PRODUCT BRIEF

PORTABLE CONSUMER CODEC

TSCS454xx

DESCRIPTION

The TSCS454xx is an ultra low-power, high-fidelity CODEC. It features a complete 24-bit processing path from the ADCs, Digital Audio Inputs, and DSPs to the DACs and DDX™ amplifiers.

This premium audio CODEC is targeted at a variety of power-sensitive market applications such as: Bluetooth Audio Streaming, USB-C Audio, Thunderbolt and Lightning Audio Accessories.

In addition to the industry standard CODEC features, the TSCS454xx includes a stereo speaker amplifier, differential mono earpiece amplifier / subwoofer line output, a true capless stereo headphone amplifier and a true capless stereo line out.

Beyond high-fidelity for portable systems, the device offers an enriched “audio presence” through built-in output audio processing capability offering up to 5 uniquely processed output channels.

The ASC Windows®-based GUI offers the designer a simplified tuning interface with export options that any software engineer could appreciate.

TARGET APPLICATIONS

- **USB-C, Thunderbolt & Lightning Mobile Audio Accessories targeted at Mobile Devices & Laptops**
- **Portable Audio Devices (Docks, BT Speakers)**
- **Virtual / Augmented Reality Headsets**
- **Personal Media Players**

FEATURES

- **On-chip Class-H true capless headphone driver**
  - 40mW output power (16Ω)
  - SNR (A-weighted) 124dB
  - True, ground-referenced, capless design
  - Headphone / Headset detection logic
  - Global Headset detection logic enables automatic support for both CTIA and OMTP headset types
- **Separate Stereo Line Outputs**
- **High-Fidelity 32-bit ADCs / DACs**
  - 1 Stereo ADC: SNR (A-weighted) 95dB
  - 1 Stereo DAC: SNR (A-weighted) 124dB
  - 1 Mono DAC: SNR (A-weighted) 124dB
- **24-bit Audio Output Processing DSP Engine**
  - Independent processing of up to five audio channels
  - 3D Stereo Enhancement
  - 12-Band Stereo Parametric Equalizers
  - Wideband DRC
  - Pro-Style, Multiband Compressor / Limiter / Expander
  - Psychoacoustic Bass Enhancement
  - High-frequency restoration for compressed audio content
- **Three 32-bit I2S/LJ/RJ input ports & output ports**
  - 8kHz ~ 96kHz Fs support
  - All ports can support I2S / LJ / RJ modes
  - Stereo Asynchronous Sample Rate Converters (In/Out)
  - 1 port can support Intel® TDM formatted data
  - 2 ports can support Bluetooth™ TDM formatted data
- **Stereo Class-D Speaker Driver**
  - 3W/channel 4Ω
  - DDX Class-D Technology achieves low EMI while delivering high efficiency
  - Constant output power mode
  - Anti-Pop circuitry
  - Filter-less architecture reduces BOM cost
- **Mono Earpiece Amplifier Speaker Driver / Subwoofer Line Output**
  - 40mW output power (16Ω)
  - Also capable of driving up to 1Vrms (10KΩ)
- **Microphone/line-in interface**
  - Analog / Digital microphone or Line-in inputs
  - Automatic Level Control
  - Dual mic bias generators
- **Low-power with built in power management**
  - 1.6 V CODEC supports 1Vrms output
  - Ultra low standby and no-signal power consumption
  - 1.6V digital / 1.7V analog supply for low power
- **Package Offering**
  - 68-pin, 8x8mm, QFN, 0.4mm pitch

PART NUMBER ORDERING

TSC454XX1NTGXyyX	68-pin QFN

- yy = silicon revision, contact TSI for current part number.

AUDIO OUTPUTS

The TSCS454xx provides multiple audio analog and digital outputs. Audio outputs include:

- A stereo 3W /channel (into 4Ω) filterless DDX™ Class-D amplifier. This amplifier is capable of driving the speakers typically found in portable equipment, providing high fidelity, high efficiency, and excellent sound quality.
- A mono 40mW (into 16Ω) Class-A/B amplifier.This amplifier is capable of driving a speakers typically found in headsets or as a line output for driving an external audio amplifier
- A capless Class-H, stereo headphone port with ground referenced outputs, capable of driving headphones without requiring an external DC blocking capacitors
- A capless Class-AB, stereo line output port with ground referenced outputs, capable of driving 10K ohm loads without requiring external DC blocking capacitors
- Advanced thermal protection algorithm automatically limits power when device temperature reaches unsafe limits.
- Constant Output Power Mode maintains output volume with dropping battery supply voltage
- Headphone/Headset Detection
  - Headphone switch detection input
  - Microphone detect input with programmable thresholds
  - Button Push detection logic
- Advanced short-circuit protection protects amplifier outputs from shorting conditions
- Three 32-bit Linear PCM, I2S / LJ / RJ stereo outputs or TDM multichannel output

Each processing path features independent volume controls, including a soft-mute capability which can slowly ramp up or down the volume changes to avoid undesirable audio artifacts

The digital audio data is converted to oversampled bit streams using 32-bit digital interpolation filters, which then enter sigma-delta DACs, and become converted to high-quality analog audio signals

DIGITAL SIGNAL PROCESSING

- Four channels of input processing selectable between a stereo ADC and four digital microphone inputs
- Five channels of fixed audio processing functions in playback path

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