RF Exposure/Safety (FCC)

Typical use of the E.U.T. is as a sensor hub.

The typical placement of the E.U.T. is on a surface. The typical distance between the E.U.T. and the user is at least 20 cm.

Calculation of Maximum Permissible Exposure (MPE)

Based on FCC Section 1.1310 Requirements

(a) Using table 1 of Section 1.1310 limit for general population/uncontrolled exposures, the above level is an average over 30 minutes.

(b) FCC limit at 2402 MHz is:

$$1\frac{mW}{cm^2}$$

(c) FCC limit at 850.0 MHz is: f/1500 =0.566 $\frac{mW}{cm^2}$

(d) The power density produced by the E.U.T. is

$$S = \frac{P_t G_t}{4\pi R^2}$$

P_t- Maximum Output Power = 8dbm, 6.3mW

G_T- Antenna Gain, 1.7 dBi = 1.48 numeric

R- Distance from Transmitter using 20cm worst case

(e) The peak power density of the EUT is:

$$S = \frac{(6.3\ x\ 1.48)}{4\pi(20)^2} = 0.002\ \frac{mW}{cm^2}$$

(f) This is below the FCC limit.

(g) The MPE for FCC ID: QIPEHS6-A is

Test Mode	ERP (dBm)	EIRP (dBm)	Peak EIRP (mW)	Average EIRP (mW)	Calculated RF Exposure at d=20cm (mW/cm^2)	MPE Limit (mW/cm^2)
GSM 850	34.5	36.65	4623.8	582.1	0.12	0.55

(h) This is below the FCC limit.

Co-location calculations

(i) $\sum$MPE = 0.12 $\frac{mW}{cm^2}$+ 0.002 $\frac{mW}{cm^2}$ = 0.122 $\frac{mW}{cm^2}$ which is less than the limit

@850MHz of 0.566 $\frac{mW}{cm^2}$

Additionally,

$$\sum \frac{S_{eqn}}{S_{\lim n}} = \frac{S_{eq1}}{S_{\lim 1}} + \frac{S_{eq2}}{S_{\lim 2}} \leq 1$$

$$\sum \frac{S_{eqn}}{S_{\lim n}} = \frac{0.12}{0.566} + \frac{0.002}{1} = 0.212 + 0.002 = 0.214 \leq 1$$

(j) This is below the FCC limit.