

S6 Flash Memory Controller

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S6

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FLASH Controller



S6

Flash Memory Controller

The Hyperstone S6 Flash Memory Controller together with provided application and flash specific firmware offers an easy-to-use turnkey platform for high reliability and performance flash solutions compliant to MMC4.2 and SD 2.0 interfaces.

- Patented wear leveling together with ECC ensuring highest reliability and endurance
- Optimized 32-Bit RISC core, instruction set, and firmware for flash handling
- Dual channel Direct Flash Access unit (DFA) for interleaved operations
- Large sector buffers for highest MLC performance
- Most power efficient design together with power saving features
- Smart and custom features possible by simple firmware upgrades
- Additional UART to connect external devices such as security controllers
- ASSP with no need for external voltage regulators, detectors or diodes
- Exceptional power loss protection also with MLC flash through optimized firmware handling
- Turnkey solution including firmware, manufacturing kit, test and development hardware, and reference schematics for SD Card or MMC

Targeted Applications

- SecureDigital™ – SD Cards for industrial and consumer applications
- microSD cards for consumer and mobile applications
- MultiMediaCards™ (MMC)
- eMMC embedded Flash
- Multi-Chip-Packages (MCP)
- SmartCards

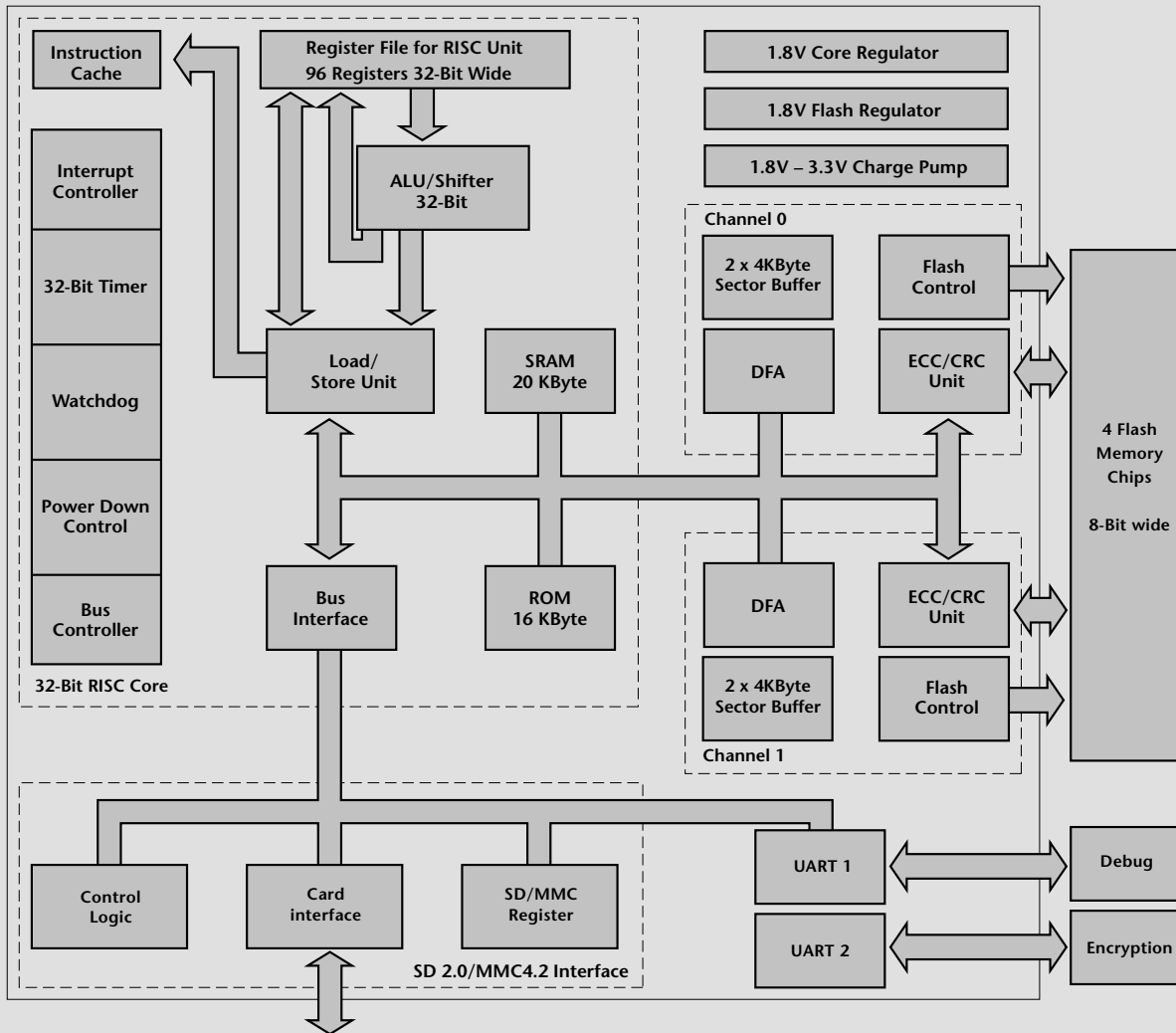
Order Information

- S6-LAK05 --- LGA 54, RoHS, -25 to +85 °C
- S6-0ABD0 --- KGD / Wafer

Compliance & Performance

- Fully compliant to SD 1.01, 1.10, and 2.0 standards
- Fully compliant to MMC 3.31, 4.1, and 4.2 standards
- 2 times 4KB large page buffers per channel achieving optimal performance for SLC and MLC flash chips with 4KB page size
- Sustained read and write up to 24 and 23 MB/s respectively using SLC in SD mode
- Sustained read and write up to 22 and 9 MB/s respectively using MLC in SD mode
- Sustained read and write up to 42 and 25 MB/s respectively using SLC in MMC mode
- Sustained read and write up to 42 and 9 MB/s respectively using MLC in MMC mode
- Data transfer rate to flash-memory of up to 40MB/s per channel

S6 Block Diagram



Controller & CPU

- High performance 32-Bit Hyperstone RISC microprocessor
- 10 to 60 MHz clock frequency using adjustable internal oscillator
- 16 KB internal Boot ROM
- 20 KB internal RAM
- Card operation current of less than 25 mA
- Automatic power-down mode during wait periods, power saving mode incl. automatic wake-up and sleep mode with $I_{cc} < 120 \mu\text{A}$
- Dual supply voltage 1.8V and 3.3V
- On-chip voltage regulator for 1.8V and charge pump for 3.0V flash memory power supply
- On-chip voltage regulator for 1.8V processor core supply
- Internal voltage detector
- Optimized die size, shape and pad layout for multi die packages, and die stacking

Host Interface & Compliance

- Fully compliant to the SD 1.01, 1.10, and 2.0 (SDHC) standards
- Fully compliant to MMC 3.31, 4.1, and 4.2 standards
- Additional General Purpose UART and optional ISO 7816-3 interface

Flash Memory Interface & Handling

- Dual channel direct flash memory access (DFA)
- Supporting all control signal for NAND type flash memory connection
- Supporting direct connection of up to 4 flash memory chip enables (CE) – 2 per channel
- 2 times 4KB large page buffers per channel achieving optimal performance for SLC and MLC flash chips with 4KB page size
- Flash memory power down logic and flash memory write protect control
- Error Correcting Code (ECC) capable of correcting 4 symbols in a 512 Bytes sector with additional CRC
- Supporting all current and future vendor flashes and technologies (NAND, AG-AND, MLC/SLC, NROM, ...) by firmware upgrades
- Firmware storage in flash memory
- Firmware is loaded into internal memory by the boot ROM
- Flash management including mapping of logical block addresses (LBA) to corresponding physical block addresses (PBA)
- Bad Block Management
- Wear leveling
- Power Loss Protection
- Interleaving, cache, and multi-plane programming ... and many more



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