



SM2504XT

Best-in-Class Power Efficiency PCIe Gen5 x4 NVMe 2.0 SSD Controller

As mainstream applications continue to demand faster and more efficient storage, the need for next-generation high-density, low-power SSD storage solutions is growing rapidly. Designed to address these requirements, the SM2504XT delivers the perfect balance of performance, efficiency, and flexibility for today's PCIe Gen5 SSDs.

Built on advanced architecture, the SM2504XT is a power-efficient SSD controller compliant with PCIe Gen5 x4 and NVMe 2.0 standards. It offers up to 30% better power compared to previous PCIe Gen5 SSD controllers, enabling faster performance with reduced thermal and power constraints. Supporting data transfer speeds up to 3,600MT/s, the SM2504XT is optimized for 3D TLC and QLC NAND technologies, making it an ideal choice for scalable, high-density SSD designs.

Superior Performance

Built on TSMC's advanced 6nm process technology, the SM2504XT SSD controller features a triple-core Arm® Cortex®-R8 processor and supports a PCIe Gen5 x4 interface with 32GT/s per lane. It includes four NAND channels, each operating at speeds up to 3,600 MT/s, delivering exceptional performance for mainstream TLC and QLC NAND-based SSDs. The SM2504XT is also equipped with an optimized system architecture and supports the Host Memory Buffer (HMB) feature, making it an ideal solution for DRAM-less SSD applications that require high performance and cost efficiency.

With its advanced architecture, the SM2504XT ensures superior performance while maintaining ultra-low power consumption. It delivers up to 11.5 GB/s sequential read and 11.0 GB/s sequential write speeds. It also achieves up to 1.7M IOPS random read and 2.0M IOPS random write performance, enabling fast and consistent responsiveness for demanding workloads.

Advanced Architecture with SCA (Separate Command Address) Support

SM2504XT supports Separate Command Address (SCA), a unique architecture that separates command and address transmission paths. It improves controller efficiency by allowing faster command processing and parallel data access, which enhances overall NAND interface performance.

NANDXtend® ECC Technology with Advanced 4K+ LDPC Engine

A key feature of the SM2504XT is the integration of Silicon Motion's proprietary NANDXtend® ECC technology, featuring an advanced 4K+ LDPC engine and end-to-end data path protection. Optimized for high-density 3D TLC and QLC NAND, this ECC architecture ensures maximum data integrity and extended SSD endurance throughout the NAND lifecycle.

Through advanced firmware algorithms and low-power design methodologies, NANDXtend® technology delivers enhanced correction efficiency and reliability, maintaining consistent performance without compromising power consumption.

Best-in-Class Power Efficiency

Built on TSMC's advanced 6nm process, the SM2504XT is engineered for exceptional energy efficiency without compromising PCIe Gen5 performance. Its power-optimized architecture supports dynamic power states, intelligently adjusting based on workload demands to minimize both active and idle power consumption. This makes the SM2504XT an ideal solution for high-performance PCs, workstations, and gaming systems, where maximizing throughput while maintaining low power draw is crucial.

KEY FEATURES

- **High Performance**
 - PCIe Gen5 x4
 - 4 NAND channels up to 3,600 MT/s
 - Triple-core Arm® Cortex®-R8 processor
- **NANDXtend® ECC Technology**
 - Innovative 4K+ LDPC engine
 - Embedded programmable RAID
- **Data Integrity and Reliability**
 - HMB data path protection
 - SRAM ECC & CRC parity
- **Best-in-class Low Power (ASIC)**
 - 2.4W (Max.) in Active mode
 - 1mW (Typ.) in PS4 state

SPECIFICATIONS

SM2504XT

Host Interface	PCIe Gen5 x4
PCIe Protocol	NVMe 2.0
Processor	Triple-core Arm® Cortex®-R8 processor
Channel/CE	4CH / 16CE
Max Performance	Sequential Read: 11.5 GB/s Sequential Write: 11.0 GB/s Random Read: 1.7M IOPS Random Write: 2.0M IOPS
NAND Flash Support	ONFI 5.1 and Toggle 5.0 Data rate up to 3,600 MT/s
Security	Real time full drive encryption with AES 128/256 TCG Opal 2.0 compliant Hardware SHA 256/384/512 and TRNG Secure Boot for FW authentication
Advanced Features	SMBus, I3C, I²C, SPI supported
Package	252LD-ball FCCSP-C (11.6 mm x 6.8mm)