



MLC

1.8" Slim Lite SATA III SSD

HERMES-JI Series

Product Specification

APRO 1.8" Slim Lite SATA III MLC SSD

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APRO CO., LTD.

Phone: +88628226-1539

Fax: +88628226-1389

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Revision History

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1.0	Initial release	2016/5/16

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1. Introduction

APRO 1.8" Slim Lite SATA III MLC SSD – HERMES-JI Series provides high capacity flash memory Solid State Drive (SSD) that electrically complies with Serial ATA 3.0 (SATA) standard. APRO 1.8" Slim Lite SATA III MLC SSD – HERMES-JI Series support SATA Gen-III (6.0 GB/s) with high performance. The main used flash memories are MLC-NAND type flash memory chips. The available disk capacities are 4GB, 8GB, 16GB, 32GB, 64GB, 128GB and 256GB

The operating temperature grade is optional for Standard grade 0°C ~ 70°C and wide temp grade with conformal coating supports -40°C ~ +85°C. The data transfer performance by sequential read is up to 420.0 MB/sec, and sequential write is up to 140.0 MB/sec.

APRO 1.8" Slim Lite SATA III MLC SSD products provide a high level interface to the host computer. This interface allows a host computer to issue commands to the 1.8" Slim Lite SATA III MLC SSD to read or write blocks of memory. Each sector is protected by a powerful 40 bits per 1024 bytes error correction (ECC). APRO 1.8" Slim Lite SATA III MLC SSD HERMES-JI Series intelligent controller manages interface protocols, data storage and retrieval as well as ECC, defect handling and diagnostics, power management and clock control.

Figure 1 shows a block diagram of the used high tech 1.8" Slim Lite SATA III MLC SSD controller.

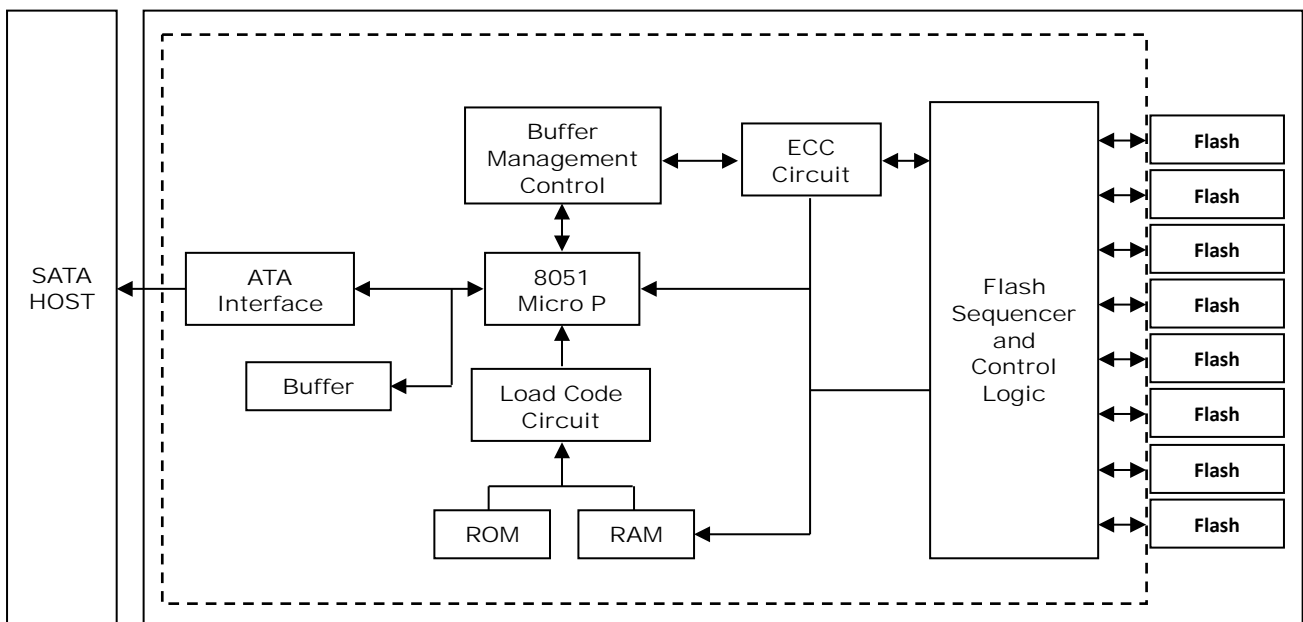


Figure 1: APRO 1.8" Slim Lite SATA III MLC SSD HERMES-JI Series controller block diagram

1.2. Scope

This document describes features, specifications and installation guide of APRO's 1.8" Slim Lite SATA III MLC SSDs – HERMES-JI Series. In the appendix, there provides order information, warranty policy, RMA/DOA procedure for the most convenient reference.

1.3. System Features

- MLC-NAND type flash technology
- 1.8" form factor compatible with JEDEC Standard : MO-297A physical specification
- SATA 7-pin (data) + 15-pin (power connector) SATA Interface
- Bare PCBA without casing.
- SATA 1.0a, SATA 2.6 and SATA 3.0 specification compliance
- SMART (Self-Monitoring, Analysis and Reporting Technology) function supported.
- Non-volatile memory and no moving parts
- MLC Flash SSD standard grade capacity from 4GB up to 256GB
- Sequential read performance up to 420.0 MB/sec
- Sequential write performance up to 140. MB/sec
- Automatic 40 bits per 1024 bytes error correction (ECC) and retry capabilities
- +5 V $\pm 5\%$ operation
- Mechanical Shock : 0.5ms, 1500 G, 3 axes
- Vibration : 7 Hz to 2K Hz, 20G, 3 axes
- Very high performance, very low power consumption
- Low weight, Noiseless
- Standard grade supports operating temperature 0°C to +70°C, and Industrial Grade, -40°C to +85°C

1.4. Flash Management Technology - Static Wear Leveling

In order to gain the best management for flash memory, APRO 1.8" Slim Lite SATA III MLC SSD HERMES-JI Series supports Static Wear-leveling technology to manage the Flash system. The life of flash memory is limited; the management is to increase the life of the flash product.

A static wear-leveling algorithm evenly distributes data over an entire Flash cell array and searches for the least used physical blocks. The identified low cycled sectors are used to write the data to those locations. If blocks are empty, the write occurs normally. If blocks contain static data, it moves that data to a more heavily used location before it moves the newly written data. The static wear leveling maximizes effective endurance Flash array compared to no wear leveling or dynamic wear leveling.

2. Product Specifications

For all the following specifications, values are defined at ambient temperature and nominal supply voltage unless otherwise stated.

2.1. Capacity Specifications

Table 1: Device Parameters

Unformatted Capacity	Cylinder	Head	Sector	LBA
4GB	7,762	16	63	7,824,096
8GB	15,525	16	63	15,649,200
16GB	16,383	16	63	31,277,232
32GB	16,383	16	63	62,533,296
64GB	16,383	16	63	125,045,424
128GB	16,383	16	63	250,069,680
256GB	16,383	16	63	500,118,192

2.2. System Environmental Specifications

Table 2: Environmental Specification

APRO 1.8" Slim Lite SATA III MLC SSD		Standard Grade	Wide Temp Grade
HERMES-JI Series		SB8SJxxxG-JJICTMB	WB8SJxxxG-JJICTMB-C
Temperature	Operating:	0°C ~ +70°C	-40°C ~ +85°C
	Non-operating:	-20°C ~ +80°C	-50°C ~ +95°C
Humidity	Operating & Non-operating:	10% ~ 95% non-condensing	
Vibration	Operating & Non-operating:	7 Hz to 2K Hz, 20G, 3 axes	
Mechanical Shock	Operating & Non-operating:	0.5ms, 1500 G, 3 axes	

2.3. System Power Requirements

Table 3: Power Requirement

APRO 1.8" Slim Lite SATA III MLC SSD		
HERMES-JI Series		
DC Input Voltage		5V±5%
+5V Current (Maximum average value)	Reading Mode :	306 (max.)
	Writing Mode :	280 (max.)
	Idle Mode :	151 (max.)

2.4. System Performance

Table 4: System Performances

Data Transfer Mode supporting		Serial ATA Gen-III (6.0Gb/s = 768MB/s)						
Average Access Time		0.1 ms (estimated)						
Maximum Performance	Capacity	4GB	8GB	16GB	32GB	64GB	128GB	256GB
	Sequential Read (MB/s)	70.0	100.0	100.0	200.0	370.0	400.0	420.0
	Sequential Write(MB/s)	16.0	20.0	20.0	40.0	80.0	140.0	140.0

Note:

(1). All values quoted are typically at 25 °C and nominal supply voltage.

(2). Testing of the 1.8" Slim Lite SATA III MLC SSD maximum performance was performed under the following platform:

- Computer with AMD 3.0GHz processor
- Windows XP Professional operating system

2.5. System Reliability

Table 5: System Reliability

Wear-leveling Algorithms	Static Wear-leveling	
Bad Blocks Management	Supportive	
ECC Technology	40 bits per 1024 bytes	
Endurance	Un-limited Read Cycles; 3K Erase Counts (P/E Cycles)	
TBW (Tera Bytes Written)		
Capacity	TBW(TB)	DWPD & Lifespan
4GB	1.16	DWPD=0.407 DWPD (Drive Written Per Day) Lifespan = 2 Years
8GB	2.32	
16GB	4.64	
32GB	9.28	
64GB	18.56	
128GB	37.12	
256GB	74.24	

Note:

(1). Written Specification which is based on JEDEC 218 (Solid-State Drive Requirements and Endurance Test Method).

(2). Lifespan is calculated by device written per day

2.6. Physical Specifications

Refer to Table 6 and see Figure 2 for 1.8" Slim Lite SATA III MLC SSD HERMES-JI Series physical specifications and dimensions.

Table 6: Physical Specifications of APRO 1.8" Slim Lite SATA III MLC SSD-HERMES-JI Series

Length:	39.00 mm / 1.53 in
Width:	54.00 mm / 2.13 in
Thickness:	5.45 mm / 0.21 in
Weight:	15.00 g / 0.53 oz

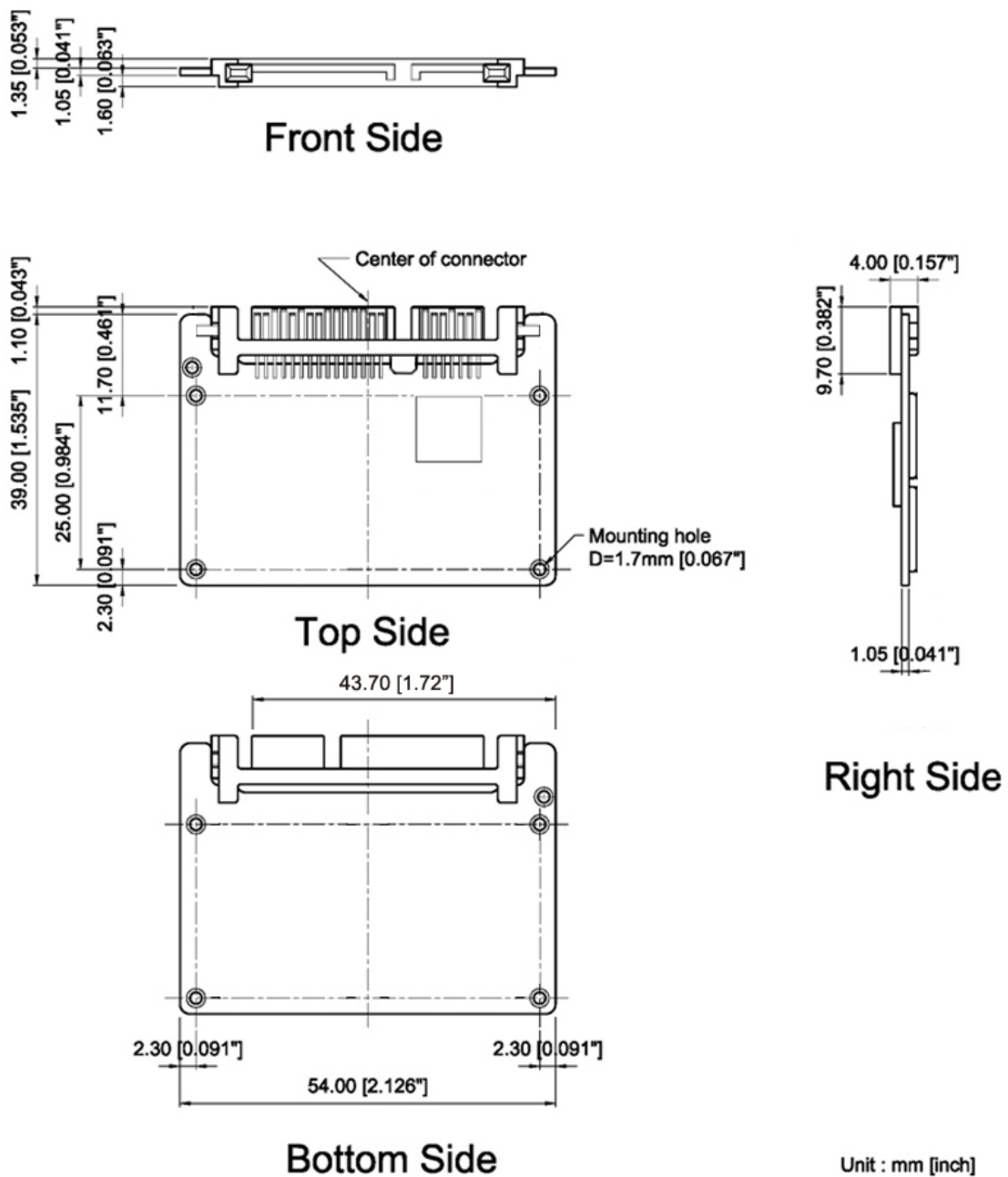


Figure 2: APRO 1.8" Slim Lite SATA III MLC SSD Dimension

2.6.1. Conformal coating

Conformal coating is a protective, dielectric coating designed to conform to the surface of an assembled printed circuit board. Commonly used conformal coatings include silicone, acrylic, urethane and epoxy. APRO applies only silicone on APRO storage products upon requested especially by customers. The type of silicone coating features good thermal shock resistance due to flexibility. It is also easy to apply and repair.

Conformal coating offers protection of circuitry from moisture, fungus, dust and corrosion caused by extreme environments. It also prevents damage from those Flash storages handling during construction, installation and use, and reduces mechanical stress on components and protects from thermal shock. The greatest advantage of conformal coating is to allow greater component density due to increased dielectric strength between conductors.

APRO uses MIL-I-46058C silicon conformal coating

3. Interface Description

3.1. APRO 1.8" Slim Lite SATA III MLC SSD interface

APRO 1.8" Slim Lite SATA III MLC SSD is equipped with standard 7 pins + 15 pins Serial ATA connector.

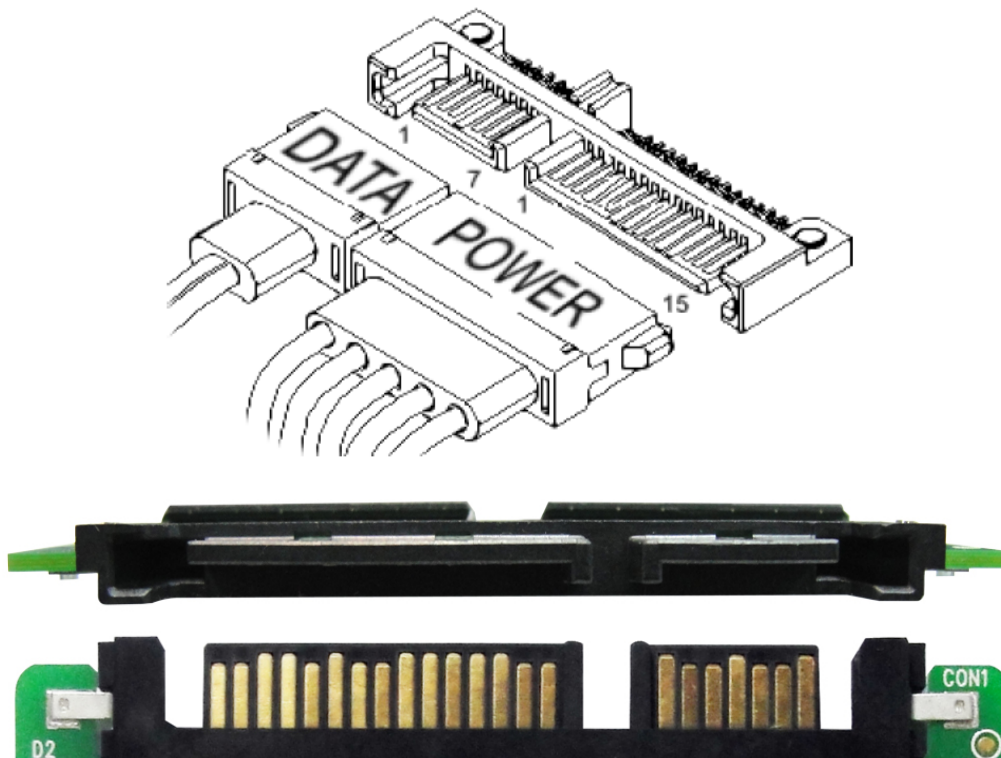


Figure 3 :The connectors of 1.8" Slim Lite SATA III MLC SSD

3.2. Pin Assignments

There are total of 7 pins in the signal segment and 15 pins in the power segment. The pin assignments are listed in below table 7.

Table 7 - Pin Assignments

Name	Type	Description
S1	GND	NA
S2	A+	Differential Signal Pair A
S3	A-	
S4	GND	NA
S5	B-	Differential Signal Pair B
S6	B+	
S7	GND	NA

Key and Spacing separate signal and power segments		
P1	NC	NA
P2	NC	NA
P3	NC	NA
P4	GND	NA
P5	GND	NA
P6	GND	NA
P7	V5	5V Power, Pre-Charge
P8	V5	5V Power
P9	V5	5V Power
P10	GND	NA
P11	DAS/DSS	Device Activity Signal / Disable Staggered Spin up
P12	GND	NA
P13	NC	NA
P14	NC	NA
P15	NC	NA

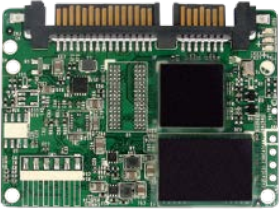
Notes:

1. All pins are in a signal row with a 1.27 mm (0.050" pitch).
2. The commands on the mating sequence in forward table apply to the case of backplane blind mate connector only. In this case, the mating sequences are:
 - (1) The pre-charge power pins and other ground pins.
 - (2) The signal pins and the rest of the power pins.

Appendix A: Ordering Information

1. Part Number List

◆ APRO 1.8" Slim Lite SATA III MLC SSD – HERMES-JI Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Wide Temp Grade (-40°C ~ +85°C)
	4GB	SB8SJ004G-JJCTMB	WB8SJ004G-JJCTMB-C
	8GB	SB8SJ008G-JJCTMB	WB8SJ008G-JJCTMB-C
	16GB	SB8SJ016G-JJCTMB	WB8SJ016G-JJCTMB-C
	32GB	SB8SJ032G-JJCTMB	WB8SJ032G-JJCTMB-C
	64GB	SB8SJ064G-JJCTMB	WB8SJ064G-JJCTMB-C
	128GB	SB8SJ128G-JJCTMB	WB8SJ128G-JJCTMB-C
	256GB	SB8SJ256G-JJCTMB	WB8SJ256G-JJCTMB-C

Notes:

- 1) **HERMES-J Series:** 4GB ~ 32GB / **HERMES-I Series:** 64GB~256GB
- 2) **C :** Special conformal coating treated on whole PCBA which may support industrial grade operating temperature -40°C ~ +85°C

2. Part Number Decoder:



X1 : Grade

S: Standard Grade – operating temp. 0° C ~ 70 ° C

W: Wide Temp Grade- operating temp. -40° C ~ +85 ° C

(with conformal coating on PCBA)

X2 : The material of case

B : Bare

X3 X4 X5 : Product category

8SJ : 1.8" Slim Lite SATA SSD

X6 X7 X8 X9 : Capacity

004G:	4GB	064G:	64GB
008G:	8GB	128G:	128GB
016G:	16GB	256G:	256GB
032G:	32GB		

X11 : Controller

J : HERMES Series

X12 : Controller version

A, B, C.....

X13 : Controller Grade

C : Commercial grade

X14 : Flash IC

T : Toshiba NAND Flash IC

X15 : Flash IC grade / Type

M : MLC-NAND Flash IC

X16 : Generation

B : 15 nm

C : Reserved for specific requirement

C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your 1.8" Slim Lite SATA III MLC SSD against defects in material and workmanship for the life of the drive. The warranty is void in the case of misuse, accident, alteration, improper installation, misapplication or the result of unauthorized service or repair. The implied warranties of merchantability and fitness for a particular purpose, and all other warranties, expressed or implied, except as set forth in this warranty, shall not apply to the products delivered. In no event shall APRO be liable for any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, this product.

BEFORE RETURNING PRODUCT, A RETURN MATERIAL AUTHORIZATION (RMA) MUST BE OBTAINED FROM APRO.

Product shall be returned to APRO with shipping prepaid. If the product fails to conform based on customers' purchasing orders, APRO will reimburse customers for the transportation charges incurred.

- **MLC (Standard grade / Wide temp. grade) 2 years / Within 3K Erasing Counts**

The warranty period is able to extend. Please contact APRO and/or Your APRO distributors for more information.