MPE CALCULATION

MorphoRapID

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1. SCOPE OF DOCUMENT

This document describes the MPE Calculation for MorphoRapID11xx product.

This document is only for personnel associated in the project, and is strictly confidential.

2. TERMINOLOGY

3. UPDATING OF DOCUMENT

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4. REFERENCE DOCUMENTS

Document	**Référence**	**Version**	**Date**

5. MPE CALCULATION FOR MORPHORAPID 11XX - OET BULLETIN 65

The MorphoRapID 11XX uses simultaneously transmitting modules FCC ID QIPHC25 and FCC ID TWG-SDCCF10G operating in the 802.11 2.412-2.462GHz and GSM850 and PCS1900 operating bands.

Considering KDB447498D01 v04 (8) (a) (ii), simultaneously transmitting antennas are >5cm apart.

The calculated MPE is required to 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.

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

Where S = Power density

EIRP = Effective Isotropic 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

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)

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for PCS1900 and 802.11

S = 1.0 mW/cm^2

For GSM 850

Transmitter frequency range = 824MHz to 849MHz

Max. Conducted Transmitter Power = 33dBm (2.0W)

Antenna gain = 0dBi

MPE Calculation to Determine Safe Operating Distance

Values: $S = 0.55\ mW/cm^2$

$P = 2000\ mW$

$G = 1$

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

$0.55 = 2000\ x1/(12.56\ x\ R^2)$

$2000 / 0.55\ x\ 12.56 = R^2$

$289.5 = R^2$

$17.0 = R$

R = 17cm

For PCS1900

Transmitter frequency range = 1850MHz to 1910MHz

Max. Conducted Transmitter Power = 30dBm (1.0W)

Antenna gain = 0dBi

MPE Calculation to Determine Safe Operating Distance

Values: $S = 1.0\ mW/cm^2$

$P = 1000mW$

$G = 1$

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

$1 = 1000\ x\ 1/(12.56\ x\ R^2)$

$1000 / 12.56 = R^2$

$79.6 = R^2$

$8.9 = R$

R = 8.9cm

For 802.11

Transmitter frequency range = 2412 - 2462 MHz

Max. Conducted Transmitter Power = 80mW

Antenna gain =2.1dBi = x1.62

MPE Calculation to Determine Safe Operating Distance

Values: $S = 1.0\ mW/cm^2$

$P = 80\ mW$

$G = 1.62$

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

$1 = 80 \times 1.62/(12.56 \times R^2)$

$80 \times 1.62 / 12.56 = R^2$

$10.33 = R^2$

$3.2 = R$

R = 3.2cm

6. CONCLUSION

It can be seen that the 20cm safe operating distance is met in accordance with the RF exposure limits for General Population/ Uncontrolled Exposure FCC Rule Part 1.1310. The calculations have been performed without allowance for any transmitter power reductions due to time occupancy of the transmissions, so are worst case. Considering the simultaneously operating transmitters in the MorphoRapID 11XX, the GSM850 transmitter is the dominant factor in determining the safe operating distance The small influence of the 802.11 transmitter will not have a significant effect on the safe operating distance.