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

5.1 Applicable Standards

According to FCC § 2.1091, §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 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/cm^2)	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
* = Plane-wave equivalent power density

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

According to RSS-102 section 2.5.2

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 MHz[6] 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 MPE Results For FCC

Targeted output power tolerance is ±1db, so we use 25 dBm as output power to calculate the MPE.

Maximum peak output power at antenna input terminal (dBm):	25
Maximum peak output power at antenna input terminal (mW):	316.23
Prediction distance (cm):	20
Prediction frequency (MHz):	914
Maximum Antenna Gain, typical (dBi):	1.2
Maximum Antenna Gain (numeric):	1.318
Power density of prediction frequency at 20.0 cm (mW/cm^2):	0.083
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	0.609

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.083 mW/cm^2. Limit is 0.609 mW/cm^2.

5.4 RF exposure evaluation exemption for IC

The max tune-up peak conducted output power is 25 dBm at 914 MHz and the antenna gain is 1.2 dBi, so the e.i.r.p is 26.2 dBm (0.417 W).

Exemption from Routine Evaluation Limit is:
$1.31 \times 10^{-2} f^{0.6834} = 1.31 \times 10^{-2} \times 914^{0.6834} = 1.38$ W = 31.41 dBm eirp

Since the device's e.i.r.p output power is less than the limit, the device is exemption from Routine Evaluation Limits –RF exposure Evaluation.