RF Exposure Evaluation Report

APPLICANT	:	**Shanghai Smawave Technology Co. ,Ltd**
EQUIPMENT	:	**CAT12 outdoor CPE**
BRAND NAME	:	**smawave**
MODEL NAME	:	**SRE410**
FCC ID	:	**2AU8HSRE410-EUD**
STANDARD	:	**47 CFR Part 2.1091**

The product evaluation date was started from Nov. 15, 2023 and completed on Nov. 15, 2023. We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.

Si Zhang

Approved by: Si Zhang

ACCREDITED Cert #5145.02

Sporton International Inc. (Kunshan)
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People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA3O1704	Rev. 01	Initial issue of report.	Dec. 04, 2023

1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Shanghai Smawave Technology Co. ,Ltd
Address	3/F, Building 8, 1001 North Qinzhou Road，Xuhui District, Shanghai, China

Manufacturer	
Company Name	Shanghai Smawave Technology Co. ,Ltd
Address	3/F, Building 8, 1001 North Qinzhou Road，Xuhui District, Shanghai, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	CAT12 outdoor CPE
Brand Name	smawave
Model Name	SRE410
FCC ID	2AU8HSRE410-EUD
Wireless Technology and Frequency Range	LTE Band 42: 3450 MHz ~3550 MHz, 3550 MHz ~ 3600 MHz LTE Band 43: 3600 MHz ~ 3700MHz LTE Band 48: 3550 MHz ~ 3700 MHz
Mode	LTE: QPSK, 16QAM, 64QAM
Antenna Gain	Ant0: LTE Band 42 : 15.61 dBi LTE Band 43 : 15.61 dBi LTE Band 48 : 15.61 dBi Ant2: LTE Band 42 : 15.64 dBi LTE Band 43 : 15.64 dBi LTE Band 48 : 15.64 dBi
Antenna Type	WWAN: Panel Antenna
HW Version	V1.0
SW Version	OCB12FW_Codium_CBSD_V10.20

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. This device supports intra-band ULCA, due to intra-band ULCA and non-CA power is same, so non-CA MPE analysis can represent ULCA MPE analysis.
3. The intra-band/inter-band ULCA mode combination could be referred to the product spec.
4. LTE Band 42/43/48 support SISO/MIMO mode.

Comments and Explanations:
1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

3. Maximum RF average output tune up power among production units

<LTE>

<Ant0>

Mode		Maximum Average power(dBm)
LTE	Band 42 Part27Q	25.00
	Band 42 Part 96	7.00
	Band 43	7.36
	Band 48	7.36

<Ant2>

	Band 42 Part27Q	24.00
	Band 42 Part 96	7.00
	Band 43	7.36
	Band 48	7.36

<Ant0+2>

Mode		Maximum Average power(dBm)
LTE	Band 42 Part27Q	25.00
	Band 42 Part 96	7.00
	Band 43	7.36
	Band 48	7.36

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

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/f2)	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/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 31 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Average EIRP (mW)	Power Density at 31cm (mW/cm^2)	Limit (mW/cm^2)	Power Density / Limit
LTE Band 42	3450	15.64	25.00	40.640	11587.774	0.960	1.000	**0.960**
LTE Band 43	3600	15.64	7.36	23.000	199.526	0.017	1.000	**0.017**
LTE Band 48	3550	15.64	7.36	23.000	199.526	0.017	1.000	0.017
LTE Band 42 MIMO	3450	15.64	25.00	40.640	11587.774	0.960	1.000	**0.960**
LTE Band 43 MIMO	3600.0	15.64	7.36	23.000	199.526	0.017	1.000	0.017
LTE Band 48 MIMO	3550.0	15.64	7.36	23.000	199.526	0.017	1.000	0.017

Note:
1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.
3. Chose the maximum RF output tune up power of all antennas among same frequency WWAN bands and the maximum antenna gain to perform MPE calculation conservatively.
4. The MIMO mode is completely uncorrelated, so selected the higher SISO gain among all antennas as MIMO gain to perform MPE calculation.

5.2. Collocated Power Density Calculation

LTE Inter-band CA:

LTE Power Density / Limit (LTE Band 42)	5GNR Power Density / Limit (LTE Band 43)	Σ(Power Density / Limit) of LTE Band 42 + LTE Band 43
0.960	0.017	0.977

Note:
1. Σ(Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for LTE Band 42 + LTE Band 43.
2. Considering all transmitter of the EIRP performance listed in the table above, the aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the MPE was calculated at 31 cm to show compliance with the power density limit, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

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