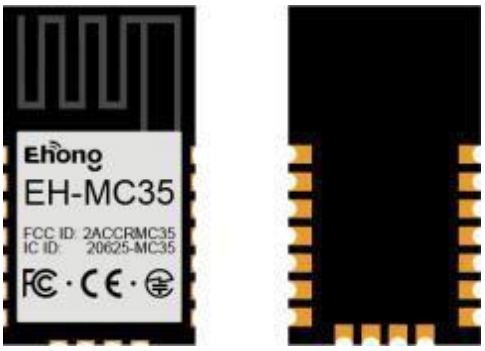
Data Sheet

EH-MC35
EH-MC35B

IoT Module Datasheet
BLE 5.3 and 2.4G



April 2024 Version 1.0

Professional IoT Module Solution Provider

1、Module Overview

1.1 characterisation

element	standard
Processor	ARM Cortex-M4 CPU (Maximum 64MHz) • EFUSE:256-bit • SRAM:64kB • Serial Flash:512B • I-Cache RAM:8KB
Standard	• Bluetooth BLE 5.3 • 2.4G private protocol
BLE RF Parameters	Transmit Power • -20dBm to +5dBm Receive Sensitivity • 2Mbps:-96dbm • 1Mbps:-99dBm RF power consumption during operation • Receive mode (RX) : 7mA • Transmit mode: 9.0mA@0dBm • Broadcast mode: 15uA (Broadcast interval: 1s, Data: 23Byters,0dBm)
Sleep power consumption	Deep LPS: 2.4uA(with 16K RAM retention,32KHz RC)
Peripherals	12 x GPIO(mux'ed) 2 x SPI(master or slave) 1 x I2C(master) 2 x UART 4 x Timers 8 x PWM 1 x Watchdog Timer
Voltage	Input power supply: 1.8V~3.6V, 3.3V (typical)
Environment	Temperature: • Operating Temperature : -40°C ~ 85°C • Storage Temperature: -55°C ~150°C Humidity:: • Relative Humidity:< 90% Non-condensing • Storage Humidity: < 90% Non-condensing
Appearance	Dimensions: 8.5 x 15 x 2.2 mm 8.5 x 10 x 2.2 mm Weight: 0.85g Pin: 18-pin Antenna: PCB antenna or external antenna
Approvals	FCC，CE，IC，SRRC，Rohs

1.2 descriptions

The EH-MC35 is a Bluetooth 5.3 low-power 2.4GHz proprietary multi-application module that combines the superior performance of a leading RF transceiver with a low-power ARM Cortex-M4 64MHz processor, a power management unit, an ADC, and an intelligent I/O distribution controller. Notably, the EH-MC35 module demonstrates excellent ultra-low-power performance, simple peripheral circuitry, and low BOM cost, making it a very cost-effective product.

The chip integrates a high performance MCU with speed up to 64MHz, as well as DMA, GPIO, SPI, UART, timer and watchdog functions. It also supports 32MHz external crystals and integrates a multi-purpose 12-bit ADC with up to 12 channels.

In addition, the EH-MC35 integrates on-chip 64K SRAM and 256-bit EFUSE, and supports user-defined IDE system-on-chip development with SFLASH MCU and JTAG software upgrades.

The EH-MC35 operates in host-less mode to run Bluetooth stacks and applications without an external MCU. It can also be used as a BLE transceiver in hosted (HCI) mode with an external host running Bluetooth stacks and applications via the UART interface (AT command). It has undergone rigorous regulatory compliance testing and is FCC, CE, IC, SRRC certified and meets the environmental requirements of the RoHS and WEEE directives.

It has undergone rigorous regulatory compliance testing and is FCC, CE, IC, and SRRC certified.

Order Code	Description	Dimensions
EH-MC35	PCB On-Board Antenna	8.5*15*2.2mm
EH-MC35B	External Antenna	8.5*10*2.2mm

表 1: EH-MC35 型号对比表

1.3 appliance

- Apple Positioning (FMN)
- Smart Home
- Beacon
- Smart Buildings
- Smart Hardware
- Electronic labelling
- Intelligent Agriculture
- Industrial Automation
- Intelligent Toys
- Mesh Network

Catalogue

2、Function Block Diagram

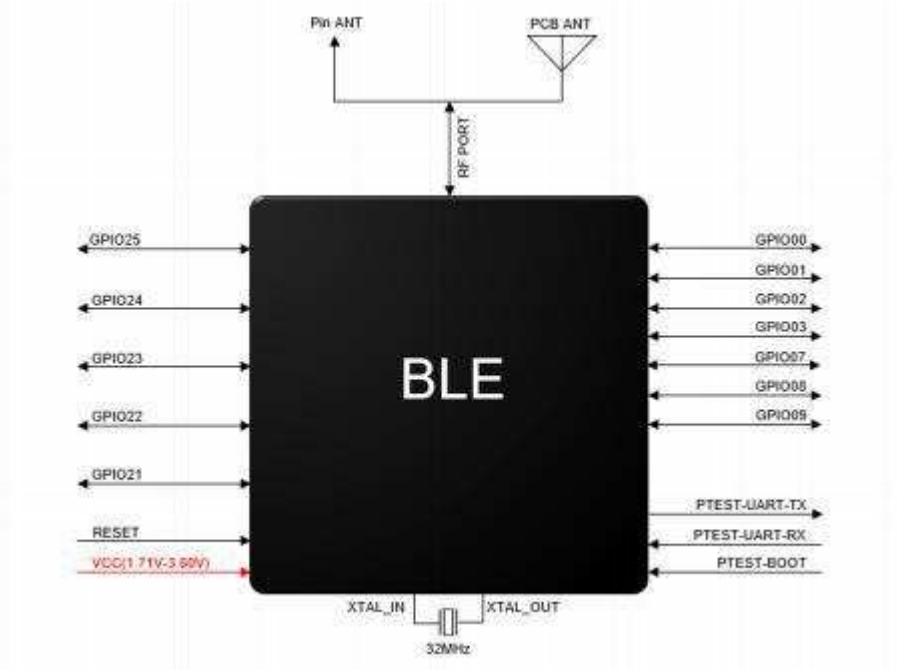


Figure 1:Function Block Diagram

3、Pin Definitions

3.1 pin-mapping

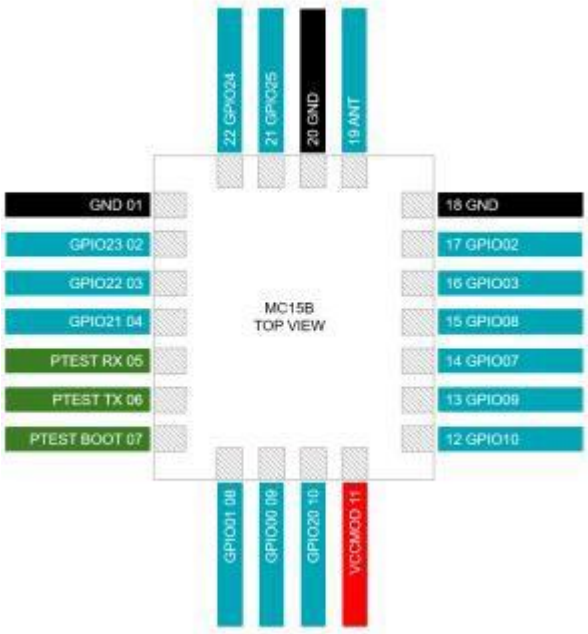


Figure 2: EH-MC35 and EH-MC35B Pin Definition Chart

3.2 Pin Description

Pin Sequence	Name	Type	Power Field	Description
1	GND	GND	GND	Ground
2	GPIO23	DIO	PWR	Digital GPIO
3	GPIO22	DIO	PWR	Digital GPIO
4	GPIO21	DIO	PWR	Digital GPIO06 / UART_RX
5	PTEST RX	DIO	PWR	GPIO06/UART_RX
6	PTEST TX	DIO	PWR	GPIO05/UART_TX
7	PTEST BOOT	DIO	PWR	GPIO04/BOOT
8	GPIO01	DIO	PWR	GPIO/SWDIO
9	GPIO00	DIO	PWR	GPIO/SWCLK
10	GPIO20	DIO	PWR	Digital GPIO
11	VCC	PWR	-	Power Input (1.71~3.6V)
12	GPIO10	D/A IO	PWR	GPIO07/ADC03
13	GPIO09	D/A IO	PWR	GPIO08/ADC04
14	GPIO07	D/A IO	PWR	GPIO03/ADC02
15	GPIO08	D/A IO	PWR	GPIO02/ADC01
16	GPIO03	DIO	PWR	Reset
17	GPIO02	D/A IO	PWR	GPIO25/XTAL32K_P
18	RESET	D/A IO	PWR	GPIO24/XTAL32K_N
19	RF	ANA	-	RF Port (MC35B Only)
20	GND	GND	GND	Ground (MC35B Only)
21	GPIO25	DIO	PWR	Digital GPIO (MC35B Only)
22	GPIO24	DIO	PWR	Digital GPIO (MC35B Only)

Table 2: Pin Descriptions

4、Electrical characteristics

4.1 Absolute maximum ratings

Exceeding the absolute maximum ratings may result in permanent damage to the device. This is an emphasis on ratings and does not address the functional operation of the device under these or other conditions beyond those indicated in this specification. Prolonged exposure to absolute maximum ratings may affect module reliability.

Parameter	Minimum	Typical	Maximum	Unit
Supply Voltage (VCC)	-0.3	-	3.9	V
Maximum Junction Temperature	-40	-	125	°C
Storage Temperature	-40	-	125	°C

Table 4: Absolute maximum ratings

4.2 Recommended working conditions

Parameter	Minimum	Typical	Maximum	Unit
Operating Temperature Range	-35	-	85	°C
Supply Voltage (VCC)	1.8	3.3	3.6	V
I/O Supply Voltage	1.8	-	VDD_BAT	V
Frequency Range	2402	-	2480	MHz

Table 5: Recommended working conditions

4.3 Power consumption characteristics

Current consumption measurements were made at an ambient temperature of 25°C at the RF port using a 3.3V power supply. All transmitter measurements are based on 100% duty cycle.

Mode	Description		Peak (mA)
RF operation	RX		7mA
	TX	TX Power:-20dBm	7.5mA
		TX Power:0dBm	9mA
		TX Power:+4dBm	9.5mA
		TX Power:+5dBm	10mA
	Beacon Broadcasting	Broadcast Interval: 1S. Data: 23Bytes, 0dBm	15uA

Table 6: Power Consumption in RF Operating Modes

Power consumption in sleep mode: VCC = 3.3V, ambient temperature: 25°C

Power Mode	32kHz RCOSC	SRAM hold	Wake-up mode	Power consumption (typical)
Power Down	Off	Off	Wake on GPIO	0.9uA
Sleep Mode	On	Retention	Wake on GPIO and Clock	2.4uA

Table 7: Power Consumption in Low Power Mode

4.4 Bluetooth Radio Frequency (RF)

Parameter	bandwidths	Modulation Method	rate	Typical	Unit
Transmit power	2MHz	GFSK	1Mbps	+5	dBm
			2Mbps	+5	dBm
Receiving Sensitivity			1Mbps	-99	dBm
			2Mbps	-96	dBm

表 8: BLE 射频特性

5、Module dimensions and PCB package graphics

5.1 Module Size

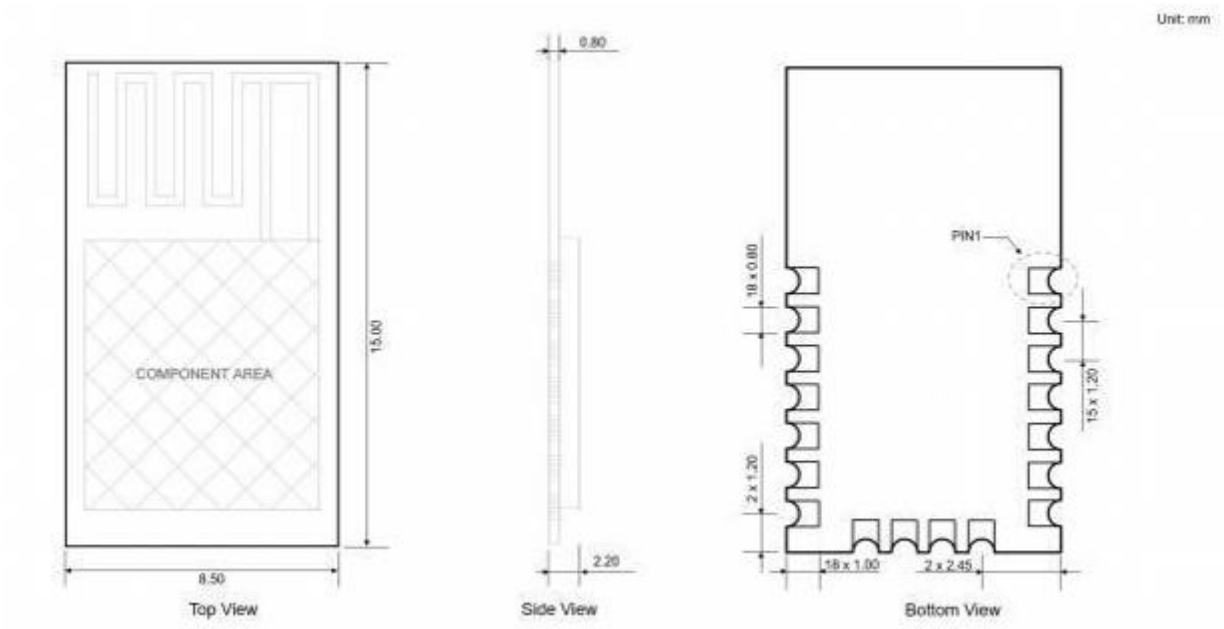


Figure 4: EH-MC35 Module Dimensions

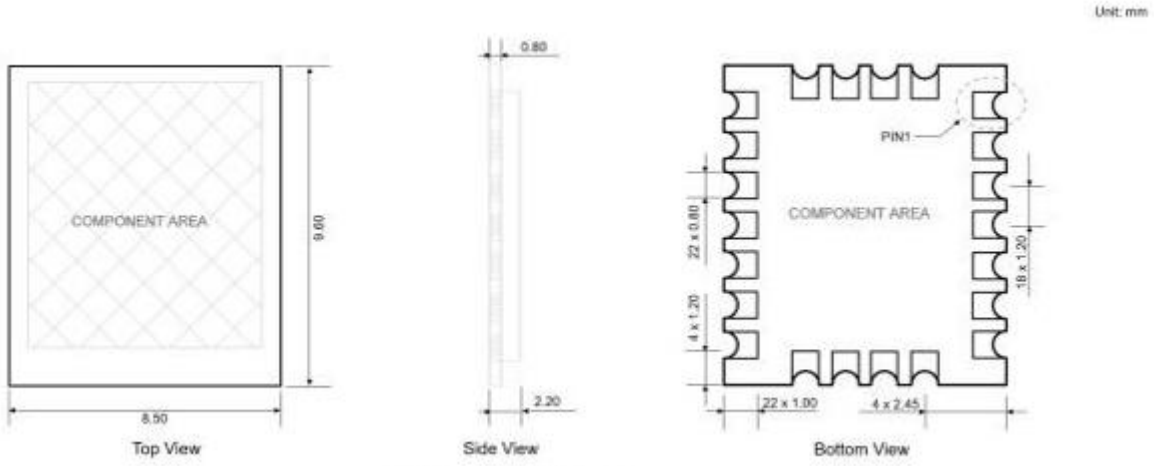


Figure 5: EH-MC35B Module Dimensions

6. Recommended PCB Packaging Graphics

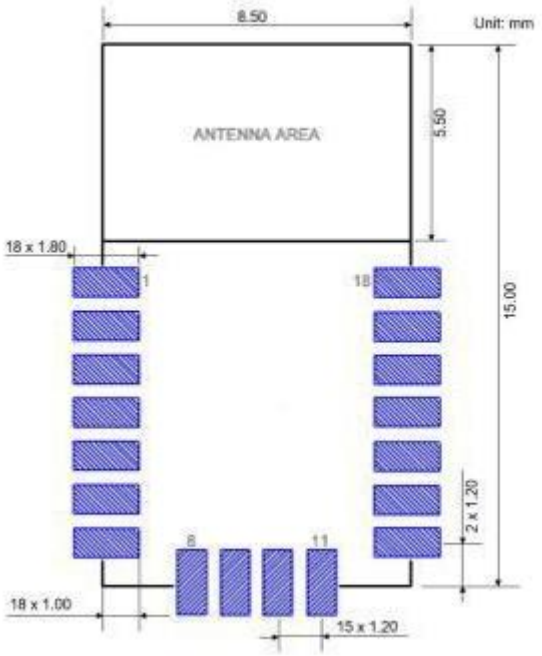


Figure 6: EH-MC35 Recommended PCB Package

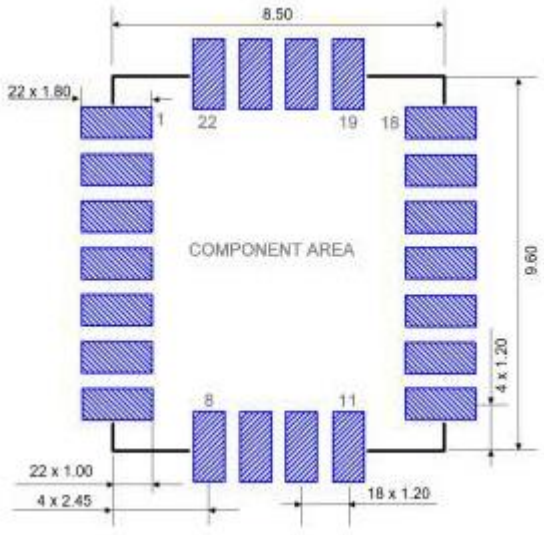


Figure 7: EH-MC35B Recommended PCB Package

7、development board

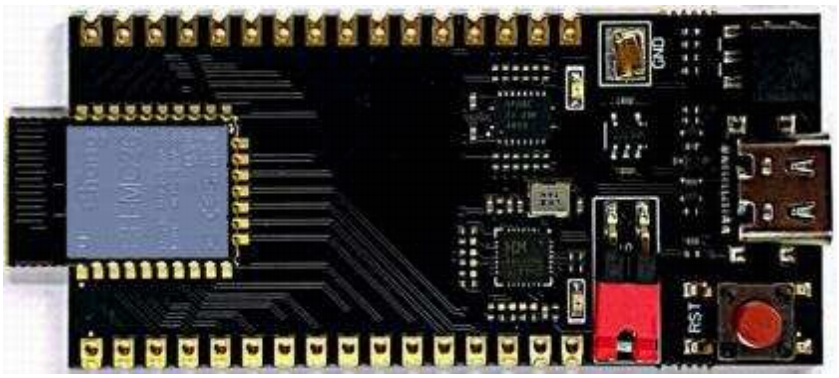


图 8：EH-MC35 开发板

EH-MC35-EVK development board is configured with key functions and serial port and JTAG chip, you can switch the serial port and JTAG through the 2.0 jump cap, while using the standard 2.54 pin pin-out module universal io convenient for customers to use, to meet the customer's basic development and verification needs to improve the efficiency of secondary development.

8、Product Handling

8.1 storage condition

- Products sealed in moisture barrier bags (MBB) should be stored in a non-condensing atmosphere at < 40 °C/90%RH.

- Modules have a moisture sensitivity class MSL of 3.

- Vacuum bags must be used within 168 hours after unpacking at 25±5 °C and 60% RH, otherwise they need to be baked before they can be put back on line.

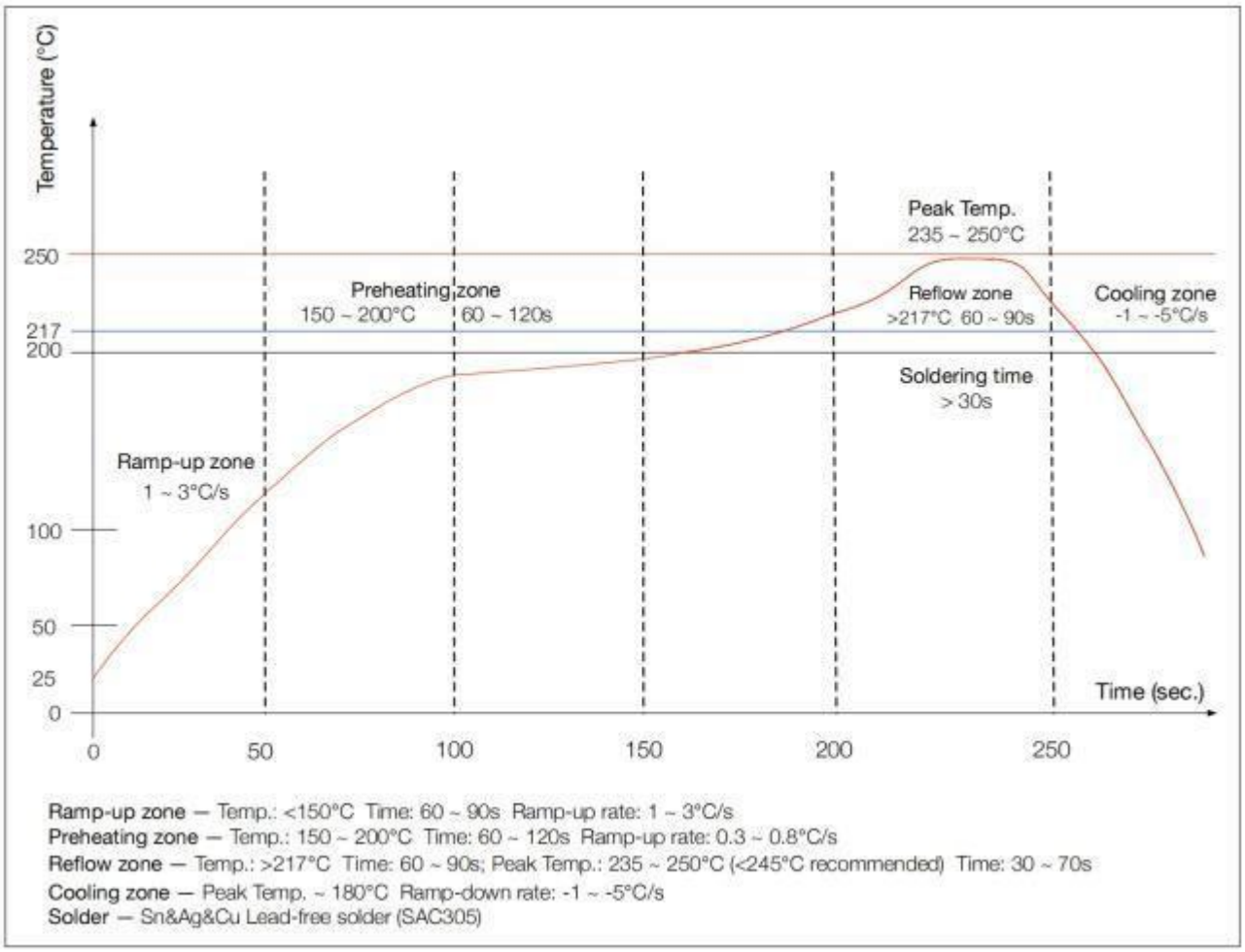
8.2 Electrostatic Discharge (ESD)

- Human Body Discharge Mode (HBM): ±2000 V

- Charging Device Mode (CDM): ±500 V

8.3 Reflow temperature profile

It is recommended that the module be reflowed only once.



9、Related documents and information

9.1 Related files of Next Rainbow Information

Technical Support Email:
support@ehonglink.com

Sales Email: sales@ehonglink.com

Contact: 021-64769993-201

9.2 revision history

date	revision	Updates
2024-4-1	V1.0	Initial Release
2024-6-14	V1.1	Modify module IO definition

Integration instructions for host product manufacturers according to KDB 996369 D03 OEM Manual v01r01

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-MC35 Model PCB Antenna(0.40dBi)

EH-MC35B 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 composit 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-MC35 (PCB Antenna)

EH-MC35B (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: 2ACCRMC35" 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 circuity), 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: 2ACCRMC35”.

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 devi ce. 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 brouillageradioélectriquesubi, mêm esi le brouillageest susceptible d'encompromettre 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-MC35.

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: Contient des IC: 20625-MC35

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-MC35 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 hava a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Mesh self-organizing network type communication equipment, can efficiently and quickly form a non-central wireless broadband network； BLE Wearable Devices,Fitness trackers and smartwatches that monitor heart rate, sleep patterns, steps taken, and other health metrics.