



**Compliance Testing, LLC**  
Previously Flom Test Lab  
*RF, EMC and Safety Testing Experts Since 1963*

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## Test Report

for

**FCC ID:** L2V-HUG

**Model:** HUG

to

**Federal Communications Commission**

Rule Part(s) 15.247

**Date of Report:** November 2, 2010

**On the Behalf of the Applicant:** Spot, LLC  
300 Holiday Square Blvd  
Covington, LA 70433

**Attention of:** Christopher Robinson, Design Engineer  
Ph: (985) 335-1530  
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Email: [chris.robinson@globalstar.com](mailto:chris.robinson@globalstar.com)

By  
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### Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	November 2, 2010	J. Erhard	Original Document
2.0	December 8, 2010	J. Erhard	Add units to Spurious Emission table, changed Type of Emission



**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 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.



## 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 is true and correct.

A handwritten signature in black ink, appearing to read "John Erhard".

John Erhard: Engineering Manager

Certifying Engineer:



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**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**

(b)(1):

**Name and Address of Applicant:** Spot, LLC  
300 Holiday Square Blvd  
Covington, LA 70433

(b)(2):

**FCC ID:** L2V-HUG

**Model Number:** HUG

(b)(3):

**Instruction Manual(s):** Please See Exhibits

(b)(4):

**Theory of Operation:** Please See Exhibits

(b)(5):

**Block Diagram:** Please See Exhibits

(b)(6):

**Test Report:** Contained Herein

(b)(7):

**Test Setup Photos:** Please See Exhibits

**Type of Emission:** QPSK

**Frequency Range, MHz:** 2402 - 2410

**Power Rating, W:** 0.00158

Switchable                       Variable                       N/A

**Maximum Power Rating, W:** 1

**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



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 C63.10-2009 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.

**A2LA**

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

Please refer to [www.a2la.org](http://www.a2la.org) for current scope of accreditation.

Certificate number: 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	A/C Powerline Conducted Emissions	N/A	The EUT does not connect to the AC Mains
RSS-GEN 6(b)	Receiver Spurious Emissions	Pass	





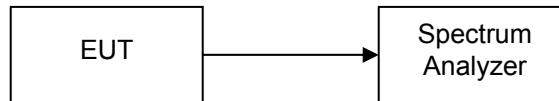
**Name of Test:** Peak Output Power  
**Specification:** 15.247(b)  
**Test Equipment Utilized:** i00331

**Engineer:** J. Erhard  
**Test Date:** 10/14/2010

### Test Procedure

The EUT was connected to a Spectrum analyzer. The RBW was set greater than the occupied bandwidth with the VBW set at least 3X the RBW. The peak readings were recorded and compared to the limit.

### Test Setup



### Transmitter Peak Output Power

Tuned Frequency MHz	Measured Power dBm	Power Watts	Limit Watts
2402	-2.18	0.00065	1
2410	-2	0.00158	1

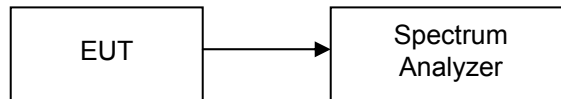
**Name of Test:** Conducted Spurious Emissions  
**Specification:** 15.247(d)  
**Test Equipment Utilized:** i00331

**Engineer:** J. Erhard  
**Test Date:** 10/14/2010

### Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the EUT met the requirements for spurious emissions. The frequency range of 30 MHz to the 10<sup>th</sup> harmonic of the fundamental transmitter was observed. When necessary a high-pass filter was utilized to eliminate the fundamental frequency ensuring that the spectrum analyzer was put in compression. Only detectable spurious emissions were recorded and plotted.

### Test Setup

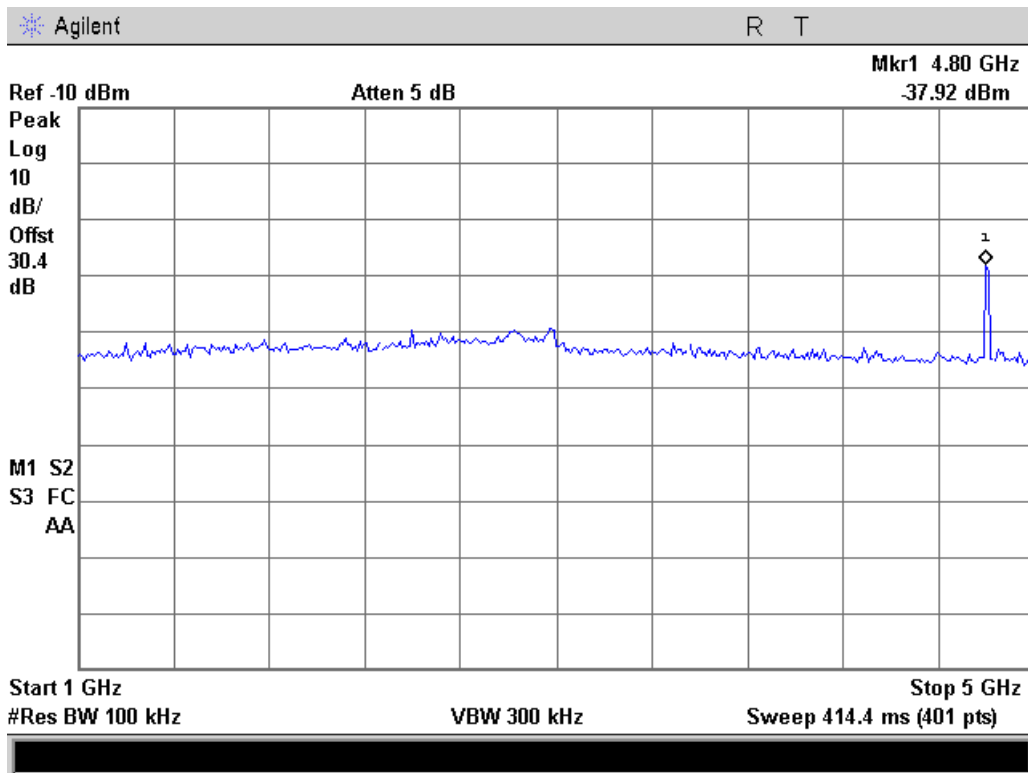
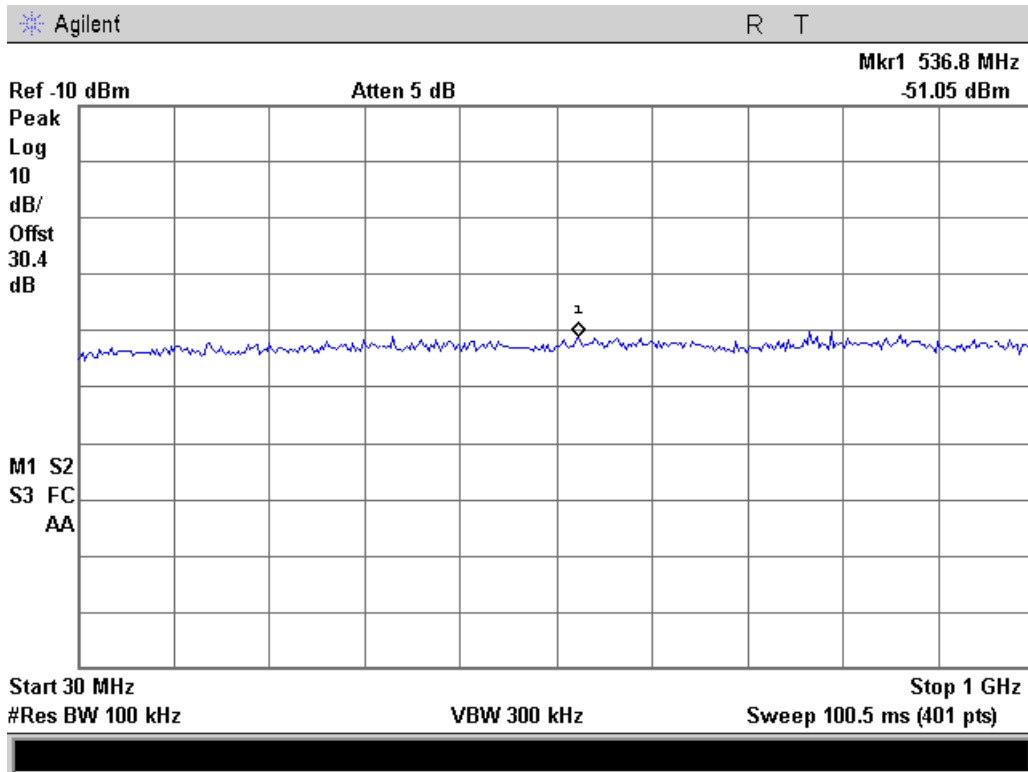


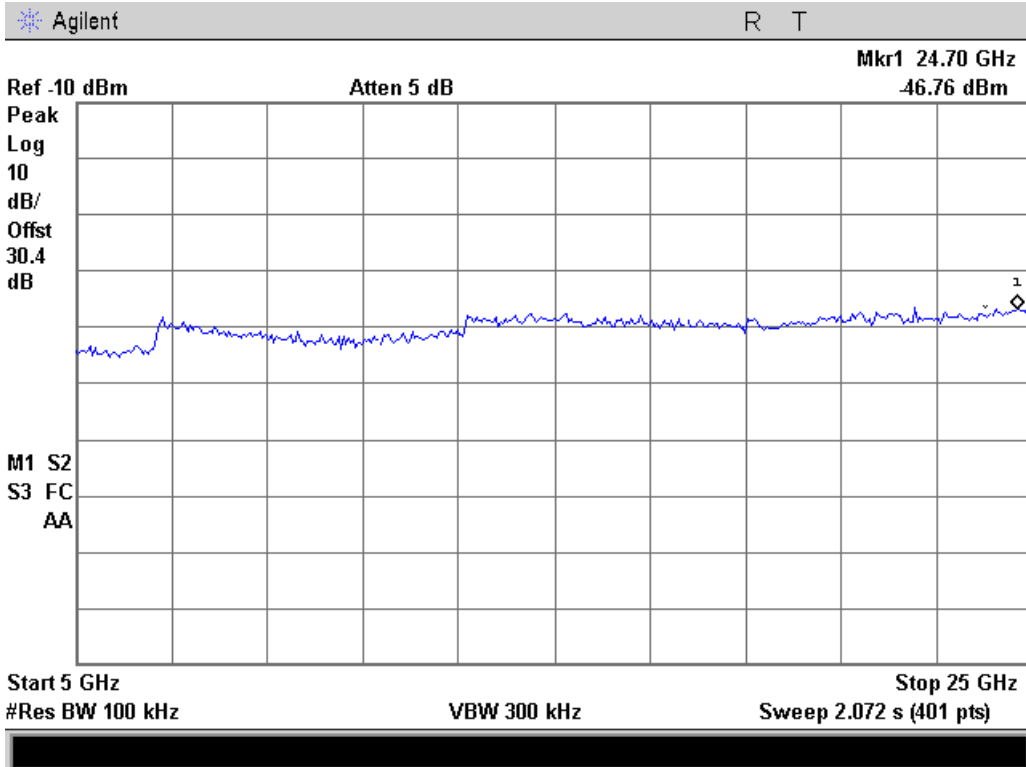
**Conducted Spurious Emissions Summary Test Table**

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement dBc	Specification Limit	Result
2402	4800	-37.92	-20 dBc	Pass
2410	4820	-38.11	-20 dBc	Pass

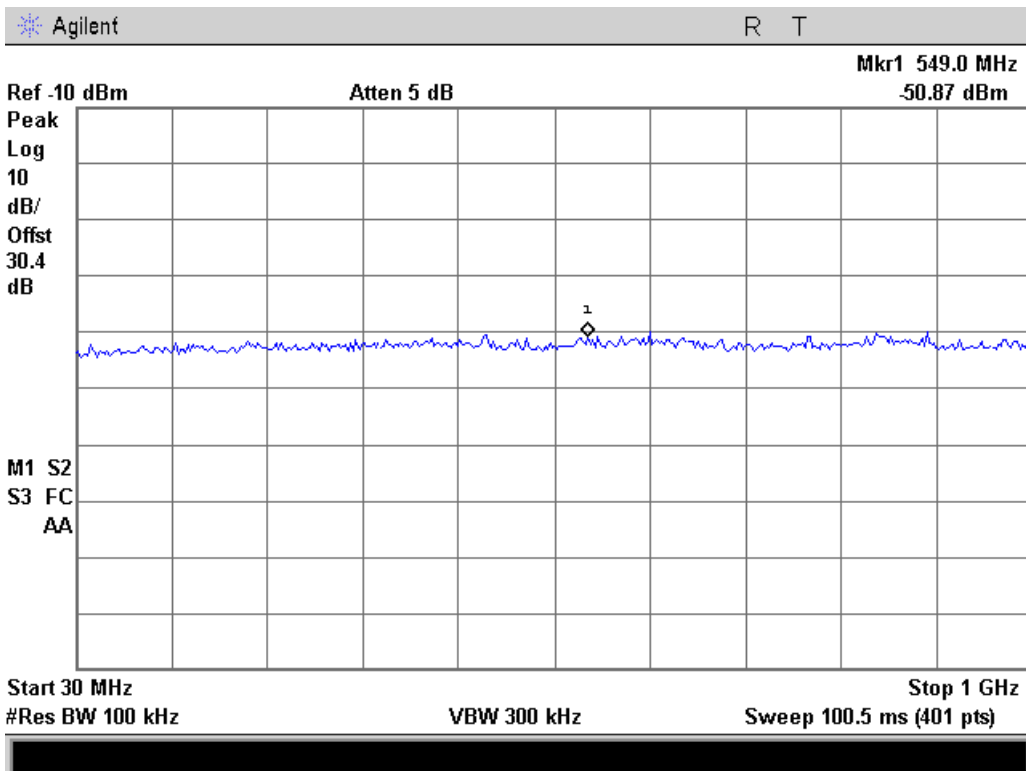


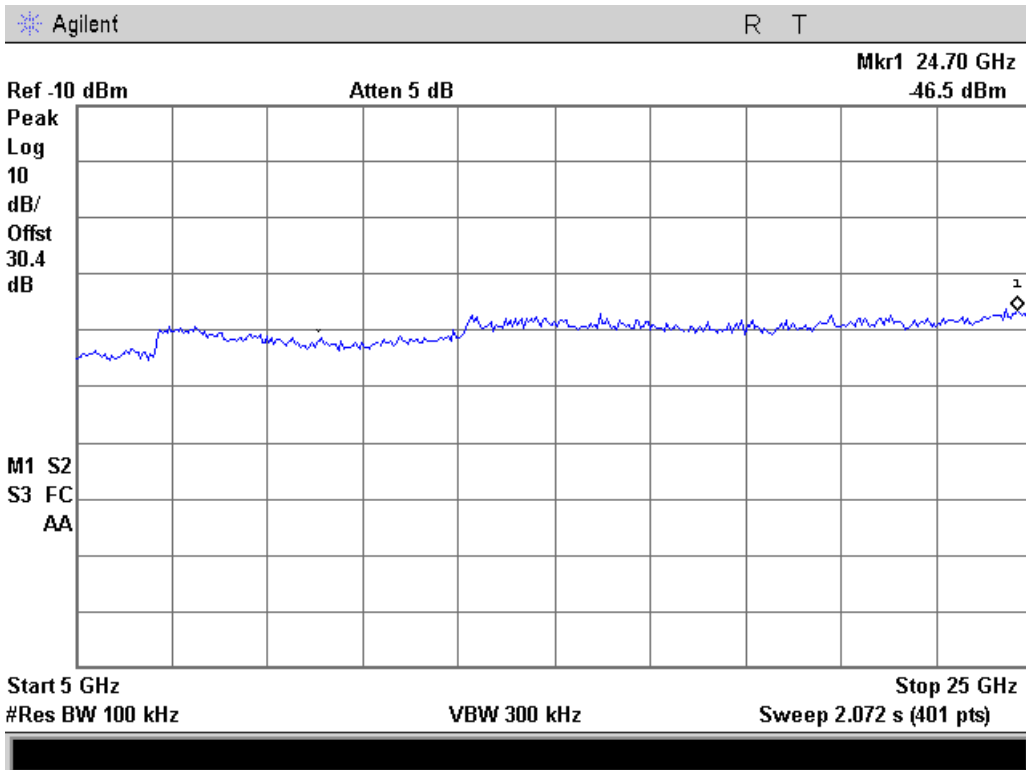
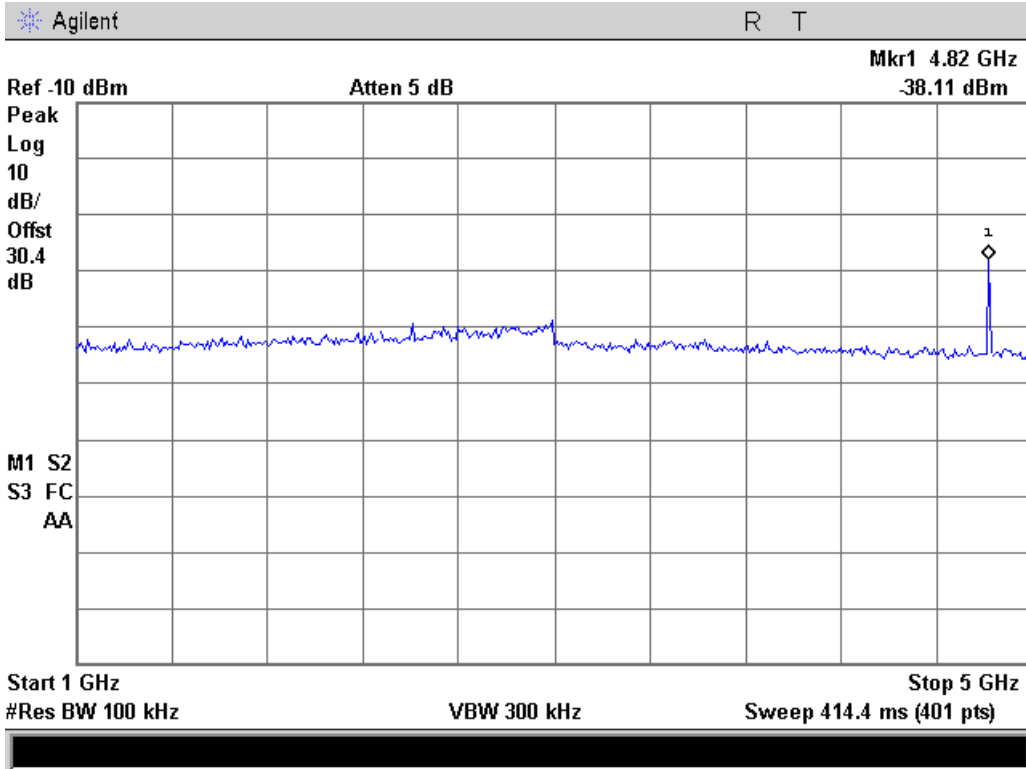
### Conducted Spurious Emissions 2402 MHz





### Conducted Spurious Emissions 2410 MHz





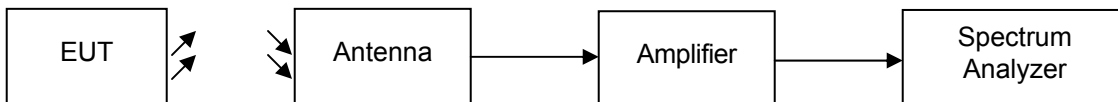
**Name of Test:** Radiated Spurious Emissions  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Test Equipment Utilized:** i00271, i00331

**Engineer:** J. Erhard  
**Test Date:** 10/14/2010

### 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 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 10<sup>th</sup> harmonic.

### Test Setup



### Radiated Spurious Emissions

Tuned Freq (MHz)	Emission Freq (MHz)	Peak Monitored Level (dBuV/m)	Peak Limit (dBuV/m)	Average Monitored Level (dBuV/m)	Average Limit (dBuV/m)	Result
2402	4804	51.79	74.0	43.51	54.0	Pass
2402	7206	53.9	74.0	45.13	54.0	Pass
2402	9608	59.68	74.0	52.56	54.0	Pass
2410	4820	51.40	74.0	45.88	54.0	Pass
2410	7230	51.41	74.0	45.16	54.0	Pass
2410	9640	59.13	74.0	52.19	54.0	Pass

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

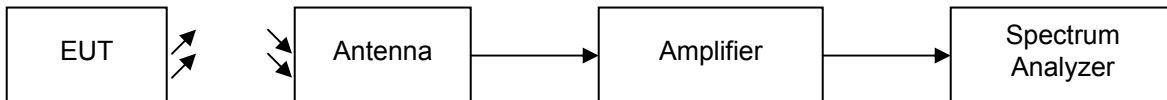
**Name of Test:** Emissions At Band Edges  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Test Equipment Utilized:** i00271, i00331

**Engineer:** J. Erhard  
**Test Date:** 10/14/2010

### Test Procedure

The EUT was tested in a semi-anechoic chamber set 3m from the receiving transducer. A spectrum analyzer was used to verify that the EUT 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



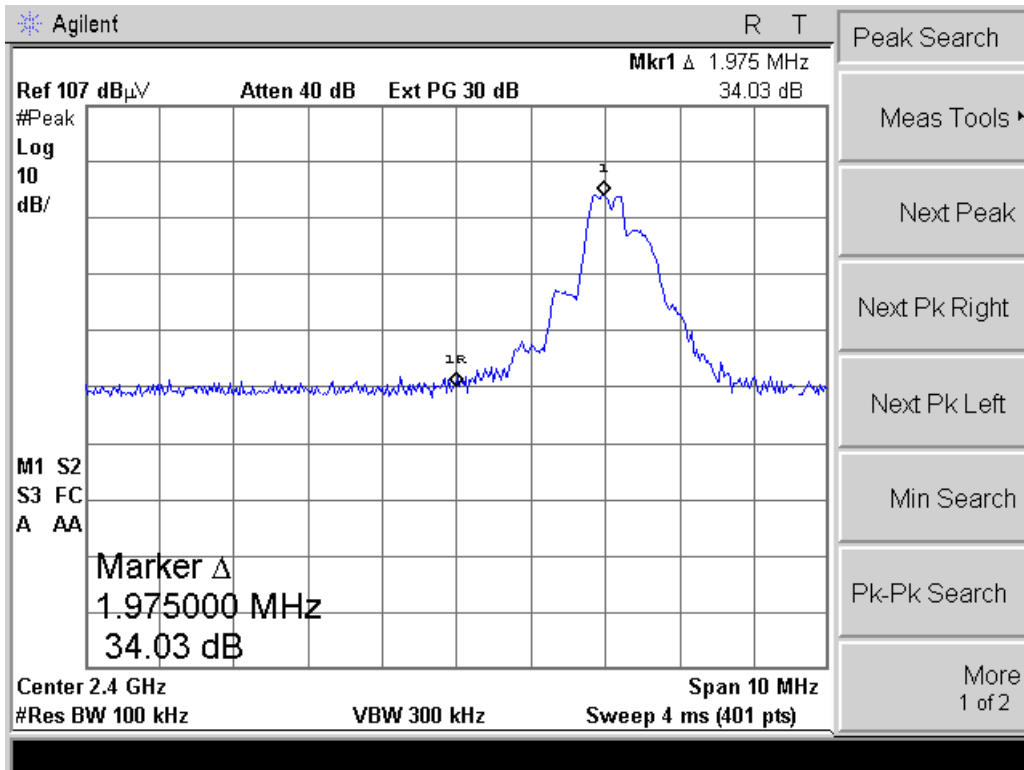
### Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit	Result
2402	2400	-34.03	Peak	-20 dBc	Pass
2410	2483.5	-44.32	Peak	-20 dBc	Pass

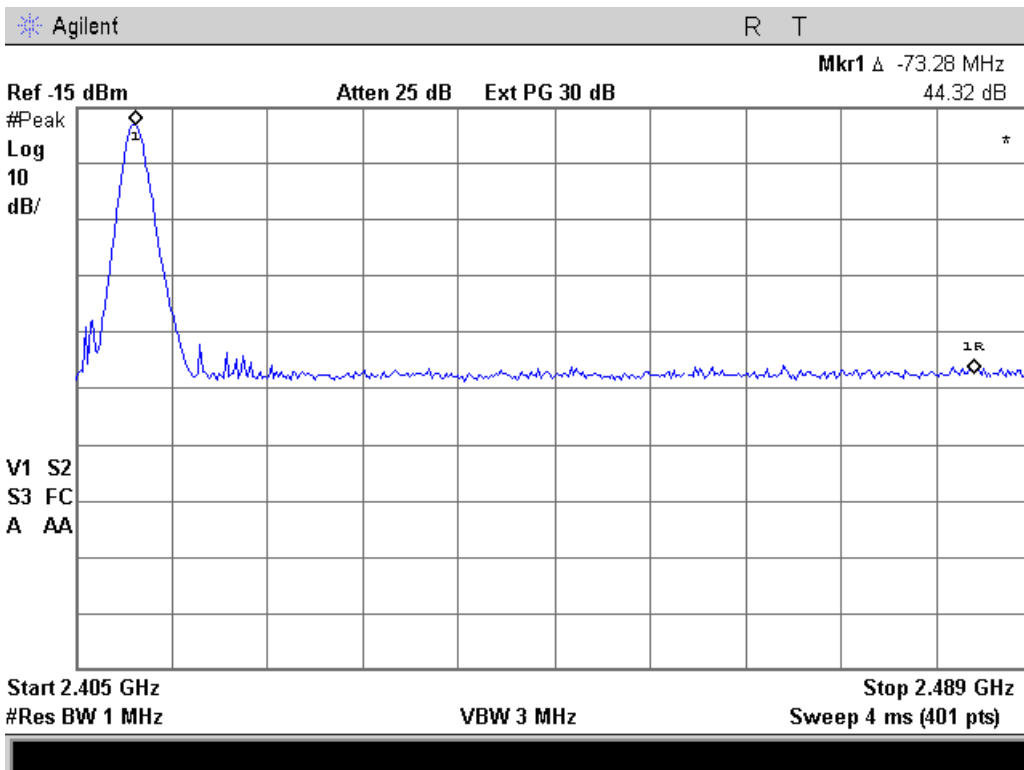
### Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2402	2389.50	53.5	Peak	74	Pass
2402	2370.42	41.94	Average	54	Pass
2410	2483.525	44.45	Peak	74	Pass
2410	2483.525	37.12	Average	54	Pass

### Band Edge 2400 MHz



### Band Edge 2483.5 MHz

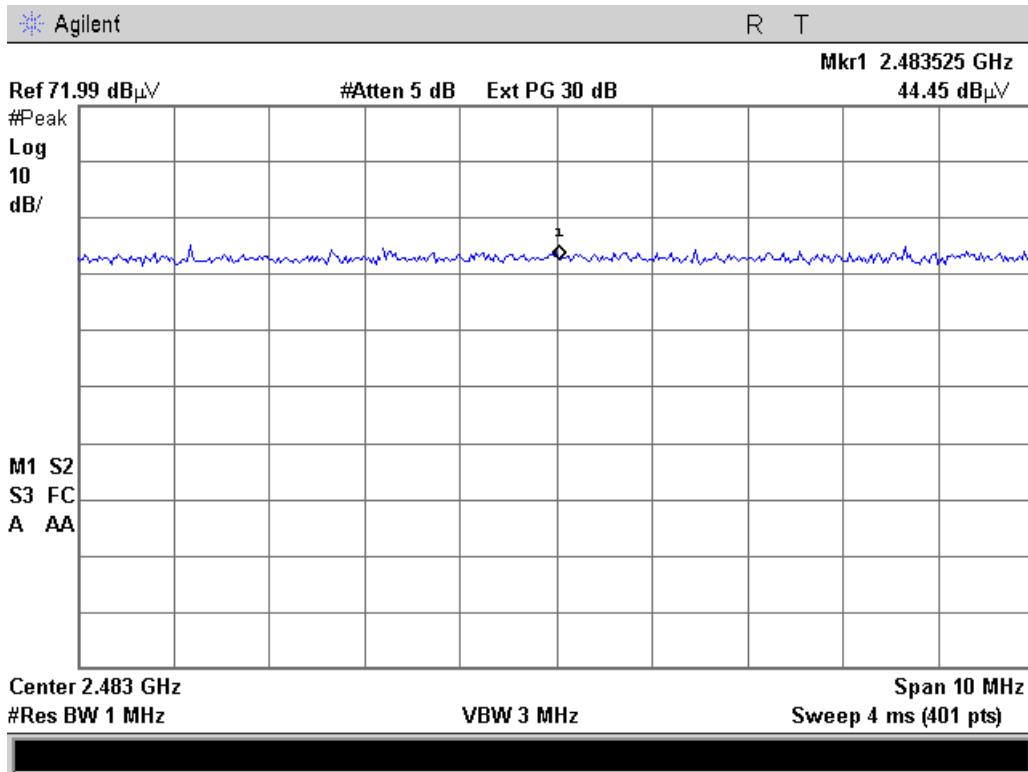




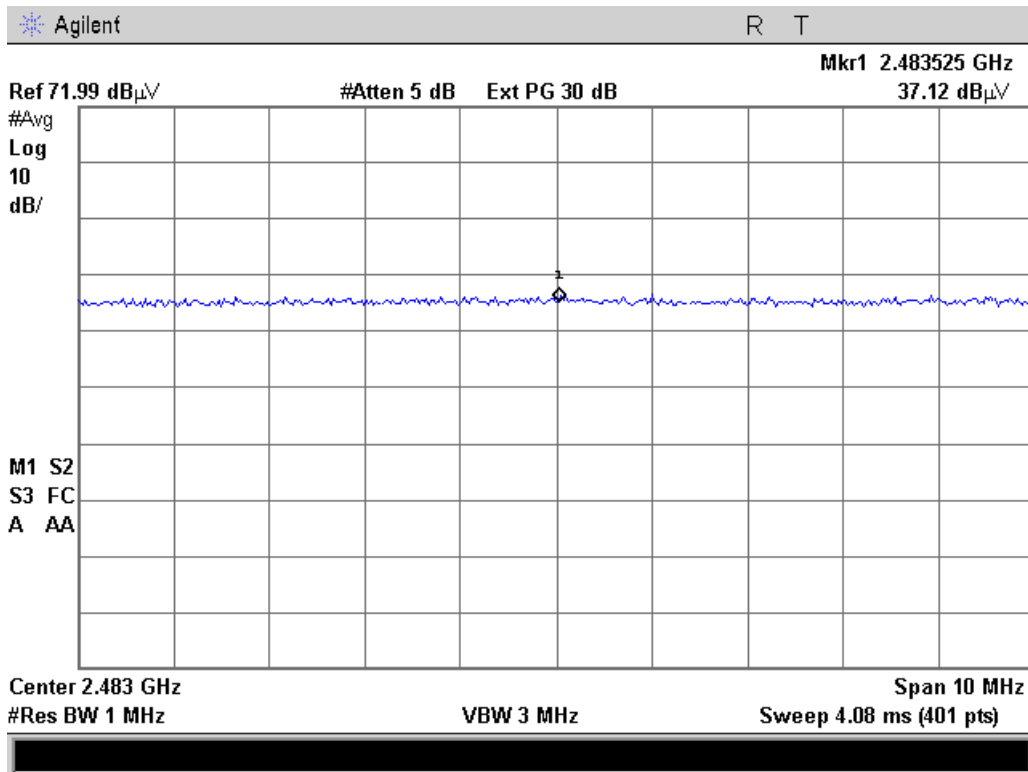




### Restricted Band 2483.5 MHz Peak



### Restricted Band 2483.5 MHz Average



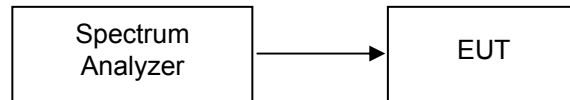
**Name of Test:** Occupied Bandwidth  
**Specification:** 15.247(a)(2)  
**Test Equipment Utilized:** i00331

**Engineer:** J. Erhard  
**Test Date:** 10/14/2010

### 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 bandwidths was measured to verify the bandwidth met the specification.

### Test Setup



### Occupied Bandwidth Summary

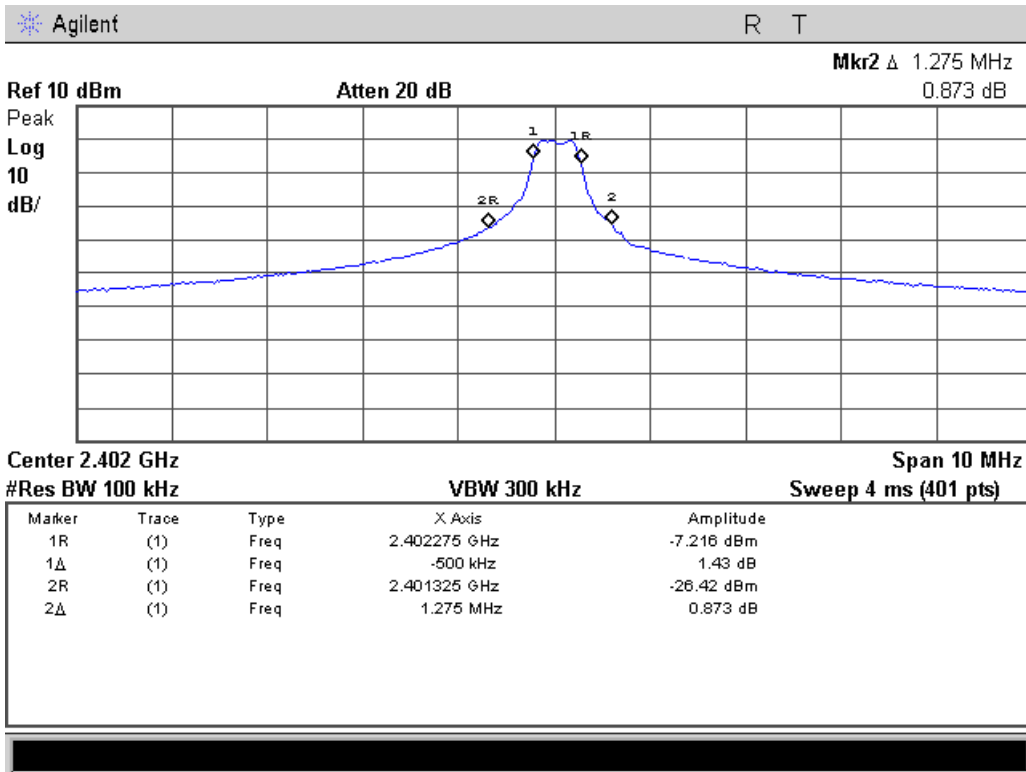
Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	500	≥ 500 KHz	Pass
2410	500	≥ 500 KHz	Pass

### 99% Occupied Bandwidth Summary

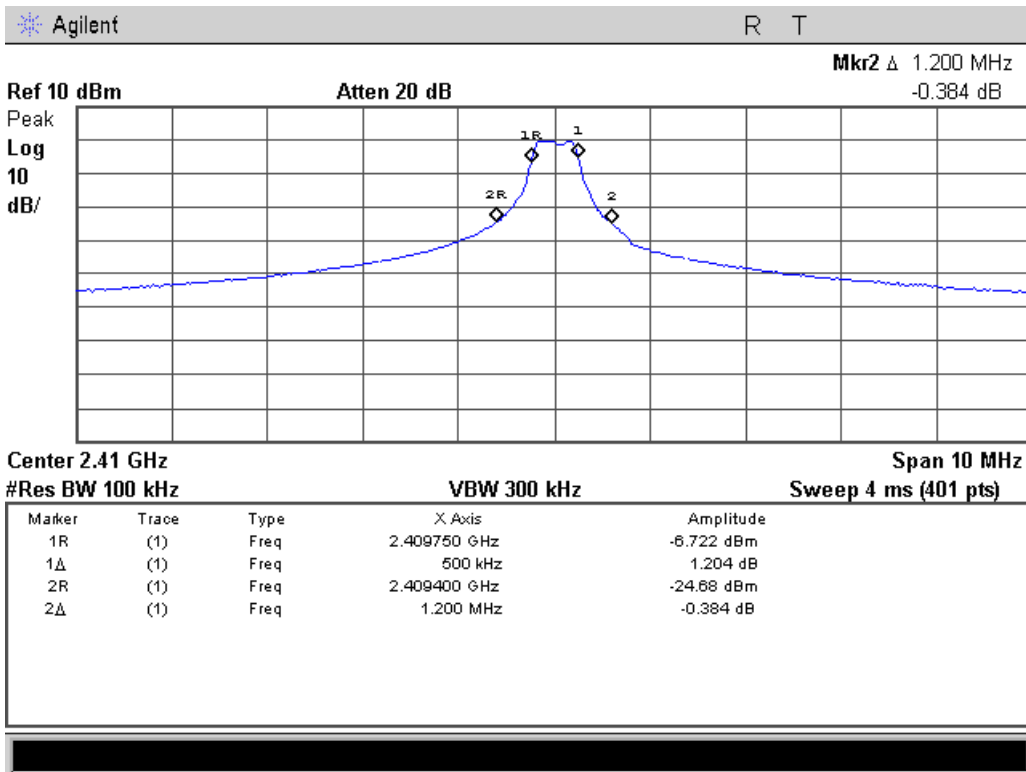
Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	1.725	≥ 500 KHz	Pass
2410	1.200	≥ 500 KHz	Pass



### Occupied Bandwidth 2402 MHz



### Occupied Bandwidth 2410 MHz

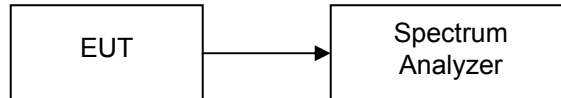


**Name of Test:** Transmitter Power Spectral Density (PSD)  
**Specification:** 15.247(e) **Engineer:** J. Erhard  
**Test Equipment Utilized:** i00331 **Test Date:** 10/14/2010

### Test Procedure

The EUT 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.

### Test Setup

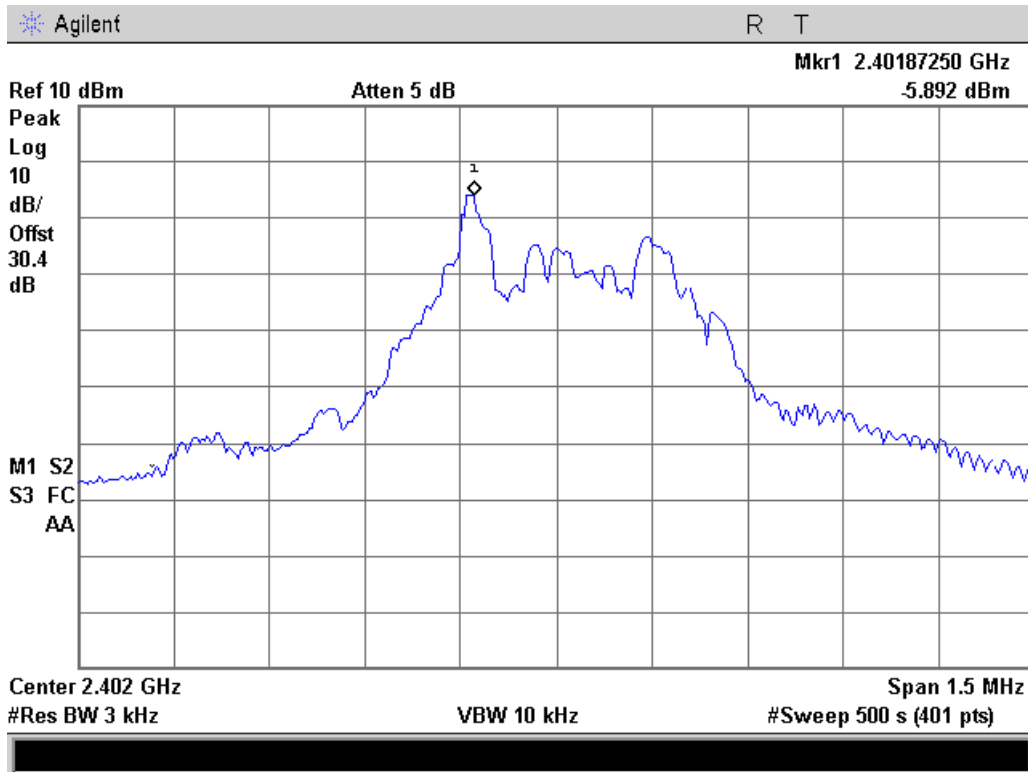


### PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	-5.892	8 dBm	Pass
2410	-5.747	8 dBm	Pass



### PSD 2402 MHz



### PSD 2410 MHz





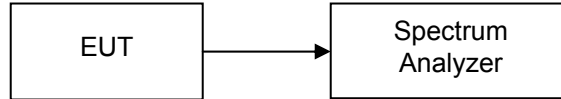
**Name of Test:** Receiver Spurious Emissions  
**Specification:** RSS-GEN 6(b)  
**Test Equipment Utilized:** i00379

**Engineer:** J. Erhard  
**Test Date:** 12/09/2010

### Test Procedure

The EUT was connected directly to a spectrum analyzer. The receiver spurious emission was measured from 30 MHz of 3 times the highest tunable frequency.

### Test Setup

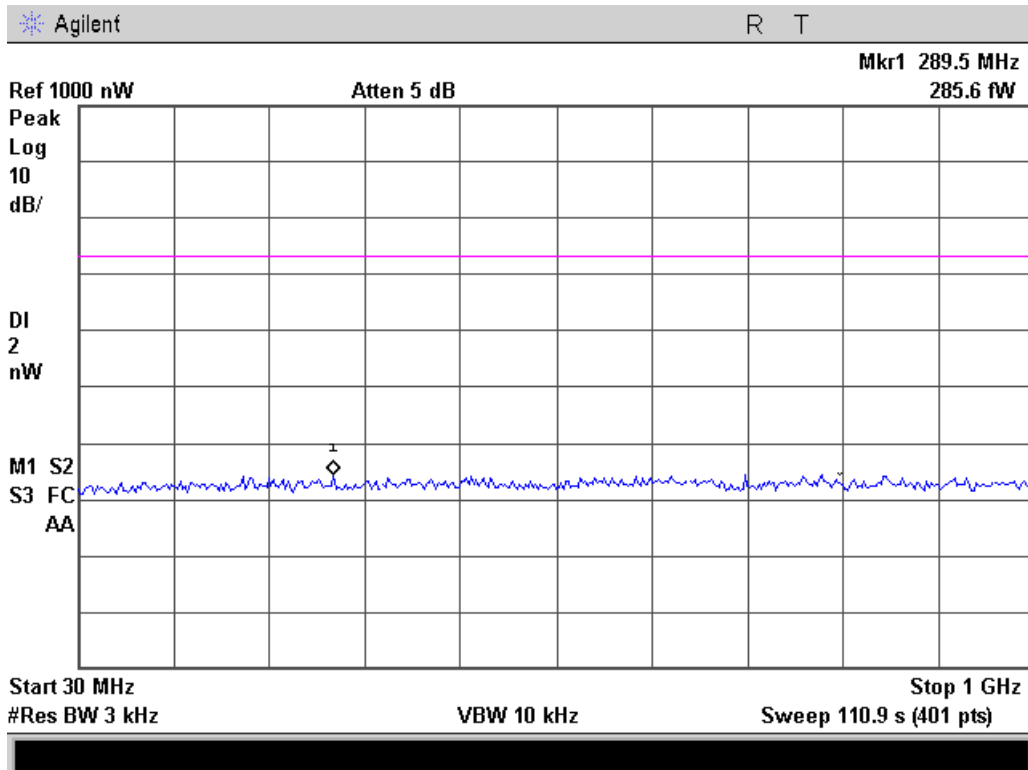


### Receiver Spurious Emissions Summary

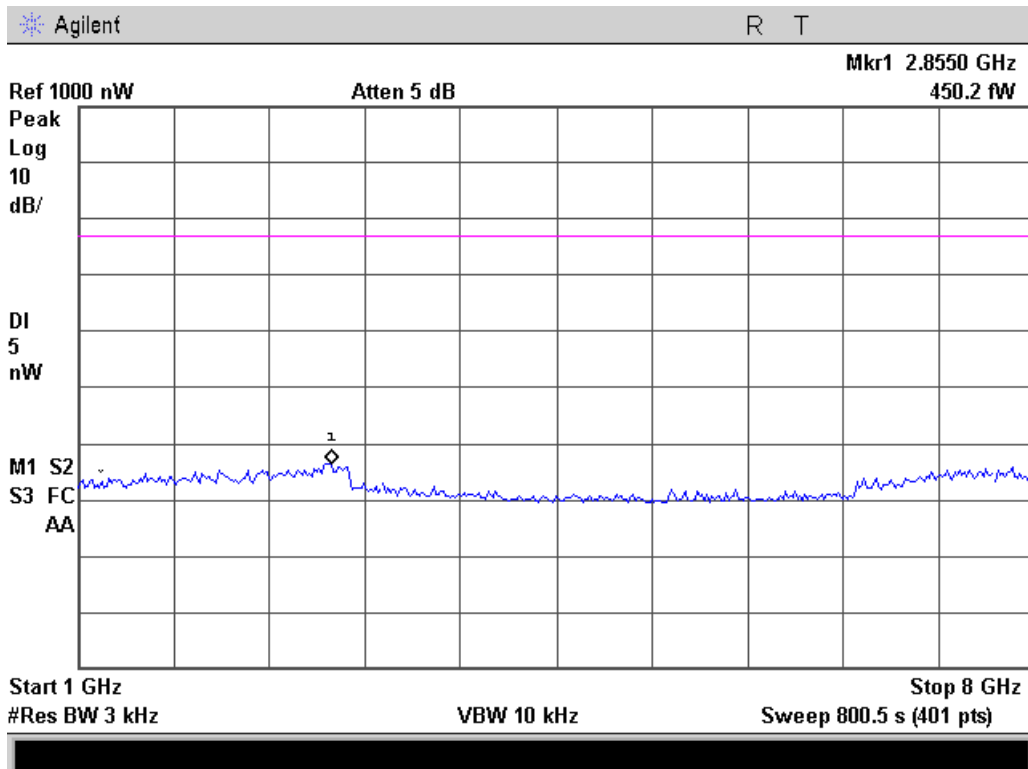
Frequency Range MHz	Recorded Measurement	Specification Limit	Result
30 – 1000	285.6 fW	2 nW	Pass
1000 - 8000	450.2 fW	5 nW	Pass



### Receiver Spurious 30 MHz – 1 GHz



### Receiver Spurious 1 GHz – 8 GHz







### Test Equipment Utilized

Description	Manufacturer	Model	Asset#	Last Calibration	Calibration Due
Horn Antenna	Antenna Research Associates	iRG-1131A	i00271	4/7/2009	4/7/2011
Spectrum Analyzer	Agilent	E4407B	i00331	11/3/2009	11/3/2010*
EMC Analyzer	Agilent	E7405A	i00379	11/22/2010	11/22/2011

\* 30-Day calibration extension

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