

# Terabit™

Industrial MSATAIII 6.0Gbp/s Solid State Drive

Data Sheet

Terabit Technology

Revision History

Version	Date	Changes	Note
V001	2015-06-28	Release	3 <sup>rd</sup> Generation
	2016-07-17	1TB version added	

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**1. Product Features**

Interface	52PIN
Form Factor	MSATAIII 6.0Gbps
Dimension	50.8 x 29.85 x 4.85 ±0.2(mm)
Capacity	NAND MLC: 16GB~1TB NAND SLC: 8GB~256GB
Performance	Read up to 530MB/s Write up to 460MB/s
Power Supply	D/C 3.3V± 5%
Operating Temperature	Standard: 0~+70°C Industrial: -20~+70°C Extended: -40~+85°C
Weight	<25g
Storage Temperature	-55~+95°C
Shock	Non-operating 1500G peak, 0.5ms Operating 50G peak, 11ms
Vibration	Frequency/Displacement: 20-80Hz/1.52mm(X, Y, Z) Frequency/Displacement: 80-2000Hz/20G
Burn-in Test	18~36 Hours
Falling Test	80cm free fall / 6 face of each unit, 2times each
Max. Power Consumption	Sequential Reading 1.80W Sequential Writing 2.85W Idle 0.2W
Electrostatic Discharge (ESD) at Temp. 24.0° C and Relative Humidity 49% (RH)	Under +/-4KV, Device functions are affected, but EUT will be back to its normal or operational state automatically.
MTBF	MLC: 1,500,000 Hours SLC: 2,000,000 Hours
Features	<ul style="list-style-type: none"> <li>- Enhanced endurance by dynamic/static wear-leveling</li> <li>- Support dynamic power management</li> <li>- Support S.M.A.R.T function</li> <li>- Automatic Bad-block Management</li> <li>- Support TRIM and NCQ (Native Command Queuing) Command</li> <li>- Support BCH ECC 66bits/1024bytes</li> <li>- On-board Tantalum Capacitors optional</li> </ul>
Data Retention	@25°C: 10 years
Certification	CE/FCC/RoHS

## 2. Overview

Terabit MSATAIII SSD fully consists of semiconductor devices using original NAND Flash and Industrial Controller, which provide high reliability and high performance for data storage. Terabit MSATAIII SSD has standard 52PIN interfaces, fully conform to the same mechanical and mounting requirements as standard rotating disk drives. This series of products are designed for premium industrial applications that require both strong reliability and high capacity such as Industrial Computer, Rugged Computer, Industrial Systems, Industrial Server, Embedded Systems, Workstations, RAID and Defense. With up to 1TB capacity on NAND MLC Flash and 256GB on SLC Flash, Terabit MSATAIII SSD totally goes through a variety of proofing tests such as Shock Test, Vibration Test, Burn-in Test, and Twisting Test. Well proved under -40~+85°C wide temperature and equipped with Power Failure Protect and Over Load Protect, this series of products can work smoothly under severe environments.

## 3. Interface

Terabit MSATAIII Solid State Drive complies SATA3.0 Standard.

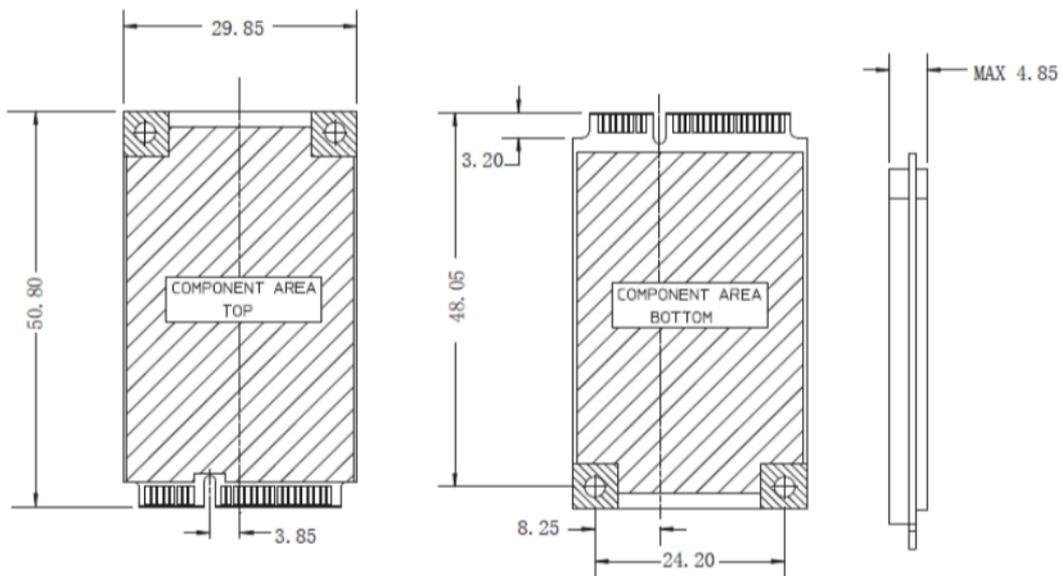
Support Transfer Mode:

PIO:0, 1, 2, 3, 4

MW-DMA: 0, 1, 2

UDMA: 0, 1, 2, 3, 4, 5

4. Physical Dimension

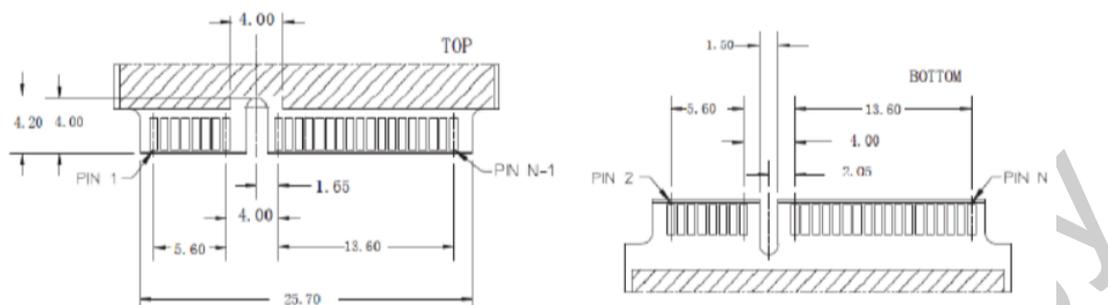


Parameter	Value	Unit
Length	50.80	mm
Width	29.85	mm
Thickness	4.85	mm

- All of the values are  $\pm 0.1\text{mm}$

## 5. PIN Description

### 5.1 PIN Location



### 5.2 Signal Description

PIN#	Assignment	Description	PIN#	Assignment	Description
1	N/A	N/A	27	GND	Return Current Path
2	+3.3V	3.3V source	28	N/A	N/A
3	N/A	N/A	29	GND	Return Current Path
4	N/A	Return Current Path	30	N/A	N/A
5	N/A	N/A	31	-A (port 1)	SATA Differential RX- based SSD
6	N/A	N/A	32	N/A	N/A
7	N/A	N/A	33	+A (port 1)	SATA Differential RX+ based SSD
8	N/A	N/A	34	GND	Return Current Path
9	GND	Return Current Path	35	GND	Return Current Path
10	N/A	N/A	36	Reserved	No Connect
11	N/A	N/A	37	GND	Return Current Path
12	N/A	N/A	38	Reserved	No Connect
13	N/A	N/A	39	+3.3V	3.3V Source
14	N/A	N/A	40	N/A	N/A
15	GND	Return Current Path	41	+3.3V	3.3V Source
16	N/A	N/A	42	N/A	N/A
17	N/A	N/A	43	GND	Return Current Path
18	GND	Return Current Path	44	N/A	N/A
19	N/A	N/A	45	Reserved	N/A
20	N/A	N/A	46	N/A	N/A
21	GND	Return Current Path	47	N/A	N/A
22	N/A	N/A	48	N/A	N/A
23	+B (port 1)	SATA Differential TX+ based on SSD	49	N/A	N/A

24	+3.3V	3.3V source	50	GND	Return Current Path
25	-B (port 1)	SATA Differential TX- based on SSD	51	GND	Return Current Path
26	GND	Return Current Path	52	+3.3V	3.3V Source

### 6. Power Consumption

Capacity	Idle	Read	Write	Unit
16GB	0.27	1.21	2.19	W
32GB	0.27	1.33	2.26	W
64GB	0.27	1.48	2.30	W
128GB	0.28	1.54	2.48	W
256GB	0.30	1.57	2.62	W
512GB	0.30	1.69	2.74	W
1TB	0.30	1.80	2.85	W

### 7. Product Reliability

NAND MLC Flash:

Capacity	Endurance Total Bytes Written	Data Retention	MTBF	Warranty
16GB	Up to 33TB	@25°C >10 Years	1.5 Million Hours	3 Years Limited
32GB	Up to 65TB			
64GB	Up to 130TB			
128GB	Up to 260TB			
256GB	Up to 520TB			
512GB	Up to 1040TB			
1TB	Up to 2080TB			

NAND SLC Flash:

Capacity	Endurance Total Bytes Written	Data Retention	MTBF	Warranty
08GB	Up to 450TB	@25°C >10 Years	2 Million Hours	5 Years Limited
16GB	Up to 900TB			
32GB	Up to 1800TB			
64GB	Up to 3600TB			
128GB	Up to 7200TB			
256GB	Up to 14400TB			

\*Total Bytes Written= 【(Flash P/E cycle) x (number of bits in drive)】 /WAI

WAI=1.428704724

### 7.1 Wear-Leveling

Terabit Industrial MSATAIII SSD support both static and dynamic wear-leveling technology. These two algorithms guarantee each block of flash memory at same level of erase cycles to improve lifetime limitation of NAND based storage.

### 7.2 ECC

ECC (Error Correction Code): Enhanced configurable BCH ECC engine. Terabit Industrial MSATAIII SSD implements the BCH ECC Algorithm, which is one of the most powerful ECC algorithms in the industry. This algorithm can correct up to 66 random bit errors in each 1024 bytes.

### 7.3 MTBF

Mean time between failures (MTBFs) for the SSD can be predicted based on the component reliability data using the methods referenced in the SR-332 reliability prediction procedures for electronic equipment, the prediction result for this SSD is more than 1,500,000 hours.

### 7.4 Bad-block Management

Terabit implements an efficient bad block management algorithm into the SSD to detect factory produced bad blocks as well as those that develop over the lifetime of the device. This process is completely transparent to the user through the use of S.M.A.R.T. command tools, i.e., the user will not be aware of the existence of the bad blocks during operation.

### 7.5 S.M.A.R.T Function

S.M.A.R.T stands for Self-Monitoring, Analysis and Reporting Technology. This technology enables the PC to predict the future failure of hard disk drives. Through the S.M.A.R.T. system, Terabit Industrial MSATAIII SSD incorporates a suite of advanced diagnostics that monitor the internal operation of the drive and provide an early warning for many types of potential problems.

### 7.6 TRIM Function

Terabit Industrial MSATAIII SSD equips built-in TRIM function, it helps collect and clean data garbage when the system in an idle situation, which keeps the system in a high performance status even after long-term using. (TRIM function will become invalid for using in RAID0)

### 7.7 Power Loss Protection (optional)

Terabit Industrial MSATAIII SSD is designed with 15pcs of Tantalum Capacitors. They drive the SSD to work for additional 30-40ms when sudden power loss to keep data safe.

### 8. Performance

Capacity	Sequential Read	Sequential Write	IOPS Read (max)	IOPS Write (max)
08GB	129MB/s	65MB/s	12000	10000
16GB	220MB/s	126MB/s	22000	17000
32GB	351MB/s	178MB/s	35000	30000
64GB	422MB/s	211MB/s	47000	42000
128GB	480MB/s	270MB/s	52000	46000
256GB	520MB/s	375MB/s	55000	51000
512GB	525MB/s	440MB/s	57000	54000
1TB	530MB/s	460MB/s	60000	57000

\*Performance varies due to different platforms.

### 9. Cache

Cache	DDR2	DDR3	Capacity
Support	/	/	/

### 10. Thermal Sensor

Thermal monitors are devices for measuring temperature, and can be found in SSDs in order to issue warnings when SSDs go beyond a certain temperature. The higher temperature the thermal monitor detects, the more power the SSD consumes, causing the SSD to get aging quickly. Hence, the processing speed of a SSD should be under control to prevent temperature from exceeding a certain range. Meanwhile, the SSD can achieve power savings.

## 11. Certifications



EN 55022:2010

EN: 55024:2010

EN 61000-3-2:2013

EN 61000-3-3:2014

47 CFR, Part2, Part15, CISPR PUB.22

With reference to RoHS Directive 2011/65/EU recasting 2002/95/EC

**12. Ordering information**

Series	*Model Name	Capacity	Flash
Industrial MSATAIII SSD	T50S3XTMLC-016G(U)	16GB	NAND MLC
	T50S3XTMLC-032G(U)	32GB	NAND MLC
	T50S3XTMLC-064G(U)	64GB	NAND MLC
	T50S3XTMLC-128G(U)	128GB	NAND MLC
	T50S3XTMLC-256G(U)	256GB	NAND MLC
	T50S3XTMLC-512G(U)	512GB	NAND MLC
	T50S3XTMLC-1024G(U)	1TB	NAND MLC

Series	Model Name	Capacity	Flash
Industrial MSATAIII SSD	T50S3XTSLC-008G(U)	08GB	NAND SLC
	T50S3XTSLC-016G(U)	16GB	NAND SLC
	T50S3XTSLC-032G(U)	32GB	NAND SLC
	T50S3XTSLC-064G(U)	64GB	NAND SLC
	T50S3XTSLC-128G(U)	128GB	NAND SLC
	T50S3XTSLC-256G(U)	256GB	NAND SLC

\*XT refers to temperature range, ST refers to standard temperature, CT refers to industrial temperature, KT refers to extended temperature.

\* "U" refers to "on-board UPS"

**13. Contact Information**

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