EMC TEST REPORT

Applicant	Smawave Technology Co. ,Ltd
FCC ID	2AU8HSRG821
Product	Ruggedized Router
Brand	Smawave
Model	SRG821
Report No.	R2409A1327-E1
Issue Date	January 16, 2025

Eurofins TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2023)/ ANSI C63.4-2014**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Prepared by: Liu Wei *Approved by: Xu Kai*

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	FCC Part15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	FCC Part15.107, ANSI C63.4-2014	PASS
Date of Testing: September 27, 2024 ~ November 10, 2024 Date of Sample Received: September 12, 2024			
Note: 1. 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.			

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.

A2LA (Certificate Number: 3857.01)

Eurofins TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform measurement.

1.3 Testing Location

Company:	Eurofins TA Technology (Shanghai) Co., Ltd.
Address:	Building 3, No.145, Jintang Rd, Pudong Shanghai, P.R.China
City:	Shanghai
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E-mail:	Kain.Xu@cpt.eurofinscn.com

2 General Description of Equipment Under Test

2.1 Applicant and Manufacturer 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

2.2 General Information

EUT Description			
Device Type	Fixed Device		
Model	SRG821		
Lab internal SN	R2409A1327/S01		
HW Version	V1.0		
SW Version	SQX5040_V1.1.4		
Power Rating	DC 24V		
Connecting I/O Port(s)	Please refer to the User's Manual.		
Antenna Type	External Antenna		
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
EUT Accessory			
Adapter 1	Manufacturer: SHENZHEN TOPOW ELECTRONICS CO., LTD Model: TPA309-29240-US		
Adapter 2	Manufacturer: Dongguan Sunun Power Co., Ltd Model: SA361V-240150U		

Note:

1. The EUT is sent from the applicant to Eurofins TA and the information of the EUT is declared by the applicant.
2. Radio equipment in band 28 is only allowed to operate from 703 MHz to 716 MHz for Subset 1; 728 MHz to 746 MHz for Subset 2 for the transmitter. 758 MHz to 771 MHz for Subset 1; 783 MHz to 801 MHz for Subset 2 for the receiver.
   Radio equipment in band n77 is only allowed to operate from 3450 MHz to 3550 MHz for Subset 1; 3700 MHz to 3980 MHz for Subset 2 for the transmitter and receiver.
   Radio equipment in band n78 is only allowed to operate from 3450 MHz to 3550 MHz for Subset 1; 3700 MHz to 3800 MHz for Subset 2 for the transmitter and receiver.

2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards
FCC Code CFR47 Part15B (2023)
ANSI C63.4-2014

2.4 Test Mode

Test Mode	
Mode 1	Adapter + EUT + LAN/WAN Port +LTE/5G NR RX +WIFI2.4G/5G Streaming

Test Type	Test Mode	Worst Mode
Radiated Emission	Mode 1	/
Conducted Emission	Mode 1	/
After technical evaluation or/and preliminary test, the test data of the worst-case condition was recorded in this report.		

3 Test Case Results

3.1 Radiated Emission

Ambient Condition

Temperature	Relative humidity
15°C ~ 35°C	30% ~ 60%

Methods of Measurement

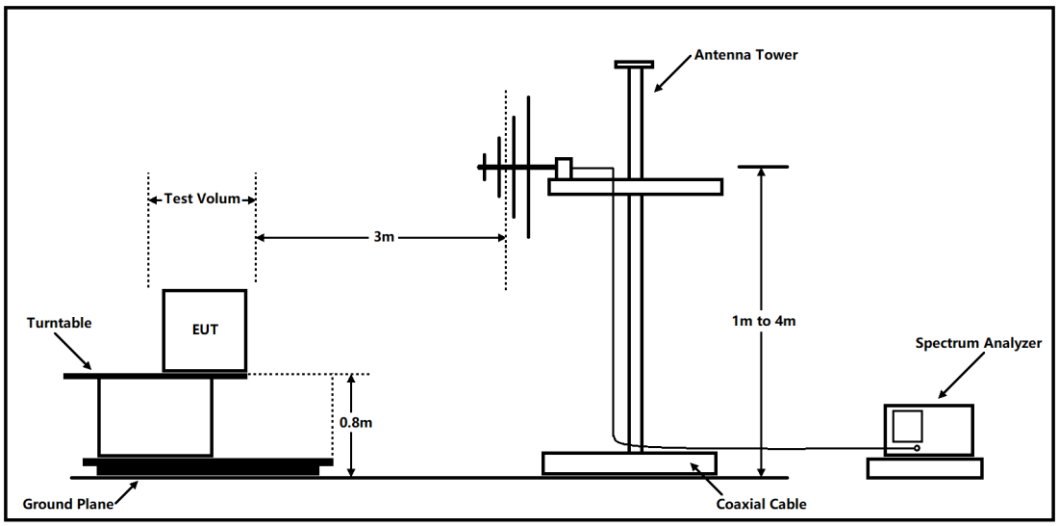
The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.
Set the spectrum analyzer in the following:

Below 1GHz:
RBW=100 kHz / VBW=300 kHz / Sweep=AUTO
Above 1GHz:
(a) PEAK Detector: RBW=1MHz / VBW=3MHz/ Sweep=AUTO
(b) AVERAGE Detector: RBW=1MHz / VBW=3MHz / Sweep=AUTO

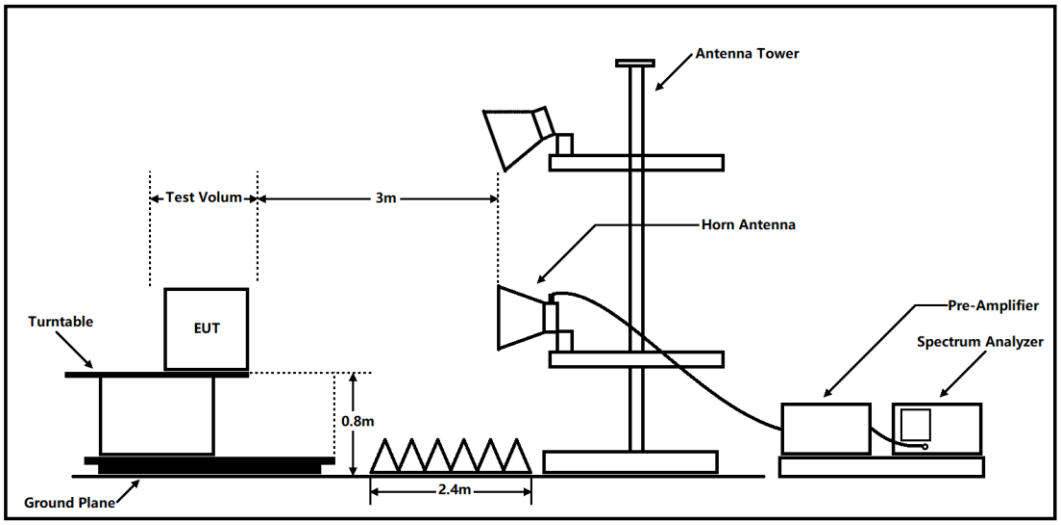
The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in lie-down position (X axis) and the worst case was recorded.

Test Setup

Below 1GHz



Above 1GHz



Note: Area side: 2.4mX3.6m

Antenna Tower meets ANSI C63.4 requirements for measurements above 1 GHz by keeping the antenna aimed at the EUT during the antenna's ascent/ descent along the antenna mast.

Limits

Class B

Frequency (MHz)	Field Strength (dBμV/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5th harmonic of the highest frequency or 40GHz, which is lower	54 74	Average Peak

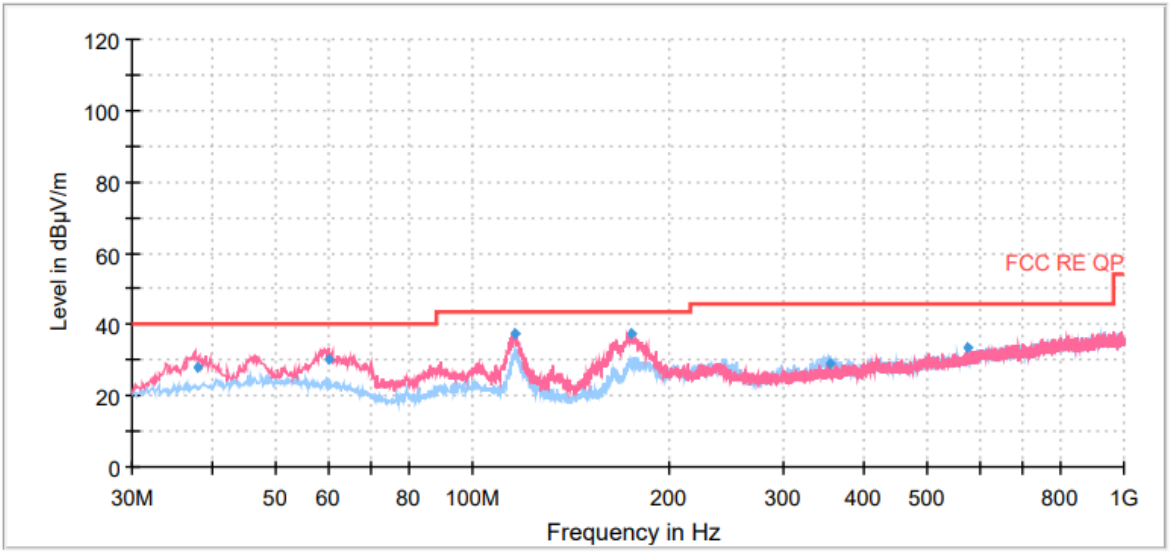
Frequency range of radiated measurements

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30
1.705-108	1000
108-500	2000
500-1000	5000
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

Test Results

Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. The Emissions in the frequency band 18GHz – 26.5GHz is more than 20dB below the limit are not reported.

The following graphs display the maximum values of horizontal and vertical by software.
For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.

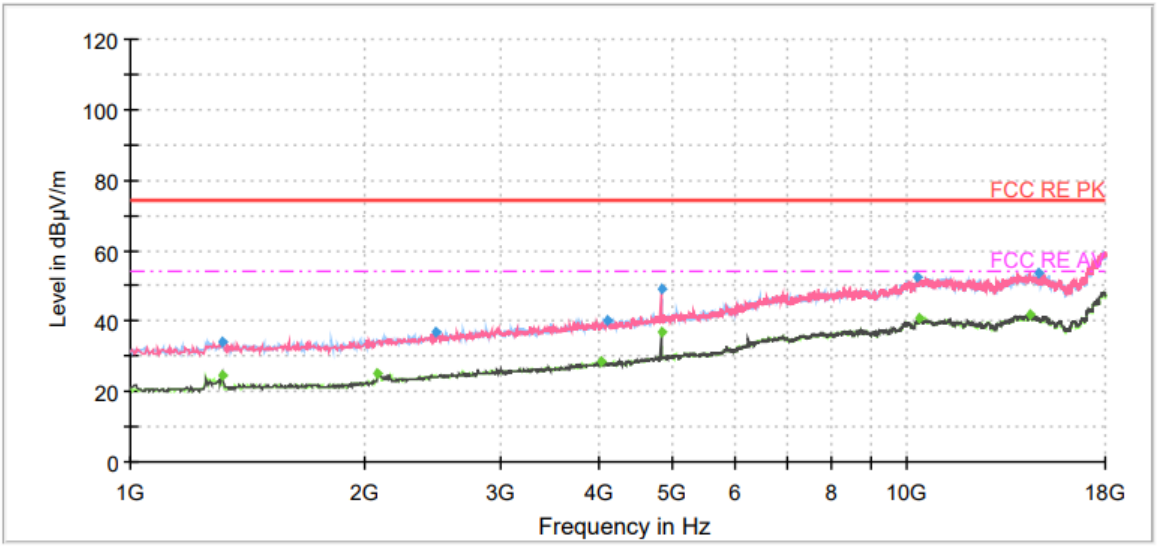


Final Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
37.85	27.90	40.00	12.10	1000.00	101.0	V	114.00	19
60.20	29.91	40.00	10.09	1000.00	101.0	V	22.00	19
115.92	37.65	43.50	5.85	1000.00	101.0	V	244.00	18
174.59	37.33	43.50	6.17	1000.00	104.0	V	226.00	16
354.05	29.10	46.00	16.90	1000.00	101.0	H	290.00	22
576.01	33.34	46.00	12.66	1000.00	101.0	V	170.00	27

Radiated Emission from 30MHz to 1GHz

Remark: 1. Correction Factor = Antenna factor + Insertion loss(cable loss+amplifier gain)
2. Margin = Limit – Quasi-Peak



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1310.25	---	24.30	54.00	29.70	500.00	100.0	V	50.00	-14
1310.25	33.98	---	74.00	40.02	500.00	100.0	V	50.00	-14
2083.75	---	25.19	54.00	28.81	500.00	100.0	V	43.00	-11
2470.50	36.61	---	74.00	37.39	500.00	100.0	V	90.00	-9
4026.00	---	28.32	54.00	25.68	500.00	200.0	V	170.00	-5
4115.25	40.26	---	74.00	33.74	500.00	100.0	V	12.00	-5
4820.75	49.26	---	74.00	24.74	500.00	100.0	V	193.00	-2
4820.75	---	36.81	54.00	17.19	500.00	100.0	V	193.00	-2
10316.00	52.28	---	74.00	21.72	500.00	100.0	V	172.00	8
10358.50	---	40.64	54.00	13.36	500.00	100.0	V	4.00	8
14413.00	---	42.02	54.00	11.98	500.00	200.0	V	353.00	10
14799.75	53.41	---	74.00	20.59	500.00	200.0	V	0.00	10

Radiated Emission from 1GHz to 18GHz

Remark: 1. Correction Factor = Antenna factor + Insertion loss (cable loss + amplifier gain)

2. Margin = Limit – MaxPeak / Average

3.2 Conducted Emission

Ambient Condition

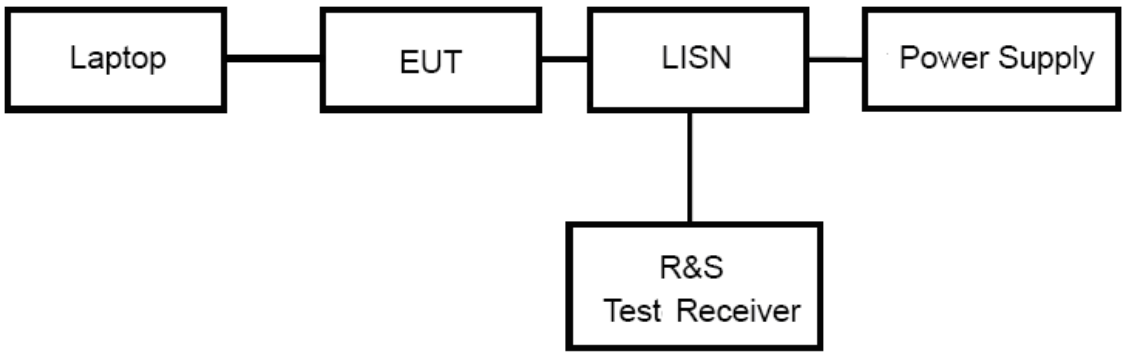
Temperature	Relative humidity
15°C ~ 35°C	30% ~ 60%

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

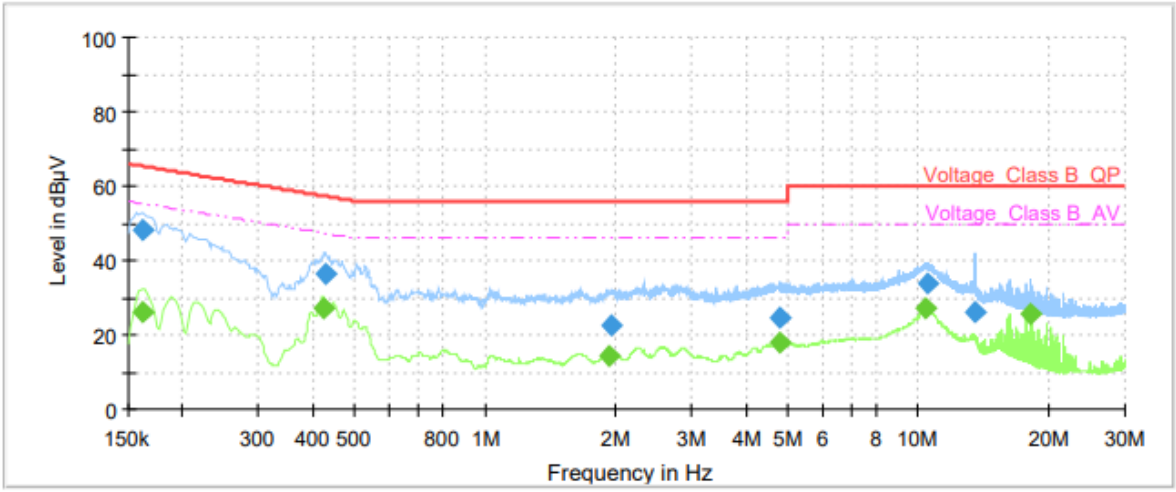
Limits

Frequency (MHz)	Class A (dBµV)		Class B (dBµV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 to 56 *	56 to 46*
0.5 - 5	73	60	56	46
5 - 30	73	60	60	50
*: Decreases with the logarithm of the frequency.				

Note: The EUT should meet CLASS B limit.

Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



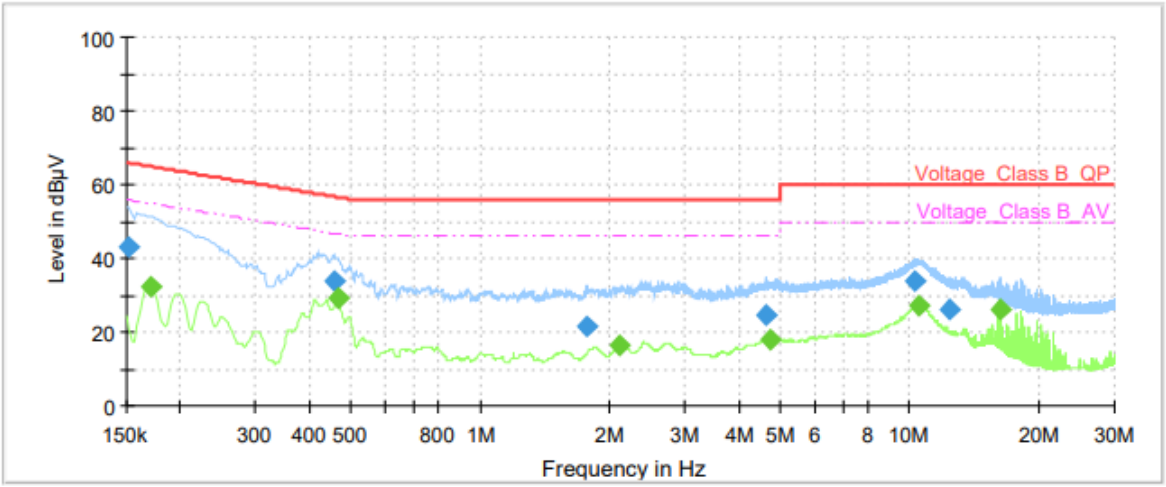
Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.16	---	25.91	55.40	29.49	1000.0	9.000	L1	ON	21.0
0.16	47.96	---	65.40	17.44	1000.0	9.000	L1	ON	21.0
0.42	---	27.18	47.40	20.22	1000.0	9.000	L1	ON	20.9
0.43	36.51	---	57.32	20.81	1000.0	9.000	L1	ON	20.9
1.93	---	14.47	46.00	31.53	1000.0	9.000	L1	ON	19.7
1.95	22.47	---	56.00	33.53	1000.0	9.000	L1	ON	19.7
4.79	---	18.06	46.00	27.94	1000.0	9.000	L1	ON	19.5
4.81	24.64	---	56.00	31.36	1000.0	9.000	L1	ON	19.5
10.40	---	27.26	50.00	22.74	1000.0	9.000	L1	ON	19.6
10.55	33.68	---	60.00	26.32	1000.0	9.000	L1	ON	19.6
13.56	26.09	---	60.00	33.91	1000.0	9.000	L1	ON	19.6
18.24	---	25.84	50.00	24.16	1000.0	9.000	L1	ON	19.7

Remark: Correct factor=cable loss + LISN factor

L line

Conducted Emission from 150 kHz to 30 MHz



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.15	43.24	---	65.88	22.64	1000.0	9.000	N	ON	21.0
0.17	---	32.16	54.95	22.79	1000.0	9.000	N	ON	21.0
0.46	33.79	---	56.77	22.98	1000.0	9.000	N	ON	20.9
0.47	---	29.06	46.56	17.50	1000.0	9.000	N	ON	20.9
1.78	21.70	---	56.00	34.30	1000.0	9.000	N	ON	19.8
2.12	---	16.52	46.00	29.48	1000.0	9.000	N	ON	19.7
4.63	24.39	---	56.00	31.61	1000.0	9.000	N	ON	19.5
4.74	---	18.10	46.00	27.90	1000.0	9.000	N	ON	19.5
10.28	33.69	---	60.00	26.31	1000.0	9.000	N	ON	19.6
10.50	---	27.24	50.00	22.76	1000.0	9.000	N	ON	19.6
12.41	25.97	---	60.00	34.03	1000.0	9.000	N	ON	19.6
16.23	---	26.00	50.00	24.00	1000.0	9.000	N	ON	19.7

Remark: Correct factor=cable loss + LISN factor

N line

Conducted Emission from 150 kHz to 30 MHz

4 Uncertainty Measurement

Case	Uncertainty	Factor k
Radiated Emission 30MHz – 200MHz	4.17 dB	1.96
Radiated Emission 200MHz – 1GHz	4.84 dB	1.96
Radiated Emission 1GHz – 18GHz	4.35 dB	1.96
Conducted Emission	2.57 dB	2

5 Main Test Instruments

Name of Equipment	Manufacturer	Type/Model	Serial Number	Calibration Date	Expiration Time
Radiated Emission					
EMI Test Receiver	R&S	ESCI3	100948	2024-05-07	2025-05-06
Signal Analyzer	R&S	FSV40	101186	2024-05-07	2025-05-06
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2023-04-16	2026-04-15
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	1023	2023-07-14	2026-07-13
Horn Antenna	SCHWARZBECK	BBHA 9120D	430	2024-07-18	2027-07-17
Amplifier	MWPA.CN	MWLA-010200G40	YQ2103039B01	2024-05-07	2025-05-06
Software	R&S	EMC32	9.26.01	/	/
Conducted Emission					
Artificial main network	R&S	ENV216	102191	2022-12-10	2024-12-09
EMI Test Receiver	R&S	ESR	101667	2024-05-07	2025-05-06
Software	R&S	EMC32	10.35.10	/	/

ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.

ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.

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