



Industrial PCMCIA ATA CARD

HERMIT-A Series

Product Specification

INDUSTRIAL

Rugged Metal PCMCIA ATA CARD

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Revision History

Revision	Description	Date
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1. Introduction

APRO Industrial Rugged PCMCIA ATA Card – HERMIT Series designed to follow ATAPI-6 (ATA-100) Standard. The main used Flash memories are Toshiba SLC-NAND Type Flash memory chips. The available Card capacities are 16MB, 32MB, 64MB, 128MB, 256MB, 512MB, 1GB, 2GB, 4GB and 8GB.

The APRO Industrial Rugged PCMCIA ATA Cards- HERMIT Series are designed electrically complies with the conventional IDE hard Card and support True IDE Mode. The data transfer modes supports PIO- 0, 1, 2, 3, 4 or MWDMA- 0, 1, 2 or UDMA- 0, 1, 2, 3, 4. The fastest reading speed is up to 40 MB/sec and writing speed is up to 28.2 MB/sec. In order to sustain various harsh and tough operating environments, APRO especially delivers the PCMCIA ATA Card frame kit in rugged metal as well as provides the optional treatment of conformal coating upon customers' request.

APRO Industrial PCMCIA ATA products provide a high level interface to the host computer. This interface allows a host computer to issue commands to the Rugged PCMCIA ATA Card to read or write blocks of memory. Each sector is protected by a powerful 4 bits Error Correcting Code (ECC). APRO Industrial Rugged PCMCIA ATA Card's HERMIT 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 Industrial Rugged PCMCIA ATA Card controller.

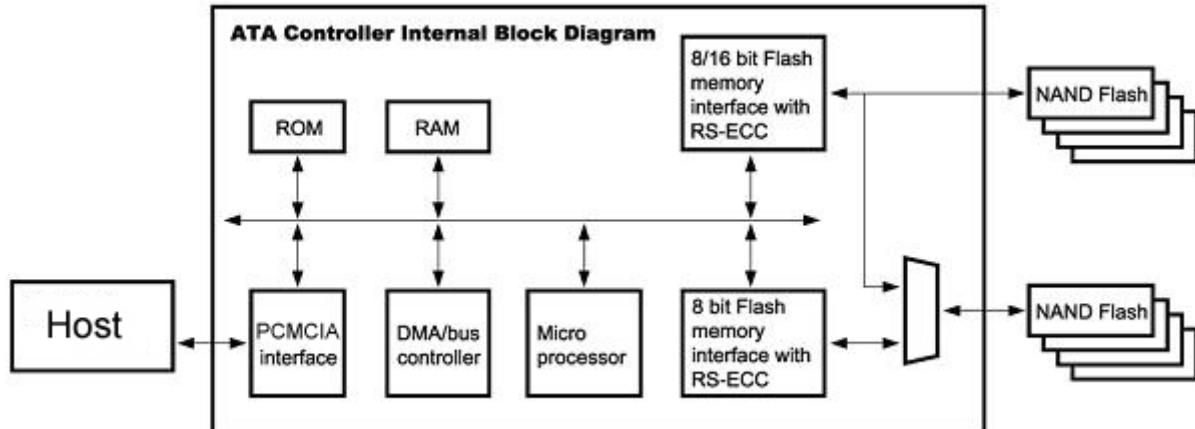


Figure 1: HERMIT Series PCMCIA ATA Card Controller Block Diagram

1.1. Scope

This document describes features, specifications and installation guide of APRO's Rugged Metal PCMCIA ATA Cards – HERMIT-A 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
- Optional Rugged metal PCMCIA ATA casing to sustain the harshest environments
- Standard 68-Pin female connector
- ATA interface and support PC Card Memory mode, PC Card I/O mode and True IDE mode
- Data transfer supports PIO 0~4, MWDMA 0~2, UDMA 0~4 supported
- Non-volatile memory and no moving parts
- SLC Flash SSD standard grade capacity from 16MB up to 8GB
- Sequential read performance up to 40.0 MB/sec
- Sequential write performance up to 28.2 MB/sec
- Automatic 4 bits per 512 bytes error correction (ECC) and retry capabilities
- +3.3V ± 5% / +5V ± 10% operation
- Shock : 1,500G , compliance to MIL-STD-810F
- Vibration : 15G, compliance to MIL-STD-810F
- 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 Rugged Metal PCMCIA ATA Card - HERMIT-A 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 Rugged Metal PCMCIA ATA Card		Standard Grade	Industrial Grade
HERMIT-A Series		SPAFCxxxG-HACTC-UF	WPAFCxxxG-HAITI-UF
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:	15G peak-to-peak maximum	
Shock	Operating & Non-operating:	1,500G maximum	

2.2. System Power Requirements

Table 2: Power Requirement

APRO Rugged Metal PCMCIA ATA Card		Standard Grade
HERMIT-A Series		SPAFCxxxG-HACTC-UF
DC Input Voltage (VCC) 100mV max. ripple(p-p)		+3.3V ± 5% / +5V ± 10%
+5V Current (Maximum average value)	Reading Mode :	150 mA (max.)
	Writing Mode :	135 mA (max.)
	Idle Mode :	2.4 mA (max.)

2.3. System Performance

Table 3: System Performances

Data Transfer Mode supporting	PIO 0~4, MWDMA 0~2, UDMA 0~4 supported										
Average Access Time	0.2 ms (estimated)										
Maximum Performance	Capacity	16MB	32MB	64MB	128MB	256MB	512MB	1GB	2GB	4GB	8GB
	Sequential Read(MB/s)	17.8	17.6	17.7	17.7	18.0	20.2	40.0	39.0	33.8	33.9
	Sequential Write(MB/s)	11.0	10.8	11.0	11.2	11.4	13.9	28.2	27.5	23.5	24.0

Note:

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

(2). Testing of the Rugged Metal PCMCIA ATA Card 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	Supported
ECC Technology	4 bits per 512 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 Rugged Metal PCMCIA ATA Card HERMIT-A Series physical specifications and dimensions.

Table 5: Physical Specifications of APRO Rugged Metal PCMCIA ATA Card-HERMIT-A Series

Length:	85.60±0.15mm(3.37±0.006 in)
Width:	54.00±0.10mm(2.13±0.004 in)
Thickness:	5.00±0.10mm(0.2±0.004 in)
Weight:	43.0g(1.52oz) typical

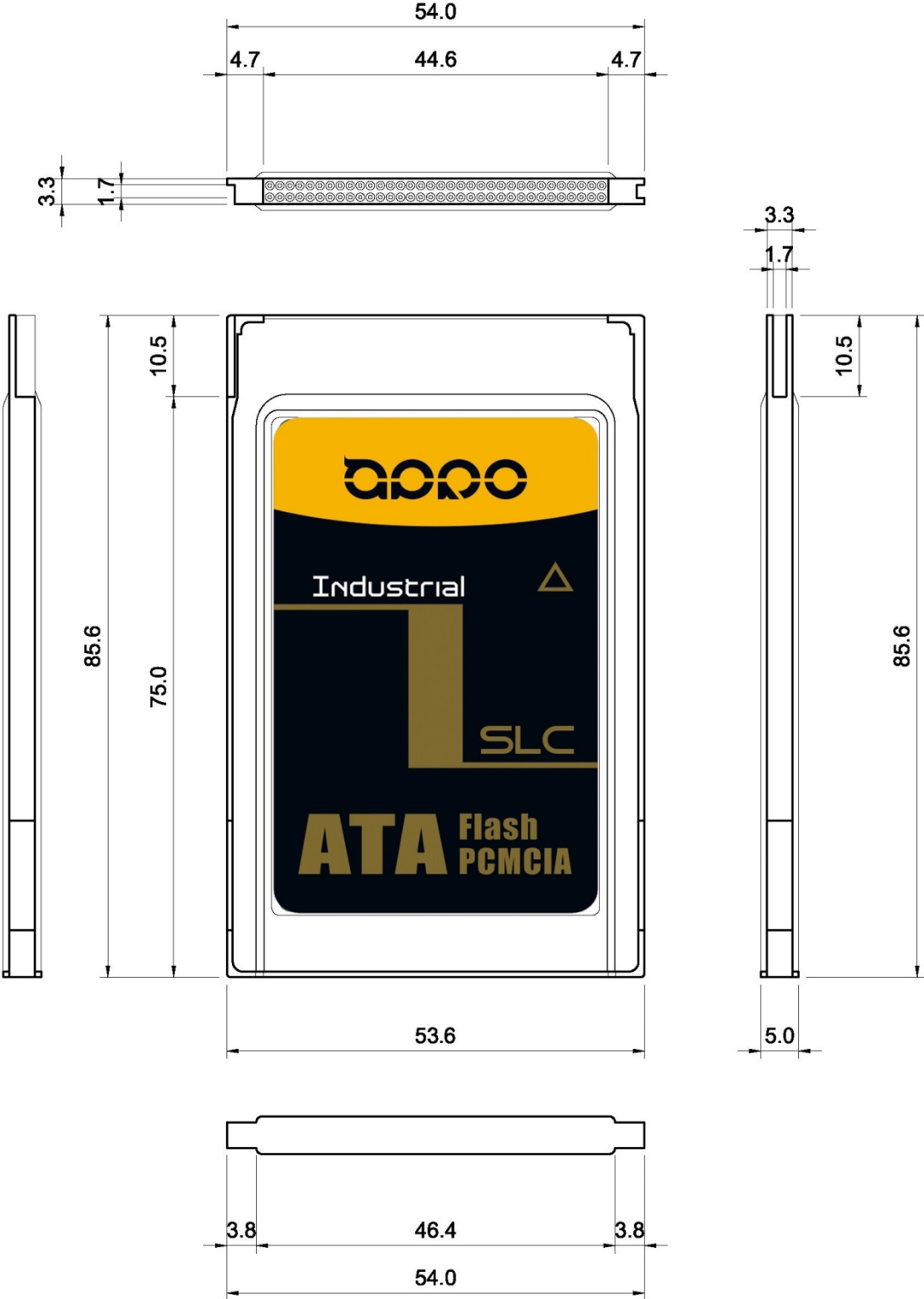


Figure 2: APRO Rugged Metal PCMCIA ATA Card Dimension

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 storage products upon request 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 Rugged Metal PCMCIA ATA Card interface

The PCMCIA ATA Card uses a 68 pin connector. The connector in the host consists of two rows of 34 pins with 0.05 inch spacing (1.27mm). Female pins are used on the card side, male pins on the system end.



Figure 3 : The connectors of PCMCIA ATA Card

3.2. Pin Assignments

Signals whose source is the host is designated as inputs while signals that APRO 2.5" PATA SLC Solid State Disk HERMIT-A Series sources are outputs. The pin assignments are listed in below table 7.


Table 7 - Pin Assignments

Pin	Name	Descriptions	Pin	Name	Descriptions	Pin	Name	Descriptions
01	GND	Ground	31	D1	I/O	61	REG#	I
02	D3	I/O	32	D2	I/O	62	BVD2	I/O
03	D4	I/O	33	WP	O	63	BVD1	I/O
04	D5	I/O	34	GND	Ground	64	D81	I/O
05	D6	I/O	35	GND	Ground	65	D91	I/O
06	D7	I/O	36	CD1#	O	66	D101	I/O
07	CE1#	I	37	D111	I/O	67	CD2#	O
08	A10	I	38	D121	I/O	68	GND	Ground
09	OE#	I	39	D131	I/O			
10	NC	-	40	D141	I/O			
11	A9	I	41	D151	I/O			
12	A8	I	42	CE2#1	I			
13	NC	-	43	VS1#	O			
14	NC	-	44	IORD#	I			
15	WE#	I	45	IOWR#	I			
16	RDY/BSY#	O	46	NC	-			
17	VCC	Power	47	NC	-			
18	NC	-	48	NC	-			
19	NC	-	49	NC	-			
20	NC	-	50	NC	-			
21	NC	-	51	VCC	Power			
22	A7	I	52	NC	-			
23	A6	I	53	NC	-			
24	A5	I	54	NC	-			
25	A4	I	55	NC	-			
26	A3	I	56	NC	-			
27	A2	I	57	VS2#	O			
28	A1	I	58	RESET	I			
29	A0	I	59	WAIT#	O			
30	D0	I/O	60	INPACK#	O			


Appendix A: Ordering Information

1. Part Number List

◆ APRO Plastic PCMCIA ATA Card – HERMIT-A Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	16MB	SPAFC016M-HACTC-UF(/C)	WPAFC016M-HAITI-UF(/C)
	32MB	SPAFC032M-HACTC-UF(/C)	WPAFC032M-HAITI-UF(/C)
	64MB	SPAFC064M-HACTC-UF(/C)	WPAFC064M-HAITI-UF(/C)
	128MB	SPAFC128M-HACTC-UF(/C)	WPAFC128M-HAITI-UF(/C)
	256MB	SPAFC256M-HACTC-UF(/C)	WPAFC256M-HAITI-UF(/C)
	512MB	SPAFC512M-HACTC-UF(/C)	WPAFC512M-HAITI-UF(/C)
	1GB	SPAFC001G-HACTC-UF(/C)	WPAFC001G-HAITI-UF(/C)
	2GB	SPAFC002G-HACTC-UF(/C)	WPAFC002G-HAITI-UF(/C)
	4GB	SPAFC004G-HACTC-UF(/C)	WPAFC004G-HAITI-UF(/C)
8GB	SPAFC008G-HACTC-UF(/C)	WPAFC008G-HAITI-UF(/C)	

◆ APRO Rugged Metal PCMCIA ATA Card – HERMIT-A Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	16MB	SRAFC016M-HACTC-UF(/C)	WRAFC016M-HAITI-UF(/C)
	32MB	SRAFC032M-HACTC-UF(/C)	WRAFC032M-HAITI-UF(/C)
	64MB	SRAFC064M-HACTC-UF(/C)	WRAFC064M-HAITI-UF(/C)
	128MB	SRAFC128M-HACTC-UF(/C)	WRAFC128M-HAITI-UF(/C)
	256MB	SRAFC256M-HACTC-UF(/C)	WRAFC256M-HAITI-UF(/C)
	512MB	SRAFC512M-HACTC-UF(/C)	WRAFC512M-HAITI-UF(/C)
	1GB	SRAFC001G-HACTC-UF(/C)	WRAFC001G-HAITI-UF(/C)
	2GB	SRAFC002G-HACTC-UF(/C)	WRAFC002G-HAITI-UF(/C)
	4GB	SRAFC004G-HACTC-UF(/C)	WRAFC004G-HAITI-UF(/C)
8GB	SRAFC008G-HACTC-UF(/C)	WRAFC008G-HAITI-UF(/C)	

2. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 – **X11 X12 X13 X14 X15** – **Z1 Z2** – **C**

X1 : Grade

S: Standard Grade – operating temp. 0° C ~ 70 ° C
W: Wide Temp Grade- operating temp. -40° C ~ +85 ° C

X2 : The material of case

P : Plastic frame kit
R : Rugged Metal frame kit

X3 X4 X5 : Product category

AFC : PCMCIA ATA flash card

X6 X7 X8 X9 : Capacity

016M:	16MB	512M:	512MB
032M:	32MB	001G:	1GB
064M:	64MB	002G:	2GB
128M:	128MB	004G:	4GB
256M:	256MB	008G:	8GB

X11 : Controller

H : Hyperstone (HERMIT-A Series)

X12 : Controller version

A, B, C.....

X13 : Controller Grade

C : Commercial grade
I : Industrial grade

X14 : Flash IC

T : Toshiba SLC-NAND Flash IC

X15 : Flash IC grade / Type

C : Commercial grade
I : Industrial grade

Z1 Z2 : Data transfer rate / ATA disk type

PF : PIO-4 mode / fixed disk type
PR : PIO-4 mode / removable disk type
UF : Defaulted as UDMA-4 mode / fixed disk type
UR : UDMA-4 mode / removable disk type
AA : PIO/UDMA & fixed/removable disk type auto-detected

C : Reserved for specific requirement

C : Conformal-coating

Appendix B: Limited Warranty

APRO warrants your PCMCIA ATA Card 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:

- SxAFCxxxG-HACTC-UF/C 3 years



- WxAFCxxxG-HAIT-UF/C 5 years



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