



# Industrial

# PCMCIA ATA CARD

## HERMIT-A Series

### **Product Specification**

INDUSTRIAL

PCMCIA ATA CARD

Version 01V1

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#### Revision History

| <b>Revision</b> | <b>Description</b>  | <b>Date</b> |
|-----------------|---|-------------|
| 1.0             | Initial release   | 2014/11/28  |
| 1.1             | Plastic & Rugged Metal Frame-Kit Separate.<br>Add Rugged Metal Frame-Kit dimension. | 2016/05/24  |

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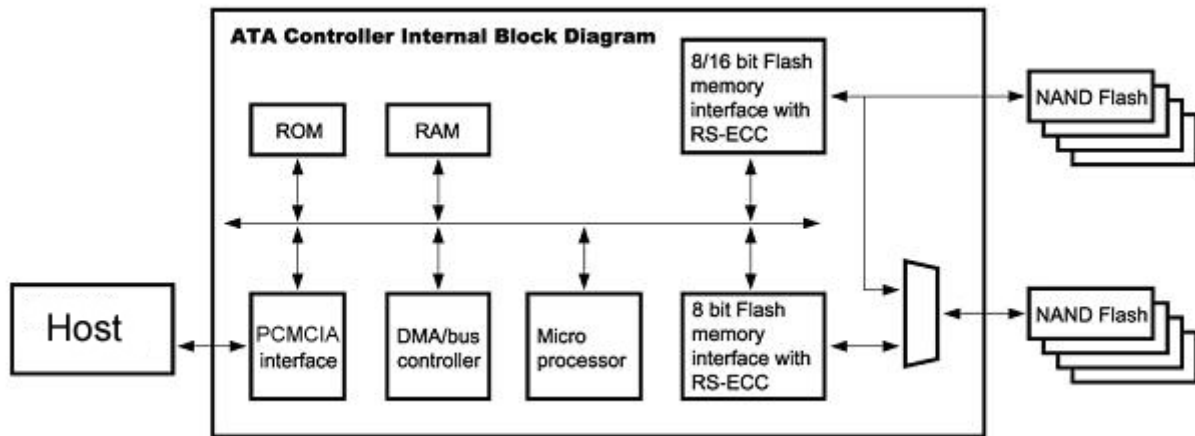
**1. Introduction**

APRO Industrial 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 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. There is also PCMCIA ATA Card by plastic frame-kit for option.

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 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 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
- Rugged metal & Plastic Frame-kit for option.
- 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 0~6, 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  $\pm$  5% / +5V  $\pm$  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 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 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 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<br>(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 0~6, 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  |
|                               | Seq. Read(MB/s)                        | 17.8 | 17.6 | 17.7 | 17.7  | 18.0  | 20.2  | 40.0 | 39.0 | 33.8 | 33.9 |
|                               | Seq. 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*

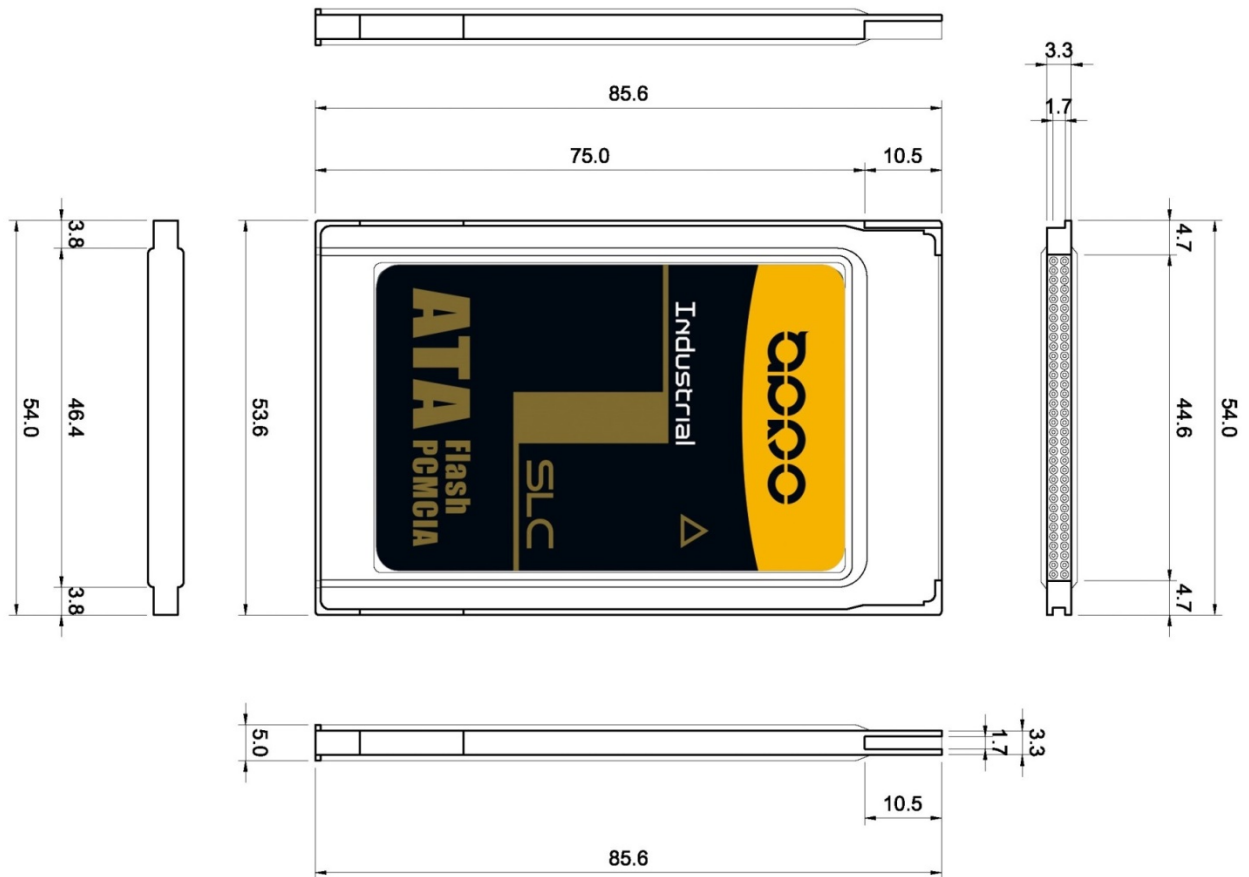
|                                 |  |
|---------------------------------|--|
| <b>Wear-leveling Algorithms</b> | Static Wear-leveling                       |
| <b>Bad Blocks Management</b>    | Supported                                  |
| <b>ECC Technology</b>           | 4 bits per 512 bytes                       |
| <b>Erase counts</b>             | NAND SLC Flash Cell Level : 60K P/E Cycles |
| <b>Data Retention</b>           | 10 years                                   |

**2.5. Physical Specifications**

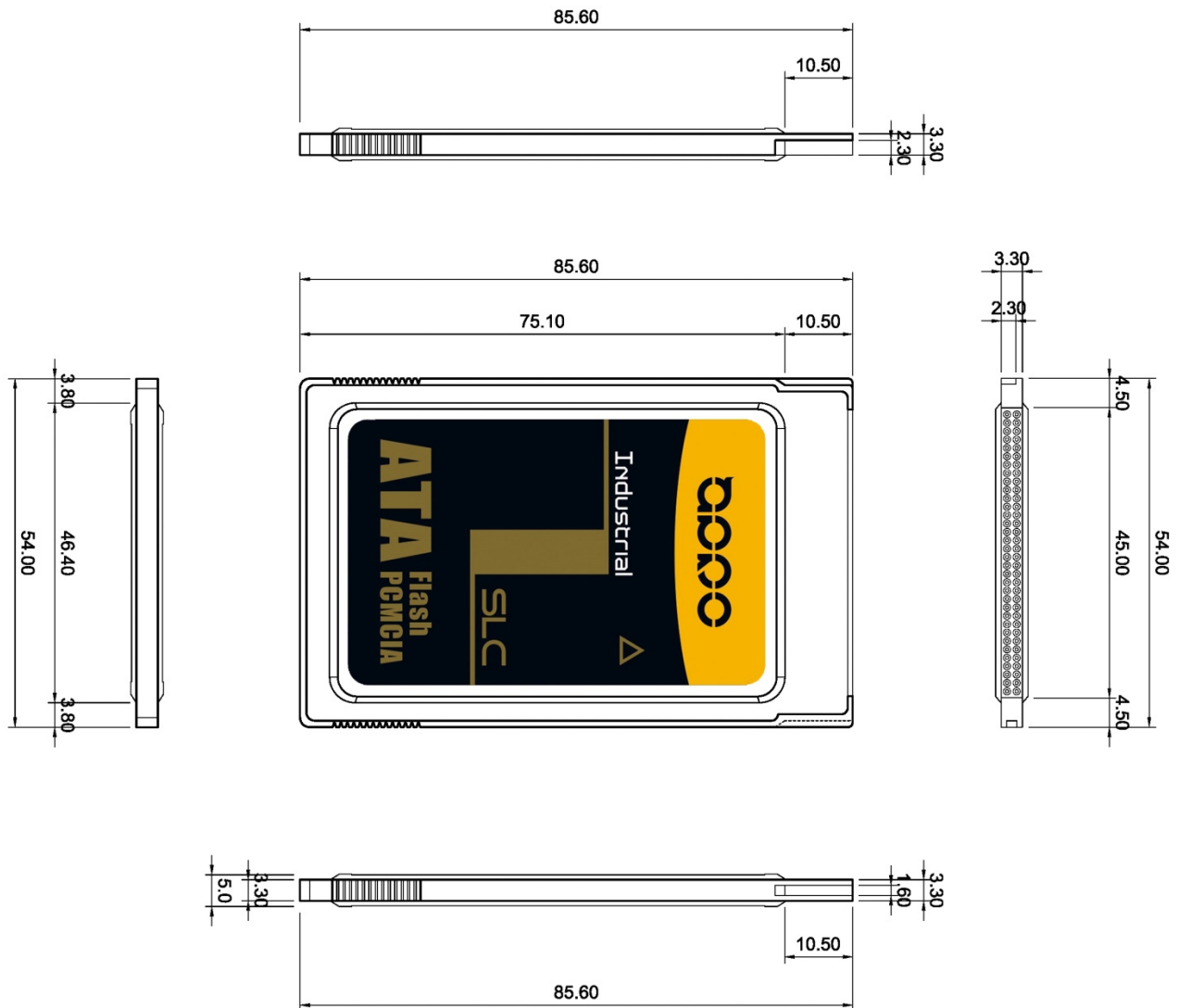
Refer to Table 5 and see Figure 2 for PCMCIA ATA Card HERMIT-A Series physical specifications and dimensions.

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

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



**Plastic Frame-Kit PCMCIA ATA CARD**



**Rugged Metal Frame-Kit PCMCIA ATA CARD**

*Figure 2: APRO 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 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 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 PCMCIA ATA Card 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

|              |       |              |       |
|--------------|-------|--------------|-------|
| <b>016M:</b> | 16MB  | <b>512M:</b> | 512MB |
| <b>032M:</b> | 32MB  | <b>001G:</b> | 1GB   |
| <b>064M:</b> | 64MB  | <b>002G:</b> | 2GB   |
| <b>128M:</b> | 128MB | <b>004G:</b> | 4GB   |
| <b>256M:</b> | 256MB | <b>008G:</b> | 8GB   |

**X11** : Controller

**H** : HERMIT 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-6 mode / fixed disk type

**PR** : PIO-6 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:***

- SLC ( Standard grade )    3 years / Within 60K Erasing Counts
- SLC ( Industrial 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.***