

IKEA of Sweden AB
TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

T1827 LEPTITER

REPORT NUMBER

200402183SHA-001

ISSUE DATE

June 23, 2020

DOCUMENT CONTROL NUMBER

TTRFFCCPART15b_V1

© 2018 Intertek



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 (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:

REVIEWED BY:

Star Guo
Project Engineer

Andy Chen
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 <i>Limits for conducted emission of class A device</i> | 11 |
| 3.1.2 <i>Limits for conducted emission of class B device</i> | 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 <i>Limits for radiated emission of class A device</i> | 16 |
| 4.1.2 <i>Limits for radiated emission of class B device</i> | 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 |
|------------------|---------|-------------------------|---------------|
| 200402183SHA-001 | Rev. 01 | Initial issue of report | June 23, 2020 |
| | | | |
| | | | |

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 : LED Retrofit Downlight
Type/Model : T1827 LEPTITER
Description of EUT : We tested it, and listed the worst data.
Rating : 120Vac, 60Hz, 9.5W
Brand name : IKEA
Category of EUT : Class B
EUT type : Table top
 Floor standing
Sample received date : April 2, 2020
Sample identification No. : 0200402-15
Date of test : April 2, 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 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 (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 / Disturbance Power / Tri-loop Test / CDN method | | | | | |
|---|-----------------------|-------------------|-----------------|--------------|------------|
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| <input checked="" type="checkbox"/> | Test Receiver | R&S | ESCS 30 | EC 2107 | 2020-07-15 |
| <input checked="" type="checkbox"/> | A.M.N. | R&S | ESH2-Z5 | EC 3119 | 2020-11-29 |
| <input checked="" type="checkbox"/> | Shielded room | Zhongyu | - | EC 2838 | 2021-01-13 |
| Radiated Emission | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| <input checked="" type="checkbox"/> | Test Receiver | R&S | ESIB 26 | EC 3045 | 2020-09-12 |
| <input checked="" type="checkbox"/> | Bilog Antenna | TESEQ | CBL 6112D | EC 4206 | 2021-06-10 |
| <input checked="" type="checkbox"/> | Semi-anechoic chamber | Albatross project | - | EC 3048 | 2020-07-31 |
| Additional instrument | | | | | |
| Used | Equipment | Manufacturer | Type | Internal no. | Due date |
| <input checked="" type="checkbox"/> | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 3326 | 2021-03-28 |
| <input checked="" type="checkbox"/> | Therom-Hygrograph | ZJ1-2A | S.M.I.F. | EC 3783 | 2021-02-28 |
| <input checked="" type="checkbox"/> | 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.

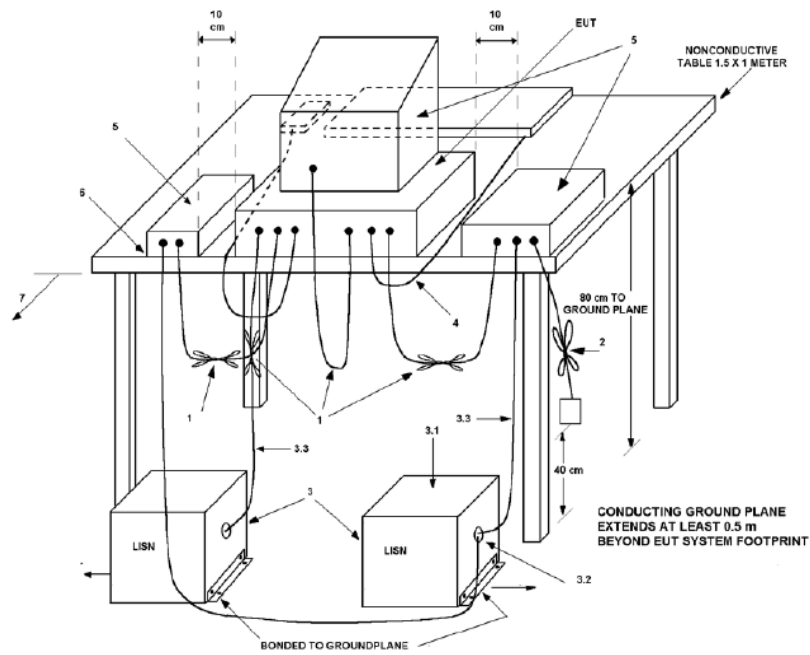
3.1.2 Limits for conducted emission of class B device

| 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 |

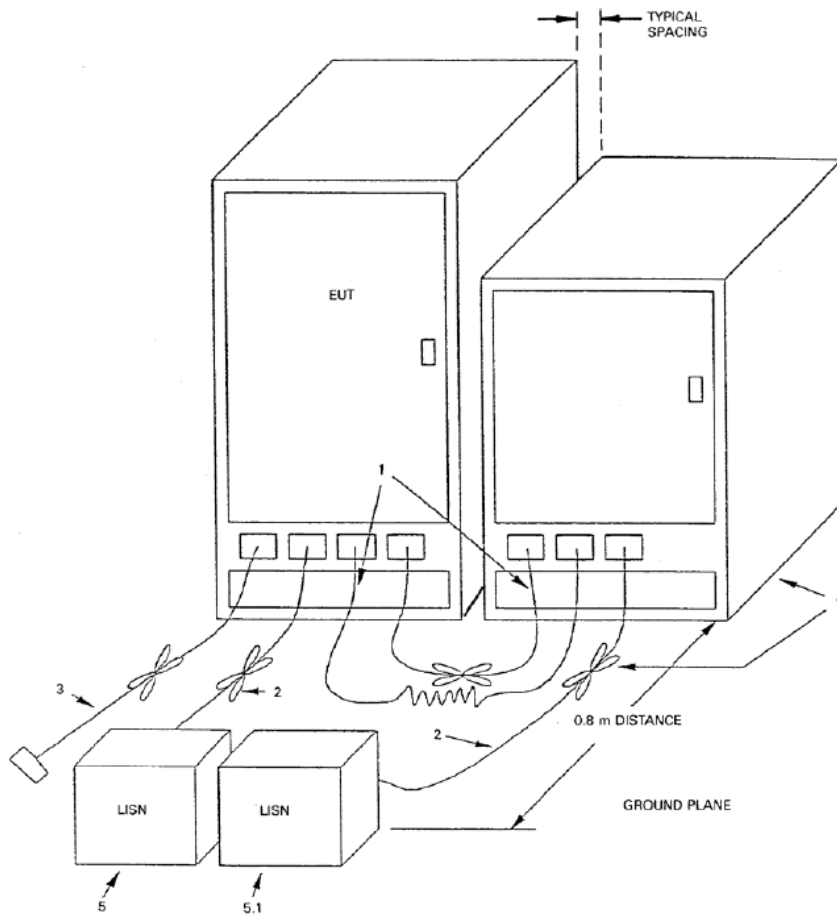
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the 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.

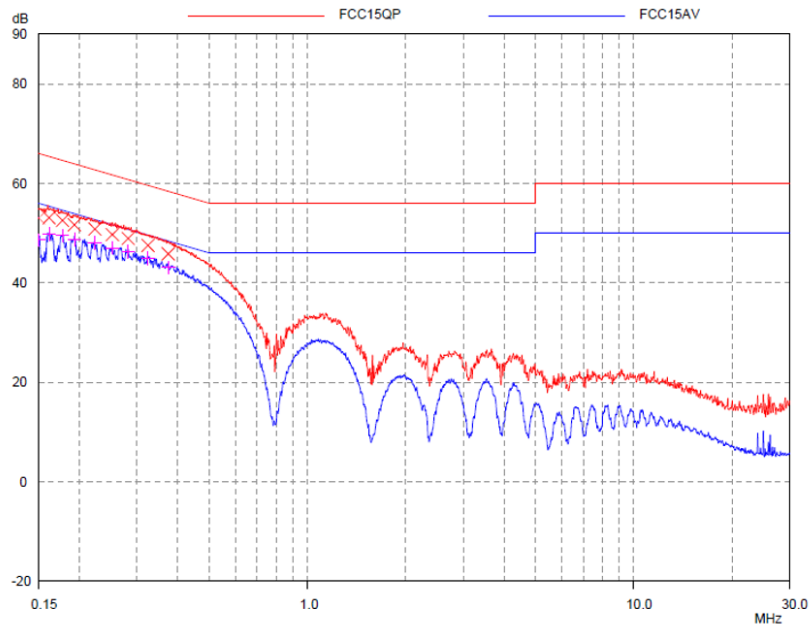
Detailed test procedure was following clause 7.3 of ANSI 63.4.

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:

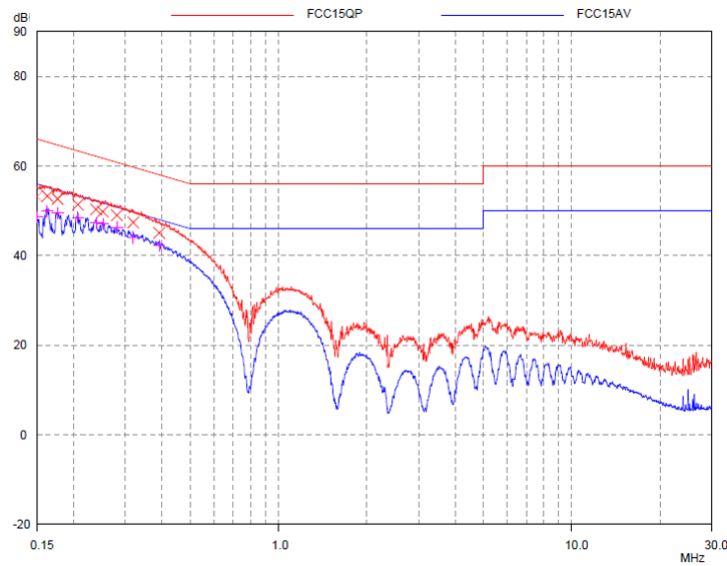


Final Measurement Results

| Frequency MHz | QP Level dB | QP Limit dB | QP Delta dB |
|------------------|----------------|----------------|----------------|
| 0.15 | 53.03 | 66.00 | 12.97 |
| 0.16117 | 53.10 | 65.40 | 12.30 |
| 0.17738 | 52.55 | 64.61 | 12.06 |
| 0.19289 | 51.69 | 63.91 | 12.22 |
| 0.2227 | 50.82 | 62.72 | 11.90 |
| 0.25204 | 49.70 | 61.69 | 11.99 |
| 0.28184 | 48.93 | 60.76 | 11.83 |
| 0.32411 | 47.55 | 59.60 | 12.05 |
| 0.3742 | 45.84 | 58.41 | 12.57 |

| Frequency MHz | AV Level dB | AV Limit dB | AV Delta dB |
|------------------|----------------|----------------|----------------|
| 0.15 | 48.60 | 56.00 | 7.40 |
| 0.16117 | 49.78 | 55.40 | 5.62 |
| 0.17738 | 49.54 | 54.61 | 5.07 |
| 0.19289 | 48.76 | 53.91 | 5.15 |
| 0.2227 | 48.06 | 52.72 | 4.66 |
| 0.25204 | 47.04 | 51.69 | 4.65 |
| 0.28184 | 46.30 | 50.76 | 4.46 |
| 0.32411 | 44.94 | 49.60 | 4.66 |
| 0.3742 | 43.13 | 48.41 | 5.28 |

N line:



Final Measurement Results

| Frequency MHz | QP Level dB | QP Limit dB | QP Delta dB |
|---------------|-------------|-------------|-------------|
| 0.15 | 53.15 | 66.00 | 12.85 |
| 0.16246 | 53.32 | 65.34 | 12.02 |
| 0.17597 | 52.67 | 64.67 | 12.00 |
| 0.20643 | 51.40 | 63.35 | 11.95 |
| 0.23834 | 50.32 | 62.15 | 11.83 |
| 0.25102 | 49.83 | 61.72 | 11.89 |
| 0.28072 | 48.99 | 60.79 | 11.80 |
| 0.31897 | 47.41 | 59.73 | 12.32 |
| 0.391 | 45.07 | 58.04 | 12.97 |

| Frequency MHz | AV Level dB | AV Limit dB | AV Delta dB |
|---------------|-------------|-------------|-------------|
| 0.15 | 48.60 | 56.00 | 7.40 |
| 0.16246 | 49.95 | 55.34 | 5.39 |
| 0.17597 | 49.48 | 54.67 | 5.19 |
| 0.20643 | 48.55 | 53.35 | 4.80 |
| 0.23834 | 47.29 | 52.15 | 4.86 |
| 0.25102 | 47.12 | 51.72 | 4.60 |
| 0.28072 | 46.26 | 50.79 | 4.53 |
| 0.31897 | 44.08 | 49.73 | 5.65 |
| 0.391 | 42.25 | 48.04 | 5.79 |

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.

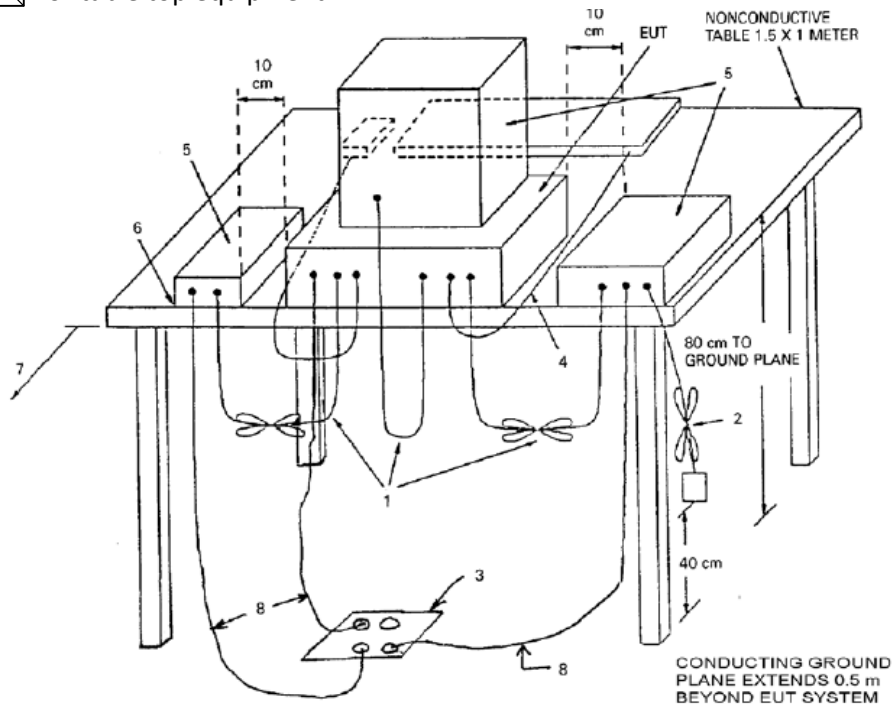
4.1.2 Limits for radiated emission of class B device

| 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 |

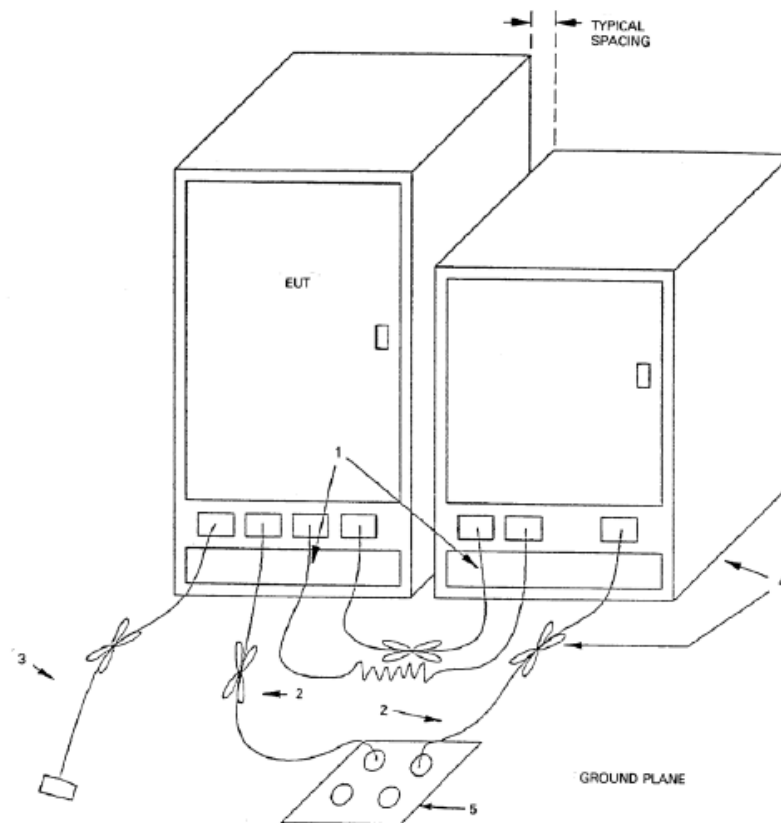
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

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.

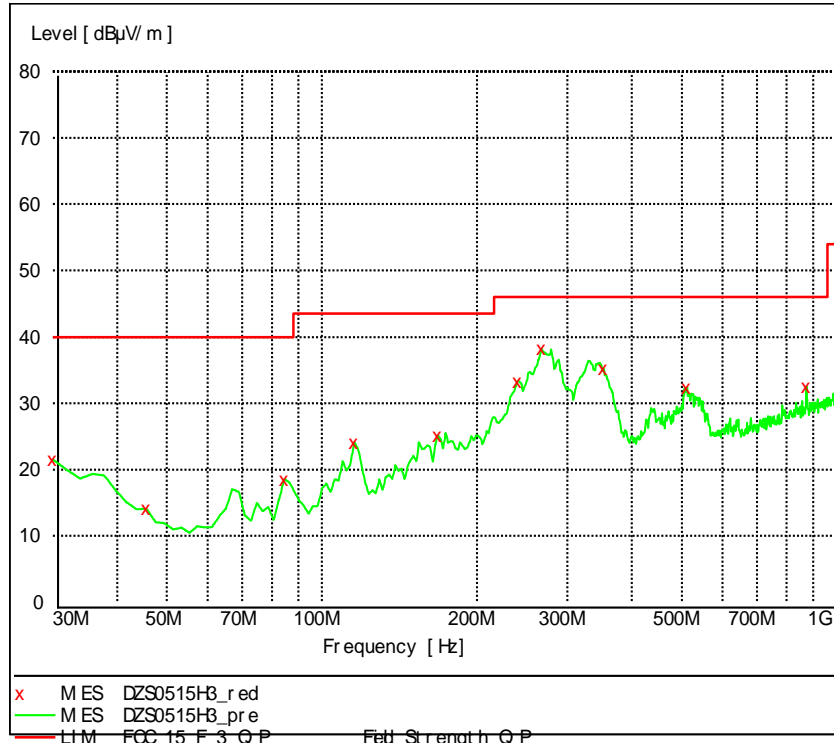
The bandwidth setting on R&S Test Receiver was 120 kHz.

The required measurement frequency range was checked.

4.4 Test Protocol

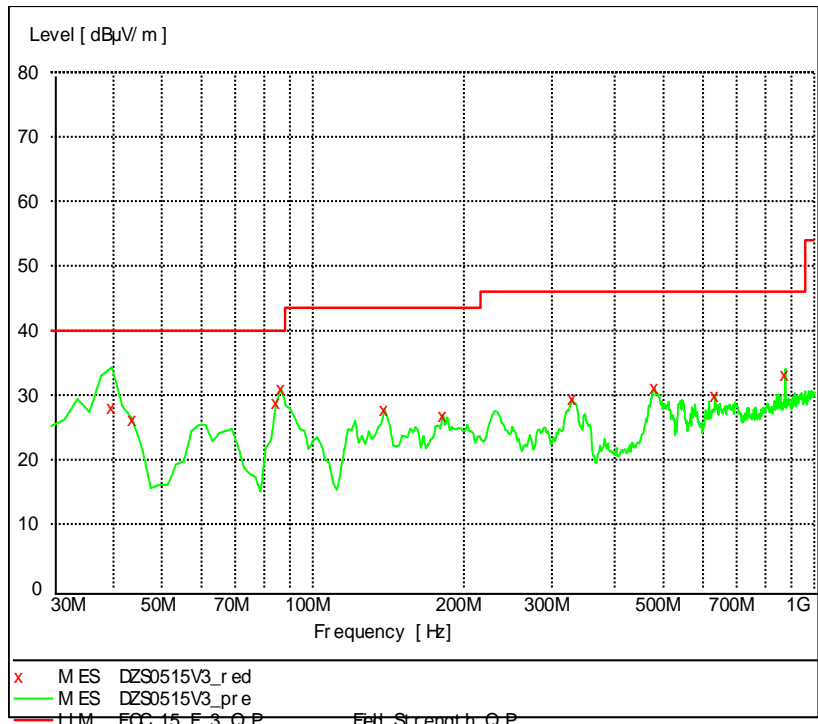
Test Curve:

Horizontal



| Frequency MHz | Level dBuV/m | Transd dB | Limit dBuV/m | Margin dB |
|------------------|-----------------|--------------|-----------------|--------------|
| 30.000000 | 21.50 | 18.8 | 40.0 | 18.5 |
| 45.551102 | 14.10 | 10.7 | 40.0 | 25.9 |
| 84.428858 | 18.50 | 8.8 | 40.0 | 21.5 |
| 115.531062 | 24.10 | 13.1 | 43.5 | 19.4 |
| 168.016032 | 25.10 | 11.0 | 43.5 | 18.4 |
| 239.939880 | 33.30 | 13.0 | 46.0 | 12.7 |
| 267.154309 | 38.20 | 15.1 | 46.0 | 7.8 |
| 352.685371 | 35.20 | 16.5 | 46.0 | 10.8 |
| 512.084168 | 32.30 | 19.8 | 46.0 | 13.7 |
| 873.647295 | 32.50 | 23.5 | 46.0 | 13.5 |

Vertical



| Frequency MHz | Level dBuV/m | Transd dB | Limit dBuV/m | Margin dB |
|------------------|-----------------|--------------|-----------------|--------------|
| 39.719439 | 28.00 | 13.6 | 40.0 | 12.0 |
| 43.607214 | 26.20 | 11.7 | 40.0 | 13.8 |
| 84.428858 | 28.80 | 8.8 | 40.0 | 11.2 |
| 86.372745 | 31.00 | 9.3 | 40.0 | 9.0 |
| 138.857715 | 27.80 | 12.6 | 43.5 | 15.7 |
| 181.623246 | 26.90 | 10.7 | 43.5 | 16.6 |
| 329.358717 | 29.50 | 15.8 | 46.0 | 16.5 |
| 480.981964 | 31.10 | 19.3 | 46.0 | 14.9 |
| 634.549098 | 30.00 | 21.2 | 46.0 | 16.0 |
| 875.591182 | 33.20 | 23.5 | 46.0 | 12.8 |

Test data:

1G - 18G:

| Polarization | Frequency (MHz) | Emission level (dBuV/m) | Limits (dBuV/m) | Margin (dBuV/m) |
|--------------|-----------------|-------------------------|-----------------|-----------------|
| Horizontal | 1390.78 | 39.0 | 74.0 | 35.0 |
| | 3991.98 | 49.0 | 74.0 | 25.0 |
| | 4803.60 | 51.5 | 74.0 | 22.5 |
| | 5434.86 | 44.7 | 74.0 | 29.3 |
| | 6697.39 | 47.2 | 74.0 | 26.8 |
| | 7839.67 | 45.9 | 74.0 | 28.1 |
| | 10454.90 | 47.5 | 74.0 | 26.5 |
| | 11987.97 | 47.7 | 74.0 | 26.3 |
| | 14362.72 | 48.8 | 74.0 | 25.2 |
| Vertical | 16436.87 | 53.0 | 74.0 | 21.0 |
| | 1803.60 | 47.7 | 74.0 | 26.3 |
| | 2434.86 | 44.9 | 74.0 | 29.1 |
| | 6727.45 | 47.4 | 74.0 | 26.6 |
| | 8561.12 | 46.1 | 74.0 | 27.9 |
| | 9613.22 | 49.5 | 74.0 | 24.5 |
| | 10785.57 | 48.5 | 74.0 | 25.5 |
| | 14362.72 | 49.9 | 74.0 | 24.1 |
| 17669.33 | 52.6 | 74.0 | 21.4 | |

Note: * means the emission level is 20dB or more lower than the relevant limit.

- 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*****