

MPE Calculation : 2.4GHz WiFi

RF function or Mode	Frequency range (MHz)			Max. Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm ²)	Requirement (mW/cm ²)
802.11b	2412.00	~	2462.00	18.50	1.97	20.47	111.430	0.0222	1.000
802.11g	2412.00	~	2462.00	15.50	1.97	17.47	55.848	0.0112	1.000
802.11n(HT20)	2412.00	~	2462.00	15.00	1.97	16.97	49.774	0.010	1.000
		~							
		~							
		~							
		~							
		~							

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user.

The MPE sample calculation for this exposure is shown below.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 111.43 / (4 \times 20^2 \times \pi) \\
 &= 0.0222 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averageing time (minutes)
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

Conclusion : The exposure condition of this device is compliant with FCC

MPE Calculation : LTE, WCDMA, GSM

RF function or Mode	Frequency range (MHz)			Tune-up Max Conducted power(dBm)	Measured Conducted power(dBm)	Maximum EIRP (dBm)	Adjusted EIRP to tune-up Max(dBm)	Maximum power density (mW/cm ²)	Requirment (mW/cm ²)
LTE(Band 2)	1850.00	~	1910.00	23.00	22.19	20.02	20.830	0.0241	1.000
LTE(Band 4)	1710.00	~	1755.00	23.00	22.45	21.00	21.550	0.0285	1.000
LTE(Band 5)	824.00	~	849.00	23.00	22.14	20.06	20.920	0.0246	0.549
LTE(Band 12,17)	699.00	~	716.00	23.00	21.92	18.18	19.260	0.0168	0.466
LTE(Band 13)	777.00	~	787.00	23.00	21.91	17.24	18.330	0.0136	0.518
WCDMA(850)	826.40	~	846.60	24.00	22.75	19.66	20.910	0.0246	0.550
WCDMA(1700)	1712.40	~	1752.60	24.00	23.46	19.87	20.410	0.0219	1.000
WCDMA(1900)	1852.40	~	1907.60	24.00	21.67	20.76	23.090	0.0406	1.000
GSM(850)	824.20	~	848.80	33.00	31.83	28.71	29.880	0.1936	0.549
GSM(1900)	1850.20	~	1909.80	31.00	29.87	24.34	25.470	0.0702	1.000

The EUT will only be used with a separation of 20 centimeters or greater between the antenna and the body of the user.

The MPE sample calculation for this exposure is shown below.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 20.83 / (4 \times 20^2 \times \pi) \\
 &= 0.0241 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(2

▪ 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)
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

Conclusion : The exposure condition of this device is compliant with FCC

RF Exposure Compliance for simultaneous operations

• Configurations for simultaneous operations

- Configuration 1: 2.4 GHz WiFi + (LTE or WCDMA or GSM)

Note: Above configuration was declared from applicant.

• Configurations for simultaneous operation

RF function or mode	2.4GHz WiFi	LTE			GSM		Σ of MPE ratios
Band	2.4GHz	Band 4	Band 12(17)	Band13	850	1900	
Power Density (mW/cm ²)	0.0222	0.0285	0.0168	0.0136	0.1936	0.0702	
Requirement (mW/cm ²)	1.0000	1.0000	0.4660	0.5180	0.5490	1.0000	
MPE ratio (Power Density/Requirement)	0.0222	0.0285	0.0361	0.0263	0.3526	0.0702	
Configuration 1 (MPE ratio)	0.0222	0.0285					0.0507
	0.0222		0.0361				0.0583
	0.0222			0.0263			0.0485
	0.0222				0.3526		0.3748
	0.0222					0.0702	0.0924

Note: The maximum power density in each RF function was used for above table.

- Requirement = Σ of MPE ratios ≤ 1

Conclusion : The exposure condition of this device is compliant with FCC