

MPE Calculation : Bluetooth

FCC ID: TQ8-VT251GIAN

RF function(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)
Bluetooth(1Mbps)	2402.00 ~ 2480.00	1.00	-0.38	0.62	1.154	0.0003	1.0000
Bluetooth(2,3Mbps)	2402.00 ~ 2480.00	-3.00	-0.38	-3.38	0.460	0.0001	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 1.154 / (4 \times 20^2 \times \pi) \\
 &= 0.0003 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averaging 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

FCC ID: TQ8-VT251GIAN

Mode(Worst case)	Frequency range (MHz)		Max Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm ²)	Requirment (mW/cm ²)
802.11g	2412.00	~ 2462.00	9.00	-1.19	7.81	6.040	0.0013	1.0000
802.11a	5180.00	~ 5240.00	9.00	0.59	9.59	9.100	0.0019	1.0000
802.11a	5260.00	~ 5320.00	9.00	2.00	11.00	12.590	0.0026	1.0000
802.11a	5500.00	~ 5720.00	8.50	4.58	13.08	20.324	0.0041	1.0000
802.11a	5745.00	~ 5825.00	7.50	4.19	11.69	14.758	0.0030	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 6.040 / (4 \times 20^2 \times \pi) \\
 &= 0.0013 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ 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

FCC ID: TQ8-VT251GIAN

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)	Requirment (mW/cm ²)
LTE(Band 13)	777.00	~ 787.00	26.20	2.73	28.93	781.628	0.1555	0.5180
LTE(Band 5)	824.70	~ 848.30	26.20	-0.16	26.04	401.791	0.0800	0.5490
LTE(Band 4)	1710.70	~ 1754.30	26.20	2.93	29.13	818.465	0.1629	1.0000
LTE(Band 2)	1850.70	~ 1909.30	26.20	4.80	31.00	1258.926	0.2505	1.0000
CDMA(Band 850)	824.70	~ 848.31	26.20	-0.16	26.04	401.791	0.0800	0.5490
CDMA(Band 1900)	1851.25	~ 1908.75	26.20	4.80	31.00	1258.926	0.2505	1.0000
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 781.628 / (4 \times 20^2 \times \pi) \\
 &= 0.1555 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

R= Distance to the center of the radiation of the antenna(20cm)

▪ Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)		Electric Field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm ²)	Averaging 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

- Worst case for simultaneous operations
- BT + W-LAN(5GHz) + LTE (Band 5)

RF function or mode(Worst case)	BT	WLAN	LTE	-	-	-	-	Σ of MPE ratios
Band(Worst case)	2.4GHz	5GHz	Band 5	-	-	-	-	
Power Density (mW/cm ²)	0.0003	0.0041	0.1555				-	
Requirement (mW/cm ²)	1.0000	1.0000	0.5180				-	
MPE ratio (Power Density/Requirement)	0.0003	0.0041	0.3002				-	
Worst case(MPE ratio)	0.0003	0.0041	0.3002				0.3046	

- Requirement = Σ of MPE ratios ≤ 1

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