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)	Requriment (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
		~							
		~							
		~							
		~							
		~							
		~							

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.

$$S = EIRP / (4 R^2 \pi)$$
$$= 1.902 / (4 \times 20^2 \times \pi)$$
$$= 0.0004 \ mW/cm^2$$

- Note

S= Maximum power density(mW/cm^2)

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/cm²)	Requriment (mW/cm²)
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	8.50	-0.84	7.66	5.835	0.0012	1.000
		~							
		~							

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.

▪ $S =$ EIRP / (4 R^2 π)

$= 22.439$ / (4 X 20^2 X π)

$= 0.005$ mW/cm²

- 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/cm²)	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/cm²)	Requriment (mW/cm²)
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
		~							
		~							

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.

▪ $S =$ $EIRP / (4 R^2 \pi)$

$= 409.261 / (4 \times 20^2 \times \pi)$

$= 0.0815$ mW/cm^2

- 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/cm²)	Averageing time (minutes)
0.3	~	1.34	614	1.63	*100	30
1.34	~	30	824/f	2.19 / f	*180 / f²	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/cm2)	0.0004	0.0045	0.0815	0.0908	0.1122	0.1448	-	
Requirement (mW/cm2)	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.

- **Requirment = Σ of MPE ratios ≤ 1**

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