# Terabit™

## Industrial M.2 NGFF SATAIII 6.0Gbps Solid State Drive

## 42mm/60mm/80mm/100mm

## Data Sheet

Revision History

| Version | Date | Changes | Note |
|---------|------|---------|------|
| V001 | 2015-06-28 | Release | |
| | 2015-10-09 | 100mm version added | |
| | 2016-11-17 | UPS added to 2280 | 45ms backup time |
| | | | |
| | | | |

# Contents

## 1. Product Features

| | |
|---|---|
| Interface | NGFF 75PIN |
| Form Factor | M.2 NGFF SATAIII 6.0Gbps |
| Dimension | 42mm Version: 42.0 x 22.0 x 3.4 ±0.1(mm)<br>60mm Version: 60.0 x 22.0 x 3.4 ±0.1(mm)<br>80mm Version: 80.0 x 22.0 x 3.4 ±0.1(mm)<br>100mm Version: 100.0 x 22.0 x 3.4 ±0.1(mm) |
| Capacity | NAND MLC: 32GB~1024GB |
| Performance | Read up to 540MB/s<br>Write up to 300MB/s |
| Power Supply | D/C 3.3V± 5% |
| Operating Temperature | Standard: 0~+70°C<br>Industrial: -20~+70°C<br>Extended: -40~+85°C |
| Weight | <20g |
| Storage Temperature | -55~+95°C |
| Shock | Non-operating 1500G peak, 0.5ms<br>Operating 50G peak, 11ms |
| Vibration | Jet (Random) Vibration, 10-2000Hz, 16.4G(X, Y, Z) |
| Burn-in Test | 72 Hours |
| Falling Test | 1.1 meter free falling |
| Max. Power Consumption | Sequential Reading 0.68W<br>Sequential Writing 0.95W<br>Idle 0.2W |
| MTBF | 1,000,000 Hours |
| Features | - Enhanced endurance by dynamic/static wear-leveling<br>- Support dynamic power management<br>- Support S.M.A.R.T function<br>- Automatic Bad-block Management<br>- Support TRIM and NCQ (Native Command Queuing) Command<br>- Support BCH ECC 66bits/1024bytes<br>- Built-in DDR 3 Cache<br>- Support on-board UPS for 2280 version |
| Data Retention | @25°C: 10 years |
| Certification | CE/FCC/RoHS |

## 2. Overview

Terabit M.2 NGFF SATAIII fully consists of semiconductor devices using original NAND Flash and Industrial controller, which provide high reliability and high performance for data storage. Terabit M.2 NGFF SATAIII SSD has standard interface and 42mm/60mm/80mm types for different applications, and fully conforms to the same mechanical and mounting requirements as standard rotating disk drives. This series of products are designed for premium applications that require both strong reliability and high capacity while installing room is limited such as Embedded Computer, Panel Computer, Tablet PC, Media Player, Ultra-book and Workstations. With up to 1024GB capacity on NAND MLC Flash, Terabit M.2 NGFF SATAIII 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 M.2 NGFF SATAIII Solid State Drive complies SATA3.0 Standard.
Compatible for SATA2.0 standard.
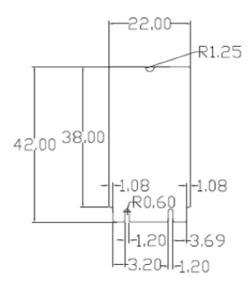
## 4. Physical Dimension



**Figure 1: 42mm Version**

| Parameter | Value | Unit |
|-----------|-------|------|
| Length | 42.0 | mm |
| Width | 22.0 | mm |
| Thickness | 3.40 | mm |

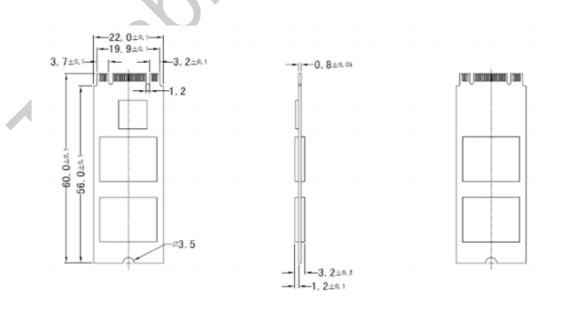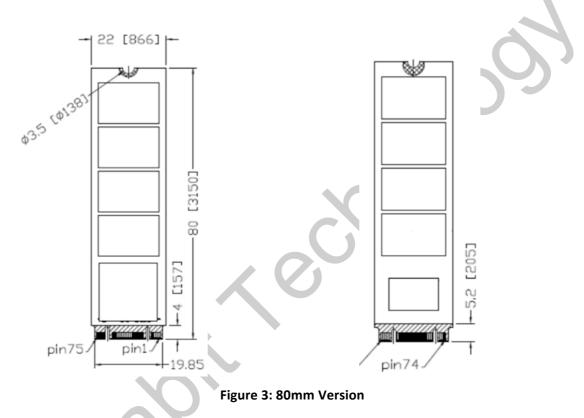**Figure 2: 60mm Version**

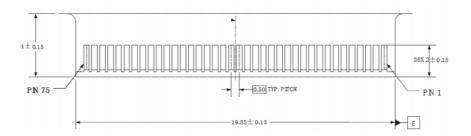| Parameter | Value | Unit |
|---|---|---|
| Length | 60.0 | mm |
| Width | 22.0 | mm |
| Thickness | 3.40 | mm |



**Figure 3: 80mm Version**

| Parameter | Value | Unit |
|---|---|---|
| Length | 80.0 | mm |
| Width | 22.0 | mm |
| Thickness | 3.40 | mm |

● All of the values are ±0.2mm

## 5. PIN Description

5.1 PIN Location



5.2 Signal Description

| Pin # | Type | Description | Pin# | Type | Description |
|---|---|---|---|---|---|
| 1 | GND | Ground | 2 | 3.3V | Supply pin, 3.3V +/- 0.5% @0.5 Amps |
| 3 | GND | Ground | 4 | 3.3V | Supply pin, 3.3V +/- 0.5% @0.5 Amps |
| 5 | GND | Ground | 6 | No connect | |
| 7 | No connect | | 8 | No connect | |
| 9 | No connect | | 10 | No connect | |
| 11 | No connect | | 12 | No connect | |
| 13 | No connect | | 14 | No connect | |
| 15 | No connect | | 16 | No connect | |
| 17 | No connect | | 18 | No connect | |
| 19 | No connect | | 20 | No connect | |
| 21 | No connect | | 22 | No connect | |
| 23 | No connect | | 24 | No connect | |
| 25 | No connect | | 26 | No connect | |
| 27 | GND | Ground | 28 | No connect | |
| 29 | No connect | | 30 | No connect | |

| 31 | No connect | | 32 | No connect | |
|----|-----------|---|----|-----------|---|
| 33 | GND | Ground | 34 | No connect | |
| 35 | No connect | | 36 | No connect | |
| 37 | No connect | | 38 | No connect | |
| 39 | GND | Ground | 40 | No connect | |
| 41 | SATA-B+ | Host receiver differential signal pair | 42 | No connect | |
| 43 | SATA-B- | Host receiver differential signal pair | 44 | No connect | |
| 45 | GND | Ground | 46 | No connect | |
| 47 | SATA-A- | Host transmitter differential signal pair | 48 | No connect | |
| 49 | SATA-A+ | Host transmitter differential signal pair | 50 | No connect | |
| 51 | GND | Ground | 52 | No connect | |
| 53 | No connect | | 54 | No connect | |
| 55 | No connect | | 56 | No connect | |
| 57 | GND | Ground | 58 | No connect | |
| 59 | No connect | | 60 | No connect | |
| 61 | No connect | | 62 | No connect | |
| 63 | No connect | | 64 | No connect | |
| 65 | No connect | | 66 | No connect | |
| 67 | No connect | | 68 | No connect | |
| 69 | GND | Ground | 70 | 3.3V | Supply pin, 3.3V +/- 0.5% @0.5 Amps |
| 71 | GND | Ground | 72 | 3.3V | Supply pin, 3.3V +/- 0.5% @0.5 Amps |
| 73 | GND | Ground | 74 | 3.3V | Supply pin, 3.3V +/- 0.5% @0.5 Amps |
| 75 | GND | Ground | | | |

## 6. Power Consumption

| Capacity | Idle | Read | Write | Unit |
|----------|------|------|-------|------|
| 32GB | 0.18 | 0.54 | 0.78 | W |
| 64GB | 0.18 | 0.57 | 0.81 | W |
| 128GB | 0.18 | 0.60 | 0.87 | W |
| 256GB | 0.20 | 0.62 | 0.90 | W |
| 512GB | 0.20 | 0.65 | 0.93 | W |
| 1024GB | 0.20 | 0.68 | 0.95 | W |

## 7. Product Reliability

NAND MLC Flash：

| Capacity | Endurance Total Bytes Written | Data Retention | MTBF | Warranty |
|----------|-------------------------------|----------------|------|----------|
| 32GB | Up to 65TB | | | |
| 64GB | Up to 130TB | | | |
| 128GB | Up to 260TB | @25℃ >10 Years | 2 Million Hours | 3 Years Limited |
| 256GB | Up to 520TB | | | |
| 512GB | Up to 1040TB | | | |
| 1024GB | Up to 2080TB | | | |

*Total Bytes Written= 【（Flash P/E cycle）x (number of bits in drive)】/WAI
WAI=1.428704724

## 7.1 Wear-Leveling

Terabit M.2 NGFF SATAIII 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 M.2 NGFF SATAIII SSD implements the BCH ECC Algorithm, which is one of the most powerful ECC algorithms in the industry. This algorithm can correct up to 12 random bit errors in each 512 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 1,000,000 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 M.2 NGFF 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. When a potential problem is detected, the SSD can be repaired or replaced before any data is lost or damaged.

## 7.6 TRIM Function

Terabit Solid State Drive 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.

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## 8. Performance

| Capacity | Sequential Read | Sequential Write | IOPS Read (max) | IOPS Write (max) |
|----------|-----------------|------------------|-----------------|------------------|
| 16GB | 220MB/s | 36MB/s | 42000 | 37000 |
| 32GB | 275MB/s | 41MB/s | 45000 | 40000 |
| 64GB | 420MB/s | 82MB/s | 47000 | 42000 |
| 128GB | 485MB/s | 162MB/s | 52000 | 46000 |
| 256GB | 500MB/s | 280MB/s | 55000 | 51000 |
| 512GB | 525MB/s | 296MB/s | 57000 | 54000 |
| 1024GB | 540MB/s | 300MB/s | 58000 | 55000 |

## 9. Cache

| Cache | DDR2 | DDR3 | Capacity |
|-------|------|------|----------|
| Support | / | Yes | / |

## 10. Thermal Sensor

| Temperature Sensor | Yes | No |
|--------------------|-----|-----|
| | Support | / |

## 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

Shanghai Terabit Technology Co., Ltd

## 12．Ordering information

| Series | *Model Name | Capacity | Flash | *Length |
|---|---|---|---|---|
| M.2 NGFF SATAIII SSD | TM2NNXTMLC-016G | 16GB | NAND MLC | Optional |
| | TM2NNXTMLC-032G | 32GB | NAND MLC | Optional |
| | TM2NNXTMLC-064G | 64GB | NAND MLC | Optional |
| | TM2NNXTMLC-128G | 128GB | NAND MLC | Optional |
| | TM2NNXTMLC-256G | 256GB | NAND MLC | Optional |
| | TM2NNXTMLC-512G | 512GB | NAND MLC | Optional |
| | TM2100XTMLC-1024G | 1024GB | NAND MLC | 100mm |

| Series | Model Name | Capacity | Flash | Length |
|---|---|---|---|---|
| M.2 NGFF SATAIII SSD | TM2NNXTSLC-016G | 16GB | NAND SLC | Optional |
| | TM2NNXTSLC-032G | 32GB | NAND SLC | Optional |
| | TM2NNXTSLC-064G | 64GB | NAND SLC | Optional |
| | TM2NNXTSLC-128G | 128GB | NAND SLC | Optional |
| | TM2NNXTSLC-256G | 256GB | NAND SLC | Optional |

*NN refers to length type, 42/60/80/100(mm).

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

## 13. Contact Information

Shanghai Terabit Technology Co., Ltd

Telephone: +86.21.34303488
Fax: +86.21.34303488
Email: sales@terabitssd.com
Website: www.terabitsys.com

Address: #513, No.38 Building, Wanke VMO, No. 2049 Pujin Road, Pujiang Town, Minhang District, Shanghai, 201112 P.R. China