



## 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

### For 2.4G WIFI

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/cm2)	Limit (mW/cm2)	Result
802.11b	2.56	3±1	4	2.51	0.000996	1.0	PASS
802.11g	5.46	5±1	6	3.98	0.001580	1.0	PASS
802.11n20	5.351	5±1	6	3.98	0.001580	1.0	PASS

### For BT

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/cm2)	Limit (mW/cm2)	Result
GFSK	2.501	2±1	3	2.00	0.000794	1.0	PASS

Remark: ANT 1/2 gain=3dBi

Note:

ANT1 and ANT2 can transmit at the same time, so the worst simultaneous transmission consideration:

$$\begin{aligned}\text{The ratio} &= \text{ANT1MPE(MAX) / limit} + \text{ANT2MPE(MAX) / limit} \\ &= 0.001580 / 1 + 0.000794 / 1 \\ &= 0.002374 < 1.0\end{aligned}$$

So a SAR test is not required