



## 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 is 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

WIFI2.4G:

Mode	Output power to antenna (dBm)	Tune UP tolerance (dBm)	Max Tune UP power (dBm)	Max Tune UP power (mW)	Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
802.11b	15.451	15±1	16	39.81	0.01757	1.0	PASS
802.11g	14.939	14±1	15	31.62	0.01396	1.0	PASS
802.11n20	13.437	13±1	14	25.12	0.01108	1.0	PASS
802.11n40	11.429	11±1	12	15.85	0.00699	1.0	PASS

Antenna gain: 3.46dBi

For 433.92MHz:

Frequency (MHz)	Electric Field (dBuV/m)	Power to antenna (dBm)	Power to antenna (mW)	Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
433.92	76.28	-18.92	0.01282	0.000003	0.29	PASS

Remark: dBuV/m to dBm , dBm = dBuV/m - 95.2

The Wi-Fi & 433.92MHz can transmit at the same time, So the worst simultaneous transmittng consideration:

The ratio =  $MPE_{(WIFI)} / \text{limit} + MPE_{(433.92)} / \text{limit} = 0.01757 / 1.0 + 0.000003 / 0.29 = 0.01758 < 1.0$ .