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

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1 Cover Page

RF MPE REPORT

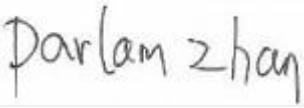
Application No.:	SHEM1808006612CR
Applicant:	Kohler Co.
FCC:	N82-KOHLER032
IC ID:	4554A-KOHLER032
Equipment Under Test (EUT): **NOTE:** The following sample(s) was/were submitted and identified by the client as	
Product Name:	UART CLOUD MODULE
Model No.(EUT):	1365472
Trade mark:	KOHLER
Standards:	FCC Rules 47 CFR §2.1091 KDB447498 D01 General RF Exposure Guidance v06 RSS-102 Issue 5 (March 2015)
Date of Receipt:	2018-08-07
Date of Test:	2018-08-08 to 2018-08-28
Date of Issue:	2018-09-10
Test Result:	**Pass***

* In the configuration tested, the EUT complied with the standards specified above.

Parlam Zhan
E&E Section 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.

Revision Record			
Version	**Description**	**Date**	**Remark**
00	Original	2018-09-10	/

Authorized for issue by:				
		 **Vincent Zhu / Project Engineer**		
		 **Parlam Zhan / Reviewer**		

2 Contents

3 General Information

3.1 Client Information

Applicant:	Kohler Co.
Address of Applicant:	444 Highland Drive KOHLER, WI 53044
Manufacturer:	Shanghai Kohler Electronics., Ltd.
Address of Manufacturer:	No. 1955, Fengxiang Road, Baoshan Area, Shanghai, PRC Post code: 200444
Factory:	Shanghai Kohler Electronics., Ltd.
Address of Factory:	No. 1955, Fengxiang Road, Baoshan Area, Shanghai, PRC Post code: 200444

3.1 General Description of E.U.T.

Power supply:	DC 5V

3.2 Technical Specifications

BLE

Antenna Gain	0dBi
Antenna Type	PIFA Antenna
Channel Spacing	2MHz
Modulation Type	GFSK
Number of Channels	40
Operation Frequency	2402MHz to 2480MHz

2.4G WiFi

Antenna Gain	2dBi
Antenna Type	PCB Antenna
Channel Spacing	5MHz
Modulation Type	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels	802.11b/g/n(HT20):11
Operation Frequency	802.11b/g/n(HT20): 2412MHz to 2462MHz

3.3 Test Location

All tests were performed at:
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. E&E Lab
588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China
Tel: +86 21 6191 5666 Fax: +86 21 6191 5678

No tests were sub-contracted.

3.4 Test Facility

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

• CNAS (No. CNAS L0599)

CNAS has accredited SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. 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.

• NVLAP (Certificate No. 201034-0)

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the National Voluntary Laboratory Accreditation Program(NVLAP). Certificate No. 201034-0.

• FCC –Designation Number: CN5033

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.
Designation Number: CN5033. Test Firm Registration Number: 479755.

• Industry Canada (IC) – IC Assigned Code: 8617A

The 3m Semi-anechoic chamber of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 8617A-1.

• VCCI (Member No.: 3061)

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.

4 Test Standards and Limits

4.1 FCC Radiofrequency radiation exposure limits:

According to§1.1310, the limit for general population/uncontrolled exposures

Frequency	Power density(mW/cm^2)	Averaging time(minutes)
300MHz~1.5GHz	f/1500	30
1.5GHz~100GHz	1.0	30

4.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where f is in MHz;

• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

• at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

5 Measurement and Calculation

5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHEM180800661201 & SHEM180800661202.

Test Mode	Test Frequency (MHz)	Output Power (dBm)	Reading Power (mW)
BLE	2402	**-1.14**	**0.77**
	2442	-1.24	0.75
	2480	-1.45	0.72

2.4G WiFi

Test Mode	Test Channel	Power [dBm]	Power [mW]
11B	2412	16.28	42.46
11B	2437	16.25	42.17
11B	2462	16.16	41.30
11G	2412	16.70	46.77
11G	2437	16.69	46.67
11G	2462	16.54	45.08
11N20SISO	2412	**16.79**	**47.75**
11N20SISO	2437	16.70	46.77
11N20SISO	2462	16.53	44.98

5.2 MPE Calculation

For FCC:

According to the formula S= $\frac{PG}{4R^2\pi}$, we can calculate S which is MPE.

Note:

1) P (Watts) =Power Input to antenna = $10^{\frac{dBm}{10}}$ / 1000

2) G (Antenna gain in numeric) = 10^ (Antenna gain in dBi /10)

3) R = distance to the center of radiation of antenna (in meter) = 20cm

4) MPE limit = 1mW/cm²

For BLE

The Max Conducted Peak Output Power is 0.77mW

The best case gain of the antenna is 0dBi. 0dB logarithmic terms convert to numeric result is nearly 1.

$$S= \frac{PG}{4R^2\pi} = \frac{0.77 \times 1}{4 \times 400 \times 3.14} =0.0002 \text{ mW/cm}^2$$

For 2.4G WiFi

The Max Conducted Peak Output Power is 47.75mW

The best case gain of the antenna is 2dBi. 2dB logarithmic terms convert to numeric result is nearly 1.58.

$$S= \frac{PG}{4R^2\pi} = \frac{47.75 \times 1.58}{4 \times 400 \times 3.14} =0.015 \text{ mW/cm}^2$$

The BT and the DTS modules can simultaneous transmitting at frequency 2.4GHz band.But the maximum rate of MPE is $\frac{0.0002}{1.0} + \frac{0.015}{1.0}$ =0.015<=1.0. according to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

For IC:

E.I.R.P.= P*G= 0.77×1=0.00077W＜2.68W

E.I.R.P.= P*G= 47.75×1.58=0.075W＜2.68W

The BT and the DTS modules can simultaneous transmitting at frequency 2.4GHz, But the maximum MPE is 0.075W+0.00077W=0.07577W<2.68W. So the device is exclusion from SAR test.

--End of the Report--