

Application brief

Smart speaker

Create the smart speakers of tomorrow with innovative designs based on Infineon's sensing, RF and power solutions

The market for smart speakers has grown dynamically in recent years. Smart speakers are typically connected speakers with voice user interfaces that offer intuitive interaction and hands-free activation based on the use of keywords. Despite rising adoption of smart speakers worldwide, the user experience has lagged behind expectations – conversations do not feel natural, and wired power connections confine smart assistants to specific spaces. Common complaints include both audio playback quality and audibility of the smart speaker. The limited functionality of smart speaker design software and the continued need for a wired power connection also hamper advances in smart speaker innovation. Overcoming these pain points presents a number of smart speaker system design challenges.

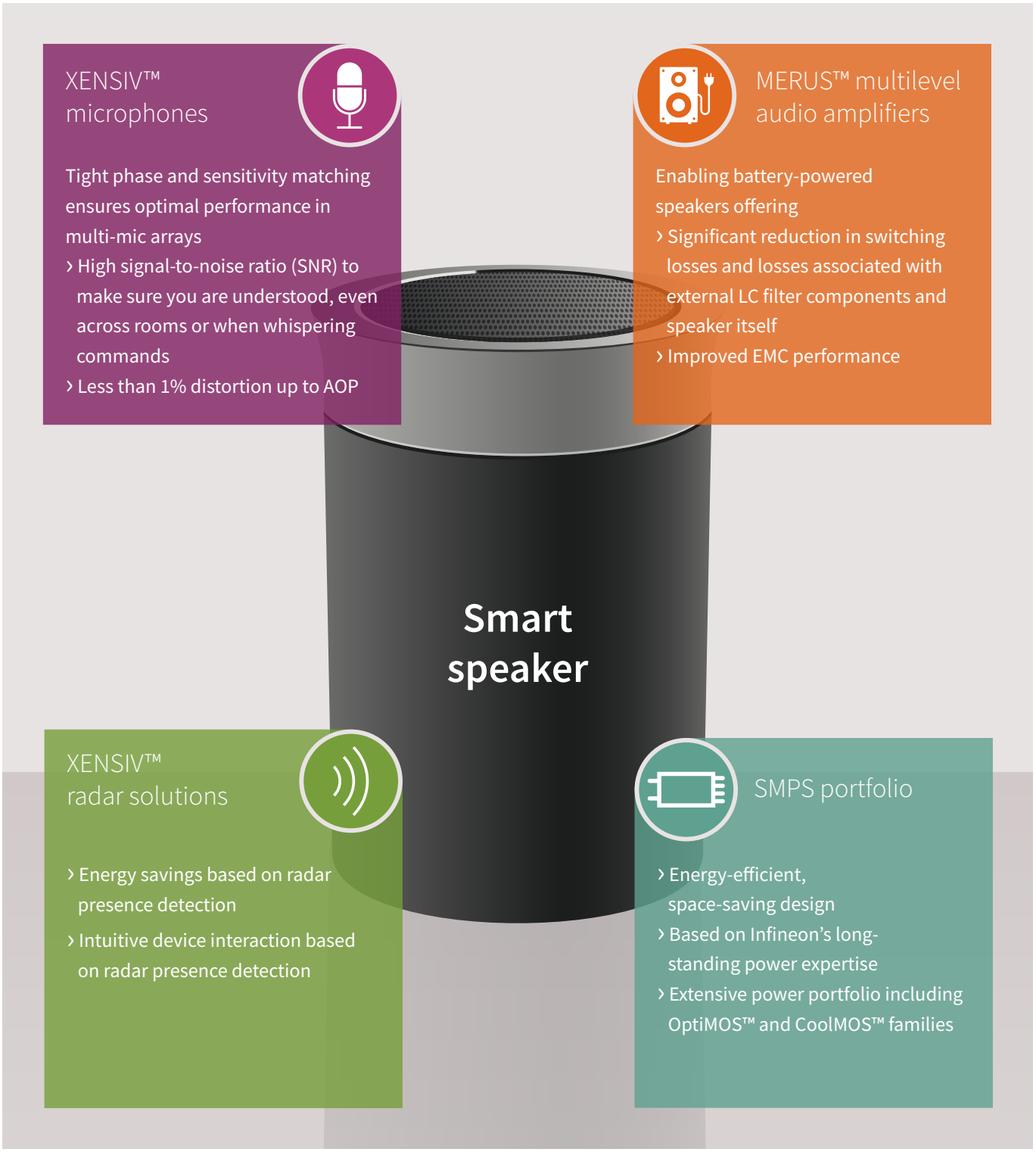
The challenge with audio playback quality lies in balancing speaker size and cost against loudness and perceived audio quality. This often involves driving the speaker to its non-linear limits while compensating for this non-linear behavior in the digital processing domain. Pushing the speaker to its boundaries and increasing loudness can, however, present a "barge-in" problem. This generally means that the voice recognition capability of the voice interface and audio system decreases if the speaker is playing music at high volume.

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

Product category	Topology	Product family	Benefits
Microphones		XENSIV™ MEMS microphones IM69D130	High-performance microphone with low self-noise (high SNR) and low distortion, setting a new performance benchmark for a superior user experience
DSP		see Microphone Partners	
Class D amplifiers		MERUS™ class D audio amplifiers MA 120xx	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
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 chips and system solutions available
High-voltage MOSFETs	Flyback	700 V CoolMOS™ P7 (standard grade)	Best price/performance CoolMOS™ SJ MOSFET family, lowering switching losses relative to standard MOSFETs
	ACF, FMCI	600 V CoolMOS™ PFD7	Lower Q_{rr}, lower hysteresis loss, low $R_{DS(on)}$
Control ICs	QR flyback ICs	ICE5QSAG, ICE5QSAG	High efficiency and low standby power
	FFR flyback IC	XDP21071	High power density; ideal for USB PD
Low-voltage MOSFETs	Synchronous rectification	OptiMOS™ PD	Low conduction losses and reduced overshoot, logic level switching, S308/PQFN 3.3x3.3 package available
Control ICs	Synchronous rectification	IR1161LTRPBF	High efficiency, simple external circuitry
Low-voltage MOSFETs	Load switch	OptiMOS™ 30 V	Low conduction losses, S308/PQFN 3.3x3.3 package available

Infineon can help to solve these conflicting needs with advanced technology enabling next-generation smart speaker designs. These include XENSIV™ MEMS microphones that combine a high dynamic range with high audio quality, and flexible MERUS™ class D audio amplifiers that do not require heat sinks or LC filters.

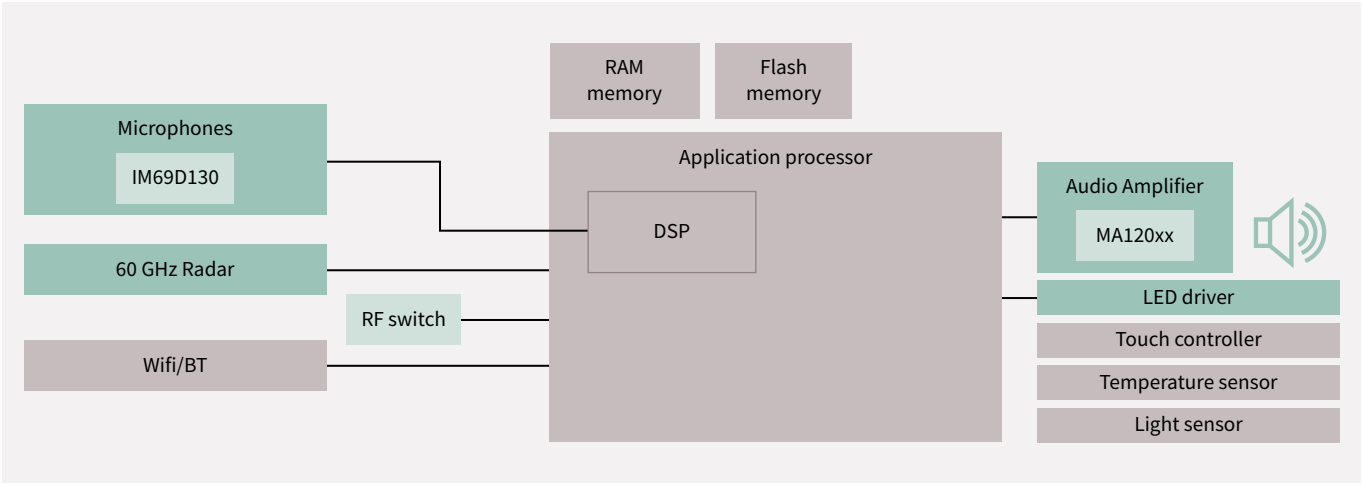
In addition, Infineon offers an extensive switched-mode power supply (SMPS) portfolio for efficient speaker chargers and smart speaker power supplies, as well as XENSIV™ radar solutions enabling smart speaker innovations such as presence detection and gesture control.

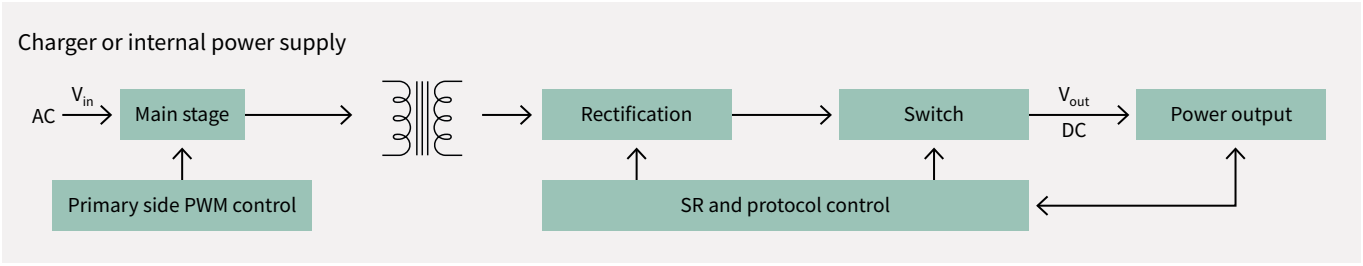


These and other semiconductor innovations from Infineon are empowering smart speaker designers to develop future-proof systems and software that combine better sound and audibility with improved portability (thanks to a small and efficient charger) and a generally more intuitive user experience.

- XENSIV™ MEMS microphones enabling improved language understanding even in advanced, futuristic use cases
- MERUS™ class D amplifiers improving audio quality, eliminating the need for heat sinks and LC filters, lowering power consumption and optimizing audio system design
- XENSIV™ radar solutions bringing innovative features such as presence detection and gesture recognition to smart speakers
- SMPS portfolio optimizing speaker design with efficient, space-saving chargers and power supplies

Rely on Infineon to increase speaker usage and adoption and enable tomorrows Smart Speaker's today





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