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PART 15 UNLICENSED MODULAR TRANSMITTER APPROVAL

Date: March 29, 2005

Time: 11:00 A.M.

To: Federal Communications Commission
445 Twelfth St., S.W.
Washington, D.C. 20554

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Applicant: Johnson Controls, Inc.
FRN : 0005 9352 59 **FCC ID# :** CB2-RFMOD2400A

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Subject : Justification for Radio Module Approval

To Whom It May Concern:

The following is justification for Johnson Controls 2.4G RF Module application for "Radio Module Approval", set forth in the requirements and policies of the authorization of unlicensed, low power "transmitter modules" for operation under Part 15 of the Commission's Rules. "Radio Module Approval" is sought with the understanding that the Johnson Controls 2.4G Wireless RF Module is designed for use with only Johnson Controls products.

Over the years, the Office of Engineering and Technology (OET) has, on a limited number of occasions, granted approval of modular transmitter circuitry that could be used in a variety of Part 15 devices without requiring those devices to obtain subsequent and separate FCC approvals. Such approvals have been granted in an effort to afford relief to equipment manufacturers by eliminating the requirement that a new equipment authorization be obtained for the same transmitter when it is installed in a new device. More recently, a number of manufacturers have requested information about the conditions under which such modular approvals might be granted. This Public Notice sets forth the requirements for approval of modular transmitter equipment designs. These requirements are in addition to what is normally required for an application for an intentional radiator.

Factors considered for seeking the equipment authorization for modular transmitters:

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(a) In order to be considered a transmitter module, the device must be a complete RF transmitter, i.e., it must have its own reference oscillator (e.g., VCO), antenna, etc. The only connectors to the module, if any, may be power supply and modulation/data inputs.

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. Typically an omni-directional ½-wave dipole antenna is supplied for most applications, with alternative antennas only approved for special, specifically tested applications. The only connectors to the module provide antenna connection, serial data connectivity, and power.

(b) Compliance with FCC RF Exposure requirements may, in some instances, limit the output power of a module and/or the final applications in which the approved module may be employed.

The RF power output for the transmit amplifier in the Johnson Controls 2.4G RF Module is limited to 16 dbm, with a typical power output of 14dbm.

(c) While the applicant for a device into which an authorized module is installed is not required to obtain a new authorization for the module, this does not preclude the possibility that some other form of authorization or testing may be required for the device (e.g., a WLAN into which an authorized module is installed must still be authorized as a PC peripheral, subject to the appropriate equipment authorization).

The Johnson Controls 2.4G RF Module is designed to be mounted in various plastic enclosures depending on the requirements of the product and interface protocol. No variation in radio circuitry occurs.

(d) In the case of a modular transceiver, the modular approval policy only applies to the transmitter portion of such devices. Pursuant to Section 15.101(b), the receiver portion will either be subject to Verification, or it will not be subject to any authorization requirements (unless it is a Scanning Receiver, in which case it is also subject to Certification, pursuant to Section 15.101(a)).

(e) The holder of the grant of equipment authorization (Grantee) of the module is responsible for the compliance of the module in its final configuration, provided that the OEM, integrator, and/or end user has complied with all of the instructions provided by the Grantee which indicate installation and/or operating conditions necessary for compliance.

The Johnson Controls 2.4G RF Module is designed to be used internally only in Johnson Controls products.

In order to obtain a modular transmitter approval, this cover letter requesting modular approval is being submitted and the numbered requirements identified below are addressed for the application for equipment authorization.

1) The modular transmitter must have its own RF shielding. This is intended to ensure that the module does not have to rely upon the shielding provided by the device into which it is installed in order for all modular transmitter emissions to comply with Part 15 limits. It is also intended to prevent coupling between the RF circuitry of the module and any wires or circuits in the device into which the module is installed. Such coupling may result in non-compliant operation.

The Johnson Controls 2.4G RF Module is a completely self contained radio module which has its own RF shielding. No other RF shielding is required or implemented.

2) The modular transmitter must have buffered modulation/data inputs (if such inputs are provided) to ensure that the module will comply with Part 15 requirements under conditions of excessive data rates or over-modulation.

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The Johnson Controls 2.4G RF Module is a completely self contained radio module which modulates its own RF transmitter. It controls the data flow to the transmitter section compliant with Part 15 requirements.

3) The modular transmitter must have its own power supply regulation. This is intended to ensure that the module will comply with Part 15 requirements regardless of the design of the power supplying circuitry in the device into which the module is installed.

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 part 15 requirements when operated within the specified supply voltage range.

4) The modular transmitter must comply with the antenna requirements of Section 15.203 and 15.204(c). The antenna must either be permanently attached or employ a “unique” antenna coupler (at all connections between the module and the antenna, including the cable). Any antenna used with the module must be approved with the module, either at the time of initial authorization or through a Class II permissive change. The “professional installation” provision of Section 15.203 may not be applied to modules.

The Johnson Controls 2.4G RF Module employs a Reverse SMA connector to the antenna to prevent use of antennas other than the type specified.

5) The modular transmitter must be tested in a stand-alone configuration, i.e., the module must not be inside another device during testing. This is intended to demonstrate that the module is capable of complying with Part 15 emission limits regardless of the device into which it is eventually installed. Unless the transmitter module will be battery powered, it must comply with the AC line conducted requirements found in Section 15.207. AC or DC power lines and data input/output lines connected to the module must not contain ferrites, unless they will be marketed with the module (see Section 15.27(a)). The length of these lines shall be length typical of actual use or, if that length is unknown, at least 10 centimeters to insure that there is no coupling between the case of the module and supporting equipment. Any accessories, peripherals, or support equipment connected to the module during testing shall be unmodified or commercially available (see Section 15.31(i)).

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.

6) The modular transmitter must be labeled with its own FCC ID number, and, 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: XYZMODEL1” or “Contains FCC ID: XYZMODEL1.” Any similar wording that expresses the same meaning may be used. The Grantee may either provide such a label, an example of which must be included in the application for equipment authorization, or, must provide adequate instructions along with the module which explain this requirement. In the latter case, a copy of these instructions must be included in the application for equipment authorization.

An FCC ID label is affixed to each unit at the time of manufacture. Since this printed circuit board is mounted inside various enclosures, the product data nameplate on that enclosure indicates the FCC ID.

7) The modular transmitter must comply with any specific rule or operating requirements applicable to the transmitter and the manufacturer must provide adequate instructions along with the module to explain any such requirements. A copy of these instructions must be included in the application for equipment authorization. For example, there are very strict operational and timing requirements that must be met before a transmitter is authorized for operation under Section 15.231. For instance, data transmission is prohibited, except for operation under Section 15.231(e), in which case there are separate field strength level and timing requirements. Compliance with these requirements must be assured.

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The Johnson Controls 2.4G RF Module is compliant with Part 15.247. Installation and other requirements are presented in the user guide to allow the unit to be correctly installed.

8) The modular transmitter must comply with any applicable RF exposure requirements. For example, FCC Rules in Sections 2.1091, 2.1093 and specific Sections of Part 15, including 15.319(i), 15.407(f), 15.253(f) and 15.255(g), require that Unlicensed PCS, UNII and millimeter wave devices perform routine environmental evaluation for RF Exposure to demonstrate compliance. In addition, spread spectrum transmitters operating under Section 15.247 are required to address RF Exposure compliance in accordance with Section 15.247(b)(4). Modular transmitters approved under other Sections of Part 15, when necessary, may also need to address certain RF Exposure concerns, typically by providing specific installation and operating instructions for users, installers and other interested parties to ensure compliance.

The Johnson Controls 2.4G RF Module complies with the RF exposure requirements of Parts 15.247, 2.1091, and 2.1093

Sincerely yours,

By: 
Thomas M. Arnold

Title: Sr. Engineering Project Manager