ST STA370BWS 2.1 路 40W 数字音频方案

ST 公司的 STA370BWS 是 2.1 路 40W 高效率数字音频系统,是数字音频处理,数字放大器控制和功率输出级的整体解决方案, 2.1 路提供两个半桥和单个全桥, 提供 2 x 9 W + 1 x 20 W 输出功率,两个全桥的两路可提供 2x20W 输出功率,工作电压 7.0 V 到 21.5 V,主要用于各种消费类电子,包括最新超薄的 LED 背光 TV.本文介绍 STA370BWS 主要特性, 应用电路和输出低通滤波器电路.

STA370BWS: 2.1-channel 40-W high-efficiency digital audio system Sound Terminal™ 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 x 9 W + 1 x 20 W of output power.

Two channels can be provided by two full-bridges, supplying up to 2 x 20 W of output power.

The IC can also be configured as 2.1 channels with 2 x 20 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 W into 6 ohm and 20 W into 4 ohm with ternary modulation with a supply of 14 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 I2S format. The high-quality conversion from PCM audio to FFX PWM switching provides over 100 dB of SNR and of dynamic range.

Full short-circuit protection is also embedded protecting output to GND, output to VCC 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.

STA370BWS 主要特性:

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 ohm at 18 V) + PWM output

– 2 channels of ternary PWM (2 x 20 W into 8 ohm at 18 V) + ternary stereo line-out

– 2.1 channels of binary PWM (left, right, LFE) (2 x 9 W into 4 ohm + 1 x 20 W into 8 ohm at 18 V)

Load-driving capabilities:

– 11 W into 6 ohm at 14 V, ternary

– 20 W into 4 ohm 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

I2C 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 (B2DRC) 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

I2S 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 I2C 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

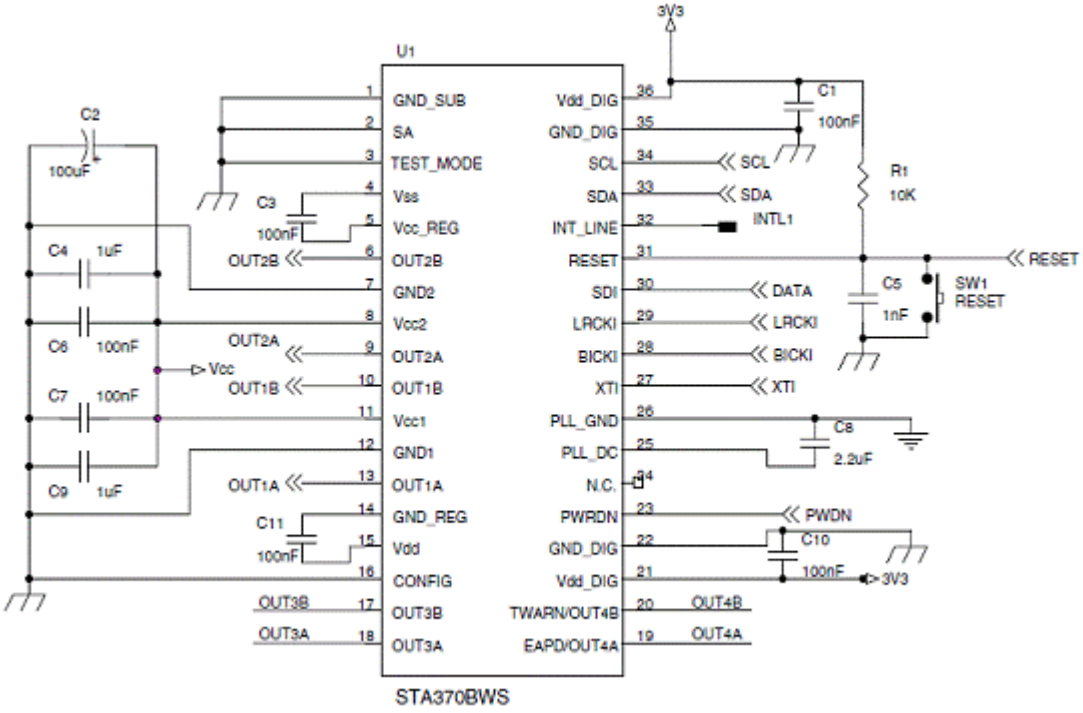

图 1.STA370BWS 应用电路

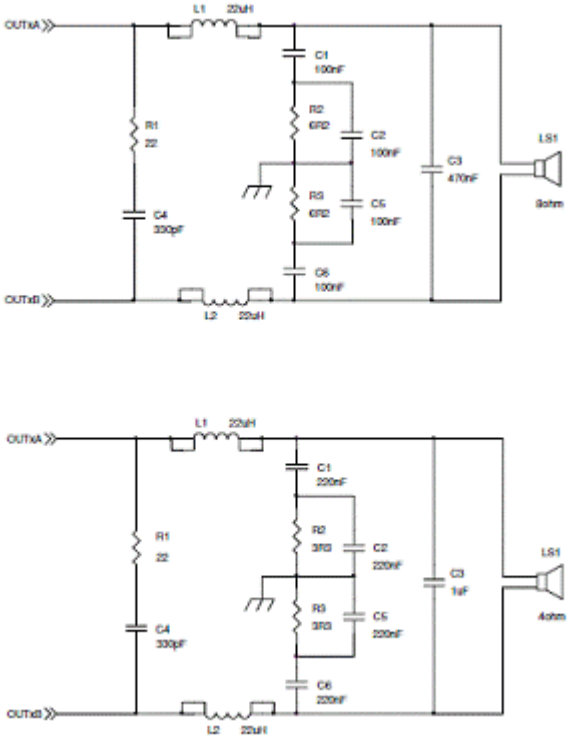

图 2.STA370BWS 输出低通滤波器