Prüfbericht - Produkte
Test report - Products

Certificate #4301.01

Prüfbericht-Nr.: *Test Report No.:*	**CN258X1O 001**	**Auftrags-Nr.:** *Order No.:*	**326091037**	**Seite 1 von 24** *Page 1 of 24*
Kunden-Referenz-Nr.: *Client Reference No.:*	**1288983**	**Auftragsdatum:** *Order date.:*	**2025-01-13**	
Auftraggeber: *Client:*	**IKEA of Sweden AB** Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: *Test item:*	**LED Bulb**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**LED2420G1CF**			
Auftrags-Inhalt: *Order content:*	**TÜV Rheinland EMC service**			
Prüfgrundlage: *Test specification:*	**FCC 47 CFR Part 15, Subpart B:2023 Class B** **ICES-005:2018**			
Wareneingangsdatum: *Date of receipt:*	**2025-01-15**	**Refer to the EUT photos file**		
Prüfmuster-Nr.: *Test sample No.:*	**A003917538-001**			
Prüfzeitraum: *Testing period:*	**Refer to test report**			
Ort der Prüfung: *Place of testing:*	**Refer to clause 1.1**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland (Shanghai) Co., Ltd.**			
Prüfergebnis*: *Test result*:*	**Pass**			

geprüft von: *tested by:*	Rambo Liu	**genehmigt von:** *authorized by:*	Hexiong Liu
Datum: *Date:* 2025-04-16		**Ausstellungsdatum:** *Issue date:* 2025-04-16	
Stellung: / *Position*	Project engineer	**Stellung:** / *Position:*	Authorizer

Sonstiges / *Other:*	FCC ID: FHO- LED2420G1CF	
	Test Firm Name:	TUV Rheinland (Shanghai) Co., Ltd.
	Designation Number:	CN1396
	Test Firm Registration Number:	930979

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	**Prüfmuster vollständig und unbeschädigt** *Test item complete and undamaged*

* Legende: P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet
Legend: P(ass) = passed a.m. test specifications(s) F(ail) = failed a.m. test specifications(s) N/A = not applicable N/T = not tested

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.

This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

Anmerkungen
Remarks

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Revision history of test report:

Report number	Issue date	Contents and reason for change if appropriate
CN258X1O 001	2025-04-16	Initial release.

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1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.
Address: Workshop14, North Half of Workshop 10 and Workshop 16, Pingqian (Taicang) Modern Industrial Park, No.525, Yuewang Lingang South Road, Shaxi, Taicang, Jiangsu, China

The used test equipment is in accordance with CISPR 16-1 series standards for measurement of radio interference.

Refer to clause 7 for test and measurement instruments.

2 General Product Information

2.1 Product Function and Intended Use

The EUT (equipment under test) is an ordinary LED bulb for lighting and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input	:	AC 120 V, 60 Hz
Rated power	:	1.6 W

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off" with dimmer.

2.4 Description of interconnecting cables

None.

2.5 Noise Generating and Noise Suppressing Parts

Refer to the circuit diagram for further information.

2.6 Highest frequency generated or used in the device or on which the device operates or tunes

The highest frequency used in the EUT is less than 108 MHz.

2.7 Submitted Documents

Circuit diagram, label and user's manual.

3 Test Set-up and Operation Modes

3.1 Principle of Configuration Selection

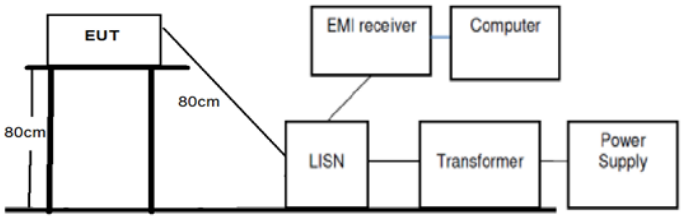
Emission: The equipment under test (EUT) was configured to measure its highest possible emission level. The test conditions were adapted accordingly in reference to the instructions for use.

Refer to the related paragraph of this report.

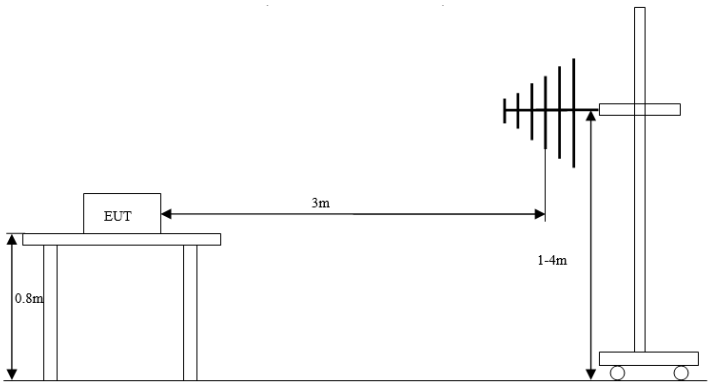
The sequence of testing:
1. Conducted emission tests were performed on 2025-03-04.
2. Radiated emission tests were performed on 2025-03-04.

3.2 Equipment and cable arrangement

Block diagram for radiated emission tests is as follows:



(Conducted emission)



(Radiated emission 30-1000 MHz)

Also refer to photographs on clause 6 for test setups for both conducted emission test and radiated emission test.

3.3 Physical Configuration for Testing

Refer to the related paragraph of this report.

3.4 Test Operation and Test Software

Refer to the related paragraph of this report. No software was used.

3.5 Special Accessories and Auxiliary Equipment

None.

3.6 Countermeasures to achieve EMC Compliance

No special measure is employed to achieve the requirement.

4 Conformity Decision Rule

For all EMI tests (when included in this report), as measurement uncertainties are less than the values U_{CISPR} given in CISPR 16-4-2, compliance with the limits is determined by comparing measurement results directly with corresponding limits without taking into consideration of measurement uncertainties.

5 Test Results E M I S S I O N

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Conducted Emission

Result:	**N/A**

Date of testing	:	2025-03-04
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2023, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-1
Frequency range	:	0.15 – 30 MHz
Limits	:	Quasi-peak limit: 0.15 – 0.5 MHz, 66 to 56 dBµV (decrease with the logarithm of frequency); 0.5 – 5 MHz, 56 dBµV; 5 – 30 MHz, 60 dBµV Average limit: 0.15 – 0.5 MHz, 56 to 46 dBµV (decrease with the logarithm of frequency); 0.5 – 5 MHz, 46 dBµV; 5 – 30 MHz, 50 dBµV
Bandwidth of EMI receiver for final measurement	:	9 kHz
Measurement time for final measurement	:	1 s
Kind of test site	:	Shielded room
Input voltage	:	AC 120 V, 60 Hz
Operational mode	:	Lighting on
Ambient condition	:	Temperature: 21.5 °C; Relative humidity: 42 %
Expanded measurement uncertainty (k=2)	:	2.33 dB The minimum margin to the limit is 21.06 dB at 0.998250 MHz. The margin is higher than expanded measurement uncertainty.

The measurement setup was made according to ANSI C63.4-2014 in a shielded room. The measurement equipment like test receivers, quasi-peak detector and artificial mains network (AMN) are in compliance with CISPR 16-1 series standards.

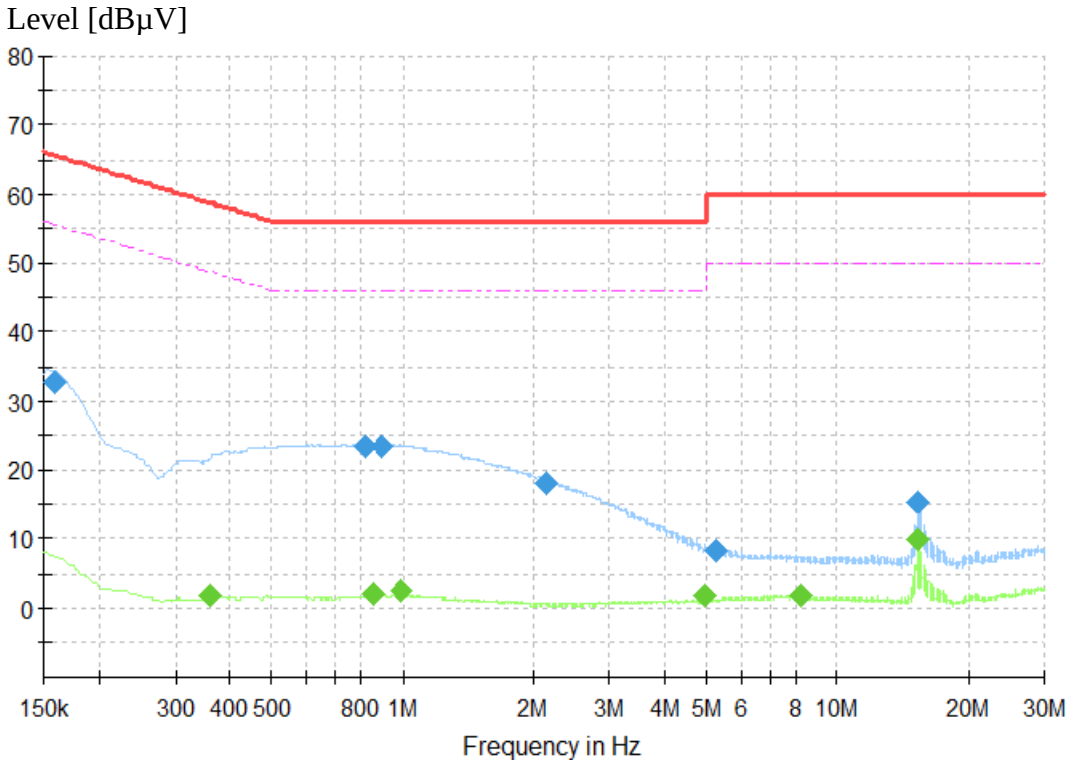
The tested object was set-up on a wooden support. The EUT was set 0.8 m away from the AMN. The cord longer than necessary to be connected to the AMN was folded forth and back parallel so as to form a bundle with a length between 0.3 m and 0.4 m. The disturbance voltage test was performed on the neutral line and phase line of the power supply of the EUT respectively.

The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, "◆" means Quasi-Peak Value and "◆" means Average Value results.

Notes on following tables of conducted emission results and conversions:

Level (dBµV): final measurement results by using quasi-peak detector and average detector
Transd (dB): transducer factor including cable loss, insertion loss of artificial mains network and gain of pre-amplifier (if used)
Margin: Limit (dBµV) - Level (dBµV)

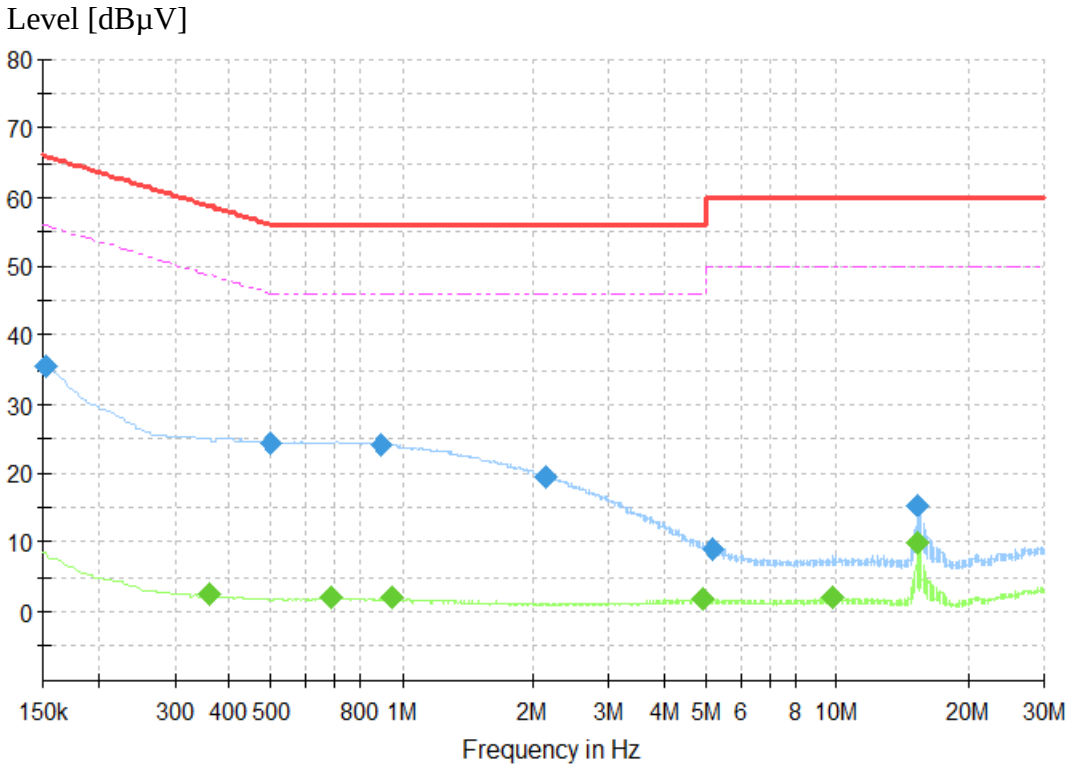
Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, Line L, maximum lighting mode



Final measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
5.244000	8.37	---	60.00	51.63	1000.0	9.000	L1	10.4
15.321750	15.25	---	60.00	44.75	1000.0	9.000	L1	10.8
2.125500	18.29	---	56.00	37.71	1000.0	9.000	L1	10.1
0.892500	23.30	---	56.00	32.70	1000.0	9.000	L1	10.6
0.820500	23.39	---	56.00	32.61	1000.0	9.000	L1	10.5
0.159000	32.63	---	65.52	32.88	1000.0	9.000	L1	10.3
15.321750	---	9.81	50.00	40.19	1000.0	9.000	L1	10.8
8.270250	---	1.85	50.00	48.15	1000.0	9.000	L1	10.8
0.856500	---	2.06	46.00	43.94	1000.0	9.000	L1	10.5
0.361500	---	1.74	48.69	46.95	1000.0	9.000	L1	10.3
4.980750	---	1.71	46.00	44.29	1000.0	9.000	L1	10.3
0.993750	---	2.41	46.00	43.59	1000.0	9.000	L1	10.7

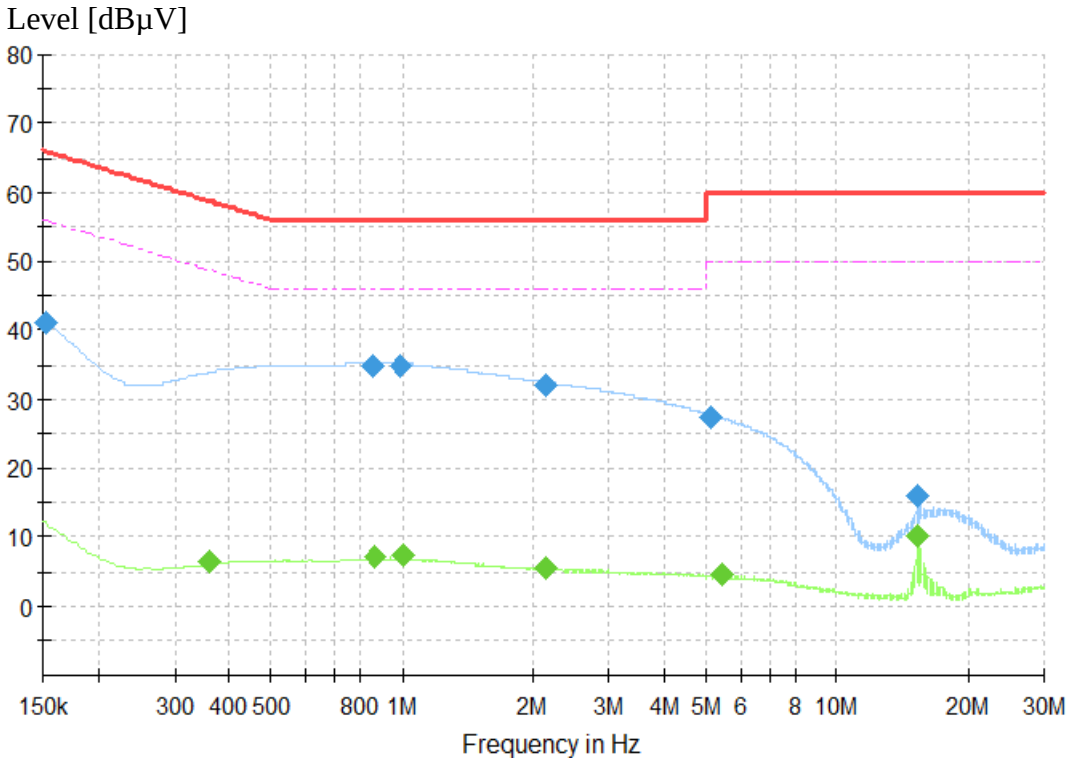
Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, Line N, maximum lighting mode



Final measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
5.192250	8.96	---	60.00	51.04	1000.0	9.000	N	10.7
15.321750	15.34	---	60.00	44.66	1000.0	9.000	N	11.1
2.123250	19.44	---	56.00	36.56	1000.0	9.000	N	10.5
0.901500	23.87	---	56.00	32.13	1000.0	9.000	N	10.4
0.498750	24.28	---	56.02	31.74	1000.0	9.000	N	10.2
0.152250	35.46	---	65.88	30.42	1000.0	9.000	N	10.2
15.321750	---	9.94	50.00	40.06	1000.0	9.000	N	11.1
9.728250	---	2.03	50.00	47.97	1000.0	9.000	N	11.0
0.687750	---	2.16	46.00	43.84	1000.0	9.000	N	10.4
0.361500	---	2.52	48.69	46.18	1000.0	9.000	N	10.4
4.884000	---	1.86	46.00	44.14	1000.0	9.000	N	10.7
0.948750	---	1.95	46.00	44.05	1000.0	9.000	N	10.4

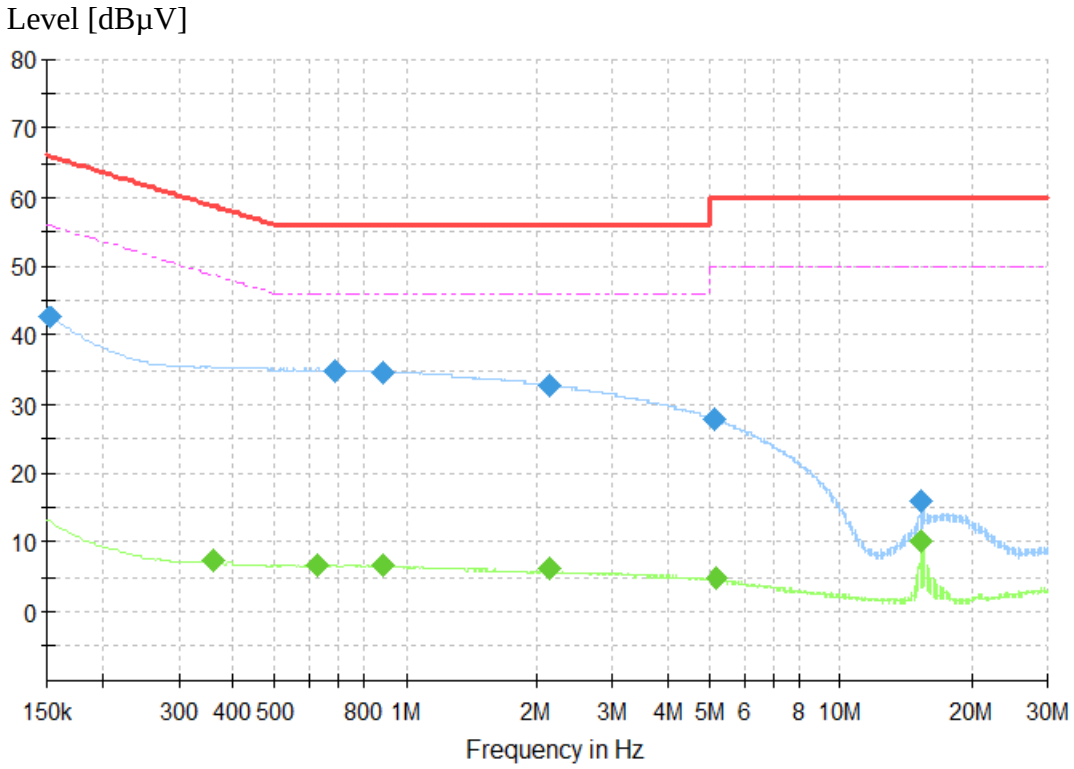
Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, Line L, minimum lighting mode



Final measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
15.321750	15.94	---	60.00	44.06	1000.0	9.000	L1	10.8
5.149500	27.47	---	60.00	32.53	1000.0	9.000	L1	10.3
2.130000	32.15	---	56.00	23.85	1000.0	9.000	L1	10.1
0.856500	34.90	---	56.00	21.10	1000.0	9.000	L1	10.5
0.998250	34.94	---	56.00	21.06	1000.0	9.000	L1	10.7
0.152250	41.15	---	65.88	24.72	1000.0	9.000	L1	10.3
15.321750	---	9.98	50.00	40.02	1000.0	9.000	L1	10.8
5.412750	---	4.56	50.00	45.44	1000.0	9.000	L1	10.4
0.865500	---	7.03	46.00	38.97	1000.0	9.000	L1	10.5
0.361500	---	6.36	48.69	42.33	1000.0	9.000	L1	10.3
2.136750	---	5.55	46.00	40.45	1000.0	9.000	L1	10.1
1.000500	---	7.19	46.00	38.81	1000.0	9.000	L1	10.7

Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, Line N, minimum lighting mode



Final measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
15.321750	16.05	---	60.00	43.95	1000.0	9.000	N	11.1
5.147250	27.59	---	60.00	32.41	1000.0	9.000	N	10.7
2.127750	32.54	---	56.00	23.46	1000.0	9.000	N	10.5
0.885750	34.45	---	56.00	21.55	1000.0	9.000	N	10.4
0.687750	34.76	---	56.00	21.24	1000.0	9.000	N	10.4
0.152250	42.63	---	65.88	23.24	1000.0	9.000	N	10.2
5.167500	---	4.78	50.00	45.22	1000.0	9.000	N	10.7
15.321750	---	10.21	50.00	39.79	1000.0	9.000	N	11.1
0.361500	---	7.21	48.69	41.49	1000.0	9.000	N	10.4
0.883500	---	6.71	46.00	39.29	1000.0	9.000	N	10.4
0.627000	---	6.82	46.00	39.18	1000.0	9.000	N	10.3
2.127750	---	5.99	46.00	40.01	1000.0	9.000	N	10.5

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated Emission (30 – 1000 MHz)

Result:	**Passed**

Date of testing	:	2025-03-04
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2023, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-3
Product classification	:	Class B
Frequency range	:	30 – 1000 MHz (see Note 1)
Limits	:	Quasi-peak limits (3 m distance): (see Note 2) 30 – 88 MHz, 40 dBµV/m; 88 – 216 MHz, 43.5 dBµV/m; 216 – 1000 MHz, 46 dBµV/m
Bandwidth of EMI receiver for final measurement	:	120 kHz
Measurement time for final measurement	:	1 s
Kind of test site	:	Semi-anechoic chamber
Supply voltage	:	AC 120 V, 60 Hz
Operational mode	:	Lighting on
Ambient condition	:	Temperature: 20.5 °C; Relative humidity: 41 %
Expanded measurement uncertainty (*k*=2)	:	5.40 dB The minimum margin to the limit is 8.7 dB at 732.420000 MHz. The margin is higher than expanded measurement uncertainty.

The radiated disturbance test was carried out in a semi-anechoic chamber. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the semi-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a 0.8 m high wooden table above the reference ground plane. The wooden table was rotated 360° around and the height of the antenna was varied from 1 m to 4 m to find the maximum disturbance. The test was performed with the antenna both in its horizontal and vertical polarizations.

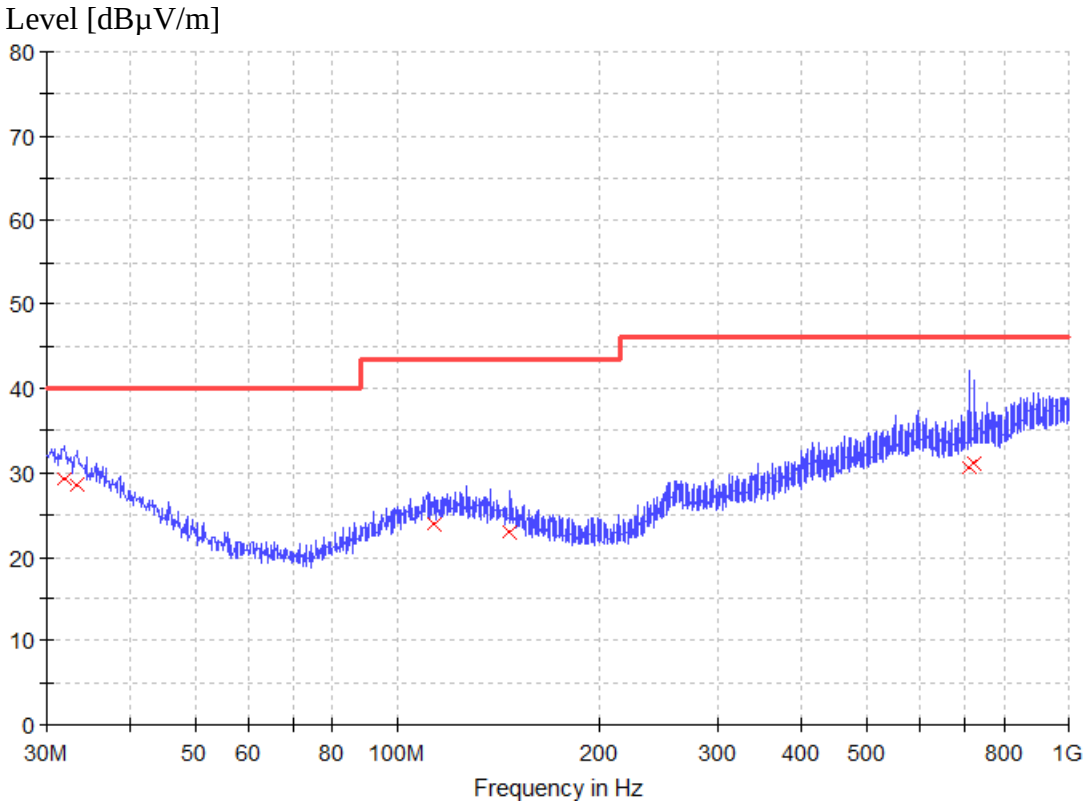
The following figures and tables were those measured by an automatic measurement system. Before final measurement, a survey was made with EUT's speed control adjusted to determine in which state the maximum disturbance was obtained. The final measurement was made in the state the maximum disturbance was obtained. In the following spectral diagram, "×" means quasi-peak test results.

Notes on following tables of radiated emission results and conversions:
QuasiPeak (dBµV/m): final measurement results by using quasi-peak detector.
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used).
Margin: Limit (dBµV/m) - QuasiPeak (dBµV/m).

Note 1: The highest frequency in the EUT is less than 108 MHz. According to FCC Part 15 subpart B §15.33 (b) (1), the upper frequency for radiated emission measurement is 1000 MHz.

Note 2: The class B limits of ICES-005:2018 is stricter than those FCC 47 CFR Part 15, Subpart B:2023 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

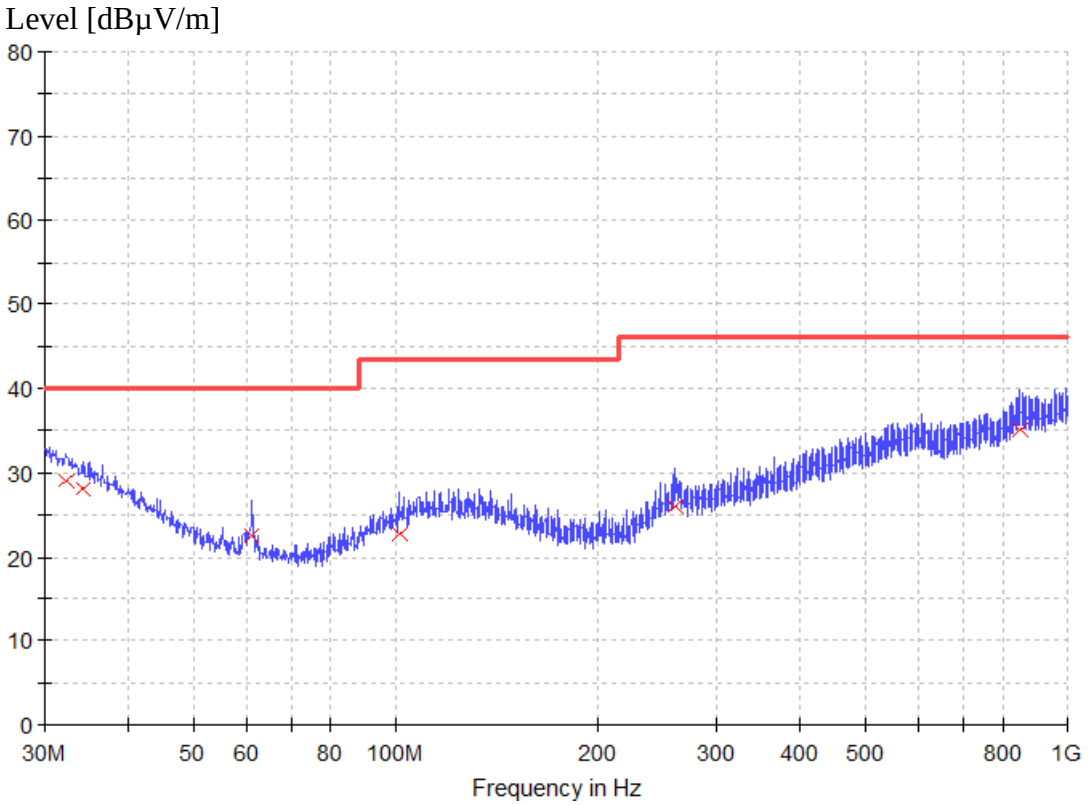
Figure 5: Spectral diagrams and measurement results, 30-1000 MHz, Horizontal polarization, maximum lighting mode



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
31.940000	29.2	1000.0	120.000	100.0	H	180.0	23.9	10.8	40.0
33.152500	28.6	1000.0	120.000	120.0	H	-66.0	23.4	11.4	40.0
112.935000	23.8	1000.0	120.000	140.0	H	144.0	18.8	19.7	43.5
146.885000	22.9	1000.0	120.000	150.0	H	-99.0	17.7	20.6	43.5
713.122500	30.7	1000.0	120.000	180.0	H	-158.0	27.0	15.3	46.0
724.035000	31.0	1000.0	120.000	200.0	H	-180.0	27.3	15.0	46.0

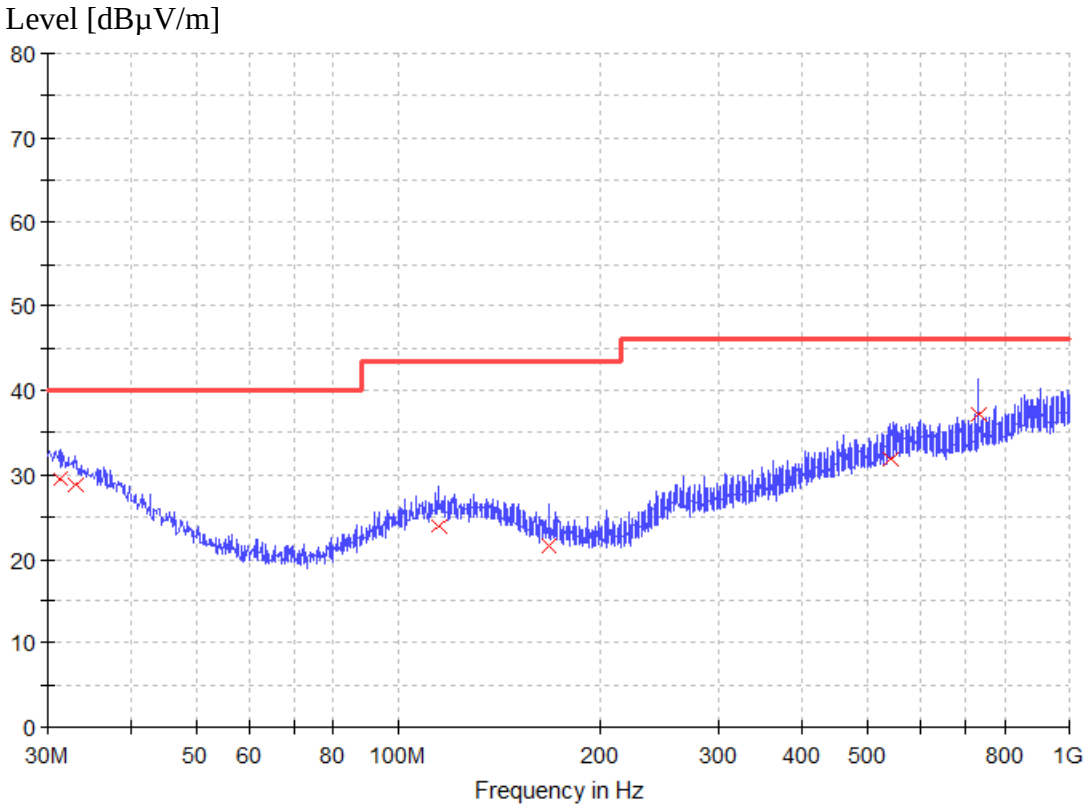
Figure 6: Spectral diagrams and measurement results, 30-1000 MHz, Vertical polarization, maximum lighting mode



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
32.182500	29.1	1000.0	120.000	100.0	V	180.0	23.8	10.9	40.0
34.365000	28.0	1000.0	120.000	120.0	V	-74.0	22.8	12.0	40.0
61.161250	22.5	1000.0	120.000	150.0	V	112.0	12.8	17.5	40.0
101.658750	22.8	1000.0	120.000	180.0	V	158.0	17.8	20.7	43.5
261.830000	25.9	1000.0	120.000	200.0	V	-140.0	20.9	20.1	46.0
848.073750	35.2	1000.0	120.000	200.0	V	-180.0	29.0	10.8	46.0

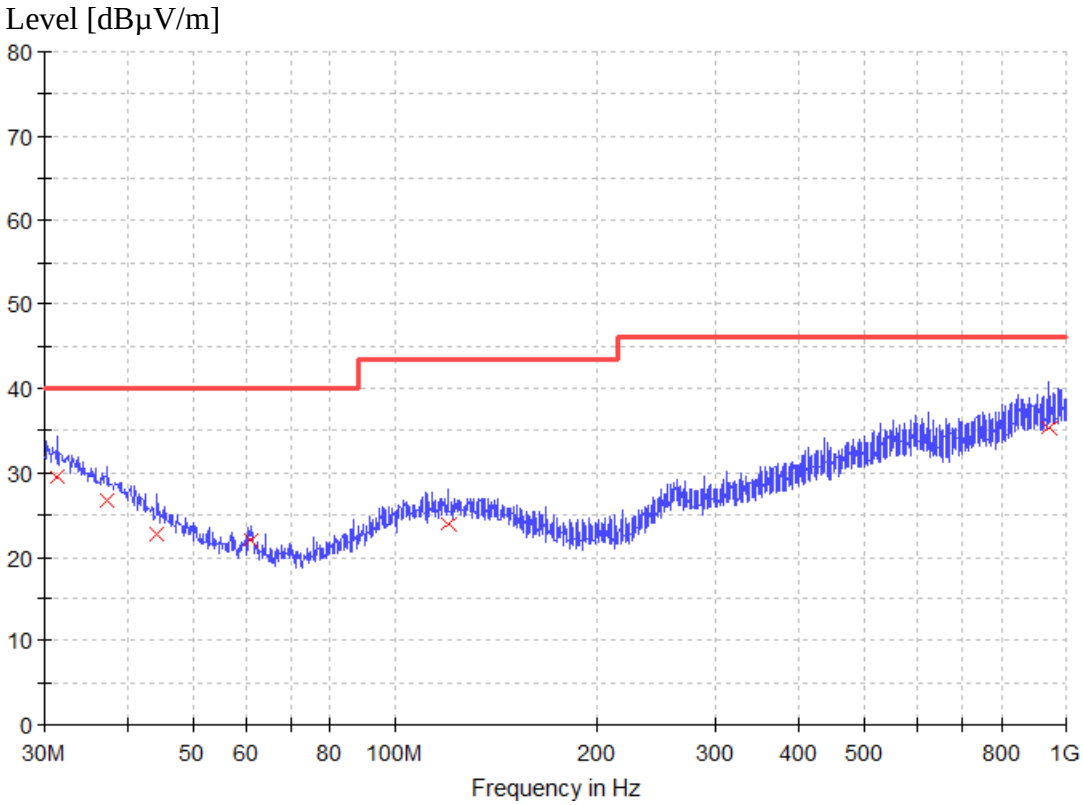
Figure 7: Spectral diagrams and measurement results, 30-1000 MHz, Horizontal polarization, minimum lighting mode



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
31.333750	29.5	1000.0	120.000	100.0	H	-180.0	24.2	10.5	40.0
33.031250	28.7	1000.0	120.000	100.0	H	-180.0	23.4	11.3	40.0
114.875000	23.9	1000.0	120.000	100.0	H	-180.0	18.8	19.6	43.5
167.497500	21.6	1000.0	120.000	100.0	H	-180.0	16.6	21.9	43.5
541.796250	31.8	1000.0	120.000	100.0	H	-180.0	26.3	14.2	46.0
732.280000	37.2	1000.0	120.000	100.0	H	180.0	27.5	8.8	46.0

Figure 8: Spectral diagrams and measurement results, 30-1000 MHz, Vertical polarization, minimum lighting mode



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBuV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBuV/m)
31.455000	29.5	1000.0	120.000	100.0	V	180.0	24.1	10.5	40.0
37.275000	26.6	1000.0	120.000	120.0	V	-147.0	21.3	13.4	40.0
44.186250	22.8	1000.0	120.000	140.0	V	92.0	17.6	17.2	40.0
60.797500	22.1	1000.0	120.000	150.0	V	-115.0	12.9	17.9	40.0
120.452500	23.9	1000.0	120.000	180.0	V	-67.0	18.9	19.6	43.5
945.316250	35.4	1000.0	120.000	200.0	V	-180.0	29.2	10.6	46.0

6 Photographs of the Test Set-Up

Refer to the test setup file.

7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
9061503	Shielded enclosure	10.055x3.605x3.000	Frankonia	08.11.2023	08.11.2028
9023229	EMI test receiver	ESR3	Rohde&Schwarz	03.08.2024	03.08.2025
G1824248	Dual display multimeter	F45	Fluke	28.06.2024	28.06.2025
9062744	EMI measurement software	EMC32-E+(10.60.20)	Rohde&Schwarz	N/A	N/A
G1830003	Artificial mains network	ENV432	Rohde&Schwarz	11.10.2024	11.10.2025
G1811378	3m semi-anechoic chamber	SAC3	Frankonia	03.12.2023	03.12.2026
G1811391	EMI test receiver	ESCI	Rohde&Schwarz	17.10.2024	17.10.2025
G1811425	Bilog antenna	CBL 6112D	Teseq	20.04.2023	20.04.2026
9062745	EMI measurement software	EMC32-MEB (10.60.20)	Rohde&Schwarz	N/A	N/A

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