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

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RF Exposure Evaluation Report

Application No.:	SZEM1702000894CR
Applicant:	KATHREIN Solutions GmbH
Manufacturer:	KATHREIN Solutions GmbH
Factory:	Sunwave Communications Co., Ltd
Product Name:	Remote Unit
Product Description:	The RU conducts digital-analog conversion and power amplification of the input signals.
Model No.(EUT):	REU
Trade Mark:	KATHREIN
FCC ID:	2AK72REU2525
Standards:	47 CFR Part 1.1307 (2016) 47 CFR Part 1.1310 (2016)
Date of Receipt:	2017-01-15
Date of Test:	2017-01-15 to 2017-04-05
Date of Issue:	2017-04-06
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.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2017-04-06		Original

Authorized for issue by:				
Tested By		Edison Li **Edison Li /Project Engineer**		2017-04-05 **Date**
Checked By		Eric Fu **Eric Fu /Reviewer**		2017-04-06 **Date**

3 Contents

4 General Information

4.1 Client Information

Applicant:	KATHREIN Solutions GmbH
Address of Applicant:	Lise-Meitner-Strasse 7, 85737 Ismaning
Manufacturer:	KATHREIN Solutions GmbH
Address of Manufacturer:	Lise-Meitner-Strasse 7, 85737 Ismaning
Factory:	Sunwave Communications Co., Ltd.
Address of Factory:	Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China Zip: 310053

4.2 General Description of EUT

Product Name:	Remote Unit
Model No.:	REU
Trade Mark:	KATHREIN
Sample Type:	Fixed production
Antenna Gain:	7dBi
Power Supply:	AC120V 60Hz
Optical Fiber:	100cm (unshielded)
DC Cable:	120cm (unshielded)
Type of Modulation:	LTE, WCDMA, CDMA
Frequency Band:	Downlink 1930MHz to 1995MHz include the Modulation: LTE, WCDMA, CDMA

4.3 Test Location

All tests were performed at:

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

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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

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R 2)

Where

Pd = power density in mW/cm2

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 id 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 and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure Evaluation

1) exposure conditions for standalone operations

Antenna Gain: 7dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 5 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

LTE	**1930~1995MHz**					
Frequency (MHz)	Maximun Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power density (mW/cm2)	Minimum Distance to Human body (m)
1932.5	7	5	44	25118.86	5	1.41
1962.5	7	5	44	25118.86	5	1.41
1992.5	7	5	44	25118.86	5	1.41
WCDMA	**1930~1995MHz**					
Frequency (MHz)	Maximun Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power density (mW/cm2)	Minimum Distance to Human body (m)
1932.4	7	5	44	25118.86	5	1.41
1962.5	7	5	44	25118.86	5	1.41
1992.6	7	5	44	25118.86	5	1.41
CDMA	**1930~1995MHz**					
Frequency (MHz)	Maximun Antenna Gain (dBi)	Maximum Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power density (mW/cm2)	Minimum Distance to Human body (m)
1931.25	7	5	44	25118.86	5	1.41
1962.5	7	5	44	25118.86	5	1.41
1993.75	7	5	44	25118.86	5	1.41

Conclusion:

So the recommend use distance away from EUT external antenna is larger than 1.41 meter.