SGS-CSTC Standards Technical Services Co., Ltd.

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

SAR Evaluation Report

Application No.:	SZEM1405002742RF
Applicant:	Sherwood Southwest, LLC
Manufacturer:	Sherwood Southwest, LLC
Factory:	Providence Enterprise Limited
Product Name:	MFRM HUB
Model No.(EUT):	E-Hub
FCC ID:	2ADEU065800
Standards:	47 CFR Part 1.1307(2013) 47 CFR Part 2.1093 (2013) KDB447498D01 General RF Exposure Guidance v05
Date of Receipt:	2014-08-07
Date of Test:	2014-10-17 to 2014-11-04
Date of Issue:	2014-11-10
Test Result :	**PASS***

* In the configuration tested, the EUT 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.

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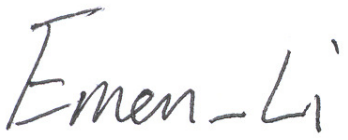
2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2014-11-10		Original

Authorized for issue by:				
Tested By		 **(Jim Huang) /Project Engineer**		2014-11-04 **Date**
Prepared By		 **(Link Liang) /Clerk**		2014-11-10 **Date**
Checked By		 **(Emen Li) /Reviewer**		2014-11-14 **Date**

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3 Contents

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4 General Information

4.1 Client Information

Applicant:	Sherwood Southwest, LLC
Address of Applicant:	2830 NE 29th Street, Ft. Lauderdale, FL 33306
Manufacturer:	Sherwood Southwest, LLC
Address of Manufacturer:	1825 W. Beltline Road, Suite 100 Carrollton, Texas 75006
Factory:	Providence Enterprise Limited
Address of Factory:	No.5-4 NeiHuan Road, shanxia Community, Pinghu Street, Longgang District, Shenzhen, China

4.2 General Description of EUT

Product Name:	MFRM HUB
Model No.:	E-Hub
Adaptor:	AC/DC adaptor model: YLS0121A-T050200 Input: 100-240V~50/60Hz 0.5A Max Output: 5.0V 2.0A
AC power cable:	150cm(unshield)
For Bluetooth	
1) classic mode	
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)
Modulation Type:	GFSK, π/4DQPSK, 8DPSK
Number of Channel:	79
Hopping Channel Type:	Adaptive Frequency Hopping systems
Sample Type:	Fixed production
Test Software of EUT:	CC256x_Bluetooth_Hardware_Evaluation_Tool.exe(manufacturer declare)
Antenna Type:	Integral
Antenna Gain:	2.5dBi
Test Voltage:	120V 60Hz

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2) BLE mode	
Operation Frequency:	2402MHz~2480MHz
Bluetooth Version:	4.0
Modulation Type:	GFSK
Number of Channel:	40
Sample Type:	Fixed production
Test Software of EUT:	CC256x_Bluetooth_Hardware_Evaluation_Tool.exe(manufacturer declare)
Antenna Type:	Integral
Antenna Gain:	2.5dBi
Test Voltage:	120V 60Hz
For Zigbee:	
Operation Frequency:	2405MHz~2480MHz
Modulation Type:	DSSS(O-QPSK)
Number of Channel:	16
Sample Type:	Fixed production
Antenna Type:	Integral
Antenna Gain:	3.3dBi
Test Voltage:	AC 120V 60Hz

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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.

- **VCCI**

  The 3m Semi-anechoic chamber, Full-anechoic Chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2197, G-416, 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 of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

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5 SAR Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v05

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

5.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)] ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR, where

f(GHz) is the RF channel transmit frequency in GHz
Power and distance are rounded to the nearest mW and mm before calculation[17]
The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

5.1.3 EUT RF Exposure

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For Bluetooth

1) classic mode

The Max Conducted Peak Output Power is 15.32dBm in highest channel(2.480GHz);

The best case gain of the antenna is 2.5dBi.

EIRP= 15.32dBm + 2.5dBi = 17.82dBm

17.82dBm logarithmic terms convert to numeric result is nearly 60.5341mW

According to the formula. calculate the EIRP test result:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)]

General RF Exposure = (60.5341mW / 32 mm) x √2.480GHz = 2.979 ①

SAR requirement:

S= 3.0 ② ;

① < ②.

So the SAR report is not required.

2) BLE mode

The Max Conducted Peak Output Power is 12.42dBm in middle channel(2.441GHz);

The best case gain of the antenna is 2.5dBi.

EIRP= 12.42dBm + 2.5dBi = 14.92dBm

14.92dBm logarithmic terms convert to numeric result is nearly 31.0456mW

According to the formula. calculate the EIRP test result:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)]

General RF Exposure = (31.0456mW / 32 mm) x √2.441GHz = 1.516 ①

SAR requirement:

S= 3.0 ② ;

① < ②.

So the SAR report is not required.

For Zigbee:

The Max Conducted Peak Output Power is 5.02dBm in highest channel(2.405GHz);

The best case gain of the antenna is 3.3dBi.

EIRP= 5.02dBm + 3.3dBi = 8.32dBm

8.32dBm logarithmic terms convert to numeric result is nearly 6.792036mW

According to the formula. calculate the EIRP test result:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] · [√f(GHz)]

General RF Exposure = (6.792036mW / 32 mm) x √2.405GHz = 0.329 ①

SAR requirement:

S= 3.0 ② ;

① < ②.

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