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)
BDR(1Mbps)	2402.00	~	2480.00	1.00	-2.95	-1.95	0.639	0.001	1.000
EDR(2, 3Mbps)	2402.00	~	2480.00	1.00	-2.95	-1.95	0.639	0.001	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.

▪ **S =** EIRP / (4 R^2 π)

= 0.639 / (4 X 20^2 X π)

= 0.001 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

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)
802.11b	2412.00	~	2462.00	16.50	0.93	17.43	55.336	0.012	1.000
802.11g	2412.00	~	2462.00	12.50	0.93	13.43	22.030	0.005	1.000
802.11n	2412.00	~	2462.00	12.50	0.93	13.43	22.030	0.005	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.

▪ **S** = EIRP / (4 R^2 π)

= 55.336 / (4 X 20^2 X π)

= 0.012 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 : 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)	Requriment (mW/cm^2)
LTE	779.50	~	784.50	24.30	3.46	27.76	597.036	0.119	0.519
LTE	1710.70	~	1754.30	24.30	5.26	29.56	903.650	0.180	1.000
CDMA 1x	824.70	~	848.31	24.80	0.95	25.75	375.838	0.075	0.549
CDMA 1x EVDO(Rev. A)	824.70	~	848.31	24.80	0.95	25.75	375.838	0.075	0.549
CDMA 1x	1851.25	~	1908.75	24.80	3.10	27.90	616.596	0.123	1.000
CDMA 1 x EVDO(Rev. A)	1851.25	~	1908.75	24.80	3.10	27.90	616.596	0.123	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.

▪ **S** = EIRP / (4 R^2 π)

= 597.036 / (4 X 20^2 X π)

= 0.119 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

RF Exposure Compliance for simultaneous operations

▪ **Configurations for simultaneous operations**

- **Configuration 1:** BT + LTE, CDMA Module
- **Configuration 2:** WLAN + LTE, CDMA Module
- **Configuration 3:** BT+ WLAN
- **Configuration 5:** BT + WLAN + LTE, CDMA Module

Note: Above configuration was declared from applicant.

▪ **Configurations for simultaneous operations(LTE, CDMA Module)**

– CDMA Cellular or PCS(Voice) + LTE B4 or B13(Data)
– CDMA Cellular(Voice) + EVDO PCS(Data)
– CDMA PCS(Voice) + EVDO Cellular(Data)

▪ **Configurations for simultaneous operations**

RF function or mode	BT	WLAN	LTE		CDMA 1x		CDMA 1x EVDO		Σ of MPE ratios
Band	2.4GHz	2.4GHz	Band 13	Band 4	Cellular	PCS	Cellular	PCS	
Power Density (mW/cm2)	0.001	0.012	0.119	0.180	0.075	0.123	0.075	0.123	
Requirement (mW/cm2)	1.000	1.000	0.519	1.000	0.549	1.000	0.549	1.000	
MPE ratio (Power Density/Requirement)	0.001	0.012	0.229	0.180	0.137	0.123	0.137	0.123	
Configuration 1 (MPE ratio)	0.001		0.229		0.137				**0.367**
	0.001		0.229			0.123			**0.353**
	0.001			0.180	0.137				**0.318**
	0.001			0.180		0.123			**0.304**
	0.001				0.137			0.123	**0.261**
	0.001					0.123	0.137		**0.261**
Configuration 2 (MPE ratio)		0.012	0.229		0.137				**0.378**
		0.012	0.229			0.123			**0.364**
		0.012		0.180	0.137				**0.329**
		0.012		0.180		0.123			**0.315**
		0.012			0.137			0.123	**0.272**
		0.012				0.123	0.137		**0.272**
Configuration 3 (MPE ratio)	0.001	0.012							**0.013**
	0.001	0.012							**0.013**
Configuration 4 (MPE ratio)	0.001	0.012	0.229		0.137				**0.379**
	0.001	0.012	0.229			0.123			**0.365**
	0.001	0.012		0.180	0.137				**0.330**
	0.001	0.012		0.180		0.123			**0.316**
	0.001	0.012			0.137			0.123	**0.273**
	0.001	0.012				0.123	0.137		**0.273**

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.