4 FCC §2.1091, §15.407(f) & IC RSS-102 - RF Exposure

4.1 Applicable Standard

According to FCC §15.407(f) and §1.1307(b)(1), 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 level in excess of the Commission's guidelines.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)	
Limits for General Population/Uncontrolled Exposure					
0.3-1.34	614	1.63	* (100)	30	
1.34-30	824/f	2.19/f	$*(180/f^2)$	30	
30-300	27.5	0.073	0.2	30	
300-1500	/	/	f/1500	30	
1500-100,000	/	/	1.0	30	

f = frequency in MHz

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

According to IC RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Time Averaging (minutes)
0.003 - 1	280	2.19	-	6
1 - 10	280 / f	2.19 / f	-	6
10 - 30	28	2.19 / f	-	6
30 – 300	28	0.073	2*	6
300 – 1 500	1.585 f ^{0.5}	$0.0042 \text{ f}^{0.5}$	f / 150	6
1 500 – 15 000	61.4	0.163	10	6
15 000 – 150 000	61.4	0.163	10	616000 / f ^{1.2}
150 000- 300 000	$0.158 ext{ f}^{0.5}$	4.21 x 10 -4 f ^{0.5}	6.67 x 10 ⁻⁵ f	616000 / f ^{1.2}

Note: *f* is frequency in MHz

^{* =} Plane-wave equivalent power density

^{* =} Power density limit is applicable at frequencies greater than 100 MHz

4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

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

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

4.3 MPE Results

5150-5250 MHz

Maximum peak output power at antenna input terminal (dBm):	<u>7.68</u>
Maximum peak output power at antenna input terminal (mW):	<u>5.861</u>
Prediction distance (cm):	<u>20</u>
Prediction frequency (MHz):	<u>5210</u>
Maximum Antenna Gain, typical (dBi):	<u>15.0</u>
Maximum Antenna Gain (numeric):	<u>31.622</u>
Power density of prediction frequency at 20.0 cm (mW/cm ²):	0.0368
Power density of prediction frequency at 20.0 cm (W/m^2):	0.368
MPE limit for uncontrolled exposure at prediction frequency (mW/cm ²):	<u>1.0</u>
MPE limit for uncontrolled exposure at prediction frequency (W/m ²):	<u>10</u>

5250-5350 MHz

Maximum peak output power at antenna input terminal (dBm):	<u>14.46</u>		
Maximum peak output power at antenna input terminal (mW):			
Prediction distance (cm):	<u>20</u>		
<u>Prediction frequency (MHz):</u>	<u>5290</u>		
Maximum Antenna Gain, typical (dBi):	<u>15.0</u>		
Maximum Antenna Gain (numeric):	31.622		
Power density of prediction frequency at 20.0 cm (mW/cm ²):	0.1756		
Power density of prediction frequency at 20.0 cm (W/m ²):	<u>1.756</u>		
MPE limit for uncontrolled exposure at prediction frequency (mW/cm ²):			
MPE limit for uncontrolled exposure at prediction frequency (W/m ²):	<u>10</u>		

5470-5725 MHz

Maximum peak output power at antenna input terminal (dBm): 14.49 Maximum peak output power at antenna input terminal (mW): 28.11 Prediction distance (cm): <u>20</u> Prediction frequency (MHz): 5690 Maximum Antenna Gain, typical (dBi): 15.0 Maximum Antenna Gain (numeric): 31.622 Power density of prediction frequency at 20.0 cm (mW/cm²): 0.1769 Power density of prediction frequency at 20.0 cm (W/m²): 1.769 MPE limit for uncontrolled exposure at prediction frequency (mW/cm²): 1.0 MPE limit for uncontrolled exposure at prediction frequency (W/m²): 10

The device meets FCC/IC MPE requirement for uncontrolled exposure environment at 20 cm distance.