

Prediction of MPE at a given distance

1. Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f ²	6
30-300	61.4	0.163	1.0	6
300-1.500			f/300	6
1.500-100.000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
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
300-1.500			f/1500	30
1.500-100.000			1.0	30

2. Test Procedure

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

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna

3. Result

Mode	Frequency (MHz)	Prediction distance (cm)	Peak RF power output		MPE (mW/cm ²)	Limit (mW/cm ²)	SAR Test Exclusion
			dBm	mW			
BT EDR	2402-2480	20	7.89	6.152	0.0020	1	Yes
BT LE	2402-2480	20	7.756	5.965	0.0020	1	Yes
2.4G WIFI	2412-2462	20	22.55	179.887	0.1421	1	Yes
5G WIFI B1	5180-5240	20	20.80	120.226	0.1126	1	Yes
5G WIFI B2	5260-5320	20	21.75	149.624	0.1402	1	Yes
5G WIFI B3	5500-5700	20	21.60	144.544	0.1354	1	Yes
5G WIFI B4	5745-5825	20	21.66	146.555	0.1373	1	Yes

Maximum Simultaneous transmission MPE Ratios for BT+WIFI

Max MPE Ratio BT/Limit	Max MPE ratio WIFI/Limit	Σ MPE ratios	Limit	Result
0.0020	0.1402	0.1422	1	PASS

BT Antenna Gain:

PCB antenna, max gain 2.22dBi, 1.67(numeric)

2.4GWIFI Antenna Gain:

Rod antenna 1, max gain 2.99dBi, 1.99(numeric)

Rod antenna 2, max gain 2.99dBi, 1.99(numeric)

The antenna MIMO combining gain is 5.99dBi. 3.98(numeric)

5G WIFI Antenna Gain:

Rod antenna 1, max gain 3.73dBi, 2.36(numeric)

Rod antenna 2, max gain 3.73dBi, 2.36(numeric)

The antenna MIMO combining gain is 6.73dBi. 4.71(numeric)

Then SAR evaluation is not required.