SiliconMotion



SM2256

SATA 6Gb/s SSD Controller with NANDXtend™ Technology

The SM2256 is a high-performance SATA 6Gb/s SSD controller ideally suited for client SSDs targeting HDD replacement, ultrabooks and tablets. The SM2256 is a complete merchant ASIC/firmware solution supporting 1x/1y/1z nm triple-level cell (TLC) NAND and extensible to 3D NAND from all major NAND suppliers. Leveraging Silicon Motion's proprietary NANDXtend™ error-correcting code (ECC) technology, the SM2256 provides a comprehensive data protection and enhances the endurance and retention of TLC NAND, delivering more than three times better durability for TLC SSD.

KEY FEATURES

- **Ultra High Performance**
  - Sequential Read: 540 MB/s*
  - Sequential Write: 480 MB/s*
  - Random Read: 90,000 IOPS*
  - Random Write: 80,000 IOPS*
- **Comprehensive NAND Flash Support**
  - 1x/1y/1z nm TLC/MLC from all major NAND suppliers
  - Extensible to support 3D NAND
- **Enhanced Security**
  - Real time full drive encryption with AES
  - TCG Opal protocol
  - Hardware SHA 256 and TRNG
- **Available in Commercial and Industrial Grade**

* 480GB SSD with SK Hynix 16nm 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 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 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

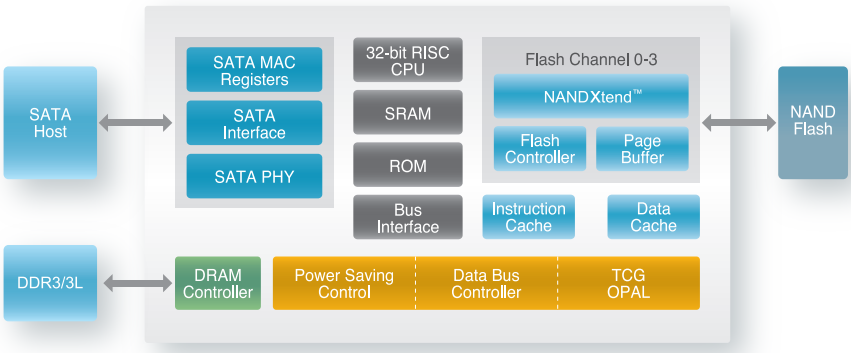
• Architecture

- 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**

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