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

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.

Table of Contents

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:** Sep. 14, 2017

Wendy Wu / Specialist

Approved by : _____ , **Date:** Sep. 14, 2017

May Chen / Manager

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^2)	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^2

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) 4TX Nss=1 for CDD and TX BF			Max Gain (dBi) 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 kth antenna is being fed by spatial stream j, or zero if it is not;

G_k is the gain in dBi of the kth 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^2)	Limit (mW/cm^2)
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] = 5.59dBi
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^2)	Limit (mW/cm^2)
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 + ……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 ---