

MEASUREMENT/TECHNICAL REPORT


Technologies Corporation
EMC Test Laboratory
Cedar Rapids, IA

Intermec Technologies Corporation
Intellitag ITRM24501 Radio Module
2450 MHz Spread Spectrum Transmitter

REPORT NO: 011214-1

DATE: December 14, 2001

APPENDIX M

MAXIMUM PERMISSIVE EXPOSURE

MAXIMUM PERMISSIVE EXPOSURE, MPE CALCULATOR

ITRM24501 radio with 5.9 dBi antenna

Intermec MN/PN IT245005 / 805-605-001

MPE Calculator dBi **5.90**
dBd + 2.17 = dBi dBi to dBd **2.17**
 TX Frequency (MHz) **2450** Watts **1** Antenna Gain dBd **3.73**

Cable Losses dB **0** dBm 30.000000

Calculated ERP (mW) 2360.478233 radiated (ERP) dBm 33.730
 Calculated EIRP (mW) 3890.451450 radiated (EIRP) dBm 35.900

Occupational Limit
5.0 mW/cm²

General Public Limit
1.0 mW/cm²

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

TX Frequency (MHz)	
wavelength	
meters	cm
0.12244898	12.245

d = cm EIRP=mW

FCC radiofrequency radiation exposure limits 1.1310			
Freq. MHz	occ.limit		public limit
300-1,500	f/1500		f/300
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 (watts)	Distance (cm)	Distance (Meters)	Distance (inches)	mW/cm ²
3890.451	100.0	1.000	39.37	0.03096
3890.451	75.0	0.750	29.53	0.05504
3890.451	50.0	0.500	19.69	0.12384
3890.451	40.0	0.400	15.75	0.19350
3890.451	30.0	0.300	11.81	0.34399
3890.451	20.0	0.200	7.87	0.77398
3890.451	19.5	0.195	7.68	0.81418
3890.451	19.0	0.190	7.48	0.85760
3890.451	18.5	0.185	7.28	0.90458
3890.451	18.0	0.180	7.09	0.95553
3890.451	17.5	0.175	6.89	1.01091
3890.451	17.0	0.170	6.69	1.07125
3890.451	16.5	0.165	6.50	1.13716
3890.451	16.0	0.160	6.30	1.20934
3890.451	15.5	0.155	6.10	1.28863
3890.451	15.0	0.150	5.91	1.37597
3890.451	14.5	0.145	5.71	1.47250
3890.451	14.0	0.140	5.51	1.57955
3890.451	13.5	0.135	5.31	1.69872
3890.451	13.0	0.130	5.12	1.83191
3890.451	12.5	0.125	4.92	1.98139

MAXIMUM PERMISSIVE EXPOSURE, MPE CALCULATOR

ITRM24501 radio with 3.1 dBi antenna

Intermec PN 805-576-101 (Huber Suhner)

MPE Calculator dBi **3.10**
dBd + 2.17 = dBi dBi to dBd **2.17**
 TX Frequency (MHz) **2450** Watts **1** Antenna Gain dBd **0.93**

Cable Losses dB **0** dBm 30.000000

Calculated ERP (mW) 1238.796587 radiated (ERP) dBm 30.930
 Calculated EIRP (mW) 2041.737945 radiated (EIRP) dBm 33.100

Occupational Limit
5.0 mW/cm²

General Public Limit
1.0 mW/cm²

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

TX Frequency (MHz)	
wavelength	
meters	cm
0.12244898	12.245

d = cm EIRP=mW

FCC radiofrequency radiation exposure limits 1.1310			
Freq. MHz	occ.limit		public limit
300-1,500	f/1500		f/300
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 (watts)	Distance (cm)	Distance (Meters)	Distance (inches)	mW/cm ²
2041.738	100.0	1.000	39.37	0.01625
2041.738	75.0	0.750	29.53	0.02888
2041.738	50.0	0.500	19.69	0.06499
2041.738	40.0	0.400	15.75	0.10155
2041.738	30.0	0.300	11.81	0.18053
2041.738	20.0	0.200	7.87	0.40619
2041.738	19.5	0.195	7.68	0.42729
2041.738	19.0	0.190	7.48	0.45007
2041.738	18.5	0.185	7.28	0.47473
2041.738	18.0	0.180	7.09	0.50147
2041.738	17.5	0.175	6.89	0.53053
2041.738	17.0	0.170	6.69	0.56220
2041.738	16.5	0.165	6.50	0.59679
2041.738	16.0	0.160	6.30	0.63467
2041.738	15.5	0.155	6.10	0.67628
2041.738	15.0	0.150	5.91	0.72212
2041.738	14.5	0.145	5.71	0.77278
2041.738	14.0	0.140	5.51	0.82896
2041.738	13.5	0.135	5.31	0.89150
2041.738	13.0	0.130	5.12	0.96140
2041.738	12.5	0.125	4.92	1.03985