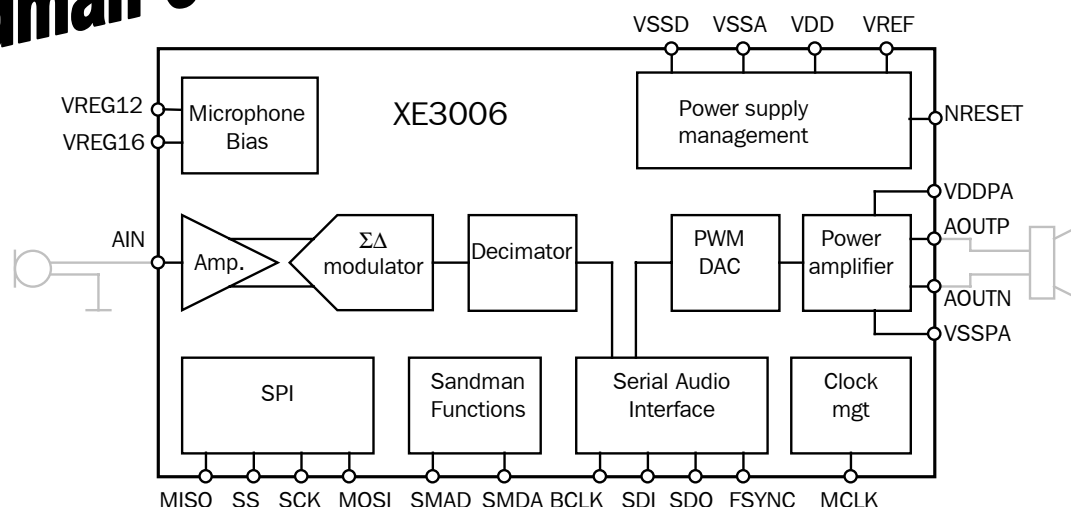




Sandman CODEC



XE3000 Series

Ultra Low-Power Audio Converters

General Description

The XE3000 series of ultra low-power audio converters are highly integrated devices. Key building blocks include microphone supply, pre-amplifier, 16-bit ADC, 16-bit DAC, serial audio interface and power management. The XE3006 includes Sandman™ functions for the ADC and the DAC, which allow for power consumption reduction of the CODEC and other components in the application. The sampling frequency of the ADC can be adjusted from 4 kHz to 20 kHz and of the DAC from 4 to 48 kHz.

Applications

- Wireless headset
- Bluetooth™ headset
- Voice / speech recognition
- Hands-free telephony
- Digital audio recording and playback
- Noise cancellation devices
- Digital hearing instruments
- Voice control / activation
- Multimedia applications
- Consumer electronics
- Music and voice sampling
- Battery-operated portable audio devices

Key product features

- Ultra low-power consumption below 2 mW
- Low-voltage operation from 1.8 to 3.3 V
- Small footprint; direct connection to microphone and speaker
- Sandman function to reduce system power (XE3006 only)
- Single supply voltage
- Adjustable sampling frequency: 4 – 48 kHz
- High dynamic range up to 84 dB
- Digital format: 16 bit 2s complement
- Various programming options
- Temperature range –40 to 85 °C

Development tools

The XE3000 Development Kit permits the evaluation of the electrical as well as the audio performance. Microphone and headset are included.

Ordering Information

XE3003	ADC	TSSOP16
XE3004	DAC	TSSOP16
XE3005	CODEC	TSSOP20
XE3006	CODEC	TSSOP24
XE3000DVK	Development Kit	

XE3000 Series description

The XE3000 series consists of four advanced low-power, highly integrated audio conversion products:

The **XE3003** is a voice audio ADC.

The **XE3004** is a voice audio DAC.

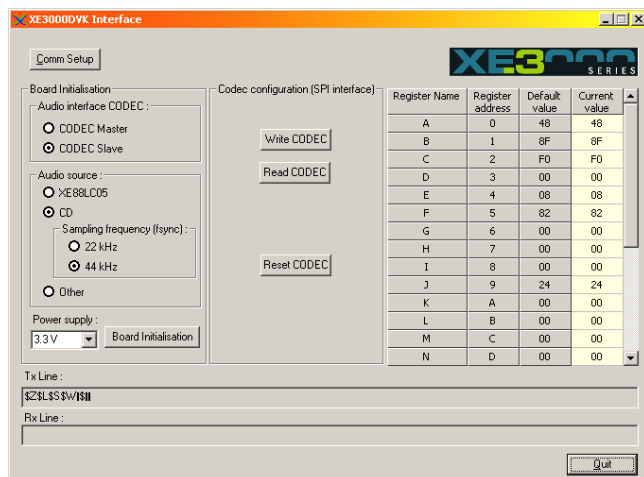
The **XE3005** is a voice audio CODEC.

The **XE3006** is a CODEC involving the Sandman function, which signals whether a signal is present in the ADC or DAC. This function allows for power reduction in the CODEC and in other components in the application.

The **XE3000DVK** is the Development Kit suited for the evaluation of the electrical as well as audio performance of the XE3000 series products.



Development kit XE3000DVK and the PC Programming Interface



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Functional description

Below is a list with the descriptions of the functional blocks that are used in the XE3000 series. The block diagram of the XE3006 is shown on page 1.

Microphone Supply

The microphone supply voltage biases an electret microphone. Two bias voltages can be selected 1.1 V or 1.6 V.

ADC-pre-amplifier

The Preamplifier is a single-ended low-noise switched-capacitor amplifier with a gain adjustable to 5 or 20.

Analog to Digital Converter

The ADC is a 16-bit, second-order Sigma-Delta modulator followed by a two-stage decimation filter. The Signal to Noise Ratio is 84 dB for $f_s = 20$ kHz. Sampling frequency can be adjusted from 4 to 20 kHz.

Digital Audio Interface

The Digital Audio Interface streams the audio data on or off chip in a user-selectable format: short frame synchronization or long frame synchronization, either in master or in slave mode.

Digital to Analog Converter

The DAC converts a 16-bit 2's complement digital audio signal in a Pulse Width Modulated (PWM) signal. Sampling frequency can be adjusted from 4 to 48 kHz.

Power Amplifier

The power amplifier is a class-D amplifier and has dedicated supply and ground pins. The peak output current is 100 mA. The power amplifier can be directly connected to a low impedance speaker or receiver. The speaker circuit forms the low-pass filter that shapes the class-D output signal.

Power Management

The Power Management Unit regulates the analog and digital supply voltages that are used on the chip. Supply voltage of the chip may vary from 1.8 to 3.3V.

Power Consumption

The power consumption of all XE3000 series devices is below 2 mW when the device is fully operational at a sampling frequency of max. 48 kHz.