



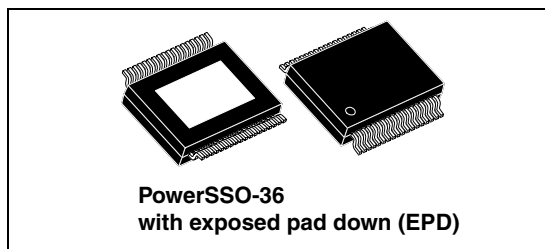
# STA370BWS

## 2.1-channel 40-W high-efficiency digital audio system Sound Terminal™

Data brief

### Features

- Wide-range supply voltage, 7.0 V to 21.5 V
- Three power output configurations:
  - 2 channels of ternary PWM (2 x 20 W into 8 Ω at 18 V) + PWM output
  - 2 channels of ternary PWM (2 x 20 W into 8 Ω at 18 V) + ternary stereo line-out
  - 2.1 channels of binary PWM (left, right, LFE) (2 x 9 W into 4 Ω + 1 x 20 W into 8 Ω at 18 V)
- Load-driving capabilities:
  - 11 W into 6 Ω at 14 V, ternary
  - 20 W into 4 Ω at 14 V, ternary
- FFX with 100-dB SNR and dynamic range
- Scalable FFX modulation index (up to 100%)
- Selectable 32- to 192-kHz input sample rates
- I<sup>2</sup>C control with selectable device address
- Digital gain/attenuation +48 dB to -80 dB with step resolution:
  - 0.125 dB/step from -60 dB to +48 dB
  - 0.25 dB/step from -80 dB to -60 dB
- Soft volume update with programmable ratio
- Individual channel and master gain/attenuation and soft/hard mute.
- Two independent DRCs configurable as a dual-band anti-clipper (B<sup>2</sup>DRC) or as independent limiters/compressors with optional global DRC capability
- EQ-DRC for DRC based on filtered signals
- Dedicated LFE processing for bass boosting with 0.125-dB/step resolution
- Audio presets:
  - 15 preset crossover filters
  - 5 preset anti-clipping modes
  - Preset night-time listening mode
- I<sup>2</sup>S input data interface



- Input and output channel mapping
- Programmable zero-detect mute
- Automatic invalid input-detect mute
- Up to 8 user-programmable biquads/channel
- Three coefficients banks for EQ presets storing with fast recall via I<sup>2</sup>C interface
- Extended filter dynamics +4/-4 for better sound shaping and easier filter implementation
- Bass/treble tones and de-emphasis control
- Selectable high-pass filter for DC blocking
- Advanced AM interference frequency switching and noise suppression modes
- F3X™ advanced PWM modulation scheme for carrier suppression (headphone or line output)
- Selectable high- or low-bandwidth noise-shaping topologies
- 96-kHz internal processing sample rate with quantization error noise shaping for very low cut-off frequency filters
- Full short-circuit protection at device power-up
- Coefficient checksum with software reset capabilities

**Table 1. Device summary**

Order code	Package	Packing
STA370BWS	PowerSSO-36 EPD	Tube
STA370BWSTR	PowerSSO-36 EPD	Tape and reel

# 1 Description

The STA370BWS is an integrated solution of digital audio processing, digital amplifier controls and power output stage to create a high-power single-chip FFX digital amplifier with high-quality and high-efficiency. Three channels of FFX processing are provided. The FFX processor implements the ternary, binary and binary differential processing capabilities of the full FFX processor.

The STA370BWS is part of the Sound Terminal™ family that provides full digital audio streaming to the speakers and offers cost effectiveness, low power dissipation and sound enrichment.

The power section consists of four independent half-bridges. These can be configured via digital control to operate in different modes.

- 2.1 channels can be provided by two half-bridges and a single full-bridge, supplying up to  $2 \times 9 \text{ W} + 1 \times 20 \text{ W}$  of output power.
- Two channels can be provided by two full-bridges, supplying up to  $2 \times 20 \text{ W}$  of output power.
- The IC can also be configured as 2.1 channels with  $2 \times 20 \text{ W}$  supplied by the device plus a drive for an external FFX power amplifier, such as STA533WF or STA515W.

The STA370BWS flexibility is shown by the load driving capability of  $11 \text{ W}$  into  $6 \Omega$  and  $20 \text{ W}$  into  $4 \Omega$  with ternary modulation with a supply of  $14 \text{ V}$ .

Also provided in the STA370BWS are a full assortment of digital processing features. This includes up to 8 programmable biquads (EQ) per channel. Special digital signal processing techniques are available to manage low-frequency quantization noise in filters with very low cut-off frequencies. The coefficient range  $-4$  to  $+4$  allows easy high-shelf filter usage and better sound shaping. Available presets enable a time-to-market advantage by substantially reducing the amount of software development needed for functions such as audio preset volume loudness, preset volume curves and preset EQ settings. There are also new advanced AM radio interference reduction modes. Dual-band DRC dynamically equalizes the system to provide linear frequency speaker response regardless of output power level. This feature separates the audio frequency band into two sub-bands independently processed to provide better sound clarity and to avoid speaker saturation.

The serial audio data input interface accepts all possible formats, including the popular I<sup>2</sup>S format. The high-quality conversion from PCM audio to FFX PWM switching provides over  $100 \text{ dB}$  of SNR and of dynamic range.

Full short-circuit protection is also embedded protecting output to GND, output to  $V_{CC}$  and output to output connections. The short-circuit (fault) condition is checked at device turn-on, so if a short circuit is detected the IC does not power up. This avoids dangerous conditions, component break down and minimizes the return from the field.

The new F3X™ modulation, already offered within STA369BWS, is capable of digitally filtering the PWM carrier to simplify external filtering requirements, AM interference and EMI. F3X™ is implemented in the auxiliary output of STA370BWS and it is specifically designed for application where a simple op-amp can be used to drive an auxiliary headphone line.

## 2 Applications

Figure 1. Applications circuit

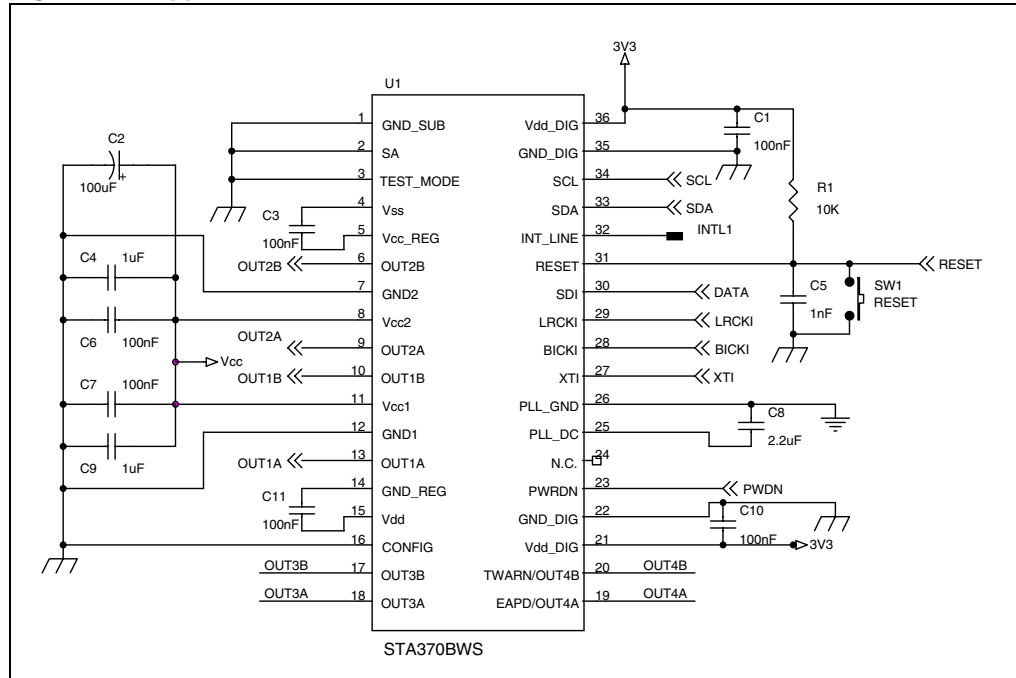
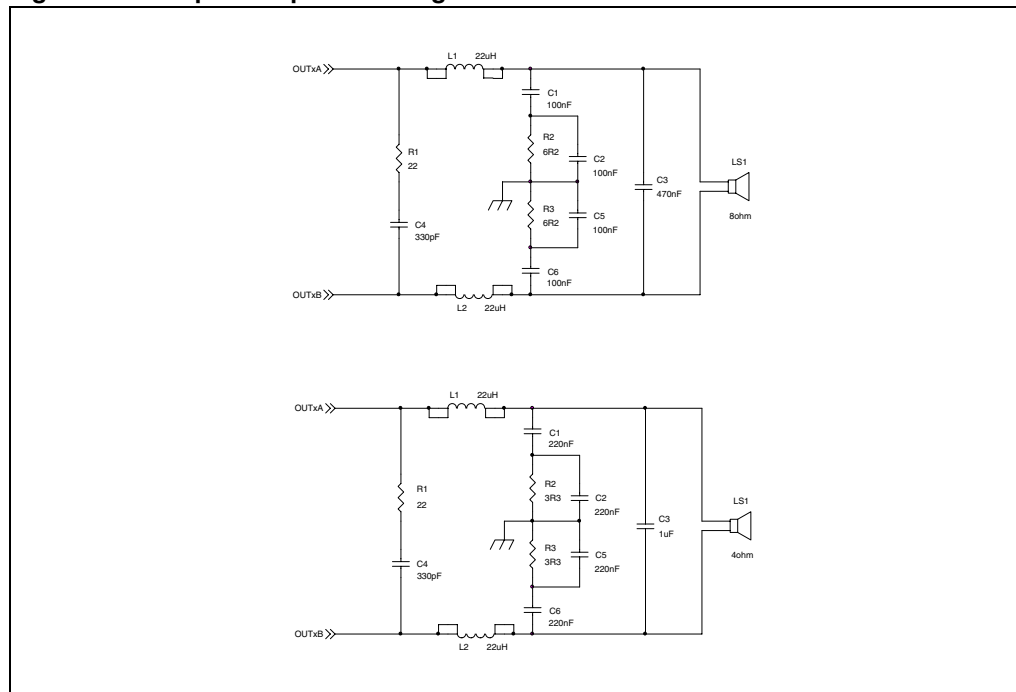


Figure 2. Output low-pass filtering



### 3 Revision history

Table 2. Document revision history

Date	Revision	Changes
10-Dec-2009	1	Initial release.

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