



## **RF Exposure and Transmitter Power Considerations for the DataCollector 915**

### **FCC ID: Q8Q-SRDC**

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 DataCollector 915 covers ISM 915 MHz, GSM 850 MHz and PCS 1900 MHz operating bands.

The following FCC Rule Parts and procedures are applicable:

Part 1.1310 – Radiofrequency radiation exposure limits

Part 2.1091 – Radiofrequency radiation exposure evaluation: mobile devices

Part 15.247(b)(2) - The maximum peak conducted output power of the intentional radiator shall not exceed the following: For frequency hopping systems operating in the 902–928 MHz band: 1 watt for systems employing at least 50 hopping channels.

Part 15.247(b)(4) - The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi.

Part 22.913(a)(2)

The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

Part 24.232(c)

Mobile/ Portable stations are limited to 2 Watts EIRP peak power

KDB447498 D01 v05

Mobile and Portable Devices RF Exposure Procedures and Equipment Authorisation Policies

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



## **MAXIMUM TRANSMITTER POWER CONSIDERATIONS**

### **For ISM 915 MHz**

Nominal Operating Frequency: 915 MHz

Number of Hopping Channels: 50

**Max. Conducted Transmitter Power  $P = 28.0 \text{ dBm}$  (631 mW) @ antenna socket (measured).**

Maximum specified antenna gain = 2.2 dBi

**EIRP = 28.0 + 2.2dBm = 30.2dBm = 1047mW**

Therefore the DataCollector 915 meets Part 15.247(b)(2) & 15.247(b)(4) conducted power limits (1 W).

### **For GSM 850 MHz**

Transmitter frequency range = 824 MHz to 849 MHz

Conducted power = 33 dBm (2000 mW)

Maximum specified antenna gain = 2.0 dBi

**EIRP = 33 + 2dBm = 35dBm = 3162mW**

For Class 10 GPRS with 2 uplink timeslots, duty cycle = 25%

**EIRP<sub>eff</sub> = 3162/4 = 791 mW**

ERP = 35 -2.2 (dipole gain) = 32.8dBm = 1905mW

For Class 10 GPRS with 2 uplink timeslots, duty cycle = 25%

**ERP<sub>eff</sub> = 1905/4 = 476 mW**

Therefore the DataCollector 915 meets Part 22.913(a)(2) power limits (ERP 7 Watts).

Also the categorical exclusion provision of FCC Part 2.1091(c) applies as  $\text{ERP}_{\text{eff}} < 1.5\text{W}$  (with considerations of source based time averaging as per KDB 447498 Section 4.1(2))



**KENURE DEVELOPMENTS LIMITED**  
THE COMPLETE DESIGN AND CONTRACT MANUFACTURE SERVICE  
Registered Office: Springlakes Deadbrook Lane Aldershot Hampshire GU12 4UH  
Tel: (01252) 338554 Fax: (01252) 329105  
Registration No: 2265402  
**ISO 9001 GB13/87609**

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**For PCS 1900 MHz**

Transmitter frequency range = 1850 MHz to 1910 MHz

Conducted Power = 30 dBm (1000 mW)

Maximum specified antenna gain = 2.0 dBi

**EIRP = 30 + 2dBm = 32dBm = 1585mW**

For Class 10 GPRS with 2 uplink timeslots, duty cycle = 25%

**EIRP<sub>eff</sub> = 1585/4 = 396 mW**

Therefore the DataCollector 915 meets 24.232(c) power limits (EIRP 2 Watts).

Also the categorical exclusion provision of FCC Part 2.1091(c) applies as EIRP<sub>eff</sub> < 3.0W  
(with considerations of source based time averaging as per KDB 447498 Section 4.1(2))



### **MPE CALCULATIONS**

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 (safe operating distance)

### **For ISM 915 MHz**

Values:

Transmitter frequency range = 902.5 MHz to 927.5 MHz

$EIRP = 1047 \text{ mW}$

$R = 20\text{cm}$

### **Power Density Requirement**

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for ISM 915 MHz

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

$S_{req1} = 902.5/1500 = 0.61 \text{ mW/cm}^2$  (worst case)

Calculation:

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

$$S = 1047/(12.56 \times 20^2)$$

$$S = 1047/(5024)$$

$$S_1 = 0.21 \text{ mW/cm}^2 (< 0.61 \text{ mW/cm}^2)$$



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**For GSM 850 MHz**

**Values:**

Transmitter frequency range = 824MHz to 849MHz

$EIRP_{eff} = 791 \text{ mW}$

$R = 20\text{cm}$

**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)

$S_{req2} = 824/1500 = 0.55 \text{ mW/cm}^2$  (worst case)

**Calculation:**

$$S = EIRP_{eff} / 4 \pi R^2$$

$$S = 791 / (12.56 \times 20^2)$$

$$S = 791 / (5024)$$

$$S_2 = 0.16 \text{ mW/ cm}^2 (< 0.55 \text{ mW/cm}^2)$$



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**For PCS 1900 MHz**

Values:

Transmitter frequency range = 1850MHz to 1910MHz

$EIRP_{eff}$  = 396 mW

R = 20cm

Power Density Requirement

From table 1 (b) - Limits for General Population/ Uncontrolled Exposure of FCC Rule Part 1.1310 for 1900MHz

$$S_{req3} = 1.0 \text{ mW/cm}^2$$

Calculation:

$$S = EIRP_{eff} / 4 \pi R^2$$

$$S = 396 / (12.56 \times 20^2)$$

$$S = 396 / (5024)$$

$$S_3 = 0.079 \text{ mW/cm}^2 (< 1.0 \text{ mW/cm}^2)$$



**KDB447498 D01 v05 Section 7.2 SIMULTANEOUS TRANSMISSION  
CONSIDERATIONS**

Worst case summation of calculated MPE ratios for 915MHz and GSM or PCS simultaneously transmitting transmitters.

$$\text{ie: } \sum \text{MPE}_{\text{ratios}} = (S_1 / S_{\text{req1}}) + (S_2 / S_{\text{req2}})$$

$$= (0.21/0.61) + (0.16/0.55)$$

$$= 0.35 + 0.29 = 0.64$$

$\sum$  of MPE ratios < 1.0, so in accordance with KDB447498 Section 7.2, simultaneous transmission test exclusion applies for the 915MHz and GSM/ PCS transmitters.

**Conclusion**

The required 20cm RF exposure limits for General Population/ Uncontrolled Exposure FCC Rule Part 15.247(b)(2), 22.913(a)(2) and 24.232(c) maximum transmitter power limits will not be exceeded for the DataCollector 915 using antennas having a maximum gain of 2.2 dBi and 2.0 dBi for the ISM and GSM antennas respectively.