



# M.2 2280 Specification

(XTREME SERIES, 3D TLC)

Version 1.3

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# 1. GENERAL DESCRIPTION



## 1.1. Introduction

FLEXXON's XTREME M.2 2280 has SATA III interface, and is fully compliant with the standard Next Generation Form Factor (NGFF) called M.2 Card Format, which is generated by Intel. It is DRAM-less design with good performance & high reliability, and suitable for embedded applications.

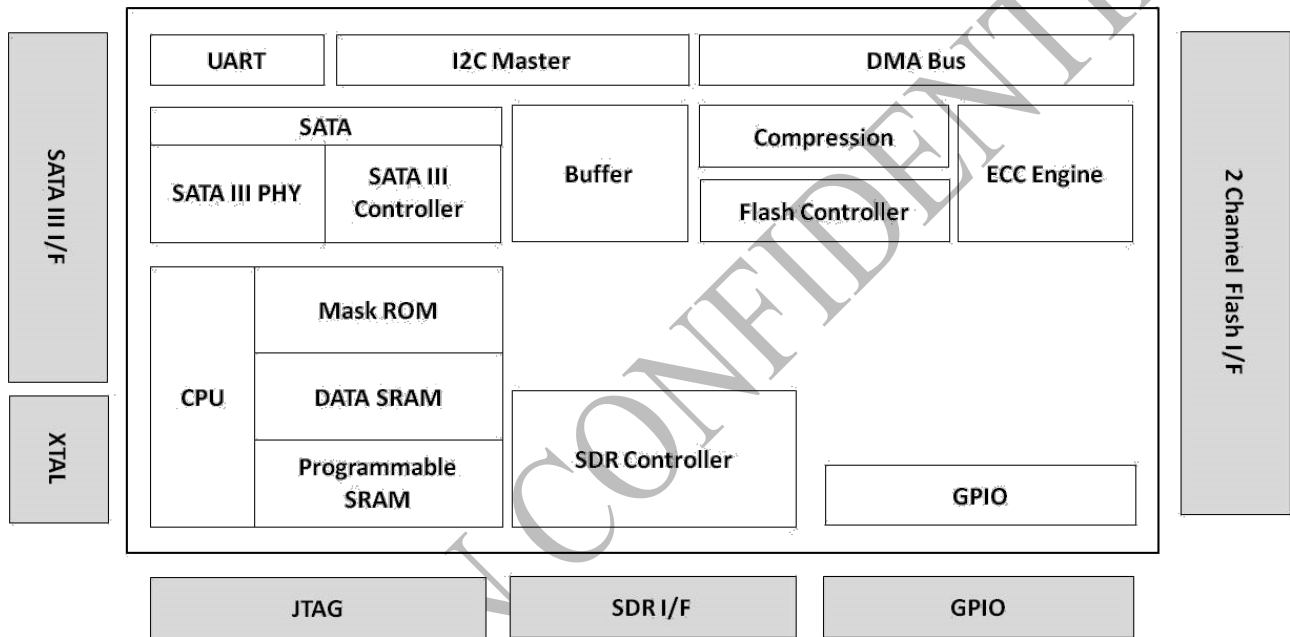


Figure 1-1 XTREME M.2 2280 Controller Block Diagram

## 1.2. Product Overview

### ❖ Flash

- 3D TLC

### ❖ Capacity

- 32GB up to 1TB

### ❖ SATA Interface

- Compliant with SATA Revision 3.2
- Compatible with SATA 1.5Gbps, 3Gbps and 6Gbps interface

### ❖ ECC Scheme

- XTREME M.2 2280 applies the LDPC (Low Density Parity Check) of ECC algorithm

### ❖ UART Function

### ❖ GPIO

### ❖ Support SMART and TRIM commands

### ❖ Low Power Management

### ❖ Power Loss Protection Algorithm

### ❖ Data Compression Technique

### ❖ Temperature Range

- Operation: 0°C ~ 70°C
- Storage: -40°C ~ 85°C

### ❖ RoHS Compliant

### 2.1. Performance

**Table 2-1 Performance of XTREME M.2 2280**

Capacity	Sequential	
	Read (MB/s)	Write (MB/s)
30/32GB	300	125
60/64GB	550	255
120/128GB	550	450
240/256GB	550	490
480/512GB	550	490
960GB/1TB	550	500

**NOTES:**

1. The performance was measured using CrystalDiskMarkv5.0x64 with SATA 6Gbps host.
2. Performance may differ according to flash configuration and platform.

### 2.2. Power

**Table 2-2 Supply Voltage of XTREME M.2 2280**

Parameter	Rating
Operating Voltage	3.3V

**Table 2-3 Power Consumption of XTREME M.2 2280 (Unit: mW)**

Capacity	Read	Write	Partial	Slumber	Idle	DEVS LP
30/32GB	950	850	15	10	300	4.9
60/64GB	1,215	1,290	20	15	325	4.9
120/128GB	1,300	1,360	20	15	325	4.9
240/256GB	1,395	1,480	20	15	325	4.9
480/512GB	1,470	1,520	22	16	325	4.9
960GB/1TB	1,575	1,620	22	15	325	4.9

**NOTE:**

1. Power Consumption may differ from flash configuration and platform.

## 2.3. TBW (Terabytes Written)

Capacity	TBW
32GB	40
64GB	82
128GB	162
256GB	245
512GB	510
1TB	850

### 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 XTREME 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	-40°C ~ 85°C
Operating Temperature	0°C ~ 70°C
Storage Humidity	40°C, 93% RH
Operating Humidity	40°C, 90% 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
Bending	≥ 20N, Hold 1 min/5 times
ESD	24°C, 49% RH, +/-4KV

**Table 4-1 ATA Command List**

Op Code	Description	Op Code	Description		
00h	NOP	C9h	Read DMA without Retry		
06h	Data Set Management	CAh	Write DMA		
10h-1Fh	Recalibrate	CBh	Write DMA without Retry		
20h	Read Sectors	CEh	Write Multiple FUA EXT		
21h	Read Sectors without Retry	E0h	Standby Immediate		
24h	Read Sectors EXT	E1h	Idle Immediate		
25h	Read DMA EXT	E2h	Standby		
27h	Read Native Max Address EXT	E3h	Idle		
29h	Read Multiple EXT	E4h	Read Buffer		
2Fh	Read Log EXT	E5h	Check Power Mode		
30h	Write Sectors	E6h	Sleep		
31h	Write Sectors without Retry	E7h	Flush Cache		
34h	Write Sectors EXT	E8h	Write Buffer		
35h	Write DMA EXT	E9h	READ BUFFER DMA		
37h	Set Native Max Address EXT	EAh	Flush Cache EXT		
38h	CFA Write Sectors Without Erase	EBh	Write Buffer DMA		
39h	Write Multiple EXT	ECh	Identify Device		
3Dh	Write DMA FUA EXT	EFh	Set Features		
3Fh	Write Long EXT	EFh	02h	Enable volatile write cache	
40h	Read Verify Sectors	EFh	03h	Set transfer mode	
41h	Read Verify Sectors without Retry	EFh	05h	Enable the APM feature set	
42h	Read Verify Sectors EXT	EFh	10h	Enable use of SATA features et	
44h	Zero EXT	EFh	10h	02h	Enable DMA Setup FIS Auto-Activate optimization
45h	Write Uncorrectable EXT	EFh	10h	03h	Enable Device-initiated interface power state (DIPM) transitions
47h	Read Log DMA EXT	EFh	10h	06h	Enable Software Settings Preservation (SSP)
57h	Write Log DMA EXT	EFh	10h	07h	Enable Device Automatic Partial to Slumber transitions
60h	Read FPDMA Queued	EFh	10h	09h	Enable Device Sleep
61h	Write FPDMA Queued	EFh	55h		Disable read look-ahead
70h-7Fh	Seek	EFh	66h		Disable reverting to power-on defaults



Op Code		Description	Op Code		Description	
90h		Execute Device Diagnostic	EFh	82h	Disable volatile write cache	
91h		Initialize Device Parameters	EFh	85h	Disable the APM feature set	
92h		Download Microcode	EFh	90h	Disable use of SATA feature set	
93h		Download Microcode DMA	EFh	90h	02h	Disable DMA Setup FIS Auto-Activate optimization
B0h		SMART	EFh	90h	03h	Disable Device-initiated interface power state (DIPM) transitions
B0h	D0h	SMART READ DATA	EFh	90h	06h	Disable Software Settings Preservation (SSP)
B0h	D1h	SMART READ ATTRIBUTE THRESHOLDS	EFh	90h	07h	Disable Device Automatic Partial to Slumber transitions
B0h	D2h	SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE	EFh	90h	09h	Disable Device Sleep
B0h	D3h	SMART SAVE ATTRIBUTE VALUES	EFh	AAh		Enable read look-ahead
B0h	D4h	SMART EXECUTE OFF-LINE IMMEDIATE	EFh	CCh		Enable reverting to power-on defaults
B0h	D5h	SMART READ LOG		F1h		Security Set Password
B0h	D6h	SMART WRITE LOG		F2h		Security Unlock
B0h	D8h	SMART ENABLE OPERATIONS		F3h		Security Erase Prepare
B0h	D9h	SMART DISABLE OPERATIONS		F4h		Security Erase Unit
B0h	DAh	SMART RETURN STATUS		F5h		Security Freeze Lock
B0h	DBh	SMART ENABLE/DISABLE AUTOMATIC OFF-LINE		F6h		Security Disable Password
B1h		Device Configuration		F8h		Read Native Max Address
B4h		Sanitize		F9h		Set Max Address
C4h		Read Multiple	F9h	01h		SET MAX SET PASSWORD
C5h		Write Multiple	F9h	02h		SET MAXLOCK
C6h		Set Multiple Mode	F9h	03h		SET MAX UNLOCK
C8h		Read DMA	F9h	04h		SET MAX FREEZE LOCK

**Table 5-1 Pin Assignment and Description of XTREME M.2 2280**

Pin #	SATA Pin	Description
1	CONFIG_3	Ground
2	3.3V	Supply pin
3	GND	Ground
4	3.3V	Supply pin
5	N/C	No Connect
6	N/C	No Connect
7	N/C	No Connect
8	N/C	No Connect
9	N/C or GND <sup>Note</sup>	No Connect or Ground
10	DAS/DSS# (O) (OD)	Status indicators via LED devices that will be provided by the system Active Low. A pulled-up LED with series current limiting resistor should allow for 9mA when On.
11	N/C	No Connect
12	Module Key	
13	Module Key	
14	Module Key	
15	Module Key	
16	Module Key	
17	Module Key	
18	Module Key	
19	Module Key	
20	N/C	No Connect
21	CONFIG_0	Ground
22	N/C	No Connect
23	N/C	No Connect
24	N/C	No Connect
25	N/C	No Connect
26	N/C	No Connect
27	GND	Ground
28	N/C	No Connect

Pin #	SATA Pin	Description
29	N/C	No Connect
30	N/C	No Connect
31	N/C	No Connect
32	N/C	No Connect
33	GND	Ground
34	N/C	No Connect
35	N/C	No Connect
36	N/C	No Connect
37	N/C	No Connect
38	DEVSLP (I)	Device Sleep, Input. When driven high the host is informing the SSD to enter a low power state
39	GND	Ground
40	N/C	No Connect
41	SATA-B+	SATA differential signals in the SATA specification
42	N/C	No Connect
43	SATA-B-	SATA differential signals in the SATA specification
44	N/C	No Connect
45	GND	Ground
46	N/C	No Connect
47	SATA-A-	SATA differential signals in the SATA specification
48	N/C	No Connect
49	SATA-A+	SATA differential signals in the SATA specification
50	N/C	No Connect
51	GND	Ground
52	N/C	No Connect
53	N/C	No Connect
54	N/C	No Connect
55	N/C	No Connect
56	Reserved for MFG Data	No Connect
57	GND	Ground
58	Reserved for MFG Clock	No Connect
59	Module Key	
60	Module Key	
61	Module Key	

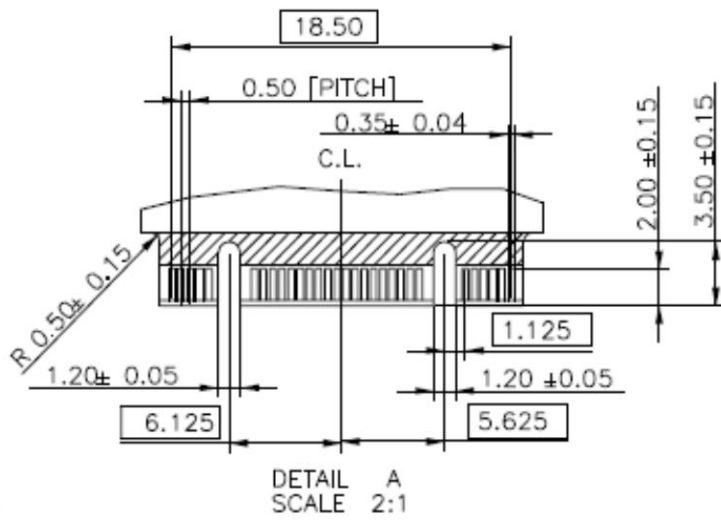
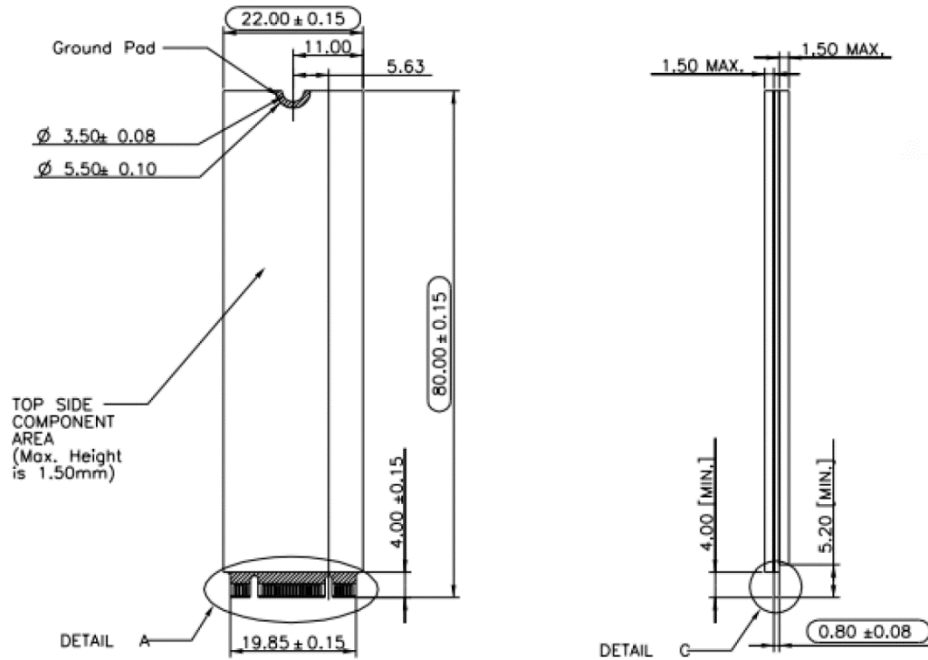
Pin #	SATA Pin	Description
62	Module Key	
63	Module Key	
64	Module Key	
65	Module Key	
66	Module Key	
67	N/C	No Connect
68	SUSCLK (I) (0/3.3V)	No Connect
69	CONFIG_1	Ground
70	3.3V	Supply pin
71	GND	Ground
72	3.3V	Supply pin
73	GND	Ground
74	3.3V	Supply pin
75	CONFIG_2	Ground

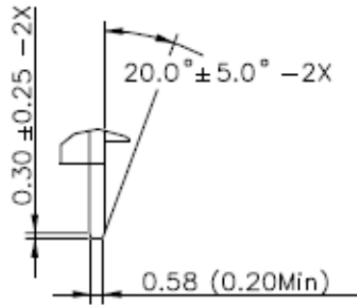
**NOTE:** N/C for Socket 2, and GND for Socket 3.

**6. PHYSICAL DIMENSION**



Dimension: 80mm (L) x 22mm (W) x 2.30mm(H)

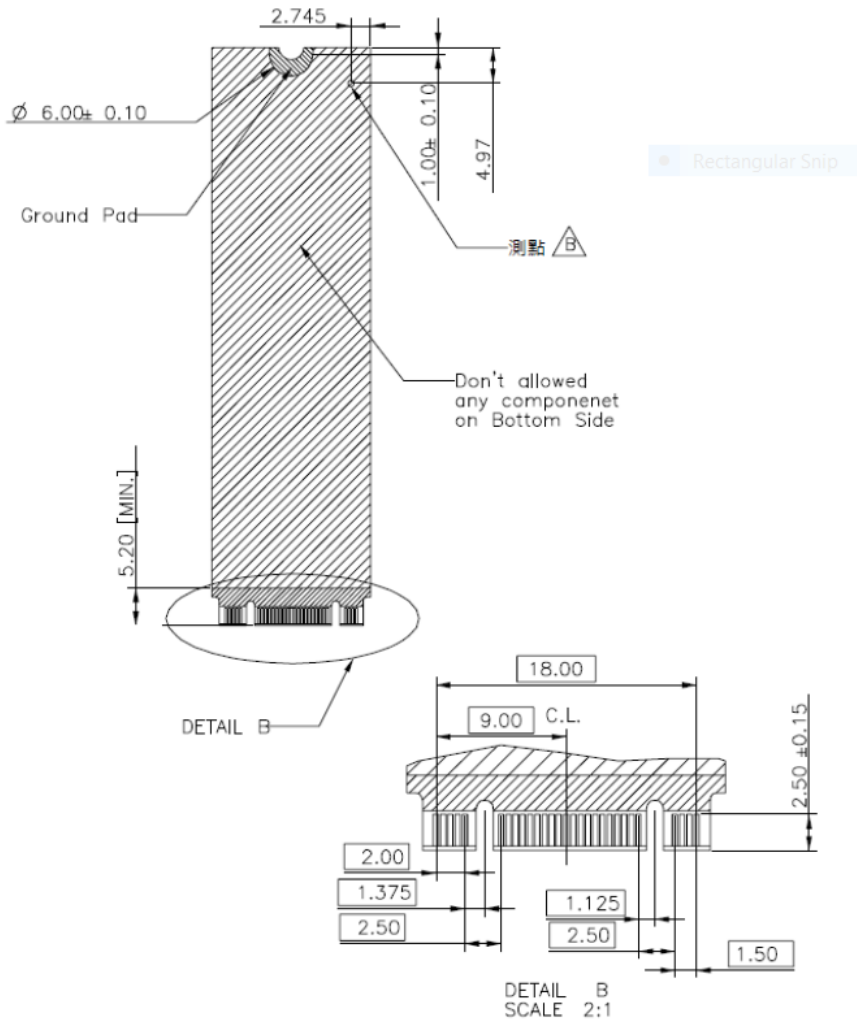




DETAIL C  
SCALE 2:1

Notes :

1. = Max Component Height
2. = No Component
3. = No Component / Signal Vias / Signal Copper / Printing
4. General Tolerance  $\pm 0.15\text{mm}$
5. is IQC inspection dimension



DETAIL B  
SCALE 2:1

## 7. ORDERING INFORMATION



Capacity	MPN
32GB	FSSO032GBC-SB00
30GB	FSSO030GBC-SB00
64GB	FSSO064GBC-SB00
60GB	FSSO060GBC-SB00
128GB	FSSO128GBC-SB00
120GB	FSSO120GBC-SB00
256GB	FSSO256GBC-SB00
240GB	FSSO240GBC-SB00
512GB	FSSO512GBC-SB00
480GB	FSSO480GBC-SB00
1TB	FSSO001TBC-SB00
960GB	FSSO960GBC-SB00

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## Revision History

Revision	Draft Date	History
1.0	2016/05	First Release
1.1	2018/01	Update performance and power consumption
1.2	2018/06	Update TBW
1.3	2019/03	Update template

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