

Prüfbericht-Nr.: <i>Test Report No.:</i>	CN20UZB1 001	Auftrags-Nr.: <i>Order No.:</i>	244268383	Seite 1 von 22 <i>Page 1 of 22</i>
Kunden-Referenz-Nr.: <i>Client Reference No.:</i>	60051577	Auftragsdatum: <i>Order date.:</i>	23.09.2020	
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>	EMC test			
Prüfgrundlage: <i>Test specification:</i>	FCC 47 CFR Part 15, Subpart B:2019 Class B ICES-005:2018			
Wareneingangsdatum: <i>Date of receipt:</i>	10.11.2020	Refer to the EUT photos file		
Prüfmuster-Nr.: <i>Test sample No.:</i>	A002945829-009			
Prüfzeitraum: <i>Testing period:</i>	Refer to test report			
Ort der Prüfung: <i>Place of testing:</i>	EMC laboratory			
Prüflaboratorium: <i>Testing laboratory:</i>	TÜV Rheinland (Shanghai) Co., Ltd.			
Prüfergebnis*: <i>Test result*:</i>	Pass			
geprüft von / tested by: <i>Jessie Xu</i>		kontrolliert von / reviewed by: <i>Hexiong Liu</i>		
Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>	Unterschrift <i>Signature</i>	Datum <i>Date</i>	Name/Stellung <i>Name/Position</i>
18.12.2020	Jessie Xu/Senior project engineer		18.12.2020	Hexiong Liu/Department manager
Sonstiges / Other: FCC ID: FHO-V2013 Test Firm Registration Number: 958801				
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: 1 = sehr gut 2 = gut 3 = befriedigend 4 = ausreichend 5 = mangelhaft P(ass) = entspricht o.g. Prüfgrundlage(n) F(ail) = entspricht nicht o.g. Prüfgrundlage(n) N/A = nicht anwendbar N/T = nicht getestet Legend: 1 = very good 2 = good 3 = satisfactory 4 = sufficient 5 = poor 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

4.1.1 CONDUCTED EMISSION

Result:

Passed

4.2.1 RADIATED EMISSION

Result:

Passed

Contents

1	TEST SITES	4
1.1	TEST FACILITIES.....	4
2	GENERAL PRODUCT INFORMATION	5
2.1	PRODUCT FUNCTION AND INTENDED USE.....	5
2.2	RATINGS AND SYSTEM DETAILS.....	5
2.3	INDEPENDENT OPERATION MODESS.....	5
2.4	DESCRIPTION OF INTERCONNECTING CABLES.....	5
2.5	NOISE GENERATING AND NOISE SUPPRESSING PARTS.....	5
2.6	HIGHEST FREQUENCY GENERATED OR USED IN THE DEVICE OR ON WHICH THE DEVICE OPERATES OR TUNES.....	5
2.7	SUBMITTED DOCUMENTS.....	5
3	TEST SET-UP AND OPERATION MODES	6
3.1	PRINCIPLE OF CONFIGURATION SELECTION.....	6
3.2	EQUIPMENT AND CABLE ARRANGEMENT.....	6
3.3	TEST SOFTWARE.....	7
3.4	SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT.....	7
3.5	COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE.....	7
4	TEST RESULTS EMISSION	8
4.1	EMISSION IN THE FREQUENCY RANGE UP TO 30 MHz.....	8
4.1.1	<i>Conducted emission</i>	8
4.2	EMISSION IN THE FREQUENCY RANGE ABOVE 30 MHz.....	14
4.2.1	<i>Radiated emission</i>	14
5	PHOTOGRAPHS OF THE TEST SET-UP	20
6	LIST OF TEST AND MEASUREMENT INSTRUMENTS	21
7	LIST OF FIGURES	22

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 6 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

2.3 Independent Operation Modess

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 65 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.

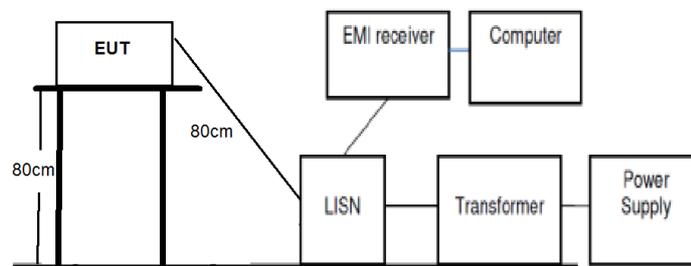
Refer to the related paragraph of this report.

The sequence of testing:

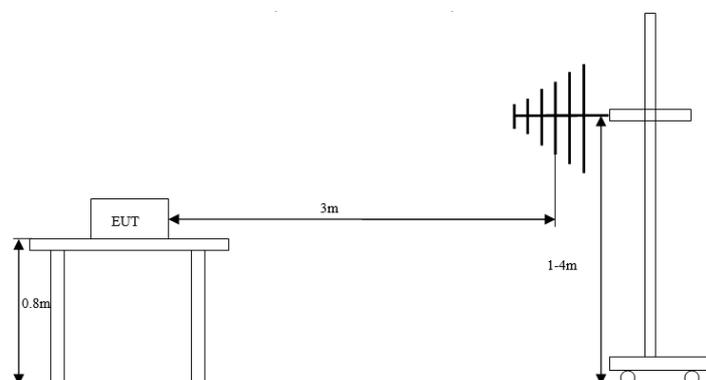
1. Radiated emission tests were performed on 17.11.2020.
2. Conducted emission tests were performed on 16.11.2020

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 5 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 Test Results EMISSION

4.1 Emission in the Frequency Range up to 30 MHz

4.1.1 Conducted emission

Result:	Passed
Date of testing	: 16.11.2020
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: 25.0 °C; Relative humidity: 48.8 %
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, Blue “◆” means Quasi-Peak Value and green “◆” means Average Value results.

Prüfbericht - Nr.: CN20UZB1 001

Test Report No.:

Seite 9 von 22

Page 9 of 22

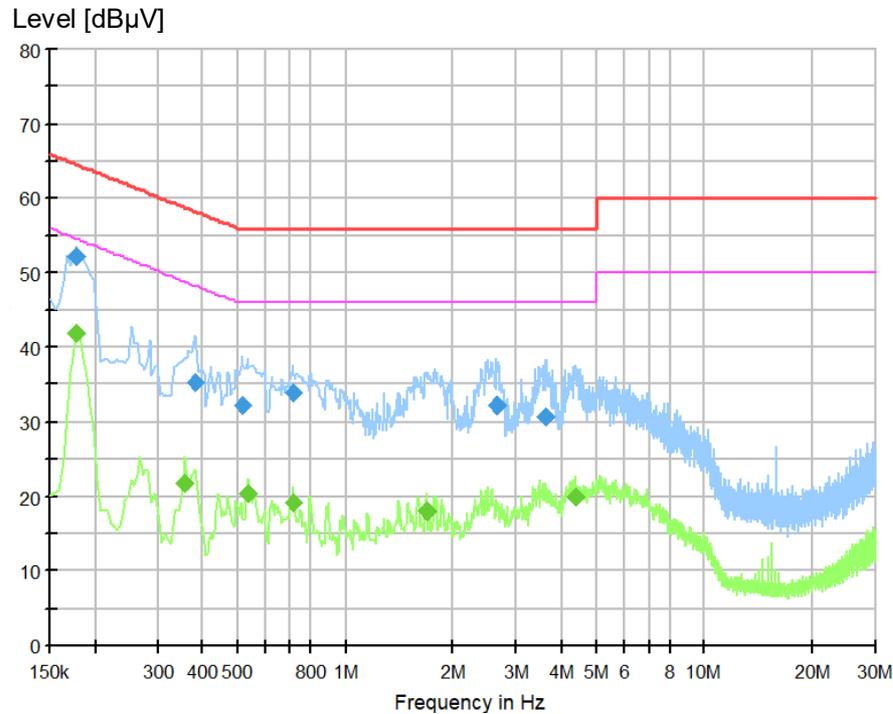
Notes on following tables of conducted emission results and conversions:

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



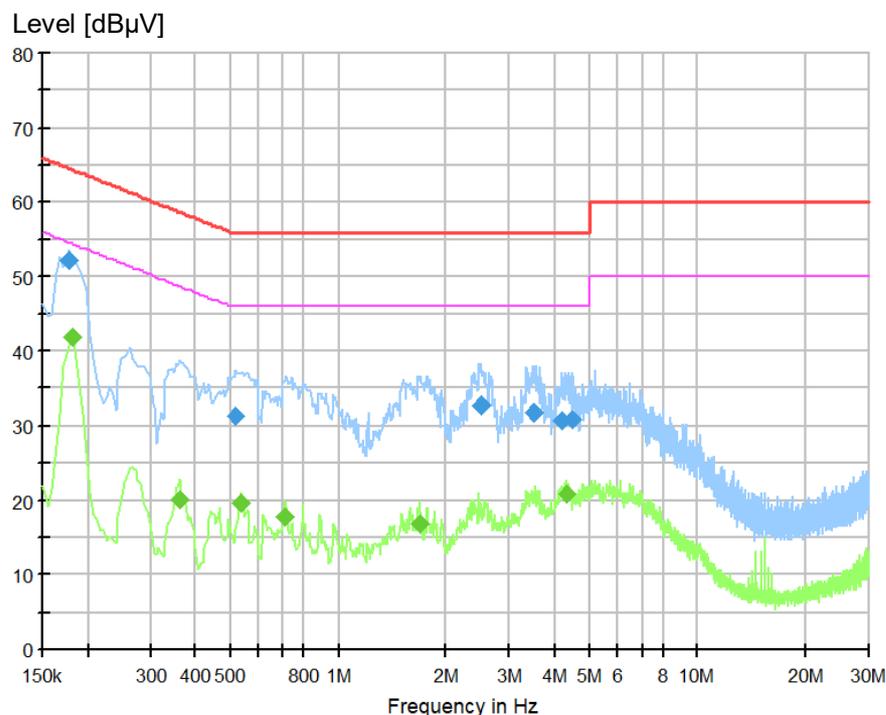
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	52.16	64.63	12.46	1000.0	9.000	L1	10.4
0.379500	35.31	58.29	22.98	1000.0	9.000	L1	10.4
0.514500	32.18	56.00	23.82	1000.0	9.000	L1	10.4
0.712500	34.03	56.00	21.97	1000.0	9.000	L1	10.4
2.643000	32.32	56.00	23.68	1000.0	9.000	L1	10.5
3.633000	30.70	56.00	25.30	1000.0	9.000	L1	10.6

Final Average measurement result:

Frequency (MHz)	CAverage (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	41.90	54.63	12.73	1000.0	9.000	L1	10.4
0.357000	21.72	48.80	27.08	1000.0	9.000	L1	10.4
0.537000	20.44	46.00	25.56	1000.0	9.000	L1	10.4
0.712500	19.18	46.00	26.82	1000.0	9.000	L1	10.4
1.675500	18.11	46.00	27.89	1000.0	9.000	L1	10.5
4.375500	19.93	46.00	26.07	1000.0	9.000	L1	10.6

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



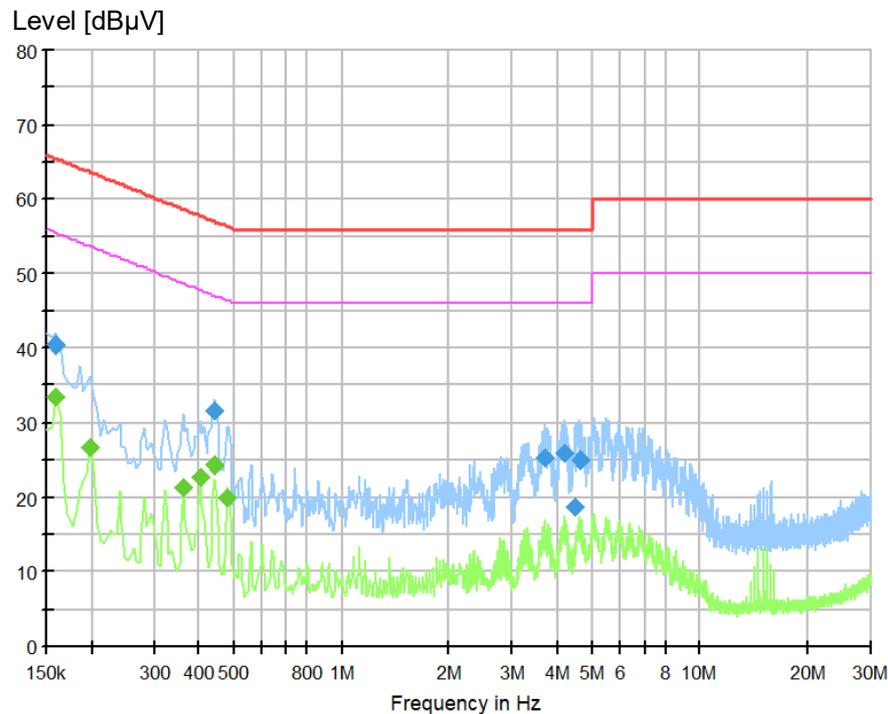
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.177000	52.17	64.63	12.46	1000.0	9.000	N	10.4
0.519000	31.38	56.00	24.62	1000.0	9.000	N	10.4
2.490000	32.82	56.00	23.18	1000.0	9.000	N	10.5
3.516000	31.72	56.00	24.28	1000.0	9.000	N	10.6
4.186500	30.75	56.00	25.25	1000.0	9.000	N	10.6
4.488000	30.99	56.00	25.01	1000.0	9.000	N	10.6

Final Average measurement result:

Frequency (MHz)	CAverage (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.181500	41.78	54.42	12.64	1000.0	9.000	N	10.4
0.361500	20.10	48.69	28.60	1000.0	9.000	N	10.4
0.537000	19.57	46.00	26.43	1000.0	9.000	N	10.4
0.708000	17.79	46.00	28.21	1000.0	9.000	N	10.5
1.680000	16.80	46.00	29.20	1000.0	9.000	N	10.5
4.353000	20.87	46.00	25.13	1000.0	9.000	N	10.6

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



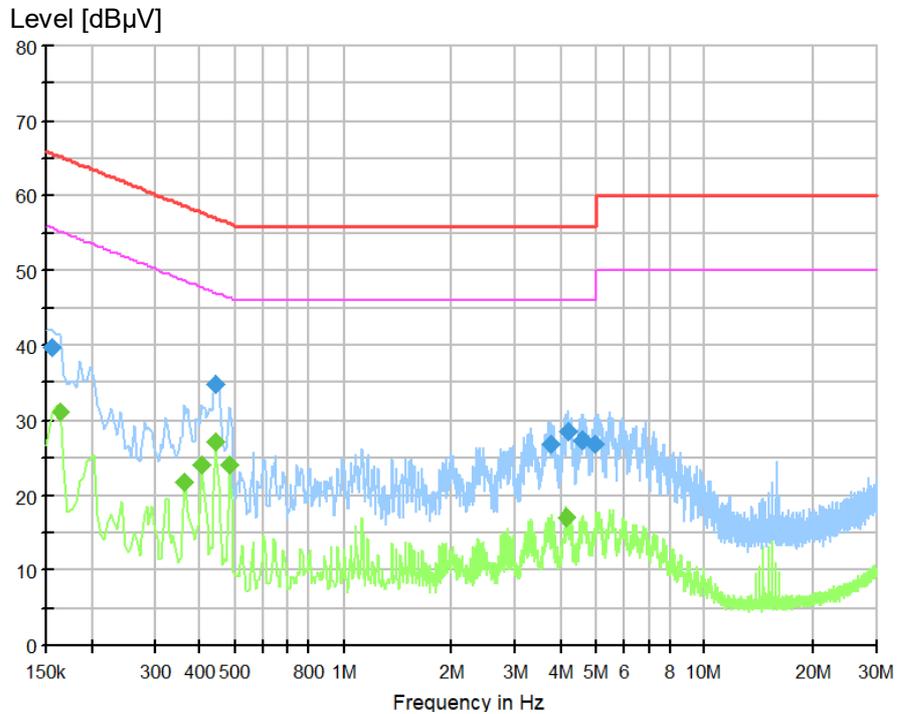
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.159000	40.46	65.52	25.05	1000.0	9.000	L1	10.4
0.442500	31.68	57.02	25.33	1000.0	9.000	L1	10.4
3.691500	25.18	56.00	30.82	1000.0	9.000	L1	10.6
4.173000	25.96	56.00	30.04	1000.0	9.000	L1	10.6
4.474500	18.66	56.00	37.34	1000.0	9.000	L1	10.6
4.614000	25.14	56.00	30.86	1000.0	9.000	L1	10.6

Final Average measurement result:

Frequency (MHz)	CAverage (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.159000	33.41	55.52	22.11	1000.0	9.000	L1	10.4
0.199500	26.72	53.63	26.92	1000.0	9.000	L1	10.4
0.361500	21.19	48.69	27.50	1000.0	9.000	L1	10.4
0.402000	22.77	47.81	25.04	1000.0	9.000	L1	10.4
0.442500	24.31	47.02	22.70	1000.0	9.000	L1	10.4
0.478500	19.89	46.37	26.47	1000.0	9.000	L1	10.4

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



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.154500	39.77	65.75	25.98	1000.0	9.000	N	10.4
0.442500	34.79	57.02	22.22	1000.0	9.000	N	10.4
3.727500	26.93	56.00	29.07	1000.0	9.000	N	10.6
4.186500	28.64	56.00	27.36	1000.0	9.000	N	10.6
4.609500	27.34	56.00	28.66	1000.0	9.000	N	10.6
4.974000	26.81	56.00	29.19	1000.0	9.000	N	10.6

Final Average measurement result

Frequency (MHz)	CAverage (dB µ V)	Limit (dB µ V)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)
0.163500	31.04	55.28	24.25	1000.0	9.000	N	10.4
0.361500	21.64	48.69	27.05	1000.0	9.000	N	10.4
0.402000	24.15	47.81	23.66	1000.0	9.000	N	10.4
0.442500	27.08	47.02	19.93	1000.0	9.000	N	10.4
0.483000	24.13	46.29	22.16	1000.0	9.000	N	10.4
4.146000	17.12	46.00	28.88	1000.0	9.000	N	10.6

4.2 Emission in the Frequency Range above 30 MHz

4.2.1 Radiated emission

Result:	Passed
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Date of testing	: 17.11.2020
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 – 960 MHz, 46 dB μ V/m; Above 960 MHz, 54 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: 24.8 °C; Relative humidity: 49.7 %
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 65 kHz. 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.

Prüfbericht - Nr.: CN20UZB1 001

Test Report No.:

Seite 15 von 22

Page 15 of 22

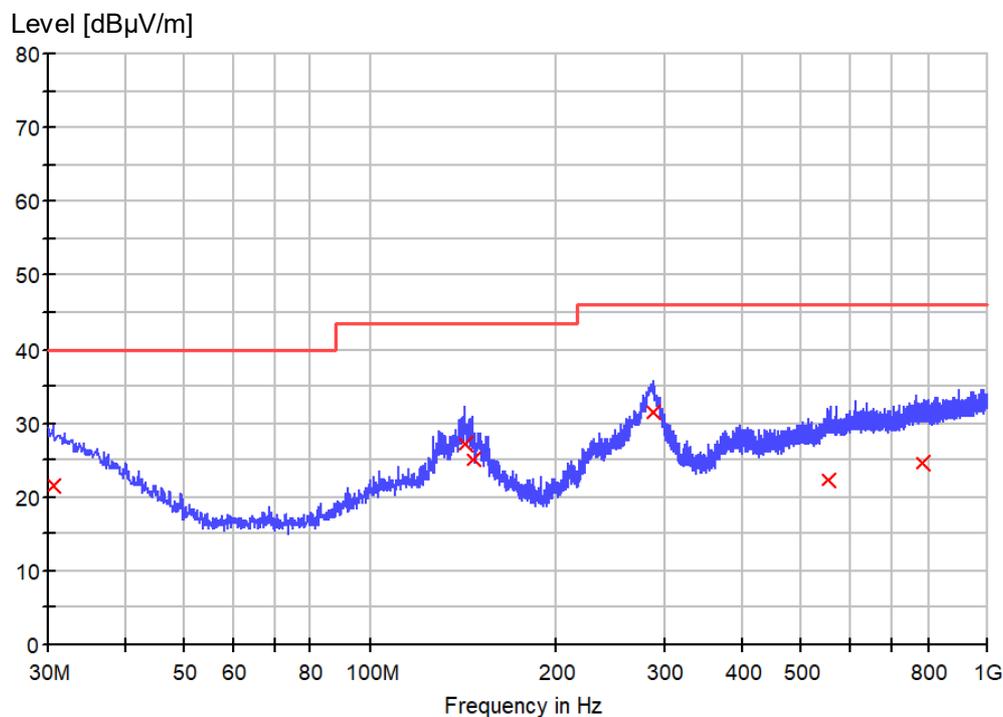
Notes on following tables of radiated emission results and conversions:

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)

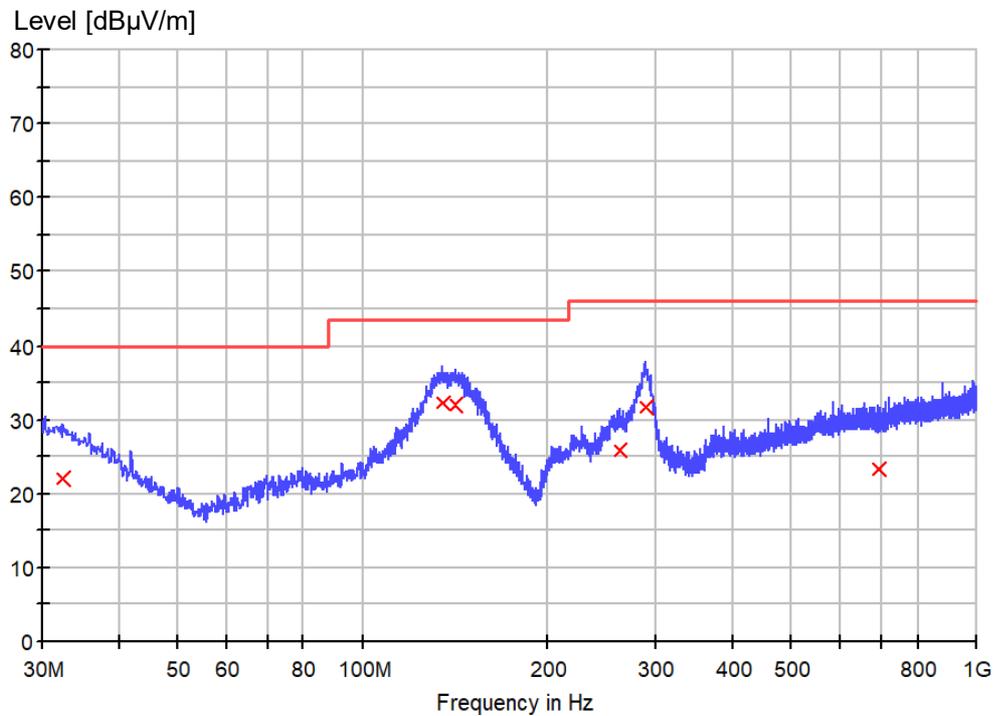
Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for maximum light output



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)
30.606250	21.5	1000.0	120.000	100.0	H	12.0	25.1	18.5	40.0
142.641250	27.2	1000.0	120.000	123.0	H	45.0	17.9	16.4	43.5
146.400000	25.1	1000.0	120.000	140.0	H	180.0	17.6	18.4	43.5
287.898750	31.5	1000.0	120.000	150.0	H	4.0	19.7	14.5	46.0
550.283750	22.3	1000.0	120.000	136.0	H	1.0	26.3	23.7	46.0
785.266250	24.6	1000.0	120.000	160.0	H	36.0	27.5	21.4	46.0

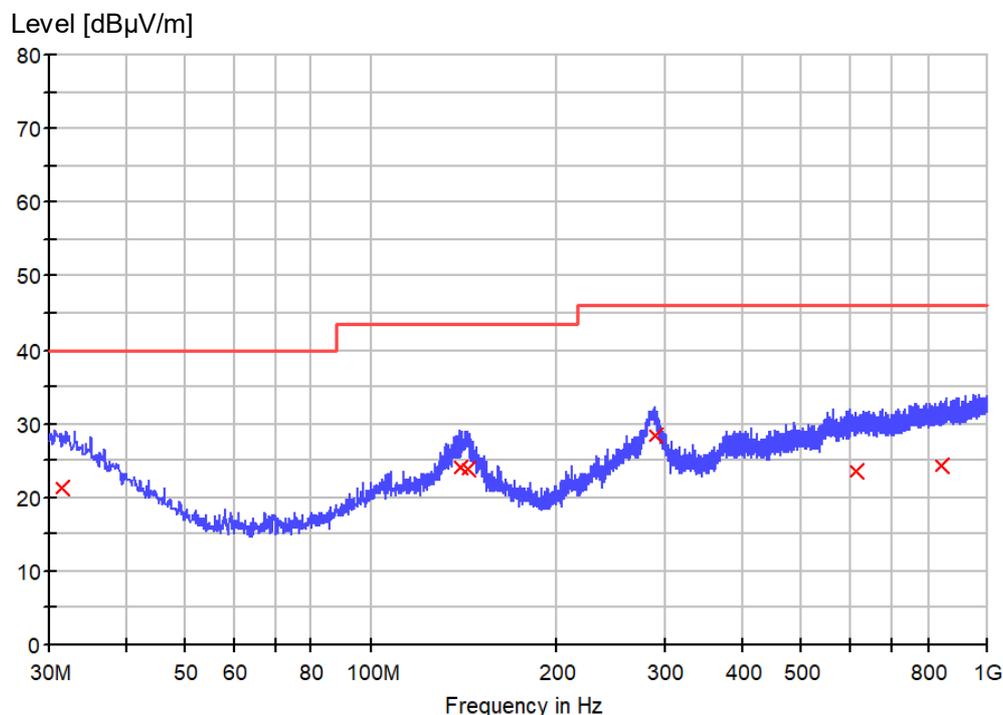
Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Vertical polarization for maximum light output



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)
32.546250	22.0	1000.0	120.000	100.0	V	12.0	24.1	18.0	40.0
134.396250	32.2	1000.0	120.000	100.0	V	45.0	18.4	11.3	43.5
141.792500	32.0	1000.0	120.000	100.0	V	33.0	17.9	11.5	43.5
261.830000	25.9	1000.0	120.000	100.0	V	15.0	20.7	20.1	46.0
289.353750	31.8	1000.0	120.000	102.0	V	69.0	19.8	14.2	46.0
693.116250	23.3	1000.0	120.000	110.0	V	0.0	26.2	22.7	46.0

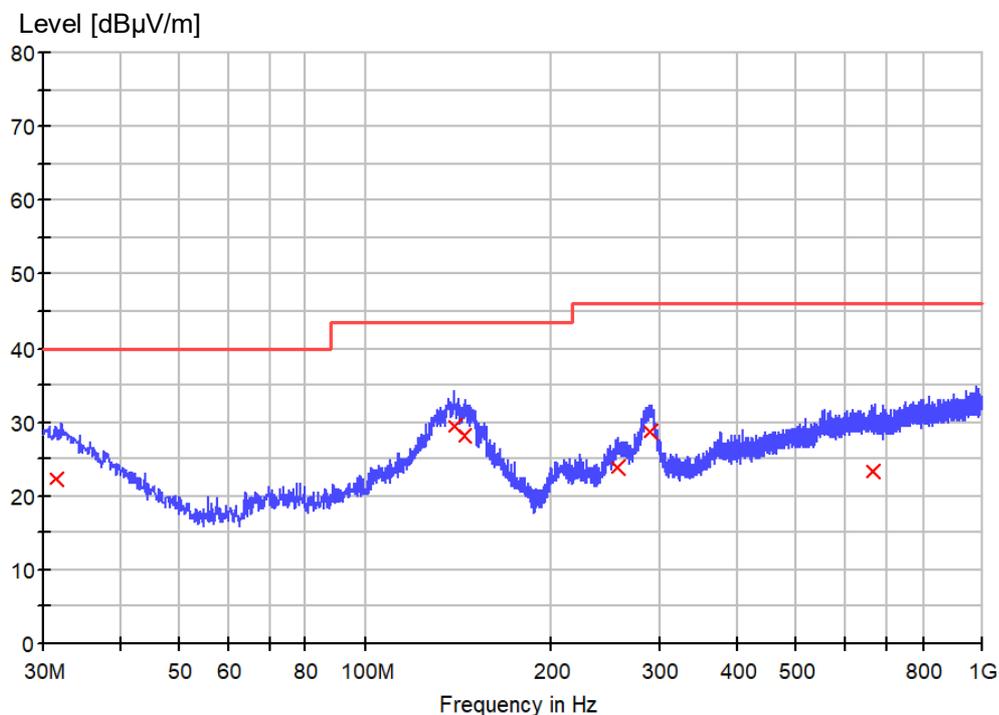
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for minimum light output



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)
31.455000	21.1	1000.0	120.000	100.0	H	12.0	24.7	18.9	40.0
139.852500	24.1	1000.0	120.000	123.0	H	180.0	18.1	19.4	43.5
143.853750	23.8	1000.0	120.000	120.0	H	5.0	17.8	19.7	43.5
288.626250	28.4	1000.0	120.000	130.0	H	4.0	19.7	17.6	46.0
612.727500	23.4	1000.0	120.000	150.0	H	90.0	26.3	22.6	46.0
843.951250	24.3	1000.0	120.000	150.0	H	14.0	27.7	21.7	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)
31.576250	22.1	1000.0	120.000	100.0	V	5.0	24.7	17.9	40.0
139.852500	29.5	1000.0	120.000	100.0	V	12.0	18.1	14.0	43.5
144.823750	28.1	1000.0	120.000	100.0	V	33.0	17.7	15.4	43.5
257.222500	23.7	1000.0	120.000	100.0	V	4.0	20.3	22.3	46.0
288.626250	28.7	1000.0	120.000	100.0	V	0.0	19.7	17.3	46.0
664.743750	23.4	1000.0	120.000	110.0	V	0.0	26.2	22.6	46.0

5 Photographs of the Test Set-Up

Refer to the test setup file

6 List of Test and Measurement Instruments

Equip.	Description	Model	Manufacturer	Last Date DD.MM.YYYY	Due Date DD.MM.YYYY
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
G1811405	EMI test receiver	ESCI	Rohde&Schwarz	06.03.2020	06.03.2021
G1830003	Artificial mains network	ENV432	Rohde&Schwarz	02.11.2020	02.11.2021
G1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A
G1824248	Dual display multimeter	F45	Fluke	18.09.2020	18.09.2022

7 List of Figures

Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, L for maximum light output.....	10
Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, N for maximum light output	11
Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, L for minimum light output	12
Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz-30 MHz, N for minimum light output.....	13
Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for maximum light output	16
Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Vertical polarization for maximum light output	17
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Horizontal polarization for minimum light output	18
Figure 8: Spectral Diagrams, Radiated Emission, 30 MHz-1000 MHz, Vertical polarization for minimum light output	19

End of test report