



# SM2508

## Superior Performance with Low Power PCIe Gen5 x4 NVMe 2.0 SSD Controller

The SM2508 is a high-performance and low-power PCIe Gen5 SSD controller solution. It is designed for AI-capable PC notebooks that require high-density, high-performance, and lower power storage solutions. The increasing demand for Gen AI applications requires innovative storage solutions to handle the increased workload while maintaining performance and reliability. The SM2508 delivers high performance and enhanced power efficiency, offering up to 70% better efficiency compared to competitors. It is engineered to comply with the PCIe Gen5 and NVMe 2.0 standards. The controller supports the latest generation of ONFI/Toggle 5.0 NAND flash interfaces. Additionally, its compatibility with the latest 3D TLC/QLC NAND technologies enables larger data density, meeting the evolving demands of next-generation AI PCs.

### Superior Performance

Built on TSMC 6nm process technology, the SM2508 SSD controller equips quad-core Arm® Cortex®-R8 processor, supporting four PCIe lanes of 32Gb/s data transfer speed. Additionally, it features 8 NAND channels with a speed of up to 3,600 MT/s per channel to deliver extreme high-end performance.

The SM2508 is optimally designed for high-performance PCs and high-end client applications. Its advanced architecture ensures minimal latency and superior performance: up to 14.5 GB/s and 14 GB/s sequential read and write; 2.5M/2.5M IOPS random read/write.

### NANDXtend® ECC Technology with Innovative 4K+LDPC Engine

A significant attribute of the SM2508 is its integration with Silicon Motion's proprietary NANDXtend® ECC technology. In conjunction with internal data path protection and a programmable firmware interface, this ensures maximum data integrity and storage endurance. Through cutting-edge design methodologies and advanced process technologies, the SM2508 achieves a combination of high throughput, reduced power consumption, and extremely high reliability.

### Best-in-Class Power Consumption

The SM2508 employs the advanced TSMC 6nm process to significantly lower power consumption. Compared to the last generation, the SM2508 achieves a remarkable 30% reduction in active power usage. Also, with its advanced process and optimized design, the SM2508 has ultra-low PS4 power consumption, less than 2mW, even lower than the PCIe Gen4 SSDs.

Moreover, it features a proprietary built-in smart clock-gating mechanism, which intelligently and automatically powers down unused blocks, ensuring highly efficient power consumption in real-time. Fully compliant with PCIe and NVMe standards, the SM2508 can operate in multiple power states based on host command requests and power consumption considerations. The controller's capability of managing power transitions between different power states is widely tested and verified on various PC platforms.

KEY FEATURES

- **High Performance**
    - PCIe Gen5 x4
    - 8 NAND channels up to 3,600MT/s
  - **NANDXtend® ECC Technology**
    - Innovative LDPC ECC engine
    - Embedded programmable RAID
- **Data Integrity and Reliability**
    - End-to-end data path protection
    - SRAM ECC & CRC parity
  - **Best-in-class Low Power (ASIC)**
    - 3.5W (Max.) in Active mode
    - <2.0mW in PS4 state

SPECIFICATIONS

SM2508

Host Interface	PCIe Gen5 x4
PCIe Protocol	NVMe 2.0
Processor	Quad-core Arm® Cortex®-R8 processor
Channel/CE	8CH/32CE
Max Performance	Seq. Read: 14.5 GB/s Seq. Write: 13.6 GB/s Random Read: 2.5M IOPS Random Write: 2.5M IOPS
NAND Flash Support	ONFI 5.0 and Toggle 5.0 NV-DDR4 up to 3,600 MT/s
DRAM	Supports DDR4 and LPDDR4, transfer rate up to 3200Mbps 32-bit data bus (DRAM) 2 chip enable pins (DRAM) DRAM ECC
Security	Real-time full-drive encryption with AES 128/256 TCG Opal 2.0 compliant Hardware SHA 256/384 and TRNG Secure Boot for FW authentication
Package	576-balls EHS-FCBGA (15mm x 15mm)
Peripheral	Built-in On-chip temperature sensors Supports NVMe-MI over SMBus Supports SMBus, I3C, I2C, SPI, and UART function