Prüfbericht-Nr.: *Test Report No.:*	**CN21QK2K 001**	**Auftrags-Nr.:** *Order No.:*	**244352524**	**Seite 1 von 22** *Page 1 of 22*
Kunden-Referenz-Nr.: *Client Reference No.:*	**1774198**	**Auftragsdatum:** *Order date.:*	**2021-08-09**	
Auftraggeber: *Client:*	**IKEA of Sweden AB** BOX 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: *Test item:*	**Semi-integrated LED lamp**			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	**LED2101G4**			
Auftrags-Inhalt: *Order content:*	**TÜV Rheinland EMC service**			
Prüfgrundlage: *Test specification:*	**FCC 47 CFR Part 15, Subpart B:2020 Class B** **ICES-005:2018**			
Wareneingangsdatum: *Date of receipt:*	**2021-08-09**	Refer to the EUT photos file		
Prüfmuster-Nr.: *Test sample No.:*	**A003106544-001**			
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: Jessie Xu

Datum: / *Date:* 2021-10-14 Jessie Xu

Stellung: / *Position:* Project manager

genehmigt von: / *authorized by:* Jiayi Zhou

Datum: / *Date:* 2021-10-14 Jiayi Zhou

Stellung: / *Position:* Senior manager

Sonstiges / *Other:*	FCC ID: FHO-LED2101G4 Test Firm Registration Number: 958801

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

V05

TEST SUMMARY

5.1.1 CONDUCTED EMISSION
Result:
Passed

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

5.2.2 RADIATED EMISSION (1-18 GHz)
Result:
Passed

Contents

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 semi-integrated LED lamp for household 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 : 4.1 W

2.3 Independent Operation Modes

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

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 2.4 GHz.

2.7 Submitted Documents

User's manual and label.

3 Test Set-up and Operation Modes

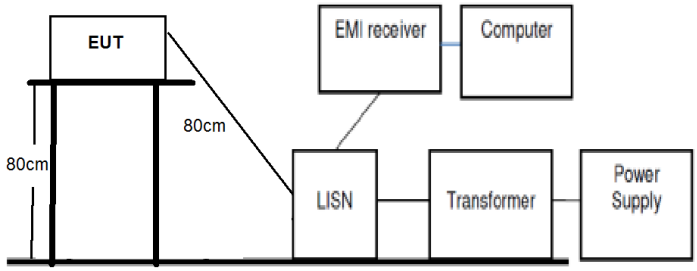
3.1 Principle of Configuration Selection

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.

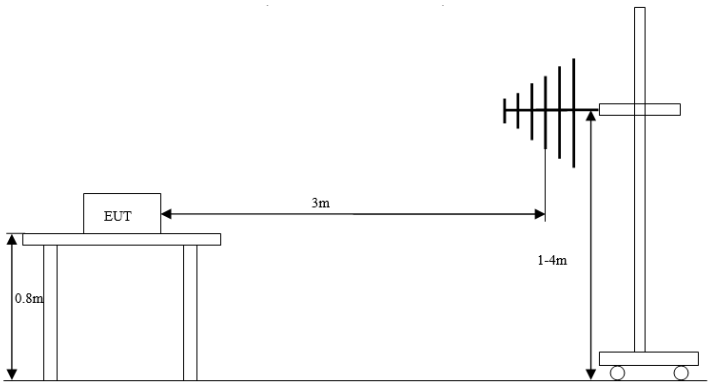
Refer to the related paragraph of this report.
The sequence of testing:
1. Radiated emission tests were performed on 2021-09-15~2021-09-24.
2. Conducted emission tests were performed on 2021-09-15.

3.2 Equipment and cable arrangement

Block diagram for both conducted emission and radiated emission tests are 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.

3.3 Test Software

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

3.4 Special Accessories and Auxiliary Equipment

During the tests, the STYRBAR remote control stainless E2001 was used for controlling the lighting output.

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	:	2021-09-15
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2020, 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 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	:	Power on
Ambient condition	:	Temperature: 21.1 °C; Relative humidity: 48.5 %
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.

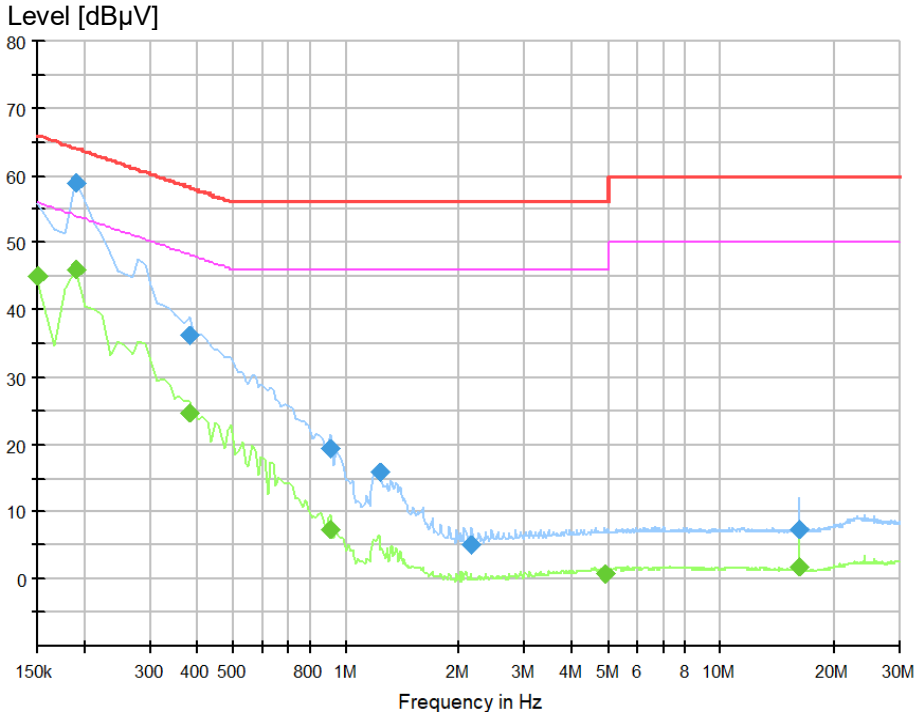
The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, "♦" means Quasi-Peak Value and green "♦" means Average Value results.

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



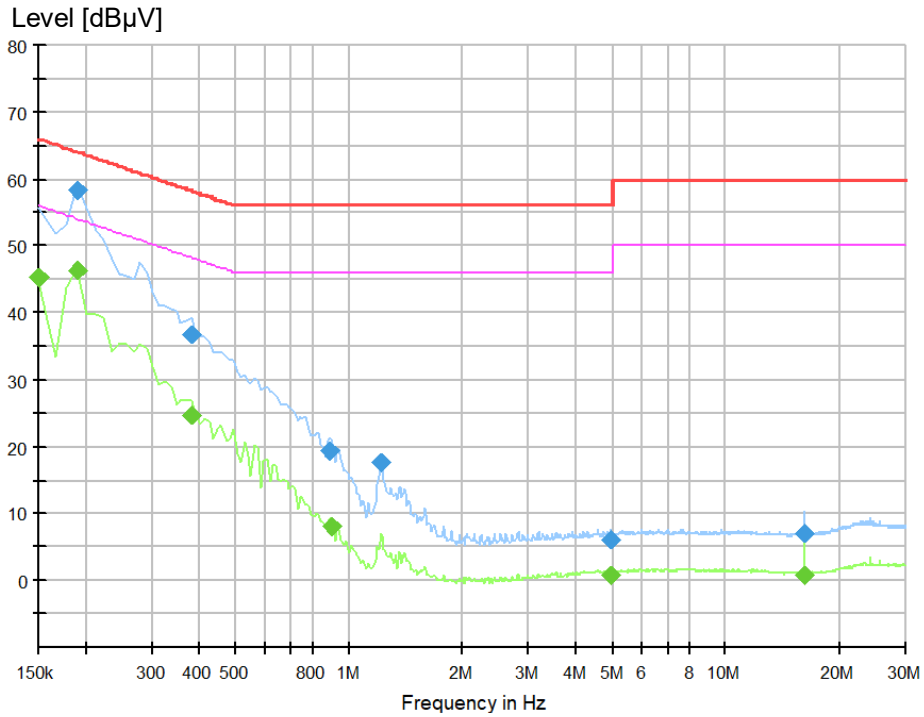
Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.189375	58.85	64.06	5.22	1000.0	9.000	L1
0.380625	36.22	58.27	22.05	1000.0	9.000	L1
0.909375	19.44	56.00	36.56	1000.0	9.000	L1
1.224375	15.95	56.00	40.05	1000.0	9.000	L1
2.169375	5.05	56.00	50.95	1000.0	9.000	L1
16.186875	7.38	60.00	52.62	1000.0	9.000	L1

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.150000	45.02	56.00	10.98	1000.0	9.000	L1
0.189375	45.94	54.06	8.13	1000.0	9.000	L1
0.380625	24.67	48.27	23.60	1000.0	9.000	L1
0.909375	7.39	46.00	38.61	1000.0	9.000	L1
4.891875	0.79	46.00	45.21	1000.0	9.000	L1
16.186875	1.79	50.00	48.21	1000.0	9.000	L1

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



Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.189375	58.30	64.06	5.76	1000.0	9.000	N
0.380625	36.88	58.27	21.39	1000.0	9.000	N
0.886875	19.32	56.00	36.68	1000.0	9.000	N
1.213125	17.68	56.00	38.32	1000.0	9.000	N
4.959375	6.15	56.00	49.85	1000.0	9.000	N
16.186875	7.17	60.00	52.83	1000.0	9.000	N

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line
0.150000	45.30	56.00	10.70	1000.0	9.000	N
0.189375	46.19	54.06	7.88	1000.0	9.000	N
0.380625	24.58	48.27	23.69	1000.0	9.000	N
0.898125	8.21	46.00	37.79	1000.0	9.000	N
4.959375	0.75	46.00	45.25	1000.0	9.000	N
16.186875	0.73	50.00	49.27	1000.0	9.000	N

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30-1000 MHz)

Result:	**Passed**

Date of testing	:	2021-09-15
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2020, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-1 series standards
Product classification	:	Class B
Frequency range	:	30 – 1000 MHz
Limits	:	Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dBµV/m; 88 – 216 MHz, 43.5 dBµV/m; 216 – 960 MHz, 46 dBµV/m; Above 960 MHz, 54 dBµV/m. (See note)
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	:	Work continuously
Ambient condition	:	Temperature: 23.6 °C; Relative humidity: 40.4 %
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 10 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.

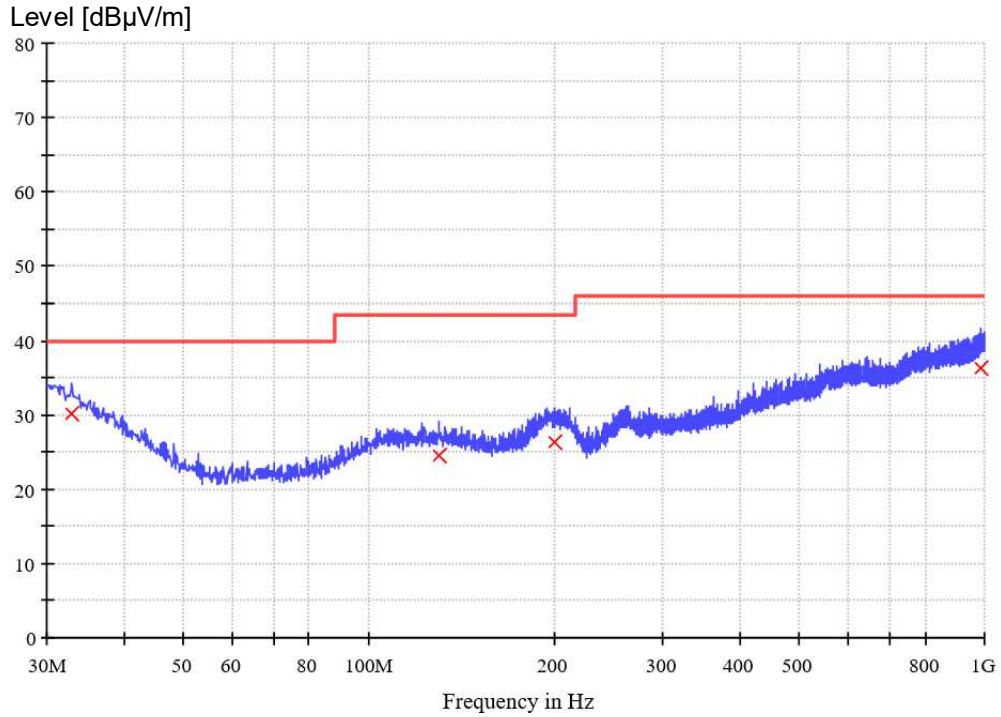
The following figures and tables were those measured by an automatic measurement system. A preview test was firstly performed with peak detector. The final test was performed with quasi-peak at those critical frequencies during the preview test. In the following spectral diagram, "×" means quasi-peak 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: The class B limits of FCC 47 CFR Part 15, Subpart B:2020 is stricter than those ICES-003:2020 Table 2 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

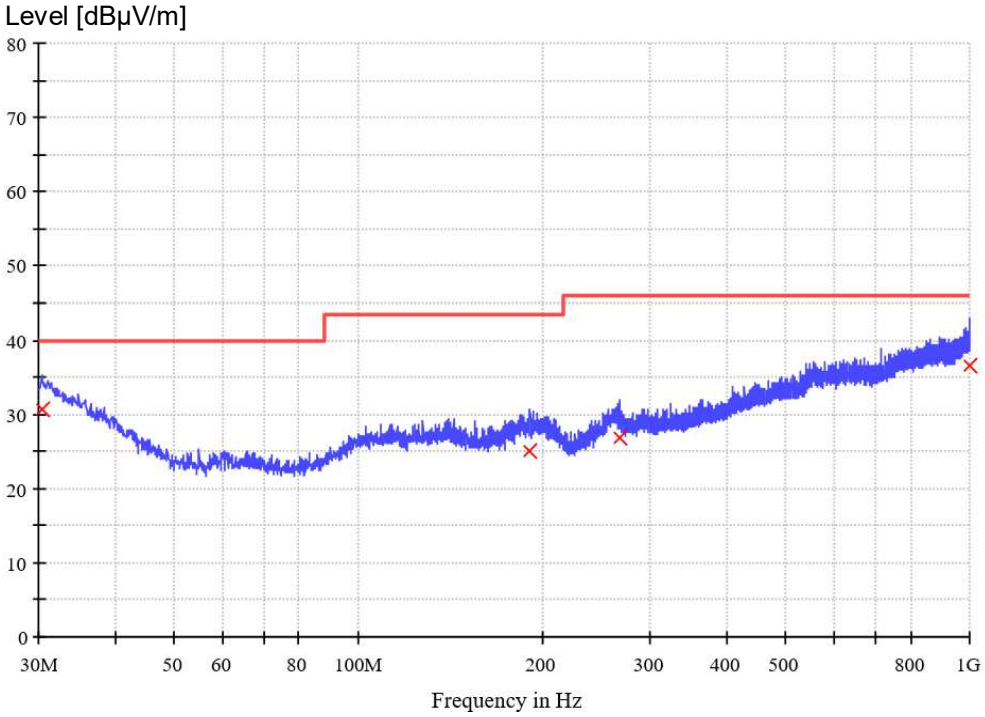
Figure 3: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
32.910000	30.2	1000.0	120.000	100.0	H	180.0	23.9	9.8	40.0
130.273750	24.6	1000.0	120.000	100.0	H	180.0	18.7	18.9	43.5
199.992500	26.4	1000.0	120.000	100.0	H	180.0	16.2	17.1	43.5
987.268750	36.3	1000.0	120.000	100.0	H	180.0	28.9	9.7	46.0

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



Final quasi-peak measurement results:

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/ m)	Margin - QPK (dB)	Limit - QPK (dBµV/m)
30.363750	30.6	1000.0	120.000	100.0	V	180.0	25.2	9.4	40.0
191.262500	25.0	1000.0	120.000	100.0	V	180.0	15.9	18.5	43.5
267.407500	26.9	1000.0	120.000	100.0	V	180.0	20.2	19.1	46.0
998.908750	36.5	1000.0	120.000	100.0	V	180.0	28.9	9.5	46.0

5.2.2 Radiated Emission (1-18 GHz)

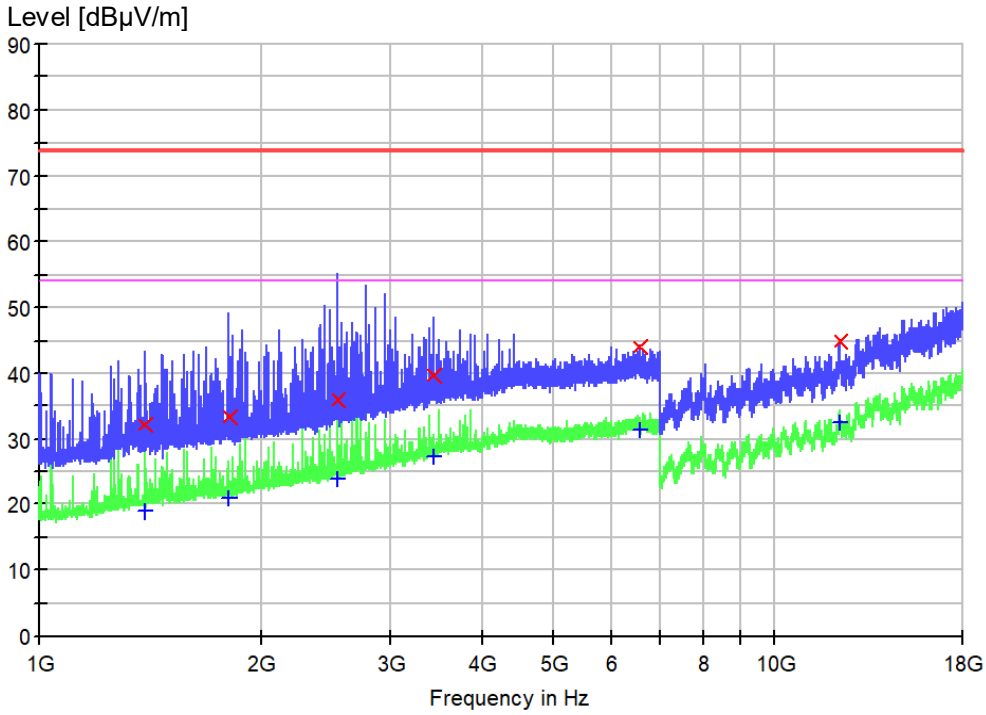
Result:	**Passed**

Date of testing	:	2021-09-24
Port	:	Enclosure
Test procedure	:	FCC 47 CFR Part 15, Subpart B:2020, ANSI C63.4-2014 and CISPR 16-1 series standards
Product classification	:	Class B
Limit	:	MaxPeak limits (3 m distance): 1–18 GHz, 74 dBµV/m Average limits (3 m distance): 1–18 GHz, 54 dBµV/m
Frequency range	:	1 GHz – 18 GHz (Note: The highest frequency in the EUT is 2.4 GHz. According to FCC Part 15 subpart B §15.33 (b) (1) the upper frequency for radiated emission measurement is 18 GHz.
Kind of test site	:	Anechoic chamber
Test distance	:	3 m
Test voltage	:	AC 120 V, 60 Hz
Operational mode	:	Work continuously
Ambient condition	:	Temperature: 23.6 °C; Relative humidity: 52.5 %
Expanded measurement uncertainty (k=2)	:	5.17 dB (1 GHz~6 GHz) 5.12 dB (6 GHz~18 GHz)

The radiated disturbance test was carried out in an anechoic room. The test distance from the receiving antenna to the EUT is 3 m. The normalized site attenuation of the fully-anechoic chamber is regularly calibrated to ensure the radiated disturbance test results are valid. During the test, the EUT was placed on a wooden support, which is 10 cm high. And the wooden support was rotated 360° around. 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. The final test was performed with peak detector and average detector at those critical frequencies during the preview test. In the following figure, "× (red)" means measurement results with peak detector and "+ (blue)" means measurement results with average detector.

Figure 5: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Horizontal polarization



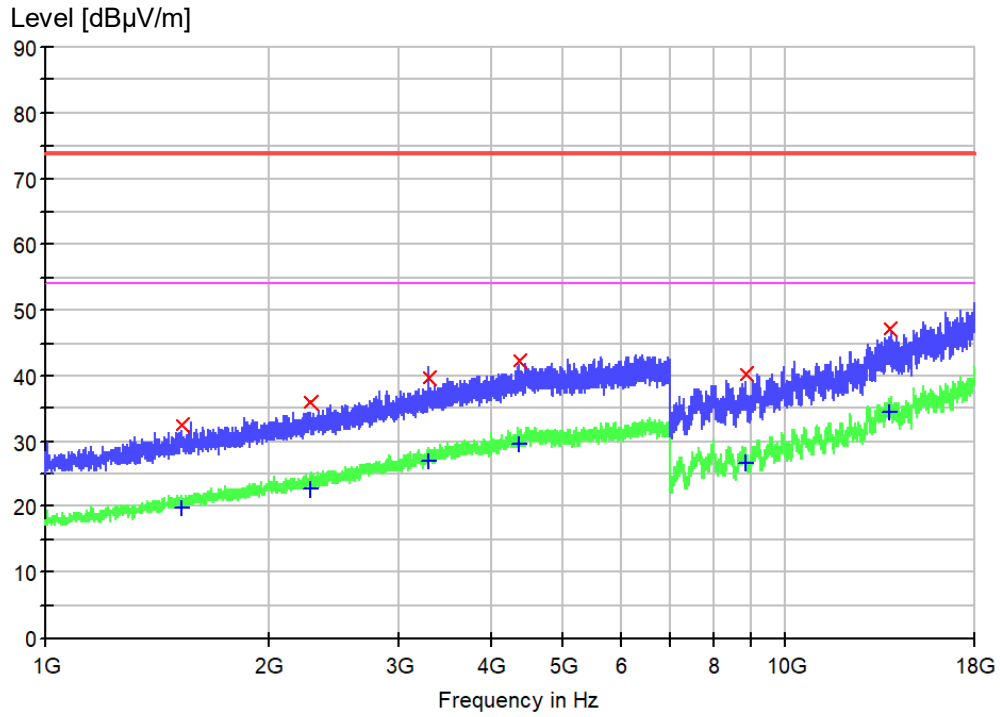
Final maxpeak measurement result:

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1392.062500	32.2	1000.0	1000.000	115.0	H	-88.0	-19.8	41.8	74.0
1808.562500	33.4	1000.0	1000.000	103.0	H	0.0	-17.4	40.6	74.0
2537.437500	36.1	1000.0	1000.000	101.0	H	25.0	-14.0	37.9	74.0
3425.687500	39.8	1000.0	1000.000	120.0	H	-94.0	-9.8	34.2	74.0
6544.125000	44.0	1000.0	1000.000	117.0	H	14.0	-4.6	30.0	74.0
12284.812500	45.0	1000.0	1000.000	100.0	H	127.0	1.3	29.0	74.0

Final average measurement result:

Frequency (MHz)	Average (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1392.062500	19.0	1000.0	1000.000	115.0	H	-88.0	-19.8	35.0	54.0
1808.562500	20.9	1000.0	1000.000	103.0	H	0.0	-17.4	33.1	54.0
2537.437500	23.9	1000.0	1000.000	101.0	H	25.0	-14.0	30.1	54.0
3425.687500	27.2	1000.0	1000.000	120.0	H	-94.0	-9.8	26.8	54.0
6544.125000	31.4	1000.0	1000.000	117.0	H	14.0	-4.6	22.6	54.0
12284.812500	32.4	1000.0	1000.000	100.0	H	127.0	1.3	21.6	54.0

Figure 6: Spectral Diagrams and measurement results, 1 GHz – 18 GHz, Vertical polarization



Final maxpeak measurement result:

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - PK+ (dB)	Limit - PK+ (dBµV/m)
1529.125000	32.5	1000.0	1000.000	100.0	V	0.0	-18.7	41.5	74.0
2273.406250	36.1	1000.0	1000.000	111.0	V	41.0	-15.1	37.9	74.0
3300.312500	39.8	1000.0	1000.000	103.0	V	124.0	-10.4	34.2	74.0
4371.843750	42.3	1000.0	1000.000	102.0	V	-99.0	-6.8	31.7	74.0
8842.312500	40.3	1000.0	1000.000	111.0	V	77.0	-1.5	33.7	74.0
13789.312500	47.1	1000.0	1000.000	109.0	V	25.0	3.6	26.9	74.0

Final average measurement result:

Frequency (MHz)	MaxPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBµV/m)
1529.125000	32.5	1000.0	1000.000	100.0	V	0.0	-18.7	34.1	54.0
2273.406250	36.1	1000.0	1000.000	111.0	V	41.0	-15.1	31.3	54.0
3300.312500	39.8	1000.0	1000.000	103.0	V	124.0	-10.4	27.0	54.0
4371.843750	42.3	1000.0	1000.000	102.0	V	-99.0	-6.8	24.4	54.0
8842.312500	40.3	1000.0	1000.000	111.0	V	77.0	-1.5	27.2	54.0
13789.312500	47.1	1000.0	1000.000	109.0	V	25.0	3.6	19.5	54.0

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
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
G1811417	Log periodic antenna	HL050	Rohde&Schwarz	10.03.2020	10.03.2023
G1822702	Spectrum analyser	FSV40	Rohde&Schwarz	01.11.2019	01.11.2021
G1825371	Preamplifier	EMC051845SE	Taiwan EMCI	14.05.2021	14.05.2023
G1811378	3m modified semi-anechoic chamber	SAC3	Frankonia	27.06.2019	27.06.2022
G1811402	EMI test receiver	ESCI	Rohde&Schwarz	01.09.2021	01.09.2022
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

8 List of Figures

End of test report