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MPE Report

Test Report No.	: 1510FS15
Applicant	: Ubiquiti Networks, Inc.
Manufacturer	: Ubiquiti Networks, Inc.
Product Type	: Access Point
Trade Name	: UBIQUITI
Model Number	: UAP-AC-LR
Date of Received	: Apr. 20, 2015
Test Period	: Jan.20, 2015
Date of Issued	: Nov. 16, 2015
Test Specification	: IEEE Std. 1528-2013 47 CFR § 2.1091 47 CFR §1.1310 ANSI / IEEE Std.C95.1-1992
Location of Test Lab.	: Chang-an Lab.

1. The test operations have to be performed with cautious behavior, the test results are as attached.
2. The test results are under chamber environment of A Test Lab Techno Corp. A Test Lab Techno Corp. does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens or samples.
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Approved By

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1. Description of Equipment under Test (EUT)

Applicant	Ubiquiti Networks, Inc. 2580 Orchard Parkway, San Jose, California, United States, 95131		
Manufacturer	Ubiquiti Networks, Inc. 2580 Orchard Parkway, San Jose, California, United States, 95131		
Product Type	Access Point		
Trade Name	UBIQUITI		
Model Number	UAP-AC-LR		
FCC ID	SWX-UAPACLR		
Class II Permissive Change	Add U-NII Band II function by software control. The change reference Class II Permissive Change Letter in detail.		
Frequency Range	IEEE 802.11a Band II-A : 5260 ~ 5320 MHz IEEE 802.11a Band II-C : 5500 ~ 5700 MHz IEEE 802.11n 5GHz 20MHz Band II-A : 5260 ~ 5320 MHz IEEE 802.11n 5GHz 20MHz Band II-C : 5500 ~ 5700 MHz IEEE 802.11n 5GHz 40MHz Band II-A : 5270 ~ 5310 MHz IEEE 802.11n 5GHz 40MHz Band II-C : 5510 ~ 5670 MHz IEEE 802.11ac 80MHz Band II-A : 5290 MHz IEEE 802.11ac 80MHz Band II-C : 5530 ~ 5610 MHz		
Transmit Power (conducted power)	IEEE 802.11a Band II-A :	0.103 W /	20.14 dBm
	IEEE 802.11a Band II-C :	0.124 W /	20.92 dBm
	IEEE 802.11n 5GHz 20MHz Band II-A :	0.134 W /	21.26 dBm
	IEEE 802.11n 5GHz 20MHz Band II-C :	0.160 W /	22.04 dBm
	IEEE 802.11n 5GHz 40MHz Band II-A :	0.098 W /	19.91 dBm
	IEEE 802.11n 5GHz 40MHz Band II-C :	0.113 W /	20.54 dBm
	IEEE 802.11ac 80MHz Band II-A :	0.084 W /	19.23 dBm
	IEEE 802.11ac 80MHz Band II-C :	0.098 W /	19.91 dBm
Antenna Type	Dual band tri pol antenna		
Max. Antenna Gain	3 dBi		
Antenna Delivery	2TX + 2RX		
Temperature Range	-10 ~ 70 °C		
RF Evaluation	0.84 W/m ²		

The above equipment was tested by A Test Lab Techno Corp. For compliance with the requirements set forth in 47 CFR § 2.1091 & 47 CFR § 1.1310. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties



2. Human Exposure Assessment

Due to the design and installation of this product, it is not possible to conduct SAR evaluation. This is because client either manufactures or supplies the antenna(s) that will be used in the installation of this product. Therefore, this product will be evaluated as a mobile device per 47 CFR §1.1310 titled "Radiofrequency radiation exposure limits", generally referred to as MPE limits.

In 47 CFR § 2.1091, paragraph (b) defines a mobile device as "a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 cm is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons." This product is intended to be installed into a vehicle such that the unit is physically secured at one location. In the installation guide supplied with the product,

Client has made the following statement: "IMPORTANT: To meet the FCC's RF Exposure Guidelines, the antenna should be installed so there is at least 20 cm of separation between the body of the user and nearby persons and the antenna". Based on the installation of the transceiver and the antenna, the transmitters radiating structure is more than 20 cm from the user. Thus, this product is a "mobile device" as defined in section § 2.1091 paragraph (b).

Exposure evaluation

$$S = \frac{PG}{4\pi R^2}$$

Where

S: power density

P: power input to the antenna

G: power gain of the antenna in the direction of interest relative to an isotropic radiator.

R: distance to the center of radiation of the antenna.



3. RF Output Power

Freq. Band	Data Rate	Frequency (MHz)	Average Conducted Power					
			Antenna 0		Antenna 1		Antenna 0+1	
			(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
IEEE 802.11a	6M	5260.0	16.10	0.041	17.11	0.051	19.64	0.092
		5280.0	16.43	0.044	17.31	0.054	19.90	0.098
		5300.0	16.65	0.046	17.49	0.056	20.10	0.102
		5320.0	16.62	0.046	17.58	0.057	20.14	0.103
		5500.0	17.44	0.055	18.34	0.068	20.92	0.124
		5520.0	17.17	0.052	18.09	0.064	20.66	0.117
		5540.0	17.11	0.051	18.04	0.064	20.61	0.115
		5560.0	16.83	0.048	17.90	0.062	20.41	0.110
		5580.0	16.55	0.045	17.54	0.057	20.08	0.102
		5600.0	16.41	0.044	17.66	0.058	20.09	0.102
		5620.0	16.17	0.041	17.36	0.054	19.82	0.096
		5640.0	15.95	0.039	16.87	0.049	19.44	0.088
		5660.0	16.17	0.041	17.45	0.056	19.87	0.097
		5680.0	16.42	0.044	17.57	0.057	20.04	0.101
	5700.0	16.71	0.047	17.88	0.061	20.34	0.108	
	54M	5260.0	15.83	0.038	16.69	0.047	19.29	0.085
		5280.0	16.14	0.041	16.84	0.048	19.51	0.089
		5300.0	16.39	0.044	17.19	0.052	19.82	0.096
		5320.0	16.33	0.043	17.40	0.055	19.91	0.098
		5500.0	17.18	0.052	18.23	0.067	20.75	0.119
		5520.0	16.87	0.049	17.95	0.062	20.45	0.111
		5540.0	16.85	0.048	17.88	0.061	20.41	0.110
		5560.0	16.57	0.045	17.57	0.057	20.11	0.103
		5580.0	16.28	0.042	17.44	0.055	19.91	0.098
		5600.0	16.15	0.041	17.23	0.053	19.73	0.094
		5620.0	15.88	0.039	16.91	0.049	19.44	0.088
		5640.0	15.68	0.037	16.86	0.049	19.32	0.086
		5660.0	15.90	0.039	17.37	0.055	19.71	0.093
5680.0		16.12	0.041	17.23	0.053	19.72	0.094	
5700.0	16.45	0.044	17.74	0.059	20.15	0.104		



Freq. Band	Data Rate	Frequency (MHz)	Average Conducted Power					
			Antenna 0		Antenna 1		Antenna 0+1	
			(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
IEEE 802.11n 5GHz 20MHz	13M	5260.0	17.04	0.051	17.98	0.063	20.55	0.113
		5280.0	17.39	0.055	18.60	0.072	21.05	0.127
		5300.0	17.65	0.058	18.78	0.076	21.26	0.134
		5320.0	17.60	0.058	18.63	0.073	21.16	0.130
		5500.0	18.46	0.070	19.54	0.090	22.04	0.160
		5520.0	18.17	0.066	19.13	0.082	21.69	0.147
		5540.0	17.97	0.063	19.11	0.081	21.59	0.144
		5560.0	17.65	0.058	18.59	0.072	21.16	0.130
		5580.0	17.61	0.058	18.73	0.075	21.22	0.132
		5600.0	17.37	0.055	18.41	0.069	20.93	0.124
		5620.0	17.06	0.051	18.02	0.063	20.58	0.114
		5640.0	16.87	0.049	18.10	0.065	20.54	0.113
		5660.0	17.13	0.052	18.33	0.068	20.78	0.120
		5680.0	17.47	0.056	18.27	0.067	20.90	0.123
	5700.0	17.73	0.059	18.71	0.074	21.26	0.134	
	130M	5260.0	16.93	0.049	17.84	0.061	20.42	0.110
		5280.0	17.26	0.053	18.53	0.071	20.95	0.124
		5300.0	17.53	0.057	18.65	0.073	21.14	0.130
		5320.0	17.45	0.056	18.54	0.071	21.04	0.127
		5500.0	18.34	0.068	19.38	0.087	21.90	0.155
		5520.0	18.05	0.064	18.88	0.077	21.50	0.141
		5540.0	17.84	0.061	19.01	0.080	21.47	0.140
		5560.0	17.53	0.057	18.22	0.066	20.90	0.123
		5580.0	17.47	0.056	18.44	0.070	20.99	0.126
		5600.0	17.24	0.053	18.19	0.066	20.75	0.119
		5620.0	16.95	0.050	17.86	0.061	20.44	0.111
		5640.0	16.74	0.047	17.74	0.059	20.28	0.107
		5660.0	17.02	0.050	18.20	0.066	20.66	0.116
5680.0		17.34	0.054	17.99	0.063	20.69	0.117	
5700.0	17.62	0.058	18.54	0.071	21.11	0.129		



Freq. Band	Data Rate	Frequency (MHz)	Average Conducted Power					
			Antenna 0		Antenna 1		Antenna 0+1	
			(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
IEEE 802.11n 5GHz 40MHz	27M	5270.0	16.11	0.041	17.07	0.051	19.63	0.092
		5310.0	16.31	0.043	17.42	0.055	19.91	0.098
		5510.0	17.11	0.051	17.92	0.062	20.54	0.113
		5550.0	16.69	0.047	17.78	0.060	20.28	0.107
		5590.0	16.28	0.042	17.29	0.054	19.82	0.096
		5630.0	15.78	0.038	16.89	0.049	19.38	0.087
		5670.0	16.21	0.042	17.09	0.051	19.68	0.093
	270M	5270.0	15.69	0.037	16.76	0.047	19.27	0.084
		5310.0	16.21	0.042	17.35	0.054	19.83	0.096
		5510.0	16.09	0.041	17.55	0.057	19.89	0.098
		5550.0	15.68	0.037	17.60	0.058	19.76	0.095
		5590.0	15.18	0.033	17.20	0.052	19.32	0.085
		5630.0	15.61	0.036	16.59	0.046	19.14	0.082
		5670.0	16.12	0.041	17.04	0.051	19.61	0.092

Freq. Band	Data Rate	Frequency (MHz)	Average Conducted Power					
			Antenna 0		Antenna 1		Antenna 0+1	
			(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
IEEE 802.11ac 80MHz	58.6M	5290.0	15.74	0.037	16.66	0.046	19.23	0.084
		5530.0	16.45	0.044	17.30	0.054	19.91	0.098
		5610.0	15.63	0.037	16.52	0.045	19.11	0.081
	780M	5290.0	15.45	0.035	16.33	0.043	18.92	0.078
		5530.0	16.14	0.041	16.05	0.040	19.11	0.081
		5610.0	15.29	0.034	16.33	0.043	18.85	0.077



4. Test Result

Freq. Band	Data Rate	Frequency (MHz)	Limit (mw/cm ²)	Distance (cm) [R]	Max Tune-up power (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G] (dBi)	Duty Cycle	[P] x [G] With Duty Cycle (mW) [TP]	Power Density [S] (mw/cm ²)
IEEE 802.11a (MIMO)	6M	5260.0	1.000	20	21.0	3	2	1	251.79	0.050
		5280.0	1.000	20	21.0	3	2	1	251.79	0.050
		5300.0	1.000	20	21.0	3	2	1	251.79	0.050
		5320.0	1.000	20	21.0	3	2	1	251.79	0.050
		5500.0	1.000	20	21.0	3	2	1	251.79	0.050
		5520.0	1.000	20	21.0	3	2	1	251.79	0.050
		5540.0	1.000	20	21.0	3	2	1	251.79	0.050
		5560.0	1.000	20	21.0	3	2	1	251.79	0.050
		5580.0	1.000	20	21.0	3	2	1	251.79	0.050
		5600.0	1.000	20	21.0	3	2	1	251.79	0.050
		5620.0	1.000	20	21.0	3	2	1	251.79	0.050
		5640.0	1.000	20	21.0	3	2	1	251.79	0.050
		5660.0	1.000	20	21.0	3	2	1	251.79	0.050
		5680.0	1.000	20	21.0	3	2	1	251.79	0.050
		5700.0	1.000	20	21.0	3	2	1	251.79	0.050
IEEE 802.11n 5GHz 20MHz (MIMO)	13M	5260.0	1.000	20	22.5	3	2	1	355.66	0.071
		5280.0	1.000	20	22.5	3	2	1	355.66	0.071
		5300.0	1.000	20	22.5	3	2	1	355.66	0.071
		5320.0	1.000	20	22.5	3	2	1	355.66	0.071
		5500.0	1.000	20	22.5	3	2	1	355.66	0.071
		5520.0	1.000	20	22.5	3	2	1	355.66	0.071
		5540.0	1.000	20	22.5	3	2	1	355.66	0.071
		5560.0	1.000	20	22.5	3	2	1	355.66	0.071
		5580.0	1.000	20	22.5	3	2	1	355.66	0.071
		5600.0	1.000	20	22.5	3	2	1	355.66	0.071
		5620.0	1.000	20	22.5	3	2	1	355.66	0.071
		5640.0	1.000	20	22.5	3	2	1	355.66	0.071
		5660.0	1.000	20	22.5	3	2	1	355.66	0.071
		5680.0	1.000	20	22.5	3	2	1	355.66	0.071
		5700.0	1.000	20	22.5	3	2	1	355.66	0.071

Note: The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.



Freq. Band	Data Rate	Frequency (MHz)	Limit (mw/cm ²)	Distance (cm) [R]	Max Tune-up power (dBm) [P]	ANT Gain (dBi)	Numeric Gain [G] (dBi)	Duty Cycle	[P] x [G] With Duty Cycle (mW) [TP]	Power Density [S] (mw/cm ²)
IEEE 802.11n 5GHz 40MHz (MIMO)	27M	5270.0	1.000	20	21.0	3	2	1	251.79	0.050
		5310.0	1.000	20	21.0	3	2	1	251.79	0.050
		5510.0	1.000	20	21.0	3	2	1	251.79	0.050
		5550.0	1.000	20	21.0	3	2	1	251.79	0.050
		5590.0	1.000	20	21.0	3	2	1	251.79	0.050
		5630.0	1.000	20	21.0	3	2	1	251.79	0.050
		5670.0	1.000	20	21.0	3	2	1	251.79	0.050
IEEE 802.11ac 80MHz (MIMO)	58.6M	5290.0	1.000	20	20.0	3	2	1	200	0.040
		5530.0	1.000	20	20.0	3	2	1	200	0.040
		5610.0	1.000	20	20.0	3	2	1	200	0.040

Note: The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.

Simultaneous Transmitting:

Simultaneous MPE = 2.4GHz MPE (Original) + 5GHz MPE (U-NII Band II) =

$$0.013 + 0.071 = 0.084 \text{ mW/cm}^2 < 1 \text{ mW/cm}^2$$