# CX20709

## USB/I$^2$S Audio CODEC, Audio/Voice DSP, Stereo Class-D, Headphone Driver

### 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/ Sound-Bar, Portable Multimedia/Navigation Devices, Smart Home Intercom System, Media IP Phone, and Unified Communication Peripherals.

The CX20709 offers multiple digital data and control I/O for flexible peripheral or MCU/ MPU connectivity. The device features one 4-wire and one 5-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 capability 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 102 dB 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 ADC supporting up to four microphones or three stereo Line-Inputs. Different audio sampling rates ranging from 8 kHz to 96 kHz are generated directly from the master clock without the need for external PLL. The power-efficient integrated Class-D stereo amplifier operates at 5 V or 3.3 V with an optional maximum power of 2.8 W at a 4 Ω load. For intercom application, the mono line-out supports 600 Ω drivers, which can drive the isolation transformer directly without an external operational amplifier.

The on-chip DSP is designed to run a suite of Voice Processing Algorithms and Audio Post Processing Effects offered by Conexant. The device features Conexant's soundbar algorithm for USB 5.1 channel sound-bar 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 3.3 V for analog and 1.8 V for the digital core. An advanced power management scheme can be configured to achieve <7.55 mW in sleep mode.

### Applications

- PC Speakers System
- LCD Display/SoundBar
- Home Automation/Intercom
- PND/PMP
- Multi Media IP Phone
- Telepresence/Unified Communication Device
- Embedded Applications

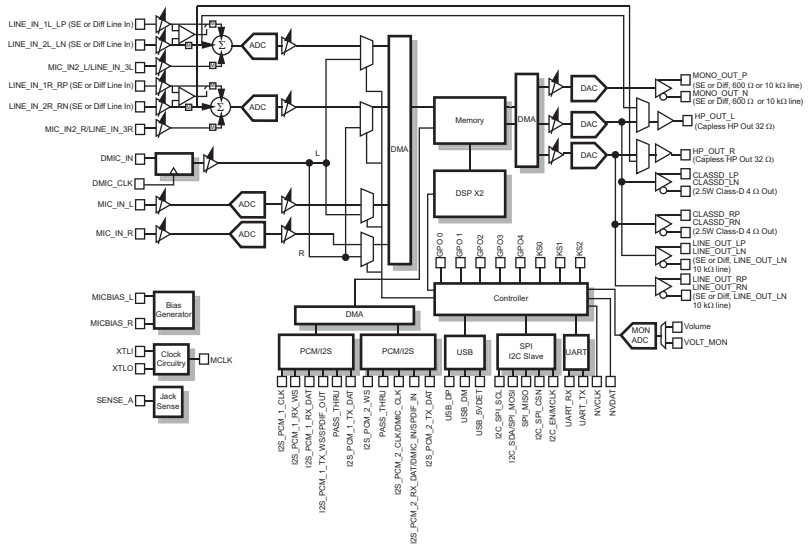
| Ordering Number | Part Number | Package | Description |
|---|---|---|---|
| DSAC-L709-21CH | CX20709-21Z | 76QFN | |
| DSAC-L709-12CH | CX20709-12Z | 76QFN | Not recommended for new design |
| CX20709-EVK2 | CX20709-EVK2 | | CX20709-21Z Evaluation Kit |
| CX20709-EVK2-IN | CX20709-EVK2-IN | | CX20709-21Z Intercom Daughter Board |
| All devices are lead-free (Pb Free) and RoHS compliant | | | |

**Part Number CX20709**

**Description** USB/I$^2$S Audio CODEC, Audio/Voice DSP, Stereo Class-D, Headphone Driver

## CODEC Features

- 4-wire and 5-wire digital audio I/O ($I^2S$/PCM/SPDIF), supporting full duplex independent sampling rates, master clock for optional PCM/$I^2S$ slave codec (SPDIF-in available in CX20709-21Z)
- One 2-wire $I^2C$ and one 4-wire SPI slave interface for external MCU
- USB 2.0 Compliant full speed UAC Interface
- Supporting dual USB playback end points (available in CX20709-21Z)
- Stereo Digital Microphone, up to 12 MHz clock rate (available in CX20709-21Z)
- Eight GPIO pins
- 2.8 W x 2 BTL filter-less stereo Class-D Speaker Amplifier
  - Low EMI Class-D amplifier output with Spread Spectrum and common mode scrambler
- Integrated 50 mW headphone driver with jack sense
- Single-ended or differential line output
- Separate mixed mono line-output for sub-woofer or intercom usage
- Three single-ended stereo or one differential stereo analog audio input
- Up to 4 microphone interfaces with on-chip bias supply (available in CX20709-21Z)
- 24-bit DAC/ADC, SNR 102 dB, THD -92 dB at 48 kHz 3.3 V
  - In DSP mode, the processing will be limited the input and output to 16-bit effective resolution
- Audio sample rate: 8,16, 22.05, 24, 32, 44.1, 48, 88.2, 96 kHz
- 90 dB Dynamic Range with 0.1% THD+N at 4 Ω 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
  - Subband Acoustic Echo Cancellation
  - Dual Microphone Beam Forming
  - Noise Reduction
  - Dynamic Loudness Adaptor
  - Microphone Automatic Gain Control
  - Subband Line Echo Cancellation (2-way intercom applications)
  - Digital Equalizer (10 bands/channel)
  - Dynamic Range Compression
  - 4th Order Digital Crossover for Subwoofer Line-out
  - Conexant sound-bar algorithm for USB 5.1 channel sound-bar enhancement (available in CX20709-21Z)
- SPoC Configuration Toolbox
  - Fast configuration via USB-to-$I^2C$ from PC
  - Data path, I/O setup, and DSP parameter adjustment
  - Output log for convenient MCU programming




**Functional Block Diagram**

### Conexant Product Portfolio

Conexant's comprehensive product portfolio includes solutions for imaging, audio, video surveillance, and embedded modem applications.



**www.conexant.com**
General Information:
U.S. and Canada:
(888) 855-4562
International:
1+ (949) 483-3000
Headquarters
4000 MacArthur Blvd.
Newport Beach, CA 92660

Doc# PBR-202964