Teison Energy Technology Co., Ltd.

RF TEST REPORT

REPORT TYPE:
FCC Part 15.225 & ISED RSS-210 RF Report

MODEL:
TS-EDW20, TS-EDW30,
TS-EDW40

REPORT NUMBER:
2406B0428SHA-001

ISSUE DATE:
November 11, 2024

DOCUMENT CONTROL NUMBER:
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Caohejing Development Zone
Shanghai 200233, China

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TEST REPORT

Report no.: 2406B0428SHA-001

Applicant:	Teison Energy Technology Co., Ltd. Meihu Road, Xihu Town, Hanjiang District, Yangzhou City, Jiangsu Province, China, 225000
Manufacturer:	Teison Energy Technology Co., Ltd. Meihu Road, Xihu Town, Hanjiang District, Yangzhou City, Jiangsu Province, China, 225000
Factory:	Teison Energy Technology Co., Ltd. Meihu Road, Xihu Town, Hanjiang District, Yangzhou City, Jiangsu Province, China, 225000
FCC ID:	2BHT2-TSEDW40
IC:	32801-TSEDW40

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2023): Radio Frequency Devices (Subpart C) **ANSI C63.10 (2020)**: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices **RSS-210 Issue 10 (December 2019):** Licence-Exempt Radio Apparatus: Category I Equipment **RSS-Gen Issue 5, Amendment 1 (March 2019):** General Requirements for Compliance of Radio Apparatus

PREPARED BY:	**REVIEWED BY:**
Project Engineer Scout Gong	Reviewer Eric Li

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Content

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Revision History

Report No.	Version	Description	Issued Date
2406B0428SHA-001	Rev. 01	Initial issue of report	November 11, 2024

Measurement Result Summary

TEST ITEM	FCC REFERENCE	IC REFERENCE	RESULT
Fundamental emission	15.225(a) (b) (c)	RSS 210 B.6	Pass
Spurious emission	15.225(d)	RSS 210 B.6	Pass
Frequency stability	15.225(e)	RSS 210 B.6	Pass
Conducted emissions	15.207	RSS-Gen Issue 5 Clause 8.8	Pass
99% and 20dB Bandwidth	15.215(c)	RSS-Gen Issue 5 Clause 6.6	Pass
Antenna requirement	15.203	RSS-GEN 6.8	Pass

Notes:

1. *NA =Not Applicable*
2. *The determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.*
3. *Additions, Deviations and Exclusions from Standards: None.*

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	EV Charger
Type/Model:	TS-EDW20, TS-EDW30, TS-EDW40
Description of EUT:	The EUT covered in the report is an EV charger. RFID card reader is incorporated in model for process control. There are 3 models, the electrical circuit design of them is identical, only the output rating is different. Model TS-EDW40 was tested as a representative. Here is the certificate information of the wireless modules which EUT equipped. For the WIFI/BT/BLE module: FCC ID: 2AL6KBL-M8723DS1 and IC: 26005-BLM8723DS1 For the LTE module: FCC ID: XMR201903EG25G and IC:10224A-201903EG25G
Rating:	TS-EDW20: Input 480V 3*26A, Output 150-1000V, 67A, 20kW TS-EDW30: Input 480V 3*38A, Output 150-1000V, 100A, 30kW TS-EDW40: Input 480V 3*51A, Output 150-1000V, 133A, 40kW
EUT type:	☒ Tabletop ☐ Floor standing
Software Version:	/
Hardware Version:	/
Serial numbers:	A240606-57-002
Sample received date:	June 06, 2024
Date of test:	June 06, 2024, to November 11, 2024

1.2 Technical Specification

Frequency Range:	13.56 MHz ~ 13.56 MHz
Modulation:	ASK
Antenna:	PCB antenna

1.3 Description of Test Facility

Name:	Intertek Testing Services (Shanghai FTZ) Co., Ltd.
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 L21189
	FCC Accredited Lab Designation Number: CN0175
	IC Registration Lab CAB identifier.: CN0014
	VCCI Registration Lab Member No: 3598 (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 (2023)
ANSI C63.10 (2020)
RSS-210 Issue 10 (December 2019)
RSS-Gen Issue 5, Amendment 1 (March 2019)

2.2 Mode of operation during the test

While testing, the internal modulation and continuous transmission was applied.

2.3 Test software list

Test Items	Software	Manufacturer	Version
Conducted emission	SKET Auto EMC Test Software	Keleto	V3.0
Radiated emission	SKET Auto EMC Test Software	Keleto	V3.0

2.4 Test peripherals list

Item No	Description	Band and Model	S/No
1	Resistor Load	-	-

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated emission	26°C	53% RH
Power line conducted emission	27°C	53% RH

2.6 Instrument list

Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESR7	EC 6194	2025-02-27
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2024-11-19
☒	Attenuator	Hua Xiang	Ts5-10db-6g	EC 6194-1	2024-12-07
☒	Shielded room	Zhongyu	-	EC 2838	2025-01-11
Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2024-11-22
☒	Bilog Antenna	TESEQ	CBL 6112B	EC 6411	2025-09-11
☒	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2025-10-15
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2025-10-07
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Spectrum Analyzer	Keysight	N9030B	EC 6078	2025-06-14
☒	Climate chamber	GWS	MT3065	EC 6021	2025-03-06
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Thermo-Hygrograph	Testo	175h1	EC 6640	2025-10-27
☒	Thermo-Hygrograph	Testo	175h1	EC 6643	2025-10-27

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	3.06 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.02 dB
	6GHz ~ 18GHz	5.28 dB

3 Fundamental Emission

Test result: **PASS**

3.1 Limit

Frequencies (MHz)	Limit at 30m (dBuV/m)	Limit at 3m (dBuV/m)
13.110 – 13.410	40.50	80.50
13.410 – 13.553	50.50	90.50
13.553 – 13.567	84.00	124.00
13.567 – 13.710	50.50	90.50
13.710 – 14.010	40.50	80.50

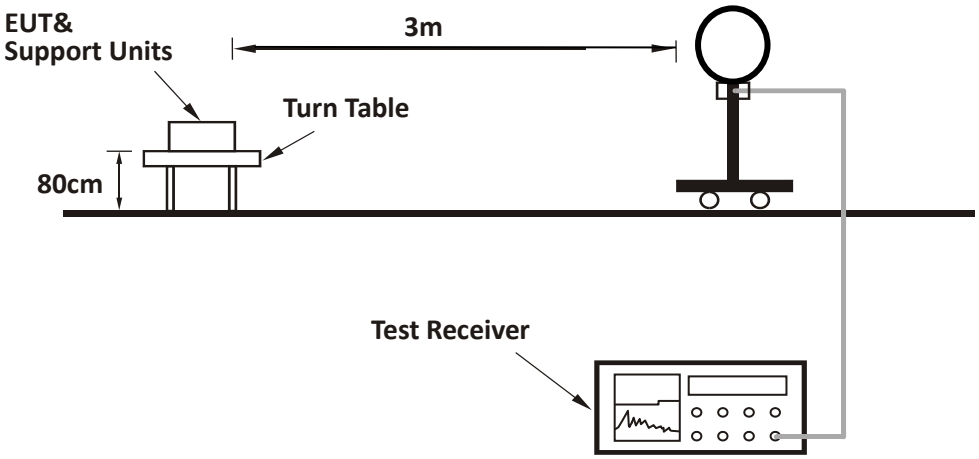
3.2 Measurement Procedure

a) The EUT was placed on a 0.8m plank above the ground at a 3-meter 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) 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 PK Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

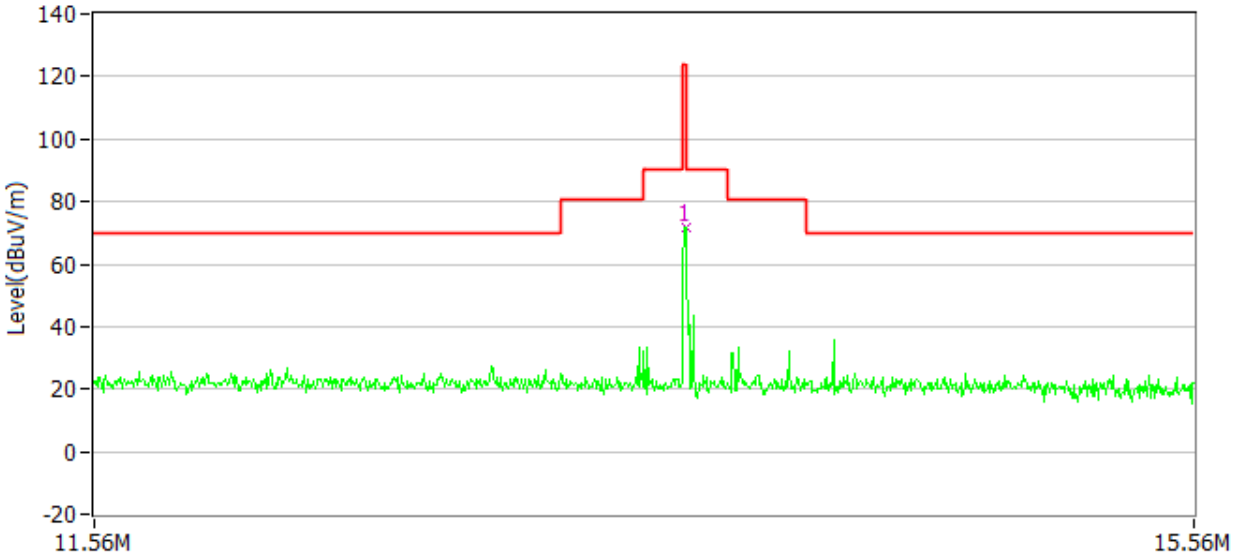
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

3.3 Test Configuration

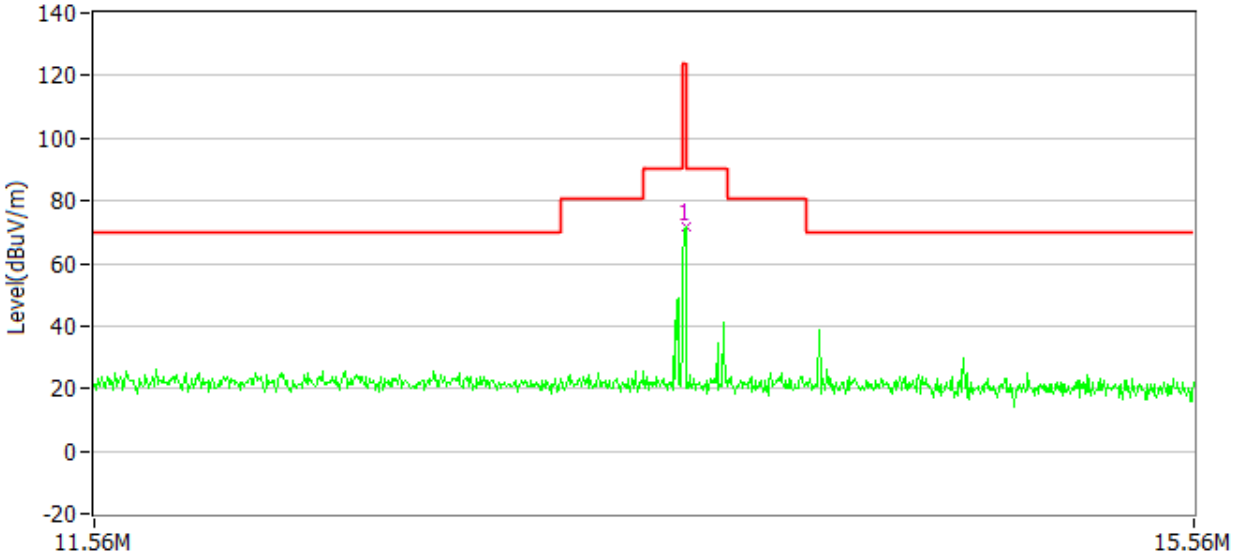


3.4 Test Results of Fundamental Emissions

Antenna Polarization: X axis

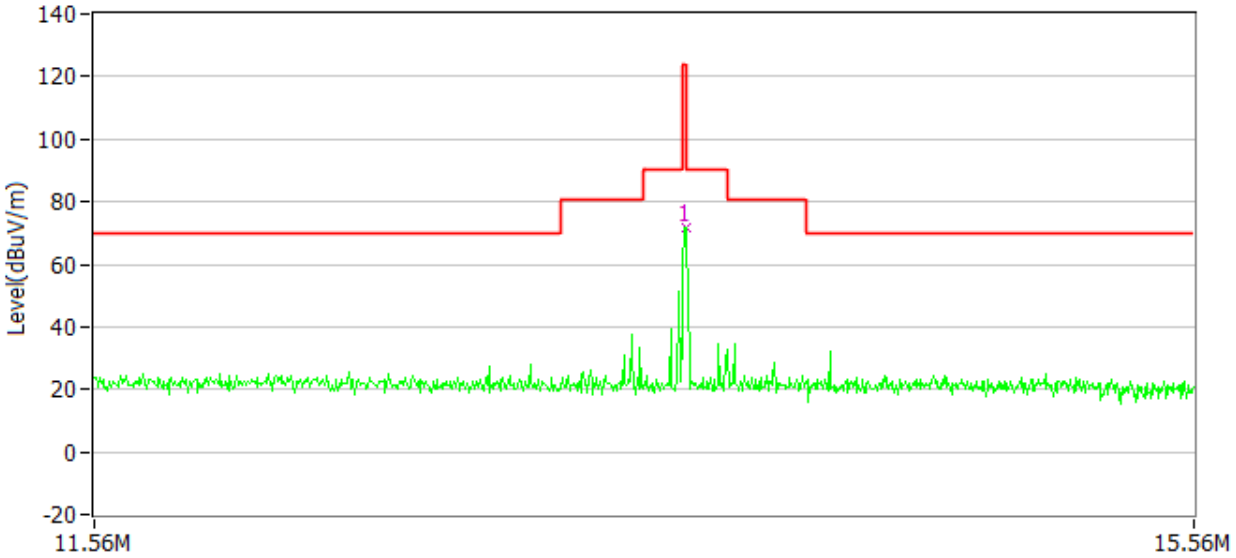


Antenna Polarization: Y axis



TEST REPORT

Antenna Polarization: Z axis



Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Detector
X	13.56	**71.80**	19.10	124.00	52.20	PK
Y	13.56	71.80	19.10	124.00	52.20	PK
Z	13.56	71.80	19.10	124.00	52.20	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*

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

4 Spurious Emission

Test result: **PASS**

4.1 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

4.2 Measurement Procedure

For Radiated emission below 30MHz:

f) The EUT was placed on a 0.8m plank above the ground at a 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
g) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
h) Both X and Y axes of the antenna are set to make the measurement.
i) 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.
j) The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

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For Radiated emission above 30MHz:

a) The EUT was placed on a 0.8m plank above the ground at a 3 meter 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.

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.

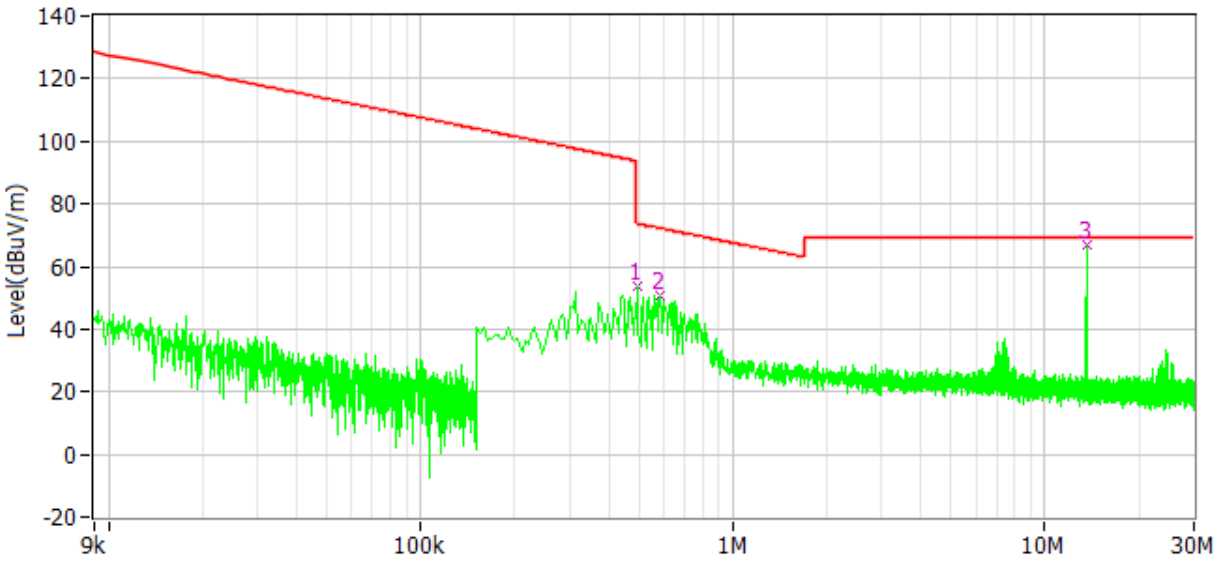
Note:

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

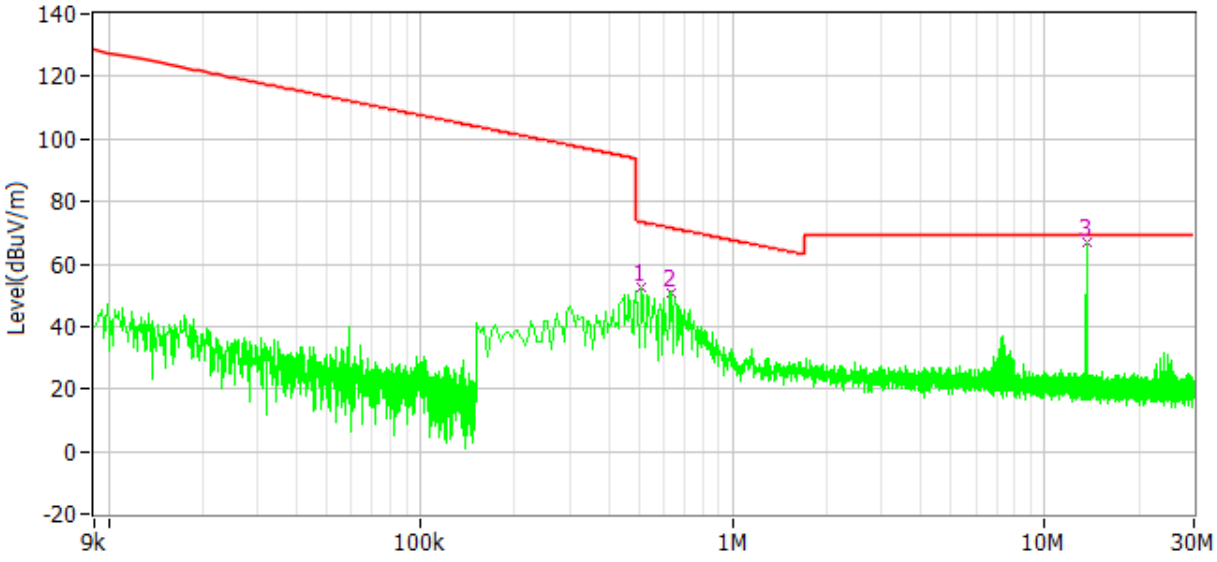
4.3 Test Results of Radiated Emissions

Test Curve (below 30MHz):

Antenna Polarization: X axis

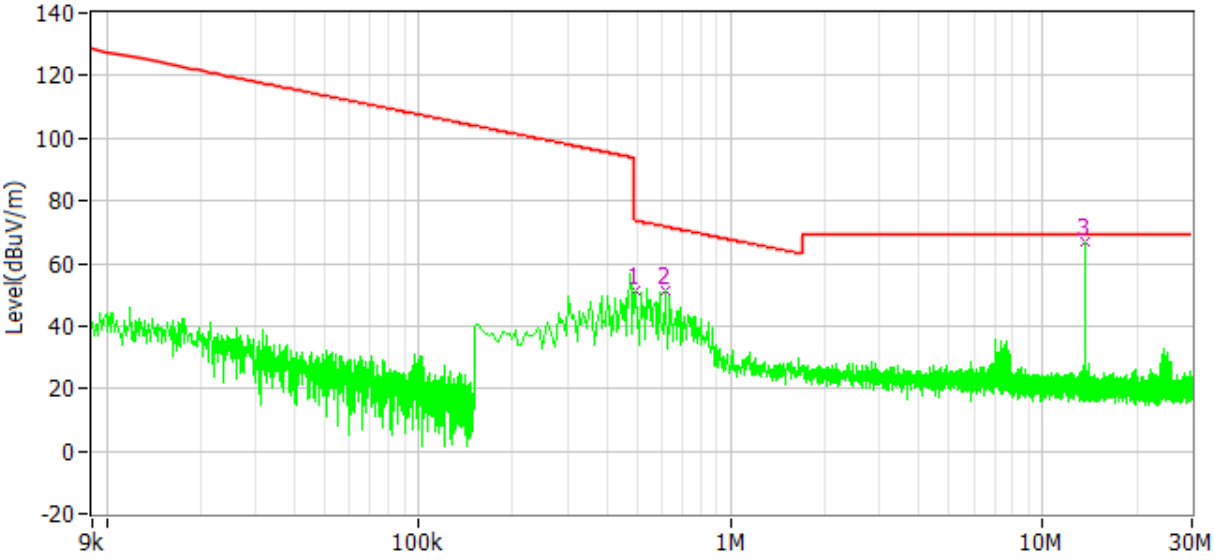


Antenna Polarization: Y axis



TEST REPORT

Antenna Polarization: Z axis



Test data below 30MHz:

Frequency	Limit (dBuV/m)	Corrected Reading (dBuV/m)	Margin (dB)	Reading (dBuV)	Factor (dB/m)	Detector	Polarity
492.000kHz	73.80	53.60	20.20	34.70	18.90	PK	X
582.000kHz	72.30	50.60	21.70	31.70	18.90	PK	X
510.000kHz	73.50	52.70	20.80	33.80	18.90	PK	Y
636.000kHz	71.50	51.00	20.50	32.10	18.90	PK	Y
496.500kHz	73.70	51.40	22.30	32.50	18.90	PK	Z
613.500kHz	71.90	51.20	20.70	32.30	18.90	PK	Z

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.

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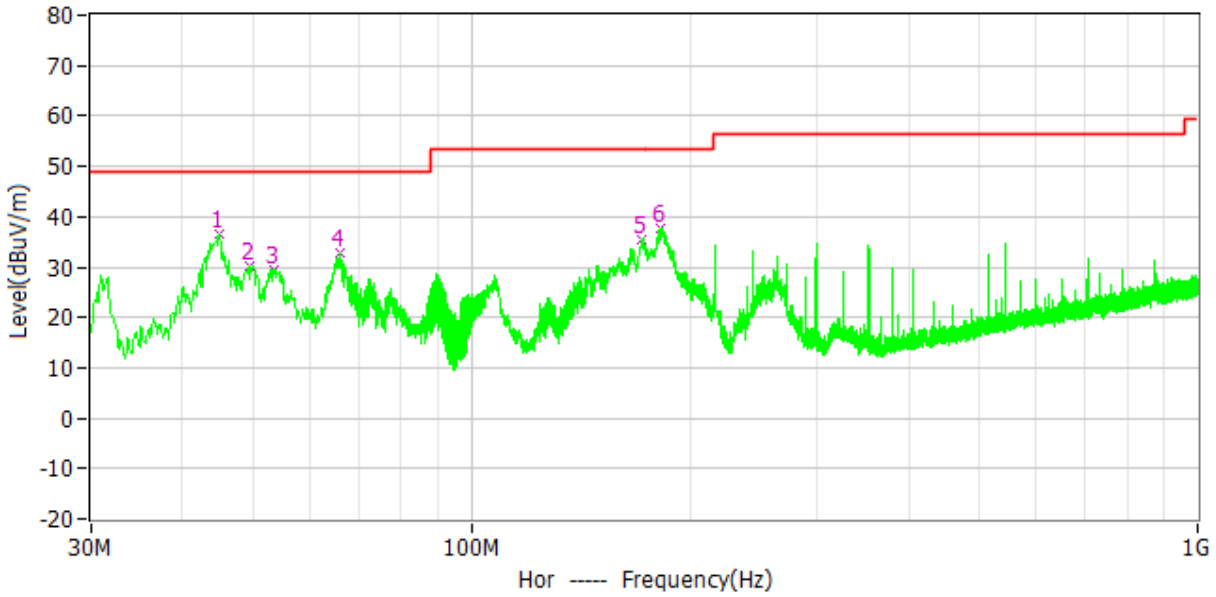
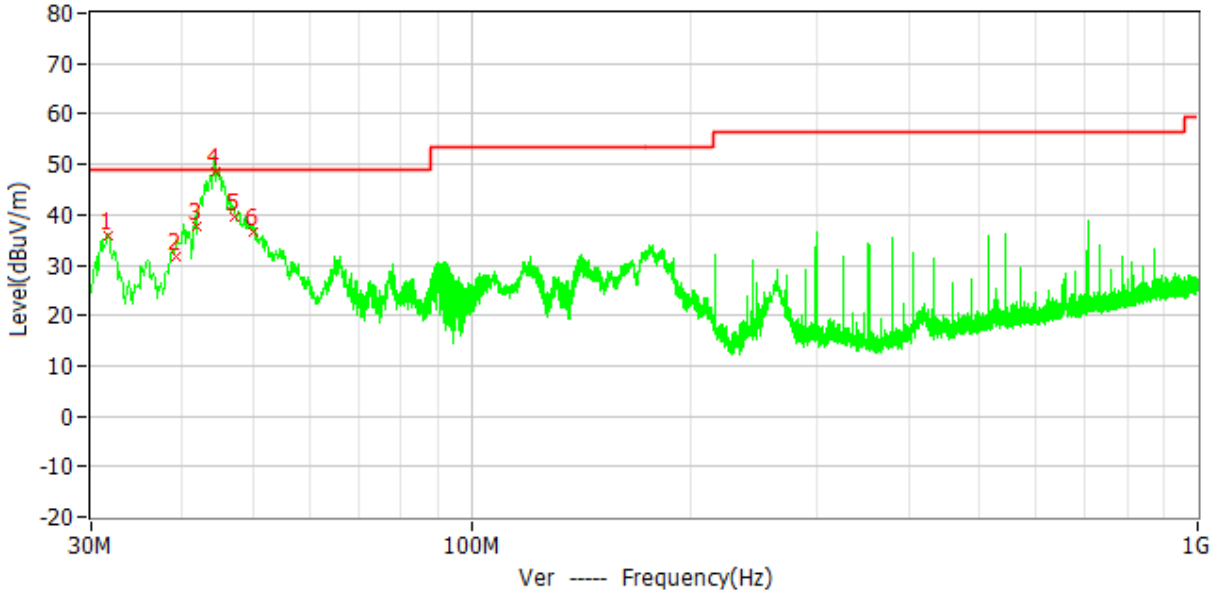
Test Curve (30MHz to 1000MHz):

Horizontal



Vertical



TEST REPORT

Test data (30MHz to 1000MHz)

Frequency (MHz)	Limit (dBuV/m)	Corrected Reading (dBuV/m)	Margin (dB)	Original Reading (dBuV)	Correct Factor (dB/m)	Detector	Polar
45.132MHz	49.00	36.50	12.50	22.20	14.30	PK	Hor
49.497MHz	49.00	30.30	18.70	15.80	14.50	PK	Hor
53.474MHz	49.00	29.60	19.40	15.30	14.30	PK	Hor
65.987MHz	49.00	32.70	16.30	19.70	13.00	PK	Hor
172.008MHz	53.50	35.40	18.10	21.50	13.90	PK	Hor
182.581MHz	53.50	37.70	15.80	24.70	13.00	PK	Hor
31.695MHz	49.00	35.70	13.30	23.20	12.50	PK	Ver
39.247MHz	49.00	31.50	17.50	17.70	13.80	PK	Ver
42.022MHz	49.00	37.70	11.30	23.60	14.10	PK	Ver
44.505MHz	49.00	48.50	0.50	34.30	14.20	PK	Ver
47.363MHz	49.00	39.60	9.40	25.20	14.40	PK	Ver
50.285MHz	49.00	36.40	12.60	21.90	14.50	PK	Ver

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.

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.

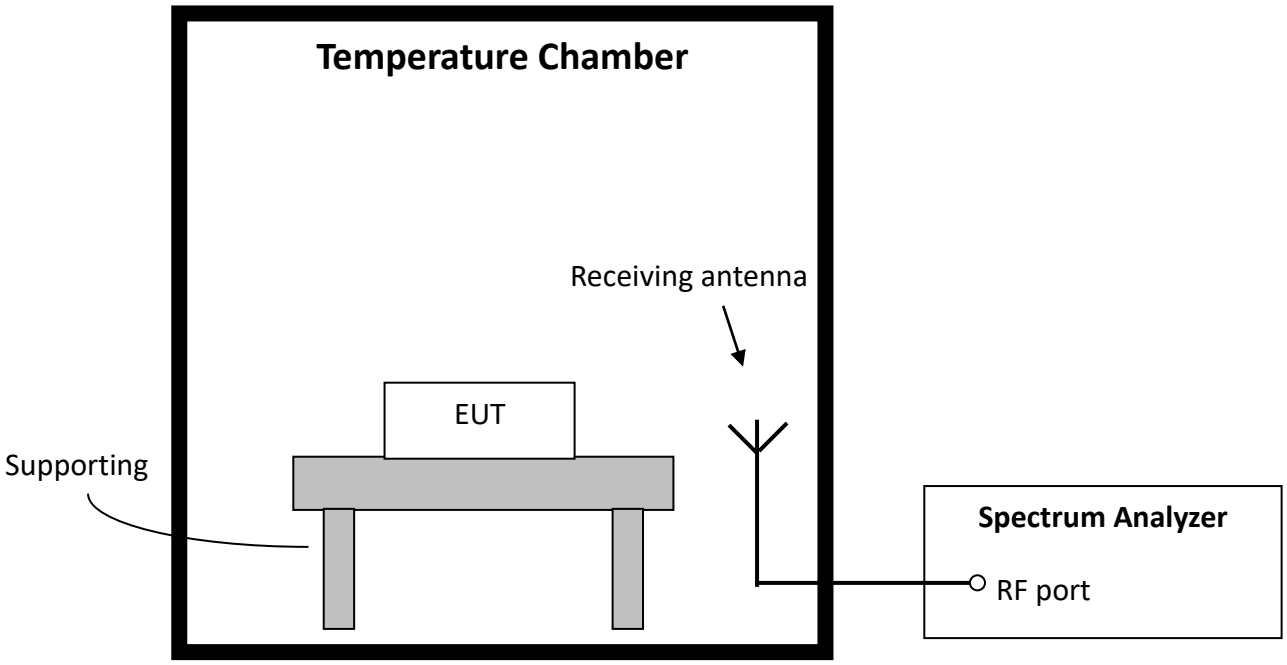
5 Frequency Stability (Temperature Variation)

Test result: **PASS**

5.1 Test limit

The frequency tolerance of the carrier signal shall be maintained within ±0.01% of the operating frequency over a temperature variation of −20 degrees to +50 degrees C at normal supply voltage.

5.2 Test Configuration



5.3 Test procedure and test setup

Test Procedure as per ANSI 63.10 clause 6.8.1.

5.4 Test protocol

Voltage (V)	Temp (ºC)	Freq Measured (MHz)	Freq Nominal (MHz)	Tolerance (%)	Limit (%)
240	-20	13.5602	13.5600	0.0014	± 0.0100
	-10	13.5602		0.0014	
	0	13.5603		0.0022	
	10	13.5602		0.0014	
	20	13.5602		0.0014	
	30	13.5602		0.0014	
	40	13.5603		0.0022	
	50	13.5602		0.0014	

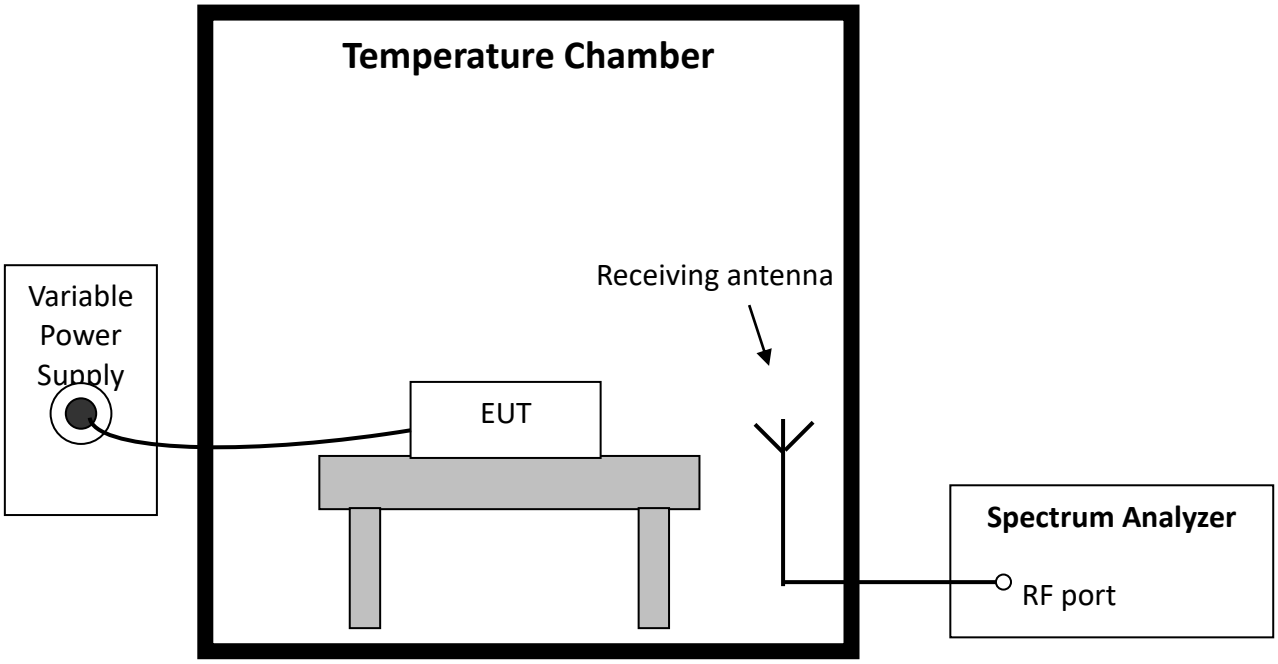
6 Frequency Stability (Voltage Variation)

Test result: **PASS**

6.1 Test limit

The frequency tolerance of the carrier signal shall be maintained within ±0.01% for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

6.2 Test Configuration



6.3 Test procedure and test setup

Test Procedure as per ANSI 63.10 clause 6.8.2.

6.4 Test protocol

Temp (ºC)	Voltage (V)	Freq Measured (MHz)	Freq nominal (MHz)	Tolerance (%)	Limit (%)
20	204	13.5602	13.5600	0.0014	± 0.0100
	240	13.5602		0.0014	
	276	13.5603		0.0022	

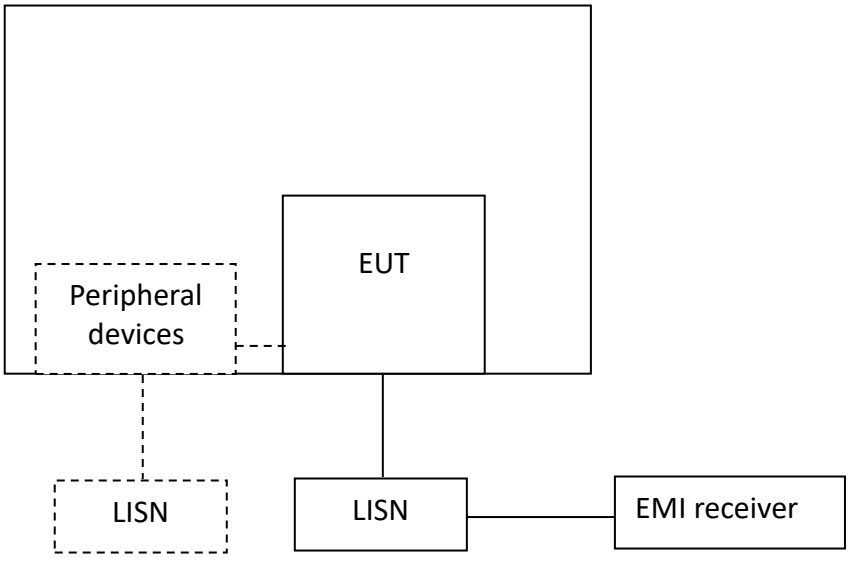
7 Conducted emissions

Test result: **PASS**

7.1 Limit

Frequency of Emission (MHz)	Conducted Emissions Limit (dBuV)	
	QP	AV
0.15 ~ 0.5	79	66
0.5 ~ 30	73	60

7.2 Test Configuration



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7.3 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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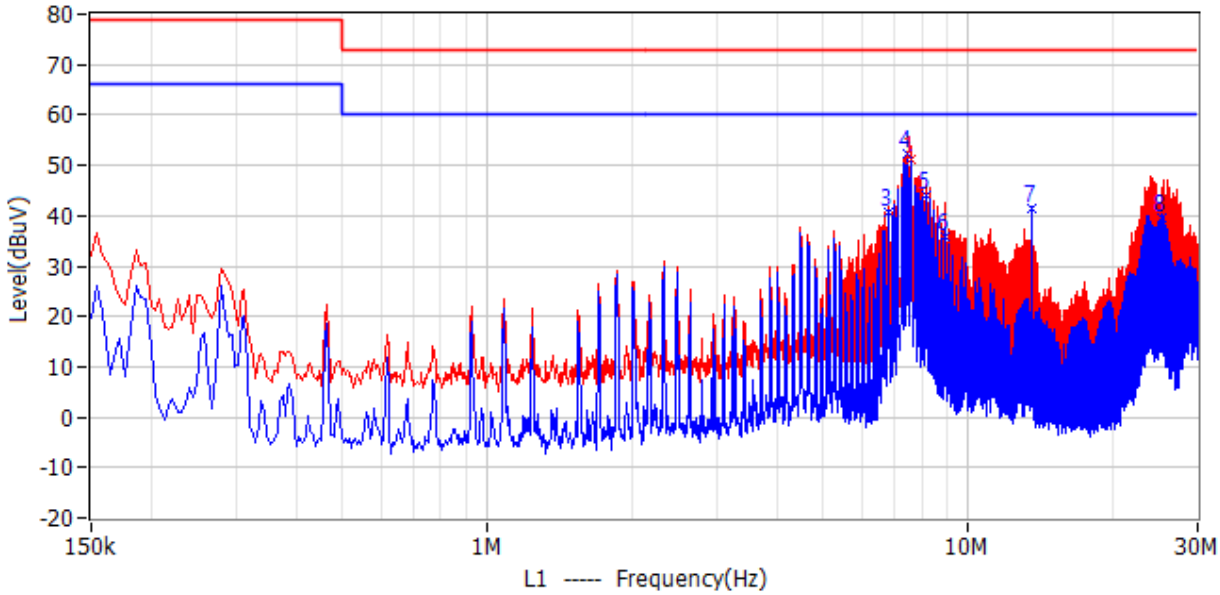
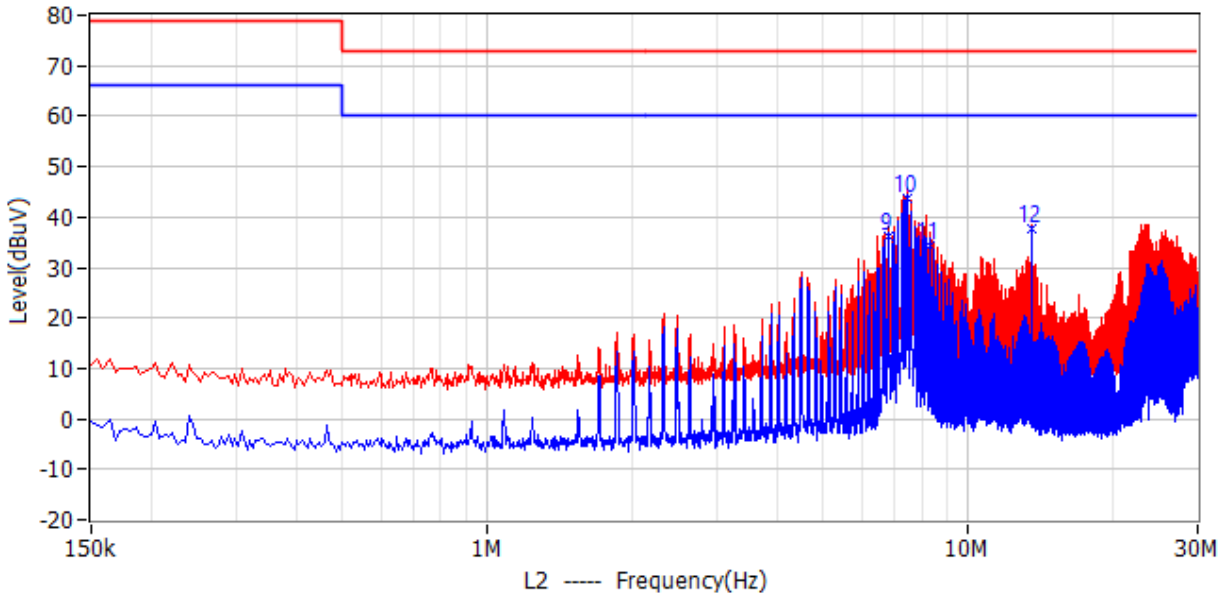
7.4 Test Results of Conducted Emissions

Test Curve:





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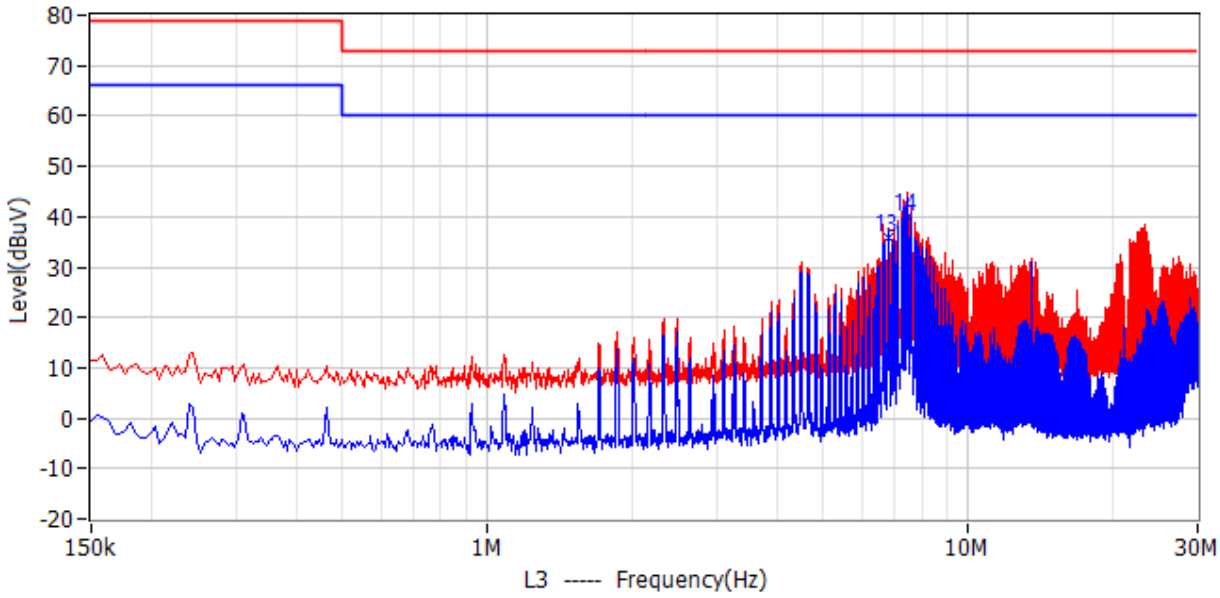
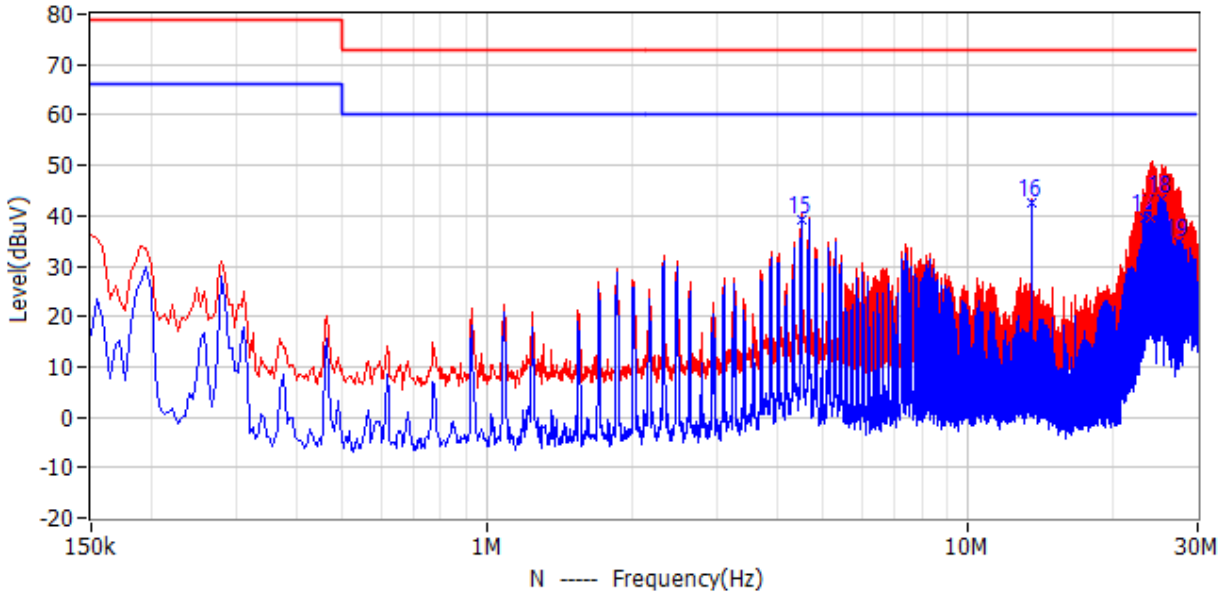

80
70
60
50
40
30
20
10
0
-10
-20
Level(dBuV)
150k
1M
10M
30M
L3 ----- Frequency(Hz)


80
70
60
50
40
30
20
10
0
-10
-20
Level(dBuV)
15
16
150k
1M
10M
30M
N ----- Frequency(Hz)

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Test Data:

Frequency	Limit (dBuV)	Level (dBuV)	Delta (dB)	Original Receiver Reading (dBuV)	Correct Factor (dB)	Detector	Phase
7.620MHz	73.00	51.00	-22.00	44.50	6.50	QP	L1
24.000MHz	73.00	39.60	-33.40	32.20	7.40	QP	N
6.846MHz	60.00	40.60	-19.40	34.10	6.50	CAV	L1
7.467MHz	60.00	52.10	-7.90	45.60	6.50	CAV	L1
8.192MHz	60.00	44.10	-15.90	37.60	6.50	CAV	L1
8.961MHz	60.00	35.70	-24.30	29.10	6.60	CAV	L1
13.560MHz	-	-	-	-	-	-	L1
25.359MHz	60.00	39.40	-20.60	31.80	7.60	CAV	L1
6.801MHz	60.00	36.20	-23.80	29.60	6.60	CAV	L2
7.472MHz	60.00	43.60	-16.40	36.90	6.70	CAV	L2
8.345MHz	60.00	34.30	-25.70	27.60	6.70	CAV	L2
13.560MHz	-	-	-	-	-	-	L2
6.801MHz	60.00	35.90	-24.10	29.30	6.60	CAV	L3
7.467MHz	60.00	39.80	-20.20	33.10	6.70	CAV	L3
4.515MHz	60.00	39.20	-20.80	32.90	6.30	CAV	N
13.560MHz	-	-	-	-	-	-	N
23.325MHz	60.00	39.70	-20.30	32.30	7.40	CAV	N
25.364MHz	60.00	43.20	-16.80	35.70	7.50	CAV	N
27.483MHz	60.00	34.80	-25.20	27.20	7.60	CAV	N

Note: The signal of 13.56MHz was caused by the RFID module. It is a wanted signal.

Remark:

1. *Correct Factor = LISN Factor + Cable Loss, the value was added to Original Receiver Reading by the software automatically.*
2. *Level = Original Receiver Reading + Correct Factor*
3. *Delta = Level – Limit*
4. *If the PK Level is lower than AV limit, the AV test can be elided.*
5. *the emissions of 13.56MHz are the product's RF signal.*

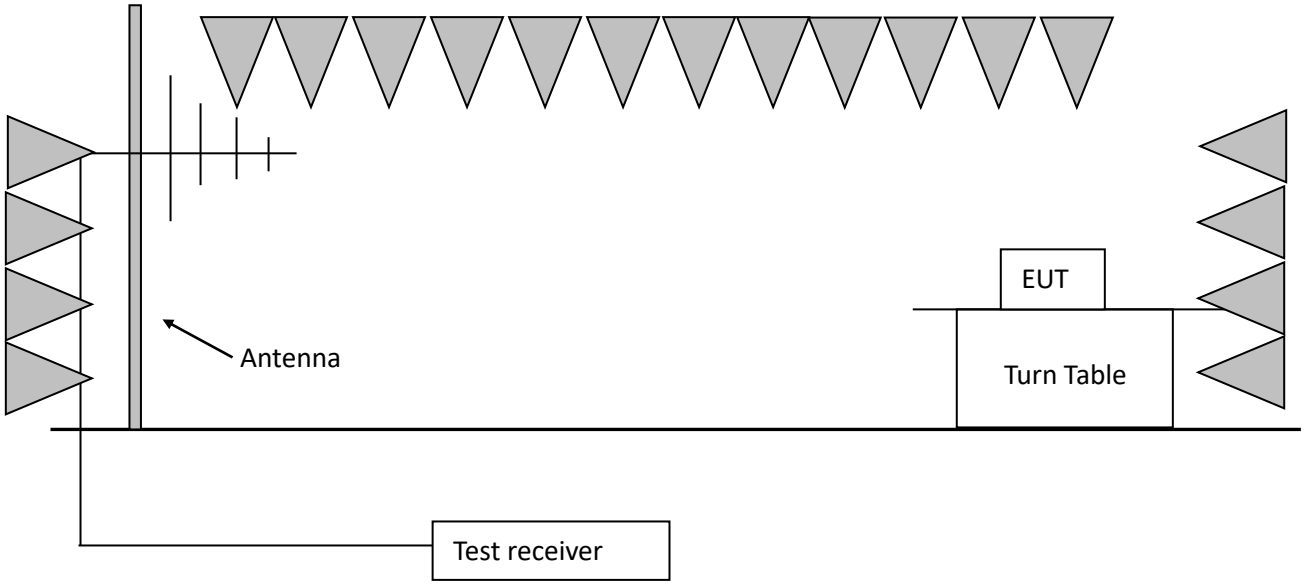
8 20dB Bandwidth

Test result: **PASS**

8.1 Limit

The 20dB bandwidth should be fallen in the allocated operating frequency range.
No limit for 99% bandwidth.

8.2 Test configuration



TEST REPORT

8.3 Test procedure and test set up

The measurement was applied in a 3m semi-anechoic chamber.

The center of the loop antenna shall be 1 m above the horizontal metal ground plane.

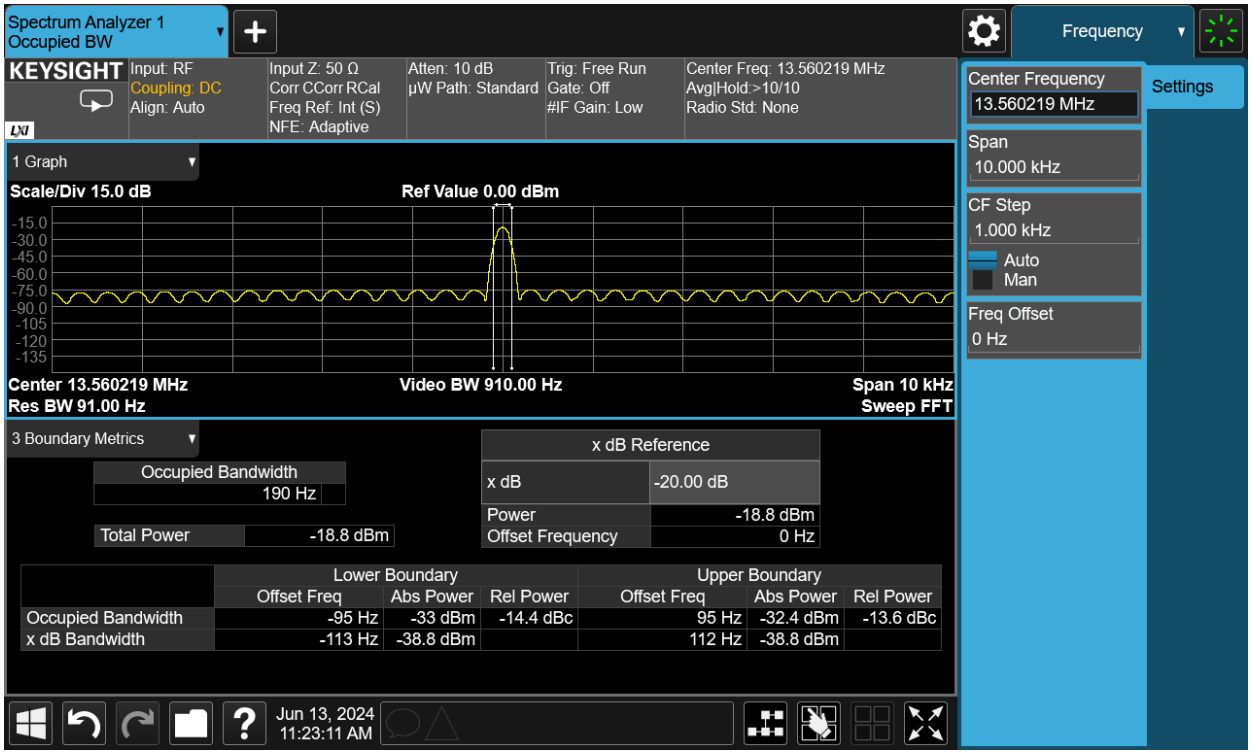
The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set RBW = 1 % to 5 % of the OBW
3. Set VBW ≥ 3 · RBW
4. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall

   be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
5. Use the 99 % power bandwidth function of the instrument (if available).
6. the 20dB bandwidth is also measured with the same setting.

8.4 Test protocol

	Lower point (MHz)	Higher point (MHz)	Bandwidth (kHz)	Allocated bandwidth (MHz)
20dB Bandwidth	13.560106	13.560331	0.225	13.553 ~ 13.567
Occupied bandwidth	13.560124	13.560314	0.190	13.553 ~ 13.567



9 Antenna requirement

Requirement:
An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Result:
EUT uses permanently attached antenna to the intentional radiator, so it can comply with the provisions of this section.

********** END **********