

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

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

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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
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**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 : Evvy Chen , **Date:** 2022/2/23
Evvy Chen / Specialist

Approved by : Clark Lin , **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/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 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.

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

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

CDD Mode

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = 0.15121 / 1 + 0.37660 / 1 = 0.52781$$

Beamforming Mode

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = 0.27591 / 1 + 0.65931 / 1 = 0.93522$$

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

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