

RF Exposure Report

Report No.: SA190806E11A

FCC ID: I88EX5510-B0

Test Model: EX5510-B0, PX7511-B0, DX5510-B0

Received Date: Aug. 06, 2019

Test Date: Aug. 26 to 28, 2019

Issued Date: Dec. 19, 2019

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
SA190806E11A	Original release.	Dec. 19, 2019

1 Certificate of Conformity

Product: Dual-Band Wireless AX Gigabit Ethernet Gateway,
Wireless AX 10G PON Gateway with VoIP,
Wireless AX VDSL Bonding Gateway

Brand: ZYXEL

Test Model: EX5510-B0, PX7511-B0, DX5510-B0

Sample Status: ENGINEERING SAMPLE

Applicant: Zyxel Communications Corporation

Test Date: Aug. 26 to 28, 2019

Standards: FCC Part 2 (Section 2.1091)
KDB 447498 D01 General RF Exposure Guidance v06
IEEE C95.1-1992

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 :  , **Date:** Dec. 19, 2019
Claire Kuan / Specialist

Approved by :  , **Date:** Dec. 19, 2019
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

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

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

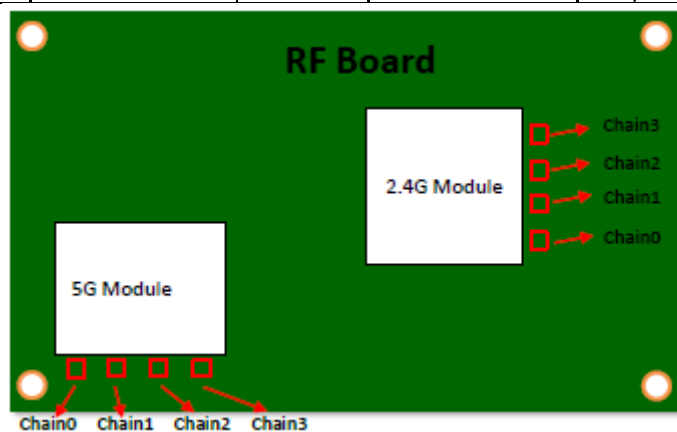
R = distance between observation point and center of the radiator in cm

2.3 Classification

The antenna of this product, under normal use condition, is at least 27cm away from the body of the user.
So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Ant. No.	Chain No.	Brand	Model	Antenna Gain (dBi)	Frequency range (GHz)	Antenna Type	Connector Type	Cable Length (mm)
1	2G Chain 2	Airgain	65-034-000014B	0.12	2.4~2.4835	Dipole	i-pex (MHF)	150
2	2G Chain 3		65-034-000015B	0.12	2.4~2.4835 5.15~5.85 (5G for RX zero wait DFS)	Dipole	i-pex (MHF)	100
3	2G Chain 0		65-034-000016B	0.12	2.4~2.4835	Dipole	i-pex (MHF)	65
4	2G Chain 1		65-034-000017B	0.12	2.4~2.4835	Dipole	i-pex (MHF)	130
5	5G Chain 2	Airgain	65-034-000018B	0	5.15~5.85	Dipole	i-pex (MHF)	195
6	5G Chain 0		65-034-000019B	0	5.15~5.85	Dipole	i-pex (MHF)	150
7	5G Chain 3		65-034-000020B	0	5.15~5.85	Dipole	i-pex (MHF)	250
8	5G Chain 1		65-034-000021B	0	5.15~5.85	Dipole	i-pex (MHF)	230



* Antenna port location

2.5 Calculation Result of Maximum Conducted Power

For 2.4GHz, 5GHz (U-NII-1, U-NII-3) data was copied from the original test report (Report No.: SA190806E11)

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	2437	995.204	6.14	27	0.44666	1
WLAN U-NII-1	5200	975.47	6.02	27	0.42587	1
WLAN U-NII-2A	5290	249.522	6.02	27	0.10894	1
WLAN U-NII-2C	5500	248.699	6.02	27	0.10858	1
WLAN U-NII-3	5785	988.981	6.02	27	0.43177	1

NOTE:

- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
- 2.4GHz: Directional gain = $0.12\text{dBi} + 10\log(4) = 6.14\text{dBi}$
5GHz: Directional gain = $0\text{dBi} + 10\log(4) = 6.02\text{dBi}$

Conclusion:

The formula of calculated the MPE is:

$$\text{CPD1} / \text{LPD1} + \text{CPD2} / \text{LPD2} + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} = 0.44666 / 1 + 0.43177 / 1 = 0.87843$$

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

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