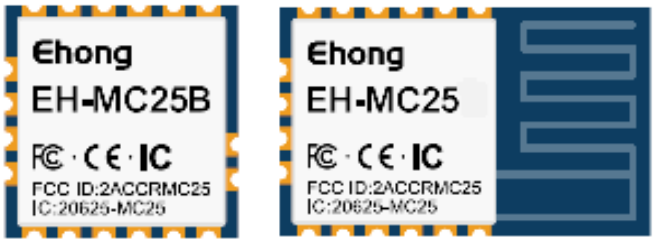
Ehong

Bluetooth Low Energy 5.2 And 2.4G Wireless MCU IoT Module

high performance, high security, multi-protocol 2.4G and BLE



EH-MC25

AIoT Module Datasheet
BLE 5.2 And 2.4G

Feb 2023 Ver 1.1

Professional *AIoT* Solution Provider

Note：
Check the link or QR code to make sure that you use the latest version of this document:
http://api.ehlink.com.cn:9527/public/EH-MC25 datasheet_V1.1.pdf

1、Module Overview

1.1 Features

ITEM	SPECIFICATION	
Microcontroller	ARM Cortex-M0+ CPU (Maximum 40MHz) • Serial flash controller with 8kB 4-way cache • 104kB SRAM, 272kB ROM • 64B EFuse • 4M Flash	
Standards	• Low Energy (BLE) compliant to Bluetooth SIG v5.2 • 2.4G proprietary features	
BLE Radio	Tx Power • -20dBm—7.5dBm Rx Sensitivity • 2Mbps:-94dBm • 1Mbps:-97dBm	Active Tx Power • RX mode: 5.3mA • Active TX mode:4.1mA@-20dBm • Active TX mode:5.9mA@0dBm • Active TX mode:6.8mA@4dBm • Active TX mode:13.1mA@7.5dBm • Advertising: 16.5uA (adv_interval:1s, payload: 23Byters, 0dBm)
Power Consumption	Power Down: 1.9uA	Deep LPS: 3.9uA
Peripherals	• 11 x GPIO(mux'ed) • 1 x SPI(master or slave) • 2 x I2C(master) • 1 x I2S/PCM	• 8 x Timers • 8 x PWM • 2 x UART • 2 x ADC (400kbps, 10-bit)
Voltage	Input voltage:1.8V~3.6V, 3.3V (typical)	
Environmental	Temperature: • Operating: 0° C ~ 85° C • Storage: -55° C ~ 150° C	Humidity • Relative: < 90% Non-condensing • Storage: < 90% Non-condensing
Physical	Dimension: 8 x 8(13) x 1.8 mm Weight: 1g	Pin: 18-pin stamp Antenna: External or PCB
Certification	BQB, FCC, CE, IC, Rohs	

1.2 Description

The EH-MC25 is Bluetooth 5.2 low energy and 2.4GHz proprietary multi-application module, It is combine the excellent performance of a leading RF transceiver with a low-power ARM Cortex-M0+, power management unit, ADC, and smart I/O distribution controller.

The embedded ARM Cortex-M0+ CPU enables developers to achieve 32-bit performance at an 8-bit price point, bypassing the step to 16-bit devices. By using a single-cycle multiply option and a 2-stage pipeline, the ARM Cortex-M0+ makes program execution simple and highly efficient.

EH-MC25 comes with a PCB antenna (ANT). EH-MC25B comes with an external antenna. A wide selection of module variants are available for customers as shown in Table 1

Ordering Code	Description	Size
EH-MC25	PCB Antenna	8*13*1.8mm
EH-MC25B	External Antenna	8*8*1.8mm

Table 1: EH-MC25 Series comparison

The two modules are equipped with Realtek 8762E chipset with ARM Cortex-M0+ processor with main frequency up to 40MHz. 272kByte Rom, 104kByte RAM and 4M bit Flash are built in, support Bluetooth 5.2, 2Mbps LE, long range mode, Apple positioning (Find My Network) The EH-MC25 also features an integrated Bluetooth 5.2, 2Mbps LE, Long Range Mode, Apple positioning (Find My Network), and ultra-low power consumption for longer battery life.

The EH-MC25 also integrates rich peripherals including SPI, I2S, I2C, UART, PWM and GPIO interfaces, plus rich application software and complete module certification, allowing customers to bring their products to market faster and at lower cost.

1.3 Applications

- Find My Network (Apple)
- Smart Home
- Beacon
- Smart Building
- Smart Hardware
- Electronic Tag
- Remote Control
- Industrial Automation
- Smart Toys
- Mesh

Contents

2、Block Diagram

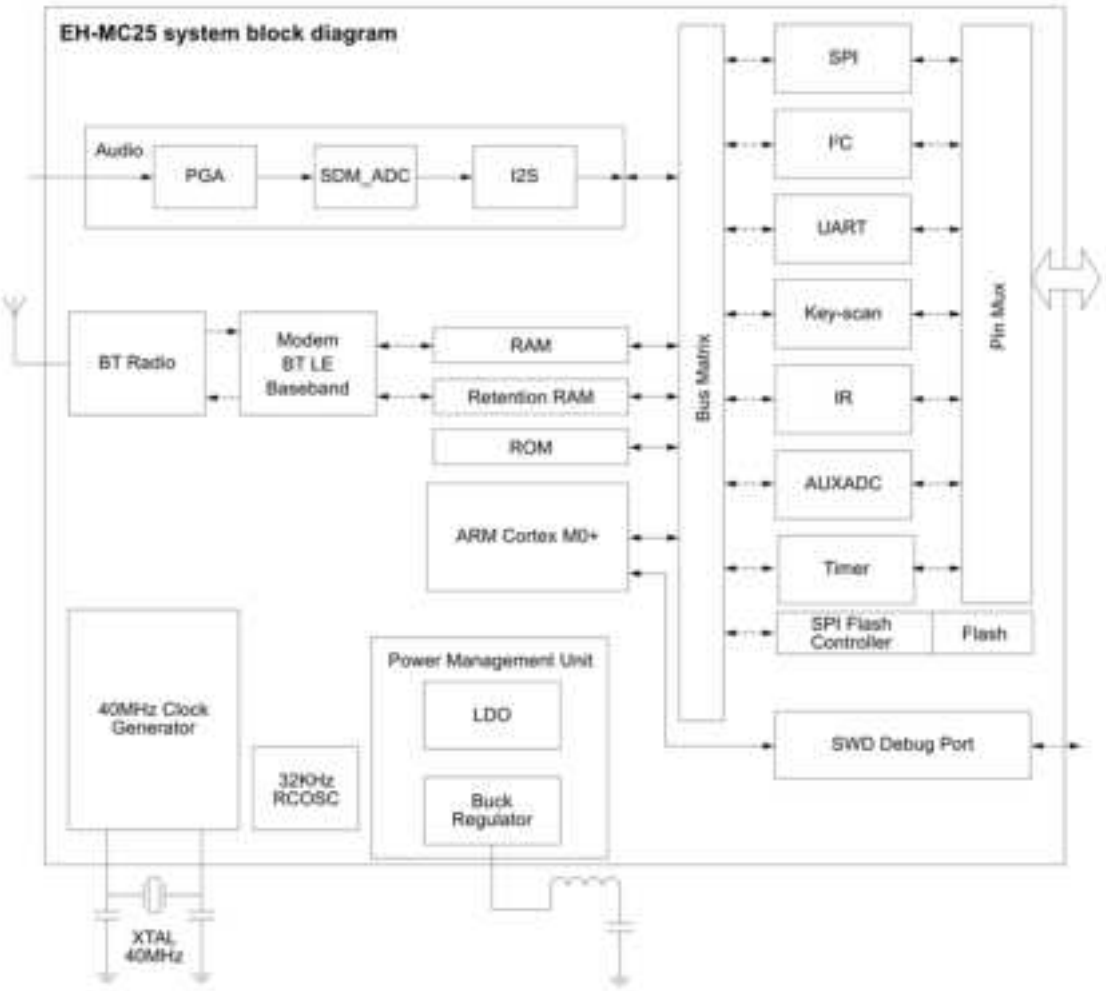


Figure1：Block Digram

3、Pin DePnitions

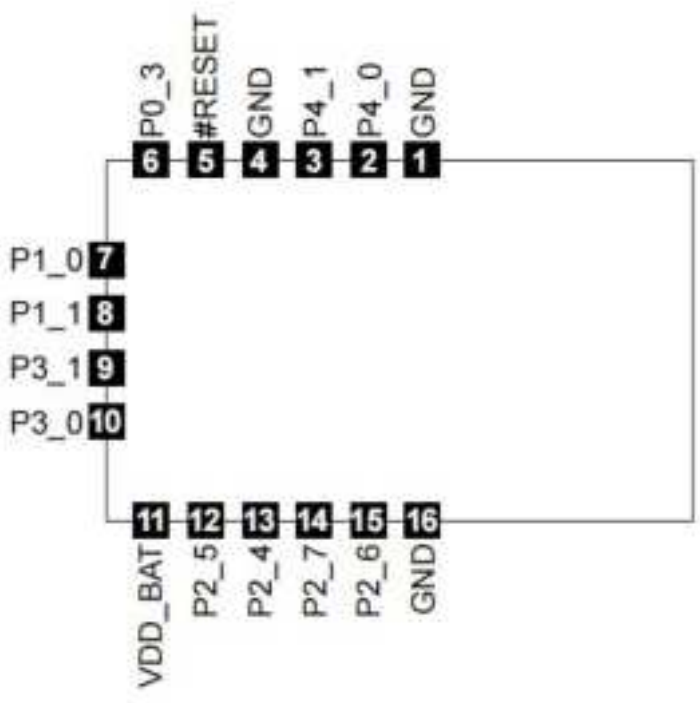


Figure2：EH-MC25 Pin Map（Top View）

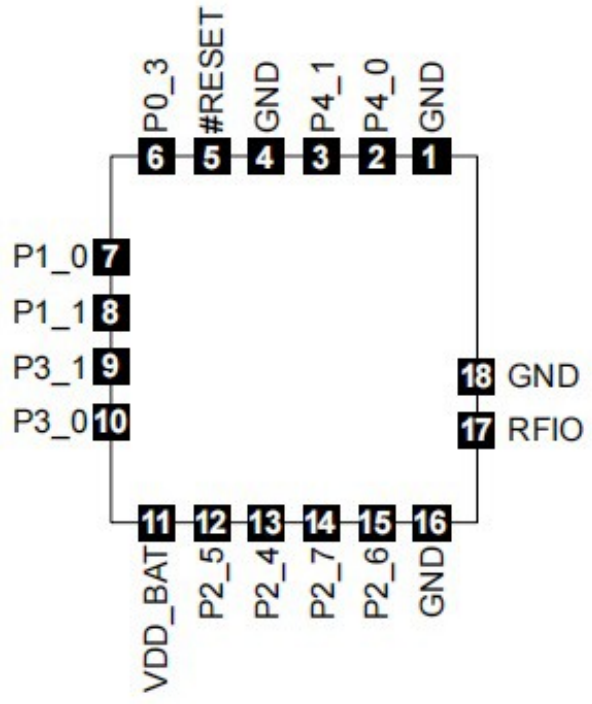


Figure3：EH-MC25B Pin Map（Top View）

Pin	Pin Name	Type	Description
1	GND		
2	P4_0	GPIO	General purpose IO
3	P4_1	GPIO	General purpose IO
4	GND		
5	RESET		Hardware reset pin, low active.
6	P0_3	LOG_UART TX.	LOG_UART TX. Power on trap: Pull-up for normal operation Pull-down to bypass executing program code in flash (PAD internal pull-up by default).
7	P1_0	SWDIO	General purpose IO,SWDIO (default)
8	P1_1	SWDCLK	General purpose IO,SWDCLK (default)
9	P3_1	HCI_UART_RX	General purpose IO,HCI_UART_RX (default)
10	P3_0	HCI_UART_TX	General purpose IO,HCI_UART_TX (default)
11	VDD_BAT		Battery voltage input. MICBIA 3.3V
12	P2_5	GPIO	General purpose IO
13	P2_4	GPIO	General purpose IO
14	P2_7	GPIO	General purpose IO, Support AUXADC
15	P2_6	GPIO	General purpose IO, Support AUXADC
16	GND		
17	RF		Antenna for MC25B
18	GND	GND	Optional for MC25B

Table2: Pin Definition

Note：General purpose IO, support Pin Multiplexer. 8mA driving capability. With wakeup function. With internal strong/weak pull-up and pull-downGPIO.

4、Electrical Characteristics

4.1 Absolute Maximum Ratings

The absolute maximum ratings provided in this section reflect the stress levels that, if exceeded, may cause permanent damage to the device. No functionality is guaranteed outside the operating specifications. Functionality and reliability are only guaranteed within the operating conditions described in Section 4.4.

Symbol	Parameter	Min	Max	Unit
VDD_BAT	Power input voltage	1.8	3.6	V
T*store*	Storage temperature	-55	125	° C

Table3: Absolute Maximum Ratings

4.2 Recommended Operating Conditions

Symbol	Min	Typ	Max	Unit
Operating ambient temperature	-35	-	85	° C
VDD_BAT	1.8	3.0	3.6	V
I/O supply Voltage	1.8	-	VDD_BAT	V
Frequency range	2402	-	2480	MHz

Table4: Recommended Operating Conditions

4.3 Power Consumption

The current consumption measurements are taken with a 3V supply at 25 ° C of ambient temperature at the RF port. All transmitters' measurements are based on 100% duty cycle.

Work Mode	Description		Peak(mA)
Active (RF working)	RX		5.3mA
	TX	TX Power:-20dBm	4.1mA
		TX Power:0dBm	5.9mA
		TX Power:+4dBm	6.8mA
		TX Power:+7.5dBm	13.1mA
	Beacon	Adv_interval：1S, payload：23Bytes, 0dBm	16.5uA

Table5: Active Mode Power Consumption

Minimum power consumption：Condition: VBAT=3V, VDDIO=3V, ambient temperature:25°C

Parameter	32kHz RCOSC	Retention SRAM	Wake-up	Current Consumption (Typical)
Power Down	Off	Off	Wake-up by GPIO	1.9uA
Deep LPS	On	Retention	Wake-up by GPIO,Timer	3.9uA

Table6: Low Power Mode Power Consumption

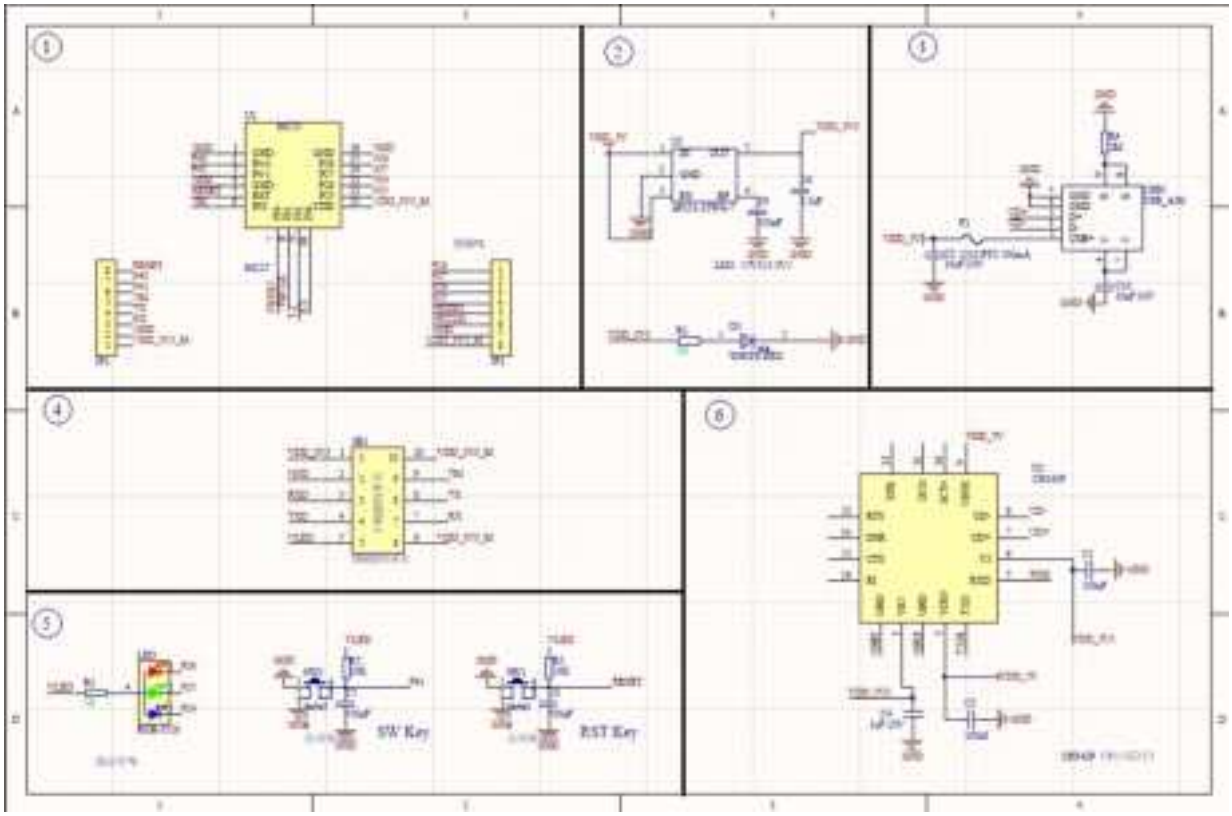
4.4 Radio Performance

Parameter	Bandwidth	Modulation	Rate	Type	Unit
Tx Power	2MHz	GFSK	1Mbps	+7.5	dBm
			2Mbps	+7.5	dBm
Rx Sensitivity			1Mbps	-97	dBm
			2Mbps	-94	dBm

Table7: BLE Radio Characteristics

5、Peripheral Schematics

This is the typical application circuit of the module connected with peripheral components (for example, power supply, antenna, reset button, and UART interface).



Note：
1、MC25 and IO definition
2、Power LDO 5V to 3.3V
3、USB interface
4、Toggle Switch
5、LED and keypad
6、Uart interface

6、Mechanical SpeciÞcation

6.1 Dimensional View

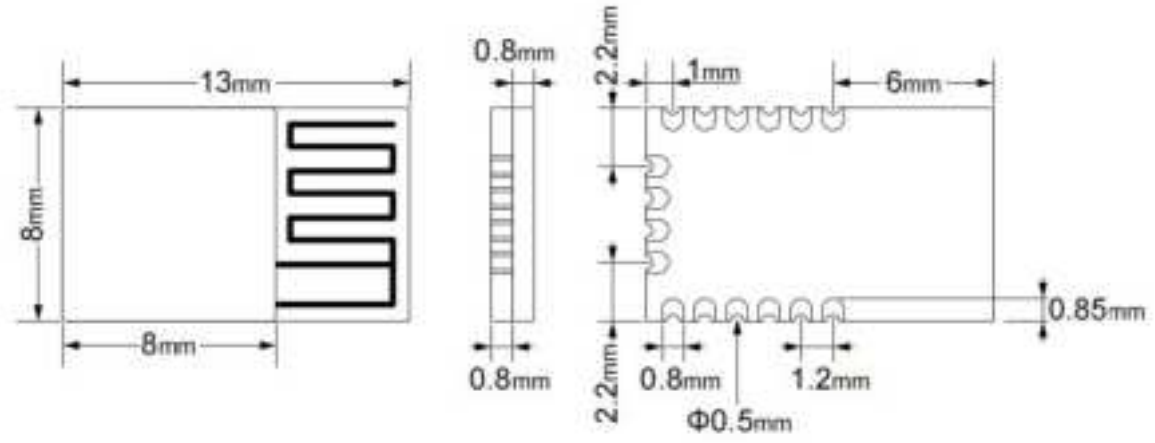


Figure 4：EH-MC25 Physical Dimensions

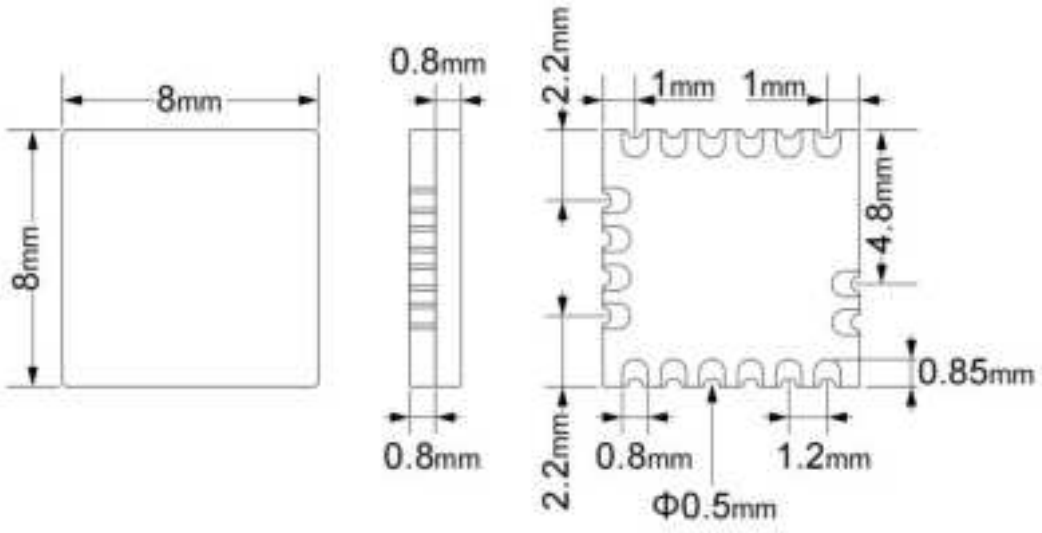


Figure 5：EH-MC25B Physical Dimensions

6.2 Recommended PCB Land Pattern

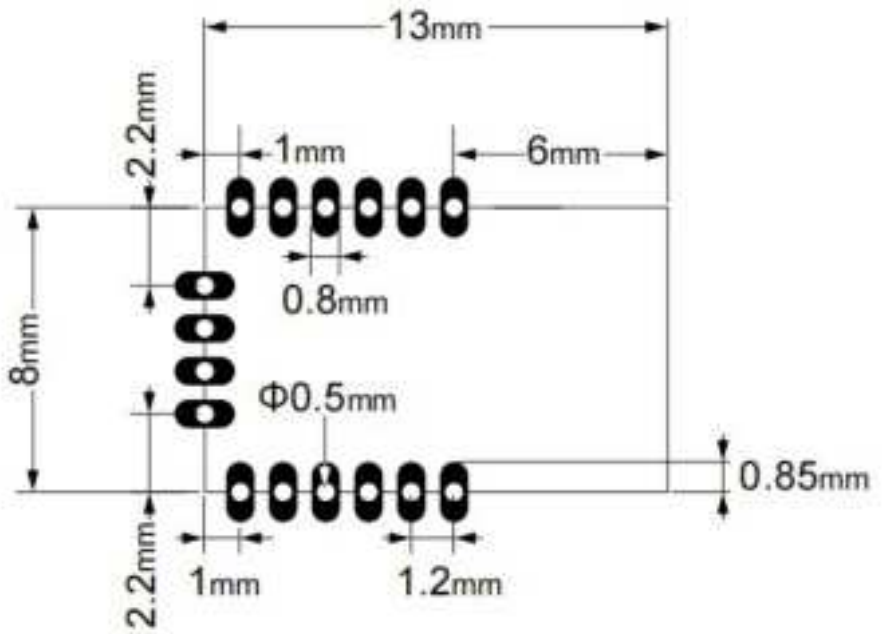


Figure 6：EH-MC25 Recommended PCB Land Pattern

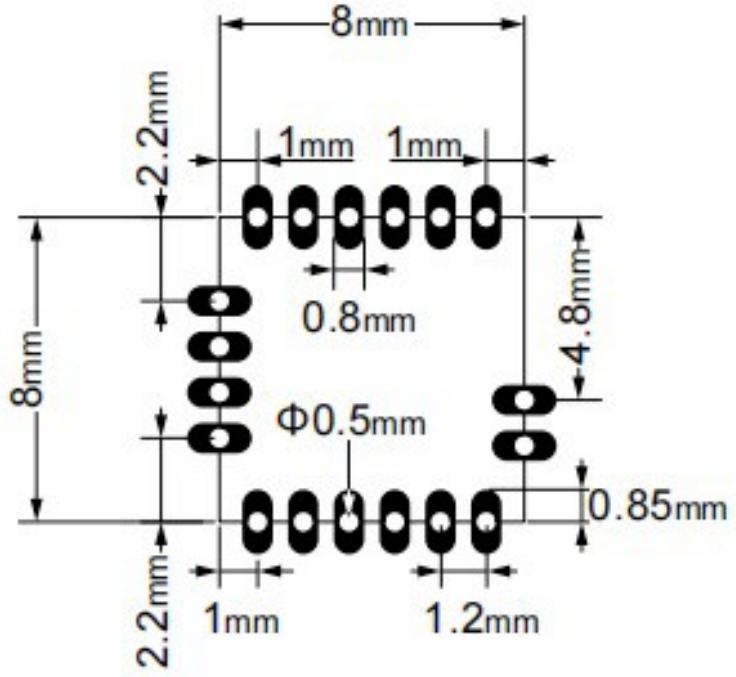


Figure 7：EH-MC25B Recommended PCB Land Pattern

7、Development Kit

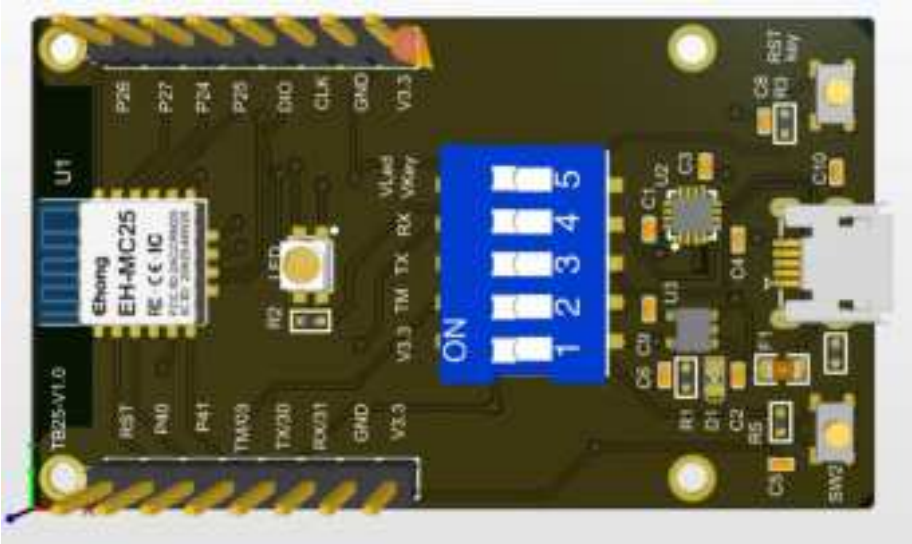


Figure 8：EH-MC25 Development Kit

The EH-MC25-EVK development board supports three colors led, key functions and comes with a serial chip to meet customers' basic development and verification needs. The EH-MC25-EVK also uses 2.54 standard pins to lead the module's universal iO and five-way dip switches, making it easy for customers to use and improving secondary development efficiency.

8、Product Handling

8.1 Storage Conditions

- The products sealed in moisture barrier bags (MBB) should be stored in a non-condensing atmospheric environment of < 40 ° C and /90%RH. The module is rated at the moisture sensitivity level (MSL) of 3.
- After unpacking, the module must be soldered within 168 hours with the factory conditions 25 ± 5 ° C and /60%RH. If the above conditions are not met, the module needs to be baked.

8.2 Electrostatic Discharge (ESD)

- Human body model (HBM): ±2000 V
- Charged-device model (CDM): ±500 V)

8.3 Reßow Proßle

Solder the module in a single reflow.

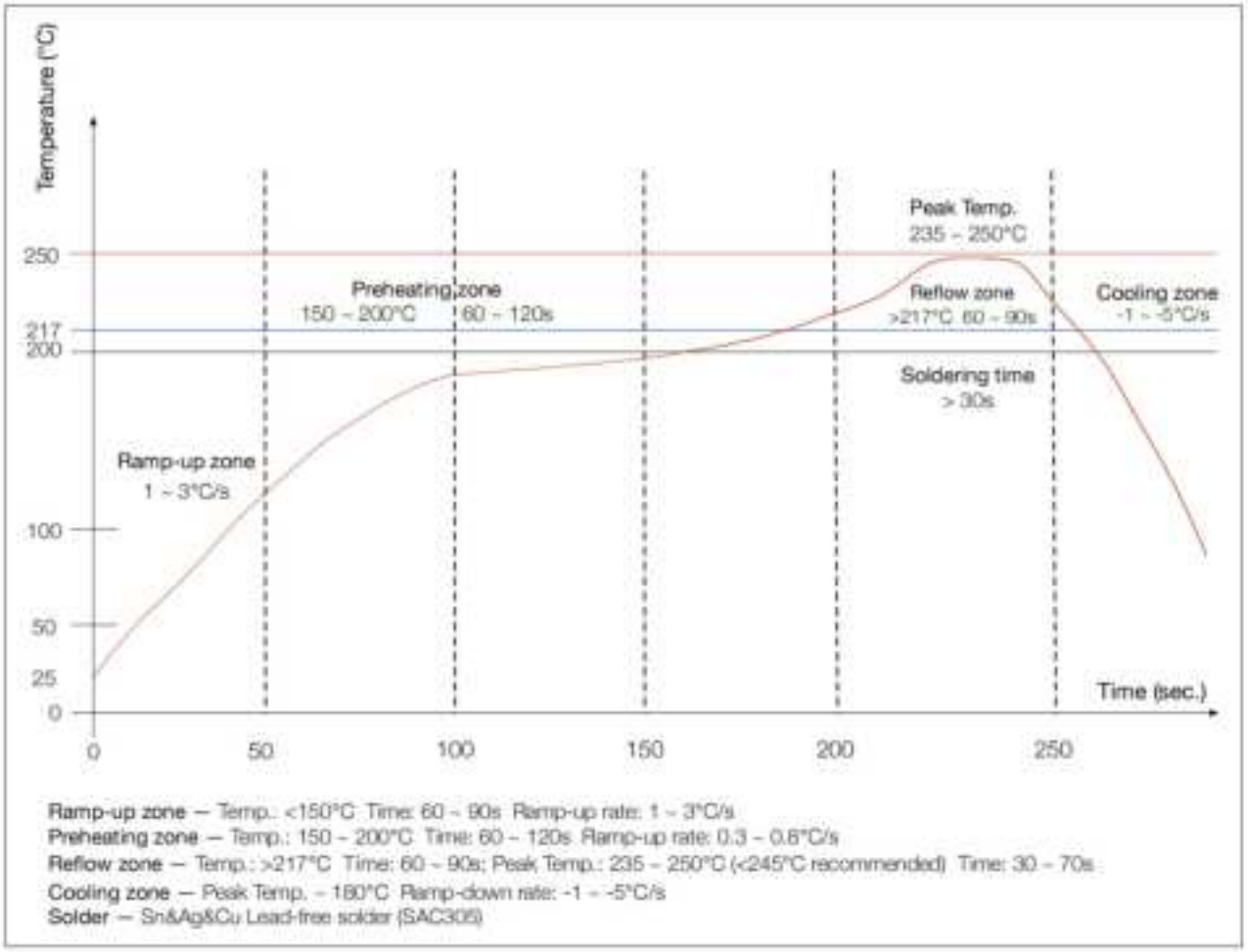


Figure 9：Reflow Profile

8.4 Ultrasonic Vibration

Avoid exposing Ehong modules to vibration from ultrasonic equipment, such as ultrasonic welders or ultrasonic cleaners. This vibration may induce resonance in the in-module crystal and lead to its malfunction or even failure. As a consequence, the module may stop working or its performance may deteriorate.

9、Related Documentation and Resources

9.1 Ehong Documents

Visit website and download:
http://www.ehonglink.com/en/h-pd-35.html#_pp=118_1336
Supports：support@ehonglink.com
Sales： sales@ehonglink.com
Phone: +0086 021-64769993-201

9.2 Revision History

Data	Version	Release notes
2022-10-1	V1.0	Preliminary Release
2023-2-1	V1.1	Update the contact list

FCC Statement

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

• Reorient or relocate the receiving antenna.
• Increase the separation between the equipment and receiver.
• Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
• Consult the dealer or an experienced radio/TV technician for help.

Important Note:

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.
This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.
Country Code selection feature to be disabled for products marketed to the US/Canada.
This device is intended only for OEM integrators under the following conditions:
1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and for the EH-MC25B Model is the external antenna, the antenna gain is 3.0dBi
2)The transmitter module may not be co-located with any other transmitter or antenna,
As long as the above conditions are met, further transmitter testing will not be required.
However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID cannot be used on the final product. In these circumstances, the OEM integrator

will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

End Product Labeling

The final end product must be labeled in a visible area with the following" Contains FCC ID: 2AC CRMC25 ".

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

ISED Statement

- English: This device complies with Industry Canada license - exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause interference, and (2) This device must accept any interference, including interference that may cause undesi red operation of the device.

The digital apparatus complies with Canadian CAN ICES - 3 (B)/NMB - 3(B).

- French:

Le présentappareilestconforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitationestautorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareildoit accepter tout brouillagera dioélectriquesubi, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

This radio transmitter (ISED certification number: 20625-MC25) has been approved by Industry Canada to operate with the antenna types listed with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (ISED certification number: 20625-MC25) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Radiation Exposure Statement

This equipment complies with Canada radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

This device is intended only for OEM integrators under the following condition:

The transmitter module may not be co-located with any other transmitter or antenna.

As long as the condition above is met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 condition ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

Important Note:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC cannot be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

Note Importante:

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l' IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling

The final end product must be labeled in a visible area with the following: Contains IC: 20625-MC25.

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: Contient des IC: 20625-MC25

Manual Information to the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.