Loongtion®

M.2 2280 NVMe SSD

Data Sheet

V1.1

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Version History

Date	Revised by	Version	Remarks
2024.01.10	Tian Yue	1.0	Initial release
2024.02.01	Tian Yue	1.1	Revised document format

1. Introduction

1.1 Document Purpose

1) This document provides a detailed and comprehensive introduction to the parameters and electrical characteristics of the M.2 2280 NVMe Series Solid-State Drive, and provides general descriptions of the product's environmental adaptability, reliability, and durability.

2) This document serves as a reference for engineering personnel during product selection, covering capacity, product grade, and related parameters.

1.2 Document Scope

This document is intended for engineering personnel in product selection.

1.3 Terms and Abbreviations

TBW: Total Bytes Written (total data write volume)

ECC: Error Correction Code (error detection and correction)

MTBF: Mean Time Between Failures (mean time between failures)

1.4 Operating Conditions

Unless otherwise specified, the recommended operating and storage temperature ranges for modules in this product series are as follows:

Table 1

Grade	**Category**	**Operating Temperature**	**Storage Temperature**
I	Industrial Grade	-40℃~85℃	-45℃~90℃

2. Product Overview

The M.2 NVMe series SSDs use a China-domestic controller and TLC NAND Flash as the storage medium, offering high capacity, high performance, and effective thermal dissipation. Onboard DRAM cache is supplied from Micron or ChangXin Memory depending on production batch, with approximately 1 GB of cache per 1 TB of SSD capacity.

2.1 Typical Applications

- Embedded devices and systems;
- Industrial and medical equipment;
- Commercial computers.

2.2 Product Features

- PCIe 3.0 x4；
- Wear leveling algorithm;
- High-reliability power management with short-circuit and undervoltage protection;
- NAND Flash Type: TLC;
- P/E cycles: 3000;
- TLC: 1 TB to 8 TB;
- Supports TRIM/NCQ/S.M.A.R.T.;

2.3 System Configuration Requirements

- Supply Voltage: 3.3 V;
- Interface: Standard M.2 M-Key Connector;
- Installation Requirement: Hardware system must support NVMe protocol.

2.4 Operating Principle

The M.2 2280 NVMe SSD provides user data storage and retrieval. The controller exchanges data with the host through the M.2 M-Key connector. Valid host data is parsed per the NVMe protocol, verified on the link, and then managed across the NAND flash array. The internal block diagram is shown in Figure 1:

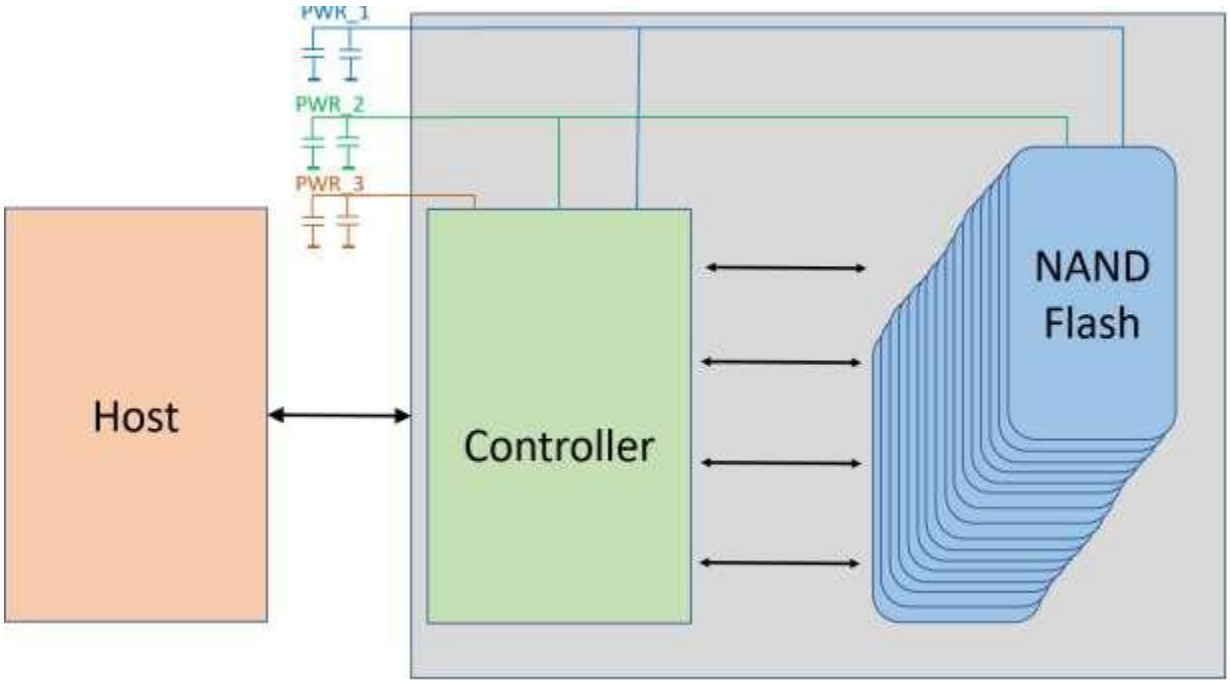


Figure 1. M.2 SSD Internal Block Diagram

3. Physical Characteristics

3.1 Interface Definition

The M.2 interface pinout is shown in Figure 2, and the signal definitions are listed in Table 9:

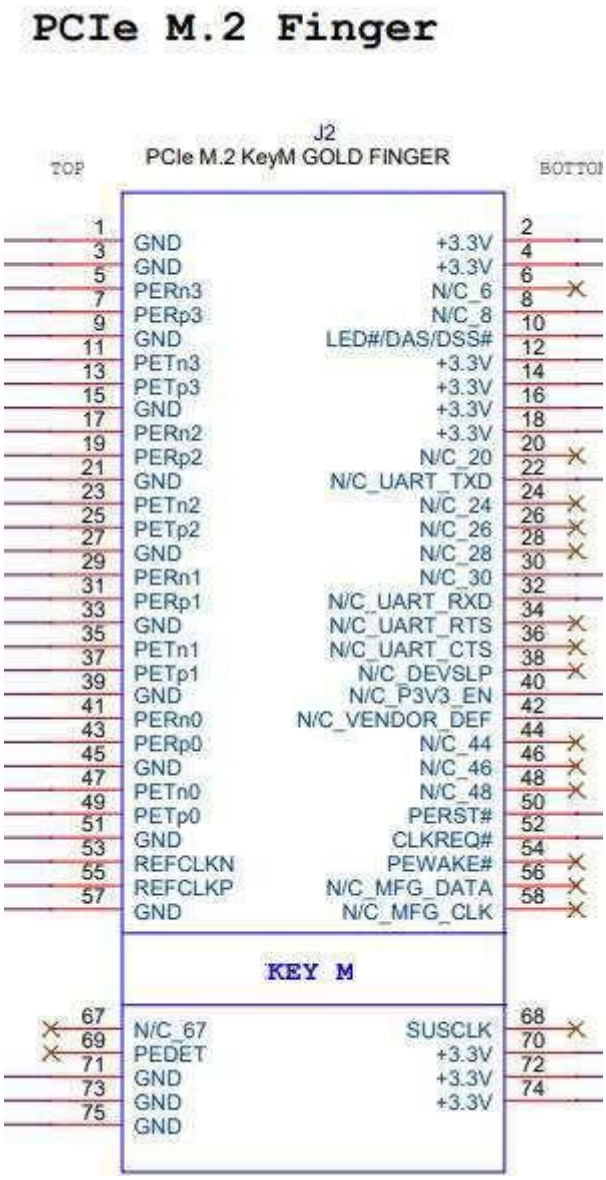


Figure 2. M.2 Pinout Diagram

This product uses the standard M.2 M-Key interface, with electrical characteristics compliant with the NVMe protocol specification. Interface signal definitions are shown in Table 9.

Table 9. M.2 SSD Signal Definitions

Pin	Signal	Description	Pin	Signal	Description
1	GND	Ground	2	+3.3V	Power input
3	GND	Ground	4	+3.3V	Power input
5	PETn3	PCIe Lane 3 Transmit Differential Signal N	6	NC_6	No connection
7	PETp3	PCIe Lane 3 Transmit	8	NC_8	No connection

		Differential Signal P			
9	GND	Ground	10	NC	No connection
11	PERn3	PCIe Lane 3 Receive Differential Signal N	12	+3.3V	Power input
13	PERp3	PCIe Lane 3 Receive Differential Signal P	14	+3.3V	Power input
15	GND	Ground	16	+3.3V	Power input
17	PETn2	PCIe Lane 2 Transmit Differential Signal N	18	+3.3V	Power input
19	PETp2	PCIe Lane 2 Transmit Differential Signal P	20	NC	No connection
21	GND	Ground	22	NC	No connection
23	PERn2	PCIe Lane 2 Receive Differential Signal N	24	NC	No connection
25	PERp2	PCIe Lane 2 Receive Differential Signal P	26	NC	No connection
27	GND	Ground	28	NC	No connection
29	PETn1	PCIe Lane 1 Transmit Differential Signal N	30	NC	Reserved
31	PETp1	PCIe Lane 1 Transmit Differential Signal P	32	NC	No connection
33	GND	Ground	34	NC	No connection
35	PERn1	PCIe Lane 1 Receive Differential Signal N	36	NC	No connection
37	PERp1	PCIe Lane 1 Receive Differential Signal P	38	NC	No connection
39	GND	Ground	40	NC	No connection
41	PETn0	PCIe Lane 0 Transmit Differential Signal N	42	NC	No connection
43	PETp0	PCIe Lane 0 Transmit Differential Signal P	44	NC	No connection
45	GND	Ground	46	NC	No connection
47	PERn0	PCIe Lane 0 Receive Differential Signal N	48	NC	No connection
49	PERp0	PCIe Lane 0 Receive Differential Signal P	50	PERST#	PCIe Reset (Active Low)
51	GND	Ground	52	CLKREQ#	PCIe Clock Request (Active Low)
53	REFCLK_N	PCIe Reference Clock (Negative)	54	NC	No connection
55	REFCLK_P	PCIe Reference Clock (Positive)	56	NC	Reserved
57	GND	Ground	58	NC	Reserved
67	NC	Software-Triggered Secure Erase Pin	68	NC	No connection
69	NC	No connection	70	+3.3V	Power input
71	GND	Ground	72	+3.3V	Power input
73	GND	Ground	74	+3.3V	Power input
75	GND	Ground			

3.2 Weight

Total weight <20 g.

3.3 Mechanical Dimensions

Mechanical dimensions: 80 mm (length) × 22 mm (width), with total height not exceeding 5 mm.

Length and width tolerances are ±0.2 mm. Dimensions are shown in Figure 3:

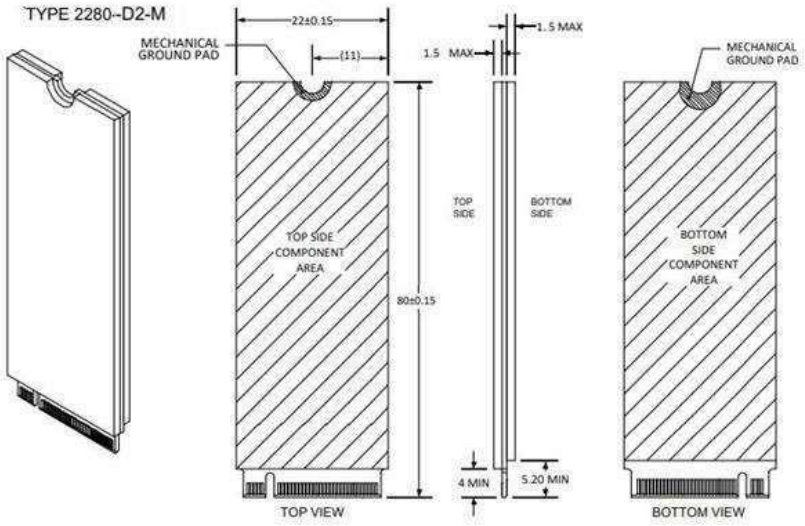


Figure 3. M.2 2280 SSD Mechanical Dimensions

4. Electrical Characteristics

4.1 Interface

- Standard M-Key gold-finger interface, gold plating thickness 3 μin;
- Standard NVMe 1.4 protocol.

4.2 Voltage

Table 2. Voltage Specifications

Parameter	Reference Value
Voltage Range	3.15-3.45V
Noise/Ripple Range	50 mV p-p or less

4.3 Product Capacity

Table 3. Capacity Specifications

Nominal Capacity	Usable Capacity
1 TB	**953 GB**
2 TB	**1.86 TB**
4 TB	**3.64 TB**
8 TB	**7.44 TB**

*Tolerance between nominal capacity and usable capacity: ±10%.

4.4 Transfer Speed

Table 4. Transfer Speed Specifications

	Capacity	1 TB	2 TB	4 TB	8 TB
Performance	Average Sequential Read Speed	≥2000 MB/s	≥2300 MB/s	≥2863 MB/s	≥2900 MB/s
	Average Sequential Write Speed	≥1500 MB/s	≥2000 MB/s	≥2316 MB/s	≥2600 MB/s
Test Environment: Windows CrystalDiskMark					

*Test speed is for reference only.

4.5 Power Consumption

Table 5. Power Consumption Specifications

	1 TB	2 TB	4 TB	8 TB
Sleep Power	0.4W	0.4W	0.4W	0.4W
Idle Power	0.5W	0.6W	0.8W	0.8W
Max Sequential Read Power	1.5W	3.5W	5.4W	7.8W
Max Sequential Write Power	2.4W	3.7W	5.5W	8.8W

*Test data is for reference only.

5. Inspection and Testing

5.1 Product Marking

The SSD label shall be placed in an appropriate location, and shall be accurate, clear, and upright, containing the following:

a) SSD model number or code;

b) Production year, batch number and serial number;

c) Manufacturer code.

For special requirements, refer to relevant documents.

5.2 Appearance Quality

The housing surface of the solid-state drive (SSD) shall be free from burrs, deformation, contamination, and corrosion.

The coating shall be uniform, free from condensation, peeling, bubbles, lacquer cracking, and other defects.

The housing fasteners shall be intact, without looseness or damage.

The markings on the SSD shall be clear and legible.

5.3 Electrical Performance Test

5.3.1 Electrical Performance Test Requirements

Table 6. Electrical Performance Test Requirements

No.	**Test Item**	**Requirement**	**Remarks**
1	Nominal Capacity, Usable Capacity	Per Section 4.3 requirements	
2	Average Sequential Read Speed	Per Section 4.4 requirements	
3	Average Sequential Write Speed	Per Section 4.4 requirements	
4	Power Consumption	Per Section 4.5 requirements	

5.3.2 SMART Information Check Test

The SSD device name and interface protocol shall comply with the requirements of the relevant documents.

5.3.3 File System Data Read/Write Test

After the file system data read/write test, the SSD shall ensure normal data copying and correct file verification.

5.4 Environmental Adaptability

5.4.1 Normal Temperature Electrical Performance Test

Under normal atmospheric and rated operating conditions, the SSD shall be powered on and subjected to electrical performance testing. Appearance shall comply with Sections 5.1 and 5.2, and performance shall meet the requirements in Sections 5.3.1 through 5.3.3.

5.4.2 Reliability

Warranty period: 5 years.

5.4.3 Endurance (TBW)

Table 7. Endurance (TBW) Specifications

Nominal Capacity	TBW

1 TB	400 TB
2 TB	800 TB
4 TB	1600 TB
8 TB	3200 TB

*TBW tolerance: ±10%.

5.5 Ordering Information

Table 8. Ordering Information

Grade / Form Factor	Nominal Capacity	Part Number (Standard)
Industrial Grade (I), M.2 2280	1 TB	YIDJ01TNQT-S
Industrial Grade (I), M.2 2280	2 TB	YIDJ02TNQT-S
Industrial Grade (I), M.2 2280	4 TB	YIDJ04TNQT-S
Industrial Grade (I), M.2 2280	8 TB	YIDJ08TNQT-S

6. Delivery Preparation

6.1 Packaging Requirements

The product is packaged in anti-static bags. The packaging shall be clean, dry, and provide adequate protection for the product.

The product carton must include anti-static foam, a certificate of conformance, and corresponding test reports.

6.2 Transportation

a) Packaged products may be transported by ordinary transport vehicles. Measures must be taken to protect against rain and snow during transportation.

b) Do not transport together with corrosive substances such as acids and alkalis.

c) Do not stack heavy objects on top of the product.

d) Handle with care.

6.3 Storage

The product shall be stored in a designated storage area with a temperature of 0°C to 35°C, relative humidity not exceeding 80%, and free from strong magnetic fields. The product must not be stored together with acids, alkalis, or corrosive substances.