

## SINGLE CHIP PC AUDIO SYSTEM

CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO+I2S

## 92HD90

### Description

The 92HD90 single-chip audio system is a low power optimized, high fidelity, 4-channel audio codec with integrated speaker amplifier, capless headphone amplifier, and low drop out voltage regulator.

Dual High Definition Audio and I2S Interfaces allow for docking audio support with a single codec.

The integrated combo jack allows for dual-function headphone and headset detection.

The integrated high-pass and band-pass filters allow for Hardware EQ and speaker protection.

The high integration of the 92HD90 enables the smallest PCB footprint with the lowest system audio BOM count and cost.

The 92HD90 provides high quality HD Audio capability to notebook and business desktop PC applications.

### Features

- **4 Channels (2 stereo DACs and 2 stereo ADCs) with 24-bit resolution**
  - Supports full-duplex stereo audio and simultaneous VoIP
  - Provides a mono output
  - 2.1 audio crossover support
- **2W/channel Class-D stereo BTL speaker amplifier @ 4 ohms and 4.75V**
  - 10 band hardware parametric equalizer
  - Hardware compressor limiter
- **Capless headphone amplifier with charge pump/LDO)**
- **I2S support (2 ports)**
- **Combo Jack Support allowing for dual-function headphone and headset detection**
- **Speaker Protection**
  - Dedicated BTL high pass filter
  - Mono bandpass filter
- **Full HDA015-B low power support**
- **Internal digital core LDO voltage regulator**
- **Microsoft WLP desktop premium logo compliant**
- **Dual SPDIF for WLP compliant support of simultaneous HDMI and SPDIF output**
- **Support for 1.5V and 3.3V HDA signaling**
- **Two digital microphone inputs (mono, stereo, or quad microphones)**
- **High performance analog mixer**
- **2 adjustable VREF Out pins for analog microphone bias**
- **4 analog ports with port presence detect (3 single ended, 1 BTL)**
- **Analog and digital PC Beep support**
- **48-pad QFN RoHS package**

# Preliminary Datasheet

## Full HDA015-B low power support

- Audio inactivity transitions codec from D0 to D3 low power mode
- Resume from D3 to D0 with audio activity in < 10 msec
- D3 to D0 transition with < -65dB pop/click
- Port presence detect in D3 with or without bit clock
- PC beep wake up in D3
- Additional vendor specific modes for even lower power

## Software Support

- Intuitive IDT HD Sound graphical user interface that allows configurability and preference settings
- 12 band fully parametric equalizer
  - Constant, system-level effects tuned to optimize a particular platform can be combined with user-mode “presets” tailored for specific acoustical environments and applications
  - System-level effects automatically disabled when external audio connections made
- Dynamics Processing
  - Enables improved voice articulation
  - Compressor/limiter allows higher average volume level without resonances or damage to speakers.
- IDT Vista APO wrapper
  - Enables multiple APOs to be used with the IDT Driver
- Microphone Beam Forming, Acoustic Echo Cancellation, and Noise Suppression
- Dynamic Stream Switching
  - Improved multi-streaming user experience with less support calls
- Broad 3<sup>rd</sup> party branded software including Creative, Dolby, DTS, and SRS

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# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP + LDO + I2S

### 1. DESCRIPTION

#### 1.1. Overview

The 92HD90 audio CODEC provides stereo 24-bit, full duplex resolution supporting sample rates up to 192kHz by the DAC and ADC. SPDIF outputs support sample rates of 192kHz, 96kHz, 88.2kHz, 48kHz, and 44.1kHz. Additional sample rates are supported by the driver software.

An integrated BTL stereo amplifier is ideal for driving 4ohm or 8ohm integrated speakers in mobile and ultra-mobile computers. For desktop computers or mobile computers using only one speaker, the BTL output stage may be configured to support a single mono speaker.

The 92HD90 audio CODEC supports a wide range of desktop and laptop configurations. The 2 independent SPDIF output interfaces provide connectivity to consumer electronic equipment or to a home entertainment system. Simultaneous HDMI and SPDIF output is possible. All inputs can be programmed with 0-30 dB gain in 10 dB steps allowing for line or microphone use of any input.

Port presence detect capabilities allow the CODEC to detect when audio devices are connected to the CODEC. The fully parametric Internal EQ can be initiated upon headphone jack insertion and removal for protection of notebook speakers.

The 92HD90 audio CODEC operates with a 3.3V digital supply and a 5V (4.75V allowed when using external voltage regulator) analog supply. It allows for 1.5V and 3.3V HDA signaling; the correct signalling level is selected dynamically based on the power supply voltage on the DVDD-IO pin.

The 92HD90 audio CODEC is offered in a 48-pin QFN Environmental (ROHS) package.

#### 1.2. Orderable Part Numbers

|                   |   |
|-------------------|---|
| 92HD90B0X5NLGXyyX | General market part number.                           |
| 92HD90B2X5NLGXyyX | OEM specific part number, contact IDT for information |
| 92HD90B4X5NLGXyyX | OEM specific part number, contact IDT for information |

yy = silicon stepping/revision, contact sales for current data.  
Add an "8" to the end for tape and reel delivery.

## 2. DETAILED DESCRIPTION

### 2.1. Port Functionality

Multi-function (Input/Output) ports allow for the highest possible flexibility and supporting a wide variety of consumer desktop and mobile system use models.

- Port A supports
  - Headphone Out
  - Line Out
  - Line Input
  - Mic with 0/10/20/30 dB Boost and Vref\_Out
- Port B supports
  - Capless Headphone Out
  - Capless Line Out
- Port C supports (not available on ZA or ZB silicon)
  - Line Out
  - Line Input
  - Mic with 0/10/20/30 dB Boost
- Port D supports
  - BTL stereo output
  - BTL (L+/L-) mono out
- Port E supports
  - Headpone Out (not available on ZA or ZB silicon)
  - Line Out (I2S)
- Port F supports
  - Line In (I2S)
  - Mic with 0/10/20/30 dB boost
- Mono Out supports
  - Line Out

| Pins 48-QFN | Port            | Input   | Output            | Headphone | BTL | Mic Bias (Vref pin) | Input boost amp   |
|-------------|-----------------|---------|-------------------|-----------|-----|---------------------|-------------------|
| 28/29       | A               | Yes     | Yes               | Yes       |     | Yes                 | Yes               |
| 31/32       | B               |         | Yes               | Yes       |     |                     |                   |
| 19/20       | C               | Yes     | Yes (no VREF out) |           |     | Yes (no VREF out)   | Yes (no VREF out) |
| 40/41/43/44 | D               |         | Yes               |           | Yes |                     |                   |
| 17          | E               |         | Yes I2S           | Yes       |     |                     |                   |
| 24          | F               | Yes I2S |                   |           |     |                     | Yes               |
| 25          | Mono Out        |         | Yes               |           |     |                     |                   |
| 48          | SPDIF_OUT0      |         | Yes               |           |     |                     |                   |
| 46          | DMIC1/SPDIFOUT1 | Yes     | Yes               |           |     |                     | Yes               |
| 4 (CLK=2)   | DMIC0           | Yes     |                   |           |     |                     | Yes               |

**Table 1. Port Functionality**

Note: Pins 15/16/18 are shared for I2S clocking. Port C is not available on ZA or ZB silicon. Headphone capability on Port E is not available on ZA or ZB silicon.

### 2.1.1. Port Characteristics

Universal (Bi-directional) jacks are supported on ports A, E, and F. Ports A and B are designed to drive 32 ohm (nominal) headphones or a 10K (nominal) load. Line Level outputs are intended to drive an external 10K load (nominal) and an on board shunt resistor of 20-47K (nominal). However, applications may support load impedances of 5K ohms and above. Input ports are 50K (nominal) at the pin.

DAC full scale outputs and intended full scale input levels are 1V rms at 5V. Line output ports and Headphone output ports on the codec may be configured for +3dBV full scale output levels by using a vendor specific verb.

Output ports are always on to prevent pops/clicks associated with charging and discharging output coupling capacitors. This maintains proper bias on output coupling caps even in power state D3 as long as AVDD is available. Unused ports should be left unconnected. When updating existing designs to use the codec, ensure that there are no conflicts between the output ports on the codec and existing circuitry.

| AFG Power State | Input Enable | Output Enable | Used as output for DAC/Mixer   | Used as output for analog PC_Beep | Used as input for ADC, mixer | Port Behavior   |
|-----------------|--------------|---------------|--|-----------------------------------|------------------------------|---|
| D0-D2           | 1            | 1             | Don't care   | Don't care                        | Yes                          | Not allowed. Port is active as input.   |
|                 |              |               |  |                                   | No                           | Not allowed. Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps. |
|                 | 1            | 0             | NA   | NA                                | Yes                          | Active - Port enabled as input  |
|                 | 1            | 0             | NA   | NA                                | No                           | Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps.              |
|                 | 0            | 1             | currently used by DAC, mixer, beep, or is traditional line or headphone output |                                   | NA                           | Active - Port enabled as output   |
|                 | 0            | 1             | not currently used by DAC, mixer, beep and is capless HP/BTL port              |                                   |                              | Inactive (Power Down)   |
|                 | 0            | 0             | NA   | NA                                | NA                           | Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps.              |
| D3              | 1            | 1             | NA   | NA                                | Don't care                   | Not allowed. Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps. |
|                 | 1            | 0             | NA   | NA                                | Don't care                   | Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps.              |
|                 | 0            | 1             | currently used by DAC, mixer, beep, or is traditional line or headphone output |                                   | Don't care                   | Low power state. If enabled, Beep will output from the port                                     |
|                 | 0            | 1             | not currently used by DAC, mixer, beep and is capless HP/BTL port              |                                   | Don't care                   | Inactive (Power Down)   |
|                 | 0            | 0             | NA   | NA                                | Don't care                   | Inactive (Power Down) - Port keeps output coupling caps charged if port uses caps.              |
| D3cold          | -            | -             |  |                                   |                              | Inactive (lower power) - Port keeps output coupling caps charged if port uses caps.             |

Table 2. Analog Output Port Behavior

# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| AFG Power State | Input Enable | Output Enable | Used as output for DAC/Mixer | Used as output for analog PC_Beep | Used as input for ADC, mixer | Port Behavior   |
|-----------------|--------------|---------------|------------------------------|-----------------------------------|------------------------------|---|
| D4              | -            | -             |                              |                                   |                              | Inactive (lower power) - Port keeps output coupling caps charged if port uses caps. |
| D5              | -            | -             |                              |                                   |                              | Off - Charge on coupling caps (if used) will not be maintained.                     |

Table 2. Analog Output Port Behavior

### 2.1.2. *Vref\_Out*

Port A supports Vref\_Out pins for biasing electret cartridge microphones. Settings of 80% AVDD, 50% AVDD, GND, and Hi-Z are supported. Attempting to program a pin widget control with a reserved or unsupported value will cause the associated Vref\_Out pin to assume a Hi-Z state and the pin widget control Vref\_En field will return a value of '000' (Hi-Z) when read.

### 2.1.3. *Jack Detect*

Plugs inserted to a jack on Ports A, B & SPDIFOUT0 are detected using SENSE\_A. Plugs inserted to a jack on Ports E, F, DMIC0, & SPDIFOUT1 are detected using SENSE\_B. Per HDA015-B, the detection circuit operates when the CODEC is in D0 - D3 and can also operate if both the CODEC and Controller are in D3 (no bus clock.) Jack detection requires that all supplies (analog and digital) are active and stable. When AVDD is not present, the value reported in the pin widget is invalid.

When the HD Audio bus is in a low power state (reset asserted and clock stopped) the CODEC will generate a Power State Change Request when a change in port connectivity is sensed and then generate an unsolicited response after the HD Audio link has been brought out of a low power state and the device has been enumerated. Per HDA015-B, this will take less than 10mS.

The following table summarizes the proper resistor tolerances for different analog supply voltages..

| AVdd Nominal Voltage (+/- 5%) | Resistor Tolerance Pull-Up | Resistor Tolerance SENSE_A/B |
|-------------------------------|----------------------------|------------------------------|
| 4.75V                         | 1%                         | 1%                           |

| Resistor | SENSE_A         | SENSE_B           |
|----------|-----------------|-------------------|
| 39.2K    | PORT A (HP0)    |                   |
| 20.0K    | PORT B (HP1)    | PORT F            |
| 10.0K    | NA              | DMIC0             |
| 5.11K    | SPDIFOUT0       | SPDIFOUT1 (DMIC1) |
| 2.49K    | Pull-up to AVDD | Pull-up to AVDD   |

**Table 3. 48pin Jack Detect**

See reference design for more information on Jack Detect implementation.

### 2.1.4. *SPDIF Output*

Both SPDIF Outputs can operate at 44.1kHz, 48kHz, 88.2kHz, 96kHz and 192kHz as defined in the Intel High Definition Audio Specification with resolutions up to 24 bits. This insures compatibility with all consumer audio gear and allows for convenient integration into home theater systems and media center PCs.

The two SPDIF output converters can not be aligned in phase with the DACs. Even when attached to the same stream, the two SPDIF output converters may be misaligned with respect to their frame boundaries.

Per the HDA015-B, the SPDIF outputs support the ability to provide clocking information even when no stream is selected for the converter, or when in a low power state. Also, the SPDIF output ports support port presence detect.

SPDIF Outputs are outlined in tables below.

| AFG Power State | RESET#             | Output Enable | Converter Dig Enable | Stream ID | Keep Alive Enable | Pin Behavior  |
|-----------------|--------------------|---------------|----------------------|-----------|-------------------|---|
| D0-D3           | Asserted (Low)     | -             | -                    | -         | -                 | Hi-Z (internal pull-down enabled) immediately after power on, otherwise the previous state is retained. |
| D0              | De-Asserted (High) | Disabled      | -                    | -         | -                 | Hi-Z (internal pull-down enabled)   |
|                 | De-Asserted (High) | Enabled       | Disabled             | -         | -                 | Active - Pin drives 0 (internal pull-down NA)   |
|                 | De-Asserted (High) | Enabled       | Enabled              | 0         | -                 | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down NA)                            |
|                 | De-Asserted (High) | Enabled       | Enabled              | 1-15      | -                 | Active - Pin drives SPDIFOut0 data (internal pull-down NA)  |
| D1-D2           | De-Asserted (High) | Disabled      | -                    | -         | -                 | Hi-Z (internal pull-down enabled)   |
|                 | De-Asserted (High) | Enabled       | -                    | -         | 0                 | Active - Pin drives 0 (internal pull-down NA)   |
| D3              | De-Asserted (High) | Enabled       | Enabled              | -         | 1                 | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down NA)                            |
|                 |                    | Disabled      | -                    | -         | 1                 | Hi-Z (internal pull-down enabled)   |
|                 |                    | Disabled      | -                    | -         | 0                 | Hi-Z (internal pull-down enabled)   |
| D3cold          | -                  | -             | -                    | -         | -                 | Hi-Z (internal pull-down enabled)   |
| D4              | -                  | -             | -                    | -         | -                 | Hi-Z (port off)   |
| D5              | -                  | -             | -                    | -         | -                 | Hi-Z (port off)   |

Table 4. SPDIF OUT 0 Behavior

| AFG Power State | RESET#             | GPIO0 Enable | Input Enable | Output Enable | Converter Dig En | Stream ID | Keep Alive En | Pin Behavior  |
|-----------------|--------------------|--------------|--------------|---------------|------------------|-----------|---------------|---|
| D0-D3           | Asserted (Low)     | -            | -            | -             | -                | -         | -             | Hi-Z (internal pull-down enabled) immediately after power on, otherwise the previous state is retained. |
| D0-D3           | De-Asserted (High) | Enabled      | -            | -             | -                | -         | -             | Active - Pin reflects GPIO0 configuration (internal pull-down enabled)                                  |
| D0-D3           | De-Asserted (High) | Disabled     | Enabled      | Disabled      | -                | -         | -             | Pin functions as digital mic input (internal pull-down enabled)   |

Table 5. SPDIF OUT 1 Behavior



| AFG Power State | RESET#             | GPIO0 Enable | Input Enable | Output Enable | Converter Dig En | Stream ID | Keep Alive En | Pin Behavior   |
|-----------------|--------------------|--------------|--------------|---------------|------------------|-----------|---------------|--|
| D0              | De-Asserted (High) | Disabled     | -            | Disabled      | -                | -         | -             | Hi-Z (internal pull-down enabled)  |
|                 |                    |              |              | Enabled       | Disabled         | -         | -             | Active - Pin drives 0 (internal pull-down NA)                                |
|                 |                    |              |              |               | Enabled          | 0         | -             | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down NA) |
|                 |                    |              |              |               |                  | 1-15      | -             | Active - Pin drives SPDIFOut1 data (internal pull-down NA)                   |
| D1-D2           | De-Asserted (High) | Disabled     | Disabled     | Disabled      | -                | -         | -             | Hi-Z (internal pull-down enabled)  |
|                 |                    |              |              | Enabled       | Disabled         | -         | -             | Active - Pin drives 0 (internal pull-down NA)                                |
|                 |                    |              |              |               | Enabled          | -         | 0             | Active - Pin drives 0 (internal pull-down NA)                                |
|                 |                    |              |              |               |                  | -         | 1             | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down NA) |
| D3              | De-Asserted (High) | Disabled     | Disabled     | Disabled      | -                | -         | -             | Hi-Z (internal pull-down enabled)  |
|                 |                    |              |              | Enabled       | Disabled         | -         | -             | Hi-Z (internal pull-down enabled)  |
|                 |                    |              |              |               | Enabled          | -         | 0             | Hi-Z (internal pull-down enabled)  |
|                 |                    |              |              |               |                  | -         | 1             | Active - Pin drives SPDIF-format, but data is zeroes (internal pull-down NA) |
| D3cold          | -                  | Disabled     | Disabled     | -             | -                | -         | -             | Hi-Z (internal pull-down enabled)  |
| D4              | -                  | -            | -            | -             | -                | -         | -             | Hi-Z (port off)  |
| D5              | -                  | -            | -            | -             | -                | -         | -             | Hi-Z (port off)  |

Table 5. SPDIF OUT 1 Behavior

## 2.2. Mono Output

The Mono Out port source selection, power state, and mute characteristics are all independently controlled by the mono output port controls. EQ does not apply to this path. An internal 2nd order band-pass filter is provided to restrict the output frequencies when using mono out to drive an external amplified sub-woofer.

The following sources are available for the Mono Out pin:

- DAC0 Output: When selected (by using the port connection list), the DAC0 left and right outputs are summed together.
- DAC1 Output: When selected (by using the port connection list), the DAC1 left and right outputs are summed together.
- Mixer Output: When selected (by using the port connection list), the mixer left and right outputs are summed together.

The stereo inputs are scaled by -6dB and then summed to provide an output that is the average of the two inputs. The full scale output at mono out is designed to be about 0dBV. It is not possible to adjust to a +3dBV output level.

## 2.3. Mono output Band-Pass Filter

For many applications, the primary speakers are incapable of reproducing low frequency audio. Therefore it is desirable to implement a woofer or sub-woofer speaker. The mono output is ideal for this task.

However, the frequency response should be restricted to prevent interference with the primary speakers. Typically an external filter, known as a cross-over filter, is used. The mono processing path includes a band-pass filter with programmable high and low cut-off frequencies to eliminate the need for an external filter.

### 2.3.1. Filter Description

The band-pass filter is derived from the common biquadratic filter and provides a 12dB/octave roll-off. The filter may be programmed for a -3dB lower band edge of: 63Hz, 80Hz, 100Hz, 120Hz, 150Hz, 200Hz, 315Hz, or 400Hz. The filter may be programmed for a -3dB upper band edge of: 150Hz, 200Hz, 250Hz, 315Hz, 400Hz, 500Hz, 630Hz, or 800Hz.

The band-pass filter is enabled by default with a cut-off frequencies at 120Hz and 250Hz. The filter may be bypassed using the associated verb (processing state verb).

The Analog PC\_Beep input is not affected by the band-pass filter.

## 2.4. Mixer

The mixer supports independent gain (-34.5 to +12dB in 1.5dB steps) on each input as well as independent mutes on each input. The following inputs are available:

- Port A
- Port C (not available on ZA or ZB silicon)
- Port F
- DAC 0
- DAC 1

## 2.5. ADC Multiplexers

The codec implements 2 ADC input multiplexers. These multiplexers incorporate the ADC record gain function (-16 to +30dB gain in 1dB steps) as an output amp and allow a preselection of one of below possible inputs:

- Port A
- Port C (not available on ZA or ZB silicon)
- Port F
- Mixer Output
- DMIC 0
- DMIC 1

## 2.6. Power Management

The HD Audio specification defines power states, power state widgets, and power state verbs. Power management is implemented at several levels. The Audio Function Group (AFG) , all con-

verter widgets, and all pin complexes support the power state verb F05/705. Converter widgets are active in D0 and inactive in D1-D3.

The following table describes what functionality is active in each power state.

| Function                  | D0 | D1 <sup>1</sup> | D2        | D3                     | D3cold                 | Vendor Specific D4     | Vendor Specific D5 |
|---------------------------|----|-----------------|-----------|------------------------|------------------------|------------------------|--------------------|
| SPDIF Outputs             | On | On              | On (idle) | On (idle) <sup>5</sup> | Off                    | Off                    | Off                |
| Digital Microphone inputs | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| DAC                       | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| D2S                       | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| ADC                       | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| ADC Volume Control        | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| Ref ADC                   | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| Analog Clocks             | On | Off             | Off       | Off                    | Off                    | Off                    | Off                |
| GPIO pins                 | On | On              | On        | On <sup>5</sup>        | On                     | On                     | Off                |
| VrefOut Pins              | On | On              | Off       | Off                    | Off                    | Off                    | Off                |
| Input Boost               | On | On              | Off       | Off                    | Off                    | Off                    | Off                |
| Analog mixer              | On | On              | Off       | Off                    | Off                    | Off                    | Off                |
| Mixer Volumes             | On | On              | Off       | Off                    | Off                    | Off                    | Off                |
| Analog PC_Beep            | On | On              | On        | On                     | Off                    | Off                    | Off                |
| Digital PC_Beep           | On | On              | On        | On <sup>5</sup>        | Off                    | Off                    | Off                |
| Lo/HP Amps                | On | On              | On        | Low Drive <sup>2</sup> | Low Drive <sup>2</sup> | Low Drive <sup>2</sup> | Off                |
| Capless HP Amps           | On | On              | On        | Low Drive <sup>2</sup> | Low Drive <sup>2</sup> | Low Drive <sup>2</sup> | Off                |
| BTL Amp                   | On | On              | On        | Low Drive <sup>2</sup> | Off                    | Off                    | Off                |
| VAG amp                   | On | On              | On        | Low Drive <sup>3</sup> | Low Drive              | Low Drive              | Off                |
| Port Sense                | On | On              | On        | On <sup>4</sup>        | Off                    | Off                    | Off                |
| Reference Bias generator  | On | On              | On        | On                     | On                     | On                     | Off                |
| Reference Bandgap core    | On | On              | On        | On                     | On                     | On                     | Off                |
| HD Audio-Link             | On | On              | On        | On <sup>5</sup>        | Limited                | Off                    | Off                |

**Table 6. Power Management**

1. No DAC or ADC streams are active. Analog mixing and loop thru are supported.
2. VAG is kept active when ports are disabled or in D3/D3cold/D4. PC\_Beep is supported in D3 but may be attenuated and distorted depending on load impedance. Hendrix and Kaveri will shut down the capless headphone amplifiers and BTL amplifier in D3 and below. In D3, the codec will turn on the BTL and Capless amplifiers if activity is detected on the PC\_BEEP input and analog PC\_Beep is enabled.
3. VAG is always ramped up and down gradually, except in the case of a sudden power removal. VAG is active in D2/D3 but in a low power state.
4. Both AVDD and DVDD must be available for Port Sense to operate.
5. Not active if BITCLK is not running (Controller in D3), but can signal power state change request (PME)

The D3-default state is available for HD Audio compliance. The programmable values, exposed via vendor-specific settings, are under IDT Device Driver control for further power reduction. The analog mixer, line and headphone amps, port presence detect, and internal references may be disabled using vendor specific verbs. Use of these vendor specific verbs will cause pops.

The default power state for the Audio Function Group after reset is D3.

## 2.7. AFG D0

The AFG D0 state is the active state for the device. All functions are active if their power state (if they support power management at their node level) has been set to D0.

## 2.8. AFG D1

D1 is a lower power mode where all converter widgets are disabled. Analog mixer and port functions are active. The part will resume from the D1 to the D0 state within 1 mS.

## 2.9. AFG D2

The D2 state further reduces power by disabling the mixer and port functions. The port amplifiers and internal references remain active to keep port coupling caps charged and the system ready for a quick resume to either the D1 or D0 state. The part will resume from the D2 state to the D0 state within 2mS.

## 2.10. AFG D3

The D3-default state is available for HD Audio compliance. All converters are shut down. Port amplifiers and references are active but in a low power state to prevent pops. Resume times may be longer than those from D2, but still less than 10mS to meet Intel low power goals. The default power state for the Audio Function Group after power is applied is D3.

While in AFG D3, the HD Audio controller may be in a D0 state (HD Audio bus active) or in a D3 state (HD Audio bus held in reset with no Bit\_Clk, SData\_Out, or Sync activity.) The expected behavior is as follows (see the HDA015-B section for more information):

| Function                          | HDA Bus active       | HDA Bus stopped                                |
|-----------------------------------|----------------------|--|
| Port Presence Detect state change | Unsolicited Response | Wake Event followed by an unsolicited response |
| GPIO state change                 | Unsolicited Response | Wake Event followed by an unsolicited response |

### 2.10.1. AFG D3cold

The D3cold power state is the lowest power state available that does not use vendor specific verbs. While in D3cold, the CODEC will still respond to bus requests to revert to a higher power state (double AFG reset, link reset). However, audio processing, port presence detect, and other functions are disabled. Per the HD Audio bus HDA015-B, the D3cold state is intended to be used just prior to removing power to the CODEC. Typically, power will be removed within 200mS. However, the codec may exit from the D3cold state by generating 2, back-to-back, AFG reset events. Resume time from D3cold is less than 200mS.

## 2.11. Vendor Specific Function Group Power States D4/D5

The codec introduces vendor specific power states. A vendor defined verb is added to the Audio Function Group that combines multiple vendor specific power control bits into logical power states for use by the audio driver. The 2 states defined offer lower power than the 5 existing states defined in the HD Audio specification and HDA015-B. The Vendor Specific D4 state provides lower digital power consumption relative to D3cold by disabling HD Audio link responses. Vendor specific D5 further reduces power consumption on the digital supply by turning off GPIO drivers, and reduces analog power consumption by turning off all analog circuitry except for reset circuits.

States D4/D5 are not entered until D3cold has been requested so are actually D3cold options rather than true, independent, power states. Software can pre-program the D4 or D5 state as a re-definition of how the part will behave when the D3cold power state is requested or software may enter D3cold, then set the D4 or D5 before performing the power state get command. The preferred method is to request D3cold, then select D4 or D5 as desired. This will reduce the severity of pops encountered when entering D4 or D5.

Both power states require a link reset or removal of DVDD to exit.

The CODEC may pop when using these verbs and transition times to an active state (D1 or D0 for example) may take several seconds.

### 2.12. Low-voltage HDA Signaling

The codec is compatible with either 1.5V or 3.3V HDA bus signaling; in the 48-QFN package the voltage selection is done dynamically based on the input voltage of DVDD\_IO.

DVDD\_IO is currently not a logic configuration pin, but rather provides the digital power supply to be used for the HDA bus signals.

When in 1.5V mode, the codec can correctly decode BITCLK, SYNC, RESET# and SDO as they operate at 1.5V; additionally it will drive SDI and SDO at 1.5V. None of the GPIOs are affected, as they always function at their nominal voltage (DVDD or AVDD).

### 2.13. Multi-channel capture

The capability to assign multiple ADC Converters to the same stream is supported to meet the microphone array requirements of Vista and future operating systems. Single converter streams are still supported this is done by assigning unique non zero Stream IDs to each converter. All capture devices (ADCs 0 and 1) may be used to create a multi-channel input stream. There are no restrictions regarding digital microphones.

The ADC Converters can be associated with a single stream as long the sample rate and the bits per sample are the same. The assignment of converter to channel is done using the “CnvtrID” widget and is restricted to even values. The ADC converters will always put out a stereo sample and therefore require 2 channels per converter.

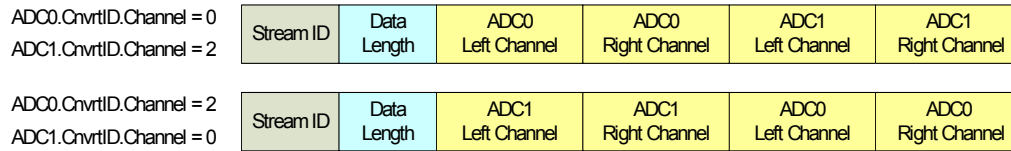
The stream will not be generated unless all entries for the targeted converters are set identically, and the total number of assigned converter channels matches the value in the NmbrChan field. These are listed the “Multi-Converter Stream Critical Entries.” table.

An example of a 4 Channel Steam with ADC0 supplying channels 0&1 and ADC1 supplying channels 2 & 3 is shown below. A 4 Channel stream can be created by assigning the same non-zero stream id “Strm= N” to both ADC0 and ADC1. The sample rates must be set the same and the number of channels must be set to 4 channels “NmbrChan = 0011”.

|              |              |        |
|--------------|--------------|--------|
| ADC1 CnvtrID | (NID = 0x08) |        |
|              | [3:0]        | Ch = 2 |
| ADC0 CnvtrID | (NID = 0x07) |        |
|              | [3:0]        | Ch=0   |

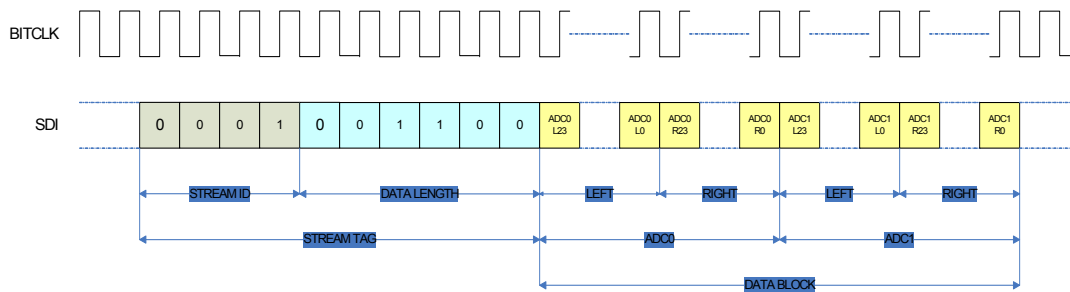
Table 7. Example channel mapping

Figure 1. Multi-channel capture



The following figure describes the bus waveform for a 24-bit, 48KHz capture stream with ID set to 1.

Figure 2. Multi-channel timing diagram



| ADC[1:0] Cnvr | Bit Number | Sub Field Name | Description  |
|---------------|------------|----------------|--|
|               | [15]       | StrmType       | Stream Type (TYPE):<br>0: PCM<br>1: Non-PCM (not supported)  |
|               | [14]       | FrmtSmpIRate   | Sample Base Rate<br>0= 48kHz<br>1=44.1kHz  |
|               | [13:11]    | SmpIRateMultp  | Sample Base Rate Multiple<br>000=48kHz/44.1kHz or less<br>001= x2<br>010= x3 (not supported)<br>011= x4 192kHz only, 176.4 not supported<br>100-111= Reserved  |
|               | [10:8]     | SmpIRateDiv    | Sample Base Rate Divisor<br>000= Divide by 1<br>001= Divide by 2 (not supported)<br>010= Divide by 3 (not supported)<br>011= Divide by 4 (not supported)<br>100= Divide by 5 (not supported)<br>101= Divide by 6 (not supported)<br>110= Divide by 7 (not supported)<br>111= Divide by 8 (not supported) |

Table 8: Mult-channel

|  |       |             |   |
|--|-------|-------------|---|
|  | [6:4] | BitsPerSmpl | Bits per Sample<br>000= 8 bits (not supported)<br>001= 16 bits<br>010= 20 bits<br>011= 24 bits<br>100-111= Reserved   |
|  | [3:0] | NmbrChan    | Number of Channels<br>Number of channels for this stream in each “sample block” of the “packets” in each “frame” on the link.<br>0000=1 channel (not supported)<br>0001 = 2 channels<br>...<br>1111= 16 channels. |
|  | [7:4] | Strm        | Software-programmable integer representing link stream ID used by the converter widget. By convention stream 0 is reserved as unused.   |
|  | [3:0] | Ch          | Integer representing lowest channel used by converter.<br>0 and 2 are valid Entries<br>If assigned to the same stream, one ADC must be assigned a value of 0 and the other ADC assigned a value of 2.             |

Table 8: Mult-channel

## 2.14. EAPD

The EAPD pin (pin 47) is a dedicated, bi-directional control pin. Although named External Amplifier Power Down (EAPD) by the HD Audio specification, this pin operates as an external amplifier power up signal. The EAPD value is reflected on the EAPD pin; a 1 causes the external amplifier to power up (equivalent to D0), and a 0 causes it to power down (equivalent to D3.) When the EAPD value = 1, the EAPD pin must be placed in a state appropriate to the current power state of the associated Pin Widget even though the EAPD value (in the register) may remain 1. The default state of this pin is 0 (driving low.) The pin defaults to an open-drain configuration (an external pull-up is recommended.)

Per the HD Audio specification and HDA015-B, multiple ports may control EAPD. The EAPD pin assumes the highest power state of all the the EAPD bits in all of the pin complexes. The default value of EAPD is 1 (powered on), but the FG power state will override and the pin will be low. A port will request External Amp Power Up when its power state is active (FG and pin widget power state is D1 or D0) or (Analog PC\_Beep is enabled and port is enabled as an output) and the port's EAPD bit is set to 1. The state of the EAPD pin (unless configured as an input or held low by an external circuit when configured as an open drain output) will be the logical OR of the external amp power up requests from all ports.

By default, the EAPD pin also functions as the Mute#/ShutDown# input for the internal BTL amplifier. In this mode, a low value at the pin (either due to internal EAPD being 0, or to an external entity forcing the pin low) will cause the internal BTL amplifier to mute or enter a low power state depending on the amplifier configuration. (See below)

Vendor specific verbs are available to configure this pin. These verbs retain their values across link and single function group resets but are set to their default values by a power on reset:

| MODE1 | MODE0 | EAPD Pin Function | Description  |
|-------|-------|-------------------|--|
| 0     | 0     | Open Drain I/O    | Value at pin is wired-AND of EAPD bit and external signal.(default)    |
| 0     | 1     | CMOS Output       | Value of EAPD bit in pin widget is forced at pin                       |
| 1     | 0     | CMOS Input        | External signal controls internal amps. EAPD bit in pin widget ignored |
| 1     | 1     | CMOS Input        | External signal controls internal amps. EAPD bit in pin widget ignored |

Table 9. EAPD Pin Mode Select

| Control Flag      | Description   |
|-------------------|---|
| EAPD PIN MODE 1:0 | Defines if EAPD pin is used as input, output, or bi-directional port (Open Drain)   |
| BTL/HP SD         | 0 = Amp controlled by EAPD pin only (default) / 1 = Amp controlled by power state (pin and FG) only   |
| BTL/HP SD MODE    | 0 = Amp will mute when disabled. (default for ZA and ZB only) / 1 = Amp will shut down (enter a low power state) when disabled (default for YA forward) |
| BTL/HP SD INV     | 0 = AMP will power down (or mute) when EAPD pin is low (default) / 1 = Amp will power down (or mute) when EAPD pin is high.                             |

Table 10. Control bit descriptions for BTL amplifier and Headphone amplifier enable configurations

| BTL SD | BTL SD MODE | BTL SD INV | EAPD Pin State | BTL Amp State   |
|--------|-------------|------------|----------------|---|
| 0      | 0           | 0          | 0              | Amplifier is mute (default <sup>1</sup> )   |
| 0      | 0           | 0          | 1              | Amplifier is active   |
| 0      | 0           | 1          | 0              | Amplifier is active   |
| 0      | 0           | 1          | 1              | Amplifier is mute   |
| 0      | 1           | 0          | 0              | Amplifier is in a low power state   |
| 0      | 1           | 0          | 1              | Amplifier is active   |
| 0      | 1           | 1          | 0              | Amplifier is active   |
| 0      | 1           | 1          | 1              | Amplifier is in a low power state   |
| 1      | 0           | NA         | NA             | Amplifier follows pin/function group power state and will mute when disabled                    |
| 1      | 1           | NA         | NA             | Amplifier follows pin/function group power state and will enter a low power state when disabled |

Table 11. BTL Amp Enable Configuration

- EAPD bit is set to one by default but the EAPD state is 0 after power-on reset because the function group is not in D0. The state after a single or double function group reset will be compliant with HDA015-B.

| HP SD | HP SD MODE | HP SD INV | EAPD Pin State | Headphone Amp State                       |
|-------|------------|-----------|----------------|---|
| 0     | 0          | 0         | 0              | Amplifier is mute (default <sup>1</sup> ) |
| 0     | 0          | 0         | 1              | Amplifier is active                       |
| 0     | 0          | 1         | 0              | Amplifier is active                       |
| 0     | 0          | 1         | 1              | Amplifier is mute                         |
| 0     | 1          | 0         | 0              | Amplifier is in a low power state         |
| 0     | 1          | 0         | 1              | Amplifier is active                       |

Table 12. Headphone Amp Enable Configuration



# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| HP SD | HP SD MODE | HP SD INV | EAPD Pin State | Headphone Amp State   |
|-------|------------|-----------|----------------|---|
| 0     | 1          | 1         | 0              | Amplifier is active   |
| 0     | 1          | 1         | 1              | Amplifier is in a low power state   |
| 1     | 0          | NA        | NA             | Amplifier follows pin/function group power state and will mute when disabled                    |
| 1     | 1          | NA        | NA             | Amplifier follows pin/function group power state and will enter a low power state when disabled |

**Table 12. Headphone Amp Enable Configuration**

- EAPD bit is set to one by default but the EAPD state is 0 after power-on reset because the function group is not in D0. The state after a single or double function group reset will be compliant with HDA015-B.

| Port E Headphone Amp Enable Configuration Bits | Normal Mode | Aux Mode                   |
|--|-------------|----------------------------|
| SD (EAPD Pin or power setting)                 | supported   | Not supported <sup>1</sup> |
| SD INV   | supported   |                            |
| SD MODE (power down or mute)                   | supported   |                            |

**Table 13. Port E Headphone Amp Enable Configuration support by part and mode**

- SD is ignored in Aux mode since the widget power state is "D3" or "D3cold".

| Analog BEEP enabled | EAPD Pin value <sup>1</sup>                             | Description  |
|---------------------|---|--|
| 0                   | Forced to low when in D2 or D3                          | Follows description in HD Audio spec. External amplifier is shut down when pin or function group power state is D2 or D3 independent of value in EAPD bit. |
| 1                   | Forced low in D2 or D3 unless port is enabled as output | Power state is ignored if port is enabled as output and port EAPD=1 to allow PC_Beep support in D2 and D3  |

**Table 14. EAPD Analog PC\_Beep behavior**

- When pin is enabled as Open Drain or CMOS output.

| AFG Power State | RESET#             | Analog PC_BEEP | Port Power State | Pin Behavior  |
|-----------------|--------------------|----------------|------------------|---|
| D0-D3           | Asserted (Low)     | -              | -                | Active low immediately after power on, otherwise the previous state is retained across FG and link reset events |
| D0              | De-Asserted (High) | -              | -                | Active - Pin reflects EAPD bit unless held low by external source.  |
| D1              | De-Asserted (High) | -              | D0-D1            | Active - Pin reflects EAPD bit unless held low by external source.  |
| D2              | De-Asserted (High) | Disabled       | D0-D2            | Pin forced low to disable external amp  |
| D2              | De-Asserted (High) | Enabled        | D0-D2            | Active - EAPD Pin high if any port EAPD bit =1 and that port also enabled as output.                            |
| D3              | De-Asserted (High) | Disabled       | D0-D3            | Pin forced low to disable external amp  |
| D3              | De-Asserted (High) | Enabled        | D0-D3            | Active - EAPD Pin high if any port EAPD bit=1 and that port also enabled as output.                             |
| D3cold          | De-Asserted (High) | -              | -                | Pin forced low to disable external amp  |
| D4              | De-Asserted (High) | -              | -                | Pin forced low to disable external amp  |
| D5              | De-Asserted (High) | -              | -                | Pin Hi-Z (off)  |

**Table 15. EAPD Behavior**

Figure 3. HP EAPD Example to be replaced by single pin for internal amp

HP AUDIO CONTROL BLOCK DIAGRAM

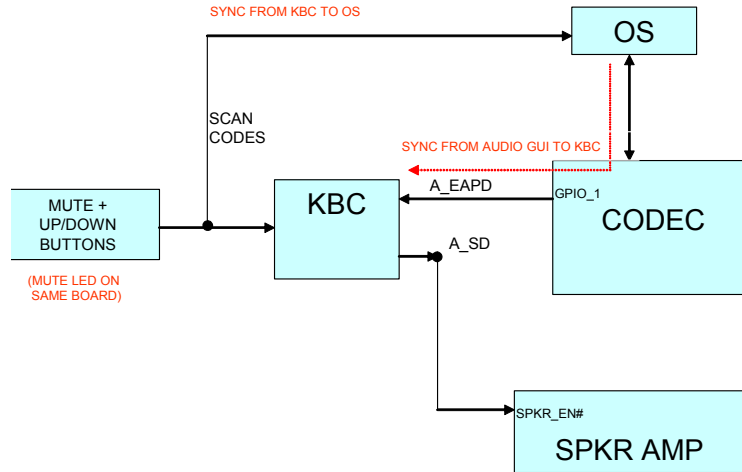
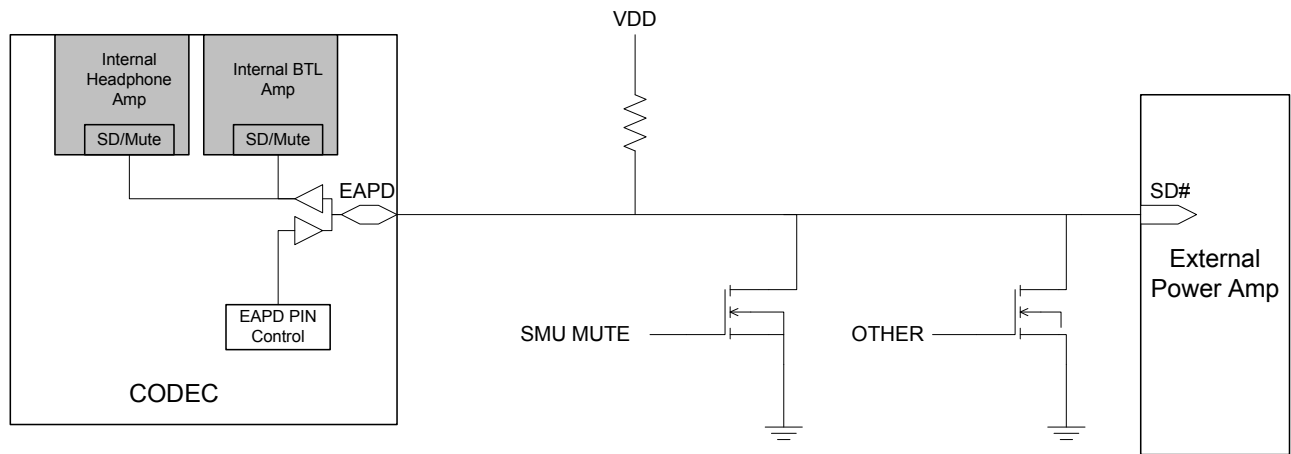


Figure 4. EAPD implementation



2.15. Digital Microphone Support

The digital microphone interface permits connection of a digital microphone(s) to the CODEC via the DMIC0, DMIC1, and DMIC\_CLK 3-pin interface. The DMIC0 and DMIC1 signals are inputs that carry individual channels of digital microphone data to the ADC. In the event that a single microphone is used, the data is ported to both ADC channels. This mode is selected using a vendor specific verb and the left time slot is copied to the ADC left and right inputs.

The DMIC\_CLK output is controllable from 4.704Mhz, 3.528Mhz, 2.352Mhz, 1.176Mhz and is synchronous to the internal master clock. The default frequency is 2.352Mhz.

The two DMIC data inputs are reported as two stereo input pin widgets that incorporate a boost amplifier. The pin widgets are shown connected to the ADCs through the same multiplexors as the

analog ports. Although the internal implementation is different between the analog ports and the digital microphones, the functionality is the same. In most cases, the default values for the DMIC clock rate and data sample phase will be appropriate and an audio driver will be able to configure and use the digital microphones exactly like an analog microphone.

To conserve power, the analog portion of the ADC will be turned off if the D-mic input is selected. When switching from the digital microphone to an analog input to the ADC, the analog portion of the ADC will be brought back to a full power state and allowed to stabilize before switching from the digital microphone to the analog input. This should take less than 10mS.

DMIC pin widgets support port presence detect directly using SENSE-B input.

The codec supports the following digital microphone configurations:

| Digital Mics | Data Sample   | ADC Conn. | Notes  |
|--------------|---|-----------|--|
| 0            | N/A   | N/A       | No Digital Microphones   |
| 1            | Single Edge   | 0, or 1   | Available on either DMIC_0 or DMIC_1<br>When using a microphone that supports multiplexed operation (2-mics can share a common data line), configure the microphone for "Left" and select mono operation using the vendor specific verb.<br>"Left" D-mic data is used for ADC left and right channels.   |
| 2            | Double Edge on either DMIC_0 or 1                                   | 0, or 1   | Available on either DMIC_0 or DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge (multiplexed output) capability.   |
| 3            | Double Edge on one DMIC pin and Single Edge on the second DMIC pin. | 0, or 1   | Requires both DMIC_0 and DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge (multiplexed output) capability. Two ADC units are required to support this configuration |
| 4            | Double Edge   | 0, or 1   | Connected to DMIC_0 and DMIC_1, External logic required to support sampling on a single Digital Mic pin channel on rising edge and second Digital Mic right channel on falling edge of DMIC_CLK for those digital microphones that don't support alternative clock edge capability. Two ADC units are required to support this configuration                       |

**Table 16. Valid Digital Mic Configurations**

| Power State | DMIC Widget Enabled? | DMIC_CLK Output | DMIC_0,1       | Notes  |
|-------------|----------------------|-----------------|----------------|--|
| D0          | Yes                  | Clock Capable   | Input Capable  | DMIC_CLK Output is Enabled when either DMIC_0 or DMIC_1 Input Widget is Enabled. Otherwise, the DMIC_CLK remains Low |
| D1-D3       | Yes                  | Clock Disabled  | Input Disabled | DMIC_CLK is HIGH-Z with Weak Pull-down   |
| D0-D3       | No                   | Clock Disabled  | Input Disabled | DMIC_CLK is HIGH-Z with Weak Pull-down   |
| D4          | -                    | Clock Disabled  | Input Disabled | DMIC_CLK is HIGH-Z with Weak Pull-down   |
| D5          | -                    | Clock Disabled  | Input Disabled | DMIC_CLK is HIGH-Z with Weak Pull-down   |

**Table 17. DMIC\_CLK and DMIC\_0,1 Operation During Power States**

Figure 5. Single Digital Microphone (data is ported to both left and right channels)

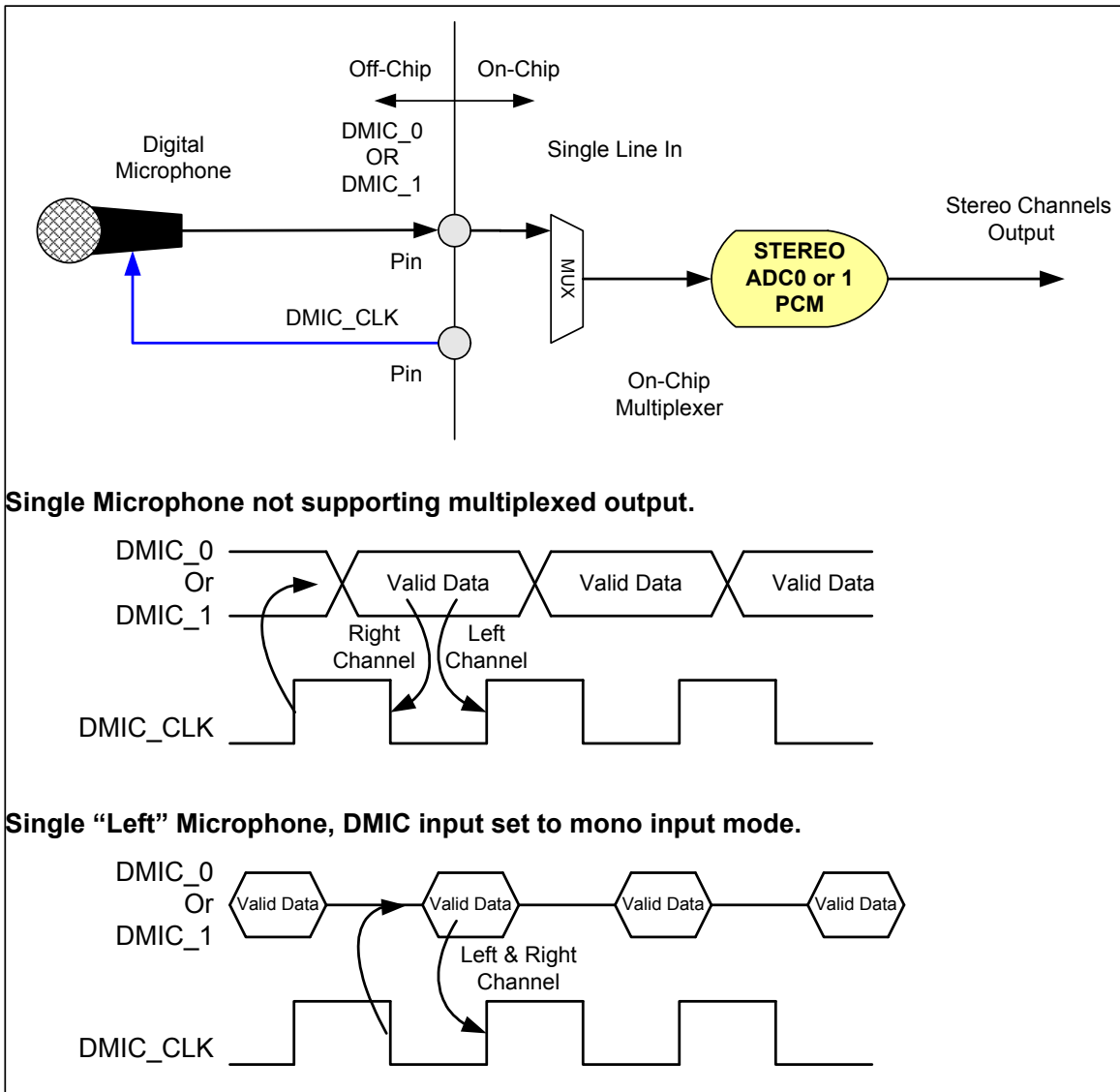
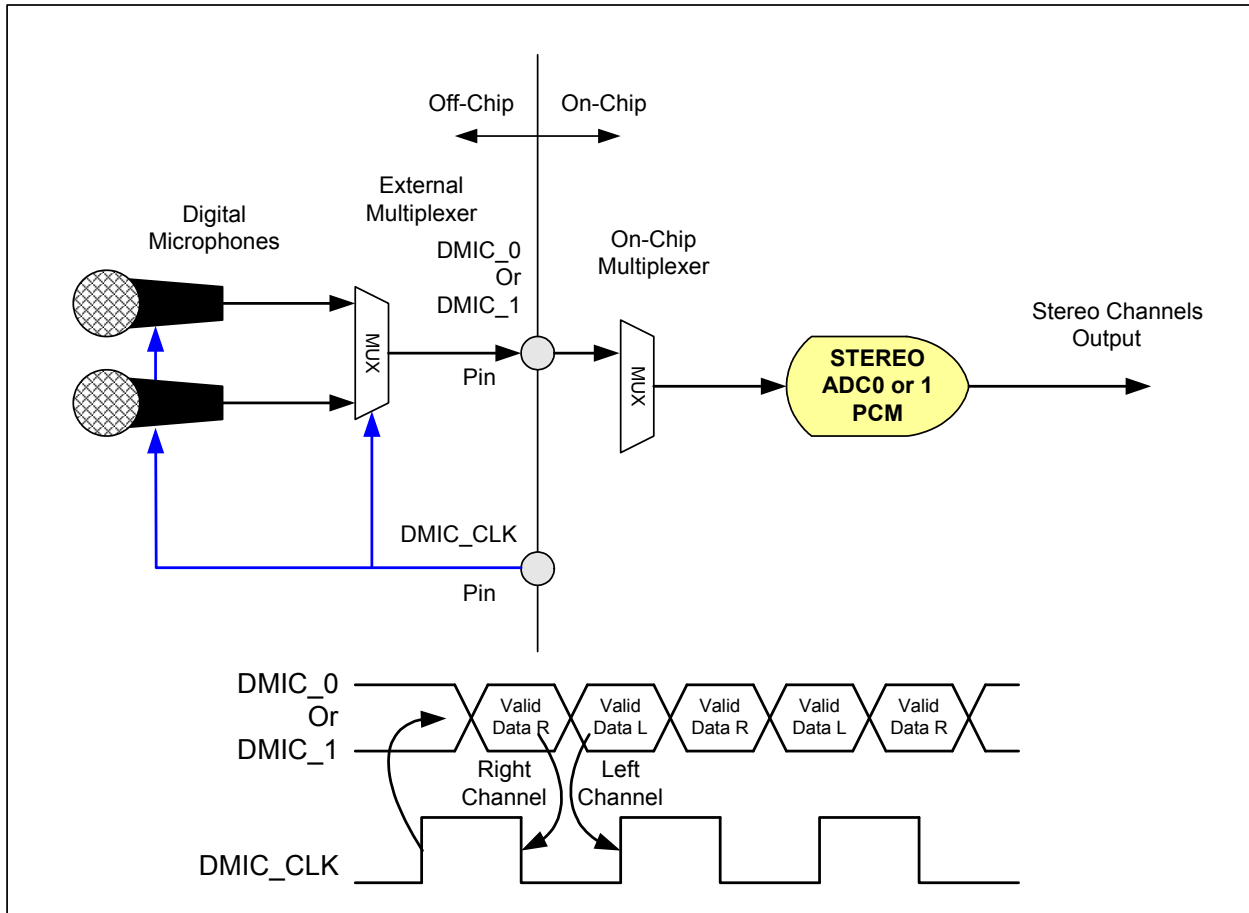
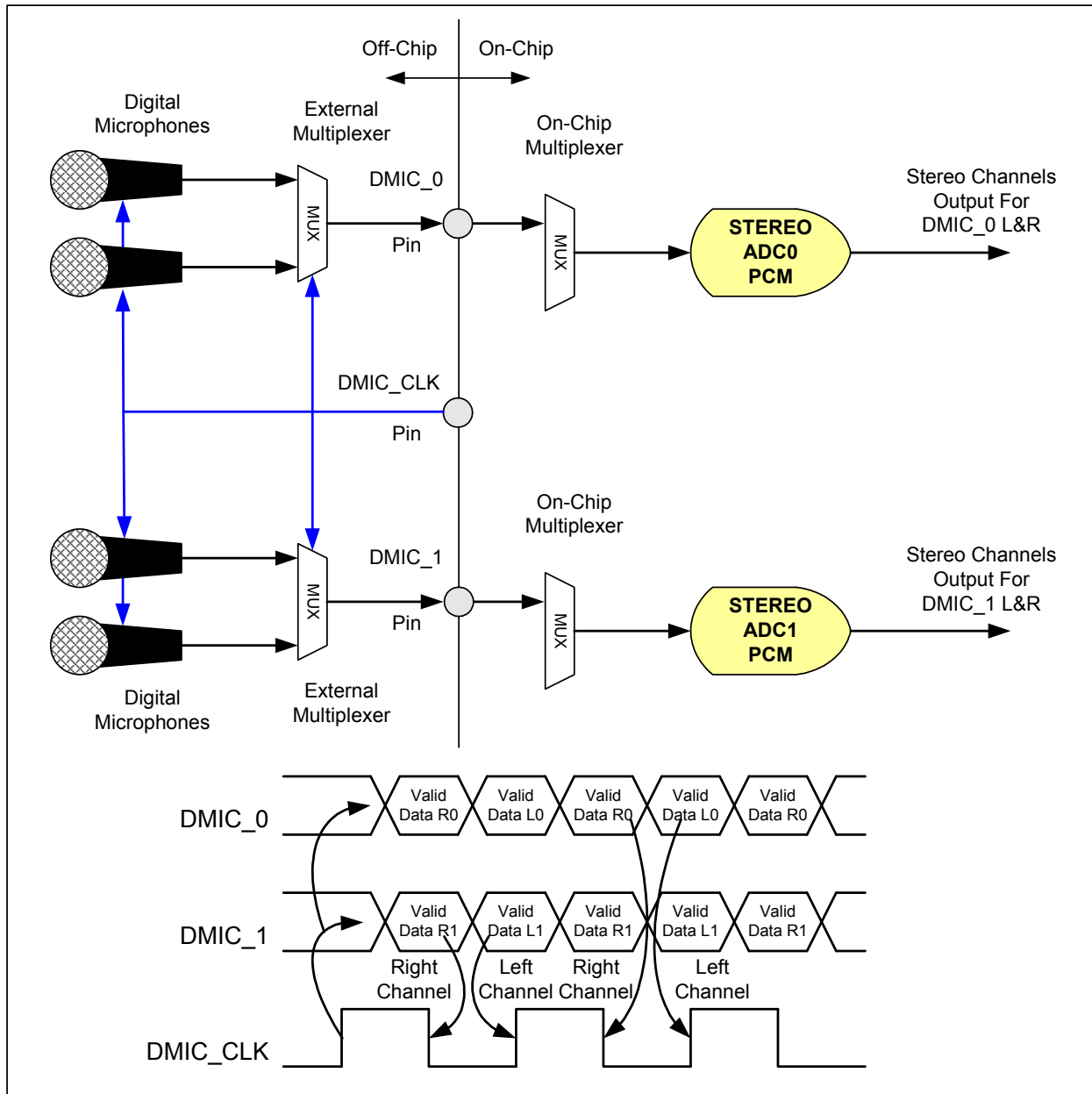


Figure 6. Stereo Digital Microphone Configuration



*Note: Some Digital Microphone Implementations support data on either edge, therefore, the external mux may not be required.*

Figure 7. Quad Digital Microphone Configuration



Note: Some Digital Microphone Implementations support data on either edge, in this case the external multiplexer is not required.

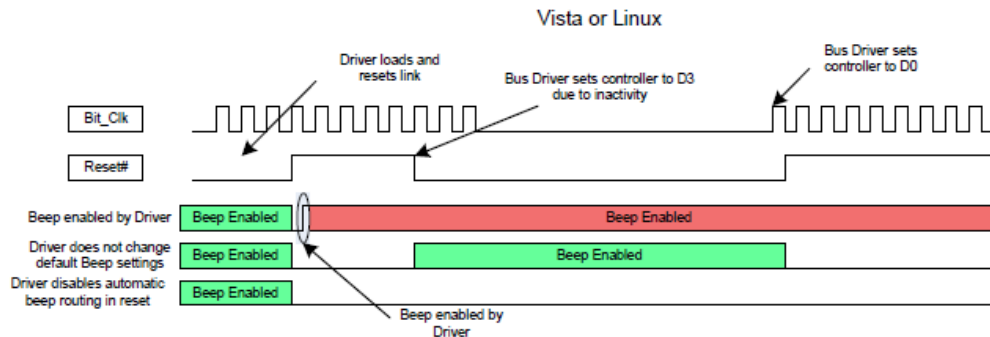
### 2.16. Analog PC-BEEP

The codec supports automatic routing of the PC\_BEEP pin to Port A, Port B, and Port D outputs when the HD-Link is in reset.

When the link is active (not held in reset) Analog PC-BEEP may be enabled manually. Analog PC\_BEEP is mixed at the port and only ports enabled as outputs will pass PC\_BEEP.

Beep activity monitoring is provided when the analog beep path is enabled and the CODEC or amplifier is in a low power state (D3).

The Analog PC Beep input is sampled for 500us every 1ms. If the beep input is high or low (>200mVpp) for at least 37% of that time, it is considered active. If it is active for less than 7.5% of that time, it is possibly inactive. If no activity is detected for 64ms (128ms, 256ms and 512ms also selectable for the idle threshold), then beep is considered inactive.



**Figure 8. Analog PC Beep Active**

**Phase 1:** analog beep auto-routing phase in the period after application of DVDD, before the first rising edge of link reset.

Once Analog PCbeep is detected(BEEP\_PRESENCE=1) after 64ms delays (after POR (power on reset)), the Amplifier will be turned on(port\_pwd=0, port\_output\_en=1, there is a timing between these two signals) and analog\_beep\_en=1. If BEEP\_PRESENCE=0 for longer than the threshold time, the amplifiers will be turned off to save power and prevent unwanted system noise from being heard.

**Phase 2:** When not in phase 1

A. If analog beep function is disabled by driver.

Analog beep auto-detect will also be disabled.

B. If analog beep function is enabled by driver.

Once analog PCbeep is detected(BEEP\_PRESENCE=1), analog pc\_beep will be enabled

If in D0-D2, enabled simply means muting or un-muting beep to avoid hearing system noise on the beep input pin but it is acceptable to turn off port amplifiers if not currently used by DACs, mixer, or beep to save power.

If in D3, enabled means that the necessary amplifiers are turned on so that the beep signal may be heard on all ports configured as outputs (see analog pc-beep description section above)

All needed amplifiers are enabled until BEEP\_PRESENCE=0 for longer than the idle threshold

A flow chart of Analog PC Beep is below.

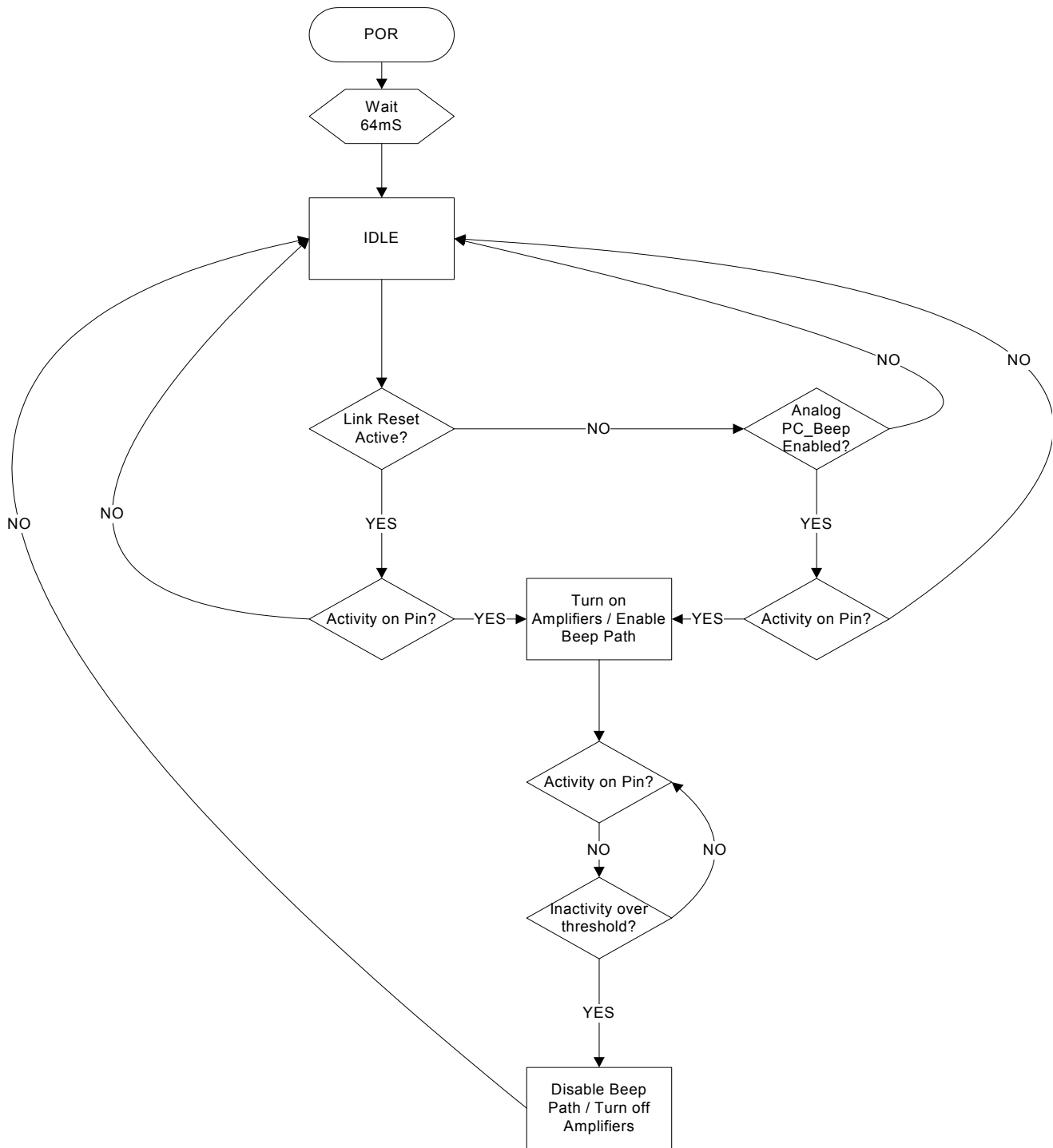


Figure 9. Analog PC Beep Flow chart

### 2.17. Digital PC-Beep

This block uses an 8-bit divider value to generate the PC beep from the 48kHz HD Audio Sync pulse. The digital PC\_Beep block generates the beep tone on all Pin Complexes that are currently configured as outputs. The HD Audio spec states that the beep tone frequency = (48kHz HD Audio



SYNC rate) / (4\*Divider), producing tones from 47 Hz to 12 kHz (logarithmic scale). Other audio sources are disabled when digital PC\_Beep is active.

It should be noted that digital PC Beep is disabled if the divider = 00h.

PC-Beep may be attenuated and distorted when the CODEC is in D3 depending on the load impedance seen by the output amplifier since all ports are in a low power state while in D3. Load impedances of 10K or larger can support full scale outputs but lower impedance loads will distort unless the output amplitude is reduced. Digital PC\_Beep requires a clock to operate and the CODEC will prevent the system from stopping the bus clock while in D3 by setting the Clock\_Stop\_OK bit to 0 to indicate that the part requires a clock.

## 2.18. Headphone Drivers

The codec implements both traditional and cap-less headphone outputs. The Microsoft Windows Logo Program allows up to the equivalent of 100ohms in series. However, an output level of +3dBV at the pin is required to support 300mV at the jack with a 32ohm load and 1V with a 320 ohm load. Microsoft allows device and system manufactures to limit output voltages to address EU safety requirements. (WLP 3.09 - please refer to the latest Windows Logo Program requirements from Microsoft.) The codec does not support power limiting.

Headphone performance will degrade if more than one port is driving a 32 ohm load.

## 2.19. BTL Amplifier

An integrated class-D stereo BTL amplifier is provided to directly drive 4 ohm speakers (2W @ 4.75V) or 8 ohm speakers (1W @ 4.75V). No external filter is needed for cable runs of 18" or less. An internal DC blocking filter prevents distortion when the audio source has DC content, and prevents unintentional power consumption when pausing audio playback. The amplifier may be controlled using the EAPD pin (see EAPD section.)

Using a vendor specific verb, the BTL amplifier may be configured to support a mono speaker connected to the L +/- pins. In this mode, the Left and Right audio is mixed and sent to the left output only. The right channel is turned off to conserve power.

Maximum gain for the BTL amplifier is programmable. The following 4 gain settings relative to a nominal line output are desired: +6.5dB, +9.5dB, +14.5dB, +16.5dB. Absolute gain may vary and the suggested accuracy is +/-1.5dB.

This gain is exposed in a vendor specific widget and is intended to mimic the pin programmable gain implemented in discrete BTL amplifiers commonly used in notebook computers.

The BTL amplifier includes thermal management circuitry. When the CODEC reaches a temperature of about 140 degrees, the output amplitude of the BTL amp is gradually lowered until the temperature falls below 140. All other functions will remain active if the BTL amplifier is shut down due to die temperature.

## 2.20. BTL Amplifier High-Pass Filter

For mobile applications, speakers are often incapable of reproducing low frequency audio and unable to handle the maximum output power of the BTL amplifier. A high-pass filter is implemented in the BTL output path to reduce the amount of low frequency energy reaching speakers attached to the BTL amplifier. This can prevent speaker failure.

### 2.20.1. Filter Description

The high-pass filter is derived from the common biquadratic filter and provides a 12dB/octave roll-off. The filter may be programmed for a -3dB response at: 100Hz, 200Hz, 300Hz, 400Hz, 500Hz, 750Hz, 1KHz, or 2KHz. The high pass filter is enabled by default with a cut-off frequency of 300Hz. The filter may be bypassed using the associated verb (processing state verb).

The analog PC\_Beep input is not affected by the digital high-pass filter. To ensure that the speakers attached to the BTL amplifier are not harmed by low frequency audio entering the PC\_Beep input, an external filter must be implemented. Fortunately, it is common practice to implement an attenuation circuit and DC blocking capacitor at the PC\_Beep input. This attenuator/filter is easily adjusted to restrict low frequency audio. The easiest approach is to reduce the value of the DC blocking capacitor but other approaches are equally effective.

### 2.21. EQ

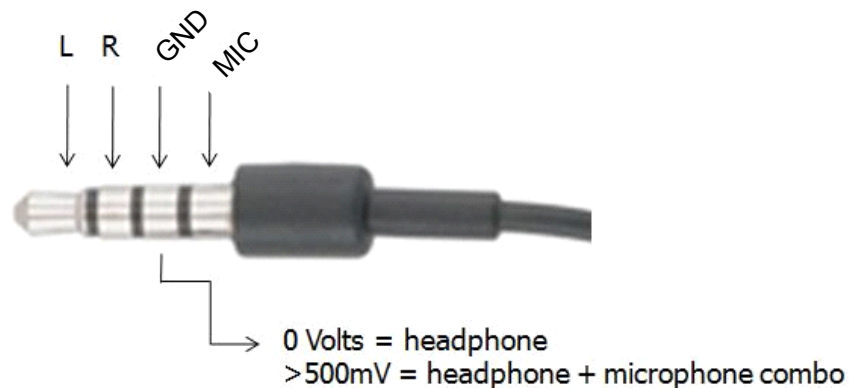
There are 5 bands of parametric EQ (bi-quad) per channel. Due to the flexibility of the bi-quad implementation, each filter band may be configured as a high-pass, low-pass, band-pass, high shelving, low shelving, or other function.

Each band has an independent set of coefficients. A bi-quad filter has 6 coefficients. One coefficient is normalized to 1 and 5 are programmed into the core. Each band supports up to +15dB boost or up to -36dB cut.

### 2.22. Combo Jack Detection

4 conductor (combo) jacks are becoming popular. In the most common implementation the 4 conductor plug has the same mechanical dimensions as a 3 conductor 3.5mm plug but the sleeve portion has been split into two segments: S1 and S2. When a 4-conductor plug (headset) is inserted into the jack T (Tip) = Left headphone audio, R (Ring) = Right headphone audio, S1 (First half of sleeve) = microphone input, and S2 (Second half of sleeve) = return (GND). When a 3-conductor plug (headphones) is inserted into the jack; T=Left audio, R=Right audio, S1=GND, S2=GND. By monitoring the S1 connection to see if it is shorted to ground, we can distinguish between headsets and headphones. Please note that analog microphone plugs (3-conductor-Lmic/Rmic/GND) and optical SPDIF plugs can not be supported using this implementation.

Figure 10. Combo Jack



Plug insertion is reported on the headphone port using the switch integrated into the jack.

The internal circuit monitors the voltage at the jack to determine if a low impedance load is present.

Detection of a microphone is not reported unless plug insertion is also detected.

## 2.23. GPIO

### 2.23.1. GPIO Pin mapping and shared functions

| GPIO # | Pin | Supply | SPDIF In | SPDIF Out | GPIO | GPI | GPO | VrefOut | DMIC | VOL | Pull Up | Pull Down |
|--------|-----|--------|----------|-----------|------|-----|-----|---------|------|-----|---------|-----------|
| 0      | 46  | DVDD   |          | YES       | YES  |     |     |         | IN   |     |         | 50K       |
| 1      | 2   | DVDD   |          |           | YES  |     |     |         | CLK  |     |         | 50K       |
| 2      | 4   | DVDD   |          |           | YES  |     |     |         | IN   |     |         | 50K       |
| 3      | 48  | DVDD   |          | YES       | YES  |     |     |         |      |     |         | 50K       |
| 4      | 24  | AVDD   |          |           | YES  |     |     | YES     |      |     |         | 50K       |

### 2.23.2. SPDIF/Digital Microphone/GPIO Selection

3 functions are available on the DMIC\_1/GPIO0/SPDIFOUT1 pin (pin 46). To determine which function is enabled, the order of precedence is followed:

1. If the GPIOs are enabled, they override both SPDIF\_OUT and Digital Mics
2. If the GPIOs are not enabled through the AFG, then at reset, the pin is pulled low by an internal pull-down resistor.
3. If the port is enabled as an input, the digital microphones will be used.
4. If the port is enabled as an output, the SPDIF output will be used.
5. In the event that the port is enabled as an input and an output, the port will be an output and the Digital Mic path will be mute.

### 2.23.3. Digital Microphone/GPIO Selection

2 functions are available on the DMIC\_CLK/GPIO1 (pin 2) and the DMIC\_0/GPIO2 (pin 4) pins. To determine which function is enabled, the order of precedence is followed:

1. If GPIOs are not enabled through the AFG, then at reset, pins 2 and 4 are pulled low by an internal pull-down resistor.
2. If the GPIO 1 is enabled, the 2 DMIC pins become mute (unless programmed for GPIO or SPDIF use) and pin 2 becomes GPIO with an internal pull-down.
3. If GPIO2 is enabled through the AFG, pin 4 becomes a GPIO and is pulled low by an internal pull-down resistor.
4. If the port is enabled as an input, the digital microphones will be used.
5. If the port is not enabled as an input or if the pin is configured as a GPIO, the digital microphone path will be mute.

## 2.24. HD Audio HDA015-B support

The codec provides complete support for the HDA015-B specification (now DCN) building on the support already present in previous products. HDA015-B features supported are:

1. Persistence of many configuration options through bus and function group reset.
2. The ability to support port presence detect in D3 even when the HD Audio bus is in a low power state (no clock.)

3. Fast resume times from low power states: 1ms D1 to D0, 2ms D2 to D0, 10mS D3 to D0.
4. Notification if persistent register settings have been unexpectedly reset.
5. SPDIF active in D3 (required)

## 2.25. Digital Core Voltage Regulator

The digital core operates from a 1.8V (10%) supply voltage. Many systems require that the CODEC use a single 3.3V digital supply, so an integrated regulator is included on die. The regulator uses pin 9, DVDD, as its voltage source. The output of the LDO is connected to pin 1 and the digital core. A 10uF capacitor must be placed on pin 1 for proper load regulation and regulator stability.

The digital core voltage regulator is only dependent on DVDD. DVDDIO may be either 3.3 or 1.5V and may precede or follow DVDD in sequence. The CODEC digital logic and I/O (unless referenced to AVDD) will operate in the absence of AVDD. DVDD and AVDD supply sequencing for the application of power and the removal of power is neither defined nor guaranteed. It is common for desktop systems to supply AVDD from the system standby supply and the CODEC will tolerate, indefinitely, the condition where AVDD is active but DVDD and DVDDIO are inactive.

## 2.26. Digital Audio Port (I2S)

Digital Input and Output capability is provided on Port F and Port E..

### 2.26.1. Characteristics

I2S output is represented as an output port with a headphone output amplifier. I2S input is represented as an input port. To ensure compatibility with the Microsoft class driver, the port is described as an analog port and provides the same connectivity as a traditional analog port.

The I2S ports share common clocks. Therefore only one set of configuration controls are required. 2 stereo analog ports are replaced by the Data Input(I2S\_DIN), Data output(I2S\_DOUT), data clock(I2S\_SCLK), and frame clock (I2S\_LRCLK) signals.

Due to the requirement that input and output converters provide independent sample rates, sample rate conversion support is provided.

Multiple data formats are supported: Left justified, I2S native (Left justified with 1 clock delay), and Right justified modes. Data lengths of 16, 20 and 24 bits are supported. When there is a mismatch between the I2S configuration and the HD Audio link programming (converter widget word length) the word lengths will be aligned using zero padding or truncation as appropriate.

The CODEC may be the clock master or a slave to an external master for the shift clock (SCLK) and frame clock (LRCLK) signals.

Data shift clock is programmable with a default providing 64 Fs for 44.1KHz based rates and 84Fs for 48KHz based rates. A 64Fs shift clock is also available for 48KHz rates but the jitter performance will be much worse than 84Fs. By default, the shift clock will automatically adjust for sample rate. However, the shift clock may also be programmed to provide a constant output independent of the selected sample rate.

| SCLK[3:0] | Frequency (MHz) | PLL clock divisor | suggested sample rate <sup>1</sup> | clocks/frame | Notes   |
|-----------|-----------------|-------------------|------------------------------------|--------------|---|
| 0000      | Auto            | Auto              | All                                | 64           | SCLK is always 64Fs (48KHz based rates have jitter)                                       |
| 0001      | 12.288          | 147/16            | 192KHz                             | 64           | High jitter (<5nS)  |
| 0010      | 6.144           | 147/8             | 96KHz                              | 64           | High jitter (<5nS)  |
| 0011      | 3.072           | 147/4             | 48KHz                              | 64           | High jitter (<5nS)  |
| 0100      | 11.2896         | 10                | 88.2KHz                            | 128          |   |
| 0101      | 5.6448          | 20                | 88.2KHz                            | 64           |   |
| 0110      | 2.8224          | 40                | 44.1KHz                            | 64           |   |
| 0111      |                 |                   |                                    |              | reserved  |
| 1000      | Auto            | Auto              | All                                | 64/84        | SCLK adjusts for sample rate. 44.1KHz based rates are 64Fs and 48KHz based rates are 84Fs |
| 1001      | 16.128          | 7                 | 192KHz                             | 84           |   |
| 1010      | 8.064           | 14                | 96KHz                              | 84           |   |
| 1011      | 4.032           | 28                | 48KHz                              | 84           |   |

Table 18. SCLK Frequency Selection

| SCLK[3:0] | Frequency (MHz) | PLL clock divisor | suggested sample rate <sup>1</sup> | clocks/frame | Notes    |
|-----------|-----------------|-------------------|------------------------------------|--------------|----------|
| 1100      | 7.056           | 16                | 88.2KHz                            | 80           |          |
| 1101      | 3.528           | 32                | 44.1KHz                            | 80           |          |
| 1110      | 1.764           | 64                | 44.1KHz                            | 40           |          |
| 1111      |                 |                   |                                    |              | reserved |

Table 18. SCLK Frequency Selection

1. In 'Auto' mode SCLK is referenced to the sample rate (SR[2:0] register bits) but in all other settings the SCLK rate is independent of the selected sample rate. Programming a sample rate that uses a different base rate from the suggested sample rate may cause corruption of the audio stream.

It is possible to invert all clocks (shift and LR clocks)

Ports are enabled/disabled using the input / output enables defined in the pin widgets.

Aux Audio Mode will be supported and the CODEC will use the MCLK pin as an input in this mode. A 12MHz input will be accepted. (See the Aux Audio section for more information.)

In normal operation, the MCLK pin is an output by default but may be configured as an input. 8 clock frequencies are available: 22.5792MHz (512x 44.1K), 11.2896MHz (256x 44.1KHz), 5.6448MHz (128x 44.1KHz), 28.224MHz (640x 44.1KHz), 14.112MHz (320x 44.1KHz), 7.056MHz (160x 44.1KHz), 24MHz (500x 48KHz), and 12MHz (250x 48KHz - default)

| MCLK[2:0] | Frequency (MHz) | PLL clock divisor | suggested sample rate | Notes             |
|-----------|-----------------|-------------------|-----------------------|-------------------|
| 000       | 24              | NA                | 96KHz                 | HD Audio BitClk   |
| 001       | 12              | NA                | 48KHz                 | HD Audio BitClk/2 |
| 010       | 22.5792         | 5                 | 88.2KHz               |                   |
| 011       | 11.2896         | 10                | 44.1KHz               |                   |
| 100       | 5.6448          | 20                | 44.1KHz               |                   |
| 101       | 28.224          | 4                 | 88.2/96KHz            |                   |
| 110       | 14.112          | 8                 | 88.2/48KHz            |                   |
| 111       | 7.056           | 16                | 44.1KHz               |                   |

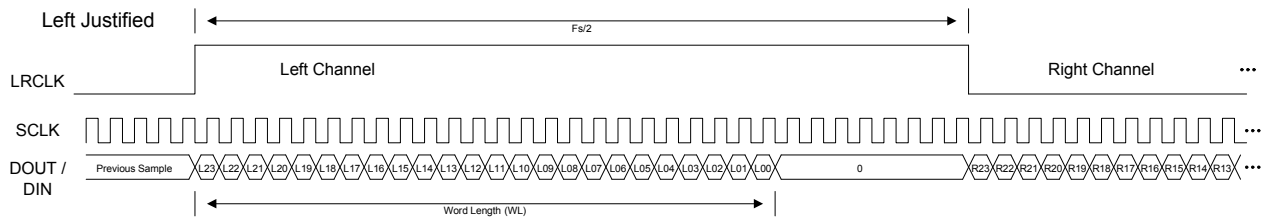
Table 19. MCLK Frequency Selection

A "bit exact mode" is provided. In this mode, the output path will not alter the data from the DAC converter widget (HD Audio stream data) sent to the I2S output port (Port E.) This means that there is no sample rate conversion, rounding, filtering or other processing that will change the sample value. Word length and sample rate are determined by the converter widget connected to the output port and not by the I2S rate and word length configuration bits. The input port (if used) will have its rate and word length converted to the requested rate of the ADC converter widget attached to the input port. The input path may be bit exact if the DAC and ADC converter widgets are programmed to the same rates and word lengths.

### 2.26.2. Left Justified Audio Interface

In Left Justified mode, the MSB is available on the first rising edge of SCLK following a LRCLK transition. The other bits are then transmitted in order. The LRCLK signal is high when left channel data is present and low when right channel data is present.

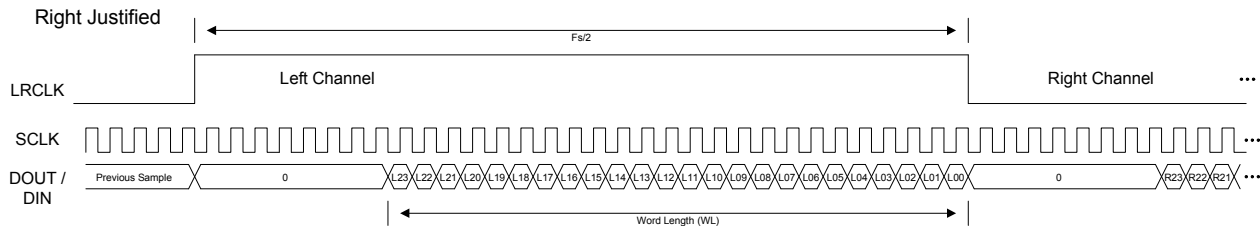
Figure 11. Left Justified Audio Interface (assuming 24-bit word length)



2.26.3. Right Justified Audio Interface (assuming n-bit word length)

In Right Justified mode, the LSB is available on the last rising edge of SCLK before a LRCLK transition. All other bits are transmitted in order. The LRCLK signal is high when left channel data is present and low when right channel data is present.

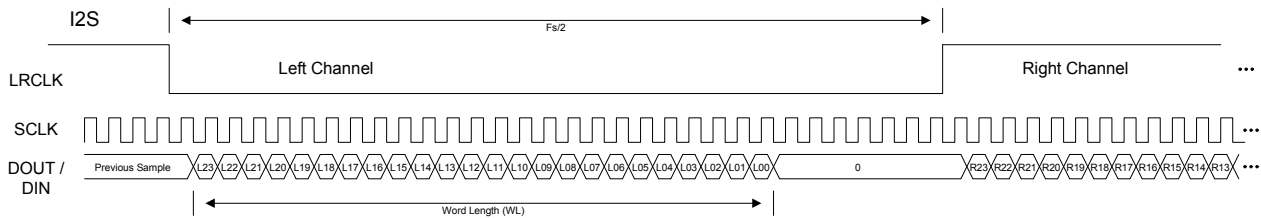
Figure 12. Right Justified Audio Interface (assuming 24-bit word length)



2.26.4. I<sup>2</sup>S Format Audio Interface

In I<sup>2</sup>S mode, the MSB is available on the second rising edge of SCLK following a LRCLK transition. The other bits up to the LSB are then transmitted in order.

Figure 13. I<sup>2</sup>S Justified Audio Interface (assuming 24-bit word length)



### 3. CHARACTERISTICS

#### 3.1. Electrical Specifications

##### 3.1.1. Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the 92HD90. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

| Item                                  | Pin  | Maximum Rating  |
|---------------------------------------|------|---|
| Analog maximum supply voltage         | AVdd | 6 Volts   |
| Digital maximum supply voltage        | DVdd | 5.5 Volts   |
| VREFOUT output current                |      | 5 mA  |
| Voltage on any pin relative to ground |      | Vss - 0.3 V to Vdd + 0.3 V  |
| Operating temperature                 |      | 0 °C to +70 °C  |
| Storage temperature                   |      | -55 °C to +125 °C   |
| Soldering temperature                 |      | Soldering temperature information for all available in the package section of this datasheet. |

Table 20. Electrical Specification: Maximum Ratings

##### 3.1.2. Recommended Operating Conditions

| Parameter                     |                            | Min.  | Typ. | Max.  | Units |
|-------------------------------|----------------------------|-------|------|-------|-------|
| Power Supplies                | DVDD_Core                  | 1.6   | 1.8  | 1.98  | V     |
|                               | DVDD_IO (3.3V signaling)   | 3.135 | 3.3  | 3.465 | V     |
|                               | DVDD_IO (1.5V signaling)   | 1.418 | 1.5  | 1.583 | V     |
| Power Supply Voltage          | Digital - 3.3 V            | 3.135 | 3.3  | 3.465 | V     |
|                               | Analog - 5 V               | 4.75  | 5    | 5.25  | V     |
| Ambient Operating Temperature |                            | 0     |      | +70   | °C    |
| Case Temperature              | T <sub>case</sub> (48-QFN) |       |      | +90   | °C    |

Table 21. Recommended Operating Conditions

**ESD:** The 92HD90 is an ESD (electrostatic discharge) sensitive device. The human body and test equipment can accumulate and discharge electrostatic charges up to 4000 Volts without detection. Even though the 92HD90 implements internal ESD protection circuitry, proper ESD precautions should be followed to avoid damaging the functionality or performance.



## 92HD90

### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

#### 3.2. 92HD90 Analog Performance Characteristics (PRELIMINARY)

( $T_{\text{ambient}} = 25\text{ }^{\circ}\text{C}$ ,  $AV_{\text{dd}} = 4.75\text{V}$  (4.5-5.25V) or  $3.3\text{V} \pm 5\%$ ,  $DV_{\text{dd}} = 3.3\text{V} \pm 5\%$  or  $1.8\text{V} \pm 10\%$ ,  $AV_{\text{ss}}=DV_{\text{ss}}=0\text{V}$ ; 20Hz to 20KHz swept sinusoidal input; Sample Frequency = 48 kHz; 0dB FS = 1Vrms for  $AV_{\text{dd}} = 4.75\text{V}$  and 0.71Vrms for  $AV_{\text{dd}} = 3.3\text{V}$ , 10K $\Omega$ //50pF load, Testbench Characterization BW: 20 Hz – 20 kHz, 0 dB settings on all gain stages)

| Parameter  | Conditions  | Min    | Typ  | Max    | Unit   |
|--|---|--------|------|--------|--------|
| <b>Digital to Analog Converters</b>                    |   |        |      |        |        |
| Resolution   |   |        | 24   |        | Bits   |
| Dynamic Range <sup>1</sup> : PCM to All Analog Outputs | -60dB FS signal level, Analog Mixer disabled  | 93     |      | -      | dB     |
| SNR <sup>2</sup> - DAC to All Line-Out Ports           | Analog Mixer Disabled, PCM data   | 95     | 98   |        | dB     |
| THD+N <sup>3</sup> - DAC to All Line-Out Ports         | Analog Mixer Disabled, -3dB FS Signal, PCM data   | 83     |      |        | dBr    |
| SNR <sup>2</sup> - DAC to All Headphone Ports          | Analog Mixer Disabled, 10K $\Omega$ load, PCM data                                      | 95     | 98   |        | dB     |
| THD+N <sup>3</sup> - DAC to All Headphone Ports        | Analog Mixer Disabled, -3dB FS Signal, 10K $\Omega$ load, PCM data                      | 83     |      |        | dBr    |
| SNR <sup>2</sup> - DAC to All Headphone Ports          | Analog Mixer Disabled, 32 $\Omega$ load, PCM data                                       | 95     | 98   |        | dB     |
| THD+N <sup>3</sup> - DAC to All Headphone Ports        | Analog Mixer Disabled, -3dB FS Signal, 32 $\Omega$ load, PCM data                       | 68     |      |        | dBr    |
| Any Analog Input (ADC) to DAC Crosstalk                | 10KHz Signal Frequency. 0dBV signal applied to ADC, DACs idle, ports enabled as output. | -65    | -    | -      | dB     |
| Any Analog Input (ADC) to DAC Crosstalk                | 1KHz Signal Frequency see above   | -65    | -    | -      | dB     |
| DAC L/R crosstalk                                      | DAC to LO or HP 20-15KHz into 10K $\Omega$ load   | 65     |      |        | dB     |
| DAC L/R crosstalk                                      | DAC to HP 20-15KHz into 32 $\Omega$ load  | 65     |      |        | dB     |
| Gain Error   | Analog Mixer Disabled   |        |      | 0.5    | dB     |
| Interchannel Gain Mismatch                             | Analog Mixer Disabled   |        |      | 0.5    | dB     |
| D/A Digital Filter Pass Band <sup>4</sup>              |   | 20     | -    | 21,000 | Hz     |
| D/A Digital Filter Pass Band Ripple <sup>5</sup>       |   |        |      | 0.125  | +/- dB |
| D/A Digital Filter Transition Band                     |   | 21,000 | -    | 31,000 | Hz     |
| D/A Digital Filter Stop Band                           |   | 31,000 | -    | -      | Hz     |
| D/A Digital Filter Stop Band Rejection <sup>6</sup>    |   | -100   | -    | -      | dB     |
| D/A Out-of-Band Rejection <sup>7</sup>                 |   | -55    | -    | -      | dB     |
| Group Delay (48KHz sample rate)                        |   | -      | -    | 1      | ms     |
| Attenuation, Gain Step Size DIGITAL                    |   | -      | 0.75 | -      | dB     |
| DAC Offset Voltage                                     |   | -      | 10   | 20     | mV     |
| Deviation from Linear Phase                            |   | -      | 1    | 10     | deg.   |
| <b>Analog Outputs</b>                                  |   |        |      |        |        |
| Full Scale All Mono/Line-Outs                          | DAC PCM Data  | 1.00   | -    | -      | Vrms   |
| Full Scale All Mono/Line-Outs                          | DAC PCM Data  | 2.83   | -    | -      | Vp-p   |

Table 22. 92HD90 Analog Performance Characteristics

# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Parameter  | Conditions   | Min        | Typ      | Max    | Unit         |
|--|--|------------|----------|--------|--------------|
| All Headphone Capable Outputs                            | 32Ω load   | 40         | 60<br>31 | -      | mW<br>(peak) |
| Amplifier output impedance                               | Mono/Line Outputs<br>Headphone Outputs   | 150<br>0.1 |          |        | Ohms         |
| External load Capacitance                                | Mono/Line Outputs<br>Headphone Outputs   |            | 220      |        | pF           |
| <b>Analog inputs</b>                                     |  |            |          |        |              |
| Full Scale Input Voltage                                 | 0dB Boost @4.75V<br>(input voltage required for 0dB FS output)                 | 1.05       | -        | -      | Vrms         |
| All Analog Inputs with boost                             | 10dB Boost   | 0.320      | -        | -      | Vrms         |
| All Analog Inputs with boost                             | 20dB Boost   | 0.105      | -        | -      | Vrms         |
| All Analog Inputs with boost                             | 30dB Boost   | 0.032      | -        | -      | Vrms         |
| Boost Gain Accuracy                                      |  | -2         |          | 2      | dB           |
| Input Impedance  |  | -          | 50       | -      | KΩ           |
| Input Capacitance  |  | -          | 15       | -      | pF           |
| <b>Analog Mixer</b>                                      |  |            |          |        |              |
| Dynamic Range: PCM to All Analog Outputs                 | -60dB FS signal level Analog Beep enabled all other mixer inputs mute          | 90         |          |        |              |
| SNR <sup>2</sup> - All Line-Inputs to all Line Outputs   | All inputs unmuted, single line input driven by ATE.                           | 85         | -        |        | dB           |
| THD+N <sup>3</sup> - All Line-Inputs to all Line Outputs | 0dB Full Scale Input on one input, all others silent.                          | 65         | -        |        | dBr          |
| SNR <sup>2</sup> - DAC to All Ports                      | Analog Mixer Enabled, PCM data, all others inputs mute.                        | 85         | -        |        | dB           |
| THD+N <sup>3</sup> - DAC to All Ports                    | Analog Mixer Enabled, 0dB FS Signal, PCM data, all others inputs unmute/silent | 72         | -        |        | dBr          |
| Attenuation, Gain Step Size ANALOG                       |  | -          | 1.5      | -      | dB           |
| <b>Analog to Digital Converter</b>                       |  |            |          |        |              |
| Resolution   |  |            | 24       |        | Bits         |
| Full Scale Input Voltage                                 | 0dB Boost<br>(input voltage required to generate 0dBFS per AES 17)             | 1.05       |          |        |              |
| Dynamic Range <sup>1</sup> , All Analog Inputs to A/D    | High Pass Filter Enabled, -60dB FS, No boost                                   | 86         | -        |        | dB           |
| Full Scale Input Voltage                                 | 20dB Boost<br>(input voltage required to generate 0dBFS per AES 17)            | 0.105      |          |        |              |
| Dynamic Range <sup>1</sup> , All Analog Inputs to A/D    | 20dB Boost<br>High Pass Filter Enabled, -60dB FS                               | 80         |          |        |              |
| THD+N <sup>3</sup> All Analog Inputs to A/D              | High Pass Filter enabled, -3dB FS signal level                                 | 78         |          |        | dB           |
| THD+N <sup>3</sup> All Analog Inputs to A/D              | 20dB Boost, High Pass Filter enabled, -3dB FS signal level                     | 72         |          |        | dB           |
| Analog Frequency Response <sup>8</sup>                   |  | 10         | -        | 30,000 | Hz           |

Table 22. 92HD90 Analog Performance Characteristics

# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Parameter   | Conditions  | Min    | Typ  | Max    | Unit   |
|---|---|--------|------|--------|--------|
| A/D Digital Filter Pass Band <sup>4</sup>           |   | 20     | -    | 21,000 | Hz     |
| A/D Digital Filter Pass Band Ripple <sup>5</sup>    |   |        |      | 0.1    | +/- dB |
| A/D Digital Filter Transition Band                  |   | 21,000 | -    | 31,000 | Hz     |
| A/D Digital Filter Stop Band                        |   | 31,000 | -    | -      | Hz     |
| A/D Digital Filter Stop Band Rejection <sup>6</sup> |   | -100   | -    | -      | dB     |
| Group Delay   | 48 KHz sample rate  | -      | -    | 1      | ms     |
| Any unselected analog Input to ADC Crosstalk        | 10KHz Signal Frequency  | -65    | -    | -      | dB     |
| Any unselected analog Input to ADC Crosstalk        | 1KHz Signal Frequency   | -65    | -    | -      | dB     |
| ADC L/R crosstalk                                   | Any selected input to ADC 20-15Khz                                | -65    |      |        | dB     |
| DAC to ADC crosstalk                                | DAC output 0dBFS. All outputs loaded. Input to ADC open. 20-15Khz | -65    |      |        | dB     |
| Spurious Tone Rejection <sup>9</sup>                |   | -      | -100 | -      | dB     |
| Attenuation, Gain Step Size (analog)                |   | -      | 1.5  | -      | dB     |
| Interchannel Gain Mismatch ADC                      |   | -      | -    | 0.5    | dB     |
| <b>Power Supply</b>                                 |   |        |      |        |        |
| Power Supply Rejection Ratio                        | 10kHz   | -      | -60  | -      | dB     |
| Power Supply Rejection Ratio                        | 1kHz  | -      | -70  | -      | dB     |
| D0 Didd <sup>10</sup>                               | 3.3V, 1.8V  |        | 25   |        | mA     |
| D0 Aidd <sup>10</sup>                               | 4.75V, 3.3V   |        | 60   |        | mA     |
| D0 Didd <sup>11</sup>                               | 3.3V, 1.8V  |        | 20   |        | mA     |
| D0 Aidd <sup>11</sup>                               | 4.75V, 3.3V   |        | 34   |        | mA     |
| D1 Didd <sup>12</sup>                               | 3.3V, 1.8V  |        | 7    |        | mA     |
| D1 Aidd <sup>12</sup>                               | 4.75V, 3.3V   |        | 30   |        | mA     |
| D2 Didd   | 3.3V, 1.8V  |        | 7    |        | mA     |
| D2 Aidd   | 4.75V, 3.3V   |        | 15   |        | mA     |
| D3 (Beep enabled) Didd <sup>13</sup>                | 3.3V, 1.8V  |        | 2    |        | mA     |
| D3 (Beep enabled) Aidd <sup>13</sup>                | 4.75V, 3.3V   |        | 7    |        | mA     |
| D3 Didd <sup>13</sup>                               | 3.3V, 1.8V  |        | 2    |        | mA     |
| D3 Aidd <sup>13</sup>                               | 4.75V, 3.3V   |        | 5    |        | mA     |
| D3cold Didd <sup>13</sup>                           | 3.3V, 1.8V  |        | 1    |        | mA     |
| D3cold Aidd <sup>13</sup>                           | 4.75V, 3.3V   |        | 5    |        | mA     |
| Vendor D4 Didd                                      | 3.3V, 1.8V  |        | 0.4  |        | mA     |
| Vendor D4 Aidd                                      | 4.75V, 3.3V   |        | 5    |        | mA     |
| Vendor D5 Didd                                      | 3.3V, 1.8V  |        | 0.4  |        | mA     |
| Vendor D5 Aidd                                      | 4.75V, 3.3V   |        | 0.6  |        | mA     |
| One Stereo ADC Didd                                 | 3.3V, 1.8V  |        | 4    |        | mA     |

Table 22. 92HD90 Analog Performance Characteristics

## 92HD90

### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Parameter                                    | Conditions  | Min | Typ         | Max | Unit  |
|--|-------------|-----|-------------|-----|-------|
| One Stereo ADC Aidd                          | 4.75V, 3.3V |     | 8           |     | mA    |
| One Stereo DAC Didd                          | 3.3V, 1.8V  |     | 4           |     | mA    |
| One Stereo DAC Aidd                          | 4.75V, 3.3V |     | 6           |     | mA    |
| <b>Voltage Reference Outputs</b>             |             |     |             |     |       |
| VREFOut <sup>14</sup>                        |             | -   | 0.5 X AVdd  | -   | V     |
| VREFOut Drive                                |             |     | 1.6         |     | mA    |
| VREFILT (VAG)                                |             |     | 0.45 X AVdd |     | V     |
| <b>Phased Locked Loop</b>                    |             |     |             |     |       |
| PLL lock time                                |             |     | 96          | 200 | usec  |
| PLL (or HD Audio Bit CLK) 24MHz clock jitter |             |     | 150         | 500 | psec  |
| <b>ESD / Latchup</b>                         |             |     |             |     |       |
| IEC1000-4-2                                  |             | 1   |             |     | Level |
| JESD22-A114-B                                |             | 2   |             |     | Class |
| JESD22-C101                                  |             | 4   |             |     | Class |

**Table 22. 92HD90 Analog Performance Characteristics**

1. Dynamic Range is the ratio of the full scale signal to the noise output with a -60dBFS signal as defined in AES17 as SNR in the presence of signal and outlined in AES6id, measured "A weighted" over 20 Hz to 20 kHz bandwidth
2. Ratio of Full Scale signal to idle channel noise output is measured "A weighted" over a 20 Hz to a 20 kHz bandwidth. (AES17-1991 Idle Channel Noise or EIAJ CP-307 Signal-to-noise Ratio).
3. THD+N ratio as defined in AES17 and outlined in AES6id, non-weighted, over 20 Hz to 20 kHz bandwidth. Results at the jack are dependent on external components and will likely be 1 - 2dB worse.
4. Peak-to-Peak Ripple over Passband meets  $\pm 0.125$ dB limits, 48 kHz or 44.1 kHz Sample Frequency. 1dB limit.
5. Peak-to-Peak Ripple over Passband meets  $\pm 0.125$ dB limits, 48 kHz or 44.1 kHz Sample Frequency. 1dB limit.
6. Stop Band rejection determines filter requirements. Out-of-Band rejection determines audible noise.
7. The integrated Out-of-Band noise generated by the DAC process, during normal PCM audio playback, over a bandwidth 28.8 to 100 kHz, with respect to a 1 Vrms DAC output.
8.  $\pm 1$ dB limits for Line Output & 0 dB gain, at -20dBV
9. Spurious tone rejection is tested with ADC dither enabled and compared to ADC performance without dither.
10. All functions/converters active, pin complexes enabled, two FDX streams, line (10Kohm) loads. Add 24mA analog current per stereo 32 ohm headphone.
11. One stereo DAC and corresponding pin widgets enabled (playback mode)
12. Mixer enabled
13. Idle measurement D3 set for minimum clicks/pops (biases and min. amps. on)
14. Can be set to 0.5 or 0.8 AVdd.

### 3.3. Class-D BTL Amplifier Performance

| Parameter   | Min | Typ   | Max | Unit    |
|---|-----|-------|-----|---------|
| Output Power (BTL 4 ohm, 5V)                      | 2   |       |     | W       |
| Amplifier Efficiency $\eta$ (4 $\Omega$ , 5V, 2W) |     | 80    |     | %       |
| THD+N (BTL 4 ohm, 5V, FS)                         |     |       | 1   | %       |
| THD+N (BTL 4 ohm, 5V, -3dBFS)                     |     |       | 0.2 | %       |
| Frequency Response                                | 20  | -     | 20K | Hz      |
| PWM frequency                                     |     | 352.8 |     | KHz     |
| Output voltage noise (4 $\Omega$ , 5V)            |     | TBD   |     | $\mu$ V |
| Idle current                                      |     | TBD   |     | mA      |
| shutdown current                                  |     | TBD   |     | mA      |

Table 23. Class-D BTL Amplifier Performance

### 3.4. Capless Headphone Supply Characteristics

| Parameter                          | Min | Typ | Max | Unit    |
|------------------------------------|-----|-----|-----|---------|
| LDO idle current                   |     | 1   | 2   | mA      |
| Capless Headphone Amp idle current |     | 2   | 3   |         |
| Charge Pump idle current           |     | 4   | 6   | mA      |
| Charge Pump shutdown time          |     | 1   |     | mS      |
| Charge Pump start-up time          |     | 10  |     | mS      |
| Frequency                          |     | 384 |     | KHz     |
| C1/C2 cap value                    |     | 2.2 |     | $\mu$ F |

Table 24. Capless Headphone Supply

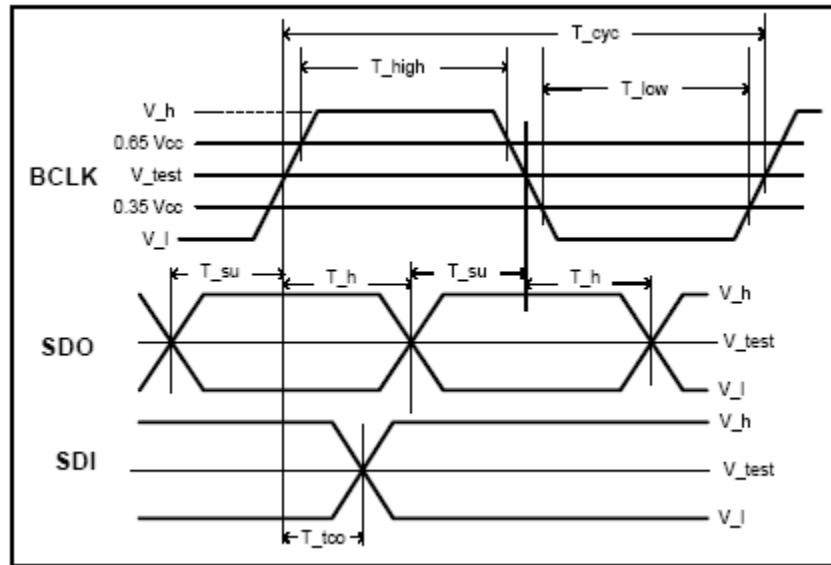
### 3.5. AC Timing Specs

#### 3.5.1. HD Audio Bus Timing

| Parameter       | Definition   | Symbol            | Min     | Typ   | Max     | Units |
|-----------------|--|-------------------|---------|-------|---------|-------|
| BCLK Frequency  | Average BCLK frequency                                 |                   | 23.9976 | 24.0  | 24.0024 | Mhz   |
| BCLK Period     | Period of BCLK including jitter                        | T <sub>cyc</sub>  | 41.163  | 41.67 | 42.171  | ns    |
| BCLK High Phase | High phase of BCLK                                     | T <sub>high</sub> | 17.5    |       | 24.16   | ns    |
| BCLK Low Phase  | Low phase of BCLK                                      | T <sub>low</sub>  | 17.5    |       | 24.16   | ns    |
| BCLK jitter     | BCLK jitter  |                   |         | 150   | 500     | ps    |
| SDI delay       | Time after rising edge of BCLK that SDI becomes valid  | T <sub>tco</sub>  | 3       |       | 11      | ns    |
| SDO setup       | Setup for SDO at both rising and falling edges of BCLK | T <sub>su</sub>   | 5       |       |         | ns    |
| SDO hold        | Hold for SDO at both rising and falling edges of BCLK  | T <sub>h</sub>    | 5       |       |         | ns    |

Table 25. HD Audio Bus Timing

Figure 14. HD Audio Bus Timing



### 3.5.2. SPDIF Timing

| Parameter               | Definition   | Symbol     | Min    | Typ    | Max    | Units |
|-------------------------|--|------------|--------|--------|--------|-------|
| SPDIF_OUT Frequency     | highest rate of encoded signal<br>64 times the sample rate |            | 2.8224 | 3.072  | 12.288 | MHz   |
| SPDIF_OUT unit interval | 1/(128 times the sample rate)                              | UI         | 177.15 | 162.76 | 40.69  | ns    |
| SPDIF_OUT jitter        | SPDIF_OUT jitter   |            |        |        | 4.43   | ns    |
| SPDIF_OUT rise time     |  | $T_{rise}$ |        |        | 15     | ns    |
| SPDIF_OUT fall time     |  | $T_{fall}$ |        |        | 15     | ns    |

Table 26. SPDIF Timing

### 3.5.3. Digital Microphone Timing

| Parameter          | Definition   | Symbol          | Min    | Typ    | Max    | Units |
|--------------------|--|-----------------|--------|--------|--------|-------|
| DMIC_CLK Frequency | Average DMIC_CLK frequency   |                 | 1.176  | 2.352  | 4.704  | MHz   |
| DMIC_CLK Period    | Period of DMIC_CLK   | $T_{dmic\_cyc}$ | 850.34 | 425.17 | 212.59 | ns    |
| DMIC_CLK jitter    | DMIC_CLK jitter  |                 |        |        | 5000   | ps    |
| DMIC Data setup    | Setup for the microphone data at<br>both rising and falling edges of<br>DMIC_CLK | $T_{dmic\_su}$  | 5      |        |        | ns    |
| DMIC Data hold     | Hold for the microphone data at<br>both rising and falling edges of<br>DMIC_CLK  | $T_{dmic\_h}$   | 5      |        |        | ns    |

Table 27. Digital Mic timing

## 3.5.4. GPIO Characteristics

| Parameter                           | Definition  | Symbol                               | Min       | Typ | Max        | Units |
|-------------------------------------|---|--------------------------------------|-----------|-----|------------|-------|
| Input High Voltage                  | input level at or above which a 1 is reliably recorded  | V <sub>ih</sub>                      | 0.6 x VDD |     |            | V     |
| Input Low Voltage                   | input level at or below which a 0 is reliably recorded<br>VDD may be DVDD or AVDD   | V <sub>il</sub>                      |           |     | 0.35 x VDD | V     |
| Output High Voltage                 | i <sub>out</sub> = 4mA<br>VDD may be DVDD or AVDD depending on pin  | V <sub>oh</sub>                      | 0.9 x VDD |     |            | V     |
| Output Low Voltage                  | i <sub>out</sub> = -4mA<br>VDD may be DVDD or AVDD depending on pin   | V <sub>ol</sub>                      |           |     | 0.1 x VDD  | V     |
| Input rise/fall time                | transition time between 10% and 90% of supply   | T <sub>rise</sub> /T <sub>fall</sub> |           |     | 10         | ns    |
| Input/Tristate High Leakage Current | V <sub>in</sub> = VDD<br>VDD may be DVDD or AVDD depending on pin (does not include pull-up or pull-down resistor if present) |                                      |           | 0.5 |            | uA    |
| Input/Tristate Low Leakage Current  | V <sub>in</sub> = 0<br>VDD may be DVDD or AVDD depending on pin (does not include pull-up or pull-down resistor if present)   |                                      |           | -50 |            | uA    |

Table 28. GPIO Characteristics

**3.5.5. I2S Interface Timing**

| Parameter          | Definition   | Symbol  | Min | Typ    | Max  | Units |
|--------------------|--|---------|-----|--------|------|-------|
| I2S_MCLK Frequency | MCLK frequency (256Fs)                               |         |     | 12.288 |      | MHz   |
| I2S_SCLK Frequency | SCLK frequency (64Fs)                                |         |     | 3.072  |      | MHz   |
| I2S_SCLK jitter    | DMIC_CLK jitter                                      |         |     |        | 4000 | ps    |
| I2S Data setup     | Setup for input and output data relative to I2S_SCLK | Ti2s_su | 5   |        |      | ns    |
| I2S Data hold      | Hold for input and output data relative to I2S_SCLK  | Ti2s_h  | 5   |        |      | ns    |

**Table 29. I2S Interface Timing**



4. FUNCTIONAL BLOCK DIAGRAM

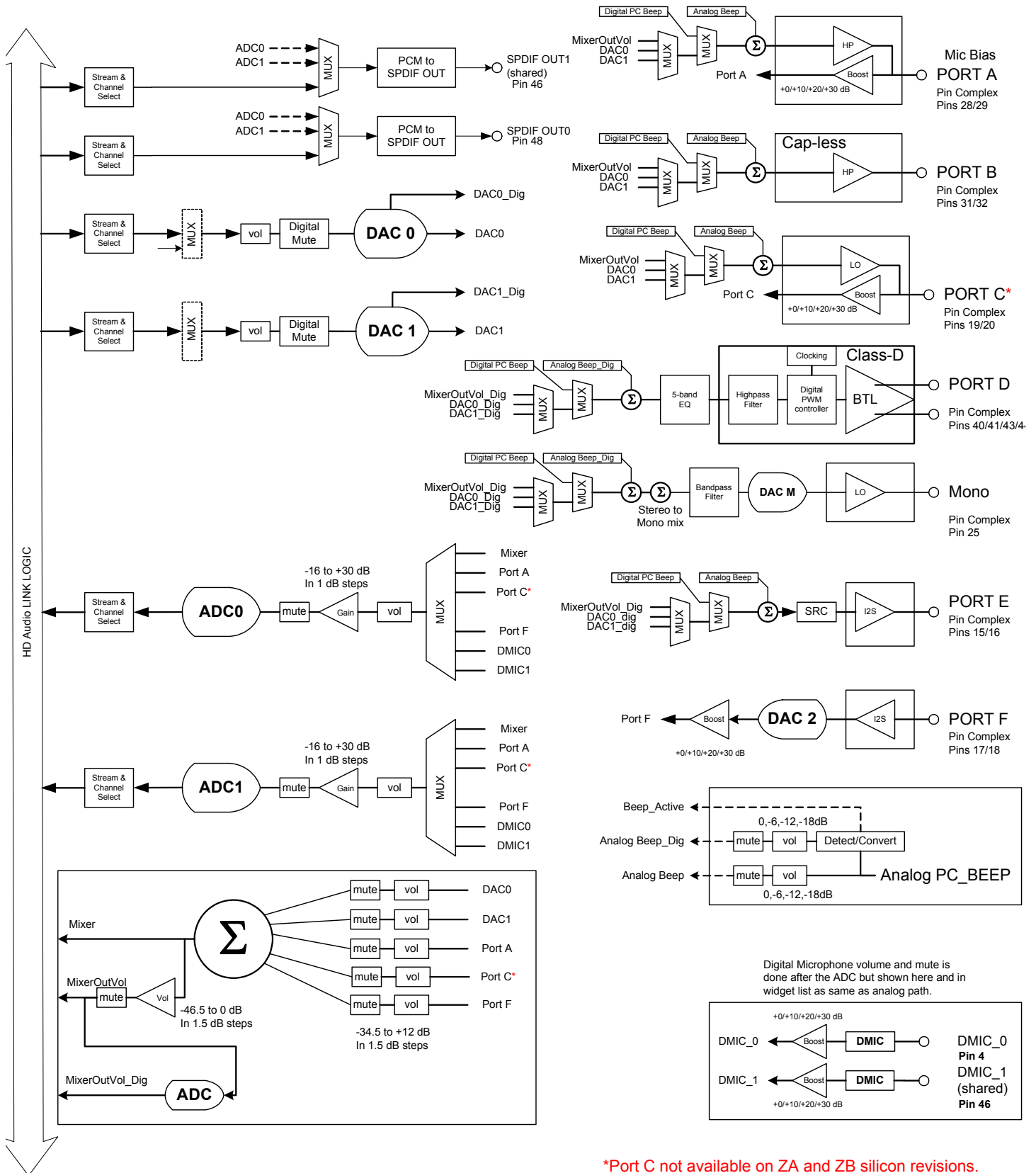


Figure 15. Functional Block Diagram

5. WIDGET DIAGRAM

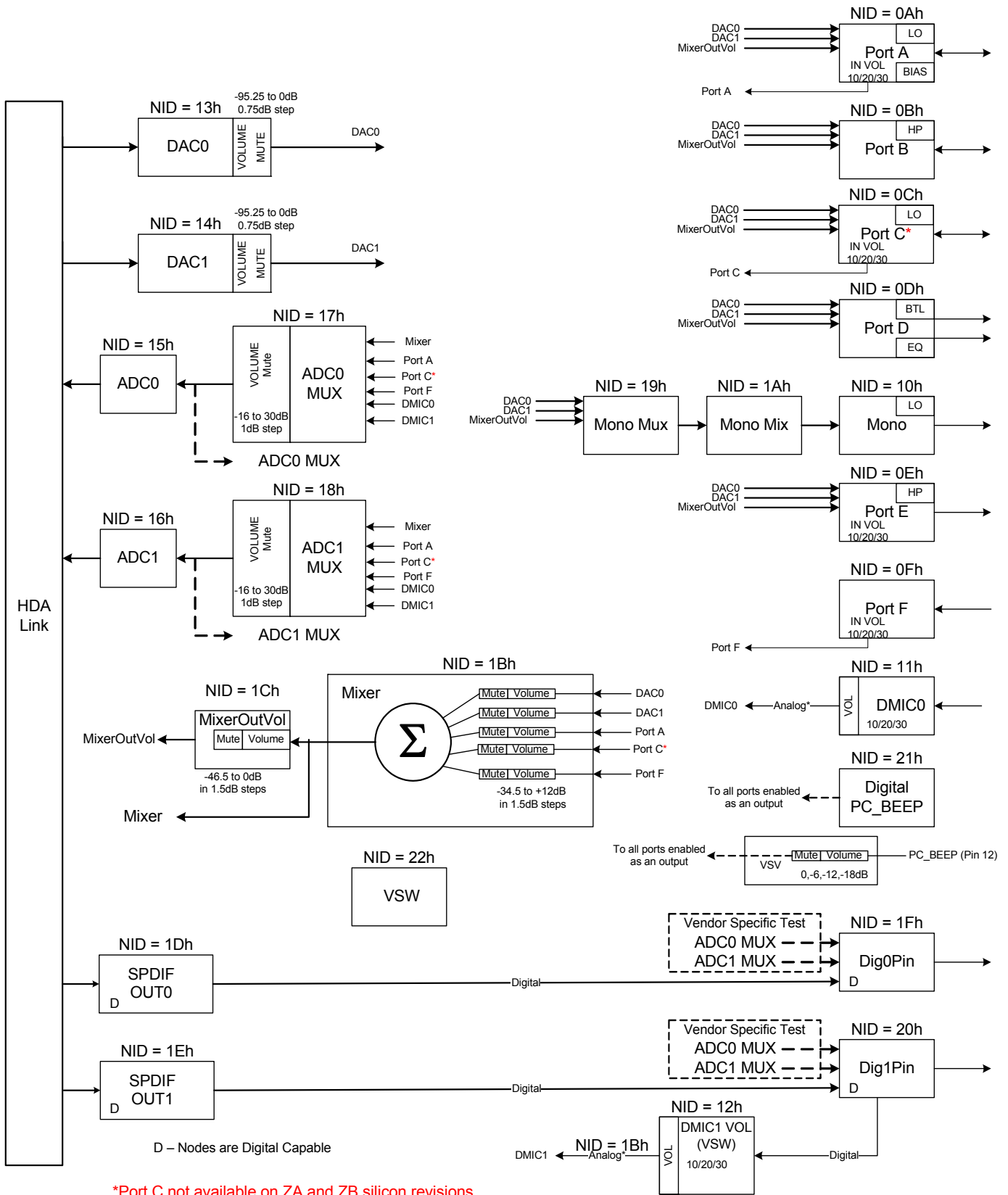


Figure 16. Widget Diagram

## 6. PORT AND PIN CONFIGURATIONS

### 6.1. Port Configurations

# Mobile

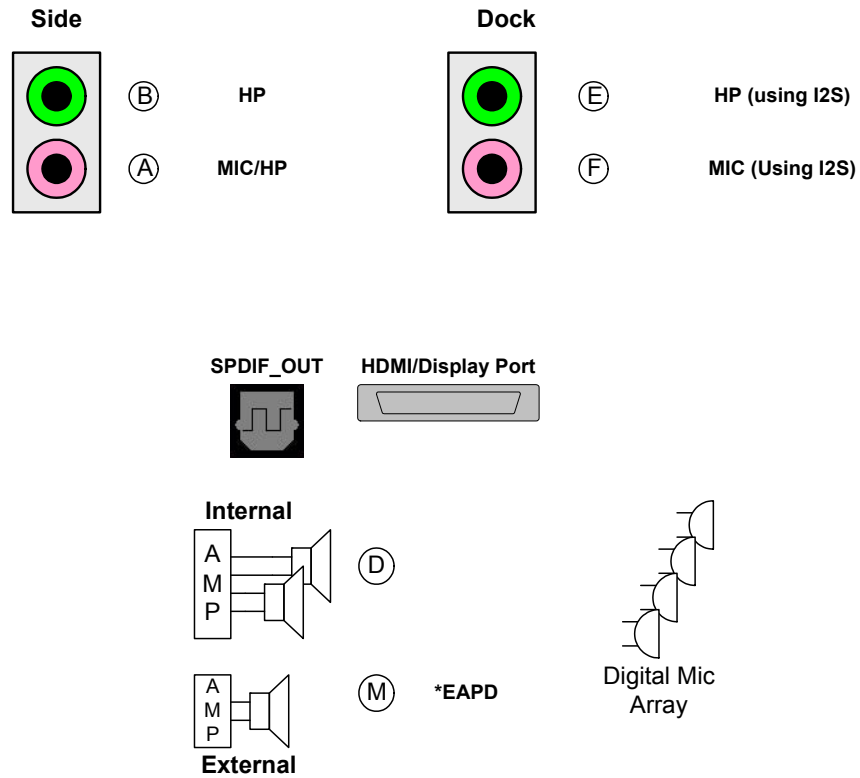


Figure 17. Port Configurations

## 6.2. Pin Configuration Default Register Settings

The following table shows the Pin Widget Configuration Default settings. Desktop implementation with 2 jacks in front and 3 jacks in rear. The internal speaker is redirected from the front (green) headphone jack. An internal microphone is present.

| Pin Name   | Port                | Location               | Device               | Connection       | Color      | Misc                   | Assoc. | Seq |
|------------|---------------------|------------------------|----------------------|------------------|------------|------------------------|--------|-----|
| PortAPin   | Connect to Jack 00b | Mainboard Front 2h     | Mic In Ah            | 1/8 inch Jack 1h | Pink 9h    | Jack Detect Override=0 | 2h     | 0h  |
| PortBPin   | Connect to Jack 00b | Mainboard Front 2h     | HP Out 2h            | 1/8 inch Jack 1h | Green 4h   | Jack Detect Override=0 | 1h     | Fh  |
| PortCPin   | Connect to Jack 00b | Mainboard Rear 1h      | Line In 8h           | 1/8 inch Jack 1h | White Eh   | Jack Detect Override=0 | 2h     | 1h  |
| PortDPin   | Internal 10b        | NA 010000b             | Speaker 1h           | Other Analog 7h  | Unknown 0h | Jack Detect Override=1 | 1h     | 0h  |
| PortEPin   | Connect to Jack 00b | Mainboard Rear 1h      | HP Out 2h            | 1/8 inch Jack 1h | Green 4h   | Jack Detect Override=0 | 5h     | 0h  |
| PortFPin   | Connect to Jack 00b | Mainboard Rear 1h      | Line In 8h           | 1/8 inch Jack 1h | Blue 3h    | Jack Detect Override=0 | 2h     | Eh  |
| MonoOutPin | No Connect 01b      | NA 000000b             | Other Fh             | Unknown 0h       | Unknown 0h | Jack Detect Override=0 | Fh     | 0h  |
| DigOutPin0 | Connect to Jack 00b | Mainboard Rear 000001b | SPDIF Out 4h         | optical 5h       | Black 1h   | Jack Detect Override=1 | 6h     | 0h  |
| DigOutPin1 | Connect to Jack 10b | Internal 011000b       | Digital Other Out 5h | Other Digital 6h | Unknown 0h | Jack Detect Override=1 | 7h     | 0h  |
| DigMic0Pin | Internal 10b        | Internal 010000b       | Mic In Ah            | ATAPI 3h         | Unknown 0h | Jack Detect Override=1 | 3h     | 0h  |

Table 30. Pin Configuration Default Settings

## 7. WIDGET INFORMATION

| Bits [39:32] | Bits [31:28]  | BITS [27:20] | BITS[19:16]     | BITS [15:0]           |
|--------------|---------------|--------------|-----------------|-----------------------|
| Reserved     | CODEC Address | NID          | Verb ID (4-bit) | Payload Data (16-bit) |

**Table 31. Command Format for Verb with 4-bit Identifier**

| Bits [39:32] | Bits [31:28]  | BITS [27:20] | BITS[19:8]       | BITS [7:0]           |
|--------------|---------------|--------------|------------------|----------------------|
| Reserved     | CODEC Address | NID          | Verb ID (12-bit) | Payload Data (8-bit) |

**Table 32. Command Format for Verb with 12-bit Identifier**

There are two types of responses: Solicited and Unsolicited. Solicited responses are provided as a direct response to an issued command and will be provided in the frame immediately following the command. Unsolicited responses are provided by the CODEC independent of any command. Unsolicited responses are the result of CODEC events such as a jack insertion detection. The formats for Solicited Responses and Unsolicited Responses are shown in the tables below. The “Tag” field in bits [31:28] of the Unsolicited Response identify the event.

| Bit [35]          | Bit [34]  | BITS [33:32] | BITS[31:0] |
|-------------------|-----------|--------------|------------|
| Valid (Valid = 1) | UnSol = 0 | Reserved     | Response   |

**Table 33. Solicited Response Format**

| Bit [35]          | Bit [34]  | BITS [33:32] | BITS[31:28] | BITS [27:0] |
|-------------------|-----------|--------------|-------------|-------------|
| Valid (Valid = 1) | UnSol = 1 | Reserved     | Tag         | Response    |

**Table 34. Unsolicited Response Format**

## 7.1. Widget List

| ID  | Widget Name | Description   |
|-----|-------------|---|
| 00h | Root        | Root Node   |
| 01h | AFG         | Audio Function Group  |
| 0Ah | Port A      | Port A Pin Widget (Headphone, Line IN/OUT, MIC)                             |
| 0Bh | Port B      | Port B Pin Widget (Capless Headphone)                                       |
| 0Ch | Port C      | Port C Pin Widget (Line IN/OUT, MIC)<br>(not available on ZA or ZB silicon) |
| 0Dh | Port D      | Port D Pin Widget (Class-D BTL output)                                      |
| 0Eh | Port E      | Port E Pin Widget (Line OUT (I2S))  |
| 0Fh | Port F      | Port F Pin Widget (Line IN ( I2S))  |
| 10h | MonoOut     | MonoOut Pin Widget (Output Only)  |
| 11h | DigMic0     | Digital Microphone 0 Pin Widget   |
| 12h | DigMic1 Vol | Vendor Specific Widget - D-Mic1 volume<br>(D pin to A mux connection)       |
| 13h | DAC0        | Stereo Output Converter to DAC  |
| 14h | DAC1        | Stereo Output Converter to DAC  |
| 15h | ADC0        | Stereo Input Converter to ADC   |
| 16h | ADC1        | Stereo Input Converter to ADC   |
| 17h | ADC0Mux     | ADC0 Mux with volume and mute   |
| 18h | ADC1Mux     | ADC1 Mux with volume and mute   |
| 19h | Mono_Mux    | Mono output source select   |
| 1Ah | Mono_Mix    | Stereo to mono conversion   |
| 1Bh | Mixer       | Input Mixer (Input Ports, DACs, Analog PC_Beep)                             |
| 1Ch | MixerOutVol | Volume control for analog mixer   |
| 1Dh | SPDIFOut0   | Stereo Output for SPDIF_Out   |
| 1Eh | SPDIFOut1   | Second Stereo Output for SPDIF_Out  |
| 1Fh | Dig0Pin     | First Digital Output Pin (pin48)  |
| 20h | Dig1Pin     | Second Digital Output Pin / DMIC Input Pin (pin 46)                         |
| 21h | PCBeep      | Digital PC Beep   |
| 22h | VSW         | Vendor Defined Widget   |

Table 35. Widget List

### 7.2. Reset Key

| Abbreviation | Description  |
|--------------|--|
| POR          | Power On Reset.  |
| SAFG         | Single AFG Reset - One single write to the Reset Verb in the AFG Node.   |
| DAFG         | Double AFG Reset - Two consecutive Single AFG Resets with only idle frames (if any) and no Link Resets between.                    |
| S&DAFG       | Single And Double AFG Reset - Either one will cause reset.   |
| LR           | Link Reset - Level sensitive reset anytime the HDA Reset is set low.   |
| ELR          | Exiting Link Reset - Edge sensitive reset any time the HDA Reset transitions from low to high.                                     |
| ULR          | Unexpected Link Reset - Level sensitive reset anytime the HDA Reset is set low when the ClkStopOK indicator is currently set to 0. |
| PS           | Power State Change - Reset anytime the Actual Power State changes for the Widget in question.                                      |

### 7.3. Root (NID = 00h): VendorID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0000h              |                     |                    |                   |

| Field Name | Bits       | R/W | Default   | Reset |
|------------|------------|-----|-----------|-------|
| Vendor     | 31:16      | R   | 111Dh     | N/A   |
|            | Vendor ID. |     |           |       |
| DeviceFix  | 15:8       | R   | see below | N/A   |
|            | Device ID. |     |           |       |
| DeviceProg | 7:0        | R   | see below | N/A   |
|            | Device ID. |     |           |       |

|           |        |
|-----------|--------|
| Device    | 92HD90 |
| Device ID | 76E7h  |

**7.3.1. Root (NID = 00h): RevID**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0002h              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Rsvd         | 31:24   | R   | 00h     | N/A (Hard-coded) |
|              | Reserved.                                       |     |         |                  |
| Major        | 23:20   | R   | 1h      | N/A (Hard-coded) |
|              | Major rev number of compliant HD Audio spec.    |     |         |                  |
| Minor        | 19:16   | R   | 0h      | N/A (Hard-coded) |
|              | Minor rev number of compliant HD Audio spec.    |     |         |                  |
| RevisionFix  | 15:12   | R   | xh      | N/A (Hard-coded) |
|              | Vendor's rev number for this device.            |     |         |                  |
| RevisionProg | 11:8  | R   | xh      | N/A (Hard-coded) |
|              | Vendor's rev number for this device.            |     |         |                  |
| SteppingFix  | 7:4   | R   | xh      | N/A (Hard-coded) |
|              | Vendor stepping number within the Vendor RevID. |     |         |                  |
| SteppingProg | 3:0   | R   | xh      | N/A (Hard-coded) |
|              | Vendor stepping number within the Vendor RevID. |     |         |                  |

**7.3.2. Root (NID = 00h): NodeInfo**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0004h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:24     | R   | 00h     | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |



| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| StartNID   | 23:16  | R   | 01h     | N/A (Hard-coded) |
|            | Starting node number (NID) of first function group |     |         |                  |
| Rsvd1      | 15:8   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| TotalNodes | 7:0  | R   | 01h     | N/A (Hard-coded) |
|            | Total number of nodes                              |     |         |                  |

#### 7.4. AFG (NID = 01h): NodeInfo

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0004h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StartNID   | 23:16  | R   | 0Ah     | N/A (Hard-coded) |
|            | Starting node number for function group subordinate nodes. |     |         |                  |
| Rsvd1      | 15:8   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| TotalNodes | 7:0  | R   | 19h     | N/A (Hard-coded) |
|            | Total number of nodes.                                     |     |         |                  |

##### 7.4.1. AFG (NID = 01h): FGType

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0005h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd       | 31:9   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| UnSol      | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Unsolicited response supported: 1 = yes, 0 = no.   |     |         |                  |
| NodeType   | 7:0  | R   | 1h      | N/A (Hard-coded) |
|            | Function group type:<br>00h = Reserved<br>01h = Audio Function Group<br>02h = Vendor Defined Modem Function Group<br>03h-7Fh = Reserved<br>80h-FFh = Vendor Defined Function Group |     |         |                  |

#### 7.4.2. AFG (NID = 01h): AFGCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0008h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd3      | 31:17  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| BeepGen    | 16   | R   | 1h      | N/A (Hard-coded) |
|            | Beep generator present: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd2      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| InputDelay | 11:8   | R   | Dh      | N/A (Hard-coded) |
|            | Typical latency in frames. Number of samples between when the sample is received as an analog signal at the pin and when the digital representation is transmitted on the HD Audio link. |     |         |                  |
| Rsvd1      | 7:4  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| OutputDelay | 3:0   | R   | Dh      | N/A (Hard-coded) |
|             | Typical latency in frames. Number of samples between when the signal is received from the HD Audio link and when it appears as an analog signal at the pin. |     |         |                  |

#### 7.4.3. AFG (NID = 01h): PCMCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ah              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:21   | R   | 000h    | N/A (Hard-coded) |
|            | Reserved.                                     |     |         |                  |
| B32        | 20  | R   | 0h      | N/A (Hard-coded) |
|            | 32 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B24        | 19  | R   | 1h      | N/A (Hard-coded) |
|            | 24 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B20        | 18  | R   | 1h      | N/A (Hard-coded) |
|            | 20 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B16        | 17  | R   | 1h      | N/A (Hard-coded) |
|            | 16 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B8         | 16  | R   | 0h      | N/A (Hard-coded) |
|            | 8 bit audio format support: 1 = yes, 0 = no.  |     |         |                  |
| Rsvd1      | 15:12   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                     |     |         |                  |
| R12        | 11  | R   | 0h      | N/A (Hard-coded) |
|            | 384kHz rate support: 1 = yes, 0 = no.         |     |         |                  |
| R11        | 10  | R   | 1h      | N/A (Hard-coded) |
|            | 192kHz rate support: 1 = yes, 0 = no.         |     |         |                  |

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| Field Name | Bits                                     | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| R10        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | 176.4kHz rate support: 1 = yes, 0 = no.  |     |         |                  |
| R9         | 8  | R   | 1h      | N/A (Hard-coded) |
|            | 96kHz rate support: 1 = yes, 0 = no.     |     |         |                  |
| R8         | 7  | R   | 1h      | N/A (Hard-coded) |
|            | 88.2kHz rate support: 1 = yes, 0 = no.   |     |         |                  |
| R7         | 6  | R   | 1h      | N/A (Hard-coded) |
|            | 48kHz rate support: 1 = yes, 0 = no.     |     |         |                  |
| R6         | 5  | R   | 1h      | N/A (Hard-coded) |
|            | 44.1kHz rate support: 1 = yes, 0 = no.   |     |         |                  |
| R5         | 4  | R   | 0h      | N/A (Hard-coded) |
|            | 32kHz rate support: 1 = yes, 0 = no.     |     |         |                  |
| R4         | 3  | R   | 0h      | N/A (Hard-coded) |
|            | 22.05kHz rate support: 1 = yes, 0 = no.  |     |         |                  |
| R3         | 2  | R   | 0h      | N/A (Hard-coded) |
|            | 16kHz rate support: 1 = yes, 0 = no.     |     |         |                  |
| R2         | 1  | R   | 0h      | N/A (Hard-coded) |
|            | 11.025kHz rate support: 1 = yes, 0 = no. |     |         |                  |
| R1         | 0  | R   | 0h      | N/A (Hard-coded) |
|            | 8kHz rate support: 1 = yes, 0 = no.      |     |         |                  |

### 7.4.4. AFG (NID = 01h): StreamCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Bh              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:3   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| AC3        | 2  | R   | 0h        | N/A (Hard-coded) |
|            | AC-3 formatted data support: 1 = yes, 0 = no.    |     |           |                  |
| Float32    | 1  | R   | 0h        | N/A (Hard-coded) |
|            | Float32 formatted data support: 1 = yes, 0 = no. |     |           |                  |
| PCM        | 0  | R   | 1h        | N/A (Hard-coded) |
|            | PCM-formatted data support: 1 = yes, 0 = no.     |     |           |                  |

#### 7.4.5. AFG (NID = 01h): InAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Dh              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 0h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 27h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 03h     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |

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| Field Name                  | Bits | R/W | Default | Reset            |
|-----------------------------|------|-----|---------|------------------|
| Offset                      | 6:0  | R   | 00h     | N/A (Hard-coded) |
| Indicates which step is 0dB |      |     |         |                  |

### 7.4.6. AFG (NID = 01h): PwrStateCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Fh              |                     |                    |                   |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| EPSS  | 31   | R   | 1h      | N/A (Hard-coded) |
| Extended power states support: 1 = yes, 0 = no.                     |      |     |         |                  |
| ClkStop   | 30   | R   | 1h      | N/A (Hard-coded) |
| D3 clock stop support: 1 = yes, 0 = no.                             |      |     |         |                  |
| S3D3ColdSup   | 29   | R   | 1h      | N/A (Hard-coded) |
| Codec state intended during system S3 state: 1 = D3Hot, 0 = D3Cold. |      |     |         |                  |
| Rsvd  | 28:5 | R   | 000000h | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| D3ColdSup   | 4    | R   | 1h      | N/A (Hard-coded) |
| D3Cold power state support: 1 = yes, 0 = no.                        |      |     |         |                  |
| D3Sup   | 3    | R   | 1h      | N/A (Hard-coded) |
| D3 power state support: 1 = yes, 0 = no.                            |      |     |         |                  |
| D2Sup   | 2    | R   | 1h      | N/A (Hard-coded) |
| D2 power state support: 1 = yes, 0 = no.                            |      |     |         |                  |
| D1Sup   | 1    | R   | 1h      | N/A (Hard-coded) |
| D1 power state support: 1 = yes, 0 = no.                            |      |     |         |                  |
| D0Sup   | 0    | R   | 1h      | N/A (Hard-coded) |
| D0 power state support: 1 = yes, 0 = no.                            |      |     |         |                  |

**7.4.7. AFG (NID = 01h): GPIOCnt**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0011h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| GPIWake    | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Wake capability. Assuming the Wake Enable Mask controls are enabled, GPIO's configured as inputs can cause a wake (generate a Status Change event on the link) when there is a change in level on the pin. |     |         |                  |
| GPIUnsol   | 30   | R   | 1h      | N/A (Hard-coded) |
|            | GPIO unsolicited response support: 1 = yes, 0 = no.  |     |         |                  |
| Rsvd       | 29:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumGPIs    | 23:16  | R   | 00h     | N/A (Hard-coded) |
|            | Number of GPI pins supported by function group.  |     |         |                  |
| NumGPOs    | 15:8   | R   | 00h     | N/A (Hard-coded) |
|            | Number of GPO pins supported by function group.  |     |         |                  |
| NumGPIOs   | 7:0  | R   | 05h     | N/A (Hard-coded) |
|            | Number of GPIO pins supported by function group.   |     |         |                  |

**7.4.8. AFG (NID = 01h): OutAmpCap**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Mute       | 31                             | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 02h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 7Fh     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 7Fh     | N/A (Hard-coded) |
|            | Indicates which step is 0dB  |     |         |                  |

#### 7.4.9. AFG (NID = 01h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd3         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Function Group have been reset. Cleared by PwrState 'Get' to this Widget. |     |         |                  |
| ClkStopOK     | 9  | R   | 1h      | POR - DAFG - ULR |
|               | Bit clock can currently be removed: 1 = yes, 0 = no.   |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                    |     |         |                  |



| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                    |     |         |                  |
| Act        | 6:4  | R   | 3h      | POR - DAFG - LR  |
|            | Actual power state of this widget.           |     |         |                  |
| Rsvd1      | 3  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                    |     |         |                  |
| Set        | 2:0  | RW  | 3h      | POR - DAFG - LR  |
|            | Current power state setting for this widget. |     |         |                  |

#### 7.4.10. AFG (NID = 01h): UnsolResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable: 1 = enabled, 0 = disabled.  |     |         |                  |
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

#### 7.4.11. AFG (NID = 01h): GPIO

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 715h              |
| Get | F1500h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd       | 31:5  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| Data4      | 4   | RW  | 0h        | POR - DAFG - ULR |
|            | Data for GPIO4. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing "0". For details of read back value, refer to HD Audio spec. section 7.3.3.22 |     |           |                  |
| Data3      | 3   | RW  | 0h        | POR - DAFG - ULR |
|            | Data for GPIO3. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing "0". For details of read back value, refer to HD Audio spec. section 7.3.3.22 |     |           |                  |
| Data2      | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | Data for GPIO2. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing "0". For details of read back value, refer to HD Audio spec. section 7.3.3.22 |     |           |                  |
| Data1      | 1   | RW  | 0h        | POR - DAFG - ULR |
|            | Data for GPIO1. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing "0". For details of read back value, refer to HD Audio spec. section 7.3.3.22 |     |           |                  |
| Data0      | 0   | RW  | 0h        | POR - DAFG - ULR |
|            | Data for GPIO0. If this GPIO bit is configured as Sticky (edge-sensitive) input, it can be cleared by writing "0". For details of read back value, refer to HD Audio spec. section 7.3.3.22 |     |           |                  |

#### 7.4.12. AFG (NID = 01h): GPIOEn

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 716h              |
| Get | F1600h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default   | Reset            |
|------------|-----------|-----|-----------|------------------|
| Rsvd       | 31:5      | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved. |     |           |                  |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Mask4      | 4   | RW  | 0h      | POR - DAFG - ULR |
|            | Enable for GPIO4: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |     |         |                  |
| Mask3      | 3   | RW  | 0h      | POR - DAFG - ULR |
|            | Enable for GPIO3: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |     |         |                  |
| Mask2      | 2   | RW  | 0h      | POR - DAFG - ULR |
|            | Enable for GPIO2: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |     |         |                  |
| Mask1      | 1   | RW  | 0h      | POR - DAFG - ULR |
|            | Enable for GPIO1: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |     |         |                  |
| Mask0      | 0   | RW  | 0h      | POR - DAFG - ULR |
|            | Enable for GPIO0: 0 = pin is disabled (Hi-Z state); 1 = pin is enabled; behavior determined by GPIO Direction control |     |         |                  |

#### 7.4.13. AFG (NID = 01h): GPIODir

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 717h              |
| Get | F1700h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:5   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Control4   | 4  | RW  | 0h        | POR - DAFG - ULR |
|            | Direction control for GPIO4: 0 = GPIO is configured as input; 1 = GPIO is configured as output |     |           |                  |
| Control3   | 3  | RW  | 0h        | POR - DAFG - ULR |
|            | Direction control for GPIO3: 0 = GPIO is configured as input; 1 = GPIO is configured as output |     |           |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Control2   | 2  | RW  | 0h      | POR - DAFG - ULR |
|            | Direction control for GPIO2: 0 = GPIO is configured as input; 1 = GPIO is configured as output |     |         |                  |
| Control1   | 1  | RW  | 0h      | POR - DAFG - ULR |
|            | Direction control for GPIO1: 0 = GPIO is configured as input; 1 = GPIO is configured as output |     |         |                  |
| Control0   | 0  | RW  | 0h      | POR - DAFG - ULR |
|            | Direction control for GPIO0: 0 = GPIO is configured as input; 1 = GPIO is configured as output |     |         |                  |

#### 7.4.14. AFG (NID = 01h): GPIOWakeEn

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 718h              |
| Get | F1800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:5   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| W4         | 4  | RW  | 0h        | POR - DAFG - ULR |
|            | Wake enable for GPIO4: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |     |           |                  |
| W3         | 3  | RW  | 0h        | POR - DAFG - ULR |
|            | Wake enable for GPIO3: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |     |           |                  |
| W2         | 2  | RW  | 0h        | POR - DAFG - ULR |
|            | Wake enable for GPIO2: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |     |           |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| W1         | 1  | RW  | 0h      | POR - DAFG - ULR |
|            | Wake enable for GPIO1: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |     |         |                  |
| W0         | 0  | RW  | 0h      | POR - DAFG - ULR |
|            | Wake enable for GPIO0: 0 = wake-up event is disabled; 1 = When HD Audio link is powered down (RST# is asserted), a wake-up event will trigger a Status Change Request event on the link. |     |         |                  |

**7.4.15. AFG (NID = 01h): GPIOUnsol**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 719h              |
| Get | F1900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd       | 31:5  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| EnMask4    | 4   | RW  | 0h        | POR - DAFG - ULR |
|            | Unsolicited enable mask for GPIO4. If set, and the Unsolicited Response control for this widget has been enabled, an unsolicited response will be sent when GPIO2 is configured as input and changes state. |     |           |                  |
| EnMask3    | 3   | RW  | 0h        | POR - DAFG - ULR |
|            | Unsolicited enable mask for GPIO3. If set, and the Unsolicited Response control for this widget has been enabled, an unsolicited response will be sent when GPIO2 is configured as input and changes state. |     |           |                  |
| EnMask2    | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | Unsolicited enable mask for GPIO2. If set, and the Unsolicited Response control for this widget has been enabled, an unsolicited response will be sent when GPIO2 is configured as input and changes state. |     |           |                  |
| EnMask1    | 1   | RW  | 0h        | POR - DAFG - ULR |
|            | Unsolicited enable mask for GPIO1. If set, and the Unsolicited Response control for this widget has been enabled, an unsolicited response will be sent when GPIO1 is configured as input and changes state. |     |           |                  |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| EnMask0   | 0    | RW  | 0h      | POR - DAFG - ULR |
| Unsolicited enable mask for GPIO0. If set, and the Unsolicited Response control for this widget has been enabled, an unsolicited response will be sent when GPIO0 is configured as input and changes state. |      |     |         |                  |

#### 7.4.16. AFG (NID = 01h): GPIOSticky

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 71Ah              |
| Get | F1A00h              |                     |                    |                   |

| Field Name  | Bits | R/W | Default   | Reset            |
|---|------|-----|-----------|------------------|
| Rsvd  | 31:5 | R   | 00000000h | N/A (Hard-coded) |
| Reserved.   |      |     |           |                  |
| Mask4   | 4    | RW  | 0h        | POR - DAFG - ULR |
| GPIO4 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |      |     |           |                  |
| Mask3   | 3    | RW  | 0h        | POR - DAFG - ULR |
| GPIO3 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |      |     |           |                  |
| Mask2   | 2    | RW  | 0h        | POR - DAFG - ULR |
| GPIO2 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |      |     |           |                  |
| Mask1   | 1    | RW  | 0h        | POR - DAFG - ULR |
| GPIO1 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |      |     |           |                  |
| Mask0   | 0    | RW  | 0h        | POR - DAFG - ULR |
| GPIO0 input type (when configured as input): 0 = Non-Sticky (level-sensitive); 1 = Sticky (edge-sensitive). |      |     |           |                  |

#### 7.4.17. AFG (NID = 01h): SubID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set | 723h                | 722h                | 721h               | 720h              |

**7.4.17. AFG (NID = 01h): SubID**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Get | F2300h / F2200h / F2100h / F2000h |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset |
|------------|--|-----|---------|-------|
| Subsys3    | 31:24  | RW  | 00h     | POR   |
|            | Subsystem ID (byte 3)                          |     |         |       |
| Subsys2    | 23:16  | RW  | 00h     | POR   |
|            | Subsystem ID (byte 2)                          |     |         |       |
| Subsys1    | 15:8   | RW  | 01h     | POR   |
|            | Subsystem ID (byte 1)                          |     |         |       |
| Assembly   | 7:0  | RW  | 00h     | POR   |
|            | Assembly ID (Not applicable to codec vendors). |     |         |       |

**7.4.18. AFG (NID = 01h): GPIOIrty**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 770h              |
| Get | F7000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:5   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| GP4        | 4  | RW  | 1h        | POR - DAFG - ULR |
|            | GPIO4 Polarity:<br>If configured as output or non-sticky input:<br>0 = inverting<br>1 = non-inverting<br><br>If configured as sticky input:<br>0 = falling edges will be detected<br>1 = rising edges will be detected |     |           |                  |

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| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| GP3        | 3   | RW  | 1h      | POR - DAFG - ULR |
|            | <p>GPIO3 Polarity:<br/>           If configured as output or non-sticky input:<br/>           0 = inverting<br/>           1 = non-inverting</p> <p>If configured as sticky input:<br/>           0 = falling edges will be detected<br/>           1 = rising edges will be detected</p> |     |         |                  |
| GP2        | 2   | RW  | 1h      | POR - DAFG - ULR |
|            | <p>GPIO2 Polarity:<br/>           If configured as output or non-sticky input:<br/>           0 = inverting<br/>           1 = non-inverting</p> <p>If configured as sticky input:<br/>           0 = falling edges will be detected<br/>           1 = rising edges will be detected</p> |     |         |                  |
| GP1        | 1   | RW  | 1h      | POR - DAFG - ULR |
|            | <p>GPIO1 Polarity:<br/>           If configured as output or non-sticky input:<br/>           0 = inverting<br/>           1 = non-inverting</p> <p>If configured as sticky input:<br/>           0 = falling edges will be detected<br/>           1 = rising edges will be detected</p> |     |         |                  |
| GP0        | 0   | RW  | 1h      | POR - DAFG - ULR |
|            | <p>GPIO0 Polarity:<br/>           If configured as output or non-sticky input:<br/>           0 = inverting<br/>           1 = non-inverting</p> <p>If configured as sticky input:<br/>           0 = falling edges will be detected<br/>           1 = rising edges will be detected</p> |     |         |                  |

### 7.4.19. AFG (NID = 01h): GPIODrive

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 771h              |
| Get | F7100h              |                     |                    |                   |



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| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd       | 31:5  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| OD4        | 4   | RW  | 0h        | POR - DAFG - ULR |
|            | GPIO4 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0, float for 1). |     |           |                  |
| OD3        | 3   | RW  | 0h        | POR - DAFG - ULR |
|            | GPIO3 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0, float for 1). |     |           |                  |
| OD2        | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | GPIO2 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0, float for 1). |     |           |                  |
| OD1        | 1   | RW  | 0h        | POR - DAFG - ULR |
|            | GPIO1 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open drain (drive 0, float for 1). |     |           |                  |
| OD0        | 0   | RW  | 0h        | POR - DAFG - ULR |
|            | GPIO0 Drive Mode: 0 = push-pull (drive 0 and 1); 1 = open-drain (drive 0, float for 1). |     |           |                  |

**7.4.20. AFG (NID = 01h): DMic**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 778h              |
| Get | F7800h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default  | Reset            |
|------------|---|-----|----------|------------------|
| Rsvd       | 31:6  | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.   |     |          |                  |
| Mono1      | 5   | RW  | 0h       | POR              |
|            | DMic1 mono select: 0 = stereo operation, 1 = mono operation (left channel duplicated to the right channel). |     |          |                  |

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| Field Name | Bits   | R/W | Default | Reset |
|------------|--|-----|---------|-------|
| Mono0      | 4  | RW  | 0h      | POR   |
|            | DMic0 mono select: 0 = stereo operation, 1 = mono operation (left channel duplicated to the right channel).  |     |         |       |
| PhAdj      | 3:2  | RW  | 0h      | POR   |
|            | Selects what phase of the DMic clock the data should be latched:<br>0h = left data rising edge/right data falling edge<br>1h = left data center of high/right data center of low<br>2h = left data falling edge/right data rising edge<br>3h = left data center of low/right data center of high |     |         |       |
| Rate       | 1:0  | RW  | 2h      | POR   |
|            | Selects the DMic clock rate:<br>0h = 4.704MHz<br>1h = 3.528MHz<br>2h = 2.352MHz<br>3h = 1.176MHz.  |     |         |       |

#### 7.4.21. AFG (NID = 01h): DACMode

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 780h              |
| Get | F8000h              |                     |                    |                   |

| Field Name       | Bits  | R/W | Default | Reset            |
|------------------|---|-----|---------|------------------|
| Rsvd             | 31:8  | R   | 000000h | N/A (Hard-coded) |
|                  | Reserved.   |     |         |                  |
| SwapEn           | 8   | RW  | 0h      | POR              |
|                  | Internal DAC left channel and right channel swap. 0h = not swap, 1h = swap.   |     |         |                  |
| SDMSettleDisable | 7   | RW  | 0h      | POR              |
|                  | SDM wait-to-settle disable:<br>1 = at mute, the SDM switches to the mute pattern immediately<br>0 = at mute, the SDM switches to the mute pattern after settling (can take up to ~45ms) |     |         |                  |

| Field Name      | Bits   | R/W | Default | Reset |
|-----------------|--|-----|---------|-------|
| SDMCoeffSel     | 6  | RW  | 0h      | POR   |
|                 | DAC SDM coefficient select (stages 1, 2, 3):<br>1 = 1/16, 1/2, 1/4<br>0 = 1/16, 1/4, 1/2   |     |         |       |
| SDMLFHalf       | 5  | RW  | 0h      | POR   |
|                 | DAC SDM local feedback coefficient select: 1 = 1/4096, 0 = 1/2048.   |     |         |       |
| SDMLFDisable    | 4  | RW  | 0h      | POR   |
|                 | DAC SDM local feedback disable: 1 = local feedback disabled, 0 = local feedback enabled.   |     |         |       |
| InvertValid     | 3  | RW  | 0h      | POR   |
|                 | DAC Valid Invert: 1 = 7.056MHz valid strobe is inverted, 0 = 7.056MHz valid strobe is not inverted.  |     |         |       |
| InvertData      | 2  | RW  | 0h      | POR   |
|                 | DAC Data Invert: 1 = 1-bit outputs are inverted, 0 = 1-bit outputs are not inverted.   |     |         |       |
| Atten6dBDisable | 1  | RW  | 1h      | POR   |
|                 | Disable built-in -6dB digital attenuation: 1 = -6dB disabled, 0 = -6dB enabled.  |     |         |       |
| Fade            | 0  | RW  | 1h      | POR   |
|                 | DAC Gain Fade Enable:<br>1 = gain will be slowly faded from old value to new value (~10ms)<br>0 = gain will jump immediately to new value. |     |         |       |

#### 7.4.22. AFG (NID = 01h): ADCMode

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 784h              |
| Get | F8400h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default  | Reset            |
|------------|-----------|-----|----------|------------------|
| Rsvd2      | 31:4      | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved. |     |          |                  |

| Field Name   | Bits  | R/W | Default | Reset |
|--------------|---|-----|---------|-------|
| InvertValid  | 3   | RW  | 0h      | POR   |
|              | ADC Valid Invert: 1 = 14.112MHz valid strobe is inverted, 0 = 14.112MHz valid strobe is not inverted. |     |         |       |
| InvertData   | 2   | RW  | 0h      | POR   |
|              | ADC Data Invert: 1 = 1-bit inputs are inverted, 0 = 1-bit inputs are not inverted.                    |     |         |       |
| ADCClkDelay  | 1   | RW  | 0h      | POR   |
|              | Delay ADC clock.  |     |         |       |
| DACCClkDelay | 0   | RW  | 0h      | POR   |
|              | Delay DAC clock.  |     |         |       |

#### 7.4.23. AFG (NID = 01h): PortUse

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7C0h              |
| Get | FC000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default  | Reset            |
|------------|--|-----|----------|------------------|
| Rsvd       | 31:7   | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.  |     |          |                  |
| Mono       | 6  | RW  | 1h       | POR              |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable  |     |          |                  |
| PortF      | 5  | RW  | 1h       | POR              |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable  |     |          |                  |
| PortE      | 4  | RW  | 1h       | POR              |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable  |     |          |                  |
| PortD      | 3  | RW  | 1h       | POR              |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable. |     |          |                  |

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| Field Name | Bits   | R/W | Default | Reset |
|------------|--|-----|---------|-------|
| PortC      | 2  | RW  | 1h      | POR   |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable  |     |         |       |
| PortB      | 1  | RW  | 1h      | POR   |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable  |     |         |       |
| PortA      | 0  | RW  | 1h      | POR   |
|            | 1=power down port if not input or output enabled, 0=do not force power down based on input or output enable. |     |         |       |

### 7.4.24. AFG (NID = 01h): ComJack

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     | 7C7h               | 7C6h              |
| Get | FC700h/FC600h       |                     |                    |                   |

| Field Name   | Bits   | R/W | Default                          | Reset            |
|--------------|--|-----|----------------------------------|------------------|
| Rsvd3        | 31:14  | R   | 00000000h                        | N/A (Hard-coded) |
|              | Reserved.  |     |                                  |                  |
| DebounceTime | 13:12  | RW  | 1h<br>Not available on ZA or ZB. | POR              |
|              | Combo Jack debounce time set.<br>2'h0 = 0.1ms; 2'h1 = 125ms; 2'h2 = 500ms; 2'h3 = 1s." |     |                                  |                  |
| Rsvd2        | 11   | R   | oh                               | N/A (Hard-coded) |
|              | Reserved.  |     |                                  |                  |

| Field Name   | Bits | R/W | Default | Reset            |
|--|------|-----|---------|------------------|
| RbCon  | 10:8 | RW  | 4h      | POR              |
| Combo jack detection reference voltage<br>000 = 0.18*AVDD<br>001 = 0.16*AVDD<br>010 = 0.14*AVDD<br>011 = 0.12*AVDD<br>100 = 0.10*AVDD<br>101 = 0.08*AVDD<br>110 = 0.06*AVDD<br>111 = 0.04*AVDD   |      |     |         |                  |
| MasterPort   | 7:5  | RW  | 0h      | POR              |
| Port tied to the jack presence detection switch<br>000 = Port A<br>001 = Port B<br>010 = Port C<br>011 = Port D<br>100 = Port E<br>101 = Port F  |      |     |         |                  |
| Rsvd1  | 4    | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |
| SlavePort  | 3:1  | RW  | 0h      | POR              |
| Port used as microphone input<br>When combo jack detection is enabled, Port presence detection as shown in the pin complex is not sensed directly by the sense input but is inferred by the load placed on the Vref_Output associated with the port<br>000 = Port A<br>001 = Port B<br>010 = Port C<br>011 = Port D;100 = Port E<br>101 = Port F |      |     |         |                  |
| Det-en   | 0    | R   | 0h      | POR              |
| 0h = disable combo jack detection 1h = enable combo jack detection   |      |     |         |                  |

**7.4.25. AFG (NID = 01h): VSPwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7D8h              |
| Get | FD800h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd       | 31:2  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| D5         | 1   | RW  | 0h        | POR - ELR        |
|            | Vendor specific D5 power state, only entered once the part is already in D3cold (this bit must be set before the command to enter D3cold). If set, this bit overrides the D4 bit (bit 0). Includes the power savings of D4, but additionally powers down GPIO pins, the VAG amp, and the HP amps. Exits this power state via POR or rising edge of Link Reset.    |     |           |                  |
| D4         | 0   | RW  | 0h        | POR - ELR        |
|            | Vendor specific D4 power state, only entered once the part is already in D3cold (this bit must be set before the command to enter D3cold). If the D5 bit (bit 1) is set, this bit is overridden. Includes the power savings of D3cold, but additionally powers down the HDA interface (no responses). Exit this power state via POR or rising edge of Link Reset. |     |           |                  |

#### 7.4.26. AFG (NID = 01h): AnaPort

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     | 7EDh               | 7ECh              |
| Get | FEC00h              |                     |                    |                   |

| Field Name | Bits                    | R/W | Default  | Reset            |
|------------|-------------------------|-----|----------|------------------|
| Rsvd2      | 31:7                    | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.               |     |          |                  |
| MonoPwd    | 6                       | RW  | 0h       | POR              |
|            | Power down Mono Output. |     |          |                  |
| FPwd       | 5                       | RW  | 0h       | POR              |
|            | Power down Port F.      |     |          |                  |
| EPwd       | 4                       | RW  | 0h       | POR              |
|            | Power down Port E.      |     |          |                  |
| DPwd       | 3                       | RW  | 0h       | POR              |
|            | Power down Port D.      |     |          |                  |

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| Field Name | Bits               | R/W | Default | Reset |
|------------|--------------------|-----|---------|-------|
| CPwd       | 2                  | RW  | 0h      | POR   |
|            | Power down Port C. |     |         |       |
| BPwd       | 1                  | RW  | 0h      | POR   |
|            | Power down Port B. |     |         |       |
| APwd       | 0                  | RW  | 0h      | POR   |
|            | Power down Port A. |     |         |       |

#### 7.4.27. AFG (NID = 01h): AnaBTL

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     | 7F6h                | 7F5h               | 7F4h              |
| Get | FF400h              |                     |                    |                   |

| Field Name       | Bits  | R/W | Default | Reset            |
|------------------|---|-----|---------|------------------|
| Rsvd6            | 31:20   | R   | 0h      | N/A (Hard-coded) |
|                  | Reserved.   |     |         |                  |
| TSOverrideHiz    | 19  | RW  | 0h      | POR              |
|                  | Override Hiz for the BTL amplifier power stage circuit: set to 1 to Hiz, set back to 0 to normal mode   |     |         |                  |
| TSTestMode       | 18  | RW  | 0h      | POR              |
|                  | Temp sense test mode select, 0=normal operation, 1=sensor will trip at ambient temperature.   |     |         |                  |
| TSForcePwd       | 17  | RW  | 1h      | POR              |
|                  | Temp sense force powerdown select<br>0=BTL will not be muted and powered down even if it is still overheating when the volume is 0h<br>1=BTL will be muted and powered down even if it is still overheating when the volume is 0h |     |         |                  |
| TSInstantCutMode | 16  | RW  | 0h      | POR              |
|                  | Temp sense instant cut mode<br>0=Two trip points used to smoothly adjust the volume<br>1=One single trip point used to set volume to wither 0 or max value (TI mode)  |     |         |                  |



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| Field Name     | Bits   | R/W | Default | Reset |
|----------------|--|-----|---------|-------|
| TSWait         | 15:12  | RW  | 3h      | POR   |
|                | Temperature sensing wait time between volume increments<br>0h = 2ms (polling at 2ms)<br>1h = 4ms (polling at 4ms)<br>2h = 8ms (polling at 8ms)<br>3h = 16ms (polling at 16ms)<br>4h = 32ms (polling at 16ms)<br>5h = 64ms (polling at 16ms)<br>6h = 128ms (polling at 16ms)<br>7h = 256ms (polling at 16ms)<br>8h = 512ms (polling at 16ms)<br>9h = 1.024s (polling at 16ms)<br>Ah = 2.048s (polling at 16ms)<br>Bh = 4.096s (polling at 16ms)<br>Ch = 8.192s (polling at 16ms)<br>Dh = 16.384s (polling at 16ms)<br>Eh = 32.768s (polling at 16ms)<br>Fh = 65.536s (polling at 16ms). |     |         |       |
| TSTripHish     | 11:9   | RW  | 3h      | POR   |
|                | Temp sense high trip point setting:<br>0h = 125 Degrees C<br>1h = 140 Degrees C<br>2h = 155 Degrees C<br>3h = 170 Degrees C<br>4h = 185 C<br>5h = 200 C<br>6h = 215 C<br>7h = Reserved   |     |         |       |
| TSOverrideRest | 8  | RW  | 0h      | POR   |
|                | Override reset for the BTL amplifier Temp sense circuit: set to 1 to recalculate, set back to 0 to latch the value   |     |         |       |
| TSTripLow      | 7:5  | RW  | 2h      | POR   |
|                | Temp sense low trip point setting:<br>0h = 110 Degrees C<br>1h = 125 Degrees C<br>2h = 140 Degrees C<br>3h = 155 Degrees C<br>4h = 170 C<br>5h = 185 C<br>6h = 200 C<br>7h = 215 C   |     |         |       |
| Rsvd1          | 4:0  | R   | 0h      | NA    |
|                | Reserved   |     |         |       |

**7.4.28. AFG (NID = 01h): AnaBTLStatus**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | FF700h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd       | 31:20  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| TSTripHigh | 19   | R   | 0h      | POR              |
|            | Temp sense high trip point status  |     |         |                  |
| TSTripLow  | 18   | R   | 0h      | POR              |
|            | Temp sense low trip point status   |     |         |                  |
| TSMute     | 17   | R   | 0h      | POR              |
|            | Temp sense forced mute status for BTL amplifier  |     |         |                  |
| TSPwd      | 16   | R   | 0h      | POR              |
|            | Temp sense forced powerdown status for BTL amplifier   |     |         |                  |
| TSLeftVol  | 15:8   | R   | 0h      | POR              |
|            | Temp sense volume status for the BTL amplifier: 00000000b..11111111b = Range specified for SPKVol field. |     |         |                  |
| TSRightVol | 7:0  | R   | 0h      | POR              |
|            | Temp sense volume status for the BTL amplifier: 00000000b..11111111b = Range specified for SPKVol field. |     |         |                  |

**7.4.29. AFG (NID = 01h): AnaCapless**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     | 7FAh                | 7F9h               | 7F8h              |
| Get | FF800h              |                     |                    |                   |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name                | Bits  | R/W | Default | Reset            |
|---------------------------|---|-----|---------|------------------|
| Rsvd2                     | 31:26   | R   | 00h     | N/A (Hard-coded) |
|                           | Reserved.   |     |         |                  |
| VRegSCDet                 | 25  | R   | 0h      | POR              |
|                           | Capless regulator short circuit detect indicator.   |     |         |                  |
| ChargePumpSCDet           | 24  | R   | 0h      | POR              |
|                           | Capless charge pump short circuit detect indicator.   |     |         |                  |
| VRegSel                   | 23:20   | RW  | 5h      | POR              |
|                           | Capless regulator output voltage multiply ratio<br>Bits [3..2] Reserved<br><br>Bits [1..0]:<br>00b = 2*Vbg<br>01b = 2.1*Vbg<br>10b = 2.2*Vbg<br>11b = 2.3*Vbg |     |         |                  |
| VRegSCRstB                | 19  | RW  | 0h      | POR              |
|                           | Capless regulator short circuit detect reset: 0 = short circuit detect disabled, 1 = short circuit detect enabled.  |     |         |                  |
| VRegGndShort              | 18  | RW  | 0h      | POR              |
|                           | Ground the capless regulator output.  |     |         |                  |
| VRegPwd                   | 17  | RW  | 0h      | POR              |
|                           | Capless regulator powerdown.  |     |         |                  |
| ChargePumpSCRstB          | 16  | RW  | 0h      | POR              |
|                           | Capless charge pump short circuit detect reset: 0 = short circuit detect disabled, 1 = short circuit detect enabled.  |     |         |                  |
| ChargePumpHiZ             | 15  | RW  | 0h      | POR              |
|                           | Hi-Z the capless charge pump outputs.   |     |         |                  |
| ChargePumpPwd             | 14  | RW  | 0h      | POR              |
|                           | Capless charge pump powerdown.  |     |         |                  |
| ChargePumpSplyDetOverride | 13  | RW  | 0h      | POR              |
|                           | Capless charge pump supply detect override.   |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits | R/W | Default | Reset |
|---|------|-----|---------|-------|
| ChargePumpFreqBypass  | 12   | RW  | 1h      | POR   |
| Capless charge pump frequency reg bypass.   |      |     |         |       |
| ChargePumpClkRate   | 11:8 | RW  | 8h      | POR   |
| Capless charge pump clock rate:<br>0000b = 800.0kHz (24MHz/30)<br>0001b = 750.0kHz (24MHz/32)<br>0010b = 706.9kHz (24MHz/34)<br>0011b = 666.7kHz (24MHz/36)<br>0100b = 631.6kHz (24MHz/38)<br>0101b = 600.0kHz (24MHz/40)<br>0110b = 571.4kHz (24MHz/42)<br>0111b = 545.5kHz (24MHz/44)<br>1000b = 800.0kHz (24MHz/30)<br>1001b = 857.1kHz (24MHz/28)<br>1010b = 923.1kHz (24MHz/26)<br>1011b = 1.000MHz (24MHz/24)<br>1100b = 1.091MHz (24MHz/22)<br>1101b = 1.200MHz (24MHz/20)<br>1110b = 1.333MHz (24MHz/18)<br>1111b = 1.500MHz (24MHz/16) |      |     |         |       |
| ChargePumpClkDiv  | 7:5  | RW  | 4h      | POR   |
| Capless charge pump analog clock divider:<br>001b = No divide<br>010b = Divide by 2, 50% duty cycle<br>100b = Divide by 4, 50% duty cycle<br>110b = Divide by 2, 75% duty cycle<br>011b = Divide by 4, 75% duty cycle<br>111b = Divide by 4, 87.5% duty cycle<br>Other values undefined   |      |     |         |       |
| ChargePumpClkSel  | 4    | RW  | 0h      | POR   |
| Capless charge pump clock select: 0 = ring oscillator, 1 = charge pump clock defined by AFGCaplessChargePumpClkRate[3:0] field below.   |      |     |         |       |
| PadGnd  | 3    | RW  | 0h      | POR   |
| Ground the output pad of the capless amplifiers.  |      |     |         |       |
| InputGnd  | 2    | RW  | 0h      | POR   |
| Ground the input to the capless output amplifiers.  |      |     |         |       |
| Rsvd1   | 1    | R   | 0h      | NA    |
| Reserved  |      |     |         |       |

| Field Name  | Bits | R/W | Default | Reset |
|---|------|-----|---------|-------|
| AntiPopBypass   | 0    | RW  | 0h      | POR   |
| 0 = Enable anti-pop on the capless headphone; 1 = bypass anti-pop on the capless headphone. |      |     |         |       |

**7.4.30. AFG (NID = 01h): Reset**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7FFh              |
| Get | FFF00h              |                     |                    |                   |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| Rsvd1   | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| Execute   | 7:0  | W   | 00h     | N/A (Hard-coded) |
| Function Reset. Function Group reset is executed when the Set verb 7FF is written with 8-bit payload of 00h. The codec should issue a response to acknowledge receipt of the verb, and then reset the affected Function Group and all associated widgets to their power-on reset values. Some controls such as Configuration Default controls should not be reset. Overlaps Response. |      |     |         |                  |

## 7.4.31. AFG (NID = 01h): DAC3OutAmp (Mono Out Volume)

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7B6hh             |
| Get | FB600h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default  | Reset            |
|------------|---|-----|----------|------------------|
| Rsvd       | 31:8  | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.   |     |          |                  |
| Mute       | 7   | RW  | 0h       | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted                    |     |          |                  |
| Gain       | 6:0   | RW  | 7Fh      | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter of AFG) |     |          |                  |

## 7.4.32. AFG (NID = 01h): AnaBeep

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7EEh              |
| Get | FEE00h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default  | Reset            |
|------------|---|-----|----------|------------------|
| Rsvd       | 31:3  | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.   |     |          |                  |
| Gain       | 2:1   | RW  | 3h       | POR              |
|            | Analog PC Beep Gain: 0h = -24dB, 1h = -18dB, 2h = -12dB, 3h = -6dB.             |     |          |                  |
| Enable     | 0   | RW  | 0h       | POR              |
|            | Analog PC Beep Enable: 1 = Analog PC beep enabled, 0 = Analog PC beep disabled. |     |          |                  |

**7.4.33. AFG (NID = 01h): I2Sctrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 7C8h              |
| Get | FC800h              |                     |                    |                   |

| Field Name        | Bits   | R/W | Default  | Reset            |
|-------------------|--|-----|----------|------------------|
| Rsvd2             | 31:6   | R   | 0000000h | N/A (Hard-coded) |
|                   | Reserved.  |     |          |                  |
| ForcePortf2Spdif0 | 5  | RW  | 0h       | POR              |
|                   | Force I2S input to PortF to SPDIFOut0 for test purpose                           |     |          |                  |
| Rsvd1             | 4  | R   | 0h       | N/A (Hard-coded) |
|                   | Reserved.  |     |          |                  |
| ForcePortf2PortB  | 3  | RW  | 0h       | POR              |
|                   | In I2S mode, the DAC2 output is routed to PortB to verified DAC2                 |     |          |                  |
| I2Cdebug          | 2  | RW  | 0h       | POR              |
|                   | I2C bus debug mode   |     |          |                  |
| BitExactSelDAC    | 1  | RW  | 0h       | POR              |
|                   | I2S bit exact mode select data source. 0h = data from DAC0, 1h = data from DAC1. |     |          |                  |
| BitExact          | 0  | RW  | 0h       | POR              |
|                   | 0h = disable I2S bit exact mode 1h = enable I2S exact mode.                      |     |          |                  |



## 7.5. PortA (NID = 0Ah): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 1h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

#### 7.5.1. PortA (NID = 0Ah): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 1h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VrefCntrl   | 15:8   | R   | 17h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 1h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 1h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.5.2. PortA (NID = 0Ah): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.5.3. PortA (NID = 0Ah): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | DAC2 Converter widget (0x22)       |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

### 7.5.4. PortA (NID = 0Ah): InAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |
| Get | B2000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.5.5. PortA (NID = 0Ah): InAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.5.6. PortA (NID = 0Ah): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

**7.5.7. PortA (NID = 0Ah): PwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

**7.5.8. PortA (NID = 0Ah): PinWCntrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| HPhnEn     | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | Headphone amp enable: 1 = enabled, 0 = disabled.  |     |         |                  |
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled.   |     |         |                  |
| InEn       | 5   | RW  | 0h      | POR - DAFG - ULR |
|            | Input enable: 1 = enabled, 0 = disabled.  |     |         |                  |
| Rsvd1      | 4:3   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| VRefEn     | 2:0   | RW  | 0h      | POR - DAFG - ULR |
|            | Vref selection (See VrefCntrl field of PinCap parameter for supported selections):<br>000b= HI-Z<br>001b= 50%<br>010b= GND<br>011b= Reserved<br>100b= 80%<br>101b= 100%<br>110b= Reserved<br>111b= Reserved |     |         |                  |

### 7.5.9. PortA (NID = 0Ah): UnsolResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:8      | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled.                 |     |         |                  |
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

#### 7.5.10. PortA (NID = 0Ah): ChSense

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

#### 7.5.11. PortA (NID = 0Ah): EAPDBTLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default   | Reset            |
|------------|-----------|-----|-----------|------------------|
| Rsvd2      | 31:2      | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved. |     |           |                  |



| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| EAPD       | 1  | RW  | 1h      | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |         |                  |
| Rsvd1      | 0  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |

**7.5.12. PortA (NID = 0Ah): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name       | Bits  | R/W | Default | Reset |
|------------------|---|-----|---------|-------|
| PortConnectivity | 31:30   | RW  | 0h      | POR   |
|                  | Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |     |         |       |
| Location         | 29:24   | RW  | 02h     | POR   |
|                  | Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |     |         |       |

**92HD90****SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | Ah      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 1h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 9h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 0h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 2h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | Fh      | POR   |
|             | Sequence.  |     |         |       |

### 7.6. PortB (NID = 0Bh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:24     | R   | 00h     | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Type   | 23:20 | R   | 4h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |       |     |         |                  |
| Delay  | 19:16 | R   | 0h      | N/A (Hard-coded) |
| Number of sample delays through widget.  |       |     |         |                  |
| Rsvd1  | 15:12 | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| SwapCap  | 11    | R   | 0h      | N/A (Hard-coded) |
| Left/right swap support: 1 = yes, 0 = no.  |       |     |         |                  |
| PwrCntrl   | 10    | R   | 1h      | N/A (Hard-coded) |
| Power state support: 1 = yes, 0 = no.  |       |     |         |                  |
| Dig  | 9     | R   | 0h      | N/A (Hard-coded) |
| Digital stream support: 1 = yes (digital), 0 = no (analog).  |       |     |         |                  |
| ConnList   | 8     | R   | 1h      | N/A (Hard-coded) |
| Connection list present: 1 = yes, 0 = no.  |       |     |         |                  |
| UnSolCap   | 7     | R   | 1h      | N/A (Hard-coded) |
| Unsolicited response support: 1 = yes, 0 = no.   |       |     |         |                  |
| ProcWidget   | 6     | R   | 0h      | N/A (Hard-coded) |
| Processing state support: 1 = yes, 0 = no.   |       |     |         |                  |
| Stripe   | 5     | R   | 0h      | N/A (Hard-coded) |
| Striping support: 1 = yes, 0 = no.   |       |     |         |                  |
| FormatOvrd   | 4     | R   | 0h      | N/A (Hard-coded) |
| Stream format override: 1 = yes, 0 = no.   |       |     |         |                  |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| AmpParOvrd  | 3    | R   | 0h      | N/A (Hard-coded) |
| Amplifier capabilities override: 1 = yes, no.           |      |     |         |                  |
| OutAmpPrsnt   | 2    | R   | 0h      | N/A (Hard-coded) |
| Output amp present: 1 = yes, 0 = no.                    |      |     |         |                  |
| InAmpPrsnt  | 1    | R   | 0h      | N/A (Hard-coded) |
| Input amp present: 1 = yes, 0 = no.                     |      |     |         |                  |
| Stereo  | 0    | R   | 1h      | N/A (Hard-coded) |
| Stereo stream support: 1 = yes (stereo), 0 = no (mono). |      |     |         |                  |

### 7.6.1. PortB (NID = 0Bh): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Rsvd2  | 31:17 | R   | 0000h   | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| EapdCap  | 16    | R   | 1h      | N/A (Hard-coded) |
| EAPD support: 1 = yes, 0 = no.   |       |     |         |                  |
| VrefCntrl  | 15:8  | R   | 00h     | N/A (Hard-coded) |
| Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |       |     |         |                  |
| Rsvd1  | 7     | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |

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| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.                 |     |         |                  |
| InCap       | 5  | R   | 0h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.                        |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.                       |     |         |                  |
| HdphDrvCap  | 3  | R   | 1h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.                |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.           |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no. |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.              |     |         |                  |

#### 7.6.2. PortB (NID = 0Bh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

**7.6.3. PortB (NID = 0Bh): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | DAC2 Converter widget (0x22)       |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

**7.6.4. PortB (NID = 0Bh): ConSelectCtrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

**7.6.5. PortB (NID = 0Bh): PwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.6.6. PortB (NID = 0Bh): PinWCntrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| HPhnEn     | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Headphone amp enable: 1 = enabled, 0 = disabled. |     |         |                  |



| Field Name | Bits                                      | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled. |     |         |                  |
| Rsvd1      | 5:0                                       | RW  | 00h     | N/A (Hard-coded) |
|            | Reserved.                                 |     |         |                  |

### 7.6.7. PortB (NID = 0Bh): UnsolResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled.                 |     |         |                  |
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

### 7.6.8. PortB (NID = 0Bh): ChSense

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

### 7.6.9. PortB (NID = 0Bh): EAPDBTLLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd2      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| EAPD       | 1  | RW  | 1h        | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |           |                  |
| Rsvd1      | 0  | R   | 0h        | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |

### 7.6.10. PortB (NID = 0Bh): ConfigDefault

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 0h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack)                   |       |     |         |       |
| Location  | 29:24 | RW  | 02h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved                                |       |     |         |       |
| Device  | 23:20 | RW  | 2h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other |       |     |         |       |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name     | Bits  | R/W | Default | Reset |
|----------------|---|-----|---------|-------|
| ConnectionType | 19:16   | RW  | 1h      | POR   |
|                | Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |     |         |       |
| Color          | 15:12   | RW  | 4h      | POR   |
|                | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other  |     |         |       |
| Misc           | 11:8  | RW  | 0h      | POR   |
|                | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override  |     |         |       |
| Association    | 7:4   | RW  | 1h      | POR   |
|                | Default association.  |     |         |       |
| Sequence       | 3:0   | RW  | Fh      | POR   |
|                | Sequence.   |     |         |       |

## 7.7. PortC (NID = 0Ch): WCap

**PORT C IS NOT AVAILABLE ON THE ZA AND ZB SILICON OF THE 92HD90, THIS FUNCTIONALITY WAS ADDED IN THE YA REVISION.**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ConnList    | 8   | R   | 1h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.               |     |         |                  |
| UnSolCap    | 7   | R   | 1h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.          |     |         |                  |
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvrd  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrd  | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.7.1. PortC (NID = 0Ch): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:17     | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| EapdCap     | 16   | R   | 1h      | N/A (Hard-coded) |
|             | EAPD support: 1 = yes, 0 = no.   |     |         |                  |
| VrefCntrl   | 15:8   | R   | 17h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 1h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.7.2. PortC (NID = 0Ch): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.7.3. PortC (NID = 0Ch): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | Reserved                           |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

### 7.7.4. PortC (NID = 0Ch): InAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |
| Get | B2000h              |                     |                    |                   |



| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.7.5. PortC (NID = 0Ch): InAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.7.6. PortC (NID = 0Ch): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

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#### 7.7.7. PortC (NID = 0Ch): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.7.8. PortC (NID = 0Ch): PinWCntrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:7  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled.   |     |         |                  |
| InEn       | 5   | RW  | 0h      | POR - DAFG - ULR |
|            | Input enable: 1 = enabled, 0 = disabled.  |     |         |                  |
| Rsvd1      | 4:3   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| VRefEn     | 2:0   | RW  | 0h      | POR - DAFG - ULR |
|            | Vref selection (See VrefCntrl field of PinCap parameter for supported selections):<br>000b= HI-Z<br>001b= 50%<br>010b= GND<br>011b= Reserved<br>100b= 80%<br>101b= 100%<br>110b= Reserved<br>111b= Reserved |     |         |                  |

### 7.7.9. PortC (NID = 0Ch): UnsolResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| En         | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicted response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

#### 7.7.10. PortC (NID = 0Ch): ChSense

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

#### 7.7.11. PortC (NID = 0Ch): EAPDBTLLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd2      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| EAPD       | 1  | RW  | 1h        | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |           |                  |

| Field Name | Bits | R/W | Default | Reset            |
|------------|------|-----|---------|------------------|
| Rsvd1      | 0    | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |

**7.7.12. PortC (NID = 0Ch): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 0h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 01h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 8h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 1h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | Eh      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 0h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 2h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 1h      | POR   |
|             | Sequence.  |     |         |       |

## 7.8. PortD (NID = 0Dh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |



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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.8.1. PortD (NID = 0Dh): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 1h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VrefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 1h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 0h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 0h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.8.2. PortD (NID = 0Dh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.8.3. PortD (NID = 0Dh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | Reserved                           |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

### 7.8.4. PortD (NID = 0Dh): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

### 7.8.5. PortD (NID = 0Dh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

**7.8.6. PortD (NID = 0Dh): PinWCntrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits                                      | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:7                                      | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                                 |     |         |                  |
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled. |     |         |                  |
| Rsvd1      | 5:0                                       | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                 |     |         |                  |

**7.8.7. PortD (NID = 0Dh): EAPDBTLLR**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd2      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| EAPD       | 1  | RW  | 1h        | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |           |                  |
| Rsvd1      | 0  | R   | 0h        | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |

**7.8.8. PortD (NID = 0Dh): ConfigDefault**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                | 71Eh                | 71Dh               | 71Ch              |

**7.8.8. PortD (NID = 0Dh): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 2h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 10h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 1h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 7h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 0h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 1h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 1h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |



## 7.9. PortE (NID = 0Eh): WCap (I2S Output)

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 1h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvrd  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrd  | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

#### 7.9.1. PortE (NID = 0Eh): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 1h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VrefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 0h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 1h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.9.2. PortE (NID = 0Eh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.9.3. PortE (NID = 0Eh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | DAC2 Converter widget (0x22)       |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

### 7.9.4. PortE (NID = 0Eh): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 780h              |
| Get | F8000h              |                     |                    |                   |

| Field Name                         | Bits   | R/W | Default   | Reset            |
|------------------------------------|--|-----|-----------|------------------|
| Rsvd1                              | 31:8   | R   | 00000000h | N/A (Hard-coded) |
|                                    | Reserved.  |     |           |                  |
| Mute                               | 7  | RW  | 0h        | POR - DAFG - ULR |
| Amp mute: 1 = muted, 0 = not muted |  |     |           |                  |
| Gain                               | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|                                    | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.9.5. PortE (NID = 0Eh): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 781h              |
| Get | F8100h              |                     |                    |                   |

| Field Name                         | Bits   | R/W | Default   | Reset            |
|------------------------------------|--|-----|-----------|------------------|
| Rsvd1                              | 31:8   | R   | 00000000h | N/A (Hard-coded) |
|                                    | Reserved.  |     |           |                  |
| Mute                               | 7  | RW  | 0h        | POR - DAFG - ULR |
| Amp mute: 1 = muted, 0 = not muted |  |     |           |                  |
| Gain                               | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|                                    | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.9.6. PortE (NID = 0Eh): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

### 7.9.7. PortE (NID = 0Eh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

**7.9.8. PortE (NID = 0Eh): PinWCntrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| HPhnEn     | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Headphone amp enable: 1 = enabled, 0 = disabled. |     |         |                  |
| OutEn      | 6  | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled.        |     |         |                  |
| InEn       | 5  | R   | 0h      | N/A (Hard-coded) |
|            | Input enable: 1 = enabled, 0 = disabled.         |     |         |                  |
| Rsvd1      | 4:0  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |

**7.9.9. PortE (NID = 0Eh): UnsolResp**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| En         | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicted response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

#### 7.9.10. PortE (NID = 0Eh): ChSense

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

#### 7.9.11. PortE (NID = 0Eh): EAPDBTLLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd2      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| EAPD       | 1  | RW  | 1h        | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |           |                  |



| Field Name | Bits | R/W | Default | Reset            |
|------------|------|-----|---------|------------------|
| Rsvd1      | 0    | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |

**7.9.12. PortE (NID = 0Eh): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 0h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 01h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 0h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 1h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 4h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 0h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 5h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |

## 7.10. PortF (NID = 0Fh): WCap (I2S Input)

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 1h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.10.1. PortF (NID = 0Fh): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 1h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VrefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 1h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.10.2. PortF (NID = 0Fh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.10.3. PortF (NID = 0Fh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits     | R/W | Default | Reset            |
|------------|----------|-----|---------|------------------|
| ConL3      | 31:24    | R   | 00h     | N/A (Hard-coded) |
|            | Reserved |     |         |                  |
| ConL2      | 23:16    | R   | 00h     | N/A (Hard-coded) |
|            | Reserved |     |         |                  |
| ConL1      | 15:8     | R   | 00h     | N/A (Hard-coded) |
|            | Reserved |     |         |                  |
| ConL0      | 7:0      | R   | 00h     | N/A (Hard-coded) |
|            | Reserved |     |         |                  |

### 7.10.4. PortF (NID = 0Fh): InAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |
| Get | B2000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.10.5. PortF (NID = 0Fh): InAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

#### 7.10.6. PortF (NID = 0Fh): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:2                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 1:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |



**7.10.7. PortF (NID = 0Fh): PwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

**7.10.8. PortF (NID = 0Fh): PinWCntrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:7  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled.   |     |         |                  |
| InEn       | 5   | RW  | 0h      | POR - DAFG - ULR |
|            | Input enable: 1 = enabled, 0 = disabled.  |     |         |                  |
| Rsvd1      | 4:3   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| VRefEn     | 2:0   | RW  | 0h      | POR - DAFG - ULR |
|            | Vref selection (See VrefCntrl field of PinCap parameter for supported selections):<br>000b= HI-Z<br>001b= 50%<br>010b= GND<br>011b= Reserved<br>100b= 80%<br>101b= 100%<br>110b= Reserved<br>111b= Reserved |     |         |                  |

#### 7.10.9. PortF (NID = 0Fh): UnsolResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

**7.10.10. PortF (NID = 0Fh): ChSense**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

**7.10.11. PortF (NID = 0Fh): EAPDBTLR**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd2      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| EAPD       | 1  | RW  | 1h        | POR - DAFG - ULR |
|            | EAPD control: 1 = set EAPD pin to 1 (powered) up if this pin is powered up, 0 = set EAPD pin to 0. |     |           |                  |

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| Field Name | Bits | R/W | Default | Reset            |
|------------|------|-----|---------|------------------|
| Rsvd1      | 0    | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |

**7.10.12. PortF (NID = 0Fh): InVolLeft**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 790h              |
| Get | F9000h              |                     |                    |                   |

| Field Name   | Bits | R/W | Default | Reset            |
|--|------|-----|---------|------------------|
| Rsvd1  | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |
| Mute   | 7    | RW  | 0h      | POR - DAFG - ULR |
| Volume mute, 1=mute, 0 not muted   |      |     |         |                  |
| Gain   | 6:0  | RW  | 00h     | POR - DAFG - ULR |
| 0 to -95.25dB in 0.75dB steps.Both headphone and BTL output paths are adjusted |      |     |         |                  |

**7.10.13. PortF (NID = 0Fh): InVolRight**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 791h              |
| Get | F9100h              |                     |                    |                   |

| Field Name                       | Bits | R/W | Default | Reset            |
|----------------------------------|------|-----|---------|------------------|
| Rsvd1                            | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.                        |      |     |         |                  |
| Mute                             | 7    | RW  | 0h      | POR - DAFG - ULR |
| Volume mute, 1=mute, 0 not muted |      |     |         |                  |

| Field Name   | Bits | R/W | Default | Reset            |
|--|------|-----|---------|------------------|
| Gain   | 6:0  | RW  | 00h     | POR - DAFG - ULR |
| 0 to -95.25dB in 0.75dB steps.Both headphone and BTL output paths are adjusted |      |     |         |                  |

**7.10.14. PortF (NID = 0Fh): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 0h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 01h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

**92HD90****SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 8h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 1h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 3h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 0h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 2h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | Eh      | POR   |
|             | Sequence.  |     |         |       |

## 7.11. MonoOut (NID = 10h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 4h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |



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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 0h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.11.1. MonoOut (NID = 10h): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 0h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VrefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 0h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 0h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.11.2. MonoOut (NID = 10h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.11.3. MonoOut (NID = 10h): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                          | R/W | Default | Reset            |
|------------|-------------------------------|-----|---------|------------------|
| ConL3      | 31:24                         | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.            |     |         |                  |
| ConL2      | 23:16                         | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.            |     |         |                  |
| ConL1      | 15:8                          | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.            |     |         |                  |
| ConL0      | 7:0                           | R   | 1Ah     | N/A (Hard-coded) |
|            | MonoMix Summing widget (0x1A) |     |         |                  |

### 7.11.4. MonoOut (NID = 10h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

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| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.11.5. MonoOut (NID = 10h): PinWCntrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits                                      | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:7                                      | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                                 |     |         |                  |
| OutEn      | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled. |     |         |                  |

| Field Name | Bits | R/W | Default | Reset            |
|------------|------|-----|---------|------------------|
| Rsvd1      | 5:0  | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |

**7.11.6. MonoOut (NID = 10h): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 1h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 00h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name     | Bits  | R/W | Default | Reset |
|----------------|---|-----|---------|-------|
| Device         | 23:20   | RW  | Fh      | POR   |
|                | Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |     |         |       |
| ConnectionType | 19:16   | RW  | 0h      | POR   |
|                | Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 0h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 0h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | Fh      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |

## 7.12. DMic0 (NID = 11h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| Rsvd2       | 31:24  | R   | 00h     | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| Type        | 23:20  | R   | 4h      | N/A (Hard-coded) |
|             | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay       | 19:16  | R   | 0h      | N/A (Hard-coded) |
|             | Number of sample delays through widget.  |     |         |                  |
| Rsvd1       | 15:12  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| SwapCap     | 11   | R   | 0h      | N/A (Hard-coded) |
|             | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl    | 10   | R   | 1h      | N/A (Hard-coded) |
|             | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| DigitalStrm | 9  | R   | 0h      | N/A (Hard-coded) |
|             | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList    | 8  | R   | 0h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnsolCap    | 7  | R   | 1h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |



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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.12.1. DMic0 (NID = 11h): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Rsvd2      | 31:17                          | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved.                      |     |         |                  |
| EapdCap    | 16                             | R   | 0h      | N/A (Hard-coded) |
|            | EAPD support: 1 = yes, 0 = no. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| VRefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 1h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 0h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HPhnDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.12.2. DMic0 (NID = 11h): InAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |
| Get | B2000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

### 7.12.3. DMic0 (NID = 11h): InAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

### 7.12.4. DMic0 (NID = 11h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name   | Bits      | R/W | Default | Reset            |
|--|-----------|-----|---------|------------------|
| Rsvd4  | 31:11     | R   | 000000h | N/A (Hard-coded) |
|  | Reserved. |     |         |                  |
| SettingsReset  | 10        | R   | 1h      | POR - DAFG - ULR |
| Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |           |     |         |                  |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd3      | 9   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Error      | 8   | R   | 0h      | POR - DAFG - ULR |
|            | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state. |     |         |                  |
| Rsvd2      | 7:6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Act        | 5:4   | R   | 3h      | POR - DAFG - LR  |
|            | Actual power state of this widget.  |     |         |                  |
| Rsvd1      | 3:2   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Set        | 1:0   | RW  | 0h      | POR - DAFG - LR  |
|            | Current power state setting for this widget.  |     |         |                  |

#### 7.12.5. DMic0 (NID = 11h): PinWCntrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits                                     | R/W | Default  | Reset            |
|------------|--|-----|----------|------------------|
| Rsvd2      | 31:6                                     | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.                                |     |          |                  |
| InEn       | 5  | RW  | 0h       | POR - DAFG - ULR |
|            | Input enable: 1 = enabled, 0 = disabled. |     |          |                  |
| Rsvd1      | 4:0                                      | R   | 00h      | N/A (Hard-coded) |
|            | Reserved.                                |     |          |                  |

**7.12.6. DMic0 (NID = 11h): UnsolResp**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled.                 |     |         |                  |
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

**7.12.7. DMic0 (NID = 11h): ChSense**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| PresDtct   | 31  | R   | 0h        | POR              |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |           |                  |
| Rsvd       | 30:0  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

**7.12.8. DMic0 (NID = 11h): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 2h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 10h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | Ah      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 3h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 0h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 1h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 3h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |



## 7.13. DMic1Vol (NID = 12h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| Rsvd2       | 31:24  | R   | 00h     | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| Type        | 23:20  | R   | Fh      | N/A (Hard-coded) |
|             | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay       | 19:16  | R   | 0h      | N/A (Hard-coded) |
|             | Number of sample delays through widget.  |     |         |                  |
| Rsvd1       | 15:12  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| SwapCap     | 11   | R   | 0h      | N/A (Hard-coded) |
|             | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl    | 10   | R   | 1h      | N/A (Hard-coded) |
|             | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| DigitalStrm | 9  | R   | 0h      | N/A (Hard-coded) |
|             | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList    | 8  | R   | 1h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnsolCap    | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.13.1. DMic1Vol (NID = 12h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

**7.13.2. DMic1Vol (NID = 12h): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                      | R/W | Default | Reset            |
|------------|---------------------------|-----|---------|------------------|
| ConL3      | 31:24                     | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.        |     |         |                  |
| ConL2      | 23:16                     | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.        |     |         |                  |
| ConL1      | 15:8                      | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.        |     |         |                  |
| ConL0      | 7:0                       | R   | 20h     | N/A (Hard-coded) |
|            | Dig1Pin Pin widget (0x20) |     |         |                  |

**7.13.3. DMic1Vol (NID = 12h): InAmpLeft**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |
| Get | B2000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

**7.13.4. DMic1Vol (NID = 12h): InAmpRight**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd1      | 31:2   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| Gain       | 1:0  | RW  | 0h        | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |           |                  |

### 7.13.5. DMic1Vol (NID = 12h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

## 7.14. DAC0 (NID = 13h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 0h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | Dh      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 1h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 0h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.14.1. DAC0 (NID = 13h): Cnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name   | Bits                                      | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Rsvd2        | 31:16                                     | R   | 0000h   | N/A (Hard-coded) |
|              | Reserved.                                 |     |         |                  |
| StrmType     | 15  | R   | 0h      | N/A (Hard-coded) |
|              | Stream type: 1 = Non-PCM, 0 = PCM.        |     |         |                  |
| FrmtSmpIRate | 14  | RW  | 0h      | POR - DAFG - ULR |
|              | Sample base rate: 1 = 44.1kHz, 0 = 48kHz. |     |         |                  |

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| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved   |     |         |                  |
| SmplRateDiv   | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1         | 7   | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| BitsPerSmpl   | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|               | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved   |     |         |                  |
| NmbrChan      | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|               | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.   |     |         |                  |

### 7.14.2. DAC0 (NID = 13h): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Gain       | 6:0   | RW  | 7Fh     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.14.3. DAC0 (NID = 13h): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Gain       | 6:0   | RW  | 7Fh     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.14.4. DAC0 (NID = 13h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd4      | 31:11     | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |



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| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 3h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.14.5. DAC0 (NID = 13h): CnvtrID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset                  |
|------------|--|-----|---------|------------------------|
| Rsvd       | 31:8   | R   | 000000h | N/A (Hard-coded)       |
|            | Reserved.  |     |         |                        |
| Strm       | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |     |         |                        |
| Ch         | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |     |         |                        |

**7.14.6. DAC0 (NID = 13h): EAPDBTLLR**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd2      | 31:3  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| SwapEn     | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | Swap enable: 1 = L/R swap enabled, 0 = L/R swap disabled. |     |           |                  |
| Rsvd1      | 1:0   | R   | 0h        | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

**7.15. DAC1 (NID = 14h): WCap**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name   | Bits      | R/W | Default | Reset            |
|--|-----------|-----|---------|------------------|
| Rsvd2  | 31:24     | R   | 00h     | N/A (Hard-coded) |
|  | Reserved. |     |         |                  |
| Type   | 23:20     | R   | 0h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |           |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| Delay       | 19:16   | R   | Dh      | N/A (Hard-coded) |
|             | Number of sample delays through widget.                     |     |         |                  |
| Rsvd1       | 15:12   | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.   |     |         |                  |
| SwapCap     | 11  | R   | 1h      | N/A (Hard-coded) |
|             | Left/right swap support: 1 = yes, 0 = no.                   |     |         |                  |
| PwrCntrl    | 10  | R   | 1h      | N/A (Hard-coded) |
|             | Power state support: 1 = yes, 0 = no.                       |     |         |                  |
| Dig         | 9   | R   | 0h      | N/A (Hard-coded) |
|             | Digital stream support: 1 = yes (digital), 0 = no (analog). |     |         |                  |
| ConnList    | 8   | R   | 0h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.                   |     |         |                  |
| UnSolCap    | 7   | R   | 0h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.              |     |         |                  |
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.                  |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                          |     |         |                  |
| FormatOvrd  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                    |     |         |                  |
| AmpParOvrd  | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.               |     |         |                  |
| OutAmpPrsnt | 2   | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                        |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                         |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono).     |     |         |                  |

**7.15.1. DAC1 (NID = 14h): Cnvtr**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| Rsvd2         | 31:16   | R   | 0000h   | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| StrmType      | 15  | R   | 0h      | N/A (Hard-coded) |
|               | Stream type: 1 = Non-PCM, 0 = PCM.  |     |         |                  |
| FrmtSmplRate  | 14  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate: 1 = 44.1kHz, 0 = 48kHz.   |     |         |                  |
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved   |     |         |                  |
| SmplRateDiv   | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1         | 7   | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| BitsPerSmpl | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|             | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved |     |         |                  |
| NmbrChan    | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|             | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.                           |     |         |                  |

### 7.15.2. DAC1 (NID = 14h): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Gain       | 6:0   | RW  | 7Fh     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

### 7.15.3. DAC1 (NID = 14h): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

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| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Gain       | 6:0   | RW  | 7Fh     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.15.4. DAC1 (NID = 14h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |

| Field Name                                   | Bits | R/W | Default | Reset           |
|--|------|-----|---------|-----------------|
| Set  | 1:0  | RW  | 3h      | POR - DAFG - LR |
| Current power state setting for this widget. |      |     |         |                 |

**7.15.5. DAC1 (NID = 14h): CnvtrID**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name   | Bits | R/W | Default | Reset                  |
|--|------|-----|---------|------------------------|
| Rsvd   | 31:8 | R   | 000000h | N/A (Hard-coded)       |
| Reserved.  |      |     |         |                        |
| Strm   | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
| Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |      |     |         |                        |
| Ch   | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
| Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |      |     |         |                        |

**7.15.6. DAC1 (NID = 14h): EAPDBTLLR**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name  | Bits | R/W | Default   | Reset            |
|---|------|-----|-----------|------------------|
| Rsvd2   | 31:3 | R   | 00000000h | N/A (Hard-coded) |
| Reserved.   |      |     |           |                  |
| SwapEn  | 2    | RW  | 0h        | POR - DAFG - ULR |
| Swap enable: 1 = L/R swap enabled, 0 = L/R swap disabled. |      |     |           |                  |
| Rsvd1   | 1:0  | R   | 0h        | N/A (Hard-coded) |
| Reserved.   |      |     |           |                  |

## 7.16. ADC0 (NID = 15h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 1h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | Dh      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |



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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 1h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.16.1. ADC0 (NID = 15h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

## 7.16.2. ADC0 (NID = 15h): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| ConL3      | 31:24                          | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL2      | 23:16                          | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL1      | 15:8                           | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL0      | 7:0                            | R   | 20h     | N/A (Hard-coded) |
|            | ADC0Mux Selector widget (0x17) |     |         |                  |

## 7.16.3. ADC0 (NID = 15h): Cnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name   | Bits                                      | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Rsvd2        | 31:16                                     | R   | 0000h   | N/A (Hard-coded) |
|              | Reserved.                                 |     |         |                  |
| StrmType     | 15  | R   | 0h      | N/A (Hard-coded) |
|              | Stream type: 1 = Non-PCM, 0 = PCM.        |     |         |                  |
| FrmtSmplRate | 14  | RW  | 0h      | POR - DAFG - ULR |
|              | Sample base rate: 1 = 44.1kHz, 0 = 48kHz. |     |         |                  |

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| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved   |     |         |                  |
| SmplRateDiv   | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1         | 7   | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| BitsPerSmpl   | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|               | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved   |     |         |                  |
| NmbrChan      | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|               | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.   |     |         |                  |

### 7.16.4. ADC0 (NID = 15h): ProcState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 703h              |
| Get | F0300h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| HPFOCDIS   | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | HPF offset calculation disable. 1 = calculation disabled; 0 = calculation enabled.                 |     |         |                  |
| Rsvd1      | 6:2  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| ADCHPFByp  | 1:0  | RW  | 1h      | POR - DAFG - ULR |
|            | Processing State: 00b= bypass the ADC HPF ("off"), 01b-11b= ADC HPF is enabled ("on" or "benign"). |     |         |                  |

#### 7.16.5. ADC0 (NID = 15h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Act        | 5:4  | R   | 3h      | POR - DAFG - LR  |
|            | Actual power state of this widget.           |     |         |                  |
| Rsvd1      | 3:2  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                    |     |         |                  |
| Set        | 1:0  | RW  | 3h      | POR - DAFG - LR  |
|            | Current power state setting for this widget. |     |         |                  |

#### 7.16.6. ADC0 (NID = 15h): CnvtrID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset                  |
|------------|--|-----|---------|------------------------|
| Rsvd       | 31:8   | R   | 000000h | N/A (Hard-coded)       |
|            | Reserved.  |     |         |                        |
| Strm       | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |     |         |                        |
| Ch         | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |     |         |                        |

#### 7.17. ADC1 (NID = 1Bh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

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| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 1h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | Dh      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |
| ProcWidget | 6  | R   | 1h      | N/A (Hard-coded) |
|            | Processing state support: 1 = yes, 0 = no.   |     |         |                  |
| Stripe     | 5  | R   | 0h      | N/A (Hard-coded) |
|            | Striping support: 1 = yes, 0 = no.   |     |         |                  |

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| FormatOvrd  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrd  | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

#### 7.17.1. ADC1 (NID = 1Bh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

#### 7.17.2. ADC1 (NID = 1Bh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                  | R/W | Default | Reset            |
|------------|-----------------------|-----|---------|------------------|
| ConL3      | 31:24                 | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.    |     |         |                  |
| ConL2      | 23:16                 | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.    |     |         |                  |
| ConL1      | 15:8                  | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.    |     |         |                  |
| ConL0      | 7:0                   | R   | 18h     | N/A (Hard-coded) |
|            | ADC1Mux widget (0x18) |     |         |                  |

**7.17.3. ADC1 (NID = 1Bh): Cnvtr**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| Rsvd2         | 31:16   | R   | 0000h   | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| StrmType      | 15  | R   | 0h      | N/A (Hard-coded) |
|               | Stream type: 1 = Non-PCM, 0 = PCM.  |     |         |                  |
| FrmtSmplRate  | 14  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate: 1 = 44.1kHz, 0 = 48kHz.   |     |         |                  |
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved |     |         |                  |



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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| SmpIRateDiv | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|             | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1       | 7   | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.   |     |         |                  |
| BitsPerSmpI | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|             | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved   |     |         |                  |
| NmbrChan    | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|             | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.   |     |         |                  |

### 7.17.4. ADC1 (NID = 1Bh): ProcState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 703h              |
| Get | F0300h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| HPFOCDIS   | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | HPF offset calculation disable. 1 = calculation disabled; 0 = calculation enabled. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd1      | 6:2  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| ADCHPFByp  | 1:0  | RW  | 1h      | POR - DAFG - ULR |
|            | Processing State: 00b= bypass the ADC HPF ("off"), 01b-11b= ADC HPF is enabled ("on" or "benign"). |     |         |                  |

### 7.17.5. ADC1 (NID = 1Bh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 3h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

## 7.17.6. ADC1 (NID = 1Bh): CnvtrID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset                  |
|------------|--|-----|---------|------------------------|
| Rsvd       | 31:8   | R   | 000000h | N/A (Hard-coded)       |
|            | Reserved.  |     |         |                        |
| Strm       | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |     |         |                        |
| Ch         | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |     |         |                        |

## 7.18. ADC0Mux (NID = 17h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| Rsvd2       | 31:24  | R   | 00h     | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| Type        | 23:20  | R   | 3h      | N/A (Hard-coded) |
|             | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay       | 19:16  | R   | 0h      | N/A (Hard-coded) |
|             | Number of sample delays through widget.  |     |         |                  |
| Rsvd1       | 15:12  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| SwapCap     | 11   | R   | 1h      | N/A (Hard-coded) |
|             | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl    | 10   | R   | 1h      | N/A (Hard-coded) |
|             | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| DigitalStrm | 9  | R   | 0h      | N/A (Hard-coded) |
|             | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList    | 8  | R   | 1h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnsolCap    | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name   | Bits  | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| ProcWidget   | 6   | R   | 0h      | N/A (Hard-coded) |
|              | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe       | 5   | R   | 0h      | N/A (Hard-coded) |
|              | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvrđ   | 4   | R   | 0h      | N/A (Hard-coded) |
|              | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParamOvrđ | 3   | R   | 1h      | N/A (Hard-coded) |
|              | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt  | 2   | R   | 1h      | N/A (Hard-coded) |
|              | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt   | 1   | R   | 0h      | N/A (Hard-coded) |
|              | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo       | 0   | R   | 1h      | N/A (Hard-coded) |
|              | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.18.1. ADC0Mux (NID = 17h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 06h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list<br>ZA/ZB: default was 05h.                             |     |         |                  |

**7.18.2. ADC0Mux (NID = 17h): ConLstEntry4**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0204h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| ConL7      | 31:24   | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.  |     |         |                  |
| ConL6      | 23:16   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved  |     |         |                  |
| ConL5      | 15:8  | R   | 12h     | N/A (Hard-coded) |
|            | DMIC1 widget (0x12)<br>ZA/ZB: this was Reserved, Port C not available |     |         |                  |
| ConL4      | 7:0   | R   | 11h     | N/A (Hard-coded) |
|            | DMIC0 widget (0x11)<br>ZA/ZB: this was DMIC1, Port C not available    |     |         |                  |

**7.18.3. ADC0Mux (NID = 17h): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| ConL3      | 31:24  | R   | 0Fh     | N/A (Hard-coded) |
|            | Port F Pin widget (0x0F)<br>ZA/ZB: this was DMIC0, Port C not available  |     |         |                  |
| ConL2      | 23:16  | R   | 0Ch     | N/A (Hard-coded) |
|            | Port C Pin widget (0x0C)<br>ZA/ZB: this was Port F, Port C not available |     |         |                  |
| ConL1      | 15:8   | R   | 0Ah     | N/A (Hard-coded) |
|            | Port A Pin widget (0x0A)   |     |         |                  |

| Field Name                  | Bits | R/W | Default | Reset            |
|-----------------------------|------|-----|---------|------------------|
| ConL0                       | 7:0  | R   | 1Bh     | N/A (Hard-coded) |
| Mixer Summing widget (0x1B) |      |     |         |                  |

#### 7.18.4. ADC0Mux (NID = 17h): OutAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Mute   | 31    | R   | 1h      | N/A (Hard-coded) |
| Mute support: 1 = yes, 0 = no.   |       |     |         |                  |
| Rsvd3  | 30:23 | R   | 00h     | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| StepSize   | 22:16 | R   | 03h     | N/A (Hard-coded) |
| Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |       |     |         |                  |
| Rsvd2  | 15    | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| NumSteps   | 14:8  | R   | 2Eh     | N/A (Hard-coded) |
| Number of gains steps (number of possible settings - 1).                       |       |     |         |                  |
| Rsvd1  | 7     | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| Offset   | 6:0   | R   | 10h     | N/A (Hard-coded) |
| Indicates which step is 0dB  |       |     |         |                  |

#### 7.18.5. ADC0Mux (NID = 17h): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Rsvd1      | 6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 5:0   | RW  | 10h     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.18.6. ADC0Mux (NID = 17h): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Rsvd1      | 6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 5:0   | RW  | 10h     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.18.7. ADC0Mux (NID = 17h): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |



| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:3                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 2:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

### 7.18.8. ADC0Mux (NID = 17h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

## 7.18.9. ADC0Mux (NID = 17h): EAPDBTLLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd2      | 31:3  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| SwapEn     | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | Swap enable: 1 = L/R swap enabled, 0 = L/R swap disabled. |     |           |                  |
| Rsvd1      | 1:0   | R   | 0h        | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |

## 7.19. ADC1Mux (NID = 18h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name   | Bits      | R/W | Default | Reset            |
|--|-----------|-----|---------|------------------|
| Rsvd2  | 31:24     | R   | 00h     | N/A (Hard-coded) |
|  | Reserved. |     |         |                  |
| Type   | 23:20     | R   | 3h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |           |     |         |                  |

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| Field Name   | Bits  | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Delay        | 19:16   | R   | 0h      | N/A (Hard-coded) |
|              | Number of sample delays through widget.                     |     |         |                  |
| Rsvd1        | 15:12   | R   | 0h      | N/A (Hard-coded) |
|              | Reserved.   |     |         |                  |
| SwapCap      | 11  | R   | 1h      | N/A (Hard-coded) |
|              | Left/right swap support: 1 = yes, 0 = no.                   |     |         |                  |
| PwrCntrl     | 10  | R   | 1h      | N/A (Hard-coded) |
|              | Power state support: 1 = yes, 0 = no.                       |     |         |                  |
| DigitalStrm  | 9   | R   | 0h      | N/A (Hard-coded) |
|              | Digital stream support: 1 = yes (digital), 0 = no (analog). |     |         |                  |
| ConnList     | 8   | R   | 1h      | N/A (Hard-coded) |
|              | Connection list present: 1 = yes, 0 = no.                   |     |         |                  |
| UnsolCap     | 7   | R   | 0h      | N/A (Hard-coded) |
|              | Unsolicited response support: 1 = yes, 0 = no.              |     |         |                  |
| ProcWidget   | 6   | R   | 0h      | N/A (Hard-coded) |
|              | Processing state support: 1 = yes, 0 = no.                  |     |         |                  |
| Stripe       | 5   | R   | 0h      | N/A (Hard-coded) |
|              | Striping support: 1 = yes, 0 = no.                          |     |         |                  |
| FormatOvrd   | 4   | R   | 0h      | N/A (Hard-coded) |
|              | Stream format override: 1 = yes, 0 = no.                    |     |         |                  |
| AmpParamOvrd | 3   | R   | 1h      | N/A (Hard-coded) |
|              | Amplifier capabilities override: 1 = yes, no.               |     |         |                  |
| OutAmpPrsnt  | 2   | R   | 1h      | N/A (Hard-coded) |
|              | Output amp present: 1 = yes, 0 = no.                        |     |         |                  |
| InAmpPrsnt   | 1   | R   | 0h      | N/A (Hard-coded) |
|              | Input amp present: 1 = yes, 0 = no.                         |     |         |                  |
| Stereo       | 0   | R   | 1h      | N/A (Hard-coded) |
|              | Stereo stream support: 1 = yes (stereo), 0 = no (mono).     |     |         |                  |

## 7.19.1. ADC1Mux (NID = 18h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 06h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.<br>ZA/ZB: Default was 05h                             |     |         |                  |

## 7.19.2. ADC1Mux (NID = 18h): ConLstEntry4

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0204h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| ConL7      | 31:24   | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.  |     |         |                  |
| ConL6      | 23:16   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| ConL5      | 15:8  | R   | 12h     | N/A (Hard-coded) |
|            | DMIC1 widget (0x12)<br>ZA/ZB: this was Reserved, Port C not available |     |         |                  |
| ConL4      | 7:0   | R   | 11h     | N/A (Hard-coded) |
|            | DMIC0 widget (0x11)<br>ZA/ZB: this was DMIC1, Port C not available    |     |         |                  |

**7.19.3. ADC1Mux (NID = 18h): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| ConL3      | 31:24   | R   | 0Fh     | N/A (Hard-coded) |
|            | Port F Pin widget (0x0F)<br>ZA/ZB: this was DMIC0, Port C not available |     |         |                  |
| ConL2      | 23:16   | R   | 0Ch     | N/A (Hard-coded) |
|            | Port C Pin widget (0x0F)<br>ZA/ZB: this was PortF, Port C not available |     |         |                  |
| ConL1      | 15:8  | R   | 0Ah     | N/A (Hard-coded) |
|            | Port A Pin widget (0x0A)  |     |         |                  |
| ConL0      | 7:0   | R   | 1Bh     | N/A (Hard-coded) |
|            | Mixer Summing widget (0x1B)   |     |         |                  |

**7.19.4. ADC1Mux (NID = 18h): OutAmpCap**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 03h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 2Eh     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1). |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 10h     | N/A (Hard-coded) |
|            | Indicates which step is 0dB                              |     |         |                  |

**7.19.5. ADC1Mux (NID = 18h): OutAmpLeft**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Rsvd1      | 6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 5:0   | RW  | 10h     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

**7.19.6. ADC1Mux (NID = 18h): OutAmpRight**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Mute       | 7   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Rsvd1      | 6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 5:0   | RW  | 10h     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

#### 7.19.7. ADC1Mux (NID = 18h): ConSelectCtrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default   | Reset            |
|------------|----------------------------------|-----|-----------|------------------|
| Rsvd       | 31:3                             | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |           |                  |
| Index      | 2:0                              | RW  | 0h        | POR - DAFG - ULR |
|            | Connection select control index. |     |           |                  |

#### 7.19.8. ADC1Mux (NID = 18h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd4      | 31:11     | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

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| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

### 7.19.9. ADC1Mux (NID = 18h): EAPDBTLLR

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ch              |
| Get | F0C00h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default   | Reset            |
|------------|---|-----|-----------|------------------|
| Rsvd2      | 31:3  | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |
| SwapEn     | 2   | RW  | 0h        | POR - DAFG - ULR |
|            | Swap enable: 1 = L/R swap enabled, 0 = L/R swap disabled. |     |           |                  |
| Rsvd1      | 1:0   | R   | 0h        | N/A (Hard-coded) |
|            | Reserved.   |     |           |                  |



## 7.20. MonoMux (NID = 19h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 3h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.20.1. MonoMux (NID = 19h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 03h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

**7.20.2. MonoMux (NID = 19h): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                               | R/W | Default | Reset            |
|------------|------------------------------------|-----|---------|------------------|
| ConL3      | 31:24                              | R   | 00h     | N/A (Hard-coded) |
|            | DAC2 Converter widget (0x22)       |     |         |                  |
| ConL2      | 23:16                              | R   | 1Ch     | N/A (Hard-coded) |
|            | MixerOutVol Selector widget (0x1C) |     |         |                  |
| ConL1      | 15:8                               | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 Converter widget (0x14)       |     |         |                  |
| ConL0      | 7:0                                | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 Converter widget (0x13)       |     |         |                  |

**7.20.3. MonoMux (NID = 19h): ConSelectCtrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 701h              |
| Get | F0100h              |                     |                    |                   |

| Field Name | Bits                             | R/W | Default  | Reset            |
|------------|----------------------------------|-----|----------|------------------|
| Rsvd       | 31:2                             | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.                        |     |          |                  |
| Index      | 1:0                              | RW  | 0h       | POR - DAFG - ULR |
|            | Connection select control index. |     |          |                  |

**7.20.4. MonoMux (NID = 19h): PwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

## 92HD90

### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.21. MonoMix (NID = 1Ah): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:24     | R   | 00h     | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Type   | 23:20 | R   | 2h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |       |     |         |                  |
| Delay  | 19:16 | R   | 0h      | N/A (Hard-coded) |
| Number of sample delays through widget.  |       |     |         |                  |
| Rsvd1  | 15:12 | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| SwapCap  | 11    | R   | 0h      | N/A (Hard-coded) |
| Left/right swap support: 1 = yes, 0 = no.  |       |     |         |                  |
| PwrCntrl   | 10    | R   | 1h      | N/A (Hard-coded) |
| Power state support: 1 = yes, 0 = no.  |       |     |         |                  |
| Dig  | 9     | R   | 0h      | N/A (Hard-coded) |
| Digital stream support: 1 = yes (digital), 0 = no (analog).  |       |     |         |                  |
| ConnList   | 8     | R   | 1h      | N/A (Hard-coded) |
| Connection list present: 1 = yes, 0 = no.  |       |     |         |                  |
| UnSolCap   | 7     | R   | 0h      | N/A (Hard-coded) |
| Unsolicited response support: 1 = yes, 0 = no.   |       |     |         |                  |
| ProcWidget   | 6     | R   | 0h      | N/A (Hard-coded) |
| Processing state support: 1 = yes, 0 = no.   |       |     |         |                  |
| Stripe   | 5     | R   | 0h      | N/A (Hard-coded) |
| Striping support: 1 = yes, 0 = no.   |       |     |         |                  |
| FormatOvrd   | 4     | R   | 0h      | N/A (Hard-coded) |
| Stream format override: 1 = yes, 0 = no.   |       |     |         |                  |

**92HD90****SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| AmpParOvrd  | 3    | R   | 0h      | N/A (Hard-coded) |
| Amplifier capabilities override: 1 = yes, no.           |      |     |         |                  |
| OutAmpPrsnt   | 2    | R   | 0h      | N/A (Hard-coded) |
| Output amp present: 1 = yes, 0 = no.                    |      |     |         |                  |
| InAmpPrsnt  | 1    | R   | 0h      | N/A (Hard-coded) |
| Input amp present: 1 = yes, 0 = no.                     |      |     |         |                  |
| Stereo  | 0    | R   | 0h      | N/A (Hard-coded) |
| Stereo stream support: 1 = yes (stereo), 0 = no (mono). |      |     |         |                  |

**7.21.1. MonoMix (NID = 1Ah): ConLst**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| Rsvd  | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| LForm   | 7    | R   | 0h      | N/A (Hard-coded) |
| Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |      |     |         |                  |
| ConL  | 6:0  | R   | 01h     | N/A (Hard-coded) |
| Number of NID entries in connection list.   |      |     |         |                  |

**7.21.2. MonoMix (NID = 1Ah): ConLstEntry0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| ConL3      | 31:24                          | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL2      | 23:16                          | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL1      | 15:8                           | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.             |     |         |                  |
| ConL0      | 7:0                            | R   | 19h     | N/A (Hard-coded) |
|            | MonoMux Selector widget (0x19) |     |         |                  |

### 7.21.3. MonoMix (NID = 1Ah): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

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| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd1      | 3:2  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                    |     |         |                  |
| Set        | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|            | Current power state setting for this widget. |     |         |                  |



## 7.22. Mixer (NID = 1Bh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 2h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 1h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 1h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.22.1. Mixer (NID = 1Bh): InAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Dh              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 05h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 1Fh     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1). |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 17h     | N/A (Hard-coded) |
|            | Indicates which step is 0dB                              |     |         |                  |

#### 7.22.2. Mixer (NID = 1Bh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 05h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.<br>ZA/ZB: Default was 04h                             |     |         |                  |

#### 7.22.3. Mixer (NID = 1Bh): ConLstEntry4

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0204h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| ConL7      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.   |     |         |                  |
| ConL6      | 23:16  | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.   |     |         |                  |
| ConL5      | 15:8   | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.   |     |         |                  |
| ConL4      | 7:0  | R   | 0Fh     | N/A (Hard-coded) |
|            | Port F Pin widget (0x0F). Uses InAmpLeft3/InAmpRight3 controls<br>ZA/ZB: was Reserved, Port C not available. |     |         |                  |

#### 7.22.4. Mixer (NID = 1Bh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| ConL3      | 31:24   | R   | 0Ch     | N/A (Hard-coded) |
|            | Port C Pin widget (0x0C). Uses InAmpLeft3/InAmpRight3 controls.<br>ZA/ZB: was Port F, Port C not available. |     |         |                  |
| ConL2      | 23:16   | R   | 0Ah     | N/A (Hard-coded) |
|            | Port A Pin widget (0x0A). Uses InAmpLeft2/InAmpRight2 controls.   |     |         |                  |
| ConL1      | 15:8  | R   | 14h     | N/A (Hard-coded) |
|            | DAC1 widget (0x14). Uses InAmpLeft1/InAmpRight1 controls.   |     |         |                  |
| ConL0      | 7:0   | R   | 13h     | N/A (Hard-coded) |
|            | DAC0 widget (0x13). Uses InAmpLeft0/InAmpRight0 controls.   |     |         |                  |

#### 7.22.5. Mixer (NID = 1Bh): InAmpLeft0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 360h              |

**7.22.5. Mixer (NID = 1Bh): InAmpLeft0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Get | B2000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.6. Mixer (NID = 1Bh): InAmpRight0**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 350h              |
| Get | B0000h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.7. Mixer (NID = 1Bh): InAmpLeft1**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 361h              |
| Get | B2001h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.8. Mixer (NID = 1Bh): InAmpRight1**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 351h              |
| Get | B0001h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.9. Mixer (NID = 1Bh): InAmpLeft2**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 362h              |
| Get | B2002h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.10. Mixer (NID = 1Bh): InAmpRight2**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 352h              |
| Get | B0002h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.11. Mixer (NID = 1Bh): InAmpLeft3**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 363h              |
| Get | B2003h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.12. Mixer (NID = 1Bh): InAmpRight3**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 353h              |
| Get | B0003h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |



**7.22.13. Mixer (NID = 1Bh): InAmpLeft4**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 364h              |
| Get | B2004h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.14. Mixer (NID = 1Bh): InAmpRight4**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 354h              |
| Get | B0004h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.15. Mixer (NID = 1Bh): InAmpLeft5**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 365h              |
| Get | B2005h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.16. Mixer (NID = 1Bh): InAmpRight5**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 355h              |
| Get | B0005h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Mute       | 7  | RW  | 1h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                      |     |         |                  |
| Rsvd1      | 6:5  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Gain       | 4:0  | RW  | 17h     | POR - DAFG - ULR |
|            | Amp gain step number (see InAmpCap parameter pertaining to this widget). |     |         |                  |

**7.22.17. Mixer (NID = 1Bh): PwrState**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

**7.23. MixerOutVol (NID = 1Ch): WCap**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 3h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 1h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |
| ProcWidget | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Processing state support: 1 = yes, 0 = no.   |     |         |                  |
| Stripe     | 5  | R   | 0h      | N/A (Hard-coded) |
|            | Striping support: 1 = yes, 0 = no.   |     |         |                  |

| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| FormatOvrD  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrD  | 3   | R   | 1h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.23.1. MixerOutVol (NID = 1Ch): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.23.2. MixerOutVol (NID = 1Ch): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                        | R/W | Default | Reset            |
|------------|-----------------------------|-----|---------|------------------|
| ConL3      | 31:24                       | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.          |     |         |                  |
| ConL2      | 23:16                       | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.          |     |         |                  |
| ConL1      | 15:8                        | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.          |     |         |                  |
| ConL0      | 7:0                         | R   | 1Bh     | N/A (Hard-coded) |
|            | Mixer Summing widget (0x1B) |     |         |                  |

### 7.23.3. MixerOutVol (NID = 1Ch): OutAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 05h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 1Fh     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |

| Field Name                  | Bits | R/W | Default | Reset            |
|-----------------------------|------|-----|---------|------------------|
| Offset                      | 6:0  | R   | 1Fh     | N/A (Hard-coded) |
| Indicates which step is 0dB |      |     |         |                  |

#### 7.23.4. MixerOutVol (NID = 1Ch): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| Rsvd2   | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| Mute  | 7    | RW  | 1h      | POR - DAFG - ULR |
| Amp mute: 1 = muted, 0 = not muted.                                       |      |     |         |                  |
| Rsvd1   | 6:5  | R   | 0h      | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| Gain  | 4:0  | RW  | 1Fh     | POR - DAFG - ULR |
| Amp gain step number (see OutAmpCap parameter pertaining to this widget). |      |     |         |                  |

#### 7.23.5. MixerOutVol (NID = 1Ch): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name                          | Bits | R/W | Default | Reset            |
|-------------------------------------|------|-----|---------|------------------|
| Rsvd2                               | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.                           |      |     |         |                  |
| Mute                                | 7    | RW  | 1h      | POR - DAFG - ULR |
| Amp mute: 1 = muted, 0 = not muted. |      |     |         |                  |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd1      | 6:5   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 4:0   | RW  | 1Fh     | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

### 7.23.6. MixerOutVol (NID = 1Ch): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |



## 7.24. SPDIFOut0 (NID = 1Dh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | 0h      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 4h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 1h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 1h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 0h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 1h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 1h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.24.1. SPDIFOut0 (NID = 1Dh): PCMCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ah              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:21   | R   | 000h    | N/A (Hard-coded) |
|            | Reserved.                                     |     |         |                  |
| B32        | 20  | R   | 0h      | N/A (Hard-coded) |
|            | 32 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B24        | 19  | R   | 1h      | N/A (Hard-coded) |
|            | 24 bit audio format support: 1 = yes, 0 = no. |     |         |                  |

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| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| B20        | 18  | R   | 1h      | N/A (Hard-coded) |
|            | 20 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B16        | 17  | R   | 1h      | N/A (Hard-coded) |
|            | 16 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B8         | 16  | R   | 0h      | N/A (Hard-coded) |
|            | 8 bit audio format support: 1 = yes, 0 = no.  |     |         |                  |
| Rsvd1      | 15:12   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                     |     |         |                  |
| R12        | 11  | R   | 0h      | N/A (Hard-coded) |
|            | 384kHz rate support: 1 = yes, 0 = no.         |     |         |                  |
| R11        | 10  | R   | 1h      | N/A (Hard-coded) |
|            | 192kHz rate support: 1 = yes, 0 = no.         |     |         |                  |
| R10        | 9   | R   | 0h      | N/A (Hard-coded) |
|            | 176.4kHz rate support: 1 = yes, 0 = no.       |     |         |                  |
| R9         | 8   | R   | 1h      | N/A (Hard-coded) |
|            | 96kHz rate support: 1 = yes, 0 = no.          |     |         |                  |
| R8         | 7   | R   | 1h      | N/A (Hard-coded) |
|            | 88.2kHz rate support: 1 = yes, 0 = no.        |     |         |                  |
| R7         | 6   | R   | 1h      | N/A (Hard-coded) |
|            | 48kHz rate support: 1 = yes, 0 = no.          |     |         |                  |
| R6         | 5   | R   | 1h      | N/A (Hard-coded) |
|            | 44.1kHz rate support: 1 = yes, 0 = no.        |     |         |                  |
| R5         | 4   | R   | 0h      | N/A (Hard-coded) |
|            | 32kHz rate support: 1 = yes, 0 = no.          |     |         |                  |
| R4         | 3   | R   | 0h      | N/A (Hard-coded) |
|            | 22.05kHz rate support: 1 = yes, 0 = no.       |     |         |                  |
| R3         | 2   | R   | 0h      | N/A (Hard-coded) |
|            | 16kHz rate support: 1 = yes, 0 = no.          |     |         |                  |

| Field Name | Bits                                     | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| R2         | 1  | R   | 0h      | N/A (Hard-coded) |
|            | 11.025kHz rate support: 1 = yes, 0 = no. |     |         |                  |
| R1         | 0  | R   | 0h      | N/A (Hard-coded) |
|            | 8kHz rate support: 1 = yes, 0 = no.      |     |         |                  |

#### 7.24.2. SPDIFOut0 (NID = 1Dh): StreamCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Bh              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:3   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| AC3        | 2  | R   | 1h        | N/A (Hard-coded) |
|            | AC-3 formatted data support: 1 = yes, 0 = no.    |     |           |                  |
| Float32    | 1  | R   | 0h        | N/A (Hard-coded) |
|            | Float32 formatted data support: 1 = yes, 0 = no. |     |           |                  |
| PCM        | 0  | R   | 1h        | N/A (Hard-coded) |
|            | PCM-formatted data support: 1 = yes, 0 = no.     |     |           |                  |

#### 7.24.3. SPDIFOut0 (NID = 1Dh): OutAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name | Bits                           | R/W | Default | Reset            |
|------------|--------------------------------|-----|---------|------------------|
| Mute       | 31                             | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no. |     |         |                  |

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| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 00h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 00h     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 00h     | N/A (Hard-coded) |
|            | Indicates which step is 0dB  |     |         |                  |

### 7.24.4. SPDIFOut0 (NID = 1Dh): Cnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name   | Bits                                      | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Rsvd2        | 31:16                                     | R   | 0000h   | N/A (Hard-coded) |
|              | Reserved.                                 |     |         |                  |
| FrmtNonPCM   | 15  | RW  | 0h      | POR - DAFG - ULR |
|              | Stream type: 1 = Non-PCM, 0 = PCM.        |     |         |                  |
| FrmtSmplRate | 14  | RW  | 0h      | POR - DAFG - ULR |
|              | Sample base rate: 1 = 44.1kHz, 0 = 48kHz. |     |         |                  |

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| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved   |     |         |                  |
| SmplRateDiv   | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1         | 7   | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| BitsPerSmpl   | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|               | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved   |     |         |                  |
| NmbrChan      | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|               | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.   |     |         |                  |

### 7.24.5. SPDIFOut0 (NID = 1Dh): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA00h               |                     |                    |                   |

| Field Name | Bits                                | R/W | Default | Reset            |
|------------|-------------------------------------|-----|---------|------------------|
| Rsvd2      | 31:8                                | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |
| Mute       | 7                                   | RW  | 0h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted. |     |         |                  |
| Rsvd1      | 6:0                                 | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |

#### 7.24.6. SPDIFOut0 (NID = 1Dh): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name | Bits                                | R/W | Default | Reset            |
|------------|-------------------------------------|-----|---------|------------------|
| Rsvd2      | 31:8                                | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |
| Mute       | 7                                   | RW  | 0h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted. |     |         |                  |
| Rsvd1      | 6:0                                 | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |

#### 7.24.7. SPDIFOut0 (NID = 1Dh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd4      | 31:11     | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

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| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 3h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

### 7.24.8. SPDIFOut0 (NID = 1Dh): CnvtrID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset                  |
|------------|--|-----|---------|------------------------|
| Rsvd       | 31:8   | R   | 000000h | N/A (Hard-coded)       |
|            | Reserved.  |     |         |                        |
| Strm       | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |     |         |                        |
| Ch         | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |     |         |                        |



## 7.24.9. SPDIFOut0 (NID = 1Dh): DigCnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set | 73Fh                | 73Eh                | 70Eh               | 70Dh              |
| Get | F0E00h / F0D00h     |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:24   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| KeepAlive  | 23  | RW  | 0h      | POR - DAFG - ULR |
|            | Keep Alive Enable: 1 = clocking information maintained during D3, 0 = clock information not required during D3. |     |         |                  |
| Rsvd1      | 22:15   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| CC         | 14:8  | RW  | 00h     | POR - DAFG - ULR |
|            | CC: Category Code.  |     |         |                  |
| L          | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | L: Generation Level.  |     |         |                  |
| PRO        | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | PRO: Professional.  |     |         |                  |
| AUDIO      | 5   | RW  | 0h      | POR - DAFG - ULR |
|            | /AUDIO: Non-Audio.  |     |         |                  |
| COPY       | 4   | RW  | 0h      | POR - DAFG - ULR |
|            | COPY: Copyright.  |     |         |                  |
| PRE        | 3   | RW  | 0h      | POR - DAFG - ULR |
|            | PRE: Preemphasis.   |     |         |                  |
| VCFG       | 2   | RW  | 0h      | POR - DAFG - ULR |
|            | VCFG: Validity Config.  |     |         |                  |
| V          | 1   | RW  | 0h      | POR - DAFG - ULR |
|            | V: Validity.  |     |         |                  |

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| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| DigEn   | 0    | RW  | 0h      | POR - DAFG - ULR |
| Digital enable: 1 = converter enabled, 0 = converter disable. |      |     |         |                  |

### 7.25. SPDIFOut1 (NID = 1Eh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Rsvd2  | 31:24 | R   | 00h     | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| Type   | 23:20 | R   | 0h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |       |     |         |                  |
| Delay  | 19:16 | R   | 4h      | N/A (Hard-coded) |
| Number of sample delays through widget.  |       |     |         |                  |
| Rsvd1  | 15:12 | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| SwapCap  | 11    | R   | 0h      | N/A (Hard-coded) |
| Left/right swap support: 1 = yes, 0 = no.  |       |     |         |                  |
| PwrCntrl   | 10    | R   | 1h      | N/A (Hard-coded) |
| Power state support: 1 = yes, 0 = no.  |       |     |         |                  |
| Dig  | 9     | R   | 1h      | N/A (Hard-coded) |
| Digital stream support: 1 = yes (digital), 0 = no (analog).  |       |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ConnList    | 8   | R   | 0h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.               |     |         |                  |
| UnSolCap    | 7   | R   | 0h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.          |     |         |                  |
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvrd  | 4   | R   | 1h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrd  | 3   | R   | 1h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.25.1. SPDIFOut1 (NID = 1Eh): PCMCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ah              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:21     | R   | 000h    | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

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| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| B32        | 20  | R   | 0h      | N/A (Hard-coded) |
|            | 32 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B24        | 19  | R   | 1h      | N/A (Hard-coded) |
|            | 24 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B20        | 18  | R   | 1h      | N/A (Hard-coded) |
|            | 20 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B16        | 17  | R   | 1h      | N/A (Hard-coded) |
|            | 16 bit audio format support: 1 = yes, 0 = no. |     |         |                  |
| B8         | 16  | R   | 0h      | N/A (Hard-coded) |
|            | 8 bit audio format support: 1 = yes, 0 = no.  |     |         |                  |
| Rsvd1      | 15:12   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.                                     |     |         |                  |
| R12        | 11  | R   | 0h      | N/A (Hard-coded) |
|            | 384kHz rate support: 1 = yes, 0 = no.         |     |         |                  |
| R11        | 10  | R   | 1h      | N/A (Hard-coded) |
|            | 192kHz rate support: 1 = yes, 0 = no.         |     |         |                  |
| R10        | 9   | R   | 0h      | N/A (Hard-coded) |
|            | 176.4kHz rate support: 1 = yes, 0 = no.       |     |         |                  |
| R9         | 8   | R   | 1h      | N/A (Hard-coded) |
|            | 96kHz rate support: 1 = yes, 0 = no.          |     |         |                  |
| R8         | 7   | R   | 1h      | N/A (Hard-coded) |
|            | 88.2kHz rate support: 1 = yes, 0 = no.        |     |         |                  |
| R7         | 6   | R   | 1h      | N/A (Hard-coded) |
|            | 48kHz rate support: 1 = yes, 0 = no.          |     |         |                  |
| R6         | 5   | R   | 1h      | N/A (Hard-coded) |
|            | 44.1kHz rate support: 1 = yes, 0 = no.        |     |         |                  |
| R5         | 4   | R   | 0h      | N/A (Hard-coded) |
|            | 32kHz rate support: 1 = yes, 0 = no.          |     |         |                  |

| Field Name | Bits                                     | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| R4         | 3  | R   | 0h      | N/A (Hard-coded) |
|            | 22.05kHz rate support: 1 = yes, 0 = no.  |     |         |                  |
| R3         | 2  | R   | 0h      | N/A (Hard-coded) |
|            | 16kHz rate support: 1 = yes, 0 = no.     |     |         |                  |
| R2         | 1  | R   | 0h      | N/A (Hard-coded) |
|            | 11.025kHz rate support: 1 = yes, 0 = no. |     |         |                  |
| R1         | 0  | R   | 0h      | N/A (Hard-coded) |
|            | 8kHz rate support: 1 = yes, 0 = no.      |     |         |                  |

### 7.25.2. SPDIFOut1 (NID = 1Eh): StreamCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Bh              |                     |                    |                   |

| Field Name | Bits   | R/W | Default   | Reset            |
|------------|--|-----|-----------|------------------|
| Rsvd       | 31:3   | R   | 00000000h | N/A (Hard-coded) |
|            | Reserved.  |     |           |                  |
| AC3        | 2  | R   | 1h        | N/A (Hard-coded) |
|            | AC-3 formatted data support: 1 = yes, 0 = no.    |     |           |                  |
| Float32    | 1  | R   | 0h        | N/A (Hard-coded) |
|            | Float32 formatted data support: 1 = yes, 0 = no. |     |           |                  |
| PCM        | 0  | R   | 1h        | N/A (Hard-coded) |
|            | PCM-formatted data support: 1 = yes, 0 = no.     |     |           |                  |

### 7.25.3. SPDIFOut1 (NID = 1Eh): OutAmpCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

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| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 00h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 00h     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 00h     | N/A (Hard-coded) |
|            | Indicates which step is 0dB  |     |         |                  |

### 7.25.4. SPDIFOut1 (NID = 1Eh): Cnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 2h                |
| Get | A0000h              |                     |                    |                   |

| Field Name   | Bits                                      | R/W | Default | Reset            |
|--------------|---|-----|---------|------------------|
| Rsvd2        | 31:16                                     | R   | 0000h   | N/A (Hard-coded) |
|              | Reserved.                                 |     |         |                  |
| FrmtNonPCM   | 15  | RW  | 0h      | POR - DAFG - ULR |
|              | Stream type: 1 = Non-PCM, 0 = PCM.        |     |         |                  |
| FrmtSmpIRate | 14  | RW  | 0h      | POR - DAFG - ULR |
|              | Sample base rate: 1 = 44.1kHz, 0 = 48kHz. |     |         |                  |

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name    | Bits  | R/W | Default | Reset            |
|---------------|---|-----|---------|------------------|
| SmplRateMultp | 13:11   | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate multiple:<br>000b= x1 (48kHz/44.1kHz or less)<br>001b= x2 (96kHz/88.2kHz/32kHz)<br>010b= x3 (144kHz)<br>011b= x4 (192kHz/176.4kHz)<br>100b-111b Reserved   |     |         |                  |
| SmplRateDiv   | 10:8  | RW  | 0h      | POR - DAFG - ULR |
|               | Sample base rate divider:<br>000b= Divide by 1 (48kHz/44.1kHz)<br>001b= Divide by 2 (24kHz/20.05kHz)<br>010b= Divide by 3 (16kHz/32kHz)<br>011b= Divide by 4 (11.025kHz)<br>100b= Divide by 5 (9.6kHz)<br>101b= Divide by 6 (8kHz)<br>110b= Divide by 7<br>111b= Divide by 8 (6kHz) |     |         |                  |
| Rsvd1         | 7   | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.   |     |         |                  |
| BitsPerSmpl   | 6:4   | RW  | 3h      | POR - DAFG - ULR |
|               | Bits per sample:<br>000b= 8 bits<br>001b= 16 bits<br>010b= 20 bits<br>011b= 24 bits<br>100b= 32 bits<br>101b-111b= Reserved   |     |         |                  |
| NmbrChan      | 3:0   | RW  | 1h      | POR - DAFG - ULR |
|               | Total number of channels in the stream assigned to this converter:<br>0000b-1111b= 1-16 channels.   |     |         |                  |

### 7.25.5. SPDIFOut1 (NID = 1Eh): OutAmpLeft

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits                                | R/W | Default | Reset            |
|------------|-------------------------------------|-----|---------|------------------|
| Rsvd2      | 31:8                                | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |
| Mute       | 7                                   | RW  | 0h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted. |     |         |                  |
| Rsvd1      | 6:0                                 | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |

#### 7.25.6. SPDIFOut1 (NID = 1Eh): OutAmpRight

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 390h              |
| Get | B8000h              |                     |                    |                   |

| Field Name | Bits                                | R/W | Default | Reset            |
|------------|-------------------------------------|-----|---------|------------------|
| Rsvd2      | 31:8                                | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |
| Mute       | 7                                   | RW  | 0h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted. |     |         |                  |
| Rsvd1      | 6:0                                 | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.                           |     |         |                  |

#### 7.25.7. SPDIFOut1 (NID = 1Eh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd4      | 31:11     | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |



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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 3h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

### 7.25.8. SPDIFOut1 (NID = 1Eh): CnvtrID

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 706h              |
| Get | F0600h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset                  |
|------------|--|-----|---------|------------------------|
| Rsvd       | 31:8   | R   | 000000h | N/A (Hard-coded)       |
|            | Reserved.  |     |         |                        |
| Strm       | 7:4  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Stream ID: 0h = Converter "off", 1h-Fh = valid ID's.                             |     |         |                        |
| Ch         | 3:0  | RW  | 0h      | POR - S&DAFG - LR - PS |
|            | Channel assignment ("Ch" and "Ch+1" assigned as a pair, for a stereo converter). |     |         |                        |

## 7.25.9. SPDIFOut1 (NID = 1Eh): DigCnvtr

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set | 73Fh                | 73Eh                | 70Eh               | 70Dh              |
| Get | F0E00h / F0D00h     |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd2      | 31:24   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| KeepAlive  | 23  | RW  | 0h      | POR - DAFG - ULR |
|            | Keep Alive Enable: 1 = clocking information maintained during D3, 0 = clock information not required during D3. |     |         |                  |
| Rsvd1      | 22:15   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| CC         | 14:8  | RW  | 00h     | POR - DAFG - ULR |
|            | CC: Category Code.  |     |         |                  |
| L          | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | L: Generation Level.  |     |         |                  |
| PRO        | 6   | RW  | 0h      | POR - DAFG - ULR |
|            | PRO: Professional.  |     |         |                  |
| AUDIO      | 5   | RW  | 0h      | POR - DAFG - ULR |
|            | /AUDIO: Non-Audio.  |     |         |                  |
| COPY       | 4   | RW  | 0h      | POR - DAFG - ULR |
|            | COPY: Copyright.  |     |         |                  |
| PRE        | 3   | RW  | 0h      | POR - DAFG - ULR |
|            | PRE: Preemphasis.   |     |         |                  |
| VCFG       | 2   | RW  | 0h      | POR - DAFG - ULR |
|            | VCFG: Validity Config.  |     |         |                  |
| V          | 1   | RW  | 0h      | POR - DAFG - ULR |
|            | V: Validity.  |     |         |                  |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| DigEn   | 0    | RW  | 0h      | POR - DAFG - ULR |
| Digital enable: 1 = converter enabled, 0 = converter disable. |      |     |         |                  |

### 7.26. Dig0Pin (NID = 1Fh): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Rsvd2  | 31:24 | R   | 00h     | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| Type   | 23:20 | R   | 4h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |       |     |         |                  |
| Delay  | 19:16 | R   | 0h      | N/A (Hard-coded) |
| Number of sample delays through widget.  |       |     |         |                  |
| Rsvd1  | 15:12 | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| SwapCap  | 11    | R   | 0h      | N/A (Hard-coded) |
| Left/right swap support: 1 = yes, 0 = no.  |       |     |         |                  |
| PwrCntrl   | 10    | R   | 1h      | N/A (Hard-coded) |
| Power state support: 1 = yes, 0 = no.  |       |     |         |                  |
| Dig  | 9     | R   | 1h      | N/A (Hard-coded) |
| Digital stream support: 1 = yes (digital), 0 = no (analog).  |       |     |         |                  |

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| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ConnList    | 8   | R   | 1h      | N/A (Hard-coded) |
|             | Connection list present: 1 = yes, 0 = no.               |     |         |                  |
| UnSolCap    | 7   | R   | 1h      | N/A (Hard-coded) |
|             | Unsolicited response support: 1 = yes, 0 = no.          |     |         |                  |
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvrd  | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvrd  | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

### 7.26.1. Dig0Pin (NID = 1Fh): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:17     | R   | 0000h   | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| EapdCap     | 16   | R   | 0h      | N/A (Hard-coded) |
|             | EAPD support: 1 = yes, 0 = no.   |     |         |                  |
| VrefCntrl   | 15:8   | R   | 00h     | N/A (Hard-coded) |
|             | Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |     |         |                  |
| Rsvd1       | 7  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.   |     |         |                  |
| InCap       | 5  | R   | 0h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.  |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.   |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.  |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.   |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no.   |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.  |     |         |                  |

### 7.26.2. Dig0Pin (NID = 1Fh): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

### 7.26.3. Dig0Pin (NID = 1Fh): ConLstEntry0

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                              | R/W | Default | Reset            |
|------------|-----------------------------------|-----|---------|------------------|
| ConL3      | 31:24                             | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL2      | 23:16                             | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL1      | 15:8                              | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL0      | 7:0                               | R   | 1Dh     | N/A (Hard-coded) |
|            | SPDIFOut0 Converter widget (0x1D) |     |         |                  |

### 7.26.4. Dig0Pin (NID = 1Fh): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Set           | 1:0  | RW  | 0h      | POR - DAFG - LR  |
|               | Current power state setting for this widget.   |     |         |                  |

#### 7.26.5. Dig0Pin (NID = 1Fh): PinWCntrl

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits                                      | R/W | Default  | Reset            |
|------------|---|-----|----------|------------------|
| Rsvd2      | 31:7                                      | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.                                 |     |          |                  |
| OutEn      | 6   | RW  | 0h       | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled. |     |          |                  |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd1      | 5:0       | R   | 00h     | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

#### 7.26.6. Dig0Pin (NID = 1Fh): UnsolicitedResp

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 708h              |
| Get | F0800h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:8   | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| En         | 7  | RW  | 0h      | POR - DAFG - ULR |
|            | Unsolicited response enable (also enables Wake events for this Widget): 1 = enabled, 0 = disabled.                 |     |         |                  |
| Rsvd1      | 6  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Tag        | 5:0  | RW  | 00h     | POR - DAFG - ULR |
|            | Software programmable field returned in top six bits (31:26) of every Unsolicited Response generated by this node. |     |         |                  |

#### 7.26.7. Dig0Pin (NID = 1Fh): ChSense

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 709h              |
| Get | F0900h              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset |
|------------|---|-----|---------|-------|
| PresDtct   | 31  | R   | 0h      | POR   |
|            | Presence detection indicator: 1 = presence detected; 0 = presence not detected. |     |         |       |



| Field Name | Bits | R/W | Default   | Reset            |
|------------|------|-----|-----------|------------------|
| Rsvd       | 30:0 | R   | 00000000h | N/A (Hard-coded) |
| Reserved.  |      |     |           |                  |

**7.26.8. Dig0Pin (NID = 1Fh): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 0h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 1h      | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

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| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 4h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 5h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

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| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 1h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 1h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 6h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |

### 7.27. Dig1Pin (NID = 20h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:24     | R   | 00h     | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

# 92HD90

## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Type   | 23:20 | R   | 4h      | N/A (Hard-coded) |
| Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |       |     |         |                  |
| Delay  | 19:16 | R   | 0h      | N/A (Hard-coded) |
| Number of sample delays through widget.  |       |     |         |                  |
| Rsvd1  | 15:12 | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| SwapCap  | 11    | R   | 0h      | N/A (Hard-coded) |
| Left/right swap support: 1 = yes, 0 = no.  |       |     |         |                  |
| PwrCntrl   | 10    | R   | 1h      | N/A (Hard-coded) |
| Power state support: 1 = yes, 0 = no.  |       |     |         |                  |
| Dig  | 9     | R   | 1h      | N/A (Hard-coded) |
| Digital stream support: 1 = yes (digital), 0 = no (analog).  |       |     |         |                  |
| ConnList   | 8     | R   | 1h      | N/A (Hard-coded) |
| Connection list present: 1 = yes, 0 = no.  |       |     |         |                  |
| UnSolCap   | 7     | R   | 1h      | N/A (Hard-coded) |
| Unsolicited response support: 1 = yes, 0 = no.   |       |     |         |                  |
| ProcWidget   | 6     | R   | 0h      | N/A (Hard-coded) |
| Processing state support: 1 = yes, 0 = no.   |       |     |         |                  |
| Stripe   | 5     | R   | 0h      | N/A (Hard-coded) |
| Striping support: 1 = yes, 0 = no.   |       |     |         |                  |
| FormatOvrd   | 4     | R   | 0h      | N/A (Hard-coded) |
| Stream format override: 1 = yes, 0 = no.   |       |     |         |                  |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| AmpParOvrd  | 3    | R   | 0h      | N/A (Hard-coded) |
| Amplifier capabilities override: 1 = yes, no.           |      |     |         |                  |
| OutAmpPrsnt   | 2    | R   | 0h      | N/A (Hard-coded) |
| Output amp present: 1 = yes, 0 = no.                    |      |     |         |                  |
| InAmpPrsnt  | 1    | R   | 0h      | N/A (Hard-coded) |
| Input amp present: 1 = yes, 0 = no.                     |      |     |         |                  |
| Stereo  | 0    | R   | 1h      | N/A (Hard-coded) |
| Stereo stream support: 1 = yes (stereo), 0 = no (mono). |      |     |         |                  |

### 7.27.1. Dig1Pin (NID = 20h): PinCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Ch              |                     |                    |                   |

| Field Name   | Bits  | R/W | Default | Reset            |
|--|-------|-----|---------|------------------|
| Rsvd2  | 31:17 | R   | 0000h   | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |
| EapdCap  | 16    | R   | 0h      | N/A (Hard-coded) |
| EAPD support: 1 = yes, 0 = no.   |       |     |         |                  |
| VrefCntrl  | 15:8  | R   | 00h     | N/A (Hard-coded) |
| Vref support:<br>bit 7 = Reserved<br>bit 6 = Reserved<br>bit 5 = 100% support (1 = yes, 0 = no)<br>bit 4 = 80% support (1 = yes, 0 = no)<br>bit 3 = Reserved<br>bit 2 = GND support (1 = yes, 0 = no)<br>bit 1 = 50% support (1 = yes, 0 = no)<br>bit 0 = Hi-Z support (1 = yes, 0 = no) |       |     |         |                  |
| Rsvd1  | 7     | R   | 0h      | N/A (Hard-coded) |
| Reserved.  |       |     |         |                  |

## 92HD90

### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| BalancedIO  | 6  | R   | 0h      | N/A (Hard-coded) |
|             | Balanced I/O support: 1 = yes, 0 = no.                 |     |         |                  |
| InCap       | 5  | R   | 1h      | N/A (Hard-coded) |
|             | Input support: 1 = yes, 0 = no.                        |     |         |                  |
| OutCap      | 4  | R   | 1h      | N/A (Hard-coded) |
|             | Output support: 1 = yes, 0 = no.                       |     |         |                  |
| HdphDrvCap  | 3  | R   | 0h      | N/A (Hard-coded) |
|             | Headphone amp present: 1 = yes, 0 = no.                |     |         |                  |
| PresDtctCap | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Presence detection support: 1 = yes, 0 = no.           |     |         |                  |
| TrigRqd     | 1  | R   | 0h      | N/A (Hard-coded) |
|             | Trigger required for impedance sense: 1 = yes, 0 = no. |     |         |                  |
| ImpSenseCap | 0  | R   | 0h      | N/A (Hard-coded) |
|             | Impedance sense support: 1 = yes, 0 = no.              |     |         |                  |

#### 7.27.2. Dig1Pin (NID = 20h): ConLst

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F000Eh              |                     |                    |                   |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Rsvd       | 31:8  | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| LForm      | 7   | R   | 0h      | N/A (Hard-coded) |
|            | Connection list format: 1 = long-form (15-bit) NID entries, 0 = short-form (7-bit) NID entries. |     |         |                  |
| ConL       | 6:0   | R   | 01h     | N/A (Hard-coded) |
|            | Number of NID entries in connection list.   |     |         |                  |

7.27.3. *Dig1Pin (NID = 20h): ConLstEntry0*

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0200h              |                     |                    |                   |

| Field Name | Bits                              | R/W | Default | Reset            |
|------------|-----------------------------------|-----|---------|------------------|
| ConL3      | 31:24                             | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL2      | 23:16                             | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL1      | 15:8                              | R   | 00h     | N/A (Hard-coded) |
|            | Unused list entry.                |     |         |                  |
| ConL0      | 7:0                               | R   | 1Eh     | N/A (Hard-coded) |
|            | SPDIFOut1 Converter widget (0x1E) |     |         |                  |

7.27.4. *Dig1Pin (NID = 20h): PwrState*

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Error      | 8   | R   | 0h      | POR - DAFG - ULR |
|            | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state. |     |         |                  |
| Rsvd2      | 7:6   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Act        | 5:4   | R   | 3h      | POR - DAFG - LR  |
|            | Actual power state of this widget.  |     |         |                  |
| Rsvd1      | 3:2   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Set        | 1:0   | RW  | 0h      | POR - DAFG - LR  |
|            | Current power state setting for this widget.  |     |         |                  |

**7.27.5. Dig1Pin (NID = 20h): PinWCntrl**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 707h              |
| Get | F0700h              |                     |                    |                   |

| Field Name | Bits                                      | R/W | Default  | Reset            |
|------------|---|-----|----------|------------------|
| Rsvd2      | 31:7                                      | R   | 0000000h | N/A (Hard-coded) |
|            | Reserved.                                 |     |          |                  |
| OutEn      | 6   | RW  | 0h       | POR - DAFG - ULR |
|            | Output enable: 1 = enabled, 0 = disabled. |     |          |                  |
| InEn       | 5   | RW  | 0h       | POR - DAFG - ULR |
|            | Input enable: 1 = enabled, 0 = disabled.  |     |          |                  |
| Rsvd1      | 4:0                                       | R   | 00h      | N/A (Hard-coded) |
|            | Reserved.                                 |     |          |                  |



**7.27.6. Dig1Pin (NID = 20h): ConfigDefault**

| Reg | Byte 4 (Bits 31:24)               | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|-----------------------------------|---------------------|--------------------|-------------------|
| Set | 71Fh                              | 71Eh                | 71Dh               | 71Ch              |
| Get | F1F00h / F1E00h / F1D00h / F1C00h |                     |                    |                   |

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| PortConnectivity  | 31:30 | RW  | 2h      | POR   |
| Port connectivity:<br>0h = Port complex is connected to a jack<br>1h = No physical connection for port<br>2h = Fixed function device is attached<br>3h = Both jack and internal device attached (info in all other fields refers to integrated device, any presence detection refers to jack) |       |     |         |       |
| Location  | 29:24 | RW  | 18h     | POR   |
| Location<br><br>Bits [5..4]:<br>0h = External on primary chassis<br>1h = Internal<br>2h = Separate chassis<br>3h = Other<br><br>Bits [3..0]:<br>0h = N/A<br>1h = Rear<br>2h = Front<br>3h = Left<br>4h = Right<br>5h = Top<br>6h = Bottom<br>7h-9h = Special<br>Ah-Fh = Reserved              |       |     |         |       |

**92HD90****SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

| Field Name  | Bits  | R/W | Default | Reset |
|---|-------|-----|---------|-------|
| Device  | 23:20 | RW  | 5h      | POR   |
| Default device:<br>0h = Line out<br>1h = Speaker<br>2h = HP out<br>3h = CD<br>4h = SPDIF Out<br>5h = Digital other out<br>6h = Modem line side<br>7h = Modem handset side<br>8h = Line in<br>9h = Aux<br>Ah = Mic in<br>Bh = Telephony<br>Ch = SPDIF In<br>Dh = Digital other in<br>Eh = Reserved<br>Fh = Other         |       |     |         |       |
| ConnectionType  | 19:16 | RW  | 6h      | POR   |
| Connection type:<br>0h = Unknown<br>1h = 1/8" stereo/mono<br>2h = 1/4" stereo/mono<br>3h = ATAPI internal<br>4h = RCA<br>5h = Optical<br>6h = Other digital<br>7h = Other analog<br>8h = Multichannel analog (DIN)<br>9h = XLR/Professional<br>Ah = RJ-11 (modem)<br>Bh = Combination<br>Ch-Eh = Reserved<br>Fh = Other |       |     |         |       |

**92HD90****SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

| Field Name  | Bits   | R/W | Default | Reset |
|-------------|--|-----|---------|-------|
| Color       | 15:12  | RW  | 0h      | POR   |
|             | Color:<br>0h = Unknown<br>1h = Black<br>2h = Grey<br>3h = Blue<br>4h = Green<br>5h = Red<br>6h = Orange<br>7h = Yellow<br>8h = Purple<br>9h = Pink<br>Ah-Dh = Reserved<br>Eh = White<br>Fh = Other |     |         |       |
| Misc        | 11:8   | RW  | 1h      | POR   |
|             | Miscellaneous:<br>Bits [3..1] = Reserved<br>Bit 0 = Jack detect override   |     |         |       |
| Association | 7:4  | RW  | 7h      | POR   |
|             | Default association.   |     |         |       |
| Sequence    | 3:0  | RW  | 0h      | POR   |
|             | Sequence.  |     |         |       |

## 7.28. DigBeep (NID = 21h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name  | Bits   | R/W | Default | Reset            |
|-------------|--|-----|---------|------------------|
| Rsvd4       | 31:24  | R   | 00h     | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| Type        | 23:20  | R   | 7h      | N/A (Hard-coded) |
|             | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Rsvd3       | 19:11  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |
| PwrCntrl    | 10   | R   | 1h      | N/A (Hard-coded) |
|             | Power state support: 1 = yes, 0 = no."   |     |         |                  |
| Rsvd2       | 9:4  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved   |     |         |                  |
| AmpParOvr   | 3  | R   | 1h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.  |     |         |                  |
| OutAmpPrsnt | 2  | R   | 1h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd1       | 1:0  | R   | 0h      | N/A (Hard-coded) |
|             | Reserved.  |     |         |                  |

**7.28.1. DigBeep (NID = 21h): OutAmpCap**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0012h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Mute       | 31   | R   | 1h      | N/A (Hard-coded) |
|            | Mute support: 1 = yes, 0 = no.   |     |         |                  |
| Rsvd3      | 30:23  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| StepSize   | 22:16  | R   | 17h     | N/A (Hard-coded) |
|            | Size of each step in the gain range: 0 to 127 = .25dB to 32dB, in .25dB steps. |     |         |                  |
| Rsvd2      | 15   | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| NumSteps   | 14:8   | R   | 03h     | N/A (Hard-coded) |
|            | Number of gains steps (number of possible settings - 1).                       |     |         |                  |
| Rsvd1      | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Offset     | 6:0  | R   | 03h     | N/A (Hard-coded) |
|            | Indicates which step is 0dB  |     |         |                  |

**7.28.2. DigBeep (NID = 21h): OutAmpLeft**

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 3A0h              |
| Get | BA000h              |                     |                    |                   |

| Field Name | Bits      | R/W | Default | Reset            |
|------------|-----------|-----|---------|------------------|
| Rsvd2      | 31:8      | R   | 000000h | N/A (Hard-coded) |
|            | Reserved. |     |         |                  |

| Field Name | Bits  | R/W | Default | Reset            |
|------------|---|-----|---------|------------------|
| Mute       | 7   | RW  | 0h      | POR - DAFG - ULR |
|            | Amp mute: 1 = muted, 0 = not muted.                                       |     |         |                  |
| Rsvd1      | 6:2   | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.   |     |         |                  |
| Gain       | 1:0   | RW  | 1h      | POR - DAFG - ULR |
|            | Amp gain step number (see OutAmpCap parameter pertaining to this widget). |     |         |                  |

### 7.28.3. DigBeep (NID = 21h): PwrState

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 705h              |
| Get | F0500h              |                     |                    |                   |

| Field Name    | Bits   | R/W | Default | Reset            |
|---------------|--|-----|---------|------------------|
| Rsvd4         | 31:11  | R   | 000000h | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| SettingsReset | 10   | R   | 1h      | POR - DAFG - ULR |
|               | Indicates if any persistent settings in this Widget have been reset. Cleared by PwrState 'Get', or a 'Set' to any Verb in this Widget. |     |         |                  |
| Rsvd3         | 9  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Error         | 8  | R   | 0h      | POR - DAFG - ULR |
|               | Error indicator: 1 = cannot enter requested power state, 0 = no problem with requested power state.                                    |     |         |                  |
| Rsvd2         | 7:6  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |
| Act           | 5:4  | R   | 3h      | POR - DAFG - LR  |
|               | Actual power state of this widget.   |     |         |                  |
| Rsvd1         | 3:2  | R   | 0h      | N/A (Hard-coded) |
|               | Reserved.  |     |         |                  |

| Field Name                                   | Bits | R/W | Default | Reset           |
|--|------|-----|---------|-----------------|
| Set  | 1:0  | RW  | 0h      | POR - DAFG - LR |
| Current power state setting for this widget. |      |     |         |                 |

#### 7.28.4. DigBeep (NID = 21h): Gen

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 70Ah              |
| Get | F0A00h              |                     |                    |                   |

| Field Name   | Bits | R/W | Default | Reset            |
|--|------|-----|---------|------------------|
| Rsvd   | 31:8 | R   | 000000h | N/A (Hard-coded) |
| Reserved.  |      |     |         |                  |
| Divider  | 7:0  | RW  | 00h     | POR - DAFG - LR  |
| Enable internal PC-Beep generation. Divider == 00h disables internal PC Beep generation and enables normal operation of the codec. Divider != 00h generates the beep tone on all Pin Complexes that are currently configured as outputs. The HD Audio spec states that the beep tone frequency = (48kHz HD Audio SYNC rate) / (4*Divider), producing tones from 47 Hz to 12 kHz (logarithmic scale). |      |     |         |                  |

#### 7.28.5. DigBeep (NID = 21h): Gain

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 77Ah              |
| Get | F7A00h              |                     |                    |                   |

| Field Name  | Bits | R/W | Default | Reset            |
|---|------|-----|---------|------------------|
| Rsvd  | 31:3 | R   | 000000h | N/A (Hard-coded) |
| Reserved.   |      |     |         |                  |
| Divider   | 2:0  | RW  | 05h     | POR - DAFG - LR  |
| Digital PC Beep Gain adjust in digital side 0h = -9dB, 1h = -6dB, 2h = -3dB, 3h = 0dB, 4h = +3db, 5h = +6db |      |     |         |                  |

## 7.29. AdvancedFunctions (NID = 22h): WCap

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    |                   |
| Get | F0009h              |                     |                    |                   |

| Field Name | Bits   | R/W | Default | Reset            |
|------------|--|-----|---------|------------------|
| Rsvd2      | 31:24  | R   | 00h     | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| Type       | 23:20  | R   | Fh      | N/A (Hard-coded) |
|            | Widget type:<br>0h = Out Converter<br>1h = In Converter<br>2h = Summing (Mixer)<br>3h = Selector (Mux)<br>4h = Pin Complex<br>5h = Power<br>6h = Volume Knob<br>7h = Beep Generator<br>8h-Eh = Reserved<br>Fh = Vendor Defined |     |         |                  |
| Delay      | 19:16  | R   | 0h      | N/A (Hard-coded) |
|            | Number of sample delays through widget.  |     |         |                  |
| Rsvd1      | 15:12  | R   | 0h      | N/A (Hard-coded) |
|            | Reserved.  |     |         |                  |
| SwapCap    | 11   | R   | 0h      | N/A (Hard-coded) |
|            | Left/right swap support: 1 = yes, 0 = no.  |     |         |                  |
| PwrCntrl   | 10   | R   | 0h      | N/A (Hard-coded) |
|            | Power state support: 1 = yes, 0 = no.  |     |         |                  |
| Dig        | 9  | R   | 0h      | N/A (Hard-coded) |
|            | Digital stream support: 1 = yes (digital), 0 = no (analog).  |     |         |                  |
| ConnList   | 8  | R   | 0h      | N/A (Hard-coded) |
|            | Connection list present: 1 = yes, 0 = no.  |     |         |                  |
| UnSolCap   | 7  | R   | 0h      | N/A (Hard-coded) |
|            | Unsolicited response support: 1 = yes, 0 = no.   |     |         |                  |



| Field Name  | Bits  | R/W | Default | Reset            |
|-------------|---|-----|---------|------------------|
| ProcWidget  | 6   | R   | 0h      | N/A (Hard-coded) |
|             | Processing state support: 1 = yes, 0 = no.              |     |         |                  |
| Stripe      | 5   | R   | 0h      | N/A (Hard-coded) |
|             | Striping support: 1 = yes, 0 = no.                      |     |         |                  |
| FormatOvr   | 4   | R   | 0h      | N/A (Hard-coded) |
|             | Stream format override: 1 = yes, 0 = no.                |     |         |                  |
| AmpParOvr   | 3   | R   | 0h      | N/A (Hard-coded) |
|             | Amplifier capabilities override: 1 = yes, no.           |     |         |                  |
| OutAmpPrsnt | 2   | R   | 0h      | N/A (Hard-coded) |
|             | Output amp present: 1 = yes, 0 = no.                    |     |         |                  |
| InAmpPrsnt  | 1   | R   | 0h      | N/A (Hard-coded) |
|             | Input amp present: 1 = yes, 0 = no.                     |     |         |                  |
| Stereo      | 0   | R   | 1h      | N/A (Hard-coded) |
|             | Stereo stream support: 1 = yes (stereo), 0 = no (mono). |     |         |                  |

**All registers (except for the reset register) are available when in normal mode through the HD Audio interface. Most are implemented using vendor defined verbs but some (volume controls specifically) are supported through standard verbs at the pin widgets**

#### 7.29.1. *AdvancedFunctions (NID = 22h): Cntrl0*

| Reg | Byte 4 (Bits 31:24) | Byte 3 (Bits 23:16) | Byte 2 (Bits 15:8) | Byte 1 (Bits 7:0) |
|-----|---------------------|---------------------|--------------------|-------------------|
| Set |                     |                     |                    | 770h:&7AFh        |
| Get | F7700h: 7AF0h       |                     |                    |                   |

| Field Name | Bits                            | R/W | Default | Reset            |
|------------|---------------------------------|-----|---------|------------------|
| Rsvd       | 31:8                            | R   | 000000h | N/A (Hard-coded) |
|            | Reserved.                       |     |         |                  |
| Value      | 7:0                             | RW  | 0h      | POR - DAFG - ULR |
|            | Contrl register value of module |     |         |                  |

## 7.29.1.1. SPKVOL L/R Registers.

| Register Address  | Bit | Label    | Type | Default | Description   |
|---|-----|----------|------|---------|---|
| verb F71/771 (Left)<br>verb F72/772 (Right)<br>verb 773 (Left and Right - write only) | 7:0 | VOL[7:0] | RW   | 30      | +36 to -91.5dB in 0.75dB steps<br>0x00 = +36dB<br>0x01 = +35.25dB<br>...<br>0x2F = +0.75dB<br>0x30 = 0dB<br>0x31 = -0.75dB<br>...<br>0xA9 = -90.75<br>0xAA to 0xFE = -91.5dB<br>0xFF = mute |

## 7.29.1.2. AIC1 Register.

| Register Address | Bit | Label       | Type | Default | Description   |
|------------------|-----|-------------|------|---------|---|
| verb F76/776     | 7   | SCLKINV     | RW   | 0       | 0 = SCLK not inverted (data and LRCLK transition on falling edge of SCLK)<br>1 = invert SCLK (data and LRCLK transition on rising edge of SCLK) |
|                  | 6   | MS          | RW   | 1       | Master/Slave<br>0 = SCLK and LRCLK are inputs (slave mode)<br>1 = SCLK and LRCLK are outputs (master mode)                                      |
|                  | 5   | LRSWAP      | RW   | 0       | Swap Left and Right Samples<br>0 = Left sample first in frame<br>1 = Right sample first in frame  |
|                  | 4   | LRP         | RW   | 0       | Left/Right (I2S_LRCLK) Polarity<br>0 = default per format<br>1 = LRCLK inverted   |
|                  | 3:2 | WL[1:0]     | RW   | 10      | Word Length<br>00 = 16 bits<br>01 = 20 bits<br>10 = 24 bits<br>11 = Reserved  |
|                  | 1:0 | FORMAT[1:0] | RW   | 10      | link format<br>00 = Right Justified<br>01 = Left Justified<br>10 = I2S<br>11 = reserved   |

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### 7.29.1.3. AIC2 Register.

| Register Address | Bit | Label     | Type | Default | Description   |
|------------------|-----|-----------|------|---------|---|
| verb F77/777     | 7   | TRI       | RW   | 0       | TRI=1 & MS = 0 (Slave mode)<br>I2S_DOUT is hi-z (I2S_SCLK and I2S_LRCLK are inputs)<br>TRI=1 & MS = 1 (Master mode)<br>I2S_DOUT, I2S_SCLK, and I2S_LRCLK are hi-z |
|                  | 6:3 | SCLK[3:0] | RW   | 0000    | SCLK rate<br>See table below  |
|                  | 2:0 | SR[2:0]   | RW   | 100     | Sample Rate<br>000 = 44.1KHz<br>001 = 88.2KHz<br>010 = Reserved<br>011 = Reserved<br>100 = 48KHz<br>101 = 96KHz<br>110 = 192KHz<br>111 = Reserved                 |

| SCLK[3:0] | Frequency (MHz) | PLL clock divisor | suggested sample rate | clocks/frame | Notes   |
|-----------|-----------------|-------------------|-----------------------|--------------|---|
| 0000      | Auto            | Auto              | All                   | 64           | SCLK is always 64Fs (48KHz based rates have jitter)                                       |
| 0001      | 12.288          | 147/16            | 192KHz                | 64           | High jitter (<5nS)  |
| 0010      | 6.144           | 147/32            | 96KHz                 | 64           | High jitter (<5nS)  |
| 0011      | 3.072           | 147/64            | 48KHz                 | 64           | High jitter (<5nS)  |
| 0100      | 11.2896         | 10                | 88.2KHz               | 128          |   |
| 0101      | 5.6448          | 20                | 88.2KHz               | 64           |   |
| 0110      | 2.8224          | 40                | 44.1KHz               | 64           |   |
| 0111      |                 |                   |                       |              | reserved  |
| 1000      | Auto            | Auto              | All                   | 64/84        | SCLK adjusts for sample rate. 44.1KHz based rates are 64Fs and 48KHz based rates are 84Fs |
| 1001      | 16.128          | 7                 | 192KHz                | 84           |   |
| 1010      | 8.064           | 14                | 96KHz                 | 84           |   |
| 1011      | 4.032           | 28                | 48KHz                 | 84           |   |
| 1100      | 7.056           | 16                | 88.2KHz               | 80           |   |
| 1101      | 3.528           | 32                | 44.1KHz               | 80           |   |
| 1110      | 1.764           | 64                | 44.1KHz               | 40           |   |
| 1111      |                 |                   |                       |              | reserved  |

## 7.29.1.4. AIC3 Register.

| Register Address | Bit | Label     | Type | Default | Description   |
|------------------|-----|-----------|------|---------|---|
| verb F78/778     | 7:6 | RSVD      | RO   | 00      | Reserved  |
|                  | 5   | SAEN      | RW   | 0       | 1 = Input enabled for I2S Secondary Audio<br>0 = Input disabled for Secondary Audio   |
|                  | 4   | AUXSWAP   | RW   | 0       | Swap Left and Right Samples of Aux Audio Output.<br>0 = Left sample first in frame<br>1 = Right sample first in frame   |
|                  | 3   | MCLKMS    | RW   | 1       | MCLK master<br>0 = MCLK is an input<br>1 = MCLK is an output (not recommended in Aux Audio Mode since 24/12MHz rates cant be supported and 112MHz internal clock is imprecise but is useful for testing.) |
|                  | 2:0 | MCLK[2:0] | RW   | 001     | MCLK rate<br>000 = 24MHz (HDA BitClk)<br>001 = 12MHz (HDA BitClk/2)<br>010 = 22.5792MHz<br>011 = 11.2896MHZ<br>100 = 5.6448MHZ<br>101 = 28.224MHz<br>110 = 14.112MHz<br>111 = 7.056MHz                    |

## 7.29.1.5. PWRM Register.

| Register Address | Bit | Label   | Type | Default | Description  |
|------------------|-----|---------|------|---------|--|
| verb F79/779     | 7   | RSVD    | RO   | 0       | Reserved   |
|                  | 6   | RSVD    | RO   | 0       | Reserved   |
|                  | 5   | RSVD    | RO   | 0       | Reserved   |
|                  | 4   | HPPWD   | RW   | 0       | Headphone ports are forced off in Aux Audio Mode (including charge pump)   |
|                  | 3   | SPKRON  | RW   | 0       | BTL (port D) is forced on in Aux Audio Mode  |
|                  | 2   | DMICPWD | RW   | 0       | DMIC powered down in Aux Audio Mode (including DAC)  |
|                  | 1   | MCLKOut | RW   | 1       | MCLK Output Enabler<br>0 = MCLK Output is disabled in master mode<br>1 = MCLK is an output in master mode (input in slave mode)) |
|                  | 0   | RSVD    | RW   | 0       | Reserved   |

## 7.29.1.6. RESET Register

| Register Address | Bit | Label | Type | Default | Description  |
|------------------|-----|-------|------|---------|--|
| verb F7F/77F     | 7:0 | RESET | RW   | 0       | Writing causes registers to revert to their default values (similar to a function group reset) |

## 7.29.1.7. STATUS Register

| Register Address | Bit | Label        | Type | Default | Description   |
|------------------|-----|--------------|------|---------|---|
| verb F80/780     | 7   | limit1latch  | RO   | 0       | Latched version of limit1, clear via GAINCTRL_LO[7]   |
|                  | 6   | limit0latch  | RO   | 0       | Latched version of limit0, clear via GAINCTRL_LO[7]   |
|                  | 5:3 | Reserved     | RO   | 0x0     | RESERVED  |
|                  | 2   | limit1       | RO   | 0       | Set (1) if regz saturation after gain multiply for CH1. may change on a sample by sample basis. |
|                  | 1   | limit0       | RO   | 0       | Set (1) if regz saturation after gain multiply for CH0. may change on a sample by sample basis. |
|                  | 0   | zerodet_flag | RO   | 0       | Set when input zero detect of long string of zeroes.  |

## 7.29.1.8. INIT Register

| Register Address | Bit | Label                | Type | Default | Description  |
|------------------|-----|----------------------|------|---------|--|
| verb F81/781     | 7:4 | Reserved             | RO   | 0       | RESERVED   |
|                  | 3   | anabeep_dcbyp        | RW   | 0       | 1 = bypass analog Beep DC filter   |
|                  | 2:1 | anabeep_dc_coef<br>f | RW   | 0x2     | 0: dc_coef = 24'h004000;<br>1: dc_coef = 24'h001000;<br>2: dc_coef = 24'h000400;<br>3: dc_coef = 24'h000100; |
|                  | 0   | Initialize           | RW   | 0       | 1= Initialize/soft reset data path. Must be set when changing the config0 or config1 registers.              |

## 7.29.1.9. CONFIG Register

| Register Address | Bit | Label     | Type | Default | Description  |
|------------------|-----|-----------|------|---------|--|
| verb F82/782     | 7   | BPFBYBYP  | RW   | 0       | 1= Bypass MonoOut band-pass filter                     |
|                  | 6   | PREBYBYP  | RW   | 1       | 1= Bypass BTL EQ filter prescale                       |
|                  | 5   | EQBYBYP   | RW   | 1       | 1= Bypass BTL EQ filter                                |
|                  | 4   | BTL_dcbyp | RW   | 0       | 1 = bypass BTL DC filter                               |
|                  | 3:1 | Reserved  | RO   | 0       | RESERVED   |
|                  | 0   | HPFBYP    | RW   | 0       | 1= Bypass BTL high-pass filter (not DC removal filter) |

## 7.29.1.10. PWM4 Register

| Register Address | Bit | Label                 | Type | Default | Description   |
|------------------|-----|-----------------------|------|---------|---|
| verb F83/783     | 7   | sc_status_clear_right | RWC  | 0       | Write once operation will clear sc_fault_status_right         |
|                  | 6   | sc_status_clear_left  | RWC  | 0       | Write once operation will clear sc_fault_status_left          |
|                  | 5   | Reserved              | RO   | 0       | RESERVED  |
|                  | 4   | sc_Fault_status_right | RO   | 0       | 1 = Fault occurs on right channel                             |
|                  | 3   | sc_Fault_status_left  | RO   | 0       | 1 = Fault occurs on left channel                              |
|                  | 2:1 | scdly_set             | RW   | 00      | Used for short circuit detection; designer will set the value |
|                  | 0   | evenbit               | RW   | 0       | 1=Noise Shaper output data are even                           |

## 7.29.1.11. PWM3 Register

| Register Address | Bit | Label   | Type | Default | Description   |
|------------------|-----|---------|------|---------|---|
| verb F84/784     | 7:6 | outctrl | RW   | 0       | pwm output muxing<br>0 = normal<br>1 = swap 0/1<br>2 = ch0 on both<br>3 = ch1 on both |
|                  | 5:0 | cvalue  | RW   | 0x2     | Tristate constant value filed, must be even and not 0                                 |

## 7.29.1.12. PWM2 Register

| Register Address | Bit | Label       | Type | Default | Description                                  |
|------------------|-----|-------------|------|---------|--|
| verb F85/785     | 7:2 | dvalue      | RW   | 0x10    | dvalue constant field.                       |
|                  | 1   | pwm_outflip | RW   | 0       | 1= swap pwm a/b output pair for all channels |
|                  | 0   | pwm_outmode | RW   | 1       | 1= tristate, 0 = binary                      |

## 7.29.1.13. PWM1Register

| Register Address | Bit | Label        | Type | Default | Description   |
|------------------|-----|--------------|------|---------|---|
| verb F86/786     | 7   | Reserved     | RO   | 0       | RESERVED  |
|                  | 6:2 | dithpos      | RW   | 0       | Dither position, where dither inserted after NS<br>0,1,2 = dither bits 2:0<br>4 = dither bits 3:1<br>5 = dither bits 4:1<br>...<br>19 = dither bits 19:17 |
|                  | 1   | dither_range | RW   | 0       | 1= dither -1 to +1, 0 = dither -3 to +3   |
|                  | 0   | dithclr      | RW   | 0       | 1 = disable dither  |

## 7.29.1.14. PWM0 Register

| Register Address | Bit | Label         | Type | Default | Description   |
|------------------|-----|---------------|------|---------|---|
| verb F87/787     | 7:6 | PhaseOffset   | RW   | 01      | PWM ch1 offset from ch0 at 8x sample rate by:<br>00 = 0 degrees<br>01 = 90 degrees<br>10 = 180 degrees<br>11 = NA |
|                  | 5   | clk320mode    | R    | 1       | 1 = PCA clock 320 mode<br>0 = PCA clock 294 mode  |
|                  | 4   | roundup       | RW   | 1       | 1= roundup, 0 = truncate for quantizer  |
|                  | 3   | bfclr         | RW   | 0       | 1 = disable binomial filter   |
|                  | 2   | fourthorder   | RW   | 0       | 1 = fourth order binomial filter, 0 = 3rd order binomial filter   |
|                  | 1   | add3_sel      | RW   | 0       | 1 = 24-bit Noise Shaper output (pre-quantizer), 0 = 8/9/10-bit quantizer output                                   |
|                  | 0   | Btl_test_mode | RW   | 0       | 1 = power stage test mode   |

## 7.29.1.15. LMTCTRL Register

Control operation of the volume Limiter (Compressor).

| Register Address | Bit | Label      | Type | Default | Description   |
|------------------|-----|------------|------|---------|---|
| verb F88/788     | 7:4 | –          | RO   | 0       | Reserved for future use.  |
|                  | 3   | zerocross  | RW   | 0       | 1 = only change limiter gain value on zero cross.   |
|                  | 2:1 | stepsize   | RW   | 0       | Gain stepsize when incrementing or decrementing:<br>0 - 0.75 dB, 1 - 1.5 dB, 2 - 3.0 dB, 3 - 6.0 dB |
|                  | 0   | limiter_en | RW   | 0       | 1 = enable limiter (compressor)   |

## 7.29.1.16. LMTATKTIME (0x19), LMTHOLDTIME (0x1A), LMTRELTIME (0x1B) Registers

These 8-bit registers set the timer values between incrementing/decrementing the Compressor attenuation values. There is one register each for Attack, Hold, and Release times, the configuration parameters are the same for all three and are shown in the table below.

| Register Address | Bit | Label      | Type | Default | Description  |
|------------------|-----|------------|------|---------|--|
| verb F89/789     | 7   | ATK10ms    | RW   | 0       | 1 = value in bits 6:0 is in 10ms units, otherwise 1ms units. |
|                  | 6:0 | LMTAT[6:0] | RW   | 0       | Timer value in units of 1 or 10ms.                           |

| Register Address | Bit | Label      | Type | Default | Description  |
|------------------|-----|------------|------|---------|--|
| verb F8A/78A     | 7   | HOLD10ms   | RW   | 0       | 1 = value in bits 6:0 is in 10ms units, otherwise 1ms units. |
|                  | 6:0 | LMTHT[6:0] | RW   | 0       | Timer value in units of 1 or 10ms.                           |

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| Register Address | Bit | Label      | Type | Default | Description  |
|------------------|-----|------------|------|---------|--|
| verb F8B/78B     | 7   | REL10ms    | RW   | 0       | 1 = value in bits 6:0 is in 10ms units, otherwise 1ms units. |
|                  | 6:0 | LMTRT[6:0] | RW   | 0       | Timer value in units of 1 or 10ms.                           |

#### 7.29.1.17. LMTATKTH (0x1D–LO, 0x1C–HI), LMTRELTH (0x1F–LO, 0x1E–HI) Registers

These 16-bit registers set the threshold values. When in attack phase and the Attack Threshold is exceeded the Compressor attenuation is incremented by stepsize (see LMTCTRL). When in release phase and the Release Threshold is not exceeded the Compressor attenuation is incremented by stepsize (but not above 0).

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb F8C/78C     | 7:0 | LATKTH[15:8] | RW   | 7F      | 8'hFF would equal threshold level of +2.0dB. Each step below this 8-bit full scale value reduces threshold level by 0.0078 dB. |

| Register Address | Bit | Label       | Type | Default | Description   |
|------------------|-----|-------------|------|---------|---|
| verb F8D/78D     | 7:0 | LATKTH[7:0] | RW   | FF      | Always 0. It isn't necessary to provide threshold resolution to the point where these lower 8 bits would be used. |

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb F8E/78E     | 7:0 | LRELTH[15:8] | RW   | 0       | 8'hFF would equal threshold level of +2.0dB. Each step below this 8-bit full scale value reduces threshold level by 0.0078 dB. |

| Register Address | Bit | Label       | Type | Default | Description   |
|------------------|-----|-------------|------|---------|---|
| verb F8F/78F     | 7:0 | LRELTH[7:0] | RW   | 0       | Always 0. It isn't necessary to provide threshold resolution to the point where these lower 8 bits would be used. |

#### 7.29.1.18. GAINCTRL\_HI Register

| Register Address | Bit | Label      | Type | Default | Description   |
|------------------|-----|------------|------|---------|---|
| verb F90/790     | 7:5 | Reserved   | RO   | 0       | RESERVED  |
|                  | 4:3 | zerodetlen | RW   | 0x2     | enable mute if input consecutive zeros exceeds this length:<br>00 = 32<br>01 = 1000<br>10 = 2000<br>11 = 4000 |
|                  | 2:0 | step_time  | RW   | 0x5     | step time units = 1<<step_time, units in GAINCTRL_LO bit 5  |



## 7.29.1.19. GAINCTRL\_LO Register

| Register Address | Bit | Label          | Type | Default | Description   |
|------------------|-----|----------------|------|---------|---|
| verb F91/791     | 7   | clr_latch      | RW   | 0       | 1 = clear limit 0/1 latches, see STATUS register                    |
|                  | 6   | RSVD           | RO   | 0       | Reserved  |
|                  | 5   | step_10ms      | RW   | 0       | 1 = units for step_time are 10ms<br>0 = units for step_time are 1ms |
|                  | 4   | stepped_change | RW   | 0       | 1 = step volume progressively to new setting                        |
|                  | 3   | disable_gain   | RW   | 0       | 1 = disable all gain functions (bypass gain multiply)               |
|                  | 2   | auto_mute      | RW   | 1       | 1 = auto mute if detect long strings of zeros on input              |
|                  | 1   | change_mode    | RW   | 0       | 1 = change gain immediately<br>0 = change on zero cross             |
|                  | 0   | mute_mode      | RW   | 1       | 1 = hard mute after reset, 0 = soft mute                            |

## 7.29.1.20. MUTE Register

| Register Address | Bit | Label    | Type | Default | Description           |
|------------------|-----|----------|------|---------|-----------------------|
| verb F92/792     | 7:3 | Reserved | RO   | 0x0     | RESERVED              |
|                  | 2   | Mute     | RW   | 0       | 1 = mute all channels |
|                  | 1   | mute1    | RW   | 0       | 1 = mute ch1          |
|                  | 0   | mute0    | RW   | 0       | 1 = mute ch0          |

## 7.29.1.21. ATTEN Register

| Register Address | Bit | Label | Type | Default | Description  |
|------------------|-----|-------|------|---------|--|
| verb F93/793     | 7:0 | atten | RW   | 0x0     | Attenuation. Each bit represents 0.5dB of attenuation to be applied to the channel. The range will be -125dB to 2dB as follows:<br>0x00: +2dB<br>0x01: +1.5dB<br>0x02: +1.0dB<br>...<br>0x47: -33.5dB<br>0x48: -34.0dB<br>0x49: -34.5dB<br>...<br>0xFE: -125dB<br>0xFF: Hard Master Mute |

## 7.29.1.22. DC\_COEF\_SEL Register

| Register Address | Bit | Label       | Type | Default | Description  |
|------------------|-----|-------------|------|---------|--|
| verb F94/794     | 7:3 | Reserved    | RO   | 0       | RESERVED   |
|                  | 2:0 | dc_coef_sel | RW   | 0x5     | 0:dc_coef = 24'h100000;<br>//2 <sup>3</sup> = 0.125<br>1:dc_coef = 24'h040000;<br>2:dc_coef = 24'h010000;<br>3:dc_coef = 24'h004000;<br>4:dc_coef = 24'h001000;<br>5:dc_coef = 24'h000400;<br>6:dc_coef = 24'h000100;<br>//2 <sup>15</sup> = 0.000330517<br>7:dc_coef = 24'h000040;<br>//2 <sup>17</sup> |

## 7.29.1.23. BTL High-Pass Filter COEF\_SEL Register

| Register Address | Bit | Label       | Type | Default | Description  |
|------------------|-----|-------------|------|---------|--|
| verb F95/795     | 7:3 | Reserved    | RO   | 0       | RESERVED   |
|                  | 2:0 | hp_coef_sel | RW   | 0x2     | Select IIR coefficients for BTL amplifier high pass filter corner frequency<br>000 = 100Hz<br>001 = 200Hz<br><b>010 = 300Hz</b><br>011 = 400Hz<br>100 = 500Hz<br>101 = 750Hz<br>110 = 1000Hz<br>111 = 2000Hz |

## 7.29.1.24. Mono Band-Pass Filter COEF\_SEL Register

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb F96/796     | 7   | Reserved     | RO   | 0       | RESERVED   |
|                  | 6:4 | bph_coef_sel | RW   | 0x3     | Select IIR coefficients for MonoOut band-pass filter lower corner frequency<br>000 = 63Hz<br>001 = 80Hz<br>010 = 100Hz<br><b>011 = 120Hz</b><br>100 = 150Hz<br>101 = 200Hz<br>110 = 315Hz<br>111 = 400Hz   |
|                  | 3   | Reserved     | RO   | 0       | RESERVED   |
|                  | 2:0 | bpl_coef_sel | RW   | 0x2     | Select IIR coefficients for MonoOut band-pass filter upper corner frequency<br>000 = 150Hz<br>001 = 200Hz<br><b>010 = 250Hz</b><br>011 = 315Hz<br>100 = 400Hz<br>101 = 500Hz<br>110 = 630Hz<br>111 = 800Hz |

## 7.29.1.25. PortA PinWCntrlVRefEn Register

| Register Address | Bit | Label | Type | Default | Description  |
|------------------|-----|-------|------|---------|--|
| verb FB0/7B0     | 7:3 | RSVD  | RO   | 00000   | RESERVED   |
|                  | 2:0 | Vref  | RW   | 000     | Vref selection for Port A. See VrefCntrl field of PinCap parameter for supported selections<br>000 = Hi-Z<br>001 = 50%<br>010 = GND<br>011 = Reserved<br>100 = 80%<br>101 = 100%<br>110 = Reserved<br>111 = Reserved |

## 7.29.1.26. PortA InAmpLeftGain Register

| Register Address | Bit | Label    | Type | Default | Description   |
|------------------|-----|----------|------|---------|---|
| verb FB1/7B1     | 7:0 | RSVD     | RO   | 000000  | RESERVED  |
|                  | 1:0 | AlnGainL | RW   | 00      | Input gain step number for Port A. See InAmpCap parameter pertaining to this widget |

## 7.29.1.27. PortA InAmpRightGain Register

| Register Address | Bit | Label    | Type | Default | Description   |
|------------------|-----|----------|------|---------|---|
| verb FB2/7B2     | 7:2 | RSVD     | RO   | 000000  | RESERVED  |
|                  | 1:0 | AlnGainR | RW   | 00      | Input gain step number for Port A. See InAmpCap parameter pertaining to this widget |

## 7.29.1.28. DMic0 InAmpLeftGain Register

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb FB3/7B3     | 7:2 | RSVD         | RO   | 000000  | RESERVED   |
|                  | 1:0 | DMIC0InGainL | RW   | 00      | Input gain step number for DMic0. See InAmpCap parameter pertaining to this widget |

## 7.29.1.29. DMIC0 InAmpRightGain Register

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb FB4/7B4     | 7:2 | RSVD         | RO   | 000000  | RESERVED   |
|                  | 1:0 | DMIC0InGainR | RW   | 00      | Input gain step number for DMic0. See InAmpCap parameter pertaining to this widget |

## 7.29.1.30. ADC0Mux OutAmpLeftGain Register

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb FB5/7B5     | 7   | AMuxMuteL    | RW   | 1       | Amp Mute: 1=muted, 0=not muted   |
|                  | 6   | RSVD         | RO   | 0       | RESERVED   |
|                  | 5:0 | AMuxOutGainL | RW   | 010000  | Output gain step number for ADC0Mux. See OutAmpCap parameter pertaining to this widget |

## 7.29.1.31. ADC0Mux OutAmpRightGain Register

| Register Address | Bit | Label        | Type | Default | Description  |
|------------------|-----|--------------|------|---------|--|
| verb FB6/7B6     | 7   | AMuxMuteR    | RW   | 1       | Amp Mute: 1=muted, 0=not muted   |
|                  | 6   | RSVD         | RO   | 0       | RESERVED   |
|                  | 5:0 | AMuxOutGainR | RW   | 010000  | Output gain step number for ADC0Mux. See OutAmpCap parameter pertaining to this widget |

## 7.29.1.32. BTL Class-D Power Stage Register Settings

| Register Address | Bit | Label    | Type | Default | Description   |
|------------------|-----|----------|------|---------|---|
| verb F97/797     | 7   | ENABLE   | RW   | 1       | 1 = Enable BTL Power stage  |
|                  | 6   | TRC_ESD  | RO   | 0       | 1 = ESD trigger detected<br>0 = No trigger  |
|                  | 5   | STRENDRV | RW   | 0       | 1 = Strengthen pre-drive<br>0 = Normal  |
|                  | 4:3 | SCTHR    | RW   | 01      | Short circuit threshold current<br>00 = 10% of PVDD<br>01 = 14% of PVDD<br>10 = 16% of PVDD<br>11 = 20% of PVDD                         |
|                  | 2:0 | DEADTIME | RW   | 001     | Dead time for output FETs<br>000 = 0.5ns<br>001 = 1.0ns<br>010 = 1.5ns<br>011 = 2ns<br>100 = 4ns<br>101 = 8ns<br>110 = 8ns<br>111 = 8ns |

| Register Address | Bit | Label    | Type | Default | Description  |
|------------------|-----|----------|------|---------|--|
| verb F98/798     | 7   | TEST_EN  | RW   | 0       | 1 = Enable short circuit test                          |
|                  | 6   | SC_DIS   | RW   | 0       | 1 = disable short circuit protection                   |
|                  | 5   | RSVD     | RW   | 0       | Reserved   |
|                  | 4   | FAULT_SC | RO   | 0       | 1 = Fault  |
|                  | 3   | RSVD     | RW   | 0       | Reserved   |
|                  | 2   | PNSEL    | RW   | 0       | 1=PFET tested, 0=NFET tested                           |
|                  | 1   | FORCE_SC | RW   | 0       | 1 = force short circuit                                |
|                  | 0   | TEST     | RW   | 0       | 1 = Pos PFET / Neg NFET on, 0 = Pos NFET / Neg PFET on |

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| Register Address | Bit | Label    | Type | Default | Description   |
|------------------|-----|----------|------|---------|---|
| verb F99/799     | 7   | ENABLE   | RW   | 1       | 1 = Enable BTL Power stage  |
|                  | 6   | TRC_ESD  | RO   | 0       | 1 = ESD trigger detected<br>0 = No trigger  |
|                  | 5   | STRENDRV | RW   | 0       | 1 = Strengthen pre-drive<br>0 = Normal  |
|                  | 4:3 | SCTHR    | RW   | 01      | Short circuit threshold current<br>00 = 10% of PVDD<br>01 = 14% of PVDD<br>10 = 16% of PVDD<br>11 = 20% of PVDD                         |
|                  | 2:0 | DEADTIME | RW   | 001     | Dead time for output FETs<br>000 = 0.5ns<br>001 = 1.0ns<br>010 = 1.5ns<br>011 = 2ns<br>100 = 4ns<br>101 = 8ns<br>110 = 8ns<br>111 = 8ns |

| Register Address | Bit | Label    | Type | Default | Description  |
|------------------|-----|----------|------|---------|--|
| verb F9A/79A     | 7   | TEST_EN  | RW   | 0       | 1 = Enable short circuit test                          |
|                  | 6   | SC_DIS   | RW   | 0       | 1 = disable short circuit protection                   |
|                  | 5   | RSVD     | RW   | 0       | Reserved   |
|                  | 4   | FAULT_SC | RO   | 0       | 1 = Fault  |
|                  | 3   | RSVD     | RW   | 0       | Reserved   |
|                  | 2   | PNSEL    | RW   | 0       | 1=PFET tested, 0=NFET tested                           |
|                  | 1   | FORCE_SC | RW   | 0       | 1 = force short circuit                                |
|                  | 0   | TEST     | RW   | 0       | 1 = Pos PFET / Neg NFET on, 0 = Pos NFET / Neg PFET on |

## 7.29.1.33. LDO LEVEL CONTROL Register

| Register Address | Bit | Label            | Type | Default | Description   |
|------------------|-----|------------------|------|---------|---|
| verb F9B/79B     | 7:3 | Reserved         | RO   | 0x0     | RESERVED  |
|                  | 2   | Lv_QUAD_BIAS     | RW   | 0       |   |
|                  | 1:0 | Lv_reg_cntrl_bit | RW   | 0x0     | Two bits are defined to program the output of the 1.8V LDO<br>00 = normal operation (3.3V in to 1.8V out)<br>01 = 1.8V*1.1 = 1.98V<br>10 = 1.8V*0.9 = 1.62V<br>11 = power down LDO/bypass. When disabled, the DVDD_Core pin must be supplied with a nominal 1.8V from an external source. |

## 7.29.1.34. EQRAM

The EQ RAM is a 52 x 48-bit SRAM that contains the EQ coefficients

| Address                      | Channel Left Coefficients (24bit) | Channel Right Coefficients (24bit) |
|------------------------------|-----------------------------------|------------------------------------|
| EQRAM Bits                   | [47:24]                           | [23:00]                            |
| based on 44.1Khz sample rate |                                   |                                    |
| 0x00                         | EQ_COEF_F0_B0                     | EQ_COEF_F0_B0                      |
| 0x01                         | EQ_COEF_F0_B1                     | EQ_COEF_F0_B1                      |
| 0x02                         | EQ_COEF_F0_B2                     | EQ_COEF_F0_B2                      |
| 0x03                         | EQ_COEF_F0_A1                     | EQ_COEF_F0_A1                      |
| 0x04                         | EQ_COEF_F0_A2                     | EQ_COEF_F0_A2                      |
| 0x05                         | EQ_COEF_F1_B0                     | EQ_COEF_F1_B0                      |
| 0x06                         | EQ_COEF_F1_B1                     | EQ_COEF_F1_B1                      |
| 0x07                         | EQ_COEF_F1_B2                     | EQ_COEF_F1_B2                      |
| 0x08                         | EQ_COEF_F1_A1                     | EQ_COEF_F1_A1                      |
| 0x09                         | EQ_COEF_F1_A2                     | EQ_COEF_F1_A2                      |
| 0x0A                         | EQ_COEF_F2_B0                     | EQ_COEF_F2_B0                      |
| 0x0B                         | EQ_COEF_F2_B1                     | EQ_COEF_F2_B1                      |
| 0x0C                         | EQ_COEF_F2_B2                     | EQ_COEF_F2_B2                      |
| 0x0D                         | EQ_COEF_F2_A1                     | EQ_COEF_F2_A1                      |
| 0x0E                         | EQ_COEF_F2_A2                     | EQ_COEF_F2_A2                      |
| 0x0F                         | EQ_COEF_F3_B0                     | EQ_COEF_F3_B0                      |
| 0x10                         | EQ_COEF_F3_B1                     | EQ_COEF_F3_B1                      |
| 0x11                         | EQ_COEF_F3_B2                     | EQ_COEF_F3_B2                      |
| 0x12                         | EQ_COEF_F3_A1                     | EQ_COEF_F3_A1                      |
| 0x13                         | EQ_COEF_F3_A2                     | EQ_COEF_F3_A2                      |
| 0x14                         | EQ_COEF_F4_B0                     | EQ_COEF_F4_B0                      |
| 0x15                         | EQ_COEF_F4_B1                     | EQ_COEF_F4_B1                      |
| 0x16                         | EQ_COEF_F4_B2                     | EQ_COEF_F4_B2                      |
| 0x17                         | EQ_COEF_F4_A1                     | EQ_COEF_F4_A1                      |
| 0x18                         | EQ_COEF_F4_A2                     | EQ_COEF_F4_A2                      |
| 0x19                         | EQ_PRESCALE                       | EQ_PRESCALE                        |

| Address                    | Channel Left Coefficients (24bit) | Channel Right Coefficients (24bit) |
|----------------------------|-----------------------------------|------------------------------------|
| EQRAM Bits                 | [47:24]                           | [23:00]                            |
| based on 48Khz sample rate |                                   |                                    |
| 0x1A                       | EQ_COEF_F0_B0                     | EQ_COEF_F0_B0                      |
| 0x1B                       | EQ_COEF_F0_B1                     | EQ_COEF_F0_B1                      |
| 0x1C                       | EQ_COEF_F0_B2                     | EQ_COEF_F0_B2                      |
| 0x1D                       | EQ_COEF_F0_A1                     | EQ_COEF_F0_A1                      |
| 0x1E                       | EQ_COEF_F0_A2                     | EQ_COEF_F0_A2                      |
| 0x1F                       | EQ_COEF_F1_B0                     | EQ_COEF_F1_B0                      |
| 0x20                       | EQ_COEF_F1_B1                     | EQ_COEF_F1_B1                      |
| 0x21                       | EQ_COEF_F1_B2                     | EQ_COEF_F1_B2                      |
| 0x22                       | EQ_COEF_F1_A1                     | EQ_COEF_F1_A1                      |
| 0x23                       | EQ_COEF_F1_A2                     | EQ_COEF_F1_A2                      |
| 0x24                       | EQ_COEF_F2_B0                     | EQ_COEF_F2_B0                      |
| 0x25                       | EQ_COEF_F2_B1                     | EQ_COEF_F2_B1                      |
| 0x26                       | EQ_COEF_F2_B2                     | EQ_COEF_F2_B2                      |
| 0x27                       | EQ_COEF_F2_A1                     | EQ_COEF_F2_A1                      |
| 0x28                       | EQ_COEF_F2_A2                     | EQ_COEF_F2_A2                      |
| 0x29                       | EQ_COEF_F3_B0                     | EQ_COEF_F3_B0                      |
| 0x2A                       | EQ_COEF_F3_B1                     | EQ_COEF_F3_B1                      |
| 0x2B                       | EQ_COEF_F3_B2                     | EQ_COEF_F3_B2                      |
| 0x2C                       | EQ_COEF_F3_A1                     | EQ_COEF_F3_A1                      |
| 0x2D                       | EQ_COEF_F3_A2                     | EQ_COEF_F3_A2                      |
| 0x2E                       | EQ_COEF_F4_B0                     | EQ_COEF_F4_B0                      |
| 0x2F                       | EQ_COEF_F4_B1                     | EQ_COEF_F4_B1                      |
| 0x30                       | EQ_COEF_F4_B2                     | EQ_COEF_F4_B2                      |
| 0x31                       | EQ_COEF_F4_A1                     | EQ_COEF_F4_A1                      |
| 0x32                       | EQ_COEF_F4_A2                     | EQ_COEF_F4_A2                      |
| 0x33                       | EQ_PRESCALE                       | EQ_PRESCALE                        |

The EQRAM is programmed indirectly through the Control Bus in the following manner:

- 1) Write the 48-bit write data to the EQRAM\_WRITE register
- 2) Write the target address to the EQ\_ADDRESS register
- 3) Set bit 7 of the EQRAM\_CTRL register

The write will occur when the EQRAM is not being accessed by the DSP audio processing routines. When complete the hardware will automatically clear this bit.

Reading back from the EQRAM is done in the following manner:

- 1) Write target address to EQ\_ADDR register
- 2) Set bit 6 of the EQRAM\_CTRL register

When the hardware completes the read it will automatically clear this bit.

- 3) When bit 6 of the EQRAM\_CTRL register has been cleared, read the 48bit data from the EQRAM\_READ register.



## 7.29.1.35. EQRAM Read Data (0x30–0x35), EQRAM Write Data (0x36–3B) Registers

These two 48-bit registers (addressed as 12 8-bit registers) are 48-bit data holding registers used when doing indirect writes/reads to the EQRAM.]]

| Register Address                  | Bit | Label       | Type | Default | Description  |
|-----------------------------------|-----|-------------|------|---------|--|
| EQRAM_READ[47:40]<br>verb FA0/7A0 | 7:0 | EQRD[47:40] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                  | Bit | Label       | Type | Default | Description  |
|-----------------------------------|-----|-------------|------|---------|--|
| EQRAM_READ[39:32]<br>verb FA1/7A1 | 7:0 | EQRD[39:32] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                  | Bit | Label       | Type | Default | Description  |
|-----------------------------------|-----|-------------|------|---------|--|
| EQRAM_READ[31:24]<br>verb FA2/7A2 | 7:0 | EQRD[31:24] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                  | Bit | Label       | Type | Default | Description  |
|-----------------------------------|-----|-------------|------|---------|--|
| EQRAM_READ[23:16]<br>verb FA3/7A3 | 7:0 | EQRD[23:16] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                 | Bit | Label      | Type | Default | Description  |
|----------------------------------|-----|------------|------|---------|--|
| EQRAM_READ[15:8]<br>verb FA4/7A4 | 7:0 | EQRD[15:8] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                | Bit | Label     | Type | Default | Description  |
|---------------------------------|-----|-----------|------|---------|--|
| EQRAM_READ[7:0]<br>verb FA5/7A5 | 7:0 | EQRD[7:0] | RW   | 0x00    | 48-bit data register, contains the contents of the most recent EQRAM address read from the RAM. The address read will have been specified by the EQRAM Address fields. |

| Register Address                   | Bit | Label       | Type | Default | Description   |
|------------------------------------|-----|-------------|------|---------|---|
| EQRAM_WRITE[47:40]<br>verb FA6/7A6 | 7:0 | EQWD[47:40] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

| Register Address                   | Bit | Label       | Type | Default | Description   |
|------------------------------------|-----|-------------|------|---------|---|
| EQRAM_WRITE[39:32]<br>verb FA7/7A7 | 7:0 | EQWD[39:32] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

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| Register Address                   | Bit | Label       | Type | Default | Description   |
|------------------------------------|-----|-------------|------|---------|---|
| EQRAM_WRITE[31:24]<br>verb FA8/7A8 | 7:0 | EQWD[31:24] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

| Register Address                   | Bit | Label       | Type | Default | Description   |
|------------------------------------|-----|-------------|------|---------|---|
| EQRAM_WRITE[23:16]<br>verb FA9/7A9 | 7:0 | EQWD[23:16] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

| Register Address                  | Bit | Label      | Type | Default | Description   |
|-----------------------------------|-----|------------|------|---------|---|
| EQRAM_WRITE[15:8]<br>verb FAA/7AA | 7:0 | EQWD[15:8] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

| Register Address                 | Bit | Label     | Type | Default | Description   |
|----------------------------------|-----|-----------|------|---------|---|
| EQRAM_WRITE[7:0]<br>verb FAB/7AB | 7:0 | EQWD[7:0] | RW   | 0x00    | 48-bit data register, contains the values to be written to the EQRAM. The address written will have be specified by the EQRAM Address fields. |

#### 7.29.1.36. EQRAM Address Register

This 8-bit register provides the address to the internal RAM when doing indirect writes/reads to the EQRAM.

| Register Address | Bit | Label      | Type | Default | Description   |
|------------------|-----|------------|------|---------|---|
| verb FAC/7AC     | 7:6 | RSVD       | RO   | 0x00    | Reserved  |
|                  | 5:0 | EQADD[5:0] | RW   | 0x00    | Contains the address (between 0x00 and 0x33) of the EQRAM to be accessed by a read or write. This is not a byte address--it is the address of the 48-bit data item to be accessed from the EQRAM. |

#### 7.29.1.37. EQRAM Control Register

This control register provides the write/read enable when doing indirect writes/reads to the EQRAM.

| Register Address | Bit | Label    | Type | Default | Description                                  |
|------------------|-----|----------|------|---------|--|
| verb FAD/7AD     | 7   | EQRAM_wr | RW   | 0       | 1 = write to EQRAM, cleared by HW when done  |
|                  | 6   | EQRAM_rd | RW   | 0       | 1 = read from EQRAM, cleared by HW when done |
|                  | 5:0 | RSVD     | RO   | 0       | Reserved                                     |

8. PINOUT AND PACKAGING

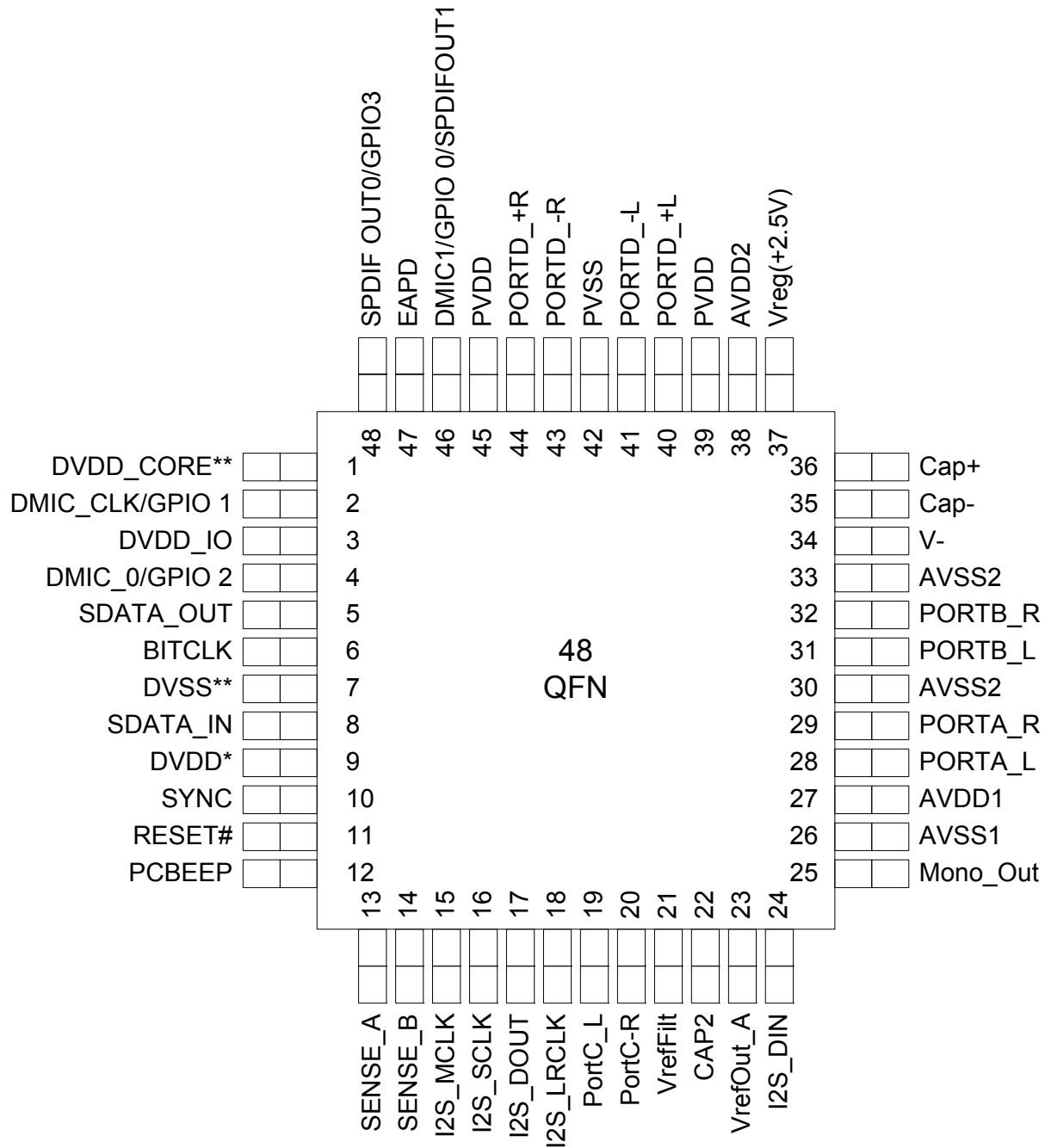


Figure 18. 48-QFN Pin Assignment

NOTE: PINS 19/20 ON ZA AND ZB SILICON ARE NO CONNECTS. PORT C FUNCTIONALITY ADDED IN YA SILICON REVISION.

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| Pin Name       | Pin Function   | I/O          | Internal Pull-up/Pull-down | 48 pin location |
|----------------|--|--------------|----------------------------|-----------------|
| DVDD_CORE      | 1.8V Digital Core Regulator Filter Cap                   | O(Digital)   | None                       | 1               |
| DMIC_CLK/GPIO1 | Digital Mic Clock Output/GPIO1                           | I/O(Digital) | 60K Pull-down              | 2               |
| DVDD_IO        | Reference Voltage (1.5V or 3.3V)                         | I(Digital)   | None                       | 3               |
| DMIC0/GPIO2    | Digital Mic 01 Input/GPIO2                               | I/O(Digital) | 60K Pull-down              | 4               |
| SDATA_OUT      | HD Audio Serial Data output from controller              | I/O(Digital) | None                       | 5               |
| BITCLK         | HD Audio Bit Clock                                       | I(Digital)   | None                       | 6               |
| DVSS           | Digital Ground   | I(Digital)   | None                       | 7               |
| SDATA_IN       | HD Audio Serial Data Input to controller                 | O(Digital)   | None                       | 8               |
| DVDD           | Digital Vdd= 3.3V  | I(Digital)   | None                       | 9               |
| SYNC           | HD Audio Frame Sync                                      | I(Digital)   | None                       | 10              |
| RESET#         | HD Audio Reset   | I(Digital)   | None                       | 11              |
| PC BEEP        | PC Beep  | I(Analog)    | None                       | 12              |
| SENSE_A        | Jack insertion detection Ports A,B,C,SPDIF0              | I(Analog)    | None                       | 13              |
| SENSE_B        | Jack insertion detection Ports E,F, Mono, SPDIF1         | I(Analog)    | None                       | 14              |
| I2S_MCLK       | Master Clock for I2S port                                | I/O(Digital) | 60K Pull-down              | 15              |
| I2S_SCLK       | Shift Clock for I2S port                                 | I/O(Digital) | 60K Pull-down              | 16              |
| I2S_DOUT       | Data output for I2S port (port E)                        | O(Digital)   | 60K Pull-down              | 17              |
| I2S_LRCLK      | Left/Right strobe for I2S port (Fs)                      | I/O(Digital) | 60K Pull-down              | 18              |
| PortC_L        | Port C Output Left<br>ZA/ZB revision pin is no connect.  | I/O(Analog)  | None                       | 19              |
| PortC_R        | Port C Output Right<br>ZA/ZB revision pin is no connect. | I/O(Analog)  | None                       | 20              |
| VREFFILT       | Analog Virtual Ground                                    | O(Analog)    | None                       | 21              |
| CAP2           | Reference filter Cap                                     | O(Analog)    | None                       | 22              |
| VREFOUT-A      | Reference Voltage out drive (intended for mic bias)      | O(Analog)    | None                       | 23              |
| I2S_DIN        | Data input for I2S port (port F)                         | I(Digital)   | 60K Pull-down              | 24              |
| MONO_OUT       | Mono output  | O(Analog)    | None                       | 25              |
| AVSS1          | Analog Ground  | I(Analog)    | None                       | 26              |
| AVDD1          | Analog Vdd=5.0V or 3.3V                                  | I(Analog)    | None                       | 27              |
| PORTA_L (HP0)  | Port A Output Left                                       | I/O(Analog)  | None                       | 28              |
| PORTA_R (HP0)  | Port A Output Right                                      | I/O(Analog)  | None                       | 29              |
| AVSS           | Analog Ground  | I(Analog)    | None                       | 30              |
| PORTB_L (HP1)  | Port B Output Left                                       | I/O(Analog)  | None                       | 31              |
| PORTB_R (HP1)  | Port B Output Right                                      | I/O(Analog)  | None                       | 32              |
| AVSS           | Analog Ground  | I(Analog)    | None                       | 33              |
| V-             | Negative analog supply                                   | O(Analog)    | None                       | 34              |
| CAP-           | Charge pump cap -  | O(Analog)    | None                       | 35              |
| CAP+           | Charge pump cap +  | O(Analog)    | None                       | 36              |
| VREG           | Linear Regulator Output (2.5V) filter cap                | O(Analog)    | None                       | 37              |

**Table 36. Pin Table**

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### SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

| Pin Name                 | Pin Function                                     | I/O           | Internal Pull-up/Pull-down | 48 pin location |
|--------------------------|--|---------------|----------------------------|-----------------|
| AVDD2                    | Analog Supply for VREG                           | I(Analog)     | None                       | 38              |
| PVDD                     | Analog Supply for Class-D amp                    | I(Analog)     | None                       | 39              |
| PORTD_+L                 | BTL amp Left +                                   | O(Analog)     | None                       | 40              |
| PORTD_-L                 | BTL amp Left -                                   | O(Analog)     | None                       | 41              |
| PVSS                     | Analog Ground                                    | I(Analog)     | None                       | 42              |
| PORTD_-R                 | BTL amp Right -                                  | O(Analog)     | None                       | 43              |
| PORTD_+R                 | BTL amp Right +                                  | O(Analog)     | None                       | 44              |
| PVDD                     | Analog Supply for Class-D amp                    | I(Analog)     | None                       | 45              |
| DMIC1/GPIO/<br>SPDIFOUT1 | Digital Microphone input, SPDIF Output, or GPIO0 | I/O(Digital)  | 60K Pull-down              | 46              |
| EAPD                     | EAPD   | I/O (Digital) | 60K Pull-up                | 47              |
| SPDIFOUT0/GPIO3          | SPDIF0 or GPIO3                                  | O(Digital)    | 60K pull-down              | 48              |

Table 36. Pin Table

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## SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO

### 8.0.2. 48-QFN Package Outline and Package Dimensions

Package dimensions are kept current with JEDEC Publication No. 95

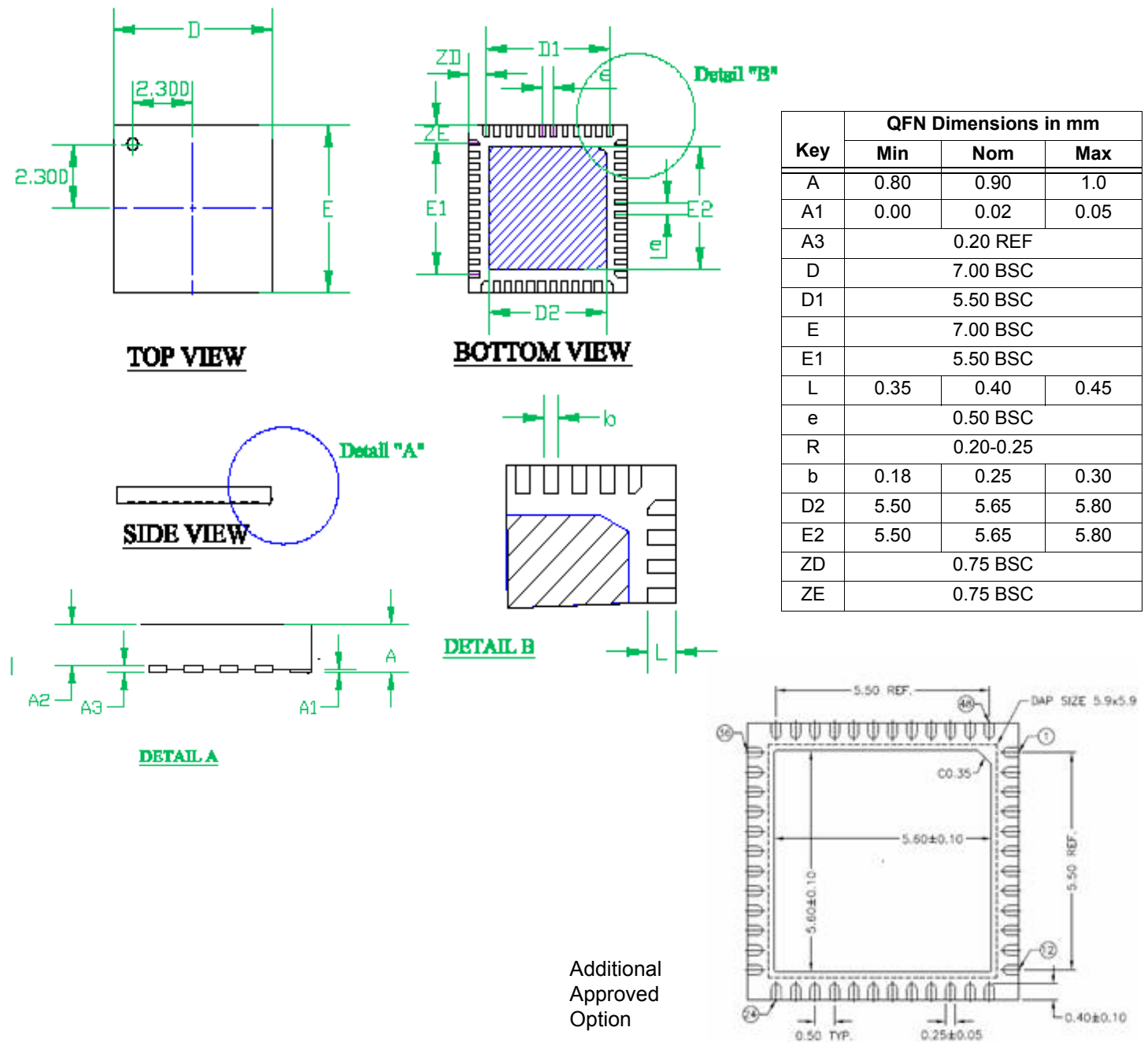


Figure 19. 48-QFN Package Diagram

8.1. Standard Reflow Profile Data

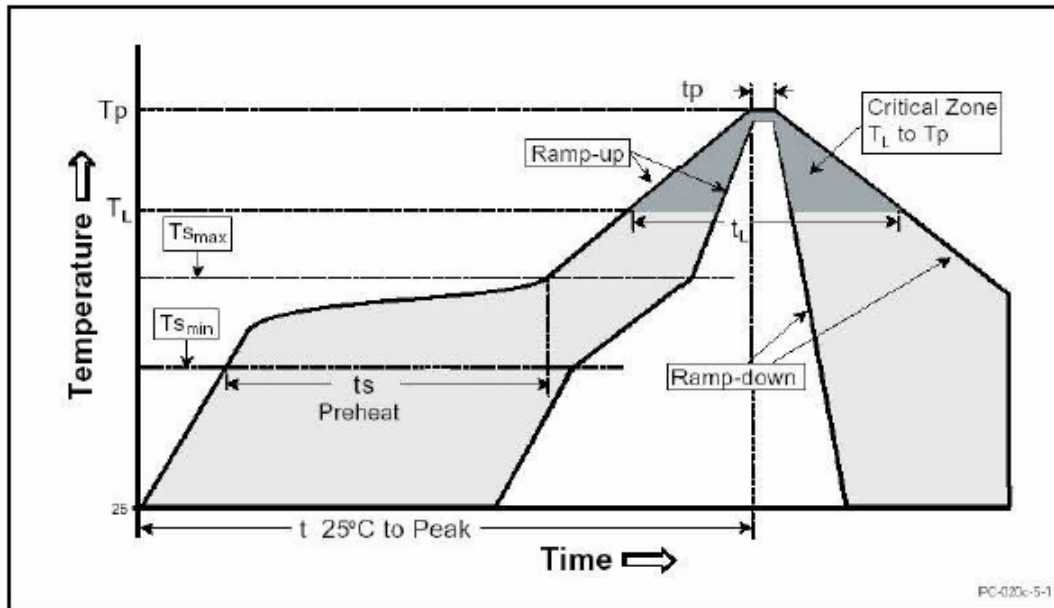
Note: These devices can be hand soldered at 360 °C for 3 to 5 seconds.

**FROM:** IPC / JEDEC J-STD-020C “Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices” (www.jedec.org/download).

| Profile Feature   | Pb Free Assembly                                 |
|---|--|
| Average Ramp-Up Rate ( $T_{s_{max}} - T_p$ )  | 3 °C / second max                                |
| Preheat: Temperature Min ( $T_{s_{min}}$ )<br>Temperature Max ( $T_{s_{max}}$ )<br>Time ( $t_{s_{min}} - t_{s_{max}}$ ) | 150 °C<br>200 °C<br>60 - 180 seconds             |
| Time maintained above: Temperature ( $T_L$ )<br>Time ( $t_L$ )  | 217 °C<br>60 - 150 seconds                       |
| Peak / Classification Temperature ( $T_p$ )   | See “Package Classification Reflow Temperatures” |
| Time within 5 °C of actual Peak Temperature ( $t_p$ )   | 20 - 40 seconds                                  |
| Ramp-Down rate  | 6 °C / second max                                |
| Time 25 °C to Peak Temperature  | 8 minutes max                                    |

Note: All temperatures refer to topside of the package, measured on the package body surface.

Table 37. Standard Reflow Profile



**9. DISCLAIMER**

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**10. DOCUMENT REVISION HISTORY**

| Revision | Date           | Description of Change  |
|----------|----------------|--|
| 0.5      | March 2010     | Initial release  |
| 0.8      | March 2010     | Added widget details, front page feature bullet updates  |
| 0.85     | June 2010      | Port E updated to add HPhnEn R/W bit in the Pin Cntrl widget and as HPCapable in the widget capabilities.  |
| 0.9      | September 2010 | Added changes for YA silicon revision (ZA/ZB prior settings referenced)<br>Port C support added in YA revision, updated pinout (Port C L/R pins 19/20, previously no connect), widget list, widget diagram, and functional diagram to include support. Widget for Port C updated, ADC0Muxm ADC1Mux and Mixer widgets updated to add connection for Port C. AFG EAPD bit added for PortE Headphone control. AFG ComJack bits added to select debounce time. Removed SCS support. Updated conditions of performance characteristics, added HDA signalling voltage to condition for power measurements. Default changed on BTL/HD_Mode from 0 to 1. Added Pin Configuration Default Settings. Corrected Combo Jack diagram. |
| 0.91     | October 2010   | Updated LDO Level Control values. Corrected step size and thermal trip in BTL section. Updated SPKVOL L/R step size to .75dB. Added additional verb for updating speaker L and R volume at the same time (to match HDA implementation). Widget 22h verbs added/reordered. Added description text for High pass and Mono band pass filter features.   |

**92HD90**

**SINGLE CHIP PC AUDIO SYSTEM, CODEC+SPEAKER AMPLIFIER+CAPLESS HP+LDO**

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