RAE Systems, Inc

RF TEST REPORT

Report Type:
FCC Part 15.225 RF report

Model:
1904C-1002, 1904C-1000

REPORT NUMBER:
220600314SHA-001

ISSUE DATE:
February 14, 2023

DOCUMENT CONTROL NUMBER:
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TEST REPORT

Report no.: 220600314SHA-001

Applicant	:	RAE Systems, Inc 1349 Moffett Park Drive Sunnyvale, CA 94089
Manufacturer	:	RAE Systems, Inc 1349 Moffett Park Drive Sunnyvale, CA 94089
FCC ID	:	SU3VERTEXVC4

SUMMARY:

The equipment complies with the requirements according to the following standard(s) or Specification:
47CFR Part 15 (2020): Radio Frequency Devices (Subpart C) **ANSI C63.10 (2013):** 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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Content

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Revision History

Report No.	Version	Description	Issued Date
220600314SHA-001	Rev. 01	Initial issue of report	February 14, 2023

Measurement result summary

TEST ITEM	FCC REFERANCE	RESULT
20dB Bandwidth&99% Bandwidth	15.215(c) 2.1049	Pass
Fundamental Field Strength and Emission Mask	15.205 & 15.225(a) (b) (c)	Pass
Emission outside the frequency band	15.225(d) /15.109	Pass
Power line conducted emission	15.207	Pass
Frequency Stability	15.225(e)	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:	VC4 Gas Monitor
Type/Model:	1904C-1002, 1904C-1000
Description of EUT:	The product covered by this report is Gas Monitor continuously monitors four locations (called points) for toxic gases, both models are same except rated ratings and pump. After evaluation, we performed Conducted Emission and Spurious Emission tests on both two models and choose 1904C-1000 for other tests.
Rating:	1904C-1002: 220V~, 50/60Hz, 2A MAX 1904C-1000: 110V~, 50/60Hz, 3A MAX
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	December 13, 2022
Date of test:	December 13, 2022 – January 22, 2023

1.2 Technical Specification

Operation Frequency Band:	13.556 ~ 13.567MHz
Normal Working Frequency:	13.56MHz
Channel Number:	1
Type of Modulation:	ASK
Antenna Designation:	Fixed Internal Loop Antenna

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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.: CN0014
	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)
ANSI C63.10 (2013)

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	ESxS-K1	R&S	V2.1.0
Radiated emission	ES-K1	R&S	V1.71

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

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2023-09-11
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2023-05-29
☐	Pre-amplifier	R&S	Pre-amp 18	EC5262	2023-06-19
☐	Horn antenna	R&S	HF 906	EC 3049	2023-11-17
☐	Horn antenna	ETS	3117	EC 4792-1	2024-01-08
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2023-07-08
☐	Pre-amplifier	R&S	Pre-amp 18	EC5262	2023-06-19
☒	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2023-03-07
Conducted Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESCS 30	EC 2107	2023-07-15
☒	A.M.N.	R&S	ESH2-Z5	EC 3119	2023-12-07
☐	A.M.N.	R&S	ENV 216	EC 3393	2023-07-04
☐	A.M.N.	R&S	ENV4200	EC 3558	2023-06-10
☐	Absorbing clamp	R&S	MDS 21	EC 2108	2023-06-19
☐	CDN	Frankonia	CDN M2M316	EC 5969	2023-03-15
☐	CDN	Schaffner	CDN M316	EC 2113-1	2023-07-16
☒	Attenuator	Weinschel	68-6-44	EC 3043-9	2024-02-04
☐	Tri-loop	Schwarzbeck	HXYZ 9170	EC 3384	2023-10-10
☐	Voltage Probe	Schwarzbeck	TK9420	EC 4888	2023-09-10
☐	Current probe	R&S	EZ-17	EC 3221	2023-03-15
☐	I.S.N.	FCC	FCC-TLISN -T2-02	EC 3754	2024-02-04
☐	I.S.N.	FCC	FCC-TLISN -T4-02	EC 3755	2024-02-04
☐	I.S.N.	FCC	FCC-TLISN -T8-02	EC 3756	2024-02-04
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2023-03-05
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2023-03-05
☐	MXG Analog Signal Generator	Agilent	N5181A	EC 5338-2	2023-03-05
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2023-03-05
☐	Power meter	Keysight	N1911A	EC 4318	2023-05-11
☐	Wideband Radio Communication	R&S	CMW500	EC 5944	2023-12-06

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	Tester				
☐	Mobile Test System	LitePoint	IQxel	EC 5176	2024-01-08
☐	Test Receiver	R&S	ESCI 7	EC 4501	2023-09-11
☒	Climate chamber	GWS	MT3065	EC 6021	2023-03-06
☐	Spectrum analyzer	Agilent	E7402A	EC 2254	2023-09-11
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3323	2023-06-13
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3324	2023-04-08
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2023-03-23
☐	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3326	2023-03-28

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
Occupied Channel Bandwidth	/	± 0.88 %

3 Fundamental Emission and Emission Mask

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

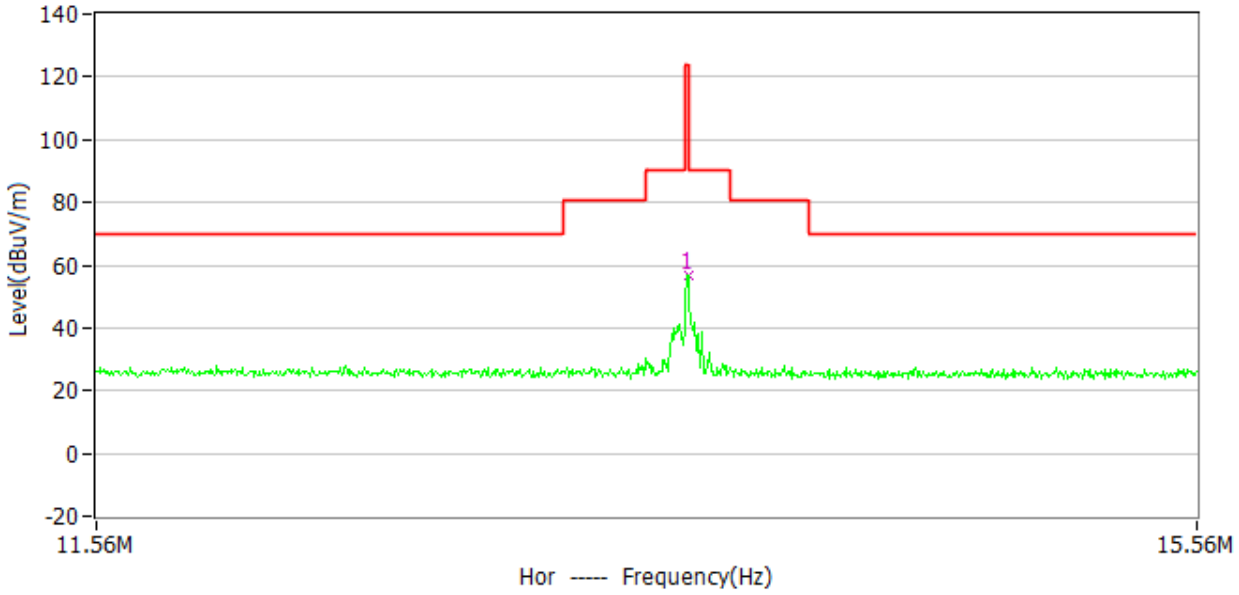
a) The EUT was placed on a 0.8m plank above the ground at a 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
b) The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height 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:

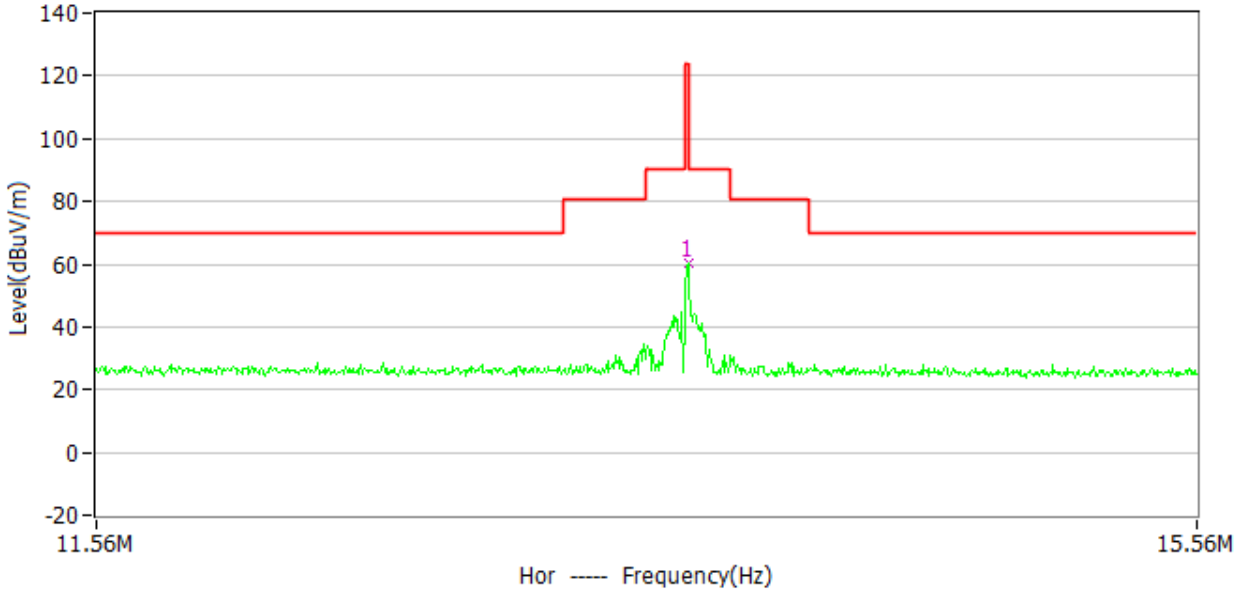
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

3.3 Test Results of Fundamental Emissions

X



Y



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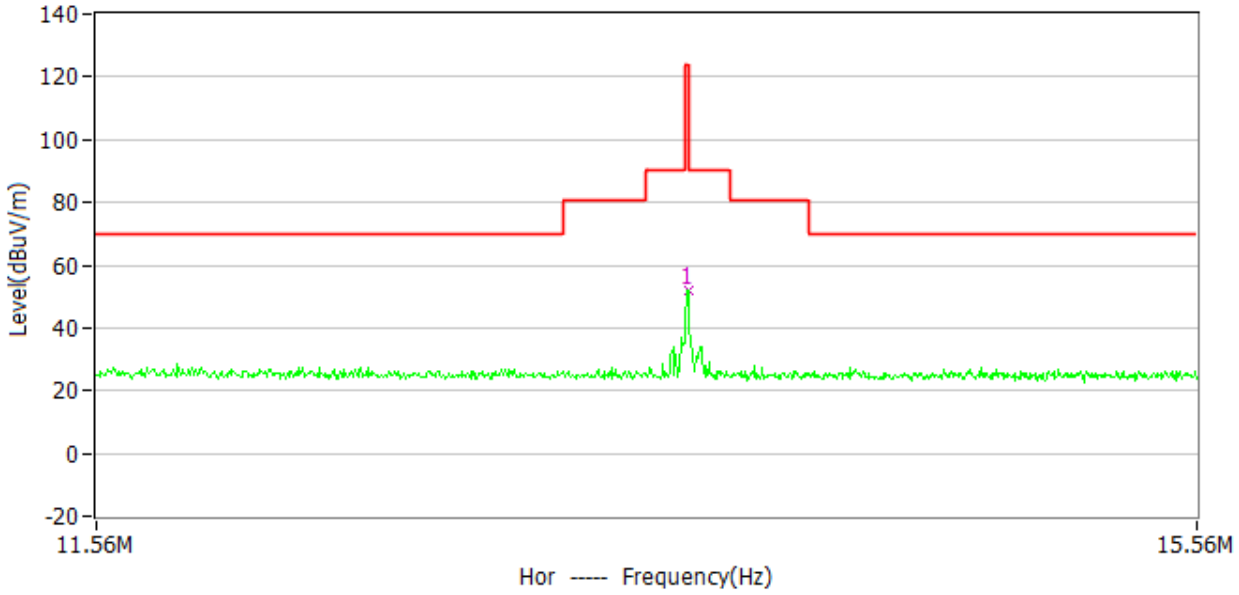
Z



Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector
X	13.56	56.80	20.30	124.00	67.20	PK
Y	13.56	60.10	20.30	124.00	63.90	PK
Z	13.56	52.10	20.30	124.00	71.90	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.

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

The EUT has been tested in all three orthogonal planes, it has the worst case when it is in horizontal position for both below 30MHz & above 30MHz.

Test data below 30MHz:

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Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin	Detector	Remark
X	0.64	58.60	71.50	12.90	PK	Spurious
X	7.16	42.40	69.50	27.10	PK	Spurious
Y	7.36	34.50	69.50	35.00	PK	Spurious
Y	24.11	42.80	69.50	26.70	PK	Spurious
Z	1.06	41.50	67.10	25.60	PK	Spurious
Z	9.51	30.20	69.50	39.30	PK	Spurious

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Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Limit (dBuV/m)	Margin	Detector	Remark
X	0.75	54.50	70.10	15.60	PK	Spurious
X	7.16	43.10	69.50	26.40	PK	Spurious
Y	9.32	40.50	69.50	29.00	PK	Spurious
Y	24.11	42.60	69.50	26.90	PK	Spurious
Z	7.26	34.60	69.50	34.90	PK	Spurious
Z	9.51	31.20	69.50	38.30	PK	Spurious

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Test data from 30MHz to 1000MHz:

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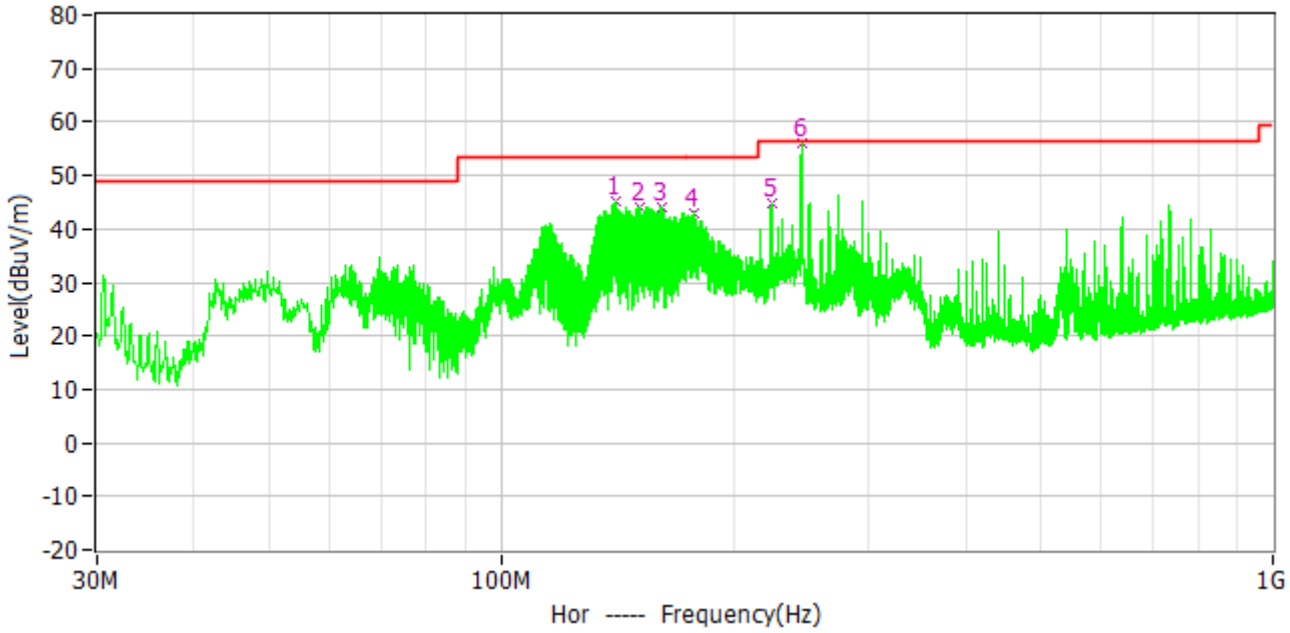

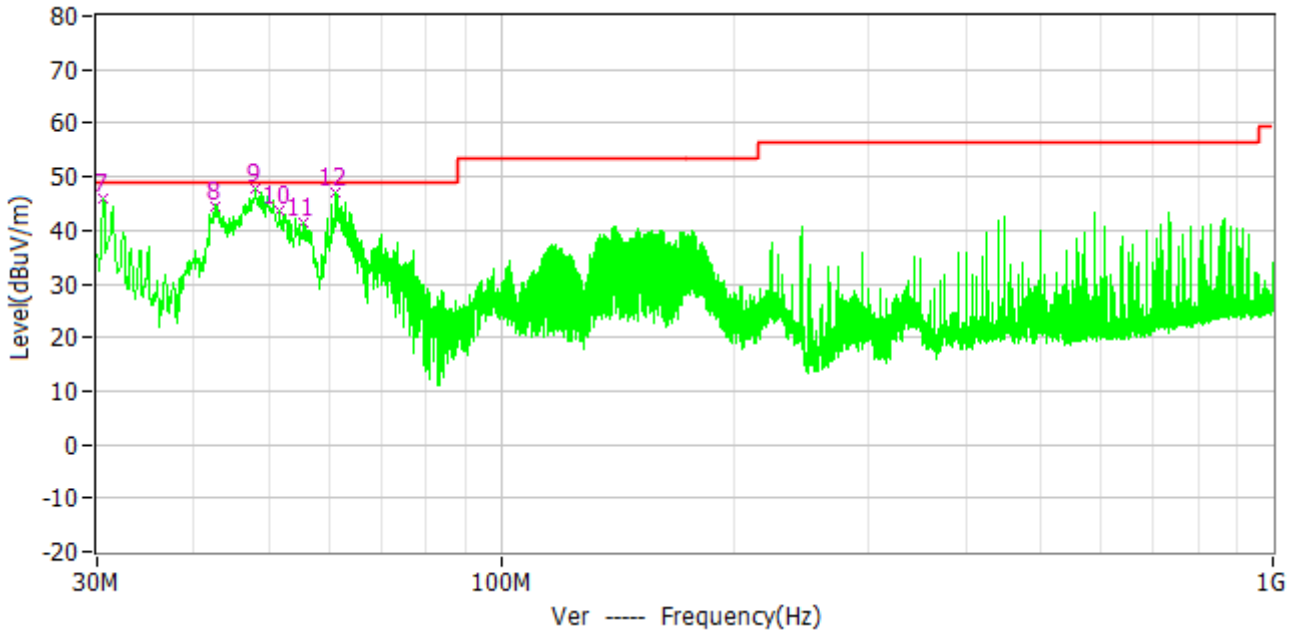

No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	140.677MHz	53.5	45.1	-8.4	31.0	14.1	PK	Hor	100.0	321.0
2*	151.250MHz	53.5	44.2	-9.3	29.7	14.5	PK	Hor	100.0	307.0
3*	161.726MHz	53.5	44.0	-9.5	29.3	14.7	PK	Hor	100.0	309.0
4*	178.313MHz	53.5	43.1	-10.4	29.8	13.3	PK	Hor	100.0	325.0
5*	224.000MHz	56.5	44.7	-11.8	32.4	12.3	PK	Hor	100.0	315.0
6*	244.952MHz	56.5	55.9	-0.6	42.7	13.2	PK	Hor	100.0	267.0

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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
7*	30.582MHz	49.0	46.1	-2.9	33.3	12.8	PK	Ver	100.0	226.0
8*	42.804MHz	49.0	44.6	-4.4	30.6	14.0	PK	Ver	100.0	184.0
9*	48.139MHz	49.0	47.9	-1.1	33.5	14.4	PK	Ver	100.0	136.0
10*	51.631MHz	49.0	43.8	-5.2	29.3	14.5	PK	Ver	100.0	128.0
11*	55.608MHz	49.0	41.3	-7.7	27.0	14.3	PK	Ver	100.0	274.0
12*	61.234MHz	49.0	47.0	-2.0	33.0	14.0	PK	Ver	100.0	312.0

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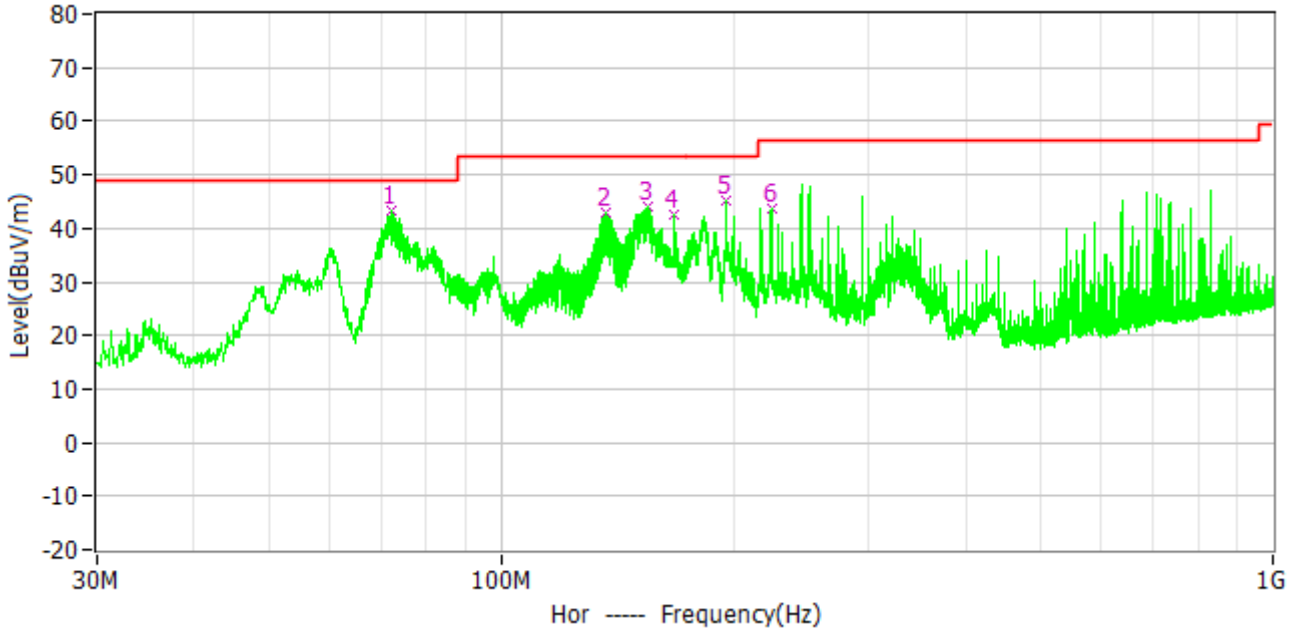

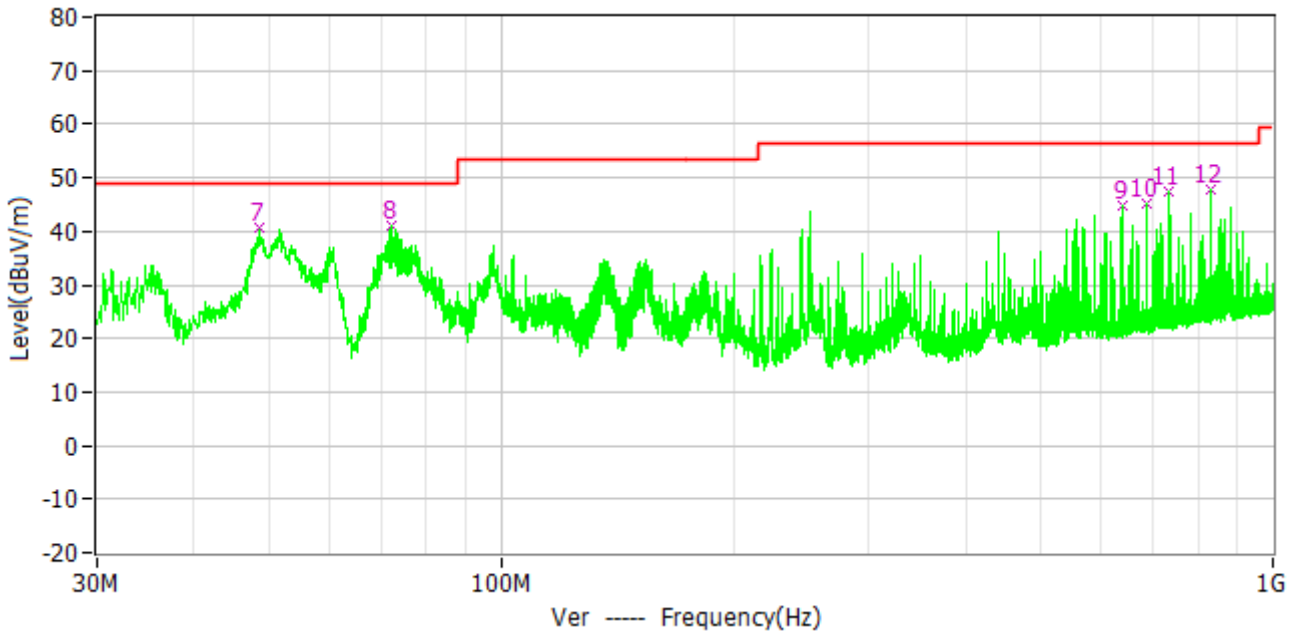

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No.	Frequency	Limit dBuV/m	Level dBuV/m	Delta dB	Reading dBuV	Factor dB/m	Detector	Polar	Height cm	Angle deg
1*	72.292MHz	49.0	43.4	-5.6	31.3	12.1	PK	Hor	100.0	360.0
2*	136.506MHz	53.5	42.8	-10.7	29.2	13.6	PK	Hor	100.0	68.0
3*	155.033MHz	53.5	44.1	-9.4	29.4	14.7	PK	Hor	100.0	77.0
4*	167.934MHz	53.5	42.5	-11.0	28.3	14.2	PK	Hor	100.0	360.0
5*	195.967MHz	53.5	45.2	-8.3	33.5	11.7	PK	Hor	100.0	360.0
6*	224.000MHz	56.5	43.8	-12.7	31.5	12.3	PK	Hor	100.0	311.0
7*	48.721MHz	49.0	40.5	-8.5	26.0	14.5	PK	Ver	100.0	92.0
8*	72.389MHz	49.0	41.0	-8.0	29.0	12.0	PK	Ver	100.0	241.0
9*	637.026MHz	56.5	44.8	-11.7	22.1	22.7	PK	Ver	100.0	271.0
10*	686.011MHz	56.5	45.1	-11.4	21.8	23.3	PK	Ver	100.0	209.0
11*	734.996MHz	56.5	47.3	-9.2	23.1	24.2	PK	Ver	100.0	171.0
12*	833.063MHz	56.5	47.8	-8.7	22.1	25.7	PK	Ver	100.0	148.0

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.

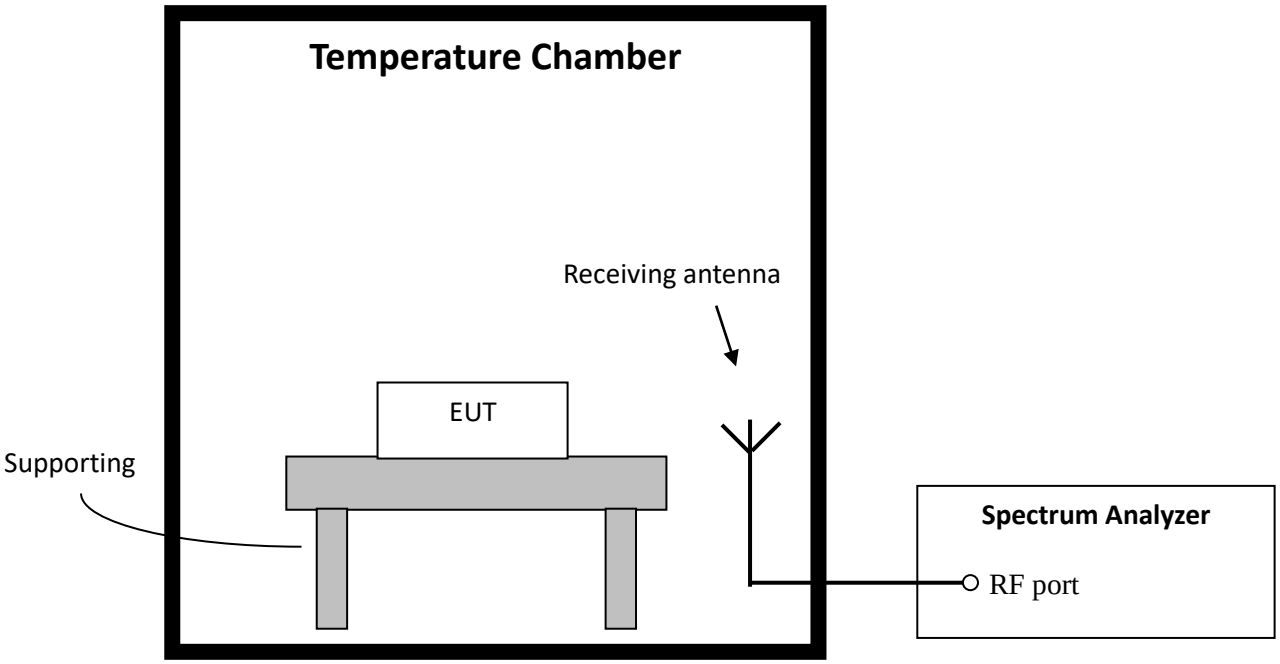
5 Frequency Stability (Temperature Variation)

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 (%)
120	-20	13.561	13.560	0.007	0.01
	-10	13.561		0.007	
	0	13.561		0.007	
	10	13.560		0	
	20	13.560		0	
	30	13.560		0	
	40	13.560		0	
	50	13.561		0.007	

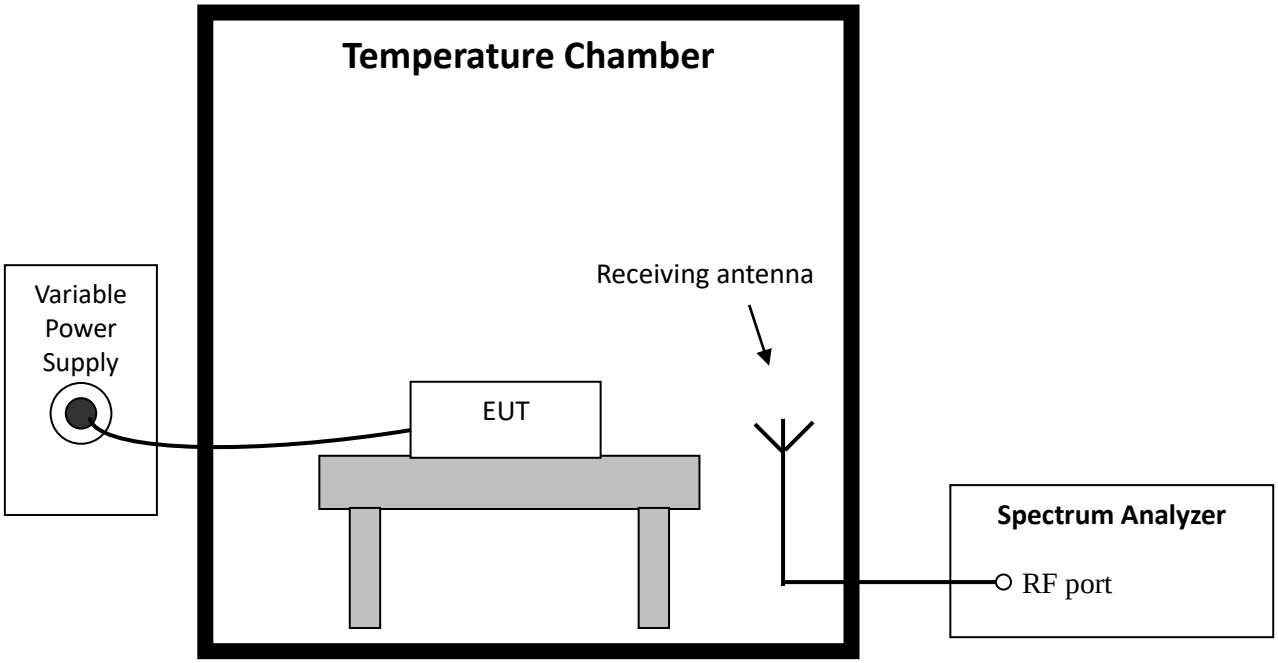
6 Frequency Stability (Voltage Variation)

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.

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6.4 Test protocol

Temp (ºC)	Voltage (V)	Freq Measured (MHz)	Freq nominal (MHz)	Tolerance (%)	Limit (%)
20	120	13.560	13.560	0	0.01
	102	13.561		0.007	
	138	13.561		0.007	

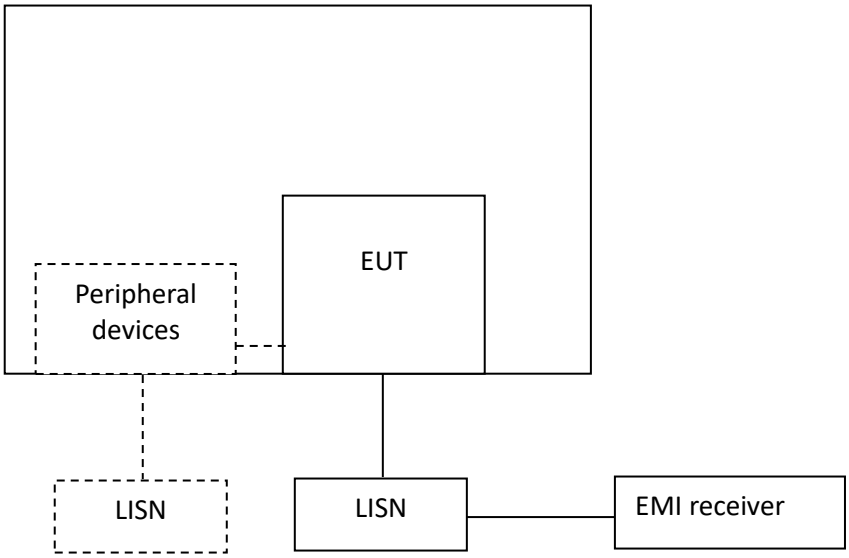
7 Conducted emissions

Test result: **Pass**

7.1 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.		

7.2 Test Configuration



7.3 Measurement Procedure

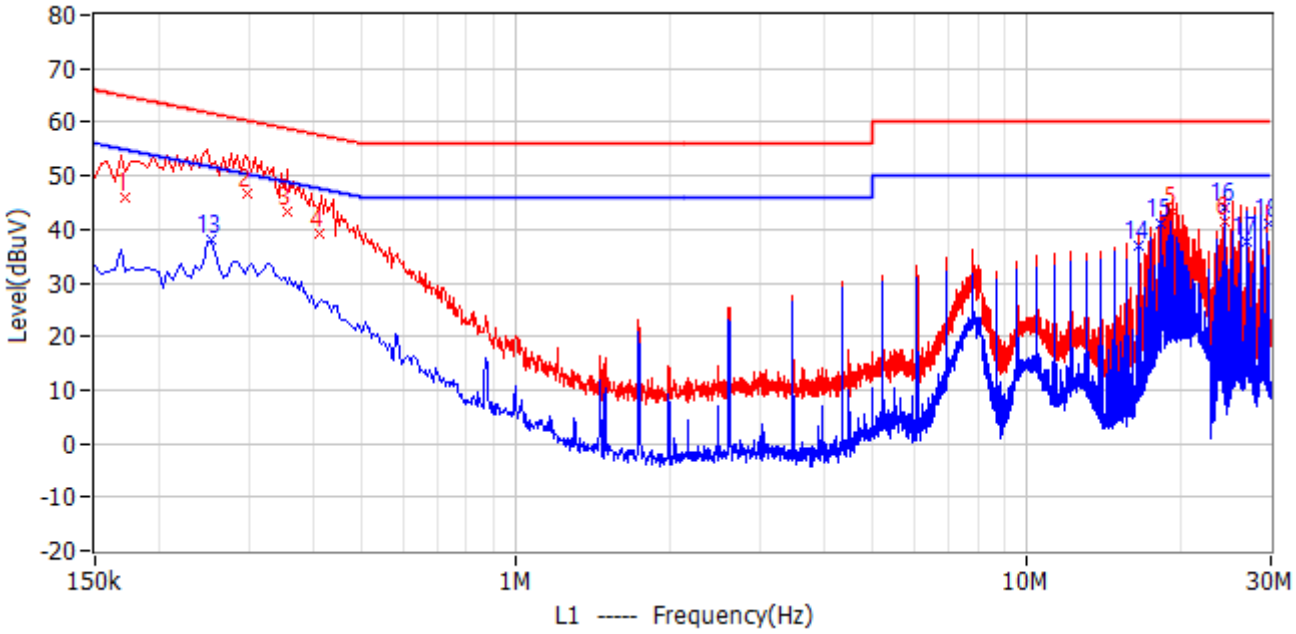
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be 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.

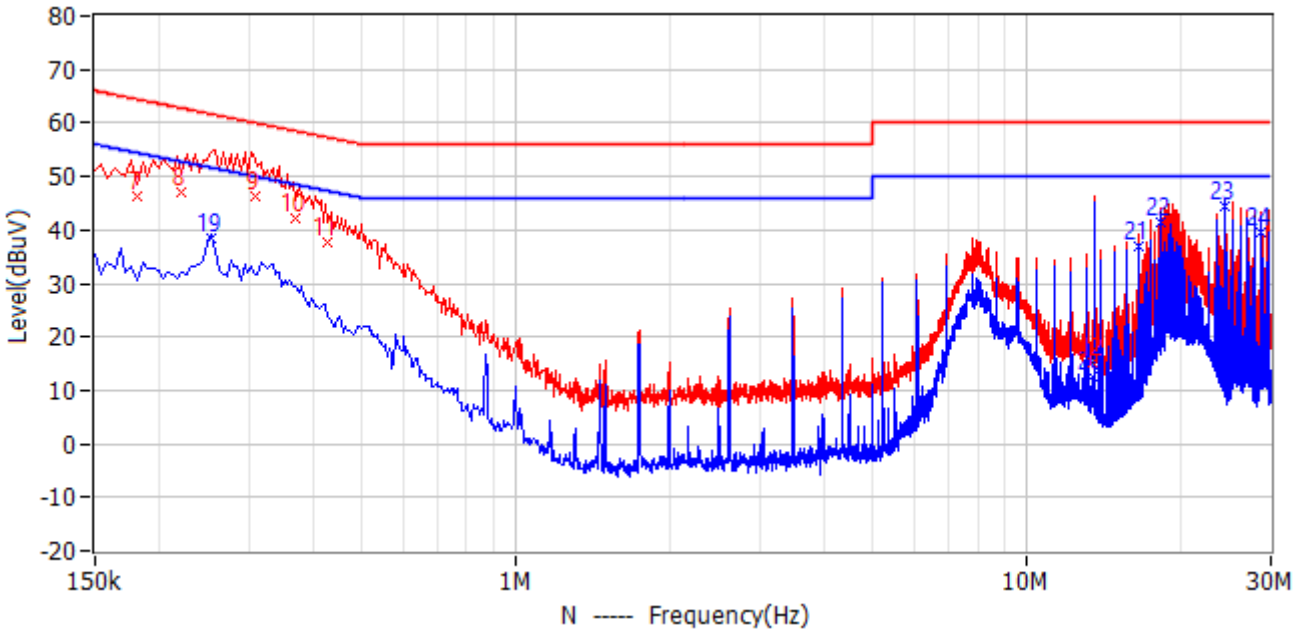
Tabletop devices shall be placed on a platform of nominal size 1 m by 1.5 m, raised 80 cm above the reference ground plane. The vertical conducting plane or wall of an RF-shielded (screened) room shall be located 40 cm to the rear of the EUT. Floor-standing devices shall be placed either directly on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

1904C-1002



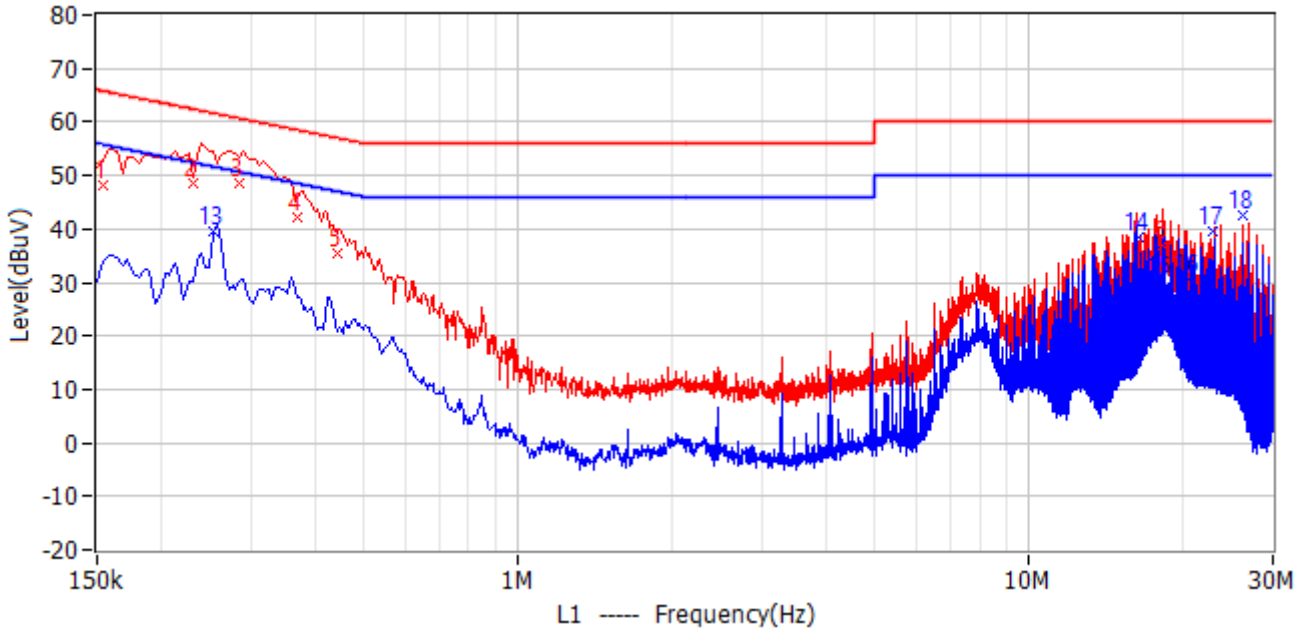


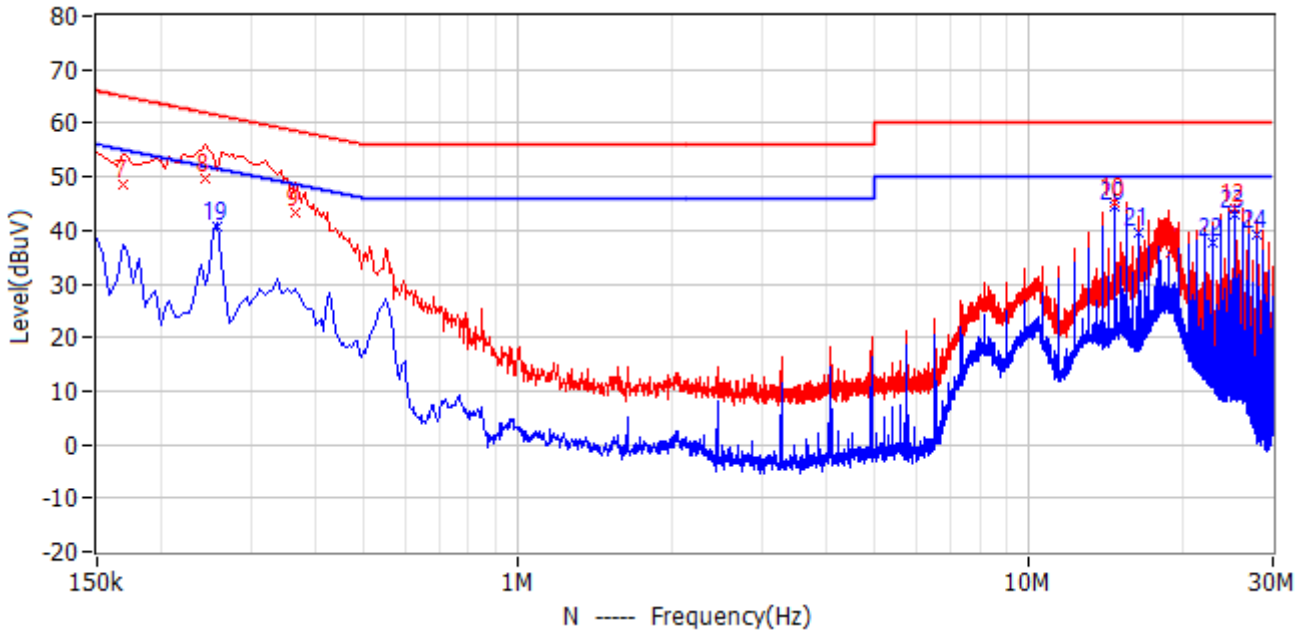
TEST REPORT

No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	172.500kHz	64.8	46.0	-18.9	39.9	6.1	QP	L1
2	298.500kHz	60.3	46.6	-13.7	40.4	6.2	QP	L1
3	357.000kHz	58.8	43.3	-15.5	37.1	6.2	QP	L1
4	411.000kHz	57.6	39.1	-18.5	32.9	6.2	QP	L1
5	19.221MHz	60.0	43.2	-16.8	36.8	6.4	QP	L1
6	24.365MHz	60.0	41.6	-18.4	35.2	6.4	QP	L1
7	181.500kHz	64.4	46.2	-18.3	40.0	6.2	QP	N
8	222.000kHz	62.7	47.0	-15.8	40.7	6.3	QP	N
9	307.500kHz	60.0	46.4	-13.6	40.2	6.2	QP	N
10	370.500kHz	58.5	42.2	-16.3	36.0	6.2	QP	N
11	429.000kHz	57.3	37.8	-19.5	31.5	6.3	QP	N
12	13.493MHz	60.0	15.2	-44.8	8.8	6.4	QP	N
13	253.500kHz	51.6	38.2	-13.4	32.0	6.2	CAV	L1
14	16.548MHz	50.0	37.0	-13.0	30.6	6.4	CAV	L1
15	18.290MHz	50.0	40.9	-9.1	34.5	6.4	CAV	L1
16	24.383MHz	50.0	44.1	-5.9	37.7	6.4	CAV	L1
17	26.993MHz	50.0	37.6	-12.4	31.1	6.5	CAV	L1
18	29.607MHz	50.0	41.1	-8.9	34.5	6.6	CAV	L1
19	253.500kHz	51.6	38.3	-13.3	32.1	6.2	CAV	N
20	13.493MHz	50.0	12.7	-37.3	6.3	6.4	CAV	N
21	16.544MHz	50.0	37.1	-12.9	30.6	6.5	CAV	N
22	18.285MHz	50.0	41.4	-8.6	34.9	6.5	CAV	N
23	24.378MHz	50.0	44.6	-5.4	38.1	6.5	CAV	N
24	28.730MHz	50.0	39.5	-10.5	32.9	6.6	CAV	N

TEST REPORT

1904C-1000





TEST REPORT

No.	Frequency	Limit dBuV	Level dBuV	Delta dB	Reading dBuV	Factor dB	Detector	Phase
1	154.500kHz	65.8	48.2	-17.6	42.0	6.2	QP	L1
2	231.000kHz	62.4	48.6	-13.8	42.4	6.2	QP	L1
3	285.000kHz	60.7	48.5	-12.2	42.3	6.2	QP	L1
4	370.500kHz	58.5	42.0	-16.5	35.8	6.2	QP	L1
5	442.500kHz	57.0	35.3	-21.7	29.1	6.2	QP	L1
6	18.321MHz	60.0	36.8	-23.2	30.4	6.4	QP	L1
7	168.000kHz	65.1	48.6	-16.5	42.4	6.2	QP	N
8	244.500kHz	61.9	49.5	-12.4	43.3	6.2	QP	N
9	366.000kHz	58.6	43.4	-15.2	37.2	6.2	QP	N
10	14.739MHz	60.0	45.3	-14.7	38.8	6.5	QP	N
11	18.987MHz	60.0	35.7	-24.3	29.2	6.5	QP	N
12	25.382MHz	60.0	44.1	-15.9	37.5	6.6	QP	N
13	253.500kHz	51.6	39.4	-12.2	33.2	6.2	CAV	L1
14	16.373MHz	50.0	38.4	-11.6	32.0	6.4	CAV	L1
15	18.132MHz	50.0	30.1	-19.9	23.7	6.4	CAV	L1
16	20.463MHz	50.0	30.6	-19.4	24.2	6.4	CAV	L1
17	22.925MHz	50.0	39.7	-10.3	33.3	6.4	CAV	L1
18	26.201MHz	50.0	42.6	-7.4	36.1	6.5	CAV	L1
19	258.000kHz	51.5	40.6	-10.9	34.4	6.2	CAV	N
20	14.739MHz	50.0	44.3	-5.7	37.8	6.5	CAV	N
21	16.377MHz	50.0	39.6	-10.4	33.1	6.5	CAV	N
22	22.929MHz	50.0	37.7	-12.3	31.2	6.5	CAV	N
23	25.382MHz	50.0	42.8	-7.2	36.2	6.6	CAV	N
24	27.839MHz	50.0	39.3	-10.7	32.7	6.6	CAV	N

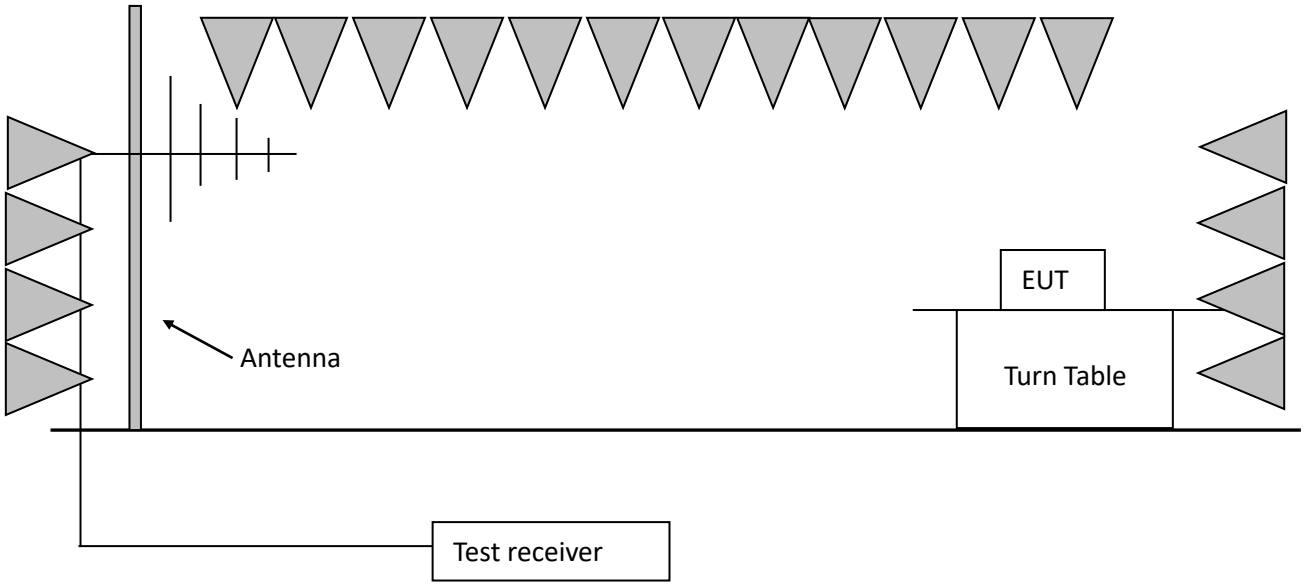
8 99% and 20dB Bandwidth

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.

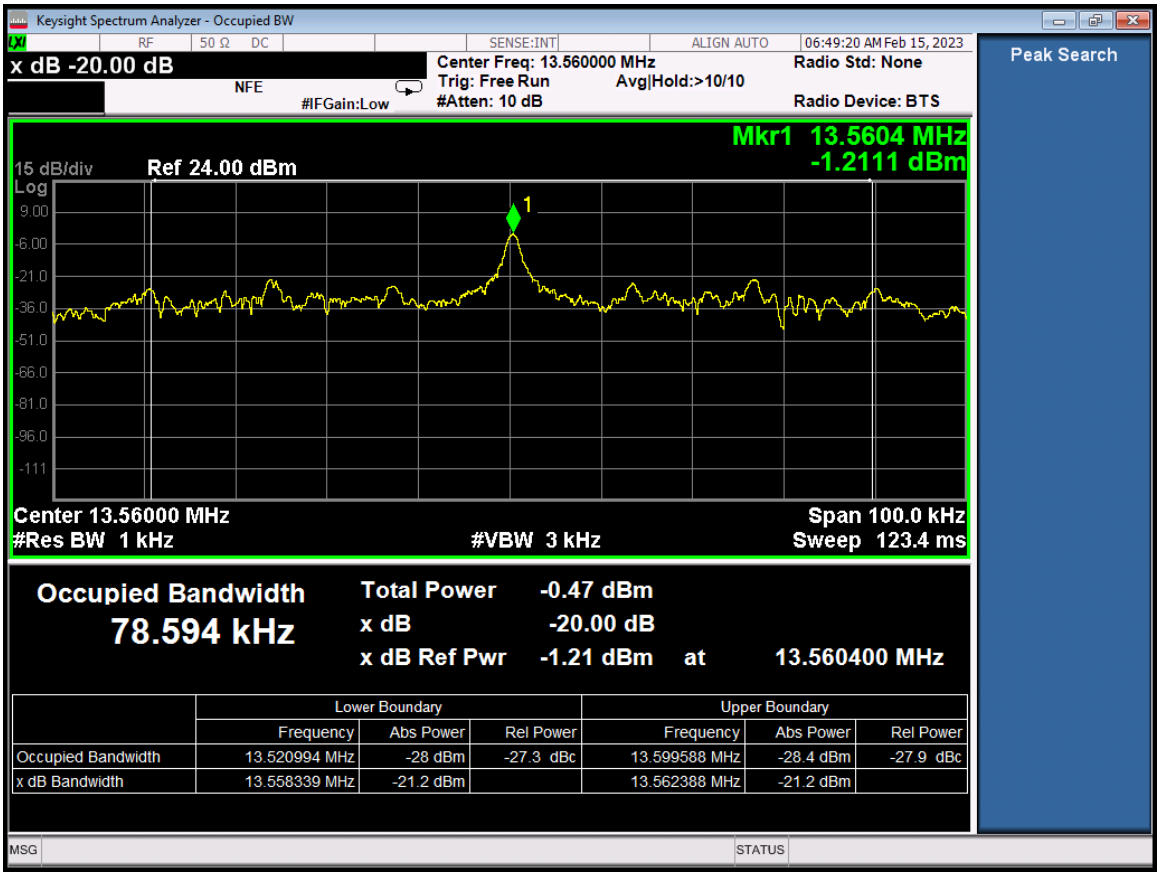
The center of the loop antenna shall be 1 m above the horizontal metal ground plane.

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 (MHz)	Allocated bandwidth (MHz)
99% Bandwidth	13.521	13.600	0.079	/
20dB Bandwidth	13.558	13.562	0.004	13.553 ~ 13.567



	Lower Boundary			Upper Boundary		
	Frequency	Abs Power	Rel Power	Frequency	Abs Power	Rel Power
Occupied Bandwidth	13.520994 MHz	-28 dBm	-27.3 dBc	13.599588 MHz	-28.4 dBm	-27.9 dBc
x dB Bandwidth	13.558339 MHz	-21.2 dBm		13.562388 MHz	-21.2 dBm	

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 **********