



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

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# RF Exposure Evaluation Report

**Application No.:** HKES1709002655IT  
**Applicant:** Pismo Labs Technology Limited  
**Address of Applicant:** FLAT A5, 5/F HK SPINNERS IND BLDG., PHASE 6, 481 CASTLE PEAK ROAD, CHEUNG SHA WAN, KOWLOON, HONG KONG  
**Manufacturer:** Pismo Labs Technology Limited  
**Address of Manufacturer:** FLAT A5, 5/F HK SPINNERS IND BLDG., 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 IP67, MAX BR1 LTE IP67, MAX BR1 LTEA IP67, Pismo93067, Pismo930LITE ♣  
♣ Please refer to section 2 of this report which indicates which model was actually tested and which were electrically identical.  
**FCC ID:** U8G-P193067  
**Standards:** 47 CFR Part 1.1307 (2016)  
47 CFR Part 1.1310 (2016)  
**Date of Receipt:** 2017-09-21  
**Date of Test:** 2017-10-10 to 2017-10-23  
**Date of Issue:** 2017-11-22

<b>Test Result :</b>	<b>PASS*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.



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.

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**2 Version**

<b>Revision Record</b>				
<b>Version</b>	<b>Chapter</b>	<b>Date</b>	<b>Modifier</b>	<b>Remark</b>
01		2017-11-22		Original

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<b>Tested by</b>				
		<hr/>		Date: 2017-10-23
<b>Checked by</b>				
		<hr/>		Date: 2017-11-22



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## 4 General Information

### 4.1 General Description of EUT

Power Supply:	Adapter Model: DSA-24PFM-12 FEU Input: AC100-240V, 50/60Hz, 0.8A Output: DC12V, 2A Or Power Over Ethernet(POE)
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)
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): 9 Channels
Channels Step:	Channels with 5MHz step
Sample Type:	Mobile production
Antenna Type:	Integral
Antenna Gain:	5.1dBi



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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 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 –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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	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/cm<sup>2</sup>

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 is the limit of MPE, 1 mW/cm<sup>2</sup>. 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**

Antenna Gain: 5.1dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.2 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 <sup>2</sup> )	Limit	Result
Lowest	2437	21.18	131.22	0.084	1.0	PASS

Note 1: Refer to report No. HKES170900265502 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.





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The EUT has included module MC7455/ MC7433 separately, and the MPE result is listed below.

Remark 1: module MC7455 cannot operation with BLE/ WiFi simultaneously, the MPE result is 0.864 < 1 and detail is shown in table 1

Operating Mode	TX Freq Range (MHz)		Max Time-Avg Cond Power (dBm)	Max Time-Avg Cond Power (W)	Max Ant Gain (dBi)	Source-Based Time-Averaged Max EIRP	Power Density @20 cm (W/m <sup>2</sup> )	IC MPE Limit (W/m <sup>2</sup> )	IC PwrDensity MPE Ratio
WCDMA Band II LTE Band 2	1850	1910	24	0.25	6	30	1.99	4.48	0.444
WCDMA Band IV LTE Band 4	1710	1755	24	0.25	6	30	1.99	4.24	0.469
WCDMA Band V LTE Band 5	824	849	24	0.25	6	30	1.99	2.58	0.772
LTE Band 7	2500	2570	23	0.20	9	32	3.15	5.50	0.573
LTE Band 12	699	716	24	0.25	6	30	1.99	2.30	0.864
LTE Band 13	777	787	24	0.25	6	30	1.99	2.47	0.804
LTE Band 25	1850	1915	24	0.25	6	30	1.99	4.48	0.444
LTE Band 26	814	849	24	0.25	6	30	1.99	2.55	0.779
LTE Band 30	2305	2315	23	0.20	1	32	0.50	5.20	0.096
LTE Band 41	2496	2690	23	0.20	9	32	3.15	5.49	0.574
WLAN 2.4 GHz	2400	2500				25	0.63	5.35	0.118
WLAN 5 GHz	5150	5850				27	1.00	9.01	0.111
WiMAX	2300	2400				25	0.63	5.19	0.121
	2500	2700				25	0.63	5.50	0.114
	3300	3800				25	0.63	6.65	0.095
BT	2400	2500				15	0.06	5.35	0.012

Table 1: MC7455 Stanalone MPE calculation



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Remark 2: Module MC7355 cannot operation with BLE/ WiFi simultaneously, the MPE result is 0.199 < 1 and detail is shown in table 2

The power density calculations for the individual transmitters per wireless technology at an exposure minimum separation distance of 20cm are shown in Table 2.

For frequency dependent limit, the lowest transmitter frequency was used to represent the lowest MPE limit in this analysis (eg. 824MHz = 0.549mW/cm<sup>2</sup> )

	Technology	Frequency (MHz)	Maximum Conducted Power (dBm)	Maximum Conducted Power (W)	Maximum Antenna Gain (dBi)	Duty Cycle	Average EIRP (dBm)	Average EIRP (mW)	Power Density @ 20cm (mW/cm <sup>2</sup> )	FCC MPE Limit (mW/cm <sup>2</sup> )
MC7355 Module	GPRS 2 UL	824-849	33.0	2.00	3.0	0.250	29.98	995.268	0.198	0.549
	EDGE 2 UL	824-849	28.0	0.63	3.0	0.250	24.98	314.731	0.063	0.549
	EDGE 3 UL	824-849	26.2	0.42	3.0	0.375	24.94	311.911	0.062	0.549
	EDGE 4UL	824-849	25.0	0.32	3.0	0.500	24.99	315.479	0.063	0.549
	GPRS 2 UL	1850-1910	30.0	1.00	3.0	0.250	26.98	498.816	0.099	1.000
	EDGE 2 UL	1850-1910	27.0	0.50	3.0	0.250	23.98	250.000	0.050	1.000
	EDGE 3 UL	1850-1910	25.2	0.33	3.0	0.375	23.94	247.760	0.049	1.000
	EDGE 4UL	1850-1910	24.0	0.25	3.0	0.500	23.99	250.594	0.050	1.000
	CDMA BC0	824-849	25.0	0.3	3.0	1.000	28.00	630.957	0.126	0.549
	CDMA BC1	1850-1910	25.0	0.3	3.0	1.000	28.00	630.957	0.126	1.000
	CDMA BC10	817-824	25.0	0.3	3.0	1.000	28.00	630.957	0.126	0.544
	UMTS	824 - 849	24.0	0.251	3.0	1.000	27.00	501.187	0.100	0.549
	UMTS	1710-1755	24.0	0.251	6.0	1.000	30.00	1000.000	0.199	1.000
	UMTS	1850 - 1910	24.0	0.251	3.0	1.000	27.00	501.187	0.100	1.000
	LTE	704 - 716	24.0	0.3	6.0	1.000	30.00	1000.000	0.199	0.469
	LTE	777 - 787	24.0	0.3	6.0	1.000	30.00	1000.000	0.199	0.518
	LTE	824 - 849	24.0	0.3	3.0	1.000	27.00	501.187	0.100	0.549
	LTE	1710 - 1755	24.0	0.3	6.0	1.000	30.00	1000.000	0.199	1.000
LTE	1850 - 1910	24.0	0.3	3.0	1.000	27.00	501.187	0.100	1.000	
LTE	1850 - 1915	24.0	0.3	3.0	1.000	27.00	501.187	0.100	1.000	

Table 2: MC7355 Stanalone MPE calculation