



**SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch**

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RF Exposure Evaluation Report

Application No.: HKES1707001942IT
Applicant: Pismo Labs Technology Limited
Address of Applicant: UNIT A5, 5/F HK SPINNERS INDUSTRIAL BUILDING, PHASE 6, 481
CASTLE PEAK ROAD, CHEUNG SHA WAN, KOWLOON, HONG KONG
Manufacturer: Pismo Labs Technology Limited
Address of Manufacturer: UNIT A5, 5/F HK SPINNERS INDUSTRIAL BUILDING, PHASE 6, 481
CASTLE PEAK ROAD, CHEUNG SHA WAN, KOWLOON, HONG KONG
Equipment Under Test (EUT):
Product Name: Peplink / Pepwave / Pismo Labs Wireless Product
Model No.: MAX BR1 IP55, MAX BR1 LTE IP55, MAX BR1 LTEA IP55, PismoAC9,
Pismo AC9♣
♣ Please refer to section 2 of this report which indicates which model was
actually tested and which were electrically identical.
FCC ID: U8G-P1AC9
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
Date of Receipt: 2017-07-20
Date of Test: 2017-09-18 to 2018-07-30
Date of Issue: 2018-08-06

Test Result :	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.



Keny Xu
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2018-08-06		Original

Authorized for issue by:				
				
		Jacky Li /Project Engineer		
				
		Eric Fu /Reviewer		



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4 General Information

4.1 General Description of EUT

Power Supply:	DC 56V Power adapter: Model No.: POE31U-1AT; Input: AC 100-240V, 50-60Hz, 0.8A; Output: DC 56V, 0.536A			
For 2.4G:				
Type of Modulation:	IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n (HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)			
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz			
Channel Number:	IEEE 802.11b/g, IEEE 802.11n(HT20): 11 Channels IEEE 802.11n(HT40): 7 Channels			
Channels Step:	Channels with 5MHz step			
Sample Type:	Mobile production			
Antenna Type:	PIFA			
Antenna Gain:	Antenna 1: 5dBi; Antenna 2: 5dBi Two antennas can simultaneous transmission			
For 5G:				
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	IEEE 802.11a	5180-5240	4
		IEEE 802.11n/ac 20MHz	5180-5240	4
		IEEE 802.11n/ac 40MHz	5190-5230	2
		IEEE 802.11ac 80MHz	5210	1
	UNII Band III	IEEE 802.11a	5745-5825	5
		IEEE 802.11n/ac 20MHz	5745-5825	5
		IEEE 802.11n/ac 40MHz	5755-5795	2
		IEEE 802.11ac 80MHz	5775	1
Type of Modulation:	IEEE 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE 802.11n: OFDM(BPSK/QPSK/16QAM/64QAM)			



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	IEEE 802.11ac: OFDM (BPSK/QPSK/16QAM/64QAM/256QAM)
DFS Function	Slave without Radar detection
TPC Function	Support
Antenna Type	PIFA
Antenna Gain	Antenna 1: 5.5dBi, Antenna 2: 6dBi
Contain LTE module:	M/N: MC7455, FCC ID: N7NMC7455 M/N: MC7354, FCC ID: N7NMC7355

Remark:

Model No.: MAX BR1 IP55, MAX BR1 LTE IP55, MAX BR1 LTEA IP55, PismoAC9, Pismo AC9

Only the model MAX BR1 IP55 was tested, since the electrical circuit design, layout, components used, internal wiring and functions were identical for all the above models, with only difference on model No.



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4.2 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China
518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.3 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Industry Canada (IC)**

Two 3m Semi-anechoic chambers and the 10m Semi-anechoic chamber of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1, 4620C-2, 4620C-3.



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4.4 Deviation from Standards

None.

4.5 Abnormalities from Standard Conditions

None.

4.6 Other Information Requested by the Customer

None.



5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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				
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

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



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4.1.3 EUT RF Exposure Evaluation

For 2.4G Wifi

Antenna Gain: 5dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.16 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratio	Result
Lowest	2422	23.33	215.28	0.135	1.0	0.135	PASS

Note: Refer to report No. HKES170700194201 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

For 5G Wifi

Antenna Gain 1 is 5.5dBi, Antenna Gain 2 is 6dBi.

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.55, 3.98 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratio	Result
High	5825	15.14	32.66	0.026	1.0	0.026	PASS

Note: Refer to report No. HKES170700194202 for EUT test Max Conducted Peak Output Power value.

The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



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For WCDMA BAND II

Antenna Gain is 4.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.51 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Mode	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratio	Result
WCDMA BAND II	24	251.19	0.125	1.0	0.125	PASS

For WCDMA BAND V

Antenna Gain is 2.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.58 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Mode	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratio	Result
WCDMA BAND V	24	251.19	0.079	0.549	0.144	PASS

For LTE BAND 7

Antenna Gain is 4.0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.51 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Mode	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit	MPE Ratio	Result
LTE BAND 7	24	251.19	0.125	1.0	0.125	PASS

Worst case scenario

Max Simultaneous transmission (2.4G and 5Gwifi with LTE)

$MPE=0.135+0.026+0.144=0.305<1$, so this product complies with RF exposure requirement and SAR test is not needed

- End of the Report -