

§ 15.407(f)

Maximum Permissible Exposure

Test Requirement(s):

§15.407(f): U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a “general population/uncontrolled” environment.

RF Exposure Requirements:

§1.1307(b)(1) and §1.1307(b)(2): Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission’s guidelines.

RF Radiation Exposure Limit:

§1.1310: As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit: EUT’s operating frequencies @ UNII-1 5180 – 5240 MHz, UNII-2A 5260 – 5320 MHz, UNII-2C 5500 – 5720 MHz, UNII-3 5745 – 5825 MHz, BLE 2402 – 2480 MHz. **Limit for Uncontrolled exposure: 1 mW/cm² or 10 W/m²**

Equation from page 18 of OET 65, Edition 97-01

$$S = PG / 4\pi R^2 \quad \text{or} \quad R = \sqrt{PG / 4\pi S}$$

where, S = Power Density (mW/cm²)

P = Power Input to antenna (mW)

G = Antenna Gain (numeric value)

R = Distance (cm)

Test Results:

FCC								
Frequency (MHz)	Con. Pwr. (mW)	Ant. Gain (dBi)	Ant. Gain numeric	Pwr. Density (mW/cm ²)	Limit (mW/cm ²)	Margin	Distance (cm)	Result
5160-2401	124.2	29	794.33	0.209	1.0	-0.791	194	Pass
5260-5320	2.4	26	398.11	0.002	1.0	-0.998	194	Pass
5500-5720	2.5	26	398.11	0.002	1.0	-0.998	194	Pass
5735-58401*	139.8	29	794.33	0.235	1.0	-0.765	194	Pass
2402-24801*	5.9	2	1.58	0.00002	1.0	-0.99998	194	Pass
58320-648001*	291742.7	45	31622.8	0.617	1.0	-0.383	194	Pass
*Simultaneous Transmission (Worse case):				0.852	1.0	-0.148	194	Pass

Note 1: Data taken from Bureau Veritas report #: SABFPJ-WTW-P20120227 (attached)

The AF60-XG may have simultaneously transmission of the 15.247 2.4 GHz BLE, and 15.407 UNII-1 UNII-2A, UNII-2C, UNII-3 and 15.255 WiGig bands. UNII-1 UNII-2A, UNII-2C and UNII-3 bands do not transmit simultaneously. Asterisk notes the worst case of the possible simultaneously transmitter combinations.

Simultaneously Transmitters Summed:

+ 0.00002 (2.4 GHz BLE)

+ 0.235 (UNII-3)

+0.617 WiGig

= 0.852

Limit of 1.0 – 0.852 (summed value) = -0.148 Margin

The safe distance for SWX-AF60XG where Power Density is less than the MPE Limit listed above was found to be 194 cm.

RF Exposure Report

Report No.: SABFPJ-WTW-P20120227

FCC ID: SWX-AF60XG

Test Model: AF60-XG

Received Date: Dec. 08, 2020

Test Date: Apr. 12, 2021

Issued Date: May 19, 2021

Applicant: Ubiquiti Inc.

Address: 685 Third Avenue, New York, New York 10017 USA

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,
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**FCC Registration /
Designation Number:** 723255 / TW2022

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specifically mentioned, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.

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Release Control Record

Issue No.	Description	Date Issued
SABFPJ-WTW-P20120227	Original release.	May 19, 2021

1 Certificate of Conformity

Product: airFiber 60 XG

Brand: UBIQUITI

Test Model: AF60-XG

Sample Status: Engineering sample

Applicant: Ubiquiti Inc.

Test Date: Apr. 12, 2021

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.

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Vivian Hunag / Specialist

Approved by : Clark Lin , **Date:** May 19, 2021
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

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

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

2.4 Antenna Gain

Antenna No.	Antenna Net Gain (dBi)	Frequency Range	Antenna Type	Connector Type
WiGig (60GHz)	45	57-71GHz	Dish	None
WLAN(5GHz)	26	5150~5850MHz	Dish	None
BT	2	2.4~2.4835GHz	PIFA	None

* 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

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 5GHz (U-NII-1)	5160-5240	124.186	29.01	194	0.20905	1
WLAN 5GHz (U-NII-3)	5735-5840	139.808	29.01	194	0.23535	1
Bluetooth	2402~2480	5.89	2	194	0.00002	1

Note:

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

Operation Mode	Evaluation Frequency (MHz)	Max EIRP (mW)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
WiGig 60GHz	58320~64800	291742.701	194	0.61686	1	Pass

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

WiGig 60GHz + WLAN 5GHz + Bluetooth = $0.61686 / 1 + 0.23535 / 1 + 0.00002 / 1 = 0.85223$

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

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