

## 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 body of the user or nearby persons and can therefore be considered a mobile transmitter per 47 CFR 2.1091 (b). 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 as  $1\text{mW}/\text{cm}^2$ . 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 ( $\text{mW}/\text{cm}^2$ )

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 following tables:

## MPE Estimates for Self Co-located Device

### FCC ID: EHABTS080-1 (PW40 Printer with Bluetooth Radio)

#### Bluetooth 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Internal Integral Antenna	PCB Trace Antenna	2400	13.86	-1.23	0	0.00208	1	0.00208

Worst Case Ratio of Power Density to the Exposure Limit = 0.00208 (Internal Integral Antenna)

### Exposure Scenarios for PW40 Printer co-located with 700C

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

700C co-located radios Sum of Worst Case Ratios (Power Density to the Exposure Limit) (see following pages for details)	PW40 Printer Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHABTS080-1)	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios
0.47068	0.00208	0.47276	1.0

PASS

The results shown in the above table are equivalent to the Sum of the EIRP of the Co-located Transmitters (EIRP TX1 + EIRP TX2 + EIRP TX3) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequencies against different exposure limits.

Please note that each radio transmits through its own antenna.

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 + ERP TX3

GSM Radio (FCC ID: EHA700C-SMC45-1) Worst Case ERP	802.11b Radio (FCC ID: HN2011B-2) Worst Case ERP	Bluetooth Radio (FCC ID: EHABTS080) Worst Case ERP	PW40 Printer (FCC ID: EHABTS080-1) Worst Case ERP	Sum of Worst Case ERPs	Power Density @ 20 cm	General Population Exposure Limit from 1.1310
(mW)	(mW)	(mW)	(mW)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
1364.70	34.24	6.37	6.37	1411.68	0.28084	1.0

PASS

### Exposure Scenarios for PW40 Printer co-located with 730

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

730 co-located radios Sum of Worst Case Ratios (Power Density to the Exposure Limit) (see following pages for details)	PW40 Printer Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHABTS080-1)	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios
0.03623	0.00208	0.03831	1.0

PASS

The results shown in the above table are equivalent to the Sum of the EIRP of the Co-located Transmitters (EIRP TX1 + EIRP TX2 + EIRP TX3) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequencies against different exposure limits.

Please note that each radio transmits through its own antenna.

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 + ERP TX3

802.11b Radio (FCC ID: EHA-802CF13) Worst Case ERP	Bluetooth Radio (FCC ID: EHABTM210) Worst Case ERP	PW40 Printer (FCC ID: EHABTS080-1) Worst Case ERP	Sum of Worst Case ERPs	Power Density @ 20 cm	General Population Exposure Limit from 1.1310
(mW)	(mW)	(mW)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
63.34	0.31	6.37	70.02	0.01393	1.0

PASS

## MPE Estimates for Self Co-located Device

### Radios in 700C Handheld Computer

#### FCC ID: EHAEM3420 (either one CDMA or one GSM radio is installed in the 700C - never both)

New CDMA Radio (Replacement for HN2SB555-2)

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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Dipole	805-606-204	1850	447	4	0	0.223	1	0.223
Dipole	805-606-102	824	480	3	0	0.191	0.55	0.347
Dipole	805-606-102	1850	447	3	0	0.177	1	0.177

Worst Case Ratio of Power Density to the Exposure Limit = 0.347

#### FCC ID: HN2SB555-2 (either one CDMA or one GSM radio is installed in the 700C - never both)

Old CDMA 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
External tuned dipole (dual band 800 / 1900 MHz)	805-606-202	824	224	3	0	0.089	0.55	0.1619
External tuned dipole (dual band 800 / 1900 MHz)	805-606-202	1850	224	3	0	0.089	1	0.0889
External tuned dipole (single band 1900 MHz)	805-606-204	1850	224	4	0	0.112	1	0.1119

Worst Case Ratio of Power Density to the Exposure Limit = 0.1619 (External Tuned Dipole Antenna - Dual Band at 824 MHz)

#### FCC ID: EHA700C-SMC45-1 (either one CDMA or one GSM radio is installed in the 700C - never both)

GSM/GPRS 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
External tuned dipole (dual band 900 / 1900 MHz)	805-606-202	1850	891	3	0	0.354	1	0.3537
External tuned dipole (single band 1900 MHz)	805-606-204	1850	891	4	0	0.445	1	0.4453

Worst Case Ratio of Power Density to the Exposure Limit = 0.4453 (External Tuned Dipole Antenna)

#### FCC ID: HN22011B-2

802.11 (b) 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Internal slot F	805-625-001	2400	89	1.2	0	0.023	1	0.0233
Internal folded monopole	805-608-003	2400	89	-2	0	0.011	1	0.0112

Worst Case Ratio of Power Density to the Exposure Limit (when co-located with CDMA Radio) = 0.0233 ( Internal slot F Antenna)

## FCC ID: HN2ABTM3-3

Old Bluetooth Radio (Will become obsolete, will be replaced by EHABTS080)

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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Internal Integral Antenna	ABTM3	2400	3.78	-5.77	0	0.00020	1	0.00020

Worst Case Ratio of Power Density to the Exposure Limit = 0.00020 (Internal Integral Antenna)

## FCC ID: EHABTS080

New Bluetooth Radio (Replacement for HN2ABTM3-3)

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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Internal Integral Antenna	PCB Trace Antenna	2400	13.86	-1.23	0	0.00208	1	0.00208

Worst Case Ratio of Power Density to the Exposure Limit = 0.00208 (Internal Integral Antenna)

## Exposure Scenarios for 700C

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

GSM Radio Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHA700C-SMC45-1)	802.11b Radio Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: HN2011B-2)	Bluetooth Radio Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHABTS080)	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios
0.44530	0.02330	0.00208	0.47068	1.0

PASS

The results shown in the above table are equivalent to the Sum of the EIRP of the three Co-located Transmitters (EIRP TX1 + EIRP TX2 + EIRP TX3) compared to the exposure limit. The benefit of this method, is that accounts for transmitters operating at different frequencies against different exposure limits.

Please note that each radio transmits through its own antenna.

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 + ERP TX3

GSM Radio (FCC ID: EHA700C-SMC45-1) Worst Case ERP	802.11b Radio (FCC ID: HN2011B-2) Worst Case ERP	Bluetooth Radio (FCC ID: EHABTS080) Worst Case ERP	Sum of Worst Case ERPs	Power Density @ 20 cm	General Population Exposure Limit from 1.1310
(mW)	(mW)	(mW)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
1364.70	34.24	6.37	1405.31	0.27958	1.0

PASS

## MPE Estimates for Self Co-located Device

### Radios in 730 Handheld Computer

#### FCC ID: EHA-802CF13

##### 802.11 (b) 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Internal Diversity Patch	805-617-001	2400	104.7	2.4	0	0.036	1	0.0362

Worst Case Ratio of Power Density to the Exposure Limit = 0.0362 (Internal Diversity Patch Antenna)

#### FCC ID: EHABTM210

##### Bluetooth 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 <sup>2</sup> )	General Population Exposure Limit from 1.1310 (mW/cm <sup>2</sup> )	Ratio of Power Density to the Exposure Limit
Integral Ceramic Antenna	104F2450S1	2400	0.549	-5	0	0.00003	1	0.00003

Worst Case Ratio of Power Density to the Exposure Limit = 0.00003 (Integral Ceramic Antenna)

### Exposure Scenarios for 730

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

802.11b Radio Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHA- 802CF13)	Bluetooth Radio Worst Case Ratio of Power Density to the Exposure Limit (FCC ID: EHABTM210)	Sum of Worst Case Ratios (Power Density to the Exposure Limit)	FCC Limit for Sum of Worst Case Ratios
0.03620	0.00003	0.03623	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 it accounts for transmitters operating at different frequencies against different exposure limits.

Please note that each radio transmits through its own antenna.

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

802.11b Radio (FCC ID: EHA-802CF13) Worst Case ERP	Bluetooth Radio (FCC ID: EHABTM210) Worst Case ERP	Sum of Worst Case ERPs	Power Density @ 20 cm	General Population Exposure Limit from 1.1310
(mW)	(mW)	(mW)	(mW/cm <sup>2</sup> )	(mW/cm <sup>2</sup> )
63.34	0.31	63.65	0.01266	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*
  - *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.”*

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