

CCM Project

Communication Center Module

MPE Calculation GPRS

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FCC ID : U6VCCMGPRS - MPE Calculation

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

The following FCC Rule Parts are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits

Part 2.1091 – Radiofrequency radiation exposure evaluation: mobile devices

Also, KDB447498 D01, v04 - Mobile and Portable Device RF Exposure Procedures and Equipment Authorisation Policies

CALCULATIONS:

Maximum Transmitter Power for CCM GPRS

ERP - GSM850

EIRPeff = ERP + 2.1dB (half wave dipole gain)

EIRPeff = 31.9 + 2.1 = 34dBm (2.52W)

EIRP - PCS1900

EIRP (measured) = 31.7dBm (1.48W)

From OET Bulletin 65 the following far field power density equation is applicable:

$$S = EIRP/4 \pi R^2$$

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 (safe operating distance)

Calculation for 850MHz

CCM GPRS Values:

Transmitter frequency range = 824.2MHz to 848.8MHz

Maximum EIRP (calculated) = 34dBm (2.52W)

For GPRS Class 10 using 2 uplink time slots;

EIRPeff = $2.52 \times 2/8 = 0.63W$

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of

FCC Rule Part 1.1310 for 850MHz

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

$S_{req} = 825/1500 = 0.55 \text{ mW/cm}^2$ (worst case)

Calculation:

$$S = EIRP/4 \pi R^2$$

$$0.55 = 630/(12.56 \times R^2)$$

$$R^2 = 630/(12.56 \times 0.55)$$

$$R = 9.5\text{cm} (<20\text{cm})$$

Calculation for 1900MHz

CCM GPRS Values:

Transmitter frequency range = 1851.25MHz to 1908.75MHz

Maximum EIRP (measured) = 31.7dBm (1.48W)

For GPRS Class 10 using 2 uplink time slots;

EIRPeff = $1.48 \times 2/8 = 0.37W$

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of

FCC Rule Part 1.1310 for 1900MHz

$S_{req} = 1.0 \text{ mW/cm}^2$

Calculation:

$$S = EIRP/4 \pi R^2$$

$$1.0 = 370/(12.56 \times R^2)$$

$$R^2 = 370/(12.56 \times 1.0)$$

$$R = 5.43\text{cm} (<20\text{cm})$$

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Calculation for 2.4GHz (BT)

CCM GPRS Values:

Transmitter frequency range = 2402MHz to 2480MHz

Maximum Transmitter Power (measured) = 13dBm (0.02W)

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of

FCC Rule Part 1.1310 for 1900MHz

Sreq = 1.0 mW/cm²

Calculation:

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

$$1.0 = 20/(12.56 \times R^2)$$

$$R^2 = 20/(12.56 \times 1.0)$$

$$R = 1.26\text{cm} (<20\text{cm})$$

Conclusion

The CCM GPRS meets the 20cm safe operating distance for Part 2.1091 RF exposure requirements.