

RF EXPOSURE EVALUATION

According to FCC 1.1310 and KDB 447498 D01 V06, 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)

According to FCC2.1091

Limits for Maximum Permissible Exposure (MPE)

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

f = frequency in MHz * = Plane-wave equivalent power density

MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 * P * G}{377 * D^2}$$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

Measurement Result

BT:

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type: PCB Antenna

Antenna gain: -1.61 dBi;

R=20cm

$mW=10^{(dBm/10)}$

antenna gain Numeric= $10^{(dBi/10)}$

BLE

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
2402	BLE 1M	-2.14	-3±1	-2	0.631	-1.61	0.69	0.0001	1
2440		-3.58	-3±1	-2	0.631	-1.61	0.69	0.0001	1
2480		-2.9	-3±1	-2	0.631	-1.61	0.69	0.0001	1
2402	BLE 2M	-2.09	-3±1	-2	0.631	-1.61	0.69	0.0001	1
2440		-3.6	-3±1	-2	0.631	-1.61	0.69	0.0001	1
2480		-2.86	-3±1	-2	0.631	-1.61	0.69	0.0001	1

2.4G WIFI

Operation Frequency:

WIFI 802.11b/g/n HT20: 2412-2462MHz,

Power density limited: 1mW/ cm²

Antenna Type: Chip Antenna

Antenna gain: 1.0 dBi;

R=20cm

$mW=10^{(dBm/10)}$

Antenna gain Numeric= $10^{(dBi/10)}$

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain			
					(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)	(mW/cm2)
Ant 1	2412	b	16.38	16±1	17	50.119	1	1.26	0.0126	1
Ant 1	2437		15.25	16±1	17	50.119	1	1.26	0.0126	1
Ant 1	2462		16.27	16±1	17	50.119	1	1.26	0.0126	1
Ant 1	2412	g	14.04	14±1	15	31.623	1	1.26	0.0079	1
Ant 1	2437		13.43	14±1	15	31.623	1	1.26	0.0079	1
Ant 1	2462		14.46	14±1	15	31.623	1	1.26	0.0079	1
Ant 1	2412	802.11n20	13.78	13±1	14	25.119	1	1.26	0.0063	1
Ant 1	2437		12.8	13±1	14	25.119	1	1.26	0.0063	1
Ant 1	2462		13.79	13±1	14	25.119	1	1.26	0.0063	1

5G WIFI

Operation Frequency: WIFI 802.11a: 5180-5240MHz; 5500-5700MHz,5745-5825MHz;

Power density limited: 1mW/cm

Antenna Type: Chip Antenna

Antenna Gain: 2.6 dBi

R=20cm

$mW=10^{(dBm/10)}$

$antenna\ gain\ Numeric=10^{(dBi/10)}$

5.2G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm ²)
5180	802.11a	13.72	13±1	14	25.119	2.6	1.82	0.0091	1
5200		13.54	13±1	14	25.119	2.6	1.82	0.0091	1
5240		13.57	13±1	14	25.119	2.6	1.82	0.0091	1

5.6G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
5260	802.11a	11.28	11±1	12	15.849	2.60	1.82	0.0057	1
5280		11.41	11±1	12	15.849	2.60	1.82	0.0057	1
5320		11.47	11±1	12	15.849	2.60	1.82	0.0057	1

5.8G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
5260	802.11a	14.75	14±1	15	31.623	2.60	1.82	0.0114	1
5280		14.79	14±1	15	31.623	2.60	1.82	0.0114	1
5320		14.08	14±1	15	31.623	2.60	1.82	0.0114	1

SIMULTANEOUS TRANSMISSIONS

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE. To comply with the MPE, the fraction of the MPE in terms of E^2 , H^2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity. In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

Worst case is Simultaneous Transmissions for 5G Wi-Fi +BLE

Band	Mode	Standalone	Standalone	Simultaneous		Verdict
		Evaluation result	Power density Limits	Evaluation result	Limit	
		(mW/cm ²)	(mW/cm ²)	ratio		
5G Wi-Fi+BLE	BLE	0.0001	1	0.0115	1	PASS
	5G WIFI	0.0114	1			

Conclusion:

For the max result : $0.0115 \leq 1.0$, SAR is not required.

Signature:

Date: 2026-07-31



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