



# Compliance Testing, LLC

Previously Flom Test Lab

RF, EMC and Safety Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.ComplianceTesting.com>

info@ComplianceTesting.com

Date: January 24, 2011

Applicant: Process Integration Management Co. LLC  
3445 E Wildwood Dr  
Phoenix, AZ 85048

Attention of: Bob Henderson, President  
Ph: (480) 967-9333  
Fax: (480) 626-1661  
E-mail: [bobhenderson@etchedintimeinc.com](mailto:bobhenderson@etchedintimeinc.com)

Equipment: Device 2 Rev A

FCC ID: Y76-NFSENSORRA

FCC Rules: 15.247 (DTS)

Enclosed please find your copy of the Engineering Test Report for which you are subject to the restrictions as listed on the attached summary.

This report may not be reproduced, except in full, without written permission from Compliance Testing, LLC. Please retain a copy of this report for your archival purposes.

Once a Telecommunication Certification Body (TCB) issues a Grant the Federal Communication Commission (FCC) has 30 days to review the application and request added information. It is your decision whether or not to market the equipment subject to a possible recall before the end of the 30 days.

If your equipment is still retained by us, it will be returned to you 30 days after approval is achieved. Our invoice for services has been directed to your Accounts Payable Department.

For any additional information please contact us.

Sincerely,

Compliance Testing



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## Test Report

for

**FCC ID:** Y76-NFSENSORRA

**Model:** Device 2 Rev A

**Description:** No Flood System Sensor

to

**Federal Communications Commission**

Rule Part(s) 15.247 (DTS)

**Date of Report:** January 24, 2011

**On the Behalf of the Applicant:** Process Integration Management Co. LLC  
3445 E Wildwood Dr  
Phoenix, AZ 85048

**Attention of:** Bob Henderson, President  
Ph: (480) 967-9333  
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By  
Compliance Testing, LLC  
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Chandler, Arizona 85225-7176  
(866) 311-3268 phone, (480) 926-3598 fax



Compliance Testing, LLC

## Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	January 24, 2011	G. Corbin	Original Document



**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.



Compliance Testing, LLC

## 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 that reads "Greg Corbin".

Certifying Engineer:

Greg Corbin



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

#### **Sub-Part 2.1033**

(b)(1):

**Name and Address of Applicant:**

Process Integration Management Co., LLC  
3445 E. Wildwood Drive  
Phoenix, AZ 85048

(b)(2):

**FCC ID:**

Y76-NFSENSORRA

**Model Number:**

Device 2 Rev A

(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

#### **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



### 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.

Environmental Conditions		
Temperature	Humidity	Pressure
21.6 – 24.5 deg C	10.8 – 29.3 %	972.4 – 975.0 mbar



Compliance Testing, LLC

## 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	Battery powered with no connections to the AC mains

### EUT Description

The sensor unit (Device 2) communicates to a base unit (Device 1). When the sensor unit detects the presence of water it sends a signal to the base that in turn can send a signal to a control valve to shutoff the water at the source. The base and sensor units both contain a DTS wireless transmitter operating in the 2400 – 2883.5 MHz frequency range.

A conducted and radiated sample was provided.

### EUT Operation during Tests

A test software program (Freescale Codewarrior) was used to tune the EUT to the low, mid, and high operating frequencies, (2405, 2440, 2480 MHz). The laptop with the test software was connected to the EUT via a USB Multilink Interface pod. The pod was only connected to the EUT to change channels and was removed prior to performing the tests.

### Accessories:

Qty	Type	Make, Model	S/N
1	USB Multilink Interface	Pemicro, HCS08/HCS12	N/A
1	Laptop PC	Dell, PP01X Latitude C840	N/A
1	AC Adapter	Dell, PA-1900-05D	N/A

### Cables:

Qty	Type	Length, m	Shield	Shielded Hood	Ferrite
1	USB	2	None	None	None



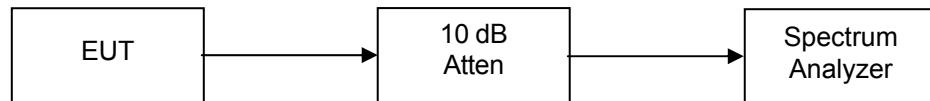
**Name of Test:** Peak Output Power  
**Specification:** 15.247(b)  
**Test Equipment Utilized:** i00331

**Engineer:** G. Corbin  
**Test Date:** 1/20/2011

### Test Procedure

The EUT was connected to a spectrum analyzer per the test set-up.  
The RBW = 3 MHz, which is greater than the OCC BW of 1.5 MHz.

### Test Setup



### Transmitter Peak Output Power

Tuned Frequency MHz	Recorded Measurement	Specification Limit	Result
2405	0.051 mw	1 W	Pass
2440	0.056 mw	1 W	Pass
2480	0.061 mw	1 W	Pass



**Name of Test:** Conducted Spurious Emissions  
**Specification:** 15.247(d)  
**Test Equipment Utilized:** i00331, i00177, i00385

**Engineer:** G. Corbin  
**Test Date:** 1/21/2011

### Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the EUT 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 10<sup>th</sup> 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

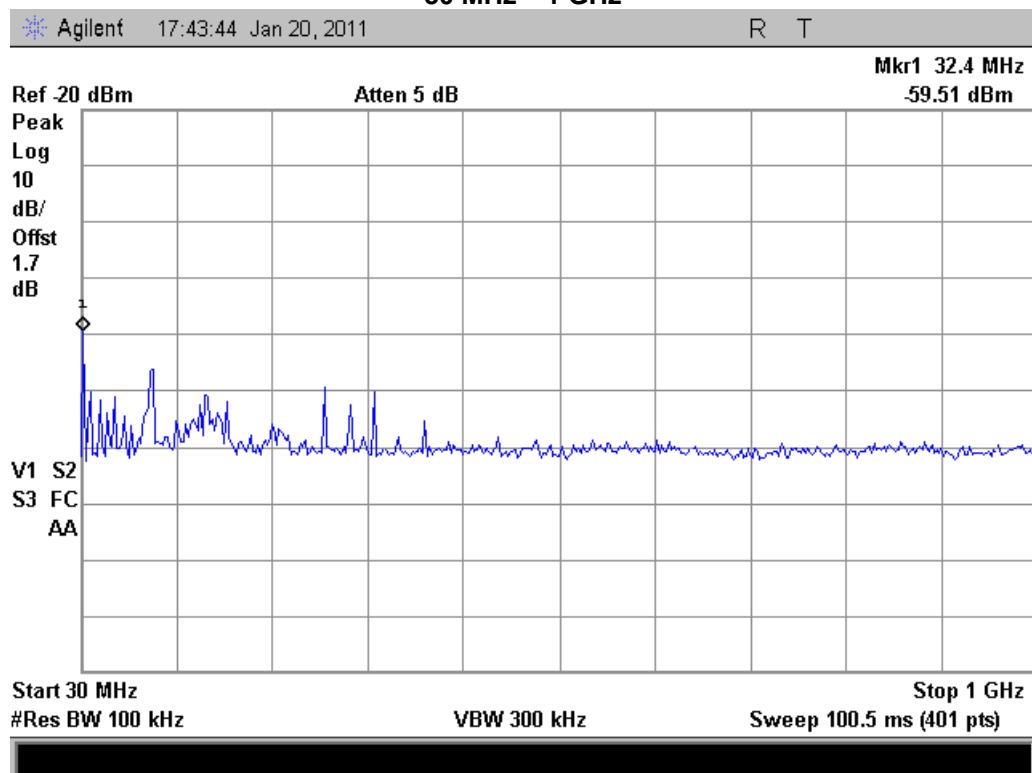


### Conducted Spurious Emissions Summary Test Table

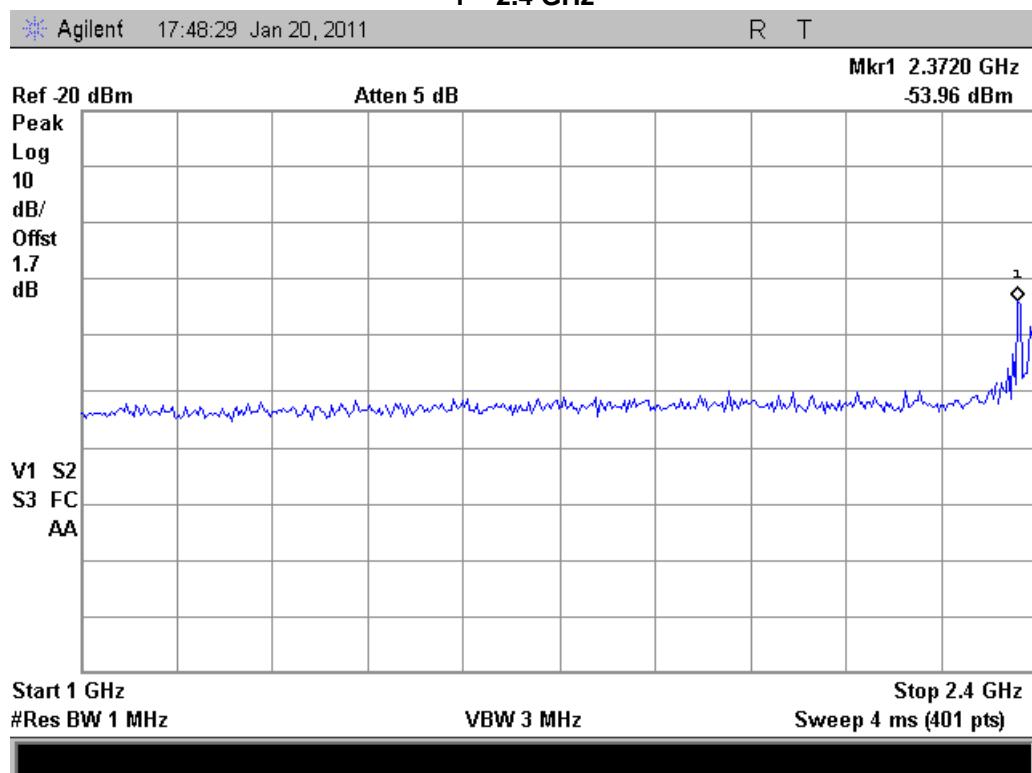
Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement dBm	Peak Output Power dBm	Corrected Measurement dBc	Specification Limit dBc	Result
2405	4804	-52.4	-12.9	-39.5	-20	Pass
2440	4912	-56.2	-12.5	-43.7	-20	Pass
2480	2511	-49.3	-12.1	-37.2	-20	Pass



Conducted Spurious Emissions 2405 MHz  
30 MHz – 1 GHz

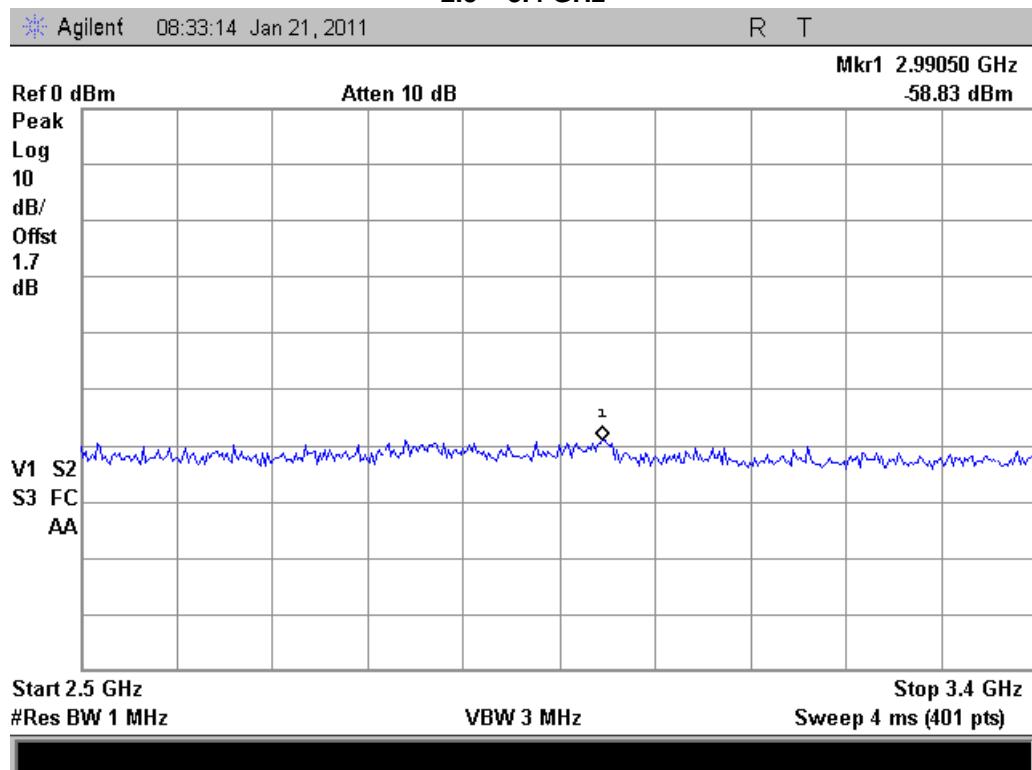


Conducted Spurious Emissions 2405 MHz  
1 – 2.4 GHz

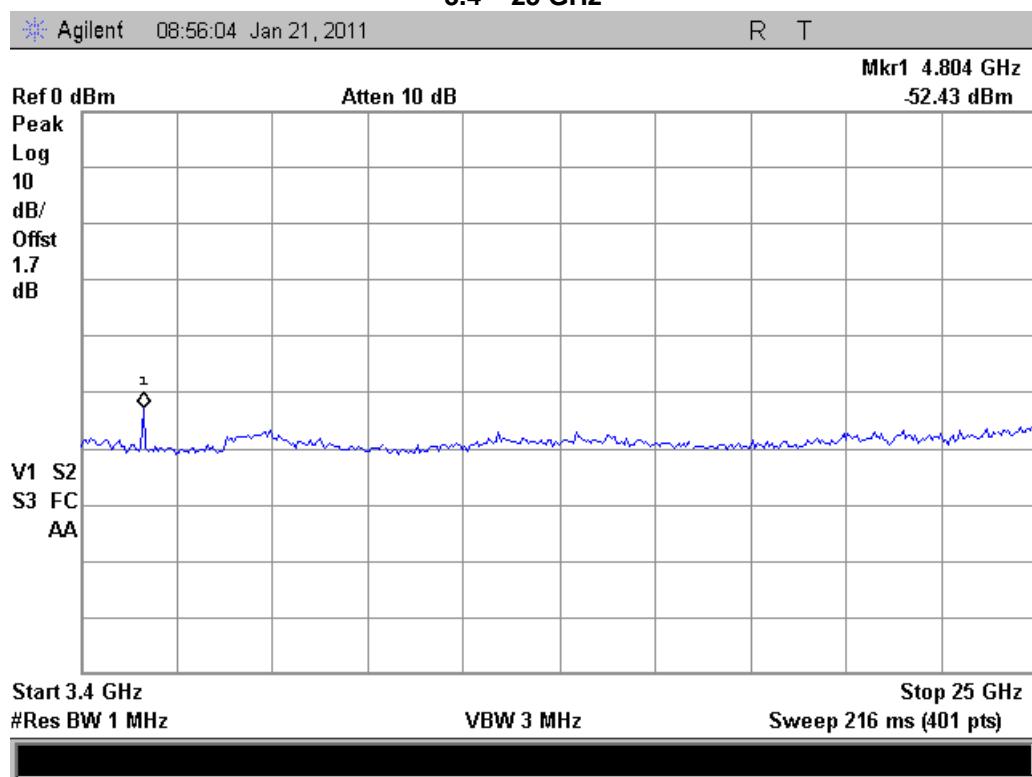




Conducted Spurious Emissions 2405 MHz  
2.5 – 3.4 GHz

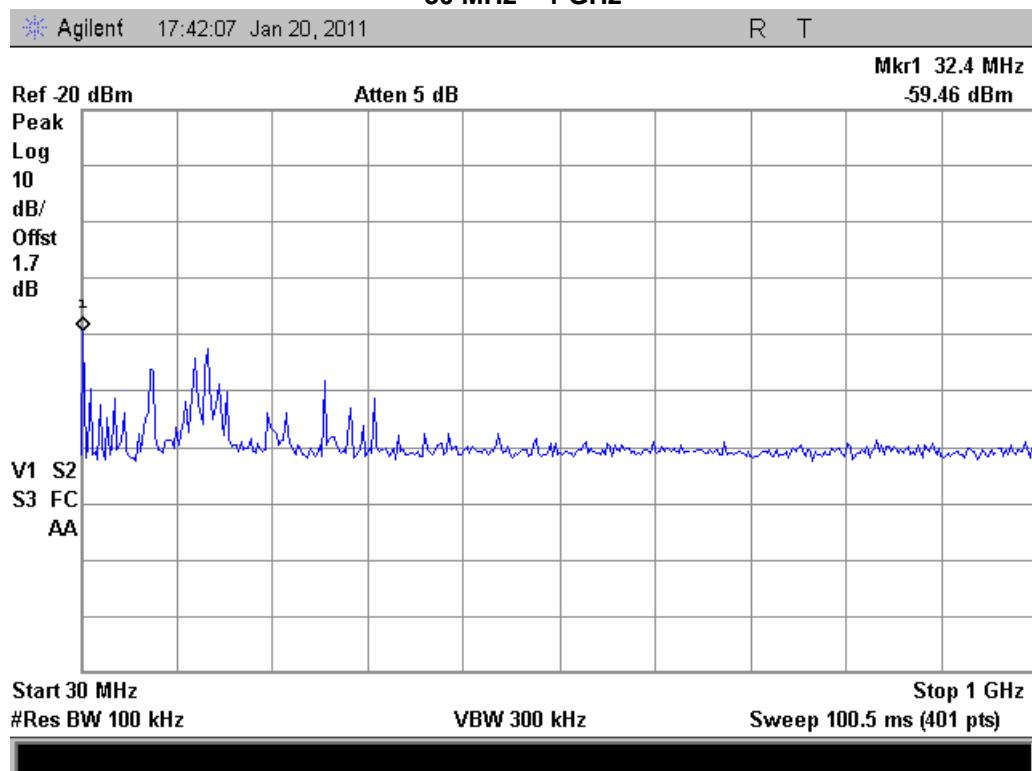


Conducted Spurious Emissions 2405 MHz  
3.4 – 25 GHz

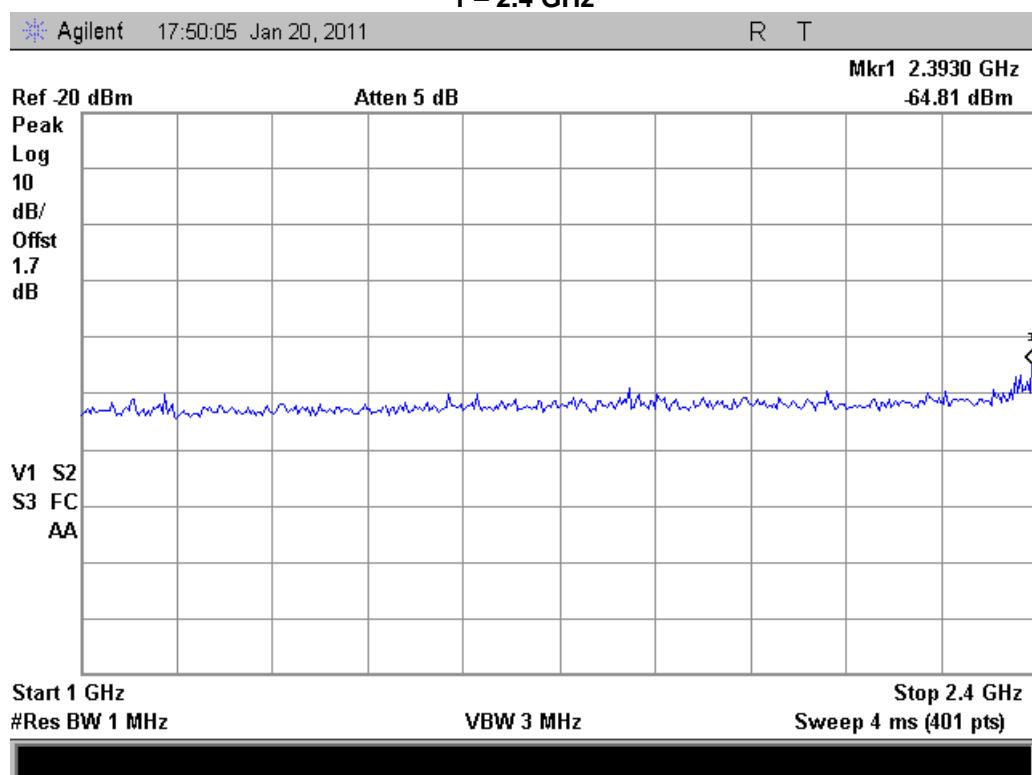




Conducted Spurious Emissions 2440 MHz  
30 MHz – 1 GHz

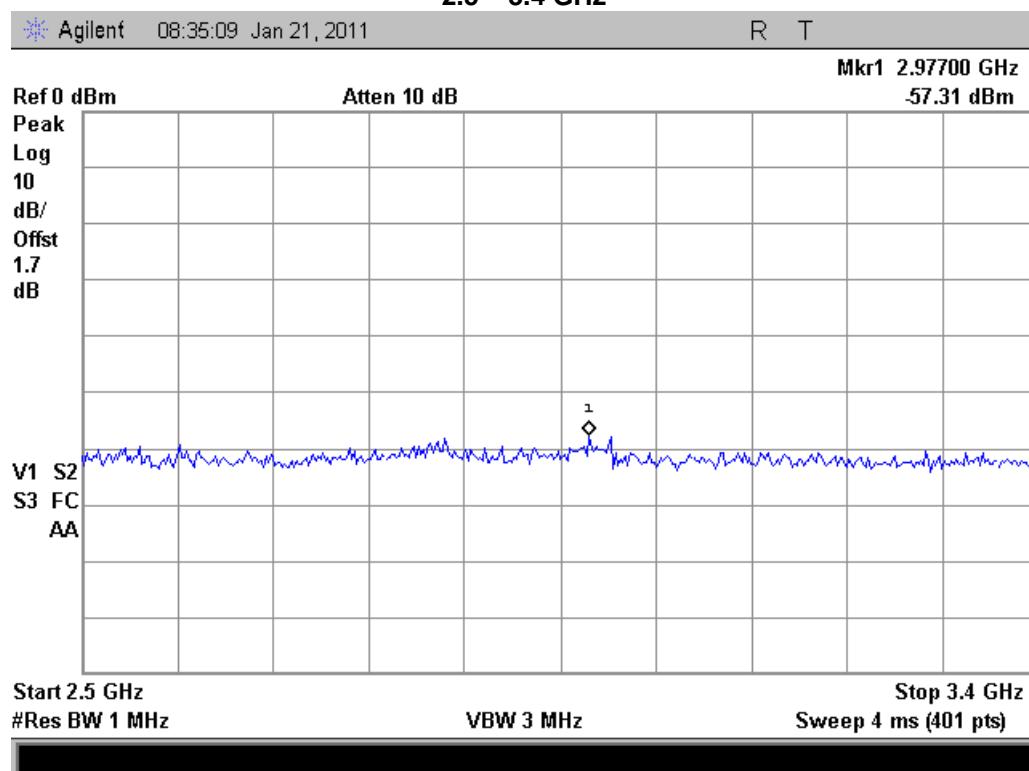


Conducted Spurious Emissions 2440 MHz  
1 – 2.4 GHz

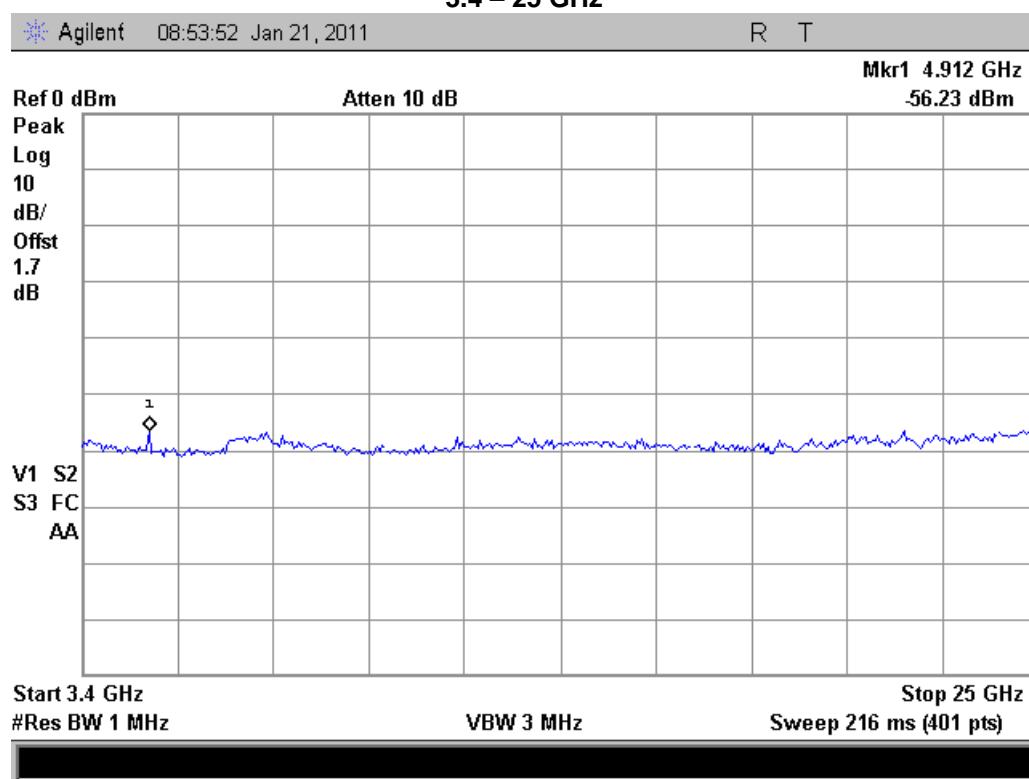




Conducted Spurious Emissions 2440 MHz  
2.5 – 3.4 GHz

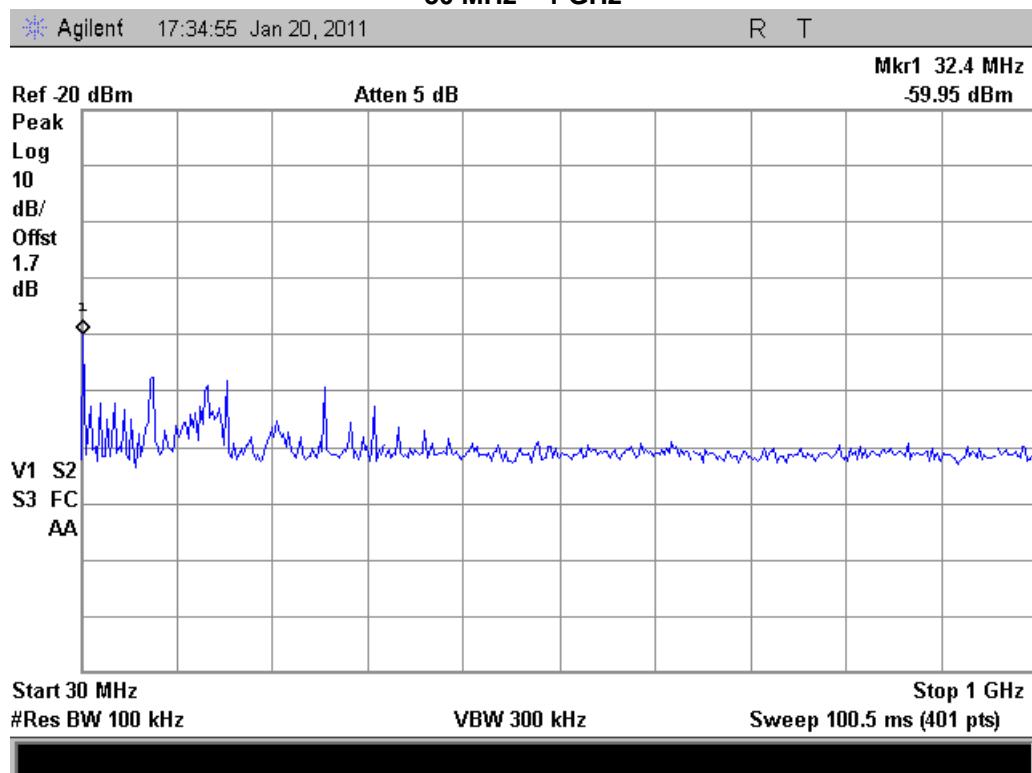


Conducted Spurious Emissions 2440 MHz  
3.4 – 25 GHz

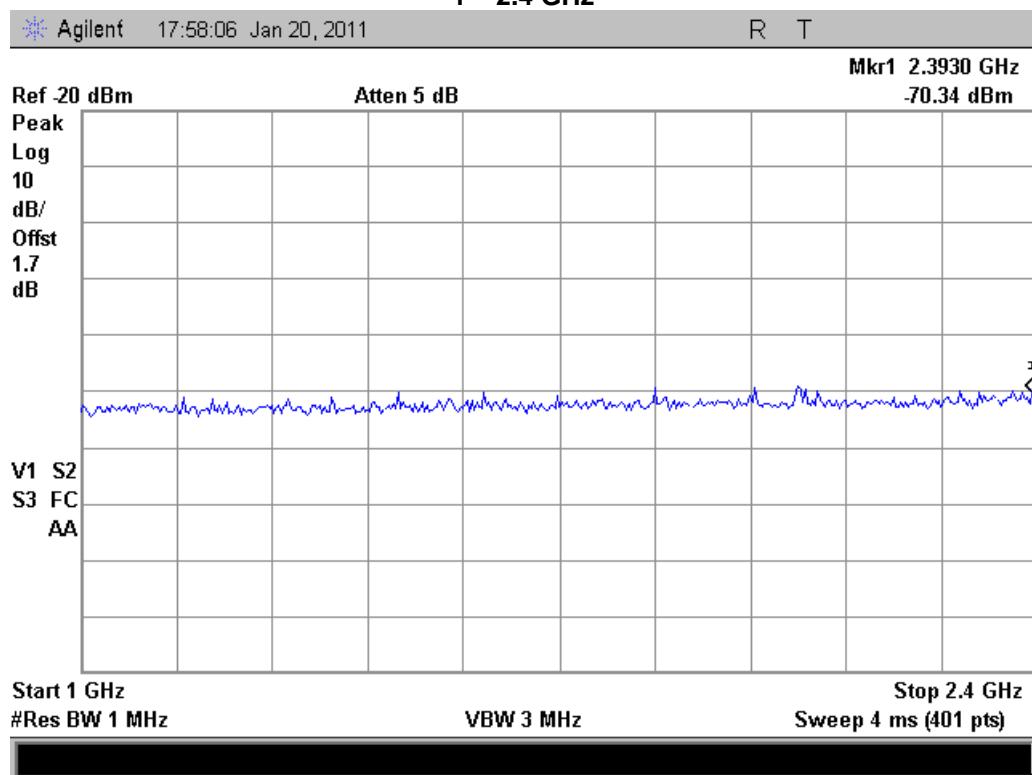




Conducted Spurious Emissions 2480 MHz  
30 MHz – 1 GHz

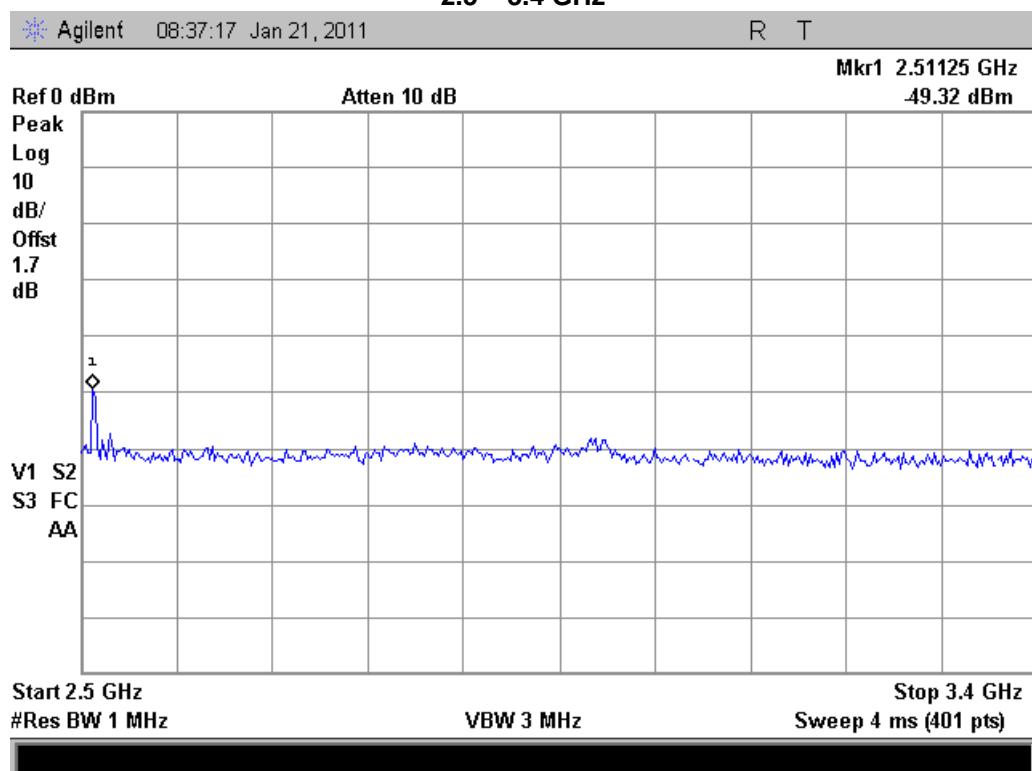


Conducted Spurious Emissions 2480 MHz  
1 – 2.4 GHz

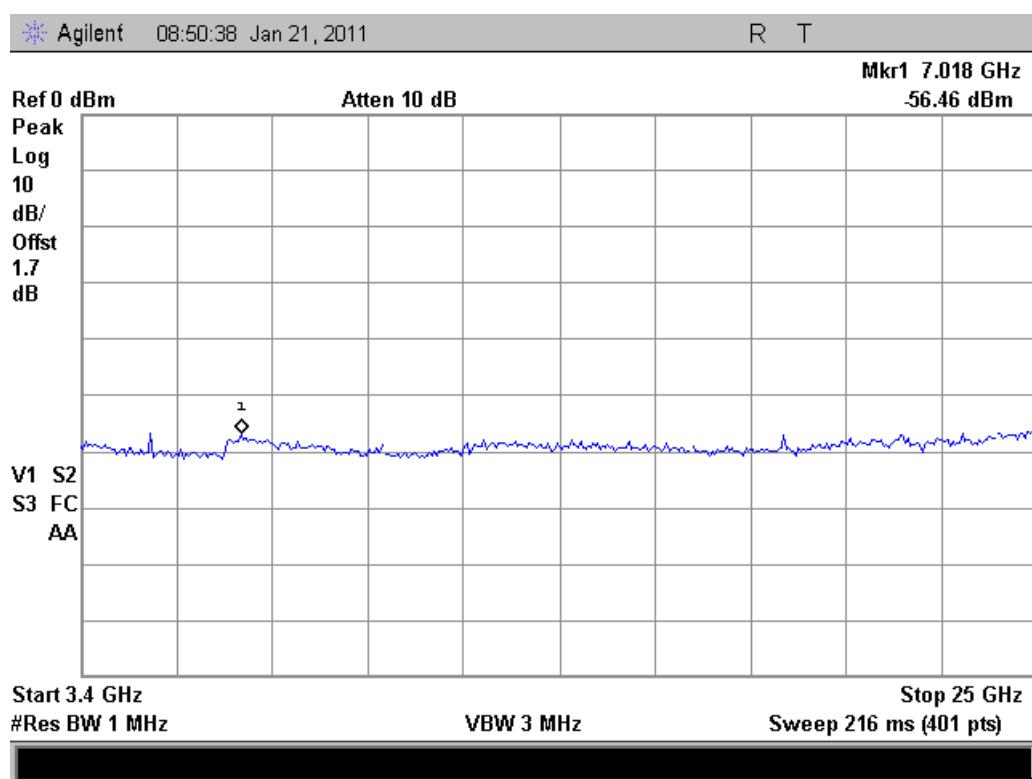




Conducted Spurious Emissions 2480 MHz  
2.5 – 3.4 GHz



Conducted Spurious Emissions 2480 MHz  
3.4 – 25 GHz





**Name of Test:** Radiated Spurious Emissions  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Test Equipment Utilized:** i00028, i00103, i00177, i00331, i00385

**Engineer:** G. Corbin  
**Test Date:** 1/21/2011

### 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 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



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

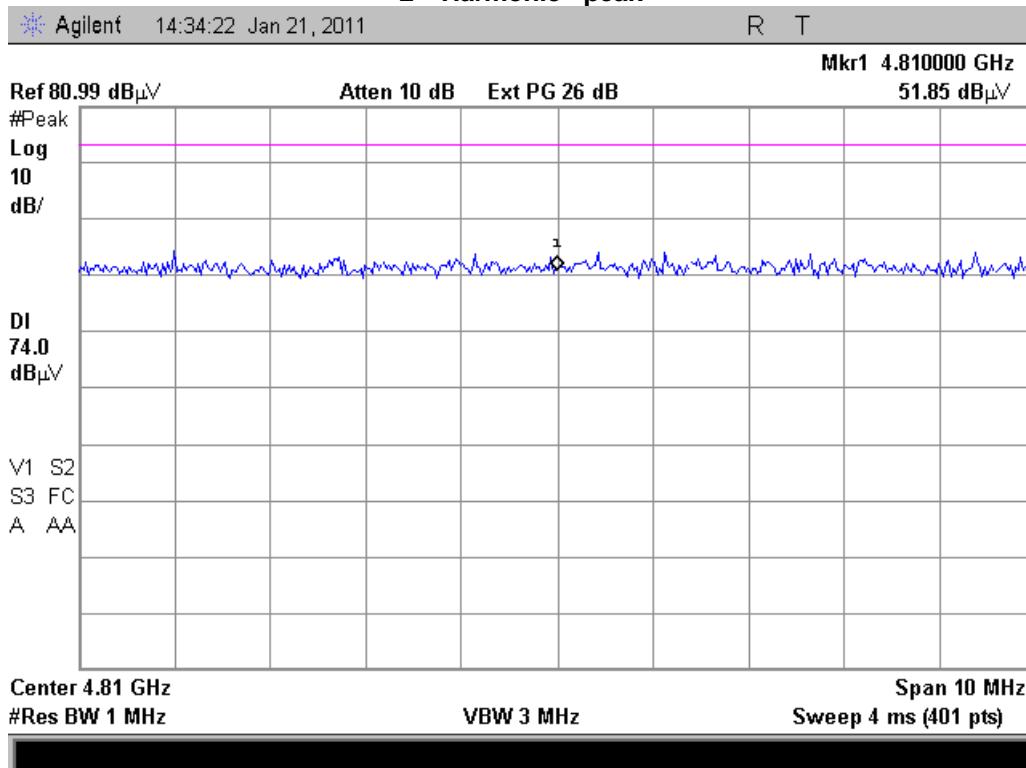
### Radiated Spurious Emissions

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
2405	4810	51.8	74.0	43.8	54.0	Pass
2405	7215	55.9	74.0	47.1	54.0	Pass
2405	9620	60.8	74.0	51.3	54.0	Pass
2440	4880	54.0	74.0	46.0	54.0	Pass
2440	7320	55.6	74.0	49.0	54.0	Pass
2440	9760	60.1	74.0	52.4	54.0	Pass
2480	4960	52.4	74.0	45.4	54.0	Pass
2480	7440	57.1	74.0	48.2	54.0	Pass
2480	9920	62.1	74.0	52.3	54.0	Pass

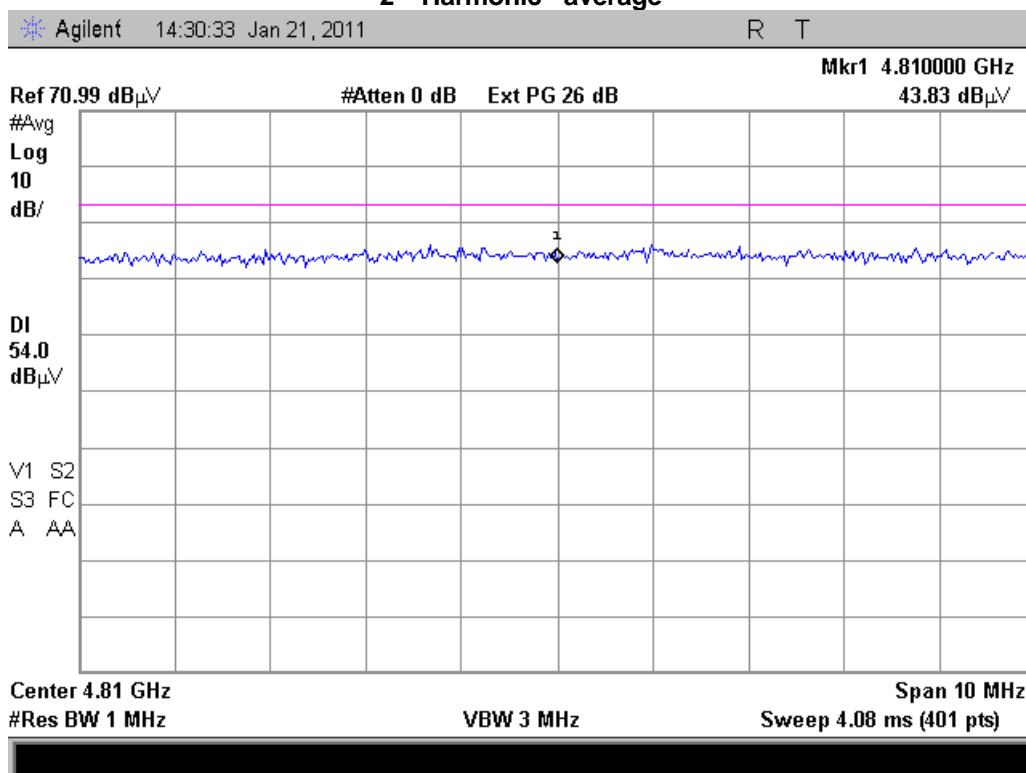
No other emissions were detectable. All emissions were greater than -20 dBc.



**Tuned Frequency = 2405 MHz**  
**2<sup>nd</sup> Harmonic - peak**

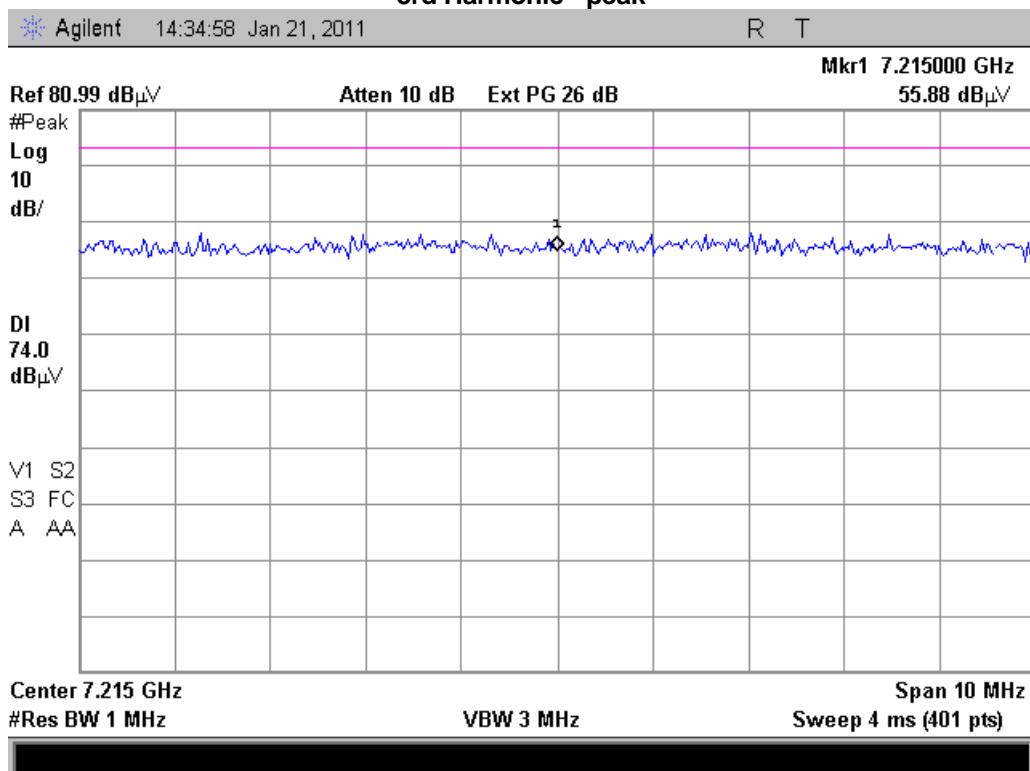


**Tuned Frequency = 2405 MHz**  
**2<sup>nd</sup> Harmonic - average**

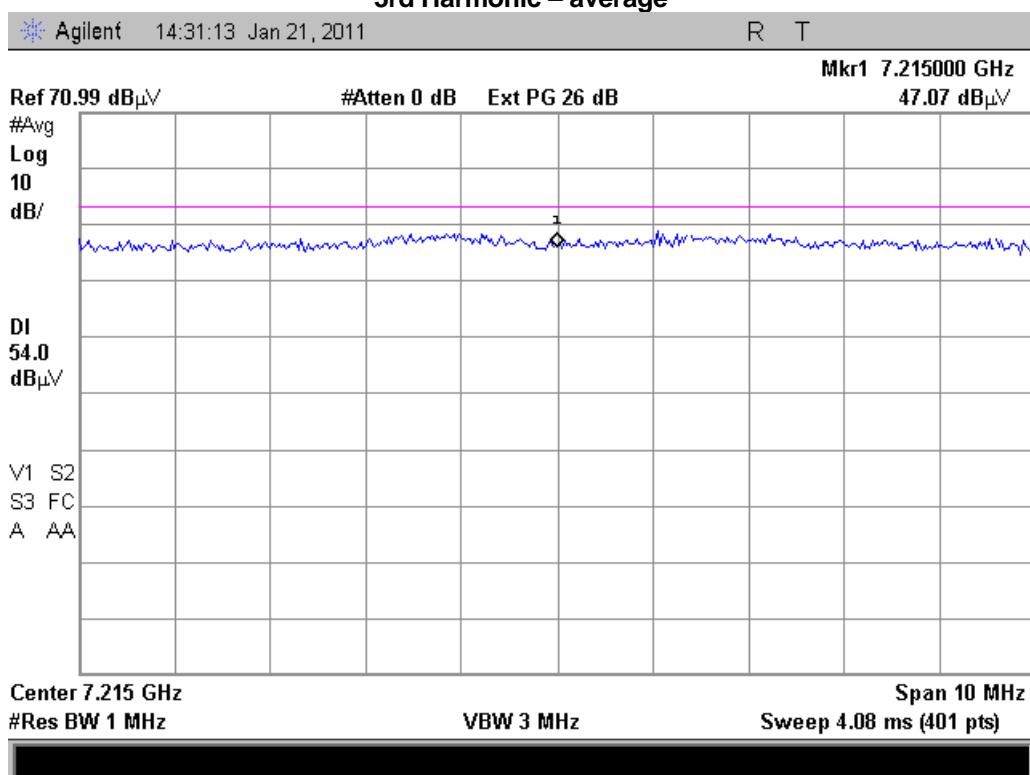




**Tuned Frequency = 2405 MHz**  
**3rd Harmonic - peak**

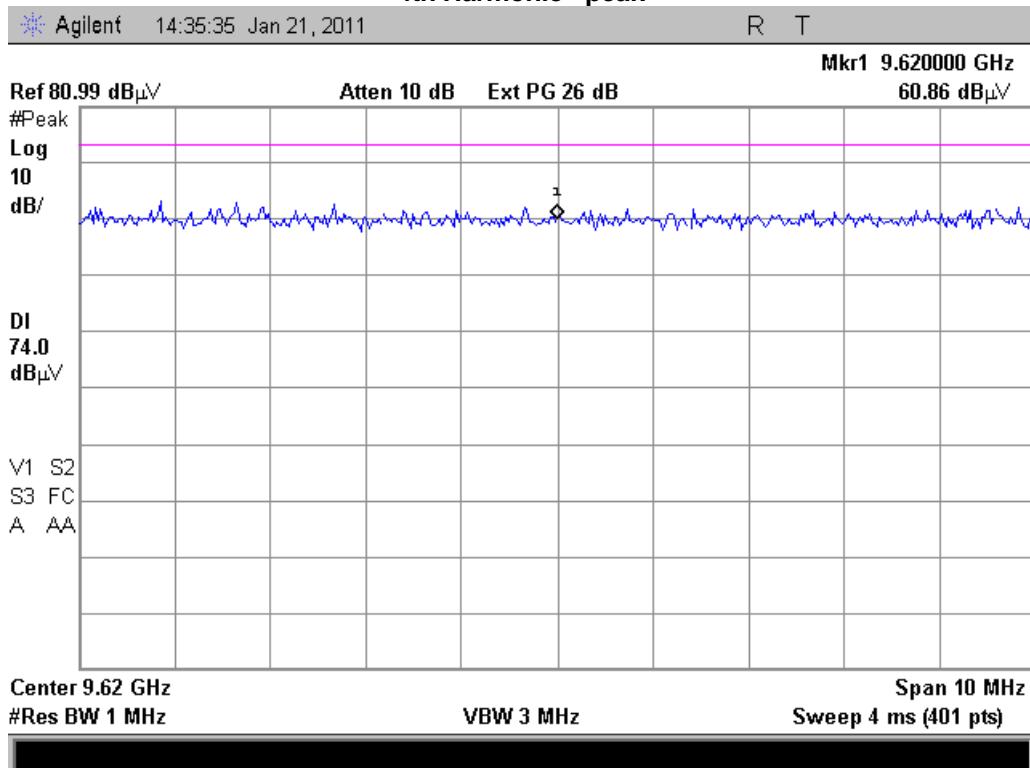


**Tuned Frequency = 2405 MHz**  
**3rd Harmonic – average**

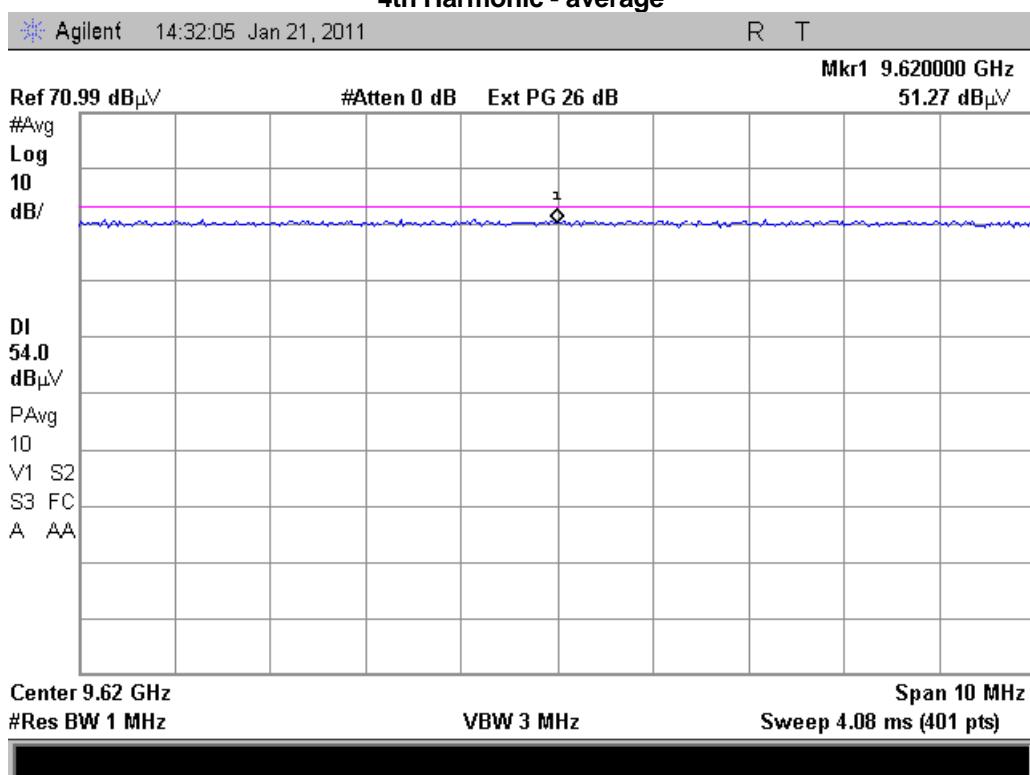




**Tuned Frequency = 2405 MHz**  
**4th Harmonic - peak**

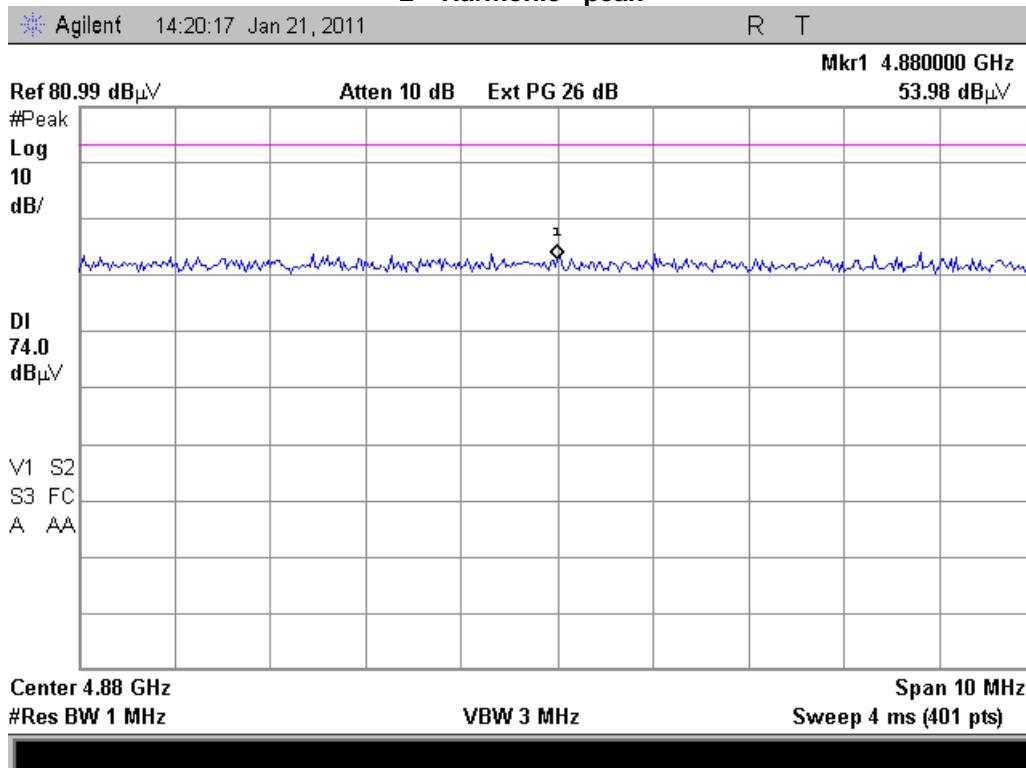


**Tuned Frequency = 2405 MHz**  
**4th Harmonic - average**

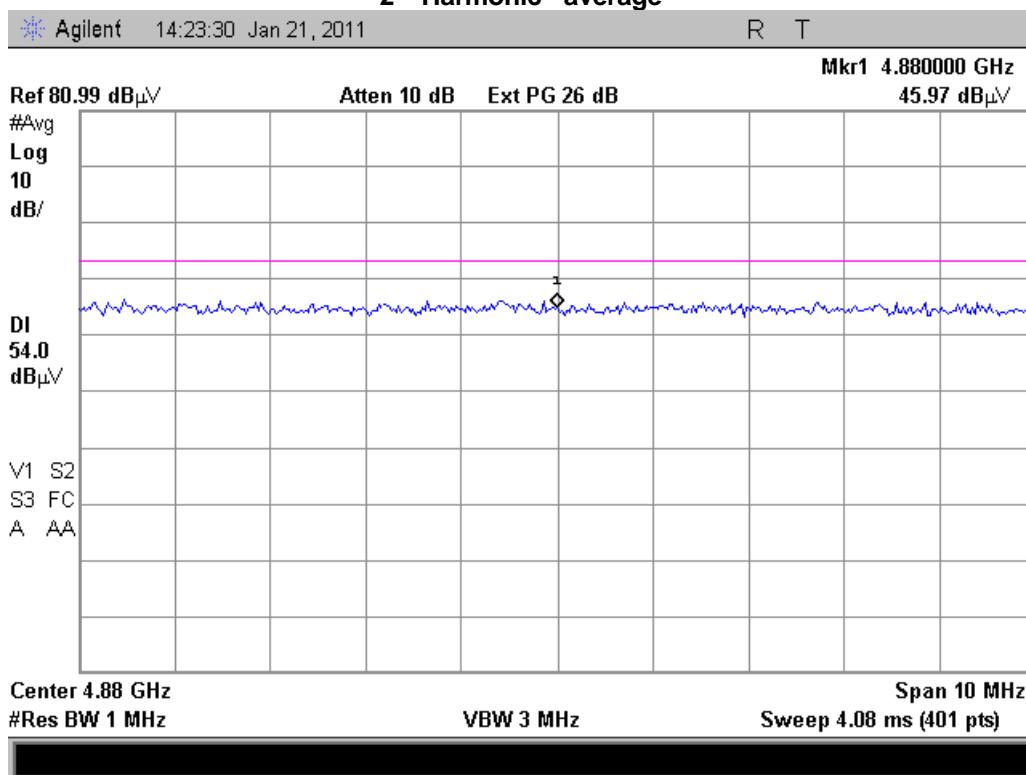




**Tuned Frequency = 2440 MHz**  
**2<sup>nd</sup> Harmonic - peak**

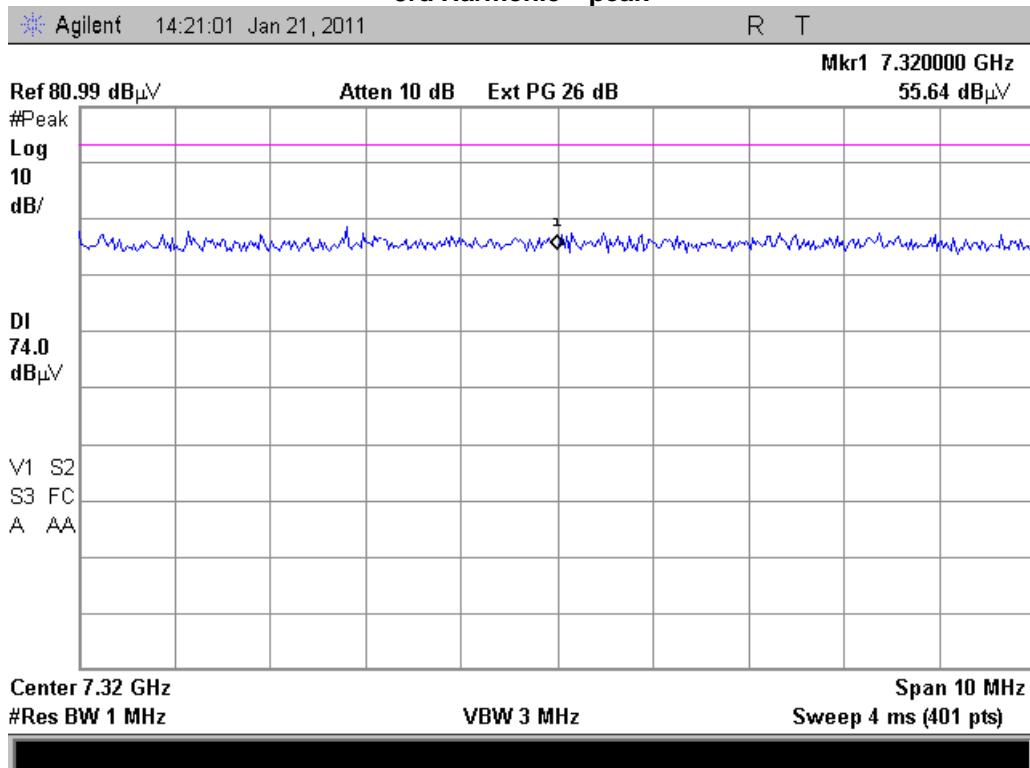


**Tuned Frequency = 2440 MHz**  
**2<sup>nd</sup> Harmonic - average**

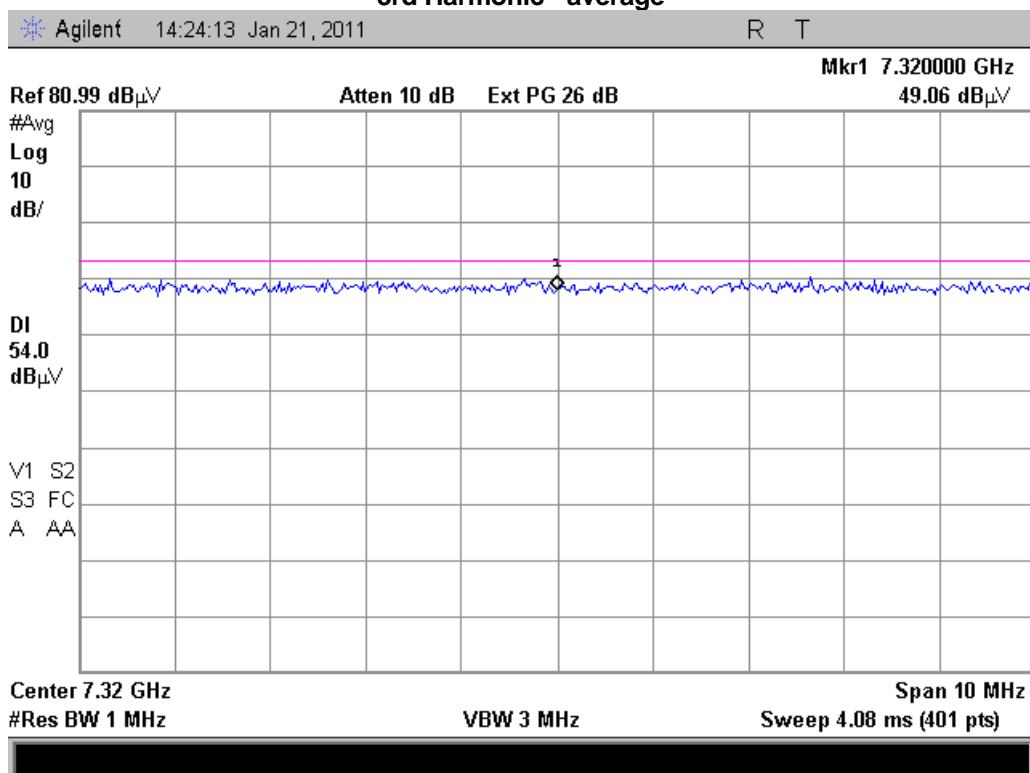




**Tuned Frequency = 2440 MHz**  
**3rd Harmonic – peak**

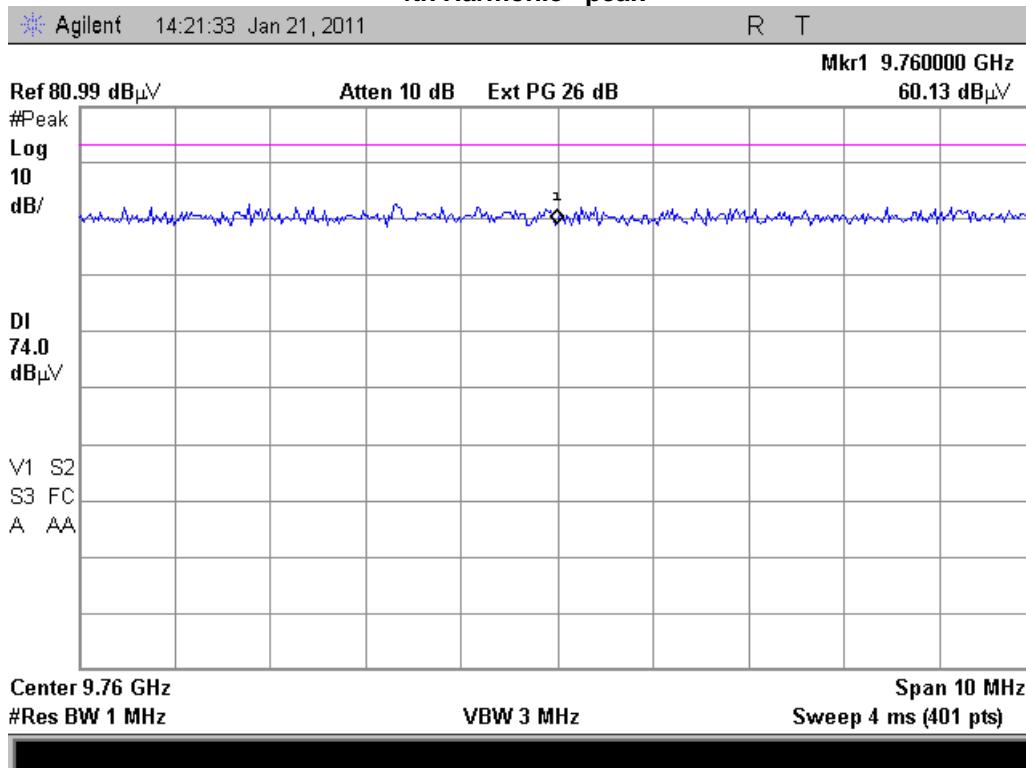


**Tuned Frequency = 2440 MHz**  
**3rd Harmonic - average**

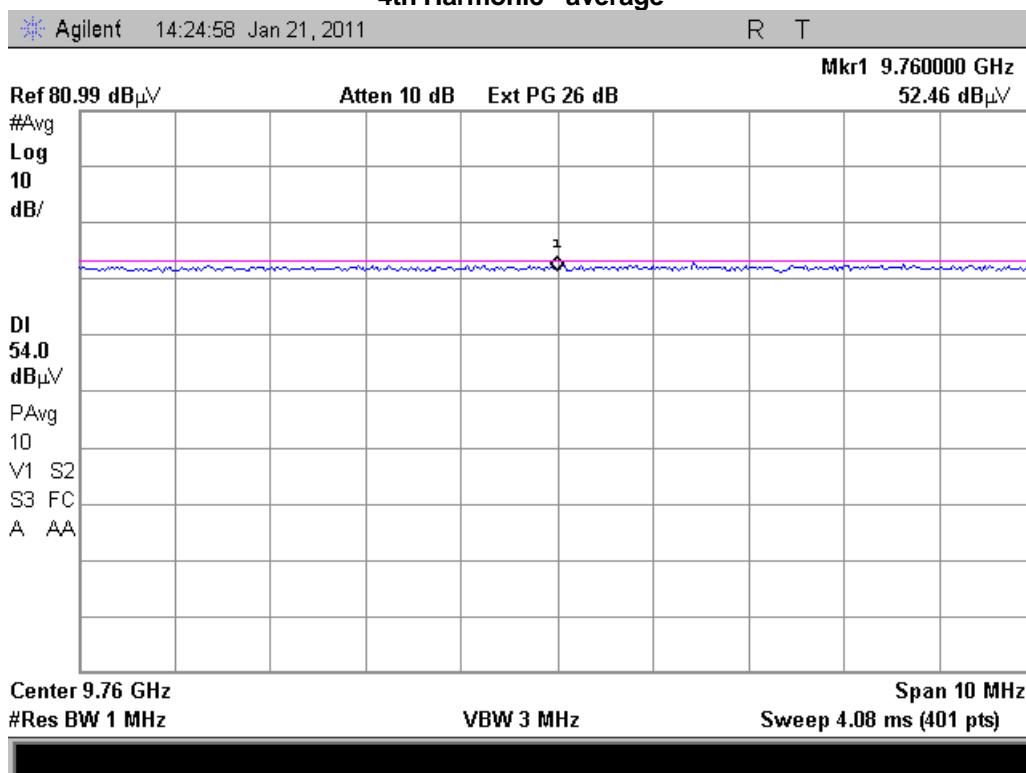




**Tuned Frequency = 2440 MHz**  
**4th Harmonic - peak**

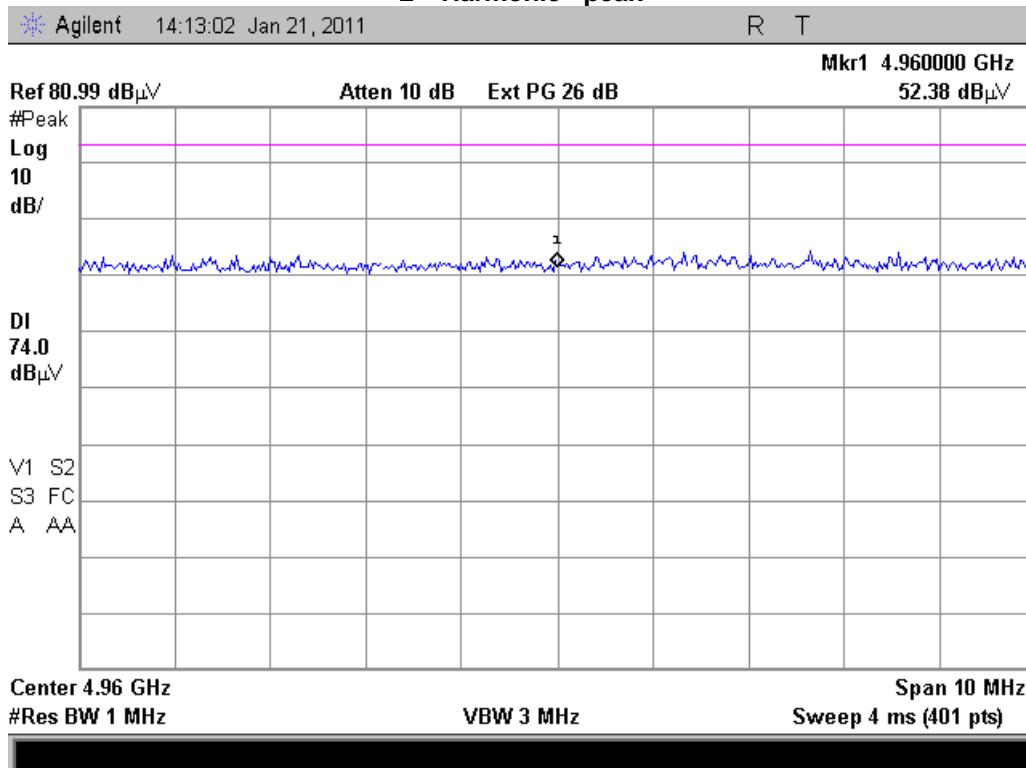


**Tuned Frequency = 2440 MHz**  
**4th Harmonic - average**

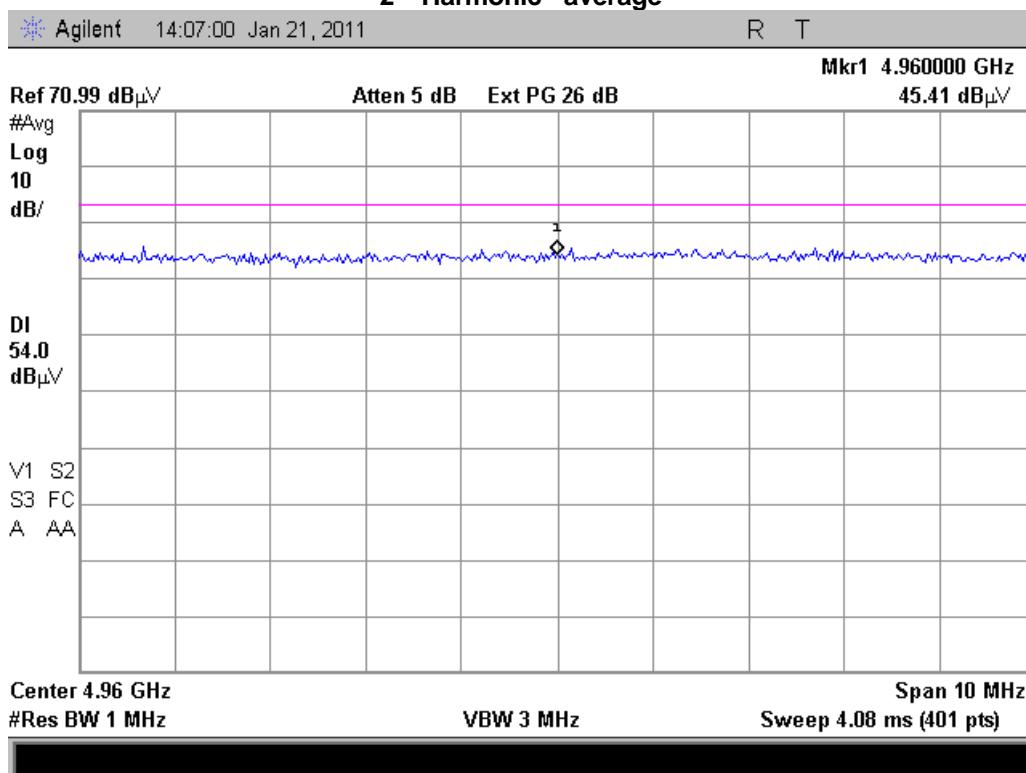




**Tuned Frequency = 2480 MHz**  
**2<sup>nd</sup> Harmonic - peak**

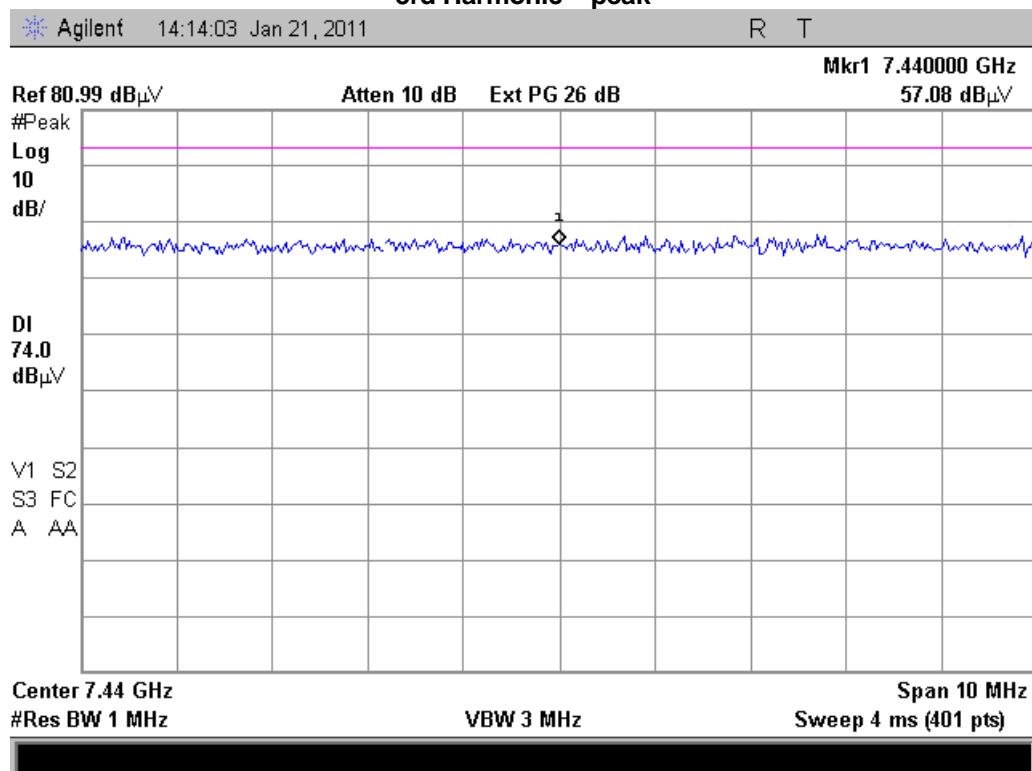


**Tuned Frequency = 2480 MHz**  
**2<sup>nd</sup> Harmonic - average**

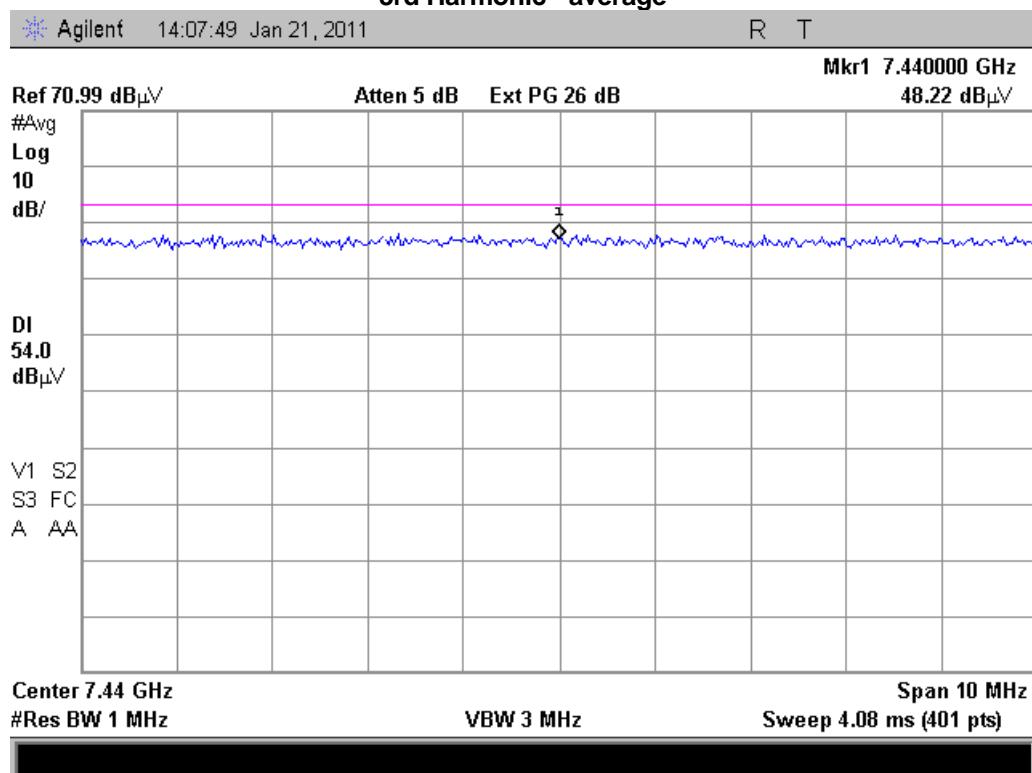




**Tuned Frequency = 2480 MHz**  
**3rd Harmonic – peak**

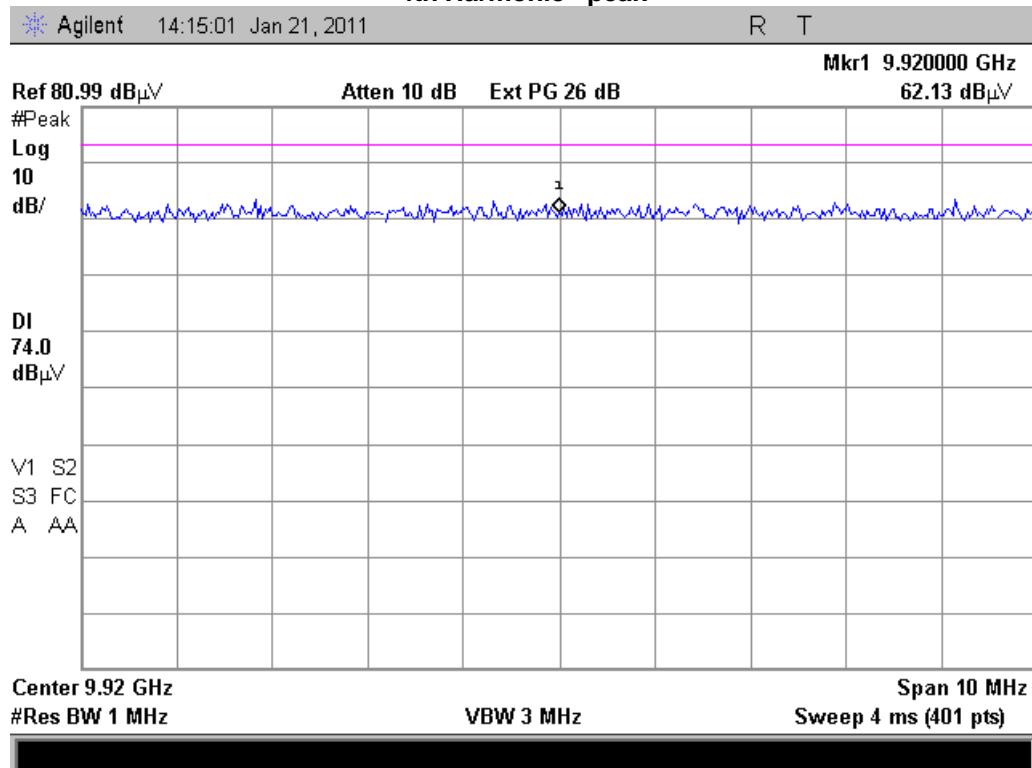


**Tuned Frequency = 2480 MHz**  
**3rd Harmonic - average**

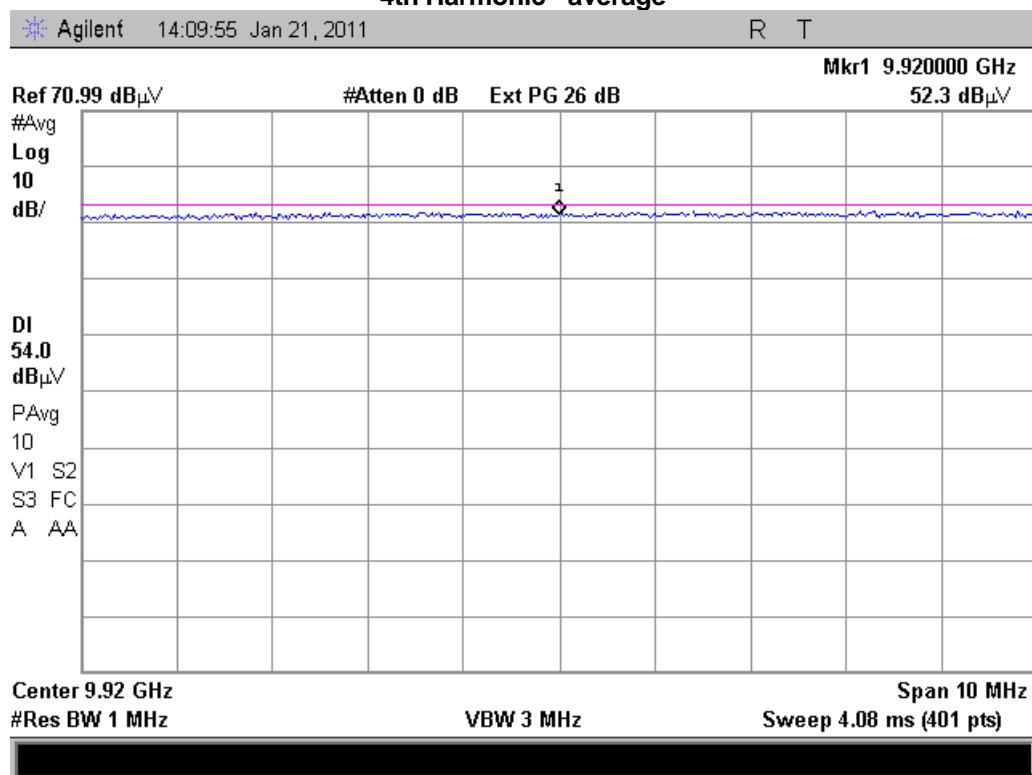




**Tuned Frequency = 2480 MHz**  
**4th Harmonic - peak**



**Tuned Frequency = 2480 MHz**  
**4th Harmonic - average**





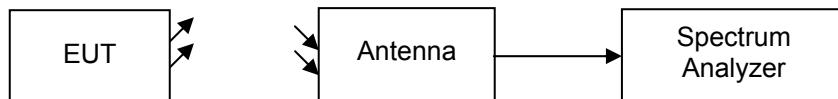
**Name of Test:** Emissions At Band Edges  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Test Equipment Utilized:** i00028, i00103, i00177, i00331, i00385

**Engineer:** G. Corbin  
**Test Date:** 1/21/2011

### 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.

#### Band Edge Test Setup



#### Band Edge Emissions Summary

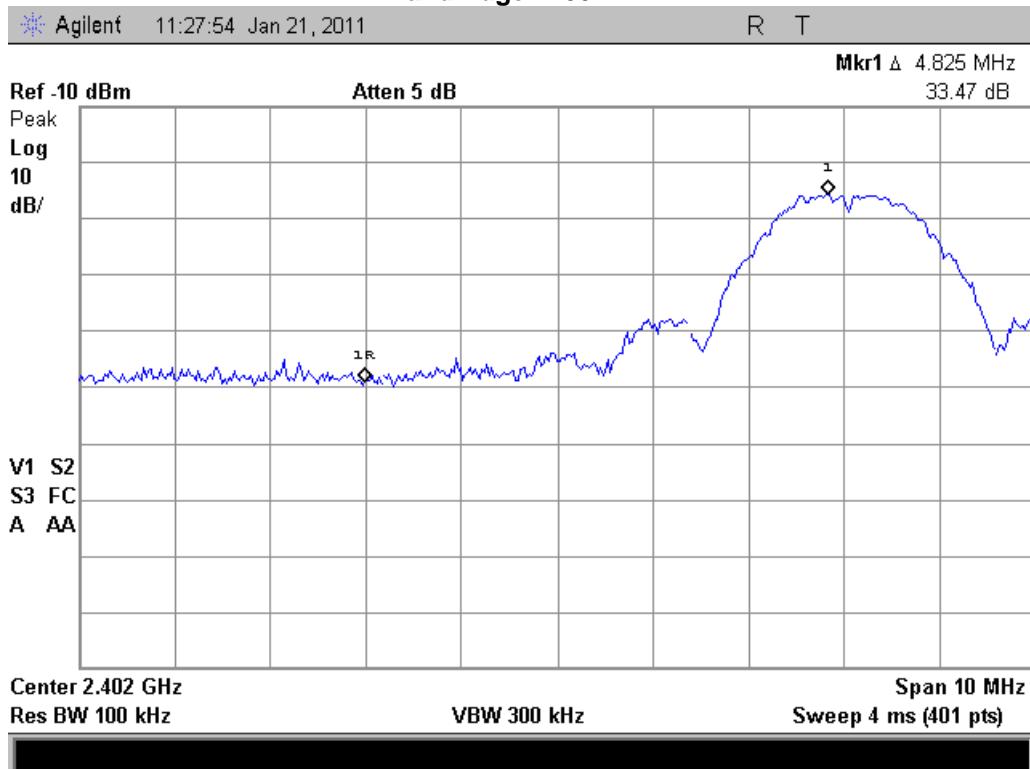
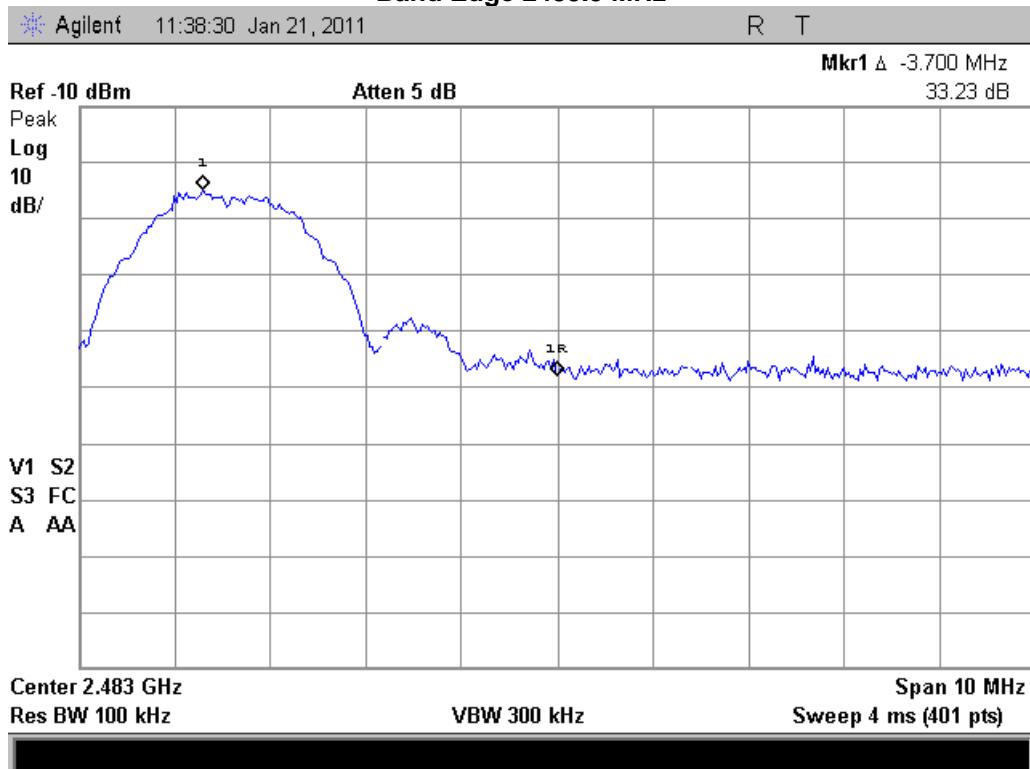
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit (dBc)	Result
2405	2400	-33.5	Peak	-20	Pass
2480	2483.5	-33.2	Peak	-20	Pass

#### Restricted Band Test Setup



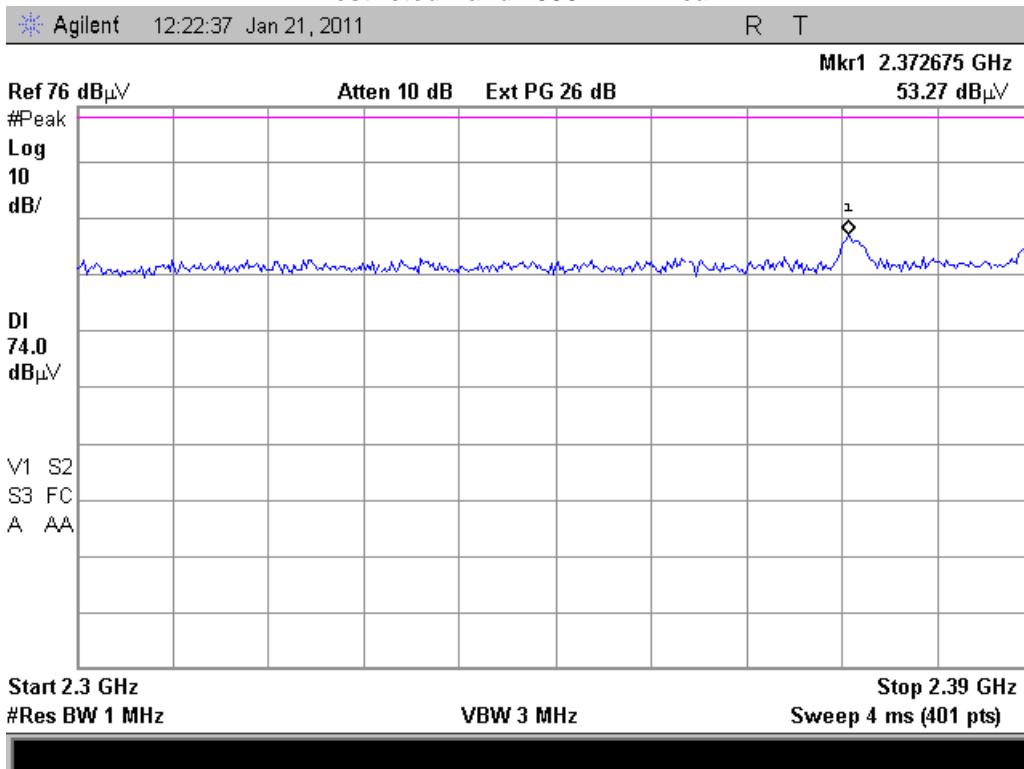
#### Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2405	2372	53.3	Peak	74	Pass
2405	2372	47.7	Average	54	Pass
2480	2483.71	59.7	Peak	74	Pass
2480	2483.62	52.9	Average	54	Pass

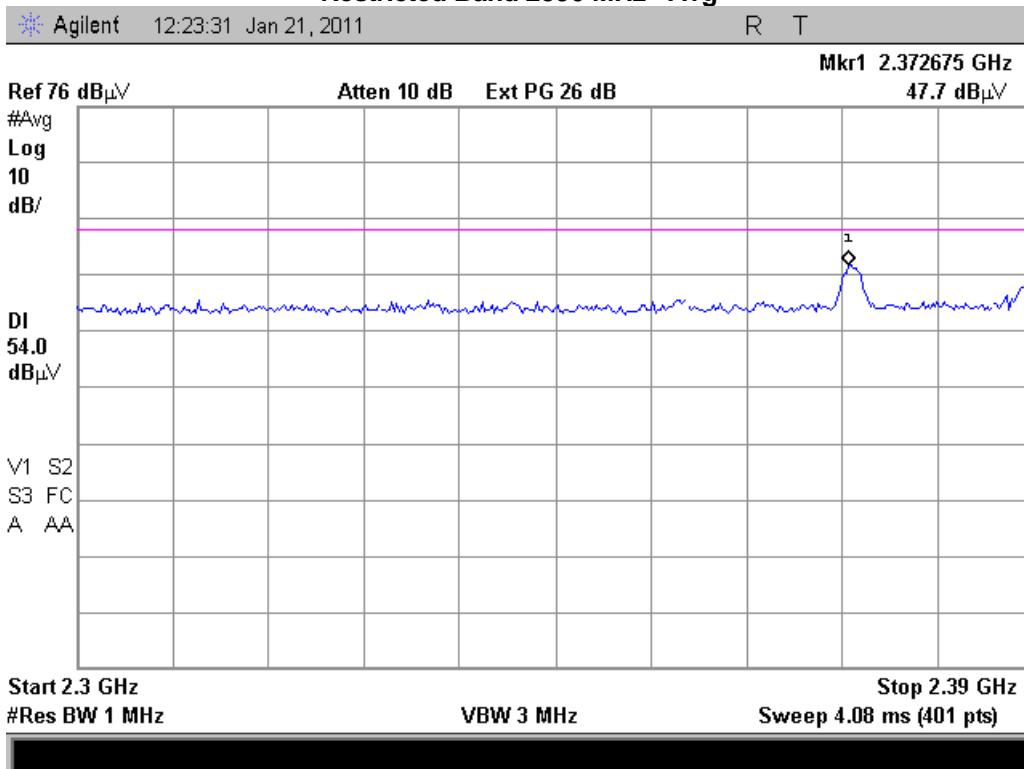
**Band Edge 2400 MHz****Band Edge 2483.5 MHz**



## Restricted Band 2390 MHz - Peak

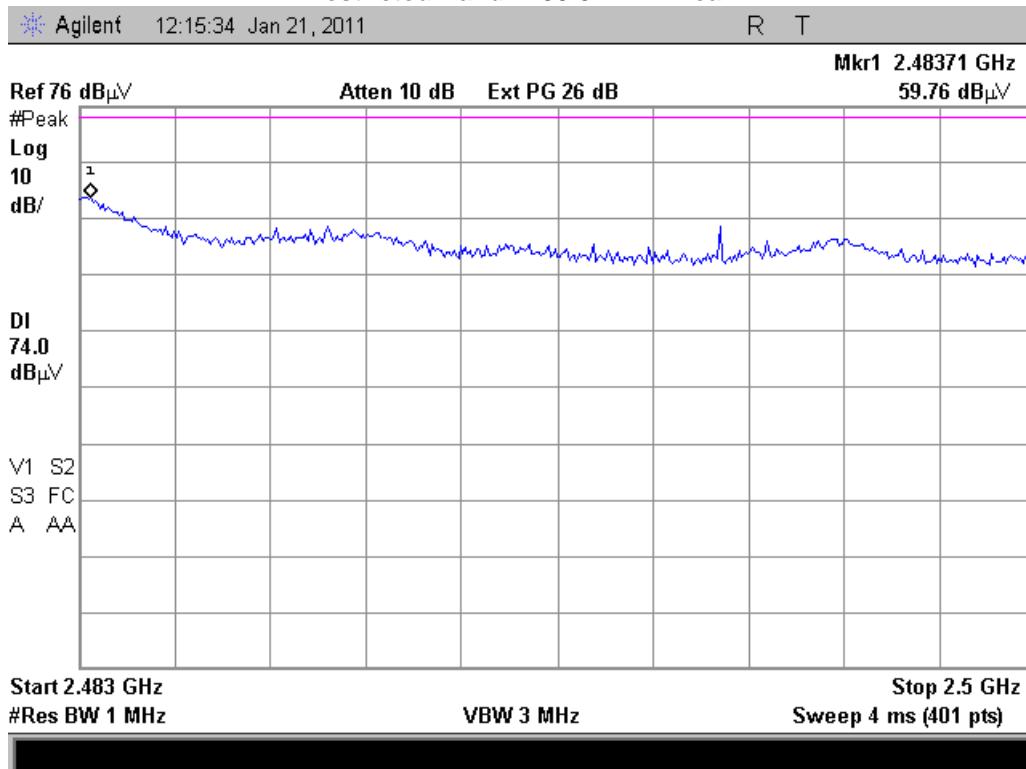


## Restricted Band 2390 MHz - Avg

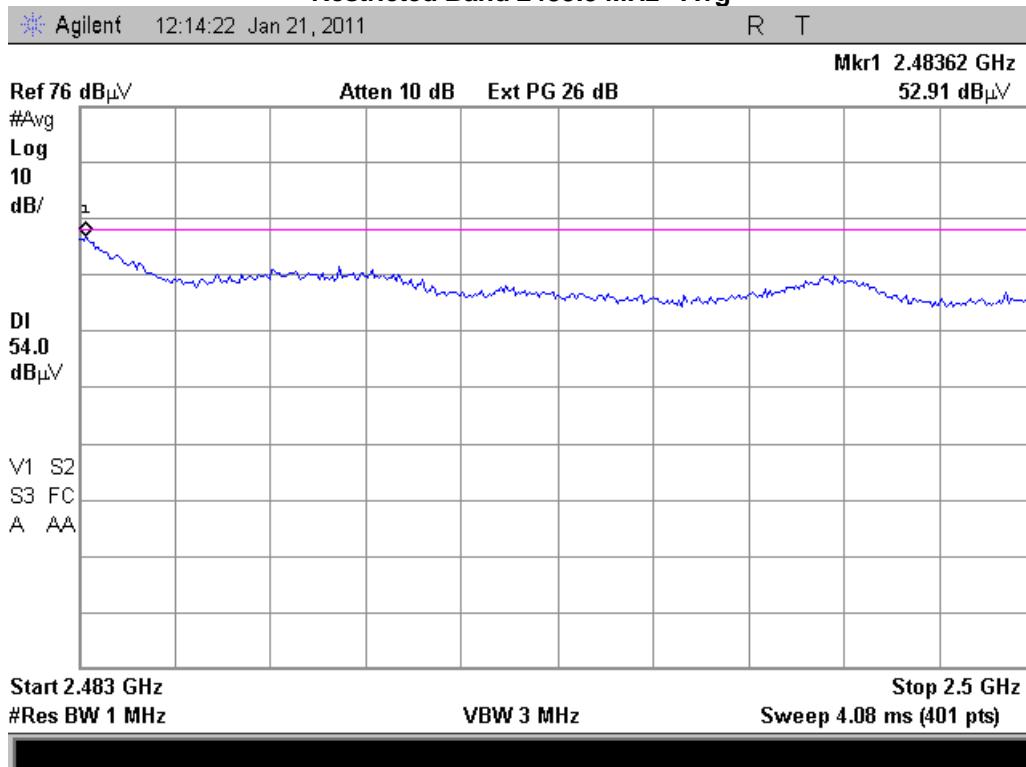




## Restricted Band 2483.5 MHz - Peak



## Restricted Band 2483.5 MHz - Avg



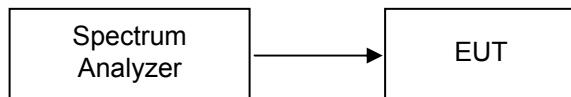
**Name of Test:** Occupied Bandwidth  
**Specification:** 15.247(a)(2)  
**Test Equipment Utilized:** i00331

**Engineer: G. Corbin  
Test Date: 1/20/2011**

## Test Procedure

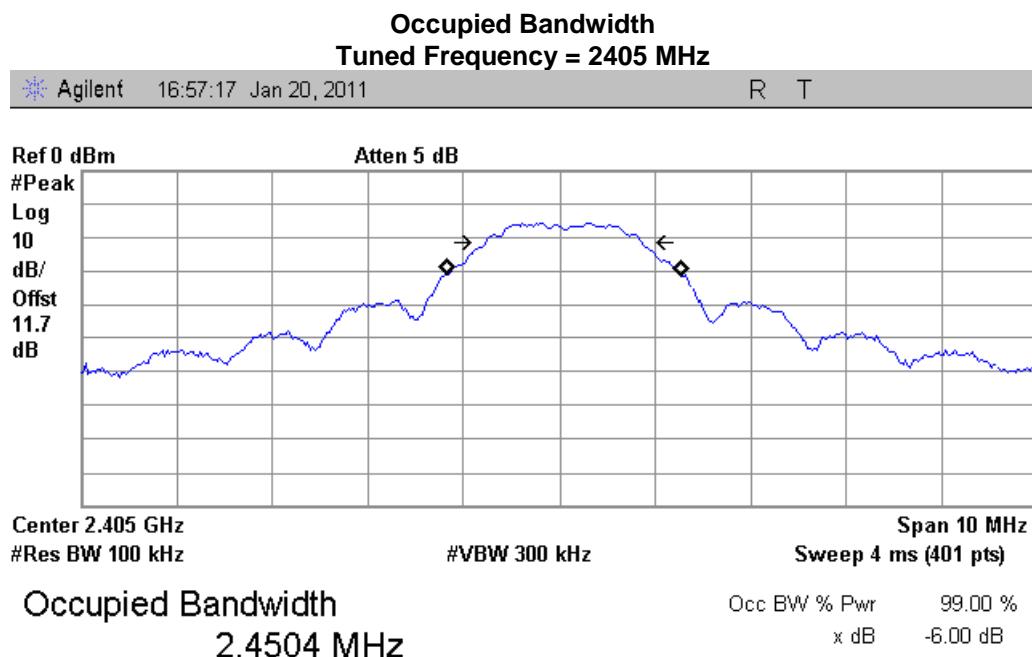
The EUT was connected directly to a spectrum analyzer. The Span was set wide enough to capture the entire transmit spectrum and the resolution bandwidth was set to at least 1% of the span. The analyzer was set to max hold and when the entire spectrum was captured the 6dB bandwidth was measured to verify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

## Test Setup



## Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2405	1619 kHz	≥ 500 kHz	Pass
2440	1605 kHz	≥ 500 kHz	Pass
2480	1601 kHz	≥ 500 kHz	Pass



Transmit Freq Error x dB Bandwidth

Occ BW % Pwr 99.00 %  
x dB -6.00 dB

**Occupied Bandwidth****Tuned Frequency = 2440 MHz**

Agilent 16:59:41 Jan 20, 2011

R T

Ref 0 dBm

Atten 5 dB

#Peak

Log

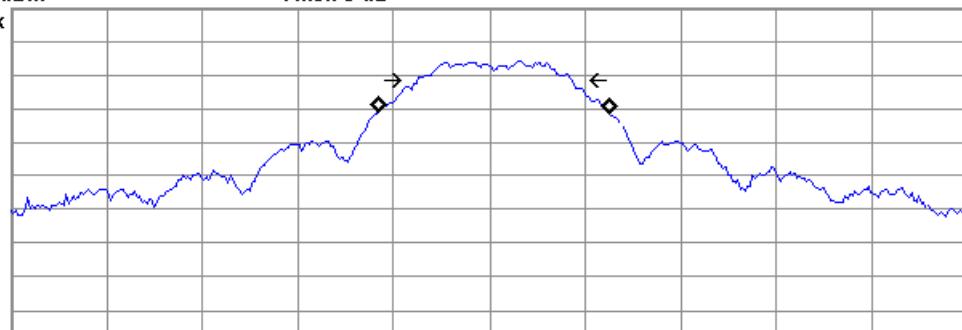
10

dB/

Offset

11.7

dB

Center 2.44 GHz  
#Res BW 100 kHz

#VBW 300 kHz

Span 10 MHz  
Sweep 4 ms (401 pts)**Occupied Bandwidth**  
**2.4195 MHz**Occ BW % Pwr 99.00 %  
x dB -6.00 dBTransmit Freq Error 50.619 kHz  
x dB Bandwidth 1.605 MHz**Occupied Bandwidth**  
**Tuned Frequency = 2480 MHz**

Agilent 17:02:02 Jan 20, 2011

R T

Ch Freq 2.48 GHz

Trig Free

Occupied Bandwidth

Ref 0 dBm

Atten 5 dB

#Peak

Log

10

dB/

Offset

11.7

dB

Center 2.48 GHz

#Res BW 100 kHz

#VBW 300 kHz

Span 10 MHz

Sweep 4 ms (401 pts)

**Occupied Bandwidth**  
**2.4302 MHz**Occ BW % Pwr 99.00 %  
x dB -6.00 dBTransmit Freq Error 48.938 kHz  
x dB Bandwidth 1.601 MHz



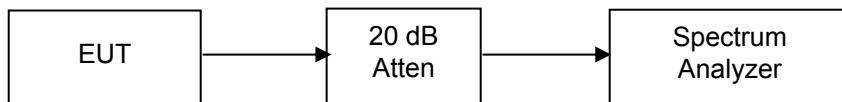
**Name of Test:** Transmitter Power Spectral Density (PSD)  
**Specification:** 15.247(e)  
**Test Equipment Utilized:** i00331

**Engineer:** G. Corbin  
**Test Date:** 1/20/2011

### Test Procedure

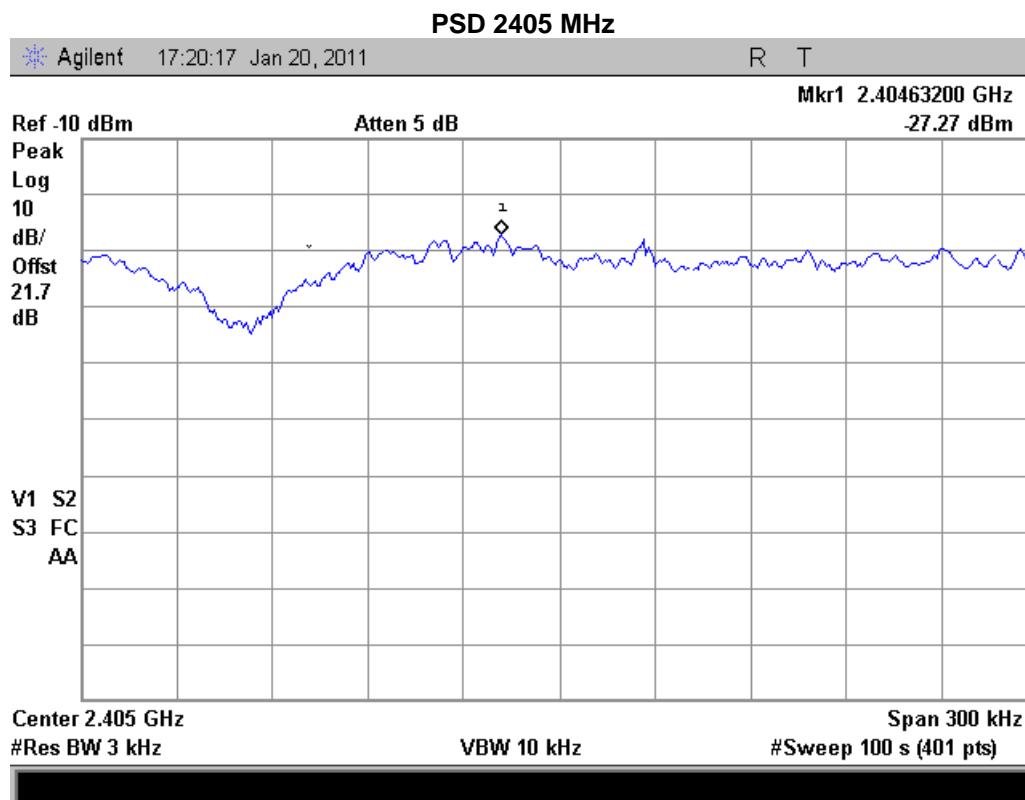
The EUT was connected directly to a spectrum analyzer.  
The test was performed per section 6.11.2.3 of C63.10 - 2009 "Procedure for determining PSD for DTS devices".

### Test Setup



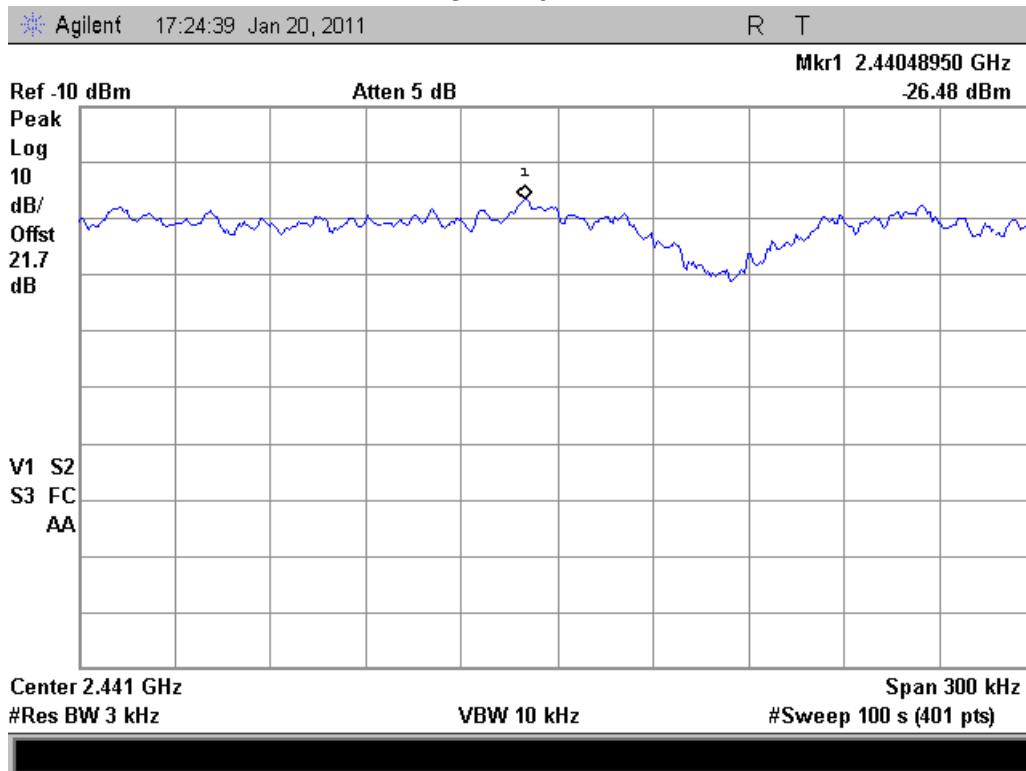
### PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2405	-27.3 dBm	8 dBm	Pass
2440	-26.5 dBm	8 dBm	Pass
2480	-26.5 dBm	8 dBm	Pass

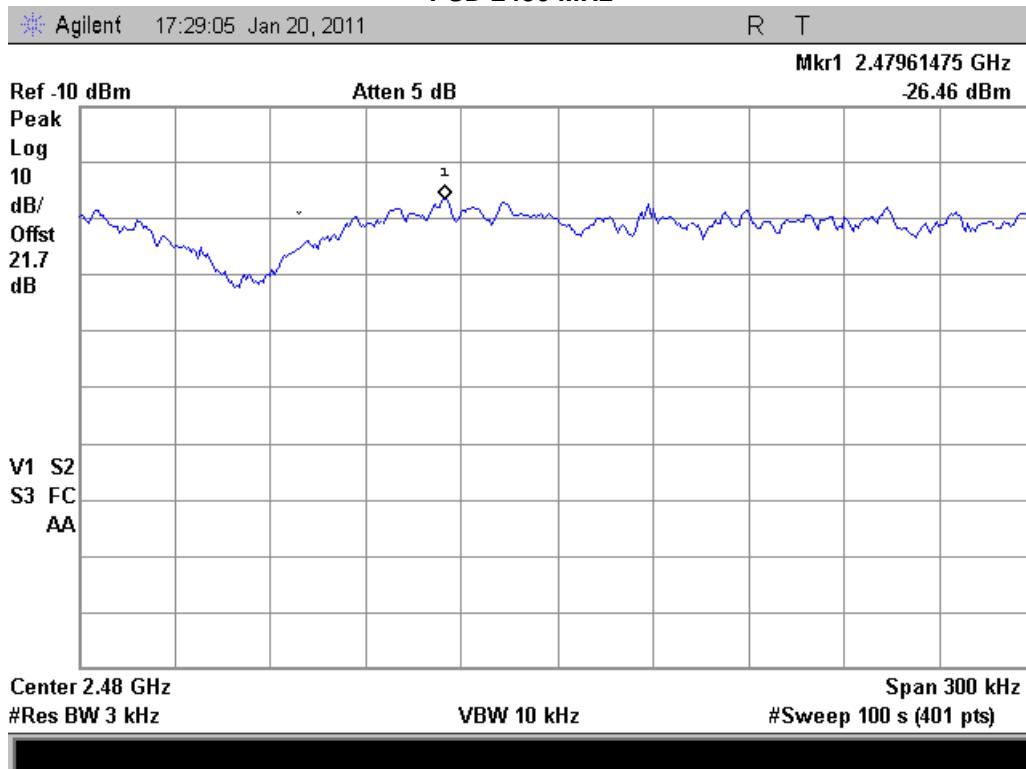




## PSD 2440 MHz



## PSD 2480 MHz





Compliance Testing, LLC

**Name of Test:** A/C Powerline Conducted Emissions  
**Specification:** 15.207  
**Test Equipment Utilized:** N/A

**Engineer: G. Corbin  
Test Date: N/A**

**Not Applicable – Device is battery powered and has no connection to the AC main**

**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
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	3/27/2009	3/27/2011
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