GLOBALFOUNDRIES 22FDX® 22nm FD-SOI (Fully-Depleted Silicon-On-Insulator) process technology platform delivers cost effective performance for connected and low power embedded applications.

22nm FD-SOI transistor technology delivers FinFET-like performance and energy-efficiency, including up to 70% lower power vs. 28nm. The simultaneous high Ft/high Fmax, high self gain and high current efficiency of 22FDX enables efficient, ultra low power analog/RF/mmWave designs.

**Target Applications and Platform Solutions**

<table>
<thead>
<tr>
<th>5G, LTE and 802.11ac/ax/ad</th>
<th>IoT / Wearables</th>
<th>Mid/low-tier Apps Processor</th>
<th>Automotive mmWave Radar, MCU, ADAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enables new RF architectures</td>
<td>Low power operation down to 0.4V</td>
<td>Full-node scaling benefits in PPAC vs. 28nm</td>
<td>High Pout for long-range radar @77GHz in single-chip auto radar system for low latency, lower power, and lower cost</td>
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<tr>
<td>• 35-50% die shrink</td>
<td>• 1pA/cell standby</td>
<td>• &lt;60% power @ iso-perf.</td>
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<tr>
<td>• 40-50% lower power for RF</td>
<td>• 80% lower total power (vs. 40nm)</td>
<td>• ~1.3X perf. @ iso-power</td>
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<tr>
<td>TxE/Rx (vs. 28nm)</td>
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<td>• ~70% area</td>
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<tr>
<td>Integrated mmWave PA with</td>
<td>High performance (RF)</td>
<td>Adaptive body bias enables</td>
<td>GLOBALFOUNDRIES AutoPro™ Service</td>
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<tr>
<td>high PSAT via FET stacking</td>
<td>LDMOS for integrated PA</td>
<td>additional PPAC gains by</td>
<td>Package</td>
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<tr>
<td></td>
<td>and switch &amp; power</td>
<td>compensating for PVT variability</td>
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<td></td>
<td>management</td>
<td>and aging</td>
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<tr>
<td>Highest ft/fmax for 5G/mmWave</td>
<td>Fully integrated &amp;</td>
<td>Roadmap to 12nm FD-SOI for</td>
<td>Automotive G2/G1 including eMRAM</td>
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<tr>
<td></td>
<td>versatile eMRAM for</td>
<td>next-gen designs</td>
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<td>storage &amp; compute</td>
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</table>
Technology Overview

- Four core device Vt’s (FBB, RBB & eLVT)
- Two I/O Vt’s @ 1.2V/1.5V/1.8V
- Full set of active and passive devices
- LDMOS (3.3V/5.0V/6.5V)
- Low power: 0.4V to 0.8V Vnom
- Reference flow for back-gate biasing
- RF BEOL /w ultra thick metal stacks
- Standard temperature range: −40°C to 125°C

IP Overview

The 22FDX Platform IP portfolio includes a wide range of silicon-proven high performance, power-optimized solutions for a broad set of applications.

### Foundation IP

<table>
<thead>
<tr>
<th>Type</th>
<th>Libraries</th>
<th>Analog / Mixed-signal</th>
<th>Processor IP</th>
<th>High-speed Interfaces</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Cell</td>
<td>Low Power/Performance/Dense/Low Leakage</td>
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<tr>
<td>Memory</td>
<td>HP/HD/ULL/TP/DP, SRAM, Register File, ROM</td>
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<tr>
<td>GPIO</td>
<td>1.2-1.8V/3.3V, ESD</td>
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<tr>
<td>Body Bias</td>
<td>Body Bias Generator, Dynamic Body-bias Controller</td>
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</tbody>
</table>

### Interface IP

- DDR3/4
- LPDDR3/4
- USB2/3.x
- PCIe
- SATA
- SERDES
- MIPI D-PHY/M-PHY
- HDMI 2.0
- LVDS
- XAUI

### Wireless Connectivity IP

- BLE
- WiFi
- NB-IoT
- Cat-M1
- OTP
- eFuse

### Analog IP

- PLL
- ADC/DAC
- Video DAC
- Audio CODEC
- LS
- RISC-V

- RTC
- Temp Sensor
- Process Monitor
- POR/BOR
- Regulator

### Non-volatile Memory IP

- BLE
- WiFi
- NB-IoT
- Cat-M1
- OTP
- eFuse

Contact GF for IP availability.

Application-optimized Solutions

- **Analog, RF/mmWave**
- Integrated RF and analog with high IT/fMAX
- WiFi & BT combo, LTE transceivers
- Low power 5G and mmWave technologies
- Ultra-low static leakage (~1pA/μm)
- ULL SRAM with <1pA/cell leakage
- IoT, Wearables, Smartcard applications

- **Ultra Low Leakage**
- Flexible power options as low as 0.4V
- Consumer, mobile, Auto IV applications

- **Ultra Low Power**
- Fully integrated, versatile memory for storage and compute for IoT and MCU (in development)

- **eMRAM**
- Grade 1 for under-the-hood automotive/industrial (in development); Grade 2

Architected for Effective Back-gate Biasing

Technology back-gate biasing feature enables dynamic tradeoffs between power, performance and leakage and provides the greatest design flexibility.

**Forward Body Bias (FBB)**
- 50% lower power at same frequency (vs 28nm)
- Up to 40% faster performance at same power (vs 28nm)

**Reverse Body Bias (RBB)**
- Reduces leakage to 1pA/micron in standby mode

High Performance and Low Power

Design and Manufacturing Ecosystem with FDXcelerator™ Partner Program

GLOBALSOLUTIONS is the sum of our internal resources and ecosystem partners, combined to efficiently enable the fastest time-to-volume.

The FDXcelerator Partner Program facilitates FDX™ SoC design, reduces time to market and minimizes development costs.