

MPE Calculation

Regulation(s): Part 1.1310, Part 2.1091

Method: KDB447498 D01v06

RF feature (Worst-Case Mode)	Frequency range (MHz)			Max Target Power (dBm) ^{Note 1}	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm ²)	Requirement (mW/cm ²)	MPE Ratio
Bluetooth(1 Mbps)	2402.0	~	2480.0	11.00	3.35	14.35	27.228	0.006	1.000	0.006
Bluetooth LE(1 Mbps)	2402.0	~	2480.0	9.00	3.35	12.35	17.180	0.004	1.000	0.004
WLAN 802.11b_Ant 1	2412.0	~	2472.0	18.50	3.35	21.85	153.109	0.031	1.000	0.031
WLAN 802.11b_Ant 2	2412.0	~	2472.0	18.50	4.21	22.71	186.638	0.037	1.000	0.037
WLAN 802.11b_2TX	2412.0	~	2472.0	21.50	6.80	28.30	676.083	0.135	1.000	0.135
WLAN 802.11a_Ant 1	5745.0	~	5825.0	18.50	3.98	22.48	177.011	0.035	1.000	0.035
WLAN 802.11a_Ant 2	5745.0	~	5825.0	18.50	4.90	23.40	218.777	0.044	1.000	0.044
WLAN 802.11a_2TX	5745.0	~	5825.0	21.50	7.46	28.96	787.046	0.157	1.000	0.157
WLAN 802.11ax(HE80)_Ant 1	5985.0	~	6385.0	9.00	5.01	14.01	25.177	0.005	1.000	0.005
WLAN 802.11ax(HE80)_Ant 2	5985.0	~	6385.0	9.00	5.36	14.36	27.290	0.006	1.000	0.006
WLAN 802.11ax(HE80)_2TX	5985.0	~	6385.0	12.00	8.20	20.20	104.713	0.021	1.000	0.021
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Note 1: 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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 27.228 / (4 \times 20^2 \times \pi) \\
 &= 0.006 \text{ mW/cm}^2
 \end{aligned}$$

- 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 : This device complies with RF exposure requirement.

RF Exposure Compliance for simultaneous operations

- **Worst case for simultaneous operations**

BT(or BLE) + 5GHz WLAN MIMO

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Simultaneous Transmission Configuration	BT + 5GHz WLAN MIMO			-		
RF feature	BT	WLAN	-	-	-	-
Band(mode)	1Mbps	802.11a_2TX	-	-	-	-
Power Density (mW/cm2)	0.006	0.157	-	-	-	-
Requirement (mW/cm2)	1.000	1.000	-	-	-	-
MPE ratio (Power Density/Requirement)	0.006	0.157	-	-	-	-
Σ of MPE ratios	0.163			-		
Requirment	1.000			-		

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

Conclusion : This device complies with RF exposure requirement.