

To Whom it May Concern:

The following is justification for Graco GNet Transceiver 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 Graco GNet Transceiver Module is designed only with Graco 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.

Several factors should be considered when seeking an equipment authorization for modular transmitters:

- (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 Graco GNet Transceiver Module is a single printed wiring board that implements a self contained, complete wireless interface module. The radio section utilizes a Xemics XE1203 radio chip which uses an on-board reference crystal of 39.000 MHz. The XE1203 chip drives an on-board power amplifier whose power output is regulated via a reference voltage controlled by the on-board microprocessor. The output of the amplifier is fed to an antenna switch and a low pass filter to the solder-attached wire antenna. The only connectors to the module are for DC power and serial data connectivity.

- (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 Graco GNet Transceiver Module is limited in output power to 23 dBm max with a typical value of 22.5 dBm. This level is controlled via factory calibration. Calibration constants are stored in FLASH memory in the on-board microprocessor and are not accessible to the user.

- (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 Graco GNet Transceiver Module is designed to be mounted in a variety of plastic enclosures depending upon the device requiring wireless communication. The only variation in the module is the shape of the attached antenna. The antenna shape is specified in manufacture for the desired application.

- (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 Graco GNet Transceiver Module is designed to be used internally only in Graco products.

In order to obtain a modular transmitter approval, a cover letter requesting modular approval must be submitted and the numbered requirements identified below must be addressed in 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 Graco GNet Transceiver Module is a completely self contained radio module which has its own RF shielding. No additional 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.

The Graco GNet Transceiver Module is a completely self contained 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.

The Graco GNet Transceiver Module has its own on-board power supply voltage regulation circuitry. In addition to on-board voltage regulation, the on-board microprocessor monitors the voltage supply to the radio circuitry. If the measured voltage is outside specified limits, the microprocessor will not allow the transmitter to function.

- 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 Graco GNet Transceiver Module has a permanently attached wire antenna. The shape of the antenna is a controlled feature fixed during manufacturing.

- 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 Graco GNet Transceiver Module was tested in a stand-alone configuration per FCC requirements and procedures and was found to be compliant with Part 15 requirements

- 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.

The Graco GNet Transceiver Module has an FCC ID label affixed to each unit at the time of manufacture.

- 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.

The Graco GNet Transceiver 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.

Please refer to the MPE calculation document included with this FCC filing.

Regards,

A handwritten signature in black ink, appearing to read "James Blaha". The signature is stylized with a large, looping initial "J" and a cursive "Blaha".

***Jim Blaha
Sr. VP Quality***

November 18, 2005