4   FCC §2.1091 & ISEDC RSS-102 - RF Exposure

4.1   Applicable Standards

FCC §2.1091, (a) Requirements of this section are a consequence of Commission responsibilities under the National Environmental Policy Act to evaluate the environmental significance of its actions. See subpart I of part 1 of this chapter, in particular §1.1307(b).

Limits for Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f^2)	6
30-300	61.4	0.163	1.0	6
300-1500	/	/	f/300	6
1500-100,000	/	/	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	842/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	30

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 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.

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

25 dBi Dish Antenna

4.9 GHz Radio

Maximum output power at antenna input terminal (dBm):	2.94
Maximum output power at antenna input terminal (mW):	1.97
Prediction distance (cm):	20
Prediction frequency (MHz):	4980
Maximum Antenna Gain, typical (dBi):	25
Maximum Antenna Gain (numeric):	316.23
Power density of prediction frequency at 20 cm (mW/cm^2):	0.124
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

8 dBi Internal Antenna

4.9 GHz Radio

Maximum peak output power at antenna input terminal (dBm):	19.45
Maximum peak output power at antenna input terminal (mW):	88.10
Prediction distance (cm):	20
Prediction frequency (MHz):	4950
Maximum Antenna Gain, typical (dBi):	8
Maximum Antenna Gain (numeric):	6.310
Power density of prediction frequency at 20 cm (mW/cm^2):	0.111
FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm^2):	1.0

Conclusion

The device is compliant with the requirement MPE limit for uncontrolled exposure. All transceiver modules must be installed with a separation distance of no less than **20** cm from all persons.

4.3   RF exposure evaluation exemption for IC

25 dBi Dish Antenna**:**

2.94 + 25 dBi = 27.94 dBm < $1.31 \times 10^{-2} f^{0.6834}$ = 4.405 W = 36.44 dBm

8 dBi Internal Antenna:

19.45 + 8 dBi = 27.45 dBm < $1.31 \times 10^{-2} f^{0.6834}$ = 4.387 W = 36.42 dBm

Conclusion

Therefore the RF exposure is not required. All transceiver modules must be installed with a separation distance of no less than **20** cm from all persons.