

SATA Disk Module (SLC) Datasheet

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Revision History

| Rev. | Date | History |
|------|------------|---|
| 0.1 | 2010/7/23 | 1. 1 st draft |
| 0.2 | 2010/8/24 | 1. Added partnumber |
| 0.3 | 2010/11/17 | 1. Added power cable specification 2. Revised mechanical drawing in "Physical Dimension" section |
| 0.4 | 2010/12/15 | 1. Update partnumber table for standard and hook types |
| | | |

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1. Overview

Advantech SQFlash SATA Disk Module (SDM) supports SATA II standard (3.0 Gb/s) interface with good performance and thus performs faster data transfer rate. Sustain read can reach up to 100MB per second (max), and sustain write reach up to 50MB per second (max). Moreover, Advantech SQFlash SDM is designed as the smallest form factor size that could enhance compatibility with various design applications. Advantech SQFlash SDM is within compact design. Particularly the 7th pin of standard SATA 7pin connector can optionally be the built-in power VCC pin. In other words, it could be connected directly to the SATA on-board socket on customers' system without additional power cable. Another advanced design of Advantech SQFlash SDM is the connector with latch and thus such innovative mechanical design could improve data transfer reliability while device operating. With the locked connector design, it could enhance anti-vibration mechanism of Advantech SQFlash SDM.

Advantech SQFlash SDM is also suitable in industrial field. It effectively reduces the booting time of operation system and the power consumption is less than hard disk drive (HDD). Advantech SQFlash SDM can work under harsh environment. And complies with ATA protocol, no additional drives are required, and the SSD can be configured as a boot device or data storage device.

2. Features

■ Standard SATA interface

- Support SATA 1.5 Gbps and 3.0 Gbps interface
- SATA Revision 2.6 compliant
- Power management supported

■ Compact Design

- Build-in VCC Power pin (pin 7)

■ Capacities

- SLC type : 2GB , 4GB , 8GB , 16GB , 32GB

■ Transfer Mode

- PIO Mode: 0~4
- Multiword DMA: 0~2
- Ultra DMA: 0~6

■ Performance

- SLC type
 - Sustain Read Speed up to 100 MB/s
 - Sustain Write Speed up to 50 MB/s

■ Access time : 0.7 ms

■ Error Correction Function

- Built-in ECC corrects up to 8-bit per 512-Byte

■ Temperature Ranges

- Commercial Temperature
 - 0°C to 70°C for operating
 - -55°C to 95°C for storage
- Industrial Temperature
 - -40°C to 85°C for operating
 - -55°C to 95°C for storage

■ Mechanical Specification

- Shock : 1,500G / 0.5ms
- Vibration : 20G / 7~2,000Hz

■ Humidity

- Relative Humidity : 10-95%, non-condensing

■ Data Retention

- 10 years

■ Acquired RoHS 、 CE 、 FCC Certificate

■ Acoustic : 0 dB

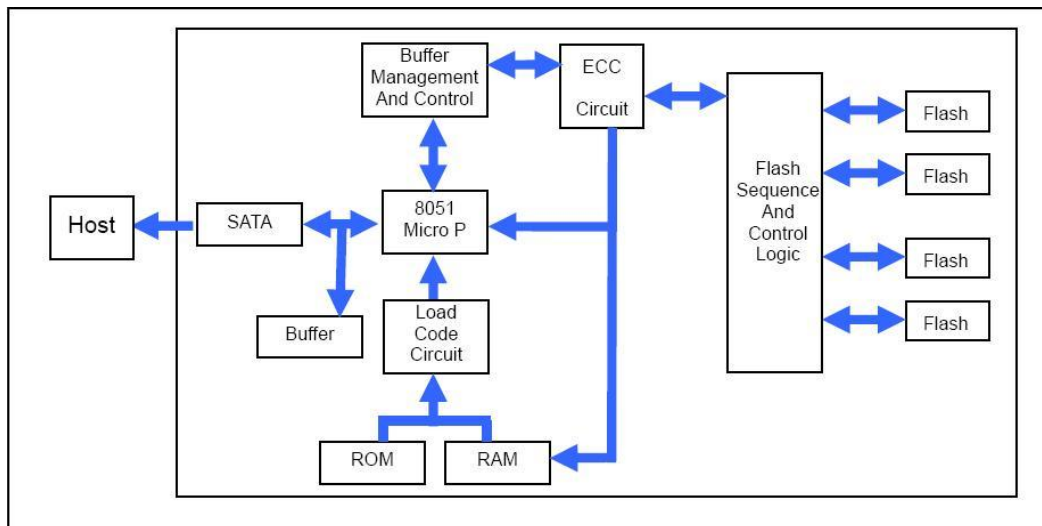
■ Dimension : 39.4 mm (L) x 25 mm (W) x 6.5 mm (H)

■ Weight : 10g ± 2g

3. Theory of operation

■ Overview

Below Figure shows the operation of Advantech SQFlash SDM from the system level, including the major hardware blocks. As the diagram shown, SATA II controller communicates with SATA II host interface directly. Also SATA II controller supports one flash IC.



■ SATA II Controller

The SATA II controller is 3.0Gbps, and supports hot-plug. This SATA II controller support four flash IC and communicates with host interface, this SATA II controller can support the flash ICs both for 2kbyte and 4kbyte per page.

■ Error Detection and Correction

Highly sophisticated Error Correction Code algorithms are implemented. The ECC unit consists of the Parity Unit (parity-byte generation) and the Syndrome Unit (syndrome-byte computation). This unit implements an algorithm that can correct 8 bits per 512 bytes in an ECC block. Code-byte generation during write operations, as well as error detection during read operation, is implemented on the fly without any speed penalties.

■ Mean Time between Failures (MTBF)

Below table summarizes the MTBF prediction results for various Advantech SQFlash SDM configurations. The analysis is performed using a RAM Commander™ failure rate prediction.

- **Failure Rate:** The total number of failures within an item population, divided by the total number of life units expended by that population, during a particular measurement interval under stated condition.
- **Mean Time between Failures (MTBF):** A basic measure of reliability for repairable items: The mean number of life units during which all parts of the item perform within their specified limits, during a particular measurement interval under stated conditions.

| Condition | MTBF (Hours) |
|---------------------------|--------------|
| Telcordia SR-332 GB, 25°C | > 3,000,000 |

■ Wear Leveling

Flash memory can be erased within a limited number of times. This number is called the erase cycle limit or write endurance limit and is defined by the flash array vendor. The erase cycle limit applies to each individual erase block in the flash device.

Advantech SQFlash SDM uses a static wear-leveling algorithm to ensure that consecutive writes of a specific sector are not written physically to the same page and block in the flash. This spreads flash media usage evenly across all pages, thereby extending flash lifetime.

■ Bad Blocks Management

Bad Blocks are blocks that contain one or more invalid bits whose reliability are not guaranteed. The Bad Blocks may be presented while the Advantech SQFlash SDM is shipped, or may develop during the life time of the SQFlash SDM. The Bad Blocks will not exceed more than 6.25% of the total device volume. When the Bad Blocks is detected, it will be flagged, and not be used anymore. The SQFlash SDM implements Bad Blocks management, Bad Block replacement, Error Correct Code to avoid data error occurred. The functions will be enabled automatically to transfer data from Bad Blocks to spare blocks, and correct error bit.

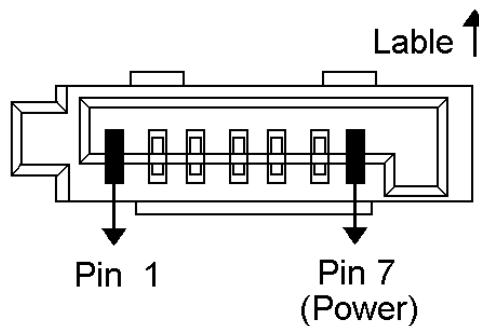
4. Pin Assignment and Description

4.1 SDM Interface Pin Assignments (Signal and Power Segment)

A Serial ATA device may be either directly connected to a host or connected to a host through a cable. For connection via cable, the cable should be no longer than 1meter.

The SATA II Interface has a separate connector for the power supply. Please refer to the pin description for further details.

| Pin # | Signal | Description |
|-------|---------------|----------------------------|
| 1 | GND | Shielding |
| 2 | A+ | Differential signal pair A |
| 3 | A- | Differential signal pair A |
| 4 | GND | Shielding |
| 5 | B- | Differential signal pair B |
| 6 | B+ | Differential signal pair B |
| 7 | GND/VCC (+5V) | Shielding/ Power |



4.2 SDM Write Protect Function

When write protect switch is switched-on, write protect function would be enabled, and ATA write command would be aborted, which can prevent the disk from modification and deletion. Write-protected data in disk could only be read, that is, users could not write to it, edit it, append data to it, or delete it. Advantech SQFlash SDM is applied to real time detect function, it detects WP pin signal. Once write prohibition state detection signal pin is pulled high, write/erase operation is prohibited. ATA write command would be aborted, that is, write protect function would be enabled. On the contrary, write protect function would be disabled, when the function is switched-off. The SDM write protect switch on and off direction is show as the below figure.

5. Identify Device Data

The Identify Device Data enables Host to receive parameter information from the device. The parameter words in the buffer have the arrangement and meanings defined in below table. All reserve bits or words are zero

| Word | Description | | Value |
|-------|--|--|---------------------|
| 0 | General configuration bit-significant information: | | 0040h |
| | 15 | 0 = ATA device | |
| | 14-8 | Retired | |
| | 7 | 1 = removable media device | |
| | 6 | Obsolete | |
| | 5-3 | Retired | |
| | 2 | Response incomplete | |
| | 1 | Retired | |
| | 0 | Reserved | |
| 1 | Obsolete | | XXXXh |
| 2 | Specific configuration | | C837h |
| 3 | Obsolete | | 00XXh |
| 4-5 | Retired | | 0000h |
| 6 | Obsolete | | XXXXh |
| 7-8 | Reserved for assignment by the CompactFlash™ Association | | 0000h |
| 9 | Retired | | 0000h |
| 10-19 | Serial number (20 ASCII characters) | | 20 ASCII characters |
| 20-21 | Retired | | 0000h |
| 22 | Obsolete | | 0000h |
| 23-26 | Firmware revision (8 ASCII characters) | | 8 ASCII characters |
| 27-46 | Model number (40 ASCII characters) | | 40 ASCII characters |
| 47 | 15-8 7-0 | 80h 00h = Reserved 01h-FFh = Maximum number of sectors that shall be transferred per interrupt on READ/WRITE MULTIPLE commands | 8001h |
| 48 | Reserved | | 0000h |
| 49 | Capabilities | | 0F00h |
| | 15-14 | Reserved for the IDENTIFY PACKET DEVICE command. | |
| | 13 | 1 = Standby timer values as specified in this standard are supported 0 = Standby timer values shall be managed by the device | |
| | 12 | Reserved for the IDENTIFY PACKET DEVICE command. | |
| | 11 | 1 = IORDY supported 0 = IORDY may be supported | |
| | 10 | 1 = IORDY may be disabled | |
| | 9 | 1 = LBA supported | |
| | 8 | 1 = DMA supported. | |
| 7-0 | Retired | | |
| 50 | Capabilities | | 4001h |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | |
|-------|--|--|----------------|
| | 15 | Shell be cleared to zero | |
| | 14: | Shall be set to one | |
| | 13-2 | Reserved | |
| | 1 | Obsolete | |
| | 0 | Shall be set to one to indicate a device specific Standby timer value minimum. | |
| 51 | Obsolete | | 0000h |
| 52 | Obsolete | | 0000h |
| 53 | 15-3 | Reserved | 0007h |
| | 2 | 1 = the fields reported in word 88 are valid 0 = the fields reported in word 88 are not valid | |
| | 1 | 1 = the fields reported in words (70:64) are valid 0 = the fields reported in words (70:64) are not valid | |
| | 0 | Obsolete | |
| 54 | Number of current logical cylinders | | XXXXh |
| 55 | Number of current logical heads | | XXXXh |
| 56 | Number of current logical sectors per logical track | | XXXXh |
| 57-58 | Current capacity in sectors | | XXXXh |
| 59 | 15-9 | Reserved | 01XXh |
| | 8 | 1 = Multiple sector setting is valid | |
| | 7-0 | xxh = Current setting for number of sectors that shall be transferred per interrupt on R/W Multiple command | |
| 60-61 | Total number of user addressable sectors | | XXXXXXXX Xh |
| 62 | Obsolete | | 0000h |
| 63 | 15-11 | Reserved | 0X07h |
| | 10 | 1 = Multiword DMA mode 2 is selected 0 = Multiword DMA mode 2 is not selected | |
| | 9 | 1 = Multiword DMA mode 1 is selected 0 = Multiword DMA mode 1 is not selected | |
| | 8 | 1 = Multiword DMA mode 0 is selected 0 = Multiword DMA mode 0 is not selected | |
| | 7-3 | Reserved | |
| | 2 | 1 = Multiword DMA mode 2 and below are supported | |
| | 1 | 1 = Multiword DMA mode 1 and below are supported | |
| | 0 | 1 = Multiword DMA mode 0 is supported | |
| 64 | 15-8 | Reserved | 0003h |
| | 7-0 | PIO modes supported | |
| 65 | Minimum Multiword DMA transfer cycle time per word | | 0078h |
| | 15-0 | Cycle time in nanoseconds | |
| 66 | Manufacturer's recommended Multiword DMA transfer cycle time | | 0078h |
| | 15-0 | Cycle time in nanoseconds | |
| 67 | Minimum PIO transfer cycle time without flow control | | 0078h |
| | 15-0 | Cycle time in nanoseconds | |
| 68 | Minimum PIO transfer cycle time with IORDY flow control | | 0078h |
| | 15-0 | Cycle time in nanoseconds | |
| 69-70 | Reserved (for future command overlap and queuing) | | 0000h |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | |
|-------|---|--|-------|
| 71-74 | Reserved for the IDENTIFY PACKET DEVICE command. | | 0000h |
| 75 | Queue depth | | 0000h |
| | 15-5 | Reserved | |
| | 4-0 | Maximum queue depth – 1 | |
| 76 | Serial ATA capabilities | | 0006h |
| | 15-13 | Reserved | |
| | 12 | Supports Native Command Queuing priority information | |
| | 11 | Supports Unload while NCQ commands outstanding | |
| | 10 | Supports Phy event counters | |
| | 9 | Supports receipt of host-initiated interface power management requests | |
| | 8 | Supports Native Command Queuing | |
| | 7-3 | Reserved for future Serial ATA signaling speed grades | |
| | 2 | 1 = Supports Serial ATA Gen2 signaling speed (3.0 Gbps) | |
| | 1 | 1 = Supports Serial ATA Gen1 signaling speed (1.5 Gbps) | |
| | 0 | Shall be cleared to zero | |
| 77 | Reserved | | 0000h |
| 78 | Serial ATA features supported | | 0048h |
| | 15-7 | Reserved | |
| | 6 | 1 = Supports software settings preservation | |
| | 5 | Reserved | |
| | 4 | 1 = Supports in-order data delivery | |
| | 3 | 1 = Device supports initiating interface power management | |
| | 2 | 1 = Supports DMA Setup Auto-Activate optimization | |
| | 1 | 1 = Supports non-zero buffer offsets in DMA Setup FIS | |
| 0 | Shall be cleared to zero | | |
| 79 | Serial ATA features enabled | | 0040h |
| | 15-7 | Reserved | |
| | 6 | 1 = Software settings preservation enabled | |
| | 5 | Reserved | |
| | 4 | 1 = In-order data delivery enabled | |
| | 3 | 1 = Device initiating interface power management enabled | |
| | 2 | 1 = DMA Setup Auto-Activate optimization enabled | |
| | 1 | 1 = Non-zero buffer offsets in DMA Setup FIS enabled | |
| 0 | Shall be cleared to zero | | |
| 80 | Major version number 0000h or FFFFh = device does not report version | | 00FCh |
| | 15 | Reserved | |
| | 14 | Reserved for ATA/ATAPI-14 | |
| | 13 | Reserved for ATA/ATAPI-13 | |
| | 12 | Reserved for ATA/ATAPI-12 | |
| | 11 | Reserved for ATA/ATAPI-11 | |
| | 10 | Reserved for ATA/ATAPI-10 | |
| | 9 | Reserved for ATA/ATAPI-9 | |
| | 8 | Reserved for ATA/ATAPI-8 | |

| | | | |
|----|---|--|-------|
| | 7 | 1 = supports ATA/ATAPI-7 | |
| | 6 | 1 = supports ATA/ATAPI-6 | |
| | 5 | 1 = supports ATA/ATAPI-5 | |
| | 4 | 1 = supports ATA/ATAPI-4 | |
| | 3 | Obsolete | |
| | 2 | Obsolete | |
| | 1 | Obsolete | |
| | 0 | Reserved | |
| 81 | Minor version number 0000h or FFFFh = device does not report version | | 0021h |
| 82 | Command set supported. | | 706Bh |
| | 15 | Obsolete | |
| | 14 | 1 = NOP command supported | |
| | 13 | 1 = READ BUFFER command supported | |
| | 12 | 1 = WRITE BUFFER command supported | |
| | 11 | Obsolete | |
| | 10 | 1 = Host Protected Area feature set supported | |
| | 9 | 1 = DEVICE RESET command supported | |
| | 8 | 1 = SERVICE interrupt supported | |
| | 7 | 1 = release interrupt supported | |
| | 6 | 1 = look-ahead supported | |
| | 5 | 1 = write cache supported | |
| | 4 | Shall be cleared to zero to indicate that the PACKET Command feature set is not supported. | |
| | 3 | 1 = mandatory Power Management feature set supported | |
| | 2 | 1 = Removable Media feature set supported | |
| 1 | 1 = Security Mode feature set supported | | |
| 0 | 1 = SMART feature set supported | | |
| 83 | Command sets supported. | | 7401h |
| | 15 | Shall be cleared to zero | |
| | 14 | Shall be set to one | |
| | 13 | 1 = FLUSH CACHE EXT command supported | |
| | 12 | 1 = mandatory FLUSH CACHE command supported | |
| | 11 | 1 = Device Configuration Overlay feature set supported | |
| | 10 | 1 = 48-bit Address feature set supported | |
| | 9 | 1 = Automatic Acoustic Management feature set supported | |
| | 8 | 1 = SET MAX security extension supported | |
| | 7 | See Address Offset Reserved Area Boot, INCITS TR27:2001 | |
| | 6 | 1 = SET FEATURES subcommand required to spinup after power-up | |
| | 5 | 1 = Power-Up In Standby feature set supported | |
| | 4 | 1 = Removable Media Status Notification feature set supported | |
| | 3 | 1 = Advanced Power Management feature set supported | |
| | 2 | 1 = CFA feature set supported | |
| 1 | 1 = READ/WRITE DMA QUEUED supported | | |
| 0 | 1 = DOWNLOAD MICROCODE command supported | | |
| 84 | Command set/feature supported extension | | 4040h |
| | 15 | Shall be cleared to zero | |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | | |
|----|---|--|-------|---|
| | 14 | Shall be set to one | | |
| | 13 | 1 = IDLE IMMEDIATE with UNLOAD FEATURE supported | | |
| | 12 | Reserved for technical report | | |
| | 11 | Reserved for technical report | | |
| | 10 | 1 = URG bit supported for WRITE STREAM DMA EXT and WRITE STREAM EXT | | |
| | 9 | 1 = URG bit supported for READ STREAM DMA EXT and READ STREAM EXT | | |
| | 8 | 1 = 64-bit World wide name supported | | |
| | 7 | 1 = WRITE DMA QUEUED FUA EXT command supported | | |
| | 6 | 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported | | |
| | 5 | 1 = General Purpose Logging feature set supported | | |
| | 4 | 1 = Streaming feature set supported | | |
| | 3 | 1 = Media Card Pass Through Command feature set supported | | |
| | 2 | 1 = Media serial number supported | | |
| | 1 | 1 = SMART self-test supported | | |
| | 0 | 1 = SMART error logging supported | | |
| 85 | Command and feature sets supported or enabled | | | |
| | 15 | Obsolete | | 0 |
| | 14 | 1 = NOP command enabled | | 1 |
| | 13 | 1 = READ BUFFER command enabled | | 1 |
| | 12 | 1 = WRITE BUFFER command enabled | | 1 |
| | 11 | Obsolete | | 0 |
| | 10 | 1 = Host Protected Area feature set enabled | | 0 |
| | 9 | 1 = DEVICE RESET command enabled | | 0 |
| | 8 | 1 = SERVICE interrupt enabled | | 0 |
| | 7 | 1 = release interrupt enabled | | 0 |
| | 6 | 1 = look-ahead enabled | | X |
| | 5 | 1 = Write Cache enabled | | X |
| | 4 | Shall be cleared to zero to indicate that the PACKET Command feature set is not supported. | | 0 |
| | 3 | 1 = Power Management feature set enabled | | 1 |
| | 2 | 1 = Removable Media feature set enabled | | 0 |
| 1 | 1 = Security Mode feature set enabled | X | | |
| 0 | 1 = SMART feature set enabled | X | | |
| 86 | Command set/feature enabled | | 3401h | |
| | 15-14 | 0 = Reserved | | |
| | 13 | 1 = FLUSH CACHE EXT command supported | | |
| | 12 | 1 = FLUSH CACHE command supported | | |
| | 11 | 1 = Device Configuration Overlay supported | | |
| | 10 | 1 = 48-bit Address features set supported | | |
| | 9 | 1 = Automatic Acoustic Management feature set enabled | | |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | |
|----|---|--|-------|
| | 8 | 1 = SET MAX security extension enabled by SET MAX SET PASSWORD | |
| | 7 | See Address Offset Reserved Area Boot, INCITS TR27:2001 | |
| | 6 | 1 = SET FEATURES subcommand required to spin-up after power-up | |
| | 5 | 1 = Power-Up In Standby feature set enabled | |
| | 4 | 1 = Removable Media Status Notification feature set enabled | |
| | 3 | 1 = Advanced Power Management feature set enabled | |
| | 2 | 1 = CFA feature set enabled | |
| | 1 | 1 = READ/WRITE DMA QUEUED command supported | |
| | 0 | 1 = DOWNLOAD MICROCODE command supported | |
| 87 | Command and feature sets supported or enabled | | 4040h |
| | 15 | Shall be cleared to zero | |
| | 14 | Shall be set to one | |
| | 13 | 1 = IDLE IMMEDIATE with UNLOAD FEATURE supported | |
| | 12 | Reserved for technical report- | |
| | 11 | Reserved for technical report- | |
| | 10 | 1 = URG bit supported for WRITE STREAM DMA EXT and WRITE STREAM EXT | |
| | 9 | 1 = URG bit supported for READ STREAM DMA EXT and READ STREAM EXT | |
| | 8 | 1 = 64 bit World wide name supported | |
| | 7 | 1 = WRITE DMA QUEUED FUA EXT command supported | |
| | 6 | 1 = WRITE DMA FUA EXT and WRITE MULTIPLE FUA EXT commands supported | |
| | 5 | 1 = General Purpose Logging feature set supported | |
| | 4 | 1 = Valid CONFIGURE STREAM command has been executed | |
| | 3 | 1 = Media Card Pass Through Command feature set enabled | |
| | 2 | 1 = Media serial number is valid | |
| | 1 | 1 = SMART self-test supported | |
| 0 | 1 = SMART error logging supported | | |
| 88 | 15 | Reserved | XX7Fh |
| | 14 | 1 = Ultra DMA mode 6 is selected 0 = Ultra DMA mode 6 is not selected | |
| | 13 | 1 = Ultra DMA mode 5 is selected 0 = Ultra DMA mode 5 is not selected | |
| | 12 | 1 = Ultra DMA mode 4 is selected 0 = Ultra DMA mode 4 is not selected | |
| | 11 | 1 = Ultra DMA mode 3 is selected 0 = Ultra DMA mode 3 is not selected | |
| | 10 | 1 = Ultra DMA mode 2 is selected 0 = Ultra DMA mode 2 is not selected | |
| | 9 | 1 = Ultra DMA mode 1 is selected 0 = Ultra DMA mode 1 is not selected | |
| | 8 | 1 = Ultra DMA mode 0 is selected 0 = Ultra DMA mode 0 is not selected | |
| 7 | Reserved | | |

| | | | |
|---------|--|--|-------|
| | 6 | 1 = Ultra DMA mode 6 and below are supported | |
| | 5 | 1 = Ultra DMA mode 5 and below are supported | |
| | 4 | 1 = Ultra DMA mode 4 and below are supported | |
| | 3 | 1 = Ultra DMA mode 3 and below are supported | |
| | 2 | 1 = Ultra DMA mode 2 and below are supported | |
| | 1 | 1 = Ultra DMA mode 1 and below are supported | |
| | 0 | 1 = Ultra DMA mode 0 is supported | |
| 89 | Time required for security erase unit completion | | 0000h |
| 90 | Time required for Enhanced security erase completion | | 0000h |
| 91 | Current advanced power management value | | 0000h |
| 92 | Master Password Revision Code | | 0000h |
| 93 | COMRESET result. The contents of this word shall be cleared to zero. | | 0000h |
| 94 | 15-8 | Vendor's recommended acoustic management value. | 0000h |
| | 7-0 | Current automatic acoustic management value. | |
| 95 | Stream Minimum Request Size | | 0000h |
| 96 | Streaming Transfer Time – DMA | | 0000h |
| 97 | Streaming Access Latency – DMA and PIO | | 0000h |
| 98-99 | Streaming Performance Granularity | | 0000h |
| 100-103 | Maximum user LBA for 48-bit Address feature set. | | XXXXh |
| 104 | Streaming Transfer Time – PIO | | 0000h |
| 105 | Reserved | | 0000h |
| 106 | Physical sector size / Logical Sector Size | | 4000h |
| | 15 | Shall be cleared to zero | |
| | 14 | Shall be set to one | |
| | 13 | 1 = Device has multiple logical sectors per physical sector. | |
| | 12 | 1= Device Logical Sector Longer than 256 Words | |
| | 11-4 | Reserved | |
| | 3-0 | 2x logical sectors per physical sector | |
| 107 | Inter-seek delay for ISO-7779 acoustic testing in microseconds | | 0000h |
| 108 | 15-12 | NAA (3:0) | 0000h |
| | 11-0 | IEEE OUI (23:12) | |
| 109 | 15-4 | IEEE OUI (11:0) | 0000h |
| | 3-0 | Unique ID (35:32) | |
| 110 | 15-0 | Unique ID (31:16) | 0000h |
| 111 | 15-0 | Unique ID (15:0) | 0000h |
| 112-115 | Reserved for world wide name extension to 128 bits | | 0000h |
| 116 | Reserved for technical report- | | 0000h |
| 117-118 | Words per Logical Sector | | 0000h |
| 119-120 | Reserved | | 0000h |
| 121-126 | Reserved | | 0000h |
| 127 | Removable Media Status Notification feature set support | | 0000h |
| | 15-2 | Reserved | |
| | 1-0 | 00 = Removable Media Status Notification feature set not supported 01 = Removable Media Status Notification feature supported 10 = Reserved 11 = Reserved | |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | |
|---------|--|---|---|
| 128 | Security Status | | 0 X 0 0 0 X X X 1 |
| | 15-9 | Reserved | |
| | 8 | Security level 0 = high, 1 = Maximum | |
| | 7-6 | Reserved | |
| | 5 | 1= Enhanced security erase supported | |
| | 4 | 1= Security count expired | |
| | 3 | 1 = Security frozen | |
| | 2 | 1 = Security locked | |
| | 1 | 1 = Security enabled | |
| 0 | 1 = Security supported | | |
| 129-159 | Vendor specific | | XXXXh |
| 160 | CFA power mode 1 | | 0000h |
| | 15 | Word 160 supported | |
| | 14 | Reserved | |
| | 13 | CFA power mode 1 is required for one or more commands implemented by the device | |
| | 12 | CFA power mode 1 disabled | |
| 11-0 | Maximum current in ma | | |
| 161-175 | Reserved for assignment by the CompactFlash™ Association | | 0000h |
| 176-205 | Current media serial number | | 0000h |
| 206-254 | Reserved | | 0000h |
| 255 | Integrity word | | XXXXh |
| | 15-8 | Checksum | |
| | 7-0 | Signature | |

6. ATA Command Set

[Command Set List]

| Class | Command | Code | FR | SC | SN | CY | DH | LBA |
|-------|---------------------------|------------|----|----|----|----|----|-----|
| 1 | Check Power Mode | 98H or E5H | - | - | - | - | D | - |
| 1 | Execute Device Diagnostic | 90H | - | - | - | - | D | - |
| 1 | Erase Sector(s) | C0H | - | Y | Y | Y | Y | Y |
| 2 | Format Track | 50H | - | Y | - | Y | Y | Y |
| 1 | Identify Device | ECH | - | - | - | - | D | - |
| 1 | NOP | 00H | - | - | - | - | D | - |
| 1 | Read Buffer | E4H | - | - | - | - | D | - |
| 1 | Read Long Sector | 22H or 23H | - | - | Y | Y | Y | Y |
| 1 | Read Verify Sector(s) | 40H or 41H | - | Y | Y | Y | Y | Y |
| 1 | Recalibrate | 1XH | - | - | - | - | D | - |
| 1 | Seek | 7XH | - | - | Y | Y | Y | Y |
| 1 | Set Multiple Mode | C6H | - | Y | - | - | D | - |
| 1 | Set Sleep Mode | 99H or E6H | - | - | - | - | D | - |
| 1 | Standby | 96H or E2H | - | - | - | - | D | - |
| 1 | Standby Immediate | 94H or E0H | - | - | - | - | D | - |
| 2 | Write Buffer | E8H | - | - | - | - | D | - |

Note: FR: Feature Register
 SC: Sector Count Register
 SN: Sector Number Register
 CY: Cylinder Registers
 DH: Card/Device/Head Register
 LBA: LBA Block Address Mode Supported

[Command Set Descriptions]

1. CHECK POWER MODE (code: 98h or E5h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|------------|---|---|-------|---|---|---|---|
| Command(7) | 98h or E5h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command checks the power mode. If the CompactFlash Storage is in, going to, or recovering from the sleep mode, the SDM sets BSY, sets the Sector Count Register to 00h, clears BSY and generates an interrupt. If the SDM is in idle mode, the SDM sets BSY, sets the Sector Count Register to FFh, clears BSY and generates an interrupt.

2. Execute Device Diagnostic (code: 90h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|-----|---|---|-------|---|---|---|---|
| Command(7) | 90h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command performs the internal diagnostic tests implemented by the SDM. When the diagnostic command is issued in the True IDE Mode, the Drive bit is ignored and the diagnostic command is executed by both the Master and the Slave with the Master responding with status for both devices. Diagnostic Codes are returned in the Error Register at the end of the command.

| Code | Error Type |
|------|---------------------------------|
| 01h | No Error Detected |
| 02h | Formatter Device Error |
| 03h | Sector Buffer Error |
| 04h | ECC Circuitry Error |
| 05h | Controller Microprocessor Error |
| 8Xh | Slave Error in True IDE Mode |

3. Erase Sector(s) (code: C0h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Command(7) | C0h | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | Sector Number (LBA 7-0) | | | | | | | |
| Sector Count(2) | Sector Count | | | | | | | |
| Feature(1) | X | | | | | | | |

This command is used to pre-erase and condition data sectors in advance of a Write without Erase or Write Multiple without Erase command. There is no data transfer associated with this command but a Write Fault error status can occur.

4. Format Track (code: 50h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Command(7) | 50h | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | X (LBA 7-0) | | | | | | | |
| Sector Count(2) | Count(LBA mode only) | | | | | | | |
| Feature(1) | X | | | | | | | |

This command writes the desired head and cylinder of the selected drive with a vendor unique data pattern (typically FFh or 00h). To remain host backward compatible, the SDM expects a sector buffer of data from the host to follow the command with the same protocol as the Write Sector(s) command although the information in the buffer is not used by the SDM. If LBA=1 then the number of sectors to format is taken from the Sec Cnt register (0=256).

5. Identify Device (code: ECh);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|-----|---|---|-------|---|---|---|---|
| Command(7) | ECh | | | | | | | |
| C/D/H(6) | X | X | X | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

The Identify Device command enables the host to receive parameter information from the SDM. This command has the same protocol as the Read Sector(s) command. All reserved bits or words are zero. Hosts should not depend in Obsolete words in Identify Device containing 0.

6. NOP (code: 00h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|-----|---|---|---|-------|---|---|---|
| Command(7) | 00h | | | | | | | |
| C/D/H(6) | X | | | | Drive | X | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command always fails with the SDM returning command aborted.

7. Read Buffer (code: E4h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|-----|---|---|---|-------|---|---|---|
| Command(7) | E4h | | | | | | | |
| C/D/H(6) | X | | | | Drive | X | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

The Read Buffer command enables the host to read the current contents of the SDM sector buffer. This command has the same protocol as the Read Sector(s) command.

8. Read Long Sector (code: 22h or 23h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Command(7) | 22h or 23h | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | Sector Number (LBA 7-0) | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

The Read Long command performs similarly to the Read Sector(s) command except that it returns 516 bytes of data instead of 512 bytes. During a Read Long command, the SDM does not check the ECC bytes to determine if there consists of 512 bytes of data transferred in word mode followed by 4 bytes of ECC data transferred in byte mode. This command has the same protocol as the Read Sector(s) command. Use of this command is not recommended.

9. Read Sector(s) (code: 20h or 21h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Command(7) | 20h or 21h | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | Sector Number (LBA 7-0) | | | | | | | |
| Sector Count(2) | Sector Count | | | | | | | |
| Feature(1) | X | | | | | | | |

This command reads from 1 to 256 sectors as specified in the Sector Count Register. A sector count of 0 requests 256 sectors. The transfer begins at the sector specified in the Sector Number Register. When this command is issued and after each sector of data (except the last one) has buffer, sets DRQ, clears BSY, and generates an interrupt. The host then reads the 512 bytes of data from the buffer.

At command completion, the Command Block Registers contain the cylinder, head and sector number of the last sector read. If an error occurs, the read terminates at the sector where the error occurred. The command Block Registers contain the cylinder head, and sector number of the sector where the error occurred. The flawed data is pending in the sector buffer.

10. Read Verify Sector(s) (code: 40h or 41h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Command(7) | 40h or 41h | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | Sector Number (LBA 7-0) | | | | | | | |
| Sector Count(2) | Sector Count | | | | | | | |
| Feature(1) | X | | | | | | | |

This command is identical to the Read Sectors command, except that DRQ is never set and no data is transferred to the host. When the command is accepted, the SDM sets BSY. When the requested sectors have been verified, the SDM clears BSY and generates an interrupt. Upon command completion, the Command Block Registers contain the cylinder, head, and sector number of the last sector verified. If an error occurs, the Read Verify Command terminates at the sector where the error occurs. The Command Block Registers contain the cylinder, head and sector number of the sector where the error occurred. The Sector Count Register contains the number of sectors not yet verified.

11. Recalibrate (code: 1Xh);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|----------|---|---|---|---|---|---|---|---|
|----------|---|---|---|---|---|---|---|---|

| | | | | | |
|------------------|-----|-----|---|-------|---|
| Command(7) | 1Xh | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | X |
| Cylinder High(5) | X | | | | |
| Cylinder Low(4) | X | | | | |
| Sector Number(3) | X | | | | |
| Sector Count(2) | X | | | | |
| Feature(1) | X | | | | |

This command is effectively a NOP command to the SDM and is provided for compatibility.

12. Seek (code: 7Xh);

| | | | | | | | | |
|------------------|---------------------------|-----|---|-------|------------------|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Command(7) | 7Xh | | | | | | | |
| C/D/H(6) | 1 | LBA | 1 | Drive | Head (LBA 27-24) | | | |
| Cylinder High(5) | Cylinder High (LBA 23-16) | | | | | | | |
| Cylinder Low(4) | Cylinder Low (LBA 15-8) | | | | | | | |
| Sector Number(3) | X (LBA 7-0) | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command is effectively a NOP command to the SDM although it does perform a range check of cylinder and head or LBA address and returns an error if the address is out of range.

13. Set Multiple Mode (code: C6h);

| | | | | | | | | |
|------------------|--------------|---|---|-------|---|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Command(7) | C6h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | Sector Count | | | | | | | |
| Feature(1) | X | | | | | | | |

This command enables the SDM to perform Read and Write Multiple operations and establishes the block count for these commands. The Sector Count Register is loaded with the number of sectors per block. Upon receipt of the command, the SDM sets BSY to 1 and checks the Sector Count Register. If the Sector Count Register contains a valid value and the block count is supported, the value is loaded and execution is enabled for all subsequent Read Multiple and Write Multiple commands. If the Sector Count Register contains 0 when the command is issued, Read and Write Multiple commands are disabled. At power on, or after a hardware or (unless disabled by a Set Feature command) software reset, the default mode is Read and Write multiple disabled.

14. Set Sleep Mode (code: 99h or E6h);

| | | | | | | | | |
|------------|------------|---|---|---|---|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Command(7) | 99h or E6h | | | | | | | |

| | | | |
|------------------|---|-------|---|
| C/D/H(6) | X | Drive | X |
| Cylinder High(5) | X | | |
| Cylinder Low(4) | X | | |
| Sector Number(3) | X | | |
| Sector Count(2) | X | | |
| Feature(1) | X | | |

This command causes the SDM to set BSY, enter the Sleep mode, clear BSY and generate an interrupt. Recovery from sleep mode is accomplished by simply issuing another command (a reset is permitted but not required). Sleep mode is also entered when internal timers expire so the host does not need to issue this command except when it wishes to enter Sleep mode immediately. The default value for the timer is 5 milliseconds.

15. Standby (code: 96h or E2h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|------------|---|---|-------|---|---|---|---|
| Command(7) | 96h or E2h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command causes the SDM to set BSY, enter the Sleep mode, clear BSY and return interrupt immediately. Recovery from sleep mode is accomplished by simply issuing another command (a reset is not required).

16. Standby Immediate (code: 94h or E0h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------------|------------|---|---|-------|---|---|---|---|
| Command(7) | 94h or E0h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |
| Cylinder High(5) | X | | | | | | | |
| Cylinder Low(4) | X | | | | | | | |
| Sector Number(3) | X | | | | | | | |
| Sector Count(2) | X | | | | | | | |
| Feature(1) | X | | | | | | | |

This command causes the SDM to set BSY, enter the Sleep mode, clear BSY and return the interrupt immediately. Recovery from sleep mode is accomplished by simply issuing another command (a reset is not required).

17. Write Buffer (code: E8h);

| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
|------------|-----|---|---|-------|---|---|---|---|
| Command(7) | E8h | | | | | | | |
| C/D/H(6) | X | | | Drive | X | | | |

| | |
|------------------|---|
| Cylinder High(5) | X |
| Cylinder Low(4) | X |
| Sector Number(3) | X |
| Sector Count(2) | X |
| Feature(1) | X |

The Write Buffer command enables the host to overwrite contents of the SDM sector buffer with any data pattern desired. This command has the same protocol as the Write Sector(s) command and transfer 512 bytes.

18. Security Set Password (code: F1h);

| | | | | | | | | |
|--------------|-----|----|-----|----|----|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |
| LBA Mid | Na | | | | | | | |
| LBA High | Na | | | | | | | |
| Device | obs | Na | obs | Na | Na | | | |
| Command | F1h | | | | | | | |

This command transfer 512 byte of data from the host. The revision code field shall be returned in the IDENTIFY DEVICE word 92. The valid revision codes are 0001h through FFFEh. A value of 0000h or FFFFh indicates that the Master Password Revision Code is not supported.

19. Security Unlock (code: F2h);

| | | | | | | | | |
|--------------|-----|----|-----|----|----|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |
| LBA Mid | Na | | | | | | | |
| LBA High | Na | | | | | | | |
| Device | obs | Na | obs | Na | Na | | | |
| Command | F2h | | | | | | | |

This command transfers 512 bytes of data from the host. If the Identifier bit is set to Master and the device is in high security level, then the password supplied shall be compared with the stored Master password. If the device is in maximum security level then the unlock shall be rejected.

If the Identifier bit is set to user then the device shall compare the supplied password with the stored User password. If the password compare fails then the device shall return command aborted to the host and decrements the unlock counter. This counter shall be initially set to five and shall decremented for each password mismatch when SECURITY UNLOCK and SECURITY ERASE UNIT commands shall be command aborted until a power-on reset or a hardware reset. SECURITY UNLOCK commands issued when the device is unlocked have no effect on the unlock counter.

20. Security Erase Prepare (code: F3h);

| | | | | | | | | |
|--------------|----|---|---|---|---|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |

Specifications subject to change without notice, contact your sales representatives for the most update information.

| | | | | | |
|----------|-----|----|-----|----|----|
| LBA Mid | Na | | | | |
| LBA High | Na | | | | |
| Device | obs | Na | obs | Na | Na |
| Command | F3h | | | | |

The SECURITY ERASE PREPARE command shall be issued immediately before the SECURITY ERASE UNIT command to enable device erasing and unlocking. This command prevents accidental loss of data on the device.

21. Security Erase Unit (code: F4h);

| | | | | | | | | |
|--------------|-----|----|-----|----|----|----|----|----|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |
| LBA Mid | Na | | | | | | | |
| LBA High | Na | | | | | | | |
| Device | obs | Na | obs | Na | Na | Na | Na | Na |
| Command | F4h | | | | | | | |

This command transfer 512 bytes of data from the host. If the password does not match the password previously saved by the device, the device shall reject the command with command aborted. The SECURITY ERASE PREPARE command shall be completed immediately prior to the SECURITY ERASE UNIT command. If the device receives a SECURITY ERASE UNIT command without an immediately prior SECURITY ERASE PREPARE command, the device shall command abort the SECURITY ERASE UNIT command. When Normal Erase mode is specified, the SECURITY ERASE UNIT command shall write binary zeroes to all user data areas. The Enhanced Erase mode is optional. When Enhanced Erase Mode is specified, the device shall write predetermined data patterns to all user areas. In Enhanced Erase mode, all previously written user data shall be overwritten, including sectors that are no longer in use due to reallocation. This command shall disable the device Lock mode, however, the Master password shall still be stored internally within the device and may be reactivated later a new User password is set.

22. Security Freeze Lock (code: F5h);

| | | | | | | | | |
|--------------|-----|----|-----|----|----|----|----|----|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |
| LBA Mid | Na | | | | | | | |
| LBA High | Na | | | | | | | |
| Device | Obs | Na | obs | Na | Na | Na | Na | Na |
| Command | F5h | | | | | | | |

The SECURITY FREEZE LOCK command shall set the device to Frozen mode. After command completion any other commands that update the device Lock mode shall be command aborted. Frozen mode shall be disabled by power-off or hardware reset. If SECURITY FREEZE LOCK shall be issued when the device in Frozen mode, the command executes and the device shall remain in Frozen mode.

23. Security Disable Password (code: F6h);

| | | | | | | | | |
|--------------|----|---|---|---|---|---|---|---|
| Register | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Features | Na | | | | | | | |
| Sector Count | Na | | | | | | | |
| LBA Low | Na | | | | | | | |
| LBA Mid | Na | | | | | | | |

| | | | | | | | | |
|----------|-----|----|-----|----|----|----|----|----|
| LBA High | Na | | | | | | | |
| Device | obs | Na | obs | Na | Na | Na | Na | Na |
| Command | F6h | | | | | | | |

The SECURITY DISABLE PASSWORD command transfer 512 bytes of data from the host. If the password selected by word 0 matches the password previously saved by the device, the device shall disable the Lock mode. This command shall not change the Master password. The Master password shall be reactivated when a User password if set.

7. System Power Consumption

7.1 DC Input Voltage

| Parameter | Rating |
|-------------------|-----------|
| Operating Voltage | 5V +/- 5% |

7.2 Power Consumption

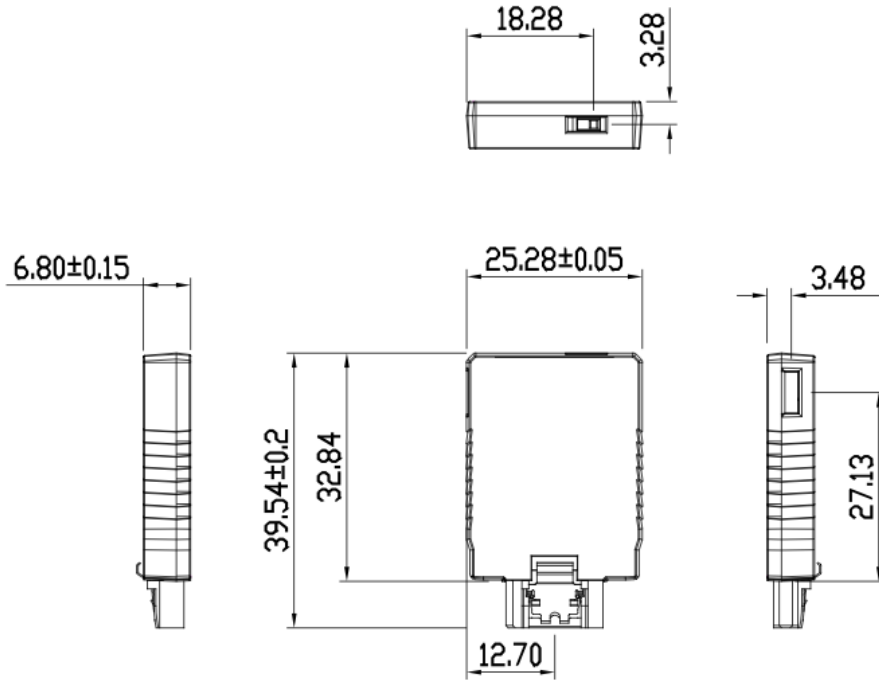
| Parameter | Value |
|-----------------|---------------|
| Sustained Read | 145 mA (max.) |
| Sustained Write | 170 mA (max.) |
| IDLE | 39 mA (max.) |

8. Device Parameters

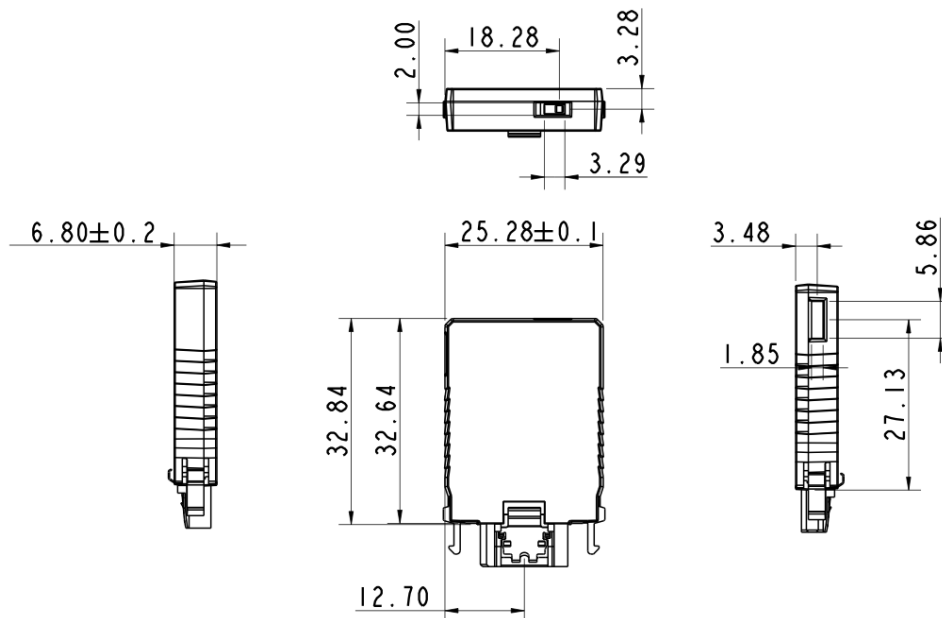
| Capacity | Cylinders | Heads | Sectors | LBA |
|----------|-----------|-------|---------|------------|
| 4GB | 7,801 | 16 | 63 | 7,864,320 |
| 8GB | 15,603 | 16 | 63 | 15,728,640 |
| 16GB | 16,383 | 16 | 63 | 31,457,280 |

9. Physical Dimension

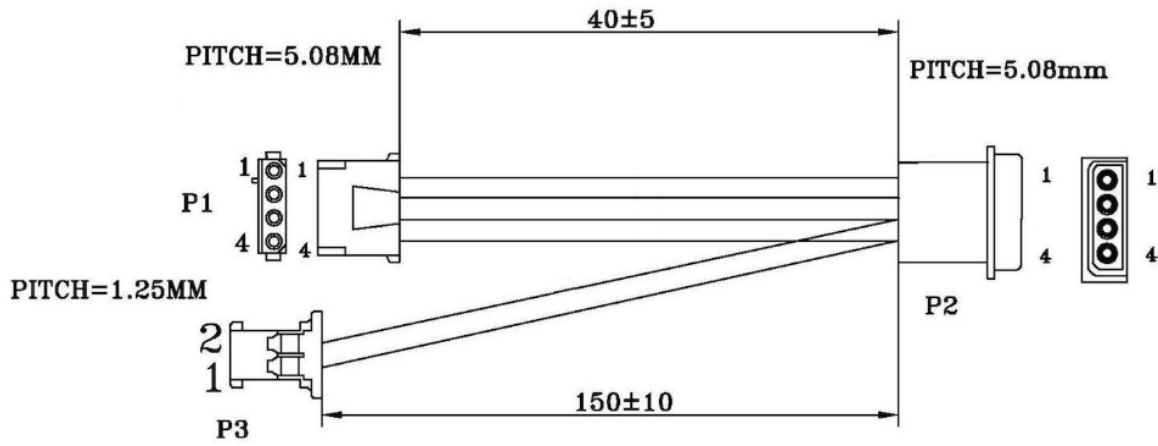
SATA Disk Module – Standard type (Unit: mm)



SATA Disk Module – Hook type (Unit: mm)



Power Cable (Unit: mm)



Appendix: Part Number Table

| PN | Description |
|---------------------------------|---|
| Standard type (non-hook) | |
| SQF-SDMS2-2G-VNC | SQF SATA DOM V 2GB SLC 2-CH (0~70°C) |
| SQF-SDMS4-4G-VNC | SQF SATA DOM V 4GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-8G-VNC | SQF SATA DOM V 8GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-16G-VNC | SQF SATA DOM V 16GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-32G-VNC | SQF SATA DOM V 32GB SLC 4-CH (0~70°C) |
| SQF-SDMS2-2G-VNE | SQF SATA DOM V 2GB SLC 2-CH (-40~85°C) |
| SQF-SDMS4-4G-VNE | SQF SATA DOM V 4GB SLC 4-CH (-40~85°C) |
| SQF-SDMS4-8G-VNE | SQF SATA DOM V 8GB SLC 4-CH (-40~85°C) |
| SQF-SDMS4-16G-VNE | SQF SATA DOM V 16GB SLC 4-CH (-40~85°C) |
| SQF-SDMS4-32G-VNE | SQF SATA DOM V 32GB SLC 4-CH (-40~85°C) |
| Hook type | |
| SQF-SDMS2-2G-VHC | SQF SATA DOM VH 2GB SLC 2-CH (0~70°C) |
| SQF-SDMS4-4G-VHC | SQF SATA DOM VH 4GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-8G-VHC | SQF SATA DOM VH 8GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-16G-VHC | SQF SATA DOM VH 16GB SLC 4-CH (0~70°C) |
| SQF-SDMS4-32G-VHC | SQF SATA DOM VH 32GB SLC 4-CH (0~70°C) |
| SQF-SDMS2-2G-VHE | SQF SATA DOM VH 2GB SLC 2-CH (-40~85°C) |
| SQF-SDMS4-4G-VHE | SQF SATA DOM VH 4GB SLC 4-CH (-40~85°C) |
| SQF-SDMS4-8G-VHE | SQF SATA DOM VH 8GB SLC 4-CH (-40~85°C) |
| SQF-SDMS4-16G-VHE | SQF SATA DOM VH 16GB SLC 4CH (-40~85°C) |
| SQF-SDMS4-32G-VHE | SQF SATA DOM VH 32GB SLC 4CH (-40~85°C) |