



1.8" uSATA III SSD Series

Model: UB94TPTXXXXZXX-XXX-XXX

Datasheet

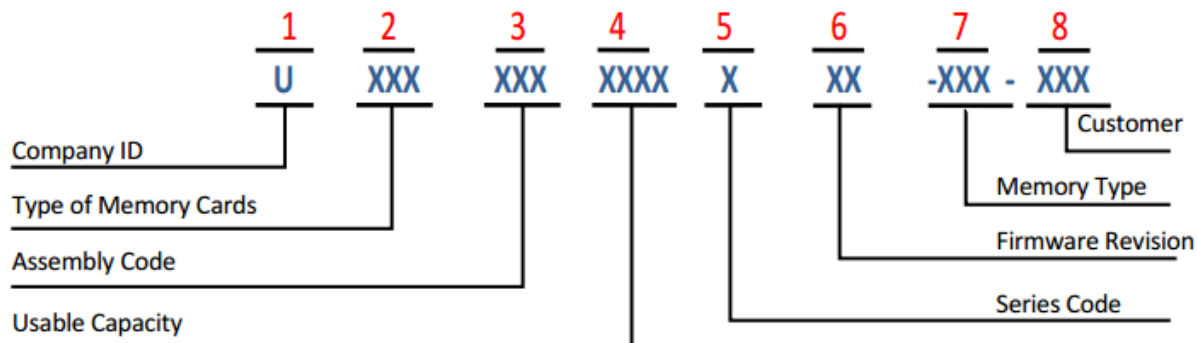
Revision History

<i>Rev.</i>	<i>Date</i>	<i>By</i>	<i>Reason For Change</i>
X	2014/11/05	Herry Chen	Preliminary Release

Product Specifications

- Available in 1.8" micro-SSD Form Factor
- Default Capacity: 16GB up to 512 GB
- Bandwidth Performance Specifications
 - Maximum Sequential Read: Up to 500 MB/s
 - Maximum Sequential Write: Up to 300MB/s
- Compatibility
 - Serial ATA Revision 3.0 fully compliant, compatible with SATA 1.5 Gb/s, 3 Gb/s and 6 Gb/s interface rates
 - ATA/ATAPI-8 Compliant
 - ATA-8 Compliant
 - SSD Enhanced SMART ATA feature set
 - Native Command Queuing (NCQ)
 - TRIM support
- Power Management
 - 1.8" micro-SATA Supply Rail
 - Supports ATA Power Management and Advanced Power Management Specifications
 - SATA Interface Power Management
 - OS-Aware Hot Plug/Removal
- Power Specifications
 - Active (typical): 3.5W
 - Idle (typical): 0.25W
- Temperature
 - Operating: Commercial: -0°C to + 70°C
Industry: -40°C to + 85°C
- Reliability
 - Mean Time Between Failures (MTBF) More than 1,000,000 Hours
- Shock
 - Operating: 1,500G. Duration 0.5ms, half sine wave
- Vibration
 - 20G. Peak, 10 ~ 20KHz with 3 axis
- Weight:
 - 100 grams
- Altitude:
 - 40,000 ft. Max
- Acoustic Noise:
 - 0 db
- Humidity:
 - 10% to 90% , non-condensing
- Compliance
 - RoHS

Ordering Information



1. Company ID

U = Unigen Corporation

2. Type of Memory Cards

B94 = 1.8" uSATA

3. Assembly Code

TPT = SSD with PS3108 (C-TEMP)

IPT = SSD with PS3108 (I-TEMP)

4. Usable Capacity

16H0 = 16GB

32H0 = 32GB

64H0 = 64GB

128H = 128GB

256H = 256GB

512H = 512GB

5. Series Code

Z

6. Firmware Revision

SX = SLC Flash F/W

MX = MLC Flash F/W

7. Memory Type

Flash Type Configuration

8. Customer Specific Markings

000 = normal

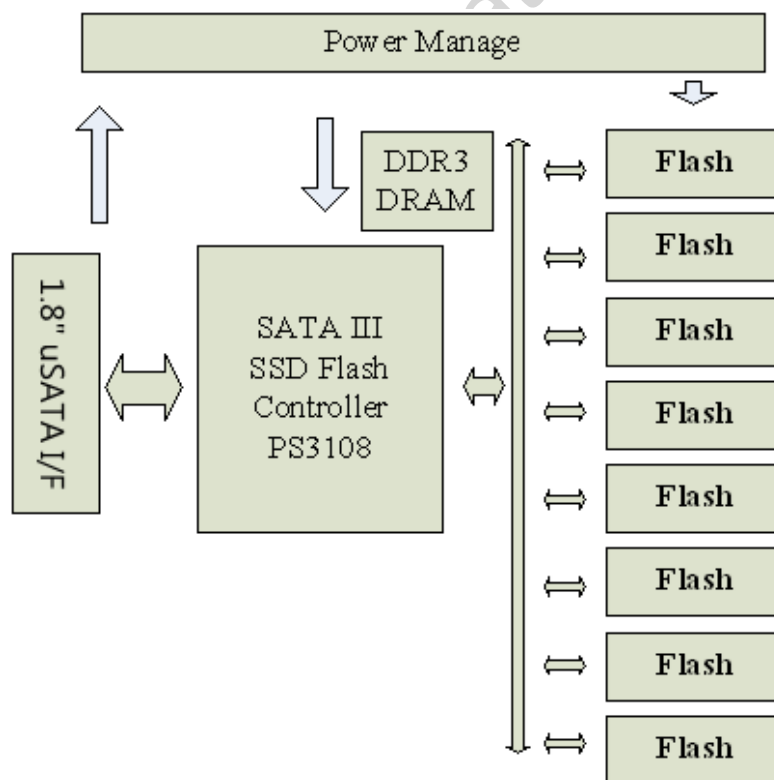
xxx = Customer Markings

1. Introduction

1.1 Product Overview

Built with a PHISON PS3108 controller, the 1.8" uSATA III SSD series is ideal for mobile and energy-efficient computing, reducing access times, and provides a durable alternative to conventional hard disc drives with superior shock resistance. It uses highly reliable NAND Flash chips with capacities up to 512GB. Designed for ultimate reliability, PS3108 series SSD have an excellent 1 million hour mean time to failure (MTTF) ensuring reliability over long term usage and dedicated technical and engineering support for OEM clients.

1.2 Block Diagram



2. Certifications and Compliance

Certification/Compliance	Description
FCC Compliant A	FCC Class A devices are those that are for use in a commercial, Industrial or business environment.
RoHS Compliant	Restriction of Hazardous Substance Directive

3. Product Specifications

3.1. Capacity

Demand (Full density) capacity	Total User Addressable Sectors in LBA Mode
16GB	31,277,232
32GB	62,533,296
64GB	125,045,424
128GB	250,069,680
256GB	500,118,192
512GB	1,000,215,216

3.2. TBW (Terabytes Written)

Capacity	Flash Structure	TBW
16GB	4GB x 4	45
32GB	8GB x 4	88
64GB	8GB x 8	168
128GB	16GB x 8	350
256GB	32GB x 8	730
512GB	64GB x 8	1370

TBW may vary from flash configuration, SDR configuration, and platform.
Please see "TBW (Terabyte Written)" in Appendix B" for details.

3.3. Performance and Power Consumption

Capacity	Flash Configuration	Performance (MB/s)		Power Consumption (mW)		
		Read	Write	Read	Write	Idle
16GB	4GB x 4, TSB 19nm Type B	450	50	1565	940	205
32GB	8GB x 4, TSB A19nm	520	100	1440	1065	190
64GB	8GB x 8, TSB A19nm	520	180	1540	1150	195
128GB	16GB x 8, TSB A19nm	520	340	1545	2260	195
256GB	32GB x 8, TSB A19nm	520	350	1575	2730	195
512GB	64GB x 8, TSB A19nm	520	480	1805	3400	205

NOTES:

1. The performance was measured using CrystalDiskMark with SATA 6Gbps host.
2. Samples were built using Toshiba A19nm Toggle MLC
3. Performance may differ according to flash configuration, SDR configuration, and platform.
4. The table above is for reference only. The criteria for MP (mass production) and for accepting goods shall be discussed based on different flash configuration.

4. Electrical Specifications

The SSD interface complies with the following standards:

- Supports SATA Gen3 interface up to 6Gb/s

4.1. Supply Voltage

Description	Rating
Operating Voltage	3.3V (+/-5%) Default 5V (+/-5%) (Option)
Maximum Ripple	100mV, 0~30MHz

4.2. Absolute Maximum Ratings

Parameters	Symbol	Min	Max	Unit
Input Voltage	Vcc	3.135	3.465	V
Current	I		1060	mA

NOTE: Stress above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any conditions above those indicated in the operational sections of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

4.3. Electrical Characteristics

Parameters	Symbol	Min	Typical	Max	Unit
Supply Voltage	Vcc	3.135	3.3	3.465	V
Operating Current	Iact			1060	mA
Idle Current	Iidl			80	mA
TX Differential Output Voltage	VdiffTx		500		mVppd
TX AC Common Mode Voltage	Vcm.acTx			50	mVp-p
RX Differential Input Voltage	VdiffRx		400		mVppd
RX AC Common Mode Voltage	Vcm.acTx			150	mVp-p

5. Environmental Specifications

5.1.1. Temperature

Ambient Temperature	Min	Max	Unit
Operating (Commercial)	0	+70	°C
Operating (Industry)	-40	+85	°C
Storage Range	-40	+85	°C

5.1.2.Shock and Vibration

Environmental Test and Qualification		Industry Specifications
Test Requirement	Procedure	
Vibration	Procedure I, Category 24- Figure 514.5C-17, modified to 16.4g RMS. XYZ, 10 to 2000Hz (Random Vibration not Sine Vibration) Vibration Time: 60 minutes per axis Unit is Operating No-error during operation Function is as specified after test	MIL-STD-810F Method 514.5 (Procedure I)
Shock (Non-Operating)	Half-Sine Waveform 1500g 0.5ms duration 18 shocks (3 shocks per face) Front, rear, top, bottom, left, right Unit is Not Operating Function/Aspect is as specified after test	MIL-STD-810F Method 516.5 (Procedure I) MIL-STD-883G Method 2002.4 (Condition B)
Humidity	48 hour cycle time 8% to 95% non-condensing Unit is Operating No-error during operation. Function is as specified after test	MIL-STD-810F Method 507.4

5.1.3. Acoustics

The drive has no moving or noise-emitting parts.
Therefore, it produces negligible sound (0 dB) in all modes of operation.

5.1.4. Altitude

Environmental Test and Qualification		Industry Specifications
Test Requirement	Procedure	
Altitude	Procedure II, 40,000 feet Unit is Operating No-error during operation Function is as specified after test	MIL-STD-810F Method 500.4 Procedure II

5.1.5. Emissions

The Unigen SSD's are compliant to the following FCC regulations

Standards	Description	Results
FCC § 15.107	Conducted Emissions	Compliant
FCC § 15.109	Radiated Emissions	Compliant

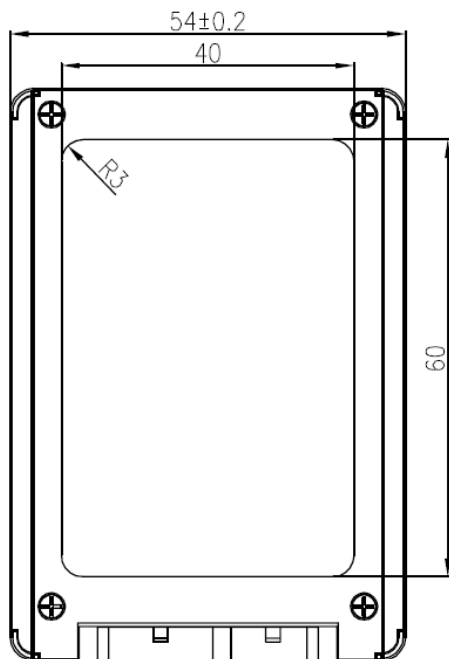
5.2. Reliability

Parameter	Value
MTBF	More than 1,000,000 Hours
Program Erase Cycles (P/E)	Depending on the Flash specs.
ECC	BCH supports up to T=72 for 1KB code word

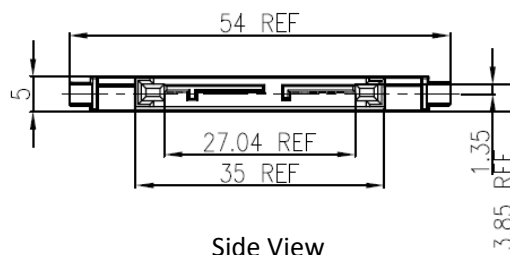
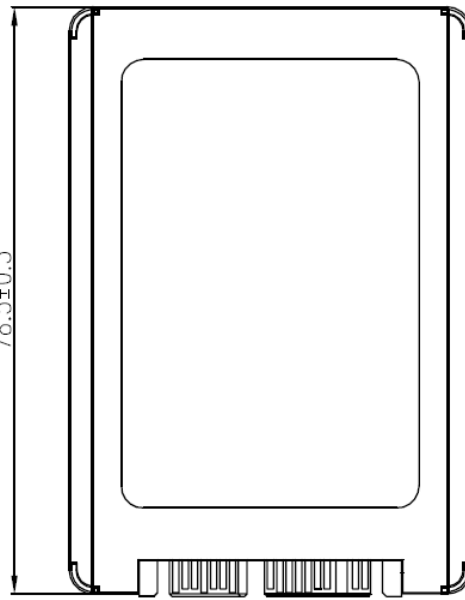
6. Mechanical Specifications

Parameter	Value
Length	78.5 mm \pm 0.3mm
Width	54.0 mm \pm 0.2mm
Height	5.0 mm \pm 0.20mm

Top View



Bottom View

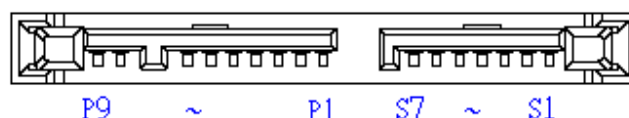


Side View

7. Pin and Signal Descriptions

This section identifies the pin locations and signal descriptions of the Unigen High Performance SSD's. The Host is connected to the SSD with a standard 15-pin uSATA connector.

Pin Locations



7.1. Hot Plug Support

Hot Plug insertion and removal are supported in the presence of a proper connector and appropriate operating system (OS) support as described in the SATA 3.1 specification. This product supports Asynchronous Signal Recovery and will issue an unsolicited COMINIT when first mated with a powered connector to guarantee reliable detection by a host system without hardware device detection.

7.2. Signal Description Table

	No.	Plug Connector pin definition	
Signal	S1	GND	
	S2	A+	Differential signal Pair A
	S3	A-	
	S4	GND	
	S5	B-	Differential signal Pair B
	S6	B+	
	S7	GND	
Key and spacing separate signal and power segments			
Power	P1	V33	3.3V power Input
	P2	V33	3.3V power Input
	P3	GND	
	P4	GND	
	P5	V5	Reserved for 5V Power Input (Option)
	P6	V5	Reserved for 5V Power Input (Option)
	P7	Optional	Reserved for Active LED Signal
	Key		
	P8	Reserved	Not Connected
	P9	Reserved	Not Connected

8. Glossary

Term	Definition
ATA	Advanced Technology Attachment
ATAPI	Advanced Technology Attachment Packet Interface
DMA	Direct Memory Access
ECC	Error-Correcting Code
EXT	Extended
GB	Giga-byte defined as 1×10^9 bytes
GC	Garbage Collection, can be real time or idle time (background)
HDD	Hard Disk Drive
Hot Plug	A term used to describe the removal or insertion of a SATA hard drive when the system is powered on.
IOPS	Input output operations per second
LBA	Logical Block Address
MB	Mega-byte defined as 1×10^6 bytes
MTBF	Mean time between failures
NCQ	Native Command Queuing. The ability of the SATA hard drive to queue and re-order commands to maximize execution efficiency.
NOP	No Operation
OS	Operating System
Port	The point at which a SATA drive physically connects to the SATA controller.
P/E	Program / Erase cycles, defines NAND lifecycle
SAS	Serial Attached SCSI
SATA	Serial ATA
SFF	Small Form Factor
SMART	Self-Monitoring, Analysis and Reporting Technology: an open standard for developing hard drives and software systems that automatically monitors a hard drive's health and reports potential problems.
SSD	Solid State Drive
TRIM	ATA8 Command informing the drive when sectors no longer contain valid data

Appendix

A.SMART Attributes

ID	Hex	Attribute Name	Attribute Name
01	01	Raw Read Error Rate	Number of accumulation of uncorrectable error. (Range 0~255)
09	09	Power On Hours (POH)	Count of hours in power-on state. The raw value of this attribute shows total count of hours in power-on state.
12	0C	Device Power Cycle Count	This attribute indicates the count of full hard disk power on/off cycles.
168	A8	SATA PHY Error Count	Sata PHY error count (only record from power on, when power off this value will clear to zero) this value include all PHY error count, ex data FIS CRC ,code error, disparity error ,command FIS crc.....)
170	AA	Bad Block Count	Bad block count. (will show early bad and later bad block count)
173	AD	Erase Count	Erase count (average, max, erase count)
192	C0	Power off Retract Cycle	Number of unexpected power loss count
218	DA	Number of accumulation CRC error	Number of accumulation CRC error (read/write data FIS CRC error)

Smart attribute actual data

0	1	2	3	4	5	6	7	8	9	10	11		
ID	Flag	flag	value	worse	DATA								threshold
01h	0Bh	00h	64h	64h	0	0	ECC error	0	0	0	0	32h	
09h	12h	00h	64h	64h	power on hour		0	0	0	0	0	00h	
0Ch	12h	00h	64h	64h	power on/off cycles				0	0	0	00h	
A8h	12h	00h	64h	64h	SATA PHY error count				0	0	0	00h	
AAh	03h	00h	note 1*	note 1*	early bad block NO		0	0	later bad block NO		0	0ah	
ADh	12h	00h	64h	64h	max erase count (MAX 65535)		average erase count (MAX 65535)		0	0	0	00h	
C0h	12h	00h	64h	64h	number of acidental power loss count				0	0	0	00h	
DAh	0Bh	00h	64h	64h	number of CRC Error				0	0	0	32h	

Note 1*: Formula

MABN: maximum acceptable bad block number

CBBN : Current bad block number

Value = ((MABN - CBBN)/(MABN)) *100

This formula calculates percentage of spare block. Value will from 100 to 1.

B. Terabytes Written (TBW)

TBW (Terabytes Written) is a measurement of SSDs' expected lifespan, which represents the amount of data written to the device. To calculate the TBW of a SSD, the following equation is applied:

$$TBW = [(NAND\ Endurance) \times (SSD\ Capacity) \times (WLE)] / WAF$$

NAND Endurance: NAND endurance refers to the P/E (Program/Erase) cycle of a NAND flash. Typically, the P/E cycle of MLC is 3K.

SSD Capacity: The SSD capacity is the specific capacity in total of a SSD.

WLE: Wear Leveling Efficiency (WLE) represents the ratio of the average amount of erases on all the blocks to the erases on any block at maximum.

WAF: Write Amplification Factor (WAF) is a numerical value representing the ratio between the amount of data that a SSD controller needs to write and the amount of data that the host's flash controller writes. A better WAF, which is near 1, guarantees better endurance and lower frequency of data written to flash memory.