Nemko Korea Co., Ltd.

165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do,17042, Republic of Korea
TEL:+82 31 330-1700 FAX:+82 31 322 2332

FCC EVALUATION REPORT FOR CERTIFICATION

Project No. : NK-24-R-585
Applicant : Samsung Electronics Co., Ltd. 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677 Korea, Republic of

Dates of receipt : December 30, 2024
Dates of Issue : February 17, 2025
Test Site : Nemko Korea Co., Ltd.

FCC ID :	**A3LCC90F001213**
Applicant :	**Samsung Electronics Co., Ltd.**
Brand Name :	**SAMSUNG**
Model:	**CC90F001213**
Additional Model(s):	**-**
EUT Type:	**Wireless Charger**
Classification:	**FCC Part 15 Low Power Transmitter Below 1705 kHz**
Date of Test:	**January 2, 2025 ~ January 2, 2025**
Applied Standard:	**FCC 47 CFR Part 15.209**

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
This report is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Tested By : Hyeonseung Lee
Test Engineer

Reviewed By : Hoonpyo Lee
Technical Manager

Revision History

Rev.	Issue Date	Revisions	Revised By
00	February 17, 2025	Initial issue	Hyeonseung Lee

TABLE OF CONTENTS

1. INTRODUCTION

1.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**
The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

1.2 Accreditation and listing

Accreditation type		Accreditation number
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
	Canada IC Registered site	Site No. 29506
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	TL124
	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications

EUT Type	Wireless Charger
Model Name	CC90F001213
Frequency of Operation	145 kHz
Modulation type	ASK
Antenna Specification	Internal type
EUT Rated Voltage	DC 5 V
Test Voltage	DC 5 V (USB-C Adaptor : AC 120 V, 60 Hz)
Remarks	-

2.2 Operation During Test

During the test, the Assist Sensor was charged on the EUT to ensure continuous measurement of the wireless charging signal.

2.2.1 Additional Information Related to Testing

The cable and attenuator loss from 9 kHz to 1 GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

2.2.2 Worst-case Configuration and Mode

Radiated emission below 1GHz was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.

For transmitter radiated spurious domain emission testing, the EUT attached with AC Adapter for the worst case condition.

The fundamentals of the EUT were investigated in three orthogonal orientations X, Y, Z.
It was determined that X-axis orientation was the worst-case orientation.
The worst case scenario for radiated spurious measurements is based on the fundamental emission measurements investigation results.

2.2.3 Additional model covered by this report

- No Comment

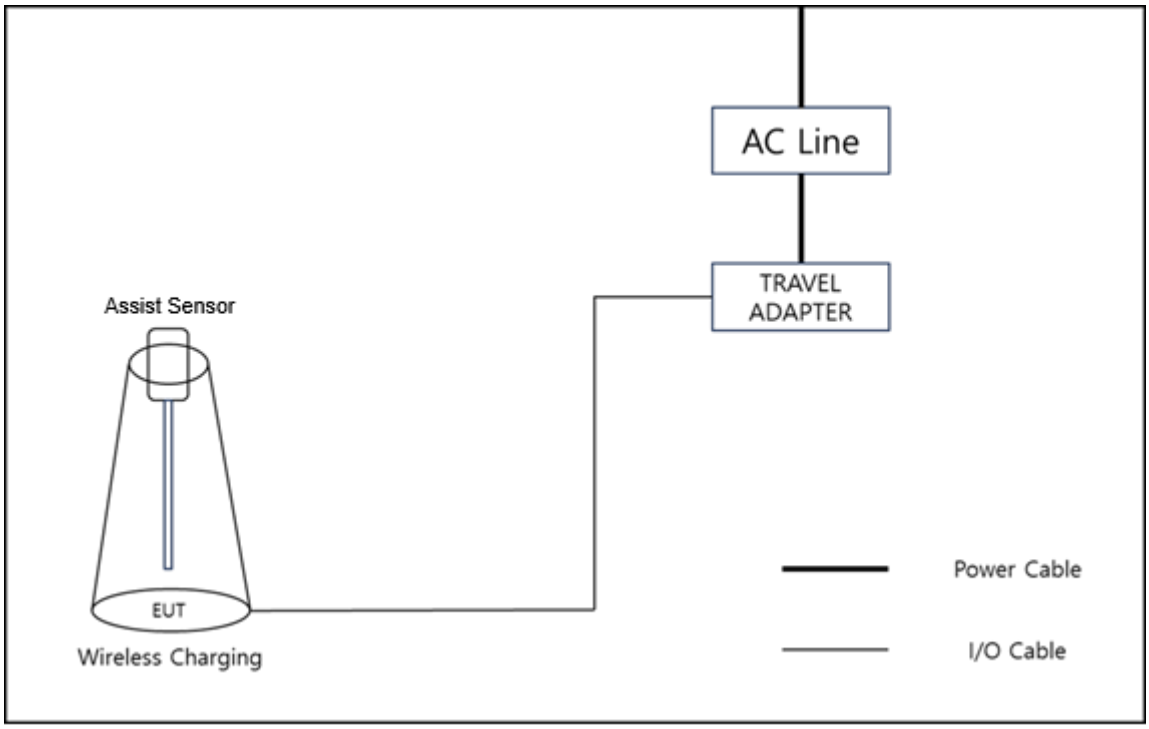
2.2.4 List of test reduction and EUT models covering other models

- No Comment

2.3 Support Equipment

EUT	Samsung Electronics Co., Ltd. Model : CC90F001213	S/N: N/A Identical Proto-type
TRAVEL ADAPTER	LG Electronics Inc. Model : MCS-04KD	S/N : N/A
Assist Sensor	Samsung Electronics Co., Ltd. Model : CC90F001113	S/N: N/A Identical Proto-type

2.4 Setup Drawing



3. ANTENNA REQUIREMENTS

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

§15.203 of the FCC Rules part 15 Subpart C

: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The transmitter has permanently attached PCB embedded antenna (Internal antenna) on board.

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	Test Condition	Result	Remark
Occupied Bandwidth	2.1049	Radiated	Note 1	-
Radiated Emission	15.209	Radiated	Complies	-
AC Line Conducted Emission	15.207	Line Conducted	Complies	-

Notes:

1. For the purpose of reporting only.

5. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 414788 D01 Radiated Test Site v01r01.
4. ANSI C63.10-2013.

6. DESCRIPTION OF TESTS

6.1 Occupied Bandwidth

Test Measurement Method

RSS-Gen Clause 6.7

Test Procedure

EUTs transmitter output is measured at channels with a spectrum analyzer.
The spectrum analyzer setting is as follows.
RBW = 300 Hz
VBW > 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
Allow trace to fully stabilize.
The spectrum analyzer internal 99% bandwidth function is utilized.

Note: Because the measured signal is CW-like, adjusting the RBW per ANSI C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

6.2 Radiated Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.4, 6.5

Limit

§15.209 (a)

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100**	3
88–216	150**	3
216–960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241.

Test Procedure

The measurement was performed at the test site that is specified in accordance with ANSI C63.10-2013.
The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna and 30 to 1000 MHz using Trilog broadband test antenna were used.
For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0˚ to 360˚ and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.
At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection.

Notes:

1. f < 30 MHz; extrapolation factor of 40 dB/decade of distance.
   Distance factor(dB) = 40log(Measurement distance in meters/Specification distance in meters)
   f ≥ 30 MHz; extrapolation factor of 20 dB/decade of distance.
   Distance factor(dB) = 20log(Measurement distance in meters/Specification distance in meters)
2. When below 30 MHz frequency range measurement, all orientations about parallel, perpendicular and ground-parallel were investigated then reported and the worse orientations of Horizontal and Vertical were set for final test. (Horizontal = Parallel, Vertical = Perpendicular)
3. Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
   Therefore, sufficient tests were mad to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field base on KDB 414788.

6.3 AC Line Conducted Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.2

Limit

§15.207(a)
for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15 to 0.5	66 to 56*	56 to 46*
0.5 to 5	56	46
5 to 30	60	50

*Decreases with the logarithm of the frequency.

Test Procedure

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure.
It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6. A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room. Rohde & Schwarz (ENV216) of the 50 ohm/50 µH Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN. Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ”. If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentine fashion) to a 1 meter length. Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time. The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCI). The detector functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

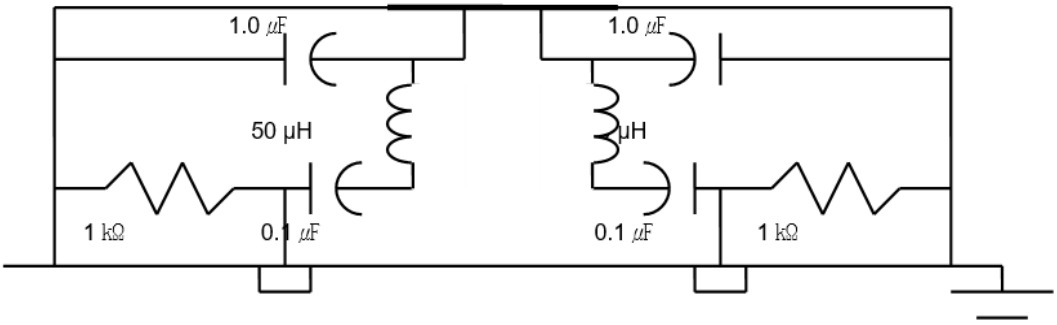


Fig. 2. LISN Schematic Diagram

7. TEST DATA

7.1 Occupied Bandwidth

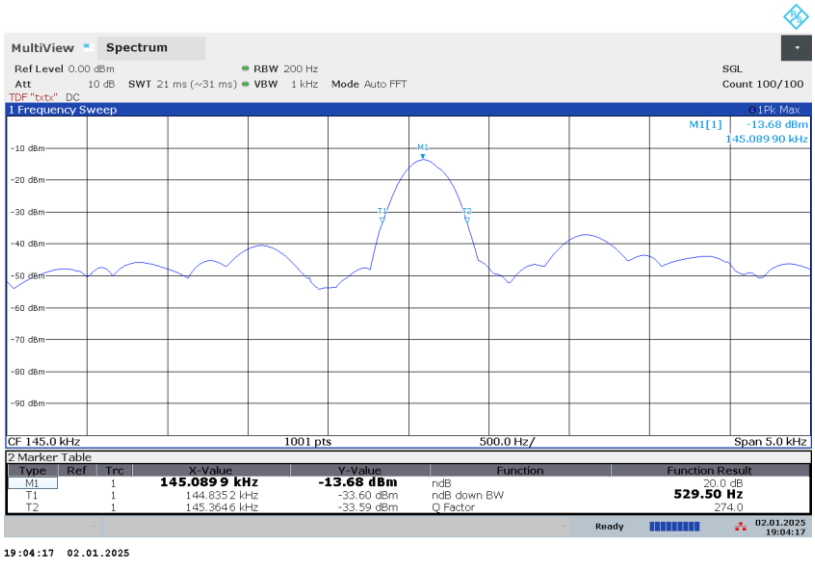
FCC §2.1049

Result

Configuration	Frequency (kHz)	Occupied Bandwidth (Hz)
Wireless Charging	145	529.5

PLOTS OF EMISSIONS

Occupied Bandwidth



7.2 Radiated Emissions

FCC §15.209

Result

Test Mode : Wireless Charging (Charging from EUT to Assist Sensor)

- 9 kHz to 30 MHz

Frequency (MHz)	Reading (dBμV)	Pol* (H/V/P)	Mode*	AF+CL+Amp (dB)**	Distance Factor (dB)	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
0.145***	52.00	H	PK	20.5	-80.0	-7.46	24.37	31.84
0.580	25.31	H	PK	20.6	-40.0	5.88	32.33	26.45
0.725	19.98	H	PK	20.6	-40.0	0.55	30.40	29.84
0.870	19.89	H	PK	20.6	-40.0	0.46	28.81	28.36
1.160	17.17	H	PK	20.6	-40.0	-2.20	26.32	28.51

Notes:
1. *Pol. : H = Horizontal, V = Vertical, P = Ground-parallel / Mode : PK = Peak, QP = Quasi-Peak
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. *** = Fundamental Frequency
4. Result(dBμV/m) = Reading + Antenna Factor + Cable Loss + Amplifier + Distance Factor
5. Other spurious was under 20 dB below Fundamental.

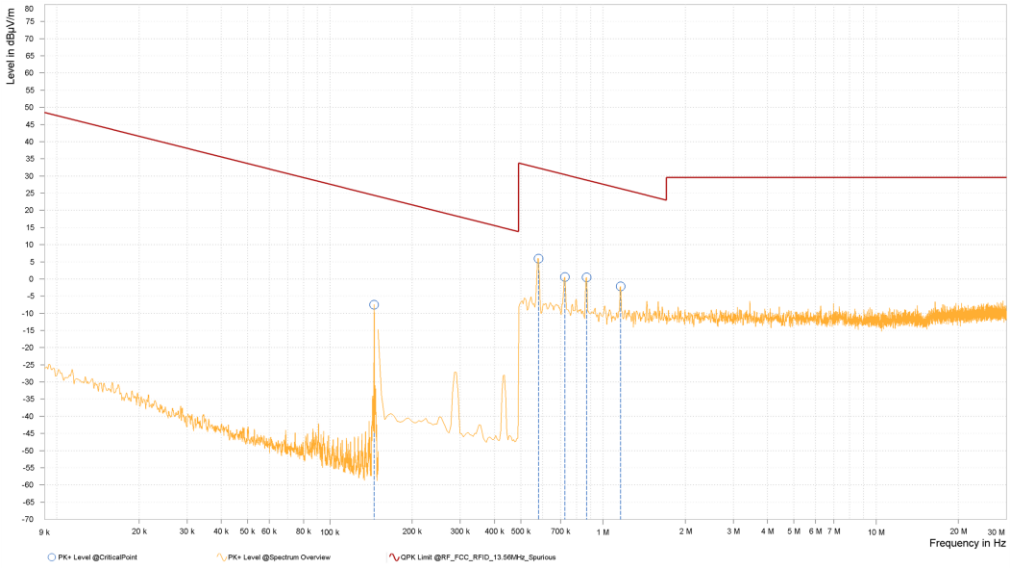
- 30 MHz to 1 000 MHz

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
34.33	29.74	V	QP	-9.2	20.52	40.00	19.48
44.00	33.79	V	QP	-6.0	27.77	40.00	12.23
89.01	30.81	H	QP	-9.2	21.61	43.50	21.89
103.49	27.89	V	QP	-6.7	21.16	43.50	22.34
120.63	33.88	V	QP	-9.1	24.74	43.50	18.76
208.80	23.24	H	QP	6.9	30.16	43.50	13.34

Notes:
1. The worst-case emission was reported.
2. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, QP = Qusi-Peak
3. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
4. Measurements using CISPR quasi-peak mode below 1 GHz.
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.
6. The limit is on the FCC §15.209.

PLOTS OF EMISSIONS

Test Plot : Spurious emission (9 kHz to 30 MHz)



Test Plot : Spurious emission (30 MHz to 1 000 MHz)

7.3 AC Line Conducted

FCC §15.207

Result

Final Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter	Corr. (dB)
0.152985	35.35	---	65.30	29.95	N	ON	9.9
0.152985	---	15.95	55.30	39.36	N	ON	9.9
0.176865	33.69	---	64.16	30.47	L1	ON	10.2
0.176865	---	14.66	54.16	39.50	L1	ON	10.2
0.194775	---	13.68	53.41	39.72	L1	ON	10.1
0.194775	32.53	---	63.41	30.88	L1	ON	10.1
0.212685	---	11.88	52.72	40.83	N	ON	10.0
0.212685	30.19	---	62.72	32.53	N	ON	10.0
0.454470	---	16.28	46.75	30.47	L1	ON	9.9
0.454470	26.14	---	56.75	30.61	L1	ON	9.9
0.723120	---	15.32	46.00	30.68	L1	ON	9.9
0.723120	23.36	---	56.00	32.64	L1	ON	9.9

Line Conducted Emissions Tabulated Data

Notes:

1. Measurements using CISPR quasi-peak mode & average mode.

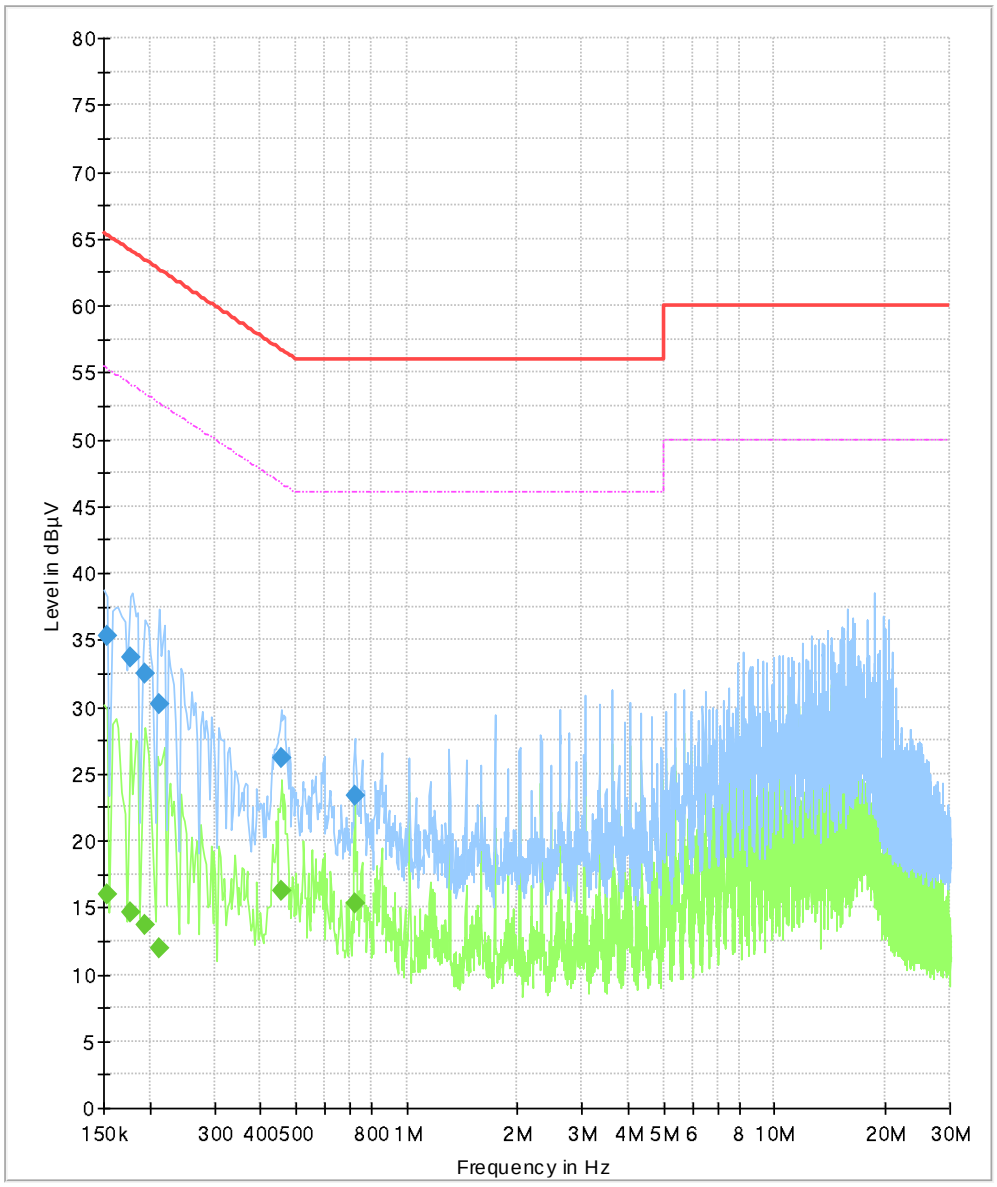
2. The worst channel was investigated and the worst -case emission are reported. See attached Plots.

*3. *) Factor = LISN + Cable Loss*

*4. **) LINE : L = Line , N = Neutral*

5. The limit is on the FCC §15.207(a).

PLOTS OF AC Line EMISSIONS



8. TEST EQUIPMENT

No.	Instrument	Manufacture	Model	Serial No.	Calibration Date	Next Calibration Date
1	Signal & Spectrum Analyzer	R&S	FSW67	101362	2024-01-17	2025-01-17
2	10 dB Attenuator	WEINSCHEL	56-10	58765	2024-10-10	2025-10-10
3	Signal Generator	R&S	SMB100A	175861	2024-03-29	2025-03-29
4	AC POWER SUPPLY	GW Instek	APS-7200	GES181345	2024-03-28	2025-03-28
5	Electric and Magnetic Field Probe	Narda	EHP-200AC	180ZX00639	2024-10-23	2025-10-23
6	EMI TEST RECEIVER	R&S	ESW44	103318	2024-01-08	2025-01-08
7	Active Loop Antenna	R&S	HFH2-Z2E	101190	2024-01-11	2025-01-11
8	TRILOG Broadband Test Antenna	Schwarzbeck	VULB 9163	01431	2024-11-11	2026-11-11
9	BIAS UNIT	R&S	IN 600	101621	N/A	N/A
10	AMPLIFIER	H.P	8447F	2805A03406	2024-01-09	2025-01-09
11	TWO-LINE V-NETWORK	R&S	ENV4200	100591	2024-07-02	2025-07-02
12	EMI TEST RECEIVER	R&S	ESR3	102930	2024-07-02	2025-07-02
13	DIGITAL MULTIMETER	EZ DIGITAL	DM-334	2111395	2024-10-08	2025-10-08
14	Humidity Temperature Recorder	Lutron	MHB-382SD	AK.26553	2024-10-16	2025-10-16
15	HYGROMETER	DRETEC	O-230	N/A	2024-01-12	2025-01-12
No.	Test program	Manufacture	Program Name	Version	Calibration Date	Next Calibration Date
1	ELEKTRA	R&S	ELEKTRA	5.03.1	N/A	N/A
2	EMC32	R&S	EMC32	11.50.00	N/A	N/A

9. ACCURACY OF MEASUREMENT & DECISION RULE

9.1 Uncertainty Calculation

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

PARAMETER	UNCERTAINTY
Radiated Disturbance, Below 30 MHz	4.5 dB
Radiated Disturbance, 30 MHz to 1 GHz	5.6 dB
Radiated Disturbance, Above 1 GHz	5.8 dB

9.2 Decision rule

The choice of whether or not to include the measurement uncertainty of the measuring system used in the test in the conformance determination.:

☐ Application of internal procedures used in type testing where traceability of measurement uncertainty is established.
☒ Applying the decision that the standard used for type testing does not require it.

END REPORT