



Compliance Testing, LLC

Previously Flom Test Lab

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FCC CFR47 Part 90 Test Report

Prepared for: Thales Communications, Inc

Model: Liberty

Description: Multi-Band Land Mobile Radio

To

**Federal Communications Commission
Rule Part 90**

Date of Issue: July 29, 2011

On the behalf of the applicant:

**Thales Communications, Inc.
22605 Gateway Center Drive
Clarksburg, MD 2087120871**

Attention of:

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**Prepared by
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Project No: p1160013**

**John Erhard
Project Test Engineer**

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All results of this test report relate only to the item(s) there were tested



Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	July 29, 2011	John Erhard	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 in the table 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 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.



Sub-part
2.1033(c) (14):

Test and Measurement Data

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: 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		
Temperature	Humidity	Pressure
26.60	33.60	963.20

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



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	Pass	
90.210	Emission Masks (Occupied Bandwidth)	Pass	
2.1047	Audio Low Pass Filter (Voice Input)	N/A	C2PC – Testing not required
2.1047	Audio Frequency Response	N/A	C2PC – Testing not required
2.1047	Modulation Limiting	N/A	C2PC – Testing not required
90.213	Frequency Stability (Temperature Variation)	N/A	C2PC – Testing not required
90.213	Frequency Stability (Voltage Variation)	N/A	C2PC – Testing not required

Accessories:

Qty	Type	Make, Model	S/N	Description
1	Audio interface box	N/A	N/A	MFG supplied breakout box allowing the injection of audio signals and control of the transmitter



Carrier Output Power (Conducted)

Name of Test: Carrier Output Power (Conducted)

Specification: 2.1046

Engineer: John Erhard

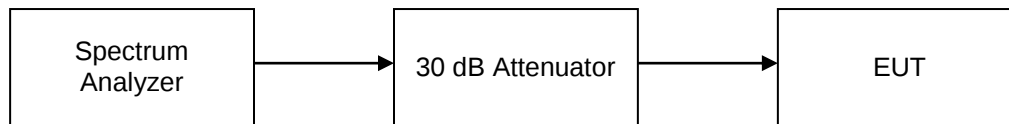
Test Equipment Utilized: i00331, i00347, i00364

Test Date: 7/29/2011

Measurement Procedure

The Equipment Under Test (EUT) was to a Spectrum analyzer through 30 dB power attenuator. The RBW was set to 1 MHz with the VBW set to 3 MHz. All cable and attenuator losses were input into the spectrum analyzer as a reference level offset to ensure accurate readings. The peak readings were taken and the result was then compared to the limit.

Test Setup



High Power Transmitter Peak Output Power

Tuned Frequency MHz	Recorded Measurement dBm	Limit dBm	Result
775	34.26	34.31	Pass
776	34.28	34.31	Pass
805	34.15	34.31	Pass
805.995	34.16	34.31	Pass



Conducted Spurious Emissions

Name of Test: Conducted Spurious Emissions

Specification: 2.1051

Engineer: John Erhard

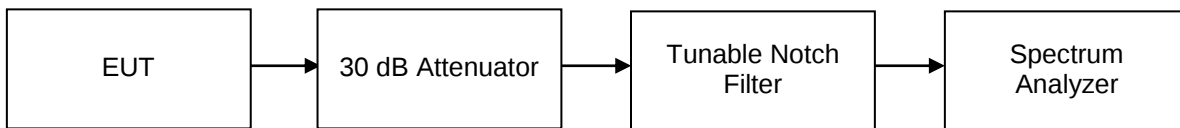
Test Equipment Utilized: i00331, i00347, i00364

Test Date: 7/29/2011

Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. A power attenuator and 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. The suppressed fundamental is visible on the first plot for each tunable frequency. All emissions harmonic and spurious emissions were below 13 dBm and all emissions were greater than -20 dBc.

Test Setup

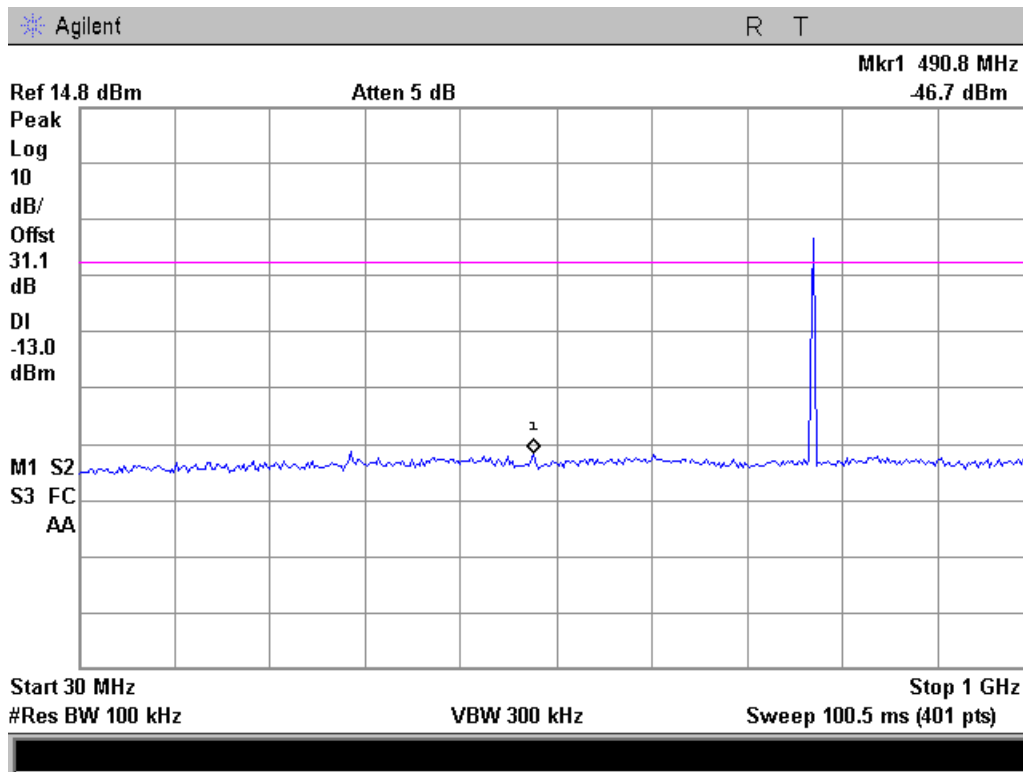


Conducted Spurious Emissions Summary Test Table

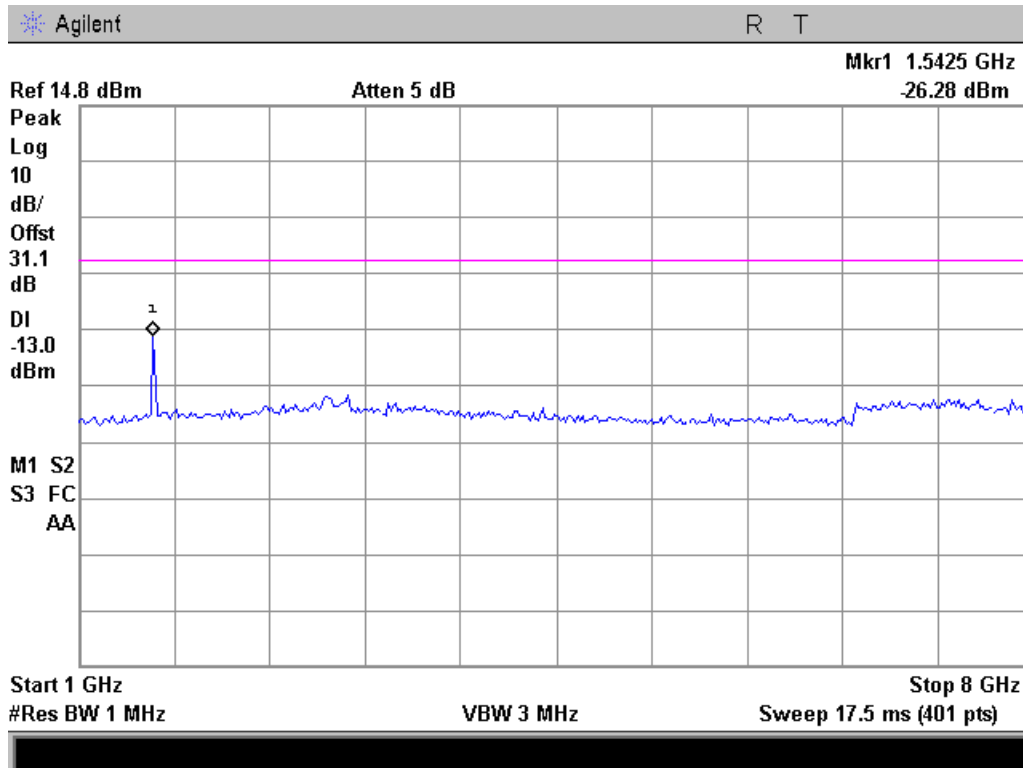
Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
775	1542.5	-26.28	-13	Pass
776	1560.0	-26.45	-13	Pass
805	1612.5	-25.0	-13	Pass
805.995	1612.5	-25.2	-13	Pass



775 MHz 30 – 1000 MHz

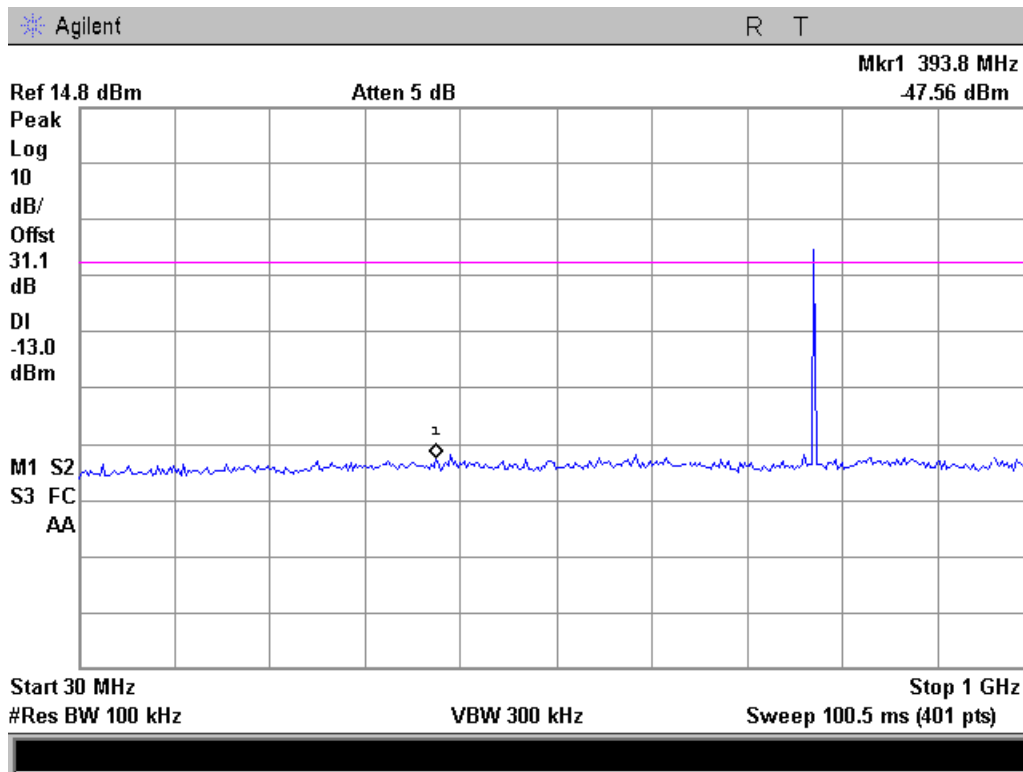


775 MHz 1000 – 8000 MHz

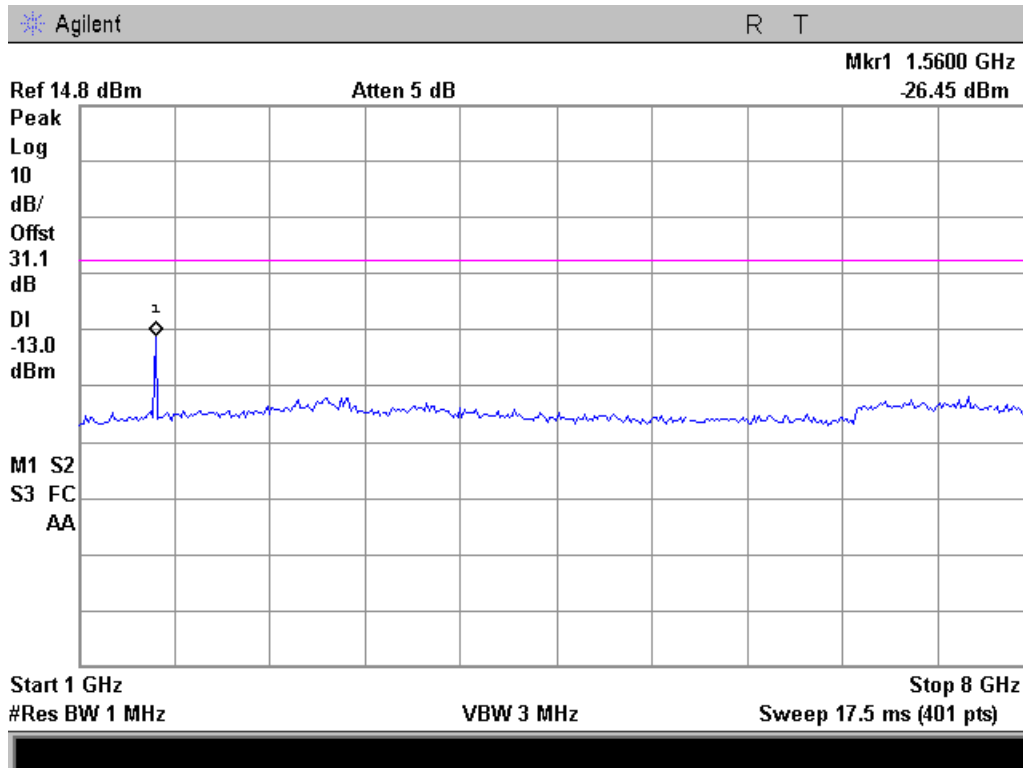




776 MHz 30 – 1000 MHz

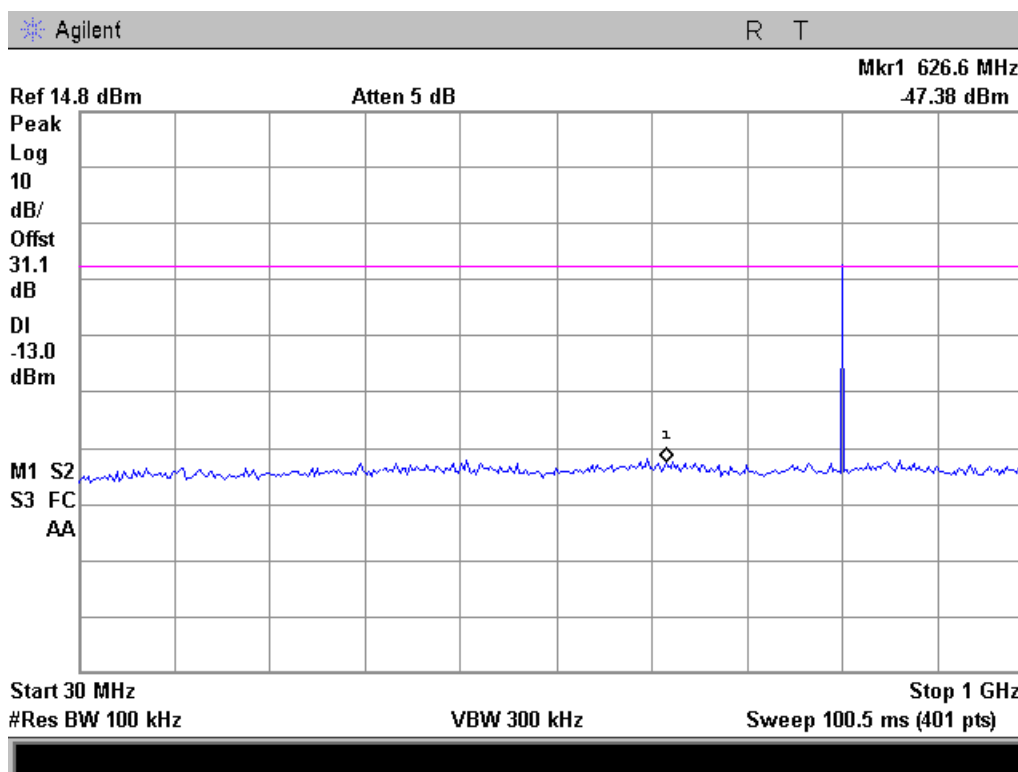


776 MHz 1000 – 8000 MHz

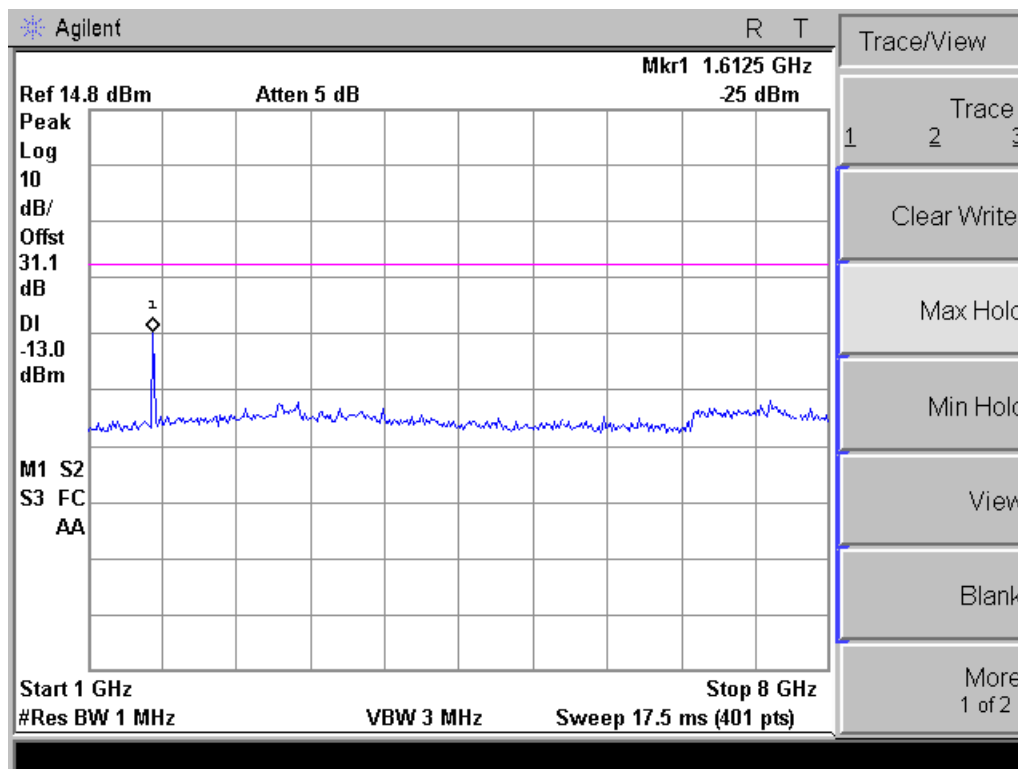




805 MHz 30 – 1000 MHz

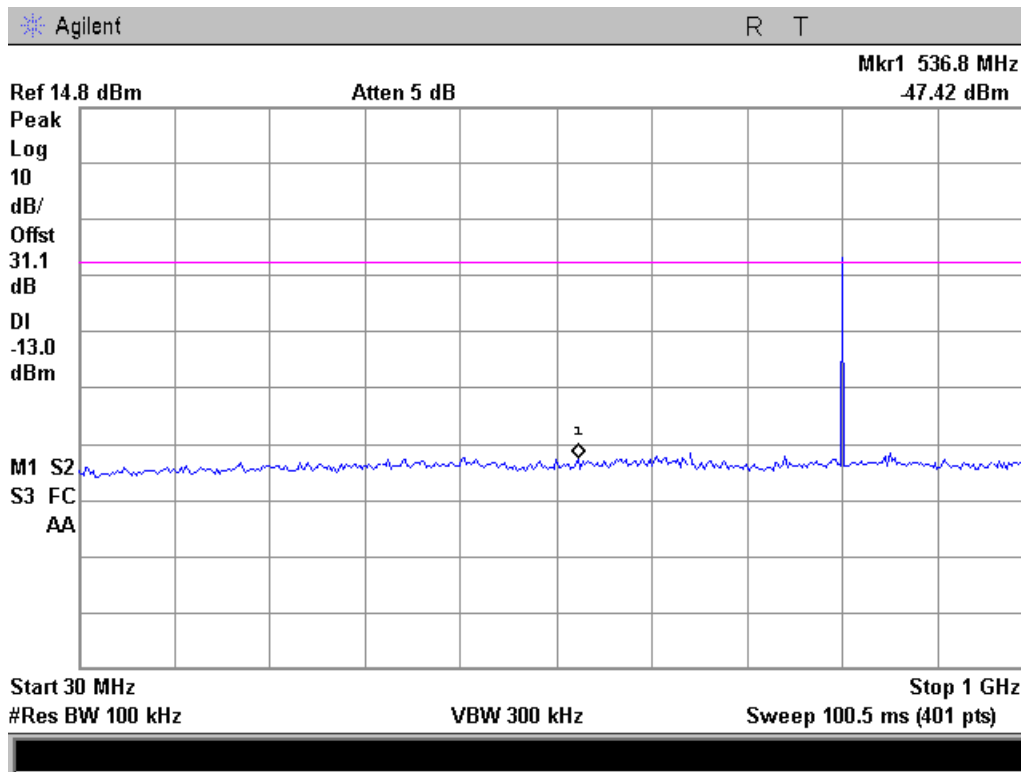


805 MHz 1000 – 8000 MHz

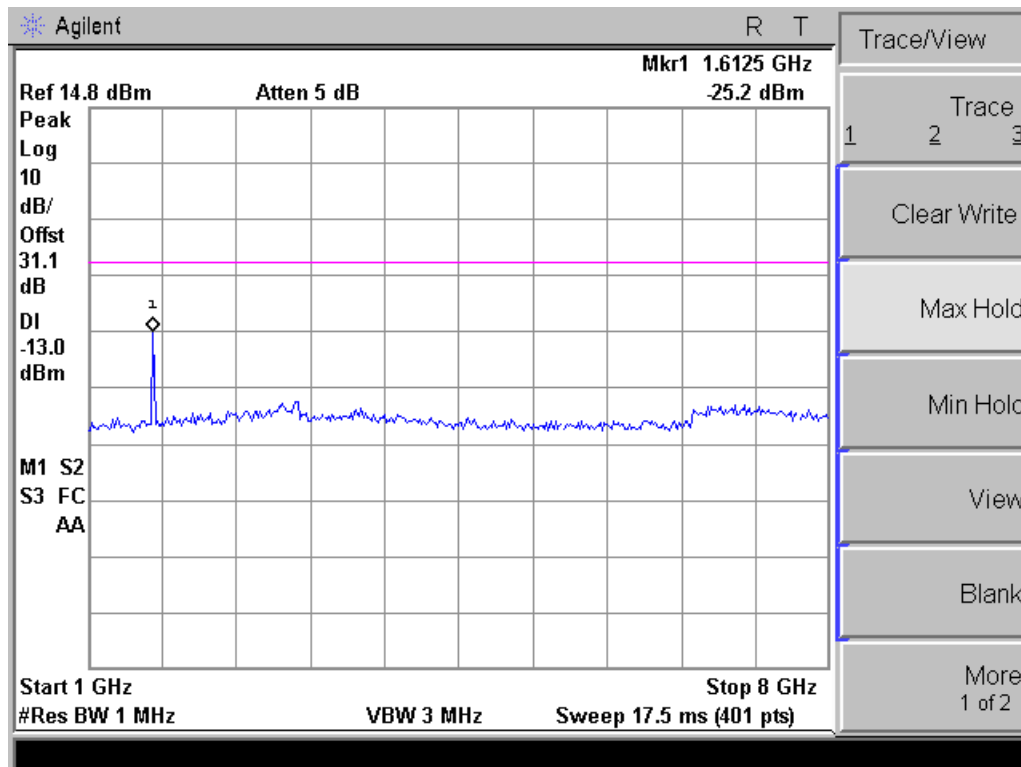




805.995 MHz 30 – 1000 MHz



805.995 MHz 1000 – 8000 MHz





Field Strength of Spurious Radiation

Name of Test: Field Strength of Spurious Radiation

Specification: 2.1053

Engineer: John Erhard

Test Equipment Utilized: i00033, i00103, 00267, 00331

Test Date: 7/29/2011

Test Procedure

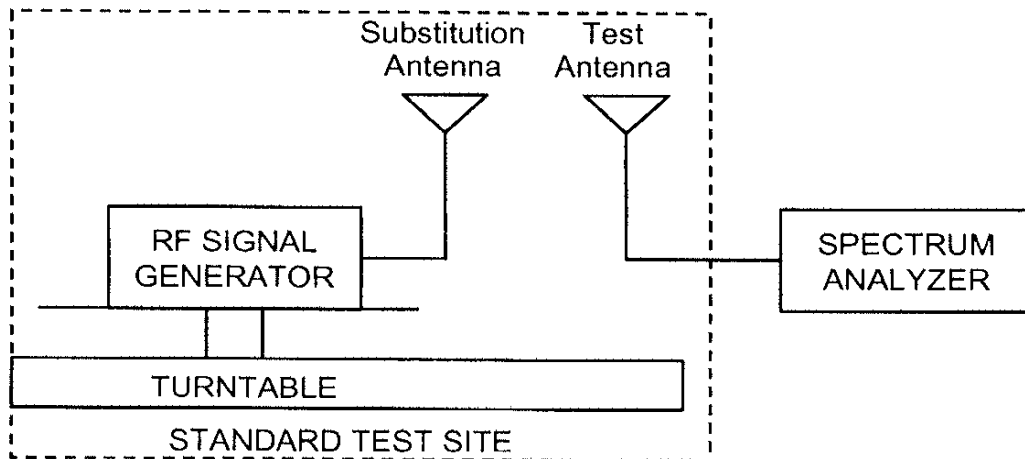
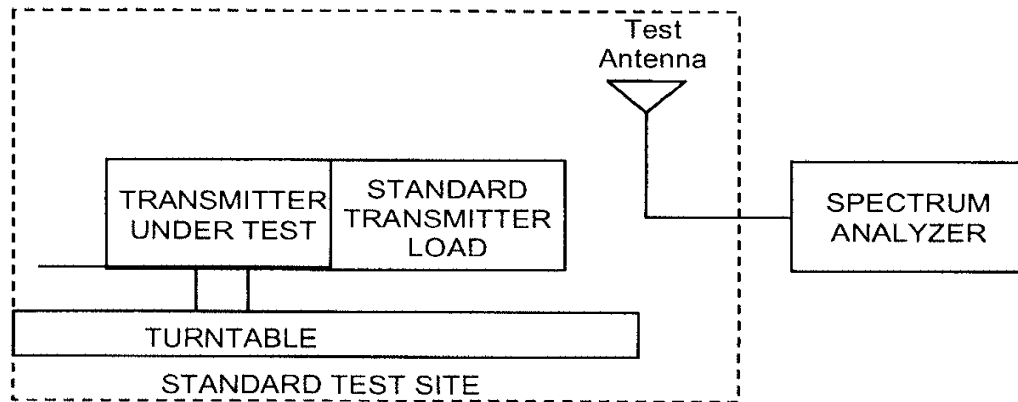
- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth 100 kHz (< 1 GHz), 1 MHz (> 1GHz)
 - 2) Video Bandwidth ≥ 3 times Resolution Bandwidth, or 30 kHz
 - 3) Sweep Speed ≤ 2000 Hz/second
 - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load that is placed on the turntable. The RF cable to this load should be of minimum length.
- D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to $\pm$ the test bandwidth (see section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.
- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in step B).
- I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
- M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB = $10\log_{10}$ (TX power in watts/0.001) – the levels in step I)

NOTE: It is permissible that the other antennas provided can be referenced to a dipole.



Test Setup





Radiated Fundamental Field Strength Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
775	21.56	34.31	Pass
776	21.64	34.31	Pass
805	20.91	34.31	Pass
805.995	21.04	34.31	Pass

775 MHz Radiated Spurious Field Strength Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1550	-43.25	-13	Pass
2325	-42.29	-13	Pass
3100	-46.44	-13	Pass

776 MHz Radiated Spurious Field Strength Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1552	-47.1	-13	Pass
2328	-44.3	-13	Pass
3104	-43.72	-13	Pass

805 MHz Radiated Spurious Field Strength Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1610	-47.81	-13	Pass
2415	-44.27	-13	Pass
3220	-42.93	-13	Pass

805.995 MHz Radiated Spurious Field Strength Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1611.99	-47.52	-13	Pass
2417.985	-45.57	-13	Pass
3223.98	-44.33	-13	Pass

No other emissions were detected. All emissions were greater than -25 dBm.



Emission Masks (Occupied Bandwidth)

Name of Test: Emission Masks (Occupied Bandwidth)

Specification: 90.210

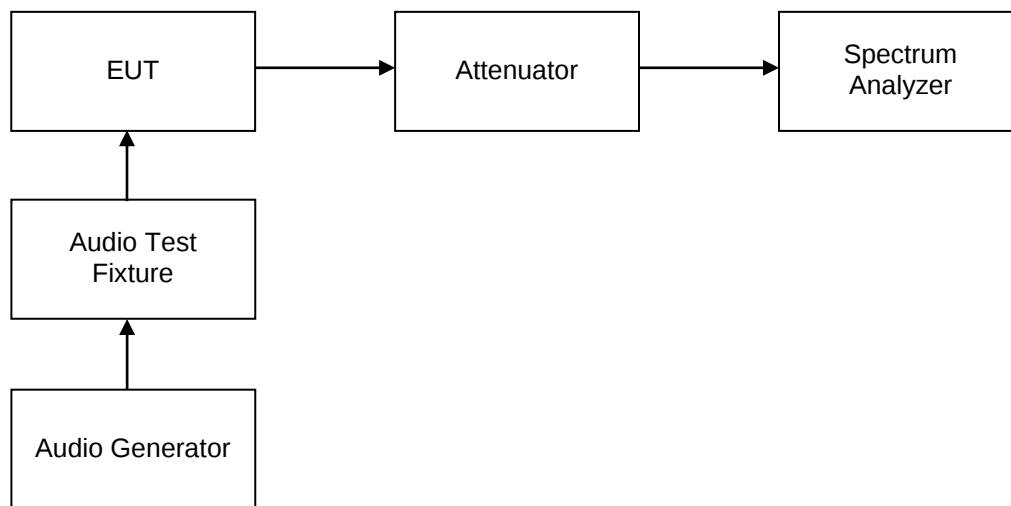
Engineer: John Erhard

Test Equipment Utilized: i00331, i00347

Test Date: 7/29/2011

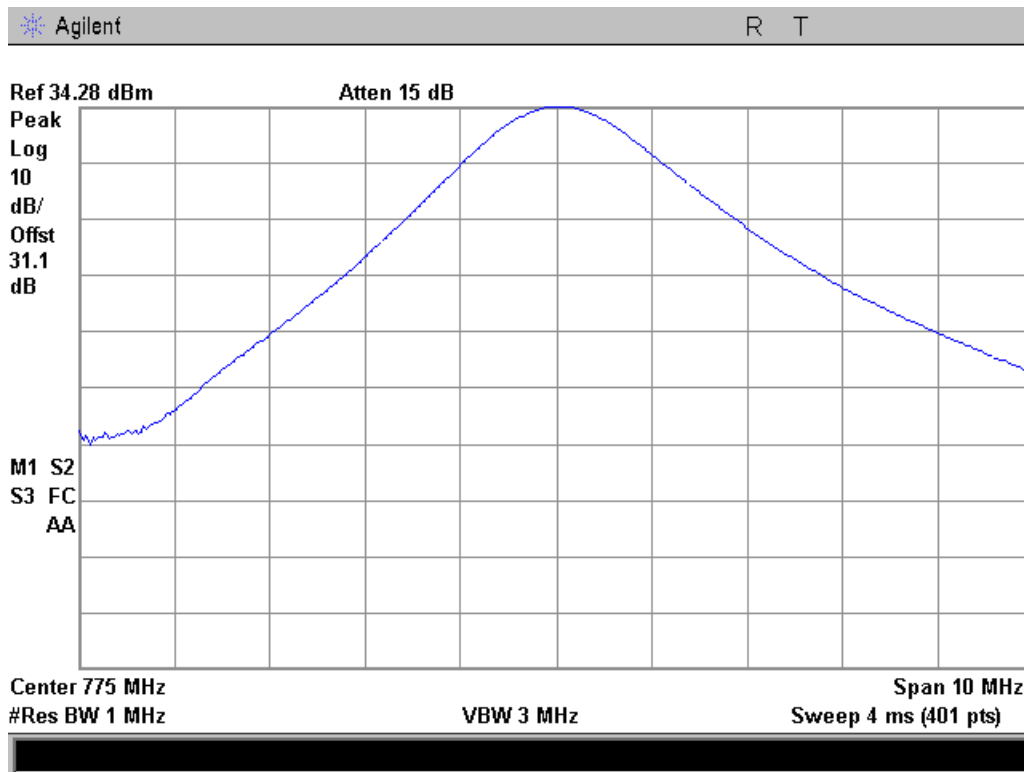
The EUT was connected to a spectrum analyzer through 30 dB power attenuator. The reference lever was set with the RBW to 1 MHz with the VBW to 3 MHz. All cable and attenuator losses were input into the spectrum analyzer as a reference level offset to ensure accurate readings. A 2.5 kHz audio signal was injected through a manufacturer supplied test fixture and the emissions masks were plotted.

Test Setup

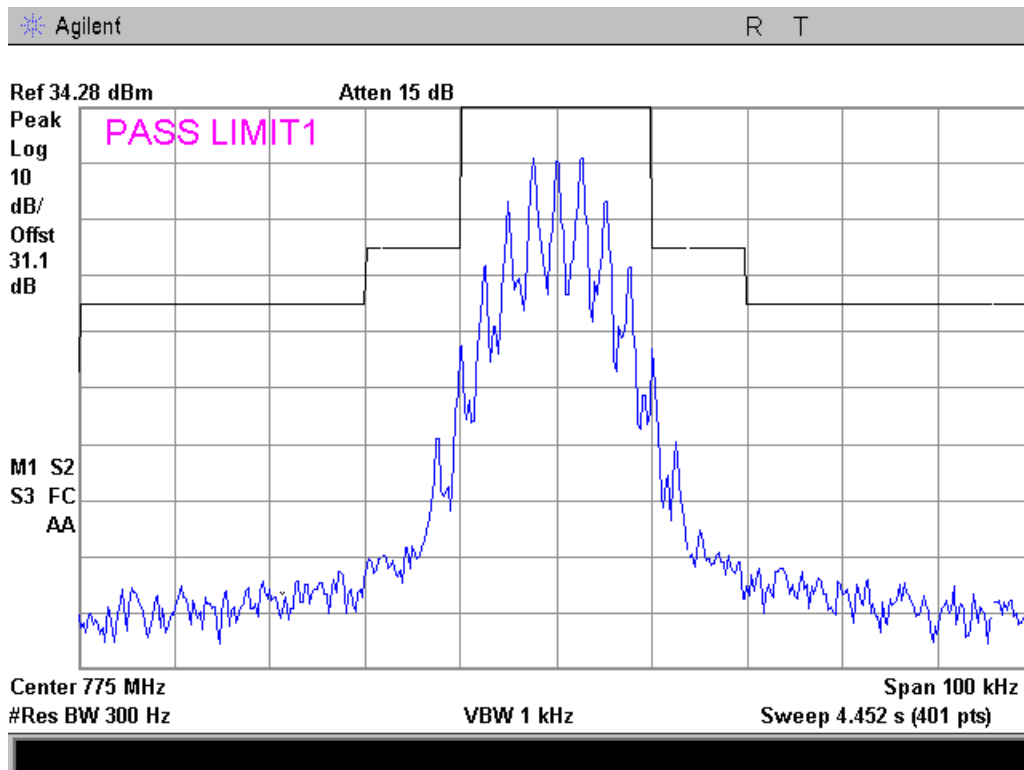




775 MHz Reference

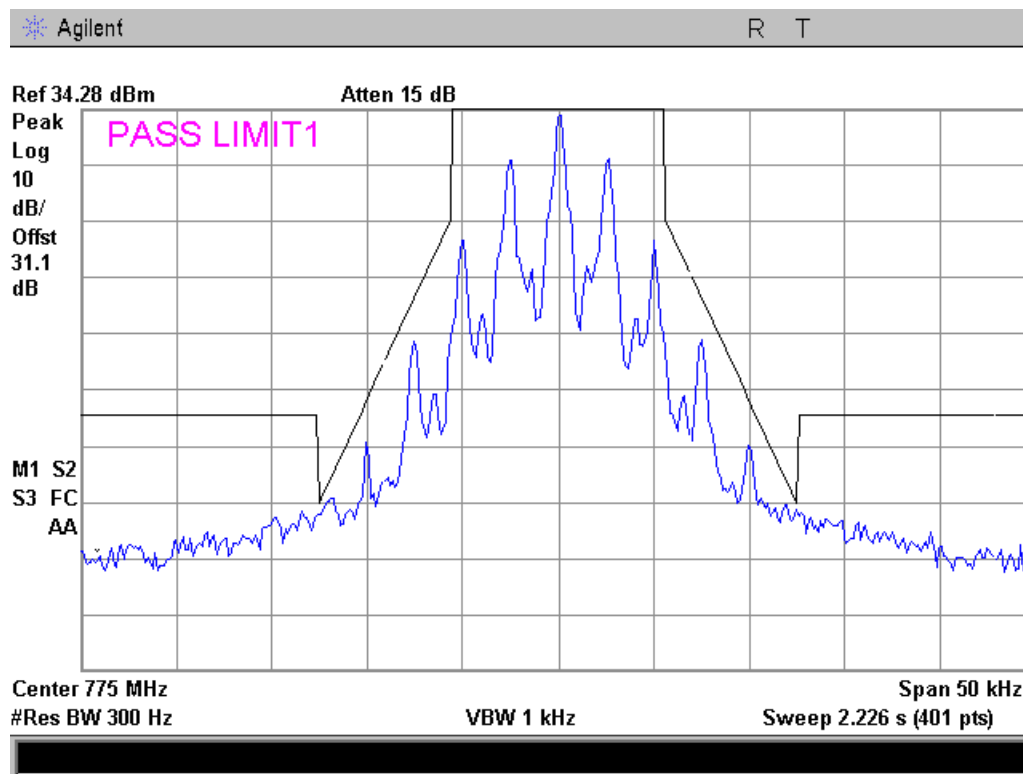


775 MHz Mask B

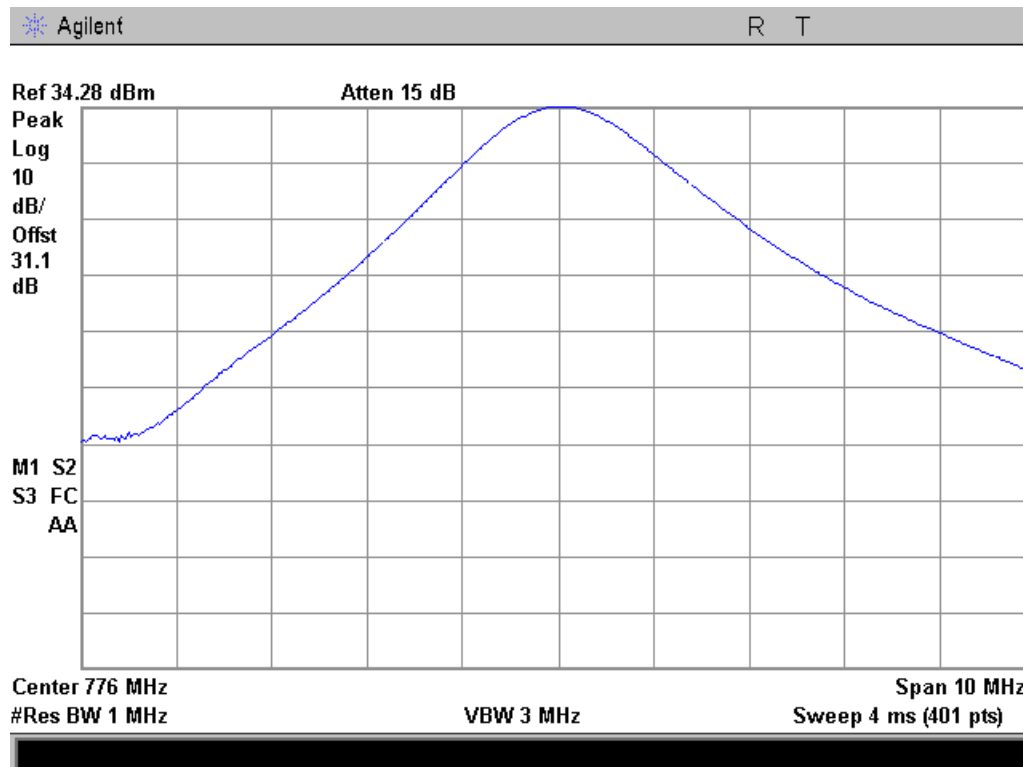




775 MHz Mask D

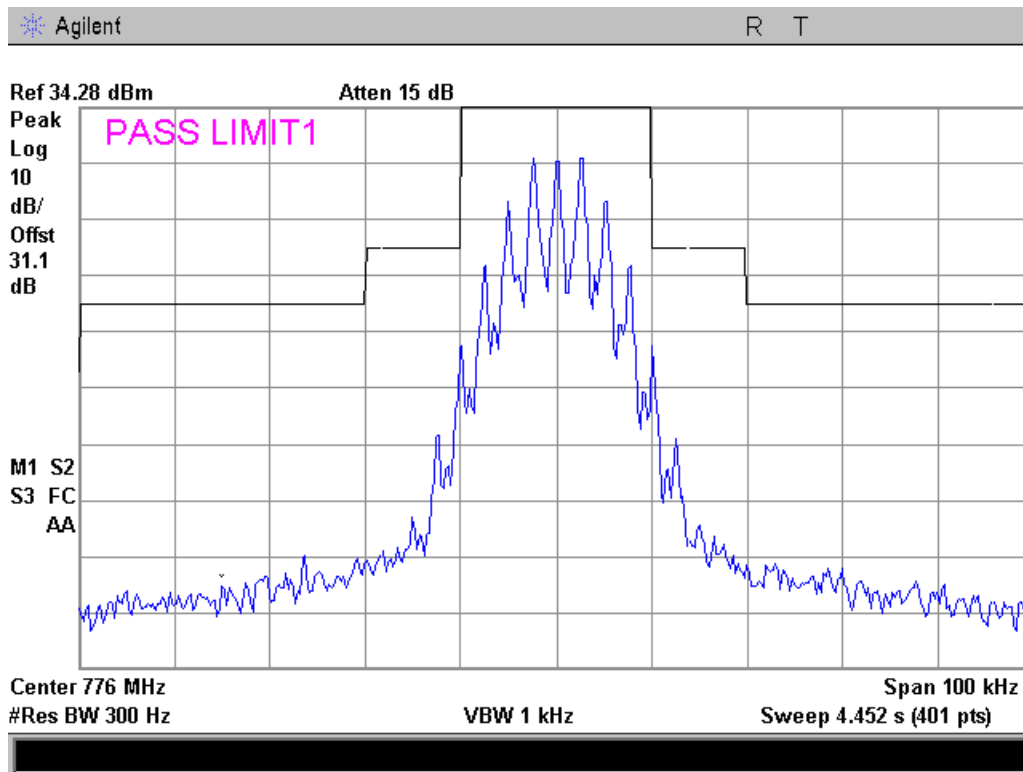


776 MHz Reference

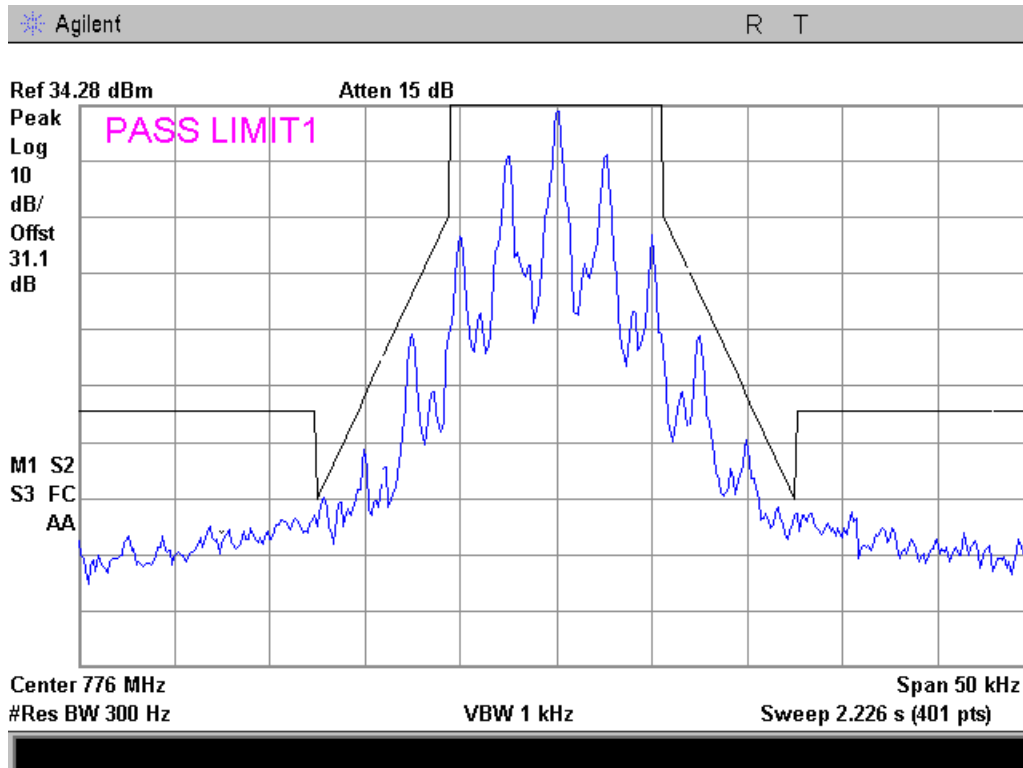




776 MHz Mask B

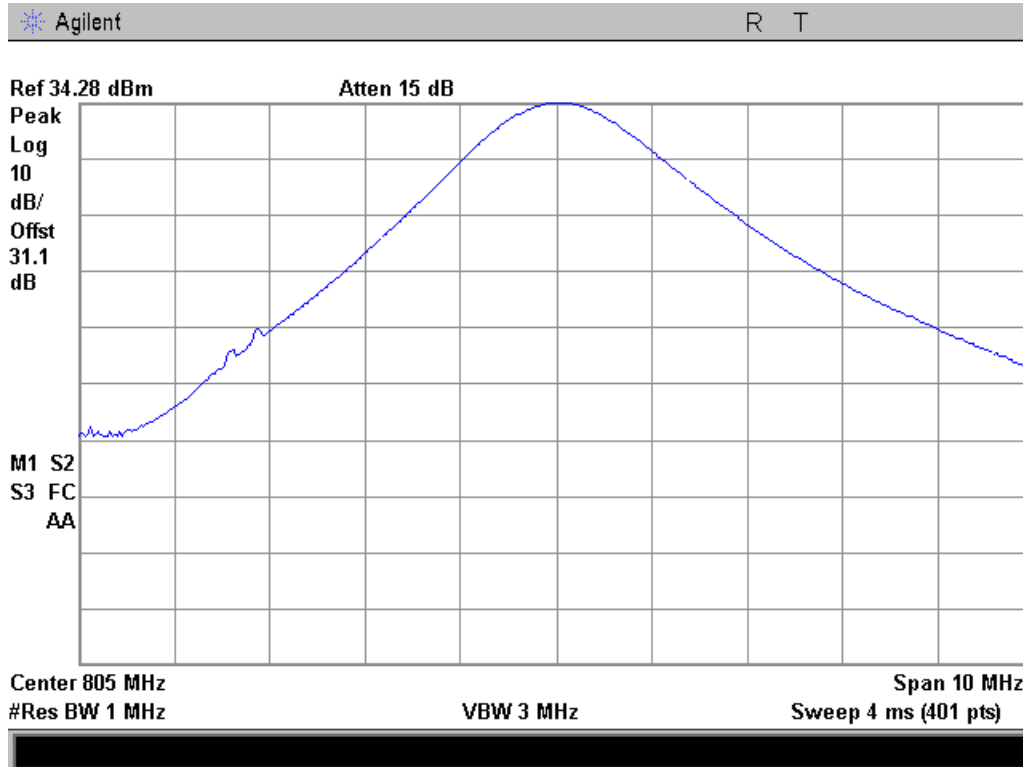


776 MHz Mask D

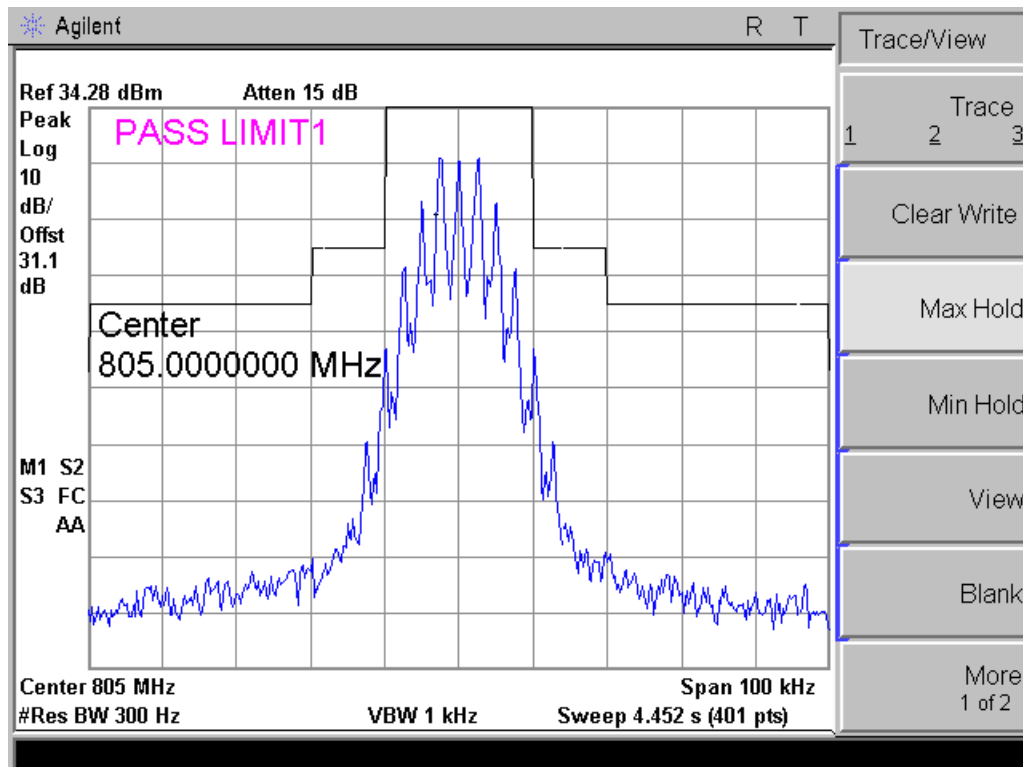




805 MHz Reference

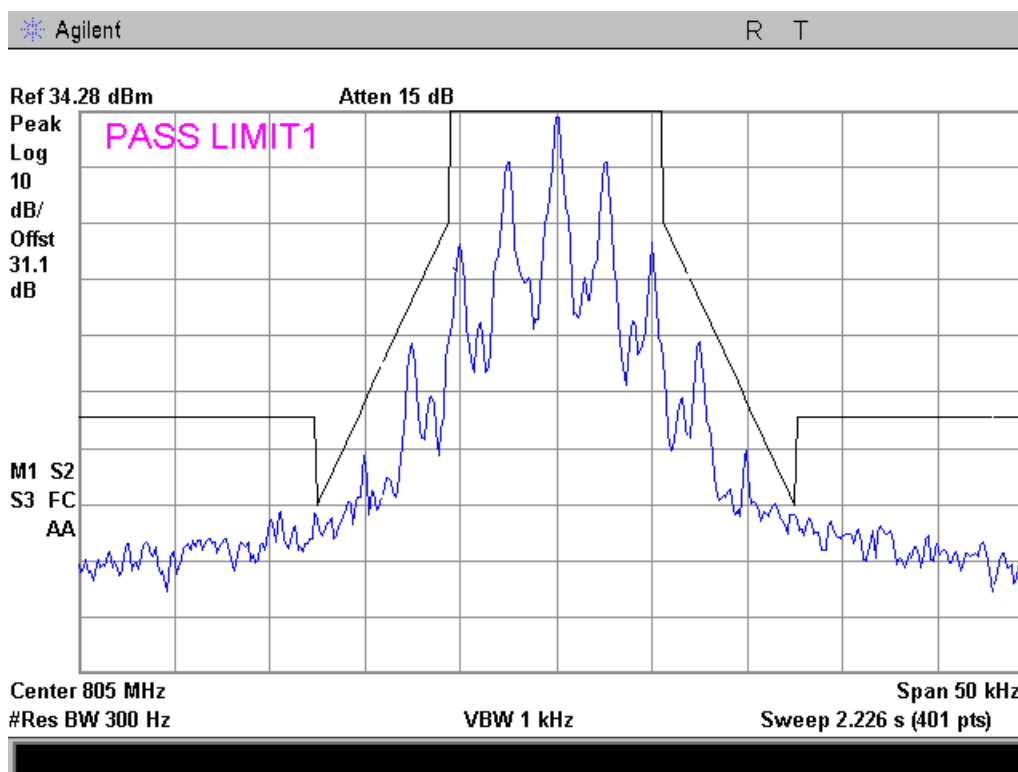


805 MHz Mask B

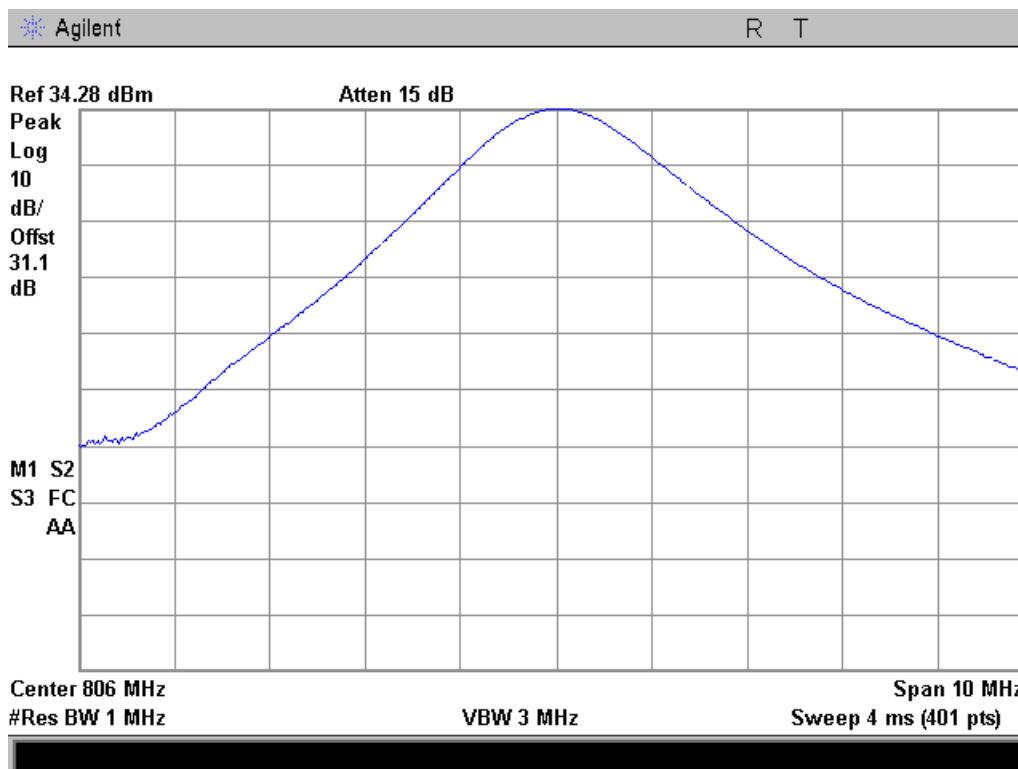




805 MHz Mask D

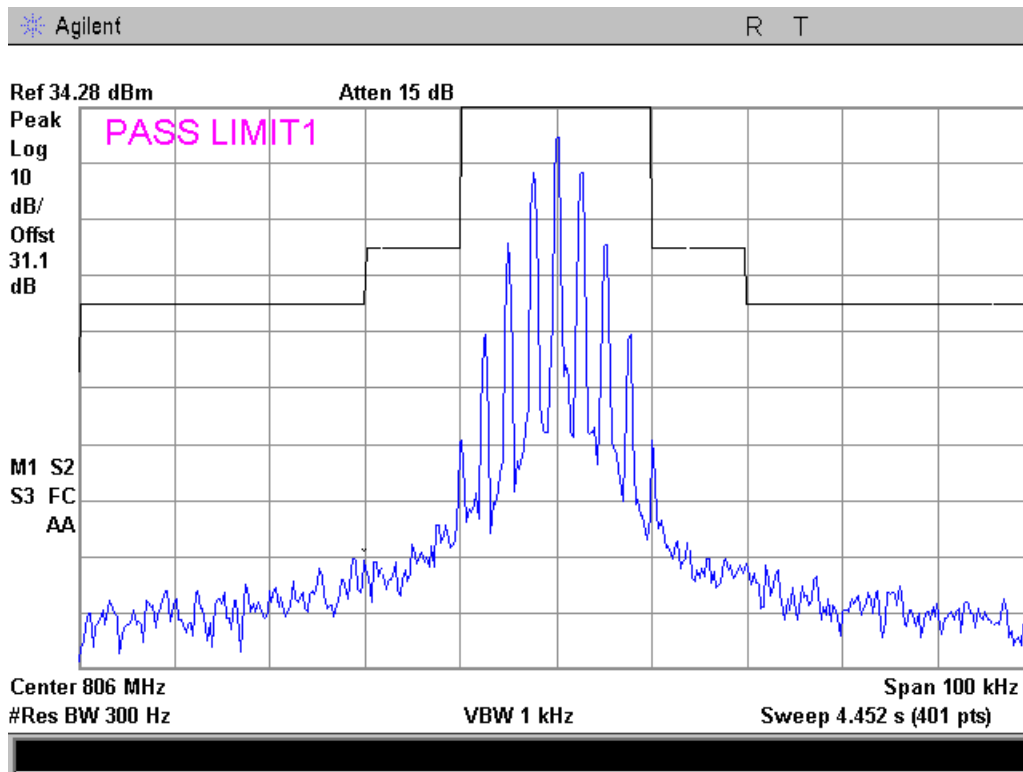


805.995 MHz Reference

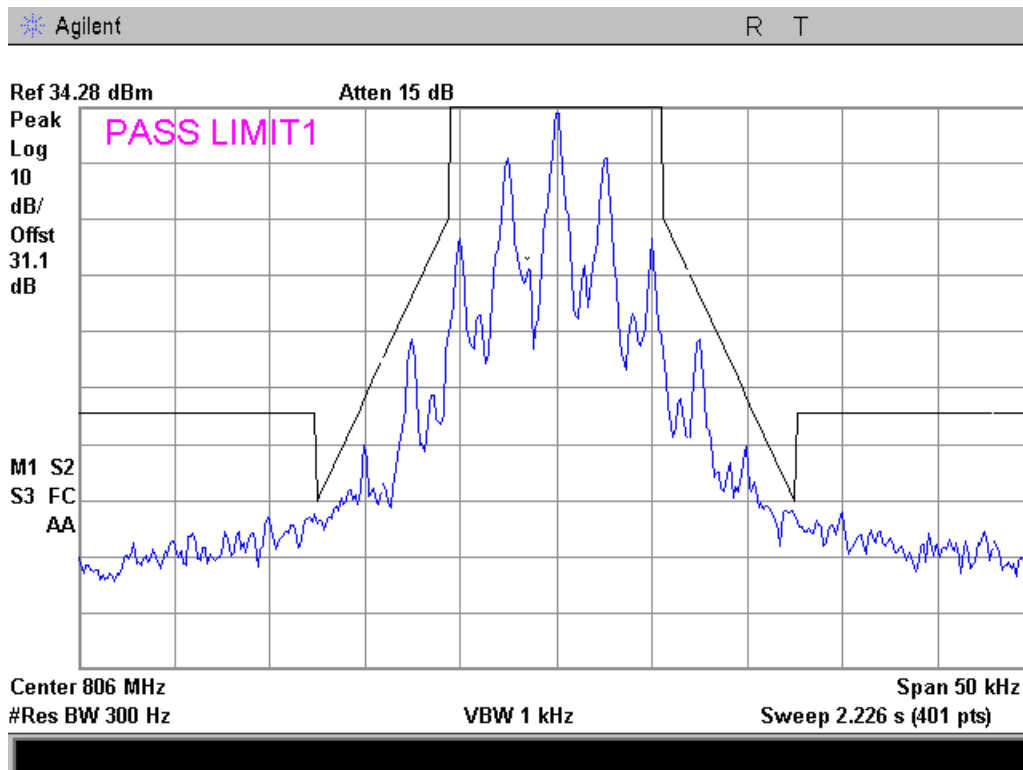




805.995 MHz Mask B



805.995 MHz Mask D





Test Equipment Utilized

Description	MFG	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
EMI Receiver	HP	8546A	i00033	10/3/2010	10/3/2011
Horn Antenna	EMOC	3115	i00103	11/5/2010	11/5/2012
Biconilog Antenna	Schaffner	CBL6111C	i00267	11/21/2009	11/21/2011
Spectrum Analyzer	Agilent	4407B	i00331	5/24/2011	5/24/2012
Power Attenuator	Narda	769-30	i00347	NCR	NCR
Tunable Notch Filter	Eagle	TNF240MFMF	i00364	NCR	NCR

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