

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(BDR)_ANT0	2 402.00	~	2 480.00	12.50	-2.06	10.44	11.067	0.002 3	1.000 0
Bluetooth(EDR)_ANT0	2 402.00	~	2 480.00	9.50	-2.06	7.44	5.547	0.001 2	1.000 0
Bluetooth(BDR)_ANT1	2 402.00	~	2 480.00	12.50	1.60	14.10	25.704	0.005 2	1.000 0
Bluetooth(EDR)_ANT1	2 402.00	~	2 480.00	9.50	1.60	11.10	12.883	0.002 6	1.000 0
Bluetooth LE_ANT0	2 402.00	~	2 480.00	12.50	-2.06	10.44	11.067	0.002 3	1.000 0
Bluetooth LE_ANT1	2 402.00	~	2 480.00	12.50	1.60	14.10	25.704	0.005 2	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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 11.067 / (4 \times 20^2 \times \pi) \\
 &= 0.002 \text{ mW/cm}^2
 \end{aligned}$$

- 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)
802.11b_ANT0_SISO	2 412.00 ~ 2 472.00	19.50	-1.48	18.02	63.387	0.012 7	1.000 0
802.11b_ANT1_SISO	2 412.00 ~ 2 472.00	19.50	0.26	19.76	94.624	0.018 9	1.000 0
802.11g_ANT0_SISO	2 412.00 ~ 2 472.00	17.00	-1.48	15.52	35.646	0.007 1	1.000 0
802.11g_ANT1_SISO	2 412.00 ~ 2 472.00	17.50	0.26	17.76	59.704	0.011 9	1.000 0
802.11n(HT20)_MIMO	2 412.00 ~ 2 472.00	20.00	2.44	22.44	175.389	0.034 9	1.000 0
802.11ax(HE20)_MIMO	2 412.00 ~ 2 472.00	22.00	2.44	24.44	277.972	0.055 4	1.000 0
802.11a_ANT0(SISO)_5GHz	5 745.00 ~ 5 825.00	19.50	1.41	20.91	123.311	0.024 6	1.000 0
802.11a_ANT1(SISO)_5GHz	5 745.00 ~ 5 825.00	19.50	1.37	20.87	122.180	0.024 4	1.000 0
802.11n(HT20)_MIMO_5GHz	5 745.00 ~ 5 825.00	21.00	4.40	25.40	346.737	0.069 0	1.000 0
802.11ax(HE20)_MIMO_5GHz	5 745.00 ~ 5 825.00	21.50	4.40	25.90	389.046	0.077 4	1.000 0
802.11n(HT40)_MIMO_5GHz	5 745.00 ~ 5 825.00	20.50	4.40	24.90	309.030	0.061 5	1.000 0
802.11ax(HE40)_MIMO_5GHz	5 745.00 ~ 5 825.00	21.00	4.40	25.40	346.737	0.069 0	1.000 0
802.11ac(VHT80)_MIMO_5GHz	5 775.00 ~ 5 775.00	16.00	4.40	20.40	109.648	0.021 9	1.000 0
802.11ax(HE80)_MIMO_5GHz	5 775.00 ~ 5 775.00	17.00	4.40	21.40	138.039	0.027 5	1.000 0
802.11a_ANT0(SISO)_6GHz	6 895.00 ~ 7 115.00	10.50	-1.56	8.94	7.835	0.001 6	1.000 0
802.11a_ANT1(SISO)_6GHz	6 895.00 ~ 7 115.00	10.50	-1.78	8.72	7.448	0.001 5	1.000 0
802.11ax(HE20)_MIMO_6GHz	6 895.00 ~ 7 115.00	8.50	1.34	9.84	9.639	0.002 0	1.000 0
802.11ax(HE40)_MIMO_6GHz	6 885.00 ~ 7 085.00	10.00	1.34	11.34	13.615	0.002 8	1.000 0
802.11ax(HE80)_MIMO_6GHz	6 945.00 ~ 7 025.00	13.00	4.16	17.16	52.000	0.010 4	1.000 0

Note: Please refer to the operation description for Max tune-up power.

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The MPE sample calculation for this exposure is shown below.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 63.387 / (4 \times 20^2 \times \pi) \\
 &= 0.013 \text{ mW/cm}^2
 \end{aligned}$$

- Note

S= Maximum power density(mW/cm²)

EIRP= Equivalent Isotropic Radiated Power(mW)

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Part 1.1310

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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
- WLAN(5GHz)_ANT0 + WLAN(2.4GHz)_ANT1

RF feature or mode	WLAN	WLAN	-	-	-	-	-	Σ of MPE ratios
Band(Worst case)	5GHz	2.4GHZ	-	-	-	-	-	
Power Density (mW/cm2)	0.077 4	0.055 4	-	-	-	-	-	
Requirement (mW/cm2)	1.000 0	1.000 0	-	-	-	-	-	
MPE ratio (Power Density/Requirement)	0.077 4	0.055 4	-	-	-	-	-	
Worst case(MPE ratio)	0.077 4	0.055 4	-	-	-	-	-	0.132 8

- Requirement = Σ of MPE ratios ≤ 1

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