



# Industrial micro USB Module

## HERMIT-C Series

### **Product Specification**

INDUSTRIAL

micro USB Module

Version 01V0

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#### Revision History

<b>Revision</b>	<b>Description</b>	<b>Date</b>
1.0	Initial release	2016/01/14
1.1	HS Type dimension correction.	2016/06/20

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## **1. Introduction**

APRO Industrial micro USB Module (MUM) HERMIT-C Series, is specified as 2.0 High Speed Device, Mass Storage Class; USB-IF (USB Implementers Forum), WHQL (Window Hardware Quality Labs). In addition to being as a removable storage device, APRO MUM HERMIT-C Series can also be configured as a bootable disk for system recovery. Also, its random access performance exceed the minimum requirement of Windows/Linux/VxWorks/QNX Embedded operating system, in which randomly access blocks of information are saved into MUM for boosting up the average performance. They are available in 128MB, 256MB, 512MB, 1GB, 2GB, 4GB, 8GB, 16GB and 32GB capacities by Toshiba SLC Flash IC..

### **1.1. Scope**

This document describes the key features and specifications of APRO MUM HERMIT-C Series.

### **1.2. System Features**

- Full metal enclosure design to endure various rough environments
- Ultra-high random read performance up to 4.9MB/sec.(max)
- Ultra-high random write performance up to 3.9MB/sec.(max)
- USB 2.0 Mass Storage compliant, and downwards compatible to USB 1.1
- Standard grade operating temperature 0°C to 70°C, and Industrial Grade, -40°C to +85°C
- S.M.A.R.T. feature support
- Flexible 96-Bit/1KB BCH ECC engine
- Capacities from 128MB to 32GB

### **1.3. Flash Management Technology - Static Wear Leveling**

In order to gain the best management for flash memory, APRO MUM HERMIT-C 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.

### 3. Product Specifications

For all the following specifications, values are defined at ambient temperature and nominal supply voltage unless otherwise stated.

#### 3.1. System Environmental Specifications

Table 1: Environmental Specification

APRO MUM HERMIT-C Series		Standard Grade	Industrial Grade
		SBMUMxxxG-HCCTC-xx	WBMUMxxxG-HCITI-xx
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	

#### 3.2. System Power Requirements

Table 2: Power Requirement

APRO MUM HERMIT-C Series		Power Requirement
DC Input Voltage (VCC)		5V±10%
+5V Current (Maximum average value)	Reading Mode :	83.4mA (max.)
	Writing Mode :	77.2 mA (max.)
	Idle Mode :	35.2 mA (max.)

#### 3.3. System Performance

Table 3: System Performances

Data Transfer Mode supporting		USB 2.0								
Average Access Time		1.1 ms (estimated)								
Maximum Performance (MB/s)	Capacity	128MB	256MB	512MB	1GB	2GB	4GB	8GB	16GB	32GB
	Sequential Read	9.6	10.5	18.1	22.5	22.6	22.6	25.2	25.4	25.5
	Sequential Write	4.9	5.2	14.5	12.8	12.7	13.2	18.2	18.0	18.5
	Random Read	3.4	3.4	4.6	4.3	3.9	3.7	4.8	4.9	4.9
	Random Write	1.6	1.6	3.4	3.1	2.9	3.0	3.8	3.9	3.9

Note:

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

(2). Testing of the MUM maximum performance was performed under the following platform:

- Computer with Intel i5 3.5GHz processor
- Windows 7 Professional operating system

### 3.5. System Reliability

Table 4: System Reliability

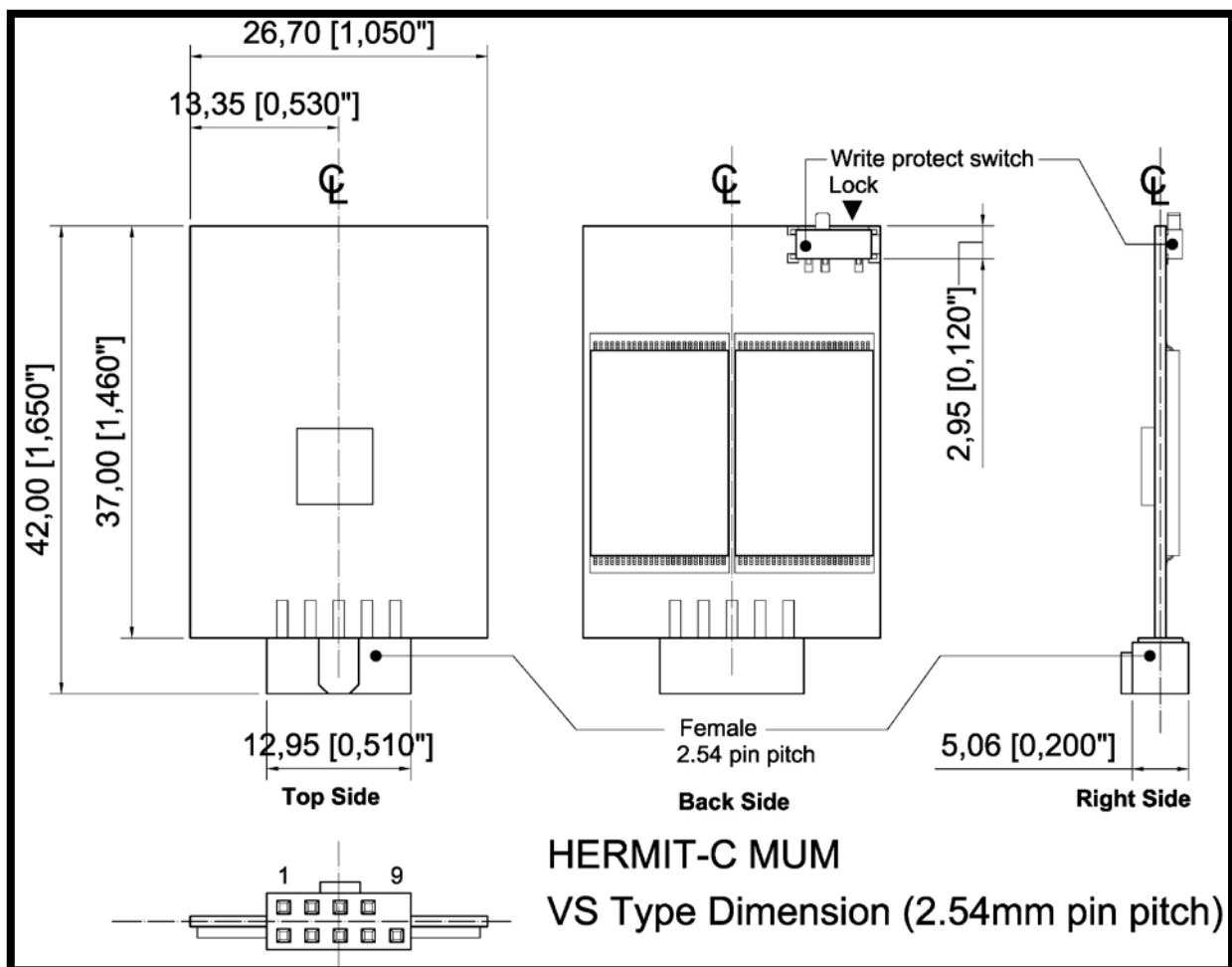
<b>Wear-leveling Algorithms</b>	Static Wear-leveling
<b>Bad Blocks Management</b>	Supportive
<b>ECC Technology</b>	96 bits per 1024 bytes
<b>Endurance</b>	Un-limited Read Cycles Endurance Management enables five years minimal useful life
<b>Data Retention</b>	10 years

### 3.6. Physical Specifications

Refer to Table 5 and see Figure 1 for APRO MUM HERMIT-C Series physical specifications and dimensions.

Table 5: Physical Specifications of APRO MUM HERMIT-C Series

<b>Form factor:</b>	HS & HL Type	VS Type
<b>Length:</b>	37.0 mm	42.0
<b>Width:</b>	26.7 mm	26.7
<b>Weight:</b>	10 g / 0.35 oz	



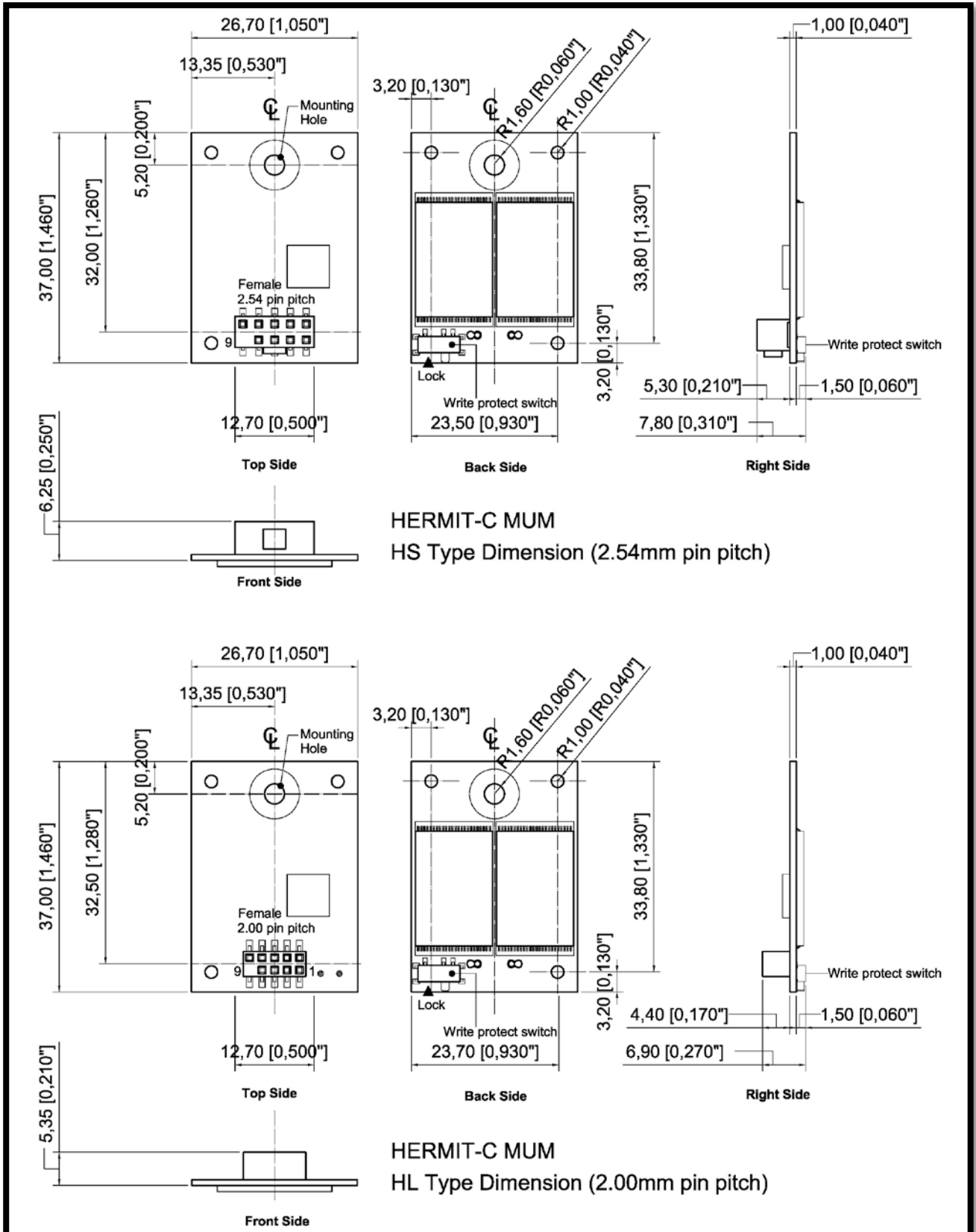


Figure 1: APRO MUM Generation 3L Dimension

### 3.6.1. 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

## 4. Interface Description

### 4.1. APRO MUM Interface

APRO MUM is equipped with standard USB 10 pins female connector.

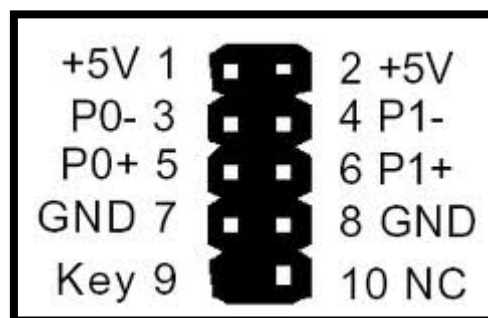


Figure 2: USB 10 pins female connector

### 4.2. Pin Assignments

There are total of USB 10 pins female Connector. The pin assignments are listed in below table 6.

Table 6 - Pin Assignments


Horizontal Type			
Pin Number	Signal	Pin Number	Signal
Pin 1	+5VDC	Pin 2	NC
Pin 3	USB -	Pin 4	NC
Pin 5	USB +	Pin 6	NC
Pin 7	GND	Pin 8	NC
Pin 9	NC	Pin 10	NC



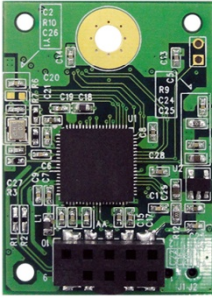
Appendix A: Ordering Information

1. Part Number List


◆ APRO Micro USB Flash Module Vertical Standard – HERMIT-C Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	128MB	SBMUM128M-HCCTC-VS(/C)	WBMUM128M-HCITI-VS(/C)
	256MB	SBMUM256M-HCCTC-VS(/C)	WBMUM256M-HCITI-VS(/C)
	512MB	SBMUM512M-HCCTC-VS(/C)	WBMUM512M-HCITI-VS(/C)
	1GB	SBMUM001G-HCCTC-VS(/C)	WBMUM001G-HCITI-VS(/C)
	2GB	SBMUM002G-HCCTC-VS(/C)	WBMUM002G-HCITI-VS(/C)
	4GB	SBMUM004G-HCCTC-VS(/C)	WBMUM004G-HCITI-VS(/C)
	8GB	SBMUM008G-HCCTC-VS(/C)	WBMUM008G-HCITI-VS(/C)
	16GB	SBMUM016G-HCCTC-VS(/C)	WBMUM016G-HCITI-VS(/C)
	32GB	SBMUM032G-HCCTC-VS(/C)	WBMUM032G-HCITI-VS(/C)

◆ APRO Micro USB Flash Module Horizontal Standard – HERMIT-C Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	128MB	SBMUM128M-HCCTC-HS(/C)	WBMUM128M-HCITI-HS(/C)
	256MB	SBMUM256M-HCCTC-HS(/C)	WBMUM256M-HCITI-HS(/C)
	512MB	SBMUM512M-HCCTC-HS(/C)	WBMUM512M-HCITI-HS(/C)
	1GB	SBMUM001G-HCCTC-HS(/C)	WBMUM001G-HCITI-HS(/C)
	2GB	SBMUM002G-HCCTC-HS(/C)	WBMUM002G-HCITI-HS(/C)
	4GB	SBMUM004G-HCCTC-HS(/C)	WBMUM004G-HCITI-HS(/C)
	8GB	SBMUM008G-HCCTC-HS(/C)	WBMUM008G-HCITI-HS(/C)
	16GB	SBMUM016G-HCCTC-HS(/C)	WBMUM016G-HCITI-HS(/C)
	32GB	SBMUM032G-HCCTC-HS(/C)	WBMUM032G-HCITI-HS(/C)

◆ APRO Micro USB Flash Module Horizontal Low Profile – HERMIT-C Series

Product Picture	Grade	Standard grade (0°C ~ 70°C)	Industrial Grade (-40°C ~ +85°C)
	128MB	SBMUM128M-HCCTC-HL(/C)	WBMUM128M-HCITI-HL(/C)
	256MB	SBMUM256M-HCCTC-HL(/C)	WBMUM256M-HCITI-HL(/C)
	512MB	SBMUM512M-HCCTC-HL(/C)	WBMUM512M-HCITI-HL(/C)
	1GB	SBMUM001G-HCCTC-HL(/C)	WBMUM001G-HCITI-HL(/C)
	2GB	SBMUM002G-HCCTC-HL(/C)	WBMUM002G-HCITI-HL(/C)
	4GB	SBMUM004G-HCCTC-HL(/C)	WBMUM004G-HCITI-HL(/C)
	8GB	SBMUM008G-HCCTC-HL(/C)	WBMUM008G-HCITI-HL(/C)
	16GB	SBMUM016G-HCCTC-HL(/C)	WBMUM016G-HCITI-HL(/C)
	32GB	SBMUM032G-HCCTC-HL(/C)	WBMUM032G-HCITI-HL(/C)

### 3. 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**: Industrial Grade- operating temp. -40° C ~ +85 ° C

**X2** : The material of case

**B** : Bare

**X3 X4 X5** : Product category

**MUM** : micro USB 2.0 Flash Module

**X6 X7 X8 X9** : Capacity

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

**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

**Y1 Y2** : Form Factor – MUM only

**VS** : Vertical type Standard form factor

**HS** : Horizontal type Standard form factor

**HL** : Horizontal type Low Profile form factor

**C** : Reserved for specific requirement

**C** : Conformal-coating

### **Appendix B: Limited Warranty**

APRO warrants your MUM 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:**

- SBMUMxxxx-HCCTC-xx(/C)      3 years



- WBMUMxxxx-HCITI-xx(/C)      5 years



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