

FCC ID: 2AQ9Y-OPI3LTS

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: $1\text{mW}/\text{cm}^2$

Antenna Type: Internal antenna

Antenna gain: 2dBi;

R=20cm

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

antenna gain Numeric= $10^{(\text{dBi}/10)}=10^{(2/10)}=1.58$

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	DH5	2.809	3±1	4	2.512	2.00	1.58	0.0008	1
2441		2.686	3±1	4	2.512	2.00	1.58	0.0008	1
2480		3.133	3±1	4	2.512	2.00	1.58	0.0008	1
2402	2DH5	2.097	2±1	3	1.995	2.00	1.58	0.0006	1
2441		2.064	2±1	3	1.995	2.00	1.58	0.0006	1
2480		2.523	2±1	3	1.995	2.00	1.58	0.0006	1
2402	3DH5	2.254	2±1	3	1.995	2.00	1.58	0.0006	1
2441		2.345	2±1	3	1.995	2.00	1.58	0.0006	1
2480		2.506	2±1	3	1.995	2.00	1.58	0.0006	1

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2402	GFSK (1M)	-9.063	-9±1	-8	0.158	2.00	1.58	0.0000	1
2440		-8.942	-9±1	-8	0.158	2.00	1.58	0.0000	1
2480		-9.646	-9±1	-8	0.158	2.00	1.58	0.0000	1
2402	GFSK (2M)	-8.99	-9±1	-8	0.158	2.00	1.58	0.0000	1
2440		-8.872	-9±1	-8	0.158	2.00	1.58	0.0000	1
2480		-9.456	-9±1	-8	0.158	2.00	1.58	0.0000	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: Internal antenna

Antenna gain: 2dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(2/10)}=1.58$

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
2412	802.11b	14.87	14±1	15	31.623	2.00	1.58	0.0100	1
2437		14.59	14±1	15	31.623	2.00	1.58	0.0100	1
2462		14.09	14±1	15	31.623	2.00	1.58	0.0100	1
2412	802.11g	14.36	14±1	15	31.623	2.00	1.58	0.0100	1
2437		14.31	14±1	15	31.623	2.00	1.58	0.0100	1
2462		13.58	14±1	15	31.623	2.00	1.58	0.0100	1
2412	802.11n H20	13.61	13±1	14	25.119	2.00	1.58	0.0079	1
2437		13.94	13±1	14	25.119	2.00	1.58	0.0079	1
2462		13.98	13±1	14	25.119	2.00	1.58	0.0079	1
2422	802.11n(H T40)	13.3	13±1	14	25.119	2.00	1.58	0.0079	1
2437		13.46	13±1	14	25.119	2.00	1.58	0.0079	1
2452		13.75	13±1	14	25.119	2.00	1.58	0.0079	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: Internal antenna

Antenna gain:2dBi;

R=20cm

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

antenna gain Numeric= $10^{(dBi/10)}=10^{(2/10)}=1.58$

5.2G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5180	802.11a	10.018	10±1	11	12.589	2.00	1.58	0.0040	1
5200		9.639	10±1	11	12.589	2.00	1.58	0.0040	1
5240		9.936	10±1	11	12.589	2.00	1.58	0.0040	1
5180	802.11ac20	10.468	10±1	11	12.589	2.00	1.58	0.0040	1
5200		10.177	10±1	11	12.589	2.00	1.58	0.0040	1
5240		10.319	10±1	11	12.589	2.00	1.58	0.0040	1
5190	802.11ac40	11.457	11±1	12	15.849	2.00	1.58	0.0050	1
5230		10.533	11±1	12	15.849	2.00	1.58	0.0050	1
5210	802.11ac80	11.153	11±1	12	15.849	2.00	1.58	0.0050	1
5180	802.11n H20	10.403	10±1	11	12.589	2.00	1.58	0.0040	1
5200		10.135	10±1	11	12.589	2.00	1.58	0.0040	1
5240		10.22	10±1	11	12.589	2.00	1.58	0.0040	1
5190	802.11n H40	11.314	11±1	12	15.849	2.00	1.58	0.0050	1
5230		10.597	11±1	12	15.849	2.00	1.58	0.0050	1

5.3G

Channel Freq. (MHz)	modulation	conducted power	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
		(dBm)		tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5260	802.11a	11.033	11±1	12	15.849	2.00	1.58	0.0050	1
5280		10.133	11±1	12	15.849	2.00	1.58	0.0050	1
5320		10.118	11±1	12	15.849	2.00	1.58	0.0050	1
5260	802.11ac20	11.199	11±1	12	15.849	2.00	1.58	0.0050	1
5280		10.498	11±1	12	15.849	2.00	1.58	0.0050	1
5320		10.491	11±1	12	15.849	2.00	1.58	0.0050	1
5270	802.11ac40	10.843	10±1	11	12.589	2.00	1.58	0.0040	1
5310		10.725	10±1	11	12.589	2.00	1.58	0.0040	1
5290	802.11ac80	10.601	10±1	11	12.589	2.00	1.58	0.0040	1
5260	802.11n H20	11.215	11±1	12	15.849	2.00	1.58	0.0050	1
5280		10.449	11±1	12	15.849	2.00	1.58	0.0050	1
5320		10.422	11±1	12	15.849	2.00	1.58	0.0050	1
5270	802.11n H40	10.859	10±1	11	12.589	2.00	1.58	0.0040	1
5310		10.491	10±1	11	12.589	2.00	1.58	0.0040	1

5.6G

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5500	802.11a	9.615	10±1	11	12.589	2.00	1.58	0.0040	1
5600		10.242	10±1	11	12.589	2.00	1.58	0.0040	1
5700		10.469	10±1	11	12.589	2.00	1.58	0.0040	1
5500	802.11ac20	9.945	10±1	11	12.589	2.00	1.58	0.0040	1
5600		10.54	10±1	11	12.589	2.00	1.58	0.0040	1
5700		10.875	10±1	11	12.589	2.00	1.58	0.0040	1
5510	802.11ac40	10.008	10±1	11	12.589	2.00	1.58	0.0040	1
5590		10.556	10±1	11	12.589	2.00	1.58	0.0040	1
5670		10.451	10±1	11	12.589	2.00	1.58	0.0040	1
5530	802.11ac80	11.829	11±1	12	15.849	2.00	1.58	0.0050	1
5610		11.63	11±1	12	15.849	2.00	1.58	0.0050	1
5500	802.11n(HT20)	9.955	10±1	11	12.589	2.00	1.58	0.0040	1
5600		10.547	10±1	11	12.589	2.00	1.58	0.0040	1
5700		10.815	10±1	11	12.589	2.00	1.58	0.0040	1

5.8G

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max		Antenna		Evaluation result (mW/cm ²)	Power density (mW/cm ²)
				tune-up power		Gain			
				(dBm)	(mW)	(dBi)	Numeric		
5745	802.11a	9.484	9±1	10	10.000	2.00	1.58	0.0032	1
5785		9.561	9±1	10	10.000	2.00	1.58	0.0032	1
5825		9.51	9±1	10	10.000	2.00	1.58	0.0032	1
5745	802.11ac20	9.923	10±1	11	12.589	2.00	1.58	0.0040	1
5785		9.93	10±1	11	12.589	2.00	1.58	0.0040	1
5825		10.087	10±1	11	12.589	2.00	1.58	0.0040	1
5755	802.11ac40	10.48	10±1	11	12.589	2.00	1.58	0.0040	1
5795		10.841	10±1	11	12.589	2.00	1.58	0.0040	1
5775	802.11ac80	11.553	11±1	12	15.849	2.00	1.58	0.0050	1
5745	802.11n H20	9.835	9±1	10	10.000	2.00	1.58	0.0032	1
5785		9.996	9±1	10	10.000	2.00	1.58	0.0032	1
5825		9.999	9±1	10	10.000	2.00	1.58	0.0032	1
5755	802.11n H40	10.519	10±1	11	12.589	2.00	1.58	0.0040	1
5795		10.824	10±1	11	12.589	2.00	1.58	0.0040	1

Signature:

Date: 2022-10-19



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