# D5-42 User Manual

## General

Power supply: The radio module use the DC-DC N5 to provide power for radio chip and RFID chip.

Transmitting: The ESP32-c3-MINI-1 module is a low-power and high-performance radio transceiver that operates in the 2.4GHz frequency band. In the transmission phase, the mainboard CPU sends the data to ESP-C3-MINI-1 through the UART interface. When ESP32-C3-MINI-1 receives the transmission command from the CPU, it enters the transmission mode to modulate the data in the RF band. After the modulation phase, the modulated RF signal will pass through the filter circuit inside the module, and finally the RF signal will radiate outward through the on-board antenna. And the ESP32 module is connected to the TRF7970ARHB through the SPI interface, and the CPU can control the TRF7970ARHB to open and perform card reading operations through the ESP32 module .

Receiving: Establishing a connection with other Bluetooth devices, the ESP32-c3-MINI-1 module will receive data sent by other Bluetooth devices. The RF signal is received from the antenna, and the ESP32-c3-MINI-1 module demodulator is responsible for extracting data from the received signal. The demodulated data is sent to the CPU through the UART interface. The data read by TRF7970ARHB can also be transmitted to the CPU through the ESP32 module or to the Bluetooth device connected to it.

Frequency range1: 13.56MHz.

Frequency range2: 2402-2480MHz.

Modulation: GFSK.

Max EIRP: 4.50 dBm.

Antenna port: PCB Antenna 3.96dBi

## The compliance of KDB 996369 D02 Module Q&A v02 Question 11:

Only internal PCB antenna, so this requirement does not apply to this product.

## The requirement for KDB 996369 D03:

**1 List of applicable FCC rules**
FCC Part 15. 247

**2 Summarize the specific operational use conditions**
None.

**3 Limited module procedures**
The module is a single module, so this requirement is not applicable to the product.

**4 Trace antenna designs**
Only internal PCB antenna, so this requirement does not apply to this product.

**5 RF exposure considerations**
**T**he SAR requirement is deemed to be satisfied without test

**6 Antennas**
For 2.4G Band:
Ant2:  PCB Antenna, 3.96dBi;

**7 Label and compliance information**
If this certified module is installed inside the host device, then the outside of the host must be labeled with “Contains FCC ID: 2BC3H2316B and IC: 31388-2316B”.

**8 Information on test modes and additional testing requirements**
The host manufacturer can use software to make the transmit continuously.

**9 Additional testing, Part 15 Subpart B disclaimer**
The module only complies with the FCC Part 15.247. If the module is installed in the host device, the host manufacturer is responsible for the compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. For example, if the host manufacturer markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuity), then the host manufacturer shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

## FCC & IC application:

This device complies with Part 15 of the FCC Rules / Industry Canada licence-exempt RSS standard(s). 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.

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, mêmesi le brouillageest susceptible d'encompromettre le fonctionnement.

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

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.

**Information for the OEM Integrators**

This device is intended for OEM integrators only. Please see the full grant of equipment document for restrictions.

**Label Information to the End User by the OEM or Integrators**

If the FCC ID of this module is not visible when it is installed inside another device, then the outside of the device into which the module is installed must be label with “Contains FCC ID: 2BC3H2316B and IC: 31388-2316B”.

**Antenna caution**

This radio module IC:31388-2316B 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.

Gain of antenna: 3.96dBi max.
Type of antenna: 50ohm, PCB antenna.

Le présentémetteur radio IC:31388-2316B étéapprouvé par Innovation, Sciences et Développementéconomique Canada pour fonctionner avec les types d'antenneénumérés ci dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cetteliste, et dont le gain estsupérieur au gain maximal indiqué pour tout type figurant sur la liste, sontstrictementinterdits pour l'exploitation de l'émetteur.Gaind'antenne: 3.96dBi maximal

**C2PC test plan**

The modular has no RF shielding as required in §15.212(a) (1)(i) and it cannot be tested in a stand-alone configuration as required in §15.212(a)(1)(v), as required in KDB 996369 D01 V03, C2PC is required for every different specific host using the module.

The following tests will be performed according to FCC Part 15.247 on the host which installed this LMA：

*(The module only supports one modulation, data rate and bandwidth, so all tests will be performed at the same modulation, data rate and bandwidth.)*

**Check the operation frequency range**

Verify 2402MHz and 2480MHz channels to ensure the OFR falls within 2400-2483.5MHz.

**Conducted RF output power**

Original module report: Max. peak power: 0.54dBm@2440MHz.

Verify the 2402MHz, 2440MHz and 2480MHz channels to ensure that the Conducted RF output power is not greater than 0.54dBm.

**Radiated Emissions (band edge)**

Verify 2402MHz and 2480MHz channels to ensure that the host also meets band edge requirements.

**Radiated Spurious Emissions**

Verify the 2402MHz, 2440MHz and 2480MHz channels to ensure that the host also meets Radiated Spurious Emissions requirements.

**Power Line Conducted Emission(FCC Part 15.207)**