

MPE Report

Applicant : PISMO LABS TECHNOLOGY LIMITED
Product Type : PEPWAVE / peplink Wireless Product
Trade Name : PEPWAVE, peplink
Model Number : AP One AC Mini, PismoAC0P, AC0P, APO-AC-MINI, AP One series, AC0E, PismoAC0E

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

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Issue by

Approved By : Jet Lu Tested By : Kris Pan
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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



Revision History

Rev.	Issue Date	Revisions	Revised By
00	Jul. 31, 2019	Initial Issue	Shelly Chen



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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	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong				
Manufacturer	PISMO LABS TECHNOLOGY LIMITED A8, 5/F, HK Spinners Industrial Building, Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Hong Kong				
Product Type	PEPWAVE / peplink Wireless Product				
Trade Name	PEPWAVE, peplink				
Model Number	AP One AC Mini, PismoAC0P, AC0P, APO-AC-MINI, AP One series, AC0E, PismoAC0E				
Product Type /Trade Name / Model Number Different Description	Those product Type & trade names & model numbers differ from each other in selling region.				
FCC ID	U8G-P1AC0P				
Frequency Range	Operate Band			Frequency Range (MHz)	
	IEEE 802.11b / 802.11g IEEE 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 802.11n 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	Model	Type	Frequency (MHz)	Max. Gain (dBi)
	ANT-0	SSP-16713	PIFA Antenna	2412 - 2462	2.13
				5150 - 5250	2.62
				5745 - 5825	2.39
	ANT-1	SSP-16713	PIFA Antenna	2412 - 2462	1.99
				5150 - 5250	2.71
				5745 - 5825	2.92
	G _{ANT}			2412 - 2462	2.06
				5150 - 5250	2.67
				5745 - 5825	2.66
	Directional Gain			2412 - 2462	5.07
				5150 - 5250	5.68
				5745 - 5825	5.67



Antenna Delivery	IEEE 802.11b / IEEE 802.11g: 2TX (CDD) IEEE 802.11n 2.4GHz 20 MHz / 40 MHz: 2TX (MIMO) IEEE 802.11a: 2TX (CDD) IEEE 802.11ac 20 MHz / 40 MHz / 80 MHz: 2TX (MIMO)
RF Evaluation	0.310 mW/cm ²
Temperature Range	-5 ~ +45°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
$S = \frac{PG}{4\pi R^2}$ 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.

4. 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-0+1
IEEE 802.11b	1	2412.0	15.47	14.90	18.20
		2437.0	16.33	14.91	18.69
		2462.0	11.55	11.02	14.30
IEEE 802.11g	6	2412.0	15.94	14.82	18.43
		2437.0	19.63	18.79	22.24
		2462.0	14.10	13.15	16.66
IEEE 802.11n 2.4 GHz 20 MHz (256QAM)	13	2412.0	15.07	13.87	17.52
		2437.0	19.70	18.86	22.31
		2462.0	14.89	14.15	17.55
IEEE 802.11n 2.4 GHz 40 MHz (256QAM)	27	2422.0	13.11	12.04	15.62
		2437.0	16.03	15.14	18.62
		2452.0	12.28	11.41	14.88
IEEE 802.11a	6	5180.0	16.86	16.41	19.65
		5200.0	20.45	20.12	23.30
		5220.0	20.62	20.31	23.48
		5240.0	20.73	20.41	23.58
		5745.0	20.03	20.20	23.13
		5765.0	20.13	20.25	23.20
		5785.0	20.02	19.98	23.01
		5805.0	20.05	19.92	23.00
IEEE 802.11ac 20 MHz	13	5825.0	20.21	20.07	23.15
		5180.0	16.79	16.41	19.61
		5200.0	20.51	20.09	23.32
		5220.0	20.59	20.21	23.41
		5240.0	20.72	20.33	23.54
		5745.0	19.94	19.93	22.95
		5765.0	20.07	19.91	23.00
		5785.0	20.02	19.95	23.00
IEEE 802.11ac 40 MHz	27	5805.0	20.01	20.05	23.04
		5825.0	20.15	20.13	23.15
		5190.0	12.18	11.33	14.79
		5230.0	20.67	20.11	23.41
IEEE 802.11ac 80 MHz	58.6	5755.0	20.62	20.06	23.36
		5795.0	20.92	20.09	23.54
		5210.0	10.21	9.55	12.90
		5775.0	18.43	18.15	21.30

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



5. Test Results

Antenna	Band	Frequency (MHz)	Limit (mw)	Distance [R] (cm)	Tune-up Power (dBm) [P]	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	20	22.81	5.07	3.21	1	613.14	0.122
	5 GHz	5180-5240	1	20	24.08	5.68	3.70	1	947.38	0.188
		5745-5825	1	20	24.04	5.67	3.69	1	934.41	0.186

Note:

1. Mobile or fixed location transmitters, minimum separation distance is 20 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/g mode is 2TX CDD.
6. The device operating IEEE 802.11 ac/n mode is 2TX MIMO.

Simultaneous Transmitting:

$$\text{Total MPE} = 2.4 \text{ GHz MPE} + 5 \text{ GHz MPE} = 0.122 + 0.188 = 0.310 \text{ mw/cm}^2 < 1 \text{ mw/cm}^2$$

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