Compliance Testing, LLC
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Test Report

Prepared for: ISC Technologies, Inc

Model: ISC - T5540
FCC ID: SS6ISC-T5540

Description: Paging Transmitter

To

FCC Part 22

And

FCC Part 90

Date of Issue: February 28, 2012

On the behalf of the applicant:	**ISC Technologies, Inc.** **301 Oak Street** **Quincy, IL 62301**
Attention of:	**Tim Anderson, Vice President** **Ph: (217) 221-0985** **E-Mail: anderson@illinoissignal.com**

Prepared By
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Project No: p1220008

Greg Corbin

Greg Corbin
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	February 28, 2012	Greg Corbin	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 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 OATS Reg, #933597

IC Reg. #2044A-1

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 cold 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
Sub-part
2.1033(c)(14)

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II, Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057, and the following individual Parts:22, 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/C63.4-2009, 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 specify 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 (ºC)	**Humidity (%)**	**Pressure (mbar)**
23.0 – 25.8	20.5 – 25.5	961.8 – 966.8

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

EUT Description

Model: ISC - T5540
Description: Paging Transmitter
DSP Firmware: 2.12
Control Software: 2.21

Additional Information

The EUT is a one way paging transmitter system, consisting of an exciter and power amplifier.
The EUT is powered by 2 AC to DC power supplies.

EUT Operation during Tests

The EUT was installed in a 19 inch rack and was tested under normal operation.

A pc with a hyper-terminal program connected to the VT 100 serial port was used to communicate to the EUT as required.

A modulation frequency of 1200 Hz square wave at a level of 4 v p-p was input to the 2 level input of the EUT.
The deviation in the control software was set to 3000 Hz.

Accessories: None

Cables: None

15.203: Antenna Requirement:

	The antenna is permanently attached to the EUT
	The antenna uses a unique coupling
X	The EUT must be professionally installed
	The antenna requirement does not apply

Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
22.565(b) 90.205(s)	Carrier Output Power (Conducted)	Pass	
2.1051, 22.359 90.210(d)	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1049, 22.357 90.210	Emission Masks (Occupied Bandwidth)	Pass	

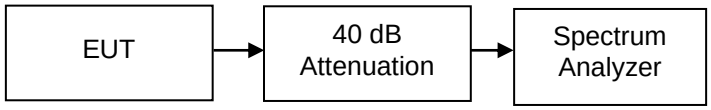
Carrier Output Power (Conducted)

Name of Test:	Carrier Output Power (Conducted)	**Engineer:** Greg Corbin
Test Equipment Utilized:	i00172, i00331	**Test Date:** 2/27/2012

Measurement Procedure

The Equipment Under Test (EUT) was connected as shown in the test set-up.
The peak readings were taken and the result was then compared to the limit.

Test Setup



Transmitter Peak Output Power

Tuned Frequency (MHz)	Recorded Measurements (dBm)	(Watts)	Limit (Watts)	Result
407	53.98	250.034	500	Pass
450	53.98	250.034	500	Pass
470	53.97	249.459	500	Pass

Note: Measured Output Power is within 20% of the manufacturer's rated output power per 90.205(s)

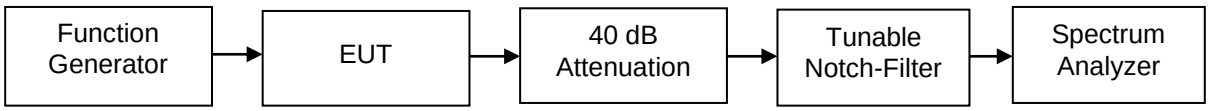
Conducted Spurious Emissions

Name of Test: Conducted Spurious Emissions **Engineer:** Greg Corbin
Test Equipment Utilized: i00118, i00124, i00172, i00331 **Test Date:** 2/27/2012

Test Procedure

The EUT was connected to a spectrum analyzer as shown in test set-up to verify that the EUT 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 frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed and plotted. . A modulation frequency of 1200 Hz square wave at a level of 4 v p-p was input to the 2 level input of the EUT. The deviation in the control software was set to 3000 Hz.

Test Setup



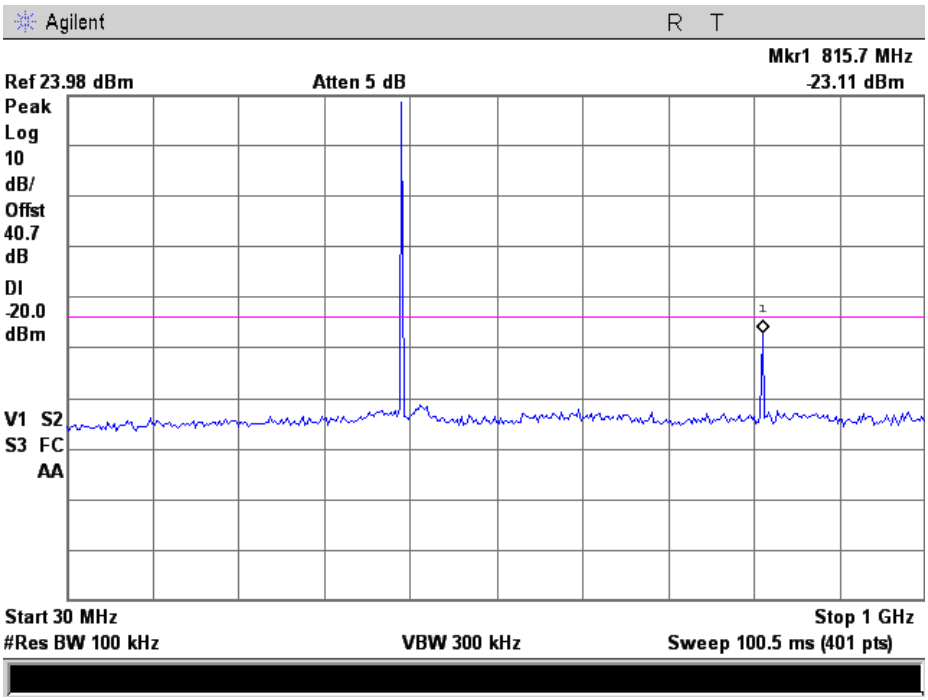
Conducted Spurious Emissions Summary Test Table

Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
407	815.7	-23.1	-20	Pass
450	2980	-27.5	-20	Pass
470	2830	-28.0	-20	Pass

Conducted Spurious Emission Test Plots

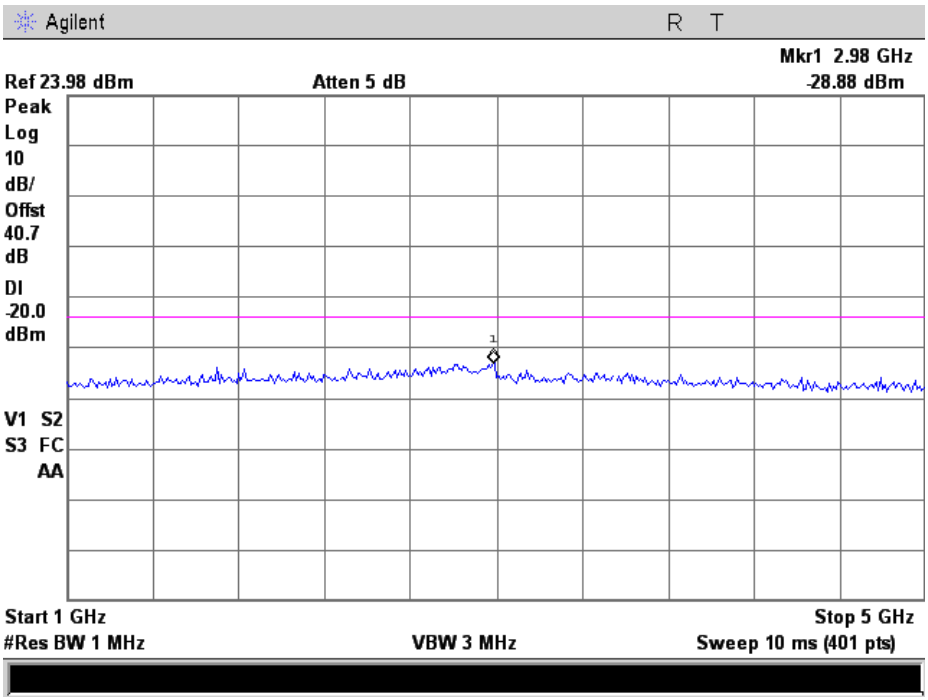
Tuned Frequency = 407 MHz

30 MHz – 1 GHz



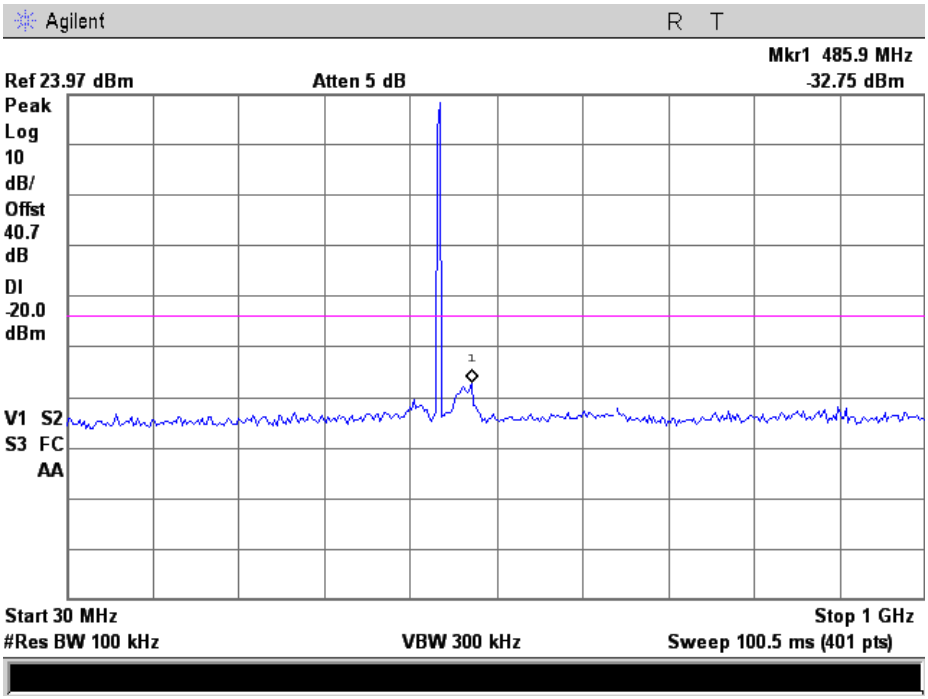
Tuned Frequency = 407 MHz

1 - 5 GHz



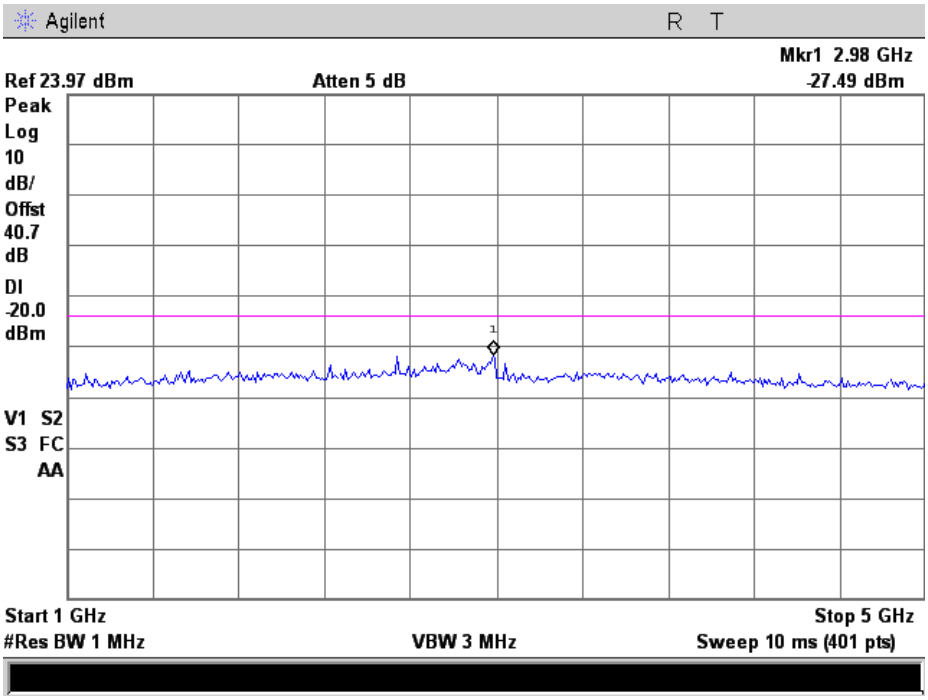
Tuned Frequency = 450 MHz

30 MHz – 1 GHz



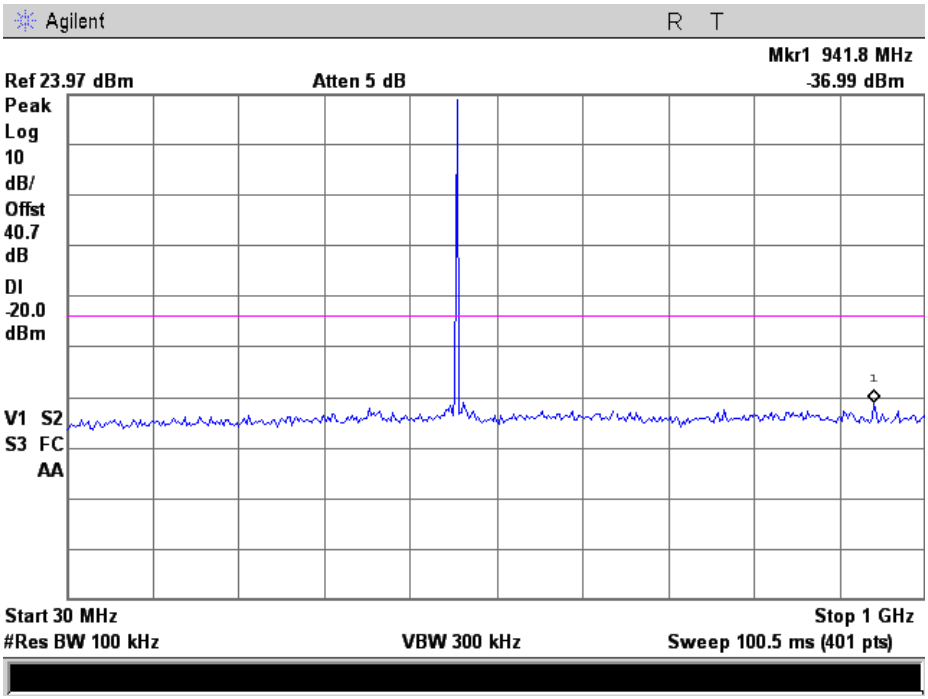
Tuned Frequency = 450 MHz

1 - 5 GHz



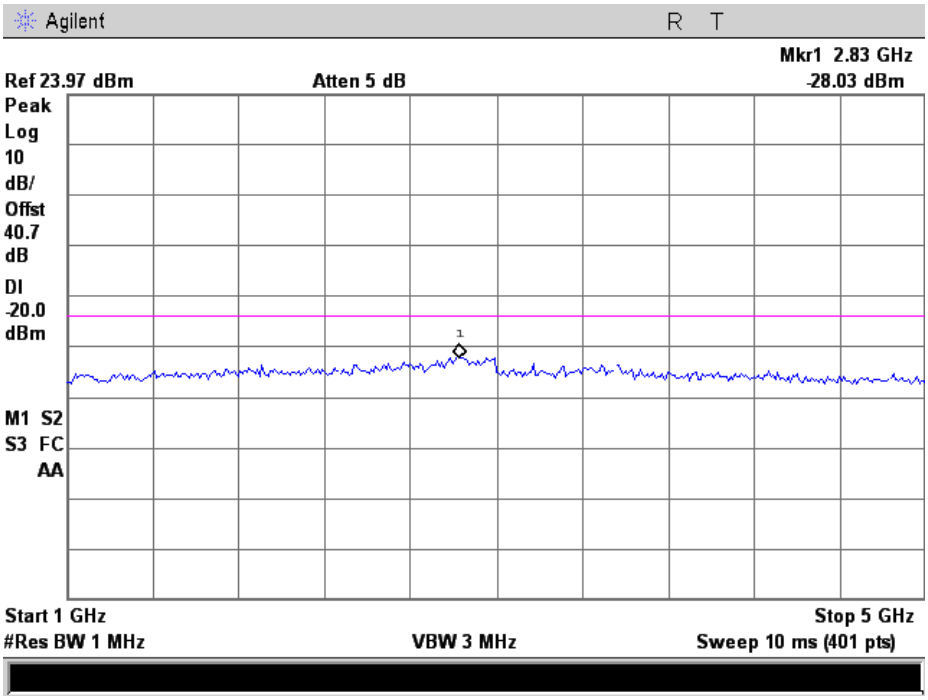
Tuned Frequency = 470 MHz

30 MHz – 1 GHz



Tuned Frequency = 470 MHz

1 - 5 GHz



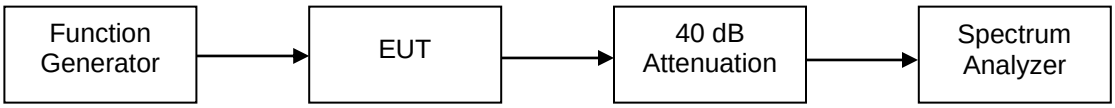
Emission Masks (Occupied Bandwidth)

Name of Test:	Emission Masks (Occupied Bandwidth)	**Engineer:** Greg Corbin
Test Equipment Utilized:	i00118, i00172, i00331	**Test Date:** 2/27/2012

Test Procedure

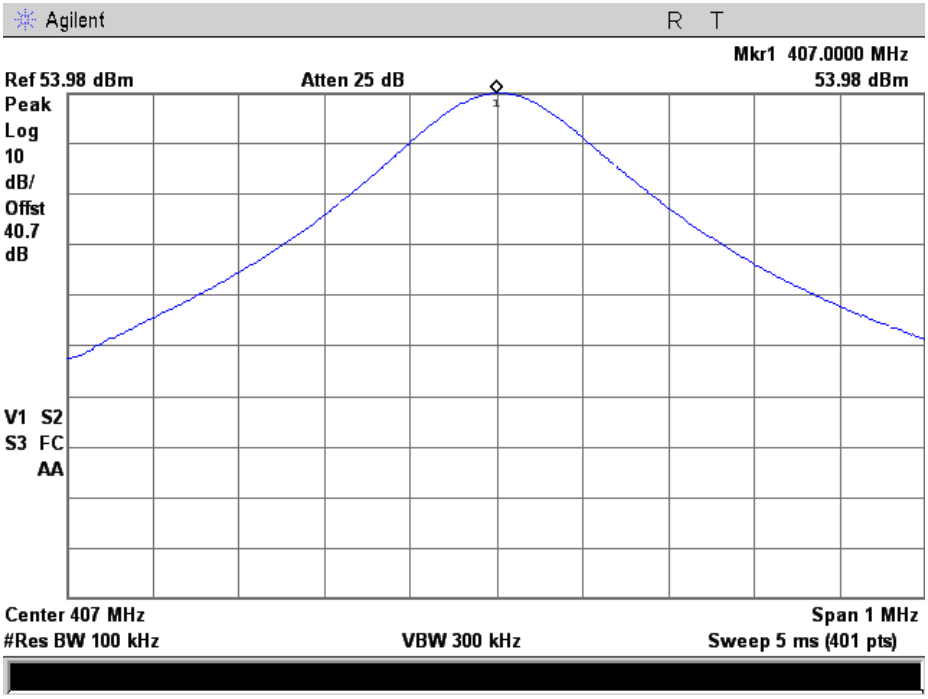
The EUT was connected directly to a spectrum analyzer to verify that the EUT meets the required emissions mask.
A reference level plot is provided to verify that the peak power was established prior to testing the mask.
A modulation frequency of 1200 Hz square wave at a level of 4 v p-p was input to the 2 level input of the EUT.
The deviation in the control software was set to 3000 Hz.

Test Setup

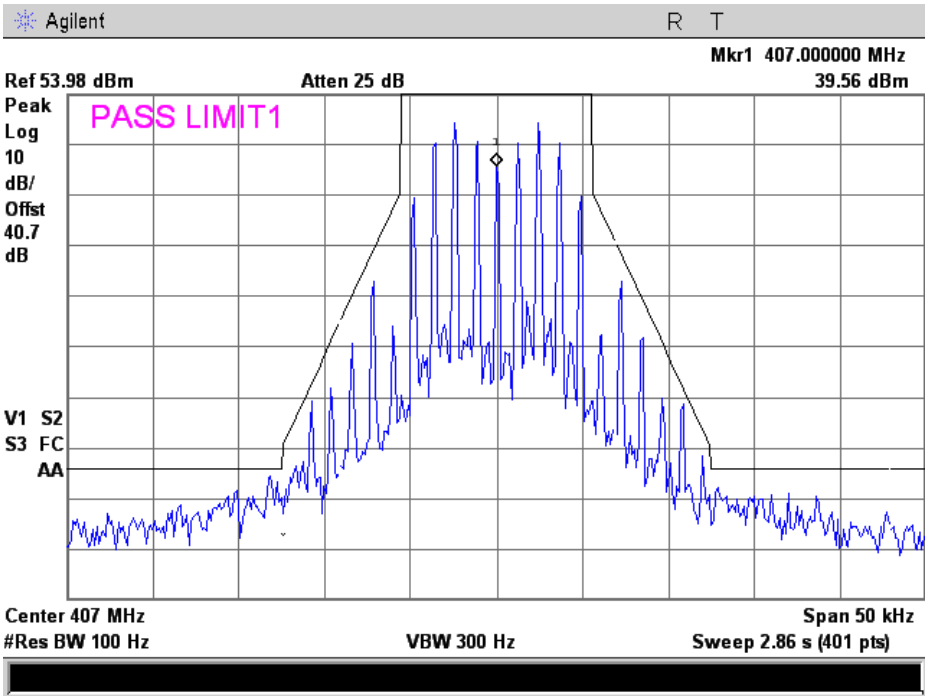


Occupied Bandwidth Plots

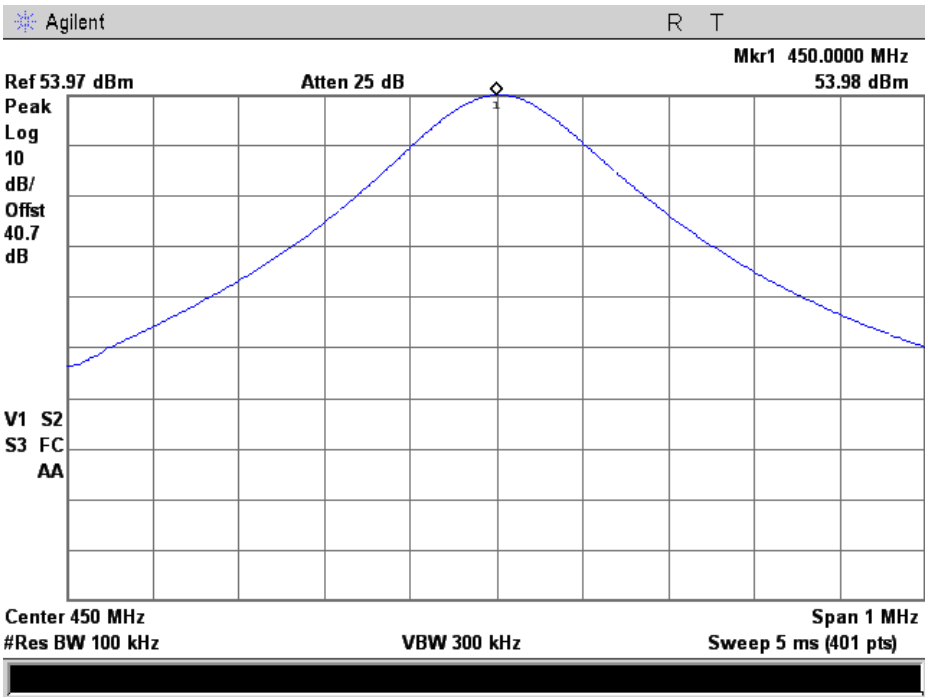
Reference 407 MHz



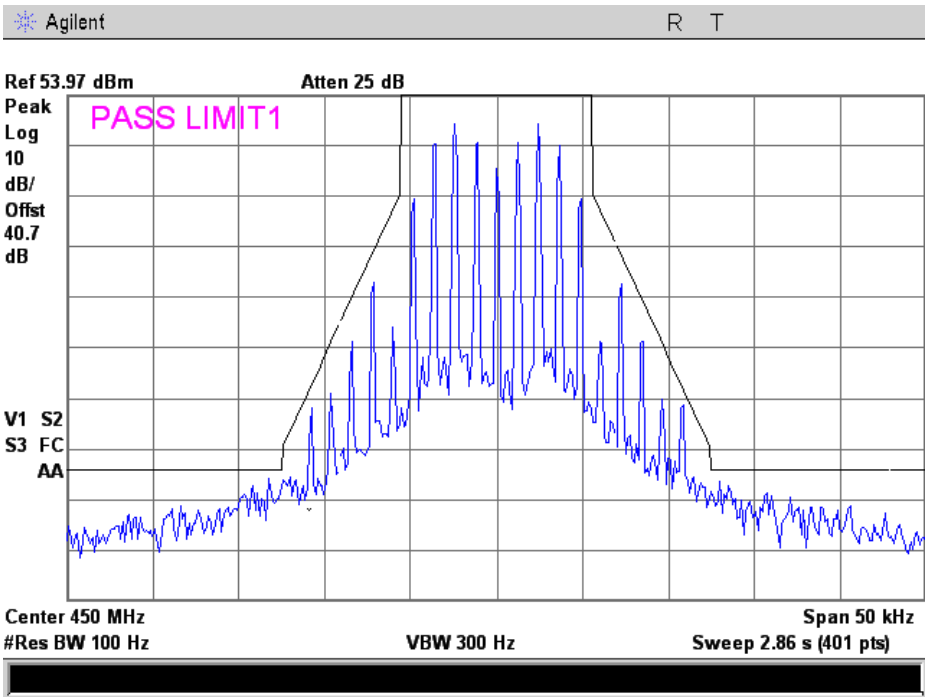
Mask D - 407 MHz



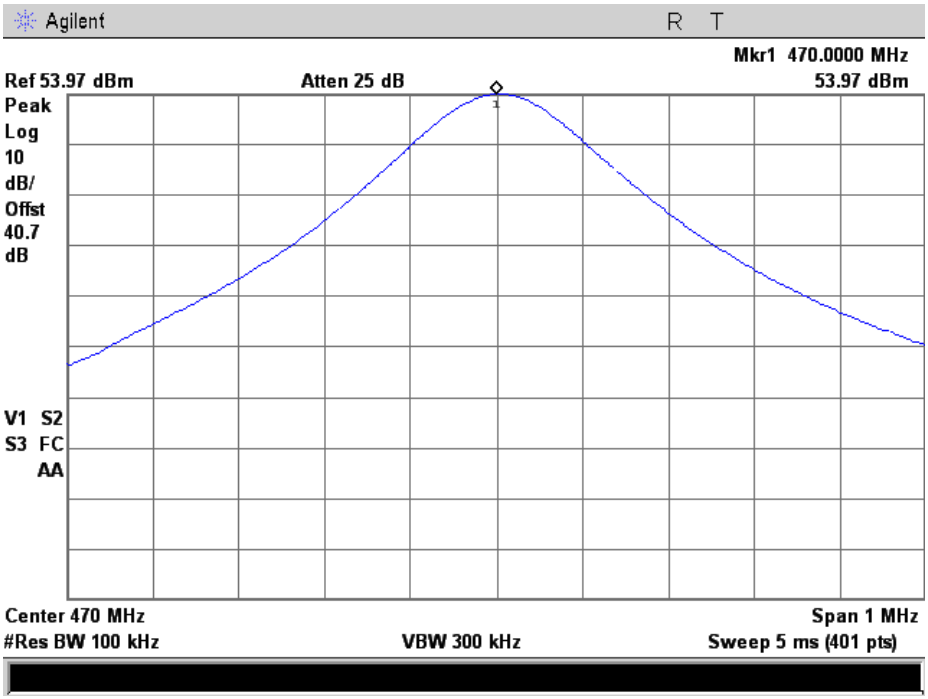
Reference 450 MHz



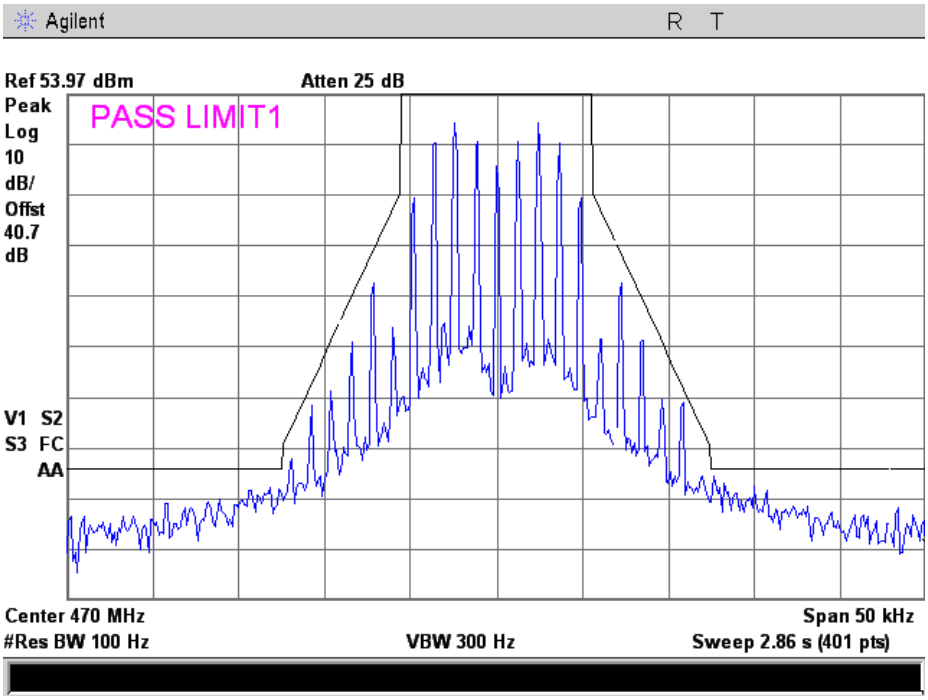
Mask D - 450 MHz



Reference 470 MHz



Mask D - 470 MHz



Necessary Bandwidth Calculations

Name of Test:	Necessary Bandwidth Calculations	**Engineer:** Greg Corbin
Specification:	2.202	**Test Date:** 2/27/2012
Test Equipment Utilized:	N/A	

Modulation = 9K6F1D

Necessary Bandwidth Calculation:

Data Rate (R) Kbps	=	2.4
Maximum Deviation (D), kHz	=	3
Necessary Bandwidth (B_N), kHz	=	2.4D+1.0R
	=	9.6

Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset #	Last Cal Date	Cal Due Date
Function Generator	HP	33120A	i00118	Verified on: 2/27/2012	
Tunable Notch Filter	Eagle	TNF-1-(250-850MHz)	i00124	Verified on: 2/27/2012	
Attenuator – 30 dB 2000 watt	Bird	8329	i00172	Verified on: 2/27/2012	
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	11/5/11	11/5/12
Spectrum Analyzer	Agilent	E4407B	i00331	5/24/11	5/24/12
Attenuator – 10 dB, 2W	Narda	779	None	Verified on: 2/27/2012	

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