APRO Co., Ltd.

Industrial micro USB Module

HERMIT-C Series

Product Specification

MLC

micro USB Module

Version 01V1

Document No. 100-xBMUM-HCTM

October, 2017

APRO CO., LTD.

Phone: +88628226-1539

Fax: +88628226-1389

Revision History

Revision	Description	Date
1.0	Initial release	2016/04/25
1.1	Add. 128GB Capacity	2017/10/25

CONTENTS

1. Introduction

APRO MLC 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 MLC 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 4GB, 8GB, 16GB, 32GB, 64GB and 128GB capacities by Toshiba MLC Flash IC..

1.1. *Scope*

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

1.2. *System Features*

- Full metal enclosure design to endure various rough environments
- Ultra-high random read performance up to 5.7MB/sec.(max)
- Ultra-high random write performance up to 3.7MB/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 wide temp. grade -40°C to +85°C
- S.M.A.R.T. feature support
- Flexible 96-Bit/1KB BCH ECC engine
- Capacities from 4GB to 128GB

1.3. *Flash Management Technology - Static Wear Leveling*

In order to gain the best management for flash memory, APRO MLC 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.

2.

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 MLC MUM HERMIT-C Series		Standard Grade	Wide Temp Grade
		SBMUMxxxG-HCCTMB-xx	WBMUMxxxG- HCCTMB-xx/C
Temperature	Operating: Non-operating:	0ºC ~ +70ºC -20ºC ~ +80ºC	-40ºC ~ +85ºC -50ºC ~ +95ºC
Humidity	Operating & Non-operating:	85% / 95% RH None-Operating	
Vibration	Operating & Non-operating:	70 Hz to 2K Hz, 15G, 3 axes	
Shock	Operating & Non-operating:	0.5ms, 1500 G, 3 axes	

3.2. *System Power Requirements*

Table 2: Power Requirement

APRO MLC MUM HERMIT-C Series		Power Requirement
DC Input Voltage (VCC)		5V±10%
+5V Current (Maximum average value)	Reading Mode :	75.5mA (max.)
	Writing Mode :	92.6mA (max.)
	Idle Mode :	37.9mA (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	4GB	8GB	16GB	32GB	64GB	128GB
	Sequential Read	29.2	28.6	28.1	28.8	28.8	28.8
	Sequential Write	11.0	11.3	19.0	19.0	19.0	19.0
	Random Read	5.7	5.6	5.5	5.5	5.5	5.5
	Random Write	3.5	3.7	3.6	3.7	3.6	3.6

Note:

(1). All values quoted are typically at 25℃ 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

3.4.

3.5. *System Reliability*

Table 4: System Reliability

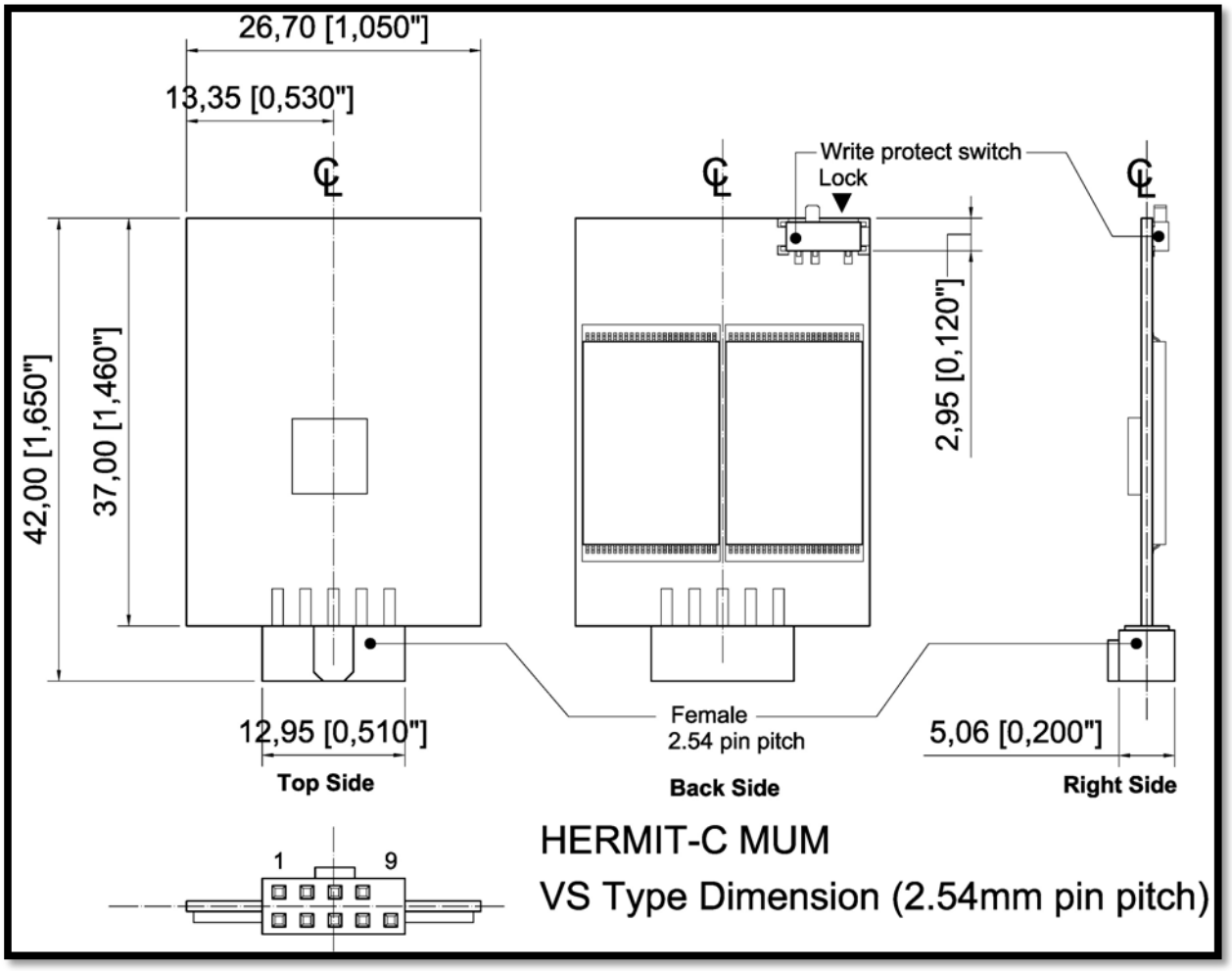
Wear-leveling Algorithms	Static Wear-leveling
Bad Blocks Management	Supportive
ECC Technology	96 bits per 1K bytes
Endurance	Un-limited Read Cycles Endurance Management enables five years minimal useful life
Data Retention	10 years

3.6. *Physical Specifications*

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

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

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



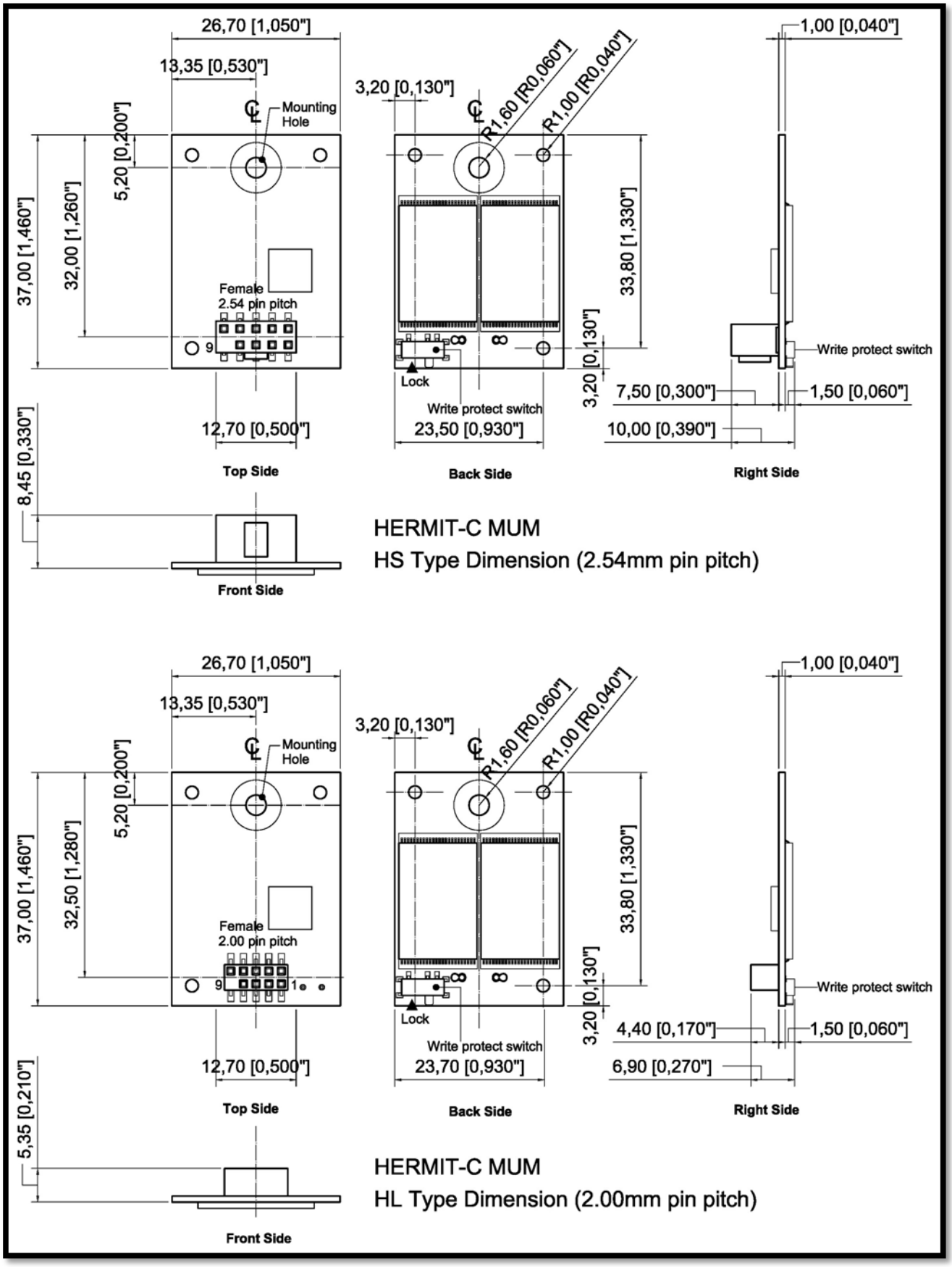


Figure 1: APRO MLC MUM Generation 3L Dimension

3.6.1.

3.6.2. 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

4. Interface Description

4.1. *APRO MLC MUM Interface*

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

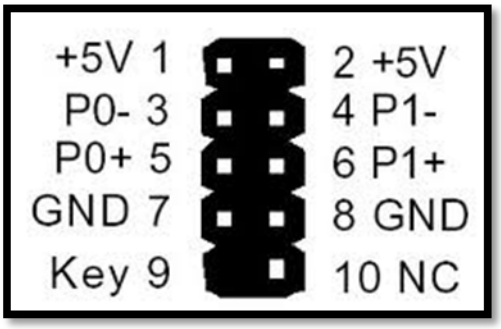


Figure 2: USB 10 pins female connector

4.2. *Pin Assignments*

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

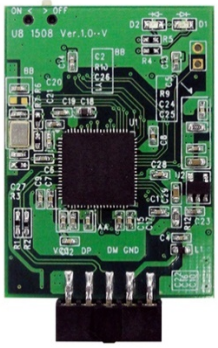
Table 6 - Pin Assignments

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

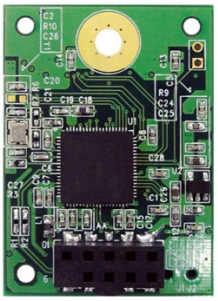
Appendix A: Ordering Information

1. Part Number List

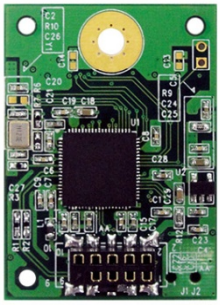
◆ **APRO Micro USB Flash Module Vertical Standard – HERMIT-C Series**

Product Picture	*Grade*	*Standard grade (0ºC ~ 70ºC)*	Wide Temp Grade *(-40ºC ~ +85ºC)*
	*4GB*	SBMUM004G-HCCTMB-VS	WBMUM004G-HCCTMB-VS/C
	8GB	SBMUM008G-HCCTMB-VS	WBMUM008G-HCCTMB-VS/C
	16GB	SBMUM016G-HCCTMB-VS	WBMUM016G-HCCTMB-VS/C
	32GB	SBMUM032G-HCCTMB-VS	WBMUM032G-HCCTMB-VS/C
	64GB	SBMUM064G-HCCTMB-VS	WBMUM064G-HCCTMB-VS/C
	128GB	SBMUM128G-HCCTMB-VS	WBMUM128G-HCCTMB-VS/C

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

Product Picture	*Grade*	*Standard grade (0ºC ~ 70ºC)*	Wide Temp Grade *(-40ºC ~ +85ºC)*
	*4GB*	SBMUM004G-HCCTMB-HS	WBMUM004G-HCCTMB-HS/C
	8GB	SBMUM008G-HCCTMB-HS	WBMUM008G-HCCTMB-HS/C
	16GB	SBMUM016G-HCCTMB-HS	WBMUM016G-HCCTMB-HS/C
	32GB	SBMUM032G-HCCTMB-HS	WBMUM032G-HCCTMB-HS/C
	64GB	SBMUM064G-HCCTMB-HS	WBMUM064G-HCCTMB-HS/C
	128GB	SBMUM128G-HCCTMB-HS	WBMUM128G-HCCTMB-HS/C

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

Product Picture	*Grade*	*Standard grade (0ºC ~ 70ºC)*	Wide Temp Grade *(-40ºC ~ +85ºC)*
	*4GB*	SBMUM004G-HCCTMB-HL	WBMUM004G-HCCTMB-HL/C
	8GB	SBMUM008G-HCCTMB-HL	WBMUM008G-HCCTMB-HL/C
	16GB	SBMUM016G-HCCTMB-HL	WBMUM016G-HCCTMB-HL/C
	32GB	SBMUM032G-HCCTMB-HL	WBMUM032G-HCCTMB-HL/C
	64GB	SBMUM064G-HCCTMB-HL	WBMUM064G-HCCTMB-HL/C
	128GB	SBMUM128G-HCCTMB-HL	WBMUM128G-HCCTMB-HL/C

2.

3. Part Number Decoder:

X1 X2 X3 X4 X5 X6 X7 X8 X9 — X11 X12 X13 X14 X15 X16 — Z1 Z2 — C

X1 : **Grade**

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

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

(Standard grade with conformal coating)

X2 : **The material of case**

B : Bare

X3 X4 X5 : **Product category**

MUM : micro USB 2.0 Flash Module

X6 X7 X8 X9 : **Capacity**

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

X11 : **Controller**

H: HERMIT Series

X12 : Controller version

A, B, C…..

X13 : **Controller Grade**

C : Commercial grade

X14 : **Flash IC**

T : Toshiba Flash IC

X15 : **Flash IC grade / Type**

M : MLC grade

X16 : **Generation**

B : 15nm

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:

- **MLC (Standard grade / Wide temp. grade) 2 years / Within 3K Erasing Counts**

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