

MPE Calculation

Regulation(s): Part 1.1310, Part 2.1091

Method: KDB447498 D01v06

RF feature(Mode)	Antenna Configuration	Frequency range (MHz)	Max Target Power (dBm)	ANT Gain (dBi)	Maximum EIRP (dBm)	Maximum EIRP (mW)	Maximum power density (mW/cm <sup>2</sup> )	Requirement (mW/cm <sup>2</sup> )
Bluetooth LE(1 Mbps)	-	2402.0 ~ 2480.0	6.0	3.9	9.90	9.773	0.002 0	1.000 0
WCDMA 850	External Antenna 1	826.4 ~ 846.6	25.0	0.7	25.70	371.536	0.074 0	0.550 0
WCDMA 1700	Internal Antenna 1	1712.4 ~ 1752.6	25.0	2.6	27.60	575.440	0.114 5	1.000 0
WCDMA 1900	Internal Antenna 1	1852.4 ~ 1907.6	25.0	4.4	29.40	870.964	0.173 3	1.000 0
LTE B2, CA_2C, n2	Internal Antenna 1	1850.0 ~ 1910.0	25.0	4.4	29.40	870.964	0.173 3	1.000 0
LTE B4	Internal Antenna 1	1710.0 ~ 1755.0	25.0	2.6	27.60	575.440	0.114 5	1.000 0
LTE B5, CA_5B, n5	External Antenna 1	824.0 ~ 849.0	25.0	0.7	25.70	371.536	0.074 0	0.549 0
LTE B7, CA_7C, n7	Internal Antenna 1	2500.0 ~ 2570.0	25.0	3.7	28.70	741.311	0.147 5	1.000 0
LTE B12, n12	External Antenna 1	699.0 ~ 716.0	25.0	1.8	26.80	478.631	0.095 3	0.466 0
LTE B13, n13	External Antenna 1	777.0 ~ 787.0	25.0	0.1	25.10	323.594	0.064 4	0.518 0
LTE B14, n14	External Antenna 1	788.0 ~ 798.0	25.0	0.0	25.00	316.228	0.063 0	0.525 0
LTE B17	External Antenna 1	704.0 ~ 716.0	25.0	1.8	26.80	478.631	0.095 3	0.469 0
LTE B25, n25	Internal Antenna 1	1850.0 ~ 1915.0	25.0	4.4	29.40	870.964	0.173 3	1.000 0
LTE B26, n26	External Antenna 1	814.0 ~ 824.0	25.0	0.7	25.70	371.536	0.074 0	0.542 0
LTE B26, n26	External Antenna 1	824.0 ~ 849.0	25.0	0.7	25.70	371.536	0.074 0	0.549 0
LTE B30, n30	Internal Antenna 1	2305.0 ~ 2315.0	19.0	2.4	21.40	138.039	0.027 5	1.000 0
LTE B38, CA_38C, n38	Internal Antenna 1	2570.0 ~ 2620.0	26.0	3.1	29.10	812.831	0.161 8	1.000 0
LTE B48, CA_48C, n48	External Antenna 2	3550.0 ~ 3700.0	19.0	3.9	22.90	194.985	0.038 8	1.000 0
LTE B41, CA_41C, n41	Internal Antenna 1	2496.0 ~ 2690.0	26.0	3.7	29.70	933.255	0.185 7	1.000 0
LTE B42, CA_42C	External Antenna 2	3450.0 ~ 3550.0	26.0	3.2	29.20	831.764	0.165 5	1.000 0
LTE B43	External Antenna 2	3700.0 ~ 3800.0	26.0	3.9	29.90	977.238	0.194 5	1.000 0
LTE B66, n66	Internal Antenna 1	1710.0 ~ 1780.0	25.0	2.6	27.60	575.440	0.114 5	1.000 0
NR Band n70	Internal Antenna 2	1695.0 ~ 1710.0	25.0	1.6	26.60	457.089	0.091 0	1.000 0
LTE B71, n71	Internal Antenna 1	663.0 ~ 698.0	25.0	1.9	26.90	489.779	0.097 5	0.442 0
NR Band n77, 78	External Antenna 2	3450.0 ~ 3550.0	26.5	3.2	29.70	933.255	0.185 7	1.000 0
NR Band n77	External Antenna 2	3700.0 ~ 3980.0	26.5	3.9	30.40	1096.479	0.218 2	1.000 0
NR Band n78	External Antenna 2	3700.0 ~ 3800.0	26.5	3.9	30.40	1096.479	0.218 2	1.000 0
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Note: Please refer to the tune-up procedure 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.

$$\begin{aligned}
 S &= \text{EIRP} / (4 R^2 \pi) \\
 &= 9.773 / (4 \times 20^2 \times \pi) \\
 &= 0.002 \text{ mW/cm}^2
 \end{aligned}$$

**- Note**  
 S= Maximum power density(mW/cm<sup>2</sup>)  
 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 <sup>2</sup> )	Averaging time (minutes)
0.3 ~ 1.34	614	1.63	*100	30
1.34 ~ 30	824/f	2.19 / f	*180 / f <sup>2</sup>	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
- BLE + LTE B71

RF feature or mode	BLE	LTE	-	-	-	-	-	$\Sigma$ of MPE ratios
Band(Worst case)	2.4GHz	Band 71	-	-	-	-	-	
Power Density (mW/cm <sup>2</sup> )	0.002 0	0.097 5	-	-	-	-	-	
Requirement (mW/cm <sup>2</sup> )	1.000 0	0.442 0	-	-	-	-	-	
MPE ratio (Power Density/Requirement)	0.002 0	0.220 6	-	-	-	-	-	
Worst case(MPE ratio)	0.002 0	0.220 6	-	-	-	-	-	

- Requirement =  $\Sigma$  of MPE ratios  $\leq 1$

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