FCC ID:2A954-C600C

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

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: external antenna
WIFI antenna1/2 gain: 4.97dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(4.97/10)=3.14
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		
2412	802.11b	15.48	15±1	16	39.81072	3.14	0.02487	1
2437		15.63	15±1	16	39.81072	3.14	0.02487	1
2462		15.61	15±1	16	39.81072	3.14	0.02487	1
2412	802.11g	13.38	13±1	14	25.11886	3.14	0.01569	1
2437		13.85	13±1	14	25.11886	3.14	0.01569	1
2462		13.78	13±1	14	25.11886	3.14	0.01569	1
2412	802.11n H20	11.33	11±1	12	15.84893	3.14	0.00990	1
2437		11.7	11±1	12	15.84893	3.14	0.00990	1
2462		11.72	11±1	12	15.84893	3.14	0.00990	1
2422	802.11n H40	12.05	12±1	13	19.95262	3.14	0.01246	1
2437		11.47	12±1	13	19.95262	3.14	0.01246	1
2452		11.23	12±1	13	19.95262	3.14	0.01246	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		
2412	802.11b	14.94	15±1	16	39.81072	3.14	0.02487	1
2437		15.35	15±1	16	39.81072	3.14	0.02487	1
2462		15.53	15±1	16	39.81072	3.14	0.02487	1
2412	802.11g	13.39	13±1	14	25.11886	3.14	0.01569	1
2437		13.67	13±1	14	25.11886	3.14	0.01569	1
2462		13.76	13±1	14	25.11886	3.14	0.01569	1
2412	802.11n H20	11.31	11±1	12	15.84893	3.14	0.00990	1
2437		11.63	11±1	12	15.84893	3.14	0.00990	1
2462		11.79	11±1	12	15.84893	3.14	0.00990	1
2422	802.11n H40	11.01	11±1	12	15.84893	3.14	0.00990	1
2437		11.28	11±1	12	15.84893	3.14	0.00990	1
2452		11.14	11±1	12	15.84893	3.14	0.00990	1

5G WIFI:

Operation Frequency: WIFI 802.11a/ac/n(HT20): 5180-5240MHz;5745-5825MHz;
WIFI 802.11ac/n(HT40): 5190-5230MHz;5755-5795MHz;WIFI 802.11ac80:5210-5210MHz;55775-5775MHz
Power density limited: 1mW/cm
Antenna Type: FPCB antenna
WIFI antenna1/2 gain: 5.17dBi;
R=20cm
mW=10^(dBm/10)
antenna gain Numeric=10^(dBi/10)= 10^(5.17/10)=3.29
5.2G ANT1
SISO

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	9.39	9±1	10	10	3.29	0.00655	1
5200		9.64	9±1	10	10	3.29	0.00655	1
5240		9.21	9±1	10	10	3.29	0.00655	1
5180	802.11n ac20	9.26	9±1	10	10	3.29	0.00655	1
5200		9.44	9±1	10	10	3.29	0.00655	1
5240		9	9±1	10	10	3.29	0.00655	1
5190	802.11n ac40	9.51	9±1	10	10	3.29	0.00655	1
5230		9.38	9±1	10	10	3.29	0.00655	1
5180	802.11n 20	9.24	9±1	10	10	3.29	0.00655	1
5200		9.43	9±1	10	10	3.29	0.00655	1
5240		9.04	9±1	10	10	3.29	0.00655	1
5190	802.11n 40	9.52	9±1	10	10	3.29	0.00655	1
5230		9.39	9±1	10	10	3.29	0.00655	1
5210	802.11ac 80	9.21	9±1	10	10	3.29	0.00655	1

5.2G ANT2
SISO

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	9.97	9±1	10	10	3.29	0.00655	1
5200		9.48	9±1	10	10	3.29	0.00655	1
5240		9.86	9±1	10	10	3.29	0.00655	1
5180	802.11n ac20	9.74	9±1	10	10	3.29	0.00655	1
5200		9.31	9±1	10	10	3.29	0.00655	1
5240		9.72	9±1	10	10	3.29	0.00655	1
5190	802.11n ac40	9.51	9±1	10	10	3.29	0.00655	1
5230		9.65	9±1	10	10	3.29	0.00655	1
5180	802.11n 20	9.64	9±1	10	10	3.29	0.00655	1
5200		9.24	9±1	10	10	3.29	0.00655	1
5240		9.65	9±1	10	10	3.29	0.00655	1
5190	802.11n 40	9.38	9±1	10	10	3.29	0.00655	1
5230		9.61	9±1	10	10	3.29	0.00655	1
5210	802.11ac 80	9.7	9±1	10	10	3.29	0.00655	1

5.8G ANT1
SISO

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	9.75	9±1	10	10	3.29	0.00655	1
5785		9.51	9±1	10	10	3.29	0.00655	1
5825		9.3	9±1	10	10	3.29	0.00655	1
5745	802.11ac20	9.09	9±1	10	10	3.29	0.00655	1
5785		9.35	9±1	10	10	3.29	0.00655	1
5825		9.17	9±1	10	10	3.29	0.00655	1
5755	802.11ac40	9.56	9±1	10	10	3.29	0.00655	1
5795		9.22	9±1	10	10	3.29	0.00655	1
5745	802.11n 20	9.12	9±1	10	10	3.29	0.00655	1
5785		9.36	9±1	10	10	3.29	0.00655	1
5825		9.2	9±1	10	10	3.29	0.00655	1
5755	802.11n 40	9.68	9±1	10	10	3.29	0.00655	1
5795		9.22	9±1	10	10	3.29	0.00655	1
5775	802.11ac 80	9.32	9±1	10	10	3.29	0.00655	1

5.8G ANT2
SISO

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	9.24	9±1	10	10	3.29	0.00655	1
5785		9.21	9±1	10	10	3.29	0.00655	1
5825		9.5	9±1	10	10	3.29	0.00655	1
5745	802.11ac20	9.4	9±1	10	10	3.29	0.00655	1
5785		8.57	9±1	10	10	3.29	0.00655	1
5825		9.21	9±1	10	10	3.29	0.00655	1
5755	802.11ac40	9.41	9±1	10	10	3.29	0.00655	1
5795		9.25	9±1	10	10	3.29	0.00655	1
5745	802.11n 20	9.43	9±1	10	10	3.29	0.00655	1
5785		9.03	9±1	10	10	3.29	0.00655	1
5825		9.15	9±1	10	10	3.29	0.00655	1
5755	802.11n 40	9.43	9±1	10	10	3.29	0.00655	1
5795		9.28	9±1	10	10	3.29	0.00655	1
5775	802.11ac 80	9.07	9±1	10	10	3.29	0.00655	1

GSM/WCDMA/LTE
Antenna Type: PIFA antenna
Max Antenna gain: 3.51dBi;

Operating Mode	Maximum measured EIRP(ERP) Power	tune-up power	Antenna		Maximum measured EIRP(ERP)	Evaluation result	Power density Limits
	(dBm)	(dBm)	Gain		(mW)	(mW/cm2)	(mW/cm2)
			(dBi)	Numeri			
GPRS/EGPRS850	33.71	33	3.51	2.24	1995.262	0.8907	1.00
GPRS/EGPRS1900	32.66	33	3.51	2.24	1995.262	0.8907	1.00
WCDMA Band 2	26.37	26	3.51	2.24	398.107	0.1777	1.00
WCDMA Band 4	25.11	26	3.51	2.24	398.107	0.1777	1.00
WCDMA Band 5	25.7	26	3.51	2.24	398.107	0.1777	0.56
LTE Band 2	22.25	23	3.51	2.24	199.526	0.0891	1.00
LTE Band 4	22.17	23.00	3.51	2.24	199.526	0.0891	1.00
LTE Band 5	22.45	23	3.51	2.24	199.526	0.0891	0.55
LTE Band 7	22.56	23	3.51	2.24	199.526	0.0891	1.00
LTE Band 12	22.05	23.00	3.51	2.24	199.526	0.0891	0.47
LTE Band 13	22.05	23.00	3.51	2.24	199.526	0.0891	0.52
LTE Band 17	22.37	23	3.51	2.24	199.526	0.0891	0.47
LTE Band 38	21.19	22.00	3.51	2.24	158.489	0.0707	1.00
LTE Band 40	22.48	23.00	3.51	2.24	199.526	0.0891	1.00
LTE Band 41	21.59	22.00	3.51	2.24	158.489	0.0707	1.00
LTE Band 66	21.33	22.00	3.51	2.24	158.489	0.0707	1.00
LTE Band 71	21.50	22.00	3.51	2.24	158.489	0.0707	0.45

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
11.83	4.97	12±1	13	19.953	20	0.019728	1	0.039455	Pass
12.12	4.97	12±1	13	19.953	20	0.019728	1		

WLAN5.2G 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
9.51	5.17	10±1	11	12.589	20	0.012948	1	0.025896	Pass
10.3	5.17	10±1	11	12.589	20	0.012948	1		

WLAN5.8G 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
9.74	5.17	9±1	10	10.000	20	0.010285	1	0.020570	Pass
8.71	5.17	9±1	10	10.000	20	0.010285	1		

Conclusion:

The conclusion should be 0.8907＜1 for Max Power Density, Compliance the RF Exposure requirement.
The 2.4Gwifi has the maximum Power Density value 0.039455 mW/cm2 in 2.4G MIMO transmitting mode;
The 5Gwifi has the maximum Power Density value 0.025896 mW/cm2 in 5G MIMO transmitting mode;

Signature:
Date: 2022-01-10

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