APRO Co., Ltd.

1.8″ MICRO SATA III MLC SSD

HERMES-F Series

Product Specification

APRO 1.8" Micro SATA III MLC SSD

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Revision History

Revision	Description	Date
1.0	Initial release	2014/8/8
1.1	Part Number - Transit to A19nm	2015/04/08

Contents

1. Introduction

APRO 1.8" Micro SATA III MLC SSD – HERMES-F Series provides high capacity flash memory Solid State Drive (SSD) that electrically complies with Serial ATA 3.0 (SATA) standard. APRO 1.8" Micro SATA III MLC SSD – HERMES-F 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 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 494.1 MB/sec, and sequential write is up to 286.1 MB/sec.

APRO 1.8" Micro 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" Micro 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" Micro SATA III MLC SSD HERMES-F 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" Micro SATA III MLC SSD controller.
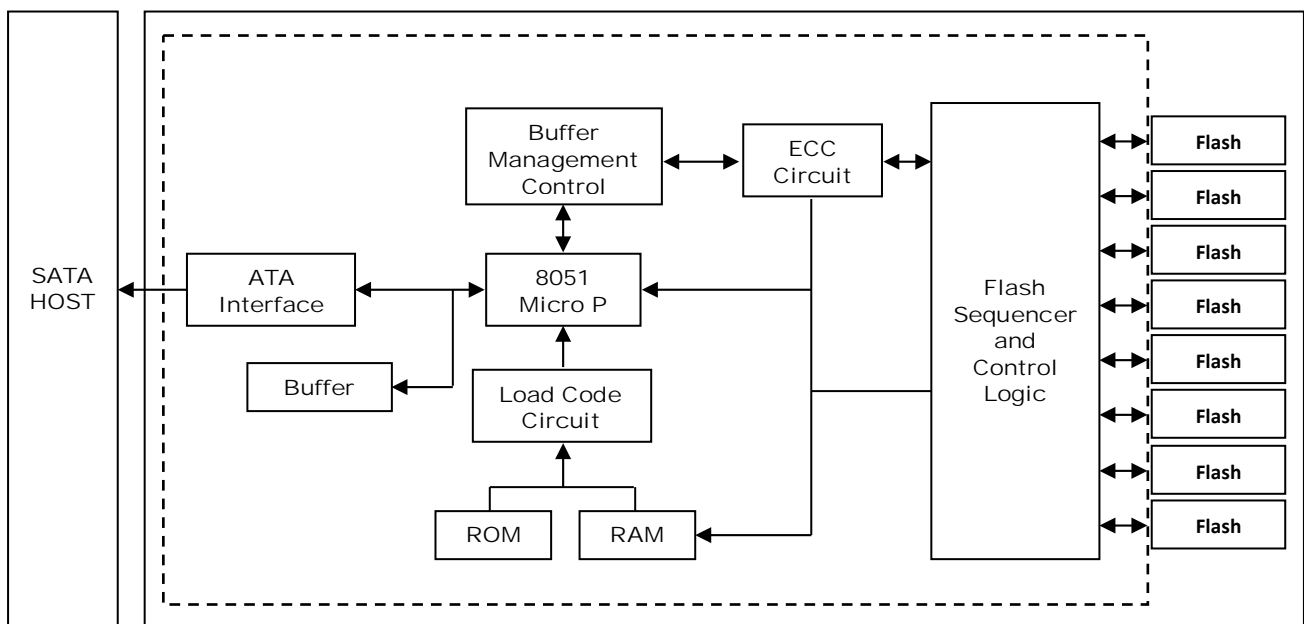

Figure 1: APRO 1.8" Micro SATA III MLC SSD HERMES-F Series controller block diagram

1.1. *Scope*

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

1.2. *System Features*

- MLC-NAND type flash technology
- 1.8" Micro SATA Form Factor
- Micro SATA 7-pin (data) + 9-pin (power connector) SATA Interface
- 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 8GB up to 512GB
- Sequential read performance up to 494.1 MB/sec
- Sequential write performance up to 286.1 MB/sec
- Automatic 40 bits per 1024 bytes error correction (ECC) and retry capabilities
- +5 V ± 5％ operation
- 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℃ to +70℃, and Industrial Grade, -40℃ to +85℃ with special conformal coating treatment on PCBA

1.3. *Flash Management Technology - Static Wear Leveling*

In order to gain the best management for flash memory, APRO 2.5" SATA III MLC SSD HERMES-F 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. System Environmental Specifications

Table 1: Environmental Specification

APRO 1.8" Micro SATA III MLC SSD HERMES-F Series		Standard Grade SP8SFxxxG-JFCTMA	Wide Temp Grade WP8SFxxxG-JFCTMA-C
Temperature	Operating:	0ºC ~ +70ºC	-40ºC ~ +85ºC
	Non-operating:	-20ºC ~ +80ºC	-50ºC ~ +95ºC
Humidity	Operating & Non-operating:	10% ~ 95% non-condensing	
Vibration	Operating & Non-operating:	7 Hz to 2K Hz, 20G, 3 axes	
Shock	Operating & Non-operating:	0.5ms, 1500 G, 3 axes	

2.2. System Power Requirements

Table 2: Power Requirement

APRO 1.8" Micro SATA III MLC SSD HERMES-F Series		Standard Grade SP8SFxxxG-JFCTMA
DC Input Voltage (VCC) 100mV max. ripple(p-p)		5V±5%
+5V Current (Maximum average value)	Reading Mode :	596 (max.)
	Writing Mode :	1073 (max.)
	Idle Mode :	151 (max.)

2.3. System Performance

Table 3: System Performances

Data Transfer Mode supporting				Serial ATA Gen-III (6.0Gb/s = 768MB/s)			
Average Access Time				0.2 ms (estimated)			
Maximum Performance	Capacity	8GB	16GB	32GB	64GB	128GB	256GB
	Sequential Read (MB/s)	132.0	244.5	460.9	493.6	494.1	489.9
	Sequential Write(MB/s)	21.2	42.7	84.7	167.0	282.3	286.1
The number of Flash IC		1	2	4	8	8	8

Note:

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

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

   - Computer with AMD 3.0GHz processor

   - Windows XP Professional operating system

2.4. *System Reliability*

Table 4: System Reliability

Wear-leveling Algorithms	Static Wear-leveling
Bad Blocks Management	Supportive
ECC Technology	40 bits per 1024 bytes
Endurance	Un-limited Read Cycles Endurance Management enables five years minimal useful life
Data Retention	10 years

2.5. *Physical Specifications*

Refer to Table 5 and see Figure 3 for 1.8" Micro SATA III MLC SSD HERMES-F Series physical specifications and dimensions.

Table 5: Physical Specifications of APRO 1.8" Micro SATA III MLC SSD-HERMES-F Series

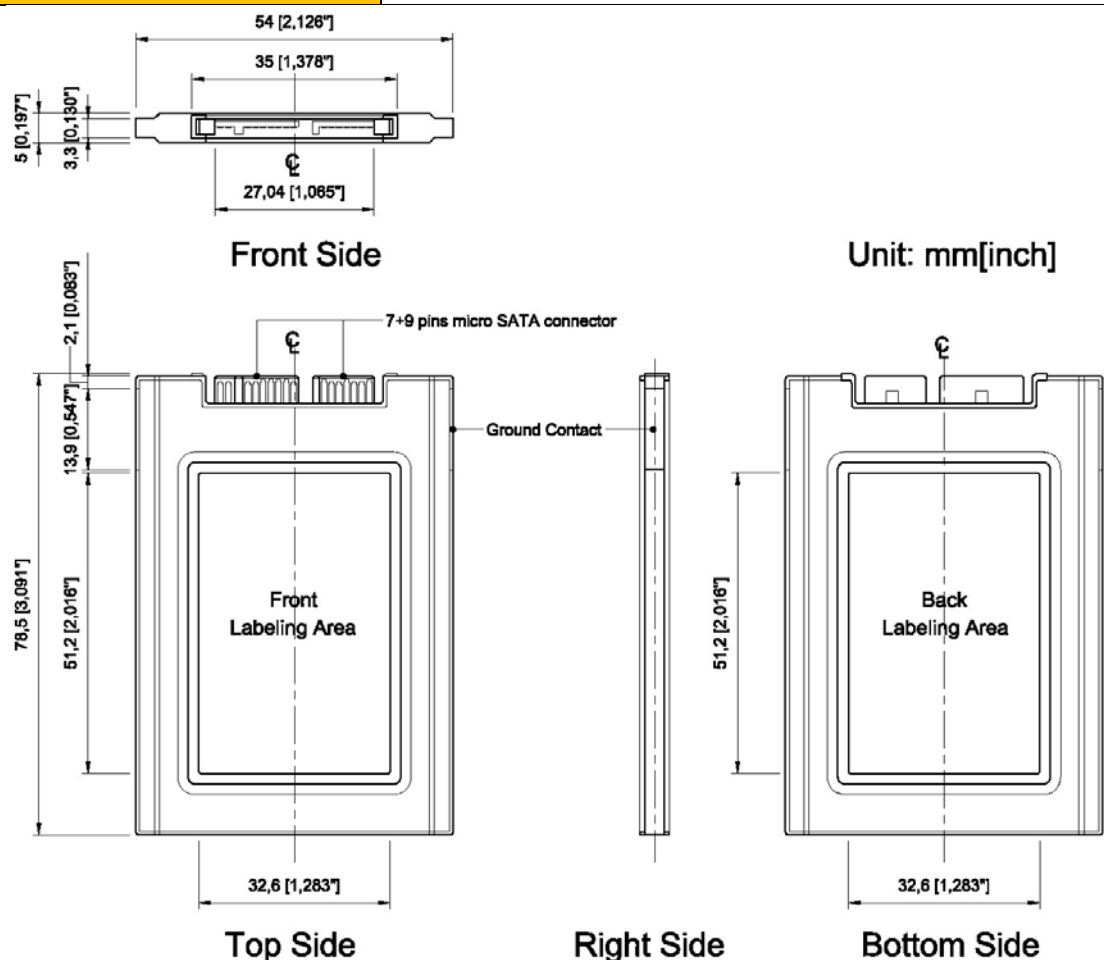| Length:	78.50 ± 0.30mm / 3.09 in
Width:	54.00 ± 0.20mm / 2.13 in
Thickness:	5.00 ± 0.15mm / 0.20 in
Weight:	25g ± 5g / 0.88 oz

Figure 2: APRO 1.8" Micro SATA III MLC SSD Dimension

2.5.1. 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 storages 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" Micro SATA III MLC SSD interface

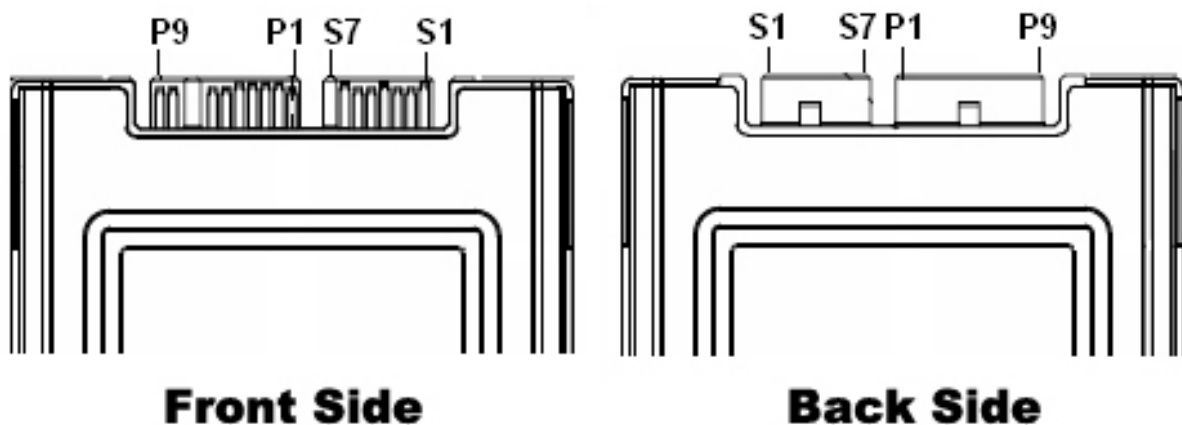APRO 1.8" Micro SATA III MLC SSD is equipped with standard 7 pins + 9 pins Serial ATA connector.

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

3.2. *Pin Assignments*

There are total of 7 pins in the signal segment and 9 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	V33	3.3V Power
P2	V33	3.3V Power, Pre-charge
P3	GND	
P4	GND	
P5	V5	5V Power, Pre-charge
P6	V5	5V Power
P7	R	Reserved
P8	Optional	Vendor Specific
P9	Optional	Vendor Specific

APRO 1.8" Micro SATA III MLC SSD – HERMES-F Series © 2015 APRO Co., Ltd.

Appendix A: Ordering Information

1. Part Number List

◆ **APRO 1.8" Micro SATA III MLC SSD – HERMES-F Series**

Product Picture	Grade	Standard grade (0ºC ~ 70ºC)	Wide Temp Grade (-40ºC ~ +85ºC)
	8GB	SP8SF008G-JFCTMA	WP8SF008G-JFCTMA/C
	16GB	SP8SF016G-JFCTMA	WP8SF016G-JFCTMA/C
	32GB	SP8SF032G-JFCTMA	WP8SF032G-JFCTMA/C
	64GB	SP8SF064G-JFCTMA	WP8SF064G-JFCTMA/C
	128GB	SP8SF128G-JFCTMA	WP8SF128G-JFCTMA/C
	256GB	SP8SF256G-JFCTMA	WP8SF256G-JFCTMA/C

Notes:

> **C :** Special conformal coating treated on whole PCBA which may support industrial grade operating temperature
>
> -40℃ ~ +85℃

2. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 — X11 X12 X13 X14 X15 X16 — C

X1 : Grade
S: Standard Grade – operating temp. 0º C ~ 70 º C
W: Wide Temp Grade- operating temp. -40º C ~ +85 º C
(Standard grade with conformal coating)

X2 : The material of case
P : Plastic

X3 X4 X5 : Product category
8SF : 1.8" Micro SATA SSD

X6 X7 X8 X9 : Capacity

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

X11 : Controller
J : JMicron (HERMES-F Series)

X12 : Controller version
A, B, C…..

X13 : Controller Grade
C : Standard grade

X14 : Flash IC
T : Toshiba MLC-NAND Flash IC

X15 : Flash IC grade / Type
M : MLC-NAND Flash IC

X16 : Generation
A : A19 nm

C : Reserved for specific requirement
C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your 1.8" Micro 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.

WARRANTY PERIOD:

- **SP8SFxxxG-JFCTMA**   **2 years**

- **WP8SFxxxG-JFCTMA/C**   **2 years**

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