S9

hyperston®

S9 SD Flash Memory Controller

The Hyperstone S9 family of flash memory controllers together with provided firmware offers an easy-to-use turnkey solution for industrial, high endurance and robust flash memory cards or embedded storage solutions compatible to SD host systems up to SD 7.1 interface standard.

- Designed to fully satisfy industrial requirements
- 32-Bit microprocessor core 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 ECC 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 ECC and low-alpha package
- Turnkey solution including firmware, manufacturing kit, test and development hardware, reference schematics, as well as health monitoring tools

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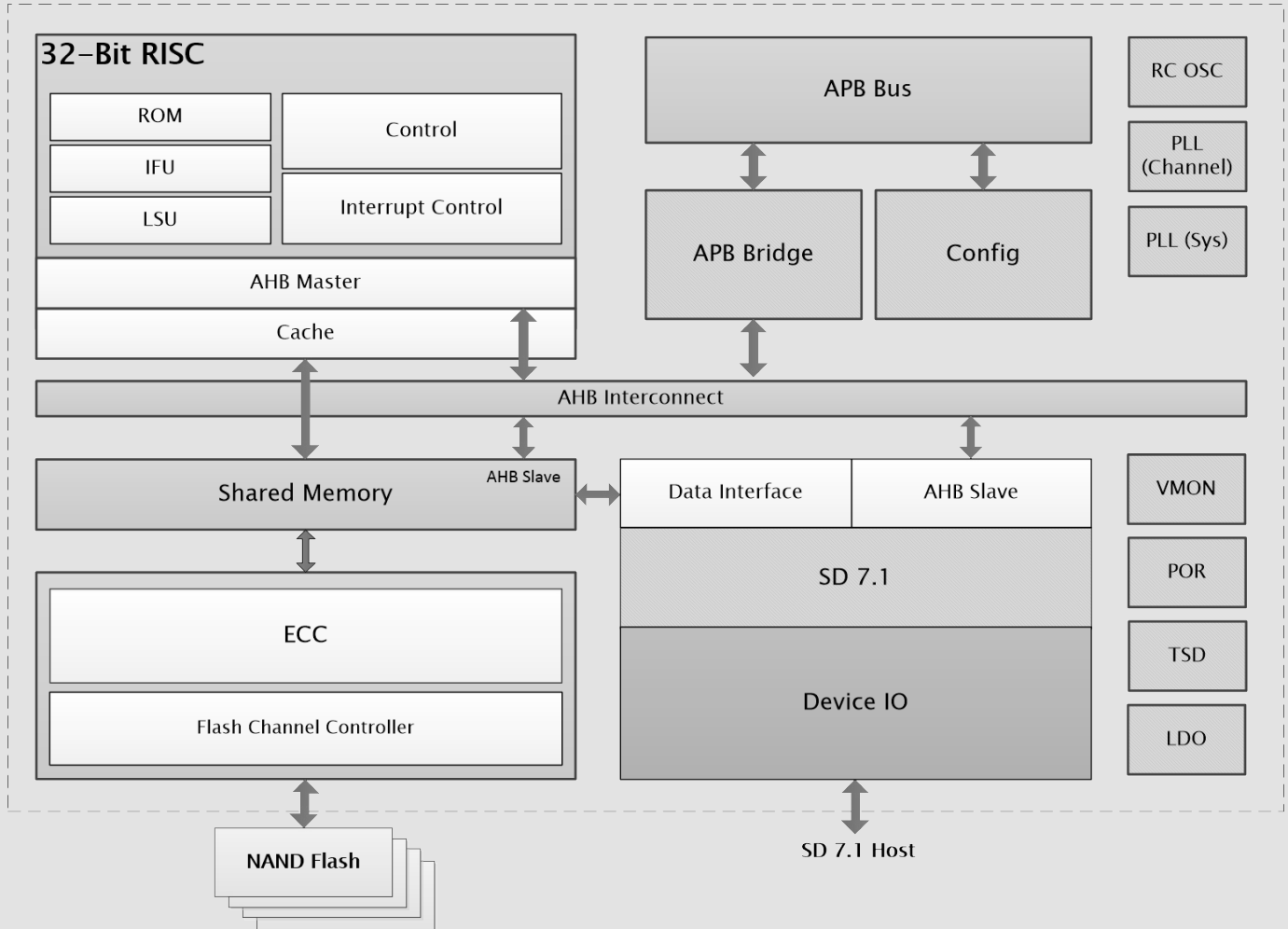- microSD cards
- Disk-on-Board solutions

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

Order Information
- S9-LAK08 (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.

Controller & CPU

- High performance microprocessor core based on the Hyperstone architecture
- Flexible clock frequency generation through internal oscillator and PLL
- 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
- 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 Physical Layer Specifications versions 3.01 to 7.1
- CPRM 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
- Hardware 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 transfer modes
- Data transfer rate to flash memories up to 400 MByte/s
- 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 for all available technologies including SLC, pSLC, MLC, pMLC, and 3D TLC as well as next generation NAND flashes
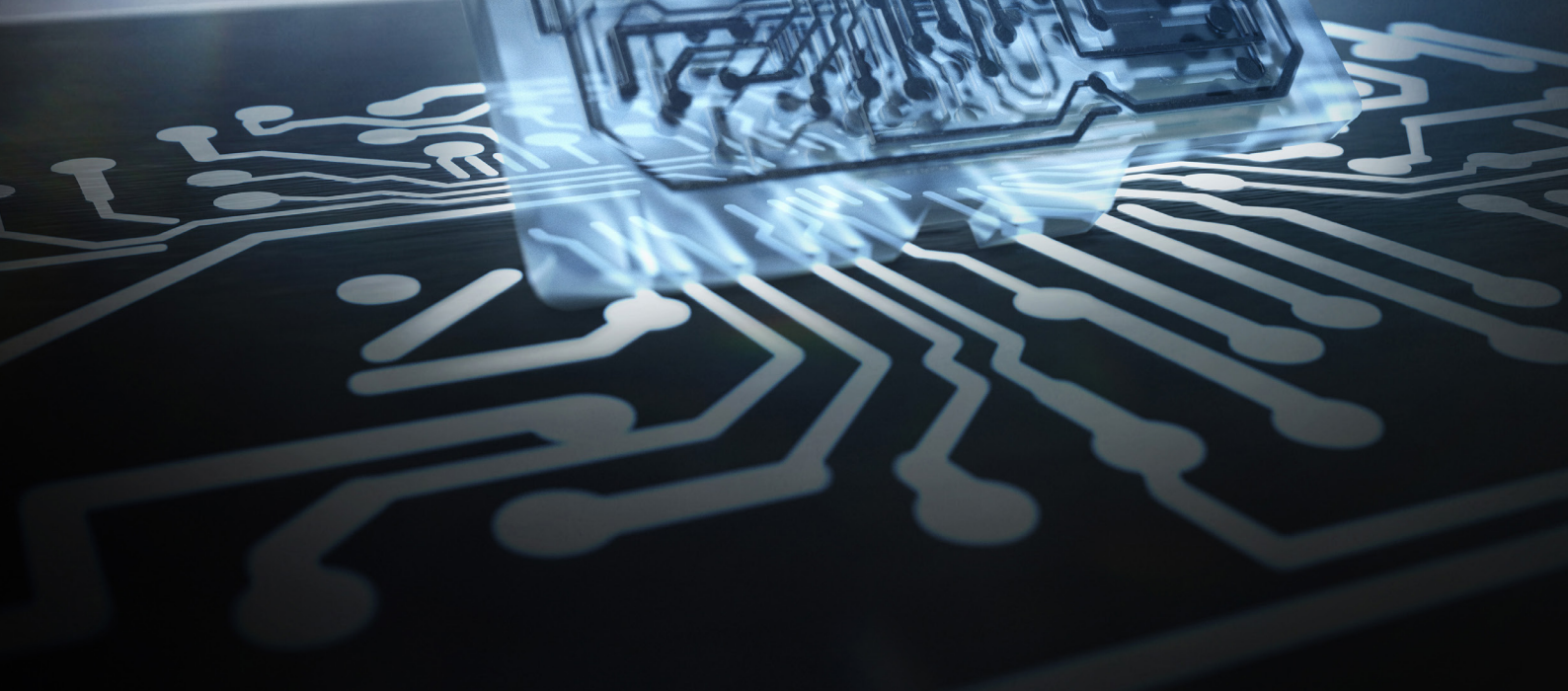
- FlashXE® eXtended Endurance read channel optimized for each flash, advanced ECC algorithms with soft-decoding, read retry, RAID and data recovery features to ensure the lowest possible read error rates and maximum endurance
- Flash memory power down logic and flash memory write protect control
- Firmware 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 to ensure the highest reliability and endurance
- hyMap® customizable sub-page-based Flash Translation Layer (FTL) enables second to none random write performance, minimal write amplification, and consequently the highest endurance for usage profiles with emphasis on random access (e.g. JEDEC Enterprise workload)
- Flexible settings for SLC caching, over-provisioning, RAID protection and performance tuning including optimization for fast boot-up times
- 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

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