

5 FCC §2.1091, §15.247(i) & ISEDC RSS-102 – RF Exposure

5.1 Applicable Standard

According to FCC §2.1091 (Mobile Devices) RF exposure is calculated.

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 (minute)
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

Note: f = frequency in MHz

* = Plane-wave equivalent power density

According to ISED RSS-102 Issue 5:

2.5.2 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

- below 20 MHz⁶ and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2} f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;
- at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

5.2 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

5.3 Test Results for the FCC

Standalone:

<u>Maximum output power at antenna input terminal (total) (dBm):</u>	11.52
<u>Maximum output power at antenna input terminal (mW):</u>	14.19
<u>Prediction distance (cm):</u>	20
<u>Predication frequency (MHz):</u>	5734.375
<u>Maximum Antenna Gain, typical (dBi):</u>	4.13
<u>Maximum Antenna Gain (numeric):</u>	2.59
<u>Power density of prediction frequency at prediction distance (mW/cm²):</u>	0.007
<u>FCC limit (mW/cm²):</u>	1.00

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.007 mW/cm². Limit is 1.00 mW/cm²

Radio Co-location:

Worst Case Co-location MPE Calculation

Radio	Max Conducted Power (dBm)	Antenna Gain (dBi)	Evaluated Distance (cm)	Worst-Case Exposure Level (mW/cm ²)	Limit (mW/cm ²)	Worst-Case Ratios	Sum of Ratios	Limit
Worst Case								
5.8GHz WASP	11.52	4.13	20	0.007	1.0	0.7%	11.04%	100%
2.4GHz Wi-Fi	23.76	3.4	20	0.10345	1.0	10.34%		

Note: 2.4 GHz Wi-Fi data is taken from test data reported in Report Number: GMIS15-A2 Rev A issued by MiCOM Labs, Inc. on 02/10/2009.

5.4 RF exposure evaluation exemption for IC

5.8 GHz WASP: Low Channel 5734.375 MHz

Maximum EIRP power = 11.52 dBm + 4.13 dBi = 15.65 dBm, which is less than $1.31 \times 10^{-2} f^{0.6834} = 4.85 \text{ W} = 36.86 \text{ dBm}$

Therefore, the RF exposure Evaluation is not required.