

**NORTHWEST EMC, INC.**  
22975 NW Evergreen Parkway, Suite 400  
Hillsboro, OR 97124

December 17, 2007

Dear Application Examiner:

On behalf of Intermec Technologies Inc., Northwest EMC is submitting this application for the limited modular approval of a Bluetooth radio in their PB42 printer. The Bluetooth radio is made by Roving Networks, M/N: RN-41. The radio is a Bluetooth 2.0 + EDR; however, Intermec Technologies will only be utilizing GFSK modulation with data rates DH1 and DM1. All other modes will be disabled (please see their attestation letter). The radio operates in the 2400-2483.5MHz band. It will be installed in Intermec's PB42 printer.

The RN-41 Bluetooth radio was originally tested by Roving Networks under the FCC ID: T9JRN41-1. These test reports have been provided to demonstrate compliance of the radio with direct connect testing requirements. Additional radiated emissions testing and AC powerline conducted emissions testing was performed while the radio was installed in the PB42 printer. This testing was performed at Northwest EMC.

The radio utilizes a single integral ceramic chip antenna. This configuration satisfies the requirements of 47 CFR 15.203. The max antenna gain of the chip antenna is -2.83dBi as measured by Yageo and Phycomp R&D Department for Roving Networks. This antenna gain data has been provided, along with the original Yageo antenna data sheet. Please note, the Yageo datasheet claims a max gain of 4.1 dBi, but this depends on the environment and is not applicable to the PB42 application.

The technical reports and exhibits demonstrate compliance with FCC rules 47 CFR 15.247 as a hybrid transmitter. For reference, please see the third example (highlighted) in the attached FCC interpretation.

Your efforts in reviewing this application are greatly appreciated.

Best regards,

Vicki Albertson  
Northwest EMC, Inc.

<b>Company:</b>	<b>Subject:</b> Digital Transmission system	20021209-001
<b>Remarks:</b>		<b>Keyword:</b> BlueTooth FH HS
<b>Rule Parts:</b> 15.247	<b>City:</b>	<b>State:</b> <b>Country:</b>
<p><b>INQUIRY:</b> I have an inquiry about FCC15.247 (f). In this section, it is stated as follows; The digital modulation operation of the hybrid system, with the frequency hopping turned off, shall comply with the power density requirements of paragraph (d) of this section. Should we apply to the above requirement even Bluetooth equipment ?</p> <p><b>RESPONSE:</b> A bluetooth device may apply under the rules in 15.247 as either a Digital transmission system, a Frequency hopping system or a Hybrid system whichever provides an advantage to the grantee as long as all the requirements are met. Please note the following regarding the requirements for Hybrids and clarification of spread spectrum systems with regard to the recent changes to the spread spectrum rules. Prior to the recent changes to the spread spectrum rules, there were two major types of spread spectrum systems. They were direct sequence and frequency hopping spread spectrum ("FHSS") systems. These two distinct systems were required to comply with separate rule requirements. The new rules, however, allow manufacturers more flexibility and are not as limiting. The new rules provide more flexibility for manufacturers by eliminating the requirement to employ direct sequence modulation techniques along with its associated requirement to comply with a minimum processing gain. Instead, manufacturers now may employ wideband digital modulation under the new rules for Digital Transmissions Systems ("DTS"). It is possible for a device to be designed to operate as a DTS, as a FHSS system, or using a combination of these two modulation types. Because of this, we have received several requests for interpretations by manufacturers that wish to produce transmission systems that employ both frequency hopping (or channel changing) techniques using digitally modulated channels. We believe that such systems fall under three possible combinations of standards, depending on the exact methods of modulation. First example: We will allow a manufacturer of a combination DTS and FHSS system to demonstrate compliance with the rules required for DTS operation or for FHSS operation. There is no need to demonstrate compliance with both the FHSS standards and the DTS standards. Second example: Systems may employ two mutually exclusive operational modes. One mode would be as a FHSS system and the other would be as a DTS. For example, a device may be operated as a FHSS system while transmitting data and as a DTS while in the acquisition mode. When operating in this manner, the device must fully comply with the rules for a FHSS system when operating in that mode and as a DTS when operating in that mode. The two types of operation must be distinct so that each mode of operation can be distinguished and separately demonstrated to comply with the pertinent standards. Third example: The third method of authorizing a combination system is as a hybrid system under the provisions described in Section 15.247(f) of the rules. Prior to the new rules on DTS operation, a hybrid system consisted of a transmission system that employed a combination of both direct sequence and frequency hopping techniques. Such systems were required to show compliance with a 17 dB processing gain. This is no longer required since the processing gain requirement has been replaced by the DTS</p>		

regulations. A hybrid system uses both digital modulation and frequency hopping techniques at the same time on the same carrier. This is similar to the combination DTS/FHSS system described above in the first example but the system is subject to slightly different standards. As indicated in Section 15.247(f), a hybrid system must comply with the power density standard of 8 dBm in any 3 kHz band when the frequency hopping function is turned off. The transmission also must comply with a 0.4 second/channel maximum dwell time when the hopping function is turned on. There is no requirement for this type of hybrid system to comply with the 500 kHz minimum bandwidth normally associated with a DTS transmission; and, there is no minimum number of hopping channels associated with this type of hybrid system. However, the hopping function must be a true hopping system, as described in Section 15.247(a)(1). The specific requirements in Section 15.247(a)(1) are: 1) A minimum channel separation. 2) Pseudorandom hop sequence. 3) Equal use of each frequency. 4) Receiver matching bandwidth and Synchronization. The additional requirements in Section 15.247 for a hybrid transmitter include the requirements the 1 watt output limit and RF safety requirements in Section 15.247(b) and the spurious emission limits of Section 15.247(c).