PCIE-100 MPE Calculation - 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 MPE calculation as given in FCC OET Bulletin 65, page 19 is used to calculate the safe operating distance for the user.

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

Where S = Power density

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

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna

Df = Duty factor

For the PCIE-100 @ GSM 850

Transmitter frequency range = 824MHz to 849MHz

Measured Transmitter Power = 1.77W @ antenna socket

Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for GSM850

S = f/1500 mW/cm^2 (f = operating frequency)

S = 824/1500 = 0.55 mW/cm^2 (worst case)

Calculation to Determine Maximum Antenna Gain (G)

Values: S = 0.55 mW/cm^2

P = 1770mW

R = 20cm

Df = 0.5 (Four slots Tx on eight).

$S = PxDfxG/4\ p\ R^2$

$0.55 = 1770 \times 0.5 \times G / (12.56 \times 20^2)$

$0.55 \times (12.56 \times 20^2) = (1770 \times 0.5) \times G$

$0.55 \times (12.56 \times 20^2) / (1770 \times 0.5) = G$

G = 3.12 (4.9dBi)

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For the PCIE-100 @ PCS1900

Transmitter frequency range = 1850MHz to 1910MHz

Measured Transmitter Power = 0.80 W @ antenna socket

Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for PCS1900

S = 1.0 mW/cm^2 (worst case)

Calculation to determine max. Antenna Gain (G)

Values: S = 1.0 mW/cm^2

P = 800mW

R = 20cm

Df = 0.5 (Four slots Tx on eight).

S = PxDfxG/4 p R^2

1 = 800 x 0.5 x G/(12.56 x 20^2)

1 x (12.56 x 20^2) = (800 x 0.5) x G

1 x (12.56 x 20^2) / (800 x 0.5) = G

G = 12.56 (10.9 dBi)

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