



RF Exposure Evaluation Declaration

FCC ID: I88EX2210-T0
Applicant: Zyxel Communications Corporation
Product: Dual-Band Wireless AX1800 Gigabit Ethernet Gateway
Model No.: EX2210-T0
Brand Name: ZYXEL
FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s): Part 2.1091
Result: Complies
Test Date: 2022-05-07

Reviewed By:

Kevin Guo

Approved By:

Robin Wu



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
2203RSU090-U4	Rev. 01	Initial Report	2022-06-06	Valid

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1.4. Product Information

Product Name	Dual-Band Wireless AX1800 Gigabit Ethernet Gateway
Model No.	EX2210-T0
Wi-Fi Specification	802.11a/b/g/n/ac/ax
Antenna Information	Refer to clause 1.5
Operating Temperature	0°C to 40°C
Accessories	
Adapter	Model No.: MAUS-1201501801 Input Power: 100 - 240V ~ 50/60Hz, 0.5A Output Power: 12V dc 1.5A
Remark: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.5. Antenna Details

Antenna Type	Frequency Band (MHz)	Tx Paths	Antenna Gain (dBi)		Beamforming Directional Gain (dBi)	CDD Directional Gain (dBi)	
			Ant 0	Ant 1		For Power	For PSD
PCB Antenna	2412 ~ 2462	2	3.5	2.9	6.51	3.5	6.51
	5180 ~ 5320	2	4.2	3.2	7.21	4.2	7.21
	5500 ~ 5720	2	4.0	3.9	7.01	4.0	7.01
	5745 ~ 5825	2	4.6	3.3	7.61	4.6	7.61

Remark:

- The EUT supports Cyclic Delay Diversity (CDD) mode and CDD signals are correlated.
 If all antennas have the same gain, G_{ANT} , Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows.
 - For power spectral density (PSD) measurements on all devices,
 Array Gain = $10 \log(N_{ANT}/N_{SS})$ dB;
 - For power measurements on IEEE 802.11 devices,
 Array Gain = 0 dB for $N_{ANT} \leq 4$;
- The EUT also supports Beam Forming mode, and the Beam Forming support 802.11ac/ax. BF Directional gain = $G_{ANT} + 10 \log(N_{ANT})$. For beamforming operation, manufacturer automatically backs power down based on a $10 \log(N)$ factor based on CDD power.

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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)
(A) Limits for Occupational/ Control Exposures				
300-1500	--	--	f/300	6
1500-100,000	--	--	5	6
(B) Limits for General Population/ Uncontrolled Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

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

Pd is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

2.2. Test Result

Product	Dual-Band Wireless AX1800 Gigabit Ethernet Gateway
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.5.

Test Mode	Frequency Band (MHz)	Conducted Power (dBm)	Tune-up Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)
802.11b/g/n/ax	2412 ~ 2462	23.88	24.0	3.5	27.5
802.11a/n/ac/ax	5180 ~ 5240 5260 ~ 5320 5500 ~ 5720 5745 ~ 5825	28.58	29.0	4.6	33.6

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Compliance Distance (cm)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
802.11b/g/n/ax	2412 ~ 2462	27.5	20.00	0.1119	1
802.11a/n/ac/ax	5180 ~ 5240 5260 ~ 5320 5500 ~ 5720 5745 ~ 5825	33.6	20.00	0.4558	1

CONCLUSION:

WLAN 2.4GHz Band, WLAN 5GHz can transmit simultaneously.

The max Power Density at R (20 cm) = $0.1119\text{mW/cm}^2 + 0.4558\text{mW/cm}^2 = 0.5677\text{mW/cm}^2 < 1\text{mW/cm}^2$.

So the compliance distance is 20 cm for device installed without any other radio equipment.

Appendix A - EUT Photograph

Refer to "2203RSU090-UE" file.

————— The End —————