Compliance with 47 CFR 15.247(i)

>"*Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this chapter.*"

The DHIB 802.11(b)/(g) and Bluetooth combination module is seeking full modular approval. Per FCC Public Notice DA 00-1407, the radio must comply with any applicable RF exposure requirements. The EUT is not subject to routine environmental evaluation per 47 CFR 2.109. The following analysis shows compliance with the maximum permissible exposure of CFR FCC 1.1310 for the General Population/Uncontrolled Exposure limits as a mobile device. If Intermec installs the module into a portable device, SAR testing will be provided. Each radio type, 802.11 and Bluetooth, transmits through its own antenna. The radios can transmit simultaneously.

The MPE estimates are as follows:

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population. The exposure level at a 20 cm distance from the EUT's transmitting antenna is calculated using the general equation:

$S = (PG)/4\pi R^2$
Where: S = power density (mW/cm^2)
P = power input to the antenna (mW)
G = numeric power gain relative to an isotropic radiator
R = distance to the center of the radiation of the antenna (20 cm = limit for MPE estimates)
PG = EIRP

Solving for S, the maximum power densities 20 cm from the transmitting antennas are summarized in the tables on the following pages:

MPE Estimates for Self Co-located Device

FCC ID: EHADHIB

Bluetooth Radio

Antenna Type	Intermec Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
		(MHz)	(mW)	(dBi)	(dB)	(mW/cm^2)	(mW/cm^2)	
PIFA	805-646-001	2400	1.629	2.201	0	0.0005380	1	0.0005380

Worst Case Ratio of Power Density to the Exposure Limit = 0.0005380

FCC ID: EHADHIB

802.11(b)/(g) radio

Antenna Type	Intermec Antenna Part No.	Transmit Frequency	Max Peak Conducted Output Power	Antenna Gain	Minimum Antenna Cable Loss	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	Ratio of Power Density to the Exposure Limit
		(MHz)	(mW)	(dBi)	(dB)	(mW/cm^2)	(mW/cm^2)	
PIFA	805-646-001	2400	192.19	2.201	0	0.063	1	0.063

Worst Case Ratio of Power Density to the Exposure Limit = 0.063

Worst Case Co-located Exposure Condition

Per Note 24 shown below, the Sum of Worst Case Power Ratios cannot exceed 1.0

Bluetooth Radio Worst Case Ratio of Power Density to the Exposure Limit	802.11b Radio Worst Case Ratio of Power Density to the Exposure Limit			Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios	
0.00054	0.06300			0.06354	1.0	PASS

The results shown in the above table are equivalent to the Sum of the EIRP of the Two Co-located Transmitters (EIRP TX1 + EIRP TX2) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequ

Please note that EIRP = ERP x 1.64, so EIRP is worst case. However, because some parties would prefer to see the calculation as the Sum of the ERP of the Two Co-located Transmitters, the table below shows compliance with ERP TX1 + ERP TX2

Bluetooth Radio Worst Case ERP	802.11b Radio Worst Case ERP			Sum of Worst Case ERPs	Power Density @ 20 cm	General Population Exposure Limit from 1.1310	
(mW)	(mW)			(mW)	(mW/cm^2)	(mW/cm^2)	
1.648835146	194.5301576			196.18	0.03903	1.0	PASS

Excerpts from TCB Training, April 3, 2002, "Mobile Transmitters", Slide 6:

"Devices operating in multiple frequency bands

❑ *When RF exposure evaluation is required for TCB approval*

      o *<u>Separate antennas</u> – estimated minimum separation distances may be considered for the frequency bands that do not require evaluation or TCB approval, however, the estimated distance should take into account the effect of co-located transmitters. (Note 24)*

       <u>Note 24</u> According to multiple frequency exposure criteria, the ratio of field strength or power density to the applicable exposure limit at the exposure location should be determined for each transmitter and the sum of these ratios must not exceed 1.0 for the location to be compliant."

The sum of the ratios (power density to the exposure limit) does not exceed 1.0; therefore, the exposure condition is compliant with FCC rules.