

FCC §1.1310 & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1310 & 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				
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

Calculated Formulary:

Predication of MPE limit at a given distance

$S = PG/4\pi R^2$ = 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 simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \leq 1$$

Calculated Data:

Radio	Frequency Range (GHz)	Tune-up power		Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
		(dBm)	(mW)			
60G	58.32-62.64	32.0	1584.89	20	0.3153	1.00
Bluetooth	2.402-2.48	3.9	2.45	20	0.0005	1.00

Note:

The output power was declared by manufacturer. (Bluetooth conducted power is -1.0dBm, antenna gain is 4.9dBi)

The 60GHz radio and Bluetooth can transmit simultaneously:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$= 0.3153/1.00 + 0.0005/1.00$$

$$= 0.3153 + 0.0005$$

$$= 0.3158 < 1.0$$

Result: The device complied with the applicable MPE Limit at the 20cm distance.