



## 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:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>,  $P_{out}$  = 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<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

BT mode					
Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
GFSK	2.441	1.75	0.000599	1.0	PASS
$\pi/4$ -DQPSK	-0.317	0.93	0.000318	1.0	PASS
8-DPSK	-1.331	0.74	0.000252	1.0	PASS

Remark: antenna gain=2.36dBi

2.4G WIFI mode							
Mode	Output power to antenna (dBm)		Output power to antenna (mW)		Power Density at R=20cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
802.11b	15.847		38.43		0.013165	1.0	PASS
802.11g	14.561		28.58		0.009791	1.0	PASS
802.11n20	ANT1 14.024	ANT2 14.017	ANT1 25.26	ANT2 25.22	(ANT1/1)+(ANT2/1) =0.017291	1.0	PASS
802.11n40	ANT1 13.951	ANT2 13.869	ANT1 24.84	ANT2 24.37	(ANT1/1)+(ANT2/1) =0.016858	1.0	PASS
802.11n20 MIMO	15.024		31.80		0.021785	1.0	PASS
802.11n40 MIMO	14.217		26.41		0.018090	1.0	PASS

Remark: 802.11b/g/n antenna gain=2.36dBi, 802.11n(MIMO) antenna gain=5.37dBi;

The device can not transmit with 2.4GWIFI and BT simultaneously.