

IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

LED1931R5

REPORT NUMBER

190801754SHA-001

ISSUE DATE

October 22, 2019

DOCUMENT CONTROL NUMBER

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Report no. 190801754SHA-001

Applicant : **IKEA of Sweden AB**
Box 702, SE-343 81 Älmhult, SWEDEN

Manufacturer : **Same as applicant**

Manufacturing site : **LEEDARSON LIGHTING CO., LTD.**
Xingtai Industrial Park, Economic Development Zone of Changtai
County, Zhangzhou City, Fujian Province, China

Summary

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

47CFR Part 15 (2018): 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

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Revision History

Report No.	Version	Description	Issued Date
190801754SHA-001	Rev. 01	Initial issue of report	October 22, 2019

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 : LED1931R5
Description of EUT : We tested it, and listed the worst data.
Rating : AC 120V, 60Hz, 4.5W, 60mA, with GU10 lamp cap
Brand name : IKEA
Category of EUT : Class B
EUT type : ☒ Table top
 ☐ Floor standing
Sample received date : August 21, 2019
Sample identification No. : 0190821-13
Date of test : August 25, 2019

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 (2017): 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 / Disturbance Power / Tri-loop Test / CDN method					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2020-07-15
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2019-11-29
☒	Shielded room	Zhongyu	-	EC 2838	2020-01-13
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2020-09-12
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2020-06-10
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2020-07-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2020-03-28
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2020-02-28
☒	Pressure meter	YM3	Shanghai Mengde	EC 3320	2020-07-01

2.7 Measurement Uncertainty

Measurement	Frequency	Expanded Uncertainty (k=2) ($\pm$)
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

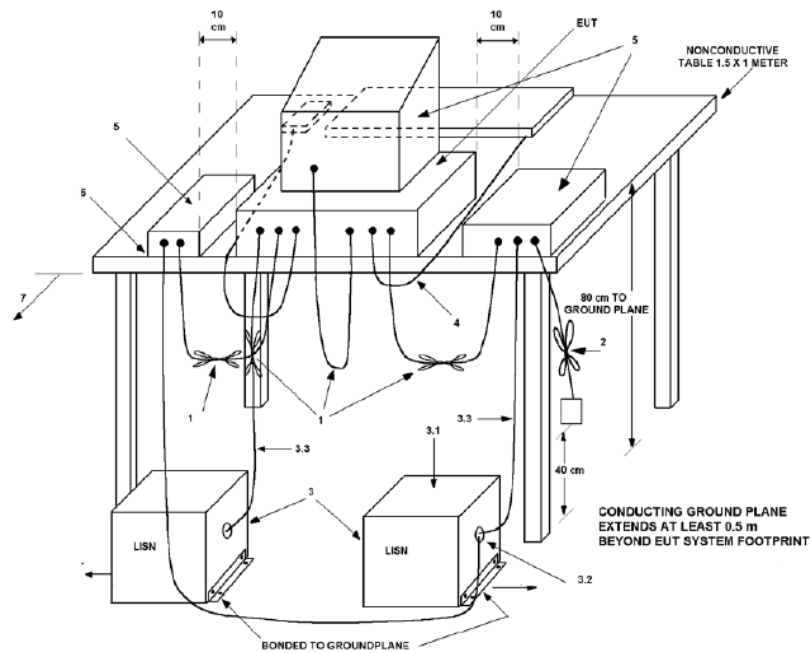
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the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

3.1.2 Limits for conducted emission of class B device

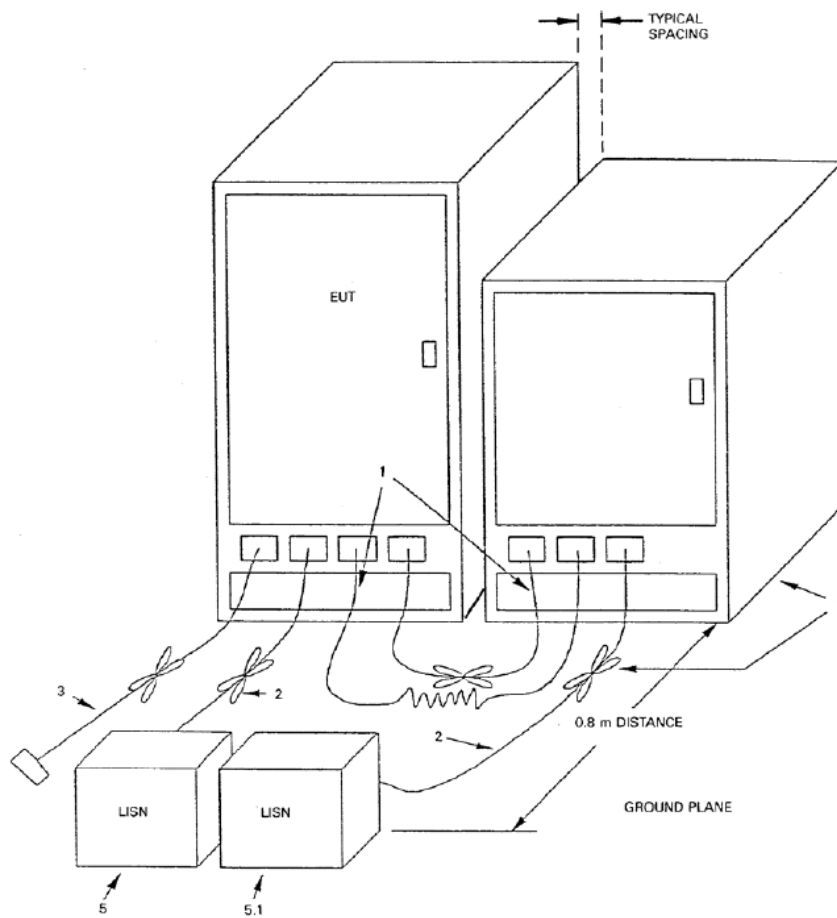
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when 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.		

3.2 Test setup

☐ For table top equipment



☐ For floor standing equipment



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.

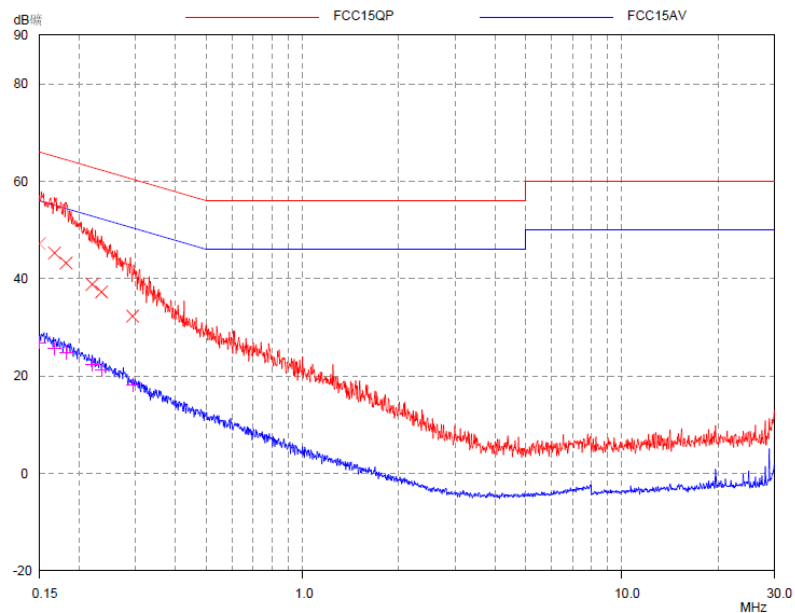
EUT arrangement and operation conditions were according to clause 6 and clause 7 of ANSI 63.4.

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

3.4 Test Protocol

BP5178FLD

L line:

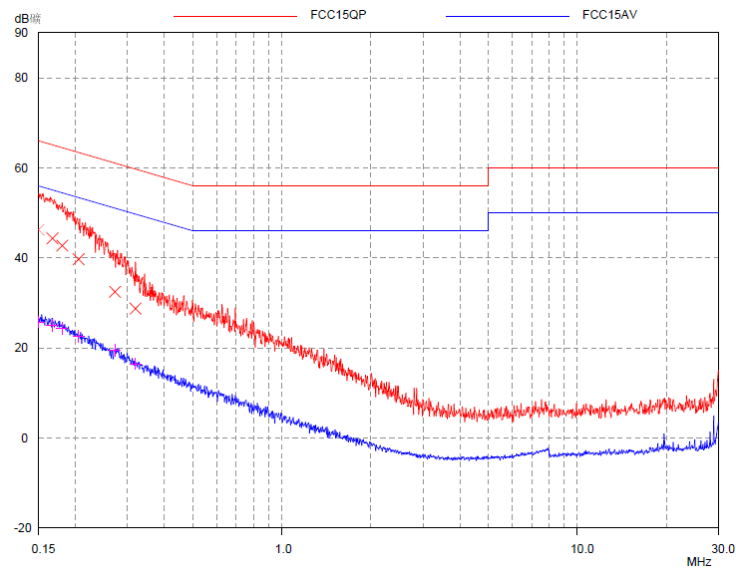


Final Measurement Results

Frequency MHz	QP Level dB _{μV}	QP Limit dB _{μV}	QP Delta dB
0.15	47.22	66.00	18.78
0.16707	45.28	65.10	19.82
0.18168	43.22	64.41	21.19
0.21917	38.86	62.85	23.99
0.23456	37.27	62.29	25.02
0.29332	32.32	60.43	28.11

Frequency MHz	AV Level dB _{μV}	AV Limit dB _{μV}	AV Delta dB
0.15	26.88	56.00	29.12
0.16707	25.59	55.10	29.51
0.18168	24.81	54.41	29.60
0.21917	22.27	52.85	30.58
0.23456	21.27	52.29	31.02
0.29332	18.21	50.43	32.22

N line:



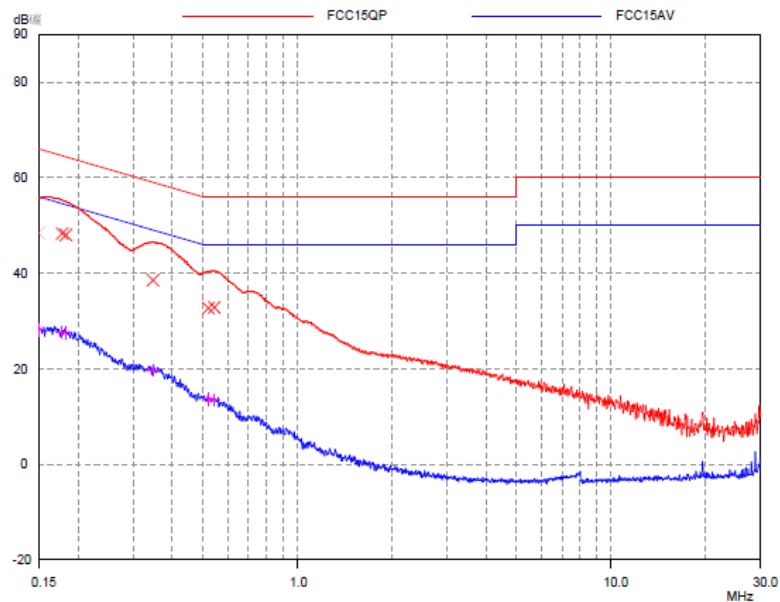
Final Measurement Results

Frequency MHz	QP Level dBμV	QP Limit dBμV	QP Delta dB
0.15	46.25	66.00	19.75
0.16707	44.35	65.10	20.75
0.18023	42.72	64.48	21.76
0.20479	39.72	63.41	23.69
0.2719	32.48	61.06	28.58
0.31897	28.76	59.73	30.97

Frequency MHz	AV Level dBμV	AV Limit dBμV	AV Delta dB
0.15	25.77	56.00	30.23
0.16707	25.02	55.10	30.08
0.18023	24.40	54.48	30.08
0.20479	22.57	53.41	30.84
0.2719	19.55	51.06	31.51
0.31897	16.46	49.73	33.27

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L line:

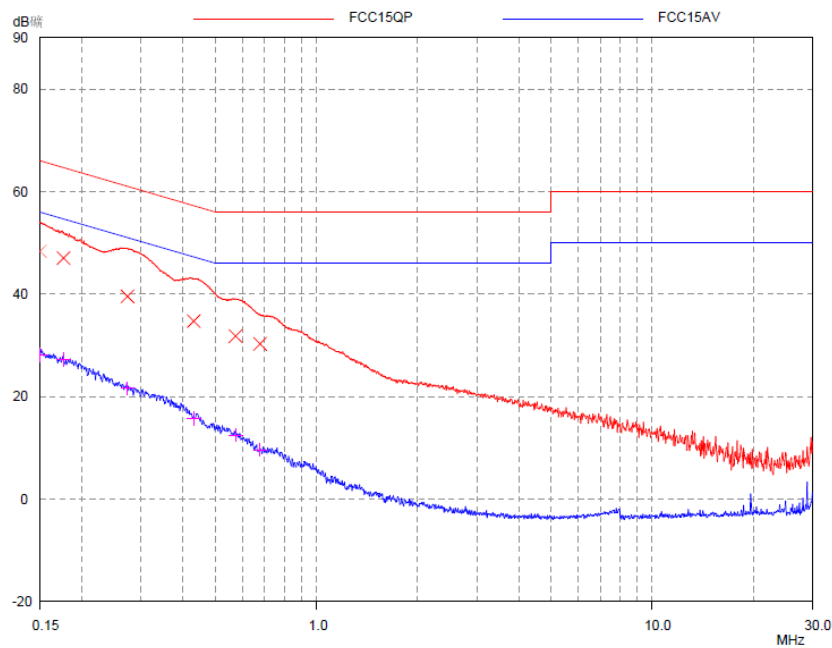


Final Measurement Results

Frequency MHz	QP Level dBm	QP Limit dBm	QP Delta dB
0.15	48.46	66.00	17.54
0.17809	48.29	64.57	16.28
0.18313	48.00	64.34	16.34
0.34687	38.52	59.04	20.52
0.5212	32.69	56.00	23.31
0.5446	32.85	56.00	23.15

Frequency MHz	AV Level dBm	AV Limit dBm	AV Delta dB
0.15	28.14	56.00	27.86
0.17809	27.70	54.57	26.87
0.18313	27.50	54.34	26.84
0.34687	19.72	49.04	29.32
0.5212	13.62	46.00	32.38
0.5446	13.47	46.00	32.53

N line:



Final Measurement Results

Frequency MHz	QP Level dBμV	QP Limit dBμV	QP Delta dB
0.15	48.38	66.00	17.62
0.17597	47.04	64.67	17.63
0.27299	39.57	61.03	21.46
0.43031	34.72	57.25	22.53
0.57361	31.82	56.00	24.18
0.67832	30.30	56.00	25.70

Frequency MHz	AV Level dBμV	AV Limit dBμV	AV Delta dB
0.15	28.19	56.00	27.81
0.17597	27.21	54.67	27.46
0.27299	21.62	51.03	29.41
0.43031	15.77	47.25	31.48
0.57361	12.51	46.00	33.49
0.67832	9.59	46.00	36.41

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

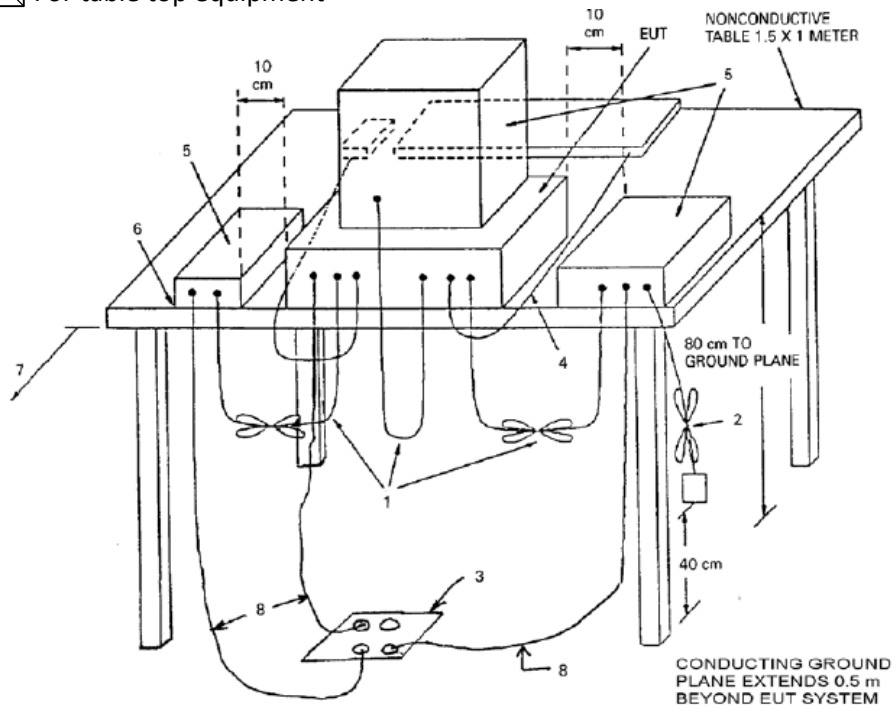
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 ~ 88	39
88 ~ 216	43.5
216 ~ 960	46.4
Above 960	49.5
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.1.2 Limits for radiated emission of class B device

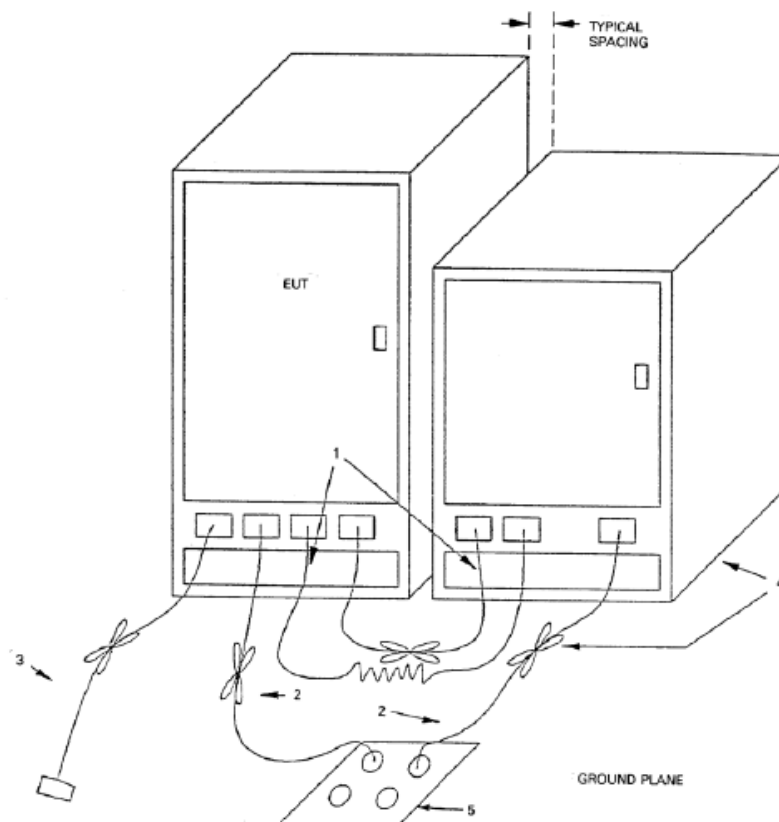
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 960	46.0
Above 960	54.0
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

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.

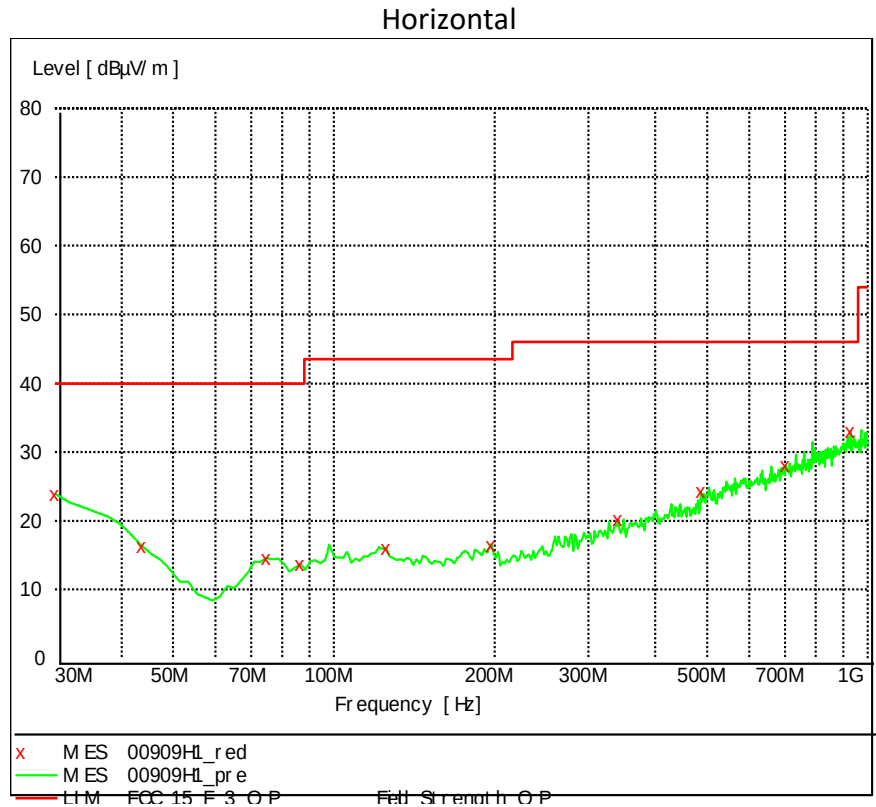
EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

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

The required measurement frequency range was checked.

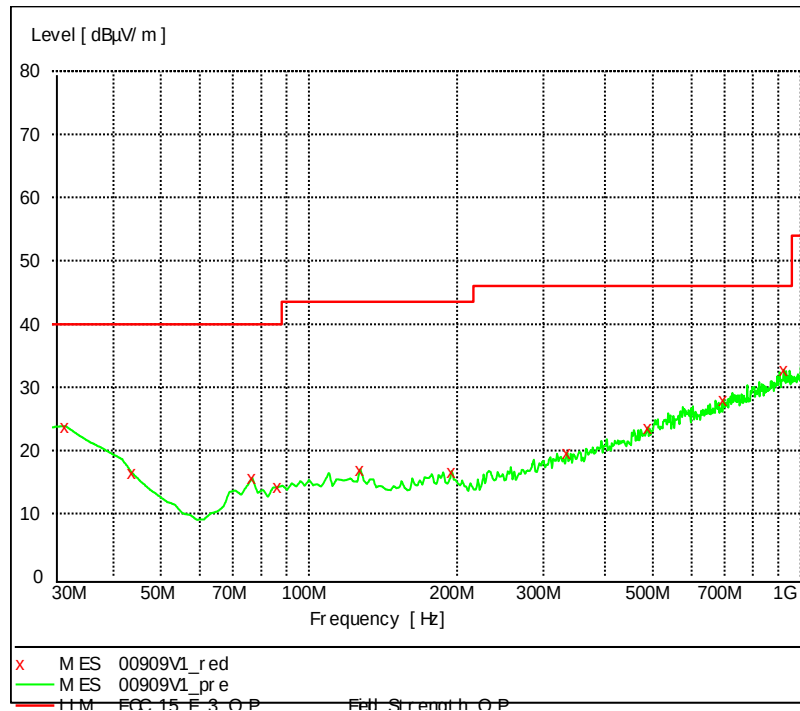
4.4 Test Protocol

Test Curve:
BP5178FLD



Frequency	Level	Transd	Limit	Margin
MHz	<u>dBuV/m</u>	<u>dB</u>	<u>dBuV/m</u>	dB
30.000000	23.90	21.3	40.0	16.1
43.607214	16.30	13.9	40.0	23.7
74.709419	14.60	9.5	40.0	25.4
86.372745	13.70	10.1	40.0	26.3
125.250501	16.00	11.7	43.5	27.5
197.174349	16.50	11.2	43.5	27.0
341.022044	20.30	15.8	46.0	25.7
486.813627	24.30	19.0	46.0	21.7
702.585170	28.10	22.4	46.0	17.9
930.020040	33.10	25.4	46.0	12.9

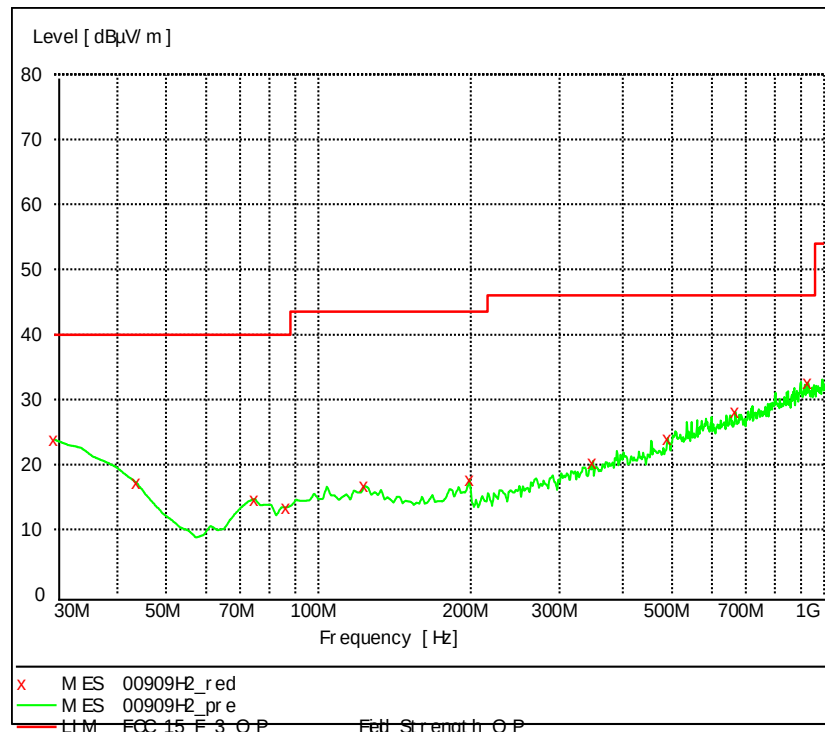
Vertical



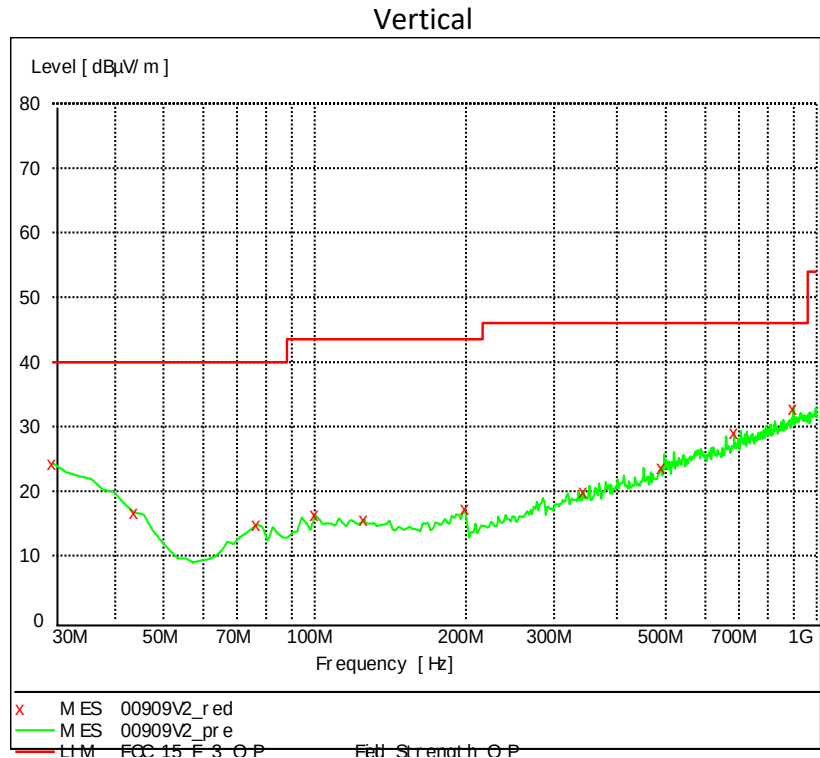
Frequency	Level	Transd	Limit	Margin
MHz	dBuV/m	dB	dBuV/m	dB
31.943888	23.80	20.4	40.0	16.2
43.607214	16.40	13.9	40.0	23.6
76.653307	15.60	9.7	40.0	24.4
86.372745	14.20	10.1	40.0	25.8
127.194389	17.00	11.6	43.5	26.5
195.230461	16.70	11.2	43.5	26.8
335.190381	19.70	15.7	46.0	26.3
488.757515	23.70	19.1	46.0	22.3
696.753507	28.00	22.3	46.0	18.0
926.132265	32.80	25.4	46.0	13.2

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Horizontal



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
30.000000	23.80	21.3	40.0	16.2
43.607214	17.20	13.9	40.0	22.8
74.709419	14.70	9.5	40.0	25.3
86.372745	13.40	10.1	40.0	26.6
123.306613	16.70	11.8	43.5	26.8
199.118236	17.80	11.2	43.5	25.7
348.797595	20.40	15.9	46.0	25.6
490.701403	24.00	19.3	46.0	22.0
667.595190	28.10	21.9	46.0	17.9
930.020040	32.60	25.4	46.0	13.4



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
30.000000	24.30	21.3	40.0	15.7
43.607214	16.70	13.9	40.0	23.3
76.653307	14.80	9.7	40.0	25.2
99.979960	16.40	11.1	43.5	27.1
125.250501	15.60	11.7	43.5	27.9
199.118236	17.30	11.2	43.5	26.2
342.965932	20.00	15.8	46.0	26.0
490.701403	23.70	19.3	46.0	22.3
685.090180	29.10	22.1	46.0	16.9
898.917836	32.80	25.2	46.0	13.2

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*****