



# RF EXPOSURE REPORT

**REPORT NO.:** SA120921C21A

**MODEL NO.:** WM-MB92M

**FCC ID:** VZ9120002

**RECEIVED:** Sep. 21, 2012

**TESTED:** Dec. 26 to 27, 2012

**ISSUED:** Feb. 05, 2014

**APPLICANT:** 4IPNET, INC.

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
(H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA120921C21A	Original release	Feb. 05, 2013

## 1. CERTIFICATION

**PRODUCT:** 802.11a/b/g/n Wireless Module  
**BRAND NAME:** 4ipnet  
**MODEL NO.:** WM-MB92M  
**TEST SAMPLE:** ENGINEERING SAMPLE  
**APPLICANT:** 4IPNET, INC.  
**TESTED DATE:** Dec. 26 to 27, 2012  
**STANDARDS:** FCC Part 2 (Section 2.1091)  
FCC OET Bulletin 65, Supplement C (01-01)  
IEEE C95.1

The above equipment (Model: WM-MB92M) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Midoli Peng , **DATE:** Feb. 05, 2014  
( Midoli Peng, Specialist )

**APPROVED BY :** May Chen , **DATE:** Feb. 05, 2014  
( May Chen, Manager )

## 2. RF EXPOSURE LIMIT

### 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 (minutes)
<b>LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE</b>				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

### 3. MPE CALCULATION FORMULA

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

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

### 4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

### 5. ANTENNA GAIN

The antennas provided to the EUT, please refer to the following table:

No.	Brand	Part No.	Antenna Type	Gain (dBi)	Connector Type
1	UNI LINK	MCS-304-01	Dipole	2.4GHz: 2.7	Re-SMA(M)
				5GHz :4	
2	UNI LINK	UT-700-04	PIFA	2.4GHz: 3.7	MMCX plug
				5GHz :4.5	
Note: The dipole antenna has two different colors (black and white) and the dipole antenna (white) was chosen for final test.					

## 6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

For PIFA antenna

For 15.247(2.4GHz):

802.11b

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	186.209	3.7	20	0.08684	1

802.11g

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	446.684	3.7	20	0.20832	1

802.11n (HT20)

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	751.724	6.71	20	0.70111	1

Directional gain = 3.7dBi + 10log(2) = 6.71dBi

802.11n (HT40)

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	409.322	6.71	20	0.38176	1

Directional gain = 3.7dBi + 10log(2) = 6.71dBi

**For PIFA antenna**  
**For 15.247(5GHz):**  
**802.11a**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	288.403	4.5	20	0.16171	1

**802.11n (HT20)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	538.450	7.51	20	0.60377	1

Directional gain = 4.5dBi + 10log(2) = 7.51dBi

**802.11n (HT40)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	566.070	7.51	20	0.63474	1

Directional gain = 4.5dBi + 10log(2) = 7.51dBi

**For PIFA antenna**

**For 15.407(5GHz):**

**802.11a**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	44.771	4.5	20	0.02510	1

**802.11n (HT20)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	43.767	7.51	20	0.04908	1

Directional gain = 4.5dBi + 10log(2) = 7.51dBi

**802.11n (HT40)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	48.561	7,51	20	0.05445	1

Directional gain = 4.5dBi + 10log(2) = 7.51dBi



**For DIPOLE antenna**

**For 15.247(2.4GHz):**

**802.11b**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	186.209	2.7	20	0.06898	1

**802.11g**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	446.684	2.7	20	0.16547	1

**802.11n (HT20)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	751.724	5.57	20	0.55691	1

Directional gain = 2.7dBi + 10log(2) = 5.57dBi

**802.11n (HT40)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412-2462	409.322	5.57	20	0.30325	1

Directional gain = 2.7dBi + 10log(2) = 5.57dBi

**For DIPOLE antenna**

**For 15.247(5GHz):**

**802.11a**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	288.403	4.0	20	0.14412	1

**802.11n (HT20)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	538.450	7.01	20	0.53811	1

Directional gain = 4.0dBi + 10log(2) = 7.01dBi

**802.11n (HT40)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 ~ 5825	566.070	7.01	20	0.56572	1

Directional gain = 4.0dBi + 10log(2) = 7.01dBi

**For DIPOLE antenna**

**For 15.407(5GHz):**

**802.11a**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	44.771	4.0	20	0.02237	1

**802.11n (HT20)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	43.767	7.01	20	0.04374	1

Directional gain = 4.0dBi + 10log(2) = 7.01dBi

**802.11n (HT40)**

FREQUENCY BAND (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/ cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180-5240	48.561	7.01	20	0.04853	1

Directional gain = 4.0dBi + 10log(2) = 7.01dBi

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