

XENSIV™ MEMS microphones

For automotive, industrial and consumer applications

www.infineon.com/mems



XENSIV™ MEMS microphones

XENSIV™ MEMS microphones are setting new performance benchmarks across a growing number of industries. These innovative silicon microphones are designed to provide the benefits of the lowest possible self-noise (high SNR) and minimal distortion for an ever-expanding range of applications.

Dedicated digital and analog MEMS mics

Our digital and analog MEMS microphones for consumer applications deliver a studio-quality audio experience in compact form factors such as smartphones or earbuds. On the other hand, our automotive-qualified solutions enable the best audio performance in harsh automotive environments, improving the in-cabin user experience and passenger comfort. Additionally, they enhance autonomous driving features and contribute to road safety.

MEMS for consumer and industrial applications

Infineon's XENSIV™ MEMS microphones are designed to capture unprecedented precision and quality audio signals. The microphones comprise Infineon's MEMS microphone chips and ASICs, the world's best-selling microphone components. Due to advanced technical characteristics, high-quality standards, and robustness at the chip level, XENSIV™ MEMS microphones add 'hearing' to many consumer applications (earbuds, headphones, wearables, smart speakers, laptops, tablets, etc.) and industrial and medical applications (predictive and preventive maintenance, security, patient monitoring systems, etc.).

MEMS microphones for automotive applications

We also offer high-performance MEMS microphones qualified to the AEC-Q103-003 automotive quality standard. They are suited for all applications inside and outside the car where the best audio performance in harsh automotive environments is required. The extended availability of these silicon devices matches the typical long lifecycle of a vehicle.

Typical applications include speech (hands-free/e-call/ICC), voice commands with microphone arrays and beamforming, active and road noise cancellation, and detecting event sounds, sirens, contact, and road conditions.

The extended availability of these silicon devices matches a vehicle's typical long lifecycle, revolutionizing the use of ATV microphones for a wide range of applications.

MEMS microphones technology

Infineon's XENSIV™ MEMS microphones are designed for capturing audio signals with unprecedented precision and quality. The microphones are comprised of Infineon's MEMS microphone chips and ASICs which are not without reason the world's best-selling microphone components.



Infineon owns all building blocks of MEMS microphones allowing to develop MEMS, ASIC, and package combinations which achieve the best possible performance and are optimized to each application.

Infineon XENSIV™ MEMS microphones shape the industry on the technology level

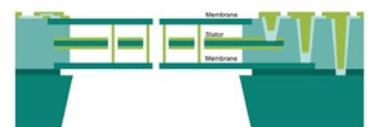
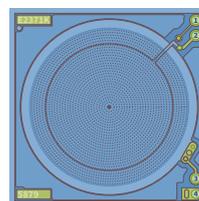
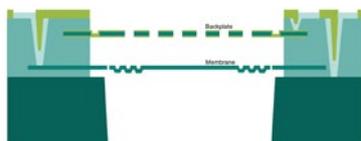
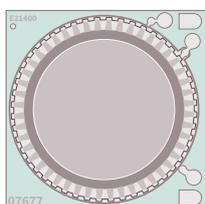
MEMS microphones use an electrically charged backplate and a membrane to form a capacitive sound transducer. The flexible membrane moves proportionally to the amplitude and frequency of incoming sound waves. The resulting change in voltage is measured, processed and output by an integrated analog or digital ASIC. Infineon distinguishes two main MEMS technologies:

Single backplate technology (SBP)

Single backplate technology (SBP) represents an industry standard for mid-end microphones with its simplicity and robustness. The SBP technology offers the best performance-to-cost ratio, especially for small package sizes and SNR values up to 69 dB SNR.

Sealed Dual Membrane (SDM)

Sealed dual membrane (SDM) is Infineon's revolutionary MEMS microphone technology that utilizes two membranes and a charged stator to create a sealed low-pressure cavity and a differential output signal. The architecture enables ultrahigh SNR (up to 75 dB SNR) and very low distortions and delivers high ingress protection (IP57) at a microphone level. Select SDM technology for best-in-class acoustic performance in medium and larger packages.



MEMS microphones for automotive applications

Qualified according to automotive standard, AEC-Q103-003

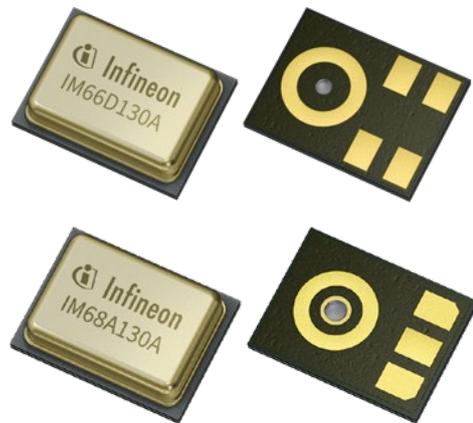
As part of our comprehensive XENSIV™ microphone family, we also offer automotive microphones, especially tested and qualified to the stringent needs of automotive use cases. These microphones close the gap in the automotive industry, providing the best possible fit for automotive applications.

XENSIV™ MEMS microphones for automotive – product portfolio

	Product	Classification	Interfaces	Main features	Package dimensions [mm ³]	SNR [dB]	AOP [dB]	Sensitivity [dBFS]	Current Consumption [μA]	Environmental robustness	Operating temp. [°C]
Digital	IM63D135A	AEC-Q103-003	Optimized for external applications	PDM	3.50 x 2.65 x 0.98	63.5	135	-41	1100	IP57	-40 to +105
	IM64D121A	AEC-Q103-003	Optimized for mid performance use cases	PDM	3.50 x 2.65 x 0.98	64	121	-26	1100	IP57	-40 to +85
	IM64D130A	AEC-Q103-003	Optimized for mid performance use cases	PDM	3.50 x 2.65 x 0.98	64	130	-36	1100	IP57	-40 to +85
	IM66D120A	AEC-Q103-003	Optimized for ANC and speech	PDM	3.50 x 2.65 x 0.98	66	120	-26	1100	IP57	-40 to +105
	IM66D130A	AEC-Q103-003	Optimized for ANC and speech	PDM	3.50 x 2.65 x 0.98	66	130	-36	1100	IP57	-40 to +105
	IM67D120A	AEC-Q103-003	Optimized for speech	PDM	4.00 x 3.00 x 1.20	67	120	-26	980		-40 to +105
	IM67D130A	AEC-Q103-003	Optimized for speech	PDM	4.00 x 3.00 x 1.20	67	130	-36	980		-40 to +105
Analog	IM64A130A	AEC-Q103-003	Optimized for mid performance use cases	Analog single-ended	3.35 x 2.50 x 0.98	64	130	-38	105	IP57	-40 to +85
	IM68A130A	AEC-Q103-003	Optimized for ANC	Analog single-ended	3.35 x 2.50 x 0.98	68	130	-38	105	IP57	-40 to +105

Key features and benefits of automotive qualified microphones

- Full automotive qualification according to AEC-Q103-003
- Increased operating temperature range up to +105°C¹
- Environmental robust up to IP57¹
- Narrow sensitivity matching for enhanced performance of beam-forming arrays
- Flat frequency and stable phase response down to 7 Hz for optimal performance in acoustic noise cancellation (ANC) applications¹
- Very high AOP for high wind-noise robustness ensures stable performance in extremely loud environments of exterior use cases¹
- Best-in-class audio performance (SNR, AOP, THD) for optimum speech quality and capture of distortion-free audio signals in loud environments such as inside a car



¹ Depending on selected product. See parameter table on page 4 for details.

Customer benefits of automotive qualified microphones

Cost saving	<ul style="list-style-type: none"> - Reduced re-qualification cost for Tier 1 due to minimized risk of qualification failure - Longer available parts enable platform concepts at Tier1/OEM
Quality	<ul style="list-style-type: none"> - Quality assured for the whole vehicle life by running qualification tests at three different temperatures over the full operating temperature range (-40°C to +105°C) - Compliance with AEC-Q103 and automotive style documentation (PPAP, Qual report, ...) simplifies OEM discussions (no waivers needed)
Performance	<ul style="list-style-type: none"> - Characterization data over full temperature range provides full transparency of acoustic behavior and avoids late discrepancies - Best-in-class audio performance leads to increased speech intelligibility and improved satisfaction of the end user
Flexibility	<ul style="list-style-type: none"> - Extended temperature range allow flexible use in different operational areas (internal and external) and various applications - High acoustic-overload-point (AOP) allows flexible placement inside/outside the vehicle
Service and knowledge	<ul style="list-style-type: none"> - Good reputation of Infineon-Automotive simplifies product selection procedures with OEMs - Premium services with our worldwide support teams shorten the learning curve and design-in cycles - Fast FAR handling, including high traceability, facilitates efficient incident management

Typical applications for automotive MEMS microphones in-cabin and outside of the vehicle



Speech: Hands free/e-call/ICC

Enabling distortion-free audio capturing for all speech-related applications thanks to the high SNR and low distortions.

Recommended products:

IM66D1x0A, IM68A130A, IM64D1xxA, IM64A130A

Interior



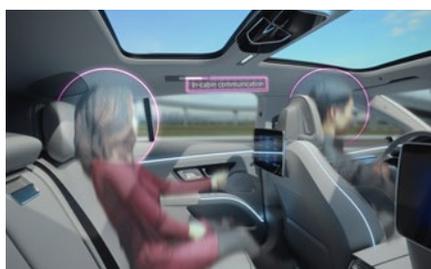
Speech: Microphone arrays/beamforming

Improved beam forming and noise suppression capabilities of microphone arrays, due to the narrow sensitivity and phase matching.

Recommended products:

IM67D1x0A, IM66D1x0A

Interior



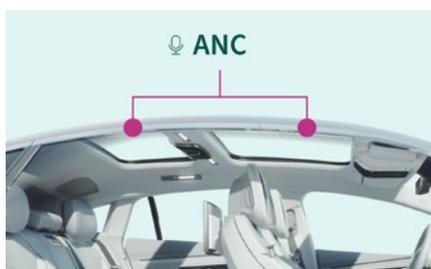
Speech recognition/voice commands

Best speech intelligibility for speech recognition due to high SNR and low distortions.

Recommended products:

IM67D1x0A, IM66D1x0A, IM68A130A

Interior



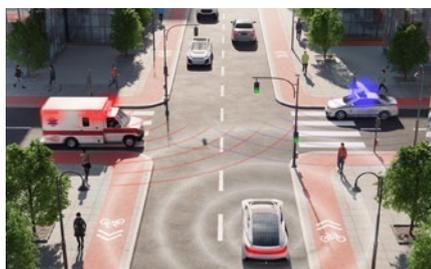
Active and road noise cancellation (ANC/RNC)

Enabling a quiet environment for comfortable travels with best ANC performance, thanks to the flat and stable frequency and phase response at lowest frequencies.

Recommended products:

IM66D1x0A, IM68A130A

Interior



Event sound detection/siren detection

The large dynamic range and high acoustic overload point contribute to road safety by detecting sounds like sirens from emergency vehicles or even dangerous road conditions.

Recommended products:

IM63D135A, IM66D130A, IM68A130A

Exterior



Voice recognition/external interaction

Allowing external interaction via voice commands and good speech intelligibility due to high SNR and low distortions (THD)

Recommended products:

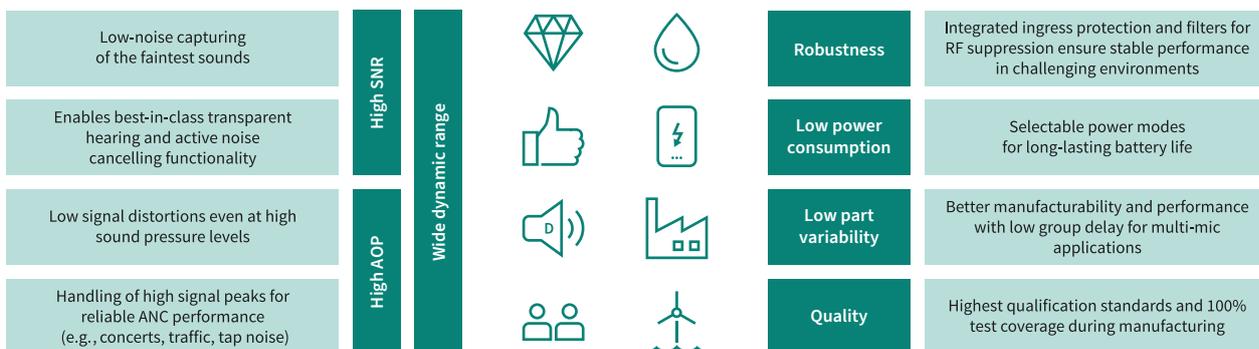
IM66D130A, IM63D135A

Exterior

MEMS microphones for consumer applications

XENSIV™ MEMS microphones feature ultralow self-noise (high SNR), extremely low distortions (THD) even at high sound pressure levels (SPL), very tight part-to-part phase and sensitivity matching, a flat frequency response with a low LFRO (low frequency roll-off), and an ultralow group delay.

Combined with selectable power modes and their very small package size, Infineon XENSIV™ MEMS microphones, combined with selectable power modes and their tiny package size, perfectly match consumer electronics with excellent audio-capturing functionalities and selected industrial applications such as predictive maintenance and security.



XENSIV™ MEMS microphones for consumer – product portfolio

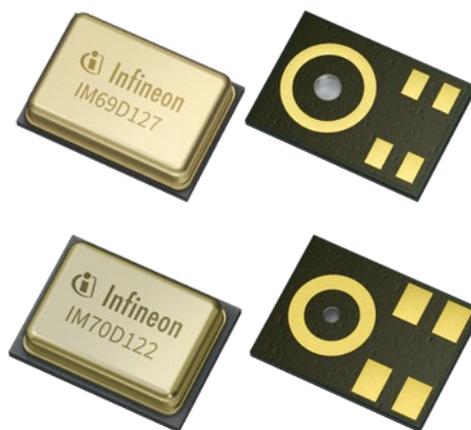
	Product	Main features	Interface	Package size [mm]	SNR [dB(A)]	AOP (1/10%THD) [dB SPL]	Current	Sensitivity	LFRO [Hz]
Digital	IM69D130	High SNR and high AOP	PDM	4 x 3 x 1.2	69	128/130	980 µA at 3.072 MHz	-36 dBFS	28
	IM69D120	High SNR and sensitivity	PDM	4 x 3 x 1.2	69	118/120	980 µA at 3.072 MHz	-26 dBFS	28
	IM69D127	High performance in small size	PDM	3.60 x 2.50 x 1	69	123/127	980 µA at 3.072 MHz	-34 dBFS	40 Hz
	IM69D128S	Ultralow current consumption	PDM	3.5 x 2.65 x 1	69	125/128	520 µA at 3.072 MHz	-37 dBFS	30
	IM67D128B	Ultralow power	PDM	3.00 x 2.00 x 0.98	67	128	540 µA at 3.072 MHz	540 dBFS	10
	IM70D122	High SNR and sensitivity	PDM	3.5 x 2.65 x 1	70	120/122	980 µA at 3.072 MHz	-26 dBFS	30
	IM72D128	Ultrahigh SNR	PDM	4 x 3 x 1.2	72	126/128	980 µA at 3.072 MHz	-36 dBFS	20
	IM73D122	Ultrahigh SNR and sensitivity	PDM	4 x 3 x 1.2	73	120/122	980 µA at 3.072 MHz	-26 dBFS	20
	IM72D128V	Ultralow current consumption	PDM	4 x 3 x 1.2	71.5	125/128	430 µA at 3.072 MHz	-36 dBFS	11
	IM68D121J	High SNR, high sensitivity & low IDD	PDM	3.5 x 2.65 x 0.98	68	118/121	580 µA at 3.072 MHz	-26 dBFS	20
	IM68D128B	High SNR & low IDD	PDM	3.5 x 2.65 x 0.98	67.5	122/128	580 µA at 3.072 MHz	-37 dBFS	20
	IM66D132H	High 1%/10% THD & low IDD	PDM	3.5 x 2.65 x 0.98	66	128/132	580 µA at 3.072 MHz	-37 dBFS	20
	IM69D129F	Ultralow power	PDM	3.50 x 2.65 x 0.98	69	127/129	450 µA at 3.072 MHz	-36 dBFS	11
	IM66D130M	Small package & low IDD	PDM	3 x 2 x 0.98	66	124/130	550 µA at 3.072 MHz	-37 dBFS	35
Analog	IM68A130	Small package and low LFRO	Single Ended	3.35 x 2.5 x 0.98	68	118/130	110 µA at 2.75 V	-38 dBV	10
	IM70A135	High SNR and high AOP	Differential	3.5 x 2.65 x 1	70	132/135	170 µA at 2.75 V	-38 dBV	37
	IM73A135	Ultra-high SNR and high AOP	Differential	4 x 3 x 1.2	73	132/135	170 µA at 2.75 V	-38 dBV	20

All XENSIV™ consumer microphones have bottom port. All SDM (Sealed Dual Membrane) XENSIV™ microphone deliver IP57 ingress protection on the component level for better manufacturability and robustness against water and dust.

Features, applications, and use cases for MEMS microphones for consumer

Features

- Ultralow self-noise/ultrahigh SNR
- Selectable power modes for longer battery life
- Sealed dual membrane (SDM) technology with ingress protection at microphone level
- Extremely low distortions (THD) even at high sound pressure levels
- High dynamic range and very high acoustic overload points (AOP)
- Very tight part-to-part phase and sensitivity matching
- Flat frequency response with a low LFRO (low frequency roll-off)
- Ultralow group delay for multi-mic applications
- Very small package sizes for various applications



Typical use cases

- Studio quality audio capturing for communication devices
- Low-latency wide-band audio signal capturing for active noise cancellation (ANC) and transparent hearing functionality
- Small form factor and current consumption for battery and size-constrained devices
- Multi-microphone (array) based beamforming and source separation for audio zoom features and multiuser audio capturing
- High range, far field voice pickup for multi room applications
- Capturing of audio signals in loud environments, such as outdoor
- Audio pattern detection for predictive and preventive maintenance and security

Applications

- TWS earbuds
- ANC headphones
- Smart speakers
- Conference speakers
- Laptops/tablets
- Wearables
- AR/VR devices
- Cameras
- Video doorbells
- Smart home
- Smart infrastructure
- Home appliances
- Industrial applications
- Medical applications

Visit the [Infineon Developer Community](#) to get the support on your design with our audio experts. Furthermore, you can delve into Knowledge Based Articles, learn about MEMS mics specifications, foundational differences between ECM and MEMS technologies, get electrical implementation hints, and so much more!

XENSIV™ MEMS microphone boards

The Infineon Audiohub Nano

The Infineon Audiohub Nano enables better evaluation of Infineon XENSIV™ microphones. The kit includes an Infineon Audiohub Nano and four microphones on flex board. Up to two additional Infineon XENSIV™ MEMS microphones can be

connected to the mono or stereo output evaluation board. The evaluation board provides a USB audio interface to stream audio data from the microphone to any audio recording and editing software. The board has two different interfaces: analog and digital.

Summary of Features

- Audio interface for analog XENSIV™ MEMS microphones
- Audio streaming over USB interface
- 48 kHz sampling rate
- 24-bit audio data (stereo)
- Dynamic range 120 dB
- Mode switch for toggling between normal mode and low power mode with four pre-defined gain configurations
- LED indication for the configured gain level in normal mode and low power mode
- Volume unit meter display with onboard LEDs
- Powered through Micro-USB

XENSIV™ MEMS microphones Audiohub Nano boards

Product	Description	SP	OPN	Board
EVAL_AHNB_DIGITALV01	Audiohub Nano Digital XENSIV™ MEMS microphones evaluation board	SP005955184	EVALAHNBDIGITALV01TOBO1	
EVAL_AHNB_ANALOGV01	Audiohub Nano Analog XENSIV™ MEMS microphones evaluation board	SP005568087	EVALAHNBANALOGV01TOBO1	

XENSIV™ MEMS microphones flex boards

Board	Description	SP	OPN	Flexkit
EVAL_IM69D130_FLEXXKIT	- Quick and easy connection to evaluation system	SP002153022	EVALIM69D130FLEXXKITTOBO1	
EVAL_IM69D120_FLEXXKIT		SP002153026	EVALIM69D120FLEXXKITTOBO1	
KIT_IM69D127V11_FLEX	- Small size: 25 mm x 4.5 mm	SP005403891	KITIM69D127V11FLEXTOBO1	
KIT_IM73A135V01_FLEX		SP005415695	KITIM73A135V01FLEXTOBO1	
KIT_IM72D128V01_FLEX		SP005429924	KITIM72D128V01FLEXTOBO1	
KIT_IM70A135V01_FLEX	- Pre-soldered MEMS microphone	SP005728204	KITIM70A135V01FLEXTOBO1	
KIT_IM68A130V01_FLEX		SP005728206	KITIM68A130V01FLEXTOBO1	
KIT_IM69D128SV01_FLEX	- Configurable select pin configuration for digital microphones	SP005744505	KITIM69D128SV01FLEXTOBO1	
KIT_IM70D122V01_FLEX		SP005826638	KITIM70D122V01FLEXTOBO1	
KIT_IM72D128VV01_FLEX		SP006038668	KITIM72D128VV01FLEXTOBO1	
KIT_IM66D130MV01_FLEX		SP006038060	KITIM66D130MV01_FLEXTOBO1	
KIT_IM66D132HV01_FLEX		SP006038061	KITIM66D132HV01_FLEX TOBO1	
KIT_IM68A130V01_FLEX		SP005728206	KITIM68A130V01_FLEX TOBO1	
KIT_IM68D128BV01_FLEX		SP006114517	KITIM68D128BV01_FLEX TOBO1	
KIT_IM68D121JV01_FLEX		SP006155584	KITIM68D121JV01FLEXTOBO1	
KIT_IM69D129FV01_FLEX		SP006038667	KITIM69D129FV01FLEXTOBO1	
KIT_IM67D128BV01_FLEX		SP006038062	KITIM67D128BV01FLEXTOBO1	

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