

FCC RF Exposure Evaluation

According to subpart 15.247(i) and subpart §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission’s guidelines.

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) 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;

According to §1.1310 and §2.1091 RF exposure is calculated.

Calculation Formula:

Prediction of power density at the distance of the applicable MPE limit:

$S = PG/4\pi R^2$ = 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);

Calculated Data:

Mode	Frequency (MHz)	Max. RF Output Power (dBm)		Max. RF Output Power (mW)	Antenna Gain (numeric)	Evaluation Distance (cm)	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)
Classic BT	2402-2480	-0.77		0.838	1.995	20	0.0003	1
BLE	2402-2480	-1.48		0.711	1.995	20	0.0003	
2.4G Wi-Fi	2142-2472	SISO	22.21	166.341	1.995	20	0.0661	
		MIMO	19.57	90.573	1.995	20	0.0360	
5G Wi-Fi	5150-5250	SISO	11.93	15.596	1.995	20	0.0062	
		MIMO	11.5	14.125	1.995	20	0.0056	
	5725-5850	SISO	10.29	10.691	1.995	20	0.0042	
		MIMO	12.8	19.055	1.995	20	0.0076	

Note: the maximum antenna gain is 3dBi for Bluetooth and Wi-Fi.

For simultaneously transmit system, the calculated power density should comply with:

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

FCC ID: T2C-ROOMCAST

Considering simultaneously transmitting system (2.4G WIFI and 5G WIFI can work at same time):

The evaluation result= $0.0003/1+0.0661/1+0.0076/1=0.074 < 1$.

Result: Compliance, the device meets MPE requirement for Devices Used by the General Public (Uncontrolled Environment) at distance ≥ 20 cm.