

4 FCC §15.247 (e)(i) and §2.1091, IC RSS-Gen 5.5 & RSS-102 - RF EXPOSURE

4.1 Applicable Standard

According to §15.247(i) 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.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Averaging Time (minutes)
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

* = Plane-wave equivalent power density

4.2 MPE Prediction

Prediction of MPE limit at a given distance

Equation from page 18 of 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

Maximum peak output power at antenna input terminal (dBm): 0.16

Maximum peak output power at antenna input terminal (mW): 1.04

Prediction distance (cm): 20

Prediction frequency (MHz): 2440

Maximum Antenna Gain, typical (dBi): 3.3

Maximum Antenna Gain (numeric): 2.138

Power density of prediction frequency at 20.0 cm (mW/cm²): 0.000442

MPE limit for uncontrolled exposure at prediction frequency (mW/cm²): 1.0

4.3 Test Result

The power density level at 20 cm is 0.000442 mW/cm², which is below the uncontrolled exposure limit of 1.0mW/cm² at 2440 MHz.

According to RSS-102 Issue 2, November 2005 §2.5.2 exception from Routine Evaluation Limits- RF Exposure Evaluation:

RF exposure evaluation is required if the separation distance between the user and the device is greater than 20 cm, except when the device operates:

- 1) below 1.5 GHz and its e.i.r.p. is equal to or less than 2.5 W;
- 2) at or above 1.5 GHz and the e.i.r.p. of the device is equal to or less than 5 W.

RF limits for device used by the general public is provided hereinafter table:

Frequency Range (MHz)	Electric Field (V/M rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Time Averaging (min)
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 - 1500	$1.585 f^{0.5}$	$0.0042 f^{0.5}$	f / 150	6
1500 – 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	$f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000 / f^{1.2}$

Note: f is the frequency in MHz

* Power density limit applicable at frequency greater than 100 MHz.

4.4 Result

The power of this device is 0.16 dBm (1.04 mW) and the antenna gain used for evaluation was 3.3 dBi (representing the worst case), according to RSS-102 section 2.5.2, this device exempt the RF exposure evaluation is.