

2.5" SATA SSD



Product Name: US25S3TNN

Capacity : 128GB 、 256GB 、 512GB 、 1TB

Revision History

Revision	Date	Description	Editor
0	June 5, 2020	Initial Release	

Table of Contents

1.0 General Description	5
2.0 Mechanical Specification	6
2.1 Physical dimensions and Weight	6
2.2 Product Dimensions	6
3.0 Product Specification	7
3.1 Interface and configuration	7
3.2 Capacity	7
3.3 Performance	7
3.3.1 Read/Write & ATTO Performance	7
3.3.2 Read/Write & CDM Performance	7
3.3.3 IOPS Performance	8
3.3.4 Read/Write & AS-SSD Performance	8
3.4 Electrical	8
3.4.1 Operating Voltage	8
3.4.2 Power Consumption (Typical)	9
3.5 Environmental Conditions	9
3.6 Reliability	9
3.6.1 Reliability	9
3.7 Endurance	9
4.0 Supported Command Sets	10
4.1 Identify Device	10
4.2 S.M.A.R.T. Attribute	13
5.0 Pin assignment and descriptions	14
6.0 Product Line up	15
7.0 Package Specifications	15

Key Features

- **Capacity:**
 - 128GB, 256GB, 512GB, 1TB
- **NAND Flash:** TLC, 64L
- **Form Factor:** 2.5 inch SATA
- **Compatibility:**
 - Serial ATA 6Gb/s interface
 - Complies with ATA-8 Standard
 - Complies SATA Revision 3.1
 - S.M.A.R.T feature supported
 - NCQ Command set supported
- **Performance:**
 - Sequential Read: Up to 560MB/s
 - Sequential Write: Up to 520MB/s
 - Random 4K Read:
Up to 86K
 - Random 4K Write:
Up to 65K
- **Power Consumption (Max.):**
 - Slumber: 0.08W
 - Active: 0.7W
 - SR/SW : 1.4W / 1.4W
 - RR/RW: 1.4W / 1.3W
 - Device Sleep: 4mW
- **Temperature:**
 - Commercial : 0°C - 70°C
 - Industrial : -40°C - 85°C
- **Reliability:**
 - Shock: 1500G/0.5ms
 - Vibration 20G Peak, 10-2000Hz
 - MTBF: 2,000,000 hours
 - TBW: 1000TB

1.0 General Description

Taking the advantages of NAND flash memory, Solid State Drive (SSD) provides better solutions on durability, performance, and power efficiency over traditional hard disk drives. Employing static wear-leveling technology to maximize device mean time between failures (MTBF), The SSD solutions are your best choice on wide-ranged mobile computing devices and consumer electronic products. With standard SATA form factor or customized module form factor, the 2.5-inch YTY UNiCORE SSD US25S3TNN offers capacities 128GB, 256GB, 512GB and 1TB using 3D TLC type flash memories.

2.0 Mechanical Specification

All product specifications not covered in this document (electrical performance, appearance, etc.) are in accordance with YTY UNICORE's defined norms and standards.

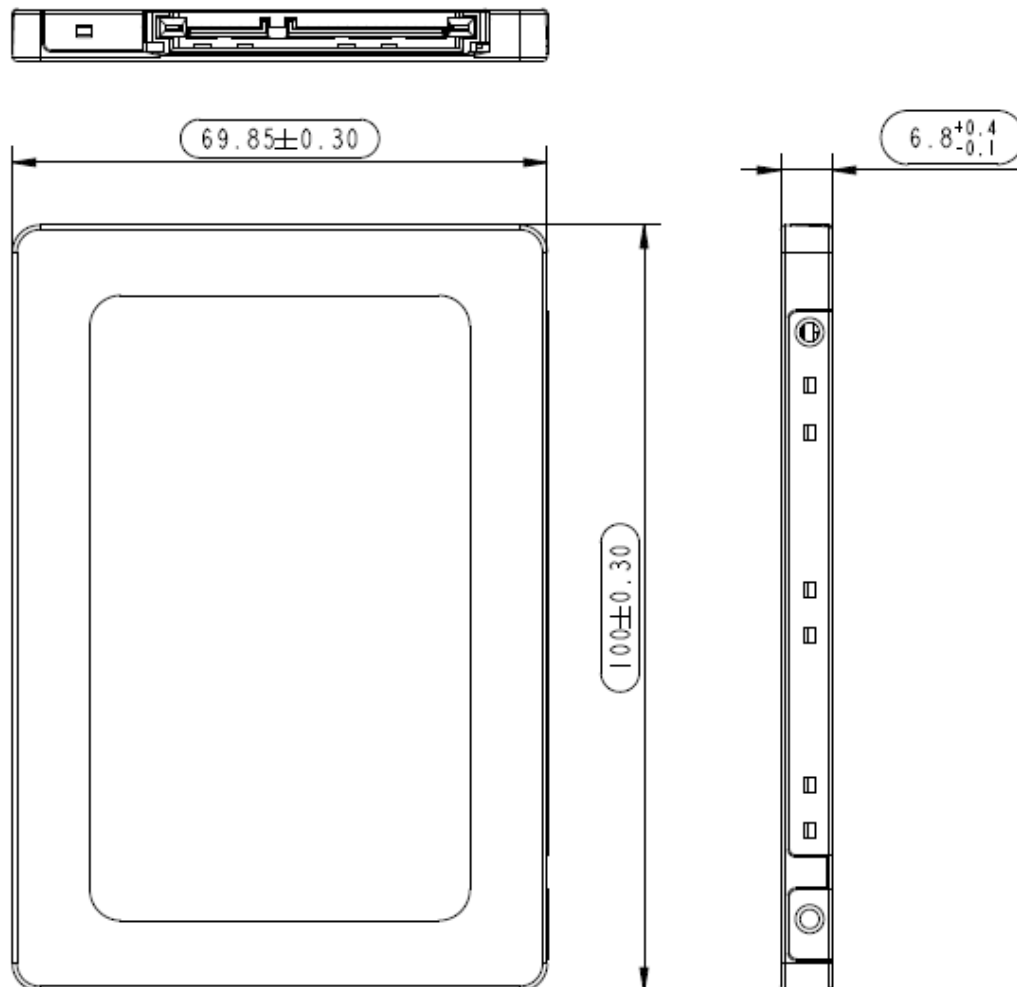
2.1 Physical dimensions and Weight

Table 2-1 Dimensions and Weight

Model	Length (mm)	Width (mm)	Height (mm)	Weight (gram)
US25S3TNN-128GNM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-256GNM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-512GNM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-001TNM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-128GWM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-256GWM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-512GWM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5
US25S3TNN-001TWM2	100+/-0.3	69.85+/-0.30	6.8+0.4/-0.1	43+/-5

2.2 Product Dimensions

Figure 2-1 Product Dimensions



3.0 Product Specification

3.1 Interface and configuration

- Compliant with Serial ATA International Organization: Serial ATA Revision 3.1
- Compliant SSD Allion compliance program.
- Support ATA-8 Command Set
- Support 1-port 1.5/3.0/6.0 Gbps SATA I/II/III interface.

3.2 Capacity

Table 3-1 User Addressable Sectors

Model	US25S3TNN			
Unformatted Capacity	128GB	256GB	512GB	1TB
Total User Addressable Sectors (LBA Mode)	250,069,680	500,118,192	1,000,215,216	2,000,409,264

Total useable capacity may be less (due to formatting, flash management, and other functions).
1GB=1,000,000,000 bytes; 1sector = 512bytes.

3.3 Performance

3.3.1 Read/Write & ATTO Performance

Table 3-2 Read/Write Performance (ATTO)

	128GB	256GB	512GB	1TB	Unit
Sequential Read	560	560	560	560	MB/s
Sequential Write	490	500	500	520	MB/s

-Seq. Read & Write speed test by ATTO

-The system conditions and test environment may affect test result

3.3.2 Read/Write & CDM Performance

Table 3-3 Read/Write Performance (CDM)

	128GB	256GB	512GB	1TB	Unit
Sequential Q32 Read	560	560	560	560	MB/s
Sequential Q32 Write	490	510	520	520	MB/s

-Seq. Read & Write speed test by Crystal Disk Mark 5.1.2

3.3.3 IOPS Performance

Table 3-4 Read/Write & IOPS Performance

	128GB	256GB	512GB	1TB	Unit
4K Random Read	58K	83K	84K	86K	IOPS
4K Random Write	64K	65K	65K	65K	IOPS

- Seq. Read & Write speed test by IOmeter 2010 with "00" pattern (Queue depth of 32; Measurements are performed on 10% capacity of LBA range. Write cache enable)
- IOPS Test Utility: IOmeter 2010 (Queue depth of 32; Measurements are performed on 10% capacity of LBA range. Write cache enable)
- The system conditions and test environment may affect test result

3.3.4 Read/Write & AS-SSD Performance

Table 3-5 Read/Write Performance (AS-SSD)

	128GB	256GB	512GB	1TB	Unit
Sequential Read	500	500	500	500	MB/s
Sequential Write	440	450	450	450	MB/s
4K-64 Thrd Read	130	220	260	270	MB/s
4K-64 Thrd Write	250	250	250	250	MB/s

- Seq. Read & Write speed test by AS-SSD with Random pattern

3.4 Electrical

3.4.1 Operating Voltage

Table 3-6 Operating Voltage

Operating Voltage	
Input Power	DC 3.3V ± 5%
Maximum Ripple	100mV p-p or less

3.4.2 Power Consumption (Typical)

Table 3-7 Power Consumption (Typical)

	128GB	256GB	512GB	1TB	Unit
Slumber	0.07	0.07	0.07	0.07	W
Active	0.63	0.63	0.63	0.63	W
Sequential Read	1.35	1.35	1.35	1.35	W
Sequential Write	1.3	1.3	1.3	1.3	W
Random Read	1.3	1.3	1.3	1.3	W
Random Write	1.2	1.2	1.2	1.2	W
Device Sleep	4	4	4	4	mW

3.5 Environmental Conditions

Table 3-8 Temperature, Humidity, Shock, Vibration

Feature	Operating	Non-Operating
Normal Temperature	0°C to 70°C	-55°C to 95°C
Wide Temperature	-40°C to 85°C	-55°C to 95°C
Humidity	0°C to 55°C / 5%~95% RH, non-condensing	
Vibration	20G Peak, 10~2000Hz	
Shock	1500G, duration 0.5ms, Half Sine Wave	

3.6 Reliability

3.6.1 Reliability

Table 3-9 Reliability Specification

Parameter	Simulate Value
Mean Time Between Failures (MTBF) The MTBF statistics were calculated by Part Count Method, not relevant to individual units	2,000,000 hours

3.7 Endurance

Endurance for the SSD can be predicted based on the operating workload .The tables as below shows the drive lifetime for each SSD capacity based JESD219 client workload.

Table 3-10 Tera Byte Written

Total Byte Written (TBW)	128GB	256GB	512GB	1TB	Unit
	120	250	500	1000	TB

4.0 Supported Command Sets

4.1 Identify Device

IDENTIFY DEVICE (ECh). This commands read out 512Bytes of drive parameter information. Parameter Information consists of the arrangement and value as shown in the following table. This command enables the host to receive the Identify Drive Information from the device.

Table 4-1 Identify Device Table

Word	F / V	Default Value	Description
0	F	0040h	General configuration
1	X	XXXXh	Default number of cylinders
2	V	0000h	Reserved
3	X	00XXh	Default number of heads
4	X	0000h	Obsolete
5	X	0240h	Obsolete
6	F	XXXXh	Default number of sectors per track
7 - 8	V	XXXXh	Number of sectors per card (Word 7 = MSW, Word 8 = LSW)
9	X	0000h	Obsolete
10 - 19	F	XXXXh	Serial number in ASCII (Right justified)
20	X	0002h	Obsolete
21	X	0002h	Obsolete
22	X	0000h	Obsolete
23 - 26	F	XXXXh	Firmware revision in ASCII Big Endian Byte Order in Word
27 - 46	F	XXXXh	Model number in ASCII (Left justified) Big Endian Byte Order in Word
47	F	8001h	Maximum number of sectors on Read/Write Multiple command
48	F	0000h	Reserved
49	F	0F00h	Capabilities
50	F	4000h	Capabilities
51	F	0200h	PIO data transfer cycle timing mode
52	X	0000h	Obsolete
53	F	0007h	Field validity
54	X	XXXXh	Current numbers of cylinders
55	X	XXXXh	Current numbers of heads
56	X	XXXXh	Current sectors per track
57 - 58	X	XXXXh	Current capacity in sectors (LBAs) (Word 57 = LSW , Word 58 = MSW)
59	F	0101h	Multiple sector setting
60 - 61	F	XXXXh	Total number of user addressable logical sectors for 28-bit

			commands (DWord)
62	X	0000h	Reserved
63	F	0207h	Multiword DMA transfer Supports MDMA mode 0, 1 and 2
64	F	0003h	Advanced PIO modes supported
65	F	0078h	Minimum Multiword DMA transfer cycle time per word
66	F	0078h	Recommended Multiword DMA transfer cycle time
67	F	0078h	Minimum PIO transfer cycle time without flow control
68	F	0078h	Minimum PIO transfer cycle time with IORDY flow control
69	F	4000h	Additional supported
70 - 74	F	0000h	Reserved
75	F	001Fh	Queue depth
76	F	070Eh	Serial ATA capabilities <ul style="list-style-type: none"> • Supports Serial ATA Gen3 • Supports Serial ATA Gen2 • Supports Serial ATA Gen1 • Supports Phy event counters log • Supports receipt of host initiated power management requests • Supports Native Command Queuing
77	F	0080h	Serial ATA additional capability <ul style="list-style-type: none"> • DevSleep_to_ReducedPwerState
78	F	0148h	Serial ATA features supported <ul style="list-style-type: none"> • Supports Device Sleep • Supports software settings preservation • Device supports initiating power management
79	V	0040h	Reserved
80	F	03F0h	Major version number (ACS-2)
81	F	0000h	Minor version number
82	F	742Bh	Command sets supported 0
83	F	7500h	Command sets supported 1
84	F	4023h	Command sets supported 2
85 - 87	V	XXXXh	Command set/feature enabled
88	V	007Fh	Ultra DMA mode supported and selected
89	F	0003h	Time required for a Normal Erase mode Security Erase Unit command
90	F	0001h	Time required for an Enhanced Erase mode Security Erase Unit command
91	V	0000h	Current advanced power management value
92	V	FFFEh	Master password identifier

93 - 99	V	0000h	Reserved
100 - 103	V	XXXXh	Maximum user LBA for 48-bit address feature set
104	V	0000h	Reserved
105	F	0100h	Maximum number of 512-byte blocks per Data Set Management command
106 - 127	V	0000h	Reserved
128	V	0001h	Security status
129 - 159	X	XXXXh	Vendor specific
160	F	0000h	Power requirement description
161	X	0000h	Reserved
162	F	0000h	Key management schemes supported
163	F	0000h	CF Advanced True IDE Timing mode capability and setting
164 - 168	V	0000h	Reserved
169	F	0001h	Data Set Management supported
170 - 216	V	XXXXh	Reserved
217	F	0001h	Non-rotating media (SSD)
218 - 221	X	0000h	Reserved
222	F	107Fh	Transport major revision (SATA Rev 3.1)
223 - 254	X	0000h	Reserved
255	X	XXXXh	Integrity word

Notes:

F/V = Fixed/variable content.

F = the content of the word is fixed and does not change. For removable media devices, these values may change when media is removed or changed.

V = the contents of the word is variable and may change depending on the state of the device or the commands executed by the device.

X = the content of the word may be fixed or variable.

4.2 S.M.A.R.T. Attribute

The following table defines the vendor specific data in byte 2 to 361 of the 512-byte SMART data.

Table 4-2 S.M.A.R.T. Attribute

Attribute ID (hex)	Attribute Name
09h	Power-On Hours Count
0Ch	Drive Power Cycle Count
A7h	SSD Protect Mode
A8h	PHY Error Count
A9h	Bad Block Count
ADh	Erase Count
AFh	Bad Cluster Table Count
B4h	User Block Count Left
C0h	Unexpected Power Loss Count
C2h	Temperature
E7h	SSD Life Left
E9h	Write Sector Count to Nand
EAh	Read Sector Count from Nand
F1h	Write Sector Count
F2h	Read Sector Count

5.0 Pin assignment and descriptions

Signals	S1	GND	System Ground
	S2	Rx+	Differential signals pair receive
	S3	Rx-	
	S4	GND	System Ground
	S5	Tx-	Differential signals pair transmit
	S6	Tx+	
	S7	GND	System Ground
Power	P1	V33	NC
	P2	V33	NC
	P3	DEVSLP	Device Sleep Signal Pin
	P4	GND	System Ground
	P5	GND	System Ground
	P6	GND	System Ground
	P7	V5/PC	+5V Power supply, 2 nd Pre-charge
	P8	V5	+5V Power supply
	P9	V5	+5V Power supply
	P10	GND	System Ground
	P11	DAS	Reserved
	P12	GND	System Ground
	P13	V12/PC	NC
	P14	V12	NC
	P15	V12	NC

6.0 Product Line up

Table 6-1 Product Line up

Part Number	Capacity	Type	P/E Cycle	Remark
US25S3TNN-128GNM2	128GB	2.5 SATA	3K	Normal, 0°C-70°C
US25S3TNN-256GNM2	256GB	2.5 SATA	3K	Normal, 0°C-70°C
US25S3TNN-512GNM2	512GB	2.5 SATA	3K	Normal, 0°C-70°C
US25S3TNN-001TNM2	1TB	2.5 SATA	3K	Normal, 0°C-70°C
US25S3TNN-128GWM2	128GB	2.5 SATA	3K	Wide, -40°C-85°C
US25S3TNN-256GWM2	256GB	2.5 SATA	3K	Wide, -40°C-85°C
US25S3TNN-512GWM2	512GB	2.5 SATA	3K	Wide, -40°C-85°C
US25S3TNN-001TWM2	1TB	2.5 SATA	3K	Wide, -40°C-85°C

7.0 Package Specifications

