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

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

RF Exposure Evaluation Report

Application No.:	HKES1509001807PS
Applicant:	Pismo Labs Technology Limited
Product Name:	Pepwave/Peplink/Pismo Wireless Product
Model No.(EUT):	Surf SOHO
Add Item No.:	Surf SOHO LTE, MAX, Surf Pro, AP Pro, Device Connector, Express, Balance, Pismo 734,CarFi,Flex AP, Pismo 934
FCC ID:	U8G-P1934S
Standards:	47 CFR Part 1.1307(2014)
	47 CFR Part 1.1310(2014)
Date of Receipt:	2015-09-30
Date of Test:	2015-10-03
Date of Issue:	2015-10-09
Test Result :	**PASS***

* In the configuration tested, the EUTdetailed in this report complied with the standards specified above.

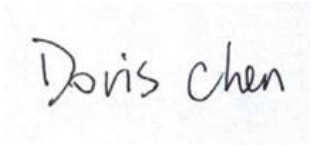
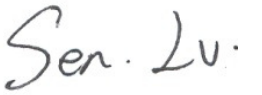
Authorized Signature:

Jack Zhang
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.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2015-10-09		Original

Authorized for issue by:				
Tested By		 **(Bill Chen) /Project Engineer**		2015-10-03 **Date**
Prepared By		 **(Doris Chen) /Clerk**		2015-10-09 **Date**
Checked By		 **(Sen Lv) /Reviewer**		2015-10-09 **Date**

3 Contents

4 General Information

4.1 Client Information

Applicant:	Pismo Labs Technology Limited
Address of Applicant:	Unit A5, 5/F, HK Spinners Ind. Bldg., Phase 6, 481 Castle Peak Road, Cheung Sha Wan, Kowloon, Hong Kong

4.2 General Description of EUT

Product Name:	Pepwave/Peplink/Pismo Wireless Product
Model No.:	Surf SOHO
Sample Type:	Fixed production
Power Supply:	Input: AC 100V-240V 50-60Hz 600mA Output: DC 12V 2000mA
DC Output Line:	146cm (Unshielded with a ferrite core)
For 2.4GHz	
Operation Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz IEEE 802.11n(HT40): 2422MHz to 2452MHz
Channel Numbers:	IEEE 802.11b/g, IEEE 802.11n(HT20): 11 Channels IEEE 802.11n(HT40): 7 Channels
Channel Separation:	5MHz
Type of Modulation:	IEEE for 802.11b: DSSS(CCK,DQPSK,DBPSK) IEEE for 802.11g : OFDM(64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11n(HT20 and HT40) : OFDM (64QAM, 16QAM, QPSK, BPSK)
Antenna Gain:	2.15dBi
Antenna Type:	PIFA
Number of transmitter chains	2
For 5GHz	
Operation Frequency:	IEEE 802.11a/ n(HT20/40): 5150MHz to 5250MHz IEEE 802.11a/ n(HT20/40): 5725MHz to 5850MHz
Type of Modulation:	IEEE for 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) IEEE for 802.11n : OFDM(BPSK/QPSK/16QAM/64QAM)
Antenna Gain:	3.49dBi
Antenna Type:	Dipole
Number of transmitter chains	2
Remark	
The device can support 2.4GHz and 5GHz, but they couldn't simultaneous transmitting.	

Remark:

Model No.: Surf SOHO, Surf SOHO LTE, MAX, Surf Pro, AP Pro, Device Connector, Express, Balance, Pismo 734,CarFi,Flex AP, Pismo 934

Only the Model Surf SOHO was tested, since the electrical circuit design, layout, components used and internal wiring were identical for all above models. Only the item number is different.

4.3 Test Location

All tests were performed at:

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

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.

4.4 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 10m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

• **FCC – Registration No.: 556682**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 556682.

• **Industry Canada (IC)**

The 3m Semi-anechoic chambers and the 10m Semi-anechoic chambers 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-2, 4620C-3.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 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: Pd = (Pout*G)/(4* Pi * R 2)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd id 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.

5.1.3 EUT RF Exposure Evaluation

For 2.4GHz

Antenna Gain: 2.15dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi = 2.15 + 3.01 = 5.16

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.28 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	Result
Middle	2437MHz	25.50	354.81	0.232	1.0	PASS

Note: Refer to report No. HKES150900180701 for EUT test Max Conducted Peak Output Power value.

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

For 5GHz

Antenna Gain: 3.49dBi

According to KDB 662911, the transmit signal is correlated,

So Directional gain = G_{ANT} + 10 log(N_{ANT}) dBi = 3.49 + 3.01 = 6.50

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 4.47 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Band I

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
38	5190 MHz	14.97	31.405	0.028	1.0	PASS

Note: Refer to report No. HKES150900180702 for EUT test Max Conducted Peak Output Power value.

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

Band IV

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
149	5745 MHz	20.09	102.094	0.091	1.0	PASS

Note: Refer to report No. HKES150900180702 for EUT test Max Conducted Peak Output Power value.

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

The device can support 2.4GHz and 5GHz, but they couldn't simultaneous transmitting.