

RF EXPOSURE EVALUATION

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

$$E \text{ (V/m)} = \frac{\sqrt{30 * P * G}}{d}$$

$$\text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

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.

Measurement Result

Operation Frequency: WIFI: 2412-2462MHz for 802.11b/g/11n(HT20);
2422-2452MHz for 802.11n(HT40);

Power density limited: 1mW/ cm²

Antenna Type: Monopole Antenna

Antenna gain:3.31dBi,
R=20cm

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)	(mW/cm2)
2412	802.11b	16.31	17±1	18	63.096	3.31	2.14	0.0269	1
2437		17.36	17±1	18	63.096	3.31	2.14	0.0269	1
2462		17.39	17±1	18	63.096	3.31	2.14	0.0269	1
2412	802.11g	17.26	18±1	19	79.433	3.31	2.14	0.0339	1
2437		18.22	18±1	19	79.433	3.31	2.14	0.0339	1
2462		18.11	18±1	19	79.433	3.31	2.14	0.0339	1
2412	802.11n HT20	16.51	17±1	18	63.096	3.31	2.14	0.0269	1
2437		17.44	17±1	18	63.096	3.31	2.14	0.0269	1
2462		17.43	17±1	18	63.096	3.31	2.14	0.0269	1
2422	802.11n HT40	16.96	17±1	18	63.096	3.31	2.14	0.0269	1
2437		17.52	17±1	18	63.096	3.31	2.14	0.0269	1
2452		17.55	17±1	18	63.096	3.31	2.14	0.0269	1

LTE Module Evaluation Result:

R=20cm

Channel Freq. (MHz)	modulation	conducted power	Max		Antenna		Evaluation result	Power density Limits
		(dBm)	tune-up power		Gain		(mW/cm2)	(mW/cm2)
			(dBm)	(mW)	(dBi)	Numeric		
1880	WCDMA II	25	25	316.228	1.61	1.45	0.0911	1.0000
1732.5	WCDMA IV	25	25	316.228	1.42	1.39	0.0872	1.0000
836.5	WCDMA V	25	25	316.228	1.19	1.32	0.0827	0.5500
1880	LTE Band 2	25	25	316.228	1.61	1.45	0.0911	1.0000
1732.5	LTE Band 4	25	25	316.228	1.42	1.39	0.0872	1.0000
836.5	LTE Band 5	25	25	316.228	1.19	1.32	0.0827	0.5500
707.5	LTE Band 12	25	25	316.228	1.19	1.32	0.0827	0.4700
782	LTE Band 13	25	25	316.228	1.19	1.32	0.0827	0.5200
793	LTE Band 14	25	25	316.228	1.19	1.32	0.0827	0.5300
1745	LTE Band 66	25	25	316.228	1.42	1.39	0.0872	1.0000
680.5	LTE Band 71	25	25	316.228	1.19	1.32	0.0827	0.4500

Note: The antenna gain specified in the table is based on the antenna configured for the finished product.

LTE power results are derived from the module report, FCC ID: XMR202008EC25AFXD

simultaneous emission

Power density Limits (mW/cm ²) WIFI	Power density Limits (mW/cm ²) LTE	Calculate Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
0.0339	0.0911	0.125	1

Conclusion:

For the max result : 0.125≤ 1 for Max Power Density, compliance RF exposure.



Signature:

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