

## RF Exposure Report

**Report No.:** SA180821E03

**FCC ID:** I88WSQ20

**Test Model:** WSQ20

**Received Date:** Oct. 11, 2018

**Test Date:** Jan. 02 to 04, 2019

**Issued Date:** Jan. 15, 2019

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

**FCC Registration /  
Designation Number:** 723255 / TW2022

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### Release Control Record

Issue No.	Description	Date Issued
SA180821E03	Original release.	Jan. 15, 2019

## 1 Certificate of Conformity

**Product:** Multy Mini Dual-Band WiFi System Add-on

**Brand:** ZYXEL

**Test Model:** WSQ20

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Zyxel Communications Corporation

**Test Date:** Jan. 02 to 04, 2019

**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 :** Wendy Wu , **Date:** Jan. 15, 2019  
Wendy Wu / Specialist

**Approved by :** May Chen , **Date:** Jan. 15, 2019  
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 <sup>2</sup> )	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f <sup>2</sup> )*	30
30-300	27.5	0.073	0.2	30
300-1500	...	...	f/1500	30
1500-100,000	...	...	1.0	30

f = Frequency in MHz ; \*Plane-wave equivalent power density

### 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 20cm away from the body of the user.

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

## 2.4 Antenna Gain

<b>For WLAN</b>				
Chain No	Antenna Net Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type
0	0	2.4 ~ 2.4835	PIFA	IPEX
1	0	2.4 ~ 2.4835	PIFA	IPEX
2	0	2.4 ~ 2.4835	PIFA	IPEX
0	0	5.15 ~ 5.25	Dipole	IPEX
	0	5.725 ~ 5.85		
1	0	5.15 ~ 5.25	Dipole	IPEX
	0	5.725 ~ 5.85		
2	0	5.15 ~ 5.25	PIFA	IPEX
	0.7	5.725 ~ 5.85		
<b>For Bluetooth</b>				
Antenna Net Gain(dBi)	Frequency range (MHz)	Antenna Type	Connector Type	
2.3	2402~2480	PIFA	IPEX	

## 2.5 Calculation Result Of Maximum Conducted Power

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
WLAN 2.4GHz	2412	960.188	4.77	20	0.57291	1
WLAN UNII-1	5200	947.747	4.77	20	0.56549	1
WLAN UNII-3	5745	992.446	5.01	20	0.62581	1
Bluetooth	2480	0.885	2.30	20	0.00030	1

### NOTE:

2.4GHz: Directional gain = 0dBi + 10log(3) = 4.77dBi

5GHz:

For UNII-1: Directional gain = 0dBi + 10log(3) = 4.77dBi

For UNII-3: Directional gain = 10 log[(10<sup>G0/20</sup> + 10<sup>G1/20</sup> + 10<sup>G2/20</sup>)<sup>2</sup> / 3] = 5.01dBi

### 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 + Bluetooth = 0.57291 / 1 + 0.00030 / 1 = 0.57321

WLAN 5GHz + Bluetooth = 0.62581 / 1 + 0.00030 / 1 = 0.62611

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

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