

Cervoz Industrial Memory Card

CFast

Momentum Series (MLC)

M350 Family

Product Datasheet



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Revision History

| Date | Revision | Description |
|------------|----------|---|
| 2017.12.14 | 1.0 | First Released |
| 2019.10.01 | 1.1 | 1.3 Ordering Information Added 2.2 Performance Updated |
| 2022.12.30 | 1.2 | MTBF Updated |



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1. Product Overview

1.1 Introduction

Cervoz Industrial CFast Card M350 Family is a high capacity Solid State Flash Disk product that is in compliance with the CFast and SATA III standards. The device design is based on the 7pin for data segment and 17pin for power and controller segment. The M350 Family CFast card is in low profile form factor and fits in any systems with CFast slots. M350 Family uses superior quality preselected multi-level cell (MLC) NAND flash memory from the industry leading manufacturer Toshiba.

M350 Family offers outstanding performance and reliability; the product family is a perfect solution for price sensitive semi-industrial and general industrial applications.

1.2 Feature

- Compliant with SATA III 6.0Gb/s
- MLC NAND flash memory
- Capacity: 32GB ~128GB
- Operating as boot disk
- Static and dynamic wear leveling
- Bad block management
- S.M.A.R.T. & TRIM command

1.3 Product Appearance & Models

Cervoz Industrial CFast Card M350



| M350 Family Standard Temp. (0°C ~ 70°C) Model No. | M350 Family Wide Temp. (-40°C ~ 85°C) Model No. | Capacity |
|---|---|----------|
| CIM-CAM350TKD032GS | CIM-CAM350TKD032GW | 32GB |
| CIM-CAM350TKD064GS | CIM-CAM350TKD064GW | 64GB |
| CIM-CAM350TLD128GS | CIM-CAM350TLD128GW | 128GB |

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 | CFast |
| Interface | SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s) |
| Connector | SATA (7+17 pin) |
| NAND Flash Type | MLC |
| Capacity | 32GB/64GB/128GB |
| Sequential Read | up to 495MB/s |
| Sequential Write | up to 445MB/s |
| ECC Scheme | Applies the LDPC (Low Density Parity Check) of ECC algorithm |
| MTBF | >3,000,000 hours |
| TeraByte Written (TBW) | 32GB: 31 64GB: 63 128GB: 125 |
| Low Power Management | DIPM/HIPM mode |
| Supply Voltage | 3.3V DC +/-5% |
| Power Consumption | Active mode: < 1550mW Idle mode: < 300mW |
| Dimension (LxWxH) | 42.8*36.4*3.3mm |

2.2 Performance

The performance was measured with below PC configuration:

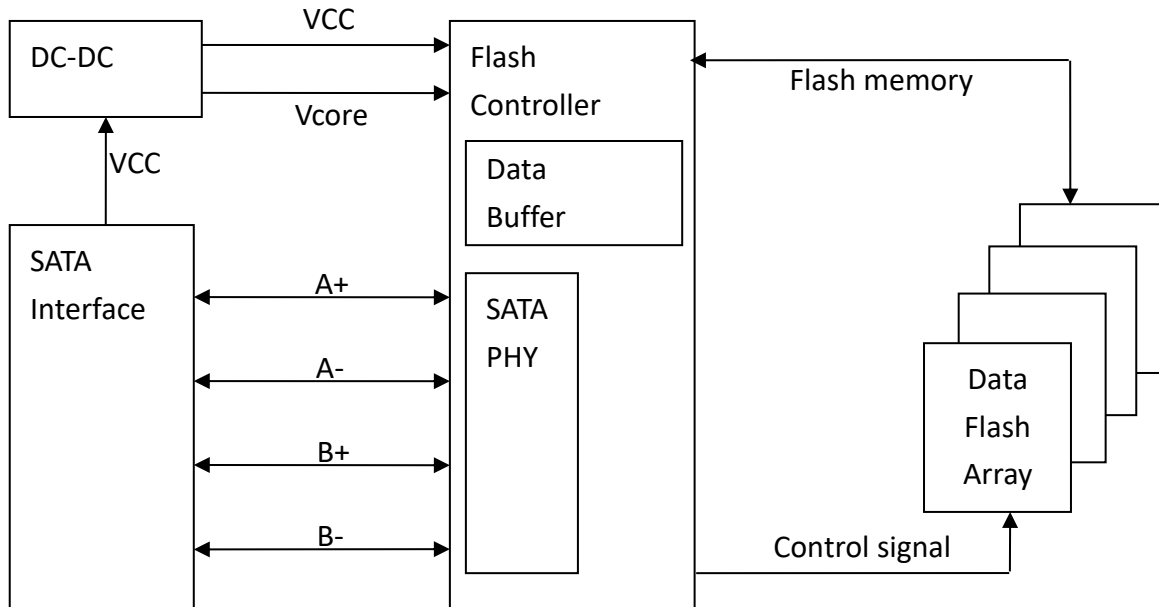
- Platform: GIGABYTE GA-Z97MX-Gaming5 (Intel Z97)
- RAM: Cervoz CIR-S3DUSI1302G(DDR3 2G 1333MHz)
- Operation Systems: Win10 64bit
- Testing Utility: Crystal Disk Mark v5.1.0
- SATAIII port (6.0 Gb/s) performance

| Capacity | 32GB | 64GB | 128GB |
|--------------------------------|---------|---------|---------|
| Sequential Read (max.) | 350MB/s | 495MB/s | 495MB/s |
| Sequential Write (max.) | 170MB/s | 315MB/s | 445MB/s |
| 4KB Random Read (QD32) | 155MB/s | 295MB/s | 345MB/s |
| 4KB Random Write (QD32) | 160MB/s | 290MB/s | 325MB/s |

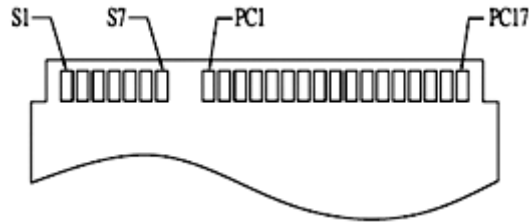
Actual performance may vary depending on use conditions and environment

2.3 Electronic Specifications

2.3.1 Block Diagram



2.3.2 Pin Assignment



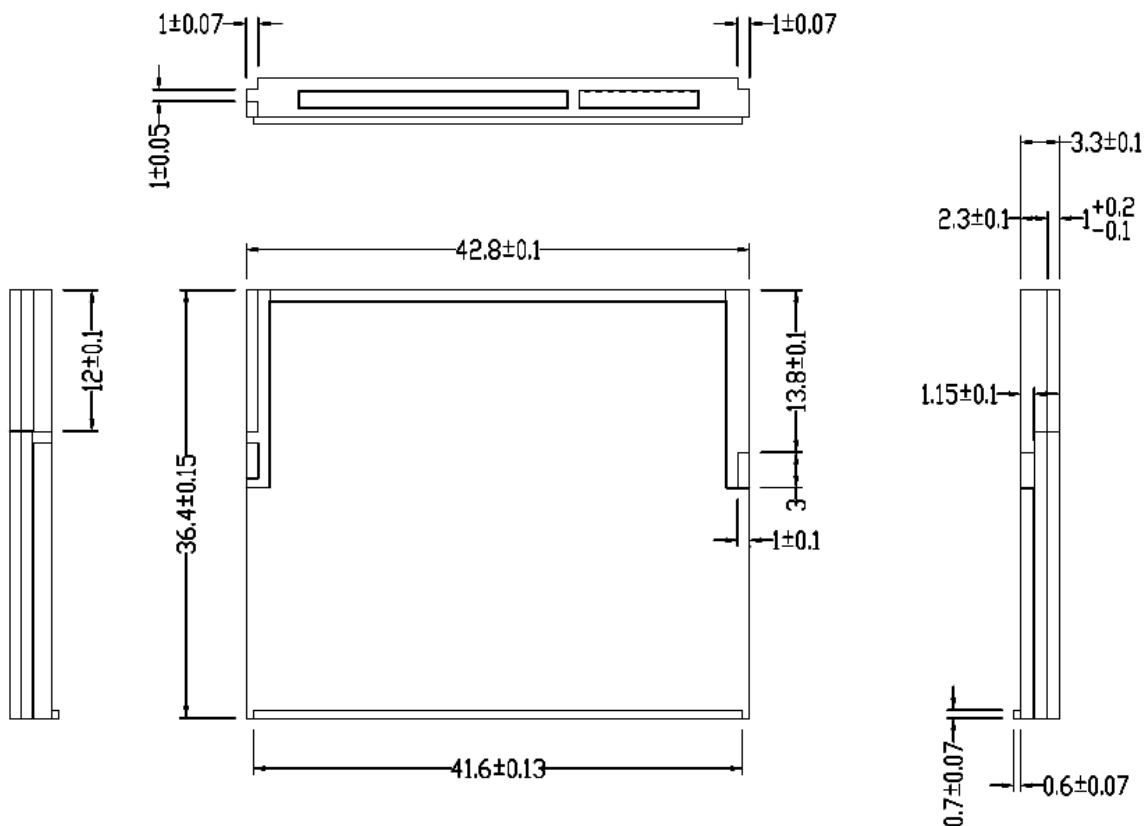
| Pin # | Segment | Pin Definition | Type | Description | Meting Sequence |
|-------------|---------|----------------|-------------------|--------------------------------------|-----------------|
| S1 | SATA | SGND | Signal GND | Ground for signal integrity | 1 st |
| S2 | SATA | A+ | SATA Differential | Signal Pair A | 2 nd |
| S3 | SATA | A- | SATA Differential | Signal Pair A | 2 nd |
| S4 | SATA | SGND | Signal GND | Ground for signal integrity | 1 st |
| S5 | SATA | B- | SATA Differential | Signal Pair B | 2 nd |
| S6 | SATA | B+ | SATA Differential | Signal Pair B | 2 nd |
| S7 | SATA | SGND | Signal GND | Ground for signal integrity | 1 st |
| | Key | | | | |
| | Key | | | | |
| PC1 | PWR/CTL | CDI | Input | Card Detect In | 3 rd |
| PC2 | PWR/CTL | PGND | Device GND | | 1 st |
| PC3 | PWR/CTL | DEVSLP | DEVSLP Card Input | DevSleep Power State Enable | 2 nd |
| PC4 | PWR/CTL | | | Reserved | 2 nd |
| PC5 | PWR/CTL | | | Reserved | 2 nd |
| PC6 | PWR/CTL | | | Reserved | 2 nd |
| PC7 | PWR/CTL | PGND | Device GND | | 1 st |
| PC8 | PWR/CTL | LED1 | LED Output | LED Output | 2 nd |
| PC9 | PWR/CTL | LED2 | LED Output | LED Output | 2 nd |
| PC10 | PWR/CTL | | | Reserved | 2 nd |
| PC11 | PWR/CTL | | | Reserved | 2 nd |
| PC12 | PWR/CTL | IFDet | GND | Card output, connect to PGND on card | 2 nd |
| PC13 | PWR/CTL | PWR | 3.3V | Device Power (3.3V) | 2 nd |
| PC14 | PWR/CTL | PWR | 3.3V | Device Power (3.3V) | 2 nd |
| PC15 | PWR/CTL | PGND | Device GND | Device Ground | 1 st |
| PC16 | PWR/CTL | PGND | Device GND | Device Ground | 1 st |
| PC17 | PWR/CTL | CDO | Output | Card Detect Out | 3 rd |

2.4 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 | 10~95%, Non-Condensing |
| Vibration | Non-Operating | 20G, 10Hz~2000Hz |
| Shock | Non-Operating | 1500G, 0.5ms |

2.5 Mechanical Specifications

| Type | Value |
|-------------|-------------------|
| Form Factor | CFast |
| Length | 42.80mm +/-0.10mm |
| Width | 36.40mm +/-0.15mm |
| Thickness | 3.30mm +/-0.10mm |



3. Supported Command

3.1 List of Command Sets

| Code | Description | Code | Description |
|----------|-----------------------------------|----------|---|
| 00h | NOP | B0h, D1h | SMART READ DATA ATTRIBUTE THRESHOLD |
| 06h | Data Set Management | B0h, D2h | SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE |
| 10h | Recalibrate | B0h, D3h | SMART SAVE ATTRIBUTE VALUES |
| 20h | Read Sectors | B0h, D4h | SMART EXECUTE OFF-LINE IMMEDIATE |
| 21h | Read Sectors without Retry | B0h, D5h | SMART READ LOG |
| 24h | Read Sectors EXT | B0h, D6h | SMART WRITE LOG |
| 25h | Read DMA EXT | B0h, D8h | SMART ENABLE OPERATIONS |
| 27h | Read Native Max Address EXT | B0h, D9h | SMART DISABLE OPERATIONS |
| 29h | Read Multiple EXT | B0h, DAh | SMART RETURN STATUS |
| 2Fh | Read Log EXT | B0h, DBh | SMART ENABLE/DISABLE AUTOMATIC OFF-LINE |
| 30h | Write Sectors | B1h | DEVICE CONFIGURATION OVERLAY |
| 31h | Write Sectors without Retry | B1h, C0h | DEVICE CONFIGURATION RESTORE |
| 34h | Write Sectors EXT | B1h, C1h | DEVICE CONFIGURATION FREEZE LOCK |
| 35h | Write DMA EXT | B1h, C2h | DEVICE CONFIGURATION IDENTIFY |
| 37h | Set Native Max Address EXT | B1h, C3h | DEVICE CONFIGURATION SET |
| 39h | Write Multiple EXT | B1h, C4h | DEVICE CONFIGURATION IDENTIFY DMA |
| 3Dh | Write DMA FUA EXT | B1h, C5h | DEVICE CONFIGURATION SET DMA |
| 3Fh | Write Long EXT | C4h | Read Multiple |
| 40h | Read Verify Sectors | C5h | Write Multiple |
| 41h | Read Verify Sectors without Retry | C6h | Set Multiple Mode |
| 42h | Read Verify Sectors EXT | C8h | Read DMA |
| 45h | Write Uncorrectable EXT | C9h | Read DMA without Retry |
| 47h | Read Log DMA EXT | CAh | Write DMA |
| 57h | Write Log DMA EXT | CBh | Write DMA without Retry |
| 60h | Read FPDMA Queued | CEh | Write Multiple FUA EXT |
| 61h | Write FPDMA Queued | E0h | Standby Immediate |
| 70h | Seek | E1h | Idle Immediate |
| 90h | Execute Device Diagnostic | E2h | Standby |
| 91h | Initialize Device Parameters | E3h | Idle |
| 92h | Download Microcode | E4h | Read Buffer |
| 93h | Download Microcode DMA | E5h | Check Power Mode |
| B0h | SMART | E6h | Sleep |
| B0h, D0h | SMART READ DATA | E7h | Flush Cache |

| Code | Description | Code | Description |
|---------------|--|------------------|---|
| E8h | Write Buffer | Efh, 82h | Disable write cache |
| E9h | Read Buffer DMA | Efh, 85h | Disable advanced power management |
| EAh | Flush Cache EXT | Efh, 90h | Disable use of Serial ATA feature set |
| EBh | Write Buffer DMA | Efh, 90h, 02h | Disable DMA Setup FIS Auto-Activate optimization |
| ECh | Identify Device | Efh, 90h, 03h | Disable Device-initiated interface power state (DIPM) transitions |
| EFh | Set Features | Efh, 90h, 06h | Disable Software Settings Preservation (SSP) |
| Efh, 02h | Enable 8-bit PIO transfer mode | Efh, 90h, 07h | Disable Device Automatic Partial to Slumber transitions |
| Efh, 03h | Set transfer mode based on value in Count field | Efh, 90h, 09h | Disable Device Sleep |
| Efh, 05h | Enable advanced power management | Efh, AAh | Enable read look-ahead feature |
| Efh, 10h | Enable use of Serial ATA feature | Efh, CCh | Enable reverting to power-on defaults |
| Efh, 10h, 02h | Enable DMA Setup FIS Auto-Activate optimization | F1h | Security Set Password |
| Efh, 10h, 03h | Enable Device-initiated interface power state (DIPM) transitions | F2h | Security Unlock |
| Efh, 10h, 06h | Enable Software Settings Preservation (SSP) | F3h | Security Erase Prepare |
| Efh, 10h, 07h | Enable Device Automatic Partial to Slumber transitions | F4h | Security Erase Unit |
| Efh, 10h, 09h | Enable Device Sleep | F5h | Security Freeze Lock |
| Efh, 55h | Disable read look-ahead feature | F6h | Security Disable Password |
| Efh, 66h | Disable reverting to power-on defaults | F8h | Read Native Max Address |

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) | NAND Flash | 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. NAND Flash

| | |
|---|---------|
| 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) |