

FCC ID:OMC453084E

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

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

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:

Measurement Result

Operation Frequency: 2402MHz~2480MHz

Power density limited: 1mW/ cm²

Antenna Type: FPC antenna

Antenna gain: 2.07dBi;

R=20cm

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

antenna gain Numeric=10^{^(dBi/10)}= 10^{^(2.07/10)}=1.61

BR+EDR:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm2)	Power density (mW/cm2)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	4.64	4±1	5	3.162	2.07	1.61	0.0010	1
2441		4.55	4±1	5	3.162	2.07	1.61	0.0010	1
2480		4.81	4±1	5	3.162	2.07	1.61	0.0010	1
2402	2DH5	7.03	7±1	8	6.310	2.07	1.61	0.0020	1
2441		6.91	7±1	8	6.310	2.07	1.61	0.0020	1
2480		7.14	7±1	8	6.310	2.07	1.61	0.0020	1
2402	3DH5	7.43	7±1	8	6.310	2.07	1.61	0.0020	1
2441		7.28	7±1	8	6.310	2.07	1.61	0.0020	1
2480		7.46	7±1	8	6.310	2.07	1.61	0.0020	1

BLE:

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain			
				(dBm)	(dBm)	(mW)	(dBi)	Numeric	(mW/cm2)
2402	GFSK1M	0.3	0±1	1	1.259	2.07	1.61	0.0004	1
2440		0.59	0±1	1	1.259	2.07	1.61	0.0004	1
2480		0.53	0±1	1	1.259	2.07	1.61	0.0004	1
2402	GFSK2M	0.27	0±1	1	1.259	2.07	1.61	0.0004	1
2440		0.57	0±1	1	1.259	2.07	1.61	0.0004	1
2480		0.51	0±1	1	1.259	2.07	1.61	0.0004	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: FPC antenna

WIFI antenna1 gain: 1.13dBi;

WIFI antenna2 gain: 2.06dBi;

R=20cm

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

antenna 1 gain Numeric= $10^{(dBi/10)}=10^{(1.13/10)}=1.3$

antenna 2 gain Numeric= $10^{(dBi/10)}=10^{(2.06/10)}=1.61$

ANT1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	15.36	15±1	16	39.811	1.13	1.30	0.0103	1
2437		15.07	15±1	16	39.811	1.13	1.30	0.0103	1
2462		15.05	15±1	16	39.811	1.13	1.30	0.0103	1
2412	802.11g	13.47	13±1	14	25.119	1.13	1.30	0.0065	1
2437		13.3	13±1	14	25.119	1.13	1.30	0.0065	1
2462		13.35	13±1	14	25.119	1.13	1.30	0.0065	1
2412	802.11n H20	12.45	12±1	13	19.953	1.13	1.30	0.0051	1
2437		12.13	12±1	13	19.953	1.13	1.30	0.0051	1
2462		12.24	12±1	13	19.953	1.13	1.30	0.0051	1
2422	802.11n(H T40)	12.44	12±1	13	19.953	1.13	1.30	0.0051	1
2437		12.39	12±1	13	19.953	1.13	1.30	0.0051	1
2452		12.31	12±1	13	19.953	1.13	1.30	0.0051	1

ANT2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result	Power density
		(dBm)		tune-up power		Gain		(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	15.37	15±1	16	39.811	2.06	1.61	0.0127	1
2437		15.54	15±1	16	39.811	2.06	1.61	0.0127	1
2462		15.58	15±1	16	39.811	2.06	1.61	0.0127	1
2412	802.11g	13.76	13±1	14	25.119	2.06	1.61	0.0080	1
2437		13.57	13±1	14	25.119	2.06	1.61	0.0080	1
2462		13.81	13±1	14	25.119	2.06	1.61	0.0080	1
2412	802.11n H20	12.57	12±1	13	19.953	2.06	1.61	0.0064	1
2437		12.49	12±1	13	19.953	2.06	1.61	0.0064	1
2462		12.6	12±1	13	19.953	2.06	1.61	0.0064	1
2422	802.11n(H T40)	12.71	12±1	13	19.953	2.06	1.61	0.0064	1
2437		12.7	12±1	13	19.953	2.06	1.61	0.0064	1
2452		12.64	12±1	13	19.953	2.06	1.61	0.0064	1

5G WIFI:

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

Power density limited: 1mW/cm

Antenna Type: FPC antenna

WIFI antenna1 gain:1.87dBi;

WIFI antenna2 gain: 1.99dBi;

R=20cm

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

antenna1 gain Numeric= $10^{(dBi/10)}=10^{(1.87/10)}=1.54$

antenna2 gain Numeric= $10^{(dBi/10)}=10^{(1.99/10)}=1.58$

5.2G

ANT1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5180	802.11a	12.76	13±1	14	25.12	1.54	0.00770	1
5200		12.7	13±1	14	25.12	1.54	0.00770	1
5240		13.14	13±1	14	25.12	1.54	0.00770	1
5180	802.11n H20	11.64	11±1	12	15.85	1.54	0.00486	1
5200		11.61	11±1	12	15.85	1.54	0.00486	1
5240		11.89	11±1	12	15.85	1.54	0.00486	1
5190	802.11n H40	11.58	11±1	12	15.85	1.54	0.00486	1
5230		11.93	11±1	12	15.85	1.54	0.00486	1
5180	802.11ac 20	11.55	11±1	12	15.85	1.54	0.00486	1
5200		11.62	11±1	12	15.85	1.54	0.00486	1
5240		11.94	11±1	12	15.85	1.54	0.00486	1
5190	802.11ac 40	11.67	11±1	12	15.85	1.54	0.00486	1
5230		11.88	11±1	12	15.85	1.54	0.00486	1
5210	802.11ac 80	11.63	11±1	12	15.85	1.54	0.00486	1

ANT2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5180	802.11a	12.12	12±1	13	19.95	1.58	0.00627	1
5200		11.96	12±1	13	19.95	1.58	0.00627	1
5240		11.61	12±1	13	19.95	1.58	0.00627	1
5180	802.11n H20	10.88	10±1	11	12.59	1.58	0.00396	1
5200		10.85	10±1	11	12.59	1.58	0.00396	1
5240		10.49	10±1	11	12.59	1.58	0.00396	1
5190	802.11n H40	10.9	10±1	11	12.59	1.58	0.00396	1
5230		10.67	10±1	11	12.59	1.58	0.00396	1
5180	802.11ac 20	10.91	10±1	11	12.59	1.58	0.00396	1
5200		10.83	10±1	11	12.59	1.58	0.00396	1
5240		10.54	10±1	11	12.59	1.58	0.00396	1
5190	802.11ac 40	10.87	10±1	11	12.59	1.58	0.00396	1
5230		10.68	10±1	11	12.59	1.58	0.00396	1
5210	802.11ac 80	10.62	10±1	11	12.59	1.58	0.00396	1

5.3G

ANT1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5260	802.11a	12.34	12±1	13	19.95	1.54	0.00611	1
5280		12.04	12±1	13	19.95	1.54	0.00611	1
5320		11.72	12±1	13	19.95	1.54	0.00611	1
5260	802.11n H20	11.88	11±1	12	15.85	1.54	0.00486	1
5280		11.86	11±1	12	15.85	1.54	0.00486	1
5320		11.91	11±1	12	15.85	1.54	0.00486	1
5270	802.11n H40	12.16	12±1	13	19.95	1.54	0.00611	1
5310		11.93	12±1	13	19.95	1.54	0.00611	1
5260	802.11ac 20	12.02	12±1	13	19.95	1.54	0.00611	1
5280		11.93	12±1	13	19.95	1.54	0.00611	1
5320		11.87	12±1	13	19.95	1.54	0.00611	1
5270	802.11ac 40	12.12	12±1	13	19.95	1.54	0.00611	1
5310		11.78	12±1	13	19.95	1.54	0.00611	1
5290	802.11ac 80	11.76	12±1	13	19.95	1.54	0.00611	1

ANT2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5260	802.11a	12.46	12±1	13	19.95	1.58	0.00627	1
5280		12.34	12±1	13	19.95	1.58	0.00627	1
5320		12.66	12±1	13	19.95	1.58	0.00627	1
5260	802.11n H20	12.26	12±1	13	19.95	1.58	0.00627	1
5280		12.39	12±1	13	19.95	1.58	0.00627	1
5320		12.41	12±1	13	19.95	1.58	0.00627	1
5270	802.11n H40	12.33	12±1	13	19.95	1.58	0.00627	1
5310		12.41	12±1	13	19.95	1.58	0.00627	1
5260	802.11ac 20	12.31	12±1	13	19.95	1.58	0.00627	1
5280		12.32	12±1	13	19.95	1.58	0.00627	1
5320		12.44	12±1	13	19.95	1.58	0.00627	1
5270	802.11ac 40	12.48	12±1	13	19.95	1.58	0.00627	1
5310		12.42	12±1	13	19.95	1.58	0.00627	1
5290	802.11ac 80	12.24	12±1	13	19.95	1.58	0.00627	1

5.6G

ANT1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Gain		
5500	802.11a	12.7	13±1	14	25.12	1.54	0.00770	1
5600		12.51	13±1	14	25.12	1.54	0.00770	1
5700		13.95	13±1	14	25.12	1.54	0.00770	1
5500	802.11n H20	11.29	12±1	13	19.95	1.54	0.00611	1
5600		11.33	12±1	13	19.95	1.54	0.00611	1
5700		12.67	12±1	13	19.95	1.54	0.00611	1
5510	802.11n H40	11.47	12±1	13	19.95	1.54	0.00611	1
5590		11.74	12±1	13	19.95	1.54	0.00611	1
5670		12.89	12±1	13	19.95	1.54	0.00611	1
5500	802.11ac 20	11.22	12±1	13	19.95	1.54	0.00627	1
5600		11.43	12±1	13	19.95	1.54	0.00627	1
5700		12.7	12±1	13	19.95	1.54	0.00627	1
5510	802.11ac 40	11.44	11±1	12	15.85	1.54	0.00627	1
5590		11.78	11±1	12	15.85	1.54	0.00627	1
5670		10.87	11±1	12	15.85	1.54	0.00627	1
5530	802.11ac 80	11.06	11±1	12	15.85	1.54	0.00627	1
5610		11.57	11±1	12	15.85	1.54	0.00627	1

ANT2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Gain		
5500	802.11a	11.3	12±1	13	19.95	1.58	0.00627	1
5600		11.74	12±1	13	19.95	1.58	0.00627	1
5700		12.72	12±1	13	19.95	1.58	0.00627	1
5500	802.11n H20	10.01	11±1	12	15.85	1.58	0.00498	1
5600		10.52	11±1	12	15.85	1.58	0.00498	1
5700		11.6	11±1	12	15.85	1.58	0.00498	1
5510	802.11n H40	10.15	11±1	12	15.85	1.58	0.00498	1
5590		10.66	11±1	12	15.85	1.58	0.00498	1
5670		11.5	11±1	12	15.85	1.58	0.00498	1
5500	802.11ac 20	10	11±1	12	15.85	1.58	0.00627	1
5600		10.5	11±1	12	15.85	1.58	0.00627	1
5700		11.6	11±1	12	15.85	1.58	0.00627	1
5510	802.11ac 40	10.12	11±1	12	15.85	1.58	0.00627	1
5590		10.58	11±1	12	15.85	1.58	0.00627	1
5670		11.53	11±1	12	15.85	1.58	0.00627	1
5530	802.11ac 80	10.09	10±1	11	12.59	1.58	0.00627	1
5610		10.57	10±1	11	12.59	1.58	0.00627	1

5.8G ANT1

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5745	802.11a	12	12±1	13	19.95	1.54	0.00611	1
5785		12.49	12±1	13	19.95	1.54	0.00611	1
5825		12.66	12±1	13	19.95	1.54	0.00611	1
5745	802.11n20	10.86	11±1	12	15.85	1.54	0.00486	1
5785		11.33	11±1	12	15.85	1.54	0.00486	1
5825		11.32	11±1	12	15.85	1.54	0.00486	1
5755	802.11n40	11.18	11±1	12	15.85	1.54	0.00486	1
5795		11.7	11±1	12	15.85	1.54	0.00486	1
5745	802.11ac 20	10.81	11±1	12	15.85	1.54	0.00486	1
5785		11.51	11±1	12	15.85	1.54	0.00486	1
5825		11.44	11±1	12	15.85	1.54	0.00486	1
5755	802.11ac 40	11.26	11±1	12	15.85	1.54	0.00486	1
5795		11.68	11±1	12	15.85	1.54	0.00486	1
5775	802.11ac 80	11.33	10±1	11	12.59	1.54	0.00386	1

ANT2

Channel Freq. (MHz)	modulation	conducted power	Tune-up power	Max		Antenna	Evaluation result at 20cm	Power density Limits
		(dBm)	(dBm)	tune-up power		Gain	Power density(mW/cm2)	(mW/cm2)
				(dBm)	(mW)	Numeric		
5745	802.11a	12.23	12±1	13	19.95	1.58	0.00627	1
5785		12.24	12±1	13	19.95	1.58	0.00627	1
5825		12.41	12±1	13	19.95	1.58	0.00627	1
5745	802.11n20	12.04	12±1	13	19.95	1.58	0.00627	1
5785		12.03	12±1	13	19.95	1.58	0.00627	1
5825		12.21	12±1	13	19.95	1.58	0.00627	1
5755	802.11n40	12.18	12±1	13	19.95	1.58	0.00627	1
5795		12.26	12±1	13	19.95	1.58	0.00627	1
5745	802.11ac 20	11.99	12±1	13	19.95	1.58	0.00627	1
5785		12.09	12±1	13	19.95	1.58	0.00627	1
5825		12.23	12±1	13	19.95	1.58	0.00627	1
5755	802.11ac 40	12.17	12±1	13	19.95	1.58	0.00627	1
5795		12.25	12±1	13	19.95	1.58	0.00627	1
5775	802.11ac 80	11.95	11±1	12	15.85	1.58	0.00498	1

WLAN2.4G MIMO

conducted power (dBm)	Gain (dBi)	tune up(dBm)	tune up(dBm)	EIRP (mW)	R(cm)	S (mW/cm ²)	MPE Limit (mW/m ²)	Calculation result	Conclusion
13.26	1.13	13±1	14	25.119	20	0.005647	1	0.015941	Pass
13.72	2.06	13±1	14	25.119	20	0.010294	1		

WLAN5G MIMO

conducted power (dBm)	Gain (dBi)	tune up(dBm)	tune up(dBm)	EIRP (mW)	R(cm)	S (mW/cm ²)	MPE Limit (mW/m ²)	Calculation result	Conclusion
11.84	1.87	12±1	13	19.953	20	0.007423	1	0.015322	Pass
12.78	1.99	12±1	13	19.953	20	0.007899	1		

Note: This product does not support simultaneous delivery.

Conclusion:

The conclusion should be $0.0127 < 1$ for Max Power Density, Compliance the RF Exposure requirement.

The 2.4Gwifi has the maximum Power Density value 0.015941 mW/cm² in 2.4G MIMO transmitting mode;

The 5Gwifi has the maximum Power Density value 0.015322 mW/cm² in 5G MIMO transmitting mode;

Signature:



Date: 2024-12-19

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