

1 Cover Page

RF Exposure Evaluation Report

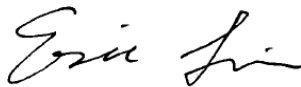
Application No.: KSEM2306001338AT
FCC ID: N82-KOHLER053
IC: 4554A-KOHLER053
Applicant: Kohler Co.
Address of Applicant: 444 Highland Drive Kohler, WI 53044 United States
Manufacturer: Shanghai Kohler Electronics., Ltd
Address of Manufacturer: No.1955, Fengxiang Road, Baoshan Area, Shanghai, 200444, PRC
Factory: Shanghai Kohler Electronics., Ltd
Address of Factory: No.1955, Fengxiang Road, Baoshan Area, Shanghai, 200444, PRC

Equipment Under Test (EUT):
EUT Name: 24GHz Radar
Model No.: 1521835
Trade Mark: KOHLER
Standard(s) : FCC Rules 47 CFR §2.1091
KDB447498 D01 General RF Exposure Guidance v06
RSS-102 Issue 5 Amendment 1 (February 2, 2021)

Date of Receipt: 2023-05-16
Date of Test: 2023-05-17 to 2023-08-06
Date of Issue: 2023-08-08

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards specified above.



Eric Lin
Laboratory Manager



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Revision Record			
Version	Description	Date	Remark
00	Original	2023-08-08	/

Authorized for issue by:			
		<i>Eric Liu</i>	
		Eric Liu/Project Engineer	
		<i>Eric Lin</i>	
		Eric Lin/Reviewer	



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2 Contents

	Page
1 COVER PAGE	1
2 CONTENTS	3
3 GENERAL INFORMATION	4
3.1 GENERAL DESCRIPTION OF E.U.T.	4
3.2 DETAILS OF E.U.T.	4
3.3 TEST LOCATION	4
3.4 TEST FACILITY	5
4 FCC RADIOFREQUENCY RADIATION EXPOSURE LIMITS	6
5 IC RADIOFREQUENCY RADIATION EXPOSURE LIMITS:	6
6 MEASUREMENT AND CALCULATION	7
6.1 MAXIMUM TRANSMIT POWER	7
6.2 RF EXPOSURE CALCULATION	7



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3 General Information

3.1 General Description of E.U.T.

Power supply:	DC 5V
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3.2 Details of E.U.T.

Operation Frequency Range:	24.00GHz to 24.25GHz
Modulation:	FMCW
Antenna type:	PCB Antenna
S/N:	0000
Firmware Version:	5.0.12

3.3 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888

Fax: +86 512 5737 0818

No tests were sub-contracted.

Note:

- 1.SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc) is provided by the applicant. (if applicable).
- 2.SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).



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Compliance Certification Services (Kunshan) Inc.

Report No.: KSEM230600133802

Page: 5 of 7

3.4 Test Facility

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

• **A2LA**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

• **FCC**

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

• **ISED**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory. Company Number: 2324E

• **VCCI**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.



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4 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

5 IC Radiofrequency radiation exposure limits:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ f ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ f ^{0.25}	0.1540/ f ^{0.25}	8.944/ f ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 f ^{0.3417}	0.008335 f ^{0.3417}	0.02619f ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ f ^{1.2}
150000-300000	0.158 f ^{0.5}	4.21 x 10 ⁻⁴ f ^{0.5}	6.67 x 10 ⁻⁵ f	616000/ f ^{1.2}

Note: f is frequency in MHz.
 *Based on nerve stimulation (NS).
 ** Based on specific absorption rate (SAR).

For 24G device, the limit of worse case is 10W/m²



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6 Measurement and Calculation

6.1 Maximum transmit power

The Power Data is based on the RF Test Report KSEM230600133801

Frequency (GHz)	dBuV/m @ 3m	E.I.R.P. Power (dBm)	E.I.R.P. Power (mW)
24.20	106.38	11.18	13.12

6.2 RF Exposure Calculation

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

Note:

- 1) P (mW)
- 2) G (Antenna gain in numeric)
- 3) R = distance to the center of radiation of antenna (in meter)
- 4) MPE limit = 1mW/cm²

The Max EIPR is 11.18dBm (13.12mW);

For FCC

$$S = \frac{PG}{4R^2\pi} = \frac{13.12}{4 \times R^2 \times 3.14} \leq 1 \text{mW/cm}^2$$

$$R \geq 1.02 \text{ cm}$$

For IC

$$S = \frac{PG}{4R^2\pi} = \frac{0.01312}{4 \times R^2 \times 3.14} \leq 10 \text{W/m}^2$$

$$R \geq 1.02 \text{ cm}$$

So the minimum distance to the center of radiation of antenna is 1.02cm, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report

--End of the Report--



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