

# Cervoz Industrial Memory Card

CFast

Supreme Series (SLC)

S350 Family

*Product Datasheet*



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## Revision History

Date	Revision	Description
2020.11.09	1.0	First Released

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## 1. Product Overview

### 1.1 Introduction

Cervoz Industrial CFast Card S350 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 S350 CFast card is in low profile form factor and fits in any systems with CFast slots.

S350 uses superior quality, preselected single-level cell (SLC) NAND flash memory from the industry leading manufacturer Kioxia (Toshiba). This product includes both standard temperature range and wide temperature range options with various capacities to choose from.

S350 offers outstanding performance and reliability, ideal for extreme applications in mission critical environments. Factory Automation, Transportation, Networking and Video Surveillance all benefit from this superior read/write endurance and data retention.

### 1.2 Feature

- Compliant with SATA III 6.0Gb/s
- SLC NAND flash memory
- Capacity: 8GB ~ 32GB
- Operating as boot disk
- Product includes Standard Temperature range & Wide Temperature range
- Static and dynamic wear leveling
- Bad block management
- S.M.A.R.T. & TRIM command

### 1.3 Product Appearance & Models

#### Cervoz Industrial CFAST Card S350



S350 Family Standard Temp. (0°C ~ 70°C) Model No.	S350 Family Wide Temp. (-40°C ~ 85°C) Model No.	Capacity
CIM-CAS350TIB008GS	CIM-CAS350TIB008GW	8GB
CIM-CAS350TIB016GS	CIM-CAS350TIB016GW	16GB
CIM-CAS350TJB032GS	CIM-CAS350TJB032GW	32GB

**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

<b>Form Factor</b>	CFast
<b>Interface</b>	SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s)
<b>Connector</b>	SATA (7+17 pin)
<b>NAND Flash Type</b>	SLC
<b>Capacity</b>	8GB/16GB/32GB
<b>Sequential Read</b>	up to 510MB/s
<b>Sequential Write</b>	up to 300MB/s
<b>ECC Scheme</b>	Applies the LDPC (Low Density Parity Check) of ECC algorithm
<b>MTBF</b>	>3,000,000 hours
<b>TeraByte Written (TBW)</b>	8GB : 156 16GB : 313 32GB : 625
<b>Low Power Management</b>	DIPM/HIPM mode
<b>Supply Voltage</b>	3.3V DC +/-5%
<b>Power Consumption</b>	Active mode: < 1700mW Idle mode: < 325mW
<b>Dimension (LxWxH)</b>	42.8*36.4*3.3mm

### 2.2 Performance

The performance was measured with below PC configuration:

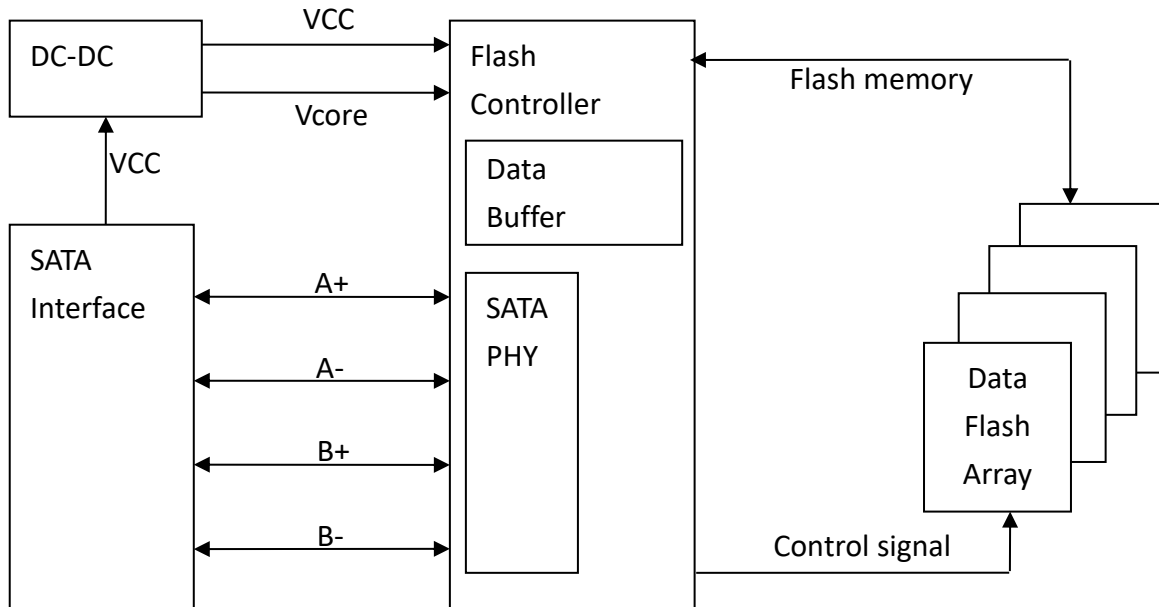
- Platform: GIGABYTE GA-Z97MX-Gaming5 (Intel Z97)
- RAM: Cervoz CIR-S3DUSI1302G(DDR3 2G 1333MHz)
- Operation Systems: Win10 64bit
- Testing Utility: Crystal Disk Mark v5.1.0
- SATAIII port (6.0 Gb/s) performance

<b>Capacity</b>	8GB	16GB	32GB
<b>Sequential Read (max.)</b>	320MB/s	510MB/s	510MB/s
<b>Sequential Write (max.)</b>	70MB/s	150MB/s	300MB/s
<b>4KB Random Read (QD32)</b>	160MB/s	280MB/s	330MB/s
<b>4KB Random Write (QD32)</b>	70MB/s	150MB/s	280MB/s

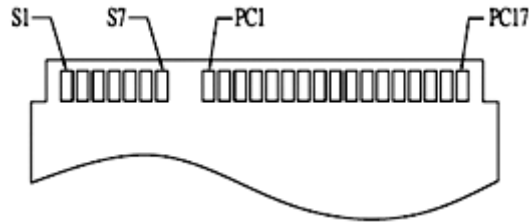
Actual performance may vary depending on use conditions and environment

## 2.3 Electronic Specifications

### 2.3.1 Block Diagram



### 2.3.2 Pin Assignment



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

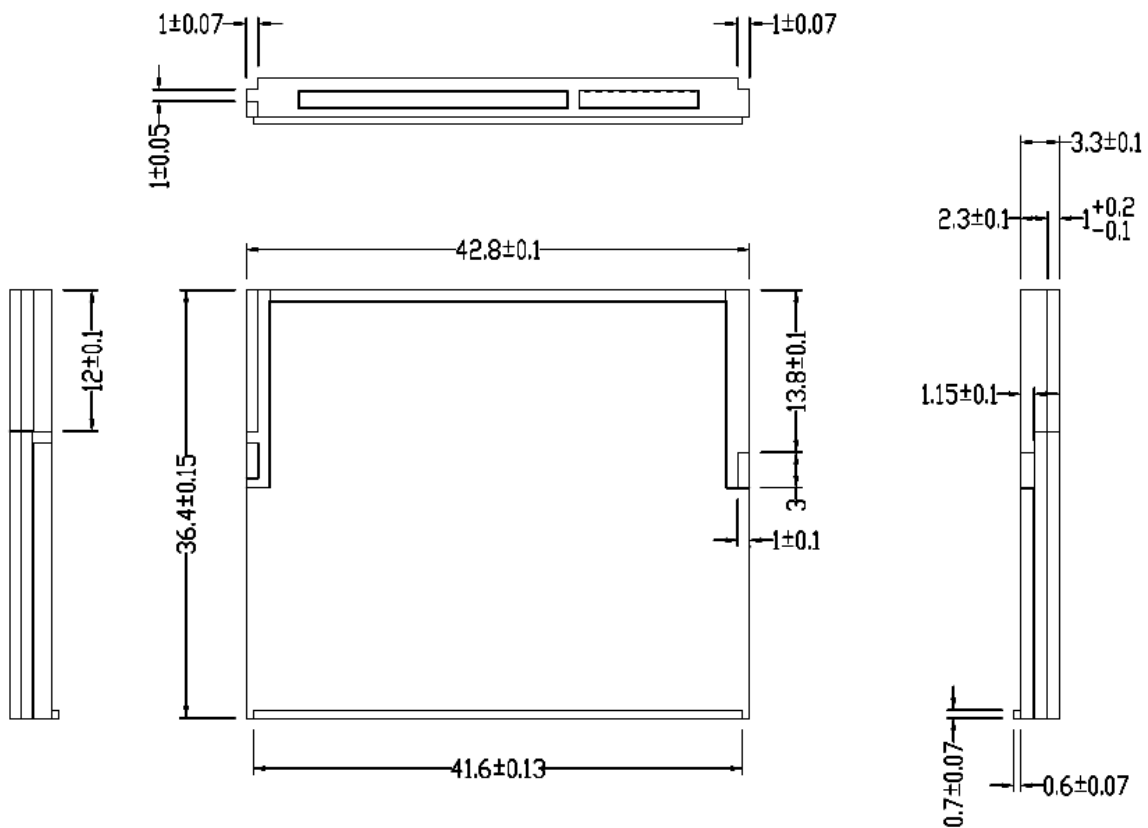


## 2.4 Environmental Specifications

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

4	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)	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
7S	SATA Disk 7pin Vertical Short
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)
T	Titan Series (TLC)

#### 4. Cervoz Family Code

Bus and Internal Control for Cervoz Product Families

##### 5. Flash Brand

M	Micron
T	Kioxia (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)