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 EUT will only be used with a separation distance of 20 centimeters or greater between the antenna and the head or torso of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091 (b).   Up to two radio modules can be installed in the EUT – each operating in the 2.4 GHz band: A FHSS Cirronet radio module, and an 802.11b/Bluetooth combo module. The radios can transmit simultaneously. Each radio transmits through its own antenna.

 The total transmit power is less than 1.5 W (ERP), therefore the EUT is categorically excluded from routine environmental evaluation per 47 CFR 2.1091(c).

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: S9E-RNGR2410

FHSS Radio

Antenna Type	Antenna Part No.	Transmit Frequency (MHz)	Max Peak Conducted Output Power (mW)	Antenna Gain (dBi)	Minimum Antenna Cable Loss (dB)	Power Density @ 20 cm (mW/cm^2)	General Population Exposure Limit from 1.1310 (mW/cm^2)	Ratio of Power Density to the Exposure Limit
Omni	PW5S-2400-02-04	2400	47.86	2	0	0.015	1	0.01509

Worst Case Ratio of Power Density to the Exposure Limit = 0.01509

FCC ID: S9E-RNGRBTWFR

802.11 (b) Radio

Antenna Type	Antenna Part No.	Transmit (MHz)	Max Peak (mW)	Antenna Gain (dBi)	Minimum (dB)	Power (mW/cm^2)	General (mW/cm^2)	Ratio of Power
Chip	ANT-2.45-CHP-X	2400	24.6	0.5	0	0.005	1	0.00549

Worst Case Ratio of Power Density to the Exposure Limit = 0.00549

Bluetooth Radio

Antenna Type	Antenna Part No.	Transmit (MHz)	Max Peak (mW)	Antenna Gain (dBi)	Minimum (dB)	Power (mW/cm^2)	General (mW/cm^2)	Ratio of Power
Chip	ANT-2.45-CHP-X	2400	1.92	0.5	0	0.00043	1	0.00043

Worst Case Ratio of Power Density to the Exposure Limit = 0.00043

Worst Case Co-located Exposure Condition

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

FHSS Radio Worst Case Ratio of Power Density to the Exposure Limit	802.11b Radio Worst Case Ratio of Power Density to the Exposure Limit	Bluetooth 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	
0.01509	0.00549	0.00043		0.02101	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 frequencies.

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.