RF Exposure Report

Report No.:	MFBFBE-WTW-P22031258
FCC ID:	I88DX4510-B1
Test Model:	DX4510-B1
Received Date:	2022/4/14
Test Date:	2022/6/5
Issued Date:	2022/7/29
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
MFBFBE-WTW-P22031258	Original release.	2022/7/29

1 Certificate of Conformity

Product:	AX6000 WiFi6 VDSL2 Bonding Gateway
Brand:	ZYXEL
Test Model:	DX4510-B1
Sample Status:	Engineering sample
Applicant:	Zyxel Communications Corporation
Test Date:	2022/6/5
FCC Rule Part:	FCC Part 2 (Section 2.1091)
Standards:	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 : Cherry Chuo , **Date:** 2022/7/29

Cherry Chuo / Specialist

Approved by : , **Date:** 2022/7/29

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

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

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

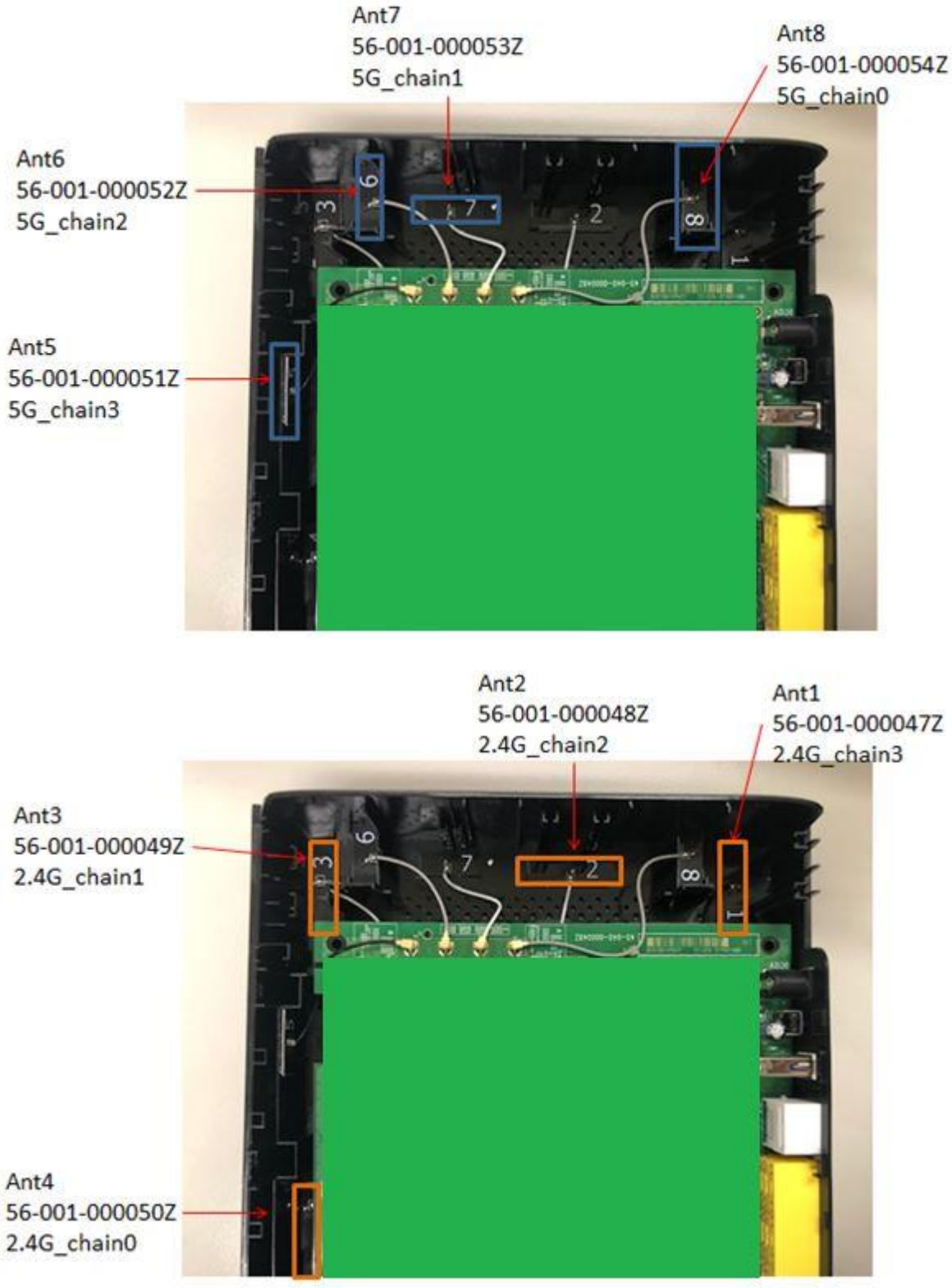
The antenna of this product, under normal use condition, is at least 24cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Antenna No.	RF Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range (GHz)	Antenna Type	Connector Type	*Cable Length (mm)
ANT1	2.4G_Chain 3	WHAYU	56-001-000047Z	2.7	2.4~2.4835	Dipole	ipex(MHF)	313
ANT2	2.4G_Chain 2	WHAYU	56-001-000048Z	2.31	2.4~2.4835	Dipole	ipex(MHF)	258
ANT3	2.4G_Chain 1	WHAYU	56-001-000049Z	2.57	2.4~2.4835	Dipole	ipex(MHF)	263
ANT4	2.4G_Chain 0	WHAYU	56-001-000050Z	2.53	2.4~2.4835	Dipole	ipex(MHF)	145
ANT5	5G_Chain 3	WHAYU	56-001-000051Z	2.6 2.92 3.31 3.16	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	ipex(MHF)	59
ANT6	5G_Chain 2	WHAYU	56-001-000052Z	2.99 3.22 3.13 2.18	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	ipex(MHF)	40
ANT7	5G_Chain 1	WHAYU	56-001-000053Z	3.48 3.09 3.79 2.46	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	ipex(MHF)	45
ANT8	5G_Chain 0	WHAYU	56-001-000054Z	0.63 2.62 2.61 3.73	5.15~5.25 5.25~5.35 5.47~5.725 5.725~5.85	Dipole	ipex(MHF)	80

*Detail antenna specification please refer to antenna datasheet and/or antenna measurement report.

* Antenna port location



The directional antenna gain, please refer to the following table:

Frequency Range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Antenna Connector
2.4~2.4835	4.84	Dipole	ipex(MHF)
5.15~5.25	7.09		
5.25~5.35	7.39		
5.47~5.725	6.21		
5.725~5.85	6.42		
Note: Directional gain is the measured value according to KDB 662911 D03 Method of MIMO Antenna Gain Measurement. More detailed information, please refer to antenna specification.			

2.5 Calculation Result

CDD Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
WLAN (2.4GHz)	2412~2462	946.837	2.70	24	0.24358	1	Pass
WiFi 5GHz (U-NII-1)	5180-5240	769.183	3.48	24	0.23681	1	Pass
WiFi 5GHz (U-NII-2A)	5240-5320	248.382	3.22	24	0.07203	1	Pass
WiFi 5GHz (U-NII-2C)	5500-5720	237.878	3.79	24	0.07865	1	Pass
WiFi 5GHz (U-NII-3)	5745-5825	993.039	3.73	24	0.32384	1	Pass

Beamforming Mode

Operation Mode	Evaluation Frequency (MHz)	Max. Average Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)	Result
WLAN (2.4GHz)	2412~2462	807.068	4.84	24	0.33984	1	Pass
WiFi 5GHz (U-NII-1)	5180-5240	708.866	7.09	24	0.50111	1	Pass
WiFi 5GHz (U-NII-2A)	5240-5320	181.289	7.39	24	0.13718	1	Pass
WiFi 5GHz (U-NII-2C)	5500-5720	237.878	6.21	24	0.13732	1	Pass
WiFi 5GHz (U-NII-3)	5745-5825	902.535	6.42	24	0.54680	1	Pass

Note:

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

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) = 0.24358 / 1 + 0.32384 / 1 = 0.56742

Beamforming Mode

WLAN (2.4GHz) + WLAN (5GHz) = 0.33984 / 1+ 0.54680 / 1 = 0.88664

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

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