



SM2258

SATA 6Gb/s SSD Controller with NANDXtend™ Technology

The SM2258 is a high-performance SATA 6Gb/s SSD controller ideally suited for client SSDs targeting HDD replacement, ultrabooks and tablets. The SM2258 is a complete merchant ASIC/firmware solution supporting 3D triple-level cell (TLC) NAND from all major NAND suppliers. Leveraging Silicon Motion's proprietary NANDXtend™ error-correcting code (ECC) technology, the SM2258 provides a comprehensive data protection and enhances the endurance and retention of 3D TLC NAND, delivering more than three times better durability for 3D TLC SSD. SM2258 also features advanced Direct-to-TLC and SLC Caching algorithms for optimal sustained performance with TLC NAND.

KEY FEATURES

- **Ultra High Performance**
 - Sequential Read: 560 MB/s*
 - Sequential Write: 520 MB/s*
 - Random Read: 90,000 IOPS*
 - Random Write: 80,000 IOPS*
- **Optimal sustained Performance**
 - Direct-to-TLC and SLC Caching
- **Comprehensive NAND Flash Support**
 - 3D TLC from all major NAND suppliers
- **Enhanced Security**
 - Real time full drive encryption with AES
 - TCG Opal protocol
 - Hardware SHA 256 and TRNG
- **Available in Commercial and Industrial Grade**

* with IMFT 3D TLC NAND



FEATURES

• Host Interface

- Industrial Standard SATA Revision 3.1 compliant
- Industrial Standard ATA/ATAPI-8 and ACS-3 command compliant
- Supports SATA interface rate of 6Gb/s (backward compatible to 1.5Gb/s and 3Gb/s)
- Native Command Queuing up to 32 commands
- Supports SATA device sleep (DevSleep)
- Data Set Management command (TRIM)
- Self-Monitoring, Analysis, and Reporting Technology (S.M.A.R.T.)
- Supports PHY Sleep mode (CFast PHYSLP)
- Supports 28-bit and 48-bit LBA (Logical Block Addressing) mode commands

• NAND Flash Support

- Supports 1z nm TLC and 3D MLC/TLC NAND
- Supports ONFI 3.0, Toggle 2.0, and Asynchronous interface
- Supports 1.8V/3.3V Flash I/O
- Supports 8KB and 16KB page size
- Supports 1-plane, 2-plane, and 4-plane operation
- 4-channel flash interface supports up to 32 NAND flash devices

• DRAM Interface

- 16-bit wide DRAM interface
- Supports DDR3/DDR3L

• Data Protection and Reliability

- Supports ATA8 security feature set
- Supports data security erase and quick erase
- Proprietary NANDXtend™ error-correcting and data protection technology triples the P/E cycles for 3D TLC SSD devices.
- Internal data shaping technique increases data endurance
- Software/Hardware write protect option
- StaticDataRefresh™ technology ensures data integrity
- Early weak block retirement option
- Global wear leveling algorithm evens program/erase count and extends SSD lifespan

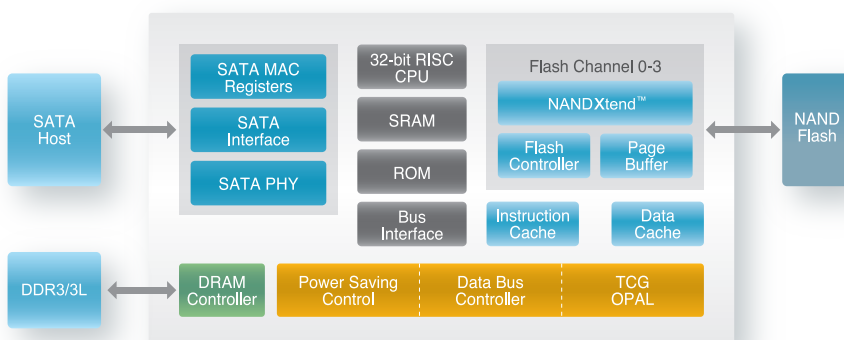
• Architecture

- 32-bit RISC CPU
- High-efficiency 64-bit system bus
- Automatic sleep and wake-up mechanism to save power
- Built-in voltage detectors for power failure protection
- Built-in power-on reset and voltage regulators
- Built-in temperature sensor for SSD temperature detection
- Supports JTAG interface, UART (RS-232) interface, and I2C interface for on-system debug

• Upgradeable Firmware

- Supports firmware in-system programming (ISP) function for firmware upgrade

BLOCK DIAGRAM



SPECIFICATIONS

Host Standards	SATA 6Gb/s
ATA Protocol	ATA-8
Flash I/F	4 Channel
CE/Channel	8
Commercial Temperature	0°C to 70°C
Industrial Temperature	-40°C to 85°C
Package	323-ball TFBGA