

Application brief

Smart speaker

Design speakers for an intuitive and outstanding user experience

Once a novelty in households, smart speakers are more and more becoming increasingly commonplace. This rapid adoption is accompanied by rising user expectations. Frustration with devices that do not understand or hear commands is, however, leading to lower user adoption. Consequently, growth rates for smart speakers are failing to reach their full potential. Components such as MEMS microphones, touch controllers and new technologies such as radar are key to improving the user experience in the smart speaker segment.

Infineon has long-standing expertise in sensor, connectivity and power solutions that fulfill the consumer market requirements in terms of outstanding performance, reliability and energy efficiency.

Choose Infineon to solve your application requirements for smart speakers

Best-in-class **voice recognition**	› Highly sensitive XENSIV™ MEMS microphones to pick up whispered or far-field voice commands › Low self-noise (SNR), wide dynamic range, low distortions, high acoustic overload point
Outstanding **audio performance**	› MERUS™ Class D amplifiers solutions provide best-in-class audio quality and have lowest power consumption for extended battery playback time › Less filtering/external components required due to its multi-level design, leading to less heat and overall BOM savings
Connectivity for highest interoperability and performance	› AIROC™ Wi-Fi and combos portfolio integrates Wi-Fi and Bluetooth® in a single-chip solution to enable small-form-factor IoT designs › Ultralow power Wi-Fi designed for battery operations, whole home range with high throughput ensures clear audio streaming without audio dropouts anywhere in the home
Reliable **touch interaction and gesturing**	› State-of-the-art noise immunity capacitive touch and gesture detection for a reliable and durable speaker HMI › Advanced inductive touch sensors make possible sleek, futuristic user interfaces with metallic overlays
Advanced **radar sensing**	› XENSIV™ 60GHz radar sensor solutions bring innovative, intuitive sensing capabilities › Presence detection, segmentation, people tracking, vital sensing
Secured **cloud service provisioning**	› Easy and secure provisioning services with OPTIGA™ Trust M for maintaining speaker's unique identity and integrity › Unify different products under unified PKI architecture
Disruptive CO_2 sensor based on photoacoustic spectroscopy **(PAS)**	› XENSIV™ PAS CO2 sensor track the environment – for improved health, productivity, and overall well-being › Real-time CO_2 monitoring for demand-controlled ventilation systems, air purifiers, and thermostats while allowing users to accurately measure and adjust indoor air quality › High performance in small size
Power portfolio for energy-efficient, space saving designs	› Wireless charging solutions for maximum performance, efficiency and safety › USB-C PD solutions for standardized power adapters › Extensive SMPS power portfolio for energy-efficient, space saving design › ESD devices for capable protection solutions with outstanding clamping

www.infineon.com/smart-speaker

Bring your smart speaker to the next level with Infineon's recommended product portfolio

Functional block	Product family		Product	Benefits
Audio input	Microphones		XENSIV™ MEMS microphones	› High performance microphone with low self-noise (high SNR) and low distortions, setting a new performance benchmark for a superior user experience
Audio output	Class D amplifier		MERUS™ class D audio amplifiers MA120xx	› Cooler, smaller and lighter amplifiers designed to maximize power efficiency and dynamic range while providing best-in-class audio performance in product form factors for great sounding audio products › Extended battery playback time or the reduction of battery size without compromising on battery playback time to save cost
Connectivity	Wi-Fi + Bluetooth® combos		AIROC™ Wi-Fi + Bluetooth combos	› Best-in-class interoperability to the widest deployed wireless IP › Whole Home Range with high throughput for multi-channel audio and RSDB (Real Simultaneous Dual Band) for speaker sub-networks › Ultralow power technology designed with battery operation in mind
Sensing	Capacitive sensing touch controller		CAPSENSE™ Controllers capacitive touch sensing controller	› State-of-the-art noise immunity (SNR > 100:1) and water rejection have made CAPSENSE™ Controllers the industry leader › Advanced inductive touch sensors make possible sleek, futuristic user interfaces with metallic overlay
	Radar sensor		XENSIV™ 60 GHz radar sensor	› Accurate presence detection and vibration detection based on ability to track sub-millimeter motion at high speed and accuracy › Both stand-alone chip as well as system solution available
	CO_2 sensor		XENSIV™ PAS CO2 sensor	› Superior accuracy, providing a direct readout of the real CO_2 level, not simply a correlation › Size and cost advantages
Security	IoT security controller		OPTIGA™ Trust M	› Easy and secure provisioning services with OPTIGA™ Trust M for maintaining speaker's unique identity and integrity › Unify different products under unified PKI architecture
Power	USB-C PD controller		EZ-PD™ USB-C controller	› USB-IF certified with market-proven USB PD stack, ensuring spec compliance and interoperability › Supports all USB PD profiles commonly used in USB-C power adapters and requires no firmware development › A highly-integrated solution that minimizes incremental BOM costs
	ESD protection		ESD111, ESD245	› Outstanding low capacitance devices for best signal integrity › High protection performance by ultralow clamping voltage
	Wireless charging		15 W inductive wireless power transmitter	› Powerful and cost-effective wireless charging solutions for high performance, smart and secure charging solutions supported by Infineon's unique wireless power controllers
	High-voltage MOSFETs	Flyback	700 V CoolMOS™ P7 (standard grade)	› Best price-competitive CoolMOS™ SJ MOSFET family › Lower switching losses than a standard MOSFET
		ACF, FMCI	600 V CoolMOS™ PFD7	› Lower Q_{rr}, lower hysteresis loss, low $R_{DS(on)}$
	SMPS flyback converter Control ICs	QR flyback ICs	ICE5QSAG	› High efficiency and low standby power
		FFR flyback IC	XDPS21071	› High power density and ideal for USB-PD
	SMPS synchronous rectification	Low-voltage MOSFETs	OptiMOS™ PD	› Low conduction losses and reduced overshoot › Logic level switching / S308 / PQFN 3.3x3.3 packages available
		Control ICs	IR1161LTRPBF	› High efficiency › Simple external circuitry
	SMPS load switch	Low voltage MOSFETs	OptiMOS™ 30 V	› Low conduction losses › S308 / PQFN 3.3x3.3 packages available

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