

IKEA of Sweden AB

RF TEST REPORT

Report Type:

FCC Part 15C RF report

Model:

E2108 NORDMÄRKE

REPORT NUMBER:

210200358SHA-001

ISSUE DATE:

October 27, 2021

DOCUMENT CONTROL NUMBER:

TTRFFCCPART15C_V1 © 2018 Intertek



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-E2108**

SUMMARY:

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

47CFR Part 15 (2019): Radio Frequency Devices (Subpart C)

ANSI C63.10 (2014): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:

REVIEWED BY:



Project Engineer
Erick Liu

Reviewer
Wakeyou Wang

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Revision History

Report No.	Version	Description	Issued Date
210200358SHA-001	Rev. 01	Initial issue of report	October 27, 2021

TEST REPORT**Measurement result summary**

TEST ITEM	FCC REFERANCE	RESULT
Radiated emissions	15.209	Pass
Conducted emissions	15.207	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.

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1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	Wireless Charger
Type/Model:	E2108 NORDMÄRKE
Description of EUT:	EUT is a wireless charger, it has only one model.
Rating:	Input: DC 5V, 2A Wireless Output: 5W Rechargeable 18650 Li-ion Battery Pack: DC 3.7V 24Wh, 6500mAh
Category of EUT:	Class B
EUT type:	<input checked="" type="checkbox"/> Table top <input type="checkbox"/> Floor standing
Software Version:	/
Hardware Version:	/
Sample Identification No.:	02070001-53-001
Sample received date:	July 27, 2021
Date of test:	August 02, 2021 ~ September 12, 2021

1.2 Technical Specification

Frequency Range:	112kHz – 148kHz
Modulation:	FSK
Antenna:	Coil antenna, 0dBi

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1.3 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

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2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2019)
ANSI C63.10 (2014)

2.2 Mode of operation during the test

Within this test report, EUT was tested under its rating voltage and frequency (120V, 60Hz).
The 0%/50%/100% battery capacity was tested and the 100% battery capacity was worst case.

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	HW-059200CHQ	Input: 100-240V AC, 50/60Hz, 0.5A Output: 5V DC, 2A; 9V DC, 2A S/N: K68204JAX01148
2	Mobile phone	Apple iPhone12	S/N: FFYFP8EV0DYL

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated emission	25°C	54% RH
Power line conducted emission	24°C	54% RH

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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	2022-07-14
<input checked="" type="checkbox"/>	A.M.N.	R&S	ESH2-Z5	EC 3119	2021-12-07
<input type="checkbox"/>	A.M.N.	R&S	ENV 216	EC 3393	2022-07-03
<input type="checkbox"/>	A.M.N.	R&S	ENV4200	EC 3558	2022-06-09
<input checked="" type="checkbox"/>	Shielding room	Zhongyu	-	EC 2838	2022-01-07
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
<input checked="" type="checkbox"/>	Test Receiver	R&S	ESIB 26	EC 3045	2022-09-11
<input checked="" type="checkbox"/>	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2022-05-30
<input type="checkbox"/>	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2022-06-09
<input type="checkbox"/>	Horn antenna	R&S	HF 906	EC 3049	2021-11-17
<input type="checkbox"/>	Horn antenna	ETS	3117	EC 4792-1	2022-01-09
<input type="checkbox"/>	Horn antenna	R&S	STLP9149	EC5881	2022-06-18
<input checked="" type="checkbox"/>	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2022-03-07
<input checked="" type="checkbox"/>	Semi-anechoic chamber	Albatross project	-	EC 3048	2022-09-14

TEST REPORT**2.7 Measurement uncertainty**

The measurement uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Frequency	Expanded Uncertainty (k=2)
Conducted emission at mains ports	9kHz ~ 150kHz	3.52 dB
	150kHz ~ 30MHz	3.19 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	4.90 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.02 dB
	6GHz ~ 18GHz	5.28 dB

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3 Radiated emissions

Test result: Pass

3.1 Limit

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

3.2 Measurement Procedure

For Radiated emission below 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meters chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) Both X and Y axes of the antenna are set to make the measurement.
- d) For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz:

- a) The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meters chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c) The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

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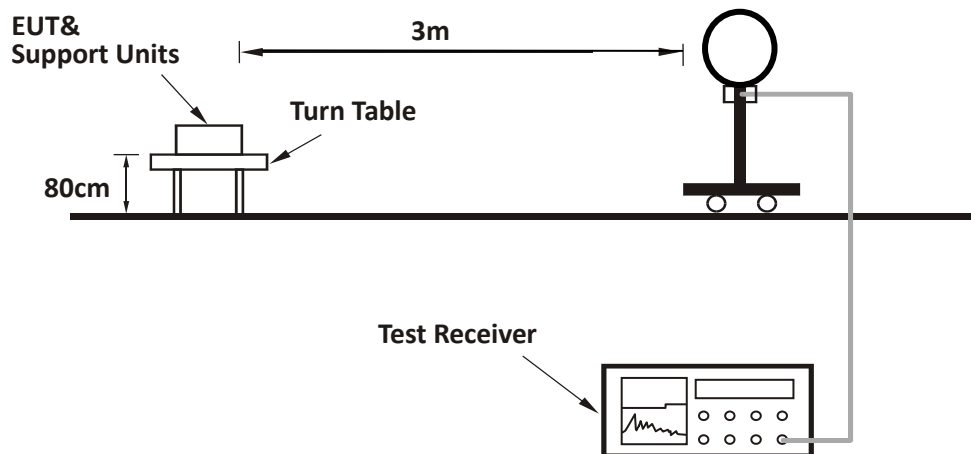
- d) For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e) The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
- 2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
- 3. All modes of operation were evaluated and the worst-case emissions were reported

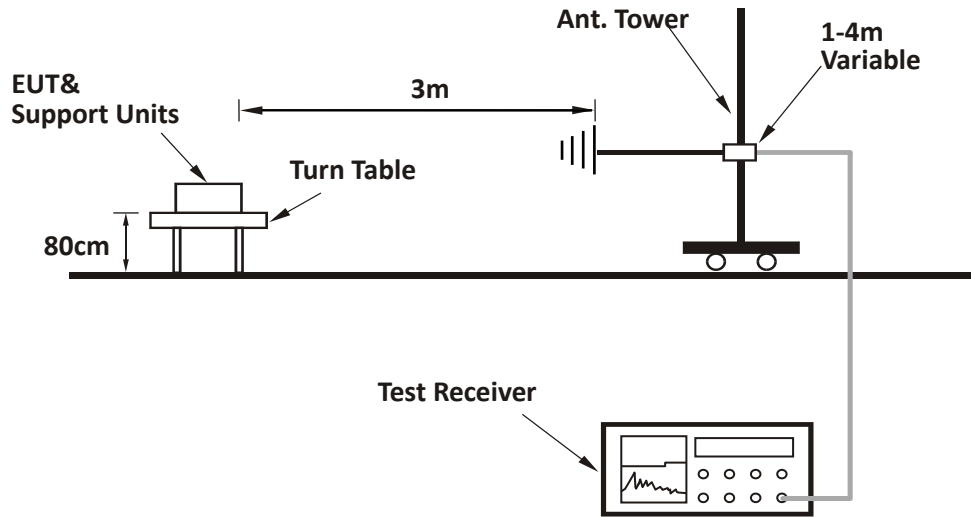
3.3 Test Configuration

For Radiated emission below 30MHz:

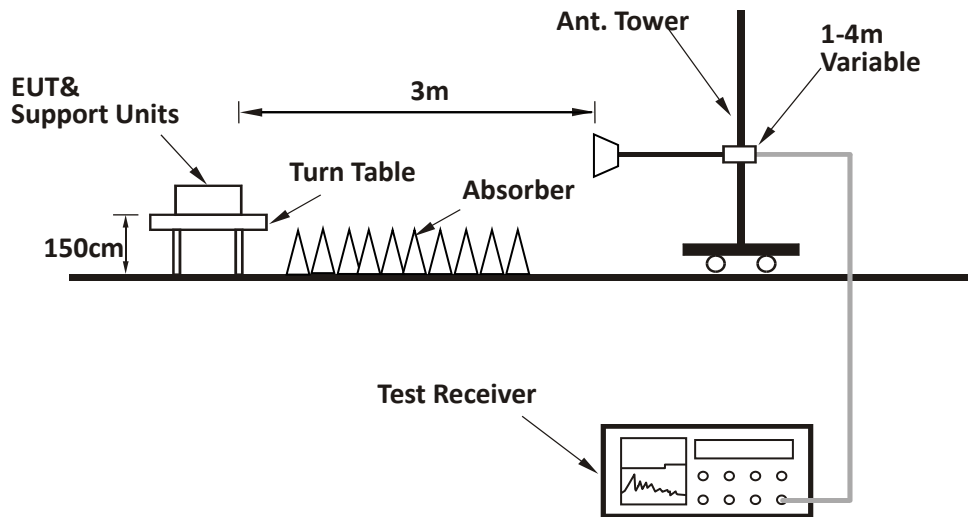


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For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:



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3.4 Test Results of Radiated Emissions

EUT was tested with empty load, half load and full load, the full load is the worst case and we listed the results in the report.

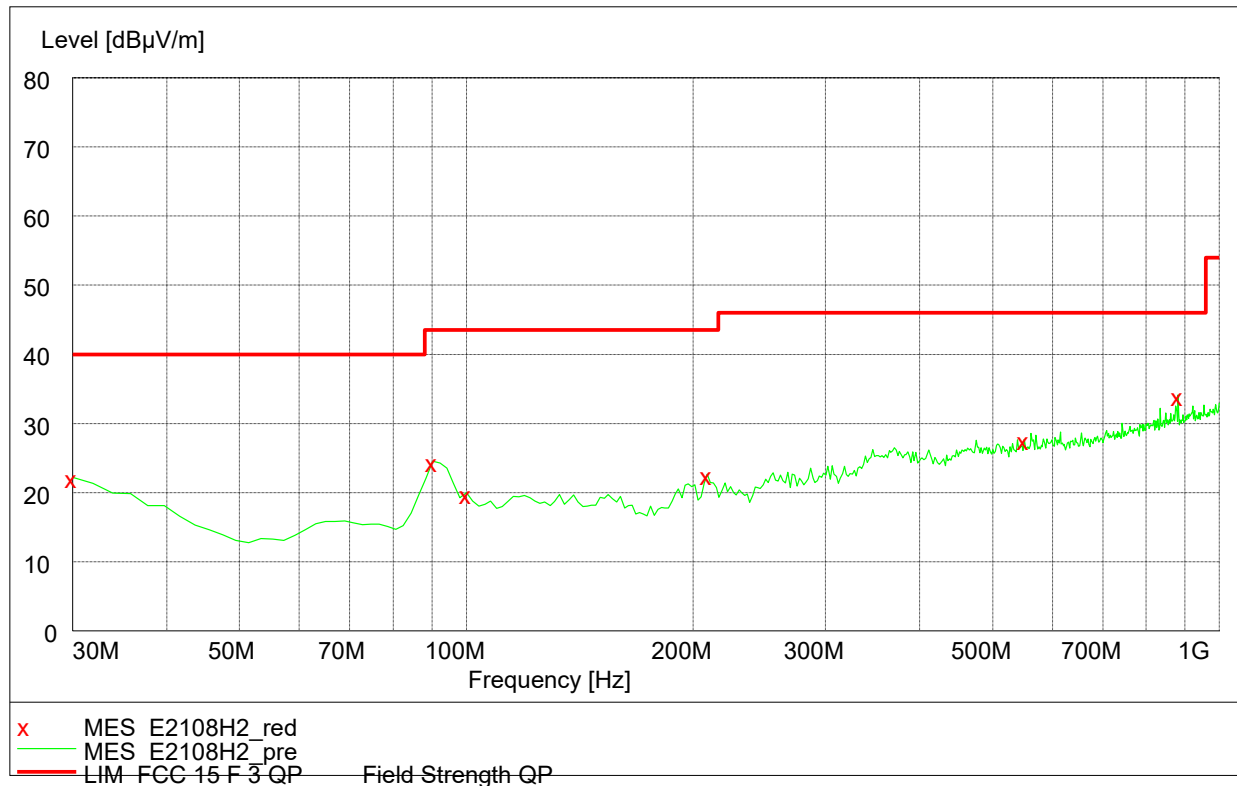
Test data below 30MHz:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector	Remark
X	0.125	66.20	10.60	105.60	39.40	PK	Fundamental
X	0.390	49.40	10.60	95.78	46.38	PK	Spurious
X	0.450	49.30	10.60	94.54	45.24	PK	Spurious
Y	0.125	54.20	10.60	105.60	51.40	PK	Fundamental
Y	0.390	44.30	10.60	95.78	51.48	PK	Spurious
Y	0.630	40.90	10.60	71.62	30.72	PK	Spurious
Z	0.125	51.60	10.60	105.60	54.00	PK	Fundamental
Z	0.630	41.30	10.60	71.62	30.32	PK	Spurious
Z	0.870	31.70	11.10	68.81	37.11	PK	Spurious

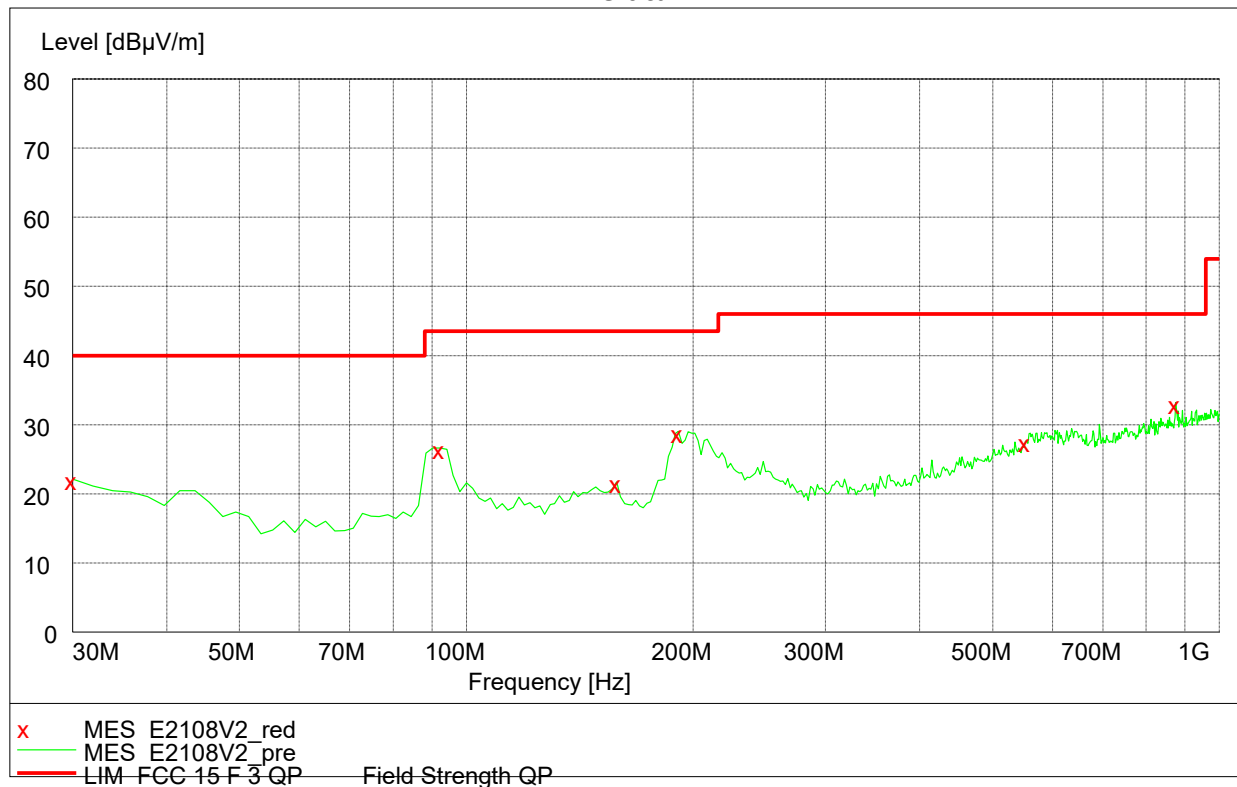
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Test data from 30MHz to 1000MHz:

Horizontal



Vertical



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Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector
H	30.00	22.20	18.80	40.00	17.80	PK
H	90.26	24.50	10.10	43.50	19.00	PK
H	99.98	20.00	12.10	43.50	23.50	PK
H	208.84	22.70	11.00	43.50	20.80	PK
H	550.96	27.70	20.30	46.00	18.30	PK
H	881.42	34.10	23.60	46.00	11.90	PK
V	30.00	22.10	18.80	40.00	17.90	PK
V	92.20	26.60	10.50	43.50	16.90	PK
V	158.30	21.70	11.40	43.50	21.80	PK
V	191.34	29.00	10.90	43.50	14.50	PK
V	552.91	27.70	20.30	46.00	18.30	PK
V	875.59	33.20	23.50	46.00	12.80	PK

- Remark: 1. Correct Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), 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.

TEST REPORT

4 Conducted emissions

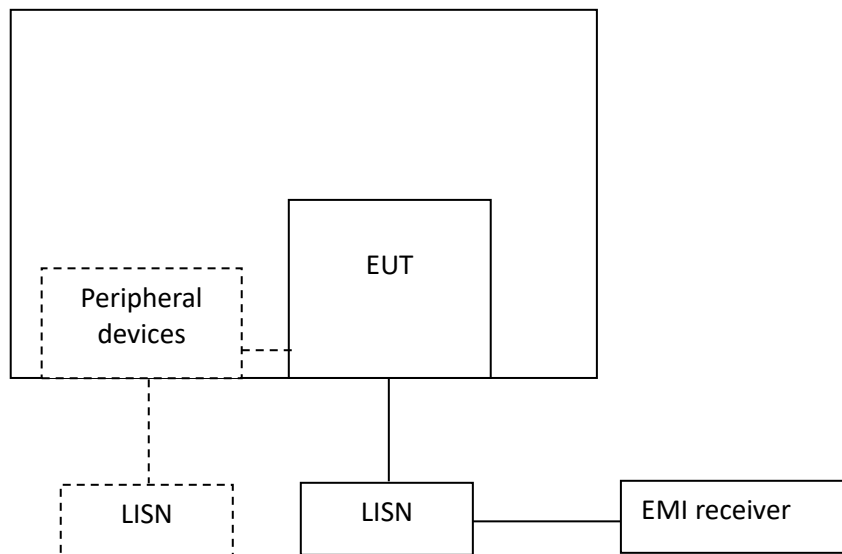
Test result: Pass

4.1 Limit

Frequency of Emission (MHz)	Conducted Emissions Limit (dBuV)	
	QP	AV
0.15-0.5	66 to 56*	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

4.2 Test Configuration



TEST REPORT**4.3 Measurement Procedure**

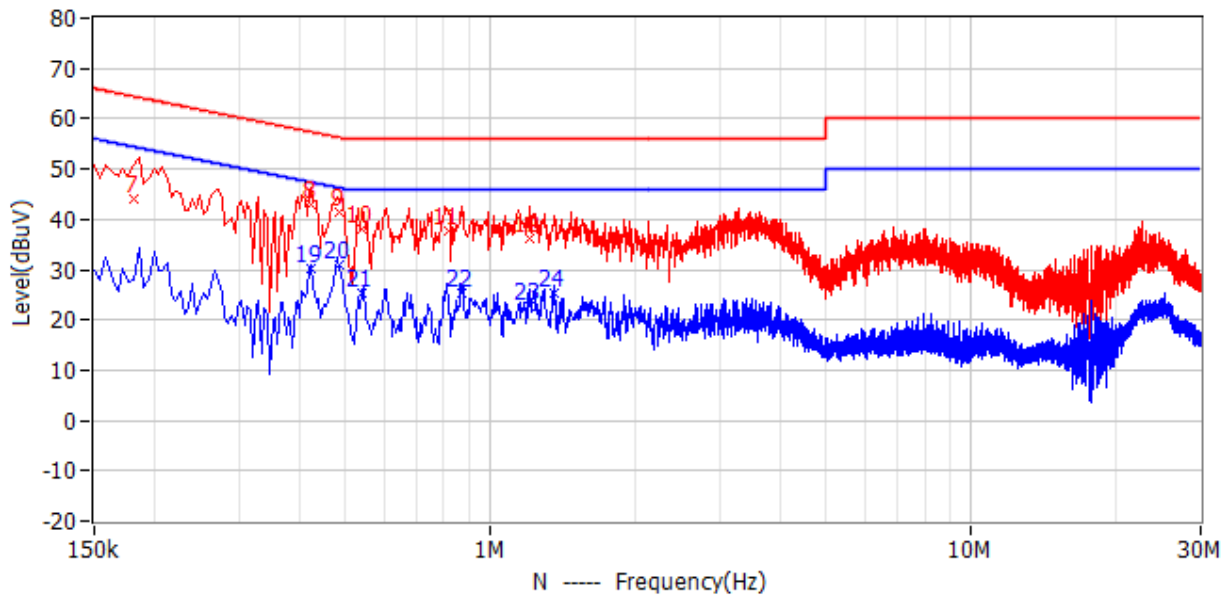
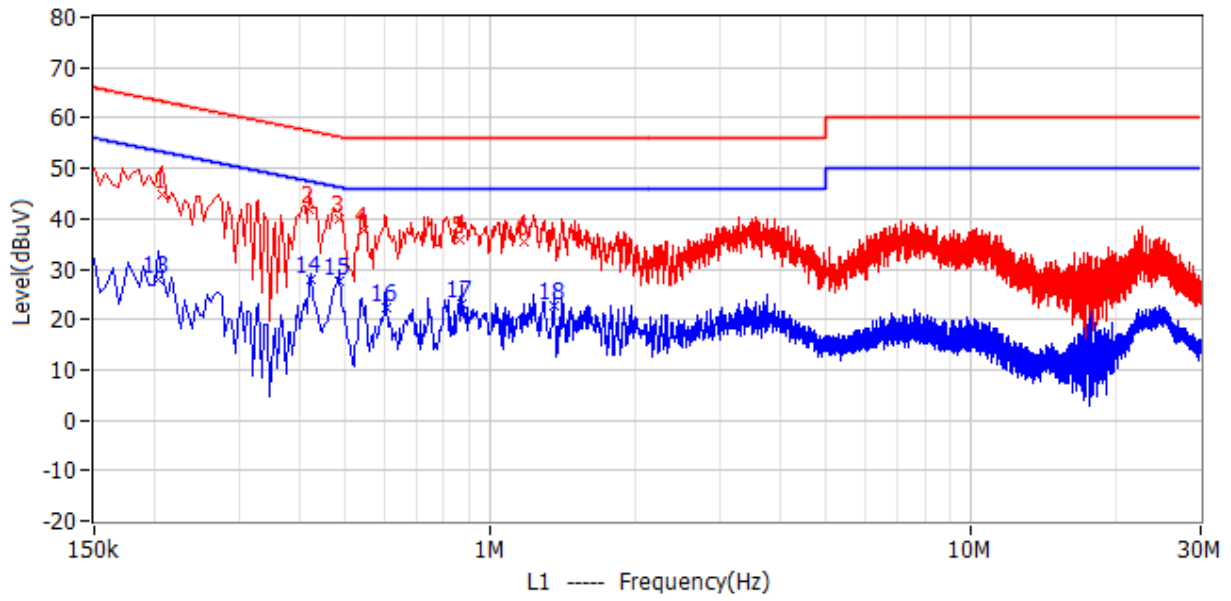
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be made on each current-carrying conductor at the plug end of the EUT power cord by the use of mating plugs and receptacles on the LISN, if used. Equipment shall be tested with power cords that are normally supplied or recommended by the manufacturer and that have electrical and shielding characteristics that are the same as those cords normally supplied or recommended by the manufacturer. For those measurements using a LISN, the 50 Ω measuring port is terminated by a measuring instrument having 50 Ω input impedance. All other ports are terminated in 50 Ω loads.

Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on the reference ground-plane or on insulating material as described in ANSI C63.4. All other surfaces of tabletop or floor-standing EUTs shall be at least 80 cm from any other grounded conducting surface, including the case or cases of one or more LISNs.

The bandwidth of the test receiver is set at 9 kHz.

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4.4 Test Results of Conducted Emissions



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No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	208.500kHz	63.3	44.9	-18.3	34.5	10.4	QP	L1
2	420.000kHz	57.4	41.7	-15.8	31.4	10.3	QP	L1
3	483.000kHz	56.3	39.8	-16.4	29.5	10.3	QP	L1
4	546.000kHz	56.0	37.7	-18.3	27.3	10.4	QP	L1
5	861.000kHz	56.0	35.8	-20.2	25.2	10.6	QP	L1
6	1.172MHz	56.0	35.4	-20.6	24.8	10.6	QP	L1
7	181.500kHz	64.4	44.2	-20.2	33.9	10.3	QP	N
8	424.500kHz	57.4	43.0	-14.4	32.7	10.3	QP	N
9	483.000kHz	56.3	41.4	-14.9	31.1	10.3	QP	N
10	541.500kHz	56.0	38.2	-17.8	27.8	10.4	QP	N
11	816.000kHz	56.0	37.8	-18.2	27.2	10.6	QP	N
12	1.208MHz	56.0	36.1	-19.9	25.5	10.6	QP	N
13	204.000kHz	53.4	27.8	-25.7	17.4	10.4	CAV	L1
14	424.500kHz	47.4	28.1	-19.2	17.8	10.3	CAV	L1
15	483.000kHz	46.3	27.6	-18.6	17.3	10.3	CAV	L1
16	609.000kHz	46.0	22.4	-23.6	12.0	10.4	CAV	L1
17	870.000kHz	46.0	23.2	-22.8	12.6	10.6	CAV	L1
18	1.356MHz	46.0	22.7	-23.3	12.1	10.6	CAV	L1
19	424.500kHz	47.4	30.3	-17.0	20.0	10.3	CAV	N
20	483.000kHz	46.3	31.1	-15.2	20.8	10.3	CAV	N
21	541.500kHz	46.0	25.4	-20.6	15.0	10.4	CAV	N
22	874.500kHz	46.0	25.5	-20.5	14.9	10.6	CAV	N
23	1.212MHz	46.0	22.8	-23.2	12.2	10.6	CAV	N
24	1.356MHz	46.0	25.5	-20.5	15.0	10.5	CAV	N

***** END *****