Advancement in Charge Trap Flash Memory Technology

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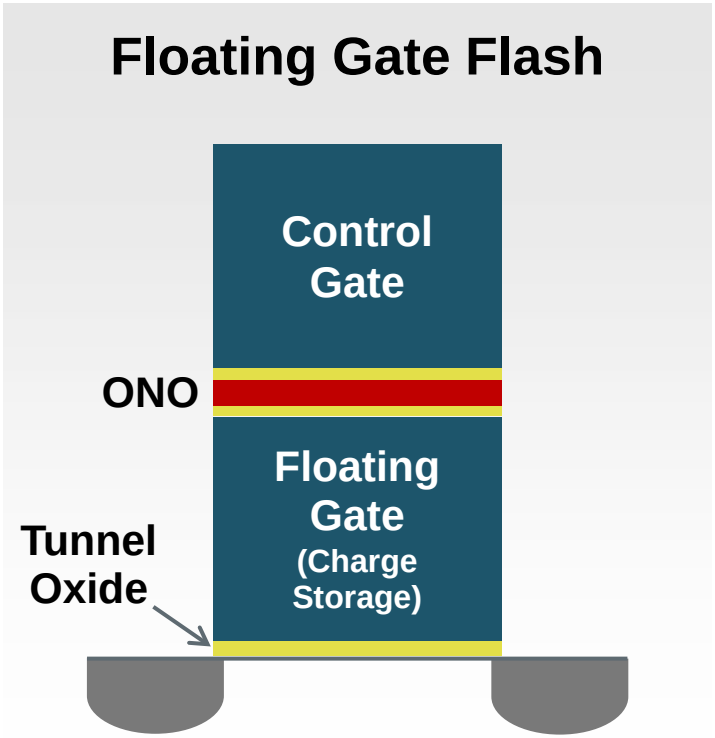
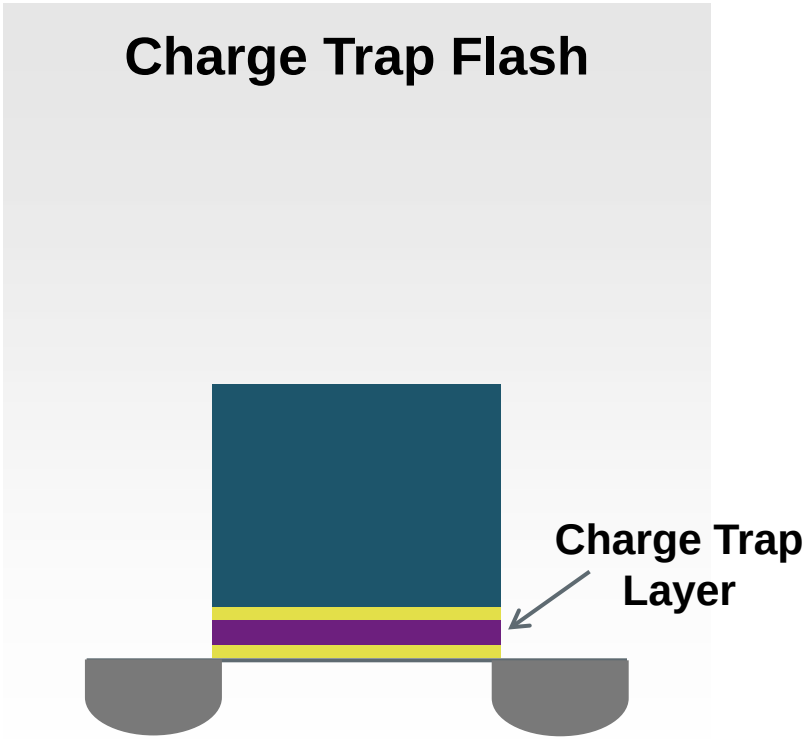
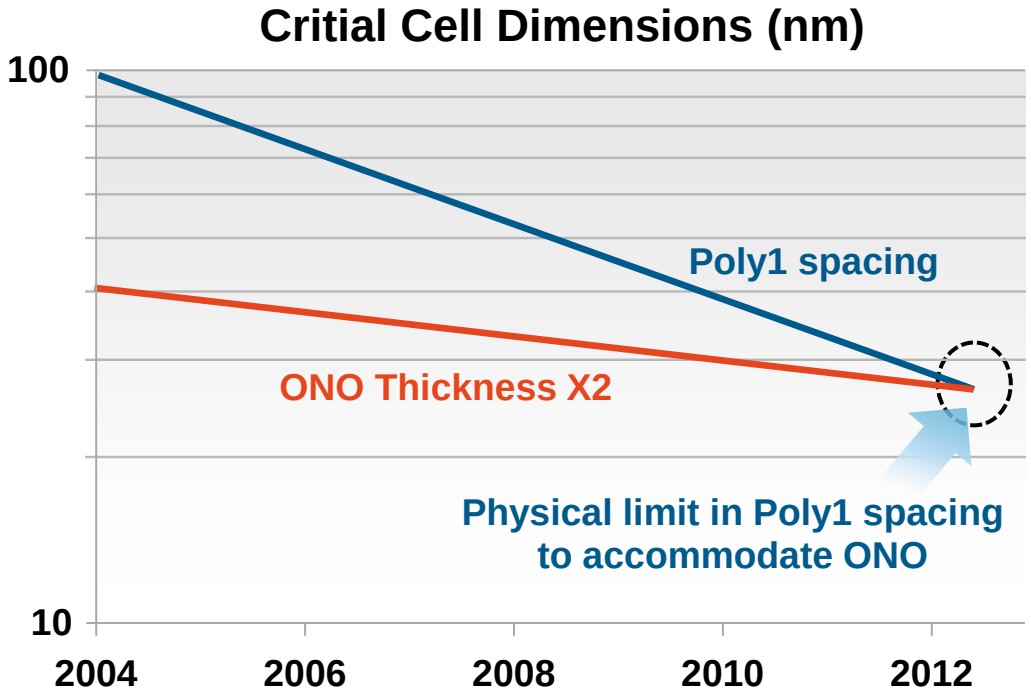
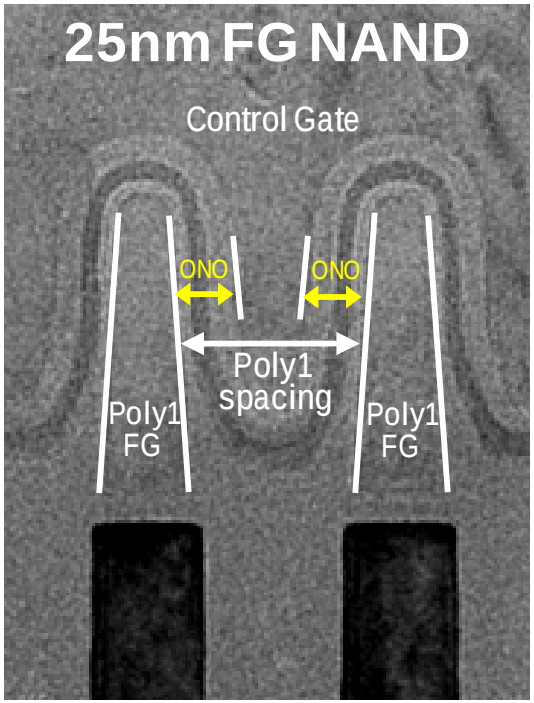
Why Charge Trap Flash?





Floating Gate Scaling Limitation

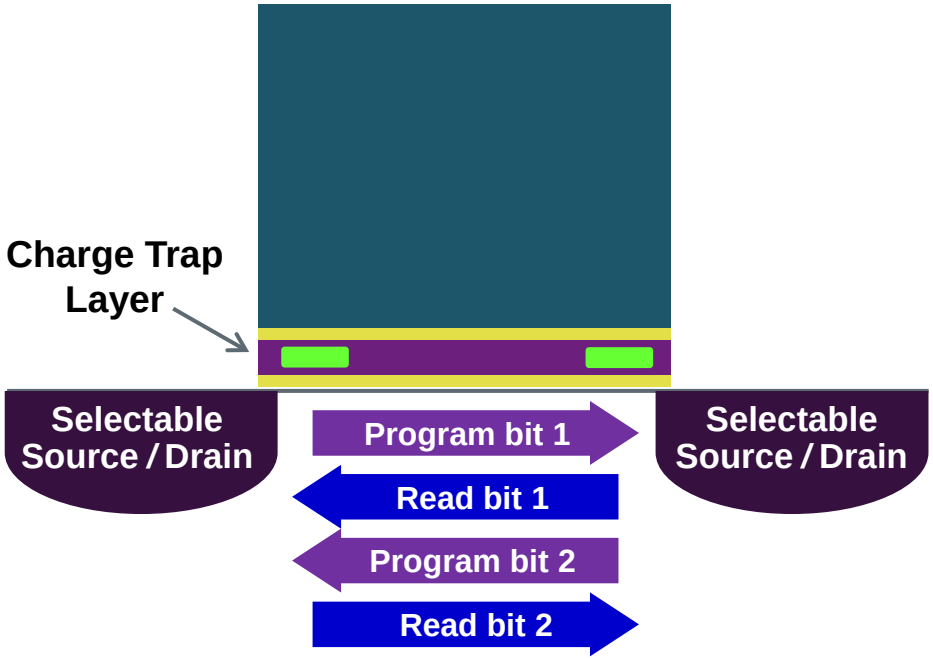




FG NAND Below 20nm

- **Difficult to fit ONO inter-poly dielectric in Poly1 spacing**
- **Cell-to-cell interference becomes increasingly troublesome**

MirrorBit® Technology



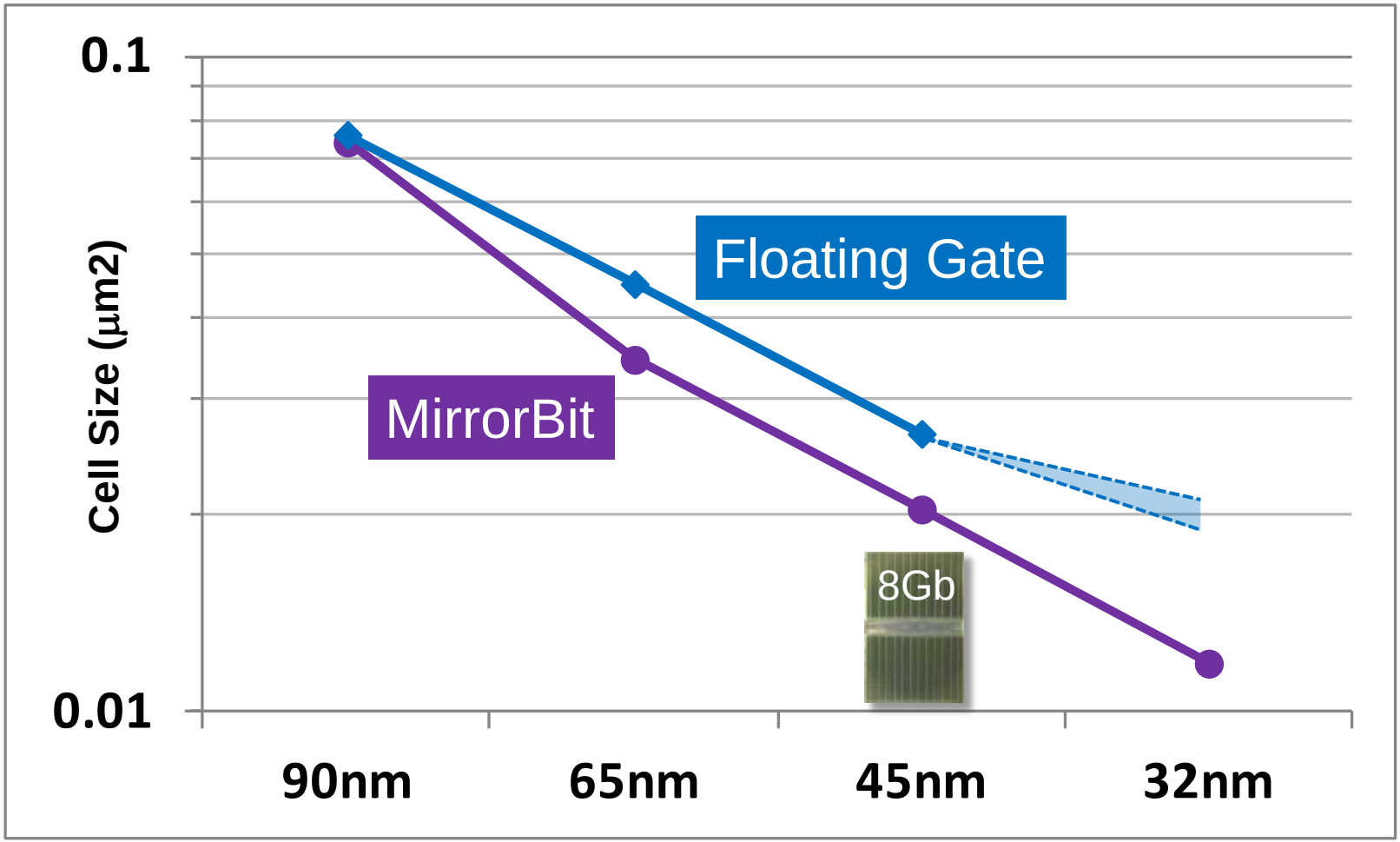
Non-conducting Charge Trap Layer

- Charge stored in two locations in each cell (doubles bit density)

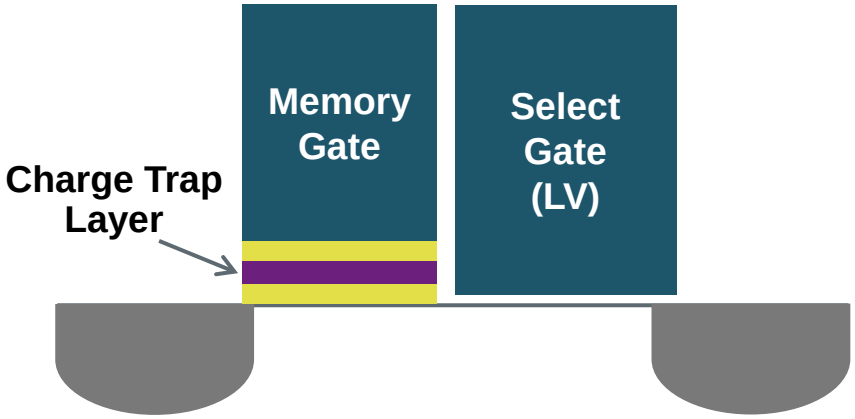
Planar, Symmetric Structure

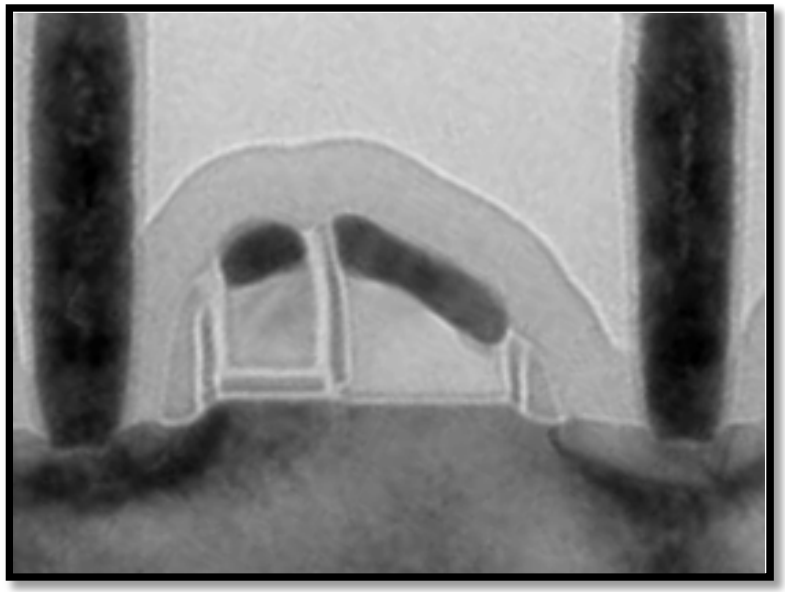
- Ease of manufacturing and better scalability

MirrorBit Core Cell Scaling Trend



Embedded Charge Trap (eCT)™ NOR Flash

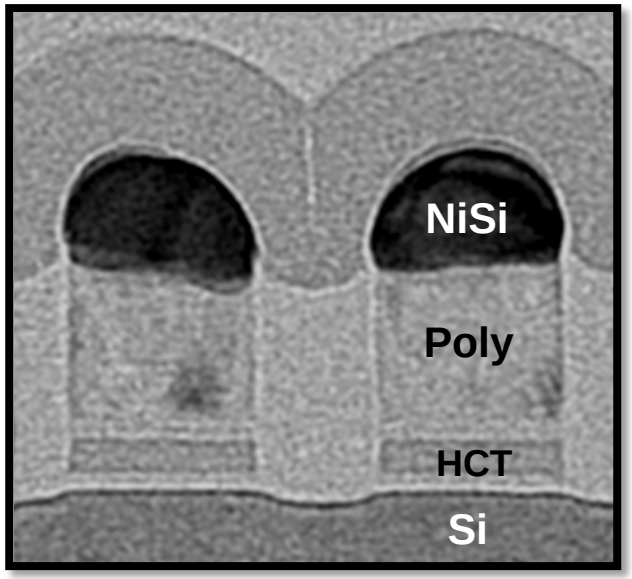




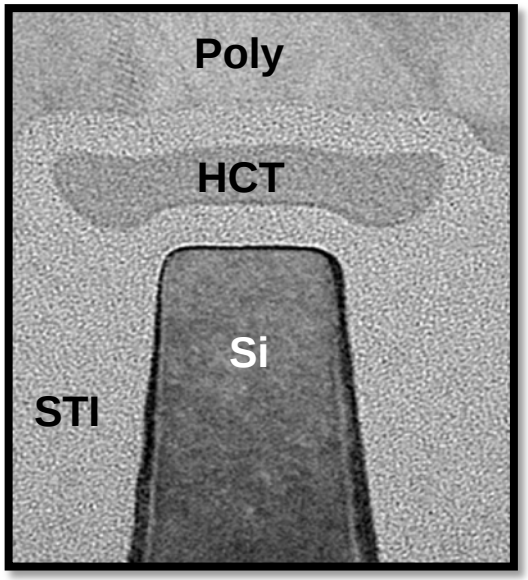
- Based on charge-trap technology used in MirrorBit
- Integrated with low-power Logic process
- Optimized for ultra-fast read, and low power

Heterogeneous Charge Trap (HCT)™ NAND Technology

Along Bitline

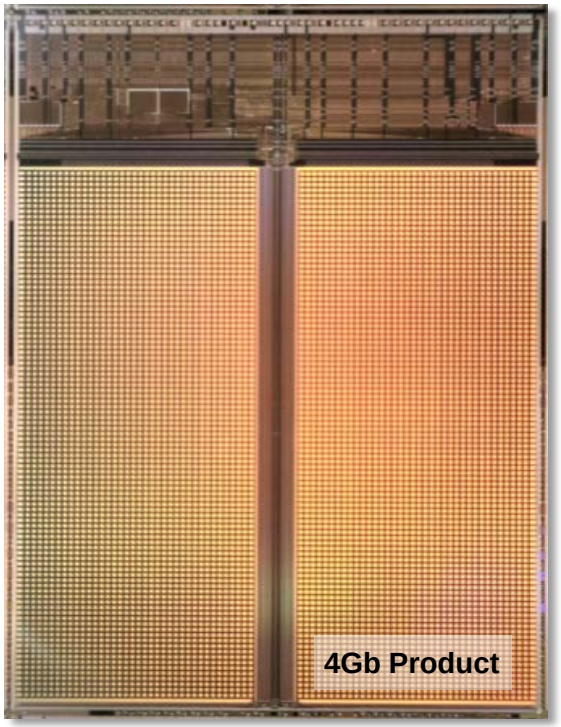


Along Wordline



- HCT film is a multi-layered stack optimized for performance and reliability
- Si content and thickness of each layer within HCT film are critical
- Shape of HCT also optimized for performance & reliability

HCT NAND Product Performance



HCT NAND Memory

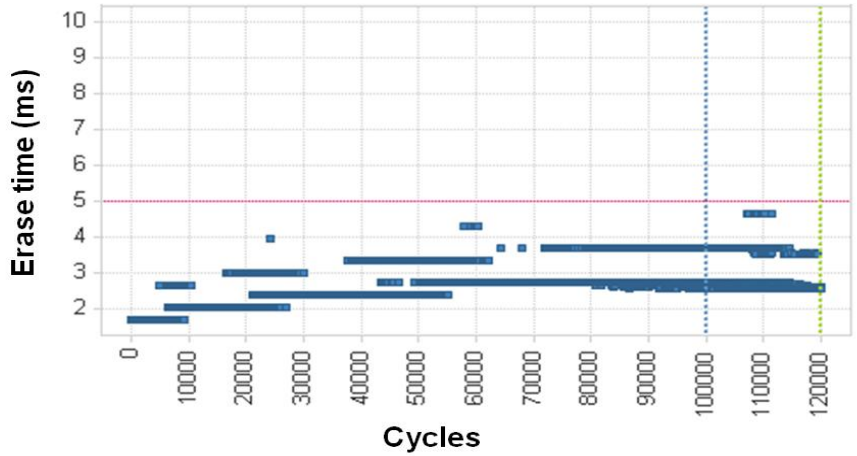
Page Size:	2KB (Main) + 64B (Spare)
Block Size:	128KB + 4KB
Endurance:	100K P/E Cycles
Retention:	10 Years

System Read Performance

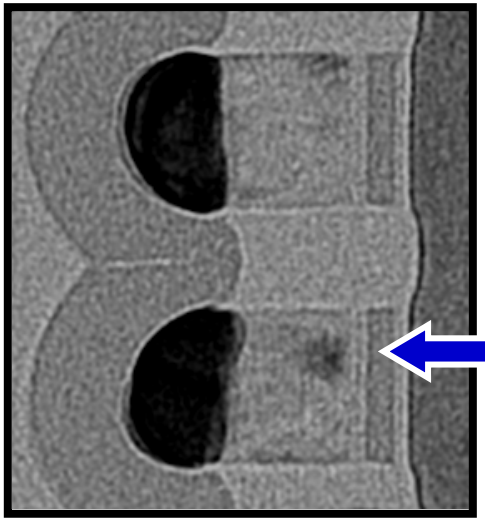
Random Read Time:	25µs
Sequential Read (async):	20ns

System Write Performance

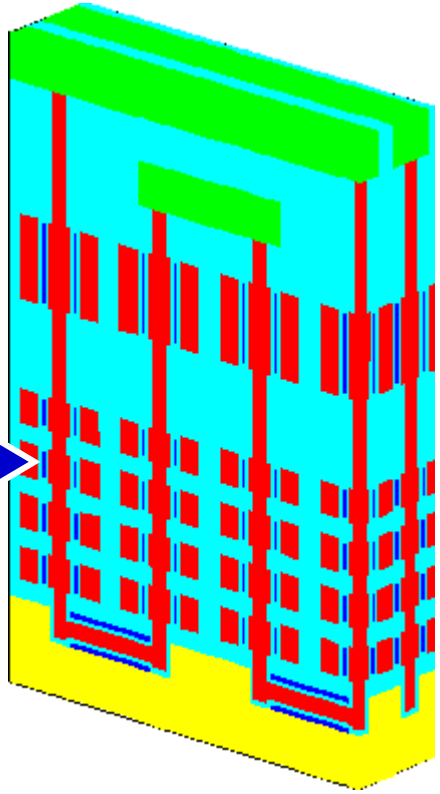
Page Program Time:	200µs
Block Erase Time:	5ms

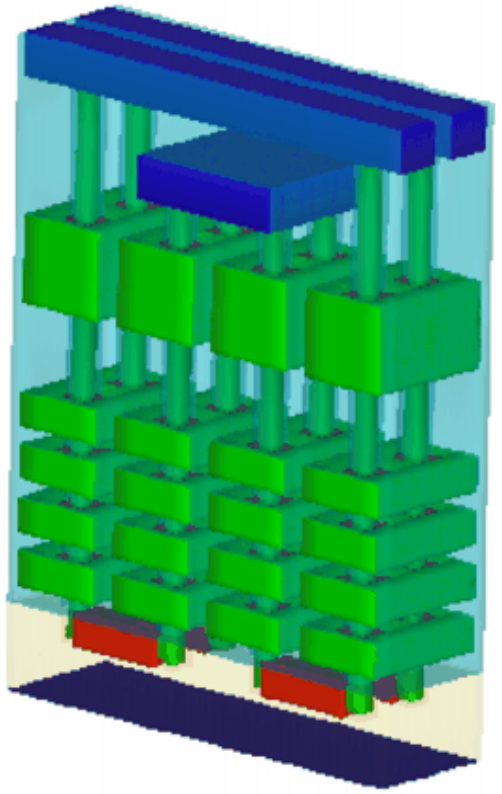


Charge Trap Technology for 3D NAND



Charge Trap Layer





Advancement in Charge Trap Flash Memory Technology

- Charge Trap Flash Technology is scalable, reliable, and highly manufacturable
- Standalone NOR Flash Technology based on Charge Trap and 2bits per cell has been in production for >10 years and continues to scale to smaller nodes while maintaining high level of reliability and performance
- Charge Trap embedded Flash Technology integrated with advanced logic for SoC applications is demonstrated, delivering high performance and reliability
- Charge Trap NAND Flash Technology is scalable to <1Xnm and can be extended to 3D

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