Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268
fax: (480) 926-3598
www.flomlabs.com
info@flomlabs.com

Date: April 16, 2009

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

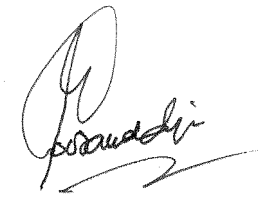
Applicant: Blackboard, Inc.
Equipment: VR4100
FCC ID: TMEVR4100X003
FCC Rules: 15.247

Gentlemen:

On behalf of the Applicant, enclosed please find Application Form 731, Engineering Test Report and all pertinent documentation, the whole for approval of the referenced equipment as shown.

We trust the same is in order. Should you need any further information, kindly contact the writer who is authorized to act as agent.

Sincerely yours,



Hoosamuddin S. Bandukwala, Lab Director

List Of Exhibits

(FCC **Certification** (Transmitters) - Revised 9/28/98)

Applicant: Blackboard, Inc.

FCC ID: TMEVR4100X003

By Applicant:

1. Letter Of Authorization

2. Identification Drawings
   - __ Id Label
   - __ Location Info
   - __ Attestation Statement(S)
   - __ Location of Compliance Statement

3. Documentation: 2.1033(B)
   - (3) User Manual(S)
   - (4) Operational Description
   - (5) Block Diagram
   - (5) Schematic Diagram
   - (7) External Photographs
   - Internal Photographs
   - Parts List
   - Active Devices

By F.T.L. Inc.

A. Testimonial & Statement of Certification

B. Statement of Qualifications

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Test Report

for

FCC ID: TMEVR4100X003

Model: VR4100

to

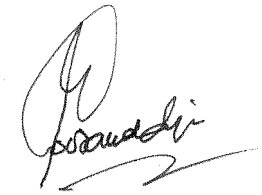
Federal Communications Commission

Rule Part(s) 15.247

Date Of Report: April 16, 2009

On the Behalf of the Applicant: Blackboard, Inc.
22601 North 19th Ave, Suite 200
Phoenix, AZ 85027

Attention of: Tom Kuestersteffen
623-476-1263
email: tkuestersteffen@blackboard.com
and/or Tim Mattson
623-476-1400



Supervised By: Hoosamuddin S. Bandukwala, Lab Director

Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	April 16, 2009	J Erhard	Original Document
2.0	June 8, 2009	J Erhard	Correct typographical error in report
3.0	June 23, 2009	J Erhard	Re-test conducted power measurements
4.0	June 24, 2009	J Erhard	Add QAM modulation to conducted power measurement

The applicant has been cautioned as to the following:

15.21 Information to User.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) Special Accessories.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

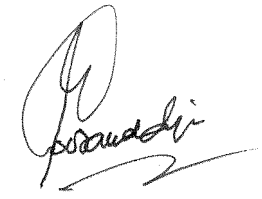
Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories 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.

Flom Test Lab

Testimonial And Statement Of Certification

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 are true and correct.



Certifying Engineer: Hoosamuddin S. Bandukwala, Lab Director

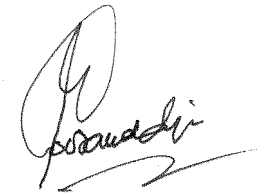
Flom Test Lab
3356 N. San Marcos Place, Suite 107
Chandler, Arizona 85225-7176
(866) 311-3268 phone, (480) 926-3598 fax

Flom Test Lab

Table Of Contents

Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: (FCC: 31040/SIT) (Canada: IC 2044A-1)	Flom Test Lab, Inc. 3356 N. San Marcos Place, Suite 107 Chandler, AZ 85225
c) Report Number:	d0940012
d) Client:	Blackboard, Inc.
e) Identification:	VR4100
Description:	802.11 Transmitter
f) EUT Condition:	Not required unless specified in individual tests.
g) Report Date:	April 16, 2009
h, j, k):	As indicated in individual tests.
i) Sampling method:	No sampling procedure used.
l) Uncertainty:	In accordance with FTL internal quality manual.
m) Supervised by:	 Hoosamuddin S. Bandukwala, Lab Director
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.

List Of General Information Required For Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to 15.247

Sub-Part 2.1033
(c)(1):

Name and Address of Applicant: Blackboard, Inc.

(c)(2): **FCC ID**: TMEVR4100X003

Model Number: VR4100

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

Please See Attached Exhibits

(c)(4): **Type of Emission**: QPSK & QAM

(c)(5): **FREQUENCY RANGE, MHz**: 2412 – 2462

(c)(6): **Power Rating, W**: 0.1258W

____ Switchable ____ Variable _X_ N/A

(c)(7): **Maximum Allowable Power** 1.0 W

15.203: **Antenna Requirement**:

_X_ 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

Subpart 2.1033 (continued)

(c)(8): **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)(9): **Label Information**:

Please See Attached Exhibits

(c)(10): **Photographs**:

Please See Attached Exhibits

(c)(11): **Digital Modulation Description**:

___ Attached Exhibits
_x_ N/A

(c)(12): **Test And Measurement Data**:

Follows

Sub-part 2.1033(b): **Test And Measurement Data**

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2 and the following individual Parts:

15.247 Operation within bands 902-928, 2400-2483.5, 5725-5850 MHz

Standard Test Conditions and Engineering Practices

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

In accordance with ANSI C63.4-2003, FCC DTS Guide March 23, 2005, 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.

A2LA

"A2LA has accredited Flom Test Labs, Inc. 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
CERT NO: 2152-01

FCC OATS Reg. #933597

IC O.A.T.S. Number: 2044A-1

Test Results Summary

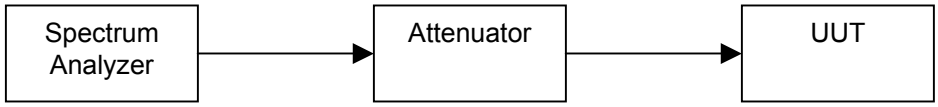
Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(d)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Emissions At Band Edges	Pass	
15.247(a)(2)	Occupied Bandwidth	Pass	
15.247(e)	Transmitter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

Name of Test: Peak Output Power
Specification: 15.247(b) **Engineer: J Erhard**
Test Equipment Utilized i00054, i00270, i00334 **Test Date: 6/24/2009**

Test Procedure

The UUT was connected directly to a spectrum analyzer input. The peak readings were taken and the result was then compared to the limit. This was performed on a spectrum analyzer while the UUT was operating in QPSK modulation mode with a bandwidth correction factor (21.4 dBm for QPSK and 22.2 dBm for QAM) added to the peak modulated reading. The 99% bandwidth was used for this correction factor correction factor is 10 * LOG (measured BW/99% OCC BW).

Test Setup



Transmitter Peak Output Power

QPSK Modulation

Tuned Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	0.0398 W	1 W	Pass
2437	0.0794 W	1 W	Pass
2462	0.1258 W	1 W	Pass

QAM Modulation

Tuned Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	0.0079 W	1 W	Pass
2437	0.0125 W	1 W	Pass
2462	0.0158 W	1 W	Pass

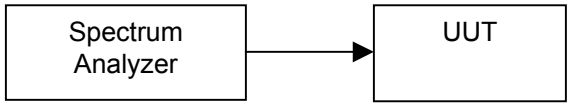
Name of Test: Conducted Spurious Emissions
Specification: 15.247(d) **Engineer: J Erhard**
Test Equipment Utilized i00054, i00331 **Test Date: 4/10/2009**

Test Procedure

The UUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. The reference level was offset for the peak power output with the resolution bandwidth set for 1 MHz. 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 reference level is added to the recorded measurement to provide the corrected level dBc

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

Test Setup



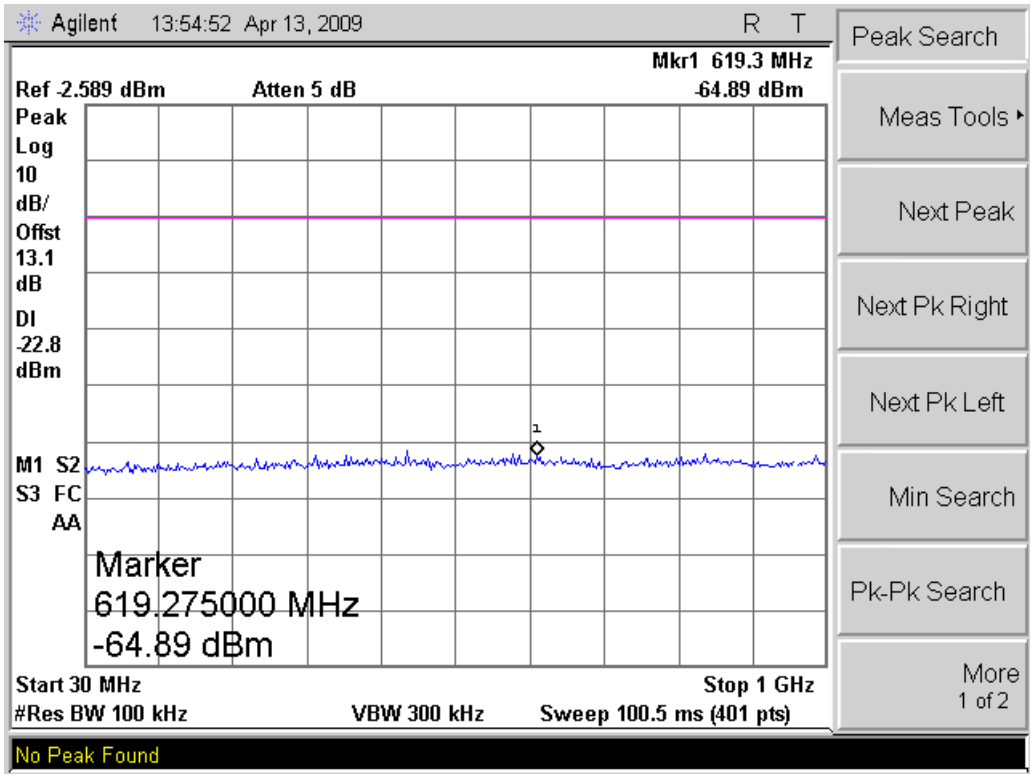
5.5 MB Conducted Spurious Emissions Summary Test Table

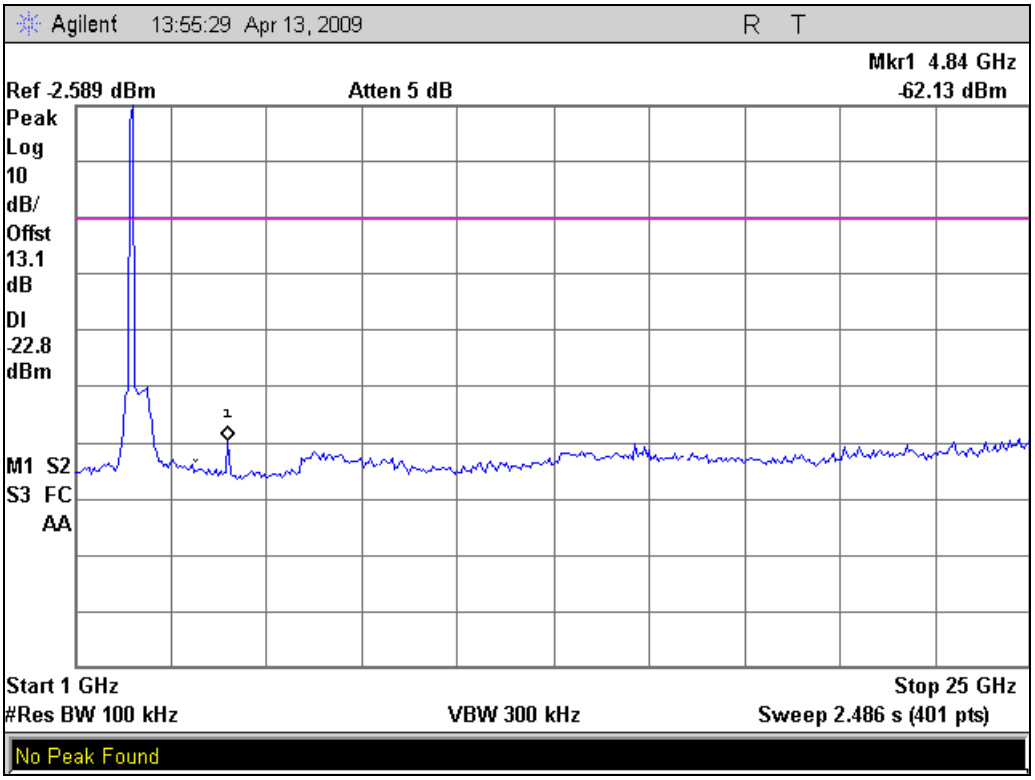
Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement dBm	Reference Level dBm	Corrected Measurement -dBc	Specification Limit	Result
2412	4840	-62.13	-2.589	-59.541	-20 dBc	Pass
2437	4900	-61.11	-0.615	-60.495	-20 dBc	Pass
2462	459.2	-56.37	3.358	-59.728	-20 dBc	Pass

54 MB Conducted Spurious Emissions Summary Test Table

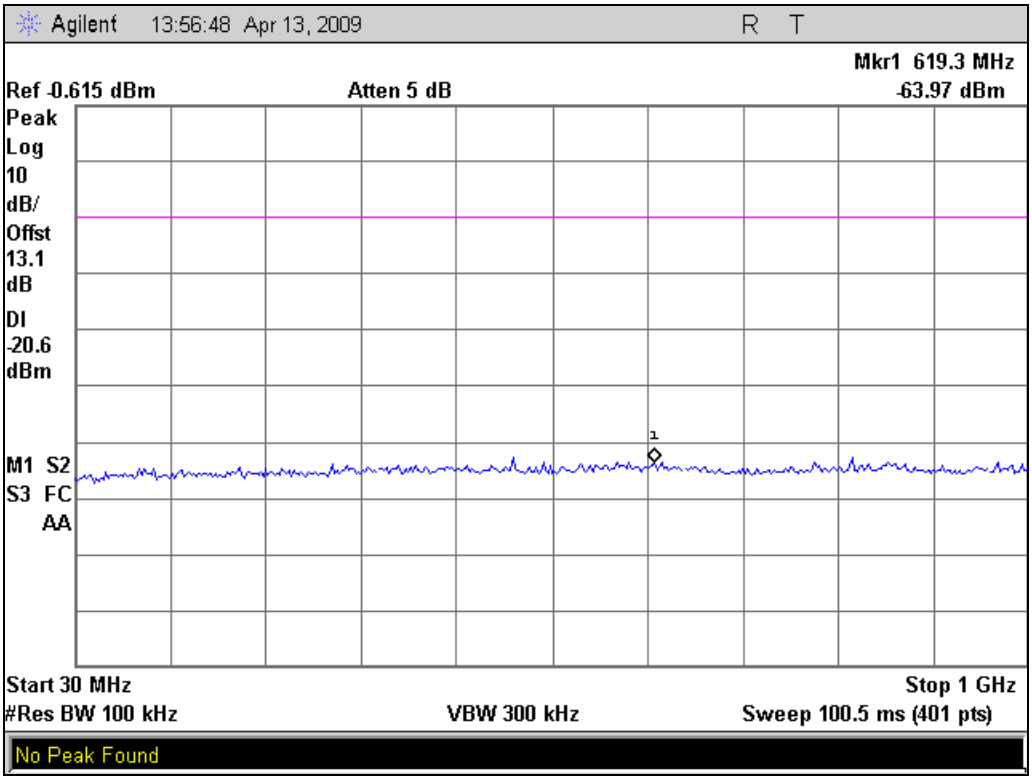
Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement dBm	Reference Level dBm	Corrected Measurement -dBc	Specification Limit	Result
2412	2740	-53.10	-12.25	-40.85	-20 dBc	Pass
2437	2800	-53.86	-9.464	-44.396	-20 dBc	Pass
2462	2800	-55.00	-7.764	-47.236	-20 dBc	Pass

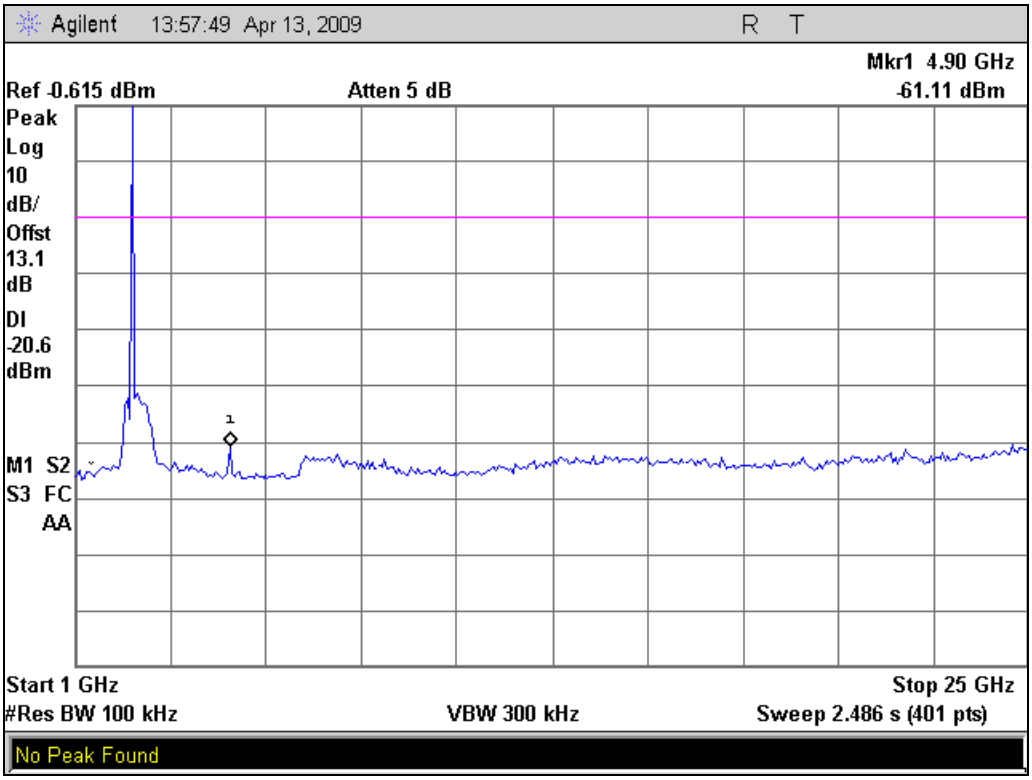
5.5 MB Conducted Spurious Emissions 2412 MHz



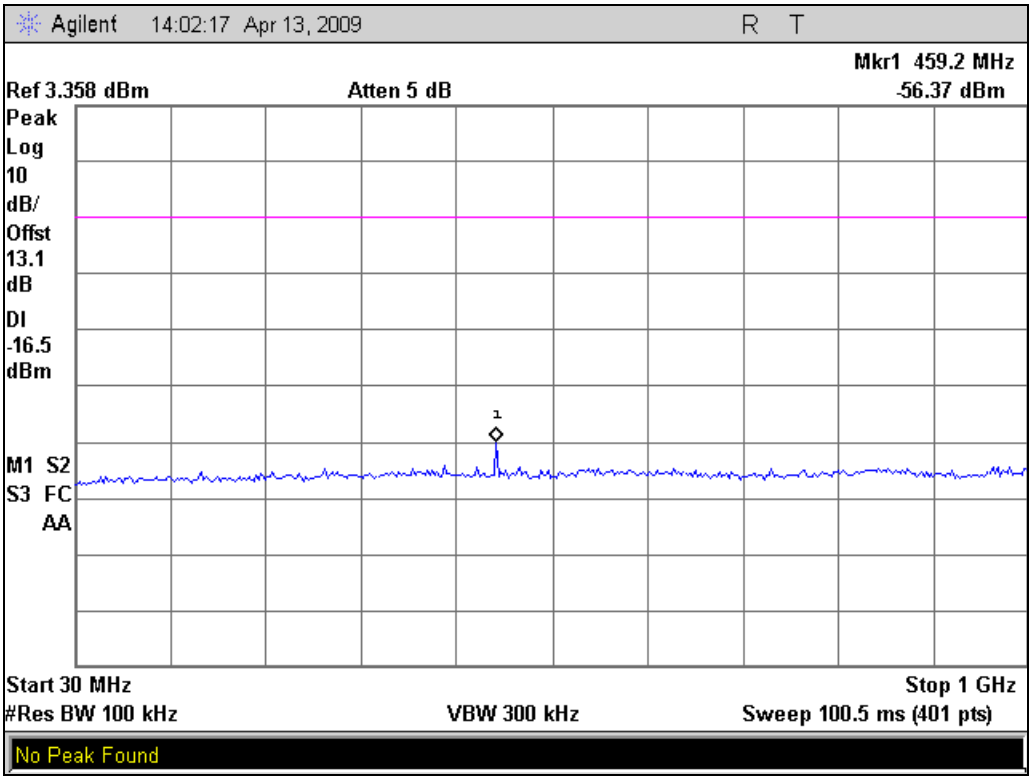


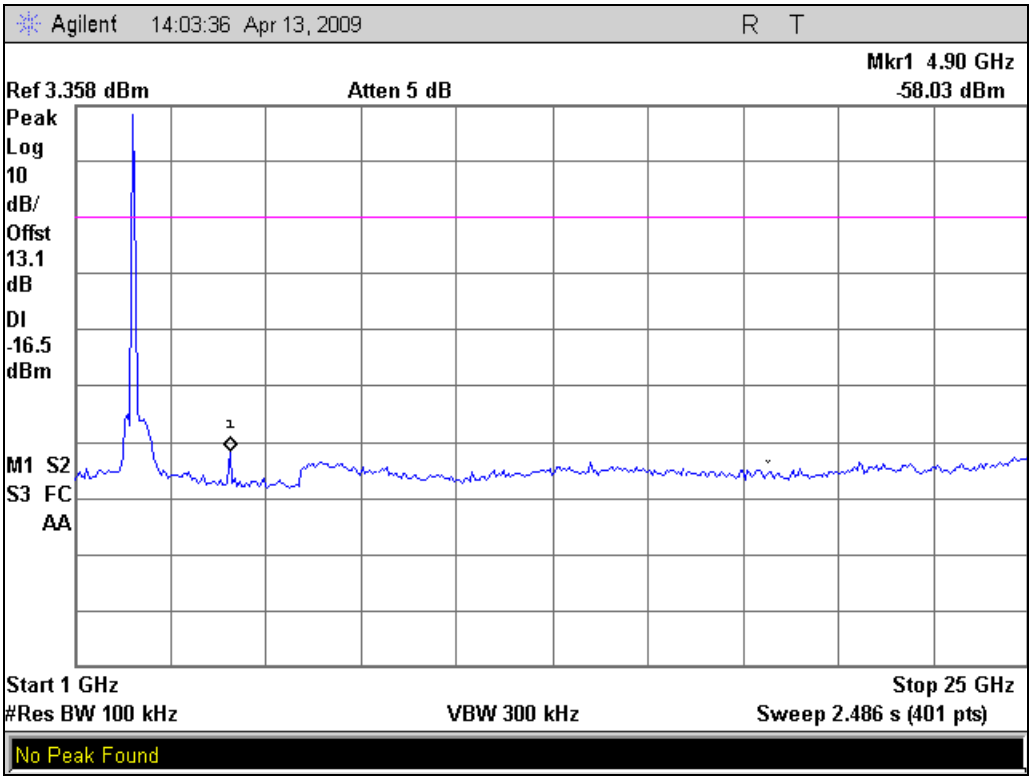
5.5 MB Conducted Spurious Emissions 2437 MHz



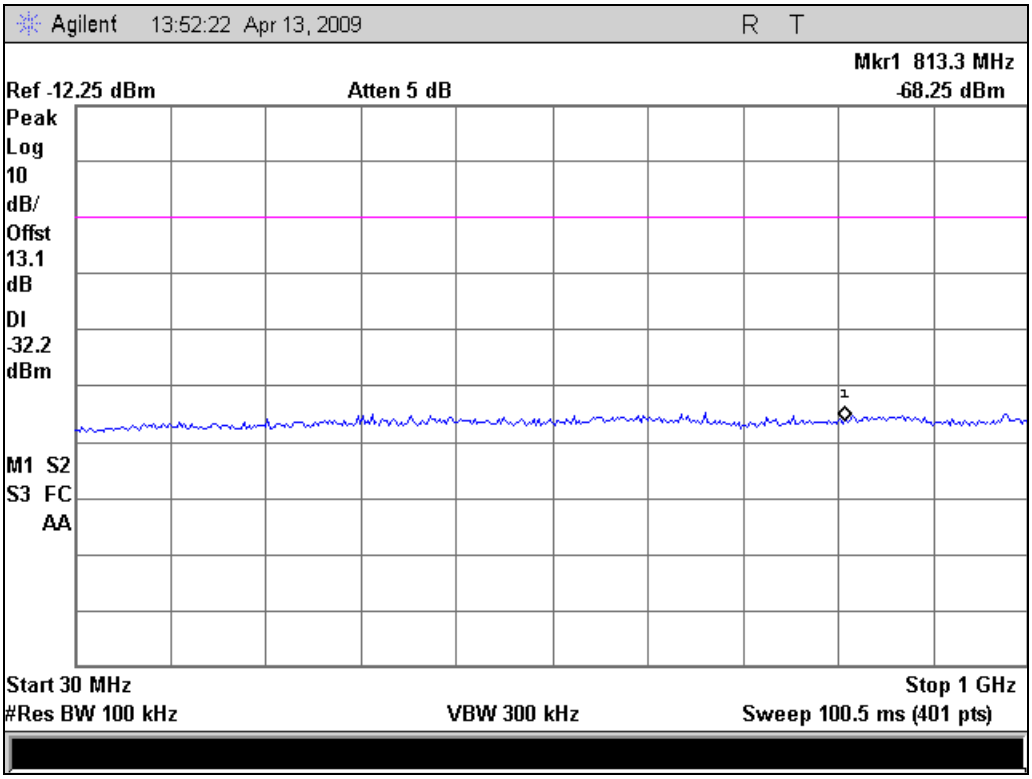


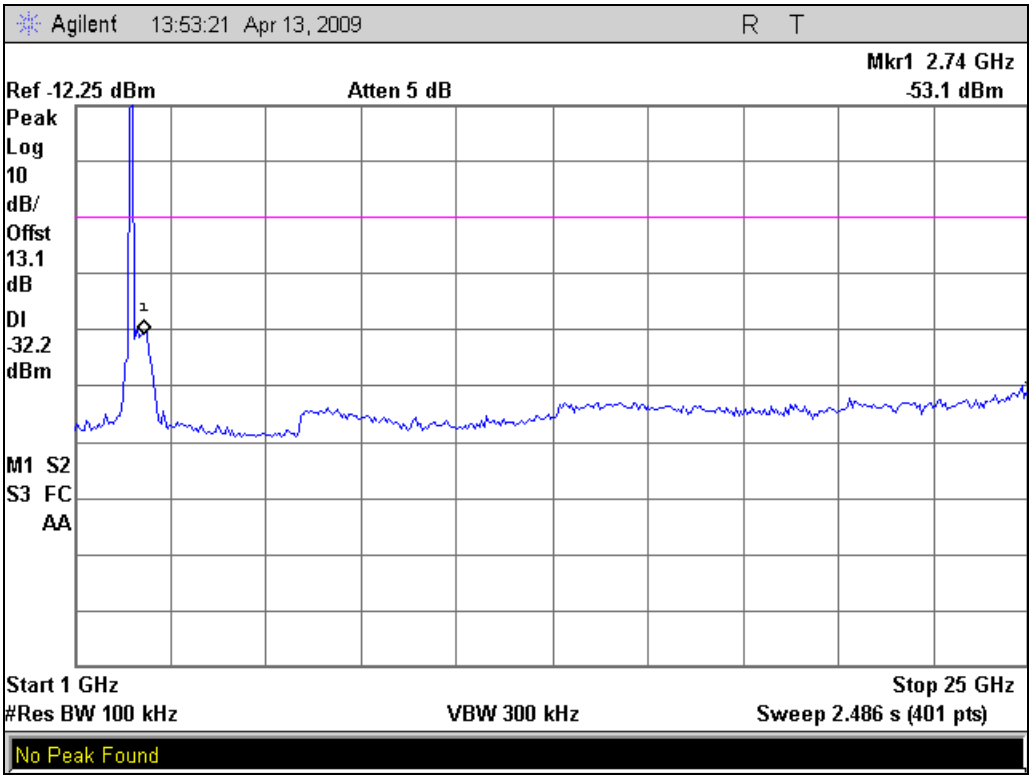
5.5 MB Conducted Spurious Emissions 2462 MHz



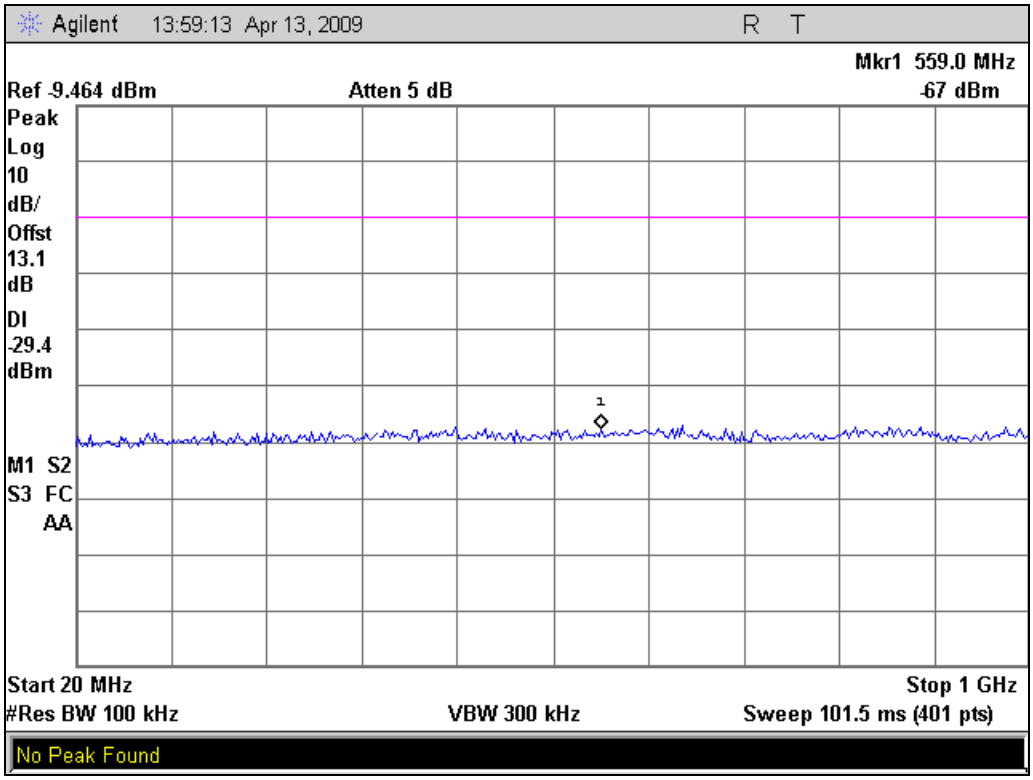


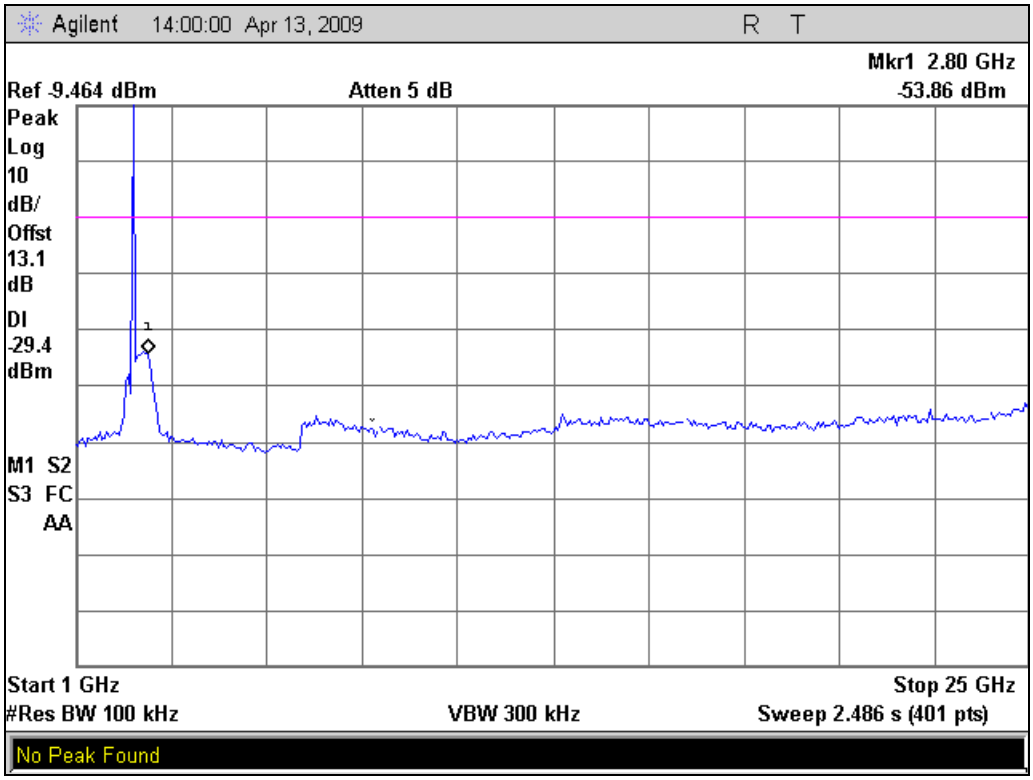
54 MB Conducted Spurious Emissions 2412 MHz



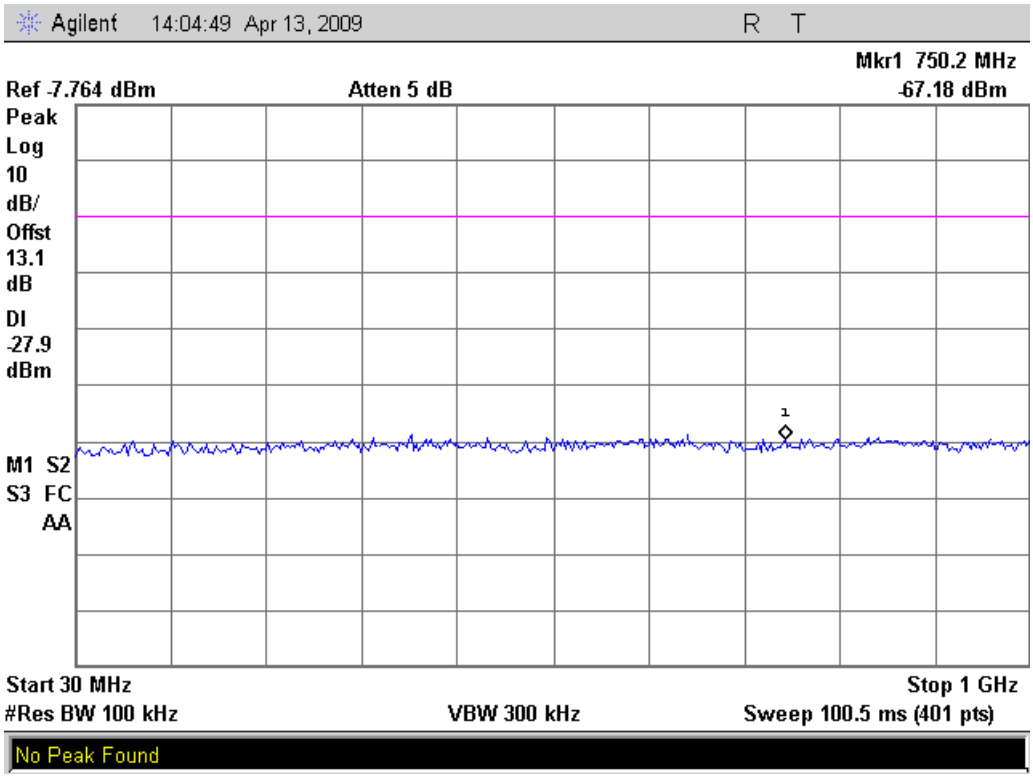


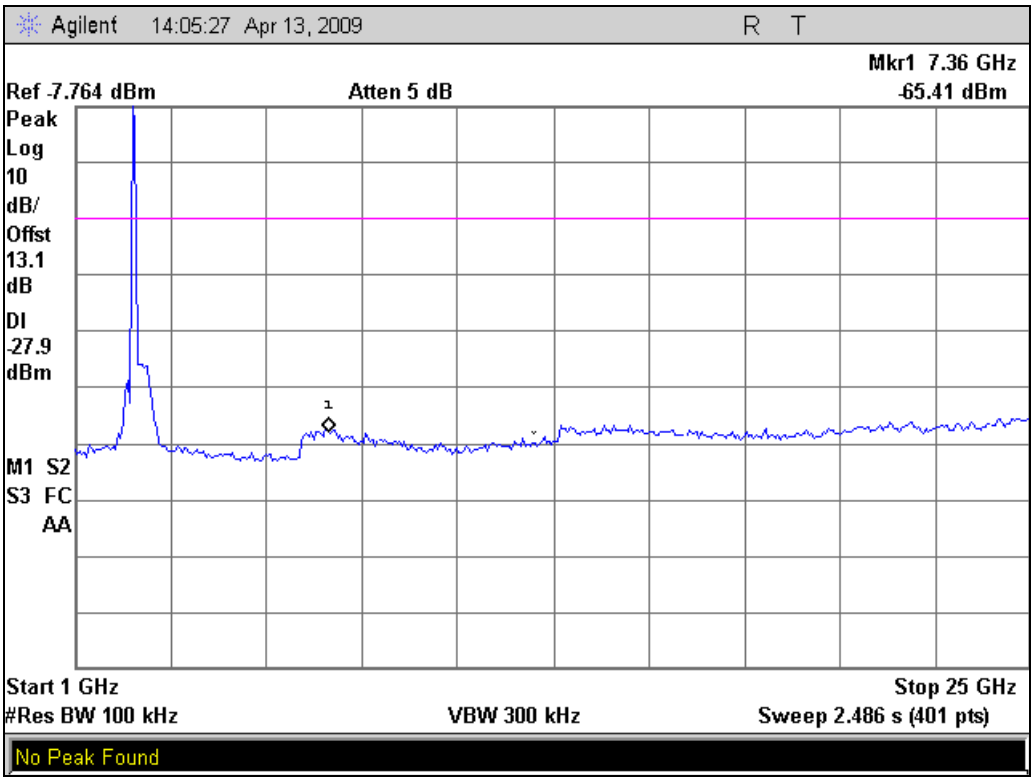
54 MB Conducted Spurious Emissions 2437 MHz





54 MB Conducted Spurious Emissions 2462 MHz



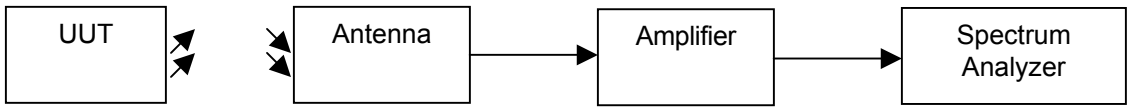


Name of Test: Radiated Spurious Emissions
Specification: 15.247(d), 15.209(a), 15.205 **Engineer: J Erhard**
Test Equipment Utilized i00029, i00054, i00103 **Test Date: 4/10/2009**

Test Procedure

The UUT was tested in a semi-anechoic chamber set 3m from the receiving antenna. A spectrum analyzer was used to verify that the UUT met the requirements for Radiated Spurious Emissions. The antenna and cable correction factors were summed with the amplifier gain and input into the spectrum analyzer as an offset 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	1 MHz	as necessary

Radiated Spurious Emissions

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Monitored Level (dBuV/m)	Peak Limit (dBuV/m)	Result
2412	4924	48.83	74.0	Pass
2412	7236	51.33	74.0	Pass
2412	9648	50.67	74.0	Pass
2437	4874	50.50	74.0	Pass
2437	7311	50.67	74.0	Pass
2437	9748	51.00	74.0	Pass
2462	4924	49.50	74.0	Pass
2462	7386	52.17	74.0	Pass
2462	9848	50.17	74.0	Pass

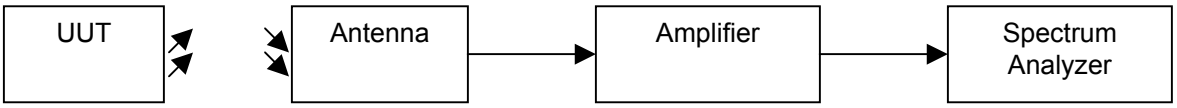
No other emissions were detectable.
All peak emissions were lower than the average limit.
All emissions were greater than –20 dBc.

Name of Test: Emissions At Band Edges
Specification: 15.247(d), 15.209(a), 15.205 **Engineer: J Erhard**
Test Equipment Utilized i00029, i00054, i00103 **Test Date: 4/10/2009**

Test Procedure

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

Test Setup



5.5 MB Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level dBc	Detector	Limit	Result
2412	2400	-40.84	Peak	-20 dBc	Pass
2462	2483.5	-38.17	Peak	-20 dBc	Pass

54 MB Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level dBc	Detector	Limit	Result
2412	2400	-26.33	Peak	-20 dBc	Pass
2462	2483.5	-29.71	Peak	-20 dBc	Pass

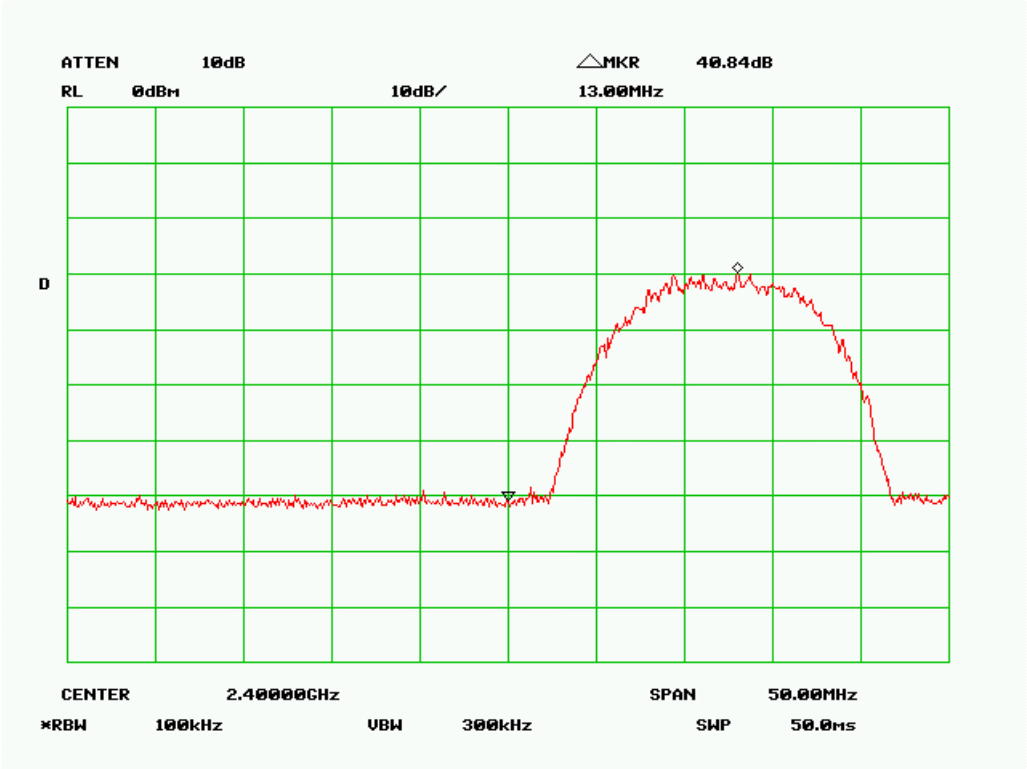
5.5 MB Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2390	51.33	Peak	74	Pass
2412	2390	38.38	Average	54	Pass
2462	2483.5	51.00	Peak	74	Pass
2462	2483.5	39.33	Average	54	Pass

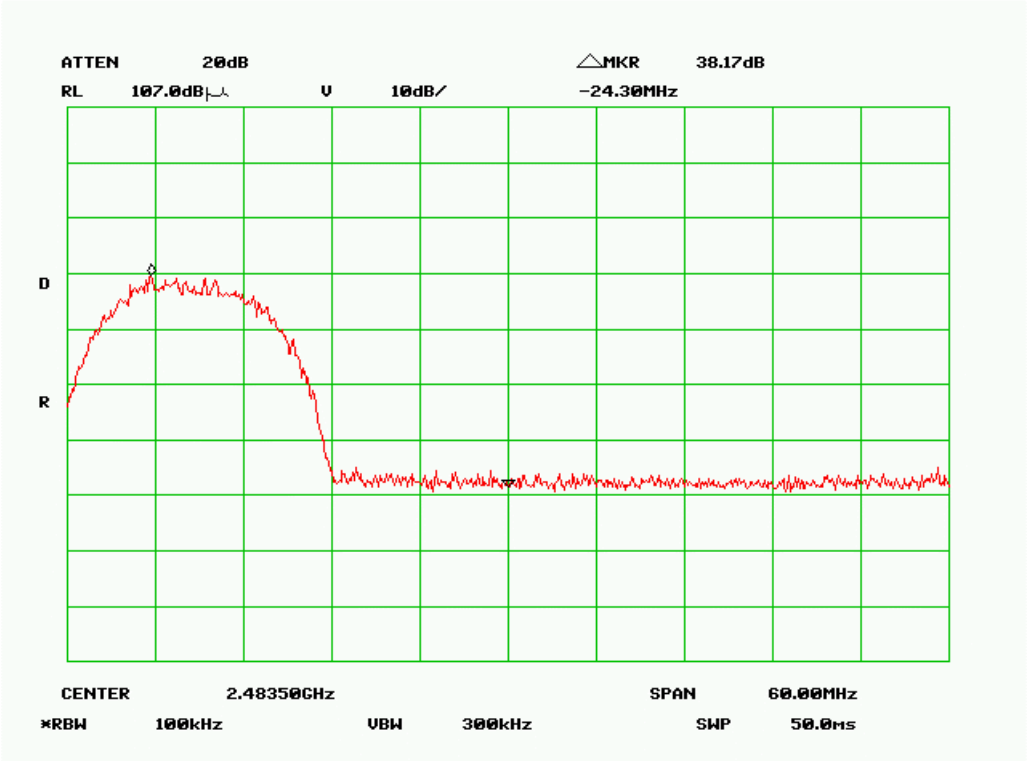
54 MB Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2412	2390	50.17	Peak	74	Pass
2412	2390	38.83	Average	54	Pass
2462	2483.5	51.50	Peak	74	Pass
2462	2483.5	39.17	Average	54	Pass

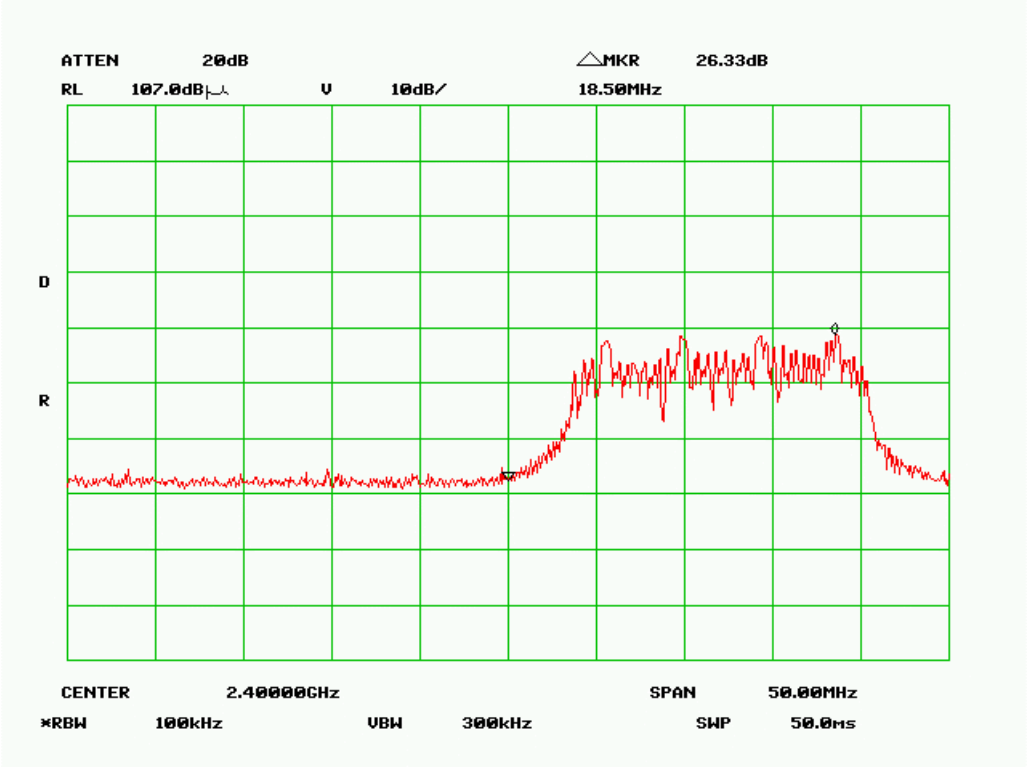
5.5 MB Band Edge 2400 MHz



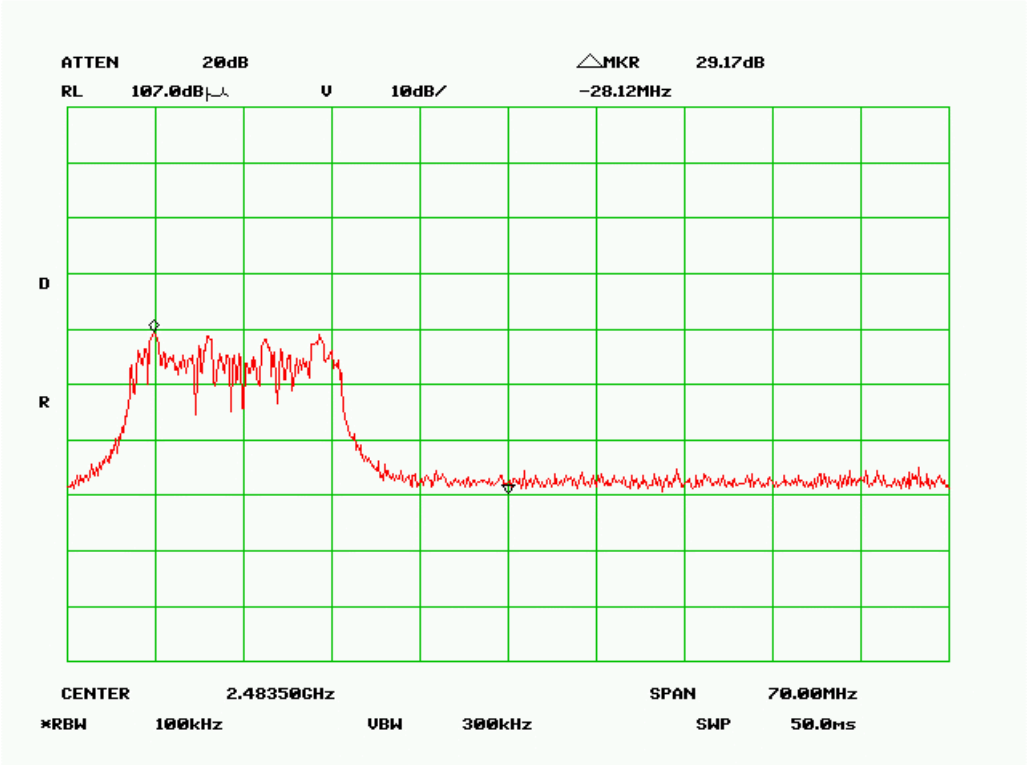
5.5 MB Band Edge 2483.5 MHz



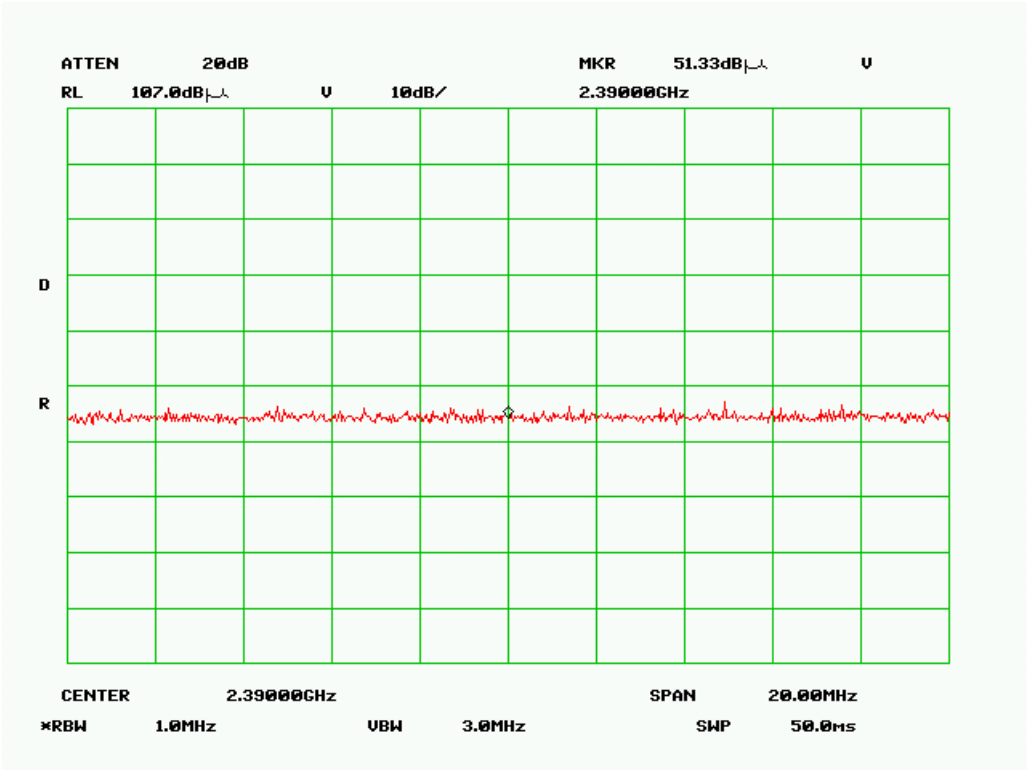
54 MB Band Edge 2400 MHz



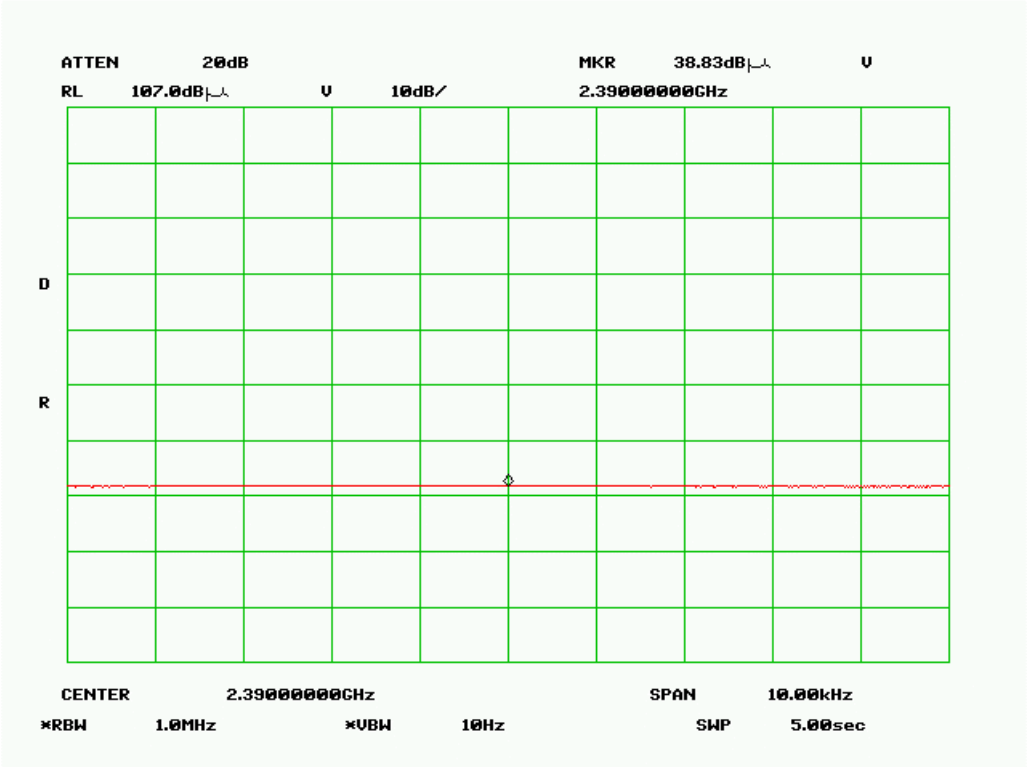
54 MB Band Edge 2483.5 MHz



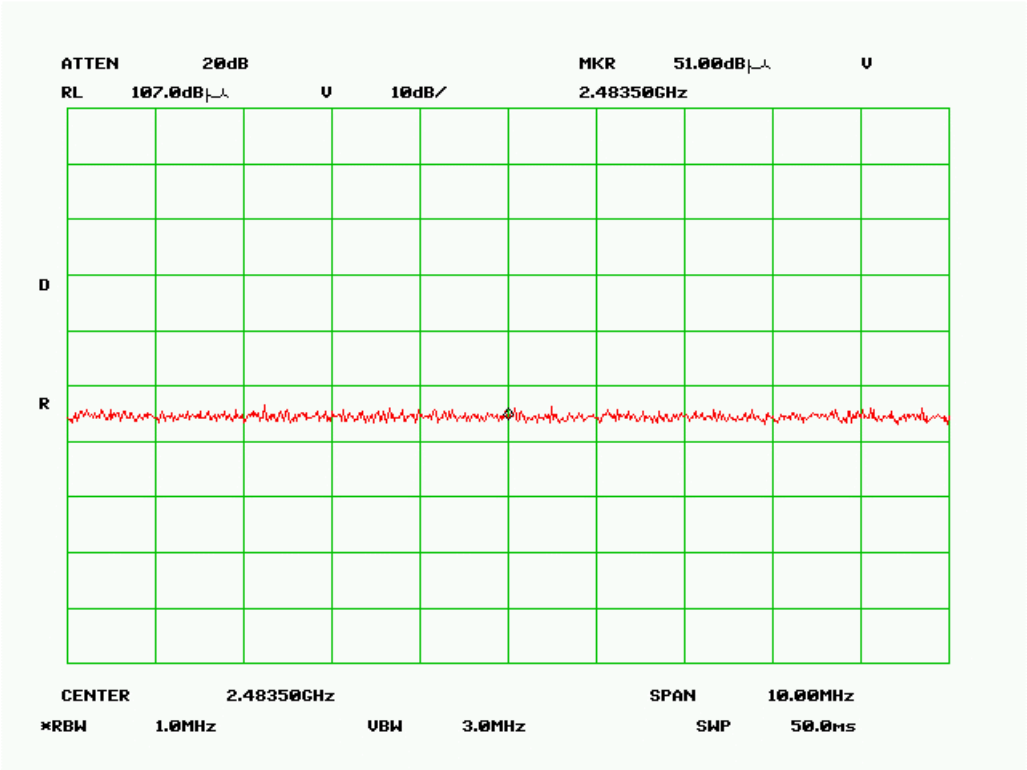
5.5 MB Restricted Band 2390 Peak MHz



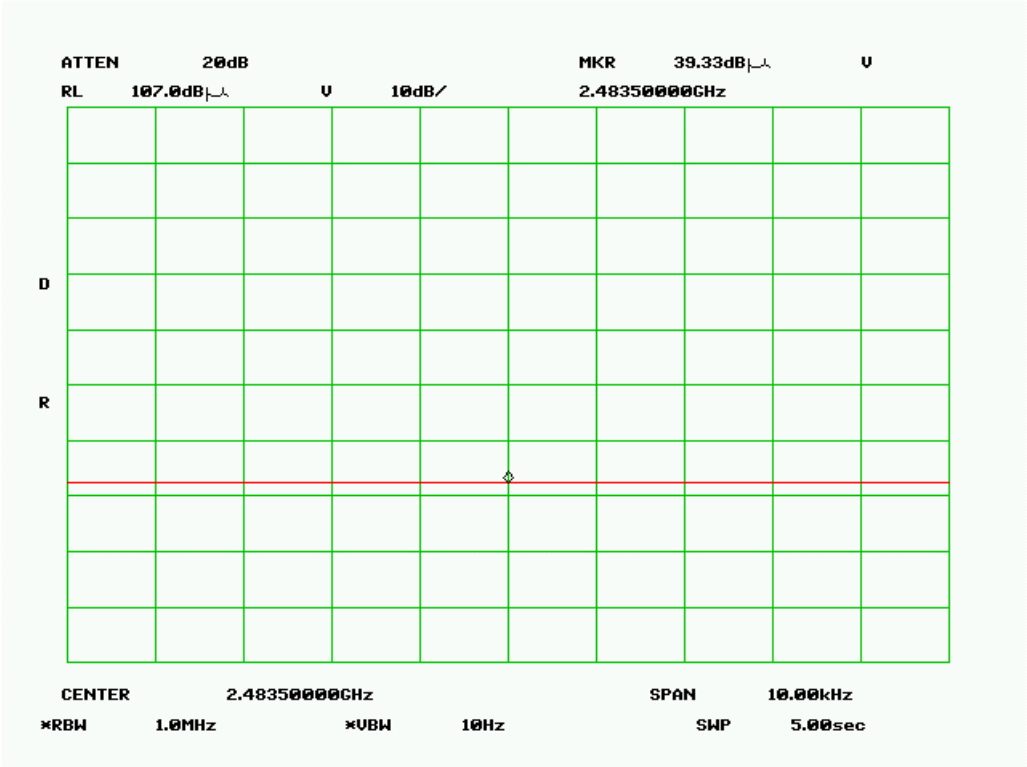
5.5 MB Restricted Band 2390 Average MHz



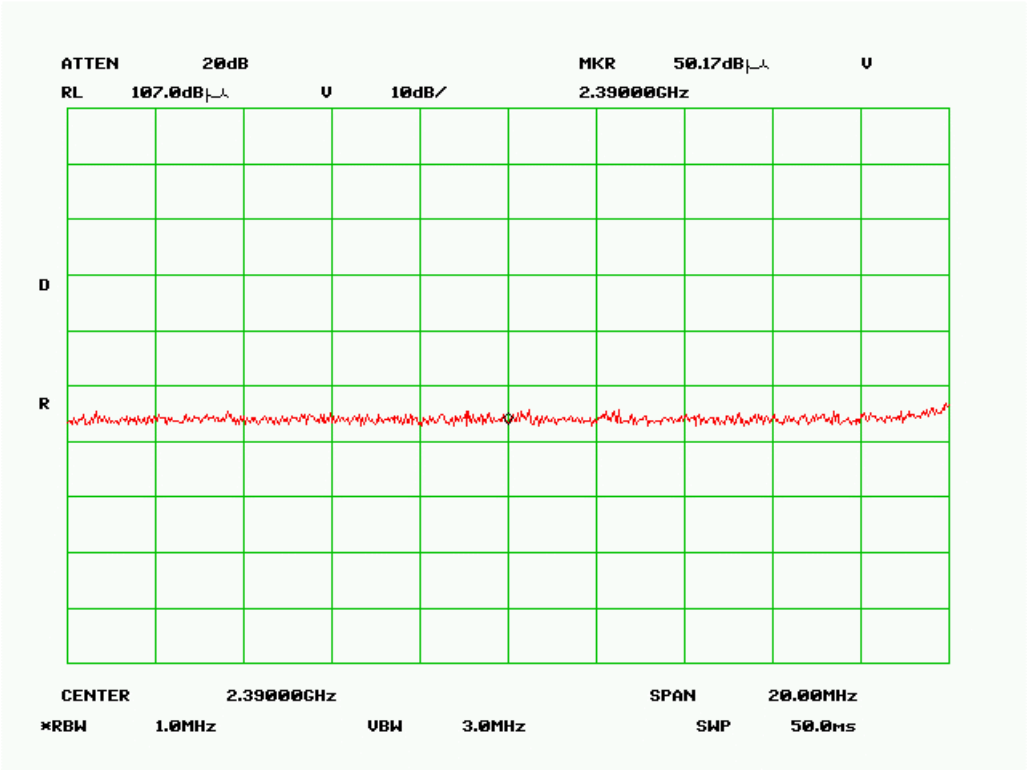
5.5 MB Restricted Band 2483.5 Peak MHz



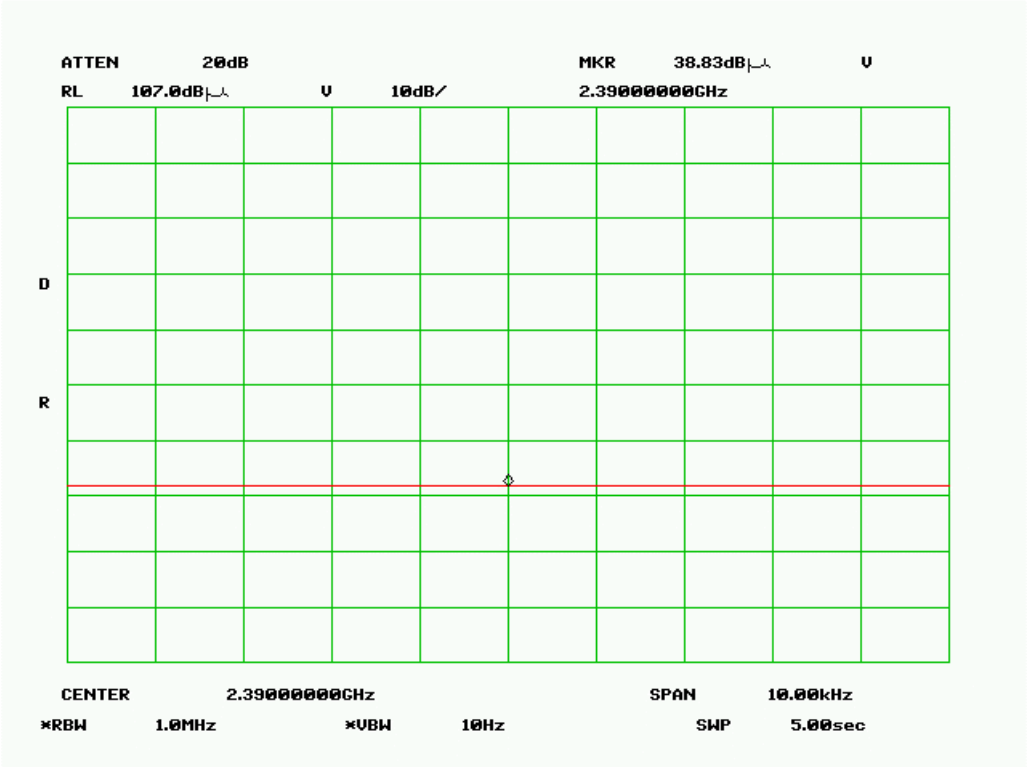
5.5 MB Restricted Band 2483.5 Average MHz



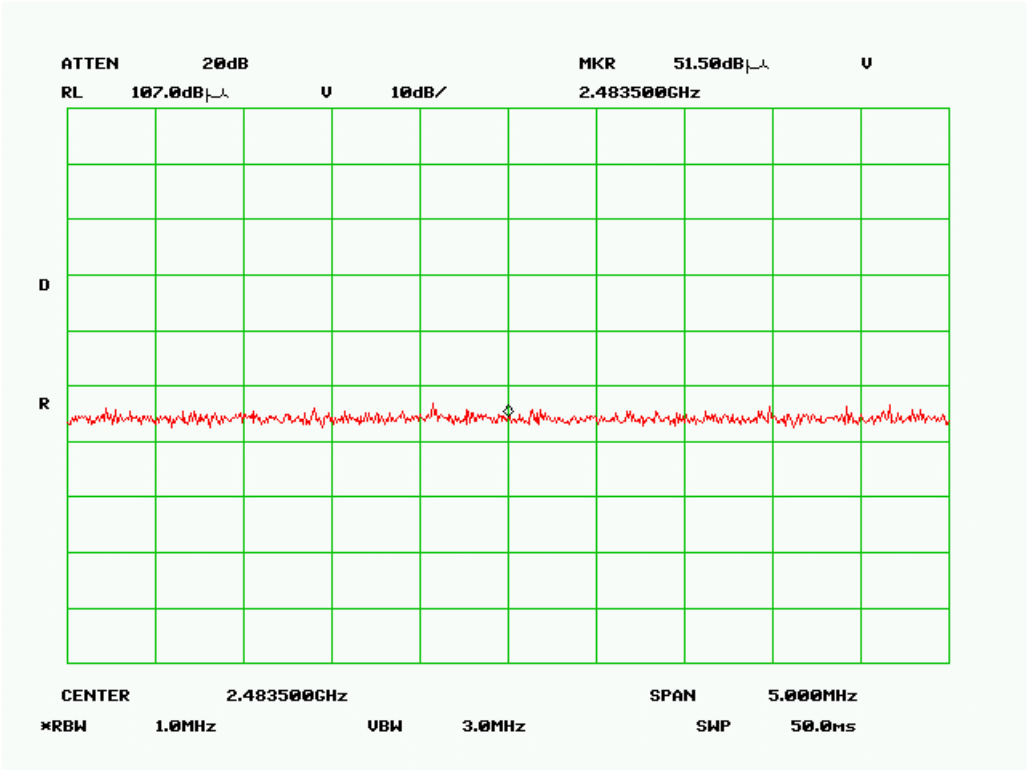
54 MB Restricted Band 2390 Peak MHz



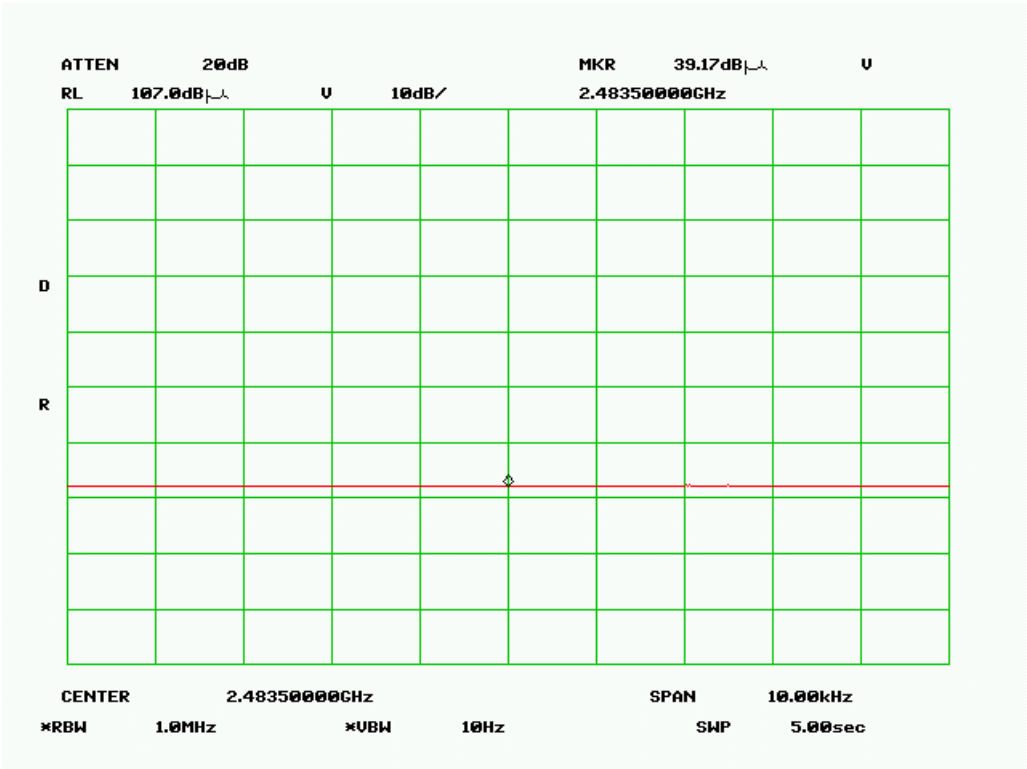
54 MB Restricted Band 2390 Average MHz



55 MB Restricted Band 2483.5 Peak MHz



55 MB Restricted Band 2483.5 Average MHz

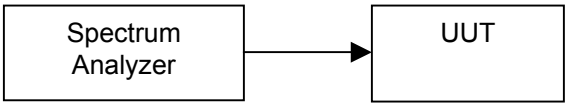


Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2) **Engineer: J Erhard**
Test Equipment Utilized i00054, i00331 **Test Date: 4/10/2009**

Test Procedure

The UUT 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



1 MB Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	10.109 MHz	≥ 500 KHz	Pass
2437	10.114 MHz	≥ 500 KHz	Pass
2462	10.116 MHz	≥ 500 KHz	Pass

54 MB Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	15.878 MHz	≥ 500 KHz	Pass
2437	15.852 MHz	≥ 500 KHz	Pass
2462	15.875 MHz	≥ 500 KHz	Pass

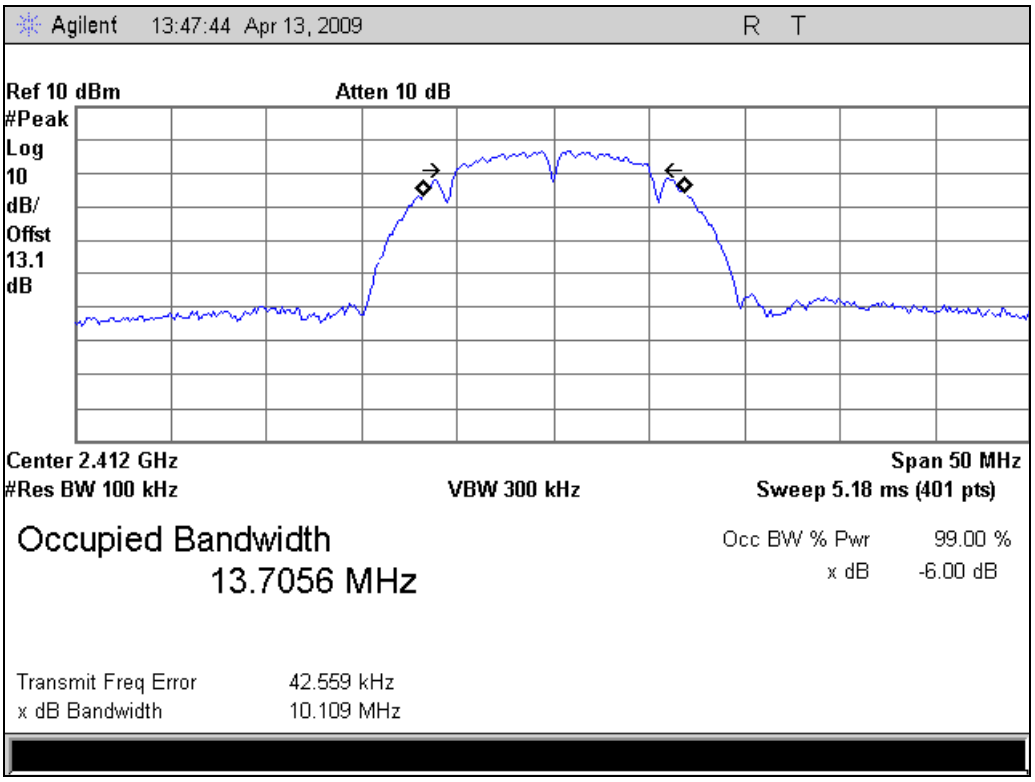
1 MB 99% Bandwidth Summary

Frequency MHz	Recorded Measurement	Result
2412	13.7056 MHz	Pass
2437	13.7530 MHz	Pass
2462	13.7606 MHz	Pass

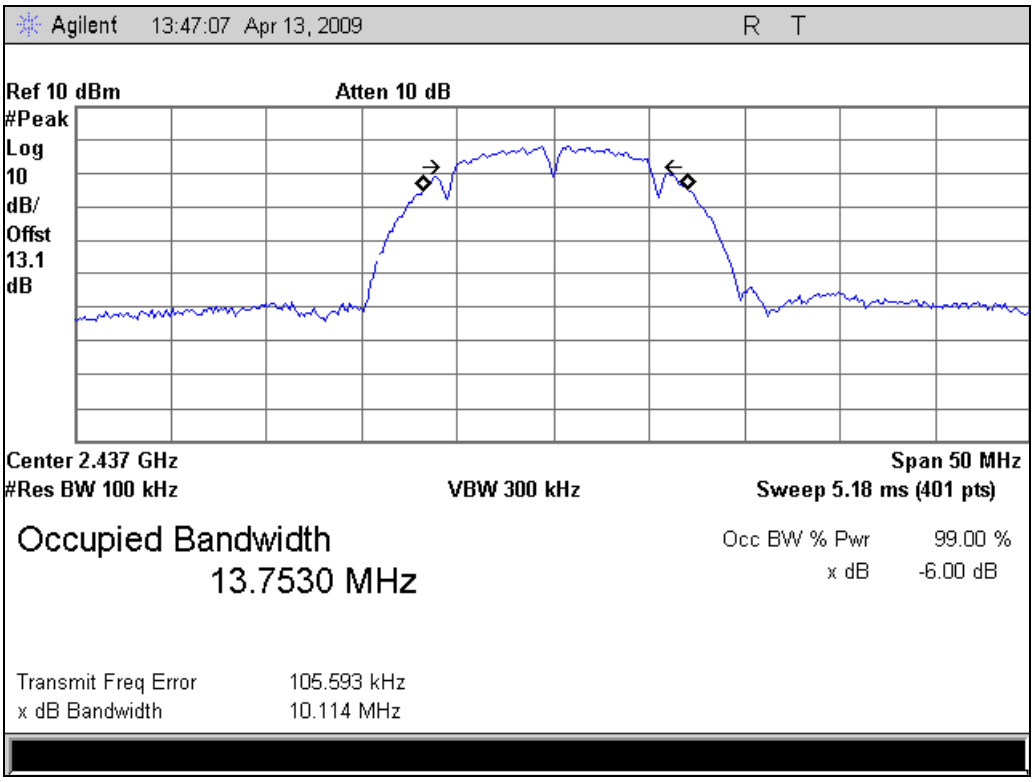
54 MB 99% Bandwidth Summary

Frequency MHz	Recorded Measurement	Result
2412	16.6475 MHz	Pass
2437	16.6458 MHz	Pass
2462	16.6442 MHz	Pass

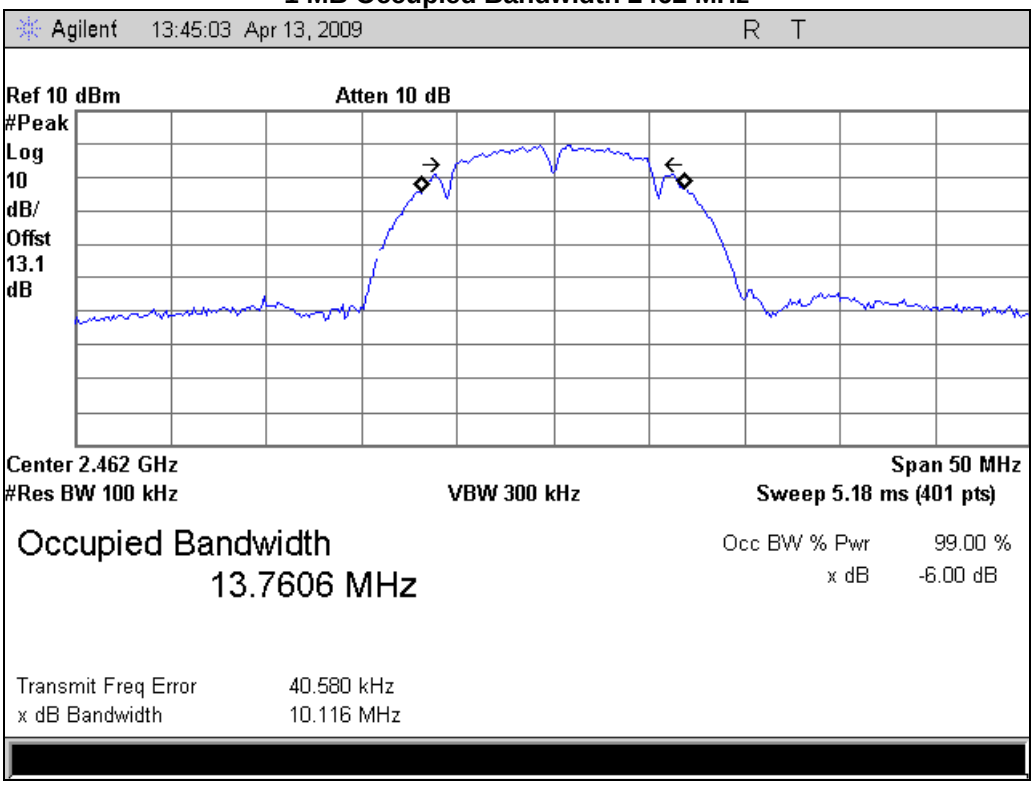
1 MB Occupied Bandwidth 2412 MHz



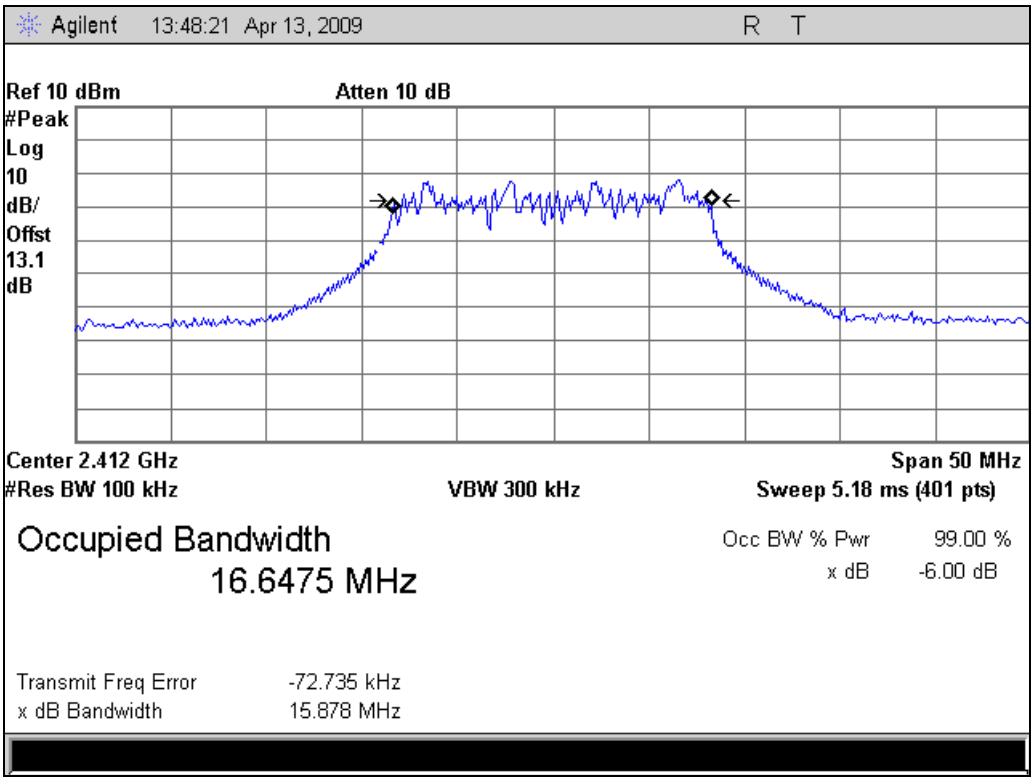
1 MB Occupied Bandwidth 2437 MHz



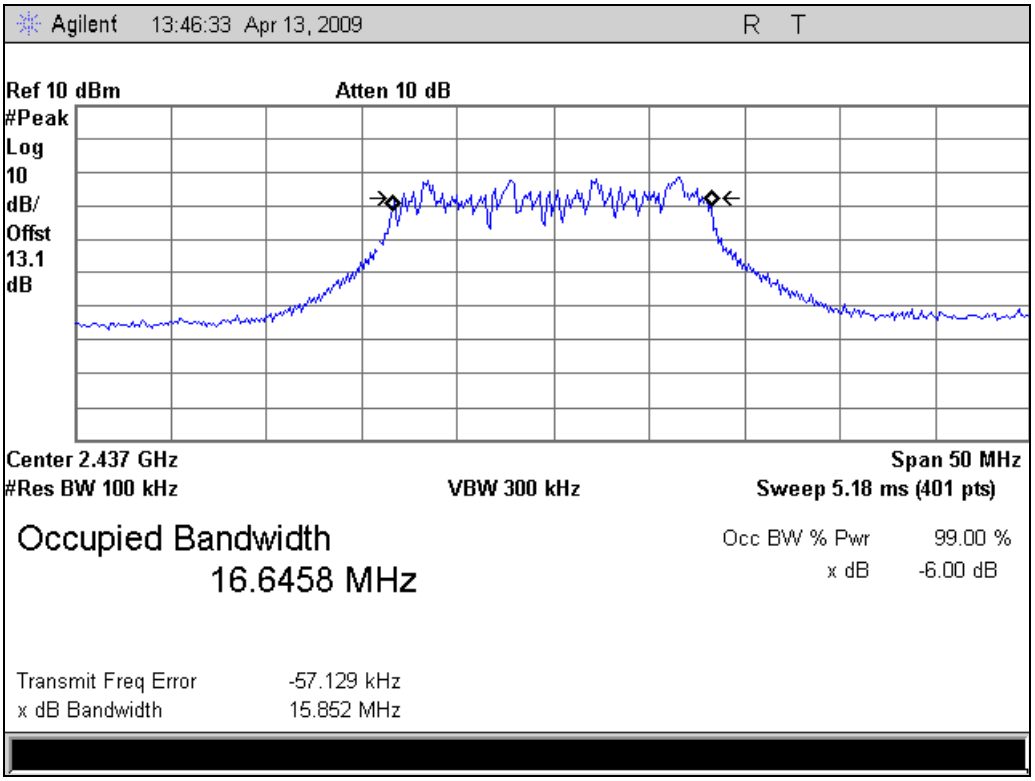
1 MB Occupied Bandwidth 2462 MHz



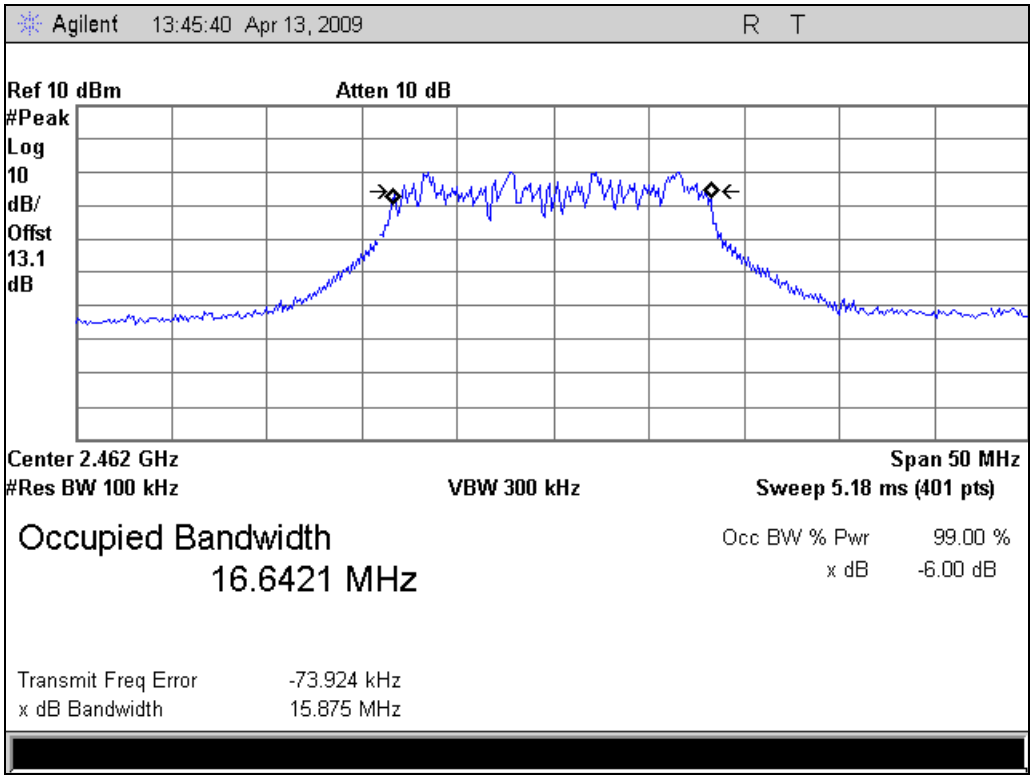
54 MB Occupied Bandwidth 2412 MHz



54 MB Occupied Bandwidth 2437 MHz



54 MB Occupied Bandwidth 2462 MHz

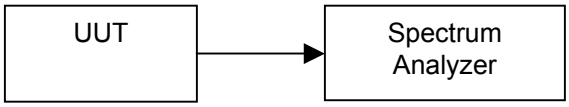


Name of Test: Transmitter Power Spectral Density (PSD)
Specification: 15.247(e) **Engineer: J Erhard**
Test Equipment Utilized i00054, i00331 **Test Date: 4/10/2009**

Test Procedure

The UUT was connected directly to a spectrum analyzer. The Span was set to 1.5 MHz and the resolution bandwidth was set to 3 KHz. The analyzer was set for a sweep time of 500 seconds. When the entire spectrum was captured the marker peak function of the analyzer was utilized to verify the PSD met the specification. The widest bandwidth for both modulation types was measured, as they are the worst case.

Test Setup



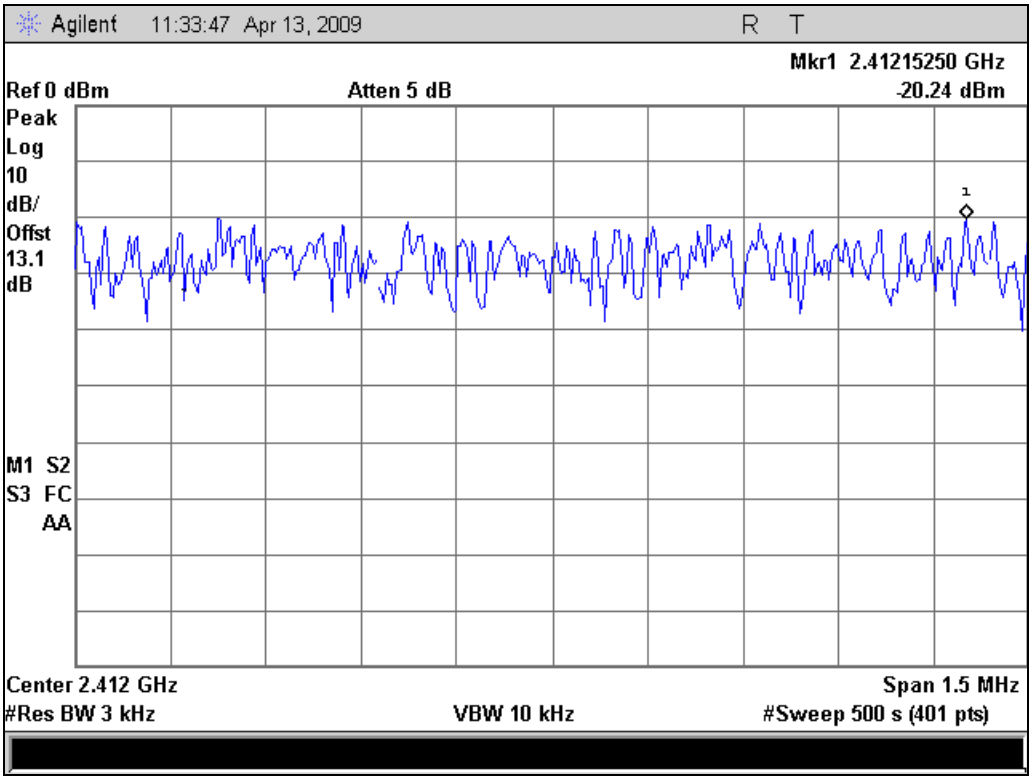
5.5 MB PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	-20.24 dBm,	8 dBm	Pass
2437	-15.46 dBm	8 dBm	Pass
2462	-13.36 dBm	8 dBm	Pass

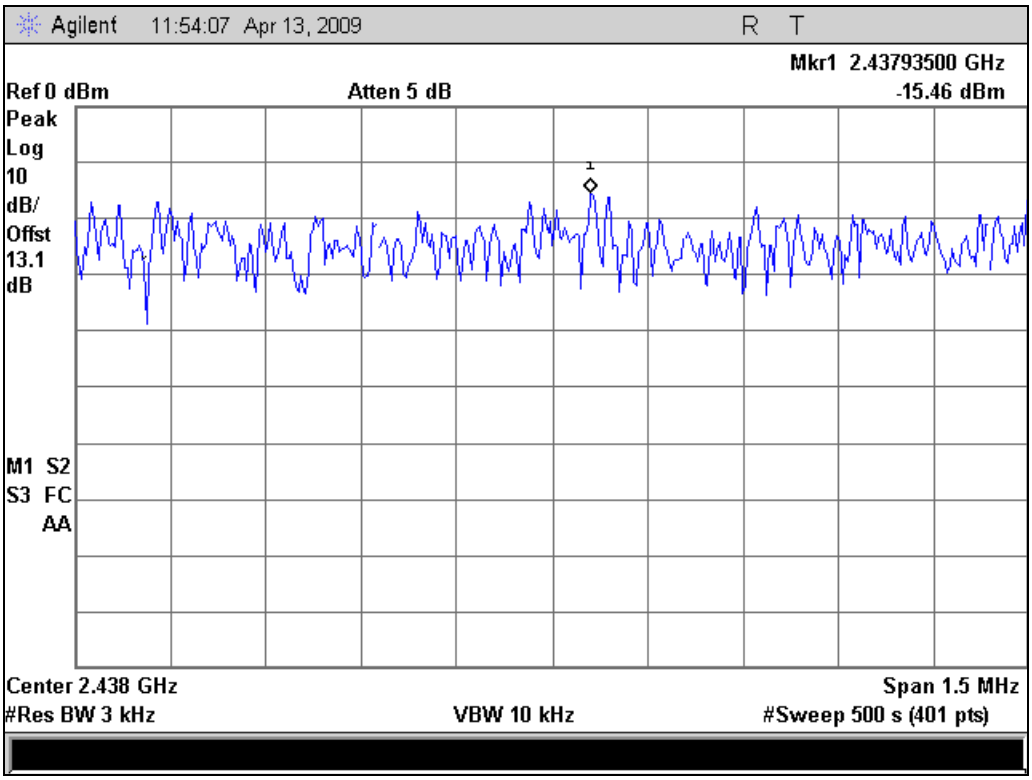
54 MB PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2412	-17.26 dBm	8 dBm	Pass
2437	-14.15 dBm	8 dBm	Pass
2462	-12.54 dBm	8 dBm	Pass

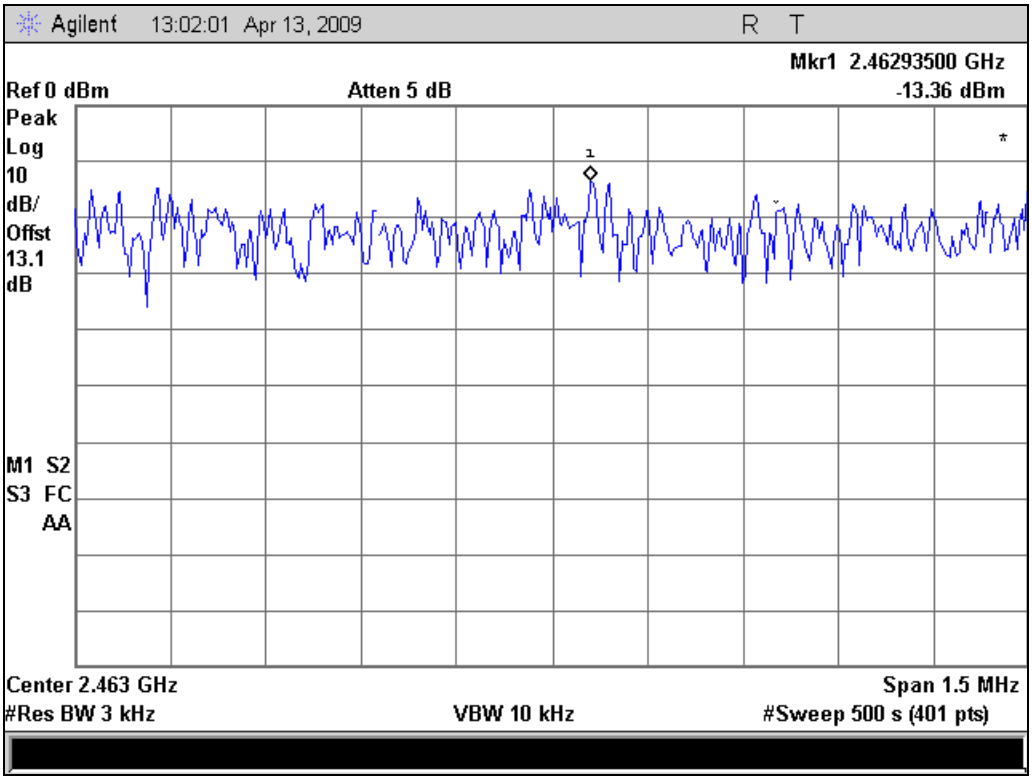
5.5 PSD 2412 MHz



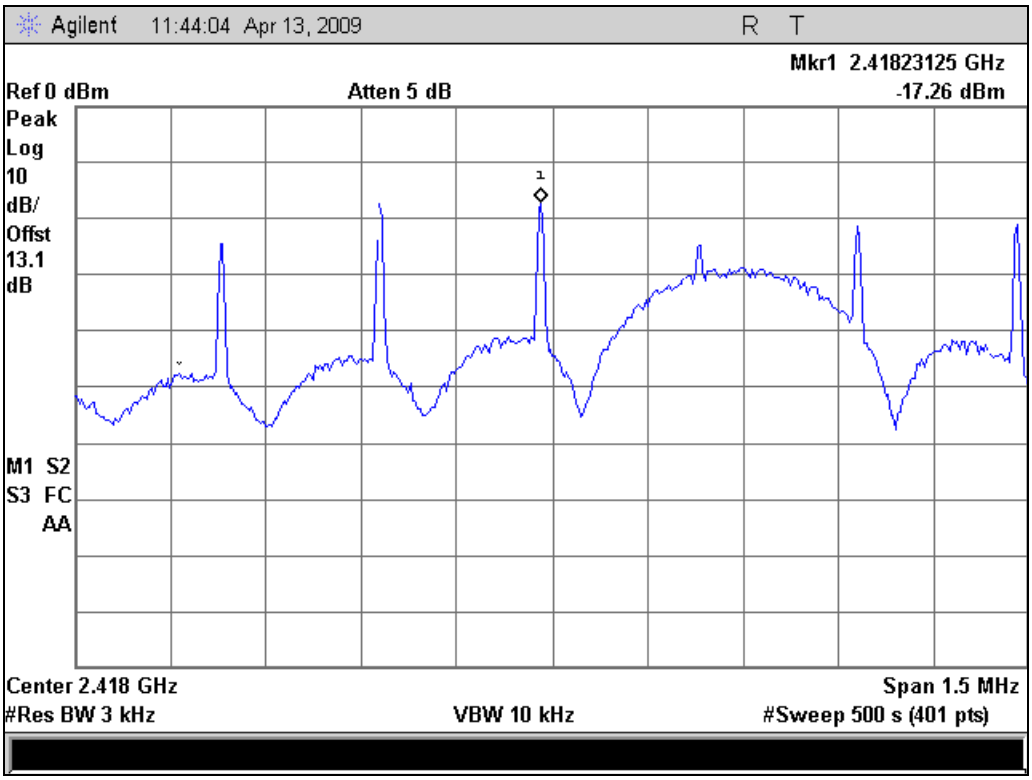
5.5 PSD 2437 MHz



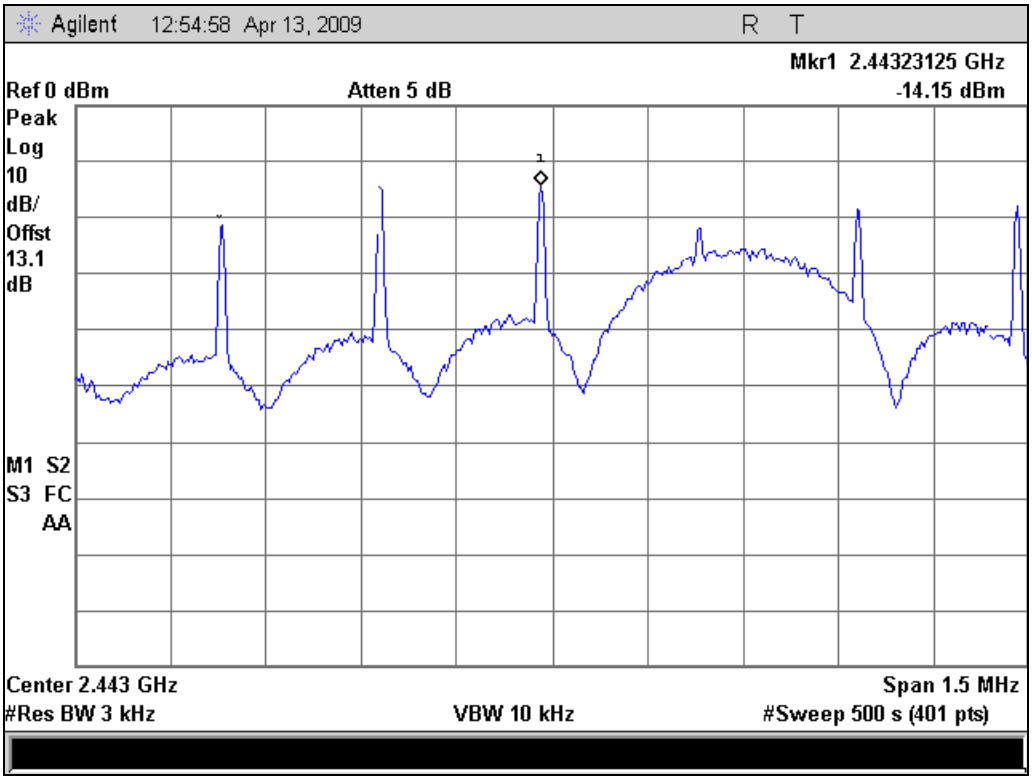
5.5 PSD 2462 MHz



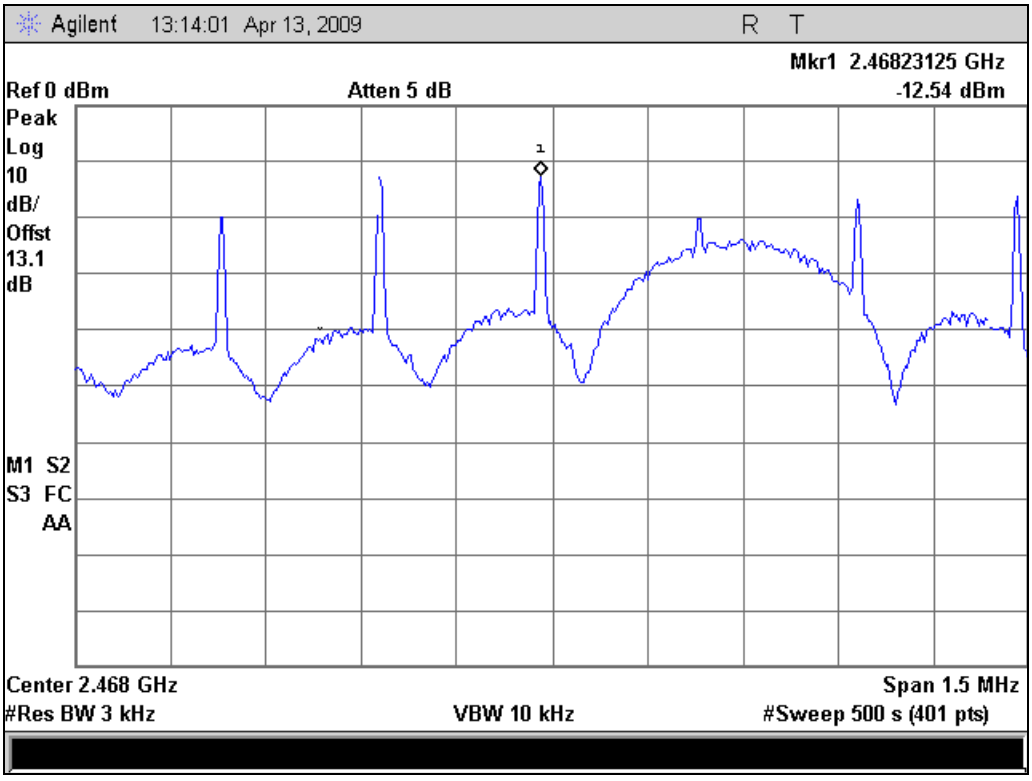
54 PSD 2412 MHz



54 PSD 2437 MH



54 PSD 2462 MHz

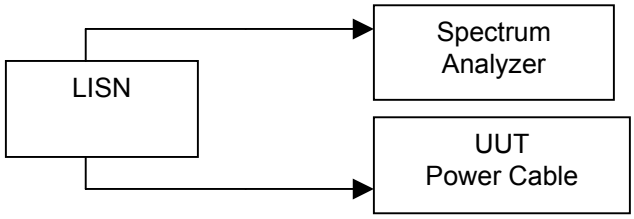


Name of Test: Powerline Conducted Emissions
Specification: 15.207 **Engineer: J Erhard**
Test Equipment Utilized 00033, i00054, i00270 **Test Date: 4/10/2009**

Test Procedure

The UUT power cable 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 monitored and compared to the specification limits. The average measurements were the worst-case and are recorded in the tables below.

Test Setup



Line 1 Quasi-Peak Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
208.93 KHz	43.93	0.2	10	54.16	64.32	-10.16
200.84 KHz	44.1	0.2	10	54.33	64.55	-10.22
200.44 KHz	43.88	0.2	10	54.1	64.56	-10.46
184.11 KHz	43.83	0.2	10	54.03	65.03	-10.99
183.14 KHz	43.76	0.2	10	53.96	65.05	-11.09
162.08 KHz	44.31	0.2	10	54.54	65.65	-11.11

Line 2 Quasi-Peak Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Limit (dB)
162.32 KHz	44.02	0.2	10	54.25	65.65	-11.39
162.02 KHz	44	0.2	10	54.23	65.66	-11.42
158.94 KHz	44.21	0.21	10	54.46	65.74	-11.29
156.58 KHz	44.21	0.23	10	54.48	65.81	-11.33
154.08 KHz	43.95	0.26	10	54.24	65.88	-11.64
151.81 KHz	44.03	0.28	10	54.35	65.95	-11.6

All other results were greater than 20 dB below the limit. No average values were within 20 dB of the limit.

Test Equipment Utilized

Description	MFG	Model Number	FTL Asset Number	Last Cal Date	Cal Due Date
Spectrum Analyzer	HP	8563E	i00029	5/5/08	5/5/09
Spectrum Analyzer	HP	85462A	i00033	11/25/08	11/28/09
Power Supply	HP	6286A	i00054	NCR	NCR
Horn Antenna	EMCO	3115	i00103	11/25/08	11/28/09
Power Meter	HP	E4418B	i00228	10/1/08	10/1/09
LISN	FCC	FCC-LISN-50-32-2-01	i00270	9/17/08	9/17/10
Spectrum Analyzer	HP	E4407B	i00331	11/3/08	11/3/09
Power Sensor	HP	8485A	i00334	9/30/08	9/30/09

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