

## Radio Module - User Guide

### 2.4GHz RF Transceiver Module



Figure 1: 2.4GHz Radio Module

**Note: This 2.4G RF Module is designed to be used internally only in Johnson Controls products. It is not intended to be sold as an end item by itself to external customers.**

The Johnson Controls 2.4G RF Module is a single printed wiring board that implements a self contained, complete wireless interface module. The radio section utilizes Chipcon 2420 radio chip, utilizing the 802.15.4 standard and is driven by a 16.000 MHz crystal circuit on board. The 2420 chip drives a balun which couples the signal through transmit/receive switches to an RF amplifier delivering 15 dbm to a reverse SMA connector for the antenna.

The RF power output for the transmit amplifier is limited to 16 dbm, with a typical power output of 14dbm. The RF Module is designed to be mounted in various plastic enclosures depending on the requirements of the product and interface protocol.

The RF Module is a completely self-contained radio module which has its own RF shielding. No other RF shielding is required or implemented. It is a completely self-contained radio module which modulates its own RF transmitter. It controls the data flow to the transmitter section compliant with FCC Part 15 requirements.

There is not a hardware voltage regulator on board. Instead, the micro-controller monitors power supply voltage on a continuous basis. Should the supply voltage be found to be outside of the normal specified operating parameters, the unit will refuse to transmit. The unit operates within the stated FCC part 15 requirements when operated within the specified supply voltage range.

**SPI Interface/Connection to Motherboard:**

The Radio Module employs an eight-pin socket to connect to a motherboard 8-pin header. This interface is for the 3.0 VDC power source and all necessary data lines to communicate with the radio module.

**Mounting:**

The Radio Module has four mounting holes. The module is intended to be pushed down and snapped onto a motherboard containing four snap lock nylon standoffs. At the same time, the 8-pin connector will be engaged.

**Antenna:**

The 2.4G Radio Module employs a Reverse SMA connector to the antenna to prevent use of antennas other than the type specified. Typically an omni-directional ½- wave dipole antenna is supplied for most applications, with alternative antennas only approved for special, specifically tested applications.

**FCC and Industry Canada Compliance:**

The Johnson Controls 2.4G RF Module was tested standalone with a one meter cable interfacing the module with its host Receiver/Translator motherboard and found to be compliant with part 15 regulations.

An FCC/IC ID label is to be affixed to each unit at the time of manufacture. Since this printed circuit board is mounted inside various enclosures, a product label on that enclosure indicates the FCC ID and IC identification. The Johnson Controls 2.4G RF Module is compliant with Part 15.247. It complies with the RF exposure requirements of Parts 15.247, 2.1091, and 2.1093

**Compliance Statement (Part 15.19)**

This device complies with Part 15 of the FCC Rules.

Operation is subject to the following two conditions: This device may not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

**Warning (Part 15.21)**

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

**20 cm Separation Distance**

To comply with FCC's RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

**Installers Responsibility to the FCC Rules and Regulations**

The Johnson Controls 2.4G RF Module has been certified per FCC Part 15 rules for integration into products without further testing or certification. To fulfill the FCC certification requirements the Installer of the Johnson Controls 2.4G RF Module must ensure that the information provided on the Johnson Controls 2.4G RF Module Label is placed on the outside of the final product.

The Johnson Controls 2.4G RF Module is labeled with its own FCC ID Number. If the FCC ID is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module.

This exterior label can use wording such as the following:

**"Contains Transmitter Module FCC ID: CB2-RFMOD2400A"**

or

**"Contains FCC ID: CB2-RFMOD2400A"**

The Installer of the Johnson Controls 2.4G RF Module must only use the approved antenna, that has been certified with this module.

The Installer of the Johnson Controls 2.4G RF Module must test their final product configuration to comply with Unintentional Radiator Limits before declaring FCC compliance per Part 15 of the FCC rules.

**Industry Canada Statement**

The term "IC" before the certification/registration number only signifies that the Industry Canada technical specifications were met.

**Section 5.5 of RSS-210**

This device has been designed to operate with an antenna having a maximum gain of 2 dB. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

**Section 5.11 of RSS-210**

To reduce potential radio interference to others, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that required for successful communication.

**References:**

- JCI Drawing 25-2624-6 (Subassembly, PW Board RF Receiver Module for WRS-RTN0000-0)
- JCI Product Specification 06-490-17