Longhorn Intelligent Tech Co.,Ltd

RF TEST REPORT

Report Type:
FCC Part 15.225 RF report

MODEL:
ECA-NC8002S-DG80, ECA-NC8002S-SG80,
ECA-NC8002S-DG40

REPORT NUMBER:
2411B0026SHA-001

ISSUE DATE:
December 19, 2024

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 2411B0026SHA-001

Applicant:	Longhorn Intelligent Tech Co.,Ltd Longhorn Hi-Tech Estate, Gongyeyuan Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China
Manufacturer:	Longhorn Intelligent Tech Co.,Ltd Longhorn Hi-Tech Estate, Gongyeyuan Road, Dalang Street, Longhua New District, Shenzhen, Guangdong, China
Factory:	Longhorn Intelligent Tech Co.,Ltd Floor 2-3, Emerging Industrial Park Factory Building, No. 72, Longhai Third Road, Xiqu, Dayawan District, Huizhou, Guangdong, China
FCC ID:	2APP2-ECA03

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

PREPARED BY:	**REVIEWED BY:**
Project Engineer Sky Yang	Reviewer Eric Li

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Revision History

Report No.	Version	Description	Issued Date
2411B0026SHA-001	Rev. 01	Initial issue of report	December 19, 2024

TEST REPORT

Measurement result summary

TEST ITEM	FCC REFERENCE	RESULT
Fundamental emission	15.225(a) (b) (c)	Pass
Spurious emission	15.225(d)	Pass
Frequency stability	15.225(e)	Pass
Conducted emissions	15.207	Pass
99% and 20dB Bandwidth	15.215(c)	Pass
Antenna requirement	15.203	Pass

Notes: 1: NA =Not Applicable

2: Determination of the test conclusion is based on IEC Guide 115 in consideration of measurement uncertainty.

TEST REPORT

1 GENERAL INFORMATION

1.1 Description of Equipment Under Test (EUT)

Product name:	EV Charger
Type/Model:	ECA-NC8002S-DG80, ECA-NC8002S-SG80, ECA-NC8002S-DG40
Description of EUT:	The EUT is electric vehicle AC charger. EUT contains three wireless modules, the FCC ID is XMR202008EC25AFXD, 2AOXV-BR2602E-U2 and 2AFOS-WT32C3-SX. ECA-NC8002S-SG80 only has one output, ECA-NC8002S-DG80 and ECA-NC8002S-DG40 have two outputs. All models are electrically identical except the rated output power. We choose ECA-NC8002S-DG80 to test as representative and list the results in this report.
Rating:	ECA-NC8002S-DG80: 208/240VAC, 60Hz, 40A max for each EV connector or 80A max for one EV connector ECA-NC8002S-SG80: 208/240VAC, 60Hz, 80A max ECA-NC8002S-DG40: 208/240VAC, 60Hz, 40A max for each EV connector
Category of EUT:	Class A
EUT type:	☒ Table top ☐ Floor standing
Software Version:	-
Hardware Version:	-
Serial numbers:	A241028-55
Sample received date:	October 28, 2024
Date of test:	November 1, 2024 ~ November 15, 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
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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)

2.2 Mode of operation during the test

While testing, the internal modulation and continuously 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

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	2025-07-23
☒	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	2025-08-18
☒	TRILOG broadband Antenna	Schwarzbeck	VULB9168	EC 6402	2025-03-19
☒	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2025-08-10
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2026-07-11
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Spectrum Analyzer	Keysight	N9030B	EC 6078	2025-03-18
☒	Climate chamber	GWS	MT3065	EC 6021	2025-03-07
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Thermo-Hygrograph	Testo	175h1	EC 6640	2025-08-29
☒	Thermo-Hygrograph	Testo	175h1	EC6642	2025-08-29

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

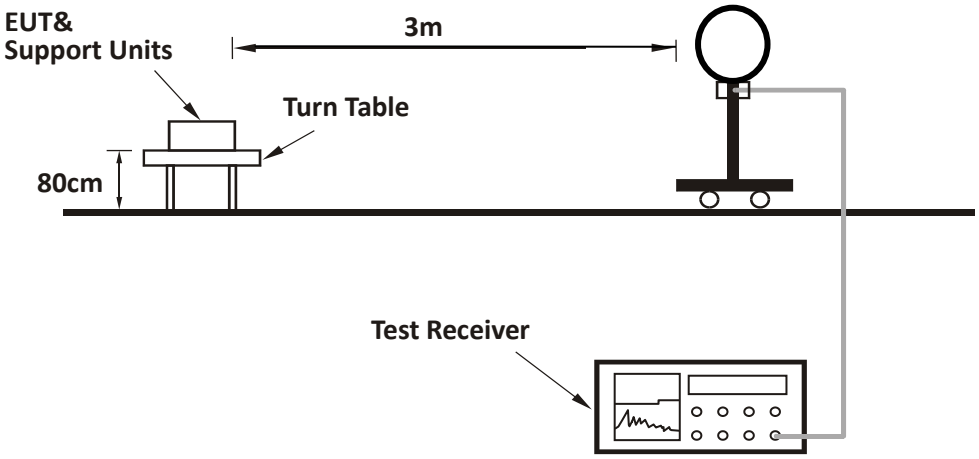
3.2 Measurement Procedure

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



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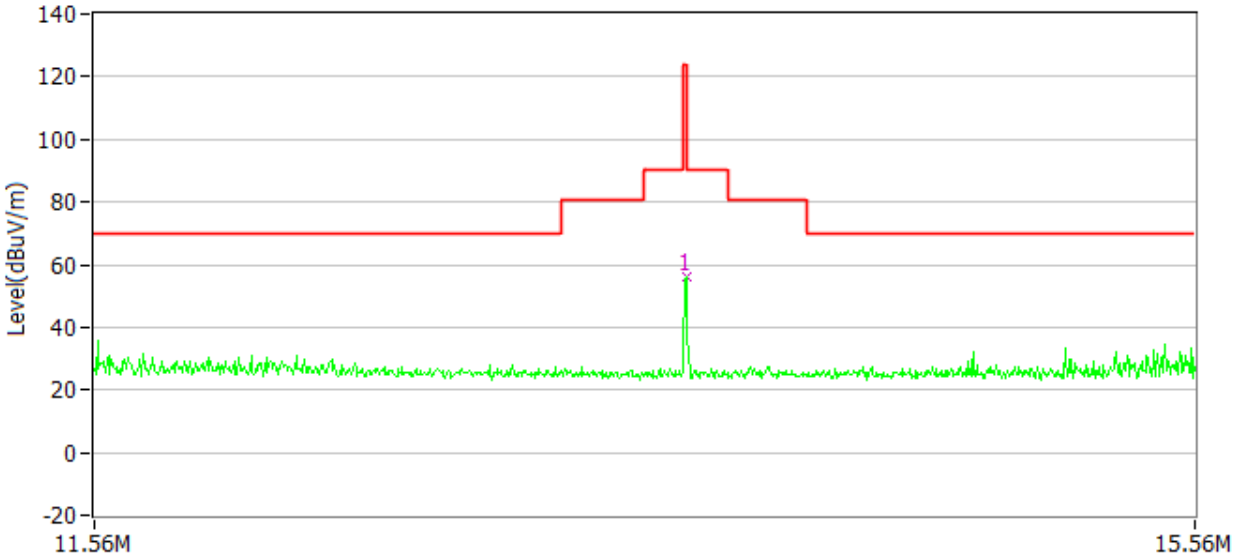
3.4 Test Results of Fundamental Emissions



Antenna Polarization	Frequency (MHz)	Level (dBuV/m)	Limit (dBuV/m)	Margin	Detector
X	13.56	55.8	124.00	68.2	PK
Y	13.56	56.0	124.00	68.0	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. Level = Original Receiver Reading + Correct Factor
3. Margin = Limit - Level

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;
Level = 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.

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.

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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.

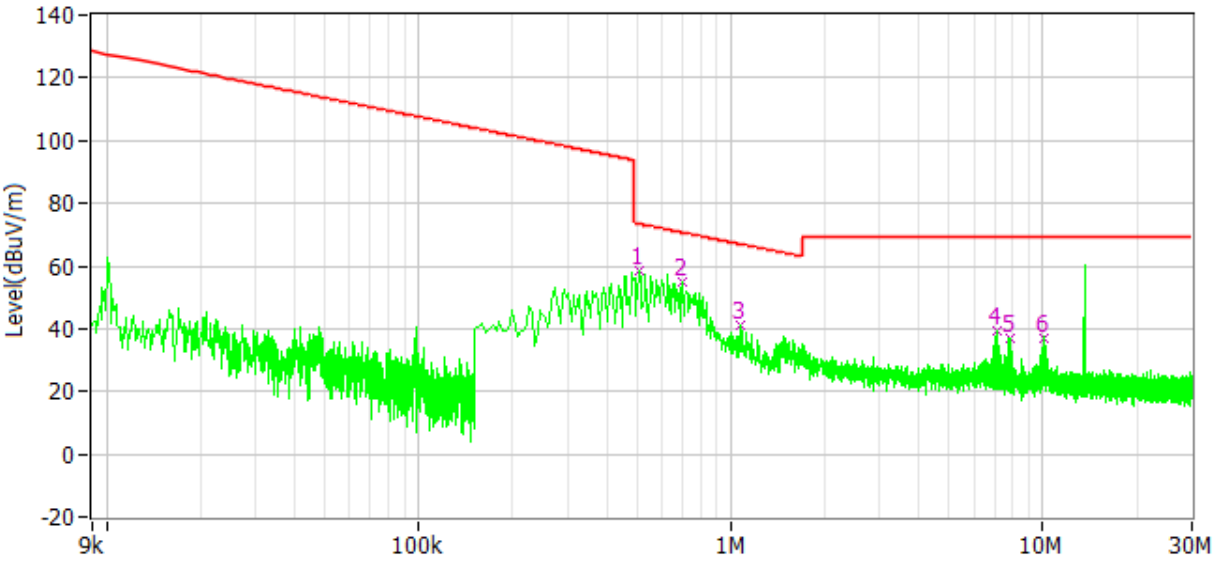
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

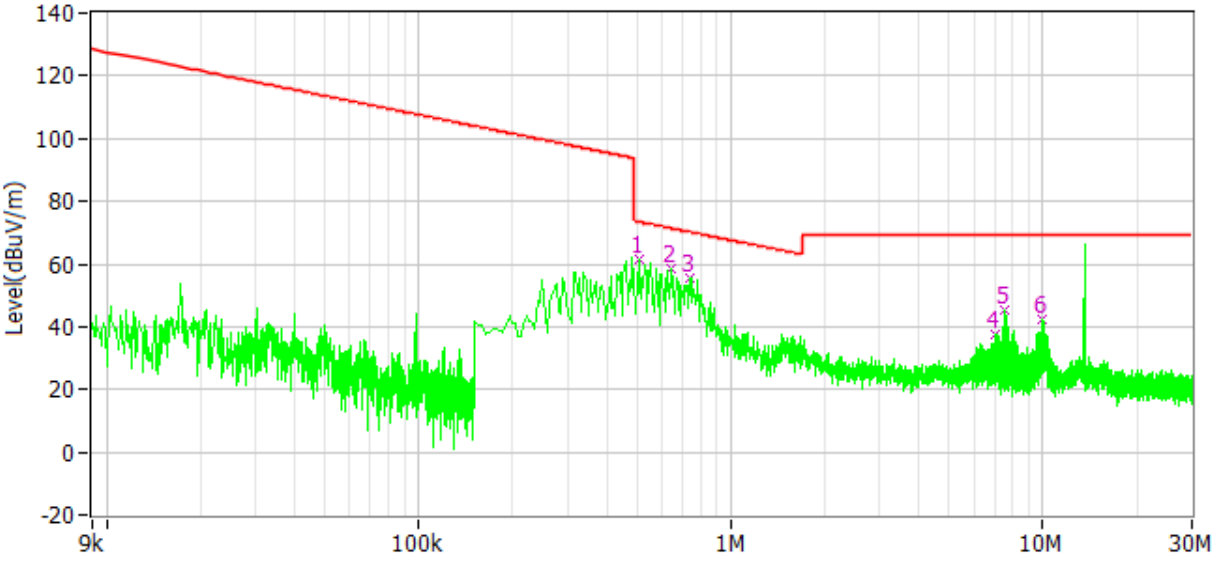
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.3 Test Results of Radiated Emissions

X



Y

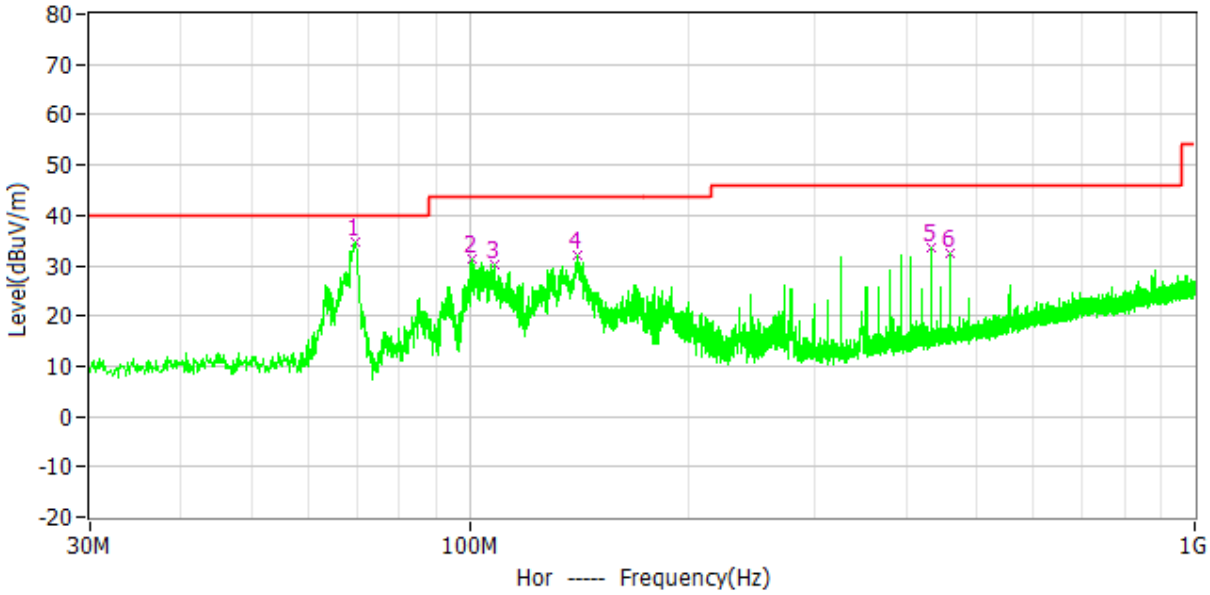


Frequency	Limit (dBuV/m)	Level (dBuV/m)	Delta (dB)	Detector	Polarity
510.000kHz	73.5	58.7	14.7	PK	X
703.500kHz	70.7	55.0	15.7	PK	X
1.068MHz	67.1	41.0	26.0	PK	X
7.130MHz	69.5	39.3	30.2	PK	X
7.818MHz	69.5	36.9	32.6	PK	X
10.064MHz	69.5	37.2	32.3	PK	X
505.500kHz	73.5	61.7	11.8	PK	Y
645.000kHz	71.4	58.3	13.2	PK	Y
735.000kHz	70.3	55.7	14.6	PK	Y
7.076MHz	69.5	37.6	31.9	PK	Y
7.526MHz	69.5	45.2	24.3	PK	Y
9.983MHz	69.5	42.2	27.3	PK	Y

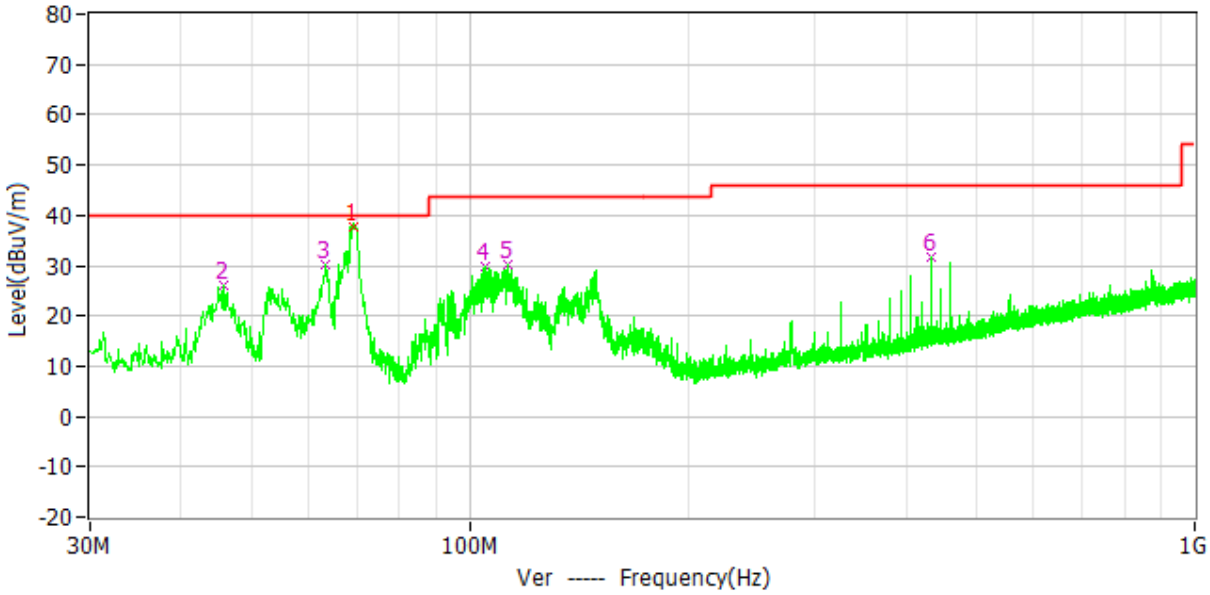
Remark: 1. Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Limit - Level

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 Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Delta = 44.00dBuV/m - 10.20dBuV/m = 29.80dB.

Horizontal



Vertical



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Test data from 30MHz to 1000MHz:

Antenna Polarization	Frequency (MHz)	Limit (dBuV/m)	Level (dBuV/m)	Delta (dB)	Detector
H	69.673MHz	40.0	34.8	5.2	PK
H	101.004MHz	43.5	31.4	12.1	PK
H	108.085MHz	43.5	30.2	13.3	PK
H	140.968MHz	43.5	31.9	11.6	PK
H	433.908MHz	46.0	33.6	12.4	PK
H	461.068MHz	46.0	32.3	13.7	PK
V	69.373MHz	40.0	37.5	2.5	QP
V	45.908MHz	40.0	25.9	14.1	PK
V	63.465MHz	40.0	30.1	9.9	PK
V	105.078MHz	43.5	29.7	13.8	PK
V	113.129MHz	43.5	30.2	13.3	PK
V	433.908MHz	46.0	31.7	14.3	PK

Remark: 1. Factor = Antenna Factor + Cable Loss (+ Amplifier, for higher than 1GHz), the value was added to Original Receiver Reading by the software automatically.
2. Level = Original Receiver Reading + Correct Factor
3. Delta = Limit - Level

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 Factor = 30.20 + 2.00 – 32.00 = 0.20dB/m;
Level = 10dBuV + 0.20dB/m = 10.20dBuV/m;
Delta = 44.00dBuV/m - 10.20dBuV/m = 29.80dB.

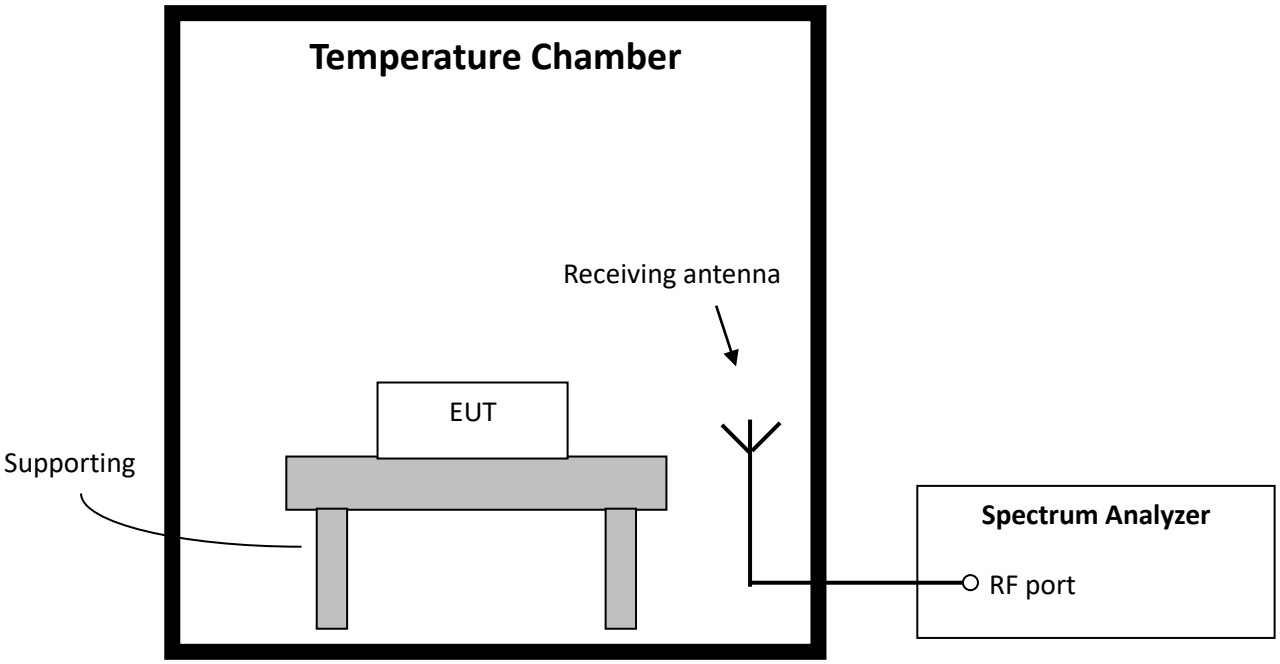
5 Frequency Stability (Temperature Variation)

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 −30 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	-30	13.5595	13.56	-0.004	±0.01
	-20	13.5598		-0.001	
	-10	13.5997		-0.002	
	0	13.5602		0.001	
	10	13.5600		0	
	20	13.5601		0.0007	
	30	13.5997		-0.002	
	40	13.5596		-0.003	
	50	13.5596		-0.003	

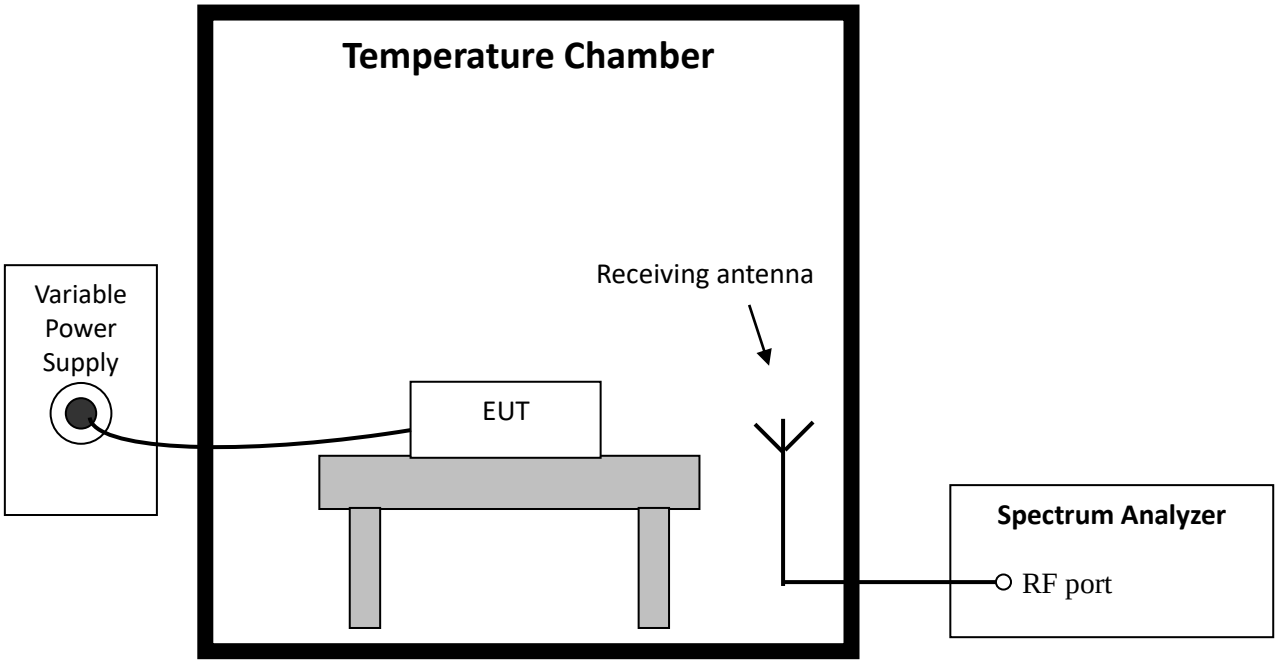
6 Frequency Stability (Voltage Variation)

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	177	13.5997	13.56	-0.002	±0.01
	208	13.5602		0.001	
	240	13.5601		0.0007	
	276	13.5596		-0.003	

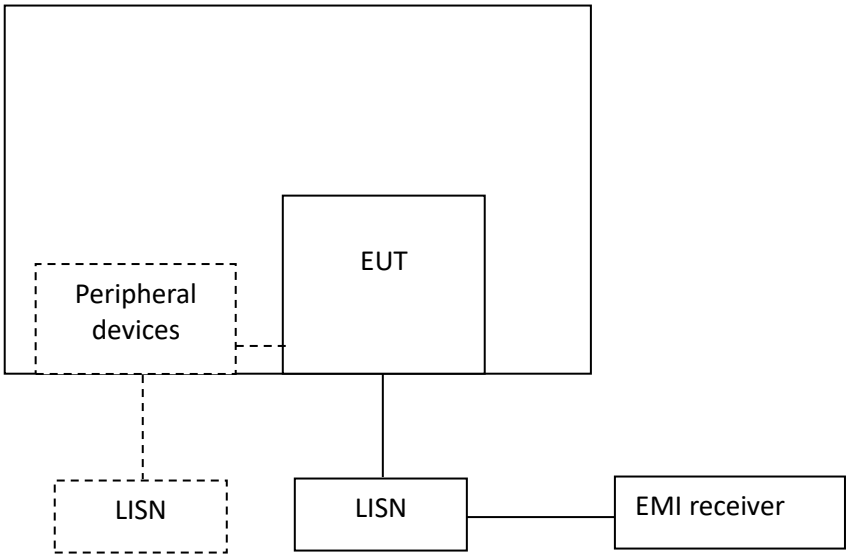
7 Conducted emissions

Test result: **Pass**

7.1 Limit

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		

7.2 Test Configuration



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.

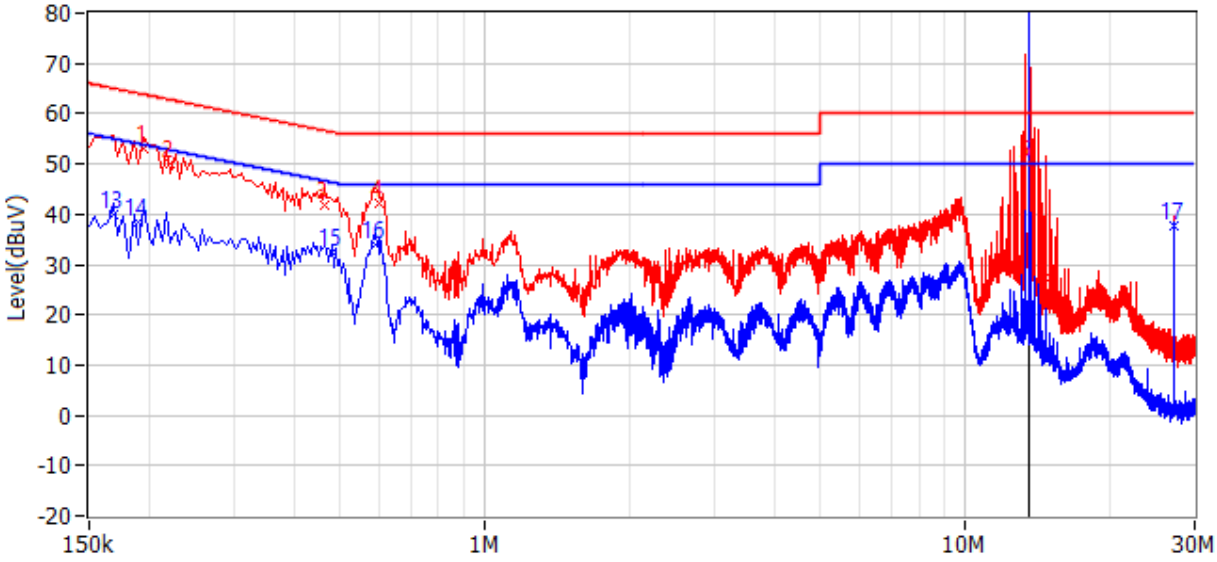
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on 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.

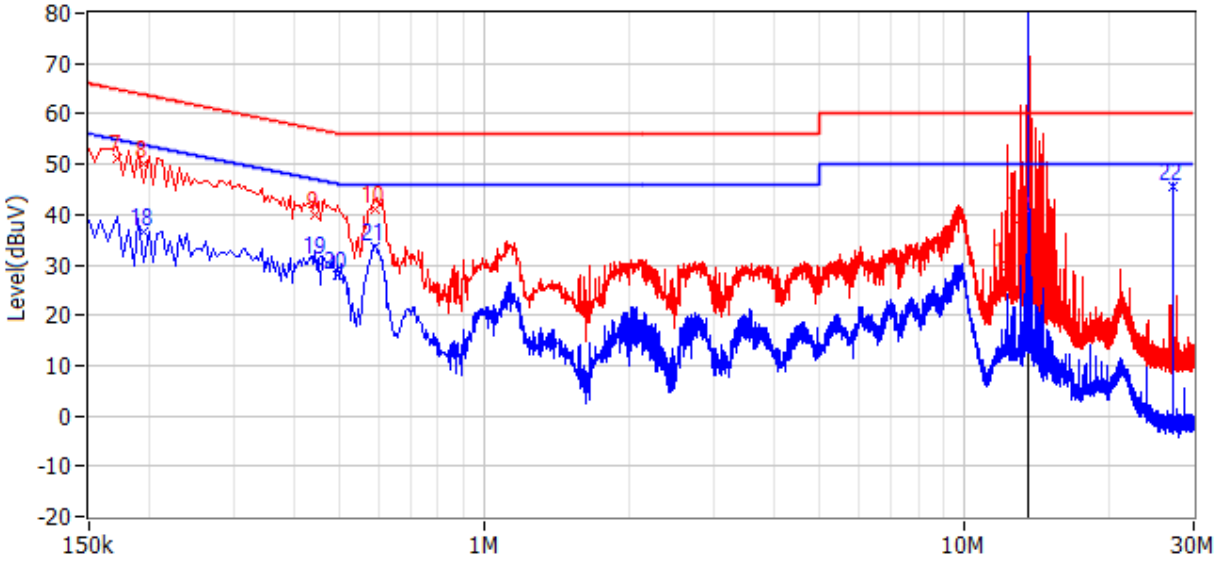
7.4 Test Results of Conducted Emissions

Test Voltage: 240VAC/60Hz

L1 Line



L2 Line



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No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Detector	Phase
1	195.000kHz	63.8	52.9	10.9	QP	L1
2	222.000kHz	62.7	50.0	12.8	QP	L1
3	465.000kHz	56.6	41.8	14.8	QP	L1
4	600.000kHz	56.0	42.0	14.0	QP	L1
5	13.443MHz	60.0	50.1	9.9	QP	L1
6	14.973MHz	60.0	23.6	36.4	QP	L1
7	172.500kHz	64.8	51.3	13.5	QP	L2
8	195.000kHz	63.8	50.0	13.9	QP	L2
9	442.500kHz	57.0	40.1	16.9	QP	L2
10	591.000kHz	56.0	41.2	14.8	QP	L2
11	12.282MHz	60.0	30.0	30.0	QP	L2
12	13.074MHz	60.0	39.3	20.7	QP	L2
13	168.000kHz	55.1	40.0	15.0	CAV	L1
14	190.500kHz	54.0	38.6	15.4	CAV	L1
15	478.500kHz	46.4	32.3	14.1	CAV	L1
16	591.000kHz	46.0	34.1	11.9	CAV	L1
17	27.123MHz	50.0	37.5	12.5	CAV	L1
18	195.000kHz	53.8	36.4	17.4	CAV	L2
19	447.000kHz	46.9	30.8	16.1	CAV	L2
20	492.000kHz	46.1	28.1	18.1	CAV	L2
21	591.000kHz	46.0	33.7	12.3	CAV	L2
22	27.123MHz	50.0	45.5	4.5	CAV	L2
23*	13.560MHz	-	-	-	-	L1
24*	13.560MHz	-	-	-	-	L2

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 = Limit - Level
4. the emissions of 13.56MHz are the product's RF signal.

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 = 66.00dBuV - 22.00dBuV = 44.00dB.

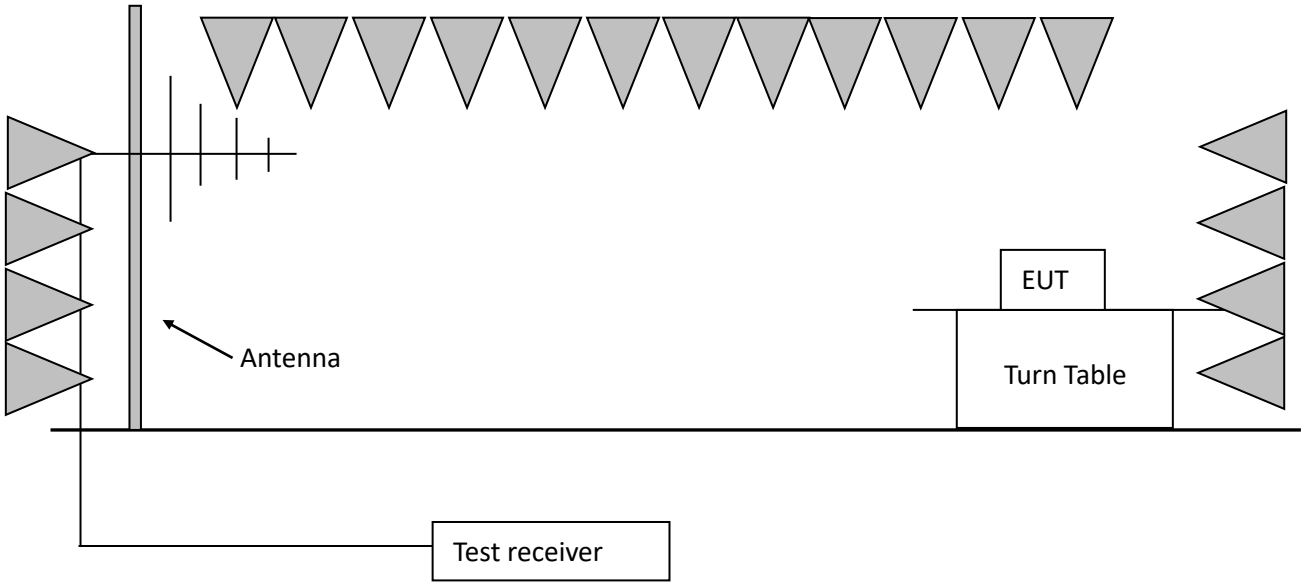
8 20dB Bandwidth

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



8.3 Test procedure and test set up

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

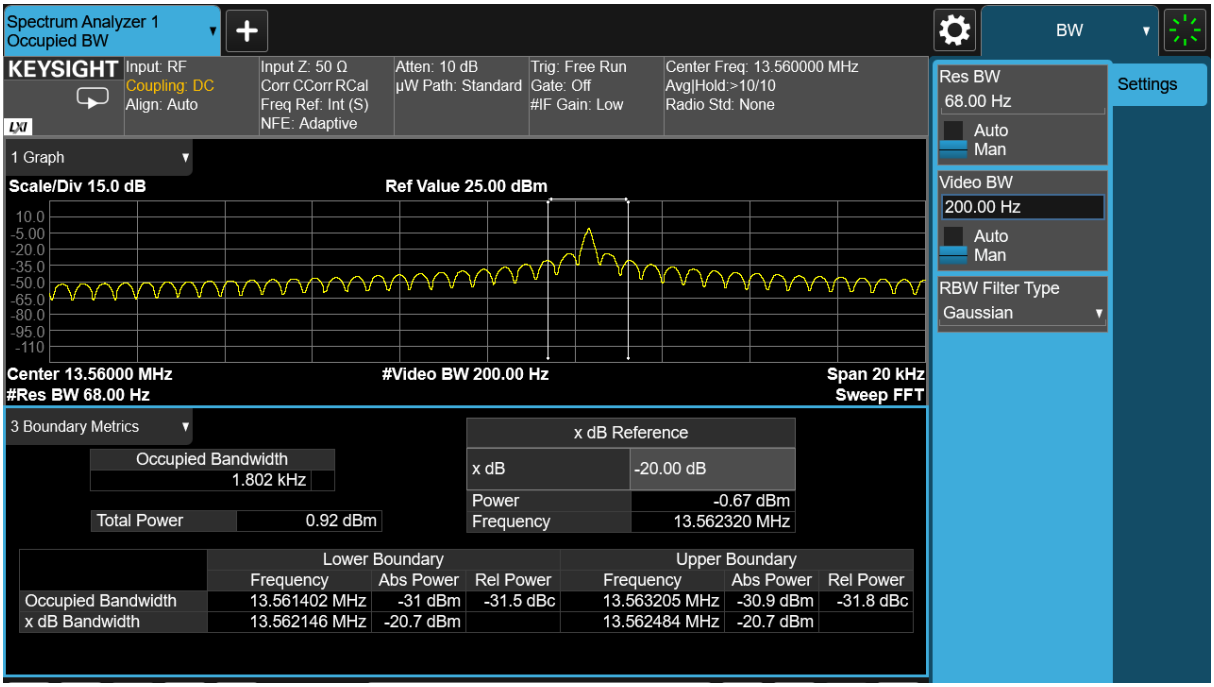
The center of the loop antenna shall be 1 m above the horizontal metal ground plane.

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	13.561402	13.563205	0.338	13.553 ~ 13.567
Occupied bandwidth	13.562146	13.562484	1.803	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 **********