

4 FCC §1.1307(b) (1) & §2.1091 - 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).

According to §1.1310 and §2.1091 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

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 Test Results

Maximum average output power at antenna input terminal (dBm): 33.357
Maximum average output power at antenna input terminal (mW): 2167.70
Prediction frequency (MHz): 459.675
Antenna Gain, typical (dBi): -1.49
Maximum Antenna Gain (numeric): 0.71
Prediction distance (cm): 20
Power density of prediction frequency at 20 cm (mW/cm²): 0.3062
MPE limit for uncontrolled exposure at predication frequency (mW/cm²): 0.3065

The average output power was derived from the maximum peak power (36.645 dBm) and duty cycle (46.9%).
The average output power = peak output power – 10*log(1/duty cycle)=36.645-3.288=.33.357 dBm.

Results

In order to pass the uncontrolled exposure limit of 0.307 mW/cm² with the Output Power being 36.645 dBm, 46.9% duty cycle, and prediction distance of 20cm, the EUT can have a maximum antenna gain of -1.49dBi.