



## 9. RF EXPOSURE EVALUATION

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
(A) Limits for Occupational / Control Exposures				
300-1,500	--	--	F/300	6
1,500-100,000	--	--	5	6
(B) Limits for General Population / Uncontrol Exposures				
300-1,500	--	--	F/1500	6
1,500-100,000	--	--	1	30

### 9.1 Friis Formula

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.

### 9.2 EUT Operating Condition

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



### 9.3 Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

#### 9.3.1 Maximum PEAK Output Power

Refer to 5.6 Maximum peak Output Power is : 19.18 dBm (for 802.11b mode CH6),  
19.90 dBm (for 802.11g mode CH6)

#### 9.3.2 Output Power into Antenna & RF Exposure Evaluation Distance

Outpower (max) (dBm)	Cable length to antenna (m)	Min Cable Loss (dB)	Input Power to Antenna (dBm)	Antenna Model	Antenna Type	Antenna Gain (dBi)	EIRP (dBm)	EIRP (Watts)	MPE Distance (cm)	Pd at 20cm (mW/cm <sup>2</sup> )	Comments
17.92		0	17.92	ANT24P2	Omni	2	19.92	0.098175	2.80	0.019531	Minimum separation shall be 20cm
17.92		0	17.92	ANT24P3	Omni	3	20.92	0.123595	3.14	0.024588	Minimum separation shall be 20cm
17.92		0	17.92	ANT24P4	Omni	4	21.92	0.155597	3.52	0.030955	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24S4	Omni Triband Stand	4	20.82	0.120781	3.10	0.024029	Minimum separation shall be 20cm
17.92		0	17.92	ANT24P5	Omni	5	22.92	0.195884	3.95	0.03897	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24S5	Omni Stand	5	21.82	0.152055	3.48	0.03025	Minimum separation shall be 20cm
17.92		0	17.92	ANT24P7	Omni	7	24.92	0.310456	4.97	0.061763	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24P93	Omni triband	9	25.82	0.381944	5.51	0.075985	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT2409	Omni	9	25.82	0.381944	5.51	0.075985	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24P12	Omni	12	28.82	0.762079	7.79	0.151611	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24P123	Omni triband	12	28.82	0.762079	7.79	0.151611	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24O5	Ceiling	5	21.82	0.152055	3.48	0.03025	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24D12	Patch	12	28.82	0.762079	7.79	0.151611	Minimum separation shall be 20cm
17.92	1.5	1.1	16.82	ANT24D18	Patch	18	34.82	3.033891	15.54	0.603573	Minimum separation shall be 20cm

Note : 1. For 802.11b Mode.

2. The power density Pd (4<sup>th</sup> column) at a distance of 20cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>. The EUT is classified as mobile product. So, RF exposure limit warning or SAR test are not required.



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Outpower (max) (dBm)	Cable length to antenna(m)	Min Cable Loss (dB)	Input Power to Antenna (dBm)	Antenna Model	Antenna Type	Antenna Gain (dBi)	EIRP (dBm)	EIRP (Watts)	MPE Distance(cm)	Pd at 20cm (mW/cm <sup>2</sup> )	Comments
18.38		0	18.38	ANT24P2	Omni	2	20.38	0.109144	2.95	0.021714	Minimum separation shall be 20cm
18.38		0	18.38	ANT24P3	Omni	3	21.38	0.137404	3.31	0.027336	Minimum separation shall be 20cm
18.38		0	18.38	ANT24P4	Omni	4	22.38	0.172982	3.71	0.034414	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24S4	Omni Triband Stand	4	21.28	0.134276	3.27	0.026713	Minimum separation shall be 20cm
18.38		0	18.38	ANT24P5	Omni	5	23.38	0.217771	4.16	0.043324	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24S5	Omni Stand	5	22.28	0.169044	3.67	0.03363	Minimum separation shall be 20cm
18.38		0	18.38	ANT24P7	Omni	7	25.38	0.345144	5.24	0.068664	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24P93	Omni triband	9	26.28	0.42462	5.81	0.084475	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT2409	Omni	9	26.28	0.42462	5.81	0.084475	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24P12	Omni	12	29.28	0.847227	8.21	0.16855	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24P123	Omni triband	12	29.28	0.847227	8.21	0.16855	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24O5	Ceiling	5	22.28	0.169044	3.67	0.03363	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24D12	Patch	12	29.28	0.847227	8.21	0.16855	Minimum separation shall be 20cm
18.38	1.5	1.1	17.28	ANT24D18	Patch	18	35.28	3.372873	16.38	0.671012	Minimum separation shall be 20cm

Note : 1. For 802.11g Mode.

- The power density Pd (4<sup>th</sup> column) at a distance of 20cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>. The EUT is classified as mobile product. So, RF exposure limit warning or SAR test are not required.