RF Exposure Evaluation Report

APPLICANT	:	Starry, Inc.
EQUIPMENT	:	Starry Wing
BRAND NAME	:	Starry
MODEL NAME	:	S00211
FCC ID	:	2AGZ3S00211
STANDARD	:	47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (KUNSHAN) 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 (KUNSHAN) INC., the test report shall not be reproduced except in full.

Mark Qu

Prepared by: Mark Qu / Manager

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SPORTON INTERNATIONAL (KUNSHAN) INC.
No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA690802	Rev. 01	Initial issue of report	Jan. 25, 2017

1. Administration Data

1.1. Testing Laboratory

Testing Site	
Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P. R. China TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958

Applicant	
Company Name	Starry, Inc.
Address	PO Box 52226 Boston, MA 02205

Manufacturer	
Company Name	Flextronics Manufacturing (Zhuhai) Co., Ltd.
Address	Xin Qing Science & Technology Industrial Park, Doumen County, Zhuhai

2. Description of Equipment Under Test (EUT)

<table>
<tr><th colspan="2">Product Feature & Specification</th></tr>
<tr><td>EUT Type</td><td>Starry Wing</td></tr>
<tr><td>Brand Name</td><td>Starry</td></tr>
<tr><td>Model Name</td><td>S00211</td></tr>
<tr><td>FCC ID</td><td>2AGZ3S00211</td></tr>
<tr><td>Wireless Technology and Frequency Range</td><td>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</td></tr>
<tr><td>Mode</td><td>802.11b/g/n HT20/HT40
802.11a/n HT20/HT40
802.11ac VHT20/VHT40/VHT80
Bluetooth v3.0 + EDR/Bluetooth v4.0 LE/Bluetooth v4.2 LE</td></tr>
<tr><td>Antenna Type</td><td>WLAN Antenna 1: FPC Antenna
WLAN Antenna 2: FPC Antenna
Bluetooth: Chip Ceramic Antenna</td></tr>
<tr><td>HW Version</td><td>Wing Ver1.2</td></tr>
<tr><td>SW Version</td><td>uboot version:1.0.9 Kernel version:W00002</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><th></th><th>Antenna 1</th><th>Antenna 2</th></tr>
<tr><td>802.11 a/b/g/n/ac SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n/ac MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
<tr><td>EUT Stage</td><td>Identical Prototype</td></tr>
<tr><td colspan="2">Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.</td></tr>
</table>

3. Maximum RF average output power among production units

<WLAN 2.4GHz Antenna 1>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	17.0
	802.11g	16.0
	802.11n-HT20	15.5
	802.11n-HT40	11.0

<WLAN 2.4GHz Antenna 2>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	18.0
	802.11g	14.5
	802.11n-HT20	17.0
	802.11n-HT40	12.0

<WLAN 2.4GHz Antenna 1+2>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11n-HT20	19.5
	802.11n-HT40	14.5

<Bluetooth>

Mode / Band	Bluetooth			
	1Mbps	2Mbps	3Mbps	LE
	(GFSK)	π/4-DQPSK	(8-DPSK)	(GFSK)
2.4GHz Bluetooth	11.0	8.5	8.5	7.5

<WLAN 5GHz Antenna 1>

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	16.0
	802.11n-HT20	16.0
	802.11n-HT40	10.5
	802.11ac-VHT20	13.5
	802.11ac-VHT40	11.5
	802.11ac-VHT80	7.0
5.8GHz	802.11a	12.0
	802.11n-HT20	12.0
	802.11n-HT40	9.5
	802.11ac-VHT20	10.5
	802.11ac-VHT40	9.5
	802.11ac-VHT80	9.5

<WLAN 5GHz Antenna 2>

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	14.5
	802.11n-HT20	14.5
	802.11n-HT40	11.0
	802.11ac-VHT20	14.0
	802.11ac-VHT40	11.0
	802.11ac-VHT80	8.0
5.8GHz	802.11a	11.5
	802.11n-HT20	12.0
	802.11n-HT40	10.5
	802.11ac-VHT20	11.0
	802.11ac-VHT40	9.5
	802.11ac-VHT80	9.5

<WLAN 5GHz Antenna 1+2>

Mode		Maximum Average Power (dBm)
5.2GHz	802.11n-HT20	16.5
	802.11n-HT40	11.0
	802.11ac-VHT20	15.5
	802.11ac-VHT40	12.0
	802.11ac-VHT80	9.5
5.8GHz	802.11n-HT20	13.5
	802.11n-HT40	11.0
	802.11ac-VHT20	13.0
	802.11ac-VHT40	10.0
	802.11ac-VHT80	12.0

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/f2)	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/f2)	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^2)	Limit (mW/cm^2)	Power Density / Limit
WLAN2.4GHz 802.11b Ant 1	2412.0	2.93	17.0	19.930	0.098	98.401	0.020	1.000	0.020
WLAN2.4GHz 802.11g Ant 1	2412.0	2.93	16.0	18.930	0.078	78.163	0.016	1.000	0.016
WLAN2.4GHz 802.11n-HT20 Ant 1	2412.0	2.93	15.5	18.430	0.070	69.663	0.014	1.000	0.014
WLAN2.4GHz 802.11n-HT40 Ant 1	2422.0	2.93	11.0	13.930	0.025	24.717	0.005	1.000	0.005
WLAN2.4GHz 802.11b Ant 2	2412.0	2.92	18.0	20.920	0.124	123.595	0.025	1.000	0.025
WLAN2.4GHz 802.11g Ant 2	2412.0	2.92	14.5	17.420	0.055	55.208	0.011	1.000	0.011
WLAN2.4GHz 802.11n-HT20 Ant 2	2412.0	2.92	17.0	19.920	0.098	98.175	0.020	1.000	0.020
WLAN2.4GHz 802.11n-HT40 Ant 2	2422.0	2.92	12.0	14.920	0.031	31.046	0.006	1.000	0.006
WLAN2.4GHz 802.11n-HT20 Ant 1+2	2412.0	5.94	19.5	25.440	0.350	349.945	0.070	1.000	0.070
WLAN2.4GHz 802.11n-HT40 Ant 1+2	2422.0	5.94	14.5	20.440	0.111	110.662	0.022	1.000	0.022
WLAN5.2GHz 802.11a Ant 1	5180.0	2.26	16.0	18.260	0.067	66.988	0.013	1.000	0.013
WLAN5.2GHz 802.11n-HT20 Ant 1	5180.0	2.26	16.0	18.260	0.067	66.988	0.013	1.000	0.013
WLAN5.2GHz 802.11n-HT40 Ant 1	5190.0	2.26	10.5	12.760	0.019	18.880	0.004	1.000	0.004
WLAN5.2GHz 802.11ac-VHT20 Ant 1	5180.0	2.26	13.5	15.760	0.038	37.670	0.007	1.000	0.007
WLAN5.2GHz 802.11ac-VHT40 Ant 1	5190.0	2.26	11.5	13.760	0.024	23.768	0.005	1.000	0.005
WLAN5.2GHz 802.11ac-VHT80 Ant 1	5210.0	2.26	7.0	9.260	0.008	8.433	0.002	1.000	0.002
WLAN5.2GHz 802.11a Ant 2	5180.0	2.14	14.5	16.640	0.046	46.132	0.009	1.000	0.009
WLAN5.2GHz 802.11n-HT20 Ant 2	5180.0	2.14	14.5	16.640	0.046	46.132	0.009	1.000	0.009
WLAN5.2GHz 802.11n-HT40 Ant 2	5190.0	2.14	11.0	13.140	0.021	20.606	0.004	1.000	0.004
WLAN5.2GHz 802.11ac-VHT20 Ant 2	5180.0	2.14	14.0	16.140	0.041	41.115	0.008	1.000	0.008
WLAN5.2GHz 802.11ac-VHT40 Ant 2	5190.0	2.14	11.0	13.140	0.021	20.606	0.004	1.000	0.004
WLAN5.2GHz 802.11ac-VHT80 Ant 2	5210.0	2.14	8.0	10.140	0.010	10.328	0.002	1.000	0.002
WLAN5.2GHz 802.11n-HT20 Ant 1+2	5180.0	5.21	16.5	21.710	0.148	148.252	0.030	1.000	0.030
WLAN5.2GHz 802.11n-HT40 Ant 1+2	5190.0	5.21	11.0	16.210	0.042	41.783	0.008	1.000	0.008
WLAN5.2GHz 802.11ac-VHT20 Ant 1+2	5180.0	5.21	15.5	20.710	0.118	117.761	0.023	1.000	0.023
WLAN5.2GHz 802.11ac-VHT40 Ant 1+2	5190.0	5.21	12.0	17.210	0.053	52.602	0.010	1.000	0.010
WLAN5.2GHz 802.11ac-VHT80 Ant 1+2	5210.0	5.21	9.5	14.710	0.030	29.580	0.006	1.000	0.006

WLAN5.8GHz 802.11a Ant 1	5745.0	2.16	12.0	14.160	0.026	26.062	0.005	0.005
WLAN5.8GHz 802.11n-HT20 Ant 1	5745.0	2.16	12.0	14.160	0.026	26.062	0.005	0.005
WLAN5.8GHz 802.11n-HT40 Ant 1	5755.0	2.16	9.5	11.660	0.015	14.655	0.003	0.003
WLAN5.8GHz 802.11ac-VHT20 Ant 1	5745.0	2.16	10.5	12.660	0.018	18.450	0.004	0.004
WLAN5.8GHz 802.11ac-VHT40 Ant 1	5755.0	2.16	9.5	11.660	0.015	14.655	0.003	0.003
WLAN5.8GHz 802.11ac-VHT80 Ant 1	5775.0	2.16	9.5	11.660	0.015	14.655	0.003	0.003
WLAN5.8GHz 802.11a Ant 2	5745.0	2.12	11.5	13.620	0.023	23.014	0.005	0.005
WLAN5.8GHz 802.11n-HT20 Ant 2	5745.0	2.12	12.0	14.120	0.026	25.823	0.005	0.005
WLAN5.8GHz 802.11n-HT40 Ant 2	5755.0	2.12	10.5	12.620	0.018	18.281	0.004	0.004
WLAN5.8GHz 802.11ac-VHT20 Ant 2	5745.0	2.12	11.0	13.120	0.021	20.512	0.004	0.004
WLAN5.8GHz 802.11ac-VHT40 Ant 2	5755.0	2.12	9.5	11.620	0.015	14.521	0.003	0.003
WLAN5.8GHz 802.11ac-VHT80 Ant 2	5775.0	2.12	9.5	11.620	0.015	14.521	0.003	0.003
WLAN5.8GHz 802.11n-HT20 Ant 1+2	5745.0	5.15	13.5	18.650	0.073	73.282	0.015	0.015
WLAN5.8GHz 802.11n-HT40 Ant 1+2	5755.0	5.15	11.0	16.150	0.041	41.210	0.008	0.008
WLAN5.8GHz 802.11ac-VHT20 Ant 1+2	5745.0	5.15	13.0	18.150	0.065	65.313	0.013	0.013
WLAN5.8GHz 802.11ac-VHT40 Ant 1+2	5755.0	5.15	10.0	15.150	0.033	32.734	0.007	0.007
WLAN5.8GHz 802.11ac-VHT80 Ant 1+2	5775.0	5.15	12.0	17.150	0.052	51.880	0.010	0.010
Bluetooth	2402	0.5	11.0	11.500	0.014	14.125	0.003	0.003

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

5.2. Collocated Power Density Calculation

Mode	Frequency	EIRP (dBm)	Power Density at 20cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit	Σ(Power Density / Limit) of WLAN+Bluetooth
WLAN2.4GHz	2412MHz ~ 2462MHz	25.44	0.070	1.000	0.070	0.073
Bluetooth	2402MHz ~ 2480MHz	11.50	0.003	1.000	0.003	

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.

Conclusion:

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