

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

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

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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 ²)	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 ²)*	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

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

where

Pd = power density in mW/cm²

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

For WLAN				
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		
For Bluetooth				
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 ²)	Limit (mW/cm ²)
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^{G0/20} + 10^{G1/20} + 10^{G2/20})² / 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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