

RF Exposure Evaluation Report

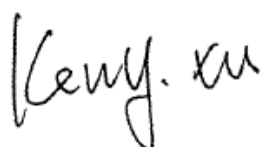
Application No.: SZCR2103020006AT
Applicant: Sunwave Communications Co., Ltd.
Address of Applicant: Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R. China
 Zip: 310053
Manufacturer: Sunwave Communications Co., Ltd.
Address of Manufacturer: Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R. China
 Zip: 310053
Factory: Sunwave Communications Co., Ltd.
Address of Factory: Sunwave Building 581 Huoju Avenue, Binjiang District, Hangzhou, P.R. China
 Zip: 310053

Equipment Under Test (EUT):

EUT Name: The RU conducts digital-analog conversion and power amplification of the input signals.
Model No.: PS-R2220708
Trade Mark: CROSSFIRE, SUNWAVE
FCC ID: 2AEJ4R2220708
Standards: 47 CFR Part 1.1307
 47 CFR Part 1.1310
Date of Receipt: 2020-09-21
Date of Test: 2020-09-21 to 2020-10-13
Date of Issue: 2020-10-13

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



Keny Xu
 EMC Laboratory Manager



2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2020-10-13		Original

Authorized for issue by:			
			
		Edison Li /Project Engineer	
			
		Eric Fu /Reviewer	



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4 General Information

4.1 General Description of EUT

Power Supply:	AC120V 60Hz
Type of Modulation	CQPSK/12.5kHz FM/TETRA in 768MHz to 775MHz CQPSK/12.5kHz FM/TETRA in 851MHz to 869MHz
Frequency Band:	Downlink 768MHz to 775MHz Downlink 851MHz to 869MHz
Normal Output Power:	37dBm (downlink)
Sample Type:	Fixed production
Antenna Gain:	0dBi



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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:

- **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.



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5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

All transmitters are exempt from routine SAR and RF exposure evaluations provided that they comply with the requirements of sections 2.5.2 and 4 of RSS102 issue 5 March 2015. If the equipment under test (EUT) meets the requirements of sections 2.5.2 and 4, applicants are only required to submit a properly signed declaration of compliance.

5.1.1.1 Exemption Limits for Routine Evaluation – RF Exposure Evaluation

- 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).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.



5.1.1.2 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/ <i>f</i>	-	6**
1.1-10	87/ <i>f</i> ^{0.5}	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/ <i>f</i> ^{0.25}	0.1540/ <i>f</i> ^{0.25}	8.944/ <i>f</i> ^{0.5}	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 <i>f</i> ^{0.3417}	0.008335 <i>f</i> ^{0.3417}	0.02619 <i>f</i> ^{0.6834}	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ <i>f</i> ^{1.2}
150000-300000	0.158 <i>f</i> ^{0.5}	4.21 x 10 ⁻⁴ <i>f</i> ^{0.5}	6.67 x 10 ⁻⁵ <i>f</i>	616000/ <i>f</i> ^{1.2}

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

F= Frequency in MHz

Friis Formula

Friis transmission formula: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot R^2)$

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 is 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.



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5.1.2 EUT RF Exposure Evaluation

Antenna Gain: 0dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 6.31 in linear scale.

Frequency (MHz)	EIRP (including Tune-up tolerance) (dBm)	Conduct power (including Tune-up tolerance) (dBm)	R (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
768	38	38	160	0.0196	0.2455	Pass
851	38	38	160	0.0196	0.2633	Pass

Note: Refer to report No. SZEM210302000601 for EUT test value.

Two bands can transmit Simultaneously. The MPE ratio is $(0.0196/0.2455) + (0.0196/0.2633) = 0.1542$ which is less than 1.0. So the RF exposure evaluation is satisfied with RSS-102.

End of the Report -

