

RADIO FREQUENCY RADIATION EXPOSURE

FCC KDB 447498 D03

Radio frequency radiation exposure evaluation.

Devices that operate under CFR47 Part 20 are subject to routine environmental evaluation for RF exposure prior to equipment authorization or use if they operate at frequencies of 1.5 GHz or below and their effective radiated power (ERP) is 1.5 watts or more for FCC requirements and 2.5 Watts or more for Industry Canada Requirements.

Prediction of MPE limit at a given distance

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

$$S = \frac{EIRP}{4\pi R^2} \text{ re - arranged } R = \sqrt{\frac{EIRP}{S4\pi}}$$

where:

S = power density

R = distance to the centre of radiation of the antenna

EIRP = EUT Maximum power

LIMITS

FCC LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

(B) Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Averaging Time E ² , H ² or S (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

Uplink

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Prediction Frequency (MHz)	Conducted Output Power dBm	Maximum Antenna Gain (dBi)	Peak Output Power EIRP (dBm)	Peak Output Power EIRP (mW)	Power Density limit (S) (mW/cm ²)	Distance (R) cm required to be less than (S)
700MHz (Lower)						
698.000	-14.67	9	-5.67	0.2710	0.465	0.22
707.000	-14.72	9	-5.72	0.2679	0.471	0.22
716.000	-14.30	9	-5.30	0.2951	0.477	0.23
700MHz (Upper)						
776.000	-15.83	9	-6.83	0.2075	0.517	0.18
781.500	-16.34	9	-7.34	0.1845	0.521	0.17
787.000	-16.32	9	-7.32	0.1854	0.525	0.17
850 MHz						
817.000	-15.12	9	-6.12	0.2443	0.545	0.19
833.000	-14.40	9	-5.40	0.2884	0.555	0.21
849.000	-15.02	9	-6.02	0.2500	0.566	0.19
1800 MHz						
1880.000	-14.00	9	-5.00	0.3162	1.000	0.16
1897.500	-13.92	9	-4.92	0.3221	1.000	0.17
1915.000	-13.93	9	-4.93	0.3214	1.000	0.16
1700 MHz						
1710.000	-13.78	9	-4.78	0.3327	1.000	0.17
1732.500	-14.06	9	-5.06	0.3119	1.000	0.16
1755.000	-14.37	9	-5.37	0.2904	1.000	0.16

Downlink

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Prediction Frequency (MHz)	Conducted Output Power dBm	Maximum Antenna Gain (dBi)	Peak Output Power EIRP (dBm)	Peak Output Power EIRP (mW)	Power Density limit (S) (mW/cm ²)	Distance (R) cm required to be less than (S)
700MHz						
728.000	35.93	9	44.93	31117.163371	0.485	72
742.000	36.19	9	45.19	33036.954104	0.495	73
757.000	35.43	9	44.43	27733.201047	0.505	67
850 MHz						
862.000	35.81	9	44.81	30269.134281	0.575	60
878.000	36.37	9	45.37	34434.993076	0.585	69
894.000	36.27	9	45.27	33651.156938	0.596	68
1900 MHz						
1930.000	36.33	9	45.33	34119.291162	1.000	53
1962.500	37.10	9	46.10	40738.027780	1.000	57
1995.000	36.53	9	45.53	35727.283815	1.000	54
2100 MHz						
2110.000	38.06	9	47.06	50815.944256	1.000	64
2132.500	38.57	9	47.57	57147.863667	1.000	68
2155.000	38.39	9	47.39	54827.696492	1.000	67