

FCC §1.1307 & §2.1091 - MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 1.1307 (b)(1), 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for General Population/Uncontrolled Exposure

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Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	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

Result

Calculated Formulary:

Predication of MPE limit at a given distance

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

S = power density (in appropriate units, e.g. mW/cm²)

P = power input to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

For worst case:

Uplink

Test Band	Frequency (MHz)	Target power (dBm)	Target power (mW)	Antenna Gain		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
				(dBi)	(numeric)			
Lower 700MHz (A+B+C Block)	698.0	23	199.53	7	5.01	30	0.09	0.47
	707.0	23	199.53	7	5.01	30	0.09	0.47
	716.0	23	199.53	7	5.01	30	0.09	0.48
Upper 700MHz (C Block)	776.0	23	199.53	7	5.01	30	0.09	0.52
	781.5	23	199.53	7	5.01	30	0.09	0.52
	787.0	23	199.53	7	5.01	30	0.09	0.52
CELLULAR	824.0	23	199.53	7	5.01	30	0.09	0.55
	836.5	23	199.53	7	5.01	30	0.09	0.56
	849.0	23	199.53	7	5.01	30	0.09	0.57
PCS	1850.0	23	199.53	7	5.01	30	0.09	1.00
	1880.0	23	199.53	7	5.01	30	0.09	1.00
	1915.0	23	199.53	7	5.01	30	0.09	1.00
AWS	1710.0	23	199.53	7	5.01	30	0.09	1.00
	1745.0	23	199.53	7	5.01	30	0.09	1.00
	1780.0	23	199.53	7	5.01	30	0.09	1.00

Downlink

Test Band	Frequency (MHz)	Target power (dBm)	Target power (mW)	Antenna Gain		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
				(dBi)	(numeric)			
Lower 700MHz (A+B+C Block)	728.0	30	1000	7	5.01	30	0.44	0.49
	737.0	30	1000	7	5.01	30	0.44	0.49
	746.0	30	1000	7	5.01	30	0.44	0.50
Upper 700MHz (C Block)	746.0	30	1000	7	5.01	30	0.44	0.50
	751.5	30	1000	7	5.01	30	0.44	0.50
	757.0	30	1000	7	5.01	30	0.44	0.50
CELLULAR	869.0	30	1000	7	5.01	30	0.44	0.58
	881.5	30	1000	7	5.01	30	0.44	0.59
	894.0	30	1000	7	5.01	30	0.44	0.60
PCS	1930.0	30	1000	7	5.01	30	0.44	1.00
	1962.5	30	1000	7	5.01	30	0.44	1.00
	1995.0	30	1000	7	5.01	30	0.44	1.00
AWS	2110.0	30	1000	7	5.01	30	0.44	1.00
	2145.0	30	1000	7	5.01	30	0.44	1.00
	2180.0	30	1000	7	5.01	30	0.44	1.00

The Maximum indoor and outdoor Gain is 7.0 dBi

Note: To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 30cm from nearby persons.

Result: Compliance