

IKEA of Sweden AB

TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

LED1936G5, LED1937T5

REPORT NUMBER

200300140SHA-001

ISSUE DATE

May 20, 2020

DOCUMENT CONTROL NUMBER

TTRFFCCPART15b_V1

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Applicant : **IKEA of Sweden AB**
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Manufacturer : **Same as applicant**

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

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Project Engineer

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Reviewer

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Revision History

Report No.	Version	Description	Issued Date
200300140SHA-001	Rev. 01	Initial issue of report	May 20, 2020

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 : LED1936G5, LED1937T5
Description of EUT : All models have the same constructions, the only difference is shape of glass bulb.
We tested LED1937T5, and listed the worst data.
Rating : 120V~, 60Hz, 5W, 55mA, with E26 lamp cap
Brand name : IKEA
Category of EUT : Class B
EUT type : ☒ Table top
☐ Floor standing
Sample received date : March 3, 2020
Sample identification No. : 0200224-27
Date of test : March 3, 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 / 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	2020-11-29
☒	Shielded room	Zhongyu	-	EC 2838	2021-01-13
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	2021-03-28
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3783	2021-02-28
☒	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

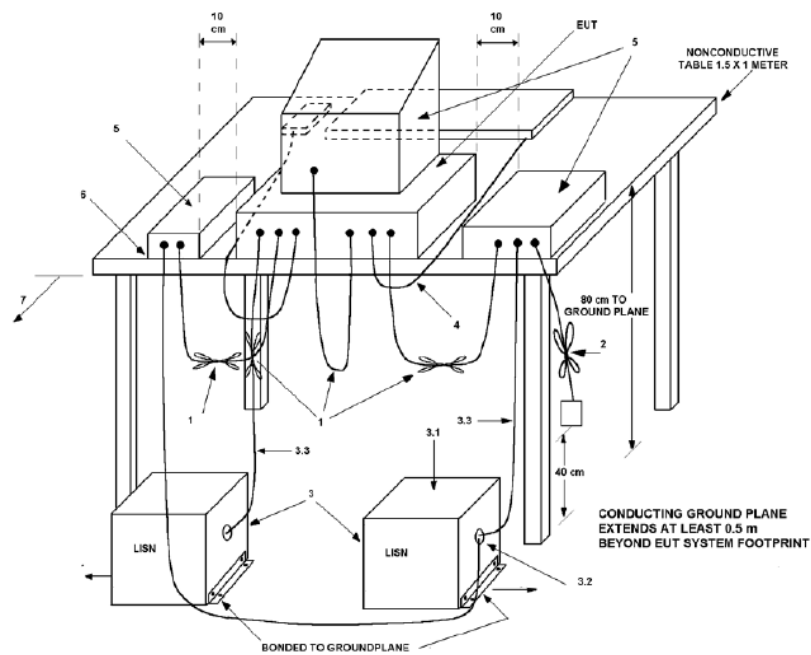
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60
Note: If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the measurement using the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

3.1.2 Limits for conducted emission of class B device

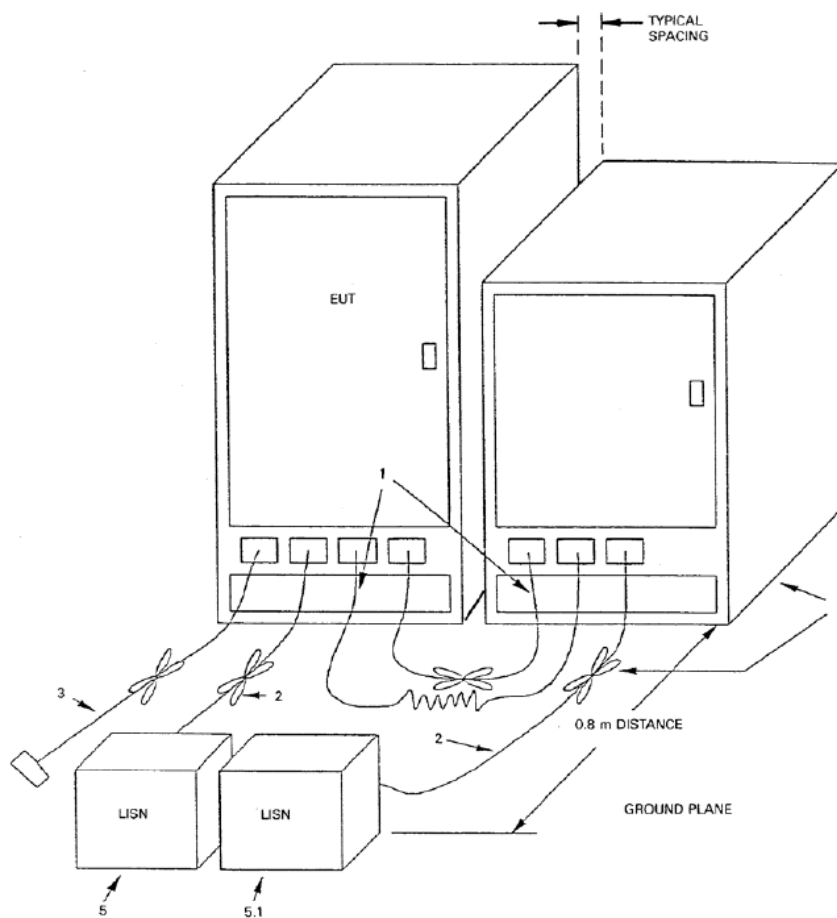
Frequency range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66 ~ 56 *	56 ~ 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz 2. If the limit for the measurement with the average detector is met when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

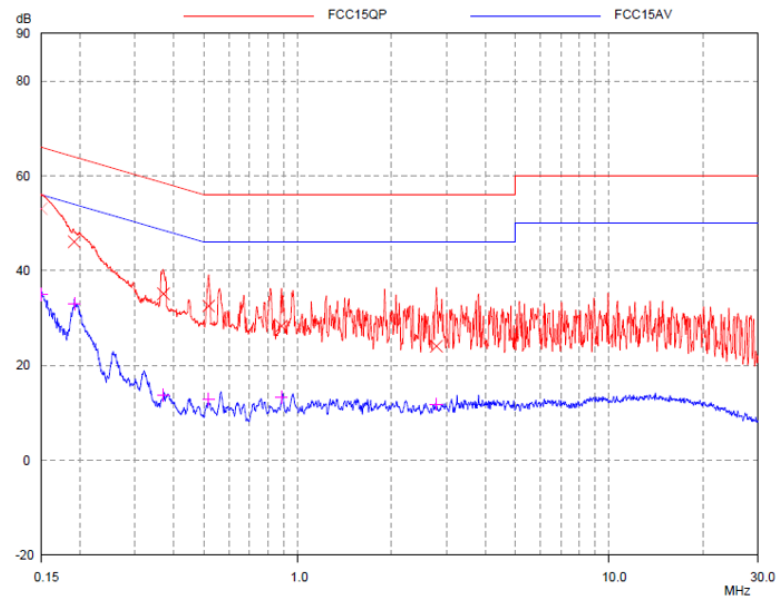
Detailed test procedure was following clause 7.3 of ANSI 63.4.

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

L line:

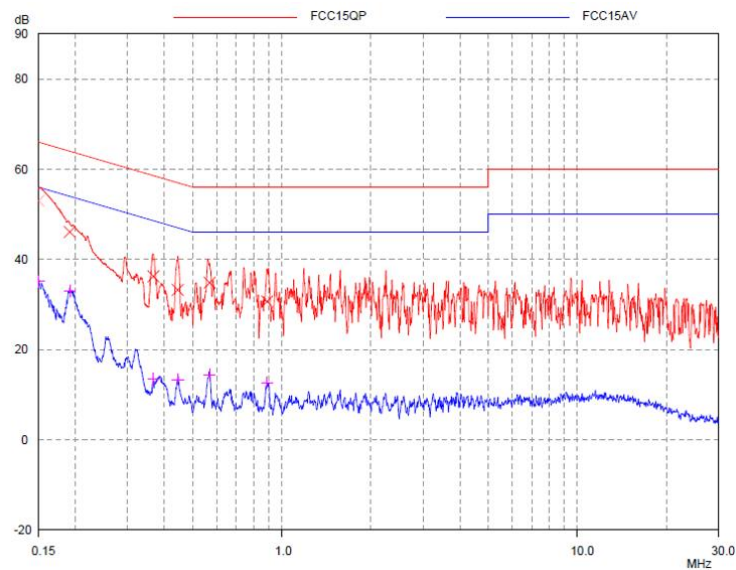


Final Measurement Results

Frequency MHz	QP Level dB	QP Limit dB	QP Delta dB
0.15	53.06	66.00	12.94
0.19135	46.09	63.98	17.89
0.36975	35.11	58.51	23.40
0.51705	32.55	56.00	23.45
0.88632	28.31	56.00	27.69
2.7872	24.06	56.00	31.94

Frequency MHz	AV Level dB	AV Limit dB	AV Delta dB
0.15	35.02	56.00	20.98
0.19135	33.06	53.98	20.92
0.36975	13.74	48.51	34.77
0.51705	12.85	46.00	33.15
0.88632	13.34	46.00	32.66
2.7872	11.83	46.00	34.17

N line:



Final Measurement Results

Frequency MHz	QP Level dB	QP Limit dB	QP Delta dB
0.15	53.00	66.00	13.00
0.19135	46.09	63.98	17.89
0.36681	36.26	58.57	22.31
0.44428	33.26	56.98	23.72
0.56905	34.84	56.00	21.16
0.88987	30.65	56.00	25.35

Frequency MHz	AV Level dB	AV Limit dB	AV Delta dB
0.15	35.10	56.00	20.90
0.19135	33.00	53.98	20.98
0.36681	13.57	48.57	35.00
0.44428	13.37	46.98	33.61
0.56905	14.38	46.00	31.62
0.88987	12.69	46.00	33.31

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

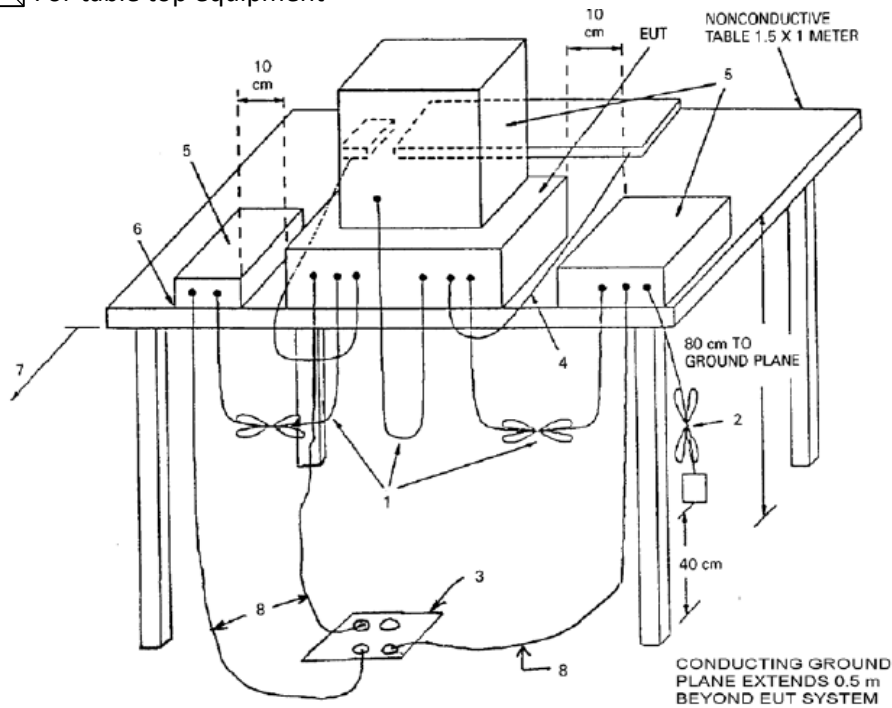
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 10m
30 ~ 88	39
88 ~ 216	43.5
216 ~ 960	46.4
Above 960	49.5
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

4.1.2 Limits for radiated emission of class B device

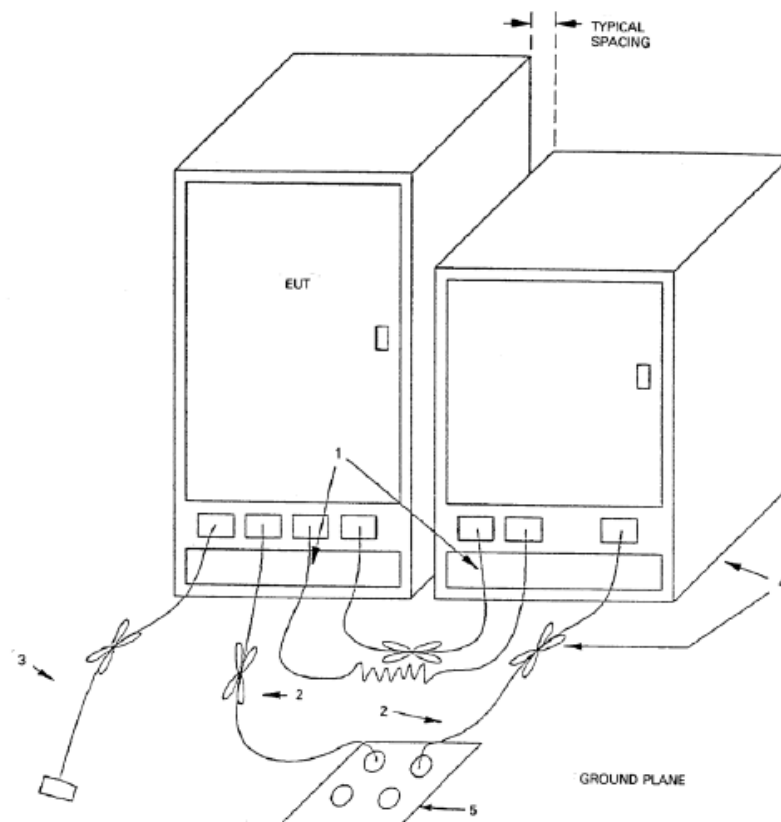
Frequency (MHz)	Permitted limit in dB μ V/m (Quasi-peak) of Measurement Distance 3m
30 ~ 88	40.0
88 ~ 216	43.5
216 ~ 960	46.0
Above 960	54.0
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.	

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.

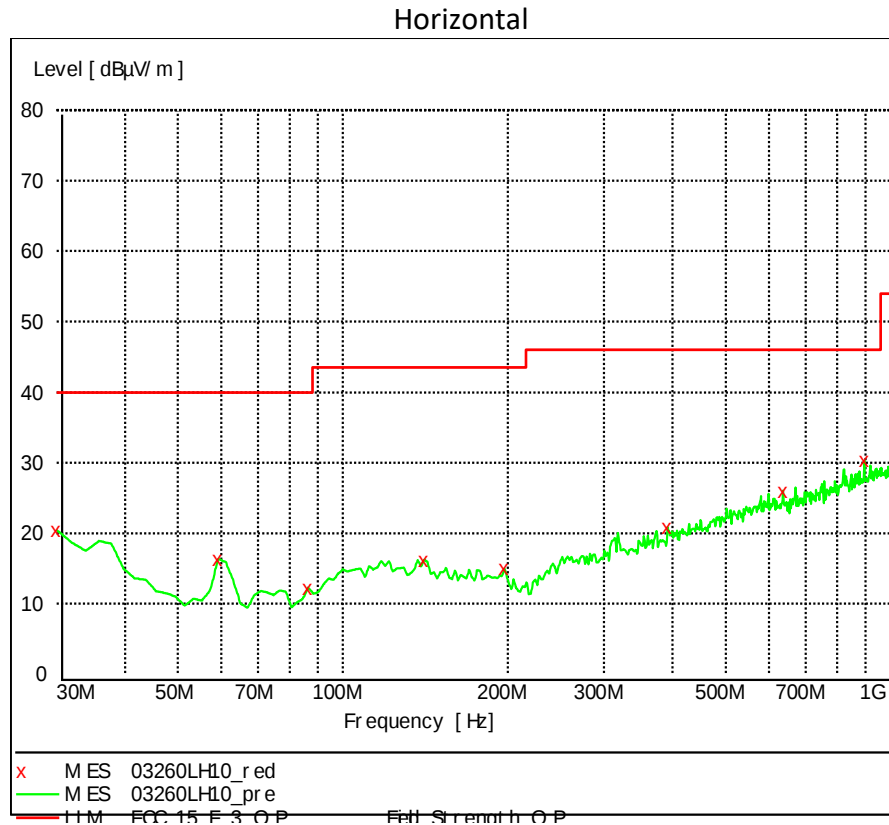
EUT arrangement and operate condition were according to clause 6 and clause 8 of ANSI 63.4.

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

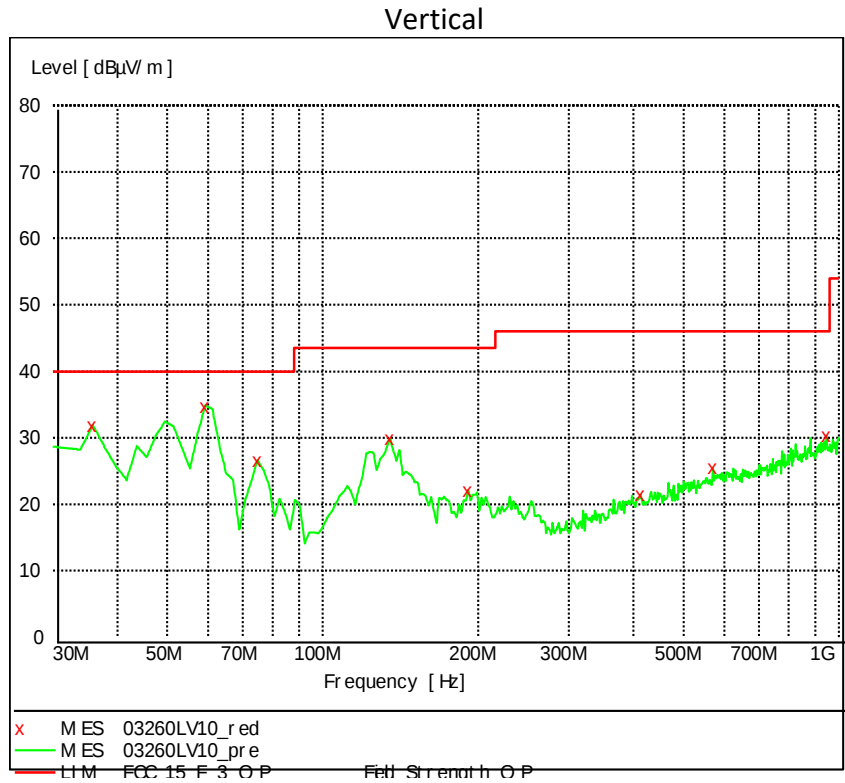
The required measurement frequency range was checked.

4.4 Test Protocol

Test Curve:



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
30.000000	20.50	18.8	40.0	19.5
59.158317	16.30	7.2	40.0	23.7
86.372745	12.30	9.3	40.0	27.7
140.801603	16.20	12.5	43.5	27.3
197.174349	15.00	11.0	43.5	28.5
391.563126	20.90	17.5	46.0	25.1
636.492986	26.00	21.2	46.0	20.0
896.973948	30.30	23.7	46.0	15.7



Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB
35.831663	31.90	15.5	40.0	8.1
59.158317	34.80	7.2	40.0	5.2
74.709419	26.60	7.6	40.0	13.4
134.969940	29.90	12.8	43.5	13.6
191.342685	22.10	10.9	43.5	21.4
412.945892	21.50	18.0	46.0	24.5
570.400802	25.50	20.6	46.0	20.5
947.515030	30.30	24.2	46.0	15.7

Test data:

1G - 18G:

Polarization	Frequency (MHz)	Emission level (dBuV/m)	Limits (dBuV/m)	Margin (dBuV/m)
Horizontal	1450.90	38.7	74.0	35.3
	4112.22	43.6	74.0	30.4
	4953.90	52.0	74.0	22.0
	5464.92	44.8	74.0	29.2
	6727.45	47.1	74.0	26.9
	8110.22	45.5	74.0	28.5
	9913.82	48.8	74.0	25.2
	12559.11	47.8	74.0	26.2
	14362.72	48.8	74.0	25.2
	17669.33	54.4	74.0	19.6
Vertical	1953.90	51.8	74.0	22.2
	5434.86	44.7	74.0	29.3
	6727.45	47.1	74.0	26.9
	8501.01	46.1	74.0	27.9
	9913.82	47.8	74.0	26.2
	12529.05	48.2	74.0	25.8
	14392.78	49.3	74.0	24.7
	17699.39	53.5	74.0	20.5

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*****