

# 1 FCC MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## 1.1 Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission’s guideline.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
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
300-1500	/	/	f/1500	30
1500-15000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equipment power density

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## 1.2 Antenna Designation

Antenna gain has been evaluated in 2.4GHz as below, the worst is used for MPE calculation.

Antenna Type	Supplier	Antenna Model No.	Freq. (MHz)	Transmitter Chain	Peak Antenna Gain (dBi)	MIMO Antenna Gain (dBi)	Worst Antenna Gain
External Di-pole antenna	LARSEN	R380500314	2.4GHz	Ch 0 & Ch 1	1.6	4.61	
	LAIRD	WTS 2450	2.4GHz	Ch 0 & Ch 1	2.1	5.11	V
Internal Printed Antenna	N/A	N/A	2.4GHz	Ch0	1.1	4.98	
	N/A	N/A	2.4GHz	Ch1	2.7		

Antenna gain has been evaluated in 5GHz as below, the worst is used for MPE calculation.

Antenna Type	Supplier	Antenna Part No.	Freq. (MHz)	Transmitter Chain	Peak Antenna Gain (dBi)	MIMO Antenna Gain (dBi)	Worst Antenna Gain
External di-pole antenna	LARSEN	R380500314	5150~5250	Ch 0 & Ch 1	5	8.01	V
			5250~5350	Ch 0 & Ch 1	5	8.01	V
			5470~5725	Ch 0 & Ch 1	5	8.01	V
			5725~5850	Ch 0 & Ch 1	5	8.01	V
	LAIRD	WTS 2450	5150~5250	Ch 0 & Ch 1	2.6	5.61	
			5250~5350	Ch 0 & Ch 1	2.6	5.61	
			5470~5725	Ch 0 & Ch 1	2.6	5.61	
			5725~5850	Ch 0 & Ch 1	3.4	6.41	
Internal Printed Antenna	N/A	N/A	5150~5250	Ch 0	4.7	7.56	
			5250~5350	Ch 0	4.6	7.66	
			5470~5725	Ch 0	4.8	7.86	
			5725~5850	Ch 0	4.7	7.08	
			5150~5250	Ch 1	4.4	7.56	
			5250~5350	Ch 1	4.7	7.66	
			5470~5725	Ch 1	4.9	7.86	
			5725~5850	Ch 1	3.4	7.08	

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### 1.3 Maximum Permissible Exposure (MPE) Evaluation

Prediction of MPE limit at a given distance

$$S = PG / 4\pi R^2$$

Where: S = Power density

P = Power input to antenna

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

Operation Mode	Evaluation Frequency (MHz)	Operation Distance (cm)	Max. output Power (dBm)	Antenna Gain (dBi)	Max. out-put Power EIRP (mW)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass / Fail
BT	2402	20	4.4	2.1	4.47	0.001	1.000	Pass
WLAN 2.4G	2402	20	23.33	5.11	698.23	0.139	1.000	Pass
WLAN 5G	5180	20	21.27	8.01	847.23	0.169	1.000	Pass

Operation Mode	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Power Density / Limit	Σ(E-Field Strength / Limit)	Pass / Fail
BT	0.001	1.00	0.001	0.3085	Pass
WLAN 2.4G	0.139	1.00	0.139		
WLAN 5G	0.169	1.00	0.169		

~ End of Report ~

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