

## RF Exposure Report

**Report No.:** SA170912E01A

**FCC ID:** 2AHBN-AP61

**Test Model:** AP61E

**Series Model:** AP61

**Received Date:** Sep. 14, 2017

**Test Date:** Oct. 11 to 24, 2017

**Issued Date:** Nov. 16, 2017

**Applicant:** Mist Systems, Inc.

**Address:** 1601 South De Anza Blvd. Suite 248 Cupertino California United States  
95014

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch  
Hsin Chu Laboratory

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### Release Control Record

| Issue No.    | Description       | Date Issued   |
|--------------|-------------------|---------------|
| SA170912E01A | Original release. | Nov. 16, 2017 |

## 1 Certificate of Conformity

**Product:** Premium Outdoor Wi-Fi & BLE Array AP

**Brand:** Mist

**Test Model:** AP61E

**Series Model:** AP61

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Mist Systems, Inc.

**Test Date:** Oct. 11 to 24, 2017

**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 :**

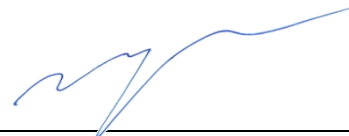


**Date:**

Nov. 16, 2017

Wendy Wu / Specialist

**Approved by :**



**Date:**

Nov. 16, 2017

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 <sup>2</sup> ) | 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 <sup>2</sup> )*              | 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/cm<sup>2</sup>

$P_{out}$  = 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 32cm away from the body of the user.  
So, this device is classified as **Mobile Device**.

## 2.4 Antenna Gain

**For Model No.: AP61**

### Radio 1- WLAN - 2.4GHz + 5GHz (Internal antenna)

| Antenna Set | Transmitter Circuit | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type | Connector Type |
|-------------|---------------------|------------------------|-----------------------|--------------|----------------|
| 1           | Chain (0)           | 3.87                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             |                     | 4.94                   | 5.15~5.25             |              |                |
|             |                     | 4.66                   | 5.25~5.35             |              |                |
|             |                     | 4.25                   | 5.47~5.725            |              |                |
|             |                     | 4.42                   | 5.725~5.85            |              |                |
|             | Chain (1)           | 3.91                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             |                     | 4.23                   | 5.15~5.25             |              |                |
|             |                     | 4.54                   | 5.25~5.35             |              |                |
|             |                     | 4.66                   | 5.47~5.725            |              |                |
|             |                     | 4.70                   | 5.725~5.85            |              |                |
|             | Chain (2)           | 3.93                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             |                     | 4.53                   | 5.15~5.25             |              |                |
|             |                     | 4.86                   | 5.25~5.35             |              |                |
|             |                     | 4.95                   | 5.47~5.725            |              |                |
|             |                     | 4.94                   | 5.725~5.85            |              |                |
|             | Chain (3)           | 3.81                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             |                     | 4.50                   | 5.15~5.25             |              |                |
|             |                     | 4.92                   | 5.25~5.35             |              |                |
|             |                     | 4.71                   | 5.47~5.725            |              |                |
|             |                     | 4.90                   | 5.725~5.85            |              |                |

### Radio 2- WLAN RX only - 2.4GHz + 5GHz (Scanning radio antenna)

| Antenna No. | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type | Connector Type |
|-------------|------------------------|-----------------------|--------------|----------------|
| 1           | 3.85                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             | 4.61                   | 5.15~5.25             |              |                |
|             | 4.71                   | 5.25~5.35             |              |                |
|             | 4.72                   | 5.47~5.725            |              |                |
|             | 4.73                   | 5.725~5.85            |              |                |

### Radio 3 - Bluetooth

| Antenna No. | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type | Connector Type |
|-------------|------------------------|-----------------------|--------------|----------------|
| 1           | 3.56                   | 2.4~2.4835            | Omni         | i-pex(MHF)     |
| 2           | 5.01                   | 2.4~2.4835            | Patch        | i-pex(MHF)     |

**For Model No.: AP61E**
**Radio 1 - WLAN - 2.4GHz + 5GHz (External antenna)**

| Antenna Set | Transmitter Circuit | Brand | Model          | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type    | Connector Type |
|-------------|---------------------|-------|----------------|------------------------|-----------------------|-----------------|----------------|
| 1           | Chain (0)           | PCTEL | FPMI2458-DP4NM | 6                      | 2.4~2.4835            | Sector          | N-Type         |
|             |                     |       |                | 5                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 5                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 5                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 5                      | 5.725~5.85            |                 |                |
|             | Chain (1)           | PCTEL | FPMI2458-DP4NM | 6                      | 2.4~2.4835            | Sector          | N-Type         |
|             |                     |       |                | 5                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 5                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 5                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 5                      | 5.725~5.85            |                 |                |
|             | Chain (2)           | PCTEL | FPMI2458-DP4NM | 6                      | 2.4~2.4835            | Sector          | N-Type         |
|             |                     |       |                | 5                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 5                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 5                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 5                      | 5.725~5.85            |                 |                |
|             | Chain (3)           | PCTEL | FPMI2458-DP4NM | 6                      | 2.4~2.4835            | Sector          | N-Type         |
|             |                     |       |                | 5                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 5                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 5                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 5                      | 5.725~5.85            |                 |                |
| Antenna Set | Transmitter Circuit | Brand | Model          | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type    | Connector Type |
| 2           | Chain (0)           | PCTEL | MPMI2458-4-NM  | 4                      | 2.4~2.4835            | Omnidirectional | N-Type         |
|             |                     |       |                | 4                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 4                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 4                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 4                      | 5.725~5.85            |                 |                |
|             | Chain (1)           | PCTEL | MPMI2458-4-NM  | 4                      | 2.4~2.4835            | Omnidirectional | N-Type         |
|             |                     |       |                | 4                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 4                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 4                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 4                      | 5.725~5.85            |                 |                |
|             | Chain (2)           | PCTEL | MPMI2458-4-NM  | 4                      | 2.4~2.4835            | Omnidirectional | N-Type         |
|             |                     |       |                | 4                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 4                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 4                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 4                      | 5.725~5.85            |                 |                |
|             | Chain (3)           | PCTEL | MPMI2458-4-NM  | 4                      | 2.4~2.4835            | Omnidirectional | N-Type         |
|             |                     |       |                | 4                      | 5.15~5.25             |                 |                |
|             |                     |       |                | 4                      | 5.25~5.35             |                 |                |
|             |                     |       |                | 4                      | 5.47~5.725            |                 |                |
|             |                     |       |                | 4                      | 5.725~5.85            |                 |                |

**Radio 2 - WLAN RX only - 2.4GHz + 5GHz (Scanning radio antenna)**

| Antenna No. | Transmitter Circuit | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type | Connector Type |
|-------------|---------------------|------------------------|-----------------------|--------------|----------------|
| 1           | Chain (0)           | 3.85                   | 2.4~2.4835            | PIFA         | i-pex(MHF)     |
|             |                     | 4.61                   | 5.15~5.25             |              |                |
|             |                     | 4.71                   | 5.25~5.35             |              |                |
|             |                     | 4.72                   | 5.47~5.725            |              |                |
|             |                     | 4.73                   | 5.725~5.85            |              |                |

**Radio 3 - Bluetooth**

| Antenna No. | Transmitter Circuit | Antenna Net Gain (dBi) | Frequency Range (GHz) | Antenna Type | Connector Type |
|-------------|---------------------|------------------------|-----------------------|--------------|----------------|
| 1           | Chain (0)           | 3.56                   | 2.4~2.4835            | Omni         | i-pex(MHF)     |
| 2           | Chain (1)           | 5.01                   | 2.4~2.4835            | Patch        | i-pex(MHF)     |

Note:

1. Max. gain was selected for Antenna Port Conducted Measurement test.
2. For antennas of radio 2 & 3, Model No.: AP61 is as same as AP61E.

## 2.5 Calculation Result of Maximum Conducted Power

For WLAN (with Internal antenna) and Bluetooth data was copied from the original test report (Report No.: SA170912E01)

### For WLAN (with Internal antenna):

| Frequency Band (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462            | 631.677        | 9.90               | 32            | 0.047972                            | 1                           |
| 5180-5240 (1TX)      | 40.272         | 4.94               | 32            | 0.00976                             | 1                           |
| 5180-5240 (4TX)      | 39.684         | 9.90               | 32            | 0.03516                             | 1                           |
| 5745-5825            | 957.748        | 10.76              | 32            | 0.88663                             | 1                           |

NOTE:

2.4GHz: Directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4] = 9.90\text{dBi}$

5.GHz:

UNII-3: Directional gain =  $10 \log[(10^{G0/20} + 10^{G1/20})^2 + 10^{G2/20} + 10^{G3/20})^2 / 4] = 10.76\text{dBi}$

### For WLAN (with External antenna):

| Frequency Band (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2412-2462            | 564.245        | 12.02              | 32            | 0.69816                             | 1                           |
| 5180-5240 (4TX)      | 39.684         | 11.02              | 32            | 0.03900                             | 1                           |
| 5745-5825 (4TX)      | 864.747        | 11.02              | 32            | 0.84992                             | 1                           |

NOTE:

2.4GHz: Directional gain =  $6\text{dBi} + 10\log(4) = 12.02\text{dBi}$

5GHz: Directional gain =  $5\text{dBi} + 10\log(4) = 11.02\text{dBi}$

### For BT-EDR:

| Frequency Band (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2402-2480            | 10.375         | 5.01               | 32            | 0.00256                             | 1                           |

### For BT-LE:

| Frequency Band (MHz) | Max Power (mW) | Antenna Gain (dBi) | Distance (cm) | Power Density (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) |
|----------------------|----------------|--------------------|---------------|-------------------------------------|-----------------------------|
| 2402-2480            | 6.622          | 5.01               | 32            | 0.00163                             | 1                           |

**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

**For Model No.: AP61**

WLAN 2.4GHz + Bluetooth =  $0.47972 / 1 + 0.00256 / 1 = 0.48228$

WLAN 5GHz + Bluetooth =  $0.88663 / 1 + 0.00256 / 1 = 0.88919$

**For Model No.: AP61E**

WLAN 2.4GHz + Bluetooth =  $0.69816 / 1 + 0.00256 / 1 = 0.70072$

WLAN 5GHz + Bluetooth =  $0.84992 / 1 + 0.00256 / 1 = 0.85248$

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

--- END ---