



# Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.ComplianceTesting.com>

[info@ComplianceTesting.com](mailto:info@ComplianceTesting.com)

## 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  
Ph: (678) 474-4722  
E-Mail: [jberger@kenwoodusa.com](mailto:jberger@kenwoodusa.com)

Prepared By  
Compliance Testing, LLC  
1724 S. Nevada Way  
Mesa, AZ 85204  
(480) 926-3100 phone / (480) 926-3598 fax  
[www.compliancetesting.com](http://www.compliancetesting.com)  
Project No: p14b0026

**Alex Macon**  
Project Test Engineer

This report may not be reproduced, except in full, without written permission from Compliance Testing.  
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



## Table of Contents

<b><u>Description</u></b>	<b><u>Page</u></b>
Standard Test Conditions and Engineering Practices	6
Test Result Summary	7
Carrier Output Power (Conducted)	8
Conducted Spurious Emissions	9
Emission Masks (Occupied Bandwidth)	13
Transient Frequency Behavior	22
Modulation Limiting	25
Necessary Bandwidth Calculations	26
Test Equipment Utilized	28



## 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)

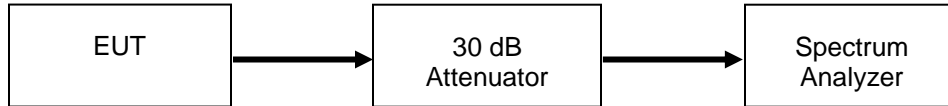
**Name of Test:** Carrier Output Power (Conducted)  
**Test Equipment Utilized:** i00379

**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:**

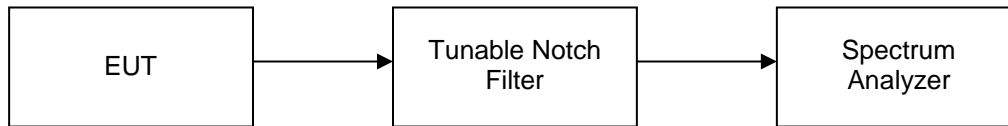
i00118, i00126, i00379, i00432

**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 10<sup>th</sup> 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**



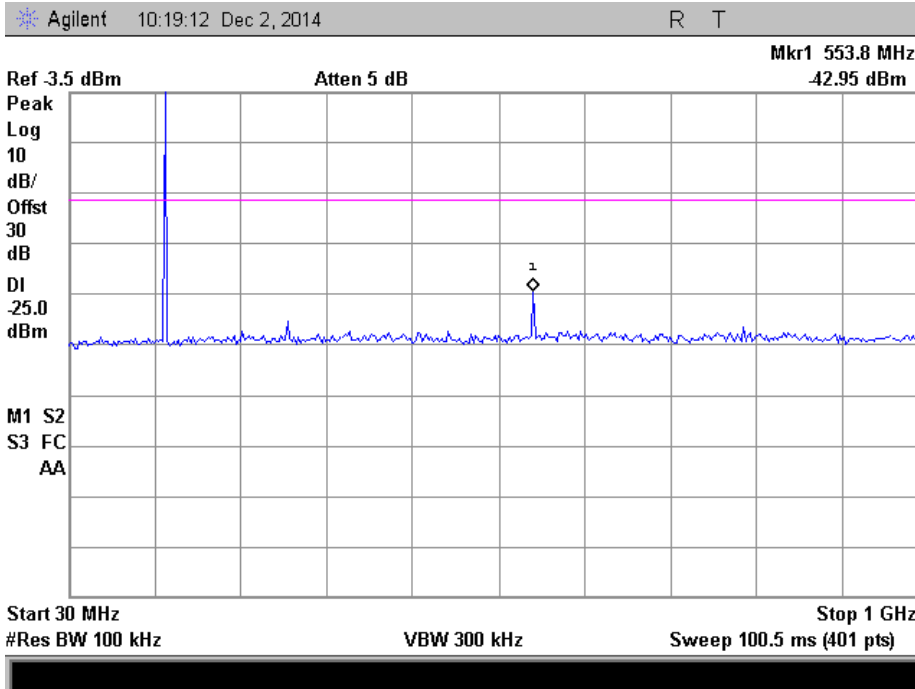
**High Power Conducted Spurious Emissions Summary Test Table**

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

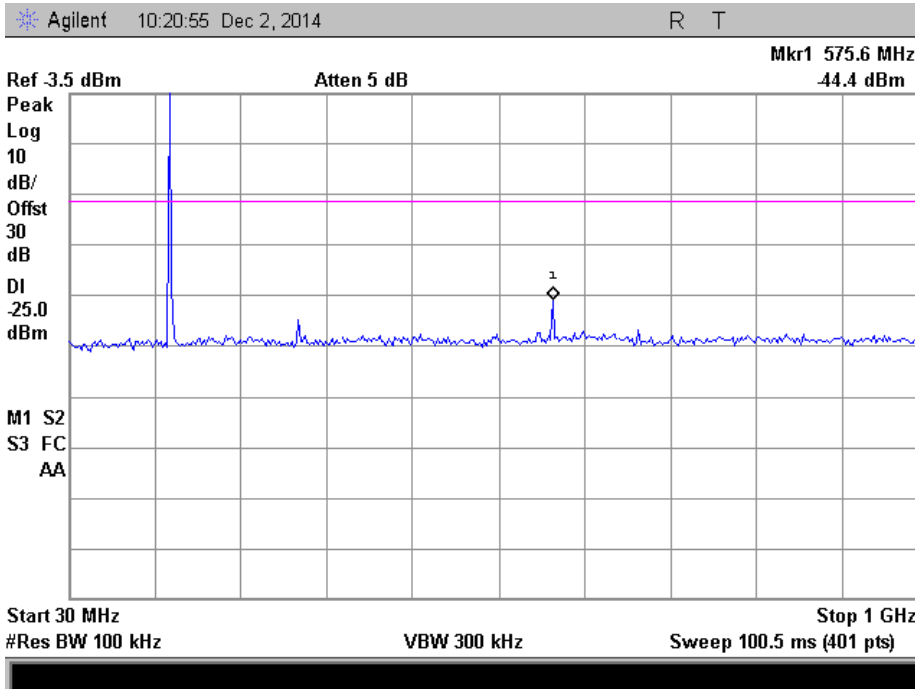


### Test Plots

138.05 MHz  
30 – 1000 MHz

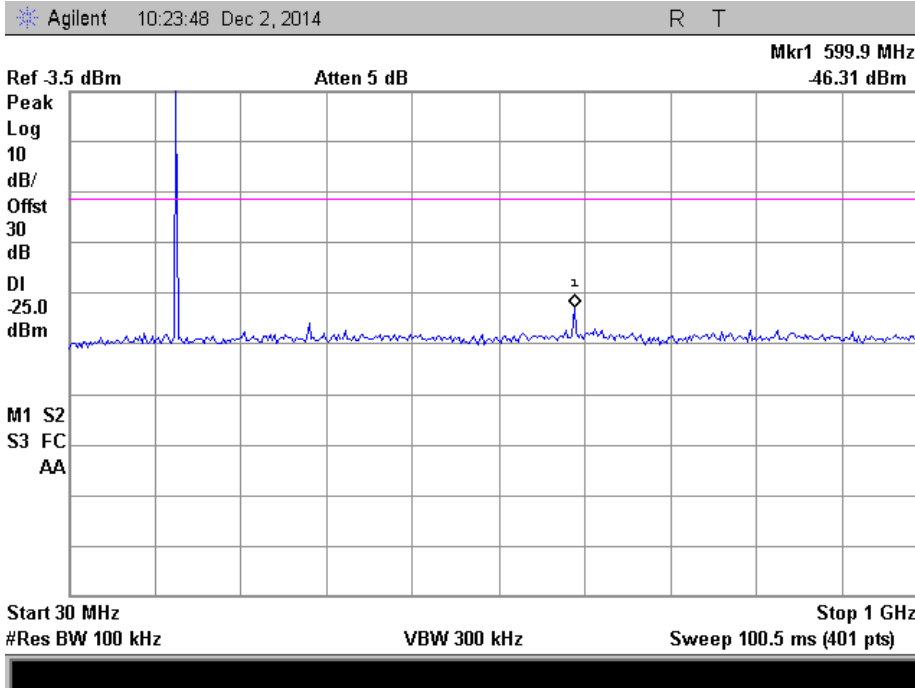


143.95 MHz  
30 – 1000 MHz

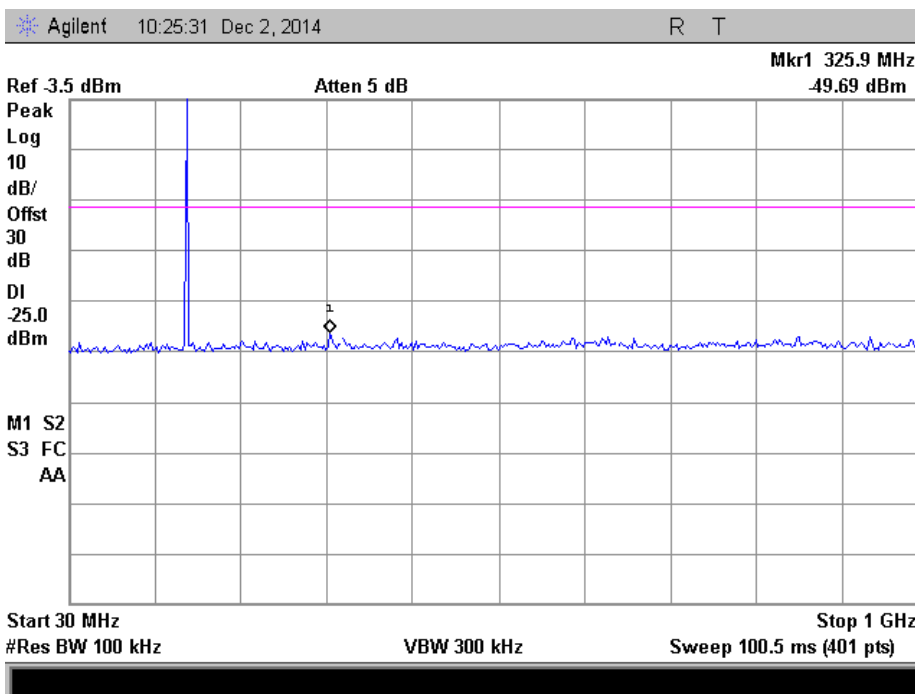




150.05 MHz  
30 – 1000 MHz

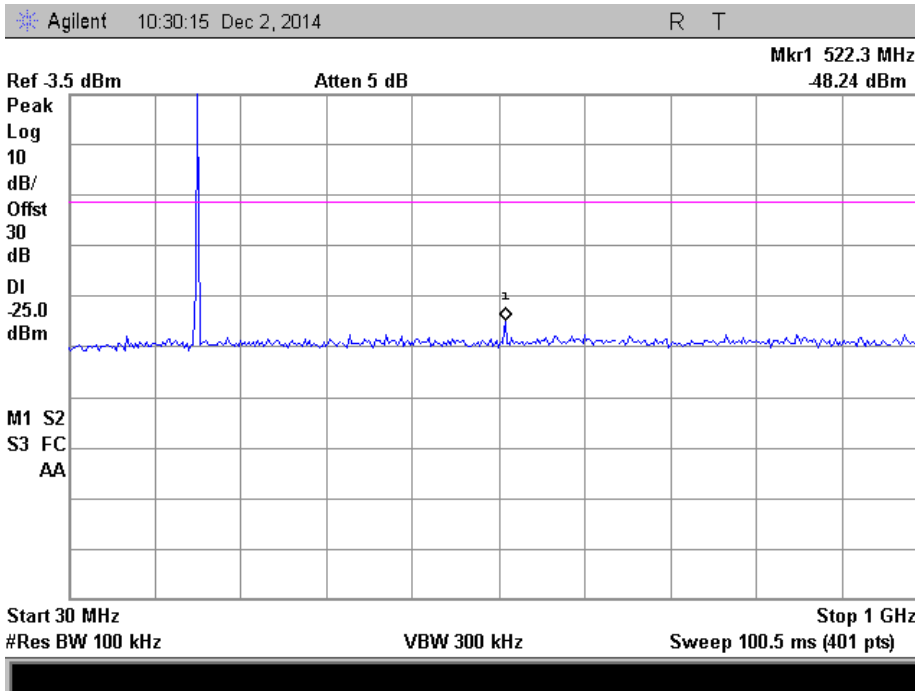


162.05 MHz  
30 – 1000 MHz





173.95 MHz  
30 – 1000 MHz





**Emission Masks (Occupied Bandwidth)**

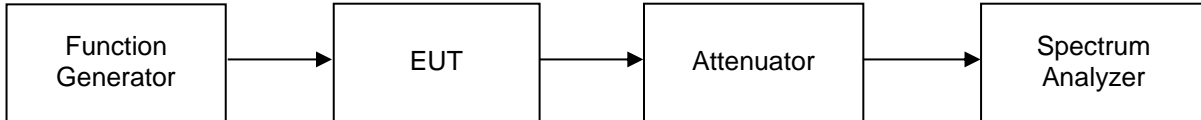
**Name of Test:** Emission Masks (Occupied Bandwidth)  
**Test Equipment Utilized** i00118, i00379

**Engineer:** Alex Macon  
**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**

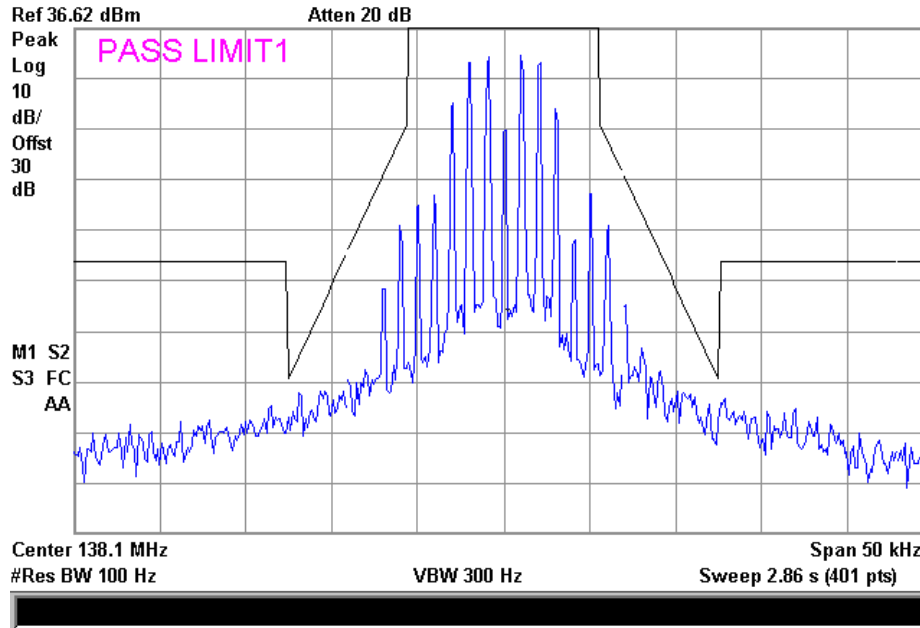




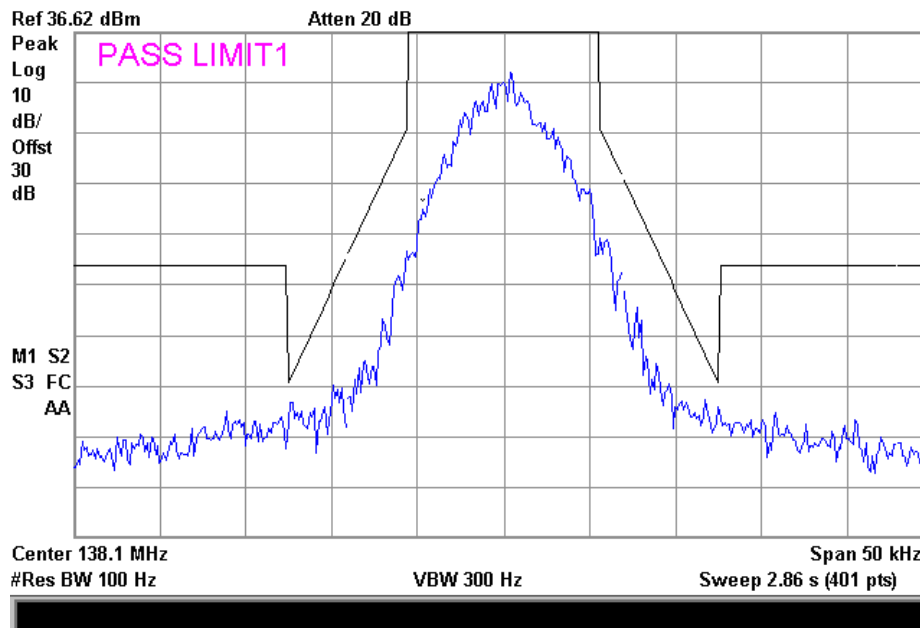
### Occupied Bandwidth Plots

Mask D 138.05 MHz

Agilent 09:57:08 Dec 2, 2014 R T

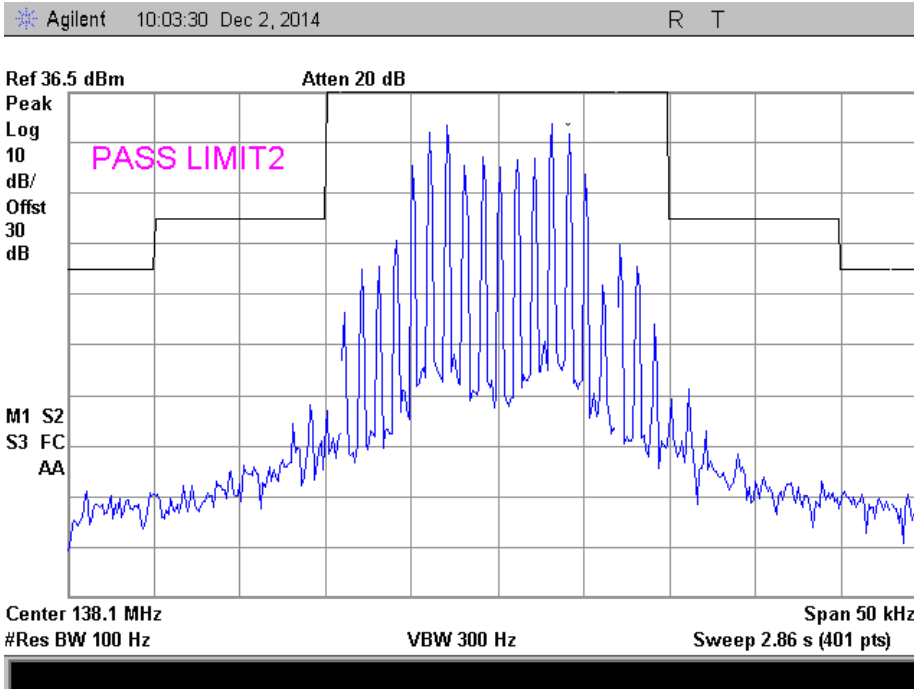


Agilent 09:56:15 Dec 2, 2014 R T

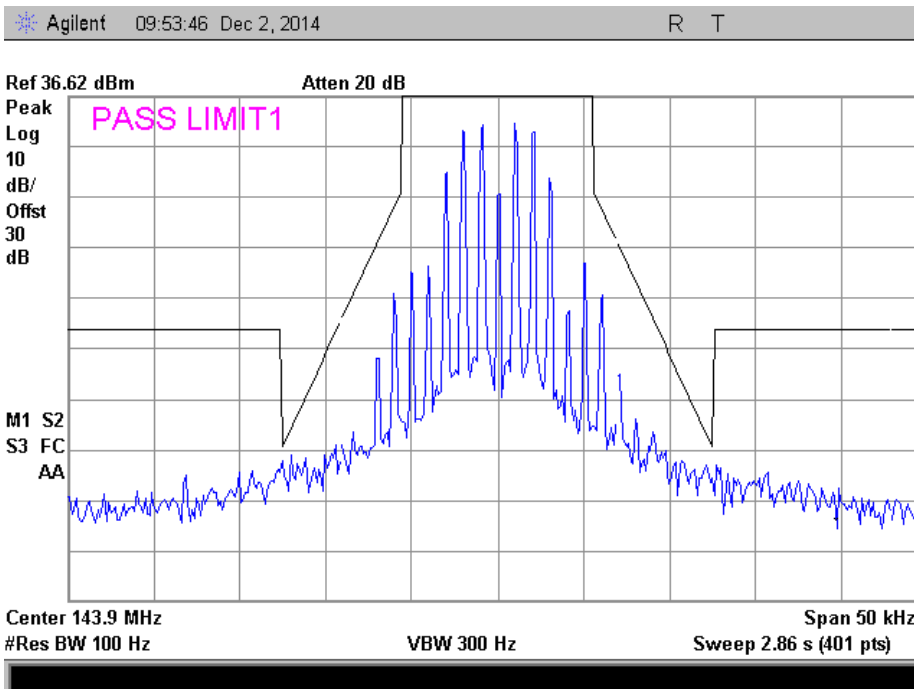




### Mask B 138.05 MHz (IC Only)

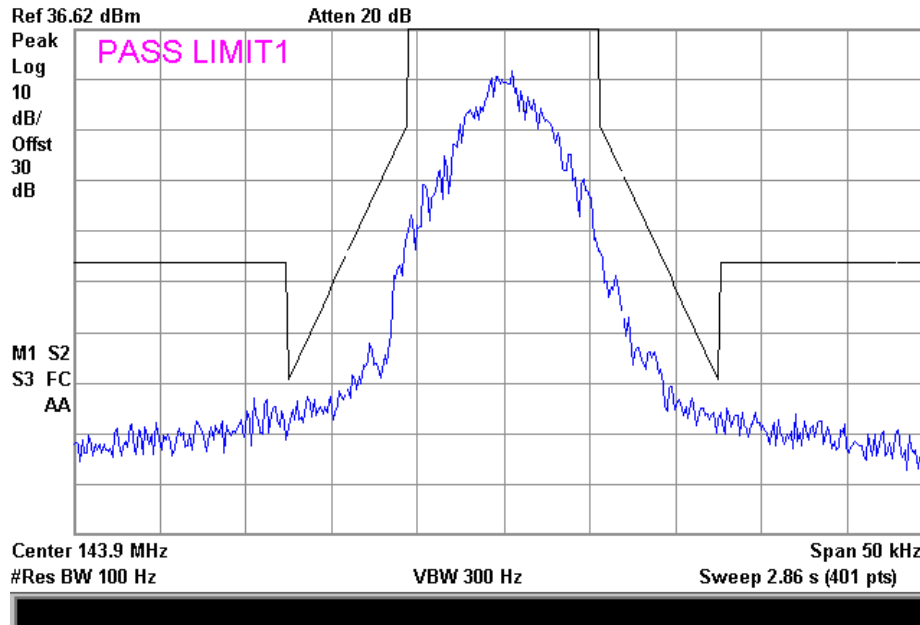


### Mask D 143.95 MHz



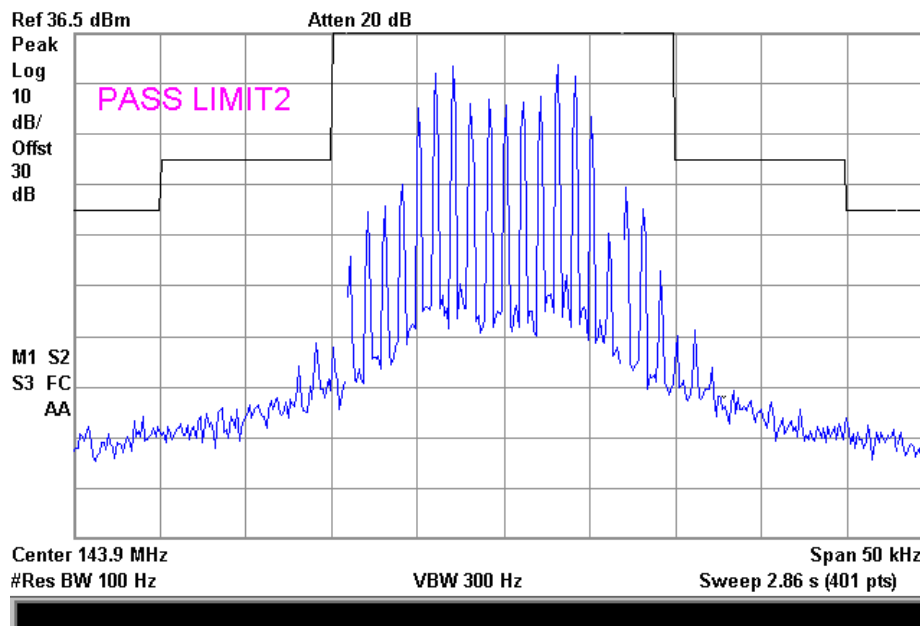


Agilent 09:54:40 Dec 2, 2014 R T



Mask B 143.95 MHz  
(IC Only)

Agilent 10:04:45 Dec 2, 2014 R T

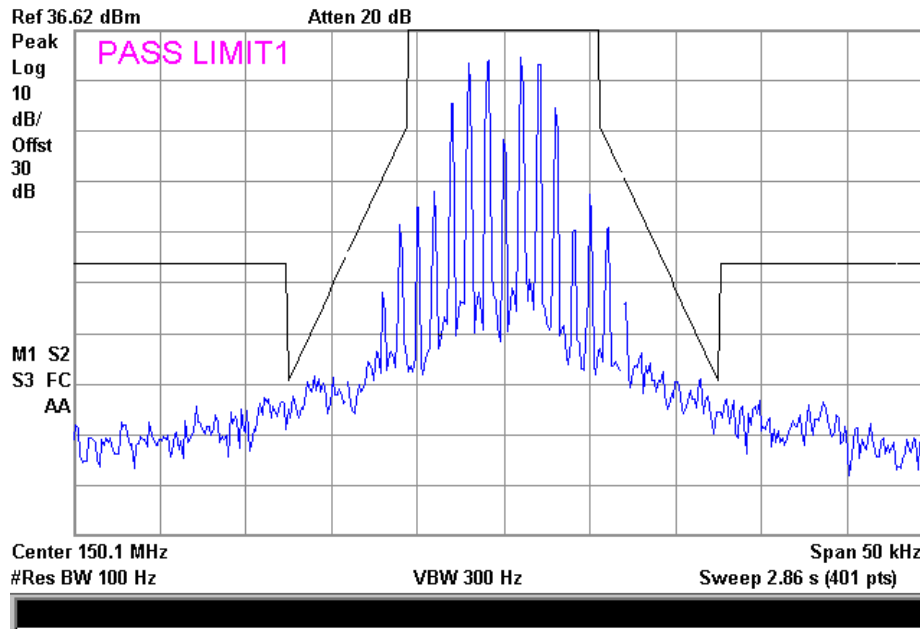




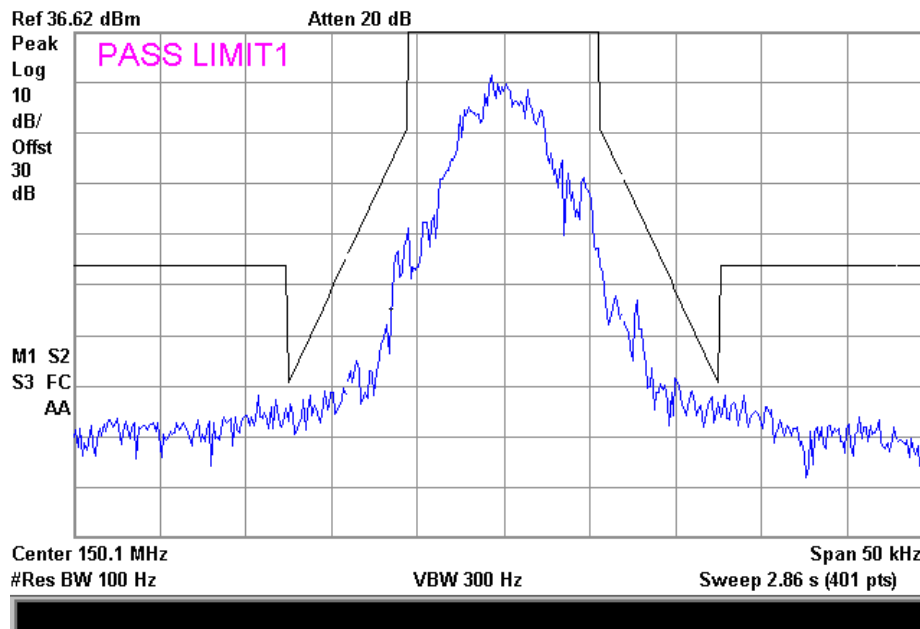


### Mask D 150.05 MHz

Agilent 09:51:21 Dec 2, 2014 R T

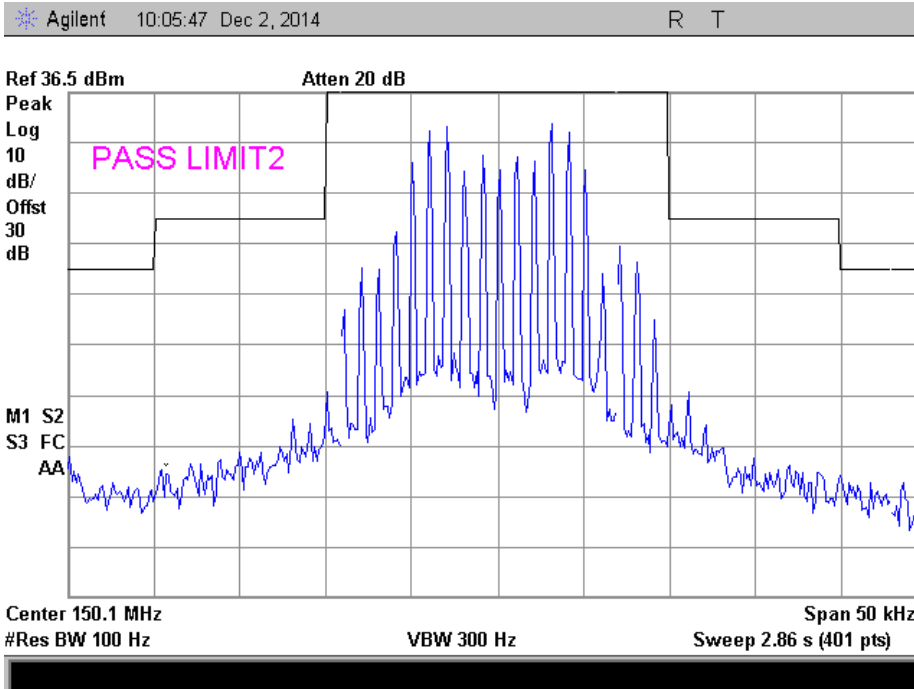


Agilent 09:50:27 Dec 2, 2014 R T

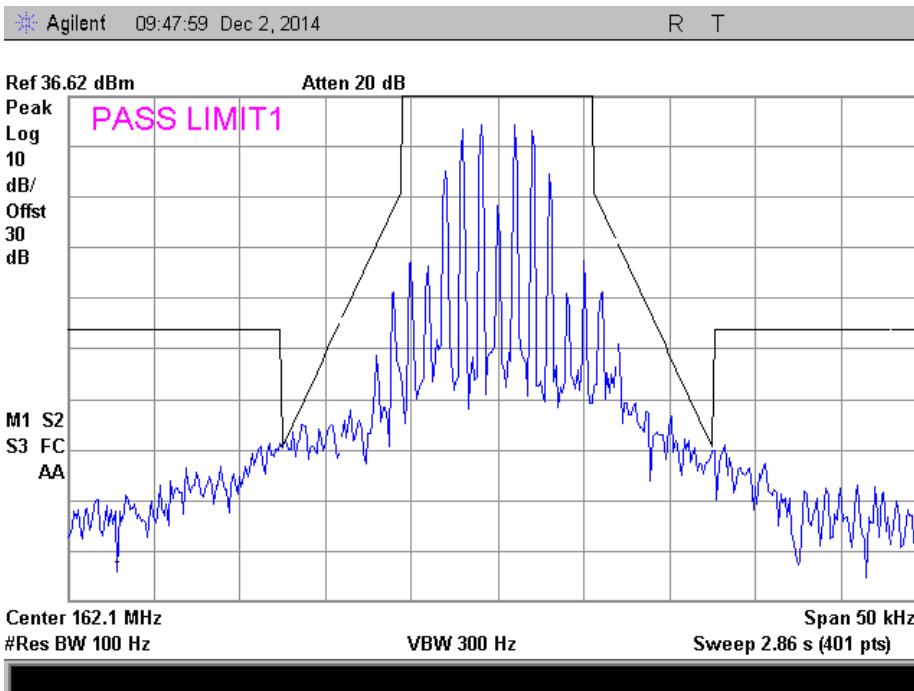




### Mask B 150.05 MHz (IC Only)

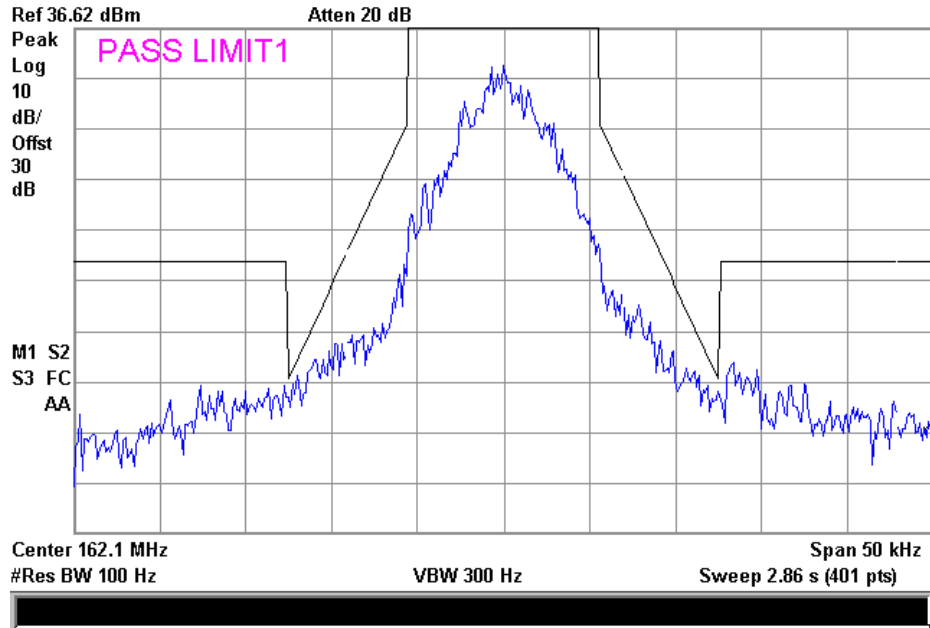


### Mask D 162.05 MHz



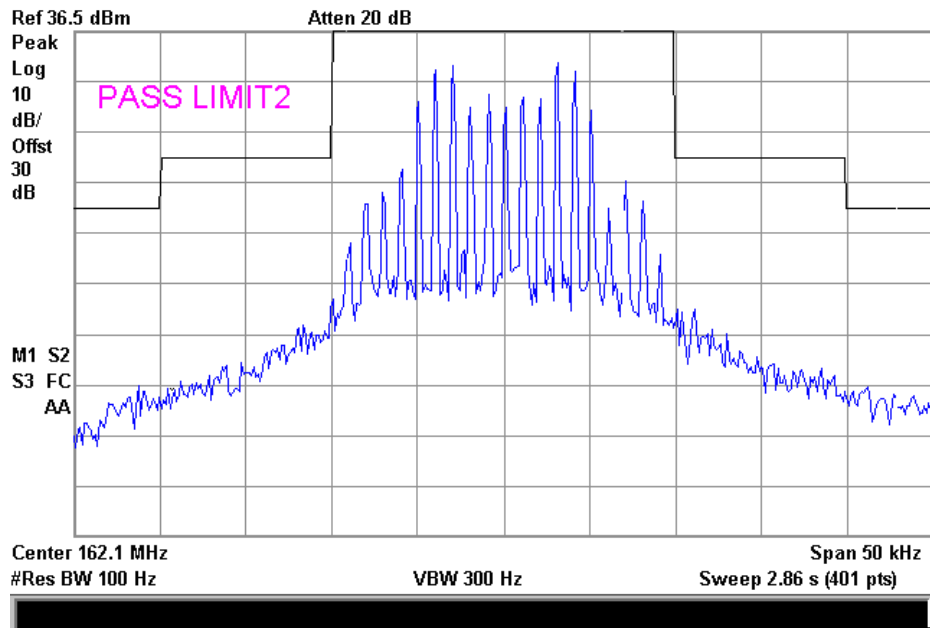


Agilent 09:49:20 Dec 2, 2014 R T



Mask B 162.05 MHz  
(IC Only)

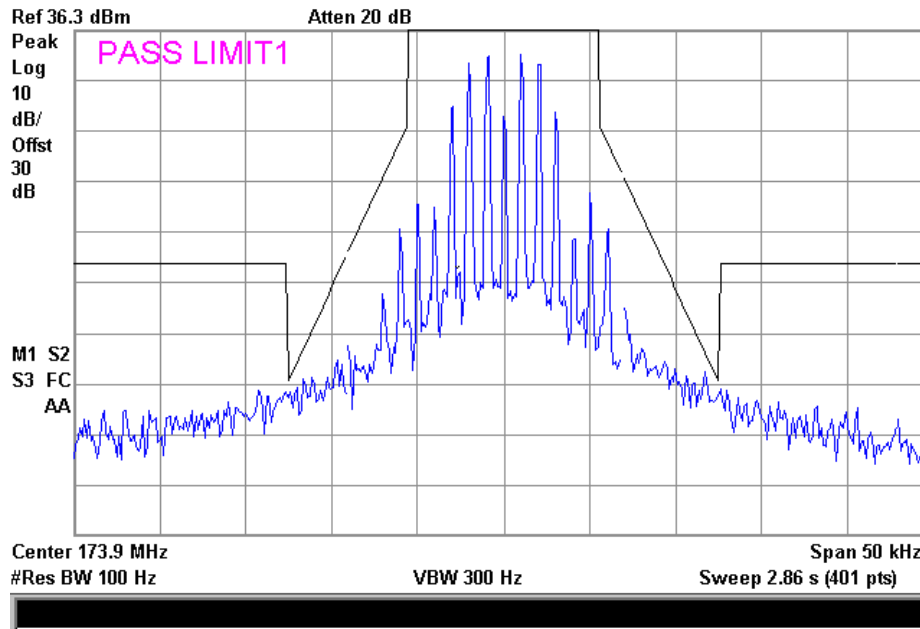
Agilent 10:06:45 Dec 2, 2014 R T



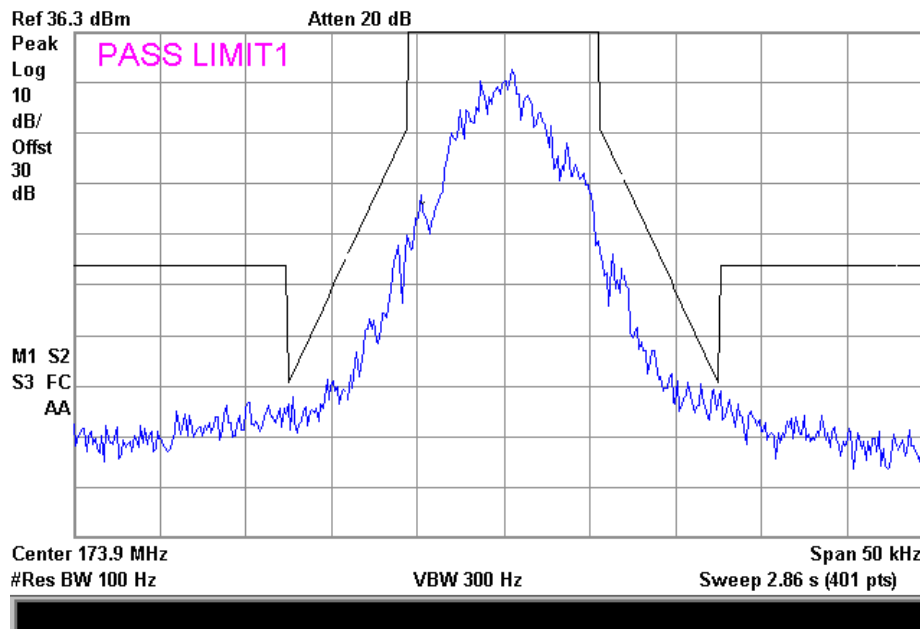


### Mask D 173.95 MHz

Agilent 09:42:28 Dec 2, 2014 R T



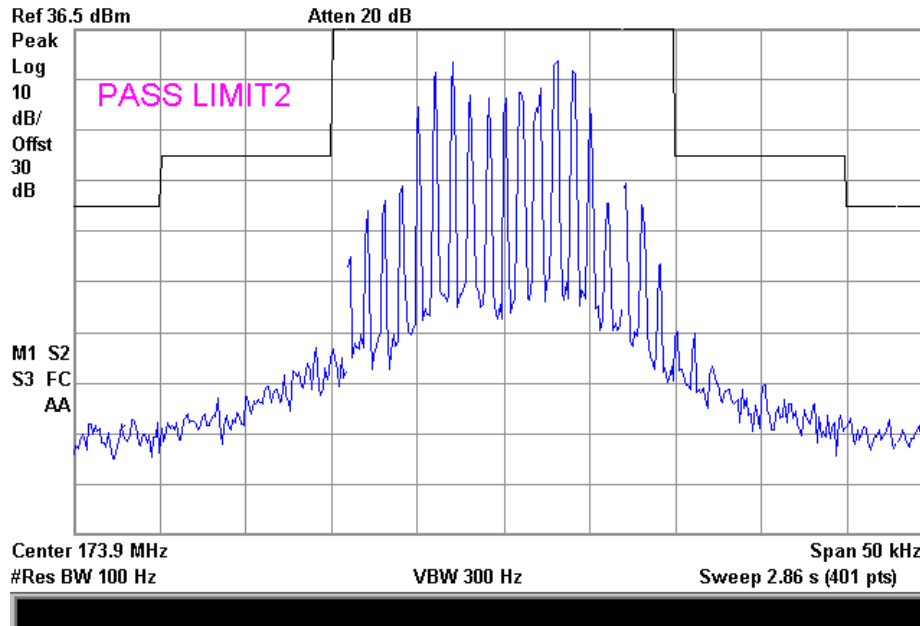
Agilent 09:41:07 Dec 2, 2014 R T





### Mask B 173.95 MHz (IC Only)

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





## Transient Frequency Behavior

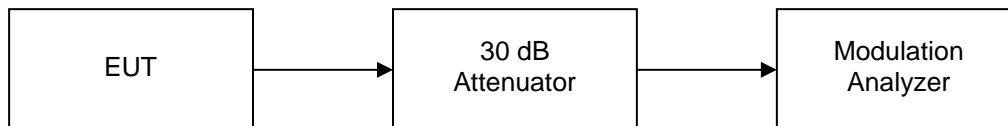
**Name of Test:** Transient Frequency Behavior  
**Test Equipment Utilized:** i00118, i00345

**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.

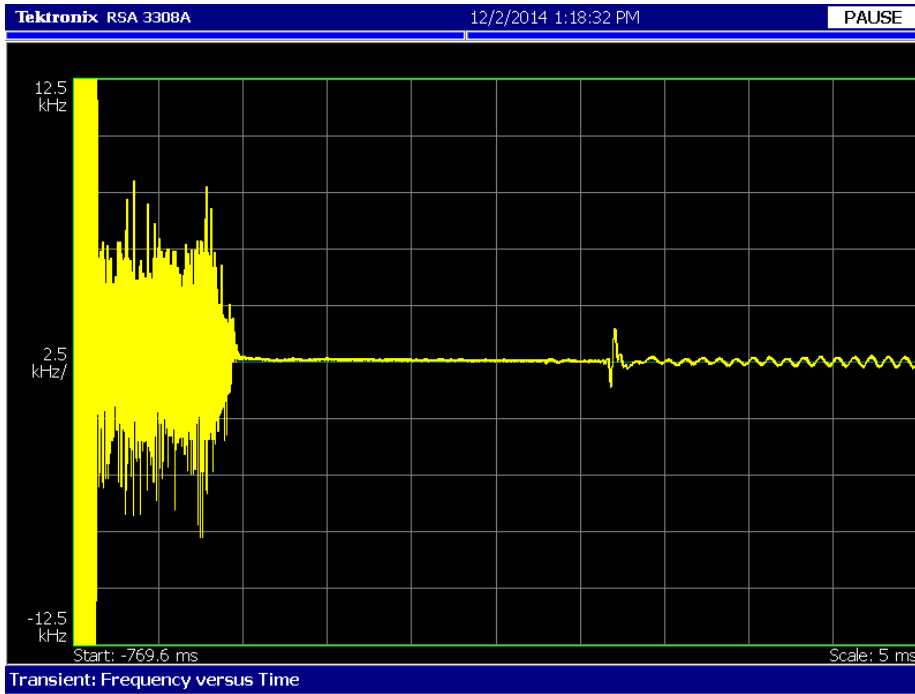
#### Test Setup



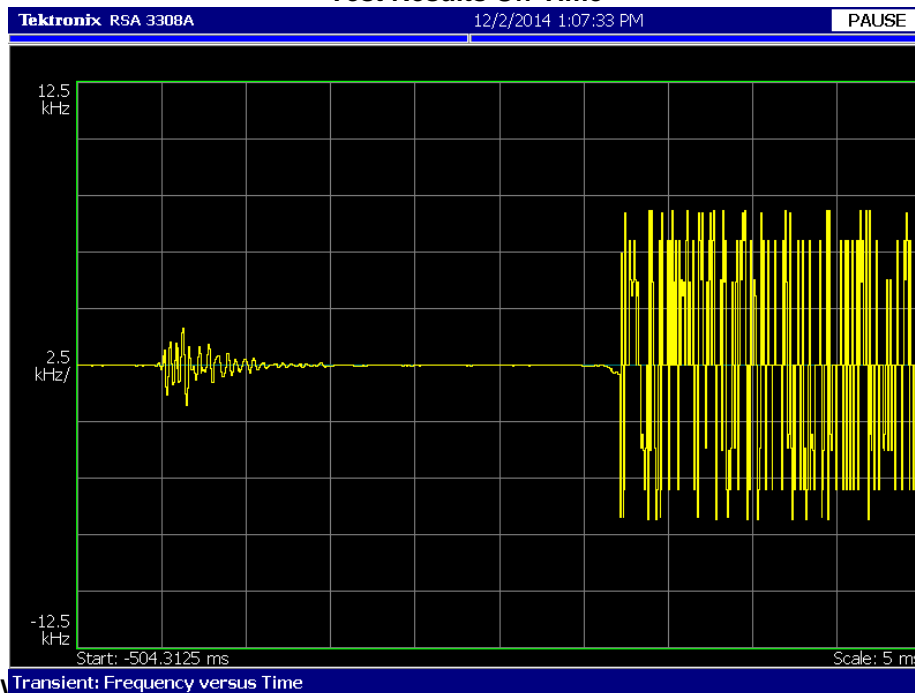


### 25 kHz Bandwidth

### Test Results On Time



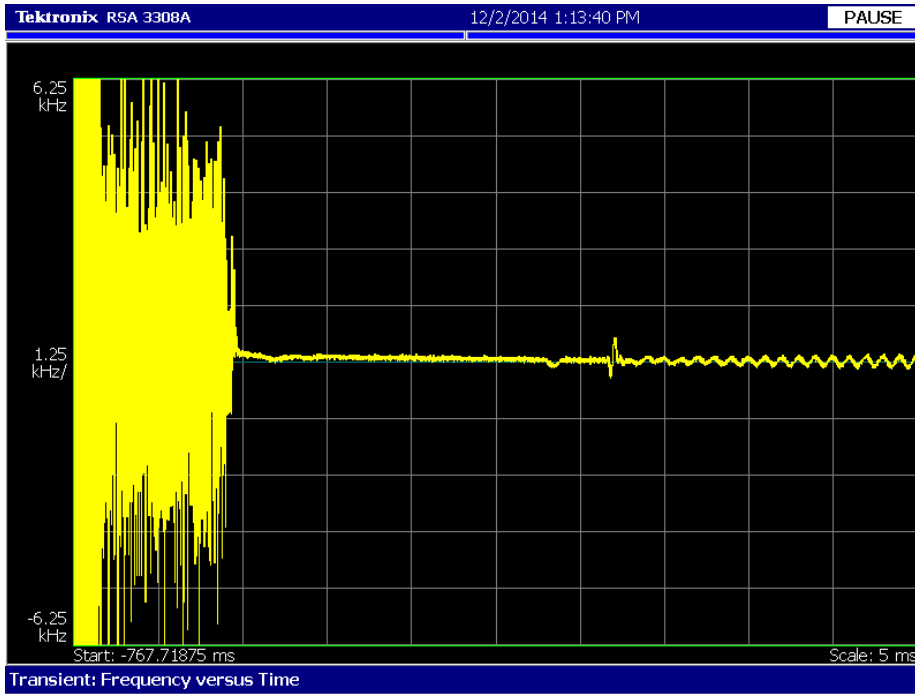
### Test Results Off Time



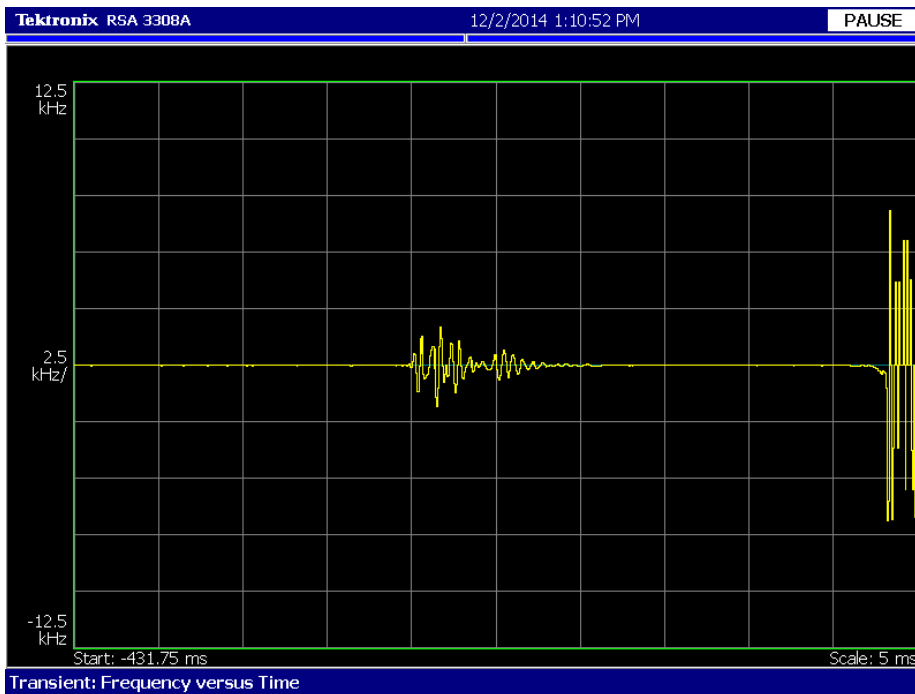


### 12.5 kHz Bandwidth

### Test Results On Time



### Test Results Off Time







### Modulation Limiting

**Name of Test:**

Modulation Limiting

**Engineer:** Alex Macon

**Test Equipment Utilized:**

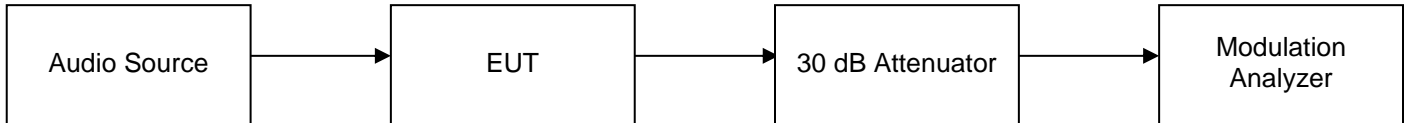
i00118, i00345

**Test Date:** 12/2/14

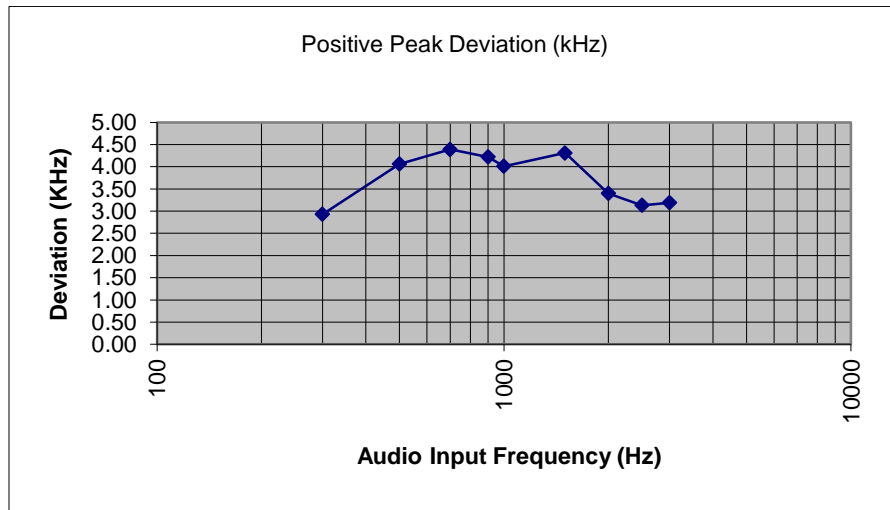
### Measurement Procedure

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.

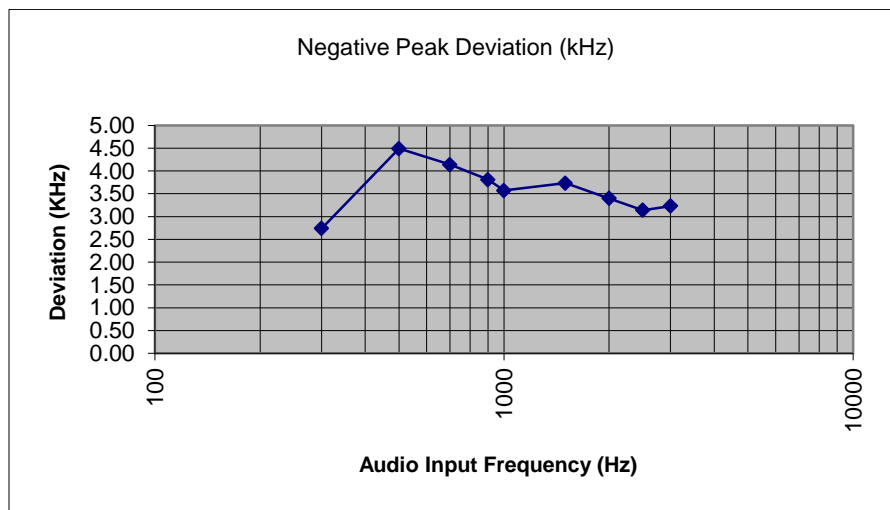
### Test Setup



### 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)		
<b>Necessary Bandwidth Calculation:</b>		
Maximum Modulation (M) kHz	=	3
Maximum Deviation (D), kHz	=	5
Constant Factor (K)	=	1
Necessary Bandwidth (B <sub>N</sub> ), kHz	=	(2xM)+(2xDxK)
	=	16.0

Modulation = 8K30F1E		
<b>Necessary Bandwidth Calculation:</b>		
Maximum Modulation (M), kHz	=	1.65
Maximum Deviation (D), kHz	=	2.5
Constant Factor (K)	=	1
Necessary Bandwidth (B <sub>N</sub> ), kHz	=	(2xM)+(2xDxK)
	=	8.3

Modulation = 8K30F1D		
<b>Necessary Bandwidth Calculation:</b>		
Data Rate (R) Kbps	=	2.3
Maximum Deviation (D), kHz	=	2.5
Necessary Bandwidth (B <sub>N</sub> ), kHz	=	2.4D+1.0R
	=	8.3



Modulation = 8K30F7W		
<b>Necessary Bandwidth Calculation:</b>		
Data Rate (R) Kbps	=	3.973
Maximum Deviation (D), kHz	=	2.5
Signaling States	=	4
Constant Factor (K)	=	1
Necessary Bandwidth (B <sub>N</sub> ), 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