



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

toll-free: (866) 311-3268  
fax: (480) 926-3598  
<http://www.flomlabs.com>  
[info@flomlabs.com](mailto:info@flomlabs.com)

Date: September 24, 2007

Federal Communications Commission  
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Blackboard, Inc.  
Equipment: 100070086  
FCC ID: TMELWI30XX002  
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

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

p0790006, d0790026

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

Applicant: Blackboard, Inc.  
FCC ID: TMELWI30XX002

**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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## **Transmitter Certification**

of

FCC ID: TMELWI30XX002

Model: LWI30XX

to

**Federal Communications Commission**

Rule Part(s) 15.247

**Date Of Report:** September 24, 2007

**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](mailto:tkuestersteffen@blackboard.com)  
and/or Tim Mattson  
623-476-1400

Supervised By:

Hoosamuddin S. Bandukwala, Lab Director

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**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.

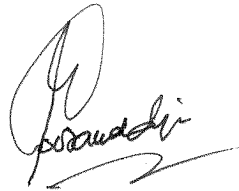
Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories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

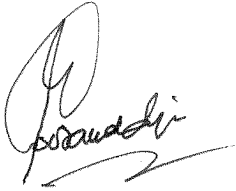


Hoosamuddin S. Bandukwala, Lab Director

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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: d0790026
- d) Client: Blackboard, Inc.
- e) Identification: 100070086  
Description: 900 MHz wireless module
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: September 24, 2007  
EUT Received:
- 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:** TMELWI30XX002

**Model Number:** LWI30XX

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

Please See Attached Exhibits

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

(c)(5): **FREQUENCY RANGE, MHz:** 902.7 – 927.5

(c)(6): **Power Rating, W:** 32.1 mW  
           \_\_\_\_\_ Switchable                      \_\_\_\_\_ Variable                        x   N/A

(c)(7): **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

**The unit was tested with a monopole antenna with a gain of 0 dBi.**

**Subpart 2.1033 (continued)**

(c)(8): **Circuit Diagram/Circuit Description:**

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Chandler, Arizona 85225-7176  
(866) 311-3268 phone, (480) 926-3598 fax



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 (spread spectrum)

### Standard Test Conditions and Engineering Practices

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

In accordance with ANSI C63.4-2004 and FCC DA 00-705. 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.

Prior to testing, the EUT was tuned up in accordance with the manufacturer's alignment procedures. All external gain controls were maintained at the position of maximum and/or optimum gain throughout the testing.

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](http://www.a2la.org) for current scope of accreditation.

Certificate number: 2152.01



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

### Test Results Summary

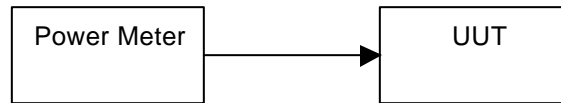
Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(d)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Emissions At Band Edges	Pass	
15.247(a)(2)	Occupied Bandwidth	Pass	
15.247(e)	Transmitter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

**Name of Test:** Peak Output Power  
**Specification:** 15.247(b)  
**Test Equipment Utilized** i00228, i00317

### 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
902.7	32.1 mW	1 W	Pass
915	30.4 mW	1 W	Pass
927.5	28.7 mW	1 W	Pass

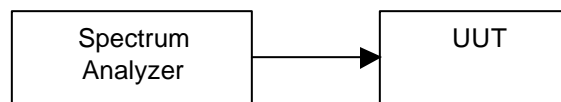
**Name of Test:** Conducted Spurious Emissions  
**Specification:** 15.247(d)  
**Spec. Limit** -20 dBc  
**Test Equipment Utilized** i00329

### 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 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.

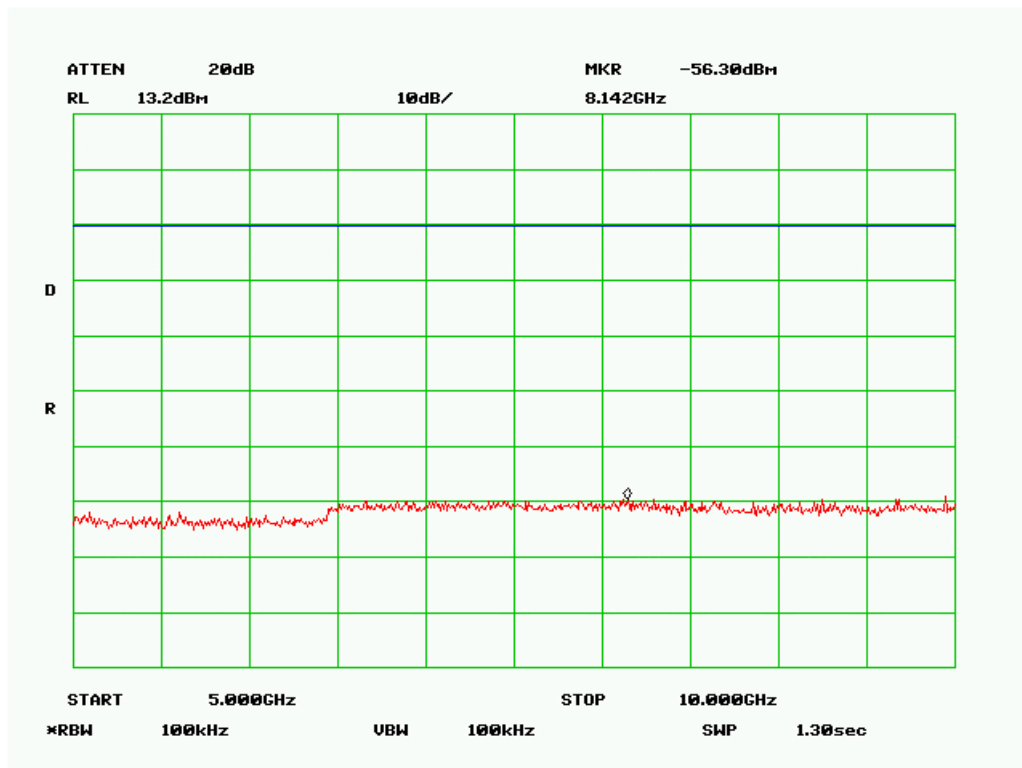
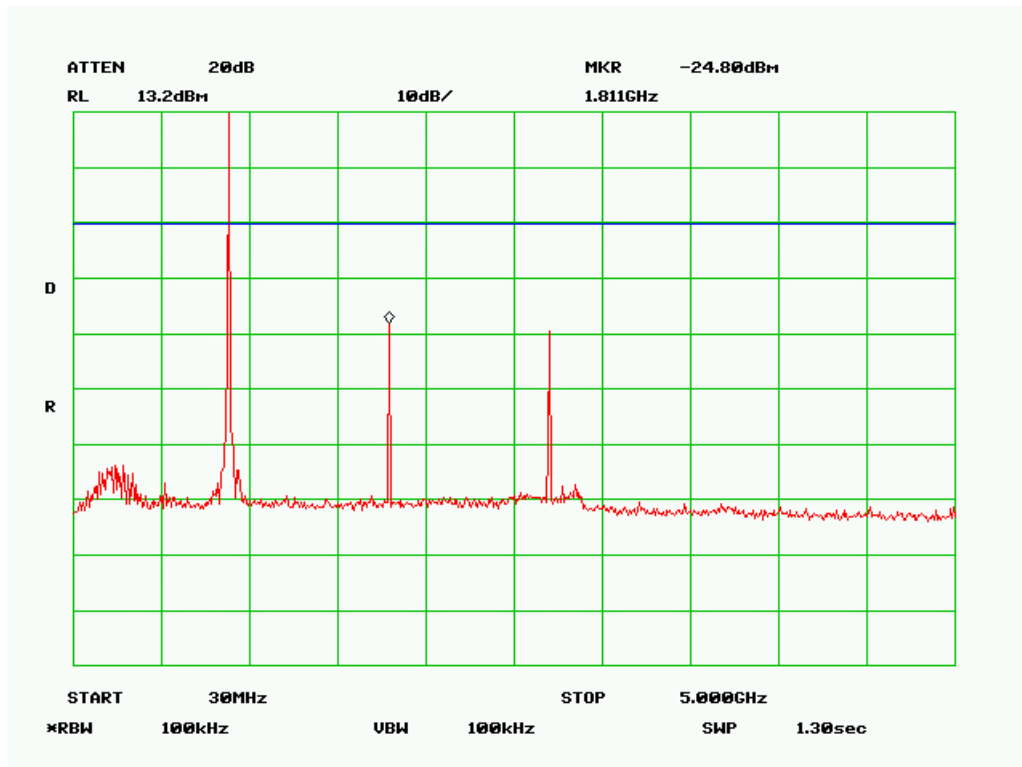
### Test Setup



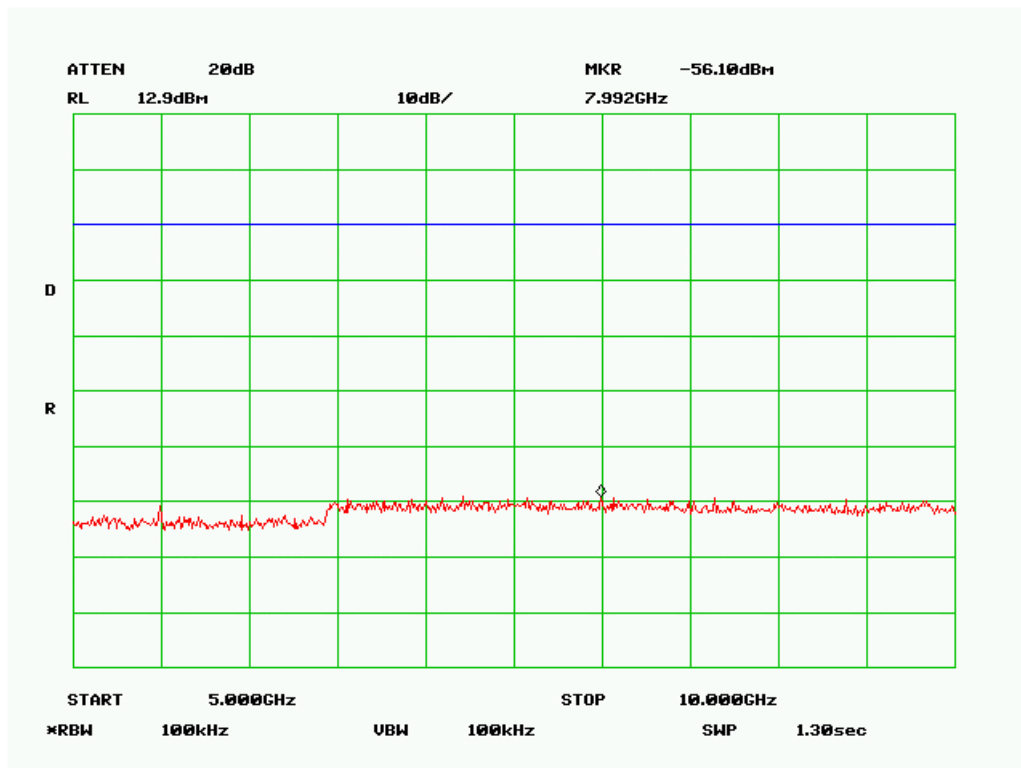
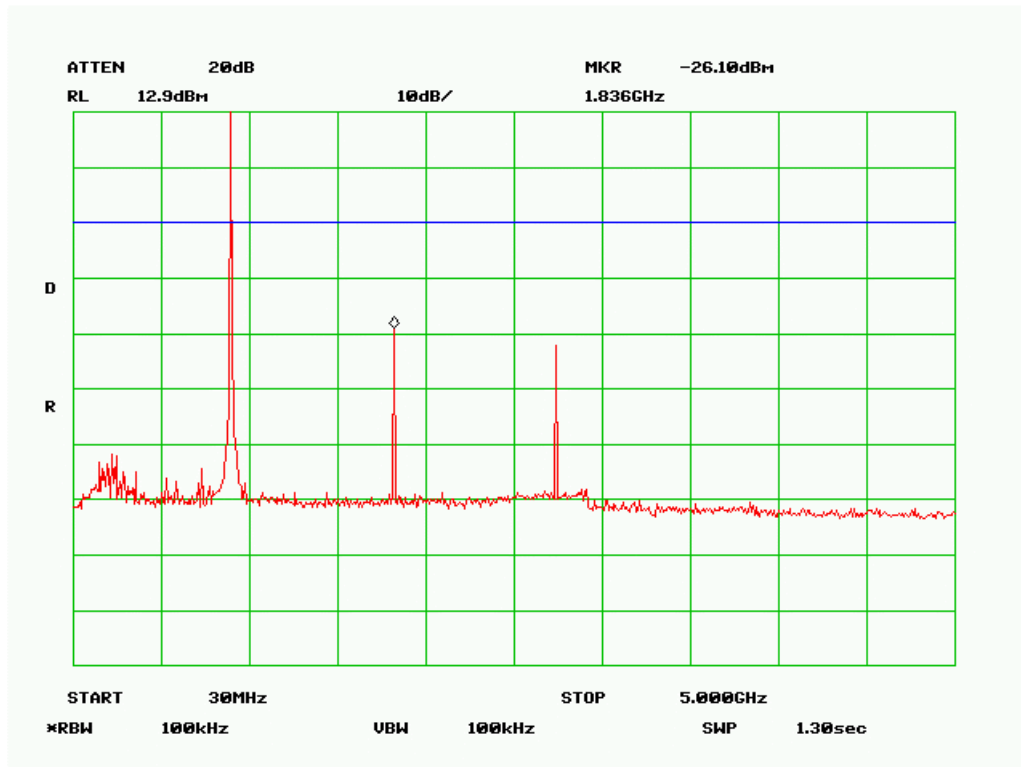
**Conducted Spurious Emissions Summary Test Table**

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement	Reference Level	Corrected Measurement	Specification Limit	Result
902.7	1811	-24.80 dBm	13.2 dBm	-38.0 dBc	-20 dBc	Pass
915	1836	-26.10 dBm	12.9 dBm	-39.0 dBc	-20 dBc	Pass
927.5	1861	-27.43 dBm	12.9 dBm	-40.33 dBc	-20 dBc	Pass

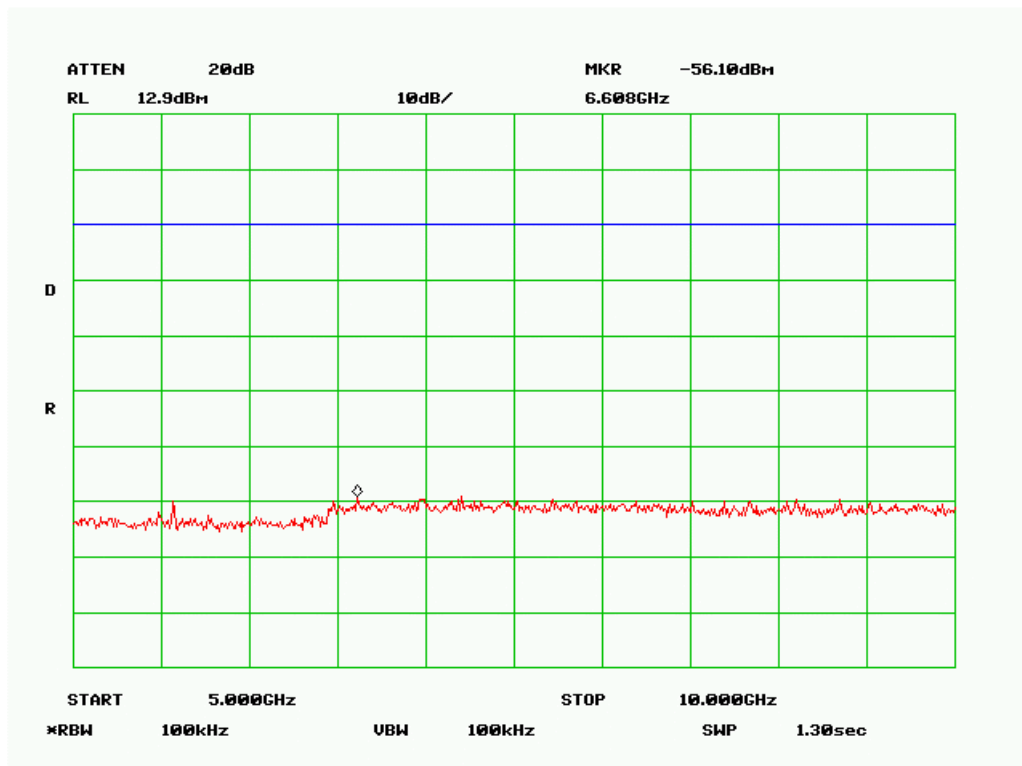
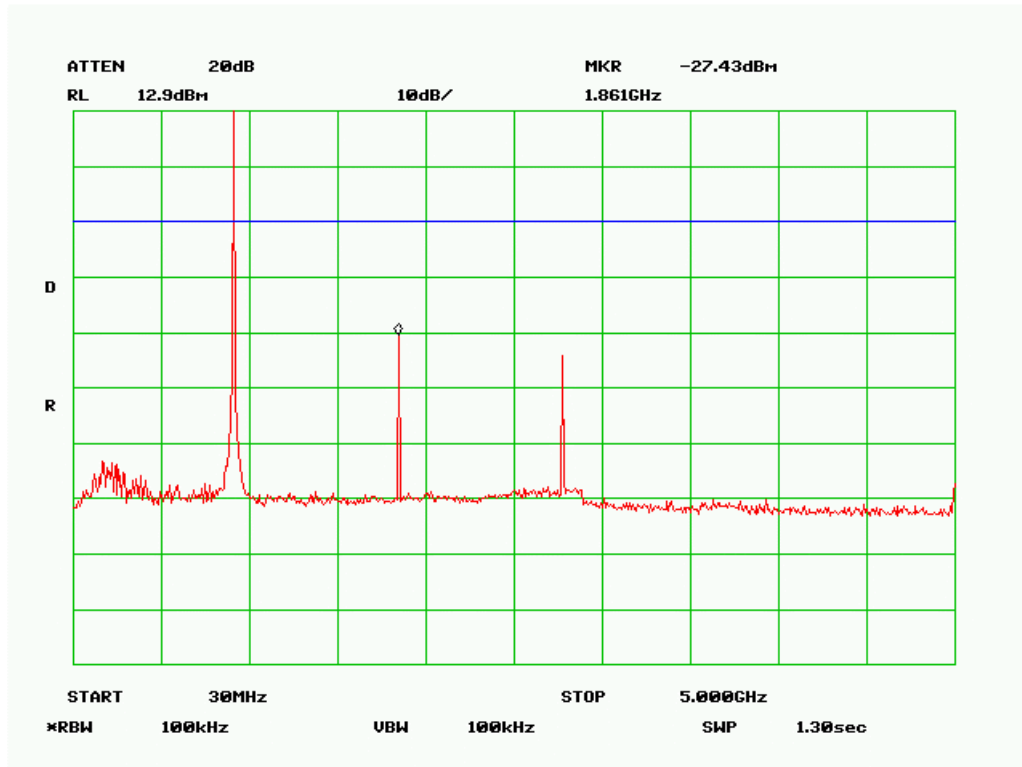
### Conducted Spurious Emissions 902.7 MHz



### Conducted Spurious Emissions 915 MHz



### Conducted Spurious Emissions 927.5 MHz



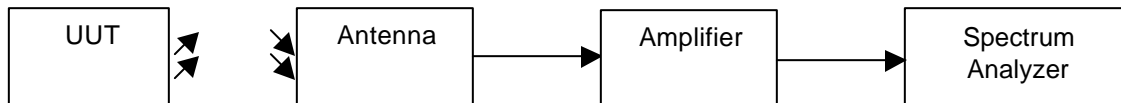


**Name of Test:** Radiated Spurious Emissions  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Spec. Limit** See Table  
**Test Equipment Utilized** i00028, i00049, i00103

### 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 10<sup>th</sup> 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

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
902.7	1805.368	N/A	74.0	37.5	54.0	Pass
902.7	2708.336	N/A	74.0	41.3	54.0	Pass
902.7	3610.866	N/A	74.0	35.4	54.0	Pass
902.7	5415.462	N/A	74.0	38.7	54.0	Pass
915	1829.806	N/A	74.0	38.4	54.0	Pass
915	2744.6879	N/A	74.0	41.8	54.0	Pass
915	3659.687	N/A	74.0	35.7	54.0	Pass
927.5	1855.035	N/A	74.0	35.3	54.0	Pass
927.5	2782.429	N/A	74.0	41.8	54.0	Pass
927.5	3709.929	N/A	74.0	36.4	54.0	Pass

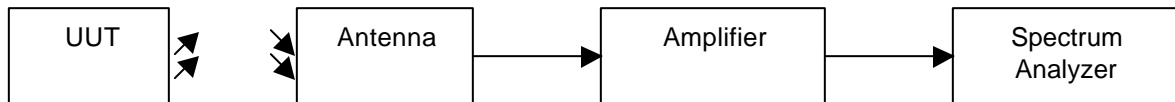
No other emissions were detectable.

**Name of Test:** Emissions At Band Edges  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Limit** -20 dBc and for restricted band 54 dBuV average and 74 dBuV peak  
**Test Equipment Utilized** i00329

### 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.

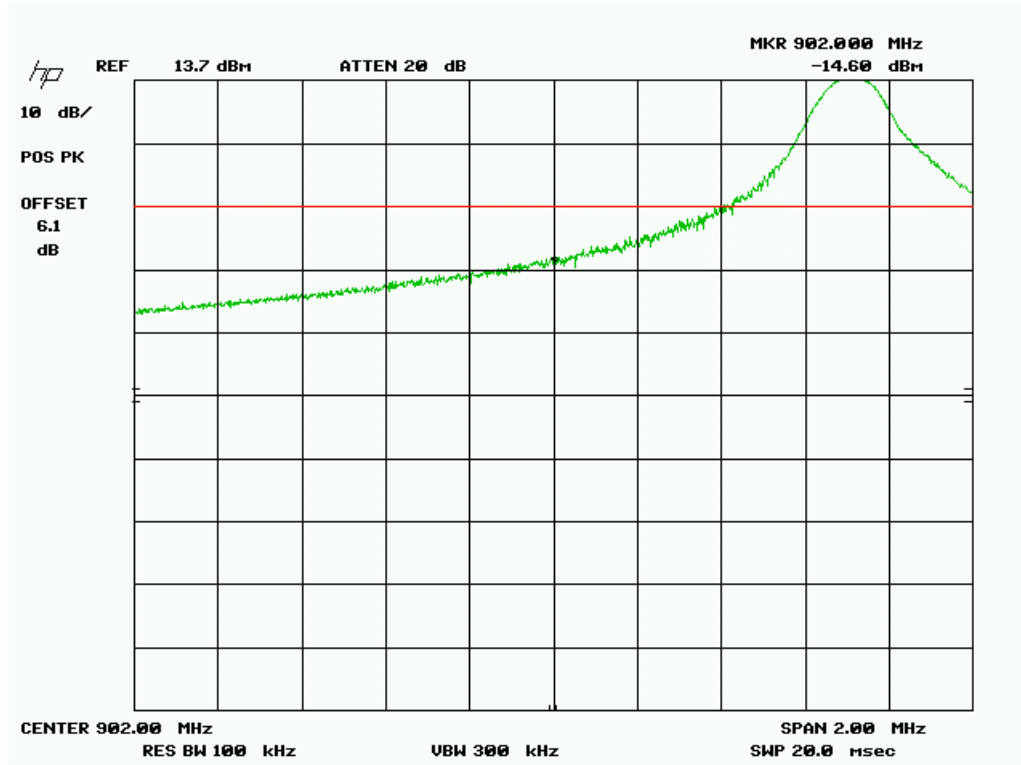
### Test Setup



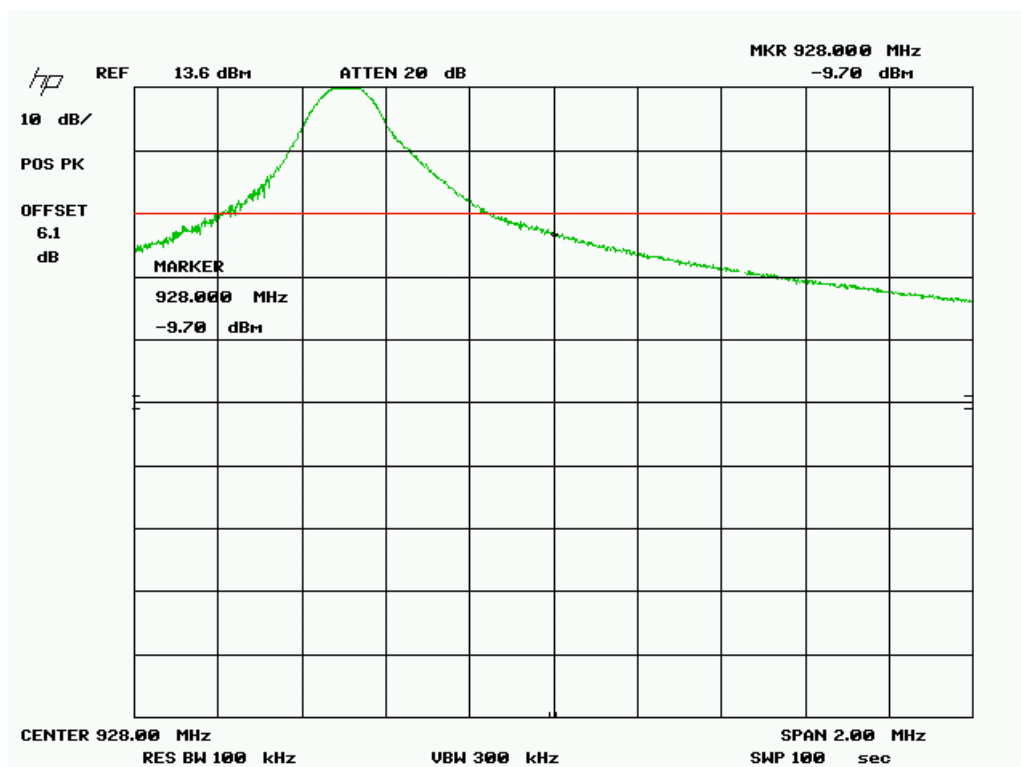
### Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level	Detector	Limit	Result
902.7	902	-28.3 dBc	Peak	-20 dBc	Pass
927.5	928	-23.3 dBc	Peak	-20 dBc	Pass

### Band Edge 902 MHz



### Band Edge 928 MHz

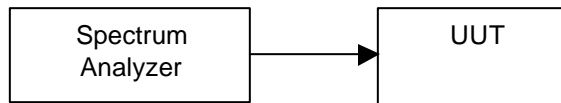


**Name of Test:** Occupied Bandwidth  
**Specification:** 15.247(a)(2)  
**Limit** BW = 500 KHz  
**Test Equipment Utilized** i00029

**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.

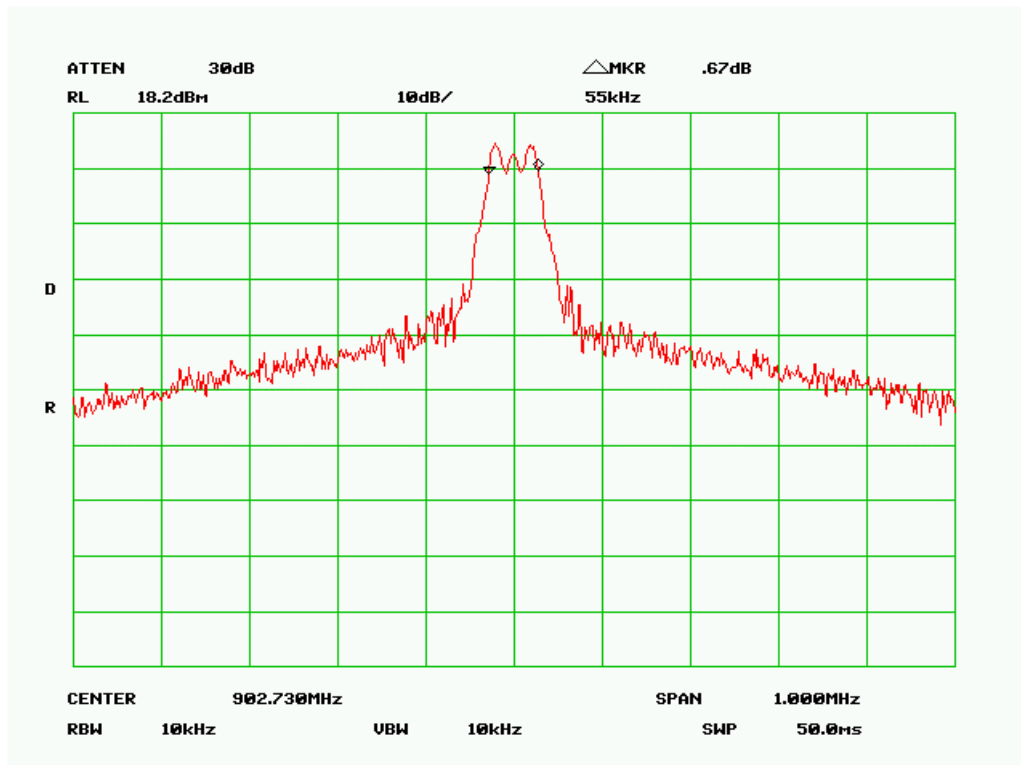
**Test Setup**



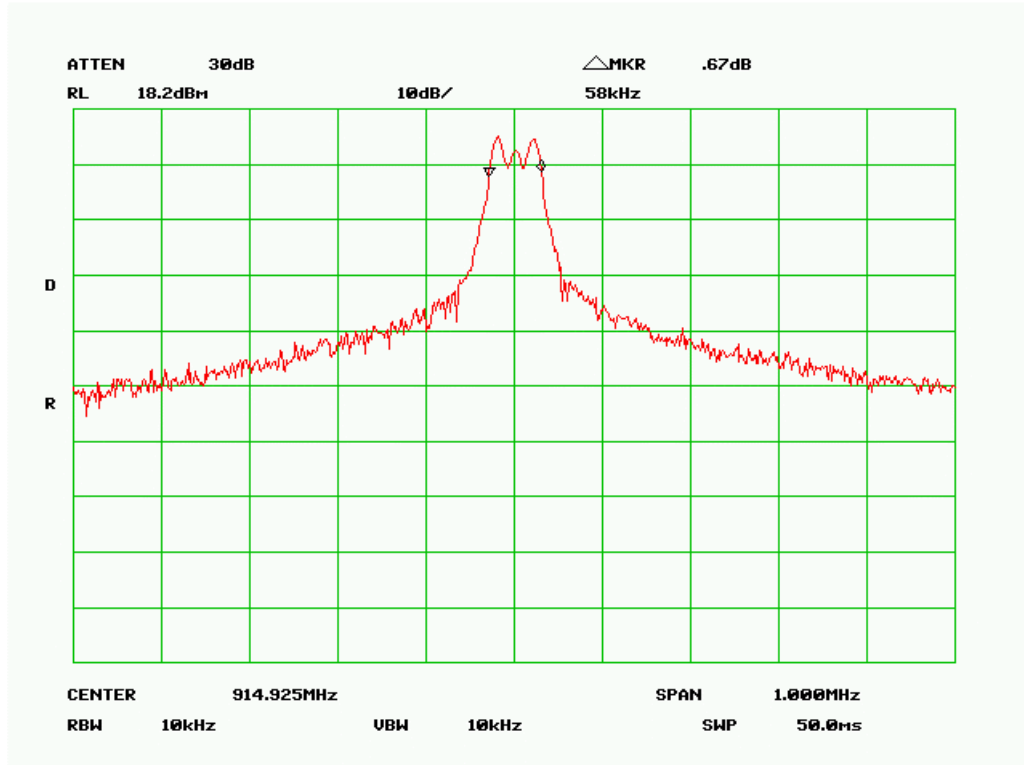
**Occupied Bandwidth Summary**

Frequency MHz	Recorded Measurement	Specification Limit	Result
902.7	55 KHz	≤ 500 KHz	Pass
915	58 KHz	≤ 500 KHz	Pass
927.5	57 KHz	≤ 500 KHz	Pass

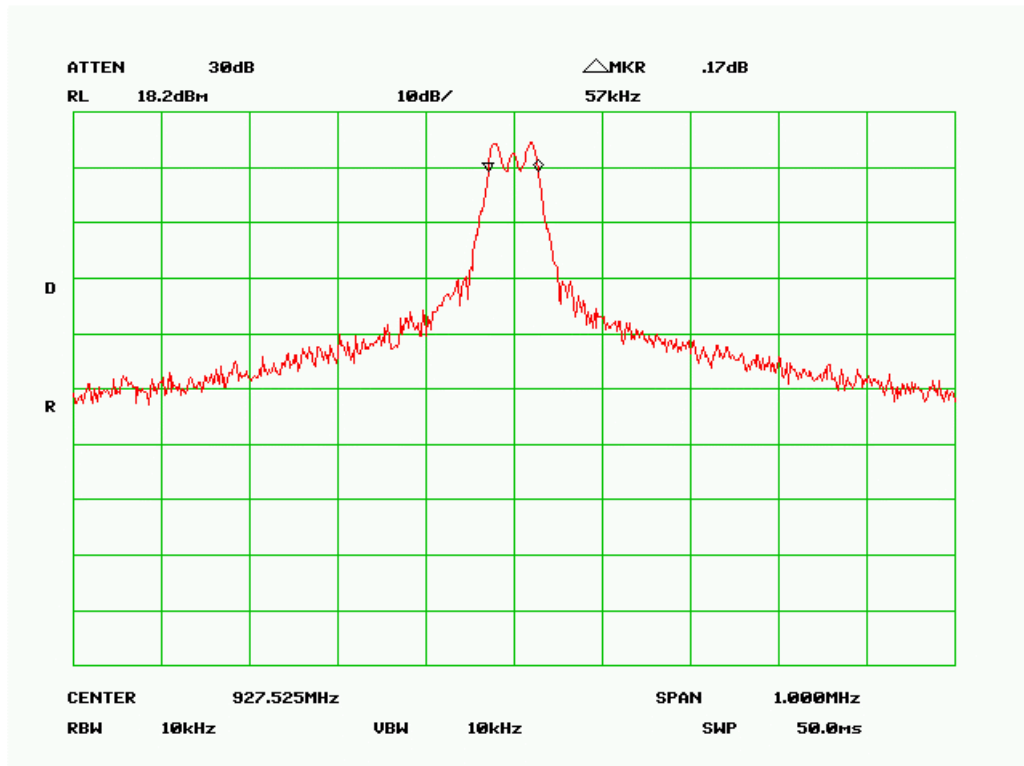
**6dB Bandwidth 902.7 MHz**



### 6dB Bandwidth 915 MHz



### 6dB Bandwidth 927.5 MHz

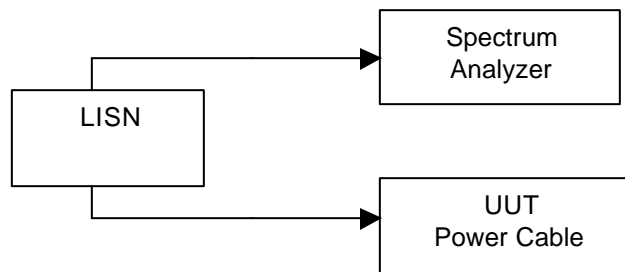


**Name of Test:** A/C Powerline Conducted Emissions  
**Specification:** 15.207  
**Test Equipment Utilized** i00049, i00270

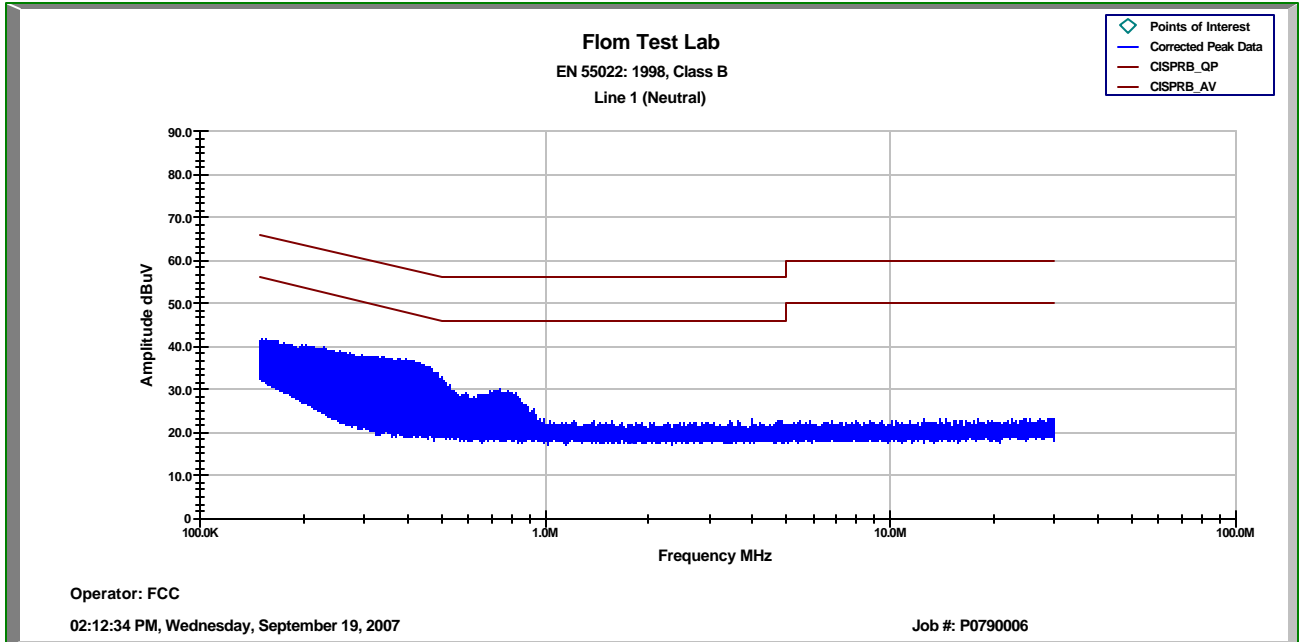
### Test Procedure

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.

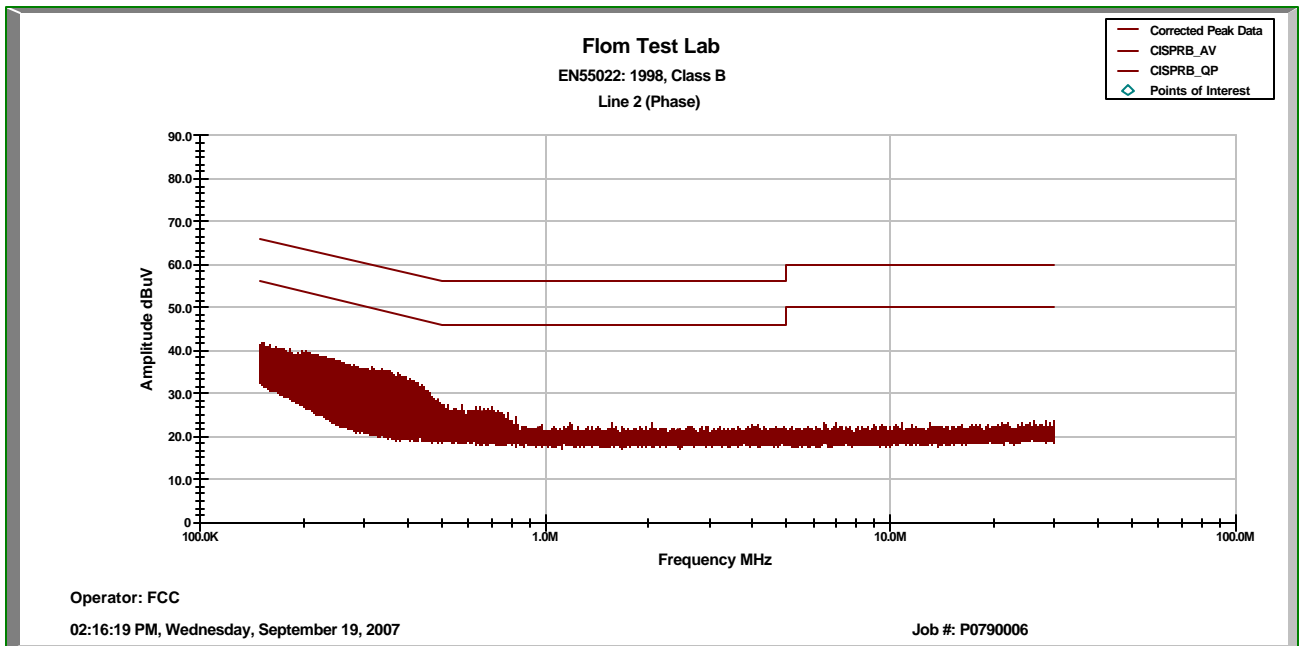
### Test Setup



### Line 1 Test Results



### Line 2 Test 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	3/9/07	3/9/08
Spectrum Analyzer	HP	8566B	i00049	8/18/07	8/18/08
Horn Antenna	EMCO	3115	i00103	9/5/06	9/5/08
Power Meter	HP	E4418B	i00228	9/6/07	9/6/08
LISN	FCC	FCC-LISN-50-32-2-01	i00270	10/25/05	10/25/07
Power sensor	HP	8481A	i00317	9/6/07	9/6/08
Spectrum Analyzer	HP	8566B	i00329	4/16/07	4/16/08

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