



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

Email: ee.shenzhen@sgs.com

Report No.: HKES170100022004

Page: 1 of 9

RF Exposure Evaluation Report

Application No: HKES17010002201T

Applicant: PACIFIC SMART SYSTEM LIMITED

Product Name: Smart Terminal with LCD Display

Model No.: Smart Terminal

Brand Name: Pepxim

FCC ID: 2AK6U-P1IOT

Standards: 47 CFR Part 1.1307(2016)

47 CFR Part 1.1310(2016)

Date of Receipt: 2017-02-07

Date of Test: 2017-02-13 to 2017-02-28

Date of Issue: 2017-03-22

Test Result :	PASS*
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* In the configuration tested, the EUT detailed 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.

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2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2017-03-22		Original

Authorized for issue by:			
		 Hank Yan	2017-03-22
Tested By		Hank Yan /Project Engineer	Date
Checked By		 Eric Fu	2017-03-22
		Eric Fu /Reviewer	Date

3 Contents

	Page
1 COVER PAGE	1
2 VERSION	2
3 CONTENTS	3
4 GENERAL INFORMATION	4
4.1 CLIENT INFORMATION.....	4
4.2 GENERAL DESCRIPTION OF EUT	4
4.3 TEST LOCATION.....	5
4.4 TEST FACILITY.....	5
4.5 DEVIATION FROM STANDARDS	6
4.6 ABNORMALITIES FROM STANDARD CONDITIONS.....	6
4.7 OTHER INFORMATION REQUESTED BY THE CUSTOMER.....	6
5 RF EXPOSURE EVALUATION	7
5.1 RF EXPOSURE COMPLIANCE REQUIREMENT.....	7
5.1.1 <i>Limits</i>	7
5.1.2 <i>Test Procedure</i>	7
5.1.3 EUT RF EXPOSURE EVALUATION	8

4 General Information

4.1 Client Information

Applicant:	PACIFIC SMART SYSTEM LIMITED
Address of Applicant:	A5, 5/F, HK Spinners IND BLDG, Phase 6, 481 Castle Peak RD, Cheung Sha Wan, KL, HongKong

4.2 General Description of EUT

Product Name:	Smart Terminal with LCD Display							
Model No.:	SMART TERMINAL							
Antenna Type:	Integral Antenna							
Power Supply:	Powered by PoE port							
For 2.4G WIFI								
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2472MHz IEEE 802.n(HT40): 2422MHz to 2462MHz							
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)&(HT40): OFDM (64QAM, 16QAM,QPSK,BPSK)							
Antenna Gain:	2dBi							
For 5G WIFI								
Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels				
	UNII Band I	IEEE 802.11a	5180-5240	4				
		IEEE 802.11n 20MHz	5180-5240	4				
		IEEE 802.11n 40MHz	5190-5230	2				
	UNII Band III	IEEE 802.11a	5745-5825	5				
		IEEE 802.11n 20MHz	5745-5825	5				
		IEEE 802.11n 40MHz	5755-5795	2				
Data Modulation:	For 802.11a: OFDM(BPSK/QPSK/16QAM/64QAM) For 802.11n: OFDM(8PSK/QPSK/16QAM/64QAM)							
Antenna Gain:	2dBi							
For Bluetooth Low Energy (BLE)								
Note: The product uses a certified RF module (FCC ID:JQ6-OK5127CKMINI) which contains BLE and NFC. The RF parameter for BLE is below:								
Operation Frequency:	2402MHz to 2480MHz							
Maximum Tune-up power:	1.54dBm @ 2402MHz							
Antenna Gain:	3dBi							

4.3 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.

4.4 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)**

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.

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

Friis Formula

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

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 data at lowest, middle and highest channel individually.

5.1.3 EUT RF Exposure Evaluation

For 2.4GHz

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.585 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 = 20cm (mW/cm ²)	Limit	MPE Ratios	Result
Middle	2437	17.760	59.704	0.019	1	0.203	PASS

Note: Refer to report No. HKES170100022002 for EUT test Max Conducted Peak Output Power value.

The distancer (5th column) calculated from the Fries transmission formula is far greater than 20cm separation requirement.

For 5GHz

Band I

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.585 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 = 20cm (mW/cm ²)	Limit	MPE Ratios	Result
48	5240	13.590	22.856	0.007	1	0.014	PASS

Note: Refer to report No. HKES170100022003 for EUT test Max Conducted Peak Output Power value.

The distancer (5th column) calculated from the Fries transmission formula is far greater than 20cm separation requirement.

Band III

Antenna Gain: 2dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.585 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 = 20cm (mW/cm ²)	Limit	MPE Ratios	Result
149	5745	13.490	22.336	0.007	1	0.051	PASS

Note: Refer to report No. HKES170100022003 for EUT test Max Conducted Peak Output Power value.

The distancer (5th column) calculated from the Fries transmission formula is far greater than 20cm separation requirement.

For BLE

Antenna Gain: 3dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 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 = 20cm (mW/cm ²)	Limit	MPE Ratios	Result
00	2402	1.540	1.426	0.001	1	0.001	PASS

Note: Refer to the MPE report of the certified module (FCC ID:JQ6-OK5127CKMINI) and find the maximum ratio of the measured power density with limit in 2402MHz, so only choose the channel to do MPE evaluation.

Exposure conditions for simultaneous transmission operations

Σ of ratios simultaneous transmitting= Wi-Fi 2.4G + Wi-Fi 5G + BLE

Ratio of Power Density of Wi-Fi 2.4G at R = 20cm	Ratio of Power Density of Wi-Fi 5G at R = 20cm	Ratio of Power Density of BLE at R = 20cm	Total ratios simultaneous transmitting at R =20cm	Limit	Result
0.019	0.007	0.001	0.027	1.0	PASS