

Meltron Electronics Corporation

2.5 inch Industrial-grade SATA III Solid State Disk S8 Series Specification

Version 1.1
DCC No:MS-12134

ALL RIGHTS ARE STRICTLY RESERVED. ANY PORTION OF THIS PAPER SHALL NOT BE REPRODUCED,
COPIED OR TRANSLATED TO ANY OTHER FORMS WITHOUT PERMISSION FROM MELTRON
ELECTRONICS CORPORATION

Table of Contents

1.	Introduction.....	4
	1.1 Overview.....	4
	1.2 Block Diagram.....	4
	1.3 Electrical / Physical Interface.....	5
	1.4 Controller Feature.....	5
	1.5 Product Block Diagram.....	6
2.	Product Specification.....	7
3.	Electrical Specifications.....	8
	3.1 Pin and Signal assignment.....	8
	3.2 Supply voltage.....	9
	3.3 Power Consumption.....	9
4.	Command Description.....	10
	4.1 ATA Command List.....	10
	4.2 Identify Device Data.....	11
5.	Mechanical Dimension.....	15

List of Figures

Figure 1-1	Controller Block Diagram.....	4
Figure 1-2	2.5 inch SATA III SSD with DDR3 Cache Buffer.....	6
Figure 3-1	Pin Assignment.....	8

List of Tables

Table 3-1	Signal Segment Pin Assignment and Description.....	8
Table 3-2	Power Segment Pin Assignment and Description.....	8
Table 3-3	Supply Voltage	9
Table 4-1	ATA Command List.....	10
Table 4-2	List of Device Identification	11
Table 4-3	List of Device Identification for Each Capacity.....	14

1. General Description

1.1 Overview

Meltron 2.5 inch SATA III SSD S8 series is a SATA 6Gb/s compatible drive that satisfies the varying needs of a wide range of user types. It is equipped with a world-class controller and the latest optimized firmware, along with strictly screened flash memory chips. This combination yields a major increase in SSD storage capacity and accelerated performance with an outstanding service life.

Targeted at the ultimate efficiency and design requirements of gamers, it comes in capacities of 60, 120, 240 and 480 gigabytes'. This new SSD provides faster system boot-up, application launch and shutdown times which is ideal hard drive replacements for users seeking a performance and reliability upgrade. With features no moving parts, resulting in greater mechanical stability and reliability, increased shock resistance, silent operation, and reduced power consumption for increased battery life.

Meltron 2.5 inch SATA III SSD S8 series handle larger amounts of data quickly and improve system responsiveness, extending notebook battery life and maximize computer performance. It provides the utmost in performance for machines with SATA III interfaces.

1.2 Block Diagram

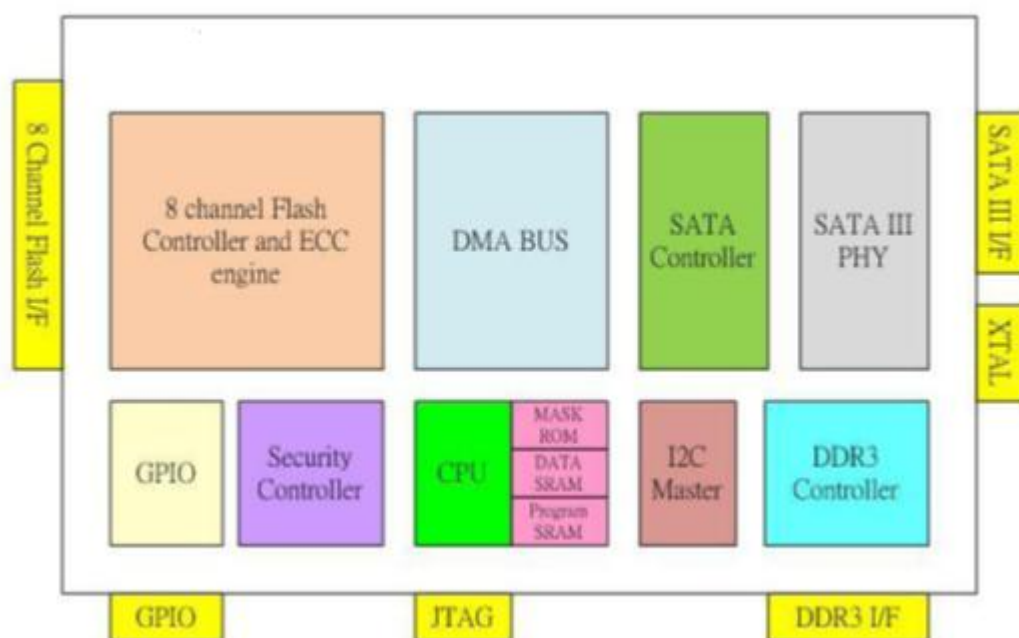


Figure 1-1 Controller Block Diagram

1.3 Electrical/ Physical Interface

a.SATA interface

Support SATA 1.5/ 3 / 6 Gbps interface.

b. DDR3 IO

Support DDR3 I/O interface

d. Flash IO

Support 1.8V and 3.3V voltage level

Support 1.8V for ONFI Flash

Support 3.3V for conventional Asynchronous Flash

1.4 Controller Features

a.SATA III

Compliant with SATA Revision 3.0

Compatible with SATA 1.5/ 3/ 6Gbps interface.

Power management supported

Support expanded register for SATA protocol 48 bits addressing mode

Embedded BIST function of SATA PHY for low cost mass production

b.NAND Flash Interface

Build-in hardware ECC circuit (Up to 72bits/1KB).

Support all types of SLC & MLC NAND Flash.

ONFI2.3

➤ Up to 8 channels for synchronous mode 3 (166MB/s)

➤ Up to 5 channels for synchronous mode 5 (200MB/s)

Toggle 1.0 interface: Up to 8 channels for 133Mbps mode (166MB/s)

Toggle 2.0 interface: Up to 5 channels for 100MHz mode (200MB/s)32 bits data bus

Bus Width: 8/ 16 bit

Contain up to 16 pcs of BGA or TSOP NAND Flash

c. DDR3 Interface

16 bits data bus

Clock Rate: 480MHz

Capacity: 256MB/512MB

Build –in 32 bit micro –controller

UART

GPIO

1.5 Product Block Diagram

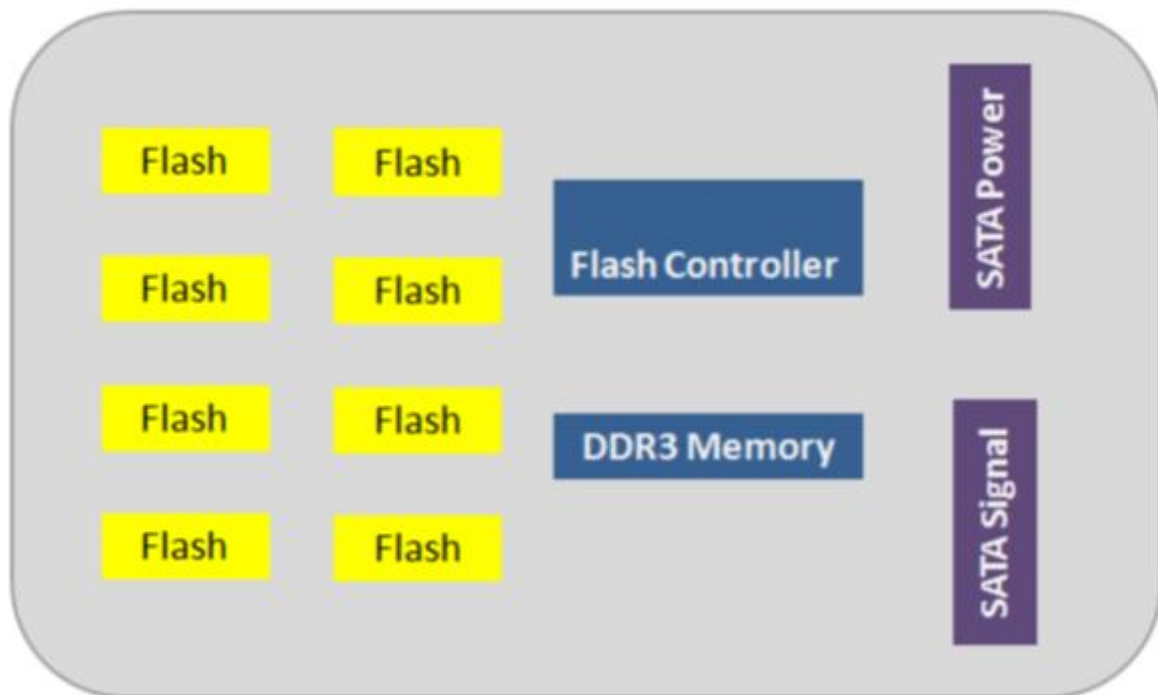


Figure 1-2: 2.5 inch SATA III SSD with DDR3 Cache Buffer

2 Product Specifications

Support Capacity

MLC: 60GB/120GB/ 240GB/ 480GB

Performance:

Sequential Read: Up to 500MB/s

Sequential Write: 400MB/s with 356Mbn/512MB DDRIII cache buffer

ECC scheme

Support 72 bits ECC correct per 1K Byte data

Environmental Conditions

Operation Temperature: MLC: 0°C to 70°C / -40~+85°C

Storage Temperature: -40~+85°C

Humidity: RH = 90% under 40°C (in operation)

Shock 500G/2ms

Vibration 20G/80-2000Hz

Booting feature from Windows/Linux OS

Acquired RoHS, WHQL, CE/FCC certificates

Support Hot-Swapping technique

Acoustic = 0dB

Encryption

Support both on-the -fly-and off-line 256-bit AES hardware encryption and decryption

Commands

Support SMART commands and TRIM command

MTBF

The predicted result of MTBF is more than 1,000,000 hours

3. Electrical Specification

3.1 Pin Assignment and Description

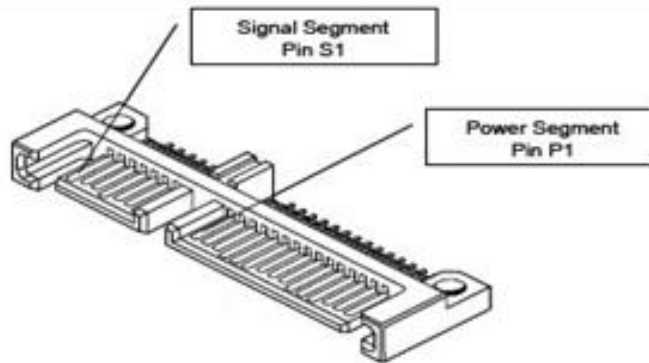


Figure 3-1 Pin Assignment

Table 3-1 Signal Segment Pin Assignment and Description

Pin Number	Function
S1	GND
S2	A+
S3	A-
S4	GND
S5	B-
S6	B+
S7	GND

Table 3-2 Power Segment Pin Assignment and Description

Pin Number	Function
P1	3.3V
P2	3.3V
P3	DEVSLP
P4	GND
P5	GND
P6	GND

P7	5V Pre-Charge
P8	5V
P9	5V
P10	GND
P11	RESERVED
P12	GND
P13	Not Used (12V Pre-Charge)
P14	Not Used (12V)
P15	Not Used (12V)

3.2 Supply voltage

Table 3-3 Supply Voltage

Parameter	Rating
Operating Voltage	5V +/- 5%
Max. Ripple	100mV , 0~30MHz

3.3 Power Consumption

Current	Read	Write	Idle	Partial	Slumber
64GB	850	600	85	20	15
128GB	670	780	85	20	15
256GB	900	830	85	20	15

Notes:

1. Samples are made of Toshiba 19nm Toggle NAND Flash
2. The operating voltage is 3.3V
3. Power consumption may vary from flash configuration and platform setting

4. Command Description

4.1 ATA Command List

Description	OP Code	Description	OP Code
Check power mode	E5h	Security Disable Password	F6h
Data Set management	06h	Security Erase Prepare	F3h
DCO	B1H	Security Erase Unit	F4h
Download Microcode PIO	92h	Security Freeze Lock	F5h
Download Microcode DMA	93h	Security Set Password	F1h
Execute drive diagnostic	90h	Security Unlock	F2h
Flush cache	E7h	Seek	70h
Flush cache Ext	EAh	Set features	EFh
Identify device	ECh	Set Max Address	F9h
Idle	E3h	Set Max Address Ext	37h
Idle immediate	E1h	Set multiple mode	C6h
Initialize drive parameters	91h	Sleep	E6h
Read buffer	E4h	Smart	B0h
Read DMA (w/o retry)	C9h	Standby	E2h
Read DMA (w/retry)	C8h	Standby immediate	E0h
Read DMA Ext	25h	Write buffer	E8h
Read FPDMA QUEUED	60h	Write DMA (w/o retry)	CBh
Read Log Ext	2Fh	Write DMA (w/retry)	CAh
Read multiple	C4h	Write DMA Ext	35h
Read multiple Ext	29h	Write DMA FUA Ext	3Dh
Read native max address	F8h	Write FPDMA QUEUED	61h
Read native max Ext	27h	Write Log Ext	3Fh
Read sector(s) (w/o retry)	21h	Write multiple	C5h
Read sector(s) (w/retry)	20h	Write multiple Ext	39h
Read sector(s) Ext	24h	Write multiple FUA Ext	CEh
Read Verify Ext	42h	Write sector(s) (w/o retry)	31h
Read verify sector(s) (w/o	41h	Write sector(s) (w/retry)	30h
Read verify sector(s)	40h	Write sector(s) Ext	34h
Recalibrate	10h	Write uncorrectable	45h

4.2 Identify Device Data

Word	F: Fixed V: Variable X: Both	Default Value	Description
0	F	0400h	General configuration bit-significant information
1	X	*1	Obsolete – Number of logical cylinders (16383)
2	V	C837h	Specific configuration
3	X	0010h	Obsolete – Number of logical heads (16)
4-5	X	00000000h	Retired
6	X	003Fh	Obsolete – Number of logical sectors per logical track (63)
7-8	V	00000000h	Reserved for assignment by the Compact Flash Association
9	X	0000h	Retired
10-19	F	Varies	Serial number (20 ASCII characters)
20-21	X	0000h	Retired
22	X	0000h	Obsolete
23-26	F	Varies	Firmware revision (8 ASCII characters)
27-46	F	Varies	Model number (xxxxxxx)
47	F	8010h	0- Maximum number of sectors transferred per interrupt on MULTIPLE commands
48	F	0000h	Reserved
49	F	2F00h	Capabilities
50	F	4000h	Capabilities
51-52	X	00000000h	Obsolete
53	F	0007h	Words 88 and 70:64 valid
54	X	*1	Obsolete –Number of logical cylinders
55	X	0010h	Obsolete – Number of logical heads (16)
56	X	003Fh	Obsolete – Number of logical sectors per track (63)
57-58	X	*2	Obsolete-Current capacity in sectors-
59	F	0110h	Number of sectors transferred per interrupt on MULTIPLE commands
60-61	F	*3	Maximum number of sector (28bit LBA Mode)

62	X	0000h	Obsolete
63	F	0407h	Multi-word DMA modes supported/selected
64	F	0003h	PIO modes supported
65	F	0078h	Minimum Multiword DMA transfer cycle time per word
66	F	0078h	Manufacturer's recommended Multiword DMA transfer cycle time
67	F	0078h	Minimum PIO transfer cycle time without flow control
68	F	0078h	Minimum PIO transfer cycle time with IORDY flow control
69	F	0100h	Additional Supported (support download microcode DMA
70	F	000h	Reserved
71-74	F	0000000000000000h	Reserved for the IDENTIFY PACKET DEVICE command
75	F	001Fh	Queue depth
76	F	0706h	Serial SATA capabilities
77	F	0000h	Reserved for future Serial ATA definition
78	F	0044h	Serial ATA features supported
79	V	0040H	Serial ATA features enabled
80	F	01F8h	Major Version Number
81	F	0000h	Minor Version Number
82	F	346bh	Command set supported
83	F	70d9h	Command set supported
84	F	6023h	Command set/feature supported extension
85	V	3469h	Command set/feature enabled
86	V	bc01h	Command set/feature enabled
87	V	6023h	Command set/feature default
88	V	003Fh	Ultra DMA Modes
89	F	001Eh	Time required for security erase unit completion
90	F	001Eh	Time required for Enhanced security erase completion
91	V	0000h	Current advanced power management value
92	V	FFFEh	Master Password Revision Code
93	F	0000h	Hardware reset result. The contents of the bits (12:0) of this word shall change only during the execution of s hardware reset.
94	V	0000h	Vendor's recommended and actual acoustic management value
95	F	0000h	Stream Minimum Request Size
96	V	0000h	Streaming Transfer Time – DMA
97	V	0000h	Streaming Access Latency – DMA and PIO
98-99	F	0000h	Streaming Performance Granularity

100-103	V	*4	Maximum user LBA for 48 bit Address feature set
104	V	0000h	Streaming Transfer Time – PIO
105	F	0000h	Maximum number of 512-byte blocks per DATA SET
106	F	4000h	Physical sector size / Logical sector size
107	F	0000h	Inter-seek delay for ISO-7779 acoustic testing in microseconds
108-111	F	0000000000000000h	Unique ID
112-115	F	0000000000000000h	Reserved
116	V	0000h	Reserved
117-118	F	00000000h	Words per logical Sector
119	F	4015h	Supported settings
120	F	4015h	Command set/Feature Enabled/Supported
121-126	F	0h	Reserved
127	F	0h	Removable Media Status Notification feature set support
128	V	0021h	Security status
129-159	X	0h	Vendor specific
160	F	0h	Compact Flash Association (CFA) power mode 1
161-167	X	0h	Reserved for assignment by the CFA
168	F	3h 2.5 inch 4h 1.8 inch 5h Less than 1.8 inch	Device Nominal Form Factor
169	F	0001h	DATA SET MANAGEMENT command is supported
170-173	F	0h	Additional Product Identifier
174-175		0h	Reserved
176-205	V	0h	Current media serial number
206	F	0h	SCT Command Transport
207-208	F	0h	Reserved
209	F	4000h	Alignment of logical blocks within a physical block
210-211	V	0000h	Write-Read-Verify Sector Count Mode 3 (not support)
212-213	F	0000h	Write-Read-Verify Sector Count Mode 2 (not support)
214-216		0000h	NV Cache relate (not support)
217	F	0001h	Non-rotating media device
218	F	0h	Reserved
219	F	0h	NV Cache relate (not support)
220	V	0h	Write read verify feature set current mode

221		oh	Reserved
222	F	101Fh	Transport major version number
223	F	0h	Transport minor version number
224-229		0h	reserved
230-233		0h	Extend number of user addressable sectors
234		0001h	Minimum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
235		00FFh	Maximum number of 512-byte data blocks per DOWNLOAD MICROCODE command for mode 03h
236-254	F	0h	Reserved
255	X	XXA5h XX is variable	Integrity word (Checksum and Signature)

Table 4-3 List of Device Identification for Each Capacity

Capacity (GB)	*1 (Word 1/ Word 54)	*2 (Word 57-58)	*3 (Word 60-61)	*4 (Word 100-103)
16	3FFFh	F8FC10h	1DD40B0h	1DD40B0h
32	3FFFh	F8FC10h	3BA2EB0h	3BA2EB0h
64	3FFFh	F8FC10h	7740AB0h	7740AB0h
128	3FFFh	F8FC10h	EE7C2B0h	EE7C2B0h
256	3FFFh	F8FC10h	FFFFFFFFh	1DCF32B0h

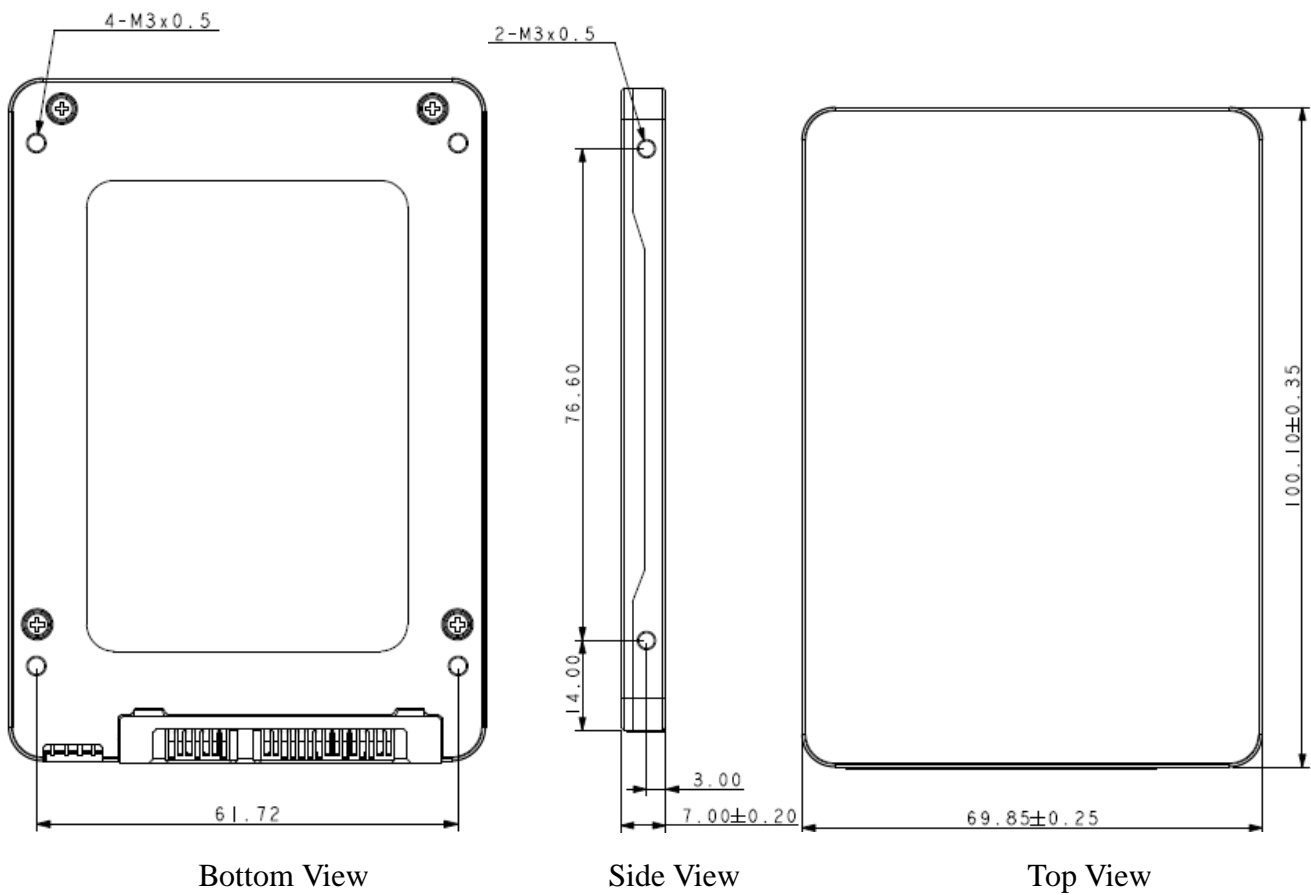
5. Mechanical Dimension

Dimension: 100.10mm(L) x 69.85mm(W) x 7.00mm(H) or 100.10mm(L) x 69.85mm(W) x 9.00mm(H)

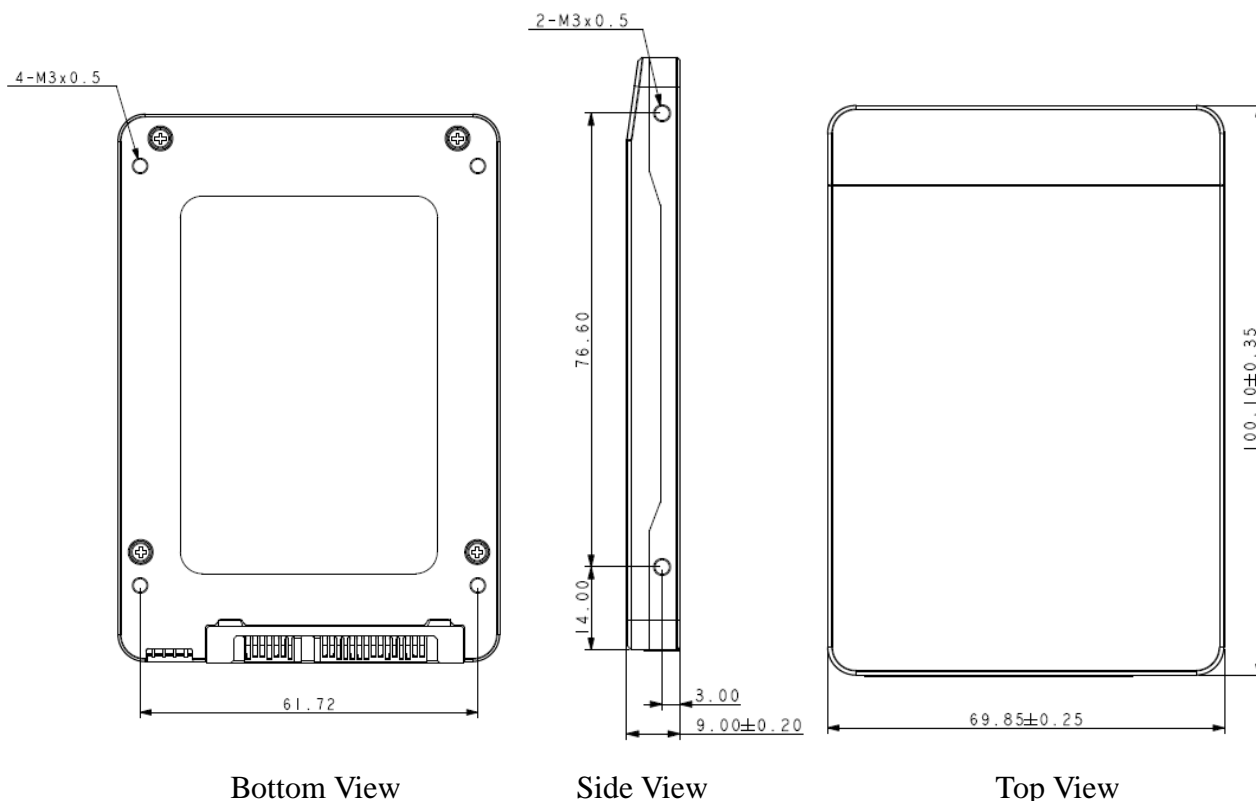
Weight : 70g

Housing: Aluminum

A. 100.10mm(L) x 69.85mm(W) x 7.00mm(H)



B: 100.10mm(L) x 69.85mm(W) x 9.00mm(H)



Revision History

Revision No.	History	Date
1.0	Preliminary Release	2012.9.26
1.1	Modify identify device data	2012.12.2

This document is provided for information use only and is subject to change without prior notice. Meltron Electronics Corp. assumes no responsibility for any errors that might appear in this Document, nor for incidental or damages resulting from the performance or use of this material