

## RF Exposure Report

**Report No.:** SA170714E03A

**FCC ID:** I88WAP6804

**Test Model:** WAP6804

**Received Date:** Dec. 15, 2016

**Test Date:** Jan. 05, 2016

**Issued Date:** Sep. 14, 2017

**Applicant:** Zyxel Communications Corporation

**Address:** No.2 Industry East RD. IX, Hsinchu Science Park, Hsinchu 30075, Taiwan

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

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### Release Control Record

Issue No.	Description	Date Issued
SA170714E03A	Original release.	Sep. 14, 2017

## 1 Certificate of Conformity

**Product:** Dual-Band AC2100 Gigabit Wireless Bridge

**Brand:** ZYXEL

**Test Model:** WAP6804

**Sample Status:** ENGINEERING SAMPLE


**Applicant:** Zyxel Communications Corporation


**Test Date:** Jan. 05, 2016

**Standards:** FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

The above equipment 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 :**  \_\_\_\_\_, **Date:** \_\_\_\_\_  
Wendy Wu / Specialist Sep. 14, 2017

**Approved by :**  \_\_\_\_\_, **Date:** \_\_\_\_\_  
May Chen / Manager Sep. 14, 2017

## 2 RF Exposure

### 2.1 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)
Limits For General Population / Uncontrolled Exposure				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

### 2.2 MPE Calculation 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

### 2.3 Classification

The antenna of this product, under normal use condition, is at least 22cm away from the body of the user.

So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain Table

Frequency	Antenna Gain (dBi)			Antenna Gain (dBi)		
	ANT_0			ANT_1		
	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
5260	2.12	--	--	2.90	--	--
5270	--	2.01	--	--	2.68	--
5290	--	--	2.36	--	--	2.54
5300	2.57	--	--	2.59	--	--
5310	--	2.55	--	--	2.17	--
5320	--	--	2.65	--	--	2.30
5500	2.45	--	--	2.85	--	--
5510	--	2.72	--	--	2.83	--
5530	--	--	2.40	--	--	3.17
5550	--	2.51	--	--	3.08	--
5580	2.39	--	--	3.05	--	--
5610	--	--	2.51	--	--	3.08
5620	3.03	--	--	3.29	--	--
5630	--	2.93	--	--	3.24	--
5670	--	2.86	--	--	2.81	--
5690	--	--	2.92	--	--	2.56
5700	3.26	--	--	2.58	--	--
5710	--	3.60	--	--	3.53	--
5720	--	--	3.36	--	--	3.54
Frequency	Antenna Gain (dBi)			Antenna Gain (dBi)		
	ANT_2			ANT_3		
	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
5260	2.72	--	--	2.62	--	--
5270	--	2.36	--	--	2.73	--
5290	--	--	2.38	--	--	2.98
5300	2.14	--	--	3.08	--	--
5310	--	1.90	--	--	2.75	--
5320	--	--	2.11	--	--	2.74
5500	3.00	--	--	3.70	--	--
5510	--	3.01	--	--	3.25	--
5530	--	--	3.42	--	--	2.99
5550	--	2.89	--	--	2.82	--
5580	3.06	--	--	3.51	--	--
5610	--	--	2.89	--	--	2.82
5620	3.23	--	--	3.54	--	--
5630	--	2.98	--	--	3.75	--
5670	--	3.25	--	--	3.55	--
5690	--	--	3.03	--	--	3.20
5700	2.65	--	--	3.39	--	--
5710	--	3.52	--	--	3.29	--
5720	--	--	3.72	--	--	3.23

## 2.5 Directional Gain Table

Frequency (MHz)	Max Gain (dBi)			Max Gain (dBi)		
	4TX Nss=1 for CDD and TX BF			4TX Nss=2 for TX BF		
	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
5260	6.11	--	--	3.10	--	--
5270	--	6.10	--	--	3.09	--
5290	--	--	6.19	--	--	3.18
5300	6.18	--	--	3.17	--	--
5310	--	5.96	--	--	2.95	--
5320	5.98	--	--	2.97	--	--
5500	6.80	--	--	3.79	--	--
5510	--	6.77	--	--	3.76	--
5530	--	--	7.02	--	--	4.01
5550	--	6.55	--	--	3.54	--
5580	6.77	--	--	3.76	--	--
5610	--	--	6.55	--	--	3.54
5620	6.37	--	--	3.36	--	--
5630	--	6.23	--	--	3.22	--
5670	--	6.50	--	--	3.49	--
5690	--	--	6.34	--	--	3.33
5700	6.37	--	--	3.36	--	--
5710	--	6.66	--	--	3.65	--
5720	6.40	--	--	3.39	--	--

Note:

1. Non-TxBF mode & TxBF mode antenna gain refer to KDB 662911 F 2) f) (ii)

$$DirectionalGain = 10 \cdot \log \left[ \frac{\sum_{j=1}^{N_{SS}} \left\{ \sum_{k=1}^{N_{ANT}} g_{j,k} \right\}^2}{N_{ANT}} \right]$$

where

Each antenna is driven by no more than one spatial stream;

 $N_{SS}$  = the number of independent spatial streams of data;

 $N_{ANT}$  = the total number of antennas

 $g_{j,k} = 10^{G_k/20}$  if the  $k$ th antenna is being fed by spatial stream  $j$ , or zero if it is not;

 $G_k$  is the gain in dBi of the  $k$ th antenna.

### 3 Calculation Result Of Conducted Power

For 2.4GHz & 5GHz (U-NII-1 and UNII-3 band) data were copied from the original test report (Report No.: SA160420E06)

#### CDD Mode / Beamforming Mode (Nss=1)

Frequency (MHz)	Conducted Power (mW)	Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	484.921	5.59	22	0.28881	1
5180-5240	767.523	6.8	22	0.60400	1
5260-5320	236.492	6.10	22	0.15840	1
5500-5720	192.836	6.55	22	0.14326	1
5745-5825	766.475	6.61	22	0.57735	1

**NOTE:**

1. 2.4GHz: Directional gain =  $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.59\text{dBi}$

2. 5GHz:

UNII-1: Directional gain of CDD mode / Beamforming Mode (Nss=1) = 6.8dBi

UNII-2A: Directional gain of CDD mode / Beamforming Mode (Nss=1) = 6.10dBi

UNII-2C: Directional gain of CDD mode / Beamforming Mode (Nss=1) = 6.55dBi

UNII-3: Directional gain of CDD mode / Beamforming Mode (Nss=1) = 6.61dBi

3. Calculations for maximum RF exposure compliance are base on the directional gain and conducted power condition.

#### Beamforming Mode (Nss=2)

Frequency (MHz)	Conducted Power (mW)	Directional Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
5180-5240	769.216	3.4	22	0.30478	1
5260-5320	236.492	3.09	22	0.07921	1
5500-5720	234.816	3.76	22	0.09176	1
5745-5825	792.287	3.37	22	0.29842	1

**NOTE:**

1. For UNII-1: Directional gain of beamforming mode (Nss=2) = 3.79dBi

2. For UNII-2A: Directional gain of beamforming mode (Nss=2) = 3.09dBi

3. For UNII-2C: Directional gain of beamforming mode (Nss=2) = 3.76dBi

4. For UNII-3: Directional gain of beamforming mode (Nss=2) = 3.6dBi

5. Calculations for maximum RF exposure compliance are base on the directional gain and conducted power condition.



**Conclusion:**

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

$WLAN\ 2.4GHz + WLAN\ 5GHz = 0.28881 / 1 + 0.60400 / 1 = 0.89281$

**Therefore the maximum calculations of above situations are less than the “1” limit.**

--- END ---