

FCC ID: 2AAU7-AH3S

Maximum Permissible Exposure (MPE)

According to FCC 1.1310: 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

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

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.

BT&Matter:

Measurement Result

Operation Frequency: 2402MHz~2480MHz &2414MHz

Power density limited: 1mW/ cm²

Antenna Type: stamped metal Antenna

Antenna gain:1.58dBi&1.98dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(1.58/10)}=1.44$

antenna gain Numeric= $10^{(dBi/10)}=10^{(1.98/10)}=1.58$

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	DH5	2.46	2±1	3	1.995	1.58	1.44	0.0006	1
2441		2.55	2±1	3	1.995	1.58	1.44	0.0006	1
2480		2.08	2±1	3	1.995	1.58	1.44	0.0006	1
2402	2DH5	1.2	1±1	2	1.585	1.58	1.44	0.0005	1
2441		1.85	1±1	2	1.585	1.58	1.44	0.0005	1
2480		1.33	1±1	2	1.585	1.58	1.44	0.0005	1
2402	3DH5	1.09	1±1	2	1.585	1.58	1.44	0.0005	1
2441		1.69	1±1	2	1.585	1.58	1.44	0.0005	1
2480		1.18	1±1	2	1.585	1.58	1.44	0.0005	1

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		
2402	GFSK(1M)	-0.23	0±1	1	1.259	1.58	1.44	0.0004	1
2440		-0.2	0±1	1	1.259	1.58	1.44	0.0004	1
2480		-0.06	0±1	1	1.259	1.58	1.44	0.0004	1
2402	GFSK(2M)	-0.24	0±1	1	1.259	1.58	1.44	0.0004	1
2440		-0.2	0±1	1	1.259	1.58	1.44	0.0004	1
2480		-0.07	0±1	1	1.259	1.58	1.44	0.0004	1

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)
2414	Matter	7.75	7±1	8	6.310	1.98	1.58	0.0020	1

2.4G WIFI:

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

WIFI 802.11n HT40:2422-2452MHz

Power density limited: 1mW/ cm²

Antenna Type: stamped metal Antenna

Antenna gain: 1.58dBi

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(1.58/10)}=1.44$

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		
2412	802.11b	15.73	15±1	16	39.811	1.58	1.44	0.0114	1
2437		15.56	15±1	16	39.811	1.58	1.44	0.0114	1
2462		15.62	15±1	16	39.811	1.58	1.44	0.0114	1
2412	802.11g	13.56	13±1	14	25.119	1.58	1.44	0.0072	1
2437		13.41	13±1	14	25.119	1.58	1.44	0.0072	1
2462		13.23	13±1	14	25.119	1.58	1.44	0.0072	1
2412	802.11n H20	12.7	12±1	13	19.953	1.58	1.44	0.0057	1
2437		12.55	12±1	13	19.953	1.58	1.44	0.0057	1
2462		12.38	12±1	13	19.953	1.58	1.44	0.0057	1
2422	802.11n(H T40)	12.64	12±1	13	19.953	1.58	1.44	0.0057	1
2437		12.53	12±1	13	19.953	1.58	1.44	0.0057	1
2452		12.39	12±1	13	19.953	1.58	1.44	0.0057	1

5G WIFI:

Operation Frequency: WIFI 802.11a/ac/n(HT20): 5180-5240MHz;5260-5320MHz,5500-5700MHz,5745-5825MHz;WIFI 802.11ac/n(HT40): 5190-5230MHz;5270-5310MHz,5510-5670MHz5755-5795MHz; WIFI 802.11ac80:5210-5210MHz;5290-5290MHz;5530-5610MHz; 5775-5775MHz

Power density limited: 1mW/cm

Antenna Type: stamped metal antenna

Antenna gain:4.44dBi

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(4.44/10)}=2.78$

5G

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/cm ²)	(mW/cm ²)
5200	802.11n20	12.37	12±1	13	19.953	4.44	2.78	0.0110	1
5260	802.11n20	12.57	12±1	13	19.953	4.44	2.78	0.0110	1
5600	802.11n20	13.93	13±1	14	25.119	4.44	2.78	0.0139	1
5190	802.11ac20	12.77	12±1	13	19.953	4.44	2.78	0.0110	1

Z-wave

Antenna Type: stamped metal

Antenna antenna gain: -0.9 dBi

Transmit power

Frequency (MHz)	EIRP power (dBuV/m)	EIRP power (dBm)	EIRP power (mW)
908.40	93.08	-2.18	0.6057
908.42	93.00	-2.26	0.5946
912.00	92.32	-2.94	0.5084
916.00	92.64	-2.62	0.5473

$EIRP=E-104.8+20\log(D)$

Maximum Permissible Exposure:

Channel Freq. (MHz)	modulation	EIRP power (dBm)	EIRP power (mW)	Tune-up power (dBm)	Max tune-up power (dBm)	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
908.40	GFSK	-2.18	0.6057	-2±1	-1	0.000128	0.61
908.42	GFSK	-2.26	0.5946	-2±1	-1	0.000128	0.61
912.00	GFSK	-2.94	0.5084	-2±1	-1	0.000128	0.61
916.00	GFSK	-2.62	0.5473	-2±1	-1	0.000128	0.61

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 LTE Module + Matter+Z-wave+WIFI2.4G

Band	Mode	Tune up (dBm)	Tune up (mW)	Standalone	Standalone	Simultaneous		Verdict
				Evaluation result	Power density Limits	Evaluation result	Limit	
				(mW/cm2)	(mW/cm2)	raio		
2.4G Wi-Fi+LTE+Z-WAVE+Matter	LTE	25	316.23	0.0629	1	0.0723	1	PASS
	2.4G WIFI	16	39.81	0.0079	1			
	Z-WAVE	-1	0.79	0.0002	0.61			
	Matter	8	6.31	0.0013	1			

Note:

1. LTE Test data reference to FCC ID: XMR201807EG91NA.
2. NO simultaneous transmissions are possible for this device of BT+WIFI2.4G/5G

Signature:

Date: 2025-12-2



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