

RF Exposure Report

Report No.: SA151230E03G

FCC ID: 2AHBN-AP41

Test Model: AP41

Series Model: AP41E

Received Date: Oct. 24, 2016

Test Date: Oct. 26 ~ Nov. 16, 2016

Issued Date: Nov. 16, 2016

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

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City
33383, TAIWAN (R.O.C.)



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Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 RF Exposure	5
2.1 Limits for Maximum Permissible Exposure (MPE).....	5
2.2 MPE Calculation Formula	5
2.3 Classification	5
3 Calculation Result of Maximum Conducted Power	6

Release Control Record

Issue No.	Description	Date Issued
SA151230E03G	Original release.	Nov. 16, 2016

1 Certificate of Conformity

Product: Premium Wi-Fi & BLE Array AP

Brand: Mist

Test Model: AP41

Series Model: AP41E

Sample Status: Engineering sample

Applicant: Mist Systems, Inc.

Test Date: Oct. 26 ~ Nov. 16, 2016

Standards: FCC Part 2 (Section 2.1091)
KDB 447498 D01 (October 23, 2015)
IEEE C95.1

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, 2016
Pettie Chen / Senior Specialist

Approved by :  , **Date:** Nov. 16, 2016
Ken Liu / Senior 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				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

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 35cm away from the body of the user. So, this device is classified as **Mobile Device**.

3 Calculation Result of Maximum Conducted Power

Frequency Band (MHz)	TX Function	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1						
EUT with internal antenna						
2412-2462	1TX	22.65	3.06	35	0.024	1
	2TX	25.45	6.37	35	0.099	1
	3TX	27.07	8.13	35	0.215	1
	4TX	28.38	9.43	35	0.392	1
5180-5240	1TX	25.14	3.85	35	0.051	1
	2TX	27.26	7.19	35	0.181	1
	3TX	26.27	8.73	35	0.205	1
	4TX	25.84	9.96	35	0.247	1
5260-5320	1TX	23.43	3.97	35	0.036	1
	2TX	21.51	7.10	35	0.047	1
	3TX	19.03	8.85	35	0.040	1
	4TX	17.95	10.02	35	0.041	1
5500-5700	1TX	23.77	4.21	35	0.041	1
	2TX	21.70	6.76	35	0.046	1
	3TX	19.40	8.65	35	0.041	1
	4TX	18.01	9.94	35	0.041	1
5745-5825	1TX	23.56	4.18	35	0.039	1
	2TX	26.55	7.10	35	0.151	1
	3TX	28.35	8.94	35	0.348	1
	4TX	29.62	10.19	35	0.622	1

Frequency Band (MHz)	TX Function	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 1						
EUT with external antenna						
2412-2462	1TX	22.65	4	35	0.030	1
	2TX	25.45	7.01	35	0.114	1
	3TX	27.07	8.77	35	0.249	1
	4TX	28.38	10.02	35	0.449	1
5180-5240	1TX	25.14	6	35	0.084	1
	2TX	27.26	9.01	35	0.275	1
	3TX	26.27	10.77	35	0.329	1
	4TX	25.84	12.02	35	0.397	1
5260-5320	1TX	23.43	6	35	0.057	1
	2TX	21.51	9.01	35	0.073	1
	3TX	19.03	10.77	35	0.062	1
	4TX	17.95	12.02	35	0.065	1
5500-5700	1TX	23.77	6	35	0.062	1
	2TX	21.70	9.01	35	0.076	1
	3TX	19.40	10.77	35	0.068	1
	4TX	18.01	12.02	35	0.065	1
5745-5825	1TX	23.56	6	35	0.059	1
	2TX	26.55	9.01	35	0.234	1
	3TX	28.35	10.77	35	0.530	1
	4TX	29.62	12.02	35	0.948	1

Frequency Band (MHz)	TX Function	Max Power (dBm)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Radio 3						
BT EDR	-	10.90	11.05	35	0.010	1
BT LE	-	6.13	11.05	35	0.003	1

Note:

WLAN:

EUT with internal antenna

2412-2462MHz:

$$2\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 6.37\text{dBi}$$

$$3\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 8.13\text{dBi}$$

$$4\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 9.43\text{dBi}$$

5180-5240MHz:

$$2\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 7.19\text{dBi}$$

$$3\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 8.73\text{dBi}$$

$$4\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 9.96\text{dBi}$$

5260-5320MHz:

$$2\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 7.10\text{dBi}$$

$$3\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 8.85\text{dBi}$$

$$4\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 10.02\text{dBi}$$

5500-5700MHz:

$$2\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 6.76\text{dBi}$$

$$3\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 8.65\text{dBi}$$

$$4\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 9.94\text{dBi}$$

5745-5825MHz:

$$2\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 7.10\text{dBi}$$

$$3\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 8.94\text{dBi}$$

$$4\text{TX: Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2/N] = 10.19\text{dBi}$$

EUT with external antenna

2412-2462MHz:

$$2\text{TX: Directional gain} = 4 \text{ dBi} + 10 \log(2) = 7.01\text{dBi}$$

$$3\text{TX: Directional gain} = 4 \text{ dBi} + 10 \log(3) = 8.77\text{dBi}$$

$$4\text{TX: Directional gain} = 4 \text{ dBi} + 10 \log(4) = 10.02\text{dBi}$$

5GHz Band:

$$2\text{TX: Directional gain} = 6 \text{ dBi} + 10 \log(2) = 9.01\text{dBi}$$

$$3\text{TX: Directional gain} = 6 \text{ dBi} + 10 \log(3) = 10.77\text{dBi}$$

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

$$\text{BT EDR/BT LE: Directional gain} = 5.03\text{dBi} + 10\log(4) = 11.05\text{dBi}$$

	MAX POWER (dBm)		TOTAL POWER (dBm)	POWER LIMIT (dBm)
	Radio 1: WLAN	Radio 3: BT		
2.4GHz	28.38	10.90	28.46	30

CONCLUSION:

2.4G & 5G & BT cannot transmit simultaneously.

The simultaneous operation mode was determined by client as below:

1. Radio 1: 2.4G + Radio 3: BT
2. Radio 1: 5G + Radio 3: BT

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

Radio 1: 2.4G + Radio 3: BT = $0.449 + 0.010 = 0.459$

Radio 1: 5G + Radio 3: BT = $0.948 + 0.010 = 0.958$

Therefore, the maximum calculation of this situation is 0.958, which is less than the "1" limit.

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