深圳市磐存科技有限公司

NVMe PCIe4.0x4 M.2 2280 SSD Datasheet

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Revision History

Revision	History	Draft Date	Remark	Created By	Review By
A/00	1. initial version	July 28th ,2023	刘先生	刘先生	陈捷敏

MI7000-MM0Y3 Series

- PCIe 4.0 x 4
- 2400MT/s NAND Interface Speed
- 3rd Agile ECC Correction
- HMB Management
- SLC Cache
- 3D TLC NAND
- PLP Protection
- Support Admin & NVM Command Set
- NVMe1.4

Capacity	4096GB
Interface	M.2 M-Key
Bytes per Sector	512 Bytes
Sequential Read	Up to 7000MB/s
Sequential Write	Up to 6400MB/s
Random Read	Up to 780K IOPS
Random Write	Up to 780K IOPS
UBER[3)]	< 1.0 x 10^{-15}
MTBF[4)]	1.5 million hours

Operation Temperature	-55~85℃
Non-operation Temperature	-55~85℃
Non-operation Humidity	5%~95%RH
Linear Shock(0.5ms duration with 1/2 sine wave)	1500Gpeak
Supply Voltage	3.3V ± 5%
Read Power Consumption	4.1W
Write Power Consumption	4.4W
Idle Power Consumption	0.7W
Length	80.0 ± 0.15mm
Width	22.0 ± 0.15mm
Height	2.3 ± 0.15mm
Weight	<= 10 g

Attention: The content of the specification may be modified without notice.

1) All performance test data are obtained at Shenzhen Pancun Technology Co., Ltd Testing Laboratory;
2) Uncorrectable Bit Error Rate
3) Mean Time between Failures

Contents

1. Introduction

1.1 General Description

The PCGNV04TT48WTA is a high-performance DRAM less PCIe 4.0 x 4 solution with M.2 M-key 2280 appearance, is the ideal option for consumer computer and Laptop. It depends on 3rd Agile ECC Technology and Write Booster2, advanced Flash Management Algorithm to ensure data security and reliability,

1.2 Product List

Part Number	Temperature Grade	Capacity	LBA Count	Interface
PCGNV04TT27ITA	-20~70℃	4096GB	8001573552	M.2 M-Key
PCGNV04TT48WTA	-40~85℃	4096GB	8001573552	M.2 M-Key
PCGNV04TT48WTA	-55~85℃	4096GB	8001573552	M.2 M-Key

2. Product Specification

2.1 Product Function

- SLC Cache
- HMB Management
- 2400MT/s NAND Interface Speed
- PLP Protection
- PCIe Gen4,Compatible with Gen3、Gen2 and Gen1

2.2 Flash Management

- Dynamic/Static Wear Leveling
- Bad Block Management
- Garbage Collection
- S.M.A.R.T
- 3rd Agile ECC

2.3 TeraBytes Written

The value of TeraBytes Written reflects the durability of SSDs, which is calculated based on several factors related to usage, such as the total amount of data written to the SSD, block management conditions, and daily workload of the drive, to comprehensively predict the durability of the device. In addition, key factors such as write amplification and P/E cycles also affect the lifespan of SSDs.

Capacity	TBW	DWPD[1)]
4096GB	2400TB	0.5

Attention:

1) Drive Writes Per Day, 3years.

2.4 Power Consumption

Table 1 Supply Voltage

Capacity	Voltage	Unit
4096GB	3.3 (+/- 5%)	V

Table 2 Power Consumption

Capacity	Description	Power Consumption	Unit
4096GB	Sequential Read	4950	mW
	Sequential Write	4620	mW
	Idle	858	mW

Attention:

Parameter	4096GB	Unit
Sequential Read	7000	MB/s
Sequential Write	6400	MB/s
Random Read	780	K IOPS
Random Write	780	K IOPS

Attention:

reads and writes is 32, and the thread is 1; The queue depth for 4K random reads and writes is 8, and the thread is 8.

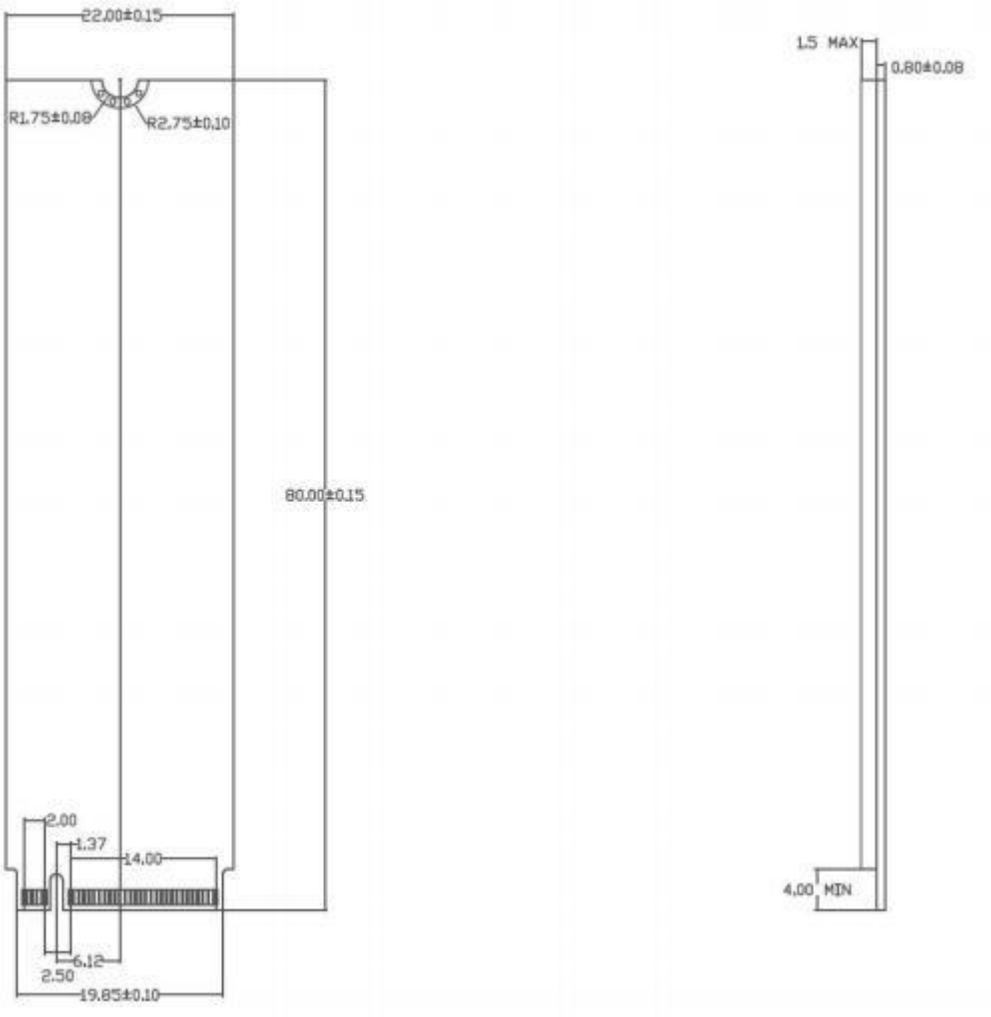
2) 1 MB/s = 1,048,576 bytes/s.

2.6Environmental Specification

Parameter	Specification
Operation Temperature	-55 ℃ ~ 85 ℃
Non-operation Temperature	-55 ℃ ~ 85 ℃
Non-operation Humidity	5%~95% RH
Vibration	7~800Hz, 3.08Grms, 30min/axis(X,Y,Z)
Shock	1500G, during 0.5ms， 1/2 sine wave

2.7Physical Dimensions

Figure 1 Physical Dimensions



3. Interface Specification

3.1 Pin Assignments and Definitions

The PCGNV04TT48WTA SSD M.2 board data and power pin definitions are shown in the table below.

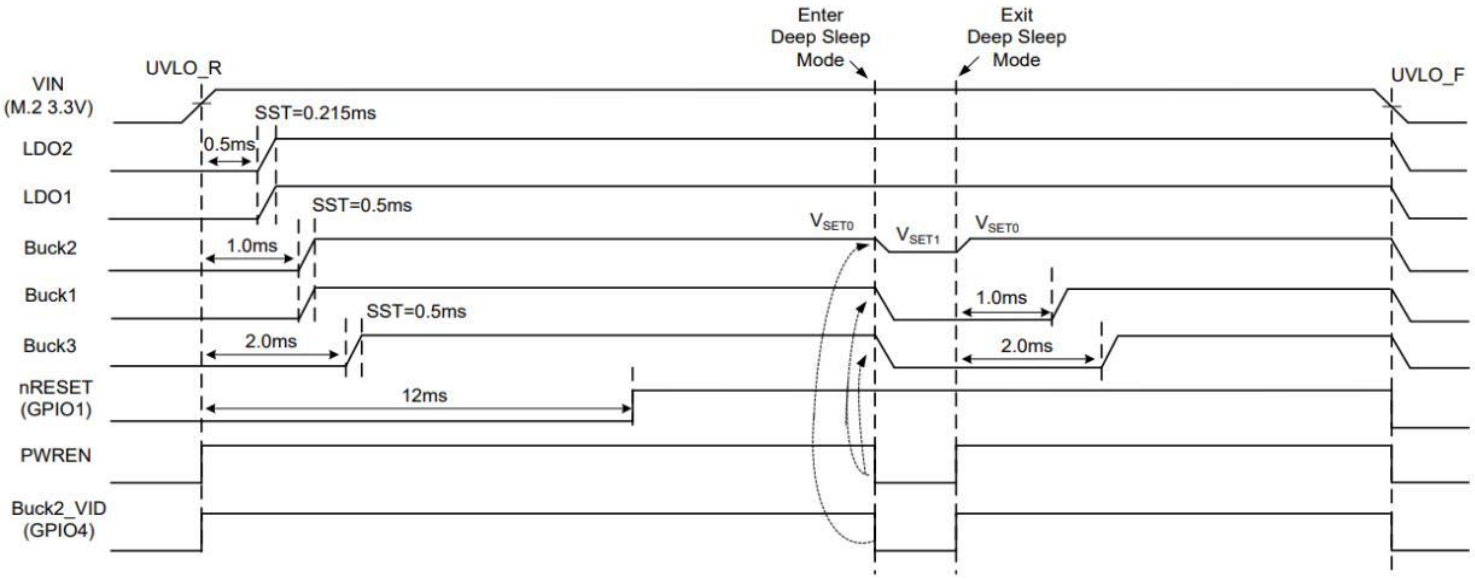
Table 4 Pin Assignments and definitions

Pin	Description	Pin	Description
74	3.3 V	75	GND
72	3.3 V	73	GND
70	3.3 V	71	GND
68	NC	69	NC
66	CONNECTOR Key M	67	NC
64	CONNECTOR Key M	65	CONNECTOR Key M
62	CONNECTOR Key M	63	CONNECTOR Key M
60	CONNECTOR Key M	61	CONNECTOR Key M
58	Reserved	59	CONNECTOR Key M
56	Reserved	57	GND
54	NC	55	REFCLKp
52	CLKREQ#	53	REFCLKn
50	PERST#	51	GND
48	NC	49	PETp0
46	NC	47	PETn0
44	ALERT#	45	GND
42	SMB_DATA	43	PERp0
40	SMB_CLK	41	PERn0
38	NC	39	GND
36	NC	37	PETp1
34	NC	35	PETn1
32	NC	33	GND
30	PLA_S3#	31	PERp1
28	NC	29	PERn1

26	NC	27	GND
24	NC	25	PETp2
22	NC	23	PETn2
20	NC	21	GND
18	3.3 V	19	PERp2
16	3.3 V	17	PERn2
14	3.3 V	15	GND
12	3.3 V	13	PETp3
10	LED_1#	11	PETn3
8	PLN#	9	GND
6	NC	7	PERp3
4	3.3 V	5	PERn3
2	3.3 V	3	GND
		1	GND

3.2VIN Power on/off Sequence

Figure 2. VIN Power on/off Sequence



4. Supported Command Set

Table 6 Supported I/O Command

Opcode	Command Name
00h	Flush
01h	Write
02h	Read
04h	Write Uncorrectable
05h	Compare

Table 7 Supported Configuration Command

Opcode	Command Name
01h	Arbitration
02h	Power Management
03h	LBA Range Type
04h	Temperature Threshold
05h	Error Recovery
06h	Volatile Write Cache
07h	Number Of Queues
08h	Interrupt Coalescing
09h	Interrupt Vector Configuration
0Ah	Write Atomicity Normal
0Bh	Asynchronous Event Configuration
0Ch	Autonomous Power State Transition
0Dh	Host Memory Buffer
0Eh	Timestamp
10h	Host Controlled Thermal Management
11h	Non-Operational Power State Config
80h	Software Progress Marker

Table 8 Supported Log Commands

Opcode	Command Name
01h	Error Information
02h	SMART / Health Information
03h	Firmware Slot Information
04h	Changed Namespace List
06h	Device Self-test
81h	Sanitize Status

5. Identify Command

The device information returned by the sector after issuing the Identify command is shown in the following table.

Table 9 Identify Controller Data Structure

Bytes	Default	Description
01:00	TBD	PCI Vendor ID (VID)
03:02	TBD	PCI Subsystem Vendor ID (SSVID)
23:04	TBD	Serial Number (SN)
63:24	TBD	Model Number (MN)
71:64	TBD	Firmware Revision (FR)
72	0x01	Recommended Arbitration Burst (RAB)
75:73	TBD	IEEE OUI Identifier (IEEE)
76	0x00	Controller Multi-Path I/O and Namespace Sharing Capabilities (CMIC)
77	0x09	Maximum Data Transfer Size (MDTS)
79:78	0x0001	Controller ID (CNTLID)
83:80	0x00010300	Version (VER)
87:84	0x001E8480 (2 Sec)	RTD3 Resume Latency (RTD3R)
91:88	0x00989680 (10 Sec)	RTD3 Entry Latency (RTD3E)
95:92	0x00000300	Optional Asynchronous Events Supported (OAES)
99:96	0x0002	Controller Attributes (CTRATT)
239:100	0x00	Reserved
255:240	0x00	Refer to the NVMe Management Interface Specification for definition
257:256	0x0017	Optional Admin Command Support (OACS)
258	0x03	Abort Command Limit (ACL)
259	0x03	Asynchronous Event Request Limit (AERL)
260	0x1F	Firmware Updates (FRMW)
261	0x0C	Log Page Attributes (LPA)
262	0x3E	Error Log Page Entries (ELPE)

263	4	Number of Power States Support (NPSS)
264	0x01	Admin Vendor Specific Command Configuration (AVSCC)
265	0x01	Autonomous Power State Transition Attributes (APSTA)
267:266	0x0157 (70C)	Warning Composite Temperature Threshold (WCTEMP)
269:268	0x0161 (80C)	Critical Composite Temperature Threshold (CCTEMP)
271:270	0x0000 (No Report)	Maximum Time for Firmware Activation (MTFA)
275:272	0x00000000	Host Memory Buffer Preferred Size (HMPRE)
279:276	0x00000000	Host Memory Buffer Minimum Size (HMMIN)
295:280	**	Total NVM Capacity (TNVMCAP)
311:296	**	Unallocated NVM Capacity (UNVMCAP)
315:312	0x00000000	Replay Protected Memory Block Support (RPMBS)
511:316	Non-zero	Reserved

6. S.M.A.R.T Information

Table 10 S.M.A.R.T Information

Bytes	Default Value	Description
0	0	Critical Warning
2:1	Current Temperature (K)	Temperature
3	100	Available Spare
4	10	Available Spare Threshold
5	0	Percentage Used
31:6	0	Reserved
47:32	0	Data Units Read
63:48	0	Data Units Written
79:64	0	Host Read Commands
95:80	0	Host Write Commands
111:96	0	Controller Busy Time
127:112	0	Power Cycles
143:128	0	Power On Hours
159:144	0	Unsafe Shutdowns
175:160	0	Media and Data Integrity Errors
191:176	0	Number of Error Information Log Entries