

MEASUREMENT/TECHNICAL REPORT



Intermec Technologies Corporation RFID 915 PC Card

REPORT NO: 20040707-1

DATE: July 7, 2004
Appendix C

RF EXPOSURE, MPE CALCULATION

Page 2 EasyCoder® Printer Antenna

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MAXIMUM PERMISSIVE EXPOSURE, MPE CALCULATOR
RFID 915 MHz PC Card "IM3"
with -3.4 dBi antenna, Intermec PN 1-206589
Intermec EasyCoder® Printer Antenna

MPE Calculator				dBi	-3.40
			dBd + 2.17 = dBi	dBi to dBd	2.17
TX Frequency (MHz)	900	Watts	1	Antenna Gain dBd	-5.57
Cable Losses dB	0.7	dBm	30.000000	Antenna minus cable = dBi	-4.10
Calculated ERP (mW)		236.047823		radiated (ERP) dBm	23.730
Calculated EIRP (mW)		389.045145		radiated (EIRP) dBm	25.900

Occupational Limit
3.00 mW/cm²

General Public Limit
0.60 mW/cm²

$$\frac{\text{EIRP}}{4 \pi d^2} = \text{mW/cm}^2$$

d = cm EIRP=mW

TX Frequency (MHz)	
wavelength	
meters	cm
0.333333333	33.333

FCC radiofrequency radiation exposure limits 1.1310			
Freq. MHz	occ.limit		public limit
300-1,500	f/300		f/1500
1,500-10,000	5		1

MPE uses EIRP for calculations. EIRP is based on TX power added to the antenna gain in dBi.
dBi = dB gain compared to an isotropic radiator

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EIRP (milliwatts)	Distance (cm)	Distance (Meters)	Distance (inches)	mW/cm ²
389.0451	100.00	1.0000	39.37	0.00310
389.0451	75.00	0.7500	29.53	0.00550
389.0451	50.00	0.5000	19.69	0.01238
389.0451	40.00	0.4000	15.75	0.01935
389.0451	35.00	0.3500	13.78	0.02527
389.0451	30.00	0.3000	11.81	0.03440
389.0451	25.00	0.2500	9.84	0.04953
389.0451	20.00	0.2000	7.87	0.07740
389.0451	19.50	0.1950	7.68	0.08142
389.0451	19.00	0.1900	7.48	0.08576
389.0451	18.50	0.1850	7.28	0.09046
389.0451	18.00	0.1800	7.09	0.09555
389.0451	17.50	0.1750	6.89	0.10109
389.0451	17.00	0.1700	6.69	0.10713
389.0451	16.50	0.1650	6.50	0.11372
389.0451	16.00	0.1600	6.30	0.12093
389.0451	15.50	0.1550	6.10	0.12886
389.0451	15.00	0.1500	5.91	0.13760

MAXIMUM PERMISSIVE EXPOSURE, MPE CALCULATOR
RFID 915 MHz PC Card "IM3"
with -5.0 dBi antenna, Intermec PN ITA915017
Intermec Card Programming Station Antenna

MPE Calculator				dBi	-5.00
			dBd + 2.17 = dBi	dBi to dBd	2.17
TX Frequency (MHz)	900	Watts	1	Antenna Gain dBd	-7.17
Cable Losses dB	0.7	dBm	30.000000	Antenna minus cable = dBi	-5.70
Calculated ERP (mW)		163.305195		radiated (ERP) dBm	22.130
Calculated EIRP (mW)		269.153480		radiated (EIRP) dBm	24.300

Occupational Limit
3.00 mW/cm²

General Public Limit
0.60 mW/cm²

$$\frac{\text{EIRP}}{4 \pi d^2} = \text{mW/cm}^2$$

d = cm EIRP=mW

TX Frequency (MHz)	
wavelength	
meters	cm
0.333333333	33.333

FCC radiofrequency radiation exposure limits 1.1310			
Freq. MHz	occ.limit		public limit
300-1,500	f/300		f/1500
1,500-10,000	5		1

MPE uses EIRP for calculations. EIRP is based on TX power added to the antenna gain in dBi.
dBi = dB gain compared to an isotropic radiator

*

EIRP (milliwatts)	Distance (cm)	Distance (Meters)	Distance (inches)	mW/cm ²
269.1535	100.00	1.0000	39.37	0.00214
269.1535	75.00	0.7500	29.53	0.00381
269.1535	50.00	0.5000	19.69	0.00857
269.1535	40.00	0.4000	15.75	0.01339
269.1535	35.00	0.3500	13.78	0.01748
269.1535	30.00	0.3000	11.81	0.02380
269.1535	25.00	0.2500	9.84	0.03427
269.1535	20.00	0.2000	7.87	0.05355
269.1535	19.50	0.1950	7.68	0.05633
269.1535	19.00	0.1900	7.48	0.05933
269.1535	18.50	0.1850	7.28	0.06258
269.1535	18.00	0.1800	7.09	0.06611
269.1535	17.50	0.1750	6.89	0.06994
269.1535	17.00	0.1700	6.69	0.07411
269.1535	16.50	0.1650	6.50	0.07867
269.1535	16.00	0.1600	6.30	0.08367
269.1535	15.50	0.1550	6.10	0.08915
269.1535	15.00	0.1500	5.91	0.09519