



RF EXPOSURE EVALUATION REPORT

FCC ID : 2AG7G-A2A
Equipment : Plume Pod
Brand Name : Plume Design Inc
Model Name : A2A
Applicant : Plume Design Inc
290 South California Ave, Suite 200,
Palo Alto, CA 94306, USA
Manufacturer : Plume Design Inc
290 South California Ave, Suite 200,
Palo Alto, CA 94306, USA
Standard : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL INC has been evaluated in accordance with 47 CFR Part 2.1091 for the device and pass the limit.

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Approved by: Cona Huang / Deputy Manager

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History of this test report

Report No.	Version	Description	Issued Date
FA860135	Rev. 01	Initial issue of report	Nov. 01, 2018

1. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Plume Pod
Brand Name	Plume Design Inc
Model Name	A2A
FCC ID	2AG7G-A2A
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz Bluetooth: 2402 MHz ~ 2480 MHz
Mode	802.11a/b/g/n/ac HT20/HT40/VHT20/VHT40/VHT80 Bluetooth LE
EUT Stage	Production Unit

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

Reviewed by: Jason Wang

Report Producer: Wan Liu

2. Maximum RF average output power among production units

<Non-beamforming mode>

Band / Mode	Average Power (dBm)
	LE
	GFSK
Bluetooth	-1

2.4GHz WLAN	Mode	Channel	Frequency (MHz)	SISO ANT 1 Tune-Up Limit (dBm)	MIMO Tune-Up Limit (dBm)
	802.11b	1	2412	20.50	21.50
		6	2437	20.50	24.00
		11	2462	20.50	23.00
	802.11g	1	2412	14.50	18.00
		2	2417	18.00	19.00
		6	2437	20.50	23.00
		10	2457	19.00	19.00
		11	2462	15.50	19.00
	802.11n-HT20	1	2412	14.00	17.00
		2	2417	18.00	19.50
		6	2437	21.00	22.50
		10	2457	18.00	18.50
		11	2462	15.00	18.50
	802.11n-HT40	3	2422	12.50	15.50
		4	2427	14.50	15.50
		6	2437	16.00	18.50
		9	2452	13.00	15.50

5.2GHz WLAN	Mode	Channel	Frequency (MHz)	SISO ANT 1 Tune-Up Limit (dBm)	MIMO Tune-Up Limit (dBm)
	802.11a	36	5180	18.00	20.00
		40	5200	17.00	20.00
		44	5220	17.00	20.00
		48	5240	18.00	20.00
	802.11n-HT20	36	5180	18.00	20.00
		40	5200	17.00	20.00
		44	5220	20.00	20.00
		48	5240	19.00	20.00
	802.11n-HT40	38	5190	16.00	20.00
		46	5230	21.50	23.00
	802.11ac-VHT20	36	5180	18.00	20.00
		40	5200	17.00	20.00
		44	5220	20.00	20.00
		48	5240	19.00	20.00
	802.11ac-VHT40	38	5190	16.00	18.00
		46	5230	21.50	23.00
	802.11ac-VHT80	42	5210	15.00	17.00

5.8GHz WLAN	Mode	Channel	Frequency (MHz)	SISO ANT 1 Tune-Up Limit (dBm)	MIMO Tune-Up Limit (dBm)
	802.11a	149	5745	13.00	14.00
		157	5785	13.00	14.00
		165	5825	13.00	14.00
	802.11n-HT20	149	5745	13.50	15.00
		157	5785	13.50	16.00
		165	5825	14.50	15.00
	802.11n-HT40	151	5755	15.50	16.00
		159	5795	17.00	16.00
	802.11ac-VHT20	149	5745	13.50	15.00
		157	5785	13.50	16.00
		165	5825	14.50	15.00
	802.11ac-VHT40	151	5755	15.50	16.00
		159	5795	17.00	16.00
	802.11ac-VHT80	155	5775	19.00	21.50

<Beamforming mode>

5.2GHz WLAN	Mode	Channel	MIMO Tune-Up Limit (dBm)
	802.11a	36	14.00
		40	14.00
		44	14.00
		48	14.00
	802.11n-HT20	36	15.50
		40	15.50
		44	15.50
		48	15.50
	802.11n-HT40	38	15.50
		46	15.50
	802.11ac-VHT20	36	15.50
		40	15.50
		44	15.50
		48	15.50
	802.11ac-VHT40	38	15.50
		46	15.50
	802.11ac-VHT80	42	15.50

5.8GHz WLAN	Mode	Channel	MIMO Tune-Up Limit (dBm)
	802.11a	149	14.00
		157	13.00
		165	14.00
	802.11n-HT20	149	14.00
		157	14.00
		165	14.00
	802.11n-HT40	151	17.00
		159	17.00
	802.11ac-VHT20	149	14.00
		157	14.00
		165	14.00
	802.11ac-VHT40	151	17.00
		159	17.00
	802.11ac-VHT80	155	23.00

3. 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 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

4. Radio Frequency Radiation Exposure Evaluation

4.1. Standalone Power Density Calculation

<Non-beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
Bluetooth	2402.0	1.23	-1.00	0.230	0.001	1.054	0.0002	1.000	0.0002
2.4GHz WLAN	2412.0	1.75	24.00	25.750	0.376	375.837	0.0748	1.000	0.0748
5GHz WLAN	5180.0	2.44	23.00	25.440	0.350	349.945	0.0697	1.000	0.0697

Note: For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.

<Beamforming mode>

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
5GHz WLAN	5180.0	5.22	23.00	28.220	0.664	663.743	0.1321	1.000	0.1321

Note:

- For conservativeness, the lowest uplink frequency of each band is used to determine the MPE limit of that band.
- This device supports Beamforming for WLAN 5GHz only; therefore, in the table above which consider maximum directional Gain 5.22dBi for Beamforming mode.
- In the above table has assessed WLAN 5GHz by referring to the maximum antenna gain and maximum power.

4.2. Collocated Power Density Calculation

WLAN Power Density / Limit	Bluetooth Power Density / Limit	Σ (Power Density / Limit) of WLAN+Bluetooth
0.1321	0.0002	0.1323

Note:

- 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 + Bluetooth.
- 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.