

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)	Requirement (mW/cm ²)
Bluetooth(BDR)	2402.00 ~ 2480.00	2.50	0.29	2.79	1.902	0.0004	1.000
Bluetooth(EDR)	2402.00 ~ 2480.00	-2.00	0.29	-1.71	0.675	0.0002	1.000
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Note: Please refer to the operation description for Max tune-up power.

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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 1.902 / (4 \times 20^2 \times \pi) \\
 &= 0.0004 \text{ mW/cm}^2
 \end{aligned}$$

- 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 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 : WLAN

Mode(Worst case)	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)
802.11g	2412.00 ~ 2462.00	9.50	-0.70	8.80	7.586	0.0016	1.000
802.11a	5180.00 ~ 5240.00	10.00	3.51	13.51	22.439	0.0045	1.000
802.11a	5260.00 ~ 5320.00	10.00	3.12	13.12	20.512	0.0041	1.000
802.11a	5500.00 ~ 5720.00	10.00	2.28	12.28	16.905	0.0034	1.000
802.11a	5745.00 ~ 5825.00	10.00	-0.84	9.16	8.242	0.0017	1.000
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Note: Please refer to the operation description for Max tune-up power.

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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 22.439 / (4 \times 20^2 \times \pi) \\
 &= 0.005 \text{ mW/cm}^2
 \end{aligned}$$

- 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 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, CDMA

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)
LTE(Band 13)	779.50 ~ 784.50	25.70	0.42	26.12	409.261	0.0815	0.519
LTE(Band 5)	824.70 ~ 848.30	25.70	0.89	26.59	456.037	0.0908	0.549
LTE(Band 4)	1710.70 ~ 1754.30	25.70	1.81	27.51	563.638	0.1122	1.000
LTE(Band 2)	1850.70 ~ 1909.30	25.70	2.92	28.62	727.780	0.1448	1.000
CDMA(Band 850)	824.70 ~ 848.31	25.70	0.89	26.59	456.037	0.0908	0.549
CDMA(Band 1900)	1851.25 ~ 1908.75	25.70	2.92	28.62	727.780	0.1448	1.000
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Note: Please refer to the operation description for Max tune-up power.

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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 409.261 / (4 \times 20^2 \times \pi) \\
 &= 0.0815 \text{ mW/cm}^2
 \end{aligned}$$

- 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 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

RF Exposure Compliance for simultaneous operations

- Worst case for simultaneous operations
- BT + WLAN(5GHz)+LTE/CDMA

RF function or mode	BT	WLAN 5GHz	LTE	LTE	LTE	LTE	-	Σ of MPE ratios	
Band(Worst case)	2.4GHz	NII-1	Band 13	Band5	Band 4	Band2	-		
Power Density (mW/cm ²)	0.0004	0.0045	0.0815	0.0908	0.1122	0.1448	-		
Requirement (mW/cm ²)	1.0000	1.0000	0.5190	0.5490	1.0000	1.0000	-		
MPE ratio (Power Density/Requirement)	0.0004	0.0045	0.1570	0.1654	0.1122	0.1448	-		
Configuration 1 (MPE ratio)	0.0004	0.0045	0.1570						0.1619
Configuration 2 (MPE ratio)	0.0004	0.0045		0.1654					0.1703
Configuration 3 (MPE ratio)	0.0004	0.0045			0.1122			0.1171	
Configuration 4 (MPE ratio)	0.0004	0.0045				0.1448		0.1497	

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 rules.