

<b>Prüfbericht-Nr.:</b> <i>Test Report No.:</i>	<b>CN224ZV6 001</b>	<b>Auftrags-Nr.:</b> <i>Order No.:</i>	<b>244406069</b>	<b>Seite 1 von 21</b> <i>Page 1 of 21</i>
<b>Kunden-Referenz-Nr.:</b> <i>Client Reference No.:</i>	<b>1774198</b>	<b>Auftragsdatum:</b> <i>Order date.:</i>	<b>2022-01-29</b>	
<b>Auftraggeber:</b> <i>Client:</i>	<b>IKEA of Sweden AB</b> Box 702, SE-343 81 Älmhult, Sweden			
<b>Prüfgegenstand:</b> <i>Test item:</i>	<b>LED USB Lamp</b>			
<b>Bezeichnung / Typ-Nr.:</b> <i>Identification / Type No.:</i>	<b>L2201 KAPPLAKE</b>			
<b>Auftrags-Inhalt:</b> <i>Order content:</i>	<b>TÜV Rheinland EMC service</b>			
<b>Prüfgrundlage:</b> <i>Test specification:</i>	<b>FCC 47 CFR Part 15, Subpart B:2020 Class B</b> <b>ICES-005:2018</b>			
<b>Wareneingangsdatum:</b> <i>Date of receipt:</i>	<b>2022-01-26</b>	Refer to the EUT photos file		
<b>Prüfmuster-Nr.:</b> <i>Test sample No.:</i>	<b>A003206720-001</b>			
<b>Prüfzeitraum:</b> <i>Testing period:</i>	<b>Refer to test report</b>			
<b>Ort der Prüfung:</b> <i>Place of testing:</i>	<b>Refer to clause 1.1</b>			
<b>Prüflaboratorium:</b> <i>Testing laboratory:</i>	<b>TÜV Rheinland (Shanghai) Co., Ltd.</b>			
<b>Prüfergebnis*:</b> <i>Test result*:</i>	<b>Pass</b>			
<b>geprüft von: / tested by:</b> Jessie Xu		<b>genehmigt von: / authorized by:</b> Hexiong Liu		
<b>Datum: / Date:</b> 2022-05-13 <i>Jessie Xu</i>		<b>Datum: / Date:</b> 2022-05-13 <i>Hexiong Liu</i>		
<b>Stellung: / Position:</b> Project manager		<b>Stellung: / Position:</b> Senior manager		
<b>Sonstiges / Other:</b>	FCC ID: FHO-L2201 Test Firm Registration Number: 958801			
<b>Zustand des Prüfgegenstandes bei Anlieferung:</b> <i>Condition of the test item at delivery:</i>		<b>Prüfmuster vollständig und unbeschädigt</b> <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				
<b>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.</b> <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>				

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## 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 the ordinary LED USB Lamp for lighting and similar use. For the further information, refer to the user's manual.

### 2.2 Ratings and System Details

Rated input voltage	:	DC 5 V
Rated power	:	0.7 W
Protection class	:	III

### 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	Power supply line	Unshielded	2500

### 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.

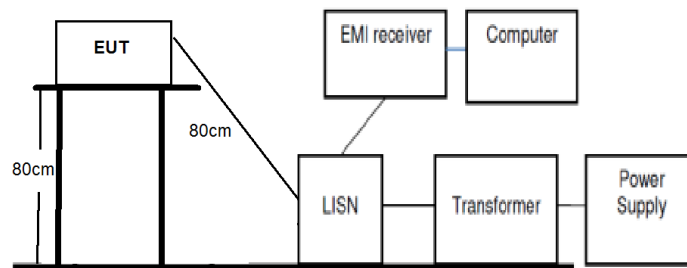
Refer to the related paragraph of this report.

The sequence of testing:

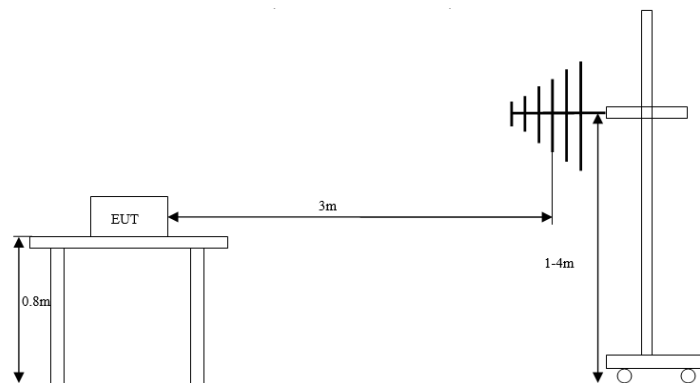
1. Radiated emission tests were performed on 2022-02-22.
2. Conducted emission tests were performed on 2022-02-18.

#### 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

During the tests, the power supply and laptop were used.

Product	Model	Brand
Power supply	ICPSW5-17NA-1 Input:AC 100-240 V, 50/60 Hz Output: DC 5 V	IKEA of Sweden AB
Laptop	T450	Thinkpad

### 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  $U_{\text{CISPR}}$  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

<b>Result:</b>	<b>Passed</b>
Date of testing	: 2022-02-18
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, 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 dB $\mu$ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 56 dB $\mu$ V; 5 – 30 MHz, 60 dB $\mu$ V Average limit: 0.15 – 0.5 MHz, 56 to 46 dB $\mu$ V (decrease with the logarithm of frequency); 0.5 – 5 MHz, 46 dB $\mu$ V; 5 – 30 MHz, 50 dB $\mu$ 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	: Mode 1: EUT powered by AC/DC adapter Mode 2: EUT powered by laptop
Ambient condition	: Temperature: 19.3 °C; Relative humidity: 44.3 %
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 “\*” means Average Value results.

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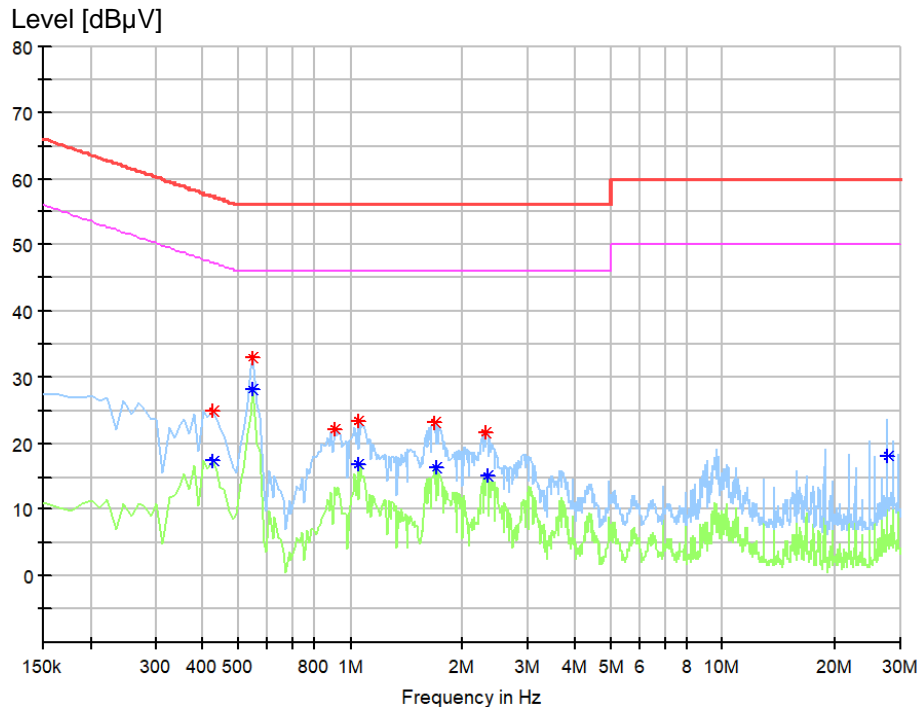
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Notes on following tables of conducted emission results and conversions:

Level (dB $\mu$ 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 $\mu$ V) - Level (dB $\mu$ V)

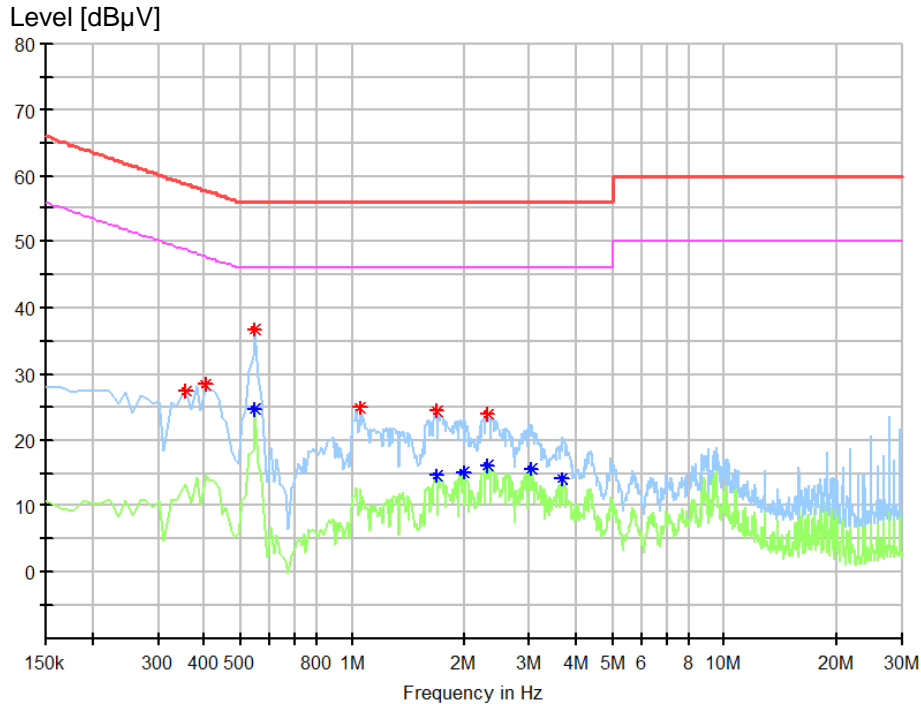
**Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for mode 1**


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
2.315625	21.73	56.00	34.27	L1
0.909375	22.06	56.00	33.94	L1
1.685625	23.15	56.00	32.85	L1
1.044375	23.53	56.00	32.47	L1
0.425625	24.89	57.34	32.45	L1
0.549375	33.02	56.00	22.98	L1

Final Average measurement result:

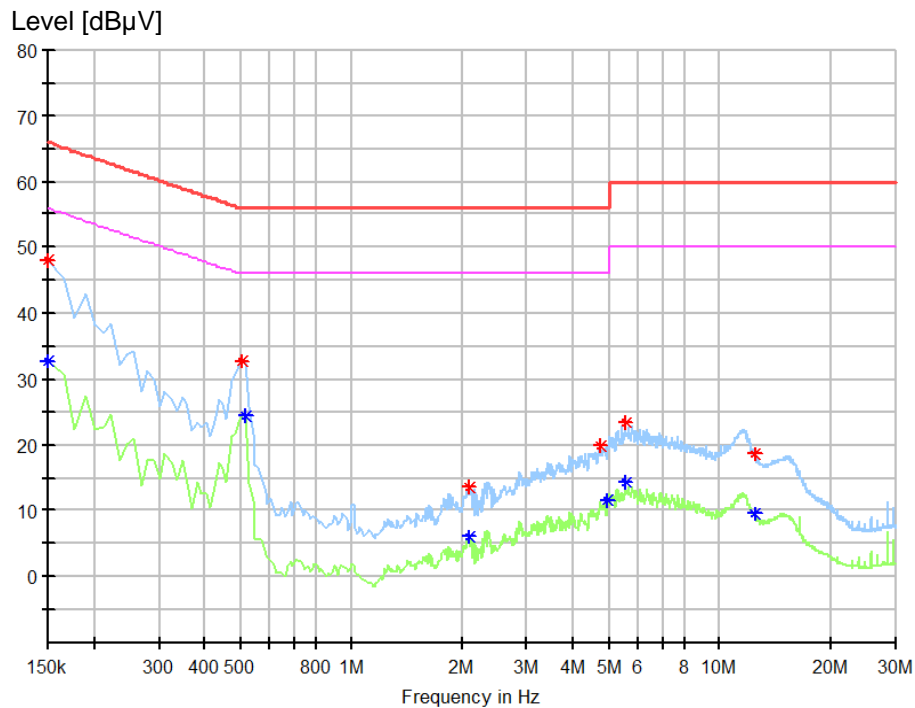
Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.425625	17.31	47.34	30.03	L1
0.549375	28.30	46.00	17.70	L1
1.044375	17.01	46.00	28.99	L1
1.708125	16.30	46.00	29.70	L1
2.326875	15.24	46.00	30.76	L1
27.729375	18.03	50.00	31.97	L1

**Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for mode 1**

**Final Quasi-peak measurement result:**

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
2.315625	23.84	56.00	32.16	N
1.685625	24.38	56.00	31.62	N
1.044375	24.88	56.00	31.12	N
0.358125	27.37	58.77	31.40	N
0.403125	28.36	57.79	29.43	N
0.549375	36.79	56.00	19.21	N

**Final Average measurement result:**

Frequency (MHz)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.549375	24.77	46.00	21.23	N
1.685625	14.70	46.00	31.30	N
1.989375	15.12	46.00	30.88	N
2.315625	16.03	46.00	29.97	N
3.013125	15.71	46.00	30.29	N
3.676875	14.19	46.00	31.81	N

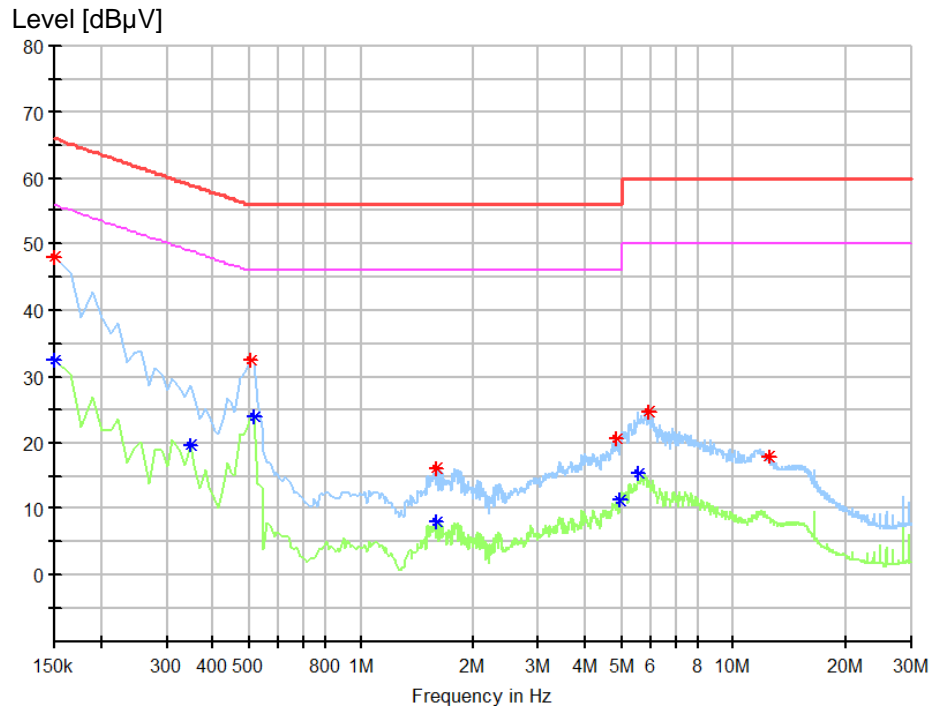
**Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for mode 2**


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line
2.090625	13.52	56.00	42.48	L1
12.429375	18.72	60.00	41.28	L1
4.734375	20.03	56.00	35.97	L1
5.555625	23.37	60.00	36.63	L1
0.504375	32.79	56.00	23.21	L1
0.150000	48.14	66.00	17.86	L1

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line
0.150000	32.71	56.00	23.29	L1
0.515625	24.49	46.00	21.51	L1
2.090625	5.99	46.00	40.01	L1
4.981875	11.54	46.00	34.46	L1
5.555625	14.33	50.00	35.67	L1
12.440625	9.67	50.00	40.33	L1

**Figure 4: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for mode 2**


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBuV)	Limit (dBuV)	Margin (dB)	Line
1.595625	16.06	56.00	39.94	N
12.429375	17.89	60.00	42.11	N
4.846875	20.67	56.00	35.33	N
5.926875	24.75	60.00	35.25	N
0.504375	32.46	56.00	23.54	N
0.150000	48.09	66.00	17.91	N

Final Average measurement result:

Frequency (MHz)	Average (dBuV)	Limit (dBuV)	Margin (dB)	Line
0.150000	32.48	56.00	23.52	N
0.346875	19.58	49.04	29.46	N
0.515625	23.99	46.00	22.01	N
1.595625	8.03	46.00	37.97	N
4.970625	11.48	46.00	34.52	N
5.555625	15.49	50.00	34.51	N

## 5.2 Emission in the Frequency Range above 30 MHz

### 5.2.1 Radiated emission

**Result:**
**Passed**

Date of testing	: 2022-02-22
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ICES-005:2018, ANSI C63.4-2014 and CISPR 16-2-2
Product classification	: Class B
Frequency range	: 30 – 1000 MHz (see Note 1)
Limits	: Quasi-peak limits (3 m distance): 30 – 88 MHz, 40 dB $\mu$ V/m; 88 – 216 MHz, 43.5 dB $\mu$ V/m; 216 – 1000 MHz, 46 dB $\mu$ 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	: EUT powered by AC/DC adapter
Ambient condition	: Temperature: 20.1 °C; Relative humidity: 43.1 %
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 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.

*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:2020 for 3 m test distance. Therefore, the former limits are used in following figures and tables.*

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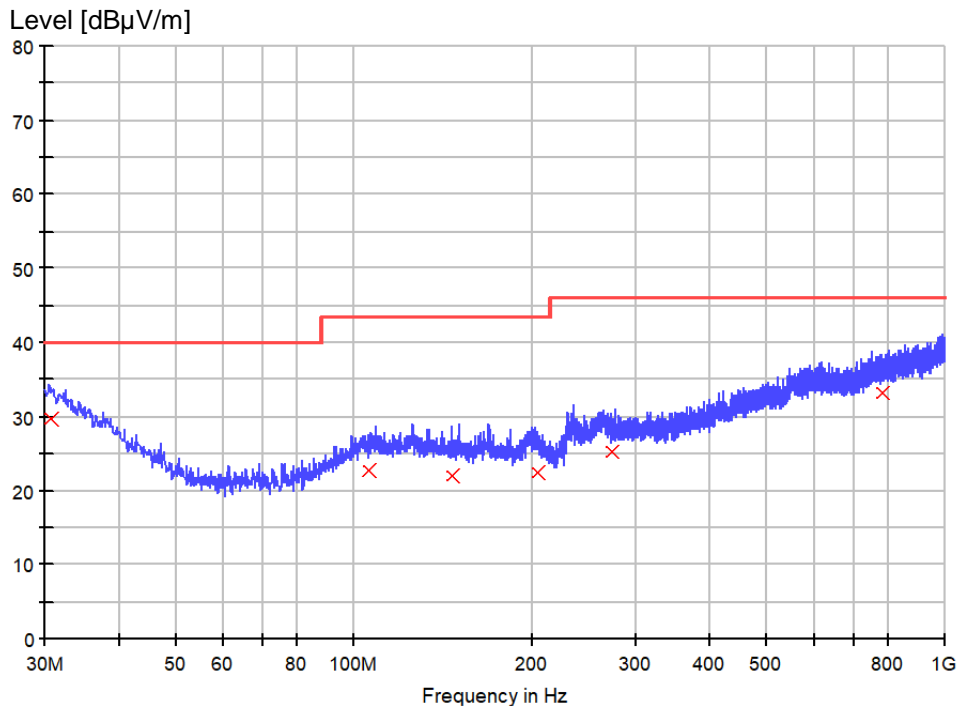
Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB $\mu$ 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)

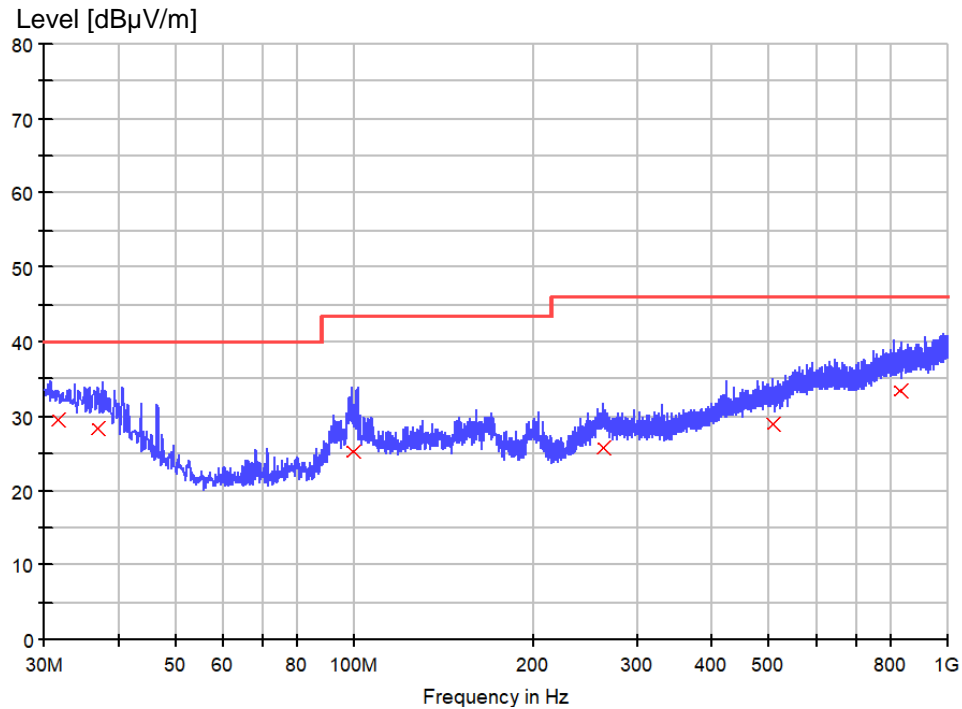
Margin: Limit (dB $\mu$ V/m) - QuasiPeak (dB $\mu$ V/m)



**Figure 5: 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)
30.606250	29.7	1000.0	120.000	100.0	H	12.0	25.1	10.3	40.0
106.145000	22.7	1000.0	120.000	100.0	H	5.0	18.3	20.8	43.5
147.006250	22.0	1000.0	120.000	100.0	H	77.0	17.5	21.5	43.5
204.236250	22.4	1000.0	120.000	120.0	H	120.0	16.2	21.1	43.5
272.257500	25.4	1000.0	120.000	110.0	H	30.0	19.6	20.6	46.0
785.145000	33.2	1000.0	120.000	130.0	H	13.0	27.5	12.8	46.0

**Figure 6: 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)
31.697500	29.4	1000.0	120.000	100.0	V	12.0	24.6	10.6	40.0
36.911250	28.3	1000.0	120.000	100.0	V	5.0	21.6	11.7	40.0
98.991250	25.3	1000.0	120.000	100.0	V	120.0	17.3	18.2	43.5
262.557500	25.7	1000.0	120.000	100.0	V	169.0	20.7	20.3	46.0
506.997500	29.0	1000.0	120.000	105.0	V	77.0	24.9	17.0	46.0
833.281250	33.4	1000.0	120.000	110.0	V	0.0	27.5	12.6	46.0

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## **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	Due Date
				DD . MM . YYYY	DD . MM . YYYY
9023229	EMI test receiver	ESR3	Rohde&Schwarz	22.03.2021	22.03.2022
G1811403	Artificial mains network	ENV216	Rohde&Schwarz	04.11.2021	04.11.2022
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	01.09.2021	01.09.2022
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023

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**End of test report**