



9. RF EXPOSURE TEST

9.1 APPLIED PROCEDURES / 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

9.1.1 MEASUREMENT INSTRUMENTS LIST

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Power Meter	Anritsu	ML2487A	6K00004714	Feb. 12, 2009
2	Power Meter Sensor	Anritsu	MA2491A	34138	Feb. 12, 2009

Remark: " N/A" denotes No Model Name , Serial No. or No Calibration specified.

9.1.2 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

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

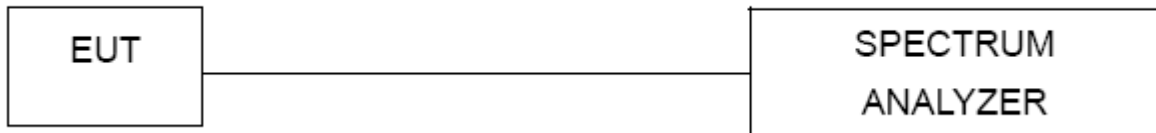
From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained



9.1.3 DEVIATION FROM STANDARD

No deviation.

9.1.4 TEST SETUP



9.1.5 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 4.1.6 Unless otherwise a special operating condition is specified in the follows during the testing.



9.1.6 TEST RESULTS - CHIP

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11b (CHIP)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.70	1.8621	18.9200	77.9830	0.028903	1
2437	2.70	1.8621	18.9500	78.5236	0.029104	1
2462	2.70	1.8621	18.8800	77.2681	0.028639	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11g (CHIP)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.70	1.8621	22.1000	162.1810	0.060111	1
2437	2.70	1.8621	22.7100	186.6380	0.069175	1
2462	2.70	1.8621	22.3000	169.8244	0.062943	1



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EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/20M (CHIP)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.70	1.8621	21.7600	149.9685	0.055584	1
2437	2.70	1.8621	22.8500	192.7525	0.071441	1
2462	2.70	1.8621	21.4600	139.9587	0.051874	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/40M (CHIP)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.70	1.8621	21.0300	126.7652	0.046984	1
2437	2.70	1.8621	21.8800	154.1700	0.057141	1
2462	2.70	1.8621	21.5100	141.5794	0.052475	1

Remark :

- (1) The SISO test requirement, MPE shall measure by using the total sum power of each transmitter chain.



9.1.7 TEST RESULTS - PIFA

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11b (PIFA)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	1.81	1.5171	18.9200	77.9830	0.023548	1
2437	1.81	1.5171	18.9500	78.5236	0.023711	1
2462	1.81	1.5171	18.8800	77.2681	0.023332	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11g (PIFA)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	1.81	1.5171	22.1000	162.1810	0.048972	1
2437	1.81	1.5171	22.7100	186.6380	0.056357	1
2462	1.81	1.5171	22.3000	169.8244	0.051280	1



EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/20M (PIFA)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	1.81	1.5171	21.7600	149.9685	0.045285	1
2437	1.81	1.5171	22.8500	192.7525	0.058204	1
2462	1.81	1.5171	21.4600	139.9587	0.042262	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/40M (PIFA)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	1.81	1.5171	21.0300	126.7652	0.038278	1
2437	1.81	1.5171	21.8800	154.1700	0.046553	1
2462	1.81	1.5171	21.5100	141.5794	0.042751	1

Remark :

- (1) The SISO test requirement, MPE shall measure by using the total sum power of each transmitter chain.



9.1.8 TEST RESULTS - DIPOLE

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11b (DIPOLE)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.13	1.6331	18.9200	77.9830	0.025348	1
2437	2.13	1.6331	18.9500	78.5236	0.025524	1
2462	2.13	1.6331	18.8800	77.2681	0.025116	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11g (DIPOLE)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.13	1.6331	22.1000	162.1810	0.052717	1
2437	2.13	1.6331	22.7100	186.6380	0.060667	1
2462	2.13	1.6331	22.3000	169.8244	0.055201	1



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EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/20M (DIPOLE)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.13	1.6331	21.7600	149.9685	0.048747	1
2437	2.13	1.6331	22.8500	192.7525	0.062654	1
2462	2.13	1.6331	21.4600	139.9587	0.045494	1

EUT :	IEEE 802.11n WLAN USB 2.0 module	Model Name :	US302
Temperature :	17 °C	Relative Humidity :	89 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n/40M (DIPOLE)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)
2412	2.13	1.6331	21.0300	126.7652	0.041205	1
2437	2.13	1.6331	21.8800	154.1700	0.050113	1
2462	2.13	1.6331	21.5100	141.5794	0.046020	1

Remark :

- (1) The SISO test requirement, MPE shall measure by using the total sum power of each transmitter chain.