

S9_S - Security - SD Flash Memory Controller

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- Security -

hyperston®

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The Hyperstone S9S family of flash memory controllers is a specialized security controller designed for industrial applications that demand greater flexibility and additional security features. Together with provided hyMap® firmware and our API which allows for customer firmware extensions, the S9S offers an easy-to-use turnkey solution for industrial, high endurance, robust flash memory drives or modules compatible to host systems up to the SD 7.1 interface.

- Designed to fully satisfy industrial requirements
- Built-in advanced security features (McEx 1.1, ASSD 3.0, DPS 1.01)
- 32-Bit core microprocessor with optimized instruction set and additional hardware accelerators for flash memory handling
- hyMap® customizable sub-page-based Flash Translation Layer (FTL) enables second to none random write performance, minimal write amplification and consequently the highest endurance without external DRAM
- FlashXE® eXtended Endurance read-channel tuned and optimized for each flash, advanced Error Correction Code algorithms and soft-decoding capability, read-retry, RAID and data recovery features to ensure the lowest possible read error rates
- Continuously updated flash memory support
- hyReliability™ flash management including superior wear leveling, read disturb management, dynamic data refresh, and power fail management ensuring the highest reliability
- Advanced protection against radiation and soft-errors including, SRAM Error Correction Code and low-alpha package
- Advanced security and encryption features
- Custom firmware extensions and feature development through firmware API
- Turnkey solution including firmware, manufacturing kit, test and development hardware, reference schematics, as well as health monitoring tools

Targeted Applications

- SecureDigital (SD) cards
- microSD cards
- Disk-on-Board solutions

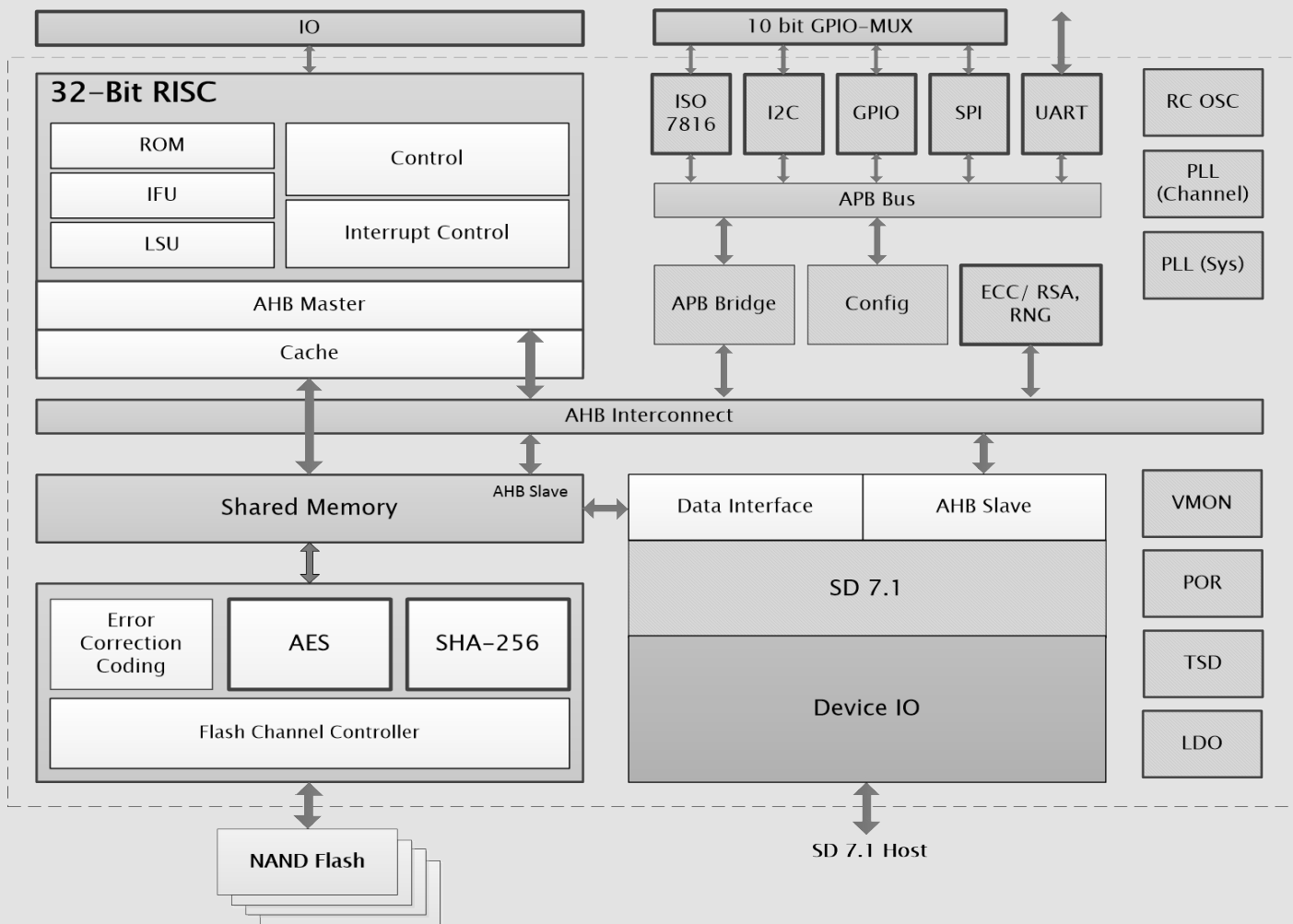
Performance

- Sequential read up to 90MB/s
- Sequential write up to 90MB/s
- Sustained 4K random write over 7.5MB/s

Order Information

- S9-LASK08 - (LGA 64, 7.5 x 4 x 0.7mm, 4CEs, RoHs, -40 to +85 °C)
- For die/wafer and customized microSD cards please contact our sales team.

S9 - Security Block Diagram



Controller & CPU

- High performance microprocessor core based on Hyperstone architecture
- Flexible clock frequency generation through internal oscillator and PLL
- 10 GPIO pins provide flexibility in the connection of extra logic
- Special GPIO transfer modes include ISO7816, I2C and SPI
- AES-128 and AES-256 support with CBC and XTS modes
- SHA-256 hashing engine and hardware RNG
- On-die temperature sensor
- Automatic power-down mode during wait periods for host data or flash memory operation completion, automatic sleep mode during host inactivity periods
- PKA supporting Elliptic Curve Cryptography (ECC) and RSA
- Supply voltage power-down detection for full power-down robustness
- On-chip voltage regulator for 1.1V processor core power supply

Host Interface & Compliance

- Compliant to the SD versions 3.01 to 7.1
- CPRM and ASSD 3.0 can be supported
- Supports DS, HS, SDR12, SDR25, SDR50, SDR104 and DDR50 transfer modes
- Host transfer rate of up to 104 MByte/s in SDR104 mode
- Support for the C2 encryption and decryption routines (CPRM)
- On-chip voltage regulator for 1.8V signaling voltage in UHS-I transfer modes

Flash Memory Interface

- Supports legacy asynchronous, Toggle mode and ONFI NAND
- Supports ONFI SDR, NV-DDR, NV-DDR2 and NV-DDR3
- Data transfer rate to flash memories up to 400 MByte/s
- Page buffers in flexible internal memory enable optimum flash channel performance
- Supports all control signals for the flash memory connection
- Supports up to 4 flash memory chip selects

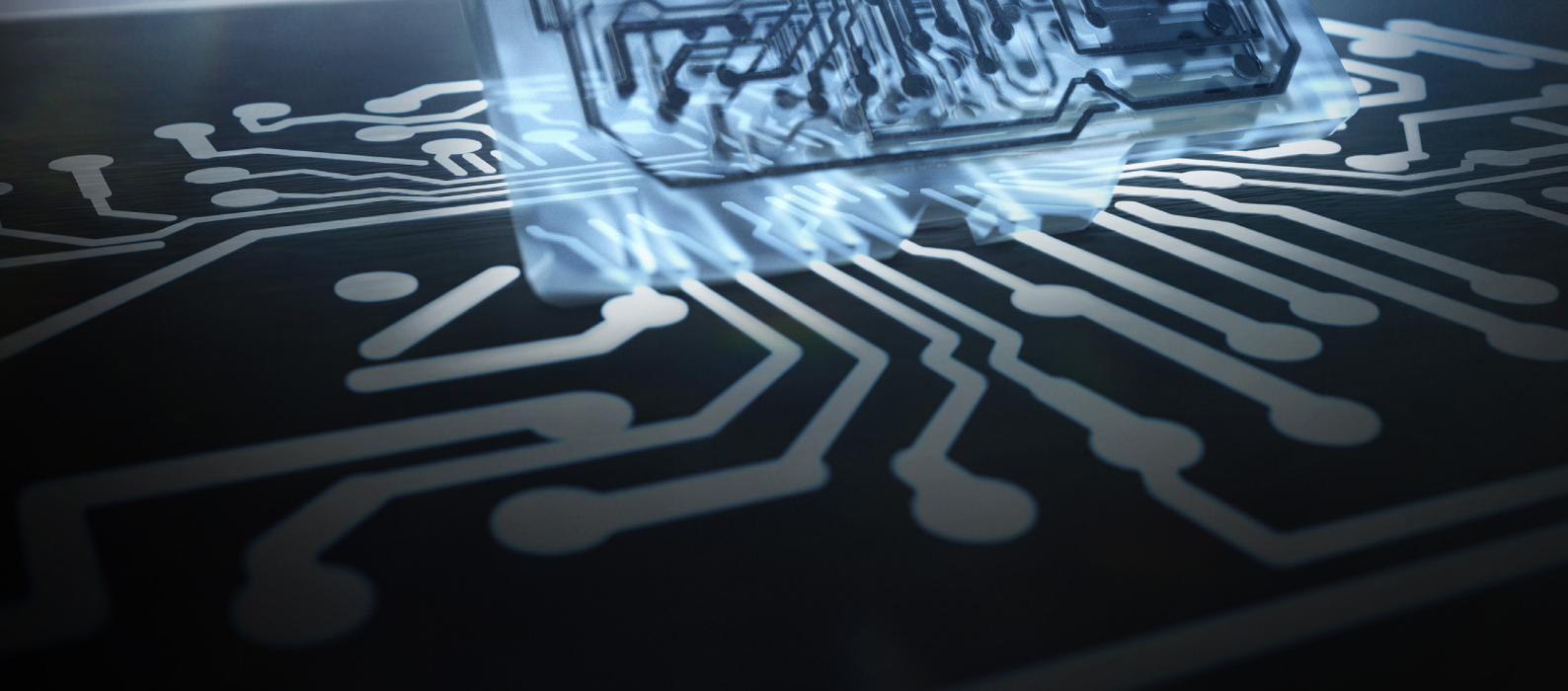
- Supports up to 16 Kbyte flash page size
- Firmware support for continuously updated available technologies including SLC, pSLC, 2D MLC, 3D MLC, pMLC, 3D TLC and next generation NAND flashes
- FlashXE® eXtended Endurance read channel optimized for each flash, advanced BCH and GCC ECC algorithms using 1KB to 4KB code words and soft information ECC decoding, read retry, RAID and data recovery features to ensure the lowest possible read error rates and maximum endurance
- Power down logic and flash memory write protect control
- Firmware storage in flash memory, loaded into internal memory by the boot ROM
- On-chip voltage regulator for 1.2V/1.8V flash memory I/O power supply

Flash Memory Management

- hyReliability™ flash management: superior wear leveling, read disturb management and power fail management
- hyMap® customizable sub-page based Flash Translation Layer (FTL)
- Flexible pre-format settings for SLC caching, over-provisioning, RAID protection and performance tuning
- Advanced thermal management features to maximize performance and data protection at extended temperatures
- Static, dynamic and global wear leveling
- Bad block management, intelligent garbage collection and support for interleaving, cache, and multi-plane programming
- Read disturb management and dynamic data refresh
- Best-in-class power fail management
- Firmware is stored redundantly for recovery and refresh and in-field firmware update without user data loss
- Secure erase, fast erase and secure trim
- Custom firmware extensions and feature development through firmware API including advanced security support and smartcard chip enablement

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