APRO Co., Ltd.

SLC

Industrial CompactFlash® Card

HERMIT-F Series

Document No. : 100-xxCFC-HFTS

Version No. : 02V2

Date : December, 2020

ISO 9001 : 2015 CERTIFIED

Product Features

- **Flash IC**
  - TOSHIBA NAND Flash IC. (KIOXIA)
  - Single-Level Cell (SLC) management technology.

- **Compatibility**
  - CF 6.1 standard compatible.
  - PC-Card 8.0 (PC-Card ATA) standard compatible.
  - PCMCIA specification version 2.1 compatible.
  - ATA-7 standard compatible in True-IDE mode.

- **Additional Capabilities**
  - Fast ATA host-to-buffer transfer rates supporting PIO mode 6, MDMA mode 4, UDMA mode 6 in True-IDE mode
  - 4K Mapping units
  - S.M.A.R.T.[*1] (Self-Monitoring, Analysis and Reporting Technology) feature set support.
  - TRIM maintenance command support.
  - Static, Dynamic, and Global wear leveling algorithm
  - Flexible 96-Bit/1KB BCH ECC engine.
  - Support bad Block Management

- **Mechanical**
  - Standard 50-pin connector consisting of two rows of 25 female contacts.
  - Dimension: 42.8 mm x 36.4 mm x 3.3 mm.
  - Weight:
    Plastic frame-kit: 12g / 0.42 oz.
    Metal frame-kit: 14g / 0.49 oz.

- **Power: Operating Voltage @ 5V(+/-) 10%**
  - Read Mode: 122.0 mA (max.)
  - Write Mode: 131.0 mA (max.)
  - Idle Mode: 4.4.0 mA (max.)

- **Performance (Maximum value) *[2]**
  - Sequential Read: 64.8 MB/sec. (max.)
  - Sequential Write: 55.7 MB/sec. (max.)
  - 4K Random Read: 9.5 MB/sec. (max.)
  - 4K Random Write: 9.3 MB/sec. (max.)

- **Capacity**
  - 16MB, 32MB, 64MB, 128MB, 256MB, 512MB, 1GB, 2GB, 4GB, 8GB, 16GB, 32GB and 64GB

- **Reliability**
  - **TBW:** Up to 451.7 TBW at 64GB Capacity. (Client workload by JESD-219A)
  - **ECC:** Flexible 96-Bit/1KB BCH ECC engine.
  - **MTBF:** > 3,000,000 hours
  - **Temperature:** (Operating)
    Standard Grade: 0ºC ~ +70ºC
    Wide Temp. Grade: -40ºC ~ +85ºC
  - **Vibration:** 70 Hz to 2K Hz, 15G, 3 axes.
  - **Shock:** 0.5ms, 1500 G, 3 axes

- **Certifications and Declarations**
  - **Certifications**: CE & FCC
  - **Declarations**: RoHS & REACH

Remarks:

1. Support official S.M.A.R.T. Utility.

2. Sequential performance is based on CrystalDiskMark 5.1.2 with file size 1000MB

Order Information

I. Part Number List

◆ **APRO SLC Industrial CompactFlash® Card HERMIT-F Series with plastic frame kit**

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	16MB	SPCFC016M-HFCTC-UF	WPCFC016M-HFITI-UF
	32MB	SPCFC032M-HFCTC-UF	WPCFC032M-HFITI-UF
	64MB	SPCFC064M-HFCTC-UF	WPCFC064M-HFITI-UF
	128MB	SPCFC128M-HFCTC-UF	WPCFC128M-HFITI-UF
	256MB	SPCFC256M-HFCTC-UF	WPCFC256M-HFITI-UF
	512MB	SPCFC512M-HFCTC-UF	WPCFC512M-HFITI-UF
	1GB	SPCFC001G-HFCTC-UF	WPCFC001G-HFITI-UF
	2GB	SPCFC002G-HFCTC-UF	WPCFC002G-HFITI-UF
	4GB	SPCFC004G-HFCTC-UF	WPCFC004G-HFITI-UF
	8GB	SPCFC008G-HFCTC-UF	WPCFC008G-HFITI-UF
	16GB	SPCFC016G-HFCTC-UF	WPCFC016G-HFITI-UF
	32GB	SPCFC032G-HFCTC-UF	WPCFC032G-HFITI-UF
	64GB	SPCFC064G-HFCTC-UF	WPCFC064G-HFITI-UF

◆ **APRO SLC Industrial CompactFlash® Card HERMIT-F Series with rugged metal frame kit**

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	16MB	SRCFC016M-HFCTC-UF	WRCFC016M-HFITI-UF
	32MB	SRCFC032M-HFCTC-UF	WRCFC032M-HFITI-UF
	64MB	SRCFC064M-HFCTC-UF	WRCFC064M-HFITI-UF
	128MB	SRCFC128M-HFCTC-UF	WRCFC128M-HFITI-UF
	256MB	SRCFC256M-HFCTC-UF	WRCFC256M-HFITI-UF
	512MB	SRCFC512M-HFCTC-UF	WRCFC512M-HFITI-UF
	1GB	SRCFC001G-HFCTC-UF	WRCFC001G-HFITI-UF
	2GB	SRCFC002G-HFCTC-UF	WRCFC002G-HFITI-UF
	4GB	SRCFC004G-HFCTC-UF	WRCFC004G-HFITI-UF
	8GB	SRCFC008G-HFCTC-UF	WRCFC008G-HFITI-UF
	16GB	SRCFC016G-HFCTC-UF	WRCFC016G-HFITI-UF
	32GB	SRCFC032G-HFCTC-UF	WRCFC032G-HFITI-UF
	64GB	SRCFC064G-HFCTC-UF	WRCFC064G-HFITI-UF

Notes:

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

II. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 – X11 X12 X13 X14 X15 – X17 X18 X19

X1 : **Grade**

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

W: Industrial Grade- operating temp. -40º C ~ +85 º C

X2 : **The material of case**

P : Plastic frame kit

R : Rugged Metal frame kit

X3 X4 X5 : **Product category**

CFC : CompactFlash® Card

X6 X7 X8 X9 : **Capacity**

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

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 (KIOXIA) SLC NAND Flash IC

X15 : **Flash IC grade / Type**

C : Commercial grade

I : Industrial grade

X17 X18 : **Data Transfer Rate**

PF : PIO-6 mode / fixed disk type

PR : PIO-6 mode / removable disk type

UF : Defaulted as UDMA-6 mode / fixed disk type

UR : UDMA-6 mode / removable disk type

AA : PIO/UDMA & fixed/removable disk type auto-detected

X19 : **Reserved for specific requirement**

C : Conformal coating (optional)

Revision History

Revision	Description	Date
1.0	Initial release	2017/11/20
1.1	Update power consumption	2018/08/07
2.0	Updated power consumption & performance	2019/06/06
2.1	Add 64MB Capacity	2020/11/12
2.2	Add 16MB, 32MB,	2020/12/14

Contents

1. Introduction

APRO SLC Industrial CompactFlash® Card HERMIT-F Series provides ULTRA HIGH RANDOM SPEED performance that electrically complies with ATA/ATAPI 7 standard and CF 6.1 standard compatible. APRO SLC Industrial CompactFlash® Card HERMIT-F Series support UDMA-6 with high random write (4K data size) performance. The available disk capacities are 16MB, 32MB, 64MB, 128MB, 256MB, 512MB, 1GB, 2GB, 4GB, 8GB, 16GB, 32GB and 64GB.

The operating temperature grade is optional for standard grade 0°C ~ 70°C and wide temp. grade -40°C ~ +85°C. The data transfer performance by sequential read is up to 64.8 MB/sec, and sequential write is up to 55.7 MB/sec; 4k data random read is up to 9.3 MB/sec, and 4k data random write is up to 9.5 MB/sec.

APRO SLC Industrial CompactFlash® Card HERMIT-F Series products provide a high level interface to the host computer. This interface allows a host computer to issue commands to the SLC Industrial CompactFlash® Card to read or write blocks of memory. Each sector is protected by a flexible 96-Bit/1KB BCH ECC engine. APRO SLC Industrial CompactFlash® Card HERMIT-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 APRO SLC Industrial CompactFlash® Card HERMIT-F Series.

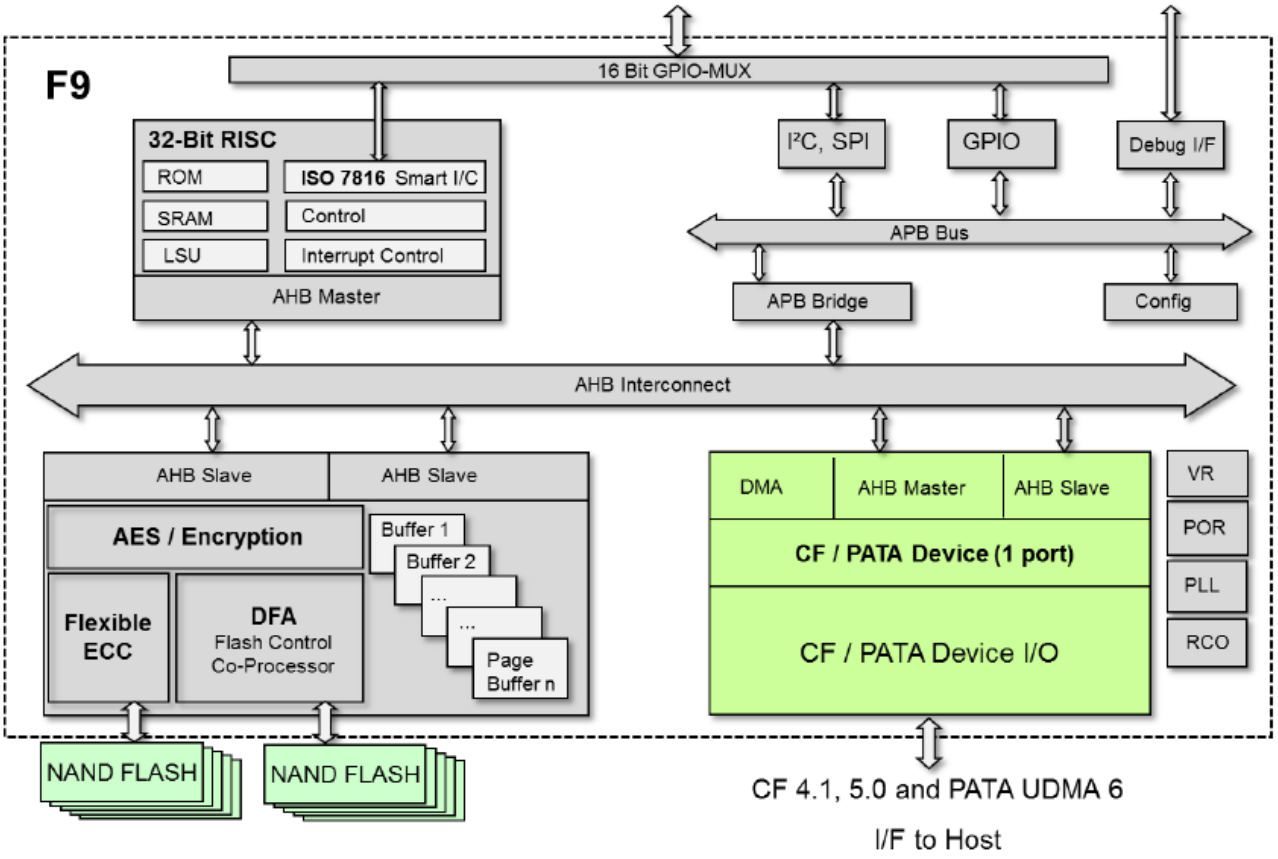

Figure 1: APRO SLC Industrial CompactFlash® Card HERMIT-F Series block diagram

1.1. *Scope*

This document describes features, specifications and installation guide of APRO SLC Industrial CompactFlash® Card HERMIT-F Series.

The appendix provides order information, warranty policy, RMA/DOA procedure for the most convenient reference.

1.2. *Flash Management Technology – Static, Dynamic, and Global Wear leveling*

- **Dynamic:**

Blocks with lowest erase count selected for writing from free block list

- **Static:**

When a block is added to the free list, its erase count is compared to the overall lowest erase count; if the distance is higher than the WL-threshold, data content is swapped (GC) and the block with low erase count moves to the free blocks

- **Global:**

Both dynamic and static WL is global within ILV channel

Done in background, interruptible by host commands

1.3. *Protected against data corruption and failing devices*

- **Sudden Power Fail (SPF) Event**
  - Reset of controller and immediate write protection of flash
  - If the last data written is corrupt, controller recovers latest valid entry
  - If a write operation is active at power loss this data might be lost
- **Transaction-oriented logging of mapping changes**
  - All mapping information is kept in non-volatile storage
  - SLC-aware Power Fail Management
  - Option: Reliable Write of user data
- **Rigorous Testing to ensure functionality**
  - Power Cycling Test
  - Stress Test
  - Regression Test

1.4. *Bad Block Management*

- **Early Bad Block**

The fault block generated during the manufacturing process of NAND Flash is called Early Bad Block.

- **Later Bad Block**

In the process of use, as the number of operations of writing and erasing increases, a fault block is gradually generated, which is called a Latter Bad Block.

Bad block management is a management mechanism for a bad block to be detected by the control IC and mark bad blocks in the NAND Flash and improve the reliability of data access. The bad block management mechanism of the control IC will establish a **Bad Block Table** when the NAND Flash is started for the first time, and will also record the errors found in the process of use in the bad block table, and data is ported to new valid blocks to avoid data loss.

In order to detect the initial bad blocks to handle run time bad blocks, APRO SLC Industrial CompactFlash® Card HERMIT-F Series provides the **Bad Block Management** scheme. It remaps a bad block to one of the reserved blocks so that the data contained in one bad block is not lost and new data writes on a bad block is avoided.

1.5. *Mean Time Between Failure (MTBF)*

1.5.1. Definition

MTBF (Mean time between failures) is defined as failure or maintenance required for the average time including failure detection and maintenance for the device. For a simple and maintainable unit, MTBF = MTTF + MTTR.

MTTF (mean time to failure) is defined as the expectation of random variables for time to failure.

MTTR（**mean time to restoration**） is the expectation of random variables of time required for restoration which includes the time required for confirmation that a failure occurred, as well as the time required for maintenance.

1.5.2. Obtaining MTBF

There are two methods for obtaining MTBF:

A. MTBF software estimation method: by calculating all the MTBF data of all the components included in the bill of material, and the data of the completed products including actual parameters of voltage and electrical current using analysis software, the MTBF of the completed product is estimated.

B. MTBF sample test method: by determining a certain number of samples and a fixed time for testing, using an Arrhenius Model and Coffin-Manson Model to obtain parameters, and then using the formula with the parameters, the longevity and in so the reliability is proved.

Arrhenius Model: **Af = e{ (1/k × Ea (1/273+Tmax – 1/273+Ttest)}**

Coffin-Manson Model: **Af = (ΔTtest/ΔTuse)m**

- **APRO uses the A method to Estimate MTBF**

MTBF is actually obtained by calculation which is just an estimation of future occurrences. The main reason to use the first method is that the data contains the analysis by all the parameters of components and actual parameters of voltage and electrical current of finished products, which is considered adequate and objective.

➢ **Interpretation of MTBF Analysis**

APRO estimates MTBF using a prediction methodology based on reliability data for the individual components in APRO products. The predicted MTBF based on Parts stress analysis Method of Telcordia Special Report SR-332, for components failure rates. Component data comes from several sources: device life tests, failure analysis of earlier equipment, device physics, and field returns.

The Telcordia model is based on the Telcordia document, Reliability Prediction Procedure for Electronic Equipment, Technical Reference SR-332. This standard basically modified the component models in MIL-HDBK-217 to better reflect the failure rates that AT&T Bell Lab equipment was experiencing in the field and was originally developed by AT&T Bell Lab as the Bellcore model.

This model supports different failure rate calculation methods in order to support the taking into account of stress, burn-in, laboratory, or field data. A Parts Count or Parts Stress analysis is included in Telcordia performance. Relex supports Telcordia Issues 1 and 2 and also Bellcore Issues 4, 5, and 6.Telcordia Issue 2, released in September 2006, are supported by Relex and Telcordia Issue 1, released in May 2001, is replaced with Relex. Refer to Telcordia Issue 2 Fields for information about the fields in Relex Reliability Studio specific to Telcordia Issue 2.

➢ **Purpose of the analyses**

The purpose of these analyses is to obtain early estimation of device reliability during engineering and customer validation stages. The prediction results will expose the reliability of whole assembly, viewed as a set of serially connected electronic components. Rating of the assembly electronic components will show the ratio between actual critical elements parameters and their specification limits. The purpose of component rating is to improve a product's inherent design reliability, increase its number of operating times, and to reduce warranty costs and to achieve a more robust design.

1.5.3. Definitions

Term	Definition
Failure	The event, or inoperable state, in which any item or part of an item does not, or would not, perform as previously specified.
Failure rate	The total number of failures within an item population, divided by the total number of life units expended by that population, during a particular measurement interval under stated condition.
FIT	Failures In Time: the number of failures in 1 billion hours.
PPM	Part per million: the number of failures in 1 million hours.
Mean Time Between Failures (MTBF)	A basic measure of reliability for repairable items: The mean number of life units during which all parts of the item perform within their specified limits, during a particular measurement interval under stated conditions..
GB	Ground, Fixed, Controlled: Nearly zero environmental stress with optimum engineering operation and maintenance. Typical applications are central office, environmentally controlled vaults, environmentally controlled remote shelters, and environmentally controlled customer premise area.
GF	Ground, Fixed, Uncontrolled: Some environmental stress with limited maintenance. Typical applications are manholes, poles, remote terminals, and customer premise areas subject to shock, vibration, temperature, or atmospheric variations.

- **Software & Database**

  Analysis Software & Analysis Method

  Software Name : Relex Reliability Studio 2008

  Software Version : Relex Studio 2008

  Analysis Method

  The prediction method used was Telcordia SR-332, Issue 2,

  Parts Count

  Failure rate ($\boldsymbol{\lambda}$) = 10^9 hours (FITs)

  MTBF=1/$\boldsymbol{\lambda}$

  $\boldsymbol{\lambda}_{SSi} = \boldsymbol{\lambda}_{Gi}\ \mathbf{TT}_{Qi}\mathbf{TT}_{Si}\mathbf{TT}_{Ti}$

  Where $\boldsymbol{\lambda}_{Gi}$: Generic steady-state failure rate for device i

  $\mathbf{TT}_{Qi}$: Quality factor for device i

  $\mathbf{TT}_{Si}$: Stress factor for device i

  $\mathbf{TT}_{Ti}$: Temperature factor for device i

- **Calculation Parameter**

  Operation Temperature : 25℃

  Environment : Ground Benign, Controlled

  Operation Stress : 50% (Voltage, Current, Power)

  Method : Method I, Case 3

Products are advertised with MTBF up to 1 million hours in the market. Take one million hours as an example, the product's estimated life is 114 years. However, the current rapid progress of technology, advancement of flash storage device's manufacturing process research and development, and the supply period of former flash IC manufacturing processes are crucial to the actual life expectancy of flash products. In short, the MTBF of flash storage is for reference only. Good customer service and technical support provided by manufacturers is the most significant issue regarding to the life-span of products.

Remark:

All the details of testing and data are for reference only and do not imply any products performance as a result. MTBF is only an estimated date and is depends on both hardware and software. User shall not assume that all the products have the same MTBF as APRO estimates.

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 SLC Industrial CompactFlash® Card HERMIT-F Series		Standard Grade	Industrial Grade
		SxCFCxxxG-HFCTC-U	WxCFCxxxG-HFITI-U
Temperature	**Operating:**	0ºC ~ +70ºC	-40ºC ~ +85ºC
	Non-operating:	-20ºC ~ +80ºC	-50ºC ~ +95ºC
Humidity	**Operating & Non-operating:**	10% ~ 95% non-condensing	
Vibration	**Operating & Non-operating:**	70 Hz to 2K Hz, 15G, 3 axes	
Shock	**Operating & Non-operating:**	0.5ms, 1500 G, 3 axes	

2.2. System Power Requirements

Table 2: Power Requirement

APRO SLC Industrial CompactFlash® Card HERMIT-F Series	
DC Input Voltage (VCC) +5V ± 10% or +3.3V ± 10%	Operating @ +5V ± 10%
Reading Mode :	122.0 mA (max.)
Writing Mode :	131.0 mA (max.)
Idle Mode :	4.4 mA (max.)

2.3. *System Performance*

Table 3: System Performances

Data Transfer Mode	PIO 2~6, MWDMA 0~4, UDMA 0~6 supported												
Random Write Access Time	0.4 ms (64GB)												
Capacity	**16MB**	**32MB**	**64MB**	**128MB**	**256MB**	**512MB**	**1GB**	**2GB**	**4GB**	**8GB**	**16GB**	**32GB**	**64GB**
Sequential Read (MB/s)	24.9	24.9	24.9	24.9	29.3	32.2	63.7	63.6	64.4	64.5	64.8	64.6	64.8
Sequential Write(MB/s)	5.9	5.9	5.9	5.9	11.8	21.0	33.2	34.8	44.9	44.9	57.1	59.5	55.7
4K Random Read (MB/s)	9.8	9.8	9.8	9.8	10.4	10.2	10.7	9.9	9.9	9.9	9.5	9.4	9.5
4K Random Write(MB/s)	3.4	3.4	3.4	3.4	5.6	7.3	9.2	7.8	9.0	9.0	9.3	9.3	9.3

Note: The performance was measured using CrystalDiskMark by file size 500MB (QD32).

2.4. *System Reliability*

Table 4: System Reliability

Wear-leveling Algorithms	Static, Dynamic, and Global wear-leveling algorithms
Bad Blocks Management	Supported
ECC Technology	Flexible 96-Bit/1KB BCH ECC engine
Erase counts	NAND SLC Flash Cell Level : 60K P/E Cycles
Capacity	**TBW(TB)**
16MB	1.0
32MB	1.0
64MB	1.0
128MB	1.0
256MB	2.2
512MB	3.9
1GB	8.0
2GB	16.1
4GB	31.3
8GB	56.1
16GB	112.6
32GB	225.6
64GB	451.7

Note:

- *Samples were built using Toshiba(KIOXIA) SLC NAND flash.*
- *Client workload by JESD-219A.*
- *The endurance of SSD could be estimated based on user behavior, NAND endurance cycles, and write amplification factor. It is not guaranteed by flash vendor.*

2.5. *Physical Specifications*

Refer to Table 5 and see Figure 3 for APRO SLC Industrial CompactFlash® Card HERMIT-F Series physical specifications and dimensions.

Table 5: Physical Specifications of APRO SLC Industrial CompactFlash® Card-HERMIT-F Series

Length:	36.40 mm
Width:	42.80 mm
Thickness:	3.3 mm
Weight:	**Plastic frame-kit:** 12g / 0.42 oz. **Metal frame-kit:** 14g / 0.49 oz.

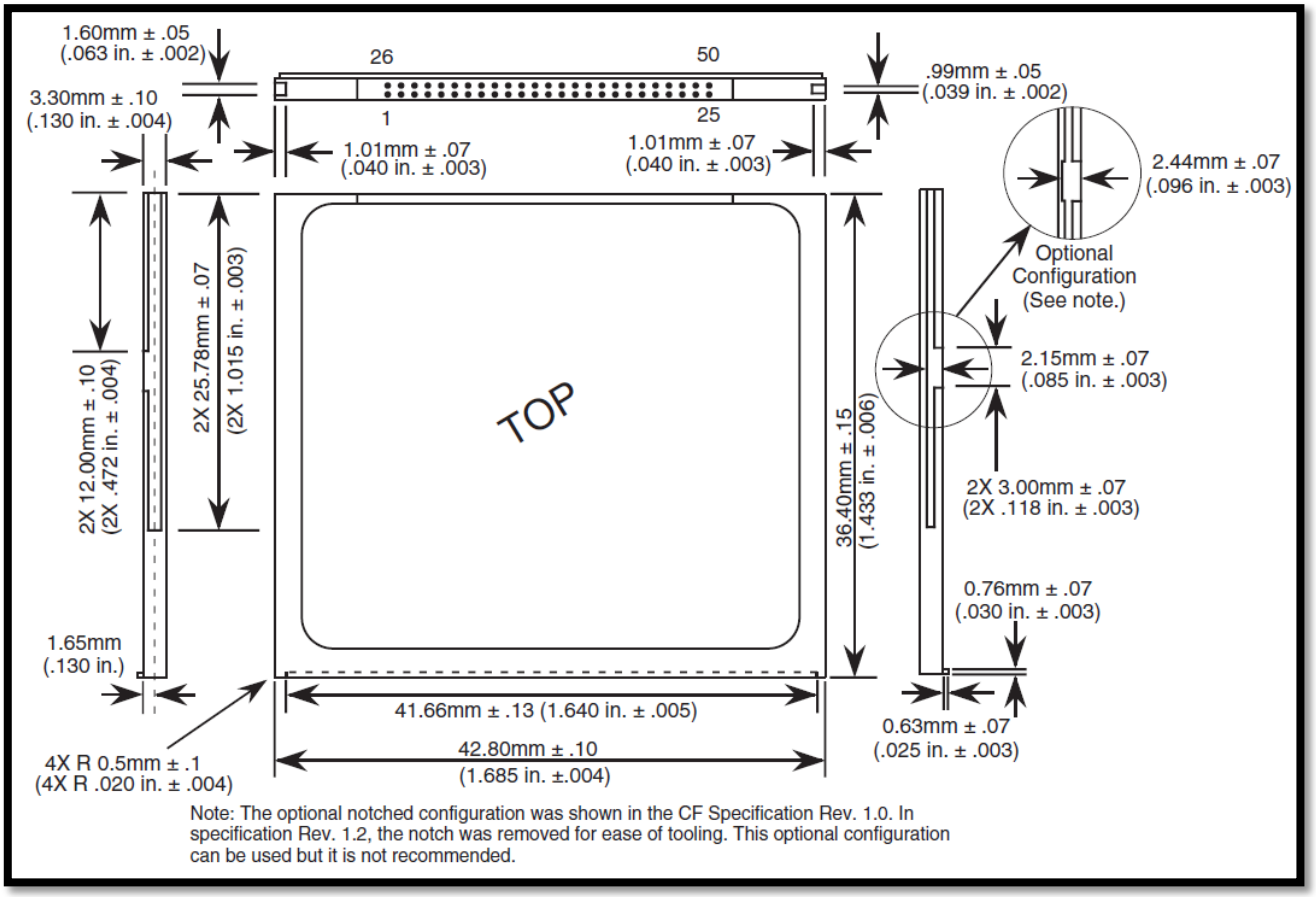

Figure 3: APRO SLC Industrial CompactFlash® Card Dimension

2.6. *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 use MIL-I-46058C silicon conformal coating

2.7. *Device Parameter*

The table 6 shows the specific capacity for the various models and the default number of heads, sectors/track and cylinders.

Table 6: Device Parameter of APRO SLC Industrial CompactFlash® Card HERMIT-F Series

Unformatted Capacity	Cylinder	Head	Sector	LBA Total Sectors
16MB	248	4	32	31,744
32MB	500	8	16	64,000
64MB	500	8	32	112,000
128MB	488	16	32	249,856
256MB	958	16	32	490,496
512MB	975	16	63	982,800
1GB	1,950	16	63	1,965,600
2GB	3,897	16	63	3,928,176
4GB	7,773	16	63	7,835,184
8GB	15,525	16	63	15,649,200
16GB	16,383	16	63	31,277,232
32GB	16,363	16	63	62,533,296
64GB	16,383	15	63	125,045,424

3. Interface Description

3.1. CF Card interface (CompactFlash® Type I)

APRO SLC Industrial CompactFlash® Card HERMIT-F Series equipped Standard 50-pin connector consisting of two rows of 25 female contacts.

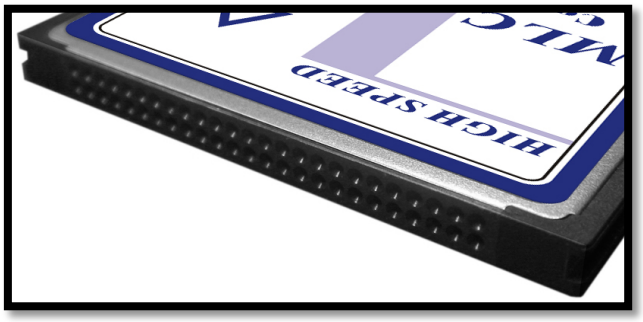

Figure 3: 50-pin CompactFlash® Type I Connector

3.2. Pin Assignments

Signals whose source is the host is designated as inputs while signals that the CompactFlash® (CF) Card sources are outputs. The pin assignments are listed in below table 7. The signal/pin assignments are listed in below Table 7. Low active signals have a "-" prefix. Pin types are Input, Output or Input/Output.

Table 7 - Pin Assignments of APRO SLC Industrial CompactFlash® Card-HERMIT-F Series

True IDE Mode[4]			
Pin Num.	**Signal Name**	**Pin Type**	**In, Out Type**
1	GND		Ground
2	D03	I/O	11Z,OZ3
3	D04	I/O	11Z,OZ3
4	D05	I/O	11Z,OZ3
5	D06	I/O	11Z,OZ3
6	D07	I/O	11Z,OZ3
7	-CS0	I	13Z
8	A10[2]	GND	Ground
9	-ATA SEL	GND	Ground
10	A09[2]	GND	Ground
11	A08[2]	GND	Ground
12	A07[2]	GND	Ground
13	VCC		Power
14	A06[2]	GND	Ground
15	A05[2]	GND	Ground
16	A04[2]	GND	Ground
17	A03[2]	GND	Ground

True IDE Mode[4]			
Pin Num.	**Signal Name**	**Pin Type**	**In, Out Type**
18	A02	I	11Z
19	A01	I	11Z
20	A00	I	11Z
21	D00	I/O	11Z,OZ3
22	D01	I/O	11Z,OZ3
23	D02	I/O	11Z,OZ3
24	-IOCS16	NC	ON3
25	-CD2	GND	Ground
26	-CD1	GND	Ground
27	D11[1]	I/O	11Z,OZ3
28	D12[1]	I/O	11Z,OZ3
29	D13[1]	I/O	11Z,OZ3
30	D14[1]	I/O	11Z,OZ3
31	D15[1]	I/O	11Z,OZ3
32	-CS1[1]	I	13Z
33	-VS1	GND	Ground
34	-IORD[7]	I	13Z
	HSTROBE[8]		
	-HDMARDY[9]		
35	-IOWR[7]	I	13Z
	STOP[8.9]		
36	-WE[3]	I	13U
37	INTRQ	O	OZ1
38	VCC		Power
39	-CSEL	I	12U
40	-VS2	NC	OPEN
41	-RESET	I	12Z
42	IORDY[7]	O	ON1
43	DMARQ	O	OZ1
44	-DMACK[6]	I	13U
45	-DASP	I/O	11U,ON1
46	-PDIAG	I/O	11U.ON1
47	D08[1]	I/O	11Z,OZ3
48	D09[1]	I/O	11Z,OZ3
49	D10[1]	I/O	11Z,OZ3
50	GND		Ground

Appendix A: Limited Warranty

APRO warrants your SLC Industrial CompactFlash® Card HERMIT-F Series 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**

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