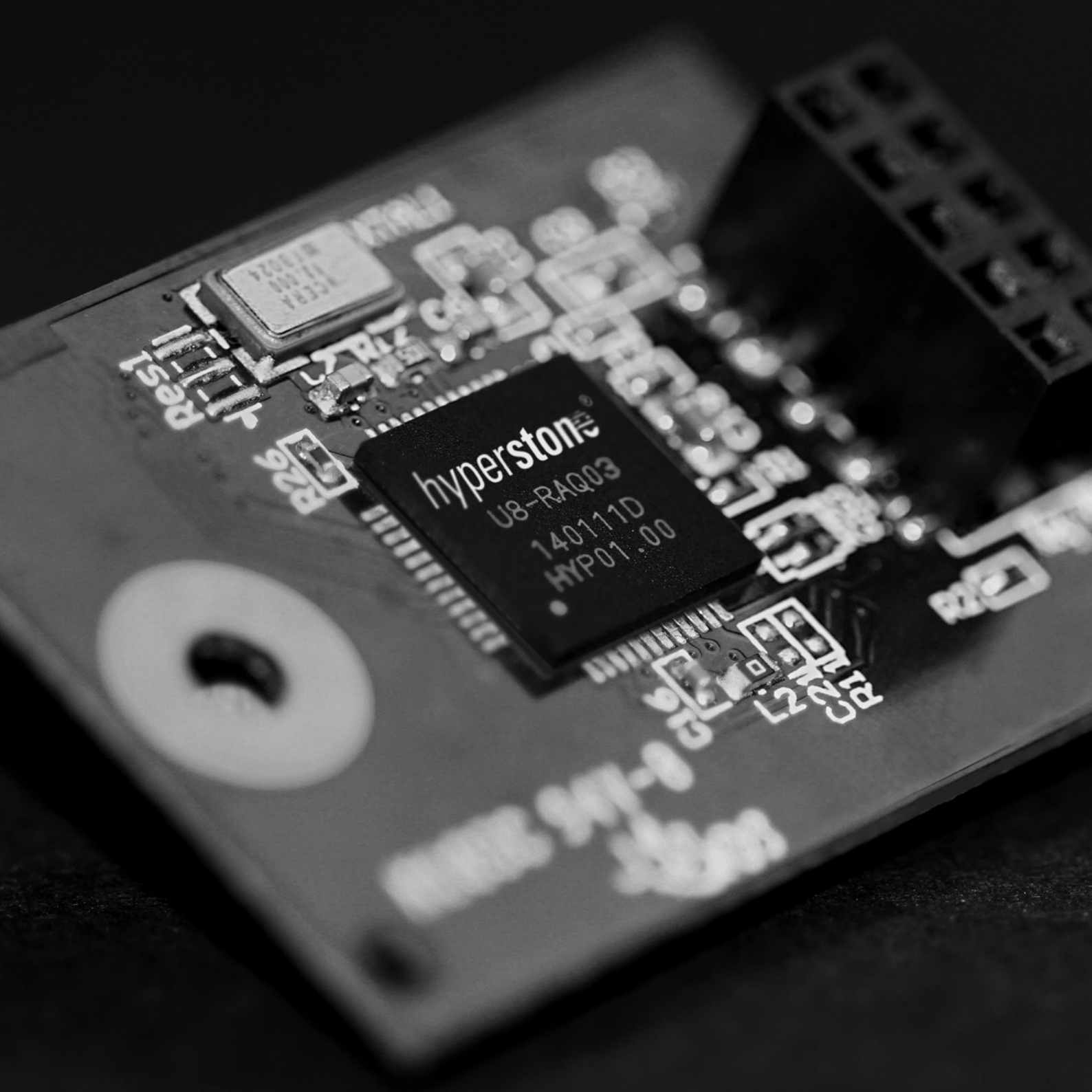
U8 Flash Memory Controller

U8

hyperstone®


hyperstone
U8-RAQ03
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U8

Flash Memory Controller

The Hyperstone U8 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 USB 2.0 interface.

- 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 96-Bit/1K BCH ECC engine supporting all Flash Memory requirements
- Optimized 32-Bit RISC core, instruction set for Flash Memory handling
- High performance on-the-fly AES 128 and 256 encryption engine, CBC, XTS modes, Hardware RNG
- Custom features can be implemented with simple firmware upgrades
- 16 GPIO for customer specific applications supporting SPI, I^2C, and ISO7816
- Turnkey solution including firmware, manufacturing kit, test and development hardware, as well as reference schematics

Targeted Applications

- Industrial USB Flash Drive
- eUSB, embedded USB module
- Ultra durable Flash Drive
- Security Flash Drive
- Multi-Chip-Package (MCP)
- Disk-on-Board

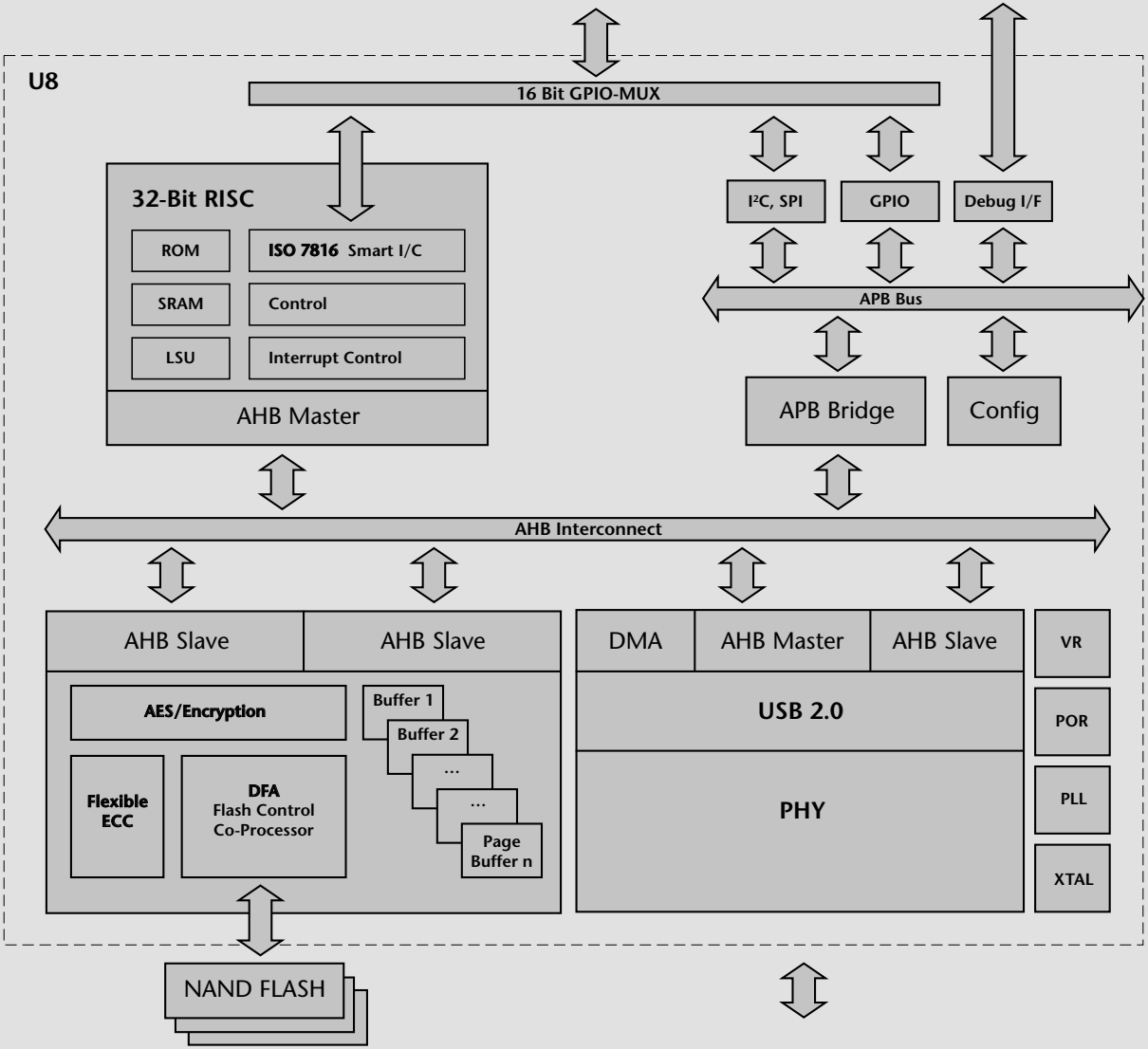
Compliance & Performance

- Fully compliant to USB 2.0 specifications
- USB mass storage device class (MSC)
- High-Speed, Full-Speed,
- Secure Erase support
- S.M.A.R.T feature support
- Host transfer rate of up to 480 MBit/s
- Sequential read and write up to 35 MB/s

Order Information

- U8-RAQ03 --- QFN 76, 9 x 9mm, 8 CEs, RoHS, -40 to +85 °C
- U8-0ABD0 --- Tested Die / Wafer

U8 Block Diagram



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, SPI, I²C, 4x CE and ISO7816
- Unique ID for security applications
- AES encryption engine 128 and 256-Bit, CBC, and XTS modes supported, high performance on-the-fly encryption/decryption
- Hardware RNG
- Flexible clock frequency generation through internal PLL combined with clock multi divider.
- Automatic power-down mode during wait periods for host data or Flash Memory operation completion, automatic sleep mode during host inactivity periods
- On-chip voltage regulator for 3.3 V to 1.2 V controller core power supply
- Current consumption in suspend mode: 0.7 mA (typical)

Host Interface & Compliance

- Fully compliant to USB 2.0 specifications
- USB mass storage device class (MSC)
- USB human interface device class (HID) support is possible
- 4 configurable endpoints
- Hi-speed, Full speed, Low speed possible
- Bulk, isochronous, and interrupt transfer modes
- S.M.A.R.T., Sanitize, and Secure Erase support using ATA pass through command
- Configurable Early-Acknowledge to avoid any data loss during power fail.

Flash Memory Interface

- Direct Flash Memory Access (DFA) co-processor including page buffers and interleaving capability
- Synchronous DDR interface compliant with Toggle DDR and ONFI 2.3, compatible with all DDR Flash Memory devices
- Asynchronous SDR interface, ONFI 1.0 compliant, compatible with all legacy interface Flashes
- Data transfer rate to Flash up to 133 MB/s
- Flexible 96-Bit/1K BCH ECC engine
- CRC for additional reliability
- Direct connection of up to 8 Flash Memory chip enables (CE)
- Flash Memory power down logic and write protect control
- Supporting all Flash technologies and all page sizes up to 16 KB
- On-chip voltage regulator for 1.8 V Flash Memory I/O power

Flash Memory Management

- hyReliability™ Flash Memory Management optimizing reliability, power fail safety, endurance, data retention and performance
- 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
- Static and Global Wear leveling to maximize write endurance
- Inherent on-the-fly garbage collection
- Read Disturb Management, dynamic data refresh to maximize data retention, and data refresh subject to read disturbance
- Management of sudden power-fails
- Interleaving, cache, and multi-plane programming
- Firmware is stored redundantly for recovery and refresh
- In-Field Firmware update without user data loss
- Customized firmware, optimizations and feature implementations possible upon request.

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