

IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

LED2019C2

REPORT NUMBER

201202060SHA-001

ISSUE DATE

February 05, 2021

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Report no. 201202060SHA-001

Applicant : **IKEA of Sweden AB**
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Manufacturer : **LEEDARSON LIGHTING CO.,LTD.**
Xingtai Industrial Park, Economic Development Zone of Changtai
County, Zhangzhou City, Fujian Province, CHINA

FCC ID : **FHO-LED2019C2**

Summary

The equipment complies with the requirements according to the following standard(s) or Specification:

47CFR Part 15 (2019): Radio Frequency Devices (Subpart B)

ANSI C63.4 (2014): American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

PREPARED BY:

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Revision History

Report No.	Version	Description	Issued Date
201202060SHA-001	Rev. 01	Initial issue of report	February 05, 2021

Measurement result summary

TEST ITEM	FCC REFERENCE	TEST RESULT	NOTE
Conducted emission	15.107	Pass	
Radiation emission	15.109	Pass	

Notes: 1: NA =Not Applicable

2. Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

3: Additions, Deviations and Exclusions from Standards: None.

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product Name : Self-ballasted LED lamps
Type/Model : LED2019C2
Description of EUT : We tested it, and listed the worst data.
Rating : 120V~, 60Hz, 1.8W, 18mA, E12
Brand name : IKEA
Category of EUT : Class B
EUT type : ☒ Table top
☐ Floor standing
Sample received date : December 16, 2020
Sample identification No. : 0201216-14
Date of test : December 16-27, 2020

1.2 Description of Test Facility

Name : Intertek Testing Services Shanghai

Address : Building 86, No. 1198 Qinzhou Road(North), Shanghai 200233, P.R. China

Telephone : 86 21 61278200

Telefax : 86 21 54262353

The test facility is : CNAS Accreditation Lab
recognized, certified, Registration No. CNAS L0139
or accredited by these FCC Accredited Lab
organizations Designation Number: CN1175

IC Registration Lab
CAB identifier.: CN0051

VCCI Registration Lab
Registration No.: R-14243, G-10845, C-14723, T-12252

A2LA Accreditation Lab
Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019): Radio Frequency Device: Subpart B

ANSI C63.4 (2014): Interim Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz.

2.2 Mode of operation during the test

Within this test report, EUT was tested under all available operation modes and tested under its rating voltage and frequency. Other voltage and frequency is specified if used.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

2.4 Test peripherals list

Item No.	Name	Band and Model	Description

2.5 Record of climatic conditions

Test Item	Temperature (°C)	Relative Humidity (%)	Pressure (Kpa)
Conducted emission	24	42	101
Radiated Emission	24	42	101

Notes: NA =Not Applicable

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2021-07-08
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2021-11-10
☒	Shielded room	Zhongyu	-	EC 2838	2022-01-12
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2021-09-16
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2021-09-25
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2021-07-14
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-03-03
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3481	2022-01-05

2.7 Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted emission at mains ports	9kHz ~ 150kHz	3.71 dB
	150kHz ~ 30MHz	3.31 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.04 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	4.97 dB
	6GHz ~ 18GHz	5.29 dB

3 Conducted emission

Test result: PASS

3.1 Limits

3.1.1 Limits for conducted emission of class A device

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

3.1.2 Limits for conducted emission of class B device

Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver with an average detector need not be carried out.		

The diagram illustrates a test setup for an EUT on a nonconductive table. The EUT is placed on a 1.5 x 1 meter nonconductive table. The table is supported by legs. A conducting ground plane extends at least 0.5 m beyond the EUT system footprint. The ground plane is bonded to the ground plane. The EUT is connected to a LISN (Line Impedance Stabilization Network) via a cable. The LISN is connected to a power source. The diagram shows the EUT, the table, the ground plane, the LISN, and the power source. Dimensions are provided for the table (1.5 x 1 meter), the EUT (10 cm), and the ground plane (90 cm to ground plane, 40 cm). Labels include: EUT, NONCONDUCTIVE TABLE 1.5 X 1 METER, 10 cm, 90 cm TO GROUND PLANE, 40 cm, CONDUCTING GROUND PLANE EXTENDS AT LEAST 0.5 m BEYOND EUT SYSTEM FOOTPRINT, BONDED TO GROUND PLANE, LISN, 3.1, 3.2, 3.3, 1, 2, 3, 4, 5, 6, 7.

The diagram illustrates a typical EMC test setup for a rack-mounted Equipment Under Test (EUT). Two EUT units are shown side-by-side on a common ground plane. A typical spacing is indicated between the units. The EUTs are connected to a power source (labeled 3) via a cable (labeled 2). The power source is connected to two LISN (Line Impedance Stabilization Network) units, which are connected to the EUTs. The LISN units are connected to the EUTs via cables (labeled 2). The EUTs are connected to the ground plane via a cable (labeled 2). The ground plane is connected to the EUTs via a cable (labeled 2). The distance between the EUTs is 0.8 m. The ground plane is labeled "GROUND PLANE".

3.3 Test Setup and Test Procedure

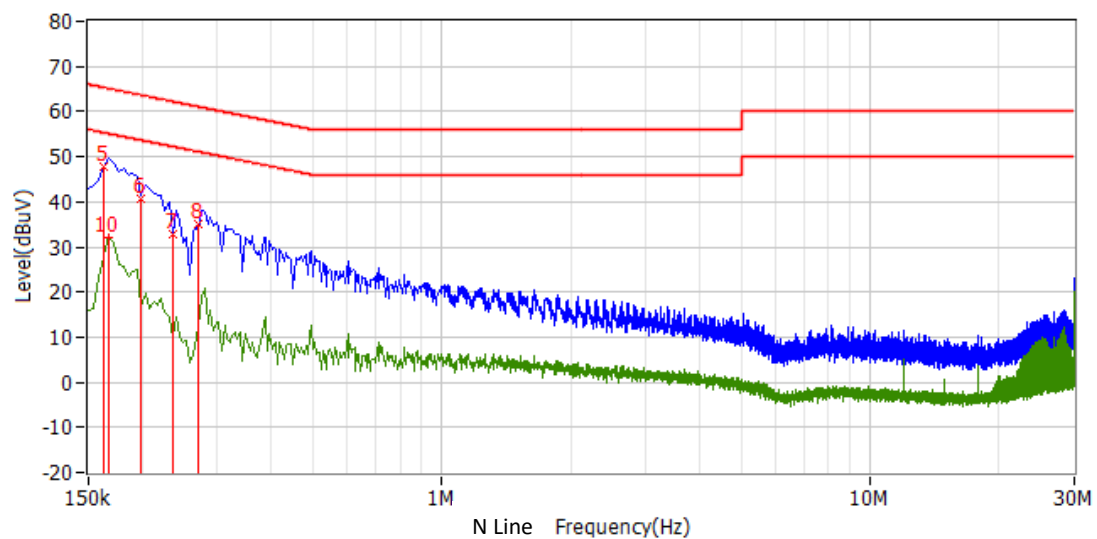
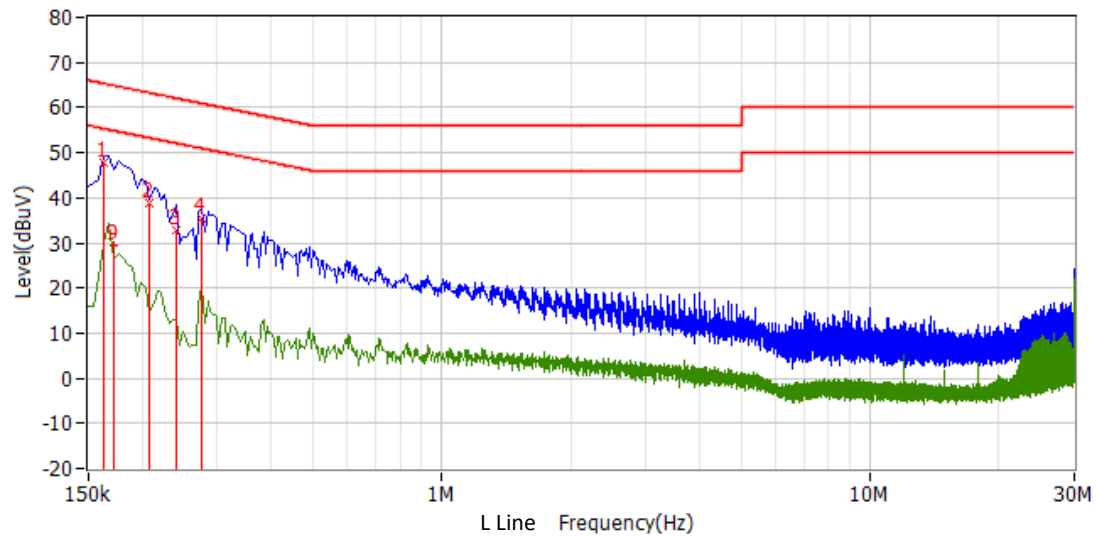
Measurement was performed in shielded room, and instruments used were following clause 4 and clause 5 of ANSI 63.4.

Detailed test procedure was following clause 7.3 of ANSI 63.4.

EUT arrangement and operation conditions were according to clause 6 and clause 7 of ANSI 63.4.

Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

3.4 Test Protocol



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Factor dB	Detector	Phase
1	163.500 kHz	65.3	47.7	-17.6	0.3	QP	L1
2	208.500 kHz	63.3	38.8	-24.5	0.3	QP	L1
3	240.000 kHz	62.1	32.8	-29.3	0.3	QP	L1
4	276.000 kHz	60.9	35.5	-25.4	0.3	QP	L1
5	163.500 kHz	65.3	47.8	-17.5	0.3	QP	N
6	199.500 kHz	63.6	40.8	-22.8	0.3	QP	N
7	235.500 kHz	62.3	32.8	-29.4	0.3	QP	N
8	271.500 kHz	61.1	35.0	-26.1	0.3	QP	N
9	172.500 kHz	54.8	29.3	-25.6	0.3	CAV	L1
10	168.000 kHz	55.1	31.9	-23.2	0.3	CAV	N

Remark: 1. Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.
2. Corrected Reading = Original Receiver Reading + Correct Factor
3. Margin = Limit - Corrected Reading
4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming LISN Factor = 10.00dB, Cable Loss = 2.00dB,
Original Receiver Reading = 10.00dBuV, Limit = 66.00dBuV.
Then Correct Factor = 10.00 + 2.00 = 12.00dB;
Corrected Reading = 10dBuV + 12.00dB = 22.00dBuV;
Margin = 66.00dBuV – 22.00dBuV = 44.00dB.

4 Radiated emission

Test result: PASS

4.1 Radiated emission limits

4.1.1 Limits for radiated emission of class A device

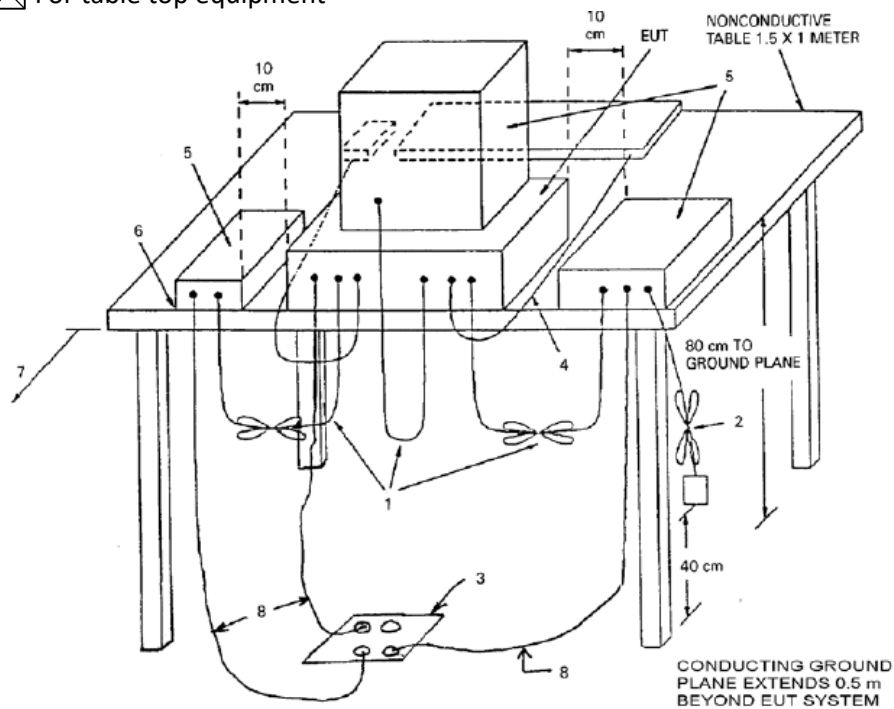
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 ~ 88	39
88 ~ 216	43.5
216 ~ 960	46.4
Above 960	49.5
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.1.2 Limits for radiated emission of class B device

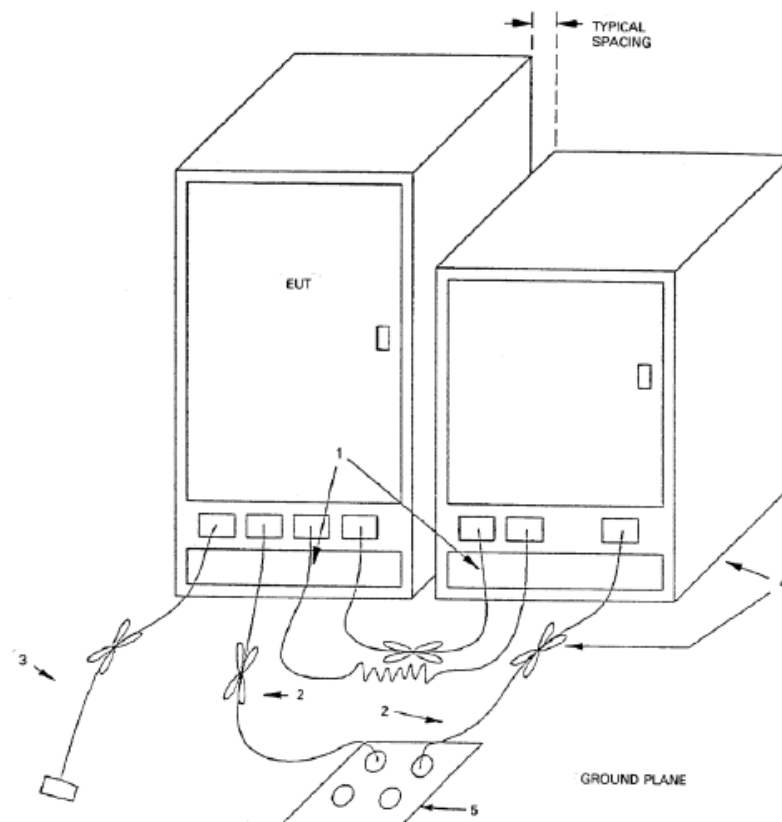
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 960	46.0
Above 960	54.0
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.2 Block diagram and test set up

 For table top equipment



☐ For floor standing equipment



4.3 Test Setup and Test Procedure

The measurement was performed in a semi-anechoic chamber.

The distance from EUT to receiving antenna is 3 meter.

Measurement was performed according to clause 4 and clause 5 of ANSI 63.4.

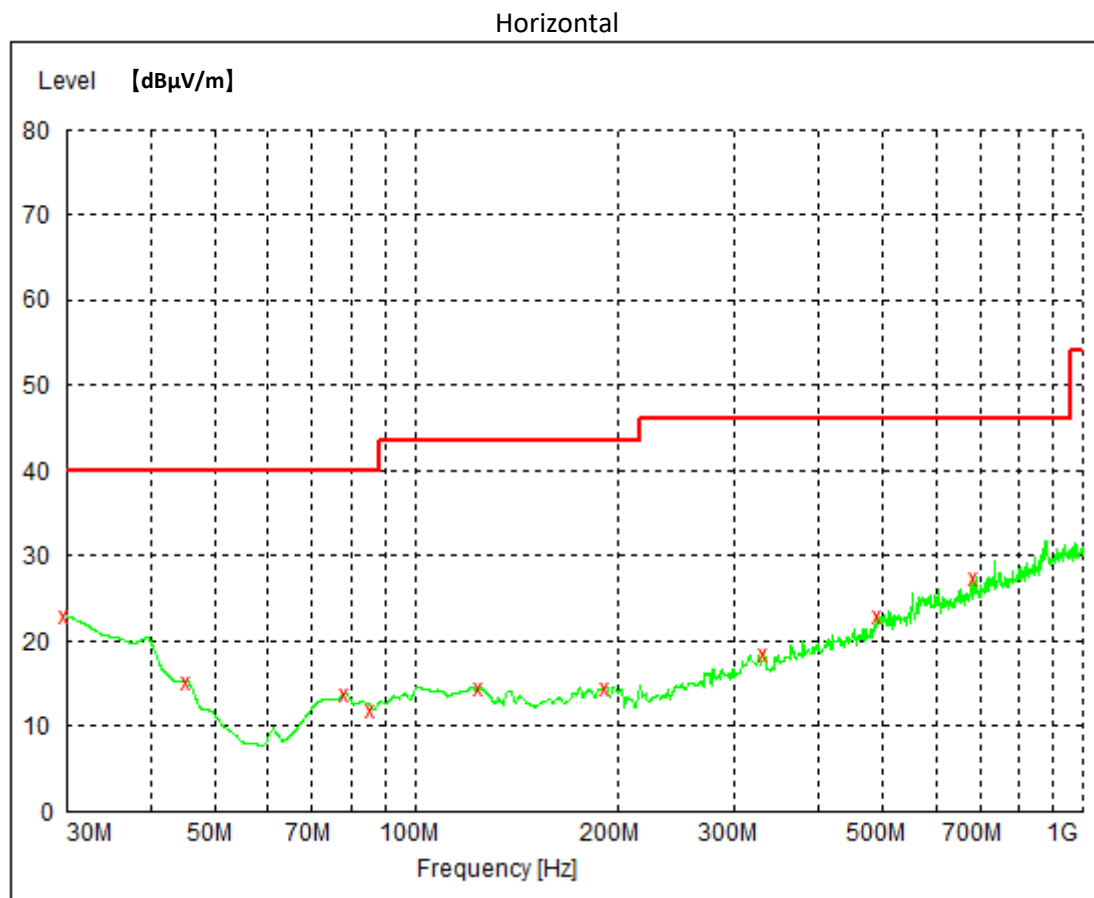
Test procedure was according to clause 8.3 of ANSI 63.4.

EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

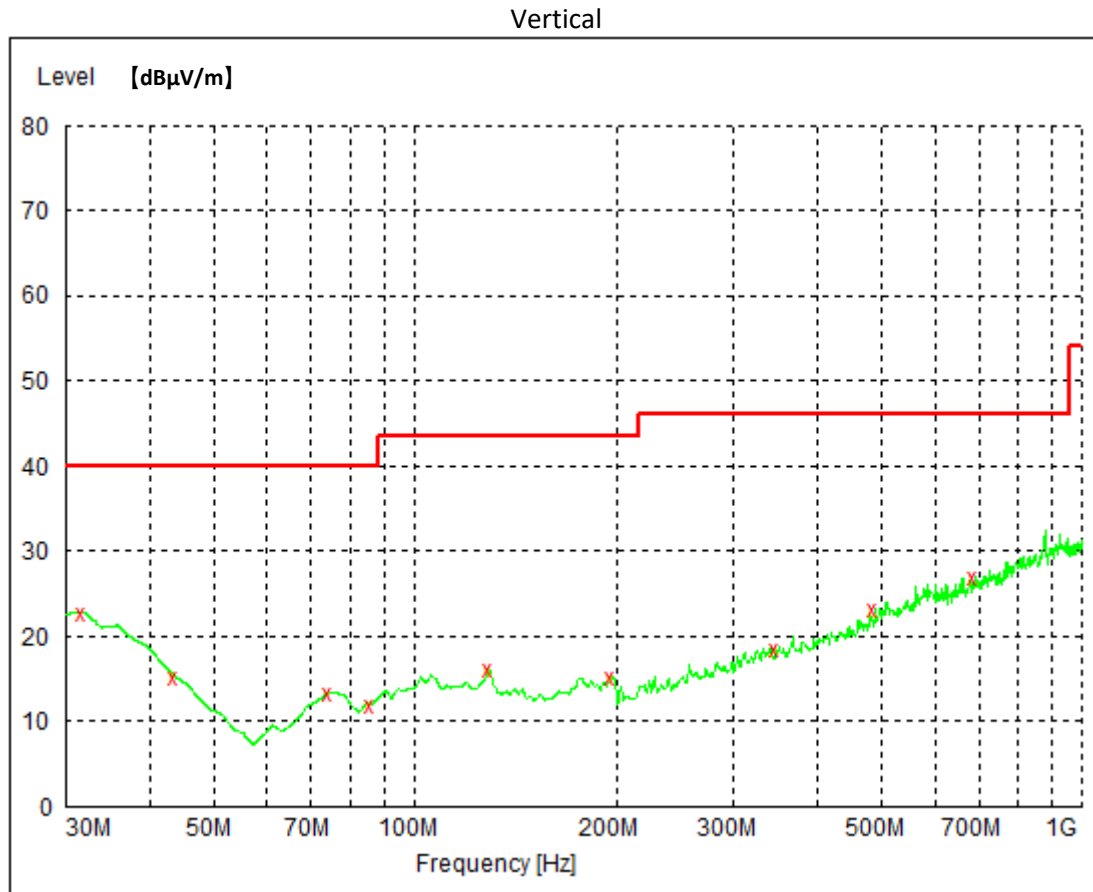
The bandwidth setting on R&S Test Receiver was 120 kHz.

The required measurement frequency range was checked.

4.4 Test Protocol



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB
30.000000	22.90	21.3	40.0	17.1
45.551102	15.30	12.5	40.0	24.7
78.597194	13.90	9.6	40.0	26.1
86.372745	11.90	10.1	40.0	28.1
125.250501	14.60	11.7	43.5	28.9
193.286573	14.60	11.2	43.5	28.9
333.246493	18.50	15.6	46.0	27.5
494.589178	22.90	19.5	46.0	23.1
688.977956	27.50	22.2	46.0	18.5



Frequency MHz	Level dBμV/m	Transd dB	Limit dBμV/m	Margin dB
31.943888	22.80	20.4	40.0	17.2
43.607214	15.30	13.9	40.0	24.7
74.709419	13.40	9.5	40.0	26.6
86.372745	12.00	10.1	40.0	28.0
129.138277	16.20	11.6	43.5	27.3
197.174349	15.20	11.2	43.5	28.3
346.853707	18.50	15.9	46.0	27.5
488.757515	23.30	19.1	46.0	22.7
688.977956	27.00	22.2	46.0	19.0

Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz)
 2. Corrected Reading = Original Receiver Reading + Correct Factor
 3. Margin = Limit - Corrected Reading
 4. If the PK Corrected Reading is lower than AV limit, the AV test can be elided.

Example: Assuming Antenna Factor = 30.20dB/m, Cable Loss = 2.00dB,
 Gain of Preamplifier = 32.00dB, Original Receiver Reading = 10.00dBuV, limit = 40.00dBuV/m.
 Then Correct Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m; Corrected Reading = 10dBuV +
 0.20dB/m = 10.20dBuV/m; Margin = 40.00dBuV/m - 10.20dBuV/m = 29.80dB.

*****END of the report*****