



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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FCC Certification 15.247 DTS

Prepared for

FCC ID: B5DM532

Model: BTR-240

Description: 2.4 GHz Wireless Intercom Base Station

to

Federal Communications Commission

Rule Part(s) 15.247

Date of Issue: April 18, 2011

On the behalf of the applicant:

Bosch (Telex)
8601 E. Cornhusker Highway
Lincoln, NE 68507

Attention of:

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Project No: p10b0009

Greg Corbin
Project Test Engineer

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	April 18, 2011	Greg Corbin	Original Document
2.0	May 9, 2011	Greg Corbin	Corrected number of channels under EUT Description on page 6



Table of Contents

Description	Page
Standard Test Conditions Engineering Practices	6
Test Results Summary	7
Peak Output Power	8
Conducted Spurious Emission	9
Radiated Spurious Emissions	13
Emissions At Band Edges	43
Occupied Bandwidth	54
Transmitter Power Spectral Density (PSD)	57
A/C Powerline Conducted Emission	59
Receiver Spurious Emissions	61
Test Equipment Utilized	63



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 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 marked 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 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.



Standard Test Conditions Engineering Practices

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

In accordance with ANSI C63.10-2009 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.

Environmental Conditions		
Temperature	Humidity	Pressure
19.8 – 24.9 deg C	20.6 – 24.5 %	967 – 986.2 mbar

EUT Description

The Bosch model BTR-240 base station transceiver is a rack mountable, full-duplex, wireless intercom radio. The base station provides a central relay location which handles the audio traffic between the TR-240 belt packs. The BTR-240 uses the IEEE 802.11b technology to transmit / receive within one channel of the 1 – 11 (2.412 to 2.462 GHz)

EUT Operation during Tests

EUT was operated under normal operating conditions.

Accessories:

Qty	Type	Make, Model	S/N
1	ITE Power Supply	GlobTek, mdl: GT-41062-1812-T3	N/A
1	RA-3	Antenna, Rubber Duck, gain = 2.1 dBi	N/A
1	RA-5E	Antenna, Magnetic Mount Whip, gain = 5 dBi	N/A
1	RA-7E	Antenna, Rubber Duck, gain = 7 dBi	N/A
1	FP-11E	Antenna, Patch, TX and RX elements mounted in separate enclosures, gain = 11 dBi	N/A
1	ANT-FPE	Antenna, Patch, TX and RX elements combined into 1 enclosure, gain = 11 dBi	N/A
1	Headset	Telex, Mdl: PH-2	N/A

Cables:

Qty	Type	Length, m	Shield	Shielded Hood	Ferrite
2	2 wire intercom cable	0.8	Yes	None	None
2	4 wire intercom cable	2	No	None	None



Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(b)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Emissions At Band Edges	Pass	
15.247(a)(2)	Occupied Bandwidth	Pass	
15.247(e)	Transmitter Power Spectral Density	Pass	
15.207	A/C Powerline Conducted Emissions	Pass	
RSS GEN6(b)	Receiver Spurious Emissions	Pass	

15.203: Antenna Requirement:

 x The antenna uses a unique coupling
The antenna connector is a reverse polarity TNC connector.

Antenna Model	Gain - dBi	Type / Description
RA-3	2.1	Rubber Duck antenna, same as type as RA-7 with less gain
RA-5	5	Magnetic mount whip antenna
RA-7	7	Rubber Duck antenna
FP-11	11	Patch antenna, TX and RX elements mounted in separate enclosures
ANT-FP	11	Patch antenna, TX and RX elements mounted in the same enclosure

Notes on Antenna selection for testing:

For radiated measurements, the three different types of antennas were tested. RA-5, RA-7, ANT-FP.

If the antennas are of the same type, the antenna with the highest gain was tested.

For the Rubber Duck antennas, the RA-7 model was used.

For the patch antennas, the ANT-FP was used



Peak Output Power

Name of Test: Peak Output Power

Specification: 15.247(b)

Engineer: Greg Corbin

Test Equipment Utilized: i00331

Test Date: 4/15/2011

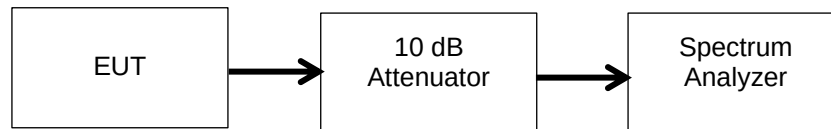
Test Procedure

The EUT was connected as shown in test set-up. The attenuator and cable loss was input to the spectrum analyzer as a reference level offset before recording measurement.

The spectrum analyzer RBW = 1 MHz and VBW = 3 MHz.

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	Specification Limit	Result
2412	26.12 mW	1 W	Pass
2437	11.88 mW	1 W	Pass
2462	24.37 mW	1 W	Pass



Conducted Spurious Emission

Name of Test: Conducted Spurious Emissions

Specification: 15.247(d)

Engineer: Greg Corbin

Test Equipment Utilized: i00331, i00177, i00385

Test Date: 4/15/2011

Test Procedure

The EUT was connected to a spectrum analyzer to verify that the EUT met the requirements for spurious emissions. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed. Only detectable spurious emissions were recorded and plotted. The peak output power is added to the recorded measurement to provide the corrected spurious level in dBc.

Only the worst case is recorded in the Conducted Spurious Emissions Summary Test Table.

Test Setup

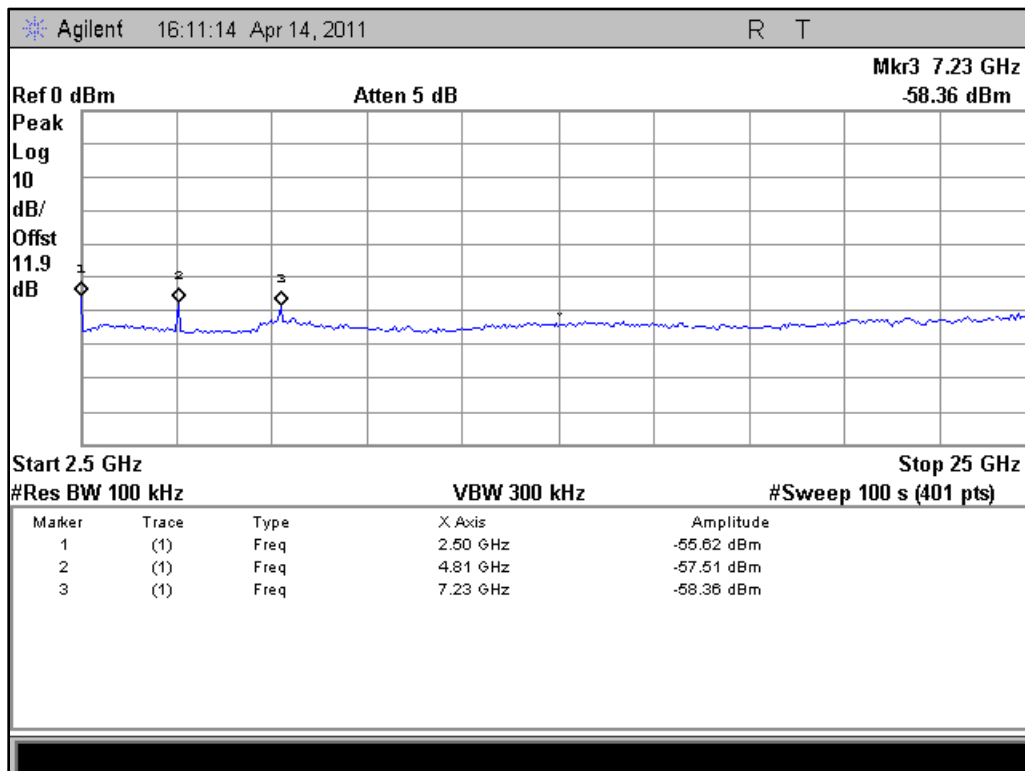
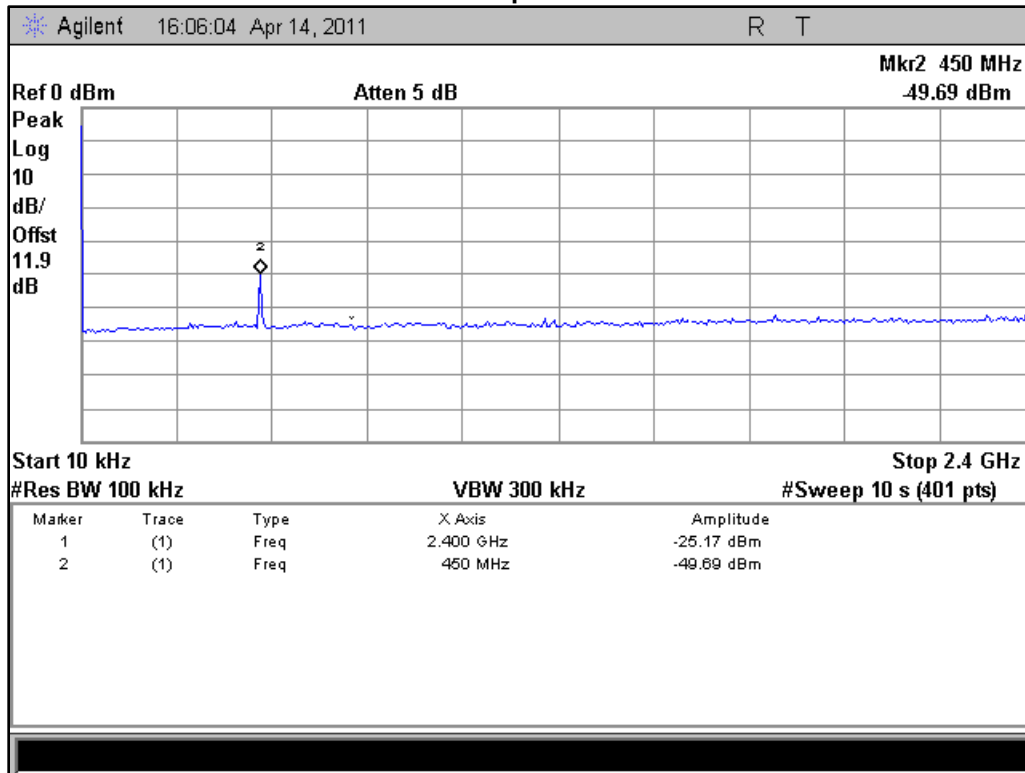


Conducted Spurious Emissions Summary Test Table

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement dBm	Peak Output Power dBm	Corrected Measurement dBc	Specification Limit dBc	Result
2412	2400	-25.2	14.2	-39.4	-20	Pass
2437	4860	-52.7	10.7	-63.4	-20	Pass
2462	2500	-35.5	13.9	-49.4	-20	Pass

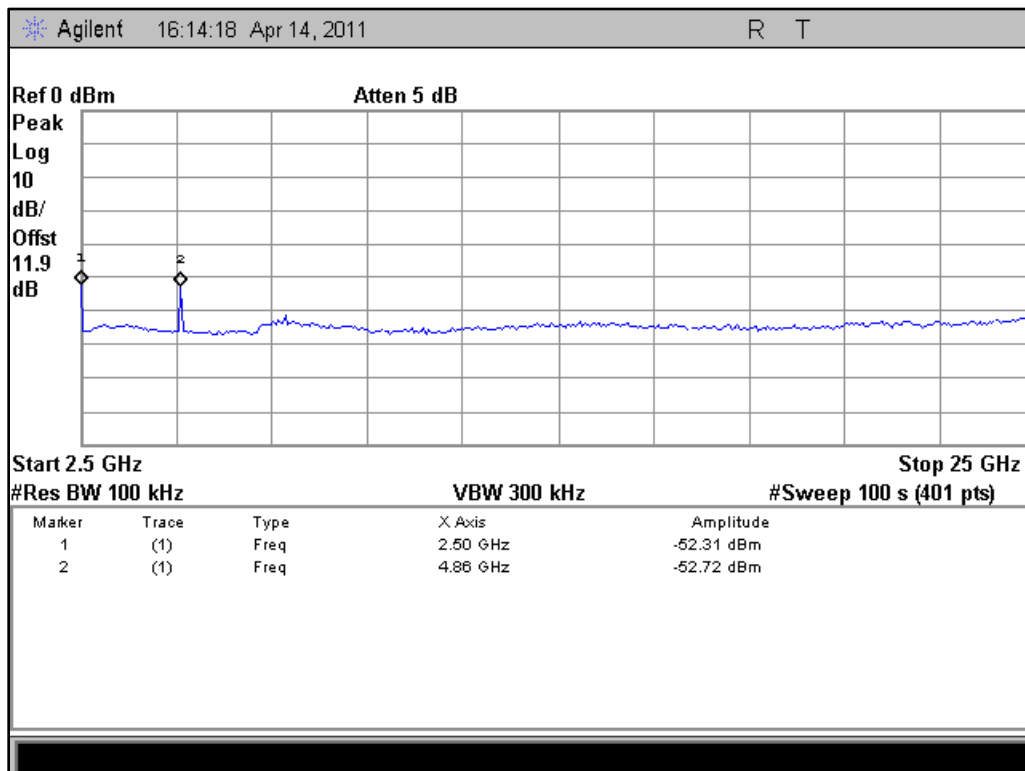
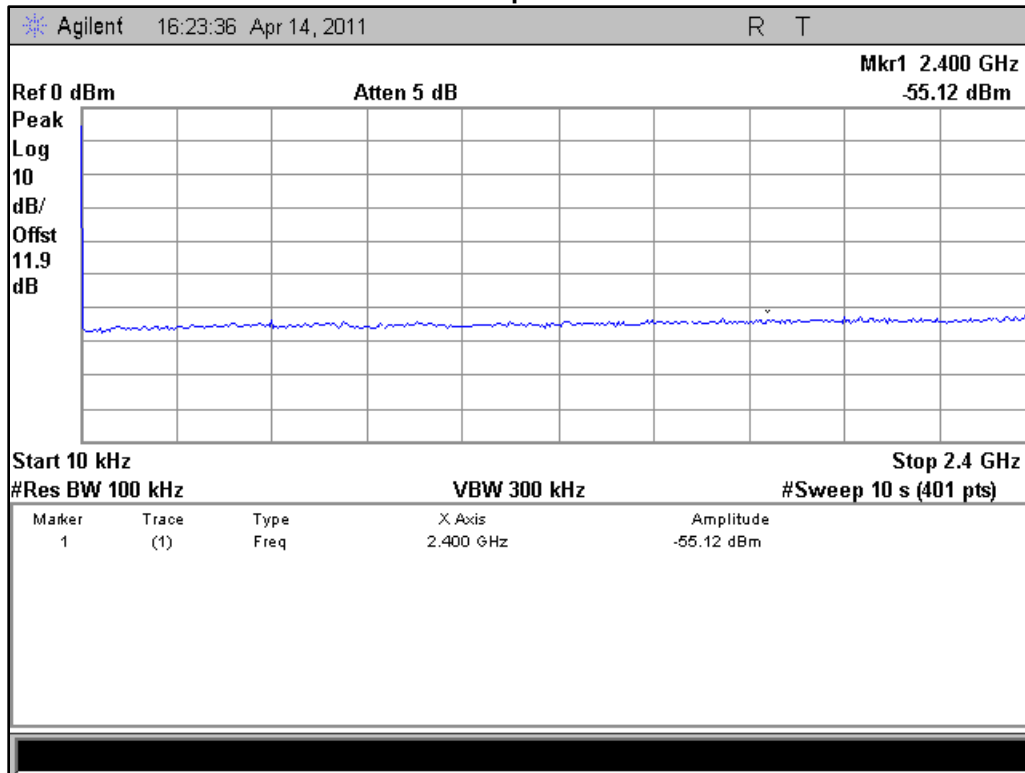


Conducted Spurious Emissions Tuned Freq = 2412 MHz



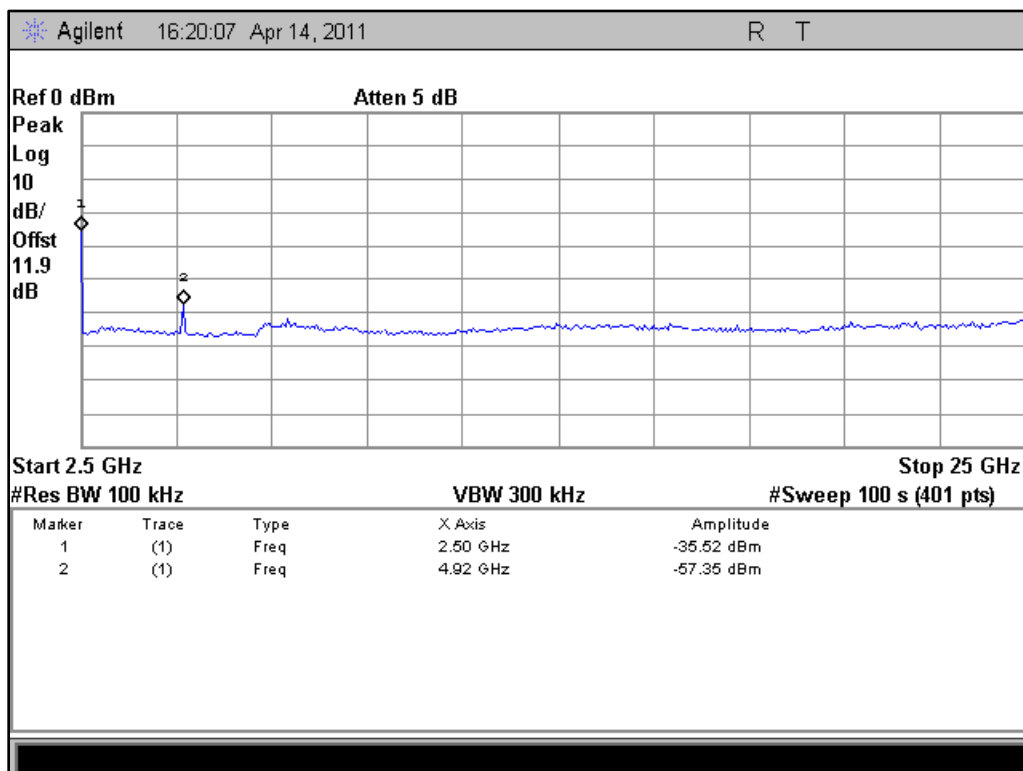
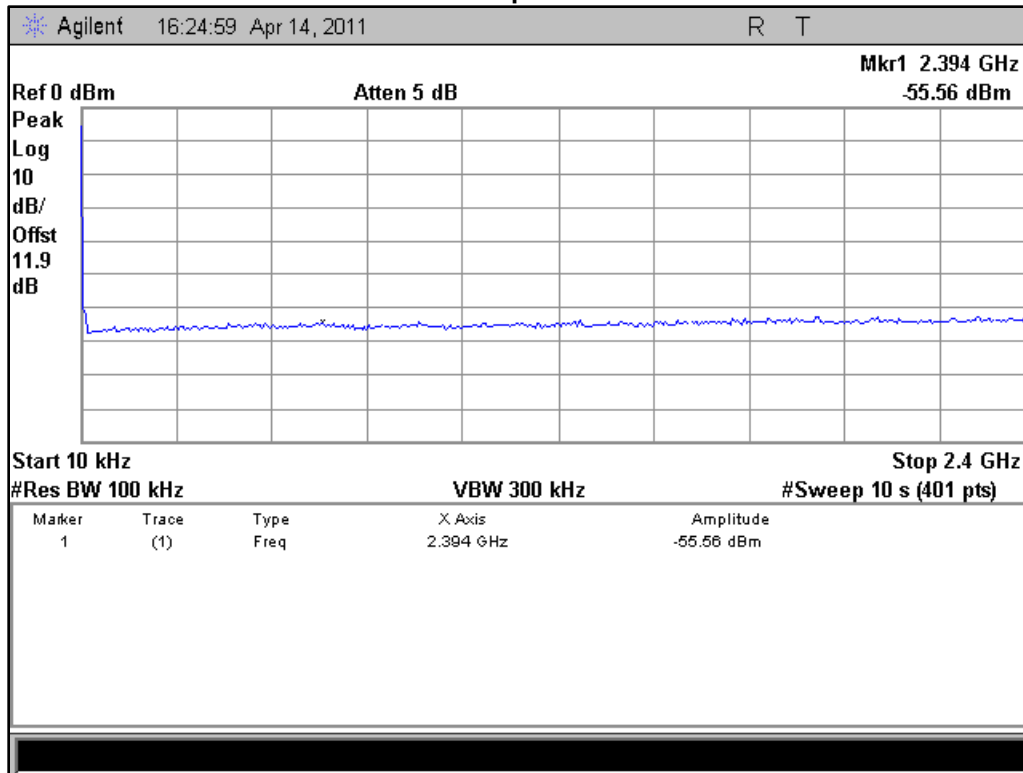


Conducted Spurious Emissions Tuned Freq = 2437 MHz





Conducted Spurious Emissions Tuned Freq = 2462 MHz





Radiated Spurious Emissions

Name of Test: Radiated Spurious Emissions

Specification: 15.247(d), 15.209(a), 15.205

Engineer: Greg Corbin

Test Equipment Utilized: i00028, i00103, i00177, i00267, i00331, i00385

Test Date: 3/25/2011

Test Procedure for Radiated Spurious Emissions: 30 – 1000 MHz

The EUT was tested in an Open Area Test Site (OATS) set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360° with the antennas in both the vertical and horizontal orientation and raised from 1 to 4 meters to ensure the TX signal levels were maximized. All emissions from 30 MHz to 1 GHz were examined.

Measured Level includes antenna and receive cable correction factors.

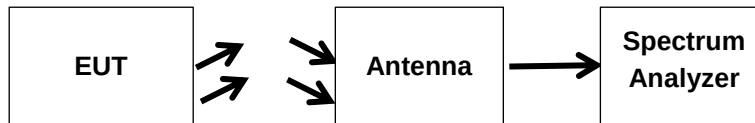
Correction factors were input into the spectrum analyzer before recording "Measured Level".

RBW = 100 KHz,

VBW = 300 KHz

Detector – Quasi Peak

Test Setup



Radiated Spurious Emissions Test Data: 30 MHz – 1 GHz Antenna = ANT-FP

Frequency MHz	Measured Level dBuV	Limit dBuV	Margin dB	Antenna Polarity H or V
39.999	35.5	40	-4.5	V
49.156	38.9	40	-1.1	V
73.730	38.1	40	-1.9	V
240.030	37.1	46	-8.9	V
355.986	17.9	46	-28.1	V
800.082	30	46	-16	H



Test Procedure for Radiated Spurious Emissions above 1 GHz

The EUT was tested in a semi anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Spurious Emissions. The antenna, band reject filter, amplifier and cable correction factors were input into the spectrum analyzer before recording the Measured Level to ensure accurate readings. The spectrum for each tuned frequency was examined to the 10th harmonic.

Test Setup



Detector Settings	RBW	VBW	Span
Peak	1 MHz	3 MHz	As necessary
Average	1 MHz	3 MHz	As necessary

Radiated Spurious Emissions Antenna = RA-5

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Level (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4284	51.9	74.0	51.4	54.0	Pass
2412	7236	42.7	74.0	39.2	54.0	Pass
2412	9648	48.5	74.0	45.8	54.0	Pass
2437	4874	52.2	74.0	51.7	54.0	Pass
2437	7311	43.3	74.0	40.2	54.0	Pass
2437	9748	48.7	74.0	44.2	54.0	Pass
2462	4924	45.0	74.0	39.6	54.0	Pass
2462	7386	44.6	74.0	41.6	54.0	Pass
2462	9848	50.3	74.0	48.3	54.0	Pass



Radiated Spurious Emissions
Antenna = RA-7

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Level (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4284	52.6	74.0	52.4	54.0	Pass
2412	7236	44.1	74.0	40.6	54.0	Pass
2412	9648	49.0	74.0	46.1	54.0	Pass
2437	4874	54.5	74.0	53.9	54.0	Pass
2437	7311	44.9	74.0	41.8	54.0	Pass
2437	9748	51.6	74.0	45.3	54.0	Pass
2462	4924	44.6	74.0	43.3	54.0	Pass
2462	7386	45.6	74.0	43.4	54.0	Pass
2462	9848	50.4	74.0	47.1	54.0	Pass

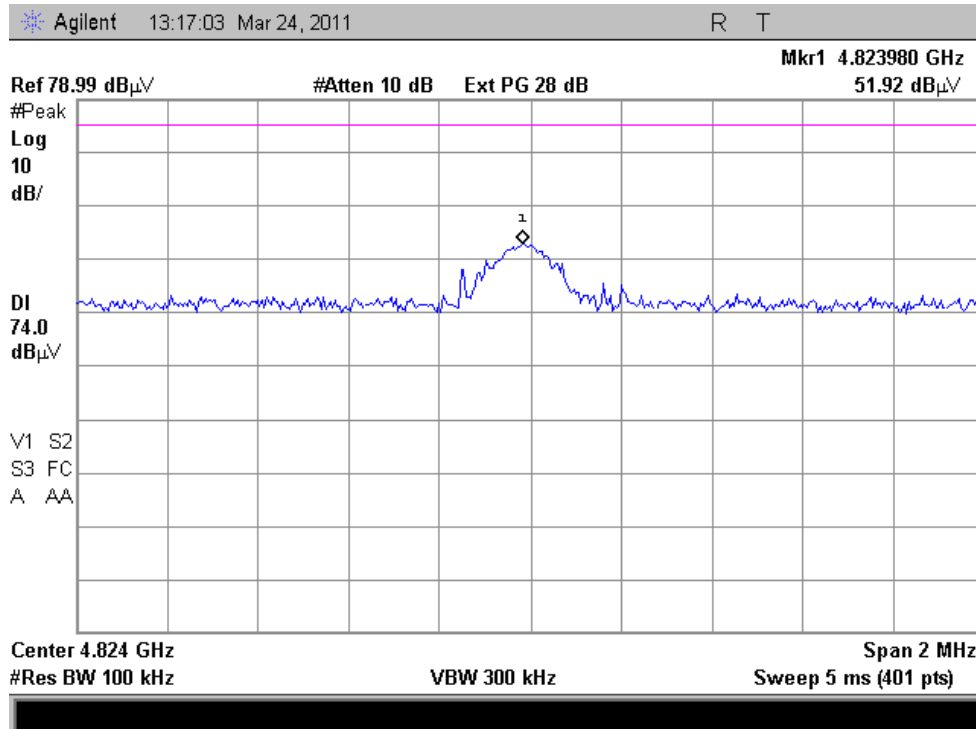
Radiated Spurious Emissions
Antenna = ANT-FP

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Level (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Level (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4284	50.7	74.0	50.0	54.0	Pass
2412	7236	44.6	74.0	41.8	54.0	Pass
2412	9648	48.9	74.0	45.7	54.0	Pass
2437	4874	52.4	74.0	53.8	54.0	Pass
2437	7311	43.7	74.0	40.6	54.0	Pass
2437	9748	48.4	74.0	45.7	54.0	Pass
2462	4924	41.5	74.0	39.2	54.0	Pass
2462	7386	44.2	74.0	41.7	54.0	Pass
2462	9848	48.9	74.0	46.2	54.0	Pass

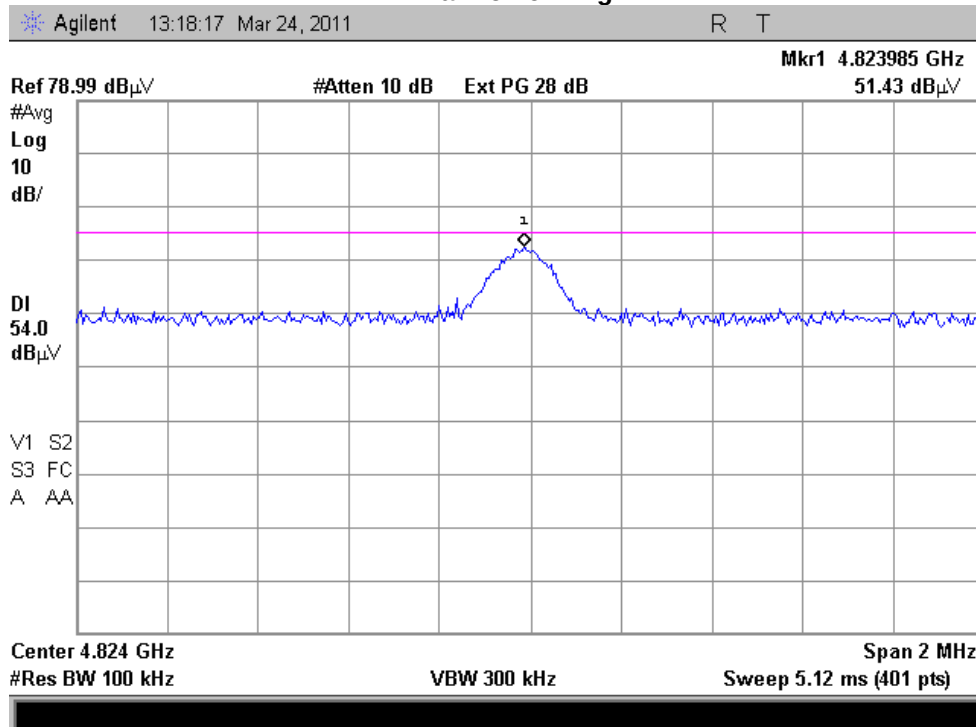
No other emissions were detectable. All emissions were greater than -20 dBc.



Tuned Frequency = 2412 MHz
Ant = RA-5
2nd Harmonic - Peak

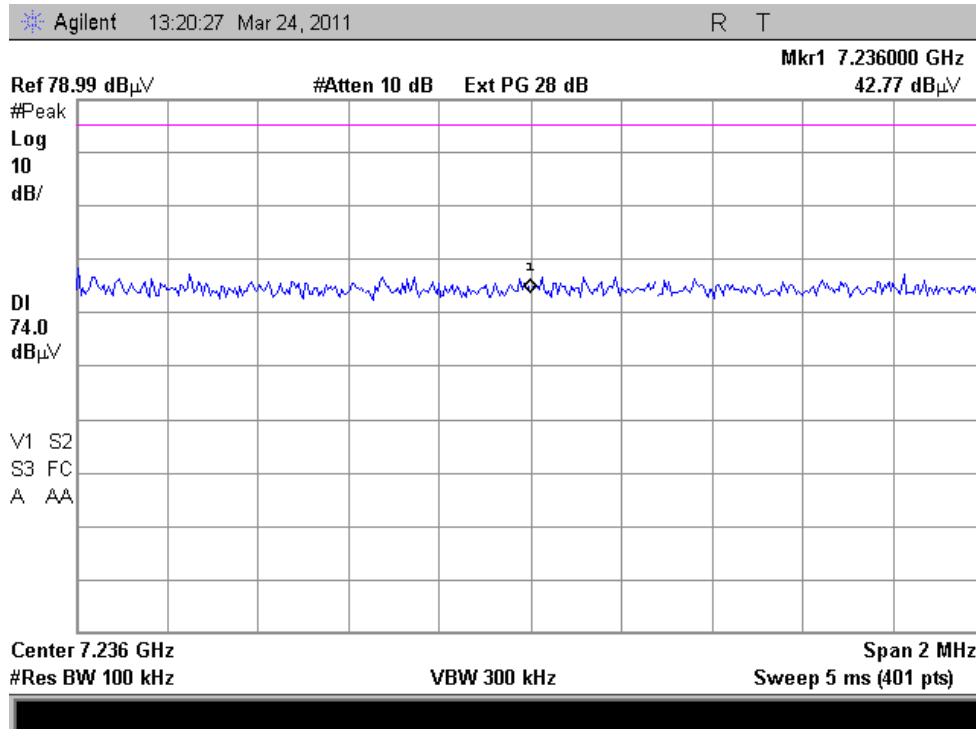


Tuned Frequency = 2412 MHz
Ant = RA-5
2nd Harmonic - Avg

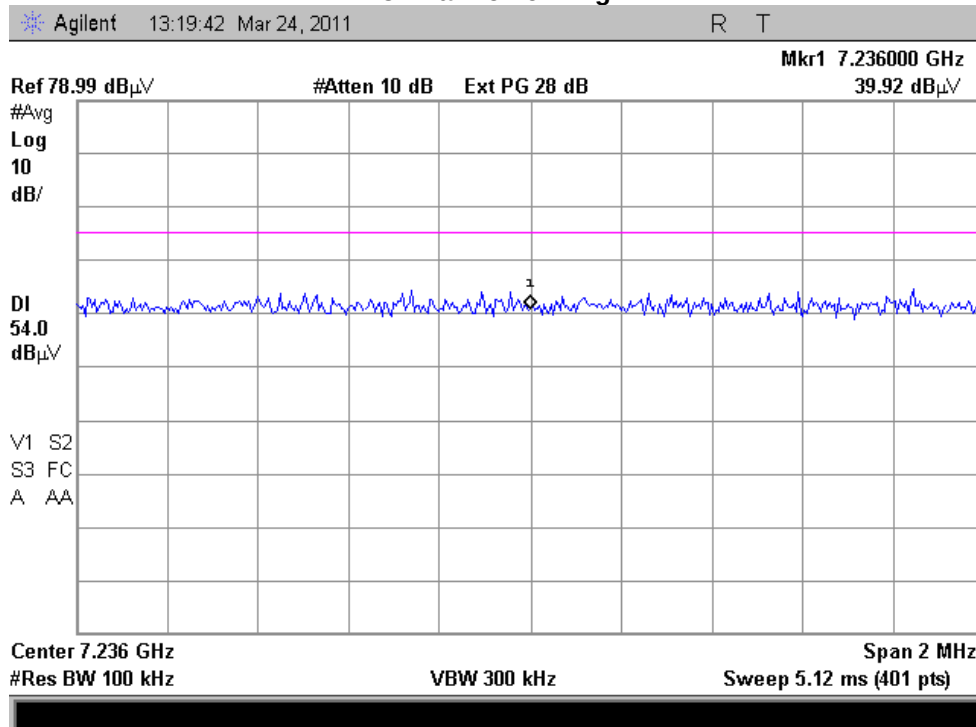




Tuned Frequency = 2412 MHz
Ant = RA-5
3rd Harmonic - Peak

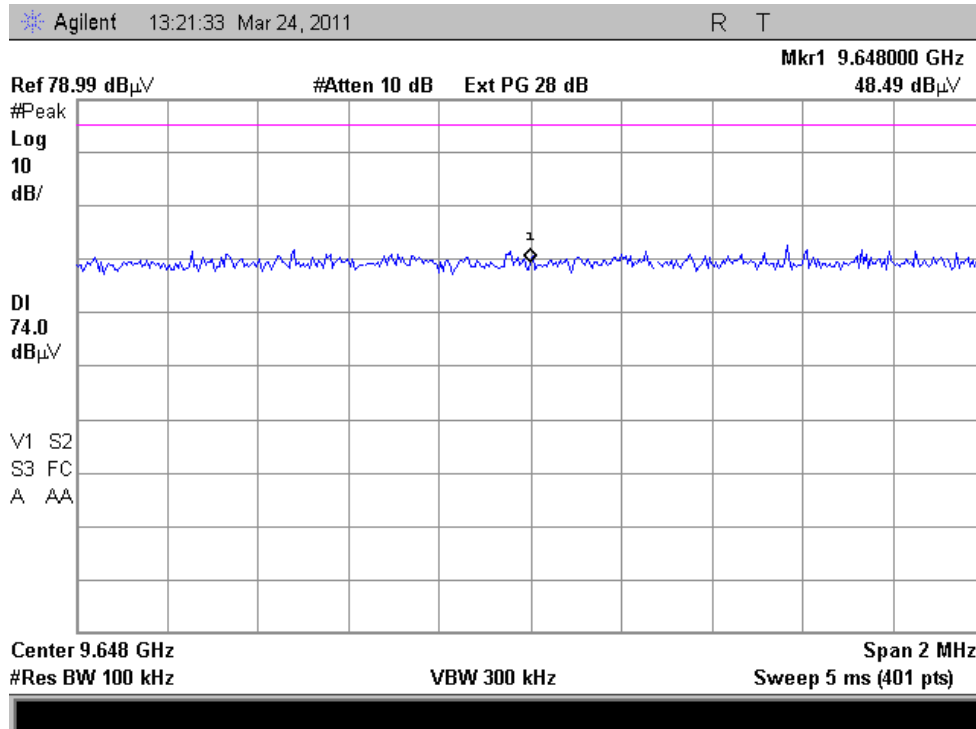


Tuned Frequency = 2412 MHz
Ant = RA-5
3rd Harmonic - Avg

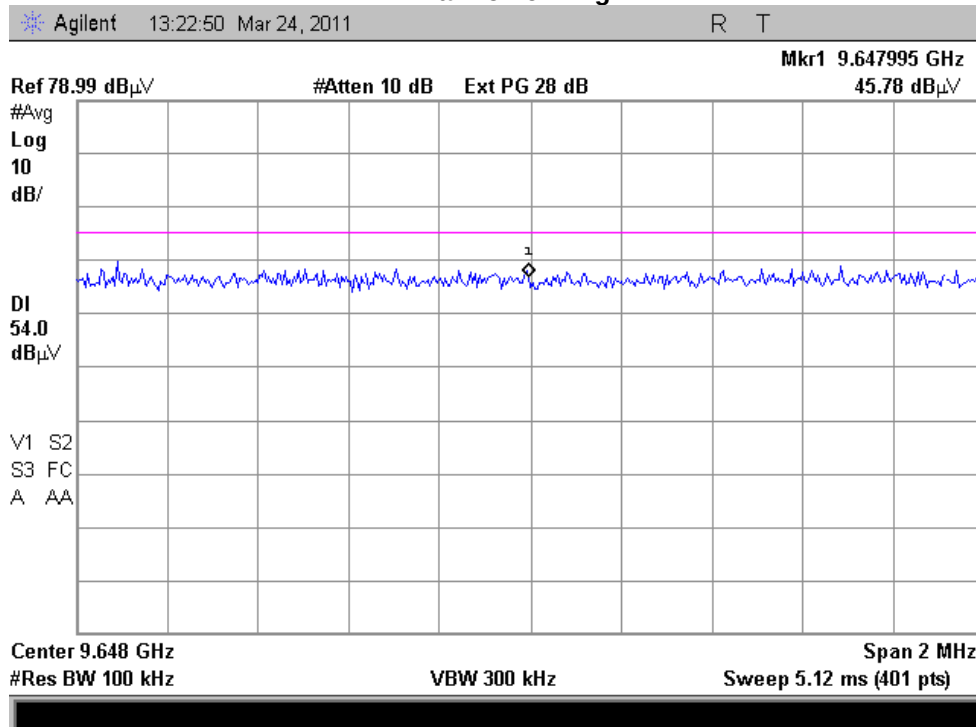




Tuned Frequency = 2412 MHz
Ant = RA-5
4th Harmonic - Peak

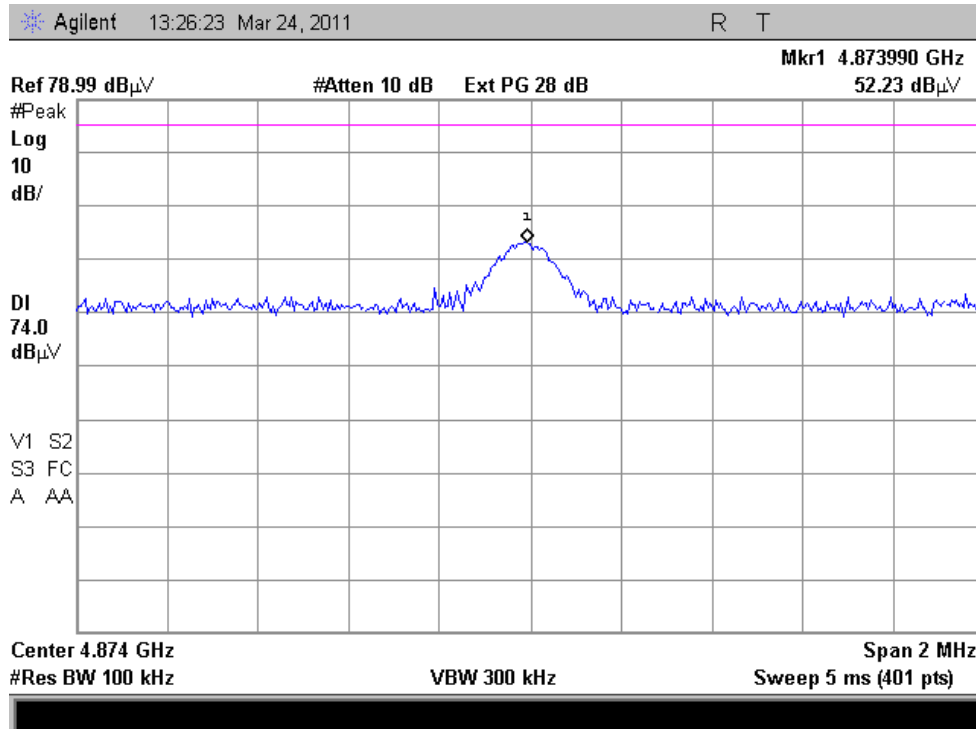


Tuned Frequency = 2412 MHz
Ant = RA-5
4th Harmonic - Avg

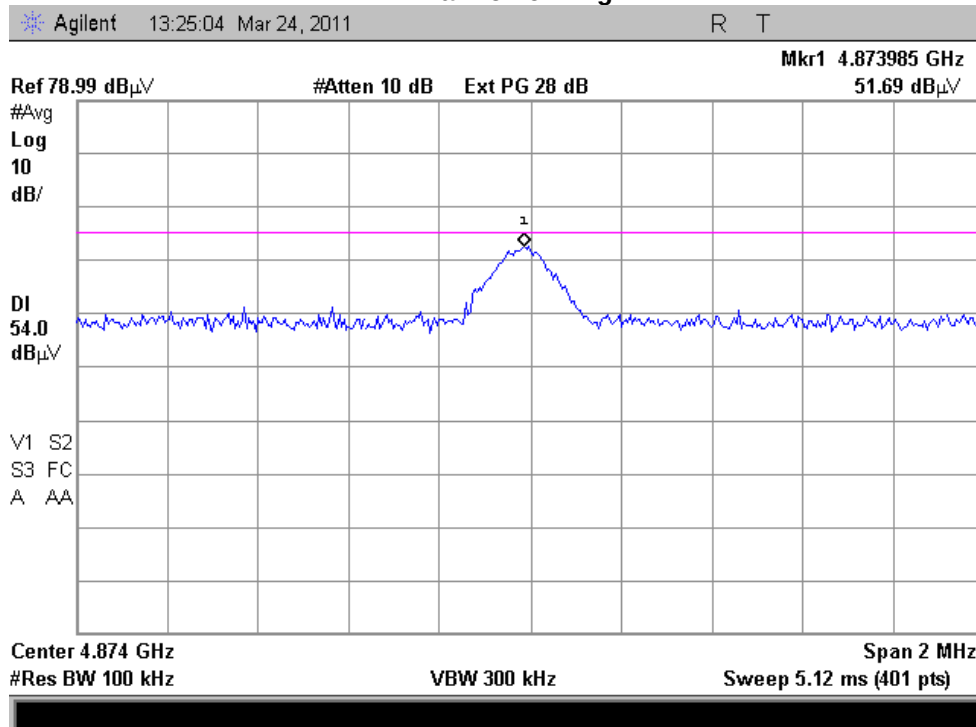




Tuned Frequency = 2437 MHz
Ant = RA-5
2nd Harmonic - Peak

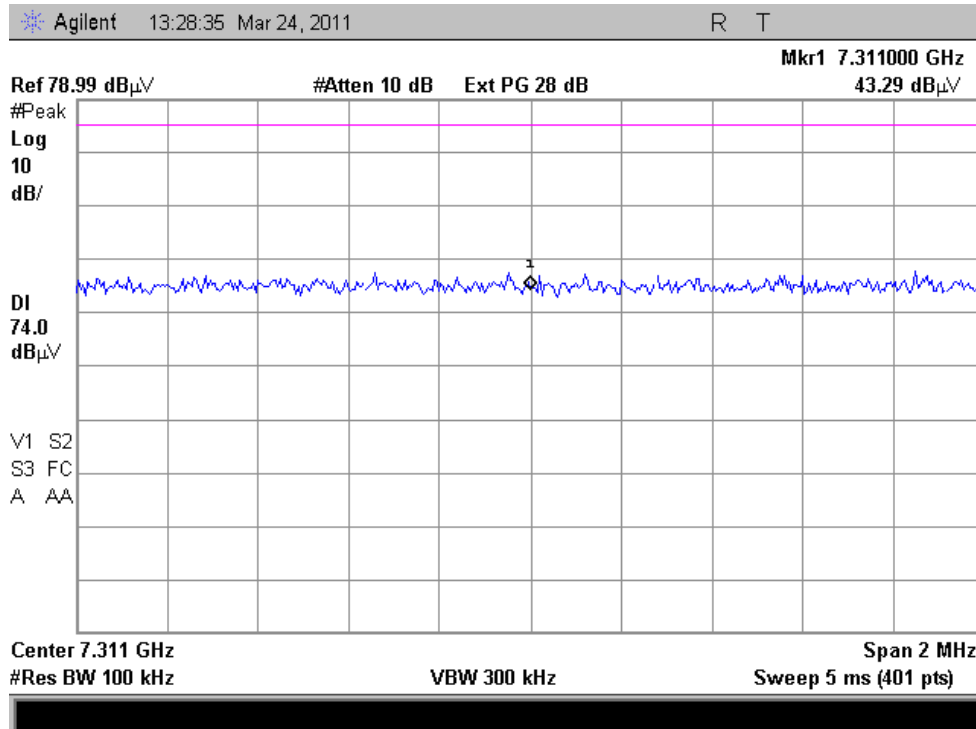


Tuned Frequency = 2437 MHz
Ant = RA-5
2nd Harmonic - Avg

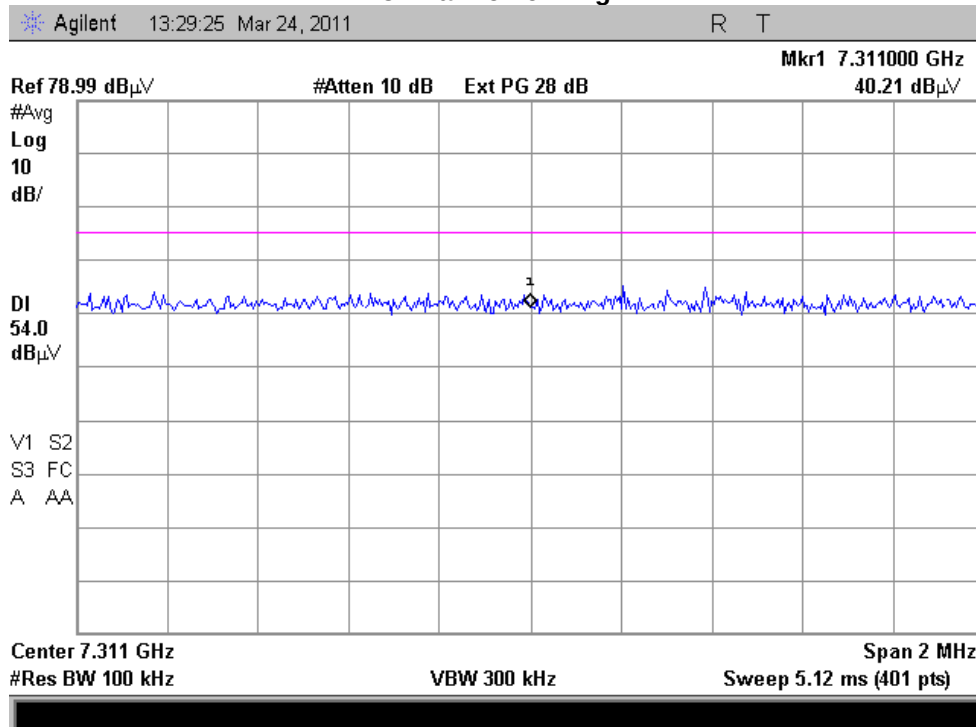




Tuned Frequency = 2437 MHz
Ant = RA-5
3rd Harmonic - Peak

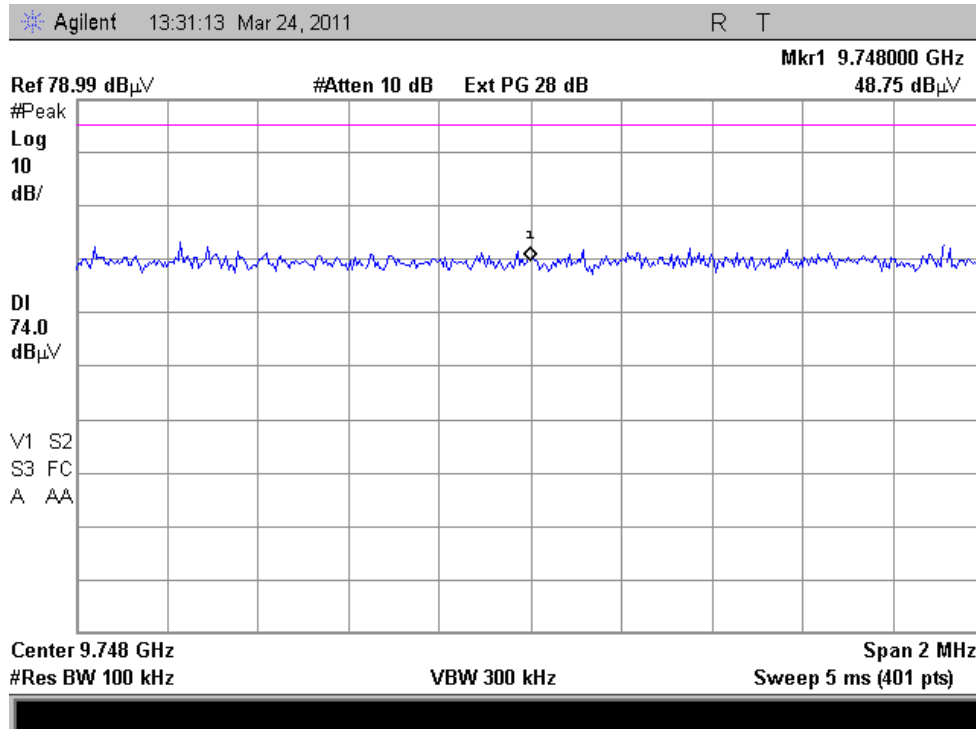


Tuned Frequency = 2437 MHz
Ant = RA-5
3rd Harmonic - Avg

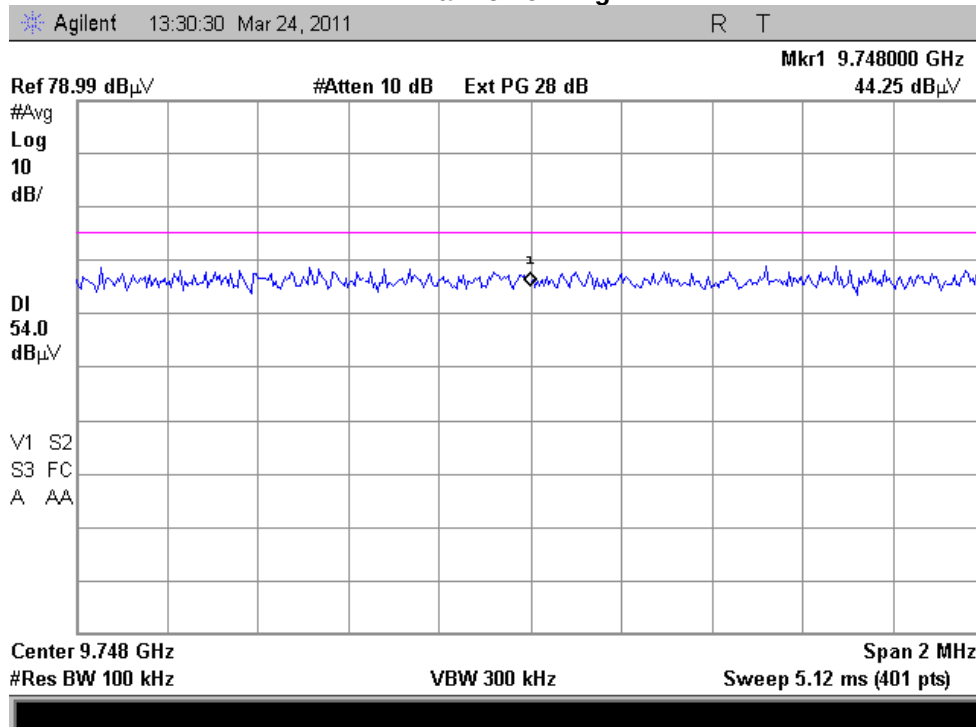




Tuned Frequency = 2437 MHz
Ant = RA-5
4th Harmonic - Peak

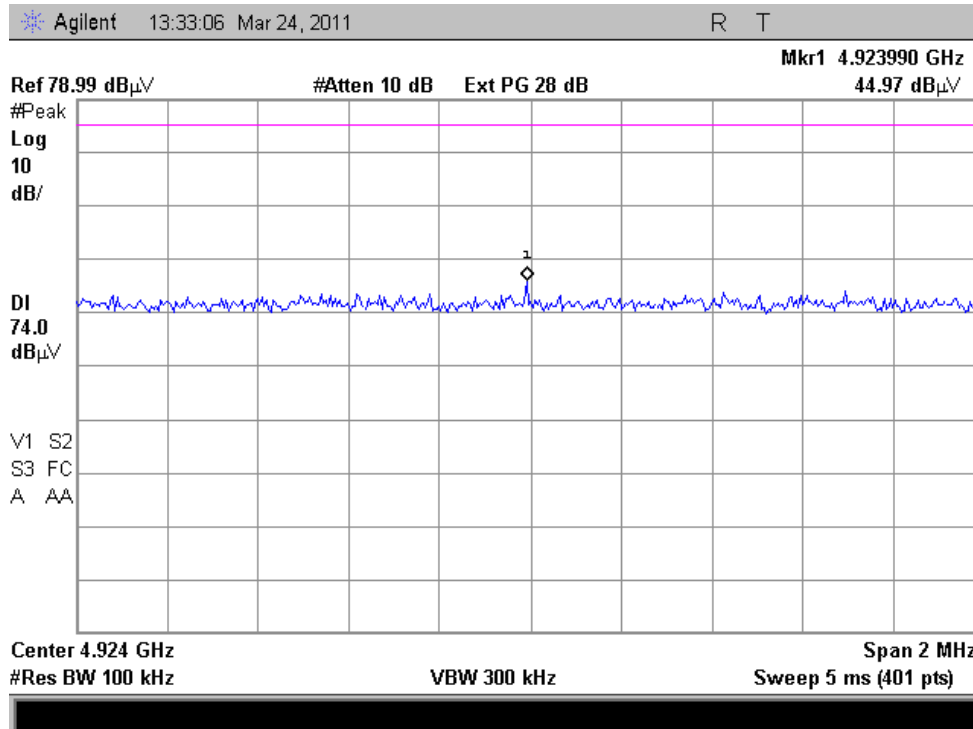


Tuned Frequency = 2437 MHz
Ant = RA-5
4th Harmonic - Avg

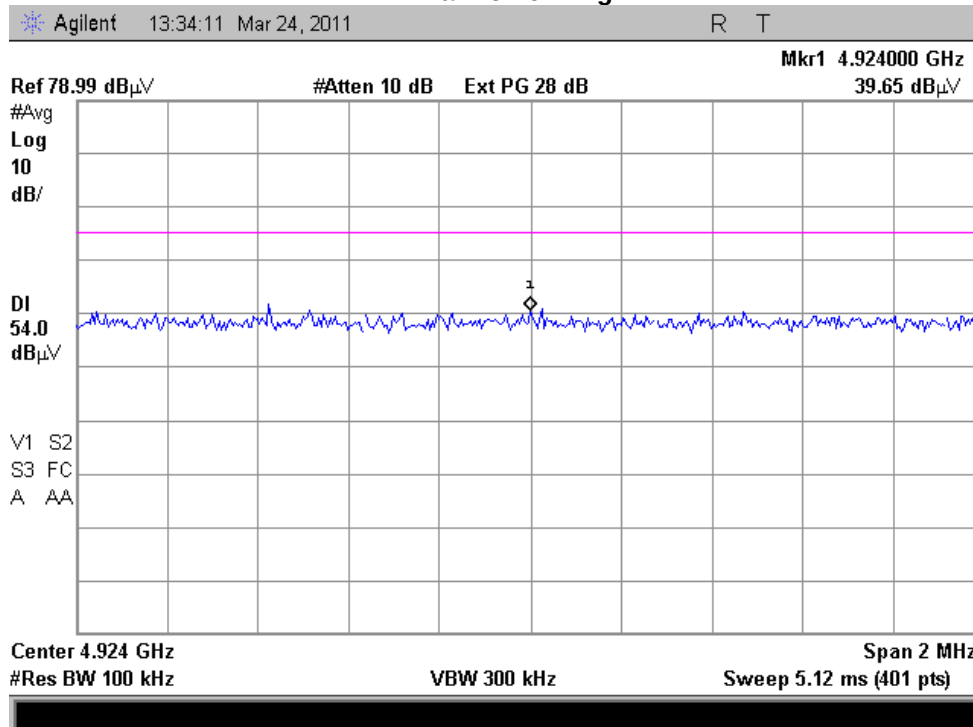




Tuned Frequency = 2462 MHz
Ant = RA-5
2nd Harmonic - Peak

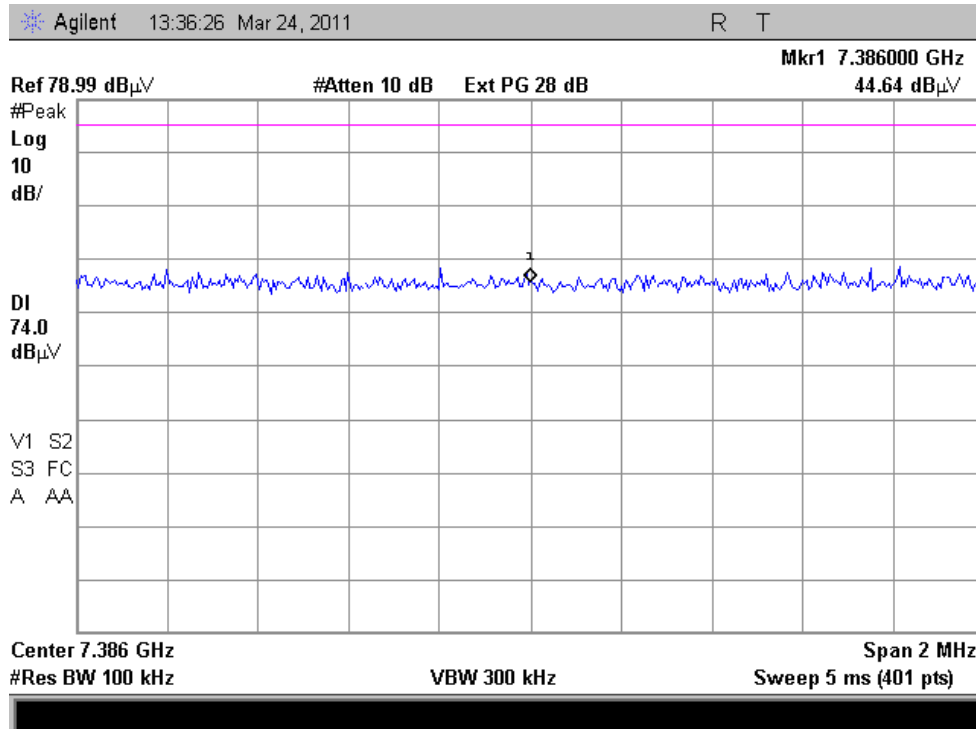


Tuned Frequency = 2462 MHz
Ant = RA-5
2nd Harmonic - Avg

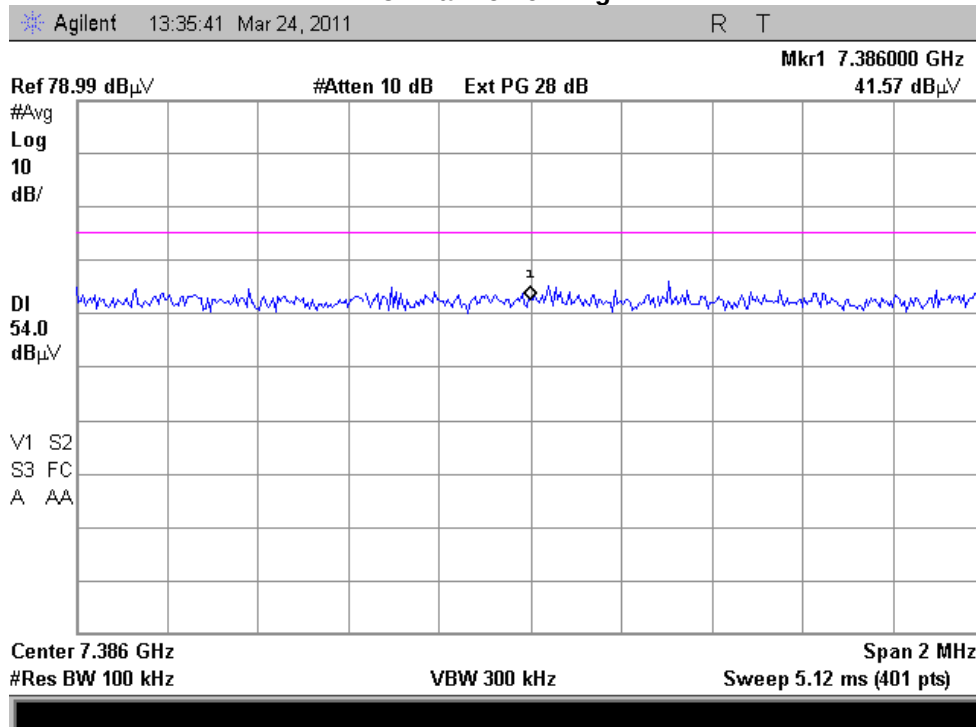




Tuned Frequency = 2462 MHz
Ant = RA-5
3rd Harmonic - Peak

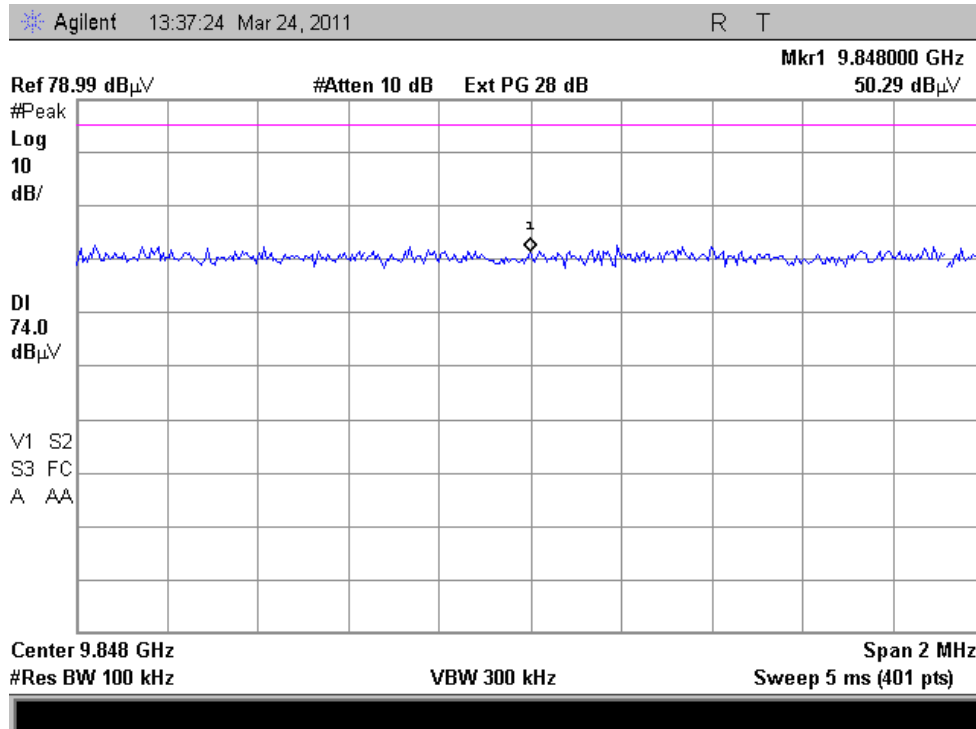


Tuned Frequency = 2462 MHz
Ant = RA-5
3rd Harmonic - Avg

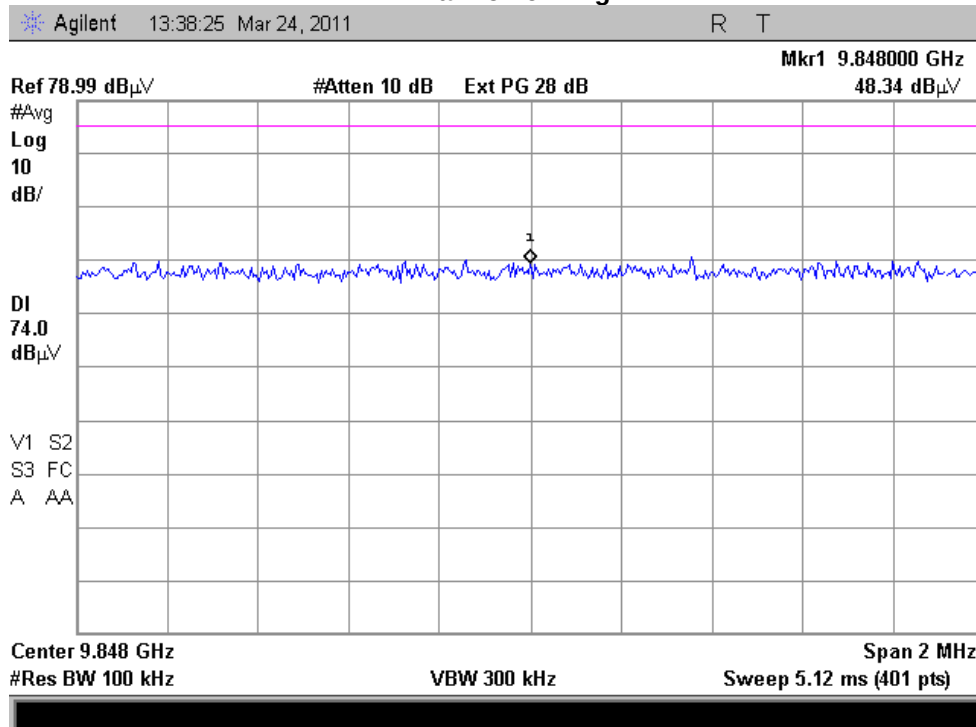




Tuned Frequency = 2462 MHz
Ant = RA-5
4th Harmonic - Peak

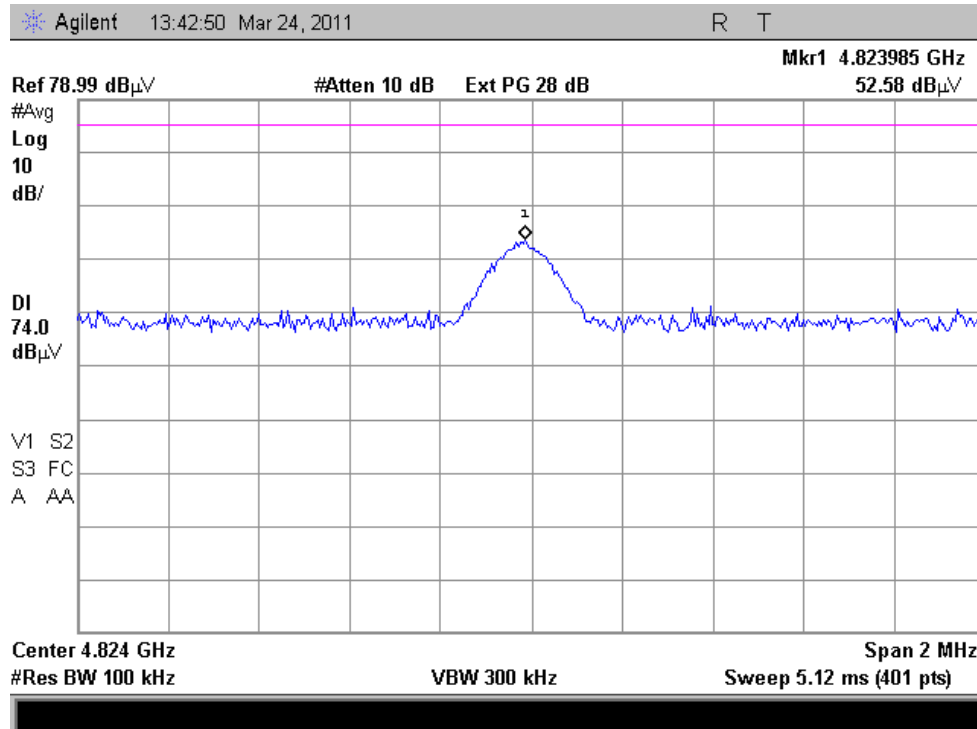


Tuned Frequency = 2462 MHz
Ant = RA-5
4th Harmonic - Avg

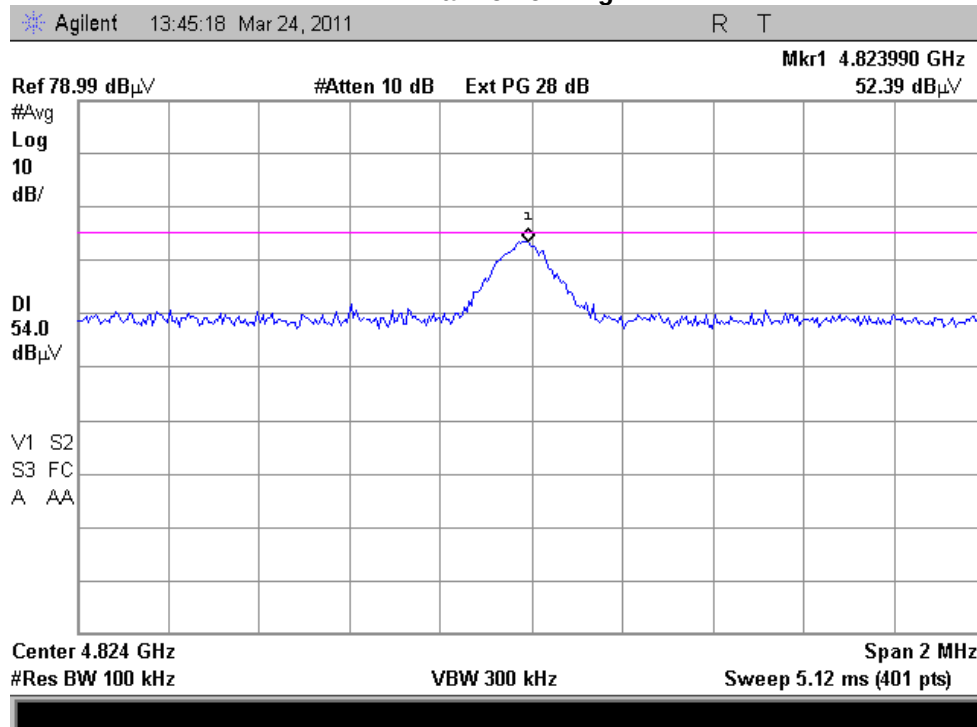




Tuned Frequency = 2412 MHz
Ant = RA-7
2nd Harmonic - Peak

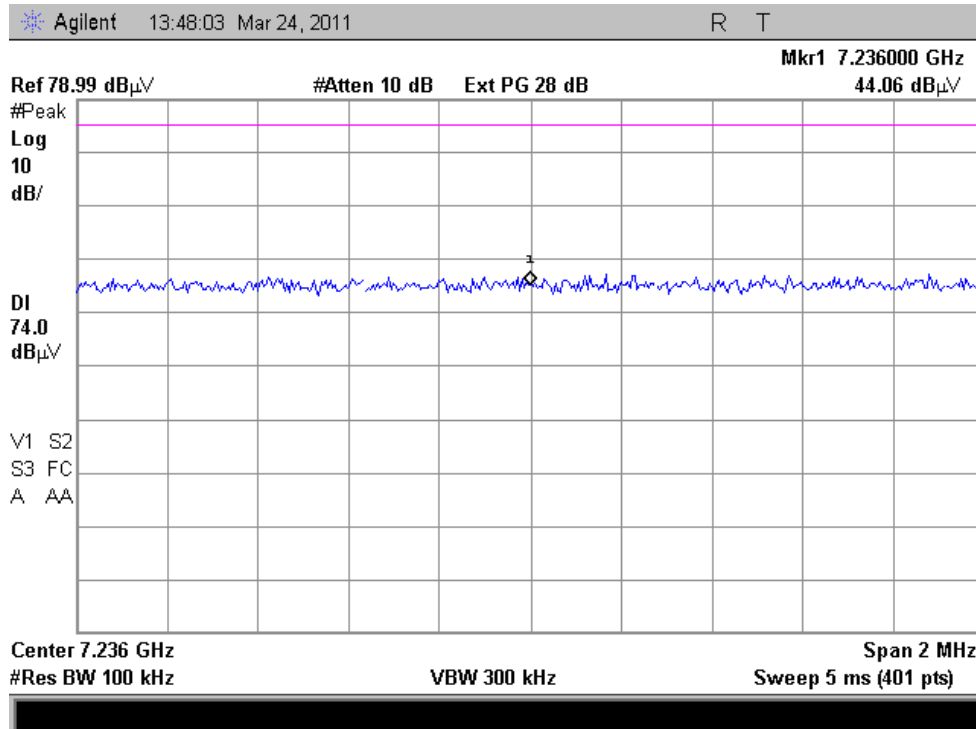


Tuned Frequency = 2412 MHz
Ant = RA-7
2nd Harmonic - Avg

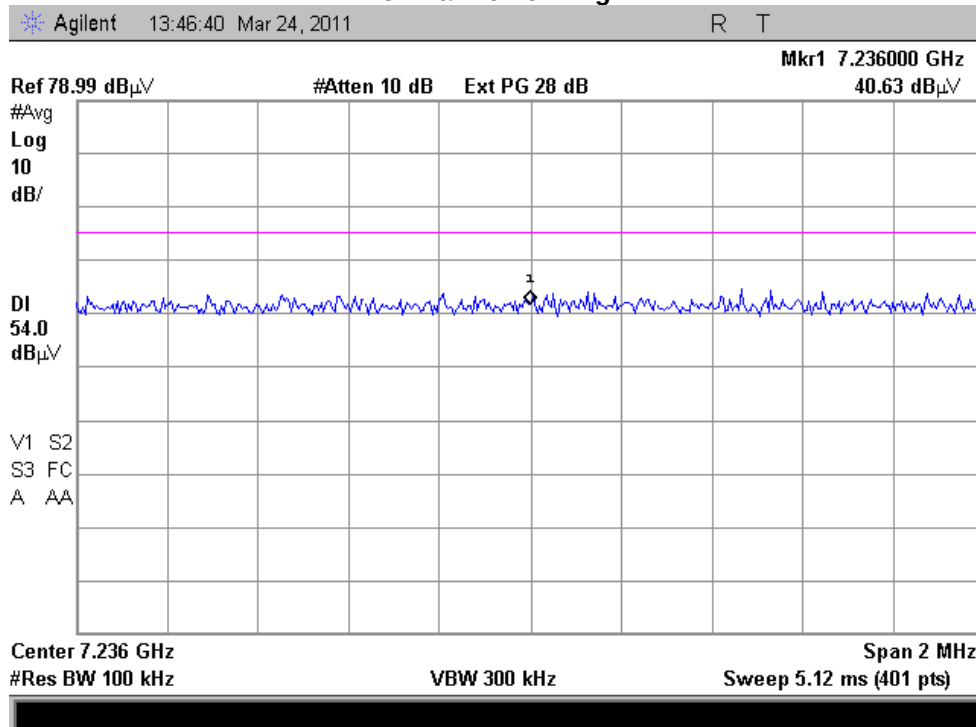




Tuned Frequency = 2412 MHz
Ant = RA-7
3rd Harmonic - Peak

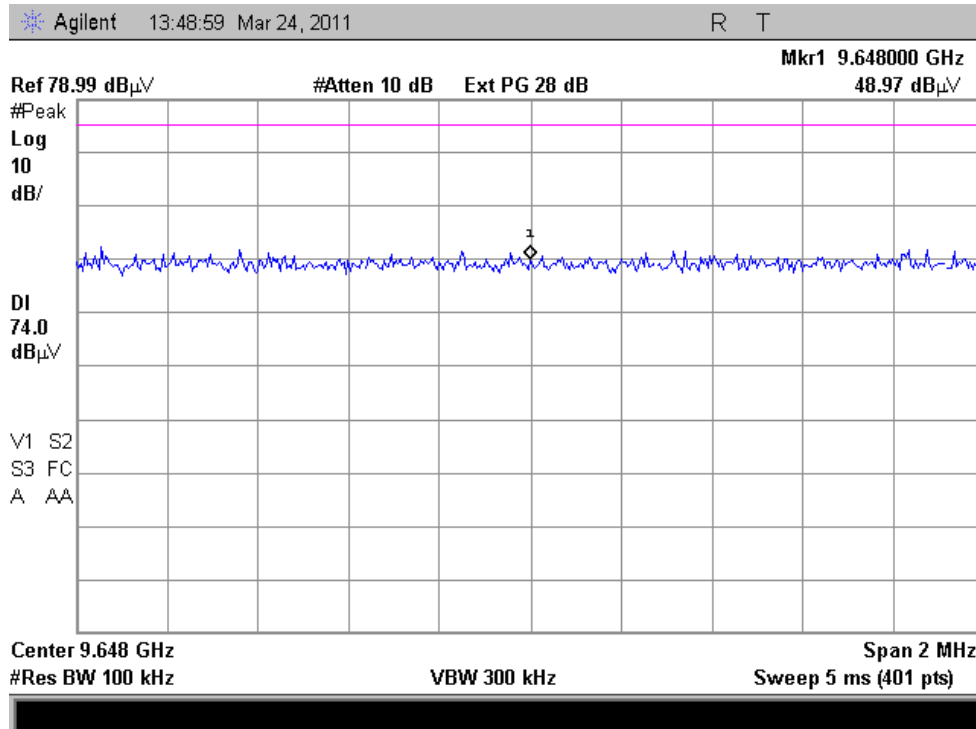


Tuned Frequency = 2412 MHz
Ant = RA-7
3rd Harmonic - Avg

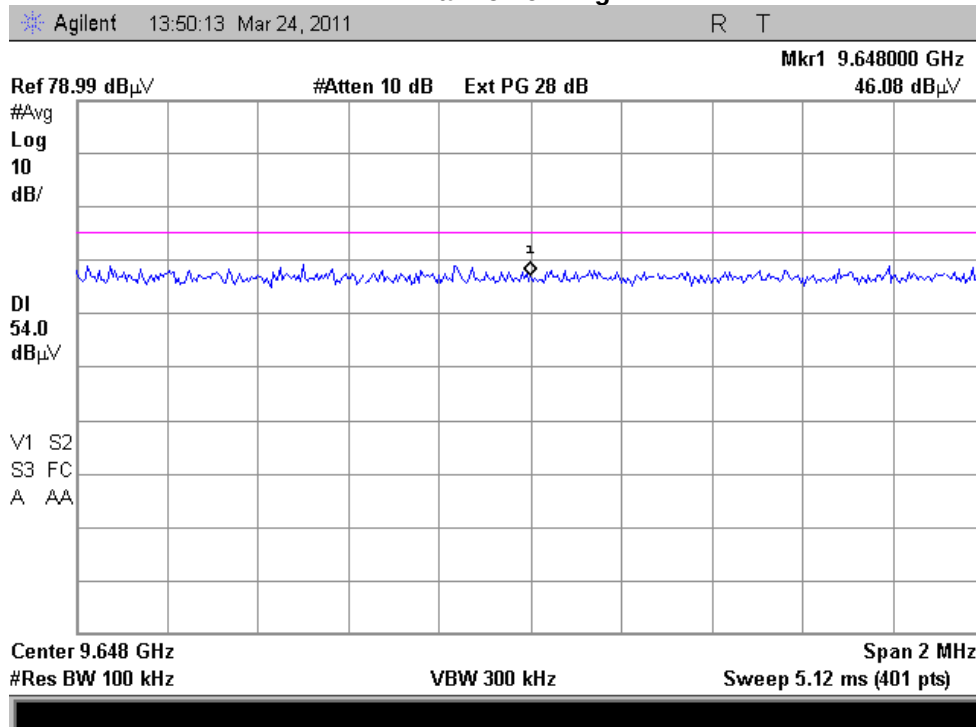




Tuned Frequency = 2412 MHz
Ant = RA-7
4th Harmonic - Peak

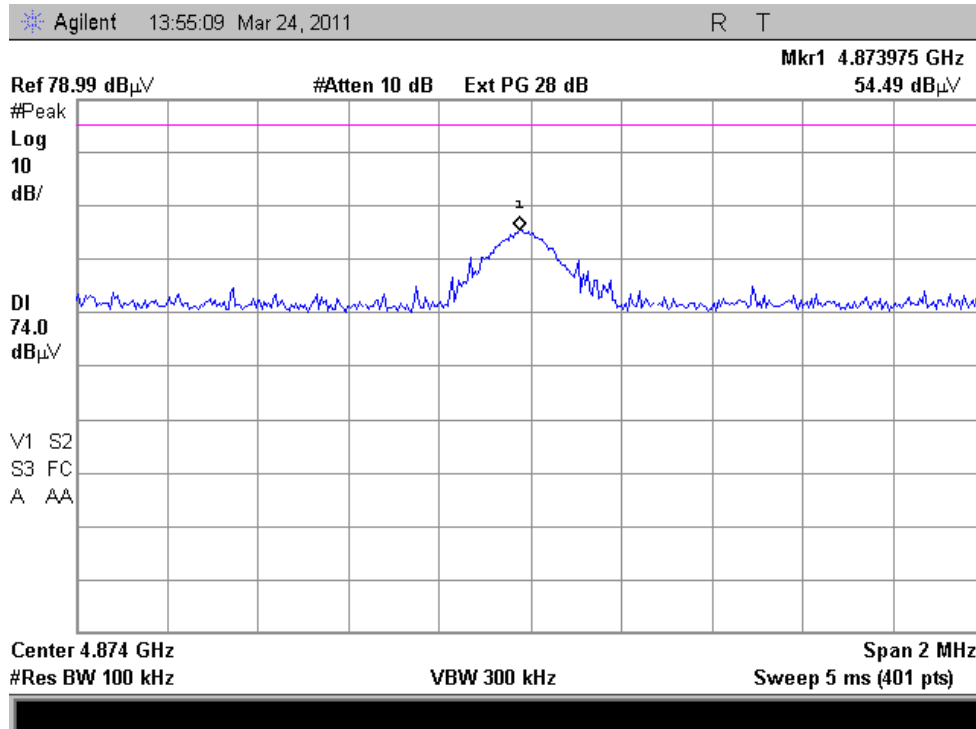


Tuned Frequency = 2412 MHz
Ant = RA-7
4th Harmonic - Avg

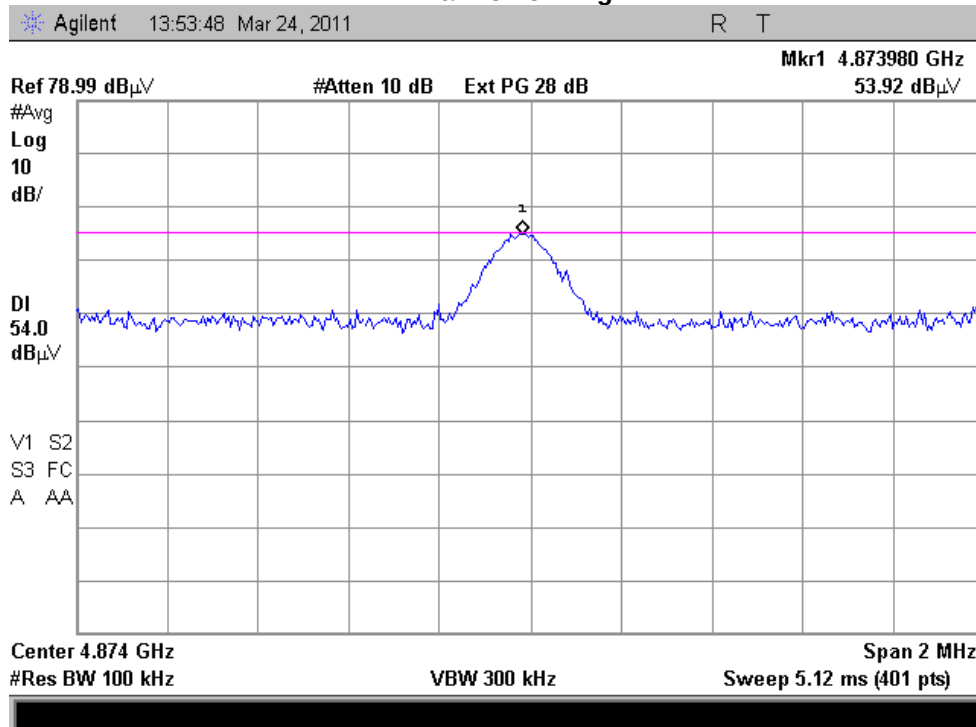




Tuned Frequency = 2437 MHz
Ant = RA-7
2nd Harmonic - Peak

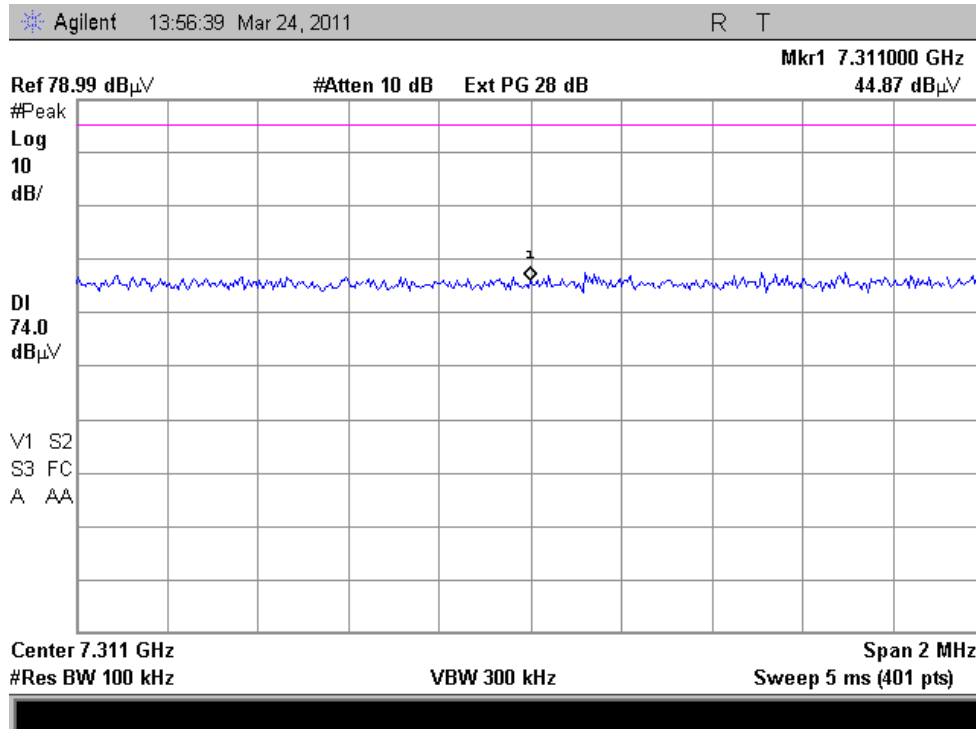


Tuned Frequency = 2437 MHz
Ant = RA-7
2nd Harmonic - Avg

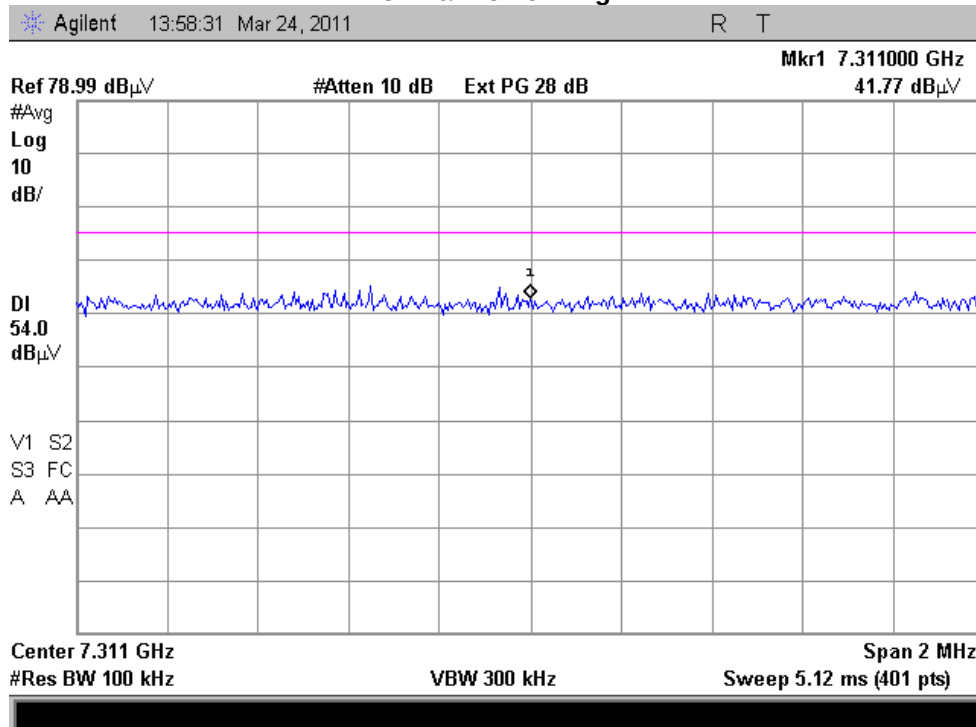




Tuned Frequency = 2437 MHz
Ant = RA-7
3rd Harmonic - Peak

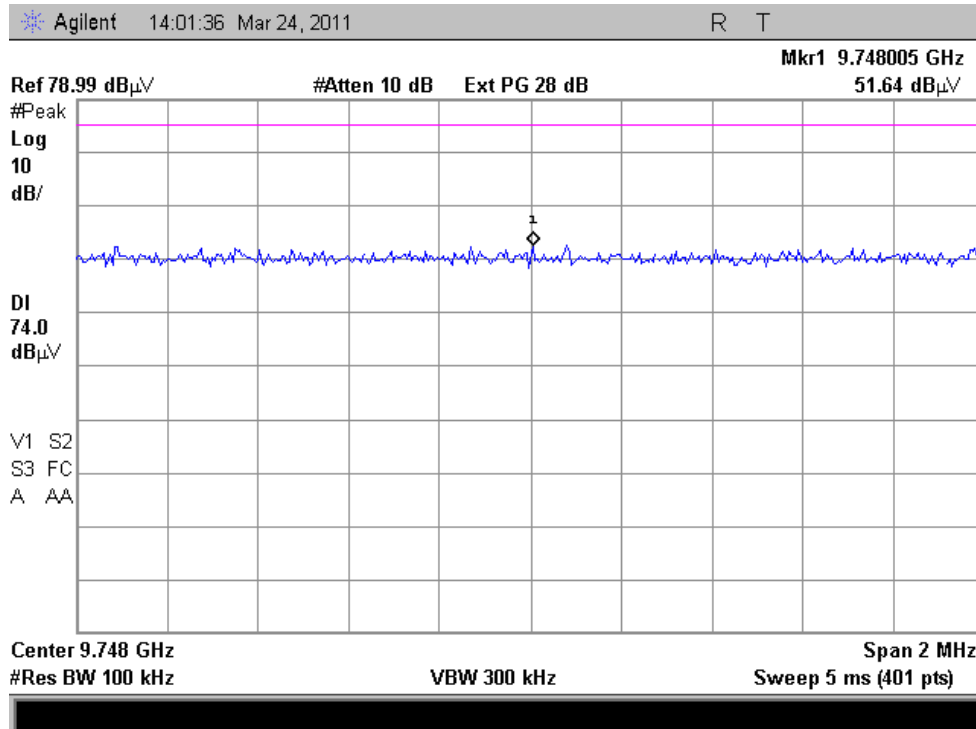


Tuned Frequency = 2437 MHz
Ant = RA-7
3rd Harmonic - Avg

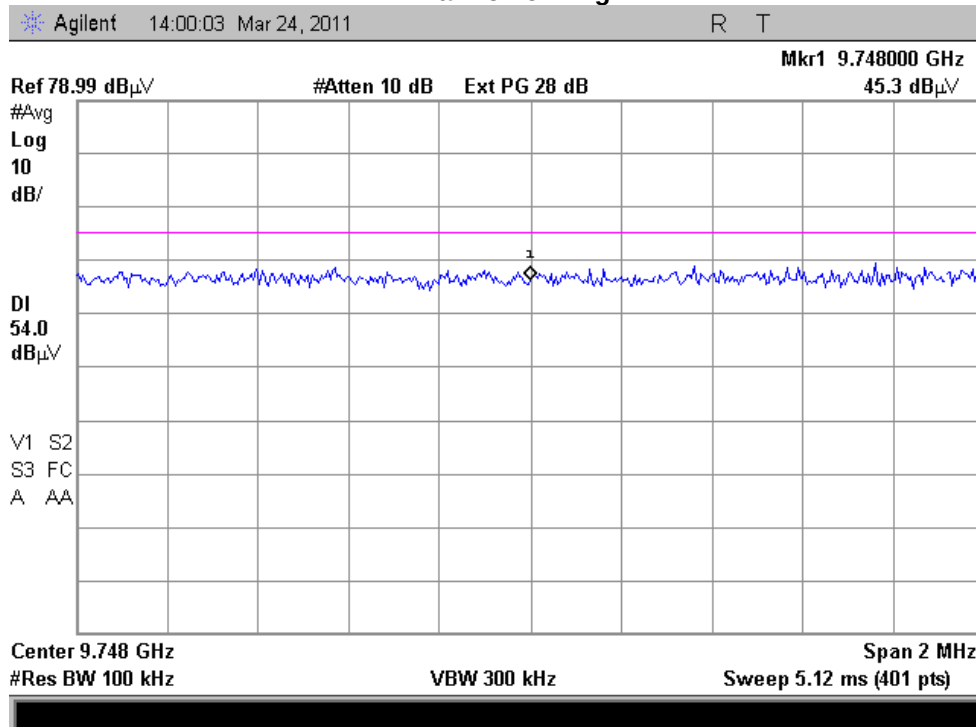




Tuned Frequency = 2437 MHz
Ant = RA-7
4th Harmonic - Peak

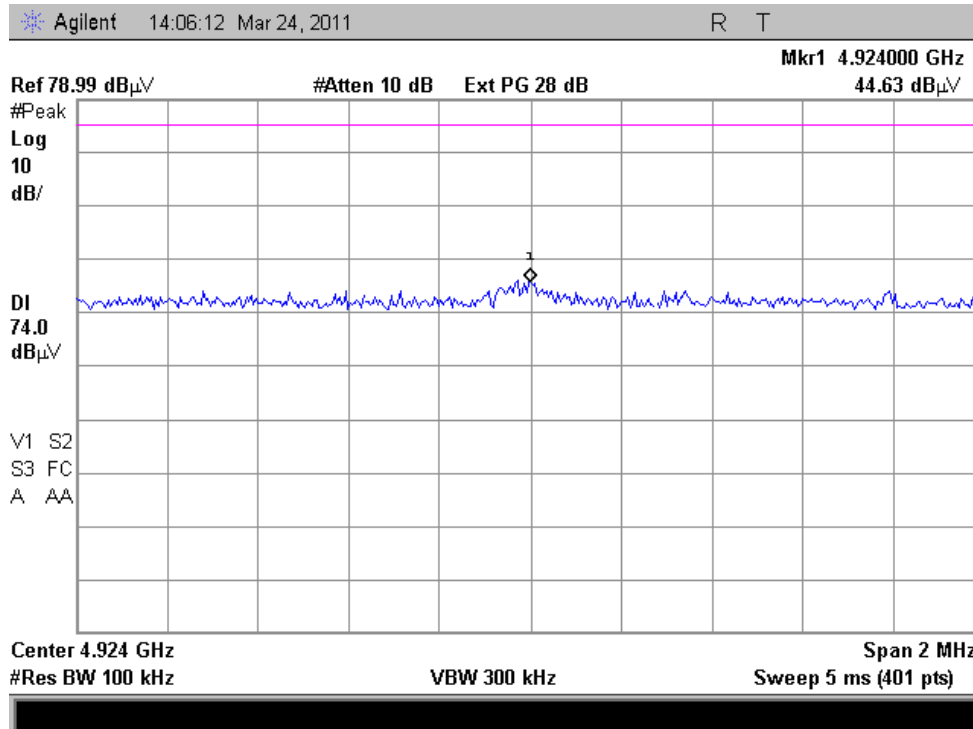


Tuned Frequency = 2437 MHz
Ant = RA-7
4th Harmonic - Avg

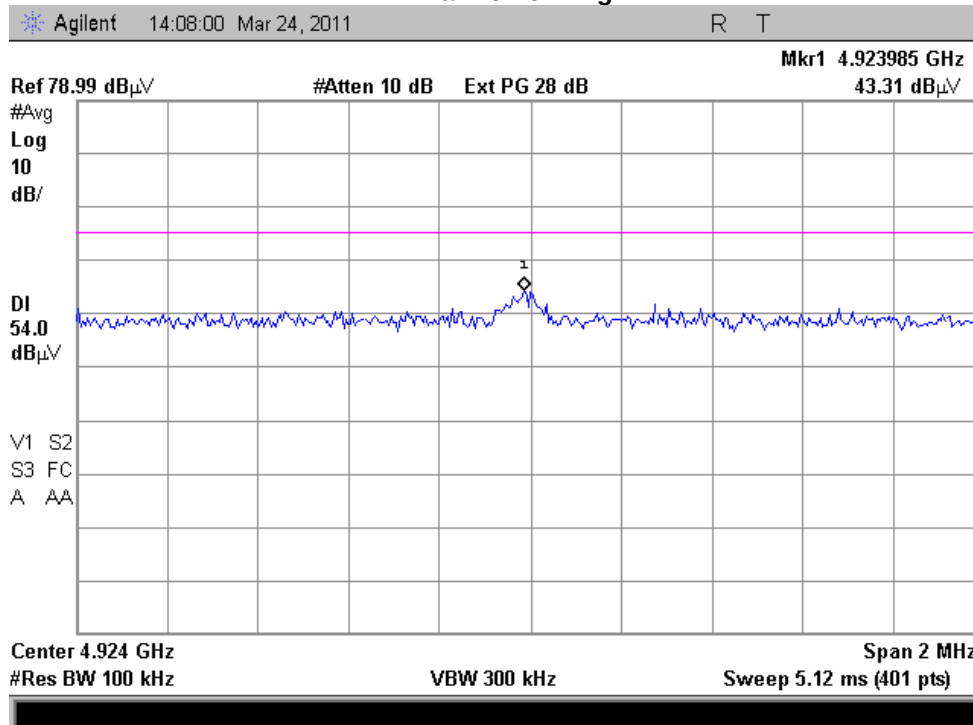




Tuned Frequency = 2462 MHz
Ant = RA-7
2nd Harmonic - Peak

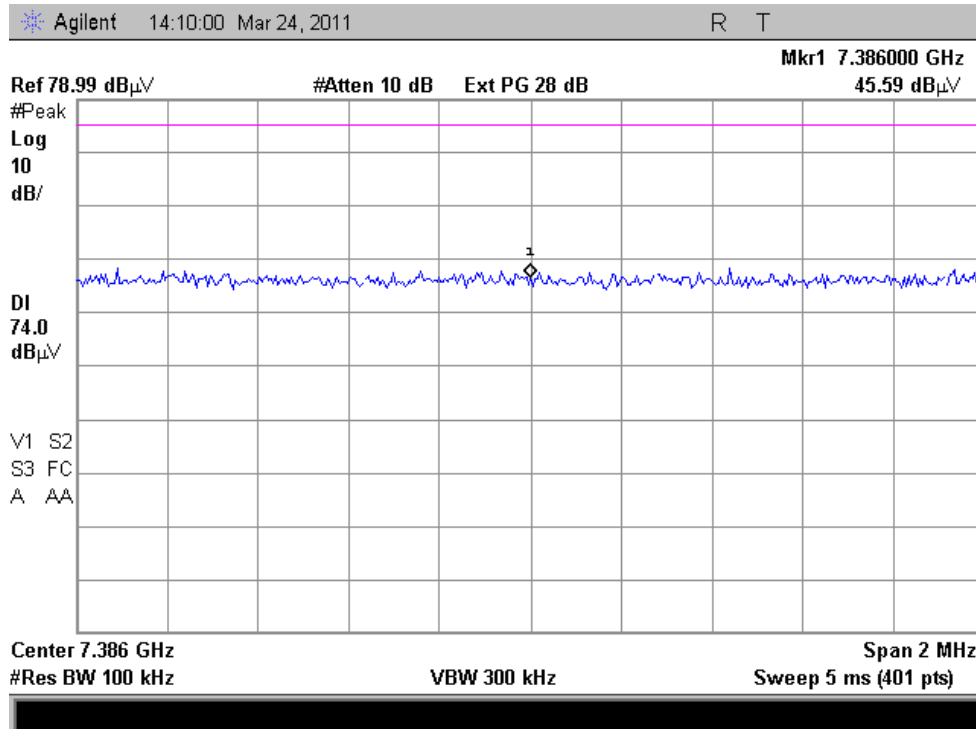


Tuned Frequency = 2462 MHz
Ant = RA-7
2nd Harmonic - Avg

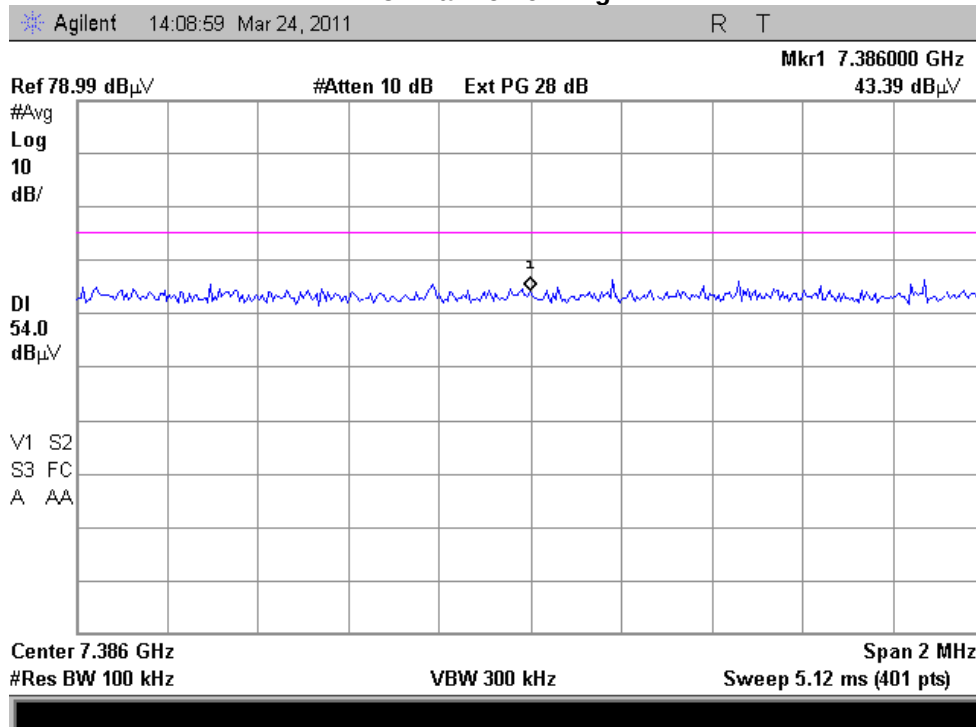




Tuned Frequency = 2462 MHz
Ant = RA-7
3rd Harmonic - Peak

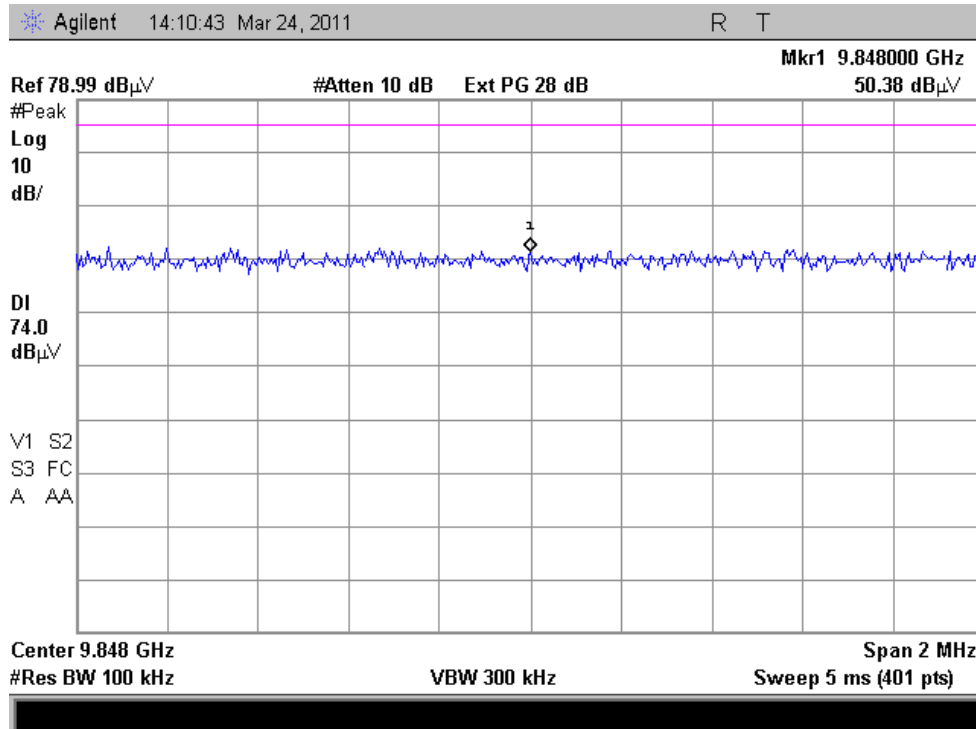


Tuned Frequency = 2462 MHz
Ant = RA-7
3rd Harmonic - Avg

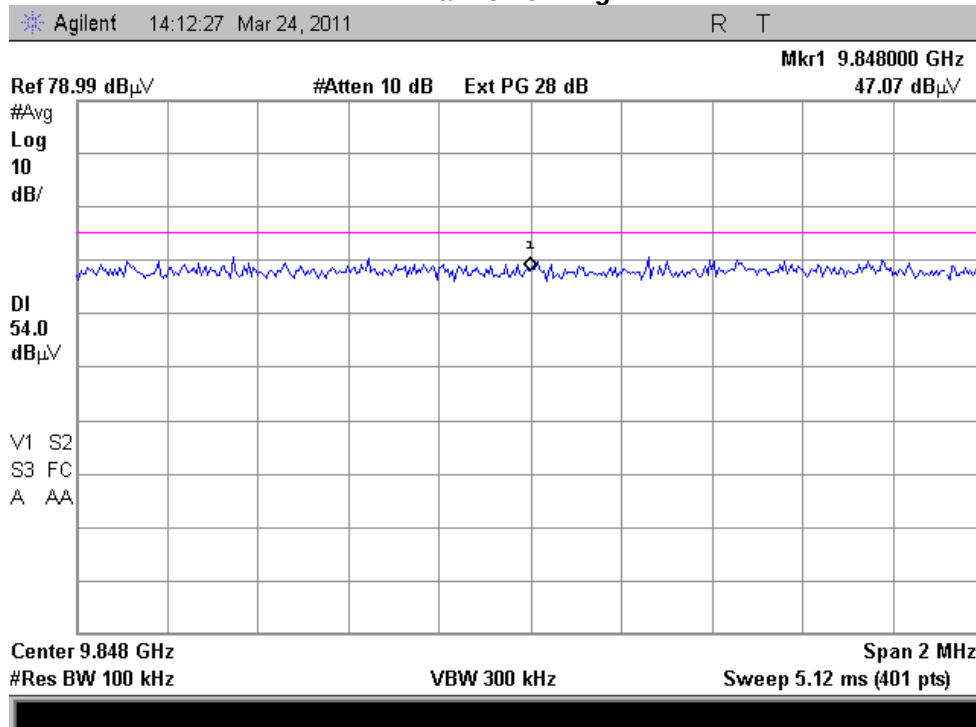




Tuned Frequency = 2462 MHz
Ant = RA-7
4th Harmonic - Peak

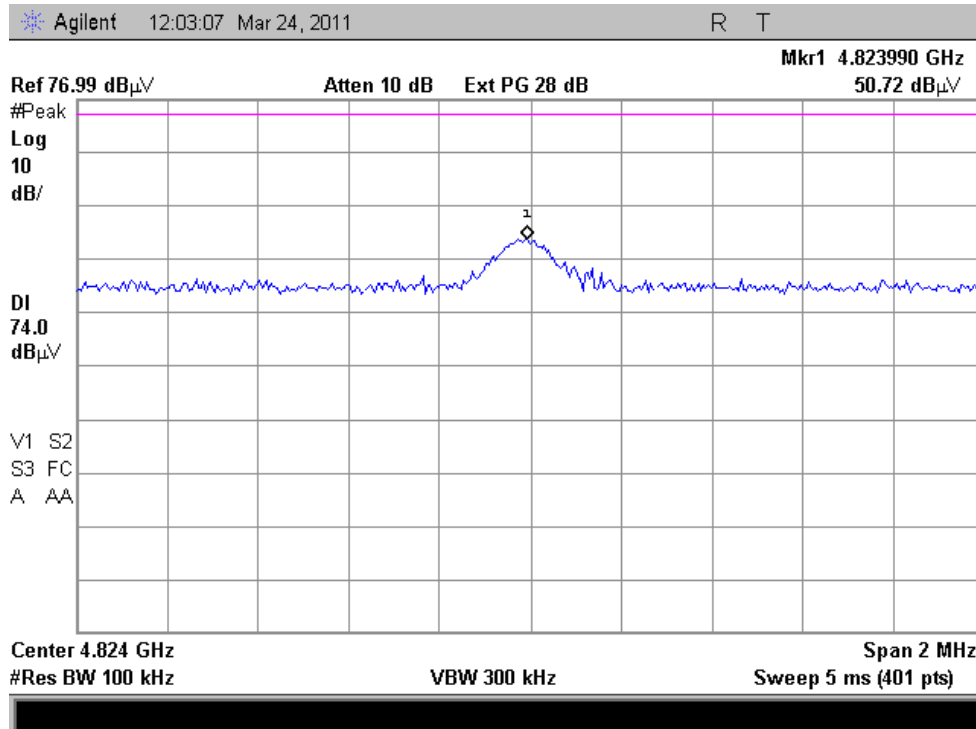


Tuned Frequency = 2462 MHz
Ant = RA-7
4th Harmonic - Avg

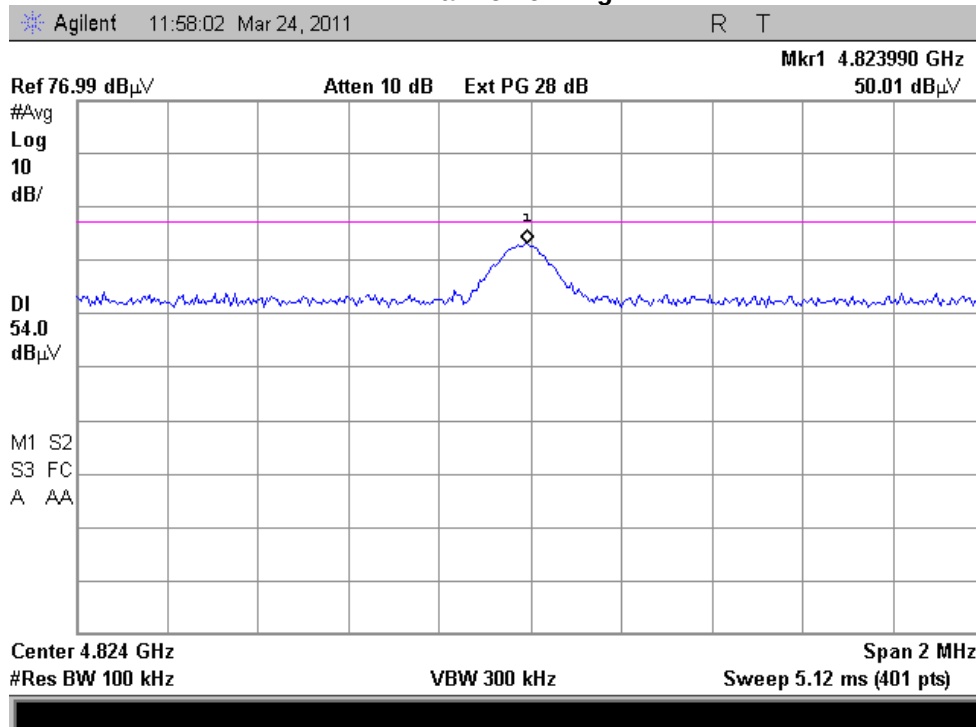




Tuned Frequency = 2412 MHz
Ant = ANT-FP
2nd Harmonic - Peak

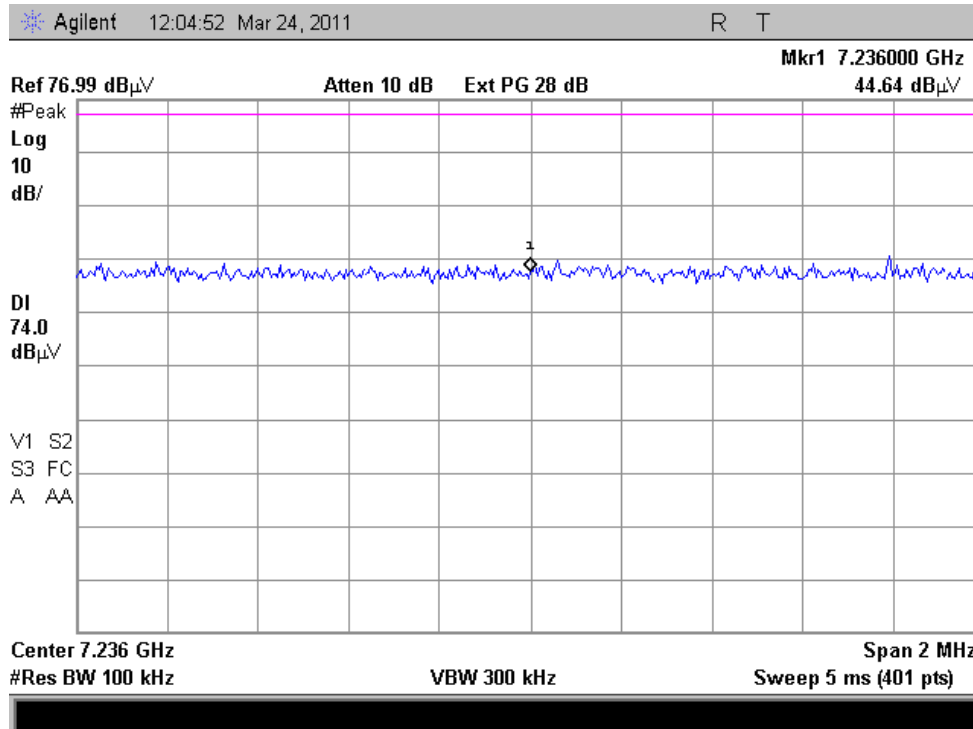


Tuned Frequency = 2412 MHz
Ant = ANT-FP
2nd Harmonic - Avg

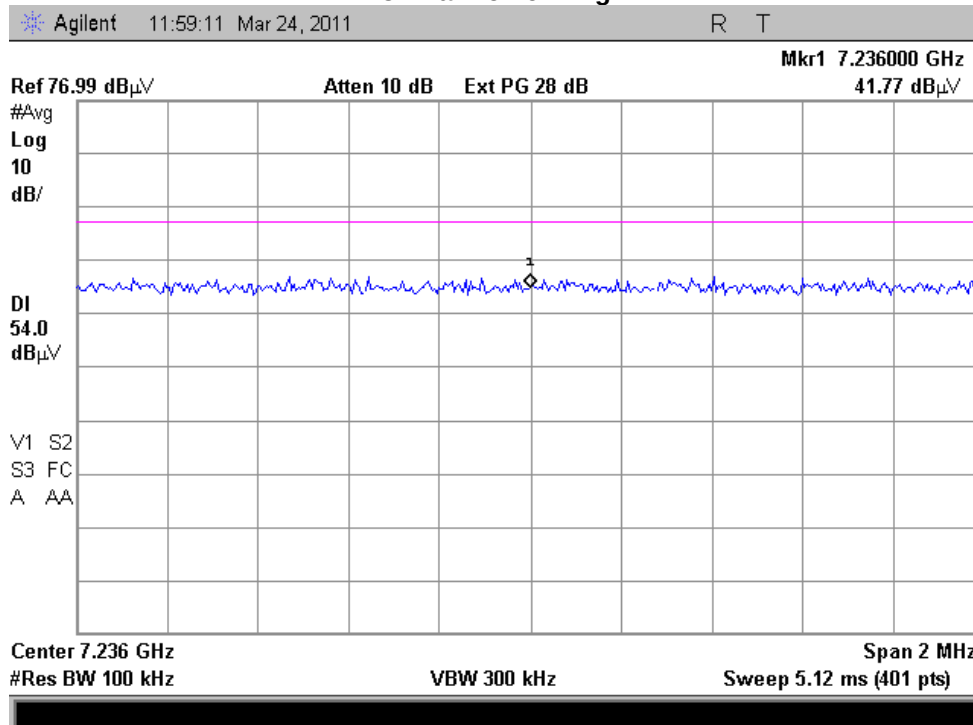




Tuned Frequency = 2412 MHz
Ant = ANT-FP
3rd Harmonic - Peak

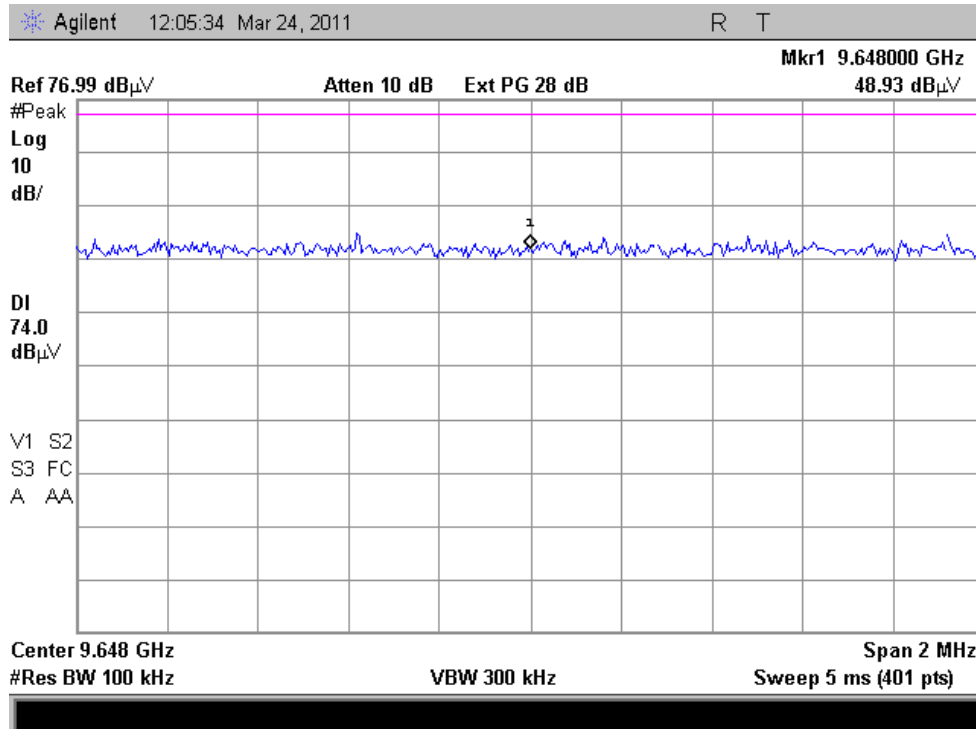


Tuned Frequency = 2412 MHz
Ant = ANT-FP
3rd Harmonic - Avg

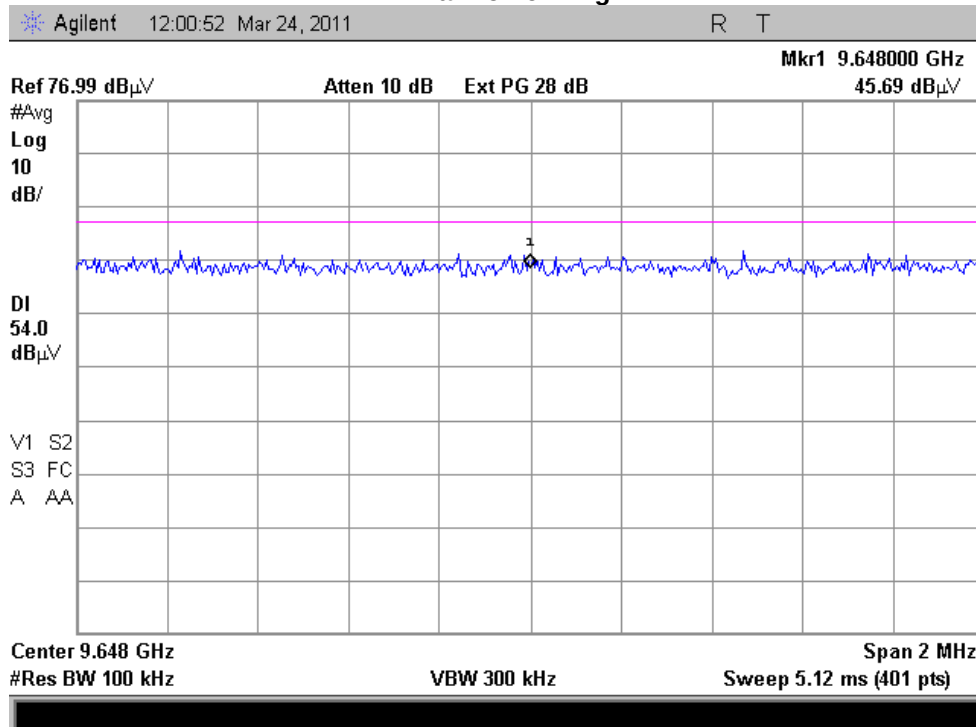




Tuned Frequency = 2412 MHz
Ant = ANT-FP
4th Harmonic - Peak

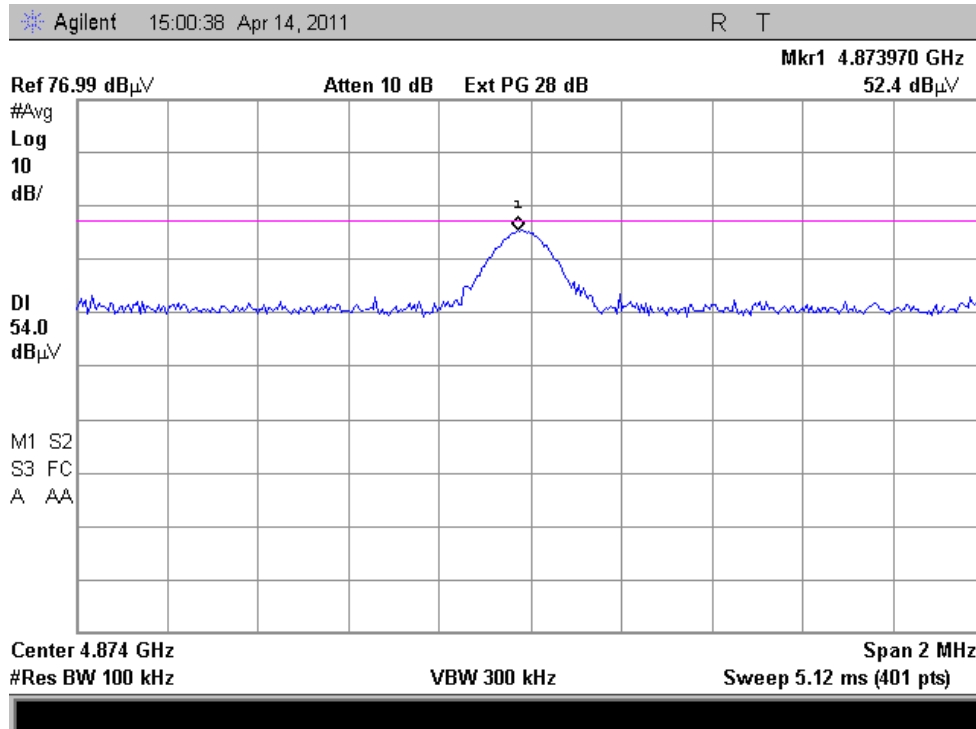


Tuned Frequency = 2412 MHz
Ant = ANT-FP
4th Harmonic - Avg

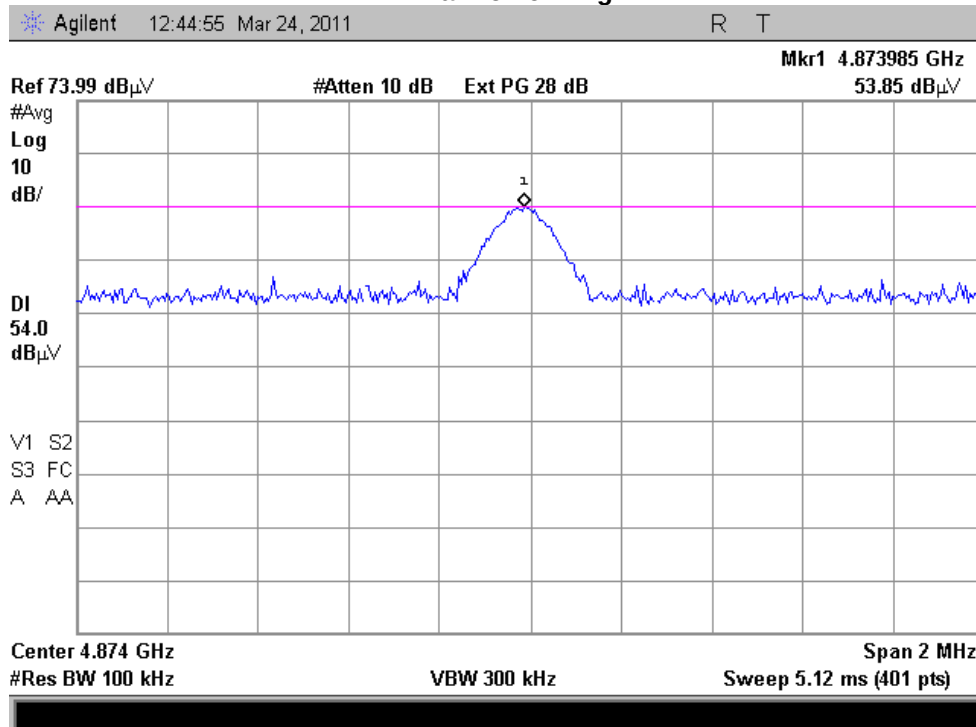




Tuned Frequency = 2437 MHz
Ant = ANT-FP
2nd Harmonic - Peak

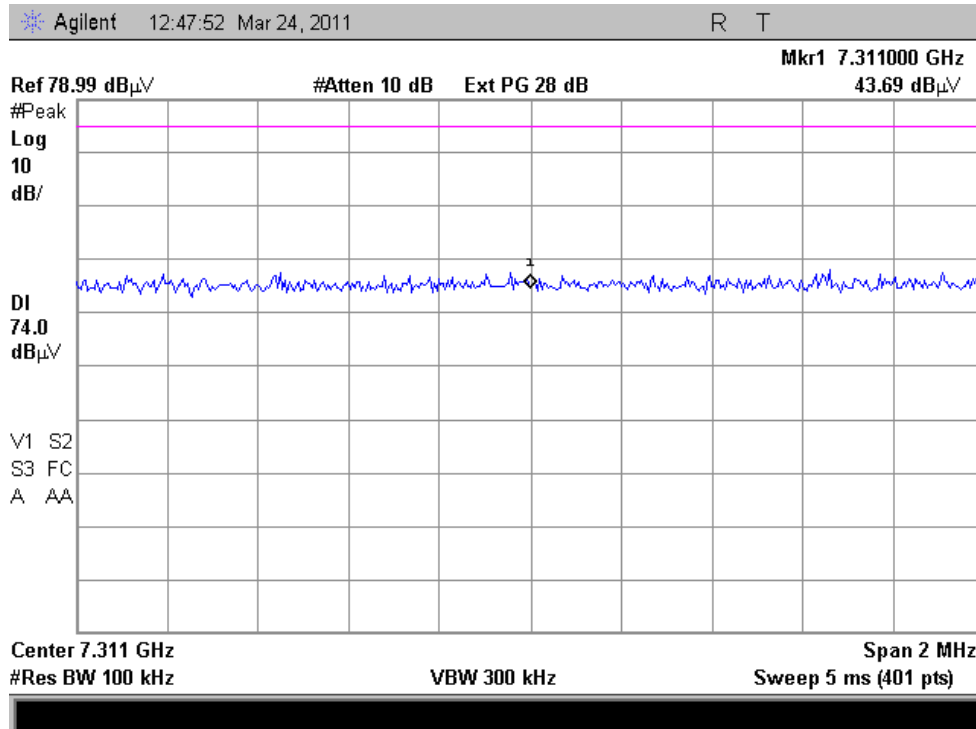


Tuned Frequency = 2437 MHz
Ant = ANT-FP
2nd Harmonic - Avg

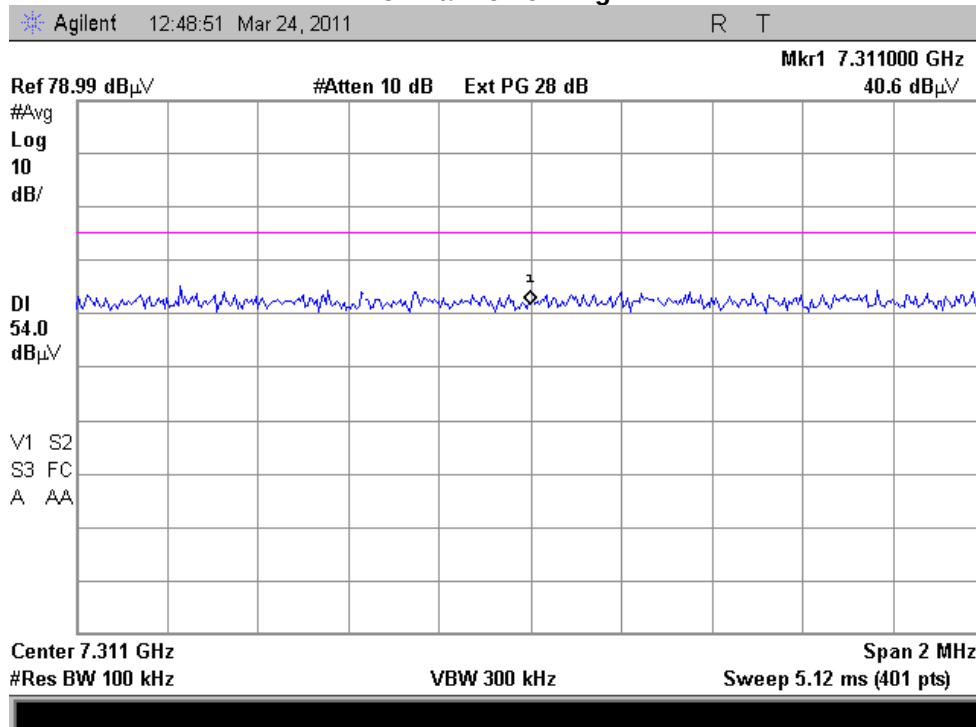




Tuned Frequency = 2437 MHz
Ant = ANT-FP
3rd Harmonic - Peak

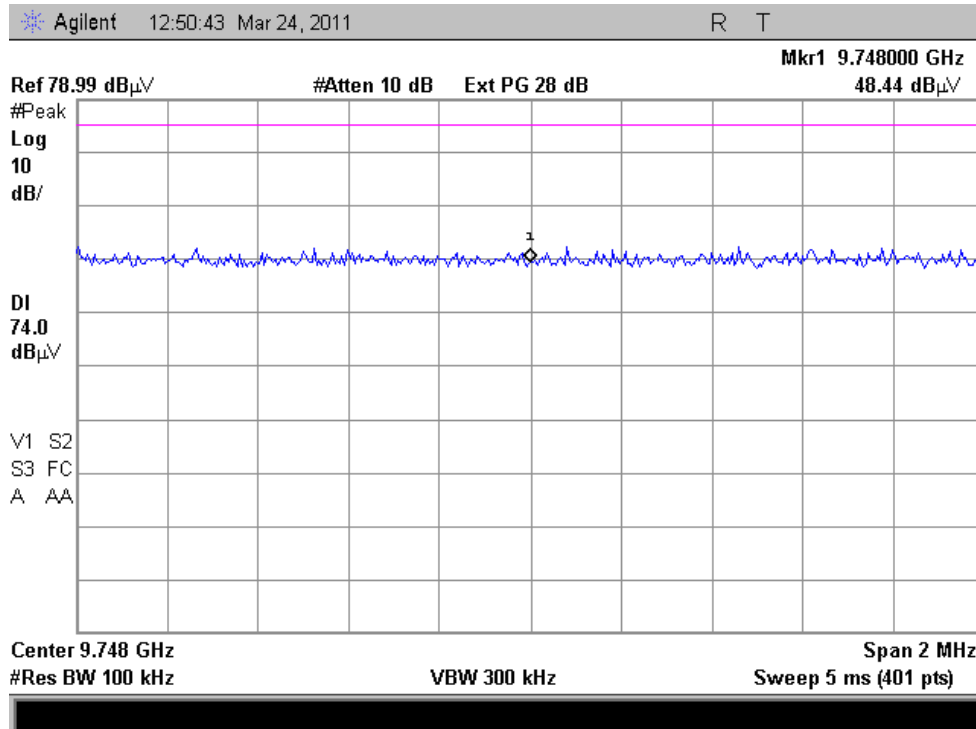


Tuned Frequency = 2437 MHz
Ant = ANT-FP
3rd Harmonic - Avg

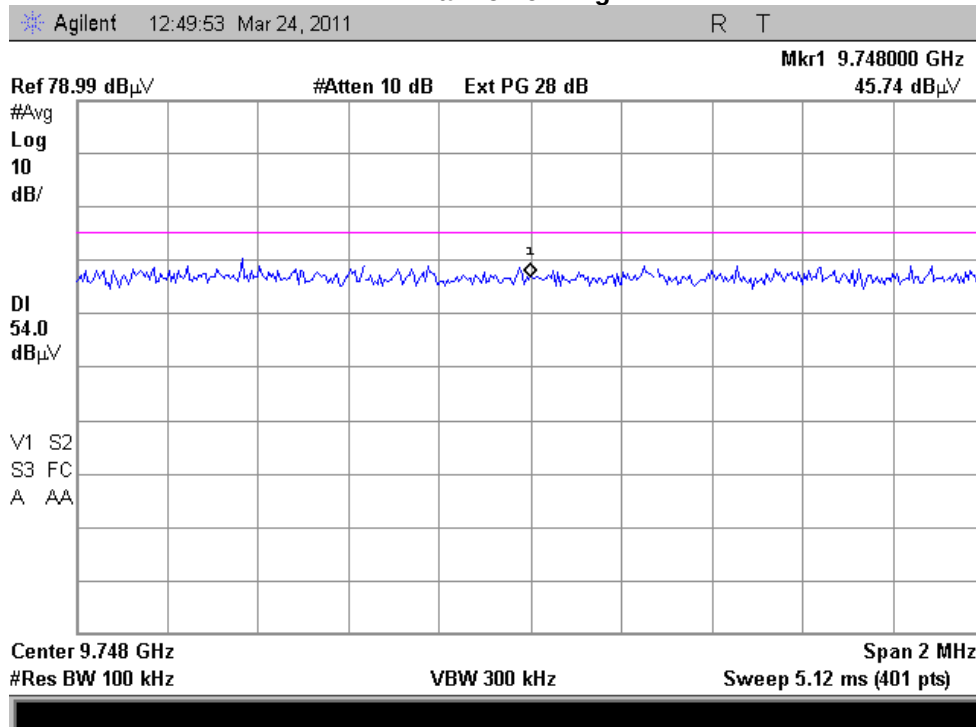




Tuned Frequency = 2437 MHz
Ant = ANT-FP
4th Harmonic - Peak

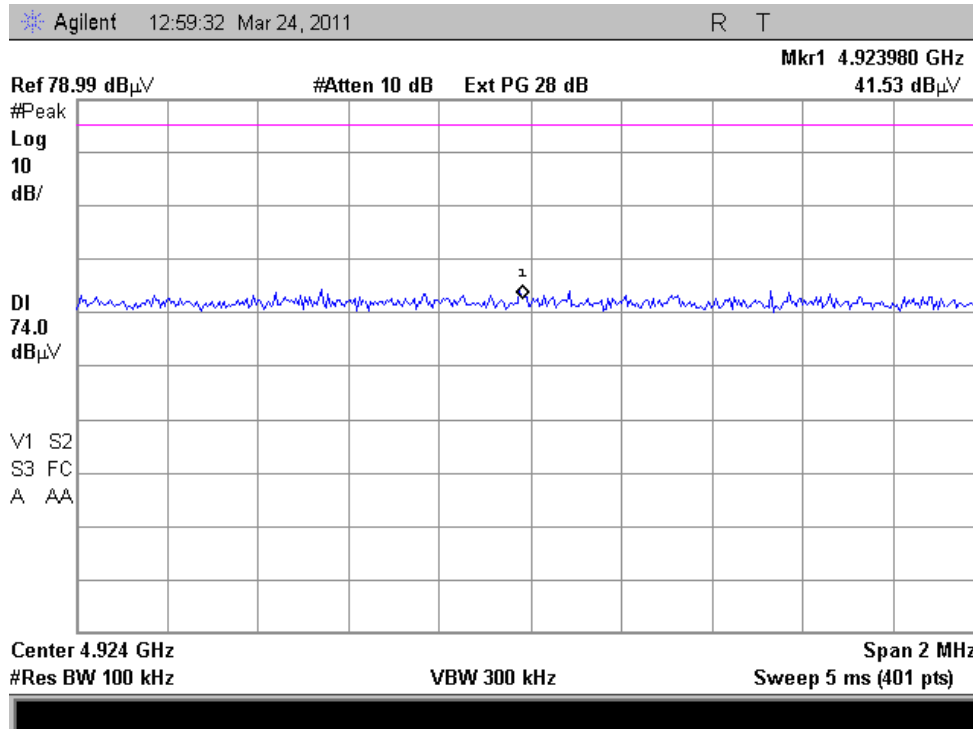


Tuned Frequency = 2437 MHz
Ant = ANT-FP
4th Harmonic - Avg

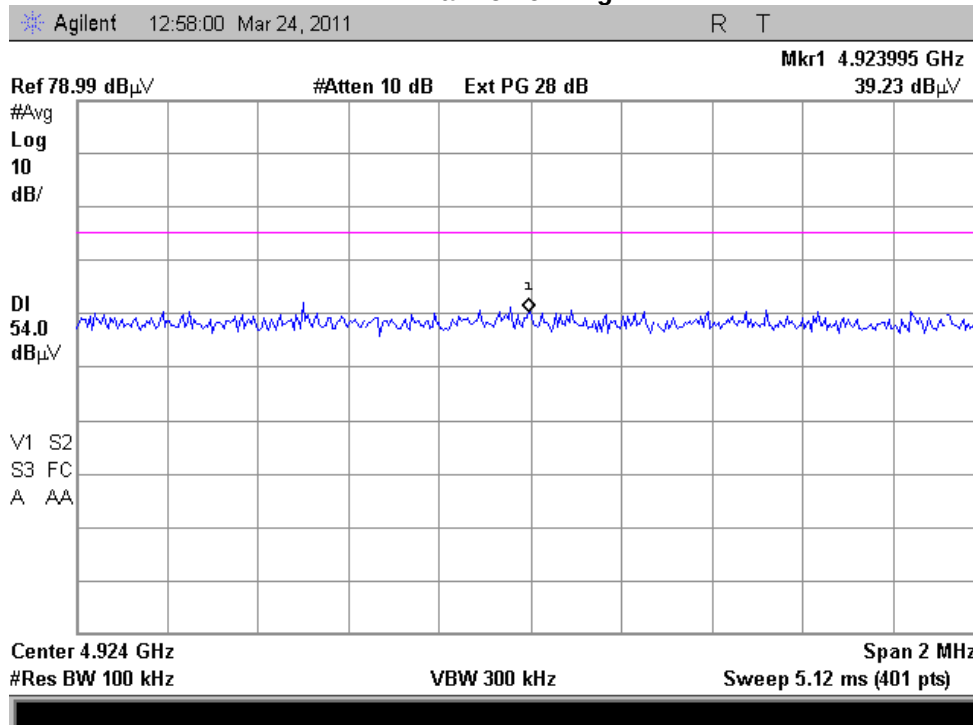




Tuned Frequency = 2462 MHz
Ant = ANT-FP
2nd Harmonic - Peak

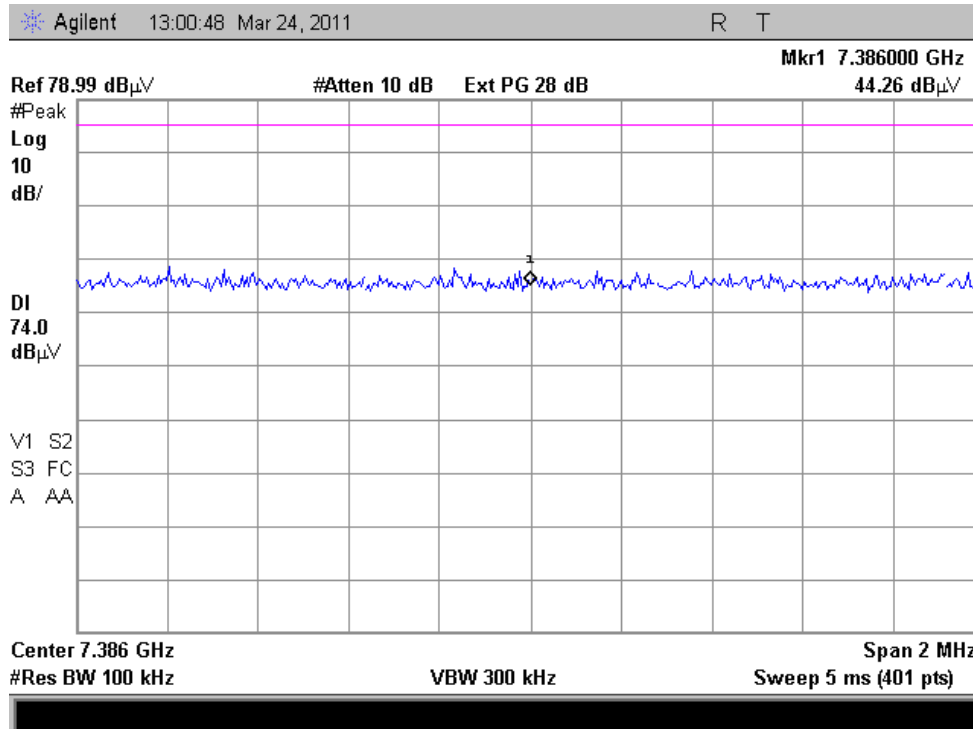


Tuned Frequency = 2462 MHz
Ant = ANT-FP
2nd Harmonic - Avg

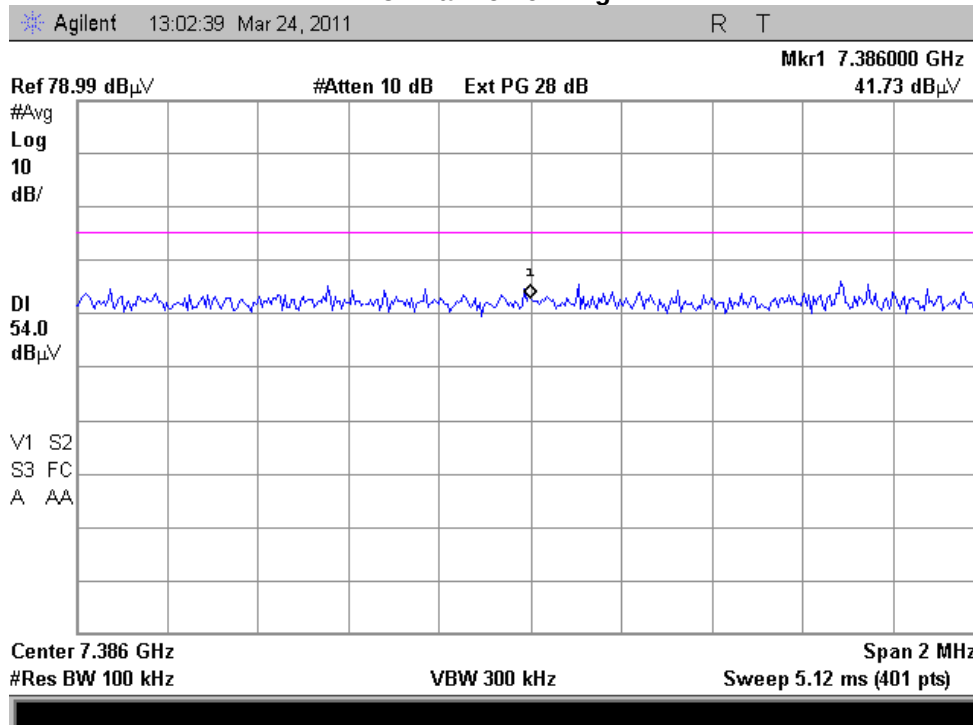




Tuned Frequency = 2462 MHz
Ant = ANT-FP
3rd Harmonic - Peak

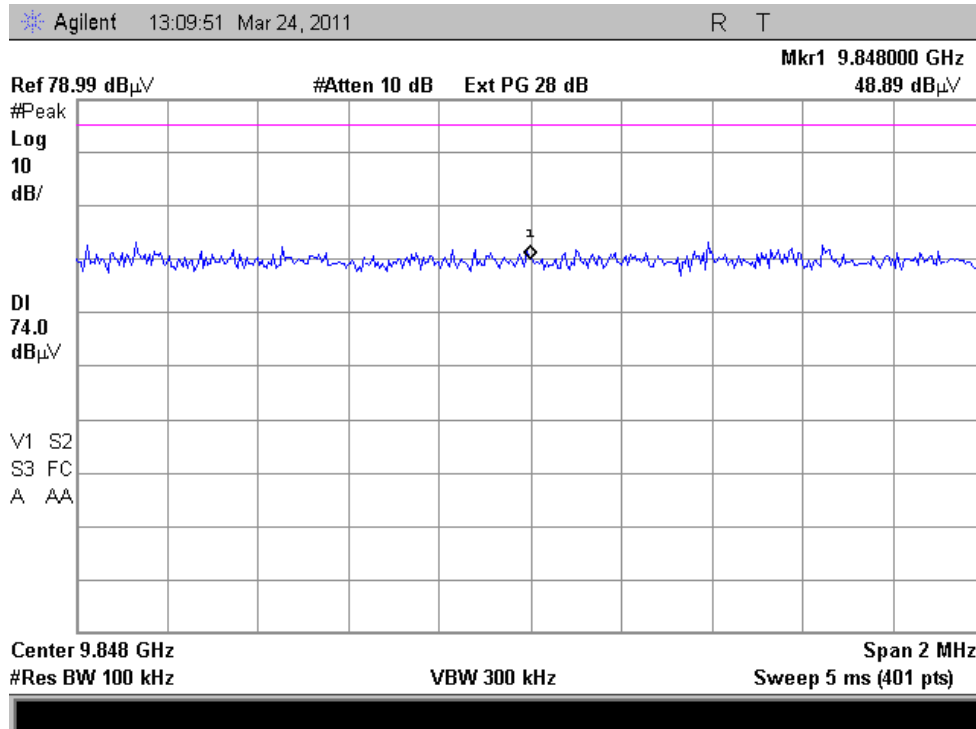


Tuned Frequency = 2462 MHz
Ant = ANT-FP
3rd Harmonic - Avg

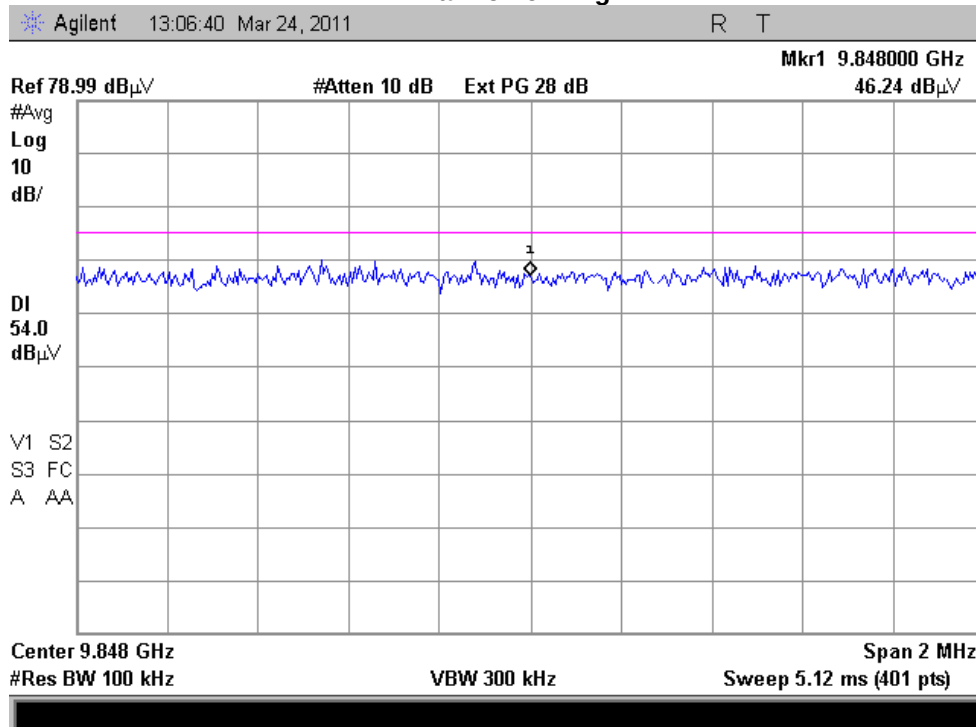




Tuned Frequency = 2462 MHz
Ant = ANT-FP
4th Harmonic - Peak



Tuned Frequency = 2462 MHz
Ant = ANT-FP
4th Harmonic - Avg





Emissions at Band Edges

Name of Test: Emissions At Band Edges

Specification: 15.247(d), 15.209(a), 15.205

Engineer: Greg Corbin

Test Equipment Utilized: i00028, i00103, i00177, i00331, i00385

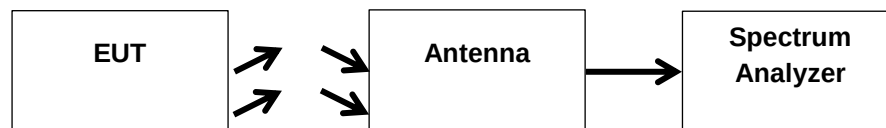
Test date: 3/24/2011

Test Procedure

The EUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for band edge and restricted band for both peak and average measurements. The cable and antenna correction factors were input into the analyzer as a reference level offset to ensure accurate readings were obtained. For the restricted band the amplifier and band reject filter correction factors were also input to the spectrum analyzer.

The measurements were performed with each antenna type using the antenna with the highest gain.

Band Edge Test Setup



Band Edge Emissions Summary

Antenna = RA-5

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit (dBc)	Result
2412	2400	-32.9	Peak	-20	Pass
2462	2483.5	-38.3	Peak	-20	Pass

Band Edge Emissions Summary

Antenna = RA-7

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit (dBc)	Result
2412	2400	-35.1	Peak	-20	Pass
2462	2483.5	-40.8	Peak	-20	Pass

Band Edge Emissions Summary

Antenna = ANT-FP

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit (dBc)	Result
2412	2400	-35.5	Peak	-20	Pass
2462	2483.5	-43.1	Peak	-20	Pass



Restricted Band Test Setup



Restricted Band Emissions Summary Antenna = RA-5

Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2390.0	63.2	Peak	74	Pass
2300 – 2390	2412	2389.5	49.4	Average	54	Pass
2483.5 - 2500	2462	2483.95	54.0	Peak	74	Pass
2483.5 - 2500	2462	2483.93	42.6	Average	54	Pass

Restricted Band Emissions Summary Antenna = RA-7

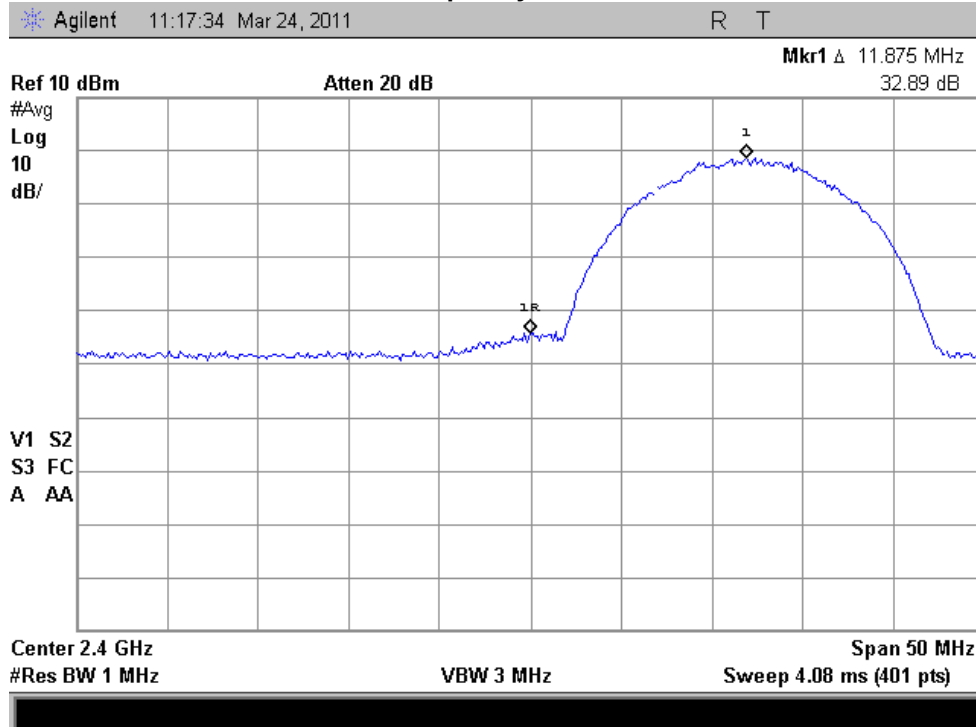
Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2389.55	62.6	Peak	74	Pass
2300 – 2390	2412	2388.65	49.0	Average	54	Pass
2483.5 - 2500	2462	2483.54	62.2	Peak	74	Pass
2483.5 - 2500	2462	2483.50	49.5	Average	54	Pass

Restricted Band Emissions Summary Antenna = ANT-FP

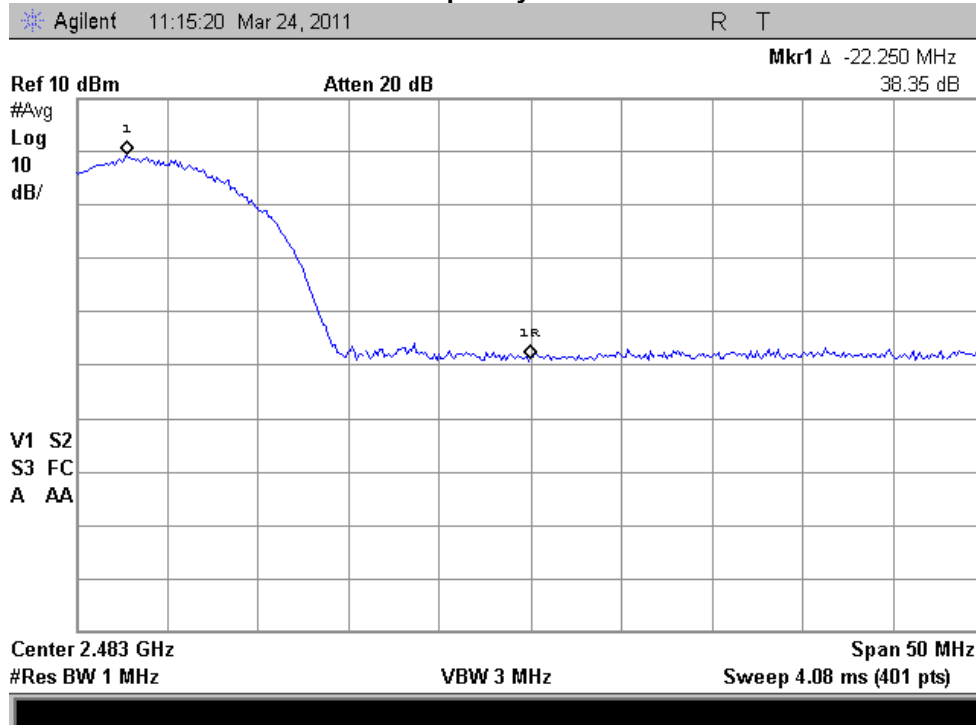
Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2390.0	65.0	Peak	74	Pass
2300 – 2390	2412	2388.87	51.4	Average	54	Pass
2483.5 - 2500	2462	2483.50	59.9	Peak	74	Pass
2483.5 - 2500	2462	2483.50	48.7	Average	54	Pass



Band Edge 2400 MHz
Antenna = RA-5
Tuned Frequency = 2412 MHz

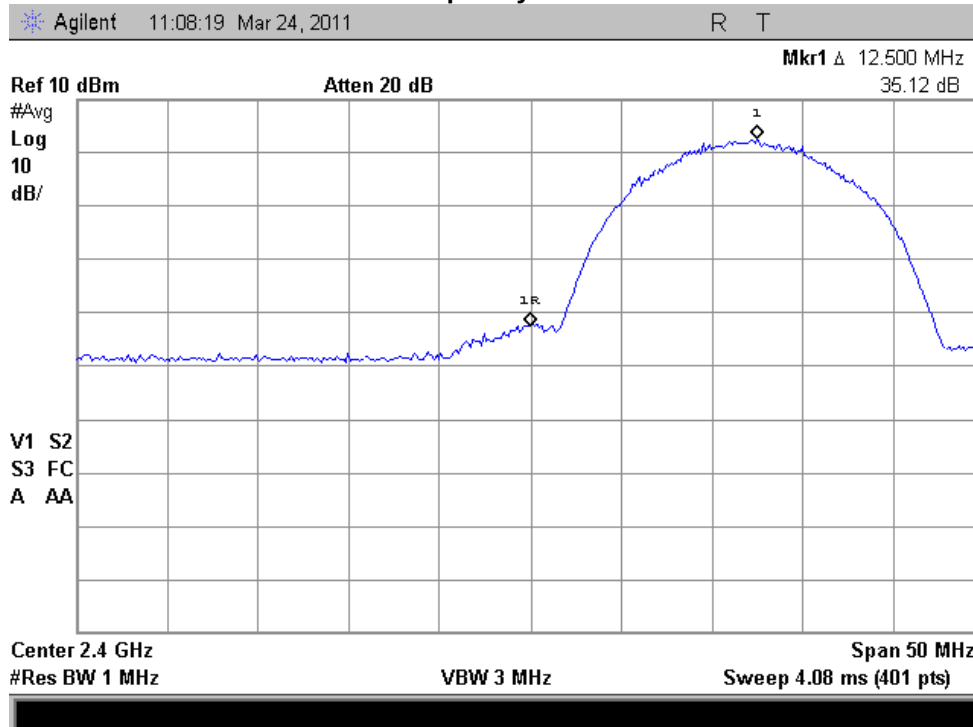


Band Edge 2483.5 MHz
Antenna = RA-5
Tuned Frequency = 2462 MHz

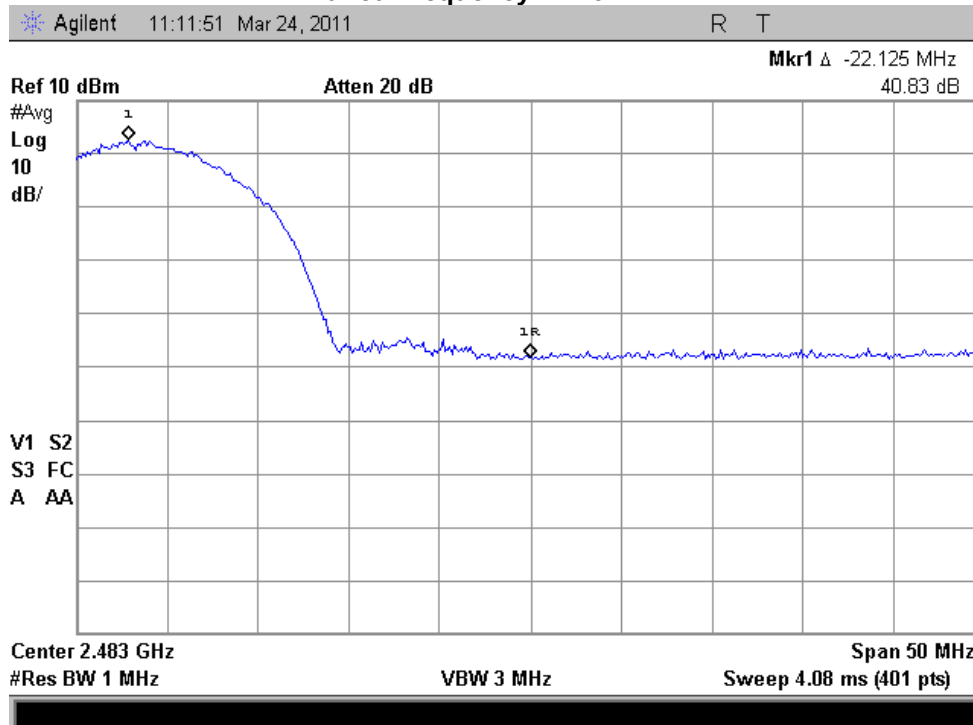




Band Edge 2400 MHz
Antenna = RA-7
Tuned Frequency = 2412 MHz

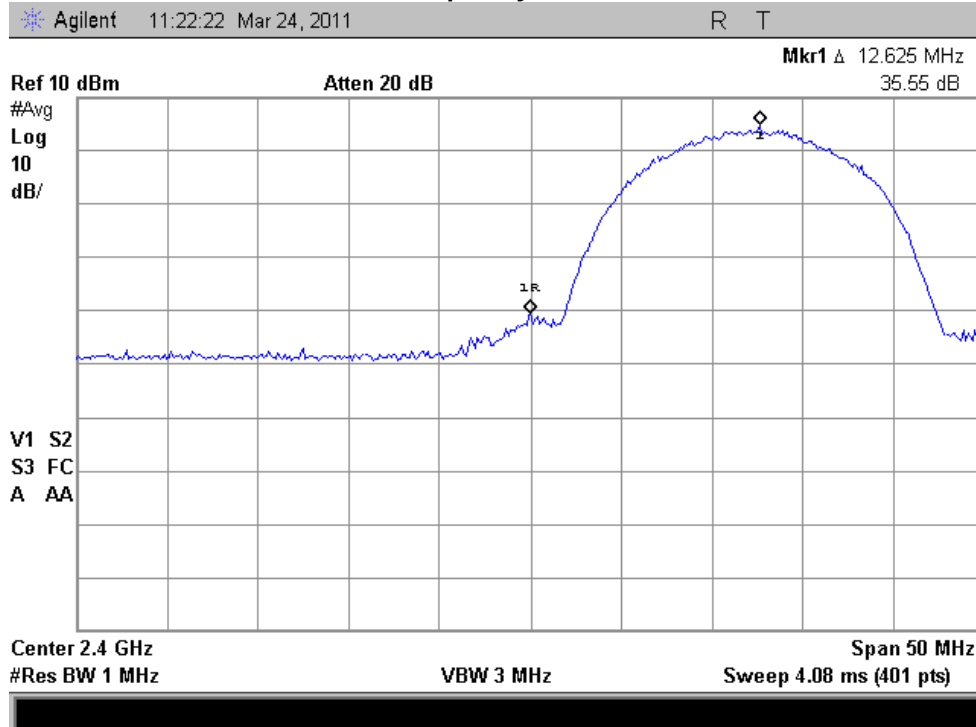


Band Edge 2483.5 MHz
Antenna = RA-7
Tuned Frequency = 2462 MHz

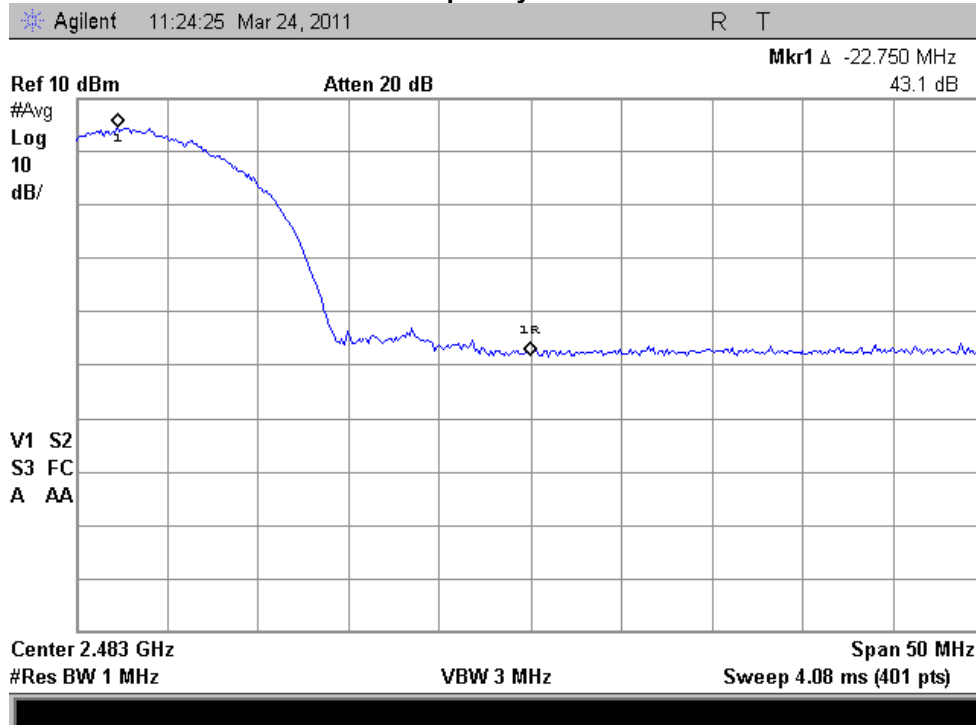




Band Edge 2400 MHz
Antenna = ANT-FP
Tuned Frequency = 2412 MHz

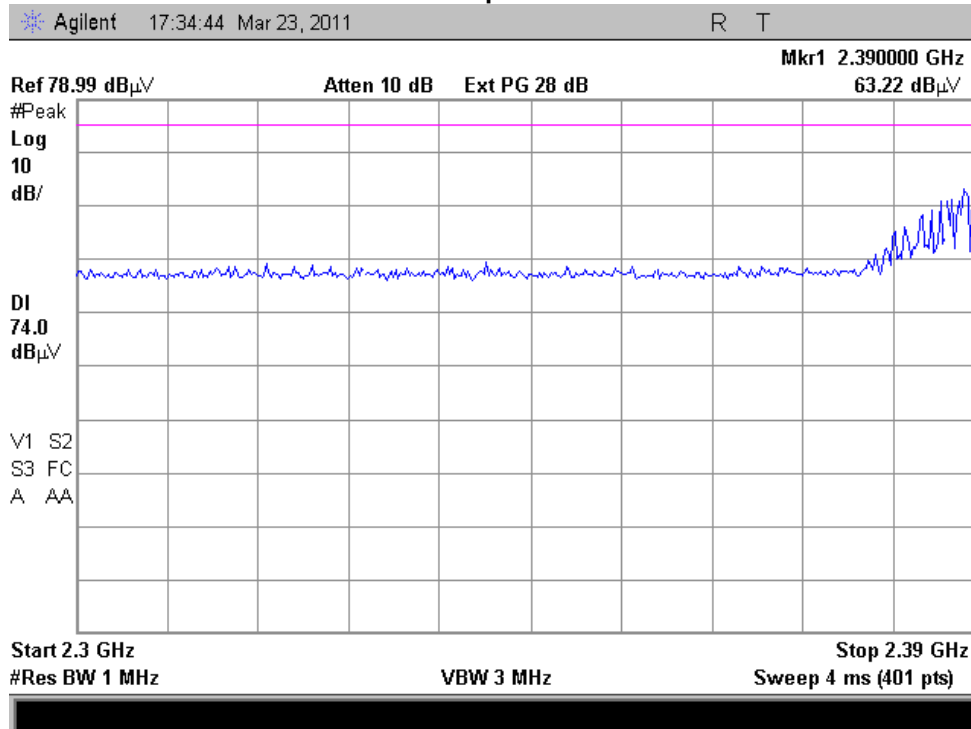


Band Edge 2483.5 MHz
Antenna = ANT-FP
Tuned Frequency = 2462 MHz

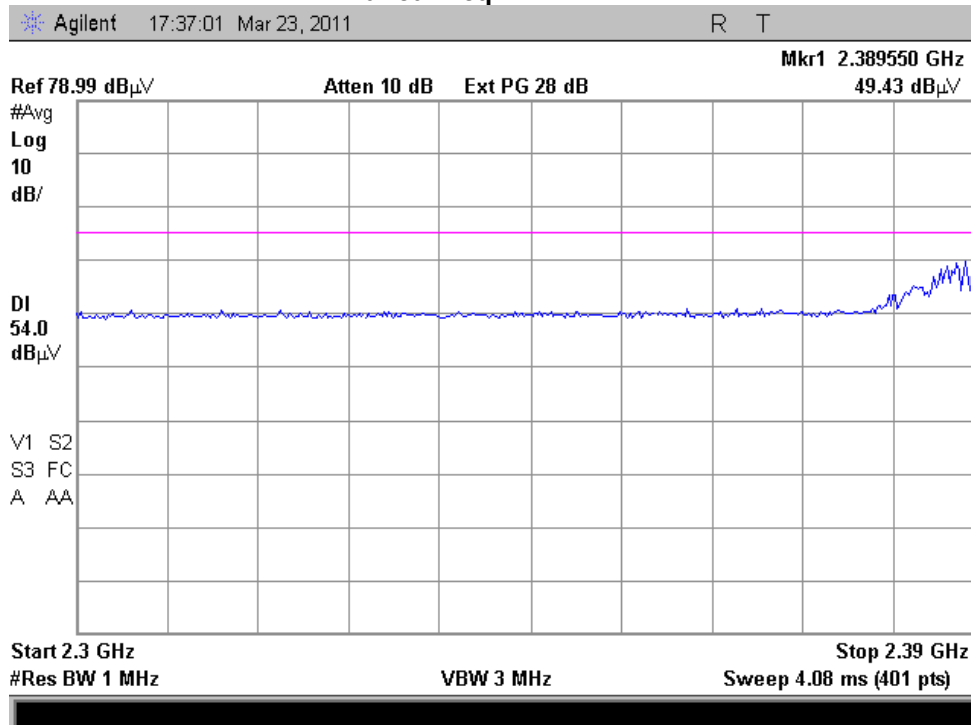




Restricted Band 2300 – 2390 MHz – Peak
Antenna = RA-5
Tuned Freq = 2412 MHz

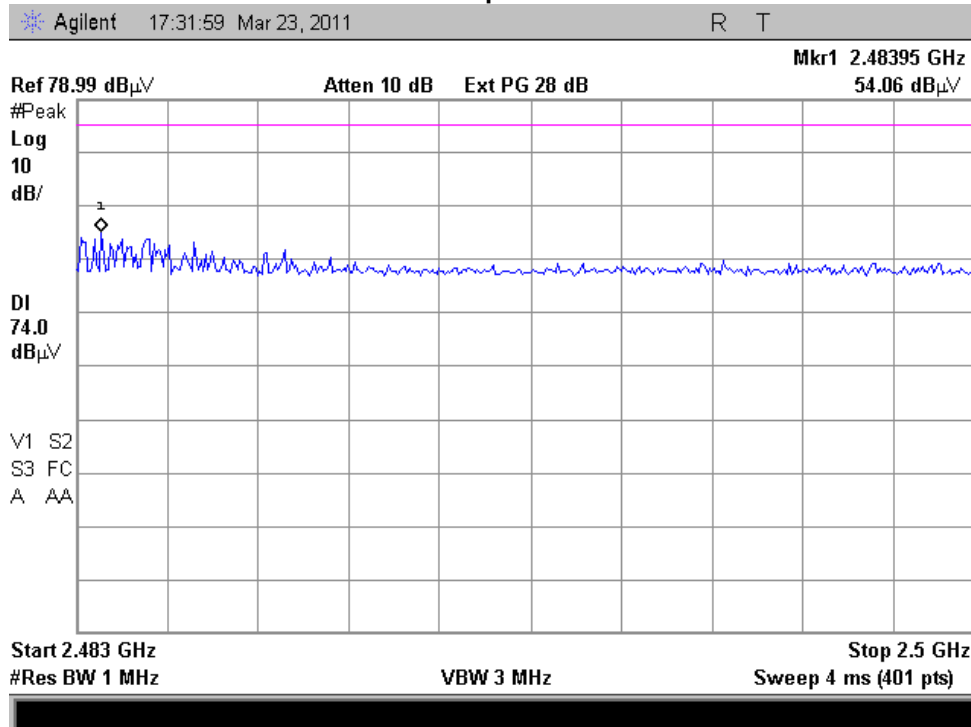


Restricted Band 2300 – 2390 MHz – Avg
Antenna = RA-5
Tuned Freq = 2412 MHz

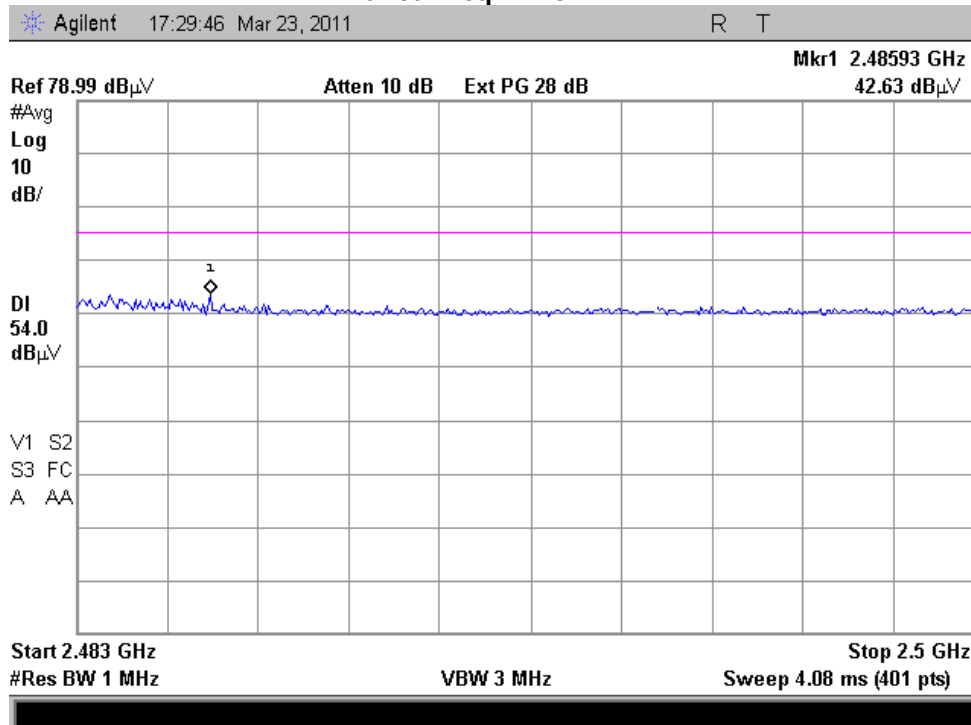




Restricted Band 2483.5 – 2500 MHz – Peak
Antenna = RA-5
Tuned Freq = 2462 MHz

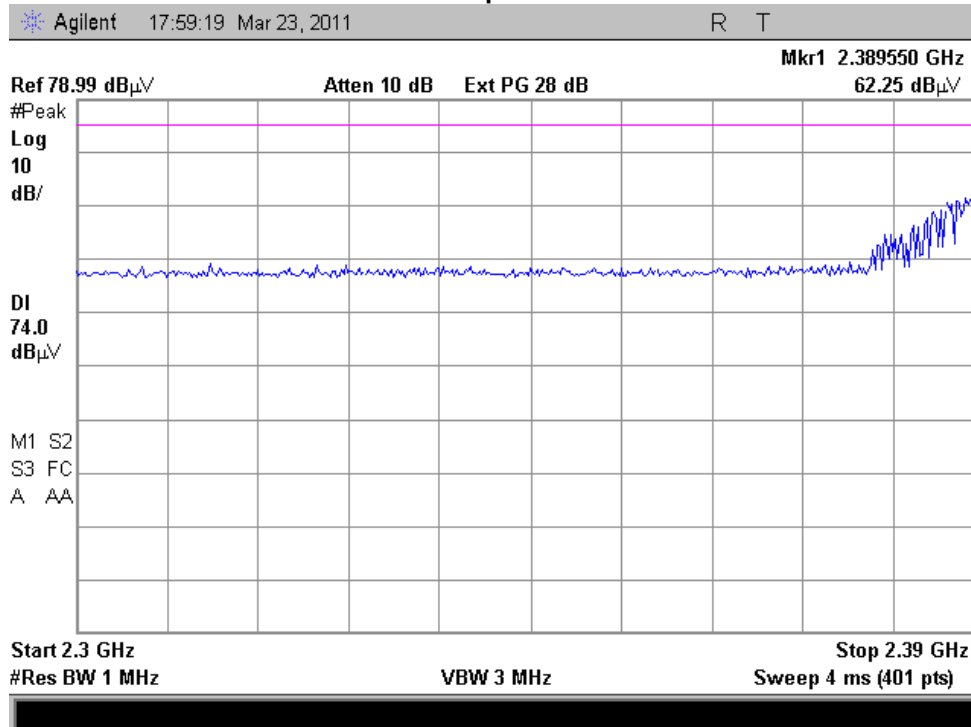


Restricted Band 2483.5 – 2500 MHz – Avg
Antenna = RA-5
Tuned Freq = 2462 MHz

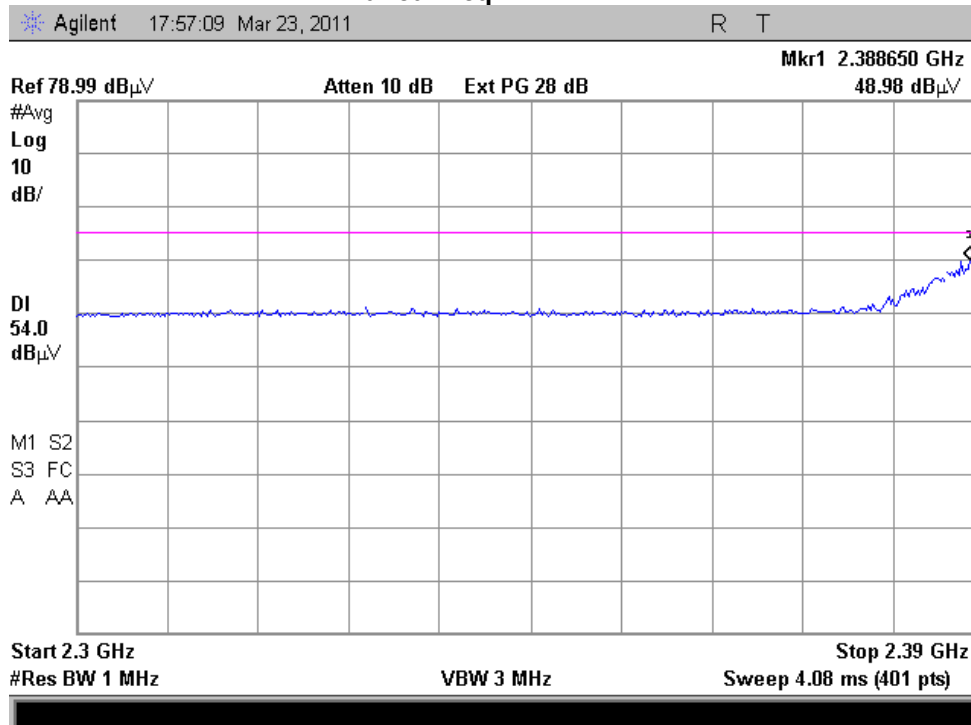




Restricted Band 2300 – 2390 MHz – Peak
Antenna = RA-7
Tuned Freq = 2412 MHz

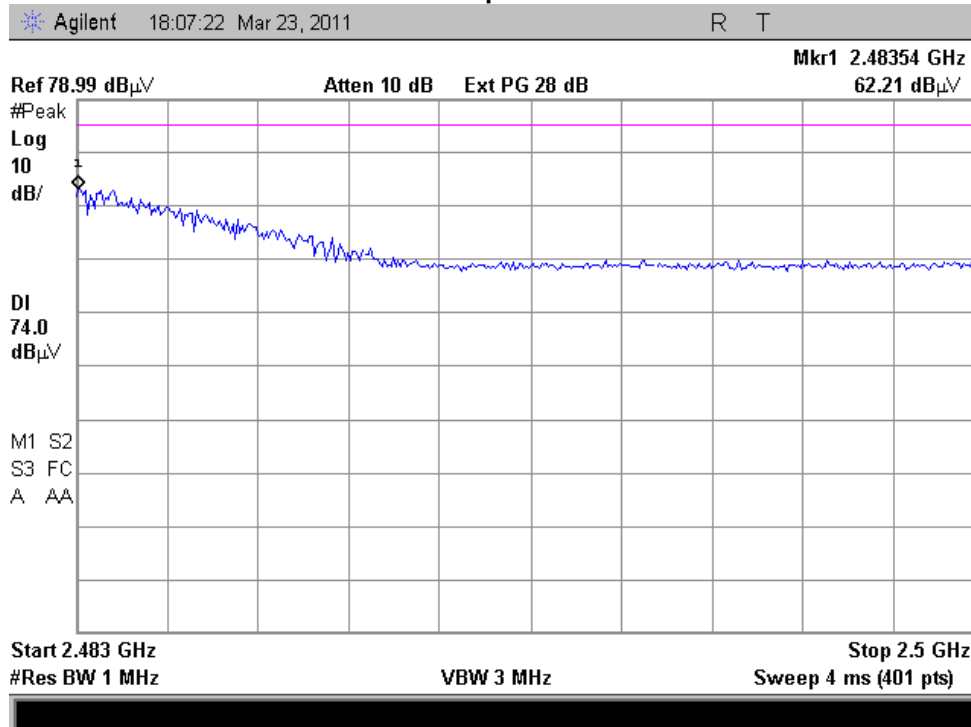


Restricted Band 2300 – 2390 MHz – Avg
Antenna = RA-7
Tuned Freq = 2412 MHz

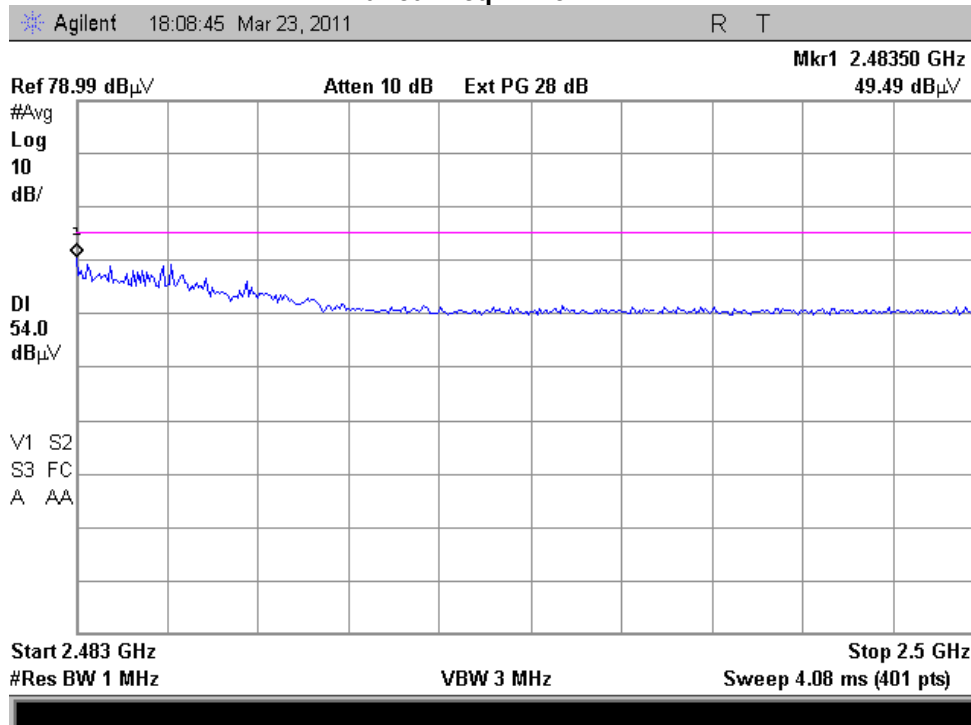




Restricted Band 2483.5 – 2500 MHz – Peak
Antenna = RA-7
Tuned Freq = 2462 MHz

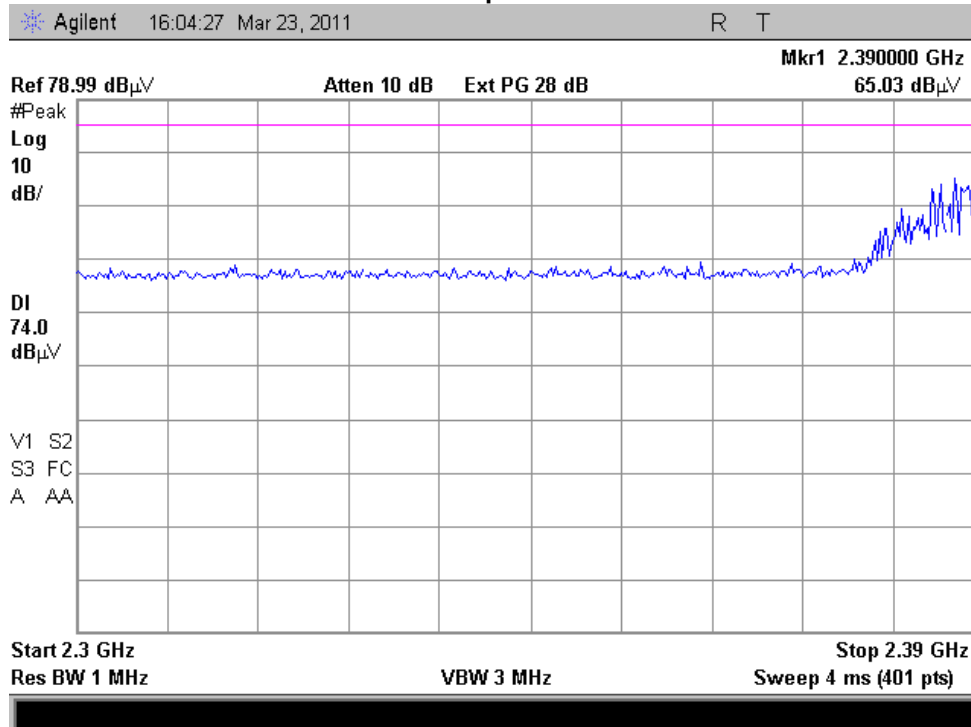


Restricted Band 2483.5 – 2500 MHz – Avg
Antenna = RA-7
Tuned Freq = 2462 MHz

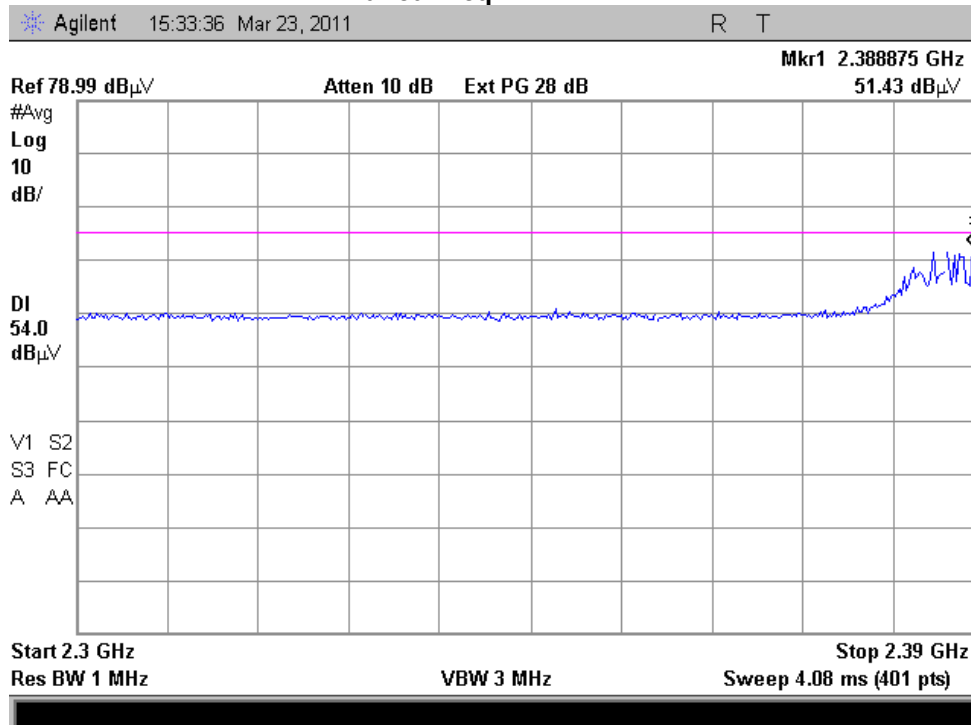




Restricted Band 2300 – 2390 MHz – Peak
Antenna = ANT-FP
Tuned Freq = 2412 MHz

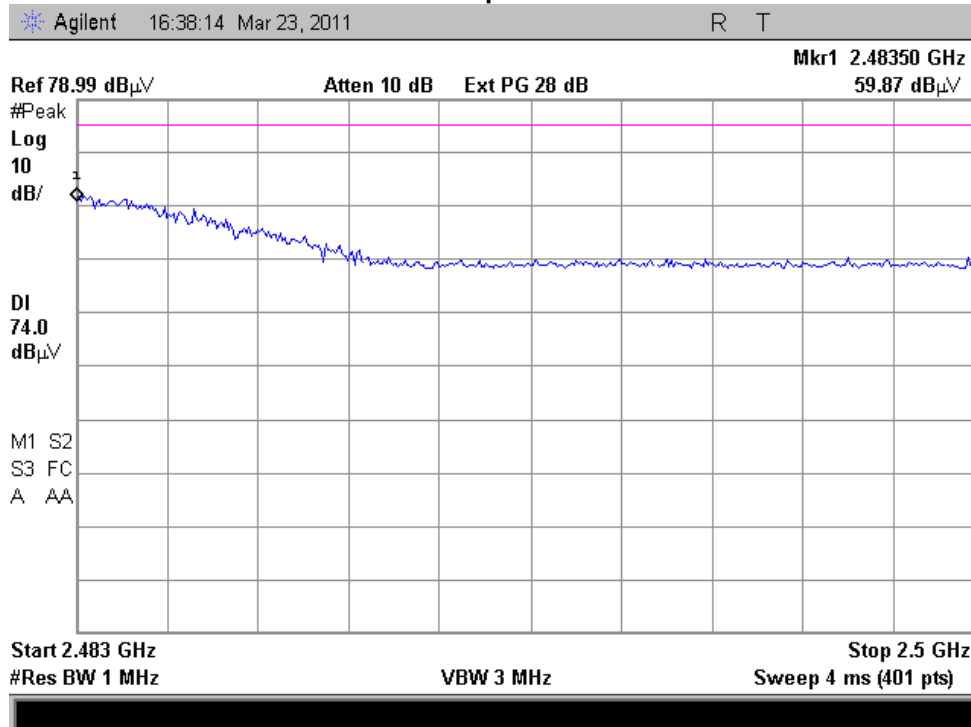


Restricted Band 2300 – 2390 MHz – Avg
Antenna = ANT-FP
Tuned Freq = 2412 MHz

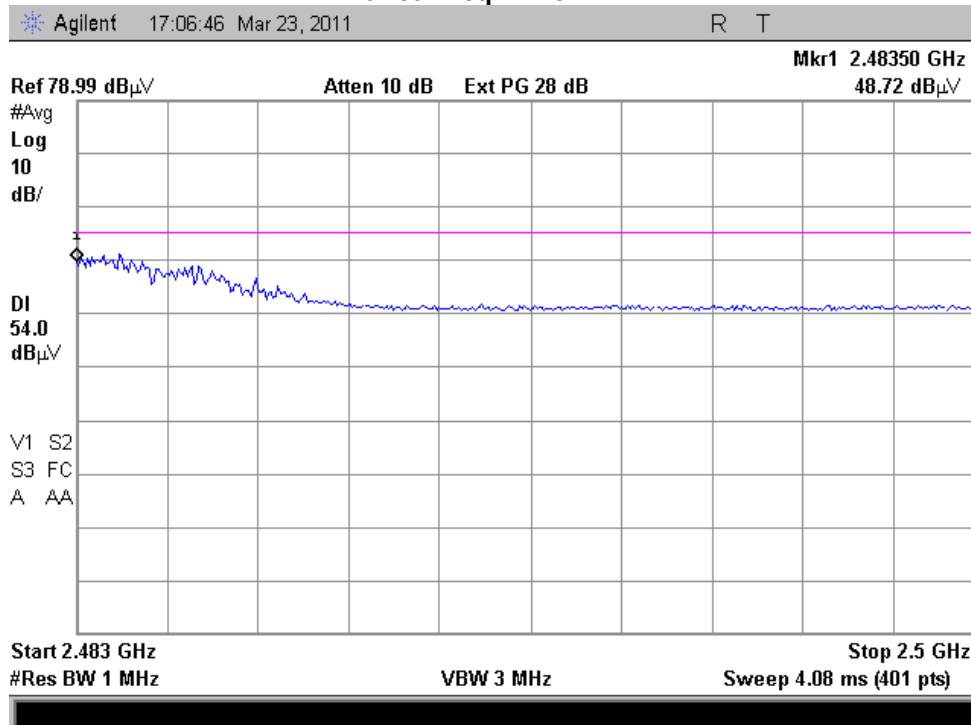




Restricted Band 2483.5 – 2500 MHz – Peak
Antenna = ANT-FP
Tuned Freq = 2462 MHz



Restricted Band 2483.5 – 2500 MHz – Avg
Antenna = ANT-FP
Tuned Freq = 2462 MHz





Occupied Bandwidth

Name of Test: Occupied Bandwidth

Specification: 15.247(a)(2)

Engineer: Greg Corbin

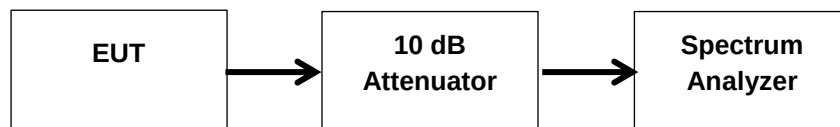
Test Equipment Utilized: i00331

Test Date: 4-14-2011

Test Procedure

The EUT was connected directly to a spectrum analyzer. The Span was set wide enough to capture the entire transmit spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold and when the entire spectrum was captured the 6dB and 99% bandwidths were measured to verify the bandwidth met the specification.

Test Setup



6 dB Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement MHz	Specification Limit kHz	Result
2412	9.773	≥ 500	Pass
2437	10.420	≥ 500	Pass
2462	10.362	≥ 500	Pass

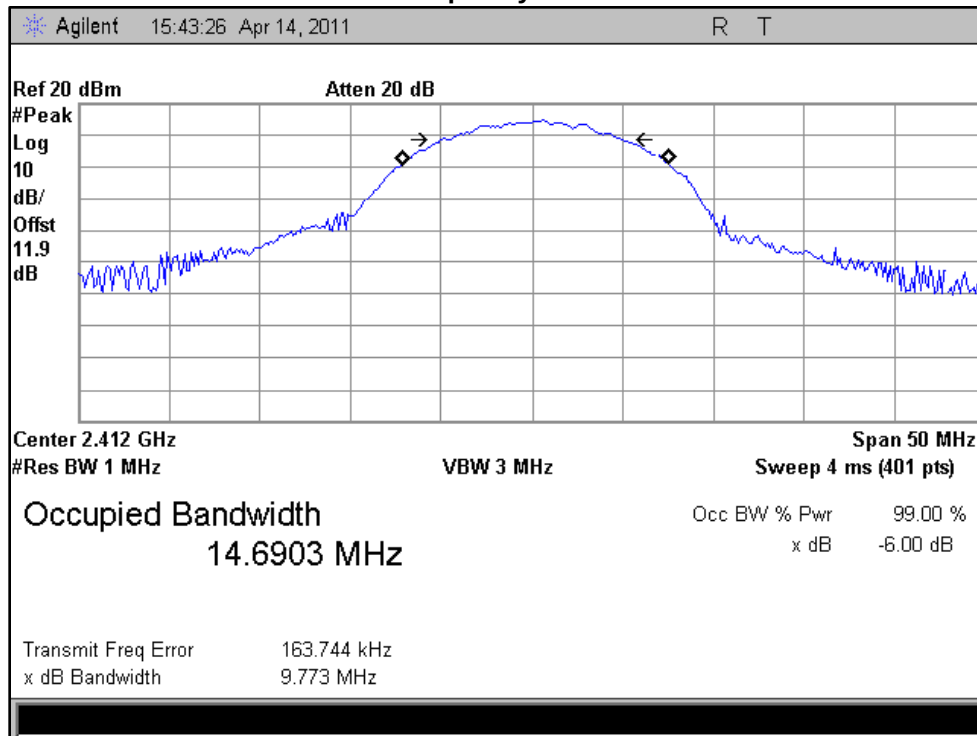
99% Bandwidth Summary

Frequency MHz	Recorded Measurement MHz	Result
2412	14.6903	Pass
2437	15.4753	Pass
2462	14.9742	Pass

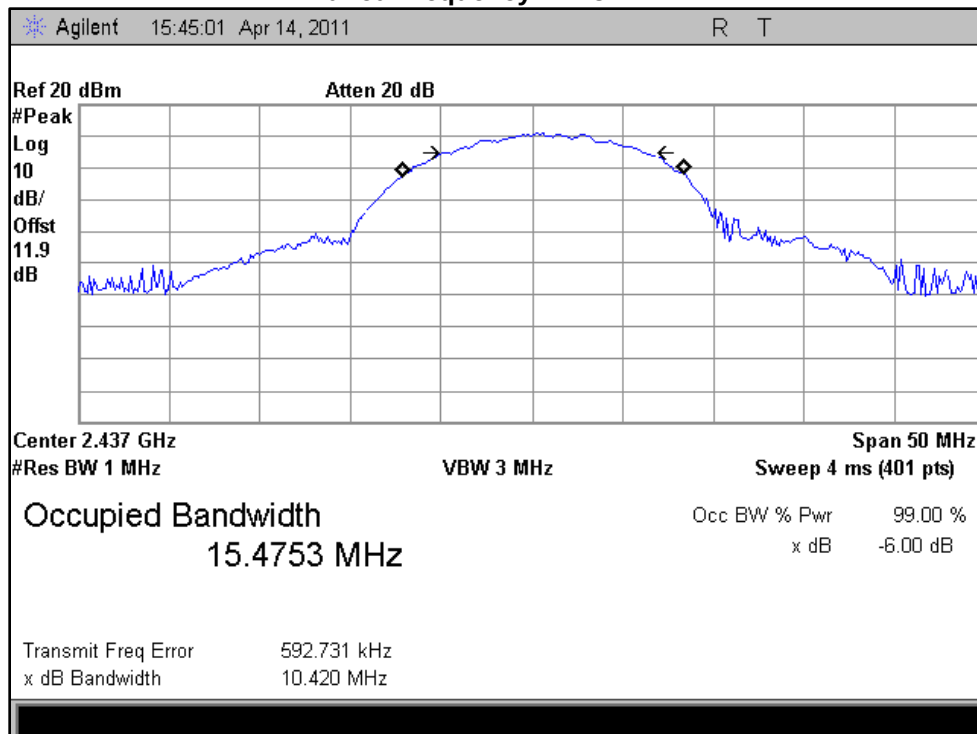


6 dB Occupied Bandwidth and 99% Necessary Bandwidth plots

Tuned Frequency = 2412 MHz

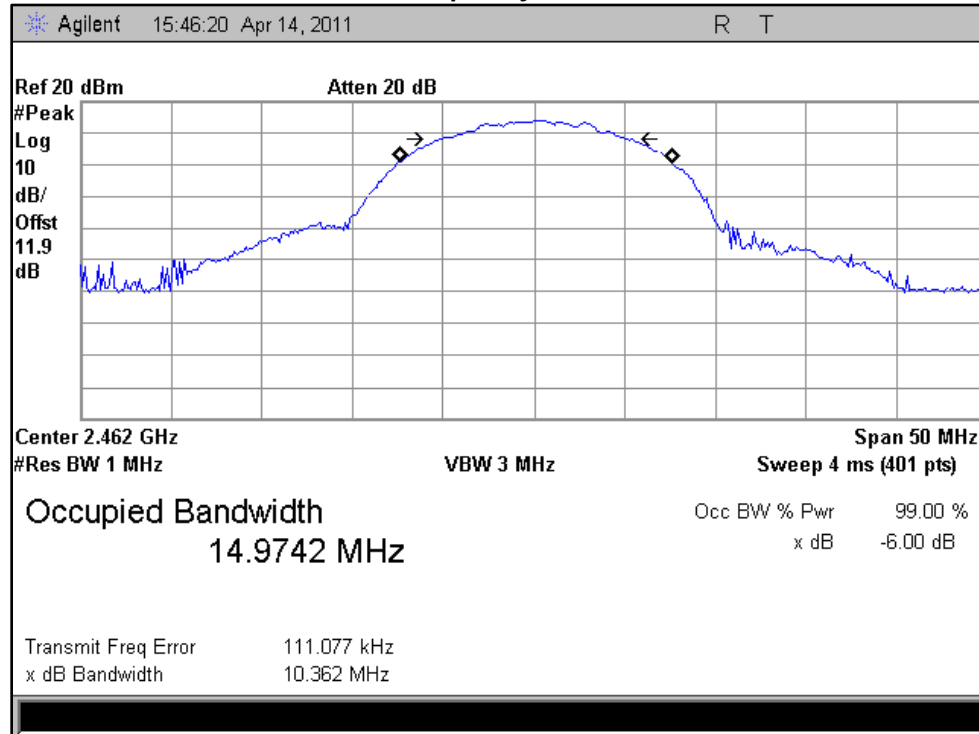


Tuned Frequency = 2437 MHz





Tuned Frequency = 2462 MHz





Transmitter Power Spectral Density (PSD)

Name of Test: Transmitter Power Spectral Density (PSD)

Specification: 15.247(e)

Engineer: Greg Corbin

Test Equipment Utilized: i00331

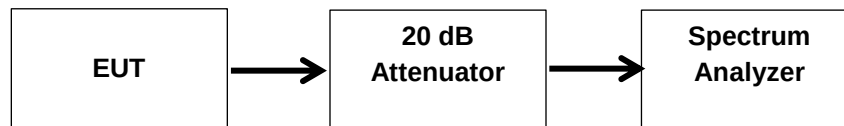
Test Date: 4/19/2011

Test Procedure

The EUT was connected directly to a spectrum analyzer.

The test was performed per section 6.11.2.3 of C63.10 - 2009 "Procedure for determining PSD for DTS devices".

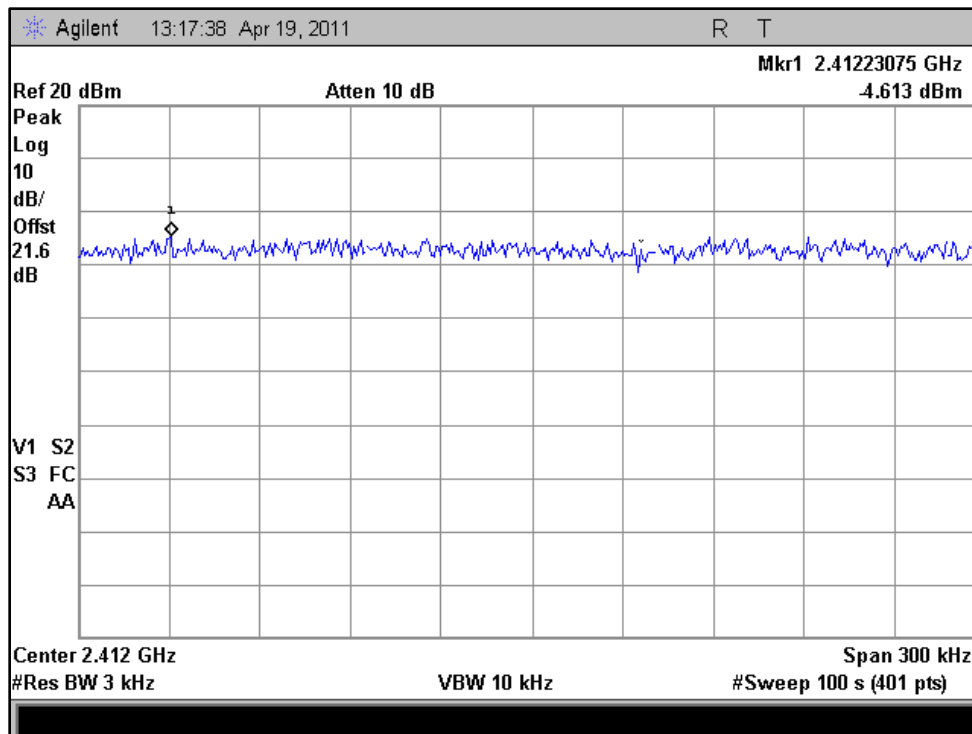
Test Setup



PSD Summary

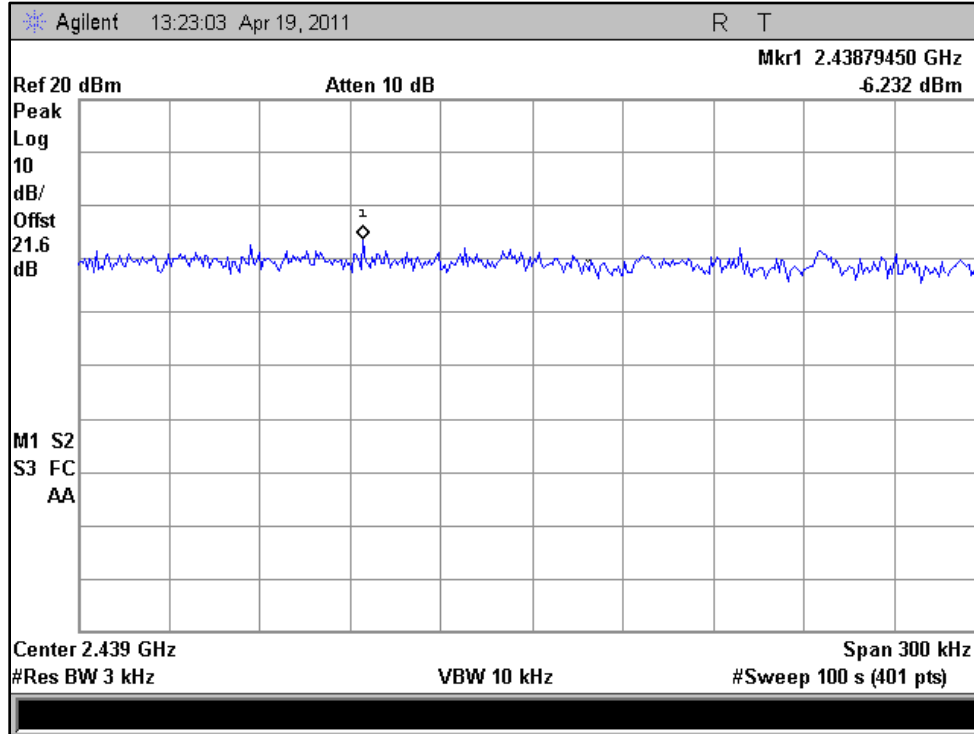
Frequency MHz	Recorded Measurement dBm	Specification Limit dBm	Result
2412	-4.61	8	Pass
2437	-6.23	8	Pass
2462	-3.43	8	Pass

PSD - 2412 MHz

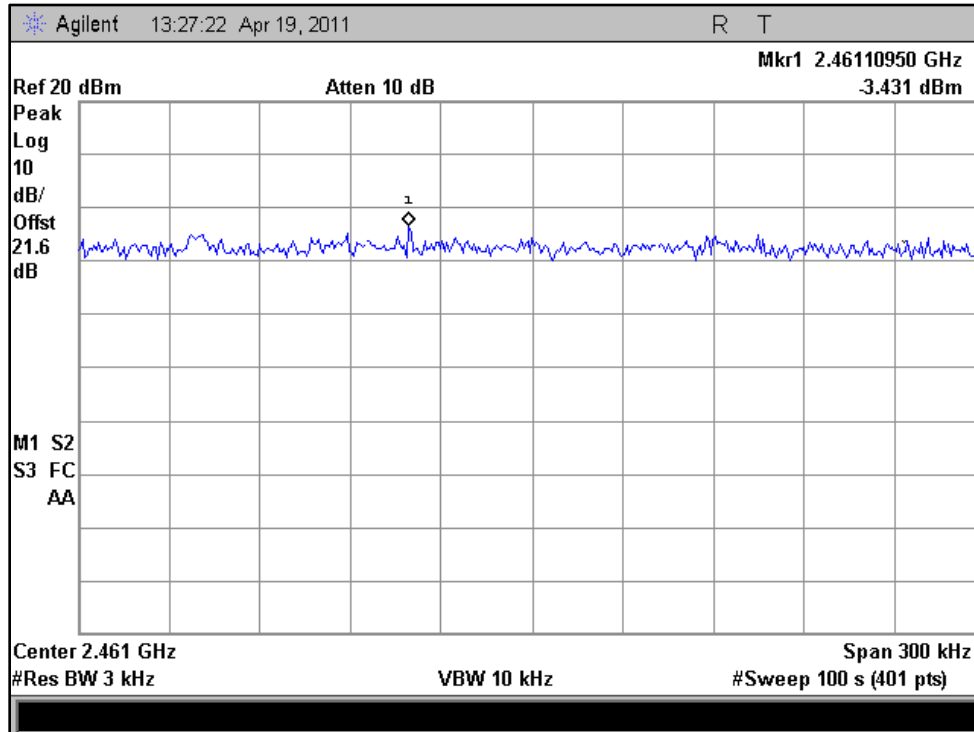




PSD - 2437 MHz



PSD 2462 MHz





A/C Powerline Conducted Emission

Name of Test: A/C Powerline Conducted Emissions

Specification: 15.207

Engineer: Greg Corbin

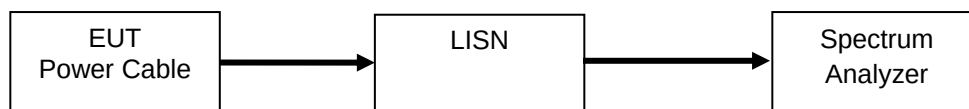
Test Equipment Utilized: i00270, i00362, i00379

Test Date: 12/28/2010

Test Procedure

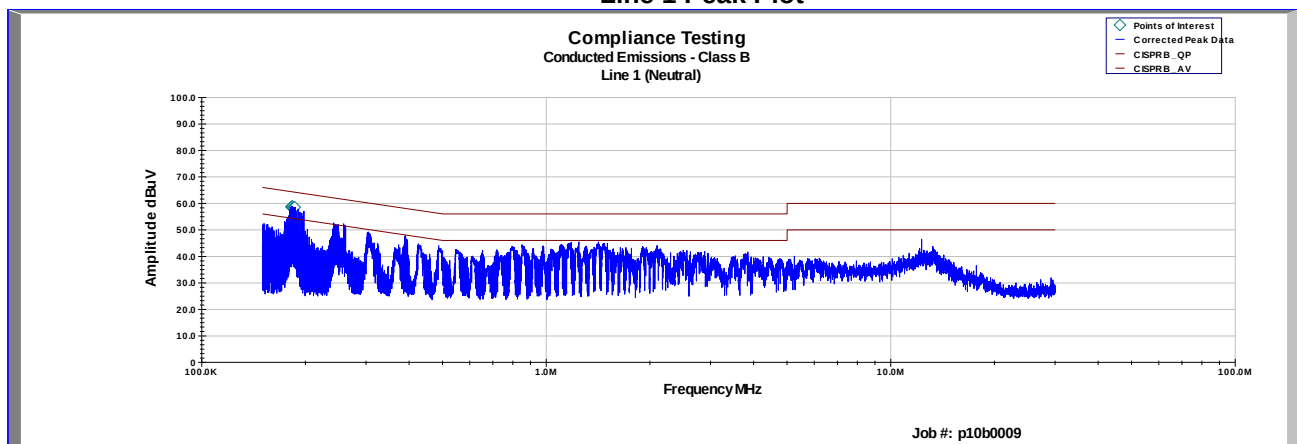
The EUT power cable was connected to a LISN and the monitored output of the LISN was connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

Test Setup

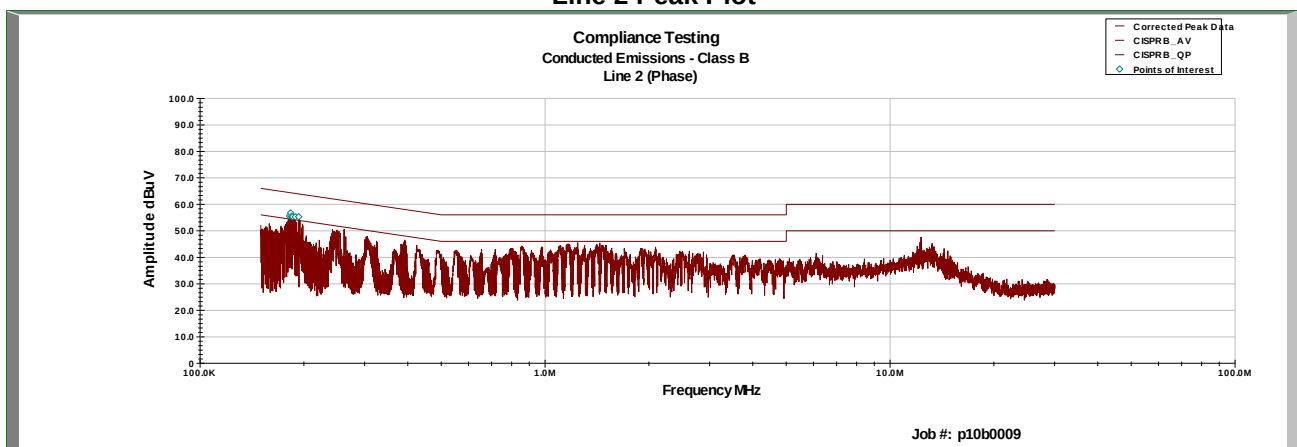


Conducted Emissions Test Results

Line 1 Peak Plot



Line 2 Peak Plot





Line 1 Neutral AVG Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L1 Final Data (dBuV)	CISPR/FCC Limit (dBuV)	AVG Margin (dB)
182.03 KHz	35.17	0.2	0.007	10	45.378	55.085	-9.707
183.14 KHz	36.15	0.2	0.003	10	46.35	55.053	-8.703
183.27 KHz	36.47	0.2	0.005	10	46.674	55.049	-8.376
184.54 KHz	35.38	0.2	0.001	10	45.585	55.013	-9.428
185.1 KHz	35.02	0.2	0	10	45.22	54.997	-9.778
189.51 KHz	32.35	0.2	0.006	10	42.555	54.871	-12.316

Line 2 Phase AVG Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L2 Final Data (dBuV)	CISPR/FCC Limit (dBuV)	AVG Margin (dB)
180.59 KHz	31.78	0.2	0.007	10	41.988	55.126	-13.138
180.92 KHz	32.18	0.2	0.005	10	42.387	55.117	-12.729
182.16 KHz	33.73	0.2	0.005	10	43.939	55.081	-11.142
182.58 KHz	33.86	0.2	0.003	10	44.059	55.069	-11.011
183.02 KHz	33.99	0.2	0.007	10	44.194	55.057	-10.863
184.29 KHz	33.87	0.2	0.004	10	44.078	55.02	-10.942

Line 1 Neutral QP Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L1 Final Data (dBuV)	CISPR/FCC Limit (dBuV)	QP Margin (dB)
182.03 KHz	45.246	0.2	0.007	10	55.452	65.085	-9.633
183.14 KHz	45.888	0.2	0.003	10	56.091	65.053	-8.962
183.27 KHz	46.342	0.2	0.005	10	56.547	65.049	-8.503
184.54 KHz	44.879	0.2	0.001	10	55.08	65.013	-9.933
185.1 KHz	44.544	0.2	0	10	54.744	64.997	-10.253
189.51 KHz	41.076	0.2	0.006	10	51.281	64.871	-13.59

Line 2 Phase QP Detector

Frequency	Measured Data (dBuV)	LISN Corr Fact (dB)	Cable Loss (dB)	Attenuator (dB)	L2 Final Data (dBuV)	CISPR/FCC Limit (dBuV)	QP Margin (dB)
180.59 KHz	41.45	0.2	0.007	10	51.659	65.126	-13.467
180.92 KHz	41.86	0.2	0.005	10	52.069	65.117	-13.047
182.16 KHz	43.43	0.2	0.005	10	53.632	65.081	-11.449
182.58 KHz	43.42	0.2	0.003	10	53.625	65.069	-11.444
183.02 KHz	43.38	0.2	0.007	10	53.584	65.057	-11.473
184.29 KHz	43.16	0.2	0.004	10	53.363	65.02	-11.657



Receiver Spurious Emissions

Name of Test: Receiver Spurious Emissions

Specification: RSS-GEN-6(b)

Engineer: Greg Corbin

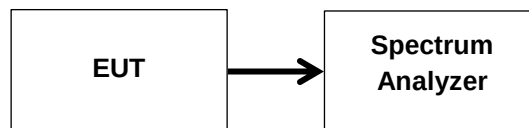
Test Equipment Utilized: i00331

Test Date: 4/14/2011

Test Procedure

The EUT was connected directly to a spectrum analyzer. The receiver spurious emissions were measured from 30 MHz to greater than 3 times the highest tunable frequency.

Test Setup

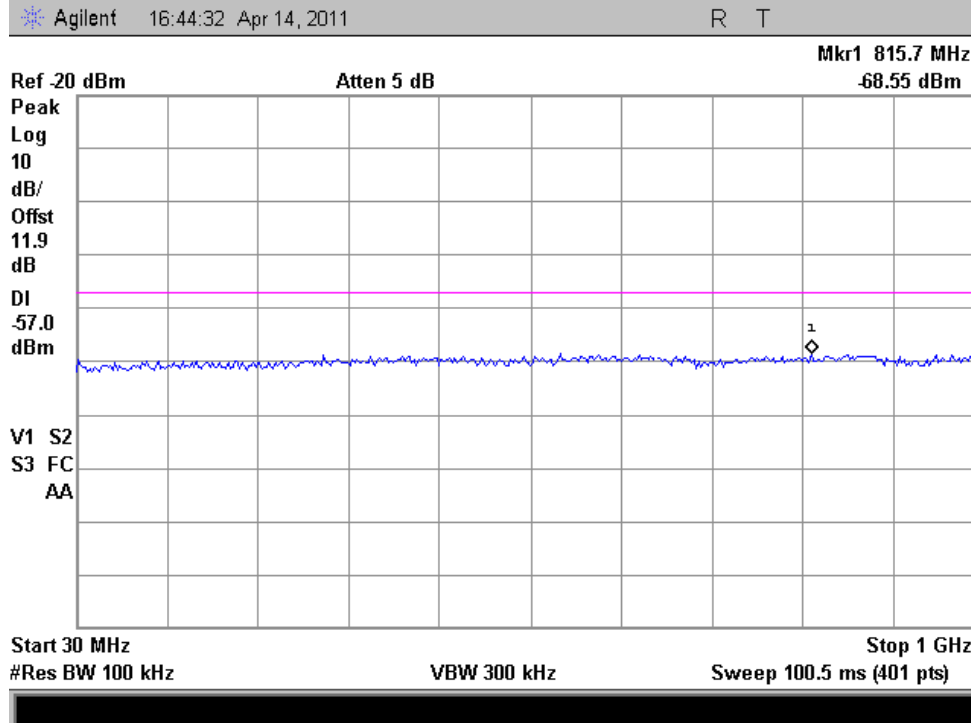


Receiver Spurious Emissions Summary

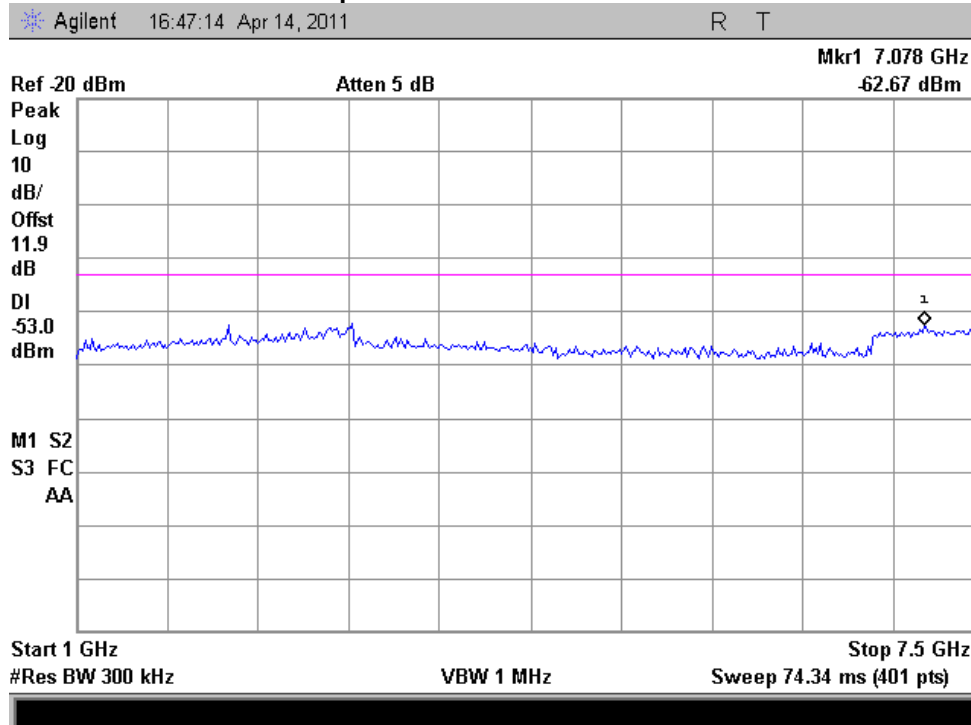
Frequency Range MHz	Recorded Measurement	Specification Limit	Result
30 – 1000	-68.5 dBm	2 nW (-57 dBm)	Pass
1000 - 8000	-62.6 dBm	5 nW (-53 dBm)	Pass



Receiver Spurious Emissions 30 MHz – 1 GHz



Receiver Spurious Emissions 1 GHz – 7.5 GHz





Test Equipment Utilized

Description	MFG	Model Number	CT Asset Number	Last Cal Date	Cal Due Date
Preamplifier	HP	8449A	i00028	9/21/2010	9/21/2011
Horn Antenna	EMCO	3115	i00103	11/5/2010	11/5/2012
High Pass filter	Trilithic	4HX3400-3-XX	i00177	Verify	When used
Bilog Antenna	Schaffner	CBL6111C	i00267	11/21/2009	11/21/2011
LISN	FCC	FCC-LISN-50-50-2-01	i00270	9/30/2010	9/30/2012
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	11/11/2010	11/11/2011
Spectrum Analyzer	Agilent	E4407B	i00331	12/20/2010	12/20/2011
Humidity / Temp Meter	Control Co.	4189CC	i00355	1/26/2011	1/26/2012
AC Power Source	Behlman	BL 6000	i00362	Verify	When used
Spectrum Analyzer	Agilent	E7405A	i00379	11/22/2010	11/22/2011
Band Reject Filter	Wainwright	WRCTF2402/2480	i00385	Verify	When used

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