

## 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> )	Requirement (mW/cm <sup>2</sup> )
BDR(1Mbps)	2402.00	~	2480.00	1.00	0.77	1.77	1.504	0.001	1.000
EDR(2, 3Mbps)	2402.00	~	2480.00	1.00	0.77	1.77	1.504	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 1.504 / (4 \times 20^2 \times \pi) \\
 &= 0.001 \text{ mW/cm}^2
 \end{aligned}$$

### - 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 antenn

### ▪ Limits for Maximum Permissible Exposure (MPE)

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

**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 <sup>2</sup> )	Requirement (mW/cm <sup>2</sup> )
802.11b	2412.00	~	2462.00	16.50	2.64	19.14	82.036	0.017	1.000
802.11g	2412.00	~	2462.00	12.50	2.64	15.14	32.659	0.007	1.000
802.11n	2412.00	~	2462.00	12.50	2.64	15.14	32.659	0.007	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 82.036 / (4 \times 20^2 \times \pi) \\
 &= 0.017 \text{ mW/cm}^2
 \end{aligned}$$

## - 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

## ▪ Limits for Maximum Permissible Exposure (MPE)

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

**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 <sup>2</sup> )	Requirement (mW/cm <sup>2</sup> )
LTE	779.50	~	784.50	24.30	0.89	25.19	330.370	0.066	0.519
LTE	1710.70	~	1754.30	24.30	4.85	29.15	822.243	0.164	1.000
CDMA 1x	824.70	~	848.31	24.80	4.24	29.04	801.679	0.160	0.549
CDMA 1x EVDO(R Rev. A)	824.70	~	848.31	24.80	4.24	29.04	801.679	0.160	0.549
CDMA 1x	1851.25	~	1908.75	24.80	3.47	28.27	671.429	0.134	1.000
CDMA 1 x EVDO(R Rev. A)	1851.25	~	1908.75	24.80	3.47	28.27	671.429	0.134	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 330.37 / (4 \times 20^2 \times \pi) \\
 &= 0.066 \text{ mW/cm}^2
 \end{aligned}$$

### - 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

### ▪ Limits for Maximum Permissible Exposure (MPE)

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

**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 3: 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/cm <sup>2</sup> )	0.001	0.017	0.066	0.164	0.160	0.134	0.160	0.134	
Requirement (mW/cm <sup>2</sup> )	1.000	1.000	0.519	1.000	0.549	1.000	0.549	1.000	
MPE ratio (Power Density/Requirement)	0.001	0.017	0.127	0.164	0.291	0.134	0.291	0.134	
Configuration 1 (MPE ratio)	0.001		0.127		0.291				0.420
	0.001		0.127			0.134			0.262
	0.001			0.164	0.291				0.456
	0.001			0.164		0.134			0.299
	0.001				0.291			0.134	0.426
	0.001					0.134	0.291		0.426
Configuration 2 (MPE ratio)		0.017	0.127		0.291				0.436
		0.017	0.127			0.134			0.278
		0.017		0.164	0.291				0.472
		0.017		0.164		0.134			0.315
		0.017			0.291			0.134	0.442
		0.017				0.134	0.291		0.442
Configuration 3 (MPE ratio)	0.001	0.017							0.018
	0.001	0.017							0.018
Configuration 4 (MPE ratio)	0.001	0.017	0.127		0.291				0.437
	0.001	0.017	0.127			0.134			0.279
	0.001	0.017		0.164	0.291				0.473
	0.001	0.017		0.164		0.134			0.316
	0.001	0.017			0.291			0.134	0.443
	0.001	0.017				0.134	0.291		0.443

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.