



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

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fax: (480) 926-3598  
<http://www.flomlabs.com>  
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**Date:** December 4, 2007

Federal Communications Commission  
Via: Electronic Filing

**Attention:** Steven Jessup  
sjessup@ensyc.com  
Phone: 775-224-4653  
FAX: 775-826-7345

**Applicant:** Ensyc Technologies  
3500 Lakeside CT. Suite 110  
Reno NV, 89509

**Equipment:** RF2400  
**FCC ID:** VVVRF24BLK  
**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:** Ensync Technologies

**FCC ID:** VVVRF24BLK

**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: VVVRF24BLK

Model: RF2400

to

**Federal Communications Commission**

Rule Part(s) 15.247

**Date Of Report:** December 4, 2007

**Applicant:**

Ensync Technologies  
3500 Lakeside CT. Suite 110  
Reno NV, 89509

**Attention of:**

Steven Jessup  
[sjessup@ensync.com](mailto:sjessup@ensync.com)  
Phone: 775-224-4653  
FAX: 775-826-7345

Supervised By:

Hoosamuddin S. Bandukwala, Lab Director

**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.

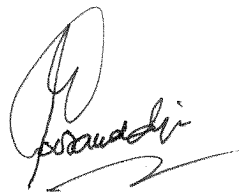
Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply 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: d07c0005

d) Client: Ensyc Technologies

e) Identification: RF2400

Description: UHF (900 MHz) RFID reader

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

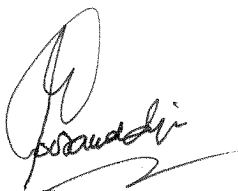
g) Report Date: December 4, 2007  
EUT Received:

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:** Ensync Technologies  
3500 Lakeside CT. Suite 110  
Reno NV, 89509

(c)(2): **FCC ID:** VVVR24BLK

**Model Number:** RF2400

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

Please See Attached Exhibits

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

(c)(5): **FREQUENCY RANGE, MHz:** 902.75 to 927.25

(c)(6): **Power Rating, W:** 280 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 dipole antenna with a gain of 2.15 dBi.



**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, 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 C63.4-2004, 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.

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

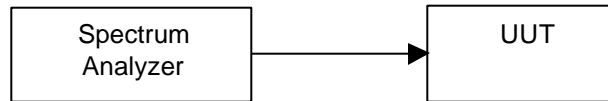
Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(d)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Emissions At Band Edges	Pass	
15.247(a)	Occupied Bandwidth	Pass	
15.247(a)	Average Frequency Dwell Time	Pass	
15.247(a)	Number of Hopping Channels	Pass	
15.207	A/C Powerline Conducted Emissions	Pass	

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

### 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

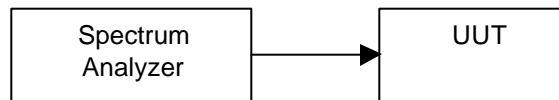
Tuned Frequency MHz	Recorded Measurement	Specification Limit	Result
902.750	280 mW	1 W	Pass
914.750	229 mW	1 W	Pass
927.250	195 mW	1 W	Pass

**Name of Test:** Conducted Spurious Emissions  
**Specification:** 15.247(d)  
**Spec. Limit** -20 dBc  
**Test Equipment Utilized** i00331

### 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 output power with the RBW set for 1 MHz. From 30 MHz to the 10<sup>th</sup> harmonic of the fundamental transmitter was observed. The measured spurious level is added to the reference level to calculate the -dBc value. Only the worst-case emission at each frequency is recorded.

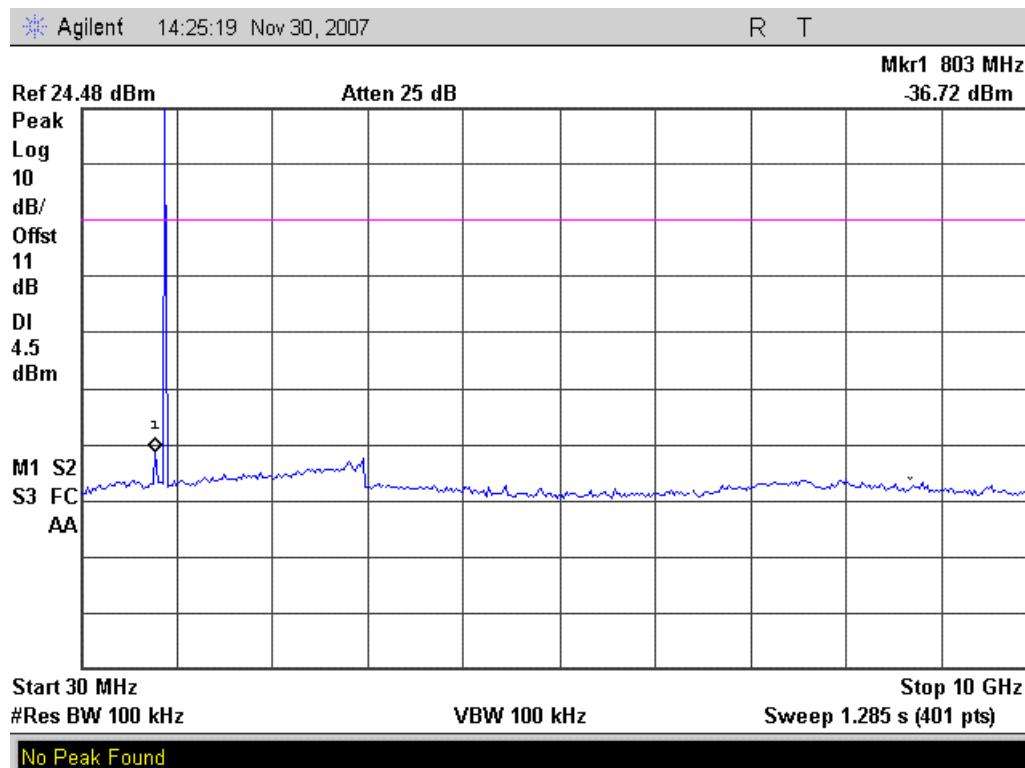
### Test Setup



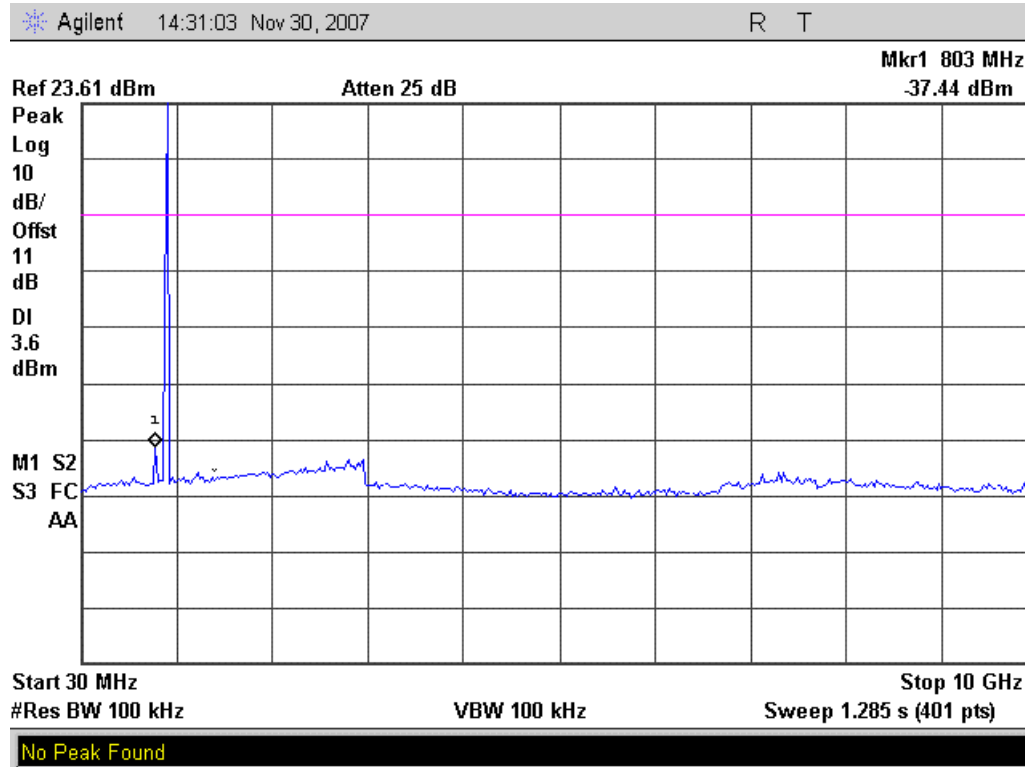
**Conducted Spurious Emissions Summary Test Table**

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement (dBm)	Reference Level (dBm)	Corrected Measurement (dBc)	Specification Limit	Result
902.750	803	-36.72	24.48	-61.20	-20 dBc	Pass
914.750	803	-37.44	23.61	-61.05	-20 dBc	Pass
927.250	828	-36.78	22.92	-59.70	-20 dBc	Pass

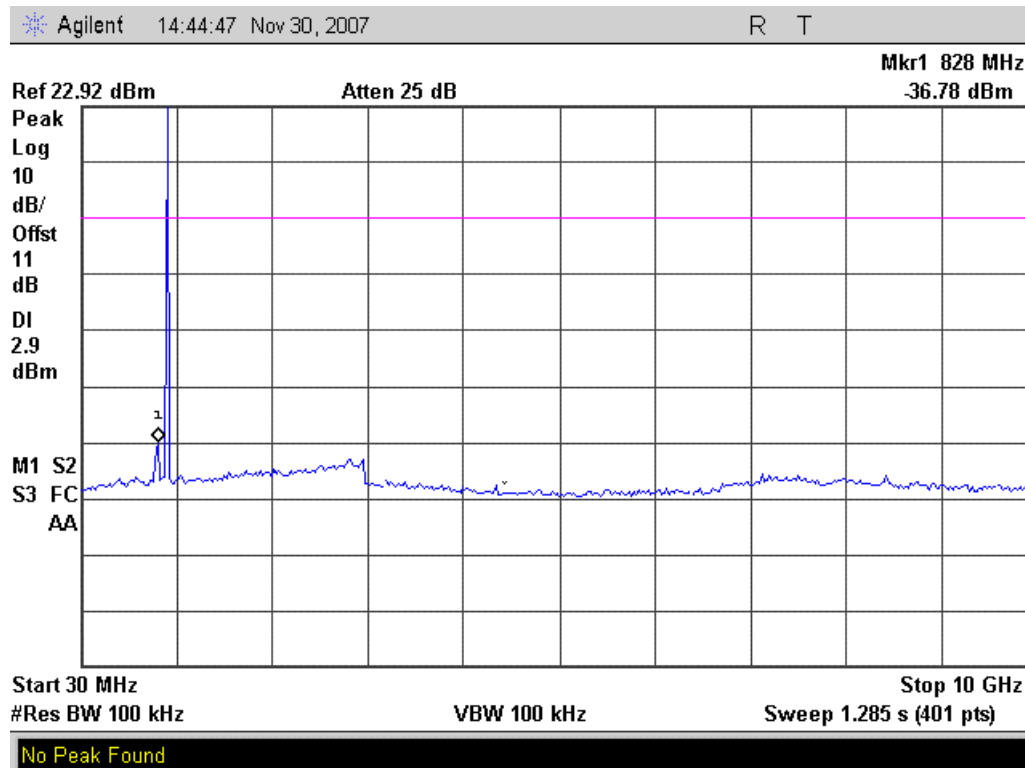
### Conducted Spurious Emissions 902.750 MHz



## Conducted Spurious Emissions 914.750 MHz



## Conducted Spurious Emissions 927.250 MHz

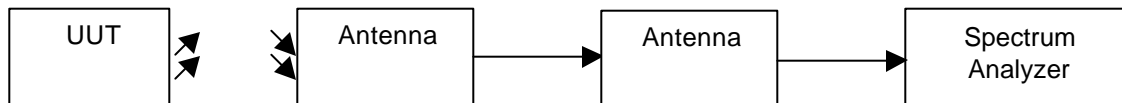


**Name of Test:** Radiated Spurious Emissions  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Spec. Limit** See Table  
**Test Equipment Utilized** i00028, i00103, i00291

### 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
902.750	1805.550	59.10	74.0	48.70	54.0	Pass
902.750	2708.325	62.60	74.0	50.20	54.0	Pass
914.750	1829.558	58.10	74.0	45.30	54.0	Pass
914.750	2744.320	60.80	74.0	49.30	54.0	Pass
927.250	1854.540	61.90	74.0	47.10	54.0	Pass
927.250	2781.819	60.40	74.0	49.00	54.0	Pass

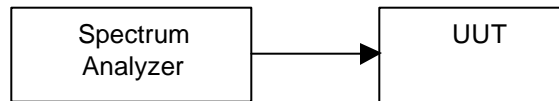
No other emissions were detectable. All emissions were greater than -20 dBc.

**Name of Test:** Emissions At Band Edges  
**Specification:** 15.247(d), 15.209(a), 15.205  
**Limit** -20 dBc and for restricted band 54 dBuV average and 74 dBuV peak  
**Test Equipment Utilized** i00331

### Test Procedure

The UUT was connected directly to a spectrum analyzer and tuned to each of the band edges. The marker was set to the band edge and to verify that the UUT met the requirements for spurious emissions. The reference level was offset for the peak output power with the RBW set for 1 MHz. From 30 MHz to the 10<sup>th</sup> harmonic of the fundamental transmitter was observed. The measured spurious level is added to the reference level to calculate the -dBc value. Only the worst-case emission at each frequency is recorded.

### Test Setup

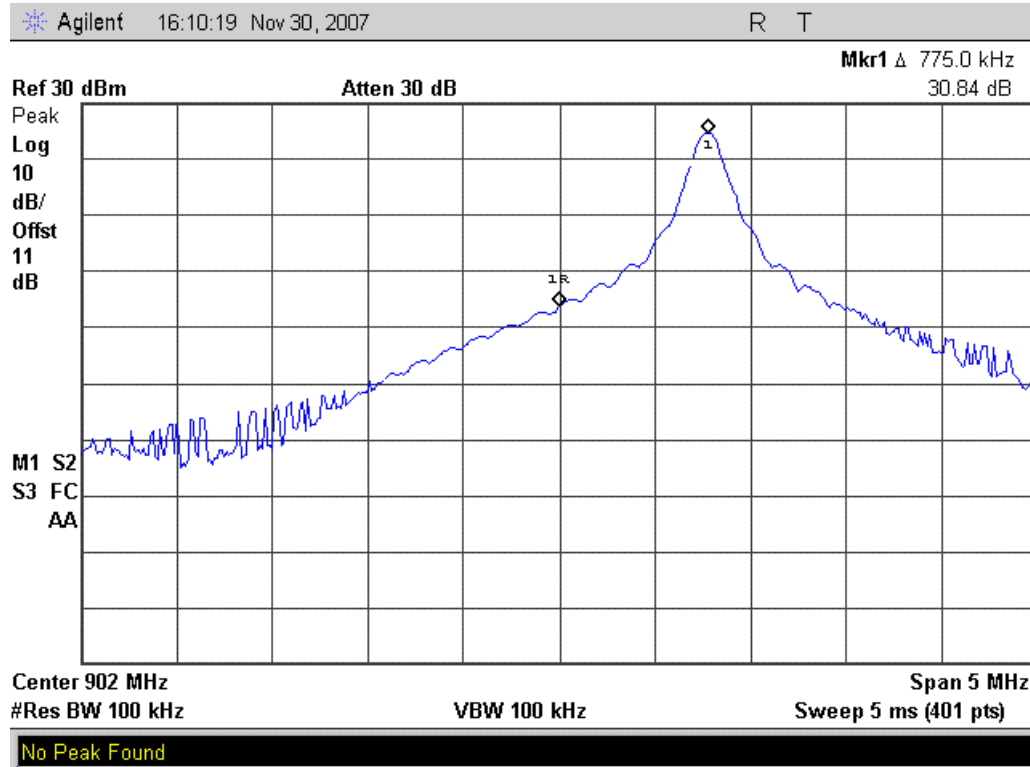


### Band Edge Emissions Summary

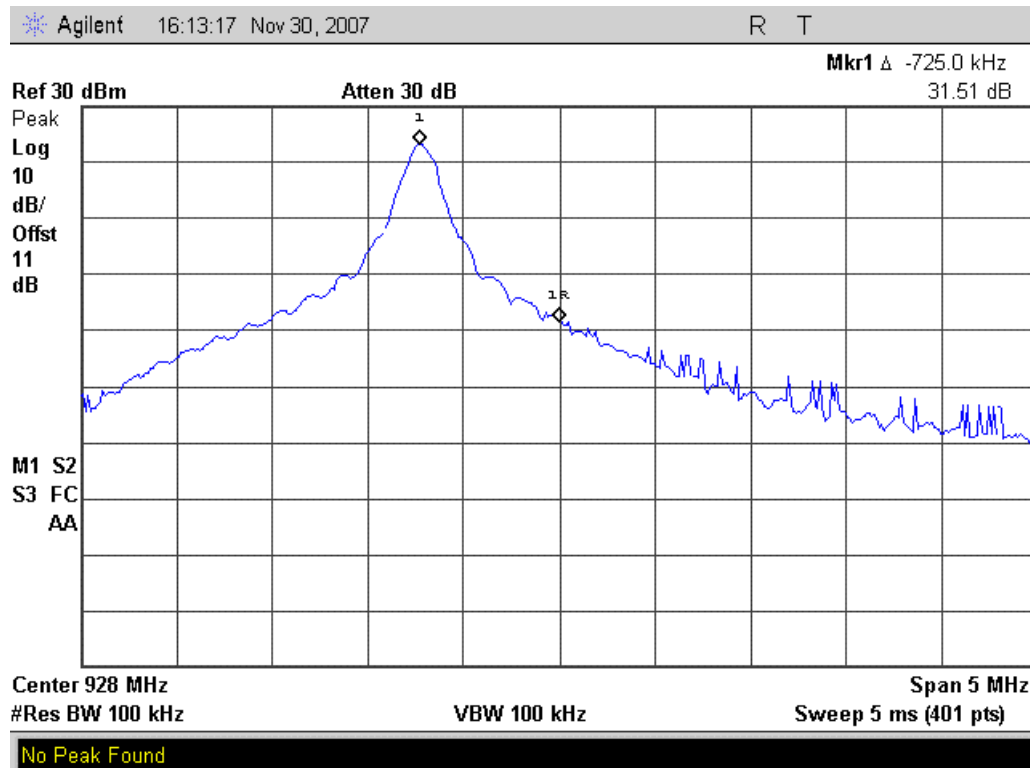
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBc)	Detector	Limit	Result
902.750	902.000	-30.84	Peak	-20 dBc	Pass
927.250	928.000	-31.51	Peak	-20 dBc	Pass



## Band Edge 902 MHz



## Band Edge 928 MHz

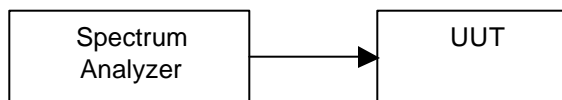


**Name of Test:** Occupied Bandwidth  
**Specification:** 15.247(a)  
**Test Equipment Utilized** i00331

### 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 20dB and 99% bandwidths were measured to verify the bandwidth met the specification.

### Test Setup



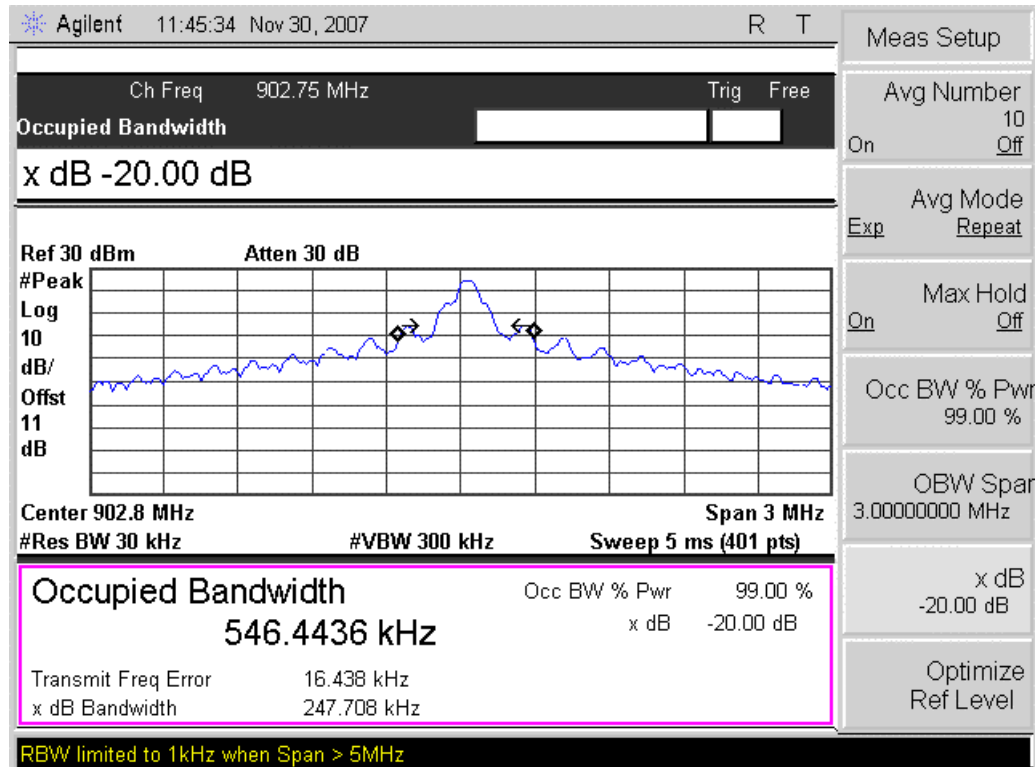
### -20 dB Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
902.750	247.708 KHz	$\leq 250$ KHz	Pass
914.750	243.049 KHz	$\leq 250$ KHz	Pass
927.250	242.990 KHz	$\leq 250$ KHz	Pass

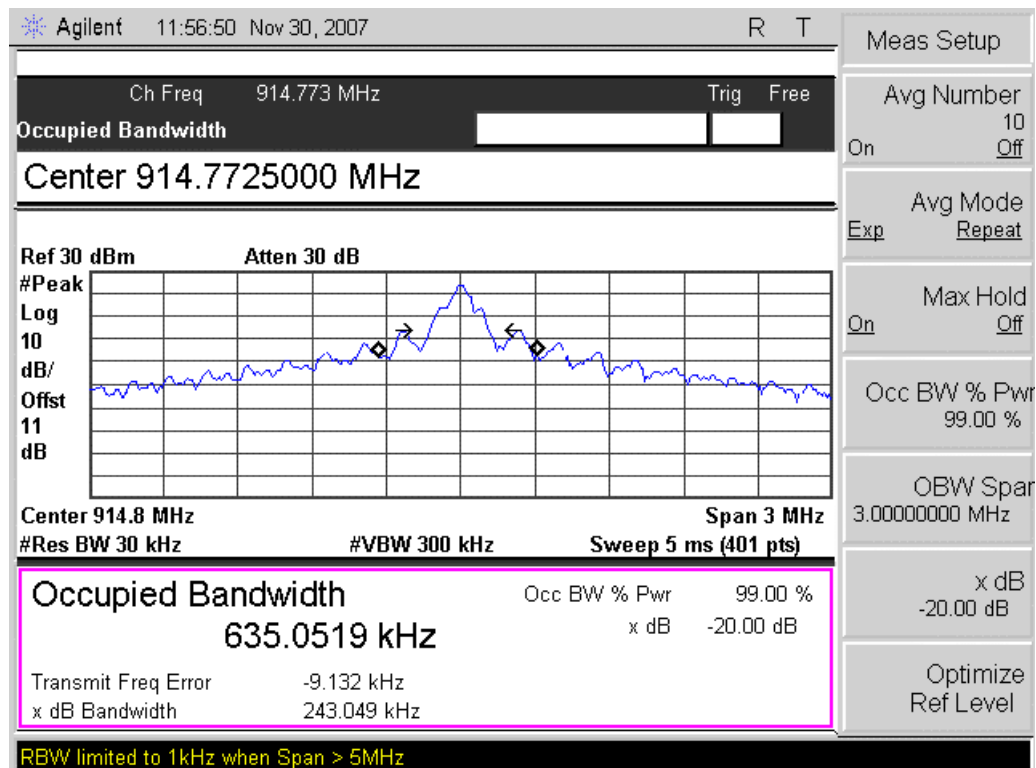
### 99% Bandwidth Summary

Frequency MHz	Recorded Measurement	Result
902.750	546.4436 KHz	Pass
914.750	635.0519 KHz	Pass
927.250	618.0905 KHz	Pass

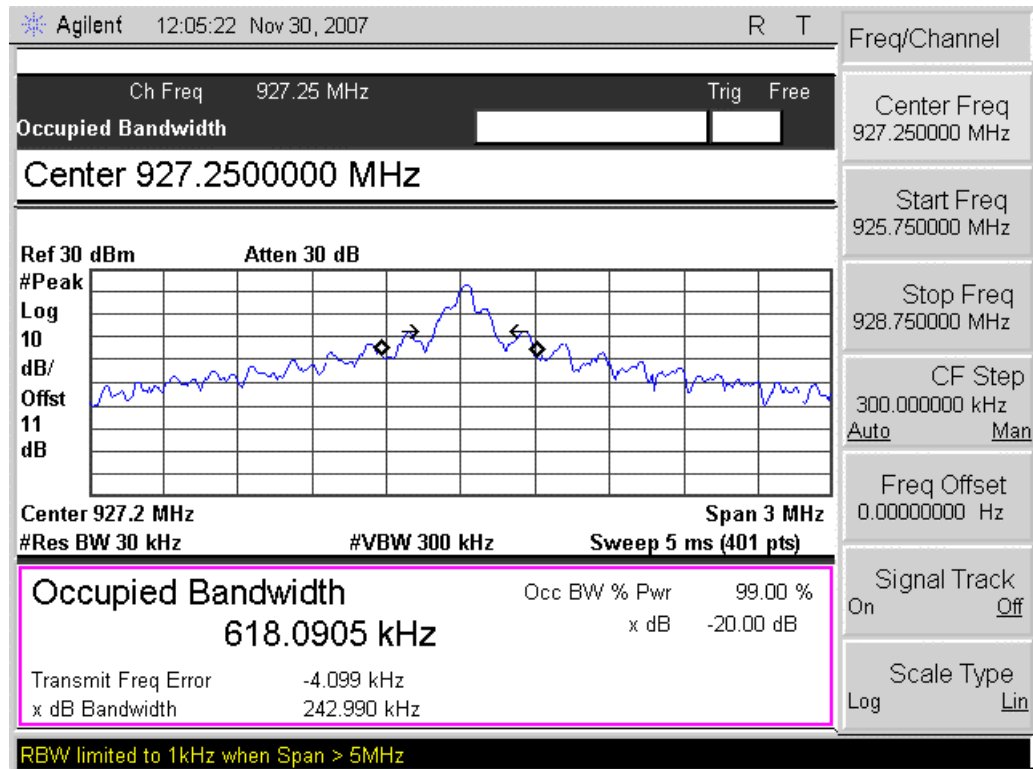
## Bandwidth 902.750 MHz



## Bandwidth 914.750 MHz



# Bandwidth 927.250 MHz



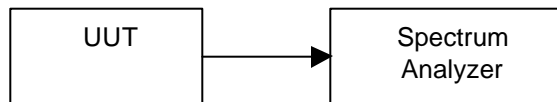


**Name of Test:** Number of Hopping Channels and Channel Separation  
**Specification:** 15.247(a)  
**Test Equipment Utilized** i00331

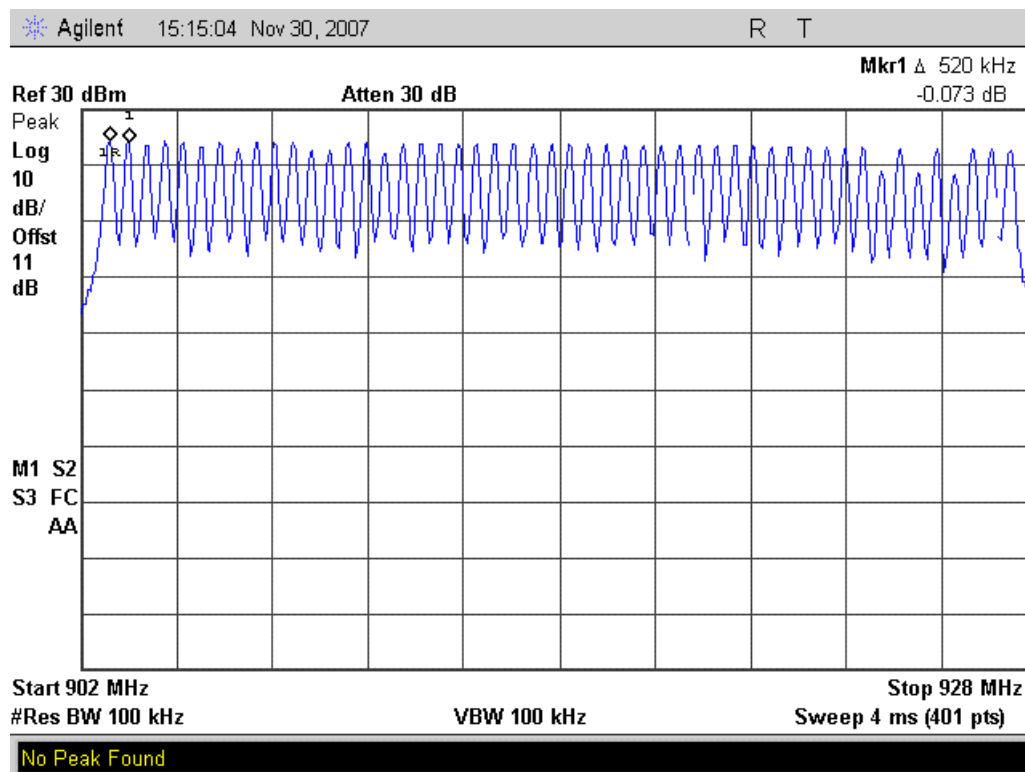
### Test Procedure

The UUT was connected directly to a spectrum analyzer. The Span was set to the specified band end points. The UUT was then set to operate in hopping mode. The MAX HOLD function of the spectrum analyzer was utilized to verify the number of hopping channels.

### Test Setup



### Number of Hopping Channels



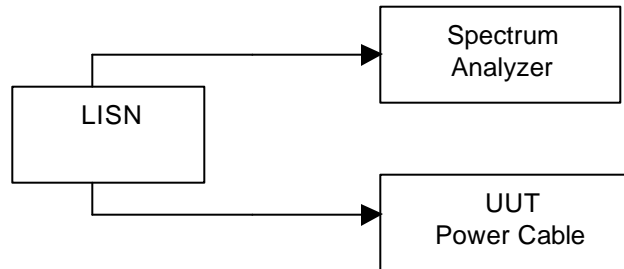
Number of Channels	Channel Separation
50	520 KHz

**Name of Test:** A/C Powerline Conducted Emissions  
**Specification:** 15.107  
**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.

### Test Setup



### Line 1 Test Results

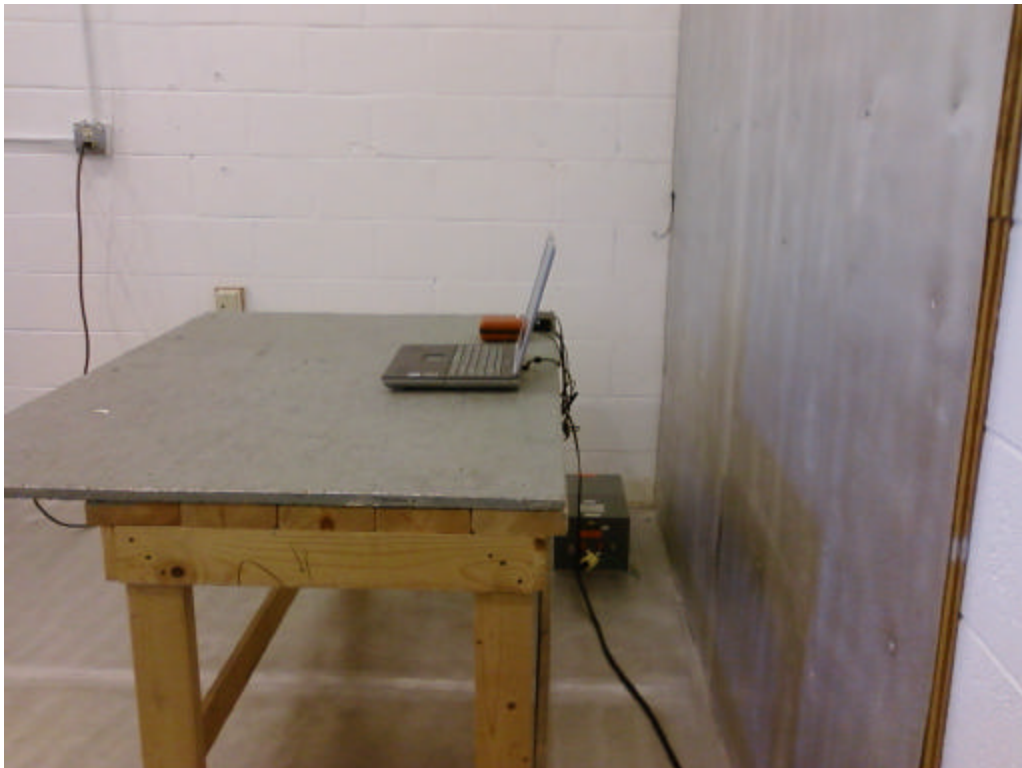
Emission Frequency	Detector	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
154.1 KHz	QP	54.35	0.26	0.02	54.63	65.88	-11.25	Pass
151.8 KHz	QP	54.75	0.28	0.02	55.05	65.95	-10.9	Pass
151.09 KHz	QP	54.68	0.29	0.02	54.99	65.97	-10.98	Pass
150.82 KHz	QP	54.67	0.29	0.02	54.98	65.98	-10.99	Pass
150.43 KHz	QP	55.11	0.3	0.02	55.43	65.99	-10.56	Pass
150.34 KHz	QP	55.72	0.3	0.02	56.04	65.99	-9.95	Pass

### Line 2 Test Results

Emission Frequency	Detector	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Corrected Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Result
152.04 KHz	Average	26.59	0.28	0.02	26.89	55.94	-29.05	Pass
150.83 KHz	Average	27.44	0.29	0.02	27.75	55.98	-28.22	Pass
152.04 KHz	QP	54.86	0.28	0.02	55.16	65.94	-10.78	Pass
150.83 KHz	QP	54.91	0.29	0.02	55.22	65.98	-10.75	Pass

All other emissions were greater than 30 dB below the limit.

## AC Conducted Emissions Test Setup Photos





### 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	8566B	i00049	8/18/07	8/18/08
Horn Antenna	EMCO	3115	i00103	9/5/06	9/5/08
LISN	FCC	FCC-LISN-50-32-2-01	i00270	10/22/07	10/22/09
Spectrum Analyzer	HP	8566B	i00291	8/7/07	8/7/08
Spectrum Analyzer	HP	E4407B	i00331	10/23/07	10/23/09

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