

### MPE Calculation : WLAN(2.4GHz)

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 <sup>2</sup> )	Requirment (mW/cm <sup>2</sup> )
802.11b	2412.00	~	2462.00	17.50	1.60	19.10	81.2831	0.0162	1.0000
802.11g	2412.00	~	2462.00	13.00	1.60	14.60	28.8404	0.0058	1.0000
802.11n(HT20)	2412.00	~	2462.00	13.00	1.60	14.60	28.8404	0.0058	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 81.2831 / (4 \times 20^2 \times \pi) \\
 &= 0.0162 \text{ mW/cm}^2
 \end{aligned}$$

#### - Note

S= Maximum power density(mW/cm<sup>2</sup>)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

#### ▪ Limits for General Population/Uncontrolled Exposure

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averageing time (minutes)
0.3	~	1.34	614	1.63	*100	30
1.34	~	30	824/f	2.19 / f	*180 / f <sup>2</sup>	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

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

**MPE Calculation : WLAN(5GHz)**

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 <sup>2</sup> )	Requirement (mW/cm <sup>2</sup> )
802.11a/n(HT20)/ac(VHT20)	5180.00	~	5240.00	12.50	1.42	13.92	24.6604	0.0050	1.0000
802.11n(HT40)/ac(VHT40)	5190.00	~	5230.00	8.00	1.42	9.42	8.7499	0.0018	1.0000
802.11ac(80)	5210.00	~	5210.00	7.00	1.42	8.42	6.9503	0.0014	1.0000
802.11a/n(HT20)/ac(VHT20)	5260.00	~	5320.00	10.50	1.42	11.92	15.5597	0.0031	1.0000
802.11n(HT40)/ac(VHT40)	5270.00	~	5310.00	7.50	1.42	8.92	7.7984	0.0016	1.0000
802.11ac(80)	5290.00	~	5290.00	7.00	1.42	8.42	6.9503	0.0014	1.0000
802.11a/n(HT20)/ac(VHT20)	5500.00	~	5720.00	12.00	-0.85	11.15	13.0317	0.0026	1.0000
802.11n(HT40)/ac(VHT40)	5510.00	~	5710.00	8.50	-0.85	7.65	5.8211	0.0012	1.0000
802.11ac(80)	5530.00	~	5690.00	9.00	-0.85	8.15	6.5314	0.0013	1.0000
802.11a/n(HT20)/ac(VHT20)	5745.00	~	5825.00	11.00	-2.39	8.61	7.2611	0.0015	1.0000
802.11n(HT40)/ac(VHT40)	5755.00	~	5795.00	7.00	-2.39	4.61	2.8907	0.0006	1.0000
802.11ac(80)	5775.00	~	5775.00	7.00	-2.39	4.61	2.8907	0.0006	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 7.2611 / (4 \times 20^2 \times \pi) \\
 &= 0.0015 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm<sup>2</sup>)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ **Limits for General Population/Uncontrolled Exposure**

FALSE			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging time (minutes)
0.3	~	1.34	614	1.63	*100	30
1.34	~	30	824/f	2.19 / f	*180 / f <sup>2</sup>	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

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

## MPE Calculation : Bluetooth

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 <sup>2</sup> )	Requirment (mW/cm <sup>2</sup> )
Bluetooth(1Mbps)	2402.00	~	2480.00	1.00	2.46	3.46	2.2182	0.0005	1.0000
Bluetooth(2/3Mbps)	2402.00	~	2480.00	-0.50	2.46	1.96	1.5704	0.0004	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 2.2182 / (4 \times 20^2 \times \pi) \\
 &= 0.0005 \text{ mW/cm}^2
 \end{aligned}$$

### - Note

S= Maximum power density(mW/cm<sup>2</sup>)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

### ▪ Limits for General Population/Uncontrolled Exposure

Frequency range (MHz)			Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averageing time (minutes)
0.3	~	1.34	614	1.63	*100	30
1.34	~	30	824/f	2.19 / f	*180 / f <sup>2</sup>	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

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

## RF Exposure Compliance for simultaneous operations

### ▪ Configurations for simultaneous:

- Configuration 1: 2.4GHz WLAN + Bluetooth
- Configuration 2: 5GHz WLAN + Bluetooth

Note: Above configuration was declared from applicant.

### ▪ Configurations for simultaneous:

RF function or mode	2.4GHz WLAN	5GHz WLAN	Bluetooth	Σ of MPE ratios
Power Density (mW/cm <sup>2</sup> )	0.0162	0.0050	0.0005	
Requirement (mW/cm <sup>2</sup> )	1.0000	1.0000	1.0000	
MPE ratio (Power Density/Requirement)	0.0162	0.0050	0.0005	
Configuration 1 (MPE ratio)	0.0162		0.0005	0.0167
Configuration 2 (MPE ratio)		0.0050	0.0005	0.0055

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.