



SLC

1.8" micro SATA III SSD

HERMES-F Series

Product Specification

INDUSTRIAL

APRO 1.8" micro SATA III SLC SSD

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Revision History

Revision	Description	Date
1.0	Initial release	2016/6/30

CONTENTS

1.	INTRODUCTION	2 -
1.1.	SCOPE	3 -
1.2.	SYSTEM FEATURES	3 -
1.3.	FLASH MANAGEMENT TECHNOLOGY - STATIC WEAR LEVELING	3 -
2.	PRODUCT SPECIFICATIONS	4 -
2.1.	SYSTEM ENVIRONMENTAL SPECIFICATIONS	4 -
2.2.	SYSTEM POWER REQUIREMENTS.....	4 -
2.3.	SYSTEM PERFORMANCE	4 -
2.4.	SYSTEM RELIABILITY.....	5 -
2.5.	PHYSICAL SPECIFICATIONS.....	5 -
2.5.1.	CONFORMAL COATING	6 -
3.	INTERFACE DESCRIPTION	6 -
3.1.	APRO 1.8" MICRO SATA III SLC SSD INTERFACE	6 -
3.2.	PIN ASSIGNMENTS	7 -
	APPENDIX A: ORDERING INFORMATION.....	8 -
1.	PART NUMBER LIST	8 -
2.	PART NUMBER DECODER:.....	8 -
	APPENDIX B: LIMITED WARRANTY	9

1. Introduction

APRO 1.8" Micro SATA III SLC SSD – HERMES-F Series provide high capacity flash memory Solid State Drive (SSD) that electrically complies with Serial ATA 3.0 (SATA) standard as well as ATA protocol is able to work as a booting disk or data storages without any additional drives.

APRO 1.8" Micro SATA III SLC SSD – HERMES-F Series support SATA Gen-III (6.0 GB/s) with high performance. The main used flash memories are SLC-NAND type flash memory chips. The available disk capacities are 8GB, 16GB, 32GB, 64GB, 128GB and 256GB. The operating temperature grade is optional for commercial level 0°C ~ 70°C and wide temperature level -40°C ~ +85°C. The data transfer performance by sustained read is up to 490.0 MB/sec (Max.), and sustained write is up to 430.0 MB/sec (Max.).

The APRO 1.8" Micro SATA III SLC 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 SLC SSD to read or write blocks of memory. Each sector is protected by a powerful 40 bits per 1024bytes in an ECC block code. APRO 1.8" Micro SATA III SLC 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 SLC SSD controller.

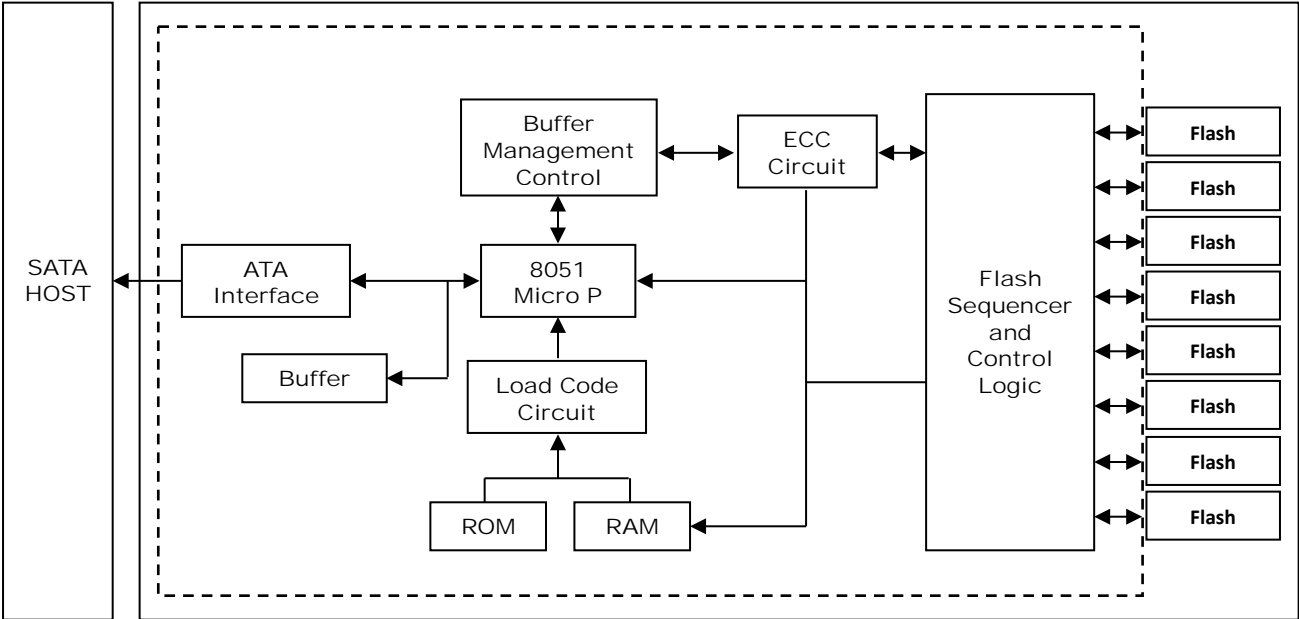


Figure 1: SSD Block diagram

1.1. Scope

This document describes features, specifications and installation guide of APRO's 1.8" Micro SATA III SLC 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

- SLC-NAND type flash technology
- 1.8" form-factor (shorter than PCMCIA Type II form-factor)
- Micro SATA 7 pins (data) + 9 pins (power connector) host Interface
- Bare PCBA without casing in 5.45 mm height
- SATA 1.0a, SATA 2.6 and SATA 3.0 specification compliance
- SMART (Self-Monitoring, Analysis and Reporting Technology) function supported.
- Support Trim commands.
- Capacity from 8GB up to 256GB
- Sequential read performance up to 490.0 MB/sec
- Sequential write performance up to 430.0 MB/sec
- Automatic 40 bits per 1024 bytes error correction (ECC) and retry capabilities
- +5 V $\pm 5\%$ 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°C to +70°C, and Industrial Grade, -40°C to +85°C

1.3. Flash Management Technology - Static Wear Leveling

In order to gain the best management for flash memory, APRO 1.8" Micro SATA III SLC 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 SLC SSD		Standard Grade	Industrial Grade
HERMES-F Series		SP8SFxxxG-JFCTC	WP8SFxxxG-JFITI
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	
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 SLC SSD		Power Consumption
HERMES-F Series		
DC Input Voltage.		5V±5%
+5V Current (Maximum average value)	Reading Mode :	450 (max.)
	Writing Mode :	600 (max.)
	Idle Mode :	190 (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		0.1 ms (estimated)					
Maximum Performance	Capacity	8GB	16GB	32GB	64GB	128GB	256GB
	Sequential Read (MB/s)	420.0	420.0	480.0	480.0	490.0	490.0
	Sequential Write(MB/s)	120.0	120.0	260.0	410.0	430.0	430.0

Note:

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

(2). Testing of the 1.8" Micro SATA III SLC 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 2 for 1.8" Micro SATA III SLC SSD HERMES-F Series physical specifications and dimensions.

Table 5: Physical Specifications

Length:	78.5 + 0.30mm / 3.09 in
Width:	54 + 0.20mm / 2.13 in
Thickness:	5 + 0.15mm / 0.20 in
Weight:	25g + 5g / 0.88oz

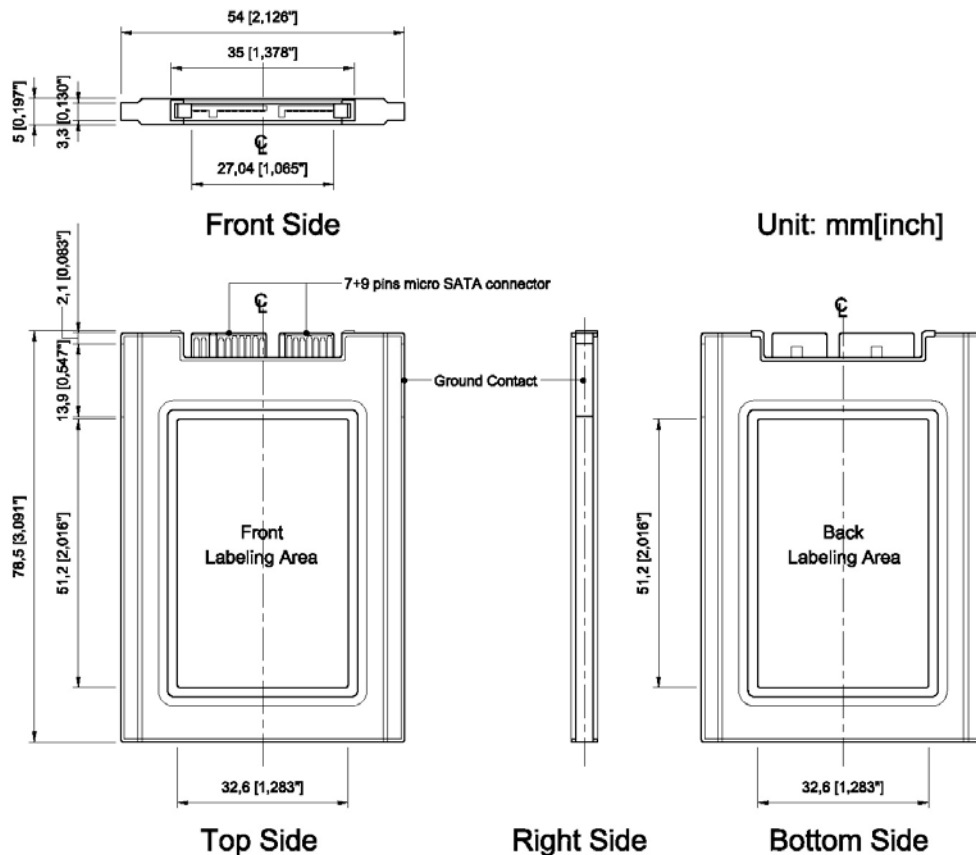


Figure 2: APRO 1.8" Micro SATA III SLC SSD Dimension

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 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" Micro SATA III SLC SSD interface

APRO 1.8" Micro SATA III SLC SSD is equipped with Micro SATA 7 pins (data) + 9 pins (power connector) host Interface

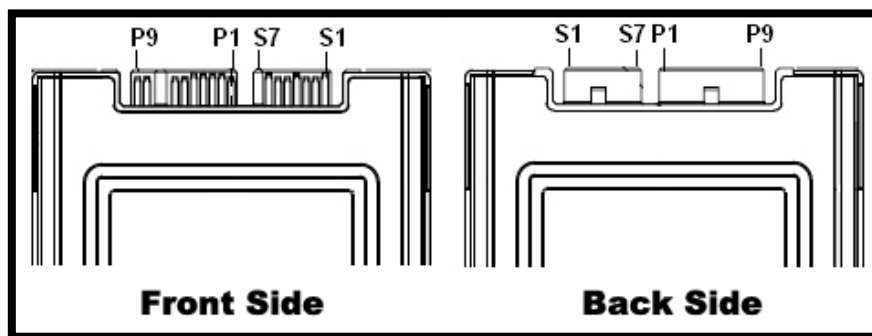


Figure 3: The connectors of 1.8" Micro SATA III SLC SSD

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			Cable Usage	Backplane
P1	NA	NA	2 nd Mate	3 rd Mate
P2	NA	NA	1 st Mate	2 nd Mate
P3	GND		1 st Mate	1 st Mate
P4	GND		1 st Mate	1 st Mate
P5	V5	5V Power, Pre-charge	1 st Mate	2 nd Mate
P6	V5	5V power	2 nd Mate	3 rd Mate
P7	R	Reserved	2 nd Mate	3 rd Mate
KEY	KEY	KEY	NC	NC
P8	Optional	Vendor Specific	2 nd Mate	3 rd Mate
P9	Optional	Vendor Specific	2 nd Mate	3 rd Mate


Notes:

1. Although the mate order is shown, hot plugging is not supported when using the cable connector receptacle.
2. All mate sequences assume zero angular offset between connectors.
3. The signal segment and power segment may be separate.
4. The 5V supply voltage pins included to meet future requirements and may optionally be provided on the power segment receptacle. Future revisions of this specification may require 5V supply voltage be provided.
5. The corresponding pin to be mated with pin P7 in the power Internal Micro receptacle connector shall voltage be provided.
6. No connect on the host side.

Appendix A: Ordering Information

1. Part Number List

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

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

2. Part Number Decoder:

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

X1 : Grade

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

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

X12 : Controller version

A, B, C.....

X2 : The material of case

P : Plastic frame kit

X13 : Controller Grade

C : Commercial grade

I : Industrial grade

X3 X4 X5 : Product category

8SF : 1.8" Micro SATA III SLC SSD

X14 : Flash IC

T : Toshiba SLC-NAND Flash IC

X6 X7 X8 X9 : Capacity

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

X15 : Flash IC grade / Type

C : Commercial grade

I : Industrial grade

X11 : Controller

J : HERMES Series

C : Reserved for specific requirement

C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your 1.8" Micro SATA III SLC 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:

- **SLC STD. Grade** **3 years / Within 60K Erasing Counts**
- **SLC IND. Grade** **5 years / Within 60K Erasing Counts**

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