



**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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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 <sup>2</sup> )	Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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**

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11b		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	18.5000	70.7946	0.022333	1
2437	2.00	1.5849	18.6000	72.4436	0.022853	1
2462	2.00	1.5849	18.6800	73.7904	0.023278	1

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11g		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	24.5200	283.1392	0.089320	1
2437	2.00	1.5849	25.8200	381.9443	0.120490	1
2462	2.00	1.5849	25.2700	336.5116	0.106157	1



## Neutron Engineering Inc.

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT20 Single TX Port. 0		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	21.9400	156.3148	0.049312	1
2437	2.00	1.5849	23.2500	211.3489	0.066673	1
2462	2.00	1.5849	24.2600	266.6859	0.084130	1

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT20 Single TX Port. 1		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	22.5100	178.2379	0.056228	1
2437	2.00	1.5849	23.5400	225.9436	0.071277	1
2462	2.00	1.5849	23.7300	236.0478	0.074465	1

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT20 Dual TX (Port. 0 + Port. 1)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	4.00	2.5119	25.2446	334.5526	0.167269	1
2437	4.00	2.5119	26.4077	437.2925	0.218636	1
2462	4.00	2.5119	27.0134	502.7337	0.251355	1

Remark :

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



EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT40 Single TX Port. 0		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	20.6600	116.4126	0.036724	1
2437	2.00	1.5849	22.4800	177.0109	0.055841	1
2462	2.00	1.5849	22.7500	188.3649	0.059422	1

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT40 Single TX Port. 1		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	2.00	1.5849	20.5600	113.7627	0.035888	1
2437	2.00	1.5849	22.8700	193.6422	0.061087	1
2462	2.00	1.5849	22.0400	159.9558	0.050460	1

EUT :	IEEE 802.11 bgn Wireless Router	Model Name :	ZW-N5900C
Temperature :	13 °C	Relative Humidity :	64 %
Test Voltage :	AC 120V/60Hz		
Test Mode :	802.11n HT40 Dual TX (Port. 0 + Port. 1)		

Frequency (MHz)	Antenna Gain (dBi)	Antenna Gain (numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm <sup>2</sup> )	Limit of Power Density (S) (mW/cm <sup>2</sup> )
2412	4.00	2.5119	23.6206	230.1753	0.115082	1
2437	4.00	2.5119	25.6897	370.6531	0.185318	1
2462	4.00	2.5119	25.4198	348.3207	0.174152	1

Remark :

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