



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: January 8, 2009

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Innovative Wireless Technologies

Equipment: Gateway Node FAP2210-001

FCC ID: SP8-FAP2210-001

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:** Innovative Wireless Technologies**FCC ID:** SP8-FAP2210-001**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: SP8-FAP2210-001

Model: FAP2210-001

to

Federal Communications Commission

Rule Part(s) 15.247

Date Of Report: January 8, 2009

On the Behalf of the Applicant: Innovative Wireless Technologies
1047 Vista Park Drive
Forest VA 24551

Attention of: Gary L. Raulerson, Jr.
434-316-5230 x 14
434-316-5232 fax

Supervised By:

Hoosamuddin S. Bandukwala, Lab Director

Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	January 8, 2009	M.Wyman	Original Document
2.0	January 21, 2009	M.Wyman	Fix the AC cond. table
3.0	January 27, 2009	M.Wyman	Replace Cond Spur per RT/TCB
4.0	February 9, 2009	J Erhard	Add additional radiated test data
5.0	February 18, 2009	J Erhard	Add -dBc to band edge test table
6.0	February 19, 2009	J Erhard	Add conducted band edge test data

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.

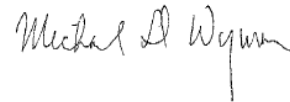
Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply 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.

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:

Test Engineer

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Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: Flom Test Lab, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044A-1) Chandler, AZ 85225

c) Report Number: d0910003

d) Client: Innovative Wireless Technologies

e) Identification: SP8-FAP2210-001

Description: Gateway Node FAP2210-001

f) EUT Condition: Not required unless specified in individual tests.

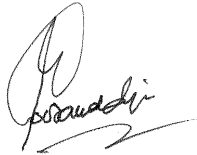
g) Report Date: January 8, 2009

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: Innovative Wireless Technologies

(c)(2): **FCC ID:** SP8-FAP2210-001

Model Number: FAP2210-001

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

Please See Attached Exhibits

(c)(4): **Type of Emission:** DTS

(c)(5): **FREQUENCY RANGE, MHz:** 903 - 927

(c)(6): **Power Rating, W:** 0.20
☐ Switchable ☒ Variable ☐ N/A

(c)(7): **Maximum Power Rating, W:** 1.0

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

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

☒ 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 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



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	Pass	

Name of Test:
Specification:
Test Equipment Utilized

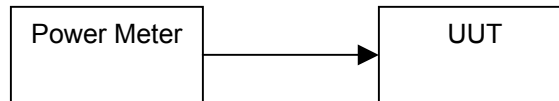
Peak Output Power
 15.247(b)
 i00228, i00317

Engineer: M.Wyman
Test Date: 1/6/09

Test Procedure

The UUT was connected directly to a power meter input. 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	Specification Limit	Result
903.000	12.21dBm	1 W	Pass
915.000	13.01dBm	1 W	Pass
927.000	13.34dBm	1 W	Pass

Name of Test: Conducted Spurious Emissions
Specification: 15.247(d)
Test Equipment Utilized i00329

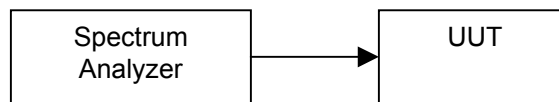
Engineer: M.Wyman
Test Date: 1/07/09

Test Procedure

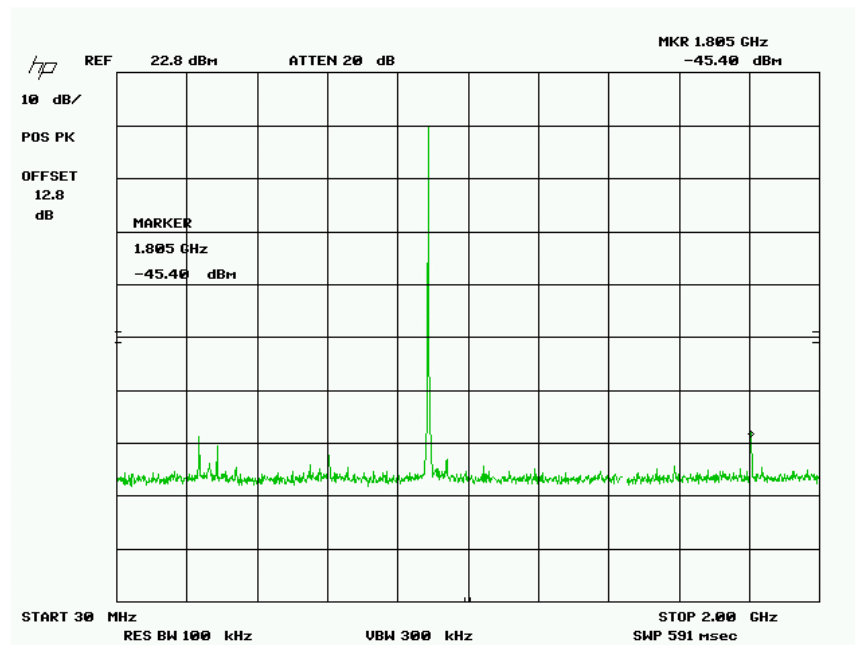
The UUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. The reference level was offset for the peak power output with the resolution bandwidth set for 1 MHz. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter 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

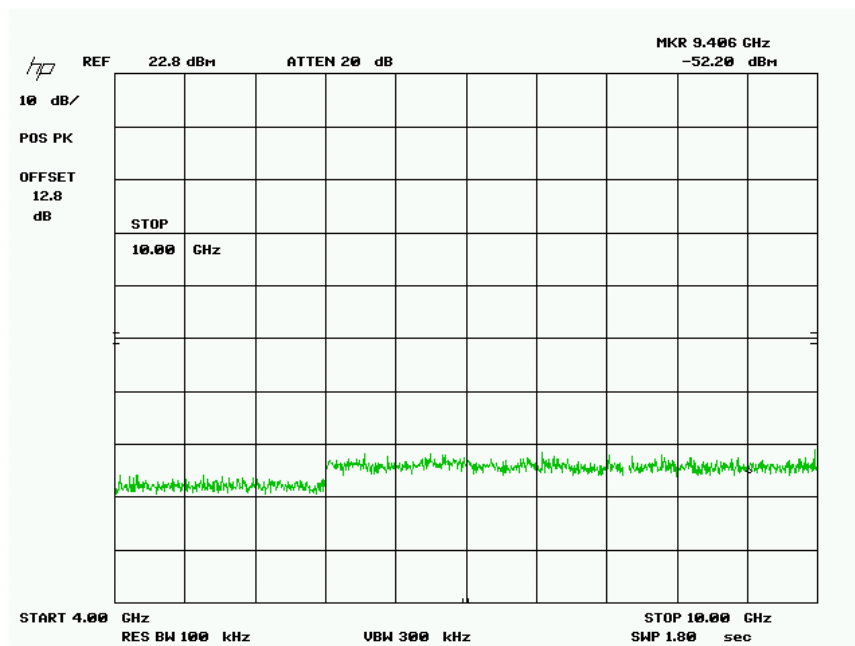
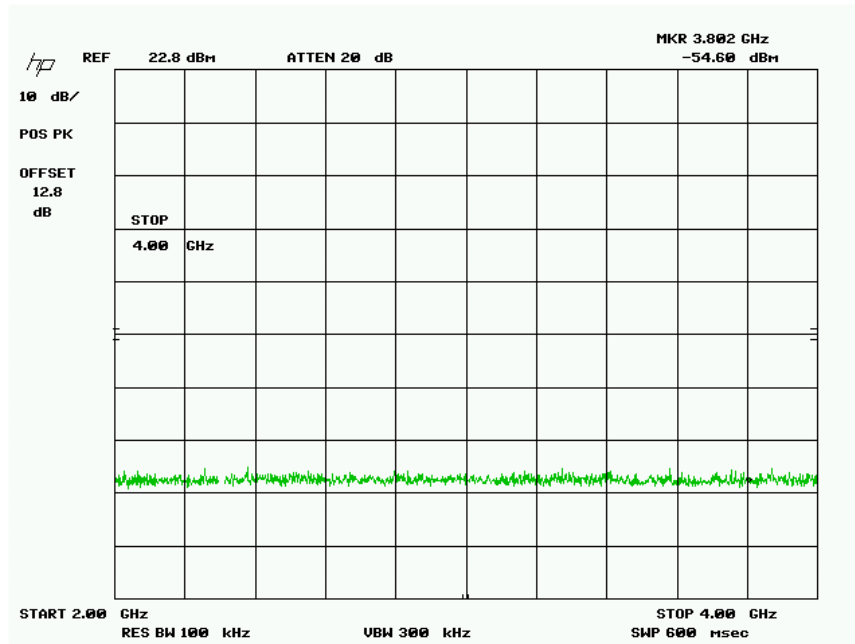
Only the worst case is recorded in the Conducted Spurious Emissions Summary Test Table.

Test Setup

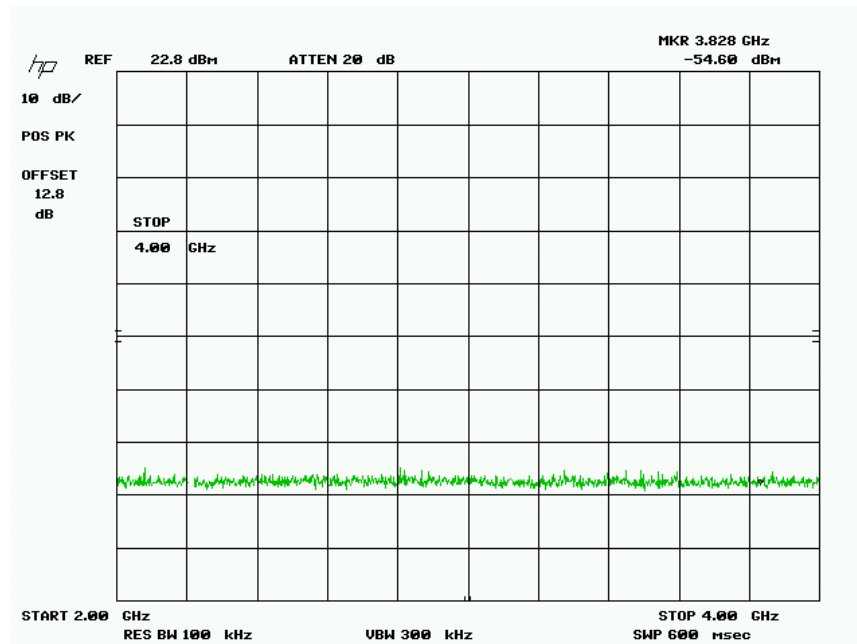
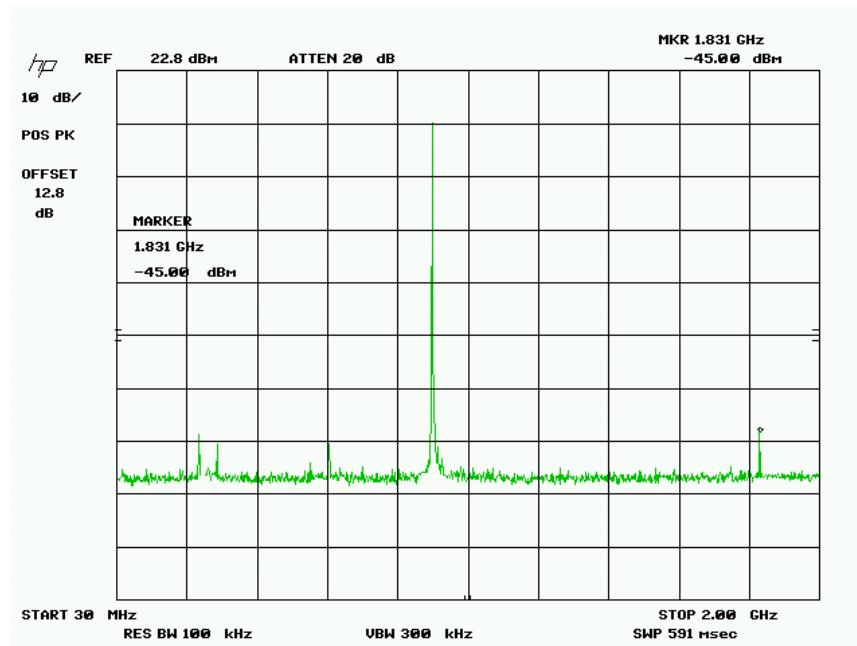


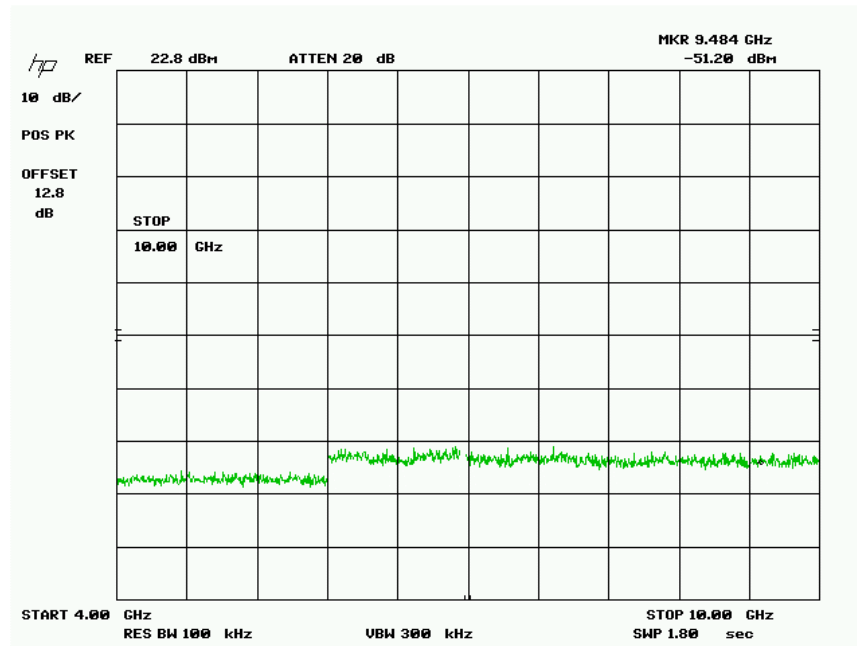
Conducted Spurious Emissions 903MHz



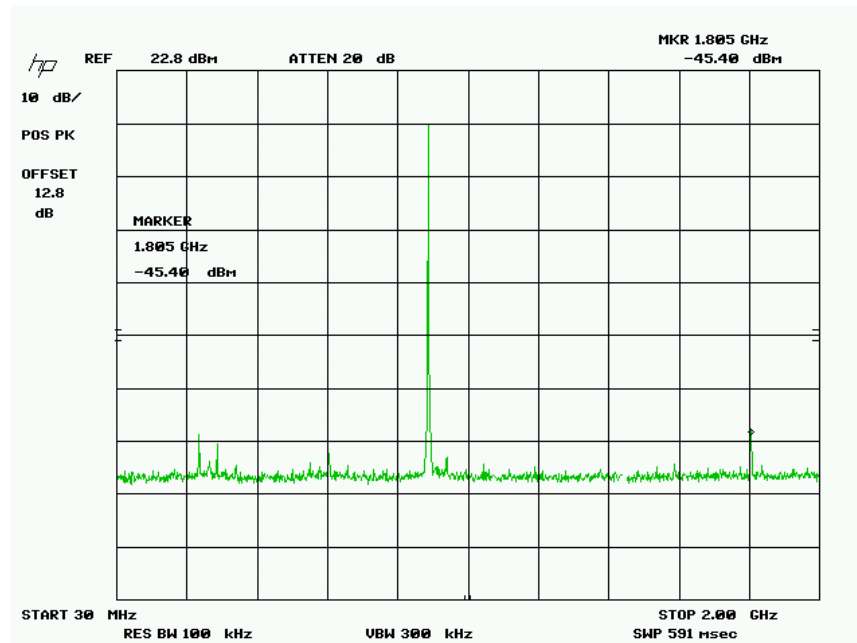


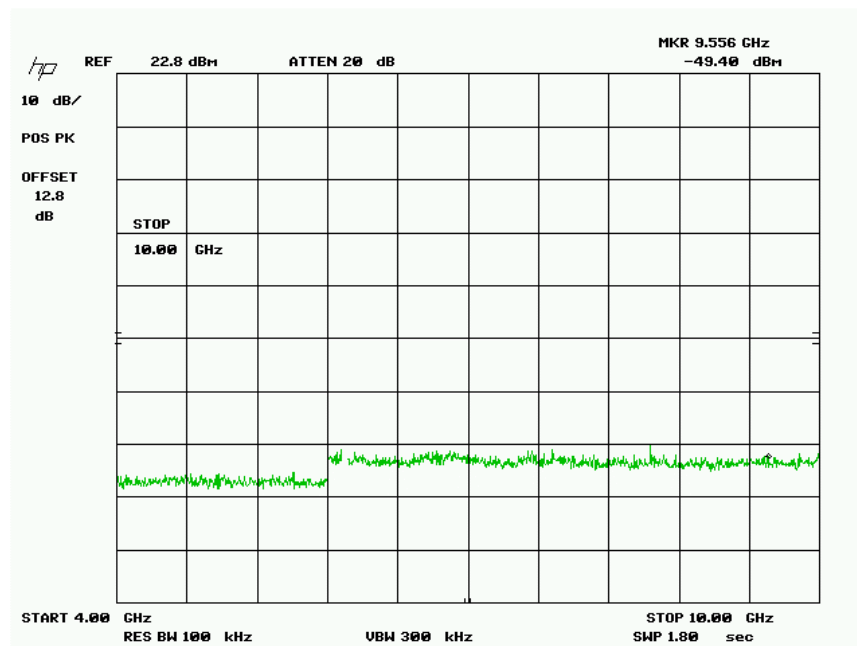
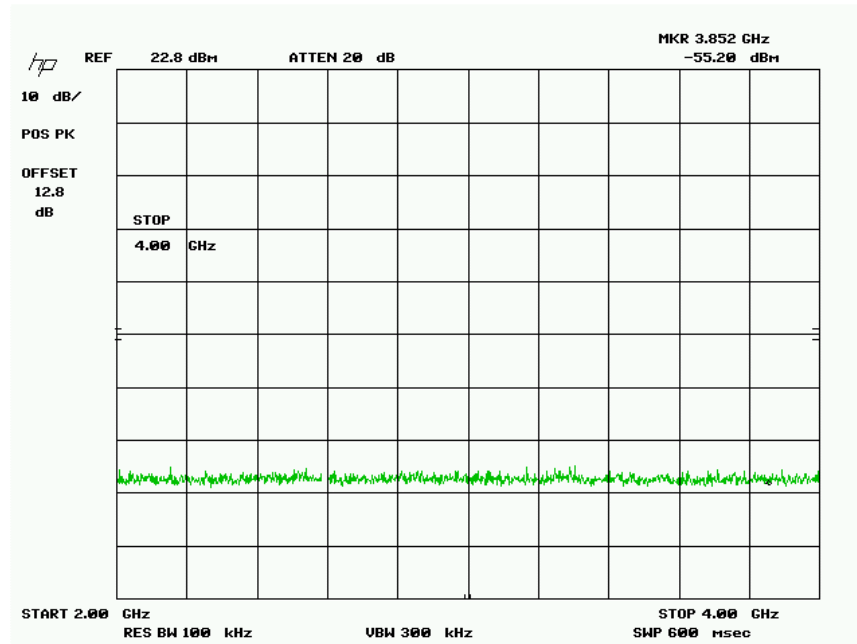
Conducted Spurious Emissions 915MHz





Conducted Spurious Emissions 927MHz





Name of Test:
Specification:
Test Equipment Utilized

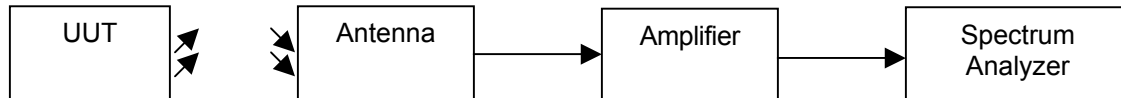
Radiated Spurious Emissions
 15.247(d), 15.209(a), 15.205
 i00271, i00028, i00329

Engineer: M.Wyman
Test Date: 1/07/09

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
Average	1 MHz	10 Hz	0 Hz

Radiated Spurious Emissions

903MHz

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
903.000	1806.000	41.2	74.0	38.6	54.0	Pass
903.000	2709.000	42.2	74.0	39.1	54.0	Pass
903.000	3612.000	42.8	74.0	39.4	54.0	Pass
903.000	4515.000	43.6	74.0	39.8	54.0	Pass
903.000	5418.000	44.4	74.0	40.3	54.0	Pass
903.000	6321.000	44.7	74.0	40.6	54.0	Pass

915MHz

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
915.000	1830.000	41.1	74.0	38.5	54.0	Pass
915.000	2745.000	42.3	74.0	39.0	54.0	Pass
915.000	3660.000	42.4	74.0	39.3	54.0	Pass
915.000	4575.000	43.7	74.0	39.9	54.0	Pass
915.000	5490.000	44.1	74.0	40.1	54.0	Pass
915.000	6405.000	44.6	74.0	40.7	54.0	Pass

927MHz

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
927.000	1854.000	41.5	74.0	38.8	54.0	Pass
927.000	2781.000	42.4	74.0	39.3	54.0	Pass
927.000	3708.000	43.0	74.0	39.7	54.0	Pass
927.000	4635.000	43.7	74.0	40.3	54.0	Pass
927.000	5490.000	44.2	74.0	40.8	54.0	Pass
927.000	6405.000	44.4	74.0	41.6	54.0	Pass

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

Name of Test:
Specification:
Test Equipment Utilized

Emissions At Band Edges
 15.247(d), 15.209(a), 15.205
 i00271, i00028, i00329

Engineer: M.Wyman
Test Date: 1/07/09

Conducted Test Procedure

The UUT was connected directly to a spectrum analyzer. Max hold and the marker delta function was used to verify that the UUT met the -20 dBc requirement for band edge.

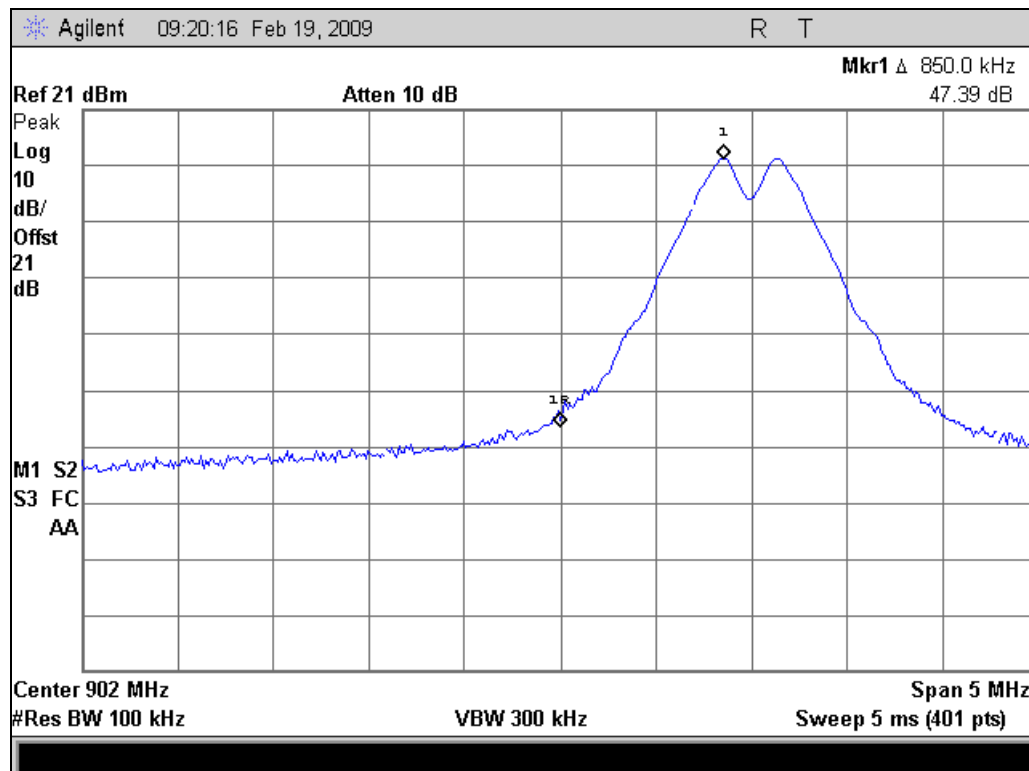
Conducted Test Setup



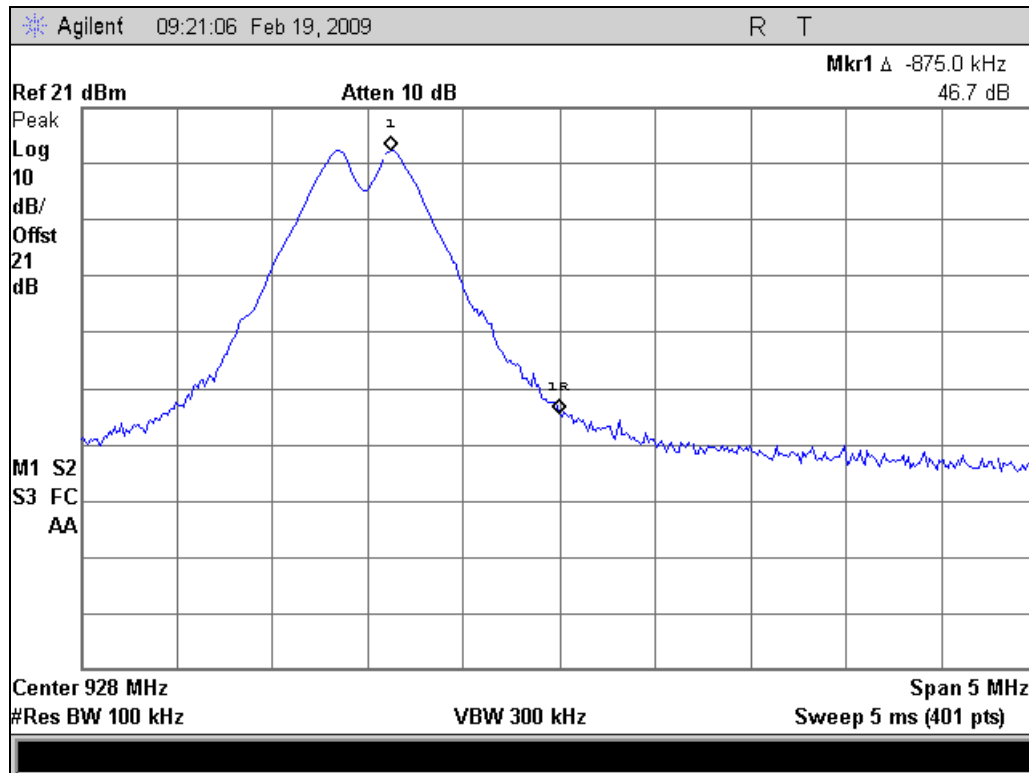
Conducted Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	-dBc Value	Limit	Result
902.000	903.000	-47.39	-20 dBc	Pass
928.000	927.000	-46.7	-20 dBc	Pass

Radiated Band Edge 902MHz



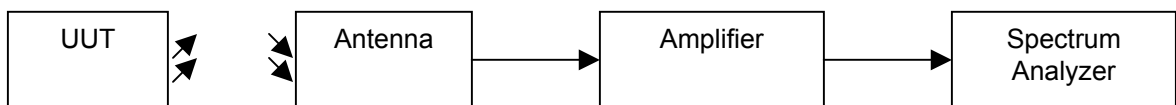
Radiated Band Edge 928MHz



Radiated 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.

Radiated Test Setup

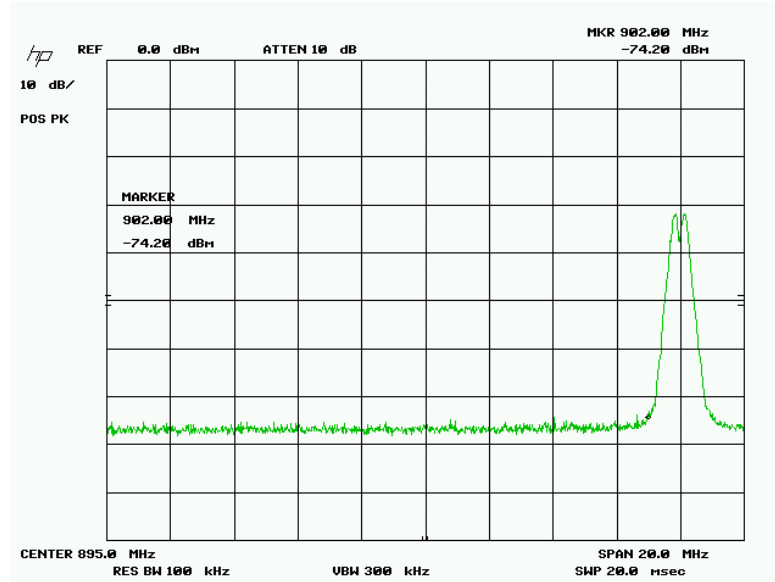


Radiated Band Edge Emissions Summary

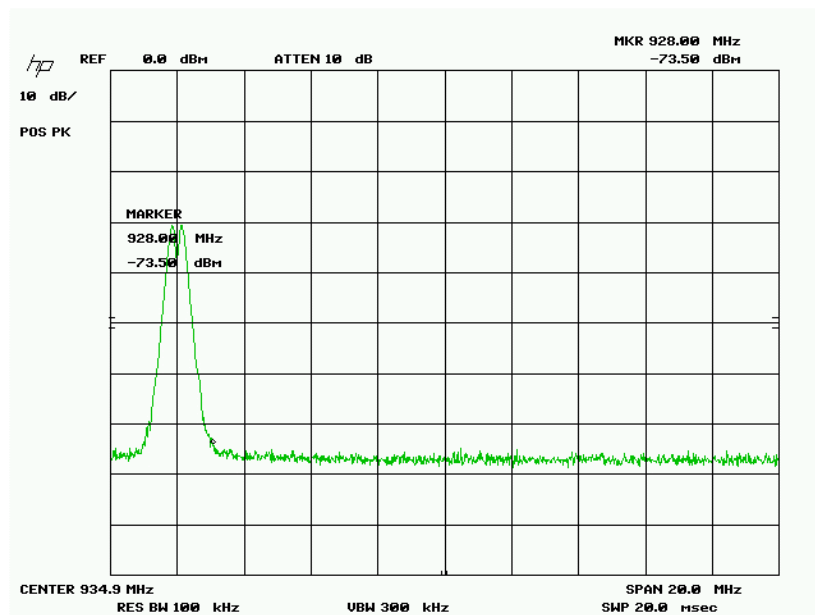
Tuned Freq (MHz)	Emission Freq (MHz)	Peak Reading	Monitored Level	-dBc Value	Limit	Result
902.000	903.000	-30 dBm	-74.2 dBm	-44.2	-20 dBc	Pass
928.000	927.000	-30 dBm	-73.5 dBm	-43.5	-20 dBc	Pass

Sample Calculation -dBc = peak reading – monitored level

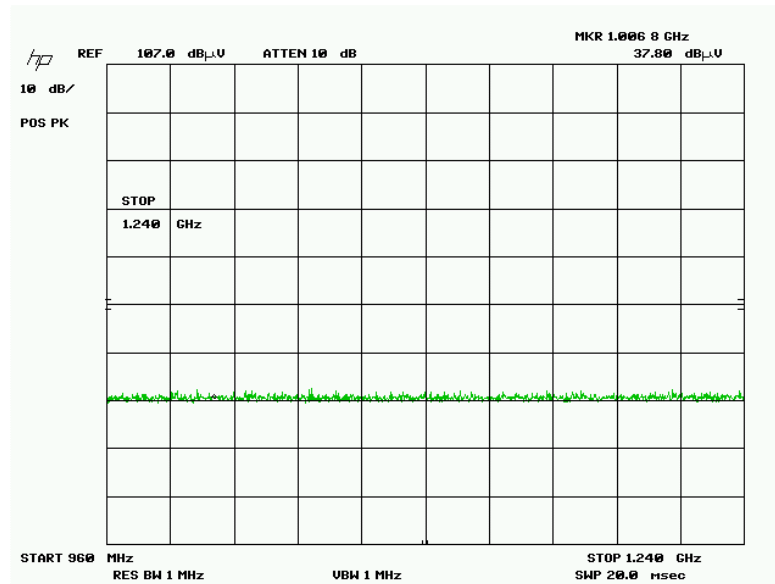
Radiated Band Edge 902MHz



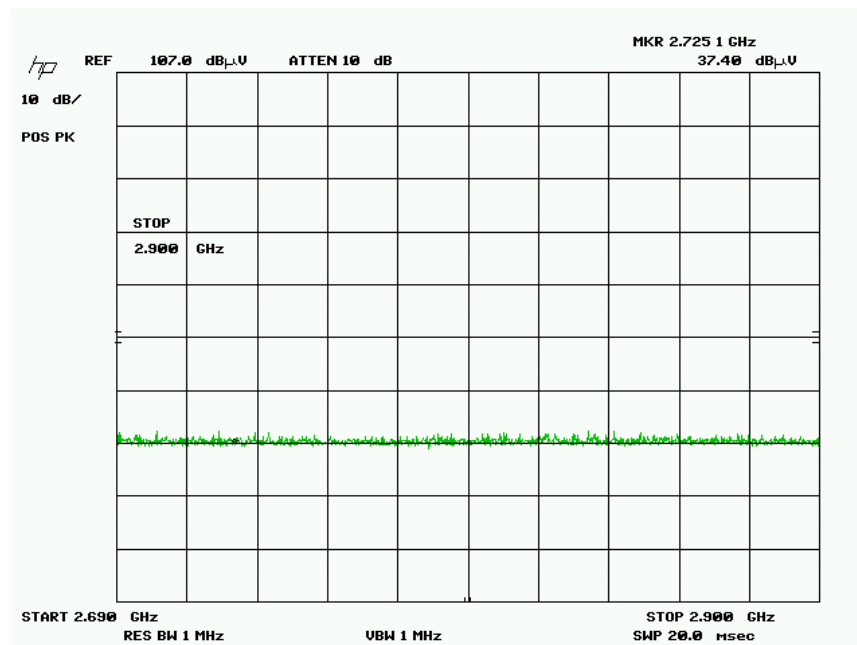
Radiated Band Edge 928MHz



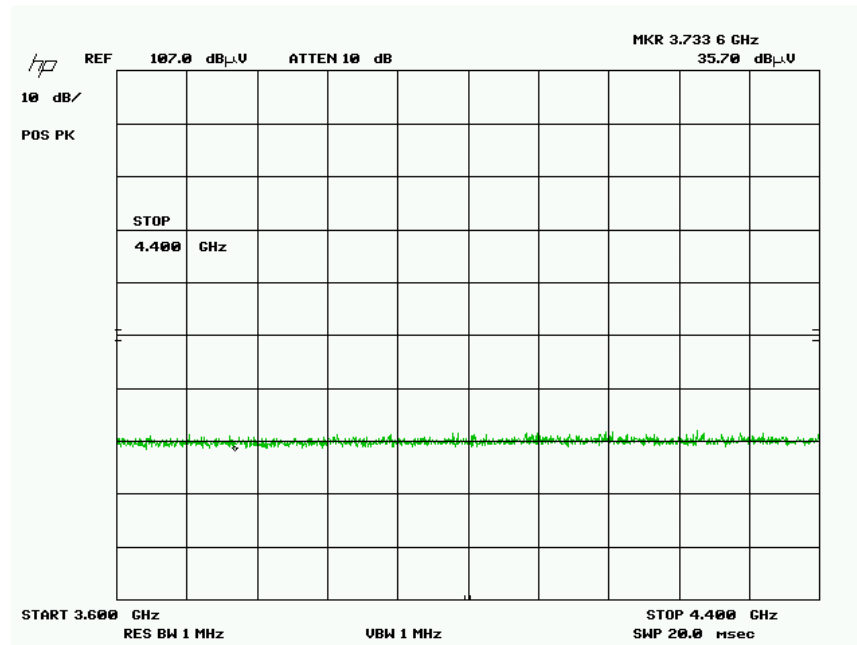
Restricted Band 960 - 1240MHz



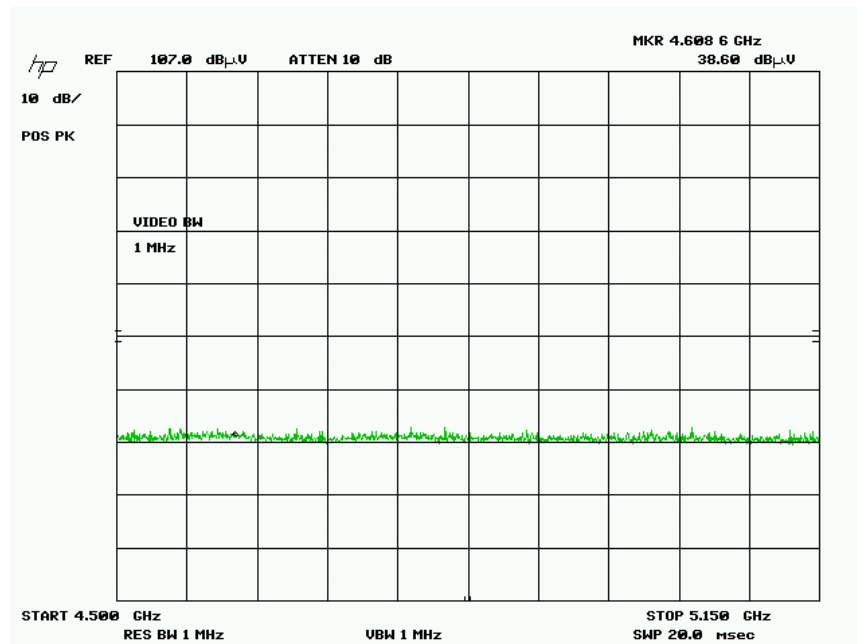
Restricted Band 2690 - 2900MHz



Restricted Band 3600 - 4400 MHz



Restricted Band 4500 - 5150MHz



Note: These photos were taken with the carrier on at maximum power of 13dBm. The resultant graphs are the harmonic restricted bands taken from 15.205. The reference power for the pictures was set to 0dBm for clarity.

Name of Test:
Specification:
Test Equipment Utilized

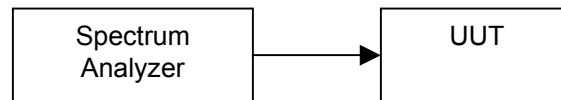
Occupied Bandwidth
 15.247(a)(2)

Engineer: M.Wyman
Test Date: 1/6/09

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.

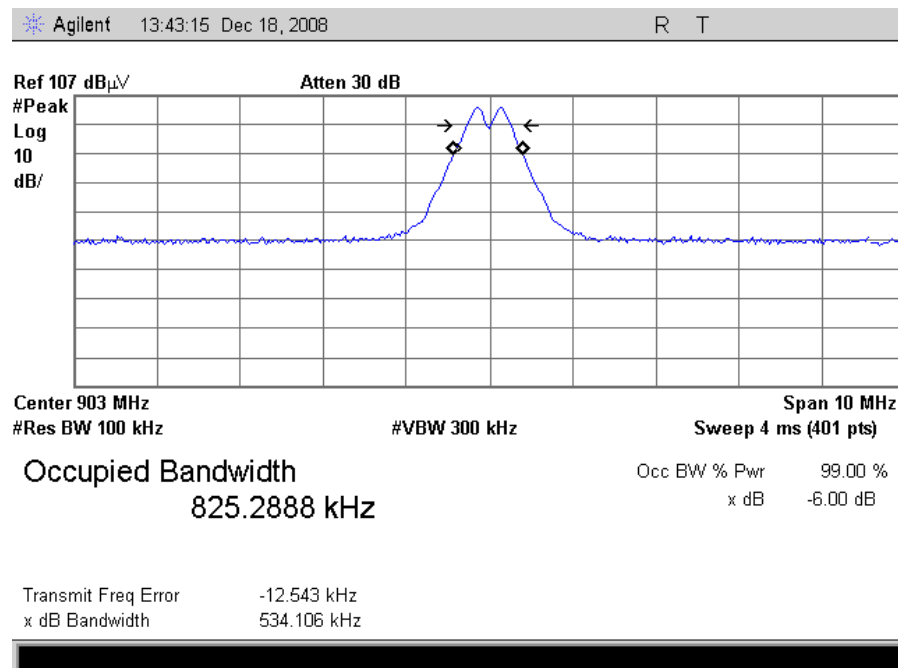
Test Setup



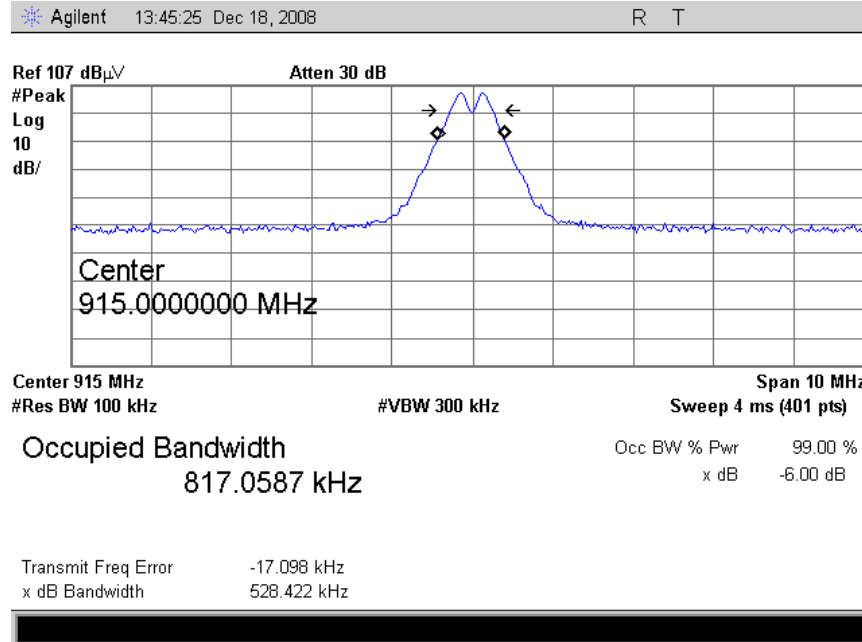
Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
903.000	534.1KHz	≥ 500 KHz	Pass
915.000	528.4KHz	≥ 500 KHz	Pass
927.000	531.6KHz	≥ 500 KHz	Pass

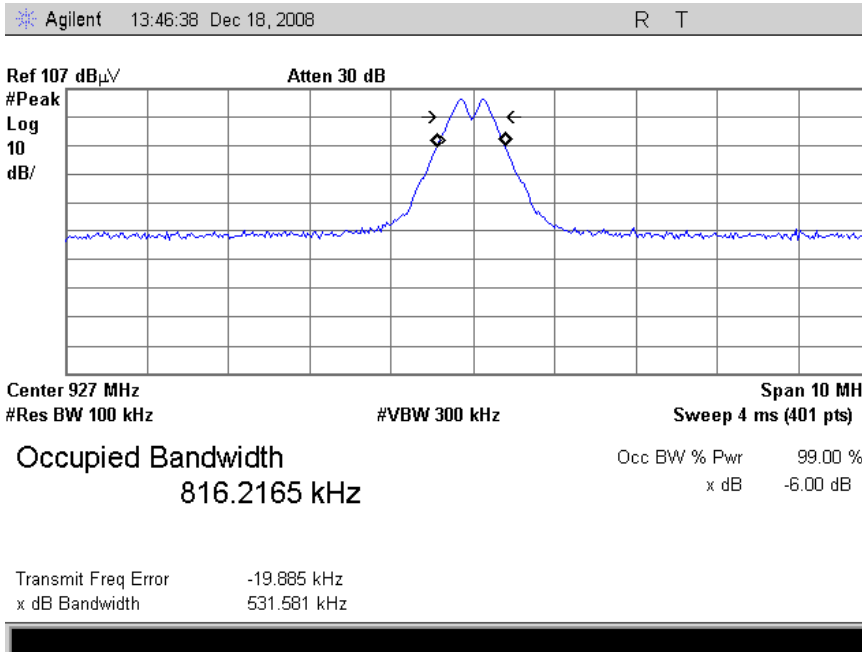
6dB and 99% Bandwidth 903MHz



6dB and 99% Bandwidth 915MHz



6dB and 99% Bandwidth 927MHz



Name of Test:
Specification:
Test Equipment Utilized

Transmitter Power Spectral Density (PSD)
 15.247(e)

Engineer: M.Wyman
Test Date: 1/6/09

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.

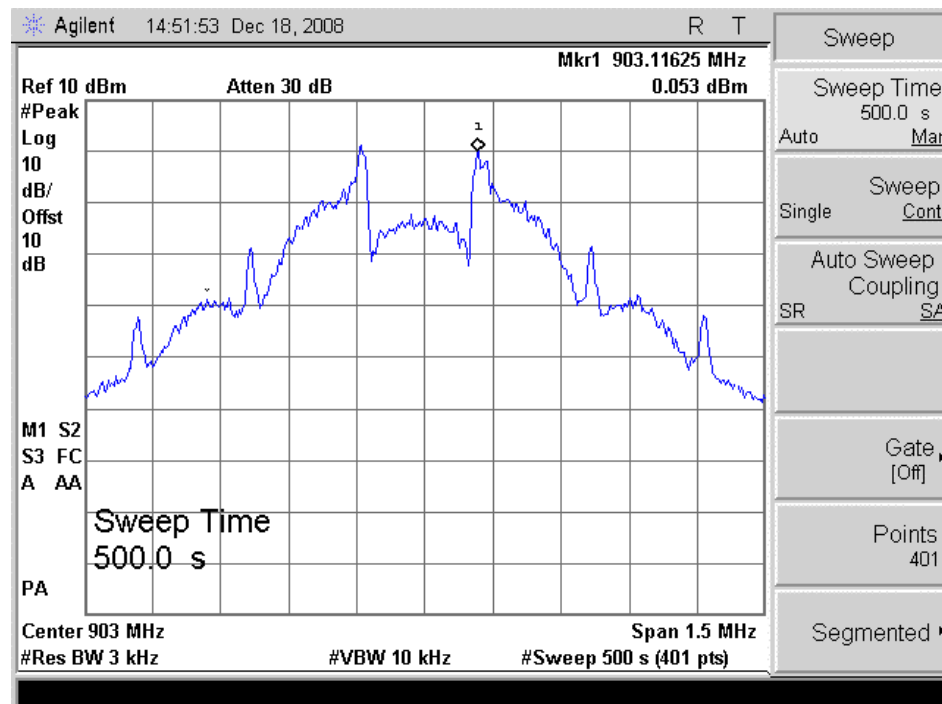
Test Setup



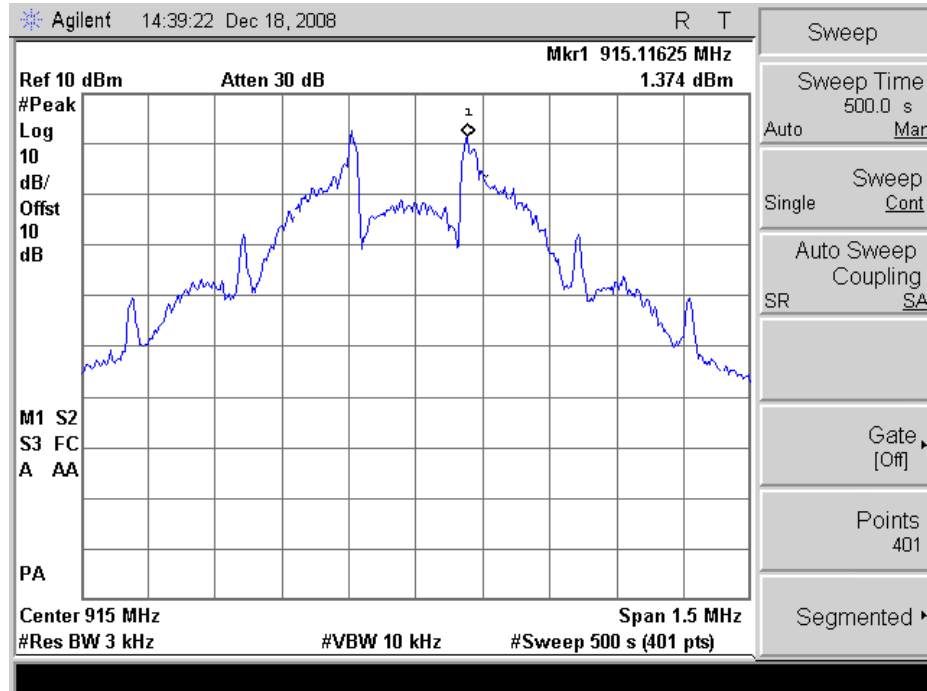
PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
903.116	0.053	8 dBm	Pass
915.116	1.374	8 dBm	Pass
926.853	1.512	8 dBm	Pass

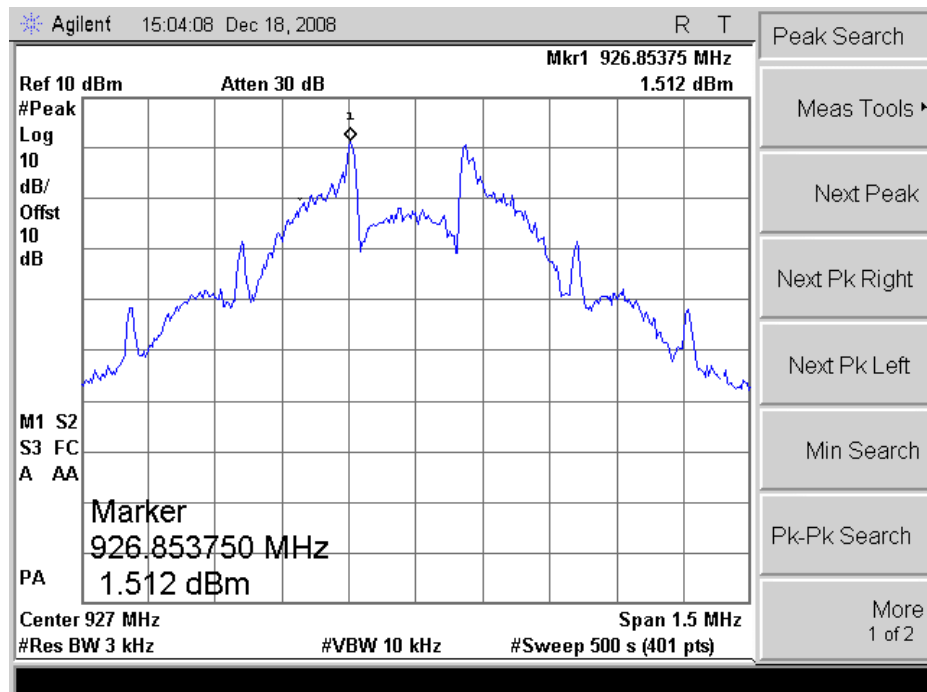
PSD 903 MHz



PSD 915 MHz



PSD 927 MHz



Name of Test:
Specification:
Test Equipment Utilized

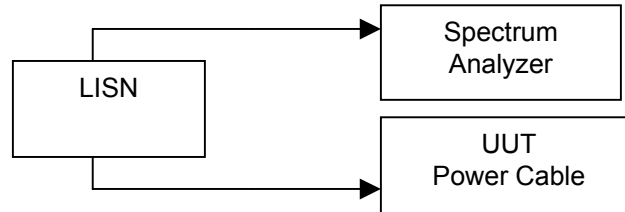
A/C Powerline Conducted Emissions
 15.207

Engineer: M. Wyman
Test Date: 1/7/09

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



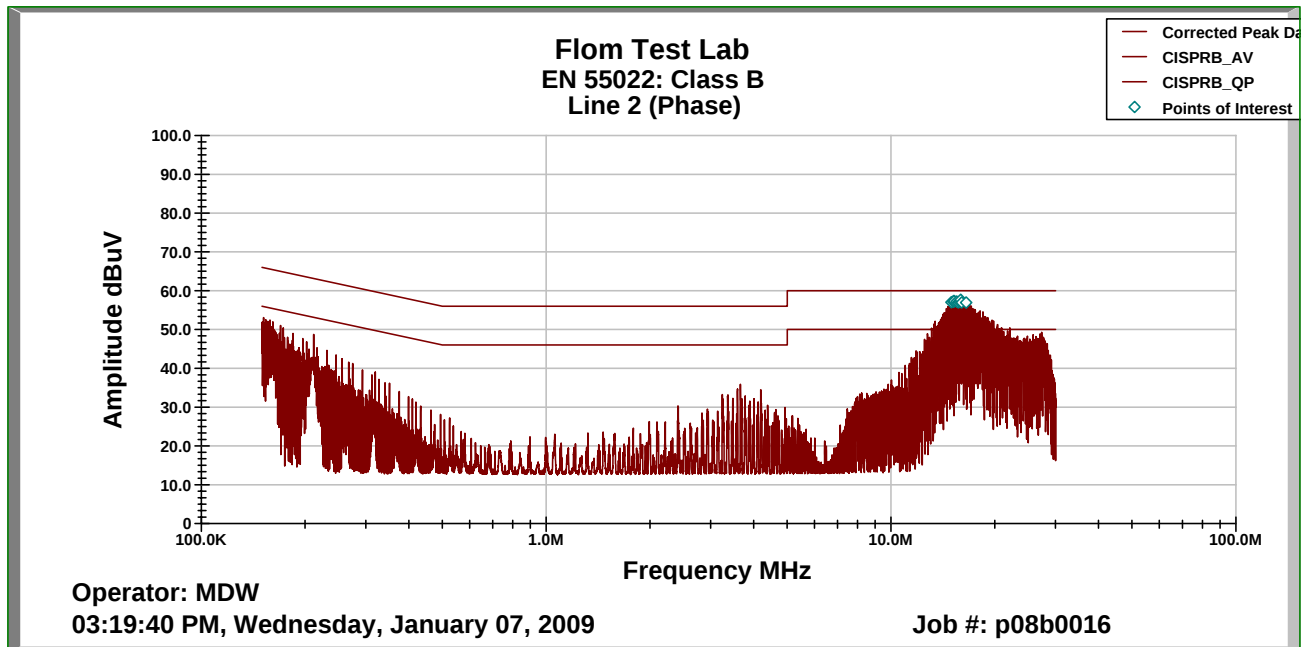
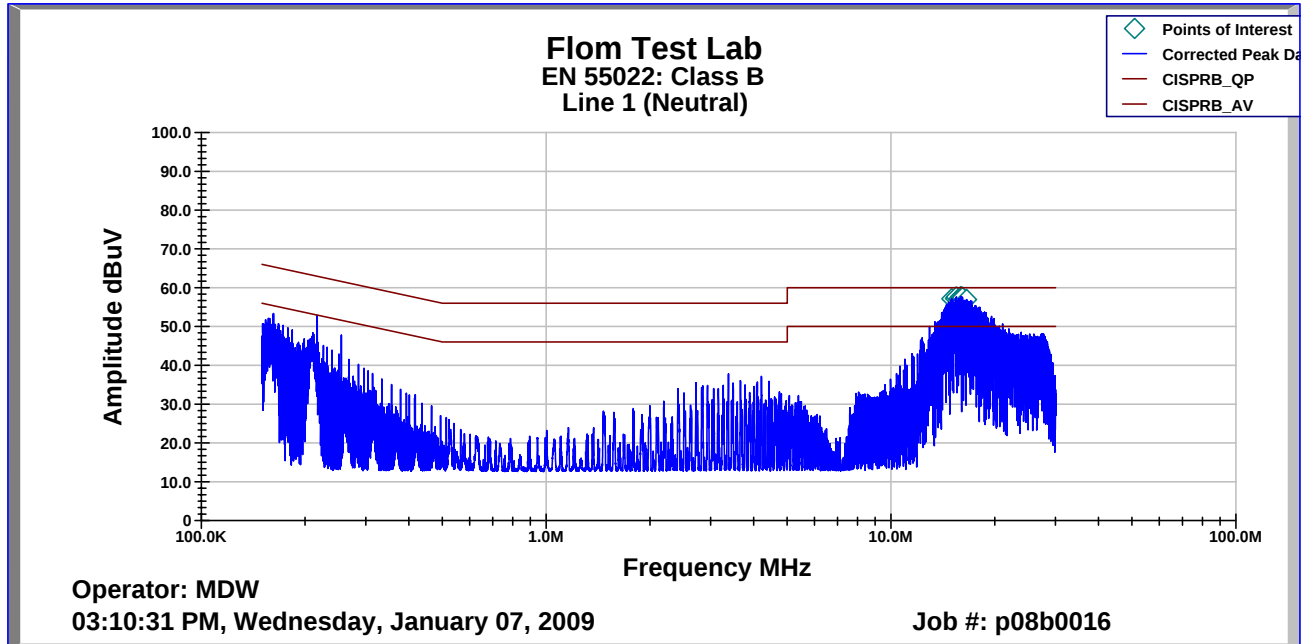
L1 – Phase Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
16.548 MHz	42.69	0	10	53.47	60	Pass
16.118 MHz	43.32	0	10	54.08	60	Pass
16.048 MHz	42.65	0	10	53.40	60	Pass
15.951 MHz	43.46	0	10	54.22	60	Pass
15.833 MHz	42.95	0	10	53.71	60	Pass
15.799 MHz	43.47	0	10	54.22	60	Pass

L2 - Neutral Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
16.491 MHz	41.26	0	10	52.03	60	Pass
16.036 MHz	42.83	0	10	53.58	60	Pass
15.923 MHz	42.76	0	10	53.52	60	Pass
15.825 MHz	43.32	0	10	54.08	60	Pass
15.651 MHz	41.82	0	10	52.57	60	Pass
15.507 MHz	43.00	0	10	53.75	60	Pass

Graphical results



Test Equipment Utilized

Description	MFG	Model Number	FTL Asset Number	Last Cal Date	Cal Due Date
RF Pre-Amplifier	HP	8449	i00028	1/23/07	1/23/09
Spectrum Analyzer	HP	8563E	i00029	5/5/08	5/5/09
Horn Antenna	ARA	1181A	I00271	3/6/08	3/6/09
Power Meter	HP	E4418B	i00228	10/1/08	10/1/09
LISN	FCC	FCC-LISN-50-32-2-01	i00270	09/17/08	09/17/10
Power sensor	HP	8481A	i00317	10/1/08	10/01//09
Spectrum Analyzer	HP	8566B	i00329	5/5/08	5/5/09

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