Compliance Testing
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toll-free: (866) 311-3268
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http://www.ComplianceTesting.com
info@ComplianceTesting.com

Test Report

for

FCC ID: YK7080508251CXXXM

Model: RFBE815

to

Federal Communications Commission

Rule Part(s) 22

Date of report: July 19, 2010

At the Request of:	RFI Americas, Inc 9329 Ravenna Rd Suite C Twinsburg, OH 44087
Attention of:	Sean Johnson, President Ph: (330) 541-6585 E-mail: sean.johnson@rfi.com.au

Supervised by: John Erhard: Engineering Manager

Test Report Revision History

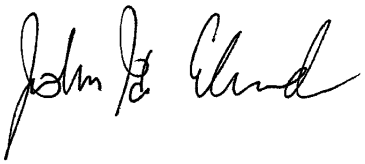
Revision	Date	Revised By	Reason for revision
1.0	July 19, 2010	J. Erhard	Original Document
2.0	August 2, 2010	K. Springer	Corrected FCC ID
3.0	August 17, 2010	J. Erhard	Edit Conducted Spurious Emissions Test Data
4.0	August 23, 2010	J. Erhard	Correct typographical error in for voltage and current information

Compliance Testing

Testimonial And Statement Of Verification

This is to certify that:

1. **That** the application was prepared either by, or under the direct supervision of, the undersigned.
2. **That** the technical data supplied with the application was taken under my direction and supervision.
3. **That** the data was obtained on representative units, randomly selected.
4. **That**, to the best of my knowledge and belief, the facts set forth in the application and accompanying technical data is true and correct.



Certifying Engineer: John Erhard: Engineering Manager

Compliance Testing
3356 N. San Marcos Place, Suite 107
Chandler, Arizona 85225-7176
(866) 311-3268 phone, (480) 926-3598 fax

Table of Contents

Required information per ISO 17025-2005, paragraph 5.10.2:

a)	**Test Report**
b) Laboratory: (FCC: 933597) (Canada: IC 2044A-1)	Compliance Testing 3356 N. San Marcos Place, Suite 107 Chandler, AZ 85225
c) Report Number:	d1070011
d) Client:	RFI Americas, Inc 9329 Ravenna Rd Suite C Twinsburg, OH 44087
e) Identification:	RFBE815 FCC ID: YK7080508251CXXXM
EUT Description:	RFBE Module
f) EUT Condition:	Not required unless specified in individual tests.
g) Report Date:	July 19, 2010
h, j, k):	As indicated in individual tests.
i) Sampling method:	No sampling procedure used.
l) Uncertainty:	In accordance with Compliance Testing internal quality manual.
m) Supervised by:	John Erhard: Engineering Manager
n) Results:	The results presented in this report relate only to the item tested.
o) Reproduction:	This report must not be reproduced, except in full, without written permission from this laboratory.

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, 2.1051, 2.1053, 2.1049, 2.1055 and the following individual Parts: 22

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.

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

Measured Temperature – 39.43°C
Measured Humidity – 17.92%

A2LA

"A2LA has accredited Compliance Testing in Chandler, AZ for technical competence in the field of Electrical testing. The accreditation covers the specific tests and types of tests listed on the agreed scope of accreditation. This laboratory meets the requirements of ISO 17025:2005 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Please refer to www.a2la.org for current scope of accreditation.

Certificate number: 2152.01

ACCREDITED
TESTING CERT# 2152.01

FCC OATS Reg. #933597

IC Reg. # 2044A-1

List of General Information Required for Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to Part 22

Sub-part 2.1033
(c)(1):

Name and Address of Applicant: RFI Americas, Inc
9329 Ravenna Rd
Suite C
Twinsburg, OH 44087

Manufacturer: RFI Americas, Inc
9329 Ravenna Rd
Suite C
Twinsburg, OH 44087

(c)(2):**FCC ID**: YK7080508251CXXXM

Model Number: RFBE815

(c)(3): **Instruction Manual(s):**

Please see attached exhibits

(c)(4): **Type of Emission**: FM, QPSK

(c)(5): **Frequency Range, MHz**: 809 - 825

(c)(6): **Power Rating, Watts**: 25.5

____ Switchable **X** Variable ____ N/A

FCC Grant Note:

(c)(7): **Maximum Allowable Power, Watts**: 45

DUT Results: Passes **X** Fails ____

Subpart 2.1033 (continued)
(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A	=	1.607
Collector Voltage, Vdc	=	28
Supply Voltage, Vdc	=	28

(c)(9): **Tune-Up Procedure**:

Please see attached exhibits

(c)(10): **Circuit Diagram/Circuit Description**:
Including description of circuitry & devices provided for determining and stabilizing frequency, for suppression of spurious radiation, for limiting modulation and limiting power.

Please see attached exhibits

(c)(11): **Label Information**:

Please see attached exhibits

(c)(12): **Photographs**:

Please see attached exhibits

(c)(13): **Digital Modulation Description**:

___ Attached Exhibits
_X_ N/A

(c)(14): **Test and Measurement Data**:

Follows

Test Results Summary

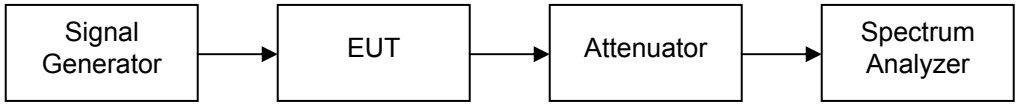
Specification	Test Name	Pass, Fail, N/A	Comments
2.1046	Transmitter Conducted Output Power	Pass	
2.1051	Transmitter Conducted Spurious Emissions	Pass	
2.1049	Occupied Bandwidth	Pass	
	Out of Band Rejection	Pass	
	Intermodulation Rejection	N/A	N/A for a single channel system
2.1053	Transmitter Radiated Spurious Emissions	Pass	
2.1055	Frequency Stability (Temperature Variation)	Pass	
2.1055	Frequency Stability (Voltage Variation)	Pass	

Name of Test: Carrier Output Power (Conducted)
Specification: 2.1046 **Engineer: J. Erhard**
Test Equipment Utilized: i00331, i00348 **Test Date: 7/13/2010**

Measurement Procedure

The Equipment Under Test (EUT) was connected to a Spectrum analyzer with appropriate attenuation to ensure the safety of the test equipment utilized. The EUT was set for a 45W maximum output power with a modulated RF input set 20 dB greater than the receiver compression point. The peak RF output power was measured to ensure that the maximum RF output power did not exceed the limit.

Test Setup



Transmitter Peak Output Power

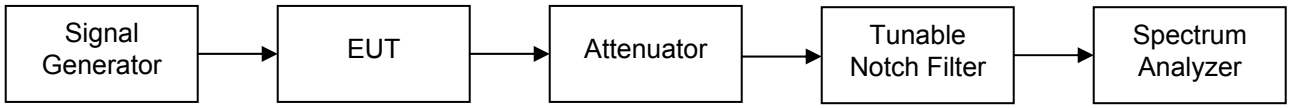
Tuned Frequency MHz	Recorded Measurement dBm	Recorded Measurement Watts	Result
809.05	44.06	25.5	Pass
817.0	44.05	25.4	Pass
824.95	43.5	22.4	Pass

Name of Test: Conducted Spurious Emissions
Specification: 2.1051 **Engineer: J. Erhard**
Test Equipment Utilized: i00331, i00348, i00364 **Test Date: 7/14/2010**

Test Procedure

The Equipment Under Test (EUT) was connected to a Spectrum analyzer with appropriate attenuation to ensure the safety of the test equipment utilized. The EUT was set for a 45W maximum output power with an FM modulated RF input. A tunable notch filter was utilized to ensure the spectrum analyzer was not driven into compression to allow for accurate measurement of conducted spurious emissions.

Test Setup



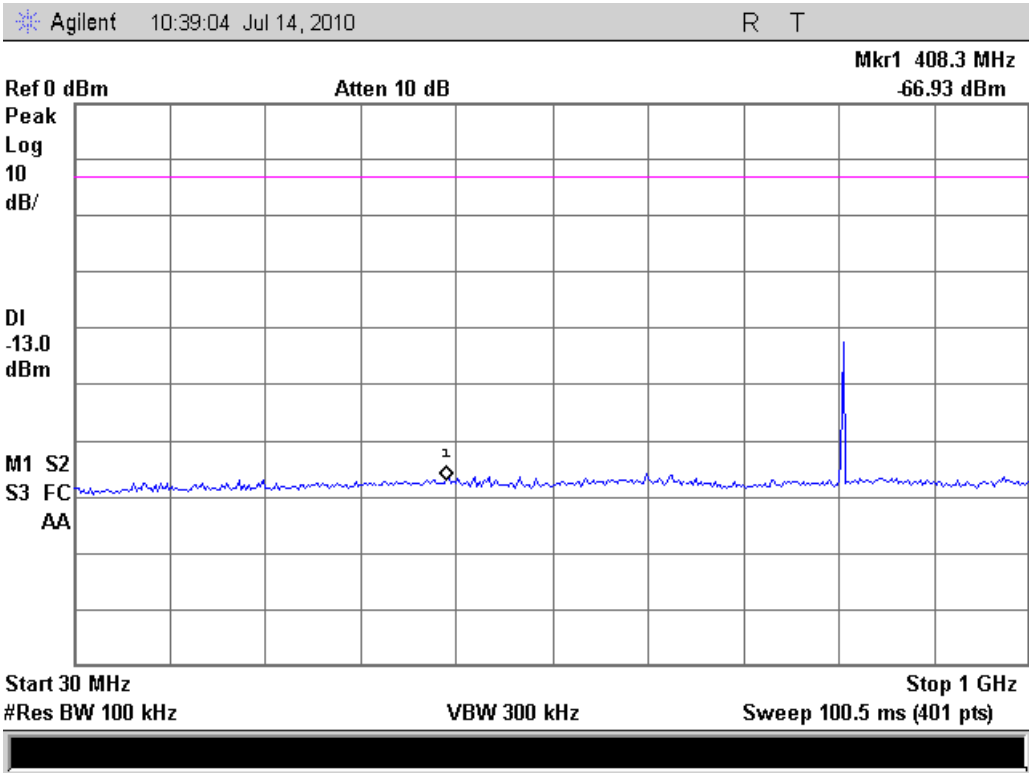
FM Conducted Spurious Emissions Summary Test Table

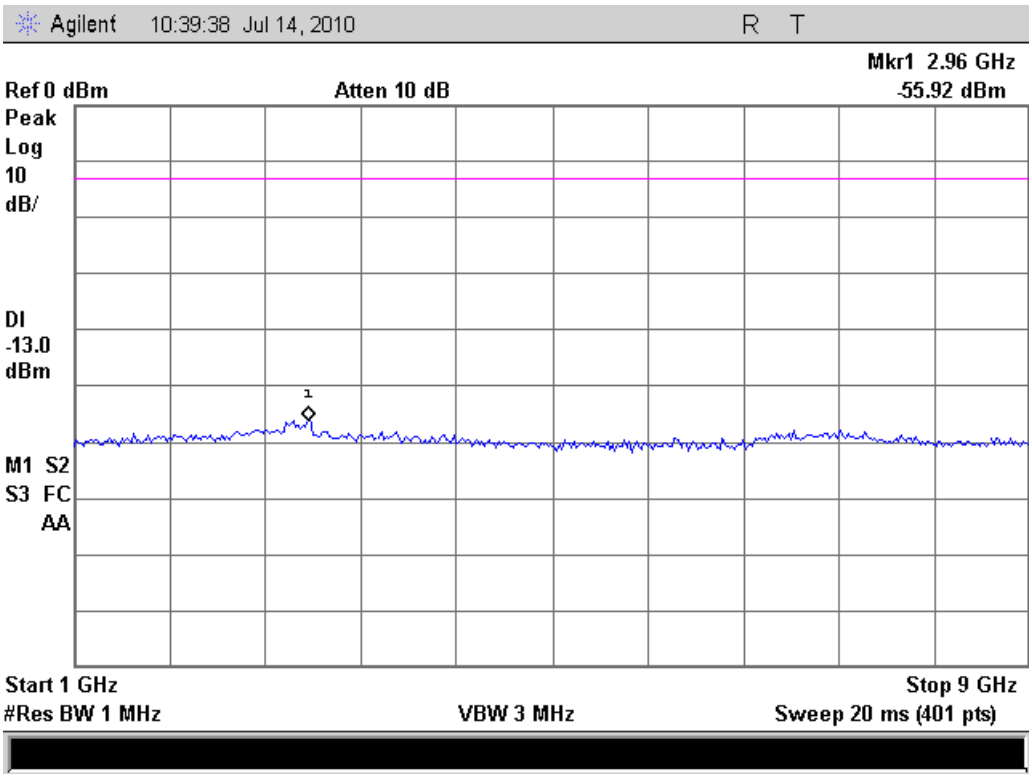
Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
809.05	2960	-55.92	-13	Pass
817.0	2980	-54.25	-13	Pass
824.95	2980	-54.23	-13	Pass

QPSK Conducted Spurious Emissions Summary Test Table

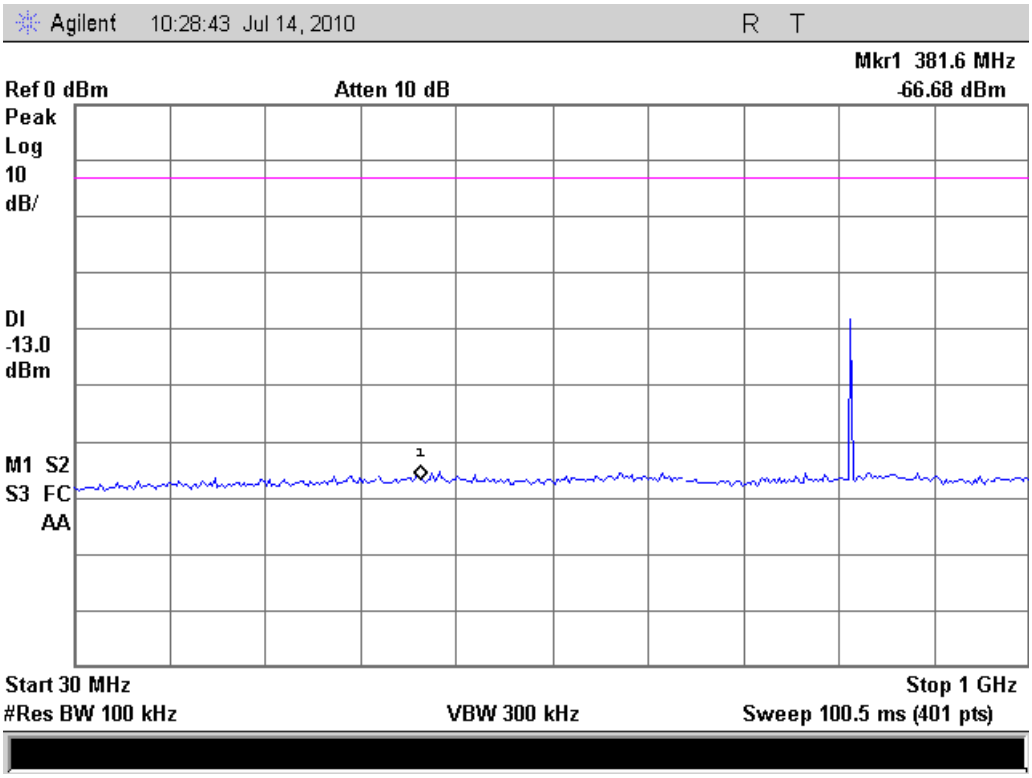
Tuned Frequency (MHz)	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
809.05	2960	-56.62	-13	Pass
817.0	2980	-54.15	-13	Pass
824.95	2980	-54.24	-13	Pass

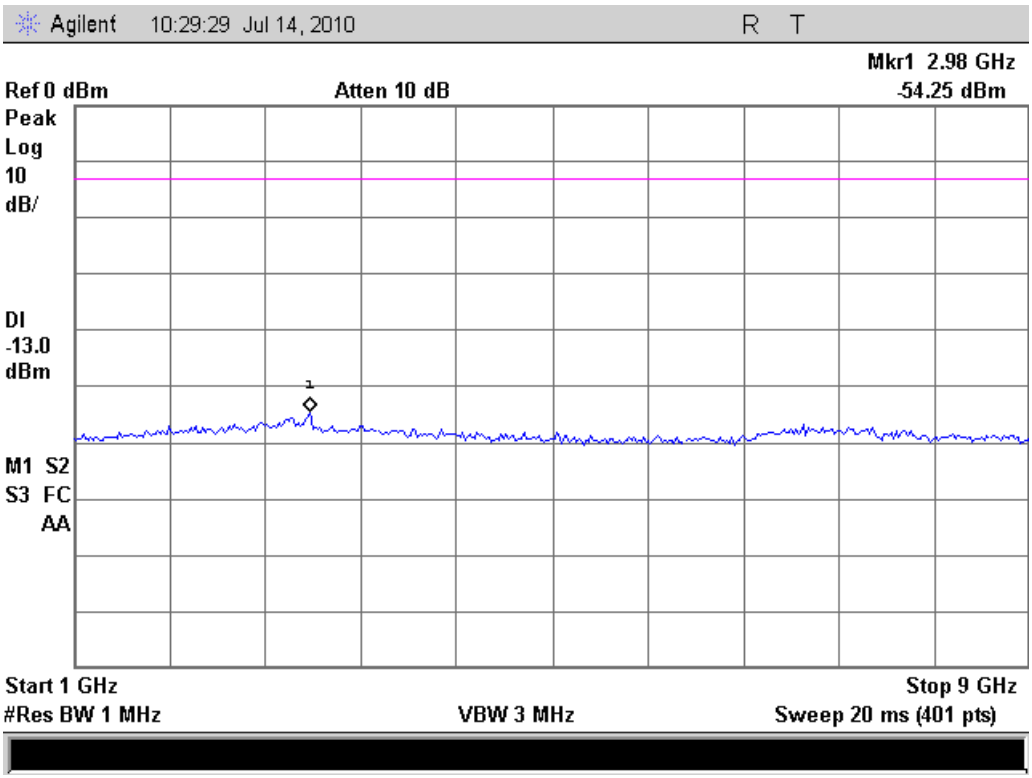
FM Conducted Spurious Emissions
809.05 MHz



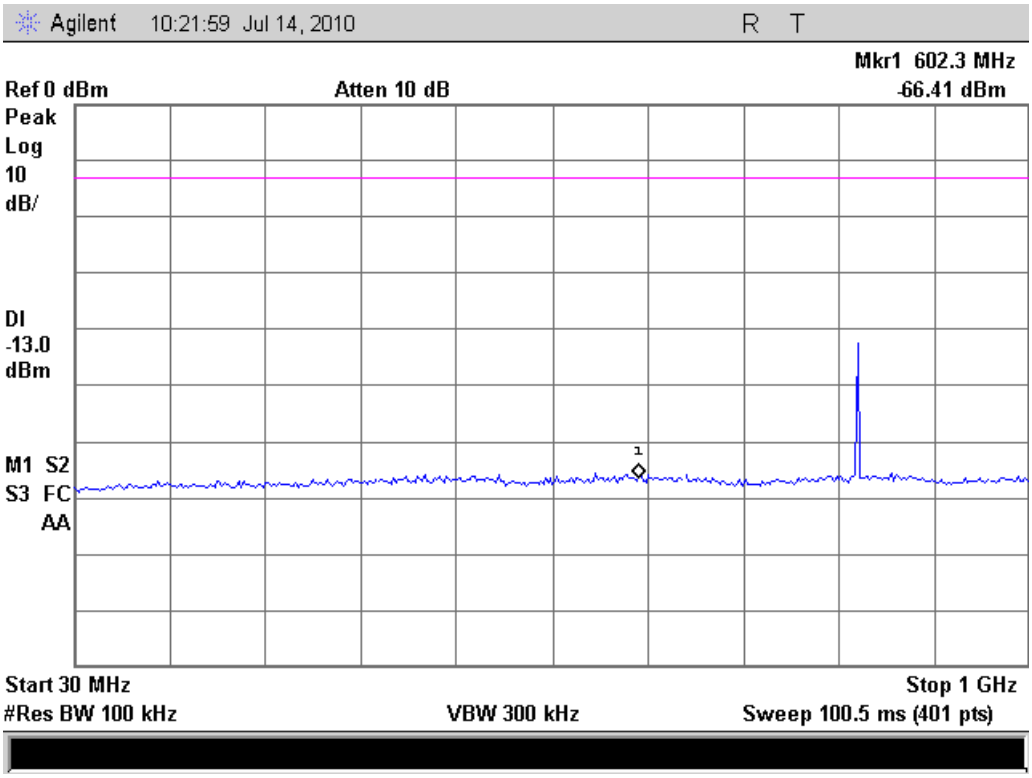


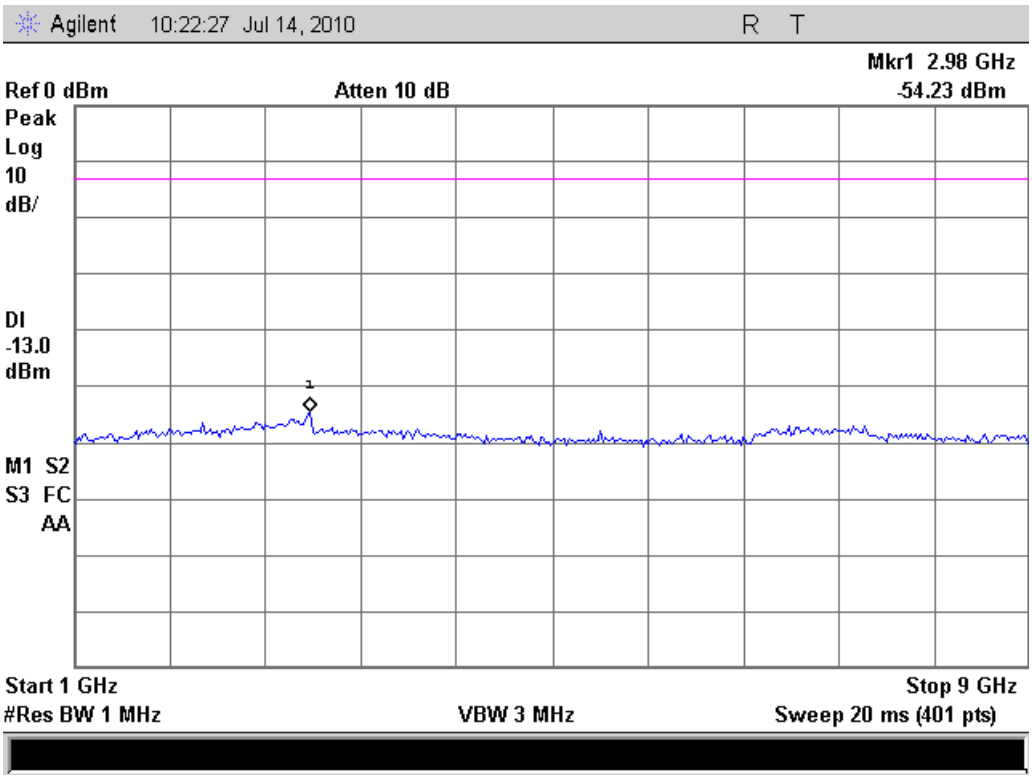
817 MHz


Agilent 10:28:43 Jul 14, 2010
R T
Mkr1 381.6 MHz
Ref 0 dBm
Atten 10 dB
-66.68 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 30 MHz
Stop 1 GHz
#Res BW 100 kHz
VBW 300 kHz
Sweep 100.5 ms (401 pts)

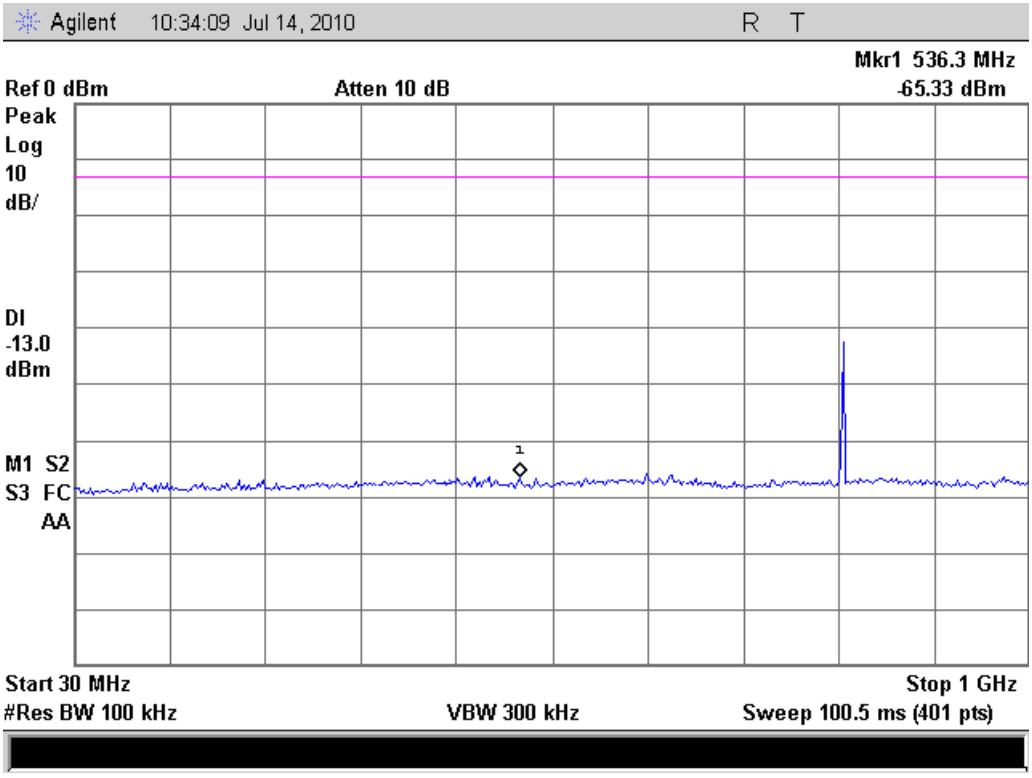

Agilent 10:29:29 Jul 14, 2010
R T
Mkr1 2.98 GHz
Ref 0 dBm
Atten 10 dB
-54.25 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
Stop 9 GHz
#Res BW 1 MHz
VBW 3 MHz
Sweep 20 ms (401 pts)

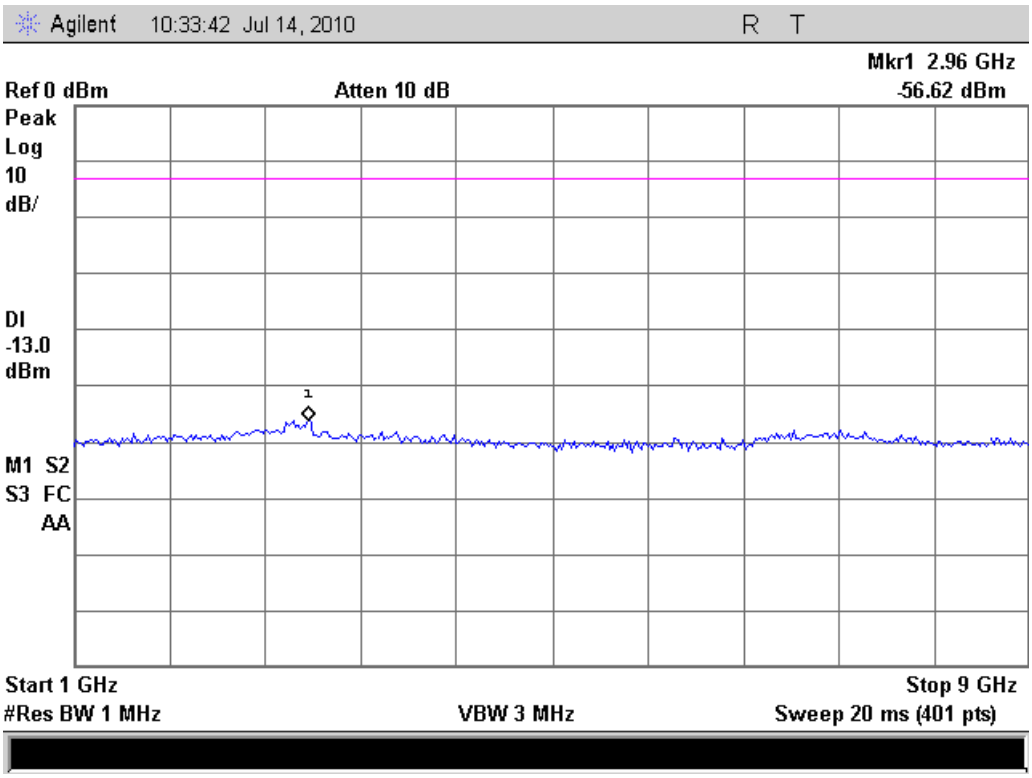
824.95 MHz


Agilent 10:21:59 Jul 14, 2010
R T
Mkr1 602.3 MHz
Ref 0 dBm
Atten 10 dB
-66.41 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 30 MHz
#Res BW 100 kHz
VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)

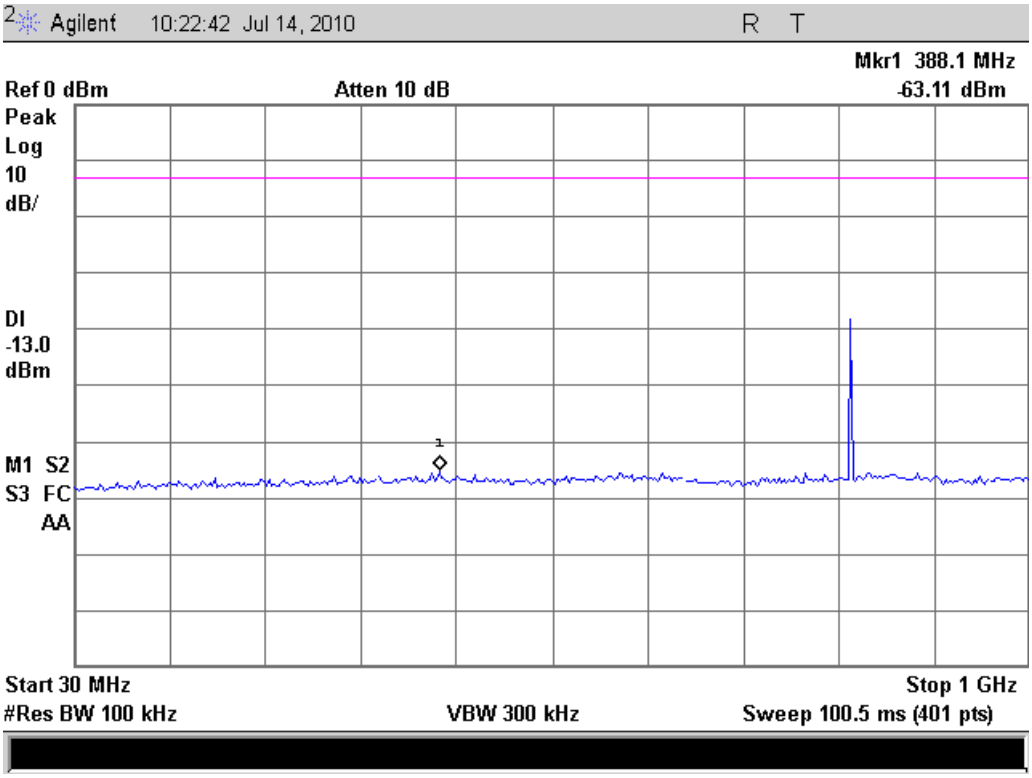

Agilent 10:22:27 Jul 14, 2010
R T
Mkr1 2.98 GHz
Ref 0 dBm
Atten 10 dB
-54.23 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
VBW 3 MHz
Stop 9 GHz
Sweep 20 ms (401 pts)

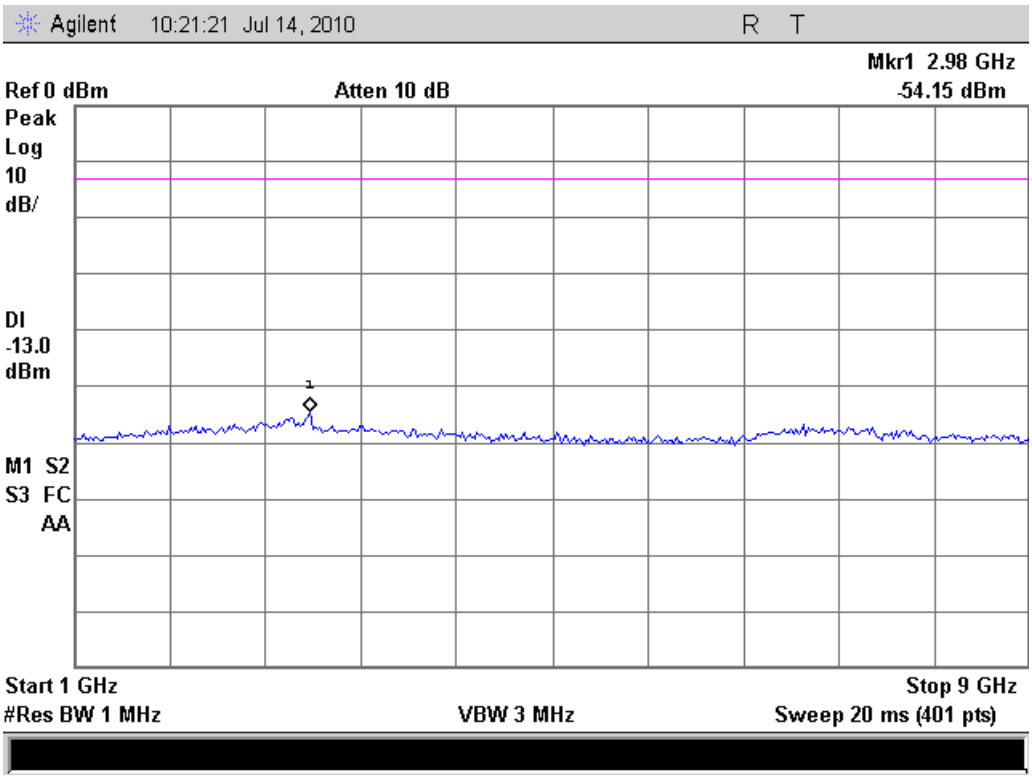
QPSK Conducted Spurious Emissions
809.05 MHz



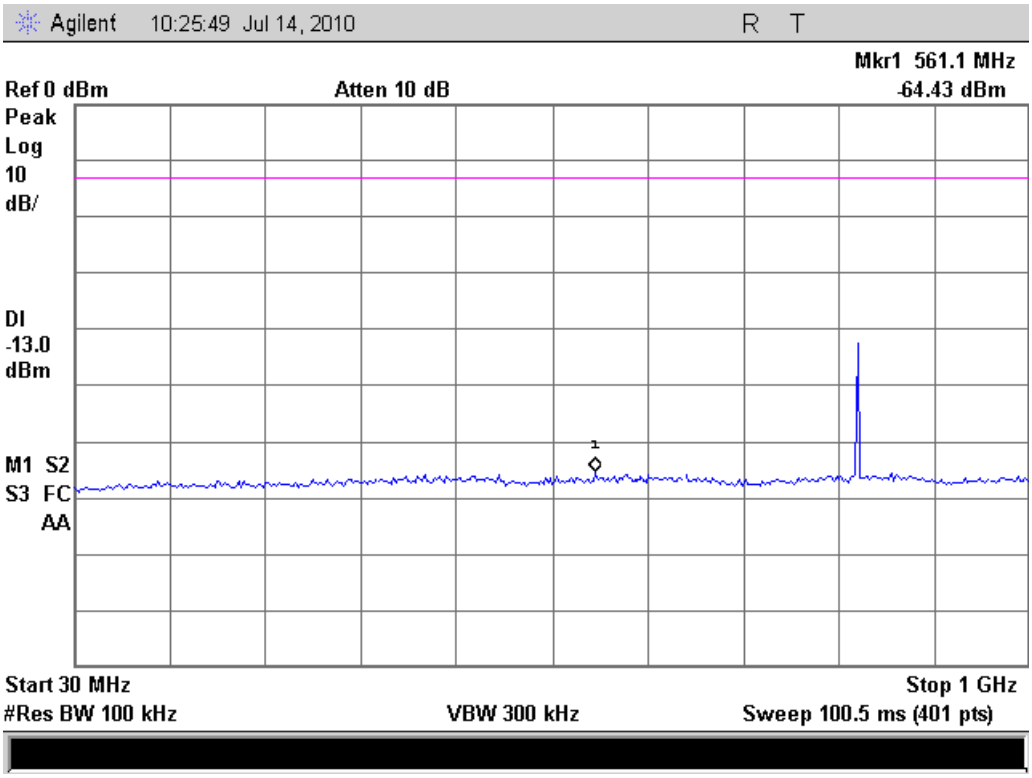


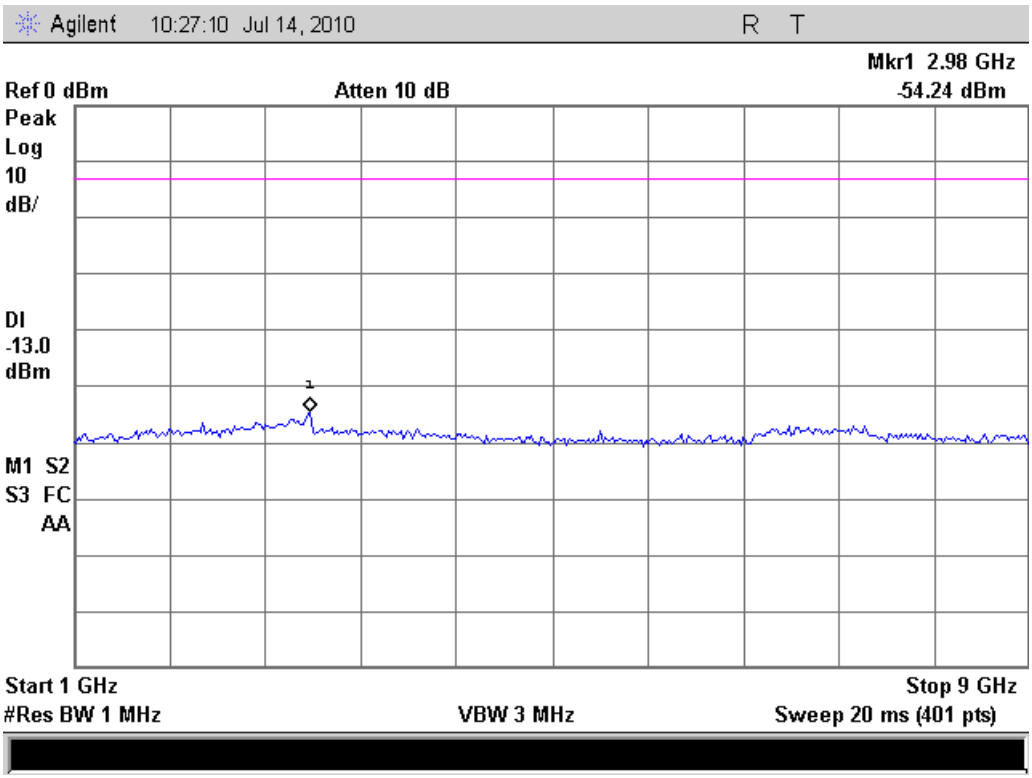
817 MHz


Agilent 10:22:42 Jul 14, 2010
R T
Mkr1 388.1 MHz
Ref 0 dBm
Atten 10 dB
-63.11 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 30 MHz
#Res BW 100 kHz
VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)


Agilent 10:21:21 Jul 14, 2010
R T
Mkr1 2.98 GHz
Ref 0 dBm
Atten 10 dB
-54.15 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
VBW 3 MHz
Stop 9 GHz
Sweep 20 ms (401 pts)

824.95 MHz


Agilent 10:25:49 Jul 14, 2010
R T
Mkr1 561.1 MHz
Ref 0 dBm
Atten 10 dB
-64.43 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 30 MHz
#Res BW 100 kHz
VBW 300 kHz
Stop 1 GHz
Sweep 100.5 ms (401 pts)


Agilent 10:27:10 Jul 14, 2010
R T
Mkr1 2.98 GHz
Ref 0 dBm
Atten 10 dB
-54.24 dBm
Peak
Log
10
dB/
DI
-13.0
dBm
M1 S2
S3 FC
AA
Start 1 GHz
#Res BW 1 MHz
VBW 3 MHz
Stop 9 GHz
Sweep 20 ms (401 pts)

Name of Test: Field Strength of Spurious Radiation
Specification: 2.1053 **Engineer: J. Erhard**
Test Equipment Utilized: i00033, i00267, i00103 **Test Date: 7/16/2010**

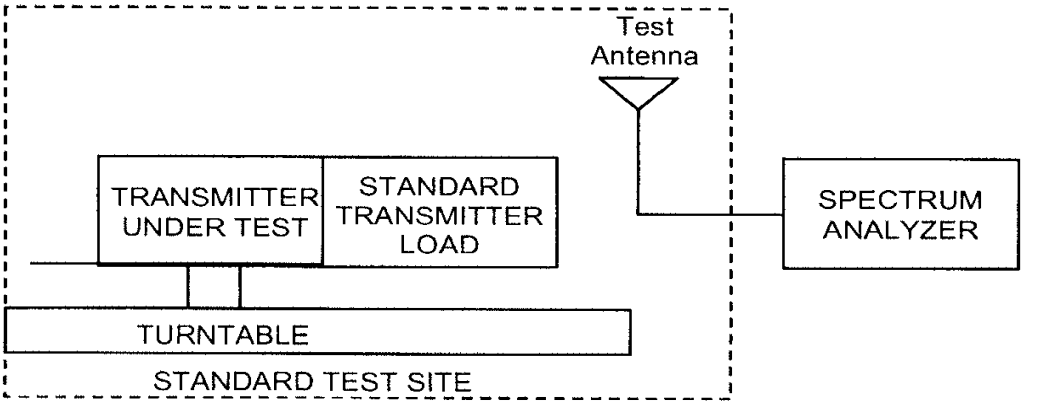
Test Procedure

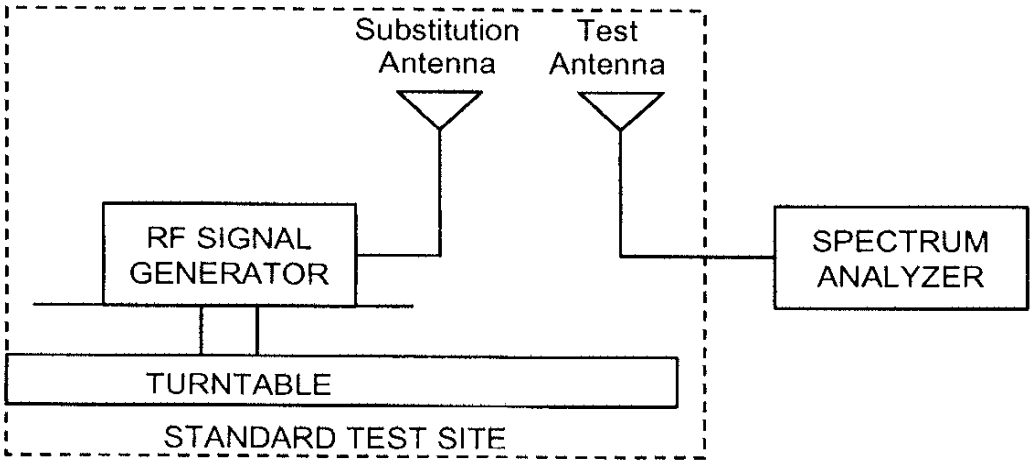
A) Connect the equipment as illustrated
B) Adjust the spectrum analyzer for the following settings:
1) Resolution Bandwidth 100 kHz (<1 GHZ), 1 MHZ (> 1GHz).
2) Video Bandwidth ≥ 3 times Resolution Bandwidth, or 30 kHz
3) Sweep Speed ≤2000 Hz/second
4) Detector Mode = Mean or Average Power
C) Place the 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 ± 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 l)**

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

Test Setup


Test
Antenna
TRANSMITTER
UNDER TEST
STANDARD
TRANSMITTER
LOAD
SPECTRUM
ANALYZER
TURNTABLE
STANDARD TEST SITE


Substitution
Antenna
Test
Antenna
RF SIGNAL
GENERATOR
SPECTRUM
ANALYZER
TURNTABLE
STANDARD TEST SITE

809.05 MHz Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm) ERP/EIRP	Result
1618.1	-79.4	40.8	-38.6	-13	Pass
2427.15	-74.3	44.6	-29.7	-13	Pass
3236.0	-79.3	47.6	-31.7	-13	Pass

817 MHz Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm) ERP/EIRP	Result
1634.0	-76.1	40.9	-35.2	-13	Pass
2451.0	-76.4	44.7	-31.7	-13	Pass
3238.0	-76.4	47.7	-28.7	-13	Pass

824.95 MHz Test Results

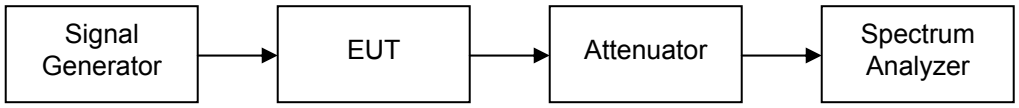
Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm) ERP/EIRP	Result
1649.9	-76.2	41.0	-35.2	-13	Pass
2474.85	-76.1	44.7	-31.4	-13	Pass
3299.8	-76.4	47.8	-28.6	-13	Pass

No other emissions were detected. All emissions were greater than –13 dBm

Name of Test: Occupied Bandwidth
Specification: 2.1049 **Engineer: J. Erhard**
Test Equipment Utilized: i00331, i00348 **Test Date: 7/15/2010**

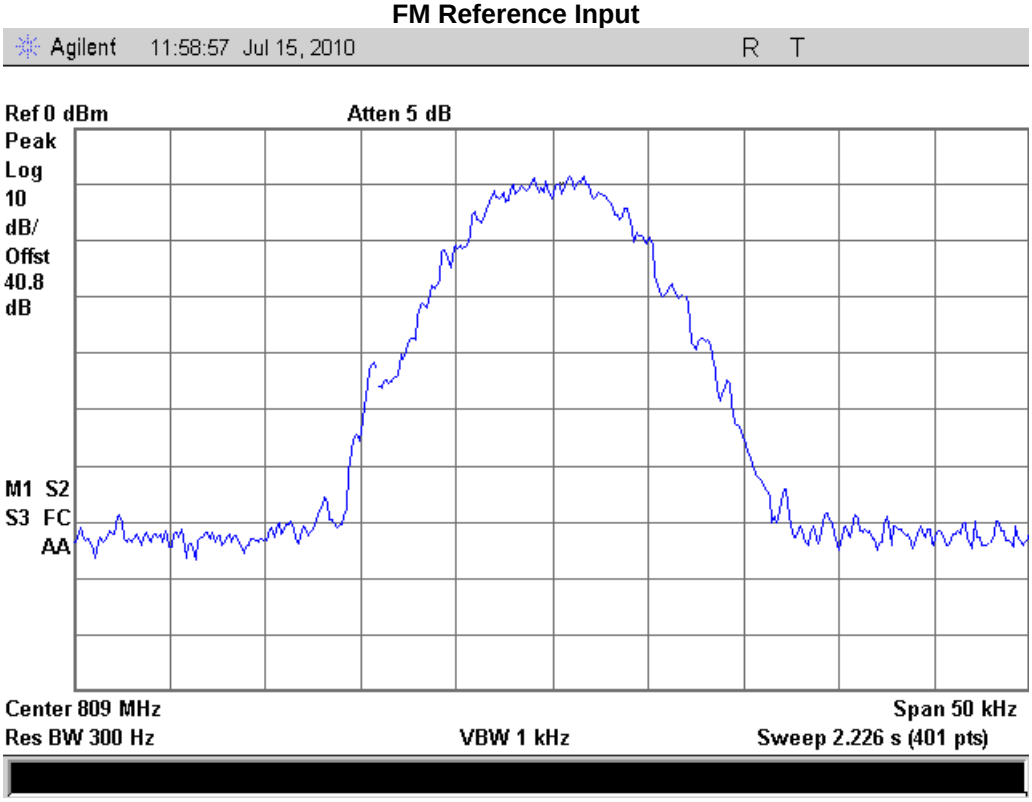
The Equipment Under Test (EUT) was connected to a Spectrum analyzer with appropriate attenuation to ensure the safety of the test equipment utilized. The EUT was set for a 45W maximum output power with an FM modulated RF input. The occupied bandwidth of the reference input signal was compared to the RF output signal to ensure that the two signals were similar. FM, C4FM, and QPSK modulations were tested, as they are representative of the emissions types the EUT will utilize.

Test Setup

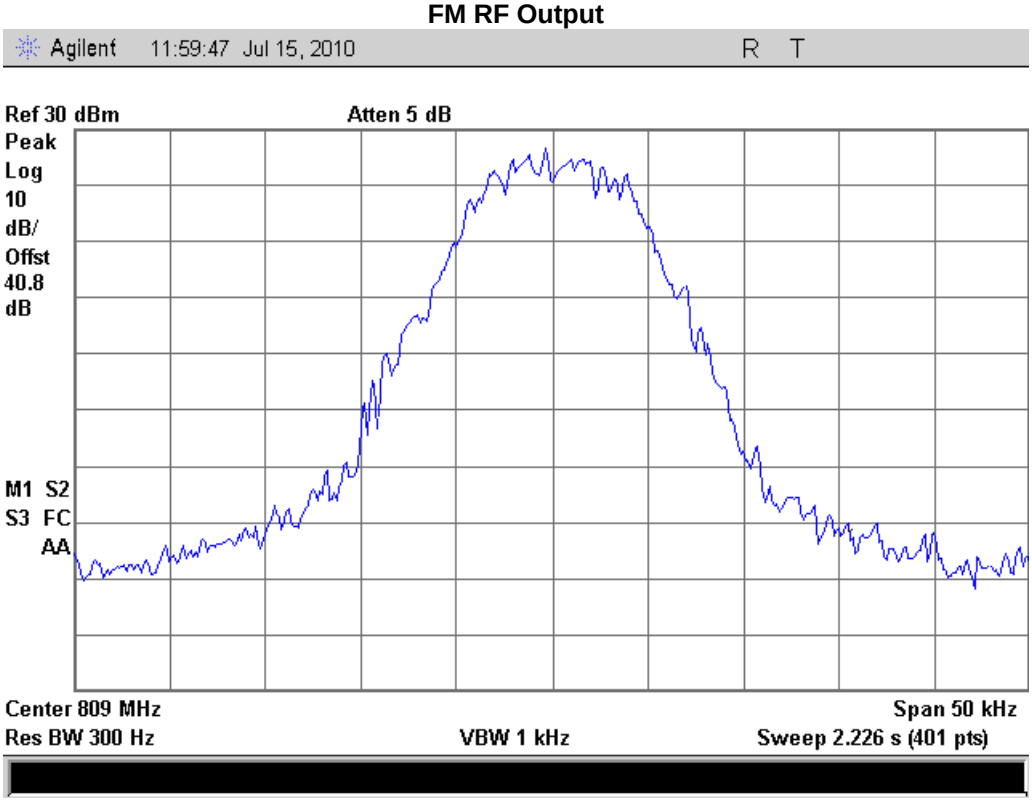


Emissions Designator	Representative Modulation	Results
F1D	C4FM	Pass
F1E	FM	Pass
F3E	FM	Pass
FXE	FM	Pass
G1E	QPSK	Pass
G1D	QPSK	Pass
D7W	QPSK	Pass
D7D	QPSK	Pass
D1E	QPSK	Pass
D1W	QPSK	Pass
F9W	C4FM	Pass

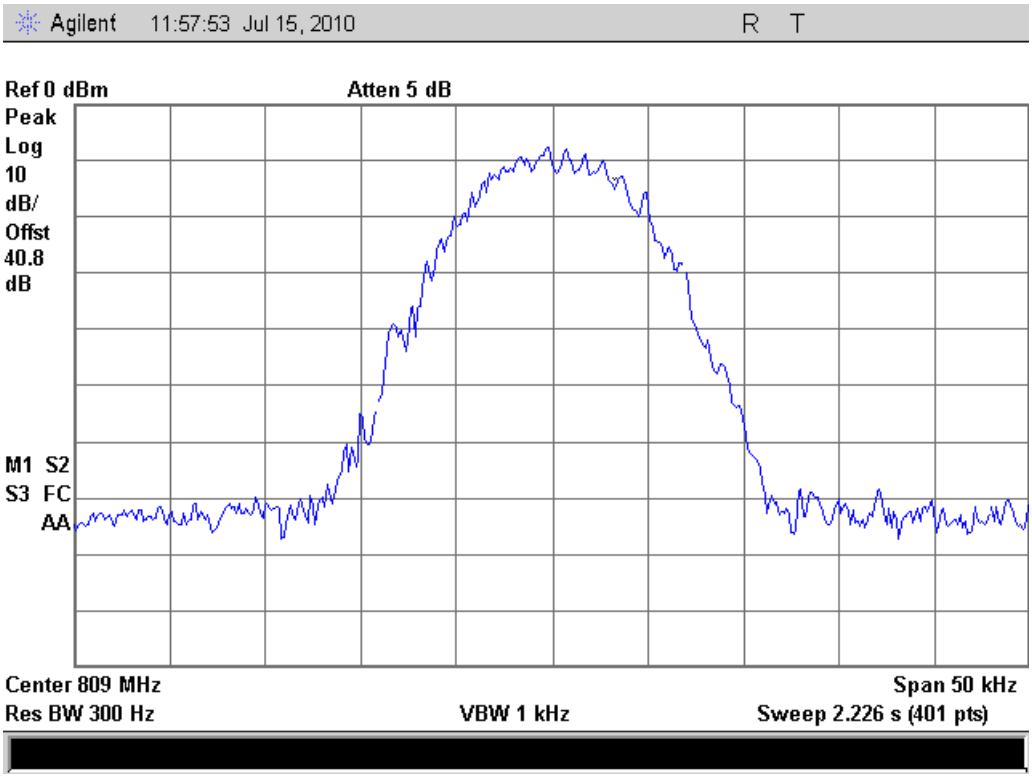
809.05 MHz Test Results
FM Reference Input



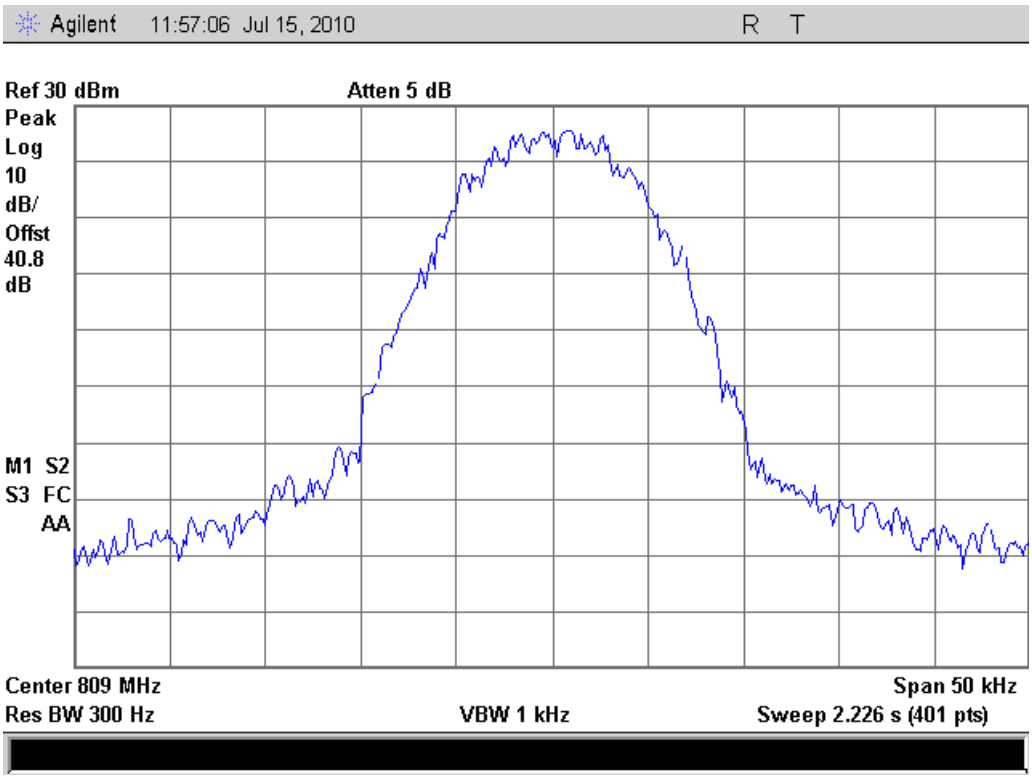
FM RF Output



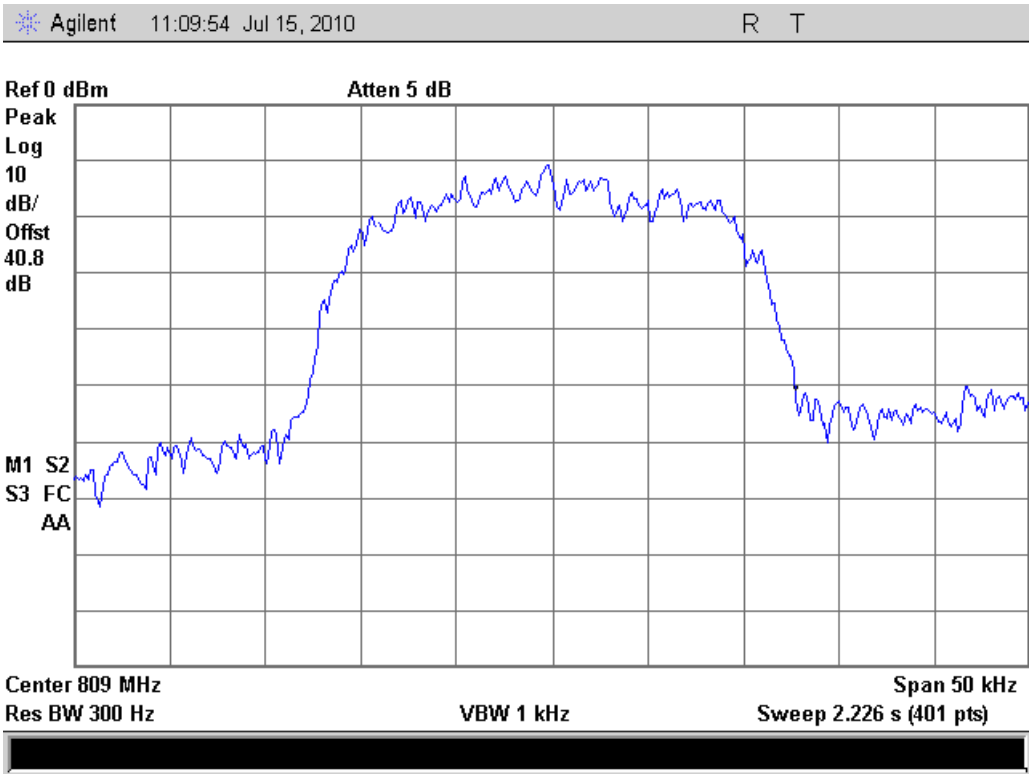
C4FM Reference Input



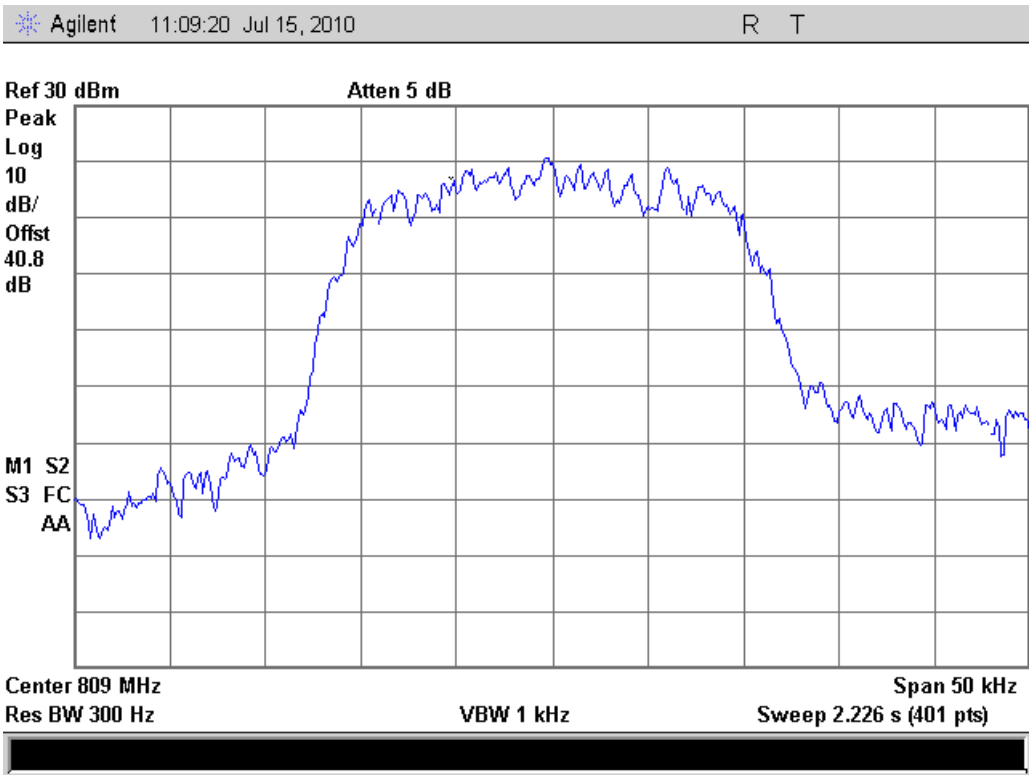
C4FM RF Output



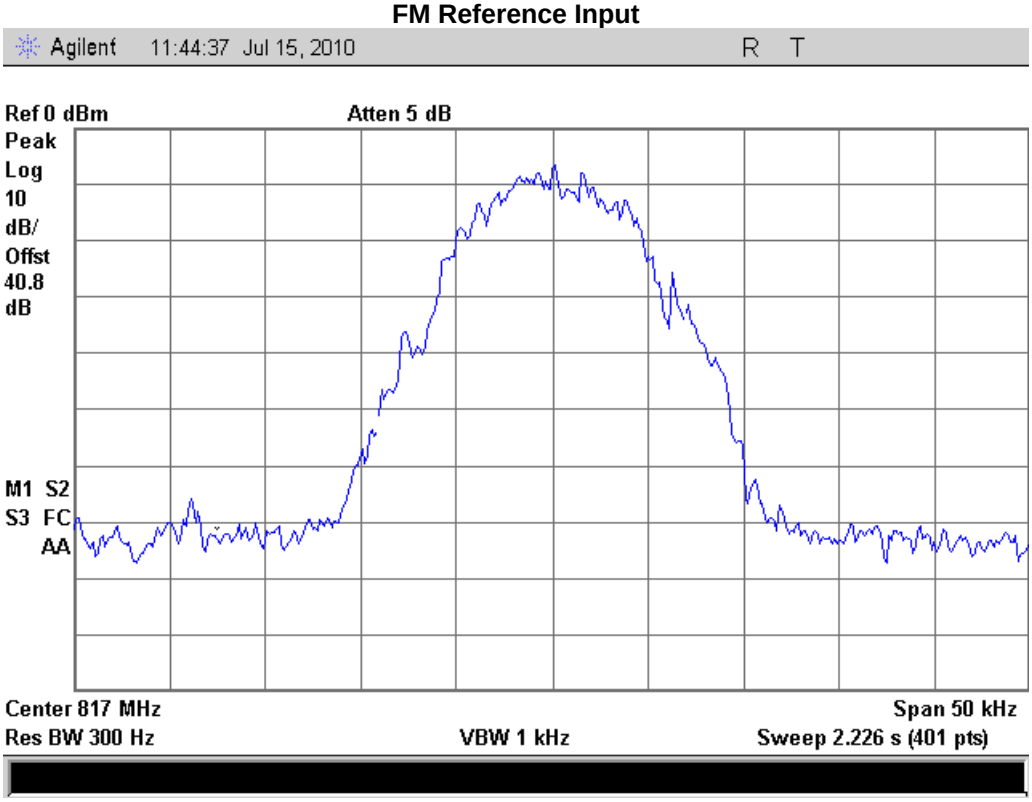
QPSK Reference Input



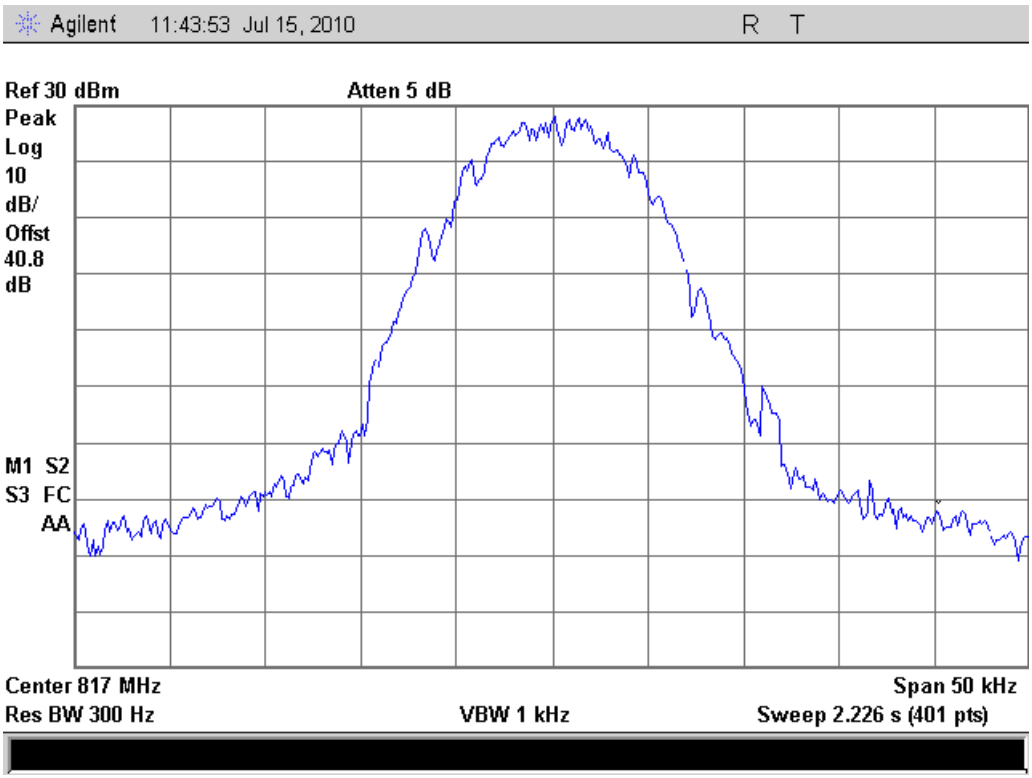
QPSK RF Output



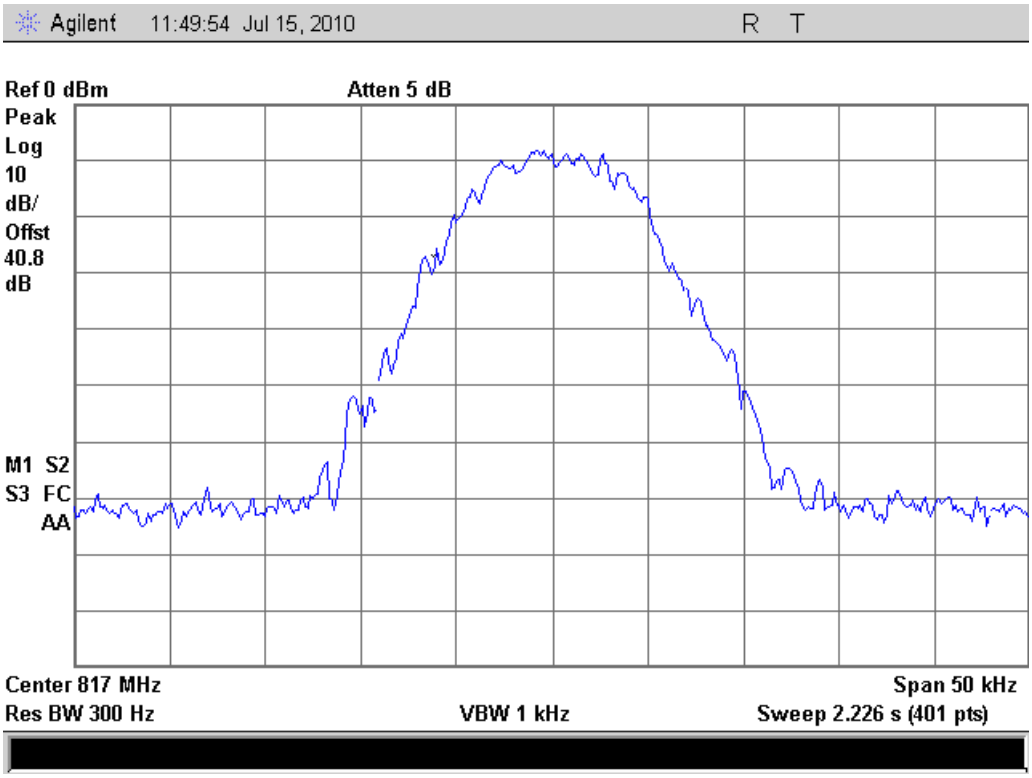
817 MHz Test Results
FM Reference Input



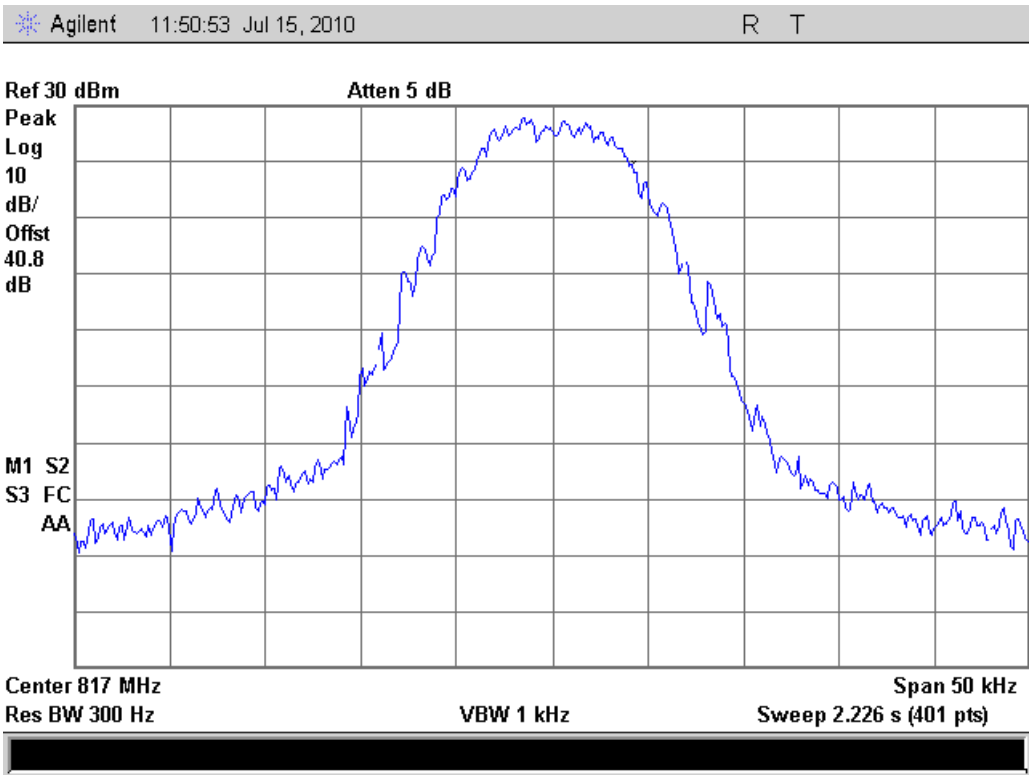
FM RF Output



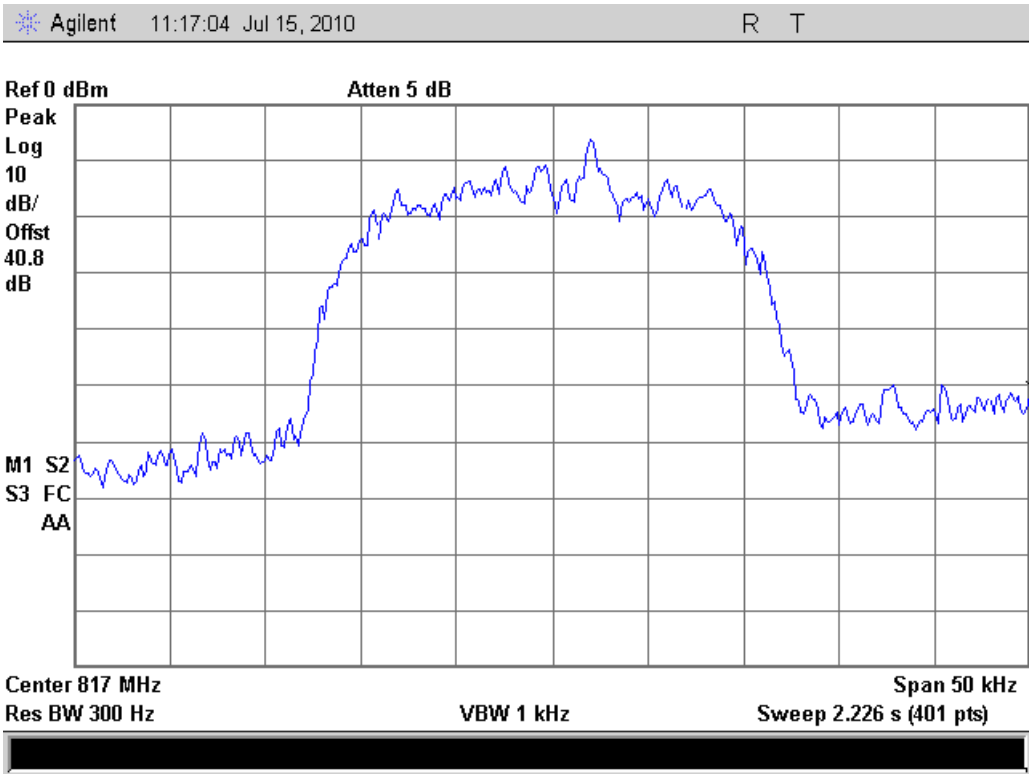
C4FM Reference Input



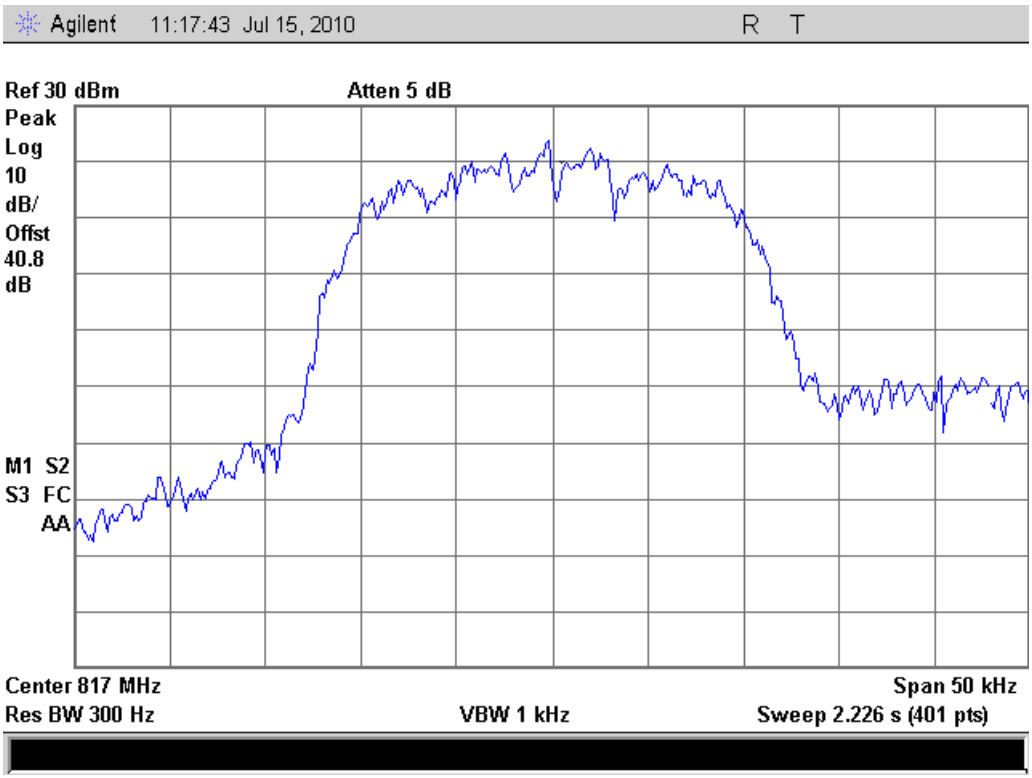
C4FM RF Output



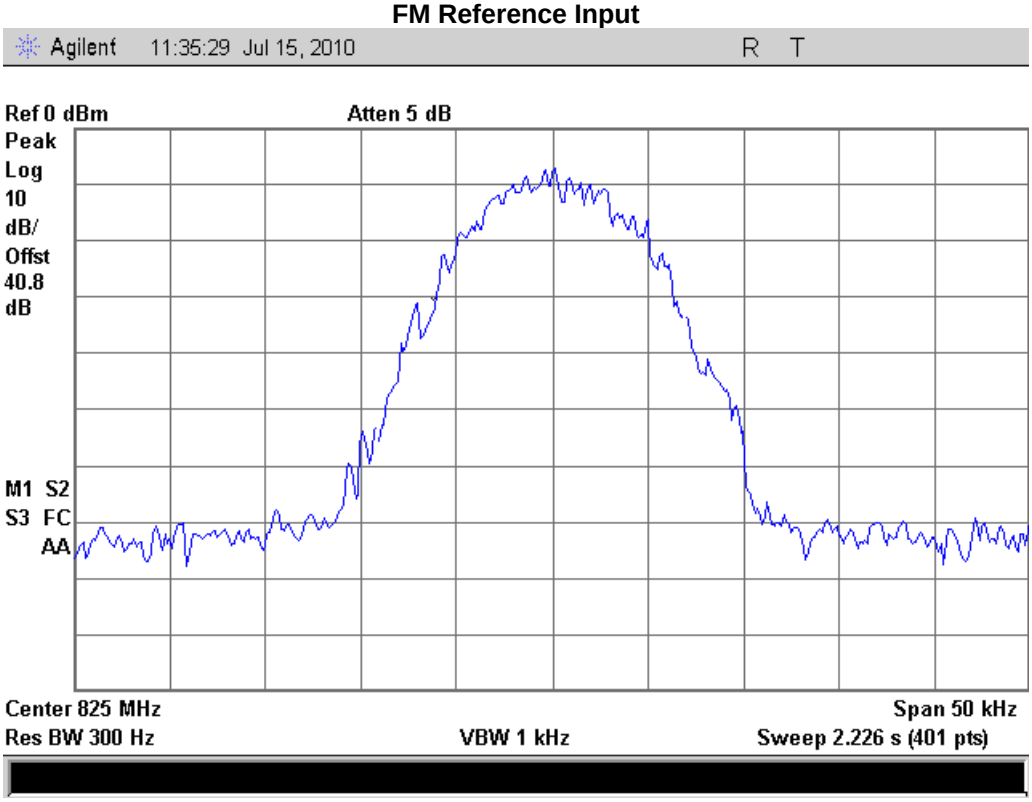
QPSK Reference Input



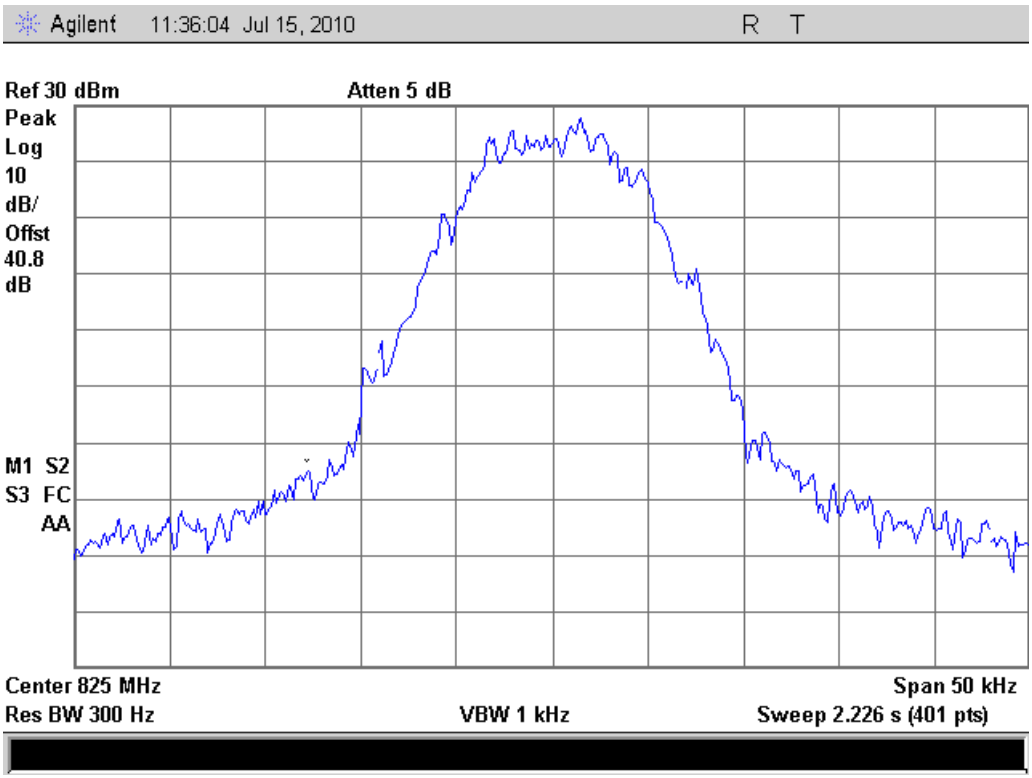
QPSK RF Output



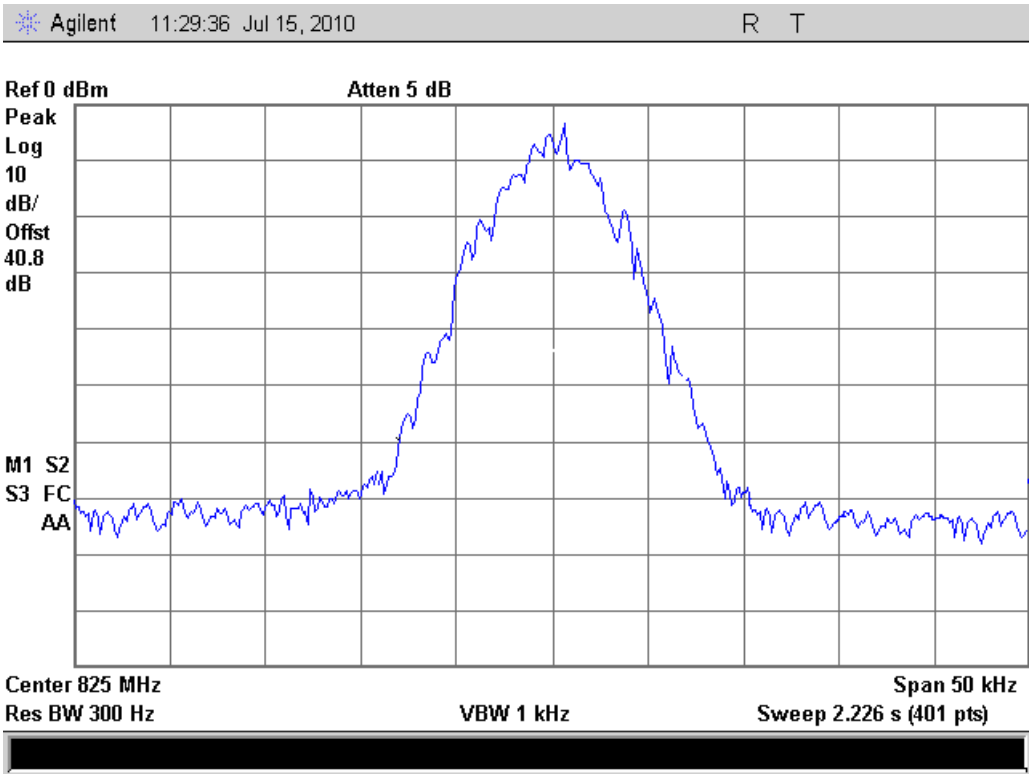
824.95 MHz Test Results
FM Reference Input



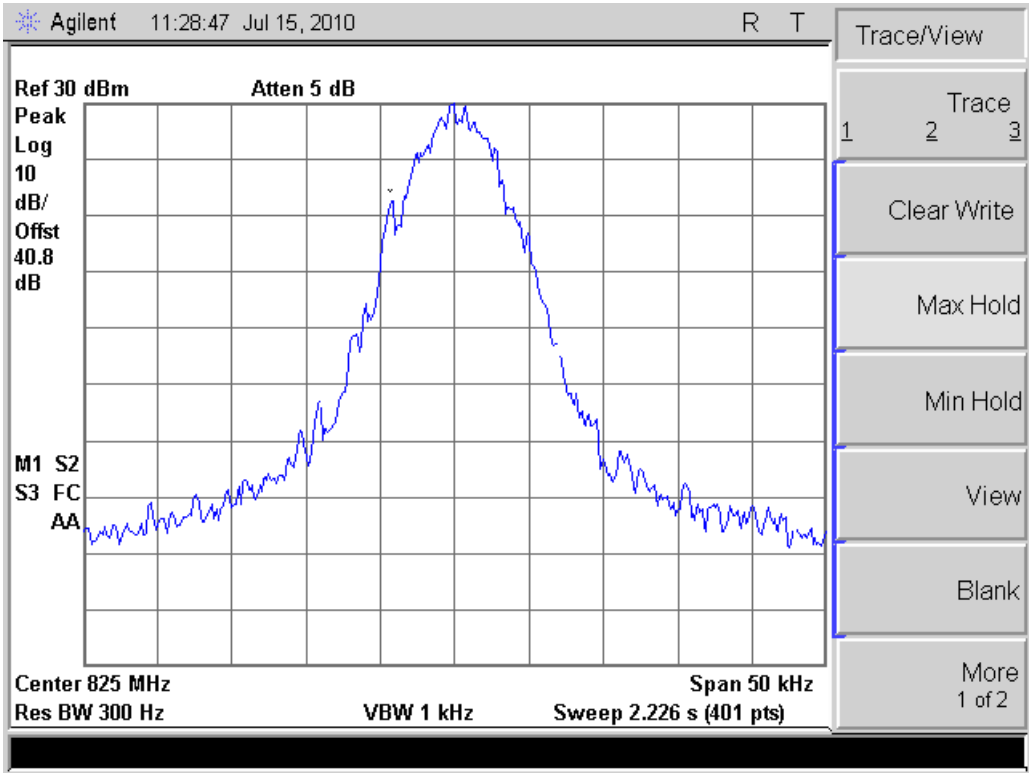
FM RF Output



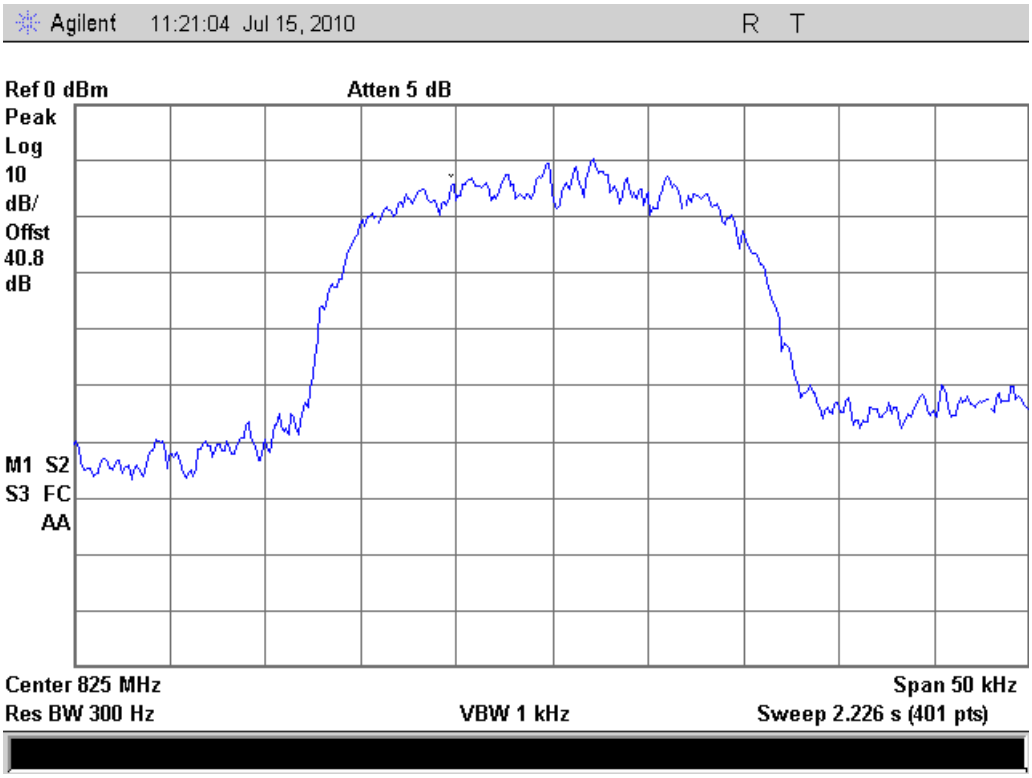
C4FM Reference Input



C4FM RF Output



QPSK Reference Input



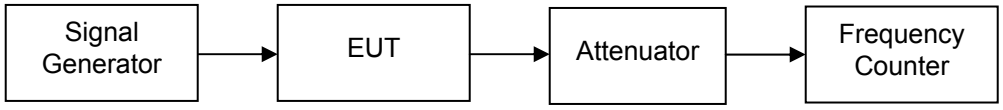
QPSK RF Output

Name of Test: Frequency Stability (Temperature Variation)
Specification: 2.1055 **Engineer: J. Erhard**
Test Equipment Utilized: i00019, i00348, i00347 **Test Date: 7/15/2010**

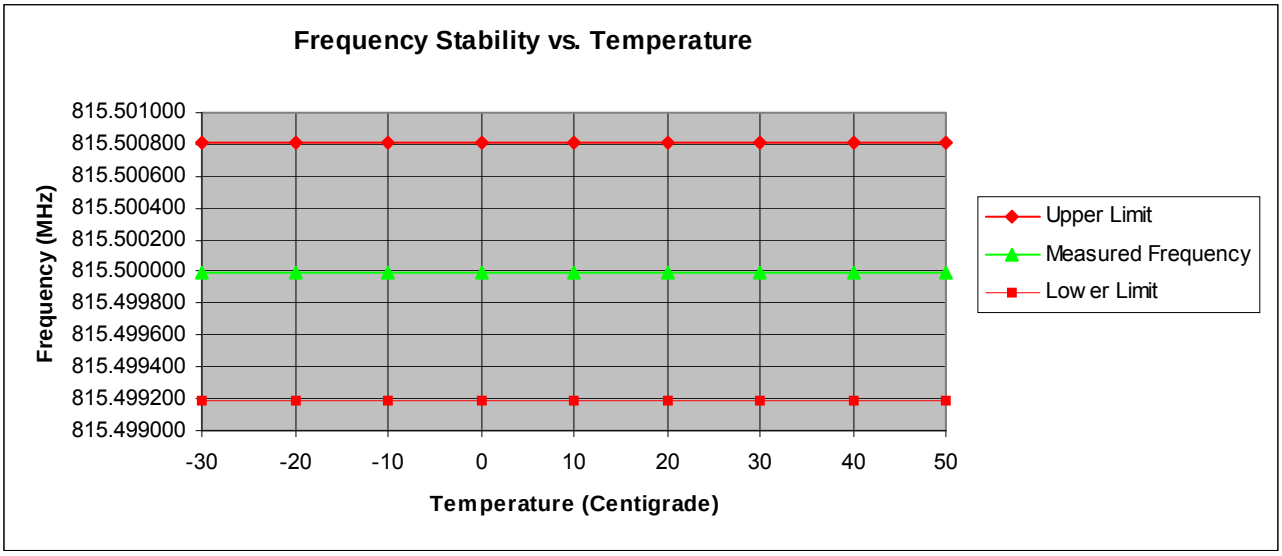
Measurement Procedure

The EUT was placed in an environmental test chamber and the RF output was connected to a frequency counter. The temperature was varied from -30ºC to 50ºC in 10ºC increments. After allowing an appropriate amount of soak time for temperature stabilization A CW RF signal was injected into the receive input and the RF output frequency was measured.

Measurement Setup



Measurement Results

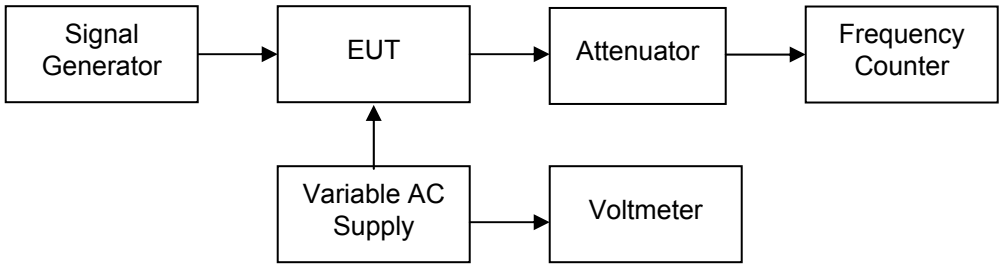


Name of Test: Frequency Stability (Voltage Variation)
Specification: 2.1055 **Engineer: J. Erhard**
Test Equipment Utilized: i00019, i00348, i00347, i00108, i00320 **Test Date: 7/14/2010**

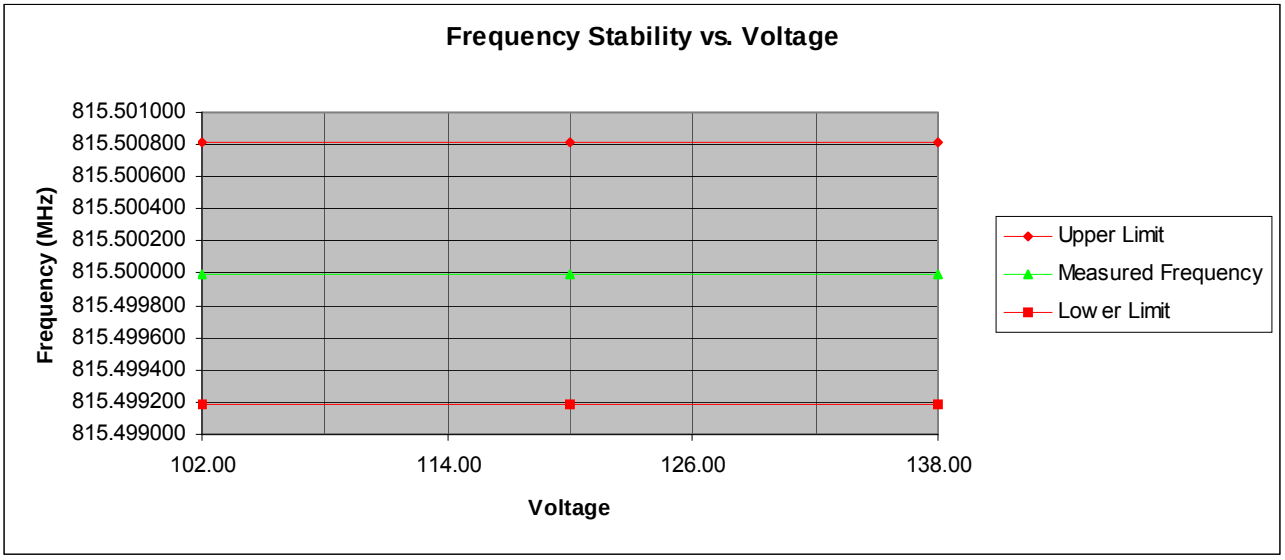
Measurement Procedure

The EUT was placed in an environmental test chamber and the RF output was connected to a frequency counter. At 20ºC A CW RF signal was injected into the receive input and the RF output frequency was measured while the input voltage was varied +/- 15%.

Measurement Setup



Measurement Results



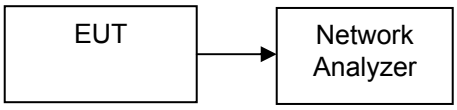
Name of Test: Out of Band Rejection
Specification:
Test Equipment Utilized: i00207

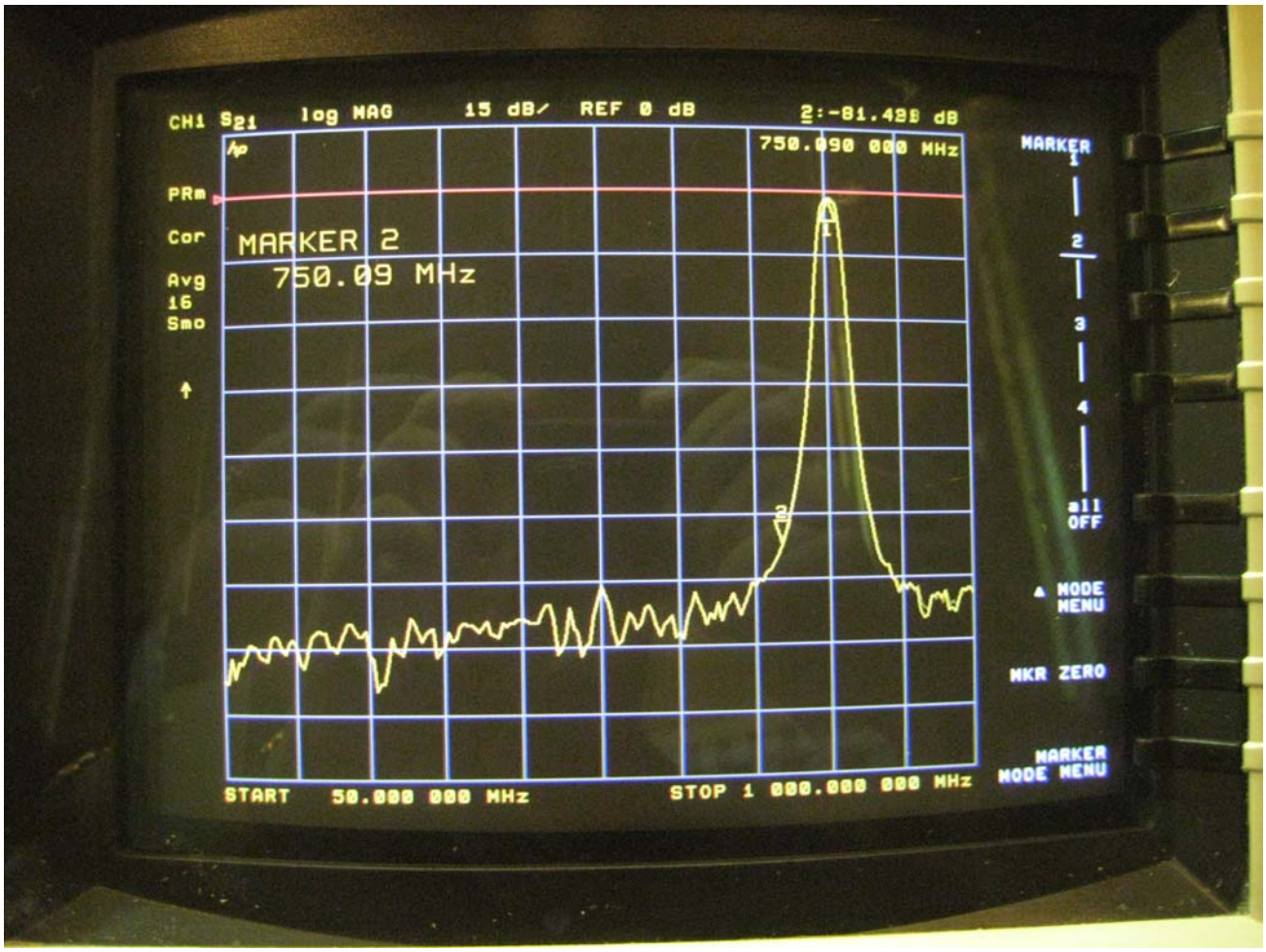
Engineer: J. Erhard
Test Date: 7/15/2010

Measurement Procedure

The EUT filter section was connected to a network analyzer and the response curve was plotted. Marker 1 was set to the center of the passband and marker 2 was set 56 MHz outside of the passband to show the total out of band rejection.

Measurement Setup





Test Equipment Utilized

Description	MFG	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
Frequency Counter	HP	5334B	i00019	2/15/2010	2/15/2011
Spectrum Analyzer	Agilent	E4407B	i00331	11/3/2009	11/3/2010
Signal Generator	Agilent	E4438C	i00348	11/23/2009	11/23/2010
Attenuator	Narda	769-30	i00347	Verify When Used	
Horn Antenna	Emco	3115	i00103	11/25/2008	11/25/2010
RF Load	Thermaline	8201	i00134	NCR	
Bilog Antenna	Schaffner	CBL6111C	i00267	11/21/2009	11/21/2011
EMI receiver	HP	8546A	i00033	11/4/2003	11/4/2010
Attenuator	Weinschel	24-40-12	N/A	Verify When Used	
Variac	Powerstat	3PN125	i00108	Verify When Used	
DMM	Fluke	75III	i00320	2/16/2010	2/16/2011
Tunable notch filter	Eagle	TNF240MFMF	i00364	Verify When Used	
Network Analyzer	HP	8573D	i00207	8/3/2009	8/3/2010

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