

SandForce® SF2000 Reference Design and Evaluation SSD

Data Sheet

Key Features

- Fully functional standard form factor SSD based on second-generation SandForce flash controllers
- DuraClass™ technology delivers
 - Award-winning performance
 - Best performance per Watt
- SATA 6Gb/s host interface
- DRAM-less design for lower BOM cost
- Full range of features supported including:
 - Temperature sensor
 - Firmware and boot code upgradable
 - LED indicators
 - RS-232 debug port
- Connector-less probing system for subsystem verification and manufacturing tests
- Turnkey solution
- Support for enterprise-class electrical and functional requirements
 - Polymer capacitor or SuperCap for catastrophic power-fail data protection
- Ultra-low power mode in client reference designs for battery driven applications



The Seagate® SandForce SF2000 reference designs and evaluation SSDs bring today's critical enterprise and client storage needs—performance, reliability, and price—together in one package like never before. Using the high-performance, second-generation SandForce SF2000 flash controller family gives drive manufacturers the flexibility to minimize costs without compromising performance or reliability. The reference design files provide a board-level production solution suitable for turnkey contract manufacturer production, as well as the basis for customized designs.

Flash Controller Expertise

Seagate DuraClass™ technology has revolutionized flash controllers to establish a new class of SSDs that combine reliability, performance, and power efficiency using standard NAND flash memory. The state-of-the-art SandForce flash controllers ensure the SSD will operate at its maximum potential.

Cost Effectiveness

The SF2000 reference designs have been designed and tested with a vast array of standard NAND flash memory parts, allowing the turnkey solution to be sourced to contract manufacturers with the most cost-effective memory available. Furthermore, the single-chip SF2000 flash controller family does not require external DRAM, delivering low power and cost-effective BOM designs.

Flexibility

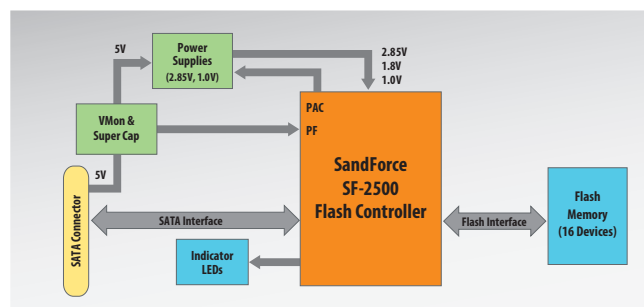
The SandForce reference design files offer configurable BOMs, editable schematic files, and layout databases for customized designs.

Standards Compliant

The SF2000 reference design files are architected to enable drive makers to meet the latest national, international, and industry standards — including RoHS, UL, FCC Class A/B and others — to speed design and testing phases to minimize time-to-market worldwide.

Target Applications

Enterprise SSDs, client SSDs, and small form factor MO-300 and MO-297 based portable and embedded applications.



Example Seagate SandForce SF2500 Evaluation 2.5-Inch SATA SSD Block Diagram

Seagate® SandForce® SF2000 Reference Design and Evaluation SSDs

SandForce Flash Controller	Enterprise: SF2500, SF2600; Client: SF2200
DuraClass™ Technology	<ul style="list-style-type: none"> • DuraWrite™ extends the endurance of SSDs • Intelligent block management and wear leveling • Intelligent read disturb management • Intelligent <i>recycling</i> for advanced free space management (garbage collection) • RAISE™ (Redundant Array of Independent Silicon Elements) • Best-in-class ECC protection for longest data retention and drive life
Performance (sustained) ¹	Sequential read and write transfer: up to 500MB/s (@ 128K blocks) Random read and write IOPS: up to 60,000 (@ 4K blocks)
Security	Data encryption: AES-256 and AES-128
Protection (enterprise)	ECC recovery: up to 55 bits correctable per 512-byte sector (BCH) Unrecoverable read errors: less than 1 sector per 10E17 bits read Power failure protection: polymer capacitor or super-capacitor circuit
Protection (client)	ECC recovery: up to 55 bits correctable per 512-byte sector (BCH) Unrecoverable read errors: less than 1 sector per 10E16 bits read
Operating Temperature	0°C to 70°C
Voltage	5V
Additional Features	<ul style="list-style-type: none"> • RS-232 debug port • ACTIVITY and FAULT LED indicators • On-board temperature sensor • Serial EEPROM for optional custom boot code • Midplane activity signal • SSD staggered <i>link up</i> control support (enterprise)

Configuration Details

Reference Designs	Application	Board Interface	Memory Type
SF-2500 2.5-Inch SATA Toggle	Enterprise Polymer Cap	SATA 6/3/1.5Gb/s	SLC, MLC, eMLC, BGA-152, Toggle, ONFi 2
SF-2500 2.5-Inch SATA ONFi	Enterprise SuperCap	SATA 6/3/1.5Gb/s	SLC, MLC, eMLC, BGA-100, ONFi 2
SF-2500 2.5-Inch SATA Toggle	Enterprise SuperCap	SATA 6/3/1.5Gb/s	SLC, MLC, eMLC, BGA-152, Toggle, ONFi 1/2
SF-2200 2.5-Inch SATA ONFi	Client	SATA 6/3/1.5Gb/s	SLC, MLC, BGA-100, ONFi 2
SF-2200 2.5-Inch SATA Toggle	Client	SATA 6/3/1.5Gb/s	SLC, MLC, TSOP-48, ONFi 2
SF-2200 2.5-Inch SATA TSOP	Client	SATA 6/3/1.5Gb/s	SLC, MLC, BGA-152, Toggle, ONFi 2
SF-2200 2.5-Inch SATA TSOP	Client DevSleep	SATA 6/3/1.5Gb/s	SLC, MLC, BGA-152, Toggle, ONFi 2
SF-2200 MO-300 mSATA ONFi	Client	mSATA 6/3/1.5Gb/s	SLC, MLC, BGA-100, ONFi 2
SF-2200 MO-300 mSATA Toggle	Client	mSATA 6/3/1.5Gb/s	SLC, MLC, BGA-132, Toggle, ONFi 2
SF-2200 MO-300 mSATA TSOP	Client	mSATA 6/3/1.5Gb/s	SLC, MLC, TSOP-48, ONFi 2
SF-2200 MO-300 mSATA TSOP	Client DevSleep	mSATA 6/3/1.5Gb/s	SLC, MLC, TSOP-48, ONFi 2
SF-2200 MO-297A SATA Toggle	Client	SATA 6/3/1.5Gb/s	SLC, MLC, BGA-152, Toggle, ONFi 2



seagate.com

AMERICAS Seagate Technology LLC 10200 South De Anza Boulevard, Cupertino, California 95014, United States, 408-658-1000
 ASIA/PACIFIC Seagate Singapore International Headquarters Pte. Ltd. 7000 Ang Mo Kio Avenue 5, Singapore 569877, 65-6485-3888
 EUROPE, MIDDLE EAST AND AFRICA Seagate Technology SAS 16-18, rue du Dôme, 92100 Boulogne-Billancourt, France, 33 1-4186 10 00