

## RF Exposure Requirement

### 1.Limits

According to FCC 1.1310: 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> )	Average Time (Minutes)
(A) Limits for Occupational/ Control Exposures				
300-1500	-	-	F/300	6
1500-100,000	-	-	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	-	-	F/1500	6
1500-100,000	-	-	1	30

F= Frequency in MHz

Friis Formula

Friis transmission formula:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in  $mW/cm^2$

$P_{out}$  = 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

$P_d$  is the limit of MPE,  $1 mW/cm^2$ . 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.

### 2.Test Procedure

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

The temperature and related humidity: 23°C and 42% RH.

### 3. Test Result of RF Exposure Evaluation

Operating mode	Frequency	RF Output Power(dBm)	RF Output Power + Tolerance value (dBm)
802.11b	2412	23.52	25.52
802.11b	2437	23.42	25.42
802.11b	2462	23.29	25.29
802.11g	2412	22.86	24.86
802.11g	2437	22.75	24.75
802.11g	2462	22.68	24.68
802.11n20(SISO)	2412	23.03	25.03
802.11n20(SISO)	2437	22.95	24.95
802.11n20(SISO)	2462	22.82	24.82
802.11n40(SISO)	2422	23.67	25.67
802.11n40(SISO)	2437	23.54	25.54
802.11n40(SISO)	2452	23.30	25.30
802.11n20(MIMO)	2412	22.90	24.90
802.11n20(MIMO)	2437	22.76	24.76
802.11n20(MIMO)	2462	22.73	24.73
802.11n40(MIMO)	2422	23.54	25.54
802.11n40(MIMO)	2437	23.33	25.33
802.11n40(MIMO)	2452	20.24	22.24
LE(GFSK)	2402	9.65	11.65
LE(GFSK)	2440	9.18	11.18
LE(GFSK)	2480	9.03	11.03
BDR(GFSK)	2402	13.09	15.09
BDR(GFSK)	2441	13.11	15.11
BDR(GFSK)	2480	13.58	15.58
EDR( $\pi/4$ -DQPSK)	2402	12.22	14.22
EDR( $\pi/4$ -DQPSK)	2441	12.43	14.43
EDR( $\pi/4$ -DQPSK)	2480	12.56	14.56
EDR(8DPSK)	2402	12.82	14.82
EDR(8DPSK)	2441	12.75	14.75
EDR(8DPSK)	2480	13.69	15.69

Note : Power tolerance = +/- 2dB

Maximum RF Power = 25.67dBm=368.98mW

$$368.98/(4*3.14*400) = 0.073443$$

Frequency Band(MHz)	Maximum RF Power(mW)	Power Density at R = 20cm( $mW/cm^2$ )
2402-2480	368.98	0.073443

Note:

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of  $1 mW/cm^2$ .