EH-MC17

Low Energy Module User Manual

08 Sep 2018 Version1.2

Professional ***Bluetooth*** Solution Provider

QUICK VIEW

- **Bluetooth® Radio**
  - Fully embedded Bluetooth® v5.0 single mode
  - ARM Cortex-M4, 160KB SRAM
  - +6dBm TX power
  - -94dbm RX sensitivity
  - LE advertising Extensions
  - AES128/192/256 encrypt/decrypt engine
  - Supports OTA(Over the Air)
- **Support Profiles**
  - BLE (Master and slave)
  - SIGmesh
  - The generic attribute profile (GATT)
  - Health care, Sports and fitness, Proximity sensing profiles
  - Alerts and timer profiles
  - HID （keyboards, remote）
- **User Interface**
  - UART*2
  - SPI master interface
  - RTC
  - I^2C *2
  - PWM *8
  - I2S/PCM interface for external audio codec
  - Supports I8080 interface for LCD
  - 4M internal SPI flash
- **General I/O**
  - 15 general purpose I/Os
  - 1 analogue I/O (10bit ADC)
- **Voltage supply: 3.3V typical**
- **Size:17.7*11.95*2.2mm**
- **Operating temperature range: -30 ℃ to 85 ℃**

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

Contact information

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1. Description

EH-MC17 Bluetooth® low energy single mode module is a single mode device targeted for low power sensors and accessories.

The module offers all Bluetooth® low energy features v5.0: radio, stack, profiles and application space for customer applications, so no external processor is needed. The module also provides flexible hardware interfaces to connect sensors, simple user interfaces or even displays directly to the module.

The module can be powered directly with a standard 3V coin cell batteries or pair of AAA batteries. In lowest power sleep mode it consumes only 1.6uA(no RAM retention and external interrupts enabled) and will wake up in few hundred microseconds.

After buying Bluetooth® module, we provide free technical support APP of iOS system or APP Android system.

2. Applications

- HID: keyboards, mice, touchpads, advanced remote controls with voice activation
- Sports and fitness sensors: heart rate, runner/cycle speed and cadence
- Health sensors: blood pressure, thermometer and glucose meters
- Mobile accessories: watches, proximity tags, alert tags and camera controls
- Smart home: heating/lighting control

3. EH-MC17 Product numbering

EH-MC17 （B）

A. EH ---------- Company Name(Ehong)

B. MC17 ---------- Module Name

C. B ---------- U.FL Port

4. Electrical Characteristics

4.1 Recommended Operation Conditions

Operating Condition	Min	Typical	Max	Unit
Operating Temperature Range	-30	+20	+85	℃
Battery (VDD_BAT) operation	1.8	+3.0	+3.6	V
I/O Supply Voltage (VDD_PIO)	1.8	+3.0	+3.6	V
AIO input	0	-	+1.26	V
Frequency range	2402		2480	MHz

Table 1: Recommended Operation Conditions

4.2 Absolute Maximum Rating

Rating	Min	Max	Unit
Storage Temperature	-40	+85	℃
Battery (VBAT) operation*	0	+3.6	V
I/O supply voltage	0	+3.6	V

Table 2：Absolute Maximum Rating

* Short-term operation up to a maximum of 10% of product lifetime is permissible without damage, but output regulation and other specifications are not guaranteed in excess of 4.2V.

4.3 Power consumption

Condition: VBAT=3V,VDDIO=3V,ambient temperature:25℃

Power mode	Current Consumption(Typical)	Unit
Active RX mode	7.3	mA
Active TX mode(TX power:0dBm)	7.9	mA
Active TX mode(TX power:4dBm)	9.6	mA
Active TX mode(TX power:7.5dBm)	11.3	mA

Table 3:Power consumption

4.4 Input/Output Terminal Characteristics

Input Voltage Levels	Min	Typical	Max	Unit
VIL input logic level low	-	-	25% xVDD	V
VIH input logic level high	70% x VDD	-	-	V
Tr/Tf	-	-	25	ns
Output Voltage Levels	Min	Typical	Max	Unit
VOL output logic level low, IOL = 8.0mA(Max Drive Strength)	-	-	20%X VDD_PADS	V
VOH output logic level high, IOL = - 8.0 mA (Max Drive Strength)	80% x VDD	-	--	V
Tr/Tf (For 30pF load)	-	-	2	ns
Input and Tri-state Current	Min	Typical	Max	Unit
With strong pull-up	3.5	4.7	6.0	KΩ
With strong pull-down	3.5	4.7	6.0	KΩ
With weak pull-up	8	40	50	μA
With weak pull-down	10	40	50	μA
CI Input Capacitance	-	5	-	pF

Table 4: Digital I/O Characteristics

Input Voltage Levels	Min	Typical	Max	Unit
AIO	0	-	VDD_AUX	V

Table 5: AIO Characteristics

Condition	Class	Max Rating
Human Body Model Contact Discharge per JEDEC EIA/JESD22-A114	1C	2000V (all pins)
Charged Device Model Contact Discharge per JEDEC EIA/JESD22-C101	C1	500V (all pins)

Table 6: ESD Protection

5. Pinout and Terminal Description

5.1 Pin Configuration

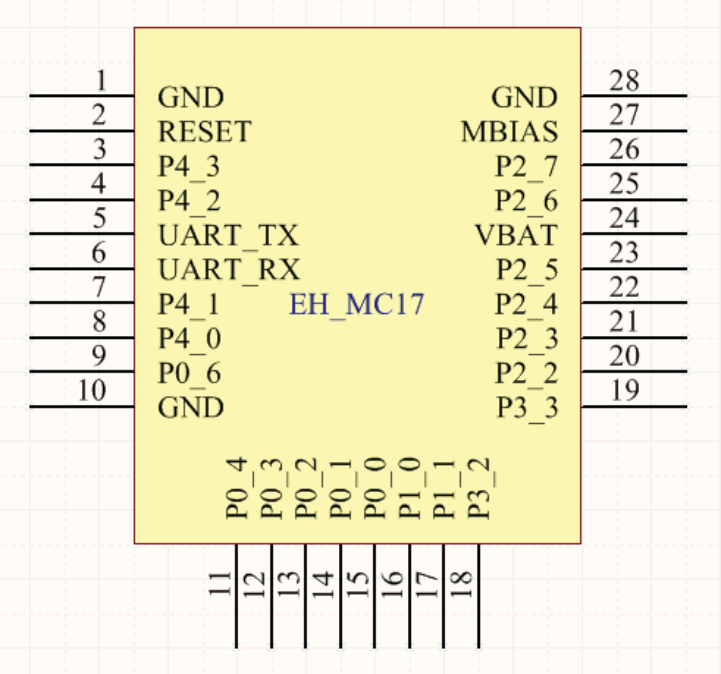

Figure 1： Pinout of EH-MC17

Pin	Pin	I/O	Description	Remark
1	GND			
2	RESET		Global reset, active low	The test point for MP needs to be reserved Use of calibration
3	P4_3	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
4	P4_2	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
5	UART TX		UART TX	The test point for MP needs to be reserved Use of calibration.
6	UART RX		UART RX	The test point for MP needs to be reserved Use of

				calibration.
7	P4_1	IO	IO	Power on trap: Pull-up for normal operation Pull-down to bypass executing program code in flash (PAD internal pull-up by default).
8	P4_0	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
9	P0_6	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
10	GND			
11	P0_4	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
12	P0_3	IO	IO	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)
13	P0_2	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
	P0_1	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
15	P0_0	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
16	P1_0	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. SWDIO (default)
17	P1_1	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. SWDCLK(default)
18	P3_2	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
19	P3_3	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down.
20	P2_2	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 2
21	P2_3	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 3
22	P2_4	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 4
23	P2_5	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 5
24	VBAT			Battery voltage input
25	P2_6	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 6 simulation MIC input N
26	P2_7	IO	IO	General input/output;8mA drive capability.Wake up function.Internal strong/weak pull-up and pull-down. AUXADC input 7 simulation MIC input P

27	MBIAS	IO	IO	Bias of microphone When microphone bias is not used, pin sharing is GPIO
28	GND			

Table 7：PIN Terminal Description

6. Physical Interfaces

6.1Power Supply

- The module power supply 3v coin cell batteries or DC 3.3v
- Power supply pin connection capacitor to chip and pin as far as possible close
- Capacitor decouples power to the chip
- Capacitor prevents noise coupling back to power plane.

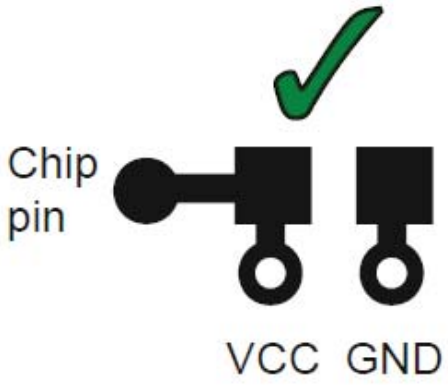

Figure 2： Power Supply PCB Design

6.2 UART

The MC17 embeds UART to implement full-duplex transmission and reception. Both TX and RX interface are 4-layer FIFO interface. Hardware flow control is also support via RTS and CTS.

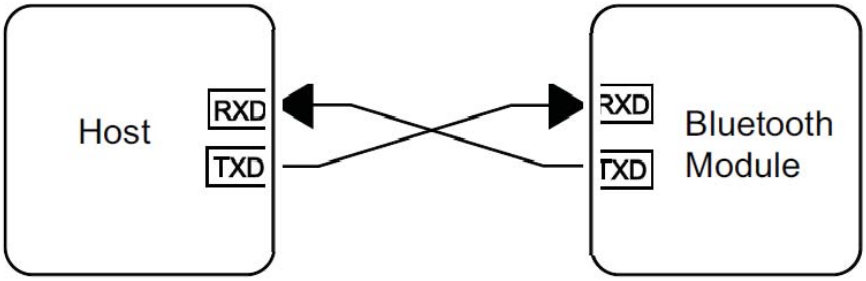

Figure 3： Connection To Host Device

Note: The maximum baud rate is 2400 baud during deep sleep.

6.4 I2C Master/ Slave

The MC17 embeds I2C hardware module, which could act as Master mode or Slave mode. I2C is POPULAR inter-IC interface requiring only 2 bus lines, a serial data line (SDA) and a serial clonk (SCL). M030 I2C module supports standard mode (100kbps), Fast-mode (400kbps), Fast-mode plus (1Mbps) and High-speed mode (3.4Mbps) with restriction that system clock must be by at least 10x of data rate. I2C module of the M030 acts as Slave mode by default. I2C slave mode supports two sub modes including DMA and Mapping mode.

6.5 SPI

The MC17 embed SPI, which could act as Master mode or Slave mode. SPI is high-speed, full-duplex and synchronous communication bus requiring 4bus lines including a chip select (CS) line, a data input (DI) line, a data output (DO)line and a clock (CK) line. SPI for the M030 acts as slave mode by default. SPI Slave mode support DMA.

7. Layout and Soldering Considerations

7.1 Soldering Recommendations

EH-MC17 is compatible with industrial standard reflow profile for Pb-free solders. The reflow profile used is dependent on the thermal mass of the entire populated PCB, heat transfer efficiency of the oven and particular type of solder paste used. Consult the datasheet of particular solder paste for profile configurations.
Comply will give following recommendations for soldering the module to ensure reliable solder joint and operation of the module after soldering. Since the profile used is process and layout dependent, the optimum profile should be studied case by case. The following recommendation should be taken as a starting point guide.

- Refer to technical documentations of particular solder paste for profile configuration.
- Avoid using more than one flow.
- Reliability of the solder joint and self-alignment of the component are dependent on the solder volume. Minimum of 150um stencil thickness is recommended.
- Aperture size of the stencil should be 1:1 with the pad size.
- A low residue, “no clean” solder paste should be used due to low mounted height of the component.

7.2 Layout Guidelines

For optimal performance of the antenna place the module at the corner of the PCB as shown in the figure 6. Do not place any metal (traces, components, battery etc.) within the clearance area of the antenna. Connect all the GND pins directly to a solid GND plane. Place the GND vias as close to the GND pins as possible. Use good layout practices to avoid any excessive noise coupling to signal lines or supply voltage lines. Avoid placing plastic or any other dielectric material closer than 6 mm from the antenna. Any dielectric closer than 6 mm from the antenna will detune the antenna to lower frequencies.

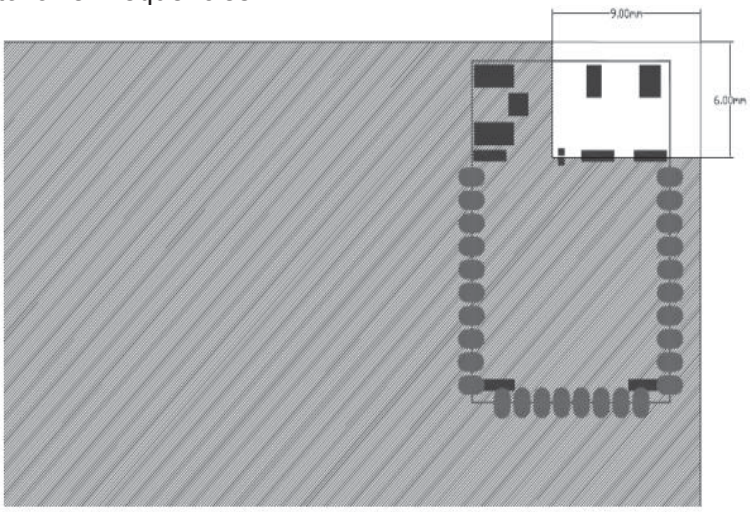

Figure 5： Clearance area of antenna

8. Mechanical and PCB Footprint Characteristics

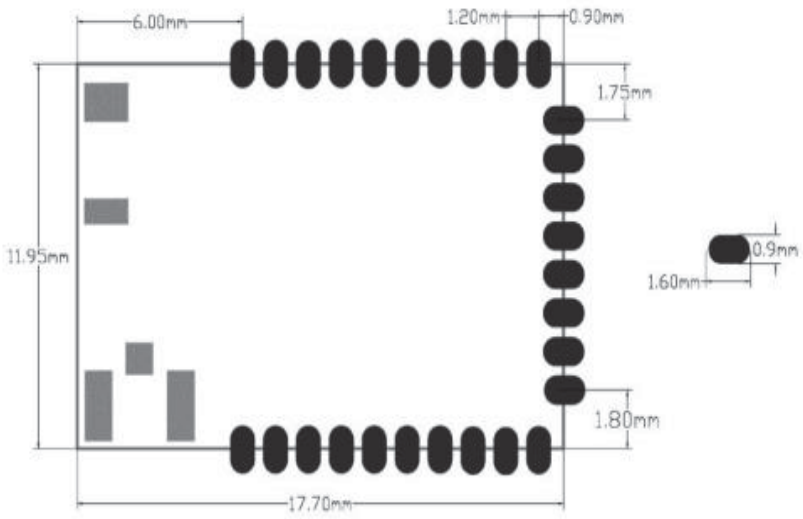

Figure 6：Physical Dimensions and Recommended Footprint (Unit: mm, Deviation:0.02mm)

9. Packaging

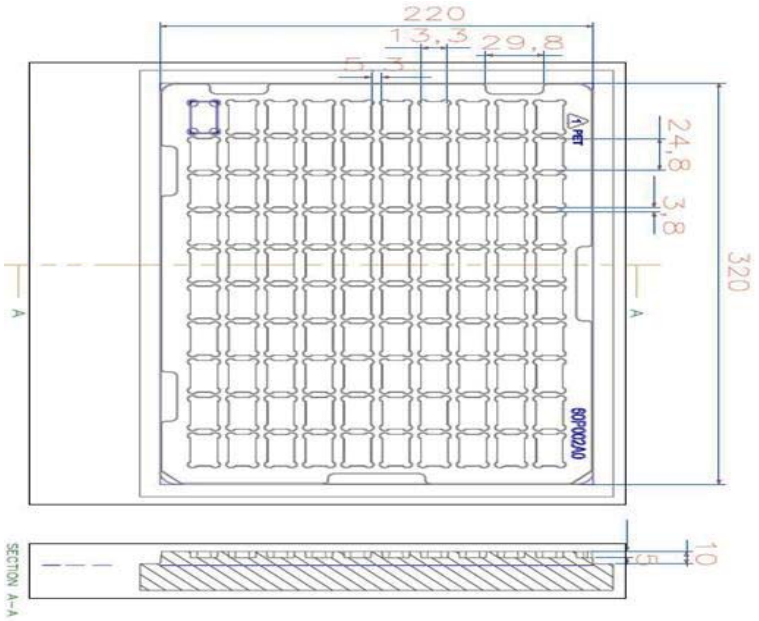

Figure 7： EH-MC17 Packaging (Pallet）

Remark：packaging for the pallet,one packaging quantity is 100 PCS。

Regulatory Module Integration Instructions

2.2 List of applicable FCC rules

This device complies with part 15.247 of the FCC Rules.

2.3 Summarize the specific operational use conditions

This module can be applied in HID, sports and fitness sensors , health sensors, mobile accessories as well as smart home. The input voltage to the module should be nominally 1.8-3.6 V DC， typical value 3V DC and the ambient temperature of the module should not exceed 85℃.

This module using one kind of ceramics antennas with maximum gain is 0 dBi ,the other kind of dipole antenna with maximum gain is 3dBi.Other antenna arrangement is not covered by this certification.
If the antenna needs to be changed，the certification should be re-applied.

2.4 Limited module procedures

Not applicable

2.5 Trace antenna designs

Not applicable

2.6 RF exposure considerations

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& your body. If the device built into a host as a portable usage， the additional RF exposure evaluation may be required as specified by 2.1093.

2.7 Antennas

Module contains one ceramics antenna or one dipole antenna.

2.8 Label and compliance information

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as: "Contains Transmitter Module FCC ID: 2ACCRMC17 "， or "Contains FCC ID: 2ACCRMC17 "，Any similar wording that expresses the same meaning may be used.

2.9 Information on test modes and additional testing requirements

a)The modular transmitter has been fully tested by the module grantee on the required number of channels， modulation types， and modes， it should not be necessary for the host installer to re-test all the available transmitter modes or settings. It is recommended that the host product manufacturer， installing the modular transmitter， perform some investigative measurements to confirm that the resulting composite system does not exceed the spurious emissions

limits or band edge limits (e.g.，where a different antenna may be causing additional emissions).
b)The testing should check for emissions that may occur due to the intermixing of emissions with the other transmitters， digital circuitry， or due to physical properties of the host product (enclosure). This investigation is especially important when integrating multiple modular transmitters where the certification is based on testing each of them in a stand-alone configuration. It is important to note that host product manufacturers should not assume that because the modular transmitter is certified that they do not have any responsibility for final product compliance.

C)If the investigation indicates a compliance concern the host product manufacturer is obligated to mitigate the issue. Host products using a modular transmitter are subject to all the applicable individual technical rules as well as to the general conditions of operation in Sections 15.5， 15.15， and 15.29 to not cause interference. The operator of the host product will be obligated to stop operating the device until the interference has been corrected

The EH-MC17 module is based on RTL8762CKF chip .support standard Bluetooth HCI UART commands. For the testing module on your product, user can refer to specification of the Bluetooth system on how to configure and evaluate the module.This specification can also be found on the official Bluetooth website:
https://www.bluetooth.org/en‐us/specification/adopted‐specifications.

2.10 Additional testing， Part 15 subpart B disclaimer

The final host / module combination need to be evaluated against the FCC Part 15B criteria for unintentional radiators in order to be properly authorized for operation as a Part 15 digital device .

The host integrator 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 and should refer to guidance in KDB 996369.

Frequency spectrum to be investigated

For host products with certified modular transmitter， the frequency range of investigation of the composite system is specified by rule in Sections 15.33(a)(1) through (a)(3)， or the range applicable to the digital device， as shown in Section 15.33(b)(1)， whichever is the higher frequency range of investigation.

Operating the host product

When testing the host product， all the transmitters must be operating.The transmitters can be enabled by using publicly-available drivers and turned on， so the transmitters are active. In certain conditions it might be appropriate to use a technology-specific call box (test set) where accessory devices or drivers are not available.

When testing for emissions from the unintentional radiator， the transmitter shall be placed in the receive mode or idle mode， if possible. If receive mode only is not possible then， the radio shall be passive (preferred) and/or active scanning. In these cases ， this would need to enable activity on the communication BUS (i.e.， PCIe， SDIO， USB) to ensure the unintentional

radiator circuitry is enabled. Testing laboratories may need to add attenuation or filters depending on the signal strength of any active beacons (if applicable) from the enabled radio(s). See ANSI C63.4， ANSI C63.10 and ANSI C63.26 for further general testing details.

The product under test is placed into a normal ‘paired' mode with another BLE device， as per the normal intended use of the product (for example， transferring data).

FCC Statement

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

ISED RSS Warning:

This device complies with Innovation, Science and Economic Development Canada licence-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.

Le présent appareil est conforme aux CNR d'ISED 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.

ISED RF exposure statement:

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

Le rayonnement de la classe b repecte ISED fixaient un environnement non contrôlés.Installation et mise en œuvre de ce matériel devrait avec échangeur distance minimale entre 20 cm tonon corps.Lanceurs ou ne peuvent pas coexister cette antenne ou capteurs avec d’autres.

IC Label Instructions:

The outside of final products that contains this module device must display a label referring to the enclosed module. This exterior label can use wording such as:

“Contains Transmitter Module

IC: 20625-MC17”,or “Contains IC: 20625-MC17”, Any similar wording that expresses the same meaning may be used Instructions d'étiquetage IC:

L'extérieur des produits finis contenant ce module doit afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser des libellés tels que: contient le module émetteur

IC: 20625-MC17 ”ou“ contient: IC: 20625-MC17 ”, tout libellé similaire exprimant le même sens peut être utilisé