



PCIe M.2 2280

MMSP350

Solid State Drive

128GB 256GB 512GB

Product Datasheet

Version 1.1

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Revision History

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1. General Description

PCIe M.2 2280 SSD series, capacity from 128GB. The PCIe series USES an ultra-high speed PCIe Gen3x4 interface to provide excellent random read and write performance and multitasking. Support NVMe 1.3 standard protocol, with 3D NAND Flash, with high storage density, good reliability. LDPC ECC error correction mechanism to ensure faster and more reliable data transmission, but also enhance the service life.

2. Product Overview

The following table lists the models of PCIe series SSD.

No.	Product Name	Capacity	NAND Flash	Form Factor
1	HC128GP3KM2T	128GB	3D TLC	PCIe Gen3 x4
2	HC256GP3KM2T	256GB	3D TLC	PCIe Gen3 x4
3	HC512GP3KM2T	512GB	3D TLC	PCIe Gen3 x4

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3. Product Specifications

3.1. Key Feature

- Capacity : 128GB/256GB/512GB
- Form-Factor : M.2 22mm x80mm
- Flash Interface :
 - PCIe Gen3x4
- PCIe Protocol
 - NVMe 1.3 certified
- Specific Feature
 - MTBF : 2,000,000 hours
 - TBW : 128GB/80TB, 256GB/150TB, 512GB/300TB
 - Performance : Read up to 1600MB/s (128GB), 3500MB/s (256GB), 3500MB/s (512GB) & Write up to 1380MB/s (128GB), 1350MB/s (256GB), 2700MB/s (512GB)
 - IOPS (4K 64Thrd Read) : Read up to 226K (128GB), 135K (256GB), 134K (512GB) & Write up to 228K (128GB), 119K (256GB), 120K (512GB)
- Input Power : DC 2.7~3.6V
- RoHS Compliant
- Power Consumption (Maximum) : <2.5W
- Operating Temperature Range : 0°C ~ 70°C
- Storage Temperature Range : -40°C ~ 85°C

3.2. Capacity

Model	PCIe	PCIe	PCIe
Capacity	128GB	256GB	512GB

3.3. Performance

3.3.1. Read/Write & CDM Performance

Item	CrystalDiskMark 6.0.0 (x64)		
Capacity	128GB	256GB	512GB (MB/s)
Sequential Q32 Read (MB/s)	1600	3500	3500
Sequential Q32 Write (MB/s)	1350	1350	2700
4K-Q32T16 Read (K)	250	118	194
4K-Q32T16 Write (K)	257	170	169
Note: 1.) Seq. Read & Write speed test by CDM, The Test Platform Z370, Test system Win10 (64Bit). 2.) Performance may vary based on PCIe capacity, hardware test platform, test software, Operating system, and other system variables.			

3.3.2. ...Read/Write & AS-SSD Performance

Item	AS SSD BenchMark 1.9		
Capacity	128GB (MB/s)	256GB (MB/s)	512GB (MB/s)
Sequential Read(MB/s)	1450	2560	2590
Sequential Write (MB/s)	1250	1239	2152
Item	AS SSD BenchMark 1.9 (IOPS)		
4K-64Thrd Read (K)	226	135	134
4K-64Thrd Write (K)	228	119	120

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Note: 1.) Seq. Read & Write speed test by AS-SSD with Random pattern, The Test Platform Z370
Test system Win10 (64Bit).
2.) Performance may vary based on PCIe capacity, hardware test platform, test software,
Operating system, and other system variables

3.3.3. Read/Write & ATTO Performance

Item	ATTO Disk Benchmark		
Capacity	128GB (MB/s)	256GB (MB/s)	512GB (MB/s)
Sequential Read	1600	3200	3500
Sequential Write	1350	1800	2700
Note: 1.) Seq. Read & Write speed test by ATTO, The Test Platform Z370, Test system Win10 (64Bit). 2.) The system conditions and test environment may affect test result			

3.4. Electrical

3.4.1. Operating Voltage

Item	Operating Voltage
Input Power	DC 2.7V~3.6V
Maximum Ripple	100mV p-p or less

3.4.2. ...Power Consumption

Power State				
PS0	PS1	PS2	PS3	PS4
< 4.2 W	< 2.5 W	< 2.0 W	< 14.0 mW	< 2.0 mW

3.5. Environmental Conditions

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Item	Operating	Non-Operating
Temperature	0° C to 70° C	-40° C to 85° C

3.6. Reliability

3.6.1. MTBF

Item	Value
MTBF	2,000,000 Hours
Remark: Mean Time Between Failures (MTBF)	

3.6.2. TBW

Total Byte Written (TB)	128GB	256GB	512GB
	80	150	300

4. S.M.A.R.T Support

The S.M.A.R.T is about the computer data drive monitoring system during operation and response the drive status and “health”. S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology; often written as SMART) is a monitoring system included in computer hard disk drives (HDDs), solid-state drives (SSDs). Its primary function is to detect and report various indicators of drive reliability with the intent of anticipating imminent hardware failures

When S.M.A.R.T. data indicates a possible imminent drive failure, software running on the host system may notify the user so preventative action can be taken to prevent data loss, and the failing drive can be replaced and data integrity maintained.

Below table shows the S.M.R.T command set.

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ID	Attribute Name	Comment
0x01	Read Error Rate	TotalNewBadCnt/TotalHostRdCnt
0x05	Reallocated Sectors Count	TotalNewBadCnt
0x09	Power-On Hours Count	Number of hours elapsed in the power-on state. The value shall be incremented by one every one hour.
0x0C	Drive Power Cycle Count	Number of device power cycling. The value shall be incremented by one on each power cycling after disk initialization is done
0xA0	Online Uncorrect Sector Count	Uncorrectable Sector Count when read/write
0xA1	Number Of Valid SpareBlocks	Number of valid spare block
0xA3	Number of initial invalid block	Number of initial invalid block
0xA4	Total Erase Count (TLC Block)	Total erase count
0xA5	Maximum P/E Cycles (TLC)	Maximum erase count
0xA6	Minimum P/E Cycles (TLC)	Minimum Erase count
0xA7	Average P/E Cycles (TLC)	Average erase count
0xA8	Max Erase Count in Spec	Max Erase Count of Spec
0xA9	Remain Life Percentage	Remain Life(%)
0xAF	Worst Component Program Fail Count	Program fail count in worst die
0xB0	Worst Component Erase Fail Count	Erase fail count in worst die
0xB1	Wearleveling Count	Total wearlevel count
0xB2	Grown Bad Block Count	Runtime invalid block count
0xB5	Program Fail Count	Total program fail count
0xB6	Erase Fail Count	Total Erase fail count
0xC0	Sudden Power Count	Number of times unexpected power off occurred. (power off when drive is in active state) The value shall be incremented by one on each unexpected power off.
0xC2	Enclosure Temperature	On-chip temperature sensor value.
0xC3	Hardware ECC recovered	Retry Pass Count
0xC4	Reallocation Event Count	Retry Fail Count
0xC5	Current Pending Sector Count	waiting move sector count
0xC6	Reported Uncorrectable Errors	Total uncorrectable count when off-line
0xC7	CRC Error Count	UltraDMA CRC Error Count
0xE8	Available Reserve Space	Remain Space(%)



0xF1	Host 32MB/unit Written (TLC)	Total LBAs Written (each write unit = 32MB)
0xF2	Host 32MB/unit Read (TLC)	Total LBAs Read (each read unit = 32MB)
0xF5	NAND 32MB/unit Written (TLC)	Total sector write to flash (each write unit = 32MB)

5. Pin assignment and descriptions

5.1....PCIe M.2 M Key Interface

1	GND		
3	GND	2	3.3V
5	PETn3	4	3.3V
7	PETp3	6	Not Used
9	GND	8	Not Used
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	Not Used
23	PERn2	22	Not Used
25	PERp2	24	Not Used
27	GND	26	Not Used
29	PETn1	28	Not Used
31	PETp1	30	Not Used
33	GND	32	Not Used
35	PERn1	34	Not Used
37	PERp1	36	Not Used
39	GND	38	Not Used
41	PETn0	40	SMCLK
43	PETp0	42	SMDAT
45	GND	44	ALERT#
47	PERn0	46	Not Used
49	PERp0	48	Not Used
51	GND	50	PERST#
53	REFCLKn	52	CLKREQ#
55	REFCLKp	54	PEWAKE#
57	GND	56	Not Used
59	Module Key	58	Not Used
61	Module Key	60	Module Key
63	Module Key	62	Module Key
65	Module Key	64	Module Key
67	Not Used	66	Module Key

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69	PEDET (NC-PCIe)	68	SUSCLK
71	GND	70	3.3V
73	GND	72	3.3V
75	GND	74	3.3V

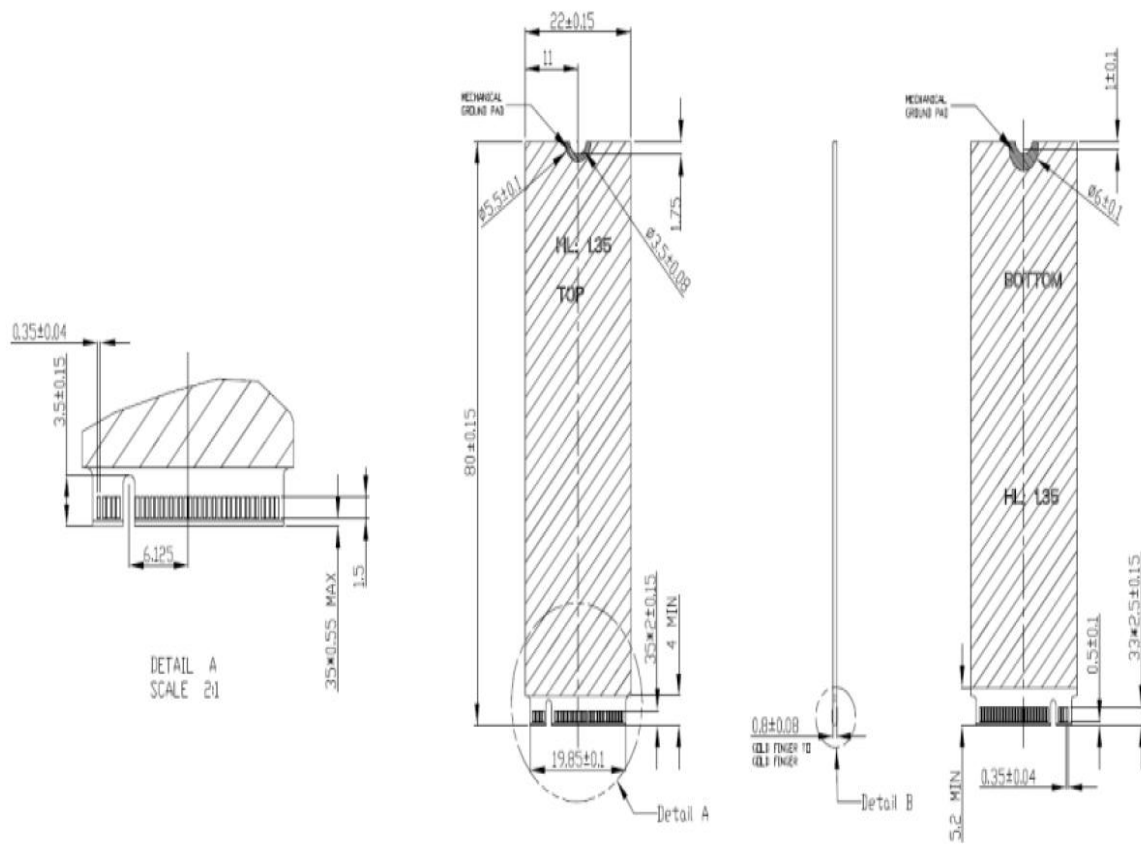
6. Product Mechanical Specification

6.1 Dimensions and Weight

Model	Length (mm)	Width (mm)	Height (mm)	Weight (Gram)
128GB	22 ± 0.15	80 ± 0.15	0.80 ± 0.10	Max 6
2TB	22 ± 0.15	80 ± 0.15	0.80 ± 0.10	Max 6

6.2 Dimension Drawing

Unit : mm



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