

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 ²)	Requirment (mW/cm ²)
802.11b	2412.00	~	2462.00	17.50	1.32	18.82	76.208	0.016	1.000
802.11g	2412.00	~	2462.00	13.50	1.32	14.82	30.339	0.007	1.000
802.11n(HT20)	2412.00	~	2462.00	13.50	1.32	14.82	30.339	0.007	1.000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 76.208 / (4 \times 20^2 \times \pi) \\
 &= 0.016 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

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

▪ Limits for General Population/Uncontrolled Exposure

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

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 ²)	Requirement (mW/cm ²)
802.11a/n(HT20)/ac(VHT20)	5180.00	~	5240.00	13.50	3.00	16.50	44.669	0.009	1.000
802.11n(HT40)/ac(VHT40)	5190.00	~	5230.00	9.00	3.00	12.00	15.849	0.004	1.000
802.11ac(80)	5210.00	~	5210.00	8.50	3.00	11.50	14.126	0.003	1.000
802.11a/n(HT20)/ac(VHT20)	5260.00	~	5320.00	13.00	3.00	16.00	39.811	0.008	1.000
802.11n(HT40)/ac(VHT40)	5270.00	~	5310.00	10.00	3.00	13.00	19.953	0.004	1.000
802.11ac(80)	5290.00	~	5290.00	9.50	3.00	12.50	17.783	0.004	1.000
802.11a/n(HT20)/ac(VHT20)	5500.00	~	5720.00	11.50	-1.84	9.66	9.247	0.002	1.000
802.11n(HT40)/ac(VHT40)	5510.00	~	5710.00	8.00	-1.84	6.16	4.131	0.001	1.000
802.11ac(80)	5530.00	~	5690.00	8.00	-1.84	6.16	4.131	0.001	1.000
802.11a/n(HT20)/ac(VHT20)	5745.00	~	5825.00	11.50	-1.03	10.47	11.143	0.003	1.000
802.11n(HT40)/ac(VHT40)	5755.00	~	5795.00	8.00	-1.03	6.97	4.978	0.001	1.000
802.11ac(80)	5775.00	~	5775.00	8.00	-1.03	6.97	4.978	0.001	1.000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 11.143 / (4 \times 20^2 \times \pi) \\
 &= 0.003 \text{ mW/cm}^2
 \end{aligned}$$

- 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 General Population/Uncontrolled Exposure

FALSE	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

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 ²)	Requiriment (mW/cm ²)
Bluetooth(1Mbps)	2402.00	~	2480.00	3.00	2.46	5.46	3.516	0.001	1.000
Bluetooth(2/3Mbps)	2402.00	~	2480.00	1.50	2.46	3.96	2.489	0.001	1.000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 3.516 / (4 \times 20^2 \times \pi) \\
 &= 0.001 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

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

▪ Limits for General Population/Uncontrolled Exposure

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

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 ²)	0.016	0.003	0.001	
Requirement (mW/cm ²)	1.000	1.000	1.000	
MPE ratio (Power Density/Requirement)	0.016	0.003	0.001	
Configuration 1 (MPE ratio)	0.016		0.001	0.017
Configuration 2 (MPE ratio)		0.003	0.001	0.004

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 rule