



Compliance Testing, LLC

Previously Flom Test Lab

EMI, EMC, RF Testing Experts Since 1963

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Test Report

Prepared for: Unigen Corporation

Model: UGWDS82NSM33

Description: 802.11 b/g/n WiFi Radio Module

To

FCC Part(s) 15.247

Date of Issue: October 14, 2011

On the behalf of the applicant:

**Unigen Corporation
45388 Warm Springs Blvd
Fremont, CA 94539**

Attention of:

**Allen Cabreros, Director of Wireless
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By the request of:

**ECOtality North America
430 S. 2nd Ave
Phoenix, AZ 85003-2418**

**Prepared by
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Project No: p1180014**

**John Erhard
Project Test Engineer**

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	October 14, 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 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 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.



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 Deg C	Humidity %
28.7	29.7

EUT Description

Wall Mount and pedestal versions of an electric car charging system

EUT Operation during Tests

Normal hardware configuration with test software for operational testing

Accessories

Qty	Type	Make, Model	S/N
1	Laptop	Dell	N/A

Cables

Qty	Type	Length (m)	Shield	Shielded Hood	Ferrite
1	USB	6 ft.	No	No	No



Test Reports Summary

Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	N/A	
15.247(b)	Conducted Spurious Emissions	N/A	
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	N/A	
15.207	A/C Powerline Conducted Emissions	N/A	
RSS GEN6(b)	Receiver Spurious Emissions	N/A	

15.203: Antenna Requirement:

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



Radiated Spurious Emissions

Name of Test: Radiated Spurious Emissions
Specification: 15.247(d), 15.209(a), 15.205
Test Equipment Utilized: i00028, i00103, i00331, i00384

Engineer: John Erhard
Test Date: 10/13/2011

Test Procedure 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



Wall Mount Radiated Spurious Emissions 11 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Value (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Value (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4824	38.34	74.0	36.82	54.0	Pass
2412	7236	43.92	74.0	40.89	54.0	Pass
2412	9648	50.24	74.0	46.13	54.0	Pass
2437	4874	47.55	74.0	40.96	54.0	Pass
2437	7311	49.81	74.0	43.21	54.0	Pass
2437	9748	55.32	74.0	50.38	54.0	Pass
2462	4924	46.00	74.0	42.03	54.0	Pass
2462	7386	51.20	74.0	44.33	54.0	Pass
2462	9848	55.90	74.0	50.64	54.0	Pass

Wall Mount Radiated Spurious Emissions 54 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Value (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Value (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4824	46.26	74.0	41.19	54.0	Pass
2412	7236	51.88	74.0	43.08	54.0	Pass
2412	9648	52.70	74.0	47.56	54.0	Pass
2437	4874	39.19	74.0	35.54	54.0	Pass
2437	7311	42.99	74.0	44.59	54.0	Pass
2437	9748	47.18	74.0	45.76	54.0	Pass
2462	4924	41.00	74.0	37.30	54.0	Pass
2462	7386	44.42	74.0	32.82	54.0	Pass
2462	9848	45.54	74.0	45.09	54.0	Pass

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



Pedestal Radiated Spurious Emissions 11 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Value (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Value (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4824	44.99	74.0	34.65	54.0	Pass
2412	7236	43.84	74.0	40.06	54.0	Pass
2412	9648	49.76	74.0	46.34	54.0	Pass
2437	4874	48.27	74.0	38.66	54.0	Pass
2437	7311	46.84	74.0	40.96	54.0	Pass
2437	9748	49.41	74.0	46.54	54.0	Pass
2462	4924	42.57	74.0	37.32	54.0	Pass
2462	7386	46.91	74.0	39.27	54.0	Pass
2462	9848	50.39	74.0	46.09	54.0	Pass

Pedestal Radiated Spurious Emissions 54 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Measured Value (dBuV/m)	Peak Limit (dBuV/m)	Average Measured Value (dBuV/m)	Average Limit (dBuV/m)	Result
2412	4824	46.32	74.0	42.57	54.0	Pass
2412	7236	53.42	74.0	46.40	54.0	Pass
2412	9648	56.13	74.0	49.20	54.0	Pass
2437	4874	48.99	74.0	40.48	54.0	Pass
2437	7311	51.62	74.0	46.77	54.0	Pass
2437	9748	56.75	74.0	52.41	54.0	Pass
2462	4924	49.63	74.0	42.14	54.0	Pass
2462	7386	50.65	74.0	47.13	54.0	Pass
2462	9848	57.78	74.0	51.75	54.0	Pass

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



Emissions at Band Edges

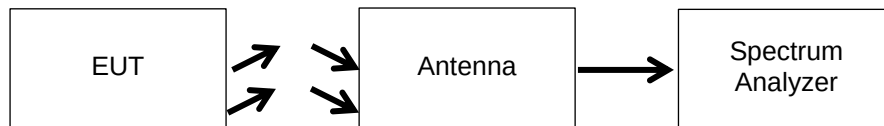
Name of Test: Emissions at Band Edges
Specification: 15.247(d), 15.209(a), 15.205
Test Equipment Utilized: i00028, i00103, i00331, i00384

Engineer: John Erhard
Test Date: 10/13/2011

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.

Band Edge Test Setup



Restricted Band Test Setup





Wall Mount Band Edge Emissions Summary 11 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBc)	Detector	Limit (dBc)	Result
2412	2400	36.95	Peak	-20 dBc	Pass
2462	2483.5	43.73	Peak	-20dBc	Pass

Wall Mount Band Edge Emissions Summary 54 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBc)	Detector	Limit (dBc)	Result
2412	2400	21.15	Peak	-20 dBc	Pass
2462	2483.5	39.9	Peak	-20dBc	Pass

Wall Mount Restricted Band Emissions Summary 11 MB

Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2337.575	52.57	Peak	74	Pass
2300 – 2390	2412	2337.575	46.24	Average	54	Pass
2483.5 - 2500	2462	2556.02	49.89	Peak	74	Pass
2483.5 - 2500	2462	2556.02	44.40	Average	54	Pass

Wall Mount Restricted Band Emissions Summary 54 MB

Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2389.55	58.93	Peak	74	Pass
2300 – 2390	2412	2389.55	52.99	Average	54	Pass
2483.5 - 2500	2462	2483.79	61.02	Peak	74	Pass
2483.5 - 2500	2462	2483.79	50.65	Average	54	Pass



Pedestal Band Edge Emissions Summary 11 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBc)	Detector	Limit (dBc)	Result
2412	2400	37.4	Peak	-20 dBc	Pass
2462	2483.5	40.32	Peak	-20dBc	Pass

Pedestal Band Edge Emissions Summary 54 MB

Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBc)	Detector	Limit (dBc)	Result
2412	2400	31.04	Peak	-20 dBc	Pass
2462	2483.5	45.09	Peak	-20dBc	Pass

Pedestal Restricted Band Emissions Summary 11 MB

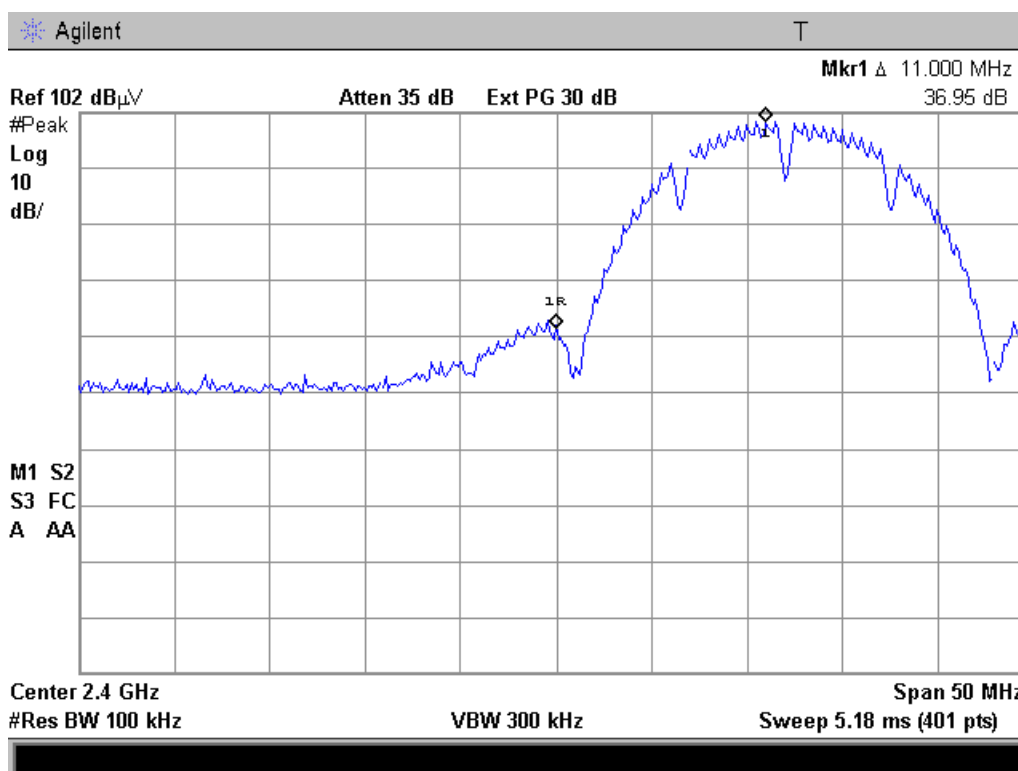
Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2386.175	52.26	Peak	74	Pass
2300 – 2390	2412	2386.175	45.99	Average	54	Pass
2483.5 - 2500	2462	2497.36	52.98	Peak	74	Pass
2483.5 - 2500	2462	2497.36	44.85	Average	54	Pass

Pedestal Restricted Band Emissions Summary 54 MB

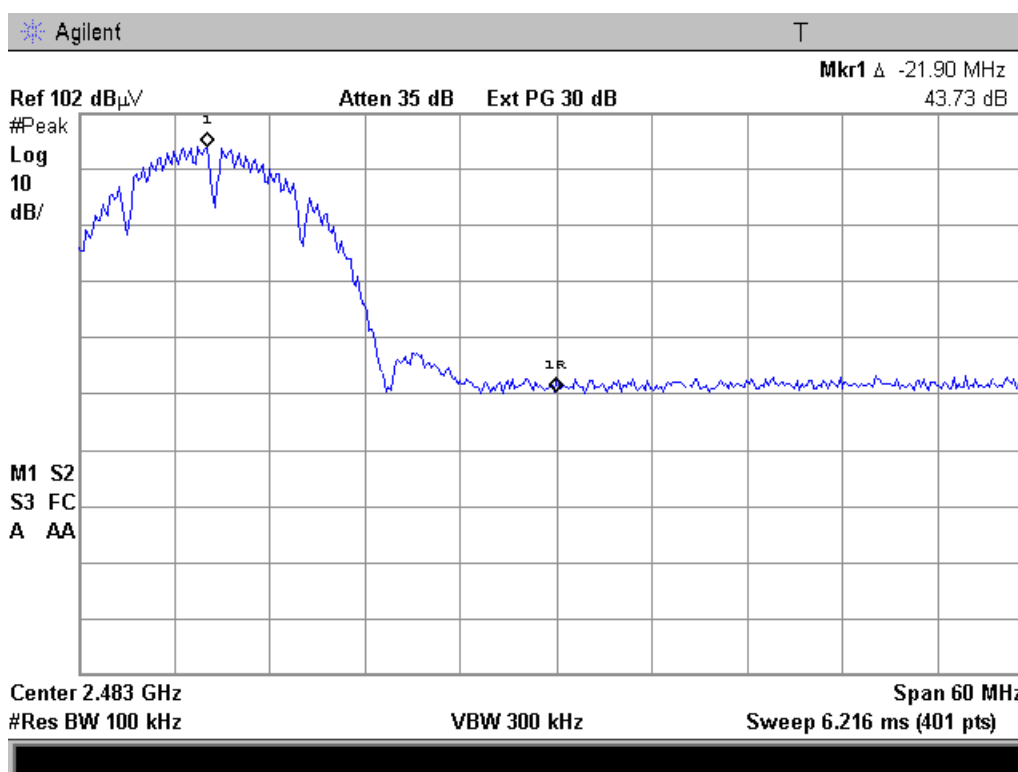
Restricted Band (MHz)	Tuned Freq (MHz)	Emission Freq (MHz)	Measured Value (dBuV/m)	Detector	Limit (dBuV/m)	Result
2300 – 2390	2412	2389.525	60.78	Peak	74	Pass
2300 – 2390	2412	2389.525	50.88	Average	54	Pass
2483.5 - 2500	2462	2483.79	60.18	Peak	74	Pass
2483.5 - 2500	2462	2483.79	49.90	Average	54	Pass



Wall Mount Band Edge 2400 MHz 11 MB

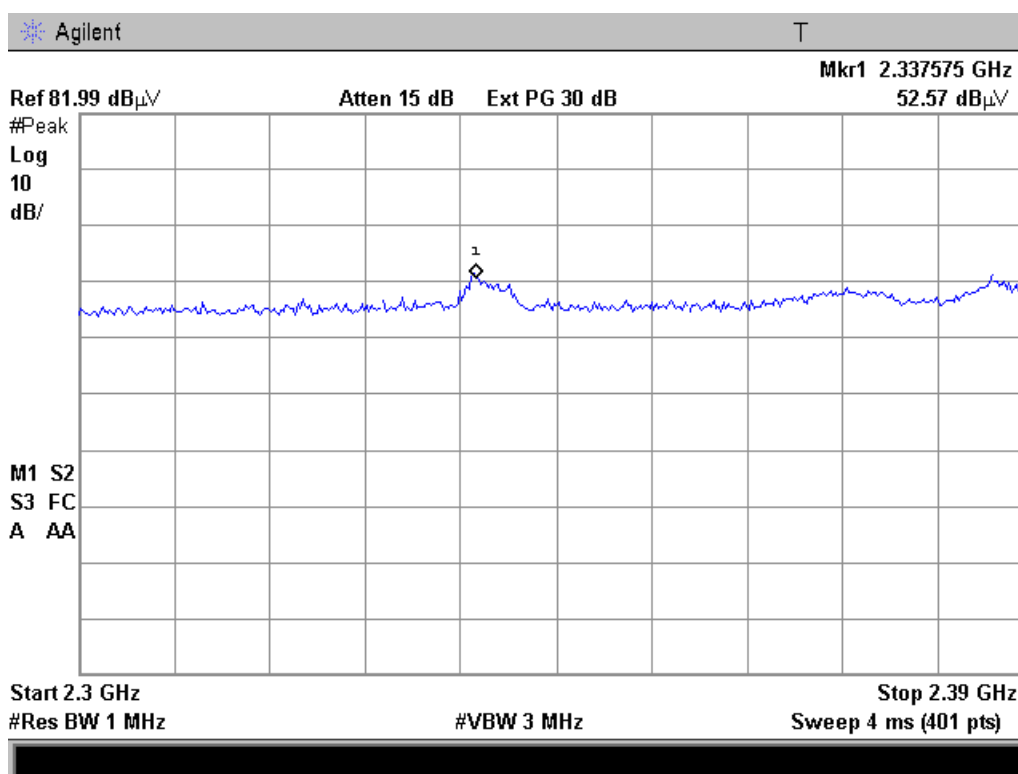


Wall Mount Band Edge 2483.5 MHz 11 MB

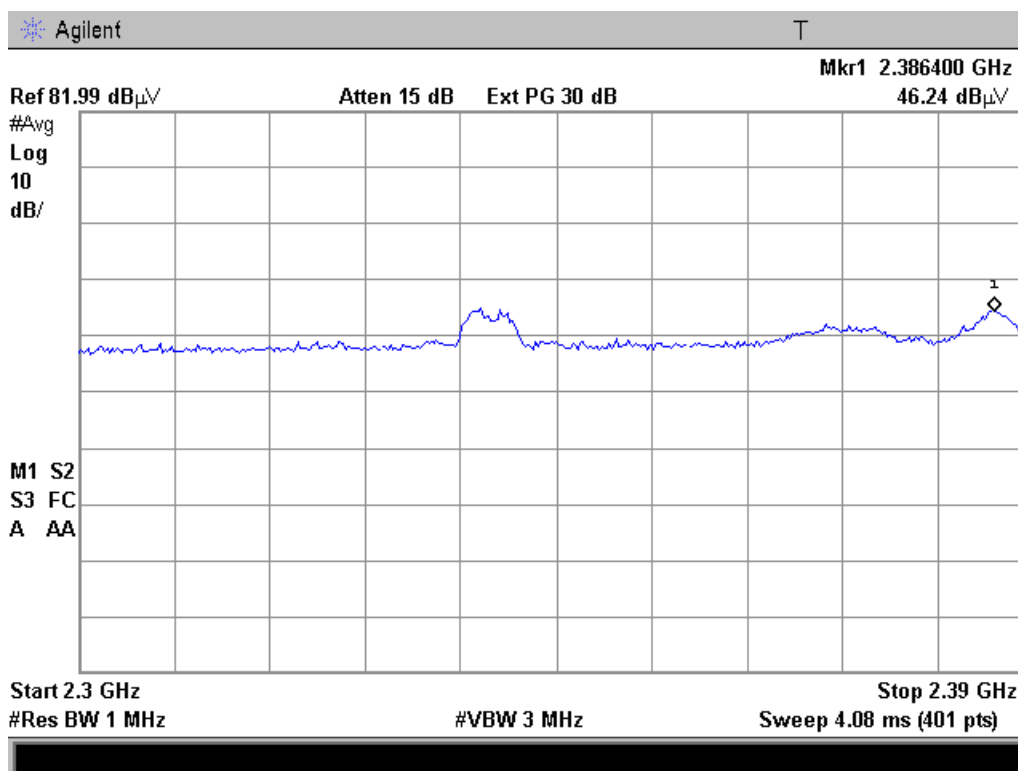




Wall Mount Restricted Band 2300 – 2390 MHz 11 MB – Peak

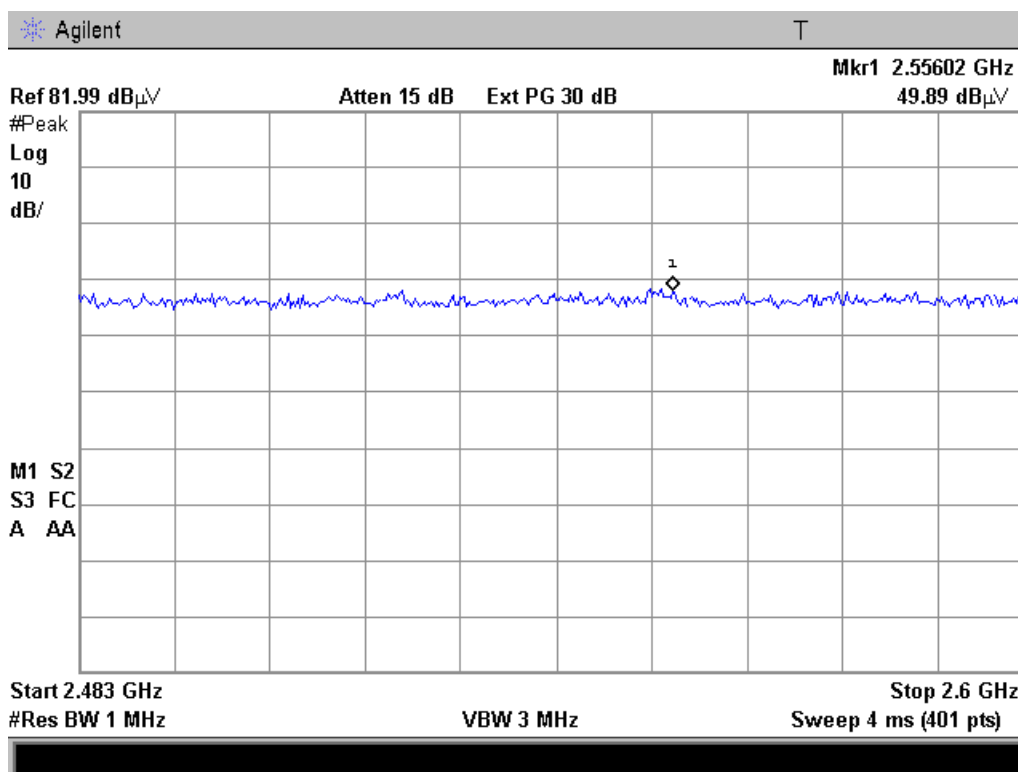


Wall Mount Restricted Band 2300 – 2390 MHz 11 MB – Avg

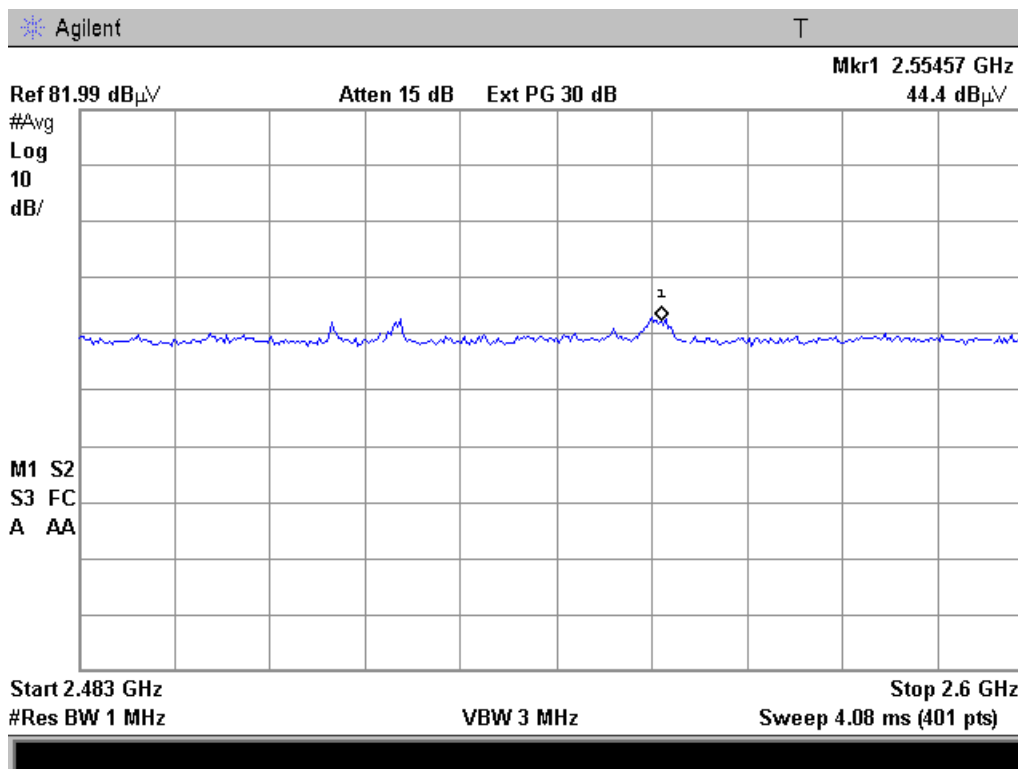




Wall Mount Restricted Band 2483.5 – 2500 MHz 11 MB – Peak

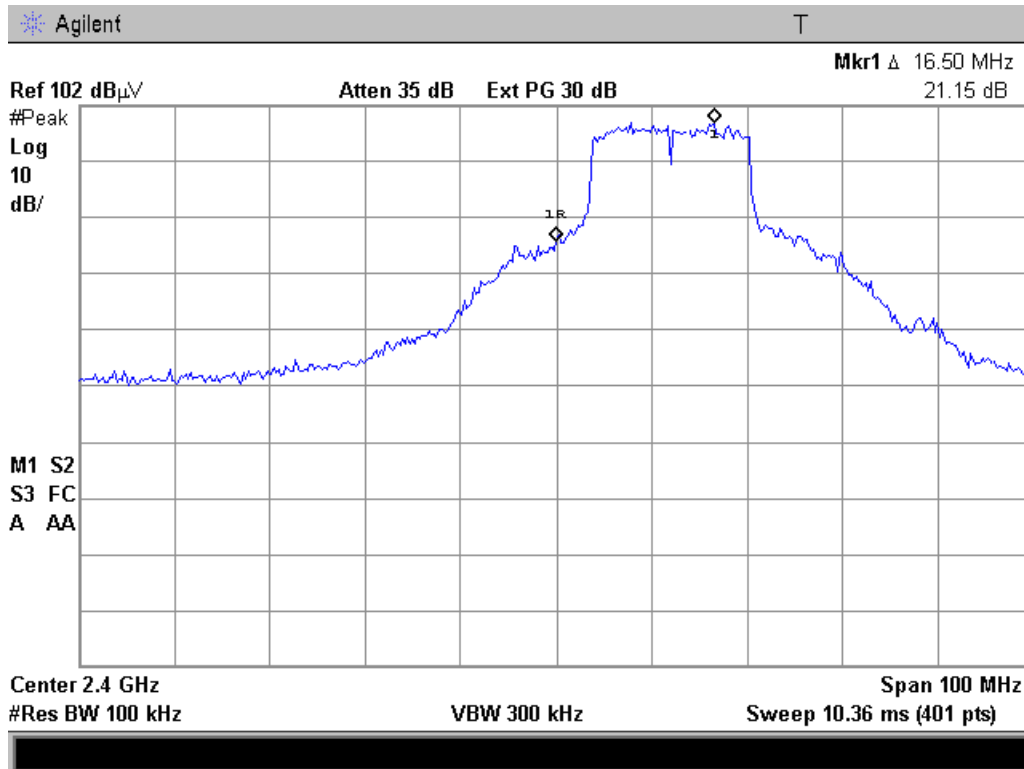


Wall Mount Restricted Band 2483.5 – 2500 MHz 11 MB – Avg

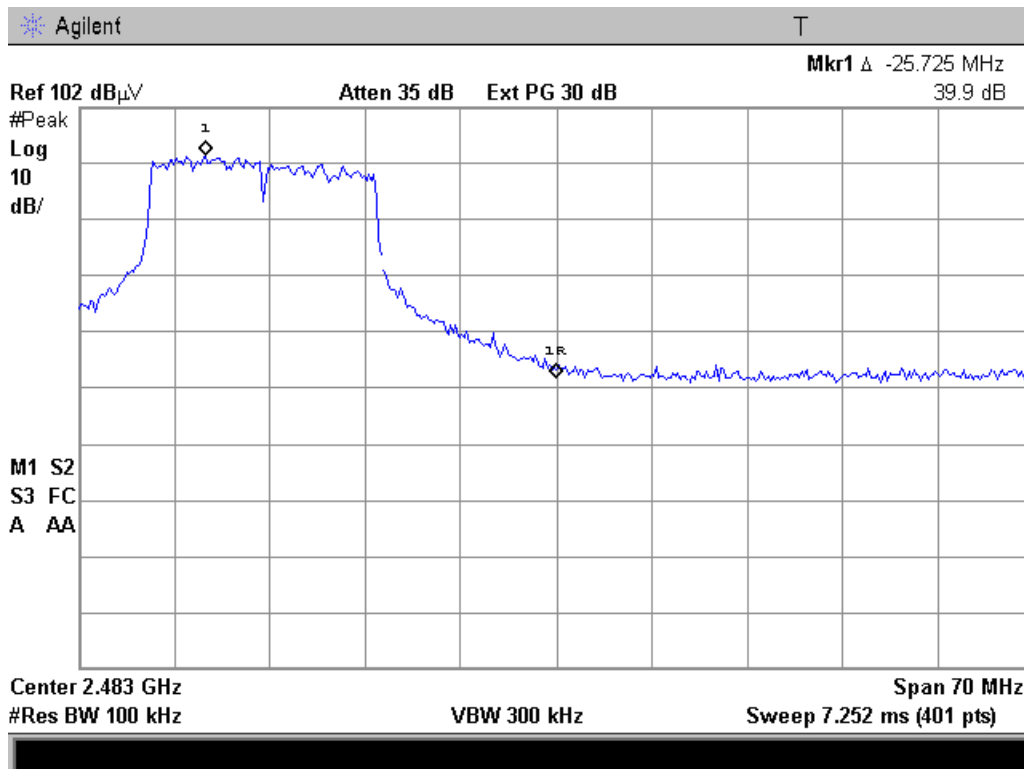




Wall Mount Band Edge 2400 MHz 54 MB

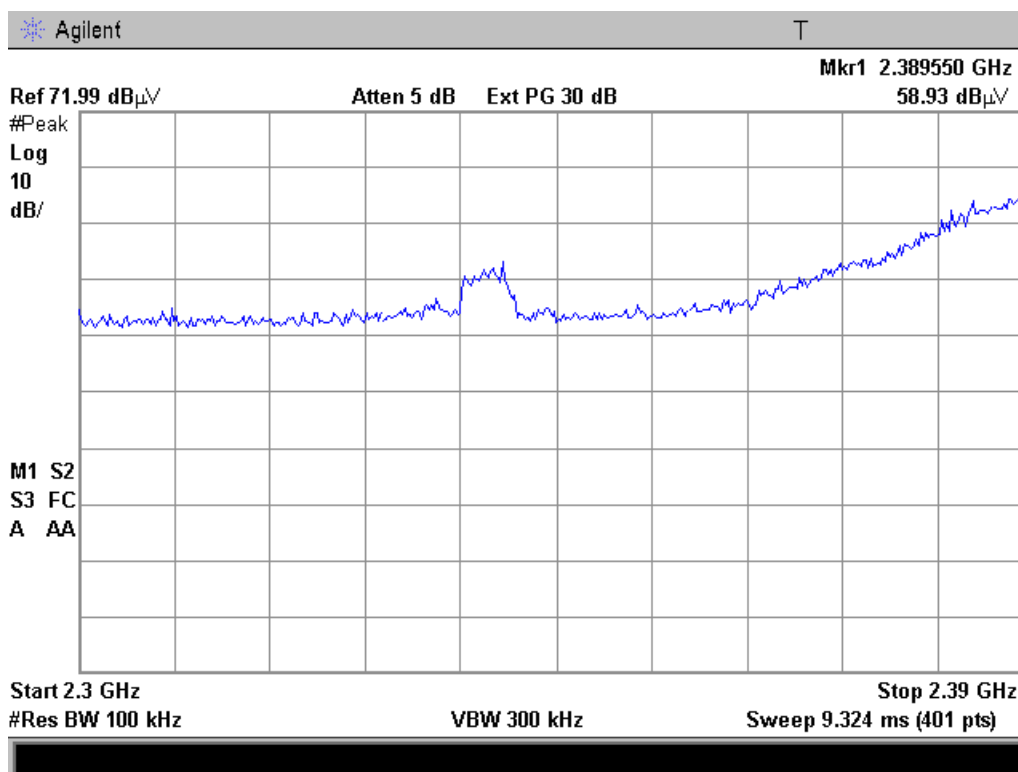


Wall Mount Band Edge 2483.5 MHz 54 MB

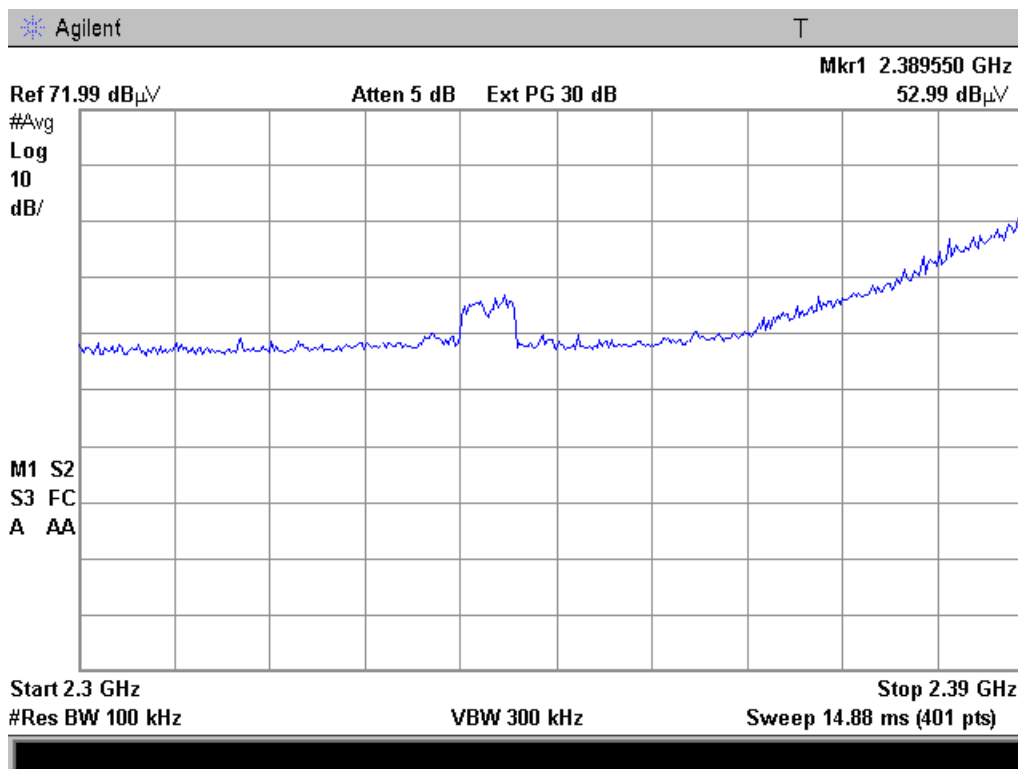




Wall Mount Restricted Band 2300 – 2390 MHz 54 MB – Peak

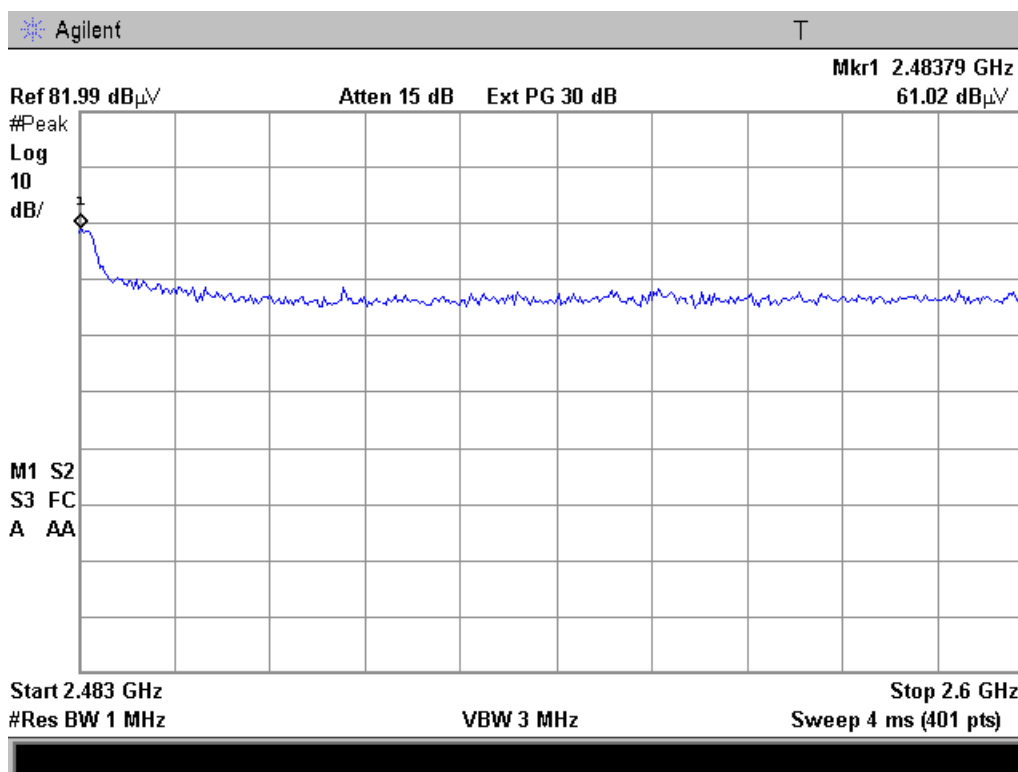


Wall Mount Restricted Band 2300 – 2390 MHz 54 MB – Avg

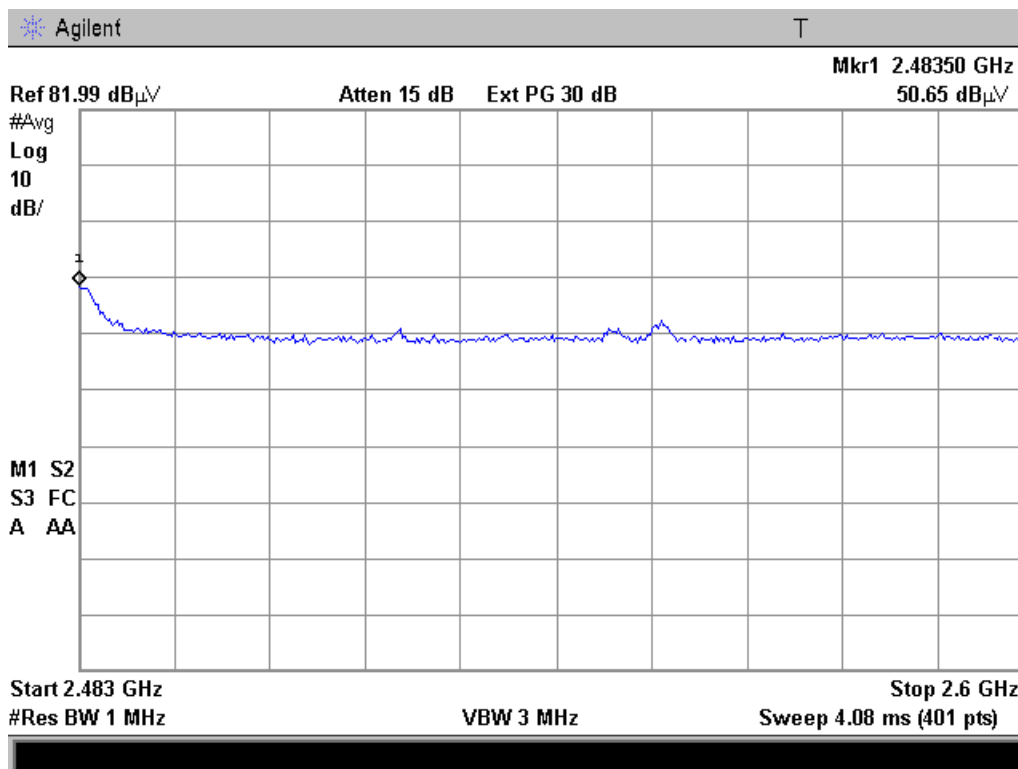




Wall Mount Restricted Band 2483.5 – 2500 MHz 54 MB – Peak

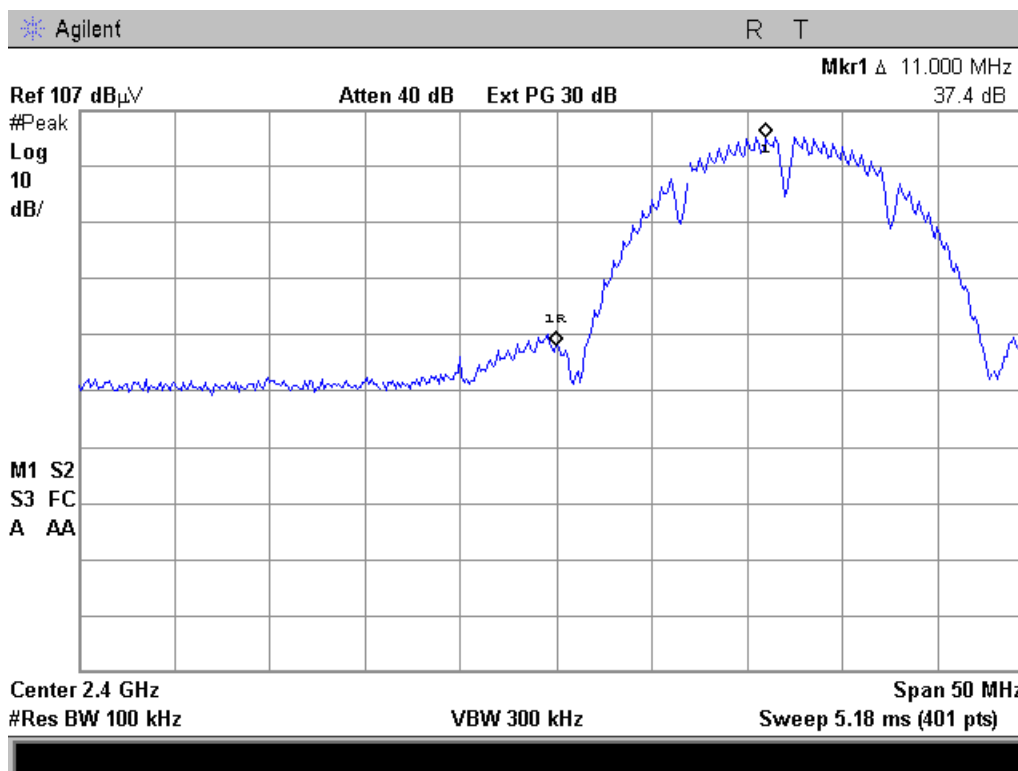


Wall Mount Restricted Band 2483.5 – 2500 MHz 54 MB – Avg

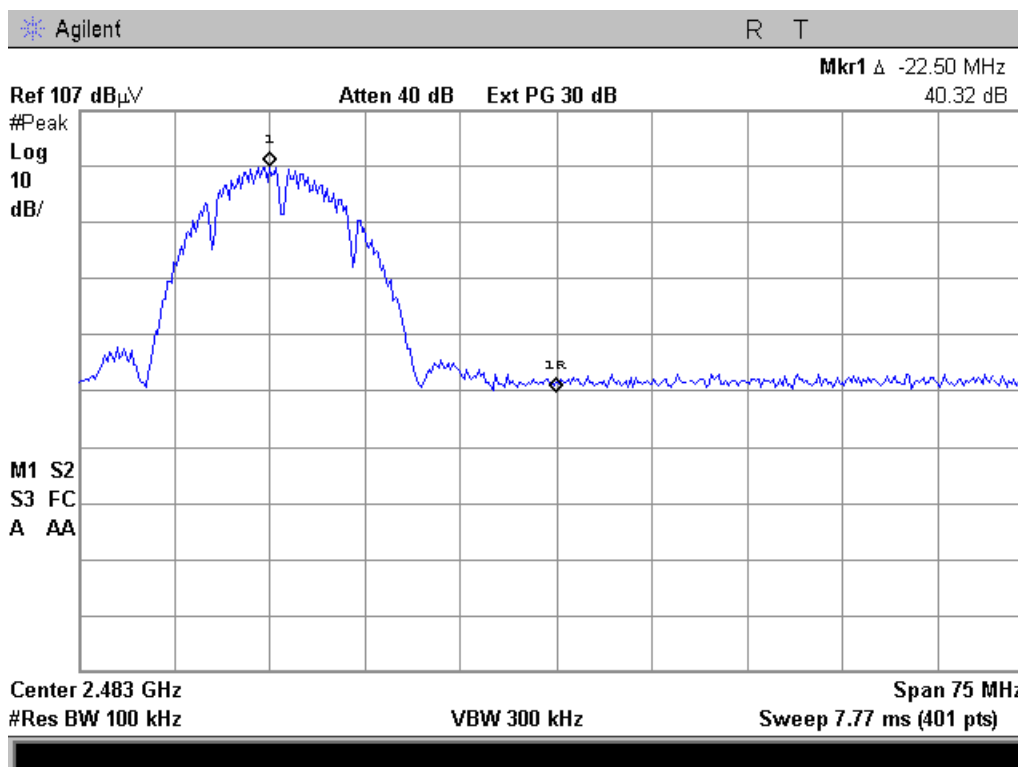




Pedestal Band Edge 2400 MHz 11 MB

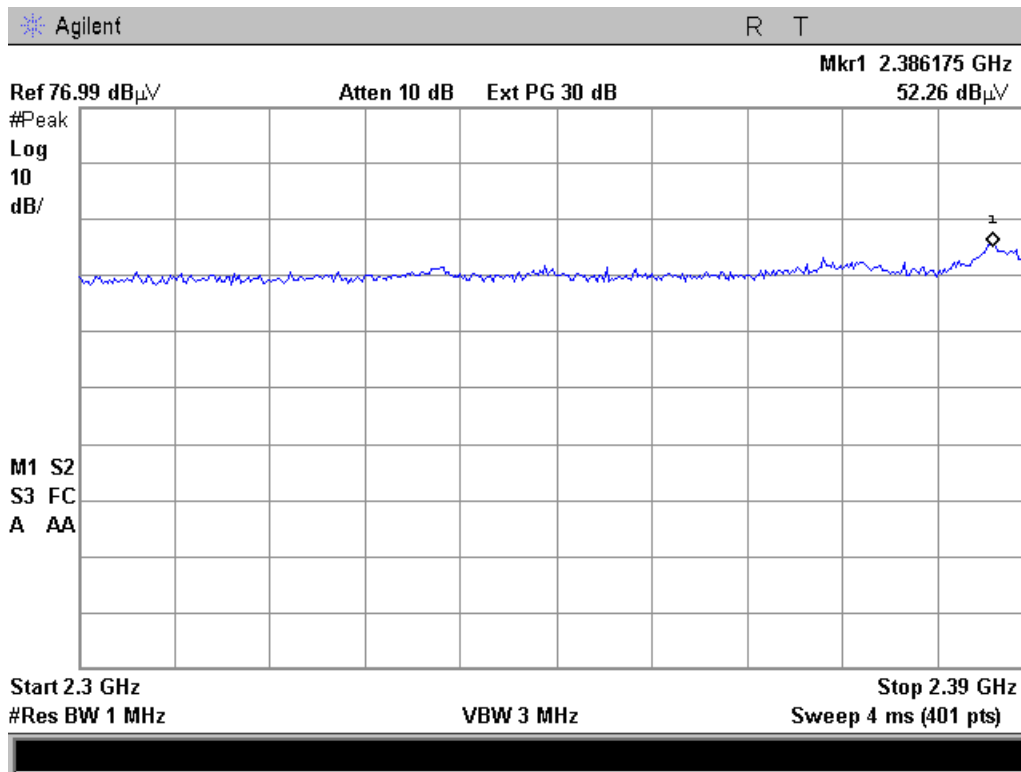


Pedestal Band Edge 2483.5 MHz 11 MB

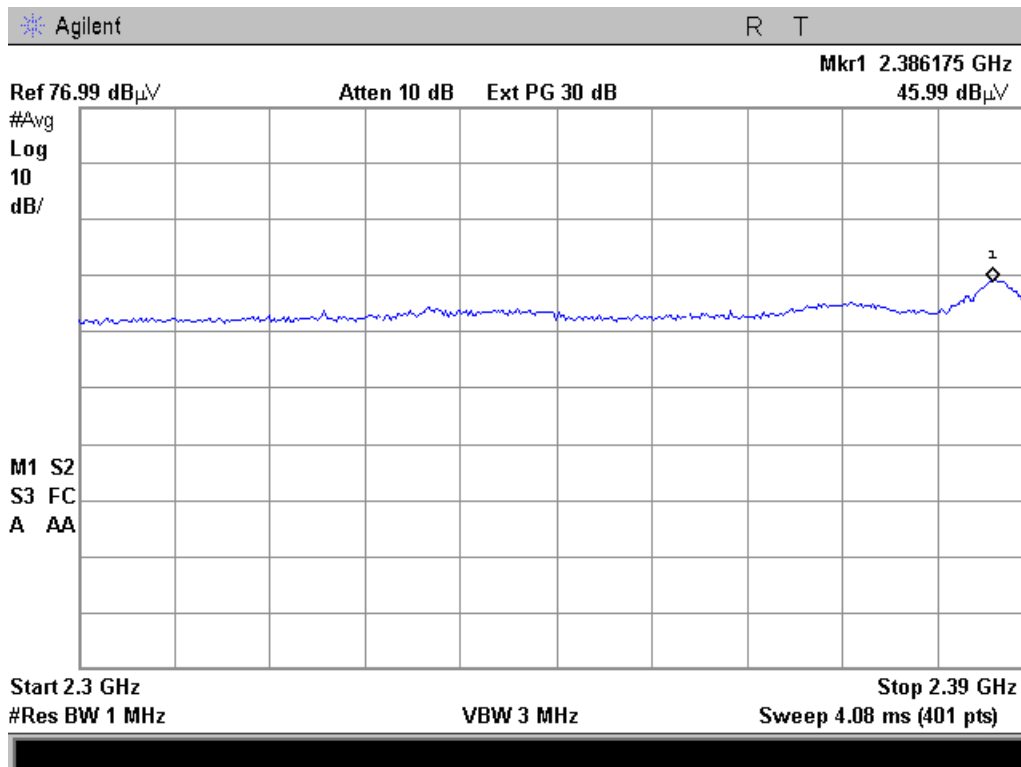




Pedestal Restricted Band 2300 – 2390 MHz 11 MB – Peak

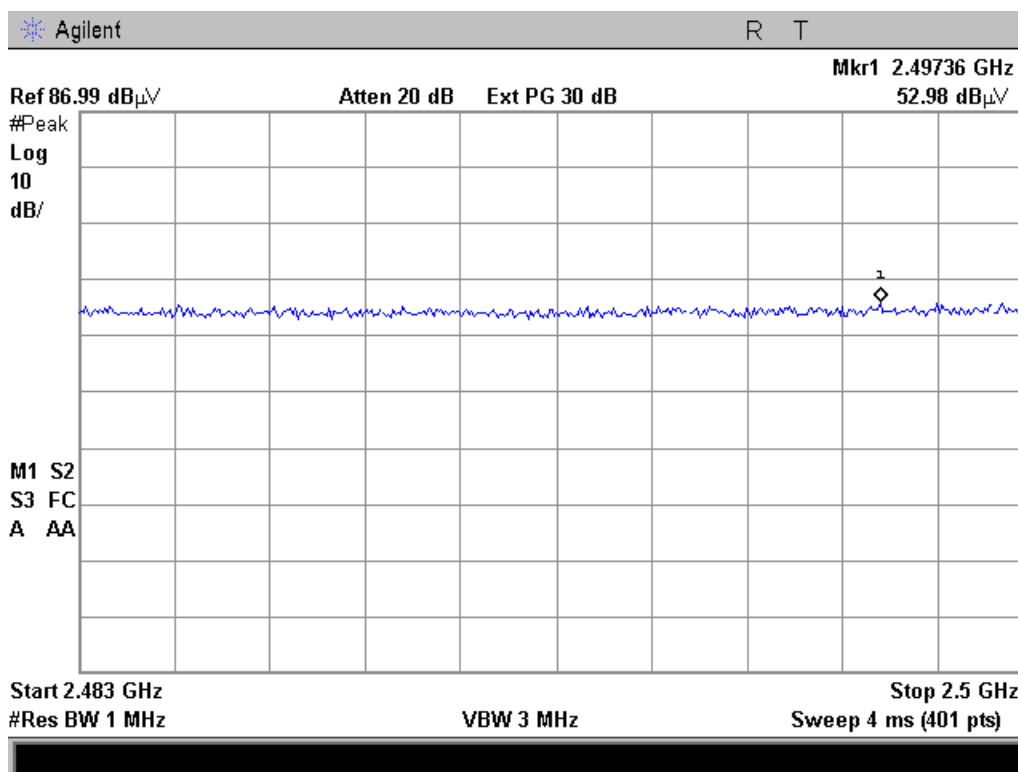


Pedestal Restricted Band 2300 – 2390 MHz 11 MB – Avg

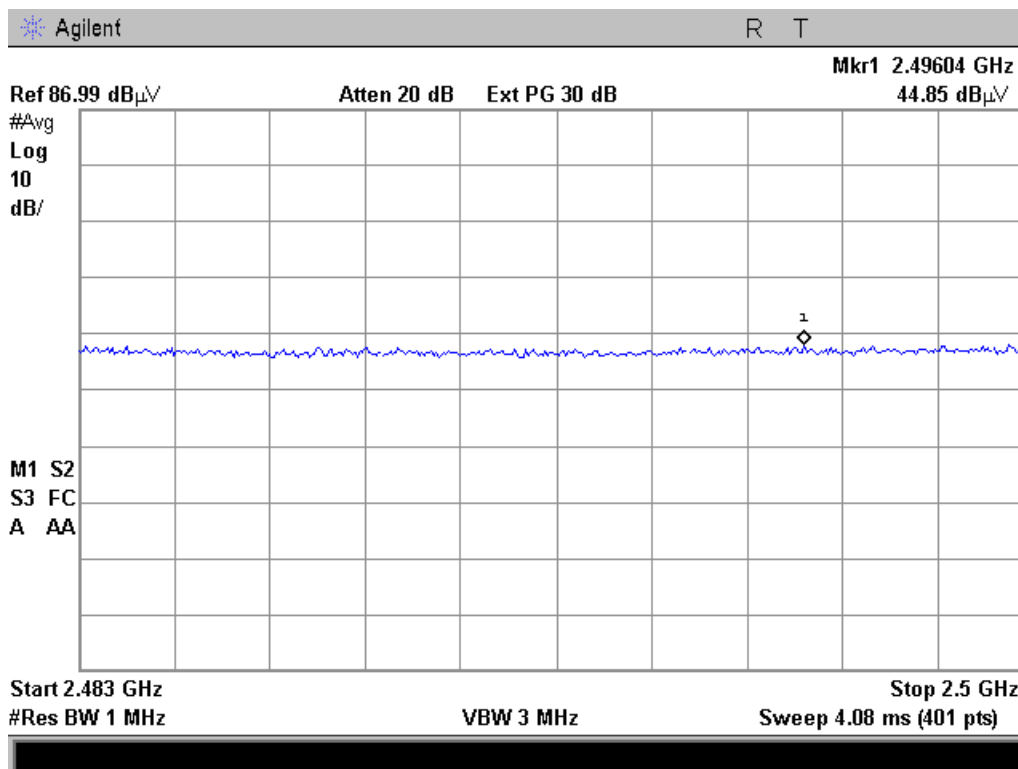




Pedestal Restricted Band 2483.5 – 2500 MHz 11 MB – Peak

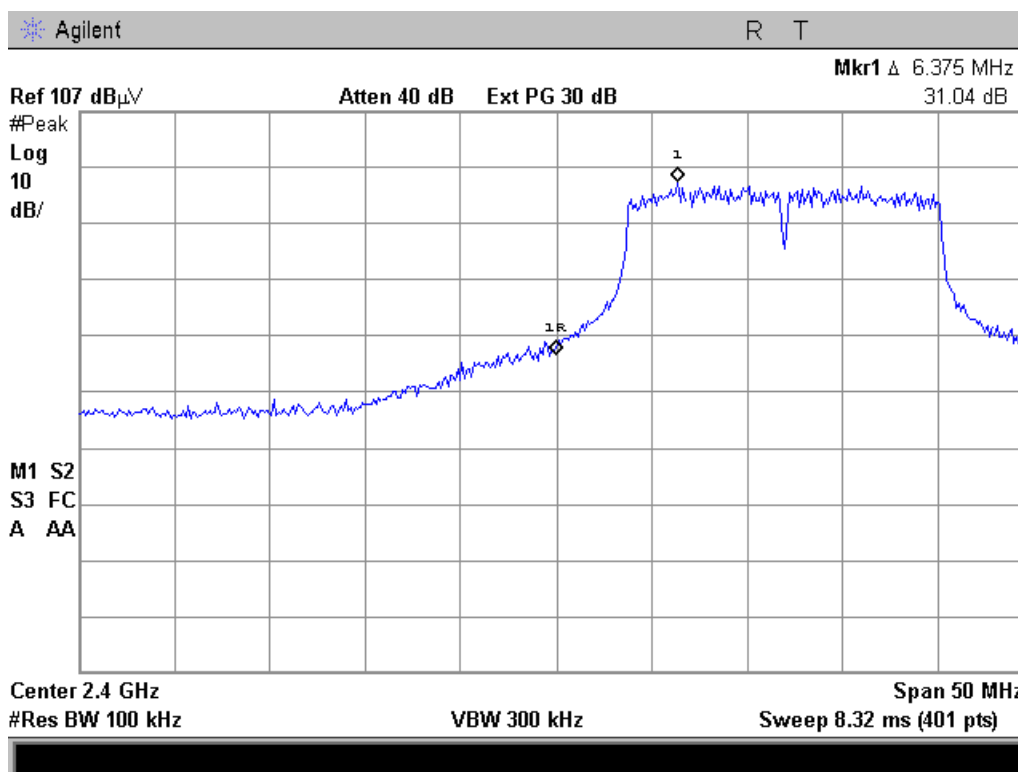


Pedestal Restricted Band 2483.5 – 2500 MHz 11 MB – Avg

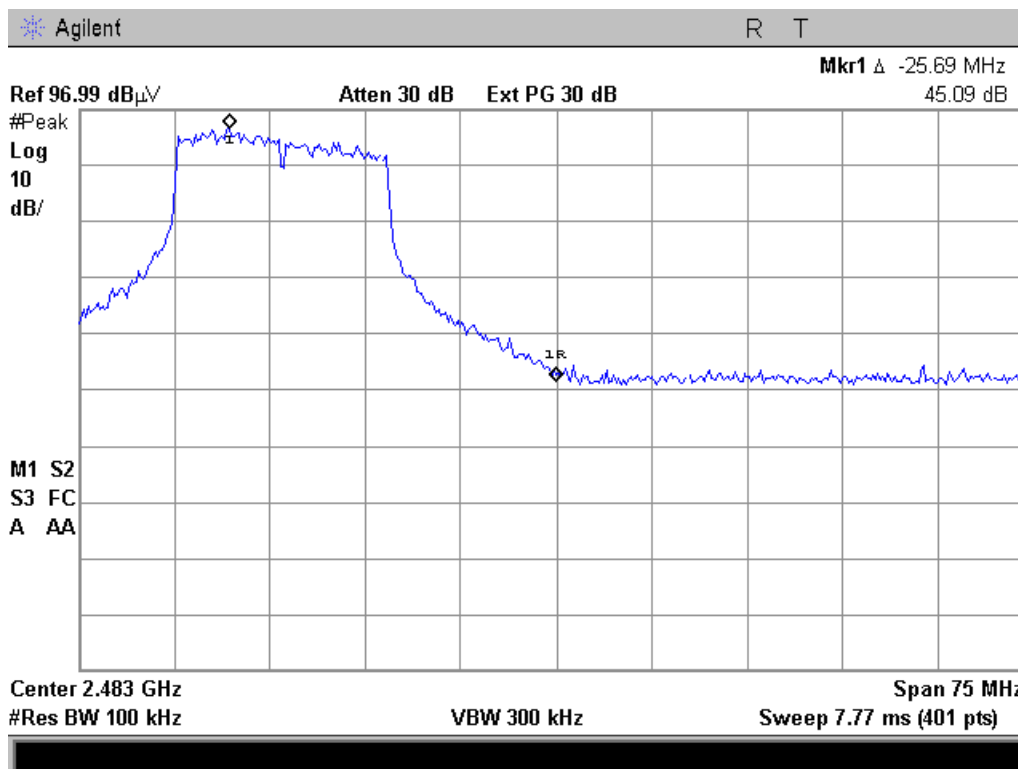




Pedestal Band Edge 2400 MHz 54 MB

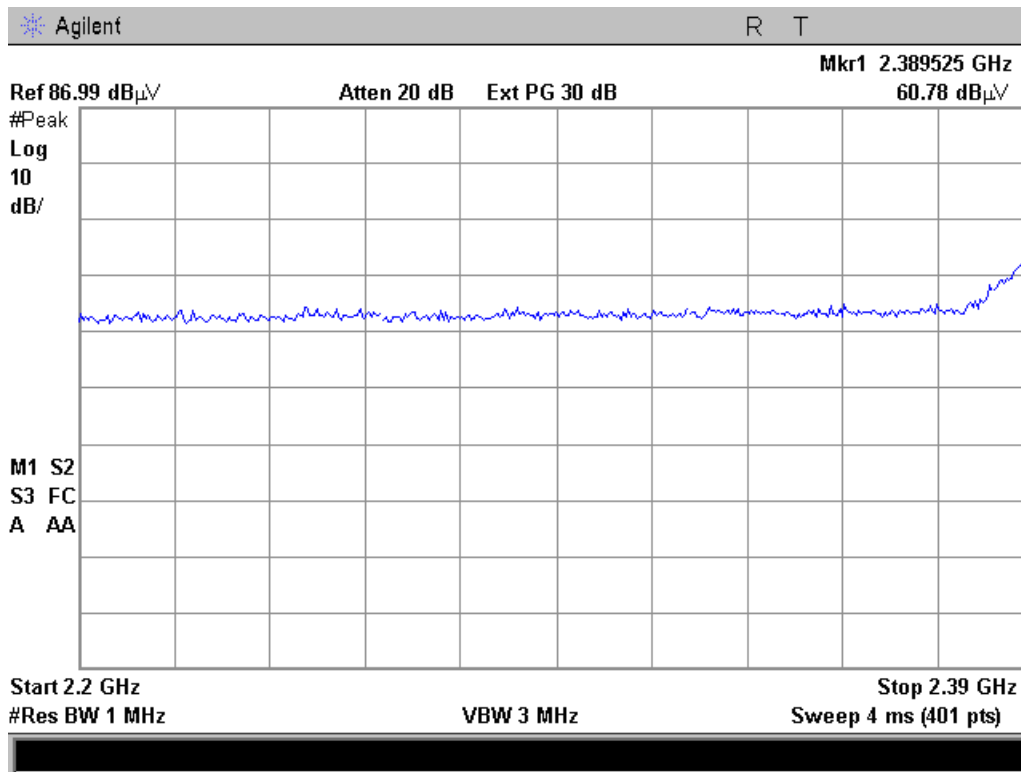


Pedestal Band Edge 2483.5 MHz 54 MB

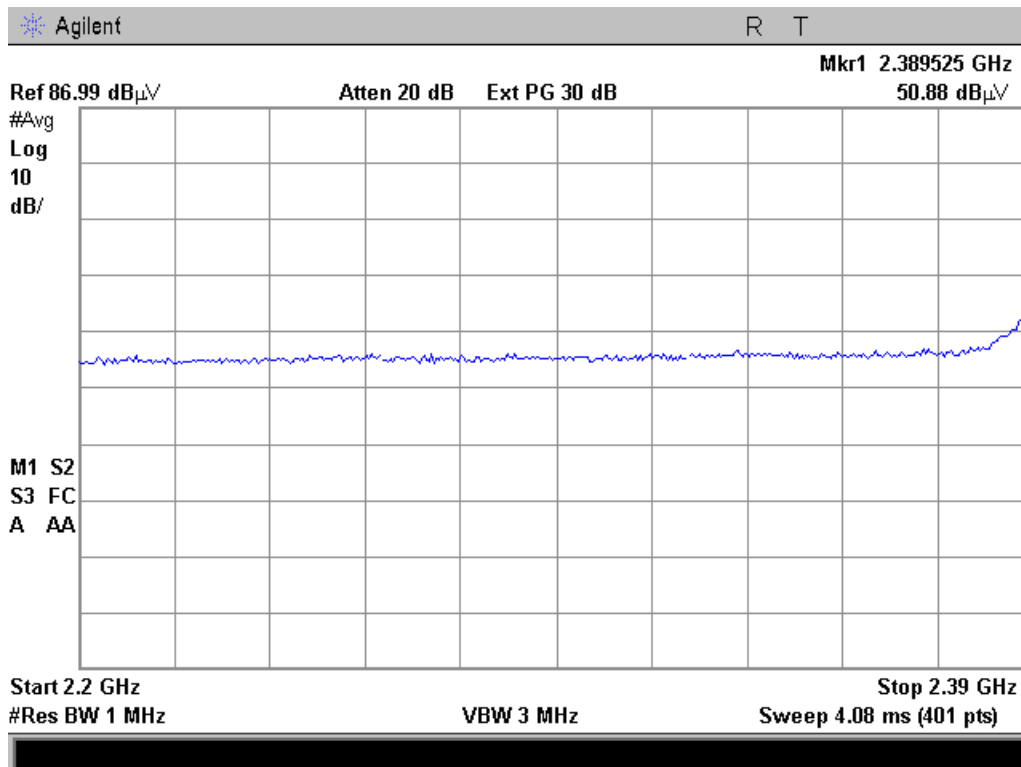




Pedestal Restricted Band 2300 – 2390 MHz 54 MB – Peak

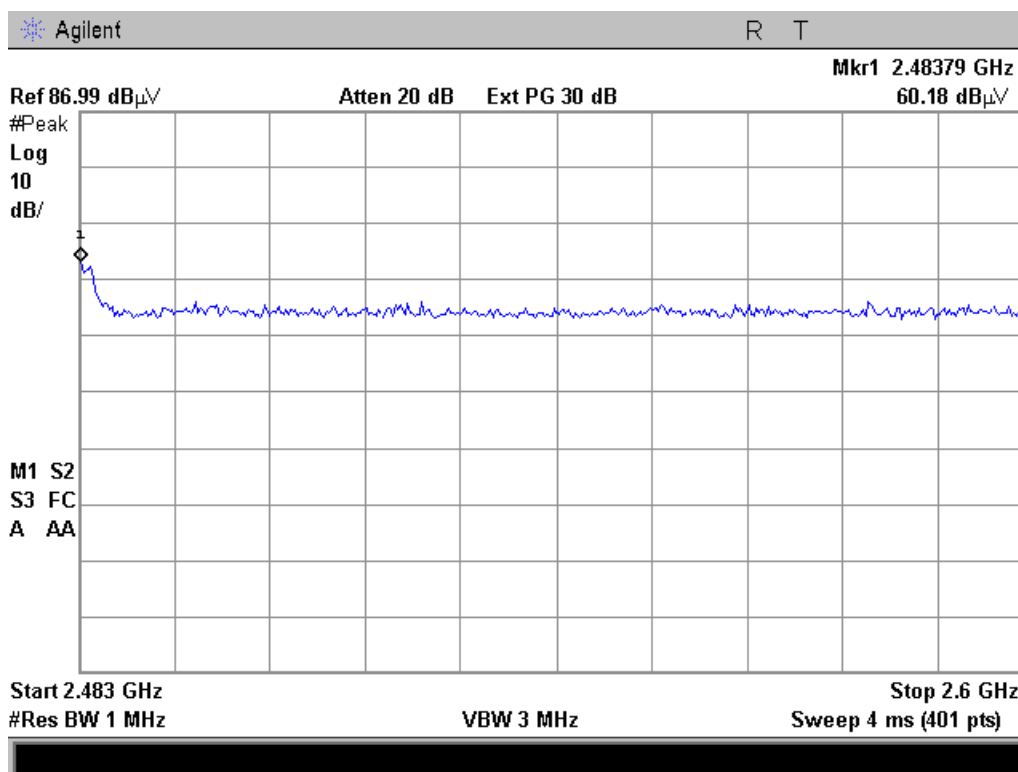


Pedestal Restricted Band 2300 – 2390 MHz 54 MB – Avg

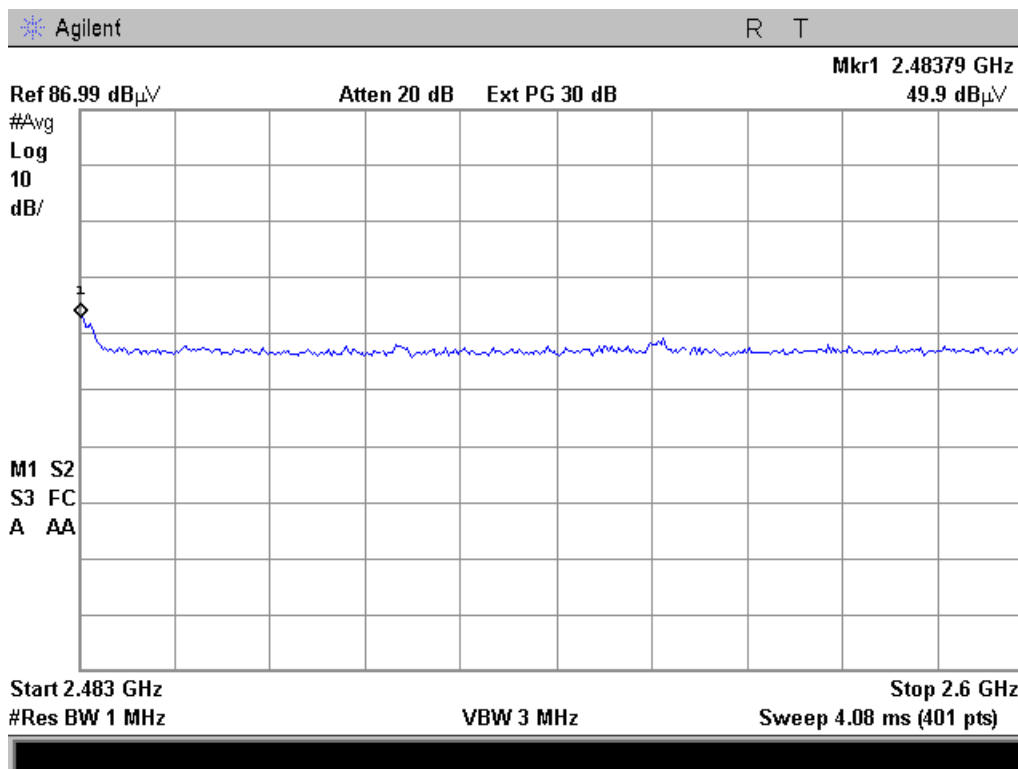




Pedestal Restricted Band 2483.5 – 2500 MHz 54 MB – Peak



Pedestal Restricted Band 2483.5 – 2500 MHz 54 MB – Avg





Occupied Bandwidth

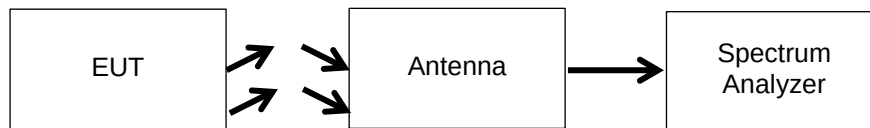
Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2)
Test Equipment Utilized: i00028, i00103, i00331

Engineer: John Erhard
Test Date: 10/13/2011

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





Wall Mount 6 dB Occupied Bandwidth Summary 11 MB

Frequency MHz	Measured Bandwidth MHz	Specification Limit kHz	Result
2412	10.212	≥ 500	Pass
2437	10.193	≥ 500	Pass
2462	9.159	≥ 500	Pass

Wall Mount 6 dB Occupied Bandwidth Summary 54 MB

Frequency MHz	Measured Bandwidth MHz	Specification Limit kHz	Result
2412	17.163	≥ 500	Pass
2437	17.001	≥ 500	Pass
2462	16.902	≥ 500	Pass

Pedestal 6 dB Occupied Bandwidth Summary 11 MB

Frequency MHz	Measured Bandwidth MHz	Specification Limit kHz	Result
2412	10.186	≥ 500	Pass
2437	9.742	≥ 500	Pass
2462	9.711	≥ 500	Pass

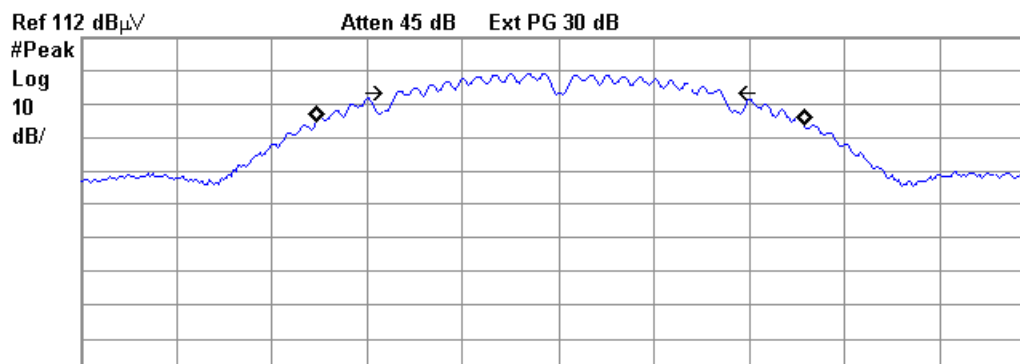
Pedestal 6 dB Occupied Bandwidth Summary 54 MB

Frequency MHz	Measured Bandwidth MHz	Specification Limit kHz	Result
2412	16.760	≥ 500	Pass
2437	16.708	≥ 500	Pass
2462	16.763	≥ 500	Pass



Wall Mount 6dB Bandwidth 2412 MHz 11 MB

Agilent T



Center 2.412 GHz Span 30 MHz
#Res BW 300 kHz VBW 1 MHz Sweep 4 ms (401 pts)

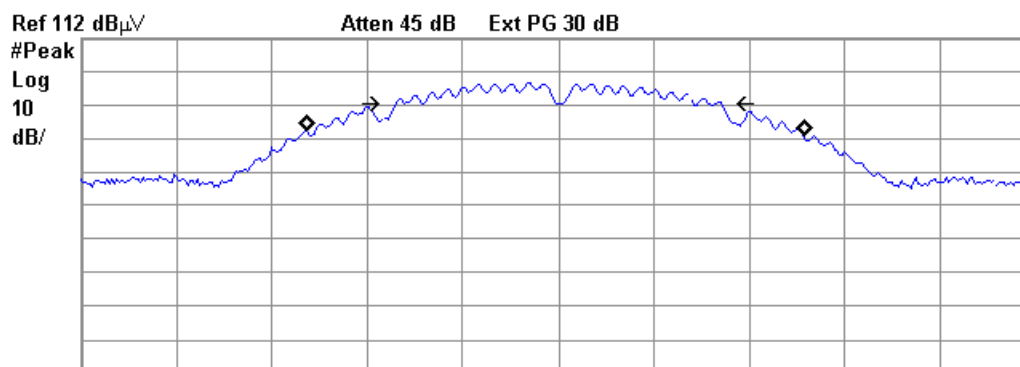
Occupied Bandwidth
15.3072 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error 61.727 kHz
x dB Bandwidth 10.212 MHz

Wall Mount 6dB Bandwidth 2437 MHz 11 MB

Agilent T



Center 2.437 GHz Span 30 MHz
#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)

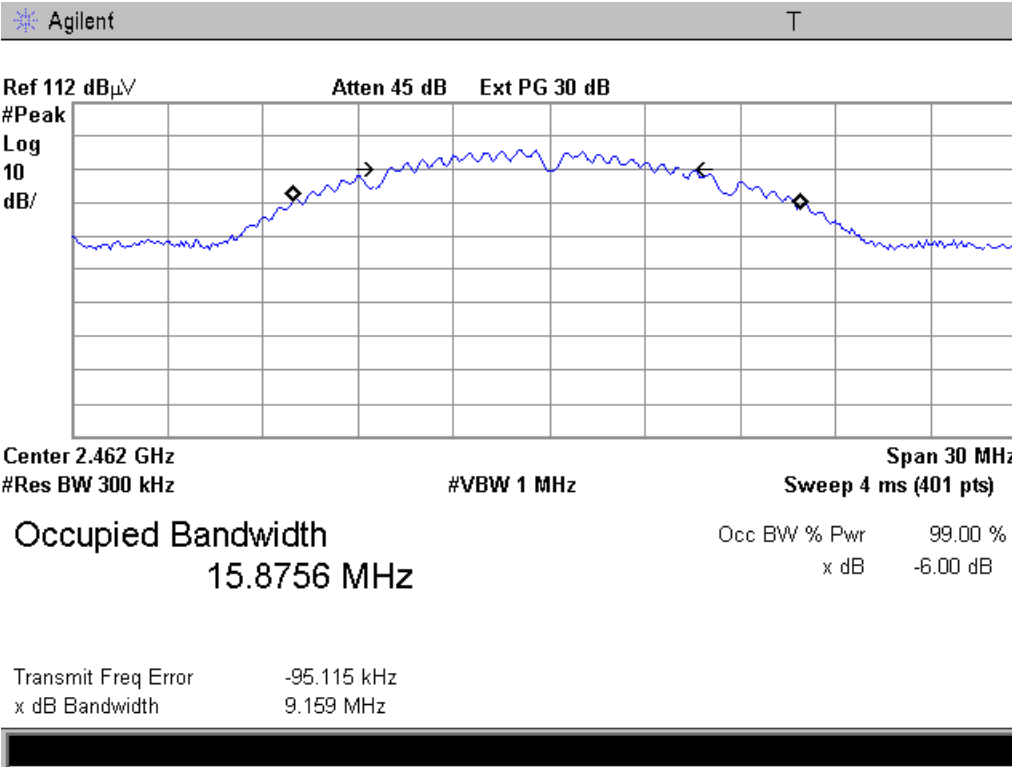
Occupied Bandwidth
15.6201 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

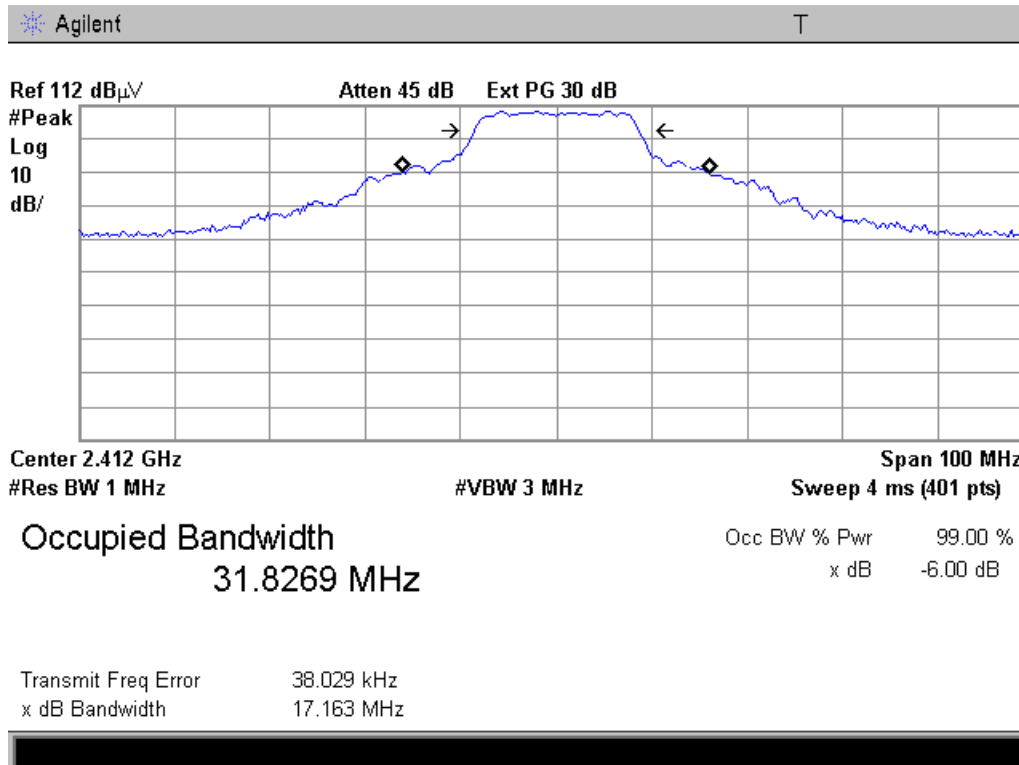
Transmit Freq Error -100.656 kHz
x dB Bandwidth 10.193 MHz



Wall Mount 6dB Bandwidth 2462 MHz 11 MB



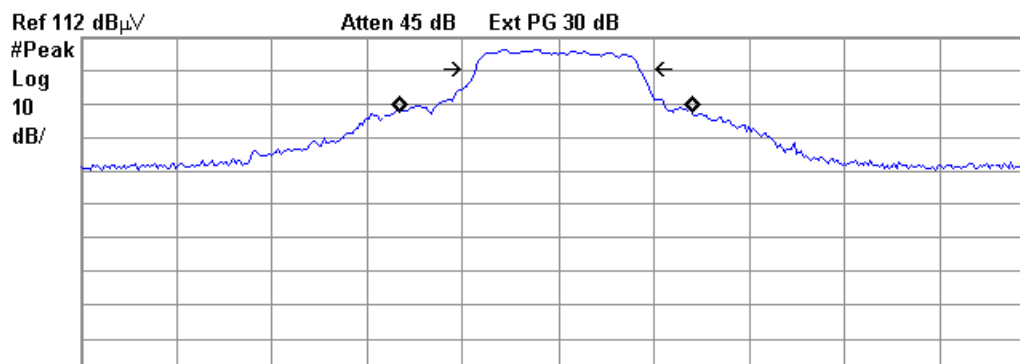
Wall Mount 6dB Bandwidth 2412 MHz 54 MB





Wall Mount 6dB Bandwidth 2437 MHz 54 MB

Agilent T



Center 2.437 GHz Span 100 MHz
#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)

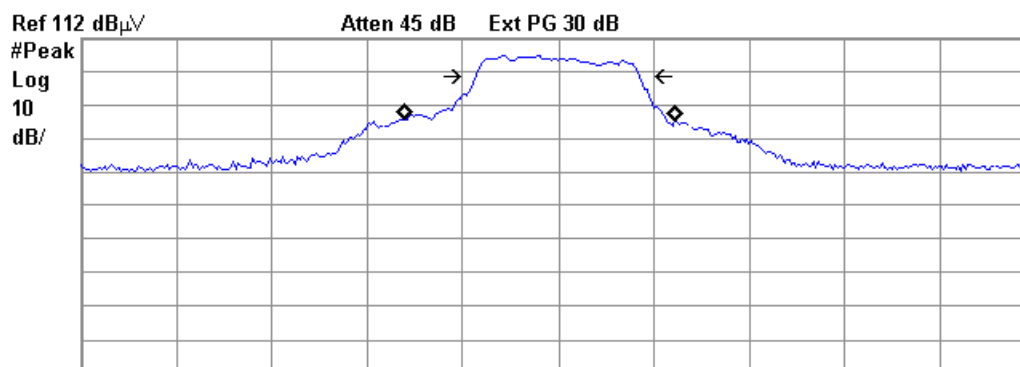
Occupied Bandwidth
30.3775 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -1.227 MHz
x dB Bandwidth 17.001 MHz

Wall Mount 6dB Bandwidth 2462 MHz 54 MB

Agilent T



Center 2.462 GHz Span 100 MHz
#Res BW 1 MHz #VBW 3 MHz Sweep 4 ms (401 pts)

Occupied Bandwidth
28.2591 MHz

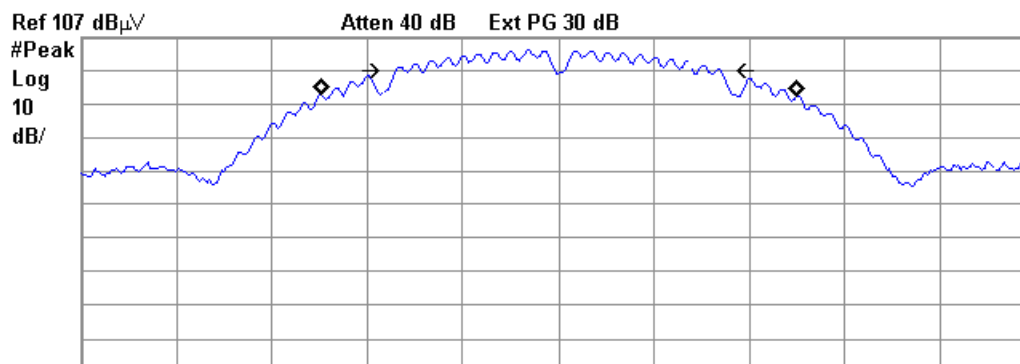
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -1.930 MHz
x dB Bandwidth 16.982 MHz



Pedestal 6dB Bandwidth 2412 MHz 11 MB

Agilent R T



Center 2.412 GHz Span 30 MHz
#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)

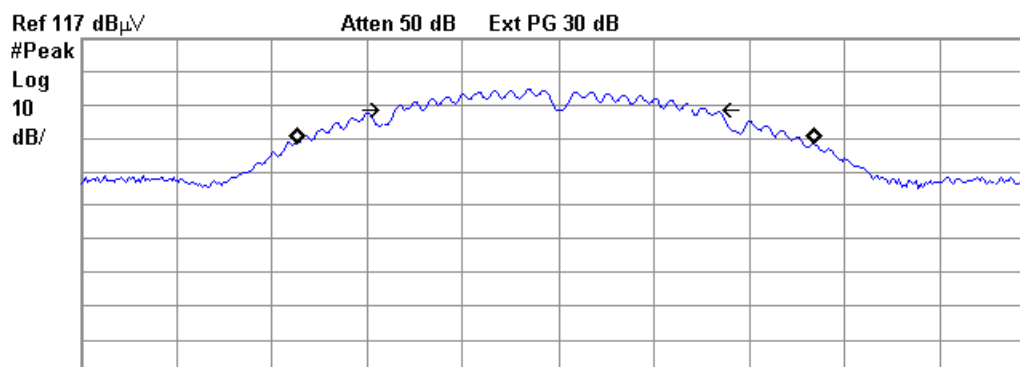
Occupied Bandwidth
14.9455 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error 19.173 kHz
x dB Bandwidth 10.186 MHz

Pedestal 6dB Bandwidth 2437 MHz 11 MB

Agilent R T



Center 2.437 GHz Span 30 MHz
#Res BW 300 kHz #VBW 1 MHz Sweep 4 ms (401 pts)

Occupied Bandwidth
16.1906 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -105.861 kHz
x dB Bandwidth 9.742 MHz



Pedestal 6dB Bandwidth 2462 MHz 11 MB

Agilent

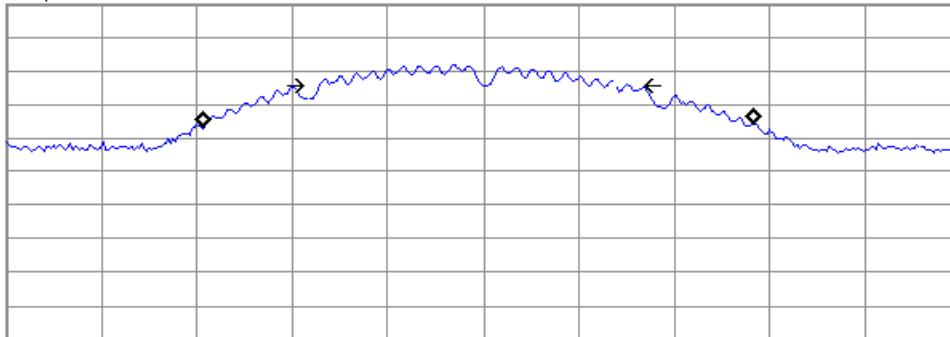
R T

Ref 117 dB μ V

Atten 50 dB

Ext PG 30 dB

#Peak
Log
10
dB/



Center 2.462 GHz

#Res BW 300 kHz

#VBW 1 MHz

Span 30 MHz

Sweep 4 ms (401 pts)

Occupied Bandwidth
17.2366 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -166.637 kHz
x dB Bandwidth 9.711 MHz

Pedestal 6dB Bandwidth 2412 MHz 54 MB

Agilent

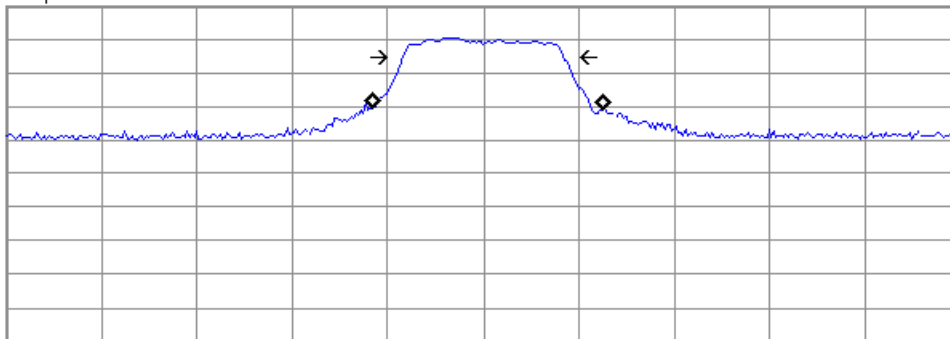
R T

Ref 117 dB μ V

Atten 50 dB

Ext PG 30 dB

#Peak
Log
10
dB/



Center 2.412 GHz

#Res BW 1 MHz

#VBW 3 MHz

Span 100 MHz

Sweep 4 ms (401 pts)

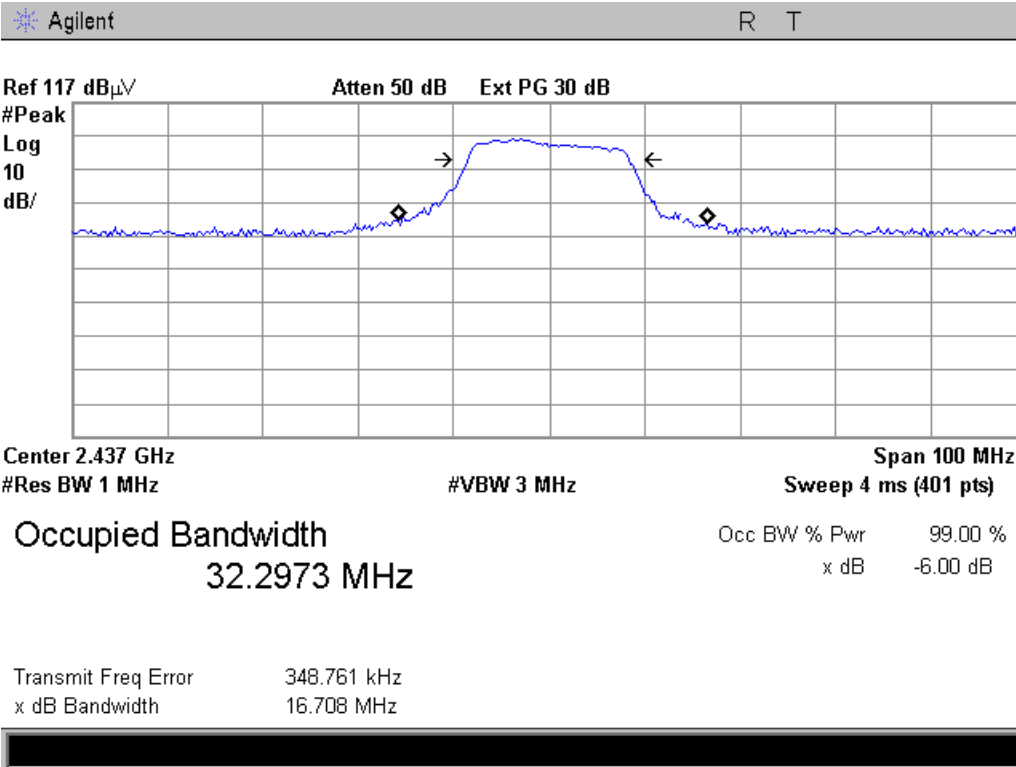
Occupied Bandwidth
23.9221 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

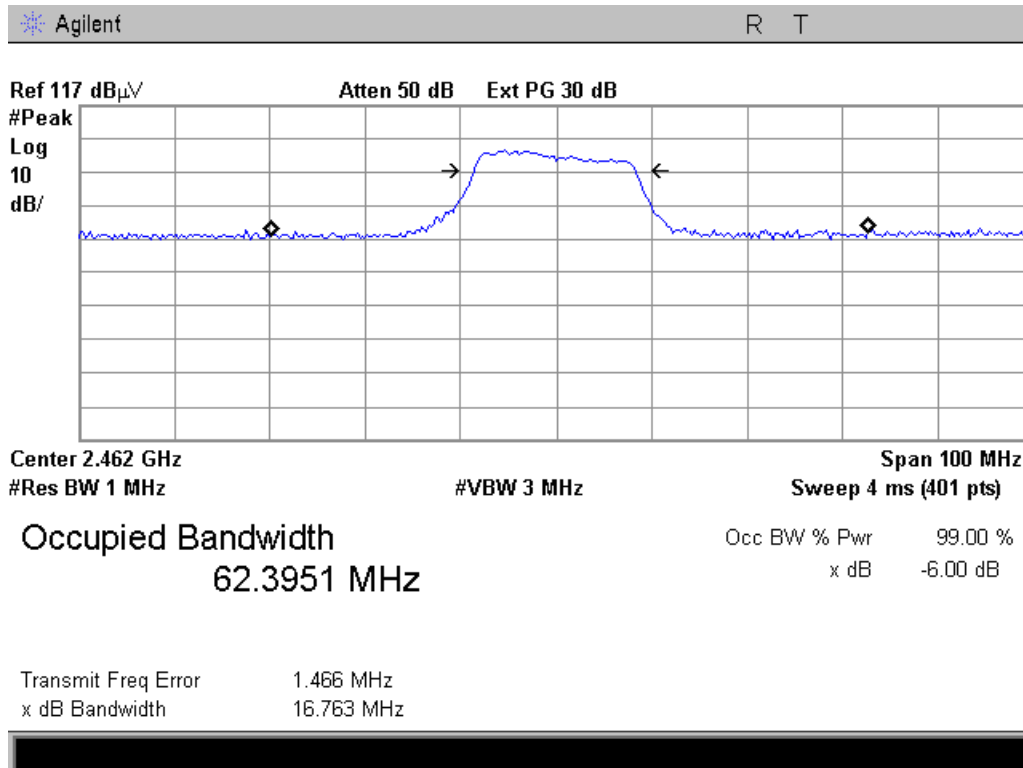
Transmit Freq Error 547.267 kHz
x dB Bandwidth 16.760 MHz



Pedestal 6dB Bandwidth 2437 MHz 54 MB



Pedestal 6dB Bandwidth 2462 MHz 54 MB





Test Equipment Utilized

Description	MFG	Model Number	CT Asset #	Last Cal Date	Cal Due Date
RF Pre-Amplifier	HP	8449	i00028	9/14/2011	9/14/2012
Horn Antenna	EMCO	3115	i00103	11/5/2010	11/5/2012
Spectrum Analyzer	HP	4407B	i00331	5/24/2011	5/24/2012
Band Reject Filter	Wainwright	WCRTF 2402/2480 – 2399/ 2483-15/+12EE	i00384	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