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

Date: December 14, 2007

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

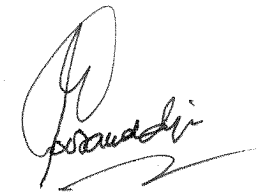
Applicant: RF Central
Equipment: RF - NLL
FCC ID: TO4-RFXNLL5858
FCC Rules: 15.247

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: RF Central

FCC ID: TO4-RFXNLL5858

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

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

Transmitter Certification

of

FCC ID:
Model: RF - NLL

to

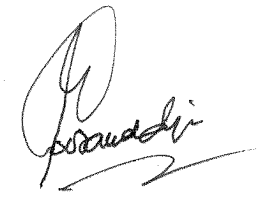
Federal Communications Commission

Rule Part(s) 15.247

Date Of Report: December 14, 2007

On the Behalf of the Applicant: RF Central
99 Garden Pkwy
Carlisle, PA 17013

Attention of: Keith Blaisdell, Director of Engineering and Production
Ph: (717)249-4900 Fax: (717)249-3630
Email: keith.blaisdell@rfcentral.com



Supervised By: 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

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

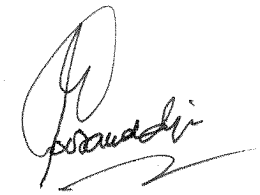
This is to certify that:

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.



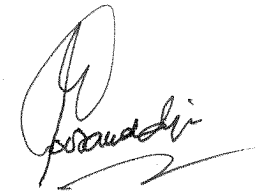
Certifying Engineer: Hoosamuddin S. Bandukwala, Lab Director

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

Table Of Contents

Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: (FCC: 31040/SIT) (Canada: IC 2044A-1)	Flom Test Lab, Inc. 3356 N. San Marcos Place, Suite 107 Chandler, AZ 85225
c) Report Number:	d07c0016
d) Client:	RF Central
e) Identification:	RF - NLL
Description:	Broadcast transmitter link
f) EUT Condition:	Not required unless specified in individual tests.
g) Report Date: EUT Received:	December 14, 2007
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: RF Central

(c)(2): **FCC ID**: TO4-RFXNLL5858

Model Number: RF - NLL

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

Please See Attached Exhibits

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

(c)(5): **FREQUENCY RANGE, MHz**: 5745 - 5825

(c)(6): **Power Rating, W**: 1Watt

____ Switchable X Variable ____ N/A

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

15.203: **Antenna Requirement**:

_____ The antenna is permanently attached to the EUT
__X__ The antenna uses a unique coupling
_____ The EUT must be professionally installed
_____ The antenna requirement does not apply

The unit was tested with a Vertical antenna with a gain of 8 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
_x_ 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 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.

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

ACCREDITED
CERT NO: 2152-01

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

Test Results Summary

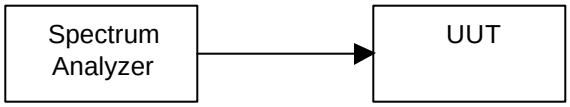
Specification	Test Name	Pass, Fail, N/A	Comments
15.247(b)	Peak Output Power	Pass	
15.247(d)	Conducted Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Radiated Spurious Emissions	Pass	
15.247(d), 15.209(a), 15.205	Emissions At Band Edges	Pass	
15.247(a)(2)	Occupied Bandwidth	Pass	
15.247(e)	Transmitter 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 Date:12/10/07**

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
5745.000	20.89mW	1 W	Pass
5785.000	33.88mW	1 W	Pass
5825.000	33.11mW	1 W	Pass

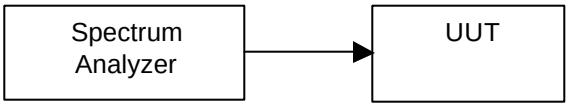
Name of Test: Conducted Spurious Emissions
Specification: 15.247(d)
Spec. Limit -20 dBC
Test Equipment Utilized i00029, i00329 **Test Date:12/14/07**

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.

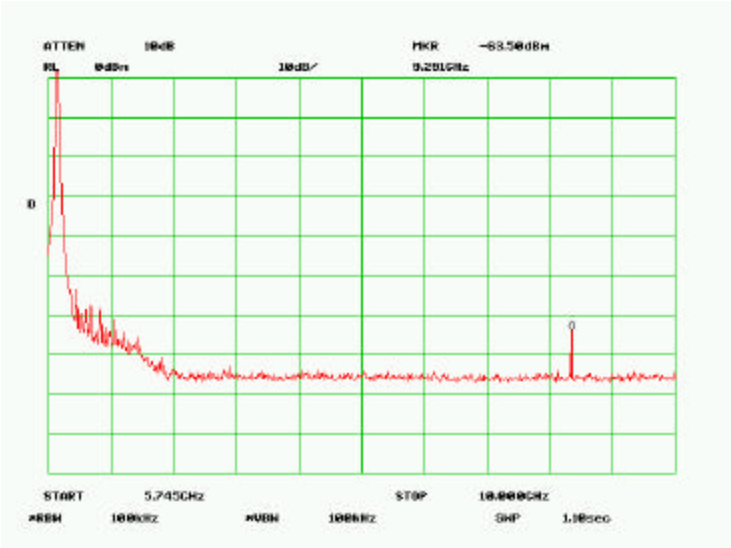
Test Setup



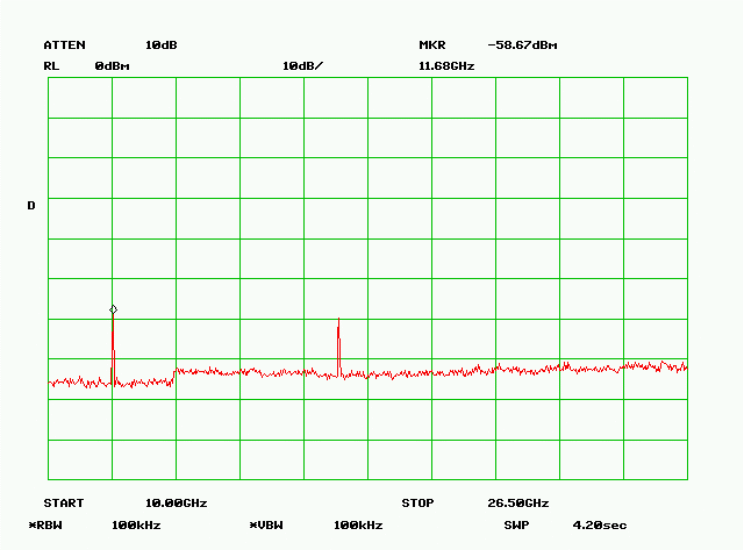
Conducted Spurious Emissions Summary Test Table

Tuned Frequency MHz	Emission Frequency MHz	Recorded Measurement	Reference Level	Corrected Measurement	Specification Limit	Result
5745.000	11680.000	-58.67dBm	13.2dBm	-71.87dBc	-20 dBc	Pass
5785.000	17400.000	-62.30dBm	15.3dBm	-77.60dBc	-20 dBc	Pass
5825.000	9297.000	-64.33dBm	15.2dBm	-79.53dBc	-20 dBc	Pass

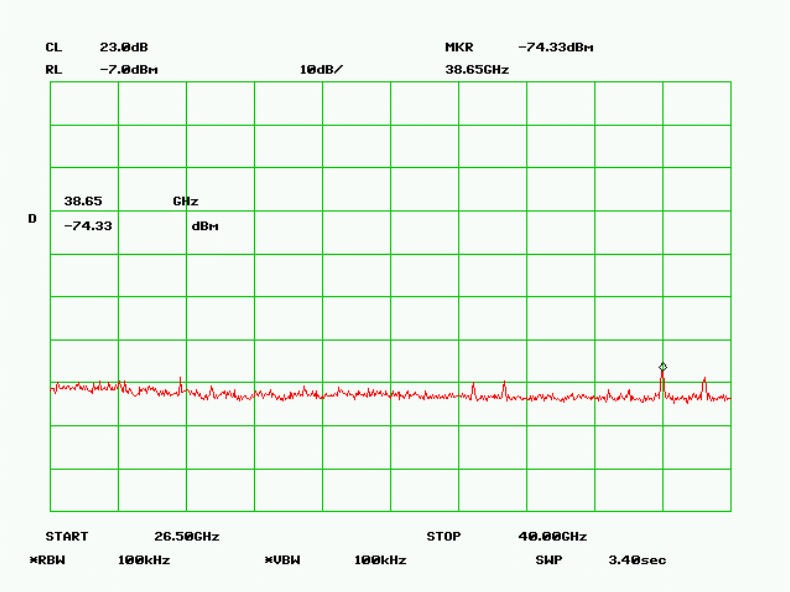
Conducted Spurious Emissions 5745 MHz



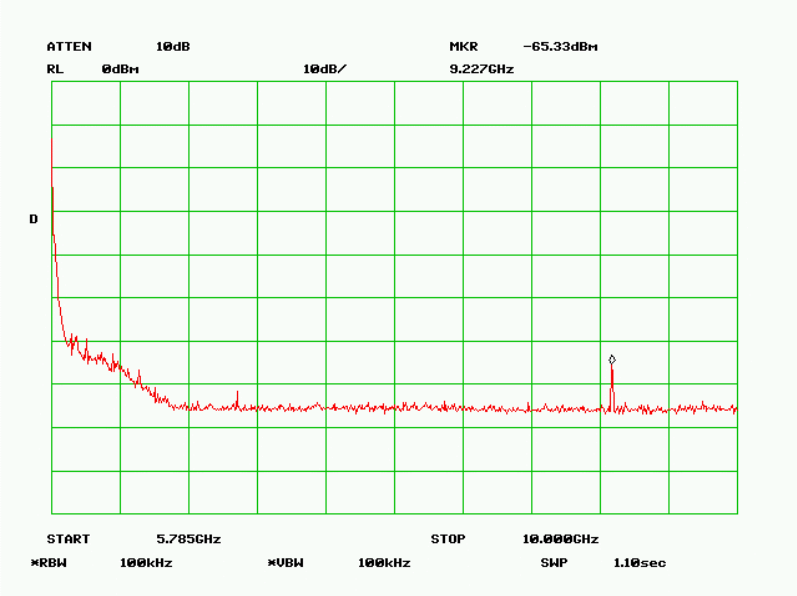
Conducted Spurious Emissions 5745 MHz



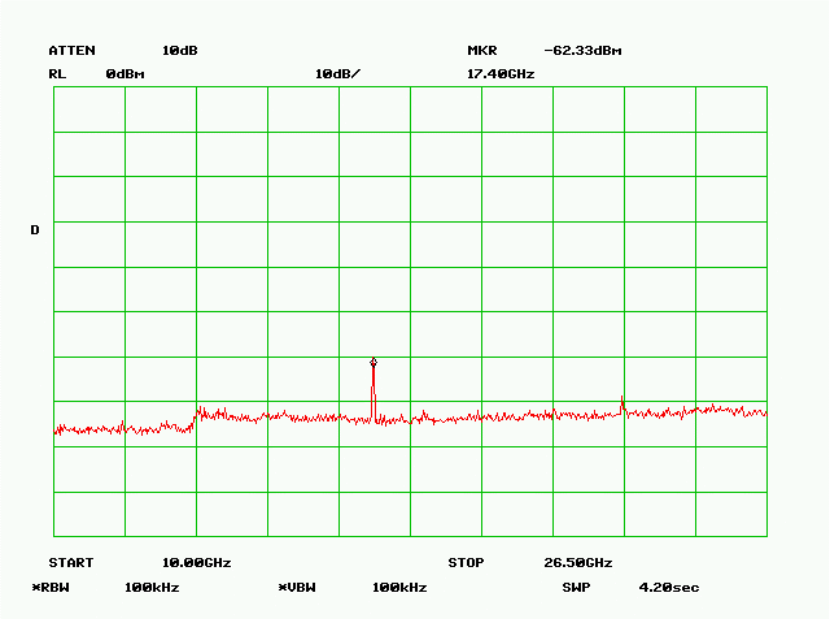
Conducted Spurious Emissions 5745 MHz



Conducted Spurious Emissions 5785 MHz

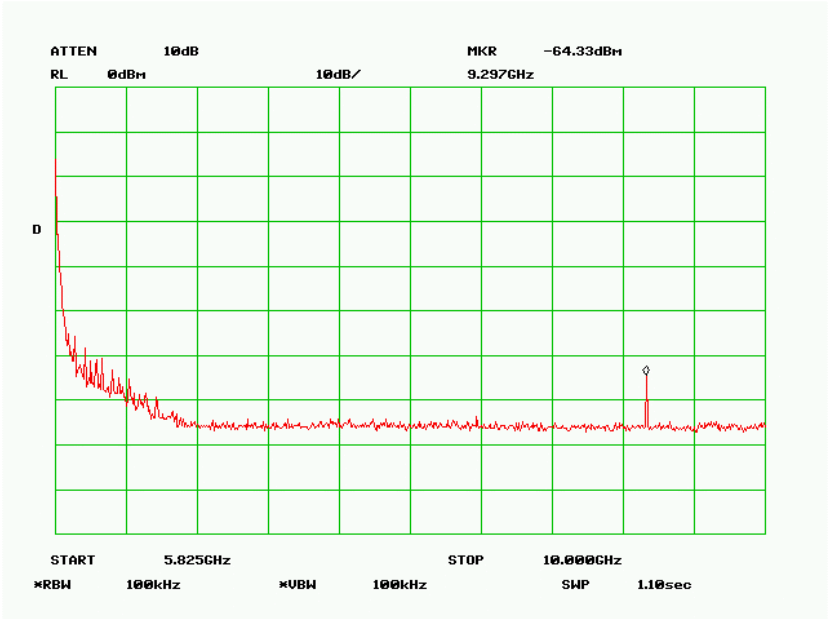


Conducted Spurious Emissions 5785 MHz

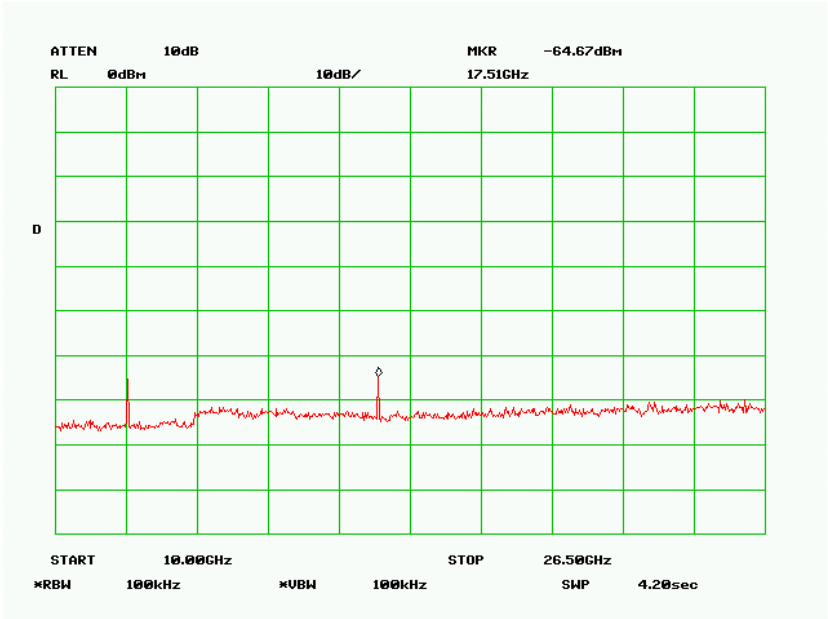


Conducted Spurious Emissions 5785 MHz

Conducted Spurious Emissions 5825 MHz



Conducted Spurious Emissions 5825 MHz



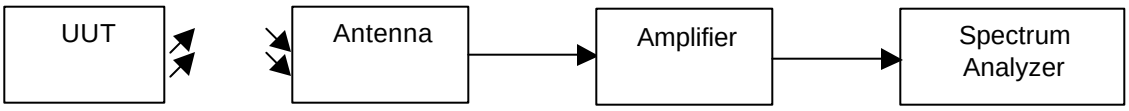
Conducted Spurious Emissions 5825 MHz

Name of Test: Radiated Spurious Emissions
Specification: 15.247(d), 15.209(a), 15.205
Spec. Limit See Table
Test Equipment Utilized i00028, i00029, i00103 **Test Date:2/19/08**

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

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
5745.000	39100	36.83	74.0	24.50	54.0	Pass
5785.000	30820	38.00	74.0	24.00	54.0	Pass
5825.000	35970	36.93	74.0	24.00	54.0	Pass

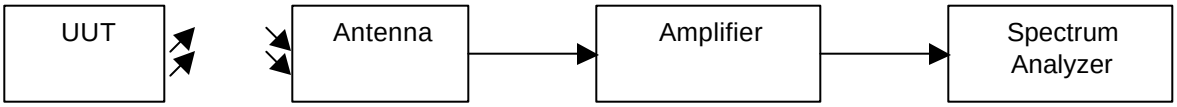
No other emissions were detectable. All emissions were greater than –20 dBc.

Name of Test: Emissions At Band Edges
Specification: 15.247(d), 15.209(a), 15.205
Limit At band edges -20 dBC and for restricted band 54 dBuV average and 74 dBuV peak
Test Equipment Utilized i00028, i00290, i00103 **Test Date:12/10/07**

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.

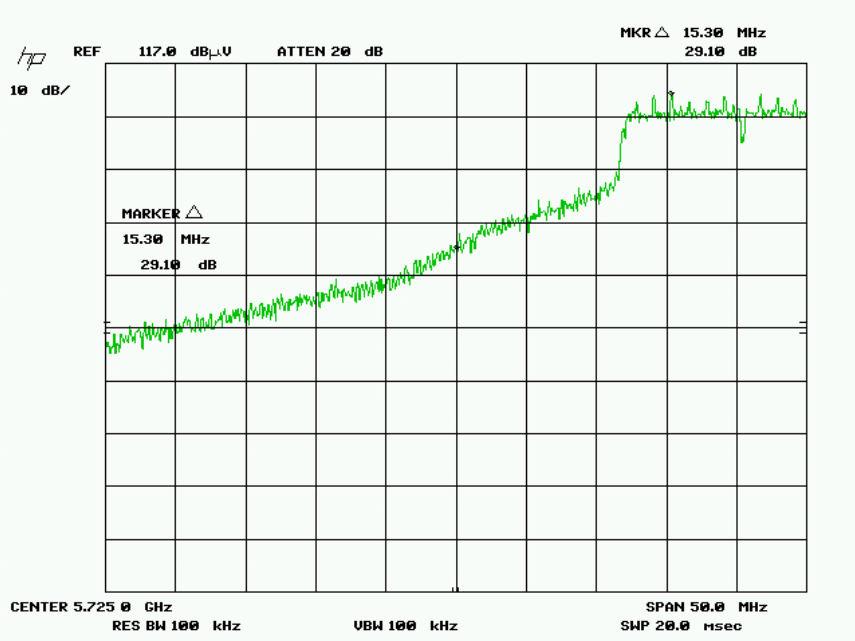
Test Setup



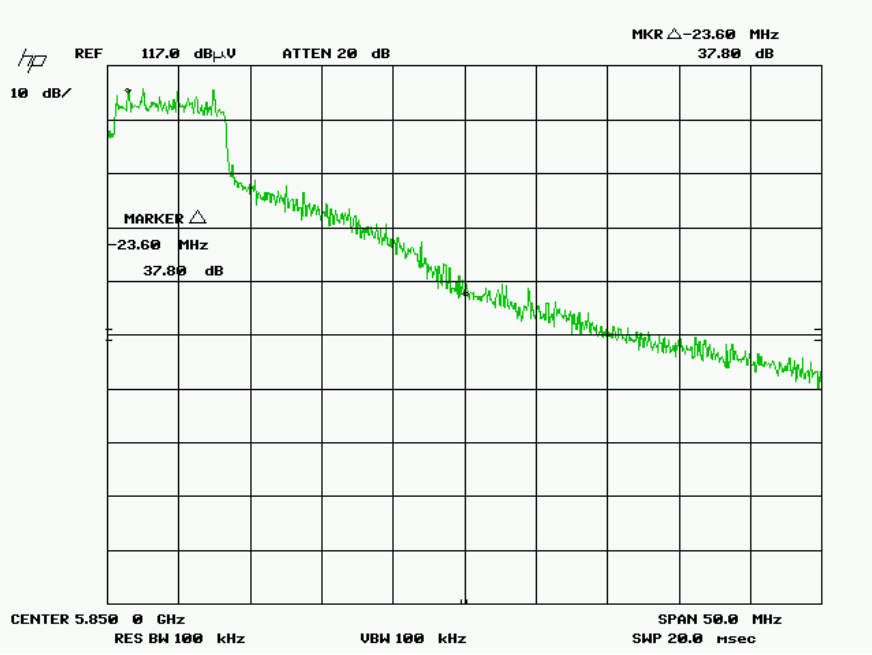
Band Edge Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level	Detector	Limit	Result
5745.000	5725.000	-29.10dBc	Peak	-20 dBc	Pass
5825.000	5850.000	-37.80dBc	Peak	-20 dBc	Pass

Band Edge 5745 MHz



Band Edge 5825 MHz



Peak detection was used to determine the level down from the carrier the signal was at the band edge.

Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
5745.000	11,490.000	67.50	Peak	74	Pass
5745.000	11,490.000	51.90	Avg.	54	Pass

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
5785.000	11,570.000	63.50	Peak	74	Pass
5785.000	11,570.000	49.30	Avg.	54	Pass

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
5825.000	11,650.000	55.90	Peak	74	Pass
5825.000	11,650.000	44.90	Avg.	54	Pass

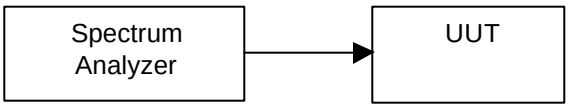
There are restricted limits at the 2nd and 4th harmonics. The 4th harmonic is completely suppressed so the peak level is well below the restricted band average limit. There are no other observable harmonics past the 4th harmonic.

Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2)
Limit BW = 500 KHz
Test Equipment Utilized i00329 **Test Date:12/10/07**

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.

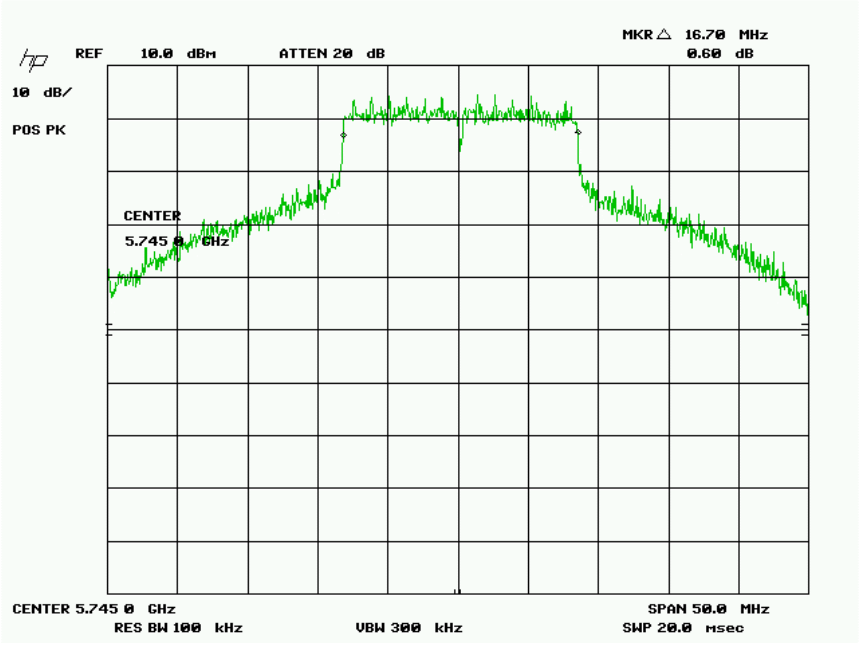
Test Setup



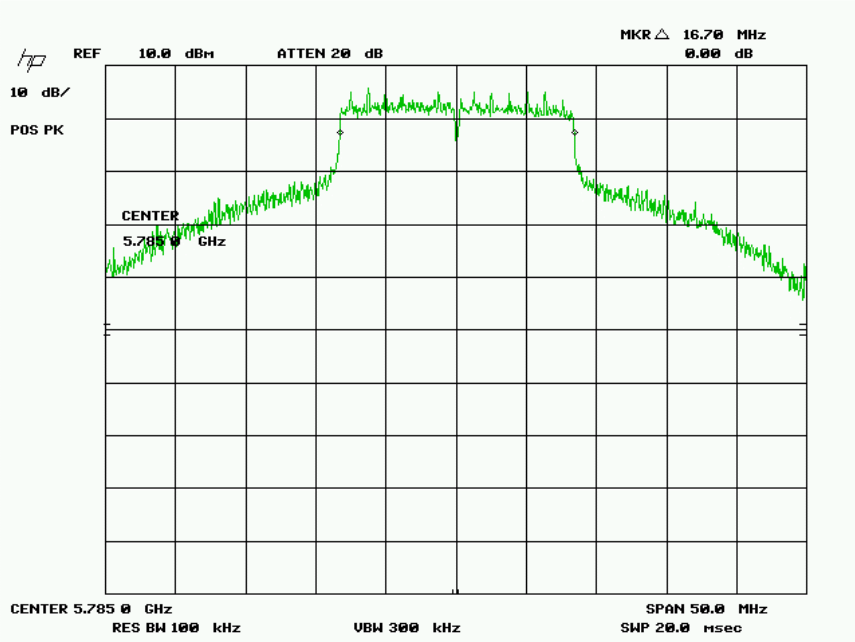
Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
5745.000	16.70MHz	= 500 KHz	Pass
5785.000	16.70MHz	= 500 KHz	Pass
5825.000	16.60MHz	= 500 KHz	Pass

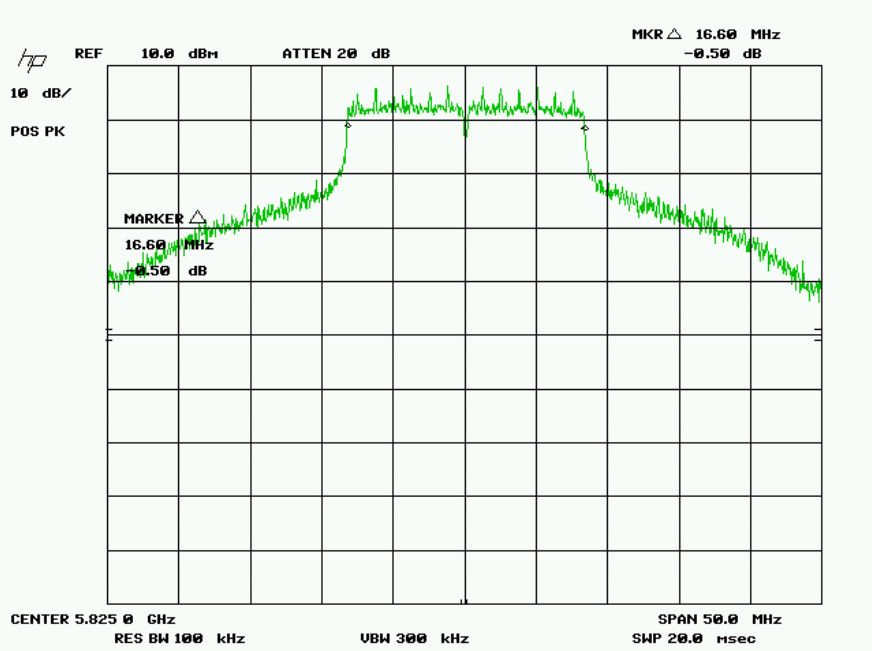
6dB Bandwidth 5745 MHz



6dB Bandwidth 5785 MHz



6dB Bandwidth 5825 MHz

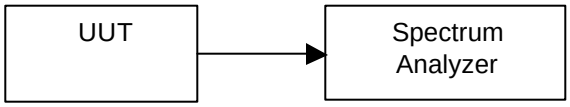


Name of Test: Transmitter Power Spectral Density (PSD)
Specification: 15.247(e)
Limit 8 dBm in any 3 kHz Bandwidth
Test Equipment Utilized i00329 **Test Date:12/11/07**

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.

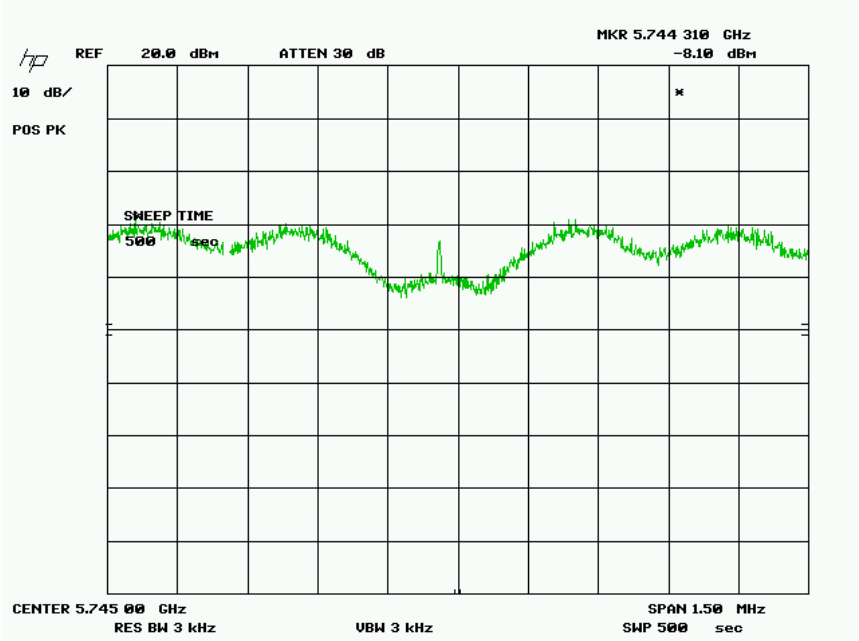
Test Setup



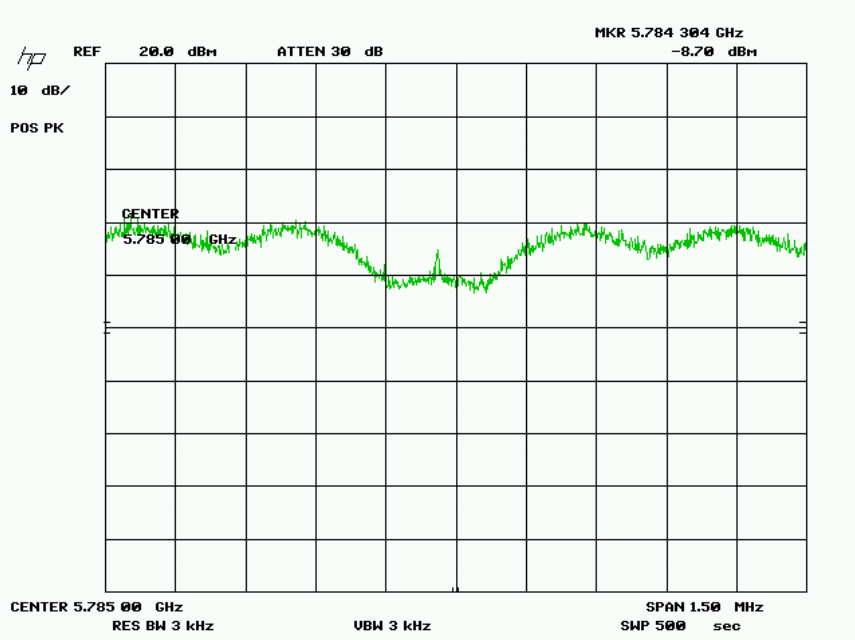
PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
5744.310	-8.10dBm	8 dBm	Pass
5784.304	-8.70dBm	8 dBm	Pass
5824.669	-7.00dBm	8 dBm	Pass

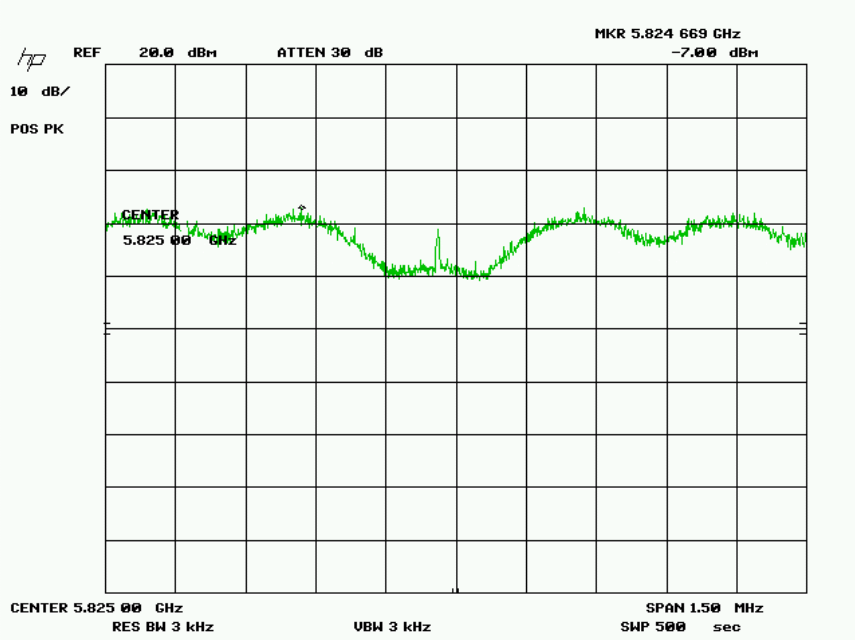
PSD 5745 MHz



PSD 5785 MHz



PSD 5825 MHz

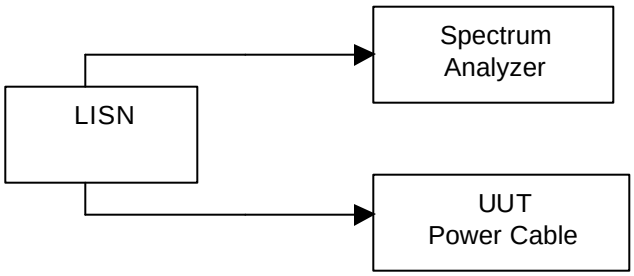


Name of Test: A/C Powerline Conducted Emissions
Specification: 15.207
Test Equipment Utilized i00033, i00270 **Test Date:11/26/07**

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)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
1.58 MHz	56.5	0	0.19	56.69	73	-16.31	Pass
168.29 KHz	49.2	0.2	0.03	49.43	79	-29.57	Pass
165.12 KHz	49.92	0.2	0.03	50.15	79	-28.85	Pass
160.55 KHz	50.4	0.2	0.02	50.62	79	-28.38	Pass
152.62 KHz	50.95	0.27	0.02	51.24	79	-27.76	Pass
151.24 KHz	51.43	0.29	0.02	51.74	79	-27.26	Pass
150.22 KHz	51.57	0.3	0.02	51.89	79	-27.29	Pass
150.18 KHz	51.59	0.3	0.02	51.91	79	-27.29	Pass
150.15 KHz	51.39	0.3	0.02	51.71	79	-27.29	Pass
150.1 KHz	51.41	0.3	0.02	51.73	79	-27.27	Pass

L2 - Neutral Test Results

Emission Frequency	Monitored Level (dBuV/m)	LISN Factor (dB)	Cable Correction Factor	Attenuation (dB)	Corrected Level (dBuV/m)	Limit (dBuV/m)	Result
1.5802 MHz	56	0	0.19	56.19	73	-16.81	Pass
154.49 KHz	50.98	0.26	0.02	51.26	79	-27.74	Pass
152.23 KHz	51.3	0.28	0.02	51.6	79	-27.4	Pass
152.02 KHz	51.5	0.28	0.02	51.8	79	-27.2	Pass
151.46 KHz	51.64	0.29	0.02	51.95	79	-27.05	Pass
151.26 KHz	51.43	0.29	0.02	51.74	79	-27.26	Pass
151.17 KHz	51.58	0.29	0.02	51.89	79	-27.11	Pass
151.1 KHz	51.65	0.29	0.02	51.96	79	-27.04	Pass
150.47 KHz	51.6	0.3	0.02	51.92	79	-27.08	Pass
150.1 KHz	51.75	0.3	0.02	52.07	79	-26.93	Pass

The data results are measured Quasi-Peak.

Test Equipment Utilized

DO NOT USE THIS LIST. It is only provided as a guide. Verify all equipment used and ensure calibration dates.

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