Vecima Networks Inc.
150 Cardinal Place, Saskatoon, SK, Canada S7L 6H7
Tel: (306) 955-7075 | Fax:(306) 955-9919
Email: sales@vecima.com | Web. www.vecima.com

MPE Calculation for AMG1020 - 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 AMG1020 covers GSM850 and PCS1900 operating bands, together with the 802.11 2.4GHz band.

The following FCC Rule Parts are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits
Part 2.1091(c)
Part 22 GSM850 devices operating at frequencies at or below 1.5GHz with effective radiated power (ERP) of 1.5 watts or more are subject to routine RF exposure evaluation, otherwise they are categorically excluded.
Part 24 PCS1900 devices operating at frequencies above 1.5GHz with effective radiated power (ERP) of 3 watts or more are subject to routine RF exposure evaluation, otherwise they are categorically excluded.

Part 22.913 (a)(2)
The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Part 24.232 (b)
Mobile/ Portable stations are limited to 2 Watts EIRP peak power

CALCULATION

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

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

Where S = Power density

EIRP = Transmitter Power x Antenna gain

R = distance to the centre of radiation of the antenna

Considerations for GSM 850 band (2G)

Transmitter frequency range = 824MHz to 849MHz

Transmitter Power (conducted) = 30.6dBm (1.15W)

Class 10 GPRS reduces Tx power by 2/ 8 (time averaged power reduction of 2 uplink timeslots in 8).

Maximum Antenna Gain = 1.6dBi @850MHz (x1.45)

Considerations for GSM 850 band (3G)

Transmitter frequency range = 826MHz to 847MHz

Transmitter Power (conducted) = 27.2dBm (0.53W)

Maximum Antenna Gain = 1.6dBi @850MHz

.ie for 1.6dBi antenna gain maximum ERP for 3G is < 1.5W, so from Part 2.1091(c), routine RF exposure evaluation is categorically excluded for 3G GSM850 band.

MPE 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)

MPE Calculation for AMG1020

Values: R = 20cm

EIRP = 1150 x 2/8 x 1.45 (1.6dBi)

EIRP = 417

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

$S = 417/(12.56 \times 20^2)$

S = 417/ 5024

S = 0.083 mW/cm^2

Calculation for Maximum radiated power output (GSM850)

For 1.6dBi gain antenna (x 1.45)

Maximum Power = 1.45 x 1.15W (30.6dBm)

ERP = EIRP – 2.1dB (half wave dipole gain)

Max. ERP = 32.2 – 2.1dBm = 30.1dBm

This is below the Part 22.913 (a)(2) limit of 7W ERP

The 1.6 dBi maximum gain antenna will therefore comply with the required FCC rule parts

Considerations for PCS1900 band (2G)

Transmitter frequency range = 1850MHz to 1910MHz

Transmitter Power (conducted) = 27.3dBm (0.54W)

Class 10 GPRS reduces Tx power by 2/ 8 (time averaged power reduction of 2 uplink timeslots in 8).

Maximum Antenna Gain = 2.9dBi @1850MHz

Considerations for PCS1900 band (3G)

Transmitter frequency range = 1850MHz to 1910MHz

Transmitter Power (conducted) = 22.9dBm (0.194W)

Maximum Antenna Gain = 2.9dBi @1850MHz

.ie for 2.9dBi antenna gain maximum ERP for 2G and 3G is < 3.0W, so from Part 2.1091(c), routine RF exposure evaluation is categorically excluded for PCS1900 band.

Calculation for Maximum radiated power output (PCS1900)

For 2.9dBi gain antenna (x 1.95)

Maximum Power = 1.95 x 0.54W (27.3dBm)

Max. EIRP = 30.2dBm

This is below the Part 24.232 (b) limit of 2W EIRP

The 2.9 dBi maximum gain antenna will therefore comply with the required FCC rule parts

Vecima Networks Inc.
150 Cardinal Place, Saskatoon, SK, Canada S7L 6H7
Tel: (306) 955-7075 | Fax:(306) 955-9919
Email: sales@vecima.com | Web. www.vecima.com

Considerations for 2.4GHz band (WIFI)

Transmitter frequency range = 2412 – 2462MHz band

Transmitter EIRP = 24.4dBm max. (275mW)

MPE Requirement

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

$S = 1.0\ mW/cm^2$

MPE Calculation for AMG1020

Values: R = 20cm

EIRP = 275mW

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

$S = 275/(12.56 \times 20^2)$

$S = 275/ 5024$

$S = 0.055\ mW/cm^2$

Conclusion

The MPE value of the AMG1020 at 20 cm meets the FCC Rule Part 1.1310 RF exposure limits operating in the respective GSM850 and PCS1900 and 2.4GHz 802.11 bands.