

RF Exposure Evaluation Report

Application No.: SZCR2104020498AT
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):
Product Name: LTE Indoor CPE
Model No.: SRT421
FCC ID: 2AU8HSRT421
Standards: 47 CFR Part 1.1307
47 CFR Part 1.1310
47 CFR Part 2.1091
KDB447498D01 General RF Exposure Guidance v06

Date of Receipt: 2021-04-13
Date of Test: 2021-04-17 to 2021-04-20
Date of Issue: 2021-05-18

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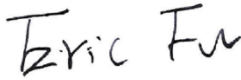
* In the configuration tested, the EUT complied with the standards specified above.

Keny Xu
EMC Laboratory Manager



2 Version

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2021-05-18		Original

Authorized for issue by:			
			
		_____ Leo Lai/Project Engineer	
			
		_____ Eric Fu/Reviewer	



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4 General Information

4.1 General Description of EUT

Test voltage:	120V~60Hz
Power adapter:	Model: ASS67A-120200 Input: 100-120V~50/60Hz 0.8A Output: DC 12V 2A

WiFi 2.4G

Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz 802.11n(HT40): 2422MHz to 2452MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11802.11b/g/n(HT20): 11 802.11n(HT40): 7
Channel Spacing:	5MHz
Antenna Type:	PCB Internal Antenna
Antenna Gain:	ANT0: 2.27dBi, ANT1: 1.82dBi, Directional Gain: 5.05dBi

WiFi 5G

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)	5755-5895	2
		802.11ac(VHT80)	5775	1
Modulation Type:	802.11a: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11n: OFDM (BPSK, QPSK, 16QAM, 64QAM) 802.11ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)			
Channel Spacing:	802.11a/n(HT20)/ac(VHT20): 20MHz 802.11n(HT40)/ac(VHT40): 40MHz 802.11ac(VHT80): 80MHz			





Antenna Type:	PCB Internal Antenna
Antenna Gain:	ANT0: 2.52dBi ANT1: 3.14dBi, Directional Gain: 5.85dBi

LTE

LTE Operation Frequency Band:	41, 48					
Modulation Type:	UL: QPSK, 16QAM, 64QAM DL: QPSK, 16QAM, 64QAM					
LTE Release Version:	R12					
LTE Power Class:	Level 3					
Working Bandwidth:	5M, 10M, 15M, 20M					
Antenna Type:	PCB Internal Antenna					
Antenna Gain:	Band 41: 4dBi; Band 48: 5dBi.					
Operating Frequency Range(s)	Band		Tx (MHz)		Rx (MHz)	
	LTE Band 41		2496 ~ 2690		2496 ~ 2690	
	LTE Band 48		3550 ~ 3700		3550 ~ 3700	
Extreme Voltage (V)	NV	12	HV	15	LV	9
Operation Temperature	Low	-30		High	60	



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

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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d 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.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



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5.1.3 EUT RF Exposure Evaluation

WiFi 2.4G

Antenna Gain: 5.05dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.199 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
2437	19.00	79.43	0.0505	1.0	PASS

WiFi 5G

Antenna Gain: 5.85dBi

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 3.846 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
5785	19.00	79.43	0.0607	1.0	PASS

LTE

Antenna Gain: Band 41: 4dBi, Band 48: 5dBi,

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.512(Band 41), 3.162(Band 48) in linear scale. Output Power Into Antenna & RF Exposure Evaluation Distance:

LTE Band	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Band 41	24.50	281.84	0.1408	1.0	PASS
Band 48	22.50	177.83	0.1119	1.0	PASS

Exposure conditions for simultaneous transmission operations

Simultaneous transmission MPE test is not required, because the Max. sum of the MPE ratios for WiFi 2.4G, WiFi 5G and LTE is $0.0505/1.0+0.0607/1.0+0.1408/1.0=0.252 < 1$

Note: Refer to report No. SZCR210402049802, SZCR210402049803 and SZCR210402049804 for EUT test Max Conducted Peak Output Power value, due to WiFi 2.4G, WiFi 5G and LTE can simultaneous transmit the signal so all of the maximum power are selected for this evaluation. The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.

- End of the Report -

