45RFSOI
Advanced 45 nm RF SOI Technology

Future-ready RF offering for mmWave and 5G applications

The GLOBALFOUNDRIES (GF) 45 nm RF SOI foundry technology, 45RFSOI, is targeted for high performance, next-generation communications, including:

- Integrated millimeter wave (mmWave) front-end modules (FEMs) and beamformers for 5G base stations and smartphones
- Phased array front ends for internet broadband satellite ground and space applications
- Fixed wireless broadband (infrastructure, customer-premises equipment) and other high-performance wireless/wired applications

45RFSOI takes advantage of a 45 nm, partially-depleted SOI server-class technology base extensively evaluated for use in mmWave applications and in high volume production at multiple GF fabs since 2008. RF-centric enablement, device and technology additions to this baseline technology, including thick copper and dielectric back-end-of-line (BEOL) features, enable 45RFSOI to handle the demanding performance requirements of 5G solutions.

**Highlights**

- Leverages a silicon-proven, server-class 45 nm partially depleted (PD) SOI technology
- Optimized for 5G/next-generation RF and mmWave applications
- Comprehensive design enablement:
  + Full RF PDK
  + RF-centric devices and features
  + mmWave modeling and enablement
  + RF-friendly metal stacks with thick top Cu levels for transmission line design
  + Comprehensive digital standard-cell library, I/Os and reference flows
  + RFwave™ ecosystem

The RF-centric enhancements available in 45RFSOI build on the inherent advantages of its SOI technology base and combine to help you optimize RF performance by enabling:

- A high \( f_t/f_{max} \) (290/410 GHz) to meet 5G mmWave operating frequencies
- Device stacking for high voltage handling and high output power
- High linearity and improved noise isolation and harmonics suppression
Enabling differentiation across applications

By using 45RFSOI, chip designers can leverage the collective benefits of RF-centric features, device stacking, an optimized BEOL and a high-resistivity substrate to develop differentiated products—across a range of applications.

<table>
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<tr>
<th>Application</th>
<th>45RFSOI benefit</th>
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<tr>
<td>PAs</td>
<td>High $f_{\text{max}}$ and stacking capability for higher output power, power gain and higher efficiency power amplifiers (PAs)</td>
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<td>LNAs</td>
<td>Low BEOL loss and low NF due to excellent $f_t$ and $NF_{\text{min}}$ for reduced noise in low noise amplifiers (LNAs)</td>
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<td>Tx Rx switches</td>
<td>Optimized BEOL, high-resistivity substrate, device stacking and low $R_{\text{on}}$ for lower insertion loss and higher linearity switches at mmWave frequency range</td>
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Process design kits are available now. Frequent MPW runs are available and enable fast prototyping so you can evaluate results in hardware early.

45RFSOI Comprehensive Design Enablement

- Libraries (Standard Cells, Memories)
- Analog / Mixed-Signal
- RF Demonstrators
- mmWave Enablement

RFwave™ Ecosystem

Full RF PDK, Reference Flow and Third-Party Simulator Support

45 nm SOI CMOS Process Technology

SoC Packaging

RF Test Services

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