

Cervoz Industrial Embedded Module

mSATA

Titan Series (3D TLC)

T387 Family

Product Datasheet



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Revision History

Date	Revision	Description
2025.08.15	1.0	First Released



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1. Product Overview

1.1 Introduction

Cervoz Industrial mSATA Embedded Module T387 family is a Solid State Flash Disk product that is in compliance with the mSATA and SATA III standards. mSATA T387 family fits in any mSATA sockets in a PC or motherboard; it can be used for both booting and storage purposes.

T387 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.

T387 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 (backward compatible to 1.5Gb/s and 3Gb/s)
- 3D TLC NAND flash memory
- Capacity: 256GB ~ 1TB
- Support AES 256-bit Encryption
- With DRAM Buffer
- End-to-End data protection
- Operating as boot disk
- Product includes Standard Temperature range & Wide Temperature range
- Low power consumption
- Shock resistance and anti-vibration
- Static and dynamic wear leveling
- Bad block management
- S.M.A.R.T. & TRIM command
- Fully compatible with Windows 8.1/10/11, Mac OS, and Linux
- RoHS compliant

1.3 Product Appearance & Models

Cervoz Industrial mSATA Module T387



T387 Family Standard Temp. (0°C ~ 70°C) Model No.	T387 Family Wide Temp. (-40°C ~ 85°C) Model No.	Capacity
CIE-MST387MNH256GS	CIE-MST387MNH256GW	256GB
CIE-MST387MOH512GS	CIE-MST387MOH512GW	512GB
CIE-MST387MOH001TS	CIE-MST387MOH001TW	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 93.1% 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	mSATA
Interface	SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s)
Connector	mSATA
NAND Flash Type	3D TLC NAND
Capacity	256GB/512GB/1TB
Sequential Read	up to 560MB/s
Sequential Write	up to 410MB/s
DRAM Buffer	Included
ECC Scheme	Applies the LDPC (Low Density Parity Check) of ECC algorithm
MTBF	>3,000,000 hours
TeraByte Written (TBW)	256GB : 469 512GB : 938 1TB : 1875
Low Power Management	DIPM/HIPM mode
Supply Voltage	3.3V DC +/-5%
Power Consumption	Active mode: < 2495mW Idle mode: < 500mW
Dimension (LxWxH)	50.80*29.85*4.00mm

2.2 Performance

The performance was measured with below PC configuration:

- Platform: GIGABYTE GA-Z170-HD3P
- RAM: Cervoz CIR-S4DUSS2404G (DDR4 4G 2400MHz)
- Operation Systems: Windows 10
- Testing Utility: Crystal Disk Mark v8.0.5 x64
- SATAIII port (6.0 Gb/s) performance

Capacity	256GB	512GB	1TB
Sequential Read (Q32T1)	560MB/s	560MB/s	560MB/s
Sequential Write (Q32T1)	260MB/s	250MB/s	410MB/s
4KB Random Read (Q32T1)	190MB/s	190MB/s	315MB/s
4KB Random Write (Q32T1)	240MB/s	235MB/s	290MB/s

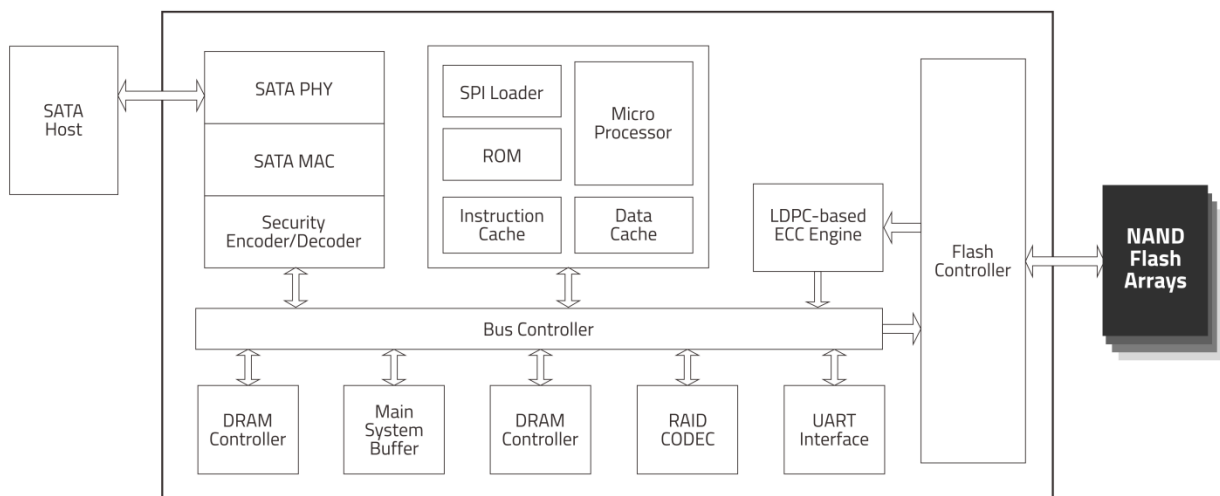
Actual performance might differ based on different using conditions and environment.

2.3 Drive Capacity

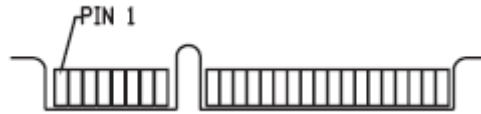
Capacity	Cylinders	Heads	Sectors	Max LBA
256GB	16,383	15	63	500,118,192
512GB	16,383	15	63	1,000,215,216
1TB	16,383	15	63	2,000,409,264

2.4 Electronic Specifications

2.4.1 Block Diagram



2.4.2 Pin Assignment



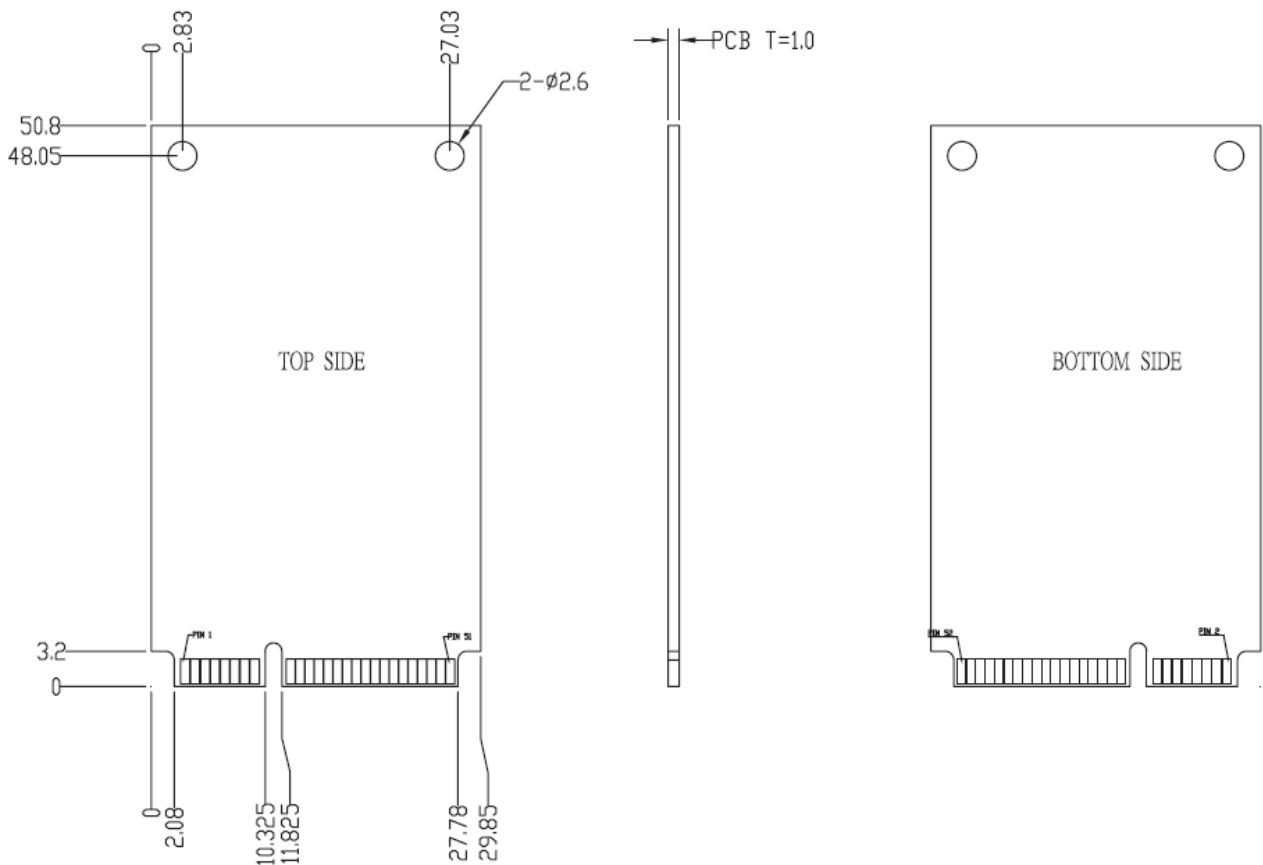
Pin #	Pin Description	Signal Name	Pin #	Pin Description	Signal Name
1	Not Used	NC	27	Ground	GND
2	3.3V power in	+3.3V	28	Not Used	NC
3	Not Used	NC	29	Ground	GND
4	Ground	GND	30	Not Used	NC
5	Not Used	NC	31	SATA Rxn	-A – RX-
6	Not Used	NC	32	Not Used	NC
7	Not Used	NC	33	SATA Rxp	+A – RX-
8	Not Used	NC	34	Ground	GND
9	Ground	GND	35	Ground	GND
10	Not Used	NC	36	Not Used	NC
11	Not Used	NC	37	Ground	GND
12	Not Used	NC	38	Not Used	NC
13	Not Used	NC	39	3.3V power in	+3.3V
14	Not Used	NC	40	Ground	GND
15	Ground	GND	41	3.3V power in	+3.3V
16	Not Used	NC	42	Not Used	NC
17	Not Used	NC	43	Not Used	NC
18	Ground	GND	44	Enter/Exit Device Sleep	DEVSLP
19	Not Used	NC	45	Not Used	NC
20	Not Used	NC	46	Not Used	NC
21	Ground	GND	47	Not Used	NC
22	Not Used	NC	48	Not Used	NC
23	SATA Txp	+B - TX+	49	Device Activity Signal	DAS
24	3.3V power in	+3.3V	50	Ground	GND
25	SATA Txn	-B - TX-	51	Default connect to GND	GND
26	Ground	GND	52	3.3V power in	+3.3V

2.5 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	5~95%, Non-Condensing
Vibration	Non-Operating	20G, 10Hz~2000Hz
Shock	Non-Operating	1500G, 0.5ms

2.6 Mechanical Specifications

Type	Value
Form Factor	mSATA
Length	50.80mm +/-0.30mm
Width	29.85mm +/-0.30mm
Thickness	4.00mm +/-0.30mm



3. Supported Command

3.1 List of Command Sets

Command	Code	Protocol
General Feature Set		
Execute Device Diagnostic	90h	Execute device diagnostic
Download Microcode	92h	PIO data-out
Download Microcode DMA	93h	DMA
Flush Cache	E7h	Non-data
Identify Device	ECh	PIO data-in
Initialize Drive Parameters	91h	Non-data
NOP	00h	Non-data
Read Buffer	E4h	PIO data-in
Read Buffer DMA	E9h	DMA
Read DMA	C8h or C9h	DMA
Read Log Ext	2Fh	PIO data-in
Read Log DMA Ext	47h	DMA
Read Multiple	C4h	PIO data-in
Read Sector(s)	20h or 21h	PIO data-in
Read Verify Sector(s)	40h or 41h	Non-data
Set Feature	EFh	Non-data
Set Multiple Mode	C6h	Non-data
Write Buffer	E8h	PIO data-out
Write Buffer DMA	EBh	DMA
Write DMA	CAh or CBh	DMA
Write Log Ext	3Fh	PIO data-out
Write Log DMA Ext	57h	DMA
Write Multiple	C5h	PIO data-out
Write Sector(s)	30h	PIO data-out
Power Management Feature Set		
Check Power Mode	E5h or 98h	Non-data
Idle	E3h or 97h	Non-data
Idle Immediate	E1h or 95h	Non-data
Sleep	E6h or 99h	Non-data
Standby	E2h or 96h	Non-data
Standby Immediate	E0h or 94h	Non-data
Security Mode Feature Set		
Security Set Password	F1h	PIO data-out

Security Unlock	F2h	PIO data-out
Security Erase Prepare	F3h	Non-data
Security Erase Unit	F4h	PIO data-out
Security Freeze Lock	F5h	Non-data
Security Disable Password	F6h	PIO data-out
SMART Feature Set		
SMART Disable Operations	B0h	Non-data
SMART Enable/Disable Autosave	B0h	Non-data
SMART Enable Operations	B0h	Non-data
SMART Execute OFF-LINE Immediate	B0h	Non-data
SMART Read Log	B0h	PIO data-in
SMART Read Data	B0h	PIO data-in
SMART Read Threshold	B0h	PIO data-in
SMART Return Status	B0h	Non-data
SMART Save Attribute Values	B0h	Non-data
SMART Write Log	B0h	PIO data-out
Host Protected Area Feature Set		
Read Native Max Address	F8h	Non-data
Set Max Address	F9h	Non-data
Set Max Set Password	F9h	PIO data-out
Set Max Lock	F9h	Non-data
Set Max Freeze Lock	F9h	Non-data
Set Max Unlock	F9h	PIO data-out
48-bit Address Feature Set		
Flush Cache Ext	EAh	Non-data
Read Sector(s) Ext	24h	PIO data-in
Read DMA Ext	25h	DMA
Read Multiple Ext	29h	PIO data-in
Read Native Max Address Ext	27h	Non-data
Read Verify Sector(s) Ext	42h	Non-data
Set Max Address Ext	37h	Non-data
Write DMA Ext	35h	DMA
Write DMA FUA Ext	3Dh	DMA
Write Multiple Ext	39h	PIO data-out
Write Multiple FUA Ext	CEh	PIO data-out
Write Sector(s) Ext	34h	PIO data-out
NCQ Feature Set		
Read FPDMA Queued	60h	DMA Queued

Write FPDMA Queued	61h	DMA Queued
DCO Feature Set		
Device Configuration	B1h	/
Sanitize Device Feature Set		
Sanitize Device	B4h	/
Miscellaneous and Historical Commands		
Data Set Management	06h	DMA
Seek	70h	Non-data
Recalibrate	10h	Non-data
Write Verify	3Ch	PIO data-out
Write Uncorrectable Ext	45h	Non-data

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
7S	SATA Disk 7pin Vertical Short
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
K	Kioxia

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)