Designing With On-Die ECC for Embedded Applications

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Agenda

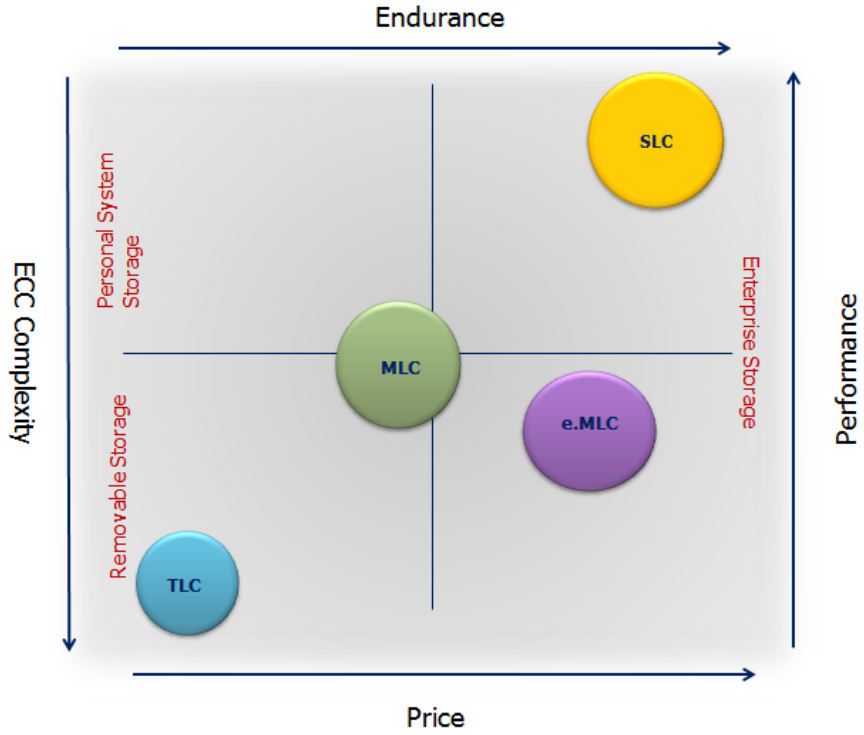
- Embedded Applications and Trends
- SLC NAND in Embedded Applications
- Parallel NAND vs. SPI NAND
- ECC Requirements and Trends
- On-Die ECC With Micron EC^{2}NAND
- Summary

Embedded Applications and Trends

- Embedded devices are everywhere with several applications across multiple segments
- Multicore CPUs and increasing appetite for memory requirements
- Low-power and low-cost requirements are driving innovation
- System designers and architects have several memory options to choose from based on their application and go-to-market requirements

- **Micron offers best-in-class memory solutions, engineered for YOUR innovation**

SLC NAND in Embedded Applications



- Based on single-level cell technology (SLC) with high Endurance capability
- High-performance discrete NAND offered in both low and high densities (1Gb to 512Gb+)
- SLC NAND market is spread across several embedded applications

SLC NAND Is Everywhere

Connected Home

- Set-Top Box
- Home Networking
- Home Automation
- Wireless Modem

Consumer

- Digital Television
- Digital Still Camera
- Wearable
- Home Audio Hi-Fi
- Blu-Ray Disc Players
- OTT

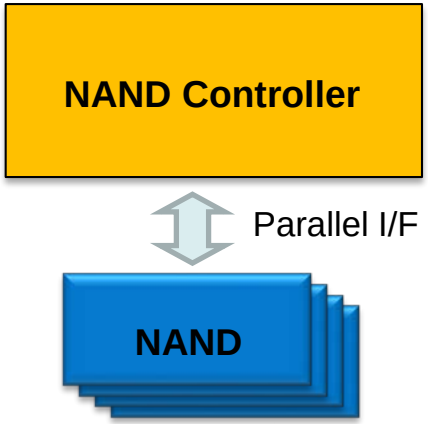
IMM

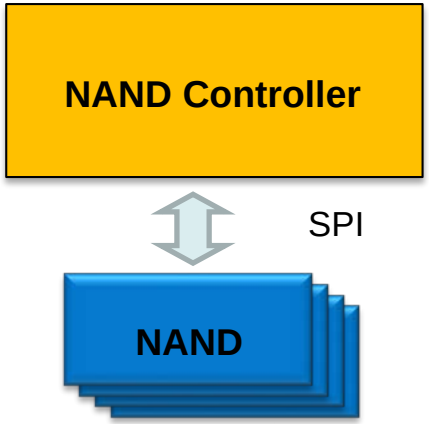
- Factory/Building Automation
- POS
- Medical
- Energy
- Transportation
- Aerospace & Defense
- Surveillance

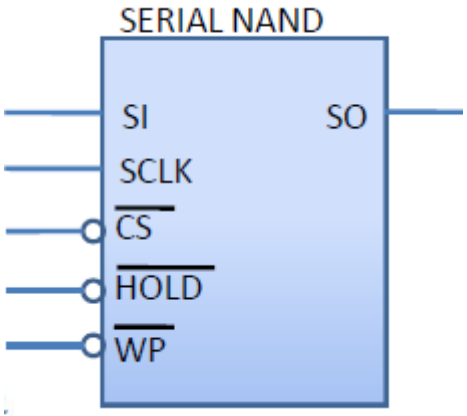
Automotive

- Infotainment
- Powertrain

Parallel NAND vs. SPI NAND







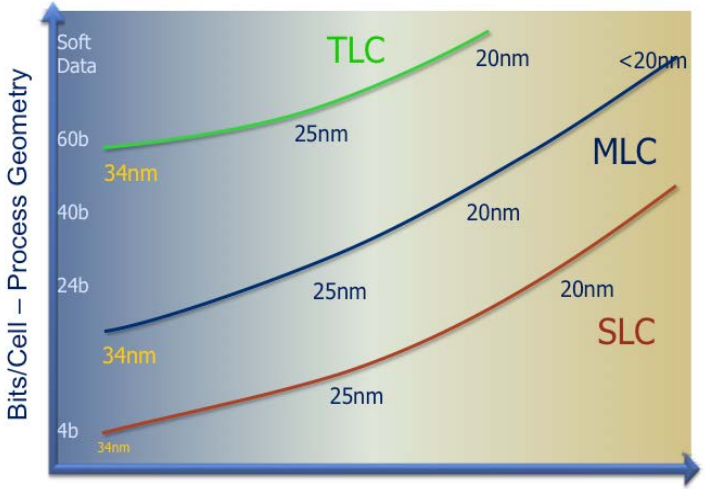
Legacy interface
Higher BOM cost for the system
Larger package size
Secure

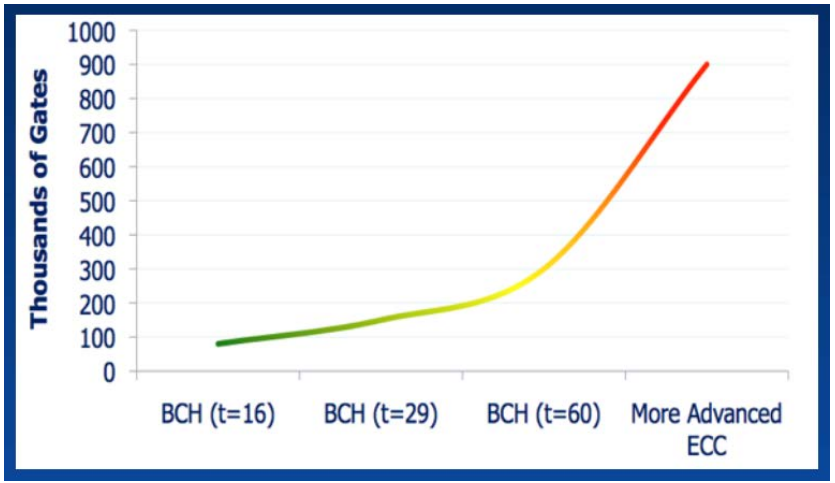
Simplified design with 4-signal SPI protocol
Low overall BOM cost for the system
Reduced package size
Lower cost
Fast write performance
Secure

Why SPI NAND?

- New applications like wearables, DTV, STB, and routers/gateways are showing interest in SPI NAND
  - Low pin count for simpler design
  - Small size for small form factor design
- SPI NAND is a great solution to meet these needs

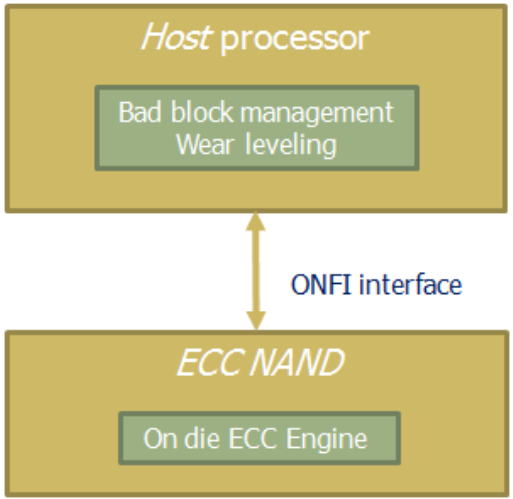
ECC Requirements and Trends





- Error correction code (ECC) requirements vary depending on cell technology and lithography shrinks
- SLC has the lowest ECC requirements due to high reliability
- ECC circuitry also gets complex depending on the ECC algorithm and the ECC bits

On-Die ECC With Micron EC²NAND



Features	Micron EC²NAND
High performance	✓
Parallel & SPI interface	✓
1.8V & 3.3V support	✓
Wide temperature offerings	✓
Security features	✓
Drop-in compatibility	✓
Ease of use	✓
Low/mid density offerings	✓

Summary

- SLC NAND is the most reliable high-performance discrete NAND; hence, it is widely adopted in several embedded applications
- SPI NAND is becoming more popular due to simpler design; also suitable for cost-sensitive applications
- Micron EC^{2}NAND offers built-in ECC and reduces burden on host for ECC needs, reducing design complexity for system designers

- **Micron offers a very wide spectrum of SLC NAND, engineered for YOUR innovation**