

# Cervoz Industrial Memory Card

CFast

Titan Series (TLC)

T380 Family

*Product Datasheet*



Date: 2022.12.30

Revision: 1.1

File: Cervoz\_Industrial\_Memory\_Card\_CFast\_T380\_Datasheet\_Rev1.1



## Revision History

Date	Revision	Description
2021.12.27	1.0	First Released
2022.12.30	1.1	MTBF and TBW Updated



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## 1. Product Overview

### 1.1 Introduction

Cervoz Industrial CFast Card T380 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 T380 Family CFast card is in low profile form factor and fits in any systems with CFast slots.

T380 family uses SSD grade quality 3D NAND flash memory from the industry leading manufacturer Micron. Cervoz's firmware builds in a powerful ECC algorithm call Low-Density Parity Check (LDPC) decoding to improve data reliability. This product includes various capacities to choose from.

T380 family offers outstanding performance and reliability; the product family is a good cost-effective solution for semi-industrial and high-capacity storage applications.

### 1.2 Feature

- Compliant with SATA III 6.0Gb/s
- 3D TLC NAND flash memory
- Capacity: 64GB ~ 1TB
- End-to-End data protection
- SLC write cache technology
- 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 T380



T380 Family Standard Temp. (0°C ~ 70°C) Model No.	T380 Family Wide Temp. (-40°C ~ 85°C) Model No.	Capacity
CIM-CAT380MLF064GS	CIM-CAT380MLF064GW	64GB
CIM-CAT380MMF128GS	CIM-CAT380MMF128GW	128GB
CIM-CAT380MMF256GS	CIM-CAT380MMF256GW	256GB
CIM-CAT380MOF512GS	CIM-CAT380MOF512GW	512GB
CIM-CAT380MOF001TS	CIM-CAT380MOF001TW	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

<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>	3D TLC
<b>Capacity</b>	64GB/128GB/256GB/512GB/1TB
<b>Sequential Read</b>	up to 560MB/s
<b>Sequential Write</b>	up to 505MB/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>	64GB : 109 128GB : 219 256GB : 438 512GB : 875 1TB : 1750
<b>Low Power Management</b>	DIPM/HIPM mode
<b>Supply Voltage</b>	3.3V DC +/-5%
<b>Power Consumption</b>	Active mode: < 1400mW Idle mode: < 275mW
<b>Dimension (LxWxH)</b>	42.8*36.4*3.3mm

### 2.2 Performance

The performance was measured with below PC configuration:

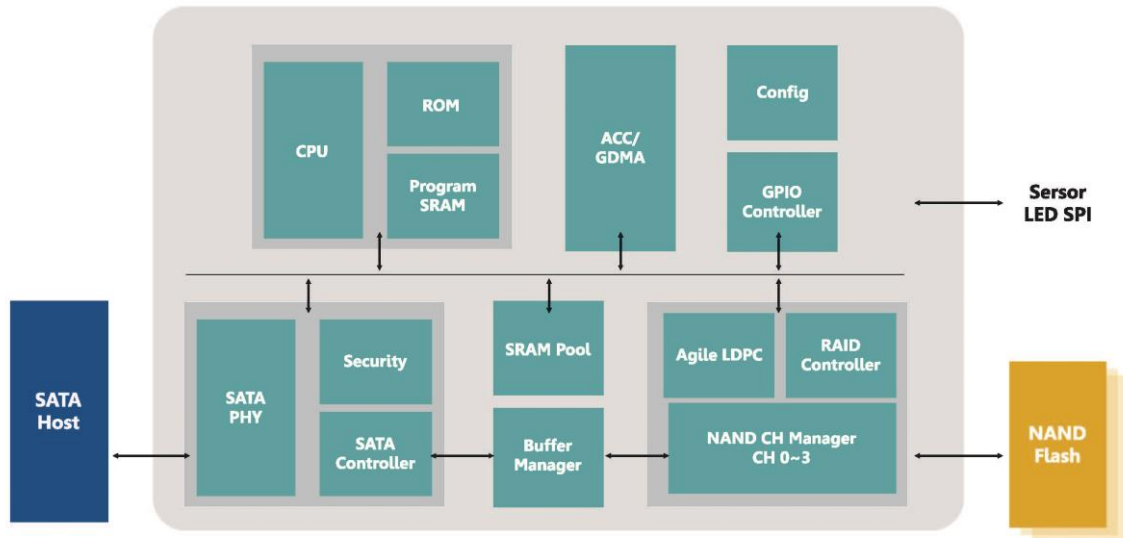
- Platform: ASUS Z97-A (Intel Z97)
- RAM: Cervoz CIR-S3DUSK1604G(DDR3 4G 1600MHz)
- Operation Systems: Windows 7
- Testing Utility: Crystal Disk Mark v5.1.0
- SATAIII port (6.0 Gb/s) performance

Capacity	64GB	128GB	256GB	512GB	1TB
<b>Sequential Read (Q32T1)</b>	290MB/s	470MB/s	560MB/s	555MB/s	560MB/s
<b>Sequential Write (Q32T1)</b>	235MB/s	470MB/s	495MB/s	500MB/s	505MB/s
<b>4KB Random Read (Q32T1)</b>	90MB/s	180MB/s	345MB/s	395MB/s	400MB/s
<b>4KB Random Write (Q32T1)</b>	210MB/s	305MB/s	315MB/s	315MB/s	310MB/s

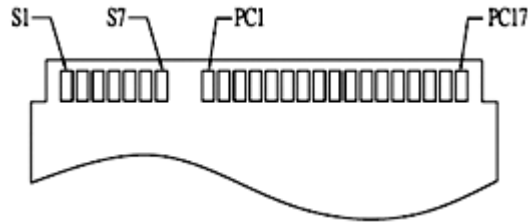
Actual performance may vary depending on use conditions and environment

## 2.3 Electronic Specifications

### 2.3.1 Block Diagram



### 2.3.2 Pin Assignment



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

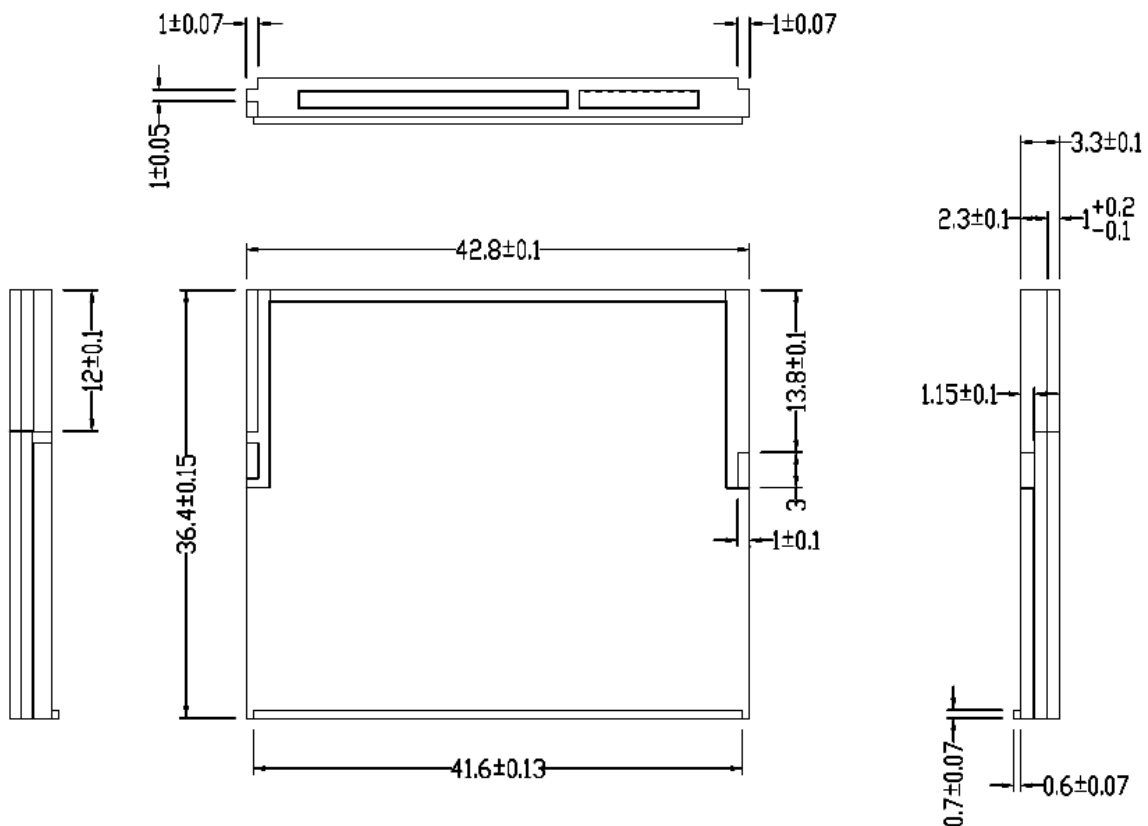


## 2.4 Environmental Specifications

Type		Value
<b>Temperature</b>	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
<b>Humidity</b>	Operating & Storage	10~95%, Non-Condensing
<b>Vibration</b>	Non-Operating	20G, 10Hz~2000Hz
<b>Shock</b>	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 Command Name	Code	PARAMETERS USED					
		SC	SC	SC	SC	SC	SC
CHECK POWER MODE	E5h	X	X	X	X	X	X
EXECUTE DIAGNOSTICS	90h	X	X	X	X	X	X
FLUSH CACHE	E7h	X	X	X	X	X	X
IDENTIFY DEVICE	ECh	X	X	X	X	X	X
IDLE	E3h	O	O	O	O	O	O
IDLE IMMEDIATE	E1h	X	X	X	X	X	X
INITIALIZE DEVICE PARAMETERS	91h	O	O	O	O	O	O
READ DMA	C8h	O	O	O	O	O	O
READ DMA EXT	25h	O	O	O	O	O	O
READ FPDMA QUEUED	60h	O	O	O	O	O	O
READ LOG DMA EXT	47h	O	O	O	O	O	O
READ LOG EXT	2Fh	O	O	O	O	O	O
READ MULTIPLE	C4h	O	O	O	O	O	O
READ SECTOR(S)	20h or 21h	O	O	O	O	O	O
READ VERIFY SECTOR(S)	40h or 41h	O	O	O	O	O	O
RECALIBRATE	10h	X	X	X	X	X	X
SECURITY DISABLE PASSWORD	F6h	X	X	X	X	X	X
SECURITY ERASE PREPARE	F3h	X	X	X	X	X	X
SECURITY ERASE UNIT	F4h	X	X	X	X	X	X
SECURITY FREEZE LOCK	F5h	X	X	X	X	X	X
SECURITY SET PASSWORD	F1h	X	X	X	X	X	X
SECURITY UNLOCK	F2h	X	X	X	X	X	X
SEEK	7xh	X	X	X	X	X	X
SET FEATURES	EFh	O	O	O	O	O	O
SET MULTIPLE MODE	C6h	O	O	O	O	O	O
SLEEP	E6h	X	X	X	X	X	X
SMART	B0h	X	X	X	X	X	X
STANDBY	E2h	X	X	X	X	X	X
STANDBY IMMEDIATE	E0h	X	X	X	X	X	X
WRITE DMA	CAh	O	O	O	O	O	O
WRITE DMA EXT	35h	O	O	O	O	O	O

WRITE FPDMA QUEUED	61h	0	0	0	0	0	0
WRITE LOG DMA EXT	57h	0	0	0	0	0	0
WRITE LOG EXT	3Fh	0	0	0	0	0	0
WRITE MULTIPLE	C5h	0	0	0	0	0	0
WRITE SECTOR(S)	30h or 31h	0	0	0	0	0	0

Note:

O = Valid

X = Don't care

SC = Sector Count Register

SN = Sector Number Register

CY = Cylinder Low/High Register

DR = DEVICE SELECT Bit (DEVICE/HEAD Register Bit 4)

HD = HEAD SELECT Bit (DEVICE/HEAD Register Bit 3-0)

FT = Features Register

#### 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)
T	Titan Series (TLC)

#### 4. Cervoz Family Code

Bus and Internal Control for Cervoz Product Families

##### 5. NAND Flash

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)