

Prüfbericht-Nr.: <i>Test Report No.:</i>	CN20UZB1 002	Auftrags-Nr.: <i>Order No.:</i>	244337281	Seite 1 von 23 <i>Page 1 of 23</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	1774198	Auftragsdatum: <i>Order date.:</i>	2021-06-07	
Auftraggeber: <i>Client:</i>	IKEA of Sweden AB BOX 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: <i>Test item:</i>	Wall Lamp			
Bezeichnung / Typ-Nr.: <i>Identification / Type No.:</i>	V2013 Kabomba			
Auftrags-Inhalt: <i>Order content:</i>	TÜV Rheinland EMC service			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15, Subpart B:2019 Class B ICES-005:2018			
Wareneingangsdatum: <i>Date of receipt:</i>	2021-06-07	Refer to the EUT photos file		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A003064155-003			
Prüfzeitraum: <i>Testing period:</i>	2021-06-17			
Ort der Prüfung: <i>Place of testing:</i>	Refer to clause 1.1			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von: / tested by: Jessie Xu		genehmigt von: / authorized by: Jiayi Zhou		
Datum: / Date: 2021-07-07 <i>Jessie Xu</i>		Datum: / Date: 2021-07-07 <i>Jiayi Zhou</i>		
Stellung: / Position: Project manager		Stellung: / Position: Senior manager		
Sonstiges / Other:	FCC ID: FHO-V2013 Test Firm Registration Number: 958801 Refer to clause 2.2 for further information.			
Zustand des Prüfgegenstandes bei Anlieferung: <i>Condition of the test item at delivery:</i>		Prüfmuster vollständig und unbeschädigt <i>Test item complete and undamaged</i>		
* 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. <i>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.</i>				

TEST SUMMARY

5.1.1 CONDUCTED EMISSION

Result:
Passed

5.2.1 RADIATED EMISSION

Result:
Passed

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1 Test Sites

1.1 Test Facilities

Laboratory: TÜV Rheinland (Shanghai) Co., Ltd.

Address: No.177, 178, Lane 777 West Guangzhong Road, Jing'an District, Shanghai, 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 wall lamp for household and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

System input : AC 120 V, 50-60 Hz
Rated power : 9 W
Protection class : II

Identities and differences: The model V2012 Kabomba was already EMC tested in the test report CN20UZB1 001. The updated report is for changing the IC and IC peripheral components for secondary part after the transformer for the built-in power supply. Therefore, the EMC tests were performed on above model with the new IC.

2.3 Independent Operation Modes

The basic operation modes are: "ON" and "OFF" with dimming function.

2.4 Description of interconnecting cables

No.	Interface and name	Shielded or not	Specified length (mm)
1	AC power line	Unshielded	245 mm

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, 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.

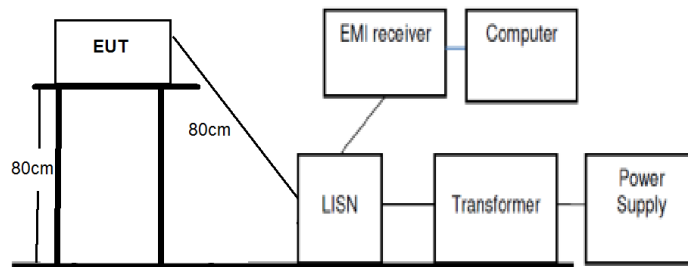
Refer to the related paragraph of this report.

The sequence of testing:

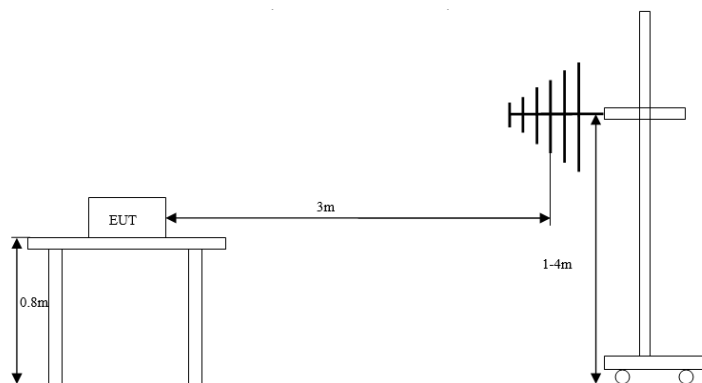
1. Radiated emission tests were performed on 2021-06-17
2. Conducted emission tests were performed on 2021-06-17

3.2 Equipment and cable arrangement

Block diagram for both conducted emission and radiated emission tests is as follows:



(Conducted emission)



(Radiated emission)

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

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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.

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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 EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Conducted emission

Result:	Passed
Date of testing	: 2021-06-17
Test procedure	: FCC 47 CFR Part 15, Subpart B:2019, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards
Frequency range	: 0.15 – 30 MHz
Limits	: Quasi-peak limit: 0.15 - 0.5 MHz, 66 to 56 dB μ V (decrease with the logarithm of frequency); 0.5 - 5 MHz, 56 dB μ V; 5 - 30 MHz, 60 dB μ V Average limit: 0.15 - 0.5 MHz, 56 to 46 dB μ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 46 dB μ V; 5 – 30 MHz, 50 dB μ V
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	: Power on with maximum light out and minimum light out respectively.
Ambient condition	: Temperature: 20.5 °C; Relative humidity: 48.2 %
Expanded measurement uncertainty ($k=2$)	: 3.39 dB

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 green “*” means Average Value results.

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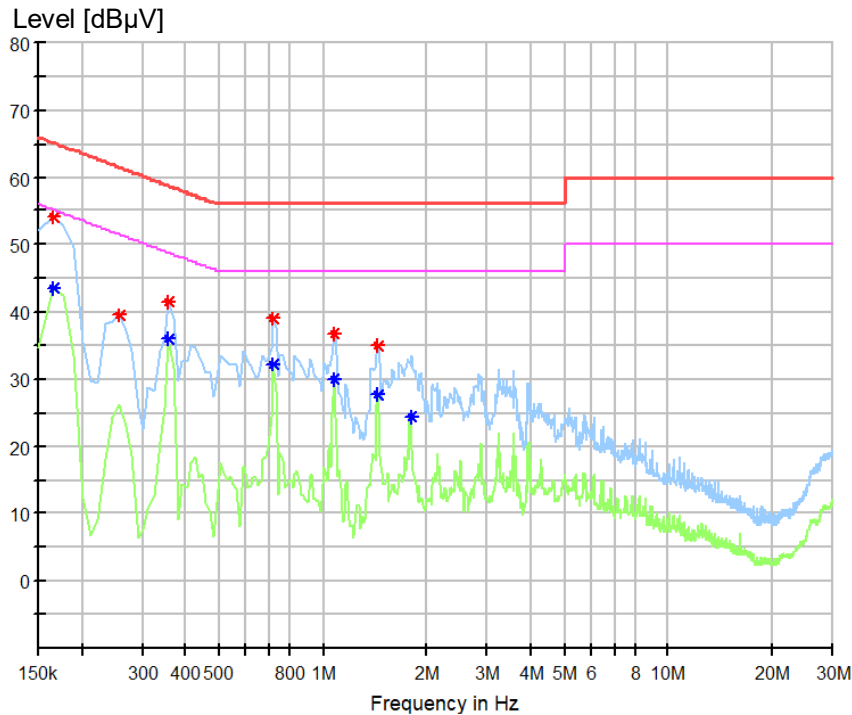
Notes on following tables of conducted emission results and conversions:

Level (dB μ V): 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 (dB μ V) - Level (dB μ V)

Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, L for maximum light output



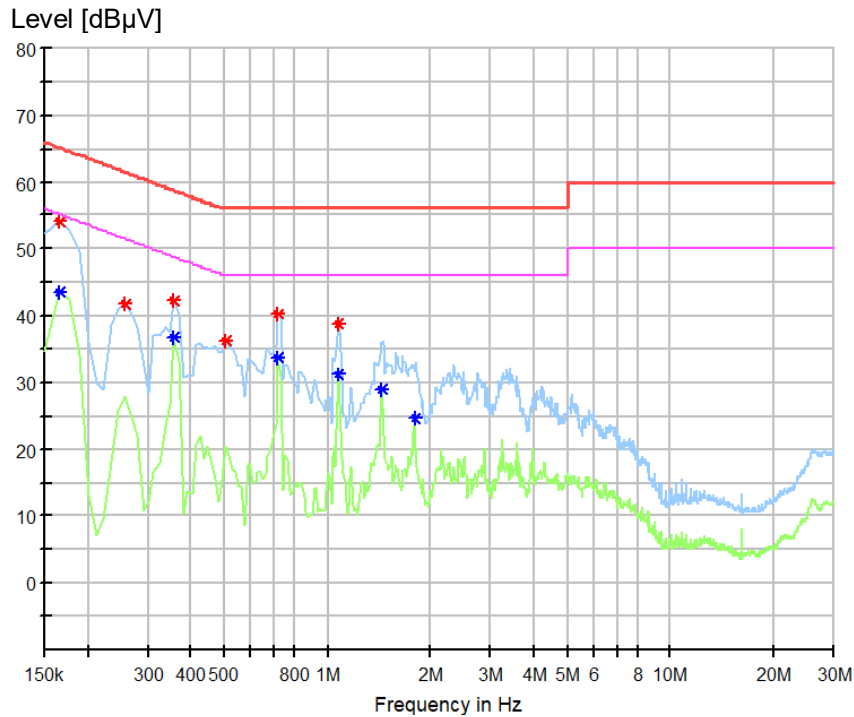
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
1.438125	34.98	56.00	21.02	L1
1.078125	36.79	56.00	19.21	L1
0.718125	38.95	56.00	17.05	L1
0.256875	39.41	61.53	22.12	L1
0.358125	41.50	58.77	17.27	L1
0.166875	54.14	65.12	10.97	L1

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
1.438125	27.83	46.00	18.17	L1
1.798125	24.37	46.00	21.63	L1
1.078125	29.98	46.00	16.02	L1
0.358125	36.12	48.77	12.65	L1
0.718125	32.27	46.00	13.73	L1
0.166875	43.47	55.12	11.65	L1

Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, N for maximum light output



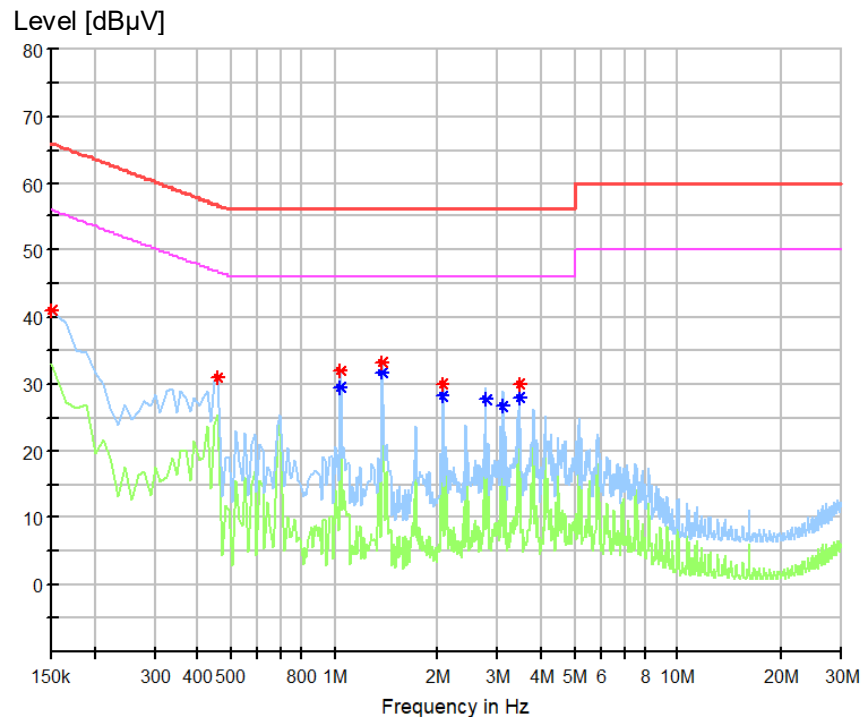
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.166875	54.23	65.12	10.88	N
0.256875	41.74	61.53	19.79	N
0.358125	42.42	58.77	16.36	N
0.504375	36.29	56.00	19.71	N
0.718125	40.25	56.00	15.75	N
1.078125	38.80	56.00	17.20	N

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.166875	43.49	55.12	11.63	N
0.358125	36.66	48.77	12.11	N
0.718125	33.72	46.00	12.28	N
1.078125	31.32	46.00	14.68	N
1.438125	29.02	46.00	16.98	N
1.798125	24.72	46.00	21.28	N

Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, L for minimum light output



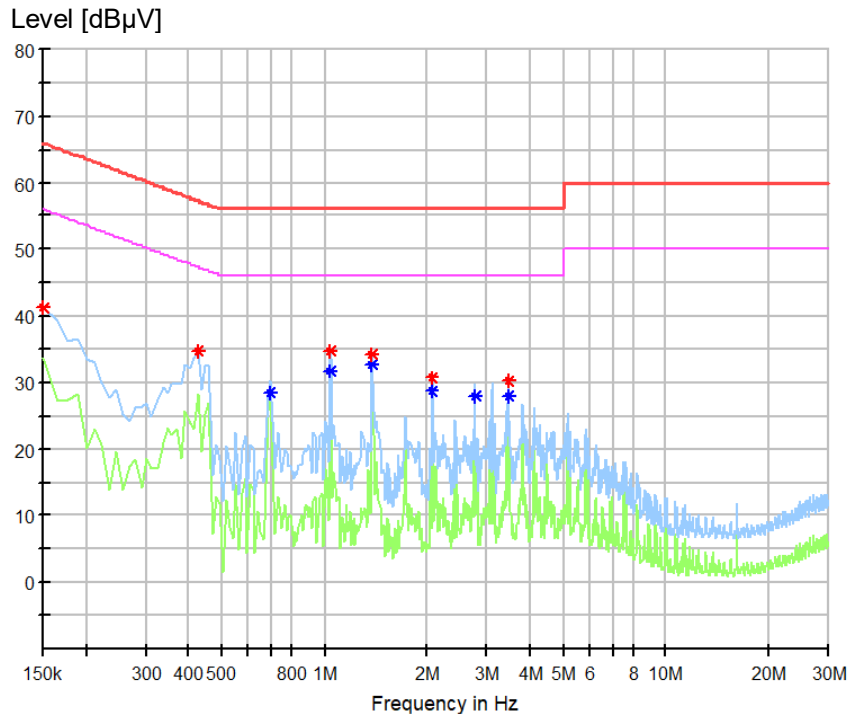
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	41.05	66.00	24.95	L1
0.459375	31.01	56.70	25.69	L1
1.033125	31.87	56.00	24.13	L1
1.381875	33.13	56.00	22.87	L1
2.068125	29.99	56.00	26.01	L1
3.451875	29.99	56.00	26.01	L1

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
1.033125	29.43	46.00	16.57	L1
1.381875	31.83	46.00	14.17	L1
2.068125	28.26	46.00	17.74	L1
2.765625	27.83	46.00	18.17	L1
3.103125	26.73	46.00	19.27	L1
3.451875	28.05	46.00	17.95	L1

Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, N for minimum light output



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	41.29	66.00	24.71	N
0.425625	34.78	57.34	22.56	N
1.033125	34.69	56.00	21.31	N
1.381875	34.22	56.00	21.78	N
2.068125	30.78	56.00	25.22	N
3.451875	30.26	56.00	25.74	N

Final Average measurement result

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.695625	28.37	46.00	17.63	N
1.033125	31.79	46.00	14.21	N
1.381875	32.79	46.00	13.21	N
2.068125	28.78	46.00	17.22	N
2.765625	28.04	46.00	17.96	N
3.451875	28.00	46.00	18.00	N

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission

Result:	Passed
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Date of testing	: 2021-06-17
Test procedure	: FCC 47 CFR Part 15, Subpart B:2019, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards
Product classification	: Class B
Frequency range	: 30 – 1000 MHz (see Note 1)
Limits	: Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dB μ V/m; 88 – 216 MHz, 43.5 dB μ V/m; 216 – 1000 MHz, 46 dB μ V/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	: Power on with maximum light out and minimum light out respectively.
Ambient condition	: Temperature: 21.7 °C; Relative humidity: 48.4 %
Expanded measurement uncertainty ($k=2$)	: 5.49 dB

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 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.

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 Table 4 is stricter than those FCC 47 CFR Part 15, Subpart B:2019 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

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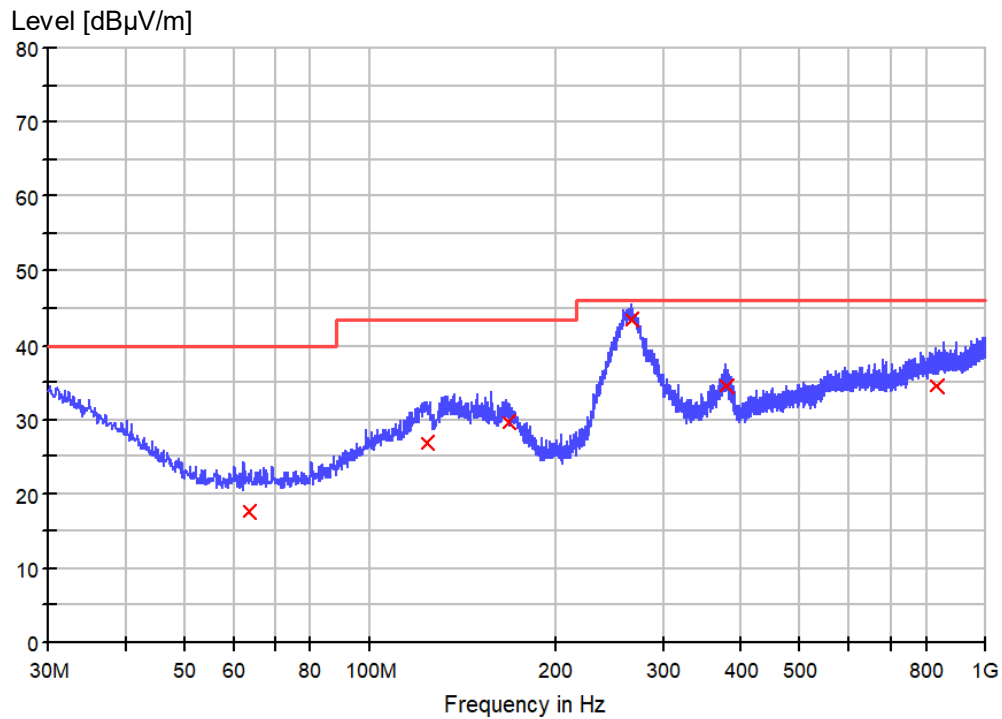
Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB μ V/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 (dB μ V/m) - QuasiPeak (dB μ V/m)

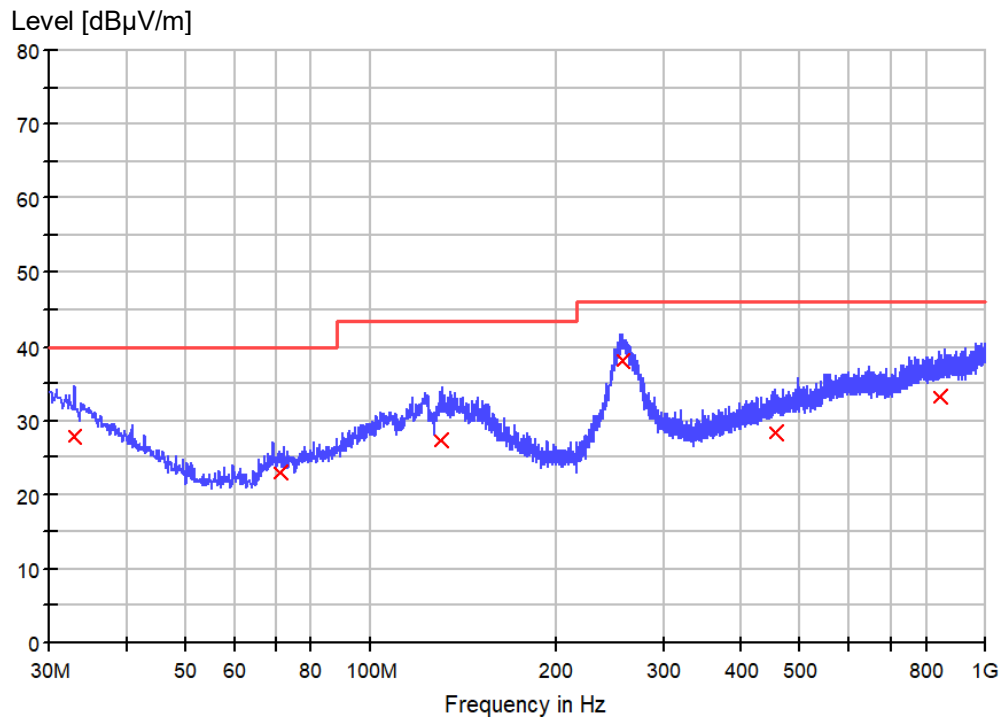
Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for maximum light output



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
63.343750	17.5	1000.0	120.000	124.0	H	-55.0	12.8	22.5	40.0
123.968750	26.8	1000.0	120.000	160.0	H	147.0	18.7	16.7	43.5
168.225000	29.6	1000.0	120.000	133.0	H	33.0	16.4	13.9	43.5
265.710000	43.5	1000.0	120.000	100.0	H	21.0	20.6	2.5	46.0
378.715000	34.5	1000.0	120.000	157.0	H	108.0	22.0	11.5	46.0
829.401250	34.6	1000.0	120.000	128.0	H	4.0	27.5	11.4	46.0

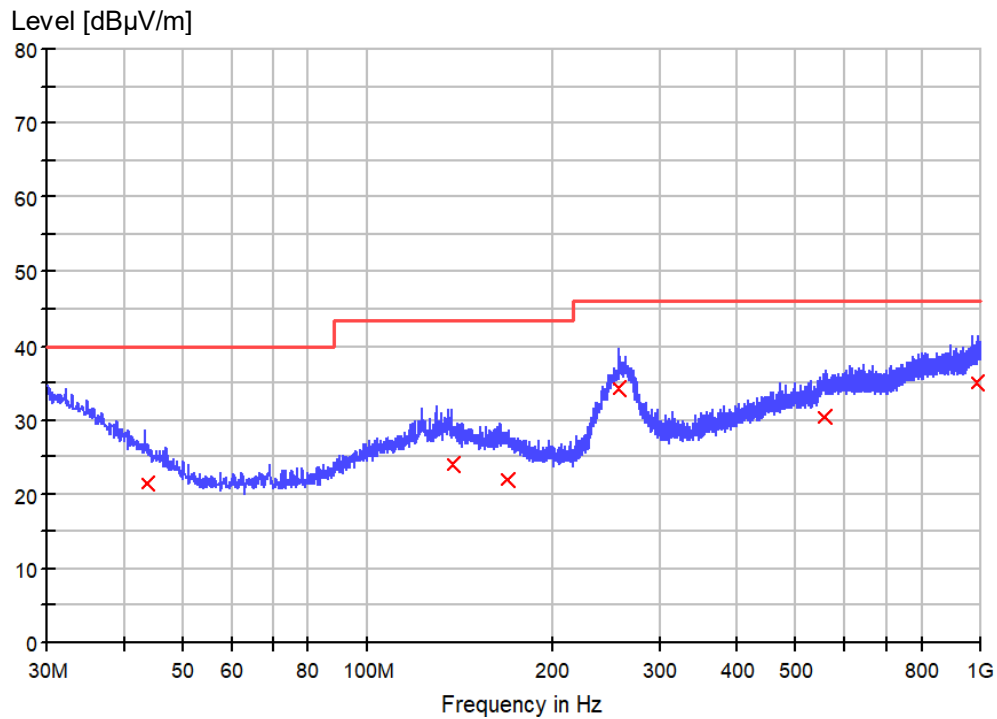
Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Vertical polarization for maximum light output



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.910000	28.0	1000.0	120.000	112.0	V	180.0	23.9	12.0	40.0
71.225000	23.1	1000.0	120.000	102.0	V	14.0	13.1	16.9	40.0
129.546250	27.3	1000.0	120.000	111.0	V	-8.0	18.7	16.2	43.5
257.222500	38.1	1000.0	120.000	100.0	V	29.0	20.3	7.9	46.0
456.436250	28.4	1000.0	120.000	109.0	V	102.0	24.3	17.6	46.0
843.830000	33.1	1000.0	120.000	133.0	V	-99.0	27.7	12.9	46.0

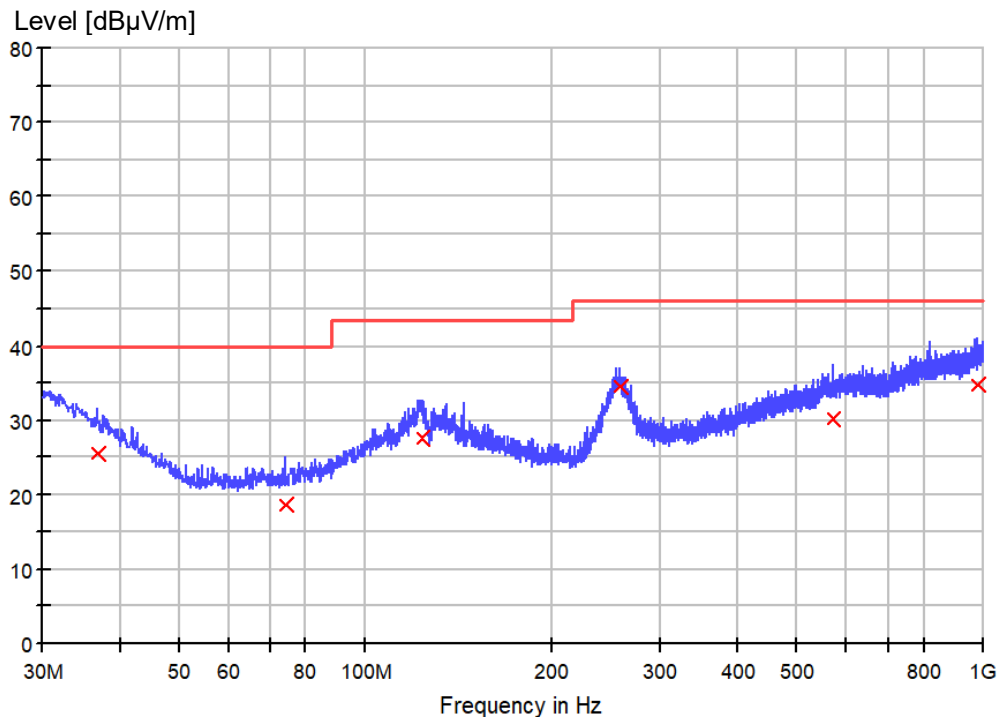
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for minimum light output



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
43.822500	21.6	1000.0	120.000	124.0	H	180.0	17.7	18.4	40.0
137.427500	24.0	1000.0	120.000	136.0	H	108.0	18.3	19.5	43.5
169.437500	22.1	1000.0	120.000	109.0	H	33.0	16.4	21.4	43.5
256.495000	34.2	1000.0	120.000	115.0	H	154.0	20.2	11.8	46.0
555.618750	30.5	1000.0	120.000	147.0	H	-99.0	26.5	15.5	46.0
989.087500	34.9	1000.0	120.000	120.0	H	21.0	28.9	11.1	46.0

Figure 8: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Vertical polarization for minimum light output



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
36.790000	25.6	1000.0	120.000	124.0	V	137.0	21.6	14.4	40.0
74.256250	18.5	1000.0	120.000	136.0	V	-99.0	13.2	21.5	40.0
124.090000	27.5	1000.0	120.000	118.0	V	125.0	18.7	16.0	43.5
257.828750	34.5	1000.0	120.000	102.0	V	11.0	20.4	11.5	46.0
572.593750	30.3	1000.0	120.000	111.0	V	-64.0	26.1	15.7	46.0
977.447500	34.8	1000.0	120.000	167.0	V	21.0	28.8	11.2	46.0

6 Photographs of the Test Set-Up

Refer to the test setup file.

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7 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
9023229	EMI test receiver	ESR3	Rohde&Schwarz	22.03.2021	22.03.2022
G1811403	Artificial mains network	ENV216	Rohde&Schwarz	23.11.2020	23.11.2021
G1824248	Dual display multimeter	F45	Fluke	18.09.2020	18.09.2022
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	27.06.2019	27.06.2022
G1811402	EMI test receiver	ESCI	Rohde&Schwarz	18.09.2020	18.09.2021
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023
G1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A

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End of test report