22FDX™ Platform
Fully-Depleted Silicon-On-Insulator

- Delivers FinFET-like performance and energy-efficiency at cost of 28nm planar
  - 70% lower power than 28nm HKMG
  - 20% smaller die than 28nm bulk planar
  - 20% lower die cost than 16/14nm
  - Ultra-low power consumption with 0.4V operation (90% lower power than 28nm HKMG)
  - Software-controlled transistor body-biasing for flexible trade-off between performance and power
  - Integrated RF for reduced system cost and back-gate feature to reduce RF power up to ~50%

- Right technology for right markets
  - Ideal for mobile, IoT and RF connectivity and networking applications

- Lower risk engagement
  - Leverages bulk digital design flows and existing EDA tools
  - Fully enabled with foundation IP and application-specific complex IP
  - Design starter kit, multiple product wafers, and early customer prototyping to ensure first-time production success

Application-optimized Platform Offerings

<table>
<thead>
<tr>
<th>22FDX-ulp</th>
<th>Ultra-low Power</th>
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<tbody>
<tr>
<td>• FinFET-like performance with 70% lower power vs. 0.9V 28nm HKMG</td>
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<tr>
<td>• Ultra low-voltage operation (~0.4V) with 90% lower power vs. 28nm HKMG</td>
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<tr>
<td>• Dynamic tradeoff of performance vs. power with body-biasing</td>
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<tr>
<th>22FDX-ull</th>
<th>Ultra-low Leakage</th>
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<tr>
<td>• Additional devices for ultra-low static leakage (~1pA/μm)</td>
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<td>• ULL SRAM with &lt;1pA/cell leakage</td>
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<td>• IP for BTLE, Zigbee and Thread</td>
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<th>22FDX-rfa</th>
<th>RF &amp; Analog</th>
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<tr>
<td>• Integrated RF and analog for reduced system cost and power</td>
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<tr>
<td>• Resistors, capacitors, inductors, transmission lines, transformers</td>
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<tr>
<td>• RF BEOL with Ultra Thick Metal stacks</td>
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<tr>
<td>• RF design enablement to leverage body-bias</td>
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FD-SOI – Fully-Depleted Silicon-On-Insulator
- Planar process similar to bulk
Dynamic Body-Bias Extends FD-SOI Flexibility

- 50% lower power at same frequency
- 30-40% faster performance at same power
- Same performance at lower Vdd
- Forward body-bias advantage: Software-controlled body-bias enables dynamic tradeoffs between power, performance and leakage

Architected for Effective Body-biasing

- Software-controlled body-bias enables dynamic tradeoffs between power, performance and leakage
- Forward Body Bias (FBB) enables FinFET-like performance and power efficiency at 28nm cost, low voltage operation down to 0.4V without speed loss
- Reverse Body Bias (RBB) enables low leakage down to 1pA/micron
- Can be used to reduce variability across the die and/or die-to-die

Ecosystem

- Cadence
- Verisilicon
- Soitec
- Mentor Graphics
- DxCorr
- SunEdison
- Synopsys
- Invecas
- ShinEtsu