

CFR47§ 15.407(f), § 2.1091 and RSS-Gen §5.5 & RSS-102 - RF EXPOSURE**Applicable Standard**

According to CFR47 §15.407, U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

According to RSS-Gen §5.5 Exposure of Humans to RF Fields, before equipment certification is granted, the applicable requirements of RSS-102 shall be met.

According to CFR47 §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

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 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000 / f ^{1.2}

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): 14.52

Maximum peak output power at antenna input terminal (mW): 28.31

Prediction distance (cm): 20

Prediction frequency (MHz): 5300

Maximum Antenna Gain, typical (dBi): 3.4

Maximum Antenna Gain (numeric): 2.19

Power density of prediction frequency at 20.0 cm (mW/cm²): 0.0123

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

Maximum peak output power at antenna input terminal (dBm): 15.31

Maximum peak output power at antenna input terminal (mW): 33.96

Prediction distance (cm): 20

Prediction frequency (MHz): 5580

Maximum Antenna Gain, typical (dBi): 3.4

Maximum Antenna Gain (numeric): 2.19

Power density of prediction frequency at 20.0 cm (mW/cm²): 0.0148

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

Test Result

The power density level at 20 cm is 0.023 mW/cm² and 0.0148 mW/cm², which are both below the uncontrolled exposure limit of 1.0 mW/cm² at 5250-5350 MHz and 5400-5725 MHz.

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

where: S = power density

P = power input to the 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 the antenna terminal: 19.30 (dBm)

Maximum peak output power at the antenna terminal: 85.11380382 (mW)

Antenna gain(typical): 2.5 (dBi)

Maximum antenna gain: 1.77827941 (numeric)

Prediction distance: 20 (cm)

Prediction frequency: 2462 (MHz)

MPE limit for uncontrolled exposure at prediction frequency: 1 (mW/cm²)

Power density at prediction frequency: **0.030111** (mW/cm²)

Maximum allowable antenna gain: **17.71269855** (dBi)

Worst case antenna gain used at 5GHz channel Worst case power used from FCC ID: RTP-550-10016-6
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