Plusetech Technology (SHENZHEN) CO., LIMITED

M.2 2280 NVMe SSD Specification

PCIe Gen3x4, 1TB

Lead-Free&Halogen-Free

(RoHS Compliant)

PSP3W3M10M8-001TB

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1. Features

◆ Form Factor

❖ M.2 Solid State Drive (NVMe Interface)

42mm x22 mm x 3.65mm
60mm x 22 mm x 2.3 mm
80mm x22 mm x2.3 mm
110mmx 22 mm x2.3 mm

- 75pin (22110/2280/2260/2242 Key M)

Available Capacities

- 128GB~1TB (3D TLC NAND Flash)

Advanced Power Management Supported

High Reliability

- Dynamic, static and active (initiative) balanced wear-leveling strategy
- Intelligent Read Disturb Management
- Intelligent Recycling for advanced free space management
- Power/Performance Balancing
- Intelligent Bad-Block Management
- S.M.A.R.T Supported
- TRIM Command Supported

Temperature Ranges

- Consumer Operating temperature: 0℃~+70℃

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2. Descriptions

◆ Host Interface

PCIe Gen 3 (8Gb/s) x4 Lane with L1.2 support

Compliant with PCIe Express 3.1

NVMe 1.3 register interface and command set 1

◆ Dual ARM Cortex R5 CPU @ 500MHz

◆ NAND Flash Interface

Supports 4 flash channels with 4 chip enable (CE) pins per channel

Supports ONFI 4.0/3.0 and Toggle 3.0/2.0 interface, frequency up to 667 MT/s

Supports Asynchronous SDR, Synchronous DDR and Toggle DDR NAND

Supports Flash /0 power 1.8V/1 .2V operation Multi-plane operation

Programmable driving strength fits different types of NAND configurations

◆ Data Reliability

Performance-optimized LDPC engine provides maximum error correction capability for 2D

MLC/TLC as well as 3D MLC/TLC

End-to-End data path protection with CRC parity (512Byte + 2Byte)

SECDED2 SRAM ECC error handling and prevention on major memory buffers

RAID engine provides multi-page protection for NAND flash data

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2.1 General Description

- Plusetech's ultra-fast and ultra-thin Plusetech M.2 NVMe SSD provide you with ultimate performance on traditional hard drives by achieving sequential read/write rates up to 3500MB/s and 3000MB/s with up to 580K I0PS.In addition, the Plusetech M.2 NVMe SSD ultra-thin 2.3mm thickness makes it the perfect solution for Pad and ultrabook, or any storage application that requires ultra-high performance and height limitations.
- For ultra-high security protection and reliability, Plusetech M.2 NVMe series SSD equips high speed Dual Coretex R5 CPU for supporting 128/256-bit AES (Advanced Encryption Standard), thus it can fully meet business users' strict requirement in ultra-low power consumption, ultra-high security and reliability.
- The Plusetech M.2 NVMe series of SSD provide advanced data protection and reliability through a combination of LDPC advanced ECC algorithms, and a longer SSD lifetime is achieved by integrating lower write-and-wear leveling factors. (WLF)
- By providing these features, the Plusetech M.2 NVMe series are the best solution to meet the various needs of consumer electronics storage applications, regardless of performance, power consumption, shape factors, and cost considerations. In addition, Plusetech M.2 NVMe series SSD are integrated with advanced technologies such as intelligent block management and wear leveling, intelligent disturbance management, power/performance balance, intelligent recovery, etc, to improve reliability and achieve advanced free space management.

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2.2 Physical Description

- The important component of Plusetech M.2 NVMe series SSD includes a Flash controller and NAND Flash memory modules. The controller works with a host system to allow data to be written to and read from the Flash memory modules through a (NVMe) interface. The SSD is offered in a M.2 form factor with a M.2 connector.

3. Ordering Information

The following Table 1 lists the part No. for Plusetech M.2 NVMe Series SSD.
Table 1: Commercial temperature product list

Capacity	Flash Type	Form Factor
1024GB	3D TLC	M.2 NVMe

*1GB=1,000,000,000 Bytes
For latest ordering information, please consult Plusetech sales representatives

4. System Performance

Table 2: System Performance Table

System Performance		Max.	Unit
Sustained Sequential Read Rate	1024GB	3500	MB/s
Sustained Sequential Write Rate	1024GB	3000	MB/s
4KB Random Read IOPS	1024GB	580K	IOPS
4KB Random Write IOPS	1024GB	420K	IOPS

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5. Environmental Specifications

5.1 Recommended Operating Conditions

Table 3: Recommended Operating Conditions

Parameter	Signal	Min	Typ	Max	Unit
Core Power Supply	VDD	0.855	0.9	0.945	V
Digital I/O Power Supply	VCCGO_33	2.7	3.3	3.47	V
NAND Flash I/O Power Supply	VCCFQ	1.14	1.2	1.26	V
		1.7	1.8	1.95	
Flash I/O Reference Voltage	VREFIO_FSH	0.49x VCCFQ	0.5xVCCFQ	0.5xVCCFQ	V
Analog Power Supply	V09_PAD	0.91	0.9	0.99	V
Analog Power Supply	VCCAH	1.62	1.8	1.98	V
Crystal Pad Power	VDD18_XTAL	1.62	1.8	1.98	V
PCIe Power Supply	VP09	0.855	0.9	0.945	V
	VP18	1.62	1.8	1.98	V
eFuse Power	VQPS	1.62	1.8	1.98	V

Voltage					

5.2 General DC Characteristics

Table 4: Digital DC Electrical Characteristics (VCCGQ of 3.3V)

Parameter	Symbol	Min	Typ	Max	Unit
General I/O Supply Voltage	VCCGO_33	2.7	3.3	3.6	V
High Level Output Voltage	V_{OH}	0.67xV_{IO}			V
Low Level Output Voltage	V_{OL}			0.4	V
High Level Output Voltage	V_{IH}	0.8xV_{IO}		V_{IO}+0.3	V
Low Level Output Voltage	V_{IL}	V_{SS33}-0.3		0.2xV_{IO}	V
Pull-up Resistance	R_{PU}	30	58	95	kΩ
Pull-down Resistance	R_{PD}	31	60	100	kΩ

Table 5: Digital DC Electrical Characteristics (VCCFQ of 1.8V)

Parameter	Symbol	Min	Typ	Max	Unit
NAND I/O Supply Voltage	VCCFQ	1.7	1.8	1.95	V
High Level Output Voltage	V_{OH}	VCCFQ -0.1			V
Low Level Output Voltage	V_{OL}			0.1	V
High Level Input Voltage	V_{IH}	0.8x V_{IO}		V_{IO} +0.3	V
Low Level Input Voltage	V_{IL}	V_{SS33} - 0.3		0.2x V_{IO}	V
Pull-up Resistance	R_{PU}	34	49.7	72	kΩ
Pull-down Resistance	R_{PD}	31	50	86	kΩ

Table 6: Digital DC Electrical Characteristics (VCCFQ of 1.2V)

Parameter	Symbol	Min	Typ	Max	Unit
NAND I/O Supply Voltage	VCCFQ	1.14	1.2	1.26	V

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High Level Output Voltage	V_{OH}	VCCFQ -0.1			V
Low Level Output Voltage	V_{OL}			0.1	V
High Level Input Voltage	V_{IH}	0.8x V_{IO}		V_{IO} +0.3	V
Low Level Input Voltage	V_{IL}	V_{SS33} - 0.3		0.2x V_{IO}	V
Pull-up Resistance	R_{PU}	59	90.3	133	kΩ
Pull-down Resistance	R_{PD}	50	89.4	161	kΩ

Table 7: Power-on Reset

Parameter		Min	Typ	Max	Unit
Detect Voltage	VRR		0.76		V
	VFR1		0.72		V
	VFR2		0.7		V
	VFR3		0.68		V
	VFR4		0.66		V
Delay Time	Rise	6.27	6.8	7.31	μs
	Fall	6.27	6.8	7.31	μs

Table 8: Flash Voltage Detection

Parameter		Min	Max	Unit
Detect Voltage(3.3V)	VRR	2.7	2.9	V
	VFR	2.6	2.8	V
Detect Voltage(1.8V)	VRR	1.6	1.8	V
	VFR	1.5	1.7	V
Delay Time	Rise	6.27	7.31	μs
	Fall	6.27	7.31	μs

Table 9: PLL

Parameter	Min	Typ	Max	Unit	Condition
Out put Clock	3.13		1200	MHz	

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Lock-in Time		160		μs	
Duty Cycle	45		55	%	
Jitter			10%	UI	
Disable, Power-down Current(1.2V)			1	μA	Regulator Disabled
Operating Current (1.2V)			4	mA	f_{CLK} =800MHz

Note: UI=out put frequency

Table 10: Feer-run Oscillator

Parameter	Min	Typ	Max	Unit	Condition
Out put Clock	150		2300	MHz	
Disable, Power-down Current(1.2V)		0.13	3	μA	
Operating Current (1.2V)		92	150	μA	f_{CLK}=1150MHz
Jitter rms	0.35			cycle	

Table 11: RTC

Parameter	Min	Typ	Max	Unit	Condition
Output ClockCLK_32K	12.22	32	56.9	KHz	
Output ClockCLK_1	0.38	1	1.78	Hz	
Operating Current (1.2V)		6	8	μA	

5.3 Recommended Storage Conditions

Table12: Recommended Storage Conditions

Parameter	Value
Consumer storage temperature	-20℃ to 85℃
Semi-industrial Operating Temperature	-10℃ to 80℃
Industrial Operating Temperature	-20℃ to 85℃
Power Supply Voltage Range	3.3VDC±5%

5.4 Shock, Vibration and Humidity

Table 13: Shock, Vibration and Humidity

Parameter	Value

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Humidity(non-condensing)	5%-95%(Operating)
Relative Humidity Gradient	30% per hour max
Vibration	10G(Peak,10-2000HZ)
Shock(Operating)	50G
Shock(Non-Operating)	1500G

5.5 Reliability

Table 14: Reliability

Parameter	Value
Mean Time Between Failures(MTBF)	>1.500,000hours(Calculation Mode: Telcordia SR-332 Issue 1 Method 1,Case 1)

5.6 Endurance and Warranty Policy

Endurance	In normal operation, guarantees for 3 years product lifetime for half the SSD capacity sequential write per day based on JEDEC 218 standard test pattern. The daily write capacity (DWPD) of the hard disk is 43% of the hard disk capacity
Warranty Policy	

5.7 Power Consumption

Table 15: Power Consumption Table

Parameter	Uni	128GB	256GB	512GB	1TB

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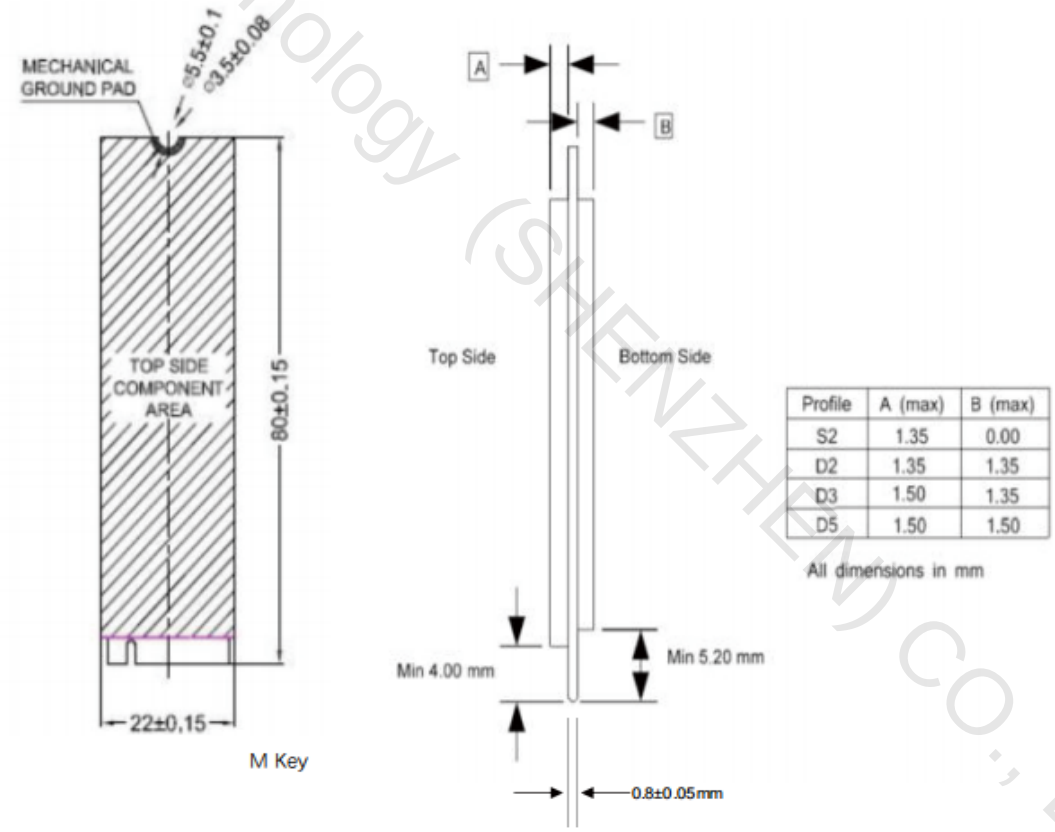
Active Write-Average	W	< 2.5	< 3.25	< 4.5	< 4.38
Active Write-Burst	W	< 2.75	< 3.5	< 4.6	< 4.4
Active Read-Average	W	< 1.5	< 1.8	< 2.0	< 2.75
Active Read-Burst	W	< 2.0	< 2.0	< 2.0	< 1.7
Idle	W	< 0.5	< 0.5	< 0.5	< 0.5

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6. Physical Dimension Diagram

Tabel 16 Physical dimensions and weight

Physical Dimensions	Size	Unit
Length	42/60/80/110	mm
Width	22	mm
Thickness	3.65/2.3/2.3/2.3	mm
PCB	0.8	mm



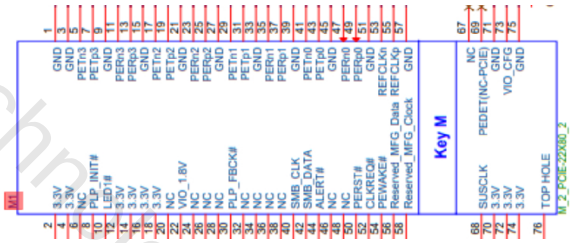
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7. Electrical Interface

◆ Pin Assignment

Figure 2 M.2 NVMe PIN

Table17 Pin Assignment and description for Signal and Power pins



2242/2260/2280/22110 Key M

1	GND		
3	GND	2	3.3V
5	PETn3	4	3.3V
7	PETp3	6	NC
9	GND	8	NC
11	PERn3	10	LED1#
13	PERp3	12	3.3V
15	GND	14	3.3V
17	PETn2	16	3.3V
19	PETp2	18	3.3V
21	GND	20	NC
23	PERn2	22	NC
25	PERp2	24	NC
27	GND	26	NC
29	PETn1	28	NC
31	PETp1	30	NC
33	GND	32	NC
35	PERn1	34	NC
37	PERp1	36	NC
39	GND	38	NC

		40	NC
41	PETn0	42	NC
43	PETp0	44	NC
45	GND	46	NC
47	PERn0	48	NC
49	PERp0	50	PERST#
51	GND	52	CLKREQ#
53	REFCLKn	54	PEWAKE#
55	PEFCLKp	56	Reserved_MFG_Data
57	GND	58	Reserved_MFG_Clock
Key M			
67	NC	68	SUSCLK
69	PEDET(NC-PCIE)	70	3.3V
71	GND	72	3.3V
73	GND	74	3.3V
75	GND		
	GND		

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