14nm FinFET Technology

The Right Technology for the Right Application™

GLOBALFOUNDRIES 14nm FinFET technology platform is ideal for high-performance, power-efficient SoCs in demanding, high-volume applications.

3D FinFET transistor technology provides best-in-class performance and power with significant cost advantages from 14nm area scaling. 14LPP technology can provide up to 55% higher device performance and 60% lower total power compared to 28nm technologies.

Gate length shrink enables performance scaling

FET is turned on its edge

- Lower supply voltage
- Reduced off-state leakage
- Faster switching speed — high drive current

Double-gate reduces off-current

Target Applications and Solutions

<table>
<thead>
<tr>
<th>Mobile Apps Processor</th>
<th>High Performance Compute &amp; Networking</th>
</tr>
</thead>
<tbody>
<tr>
<td>60% power reduction</td>
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</tr>
<tr>
<td>80% higher performance, &gt;2.2GHz</td>
<td>2x # cores</td>
</tr>
<tr>
<td>45% area reduction</td>
<td>&gt;3GHz maximum performance</td>
</tr>
<tr>
<td>~2x output increase per wafer</td>
<td>55% area reduction</td>
</tr>
<tr>
<td></td>
<td>&gt;56G SerDes, 32 channels</td>
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</tbody>
</table>

(max. benefit compared to 28nm technology)
Technology Overview

- Twin-well CMOS bulk FinFET (4 Core device Vt’s)
- Two gate dielectrics: thin (SG) and medium I/O (EG)
- Full suite of passive devices
- Optional MIM capacitor, Mx/Vx eFuse
- VDD: 0.8V nominal or 0.945V overdrive
- Standard temperature range: -40°C to 125°C

IP Overview

The comprehensive 14LPP FinFET 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>Standard Cell 10.5T</th>
<th>Standard Cell 9T</th>
<th>Standard Cell 7.5T</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPIO / ESD</td>
<td>PLL</td>
<td>Temp Sensor</td>
</tr>
<tr>
<td>ROM Compiler</td>
<td>SRAM Compiler/TCAM</td>
<td></td>
</tr>
</tbody>
</table>

Interface IP

<table>
<thead>
<tr>
<th>DDR3/4</th>
<th>LPDDR3/4</th>
<th>PCIe G1.1/2/3/4</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIPI G1/2/3</td>
<td>SATA I/II/III</td>
<td>SerDes (6G-56G)</td>
</tr>
<tr>
<td>USB2/3.x</td>
<td>HDMI/DP</td>
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</tbody>
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Memory

<table>
<thead>
<tr>
<th>High density memories</th>
<th>NVM: Electrical Fuse</th>
<th>NVM: OTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRAM Compiler/TCAM</td>
<td>ROM Compiler</td>
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Processors

<table>
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<tr>
<th>Analog / mixed-signal</th>
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</thead>
</table>

Segment-specific (Cloud / Data Center, Networking, IoT)

Contact GF for IP availability.

Application-optimized Platform Extensions

High Performance

- >3GHz operation
- Server, Data Center, ASICs

7.5T

- >8.5M gates/mm²
- Mobile applications

Automotive

- Grade 2, Grade 1
- In-vehicle compute/networking

Ultra Low Power

- Flexible power options

Analog RF

- Wi-Fi, transceivers,
- high-speed networking

Performance, Power, Cost Advantages from 14nm Area Scaling

- Up to 55% performance improvement at iso power
- Up to 60% power reduction at iso frequency

GLOBALSOLUTIONS® Design and Manufacturing Ecosystem

GLOBALSOLUTIONS is the sum of internal resources and external partners, combined into an ecosystem that efficiently enables the fastest time-to-volume for customers. This ecosystem includes partners in all aspects of design enablement and turnkey services, OPC and mask operations, and advanced capabilities in assembly solutions.