

IKEA of Sweden AB

EMC TEST REPORT

SCOPE OF WORK:

FCC Part 15 subpart B – EMC report

Model:

E2109 Obegränsad

REPORT NUMBER

211102930SHA-001

ISSUE DATE

July 1, 2022

DOCUMENT CONTROL NUMBER

TTRFFCCPART15b_V1

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

Manufacturer : IKEA of Sweden AB
Box 702, 343 81 Älmhult, SWEDEN

FCC ID : FHO-E2109

Summary

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

47CFR Part 15 (2020): 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:



Sky Yang
Project Engineer

REVIEWED BY:



Erick Liu
Reviewer

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Revision History

Report No.	Version	Description	Issued Date
211102930SHA-001	Rev. 01	Initial issue of report	July 1, 2022

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 : Clock
Type/Model : E2109 Obegränsad
Description of EUT : EUT is a clock, it has only one model.
Rating : 5V DC, 1A / 3x(AAA)battery
Brand name : IKEA
Category of EUT : Class B
EUT type : Table top
 Floor standing
Sample received date : December 06, 2021
Date of test : December 07, 2021 ~ December 24, 2021

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: CN0175

- 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 (2020): 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
1	Adapter	Huawei, HW-059200CHQ	-

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
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESCS 30	EC 2107	2022-07-15
<input checked="" type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	EC 3119	2022-12-07
<input type="checkbox"/>	A.M.N.	R&S	ENV 216	EC 3393	2022-07-04
<input type="checkbox"/>	A.M.N.	R&S	ENV4200	EC 3558	2023-06-09
<input checked="" type="checkbox"/>	Shielding room	Zhongyu	-	EC 2838	2023-01-06
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2022-09-12
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2023-05-29
<input type="checkbox"/>	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2023-06-09
<input type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2022-11-17
<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2023-01-08
<input type="checkbox"/>	Horn antenna	R&S	STLP9149	EC5881	2023-06-18
<input type="checkbox"/>	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2023-03-06
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2022-09-15

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.

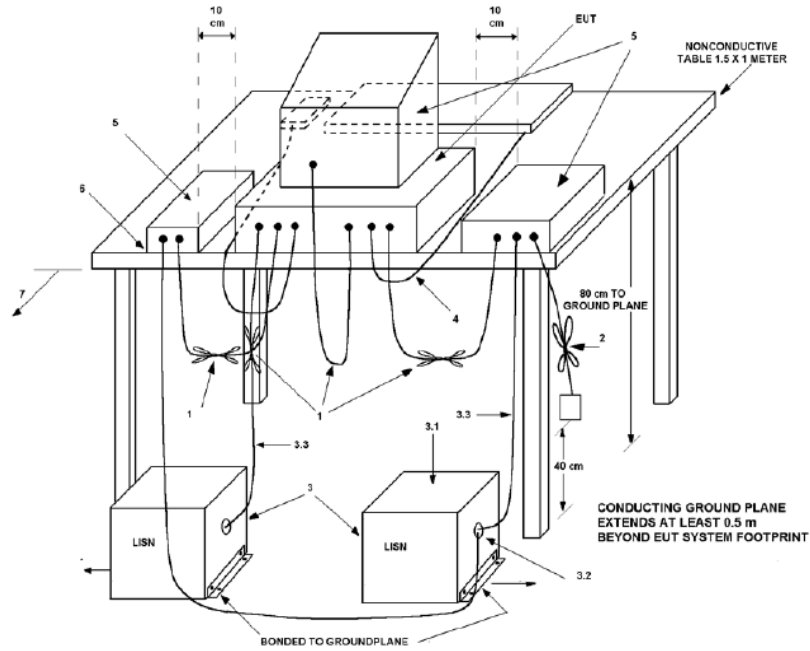
3.1.2 Limits for conducted emission of class B device

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

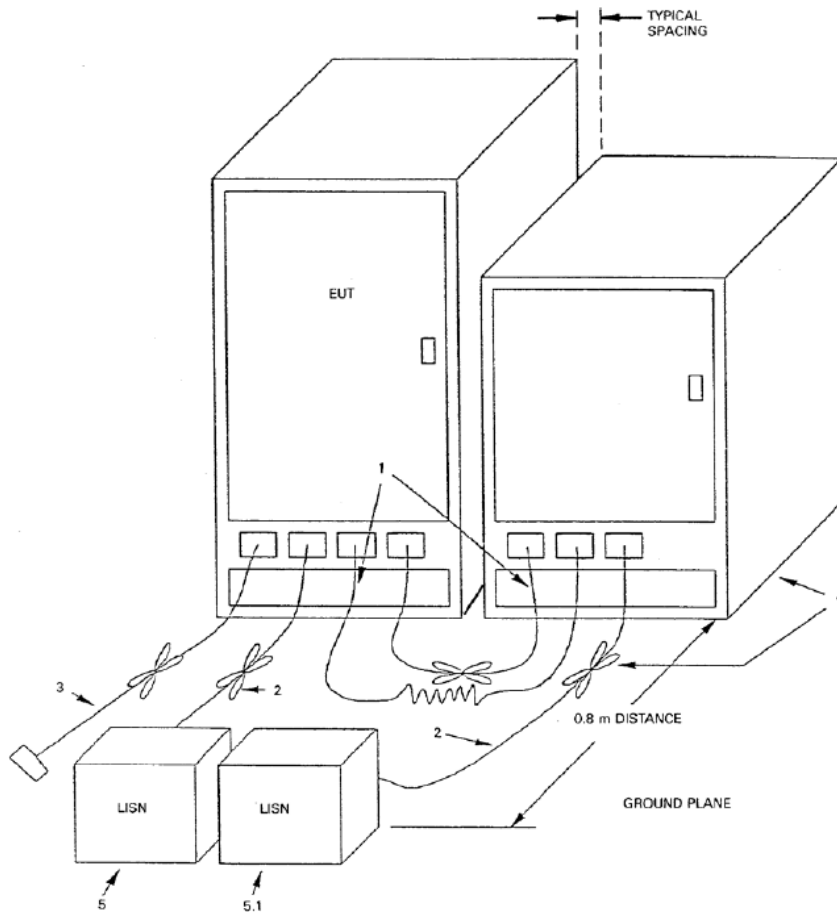
Note: 1. * Means the limit decreasing linearly with the logarithm of the frequency in the range 0.15MHz to 0.5MHz
 2. If the limit for the measurement with the average detector is met when using a receiver with a quasi-peak detector, the equipment under test shall be deemed to meet both limits and the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

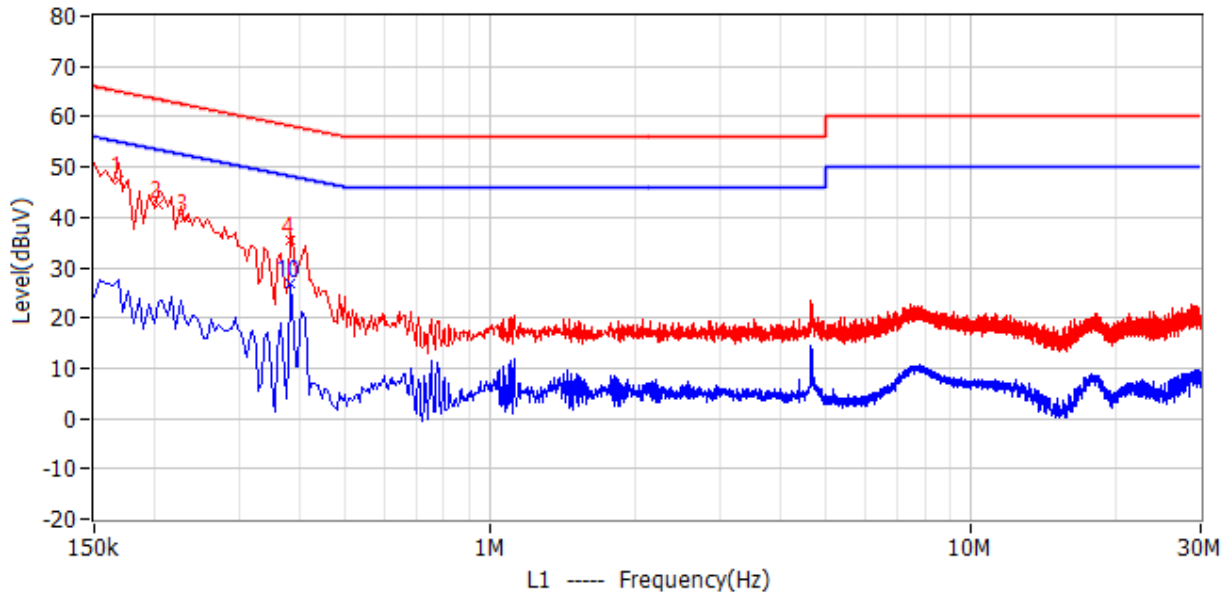
Detailed test procedure was following clause 7.3 of ANSI 63.4.

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

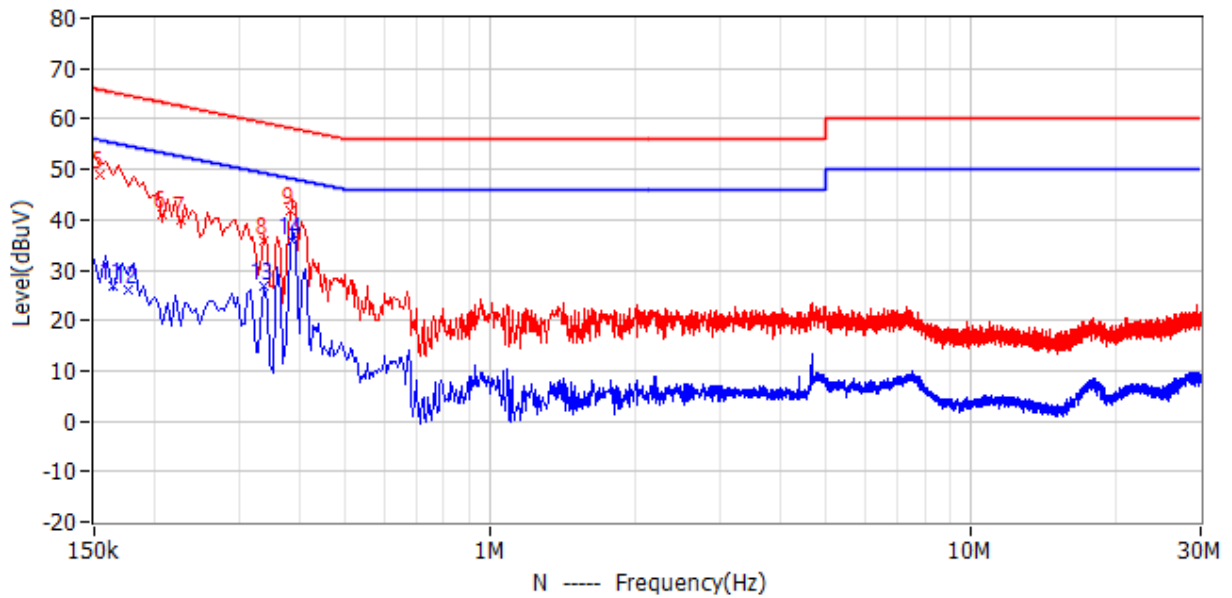
Frequency range 150kHz – 30MHz was checked and EMI receiver measurement bandwidth was set to 9 kHz.

3.4 Test Protocol

L-Line



N-Line



No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	168.000kHz	65.1	47.4	-17.7	37.1	10.3	QP	L1
2	204.000kHz	63.4	42.5	-20.9	32.1	10.4	QP	L1
3	231.000kHz	62.4	39.9	-22.5	29.6	10.3	QP	L1
4	384.000kHz	58.2	35.3	-22.9	25.0	10.3	QP	L1
5	154.500kHz	65.8	49.0	-16.7	38.6	10.4	QP	N
6	208.500kHz	63.3	40.9	-22.3	30.5	10.4	QP	N
7	226.500kHz	62.6	40.1	-22.4	29.7	10.4	QP	N
8	339.000kHz	59.2	35.7	-23.5	25.4	10.3	QP	N
9	384.000kHz	58.2	41.9	-16.3	31.6	10.3	QP	N
10	384.000kHz	48.2	26.8	-21.4	16.5	10.3	CAV	L1
11	163.500kHz	55.3	26.9	-28.4	16.6	10.3	CAV	N
12	177.000kHz	54.6	26.1	-28.6	15.8	10.3	CAV	N
13	339.000kHz	49.2	26.7	-22.5	16.4	10.3	CAV	N
14	388.500kHz	48.1	35.9	-12.2	25.6	10.3	CAV	N

Remark: 1. Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.

2. Level = Original Receiver Reading + Factor

3. Delta = Level - Limit

4. If the PK Level 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 Factor = 10.00 + 2.00 = 12.00dB;

Level = 10dBuV + 12.00dB = 22.00dBuV;

Delta = 22.00dBuV - 66.00dBuV = -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.

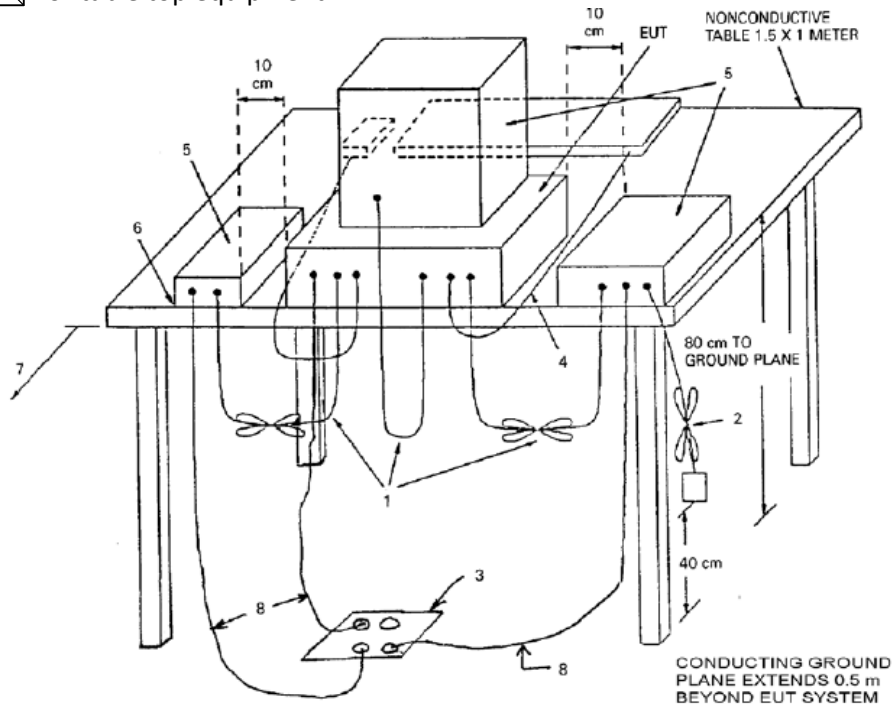
4.1.2 Limits for radiated emission of class B device

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

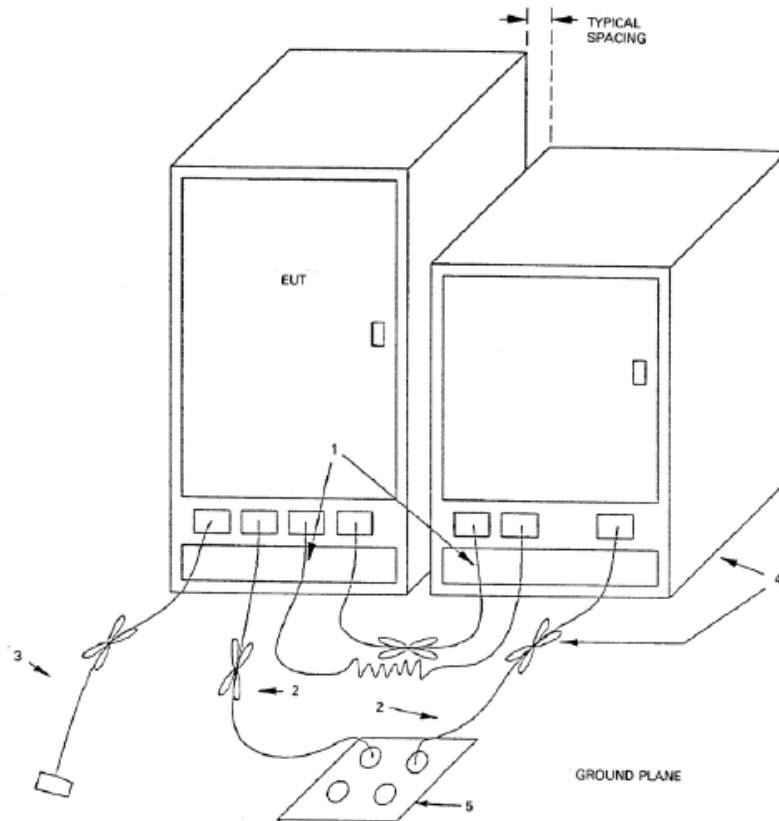
Note: for the measurement distance other than 3m and 10m, the limit is varied according to 20dB/10 decades.

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.

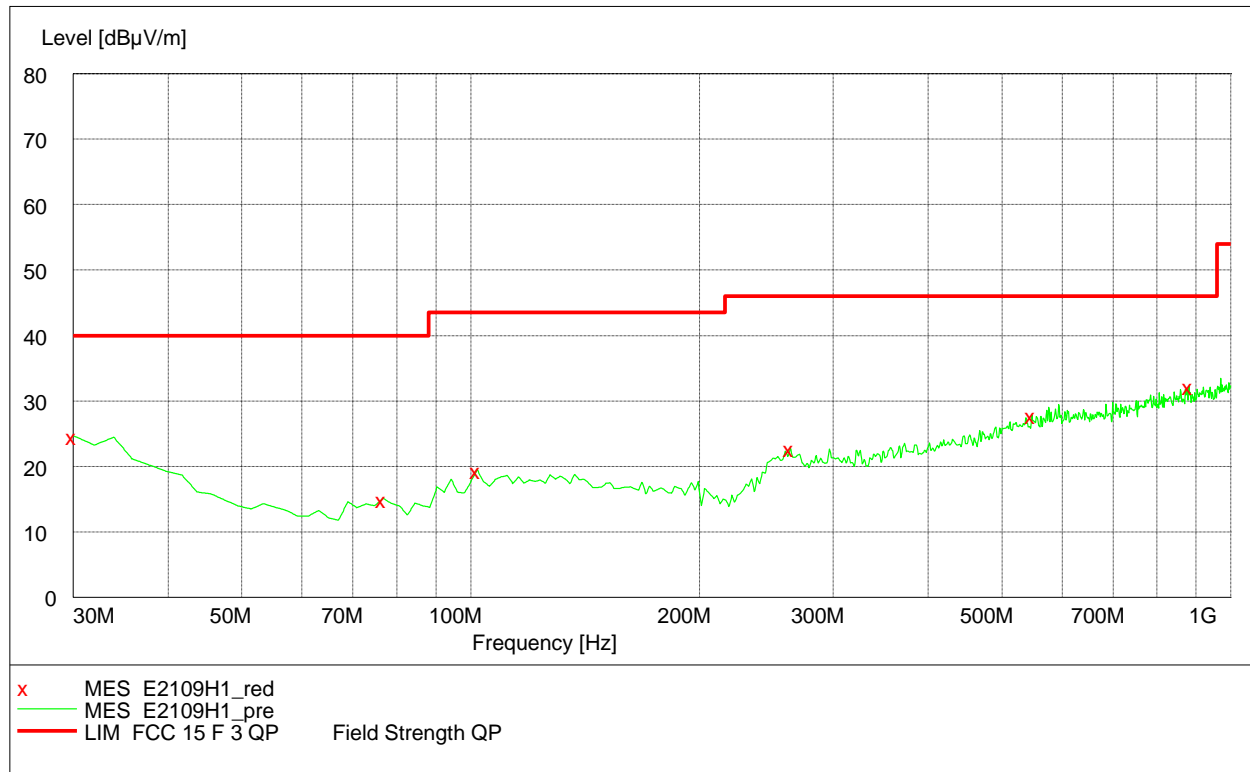
The bandwidth setting on R&S Test Receiver was 120 kHz.

The required measurement frequency range was checked.

4.4 Test Protocol

Test Curve:

Horizontal



Vertical



Antenna	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
H	30.00	24.70	21.40	40.00	15.30	PK
H	76.65	15.10	8.70	40.00	24.90	PK
H	101.92	19.50	12.70	43.50	24.00	PK
H	263.27	22.80	15.70	46.00	23.20	PK
H	547.07	27.90	21.10	46.00	18.10	PK
H	881.42	32.30	24.20	46.00	13.70	PK
V	30.00	28.30	21.40	40.00	11.70	PK
V	82.48	23.70	9.40	40.00	16.30	PK
V	107.76	24.30	13.10	43.50	19.20	PK
V	210.78	32.30	11.30	43.50	11.20	PK
V	354.63	29.20	17.30	46.00	16.80	PK
V	939.74	33.20	24.70	46.00	12.80	PK

- 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*****