

The Hyperstone S8 family of Flash Memory Controllers, together with provided application and Flash specific firmware, offers an easy-to-use turnkey platform for industrial, high endurance, robust Flash Memory cards or modules compatible to host systems with (e)SD or (e)MMC interfaces.

- Designed to satisfy industrial requirements
- **hyReliability™** Flash Management including superior wear leveling, read disturb management, and power fail management ensuring highest reliability and endurance
- Continuously updated Flash Memory chip support and long term availability
- Flexible ECC engine supporting all Flash Memory types
- Optimized 32-Bit RISC core and instruction set for Flash Memory handling
- High performance on-the-fly AES encryption engine
- Custom features can be implemented with simple firmware upgrades
- 16 GPIO for customer specific applications supporting SDIO 3.0, SPI, I²C, and ISO7816
- ASSP with minimal external active components
- Turnkey solution including firmware, manufacturing kit, test and development hardware, as well as reference schematics

Targeted Applications

- SecureDigital (SD) Cards
- microSD and Smart microSD
- eMMC
- Legacy MMC and SD cards
- Embedded Flash modules
- Multi-Chip-Package (MCP)
- Disk-on-board

Order Information

- S8-LAK07 --- LGA 52, 7.5x4.0x0.7mm
4 CEs, RoHS, -25 to +85 °C
- S8-RAP05 --- BGA 100
8 CEs, RoHS, -40 to +85 °C
- S8-0ABD0 --- Tested Die/Wafer

S8

Flash Memory Controller

Flash Memory Interface & Handling

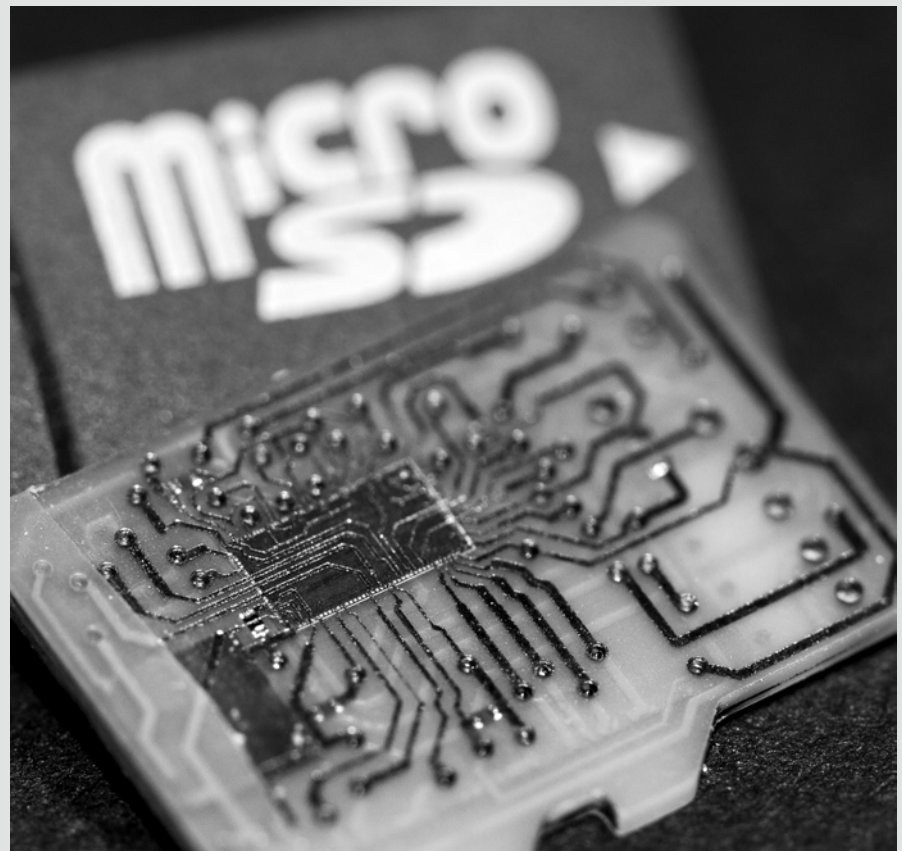
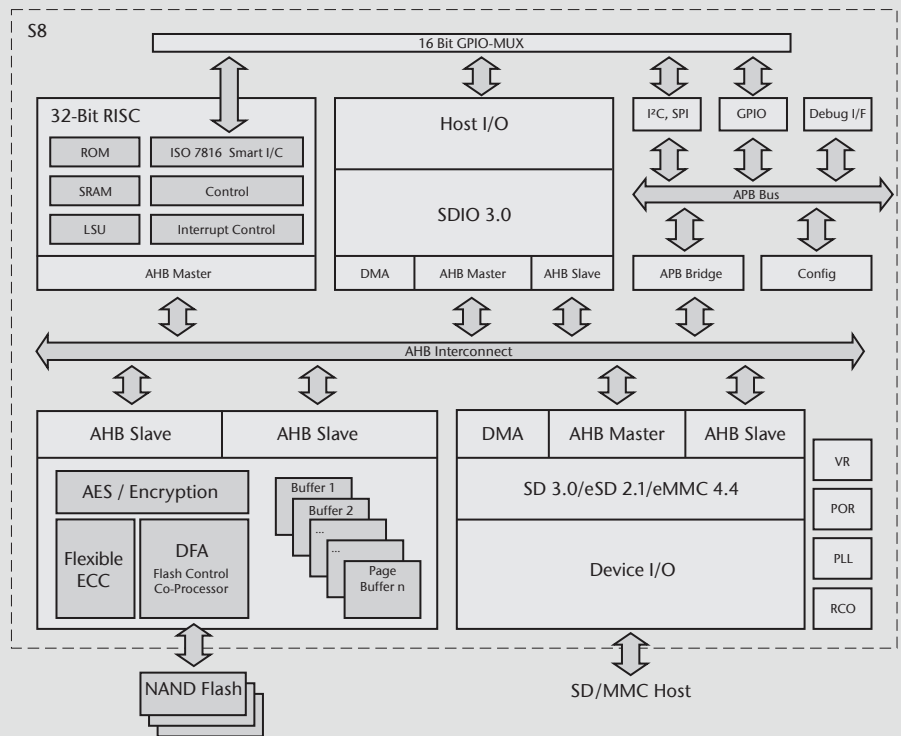
- **hyReliability™** Flash Memory Management optimizing reliability, power fail safety, endurance, data retention, and performance
- Management of sudden power fails
- Read Disturb Management and dynamic data refresh
- In-Field Firmware update without user data loss
- Firmware is stored redundantly for recovery and periodic refresh
- Flexible ECC engine supporting all available Flash with additional CRC for highest reliability
- Static and Global Wear leveling to maximize write endurance
- Support for all Flash technologies and page sizes up to 16KB
- Direct Flash Access (DFA) co-processor including page buffers and interleaving capability
- Synchronous DDR interface compliant with Toggle DDR and ONFI 2.1, compatible with all DDR Flash Memory devices
- Asynchronous SDR interface, ONFI 1.0 compliant, compatible with all legacy interface Flash
- Data transfer rate to Flash up to 200 MB/s
- Direct connection of up to 8 Flash Memory chip enables (CE)
- Flash Memory power down logic and Flash Memory write protect control
- On-chip voltage regulator for 1.8V Flash Memory I/O power
- Complete Flash Translation Layer (FTL) for random Flash data access including mapping of logical block addresses (LBA) to physical block addresses (PBA)
- Bad Block Management
- Interleaving, cache, and multi-plane programming
- Customized firmware, optimizations and feature implementations possible upon request

Controller & CPU

- High performance 32-Bit Hyperstone RISC microprocessor
- Large internal RAM provides firmware flexibility
- 16 GPIO pins for customer specific applications, multiplexed interface options include: 16 GPIO, SDIO 3.0, SPI, I²C, and ISO7816
- Unique ID for security applications
- High performance on-the-fly AES encryption engine 128 and 256-bit, ECB, CBC, & XTS modes
- Flexible clock frequency generation via internal oscillator/PLL
- Automatic power-down mode during wait periods, automatic sleep mode during host inactivity periods
- On-chip voltage regulator for 1.2V controller core power

Host Interface & Compliance

- Fully compliant to SD 3.0 (UHS-I), SD 2.0, and eSD 2.1
- CPRM and ASSD 2.0 or Mc-EX supported
- Fully compliant to eMMC 4.4.1, and MMC 4.2 specifications
- Optional support for eMMC 4.5 features (Power-Off Notification, Discard, and Sanitize)
- Host transfer rate of up to 104 MB/s in SD 3.0 SDR104 and eMMC 4.4 DDR modes
- Sequential read and write up to 90 MB/s using toggle mode or ONFI 2 SLC Flash
- Sequential read and write up to 60 and 25 MB/s respectively using toggle mode or ONFI 2 MLC Flash
- On-chip voltage regulator for 1.8V signaling voltage in SD 3.0 transfer modes.



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