

## RF Exposure Evaluation

### Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) 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
1500–100,000			1.0	30

f = frequency in MHz

Friis transmission formula:  $Pd = (Pout * G) / (4 * pi * r^2)$

Where

**Pd** = power density in mW/cm<sup>2</sup>, **Pout** = output power to antenna in mW;

**G** = gain of antenna in linear scale, **Pi** = 3.1416;

**R** = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## Test Result of RF Exposure Evaluation

### Module 1: ANT 1&2

Band	Frequency	Max output power (dBm)	Output power (mW)	Antenna gain (dBi)	Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Verdict
2.4G WIFI	2462MHz ANT 2	16.58	45.50	1.67	0.0133	1.0	PASS
	2437MHz MIMO	13.77	23.82	4.60	0.0137	1.0	
5.2G WIFI	5200MHz ANT 2	15.58	36.14	2.77	0.0136	1.0	
	5190MHz MIMO	11.88	15.42	5.76	0.0116	1.0	
5.8G WIFI	5755MHz ANT 2	15.51	35.56	2.68	0.0131	1.0	
	5805MHz MIMO	15.03	31.84	5.63	0.0232	1.0	

### Module 2: ANT 3&4

Band	Frequency	Max output power (dBm)	Output power (mW)	Antenna gain (dBi)	Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Verdict
2.4G WIFI	2437MHz ANT 3	18.27	67.14	1.59	0.0193	1.0	PASS
	2437MHz MIMO	18.60	72.44	4.68	0.0423	1.0	
5.2G WIFI	5230MHz ANT 4	15.00	31.62	2.85	0.0121	1.0	
	5230MHz MIMO	15.05	31.99	5.82	0.0243	1.0	
5.8G WIFI	5795MHz ANT 4	15.76	37.67	2.67	0.0139	1.0	
	5795MHz MIMO	15.79	37.93	5.55	0.0271	1.0	

1. The product contains two WIFI modules, each WIFI module has two antennas, and the two WIFI modules cannot transmit signals at the same time.
2. The max power density is less than MPE exempt limit, so it is compliance.