

# Memoright MS-701 Series mSATA NAND Flash Solid State Drive

Model Code: MRMAD4B\*\*\*\*\*M2C\*\*

## Product Specification

### Overview

This document serves as a reference basis for MS-701 Series Solid State storage technical characteristics to help you choose Memoright commercial operating temperature range NAND Flash solution.

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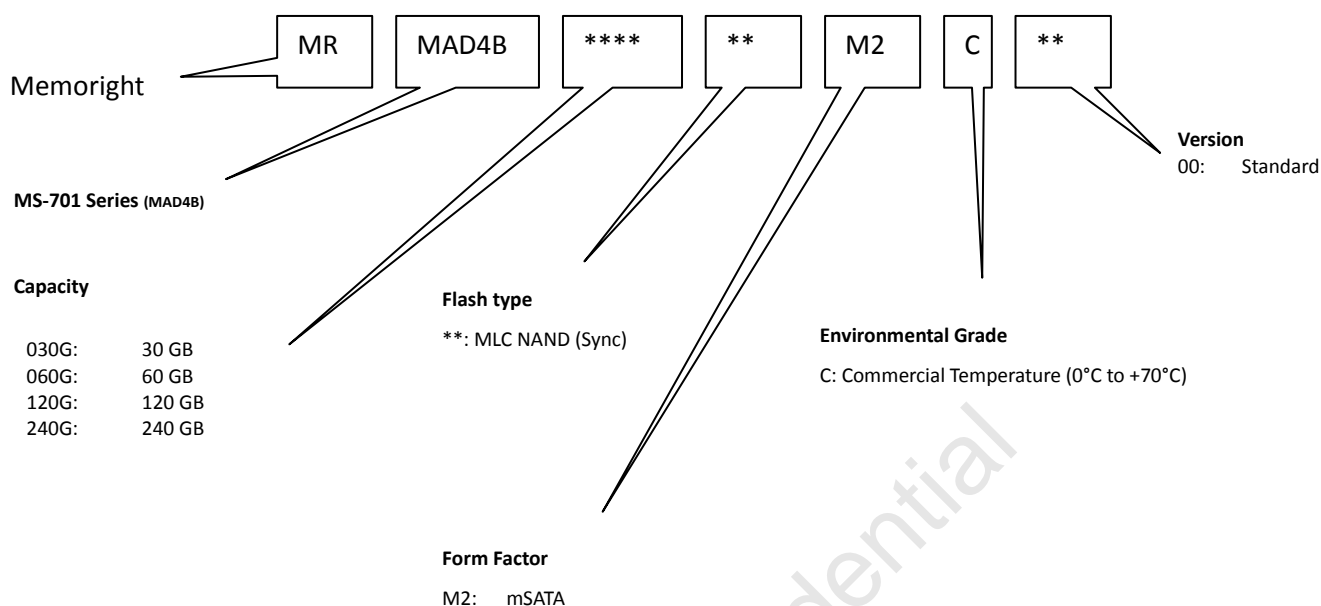
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## Ordering information

### Decoder



### Product code

Memoright MS-701 Series	
Part Number	Description
MRMAD4B030GCBM2C00	30 GB, SATA III, Sync MLC, 2.5" NAND Flash SSD, Commercial Solution
MRMAD4B060GCCM2C00	60 GB, SATA III, Sync MLC, 2.5" NAND Flash SSD, Commercial Solution
MRMAD4B120GC9M2C00	120 GB, SATA III, Sync MLC, 2.5" NAND Flash SSD, Commercial Solution
MRMAD4B240GCDM2C00	240 GB, SATA III, Sync MLC, 2.5" NAND Flash SSD, Commercial Solution

For the latest ordering information, please consult Memoright's sales representatives or check on our website: <http://www.memoright.com>

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## 1. Product Description

The MS-701 series are mSATA interface flash memory drivers that feature a flash controller and NAND flash memory devices. The MS 701 series is available in 30 GB to 240 GB capacities. The drives support SATA I / II/III data transfer. The MS-701 mSATA is geared specifically to the industrial market for use in such products as ATM, factory automation machines, POS terminals, Measuring products, Ticket-vending machines, parking systems and other industrial products that require high tolerance to environmental.

### Features

- High capacity in small form factor
    - 30 GB ~ 240 GB
    - mSATA connector
  - Interface to host
    - Standards : SATA I/II/III (1.5/3.0/6.0 Gbps )
  - High performance
    - Internal transfer read rate : Up to 550 MB/s
    - Internal transfer write rate : Up to 450 MB/s
    - Average access time : 0.3 ms
  - Low Power consumption
    - Supply Voltage : 3.3v ± 5 %
    - Typical write : Avg. 1 W
    - Typical idle : Avg. 0.4 W
  - High Reliability
    - Mean time Between failure (MTBF) :  
2,100,000 hours, based on Part Stress Analysis
    - ECC : Built-in 55 bit BCH-ECC engine
    - Operating Temperature :
- Commercial: -0°C to + 70°C
  - Endurance
    - > 3 yrs sequential write (for a half drive's capacity write per day)
  - Support Bad Blocks Management
  - Opal Compliant
  - Support FDE (Full Disk Encrypting)
  - System Performance: Access time: 0.3 ms
  - Certificate
    - CE and FCC Compatibility  
conforms to CE and FCC requirements.
    - RoHS Compliance  
fully compliant with RoHS directive.
  - Form Factor : Mini-PCIe / mSATA.
  - Dimension( W x L x H): 30 x 51.0 x 3.40 mm
  - Interface: support JEDEC MO-300 Standard
  - Connector: mSATA 52 pin standard

## 2. mSATA interface

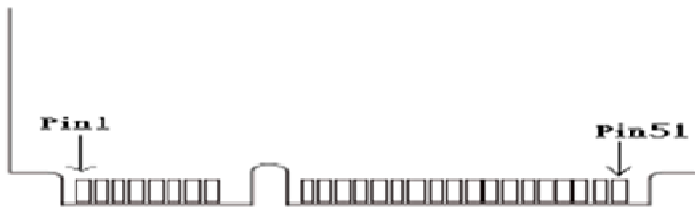


Figure 1: mSATA Pin

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

Table 1: Pin Assignment

### 3. Physical Dimensions

W30mm\*L51.0mm\*H3.4mm

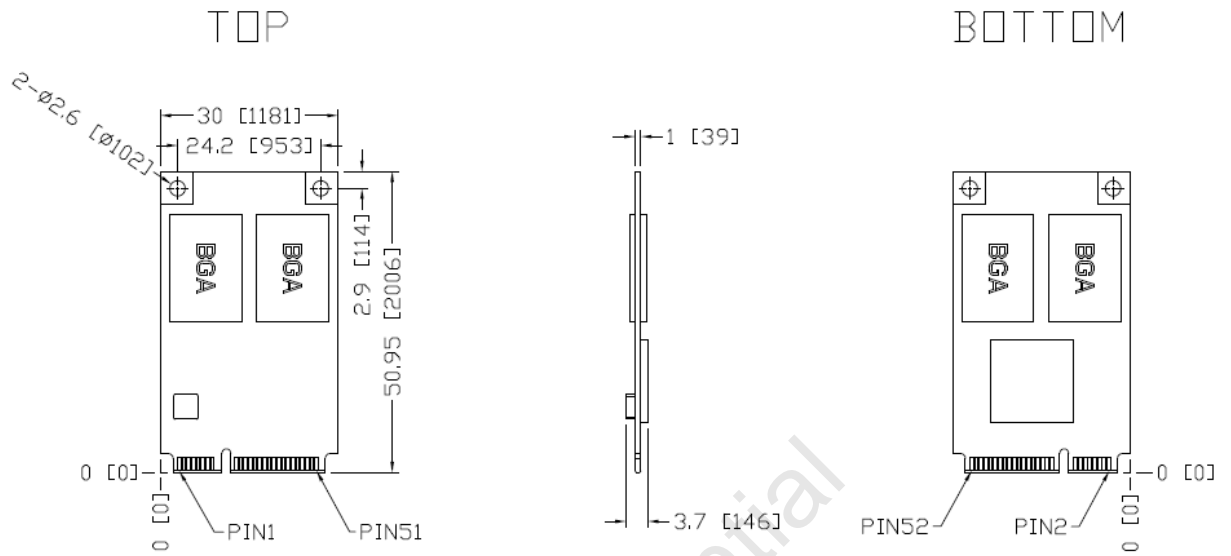


Figure 2: Physical Dimensions

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### 3.1 Specification Summary Table

<b>Unformatted capacity</b> * <sup>1</sup>	30 GB	60 GB	120 GB	240 GB
<b>Access Time</b>	<0.3ms			
<b>Sequential Read transfer rate</b> * <sup>2</sup>	Up to 550 MB/s	Up to 550 MB/s	Up to 550 MB/s	Up to 550 MB/s
<b>Sustained Write transfer rate</b> * <sup>2</sup>	Up to 350 MB/s	Up to 450 MB/s	Up to 450 MB/s	Up to 450 MB/s
<b>Channel</b>	8			
<b>Media type</b>	Multi Layer Cell (MLC) NAND Flash			
<b>Random 4KByte IOPS (read)</b>	7,000	13,000	25,000	25,000
<b>Random 4KByte IOPS (write)</b>	24,000	24,000	24,000	24,000
<b>Interface</b>	Serial ATA 1.0/2.0/3.0 (1.5Gb/sec ,3.0Gbps and 6.0Gbps auto-negotiated)			
<b>Height</b>	3.4 mm			
<b>Width</b>	30 mm			
<b>Length</b>	51mm			
<b>Average latency (Typical)</b>	0.1 ms			
<b>Idle mode power (Typical)</b> * <sup>3</sup>	0.35W	0.4W	0.6W	0.6W
<b>Voltage</b>	3.3V+/-5%			
<b>Sustain Write/1MB</b>	1.9W	1.9W	2.3W	3W
<b>Temperature (Operating)</b>	0°C to 70°C (commercial),			
<b>Temperature (Non-Operating)</b>	-40 ~85°C			
<b>Humidity (non-condensing)</b>	5% ~ 95%			
<b>Drive acoustics, sound power (dB)</b>	0 dB			
<b>Shock (Operating)</b>	1000G (duration 0.5msec, Half Sine Wave)			
<b>Shock (Non-Operating)</b>	1500G (Duration 0.5msec, Half Sine Wave)			
<b>Vibration (Operating)</b>	10 (Peak, 10~2000Hz)			
<b>Non-recoverable read errors</b>	<10 <sup>-16</sup>			
<b>Mean Time Before Failure (MTBF)</b>	> 2,100,000 hrs			
<b>Altitude</b>	-1000 ~ 60,000 feet			

Table 2: Specifications Summary

- \*<sup>1</sup> 1GB = 1,000,000,000 Bytes  
 \*<sup>2</sup> 1GB = 1024 Mega Bytes  
 \*<sup>3</sup> Typical value under room temperature

### 3.2 Unformatted capacity

Table 3: Products capacity

MS-701

Model	Unformatted capacity	Guaranteed sectors	Bytes per sector
MRMAD4B240GCDM2C00	240 GB	468,862,128	512
MRMAD4B120GC9M2C00	120 GB	234,441,648	512
MRMAD4B060GCCM2C00	60 GB	117,231,408	512
MRMAD4B030GCBM2C00	30 GB	5,8626,288	512

### 3.3 default logic geometry

Table 4: Default logic geometry

MS-701

Model	Cylinders	Read/write heads	Sectors per track
MRMAD4B240GCDM2C00	465141	16	63
MRMAD4B120GC9M2C00	232581	16	63
MRMAD4B060GCCM2C00	116301	16	63
MRMAD4B030GCBM2C00	58161	16	63

#### 4. Environmental Specifications

##### 4.1 Operating Temperature

Parameter	Specifications
<b>Operating (commercial)</b>	0°C to 70°C
<b>Non-Operating</b>	-40°C to 85°C
<b>Storage</b>	-55°C to 95°C
<b>Maximum temperature gradient</b>	25°C per hour

Table 5: Operation Temperature

##### 4.2 Humidity

**Relative Humidity: 10-95%, non-condensing**

##### 4.3 Shock and Vibration

Parameter	Specifications
<b>Operating</b>	<b>2.17G , 7 - 500HZ</b>
<b>Non-Operating</b>	<b>3.0G , 5 – 500HZ</b>

Table 6: Shock

Parameter	Acceleration Force (G)	Half-sine Pulse Duration (m sec)
<b>Operating</b>	<b>500</b>	<b>2</b>
	<b>1,000</b>	<b>1</b>
	<b>1,500</b>	<b>0.5</b>
<b>Non-Operating</b>	<b>200</b>	<b>10</b>
	<b>1,500</b>	<b>1</b>
	<b>1,500</b>	<b>0.5</b>

Table 7: Vibration

## 5. Mean Time Between Failure (MTBF)

The MTBF prediction results for various mSATA configurations. The analysis was performed using a RAM Commander™ failure rate prediction.

- **Failure Rate:** The total number of failures within an item population, divided by the total number of life units expended by that population, during a particular measurement interval under stated condition.
- **Mean Time between Failures (MTBF):** A basic measure of reliability for repairable items: The mean number of life units during which all parts of the item perform within their specified limits, during a particular measurement interval under stated conditions.

### Product Condition MTBF (Hours)

mSATA 25°C > 2,100,000

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## 6. Supported ATA Commands

Command Name	Command Code	Support
Check Power Mode	E5H (98H)	Yes
Execute Device Diagnostic	90H	Yes
Format Track	(50H)	Yes
Identify Device	ECH	Yes
Idle	E3H (97H)	Yes
Idle immediate	E1H (95H)	Yes
Initialize Device Parameters	(91H)	Yes
NOP	00H	Yes
Read Buffer	E4H	Yes
Read Long Sector	(22H or 23H)	Yes
Read Multiple	C4H	Yes
Read Sector(s)	20H or 21H	Yes
Read Verify Sector	40H or 41H	Yes
Read DMA	C8H	Yes
Recalibrate	(1XH)	Yes
Seek	70H	Yes
Set Features	EFH	Yes
Set Multiple Mode	C6H	Yes
Set Sleep Mode	E6H (99H)	Yes
Standby	E2H (96H)	Yes
Standby Immediate	E0H (94H)	Yes
Write Buffer	E8H	Yes
Write Multiple	C5H	Yes
Write Sector	30H	Yes
Write DMA	CAH	Yes
Write Verify	(3CH)	Yes
Security Set Password	F1H	Yes
Security Unlock	F2H	Yes
Security Erase Prepare	F3H	Yes
Security Erase Unit	F4H	Yes
Security Freeze Lock	F5H	Yes
Security Disable Password	F6H	Yes

Table 8: Supported commands list

**Memoright** MS-701 Series product specification

## **Sales and technical support**

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