

## Appendix 11. 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)
BDR(GFSK)	2402	3.07
BDR(GFSK)	2441	2.25
BDR(GFSK)	2480	1.07
EDR( $\pi/4$ -DQPSK)	2402	0.02
EDR( $\pi/4$ -DQPSK)	2441	-1.09
EDR( $\pi/4$ -DQPSK)	2480	-2.37
EDR(8DPSK)	2402	0.02
EDR(8DPSK)	2441	-1.09
EDR(8DPSK)	2480	-2.37

Maximum RF Power=3.07dBm-4.54dBi=-1.47dBm=0.71mW

$0.71 / (4 * 3.14 * 400) = 0.000141$

Frequency Band(MHz)	Maximum RF Power(mW)	Power Density at R = 20cm( $mW/cm^2$ )
2402-2480	3.21	0.000141

**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  $1 mW/cm^2$ .