



Compliance Testing, LLC

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Test Report

for

FCC ID: L2V-HUGKEY

Model: HUGKEY

to

Federal Communications Commission

Rule Part(s) 15.247

Date of Report: November 9, 2010

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

Attention of: Christopher Robinson, Design Engineer
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By
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Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	November 9, 2010	J. Erhard	Original Document
2.0	December 9, 2010	J. Erhard	Add RSS-GEN Receiver Spurious Test info



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".

Certifying Engineer:

John Erhard: Engineering Manager



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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

(b)(2):

FCC ID: L2V-HUGKEY

Model Number: HUGKEY

(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: DTS

FREQUENCY RANGE, MHz: 2402 - 2410

Power Rating, W: 0.0007

☐ Switchable

☐ Variable

☒ N/A

Maximum Power Rating, W: 1W

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 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	



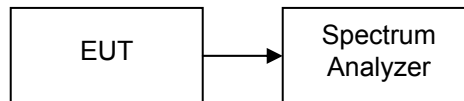
Name of Test: Peak Output Power
Specification: 15.247(b)
Test Equipment Utilized: i00331

Engineer: J. Erhard
Test Date: 11/8/2010

Test Procedure

The EUT was connected directly to a spectrum analyzer with the RBW set wider than the occupied bandwidth. The peak readings were taken and the result was then compared to the limit.

Test Setup



Transmitter Peak Output Power

Tuned Frequency (MHz)	Recorded Measurement (dBm)	Recorded Measurement (Watts)	Limit (Watts)	Result
2402	-1.491	0.00071	1 W	Pass
2410	-1.716	0.00067	1 W	Pass



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

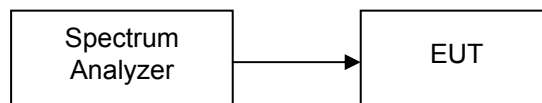
Engineer: J. Erhard
Test Date: 11/8/2010

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 from 30 MHz to the 10th harmonic of the fundamental transmitter was observed. A high pass filter was utilized where necessary to eliminate the fundamental preventing the spectrum analyzer from operating in compression.

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

Test Setup

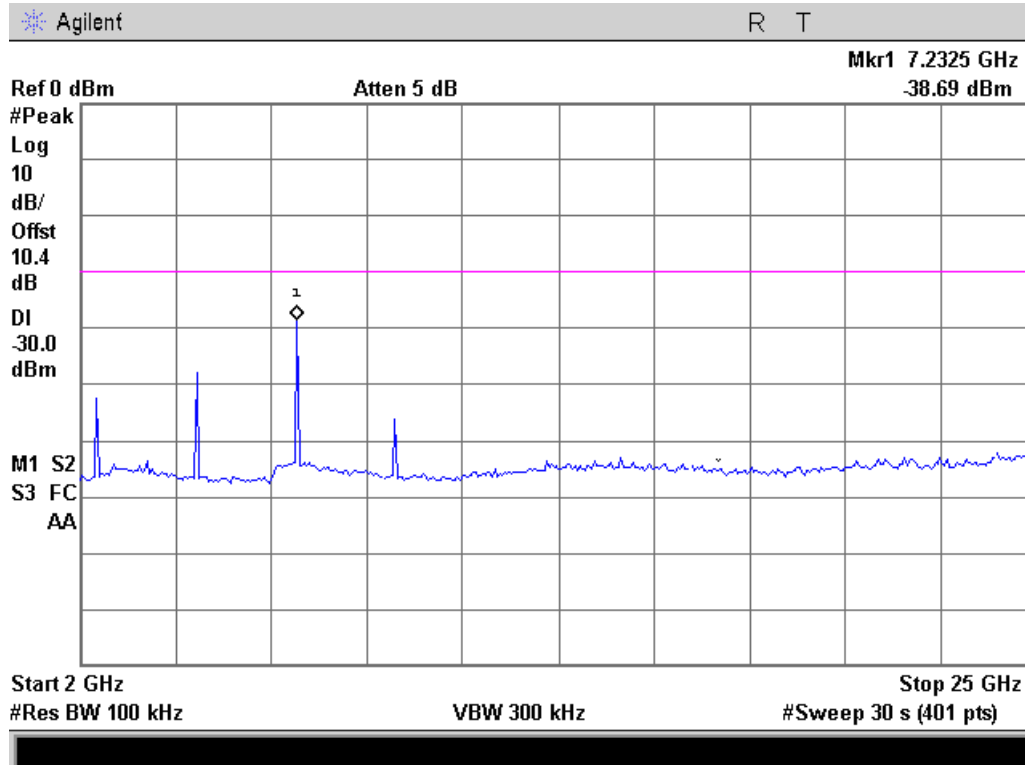
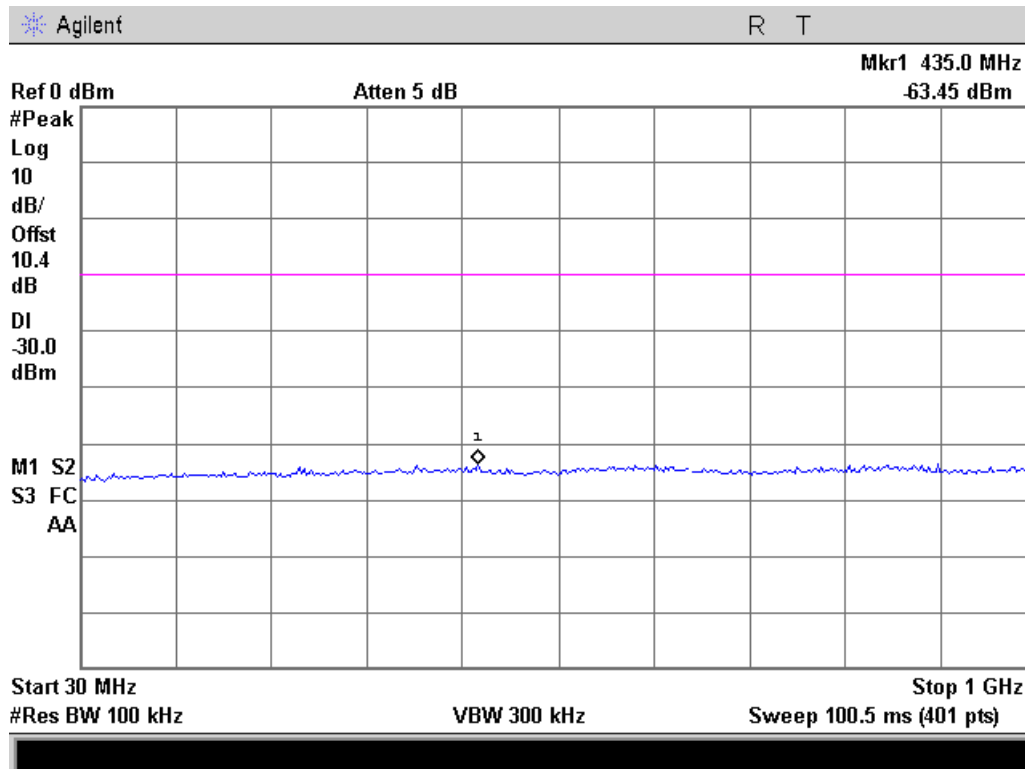


Conducted Spurious Emissions Summary Test Table

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	7232.5	-38.69	-20 dBc	Pass
2410	7232.5	-38.55	-20 dBc	Pass

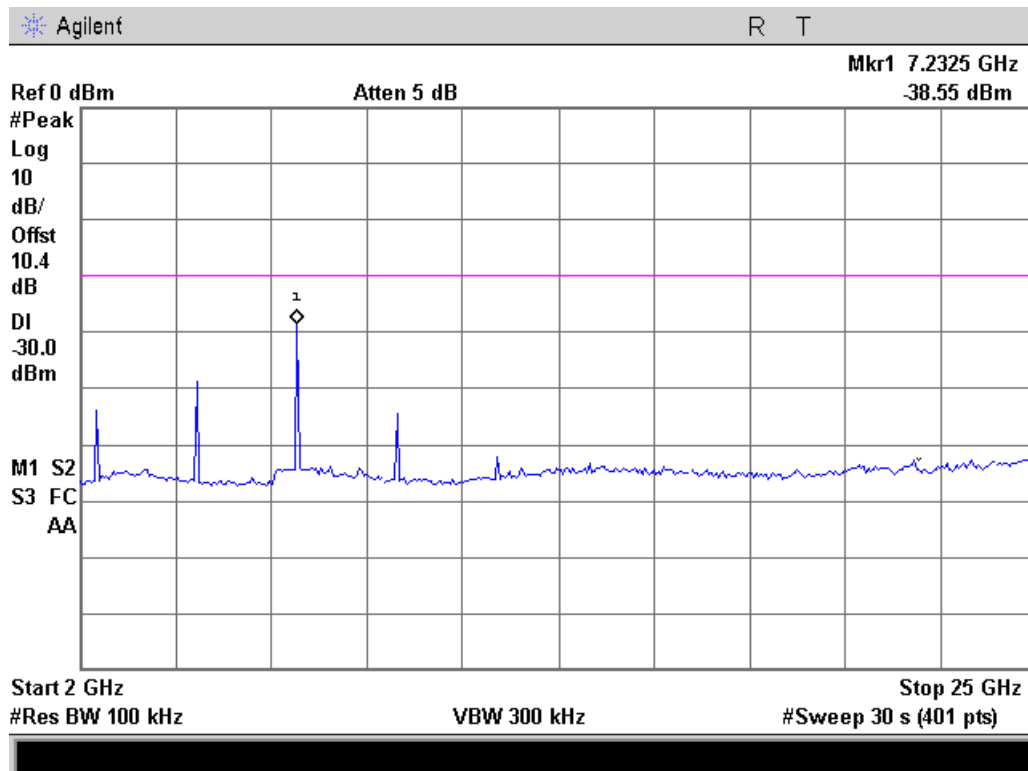
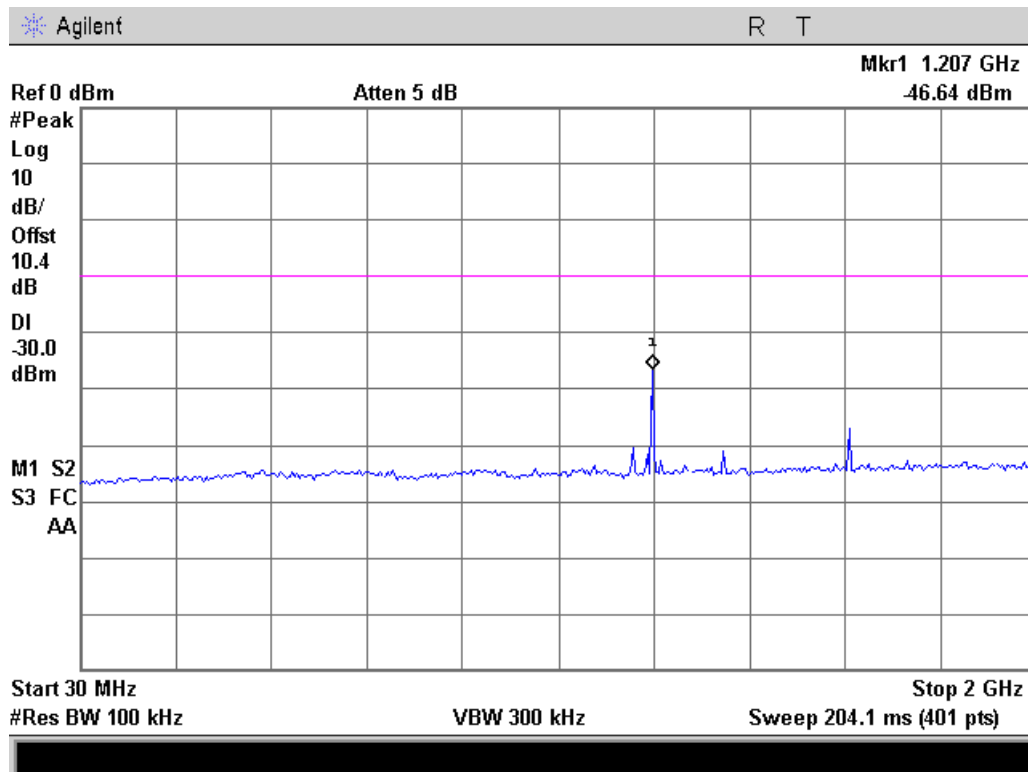


Conducted Spurious Emissions 2402 MHz





Conducted Spurious Emissions 2410 MHz





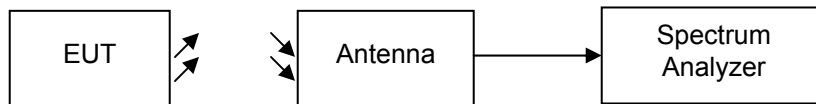
Name of Test: Radiated Spurious Emissions
Specification: 15.247(d), 15.209(a), 15.205
Test Equipment Utilized: i00331, i00271

Engineer: J. Erhard
Test Date: 11/9/2010

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 10th 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	4803.975	51.39	74.0	48.86	54.0	Pass
2402	7206.150	51.84	74.0	48.39	54.0	Pass
2402	9608.075	48.55	74.0	43.34	54.0	Pass
2410	4819.850	50.27	74.0	44.38	54.0	Pass
2410	7229.775	50.48	74.0	44.38	54.0	Pass
2410	9640.000	46.57	74.0	40.42	54.0	Pass

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



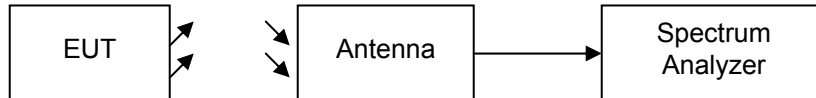
Name of Test: Emissions At Band Edges
Specification: 15.247(d), 15.209(a), 15.205
Test Equipment Utilized: i00331, i00271

Engineer: J. Erhard
Test Date: 11/9/2010

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 to ensure accurate readings were obtained.

Test Setup



Band Edge Emissions Summary

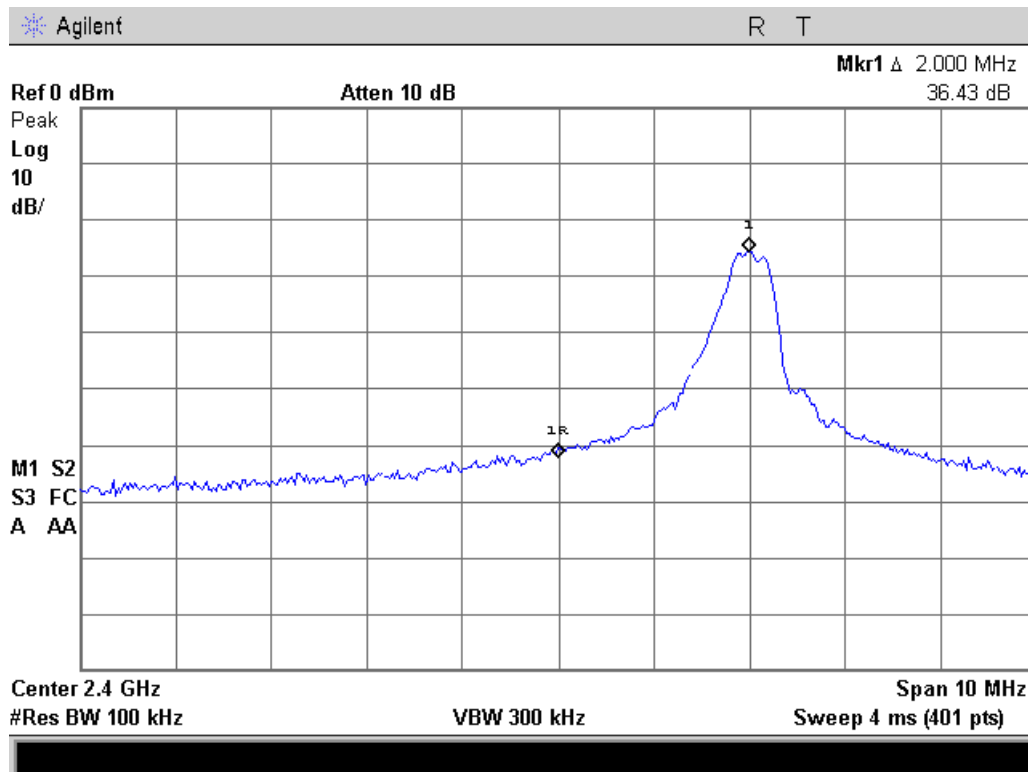
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit (dBc)	Result
2402	2400	-36.43	Peak	-20	Pass
2410	2483.5	-42.37	Peak	-20	Pass

Restricted Band Emissions Summary

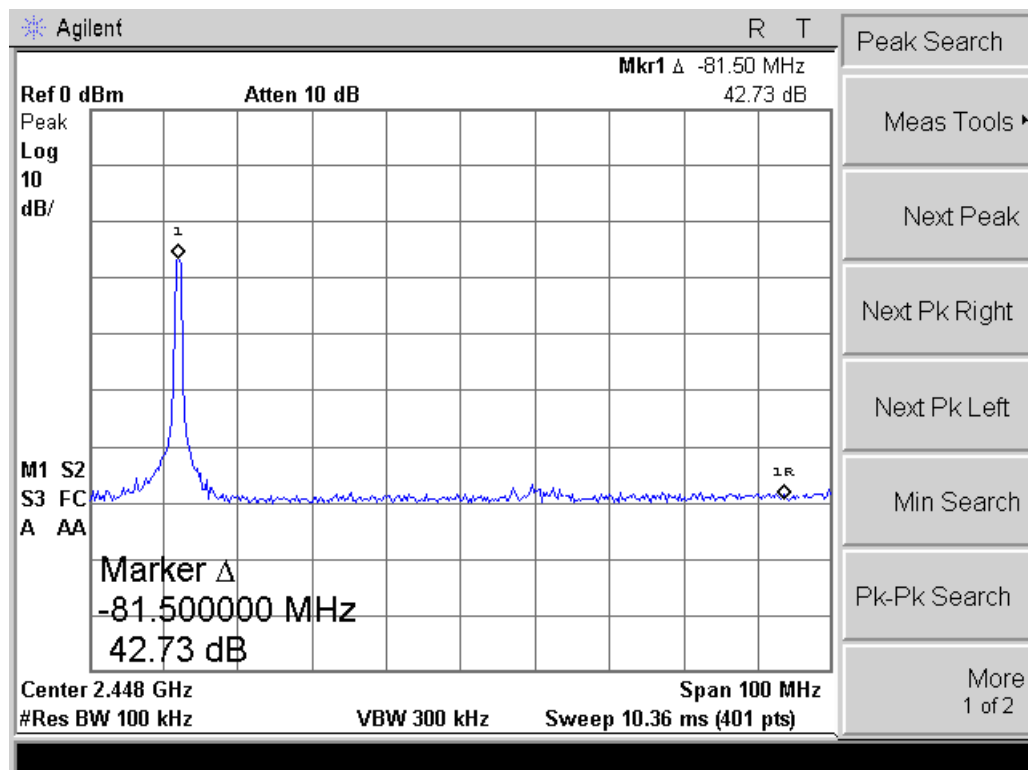
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2402	2389.875	53.88	Peak	74	Pass
2402	2383.825	44.1	Average	54	Pass
2410	2483.5	46.3	Peak	74	Pass



Band Edge 2400 MHz

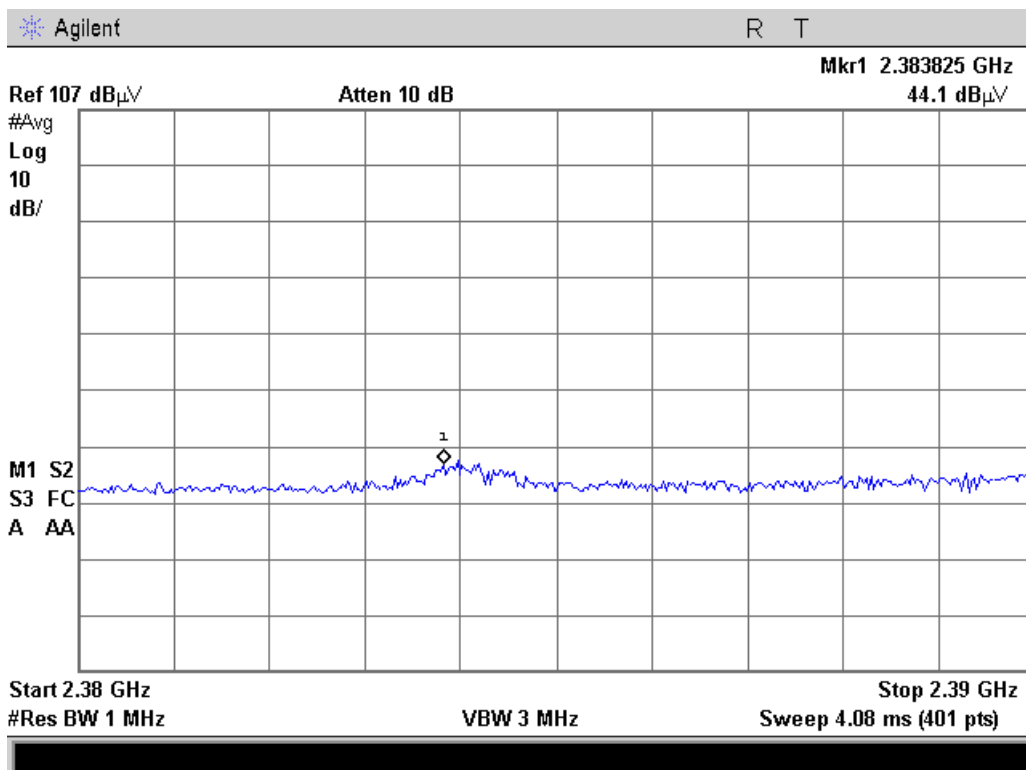
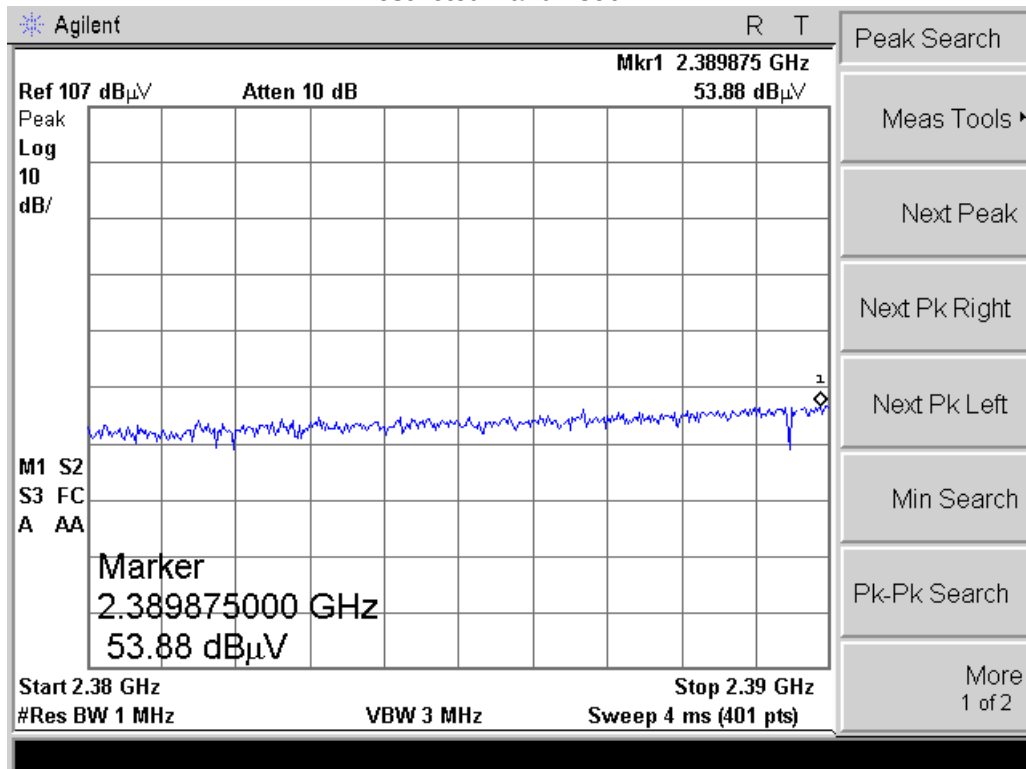


Band Edge 2483.5 MHz



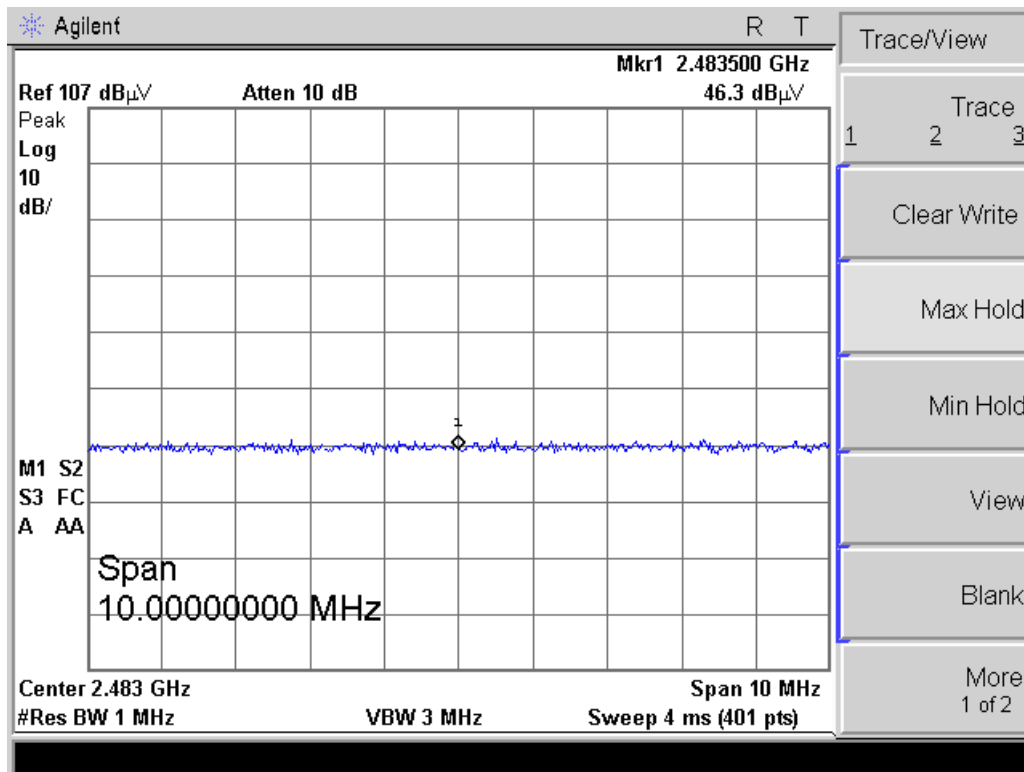


Restricted Band 2390 MHz





Restricted Band 2483.5 MHz



*** Note - the peak value was below the average limit.



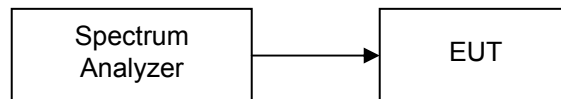
Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2)
Test Equipment Utilized: i00331

Engineer: J. Erhard
Test Date: 11/8/2010

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 and 99% bandwidths were measured to verify the bandwidth met the specification.

Test Setup



Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	545 kHz	≥ 500 KHz	Pass
2410	547 kHz	≥ 500 KHz	Pass

99% Bandwidth Summary

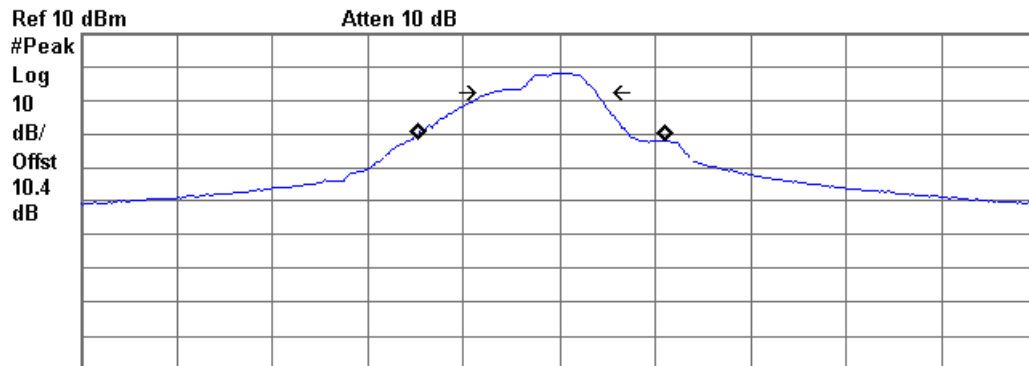
Frequency MHz	Recorded Measurement	Result
2402	1.2829 MHz	Pass
2410	1.3148 MHz	Pass



Bandwidth 2402 MHz

Agilent

R T



Center 2.402 GHz

Span 5 MHz

#Res BW 100 kHz

#VBW 300 kHz

#Sweep 20 ms (401 pts)

Occupied Bandwidth
1.2829 MHz

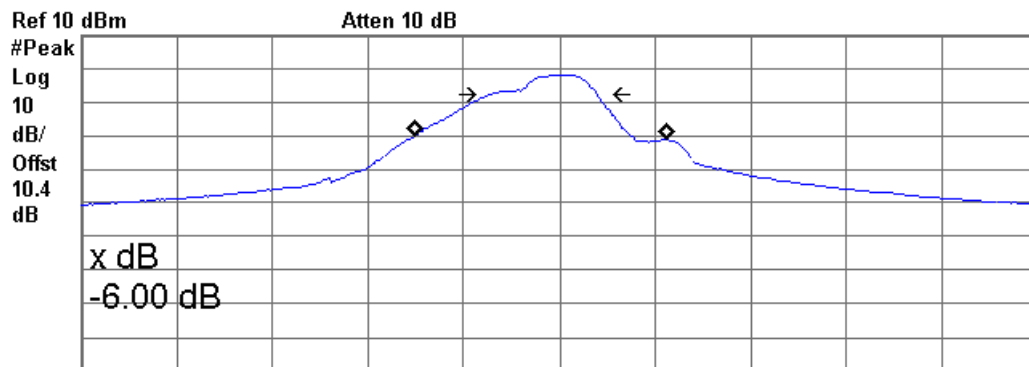
Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -97.319 kHz
x dB Bandwidth 545.426 kHz

Bandwidth 2410 MHz

Agilent

R T



Center 2.41 GHz

Span 5 MHz

#Res BW 100 kHz

#VBW 300 kHz

#Sweep 20 ms (401 pts)

Occupied Bandwidth
1.3148 MHz

Occ BW % Pwr 99.00 %
x dB -6.00 dB

Transmit Freq Error -97.712 kHz
x dB Bandwidth 547.914 kHz

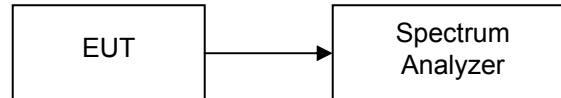


Name of Test: Transmitter Power Spectral Density (PSD)
Specification: 15.247(e) **Engineer:** J. Erhard
Test Equipment Utilized: i00331 **Test Date:** 11/8/2010

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

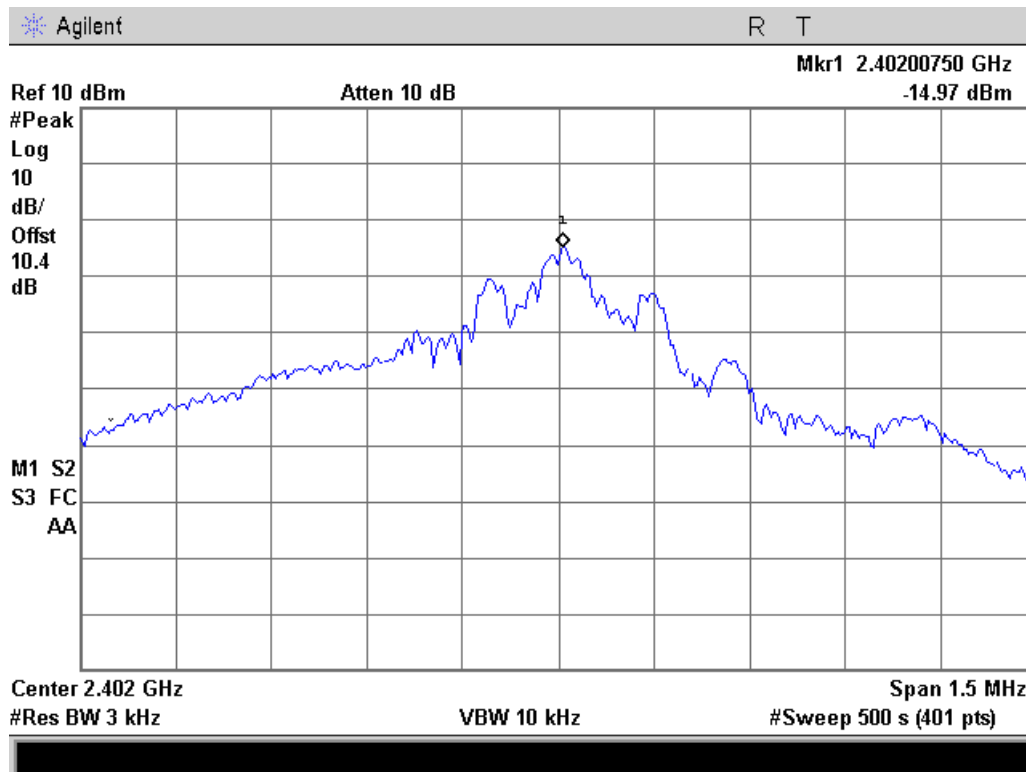


PSD Summary

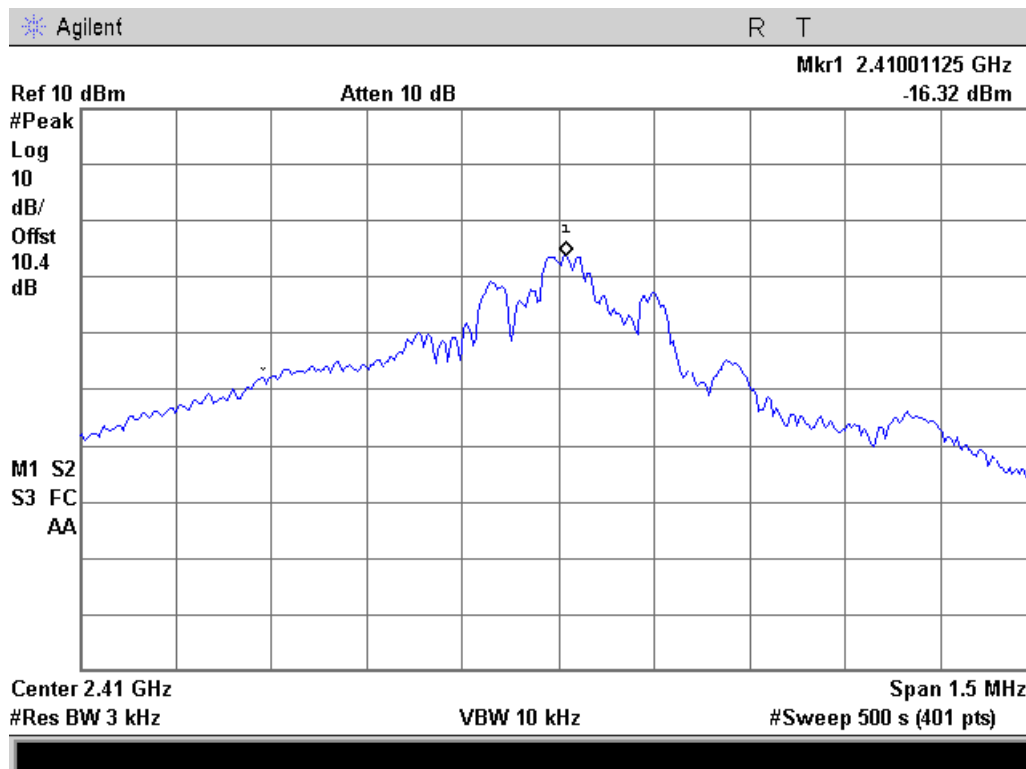
Frequency MHz	Recorded Measurement	Specification Limit	Result
2402	-14.97 dBm	8 dBm	Pass
2410	-16.32 dBm	8 dBm	Pass



PSD 2402 MHz



PSD 2410 MHz





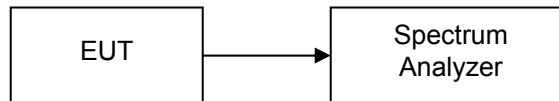
Name of Test: Receiver Spurious Emissions
Specification: RSS-GEN 6(b)
Test Equipment Utilized: i00379

Engineer: J. Erhard
Test Date: 12/9/2010

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

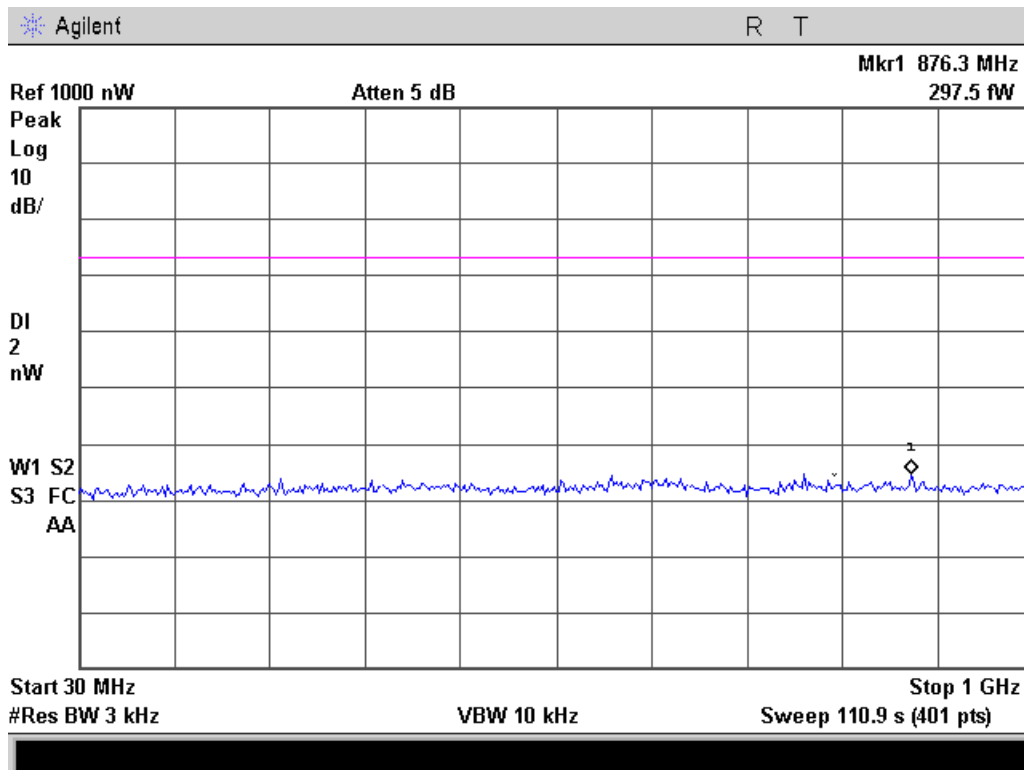


Receiver Spurious Emissions Summary

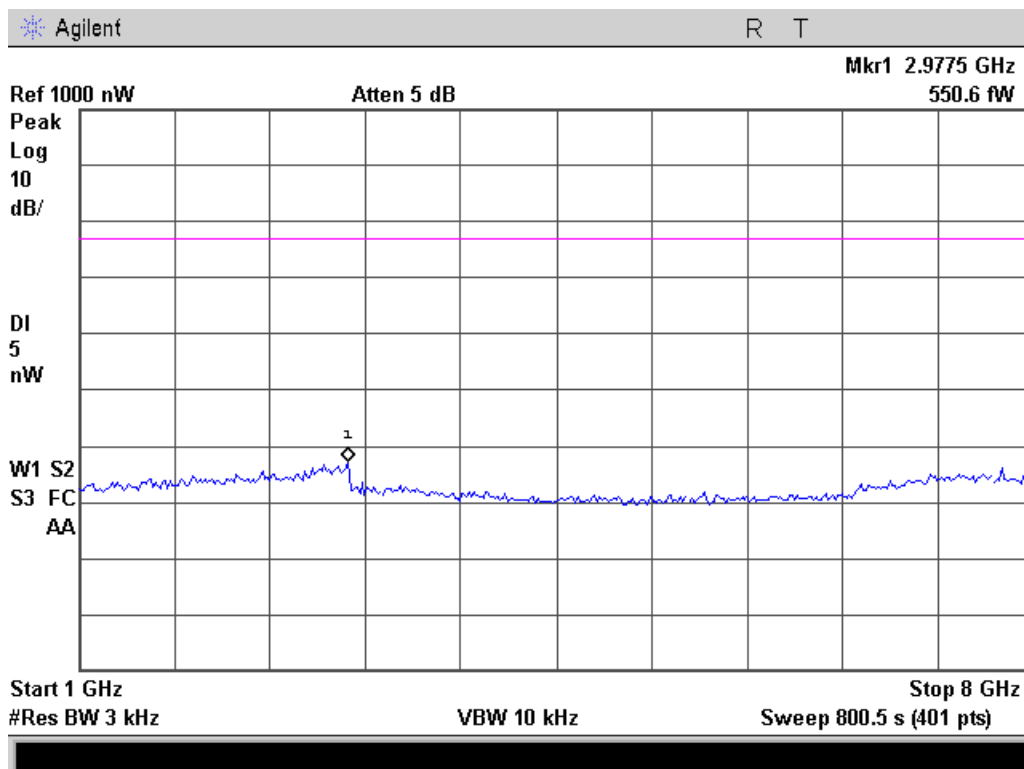
Frequency Range MHz	Recorded Measurement	Specification Limit	Result
30 - 1000	297.5 fW	2 nW	Pass
1000 - 8000	550.6 fW	5 nW	Pass



Receiver Spurious Emissions 30 MHz – 1 GHz



Receiver Spurious Emissions 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