IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK:
FCC Part 15 subpart B – EMC report

Model:
LED1927C3

REPORT NUMBER
191000594SHA-001

ISSUE DATE
October 22, 2019

DOCUMENT CONTROL NUMBER
TTRFFCCPART15b_V1
© 2018 Intertek

Intertek Testing Services Shanghai,
Building No.86, 1198 Qinzhou Road (North),
Caohejing Development Zone,
Shanghai 200233, China

Telephone: 86 21 6127 8200
www.intertek.com

Report no. 191000594SHA-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

PREPARED BY:	**REVIEWED BY:**
Star Guo	Andy Chen
Project Engineer	Reviewer

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.

Contents

REVISION HISTORY **4**

MEASUREMENT RESULT SUMMARY **5**

1 GENERAL INFORMATION **6**

1.1 DESCRIPTION OF EQUIPMENT UNDER TEST (EUT) 6
1.2 DESCRIPTION OF TEST FACILITY 7

2 TEST SPECIFICATIONS **8**

2.1 STANDARDS OR SPECIFICATION 8
2.2 MODE OF OPERATION DURING THE TEST 8
2.3 TEST SOFTWARE LIST 8
2.4 TEST PERIPHERALS LIST 8
2.5 RECORD OF CLIMATIC CONDITIONS 8
2.6 INSTRUMENT LIST 9
2.7 MEASUREMENT UNCERTAINTY 10

3 CONDUCTED EMISSION **11**

3.1 LIMITS 11
3.1.1 Limits for conducted emission of class A device 11
3.1.2 Limits for conducted emission of class B device 11
3.2 TEST SETUP 12
3.3 TEST SETUP AND TEST PROCEDURE 13
3.4 TEST PROTOCOL 14

4 RADIATED EMISSION **16**

4.1 RADIATED EMISSION LIMITS 16
4.1.1 Limits for radiated emission of class A device 16
4.1.2 Limits for radiated emission of class B device 16
4.2 BLOCK DIAGRAM AND TEST SET UP 17
4.3 TEST SETUP AND TEST PROCEDURE 18
4.4 TEST PROTOCOL 19

Revision History

Report No.	Version	Description	Issued Date
191000594SHA-001	Rev. 01	Initial issue of report	October 22, 2019

Measurement result summary

TEST ITEM	FCC REFERANCE	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	:	LED1927C3
Description of EUT	:	We tested it, and listed the worst data.
Rating	:	AC 120V, 60Hz, 2.4W, 24mA, with E12 lamp cap
Brand name	:	IKEA
Category of EUT	:	Class B
EUT type	:	☒ Table top ☐ Floor standing
Sample received date	:	October 11, 2019
Sample identification No.	:	0191011-12
Date of test	:	October 11, 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 recognized, certified, or accredited by these organizations	:	CNAS Accreditation Lab Registration No. CNAS L0139 FCC Accredited Lab 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) (±)
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

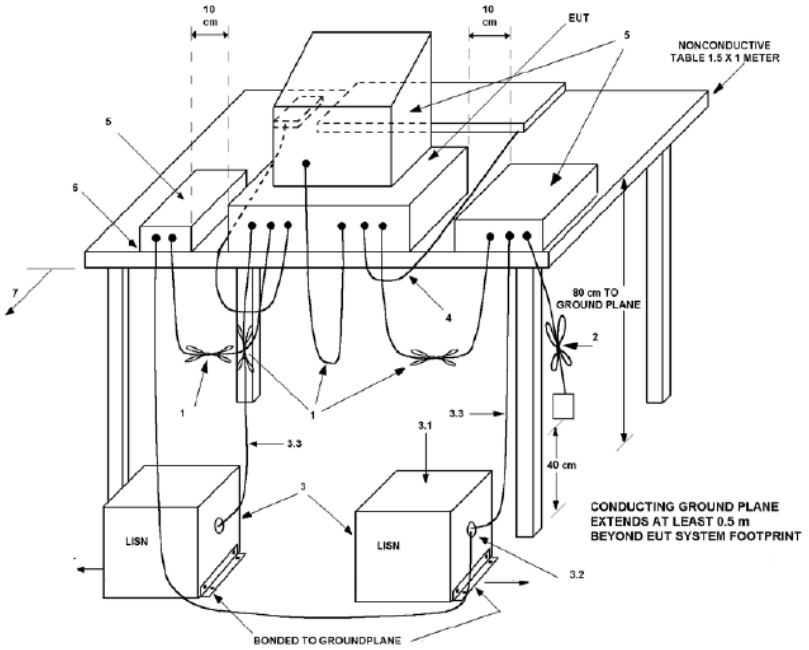
Frequency range (MHz)	Limits dB(μV) Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the receiver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

3.1.2 Limits for conducted emission of class B device

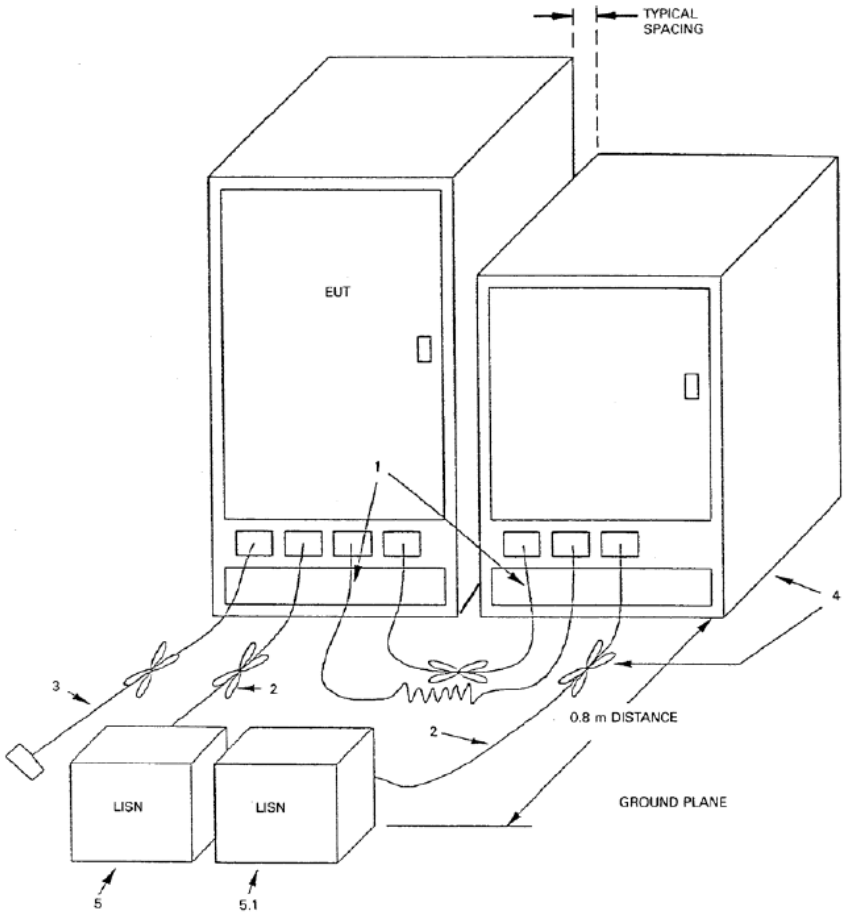
Frequency range (MHz)	Limits dB(μV) Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when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

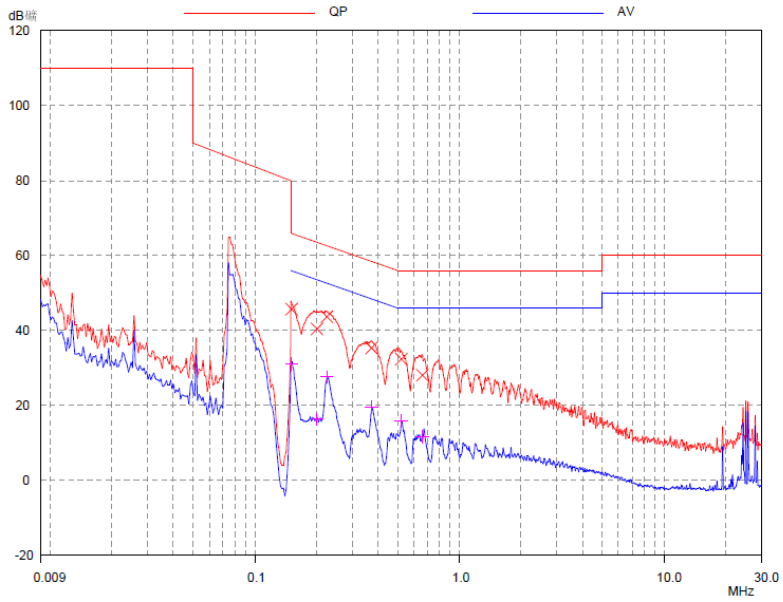


3.3 Test Setup and Test Procedure

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

L line:

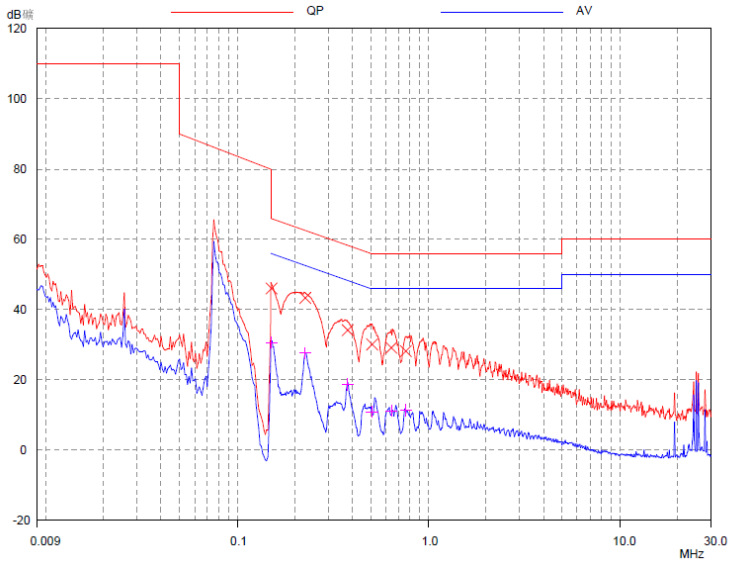


Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0.1512	45.71	65.93	20.22
0.20143	40.45	63.55	23.10
0.2252	43.69	62.62	18.93
0.37204	35.37	58.46	23.09
0.51991	32.39	56.00	23.61
0.66031	28.07	56.00	27.93

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB
0.1512	31.06	55.93	24.87
0.20143	16.38	53.55	37.17
0.2252	27.61	52.62	25.01
0.37204	19.58	48.46	28.88
0.51991	15.98	46.00	30.02
0.66031	11.63	46.00	34.37

N line:



Final Measurement Results

Frequency MHz	QP Level dBµV	QP Limit dBµV	QP Delta dB
0.1512	46.05	65.93	19.88
0.227	43.35	62.56	19.21
0.37801	34.15	58.32	24.17
0.50763	30.11	56.00	25.89
0.63959	29.17	56.00	26.83
0.76214	28.17	56.00	27.83

Frequency MHz	AV Level dBµV	AV Limit dBµV	AV Delta dB
0.1512	30.68	55.93	25.25
0.227	27.61	52.56	24.95
0.37801	18.70	48.32	29.62
0.50763	10.94	46.00	35.06
0.63959	11.25	46.00	34.75
0.76214	11.33	46.00	34.67

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

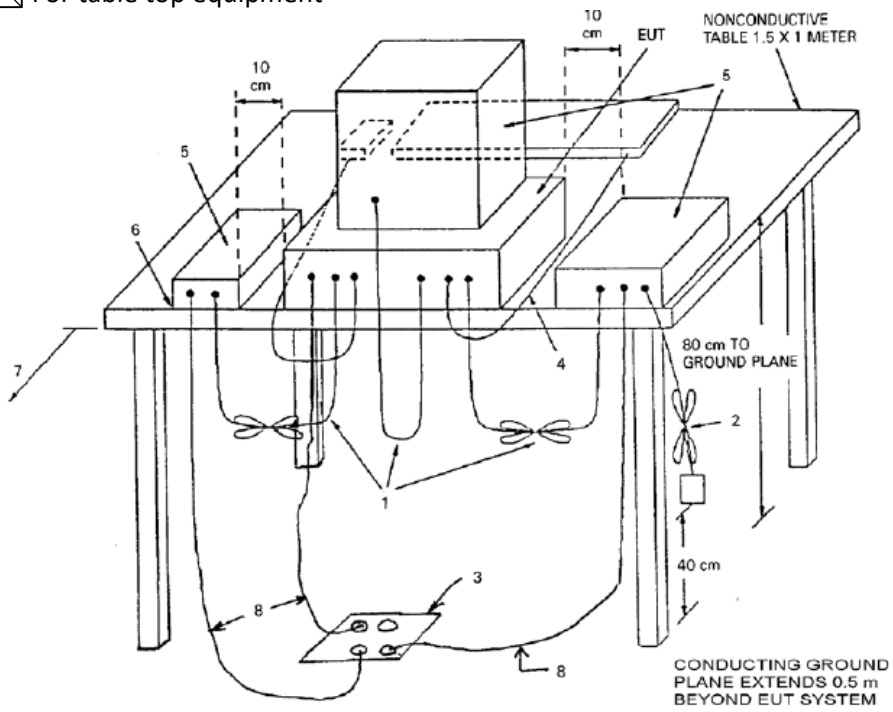
Frequency (MHz)	Permitted limit in dBμV/m (Quasi-peak) of Measurement Distance 10m
30 ~ 88	39
88 ~ 216	43.5
216 ~ 960	46.4
Above 960	49.5
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.1.2 Limits for radiated emission of class B device

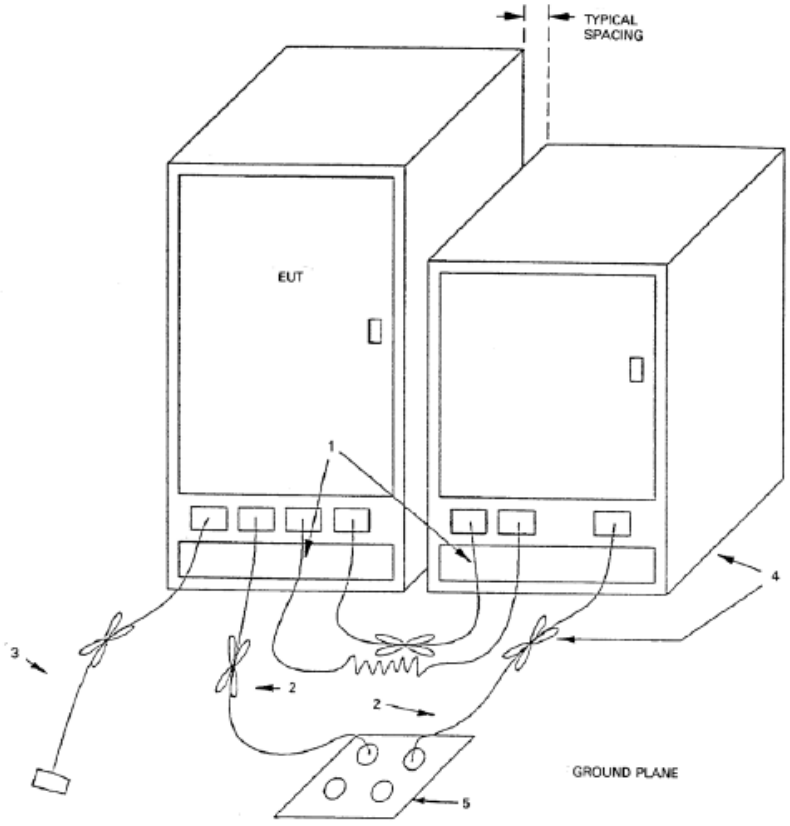
Frequency (MHz)	Permitted limit in dBμV/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 960	46.0
Above 960	54.0
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.2 Block diagram and test set up

☒ For table top equipment



☐ For floor standing equipment



4.3 Test Setup and Test Procedure

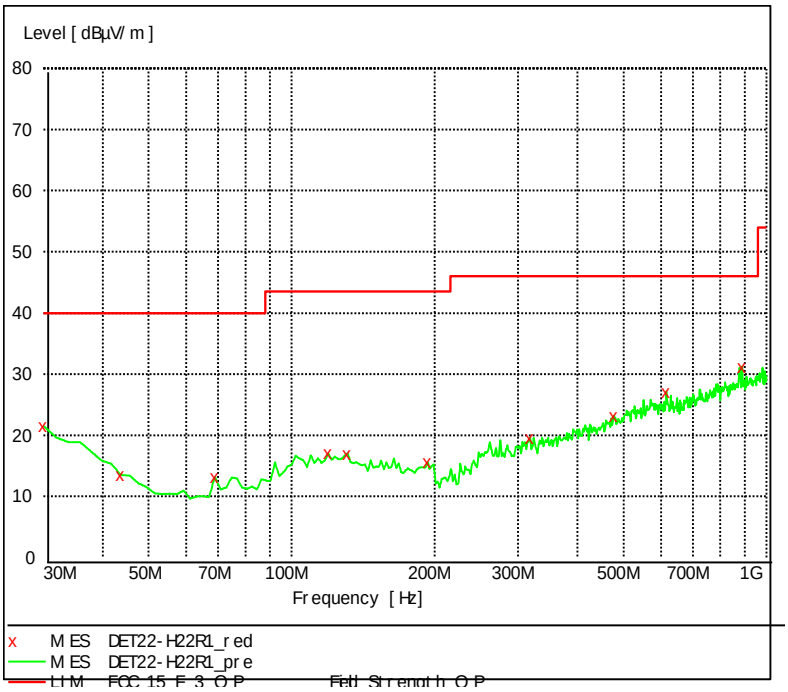
The measurement was performed in a semi-anechoic chamber.

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

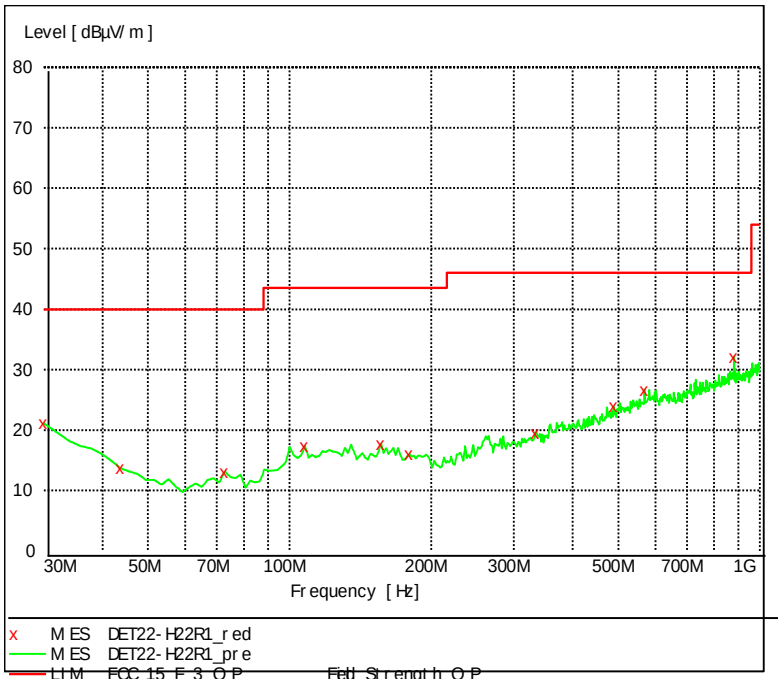
Test Curve:

Horizontal



Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB
30.000000	21.50	18.8	40.0	18.5
43.607214	13.50	11.7	40.0	26.5
68.877756	13.20	7.4	40.0	26.8
119.418838	17.10	13.3	43.5	26.4
131.082164	17.00	12.9	43.5	26.5
193.286573	15.60	10.9	43.5	27.9
317.695391	19.60	15.5	46.0	26.4
477.094188	23.20	19.3	46.0	22.8
615.110220	27.10	21.0	46.0	18.9
889.198397	31.20	23.6	46.0	14.8

Vertical



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
30.000000	21.10	18.8	40.0	18.9
43.607214	13.70	11.7	40.0	26.3
72.765531	13.10	7.5	40.0	26.9
107.755511	17.40	12.6	43.5	26.1
156.352705	17.80	11.5	43.5	25.7
179.679359	16.00	10.6	43.5	27.5
333.246493	19.60	16.0	46.0	26.4
488.757515	24.00	19.5	46.0	22.0
568.456914	26.70	20.5	46.0	19.3
881.422846	32.20	23.6	46.0	13.8

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*****