MPE Estimates, RFID frequency of operation 902.75 - 927.25 MHz

IM5R3 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/cm² = F(MHz) / 1500

Limit 0.601 mW/cm² 902 MHz

System Description

The IM5 RFID radio module is utilized within Intermec RFID fixed readers.
Antennas in this estimate represent the highest gain antennas used with the IM5.
The user manual instruct to provide for a separation distance of 23-cm or greater distance between the IM5 RFID system antennas and the head or torso of the user or near by persons.

Radio Disc / Rule	**MHz -**	**MHz**	**Milliwatts (Conducted)**
IM5R3			
RFID Radio FCC ID: EHA-IM5R3	**IC: 1223A-IM5R3**		
15.247, RSS-210	902.75	927.25	943.0

Antennas)

Intermec PN	Vendor	Vendor PN	Type	Polorization	Linear Gain	Connector	Dimensions (mm)
805-626-002	Kathrein	25-578	Patch	Linear	6	RP, N	262 x 155 x 49
805-655-001	Huber Suhner	84024999	Panel	Circular	7	RP, N	371 x 371 x 40
N/A	Huber Suhner	84039146	Panel	Circular	8	RP, TNC	630 x 320 x 40

Antenna cables
All cables have a minimum of 2.3 dB loss. HS 84039146 requires (RP) TNC to (RP) N adapter with 1 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 23 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/cm²)
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 (23 cm = limit for this MPE estimate)
PG = EIRP

Solving for S, the maximum power densities 23 cm from the transmitting antennas are summarized in the following tables:

Calculation of RF Exposure

Calculations for Exposure **cm 23.0** **inches 9.06**

Antenna Part Number	Peak Conducted Power (mW)	Antenna Gain (dBi)	Cable Loss (dB)	Antenna - Cable System Gain (dBi)	Pwr Density @ 23 cm (mW/cm²)	Pwr Density Limit (mW/cm²)	Pass - Fail
805-626-002	943.0	6	2.3	3.7	0.333	0.601	Pass
805-655-001	943.0	7	2.3	4.7	0.419	0.601	Pass
84039146	943.0	8	3.3	4.7	0.419	0.601	Pass

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