



Certificate #4301.01

Prüfbericht-Nr.: Test Report No.:	CN21R39L 001	Auftrags-Nr.: Order No.:	244374599	Seite 1 von 22 Page 1 of 22
Kunden-Referenz-Nr.: Client Reference No.:	1774198	Auftragsdatum: Order date.:	2021-11-16	
Auftraggeber: Client:	IKEA of Sweden AB BOX 702, SE-343 81 Älmhult, Sweden			
Prüfgegenstand: Test item:	OBEGRÄNSAD Record Player			
Bezeichnung / Typ-Nr.: Identification / Type No.:	E2126			
Auftrags-Inhalt: Order content:	TÜV Rheinland EMC service			
Prüfgrundlage: Test specification:	FCC 47 CFR Part 15, Subpart B:2020 Class B ICES-003:2020			
Wareneingangsdatum: Date of receipt:	2021-11-16	Refer to the EUT photos file		
Prüfmuster-Nr.: Test sample No.:	A003160427-004			
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		genehmigt von: / authorized by: Hexiong Liu		
Datum: / Date: 2022-03-10 <i>Jessie Xu</i>		Datum: / Date: 2022-03-10 <i>Hexiong Liu</i>		
Stellung: / Position: Project manager		Stellung: / Position: Department manager		
Sonstiges / Other:	FCC ID: FHO-E2126 Test Firm Registration Number: 958801			
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 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>				

V05

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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 (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 record player for household and similar use. For the further information, refer to the user's manual.

2.2 Ratings and System Details

Rated input : DC 5 V, 1 A
Protecting class : III

2.3 Independent Operation Modes

The basic operation modes are: "On" or "Off".

2.4 Description of interconnecting cables

No.	Interface and name	Shielded or not	Specified length
1	AUX line	Unshielded	1550 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

Rating labels, circuit diagram and user's manual.

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.

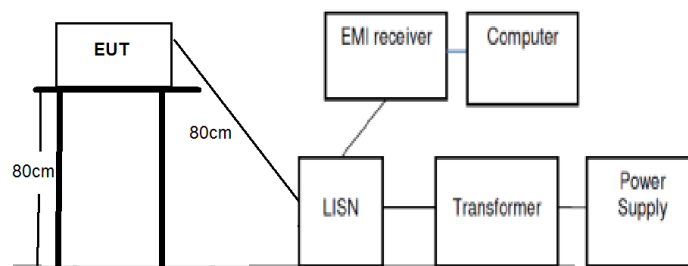
Refer to the related paragraph of this report.

The sequence of testing:

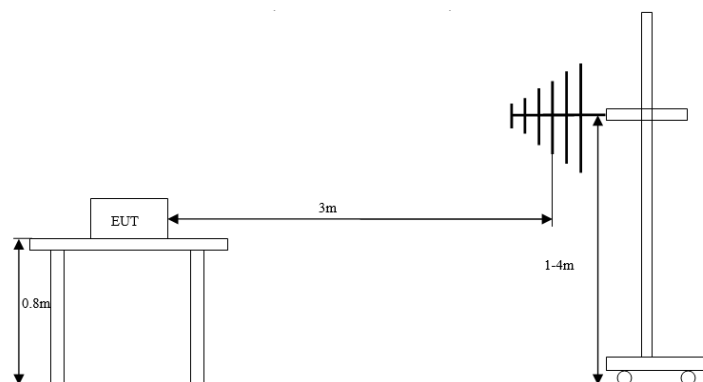
1. Conducted emission tests were performed on 2021-11-30
2. Radiated emission tests were performed on 2021-12-01

3.2 Equipment and cable arrangement

Block diagrams 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 conducted emission and radiated emission tests.

3.3 Test Software

No special test software was used during the tests.

3.4 Special Accessories and Auxiliary Equipment

During the tests, the EUT was powered by an adapter. And a speaker was connected with the AUX output ports.

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 EMISSION

5.1 Emission in the Frequency Range up to 30 MHz

5.1.1 Conducted emission

Result:		Passed
Date of testing	: 2021-11-30	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ICES-003:2020, 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 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 for adapter	
Operational mode	: Mode 1: EUT powered by adapter and played music by speaker Mode 2: EUT powered by laptop with adapter and played music by speaker	
Ambient condition	: Temperature: 20.2 °C; Relative humidity: 41.2 %	
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.

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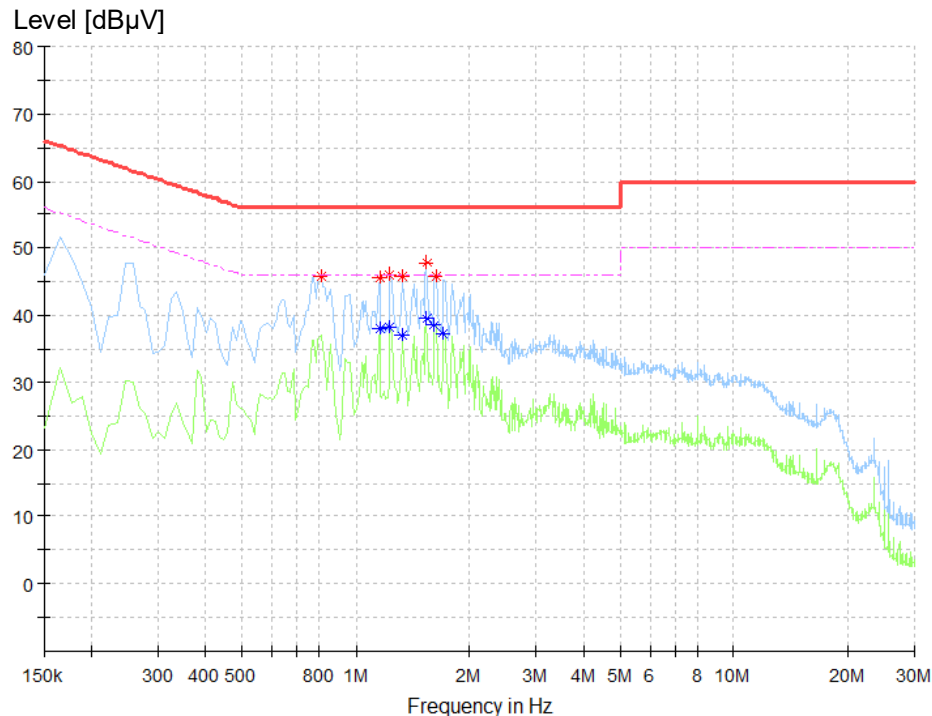
The following figures and tables were those measured by an automatic measuring system. Both quasi-peak and average measurements were performed. In the following spectral diagram, “*” means Quasi-Peak Value and “*” means Average Value results.

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)

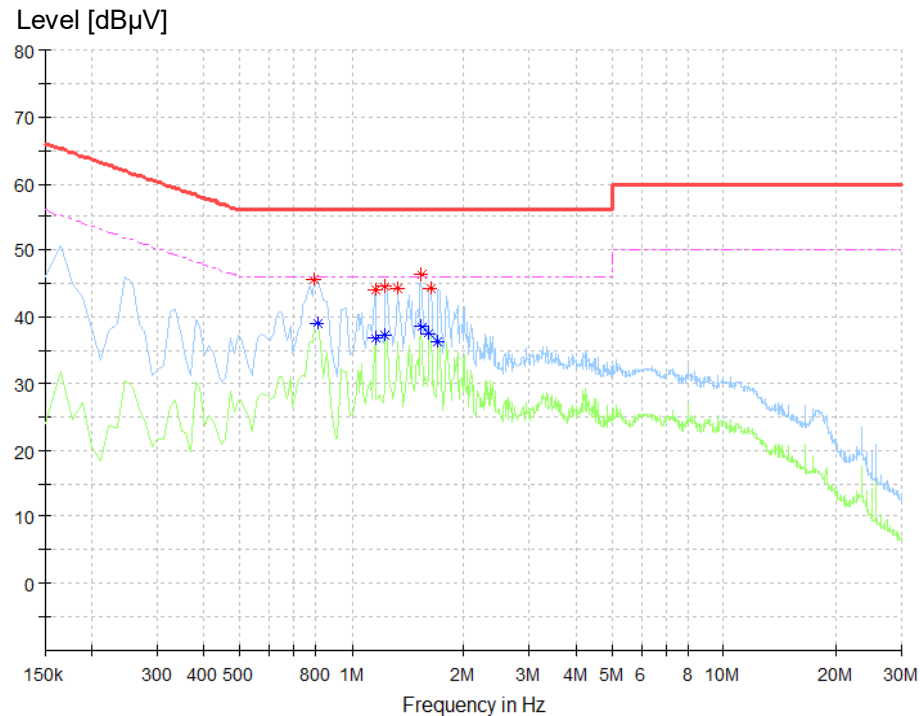
Figure 1: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for Mode 1


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter
1.156875	45.63	56.00	10.37	L1	ON
1.629375	45.78	56.00	10.22	L1	ON
1.325625	45.79	56.00	10.21	L1	ON
0.808125	45.87	56.00	10.13	L1	ON
1.235625	45.98	56.00	10.02	L1	ON
1.539375	47.84	56.00	8.16	L1	ON

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter
1.618125	38.59	46.00	7.41	L1	ON
1.235625	38.29	46.00	7.71	L1	ON
1.708125	37.25	46.00	8.75	L1	ON
1.325625	37.05	46.00	8.95	L1	ON
1.156875	38.05	46.00	7.95	L1	ON
1.539375	39.53	46.00	6.47	L1	ON

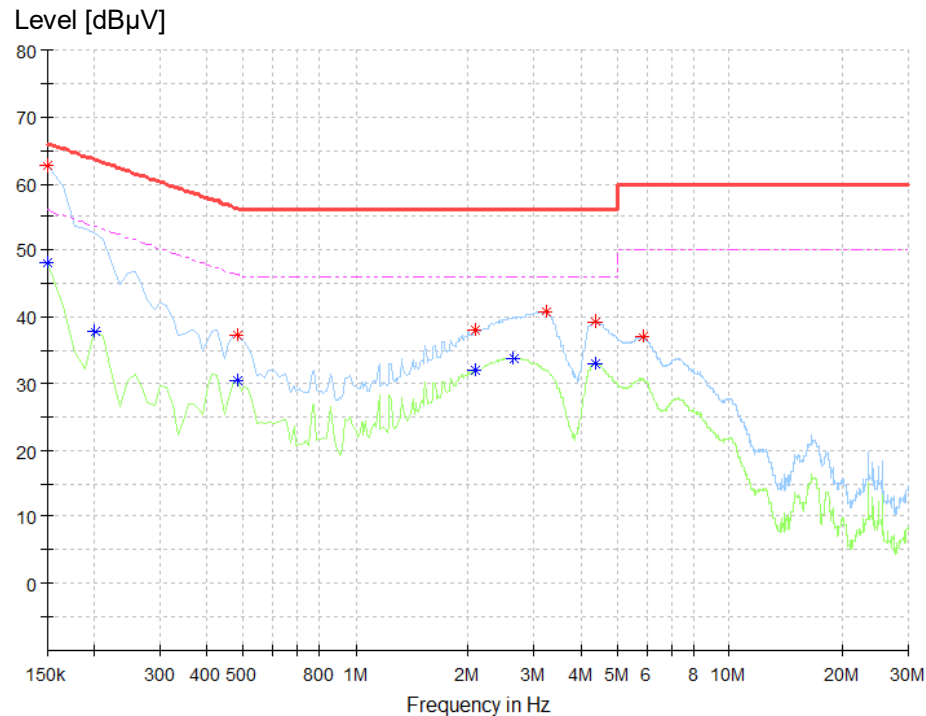
Figure 2: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, N for Mode 1


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
1.156875	44.07	56.00	11.93	N	ON
1.629375	44.33	56.00	11.67	N	ON
1.325625	44.41	56.00	11.59	N	ON
1.235625	44.48	56.00	11.52	N	ON
0.796875	45.66	56.00	10.34	N	ON
1.539375	46.32	56.00	9.68	N	ON

Final Average measurement result:

Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
1.708125	36.38	46.00	9.62	N	ON
1.618125	37.54	46.00	8.46	N	ON
1.539375	38.41	46.00	7.59	N	ON
0.808125	38.95	46.00	7.05	N	ON
1.156875	36.79	46.00	9.21	N	ON
1.235625	37.28	46.00	8.72	N	ON

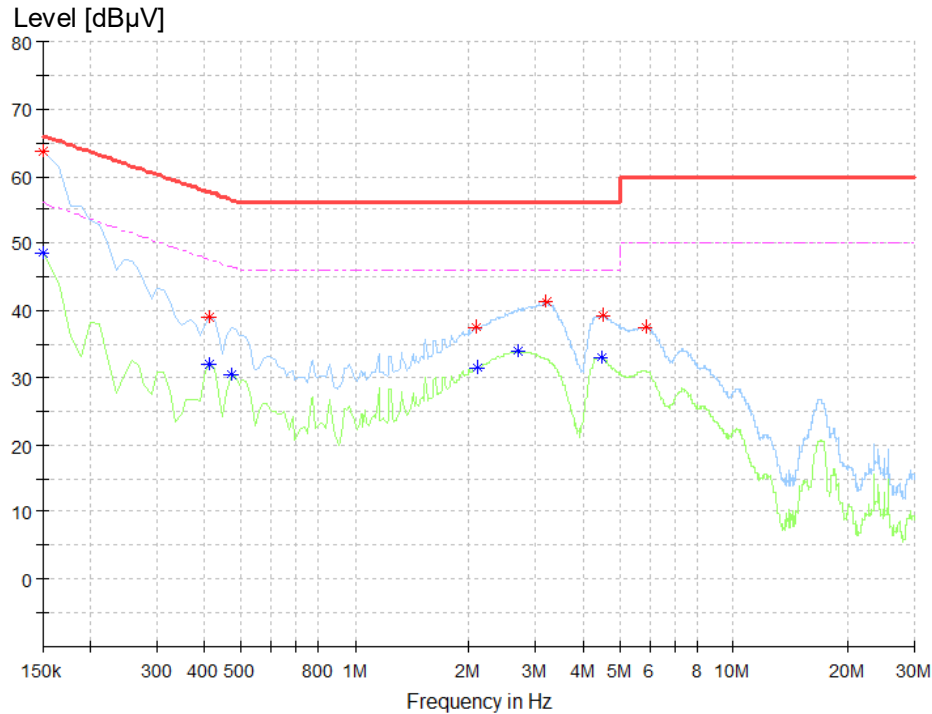
Figure 3: Spectral Diagrams, Conducted Emission, 150 kHz – 30 MHz, L for Mode 2


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter
5.904375	36.94	60.00	23.06	L1	ON
0.481875	37.16	56.31	19.14	L1	ON
2.090625	37.93	56.00	18.07	L1	ON
4.363125	39.33	56.00	16.67	L1	ON
3.226875	40.74	56.00	15.26	L1	ON
0.150000	62.53	66.00	3.47	L1	ON

Final Average measurement result:

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Filter
4.374375	32.98	46.00	13.02	L1	ON
2.653125	33.83	46.00	12.17	L1	ON
0.200625	37.82	53.59	15.77	L1	ON
0.150000	48.16	56.00	7.84	L1	ON
2.079375	32.09	46.00	13.91	L1	ON
0.481875	30.35	46.31	15.96	L1	ON

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


Final Quasi-peak measurement result:

Frequency (MHz)	QuasiPeak (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
2.090625	37.51	56.00	18.49	N	ON
5.904375	37.64	60.00	22.36	N	ON
0.414375	38.97	57.56	18.59	N	ON
4.509375	39.36	56.00	16.64	N	ON
3.181875	41.28	56.00	14.72	N	ON
0.150000	63.54	66.00	2.46	N	ON

Final Average measurement result:

Frequency (MHz)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Line	Filter
4.475625	33.05	46.00	12.95	N	ON
2.686875	33.88	46.00	12.12	N	ON
0.414375	31.95	47.56	15.61	N	ON
0.150000	48.48	56.00	7.52	N	ON
2.101875	31.57	46.00	14.43	N	ON
0.470625	30.58	46.50	15.93	N	ON

5.2 Emission in the Frequency Range above 30 MHz

5.2.1 Radiated emission (30-1000 MHz)

Result:		Passed
Date of testing	: 2021-12-01	
Test procedure	: FCC 47 CFR Part 15, Subpart B:2020, ICES-003:2020, 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 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 for adapter	
Operational mode	: Mode 1: EUT powered by adapter and played music by speaker Mode 2: EUT powered by laptop with adapter and played music by speaker	
Ambient condition	: Temperature: 20.1 °C; Relative humidity: 44.4 %	
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 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) and table 3 of ICES-003:2020, the upper frequency for radiated emission measurement is 1000 MHz.

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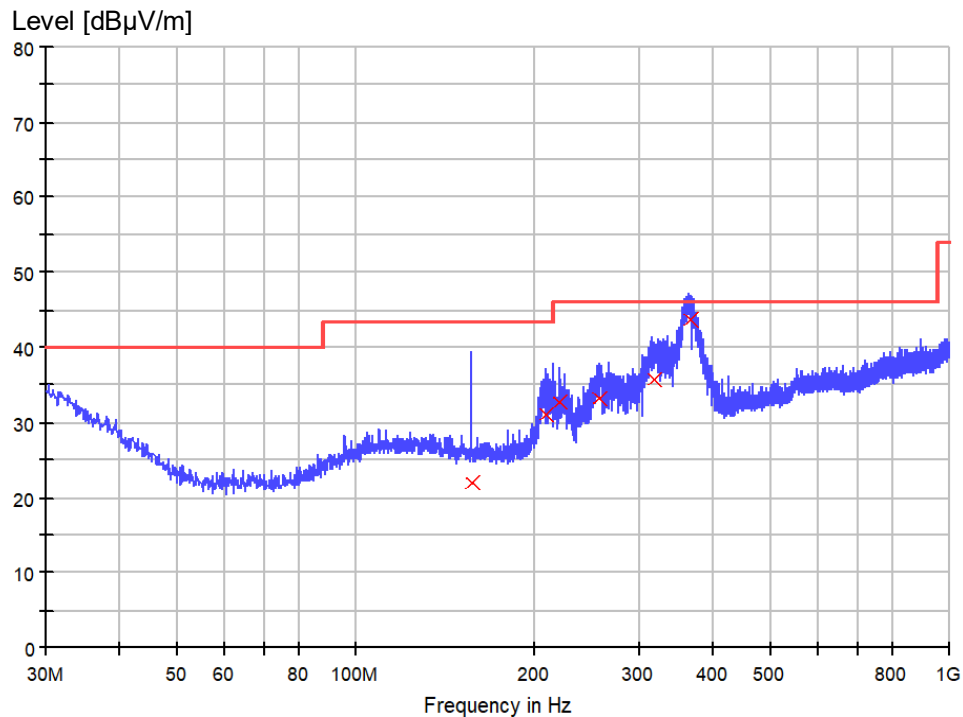
Note 2: The class B limits of FCC 47 CFR Part 15, Subpart B:2020 is stricter than those ICES-003:2020 Table 2 for 3 m test distance. Therefore, the former limits are used in following figures and tables.

Notes on following tables of radiated emission results and conversions:

QuasiPeak (dB μ V/m): final measurement results by using quasi-peak detector

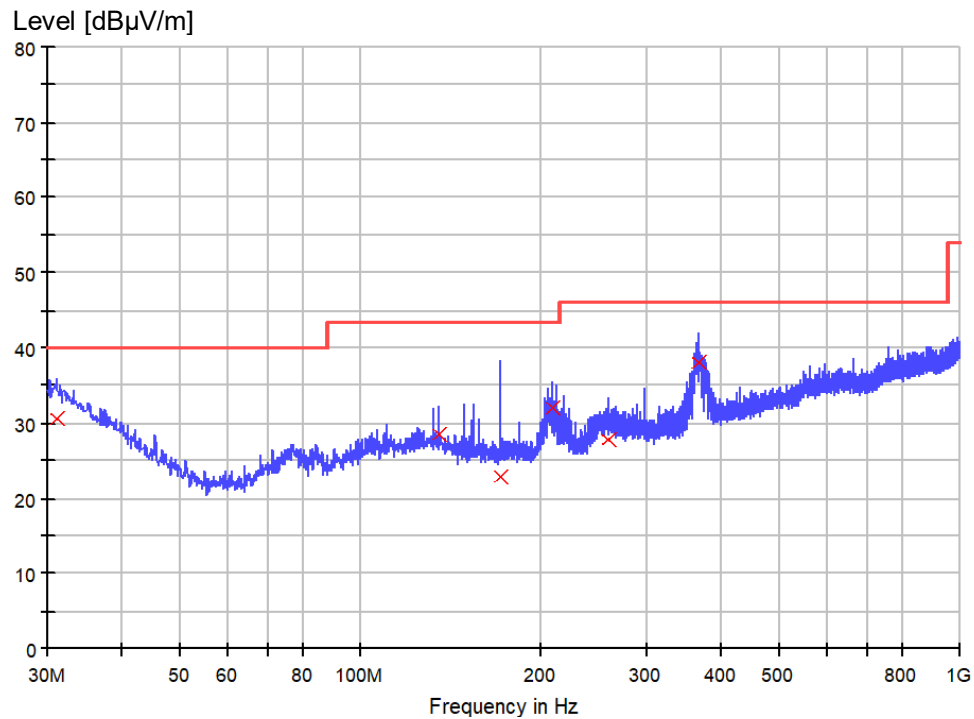
Corr. (dB): correction factor including: antenna factor, cable loss, and gain of pre-amplifier (if used)

Margin: Limit (dB μ V/m) - QuasiPeak (dB μ V/m)

Figure 5: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization for Mode 1


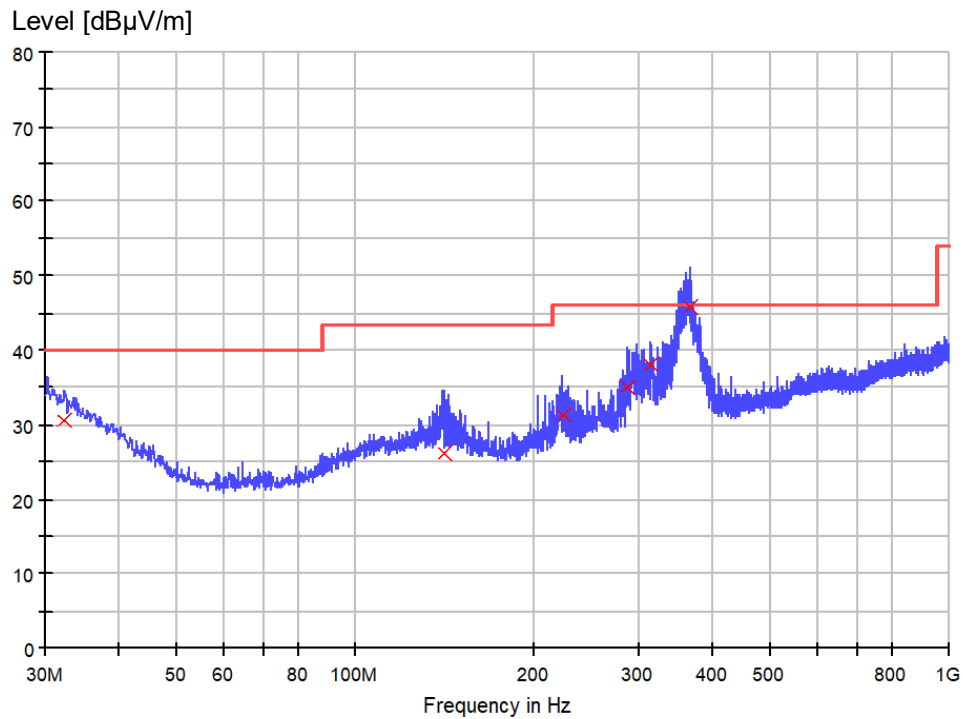
Final quasi-peak measurement results:

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)
156.948750	21.9	1000.0	120.000	100.0	H	-62.0	16.8	21.6	43.5
208.843750	31.2	1000.0	120.000	165.0	H	152.0	16.1	12.3	43.5
220.847500	32.7	1000.0	120.000	100.0	H	-180.0	16.0	13.3	46.0
257.222500	33.1	1000.0	120.000	100.0	H	-103.0	20.3	12.9	46.0
318.211250	35.8	1000.0	120.000	100.0	H	180.0	20.6	10.2	46.0
365.862500	43.8	1000.0	120.000	100.0	H	-60.0	21.8	2.2	46.0

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Figure 6: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization for Mode 1

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)
31.091250	30.6	1000.0	120.000	120.0	V	-6.0	24.9	9.4	40.0
135.123750	28.6	1000.0	120.000	165.0	V	180.0	18.4	14.9	43.5
171.377500	23.0	1000.0	120.000	115.0	V	81.0	16.3	20.5	43.5
208.843750	32.1	1000.0	120.000	130.0	V	-32.0	16.1	11.5	43.5
258.920000	27.8	1000.0	120.000	100.0	V	-85.0	20.5	18.2	46.0
367.560000	38.1	1000.0	120.000	150.0	V	-171.0	21.8	7.9	46.0

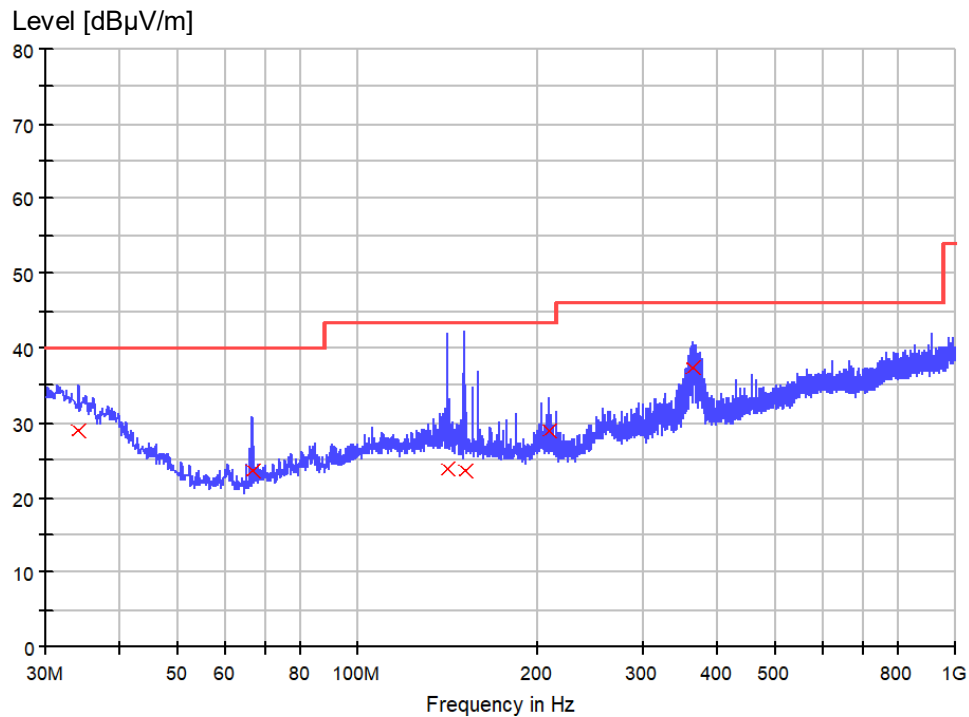
Figure 7: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Horizontal polarization for Mode 2



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)
32.303750	30.8	1000.0	120.000	110.0	H	150.0	24.3	9.3	40.0
141.065000	26.2	1000.0	120.000	135.0	H	-78.0	18.1	17.3	43.5
223.636250	31.3	1000.0	120.000	160.0	H	-155.0	16.3	14.7	46.0
287.535000	35.1	1000.0	120.000	120.0	H	9.0	19.7	10.9	46.0
314.088750	38.0	1000.0	120.000	100.0	H	180.0	20.4	8.0	46.0
365.741250	45.7	1000.0	120.000	150.0	H	126.0	21.8	0.3	46.0

Figure 8: Spectral Diagrams, Radiated Emission, 30 MHz – 1000 MHz, Vertical polarization for Mode 2



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)
34.122500	29.1	1000.0	120.000	110.0	V	-4.0	23.2	10.9	40.0
66.738750	23.7	1000.0	120.000	125.0	V	-101.0	13.0	16.3	40.0
141.186250	23.9	1000.0	120.000	150.0	V	-124.0	18.1	19.6	43.5
150.886250	23.7	1000.0	120.000	110.0	V	180.0	17.2	19.8	43.5
208.843750	29.0	1000.0	120.000	160.0	V	24.0	16.1	14.5	43.5
362.467500	37.5	1000.0	120.000	135.0	V	-180.0	21.8	8.5	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 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	01.09.2021	01.09.2022
G1811425	Bilog antenna	CBL 6112D	Teseq	10.03.2020	10.03.2023
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
G1824845	EMC measurement software	EMC32 (Ver 10.20.01)	Rohde&Schwarz	N/A	N/A

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End of test report