Oracle America, Inc

RF TEST REPORT

Report Type:
FCC Part 15.209 & RSS-210 RF report

Model:
MICROS Workstation 6 Series 2

REPORT NUMBER:
190503052SHA-001

ISSUE DATE:
Aug 1, 2019

DOCUMENT CONTROL NUMBER:
TTRFFCCPART15C_V1 © 2018 Intertek

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TEST REPORT

Report no.: 190503052SHA-001

Applicant	:	Oracle America, Inc 500 Oracle Parkway Redwood City, CA 94065 US
Manufacturer	:	Oracle America, Inc 500 Oracle Parkway Redwood City, CA 94065 US
Factory	:	GES Manufacturing Services (M) SDN BHD Plo 34 Fasa 2, Kawasan Perindustrian, Senai 81400, Johor, Malaysia
FCC ID	:	A4HWS6S2
IC	:	9870A-WS6S2

SUMMARY:

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

47CFR Part 15 (2018): Radio Frequency Devices (Subpart C)

RSS-210 (Issue 9): Licence-Exempt Radio Apparatus: Category I Equipment

RSS-Gen (Issue 5): General Requirements for Compliance of Radio Apparatus

ANSI C63.10 (2013): American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

PREPARED BY:	**REVIEWED BY:**
Project Engineer Stephanie Zhang	Reviewer Wakeyou Wang

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Content

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Revision History

Report No.	Version	Description	Issued Date
190503052SHA-001	Rev. 01	Initial issue of report	Aug 1, 2019

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Measurement result summary

TEST ITEM	FCC REFERANCE	IC REFERANCE	RESULT
Radiated emissions	15.209	RSS-210 Clause 4.4	Pass
Conducted emissions	15.207	RSS-GEN Clause 8.8	Pass
99% Bandwidth	-	RSS-GEN Clause 6.7	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:	Point of Sale Terminal
Type/Model:	MICROS Workstation 6 Series 2
Description of EUT:	There is one model only. The RF function is assessed in this report. There are two optional panels that are electrical identical except for different ports. Both were tested and the worse data is listed in this report. Among this report, an AC/DC adapter was used to power up the EUT, the adaptors information is as below: Model FSP120-AHAN3: Input: AC 100-240V, 50-60Hz, 2A; Output: DC 12V, 10A max. The device supports 802.11a/b/g/n/ac, Bluetooth and RFID functions. Among this report only 125kHz RFID was assessed.
Rating:	DC 12V-15V, 8.3A;
EUT type:	☒ Table top ☐ Floor standing
Software Version:	/
Hardware Version:	/
Sample received date:	June 14, 2019
Date of test:	June 14, 2019 – July 29, 2019

1.2 Technical Specification

Frequency Range:	125 kHz ~ 125 kHz

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: CN1175
	IC Registration Lab Registration code No.: 2042B-1
	VCCI Registration Lab Registration No.: R-4243, G-845, C-4723, T-2252
	NVLAP Accreditation Lab NVLAP LAB CODE: 200849-0
	A2LA Accreditation Lab Certificate Number: 3309.02

2 TEST SPECIFICATIONS

2.1 Standards or specification

47CFR Part 15 (2018)
RSS-210 (Issue 9)
RSS-Gen (Issue 5)
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
1	Adapter (12V DC power adaptor from the bottom power connector)	FSP120-AHAN3	/

2.5 Test environment condition:

Test items	Temperature	Humidity
Radiated emission	26°C	56% RH
Power line conducted emission	26°C	56% RH

2.6 Instrument list

Radiated Emission					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Test Receiver	R&S	ESIB 26	EC 3045	2019-09-12
☒	Bilog Antenna	TESEQ	CBL 6112D	EC 4206	2019-12-10
☒	Pre-amplifier	R&S	AFS42-00101800-25-S-42	EC5262	2020-06-11
☒	Horn antenna	R&S	HF 906	EC 3049	2019-11-16
☐	Horn antenna	ETS	3117	EC 4792-1	2020-02-25
☐	Horn antenna	TOYO	HAP18-26W	EC 4792-3	2020-07-09
☒	Active loop antenna	Schwarzbeck	FMZB1519	EC 5345	2020-03-14
RF test					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	PXA Signal Analyzer	Keysight	N9030A	EC 5338	2020-03-04
☐	Power sensor	Agilent	U2021XA	EC 5338-1	2020-03-04
☐	Vector Signal Generator	Agilent	N5182B	EC 5175	2020-03-04
☒	Climate chamber	GWS	MT3065	EC 6021	2020-07-02
☐	Spectrum Analyzer	Keysight	N9030A	EC 6078	2020-6-11
Tet Site					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☐	Shielded room	Zhongyu	-	EC 2838	2020-01-13
☐	Shielded room	Zhongyu	-	EC 2839	2020-01-13
☒	Semi-anechoic chamber	Albatross project	-	EC 3048	2019-07-31
☐	Fully-anechoic chamber	Albatross project	-	EC 3047	2019-07-31
Additional instrument					
Used	Equipment	Manufacturer	Type	Internal no.	Due date
☒	Therom-Hygrograph	ZJ1-2A	S.M.I.F.	EC 3325	2020-04-07

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

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 meter 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 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.

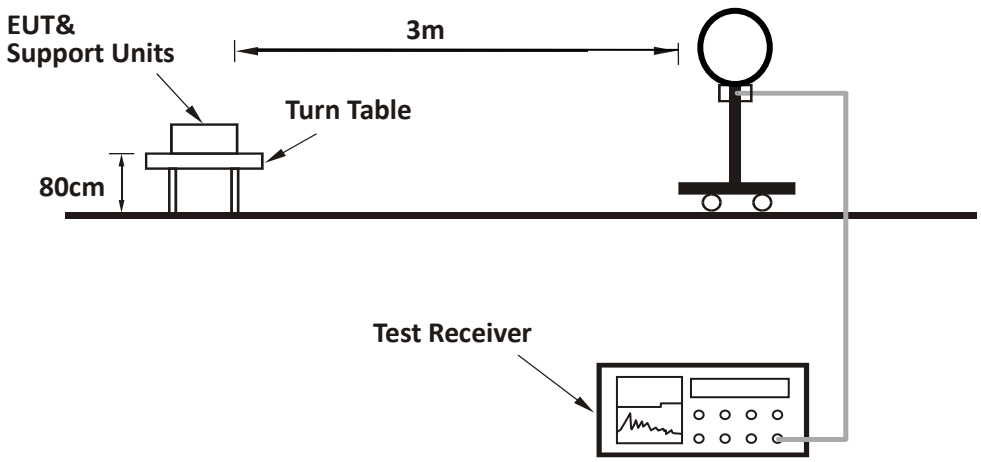
f) The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

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

3.3 Test Configuration

For Radiated emission below 30MHz:



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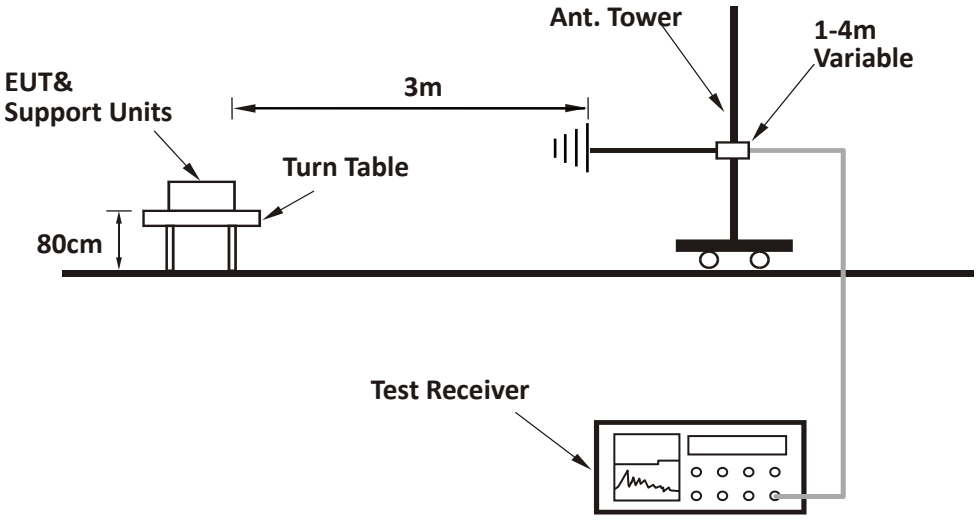
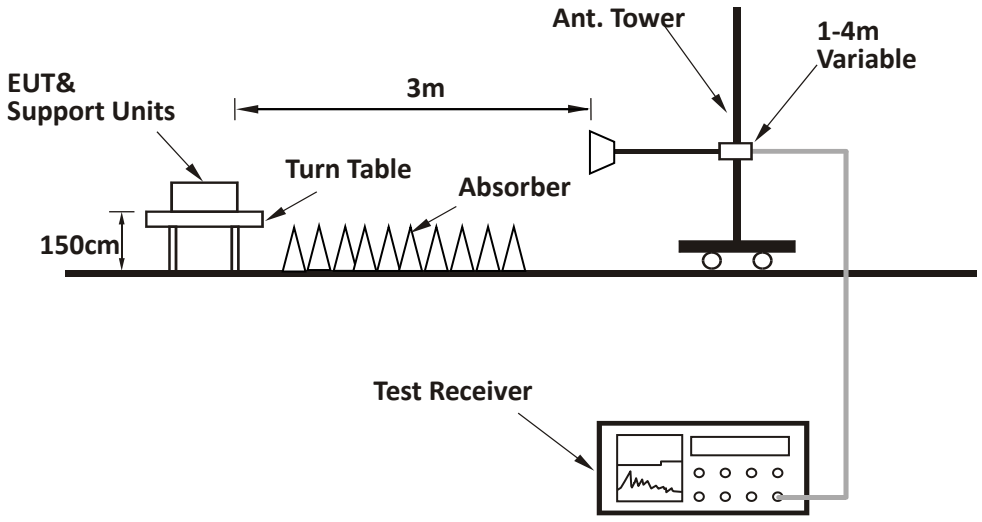
For Radiated emission 30MHz to 1GHz:



For Radiated emission above 1GHz:



3.4 Test Results of Radiated Emissions

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	85.70	20.20	105.67	19.97	PK	Fundamental
X	0.508	55.60	20.00	73.49	17.89	PK	Spurious
X	1.17	41.60	20.20	66.24	24.64	PK	Spurious
X	7.50	61.60	20.20	69.50	7.90	PK	Spurious
Y	9.84	41.60	20.20	69.50	27.90	PK	Spurious
Z	7.62	50.50	20.30	69.50	19.00	PK	Spurious
Z	21.20	40.50	20.80	69.50	29.00	PK	Spurious

Test data from 30MHz to 1000MHz:

Antenna Polarization	Frequency (MHz)	Corrected Reading (dBuV/m)	Correct Factor (dB/m)	Limit (dBuV/m)	Margin	Detector
H	162.18	31.70	11.20	43.50	11.80	PK
H	189.40	31.10	10.90	43.50	12.40	PK
H	325.47	40.50	15.70	46.00	5.50	PK
H	352.69	38.80	16.50	46.00	7.20	PK
H	597.62	34.00	20.90	46.00	12.00	PK
H	815.33	36.10	23.00	46.00	9.90	PK
V	78.60	29.40	7.80	43.50	14.10	PK
V	86.37	28.30	9.30	43.50	15.20	PK
V	127.19	27.10	13.10	43.50	16.40	PK
V	409.06	33.90	17.90	46.00	12.10	PK
V	696.75	31.10	21.60	46.00	14.90	PK
V	792.00	31.10	22.80	46.00	14.90	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
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.

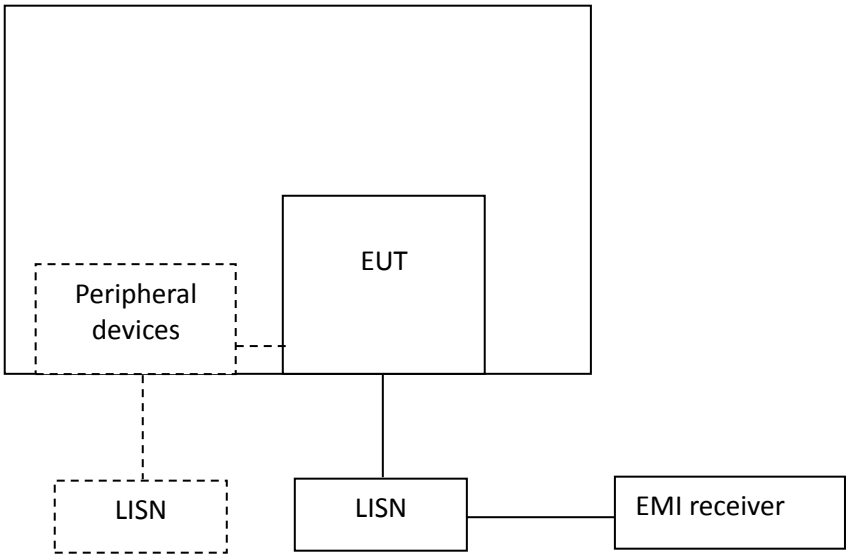
4 Conducted emissions

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



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4.3 Measurement Procedure

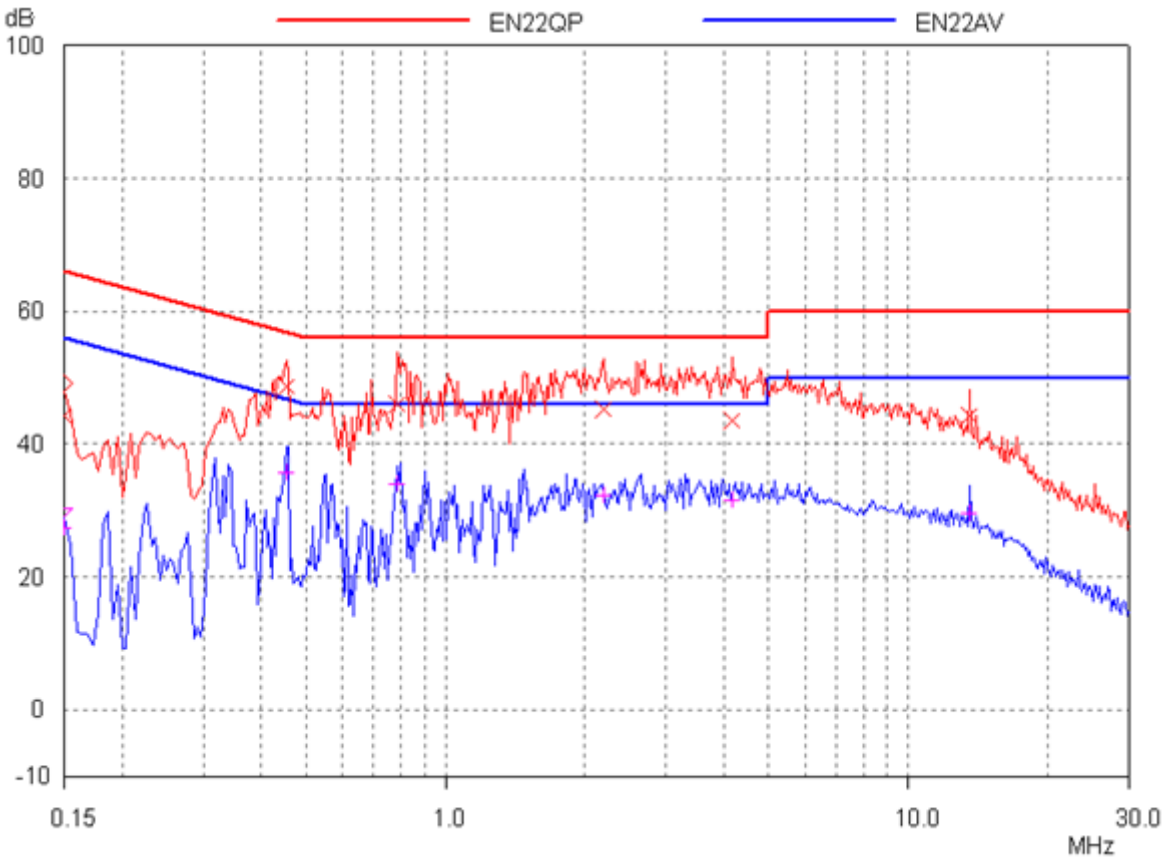
Measured levels of ac power-line conducted emission shall be the emission voltages from the voltage probe, where permitted, or across the 50 Ω LISN port (to which the EUT is connected), where permitted, terminated into a 50 Ω measuring instrument. All emission voltage and current measurements shall be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

4.4 Test Results of Conducted Emissions

L-Line



Frequency MHz	Quasi Pk dB	Limit dB	Delta dB	Average dB	Limit dB	Delta dB
0.15	44.35	66.00	21.65	27.37	56.00	28.63
0.4515	48.61	56.85	8.24	35.64	46.85	11.21
0.7845	45.93	56.00	10.07	34.00	46.00	12.00
2.175	45.23	56.00	10.77	32.18	46.00	13.82
4.155	43.57	56.00	12.43	31.48	46.00	14.52
13.56	44.37	60.00	15.63	29.68	50.00	20.32

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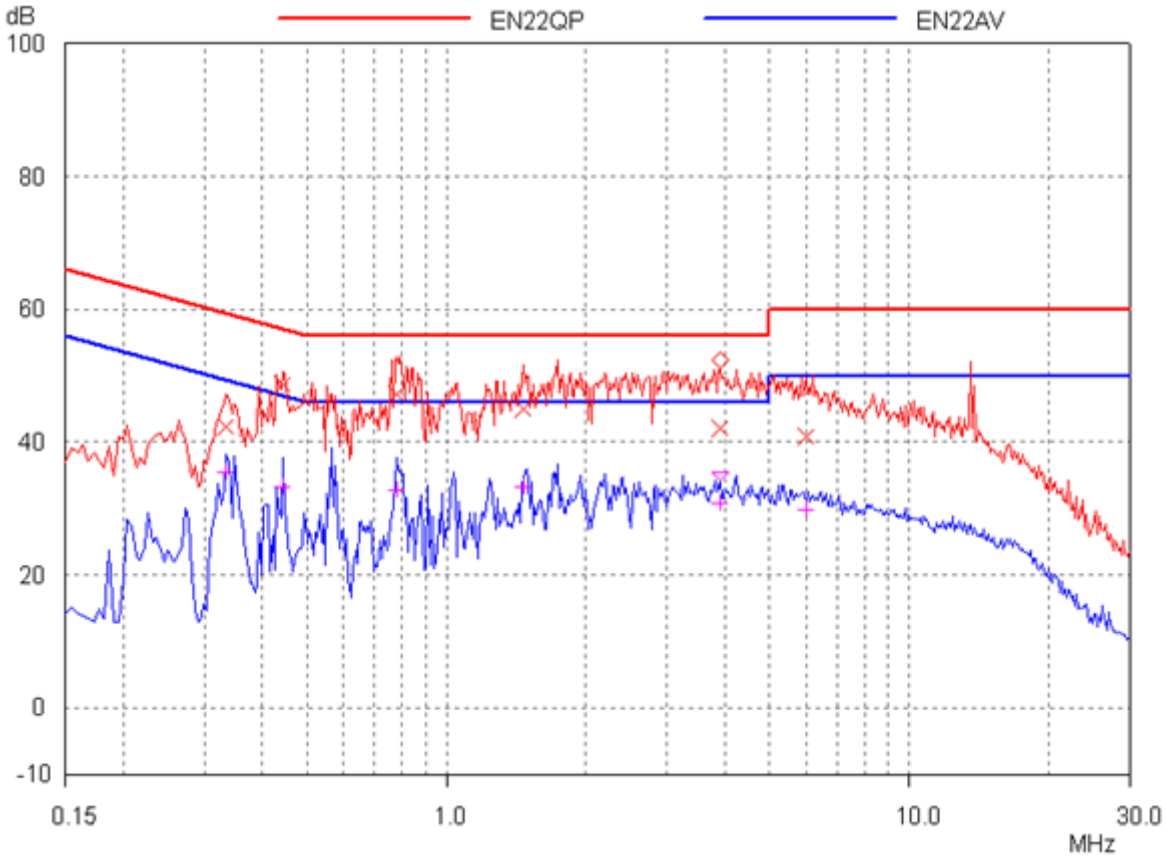
N-Line



Frequency MHz	Quasi Pk dB	Limit dB	Delta dB	Average dB	Limit dB	Delta dB
0.3345	42.27	59.34	17.07	35.56	49.34	13.78
0.4425	48.71	57.01	8.30	33.19	47.01	13.82
0.78	47.21	56.00	8.79	32.68	46.00	13.32
1.464	45.02	56.00	10.98	33.20	46.00	12.80
3.876	42.09	56.00	13.91	30.84	46.00	15.16
5.982	40.88	60.00	19.12	29.79	50.00	20.21

Remark: 1. Correct Factor = LISN Factor + Cable Loss, 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.

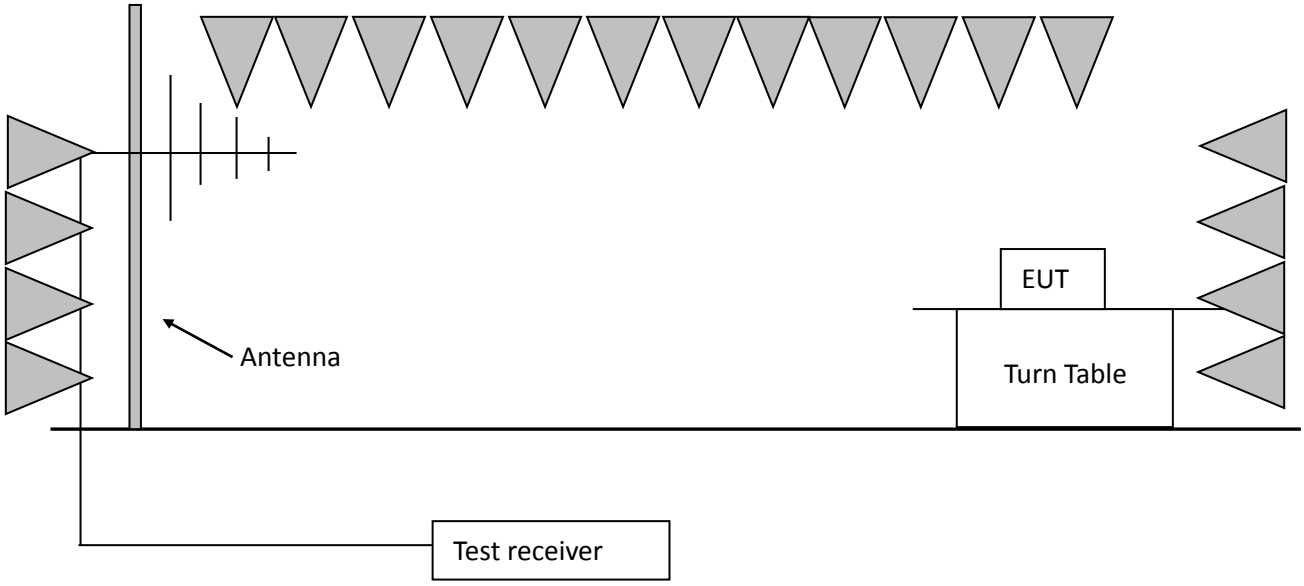
5 99% Bandwidth

Test result: Pass

5.1 Limit

No limit for 99% bandwidth.

5.2 Test configuration



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5.3 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).

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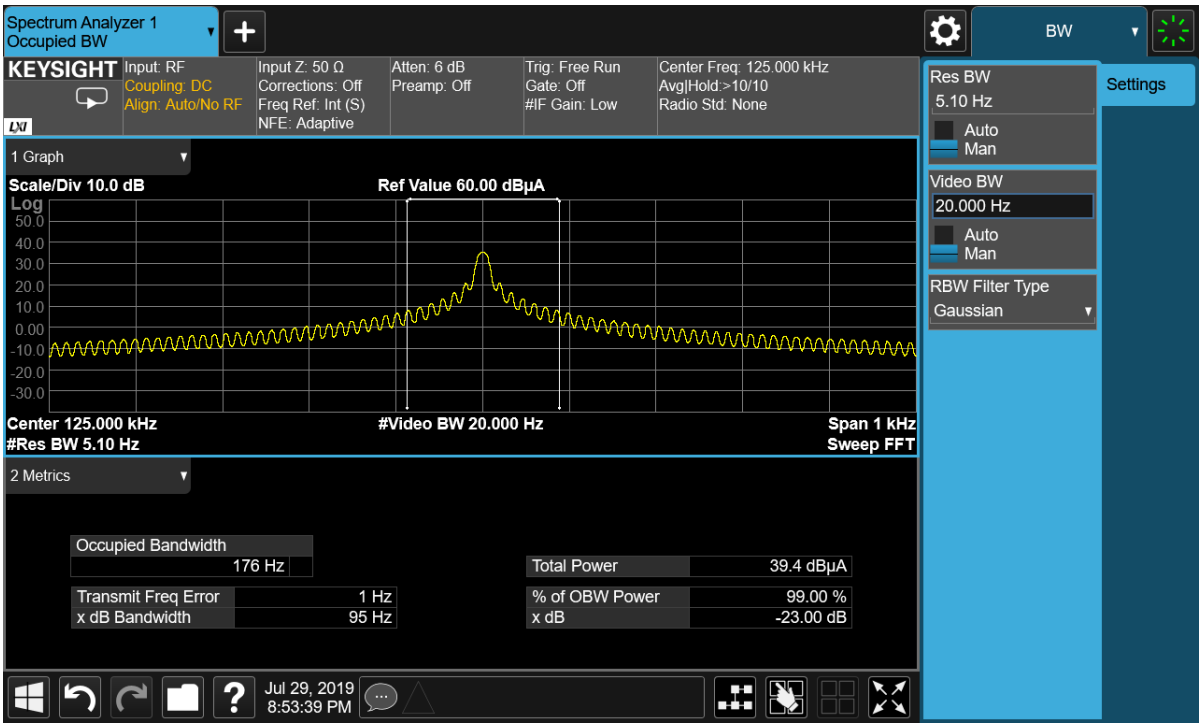
5.4 Test protocol

Lower point (kHz)	Higher point (kHz)	Bandwidth (kHz)
124.91	125.09	0.176



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6 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 **********