

Imec demonstrates a low-power 7Gbps 60GHz transceiver for the wireless consumer market

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Imec's low-power 7Gbps 60GHz transceiver IC implemented in 40nm low-power CMOS.

Imec, in collaboration with Panasonic, has developed a prototype of a 60GHz radio transceiver allowing to reach data rates of 7Gbps over short distances at very low power consumption. The chip achieves this performance over the 4 channels specified by the IEEE802.11ad standard. Imec's low-power 60GHz solution is an important step towards adoption of 60GHz technology in low-cost battery-operated consumer products such as smart phones and tablets.

Today's wireless consumer electronic products increasingly include data-intensive applications, while applications below 10GHz such as WLAN face spectrum scarcity. This drives wireless system designers to explore higher frequency bands such as the unlicensed band around 60GHz. This band is available throughout the world and enables multi-Gbps wireless communication over short distances. However, to enable 60GHz radio solutions for portable mass-market products, cost, area and power consumption need to drastically decrease. [Imec's](#) ultra-low power CMOS-based

solution is an important step to solve these challenges.

Imec's transceiver front-end prototype IC (integrated circuit) achieves an EVM (error vector management) better than -17dB for QAM16 modulation in the 4 channels specified by the IEEE802.11ad standard, reaching data rates of 7Gbps over short distances. The IC is implemented in 40nm LP (low-power) digital CMOS targeting low-cost volume production. The TX (transmitter) signal path, consisting of a power amplifier (PA) and a mixer, consumes only 90mW with 10.2dBm OP1dB. The RX (receiver) signal path, consisting of a low noise amplifier (LNA) and a mixer, consumes only 35mW with a noise frequency (NF) of 5.5dB and 30dB gain. ESD (electrostatic discharge) robustness is more than 4kV HBM (human body model). The compact core area of only 0.7mm² makes this transceiver front-end solution particularly suitable for use in phased arrays. The area is kept low thanks to the use of lumped components even at 60GHz, and very compact mm-wave CMOS layout techniques. Continuous research done at imec on power efficient CMOS PAs enables further important reductions in the power consumption of the transmitter section. The front-end is now further being integrated into a beamforming [transceiver](#) prototype.

"We are excited that we achieved together with our partner [Panasonic](#) these excellent results;" said Liesbet Van der Perre, scientific program director green radios. "These results prove that our 60GHz R&D program pioneers industry-relevant design solutions for low cost and low power 60GHz phased array radios covering the system level, IC design and antenna design. We work towards a proof-of-concept for the complete system, compliant with the applicable industrial standards. We invite other companies to join our 60GHz R&D

program as research partner or they can have access to the technology for further development through licensing."

Provided by IMEC

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