



Industrial mSATA Specification

(VALUE Series, SLC)

Version 1.1

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1.1. Introduction

FLEXON's VALUE mSATA has SATA II interface, and is fully compliant with standard mSATA Form Factor, known as JEDEC MO-300 standard. It offers low power consumption, good compatibility and high reliability, suitable for embedded system.

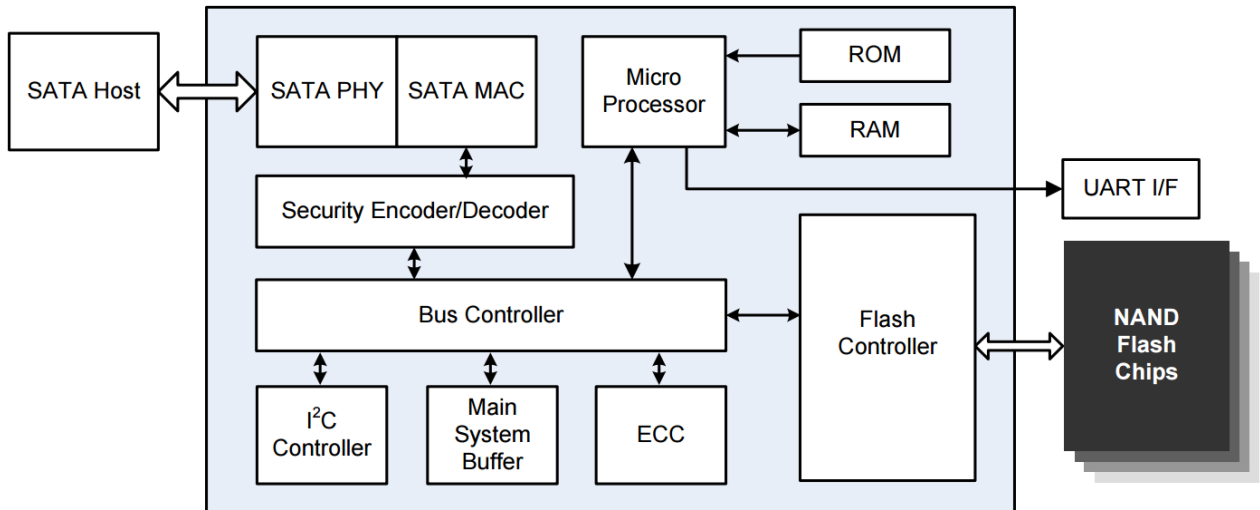


Figure 1-1 VALUE mSATA Controller Block Diagram

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1.2. Product Overview

- ❖ **Flash**
 - SLC
- ❖ **Capacity**
 - 2GB up to 64GB
- ❖ **SATA Interface**
 - Compliant with SATA Revision 2.6
 - Compatible with SATA 1.5Gbps and 3Gbps interface
- ❖ **Robust Data Protection**
 - Hardware BCH ECC engine
 - Data shaping for higher data reliability
 - StaticDataRefresh ensures data integrity
- ❖ **UART Function**
- ❖ **Low Power Management**
- ❖ **Voltage Detectors for Power Fail Protection**
- ❖ **Global Wear Leveling Algorithm**
- ❖ **Temperature Range**
 - Operation (Silver): 0°C ~ 70°C
 - Operation (Diamond): -40°C ~ 85°C
 - Storage: -40°C ~ 85°C
- ❖ **RoHS Compliant**

2.1. Performance

Table 2-1 Performance of VALUE mSATA

Capacity	Sequential	
	Read (MB/s)	Write (MB/s)
2GB	40	30
4GB	90	60
8GB	80	50
16GB	145	100
32GB	230	165
64GB	240	170

NOTES:

1. The performance was measured using CrystalDiskMark.
2. Performance may differ according to flash configuration and platform.

2.2. Power

Table 2-2 Supply Voltage of VALUE mSATA

Parameter	Rating
Operating Voltage	3.3V +/- 5%

Table 2-3 Power Consumption of VALUE mSATA

Parameter	Power Consumption
Idle (max.)	0.45W
Active (max.)	< 2.0W

NOTE:

Power Consumption may differ according to flash configuration and platform.

2.3. TBW (Terabytes Written)

Capacity	TBW
2GB	105
4GB	200
8GB	390
16GB	769
32GB	1516
64GB	3020

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 FLEXON's VALUE mSATA 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	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

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Table 4-1 Supported ATA Command Set

#	Command	Code	Protocol
General Feature Set			
1	Execute Drive Diagnostic	90h	Device diagnostic
2	Flush Cache	E7h	Non-data
3	Identify Device	ECh	PIO data-in
4	Read DMA	C8h	DMA
5	Read Multiple	C4h	PIO data-in
6	Read Sector(s)	20h	PIO data-in
7	Read Verify Sector(s)	40h or 41h	Non-data
8	Set Feature	EFh	Non-data
9	Set Multiple Mode	C6h	Non-data
10	Write DMA	CAh	DMA
11	Write Multiple	C5h	PIO data-out
12	Write Sector(s)	30h	PIO data-out
13	NOP	00h	Non-data
14	Read Buffer	E4h	PIO data-in
15	Write Buffer	E8h	PIO data-out
Power Management Feature Set			
16	Check Power Mode	E5h or 98h	Non-data
17	Idle	E3h or 97h	Non-data
18	Idle Immediate	E1h or 95h	Non-data
19	Sleep	E6h or 99h	Non-data
20	Standby	E2h or 96h	Non-data
21	Standby Immediate	E0h or 94h	Non-data
Security Mode Feature Set			
22	Security Set Password	F1h	PIO data-out

23	Security Unlock	F2h	PIO data-out
24	Security Erase Prepare	F3h	Non-data
25	Security Erase Unit	F4h	PIO data-out
26	Security Freeze Lock	F5h	Non-data
27	Security Disable Password	F6h	PIO data-out
SMART Feature Set			
28	SMART Disable Operations	B0h	Non-data
29	SMART Enable/Disable Autosave	B0h	Non-data
30	SMART Enable Operations	B0h	Non-data
31	SMART Return Status	B0h	Non-data
32	SMART Execute Off-Line Immediate	B0h	Non-data
33	SMART Read Data	B0h	PIO data-in
Host Protected Area Feature Set			
34	Read Native Max Address	F8h	Non-data
35	Set Max Address	F9h	Non-data
36	Set Max Set Password	F9h	PIO data-out
37	Set Max Lock	F9h	Non-data
38	Set Max Freeze Lock	F9h	Non-data
39	Set Max Unlock	F9h	PIO data-out
CFA Feature Set			
40	CFA Request Extended Error Code	03h	Non-data
41	CFA Write Sectors Without Erase	38h	PIO data-out
42	CFA Erase Sectors	C0h	Non-data
43	CFA Writer Multiple Without Erase	CDh	PIO data-out
44	CFA Translate Sector	87h	PIO data-in
45	Set Features Enable/Disable 8-bit Transfer	EFh	Non-data

5. PIN ASSIGNMENT



The signals assigned for Serial ATA applications are described in Table 5-1.

Pin definition	Pin Number
GND	4,9,15,18,21,26,27,29,34,35,37,40,43,50
3V3 power+in	2,24,39,41,52
SATA Txn	25
SATA Txp	23
SATA Rxn	31
SATA Rxp	33
Presence Detection	51
DA/DSS	49

Table 5-1 mSATA SSD Connector Pin Definition

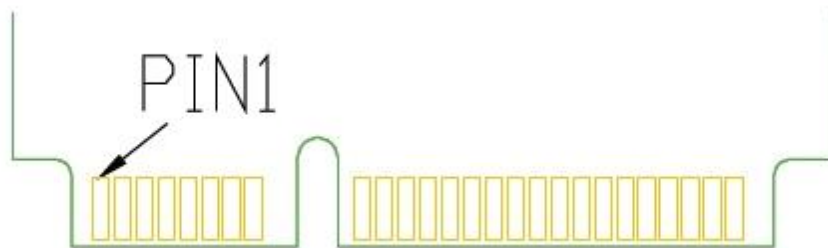


Figure 5-1 mSATA Connector Pin Assignment

Signal Name	Pin #	Pin #	Signal Name
Presence Detection	51	52	+3.3V
DA/DSS	49	50	GND
NC	47	48	NC
NC	45	46	NC
GND	43	44	NC
+3.3V	41	42	NC
+3.3V	39	40	GND
GND	37	38	NC
GND	35	36	NC
+A – RX-	33	34	GND
-A – RX-	31	32	NC
GND	29	30	NC
GND	27	28	NC
-B - TX-	25	26	GND
+B - TX+	23	24	+3.3V
GND	21	22	NC
NC	19	20	NC
NC	17	18	GND
GND	15	16	NC
NC	13	14	NC
NC	11	12	NC
GND	9	10	NC
NC	7	8	NC
NC	5	6	NC
NC	3	4	GND
NC	1	2	+3.3V

Table 5-2 Pin Assignment of mSATA

6. PHYSICAL DIMENSION

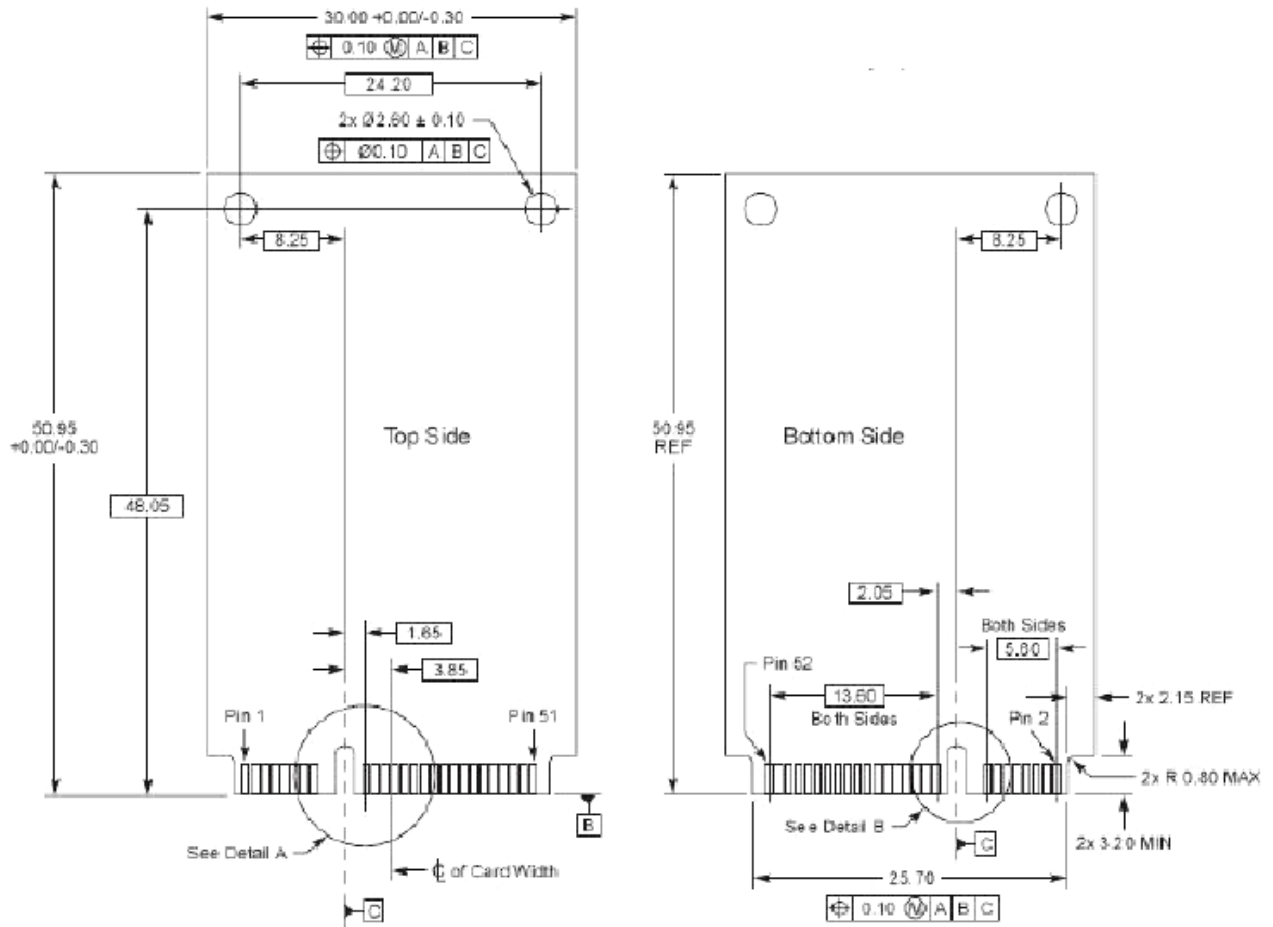


Figure 6-1 mSATA SSD Module Dimensions

Length	50.95 +/- 0.3mm
Width	30.00 +/- 0.3mm
Thickness	3.30 +/- 0.3mm

Table 6-1 mSATA SSD Module Physical Dimension

7. ORDERING INFORMATION

Capacity	MPN (Silver Grade)	MPN (Diamond Grade)
2GB	FSSE002GSS-M400	FSSE002GSE-M400
4GB	FSSE004GSS-M400	FSSE004GSE-M400
8GB	FSSE008GSS-M400	FSSE008GSE-M400
16GB	FSSE016GSS-M400	FSSE016GSE-M400
32GB	FSSE032GSS-M400	FSSE032GSE-M400
64GB	FSSE064GSS-M400	FSSE064GSE-M400

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Revision History

Revision	Draft Date	History
0.1	2012/10	First release
1.0	2014/05	Update template
1.1	2015/12	Update template, add 64GB

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