CX2070x USB/I^{2}S Audio CODEC

ImagingSmart™ Product Brief

CONEXANT®
EXPERIENCE SMART™

USB/I^{2}S Audio CODEC, AudioVoice DSP, Stereo Class-D, Headphone Driver

Product Overview

The CX20709 is one of Conexant's audio/voice DSP CODEC family solutions with highly-integrated hardware DSP, CODEC, class-D amplifier, USB, I^{2}S, S/PDIF, and I^{2}C interfaces. The solution features a suite of turnkey audio and voice enhancement algorithms designed for convergence audio entertainment and voice communication applications, such as PC docking system/soundbars, portable multimedia/navigation devices, Smart home intercom systems, media IP phones, and Unified Communication peripherals.

The CX20709 offers multiple digital data and control I/Os for flexible peripheral or MCU/MPU connectivity. The device features one four-wire and one five-wire digital audio interface, which can be mixed or multiplexed to support bi-directional I^{2}S, PCM, and S/PDIF. The device can be controlled and configured by both read and write capabilities through I^{2}C and SPI. The device features a USB 2.0 compliant audio class interface (full-speed for data and control) and a UART interface for the external MCU/MPU interface.

The device integrates three high-performance 102dB SNR, 24-bit DACs for 2.1CH speaker output, capless headphone output, and single-ended/differential line-output. The analog input paths feature four high performance, 24-bit ADCs supporting up to four microphones or three stereo line-inputs. Different audio sampling rates ranging from 8kHz to 96kHz are generated directly from the master clock without the need for an external PLL. The power-efficient integrated class-D stereo amplifier operates at 5V or 3.3V with an optional maximum power of 2.8W at a 4Ω load. For an intercom application, the mono line-out supports 600Ω drivers that can drive the isolation transformer directly without an external operational amplifier.

The on-chip DSP is designed to run a suite of VPAs and audio post processing effects offered by Conexant. The device features Conexant's soundbar algorithm for USB 5.1 channel soundbar enhancement. The audio designer has the ability to adjust and optimize performance on the target system by using the SPoC configuration toolbox.

The CX20709 operates at supply voltages down to 3.3V for analog, and 1.8V for the digital core. An advanced power management scheme can be configured to achieve <7.55mW in sleep mode.

Applications

- PC speakers system
- LCD display/soundbar
- Home automation/intercom
- PND/PMP
- Multimedia IP phone
- Telepresence/Unified Communication device
- Embedded applications

Key Features

- Four-wire and five-wire digital audio I/O (I^{2}S/PCM/SPDIF) that supports full-duplex independent sampling rates and a master clock for an optional PCM/I^{2}S slave CODEC (S/PDIF-in available in CX20709-21Z)
- One two-wire I^{2}C and one four-wire SPI slave interface for an external MCU
- USB 2.0 compliant full-speed UAC interface
- Single-ended or differential line output

System Block Diagram
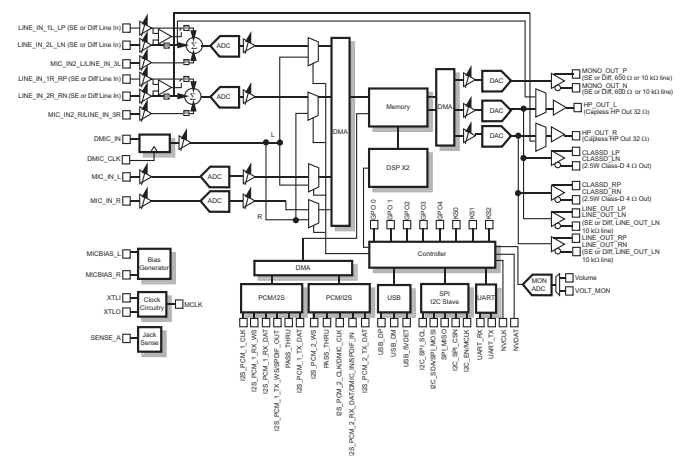
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Additional Features

- Supports dual USB playback endpoints (available in CX20709-21Z)
- Stereo digital microphone, up to a 12MHz clock rate (available in CX20709-21Z)
- Eight GPIO pins
- 2.8W x 2 BTL filterless stereo class-D speaker amplifier—Low EMI class-D amplifier output with spread spectrum and common mode scrambler
- Integrated 50mW headphone driver with jack sense
- Separate mixed mono line-output for sub-woofer or intercom usage
- Three single-ended stereo or one differential stereo analog audio inputs
- Up to four microphone interfaces with on-chip bias supply (available in CX20709-21Z)

- 24-bit DAC/ADC, SNR 102dB, THD–92dB at 48kHz 3.3V—In DSP mode, the processing limits the input and output to a 16-bit effective resolution
- Audio sample rates of 8kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz, 88.2kHz, and 96kHz
- 90dB dynamic range with 0.1% THD+n at a 4Ω load
- 12-bit ADC multiplexed to support analog volume potentiometer and DC level detection
- Flexible power management
- Variable master clock rates
- Configurable on-chip proprietary voice/audio processing
    - Sub-band AEC
    - Dual microphone beam forming
    - Noise reduction
    - Dynamic loudness adaptor
    - Microphone AGC
    - Sub-band line echo cancellation (two-way intercom applications)
    - Digital equalizer (10 bands/channel)
    - Dynamic range compression
    - Fourth order digital crossover for subwoofer line-out
    - Conexant soundbar algorithm for USB 5.1 channel soundbar enhancement (available in CX20709-21Z)
- SPoC configuration toolbox
    - Fast configuration through USB-to-I²C from a PC
    - Data path, I/O setup, and DSP parameter adjustment
    - Output log for convenient MCU programming

Ordering Information

Ordering Part Number	Part Number	Description	Package
DSAC-L709-21CH	CX20709-21Z	USB/I²S Audio CODEC	76QFN
DSAC-L709-12CH	CX20709-12Z	Conexant does not recommended this part number for new designs.	76QFN
CX20709-EVK2	CX20709 EVK2	CX20709-21Z EVK	-
CX20709-EVK2-IN	CX20709 EVK2 IN	CX20709-21Z Intercom Daughterboard	-

Note: All devices are lead-free (Pb-free) and RoHS compliant.

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