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)

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 (V/m) = $\frac{\sqrt{30 * P * G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

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: 2402-2480MHz,

Power density limited: 1mW/ cm^2

Power density limited: 1mW/cm
Antenna Type: FPC Antenna
Antenna :1.06dBi
R=20cm
mW=10^(dBm/10)

Mode	Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)
BT	2402	GFSK	6.74	7±1	8	6.310	1.06	1.28	0.0016
	2441		7.29	7±1	8	6.310	1.06	1.28	0.0016
	2480		7.24	7±1	8	6.310	1.06	1.28	0.0016
BT	2402	π/4-DQPSK	6.82	7±1	8	6.310	1.06	1.28	0.0016
	2441		7.17	7±1	8	6.310	1.06	1.28	0.0016
	2480		7.16	7±1	8	6.310	1.06	1.28	0.0016
BT	2402	8-DPSK	6.78	7±1	8	6.310	1.06	1.28	0.0016
	2441		7.37	7±1	8	6.310	1.06	1.28	0.0016
	2480		7.25	7±1	8	6.310	1.06	1.28	0.0016
BLE	2402	GFSK	3.9	4±1	5	3.162	1.06	1.28	0.0008
	2440		3.73	4±1	5	3.162	1.06	1.28	0.0008
	2480		4.23	4±1	5	3.162	1.06	1.28	0.0008
BLE 2M	2402	802.11n20	3.8	4±1	5	3.162	1.06	1.28	0.0008
	2440		3.79	4±1	5	3.162	1.06	1.28	0.0008
	2480		4.33	4±1	5	3.162	1.06	1.28	0.0008

2.4G WIFI:

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

WIFI 802.11n HT40:2422-2452MHz

Power density limited: 1mW/ cm^2

Power density limited: 1mW/cm
Antenna Type: FPC Antenna
2.4G WIFI Antenna 1:1.06dBi;

R=20cm
mW=10^(dBm/10)

WLAN2.4G WiFi

Antenna	Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain (dBi)	Antenna Gain Numeric	Evaluation result (mW/cm2)
Ant 1	2412	802.11b	13.57	13±1	14	25.119	1.06	1.28	0.0064
Ant 1	2437		13.68	13±1	14	25.119	1.06	1.28	0.0064
Ant 1	2462		13.64	13±1	14	25.119	1.06	1.28	0.0064
Ant 1	2412	802.11g	10.26	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2437		10.03	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2462		10.39	10±1	11	12.589	1.06	1.28	0.0032
Ant1	2412	802.11n20	11.91	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2437		10.39	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2462		10.05	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2412	802.11ax20	10.44	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2437		10.33	10±1	11	12.589	1.06	1.28	0.0032
Ant 1	2462		10.19	10±1	11	12.589	1.06	1.28	0.0032

5G WIFI

802.11a/n20/ac/ax20: 5180-5240MHz, 5745-5825MHz

Power density limited: 1mW/cm
Antenna Type: FPC antenna

Antenna Gain: 5.56dBi;
R=20cm
mW=10^(dBm/10)
antenna 1gain Numeric=10^(dBi/10)

5.2G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
					(dBm)	(mW)	(dBi)	Numeric		
Ant1	5180	802.11a	11.43	11±1	12	15.849	5.56	3.60	0.0113	1
Ant1	5200		11.38	11±1	12	15.849	5.56	3.60	0.0113	1
Ant1	5240		11.27	11±1	12	15.849	5.56	3.60	0.0113	1
Ant1	5180	802.11n H20	12.16	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5200		11.77	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5240		11.76	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5180	802.11ac20	12.05	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5200		11.99	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5240		12.08	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5180	802.11ax20	11.98	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5200		12.30	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5240		12.25	12±1	13	19.953	5.56	3.60	0.0143	1

5.8G

Antenna	Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density Limits
			(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
					(dBm)	(mW)	(dBi)	Numeric		
Ant1	5745	802.11a	11.67	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5785		11.95	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5825		12.69	12±1	13	19.953	5.56	3.60	0.0143	1
Ant1	5745	802.11n H20	12.35	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5785		12.44	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5825		13.13	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5745	802.11ac20	12.08	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5785		12.37	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5825		13.19	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5745	802.11ax20	12.18	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5785		12.68	13±1	14	25.119	5.56	3.60	0.0180	1
Ant1	5825		13.23	13±1	14	25.119	5.56	3.60	0.0180	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 5.8G Wi-Fi +BT

Band	Mode	EIRP (dBm)	EIRP (mW)	Standalone	Standalone	Simultaneous		Verdict
				Evaluation result	Power density Limits	Evaluation result	Limit	
				(mW/cm2)	(mW/cm2)	raio		
5.8G Wi-Fi+BT	BT	9.06	8.05	0.0016	1	0.0341	1	PASS
	5.8G WIFI	19.56	90.36	0.0325	1			

Conclusion:
For the max result : 0.0341≤ 1.0, SAR is not required.

Signature: **Date:** 2025-07-29

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