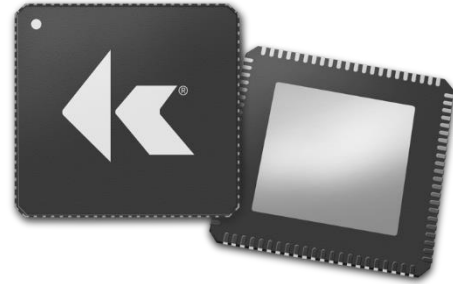


IA8508



Audio Edge Processor Platform Supporting Open DSP

IA8508 is a high-performance, ultra-low power audio edge processor that is optimized for Mobile and IoT products with open DSP flexibility and a host of connectivity options.



Multi-Core Audio Processing

IA8508 combines three Tensilica-based, audio-centric DSP cores with an ARM Cortex M4 to maximize design flexibility. The DSP cores provide low-latency, high-capacity processing for audio and machine learning computations, while the Cortex M4 blends signal processing with general-purpose controller capability. The platform leverages 4MB of user available RAM to enable multiple simultaneous use cases and can be advantageously configured into an ultra-low power system. See page 2 for detailed core information.

Highly Optimized, Advanced Instruction Set

The included 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 sensing solutions. Optimized frame-based processing utilizes floating-point data types, SIMD, and a flexible extended instruction set for non-linear functions and accelerated DNN MACs.

Typical Applications

- **IoT Hubs/ Smart Speakers**
- **Mobile Devices**
- **Smart TVs & Remotes**

Open DSP

The IA8508, an open DSP platform, brings leading contributors to the intelligent voice ecosystem to develop algorithms for audio and sensing performance. This Knowles partner program has combined world-class algorithm partners and cloud contributors into an ecosystem that provides many solutions for complex audio and sensing needs, increasing the versatility of IA8508-based solutions.

Use Case Examples

Mobile: Enable always-on voice assistants in mobile products while maintaining a low power profile for battery life. Combine audio and various inputs for ML processing at the edge, offloading the AP for sensing and audio algorithms. This enables smart, natural mobile interactions with a voice assistant.

Smart Hub: Determines location of voice source while tuning out a noisy environment and detecting voice commands while playing music. 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.





Core Details

- **ARM Cortex M4** with floating point for general applications and control, signal processing, or plug-ins
- **DeltaMax** 128-bit DSP core for 4-way SIMD floating point processing for high capacity DNN with Knowles instruction set extensions
- **HemiDelta** 64-bit DSP core enabling ultra-low power, always-on, 2-way SIMD floating point processing, with both Xtensa HiFi 3 and Knowles instruction sets
- **SSP** 256-bit DSP core targeting ultra-low latency applications such as Asynchronous Sample Rate Conversion (ASRC), Active Noise Cancellation (ANC) and Ambient Sound Processing

Audio Edge Processor

Core	Cortex M4	HemiDelta+ HiFi3	DeltaMax	SSP
Inst	Armv7	Tensilica (Plus Knowles Extended Instruction Set)		
Clock Freq	150MHz			
Tools	OpenDSP SDK			
Mem	4MB RAM			
Usage	Applications Connectivity Stack Control	Ultra Low Power Voice Processing	Multi-Channel Processing Intense Compute	Low Latency Single Sample ANC

Additional Features

Hardware Support

- IA8508 can be configured as a DSP platform for plugin development, without any Knowles Algorithms

Software Capability & Tools

- Voice optimization for IoT, Mobile, capable of multiple microphone inputs, low power modes and multi-channel AEC
- 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
IA8508	LFBGA	IA8508AB
IA8508	VQFN	IA8508AQ
IA8508	eWLB	IA8508BC

IA8508 Specifications

Multi-Core	ARM Cortex M4 for general processing, and DSP cores- DeltaMax, HemiDelta, and SSP
Audio Interfaces	Up to 8x PDM Digital Microphones- 4x stereo inputs, 4x mono inputs, and 1 stereo output, supporting clock rates up to 6.144 MHz Up to 6x I ² S/TDM ports supporting 8 channels each of 32-bit audio data using a 24.576 MHz input clock
Control Interfaces	SPI, I ² C, UART, available GPIOs
Memory	4 MB User Available RAM
Clock	150 MHz
System Requirements	1.2V/1.8V/3.3V Vdd -20 to 85°C
Packaging Options	LFBGA 8x8x1.3mm 0.65pitch, 112 ball VQFN 10x10x0.85mm, 88pin eWLB 5.24x5.24x0.715mm 0.4pitch, 105 ball

For more information, visit <https://solutions.knowles.com/>

