



nRF Module User Manual

(Model: HM2401)

INTRODUCTION

This manual contains important instructions for HM2401 and must be read in its entirety before installing or commissioning the equipment. For safety, only qualified technician, who has received training or has demonstrated skills can install and maintain this device under the guide of this document.

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1. Important Safety Information

Read this First

This manual contains important instructions to follow during installation and maintenance of the nRF module.

Safety Instructions

- Only qualified personnel can install or replace the nRF module.
- Do not attempt to repair the module as it contains the parts that are not serviceable to users. If the module breaks down, please contact your distributor for maintenance. Opening the module without permission will invalidate the warranty.
- Please read all technical instructions and cautions in this manual before installing and using the module.

Audience

This manual is only for professional installation and maintenance personnel to use.

2. Module Interfaces

2.1 HM2401 Dimensions

HM2401 dimensions: 19.7mm(W)*32.8mm(L)*3.5mm(H)

Figure 1 shows the HM2401 dimensions.

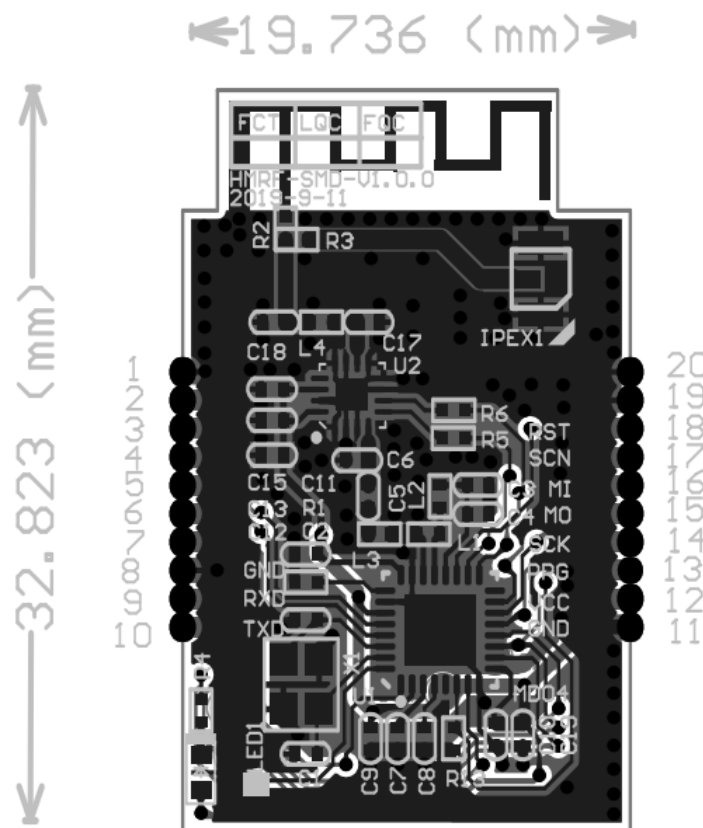


Figure 1 HM2401 dimensions

2.2 Pin Definition

This Table 1 describes the interface pins .

| NO. | Symbol | I/O Type | Function |
|-----|--------|----------|--|
| 1 | Gnd | P | Power supply reference ground pin |
| 2 | NC | I | Null pin, no internal connection |
| 3 | P1.5 | I/O | RESERVED, P1.5, which is connected to P1.5 on the IC |
| 4 | P1.6 | I/O | RESERVED, P1.6, which is connected to P1.6 on the IC |
| 5 | P0.1 | I/O | RESERVED ,P0.1, which is connected to P0.1 on |

| | | | |
|----|------|--------|--|
| | | | the IC |
| 6 | P0.6 | I/O | RESERVED, P0.6, which is connected to P0.6 on the IC |
| 7 | SCK | I/O | Serial peripheral interface clock pin |
| 8 | GND | P | Power supply reference ground pin |
| 9 | RXD | I/O | UART_RX, which is connected to P0.4 on the IC |
| 10 | TXD | Output | UART_TX, which is connected to P0.3 on the IC |
| 11 | GND | P | Power supply reference ground pin |
| 12 | VCC | P | Power supply pin |
| 13 | PRG | I/O | Set high to enter flash programming mode |
| 14 | SCK | I/O | Serial peripheral interface clock pin |
| 15 | MO | O | Serial peripheral interface data output pin |
| 16 | MI | I | Serial peripheral interface data input pin |
| 17 | SCN | I/O | Serial peripheral interface Chip selection pin |
| 18 | RST | I/O | Hardware reset pin (active at a low level) |
| 19 | GND | P | Power supply reference ground pin |
| 20 | GND | P | Power supply reference ground pin |

Table 1 HM2401 interface pins

3. Integration Instructions

3.1 List of applicable FCC rules

This module has been tested and found to comply with part 15C requirements for Modular Approval.

3.2 Summarize the specific operational use conditions

This module can be used in DTU, micro-converter and other equipment. The input voltage to the module should be nominally 1.9~3.6 VDC and the ambient temperature of the module should not exceed 80°C. HM2401 uses a PCB antenna with max antenna gain 2dBi. If the antenna needs to be changed, the certification should be re-applied.

3.3 Limited module procedures

NA

3.4 Trace antenna designs

NA

3.5 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.

3.6 Antennas

| Antenna Type | Peak Gain |
|--------------|-----------|
| PCB antenna | 2dBi |

3.7 Label and compliance information

When the module is installed in the host device, the FCC ID/IC label must be visible through a window on the final device or it must be visible when an access panel or cover is easily re-moved. If not, a second label must be placed on the outside of the final device that contains the following text: “Contains FCC ID: 2ARNB-HM2401”

“Contains IC: 24490-HM2401”. The FCC ID/IC can be used only when all FCC ID/IC compliance requirements are met.

3.8 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 have been corrected.

3.9 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.

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).

FCC Statment:

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 operation.

4. Basic Operation

4.1 NRF Channel List

Depending on the program, the module can work on 2403, 2423, 2440, 2461 or 2475MHz. Unless necessary, it's forbidden to change the module program.

5. Troubleshooting

If the nRF module can't work well, please follow this guideline:

- a) Try to repower on the device. If the LED on the module can't light, please change the module or send the whole device to us.
- b) If the LED can light, please change the antenna.
- c) After changing the antenna, if it still can't work, please change the module or send the whole device to us.

6. Technical Data

| | |
|-------------------|---------------------------------|
| Model | HM2401 |
| Type | 2.4G RF |
| Channel List | 2403, 2423, 2440, 2461, 2475MHz |
| Modulation Type | GFSK |
| Antenna Gain | 2dBi |
| Working Voltage | 1.9~3.6V |
| Power Consumption | 40mW typical |

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 respecte 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.