



# Industrial PCIe M.2 2280 Specification

(GEX SERIES, 3D TLC)

**Version 1.4**

Address: 28 Genting Lane, #09-03/4/5 Platinum 28, Singapore 349585

Tel : +65-6493 5035

Fax : +65-6493 5037

Website: <http://www.flexxon.com>

Email: [flexxon@flexxon.com](mailto:flexxon@flexxon.com)

## TABLE OF CONTENTS

<b>1. GENERAL DESCRIPTION .....</b>	<b>3</b>
1.1. Introduction.....	3
1.2. Product Overview .....	3
1.3. Power Loss Protection (Optional) .....	4
<b>2. PRODUCT SPECIFICATIONS.....</b>	<b>5</b>
2.1. Performance.....	5
2.2. Power .....	5
2.3. TBW (Terabytes Written) .....	6
2.4. MTBF .....	6
2.5. Data Retention .....	6
<b>3. ENVIRONMENTAL SPECIFICATIONS.....</b>	<b>7</b>
<b>4. PIN ASSIGNMENT .....</b>	<b>8</b>
<b>5. PHYSICAL DIMENSION .....</b>	<b>12</b>
<b>6. ORDERING INFORMATION .....</b>	<b>13</b>

# 1. GENERAL DESCRIPTION

---



## 1.1. Introduction

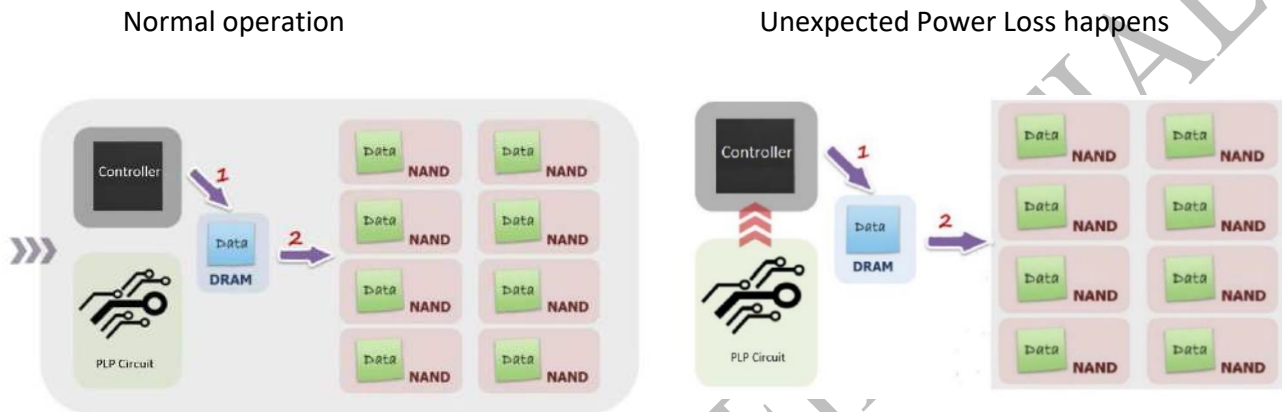
FLEXXON's GEX M.2 2280 has PCIe Gen3x4 interface, and is fully compliant with NVMe 1.3 industrial standard. It supports high performance, good reliability and low power solution suitable for Industrial PC, Enterprise-Grade server and Professional-Grade Photography System.

## 1.2. Product Overview

- ❖ **Flash**
  - 3D TLC
- ❖ **Capacity**
  - 256GB to 2TB
- ❖ **PCIe Interface**
  - Compliant with NVMe 1.3
  - Compatible with PCIe I/II/III x4 interface
- ❖ **ECC Scheme**
  - GEX M.2 2280 applies the LDPC (Low Density Parity Check) of ECC algorithm
- ❖ **UART Function**
- ❖ **GPIO**
- ❖ **Support SMART and TRIM commands**
- ❖ **Support DDR3/DDR3L External DRAM**
- ❖ **Low Power Management**
- ❖ **Power Failure Protection (Optional)**
- ❖ **End to End data path protection**
- ❖ **Global Wear Leveling Algorithm**
- ❖ **AES256 and TCG Opal (Optional)**
- ❖ **Temperature Range**
  - Operation (Silver) : 0°C ~ 70°C
  - Operation (Diamond) : -40°C ~ 85°C
  - Storage: -55°C ~ 95°C
- ❖ **RoHS Compliant**

### 1.3. Power Loss Protection (Optional)

FLEXON designs SSD device with a hardware power loss protection mechanism. It has a voltage drop detector, so when the SSD device detects the host power dropping, the SSD's power loss protection circuit will be triggered and begin providing power to the SSD. The SSD then will start to flush cached data from DRAM memory to NAND flash memory in order to preserve data integrity and prevent data loss.



The SSD is powered by the host power, and the power loss protection circuit is charged by the host power.

When the SSD detects the host power dropping, the power loss protection circuit starts to provide power to the SSD while it flushes cached data from DRAM to NAND.

Figure 1-1 power loss protection mechanism

## 2. PRODUCT SPECIFICATIONS



### 2.1. Performance

Table 2-1 Performance of PCIe GEX M.2 2280

Capacity	Sequential	
	Read (MB/s)	Write (MB/s)
240/256GB	2000	1100
480/512GB	3123	2110
960GB/1TB	3255	2721
1920GB/2TB	3369	2845

**NOTES:**

1. Performance may differ according to flash configuration and platform.

### 2.2. Power

Table 2-2 Supply Voltage of GEX M.2 2280

Parameter	Rating
Operating Voltage	3.3V +/- 5%

Table 2-3 Power Consumption of GEX M.2 2280

Parameter	Power Consumption
Idle (max.)	0.7W
Active (max.)	6.6W

**NOTE:** Power Consumption may differ according to flash configuration and platform.

## 2.3. TBW (Terabytes Written)

Capacity	TBW
240/256GB	436
480/512GB	889
960GB/1TB	1756
1920GB/2TB	3376

### NOTES:

1. TBW may differ according to flash configuration and platform.
2. Samples were tested under JESD218A endurance test method and JESD219A endurance workloads specification.

## 2.4. MTBF

MTBF, an acronym for Mean Time Between Failures, is a measure of a device's reliability. Its value represents the average time between a repair and the next failure. The predicted result of FLEXXON's GEX M.2 2280 is more than 2 million hours.

## 2.5. Data Retention

- 10 years if > 90% life remaining (@25C)
- 1 year if < 10% life remaining (@25C)

### 3. ENVIRONMENTAL SPECIFICATIONS



Test Items	Test Conditions
Storage Temperature	-55°C ~ 95°C
Operating Temperature	Silver Grade: 0°C ~ 70°C Diamond Grade: -40°C ~ 85°C
Storage Humidity	Silver Grade: 40°C, 95% RH Diamond Grade: 55°C, 95% RH
Operating Humidity	Silver Grade: 40°C, 93% RH Diamond Grade: 55°C, 95% RH
Shock	1500G, Half Sin Pulse Duration 0.5ms
Vibration	80Hz ~ 2000Hz/20G, 20Hz ~ 80Hz/1.52mm, 3 axis/60min
Drop	80cm free fall, 6 face of each unit, 2 times each
Bending	≥ 20N, Hold 1 min/5 times
ESD	24°C, 49% RH, +/-4KV 25 times, Air +/-8KV 10 times

FLEXXON CONFIDENTIAL

## 4. PIN ASSIGNMENT



Table 4-1 Pin Assignment and Description of GEX M.2 2280

Pin No.	PCIe Pin	Description
1	GND	CONFIG_3 = GND
2	3.3V	3.3V source
3	GND	Ground
4	3.3V	3.3V source
5	PETn3	PCIe TX Differential signal defined by PCI Express M.2 spec
6	N/C	No connect
7	PETp3	PCIe TX Differential signal defined by PCI Express M.2 spec
8	N/C	No connect
9	GND	Ground
10	LED1#	Open drain, active low signal. These signals are used to allow the add-in card to provide status indicators via LED devices that will be provided by the system.
11	PERn3	PCIe RX Differential signal defined by PCI Express M.2 spec
12	3.3V	3.3V source
13	PERp3	PCIe RX Differential signal defined by PCI Express M.2 spec
14	3.3V	3.3V source
15	GND	Ground
16	3.3V	3.3V source
17	PETn2	PCIe TX Differential signal defined by PCI Express M.2 spec
18	3.3V	3.3V source
19	PETp2	PCIe TX Differential signal defined by PCI Express M.2 spec
20	N/C	No connect
21	GND	Ground
22	N/C	No connect



23	PERn2	PCIe RX Differential signal defined by PCI Express M.2 spec
24	N/C	No connect
25	PERp2	PCIe RX Differential signal defined by PCI Express M.2 spec
26	N/C	No connect
27	GND	Ground
28	N/C	No connect
29	PETn1	PCIe TX Differential signal defined by PCI Express M.2 spec
30	N/C	No connect
31	PETp1	PCIe TX Differential signal defined by PCI Express M.2 spec
32	N/C	No connect
33	GND	Ground
34	N/C	No connect
35	PERn1	PCIe RX Differential signal defined by PCI Express M.2 spec
36	N/C	No connect
37	PERp1	PCIe RX Differential signal defined by PCI Express M.2 spec
38	N/C	No connect
39	GND	Ground
40	SMB_CLK (I/O) (0/1.8V)	SMBus Clock; Open Drain with pull-up on platform
41	PETn0	PCIe TX Differential signal defined by PCI Express M.2 spec
42	SMB_DATA (I/O) (0/1.8V)	SMBus Data; Open Drain with pull-up on platform
43	PETp0	PCIe TX Differential signal defined by PCI Express M.2 spec
44	ALERT#(O) (0/1.8V)	Alert notification to master; Open Drain with pull-up on platform; Active Low
45	GND	Ground

46	N/C	No connect
47	PERn0	PCIe RX Differential signal defined by PCI Express M.2 spec
48	N/C	No connect
49	PERp0	PCIe RX Differential signal defined by PCI Express M.2 spec
50	PERST#(I/O)(0/3.3V)	PE-Reset is a functional reset to the card as defined by the PCIe Mini CEM specification.
51	GND	Ground
52	CLKREQ#(I/O)(0/3.3V)	Clock Request is a reference clock request signal as defined by the PCIe Mini CEM specification; Also used by L1 PM Sub-states.
53	REFCLKn	PCIe Reference Clock signals (100 MHz) defined by the PCI Express M.2 spec.
54	PEWAKE#(I/O)(0/3.3V)	PCIe PME Wake. Open Drain with pull up on platform; Active low
55	REFCLKp	PCIe Reference Clock signals (100 MHz) defined by the PCI Express M.2 spec.
56	Reserved for MFG DATA	Manufacturing Data Line. Used for SSD manufacturing only. Not used in normal operation. Pins should be left N/C in platform socket.
57	GND	Ground
58	Reserved for MFG CLOCK	Manufacturing Clock Line. Used for SSD manufacturing only. Not used in normal operation. Pins should be left N/C in platform socket.
59	Module Key M	Module Key
60	Module Key M	
61	Module Key M	
62	Module Key M	
63	Module Key M	
64	Module Key M	
65	Module Key M	
66	Module Key M	
67	N/C	No connect

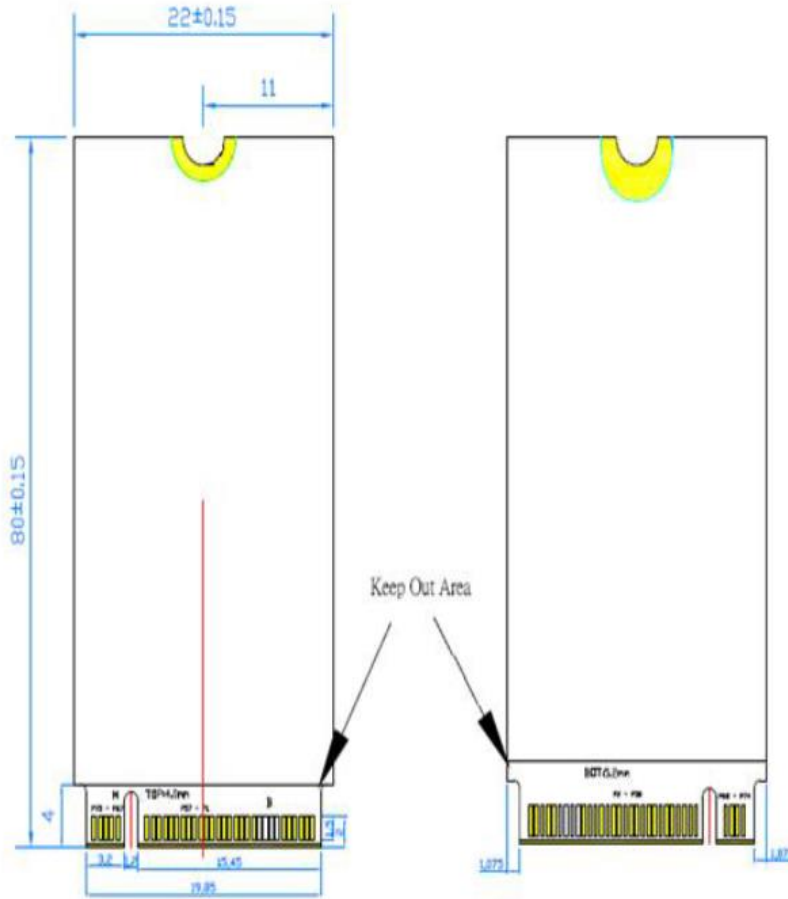
68	SUSCLK (32KHz) (I)(0/3.3V)	Do not use
69	PEDET	NC-PCIe
70	3.3V	3.3V source
71	GND	Ground
72	3.3V	3.3V source
73	GND	Ground
74	3.3V	3.3V source
75	GND	Ground

FLEXON CONFIDENTIAL

## 5. PHYSICAL DIMENSION



Dimension: 80mm(L) x 22 mm(W) x 3.8mm(H)



## 6. ORDERING INFORMATION



Capacity	MPN (Diamond Grade)	MPN (Silver Grade)
256GB	FCSO256GBE-M600	FCSO256GBS-M600
240GB	FCSO240GBE-M600	FCSO240GBS-M600
512GB	FCSO512GBE-M600	FCSO512GBS-M600
480GB	FCSO480GBE-M600	FCSO480GBS-M600
1TB	FCSO001TBE-M600	FCSO001TBS-M600
960GB	FCSO960GBE-M600	FCSO960GBS-M600
2TB	FCSO002TBE-M600	FCSO002TBS-M600
1920GB	FCSO1920BE-M600	FCSO1920BS-M600

### Power Loss Protection

Capacity	MPN (Diamond Grade)	MPN (Silver Grade)
256GB	FCSO256GBE-M60P	FCSO256GBS-M60P
240GB	FCSO240GBE-M60P	FCSO240GBS-M60P
512GB	FCSO512GBE-M60P	FCSO512GBS-M60P
480GB	FCSO480GBE-M60P	FCSO480GBS-M60P
1TB	FCSO001TBE-M60P	FCSO001TBS-M60P
960GB	FCSO960GBE-M60P	FCSO960GBS-M60P
2TB	FCSO002TBE-M60P	FCSO002TBS-M60P
1920GB	FCSO1920BE-M60P	FCSO1920BS-M60P

### AES256/TCG OPAL

Capacity	MPN (Diamond Grade)	MPN (Silver Grade)
256GB	FCSO256GBE-M60S	FCSO256GBS-M60S
240GB	FCSO240GBE-M60S	FCSO240GBS-M60S
512GB	FCSO512GBE-M60S	FCSO512GBS-M60S
480GB	FCSO480GBE-M60S	FCSO480GBS-M60S
1TB	FCSO001TBE-M60S	FCSO001TBS-M60S
960GB	FCSO960GBE-M60S	FCSO960GBS-M60S
2TB	FCSO002TBE-M60S	FCSO002TBS-M60S
1920GB	FCSO1920BE-M60S	FCSO1920BS-M60S

Conformal coating

Capacity	MPN (Diamond Grade)	MPN (Silver Grade)
256GB	FCSO256GBE-M60F	FCSO256GBS-M60F
240GB	FCSO240GBE-M60F	FCSO240GBS-M60F
512GB	FCSO512GBE-M60F	FCSO512GBS-M60F
480GB	FCSO480GBE-M60F	FCSO480GBS-M60F
1TB	FCSO001TBE-M60F	FCSO001TBS-M60F
960GB	FCSO960GBE-M60F	FCSO960GBS-M60F
2TB	FCSO002TBE-M60F	FCSO002TBS-M60F
1920GB	FCSO1920BE-M60F	FCSO1920BS-M60F

FLEXXON CONFIDENTIAL

## Revision History

Revision	Date	Description
1.0	2020/04	Preliminary release
1.1	2020/12	Update Pin assignment description
1.2	2021/02	Update performance and ordering information
1.3	2021/04	Update power consumption
1.4	2021/06	Update ordering information

FLEXON CONFIDENTIAL