

Cervoz Industrial Embedded Module

mSATA

Titan Series (3D TLC)

T376 Family

Product Datasheet



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Revision: 1.0

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Revision History

| Date | Revision | Description |
|------------|----------|----------------|
| 2020.05.25 | 1.0 | First Released |

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1. Product Overview

1.1 Introduction

Cervoz Industrial mSATA Embedded Module T376 family is a Solid State Flash Disk product that is in compliance with the mSATA and SATA III standards. mSATA T376 family fits in any mSATA sockets in a PC or motherboard; it can be used for both booting and storage purposes. In addition, T376 family has a very unique function named Powerguard. The purpose of Powerguard is to protect data loss while encountering an improper power failure. Powerguard would complete the task of saving the boot files from the controller into the flash storage after sudden power loss. Cervoz designs these flash modules with additional tantalum capacitors to store these extra charges. With this special design, mSATA is constantly charging the tantalum capacitors with 12V power during its operation.

T376 family uses SSD grade quality 3D TLC NAND flash memory from the industry leading manufacturer Micron. This product includes various capacities to choose from.

1.2 Application Fields

- Industrial PC and Thin Client
- Ticketing, Examining and Testing Machine
- Military, Health and Automatic Equipment
- Server, Cloud Computer

1.3 Features

- Compliant with SATA III 6.0Gb/s (backward compatible to 1.5Gb/s and 3Gb/s)
- 3D TLC NAND flash memory
- Capacity: 128GB ~ 1TB
- Powerguard Function (Power Loss Protection)
- Write Protect Function (Optional)
- Support AES 256-bit Encryption
- With DDR3 DRAM Buffer
- SLC write cache technology
- Operating as boot disk
- Product includes Standard Temperature range & Wide Temperature range
- Low power consumption
- Shock resistance and anti-vibration
- Static and dynamic wear leveling
- Bad block management
- S.M.A.R.T. & TRIM command
- Fully compatible with Windows XP, Windows 7, Windows 8, Windows 10, Mac OS, and Linux
- RoHS compliant

1.4 Product Appearance & Models

Cervoz Industrial mSATA Module T376



| T376 Family Standard Temp. (0°C ~ 70°C) Model No. | T376 Family Wide Temp. (-40°C ~ 85°C) Model No. | Capacity |
|---|---|----------|
| CIE-MST376MMF128GS | CIE-MST376MMF128GW | 128GB |
| CIE-MST376MMF256GS | CIE-MST376MMF256GW | 256GB |
| CIE-MST376MOF512GS | CIE-MST376MOF512GW | 512GB |
| CIE-MST376MOF001TS | CIE-MST376MOF001TW | 1TB |

Please Note:

Since certain storage capacity has to be reserved for firmware and controller management purposes; the physical capacity of the SATA flash module will be approximately 92.5% of the indicated capacity. If you need to install an image that has the exact (or close to) the indicated size of the flash module, please choose your flash module with a greater capacity.

2. Product Specifications

2.1 General Specifications

| | |
|-------------------------------|--|
| Form Factor | mSATA |
| Interface | SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s) |
| Connector | mSATA |
| NAND Flash Type | 3D TLC NAND |
| Capacity | 128GB/256GB/512GB/1TB |
| Sequential Read | up to 560MB/s |
| Sequential Write | up to 480MB/s |
| DDR3 DRAM Buffer | Included |
| ECC Scheme | Applies the LDPC (Low Density Parity Check) of ECC algorithm |
| MTBF | 2,000,000 hours |
| Terabyte Written (TBW) | 128GB : 146 256GB : 292 512GB : 583 1TB : 1167 |
| Low Power Management | DIPM/HIPM mode |
| Supply Voltage | +3.3V DC \pm 5% |
| Power Consumption | Active mode: < 2020mW Idle mode: < 470mW |
| Dimension (LxWxH) | 50.95*30.00*3.90mm |

2.2 Performance

The performance was measured with below PC configuration:

- Platform: GIGABYTE_B150M-D3H
- RAM: Cervoz CIR-S3DUSPM1604G (DDR3 4G 1600MHz)
- Operation Systems: Windows 10
- Testing Utility: Crystal Disk Mark v5.1.0 x64
- SATAIII port (6.0 Gb/s) performance

| Capacity | 128GB | 256GB | 512GB | 1TB |
|-------------------------|---------|---------|---------|---------|
| Sequential Read (max.) | 485MB/s | 560MB/s | 560MB/s | 560MB/s |
| Sequential Write (max.) | 410MB/s | 480MB/s | 480MB/s | 455MB/s |
| 4KB Random Read (QD32) | 150MB/s | 285MB/s | 285MB/s | 290MB/s |
| 4KB Random Write (QD32) | 305MB/s | 280MB/s | 270MB/s | 270MB/s |

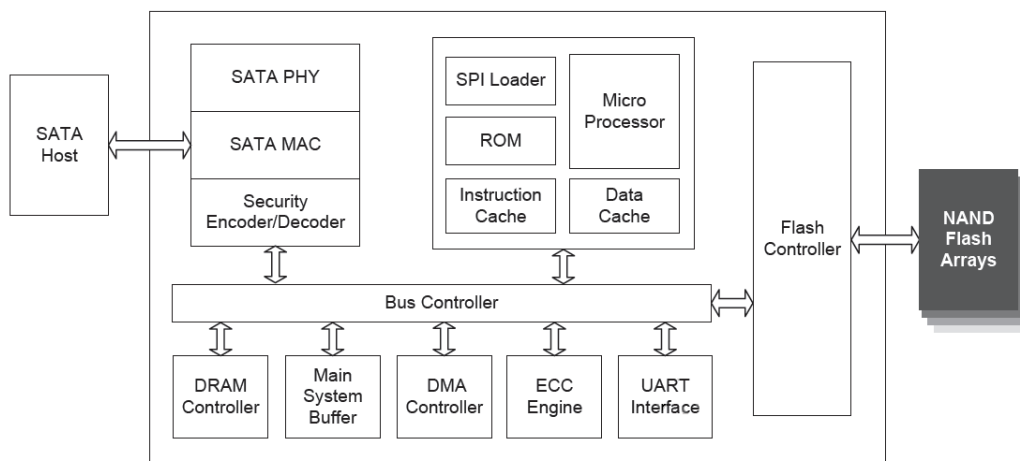
Actual performance might differ based on different using conditions and environment.

2.3 Drive Capacity

| Capacity | Cylinders | Heads | Sectors | Max LBA |
|----------|-----------|-------|---------|---------------|
| 128GB | 16,383 | 16 | 63 | 250,069,680 |
| 256GB | 16,383 | 15 | 63 | 500,118,192 |
| 512GB | 16,383 | 15 | 63 | 1,000,215,216 |
| 1TB | 16,383 | 15 | 63 | 2,000,406,264 |

2.4 Electronic Specifications

2.4.1 Block Diagram



2.4.2 Pin Assignment



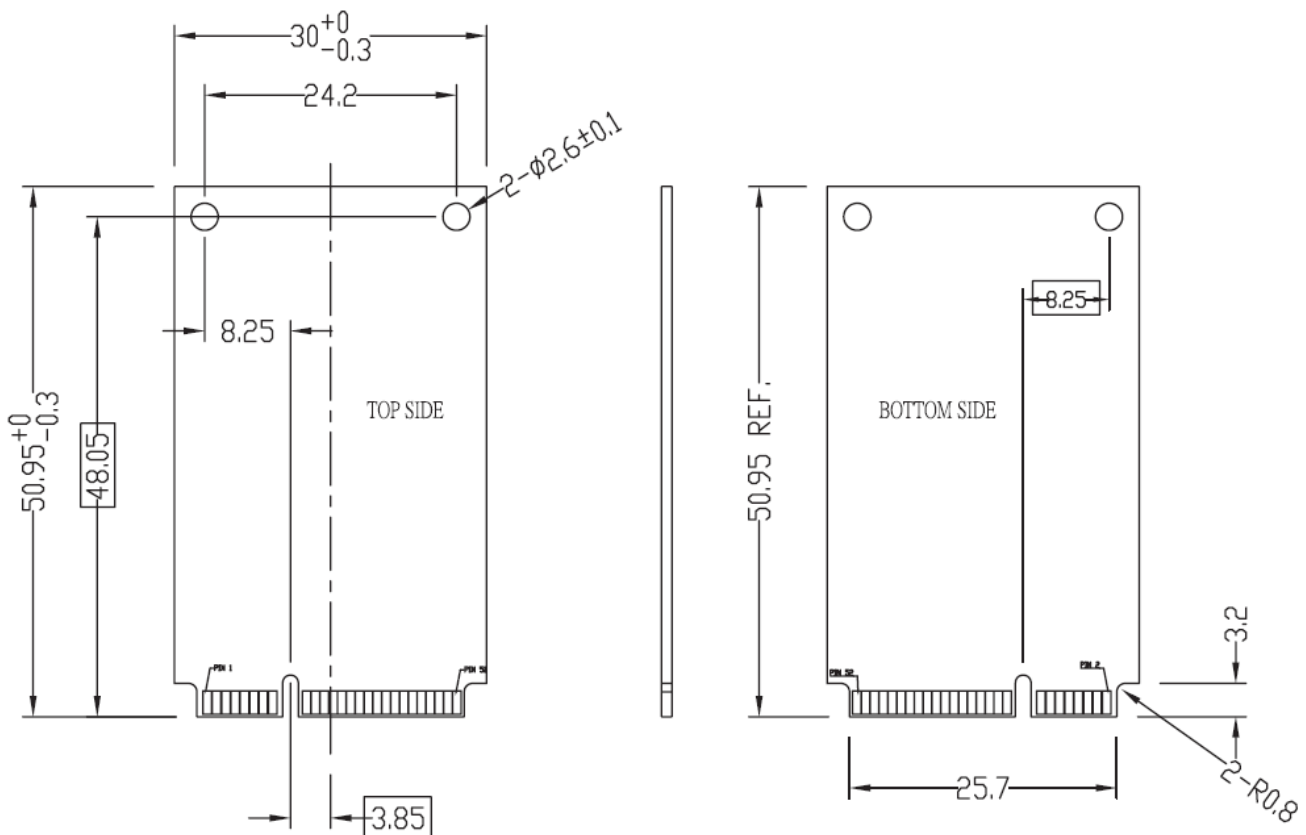
| Pin # | Pin Description | Signal Name | Pin # | Pin Description | Signal Name |
|-------|-----------------------|-------------|-------|------------------------|-------------|
| 1 | NC | NA | 27 | System ground | GND |
| 2 | DC 3.3V power in | +3.3V | 28 | Reserved pin | Reserved |
| 3 | NC | NA | 29 | System ground | GND |
| 4 | System ground | GND | 30 | NC | NA |
| 5 | NC | NA | 31 | SATA Differential RX- | SATA_RX- |
| 6 | Reserved pin | Reserved | 32 | NC | NA |
| 7 | NC | NA | 33 | SATA Differential RX+ | SATA_RX+ |
| 8 | NC | NA | 34 | System ground | GND |
| 9 | System ground | GND | 35 | System ground | GND |
| 10 | NC | NA | 36 | Reserved pin | Reserved |
| 11 | NC | NA | 37 | System ground | GND |
| 12 | NC | NA | 38 | Reserved pin | Reserved |
| 13 | NC | NA | 39 | DC 3.3V power in | +3.3V |
| 14 | NC | NA | 40 | System ground | GND |
| 15 | System ground | GND | 41 | DC 3.3V power in | +3.3V |
| 16 | NC | NA | 42 | NC | NA |
| 17 | NC | NA | 43 | NC | NA |
| 18 | System ground | GND | 44 | Device sleep signal in | DEVSLP |
| 19 | Reserved pin | Reserved | 45 | NC | NA |
| 20 | Reserved pin | Reserved | 46 | NC | NA |
| 21 | System ground | GND | 47 | NC | NA |
| 22 | NC | NA | 48 | Reserved pin | Reserved |
| 23 | SATA Differential TX+ | SATA_TX+ | 49 | Data access signal out | DAS |
| 24 | DC 3.3V power in | +3.3V | 50 | System ground | GND |
| 25 | SATA Differential TX- | SATA_TX- | 51 | System ground | GND |
| 26 | System ground | GND | 52 | DC 3.3V power in | +3.3V |

2.5 Environmental Specifications

| Type | | Value |
|--------------------|---------------------------------|-----------------------|
| Temperature | Standard Temperature Operating: | 0°C~70°C |
| | Standard Temperature Storage: | -40°C~85°C |
| | Wide Temperature Operating: | -40°C~85°C |
| | Wide Temperature Storage: | -50°C~95°C |
| Humidity | Operating & Storage | 5~95%, Non-Condensing |
| Vibration | Non-Operating | 20G, 10Hz~2000Hz |
| Shock | Non-Operating | 1500G, 0.5ms |

2.6 Mechanical Specifications

| Type | Value |
|-------------|----------------------|
| Form Factor | mSATA |
| Length | 50.95mm +0 / -0.30mm |
| Width | 30.00mm +0 / -0.30mm |
| Thickness | 3.90mm ± 0.30mm |

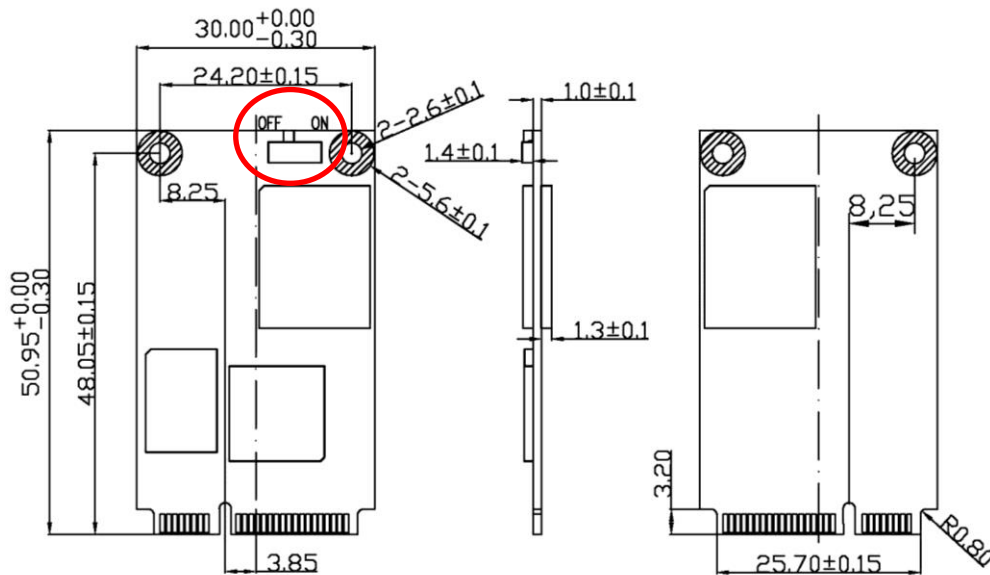


3. Powerguard Function(Power Loss Protection)

The Powerguard function provides additional power during an unexpected power outage to complete current flash write operation, moreover to protect firmware, mapping table integrity.

4. Write Protection (Optional)

Write protect function can be triggered by operating the write protection switch. Once write-protection activated, the mSATA SSD will become read-only and the user will not be able to write or delete any data on the mSATA SSD.



5. Supported Command

5.1 List of Command Sets

| Command | Code | Protocol |
|-----------------------------|------------|---------------------------|
| General Feature Set | | |
| Execute Device Diagnostic | 90h | Execute device diagnostic |
| Download Microcode | 92h | PIO data-out |
| Download Microcode DMA | 93h | DMA |
| Flush Cache | E7h | Non-data |
| Identify Device | ECh | PIO data-in |
| Initialize Drive Parameters | 91h | Non-data |
| NOP | 00h | Non-data |
| Read Buffer | E4h | PIO data-in |
| Read Buffer DMA | E9h | DMA |
| Read DMA | C8h or C9h | DMA |
| Read Log Ext | 2Fh | PIO data-in |
| Read Log DMA Ext | 47h | DMA |
| Read Multiple | C4h | PIO data-in |
| Read Sector(s) | 20h or 21h | PIO data-in |

| | | |
|--|------------|--------------|
| Read Verify Sector(s) | 40h or 41h | Non-data |
| Set Feature | EFh | Non-data |
| Set Multiple Mode | C6h | Non-data |
| Write Buffer | E8h | PIO data-out |
| Write Buffer DMA | EBh | DMA |
| Write DMA | CAh or CBh | DMA |
| Write Log Ext | 3Fh | PIO data-out |
| Write Log DMA Ext | 57h | DMA |
| Write Multiple | C5h | PIO data-out |
| Write Sector(s) | 30h | PIO data-out |
| Power Management Feature Set | | |
| Check Power Mode | E5h or 98h | Non-data |
| Idle | E3h or 97h | Non-data |
| Idle Immediate | E1h or 95h | Non-data |
| Sleep | E6h or 99h | Non-data |
| Standby | E2h or 96h | Non-data |
| Standby Immediate | E0h or 94h | Non-data |
| Security Mode Feature Set | | |
| Security Set Password | F1h | PIO data-out |
| Security Unlock | F2h | PIO data-out |
| Security Erase Prepare | F3h | Non-data |
| Security Erase Unit | F4h | PIO data-out |
| Security Freeze Lock | F5h | Non-data |
| Security Disable Password | F6h | PIO data-out |
| SMART Feature Set | | |
| SMART Disable Operations | B0h | Non-data |
| SMART Enable/Disable Autosave | B0h | Non-data |
| SMART Enable Operations | B0h | Non-data |
| SMART Execute OFF-LINE Immediate | B0h | Non-data |
| SMART Read Log | B0h | PIO data-in |
| SMART Read Data | B0h | PIO data-in |
| SMART Read Threshold | B0h | PIO data-in |
| SMART Return Status | B0h | Non-data |
| SMART Save Attribute Values | B0h | Non-data |
| SMART Write Log | B0h | PIO data-out |
| Host Protected Area Feature Set | | |
| Read Native Max Address | F8h | Non-data |
| Set Max Address | F9h | Non-data |
| Set Max Set Password | F9h | PIO data-out |

| | | |
|--|-----|--------------|
| Set Max Lock | F9h | Non-data |
| Set Max Freeze Lock | F9h | Non-data |
| Set Max Unlock | F9h | PIO data-out |
| 48-bit Address Feature Set | | |
| Flush Cache Ext | EAh | Non-data |
| Read Sector(s) Ext | 24h | PIO data-in |
| Read DMA Ext | 25h | DMA |
| Read Multiple Ext | 29h | PIO data-in |
| Read Native Max Address Ext | 27h | Non-data |
| Read Verify Sector(s) Ext | 42h | Non-data |
| Set Max Address Ext | 37h | Non-data |
| Write DMA Ext | 35h | DMA |
| Write DMA FUA Ext | 3Dh | DMA |
| Write Multiple Ext | 39h | PIO data-out |
| Write Multiple FUA Ext | CEh | PIO data-out |
| Write Sector(s) Ext | 34h | PIO data-out |
| NCQ Feature Set | | |
| Read FPDMA Queued | 60h | DMA Queued |
| Write FPDMA Queued | 61h | DMA Queued |
| DCO Feature Set | | |
| Device Configuration | B1h | / |
| Sanitize Device Feature Set | | |
| Sanitize Device | B4h | / |
| Miscellaneous and Historical Commands | | |
| Data Set Management | 06h | DMA |
| Seek | 70h | Non-data |
| Recalibrate | 10h | Non-data |
| Write Verify | 3Ch | PIO data-out |
| Write Uncorrectable Ext | 45h | Non-data |

5.2 Identify Device

| Word | F/V | Default Value | Description |
|---------|-----|---------------|---|
| 0 | F | 0040h | General configuration |
| 1 | X | XXXXh | Default number of cylinders |
| 2 | V | 0000h | Reserved |
| 3 | X | 00XXh | Default number of heads |
| 4 | X | 0000h | Obsolete |
| 5 | X | 0240h | Obsolete |
| 6 | F | XXXXh | Default number of sectors per track |
| 7 - 8 | V | XXXXh | Number of sectors per card (Word 7 = MSW, Word 8 = LSW) |
| 9 | X | 0000h | Obsolete |
| 10 - 19 | F | XXXXh | Serial number in ASCII (Right justified) |
| 20 | X | 0002h | Obsolete |
| 21 | X | 0002h | Obsolete |
| 22 | X | 0000h | Obsolete |
| 23 - 26 | F | XXXXh | Firmware revision in ASCII Big Endian Byte Order in Word |
| 27 - 46 | F | XXXXh | Model number in ASCII (Left justified) Big Endian Byte Order in Word |
| 47 | F | 8001h | Maximum number of sectors on Read/Write Multiple command |
| 48 | F | 0000h | Reserved |
| 49 | F | 0F00h | Capabilities |
| 50 | F | 4000h | Capabilities |
| 51 | F | 0200h | PIO data transfer cycle timing mode |
| 52 | X | 0000h | Obsolete |
| 53 | F | 0007h | Field validity |
| 54 | X | XXXXh | Current numbers of cylinders |
| 55 | X | XXXXh | Current numbers of heads |
| 56 | X | XXXXh | Current sectors per track |
| 57 - 58 | X | XXXXh | Current capacity in sectors (LBAs) (Word 57 = LSW , Word 58 = MSW) |
| 59 | F | 0101h | Multiple sector setting |
| 60 - 61 | F | XXXXh | Total number of user addressable logical sectors for 28-bit commands (DWord) |



| Word | F/V | Default Value | Description |
|---------|-----|---------------|--|
| 62 | X | 0000h | Reserved |
| 63 | F | 0207h | Multiword DMA transfer Supports MDMA mode 0, 1 and 2 |
| 64 | F | 0003h | Advanced PIO modes supported |
| 65 | F | 0078h | Minimum Multiword DMA transfer cycle time per word |
| 66 | F | 0078h | Recommended Multiword DMA transfer cycle time |
| 67 | F | 0078h | Minimum PIO transfer cycle time without flow control |
| 68 | F | 0078h | Minimum PIO transfer cycle time with IORDY flow control |
| 69 | F | 4000h | Additional supported |
| 70 - 74 | F | 0000h | Reserved |
| 75 | F | 001Fh | Queue depth |
| 76 | F | 070Eh | Serial ATA capabilities <ul style="list-style-type: none"> • Supports Serial ATA Gen3 • Supports Serial ATA Gen2 • Supports Serial ATA Gen1 • Supports Phy event counters log • Supports receipt of host initiated power management requests • Supports Native Command Queuing |
| 77 | F | 0080h | Serial ATA additional capability <ul style="list-style-type: none"> • DevSleep to Reduced Power State |
| 78 | F | 0148h | Serial ATA features supported <ul style="list-style-type: none"> • Supports Device Sleep • Supports software settings preservation |
| 79 | V | 0040h | Reserved |
| 80 | F | 03F0h | Major version number (ACS-2) |
| 81 | F | 0000h | Minor version number |
| 82 | F | 742Bh | Command sets supported 0 |
| 83 | F | 7500h | Command sets supported 1 |
| 84 | F | 4023h | Command sets supported 2 |
| 85 - 87 | V | XXXXh | Command set/feature enabled |
| 88 | V | 007Fh | Ultra DMA mode supported and selected |
| 89 | F | 0003h | Time required for a Normal Erase mode Security Erase Unit command |
| 90 | F | 0001h | Time required for an Enhanced Erase mode Security Erase Unit |
| 91 | V | 0000h | Current advanced power management value |
| 92 | V | FFFEh | Master password identifier |

| Word | F/V | Default Value | Description |
|-----------|-----|---------------|---|
| 93 - 99 | V | 0000h | Reserved |
| 100 - 103 | V | XXXXh | Maximum user LBA for 48-bit address feature set |
| 104 | V | 0000h | Reserved |
| 105 | F | 0100h | Maximum number of 512-byte blocks per Data Set Management |
| 106 - 127 | V | 0000h | Reserved |
| 128 | V | 0001h | Security status |
| 129 - 159 | X | XXXXh | Vendor specific |
| 160 | F | 0000h | Power requirement description |
| 161 | X | 0000h | Reserved |
| 162 | F | 0000h | Key management schemes supported |
| 163 | F | 0000h | CF Advanced True IDE Timing mode capability and setting |
| 164 - 168 | V | 0000h | Reserved |
| 169 | F | 0001h | Data Set Management supported |
| 170 - 216 | V | XXXXh | Reserved |
| 217 | F | 0001h | Non-rotating media (SSD) |
| 218 - 221 | X | 0000h | Reserved |
| 222 | F | 107Fh | Transport major revision (SATA Rev 3.1) |
| 223 - 254 | X | 0000h | Reserved |
| 255 | X | XXXXh | Integrity word |

Notes:

1. F = content (byte) is fixed and does not change.
2. V = content (byte) is variable and may change depending on the state of the device or the commands executed by the device.
3. X = content (byte) is vendor specific and may be fixed or variable.

5.3 Identify Device SMART Feature Set

| Value | Command | Value | Command |
|-------|----------------------------|-------|--------------------------|
| D0h | Read Data | D5h | Read Log |
| D1h | Read Attribute Threshold | D6h | Write Log |
| D2h | Enable/Disable Autosave | D8h | Enable SMART Operations |
| D3h | Save Attribute Values | D9h | Disable SMART Operations |
| D4h | Execute OFF-LINE Immediate | DAh | Return Status |

If the reserved size is below the threshold, the status can be read from the Cylinder Register using the Return Status command (DAh).

5.4 SMART Data Feature

The following 512 bytes make up the device SMART data structure. Users can obtain the data using the “Read Data” command (D0h).

| Byte | F / V | Description |
|-----------|-------|---|
| 0 - 1 | X | Revision code |
| 2 - 361 | X | Vendor specific (see 4.3.2) |
| 362 | V | Off-line data collection status |
| 363 | X | Self-test execution status byte |
| 364 - 365 | V | Total time in seconds to complete off-line data collection activity |
| 366 | X | Vendor specific |
| 367 | F | Off-line data collection capability |
| 368 - 369 | F | SMART capability |
| 370 | F | Error logging capability <ul style="list-style-type: none"> • 7-1 Reserved • 0 1 = Device error logging supported |
| 371 | X | Vendor specific |
| 372 | F | Short self-test routine recommended polling time (in minutes) |
| 373 | F | Extended self-test routine recommended polling time (in minutes) |
| 374 | F | Conveyance self-test routine recommended polling time (in minutes) |
| 375 - 385 | R | Reserved |
| 386 - 395 | F | Firmware version/date code |
| 396 - 399 | F | Reserved |
| 400 - 405 | F | ‘SM2246’ |
| 406 - 510 | X | Vendor specific |
| 511 | V | Data structure checksum |

5.5 SMART Attributes

The following table defines the vendor specific data in byte 2 to 361 of the 512-byte SMART data.

| Attribute ID (hex) | Raw Attribute Value | | | | | | | Attribute Name |
|--------------------|---------------------|-----|----|-----|----|----|-----|---|
| 01 | MSB | 00 | 00 | 00 | 00 | 00 | 00 | Read error rate |
| 05 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Reallocated sectors count |
| 09 | LSB | | | MSB | 00 | 00 | 00 | Power-on hours |
| 0C | LSB | | | MSB | 00 | 00 | 00 | Power cycle count |
| A0 | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable sector count when read/write |
| A1 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Number of valid spare block |
| A3 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Number of initial invalid block |
| A4 | LSB | | | MSB | 00 | 00 | 00 | Total erase count |
| A5 | LSB | | | MSB | 00 | 00 | 00 | Maximum erase count |
| A6 | LSB | | | MSB | 00 | 00 | 00 | Minimum erase count |
| A7 | LSB | | | MSB | 00 | 00 | 00 | Average erase count |
| A8 | LSB | | | MSB | 00 | 00 | 00 | Max erase count of spec |
| A9 | LSB | | | MSB | 00 | 00 | 00 | Remain Life (percentage) |
| AF | LSB | | | MSB | 00 | 00 | 00 | Program fail count in worst die |
| B0 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Erase fail count in worst die |
| B1 | LSB | | | MSB | 00 | 00 | 00 | Total wear level count |
| B2 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Runtime invalid block count |
| B5 | LSB | | | MSB | 00 | 00 | 00 | Total program fail count |
| B6 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Total erase fail count |
| BB | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable error count |
| C0 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Power-off retract count |
| C2 | MSB | 00 | 00 | 00 | 00 | 00 | 00 | Controlled temperature |
| C3 | LSB | | | MSB | 00 | 00 | 00 | Hardware ECC recovered |
| C4 | LSB | | | MSB | 00 | 00 | 00 | Reallocation event count |
| C6 | LSB | | | MSB | 00 | 00 | 00 | Uncorrectable error count off-line |
| C7 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Ultra DMA CRC error count |
| E1 | LSB | | | | | | MSB | Total LBAs written (each write unit = 32MB) |
| E8 | LSB | MSB | 00 | 00 | 00 | 00 | 00 | Available reserved space |
| F1 | LSB | | | | | | MSB | Total LBAs written (each write unit = 32MB) |
| F2 | LSB | | | | | | MSB | Total LBAs read (each read unit = 32MB) |

6. Part No. Decoder

| 1 | - | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|--------------|---|-------------|----------------|---|-------------|----------------|------------|-----------------|-----------------|----------------|
| Product Line | - | Form Factor | Product Series | Cervoz Family Code (Bus / Internal Control) | Flash Brand | Flash Capacity | Flash Mode | Module Capacity | Operating Temp. | Customize Code |
| XXX | - | XX | X | XXX | X | X | X | XXXX | X | XX |

1. Product Line

| | |
|-----|-----------------------------------|
| CIS | Cervoz Industrial SSD |
| CIM | Cervoz Industrial Memory Card |
| CIE | Cervoz Industrial Embedded Module |

2. Form Factor

| | |
|----|---------------------------------|
| 2S | 2.5" SATA |
| 2P | 2.5" PATA |
| CF | CompactFlash |
| CA | CFast |
| MS | mSATA |
| HM | Half Size mSATA |
| HS | Half Slim |
| M4 | M.2 2242 |
| M6 | M.2 2260 |
| M8 | M.2 2280 |
| 0V | PATA Disk 40pin Vertical |
| 4V | PATA Disk 44pin Vertical |
| 4L | PATA Disk 44pin Horizontal Left |
| 7T | SATA Disk 7pin Vertical Tall |
| 7S | SATA Disk 7pin Vertical Short |
| 7L | SATA Disk 7pin Horizontal Left |
| 7R | SATA Disk 7pin Horizontal Right |

3. Product Series

| | |
|---|--------------------------|
| S | Supreme Series (SLC) |
| R | Reliance Series (RO-MLC) |
| M | Momentum Series (MLC) |
| T | Titan Series (TLC) |

4. Cervoz Family Code

Bus and Internal Control for Cervoz Product Families

5. Flash Brand

| | |
|---|---------|
| M | Micron |
| T | Toshiba |

6. Flash Capacity

| | |
|---|-------|
| A | 256Mb |
| B | 512Mb |

| | |
|---|-------|
| C | 1Gb |
| D | 2Gb |
| E | 4Gb |
| F | 8Gb |
| G | 16Gb |
| H | 32Gb |
| I | 64Gb |
| J | 128Gb |
| K | 256Gb |
| L | 512Gb |
| M | 1Tb |
| N | 2Tb |
| O | 4Tb |

7. Flash Mode

Internal Control for Flash Mode

8. Module Capacity

| | |
|------|-------|
| 128M | 128MB |
| 256M | 256MB |
| 512M | 512MB |
| 001G | 1GB |
| 002G | 2GB |
| 004G | 4GB |
| 008G | 8GB |
| 016G | 16GB |
| 032G | 32GB |
| 064G | 64GB |
| 128G | 128GB |
| 256G | 256GB |
| 512G | 512GB |
| 001T | 1TB |
| 002T | 2TB |

9. Operating Temperature

| | |
|---|--------------------------------------|
| S | Standard Grade (0~ +70°C) |
| W | Wide Temperature Grade (-40 ~ +85°C) |

10. Customize Code

| | |
|----|------------------------|
| WP | Write Protect Function |
|----|------------------------|