55LPx
55 nm Process Technology

GLOBALFOUNDRIES 55LPx process technology platform enables IP reusability across multiple applications in both Consumer and Automotive markets, optimizing resources, reducing cost and improving time-to-market.

The comprehensive, highly configurable and production proven 55LPx platform solution enables integration of logic, RF, analog and non-volatile memory to provide cost effective solutions.

### Target Applications and Solutions
- Automotive (body electronics / power train) (55LPx+eNVM)
- Secure applications (Smart Cards, card reader) (55LPx+eNVM+RF)
- Battery-powered, next-generation SoC (Wearables) (55LPx+eNVM+RF+ULP)
- Battery-powered IoT end nodes (55LPx+eNVM+RF+ULP)
- Smart Energy/Grid (Smart meters) (55LPx+eNVM+RF+ULP)

### Highlights
- Single 55 nm platform with one model and PDK and IP re-usability for maximum ROI
  + Manufactured in Singapore
  + High volume production capability with world-class D0 (<0.04 def/in²) defect density
- Optimized for integrated analog, power and mixed-signal applications
  + Consumer and Industrial
  + IoT and Wearables
  + Automotive MCU
  + Low to mid-range MCUs
  + HV (DDI/TDDI) and Analog
- Comprehensive design ecosystem
  + Full range of Foundation and Complex IP libraries
  + PDK and reference flows supported by major EDA and IP partners
  + Proven eNVM technology with high endurance and high reliability
- Extensive services and supply chain support
  + Regularly scheduled MPWs
  + Layout database consolidation and mask assembly services
  + Advanced packaging and test solutions including 2.5D and 3D

### Architecture
- **55LPx Baseline**
  - MIMCap
  - Deep NWell
  - 1.2 V CMOS Baseline, DG I/O, 1P6M, RVT + HVT, SRAM
  - P-Substrate

- **55LPx+eNVM**
  - BCDLite®
    - Isolated low Rdson 8–12 V EDPMOS
    - Isolated low Rdson 8–12 V EDNMOS
    - Isolated ULR 5 V EDNMOS & EDPMOS
    - TaN Resistor

- **ULP**
  - SLVT
  - SHVT
  - 0.9 V SRAM
  - eNVM
  - eFlash
Technology Overview

- 55 nm LPx with 1.2 V and 2.5 V CMOS logic
- 5 V EDMOS, APMOM, MIM
- 55 nm BCDLite® with 8–12 V and UL 5 V EDNMOS and EDPMOS, TaN Resistors
- 55 nm ULP with SLVT, SHVT, 0.9 V SRAM and 0.9 V standard cell library with Always-on blocks
- eNVM 0.09 μm² eFlash bit cell, Automotive Grade 1
- Operating temperature range: −40°C to 125°C

IP Overview

The 55LPx 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 2.5/1.2/0.9 V (8T, 9T, 12T)</th>
<th>GPIO</th>
</tr>
</thead>
<tbody>
<tr>
<td>SRAM &amp; ROM Compiler</td>
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<tr>
<td>Analog and Digital PLL</td>
<td>Always-on Std Cells</td>
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</tbody>
</table>

### Interface IP

<table>
<thead>
<tr>
<th>DDR3/2</th>
<th>LPDDR3/2</th>
<th>HDMI 1.4</th>
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</thead>
<tbody>
<tr>
<td>MIPI D-PHY</td>
<td>PCIe G1/2</td>
<td>USB3.0/2.0</td>
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<td>SATA I/II</td>
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<th>Memory</th>
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<td>NVM: eFlash</td>
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<tr>
<td>ROM</td>
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</tbody>
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Contact GF for IP availability.

### 55 nm Platform Extensions

- 55LPx: 1.2 V baseline logic process with Foundation and Complex IP—reusable across platform
- 55 BCDLite: 5 V, 8 V and 12 V EDMOS power FETs, analog, and dense digital components for mobile applications
- 55ULP: SLVT/SHVT Transistors and 0.9 V SRAM for battery-powered, low voltage applications
- 55RF: RF features and models for Bluetooth, LTE transceivers and other wireless communications
- eNVM: Consumer and Automotive Grade embedded NVM for MCU, IoT, NFC, Bluetooth, WiFi

### 55 nm High Performance and High Reliability eFlash solution

#### Fast Speed
- Read Access ~8–10 ns
- Sector Erase time ~2–3 ms
- Word Program speed ~5 μs

#### Small Macro
- 0.0904 μm² bit cell
- Optimized macro
- Flexible macro form factor

#### Cost Benefit
- 2x die per wafer in 55 nm compared to 90 nm

#### High Density
- NVM Memory density up to 16 Mb

#### Power Efficient
- 55 nm ULP
- Active I_{peak} < 100 μA/MHz (low-power mode)

#### Reliable
- Automotive grade
- 20 year data retention

#### Endurance
- >500k Cycles

### GLOBALSOLUTIONS® Design and Manufacturing Ecosystem

GLOBALSOLUTIONS is the sum of our internal resources and ecosystem partners, combined to efficiently enable the fastest time-to-volume. This ecosystem includes partners in all aspects of design enablement and turnkey services, OPC and mask operations, and advanced capabilities in assembly solutions.

- **Libraries (Standard Cells, Memories)**
- **Analog / Mixed-signal**
- **Processor IP**
- **High-speed Interfaces**

- **Full Suite PDK, Reference Flow**
- **55LPx Process Technology**
- **SoC Packaging**
- **2.5D and 3D Packaging**

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