

MPE Calculation for DataSend900 - OET Bulletin 65

FCC ID: MS8C9G

The transmitter operation for the DataSend900 covers the 902MHz to 928MHz ISM band. The DataSend900 also contains a GPRS Class 10 modem using the GSM850 and PCS1900 operating bands.

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.

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 ($EIRP = P \times G$)

P = Conducted Transmitter Power

G = Antenna Gain (relative to an isotropic radiator)

R = distance to the centre of radiation of the antenna

For GSM 850

Transmitter frequency range = 824MHz to 849MHz

Conducted power = 30.5dBm (measured)

GSM antenna gain used = 2.0dBi max

Therefore $EIRP = 30.5 + 2.0 = 32.5\text{dBm}$

$$= 1.78\text{W}$$

The device supports a maximum of 2 active time slots



Therefore source based time based average Transmitter Power $P_{ave} = (1.78W^*2/8)$

$$= 0.45W_{ave}$$

Requirement

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

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

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

$$R = 20\text{cm}$$

MPE Calculation

Values:

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

$$= 450/(12.56 \times 20^2)$$

$$= 0.09 \text{ mW/cm}^2$$

For PCS1900

Transmitter frequency range = 1850MHz to 1910MHz

Part 2.1091(c)

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.

Measured EIRP = 28.8dBm

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

$$= 26.7\text{dBm} = 0.47\text{W}$$

so from Part 2.1091(c), routine RF exposure evaluation is categorically excluded.

For ISM Band 902MHz to 928MHz

Measured conducted power = 21.2dBm

902MHz to 928MHz ISM band antenna gain used = 2.15dBi max

Therefore EIRP = 21.2 + 2.15 = 23.35dBm

$$= 0.216W$$

Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for 902-928MHz

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

$$\mathbf{S = 902/1500 = 0.60 \text{ mW/cm}^2 \text{ (worst case)}}$$

$$\mathbf{R = 20cm}$$

MPE Calculation

Values:

$$\begin{aligned} S &= \mathbf{EIRP/4 \pi R^2} \\ &= 216/(12.56 \times 20^2) \\ &= \mathbf{0.043 \text{ mW/cm}^2} \end{aligned}$$

Conclusion

The MPE value of the DataSend900 at 20 cm meets the FCC Rule Part 1.1310 exposure limits.