

### MPE Calculation : Bluetooth LE

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> )
Bluetooth LE	2402.00	~ 2480.00	0.70	0.50	1.20	1.319	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 1.319 / (4 \times 20^2 \times \pi) \\
 &= 0.001 \text{ mW/cm}^2
 \end{aligned}$$

**- 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 antenna(2

**▪ 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 : GSM

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> )
GSM850	824.20	~	848.80	33.50	0.05	33.55	2264.645	0.451	0.549
GSM1900	1850.20	~	1909.80	30.00	1.73	31.73	1489.362	0.297	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 2264.645 / (4 \times 20^2 \times \pi) \\
 &= 0.451 \text{ mW/cm}^2
 \end{aligned}$$

**- 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(2

**▪ 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:** Bluetooth LE + GSM850
- **Configuration 2:** Bluetooth LE + GSM1900

Note: Above configuration was declared from applicant.

- **Configurations for simultaneous operations**

RF function or mode	BT LE	GSM		Σ of MPE ratios
Band	2.4GHz	GSM850	GSM1900	
Power Density (mW/cm <sup>2</sup> )	0.001	0.451	0.297	
Requirement (mW/cm <sup>2</sup> )	1.000	0.549	1.000	
MPE ratio (Power Density/Requirement)	0.001	0.821	0.297	
Configuration 1 (MPE ratio)	0.001	0.821		
Configuration 2 (MPE ratio)	0.001		0.297	<b>0.298</b>

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.**