



CERVOZ

Cervoz Industrial SSD

2.5" SATA

Reliance Series (RO-MLC)

R336 Family

Product Datasheet



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Revision: 2.0

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Revision History

| Date | Revision | Description |
|------------|----------|---|
| 2017.04.25 | 1.0 | First Released |
| 2017.07.21 | 1.1 | Wide-Temperature solution added |
| 2019.10.01 | 2.0 | New Manufacturing Process for NAND Flash IC 1.4 Ordering Information Changed 2.1 Power Consumption Updated 2.2 Performance Updated |

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1. Product Overview

1.1 Introduction

Cervoz Industrial 2.5" SATA SSD R336 family is a high capacity Solid State Disk product that is in compliance with the 2.5" form factor and SATA III standards. The device design is based on the 7pin for data segment and 15pin for power segment standards.

R336 family uses preselected multi-level cell (MLC) NAND flash memory from the industry leading manufacturer Micron and utilizes our "Reliability Optimized-MLC (RO-MLC) Technology". We adopt specialized firmware to control MLC NAND flash which only uses the strong pages of MLC NAND as storage; the technology is manipulated at the block level, and with each block's capacity halved by treating it as SLC. This product includes various capacities to choose from.

R336 family offers high performance with reliability and endurance, as well as a remarkable price-performance ratio, ideal for applications in harsh environments. Industrial PC/Embedded PC, Factory Automation, Transportation, Information & Entertainment and Server & Cloud Computing all benefit from this superior reliability and cost-effectiveness.

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)
- MLC NAND flash memory with RO-MLC technology
- Capacity: 16GB ~ 256GB
- With 16-bit wide DDR3 DRAM Buffer
- 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 2.5" SATA SSD R336



| R336 Family Standard Temp. (0°C ~ 70°C) Model No. | R336 Family Wide Temp. (-40°C ~ 85°C) Model No. | Capacity |
|---|---|----------|
| CIS-2SR336MKD016GS | CIS-2SR336MKD016GW | 16GB |
| CIS-2SR336MKD032GS | CIS-2SR336MKD032GW | 32GB |
| CIS-2SR336MKD064GS | CIS-2SR336MKD064GW | 64GB |
| CIS-2SR336MKD128GS | CIS-2SR336MKD128GW | 128GB |
| CIS-2SR336MLD256GS | CIS-2SR336MLD256GW | 256GB |

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 | 2.5 inch |
| Interface | SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s) |
| Connector | SATA (7 + 15 pin) |
| NAND Flash Type | MLC (Controlled by Reliability Optimized-MLC Technology) |
| Capacity | 16GB/32GB/64GB/128GB/256GB |
| Sequential Read | up to 550MB/s |
| Sequential Write | up to 465MB/s |
| DDR3 DRAM Buffer | Included |
| ECC Scheme | up to 66bits / 1K Byte |
| MTBF | >3,000,000 hours |
| Terabyte Written (TBW) | 16GB : 104 32GB : 208 64GB : 416 128GB : 833 256GB : 1666 |
| Low Power Management | DIPM / HIPM mode |
| Supply Voltage | +5V DC \pm 5% |
| Power Consumption | Active mode: < 2030mW Idle mode: < 425mW |
| Dimension (L x W x H) | 100.00*69.85*7.00mm |
| Weight | 61 \pm 1g |

2.2 Performance

The performance was measured with below PC configuration:

- Platform: GIGABYTE GA-Z170-HD3P
- RAM: Cervoz CIR-S4DUSS2404G (DDR4 4G 2400MHz)
- Operation Systems: Windows 10
- Testing Utility: Crystal Disk Mark v5.1.0 x64
- SATAIII port (6.0 Gb/s) performance

| Capacity | 16GB | 32GB | 64GB | 128GB | 256GB |
|-------------------------|---------|---------|---------|---------|---------|
| Sequential Read (max.) | 300MB/s | 550MB/s | 550MB/s | 550MB/s | 550MB/s |
| Sequential Write (max.) | 155MB/s | 310MB/s | 460MB/s | 465MB/s | 465MB/s |
| 4KB Random Read (QD32) | 100MB/s | 195MB/s | 275MB/s | 285MB/s | 285MB/s |
| 4KB Random Write (QD32) | 160MB/s | 315MB/s | 325MB/s | 305MB/s | 310MB/s |

Actual performance may vary depending on use conditions and environment

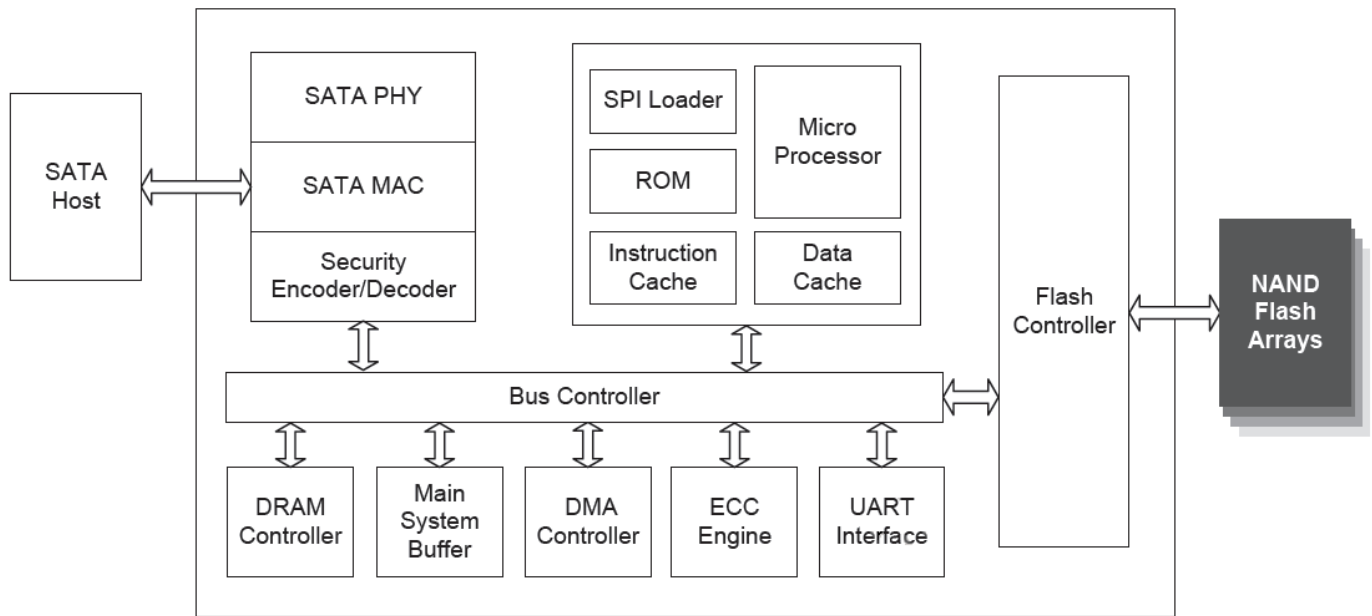
2.3 Drive Capacity

| Capacity | Cylinders | Heads | Sectors | Max LBA |
|----------|-----------|-------|---------|-------------|
| 16GB | 16,383 | 16 | 63 | 31,277,232 |
| 32GB | 16,383 | 16 | 63 | 62,533,296 |
| 64GB | 16,383 | 16 | 63 | 125,045,424 |
| 128GB | 16,383 | 16 | 63 | 250,069,680 |
| 256GB | 16,383 | 16 | 63 | 500,118,192 |

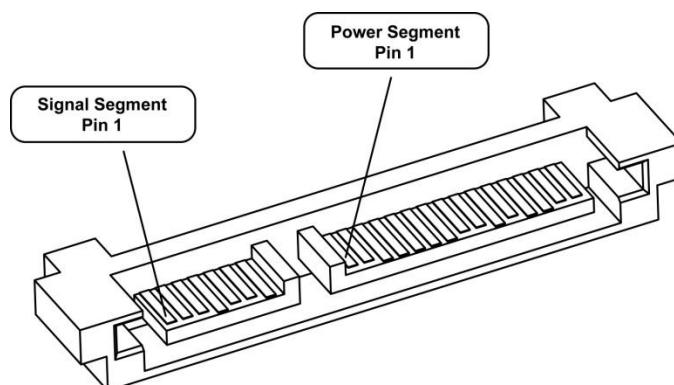


2.4 Electronic Specifications

2.4.1 Block Diagram



2.4.2 Pin Assignment



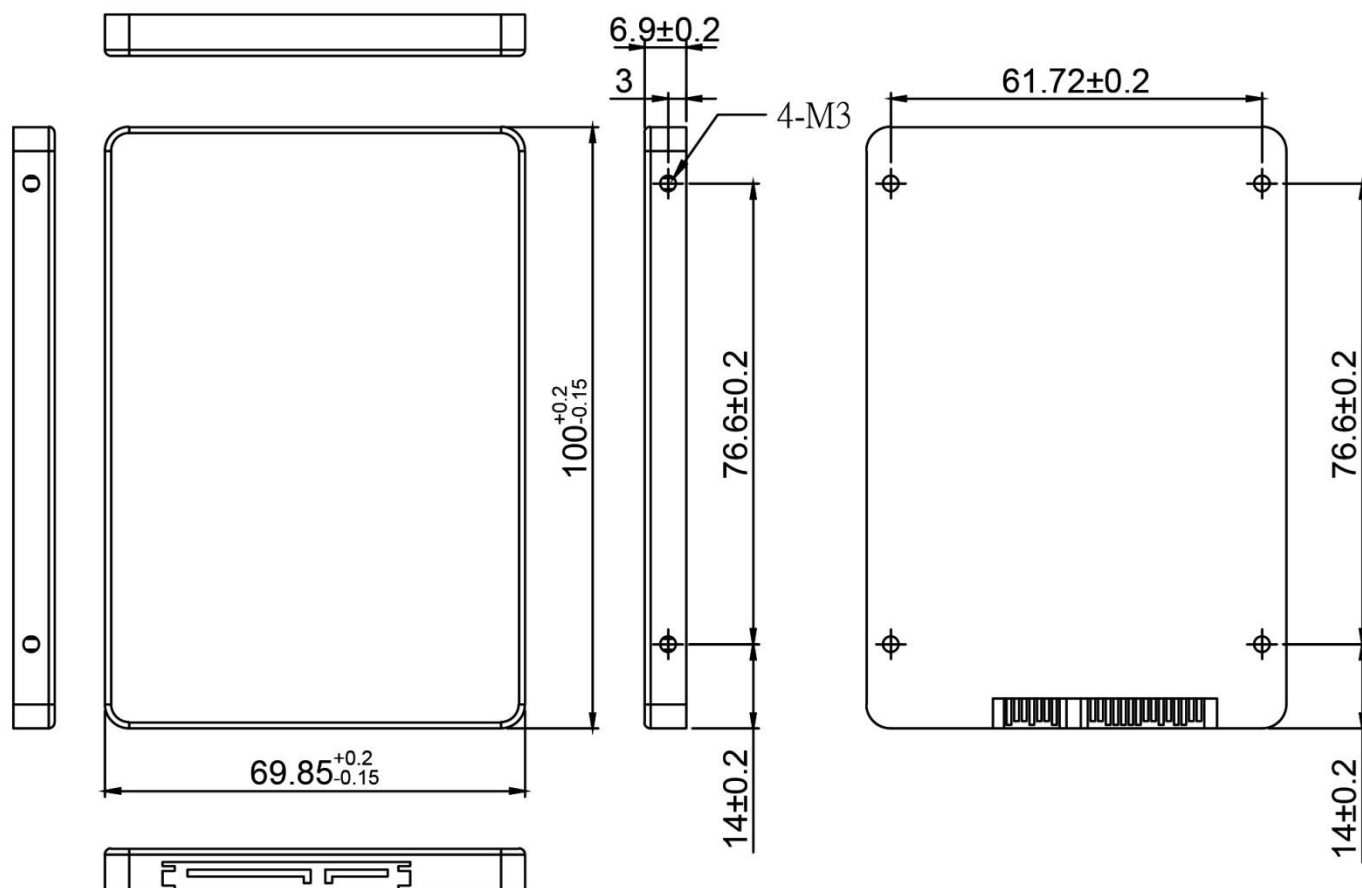
| Group | Pin No. | Function | Description |
|----------------|---------|----------|------------------------------------|
| Signal Segment | S1 | GND | Ground |
| | S2 | Rx+ | Differential Signals Pair Receive |
| | S3 | Rx- | |
| | S4 | GND | Ground |
| | S5 | Tx- | Differential Signals Pair Transmit |
| | S6 | Tx+ | |
| | S7 | GND | Ground |
| Key & Spacing | | | |
| Power Segment | P1 | NC | NA |
| | P2 | NC | NA |
| | P3 | NC | NA |
| | P4 | GND | Ground |
| | P5 | GND | Ground |
| | P6 | GND | Ground |
| | P7 | V5/PC | +5V Power supply, Pre-charge |
| | P8 | V5 | +5V Power supply |
| | P9 | V5 | +5V Power supply |
| | P10 | GND | Ground |
| | P11 | NC | NA |
| | P12 | GND | Ground |
| | P13 | NC | NA |
| | P14 | NC | NA |
| | P15 | NC | NA |

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 | 2.5" SATA |
| Length | 100.00 mm +0.2 / -0.15 mm |
| Width | 69.85 mm +0.2 / -0.15 mm |
| Thickness | 6.90 mm ± 0.2 mm |



3. Supported Command

3.1 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 |

| Command | Code | Protocol |
|--|------|--------------|
| 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 |

| Command | Code | Protocol |
|---------------------------------------|------|--------------|
| 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 |

3.2 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 • Device supports initiating power management |
| 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 |
| 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 |
| 93 - 99 | V | 0000h | Reserved |
| 100 - 103 | V | XXXXh | Maximum user LBA for 48-bit address feature set |
| 104 | V | 0000h | Reserved |

| Word | F/V | Default Value | Description |
|-----------|-----|---------------|---|
| 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.

3.3 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).

3.4 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 |

3.5 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) |

4. Part No. Decoder

4.1 Part No. Decoder

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

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 |
| 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) |

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 |

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 |

9. Operating Temperature

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