M.2 2280 NVMe PCIe3.0 SSD DATA SHEET

PSP3S6M10M8-512G

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1.General Description

Feature	Description
Capacity	256GB/512GB/1TB/2TB
Nand Flash	SDK BICs6 3D Nand
Interface	PCIe Gen3x4 (NVMe)
Compliance	NVMe 1.4
Form Factor	M.2 2280
Power Management	3.3V ± 5%
Performance	Read: up to 3300 MB/s(1TB) Write: up to 2900 MB/s(1TB)
Power Consumption	Active write:2900mW(2TB) Active read:3100mW(2TB)
MTBF	1,500,000 Hours
Features	Bad Block Management Static and Dynamic Wear Leveling Advanced hardware LDPC ECC Technology Supports SLC Caching for improved performance Supports S.M.A.R.T., TRIM Command Supports Modern Standby
Temperature Range	Operation: 0°C ~ 70°C Storage: -40°C ~ 85°C

Controller Block Diagram

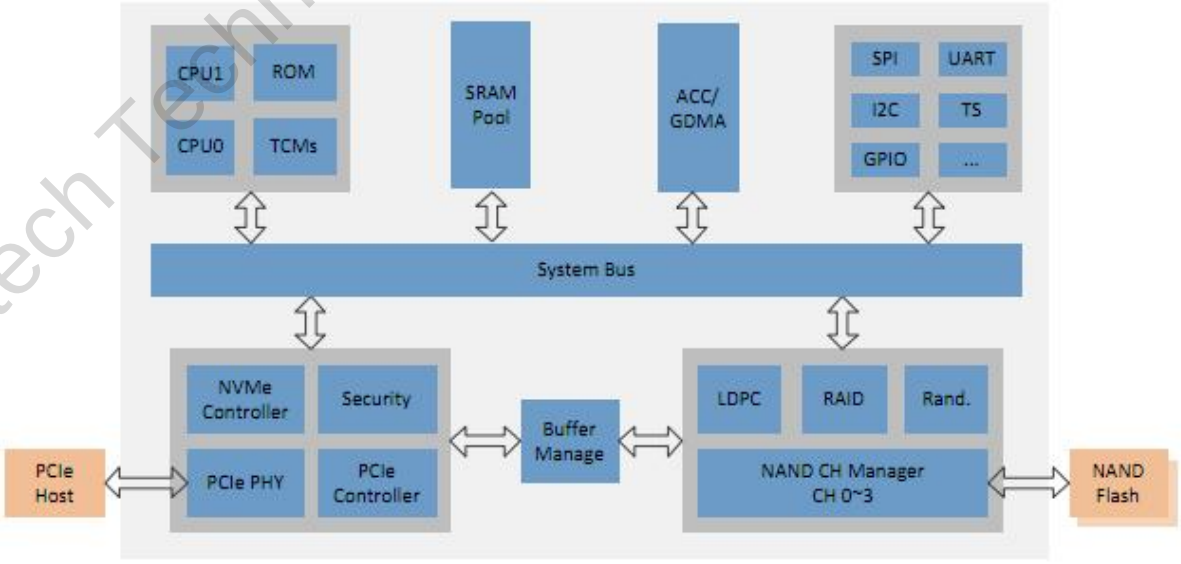
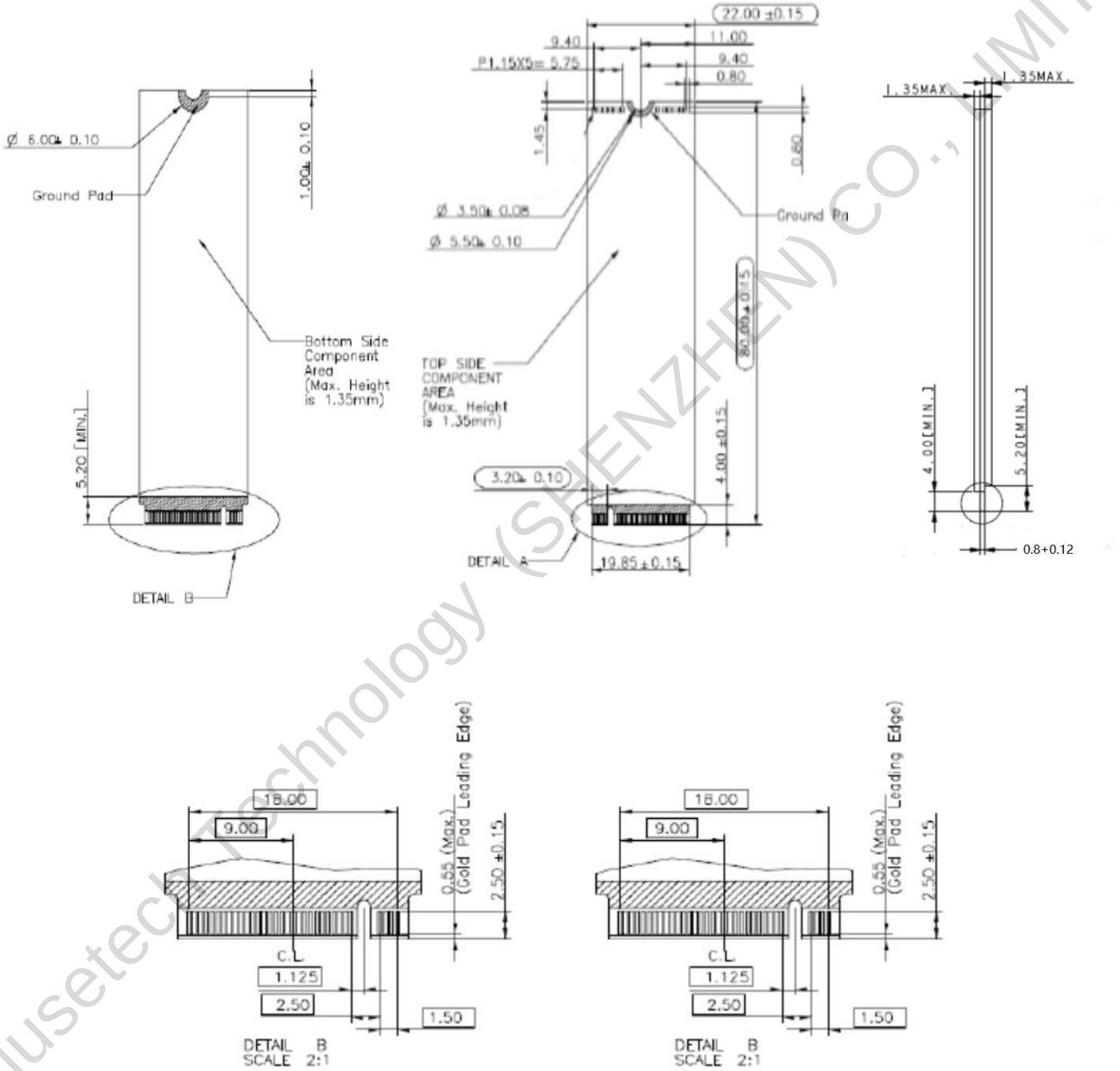


Figure 1-1 Controller Block Diagram

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2.Physical Specifications

Dimensions	Length（mm）	80±0.15mm
	Width（mm）	22±0.15mm
	Height（mm）	3.65±0.25mm
Weight		7g



[Figure 2-1] M.2 2280 Physical dimension

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3.Product Specifications

3.1 Drive Capacity

Nominal Capacity	256GB	512GB	1TB	2TB	
OS Capacity	238.47GB	476.94GB	953.86GB	1907.73GB	

*For Flash Media Devices, 1 megabyte = 1 million bytes; 1 gigabyte = 1 billion bytes. Actual usable capacity may vary.

3.2 System Performance

-CPU： AMD Ryzen 5 5600x6
-DRAM： 16GB DDR4 3200MHz
-Chipset： ASUS B550M-PLUS
-OS： Windows 10 x64 21H2
-Test Tool： CrystalDiskMark 8.0.4
-The system conditions and test environment may affect test result;

3.2.1 Crystal Disk Mark Test

Capacity	Sequential Read(max)	Sequential Write(max)	4KB Random Read(Q32T16)	4KB Random Write(Q32T16)	Unit
256GB	2100	1600	1290	1260	MB/s
512GB	3300	2800	2200	1500	MB/s
1TB	3500	2900	2350	1620	MB/s
2TB	3500	3000	1980	1560	MB/s

Note: Performance is based on CrysalDiskMark8.0.4 with file size 1000MB

3.2.2 AS SSD Benchmark Test

Capacity	Sequential Read(max)	Sequential Write(max)	4K-64Thrd Read	4K-64Thrd Write	Unit
256GB	1800	1200	460	680	MB/s
512GB	2800	2480	780	1230	MB/s
1TB	3000	2620	865	1430	MB/s
2TB	3000	2700	1180	1460	MB/s

Note: Performance is based on AS SSD Benchmark2.0.7316.34247with file size 1000MB

3.3 Power consumption

Capacity	Parameter		
	Idle(mW)	Read(mW)	Write(mW)
256GB	313	1960	1970
512GB	326	2310	2370
1TB	321	2890	2680
2TB	350	3100	2900

Note: Input Voltage 3.3V±5%

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3.4 MTBF

MTBF, an acronym for Mean Time Between Failures, is a measure of a device's reliability. Its value represents the average time between a repair and the next failure. The measure is typically in units of hours. The higher the MTBF value, the higher the reliability of the device.

MTBF	1,500,000 Hours

3.5 Endurance

Capacity	256GB	512GB	1TB	2TB	
TBW	180	300	600	1200	

3.6 Environmental Specifications

Temperature:
Storage: -40°C to 85°C
Operational: 0°C to 70°C
Humidity: RH 90% under 40°C (operational)
Shock: 1500G duration 0.5ms, Half Sine Wave

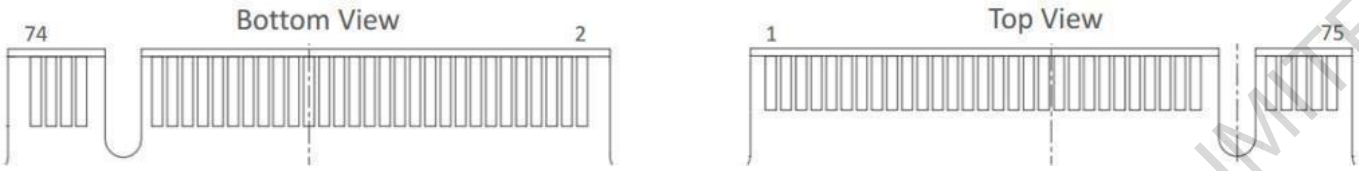
Notes:

- ◆Temperature specification is following JEDEC standard; Expressed temperature must be measured right on the case
- ◆Humidity is measured in non-condensing
- ◆Test condition for shock: 0.5ms duration with half sine wave

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4.Interface Description

4.1 Pin Assignment



[Figure 3-1]Pin Assignments

4.2 Pin Description

Pin	Type	Description
1	GND	CONFIG_3 = GND
2	3.3V	3.3V source
3	GND	Ground
4	3.3V	3.3V source
5	PETn3	PCIe TX Differential signal defined by the PCI Express M.2 spec
6	N/C	No connect
7	PETp3	PCIe TX Differential signal defined by the PCI Express M.2 spec
8	N/C	No connect
9	GND	Ground
10	LED1#	Open drain, active low signal. These signals are used to allow the add-in card to provide status indicators via LED devices that will be provided by the system.
11	PERn3	PCIe RX Differential signal defined by the PCI Express M.2 spec
12	3.3V	3.3V source
13	PERp3	PCIe RX Differential signal defined by the PCI Express M.2 spec
14	3.3V	3.3V source
15	GND	Ground
16	3.3V	3.3V source
17	PETn2	PCIe TX Differential signal defined by the PCI Express M.2 spec
18	3.3V	3.3V source
19	PETp2	PCIe TX Differential signal defined by the PCI Express M.2 spec
20	N/C	No connect
21	GND	Ground
22	N/C	No connect
23	PERn2	PCIe RX Differential signal defined by the PCI Express M.2 spec
24	N/C	No connect
25	PERp2	PCIe RX Differential signal defined by the PCI Express M.2 spec
26	N/C	No connect
27	GND	Ground
28	N/C	No connect

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29	PETn1	PCIe TX Differential signal defined by the PCI Express M.2 spec
30	N/C	No connect
31	PETp1	PCIe TX Differential signal defined by the PCI Express M.2 spec
32	N/C	No connect
33	GND	Ground
34	N/C	No connect
35	PERn1	PCIe RX Differential signal defined by the PCI Express M.2 spec
36	N/C	No connect
37	PERp1	PCIe RX Differential signal defined by the PCI Express M.2 spec
38	N/C	No connect
39	GND	Ground
40	N/C	No connect
41	PETn0	PCIe TX Differential signal defined by the PCI Express M.2 spec
42	N/C	No connect
43	PETp0	PCIe TX Differential signal defined by the PCI Express M.2 spec
44	N/C	No connect
45	GND	Ground
46	N/C	No connect
47	PERn0	PCIe RX Differential signal defined by the PCI Express M.2 spec
48	N/C	No connect
49	PERp0	PCIe RX Differential signal defined by the PCI Express M.2 spec
50	PERST#(I)(0/3.3V)	PE-Reset is a functional reset to the card as defined by the PCIe Mini CEM specification.
51	GND	Ground
52	CLKREQ#(I/O)(0/3.3V)	Clock Request is a reference clock request signal as defined by the PCIe Mini CEM specification; Also used by L1 PM Sub-states.
53	REFCLKn	PCIe Reference Clock signals (100 MHz) defined by the PCI Express M.2 spec.
54	N/C	No connect
55	REFCLKp	PCIe Reference Clock signals (100 MHz) defined by the PCI Express M.2 spec.
56	Reserved for MFG DATA	Manufacturing Data line. Used for SSD manufacturing only. Not used in normal operation. Pins should be left N/C in platform Socket.
57	GND	Ground
58	Reserved for MFG CLOCK	Manufacturing Clock line. Used for SSD manufacturing only. Not used in normal operation. Pins should be left N/C in platform Socket.
59	N/C	Module Key M
60	N/C	Module Key M
61	N/C	Module Key M
62	N/C	Module Key M

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63	N/C	Module Key M
64	N/C	Module Key M
65	N/C	Module Key M
66	N/C	Module Key M
67	N/C	No connect
68	N/C	No connect
69	N/C	No connect
70	3.3V	3.3V source
71	GND	Ground
72	3.3V	3.3V source
73	GND	Ground
74	3.3V	3.3V source
75	GND	Ground

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5.Command Descriptions

5.1 Supported Command Lists

Identifier	O/M	Command Description	Supported
Admin Commands			
00h	M	Delete I/O Submission Queue	Supported
01h	M	Create I/O Submission Queue	Supported
02h	M	Get Log Page	Supported
04h	M	Delete I/O Completion Queue	Supported
05h	M	Create I/O Completion Queue	Supported
06h	M	Identify	Supported
08h	M	Abort	Supported
09h	M	Set Feature	Supported
0Ah	M	Get Feature	Supported
0Ch	M	Asynchronous Event Request	Supported
10h	O	Firmware Commit	Supported
11h	O	Firmware Image Download	Supported
14h	O	Device Self-test	Supported
80h	O	Format NVM	Supported
81h	O	Security Send	Supported
82h	O	Security Receive	Supported
84h	O	Sanitize	Supported
I/O Commands			
00h	O	Flush	Supported
01h	O	Write	Supported
02h	O	Read	Supported
04h	O	Write Uncorrectable	Not Supported
05h	O	Compare	Supported
08h	O	Write Zeroes	Supported
09h	O	Dataset Management	Supported
Set Feature Commands			
00h		Reserved	
01h	M	Arbitration	Supported
02h	M	Power Management	Supported
03h	O	LBA Range Type	Not Supported
04h	M	Temperature Threshold	Supported
05h	M	Error Recovery	Supported
06h	O	Volatile Write Cache	Supported
07h	M	Number Of Queues	Supported
08h	M	Interrupt Coalescing	Supported
09h	M	Interrupt Vector Configuration	Supported
0Ah	M	Write Atomicity Normal	Supported

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0Bh	M	Asynchronous Event Configuration	Supported
0Ch	O	Autonomous Power State Transition	Supported
0Dh	O	Host Memory Buffer	Not Supported
0Eh	O	Timestamp	Supported
10h	O	Host Controlled Thermal Management	Supported
11h	O	Non-Operational Power State Config	Supported
0Eh-7Dh		Reserved	
80h	O	Software Progress Marker	Supported
Get Log Page Commands			
00h		Reserved	
01h	M	Error Information	Supported
02h	M	SMART / Health Information	Supported
03h	M	Firmware Slot Information	Supported
04h	O	Changed Namespace List	Supported
06h	O	Device Self-test	Supported
09h-7Fh		Reserved	
81h	O	Sanitize Status	Supported
82h-FFh		Reserved	

5.2 SMART Attributes

SMART Data Vendor-specific Attributes

Bytes Index	Bytes	Description
[0]	1	Critical Warning
[2:1]	2	Composite Temperature
[3]	1	Available Spare
[4]	1	Available Spare Threshold
[5]	1	Percentage Used
[31:6]	26	Reserved
[47:32]	16	Data Units Read
[63:48]	16	Data Units Written
[79:64]	16	Host Read Commands
[95:80]	16	Host Write Commands
[111:96]	16	Controller Busy Time
[127:112]	16	Power Cycles
[143:128]	16	Power On Hours
[159:144]	16	Unsafe Shutdowns
[175:160]	16	Media and Data Integrity Errors
[191:176]	16	Number of Error Information Log Entries
[195:192]	4	Warning Composite Temperature Time
[199:196]	4	Critical Composite Temperature Time
[201:200]	2	Temperature Sensor 1 (Current Temperature)
[203:202]	2	Temperature Sensor 2 (N/A)

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[205:204]	2	Temperature Sensor 3 (N/A)
[207:206]	2	Temperature Sensor 4 (N/A)
[209:208]	2	Temperature Sensor 5 (N/A)
[211:210]	2	Temperature Sensor 6 (N/A)
[213:212]	2	Temperature Sensor 7 (N/A)
[215:214]	2	Temperature Sensor 8 (N/A)
[511:216]	296	Reserved

6.Identify Device Data

The following table details the sector data returned by the IDENTIFY DEVICE command.

Bytes	O/M	Description	Default Value
01:00	M	PCI Vendor ID (VID)	\
03:02	M	PCI Subsystem Vendor ID (SSVID)	\
23:04	M	Serial Number (SN)	TBD
63:24	M	Model Number (MN)	TBD
71:64	M	Firmware Revision (FR)	TBD
72	M	Recommended Arbitration Burst (RAB)	0x01
75:73	M	IEEE OUI Identifier (IEEE)	0x6479A7
76	O	Controller Multi-Path I/O and Namespace Sharing Capabilities (CMIC)	0x00
77	M	Maximum Data Transfer Size (MDTS)	0x09
79:78	M	Controller ID (CNTLID)	0x0001
512	M	Submission Queue Entry Size (SQES)	0x66
513	M	Completion Queue Entry Size (CQES)	0x44
515:514	M	Maximum Outstanding Commands (maxcmd)	0x0200
519:516	M	Number of Namespaces (NN)	0x00000001
521:520	M	Optional NVM Command Support (ONCS)	0x005D
523:522	M	Fused Operation Support (FUSES)	0x0000
524	M	Format NVM Attributes (FNA)	0x00
525	M	Volatile Write Cache (VWC)	0x07
527:526	M	Atomic Write Unit Normal (AWUN)	0x00FF
529:528	M	Atomic Write Unit Power Fail (AWUPF)	0x0000
1023:768	M	NVM Subsystem NVMe Qualified Name (subnqn)	0x00
2047:1792	-	Refer to the NVMe over Fabrics specification	0x00

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7.Product Line up

Type	Capacity	MODEL	Part Number
PSP3S6M10M8-512G	512GB	PCIe 3.0 2280 512G	PCIe 3.0 2280 512G

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