

Record-Breaking Analog to Digital & Digital to Analog Converters

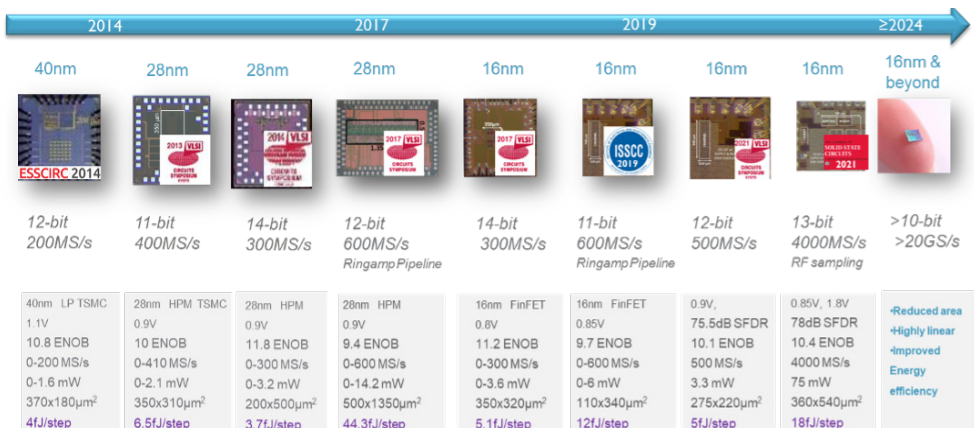
Imec's low-power high-performance analog to digital converters (ADC) with record figures of merit target Beyond 5G wireless and next-generation wireline applications.

Application 1: 5G & beyond mobile handset and base station applications

Imec's ADCs for smartphone applications support highly digitized receiver architectures through high resolution as well as wider channel bandwidths of next-generation standards such as 5G, 5G millimeter wave (28 & 39GHz), and the emerging generation of Wi-Fi (IEEE802.11be). Imec's novel ADCs architectures realize the resolution and speed requirements at very low power consumption. This is of utmost importance for next-generation handheld and battery-powered devices.

RF-sampling ADCs with multiple gigasample-per-second (GSPS) speeds on the other hand enable radios that combine multiple bands for 5G cellular base station applications. The resulting smaller and lower-power systems can ultimately reduce the number of remote radio head (RRH) boxes at each cell site. Imec's RF-sampling ADC achieves excellent spectral purity in combination with record low power consumption. In this way, it addresses the integration and power challenges for 5G multi-band and massive mimo base stations.

In imec's ADC research program, new ADC architectures and building blocks are explored targeting resolutions of > 10 bit, speeds in excess of 20GS/s, high linearity and this at record low power consumption to enable next-generation System-on-Chips for beyond 5G FR3 infrastructure applications.

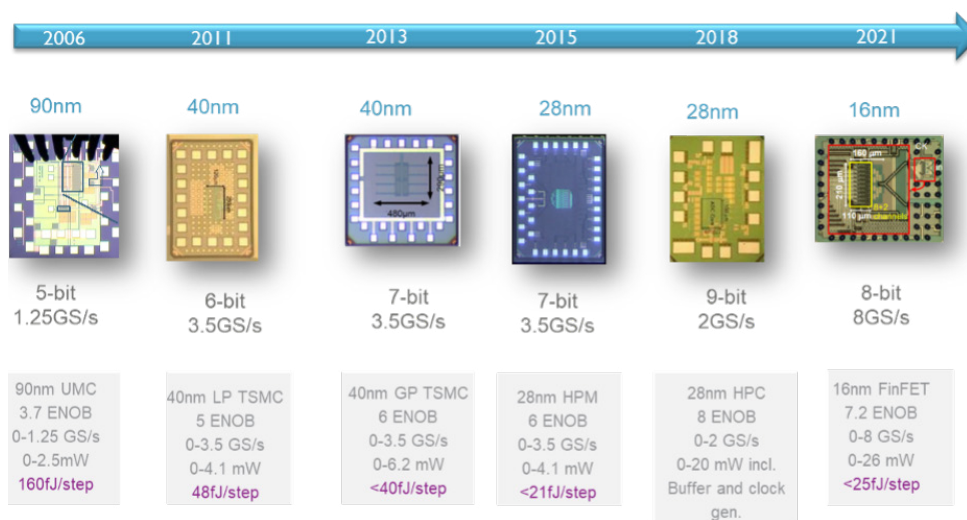


Application 2: Millimeter Wave applications

A number of recent standards target high data-rate communication at relatively short distances, such as the IEEE802.11ay standard in the unlicensed 60GHz frequency band. Typical applications are cable replacement for high data-rate applications such as video streaming, wireless docking,... Alternatively, by exploiting large scale antenna arrays, also applications such as small cell backhaul and fixed wireless access can be enabled.

Millimeter wave frequencies are also used for high-resolution radar systems (e.g. in the unlicensed 79GHz frequency band) enabling small, low-cost and low-power solutions.

All these applications have in common that they use relatively simple modulation schemes and very wide channel bandwidths, resulting in low-resolution and very high-sample-rate requirements for the analog-to-digital converters.



Application 3: Wireline applications

Wireline industry has a clear roadmap towards 800Gbps/1.6Tbps Ethernet products. One of the key challenges to realize these products is wide-band and low power AD and DA conversion. Imec's wireline ADC & DAC research program explores novel architectures enabling these next-generation wireline applications with:

- Sampling rate \gg 150GS/s
- Analog bandwidth \gg 50GHz
- 7 bit resolution
- Record-breaking power consumption
- Process technology: 5nm CMOS & beyond

Available for transfer, partnering for next generations

Imec licenses the mature ADC IP to industry in a package including:

- design database
- evaluation board
- documentation (design reports, measurement reports,...)
- training and support (including tutorial & hands-on workshop,...)

In its ADC research program, imec partners with industrial players to design the next generation ADCs targeting increased performance (speed, resolution) and improved power-efficiency in deeply-scaled CMOS.

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