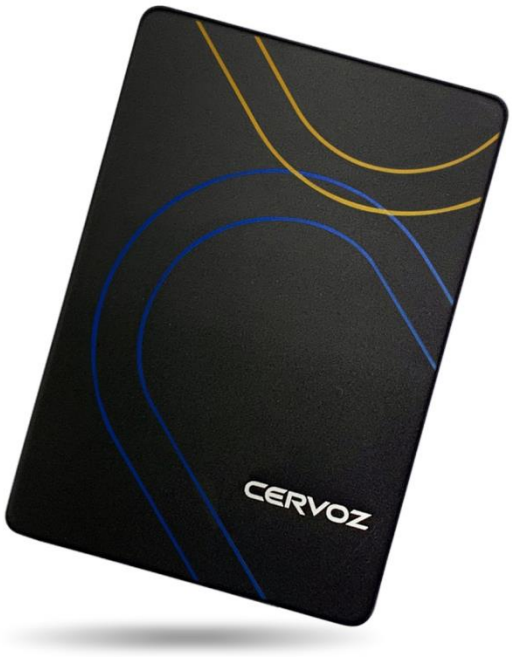
Cervoz Industrial SSD

2.5” SATA

Titan Series (TLC NAND)

T381 Family

Product Datasheet



Date: 2023.01.19

Revision: 1.1

File: Cervoz_Industrial_SSD_2.5”_SATA_T381_Datasheet_Rev 1.1

Revision History

Date	Revision	Description
2022.12.20	1.0	First Released
2023.01.19	1.1	1.3 Ordering Information Added

Table of Contents

1. Product Overview

1.1 Introduction

Cervoz Industrial 2.5” SATA SSD T381 family is a high capacity Solid State Disk product that is in compliance with the 2.5” form factor and SATA III standards. The device design is based on the 7pin for data segment and 15pin for power segment standards.

T381 family uses TLC NAND Flash. 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.

T381 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
- TLC NAND flash memory
- Capacity: 128GB ~ 2TB
- End-to-End data protection
- SLC write cache technology
- Operating as boot disk
- Static and dynamic wear leveling
- Bad block management
- S.M.A.R.T. & TRIM command

1.3 Product Appearance & Models

Cervoz Industrial 2.5” SATA SSD T381

T381 Family Standard Temp. (0°C ~ 70°C) Model No.	Capacity
CIS-2ST381OLV128GS	128GB
CIS-2ST381OMV128GS	128GB
CIS-2ST381ONV256GS	256GB
CIS-2ST381ONV512GS	512GB
CIS-2ST381ONV001TS	1TB
CIS-2ST381OOV002TS	2TB

Please Note:

Since certain storage capacity has to be reserved for firmware and controller management purposes; the physical capacity of the 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	2.5inch
Interface	SATA III 6.0Gb/s (backward compatible to 3.0Gb/s, 1.5Gb/s)
Connector	SATA (7 + 15 pin)
NAND Flash Type	TLC NAND
Capacity	128GB/256GB/512GB/1TB/2TB
Sequential Read	up to 560 MB/s
Sequential Write	up to 530 MB/s
ECC Scheme	Applies the LDPC (Low Density Parity Check) of ECC algorithm
MTBF	>3,000,000 hours
TeraByte Written (TBW)	128GB : 188 256GB : 375 512GB : 750 1TB : 1500 2TB : 3000
Low Power Management	DIPM / HIPM mode
Supply Voltage	+5V DC +/-5%
Power Consumption	Active mode: < 1750mW Idle mode: < 215mW
Dimension (LxWxH)	100.00*69.85*7.00mm

2.2 Performance

The performance was measured with below PC configuration:

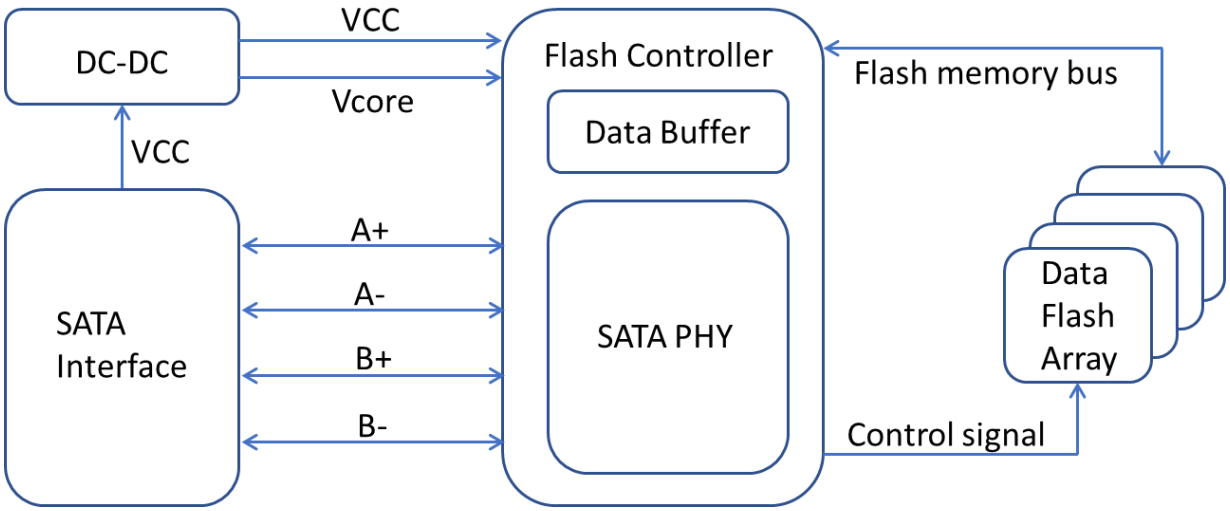
- Platform: ASUS TUF Gaming B550-PLUS
- RAM: Cervoz CIR-S4DUSY3216G (DDR4 16G 3200MHz)
- Operation Systems: Windows 10
- Testing Utility: Crystal Disk Mark v8.0.4 x 64
- SATAIII port (6.0 Gb/s) performance

Capacity	128GB	256GB	512GB	1TB	2TB
Sequential Read (Q32T1)	555 MB/s	560 MB/s	560 MB/s	560 MB/s	560 MB/s
Sequential Write (Q32T1)	480 MB/s	510 MB/s	525 MB/s	530 MB/s	530 MB/s
4KB Random Read (QD32T1)	205 MB/s	390 MB/s	400 MB/s	400 MB/s	405 MB/s
4KB Random Write (QD32T1)	335 MB/s	365 MB/s	375 MB/s	375 MB/s	375 MB/s

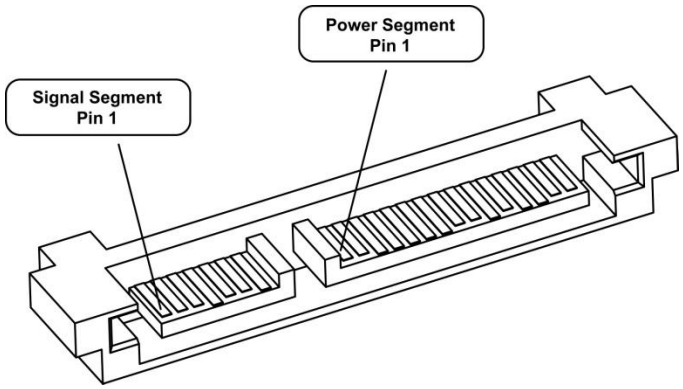
Actual performance might differ based on different using conditions and environment.

2.3 Electronic Specifications

2.3.1 Block Diagram



2.3.2 Pin Assignment



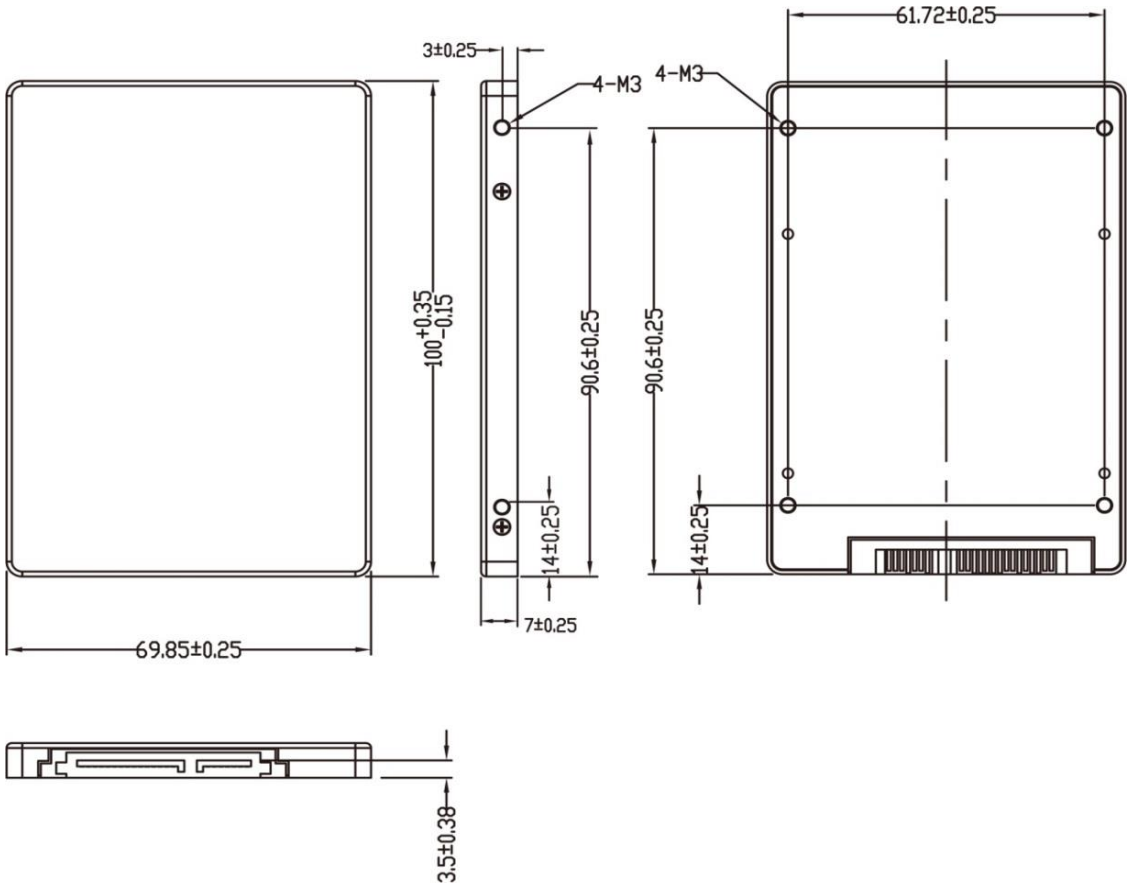
Group	Pin No.	Function	Description
Signal Segment	S1	GND	Ground
	S2	A+	Differential Signal Pair A
	S3	A –	Differential Signal Pair A
	S4	GND	Ground
	S5	B –	Differential Signal Pair B
	S6	B+	Differential Signal Pair B
	S7	GND	Ground
Key & Spacing			
Power Segment	P1	NC	Not Used (3.3V Power)
	P2	NC	Not Used (3.3V Power)
	P3	NC	Not Used
	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(12V Power, Pre-charge)
	P14	NC	Not Used (12V Power)
	P15	NC	Not Used (12V Power)

2.4 Environmental Specifications

Type		Value
Temperature	Standard Temperature Operating: Standard Temperature Storage:	0˚C~70˚C -40˚C~85˚C
Humidity	Operating & Storage	5~95%, Non-Condensing
Vibration	Non-Operating	20G, 10Hz~2000Hz
Shock	Non-Operating	1500G, 0.5ms

2.5 Mechanical Specifications

Type	Value
Form Factor	2.5” SATA
Length	100.00mm +/-0.25mm
Width	69.85mm +/-0.25mm
Thickness	7.00mm +/-0.25mm



3. Supported Command

3.1 List of Command Sets

Code	Description	Code	Description
00h	NOP	E1h	Idle Immediate
06h	Data Set Management	E2h	Standby
10h-1Fh	Recalibrate	E3h	Idle
20h	Read Sectors	E4h	Read Buffer
21h	Read Sectors without Retry	E5h	Check Power Mode
24h	Read Sectors EXT	E6h	Sleep
25h	Read DMA EXT	E7h	Flush Cache
27h	Read Native Max Address EXT	E8h	Write Buffer
29h	Read Multiple EXT	E9h	READ BUFFER DMA
2Fh	Read Log EXT	EAh	Flush Cache EXT
30h	Write Sectors	EBh	Write Buffer DMA
31h	Write Sectors without Retry	ECh	Identify Device
34h	Write Sectors EXT	EFh	Set Features
35h	Write DMA EXT	90h	Execute Device Diagnostic
37h	Set Native Max Address EXT	91h	Initialize Device Parameters
39h	Write Multiple EXT	92h	Download Microcode
3Dh	Write DMA FUA EXT	93h	Download Microcode DMA
3Fh	Write Long EXT	B0h	SMART
40h	Read Verify Sectors	EFh, 02h	Enable volatile write cache
41h	Read Verify Sectors without Retry	EFh, 03h	Set transfer mode
42h	Read Verify Sectors EXT	EFh, 05h	Enable the APM feature set
47h	Read Log DMA EXT	EFh, 10h	Enable use of SATA features et
57h	Write Log DMA EXT	EFh, 10h, 02h	Enable DMA Setup FIS Auto-Activate optimization
60h	Read FPDMA Queued	EFh, 10h, 03h	Enable Device-initiated interface power state (DIPM) transitions
61h	Write FPDMA Queued	EFh, 10h, 06h	Enable Software Settings Preservation (SSP)
70h-76h	Seek	EFh, 10h, 07h	Enable Device Automatic Partial to Slumber transitions
79h-7Fh	Seek	EFh, 10h, 09h	Enable Device Sleep
C9h	Read DMA without Retry	EFh, 55h	Disable read look-ahead
CAh	Write DMA	EFh, 66h	Disable reverting to power-on defaults
CBh	Write DMA without Retry	EFh, 82h	Disable volatile write cache
CEh	Write Multiple FUA EXT	EFh, 85h	Disable the APM feature set

Code	Description	Code	Description
E0h	Standby Immediate	F9h, 02h	SET MAXLOCK
C4h	Read Multiple	F9h, 03h	SET MAX UNLOCK
C5h	Write Multiple	F9h, 04h	SET MAX FREEZE LOCIK
C6h	Set Multiple Mode	EFh, 90h	Disable use of SATA feature set
C8h	Read DMA	EFh, 90h, 02h	Disable DMA Setup FIS Auto-Activate optimization
B0h, D0h	SMART READ DATA	EFh, 90h, 03h	Disable Device-initiated interface power state (DIPM) transitions
B0h, D0h, 00h	SMART READ ATTRIBUTE THRESHOLDS	EFh, 90h, 06h	Disable Software Settings Preservation (SSP)
B0h, D0h, F1h	SMART ENABLE ATTRIBUTE AUTOSAVE	EFh, 90h, 07h	Disable Device Automatic Partial to Slumber transitions
B0h, D4h	SMART EXECUTE OFF-LINE IMMEDIATE	EFh, 90h, 09h	Disable Device Sleep
B0h, D5h	SMART READ LOG	EFh, AAh	Enable read look-ahead
B0h, D6h	SMART WRITE LOG	EFh, CCh	Enable reverting to power-on defaults
B0h, D8h	SMART ENABLE OPERATIONS	F1h	Security Set Password
B0h, D9h	SMART DISABLE OPERATIONS	F2h	Security Unlock
B0h, DAh	SMART RETURN STATUS	F3h	Security Erase Prepare
B1h, C0h	DEVICE CONFIGURATION RESTORE	F4h	Security Erase Unit
B1h, C2h	DEVICE CONFIGURATION IDENTIFY	F5h	Security Freeze Lock
B1h, C3h	DEVICE CONFIGURATION SET	F6h	Security Disable Password
B1h, C4h	DEVICE CONFIGURATION IDENTIFY DMA	F8h	Read Native Max Address
B1h, C5h	DEVICE CONFIGURATION SET DMA	F9h	Set Max Address
F9h, 01h	SET MAX SET PASSWORD		

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
T	Toshiba
K	Kioxia
O	OEM NAND Flash

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)