Product Specification

Product name : 2.4GHz band wireless module

Product type : HRF-2401

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Issued sign

ISSUED
'15.08.03
HERUTU

Date	Drawing Number	Approved	Checked	Drawn
2015.08.03	DC15002-02	ENG.DEPT 2015.08.03 NAKAI	SALES 2015.08.03 FUJITA	ENG.DEPT 2015.08.03 UEDA

1. Summary

・HRF-2401 is 2.4GHz band wireless module.

・CPU is mounted in HRF-2401. It can be used by arranging only an input/output circuit to motherboard.

・HRF-2401 can work by coin battery or dry battery.

・It can be selected from 4 kinds of antennas by customer situation.

・HRF-2401 can not work by itself. It is necessary to be mounted to motherboard.

IMPORTANT NOTE:

ⅰ.That module is limited to OEM installation only.

ⅱ.That OEM integrators is responsible for ensuring that the end-user has no manual instructions to remove or install module.

ⅲ.That module is limited to installation in mobile or fixed applications, according to Part 2.1091(b)

ⅳ.That separate approval is required for all other operating configurations,

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 required regulatory information/warning as below.

ⅰ.End-users must be provided with transmitter/antenna installation requirements and operating conditions for satisfying RF exposure compliance.

ⅱ.A separate section should clearly state "FCC RF Exposure requirements:"

ⅲ.Required operating conditions for end users

ⅳ.Antenna/or transmitter installation requirements.

Labelling Requirements for the Host device

The host device shall be properly labelled to identify the modules within the host device. The Industry Canada certification label of a module shall be clearly visible at all times when installed in the host device,
otherwise the host device must be labelled to display the Industry Canada certification number of the module, preceded by the words "Contains transmitter module", or the word "Contains", or similar wording expressing the same meaning, as follows:
Contains transmitter module IC:
10608A-HRF2401 where 10608A-HRF2401 is the module's certification number.
The applicant for equipment certification of the module shall provide with each unit of the module either a label such as described above, or an explanation and instructions to the user as to the host device labelling requirements.

2.Specification

■General specification

Item	Specification
Product type	HRF-2401
Device	nRF24LE1-F16Q48 Flash memory 16kByte/RAM 1kByte
Power source	2.05V～6.0V(Inside 2.0V)
Current Consumption	Transmition approx 17.0mA/Receiving approx 18.5mA Standby Max 5.5μA
Usage environment	0℃～50℃/RH Under 85%
External dimensions	20mm×32mm×3mm
Quority of Material	Shield case：C7521P t=0.15/basis material

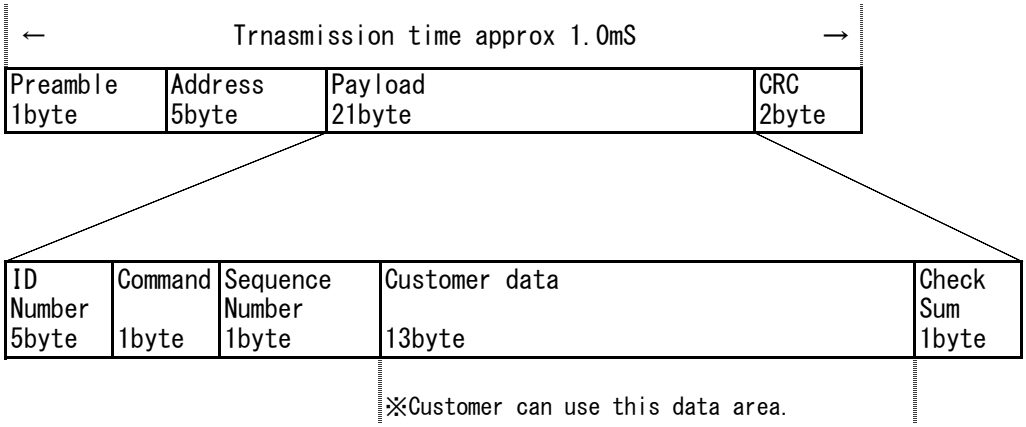
■Wireless Specification

Item	Soecification
Frequency	2403MHz～2478MHz
Type of Modulation	GFSK
Emission desingnation	F1D
Mode of operation	Half duplex
Transmit power	2.1mW
Channel spacing	1MHz
Number of channel	76ch
Frequency deviation	±160kHz
Frequency error	±30ppm
Data rate	250kbps
Crystal oscillation frequency	16MHz
Antenna type *1	Internal antenna ①1/4λ Dipole chip antenna External antenna ②1/4λ Dipole antenna(Flying Lead and U-FL connector) ③1/2λ Dipole antenna(SMB Male connector) ④1/2λ Dipole antenna(SMB Male connector) Magnet Base / Cable:RG174-1.5m

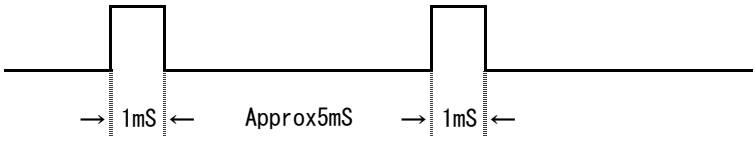
*1 Antenna is used only 1 type from 4kinds

■Communication format

①Trnasmitting and receiving data format



②Transmission interval



Data transmission time 1mS＋Stop time approx 5mS ->1cycle(Approx 6mS)

■Interface specification

Item	Specification
Coaxial connector *2	For external antenna : 20279-001E-01
GP-IO *3	・Input/Output port number Maximum 30lines ・PWM 2CH(Frequency range : 4khz～254kHz) ・ADC Resolusion performance Maximum 12bit
Serial Communication	・UART Synchronous system : Asynchromous communication Communication speed : Under 38400bps Start bit : 1bit Data length : 8bit Stop bit : 1bit Parity bit : none Flow sequence : none ・I2C Standard mode(100kbps) High speed mode(400kbps) ・SPI Slave(8Mbps) *4
Terminal shape	Side throw hole(1.5mm pitch) *5 Terminal number : 35pin

*2 *In case of the chip antenna specification, the coaxial connector for external antennas is made non-mounting.

*3 A serial communication shares a part port with an input/output port and PWM/ADC. It isn't possible to overlap and use.

*4 Communication speed for SPI port is limited depending on a resistance to be connected.

*5 Also there are 3 pin of side throw hole to fix the shield case. When it is mounted,a module has to fix to motherboard by solder for fixed reinforcement.

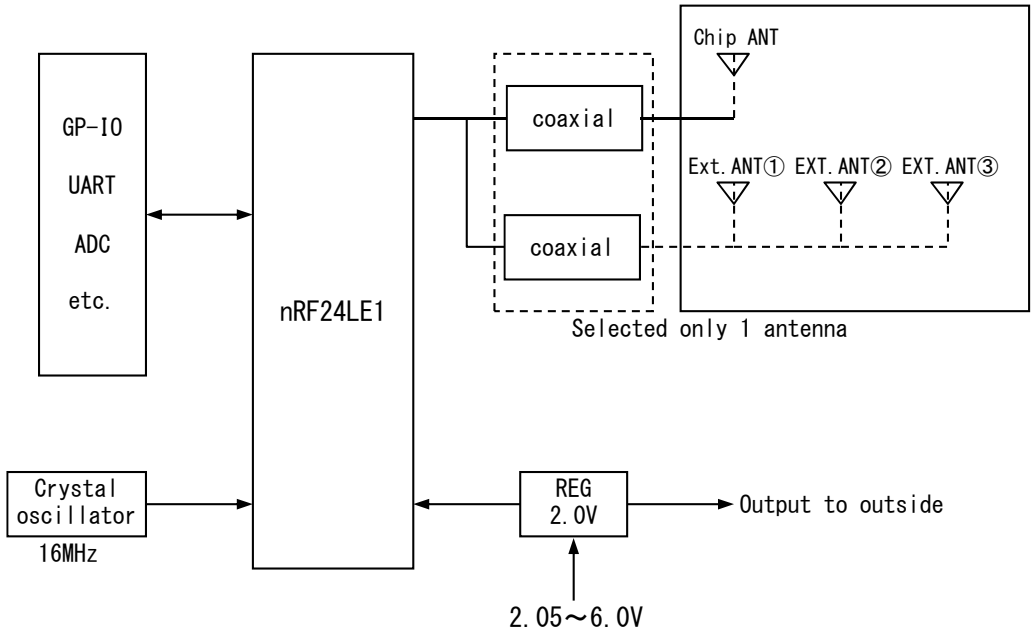
3.Operating explanation

HRF-2401 do a pairing with an equipment to communicate before wireless communicating.
Piring way is different by a specification of included the interface electric substract.
One is to match each ID by dipswitch,one is transmitter send ID data by registration switch,receiver register the ID data received from transmitter.
There are several ways for registration by customer specification.
Each equipment done a paring communicates by using 1ch among 4ch selected from 76ch.

Each equipment can receive an answer back by setting.

Input and output terminal can be connected a keyboard,a LED and a LCD etc.
It is programed by costomer request.

4.Block diagram



5.Precaution for use

①Antenna

The certification of HRF-2401 is included antenna to be used.
It can be registered 4 kinds of antenna for HRF-2401.
Other antenna not to be certified can not be used.

Please use only allowed antenna (in below list).

Internal antenna ①1/4λ Dipole chip antenna External antenna ②1/4λ Dipole antenna(Flying Lead and U-FL connector) ③1/2λ Dipole antenna(SMB Male connector) ④1/2λ Dipole antenna(SMB Male connector) Magnet Base / Cable:RG174-1.5m

Use other antenna may subject to additional testing and filing to FCC.

②Chip antenna

When you use a HRF-2401 of chip antenna specification,communication distance may be short noticeably.
Then please get a clearance around the antenna as far as possible.

③All kinds protection circuit

This module recommends to include a protection circuit according to the use because a protection circuit from static electricity isn't included in a port variously.

④Power source

A minimum of a operation voltage is set to 2.05V,because a regulator of 2V is mounted on this module.
Please take the measure which stops a malfunction of a circuit using voltage detection IC by used battery and power unit.

⑤Request to the final product 1

1) Please include the following sentence on the final product.

> 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.

2) In the instruction manual of the final product, please describe the following sentence.

> Caution: The user is cautioned that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
>
> This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users mustfollow the specific operating instructions for satisfying RF exposure compliance. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

3) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual

Note: 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.

4) The final end product must be labeled in a visible area with the following.

Contains TX FCC ID:T82HRF-2401

⑥Request to the final product 2

1) In the instruction manual of the final product, please describe the following sentence.

This device complies with part of FCC Rules and Industry 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'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.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

IMPORTANT NOTE: Radiation Exposure Statement
The available scientific evidence does not show that any health problems are associated with using low power wireless devices.
There is no proof, however, that these low power wireless devices are absolutely safe. Low power Wireless devices emit low levels of radio frequency energy (RF) in the microwave range while being used. Whereas high levels of RF can produce health effects (by heating tissue), exposure of low-level RF that does not produce heating effects causes no known adverse health effects. Many studies of low-level RF exposures have not found any biological effects. Some studies have suggested that some biological effects might occur, but such findings have not been confirmed by additional research. This device (モデル名) has been tested and found to comply with IC radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the IC radio frequency (RF) Exposure rules.

Les connaissances scientifiques dont nous disposons n'ont mis en évidence aucun problème de santé associé à l'usage des appareils sans fil à faible puissance. Nous ne sommes cependant pas en mesure de prouver que ces appareils sans fil à faible puissance sont entièrement sans danger. Les appareils sans fil à faible puissance émettent une énergie radioélectrique (RF) très faible dans le spectre des micro-ondes lorsqu'ils sont utilisés. Alors qu'une dose élevée de RF peut avoir des effets sur la santé (en chauffant les tissus), l'exposition à de faibles RF qui ne produisent pas de chaleur n'a pas de mauvais effets connus sur la santé. De nombreuses études ont été menées sur les expositions aux RF faibles et n'ont découvert aucun effet biologique. Certaines études ont suggéré qu'il pouvait y avoir certains effets biologiques, mais ces résultats n'ont pas été confirmés par des recherches supplémentaires. モデル名 a été testé et jugé conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (FR) RSS-102 de l'IC.

(モデル名), please fill in the model number of the device