

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: Ceramic Antenna

Antenna gain: 2.23 dBi;

R=20cm

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

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

BT

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	GFSK	-3.35	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2441		-2.76	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2480		-1.99	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2402	π/4-DQPSK	-2.57	-2±1	-1	0.794	2.23	1.67	0.0003	1
2441		-1.96	-2±1	-1	0.794	2.23	1.67	0.0003	1
2480		-1.19	-2±1	-1	0.794	2.23	1.67	0.0003	1
2402	8-DPSK	-2	-1.5±1	-0.5	0.891	2.23	1.67	0.0003	1
2441		-1.34	-1.5±1	-0.5	0.891	2.23	1.67	0.0003	1
2480		-0.59	-1.5±1	-0.5	0.891	2.23	1.67	0.0003	1

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	-3.31	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2440		-2.89	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2480		-1.94	-2.5±1	-1.5	0.708	2.23	1.67	0.0002	1
2402	BLE 2M	-3.33	-3±1	-2	0.631	2.23	1.67	0.0002	1
2440		-2.8	-3±1	-2	0.631	2.23	1.67	0.0002	1
2480		-2.08	-3±1	-2	0.631	2.23	1.67	0.0002	1

2.4G WIFI

Operation Frequency:

WIFI 802.11b/g/n20/ax20: 2412-2462MHz, n40/ax40:2422-2452MHz

Power density limited: 1mW/ cm²

Antenna Type: Ceramic Antenna

Antenna gain: 2.23 dBi;

R=20cm

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

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

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)
2412	11b	14.95	15±1	16	39.811	2.23	1.67	0.0132	1
2437		15.44	15±1	16	39.811	2.23	1.67	0.0132	1
2462		15.3	15±1	16	39.811	2.23	1.67	0.0132	1
2412	11g	14.75	14±1	15	31.623	2.23	1.67	0.0105	1
2437		14.64	14±1	15	31.623	2.23	1.67	0.0105	1
2462		14.71	14±1	15	31.623	2.23	1.67	0.0105	1
2412	11n20	12.36	12±1	13	19.953	2.23	1.67	0.0066	1
2437		12.11	12±1	13	19.953	2.23	1.67	0.0066	1
2462		12.46	12±1	13	19.953	2.23	1.67	0.0066	1
2422	11n40	12.35	12±1	13	19.953	2.23	1.67	0.0066	1
2437		12.3	12±1	13	19.953	2.23	1.67	0.0066	1
2452		12.23	12±1	13	19.953	2.23	1.67	0.0066	1
2412	11ax20	12.41	12±1	13	19.953	2.23	1.67	0.0066	1
2437		12.34	12±1	13	19.953	2.23	1.67	0.0066	1
2462		12.48	12±1	13	19.953	2.23	1.67	0.0066	1
2422	11ax40	12.24	12±1	13	19.953	2.23	1.67	0.0066	1
2437		12.51	12±1	13	19.953	2.23	1.67	0.0066	1
2452		12.31	12±1	13	19.953	2.23	1.67	0.0066	1

5.6G WIFI

Operation Frequency: WIFI 802.11a/ac/ax/n(HT20): 5500-5700MHz;WIFI 802.11ac/ax/n(HT40): 5510-5670MHz;

Power density limited: 1mW/cm

Antenna Type: Ceramic Antenna

Antenna Gain:4.05 dBi

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)

5.6G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density Limits (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5500	802.11a	13.01	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5600		11.81	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5700		12.61	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5500	802.11n20	12.57	12±1	13	19.953	4.05	2.54	0.0101	1
5600		11.56	12±1	13	19.953	4.05	2.54	0.0101	1
5700		11.98	12±1	13	19.953	4.05	2.54	0.0101	1
5510	802.11n40	12.2	12±1	13	19.953	4.05	2.54	0.0101	1
5590		11.91	12±1	13	19.953	4.05	2.54	0.0101	1
5670		11.85	12±1	13	19.953	4.05	2.54	0.0101	1
5500	802.11ac20	13.09	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5600		11.43	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5700		12.57	12.5±1	13.5	22.387	4.05	2.54	0.0113	1
5510	802.11ac40	12.98	12±1	13	19.953	4.05	2.54	0.0101	1
5590		11.89	12±1	13	19.953	4.05	2.54	0.0101	1
5670		12.34	12±1	13	19.953	4.05	2.54	0.0101	1
5500	802.11ax20	12.82	12±1	13	19.953	4.05	2.54	0.0101	1
5600		11.52	12±1	13	19.953	4.05	2.54	0.0101	1
5700		13.05	13±1	14	25.119	4.05	2.54	0.0127	1
5510	802.11ax40	12.32	12±1	13	19.953	4.05	2.54	0.0101	1
5590		11.4	12±1	13	19.953	4.05	2.54	0.0101	1
5670		11.76	12±1	13	19.953	4.05	2.54	0.0101	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 5.6G Wi-Fi +BT

Band	Mode	Standalone	Standalone	Simultaneous		Verdict
		Evaluation result	Power density Limits	Evaluation result	Limit	
		(mW/cm2)	(mW/cm2)	raio		
5.8G Wi-Fi+BT	BT	0.0003	1	0.0130	1	PASS
	5.6G WIFI	0.0127	1			

Conclusion:

For the max result : $0.013 \leq 1.0$, SAR is not required.

Signature:

Date: 2026-07-29



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