Plusetech Technology (SHENZHEN) CO., LIMITED

M.2 2280 NVMe SSD Specification

PCIe Gen3x4, 128GB / 256GB / 512GB / 1024GB

Lead-Free&Halogen-Free

(RoHS Compliant)

PSP3H7R57M8-128GB

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Revision History

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1. General Description

• Capacity

128GB/256GB/512GB 1024GB is available

• Form Factor

– M.2 2280 (M Key)

• Features

– PCIe Gen3 8Gb/s Interface, up to 4 Lanes
– Compliant with NVMe Express Revision 1.4
– Support Host Memory Buffer
– Compliant with PCIe Express Revision 3.1

• Performance

• 128GB / 256GB
– Read：Up to 3000 MB/s (CDM)
– Write：Up to 2000MB/s (CDM).
512GB / 1TB / 2TB
– Read：Up to 3100MB/s (CDM)
– Write：Up to 2000MB/s (CDM)

• TBW

128GB / 256GB: 300TB(Min)

512GB / 1024GB： 600TB(Min)

• Power Consumption

– Active write: 3000 mW (2048GB Max)–
Active read:< 3500 mW (2028GB Max)

• Temperature

– Operating：0°C to 70°C
– Non-Operating：-40°C to 85°C

• Shock & Vibration

– Shock：1500G, duration 0.5ms, Half Sine Wave (Non-Operating)
– Vibration：10~2000Hz, 20G,3.08Grms, 30min/axis(X,Y,Z) (Non-Operating)
* Applicable only for all product

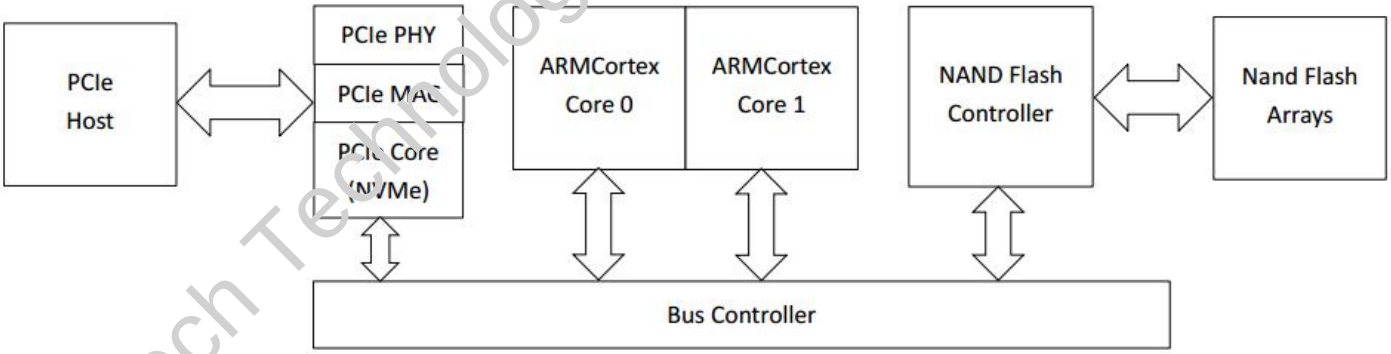
• MTBF

– 1,500,000 Hours

• Weight

128G / 256G / 512G / 1024G– Max 7g

• SSD Functional Block Diagram



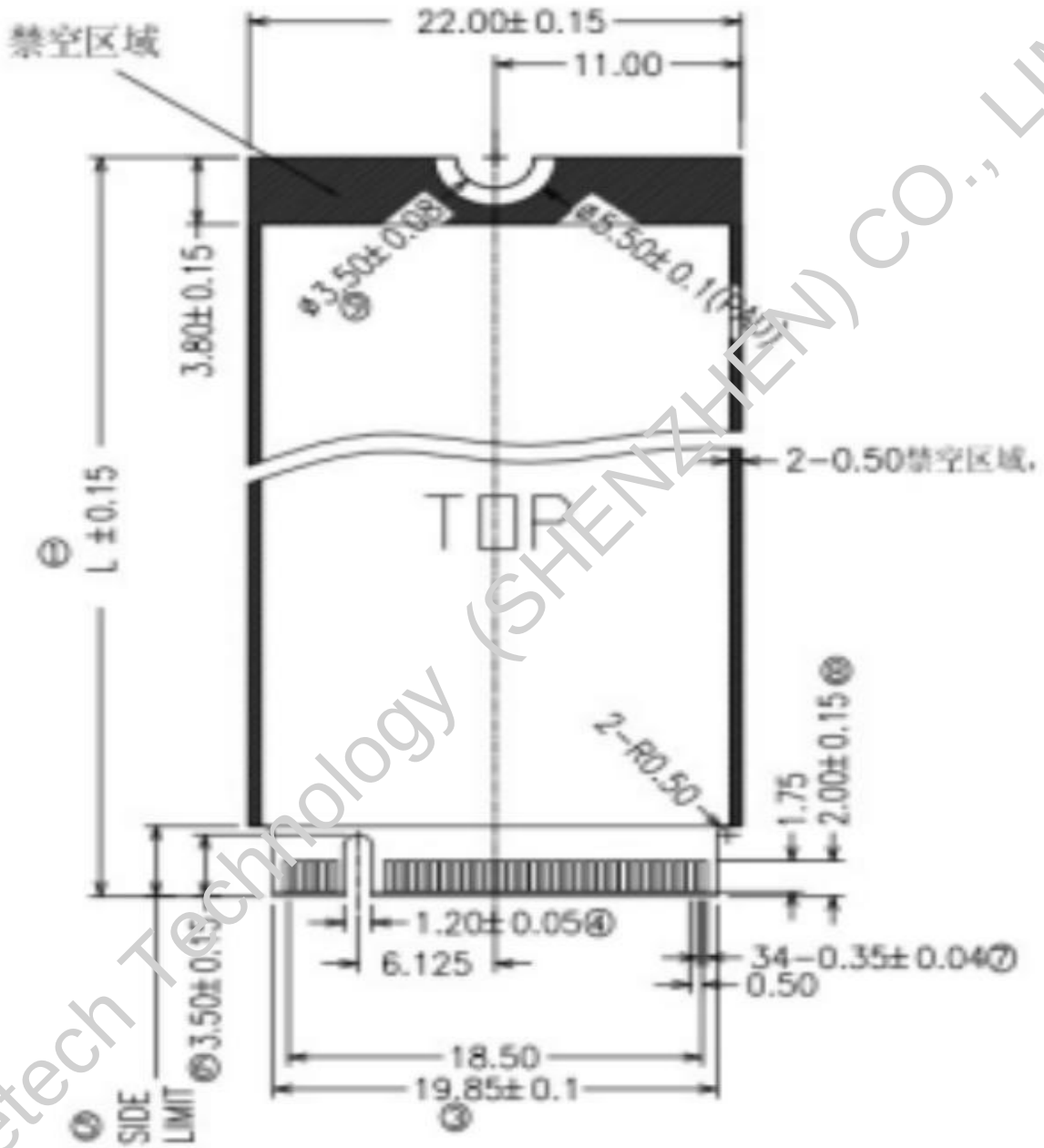
[Figure 1-1] SSD Functional Block Diagram

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2. Mechanical Specification

2.1 M.2 2280 SSD physical dimensions and Weight

Capacity	Height (mm)	Width (mm)	Length (mm)	Weight (gram)
128GB/256GB/512GB	MAX 2.15	22.00 ±0.15	80.00 ±0.15	MAX 7g



L	A(MAX)	B(MAX)
80	1.35	0

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

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3. Product Specifications

3.1 Capacity

Nominal Capacity	128GB	256GB	512GB	1024GB
Unformatted Capacity	119	238	476.94	938.7
User-Addressable Sectors	1000215216	1000215216	1000215216	1000215216
Bytes per Sector	512 Bytes			

[Table 3-1] User Addressable Sectors

NOTE:

1 Megabyte (MB) = 1 Million bytes; 1 Gigabyte (GB) =1 Billion bytes

2 User Addressable Sectors in LBA mode is calculated by IDEMA rule.

3.2 Performance

Parameter	Unit	128GB	256GB	512GB
Sequential Read CMD (Max)	MB/S	2500	3100	3100
Sequential Write CDM (Max)	MB/S	1700	2000	2000
Random Read 4K Q32T16 CDM (Max)	IOPS	270000	270000	270000
Random Read 4K Q1T1 CDM (Max)	IOPS	15000	15000	15000
Random Write 4K Q32T16 CDM (Max)	IOPS	28000	28000	28000
Random Write 4K Q1T1 CDM (Max)	IOPS	46000	47000	47000

[Table 3-2] Drive Performance

* Actual performance may vary depending on use conditions and environment

* Note

1. Performance measured using CrystalDiskMark 3.0.4
2. Write cache enabled
3. 1MB/sec = 1,048,576 bytes/sec was used in sequential performance

-System: Intel Z370 Chipset, Intel Core i7-8700K@3.7GHz, 8GB DDR4

-OS: Windows 10 x64 with HMB turn on.

3.3 System Power Consumption

[Table 3-4] Power Consumption

Parameter		128GB	256GB	512GB	1024GB
Active[1] (Typical, RMS)	Read	2.35W	2.60W	2.60W	2.60W
	Write	2.48W	2.54W	2.48W	2.48W
Idle[2] (Typical)		950mW			
L1.2 (Typical)		1.8mW			

CPU : Intel Core i7-7700K@4.2GHz

DRAM : 8GB DDR4

Chipset : Intel Z270

OS : Windows 10 x64

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3.4 Supply Voltage

Item	Requirements
Allowable voltage	3.3V ± 5%
Allowable noise/ripple	100mV p-p or less

[Table 3-3] Voltage Requirements

3.5 System Reliability

Capacity	MTBF
128GB	1,500,000 Hours
256GB	
512GB	
1024GB	

[Table 3-5] MTBF Specifications

MTBF is Mean Time Between Failure. As same word, annual failure ratio is 0.4%.

3.6 Endurance

TBW			
128GB	**128GB**	**256GB**	**512GB**
150TB(Min)	150TB(Min)	300TB(Min)	600TB(Min)

[Table 3-7] Endurance Specifications

Notes:

1- 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) x (SSD Capacity)] / WAF

NAND Endurance: NAND endurance refers to the P/E (Program/Erase) cycle of a NAND flash.

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

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.

2- The above TBW values are calculated based on WAF=1.

3- TBW may differ according to flash configuration and platform.

4- The endurance of SSD could be estimated based on user behavior, NAND endurance cycles, and write amplification factor. It is not guaranteed by flash vendor.

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3.7 Environmental Specifications

Features	Operating	Non-Operating
Temperature	0°C to 70°C	-40°C to 85°C
Humidity	5% to 95%, non-condensing	
Vibration	10~2000Hz, 20G,3.08Grms, 30min/axis(X,Y,Z) (Non-Operating)	
Shock	1500G, duration 0.5ms, Half Sine Wave (Non-Operating)	

[Table 3-6] Power Consumption

Notes:

1-Temperature is measured by SMART Temperature .Proper airflow recommended.

2-Humidity is measured in non-condensing

3- Test condition for shock: 0.5ms duration with half sine wave

4- Test condition for vibration: 10Hz to 2,000Hz, 15mins/axis on 3axis

4. Electrical Interface Specification

4.1 Connector Dimension and Pin Location



[Figure 4-1] M.2 2280 Signal and Power pins

4.2 M.2 2280 Pin Assignments and Definition

Pin #	Assignment	Description	Pin #	Assignment	Description
1	GND	Ground	2	3.3V	3.3V source
3	GND	Ground	4	3.3V	3.3V source
5	PETn3	PCIe TX	6	N/C	N/C
7	PETp3	PCIe TX	8	N/C	N/C
9	GND	Ground	10	LED_1#	Device Active Signal
11	PERn3	PCIe RX	12	3.3V	3.3V source
13	PERp3	PCIe RX	14	3.3V	3.3V source
15	GND	Ground	16	3.3V	3.3V source
17	PETn2	PCIe TX	18	3.3V	3.3V source
19	PETp2	PCIe TX	20	N/C	N/C
21	GND	Ground	22	N/C	N/C
23	PERn2	PCIe RX	24	N/C	N/C
25	PERp2	PCIe RX	26	N/C	N/C
27	GND	Ground	28	N/C	N/C
29	PETn1	PCIe TX	30	N/C	N/C

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Pin #	Assignment	Description	Pin #	Assignment	Description
31	PETp1	PCIe TX	32	N/C	N/C
33	GND	Ground	34	N/C	N/C
35	PERn1	PCIe RX	36	N/C	N/C
37	PERp1	PCIe RX	38	N/C	N/C
39	GND	Ground	40	N/C	N/C
41	PETn0	PCIe TX	42	N/C	N/C
43	PETp0	PCIe TX	44	N/C	N/C
45	GND	Ground	46	N/C	N/C
47	PERn0	PCIe RX	48	N/C	N/C
49	PERp0	PCIe RX	50	PERST#	PCIe Reset
51	GND	Ground	52	CLKREQ#	PCIe Device Clock Request
53	REFCLKN	PCIe Reference Clock	54	N/C	N/C
55	REFCLKP	PCIe Reference Clock	56	N/C	N/C
57	GND	Ground	58	N/C	N/C
59	N/C	Mechanical Notch	60	N/C	Mechanical Notch
61	N/C	Mechanical Notch	62	N/C	Mechanical Notch
63	N/C	Mechanical Notch	64	N/C	Mechanical Notch
65	N/C	Mechanical Notch	66	N/C	Mechanical Notch
67	N/C	N/C	68	N/C	N/C
69	N/C	N/C	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			

[Table 4-1] M.2 2280 Connector Pin Assignment

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5. Supported Command Set and Feature

The Admin command sets and NVM I/O command sets of RTS5766 are defined in compliant with NVM Express specification revision 1.3.

5.1 Admin Command Set

Opcode(Hex)	Command Name
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 Commit
11h	Firmware Image Download
80h	Format NVM

[Table 5-1] Admin command

5.2 NVM Express I/O Command Set

Opcode(Hex)	Command Name
00h	Flush
01h	Write
02h	Read
09h	Dataset Management

[Table 5-2] NVMe I/O command

5.3 Log Page Identifiers Support

Log Identifier (Hex)	Description
01h	Error Information
02h	SMART / Health Information
03h	Firmware Slot Information

[Table 5-3] Log Identifier

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5.4 Feature Identifiers Support

Feature Identifier (Hex)	Description
04h	Temperature Threshold
07h	Number of Queues
08h	Interrupt Coalescing
09h	Interrupt Vector Configuration
0Dh	Host Memory Buffer

[Table 5-4] Feature Identifier

5.5 SMART/Health Information

Bytes	Description
0	Critical Warning
2:1	Composite Temperature
3	Available Spare
4	Available Spare Threshold
5	Percentage Used
31:6	Reserved
47:32	Data Units Read
63:48	Data Units Written
79:64	Host Read Commands
95:80	Host Write Commands
111:96	Controller Busy Time
127:112	Power Cycles
143:128	Power On Hours
159:144	Unsafe Shutdowns
175:160	Media and Data Integrity Errors
191:176	Number of Error Information Log Entries
195:192	Warning Composite Temperature Time
199:196	Critical Composite Temperature Time
201:200	Temperature Sensor 1
203:202	Temperature Sensor 2
205:204	Temperature Sensor 3
207:206	Temperature Sensor 4
209:208	Temperature Sensor 5
211:210	Temperature Sensor 6
213:212	Temperature Sensor 7
215:214	Temperature Sensor 8
219:216	Thermal Management Temperature 1 Transition Count
223:220	Thermal Management Temperature 2 Transition Count
227:224	Total Time For Thermal Management Temperature 1
231:228	Total Time For Thermal Management Temperature 2
511:232	Reserved

[Table 5-5] SMART Information

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5.6 Identify Command

The Identify Command returns the data described below.

Bytes	Default Value	Description
01:00	XXX	PCI Vendor ID(VID)
03:02	XXX	PCI Subsystem Vendor ID
23:04	XXX	Serial Number
63:24	XXX	Model Number
71:64	XXX	Firmware Revision
72	10h	Recommended Arbitration Burst
75:73	845DD7h	IEEE OUI Identifier
76	00h	Controller Multi-Path I/O and Namespace Sharing Capabilities
77	08h	Maximum Data Transfer Size
255:78	-	Reserved
257:256	04h	Optional Admin Command Support
258	03h	Abort Command Limit
259	03h	Asynchronous Event Request Limit
260	02h	Firmware Updates
261	02h	Log Page Attributes
262	07h	Error Log Page Entries
263	03h	Number of Power States Support
264	01h	Admin Vendor Specific Command Configuration
265:511	-	Reserved
512	66h	Submission Queue Entry Size
513	44h	Completion Queue Entry Size
515:514	-	Reserved
519:516	01h	Number of Namespaces
521:520	14h	Optional NVM Command Support
523:522	00h	Fused Operation Support
524	00h	Format NVM Attributes
525	01h	Volatile Write Cache
527:526	01h	Atomic Write Unit Normal
529:528	00h	Atomic Write Unit Power Fail
530	00h	NVM Vendor Specific Command Configuration
531-2047	-	Reserved
2079:2048	00h	Power State 0 Descriptor
...	00h	(N/A)
3071:3040	00h	Power State 31 Descriptor
4095:3072	-	Reserved

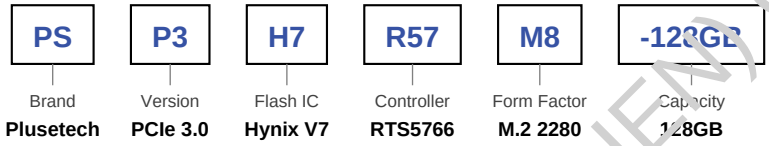
[Table 5-6] Identify Data Structure

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6. Product Line up

Type	Capacity	MODEL	Part Number
PCIe M.2 2280 SSD	128GB	NVME SSD 128GB	PSP3H7R57M8-128GB

Part Number Naming Rule



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