

# 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

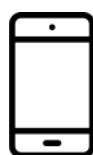
**Low Power Voice Wake:** Listens for specific OEM keywords to wake the host processor. Large memory enables processing of multiple stages on-chip for accurate results.

**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

## Ordering Information

Product	Package	Ordering Part Number
IA8201	eWLB	IA8201BC
IA8201	QFN	IA8201CQ

## IA8201 Specifications

<b>Multi-Core</b>	DeltaMax, optimized for compute HemiDelta, optimized for low power
<b>Audio Interfaces</b>	Up to 4x PDM Digital Microphones- 2 stereo inputs, 4x mono inputs, and 1 stereo output, supporting clock rates up to 6.144 MHz  Up to 3x I <sup>2</sup> S/TDM ports supporting 8 channels each of 32-bit audio data using a 24.576 MHz input clock
<b>Control Interfaces</b>	SPI, I <sup>2</sup> C, UART, available GPIOs.
<b>Memory</b>	1.44MB RAM (1MB available to user)
<b>Clock</b>	175 MHz
<b>System Requirements</b>	IA8201BC 1.8V Vdd IA8201CQ 1.8V Vdd and 3.3V Vdd -20 to 85°C
<b>Packaging Options</b>	eWLB 3.00x2.6x0.715mm, 0.4 pitch, 42 ball QFN 6.00x6.00x0.75mm, 0.5 pitch, 40 lead

For documents and SDK, sign up at <https://solutions.knowles.com/>

