

Enabler[®] IIE FCC MPE Calculation

Revision 2.0

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MPE Calculation for Enfora Enabler[®] IIE - OET Bulletin 65

The FCC requires that the calculated MPE be equal to or less than a given limit dependent on frequency at a distance of 20 cm from a device to the body of a user.

The transmitter operation for the **Enabler IIE (EDG0208)** radio module covers GSM850 and PCS1900 operating bands.

The MPE calculation as given in FCC OET Bulletin 65, page 19 is used to calculate the safe operating distance for the user.

$$S = \text{EIRP} / 4 \pi R^2$$

Where

S = Power density

EIRP = Effective Isotropically Radiated Power (EIRP = P x G)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna

Requirements:

From table 1(b) – Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310

For GSM850 $S = f/1500 \text{ mW/cm}^2$ (f = operating frequency)

$S = 824/1500 = 0.55 \text{ mW/cm}^2$ (worst case)

For GSM1900 $S = 1.0 \text{ mW/cm}^2$ (worst case)

Summary Conclusion:

The required 20cm RF exposure limits for General Population / Uncontrolled Exposure FCC Rule Part 1.1310 will not be exceeded for the **Enabler IIE** using antennas having a maximum gain of **6.5 dBi** for the **GSM850 band** and **3 dBi** for the **GSM1900 band** respectively.

Source based time average transmitter power

The Spider AT supports a maximum of 2 transmit timeslots in a GPRS mode of operation which may be used at the networks discretion. In GSM mode of operation the Spider AT uses 1 transmit timeslot. It is not possible to configure the Spider AT to use more than 2 transmit time slots. Therefore a source based time averaging calculation is used to reduce calculated the average transmit power. Since the maximum number of GSM timeslots available in a single burst is 8 and only 2 of these are used the average power would be 2/8 (1/4) of the measured ERP/EIRP.

For the Enabler IIE @ GSM850

Measured ERP Tx Power = 2.45W.

$P_{ave} = 2.45/4 = 613 \text{ mW}$; $S = 0.55 \text{ mW/cm}^2$; $R = 20\text{cm}$

$S = P \times G / 4 \pi R^2$

$G = 0.55 \times (12.56 \times 20^2) / 613$

G = 4.5 = 6.5 dBi

Calculation for EDG0208 Maximum radiated power output

For 6.5 dBi gain antenna:

Power = 2.45 x 4.5 = 11.025W EIRP (40.4dBm)

ERP = EIRP – 2.1dB (half wave dipole gain) = 40.4 – 2.1dBm = 38.3dBm (6.8W)

This is below the Part 22.913 (a)(2) limit of 7W ERP. The 6.5dBi maximum gain antenna will therefore comply with the required FCC rule parts.

For the Enabler IIE @ GSM1900

Transmitter frequency range = 1850MHz to 1910MHz

Max. Conducted Transmitter Power P = 30dBm (1.0W) @ antenna socket

Maximum antenna gain G that can be used to comply with the maximum transmitter power limit of 2W EIRP of Part 24.232(b) is calculated as:

$P \times G = 2$

G = 2/1 = 2 (3dBi)

For 3dBi antenna gain maximum ERP is < 3.0W, so from Part 2.1091(c), routine RF exposure evaluation is categorically excluded. The 3dBi maximum gain antenna will therefore comply with the required FCC rule parts.