

## 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 and DAC can be adjusted from 4 kHz to 48kHz.

#### Applications

- Wireless headsets
- Voice / speech recognition
- Hands-free telephony
- Digital audio recording and playback
- Noise cancellation devices
- Digital hearing instruments
- Multimedia applications
- Consumer electronics
- Battery-operated portable audio devices

#### Key product features

- Ultra low-power consumption - below 2 mW
- Wide supply voltage range - 1.8 to 3.3 V
- Sandman™ function to reduce system power consumption - XE3006 only.
- Small footprint; direct connection to microphone and speaker
- Adjustable sampling frequency: 4 – 48 kHz
- Dynamic range of typ. 78 dB
- Digital format: 16 bit 2s complement
- Temperature range –20 to 70 °C

#### Development tool

The XE3000DVK 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 an audio ADC.

The **XE3004** is an audio DAC.

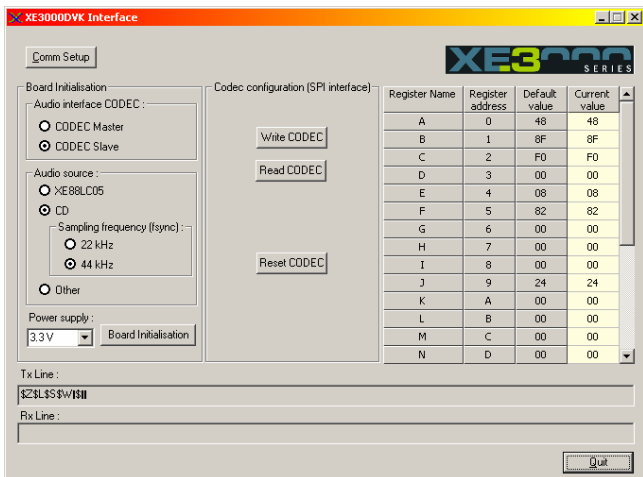
The **XE3005** is an audio CODEC.

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 application components.

The **XE3000DVK** is the Development Kit 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 Pre-amplifier 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 typical Signal to Noise Ratio is 78 dB for  $f_s = 20$  kHz. Sampling frequency can be adjusted from 4 to 48 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.