



Compliance Testing, LLC

Previously Flom Test Lab

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Test Report

Prepared for: JVCKenwood USA Corporation

Model: NX-240-K, NX-240-M, NX-240-M2 and NX-240V-K

Description: VHF DIGITAL TRANSCEIVER

Serial Number: N/A

FCC ID: ALH443700

To

FCC Part 90

Date of Issue: December 9, 2014

On the behalf of the applicant:

JVCKenwood USA Corporation
Communications Division
3970 Johns Creek Court
Suwanee, GA 30024

Attention of:

Joel Berger, Research & Development
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Prepared By
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Project No: p14b0026

Alex Macon
Project Test Engineer

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All results contained herein relate only to the sample tested.



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	December 2, 2014	Alex Macon	Original Document



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ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.

Testing Certificate Number: **2152.01**



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A



The Applicant has been cautioned as to the following:

15.21: Information to the User

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): Special Accessories

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.



Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II, Part 2, Subpart J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, and the following individual Parts: FCC Part 90.

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI/TIA 603C, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temp (°C)	Humidity (%)	Pressure (mbar)
20.5 – 22.6	35.2 – 37.2	971.2 – 977.2

Measurement results, unless otherwise noted, are worst-case measurements.

EUT Description

Model: NX-240-K, NX-240-M, NX-240-M2 and NX-240V-K

Description: VHF DIGITAL TRANSCEIVER

Serial Number: N/A

Additional Information:

EUT is an occupation push to talk radio

EUT Operation during Tests

EUT was in normal operating mode.

Accessories: None

Cables: None

Modifications: None



Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1046	Carrier Output Power (Conducted)	Pass	
2.1051	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1053	Field Strength of Spurious Radiation	N/A	See Note 1
90.210, 2.1049	Emission Masks (Occupied Bandwidth)	Pass	
2.1047	Audio Low Pass Filter (Voice Input)	N/A	See Note 1
2.1047	Audio Frequency Response	N/A	See Note 1
2.1047(a)	Modulation Limiting	Pass	
90.213	Frequency Stability (Temperature Variation)	N/A	See Note 1
90.213	Frequency Stability (Voltage Variation)	N/A	See Note 1
90.214	Transient Frequency Behavior	Pass	
RSS-Gen	Receiver Spurious Emissions	N/A	See Note 1
2.202	Necessary Bandwidth Calculation	Pass	

Note 1: Report is intended for a Class 2 Permissive Change which is adding two new modulation bandwidths. This test is not applicable as the addition would not alter these measurements.



Carrier Output Power (Conducted)

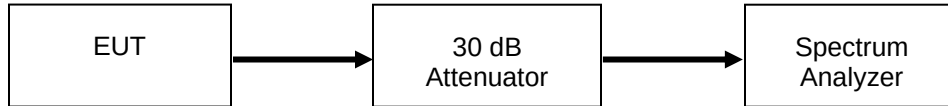
Name of Test: Carrier Output Power (Conducted)
Test Equipment Utilized: i00379

Engineer: Alex Macon
Test Date: 12/2/14

Measurement Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer through a 30 dB Power attenuator. All cable and attenuator losses were input into the spectrum analyzer as a reference level offset to ensure accurate readings were obtained.

Test Setup



High Power Transmitter Peak Output Power

Tuned Frequency (MHz)	Recorded Measurement (dBm)	Result
138.05	36.67	Pass
143.95	36.58	Pass
150.05	36.75	Pass
162.05	36.69	Pass
173.95	36.69	Pass



Conducted Spurious Emissions

Name of Test:

Conducted Spurious Emissions

Engineer: Alex Macon

Test Equipment Utilized:

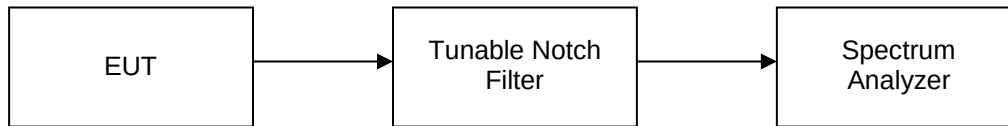
i00118, i00126, i00379, i00432

Test Date: 12/2/14

Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. A tunable notch filter was utilized to ensure the fundamental did not put the spectrum analyzer into compression. The resolution bandwidth set for 100 kHz and the reference level was adjusted to ensure the system had sufficient dynamic range to measure spurious emissions. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed and plotted. Only the worst case plots are included. The limit line was set for -25 dBm for comparison to RSS-119 which is the more stringent limit.

Test Setup



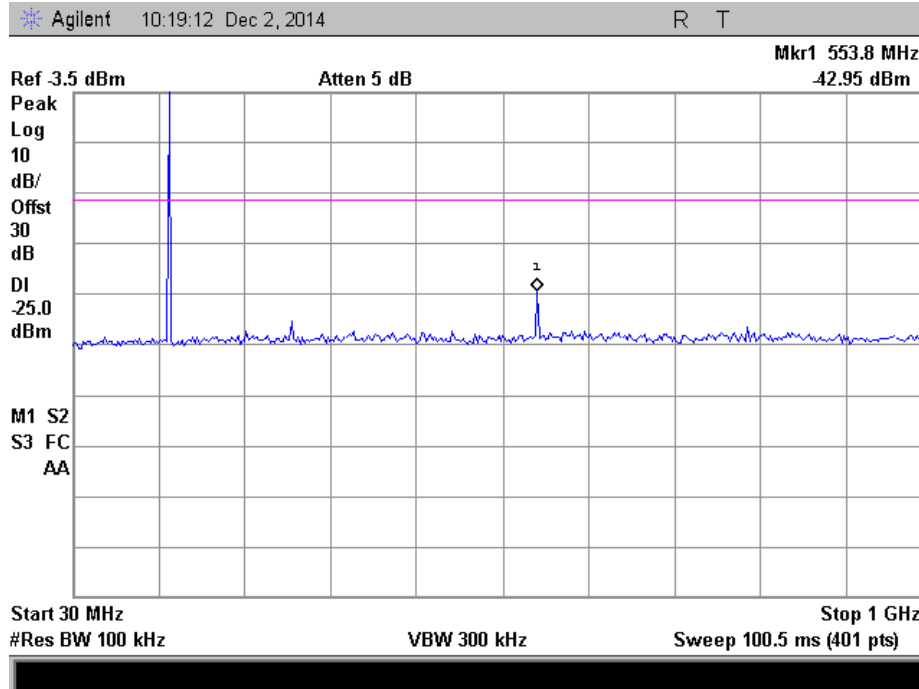
High Power Conducted Spurious Emissions Summary Test Table

Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
138.05	553.8	-42.95	-25	Pass
143.95	575.6	-44.4	-25	Pass
150.05	599.9	-46.31	-25	Pass
162.05	325.9	-49.69	-25	Pass
173.95	522.3	-48.24	-25	Pass

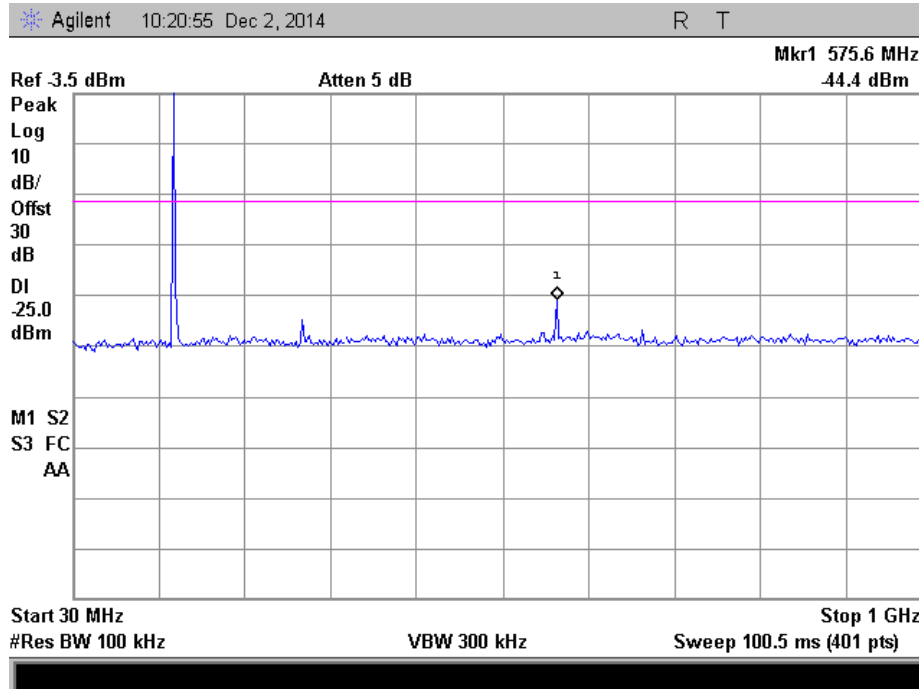


Test Plots

138.05 MHz
30 – 1000 MHz

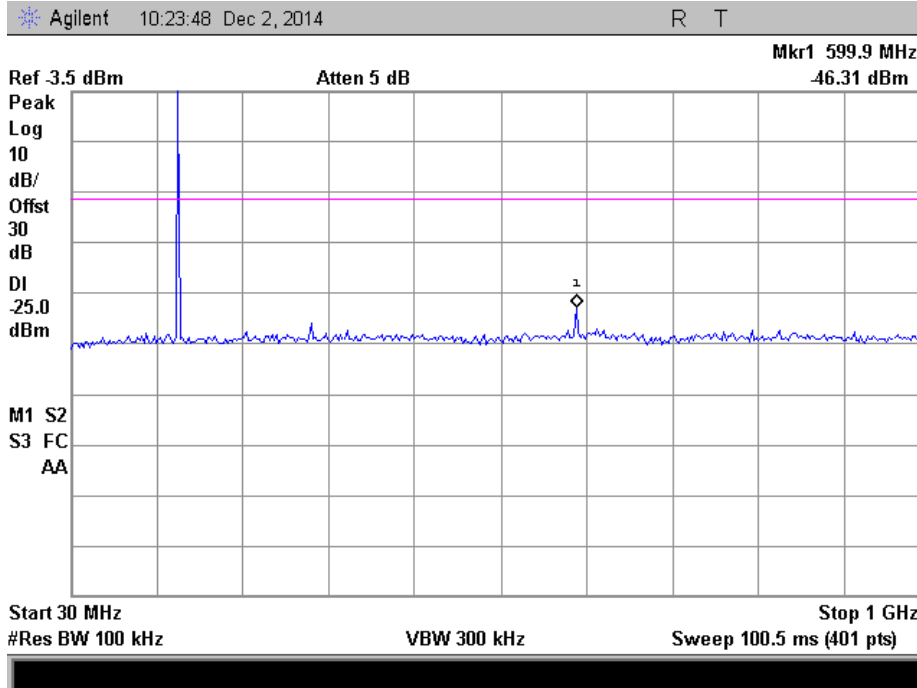


143.95 MHz
30 – 1000 MHz

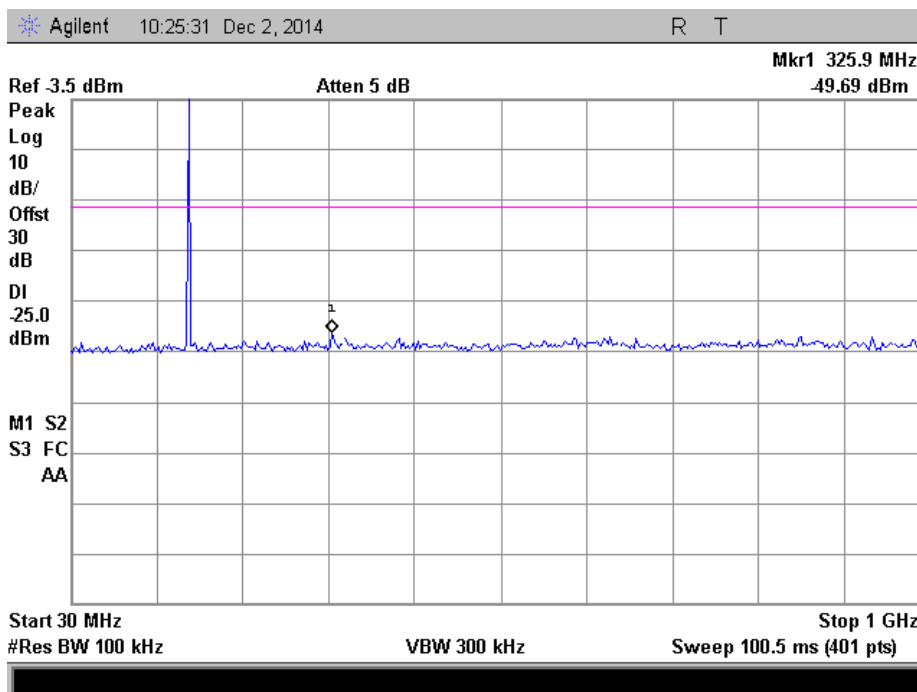




150.05 MHz
30 – 1000 MHz

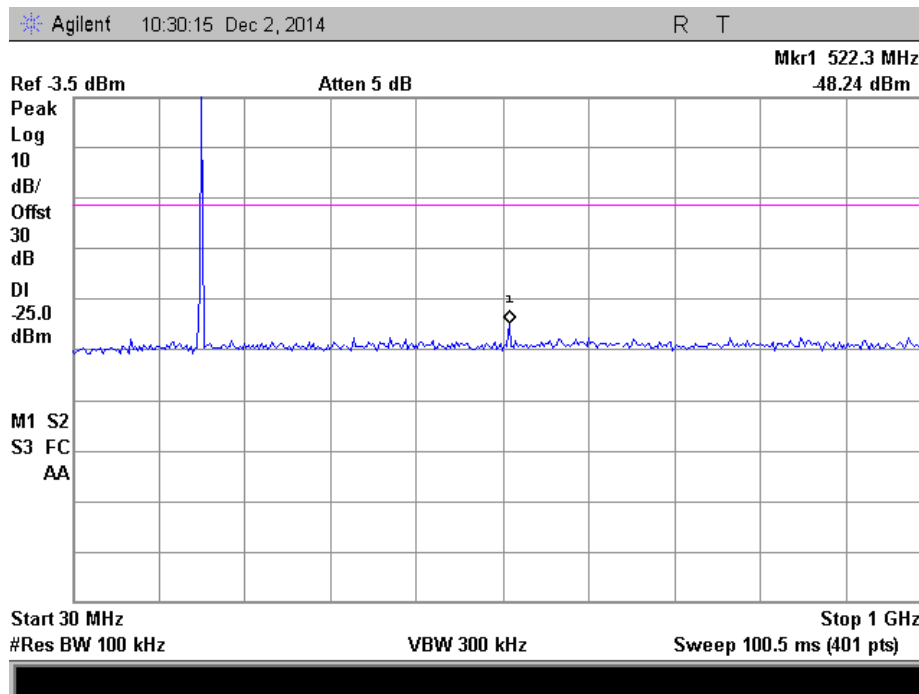


162.05 MHz
30 – 1000 MHz





173.95 MHz
30 – 1000 MHz





Emission Masks (Occupied Bandwidth)

Name of Test:

Emission Masks (Occupied Bandwidth)

Engineer: Alex Macon

Test Equipment Utilized

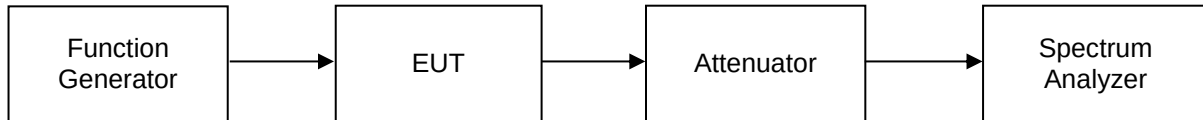
i00118, i00379

Test Date: 12/2/14

Measurement Procedure

The EUT was connected directly to a spectrum analyzer to verify that the EUT meets the required emissions mask. A modulation frequency of 2.5 kHz at a level of 100 mVPP was input into the EUT.

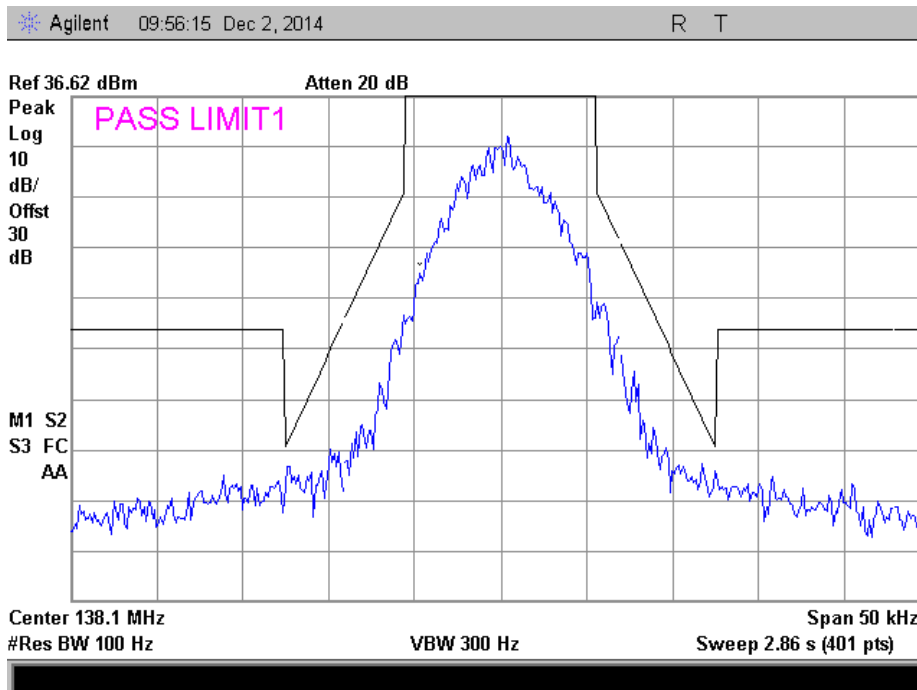
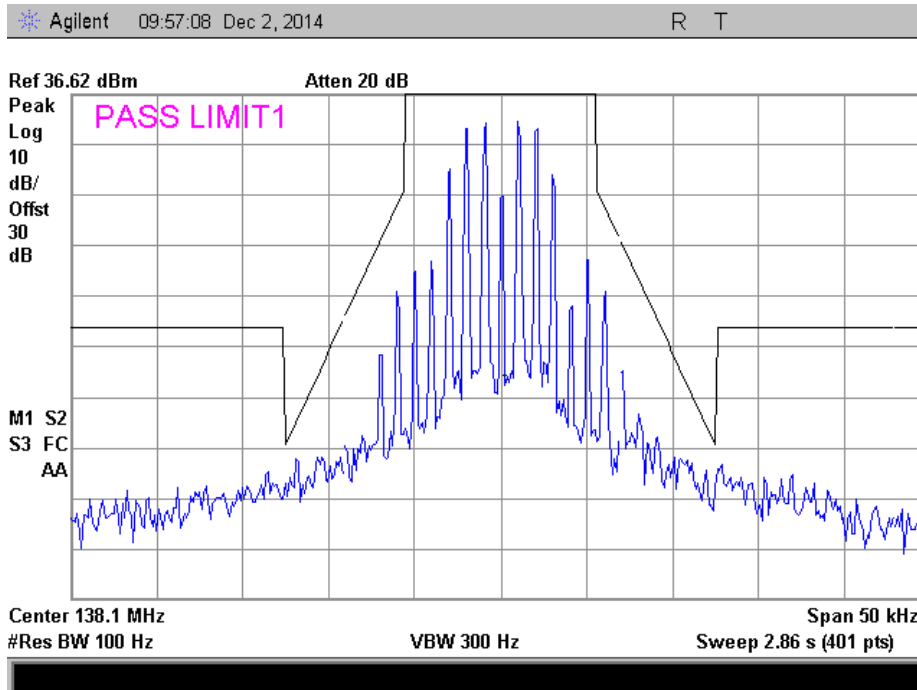
Test Setup





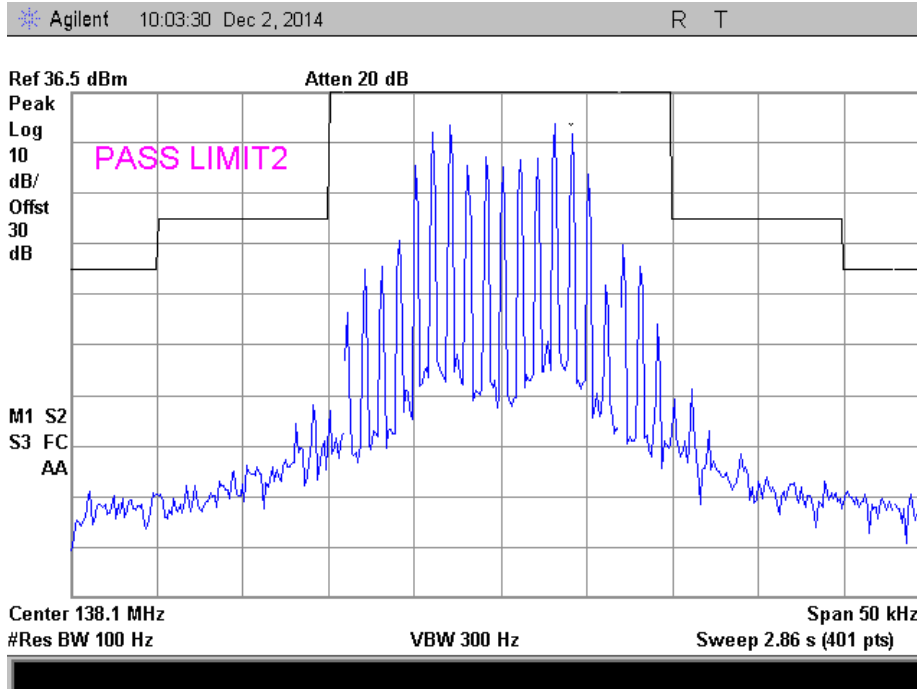
Occupied Bandwidth Plots

Mask D 138.05 MHz

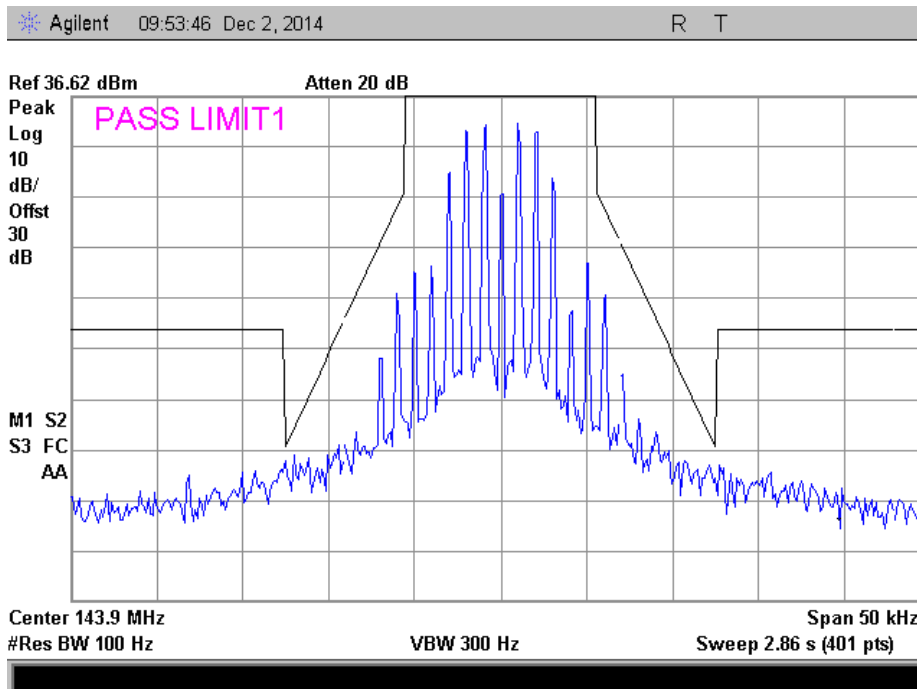


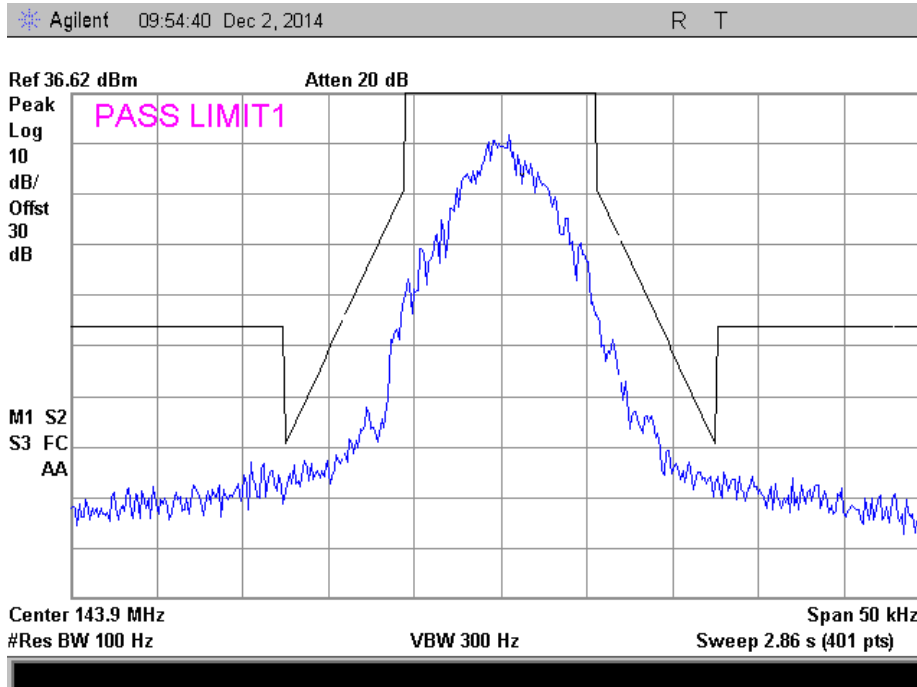


Mask B 138.05 MHz (IC Only)

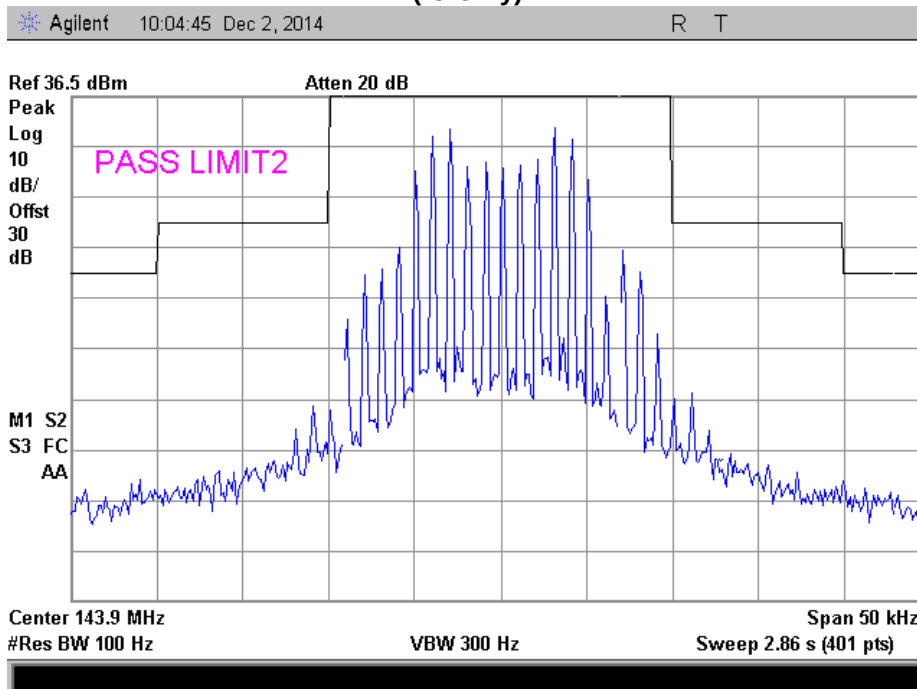


Mask D 143.95 MHz



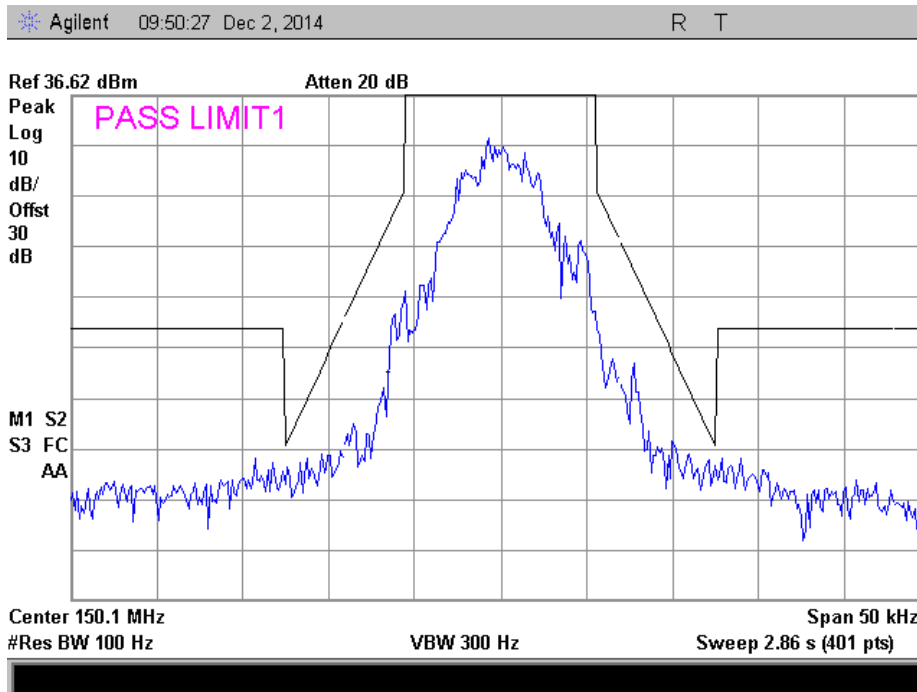
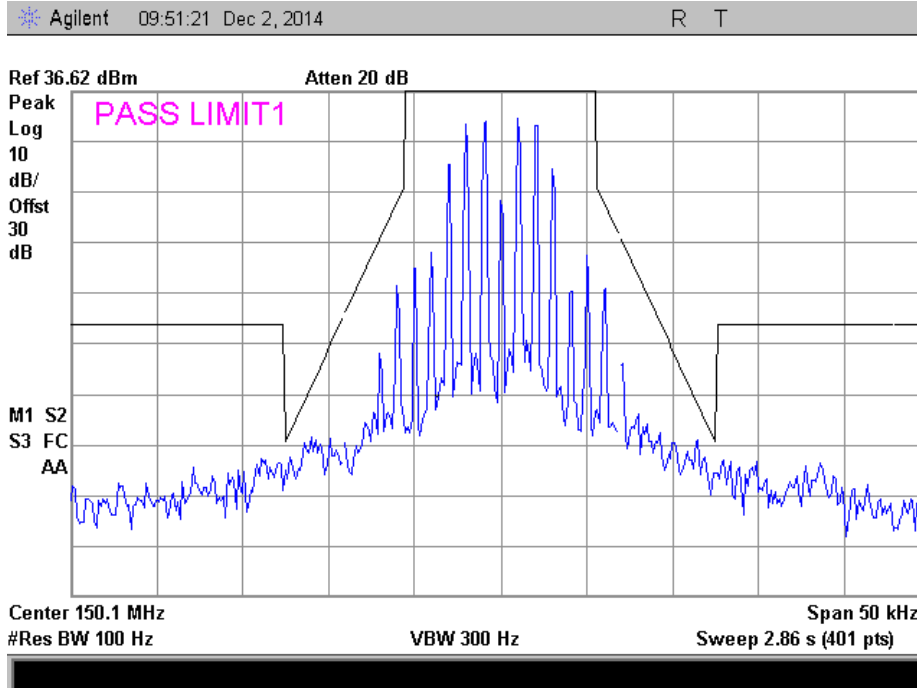


Mask B 143.95 MHz
(IC Only)



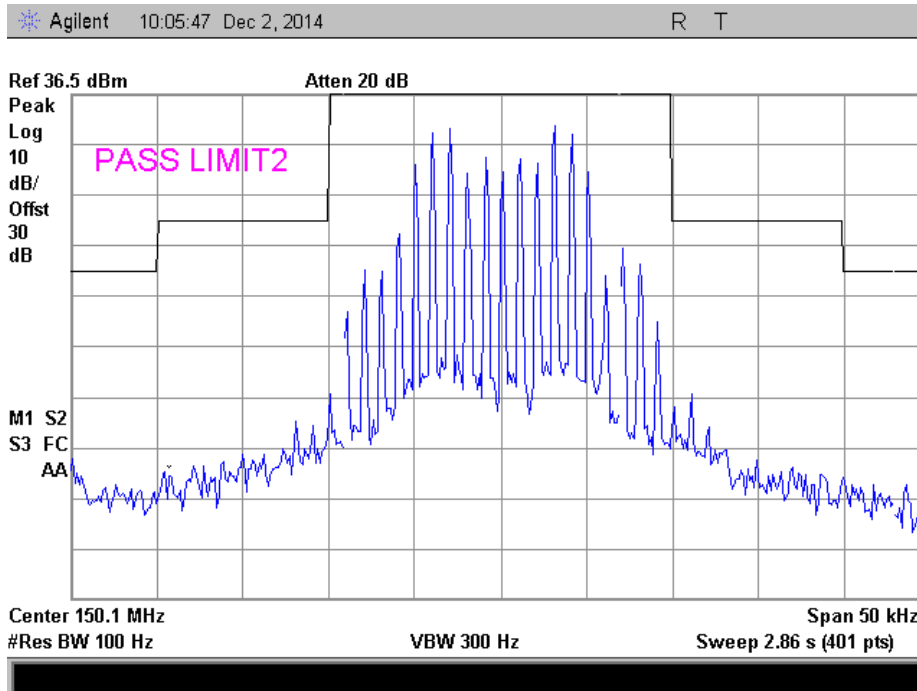


Mask D 150.05 MHz

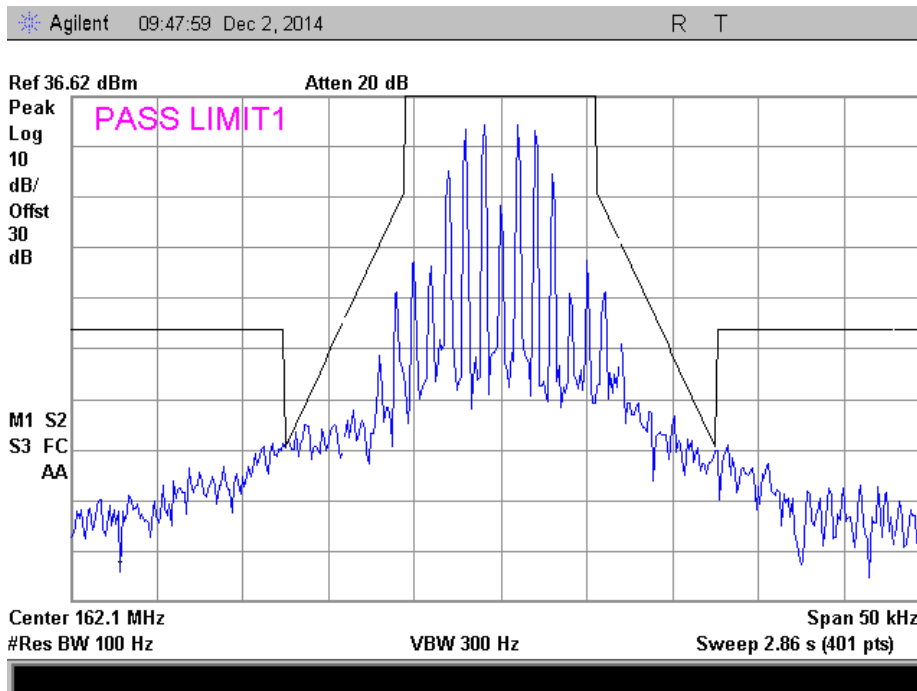




Mask B 150.05 MHz (IC Only)

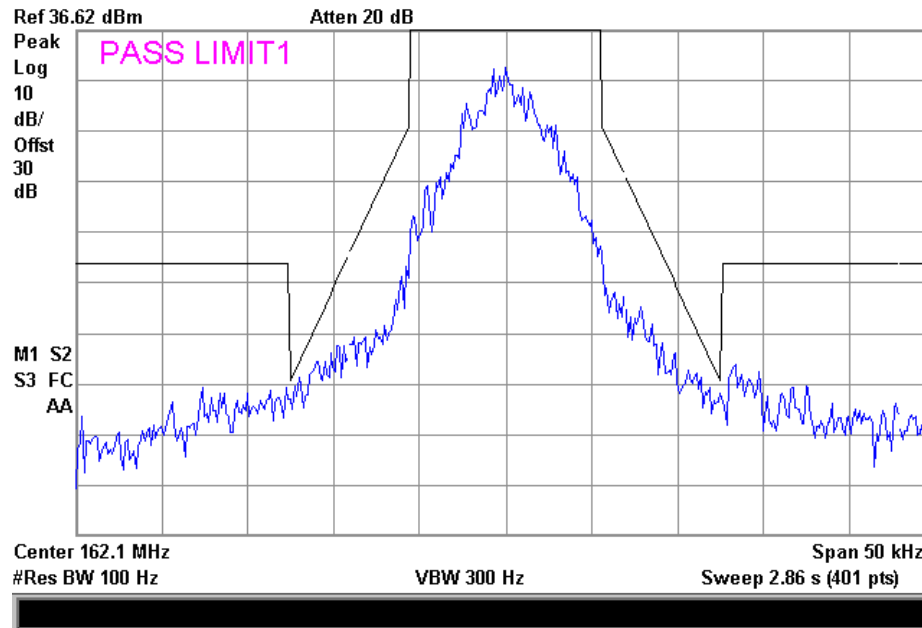


Mask D 162.05 MHz



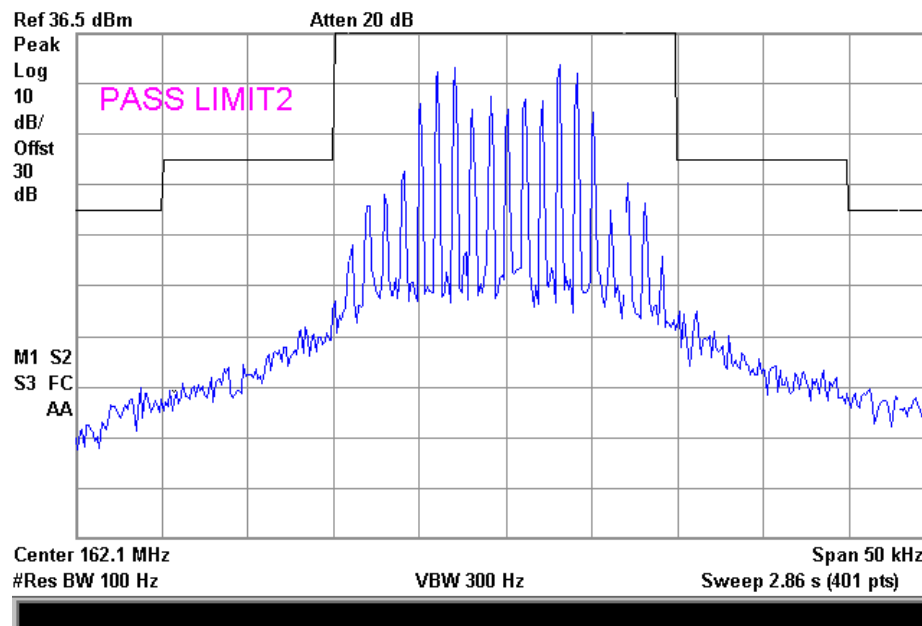


Agilent 09:49:20 Dec 2, 2014 R T



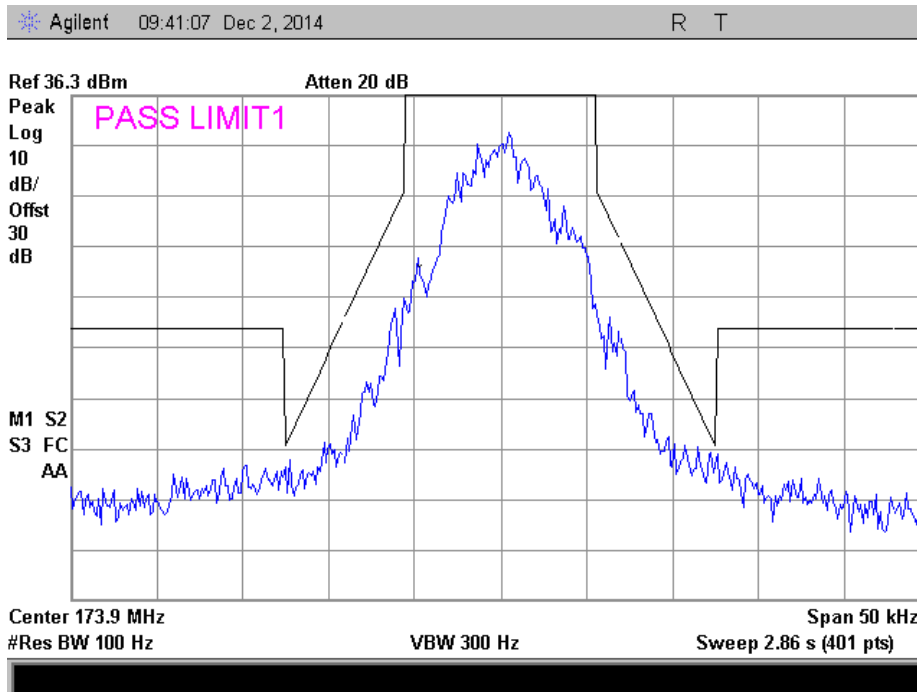
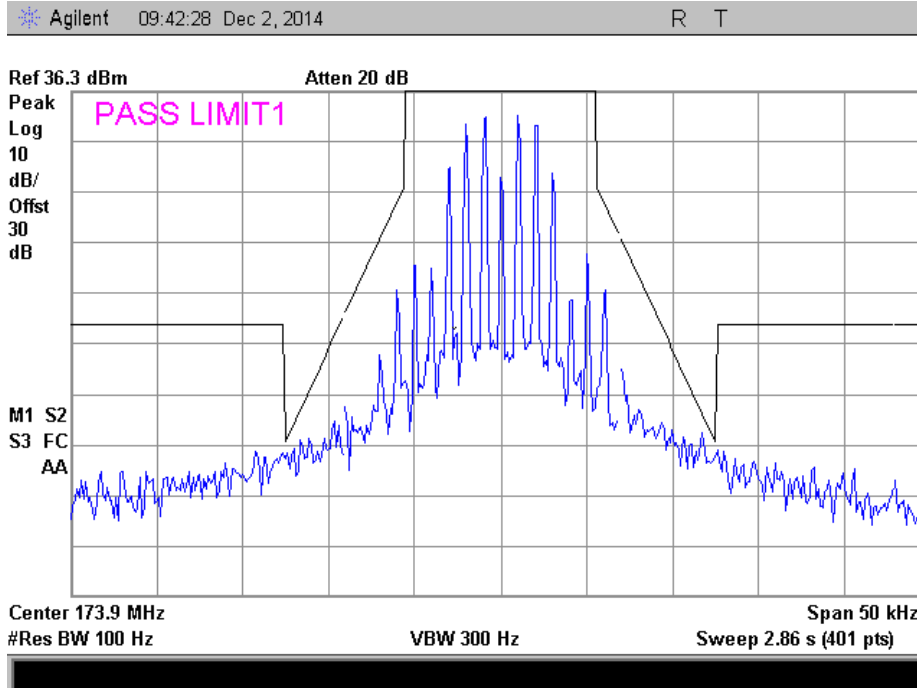
Mask B 162.05 MHz
(IC Only)

Agilent 10:06:45 Dec 2, 2014 R T





Mask D 173.95 MHz





Agilent 10:07:51 Dec 2, 2014 R T

Ref 36.5 dBm Atten 20 dB

Peak
Log
10
dB/
Offst
30
dB

PASS LIMIT2

M1 S2
S3 FC
AA

Center 173.9 MHz Span 50 kHz
#Res BW 100 Hz VBW 300 Hz Sweep 2.86 s (401 pts)

The image shows a spectrum plot on a grid. The vertical axis is labeled 'Peak Log 10 dB/ Offst 30 dB' and the horizontal axis is labeled 'Center 173.9 MHz'. A blue line represents the signal spectrum, showing a broad peak with many smaller peaks. A black step function is overlaid on the plot, with a label 'PASS LIMIT2' in pink. The plot also includes a reference level 'Ref 36.5 dBm' and an attenuation 'Atten 20 dB'. At the bottom, the following parameters are listed: 'Span 50 kHz', '#Res BW 100 Hz', 'VBW 300 Hz', and 'Sweep 2.86 s (401 pts)'. On the left side, there are labels 'M1 S2', 'S3 FC', and 'AA'.



Transient Frequency Behavior

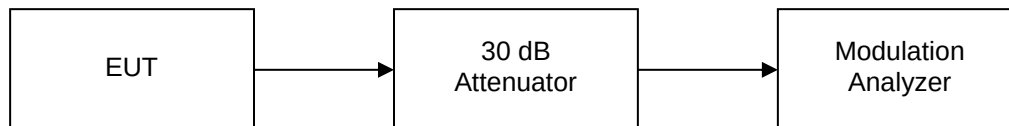
Name of Test: Transient Frequency Behavior
Test Equipment Utilized: i00118, i00345

Engineer: Alex Macon
Test Date: 12/2/14

Measurement Procedure

The EUT was connected directly to a modulation analyzer through a 40 dB attenuator to verify that the EUT meets the required Transient Frequency Behavior response per the specification. The modulation analyzer is a real time spectrum analyzer with integrated demodulation, audio measurement capabilities, and timing analysis. The turn on and turn off transient timing was measured and recorded.

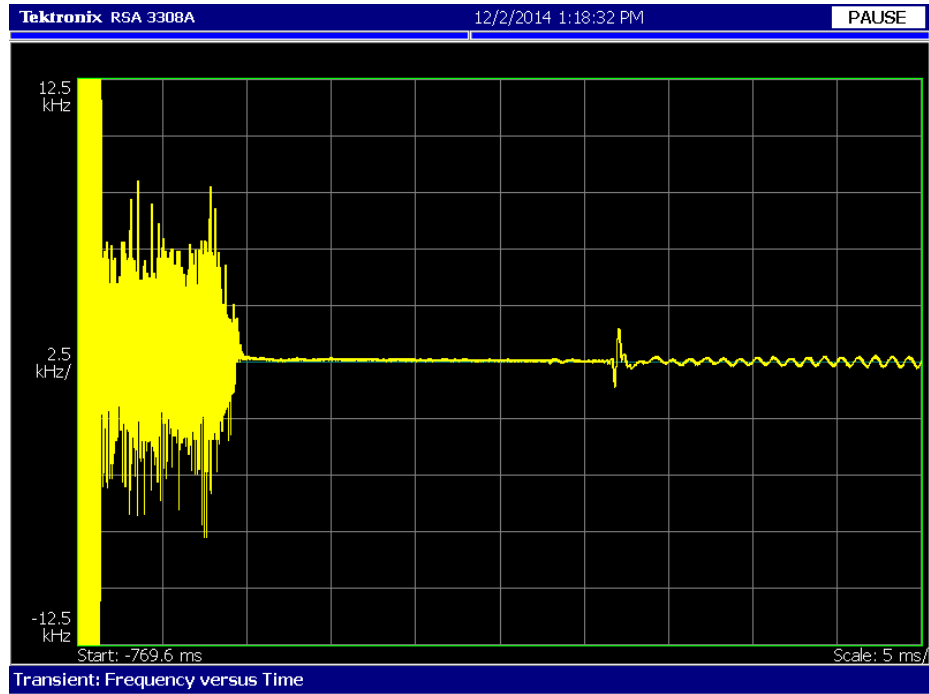
Test Setup



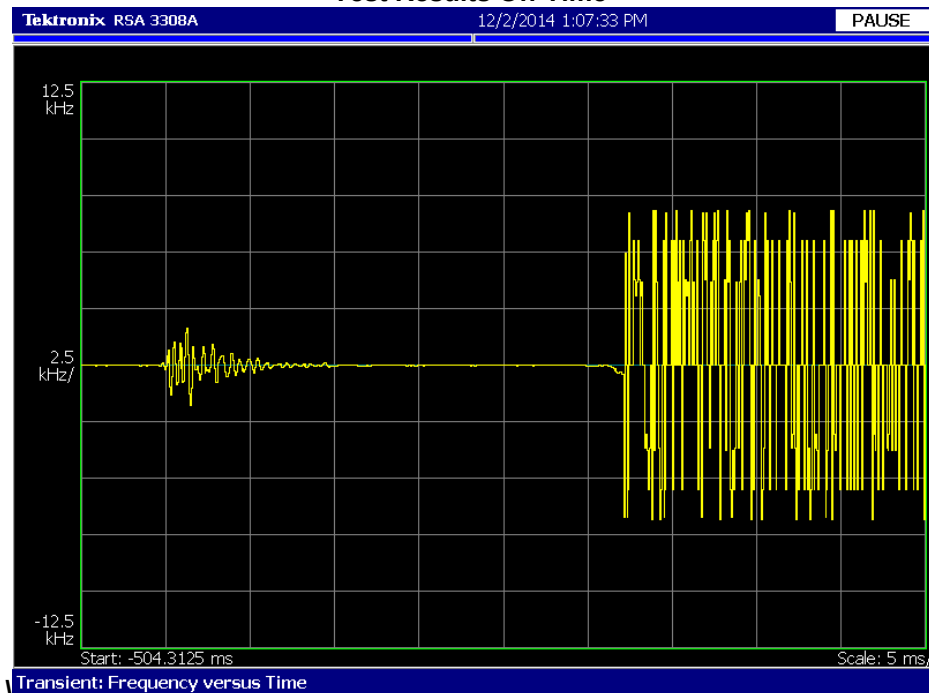


25 kHz Bandwidth

Test Results On Time



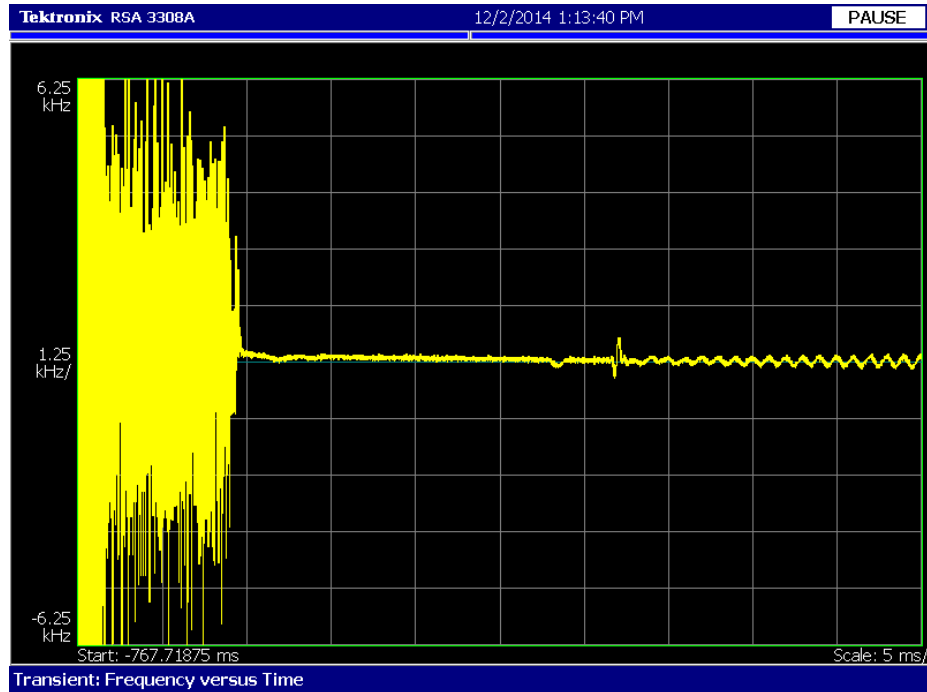
Test Results Off Time



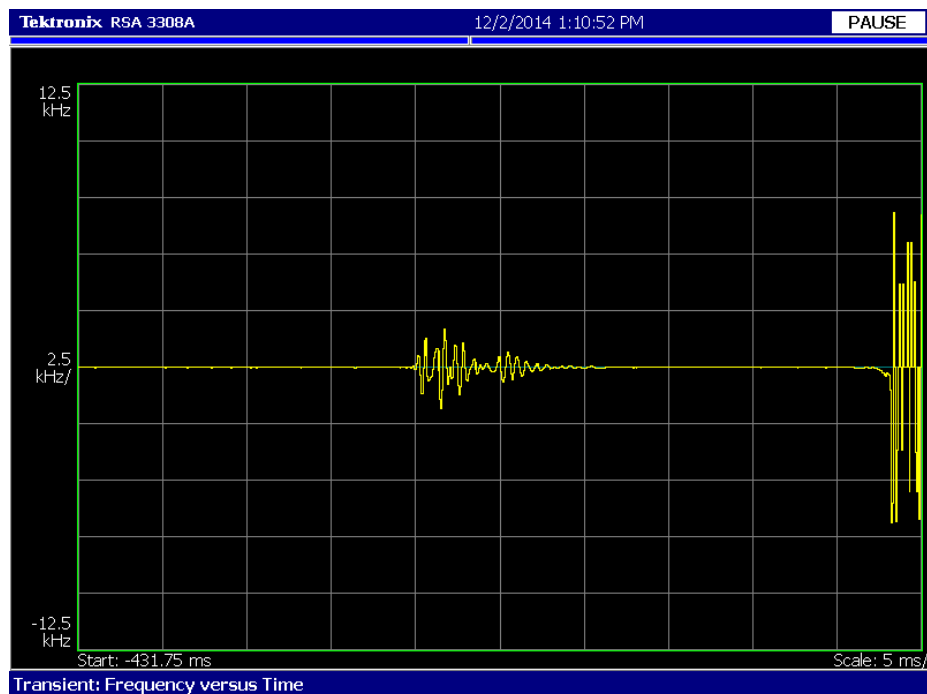


12.5 kHz Bandwidth

Test Results On Time



Test Results Off Time





Modulation Limiting

Name of Test:

Modulation Limiting

Engineer: Alex Macon

Test Equipment Utilized:

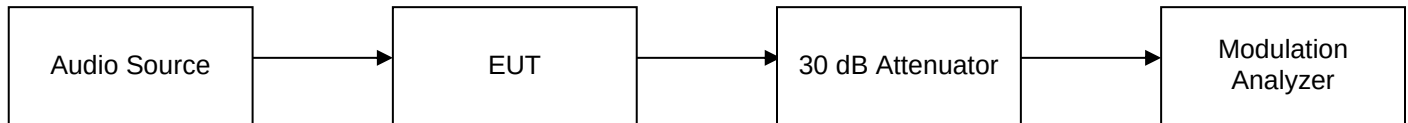
i00118, i00345

Test Date: 12/2/14

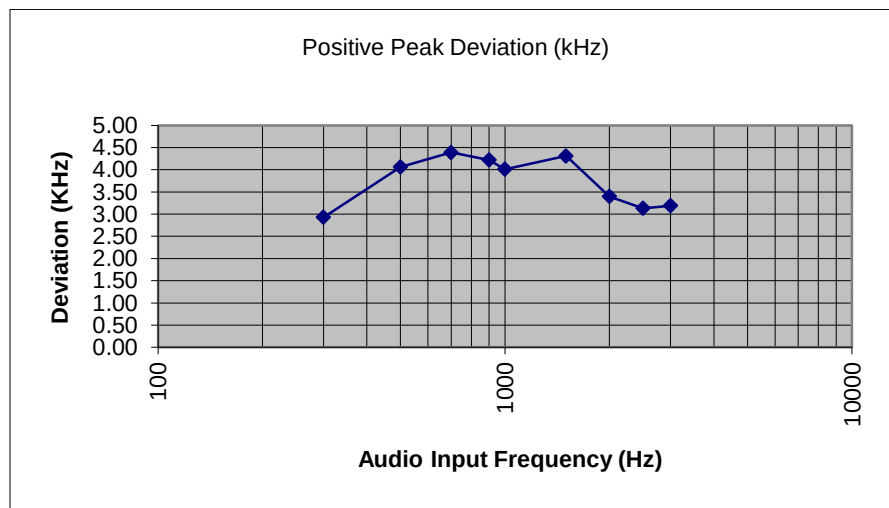
Measurement Procedure

The EUT was connected directly to a modulation analyzer through an attenuator. The audio source was tuned across the required audio frequency range and the modulation limiting response was measured and plotted. The modulation analyzer is a real time spectrum analyzer with integrated demodulation, audio measurement capabilities, and timing analysis.

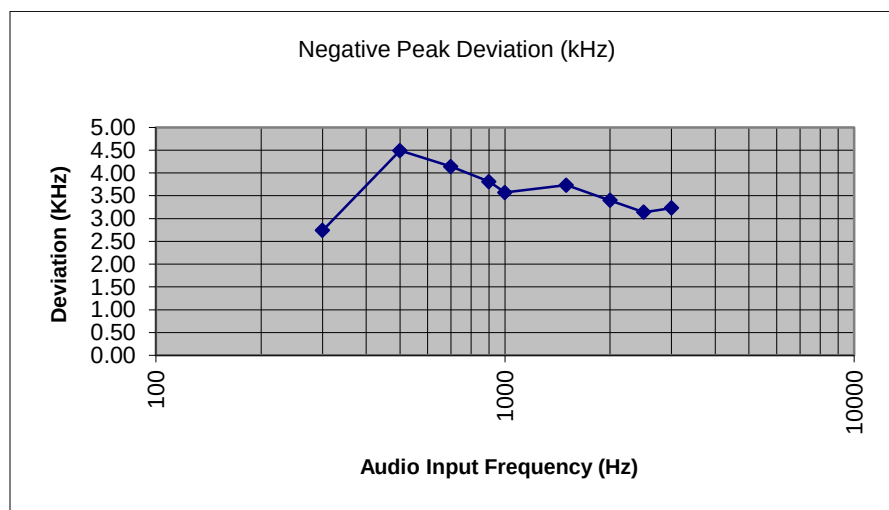
Test Setup



Positive Peaks



Negative Peaks





Necessary Bandwidth Calculations

Name of Test:

Necessary Bandwidth Calculations

Engineer: Alex Macon

Test Specification:

2.202

Test Date: 12/2/14

Modulation = 16K0F3E (RSS-119 Only)		
Necessary Bandwidth Calculation:		
Maximum Modulation (M) kHz	=	3
Maximum Deviation (D), kHz	=	5
Constant Factor (K)	=	1
Necessary Bandwidth (B_N), kHz	=	$(2 \times M) + (2 \times D \times K)$
	=	16.0

Modulation = 8K30F1E		
Necessary Bandwidth Calculation:		
Maximum Modulation (M), kHz	=	1.65
Maximum Deviation (D), kHz	=	2.5
Constant Factor (K)	=	1
Necessary Bandwidth (B_N), kHz	=	$(2 \times M) + (2 \times D \times K)$
	=	8.3

Modulation = 8K30F1D		
Necessary Bandwidth Calculation:		
Data Rate (R) Kbps	=	2.3
Maximum Deviation (D), kHz	=	2.5
Necessary Bandwidth (B_N), kHz	=	$2.4D + 1.0R$
	=	8.3



Modulation = 8K30F7W		
Necessary Bandwidth Calculation:		
Data Rate (R) Kbps	=	3.973
Maximum Deviation (D), kHz	=	2.5
Signaling States	=	4
Constant Factor (K)	=	1
Necessary Bandwidth (B_N), kHz	=	$(R/\log_2 S) + 2DK$
	=	8.3



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Function Generator	HP	33120A	i00118	Verified on: 11/30/14	
Tunable Notch Filter	Eagle	TNF-1-(100-250MHz)	i00126	Verified on:11/30/14	
Spectrum Analyzer	Tektronix	RSA3308A	i00345	3/18/14	3/18/15
EMI Analyzer	Agilent	E7405A	i00379	1/14/14	1/14/15
High Pass Filter	K&L	7IH40-980/T6000-O/O	i00432	Verified on:11/30/14	

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT