APRO Co., Ltd.

SATA III
MLC CFast Card

HERMES-G Series

Product Specification

APRO MLC SATA III CFast Card

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Revision History

Revision	Description	Date
1.0	Initial Released	2014/3/26
1.1	Add 128GB Capacity	2014/5/16
1.2	Part Number - Transit to A19nm	2015/04/08

CONTENTS

APRO MLC CFast Card HERMES-G Series © 2015 APRO Co., Ltd.

1. Introduction

APRO MLC CFast Card compliant to the CFast™ Specification 2.0 issued by CompactFlash Association (CFA), it breakthroughs the speed performance under traditional ATA/ATAPI specification. Integrating the CompactFlash card form factor and Serial ATA (SATA I/ II/ III) interface, the transfer speed is much higher than traditional CF Card while it keeps small form factor and rigid case as CF Card. The HERMES-G Series CFast Card also supports Metal Frame Kit as an optional product which may endure various harsh operating environments. The main used Flash memory is MLC-NAND Type Flash memory chips from 4GB up to 128GB. APRO's HERMES-G Series MLC CFast Card features with great portability and resistance against vibration. The sequential read speed is 312.8 MB/sec and sequential write speed is 154.5 MB/sec for Multiple Level Cell (MLC) solution. Furthermore, APRO also provide 1.8" SATA to CFast card Adapter (P/N: AD-CA128SATA200AR) to increase the application flexibility.

APRO's MLC CFast Card supports optional standard grade operating temperature 0℃ ~ 70℃ and wide temperature -40℃ ~ +85℃.

APRO's MLC CFast Card is suitable to handheld device embedded system, inventory recorder and particularly for serious environment monitor recorder system. Also, through APRO 1.8" SATA to CFast card Adapter, APRO MLC CFast Card can be high speed booting SSD to varieties of IPC motherboards and PC structure system. Figure 1 shows a block diagram of the used high tech CFast Card controller.
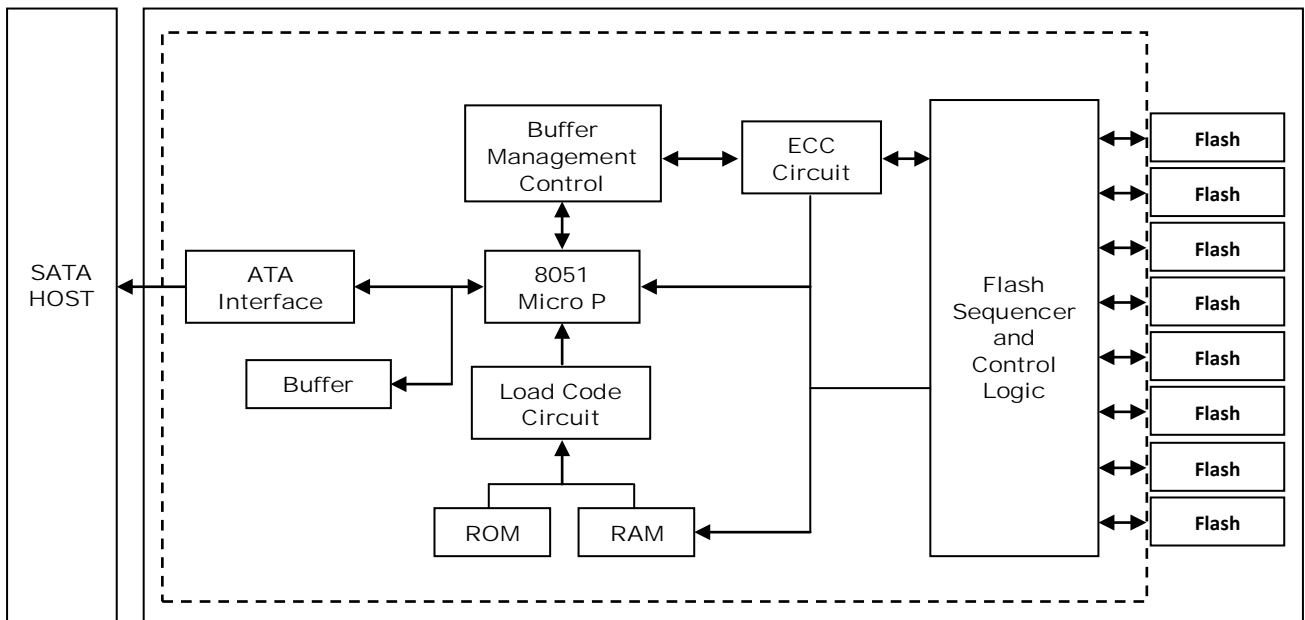
Figure 1: APRO SATA III CFast Card HERMES-G Series controller block diagram

1.1. *Scope*

This document describes features, specifications and installation guide of APRO's MLC SATA III CFast Card – HERMES-G 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
- Compliant with CFast™ specification V2.0
- CFast Type I form-factor
- 7-pin (data) + 17-pin (power) CFast Card connector
- 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
- Capacity from 4GB up to 128GB
- Sequential read performance up to 312.8 MB/sec
- Sequential write performance up to 154.5 MB/sec
- Automatic 40 bits per 1024 bytes error correction (ECC) and retry capabilities
- +3.3V ±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 wide temp Grade with conformal coating, -40℃ to +85℃

1.3. *Flash Management Technology - Static Wear Leveling*

In order to gain the best management for flash memory, APRO MLC SATA III CFast Card HERMES-G 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

HERMES-G Series MLC SATA III CFast Card		Standard Grade	Wide Temp Grade
		SPCFAxxxG-JGCTMA	**WPCFAxxxG-JGCTMA/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 MLC SATA III CFast Card HERMES-G Series		Standard Grade SPCFAxxxG-JGCTMA
DC Input Voltage (VCC) 100mV max. ripple(p-p)		3.3V±5%
+3.3V Current (Maximum average value)	**Reading Mode :**	260 mA (max.)
	Writing Mode :	330 mA (max.)
	Idle Mode :	120 mA (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**	**4GB**	**8GB**	**16GB**	**32GB**	**64GB**	**128GB**
	Sequential Read (MB/s)	107.5	132.2	256.5	312.8	312.8	308.5
	Sequential Write(MB/s)	11.5	21.1	38.9	85.1	153.3	154.5

Note:

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

(2). Testing of the MLC SATA III CFast Card maximum performance was performed under the following platform:

- Computer with Intel i5 3.5GHz processor with Windows 7 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 APRO MLC Cfast Card – HERMES-G Series physical dimensions.

Table 5: Physical Specifications of MLC Cfast Card-HERMES-G Series

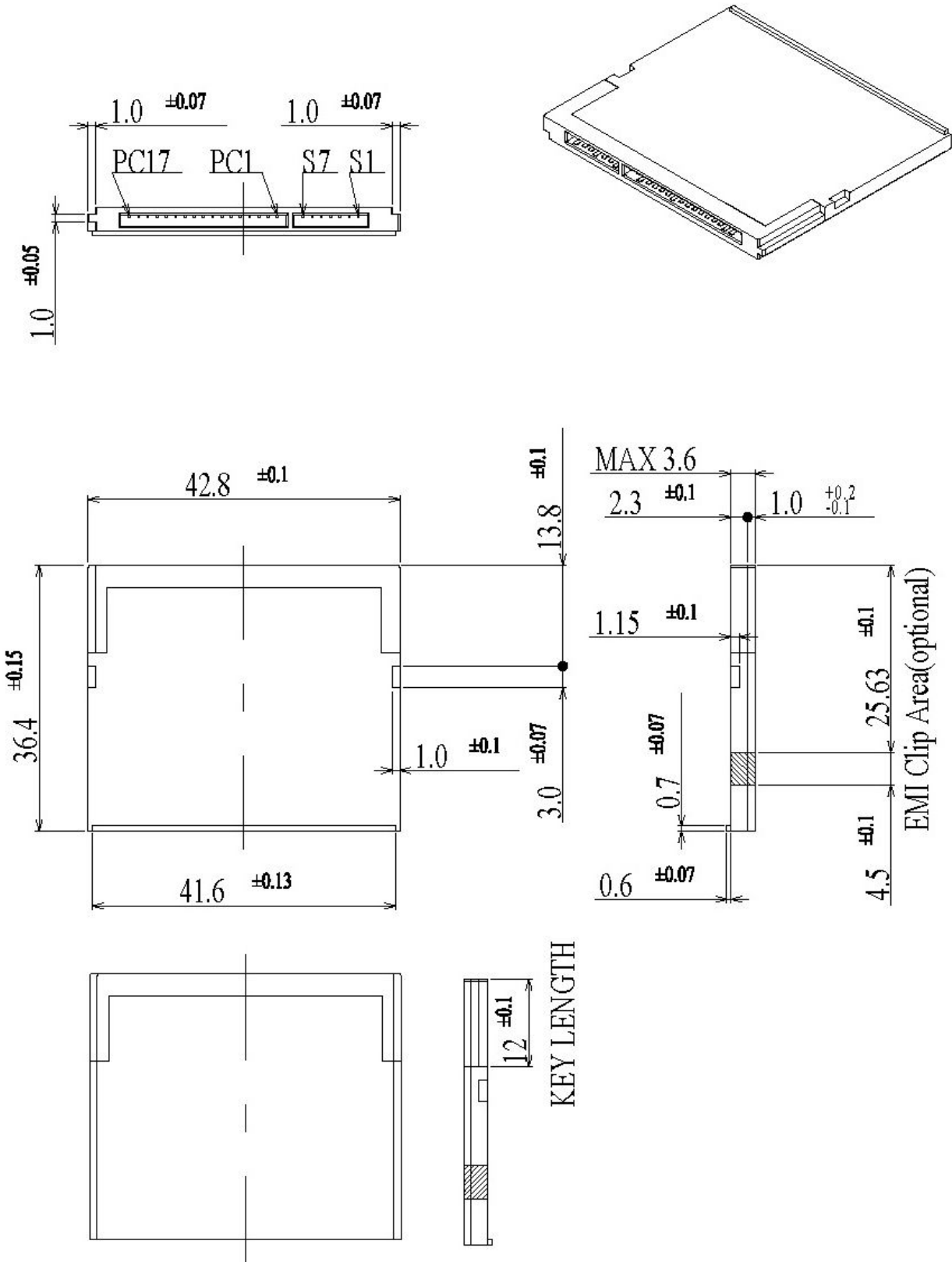| Length:	42.8 + 0.10mm / 1.69 in
Width:	36.4 + 0.15mm / 1.43 in
Thickness:	3.5 (3.6 max) + 0.1mm / 0.13 in (Based on Cfast 1.0 Specification, the max. thickness is 3.6mm.)
Weight:	Plastic: 10g / 0.4oz ; Metal: 13g / 0.46oz

Figure 2: APRO MLC SATA III CFast Card 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 CFast Card interface

APRO CFast Card is equipped with 7 pins in the signal segment and 17 pins in the power segment.

Figure 3: SATA 7-pin (data) + 17-pin (power)

3.2. *Pin Assignments*

Refer to Table 7 and see Figure 3 for APRO MLC CFast Card – HERMES-G Series pin assignments. There are total of 7

pins in the signal segment and 17 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	CDI	Card Detect In
P2	PGND	Device Ground
P3	DEVSLP	Device Sleep
P4	NA	Reserved
P5	NA	Reserved
P6	NA	Reserved
P7	PGND	Device Ground
P8	LED1	LED Output
P9	LED2	LED Output
P10	NA	Reserved
P11	NA	Reserved
P12	IFDET	NA
P13	PWR	Device Power
P14	PWR	Device Power
P15	PGND	Device Ground
P16	PGND	Device Ground
P17	CDO	Card Detect Out

Appendix A: Ordering Information

1. *Part Number List*

◆ **APRO MLC SATA III CFast Card – HERMES-G Series with Plastic frame Kit**

Product Picture	Grade	Standard grade (0ºC ~ 70ºC)	Wide Temp Grade (-40ºC ~ +85ºC)
	4GB	SPCFA004G-JGCTMA	WPCFA004G-JGCTMA/C
	8GB	SPCFA008G-JGCTMA	WPCFA008G-JGCTMA/C
	16GB	SPCFA016G-JGCTMA	WPCFA016G-JGCTMA/C
	32GB	SPCFA032G-JGCTMA	WPCFA032G-JGCTMA/C
	64GB	SPCFA064G-JGCTMA	WPCFA064G-JGCTMA/C
	128GB	SPCFA128G-JGCTMA	WPCFA128G-JGCTMA/C

◆ **APRO MLC SATA III CFast Card – HERMES-G Series with Rugged Metal frame Kit**

Product Picture	Grade	Standard grade (0ºC ~ 70ºC)	Wide Temp Grade (-40ºC ~ +85ºC)
	4GB	SRCFA004G-JGCTMA	WRCFA004G-JGCTMA/C
	8GB	SRCFA008G-JGCTMA	WRCFA008G-JGCTMA/C
	16GB	SRCFA016G-JGCTMA	WRCFA016G-JGCTMA/C
	32GB	SRCFA032G-JGCTMA	WRCFA032G-JGCTMA/C
	64GB	SRCFA064G-JGCTMA	WRCFA064G-JGCTMA/C
	128GB	SRCFA128G-JGCTMA	WRCFA128G-JGCTMA/C

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
(With Conformal Coating treatment on PCBA)

X2 : **The material of case**
P : Plastic frame kit
R : Rugged Metal frame kit

X3 X4 X5 : **Product category**
CFA : CFast card

X6 X7 X8 X9 : **Capacity**

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

X11 : **Controller**
J : JMicron (HERMES-G Series)

X12 : Controller version
A, B, C…..

X13 : **Controller Grade**
C : Commercial grade

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

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

X16 : **Flash IC**
A : A19 nm

C : **Reserved for specific requirement**
C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your SATA III CFast Cards 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:

- **SxCFAxxxG-JGCTMA**   2 years

- **WxCFAxxxG-JGCTMA/C**   2 years

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