

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)
BDR(1Mbps)	2402.00	~	2480.00	2.00	-0.10	1.90	1.549	0.0004	1.000
EDR(2, 3Mbps)	2402.00	~	2480.00	0.50	-0.10	0.40	1.097	0.0003	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 1.549 / (4 \times 20^2 \times \pi) \\
 &= 0.0004 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna

▪ 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	25.00	-0.08	24.92	310.456	0.0618	0.519
LTE(Band 4)	1710.70	~	1754.30	25.00	-1.44	23.56	226.987	0.0452	1.000
CDMA(Band 850)	824.70	~	848.31	26.00	4.17	30.17	1039.921	0.2069	0.549
CDMA(Band 1900)	1851.25	~	1908.75	26.00	2.98	28.98	790.679	0.1574	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 310.456 / (4 \times 20^2 \times \pi) \\
 &= 0.0618 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna

▪ 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

▪ Configurations for simultaneous operations(LTE, CDMA Module)

- LTE Band 13 + CDMA 850(Cellular)
- LTE Band 4 + CDMA 850(Cellular)
- LTE Band 4 + CDMA 1900(PCS)
- LTE Band 13 + CDMA 1900(PCS)

Note: Above configuration was declared from applicant.

▪ Configurations for simultaneous operation

RF function or mode	BT	LTE		CDMA		-		Σ of MPE ratios
Band	2.4GHz	Band 13	Band 4	Cellular	PCS	-	-	
Power Density (mW/cm ²)	0.0004	0.0618	0.0452	0.2069	0.1574			
Requirement (mW/cm ²)	1.0000	0.5190	1.0000	0.5490	1.0000			
MPE ratio (Power Density/Requirement)	0.0004	0.1191	0.0452	0.3769	0.1574			
Configuration 1 (MPE ratio)	0.0004	0.1191		0.3769				0.4963
	0.0004		0.0452	0.3769				0.4225
	0.0004		0.0452		0.1574			0.2030
	0.0004	0.1191			0.1574			0.2769

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.