Terabit™

Commercial AIC PCIE/NVMe Solid State Drive

Data Sheet

Revision History

Version	Date	Changes	Note
V001	2016-06-28	Release	

Contents

1. Product Features

Interface	PCIe Gen3 x 4
Form Factor	AIC (HHHL)
Dimension	167.65 x 68.90 x 17.14 ±0.1(mm)
Capacity	NAND MLC: 240GB~1920GB
Performance	Read up to 2500MB/s Write up to 1400MB/s
Power Supply	D/C 12.0V± 8%
Operating Temperature	0~+70°C
Weight	<230g
Storage Temperature	-40~+85°C
Shock	Non-operating 1500G peak, 0.5ms Operating 50G peak, 11ms
Vibration	20Hz~80Hz/1.52mm ~ 80Hz-2000Hz/20G X,Y,Z axis/60min for each
Drop	80cm free falling
Bending	≥50N / Hold 1min/5 times
Burn-in Test	36 Hours
Max. Power Consumption	Sequential Reading 5580mW Sequential Writing 7200mW Idle 500mW
MTBF	2,000,000 Hours
Features	- Enhanced endurance by dynamic/static wear-leveling - Support dynamic power management - Support S.M.A.R.T function - Automatic Bad-block Management - Support TRIM and NCQ (Native Command Queuing) Command - Support BCH ECC 66bits/1024bytes - Low Power Management
Data Retention	@25°C: 10 years
Certification	CE/FCC/RoHS

2. Overview

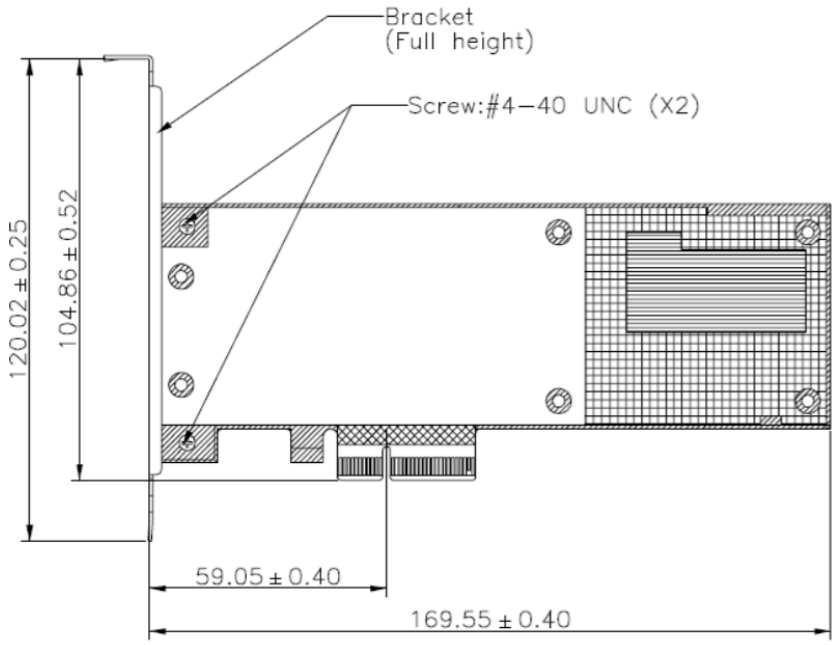
Terabit AIC PCIE SSD fully consists of semiconductor devices using original Toshiba NAND MLC Flash, which provide high reliability and high performance for data storage. Terabit AIC PCIE SSD is compliant with standard AIC (Add-in-Card) HHHL form factor for different applications, and fully conforms to the same mechanical and mounting requirements as standard rotating disk drives. This series of products are designed for Enterprise applications that require both strong reliability and fast performance such as Enterprise Server, Data Base and Workstations. With up to 1920GB capacity on NAND MLC Flash, Terabit AIC PCIE SSD totally goes through a variety of proofing tests such as Shock Test, Drop Test, Vibration Test and Burn-in Test. Well proved under 0~+70°C temperature and equipped with Power Failure Protect and Over Load Protect, this series of products can work smoothly under Enterprise environments.

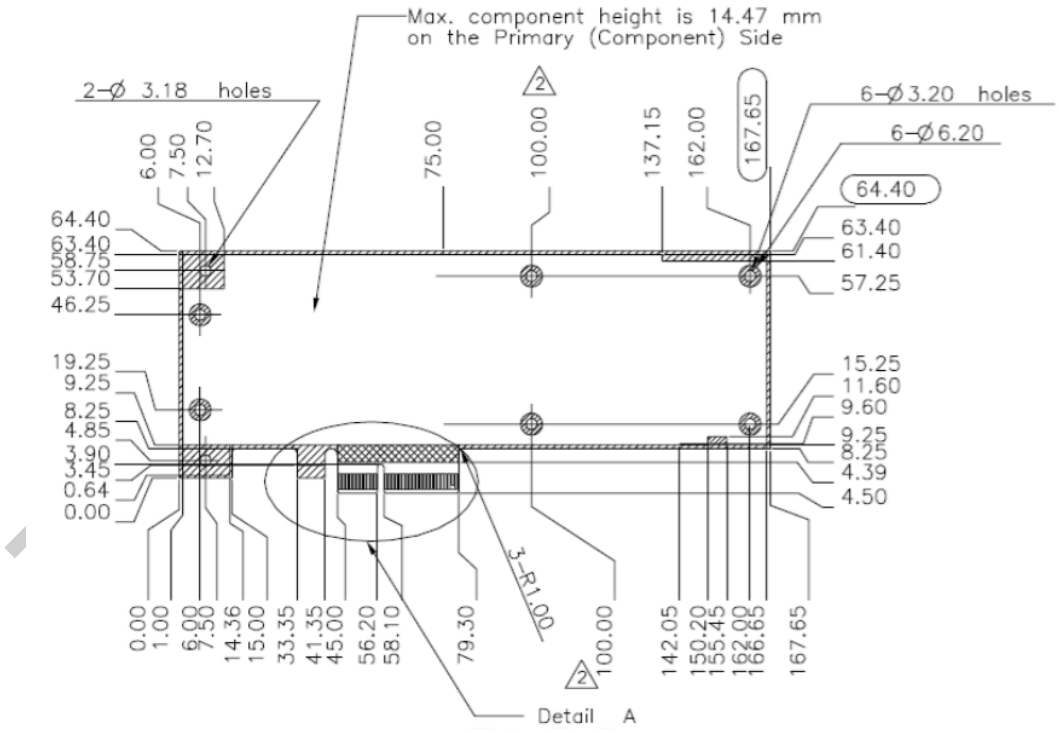
3. Interface

Terabit AIC PCIE Solid State Drive complies PCIe Gen3 x 4 interface

- Compliant with NVMe 1.2
- Compatible with PCIe I/II/III x 4 interface
- Support up to queue depth 64k
- Support power management

4. Physical Dimension





Parameter	Value	Unit
Length	167.65	mm
Width	68.90	mm
Height	17.14	mm

5. PIN Description

5.1 PIN Location

5.2 Signal Description

Pin#	Top		Bottom	
1	+12V	12V Power	PRSNT1	Hot-Plug presence detect
2	+12V	12V Power	+12V	12V Power
3	+12V	12V Power	+12V	12V Power
4	GND	Ground	GND	Ground
5	SMCLK	SMBus Clocl	JTAG2	TCK (Test Clock), clock input for JTAG interface
6	SMDAT	SMBus data	JTAG3	TDI (Test Data Input)
7	GND	Ground	JTAG4	TDO (Test Data Output)
8	+3.3V	3.3V Power	JTAG5	TMS (Test Data Select)
9	JTAG1	TRST# (Test Reset) resets the JTAG interface	+3.3V	3.3V Power
10	3.3Vaux	3.3V auxiliary power	+3.3V	3.3V Power
11	GND	Signal for Link reactivation	PERST#	Fundamental reset
12	WAKE#	Reserved	GND	Ground
13	GND	Ground	REFCLK+	Reference clock (differential pair)
14	PETp0	Transmitter differential pair, Lane 0	REFCLK-	Reference clock (differential pair)
15	PETn0	Transmitter differential pair, Lane 0	GND	Ground
16	GND	Ground	PERp0	Receiver differential pair, Lane 0
17	PRSNT2 #	Hot-plug presence detect	PERn0	Receiver differential pair, Lane 0

18	GND	Ground	GND	Ground
19	PETp1	Transmitter differential pair, Lane 1	RSVD	Reserved
20	PETn1	Transmitter differential pair, Lane 1	GND	Ground
21	GND	Ground	PERp1	Receiver differential pair, Lane 1
22	GND	Ground	PERn1	Receiver differential pair, Lane 1
23	PETp2	Transmitter differential pair, Lane 2	GND	Ground
24	PETn2	Transmitter differential pair, Lane 2	GND	Ground
25	GND	Ground	PERp2	Receiver differential pair, Lane 2
26	GND	Ground	PERn2	Receiver differential pair, Lane 2
27	PETp3	Transmitter differential pair, Lane 3	GND	Ground
28	PETn3	Transmitter differential pair, Lane 3	GND	Ground
29	GND	Ground	PERp3	Receiver differential pair, Lane 3
30	RSVD	Reserved	PERn3	Receiver differential pair, Lane 3
31	PRSNT2 #	Hot-Plug presence detect	GND	Ground
32	GND	Ground	RSVD	Reserved

6. Power Consumption

Capacity	Idle	Read	Write	Unit
240GB	500	2940	4690	mW
480GB	500	5570	7270	mW
960GB	500	5580	7275	mW
1920GB	500	5580	7300	mW

7. Product Reliability

NAND MLC Flash：

Capacity	Endurance Total Bytes Written	Data Retention	MTBF	Warranty
240GB	Up to 349TB	@25°C >10 Years	2 Million Hours	5 Years Limited
480GB	Up to 698TB			
960GB	Up to 1396TB			
1920GB	Up to 2793TB			

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

7.1 Wear-Leveling

Terabit AIC PCIE SSD supports 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 AIC PCIE SSD implements the BCH ECC Algorithm, which is one of the most powerful ECC algorithms in the industry. This algorithm can correct up to 60 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 reliability prediction procedures for electronic equipment, the prediction result for this SSD is more than 2,000,000 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 AIC PCIE 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, and it helps collect and cleans data garbage, which keeps the system in a high performance status even after long-term using.

8. Performance

Capacity	Sequential R(max)	Sequential W(max)	IOPS Read (max)	IOPS Write (max)
240GB	2300MB/s	900MB/s	250,000	140,000
480GB	2400MB/s	1300MB/s	300,000	160,000
960GB	2500MB/s	1350MB/s	350,000	200,000
1920GB	2500MB/s	1400MB/s	420,000	200,000

9. Cache

Cache	DDR2	DDR3	Capacity
Support	/	Yes	/

10. NVMe Command List

Admin Commands	
Opcode	Command Description
00h	Delete I/O Submission Queue
01h	Create I/O Submission Queue
02h	Get Log Page
04h	Delete I/O Completion Queue
05h	Create I/O Completion Queue
06h	Identify
08h	Abort
09h	Set Features
0Ah	Get Features
0Ch	Asynchronous Event Request
10h	Firmware Activate
11h	Firmware Image Download

Admin Commands-NVM Command Set Sepcific	
Opcode	Command Description
80h	Format NVM
81h	Security Send
82h	Security Receive

NVM Commands	
Opcode	Command Description
00h	Flush
01h	Write
02h	Read
04h	Write Uncorretable
05h	Compare
08h	Write Zeroes
09h	Dataset Management

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	NVME
Enterprise PCIE SSD	EPCINVMSTMLC-240G	240GB	NAND MLC	Support
	EPCINVMSTMLC-480G	480GB	NAND MLC	Support
	EPCINVMSTMLC-960G	960GB	NAND MLC	Support
	EPCINVMSTMLC-1920G	1920GB	NAND MLC	Support

13. Contact Information

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