

MPE TEST REPORT

Applicant	Smawave Technology Co. ,Ltd
FCC ID	2AU8HSRG821
Product	Ruggedized Router
Brand	Smawave
Model	SRG821
Report No.	R2409A1327-M1
Issue Date	January 16, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC 47 CFR Part 1 1.1310**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

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1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **Eurofins TA Technology (Shanghai) Co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

1.2 Test Facility

FCC (Designation number: CN1179, Test Firm Registration Number: 446626)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform measurements.

1.3 Testing Location

Company: Eurofins TA Technology (Shanghai) Co., Ltd.
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1.4 Laboratory Environment

Temperature	Min. = 18°C, Max. = 25°C
Relative humidity	Min. = 20%, Max. = 80%
Ground system resistance	< 0.5 Ω
Ambient noise is checked and found very low and in compliance with requirement of standards. Reflection of surrounding objects is minimized and in compliance with requirement of standards.	

2 Description of Equipment Under Test

Client Information

Applicant	Smawave Technology Co. ,Ltd.
Applicant address	2/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China
Manufacturer	Smawave Technology Co., Ltd
Manufacturer address	2/F, Building 8, 1001 North Qinzhou Road, Xuhui District, Shanghai, China

General Technologies

EUT Description			
Model	SRG821		
Lab internal SN	R2409A1327/S01		
Hardware Version	V1.0		
Software Version	SQX5040_V1.1.4		
Frequency	Band	TX (MHz)	RX (MHz)
	LTE Band 2	1850 ~ 1910	1930 ~ 1990
	LTE Band 4	1710 ~ 1755	2110 ~ 2155
	LTE Band 5	824 ~ 849	869 ~ 894
	LTE Band 7	2500 ~ 2570	2620 ~ 2690
	LTE Band 12	699 ~ 716	729 ~ 746
	LTE Band 13	777 ~ 787	746 ~ 756
	LTE Band 14	788 ~ 798	758 ~ 768
	LTE Band 17	704 ~ 716	734 ~ 746
	LTE Band 25	1850 ~ 1915	1930 ~ 1995
	LTE Band 26	814 ~ 849	859 ~ 894
	LTE Band 30	2305 ~ 2315	2350 ~ 2360
	LTE Band 38	2570 ~ 2620	2570 ~ 2620
	LTE Band 41	2496 ~ 2690	2496 ~ 2690
	LTE Band 42	3450 ~ 3550	3450 ~ 3550
	LTE Band 43	3700 ~ 3800	3700 ~ 3800
	LTE Band 48	3550 ~ 3700	3550 ~ 3700
	LTE Band 66	1710 ~ 1780	2110 ~ 2180
	LTE Band 71	663 ~ 698	617 ~ 652

	NR Band n2	1850 ~ 1910	1930 ~ 1990
	NR Band n5	824 ~ 849	869 ~ 894
	NR Band n7	2500 ~ 2570	2620 ~ 2690
	NR Band n12	699 ~ 716	729 ~ 746
	NR Band n13	777 ~ 787	746 ~ 756
	NR Band n14	788 ~ 798	758 ~ 768
	NR Band n25	1850 ~ 1915	1930 ~ 1995
	NR Band n26	814 ~ 849	859 ~ 894
	NR Band n30	2305 ~ 2315	2350 ~ 2360
	NR Band n38	2570 ~ 2620	2570 ~ 2620
	NR Band n41	2496 ~ 2690	2496 ~ 2690
	NR Band n48	3550 ~ 3700	3550 ~ 3700
	NR Band n66	1710 ~ 1780	2110 ~ 2180
	NR Band n70	1695 ~ 1710	1995 ~ 2020
	NR Band n71	663 ~ 698	617 ~ 652
	NR Band n77	3300 ~ 4200	3300 ~ 4200
	NR Band n78	3450 ~ 3800	3450 ~ 3800
	Wi-Fi 2.4G	2400 ~ 2483.5	2400 ~ 2483.5
	Wi-Fi 5G (U-NII-1)	5150 ~ 5250	5150 ~ 5250
	Wi-Fi 5G (U-NII-2A)	5250 ~ 5350	5250 ~ 5350
	Wi-Fi 5G (U-NII-2C)	5470 ~ 5725	5470 ~ 5725
	Wi-Fi 5G (U-NII-3)	5725 ~ 5850	5725 ~ 5850
Date of Sample Received	September 12, 2024		
Note: 1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant. 2. All indications of Pass/Fail in this report are opinions expressed by Eurofins TA Technology (Shanghai) Co., Ltd. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only.			

3 Maximum Tune up and Antenna Gain

The numeric gain (G) of the antenna with a gain specified in dB is determined by

$$\text{Numeric gain (G)} = 10^{(\text{antenna gain}/10)}$$

Band	Maximum Tune up Power		Antenna Gain (dBi)	Numeric Gain
	(dBm)	(mW)		
LTE Band 2 / CA_2C	25.00	316.228	3.65	2.317
LTE Band 4	25.00	316.228	3.83	2.415
LTE Band 5 / CA_5B	25.00	316.228	3.53	2.254
LTE Band 7 / CA_7C	25.00	316.228	2.37	1.726
LTE Band 12	25.00	316.228	3.19	2.084
LTE Band 13	25.00	316.228	2.44	1.754
LTE Band 14	25.00	316.228	2.50	1.778
LTE Band 17	25.00	316.228	3.19	2.084
LTE Band 25	25.00	316.228	3.71	2.350
LTE Band 26	25.00	316.228	3.53	2.254
LTE Band 30	25.00	316.228	0.48	1.117
LTE Band 38 / CA_38C	28.00	630.957	2.41	1.742
LTE Band 41 / CA_41C	28.00	630.957	3.27	2.123
LTE Band 42 / CA_42C	28.00	630.957	0.32	1.076
LTE Band 43 / CA_43C	28.00	630.957	0.22	1.052
LTE Band 48	25.00	316.228	-0.94	0.805
LTE Band 66 / CA_66B / CA_66C	25.00	316.228	3.83	2.415
LTE Band 71	25.00	316.228	3.19	2.084
NR Band n2	25.00	316.228	3.65	2.317
NR Band n5	25.00	316.228	3.53	2.254
NR Band n7	25.00	316.228	2.37	1.726
NR Band n12	25.00	316.228	3.19	2.084
NR Band n13	25.00	316.228	2.44	1.754
NR Band n14	25.00	316.228	2.50	1.778
NR Band n25	25.00	316.228	3.71	2.350
NR Band n26	25.00	316.228	3.53	2.254
NR Band n30	25.00	316.228	0.48	1.117
NR Band n38	28.00	630.957	2.41	1.742

NR Band n38 (MIMO)	28.00	630.957	2.41	1.742
NR Band n41	28.00	630.957	3.27	2.123
NR Band n41 (MIMO)	28.00	630.957	3.27	2.123
NR Band n48	25.00	316.228	-0.94	0.805
NR Band n66	25.00	316.228	3.83	2.415
NR Band n70	25.00	316.228	3.42	2.198
NR Band n71	25.00	316.228	3.19	2.084
NR Band n77	28.00	630.957	0.32	1.076
NR Band n77 (MIMO)	30.00	1000.000	0.32	1.076
NR Band n78	28.00	630.957	0.32	1.076
NR Band n78 (MIMO)	30.00	1000.000	0.32	1.076
Wi-Fi 2.4G	26.00	398.107	2.06	1.607
Wi-Fi 5G	26.00	398.107	5.28	3.373

4 MPE Limit

According to section 1.1310 of FCC 47 CFR Part 1, limits for maximum permissible exposure (MPE) are as following.

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
3-30	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

* = Plane-wave equivalent power density

Note1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational / controlled limits apply provided he or she is made aware of the potential for exposure.

Note2: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

The maximum permissible exposure for 300~1500 MHz is f/1500, for 1500~100,000MHz is 1.0. So

Band	The Maximum Permissible Exposure (mW/cm ²)
LTE Band 2 / CA_2C	1.000
LTE Band 4	1.000
LTE Band 5 / CA_5B	0.549
LTE Band 7 / CA_7C	1.000
LTE Band 12	0.466
LTE Band 13	0.518
LTE Band 14	0.525
LTE Band 17	0.469
LTE Band 25	1.000
LTE Band 26	0.549
LTE Band 30	1.000
LTE Band 38 / CA_38C	1.000
LTE Band 41 / CA_41C	1.000
LTE Band 42 / CA_42C	1.000
LTE Band 43 / CA_43C	1.000
LTE Band 48	1.000
LTE Band 66 / CA_66B / CA_66C	1.000
LTE Band 71	0.442
NR Band n2	1.000
NR Band n5	0.549
NR Band n7	1.000
NR Band n12	0.466
NR Band n13	0.518
NR Band n14	0.525
NR Band n25	1.000
NR Band n26	0.549
NR Band n30	1.000
NR Band n38	1.000
NR Band n41	1.000
NR Band n48	1.000
NR Band n66	1.000
NR Band n70	1.000
NR Band n71	0.442
NR Band n77	1.000
NR Band n78	1.000
Wi-Fi 2.4G	1.000
Wi-Fi 5G	1.000

5 RF Exposure Evaluation Result

RF exposure evaluation method is based on KDB 447498 D01, this calculation is based on the conducted power, maximum power and antenna gain with provides the minimum separation distance. The formula shown below is from OET Bulletin 65 Edition 97-01 Per KDB 447498 D01:

$$S = PG / 4\pi R^2$$

Where: S = power density (in appropriate units, e.g. mW/cm²)

P = Time-average maximum tune up procedure (in appropriate units, e.g., mW)

G = the numeric gain of the antenna

R = distance to the center of radiation of the antenna (20 cm = limit for MPE)

Band	Maximum Tune up (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)	PG (mW)	Result (mW/cm ²)	Limit Value (mW/cm ²)	The MPE Ratio
LTE Band 2 / CA_2C	25.00	3.65	28.650	732.825	0.145	1.000	0.145
LTE Band 4	25.00	3.83	28.830	763.836	0.151	1.000	0.151
LTE Band 5 / CA_5B	25.00	3.53	28.530	712.853	0.141	0.549	0.257
LTE Band 7 / CA_7C	25.00	2.37	27.370	545.758	0.108	1.000	0.108
LTE Band 12	25.00	3.19	28.190	659.174	0.131	0.466	0.280
LTE Band 13	25.00	2.44	27.440	554.626	0.110	0.518	0.212
LTE Band 14	25.00	2.50	27.500	562.341	0.111	0.525	0.212
LTE Band 17	25.00	3.19	28.190	659.174	0.131	0.469	0.278
LTE Band 25	25.00	3.71	28.710	743.019	0.147	1.000	0.147
LTE Band 26	25.00	3.53	28.530	712.853	0.141	0.549	0.257
LTE Band 30	25.00	0.48	25.480	353.183	0.070	1.000	0.070
LTE Band 38 / CA_38C	28.00	2.41	30.410	1099.006	0.218	1.000	0.218
LTE Band 41 / CA_41C	28.00	3.27	31.270	1339.677	0.265	1.000	0.265
LTE Band 42 / CA_42C	28.00	0.32	28.320	679.204	0.135	1.000	0.135
LTE Band 43 / CA_43C	28.00	0.22	28.220	663.743	0.132	1.000	0.132
LTE Band 48	25.00	-0.94	24.060	254.683	0.050	1.000	0.050
LTE Band 66 / CA_66B / CA_66C	25.00	3.83	28.830	763.836	0.151	1.000	0.151
LTE Band 71	25.00	3.19	28.190	659.174	0.131	0.442	0.295

NR Band n2	25.00	3.65	28.650	732.825	0.145	1.000	0.145
NR Band n5	25.00	3.53	28.530	712.853	0.141	0.549	0.257
NR Band n7	25.00	2.37	27.370	545.758	0.108	1.000	0.108
NR Band n12	25.00	3.19	28.190	659.174	0.131	0.466	0.280
NR Band n13	25.00	2.44	27.440	554.626	0.110	0.518	0.212
NR Band n14	25.00	2.50	27.500	562.341	0.111	0.525	0.212
NR Band n25	25.00	3.71	28.710	743.019	0.147	1.000	0.147
NR Band n26	25.00	3.53	28.530	712.853	0.141	0.549	0.257
NR Band n30	25.00	0.48	25.480	353.183	0.070	1.000	0.070
NR Band n38	28.00	2.41	30.410	1099.006	0.218	1.000	0.218
NR Band n38 (MIMO)	28.00	2.41	30.410	1099.006	0.218	1.000	0.218
NR Band n41	28.00	3.27	31.270	1339.677	0.265	1.000	0.265
NR Band n41 (MIMO)	28.00	3.27	31.270	1339.677	0.265	1.000	0.265
NR Band n48	25.00	-0.94	24.060	254.683	0.050	1.000	0.050
NR Band n66	25.00	3.83	28.830	763.836	0.151	1.000	0.151
NR Band n70	25.00	3.42	28.420	695.024	0.138	1.000	0.138
NR Band n71	25.00	3.19	28.190	659.174	0.131	0.442	0.295
NR Band n77	28.00	0.32	28.320	679.204	0.135	1.000	0.135
NR Band n77 (MIMO)	30.00	0.32	30.320	1076.465	0.213	1.000	0.213
NR Band n78	28.00	0.32	28.320	679.204	0.135	1.000	0.135
NR Band n78 (MIMO)	30.00	0.32	30.320	1076.465	0.213	1.000	0.213
Wi-Fi 2.4G	26.00	2.06	28.060	639.735	0.127	1.000	0.127
Wi-Fi 5G	26.00	5.28	31.280	1342.765	0.266	1.000	0.266
Note: R = 20cm $\pi = 3.1416$ The MPE Ratio = Mac Result÷Limit Value							

So the simultaneous transmitting antenna pairs as below:

$$\text{TER} = \text{Main Antenna MPE ratio} + \text{Wi-Fi Antenna MPE ratio} = 0.295 + 0.266 = 0.561 < 1$$

Note: For transmitters, minimum separation distance is 20cm, even if calculations indicate MPE distance is less.

IMPORTANT NOTE: To comply with the FCC RF exposure compliance requirements, the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. No change to the antenna or the device is permitted. Any change to the antenna or the device could result in the device exceeding the RF exposure requirements and void user's authority to operate the device.

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

*****END OF REPORT *****