



 knowles

KNOWLES AISonic™ SELECTION GUIDE

VOICE-ENABLE YOUR IoT DESIGN

Voice-enable your applications by using Knowles AISonic™ Audio Edge Processors.

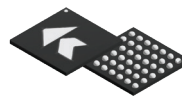
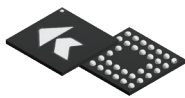
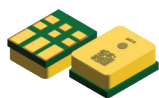
Knowles leverages our industry-leading experience in AISonic™ Audio Edge Processors, MEMS microphones and SmartMics to enrich users with seamless interactions to intelligent voice assistants, audio front end processing and still maintain the critical low power requirements for a range of applications including IoT and mobile devices, TWS & OTE headsets, televisions, home appliances, wearables and remote controls.

Applying voice on the edge capabilities combined with optimal machine learning performance, our AISonic™ Audio Edge Processors are designed to provide wake-on-voice processing features that respond to users in near-field and far-field solutions. Pairing Knowles audio processors with world class audio algorithms from leading algorithm providers enables customers to design modern products with far-field voice processing functionality for accurate listening. Pioneering low power audio processors are paired with optimized MEMS microphones to set new standards of performance and innovation in intelligent voice-enabled devices.

Solving acoustic VUI challenges:

- Multi-mic Beamforming
- Noise Suppression
- Acoustic Echo Cancellation
- Output Processing, Spatial Audio
- Coverage for various voice call standards
- Double Talk





	IA610 / IA611	IA700	IA8201	IA8202
Description	SmartMic with always-on voice wake	Single-Core Low Power Edge Processor	Dual-Core Audio Processor	Extended Memory Quad-Core Audio Processor
Maximum number of mics	1 (integrated mic)	2	4	8
Maximum talker distance	Near field up to 1m	up to 3m	up to 5m	Far-field greater than 5m
Memory	248kB	248kB	1.4MB	2.8MB
Size / Package	<ul style="list-style-type: none"> IA610 (Bottom port): 3.50×2.65×0.98mm IA611 (Top port): 4.00×3.00×1.30mm 	<ul style="list-style-type: none"> QFN: 3.50×3.50×0.75mm 	<ul style="list-style-type: none"> eWLB: 3.0×2.6×0.50mm QFN: 6.0×6.0×0.75mm LGA: 3.0×2.6×0.70mm 	<ul style="list-style-type: none"> LGA: 7.00×7.00×0.63mm
Digital Audio I/O	1x PDM in, 2x PDM out, 1x I ² S/TDM (4ch in/out)	4x PDM in, 2x PDM out, 1x I ² S/TDM (4ch in/out)	4x PDM in, 2x PDM out, 3x I ² S/TDM (4ch in/out)	8x PDM in, 4x PDM out 6x I ² S/TDM (4ch in/out)
Digital Comm I/O	1x I ² C, 1x SPI, 1x UART, 1x GPIO w/ interrupt	1x I ² C, 2x SPI, 1x UART, 6x GPIOs w/ interrupts	2x I ² C, 2x SPI, 2x UART, 25x GPIOs w/interrupts, Self-boot capable from Flash	4x I ² C, 4x SPI, 4x UART, 50x GPIOs w/interrupts, Self-boot capable from Flash
Features	<ul style="list-style-type: none"> Low power always-on voice wake DSP + Mic = smallest foot print Lowest system cost solution 	<ul style="list-style-type: none"> Low power always-on voice wake Pair with 2x Cornell II mics for Beam Forming 	<ul style="list-style-type: none"> Multi-channel AEC, Concurrent Voice UI ASR and Calling Ambient contextual detection Local ASR Low power VAD 	
Cores	43MHz HMD-Lite 64-bit HiFi3-compatible SIMD	100MHz HMD-Lite 64-bit HiFi3-compatible SIMD	2x 175MHz AU/ML cores with up to 128-bit data-path HiFi3-compatible SIMD (6x 32-bit MACs/cycle)	4x 175MHz AU/ML cores with up to 128-bit data-path HiFi3-compatible SIMD (12x 32-bit MACs/cycle)
Power consumption	1-mic algos for always-listening AMA compatible device: 2mW (includes mic)	1-mic algos for always-listening AMA compatible device: 1.1mW	3-mic algos for always-listening AVS compatible device (AEC + Beamforming + NS + KW): 32mW	
Signal-to-echo ratio	n/a	-20 dB SER Loud talker	-30 dB SER Soft talker	-35 dB SER Soft talker
Commands with nearby distractors	Light +6dB SNR	Improved Stationary 0dB SNR	Better stationary, impulse noise ≥ -10dB SNR	Best diffused, stationary, impulse noise ≤ -10dB SNR
KW Model processing	Light 1st Stage	Light 1st Stage	Combined KW stages 1+2	Heavy DSP KW model

DEVELOPMENT KITS

IA611RDI-01 Evaluation Module

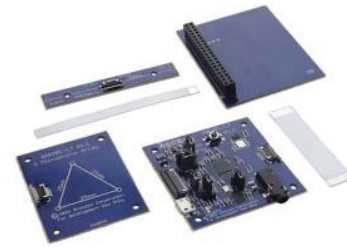
- Compatible with Microchip SAM D21 Xplained Pro Development Board
- Use Cases: Voice Wake and Local Commands, Acoustic Authentication, Machine Learning
- Integrated sample code with Atmel Studio 7 for the SAM D21 Xplained Pro Development Board



Available on Digi-Key and Mouser

IA8201-RDI-01 Evaluation Module

- Compatible with Raspberry Pi
- Use Cases: Voice Wake and Local Commands, Audio Front End for voice and hearing enhancement, Machine Learning
- Includes 2-mic and 3-mic array boards



Available on Digi-Key and Mouser

Bundle all of the hardware, software and algorithms required to test, prototype, and debug voice and audio functionality and integration in applications.

OPEN DSP: 3RD PARTY DEVELOPER ECOSYSTEM



Wake word and local commands



Wake word and local commands, Voice enhancement



Wake word and local commands



Voice and hearing enhancement



Spatial Audio



Output processing



Acoustic authentication



TensorFlow Lite Machine learning and context detection

The goal of Knowles' Open DSP 3rd Party Developer Ecosystem is to pair Knowles Audio Processors and Microphones with world-class algorithm solutions from leading providers. With algorithms ported to and tested on Knowles hardware, OEMs can integrate value-added functionality quickly while minimizing design risk.

ADDITIONAL RESOURCES

Solutions portal: <https://solutions.knowles.com/>

Smart microphones: www.knowles.com/products/smart-mics

Audio edge processors: www.knowles.com/products/audio-processors

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