

## **EH-MC17 EH-MC17B**

Low Energy Module Data Sheet

2 April 2020 Version 1.9

## VERSION HISTORY

Version	Comment
V1.0	First edition
V1.1	Replace the chip with RTL8762CKF, 25/26/27 Pin definition changes
V1.2	Update module power consumption
V1.3	Modify some descriptions to add the master-slave support mode
V1.4	Add module block diagram
V1.5	Add antenna patterns
V1.6	Add MIC certification
V1.7	Modify the pin description
V1.8	Add U.FL port diameter
V1.9	Add connection status indication pin

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# 1. Introduction

The EH-MC17 is a low power and cost-effective Bluetooth SOC module that supports Bluetooth 5. It has a built-in M4 core, 160KB of RAM, support Bluetooth long range, big data and other new features, also supports SIG mesh.

The module supports multiple working modes, including master-slave integration, multi-master and multi-slave, and one master and multiple slaves, which can meet the needs of multiple application scenarios.

The module provides up to 512kB of ROM space, supports a variety of hardware interfaces, and can directly connect external devices such as sensors without the need for an external processor to meet customer customization needs.

With certifications of CE, IC, FCC, ROHS, SIG, MIC,SRRC, EH-MC17 support customers to build the end device and to enter the market quicker.

# 2. Quick Specifications

Bluetooth Version	
BLE Version	Bluetooth 5 Low Energy
	Bluetooth/SIG Mesh
Radio	
Frequency	2402MHZ-2480MHZ
Transmit power	< +6dBm
Receiver sensitivity	-97dBm
Modulations	GFSK at 1 Mbps, 2 Mbps data rates
Antenna	Integrated (-0.081dBi peak); support onboard antenna or external antenna
BLE Long range	Supported
OTA	Supported
Electrical Specifications	
Power supply	1.8 VDC to 3.6 VDC, 3.3VDC typical
Current consumption	Active TX mode( TX power:0dBm): 8.8mA
	Active TX mode( TX power:4dBm): 10.4mA
	Active TX mode( TX power:7.5dBm): 16.8mA
	Active TX mode( TX power:-20dBm): 7.6mA
	Active RX mode : 6.8mA eg. (RX only @ 1 Mbps @ 3V, DCDC enabled)
	Standby
	Sleep
System Off, On	
Hardware	
Dimension	17.70x11.95x2.20mm
Temperature Range	-40°C to +85°C

Interfaces	UART*2	I2S*2	GPIO*20	I8080	PCM
	SPI Master-slave interface	PWM*8	RTC	SWD	
<b>Certification</b>					
FCC	FCC Identifier: 2ACCREHMC17 compliance with FCC Part 15, Sub part C, and section 15.203, 15.205, 15.207,15.209 and 15.247 rules.				
IC	Certification number: 20625- EHMC17 IC: 12208A-04				
CE	ETSI EN 301 489-1 V2.2.1 (2019-03)*--EMC ETSI EN 301 489-17 V3.2.0 (2017-03)--EMC ETSI EN 300 328 V2.2.2 (2019-07)--Radio EN 50663:2017--Health EN 62479:2010--Health EN60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013--Safety Attestation Number : AOC RSHD190611013-03				
SIG	DID: D046582; QDID: 107942;115668				
SRRC	Certification number: 2019DP8815				
MIC	JAPAN MIC Number:211-191224				
ROHS	Attestation Number : AOC R3SH190613F1552E -13				
<b>Export</b>					
HTS: 8473.30.1180					

### 3. Applications

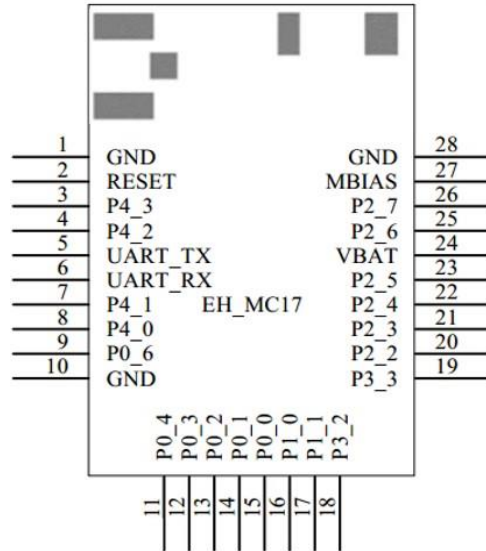
- Smart buildings, Smart cities
- Industry 4.0
- Low-Power Sensor Networks
- Fitness / Sports / Health
- Smart Home
- Smart lighting systems
- iBeacons™ / Proximity
- BLE Mesh applications
- Smart Toys / accessories
- Internet of Things
- Hotel Automation
- Office Automation

### 4. Ordering Information

Part number	description
EH-MC17	Module with ceramic antenna
EH-MC17B	Module with U.FL port, diameter: 2mm

## 5. Pin Descriptions

### 5.1 Pin-out



## 5.2 Pin Descriptions

No.	Pin Name	Function	Remark
1	GND	-	-
2	RESET	-	The test point for MP needs to be reserved Use of calibration, Global reset, active low.
3	P4_3	General input/output	Bluetooth connection status indication pin, connect low electrical level, disconnect high electrical level.
4	P4_2	General input/output	-
5	UART TX	P3_0	The test point for MP needs to be reserved Use of calibration.
6	UART RX	P3_1	The test point for MP needs to be reserved Use of calibration.
7	P4_1	General input/output	-
8	P4_0	General input/output	-
9	P0_6	General input/output	-
10	GND	-	-
11	P0_4	General input/output	-
12	P0_3	LOG_UART TX.	The test point for MP needs. Power on trap: Pull-up for normal operation Pull-down for firmware download by serial port,
13	P0_2	General input/output	-
14	P0_1	General input/output;	-
15	P0_0	General input/output;	-
16	P1_0	General input/output;	SWDIO (default )
17	P1_1	General input/output;	SWDCLK(default )
18	P3_2	General input/output;	-
19	P3_3	General input/output;	-
20	P2_2	General input/output;	Internal AUXADC input 2

21	P2_3	General input/output;	Internal AUXADC input 3
22	P2_4	General input/output;	Internal AUXADC input 4
23	P2_5	General input/output;	AUXADC input 5
24	VBAT	-	Battery voltage input
25	P2_6	General input/output;	AUXADC input 6 simulation MIC input N
26	P2_7	General input/output;	AUXADC input 7 simulation MIC input P
27	MBIAS	IO	Bias of microphone When microphone bias is not used, pin sharing is GPIO
28	GND	-	-

**NOTE:**

1 General input/output; 8mA drive capability. Support Wake up function. All are internal strong/weak pull-up and pull-down.

2 The test point for MP should to be reserved include UART TX, UART RX, LOG\_UART TX, RESET.

3 For debug, the SWDIO and SWDCLK test point are suggested to be reserved.

4 if work with MCU chip, the reset pin is suggested to be connected.

## 6. Electrical Specifications

### 6.1 Recommended Operation Conditions

Operating Condition	Min	Typical	Max	Unit
Operating Temperature Range	-40	+20	+85	°C
Storage Temperature Range	-40	+20	+85	°C
Battery (VDD_BAT) operation	2.1	+3.0	+3.6	V
I/O Supply Voltage (VDD_PIO)	1.8	+3.0	+3.6	V
AIO input	0	-	+3.3	V
Frequency range	2402		2480	MHz

### 6.2 Module power consumption

- Working current: Condition: VBAT=3V, VDDIO=3V, ambient temperature: 25°C

Power mode	Current Consumption(Max)	Unit
Active RX mode	6.8	mA



Active TX mode( TX power:-20dBm)	7.6	mA
Active TX mode( TX power:0dBm)	8.8	mA
Active TX mode( TX power:4dBm)	10.4	mA
Active TX mode( TX power:7.5dBm)	16.8	mA

Table 1: Module average power consumption

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

Power Mode	Always on Registers	32k RCOSC/XTAL	Retention SRAM	CPU	Wakeup Method	Current Consumption (typical)
Power down	ON	OFF	OFF	OFF	Wakeup by GPIO	450nA
Deep LPS	ON	ON	Retention	OFF	Wakeup by GPIO,timer	2.5 $\mu$ A(with 160K SRAM in retention state)

Table 2: Module minimum power consumption

Condition	Level	Max Rating
Human body contact discharge rate JEDEC EIA/JESD22-A114	1C	2000V (all pins)
Charge device type according to contact discharge JEDEC EIA/JESD22-C101	C1	500V (all pins)

Table 3: ESD Protection

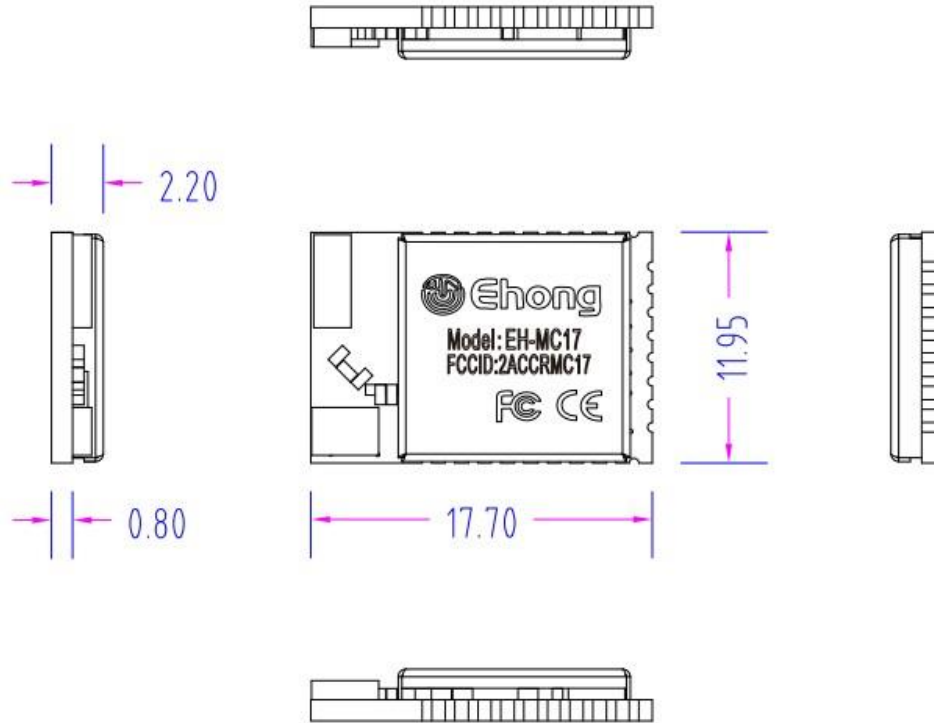
## 7. Software/ Firmware

Software Support	
Standard Software	Ehong provide module with standard software for customer to develop. Support to make some modification and support customized MAC address
SDK development	Ehong provide SDK and description
Software encryption	Support software encryption for mass production

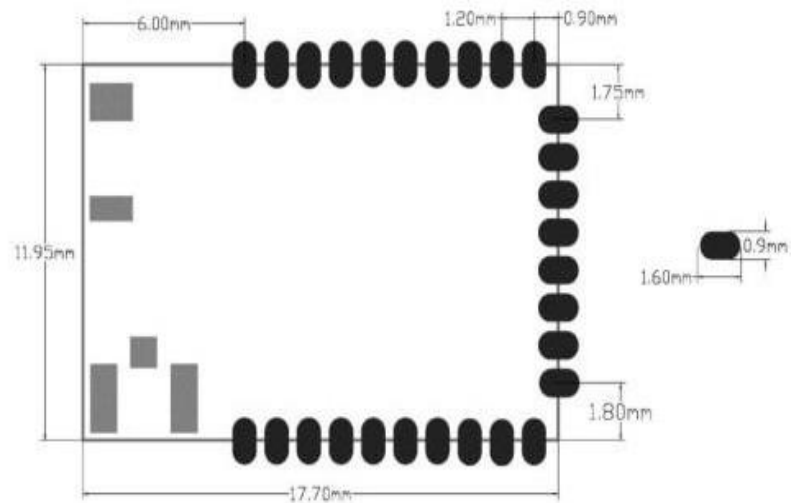
Table 4: software supports

## 8. Mechanical Data

### 8.1 Dimensions



### 8.2 Recommended PCB Land Pads



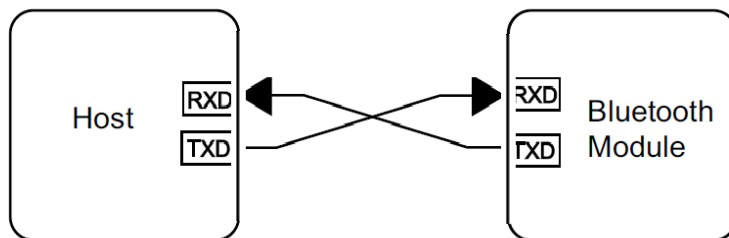
## 9. Physical Interfaces

### 9.1 GPIO

The General input/output can be set different function according the the pinmux configuration in the code including PWM, UART, i2C etc.

### 9.2 UART

The MC17 supports three UARTs, two interfaces support full-duplex transmission and reception, and one interface supports LOG (P0\_3). Support hardware flow control through RTS and CTS.



**Note:** Baud rate supports from 1200 bps from 2Mbps

### 9.3 I2C Master/ Slave

There are two independent I2C interfaces in the MC17 consisting of a serial data line (SDA) and a serial clock (SCL). Both I2C interfaces can be configured in master-slave mode. Supports 7/10-bit I2C address; configurable I2C address (slave mode); standard rate (1-100kHz), fast rate (100kHz-400kHz); TXFIFO 8-bit\*24; RXFIFO 8-bit\*40; DMA support.

### 9.4 SPI

The MC17 has two separate SPI interfaces. SPI0 supports master-slave mode, and SPI1 only supports master mode.

### 9.5 More interfaces

MC17 has microphone interface, audio output interface, I8080 LCD controller interface

## 10. RF Design Notes

### 10.1 Recommended RF Layout & Ground Plane

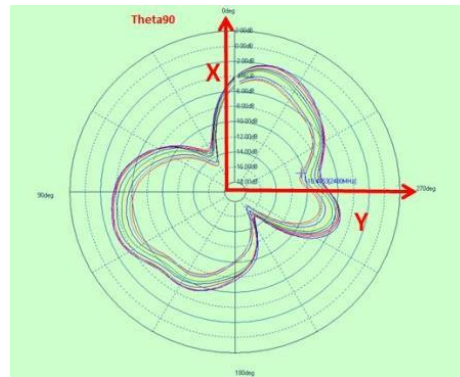
For the EH-MC17, the integrated antenna requires a suitable ground plane to radiate effectively.

The area under and extending out from the antenna portion of the module should be kept clear of copper and other metal. The module should be placed at the edge of the PCB with the antenna edge facing out.

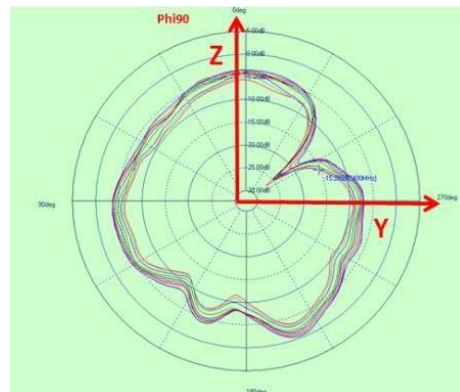
## 10.2 Antenna Patterns

Antenna patterns are based on the EH-MC17 Evaluation Kit

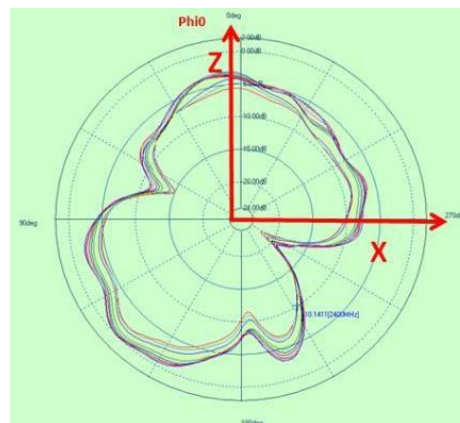
### 10.2.1 X-Y Plane



### 10.2.2 Y-Z Plane



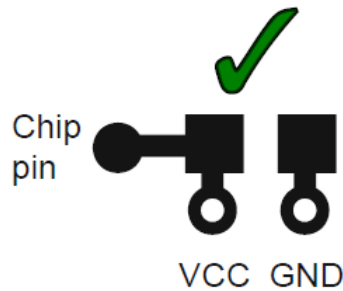
### 10.2.3 X-Z Plane



## 11. Layout and Soldering

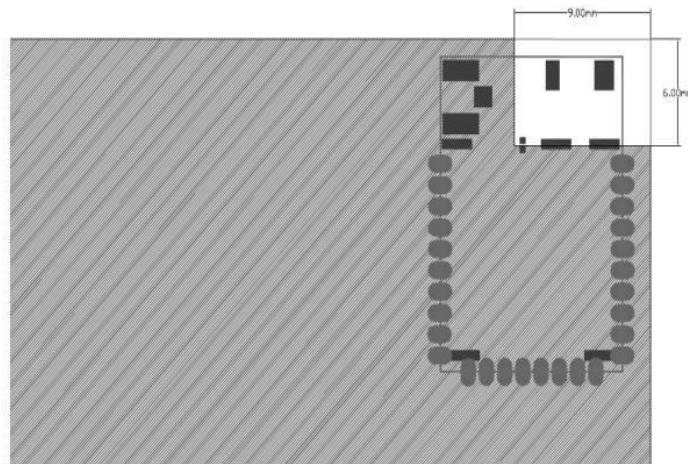
### 11.1 Layout

- Module power supply: 3v button battery or DC 3.3v
- Power pin connection capacitor is as close as possible to chip and pin
- Decoupling the power supply from the chip using a capacitor
- Use capacitors to prevent noise from coupling back to the power plane.



### 11.2 Layout Guidelines

To optimize antenna performance, place the module in the corner of the PCB as shown in Figure 6. Do not cover copper and trace the antenna clearance area. Keep the antenna area as far away as possible from the power supply and metal components. Connect all GND pins directly to a solid GND plane. Place GND vias as close as possible to the GND pin. Use a good layout method to avoid excessive noise coupling with signal lines or supply voltage lines.



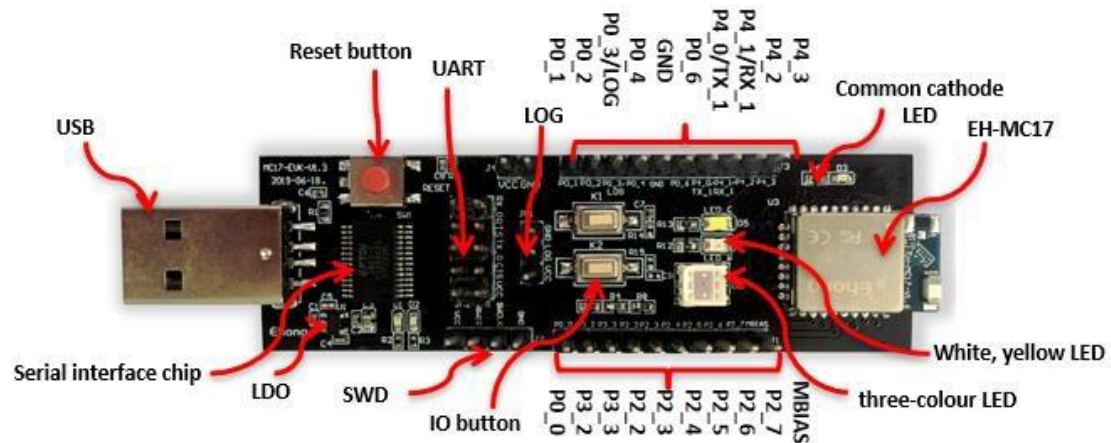
## 12. Development Kit

EH-MC17-EVK was designed based on EH-MC17 module.

The development board integrates LED, reset button, IO interface, PWM interface, I2C interface and

SWD interface. There are 20 IO ports (not including download serial port).

This development board has a rich interface and complete integrity, which can help customers easily complete product development and testing.



### 13. Certifications

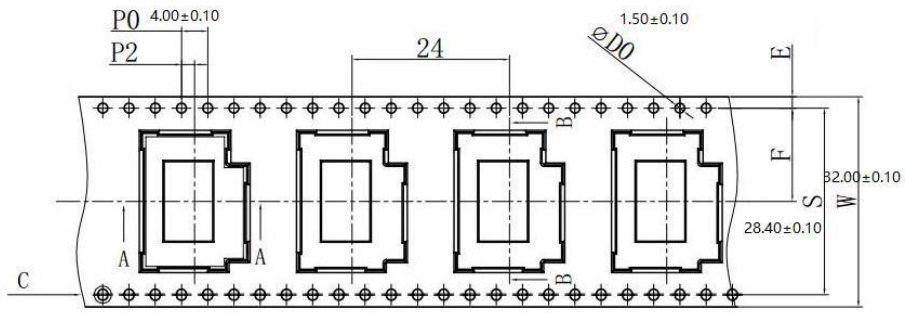
FCC	FCC Identifier: 2ACCREHMC17 compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207,15.209 and 15.247 rules.
IC	Certification number: 20625- EHMC17 IC: 12208A-04
CE	ETSI EN 301 489-1 V2.2.1 (2019-03)*--EMC ETSI EN 301 489-17 V3.2.0 (2017-03)--EMC ETSI EN 300 328 V2.2.2 (2019-07)--Radio EN 50663:2017--Health EN 62479:2010--Health EN60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013--Safety Attestation Number : AOC RSHD190611013-03
SIG	DID: D046582; QDID: 107942;115668
SRRC	Certification number: 2019DP8815
ROHS	Attestation Number : AOC R3SH190613F1552E -13

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### 14. Packaging and Labeling

#### 14.1 Carrier Tape Dimensions

Modules are packaged on reels loaded with 1000 modules. Each reel is placed in an antistatic bag with a desiccant pack and a humidity card and placed in an 36x25x12cm box. Anti-static warnings and labels adhere to the outside of the bag.



## 14.2 Packing Label

<b>Ehong</b>	
<b>Customer Name</b>	XXXX
<b>PO#</b>	***** 
<b>Material NO.</b>	85200X
<b>Model</b>	EH-XX
<b>Quantity</b>	XX PCS 
<b>Date</b>	XX/XX/XX 
  	

Integration instructions for host product manufacturers according to KDB 996369 D03  
OEM Manual v01

List of applicable FCC rules:

FCC Part 15 Subpart C 15.247 & 15.207 & 15.209

Specific operational use conditions:

The module is a Bluetooth module with BLE function. Operation Frequency: 2402-2480MHz

Number of Channel: 40 Modulation: GFSK

Type: EH-MC17 Model Chip ceramic Bluetooth Antenna(-0.081dBi)

EH-MC17B Model External Antenna(1.99dBi)

The module can be used for mobile or portable applications with a maximum 1.99dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer 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.

Limited module procedures

Not applicable. The module is a Single module and complies with the requirement of FCC Part 15.212.

Trace antenna designs

Not applicable. The module has its own antenna, and doesn't need a host's printed board microstrip trace antenna etc.

RF exposure considerations

The module must be installed in the host equipment such that at least 20cm is maintained between the antenna and users' body; and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Antennas

Antenna Specification are as follows: Type: EH-MC17 (Chip Ceramic Bluetooth Antenna)  
EH-MC17B (External Antenna)

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna;  
The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached



or employ a 'unique' antenna coupler.

As long as the conditions above are met, further transmitter test will not be required.

However, the host manufacturer is still responsible for testing their end-product for any additional compliance requirements required with this module installed (for example, digital device emissions, PC peripheral requirements, etc.)

#### Label and compliance information

Host product manufacturers need to provide a physical or e-label stating "Contains FCC ID: 2ACCREHMC17" with their finished product.

#### Information on test modes and additional testing requirements

Operation Frequency: 2402-2480MHz Number of Channel: 40

Modulation: GFSK

Host manufacturer must perform test of radiated & conducted emission and spurious emission, etc according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the end product can be sold legally.

#### Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 & 15.207 & 15.209 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuitry), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

#### Federal Communication Commission Statement (FCC, U.S.)

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 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.

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.

FCC Caution:

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

#### IMPORTANT NOTES

Co-location warning:

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

OEM integration instructions:

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

The transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the external antenna(s) that has been originally tested and certified with this module.

As long as the conditions above are 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 (for example, digital device emissions, PC peripheral requirements, etc.).

Validity of using the module certification:

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module 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 Transmitter Module FCC ID: 2ACCREHMC17".

Information that must be placed in the end user manual:

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.

#### 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 undesired operation of the device. The digital apparatus complies with Canadian CAN ICES - 3 (B)/NMB - 3(B).

French: Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This radio transmitter 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 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-EHMC17. Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante:

Contient des IC: 20625-EHMC17

**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.

This radio transmitter ISED Number: 20625-EHMC17 has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

## 15. Related Documents

**Ehong Documents:**

Visit website and download: [http://www.ehonglink.com/en/h-pd-35.html#\\_pp=118\\_1336](http://www.ehonglink.com/en/h-pd-35.html#_pp=118_1336)

Supports: [support@ehonglink.com](mailto:support@ehonglink.com) phone: +0086 021-64769993-201

Sales: [sales@ehonglink.com](mailto:sales@ehonglink.com)