



11 RF EXPOSURE COMPLIANCE

11.1 LIMIT

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

NOTE: f = frequency in MHz ; *Plane-wave equivalent power density.

11.2 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2495A	1128008	Feb,20,2013
2	Power Meter Sensor	Anritsu	MA2411B	1126001	Feb,20,2013

NOTE: **N/A**: denotes No Model Name, No Serial No. or No Calibration specified.

11.3 MPE CALCULATION METHOD

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \qquad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

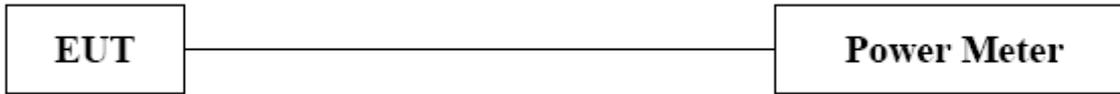
The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained



11.4 TEST SETUP LAYOUT



11.5 DEVIATION FROM TEST STANDARD

No deviation

11.6 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 5.6 Unless otherwise a special operating condition is specified in the follows during the testing.



11.7 TEST RESULTS

E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11b/2412 MHz, 2437 MHz, 2462 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2412 MHz	4.11	2.5763	17.9500	62.3735	0.031985	1	PASS
2437 MHz	4.11	2.5763	17.6900	58.7489	0.030127	1	PASS
2462 MHz	4.11	2.5763	17.7600	59.7035	0.030616	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11g/2412 MHz, 2437 MHz, 2462 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2412 MHz	4.11	2.5763	20.7400	118.5769	0.060807	1	PASS
2437 MHz	4.11	2.5763	21.0200	126.4736	0.064856	1	PASS
2462 MHz	4.11	2.5763	20.8400	121.3389	0.062223	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (20 MHz)/ANT.1/2412 MHz, 2437 MHz, 2462 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2412 MHz	4.11	2.5763	21.2000	131.8257	0.067601	1	PASS
2437 MHz	4.11	2.5763	21.0400	127.0574	0.065155	1	PASS
2462 MHz	4.11	2.5763	21.0300	126.7652	0.065006	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (20 MHz)/ANT.2/2412 MHz, 2437 MHz, 2462 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2412 MHz	5.31	3.3963	21.3600	136.7729	0.092459	1	PASS
2437 MHz	5.31	3.3963	21.7900	151.0080	0.102082	1	PASS
2462 MHz	5.31	3.3963	21.2700	133.9677	0.090563	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (20 MHz)/ANT.Total/2412 MHz, 2437 MHz, 2462 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2412 MHz	9.42	8.7498	24.2910	268.5986	0.467793	1	PASS
2437 MHz	9.42	8.7498	24.4415	278.0654	0.484281	1	PASS
2462 MHz	9.42	8.7498	24.1620	260.7329	0.454094	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (40 MHz)/ANT.1/2422 MHz, 2437 MHz, 2452 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2422 MHz	4.11	2.5763	19.6400	92.0450	0.047201	1	PASS
2437 MHz	4.11	2.5763	19.8700	97.0510	0.049768	1	PASS
2452 MHz	4.11	2.5763	19.8000	95.4993	0.048972	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (40 MHz)/ANT.2/2422 MHz, 2437 MHz, 2452 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2422 MHz	5.31	3.3963	19.8200	95.9401	0.064856	1	PASS
2437 MHz	5.31	3.3963	19.3200	85.5067	0.057803	1	PASS
2452 MHz	5.31	3.3963	19.8400	96.3829	0.065155	1	PASS



E.U.T	802.11b/g/n 2T2R Wireless Lan USB Module	Model Name	WN4615R
Temperature	26°C	Relative Humidity	60%
Test Voltage	AC 120V/60Hz		
Test Mode	IEEE 802.11n (40 MHz)/ANT.Total/2422 MHz, 2437 MHz, 2452 MHz		

Frequency	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S)	Limit of Power Density (S)	Result
2422 MHz	9.42	8.7498	22.7412	187.9850	0.327396	1	PASS
2437 MHz	9.42	8.7498	22.6140	182.5577	0.317944	1	PASS
2452 MHz	9.42	8.7498	22.8303	191.8822	0.334183	1	PASS