

MPE Calculation

Regulation(s): Part 1.1310, Part 2.1091

Method: KDB447498 D01v06

RF feature(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(1 Mbps)	2 402.00	~	2 480.00	12.00	-0.10	11.90	15.489	0.003 1	1.000 0
Bluetooth(2, 3 Mbps)	2 402.00	~	2 480.00	10.00	-0.10	9.90	9.773	0.002 0	1.000 0
Bluetooth LE(1 Mbps)	2 402.00	~	2 480.00	2.50	-0.10	2.40	1.738	0.000 4	1.000 0
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 15.489 / (4 \times 20^2 \times \pi) \\
 &= 0.0031 \text{ mW/cm}^2
 \end{aligned}$$

- 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)

Part 1.1310

▪ 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

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RF feature(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)
WLAN 802.11b	2 412.00	~	2 462.00	18.00	-0.10	17.90	61.660	0.012 3	1.000 0
WLAN 802.11a	5 180.00	~	5 240.00	18.50	-0.56	17.94	62.231	0.012 4	1.000 0
WLAN 802.11a	5 745.00	~	5 825.00	18.50	-1.19	17.31	53.827	0.010 8	1.000 0
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 61.660 / (4 \times 20^2 \times \pi) \\
 &= 0.0123 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

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Part 1.1310

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LTE Band 12(17)	699.0	~	716.0	25.00	-0.50	24.50	281.839	0.056 1	0.466 0
LTE Band 13	777.0	~	787.0	25.00	-0.30	24.70	295.121	0.058 8	0.518 0
LTE Band 26	814.0	~	824.0	25.00	-0.20	24.80	301.996	0.060 1	0.542 0
LTE Band 26(5)	824.0	~	849.0	25.00	-0.20	24.80	301.996	0.060 1	0.549 0
LTE Band 4	1710.0	~	1755.0	25.00	3.20	28.20	660.694	0.131 5	1.000 0
LTE Band 25(2)	1850.0	~	1915.0	25.00	3.20	28.20	660.694	0.131 5	1.000 0
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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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 281.839 / (4 \times 20^2 \times \pi) \\
 &= 0.0561 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

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Part 1.1310

▪ 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)
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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 1Mbps + WLAN(5GHz 802.11a) + LTE Band 4

RF feature or mode	BT 1 Mbps	WLAN 802.11a	LTE	-	-	-	-	Σ of MPE ratios
Band(Worst case)	2.4 GHz	5 GHz	Band 5	-	-	-	-	
Power Density (mW/cm ²)	0.003 1	0.012 4	0.131 5	-	-	-	-	
Requirement (mW/cm ²)	1.000 0	1.000 0	1.000 0	-	-	-	-	
MPE ratio (Power Density/Requirement)	0.003 1	0.012 4	0.131 5	-	-	-	-	
Worst case(MPE ratio)	0.003 1	0.012 4	0.131 5	-	-	-	-	0.147 0

- Requirement = **Σ of MPE ratios ≤ 1**

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