FCC ID: Z3K-X20674012A

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 (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: 2402MHz~2480MHz

Power density limited: 1mW/ cm^2

Antenna Type: PIFA antenna

WIFI antenna gain: 2.0dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)= 10^(1/10)=1.58

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain Numeric	Evaluation result at 20cm Power density(mW/cm	Power density Limits (mW/cm2)
2402	GFSK	5.795	6±1	7	5.011872	1.58	0.00158	1
2441		6.418	6±1	7	5.011872	1.58	0.00158	1
2480		6.384	6±1	7	5.011872	1.58	0.00158	1
2402	π/4-DQPSK,	4.895	5±1	6	3.981072	1.58	0.00125	1
2441		5.388	5±1	6	3.981072	1.58	0.00125	1
2480		5.425	5±1	6	3.981072	1.58	0.00125	1
2402	8DPSK	5.038	5±1	6	3.981072	1.58	0.00125	1
2441		5.547	5±1	6	3.981072	1.58	0.00125	1
2480		5.546	5±1	6	3.981072	1.58	0.00125	1
2402	BLE(GFSK)	5.735	6±1	7	5.011872	1.58	0.00158	1
2441		6.311	6±1	7	5.011872	1.58	0.00158	1
2480		6.289	6±1	7	5.011872	1.58	0.00158	1

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

Antenna Type: PIFA Antenna

WIFI antenna gain: 2.0dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)= 10^(1/10)=1.58

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain Numeric	Evaluation result at 20cm Power density(mW/cm	Power density Limits (mW/cm2)
2412	802.11b	12.69	13±1	14	25.11886	1.58	0.00790	1
2437		13.01	13±1	14	25.11886	1.58	0.00790	1
2462		12.81	13±1	14	25.11886	1.58	0.00790	1
2412	802.11g	11.76	12.7±1	13.7	23.44229	1.58	0.00737	1
2437		13.53	12.7±1	13.7	23.44229	1.58	0.00737	1
2462		13.69	12.7±1	13.7	23.44229	1.58	0.00737	1
2412	802.11n H20	11.64	11±1	12	15.84893	1.58	0.00498	1
2437		13.6	13±1	14	25.11886	1.58	0.00790	1
2462		13.76	13±1	14	25.11886	1.58	0.00790	1
2422	802.11n H40	12.96	13±1	14	25.11886	1.58	0.00790	1
2437		13.19	13±1	14	25.11886	1.58	0.00790	1
2452		13.33	13±1	14	25.11886	1.58	0.00790	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: PIFA Antenna

WIFI antenna gain: 2.0dBi;

R=20cm

mW=10^(dBm/10)

antenna gain Numeric=10^(dBi/10)= 10^(1/10)=1.58

5.2G

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/cm	(mW/cm2)
				(dBm)	(mW)	Numeric		
5180	802.11a	12.31	12±1	13	19.95262	1.58	0.00627	1
5200		12.21	12±1	13	19.95262	1.58	0.00627	1
5240		12.46	12±1	13	19.95262	1.58	0.00627	1
5180	802.11n H20	11.98	12±1	13	19.95262	1.58	0.00627	1
5200		12.34	12±1	13	19.95262	1.58	0.00627	1
5240		12.68	12±1	13	19.95262	1.58	0.00627	1
5190	802.11n H40	12.29	12±1	13	19.95262	1.58	0.00627	1
5230		12.79	12±1	13	19.95262	1.58	0.00627	1

5.3G

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/cm	(mW/cm2)
				(dBm)	(mW)	Numeric		
5260	802.11a	9.96	10.5±1	11.5	14.12538	1.58	0.00444	1
5280		10.28	10.5±1	11.5	14.12538	1.58	0.00444	1
5320		11.17	10.5±1	11.5	14.12538	1.58	0.00444	1
5260	802.11n H20	10.08	11±1	12	15.84893	1.58	0.00498	1
5280		10.37	11±1	12	15.84893	1.58	0.00498	1
5320		11.26	11±1	12	15.84893	1.58	0.00498	1
5270	802.11n H40	10.33	11±1	12	15.84893	1.58	0.00498	1
5310		11.36	11±1	12	15.84893	1.58	0.00498	1

5.6G

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/cm	(mW/cm2)
				(dBm)	(mW)	Numeric		
5500	802.11a	12.48	12±1	13	19.95262	1.58	0.00627	1
5600		11.83	12±1	13	19.95262	1.58	0.00627	1
5700		12.3	12±1	13	19.95262	1.58	0.00627	1
5500	802.11n H20	12.49	12±1	13	19.95262	1.58	0.00627	1
5600		11.89	12±1	13	19.95262	1.58	0.00627	1
5700		12.34	12±1	13	19.95262	1.58	0.00627	1
5510	802.11n H40	10.67	10±1	11	12.58925	1.58	0.00396	1
5590		11.86	12±1	13	19.95262	1.58	0.00627	1
5670		12.63	12±1	13	19.95262	1.58	0.00627	1

5.8G

Channel Freq. (MHz)	modulation	conducted power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Max tune-up power (mW)	Antenna Gain Numeric	Evaluation result at 20cm Power density(mW/cm	Power density Limits (mW/cm2)
5745	802.11a	10.04	11±1	12	15.84893	1.58	0.00498	1
5785		10.76	11±1	12	15.84893	1.58	0.00498	1
5825		11.71	11±1	12	15.84893	1.58	0.00498	1
5745	802.11n20	10.14	11±1	12	15.84893	1.58	0.00498	1
5785		10.83	11±1	12	15.84893	1.58	0.00498	1
5825		11.78	11±1	12	15.84893	1.58	0.00498	1
5755	802.11n40	10.4	11±1	12	15.84893	1.58	0.00498	1
5795		11.15	11±1	12	15.84893	1.58	0.00498	1

Conclusion:

For the max result : 0.00790≤ 1.0 for Max Power Density, No RF exposure evaluation is required.

Signature:
Date: 2020-04-10

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