

SandForce® SF3700 Family

FLASH CONTROLLERS Data Sheet

Key Features

- Scalable and flexible SF3000 architecture
- Native PCIe Gen2 x2/x4 and SATA 6Gb/s interfaces in a single ASIC design
- Up to 2TB capacity
- DuraWrite™ data reduction efficiently maximizes SSD endurance
- SHIELD™ error correction implements LDPC with DSP to ensure data integrity even as flash ages
- Enhanced RAISE™ data protection can recover page, block and die failures
- Dual AES-256 hardware encryption and optional TCG Opal secure data at rest
- Power-fail circuitry prevents data loss due to power faults in enterprise applications
- Ultra low power modes including L1.2 for PCIe and DevSleep for SATA
- Single-chip, DRAM-less solution enables small form factors and low BOM cost
- Complete solution including ASIC, FW, RDK, and development tools

The growing trends toward big data and portable computing create new requirements for data storage. Solid state drives offer compelling benefits, ranging from high performance and low latency for hyperscale data centers to low power consumption for client computing. The SF3700 family, the third generation of Seagate® SandForce flash controllers, enables SSD manufacturers to build robust PCIe and SATA flash storage solutions.

Scalable and Flexible Architecture

The SF3000 architecture is scalable and flexible, delivering exceptional performance, reliability, and data security, and supporting rapid adoption of the latest host interfaces and flash technologies. The new platform enables greater product differentiation and OEM-specific customization to meet the demands of both enterprise and client computing applications.

Two Host Interfaces – One ASIC

The SF3700 family is the industry's first flash controller to fully support native PCIe Gen2 and SATA 6Gb/s host interfaces in a single ASIC design. This unique 2-in-1 capability enables a single PCB to be assembled as an SSD with either a PCIe or a SATA interface. SF3700 flash controllers offer simplified board design, greater manufacturing flexibility, and lower cost.

Native PCI Express Interface

The SF3700 family enables client and enterprise PCIe solid state storage. It supports both AHCI and NVMe protocols across PCIe to deliver ultimate performance, and offers an end-to-end NVMe solution comprised of host drivers and target silicon, ensuring interoperability with a broad range of products. In addition, SF3700 flash controllers support low power PCIe modes, including L1.2 for both enterprise and client solutions.

Endurance and Reliability

As NAND flash memory geometries shrink, delivering the endurance and reliability that customers demand becomes more challenging. The SF3700 family combines several techniques to extend flash memory life and maintain data integrity. Next-generation DuraWrite™ data reduction lowers write amplification and P/E cycles to maximize SSD endurance. SHIELD™ advanced error correction further extends flash memory life by implementing an LDPC code that combines hard-decision, soft-decision, DSP, and adaptive ECC.

Data Protection

SF3700 flash controllers provide superior data protection with enhanced RAISE™ (Redundant Array of Independent Silicon Elements) technology that includes new levels of data protection and additional redundancy for mission-critical enterprise solutions, ensuring access to data even after a page, block, or full die fault. RAISE technology provides the protection and reliability of RAID on a single drive without the 2x write overhead of parity.

Data Security

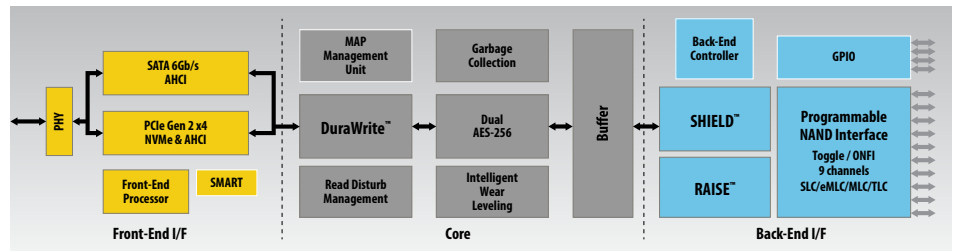
As the workforce becomes increasingly mobile, data security becomes increasingly important. The SF3700 family implements high-level security protocols to safeguard data stored in flash memory. Dual AES-256 hardware encryption protects data at rest, and optional support for TCG Opal and eDrive provide interoperability with management applications.



SandForce® SF3700 Family



Seagate SandForce SF3700 Block Diagram



Seagate® SandForce® SF3700 Flash Controller Family	SF3719	SF3729	SF3739	SF3759
Applications	Entry Client	Mainstream Client	Enthusiast Client Value Enterprise	Enterprise Caching Enterprise Storage
DuraClass™ Technology	DuraWrite™ data reduction Enhanced RAISE™ data protection SHIELD™ error correction Intelligent block management and wear leveling Intelligent read disturb management Intelligent garbage collection Intelligent data retention optimization Power/performance balancing Thermal threshold management			
Architecture	SF3000			
Host Interface	SATA 6Gb/s PCIe Gen2 x2 (AHCI and NVMe)		SATA 6Gb/s PCIe Gen2 x2/x4 (AHCI and NVMe)	
Max Capacity Supported	128GB ¹	2TB ¹	2TB ¹	2TB ¹
Flash Memory Support	MLC 9 channels up to 400MT/s ONFI 2/3, Toggle 1/2	MLC, TLC 9 channels up to 400MT/s ONFI 2/3, Toggle 1/2		SLC, eMLC, MLC, TLC, 9 channels up to 400MT/s ONFI 2/3, Toggle 1/2
Sector Size Support	512 B			
Security	Dual AES-256 encryption TCG Opal v2.0, IEEE-1667, Windows eDrive (Optional) TCG Enterprise (Optional only with SF3759)			
Reliability	SHIELD Error Correction Full end-to-end CRC protection			
Data Protection	RAISE 1 + Fractional RAISE	RAISE 1 + Fractional RAISE RAISE 2	RAISE 1 + Fractional RAISE RAISE 2 + Auto-Reallocation	
Power Fail Protection	FW + partial		FW + partial + full	
Package	624-ball FCBGA - 17 x 17 mm, 0.65 mm pitch			
Compliance	RoHS, Halogen-Free, Green			

Note: These specifications are preliminary and subject to change.

¹ One gigabyte, or GB, equals one billion bytes and one terabyte, or TB, equals one trillion bytes when referring to product capacity.



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