RF Exposure Report

Report No.: SABHYD-WTW-P21051101A

FCC ID: I881WSM20

Test Model: WSM20

Received Date: 2021/12/7

Test Date: 2021/12/23

Issued Date: 2022/2/23

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

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

FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SABHYD-WTW-P21051101A	Original release.	2022/2/23

1   Certificate of Conformity

Product:	AX1800 Dual-Band WiFi 6 System
Brand:	ZYXEL
Test Model:	WSM20
Sample Status:	Engineering sample
Applicant:	Zyxel Communications Corporation
Test Date:	2021/12/23
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 :   _Evy Chen_   ,   **Date:**   2022/2/23

Evy Chen / Specialist

Approved by :   _____   ,   **Date:**   2022/2/23

Clark Lin / Technical 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

$$Pd = (Pout*G) / (4*pi*r^2)$$

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 20 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4   Antenna Gain

Antenna NO.	RF Chain NO.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
2	2.4G_Chain 0	WHAYU	56-001-000044Z	2.5	2.4~2.4835GHz	Dipole	i-pex(MHF)	115
	5G_Chain 0			3.4	5.15~5.85GHz			
3	2.4G_Chain 1	WHAYU	56-001-000045Z	2.4	2.4~2.4835GHz	PIFA	i-pex(MHF)	115
	5G_Chain 1			3.4	5.15~5.85GHz			

* The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

2.5 Calculation Result of Maximum Conducted Power

CDD Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Max. Average Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Pass/ Fail
WLAN (2.4GHz)	2412~2462	427.409	26.31	2.50	20	0.15121	1	Pass
WLAN (5GHz)	5180~5240 5475~5825	865.257	29.37	3.40	20	0.37660	1	Pass

Beamforming Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Max. Average Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Pass/ Fail
WLAN (2.4GHz)	2412~2462	394.486	25.96	5.46	20	0.27591	1	Pass
WLAN (5GHz)	5180~5240 5475~5825	757.46	28.79	6.41	20	0.65931	1	Pass

Note:

Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

1. 2.4GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$ = 5.46 dBi
2. 5GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2]$ = 6.41 dBi

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

CDD Mode

WLAN 2.4GHz + WLAN 5GHz = 0.15121 / 1 + 0.37660 / 1 = 0.52781

Beamforming Mode

WLAN 2.4GHz + WLAN 5GHz = 0.27591 / 1 + 0.65931 / 1 = 0.93522

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

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