IA8201

Enables wake-on-voice processing for low latency voice UI, noise reduction, context awareness, and accelerated machine learning inferencing for edge processing of sensor inputs.

The Knowles AISonic™ Audio Edge Processor IA8201 is a high-performance, ultra-low power audio-centric OpenDSP supporting up to 4 mics, multiple high speed interfaces and GPIOs in two package options (eWLB and QFN).

Multi-Core Audio Processing

IA8201 combines two Tensilica-based, audio-centric DSP cores; one for high power compute and ML, the other for very low power always-on processing of sensor inputs. Either one can also function as a general-purpose controller using the Tensilica based instruction set. A rich set of audio and general purpose high speed interfaces enable flexible interfacing with digital microphones, motion, environmental sensors, and as needed with a host for further processing. 1MB of user RAM enables storage of multiple algorithms and voice keywords.

Highly Optimized, Advanced Instruction Set

The DSP SDK (Software Development Kit) with Knowles and Xtensa HiFi 3 instruction sets enable extensive audio capabilities for voice and audio processing, voice user interface, and ambient sound processing. Optimized frame-based processing utilizes floating-point data types, SIMD, and a flexible extended instruction set for non-linear functions and accelerated DNN MACs.

Open DSP

The IA8201, an open DSP platform, brings together leading contributors to the intelligent voice ecosystem to improve audio performance in a variety of use cases. This Knowles partner program brings world-class algorithm and cloud contributors to an ecosystem where a multitude of solutions solve complex audio problems, increasing the versatility of an IA8201-based solution.

Use Case Examples

Low Power Voice Wake: Listens for specific OEM keywords to wake the host processor. Large memory enables processing of multiple stages on-chip for accurate results.

Proximity Detection: When combined with an ultrasonic capable speaker and microphone, detects the distance between the system and an object; can replace an IR-Prox sensor in bezel-less phones.

Hub: Determines location of voice source while tuning out a noisy environment and lowering music to detect voice commands. Simultaneously takes metadata input and overrides beamformer to focus on camera-tracked objects.

Security System: Activate with a voice command. Detect glass breakage/smoke-alarm, log direction of noise source, trigger alarm, and send alerts through WiFi connection.

Wireless Earbuds: Delivers low power premium wake-on-voice performance, talk detection to eliminate false triggers, enhanced voice quality through advanced beam forming and noise reduction algorithms as well as support for local commands including answer/ignore calls.
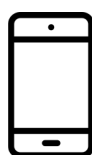
Core Details

- **DeltaMax** is an Xtensa LX5 128-bit 4-way floating-point SIMD DSP core, with Knowles instruction set extensions optimized for high performance frame-based audio processing and DNN acceleration
- **HemiDelta** is an Xtensa LX5 64-bit 2-way floating-point SMID DSP core, with both Xtensa HiFi 3 and Knowles instruction sets, optimized for low power

Additional Features

Open DSP
- IA8201 can be configured as a DSP platform for plugin development, without any Knowles Algorithms
- Contact Knowles Representative for available third party features and algorithms support

Software Capability & Tools
- Far-field voice optimization for Mobile and IoT, capable of multiple microphone inputs and stereo AEC Barge-in
- Capable of on-system keyword trigger processing, hybrid second-stage keyword verification, and cloud ASR-A implementation
- Development libraries for voice communication and voice interface, including noise suppression, beamforming, echo cancellation, speech enhancement and meta-data processing techniques
- SDK support with simulators, tools, example code and documentation

IA8201 Specifications

Multi-Core	DeltaMax, optimized for compute HemiDelta, optimized for low power
Audio Interfaces	Up to 4x PDM Digital Microphones- 1 stereo input, 4x mono inputs, and 1 stereo output, supporting clock rates up to 6.144 MHz Up to 3x I²S/TDM ports supporting 8 channels each of 32-bit audio data using a 24.576 MHz input clock
Control Interfaces	SPI, I²C, UART, available GPIOs.
Memory	1.44MB RAM (1MB available to user)
Clock	175 MHz
System Requirements	IA8201BC 1.8V Vdd IA8201CQ 1.8V Vdd and 3.3V Vdd -20 to 85°C
Packaging Options	eWLB 3.00x2.6x0.715mm, 0.4 pitch, 42 ball QFN 6.00x6.00x0.75mm, 0.5 pitch, 40 lead

For more information, visit www.knowles.com/IA8201
For documents and SDK, sign up at
https://solutions.knowles.com/

Ordering Information

Product	Package	Ordering Part Number
IA8201	eWLB	IA8201BC
IA8201	QFN	IA8201CQ

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