

# RF Exposure - MPE Estimates, RFID frequency of operation 902.75 - 927.25 MHz

## IM11 RFID Radio Module

### FCC regulations compliance

47 CFR 15.247(i) Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

47 CFR 2.1091 (b). The system is classified as a mobile transmitter.

47 CFR 2.1091(c) The EUT is categorically excluded from routine environmental evaluation.

#### 47 CFR 1.1310 General Public Limit $mW/cm^2 = F(MHz) / 1500$

Limit      0.601       $mW/cm^2$       902 MHz

### System Description

The IM11 RFID radio module is utilized within Intermec RFID fixed readers. Antennas in this estimate represent the highest gain antennas used with the IM11. The user manual instruct to provide for a separation distance of 25.4-cm or greater distance between the IM11 RFID system antennas and the head or torso of the user or near by persons.

Radio Disc / Rule	MHz -	MHz	Milliwatts (Conducted)
IM11			
RFID Radio FCC ID: EHA-IM11	IC: 1223A-IM11		
15.247, RSS-210	902.75	927.25	1000.0

#### Antennas

	Vendor	Vendor PN	Type	Polorization	Linear Gain	Connector	Dimensions (mm)
Intermec PN							
N/A	Kathrein	520 10087	Panel	Circular	7.5	N	557 x 262 x 59
N/A	Huber Suhner	1309.17.0085	Panel	Linear	8	N	190 x 190 x 30
N/A	NeWave	NSS-N7	Panel	Linear	5.5	TNC	2200 x 229 x 38

#### Antenna cables

All cables have a minimum of 2.4 dB loss

**Table 1 in 47 CFR 1.1310 defines the maximum permissible exposure (MPE) for the general population. The exposure level at the distance listed from the EUT's transmitting antenna is calculated using the general equation:**

The exposure level at a 25.4 cm distance from the EUT's transmitting antenna is calculated using the general equation (See OET 65, Page 19, Eq. 4):

$$S = (PG)/4(PI)R^2$$

Where: S = power density ( $mW/cm^2$ )

P = power input to the antenna (mW)

G = numeric power gain relative to an isotropic radiator

R = distance to the center of the radiation of the antenna (25.4 cm = limit for this MPE estimate)

PG = EIRP

Solving for S, the maximum power densities 25.4 cm from the transmitting antennas are summarized in the following tables:

#### Calculation of RF Exposure

**Calculations for Exposure**

cm	inches
25.4	10.00

Vendor Part Number	Peak Conducted Power (mW)	Antenna Gain (dBi)	Cable Loss (dB)	Antenna - Cable System Gain (dBi)	Pwr Density @ 25.4 cm ( $mW/cm^2$ )	Pwr Density Limit ( $mW/cm^2$ )	Pass - Fail
520 10087	1000.0	7.5	2.4	5.1	0.399	0.601	Pass
1309.17.0085	1000.0	8	2.4	5.6	0.448	0.601	Pass
NSS-N7	1000.0	5.5	2.4	3.1	0.252	0.601	Pass

**The worst case exposure for all antennas is below the limits defined by the FCC.**