Cervoz Industrial Memory Card

CFast

Reliance Series (RO-MLC)

R310 Family

Product Datasheet

Date: 2015.04.13

Revision: 1.1

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Revision History

Date	Revision	Description
2015.01.05	1.0	First Released
2015.04.13	1.1	TeraByte Written (TBW) Information Added

Table of Contents

1. Product Overview

1.1 Introduction

Cervoz Industrial CFast Card R310 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 R310 CFast card is in low profile form factor and fits in any systems with CFast slots.

R310 uses preselected multi-level cell (MLC) NAND flash memory from the industry leading manufacturer Toshiba 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 both standard temperature range and wide temperature range options with various capacities to choose from.

R310 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 Feature

- Compliant with SATA III 6.0Gb/s
- MLC NAND flash memory with RO-MLC technology
- Capacity: 2GB ~ 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 R310

R310 Family Standard Temp. (0°C ~ 70°C) Model No.	R310 Family Wide Temp. (-40°C ~ 85°C) Model No.	Capacity
CIM-CAR310THT002GS	CIM-CAR310THT002GW	2GB
CIM-CAR310TIT004GS	CIM-CAR310TIT004GW	4GB
CIM-CAR310TIT008GS	CIM-CAR310TIT008GW	8GB
CIM-CAR310TJT016GS	CIM-CAR310TJT016GW	16GB
CIM-CAR310TKB032GS	CIM-CAR310TKB032GW	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.

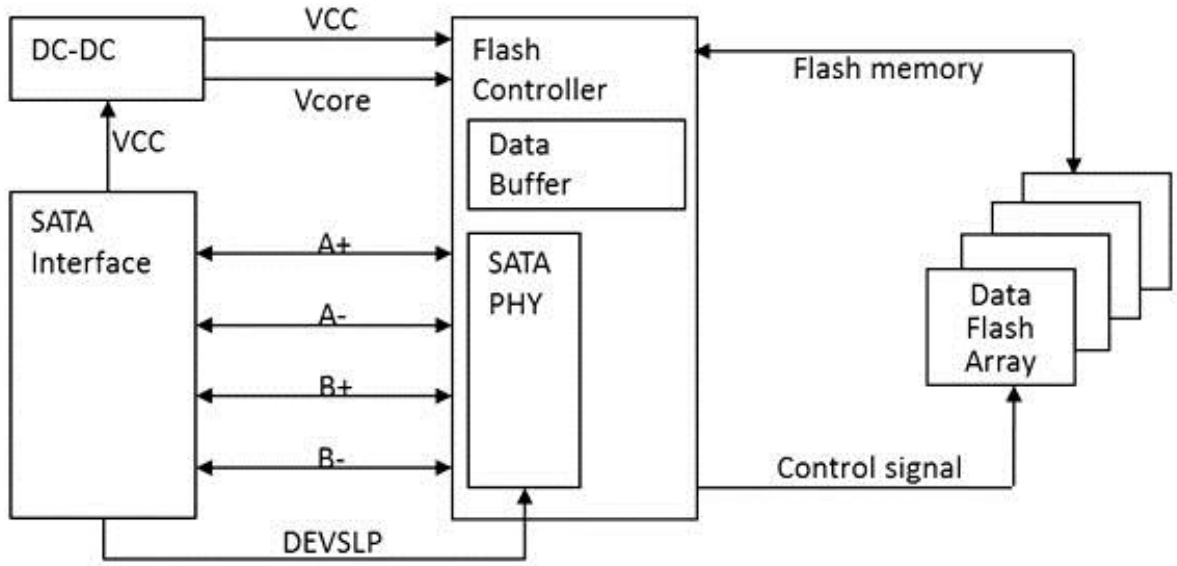
2. Product Specifications

2.1 General Specifications

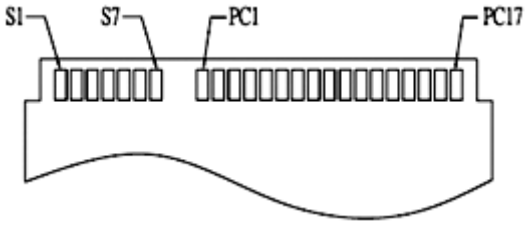
Form Factor	CFast
Interface	SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s)
Connector	SATA (7+17 pin)
NAND Flash Type	MLC (Controlled by Reliability Optimized-MLC Technology)
Capacity	2GB/4GB/8GB/16GB/32GB
Sequential Read	up to 520MB/s
Sequential Write	up to 195MB/s
ECC Scheme	up to 72bits / 1K Byte
MTBF	2,000,000 hours
TeraByte Written (TBW)	2GB : 26 4GB : 52 8GB : 103 16GB : 206 32GB : 413
Low Power Management	DEVSLP mode (Optional) DIPM/HIPM mode
Supply Voltage	+3.3V DC
Power Consumption	Active mode: < 1600mW Idle mode: < 300mW DEVSLP mode: < 5mW
Dimension (LxWxH)	42.8*36.4*3.3mm

2.2 Electronic Specifications

2.2.1 Block Diagram



2.2.2 Pin Assignment



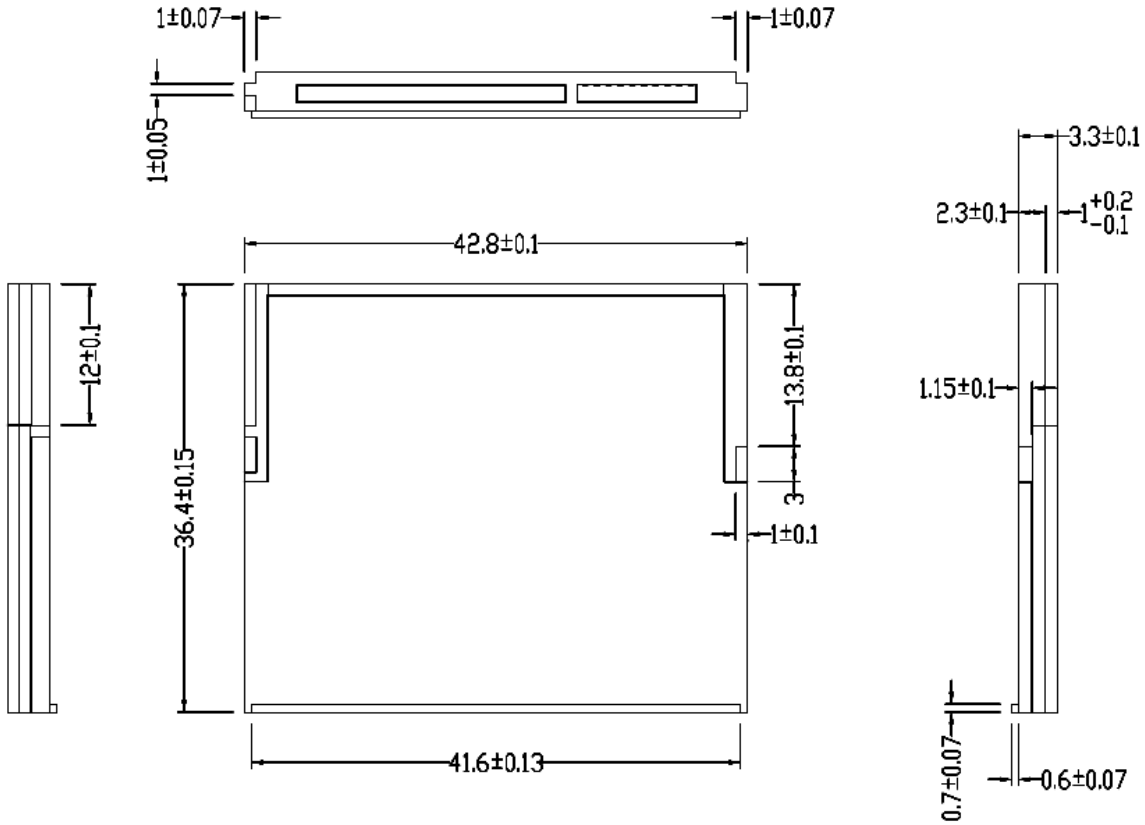
Pin #	Segment	Pin Definition	Type	Description	Meting Sequence
S1	SATA	SGND	Signal GND	Ground for signal integrity	1st
S2	SATA	A+	SATA Differential	Signal Pair A	2nd
S3	SATA	A-	SATA Differential	Signal Pair A	2nd
S4	SATA	SGND	Signal GND	Ground for signal integrity	1st
S5	SATA	B-	SATA Differential	Signal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

2.3 Environmental Specifications

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

2.4 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	97h	IDLE
06h	Data Set Management	98h	CHECK POWER MODE
10h-1Fh	Recalibrate	99h	SLEEP
20h	Read Sectors	B0h	SMART
21h	Read Sectors without Retry	B1h	DEVICE CONFIGURATION
24h	Read Sectors EXT	C4h	Read Multiple
25h	Read DMA EXT	C5h	Write Multiple
27h	Read Native Max Address EXT	C6h	Set Multiple Mode
29h	Read Multiple EXT	C8h	Read DMA
2Fh	Read Log EXT	C9h	Read DMA without Retry
30h	Write Sectors	CAh	Write DMA
31h	Write Sectors without Retry	CBh	Write DMA without Retry
34h	Write Sectors EXT	CEh	Write Multiple FUA EXT
35h	Write DMA EXT	E0h	Standby Immediate
37h	Set Native Max Address EXT	E1h	Idle Immediate
38h	CFA WRITE SECTORS WITHOUT ERASE	E2h	Standby
39h	Write Multiple EXT	E3h	Idle
3Dh	Write DMA FUA EXT	E4h	Read Buffer
3Fh	Write Long EXT	E5h	Check Power Mode
40h	Read Verify Sectors	E6h	Sleep
41h	Read Verify Sectors without Retry	E7h	Flush Cache
42h	Read Verify Sectors EXT	E8h	Write Buffer
45h	WRITE UNCORRECTABLE EXT	EAh	Flush Cache EXT
60h	Read FPDMA Queued	ECh	Identify Device
61h	Write FPDMA Queued	EFh	Set Features
70h-7Fh	Seek	F1h	Security Set Password
90h	Execute Device Diagnostic	F2h	Security Unlock
91h	Initialize Device Parameters	F3h	Security Erase Prepare
92h	Download Microcode	F4h	Security Erase Unit
93h	DOWNLOAD MICROCODE DMA	F5h	Security Freeze Lock
94h	STANDBY IMMEDIATE	F6h	Security Disable Password
95h	IDLE IMMEDIATE	F8h	Read Native Max Address
96h	STANDBY	F9h	Set 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	Die Package	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
HS	Half Slim
0V	PATA Disk 40pin Vertical
4V	PATA Disk 44pin Vertical
7T	SATA Disk 7pin Vertical Tall

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. Die Package

T	TSOP
B	BGA

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)