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Report On

Radio Testing of the
NantWorks
HBox Access Point for Medical Devices

FCC Part 15 Subpart C §15.225
IC RSS-210 Issue 8 December 2010

Report No. SC1311091D

January 2014

REPORT ON Radio Testing of the
NantWorks
Access Point for Medical Devices

TEST REPORT NUMBER SC1311091D

PREPARED FOR NantWorks
9920 Jefferson Blvd.
Culver City, CA 90232

CONTACT PERSON David Lu
RF Engineer
(858) 735-6852
dlu@nantworks.com

PREPARED BY 
Ferdinand S. Custodio
Name
Authorized Signatory
Title: EMC/Wireless Test Engineer

APPROVED BY 
Chip R. Fleury
Name
Authorized Signatory

DATED January 10, 2014

Revision History

SC1311091D NantWorks HBox Access Point for Medical Devices					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
01/10/2014	Initial Release				Chip R. Fleury

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FCC ID IFU1001008
IC: N/A
Report No. SC1311091D



SECTION 1

REPORT SUMMARY

Radio Testing of the
NantWorks
Access Point for Medical Devices

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the NantWorks Access Point for Medical Devices to the requirements of FCC Part 15 Subpart C §15.225 and IC RSS-210 Issue 8 December 2010.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	NantWorks
Model Number(s)	200-HBX-PDL
FCC ID Number	IFU1001008
FCC Classification	Low power Communications device Transmitter (DXX)
IC Number	N/A
Serial Number(s)	34008112
Device Capabilities	802.11 a/b/g/n WLAN (DTS/U-NII), Bluetooth 2.0 + EDR, Bluetooth 4.0 and NFC
Mode Verified	NFC (Near Field Communication)
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none">• FCC Part 15 Subpart C §15.225 (October 1, 2013).• IC RSS-210 Issue 8 December 2010 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment.• RSS-Gen Issue 3 December 2010 - General Requirements and Information for the Certification of Radio Apparatus.
Start of Test	December 02, 2013
Finish of Test	December 04, 2013
Name of Engineer(s)	Ferdinand S. Custodio
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC Part 15 Subpart C §15.225 with cross-reference to the corresponding IC RSS standard is shown below.

Section	Spec Clause	RSS	Test Description	Result	Comments/Base Standard
2.1	§2.1049	RSS-Gen 4.61	Occupied Bandwidth	As Reported	
2.2	§15.225(a)(b)(c)	RSS-210 (A2.6)	In-Band Emissions	Compliant	
2.3	§15.225(d)	RSS-210 (A2.6)	Out-of-Band Emissions	Compliant	§15.209
2.4	§15.225(e)	RSS-210 (A2.6)	Frequency Tolerance	Compliant	
2.5	§15.207	RSS-Gen 7.2.4	AC Conducted Emissions	Compliant	
-		RSS-Gen 6.0	Receiver Spurious Emissions	N/A*	

* Not applicable. EUT does not have a separate receive mode.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a NantWorks HBox Access Point for Medical Devices. The EUT can connect to a network through Ethernet port or Wi-Fi. In normal operation, the EUT collects user data via USB, Bluetooth or Wi-Fi and upload the information back to a data server. The NFC function is for quick Bluetooth pairing by obtaining the device info when within NFC range of the EUT. Only the NFC function verified in this test report.

1.3.2 EUT General Description

EUT Description	Access Point for Medical Devices
Model Name	HBox
Model Number(s)	200-HBX-PDL
Rated Voltage	Internal 3.7VDC Li-Ion Battery (Gold Peak Industries 130801-00), AC adapter/charger is Hon-Kwang Switching Power Supply Model: HK-AB-050A400-US, output is 5.0VDC 4.0A
Output Power	51.0 dB μ V/m @ 3 meters
Frequency Range	13.56 MHz in the 13.110 to 14.010 MHz band
Number of Operating Frequencies	1
Channel/s Verified	13.56 MHz
Antenna Type (used during evaluation)	Integral near field antenna (Complies with Part 15.203 requirements)
Modulation Used	ASK

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	Using Tera Term to program the EUT, NFC (Near Field Communication) module is set to WFE (Wait for Event) and active mode. These mode programs the EUT for continuous and maximum power operation of the radio. This mode is considered worst case as declared by the manufacturer for verification purposes.

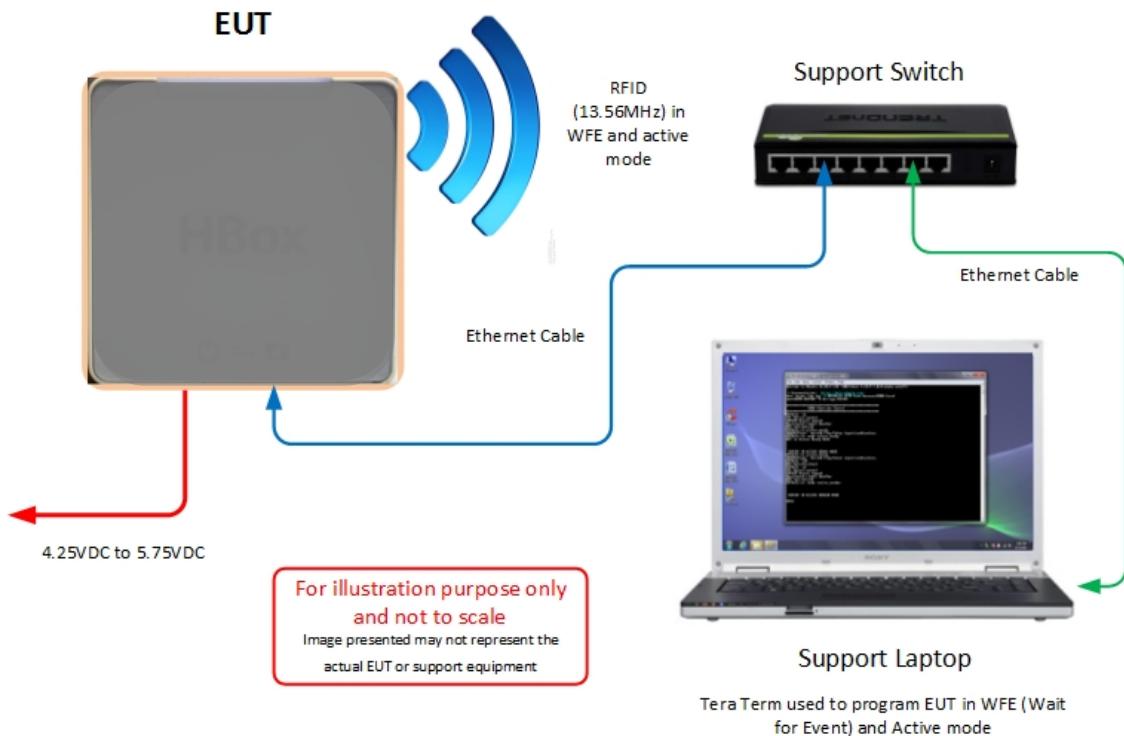
1.4.2 EUT Exercise Software

HBOX Function Tester. This is built-in within the firmware. Radio commands are executed via Ethernet using Tera Term from a support PC.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
Sony	Personal Computer (Y Series Laptop)	Model PCG-31311L
Sony	AC Adapter	Model PCGA-AC19V9 S/N:147839091 0023259
Hon-Kwang	I.T.E. Power Supply for EUT	Model HK-AB-050A400-US 5VDC @ 4A
Trendnet	Broadband Router	Model TW100S4W1CA S/N: RA1332S400789
DVE	Switching Adapter for Broadband Router	Model DSA-6PFE-05 FUS 050100 5VDC @ 1A
Lorom	CAT5E Patch Cable (2X)	Unshielded, 1.5 meters Ethernet cables

1.4.4 Simplified Test Configuration Diagram



1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 34008112		
N/A		

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5296

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US5296.

1.8.2 Industry Canada (IC) Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No. 3067A.

FCC ID IFU1001008
IC: N/A
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SECTION 2

TEST DETAILS

Radio Testing of the
NantWorks
Access Point for Medical Devices

2.1 OCCUPIED BANDWIDTH

2.1.1 Specification Reference

Part 15 Subpart J §15.1049 and RSS-Gen 4.61

2.1.2 Standard Applicable

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

2.1.3 Equipment Under Test and Modification State

Serial No: 34008112 / Default Test Configuration

2.1.4 Date of Test/Initial of test personnel who performed the test

December 04, 2013/FSC

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

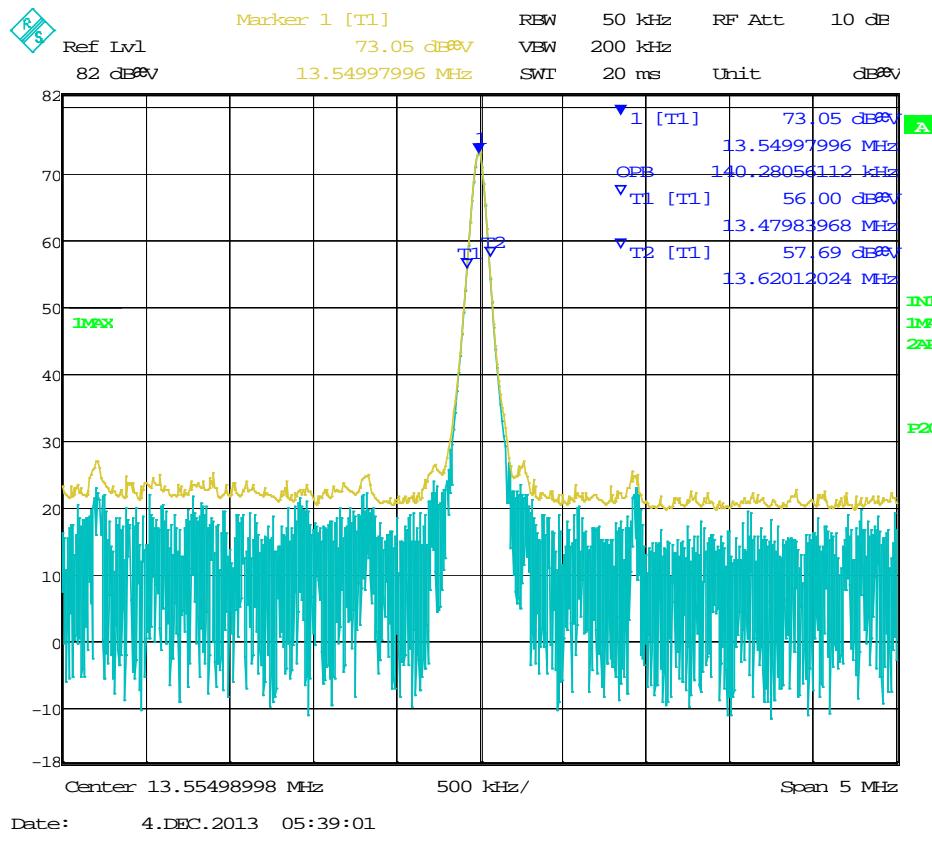
Ambient Temperature	22.2°C
Relative Humidity	37.5%
ATM Pressure	98.8 kPa

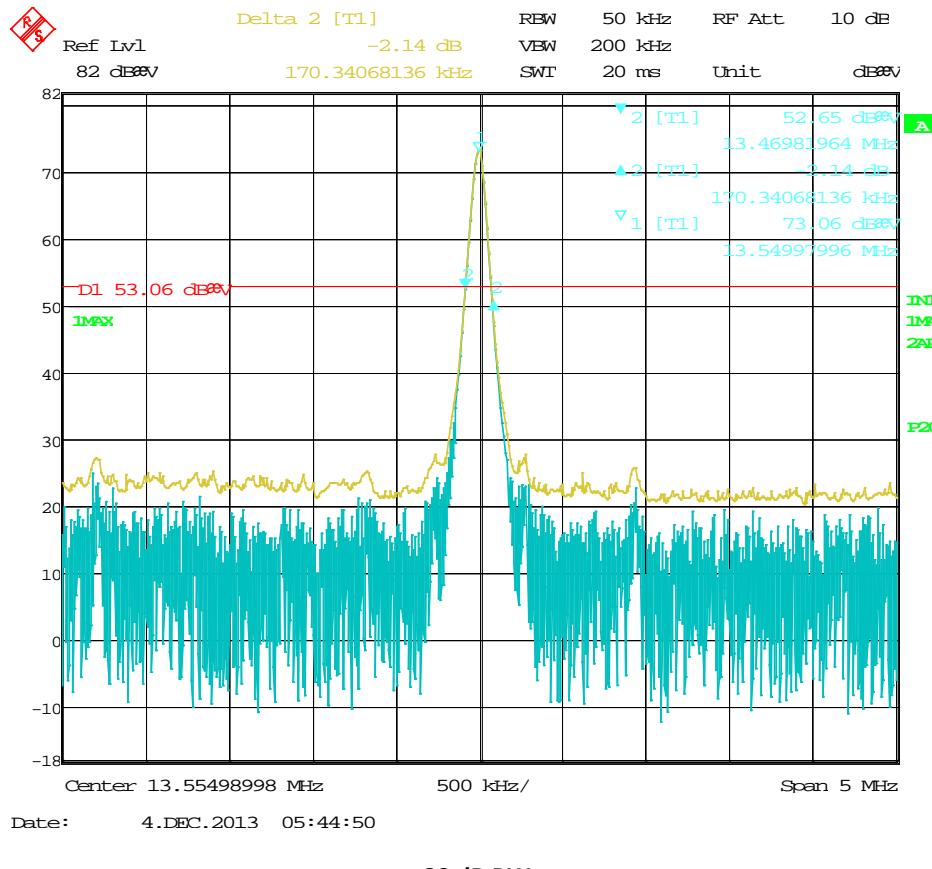
2.1.7 Additional Observations

- This is a radiated test.
- A peak output reading was taken. A display line was drawn 20dB below the peak level.
- 20dB bandwidth verified using delta-marker measurements from the line drawn.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.
- For 99% bandwidth, the OBW measurement function of the spectrum analyzer was used.

2.1.8 Test Results

Frequency	20 dB Bandwidth	99% Bandwidth
13.56 MHz	170.34 kHz	140.28 kHz





2.2 IN BAND EMISSIONS

2.2.1 Specification Reference

Part 15 Subpart C §15.225(a)(b)(c)

2.2.2 Standard Applicable

- (a) The field strength of any emissions within the band 13.553-13.567 MHz shall not exceed 15,848 microvolts/meter at 30 meters.
- (b) Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.
- (c) Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

2.2.3 Equipment Under Test and Modification State

Serial No: 34008112 / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

December 03, 2013/FSC

2.2.5 Test Equipment Used

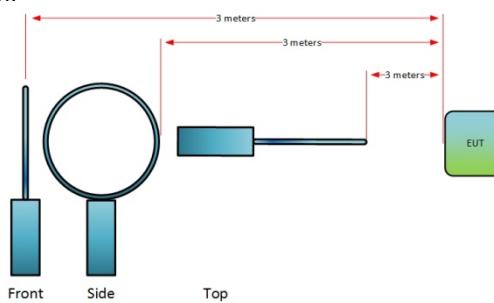
The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

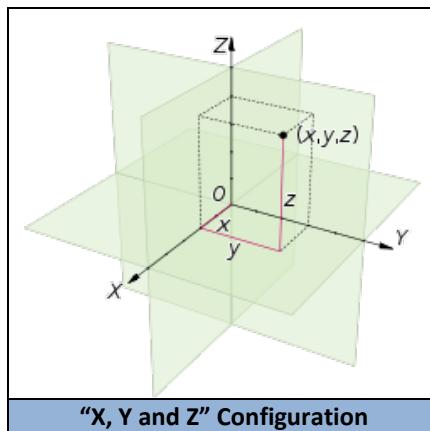
Ambient Temperature	21.9°C
Relative Humidity	28.4 %
ATM Pressure	98.7 kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to 1GHz.
- Below 30MHz, prescans were performed to determine best antenna position with the highest recorded emissions. No significant results difference noted. Verification performed using "Front" position.



- The EUT was verified in three (3) orthogonal axes. Only the worst case configuration presented ("Y" Axis). For orientation purposes, "X" axis is where the wall mounting side of the EUT is flat on the test table.



- Measurement was done at 3 meter. Limits below 30MHz were corrected using extrapolation factor of 40 dB/decade. See sample computation below:

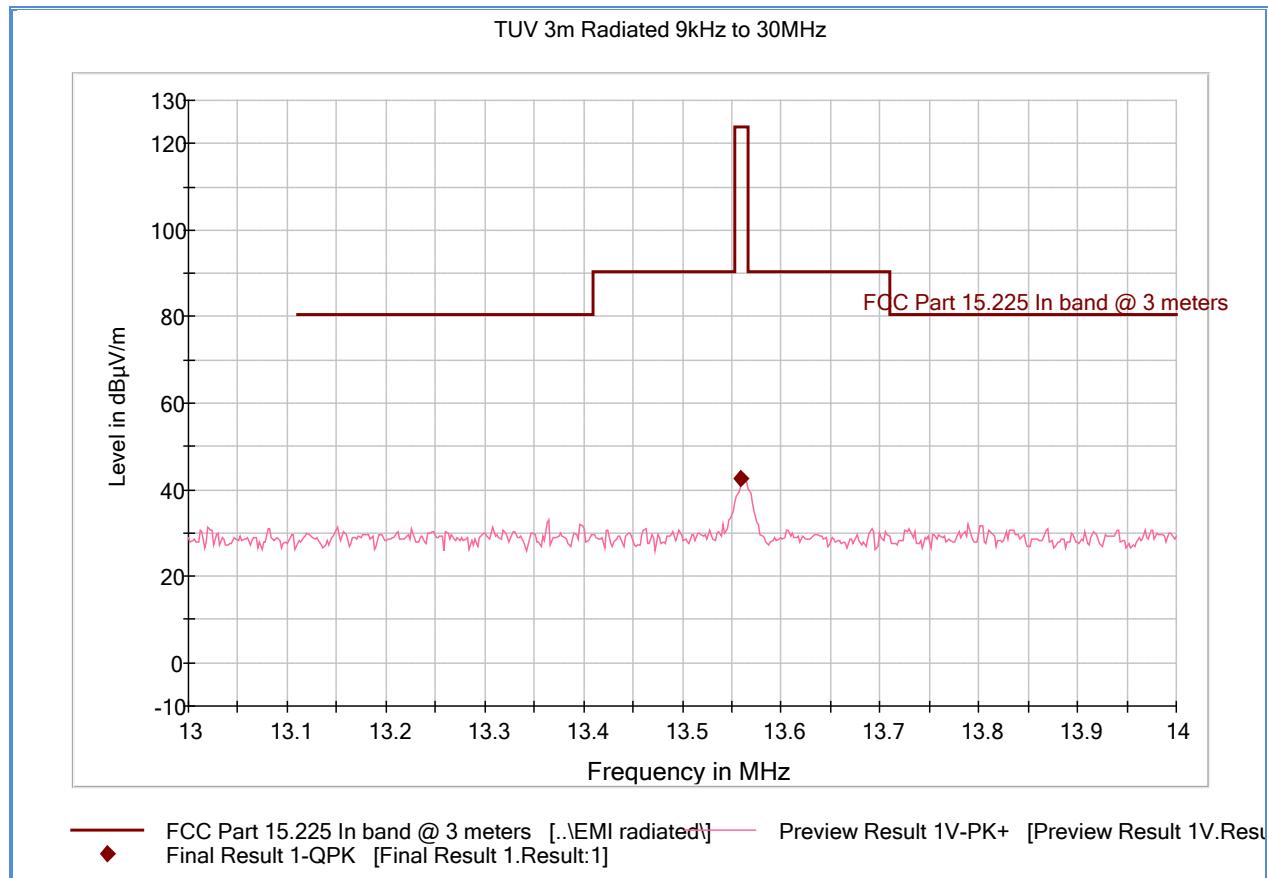
$$\begin{aligned}
 \text{Limit @ 9kHz} &= 2400/F(\text{kHz}) \mu\text{V/m} \\
 &= 20 \log(2400/9) \text{ dB}\mu\text{V/m} \\
 &= 48.52 \text{ dB}\mu\text{V/m} @ 300 \text{ meters} \\
 &= 48.52 \text{ dB}\mu\text{V/m} + (40 \log 300/3) @ 3 \text{ meters} \\
 &= 128.52 \text{ dB}\mu\text{V/m} @ 3 \text{ meters}
 \end{aligned}$$

- There are no other emissions observed "in-band" other than the fundamental (13.56 MHz).
- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 for sample computations.

2.2.8 Test Results Summary Table

Frequency	Axis (Orientation)	QuasiPeak (dB μ V/m)
13.56 MHz	X	42.6
13.56 MHz	Y	51.0
13.56 MHz	Z	50.5

2.2.9 Test Results ("X" Axis)

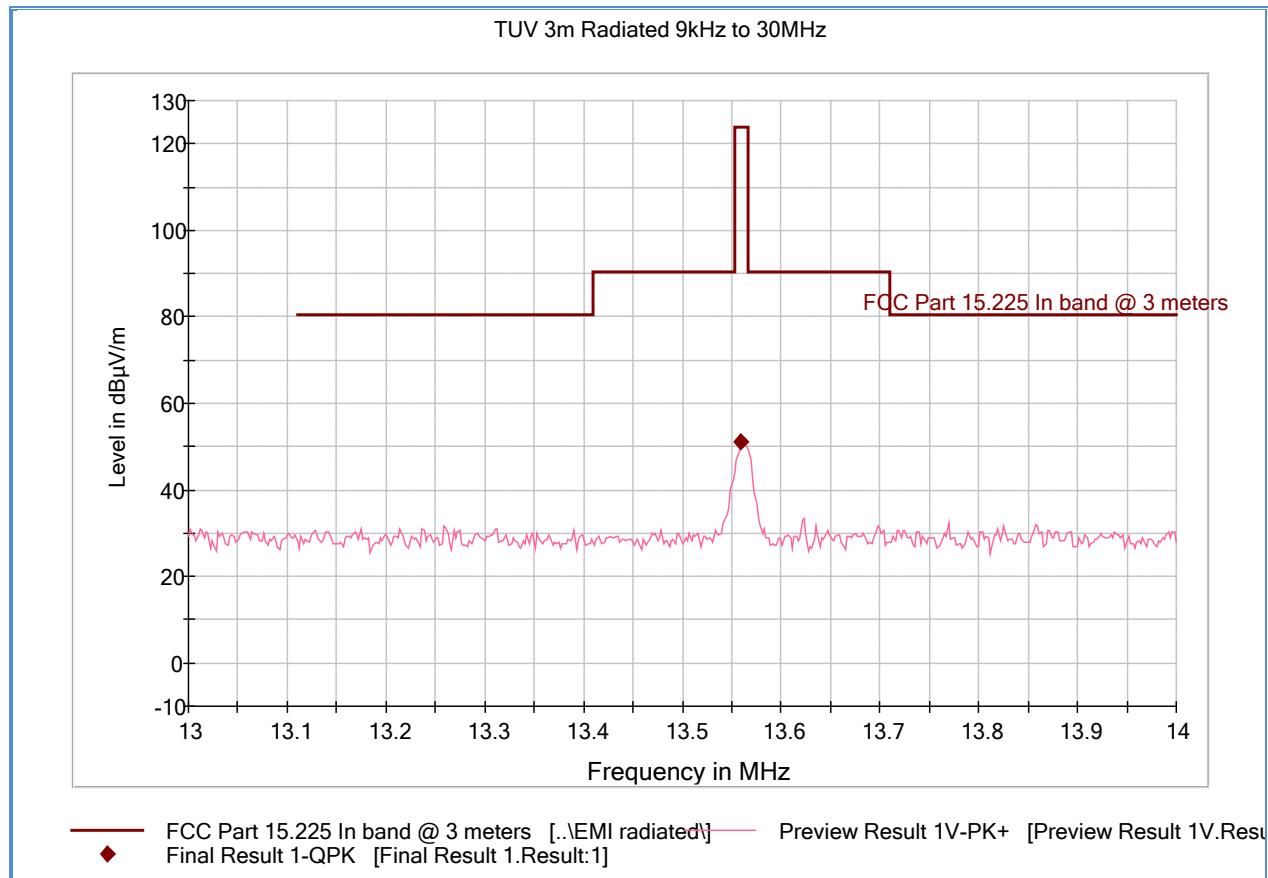


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
13.559122	42.6	1000.0	9.000	100.0	V	0.0	20.8	81.4	124.0

Test Notes:

2.2.10 Test Results ("Y" Axis)

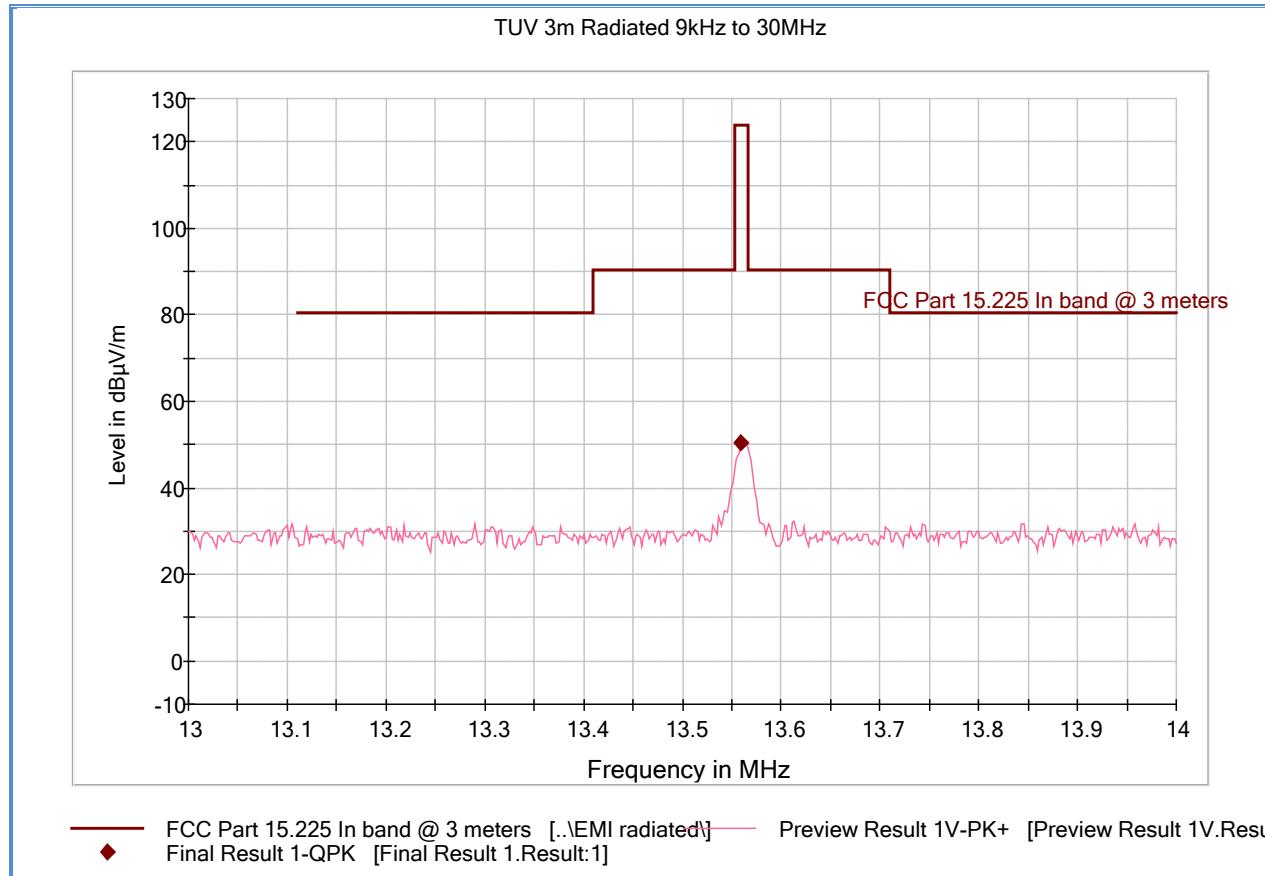


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
13.559122	51.0	1000.0	9.000	100.0	V	189.0	20.8	73.0	124.0

Test Notes:

2.2.11 Test Results ("Z" Axis)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dB μ V/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
13.559122	50.5	1000.0	9.000	100.0	V	189.0	20.8	73.5	124.0

Test Notes:

2.3 OUT OF BAND EMISSIONS

2.3.1 Specification Reference

Part 15 Subpart C §15.225(a)(b)(c)(d)

2.3.2 Standard Applicable

(d) The field strength of any emissions appearing outside of the 13.110-14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

2.3.3 Equipment Under Test and Modification State

Serial No: 34008112 / Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

December 03, 2013/FSC

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions

Ambient Temperature	21.9°C
Relative Humidity	28.4 %
ATM Pressure	98.7 kPa

2.3.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to 1GHz.
- Below 30MHz, prescans were performed to determine best antenna position with the highest recorded emissions. No significant difference noted on the results. Verification performed using "Front" position.
- The EUT was verified in three (3) orthogonal axes. Only the worst case configuration presented ("Y" Axis).
- Measurement was done at 3 meter. Limits below 30MHz were corrected using extrapolation factor of 40 dB/decade. See sample computation below:

$$\begin{aligned}\text{Limit @ 9kHz} &= 2400/F(\text{kHz}) \mu\text{V/m} \\ &= 20 \log (2400/9) \text{ dB}\mu\text{V/m} \\ &= 48.52 \text{ dB}\mu\text{V/m} @ 300 \text{ meters} \\ &= 48.52 \text{ dB}\mu\text{V/m} + (40 \log 300/3) @ 3 \text{ meters} \\ &= 128.52 \text{ dB}\mu\text{V/m} @ 3 \text{ meters}\end{aligned}$$

- Measurement was done using EMC32 V8.53 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 and 2.3.9 for sample computations.

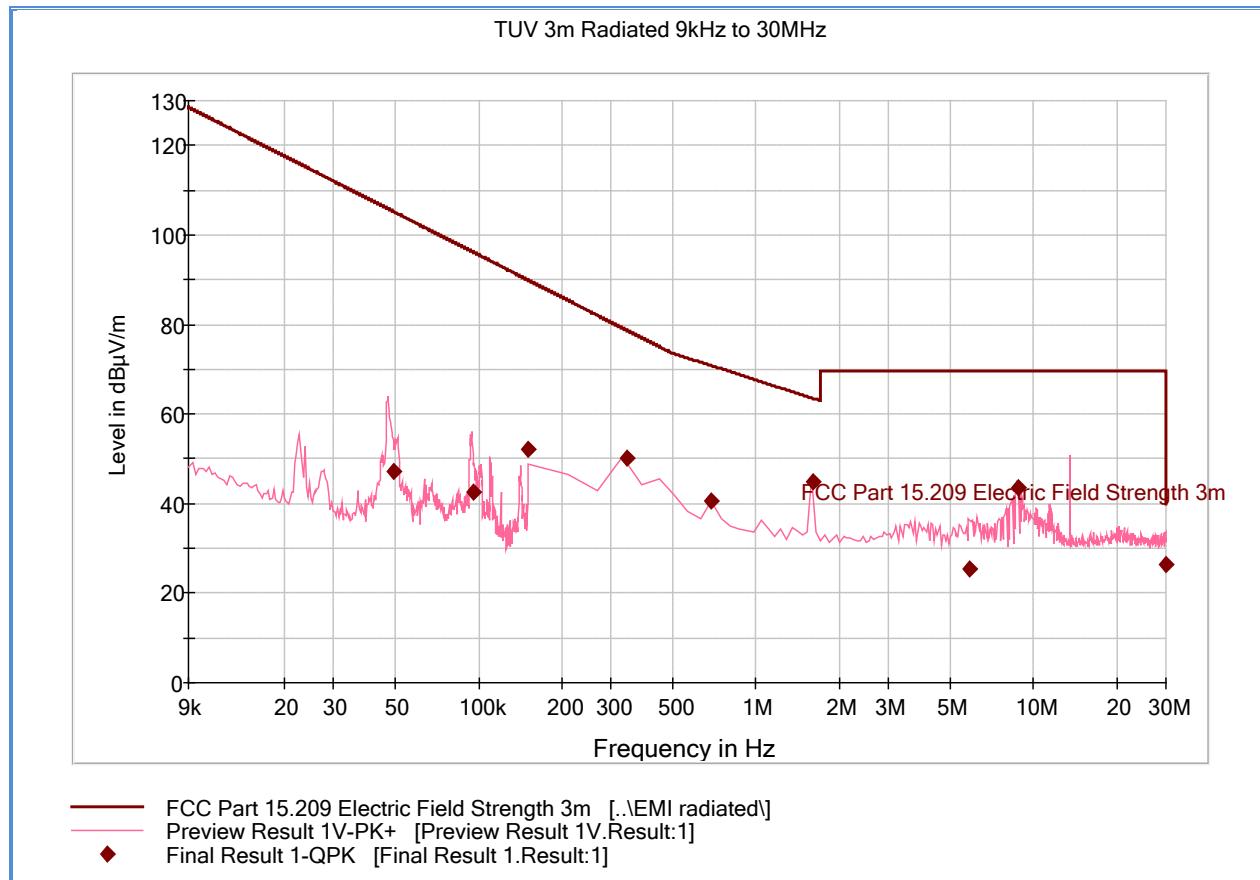
2.3.8 Sample Computation (Radiated Emission 9kHz to 30MHz)

Measuring equipment raw measurement (db μ V) @ 9 kHz			25.0
Correction Factor (dB)	Asset# 1057 (cable)	0.1	24.8
	Asset# 1172 (cable)	0.3	
	Asset# 6628 (antenna)	24.4	
Reported QuasiPeak Final Measurement (db μ V/m) @ 9kHz			49.8

2.3.9 Sample Computation (Radiated Emission 30MHz to 1GHz)

Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.3.10 Test Results (Worst Case Orientation 9kHz to 30MHz)

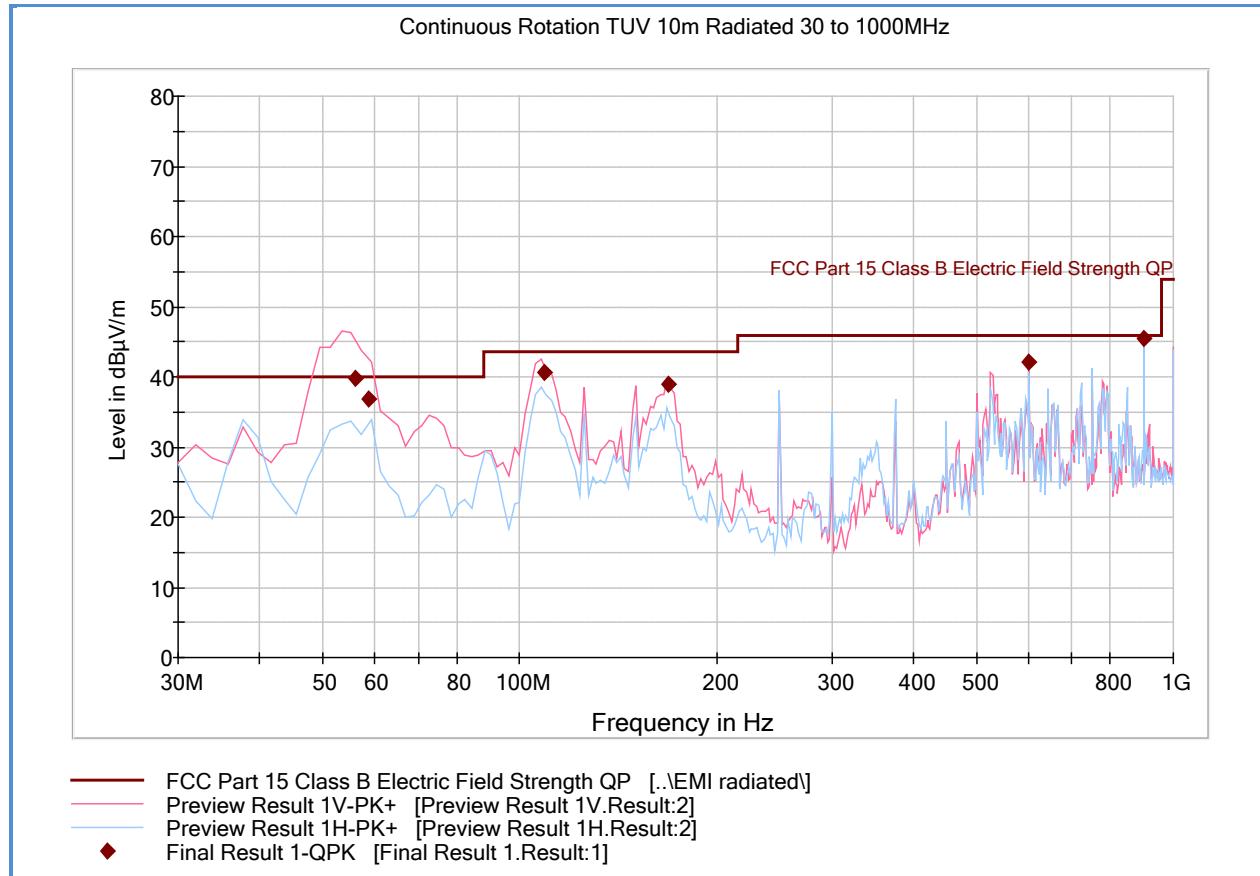


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
0.049146	47.3	1000.0	0.200	100.0	V	185.0	20.2	58.0	105.3
0.096335	42.5	1000.0	0.200	100.0	V	172.0	19.8	53.5	96.1
0.150000	52.2	1000.0	0.200	100.0	V	176.0	19.7	37.8	90.0
0.344000	50.1	1000.0	9.000	100.0	V	304.0	19.6	28.6	78.6
0.690377	40.6	1000.0	9.000	100.0	V	292.0	19.9	30.2	70.8
1.611671	44.7	1000.0	9.000	100.0	V	308.0	20.3	18.7	63.5
5.854866	25.3	1000.0	9.000	100.0	V	258.0	20.5	44.2	69.5
8.841848	43.5	1000.0	9.000	100.0	V	167.0	20.4	26.0	69.5
29.846000	26.3	1000.0	9.000	100.0	V	325.0	24.1	43.3	69.5

Test Notes: In-band emissions ignored for this test.

2.3.11 Test Results (Worst Case Orientation 30MHz to 1GHz)



Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
56.006653	39.7	1000.0	120.000	100.0	V	188.0	-21.8	0.3	40.0
58.702204	36.9	1000.0	120.000	150.0	V	194.0	-22.0	3.1	40.0
108.795511	40.6	1000.0	120.000	106.0	V	239.0	-20.5	2.9	43.5
168.816032	38.9	1000.0	120.000	100.0	V	302.0	-18.0	4.6	43.5
600.023006	42.2	1000.0	120.000	100.0	V	148.0	-4.5	3.8	46.0
900.021723	45.5	1000.0	120.000	100.0	H	123.0	0.5	0.5	46.0

Test Notes: Emissions around 56MHz were verified coming from the support broadband router.

2.4 FREQUENCY TOLERANCE

2.4.1 Specification Reference

Part 15 Subpart C §15.225(e)

2.4.2 Standard Applicable

(e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and 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.

2.4.3 Equipment Under Test and Modification State

Serial No: 34008112 / Default Test Configuration

2.4.4 Date of Test/Initial of test personnel who performed the test

December 02, 2013/FSC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.4.6 Environmental Conditions

Ambient Temperature	22.8°C
Relative Humidity	27.5%
ATM Pressure	99.4 kPa

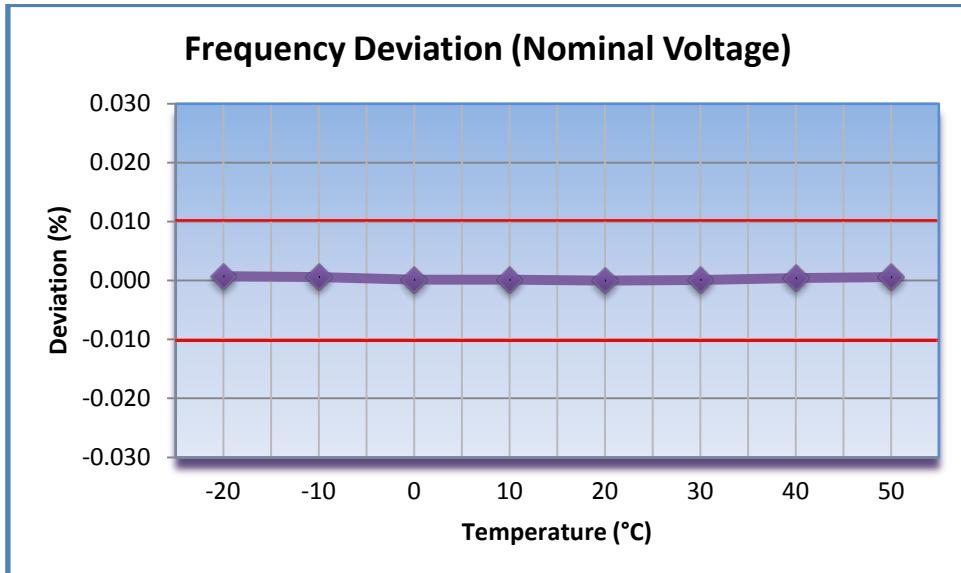
2.4.7 Additional Observations

- This is a radiated test.
- Span is wide enough to capture the channel transmission.
- Signal count function of the Spectrum Analyzer used for this test.
- RBW set to 1kHz (below 1.356kHz [$\pm 0.01\%$ tolerance limit] for better resolution)
- A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level was allowed prior to each frequency measurement.

2.4.8 Test Results

Voltage (%)	EUT Voltage (VDC)	Temp (°C)	Frequency (Hz)	Frequency Deviation (Hz)	Deviation (%)
100	5	-20	13,559,665.11	100.70	0.0007426382
100	5	-10	13,559,684.08	81.73	0.0006027390
100	5	0	13,559,747.99	17.82	0.0001314182
100	5	+10	13,559,748.02	17.79	0.0001311970
100	4.25	+20	13,559,755.59	10.22	0.0000753700
100	5	+20	13,559,765.81	0	0.0000000000
100	5.75	+20	13,559,754.14	11.67	0.0000860634
100	5	+30	13,559,752.65	13.16	0.0000970518
100	5	+40	13,559,709.42	56.39	0.0004158626
100	5	+50	13,559,689.25	76.56	0.0005646115

2.4.9 Results Graph



2.5 AC CONDUCTED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.207(a) and RSS-Gen 7.2.4

2.5.2 Standard Applicable

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
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.

2.5.3 Equipment Under Test and Modification State

Serial No: 34008112 / Default Test Configuration

2.5.4 Date of Test/Initial of test personnel who performed the test

December 04, 2013/FSC

2.5.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.5.6 Environmental Conditions

Ambient Temperature	22.2°C
Relative Humidity	37.5%
ATM Pressure	98.8 kPa

2.5.7 Additional Observations

- The EUT was verified using AC adapter supplied by the manufacturer..
- EUT verified using input voltage of 120VAC 60Hz.
- Measurement was done using EMC32 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.5.8 for sample computation.

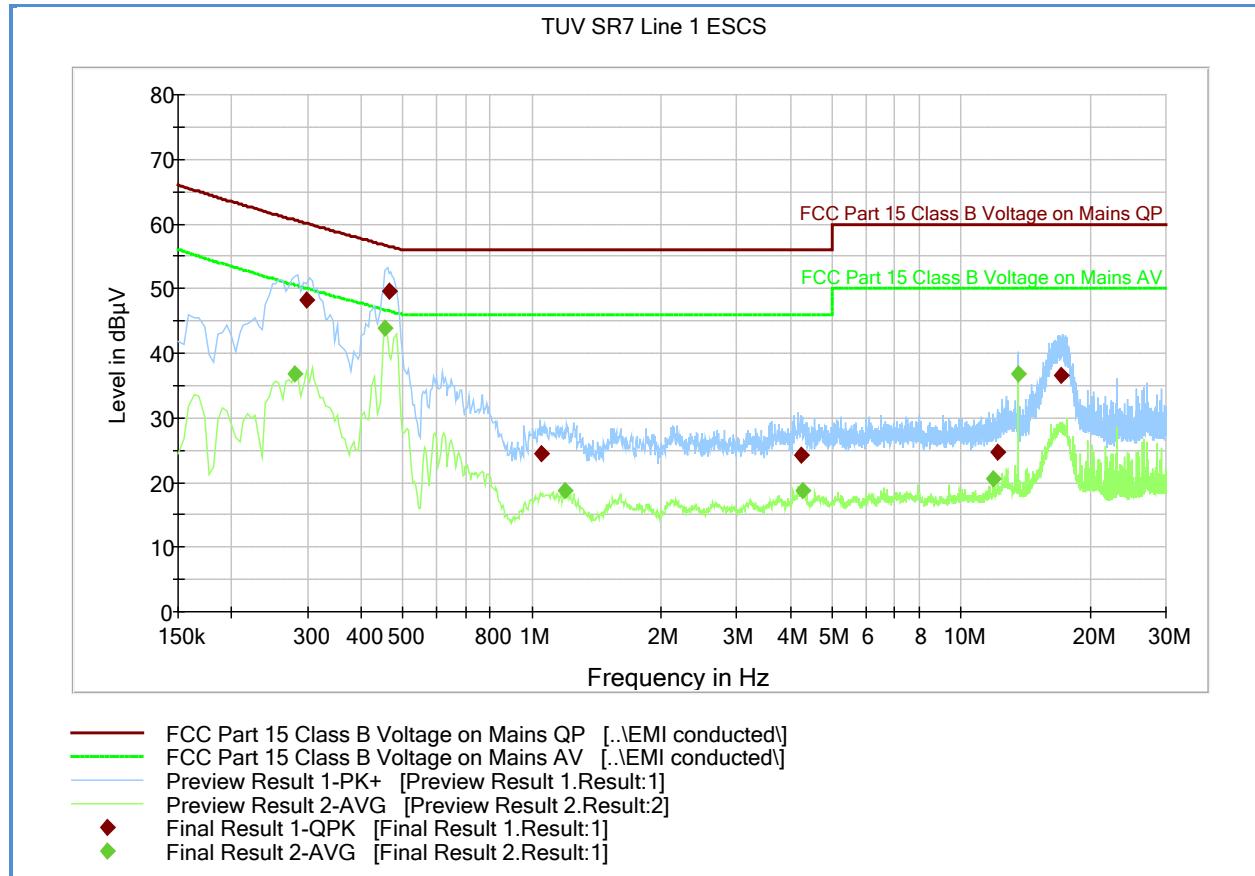
2.5.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (db μ V) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7567 (LISN)	0.30	
Reported QuasiPeak Final Measurement (db μ V) @ 150kHz			26.2

2.5.9 Test Results

Compliant. See attached plots and tables.

2.5.10 Line 1 (Hot) NFC Mode



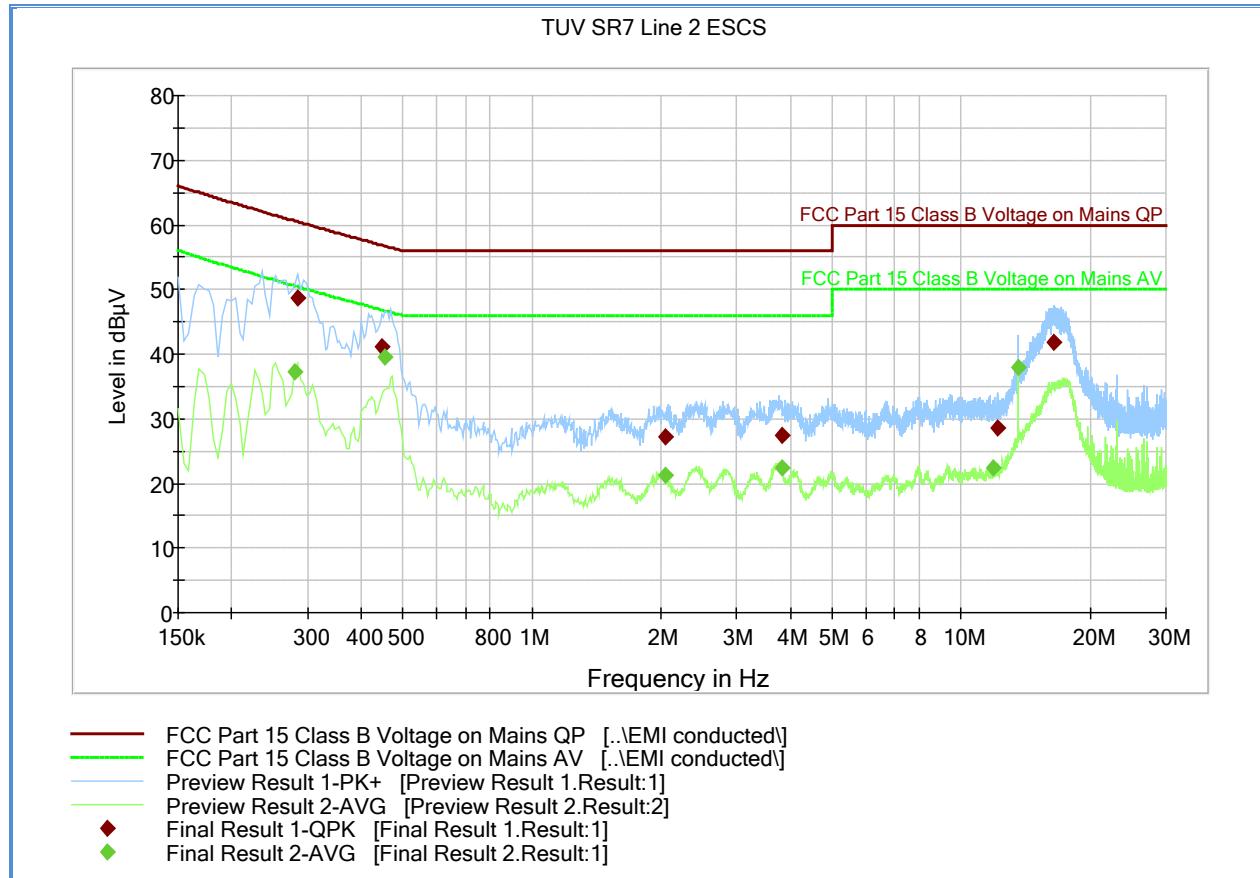
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.298500	48.3	1000.0	9.000	Off	L1	20.3	11.8	60.1
0.465000	49.5	1000.0	9.000	Off	L1	20.2	7.1	56.6
1.050000	24.5	1000.0	9.000	Off	L1	20.2	31.5	56.0
4.245000	24.1	1000.0	9.000	Off	L1	20.4	31.9	56.0
12.192000	24.6	1000.0	9.000	Off	L1	20.5	35.4	60.0
17.106000	36.5	1000.0	9.000	Off	L1	20.8	23.5	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.280500	36.9	1000.0	9.000	Off	L1	20.3	13.7	50.6
0.456000	43.8	1000.0	9.000	Off	L1	20.2	2.9	46.7
1.198500	18.8	1000.0	9.000	Off	L1	20.3	27.2	46.0
4.263000	18.7	1000.0	9.000	Off	L1	20.4	27.3	46.0
11.890500	20.6	1000.0	9.000	Off	L1	20.5	29.4	50.0
13.560000	36.9	1000.0	9.000	Off	L1	20.6	13.1	50.0

2.5.11 Line 2 (Neutral) NFC Mode



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.285000	48.6	1000.0	9.000	Off	N	21.1	11.9	60.5
0.447000	41.2	1000.0	9.000	Off	N	21.1	15.7	56.9
2.053500	27.2	1000.0	9.000	Off	N	21.1	28.8	56.0
3.817500	27.4	1000.0	9.000	Off	N	21.2	28.6	56.0
12.138000	28.6	1000.0	9.000	Off	N	21.3	31.4	60.0
16.444500	41.8	1000.0	9.000	Off	N	21.6	18.2	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit - Ave (dBµV)
0.280500	37.2	1000.0	9.000	Off	N	21.1	13.3	50.6
0.456000	39.5	1000.0	9.000	Off	N	21.1	7.2	46.7
2.053500	21.3	1000.0	9.000	Off	N	21.1	24.7	46.0
3.835500	22.3	1000.0	9.000	Off	N	21.2	23.7	46.0
11.895000	22.4	1000.0	9.000	Off	N	21.3	27.6	50.0
13.560000	38.0	1000.0	9.000	Off	N	21.4	12.0	50.0

2.6 RECEIVER SPURIOUS EMISSIONS

2.6.1 Specification Reference

RSS-Gen 6.0

2.6.2 Standard Applicable

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10 of RSS-Gen Issue 3 December 2010.

2.6.3 Equipment Under Test and Modification State

Test not performed. EUT does not have a separate receive mode when in NFC configuration.

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SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Antenna Conducted Port Measurement						
7582	Signal/Spectrum Analyzer	FSW26	101614	Rhode & Schwarz	11/19/13	11/19/14
1189	Signal Generator	8648C	3623A03059	Hewlett Packard	08/06/13	08/06/14
-	20dB Attenuator	46-20-34	BK5773	Weinschel Corp.	Verified by 1189 and 7582	
7579	Temperature Chamber	115	151617	TestQuity	07/16/13	07/16/14
Conducted Emissions						
1024	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	03/11/13	03/11/14
7567	LISN	FCC-LISN-50-25-2-10	120304	Fischer Custom Comm.	06/11/13	06/11/14
7568	LISN	FCC-LISN-50-25-2-10	120305	Fischer Custom Comm.	07/10/13	07/10/14
8789	20dB Attenuator	HAT-20	YUU29001245	Mini Circuits	03/01/13	03/01/14
8792	20dB Attenuator	HAT-20	YUU29001245	Mini Circuits	03/01/13	03/01/14
Radiated Emissions						
1002	Bilog Antenna	3142C	00058717	ETS-Lindgren	01/21/13	01/21/14
6628	Loop Antenna	HFH 2-ZZ	880 458/25	Rhode & Schwarz	10/31/13	10/31/15
1027/1028	EMI Test Receiver	ESMI	848926/003	Rhode & Schwarz	04/24/13	04/24/14
1016	Pre-amplifier	PAM-0202	187	PAM	10/08/13	10/08/14
Miscellaneous						
6452	Multimeter	3478A	2911A52177	Hewlett Packard	08/02/13	08/02/14
7554	Barometer/Temperature /Humidity Transmitter	iBTHX-W	0400706	Omega	04/17/13	04/17/14
1123	DC Power Supply	E3631A	N/A	Hewlett Packard	Verified by 6452	
	Test Software	EMC32	V8.53	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Measurements

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined Uncertainty (u_c):		0.80
			Coverage Factor (k):		2
			Expanded Uncertainty:		1.59

3.2.2 Radiated Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	3.55	2.05	4.20
6	EUT Setup	Rectangular	1.00	0.58	0.33
			Combined Uncertainty (u_c):		2.23
			Coverage Factor (k):		2
			Expanded Uncertainty:		4.45

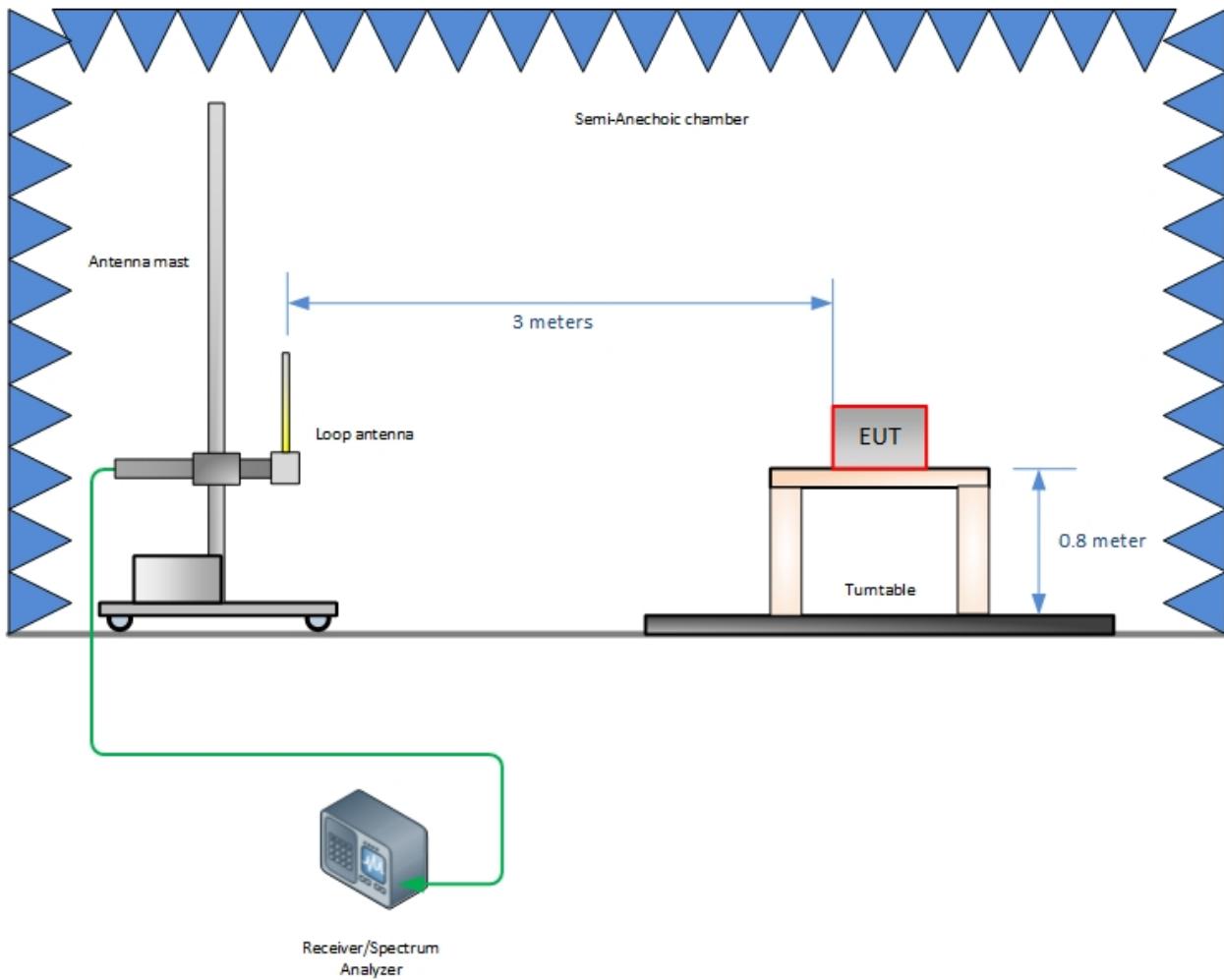
FCC ID IFU1001008
IC: N/A
Report No. SC1311091D



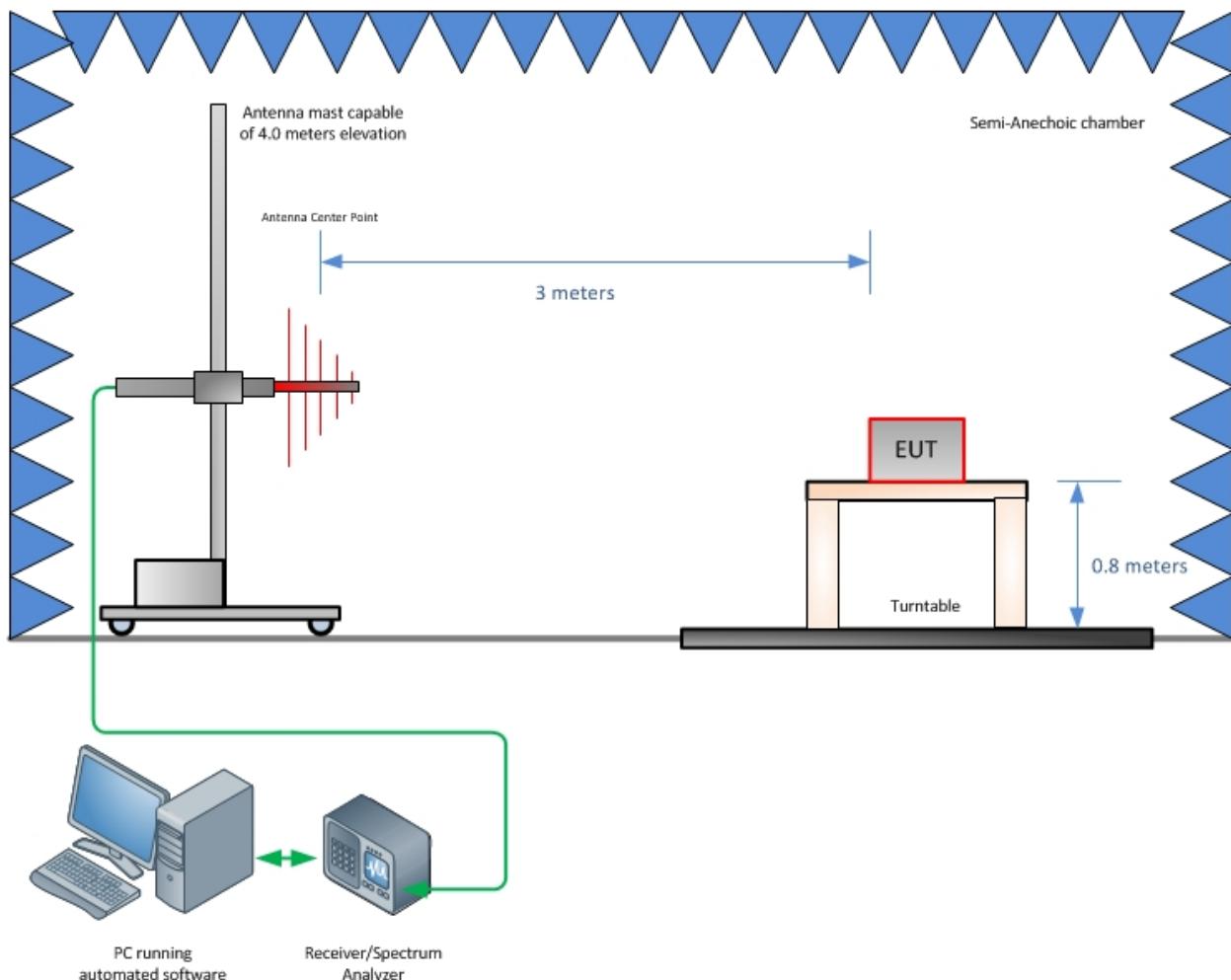
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



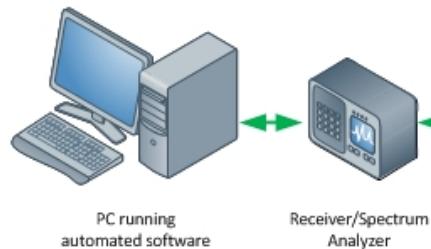
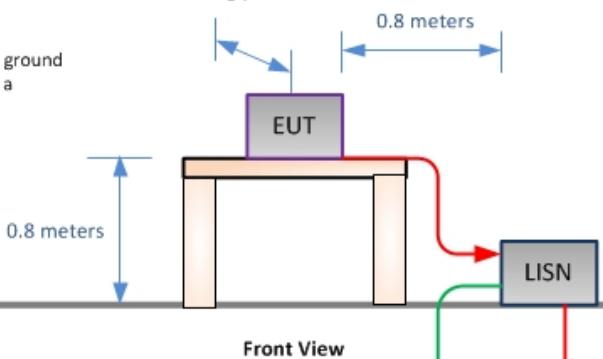
Radiated Emission Test Setup (Below 30 MHz)



Shielded Enclosure

- EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated into 50Ω loads.
- LISN at least 80 cm from nearest part of EUT chassis.
- Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.
- Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
- Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.

0.4 meters from vertical conducting plane



Conducted Emission Test Setup

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IC: N/A
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SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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