RF Exposure Evaluation Report

Equipment	:	**NanoStation AC Loco**
Brand Name	:	**UBIQUITI**
Model No.	:	**NS-5ACL**
FCC ID	:	**SWX-NS5ACLW**
Standard	:	**47 CFR Part 2.1091**
Applicant / Manufacturer	:	**Ubiquiti Networks, Inc.** **685 Third Avenue, 27th Floor New York, New York 10017 USA**

The product sample received on Aug. 11, 2017 and completely tested on Aug. 30, 2017. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit.

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Kevin Liang
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA720828-02	Rev. 01	Initial issue of report	Sep. 06, 2017

1 General Description

1.1 EUT General Information

RF General Information			
Evaluation Mode	**Frequency Range (MHz)**	**Operating Frequency (MHz)**	**Modulation Type**
2.4GHz WLAN	2400-2483.5	2412-2462	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n: OFDM (BPSK, QPSK, 16QAM, 64QAM)
5GHz WLAN	5150-5250 5725-5850	5160-5245 5735-5840	802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM

1.2 Testing Location

Testing Location			
☒	HWA YA	ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test site Designation No. TW1190 with FCC.			
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)	
		TEL : 886-3-656-9065	FAX : 886-3-656-9085
Test site Designation No. TW0006 with FCC.			

2 Maximum Permissible Exposure

2.1 Limit of Maximum Permissible Exposure

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
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

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|²,|H|² or S (minutes)
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

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2 MPE Calculation Method

The MPE was calculated at 25 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

2.3 Calculated Result and Limit

Exposure Environment: General Population / Uncontrolled Exposure

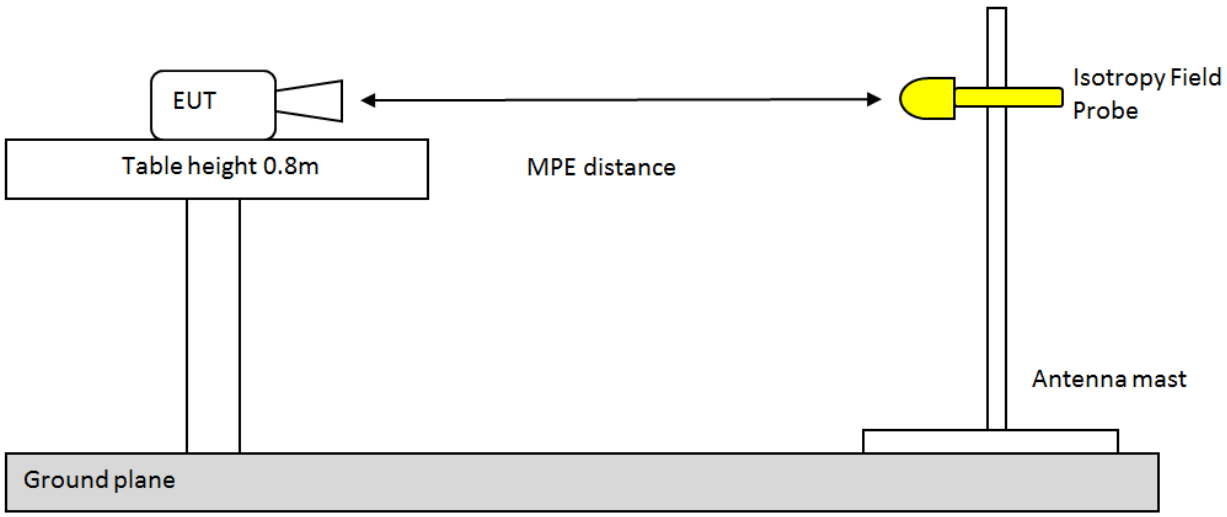
P to M

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
2.4G;G1D	2.00	11.15	13.15	0.02065	25	0.00263	1.00000
2.4G;D1D	2.00	15.43	17.43	0.05534	25	0.00705	1.00000
5.2G;D1D	13.00	7.96	20.96	0.12474	25	0.01588	1.00000
5.8G;D1D	13.00	22.96	35.96	3.94457	25	0.50224	1.00000

P to P

Mode	DG (dBi)	Power (dBm)	EIRP (dBm)	EIRP (W)	Distance (cm)	S (mW/cm^2)	S Limit (mW/cm^2)
2.4G;G1D	2.00	11.15	13.15	0.02065	25	0.00263	1.00000
2.4G;D1D	2.00	15.43	17.43	0.05534	25	0.00705	1.00000
5.2G;D1D	13.00	25.56	38.56	7.17794	25	0.91392	1.00000
5.8G;D1D	13.00	22.96	35.96	3.94457	25	0.50224	1.00000

2.4 MPE Measurement Method



Horizontal Plane

1. Align Probe with antenna axis. Probe should same height as Antenna axis.
   And take power density measurement with Probe.
2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
   Take power density measurement again.
3. Repeat step 2, until complete 360 degree.
   Each measured power density should be less than MPE limit.

Vertical Plane

1. Align Probe with antenna axis. Move probe to height of 10cm above ground plane.
   Take power density measurement.
   Then repeat measure with 10cm increment of probe height until 180 cm.
2. Rotate table 45 degree (30 degree if MPE distance is more 60cm).
   Repeat the power density measure from 10cm to 180cm
3. Repeat step 2, until complete 360 degree.

Spatial Average of same vertical plane should be less then MPE limit.

For Probe or measurement equipment requirement, please see FCC OET Bulletin 65 97-01

Note:

Either peak or spatially averaged results may be applied to determine compliance; and with respect to plane-wave equivalent power density limits when ≥ 300 MHz, and electric and magnetic field strength limits when < 300 MHz.

2.5 Measurement Result and Limit

Test Mode	HT20	Test Frequency (MHz)		5200		MPE Distance (cm)		25
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
174	0.69880	0.33220	0.00734	0.00672	0.00442	0.00432	0.00462	0.69920
Max PSD (mW/cm²)	0.69920							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.00592	0.00269	0.00148	0.00101	0.00073	0.00135	0.00332	0.00442
20	0.00574	0.00332	0.00135	0.00077	0.00063	0.00086	0.00311	0.00812
30	0.00892	0.00443	0.00134	0.00131	0.00083	0.00075	0.00224	0.01020
40	0.01120	0.00224	0.00132	0.00182	0.00221	0.00171	0.00742	0.00836
50	0.01420	0.01006	0.00094	0.00264	0.00251	0.00226	0.00124	0.00334
60	0.00924	0.00246	0.00161	0.00272	0.00552	0.00462	0.01420	0.01723
70	0.02030	0.00304	0.00296	0.00364	0.00339	0.00482	0.01246	0.02730
80	0.02013	0.00311	0.00392	0.00426	0.00428	0.00336	0.01651	0.16420
90	0.02622	0.00452	0.00242	0.00193	0.00477	0.00465	0.01524	0.26130
100	0.02124	0.00549	0.00424	0.00462	0.00614	0.00412	0.00884	0.11420
110	0.02115	0.00518	0.00371	0.00556	0.00214	0.00381	0.00576	0.01162
120	0.00734	0.00314	0.00082	0.00329	0.00322	0.00274	0.00623	0.00774
130	0.00582	0.00024	0.00088	0.00242	0.00402	0.00415	0.00266	0.00556
140	0.00334	0.00049	0.00104	0.00290	0.00334	0.00246	0.00225	0.00352
150	0.00241	0.00128	0.00074	0.00186	0.00190	0.00118	0.00119	0.00139
160	0.00096	0.00054	0.00053	0.00110	0.00112	0.00090	0.00087	0.00084
170	0.00045	0.00033	0.00028	0.00039	0.00058	0.00086	0.00072	0.00064
180	0.00028	0.00027	0.00041	0.00047	0.00077	0.00062	0.00053	0.00032
Spatial Average (mW/cm²)	0.01027	0.00294	0.00167	0.00237	0.00267	0.00251	0.00582	0.03613
Max Spatial Average (mW/cm²)	0.03613							
MPE Limit (mW/cm²)	1							

Test Mode	HT20	Test Frequency (MHz)	5240	MPE Distance (cm)	25			
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
178	0.63860	0.00846	0.01680	0.00802	0.05490	0.14200	0.15200	0.64000
Max PSD (mW/cm²)	0.64000							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.00188	0.00108	0.00048	0.00022	0.00058	0.00169	0.00389	0.00231
20	0.00406	0.00224	0.00086	0.00055	0.00118	0.00356	0.00786	0.00923
30	0.00818	0.00404	0.00176	0.00112	0.00087	0.00110	0.00744	0.01531
40	0.01723	0.00402	0.00136	0.00199	0.00113	0.00104	0.00713	0.01324
50	0.01196	0.00388	0.00121	0.00288	0.00281	0.00373	0.00424	0.01326
60	0.02136	0.00441	0.00122	0.00226	0.00808	0.00216	0.00838	0.01516
70	0.04160	0.00460	0.00136	0.00288	0.00622	0.00341	0.01642	0.04623
80	0.01632	0.00412	0.00338	0.00438	0.00633	0.00395	0.00742	0.17080
90	0.20600	0.00418	0.00235	0.00259	0.00524	0.00323	0.00366	0.22500
100	0.08220	0.00456	0.00448	0.00476	0.00723	0.00411	0.00322	0.07360
110	0.02025	0.00437	0.00324	0.00588	0.00501	0.00163	0.00537	0.02226
120	0.00658	0.00294	0.00174	0.00312	0.00508	0.00188	0.00588	0.05960
130	0.00322	0.00218	0.00056	0.00213	0.00344	0.00227	0.00165	0.00366
140	0.00225	0.00148	0.00056	0.00213	0.00248	0.00108	0.00245	0.00286
150	0.00172	0.00157	0.00580	0.00122	0.00233	0.00102	0.00128	0.00204
160	0.00144	0.00086	0.00091	0.00147	0.00168	0.00146	0.00088	0.00168
170	0.00086	0.00042	0.00082	0.00920	0.00099	0.00078	0.00099	0.01168
180	0.00053	0.00041	0.00045	0.00063	0.00071	0.00066	0.00084	0.00071
Spatial Average (mW/cm²)	0.02487	0.00285	0.00181	0.00274	0.00341	0.00215	0.00494	0.03826
Max Spatial Average (mW/cm²)	0.03826							
MPE Limit (mW/cm²)	1							

Test Mode	HT30	Test Frequency (MHz)	5235	MPE Distance (cm)	25			
EUT Plane	Horizontal							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
176	0.78120	0.04412	0.02300	0.02010	0.01030	0.00542	0.14230	0.77220
Max PSD (mW/cm²)	0.78120							
MPE Limit (mW/cm²)	1							
EUT Plane	Vertical							
Probe height (cm) \ Deg	0~45°	45~90°	90~135°	135~180°	180~225°	225~270°	270~315°	315~360°
	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)	Max PSD (mW/cm²)
10	0.00209	0.00123	0.00057	0.00024	0.00064	0.00174	0.00465	0.00331
20	0.00466	0.00243	0.00097	0.00063	0.00121	0.00412	0.00813	0.00945
30	0.00848	0.00426	0.00186	0.00122	0.00092	0.00118	0.00765	0.01611
40	0.01902	0.00432	0.00176	0.00217	0.00143	0.00116	0.00732	0.01344
50	0.01204	0.00412	0.00125	0.00292	0.00291	0.00394	0.00456	0.01330
60	0.02136	0.04420	0.00128	0.00243	0.00816	0.00221	0.00846	0.01520
70	0.04360	0.00415	0.00131	0.00358	0.00722	0.00441	0.01742	0.04723
80	0.01672	0.00229	0.00347	0.00445	0.00634	0.00405	0.00786	0.17220
90	0.22100	0.00438	0.00245	0.00336	0.00621	0.00423	0.00478	0.23500
100	0.08420	0.00486	0.00486	0.00456	0.00723	0.00424	0.00354	0.07560
110	0.02125	0.00467	0.00354	0.00614	0.00512	0.00183	0.00557	0.02420
120	0.00658	0.00294	0.00017	0.00328	0.00513	0.00202	0.00614	0.06230
130	0.00356	0.00228	0.00060	0.00243	0.00364	0.00247	0.00173	0.00372
140	0.00245	0.00152	0.00068	0.00233	0.00264	0.00118	0.00271	0.00296
150	0.00191	0.00173	0.00670	0.00142	0.00263	0.00112	0.00148	0.00224
160	0.00165	0.00091	0.00093	0.00153	0.00171	0.00150	0.00088	0.00172
170	0.00096	0.00045	0.00082	0.00960	0.00101	0.00082	0.00101	0.01120
180	0.00059	0.00042	0.00047	0.00067	0.00072	0.00069	0.00086	0.00072
Spatial Average (mW/cm²)	0.02623	0.00506	0.00187	0.00294	0.00360	0.00238	0.00526	0.03944
Max Spatial Average (mW/cm²)	0.03944							
MPE Limit (mW/cm²)	1							

2.6 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Isotropic Electric Field Probe	ETS-LINDGREN	HI-6105	00130664	100kHz~6GHz	10/Oct/2016	09/Oct/2017