

# **User manual**

**Wireless module**

**RY24TL-01DT**

Rev 1.0

**Ryoyo Electro Corporation**

### **Compliance statement to FCC/IC**

This module complies with part 15 of the FCC rules and IC RSS-210.

Operation is subject to the following 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.

### **Warning**

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

### **RF exposure compliance**

- 1) To comply with FCC/IC RF exposure compliance requirements, a separation distance of at least 20 cm must be maintained between the antenna of this device and all persons.
- 2) This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

### **Requirements to end product**

This module must be integrated only by OEM integrators under the following conditions.

(1) OEM integrator has to be aware not provide information to the users regarding how to install or remove this module in the users manual of the end product which integrate this module. Installation by end users is strictly prohibited.

(2) Antenna

OEM integrator shall use this module without any modifications including antenna.

If module integrator uses a unique antenna, the FCC certification is required for the end product. OEM integrator must make sure that 20cm minimum separation is maintained between users and the antenna.

(3) Co-location.

This module must not be co-located or operated in conjunction with any other antenna or transmitter. The module integrator shall obtain FCC approval for the end product, if the module is used for co-location operation.

(4) Markings

To satisfy FCC/IC exterior labeling requirements, the following text must be placed on the exterior of the end product.

**Contains Module FCC ID: HV4RY24TL, IC: 6888A-RY24TL**

Any similar wording that expresses the same meaning may be used.

(5) Caution to user for modification

The following caution is expressed on the user's instruction manual.

**The changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the device.**

(6) Compliance statement to FCC

The following statement is expressed on the user's instruction 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.**

(7) Compliance statement to IC

The following statement is expressed on the user's instruction manual.

**Operation is subject to the following 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.**

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## 1. Introduction

Wireless module RY24TL-01DT is bi-directional serial data communication module by using 2.4GHz ISM band.

### Features

Ultra low latency 2.4GHz wireless serial communication

Secure wireless communication by 40bit ID code

Unique user ID (24bit)

RF strength monitor

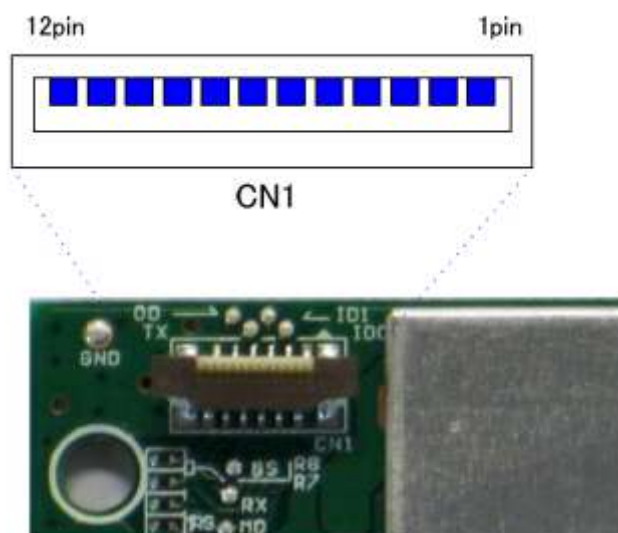
## 2. RF Specification

Item	Description
RF band	2.4GHz ISM band
Carrier frequency	2,404MHz/2,409MHz/2,414MHz/2,437MHz 2,442MHz/2,447MHz/2,470MHz/2,475MHz 2,480MHz
Band width	1MHz
Output power	+ 1.8 dBm (1.5mW)
Receive sensitivity	- 85 dBm (0.1%BER)
Modulation	GFSK
Diffusion	No
Data transfer rate	1Mbps
Antenna type	PCB antenna
ID length	40bit

### 3. Connector description

Pin No	Pin name	Direction	Internal connection	Description
1	VDD	In	-	VDD in (+3.3V)
2				
3	RESET	In	Pull up (4.7Kohm)	Reset
4	MODE	In/Out	Pull up (4.7Kohm)	Only for F/W update
5	TXD	In	Pull up (68Kohm)	Data input (UART)
6	RXD	Out	Pull up (68Kohm)	Data output (UART)
7	Out Detect/ ID OK	Out	Pull down (68Kohm)	Out detect and ID set finish indicator
8	BS/PS	In	Pull down (68Kohm)	Mode select (Low=PS/High=BS)
9	ID_0	In	Pull down (68Kohm)	ID set mode 0 select
10	ID_1	In	Pull down (68Kohm)	ID set mode 1 select
11	VSS	In	-	VSS
12				

### Pin layout



## 4. Control specification

### 4.1 Requirements for power on procedure

CPU I/F will available to access with command 150ms after power supply had stabled.

BS/PS pin have to be fixed before not passed 120ms after power supply had stabled.

When BS mode is selected, this module starts a sequence for searching the other BS module.

After the searching sequence, a table of used is decided. (Max 6 tables)

### 4.2 Reset

For reset module, input low pulse to RESET pin Low.

After reset, It is necessary to keep time condition same as after power on.

### 4.3 Operation mode selection

Operation mode is decided as follow.

<BS/PS pin>

Low/Open : PS Mode

High : BS Mode

### 4.4 User ID write/read

User can rewrite ID by using ID\_0, ID\_1 and serial pin.

<ID1 / ID0>

0 0 : Normal

0 1 : Not specified

1 0 : ID write

1 1 : ID read

#### 4.5 Serial communication (UART)

This module provide serial interface for control as follow.

Item	Value
Bit rate	115,200bps
Data length	8bit
Parity	Non
Start bit	1bit
Stop bit	1bit
Flow control	Non

Kind of Packet	Input/Output	Length (byte)	Valid mode (BS/PS)
BS→PS payload input	In	8	BS
PS→BS payload output	Out	16	BS
PS→BS payload input	In	16	PS
BS→PS payload output	Out	8	PS
ID write	In	3	BS/PS
ID read	Out	3	BS/PS
Test command	In	5	BS/PS



#### 4.6 Out detect function

User can detect that this system is out of range by using Out Detect pin.

<Out Detect pin>

Low : Out of range

High : Good quality for communication

#### 4.7 Stand-by mode

By using serial command, user can disable to transmit from BS module.

When into stand-by mode, all packets except broadcast packet are canceled to transmit.

## 5. Electrical characteristics

### 5.1 Absolute maximum ratings

Symbol	Parameter	Rating	Unit
VDD	Supply voltage	-0.3 to 3.6	V
VSS	Supply voltage	-0.3 to VDD+0.3	V
Topr	Operating temperature	-20 to 85	°C

### 5.2 Recommended operating conditions (DC)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
VDD	Supply voltage		3.0	3.3	3.6	V
Topr	Operating temperature		0		60	°C
VIH	H input voltage		VDD*0.8		VDD	V
VIL	L input voltage		0		VDD*0.2	V
VOH	H output voltage	IOH = -1mA	VDD-0.5		VDD	V
VOL	L output voltage	IOL = 1mA			0.5	V
IOH	H output current	Average of 100ms			-5	mA
IOL	L output current	Average of 100ms	5			mA
IVDD1	Power supply current (BS mode)	Standard: 25°C Max:0 to 60°C	10.5		25	mA
IVDD2	Power supply current (PS mode)	Standard: 25°C Max:0 to 60°C	18		30	mA

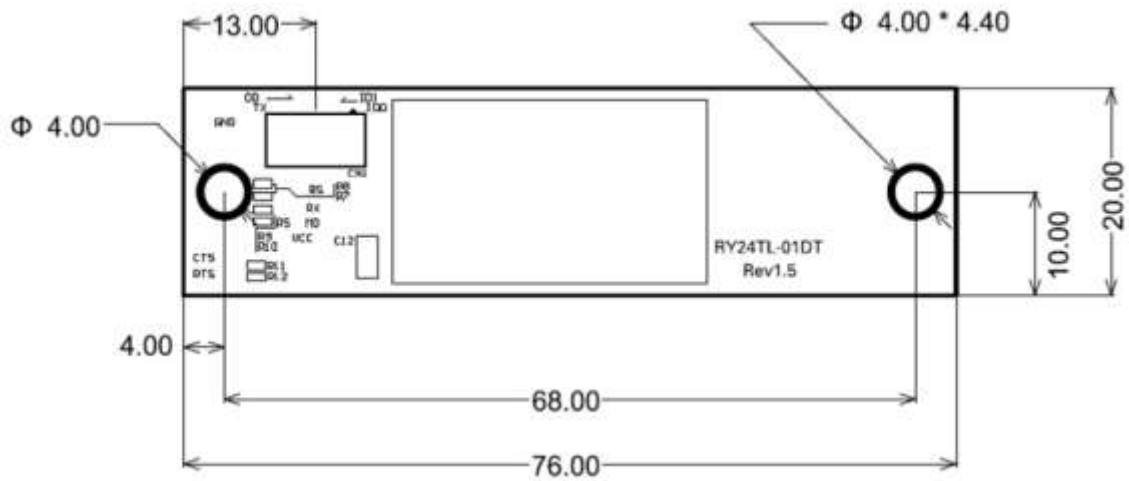
Note) Temperature condition is 0 to 60°C, if not specified.

### 5.3 Recommended operating conditions (AC and others)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
-	UART output baud rate		113.8	115.2	117.3	Kbps
-	ID write cycles	MCU manufacturer guaranteed cycle	1000			Cycle
-	ID retention	Temp. 55°C	20			Year

## 6. Mechanical specification

Outline drawing (unit mm)

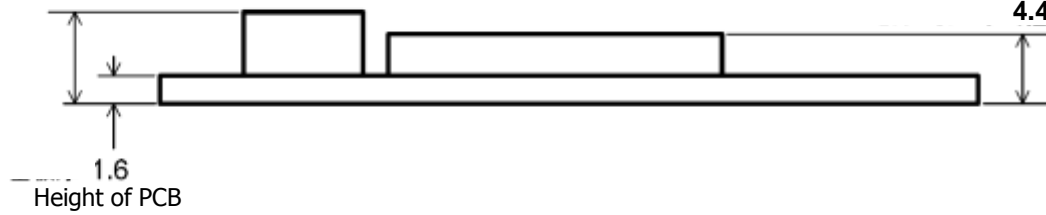


Height with connector

5.7

Maximum height without connector

4.4



Weight: 8.2g