

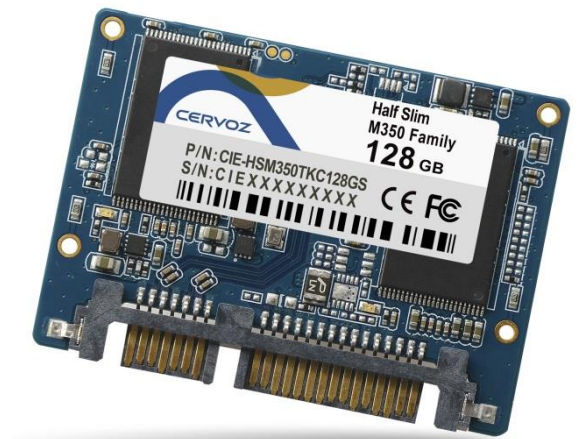
Cervoz Industrial Embedded Module

Half Slim

Momentum Series (MLC)

M350 Family

Product Datasheet



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Revision History

Date	Revision	Description
2017.03.03	Preliminary	First Released
2017.03.09	1.0	Product Picture Added
2017.03.27	1.1	3.1 List of Command Sets Updated
2017.05.26	1.2	1.3 Ordering Information Added
2022.12.30	1.3	MTBF Updated



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1. Product Overview

1.1 Introduction

Cervoz Industrial Half Slim Embedded Module M350 family is a Solid State Disk product that is in compliance with the SATA III standards. The device design is based on the 7pin for data segment and 15pin for power segment standards. The Half Slim Embedded Module M350 family fits in any 7+15 SATA sockets on a motherboard; it can be used for both booting or storage purposes.

M350 family uses superior quality preselected multi-level cell (MLC) NAND flash memory from the industry leading manufacturer Toshiba. This product includes various capacities to choose from.

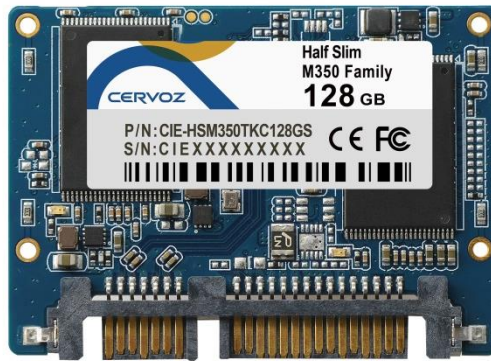
M350 family offers outstanding performance and reliability; the product family is a perfect solution for price sensitive semi-industrial and general industrial applications.

1.2 Feature

- Compliant with SATA III 6.0Gb/s
- MLC NAND flash memory
- Capacity: 32GB ~ 128GB
- Operating as boot disk
- 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 Half Slim Module M350



M350 Family Standard Temp. (0°C ~ 70°C) Model No.	M350 Family Wide Temp. (-40°C ~ 85°C) Model No.	Capacity
CIE-HSM350TJC032GS	CIE-HSM350TJC032GW	32GB
CIE-HSM350TJC064GS	CIE-HSM350TJC064GW	64GB
CIE-HSM350TKC128GS	N/A	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	Half Slim
Interface	SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s)
Connector	SATA (7+15pin)
NAND Flash Type	MLC
Capacity	Standard Temp. : 32GB/64GB/128GB
	Wide Temp. : 32GB/64GB
Sequential Read	up to 495MB/s
Sequential Write	up to 315MB/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	5V DC +/-5%
Power Consumption	Active mode: < 1600mW
	Idle mode: < 285mW
Dimension (LxWxH)	54.00*39.00*4.00mm

2.2 Performance

The performance was measured with below PC configuration:

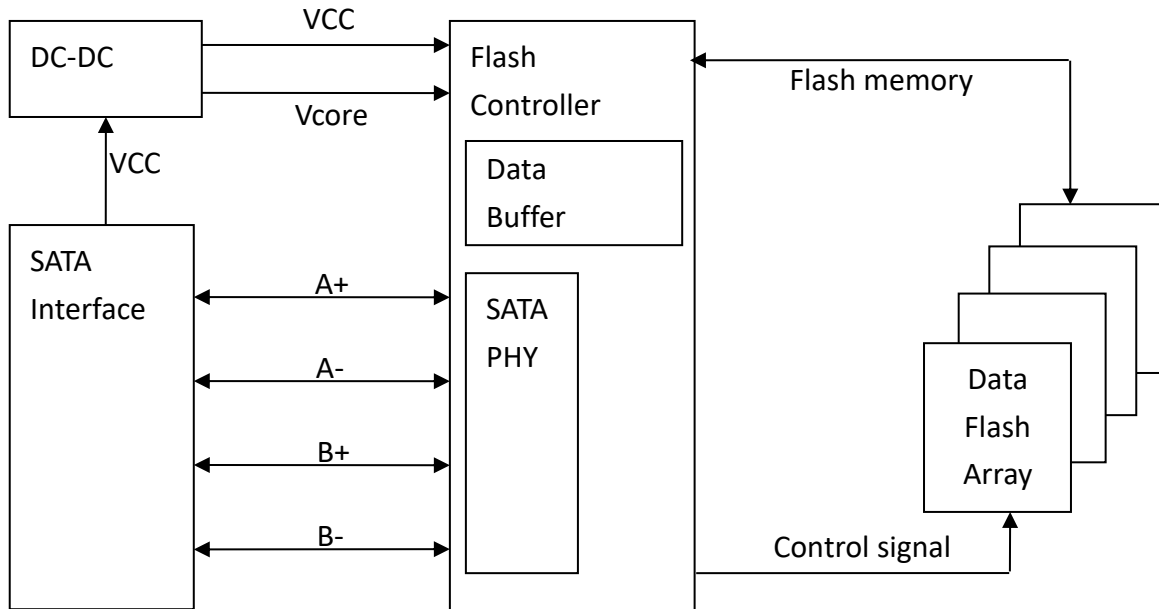
- Platform: ASUS Z97-A (Intel Z97)
- RAM: Cervoz CIR-S3DUSK1604G(DDR3 4G 1600MHz)
- Operation Systems: Windows 7
- Testing Utility: Crystal Disk Mark v5.1.0
- SATAIII port (6.0 Gb/s) performance

Capacity	32GB	64GB	128GB
Sequential Read (max.)	515MB/s	505MB/s	495MB/s
Sequential Write (max.)	160MB/s	265MB/s	315MB/s
4KB Random Read (QD32)	140MB/s	255MB/s	355MB/s
4KB Random Write (QD32)	110MB/s	145MB/s	240MB/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



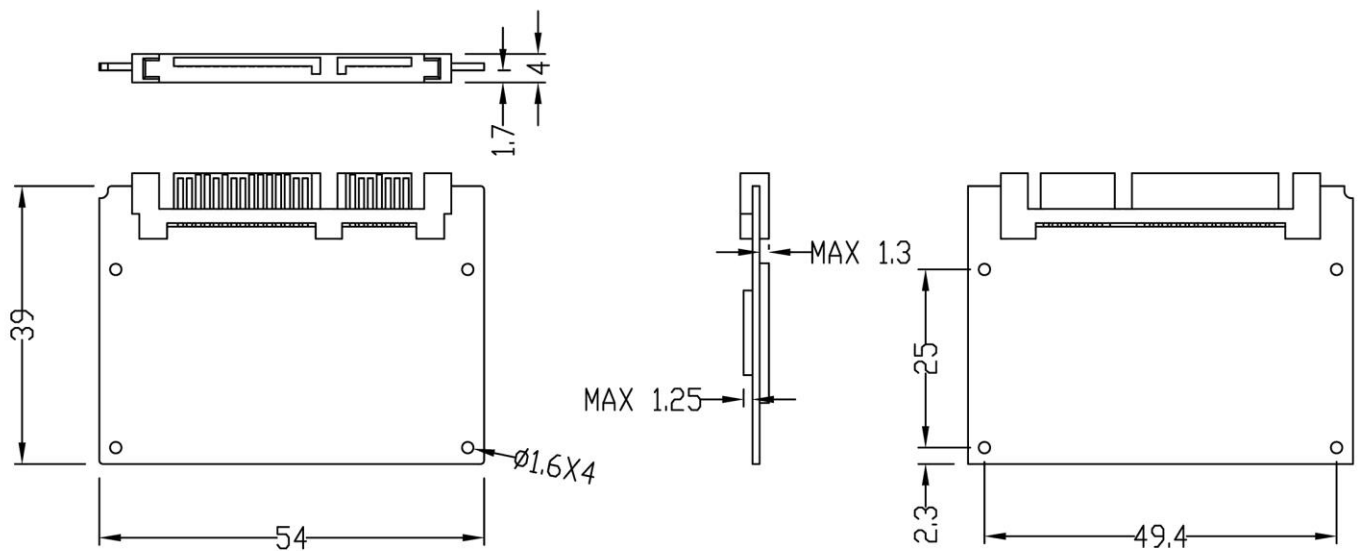
Group	Pin No.	Function	Description
Signal Segment	S1	GND	Ground
	S2	A+	Differential Signal Pair A
	S3	A –	Differential Signal Pair A
	S4	GND	Ground
	S5	B –	Differential Signal Pair B
	S6	B+	Differential Signal Pair B
	S7	GND	Ground
Key & Spacing			
Power Segment	P1	NC	Not Used (3.3V Power)
	P2	NC	Not Used (3.3V Power)
	P3	DEVSLP	Device Sleep Mode
	P4	GND	Ground
	P5	GND	Ground
	P6	GND	Ground
	P7	V5	5V Power, Pre-charge
	P8	V5	5V Power
	P9	V5	5V Power
	P10	GND	Ground
	P11	Reserved	Reserved
	P12	GND	Ground
	P13	NC	Not Used
	P14	NC	Not Used
	P15	NC	Not Used

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	Half Slim
Length	54.00mm +/-0.15mm
Width	39.00mm +/-0.15mm
Thickness	4.00mm +/-0.15mm



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)