

## TWO BANDS DIGITALLY CONTROLLED AUDIO PROCESSOR WITH BASS ALC SURROUND

### 1 FEATURES

- INPUT MULTIPLEXER
  - 4 STEREO INPUTS
  - SELECTABLE INPUT GAIN FOR OPTIMAL ADAPTATION TO DIFFERENT SOURCES
- ONE STEREO OUTPUT
- BASS ALC
- TREBLE AND BASS CONTROL IN 2.0dB
- STEPS
- VOLUME CONTROL IN 1.0dB STEPS
- TWO SPEAKER ATTENUATORS:
  - TWO INDEPENDENT SPEAKER CONTROL IN 1.0dB STEPS FOR BALANCE FACILITY
  - INDEPENDENT MUTE FUNCTION
- ALL FUNCTION ARE PROGRAMMABLE VIA SERIAL BUS
- EXTERNALLY ADJUSTABLE SURROUND

### 2 DESCRIPTION

The TDA7468D is a volume tone (bass and treble) balance (Left/Right) processor for quality audio

Figure 1. Package



SO28

Table 1. Order Codes

Part Number	Package
TDA7468D	SO28
TDA7468D13TR	Tape & Reel

applications in Hi-Fi systems.

Selectable input gain is provided. Control of all the functions is accomplished by serial bus.

The AC signal setting is obtained by resistor networks and switches combined with operational amplifiers.

Thanks to the used BIPOLE/CMOS Technology, Low Distortion, Low Noise and DC stepping are obtained

Figure 2. PIN CONNECTION (Top view)

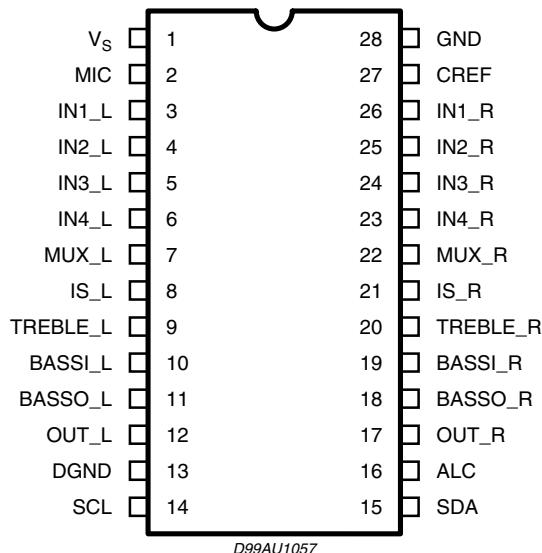
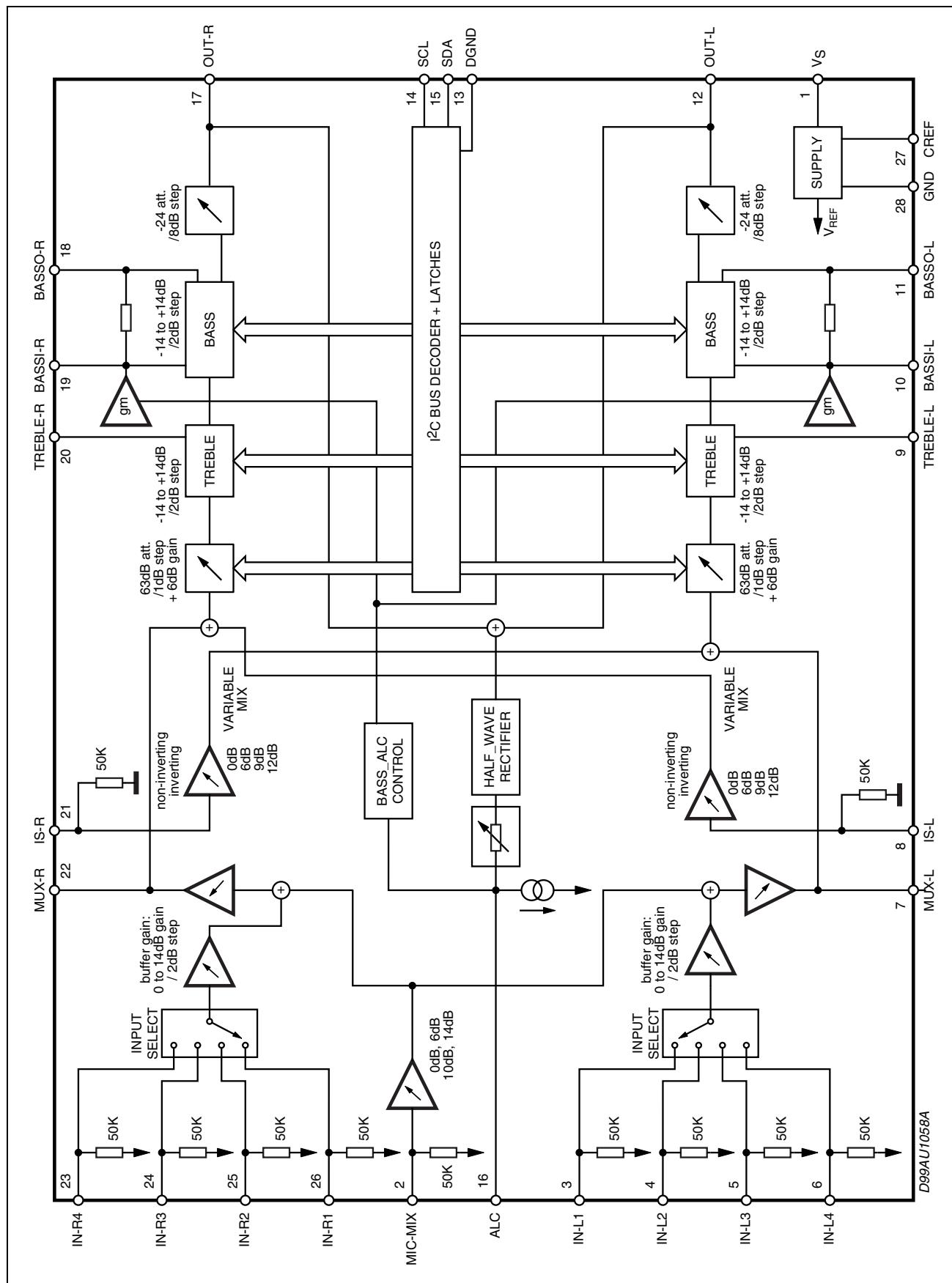


Figure 3. BLOCK DIAGRAM



**Table 2. ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit
V <sub>S</sub>	Operating Supply Voltage	10.5	V
T <sub>amb</sub>	Operating Ambient Temperature	0 to 70	°C
T <sub>stg</sub>	Storage Temperature Range	-55 to 150	°C

**Table 3. THERMAL DATA**

Symbol	Parameter	Value	Unit
R <sub>th j-pin</sub>	Thermal Resistance Junction-pins	85	°C/W

**Table 4. QUICK REFERENCE DATA**

Symbol	Parameter	Min.	Typ.	Max.	Unit
V <sub>S</sub>	Supply Voltage	5	9	10	V
V <sub>CL</sub>	Max. input signal handling	2			Vrms
THD	Total Harmonic Distortion V <sub>I</sub> = 1Vrms; f = 1KHz		0.01	%	%
	Total Harmonic Distortion V <sub>I</sub> = 0.1Vrms; f = 1KHz			0.1	%
S/N	Signal to Noise Ratio V <sub>out</sub> = 1Vrms (0dB)		100		dB
S <sub>C</sub>	Channel Separation f = 1KHz		90		dB
	Input Gain (2dB step)	0		14	dB
	Volume Control (1dB step)	-87		0	dB
	Treble Control (2dB step)	-14		+14	dB
	Bass Control (2dB step)	-14		+14	dB
	Mute Attenuation		86		dB

**ELECTRICAL CHARACTERISTICS**

(refer to the test circuit  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 9\text{V}$ ,  $f = 1\text{KHz}$  all controls flat ( $G = 0\text{dB}$ ), unless otherwise specified)

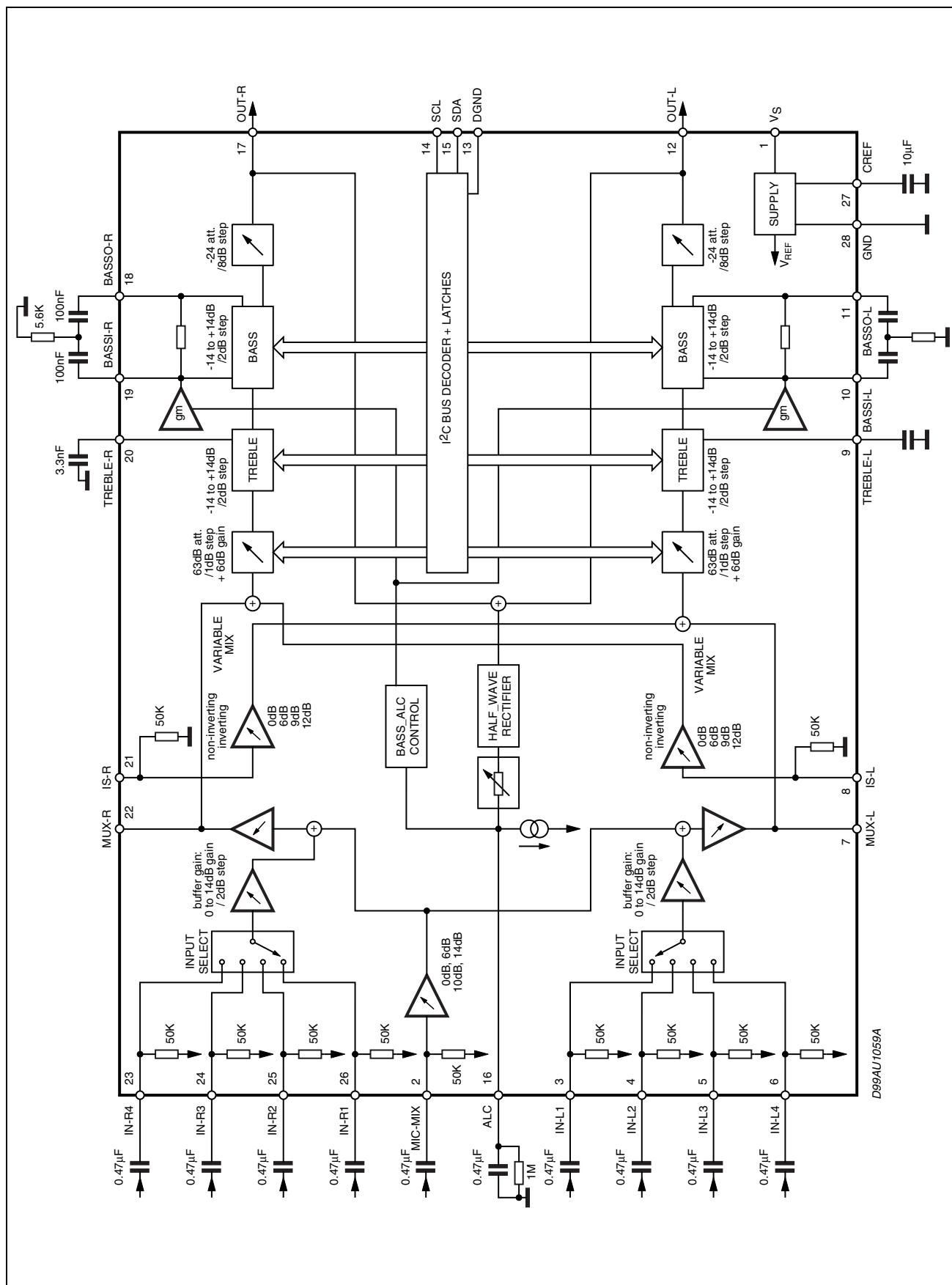
Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>SUPPLY</b>						
$V_S$	Supply Voltage		5	9	10	V
$I_S$	Supply Current			9		mA
SVR	Ripple Rejection		60	90		dB
<b>INPUT STAGE</b>						
$R_{IN}$	Input Resistance		35	50	65	$\text{k}\Omega$
$V_{CL}$	Clipping Level	THD = 0.3%	2	2.5		$\text{V}_{rms}$
$S_{IN}$	Input Separation		80	100		dB
$G_{inmin}$	Minimum Input Gain		-1	0	1	dB
$G_{inmax}$	Maximum Input Gain			14		dB
$G_{step}$	Step Resolution			2		dB
<b>MIC</b>						
$R_{IN}$	Input Resistance		35	50	65	$\text{k}\Omega$
$G_{mic1}$	Mic Input Gain 1			14		dB
$G_{mic2}$	Mic Input Gain 2			10		dB
$G_{mic3}$	Mic Input Gain 3			6		dB
$G_{min4}$	Mic Input Gain 4			0		dB
$MIX_{mic}$	Mixing Rate			50		%
<b>SURROUND</b>						
$R_{in}$	Input Resistance		35	50	65	$\text{k}\Omega$
$G_{inmin}$	Minimum Input Gain		-1	0	1	dB
$G_{inmax}$	Maximum Input Gain			12		dB
$G_{inV}$	Inverting Gain			-1		
$M_{ixmin}$	Minimum Mixing Rate			0		%
$M_{ixmax}$	Maximum Mixing Rate			100		%
CrossTalk k	Crosstalk of Mux Output to 100% IS		40			dB
$G_{buffer}$	Buffer Gain			6		dB
<b>VOLUME CONTROL</b>						
$C_{RANGE1}$	Vol 1 Control Range			63		dB
$A_{VMAX1}$	Vol 1 Max. Attenuation		61	63	65	dB
$A_{STEP1}$	Vol 1 Step Resolution		0.5	1	1.5	dB
Match1	Matching			TBD		dB
$C_{RANGE2}$	Vol 2 Control Range			24		dB
$A_{VMAX2}$	Vol 2 Max. Attenuation		22	24	26	dB
$A_{STEP2}$	Vol 2 Step Resolution		7	8	9	dB
Match2	Matching			TBD		dB
$A_{VMAX1+}$ $A_{VMAX2}$	Vol 1 + Vol 2 Max Attenuation			84		dB

**ELECTRICAL CHARACTERISTICS** (continua)

(refer to the test circuit  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_S = 9\text{V}$ ,  $f = 1\text{KHz}$  all controls flat ( $G = 0\text{dB}$ ), unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
<b>BASS CONTROL</b>						
$\text{Gb}$	Control Range	Max. Boost/cut	$\pm 12.0$	$\pm 14.0$	$\pm 16.0$	$\text{dB}$
$\text{B}_{\text{STEP}}$	Step Resolution		1	2	3	$\text{dB}$
$R_B$	Internal Feedback Resistance		33	44	55	$\text{k}\Omega$
<b>BASS ALC CONTROL</b>						
$R_{\text{attack}1}$	Attack Time Resistor 1			12.5		$\text{k}\Omega$
$R_{\text{attack}2}$	Attack Time Resistor 2			25		$\text{k}\Omega$
$R_{\text{attack}3}$	Attack Time Resistor 3			50		$\text{k}\Omega$
$R_{\text{attack}4}$	Attack Time Resistor 4			100		$\text{k}\Omega$
$\text{Thresh}1$	Threshold 1			700		$\text{mVrms}$
$\text{Thresh}2$	Threshold 2			485		$\text{mVrms}$
$\text{Thresh}3$	Threshold 3			320		$\text{mVrms}$
$\text{Thresh}4$	Threshold 4			170		$\text{mVrms}$
<b>TREBLE CONTROL</b>						
$\text{Gt}$	Control Range	Max. Boost/cut	$+13.0$	$+14.0$	$+15.0$	$\text{dB}$
$\text{T}_{\text{STEP}}$	Step Resolution		1	2	3	$\text{dB}$
$R_t$	Internal Resistance			25		$\text{k}\Omega$
<b>AUDIO OUTPUTS</b>						
$\text{VoCL}$	Clipping Level	THD = 0.3%	2	2.5		$\text{Vrms}$
$\text{RL}$	Output Load Resistance		2			$\text{k}\Omega$
$\text{V}_{\text{OUT}}$	DC Voltage Level			4.5		$\text{V}$
<b>GENERAL</b>						
$\text{E}_{\text{NO}}$	Output Noise	BW = 20Hz to 20KHz;				
		All gains 0dB;				
		output muted		5		$\mu\text{V}$
		flat		10	15	$\mu\text{V}$
$\text{S/N}$	Signal to Noise Ratio	All gains 0dB; $\text{V}_O = 1\text{Vrms}$ ;		100		$\text{dB}$
$\text{Sc}$	Channel Separation Left/Right			90		$\text{dB}$
$d$	Distortion	$\text{Av} = 0$ ; $\text{V}_I = 0.1\text{Vrms}$ ;			0.1	%
		$\text{Av} = 0$ ; $\text{V}_I = 1\text{Vrms}$ ;		0.01		%
$\text{Sc}$	Channel Separation left/right			90		$\text{dB}$
	Total Tracking Error			0	1	$\text{dB}$
<b>BUS INPUT</b>						
$\text{V}_{\text{IL}}$	Input Low Voltage				1	$\text{V}$
$\text{V}_{\text{IH}}$	Input High Voltage		2.5			$\text{V}$
$I_{\text{IN}}$	Input Current	$\text{V}_{\text{IN}} = 0.4\text{V}$	-5		5	$\mu\text{A}$
$\text{V}_O$	Output Voltage (ACK)	$\text{I}_O = 1.6\text{mA}$		0.4	0.8	$\text{V}$

Figure 4. TEST CIRCUIT



### 3 APPLICATION SUGGESTIONS

The first and the last stages are volume control blocks. The control range is 0 to -63dB (mute) with 1dB step resolution for this first one, 0 to 24dB (mute) with 8dB step resolution for the last one.

The very high resolution allows the implementation of systems free from any noisy acoustical effect.

The TDA7468D audioprocessor provides 2 bands tones control.

#### 3.1 Bass, Stages

The Bass cell has an internal resistor  $R_i = 44K\Omega$  typical.

Several filter types can be implemented, connecting external components to the Bass IN and OUT pins.

The fig.5 refers to basic T Type Bandpass Filter starting from the filter component values (R1 internal and R2,C1,C2 external) the centre frequency  $F_C$ , the gain  $A_V$  at max. boost and the filter Q factor are computed as follows:

$$F_C = \frac{1}{2 \cdot \pi \cdot \sqrt{R_1 \cdot R_2 \cdot C_1 \cdot C_2}}$$

$$A_V = \frac{R_2 \cdot C_2 + R_2 \cdot C_1 + R_i \cdot C_1}{R_2 \cdot C_1 + R_2 \cdot C_2}$$

$$Q = \frac{\sqrt{R_1 \cdot R_2 \cdot C_1 \cdot C_2}}{R_2 \cdot C_1 + R_2 \cdot C_2}$$

Viceversa, once  $F_C$ ,  $A_V$ , and  $R_i$  internal value are fixed, the external components values will be:

$$C_1 = \frac{A_V - 1}{2 \cdot \pi \cdot F_C \cdot R_i \cdot Q} \quad C_2 = \frac{Q^2 \cdot C_1}{A_V - 1 - Q^2}$$

$$R_2 = \frac{A_V - 1 - Q^2}{2 \cdot \pi \cdot C_1 \cdot F_C \cdot (A_V - 1) \cdot Q}$$

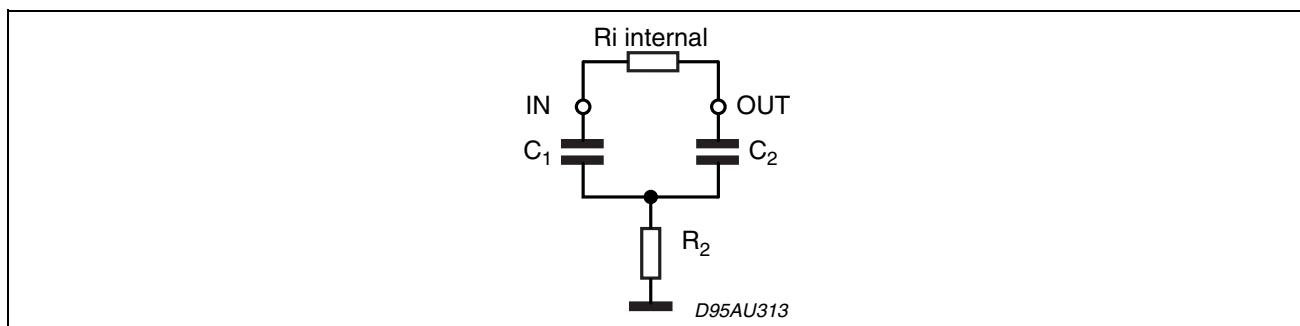
#### 3.2 Treble Stage

The treble stage is a high pass filter whose time constant is fixed by an internal resistor (25KΩ typical) and an external capacitor connected between treble pins and ground.

#### 3.3 CREF

The suggested 10μF reference capacitor (CREF) value can be reduced to 4.7μF if the application requires faster power ON.

**Figure 5.**



## 4 I<sup>2</sup>C BUS INTERFACE

Data transmission from microprocessor to the TDA7468D and vice versa takes place through the 2 wires I<sup>2</sup>C BUS interface, consisting of the two lines SDA and SCL (pull-up resistors to positive supply voltage must be connected).

### 4.1 Data Validity

As shown in fig. 6, the data on the SDA line must be stable during the high period of the clock. The HIGH and LOW state of the data line can only change when the clock signal on the SCL line is LOW.

### 4.2 Start and Stop Conditions

As shown in fig.7 a start condition is a HIGH to LOW transition of the SDA line while SCL is HIGH. The stop condition is a LOW to HIGH transition of the SDA line while SCL is HIGH.

### 4.3 Byte Format

Every byte transferred on the SDA line must contain 8 bits. Each byte must be followed by an acknowledge bit. The MSB is transferred first.

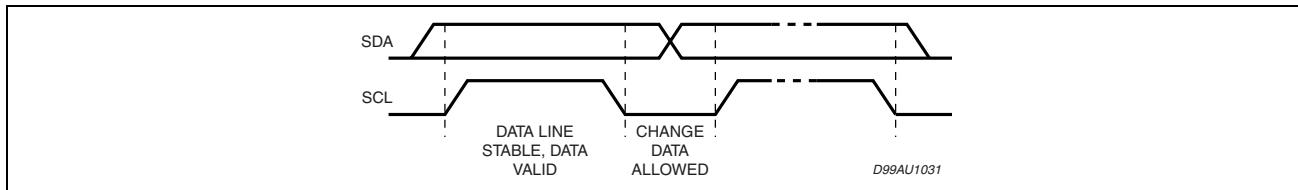
### 4.4 Acknowledge

The master ( $\mu$ P) puts a restive HIGH level on the SDA line during the acknowledge clock pulse (see fig. 4). The peripheral (audio processor) that acknowledges has to pull-down (LOW) the SDA line during this clock pulse. The audio processor which has been addressed has to generate an acknowledge after the reception of each byte, otherwise the SDA line remains at the HIGH level during the ninth clock pulse time. In this case the master transmitter can generate the STOP information in order to abort the transfer.

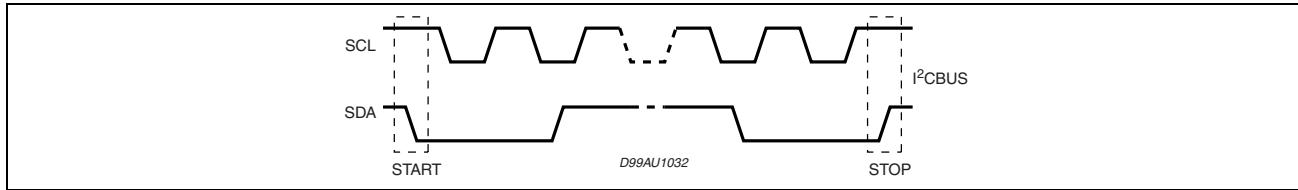
### 4.5 Transmission without Acknowledge

Avoiding to detect the acknowledge of the audio processor, the  $\mu$ P can use a simpler transmission: simply it waits one clock without checking the slave acknowledging, and sends the new data. This approach of course is less protected from misworking.

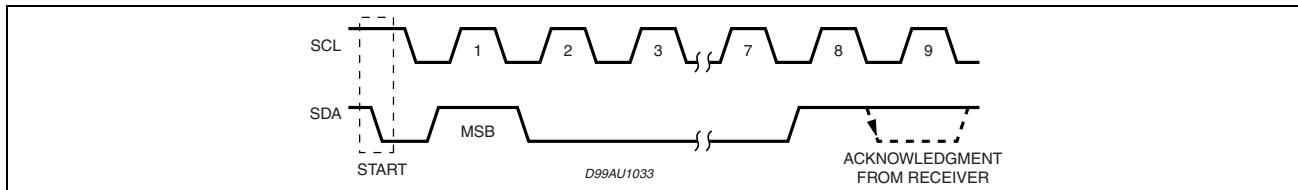
**Figure 6. Data Validity on the I<sup>2</sup>CBUS**



**Figure 7. Timing Diagram of I<sup>2</sup>CBUS**



**Figure 8. Acknowledge on the I<sup>2</sup>CBUS**

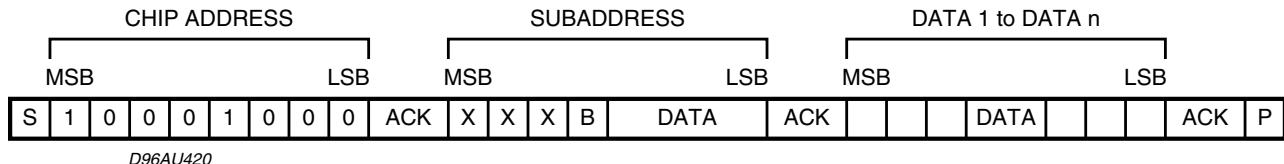


## 5 SOFTWARE SPECIFICATION

### Interface Protocol

The interface protocol comprises:

- A start condition (S)
- A chip address byte, containing the TDA7468D address
- A subaddress bytes
- A sequence of data (N byte + acknowledge)
- A stop condition (P)



ACK = Acknowledge

S = Start; P = Stop

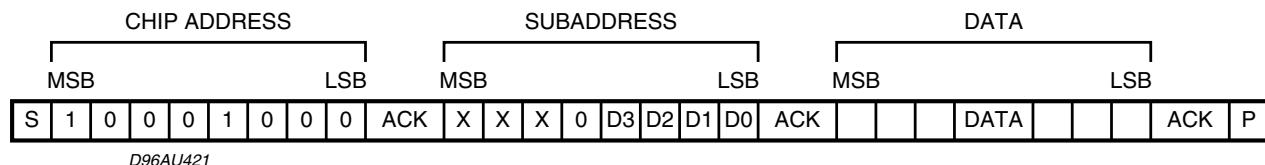
A = Address

B = Auto Increment

## 6 EXAMPLES

### 6.1 No Incremental Bus

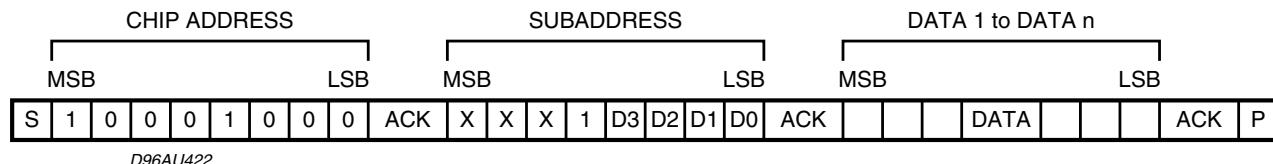
The TDA7468D receives a start condition, the correct chip address, a subaddress with the B = 0 (no incremental bus), N-data (all these data concern the subaddress selected), a stop condition.



### 6.2 Incremental Bus

The TDA7468D receive a start conditions, the correct chip address, a subaddress with the B = 1 (incremental bus): now it is in a loop condition with an autoincrease of the subaddress whereas SUBADDRESS from "XXX1000" to "XXX1111" of DATA are ignored.

The DATA 1 concern the subaddress sent, and the DATA 2 concern the subaddress sent plus one in the loop etc, and at the end it receivers the stop condition.



**Table 5. POWER ON RESET CONDITION**

MSB								LSB
D7	D6	D5	D4	D3	D2	D1	D0	
1	1	1	1	1	1	1	0	

## 7 DATA BYTES

Address = (HEX) 10001000.

**Table 6. FUNCTION SELECTION: First byte (subaddress)**

MSB								LSB	SUBADDRESS
D7	D6	D5	D4	D3	D2	D1	D0		
X	X	X	B	0	0	0	0	INPUT SELECT & MIC	
X	X	X	B	0	0	0	1	INPUT GAIN	
X	X	X	B	0	0	1	0	SURROUND	
X	X	X	B	0	0	1	1	VOLUME LEFT	
X	X	X	B	0	1	0	0	VOLUME RIGHT	
X	X	X	B	0	1	0	1	TREBLE & BASS	
X	X	X	B	0	1	1	0	OUTPUT	
X	X	X	B	0	1	1	1	BASS ALC	

B = 1: INCREMENTAL BUS; ACTIVE

B = 0: NO INCREMENTAL BUS

X = INDIFFERENT 0/1

**Table 7. INPUT SELECTION & MIC**

MSB							LSB	
D7	D6	D5	D4	D3	D2	D1	D0	
								INPUT SELECT
					0	0	0	IN1
					0	0	1	IN2
					0	1	0	IN3
					0	1	1	IN4
								MUTE (IN5)
					1			ON (IN5)
					0			OFF
								MIC
			0	0				Gain: 14dB
			0	1				Gain: 10dB
			1	0				Gain: 6dB
			1	1				Gain: 0dB
		1						OFF
		0						ON

**Table 8. INPUT GAIN SELECTION**

<b>MSB</b>								<b>LSB</b>	<b>INPUT GAIN</b>
<b>D7</b>	<b>D6</b>	<b>D5</b>	<b>D4</b>	<b>D3</b>	<b>D2</b>	<b>D1</b>	<b>D0</b>	<b>2dB STEPS</b>	
					0	0	0		0dB
					0	0	1		2dB
					0	1	0		4dB
					0	1	1		6dB
					1	0	0		8dB
					1	0	1		10dB
					1	1	0		12dB
					1	1	1		14dB

GAIN = 0 to 30dB

**Table 9. SURROUND**

<b>MSB</b>								<b>LSB</b>	<b>SURROUND</b>
<b>D7</b>	<b>D6</b>	<b>D5</b>	<b>D4</b>	<b>D3</b>	<b>D2</b>	<b>D1</b>	<b>D0</b>	<b>SURROUND MODE</b>	
								1	ON
								0	OFF
									<b>GAIN</b>
					0	0			0dB
					0	1			6dB
					1	0			9dB
					1	1			12dB
									<b>MIXING</b>
		0	0	0					inverting : 100%
		0	0	1					inverting : 50%
		0	1	0					inverting : 25%
		0	1	1					0%
		1	0	0					non-inverting : 100%
		1	0	1					non-inverting : 75%
		1	1	0					non-inverting : 50%
		1	1	1					mute
									<b>BUFFER GAIN</b>
	1								0
	0								6dB

**Table 10. VOLUME**

<b>MSB</b>								<b>LSB</b>	<b>VOLUME</b>
<b>D7</b>	<b>D6</b>	<b>D5</b>	<b>D4</b>	<b>D3</b>	<b>D2</b>	<b>D1</b>	<b>D0</b>		<b>1dB STEPS</b>
					0	0	0		0dB
					0	0	1		-1dB
					0	1	0		-2dB
					0	1	1		-3dB
					1	0	0		-4dB
					1	0	1		-5dB
					1	1	0		-6dB
					1	1	1		-7dB
									<b>8dB STEPS</b>
		0	0	0					0dB
		0	0	1					-8dB
		0	1	0					-16dB
		0	1	1					-24dB
		1	0	0					-32dB
		1	0	1					-40dB
		1	1	0					-48dB
		1	1	1					-56dB
									<b>VOLUME 2</b>
0	0								0dB
0	1								-8dB
1	0								-16dB
1	1								-24dB

VOLUME = 0 to -87dB

**Table 11. VOLUME setting 1**

<b>Target Volume (dB)</b>	<b>Volume1 1dB step (dB)</b>	<b>Volume1 8dB step (dB)</b>	<b>Volume2 8dB step (dB)</b>
0	0	0	0
-1	-1		
-2	-2		
-3	-3		
-4	-4		
-5	-5		
-6	-6		
-7	-7		
<b>-8</b>	<b>0</b>	<b>-8</b>	<b>0</b>
-9	-1		
-10	-2		
-11	-3		
-12	-4		
-13	-5		
-14	-6		
-15	-7		

**Table 11. VOLUME setting 1 (continua)**

Target Volume (dB)	Volume1 1dB step (dB)	Volume1 8dB step (dB)	Volume2 8dB step (dB)
-16	0	-16	0
-17	-1		
-18	-2		
-19	-3		
-20	-4		
-21	-5		
-22	-6		
-23	-7		
-24	0	-24	0
-25	-1		
-26	-2		
-27	-3		
-28	-4		
-29	-5		
-30	-6		
-31	-7		
-32	0	-32	0
-33	-1		
-34	-2		
-35	-3		
-36	-4		
-37	-5		
-38	-6		
-39	-7		
-40	0	-40	0
-41	-1		
-42	-2		
-43	-3		
-44	-4		
-45	-5		
-46	-6		
-47	-7		
-48	0	-48	0
-49	-1		
-50	-2		
-51	-3		
-52	-4		
-53	-5		
-54	-6		
-55	-7		
Target Volume (dB)	Volume1 1dB step (dB)	Volume1 8dB step (dB)	Volume2 8dB step (dB)
-56	0	-56	0
-57	-1		

**Table 11. VOLUME setting 1 (continua)**

-58	-2		
-59	-3		
-60	-4		
-61	-5		
-62	-6		
-63	-7		
<b>-64</b>	<b>0</b>	<b>-56</b>	<b>8</b>
-65	-1		
-66	-2		
-67	-3		
-68	-4		
-69	-5		
-70	-6		
-71	-7		
<b>-72</b>	<b>0</b>	<b>-56</b>	<b>-16</b>
-73	-1		
-74	-2		
-75	-3		
-76	-4		
-77	-5		
-78	-6		
-79	-7		
<b>-80</b>	<b>0</b>	<b>-56</b>	<b>-24</b>
-81	-1		
-82	-2		
-83	-3		
-84	-4		
-85	-5		
-86	-6		
-87	-7		

**Table 12. VOLUME setting 2**

Target Volume (dB)	Volume1 1dB step (dB)	Volume1 8dB step (dB)	Volume2 8dB step (dB)
0	0	0	0
-1	-1		
-2	-2		
-3	-3		
-4	-4		
-5	-5		
-6	-6		
-7	-7		

**Table 12. VOLUME setting 2 (continua)**

Target Volume (dB)	Volume1 1dB step (dB)	Volume1 8dB step (dB)	Volume2 8dB step (dB)
-8	0	-8	0
-9	-1		
-10	-2		
-11	-3		
-12	-4		
-13	-5		
-14	-6		
-15	-7		
-16	0	-16	0
-17	-1		
-18	-2		
-19	-3		
-20	-4		
-21	-5		
-22	-6		
-23	-7		
-24	0	-16	-8
-25	-1		
-26	-2		
-27	-3		
-28	-4		
-29	-5		
-30	-6		
-31	-7		
-32	0	-16	-16
-33	-1		
-34	-2		
-35	-3		
-36	-4		
-37	-5		
-38	-6		
-39	-7		
-40	0	-16	-24
-41	-1		
-42	-2		
-43	-3		
-44	-4		
-45	-5		
-46	-6		
-47	-7		

**Table 12. VOLUME setting 2 (continua)**

Target Volume (dB)	Volume1 1dB step (dB)	Volume1 8dB step (dB)	Volume2 8dB step (dB)
-48	0	-24	-24
-49	-1		
-50	-2		
-51	-3		
-52	-4		
-53	-5		
-54	-6		
-55	-7		
-56	0	-32	-24
-57	-1		
-58	-2		
-59	-3		
-60	-4		
-61	-5		
-62	-6		
-63	-7		
-64	0	-40	-24
-65	-1		
-66	-2		
-67	-3		
-68	-4		
-69	-5		
-70	-6		
-71	-7		
-72	0	-48	-24
-73	-1		
-74	-2		
-75	-3		
-76	-4		
-77	-5		
-78	-6		
-79	-7		
-80	0	-56	-24
-81	-1		
-82	-2		
-83	-3		
-84	-4		
-85	-5		
-86	-6		
-87	-7		

**Table 13. TREBLE & BASS SELECTION**

<b>MSB</b>								<b>LSB</b>	
<b>D7</b>	<b>D6</b>	<b>D5</b>	<b>D4</b>	<b>D3</b>	<b>D2</b>	<b>D1</b>	<b>D0</b>	<b>TREBLE</b>	
				0	0	0	0		-14dB
				0	0	0	1		-12dB
				0	0	1	0		-10dB
				0	0	1	1		-8dB
				0	1	0	0		-6dB
				0	1	0	1		-4dB
				0	1	1	0		-2dB
				0	1	1	1		0dB
				1	0	0	0		14dB
				1	0	0	1		12dB
				1	0	1	0		10dB
				1	0	1	1		8dB
				1	1	0	0		6dB
				1	1	0	1		4dB
				1	1	1	0		2dB
				1	1	1	1		0dB
								<b>BASS (*)</b>	
0	0	0	0						-14dB
0	0	0	1						-12dB
0	0	1	0						-10dB
0	0	1	1						-8dB
0	1	0	0						-6dB
0	1	0	1						-4dB
0	1	1	0						-2dB
0	1	1	1						0dB
1	0	0	0						14dB
1	0	0	1						12dB
1	0	1	0						10dB
1	0	1	1						8dB
1	1	0	0						6dB
1	1	0	1						4dB
1	1	1	0						2dB
1	1	1	1						0dB

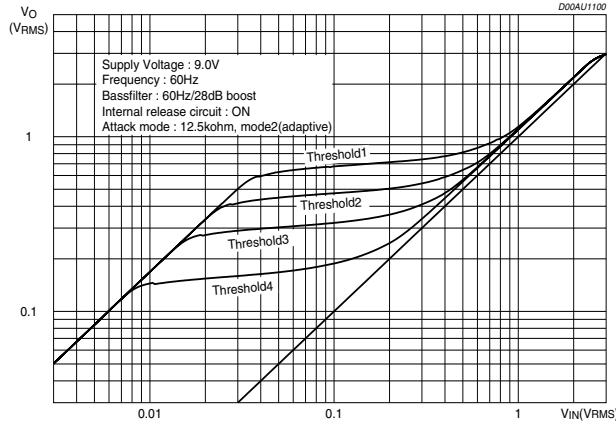
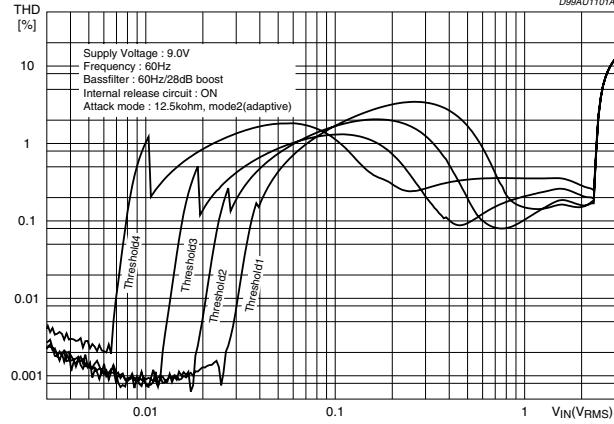
(\*) When BASS is programmed in the range -14dB/0dB, ALC is automatically switched to "OFF".

**Table 14. OUTPUT**

<b>MSB</b>								<b>LSB</b>	
<b>D7</b>	<b>D6</b>	<b>D5</b>	<b>D4</b>	<b>D3</b>	<b>D2</b>	<b>D1</b>	<b>D0</b>	<b>MUTE</b>	
							0		ON
							1		OFF

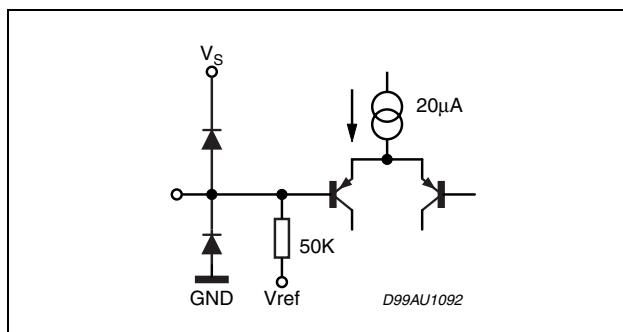
**Table 15. BASS ALC**

MSB								LSB	BASS ALC
D7	D6	D5	D4	D3	D2	D1	D0		
									ALC Mode
							1		ON
							0		OFF
									Detector
							1		ON
							0		OFF
									Release Current Circuit
							1		ON
							0		OFF
									Attack Time Resistor
			0	0					12.5KΩ
			0	1					25KΩ
			1	0					50KΩ
			1	1					100KΩ
									Threshold
	0	0							700mVrms
	0	1							485mVrms
	1	0							320mVrms
	1	1							170mVrms
									Attack Mode
0									MODE 1: Fixed Resistor
1									MODE 2: Adaptive

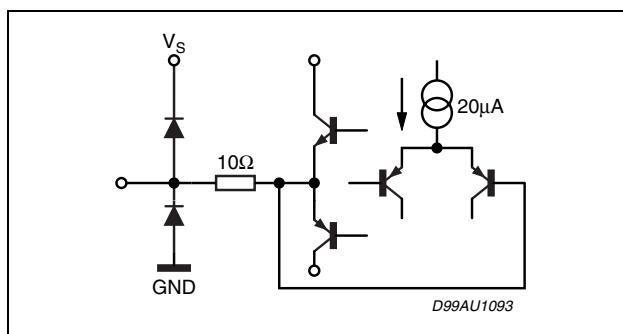
**Figure 9. BASS ALC : Threshold curve****Figure 10. BASS ALC : THD**

## 8 IC1

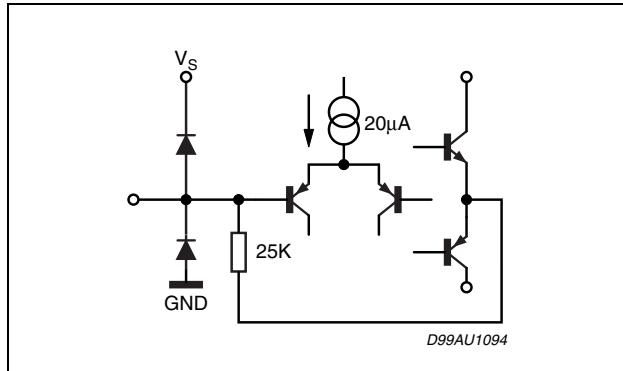
**Figure 11. PINS: IN1\_L, IN1\_R, IN2\_L, IN2\_R, IN3\_L, IN3\_R, IN4\_L, IN4\_R, IS\_L, IS\_R, MIC**



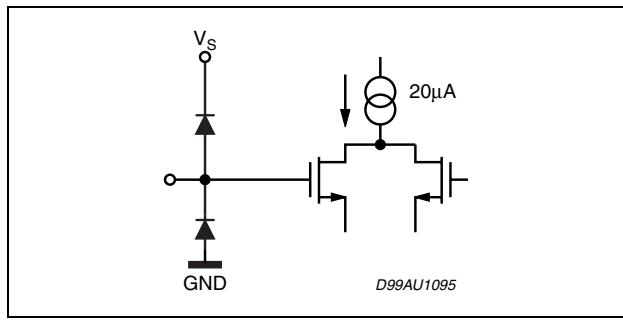
**Figure 12. PINS: OUT\_L, OUT\_R, IMUX\_L, MUX\_R**



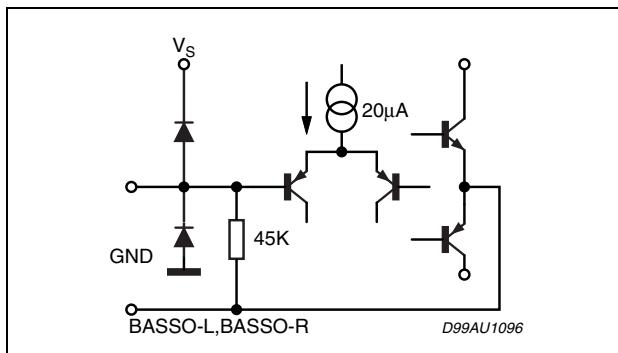
**Figure 13. PINS: TREBLE\_L, TREBLE\_R**



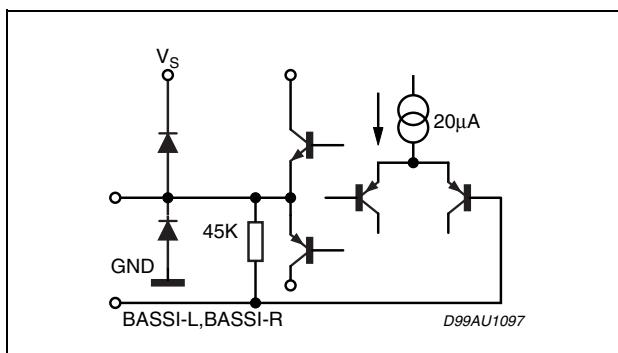
**Figure 14. PINS: SCL, SDA**



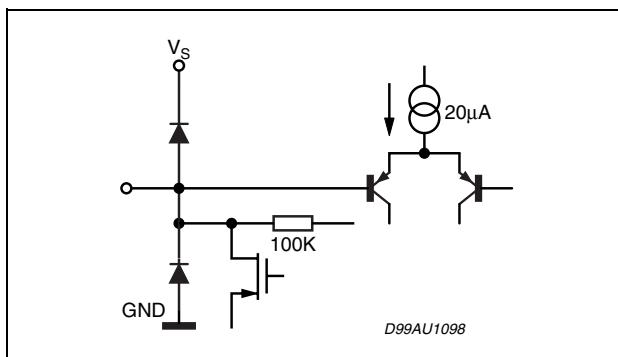
**Figure 15. PINS: BASSI\_L, BASSI\_R**



**Figure 16. PINS: BASSO\_L, BASSO\_R**



**Figure 17. PIN: ALC**



**Figure 18. PIN: CREF**

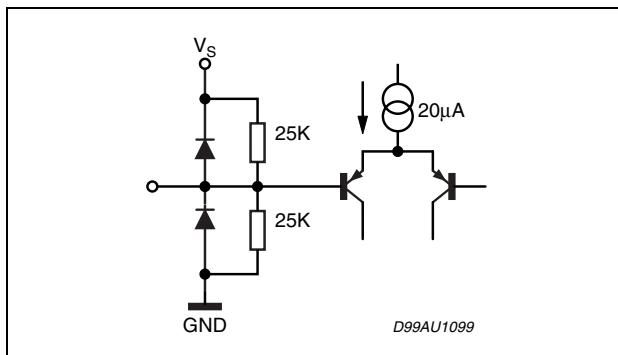
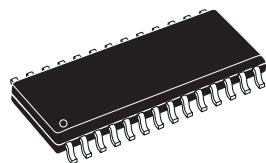


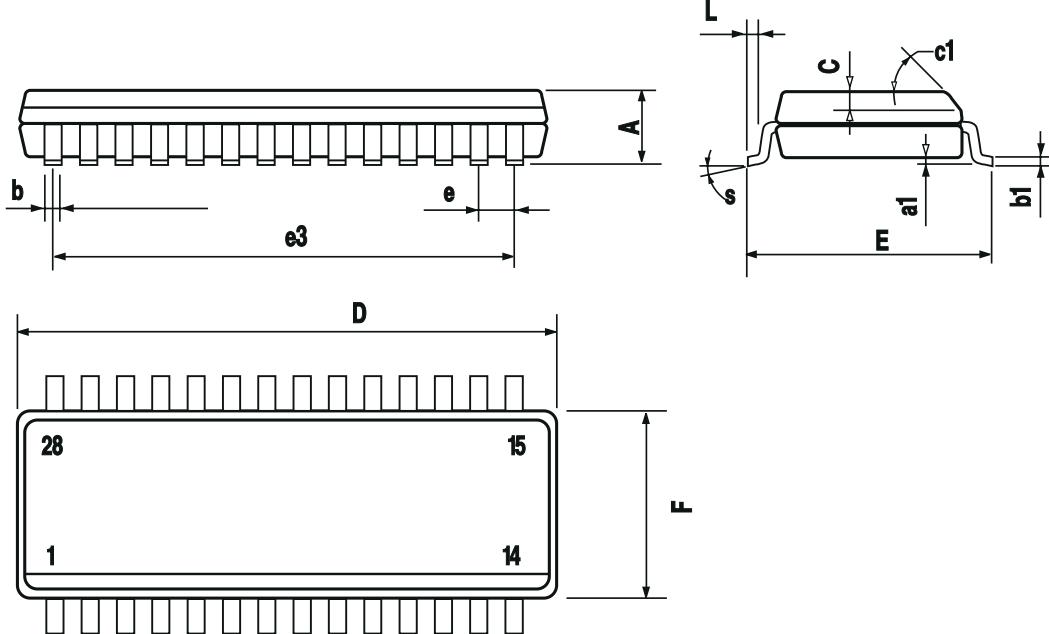
Figure 19. SO28 Mechanical Data &amp; Package Dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			2.65			0.104
a1	0.1		0.3	0.004		0.012
b	0.35		0.49	0.014		0.019
b1	0.23		0.32	0.009		0.013
C		0.5			0.020	
c1	45° (typ.)					
D	17.7		18.1	0.697		0.713
E	10		10.65	0.394		0.419
e		1.27			0.050	
e3		16.51			0.65	
F	7.4		7.6	0.291		0.299
L	0.4		1.27	0.016		0.050
S	8 ° (max.)					

### OUTLINE AND MECHANICAL DATA



SO-28



**Table 16. Revision History**

Date	Revision	Description of Changes
January 2004	1	First Issue in EDOCS DMS
June 2004	2	Changed the Style-sheet in compliance to the new "Corporate Technical Publications Design Guide"
March 2006	3	Updated figure 19 "SO28 Mechanical Data & Package Dimensions"

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