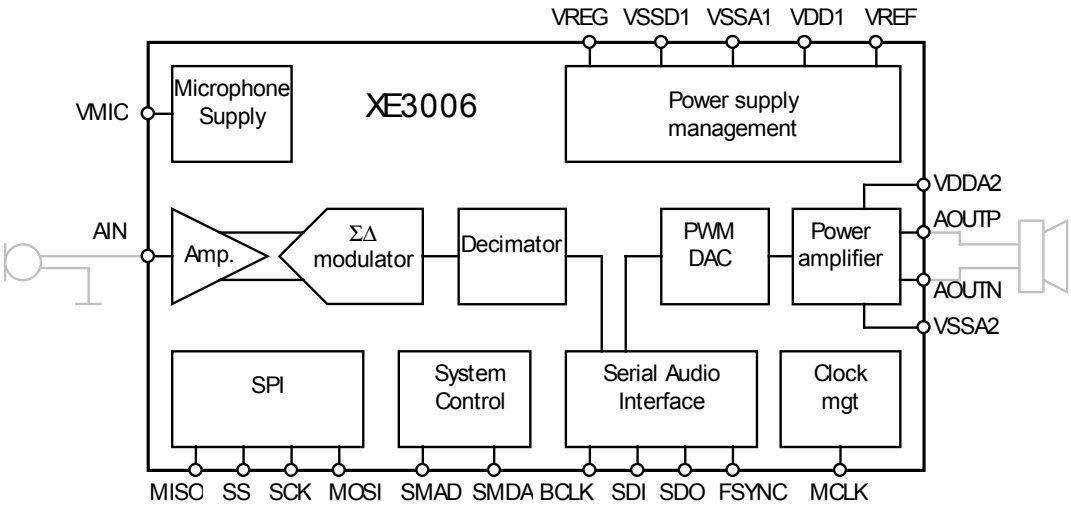
XEMICS

Sandman CODEC

XE3000 - Flyer



XE3000 Series

Ultra Low-Power Audio Converters

General Description

The XE3000 series of ultra low-power data converters consist of the XE3003 (ADC), the XE3004 (DAC) and XE3005 (CODEC) and the XE3006 (CODEC with Sandman function) for voice and audio applications. They include microphone supply, preamplifier, 16-bit ADC, 16-bit DAC, serial audio interface, power management, clock management and Sandman functions for the ADC and the DAC. 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

- Voice / speech recognition
- Speech synthesis
- 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 operation below 2 mW
- Low-voltage operation down to 1.8 V
- Sandman function to reduce system power
- Single supply voltage
- Adjustable sampling frequency: 4 – 48 kHz
- High dynamic range: 84 dB
- Digital format: 16 bit 2s complement
- Only 2 low-cost external components
- Easy interfacing to various DSPs and µCs
- Direct connection to microphone and speaker
- Various programming options

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	TSSOP20
• XE3004	DAC	TSSOP20
• XE3005	CODEC	TSSOP20
• XE3006	CODEC	TSSOP24
• XE3000DVK	Development Kit	
• Availability:	Sampling now	

XE3000 Series

Ultra-Low-Power Voice Data Converters

XE3000 Series description

The XE3000 series consists of a number of voice data acquisition products:

The **XE3003** is a voice ADC.

The **XE3004** is a voice DAC.

The **XE3005** is a voice CODEC and is the combination of the XE3003 and the XE3004.

The **XE3006** is a CODEC with the Sandman function, which signals whether a signal is present in the ADC or DAC. This function allows you to put system elements to sleep.

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

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.

Clock management

The clock management unit includes a clock divider that can be adjusted to 1, 2, 3 or 4. The Master Clock must be 256 times higher (at clock division =1) than the sampling frequency.

Microphone Supply

The Microphone Supply voltage biases an electret microphone. The microphone supply voltage is 1.2 V

Amplifier

The Preamplifier is a single-ended low-noise switched-capacitor amplifier with a gain adjustable to 1 or 4.

Analog to Digital Converter

The ADC is a second-order Sigma-Delta modulator followed by a two-stage decimation filter. The oversampling ratio is 64. The Signal to Noise Ratio is 84 dB for f_s = 20 kHz. The modulator bitstream is decimated to a 16-bit 2's complement output format. 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 PA is directly connected to a 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 from1.8 to 3.3V.

Control unit

The control unit controls all the settings of the various blocks on the chip. It consists of a register bank with a default initial configuration. The initial setting can be modified through the SPI interface. The control unit has two outputs:

- Sandman function for ADC (SMAD): signal that indicates whether a signal above a predefined noise level is present at the input of the ADC.
- Sandman function for DAC (SMDA): signal that indicates whether the signal entering the DAC is above a predefined noise level. This signal can be used internally to automatically turn off the DAC.

SPI Interface

The SPI allows access to the control unit and operates in slave mode only.

Power Consumption

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

For further information about the **XE3000 SERIES** please contact: XEMICS, Maladière 71 - CH-2007 Neuchâtel
Tel.: +41 32 720 5511 – Fax: +41 32 720 5770 – E-mail: info@xemics.com – Web: www.xemics.com XXF0107-120