

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 is a 6820 Printer with a BTS080 Bluetooth module installed internally. The 6820 will be used for Personal Area Network and inventory control applications. The radio module operates in the 2400-2483.5MHz band. The EUT will only be used with a separation distance of 20 centimeters or greater between the antenna and the body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091(b). The maximum antenna gain measured was -1.03 dBi.

The maximum peak power is 13.86 mW (EIRP) for FCC ID: EHABTS080-2. The transmit frequency is 2402-2480 MHz. Since the transmit frequency is greater than 1.5 GHz, and the output power is less than 3 W ERP, the EUT is categorically excluded from routine environmental evaluation per 47 CFR 2.1091(c).

The 6820 printer has a docking station for Intermec's CK60. The CK60 is a handheld computer that contains a Bluetooth radio, FCC ID: HN2-BTM311, and an 802.11 radio, FCC ID: EHA802UIAG. Each radio transmits through its own antenna and can transmit simultaneously with the other radios.

The MPE estimates are as follows:

Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population as $(f_{\text{MHz}}/1500) \text{ mW/cm}^2$. 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 density 20 cm from the transmitting antenna is summarized in the following tables:

FCC ID: EHABTS080-2

Bluetooth Radio in 6820 Printer

Antenna Type	Antenna Part No.	Transmit Frequency Band (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
Internal Integral Antenna	PCB Trace Antenna	2400	13.86	-1.03	0	0.00218	1	0.00218

FCC ID: EHA802UIAG

Antenna Type	Transmit Frequency Band (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
Flex Circuit	2400	45.2	2	0	0.01425	1	0.01425
Flex Circuit	5250	17.24	4	0	0.00862	1	0.00862

MPE Estimate for BTM311 in the CK60 by itself

FCC ID: HN2-BTM311

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
Inverted F Chip Antenna	AH 104F245001-T	2400	8.69	2	0	0.00274	1	0.00274

The sum of the ratios to the exposure limit for the CK60 is summarized below:

The Ratios to the Exposure Limit Sum for the CK60

Worst case power density ratio of EHA802UIAG	Worst case power density ratio for HN2-BTM311	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios in CK60
0.01425	0.00274	0.01699	1

The sum of the ratios to the exposure limit for the exposure scenario for the 6820 Printer co-located with CK60 is summarized in the following table:

The Ratios to the Exposure Limit for the 6820 Printer co-located with the CK60

Sum of Worst Case Ratios for CK60	Worst Case Power Density ratio for EHABTS080-2 in 6820 Printer	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios in CK60
0.01699	0.00218	0.01917	1

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*
 - *Separate antennas – 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)*

Note 24 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.

Per Note 24, the sum of the worst-case power ratios in any scenario does not exceed 1.0; therefore, the exposure condition is compliant with FCC rules.