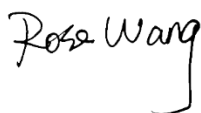


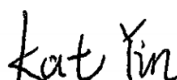
RF Exposure Evaluation Report

APPLICANT : Aerohive networks Inc
EQUIPMENT : wireless access point
BRAND NAME : Aerohive
MODEL NAME : AP650X
FCC ID : WBV-AP650X
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

We, Sporton International (Kunshan) Inc., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International (Kunshan) Inc., the test report shall not be reproduced except in full.



Reviewed by: Rose Wang / Supervisor



Approved by: Kat Yin / Manager



Sporton International (Kunshan) Inc.

No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China



Table of Contents

1. ADMINISTRATION DATA	4
1.1. Testing Laboratory	4
2. DESCRIPTION OF EQUIPMENT UNDER TEST (EUT)	5
3. MAXIMUM RF AVERAGE OUTPUT POWER AMONG PRODUCTION UNITS.....	6
4. RF EXPOSURE LIMIT INTRODUCTION	11
5. RADIO FREQUENCY RADIATION EXPOSURE EVALUATION.....	12
5.1. Standalone Power Density Calculation	12
5.2. Collocated Power Density Calculation.....	13

**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA921502	Rev. 01	Initial issue of report	Aug. 08, 2019

**1. Administration Data****1.1. Testing Laboratory**

Sporton International (Kunshan) Inc. is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory		
Test Firm	Sporton International (Kunshan) Inc.	
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158 FAX : +86-512-57900958	
Test Site No.	FCC Designation No.	FCC Test Firm Registration No.
	CN1257	314309

Applicant	
Company Name	Aerohive networks Inc
Address	1011 McCarthy Boulevard Milpitas, CA 95035 United States

2. Description of Equipment Under Test (EUT)

Product Feature & Specification					
EUT Type	wireless access point				
Brand Name	Aerohive				
Model Name	AP650X				
FCC ID	WBV-AP650X				
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5150 MHz ~ 5250 MHz WLAN 5.3GHz Band: 5250 MHz ~ 5350 MHz WLAN 5.5GHz Band: 5470 MHz ~ 5730 MHz WLAN 5.8GHz Band: 5725 MHz ~ 5850 MHz Bluetooth: 2402 MHz ~ 2480 MHz				
Mode	WLAN 2.4GHz 802.11b/g/n HT20 WLAN 2.4GHz 802.11ac VHT20 WLAN 2.4GHz 802.11ax HE20 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80 WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160 Bluetooth LE				
Antenna Function for Transmitter		Ant. 1	Ant. 2	Ant. 3	Ant. 4
	Bluetooth	V	-	-	-
	WLAN 2.4GHz 802.11 b/g/n/ac/ax SISO/MIMO	V	V	V	V
	WLAN 5GHz 802.11 a/n/ac/ax SISO/MIMO	V	V	V	V
HW Version	1				
SW Version	10.0				
EUT Stage	Production Unit				
Remark:					
1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.					
2. The device contains two 5GHz modules, and called ETH6 and ETH 7, ETH 6 can work separately and ETH7 can only transmit with ETH6 which at 5150~5350MHz and eth6 work at 5470~5850MHz. So ETH6 evaluate all the frequency bands and eth7 only test 5150~5350MHz.					
3. ETH7 also supports WLAN2.4GHz.					

ANTENNA	BLUETOOTH	WLAN2.4GHz	WLAN5GHz
Bluetooth ANT.1	4.20dBi	6.00 dBi	5.00 dBi
WLAN ANT.1		6.00 dBi	5.00 dBi
WLAN ANT.2		6.00 dBi	5.00 dBi
WLAN ANT.3		6.00 dBi	5.00 dBi
WLAN ANT.4		6.00 dBi	5.00 dBi

**3. Maximum RF average output power among production units****<WLAN 2.4GHz>**

Model Name	Mode	Maximum Average Power (dBm)	
		SISO	4x4 MIMO
ETH7	802.11b	20.5	26.5
	802.11g	13.5	19.5
	802.11n-HT20	13.5	19.5
	802.11ac-VHT20	13.5	19.5
	802.11ax-HE20	13.5	19.5

Note: WLAN2.4GHz has no beamforming mode.

<Bluetooth>

Mode	Maximum Average Power (dBm)
Bluetooth	5.5

**<WLAN 5GHz SISO and 4x4 MIMO with CDD Mode>**

Model Name		Mode	Maximum Average Power (dBm)	
			SISO	4x4 MIMO
ETH6	WLAN 5.2GHz	802.11a	19.0	21.5
		802.11n-HT20	19.0	21.0
		802.11n-HT40	17.5	19.0
		802.11ac-VHT20	19.0	21.0
		802.11ac-VHT40	17.0	19.0
		802.11ac-VHT80	14.5	17.5
		802.11ax-HE20	18.5	21.0
		802.11ax-HE40	16.5	19.0
		802.11ax-HE80	17.5	17.5
		802.11ax-HE160	14.5	17.5
	WLAN 5.3GHz	802.11a	18.0	20.0
		802.11n-HT20	18.0	20.5
		802.11n-HT40	15.5	19.0
		802.11ac-VHT20	18.0	20.0
		802.11ac-VHT40	16.0	19.0
		802.11ac-VHT80	16.0	17.5
		802.11ax-HE20	17.5	20.5
		802.11ax-HE40	15.5	18.5
		802.11ax-HE80	16.0	17.0
	WLAN 5.5GHz	802.11a	18.0	20.0
		802.11n-HT20	18.0	20.5
		802.11n-HT40	16.0	20.0
		802.11ac-VHT20	18.0	20.0
		802.11ac-VHT40	18.0	20.0
		802.11ac-VHT80	15.0	17.5
		802.11ax-HE20	18.0	20.0
		802.11ax-HE40	18.0	20.0
		802.11ax-HE80	15.0	17.5
		802.11ax-HE160	14.5	17.0
	WLAN 5.8GHz	802.11a	20.5	25.0
		802.11n-HT20	21.0	24.5
		802.11n-HT40	18.5	26.0
		802.11ac-VHT20	20.5	24.5
		802.11ac-VHT40	16.0	25.5
		802.11ac-VHT80	20.0	21.0
		802.11ax-HE20	21.0	24.5
		802.11ax-HE40	21.0	25.5
		802.11ax-HE80	19.0	21.0



Model Name		Mode	Maximum Average Power (dBm)	
			SISO	4x4 MIMO
ETH7	WLAN 5.2GHz	802.11a	18.0	21.0
		802.11n-HT20	18.0	21.0
		802.11n-HT40	17.0	18.5
		802.11ac-VHT20	18.0	20.5
		802.11ac-VHT40	16.5	18.5
		802.11ac-VHT80	15.0	17.0
		802.11ax-HE20	18.0	20.0
		802.11ax-HE40	16.5	18.0
		802.11ax-HE80	15.5	17.5
		802.11ax-HE160	14.5	17.5
	WLAN 5.3GHz	802.11a	18.0	19.5
		802.11n-HT20	18.0	19.5
		802.11n-HT40	16.0	18.0
		802.11ac-VHT20	18.0	20.0
		802.11ac-VHT40	15.5	18.5
		802.11ac-VHT80	13.0	17.5
		802.11ax-HE20	17.5	19.5
		802.11ax-HE40	15.0	18.0
		802.11ax-HE80	13.0	17.0

**<<WLAN 5GHz 4x4 MIMO with Beamforming Mode>**

Model Name		Mode	Maximum Average Power (dBm)
ETH6	WLAN 5.2GHz	802.11n-HT20	20.5
		802.11n-HT40	23.5
		802.11ac-VHT20	20.0
		802.11ac-VHT40	18.0
		802.11ac-VHT80	17.0
		802.11ax-HE20	20.5
		802.11ax-HE40	18.5
		802.11ax-HE80	17.0
		802.11ax-HE160	14.0
	WLAN 5.3GHz	802.11n-HT20	14.5
		802.11n-HT40	15.0
		802.11ac-VHT20	14.5
		802.11ac-VHT40	14.5
		802.11ac-VHT80	13.5
		802.11ax-HE20	15.0
		802.11ax-HE40	14.5
		802.11ax-HE80	13.5
	WLAN 5.5GHz	802.11n-HT20	14.5
		802.11n-HT40	15.5
		802.11ac-VHT20	14.5
		802.11ac-VHT40	15.0
		802.11ac-VHT80	13.5
		802.11ax-HE20	15.0
		802.11ax-HE40	14.0
		802.11ax-HE80	14.5
		802.11ax-HE160	13.5
	WLAN 5.8GHz	802.11n-HT20	23.0
		802.11n-HT40	23.0
		802.11ac-VHT20	23.0
		802.11ac-VHT40	22.5
		802.11ac-VHT80	20.0
		802.11ax-HE20	23.5
		802.11ax-HE40	23.0
		802.11ax-HE80	20.0



Model Name		Mode	Maximum Average Power (dBm)
ETH7	WLAN 5.2GHz	802.11n-HT20	19.0
		802.11n-HT40	17.5
		802.11ac-VHT20	19.5
		802.11ac-VHT40	17.5
		802.11ac-VHT80	15.5
		802.11ax-HE20	19.5
		802.11ax-HE40	17.5
		802.11ax-HE80	14.5
		802.11ax-HE160	14.0
	WLAN 5.3GHz	802.11n-HT20	14.5
		802.11n-HT40	14.5
		802.11ac-VHT20	14.5
		802.11ac-VHT40	15.0
		802.11ac-VHT80	14.5
		802.11ax-HE20	14.5
		802.11ax-HE40	14.0
		802.11ax-HE80	14.0



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 ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) 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

The MPE was calculated at 24.5 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

Model Name	Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 24.5cm (mW/mW ²)	Limit (mW/mW ²)	Power Density / Limit
ETH6	WLAN 5.2GHz	5180.0	5.0	21.50	26.500	0.447	446.684	0.059	1.000	0.059
	WLAN 5.3GHz	5260.0	5.0	20.50	25.500	0.355	354.813	0.047	1.000	0.047
	WLAN 5.5GHz	5500.0	5.0	20.50	25.500	0.355	354.813	0.047	1.000	0.047
	WLAN 5.8GHz	5745.0	5.0	26.00	31.000	1.259	1258.925	0.167	1.000	0.167
ETH7	WLAN 2.4GHz	2412.0	6.0	26.50	32.500	1.778	1778.279	0.236	1.000	0.236
	WLAN 5.2GHz	5180.0	5.0	21.00	26.000	0.398	398.107	0.053	1.000	0.053
	WLAN 5.3GHz	5260.0	5.0	20.00	25.000	0.316	316.228	0.042	1.000	0.042
-	Bluetooth	2402.0	4.2	5.50	9.700	0.009	9.333	0.001	1.000	0.001

<For Beamforming mode>

Model Name	Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 24.5cm (mW/mW ²)	Limit (mW/mW ²)	Power Density / Limit
ETH6	WLAN 5.2GHz	5180.0	8.0	23.50	31.500	1.413	1412.538	0.187	1.000	0.187
	WLAN 5.3GHz	5260.0	8.0	15.00	23.000	0.200	199.526	0.026	1.000	0.026
	WLAN 5.5GHz	5500.0	8.0	15.50	23.500	0.224	223.872	0.030	1.000	0.030
	WLAN 5.8GHz	5745.0	8.0	23.50	31.500	1.413	1412.538	0.187	1.000	0.187
ETH7	WLAN 5.2GHz	5180.0	8.0	19.50	27.500	0.562	562.341	0.075	1.000	0.075
	WLAN 5.3GHz	5260.0	8.0	15.00	23.000	0.200	199.526	0.026	1.000	0.026

Note:

- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
- This device support beamforming for WLAN 5GHz 802.11n/ac HT20/HT40/VHT20/VHT40/VHT80 and WLAN 5GHz 802.11ax HE20/HE40/HE80/HE160.
- In the above table have assessed WLAN 2.4GHz and WLAN 5GHz by referring to their maximum direction gain and maximum output power.
- WLAN2.4GHz has no beamforming mode.
- This device supports cross-polarization Antenna for WLAN5GHz. So for 4X4 MIMO antenna the beamforming gain is per chain gain +10g2=5+3.0=8.0dBi.
- For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band
- Chose the maximum power to do MPE analysis.
- The 2*2 and 3*3 power setting are same with 1*1 and 4*4, so we only test 1*1 and 4*4 for compliances.

**5.2. Collocated Power Density Calculation**

WLAN 2.4GHz Power Density / Limit	WLAN 5GHz- ETH6 Power Density / Limit	WLAN 5GHz- ETH7 Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN2.4GHz +WLAN5GHz+Bluetooth
0.236	0.187	0.075	0.001	0.499

Note:

1. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz + WLAN 5GHz + Bluetooth.
2. The device contains two 5GHz modules, and called ETH6 and ETH 7, ETH 6 can work separately and ETH7 can only transmit with ETH6 which at 5150~5350MHz and ETH6 work at 5470~5850MHz. so WLAN 5G transmit simultaneously have evaluated for ETH6 and ETH 7.
3. Considering the WLAN 2.4GHz/5GHz 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 3 collocated transmitters is compliant.

Conclusion:

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