RF Exposure Evaluation Report

APPLICANT	:	**Smawave Technology Co. ,Ltd**
EQUIPMENT	:	**5G ODU_NA**
BRAND NAME	:	**smawave**
MODEL NAME	:	**SRE620-b**
FCC ID	:	**2AU8HSRE620-B**
STANDARD	:	**47 CFR Part 2.1091**

The product evaluation date was started from May 31, 2023 and completed on May 31, 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.

Approved by: Si Zhang

Sporton International Inc. (Kunshan)
No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300
People's Republic of China

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA342001	Rev. 01	Initial issue of report.	May 31, 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 FAX : +86-512-57900958		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

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

Manufacturer	
Company Name	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	5G ODU_NA
Brand Name	smawave
Model Name	SRE620-b
FCC ID	2AU8HSRE620-B
Wireless Technology and Frequency Range	LTE Band 41: 2496 MHz ~ 2690 MHz LTE Band 48: 3550 MHz ~ 3700 MHz 5G NR n41 : 2496 MHz ~ 2690 MHz 5G NR n48 : 3550 MHz ~ 3700 MHz
Mode	LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR : CP-OFDM / DFT-s-OFDM, PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM
Antenna Gain	<Ant. 0> LTE Band 48 : 8.26 dBi 5G NR n41 : 6.29 dBi 5G NR n48 : 8.26 dBi <Ant.3>: LTE Band 41 : 5.85 dBi 5G NR n41 : 5.85 dBi 5G NR n48 : 8.41 dBi
Antenna Type	WWAN : Fixed External Antenna
HW Version	V1.0
SW Version	Codium_FW_5G_1.0.8

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 HPUE for 5G NR n41 with class 2 power level, so HPUE has been performed MPE calculation.
3. 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.
4. 5GNR n41/n48 support SA mode only.
5. WWAN 5GNR n41/n48 support SISO/MIMO mode, so only chose MIMO tune up power to perform MPE calculation conservatively for MIMO power is higher.

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>

Mode		Maximum Average power(dBm)
LTE	Band 41 PC3	24.00
	Band 41 PC2	27.00
	Band 48	23.00

<5GNR>

Mode		Maximum Average power(dBm)
5GNR	n41 PC3	25.00
	n41 PC2	28.00
	n48	23.00

<MIMO>

Mode		Maximum Average power(dBm)
5GNR	n41 Ant0+3	28.00
	n48 Ant0+3	23.00

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 20 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 20cm (mW/cm^2)	Limit (mW/cm^2)
LTE Band 41	2496.0	5.85	27.00	32.850	1927.525	0.384	1.000
LTE Band 48	3550.0	8.26	23.00	31.260	1336.596	0.266	1.000
5G NR n41	2496.0	6.29	28.00	34.290	2685.344	0.535	1.000
5G NR n48	3550.0	8.41	23.00	31.410	1383.566	0.275	1.000

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. The MIMO mode is completely uncorrelated, so selected the higher SISO gain among all antennas as MIMO gain to perform MPE calculation.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

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