

## Two-Channel High Performance Microphone Array ADCs with Programmable Pre-amplifier and Class D PWM Out

### Product Overview

The CX20812 is a high performance, analog front-end, high-definition voice capture IC for voice recognition, control, and conferencing applications. The device supports a microphone array with up to two synchronized ADCs and programmable pre-amplifiers. Each pre-amplifier has a dedicated micbias supply that eliminates crosstalk. The entire input path guarantees 106dB dynamic range, which allows the voice system to use the full performance of a high SNR microphone using low microphone boost to prevent microphone saturation. This path is critical for far field applications, and also ideal for compact speaker-phone designs where the microphone and speakers are in close proximity.

The CX20812 features high-resolution digital and analog gain control over a wide range, allowing a selection of optimal operating points for microphones with a wide range of sensitivity. The smooth gain ramping circuit allows dynamically adjusting microphone gain without introducing audible artifacts.

The CX20813 adds a mono digital PWM class D amplifier for ringer and audio playback functions. The class D amplifier output drives up to 1W-rms into a 4Ω load. The PWM output can be configured to support an external output stage amplifier for higher output power applications.

The CX20812 and CX20813 are the industry's first dedicated voice capture ICs that are designed to service the most demanding voice interactive applications.

### Key Features

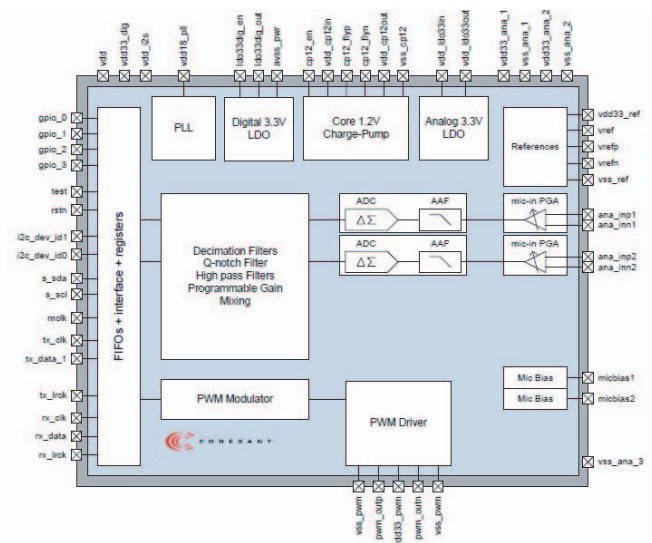
- Two high-performance ADCs with pre-amplifiers
- Microphone/line input support
- Dynamic range: 106dB
- THD+n: -85dB measured at -1dBFS
- Supported audio sample rates of: 8kHz, 16kHz, 22.05kHz, 24kHz, 32kHz, 44.1kHz, 48kHz, 88.2kHz, and 96kHz
- ADCs channels mixer
- Two micbias voltages from 1.5V to 4V

- Digitally controlled gain adjustment:
  - Analog gain 0dB to 30dB with 0.5dB steps
  - Digital gain -74dB to 12dB with 0.125dB steps
  - Gain ramping minimizes audible artifacts when gain switching
- Integrated offset calibration to minimize the BOM
- Two programmable biquads to configure Q-notch, HPF, or other type of filters
- Integrated LDO allows single supply (3V~5.5V) to minimize the BOM
- Integrated charge pump for power management
- Consumes very low power; 0.02mW in sleep mode
- Digital class D PWM output up to 1W into 4Ω speakers on the CX20813

### Applications

- Voice interactive products
- Voice capture systems
- In-vehicle infotainment

### System Block Diagram



## Additional Features

- Configurable low power and high performance modes
- Four-wire audio I<sup>2</sup>S/PCM output supports the four ADC's data, and also supports TDM
- Three-wire audio I<sup>2</sup>S/PCM input on the CX20813 that supports mono DACs
- I<sup>2</sup>S master and slave mode support
- Integrated PLL supports 900kHz up to 50MHz input clocks in master mode, and 256Fs in slave mode
- Two-wire I<sup>2</sup>C slave interface for external MCU

- Four general GPIOs
- Support of 1.8V and 3.3V digital I/Os
- CX20812: 48 QFN, 6x6
- CX20813: 60 QFN, 7x7

## Ordering Information

Part Number	Description	Package
CX20812-11Z	Two-channel input only.	6x6mm QFN
CX20813-11Z	Two-channel input with playback digital PWM class D amplifier.	7x7mm QFN

## Electrical Characteristics

T<sub>A</sub> = 25 °C, AVDD = DVDD = 3.3 V, 1kHz signal, f<sub>s</sub> = 48kHz, PGA gain = 0dB

Parameter	Minimum	Typical	Maximum	Unit	Comments
<b>Recommended Operating Conditions</b>					
Analog Voltage Supply (Input to LDO)	3.15	-	5.25	V	LDO and charge pump integrated.
Digital Core Power Supply	-	1.2	2	V	LDO and charge pump integrated.
Digital I/O Supply—3.3V	3.15	3.3	3.45	V	3.3V signaling levels.
Digital I/O Supply—1.8V	1.71	1.8	1.89	V	1.8V Signaling level.
Ground (AGND, PGND, DGND)	-	0	-	-	-
<b>Microphone Input</b>					
SNR (A-weighted)	-	106	-	dB	Microphone gain = 6dB (measured at -60dBFS input).
THD	-	-89	-	dB	Microphone gain = 0dB (measured at -1dBFS input).
Power Supply Rejection Ratio	-	90	-	dB	At 217Hz.
Mute Attenuation	80	-	-	dB	-
Input Resistance	8	-	500	kΩ	Input PGA gain setting dependent.
<b>Micbias</b>					
Bias Voltage	1.5	-	4	V	-
Bias Current	-	-	10	-	-
Noise in the Signal Bandwidth	-	-116	-	dBV	20kHz bandwidth.
<b>PWM (CX20813 Only)</b>					
Full-scale Output	-	2	-	V <sub>rms</sub>	Scales with supply.
SNR (A-weighted)	-	89	-	dB	AVDD = 3.3V, 4Ω load.
THD+n	-	-53.1	-	dB	AVDD = 3.3V, 4Ω load.

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