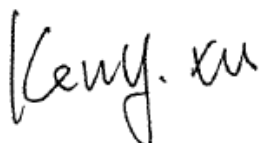


# RF Exposure Evaluation Report

**Application No.:** SZEM1907016814CR  
**Applicant:** Sunwave Communications Co., Ltd.  
**Address of Applicant:** Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China  
 Zip: 310053  
**Manufacturer / Factory:** Sunwave Communications Co., Ltd.  
**Address of Manufacturer / Factory:** Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R.China  
 Zip: 310053  
**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):** iDAS-R304000  
**Trade Mark:** CROSSFIRE, SUNWAVE  
**FCC ID:** 2AEJ4R30441  
**Standards:** 47 CFR Part 1.1307  
 47 CFR Part 1.1310  
**Date of Receipt:** 2019-07-06  
**Date of Test:** 2019-07-06 to 2019-08-01  
**Date of Issue:** 2019-08-02

<b>Test Result :</b>	<b>PASS*</b>
----------------------	--------------

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




Keny Xu  
EMC Laboratory Manager



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.  
**Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8397 1443, or e-mail: CN.Doccheck@sgs.com**

## 2 Version

<i>Revision Record</i>				
<i>Version</i>	<i>Chapter</i>	<i>Date</i>	<i>Modifier</i>	<i>Remark</i>
01		2019-08-02		Original

<b>Authorized for issue by:</b>			
			
		_____	
		<b>Edison Li /Project Engineer</b>	
			
		_____	
		<b>Eric Fu /Reviewer</b>	



### 3 Contents

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



## 4 General Information

### 4.1 General Description of EUT

Product Name:	Remote Unit
Model No.:	iDAS-R304000
Trade Mark:	CROSSFIRE, SUNWAVE
Sample Type:	Fixed production
Antenna Gain:	3dBi
Power Supply:	DC48V
Optical Fiber:	200cm (unshielded)
DC Cable:	200cm (unshielded)
RF Cable:	200cm (shielded)
Type of Modulation	LTE
Frequency Band:	Downlink 2496MHz to 2690MHz
Normal Output Power:	20dBm (downlink)
Contains BT/WIFI function	
Conatins FCC ID:	BT: S78-I482E WIFI: NDD9578111008
Frequency range:	BT: 2402-2480MHz WIFI: 2412-2452MHz for IEEE 802.11b/g/n20, 2422-2462MHz for IEEE 802.11n40
Antenna Type:	Integral
Antenna Gain:	BT: -1.0 dBi WIFI: 3.0 dBi



## 4.2 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.

## 4.3 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 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

## 4.4 Deviation from Standards

None.

## 4.5 Abnormalities from Standard Conditions

None.

## 4.6 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 <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposures</b>				
0.3–3.0 .....	614	1.63	*(100)	6
3.0–30 .....	1842/f	4.89/f	*(900/f <sup>2</sup> )	6
30–300 .....	61.4	0.163	1.0	6
300–1500 .....	.....	.....	f/300	6
1500–100,000 .....	.....	.....	5	6
<b>(B) Limits for General Population/Uncontrolled Exposure</b>				
0.3–1.34 .....	614	1.63	*(100)	30
1.34–30 .....	824/f	2.19/f	*(180/f <sup>2</sup> )	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:  $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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 20cm

$P_d$  is the limit of MPE. 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.



**5.1.3 EUT RF Exposure Evaluation**

**1) exposure conditions for standalone operations**

Output Power Into Antenna & RF Exposure Evaluation Antenna Gain:

Operating frequency range: 2496~2690MHz							
Peak Output Power (dBm)	Peak Output Power (mW)	Minimum Distance to Human body (cm)	Maximun Antenna Gain (Numeric)	Maximun Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Power density limit (mW/cm <sup>2</sup> )	MPE Ratio
25.01	316.96	20	2.00	3	0.126	1.0	0.126

Remark:

1). This product support 2\*2 MIMO, Peak Output Power is the MIMO output power.

**2) exposure conditions for standalone operations for Bluetooth**

Antenna Gain: -1.0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.80 in linear scale.

MPE Evaluation and MPE Ratio result:

Bluetooth							
Peak Output Power (dBm)	Peak Output Power (mW)	Minimum Distance to Human body (cm)	Maximun Antenna Gain (Numeric)	Maximun Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Power density limit (mW/cm <sup>2</sup> )	MPE Ratio
8.84	7.66	20	0.80	-1.0	0.0012	1	0.0012

**3) exposure conditions for standalone operations for WIFI**

Antenna Gain: 3.0 dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 0.80 in linear scale.

MPE Evaluation and MPE Ratio result:

WIFI							
Peak Output Power (dBm)	Peak Output Power (mW)	Minimum Distance to Human body (cm)	Maximun Antenna Gain (Numeric)	Maximun Antenna Gain (dBi)	Power density (mW/cm <sup>2</sup> )	Power density limit (mW/cm <sup>2</sup> )	MPE Ratio
24.22	264	20	2.00	3.0	0.10	1	0.10



**4) Exposure conditions for simultaneous transmission operation:**

Simultaneous transmission MPE ratio:  $0.126+0.0012+0.10=0.2272$

SAR test is not required for the simultaneous transmission MPE ratio is less than 1.0.

Conclusion:

The EUT comply with the RF exposure requirement and exclusion from SAR test.

- End of the Report -

