



A Test Lab Techno Corp.

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MPE Report

Test Report No.	: 1901FS13
Applicant	: Araknis Networks
Product Type	: WAVE 2 AC WIRELESS ACCESS POINT
Trade Name	: Araknis Networks
Model Number	: AN-810-AP-I-AC
Received Date	: Nov. 26, 2018
Test Period	: Dec. 04, 2018
Issue Date	: Feb. 13, 2019
Test Specification	: ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013
	47 CFR § 2.1091
	47 CFR § 1.1310

1. The test operations have to be performed with cautious behavior, the test results are as attached.
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1. Description of Equipment under Test (EUT)

Applicant	Araknis Networks 1800 Continental Blvd. Suite 300, Charlotte, North Carolina, 28273, United States				
Manufacturer	Emplus Technologies Inc. No. 42, Sec. 1, Minsheng N. Rd., Guishan Dist., Taoyuan City 333, Taiwan				
Product Type	WAVE 2 AC WIRELESS ACCESS POINT				
Trade Name	Araknis Networks				
Model Number	AN-810-AP-I-AC				
FCC ID	2AG6R-AN810APIAC				
Frequency Range	Operate Band				Frequency Range (MHz)
	IEEE 802.11b / 802.11g / 802.11n 2.4 GHz 20 MHz(256QAM)				2412 - 2462
	IEEE 802.11n 2.4 GHz 40 MHz(256QAM)				2422 - 2452
	IEEE 802.11a U-NII Band I				5180 - 5240
	IEEE 802.11a U-NII Band III				5745 - 5825
	IEEE 802.11ac / 802.11n 5 GHz 20 MHz U-NII Band I				5180 - 5240
	IEEE 802.11ac / 802.11n 5 GHz 20 MHz U-NII Band III				5745 - 5825
	IEEE 802.11ac / 802.11n 5 GHz 40 MHz U-NII Band I				5190 - 5230
	IEEE 802.11ac / 802.11n 5 GHz 40 MHz U-NII Band III				5755 - 5795
	IEEE 802.11ac 80 MHz U-NII Band I				5210
	IEEE 802.11ac 80 MHz U-NII Band III				5775
Antenna Information	Frequency	ANT	Model Number	Type	Max. Gain (dBi)
	2.4 GHz	ANT-0	5718A0346300	Metal PIFA Antenna	2.86
		ANT-1	5718A0347300	Metal PIFA Antenna	3.12
		ANT-2	5718A0348300	Metal PIFA Antenna	3.14
		ANT-3	5718A0349300	Metal PIFA Antenna	3.29
		G _{ANT}			3.11
		Directional Gain			9.12
	5 GHz	ANT-0	5718A0350300	Metal PIFA Antenna	U-NII Band I 4.78
					U-NII Band III 5.07
		ANT-1	5718A0351300	Metal PIFA Antenna	U-NII Band I 4.61
					U-NII Band III 5.50
		ANT-2	5718A0352300	Metal PIFA Antenna	U-NII Band I 4.31
					U-NII Band III 5.36
		ANT-3	5718A0353300	Metal PIFA Antenna	U-NII Band I 4.15
					U-NII Band III 5.84
		G _{ANT}			U-NII Band I 4.47
					U-NII Band III 5.45
		Directional Gain			U-NII Band I 10.49
					U-NII Band III 11.47



Antenna Delivery	IEEE 802.11b / IEEE 802.11g: 4TX (CDD) IEEE 802.11n 2.4GHz 20 MHz / 40 MHz: 4TX (STBC/Beamforming on) IEEE 802.11a: 4TX (CDD) IEEE 802.11ac 20 MHz / 40 MHz / 80 MHz: 4TX (STBC/Beamforming on)
RF Evaluation	0.376 mW/cm ²
Temperature Range	0 ~ +50°C

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

The conducted power turn-up tolerance reference manufacturer specification.

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)				
			ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11b	1	2412.0	18.04	17.65	17.92	17.93	23.91
		2437.0	18.23	17.93	17.97	18.27	24.12
		2462.0	18.57	18.45	18.19	18.71	24.50
	2	2437.0	17.91	17.82	17.87	18.01	23.92
	5.5	2437.0	17.90	17.80	17.82	18.03	23.91
	11	2437.0	17.88	17.85	17.86	17.94	23.90
IEEE 802.11g	6	2412.0	16.61	16.45	16.55	16.57	22.57
		2437.0	16.56	16.56	16.65	16.61	22.62
		2462.0	15.95	15.90	15.88	16.04	21.96
	9	2437.0	16.50	16.50	16.50	16.50	22.52
	12	2437.0	16.51	16.49	16.49	16.52	22.52
	18	2437.0	16.52	16.51	16.51	16.55	22.54
	24	2437.0	16.49	16.49	16.52	16.56	22.54
	36	2437.0	16.53	16.52	16.49	16.50	22.53
	48	2437.0	16.51	16.51	16.48	16.55	22.53
	54	2437.0	16.52	16.50	16.47	16.53	22.53
IEEE 802.11n 2.4 GHz 20 MHz	26	2412.0	13.91	13.76	13.83	13.87	19.86
		2437.0	16.21	16.03	16.08	16.16	22.14
		2462.0	13.45	13.62	13.59	13.54	19.57
	57.6	2437.0	16.05	16.00	16.00	16.10	22.06
	86.8	2437.0	16.05	15.99	16.02	16.00	22.04
	115.6	2437.0	16.06	15.98	16.01	16.07	22.05
	173.2	2437.0	16.02	15.97	15.99	16.11	22.04
	231.2	2437.0	16.10	16.00	15.97	16.13	22.07
	260	2437.0	16.02	15.99	15.99	16.05	22.03
	288.8	2437.0	16.07	15.97	16.00	16.09	22.05
IEEE 802.11n 2.4 GHz 40 MHz	54	2422.0	12.38	12.26	12.32	12.27	18.33
		2437.0	15.38	15.15	15.26	15.33	21.30
		2452.0	12.40	12.24	12.29	12.35	18.34
	120	2437.0	15.20	15.10	15.21	15.29	21.22
	180	2437.0	15.23	15.02	15.20	15.22	21.19
	240	2437.0	15.30	15.03	15.18	15.23	21.21
	360	2437.0	15.29	15.06	15.17	15.18	21.20
	480	2437.0	15.18	15.11	15.15	15.15	21.17
	540	2437.0	15.18	15.10	15.10	15.19	21.16
	600	2437.0	15.26	15.08	15.18	15.21	21.20
	720	2437.0	15.28	15.09	15.16	15.20	21.20
	800	2437.0	15.31	14.92	15.21	15.19	21.18

Note: The relevant measured result has the offset with cable loss already.

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)				
			ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11a	6	5180.0	16.25	16.36	16.35	16.21	22.31
		5200.0	16.20	16.14	16.24	16.18	22.21
		5220.0	16.21	16.18	16.26	16.12	22.21
		5240.0	16.11	16.20	16.25	16.22	22.22
		5745.0	18.95	18.70	19.02	18.72	24.87
		5765.0	18.96	18.87	19.14	18.86	24.98
		5785.0	19.01	18.98	19.08	18.97	25.03
		5805.0	19.05	18.94	19.03	18.96	25.02
		5825.0	18.97	19.06	19.15	19.08	25.09
	54	5180.0	16.17	16.30	16.28	16.15	22.25
		5200.0	16.10	16.04	16.20	16.10	22.13
		5220.0	16.11	16.10	16.20	16.05	22.14
		5240.0	16.05	16.13	16.17	16.13	22.14
		5745.0	18.87	18.60	18.93	18.68	24.79
		5765.0	18.88	18.81	19.05	18.80	24.91
		5785.0	18.95	18.90	18.95	18.90	24.95
		5805.0	18.98	18.85	18.81	18.89	24.90
		5825.0	18.90	19.00	19.07	19.01	25.02
IEEE 802.11n 5 GHz 20 MHz	26	5180.0	15.96	15.89	16.01	15.98	21.98
		5200.0	16.01	15.95	16.08	15.95	22.02
		5220.0	16.00	16.03	16.04	15.98	22.03
		5240.0	15.97	15.96	16.04	16.02	22.02
		5745.0	18.32	18.34	18.45	18.43	24.41
		5765.0	18.29	18.23	18.49	18.48	24.39
		5785.0	18.31	18.13	18.42	18.50	24.36
		5805.0	18.29	18.29	18.55	18.53	24.44
		5825.0	18.21	18.31	18.43	18.52	24.39
	346.8	5180.0	15.90	15.80	15.94	15.91	21.91
		5200.0	15.89	15.91	16.01	15.88	21.94
		5220.0	15.92	15.93	15.98	15.92	21.96
		5240.0	15.90	15.87	15.97	15.93	21.94
		5745.0	18.20	18.29	18.35	18.30	24.31
		5765.0	18.21	18.17	18.40	18.40	24.32
		5785.0	18.30	18.04	18.39	18.45	24.32
		5805.0	18.19	18.17	18.50	18.43	24.35
		5825.0	18.10	18.20	18.37	18.48	24.31

Note: The relevant measured result has the offset with cable loss already.

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)				
			ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11n 5 GHz 40 MHz	54	5190.0	16.29	16.36	16.34	16.45	22.38
		5230.0	18.45	18.53	18.51	18.42	24.50
		5755.0	17.75	17.85	17.35	17.62	23.67
		5795.0	17.66	17.65	17.60	17.54	23.63
	800	5190.0	16.20	16.28	16.28	16.39	22.31
		5230.0	18.39	18.47	18.40	18.35	24.42
		5755.0	17.66	17.72	17.28	17.51	23.57
		5795.0	17.59	17.60	17.51	17.49	23.57
IEEE 802.11n 5 GHz 80 MHz	117.2	5210.0	14.22	14.18	14.20	14.23	20.23
		5775.0	18.23	18.42	17.80	18.34	24.22
	1733.2	5210.0	14.12	14.07	14.08	14.14	20.12
		5775.0	18.14	18.35	17.70	18.27	24.14

Note: The relevant measured result has the offset with cable loss already.

Beamforming on

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)				
			ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11n 2.4 GHz 20 MHz	13	2412.0	7.46	7.32	7.52	7.22	13.40
		2437.0	9.71	9.69	9.72	9.63	15.71
		2462.0	6.94	7.13	7.16	7.00	13.08
	28.8	2437.0	9.67	9.61	9.64	9.53	15.63
	43.4	2437.0	9.65	9.60	9.64	9.54	15.63
	57.8	2437.0	9.64	9.59	9.63	9.57	15.63
	86.6	2437.0	9.63	9.64	9.68	9.55	15.65
	115.6	2437.0	9.65	9.57	9.66	9.56	15.63
	130	2437.0	9.66	9.56	9.60	9.54	15.61
	144.4	2437.0	9.64	9.58	9.61	9.53	15.61
IEEE 802.11n 2.4 GHz 40 MHz	27	2422.0	5.82	5.90	5.79	5.88	11.87
		2437.0	8.68	8.54	8.63	8.55	14.62
		2452.0	5.72	5.67	5.85	5.55	11.72
	60	2437.0	8.58	8.44	8.53	8.50	14.53
	90	2437.0	8.57	8.45	8.50	8.47	14.52
	120	2437.0	8.56	8.50	8.54	8.46	14.54
	180	2437.0	8.60	8.46	8.57	8.47	14.55
	240	2437.0	8.61	8.47	8.58	8.45	14.55
	270	2437.0	8.56	8.46	8.55	8.46	14.53
	300	2437.0	8.61	8.46	8.54	8.44	14.53
	360	2437.0	8.60	8.45	8.55	8.46	14.54
	400	2437.0	8.59	8.44	8.58	8.50	14.55

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)				
			ANT-0	ANT-1	ANT-2	ANT-3	ANT-0+1+2+3
IEEE 802.11ac 20 MHz	26	5180.0	9.86	9.75	9.92	9.84	15.86
		5200.0	9.81	9.78	9.96	9.88	15.88
		5220.0	9.80	9.85	9.97	9.80	15.88
		5240.0	9.83	9.80	9.93	9.83	15.87
		5745.0	11.98	12.13	12.19	12.22	18.15
		5765.0	12.13	12.25	12.14	12.19	18.20
		5785.0	11.95	12.05	11.99	12.10	18.04
		5805.0	12.07	12.13	12.07	12.08	18.11
		5825.0	12.21	12.14	11.97	12.06	18.12
	346.8	5180.0	9.80	9.69	9.82	9.80	15.80
		5200.0	9.75	9.71	9.86	9.77	15.79
		5220.0	9.72	9.77	9.85	9.69	15.78
		5240.0	9.75	9.73	9.86	9.73	15.79
		5745.0	11.88	12.05	12.10	12.14	18.06
		5765.0	12.01	12.13	12.06	12.08	18.09
		5785.0	11.88	11.97	11.85	12.00	17.95
		5805.0	12.01	12.06	11.94	11.95	18.01
		5825.0	12.16	12.07	11.89	11.94	18.04
IEEE 802.11ac 40 MHz	54	5190.0	10.05	9.99	10.11	10.09	16.08
		5230.0	11.80	11.83	11.79	11.87	17.84
		5755.0	11.32	11.25	11.35	11.28	17.32
		5795.0	11.34	11.20	11.40	11.24	17.32
	800	5190.0	9.96	9.89	10.04	9.95	15.98
		5230.0	11.71	11.71	11.70	11.73	17.73
		5755.0	11.21	11.20	11.27	11.19	17.24
		5795.0	11.23	11.13	11.30	11.14	17.22
IEEE 802.11ac 80 MHz	117.2	5210.0	7.91	7.86	8.02	7.97	13.96
		5775.0	11.90	11.80	11.89	11.82	17.87
	1733.2	5210.0	7.81	7.78	7.93	7.89	13.87
		5775.0	11.82	11.72	11.77	11.70	17.77

Note:1. The relevant measured result has the offset with cable loss already.

4. Test Results

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11b CDD	1	2412.0	1	20	25.00	3.11	2.04	1	645.1	0.128
		2437.0	1	20	25.00	3.11	2.04	1	645.1	0.128
		2462.0	1	20	25.00	3.11	2.04	1	645.1	0.128
IEEE 802.11g CDD	6	2412.0	1	20	23.00	3.11	2.04	1	407.03	0.081
		2437.0	1	20	23.00	3.11	2.04	1	407.03	0.081
		2462.0	1	20	23.00	3.11	2.04	1	407.03	0.081
IEEE 802.11n 2.4 GHz 20 MHz STBC	26	2412.0	1	20	22.50	3.11	2.04	1	362.77	0.072
		2437.0	1	20	22.50	3.11	2.04	1	362.77	0.072
		2462.0	1	20	22.50	3.11	2.04	1	362.77	0.072
IEEE 802.11n 2.4 GHz 40 MHz STBC	54	2422.0	1	20	21.50	3.11	2.04	1	288.16	0.057
		2437.0	1	20	21.50	3.11	2.04	1	288.16	0.057
		2452.0	1	20	21.50	3.11	2.04	1	288.16	0.057

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11a CDD	6	5180.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5200.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5220.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5240.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5745.0	1	20	25.50	5.45	3.51	1	1245.39	0.248
		5765.0	1	20	25.50	5.45	3.51	1	1245.39	0.248
		5785.0	1	20	25.50	5.45	3.51	1	1245.39	0.248
		5805.0	1	20	25.50	5.45	3.51	1	1245.39	0.248
		5825.0	1	20	25.50	5.45	3.51	1	1245.39	0.248
IEEE 802.11ac 20 MHz STBC	26	5180.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5200.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5220.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5240.0	1	20	22.50	4.47	2.8	1	497.92	0.099
		5745.0	1	20	25.00	5.45	3.51	1	1109.96	0.221
		5765.0	1	20	25.00	5.45	3.51	1	1109.96	0.221
		5785.0	1	20	25.00	5.45	3.51	1	1109.96	0.221
		5805.0	1	20	25.00	5.45	3.51	1	1109.96	0.221
		5825.0	1	20	25.00	5.45	3.51	1	1109.96	0.221
IEEE 802.11ac 40 MHz STBC	54	5190.0	1	20	25.00	4.47	2.8	1	885.44	0.176
		5230.0	1	20	25.00	4.47	2.8	1	885.44	0.176
		5755.0	1	20	24.00	5.45	3.51	1	881.67	0.175
		5795.0	1	20	24.00	5.45	3.51	1	881.67	0.175
IEEE 802.11ac 80 MHz STBC	117.2	5210.0	1	20	20.50	4.47	2.8	1	314.17	0.063
		5775.0	1	20	24.50	5.45	3.51	1	989.25	0.197

Band	Data Rate (Mbps)	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Max tune-up Power (upper limit) [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (mW)	Power Density [S] (mw/cm ²)
IEEE 802.11n 2.4 GHz 20 MHz BF ON	26	2412.0	1	20	16.00	9.12	8.17	1	325.25	0.065
		2437.0	1	20	16.00	9.12	8.17	1	325.25	0.065
		2462.0	1	20	16.00	9.12	8.17	1	325.25	0.065
IEEE 802.11n 2.4 GHz 40 MHz BF ON	54	2422.0	1	20	15.00	9.12	8.17	1	258.36	0.051
		2437.0	1	20	15.00	9.12	8.17	1	258.36	0.051
		2452.0	1	20	15.00	9.12	8.17	1	258.36	0.051
IEEE 802.11ac 20 MHz BF ON	26	5180.0	1	20	16.00	10.49	11.19	1	445.48	0.089
		5200.0	1	20	16.00	10.49	11.19	1	445.48	0.089
		5220.0	1	20	16.00	10.49	11.19	1	445.48	0.089
		5240.0	1	20	16.00	10.49	11.19	1	445.48	0.089
		5745.0	1	20	18.50	11.47	14.03	1	993.25	0.198
		5765.0	1	20	18.50	11.47	14.03	1	993.25	0.198
		5785.0	1	20	18.50	11.47	14.03	1	993.25	0.198
		5805.0	1	20	18.50	11.47	14.03	1	993.25	0.198
		5825.0	1	20	18.50	11.47	14.03	1	993.25	0.198
IEEE 802.11ac 40 MHz BF ON	54	5190.0	1	20	18.00	10.49	11.19	1	706.04	0.140
		5230.0	1	20	18.00	10.49	11.19	1	706.04	0.140
		5755.0	1	20	17.50	11.47	14.03	1	788.96	0.157
		5795.0	1	20	17.50	11.47	14.03	1	788.96	0.157
IEEE 802.11ac 80 MHz BF ON	117.2	5210.0	1	20	14.50	10.49	11.19	1	315.38	0.063
		5775.0	1	20	18.00	11.47	14.03	1	885.23	0.176

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.
2. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
3. Each band max power which perform MPE of any configurations.
4. The MPE results are evaluated by lowest data rate for WLAN.
5. The device operating IEEE 802.11 a/b/g mode is 4TX CDD.
6. The device operating IEEE 802.11 n/ac mode is 4TX STBC / Beamforming on.

Simultaneous Transmitting :

$$\text{Total MPE} = 2.4\text{GHz MPE} + 5\text{GHz MPE} = 0.128 + 0.248 = 0.376 \text{ (mw)/cm}^2 < 1 \text{ (mw)/cm}^2$$