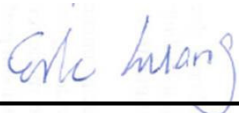


# RF Exposure Evaluation Report

APPLICANT : Ubiquiti Networks, Inc.  
EQUIPMENT : Mesh Points  
BRAND NAME : ULABS  
MODEL NAME : AFi-P-HD  
FCC ID : SWX-AFPHD  
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.



Reviewed by: Eric Huang / Deputy Manager



Approved by: Jones Tsai / Manager



## **SPORTON INTERNATIONAL INC.**

No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)



## **Table of Contents**

|                                                                        |          |
|------------------------------------------------------------------------|----------|
| <b>1. ADMINISTRATION DATA .....</b>                                    | <b>4</b> |
| 1.1. Testing Laboratory .....                                          | 4        |
| <b>2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) .....</b>              | <b>4</b> |
| <b>3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS .....</b> | <b>5</b> |
| <b>4. RF EXPOSURE LIMIT INTRODUCTION .....</b>                         | <b>6</b> |
| <b>5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION .....</b>          | <b>7</b> |
| 5.1. Standalone Power Density Calculation .....                        | 7        |
| 5.2. Collocated Power Density Calculation.....                         | 7        |



**Revision History**

| REPORT NO.  | VERSION | DESCRIPTION             | ISSUED DATE   |
|-------------|---------|-------------------------|---------------|
| FA630314-01 | Rev. 01 | Initial issue of report | Jul. 26, 2016 |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |
|             |         |                         |               |



## **1. Administration Data**

### **1.1. Testing Laboratory**

| Testing Laboratory |                                                                                                                                                  |
|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Site          | SPORTON INTERNATIONAL INC.                                                                                                                       |
| Test Site Location | No.52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Taoyuan City, Taiwan (R.O.C.)<br>TEL: +886-3-327-3456<br>FAX: +886-3-328-4978 |

| Applicant    |                                                               |
|--------------|---------------------------------------------------------------|
| Company Name | Ubiquiti Networks, Inc.                                       |
| Address      | 12F, No.105, Song Ren Rd., SinYi District, Taipei 110, Taiwan |

| Manufacturer |                                                               |
|--------------|---------------------------------------------------------------|
| Company Name | Ubiquiti Networks, Inc.                                       |
| Address      | 12F, No.105, Song Ren Rd., SinYi District, Taipei 110, Taiwan |

## **2. Description of Equipment Under Test (EUT)**

| Product Feature & Specification         |                                                                                                                                                           |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                                | Mesh Points                                                                                                                                               |
| Brand Name                              | ULABS                                                                                                                                                     |
| Model Name                              | AFi-P-HD                                                                                                                                                  |
| FCC ID                                  | SWX-AFPHD                                                                                                                                                 |
| Wireless Technology and Frequency Range | WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz<br>WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz<br>WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz<br>Bluetooth: 2402 MHz ~ 2480 MHz |
| Mode                                    | · 802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80<br>· Bluetooth EDR/LE                                                                                      |
| EUT Stage                               | Identical Prototype                                                                                                                                       |

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

**3. Maximum RF average output power among production units**

| Mode / Band       | Average Power (dBm) |       |       |    |
|-------------------|---------------------|-------|-------|----|
|                   | EDR                 |       |       | LE |
|                   | 1Mbps               | 2Mbps | 3Mbps |    |
| 2.4 GHz Bluetooth | 0                   | 0     | 0     | 0  |

| Band / Frequency (MHz) |      | IEEE 802.11 Average Power (dBm) |      |      |      |
|------------------------|------|---------------------------------|------|------|------|
|                        |      | Ant 1+2+3                       |      |      |      |
|                        |      | 11b                             | 11g  | HT20 | HT40 |
| 2.4GHz Band            | 2412 | 27.0                            | 20.0 | 20.0 |      |
|                        | 2422 |                                 |      |      | 18.0 |
|                        | 2437 | 26.5                            | 20.0 | 20.0 | 22.0 |
|                        | 2452 |                                 |      |      | 16.5 |
|                        | 2462 | 26.5                            | 19.5 | 20.0 |      |

| Band / Frequency (MHz) |      | IEEE 802.11 Average Power (dBm) |      |      |       |       |       |
|------------------------|------|---------------------------------|------|------|-------|-------|-------|
|                        |      | Ant 1+2+3                       |      |      |       |       |       |
|                        |      | 11a                             | HT20 | HT40 | VHT20 | VHT40 | VHT80 |
| 5.2GHz Band            | 5180 | 24.0                            | 23.0 |      | 23.0  |       |       |
|                        | 5190 |                                 |      | 17.5 |       | 17.5  |       |
|                        | 5200 |                                 |      |      | 25.0  |       |       |
|                        | 5210 |                                 |      |      |       |       | 13.5  |
|                        | 5220 | 24.5                            | 25.0 |      |       |       |       |
|                        | 5230 |                                 |      | 26.0 |       | 26.0  |       |
|                        | 5240 | 25.0                            | 25.0 |      | 25.0  |       |       |
| 5.8GHz Band            | 5745 | 23.5                            | 20.5 |      | 20.5  |       |       |
|                        | 5755 |                                 |      | 22.0 |       | 22.0  |       |
|                        | 5775 |                                 |      |      |       |       | 20.5  |
|                        | 5785 | 21.0                            | 20.0 |      | 20.0  |       |       |
|                        | 5795 |                                 |      | 22.5 |       | 22.5  |       |
|                        | 5825 | 23.0                            | 22.5 |      | 22.5  |       |       |

**Note :** The Max Average Power for WLAN 2.4GHz/5GHz within the table are for MIMO mode.



#### **4. RF Exposure Limit Introduction**

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

| Frequency range (MHz)                                          | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposures</b>        |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *(100)                              | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *(900/f <sup>2</sup> )              | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1500                                                       |                               |                               | f/300                               | 6                        |
| 1500-100,000                                                   |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *(100)                              | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *(180/f <sup>2</sup> )              | 30                       |
| 30-300                                                         | 27.5                          | 0.073                         | 0.2                                 | 30                       |
| 300-1500                                                       |                               |                               | f/1500                              | 30                       |
| 1500-100,000                                                   |                               |                               | 1.0                                 | 30                       |

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



## **5. Radio Frequency Radiation Exposure Evaluation**

### **5.1. Standalone Power Density Calculation**

| Band        | Frequency (MHz) | Antenna Gain (dBi) | Maximum Power (dBm) | Maximum EIRP (dBm) | Maximum EIRP (W) | Average EIRP (mW) | Power Density at 20cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Power Density / Limit |
|-------------|-----------------|--------------------|---------------------|--------------------|------------------|-------------------|---------------------------------------------|-----------------------------|-----------------------|
| Bluetooth   | 2402.0          | 1.00               | 0.00                | 1.000              | 0.001            | 1.259             | 0.0003                                      | 1.000                       | 0.0003                |
| 2.4GHz WLAN | 2412.0          | 5.00               | 27.00               | 32.000             | 1.585            | 1584.893          | 0.315                                       | 1.000                       | 0.315                 |
| 5GHz WLAN   | 5230.0          | 5.00               | 26.00               | 31.000             | 1.259            | 1258.925          | 0.251                                       | 1.000                       | 0.251                 |

### **5.2. Collocated Power Density Calculation**

| WLAN Power Density / Limit | Bluetooth Power Density / Limit | $\Sigma$ (Power Density / Limit) of WLAN+Bluetooth |
|----------------------------|---------------------------------|----------------------------------------------------|
| 0.315                      | 0.0003                          | 0.3153                                             |

**Note:**

1.  $\Sigma$ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN + Bluetooth.
2. Considering the WLAN module collocation with the Bluetooth transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant

## **Conclusion:**

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.