

# 1 Cover Page

## RF Exposure Evaluation Report

**Application No.:** KSCR2201000160AT  
**FCC ID:** 2AU8HSRT321-CBRS  
**Applicant:** Smawave Technology Co.,Ltd  
**Address of Applicant:** 3/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China  
**Manufacturer:** Smawave Technology Co.,Ltd  
**Address of Manufacturer:** 3/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China  
**Equipment Under Test (EUT):**  
**EUT Name:** Indoor CPE  
**Model No.:** SRT321  
**Trade mark:** Smawave  
**Standard(s) :** FCC Rules 47 CFR §2.1091  
**Date of Receipt:** 2022-01-29  
**Date of Test:** 2022-02-28 to 2022-03-01  
**Date of Issue:** 2022-03-01

<b>Test Result:</b>	<b>Pass*</b>
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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	Chapter	Date	Modifier	Remark
01		2022-03-01		Original

Authorized for issue by:			
		Milo Li	
		Milo_Li/Project Engineer	
		Eric Lin	
		Eric Lin/Reviewer	



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### 3 General Information

#### 3.1 General Description of E.U.T.

Power supply:	Adaptor Model: BY-SKY120200U71L Input: 100-240V~50/60Hz, 0.7A Output: 12.0V-2A
Cable(s):	1.0m LAN Cable

#### 3.2 Technical Specifications

##### 2.4GHz

Antenna Gain:	Ant 1: 2.27dBi (Provided by the manufacturer) Ant 2: 1.82dBi (Provided by the manufacturer) Directional gain: 5.06 dBi
Antenna Type:	Ant 1: PCB Antenna Ant 2: 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):11 802.11n(HT40):7
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz

##### 5GHz

Operation Frequency:	Band	Mode	Frequency Range(MHz)	Number of channels
	UNII Band I	802.11a/n(HT20)/ac(VHT20)	5180-5240	4
		802.11n(HT40)/ac(VHT40)	5190-5230	2
		802.11ac(VHT80)	5210	1
	UNII Band III	802.11a/n(HT20)/ac(VHT20)	5745-5825	5
		802.11n(HT40)/ac(VHT40)	5755-5795	2
		802.11ac(VHT80)	5775	1
Modulation Type:	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
Data Rate:	802.11a: 6/9/12/18/24/36/48/54Mbps 802.11n: MCS0-7 802.11ac: MCS0-9			
Channel Spacing:	802.11a/n(HT20)/ac(VHT20): 20MHz 802.11n(HT40)/ac(VHT40): 40MHz			



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	802.11ac(VHT80): 80MHz
Antenna Gain:	Ant 1: 3.17dBi (Provided by the manufacturer) Ant 2: 3.14dBi (Provided by the manufacturer) Directional gain:6.17dBi
Antenna Type:	PCB Antenna

**4G**

Frequency Band:	LTE BAND	Duplex Mode	Uplink (MHz)	Downlink (MHz)	Supported Channel Bandwidth					
					1.4	3	5	10	15	20
	42	FDD	3450 - 3600	3450 - 3600	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	43	FDD	3600 - 3700	3600 - 3700	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	48	FDD	3550 - 3700	3550 - 3700	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Type of Modulation:	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM									
Channel Bandwidth:	Single carrier: 5MHz, 10MHz, 15MHz, 20MHz;									
Sample Type:	Mobile device									
Antenna Type:	PCB Antenna Ant 1: TX & RX Ant 2 & Ant 3 & Ant 4: RX									
Antenna Gain:	Refer to Antenna List Table									
MIMO Type:	1T4R									

Antenna	LTE Band	Frequency Range (MHz)	Antenna Gain (dBi)			
			Ant 1	Ant 2	Ant 3	Ant 4
SRT321_0738	Band 42H	3450-3550	1.34	0.43	1.83	1.96
	Band 43L	3600-3700	3.31	1.01	1.97	3.33
	Band 48	3550-3700	3.31	1.01	1.97	3.33
SRT321_3438	Band 42H	3450-3550	3.68	3.87	4.43	2.43
	Band 43L	3600-3700	3.50	4.21	4.39	2.80
	Band 48	3550-3700	3.55	4.21	4.39	2.80

**Remark:**

- 1) SRT321\_0738 and SRT321\_3438 are two different versions of the antenna, because they are the same type of antenna, we choose the SRT321\_3438 with higher gain value to do all the tests.
- 2) The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test result due to incorrect information about antenna gain values.



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### 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.

### 3.4 Test Facility

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

• **CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 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. 2541.01)**

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

• **FCC (Designation Number: CN1172)**

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

• **ISED (CAB identifier: CN0072)**

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 (Member No.: 1938)**

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 Test Standards and Limits

### 4.1 FCC Radiofrequency radiation exposure limits:

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

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
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 <sup>2</sup> )	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: Limit for 2.4GHz is 1.0 mW/cm<sup>2</sup>, 5GHz is 1.0 mW/cm<sup>2</sup>, LTE TDD Band 42H/43L/48 is 1mW/cm<sup>2</sup>.



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## 5 Measurement and Calculation

### 5.1 Maximum transmit power

#### 2.4GHz

The Power Data is based on the RF Test Report KSCR220100016001

Test Mode	Channel	Antenna 1 Power[dBm]	Antenna 2 Power[dBm]	MIMO Power[dBm]	Antenna 1 Power[mW]	Antenna 2 Power[mW]	MIMO Power[mW]
11B	2412	13.42	13.37	NA	21.98	21.73	N/A
11B	2437	13.74	13.14	NA	23.66	20.61	N/A
11B	2462	13.53	13.76	NA	22.54	<b>23.77</b>	N/A
11G	2412	13.63	13.28	NA	23.07	21.28	N/A
11G	2437	13.79	13.40	NA	<b>23.93</b>	21.88	N/A
11G	2462	13.36	13.15	NA	21.68	20.65	N/A
11N20MIMO	2412	11.39	9.95	13.74	13.77	9.89	23.66
11N20MIMO	2437	12.97	10.68	14.98	19.82	11.69	<b>31.48</b>
11N20MIMO	2462	10.87	9.81	13.38	12.22	9.57	21.78
11N40MIMO	2422	12.76	10.90	14.94	18.88	12.30	31.19
11N40MIMO	2437	11.93	9.24	13.80	15.60	8.39	23.99
11N40MIMO	2452	11.85	9.53	13.85	15.31	8.97	24.27



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5GHz

The Power Data is based on the RF Test Report KSCR220100016002

Test Mode	Test Channel	Antenna 1 Power[dBm]	Antenna 2 Power[dBm]	MIMO Power[dBm]	Antenna 1 Power[mW]	Antenna 2 Power[mW]	MIMO Power[mW]
802.11a	5180	14.49	13.10	N/A	<b>28.12</b>	20.42	N/A
	5200	14.33	13.34	N/A	27.10	21.58	N/A
	5240	14.16	14.13	N/A	26.06	<b>25.88</b>	N/A
	5745	13.80	13.34	N/A	23.99	21.58	N/A
	5785	13.97	12.88	N/A	24.95	19.41	N/A
	5825	13.25	12.64	N/A	21.13	18.37	N/A
802.11n(HT20)	5180	9.65	12.31	14.19	9.23	17.02	26.24
	5200	9.30	12.41	14.14	8.51	17.42	25.94
	5240	8.42	13.09	14.36	6.95	20.37	27.29
	5745	9.01	12.70	14.25	7.96	18.62	26.61
	5785	8.42	12.10	13.65	6.95	16.22	23.17
	5825	7.72	11.57	13.07	5.92	14.35	20.28
802.11n(HT40)	5190	9.60	12.68	14.42	9.12	18.54	27.67
	5230	8.99	12.70	14.24	7.93	18.62	26.55
	5755	9.08	12.55	14.16	8.09	17.99	26.06
	5795	8.78	12.24	13.86	7.55	16.75	24.32
802.11ac(VHT20)	5180	10.19	12.26	14.36	10.45	16.83	27.29
	5200	9.51	12.80	14.47	8.93	19.05	<b>27.99</b>
	5240	8.77	12.79	14.24	7.53	19.01	26.55
	5745	9.49	12.75	14.43	8.89	18.84	27.73
	5785	8.83	12.25	13.88	7.64	16.79	24.43
	5825	8.20	11.96	13.49	6.61	15.70	22.34
802.11ac(VHT40)	5190	10.18	10.66	13.44	10.42	11.64	22.08
	5230	9.49	10.85	13.23	8.89	12.16	21.04
	5755	9.79	11.16	13.54	9.53	13.06	22.59
	5795	9.11	11.01	13.17	8.15	12.62	20.75
802.11ac(VHT80)	5210	10.53	10.49	13.52	11.30	11.19	22.49
	5775	8.77	11.29	13.22	7.53	13.46	20.99



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4G

The Power Data is based on the RF Test Report KSCR220100016003

Frequency Band	Highest Averaged Power Output(dBm)	Antenna Gain(dBi)	E.I.R.P. (dBm)
LTE Band 42H	26.31	3.68	29.99
LTE Band 43L/48	24.54	3.55	28.09



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## 5.2 MPE Calculation

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

Note:

- 1) P (mW)
- 2) R = distance to the center of radiation of antenna (in meter) = 20cm
- 3) MPE limit = 1mW/cm<sup>2</sup>

### For 2.4G WiFi - Antenna1:

The max. antenna gain is		2.27	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
23.93	1.687	20	0.00803	1	Pass

### For 2.4G WiFi - Antenna2:

The max. antenna gain is		1.82	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
23.77	1.521	20	0.00719	1	Pass

### In MIMO mode:

The max. antenna gain is		5.06	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
31.48	3.206	20	0.02008	1	Pass



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**For 5G WiFi - Antenna1:**

The max. antenna gain is		3.17	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
28.12	2.075	20	0.01161	1	Pass

**For 5G WiFi - Antenna2:**

The max. antenna gain is		3.14	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
25.88	2.061	20	0.01061	1	Pass

**In MIMO mode:**

The max. antenna gain is		6.17	dBi		
Max. Conducted Power P(mW)	Gain in Linear Scale G	Operation Distance R(cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Result
27.99	4.140	20	0.02305	1	Pass

**4G**

Frequency Band	Power Density at 20cm (mW/m <sup>2</sup> )	Limit(mW/m <sup>2</sup> )	Verdict
LTE Band 42H	0.1985	1.00	Pass
LTE Band 43L/48	0.1282	1.00	Pass

The 2.4G WiFi&5G WiFi&LTE can simultaneous transmitting. But the maximum rate of MPE is = 0.02008/1 + 0.02305/1 + 0.1985/1 =0.24163 <= 1.

According to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

**--End of the Report--**



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