

MPE Report

Applicant : Iconnect
Product Type : 802.11ac WiFi Dual-Band AP/Bridge
Trade Name : ALFA
Model Number : MatrixPro 2, Matrix 2X, Matrix 2, Matrix 2-EX,
AP120C-AC, N52Q, APAC-5824, IWA-AP102,
WA512G, AP120CU-AC PCBA, AP120C-AC PCBA,
Range-ACX, Range-AC

Test Specification : ANSI / IEEE Std.C95.1-1992 / IEEE Std. 1528-2013
47 CFR § 2.1091
47 CFR § 1.1310

Received Date : Mar. 22, 2019
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Issue by

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Taiwan Accreditation Foundation accreditation number: 1330
Test Firm MRA designation number: TW0010

Note:

- 1.The test results are valid only for samples provided by customers and under the test conditions described in this report.
- 2.This report shall not be reproduced except in full, without the written approval of A Test Lab Technology Corporation.
- 3.The relevant information is provided by customers in this test report. According to the correctness, appropriateness or completeness of the information provided by the customer, if there is any doubt or error in the information which affects the validity of the test results, the laboratory does not take the responsibility.



Revision History

Rev.	Issue Date	Revisions	Revised By
00	Aug. 14, 2019	Initial Issue	Jennifer Liu
01	Aug. 22, 2019	Page 9 Revised Test Result Frequency.	Jennifer Liu
02	Aug. 27, 2019	IEEE 802.11b/g/n 2.4 GHz 20 MHz deletes channel 13 data and information. IEEE 802.11n 2.4 GHz 40 MHz deletes channel 11 data and information.	Jennifer Liu
03	Aug. 28, 2019	Page 1 & 4 Revised Model Number.	Jennifer Liu



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1. Reference Testing Standards

Standard	Description	Version
ANSI/IEEE C95.1	American National Standard safety levels with respect to human exposure to radio frequency electromagnetic fields, 300 KHz to 100 GHz, New York.	2005

2. Description of Equipment under Test (EUT)

Applicant	Iconnect No.9, Aly. 58, Ln. 112, Ruiguang Rd., Neihs Dist., Taipei City, 114 ,Taiwan	
Manufacturer	Iconnect No.9, Aly. 58, Ln. 112, Ruiguang Rd., Neihs Dist., Taipei City, 114 ,Taiwan	
Product Type	802.11ac WiFi Dual-Band AP/Bridge	
Trade Name	ALFA	
Model Number	MatrixPro 2, Matrix 2X, Matrix 2, Matrix 2-EX, AP120C-AC, N52Q, APAC-5824, IWA-AP102, WA512G, AP120CU-AC PCBA, AP120C-AC PCBA, Range-ACX, Range-AC	
Models different description	<p>The different lies in the appearance of the material, as follows :</p> <p>Iron shell : MatrixPro 2 Plastic shell : Matrix 2X Iron shell / Plastic shell : Matrix 2, Matrix 2-EX, AP120C-AC, N52Q, APAC-5824, IWA-AP102, WA512G, AP120CU-AC PCBA, AP120C-AC PCBA , Range-ACX, Range-AC</p> <p>Due to market demand, several series models are added. rest of the spare parts such as circuit design and printed circuit boards remain the same.</p>	
FCC ID	2AB874018	
Frequency Range	Operate Band	Frequency Range (MHz)
	IEEE 802.11b / 802.11g	2412 - 2462
	IEEE 802.11n 2.4 GHz 20 MHz	
	IEEE 802.11n 2.4 GHz 40 MHz	2422 - 2452
	IEEE 802.11a U-NII Band I	5180 - 5240
	IEEE 802.11a U-NII Band III	5745 - 5825
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band I	5180 - 5240
	IEEE 802.11n 5 GHz / 802.11ac 20 MHz U-NII Band III	5745 - 5825
	IEEE 802.11n 5 GHz / 802.11ac 40 MHz U-NII Band I	5190 - 5230
	IEEE 802.11n 5 GHz / 802.11ac 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	ANT	Manufacturer	Model	Type	Frequency (MHz)	Max. Gain (dBi)
	ANT-0/ ANT-1	Alfa Networks Inc.	AOA-2458-59-TM	External antenna (N Type)	2412-2462	5
					5150-5250	9
					5725-5850	9
	G _{ANT}				2412-2462	5
					5150-5250	9
					5725-5850	9
	Directional Gain				2412-2462	8.01
					5150-5250	12.01
					5725-5850	12.01
Antenna Delivery	IEEE 802.11b / 802.11g: 2TX (CDD) IEEE 802.11n 2.4 GHz 20 MHz / 40 MHz: 2TX (MiMO) IEEE 802.11a: 2TX (CDD) IEEE 802.11ac 20 MHz / 40 MHz / 80 MHz: 2TX (MiMO)					
RF Evaluation	0.985 mW/cm ²					
Operate Temp. Range	-40 ~ 40°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



3. *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
$S = \frac{PG}{4\pi R^2}$ <p>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.</p>

4. RF Output Power

Band	Data Rate (Mbps)	Frequency (MHz)	Average Conducted power (dBm)		
			ANT-0	ANT-1	ANT-0+1
IEEE 802.11b	1	2412.0	19.28	19.79	22.55
		2437.0	20.47	20.17	23.33
		2462.0	19.22	18.72	21.99
IEEE 802.11g	6	2412.0	12.74	13.06	15.91
		2437.0	17.37	17.41	20.40
		2462.0	11.97	12.71	15.37
IEEE 802.11n 2.4 GHz 20 MHz	13	2412.0	12.67	13.07	15.88
		2437.0	16.53	16.77	19.66
		2462.0	12.11	12.77	15.46
IEEE 802.11n 2.4 GHz 40 MHz	27	2422.0	8.08	8.88	11.51
		2437.0	14.13	14.61	17.39
		2452.0	8.23	8.61	11.43

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-0+1
IEEE 802.11a	6	5180.0	15.04	14.19	17.65
		5200.0	18.81	18.12	21.49
		5220.0	18.80	18.29	21.56
		5240.0	18.85	18.45	21.66
		5745.0	20.47	20.37	23.43
		5765.0	20.36	20.15	23.27
		5785.0	20.35	20.00	23.19
		5805.0	20.32	20.00	23.17
		5825.0	20.36	20.05	23.22
IEEE 802.11ac 20 MHz	13	5180.0	15.15	14.10	17.67
		5200.0	18.86	18.23	21.57
		5220.0	18.84	18.34	21.61
		5240.0	18.94	18.41	21.69
		5745.0	20.40	20.44	23.43
		5765.0	20.36	20.20	23.29
		5785.0	20.41	20.12	23.28
		5805.0	20.37	19.99	23.19
		5825.0	20.39	20.03	23.22
IEEE 802.11ac 40 MHz	27	5190.0	9.80	8.83	12.35
		5230.0	16.90	16.23	19.59
		5755.0	17.86	17.83	20.86
		5795.0	17.93	17.53	20.74
IEEE 802.11ac 80 MHz	58.6	5210.0	6.38	5.78	9.10
		5775.0	12.47	12.29	15.39

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

5. Test Result

Antenna	Band	Frequency (MHz)	Limit (mw)/cm ²	Distance [R] (cm)	max tune-up Power [P] (dBm)	ANT Gain (dBi)	Numeric Gain [G]	Duty Cycle	Power with Duty cycle [TP] (mW)	Power Density [S] (mw)/cm ²
Wi-Fi Antenna	2.4 GHz	2412-2462	1	21	23.83	8.01	6.32	1	1527.59	0.276
	5 GHz	5150-5250	1	21	22.19	12.01	15.89	1	2633.07	0.475
		5725-5850	1	21	23.93	12.01	15.89	1	3928.10	0.709

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 21 cm, even if calculations indicate MPE distance is less.
2. We used the maximum power and gain to provide MPE results.
3. The Numeric Gain calculated by $10^{(\text{ant. Gain(dBi)} / 10)}$.
4. The MPE results are evaluated by lowest data rate for WLAN.
5. The device operating IEEE 802.11 a/b mode is 2TX CDD.
6. The device operating IEEE 802.11 ac/n mode is 2TX MIMO.

Simultaneous Transmitting :

$$\text{Total MPE} = 2.4\text{GHz MPE} + 5\text{GHz MPE} = 0.276 + 0.709 = 0.985 \text{ (mw)/cm}^2 < 1 \text{ (mw)/cm}^2$$

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