Prüfbericht-Nr.: *Test report no.:*	**CN23XEH4 002**	**Auftrags-Nr.:** *Order no.:*	**80100258**	**Seite 1 von 20** *Page 1 of 20*
Kunden-Referenz-Nr.: *Client reference no.:*	**1288983**	**Auftragsdatum:** *Order date:*	**2024-02-01**	
Auftraggeber: *Client:*	**IKEA of Sweden AB** Box 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: *Test item:*	**Portable general purpose luminaires**			
Bezeichnung / Typ-Nr.: *Identification / Type no.:*	**J2301 Solvinden**			
Auftrags-Inhalt: *Order content:*	**TÜV Rheinland EMC service**			
Prüfgrundlage: *Test specification:*	**FCC 47 CFR Part 15, Subpart B:2022 Class B** **ICES-005:2018**			
Wareneingangsdatum: *Date of sample receipt:*	**2024-02-02**	Refer to the EUT photos file		
Prüfmuster-Nr.: *Test sample no:*	**A003656288-002**			
Prüfzeitraum: *Testing period:*	**Refer to test report**			
Ort der Prüfung: *Place of testing:*	**Refer to clause 1.1**			
Prüflaboratorium: *Testing laboratory:*	**TÜV Rheinland (Suzhou) Co., Ltd.**			
Prüfergebnis*: *Test result*:*	**Pass**			

geprüft von:
tested by: Jessie Xu

Datum:
Date: 2024-05-21

Stellung / Position: Project engineer

genehmigt von:
authorized by: Jiaqi Zhou

Ausstellungsdatum:
Issue date: 2024-05-21

Stellung / Position: Reviewer

Sonstiges / *Other:*
FCC ID: FHO-J2301
Test Firm Name: TÜV Rheinland (Suzhou) Co., Ltd.
Test Firm Registration Number: 251781
Designation Number: CN1370

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 specification(s)*	*F(ail) = failed a.m. test specification(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 above mentioned 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

1	Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben. Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden. *The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system.* *Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request.*
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4	Die Entscheidungsregel für Konformitätserklärungen basierend auf numerischen Messergebnisen in diesem Prüfbericht basiert auf der "Null-Grenzwert-Regel" und der "Einfachen Akzeptanz" gemäß ILAC G8:2019 und IEC Guide 115:2021, es sei denn, in der auf Seite 1 dieses Berichts genannten angewandten Norm ist etwas anderes festgelegt oder vom Kunden gewünscht. Dies bedeutet, dass die Messunsicherheit nicht berücksichtigt wird und daher auch nicht im Prüfbericht angegeben wird. Zu weiteren Informationen bezueglich des Risikos durch diese Entscheidungsregel siehe ILAC G8:2019. The decision rule for statements of conformity, based on numerical measurement results, in this test report is based on the “Zero Guard Band Rule” and “Simple Acceptance” in accordance with ILAC G8:2019 and IEC Guide 115:2021, unless otherwise specified in the applied standard mentioned on Page 1 of this report or requested by the customer. This means that measurement uncertainty is not taken in account and hence also not declared in the test report. For additional information to the resulting risk based of this decision rule please refer to ILAC G8:2019.

TEST SUMMARY

5.1.1 CONDUCTED EMISSION
Result:
Passed
5.2.1 RADIATED EMISSION (30-1000 MHz)
Result:
Passed

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1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Suzhou) Co., Ltd.
Address: No.14 building and north half of No.10 workshop building, No.525, Yuewang Lingang South Road, Pingqian (Taicang) Modern Industrial Park, Shaxi Town, Taicang City, Jiangsu Province, 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 portable general purpose luminaires 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 : 1.4 W
Protection class : II

The model J2301 Solvinden was already EMC tested as described in the report CN23XEH4 001. Compared with the report, one of the above standards has been updated. However according to the content of update, no additional test is needed. The report is also for adding the alternative LED driver CPSW24-3.6-IL-1 (Rated input: 100-120 Vac, 50/60 Hz, Max 0.05 A; Output: DC 24 V, Max. 0.15 A, 3.6 W). Therefore, the EMI tests were performed on the model J2301 Solvinden with the new LED driver.

2.3 Independent Operation Modes

The basic operation modes are: "ON" and "OFF".

2.4 Description of interconnecting cables

No.	Interface and name	Shielded or not	Specified length (m)
1	AC power line of LED power supply	unshielded	0.9
2	DC power line of LED power supply	unshielded	4

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 70 kHz.

2.7 Submitted Documents

Circuit diagram, user's manual and rating label.

3 Test Set-up and Operation Modes

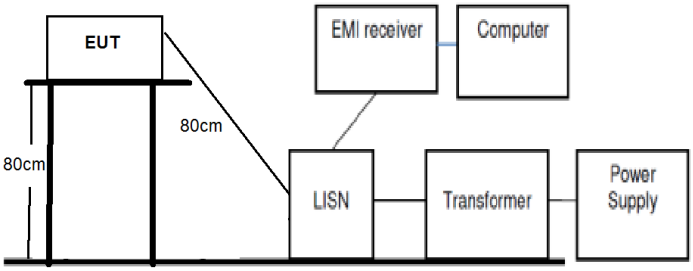
3.1 Principle of Configuration Selection

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.

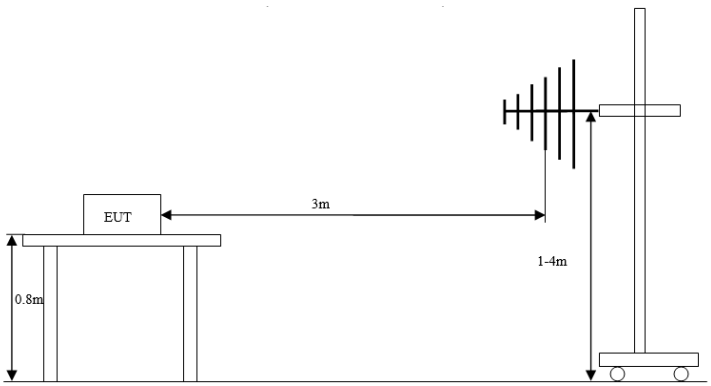
Refer to the related paragraph of this report.
The sequence of testing:
1. Radiated emission tests were performed on 2024-05-07.
2. Conducted emission tests were performed on 2024-05-08.

3.2 Equipment and cable arrangement

Block diagram for both conducted emission and 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 Test Software

No special test software was used during the tests.

3.4 Special Accessories and Auxiliary Equipment

None.

3.5 Countermeasures to achieve EMC Compliance

No other special measure is employed to achieve the requirement.

4 Conformity Decision Rule

For all EMI tests 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:	**Passed**

Date of testing	:	2024-05-07
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2022, 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: 23.5 °C; Relative humidity: 49.4 %
Expanded measurement uncertainty (*k*=2)	:	2.33 dB The minimum margin to the limit is 3.09 dB at 0.1635MHz. 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.

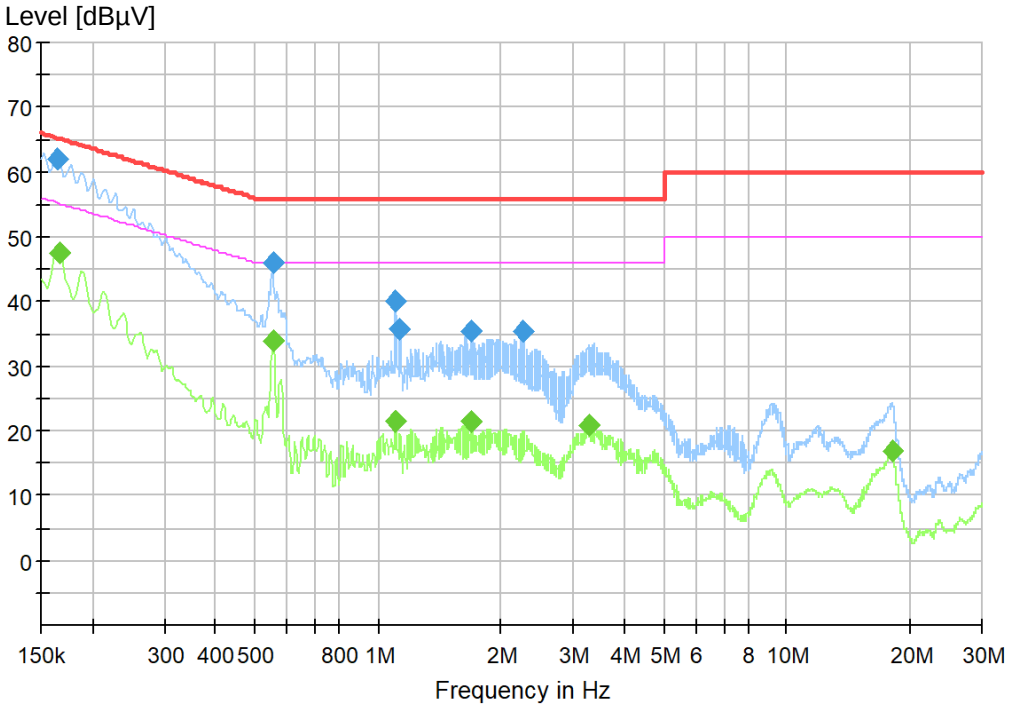
The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, "♦" means Quasi-Peak Value and "♦" means Average Value results.

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, L



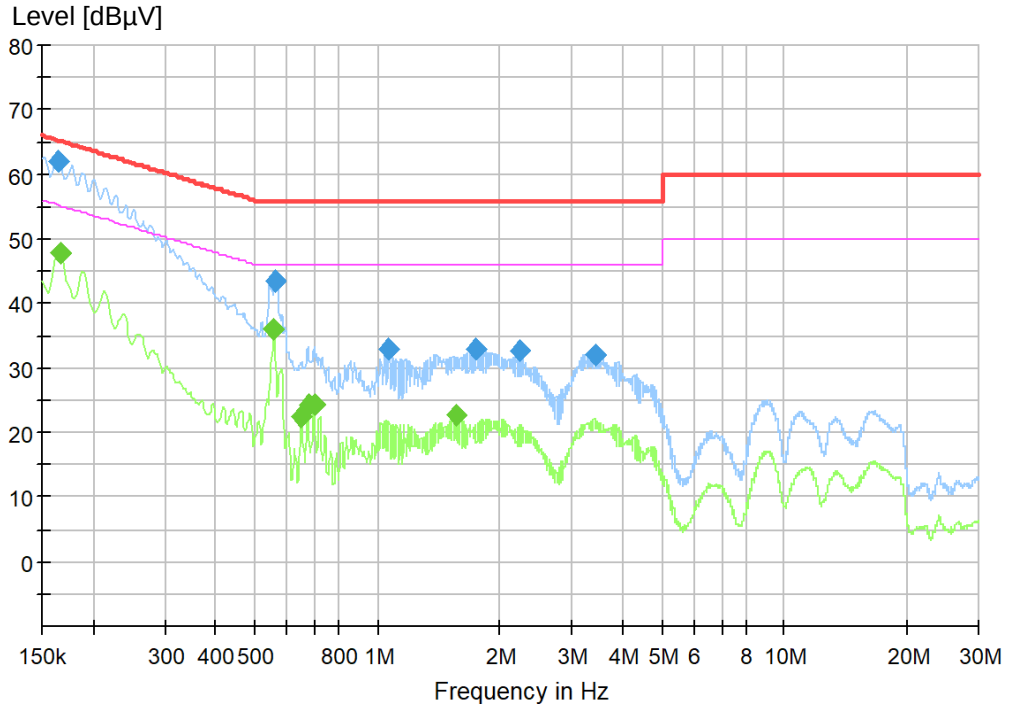
Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.163500	62.02	65.28	3.27	1000.0	9.000	L1	10.4
0.550500	45.85	56.00	10.15	1000.0	9.000	L1	10.5
1.101750	40.23	56.00	15.78	1000.0	9.000	L1	10.8
1.128750	35.85	56.00	20.15	1000.0	9.000	L1	10.8
1.677750	35.57	56.00	20.43	1000.0	9.000	L1	10.4
2.256000	35.46	56.00	20.54	1000.0	9.000	L1	10.3

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165750	47.62	55.17	7.55	1000.0	9.000	L1	10.4
0.552750	33.88	46.00	12.12	1000.0	9.000	L1	10.5
1.101750	21.66	46.00	24.34	1000.0	9.000	L1	10.8
1.680000	21.48	46.00	24.52	1000.0	9.000	L1	10.4
3.282000	20.79	46.00	25.21	1000.0	9.000	L1	10.4
18.010500	16.78	50.00	33.22	1000.0	9.000	L1	11.2

Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N



Final quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.163500	62.19	65.28	3.09	1000.0	9.000	N	10.5
0.557250	43.57	56.00	12.43	1000.0	9.000	N	10.4
1.065750	32.94	56.00	23.06	1000.0	9.000	N	10.5
1.738500	32.93	56.00	23.07	1000.0	9.000	N	10.7
2.224500	32.71	56.00	23.29	1000.0	9.000	N	10.7
3.432750	32.20	56.00	23.80	1000.0	9.000	N	10.8

Final average measurement result:

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.165750	47.88	55.17	7.29	1000.0	9.000	N	10.6
0.555000	35.95	46.00	10.05	1000.0	9.000	N	10.4
0.649500	22.56	46.00	23.44	1000.0	9.000	N	10.5
0.674250	24.43	46.00	21.57	1000.0	9.000	N	10.5
0.696750	24.28	46.00	21.72	1000.0	9.000	N	10.6
1.556250	22.75	46.00	23.25	1000.0	9.000	N	10.7

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30-1000 MHz)

Result:	**Passed**

Date of testing	:	2024-05-08
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2022, 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): 30 – 88 MHz, 40 dBµV/m; 88 – 216 MHz, 43.5 dBµV/m; 216 – 1000 MHz, 46 dBµV/m (see Note 2)
Bandwidth of EMI receiver for final measurement	:	120 kHz
Measurement time for final measurement	:	1 s
Kind of test site	:	Semi-anechoic chamber
Input voltage	:	AC 120 V, 60 Hz
Operational mode	:	Lighting on
Ambient condition	:	Temperature: 21.6 °C; Relative humidity: 45.3 %
Expanded measurement uncertainty (*k*=2)	:	5.40 dB The minimum margin to the limit is 12.5 dB at 31.333750 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 an 80 cm wooden support above the reference ground plane. The wooden support 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. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following spectral diagram, "×" means quasi-peak test results.

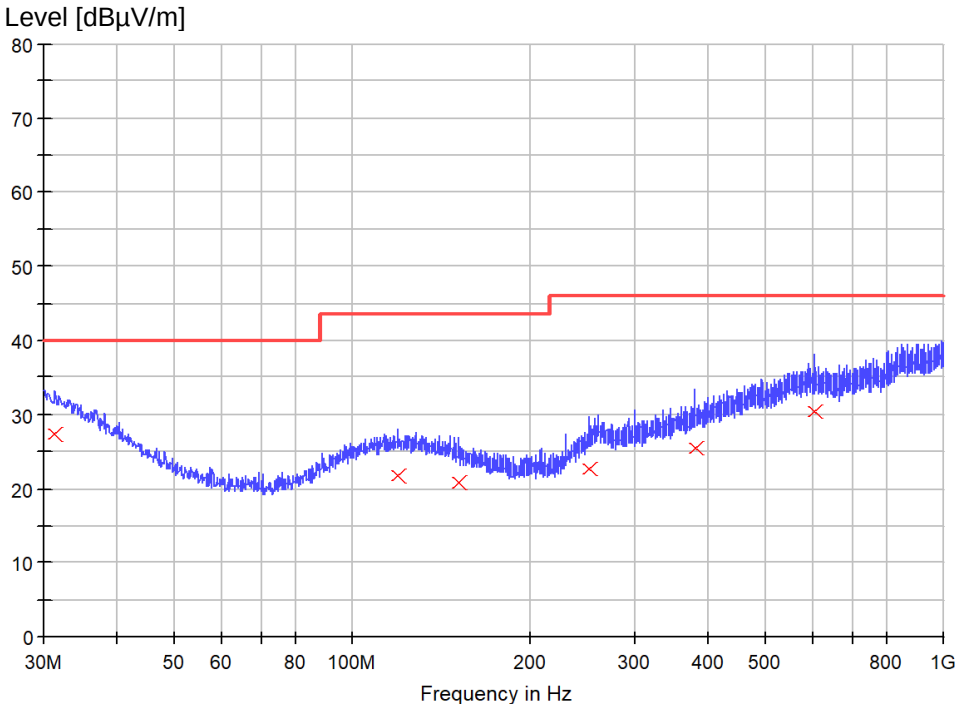
Notes on following tables of radiated emission results and conversions:

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:2022 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

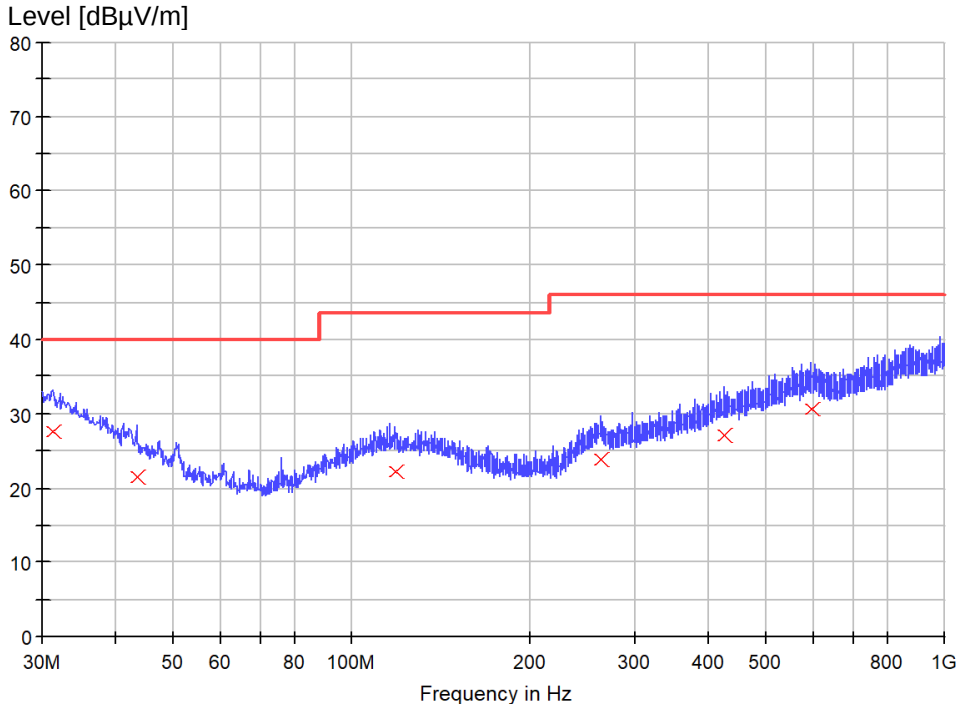
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.455000	27.4	120.000	100.0	H	-180.0	24.1	12.6	40.0
118.997500	21.8	120.000	100.0	H	-180.0	18.9	21.7	43.5
151.250000	20.8	120.000	100.0	H	-180.0	17.6	22.7	43.5
251.766250	22.7	120.000	100.0	H	-180.0	19.7	23.3	46.0
380.533750	25.6	120.000	100.0	H	-180.0	22.4	20.4	46.0
605.210000	30.4	120.000	100.0	H	-180.0	27.0	15.6	46.0

Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
31.333750	27.5	120.000	100.0	V	180.0	24.2	12.5	40.0
43.337500	21.6	120.000	100.0	V	180.0	18.0	18.4	40.0
118.270000	22.2	120.000	100.0	V	180.0	18.9	21.3	43.5
262.800000	23.8	120.000	100.0	V	180.0	20.9	22.2	46.0
424.668750	27.2	120.000	100.0	V	180.0	24.0	18.8	46.0
597.813750	30.7	120.000	100.0	V	180.0	26.9	15.3	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
G1811378	3m semi-anechoic chamber	SAC3	Frankonia	03.12.2023	03.12.2026
G1811391	EMI test receiver	ESCI	Rohde&Schwarz	16.10.2023	16.10.2024
G1811425	Bilog antenna	CBL 6112D	Teseq	20.04.2023	20.04.2026
9062745	EMI measurement software 3m SAC	EMC32 (10.60.20)	Rohde&Schwarz	N/A	N/A
9061503	Shielded enclosure	10.055x3.605x3.000	Frankonia	08.11.2023	08.11.2028
9023229	EMI test receiver	ESR3	Rohde&Schwarz	23.08.2023	23.08.2024
G1830003	Artificial mains network	ENV432	Rohde&Schwarz	16.10.2023	16.10.2024
G1824248	Dual display multimeter	F45	Fluke	08.10.2022	08.10.2024
9062744	EMI measurement software SR1	EMC32 (10.60.20)	Rohde&Schwarz	N/A	N/A

8 List of Figures

Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L 12
Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N 13
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Figure 4: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization 17

End of test report