



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: May 14, 2007

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Unigen Corporation
Equipment: LETO-LPA
FCC ID: R8KUGWJ4USHN33
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

enclosure(s)
cc: Applicant
HSB/je

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

Applicant: Unigen Corporation
FCC ID: R8KUGWJ4USHN33

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: R8KUGWJ4USHN33
Model: LETO-LPA

to

Federal Communications Commission

Rule Part(s) 15.247

Date Of Report: May 14, 2007
Date of revised report: June 29, 2007

On the Behalf of the Applicant: Unigen Corporation
45388 Warm Springs Blvd.
Fremont, CA 94539

Attention of: Mark Morrissey, Director of Business Development
(800) 826-0808; (510) 668-2088 ext 2087
Email: mmorrissey@unigen.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

MFAp0740024, d0750053

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.

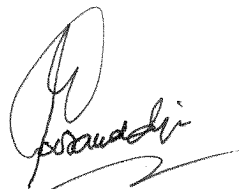
Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories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

Table Of Contents

Rule	Description	Page
	Test Report	1
2.1033(c)	General Information Required	2
	Standard Test Conditions and Engineering Practices	4
	Test Results Summary	5
15.247(b)	Peak Output Power	6
15.247(d)	Conducted Spurious Emissions	6
15.247(c),	Radiated Spurious Emissions	17
15.247(c),	Emissions At Band Edges	18
15.247(a)(2)	Occupied Bandwidth	21
15.247(d)	Transmitter Power Spectral Density (PSD)	25
15.207	AC Conducted Emissions	27
	Test Equipment Utilized	29

Required information per ISO 17025-2005, paragraph 5.10:

a) **Test Report**

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

c) Report Number: d0750053

d) Client: Unigen Corporation

e) Identification: LETO-LPA
Description: 2400 MHz DTS Transmitter and Reciever

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

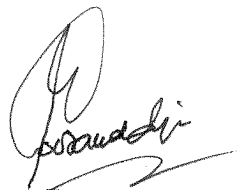
g) Report Date: May 14, 2007
EUT Received:

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: Unigen Corporation

(c)(2): **FCC ID:** R8KUGWJ4USHN33

Model Number: LETO-LPA

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

Please See Attached Exhibits

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

(c)(5): **FREQUENCY RANGE, MHz:** 2404 to 2467

(c)(6): **Power Rating, W:** 30 mW
_____ Switchable _____ Variable X N/A

(c)(7): **FCC Limit Power Rating, W:** 125 mW

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 2-dBi-monopole antenna connected to the transmitter utilizing an MMCX connector.

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 2400-2483.5 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 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 for current scope of accreditation.

Certificate number: 2152.01



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	

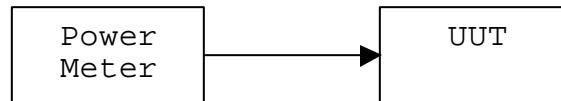
All Tests were conducted at the maximum data rate of 1MBPs.

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
2404	30 mW	250 mW	Pass
2434	20 mW	250 mW	Pass
2467	19 mW	250 mW	Pass

Name of Test: Conducted Spurious Emissions
Specification: 15.247(d)
Spec. Limit -20 dBc
Test Equipment Utilized i00029, 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 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.

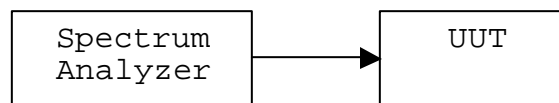
Sample Calculation

Reference Level Offset - Recorded Level = Corrected Level

Settings

RBW = 100 KHz
 VBW = 100 KHz
 Detector - Peak

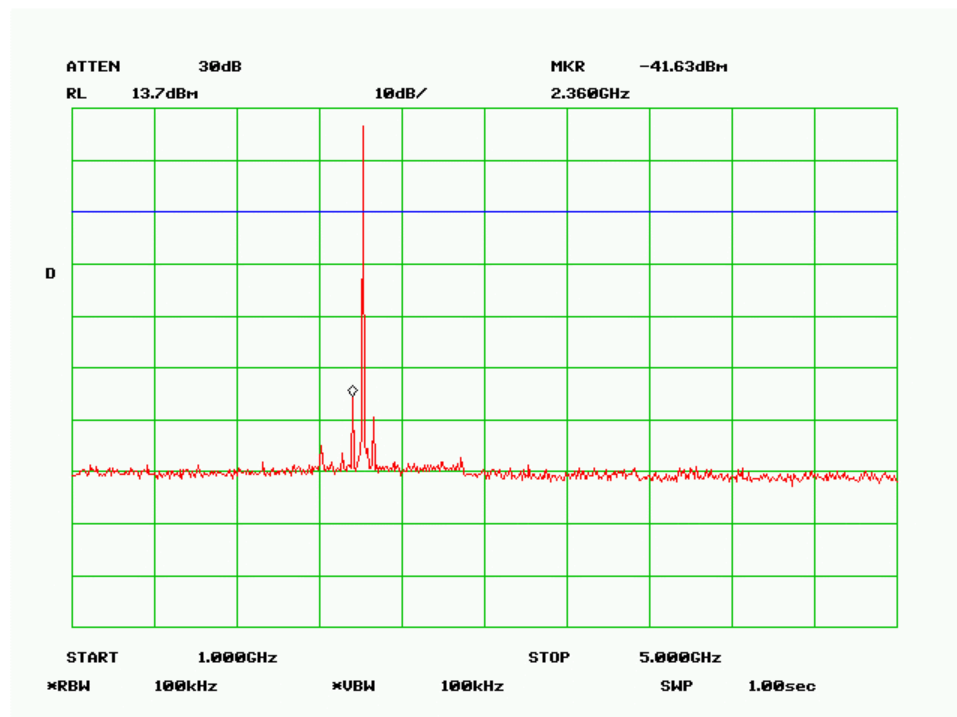
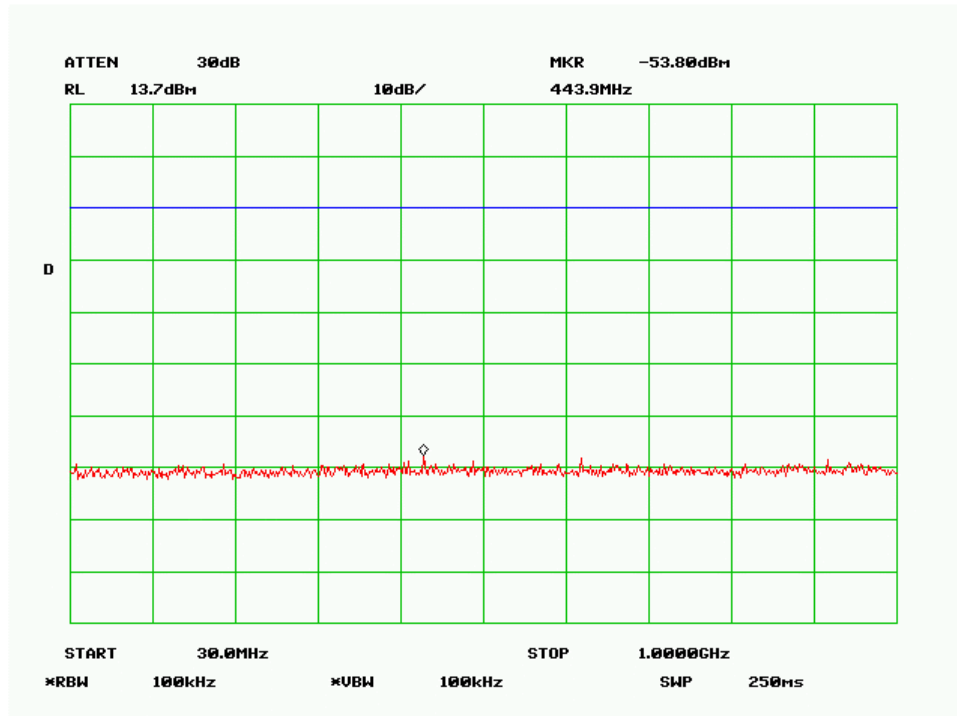
Test Setup

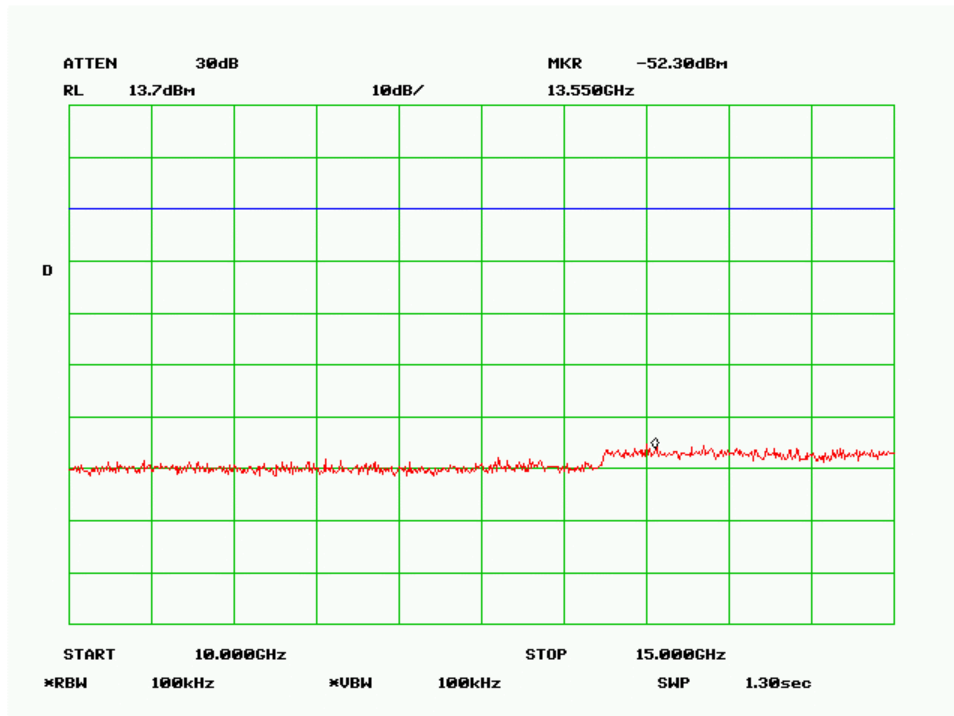
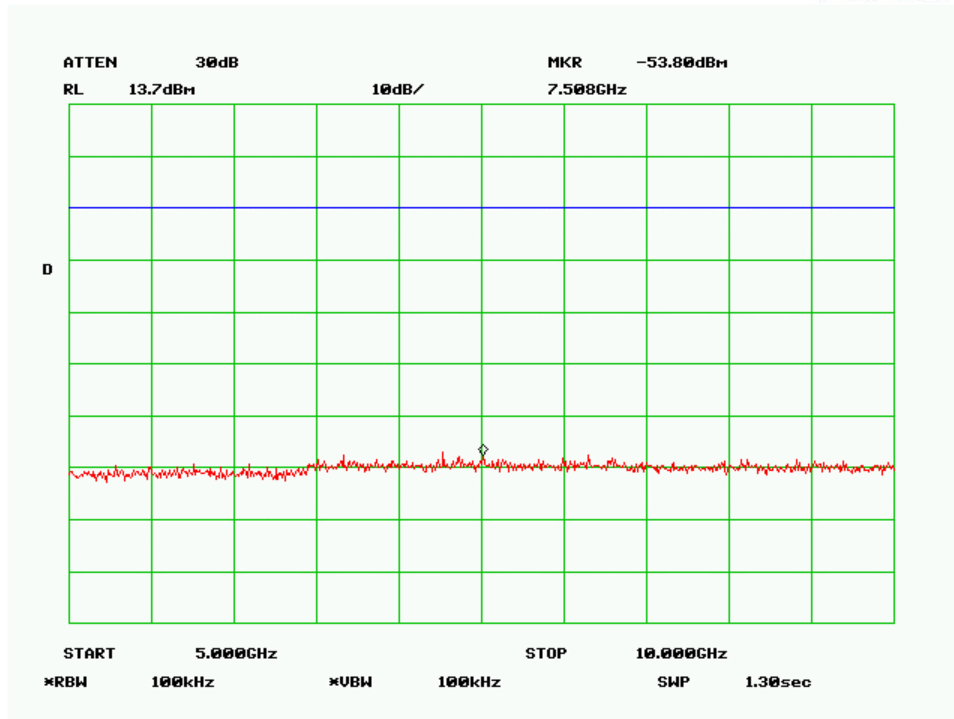


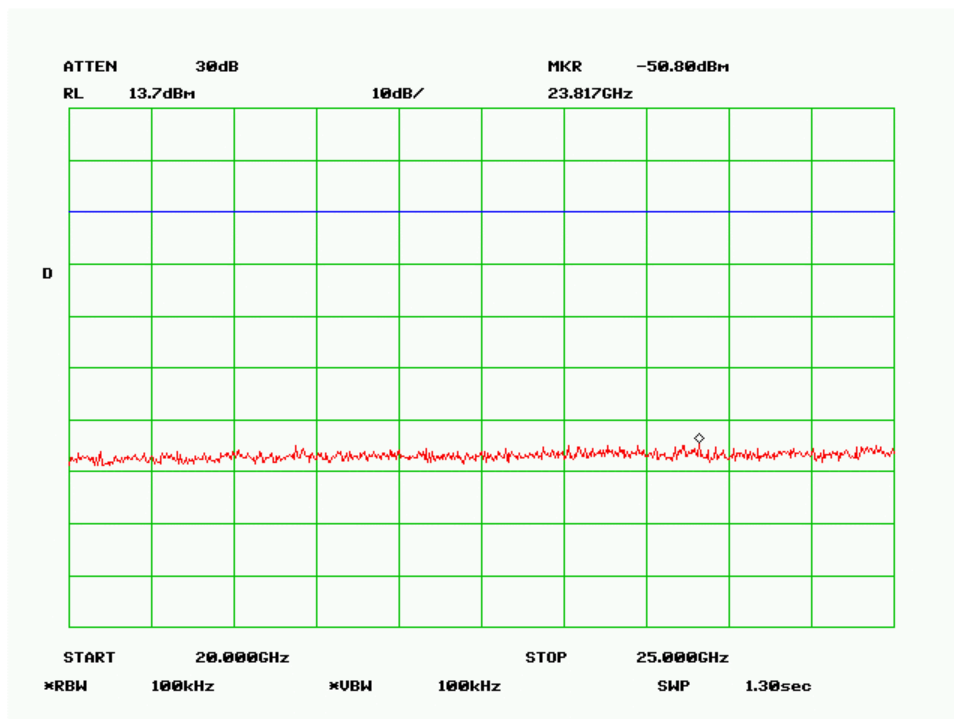
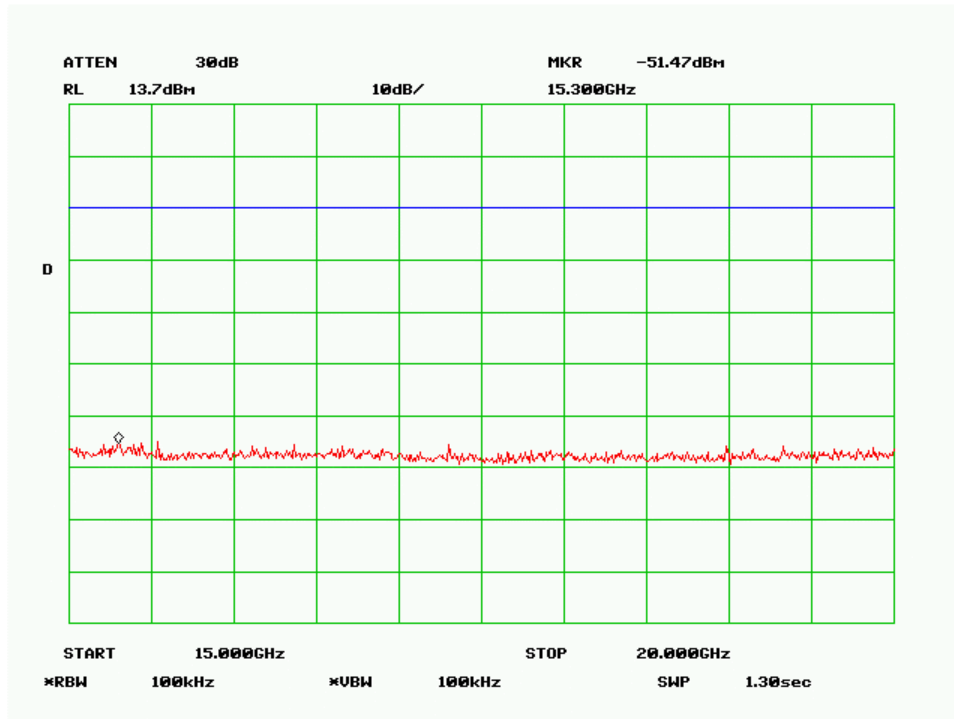
Conducted Spurious Emissions Summary Test Table

Tuned Frequency MHz	Emission Frequency MHz	Recorded Level dB	Reference Level Offset dB	Corrected Level dBc	Specification Limit	Result
2404	2360	-41.63	13.7	-55.33	-20 dBc	Pass
2434	2387	-41.37	12.8	-54.17	-20 dBc	Pass
2467	2420	-42.20	11.6	-53.80	-20 dBc	Pass

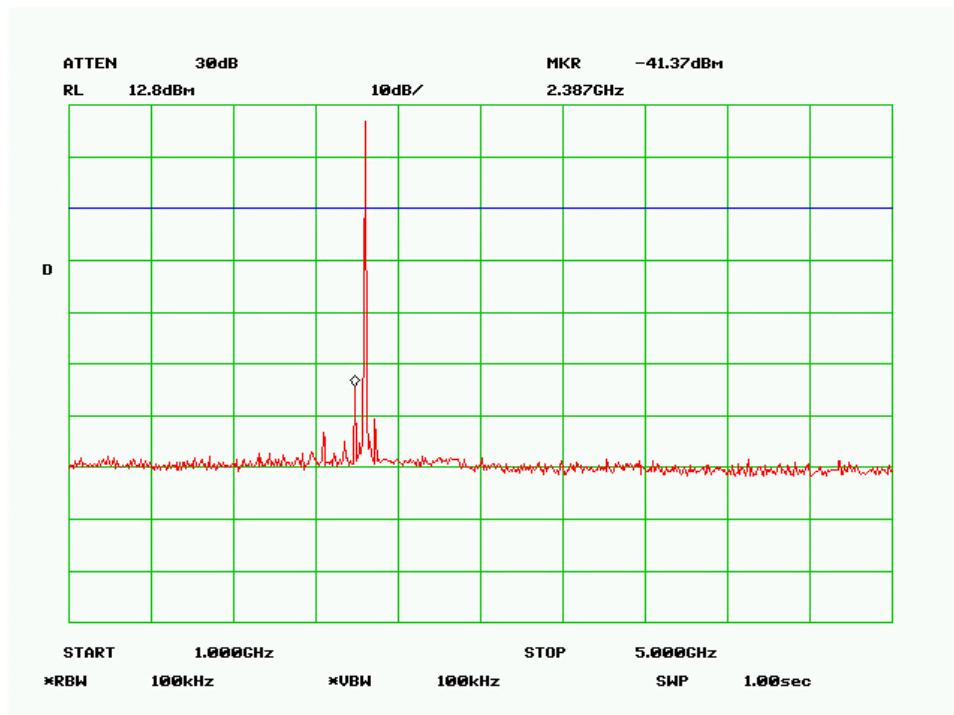
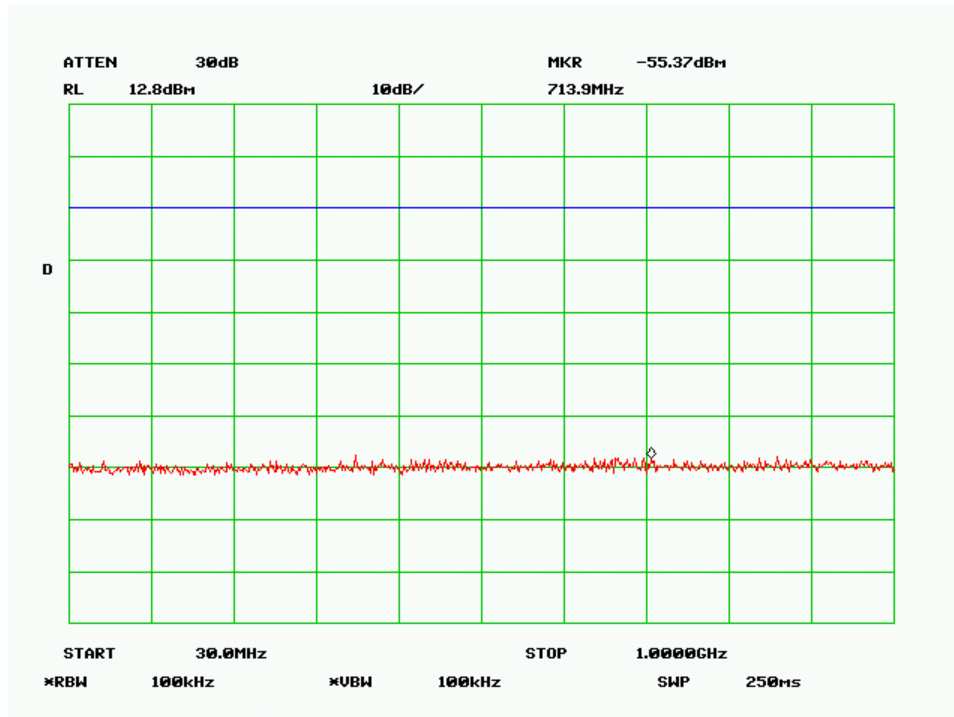
Conducted Spurious Emissions 2404 MHz

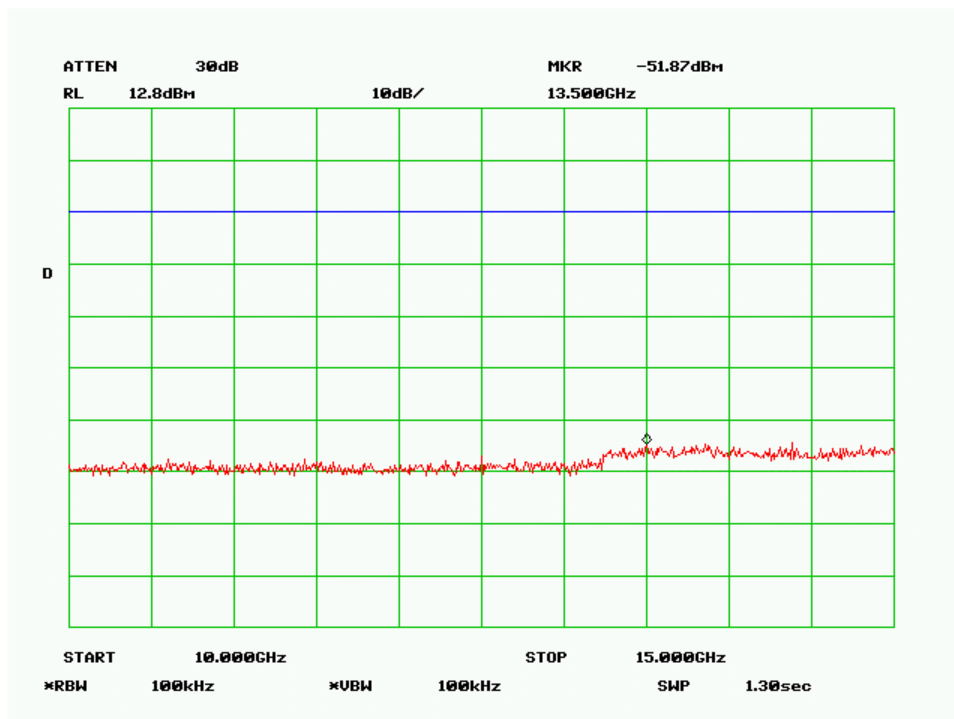
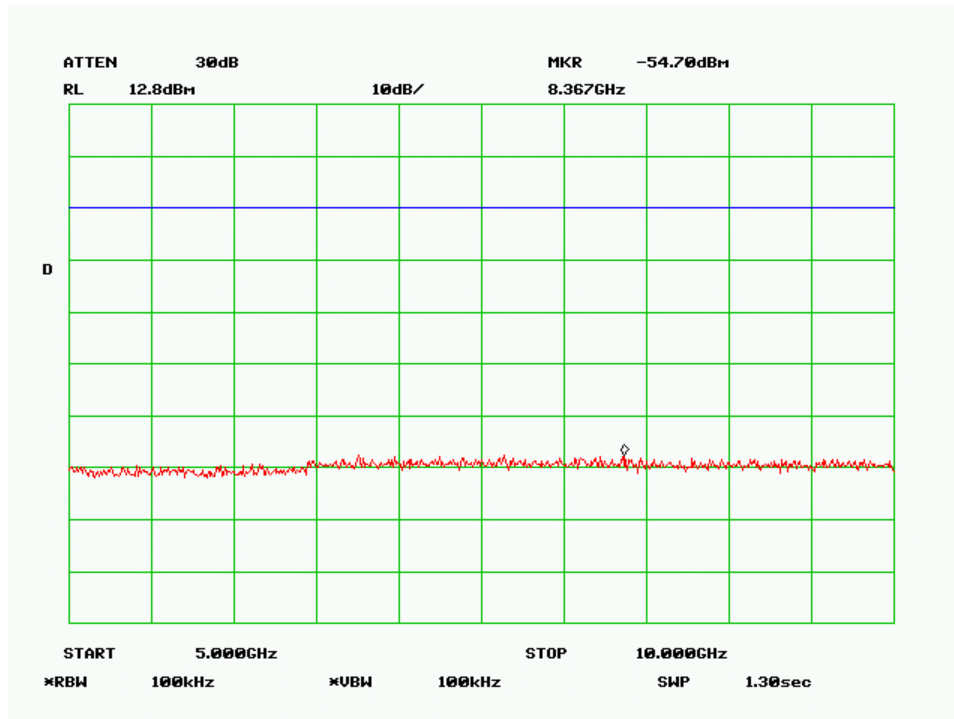


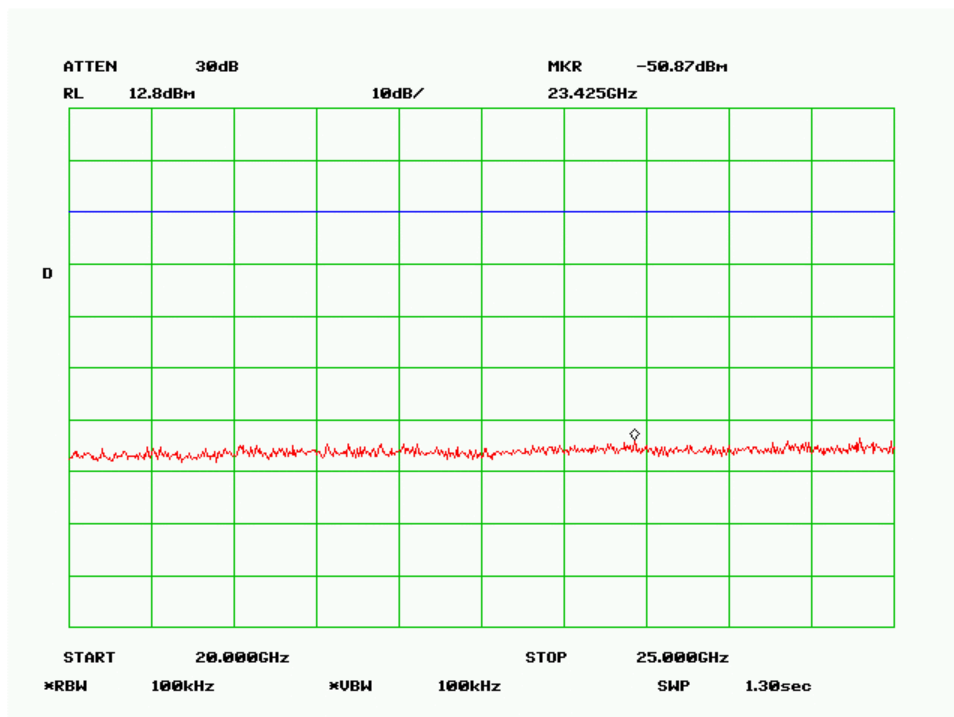
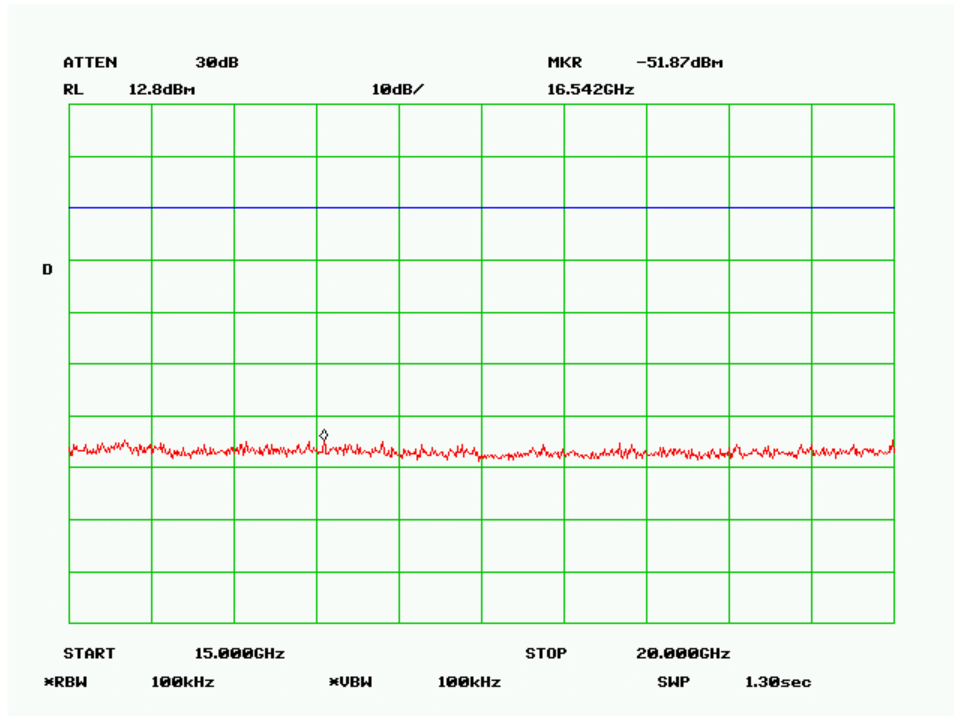




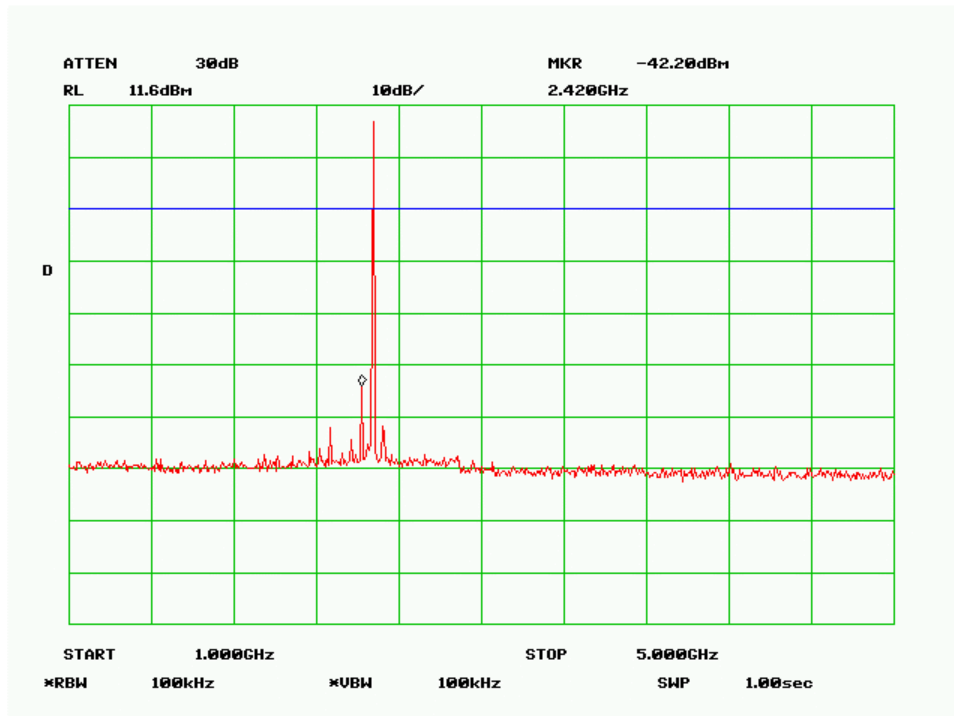
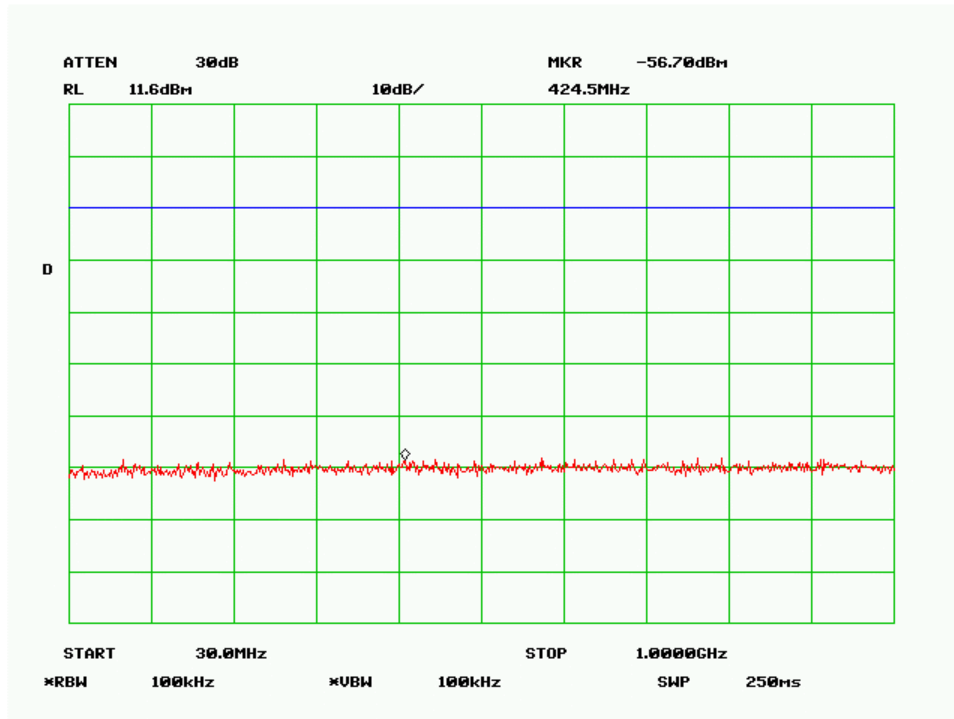
Conducted Spurious Emissions 2434 MHz

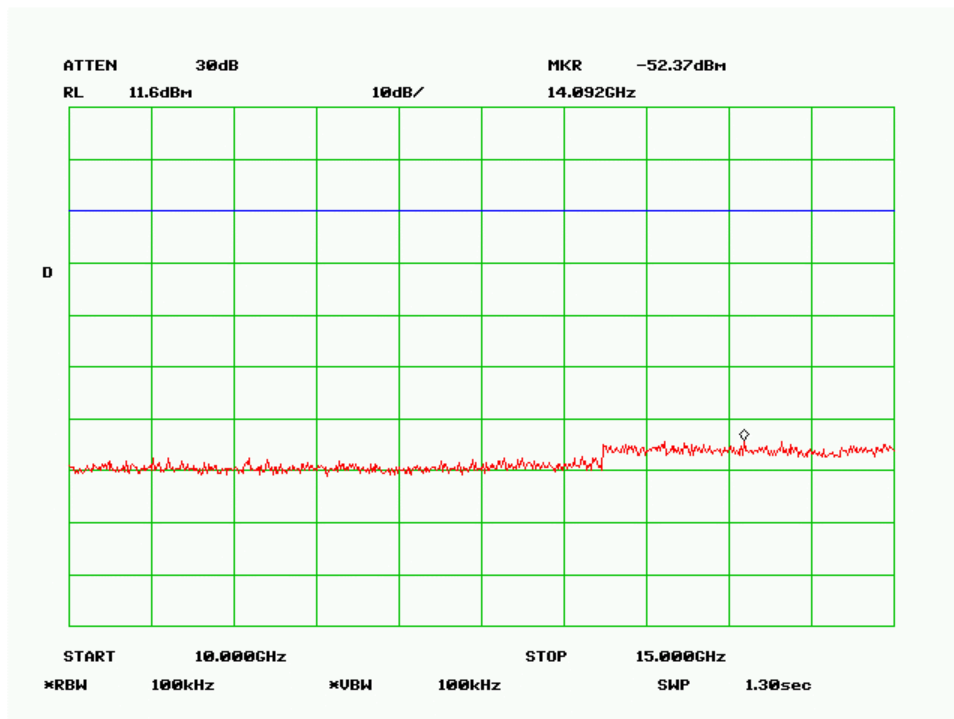
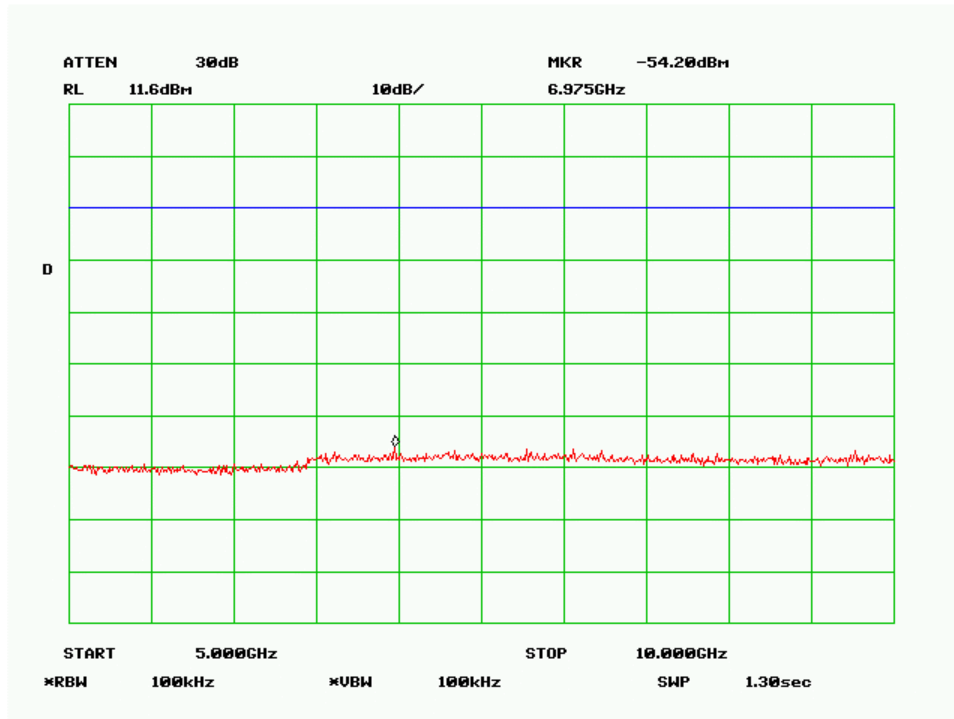


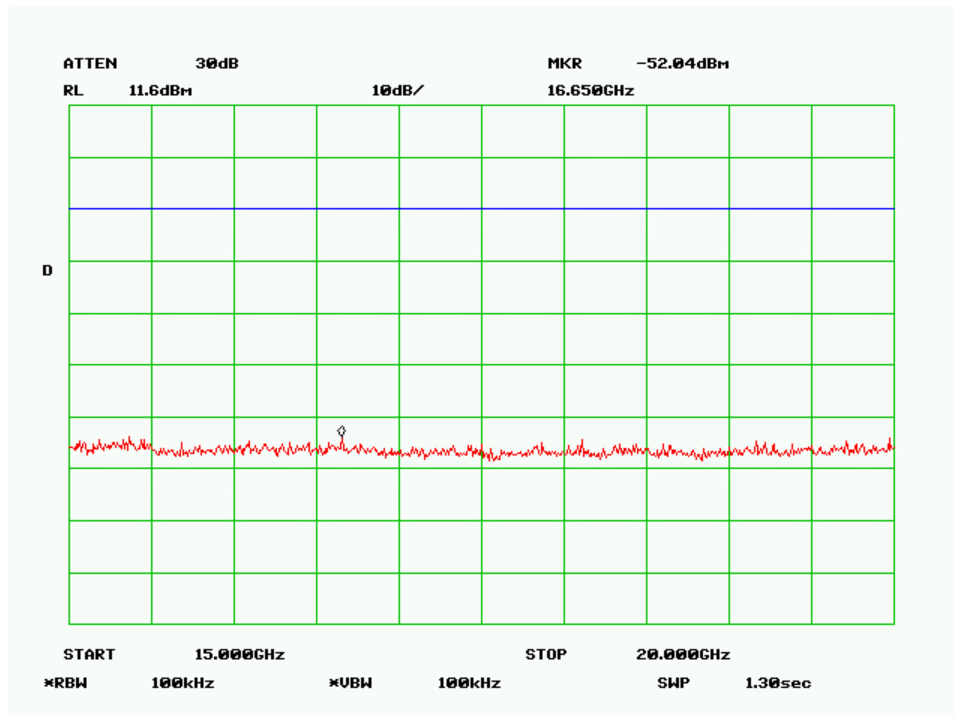
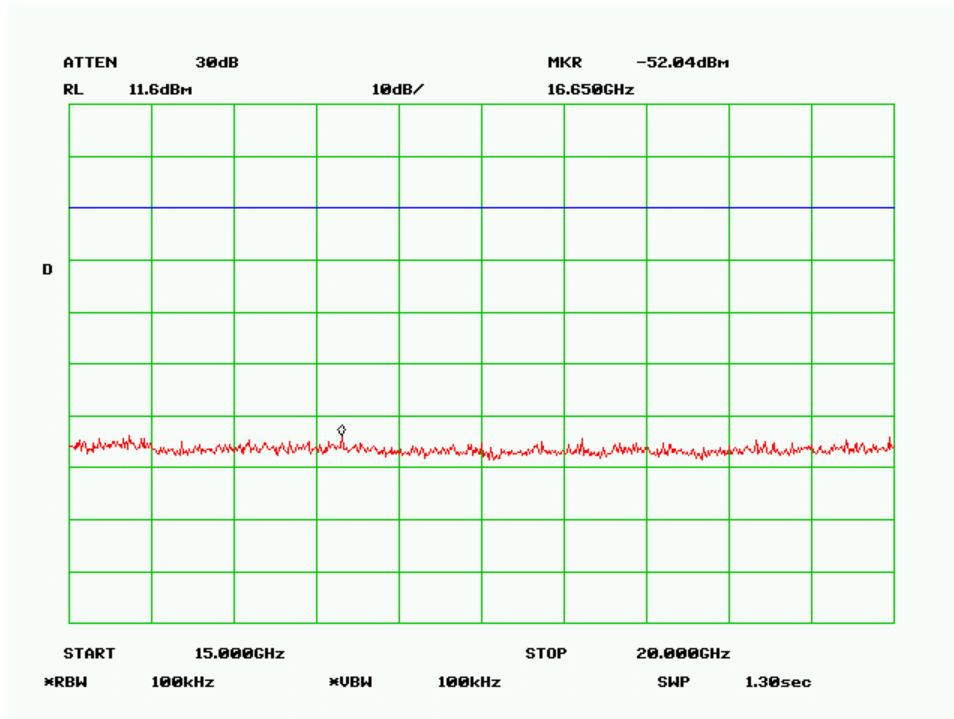




Conducted Spurious Emissions 2467 MHz







Name of Test: Radiated Spurious Emissions
Specification: 15.247(c), 15.209(a), 15.205
Spec. Limit See Table
Test Equipment Utilized i00029, i00033, i00088, i00089, i00103

Test Procedure

The UUT was tested in an Open Area Test Site (OATS) set 3m from the receiving transducer. A spectrum analyzer was used to verify that the UUT met the requirements for Radiated Spurious Emissions. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed. Rotating the UUT 360° and raising the antenna from 1 – 4 meters in both the horizontal and vertical antenna polarizations maximized the signals. High, middle, and low channels were tested and the six highest emissions are recorded.

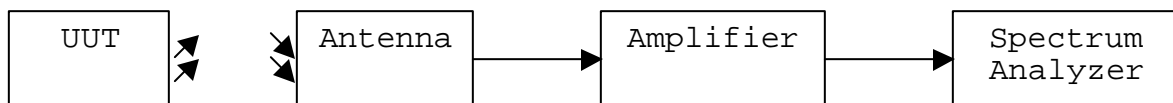
Sample Calculation

Monitored Level + Correction Factor = Corrected Level
 Correction Factor = ACF + Cable Loss+ Distance Correction Factor
 Distance Correction Factor = 10 Log D1/D2

Settings

RBW = 100 KHz
 VBW = 100 KHz
 Detector – Quasi-Peak

Test Setup



Radiated Spurious Emissions

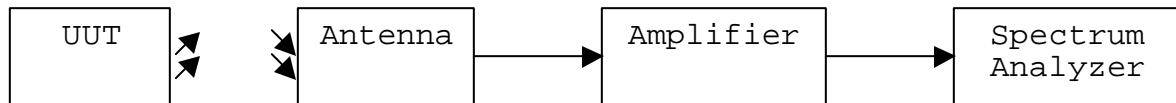
Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Correction Factor (dB)	Corrected Value (dBuV/m)	Limit (dBuV/m)	Result
2404	50.116	14.3	14.1	28.4	50	Pass
2467	200.163	13.3	18.9	32.2	50	Pass
2404	300.083	14.2	18.7	32.9	57	Pass
2434	499.998	15.7	23.4	39.1	57	Pass
2404	750.002	15.9	27.4	43.3	57	Pass
2434	969.995	15.4	31.3	46.7	57	Pass

Name of Test: Emissions At Band Edges
Specification: 15.247(c), 15.209(a), 15.205
Limit -20 dBC and for restricted band 54 dBuV average and 74 dBuV peak
Test Equipment Utilized i00028, i00271, i00290

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.

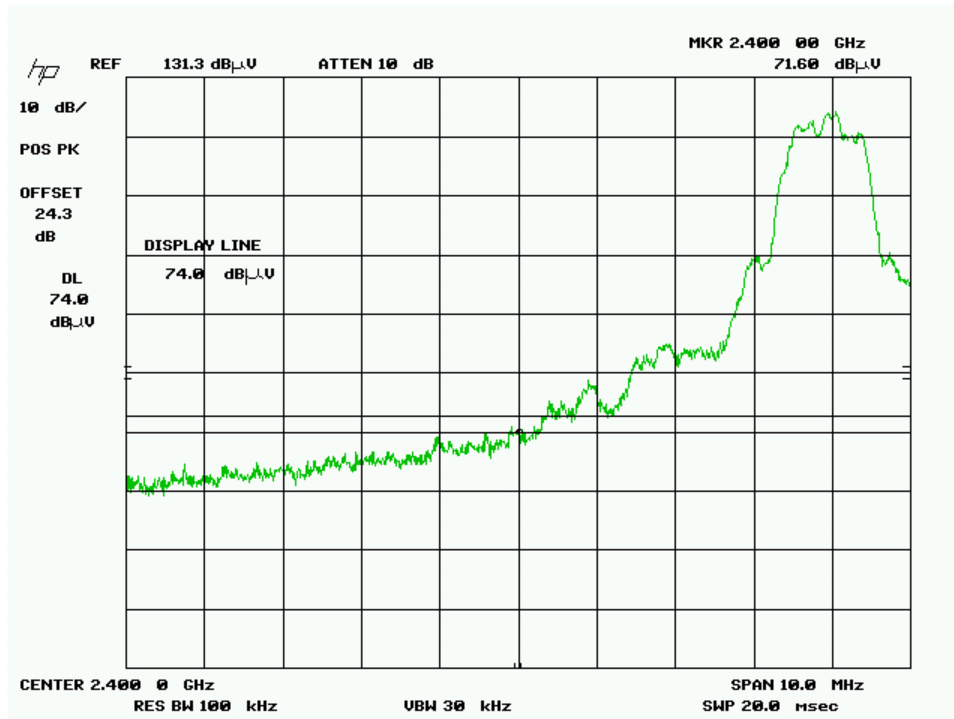
Test Setup



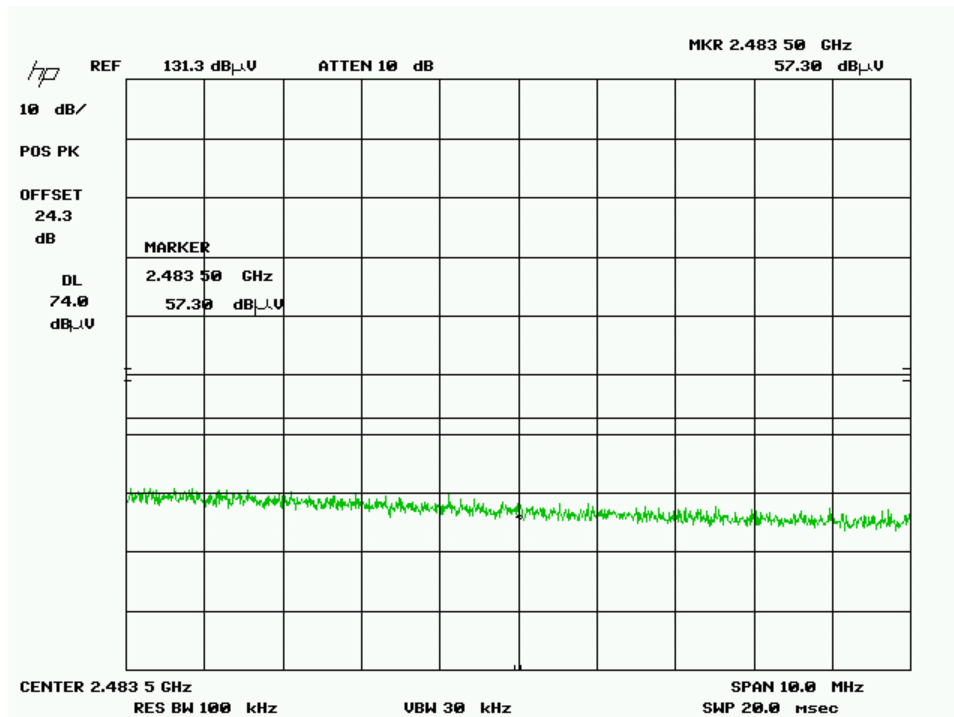
Band Edge / Restricted Band Emissions Summary

Tuned Freq (MHz)	Emission Freq (MHz)	Monitored Level (dBuV/m)	Detector	Limit (dBuV/m)	Result
2404	2400.0	71.6	Peak	74	Pass
2467	2483.5	57.3	Peak	74	Pass
2404	2400.0	36.2	Average	54	Pass
2467	2483.5	34.5	Average	54	Pass

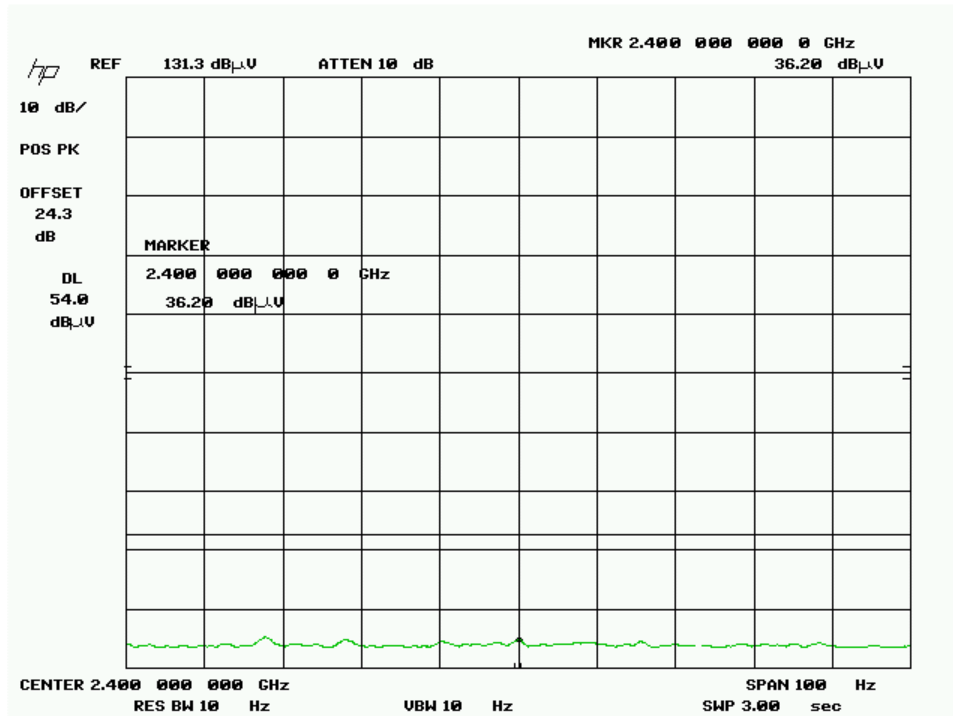
Band Edge Peak 2404 MHz



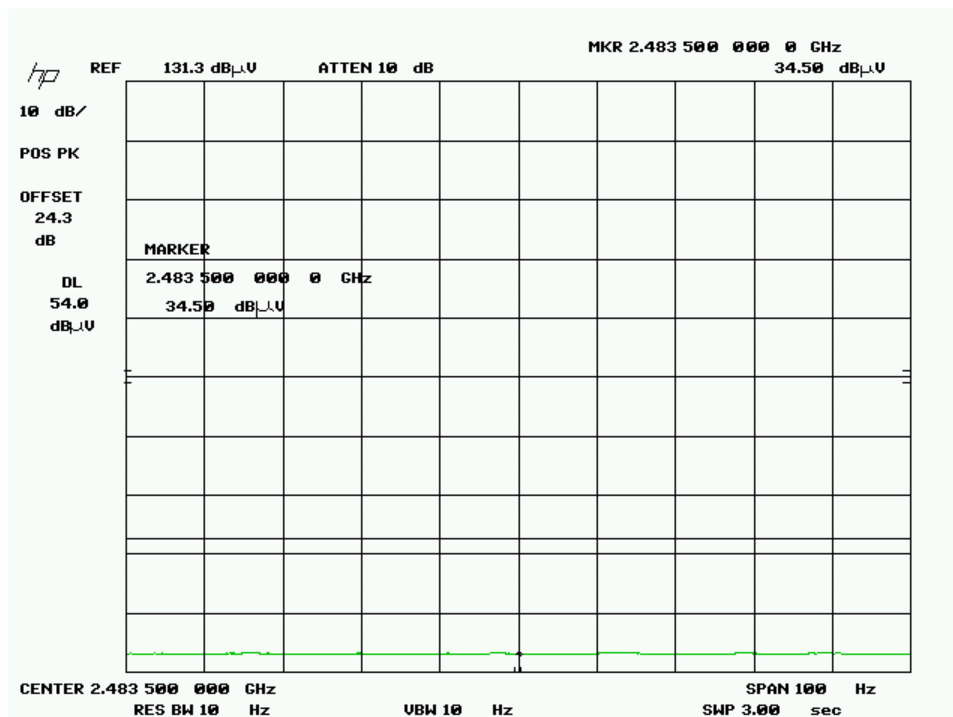
Band Edge Peak 2467 MHz



Band Edge Average 2404 MHz



Band Edge Average 2467 MHz

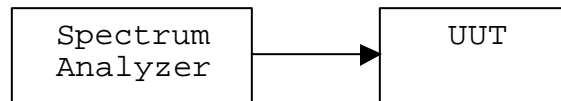


Name of Test: Occupied Bandwidth
Specification: 15.247(a)(2)
Limit BW = 500 KHz
Test Equipment Utilized i00329

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 measured to verify the bandwidth met the specification.

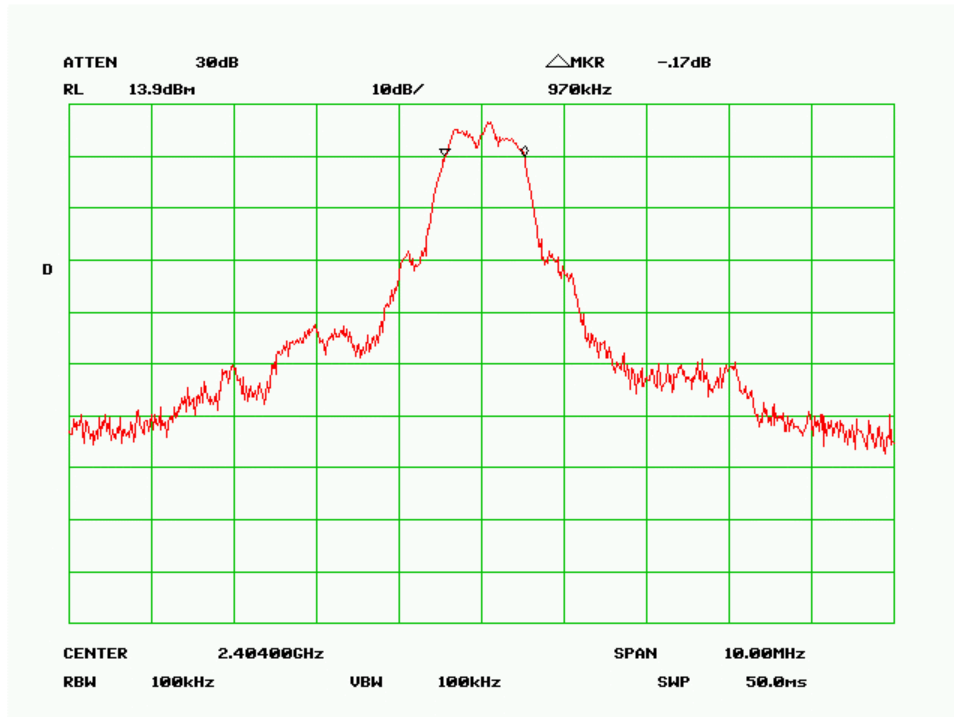
Test Setup



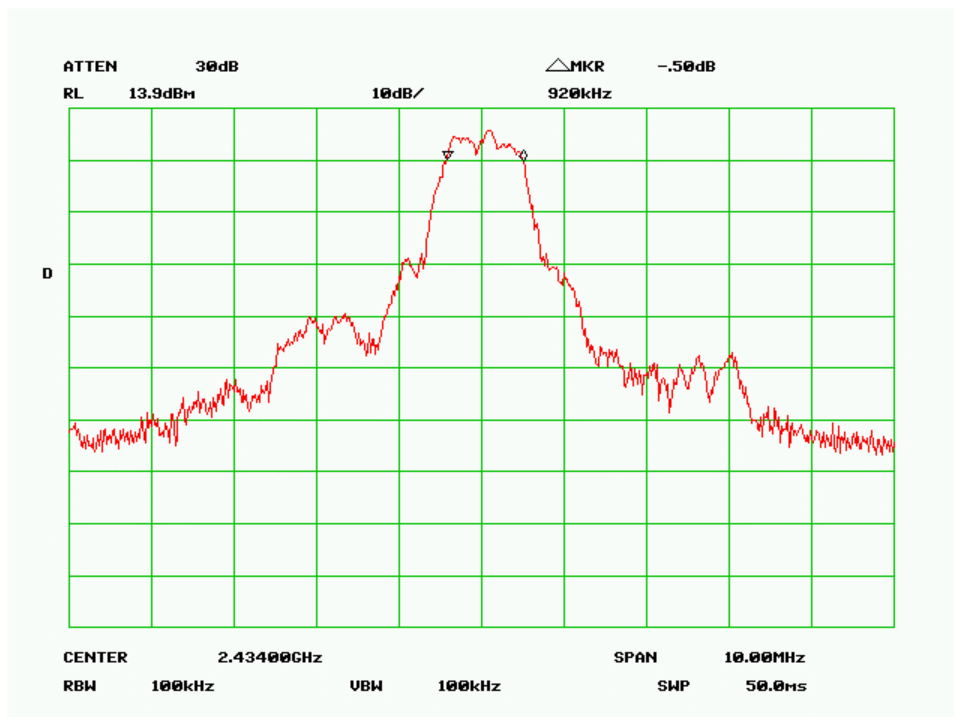
Occupied Bandwidth Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2404	970 kHz	= 500 KHz	Pass
2434	920 kHz	= 500 KHz	Pass
2467	930 kHz	= 500 KHz	Pass

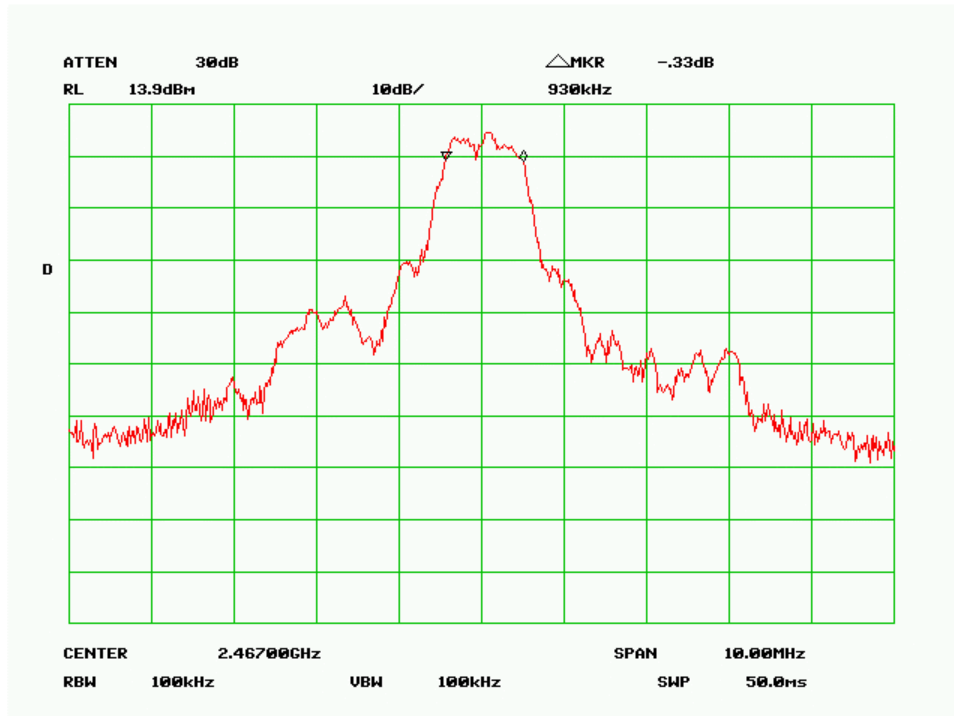
6 dB Bandwidth 2404 MHz



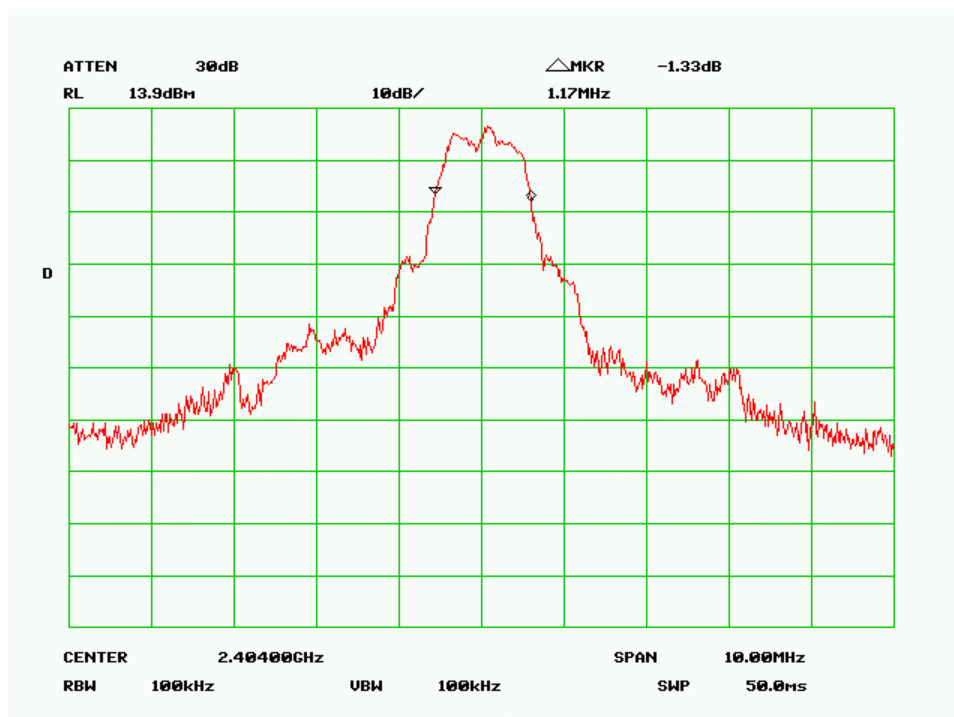
6 dB Bandwidth 2434 MHz



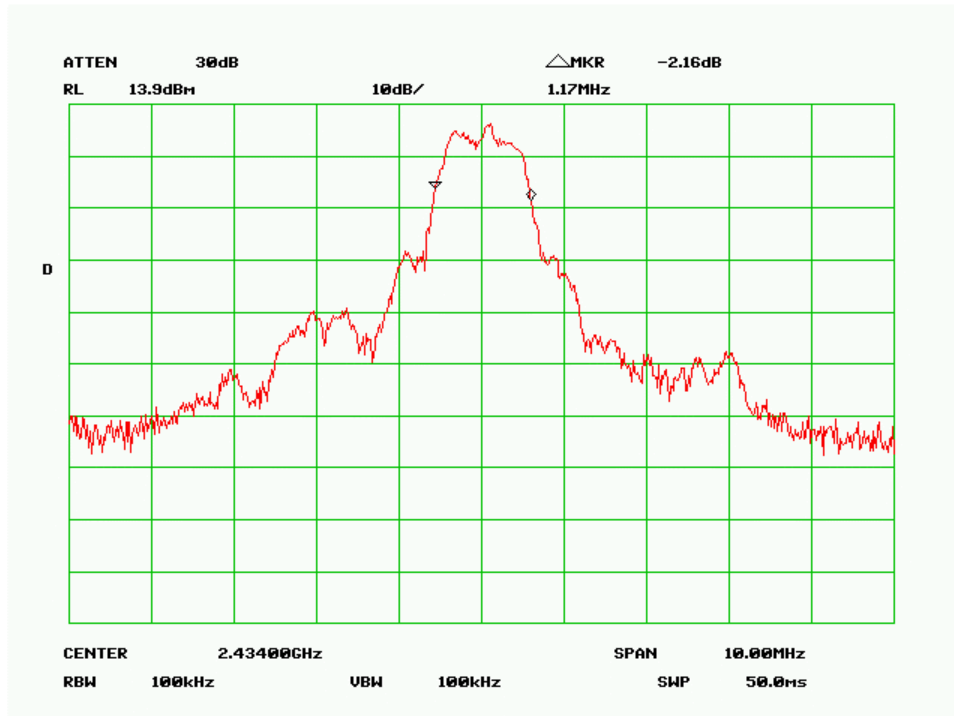
6 dB Bandwidth 2467 MHz



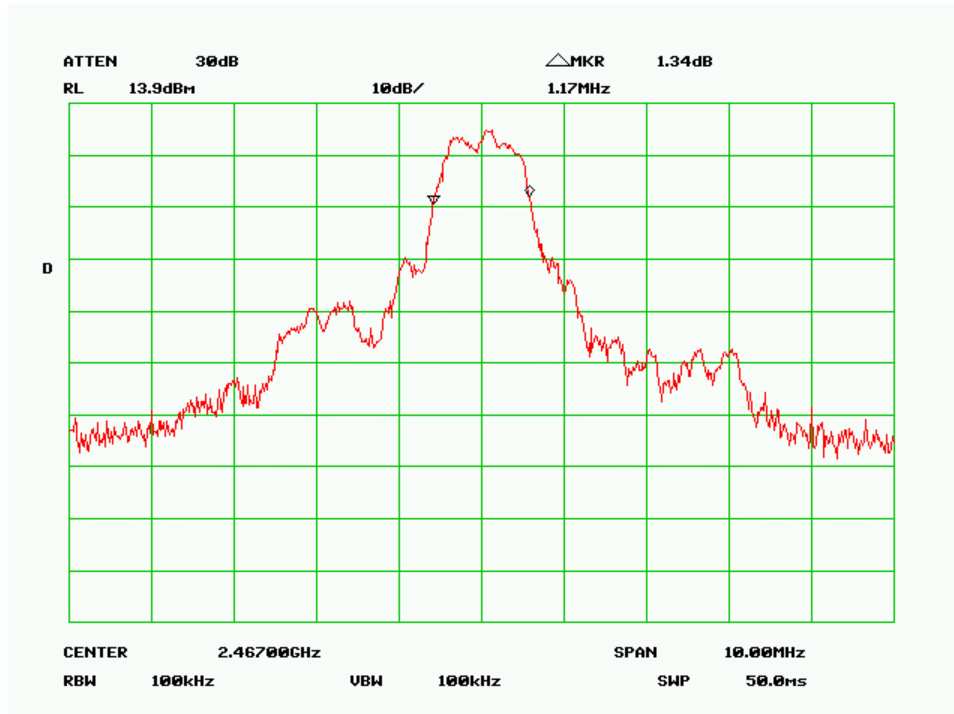
99% Bandwidth 2404 MHz



99% Bandwidth 2434 MHz



99% Bandwidth 2467 MHz

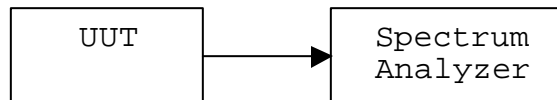


Name of Test: Transmitter Power Spectral Density (PSD)
Specification: 15.247(d)
Limit: 8 dBm in any 3 kHz Bandwidth
Test Equipment Utilized: i00329

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.

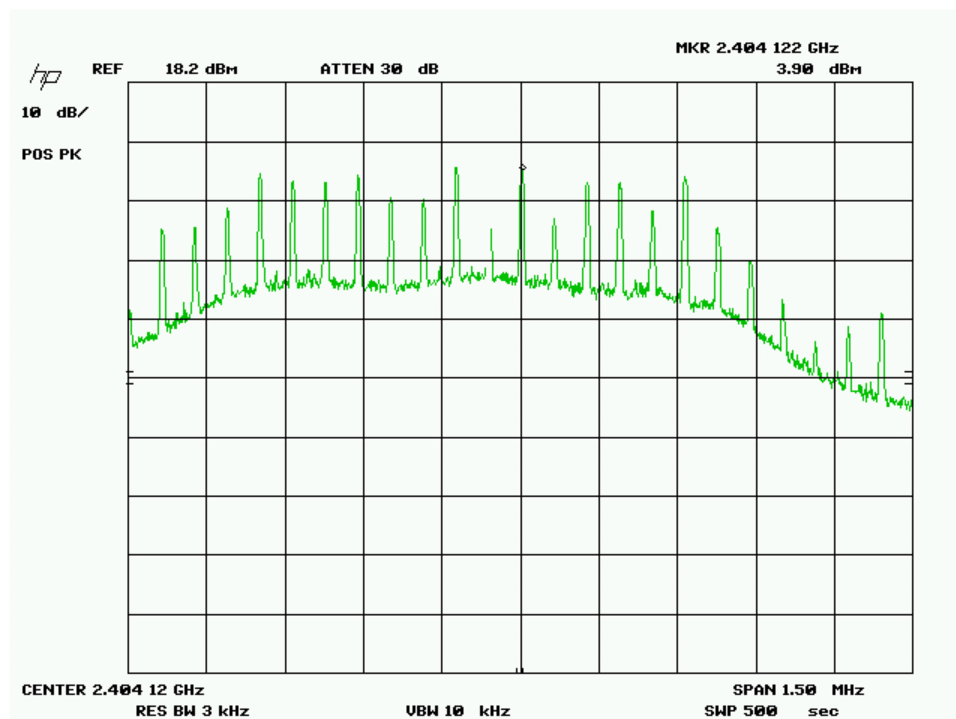
Test Setup



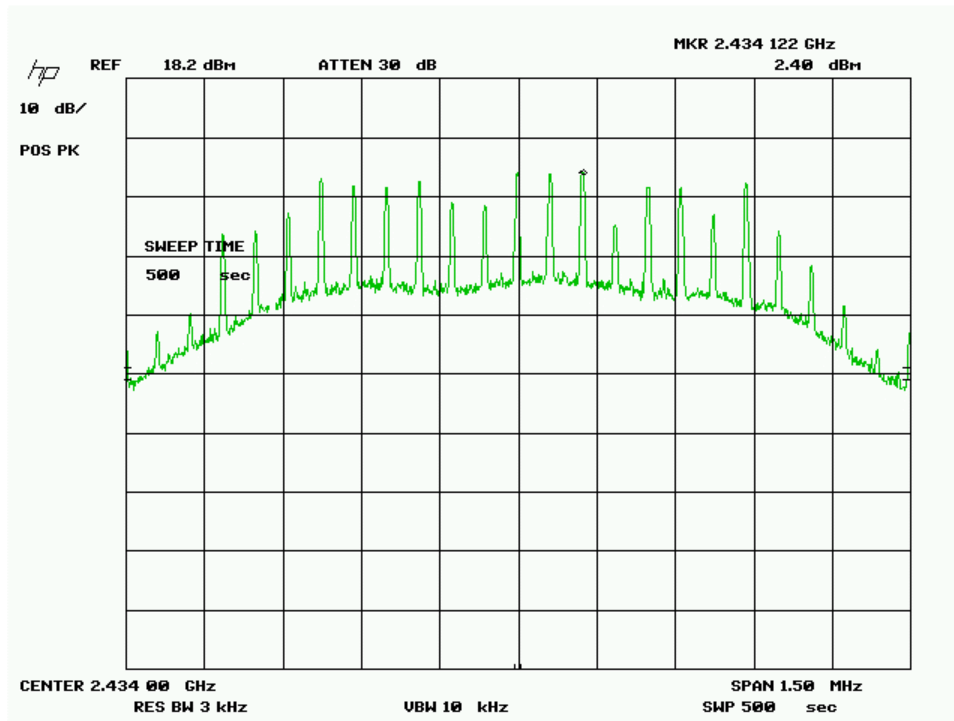
PSD Summary

Frequency MHz	Recorded Measurement	Specification Limit	Result
2404	3.9 dBm	8 dBm	Pass
2434	2.4 dBm	8 dBm	Pass
2467	1.6 dBm	8 dBm	Pass

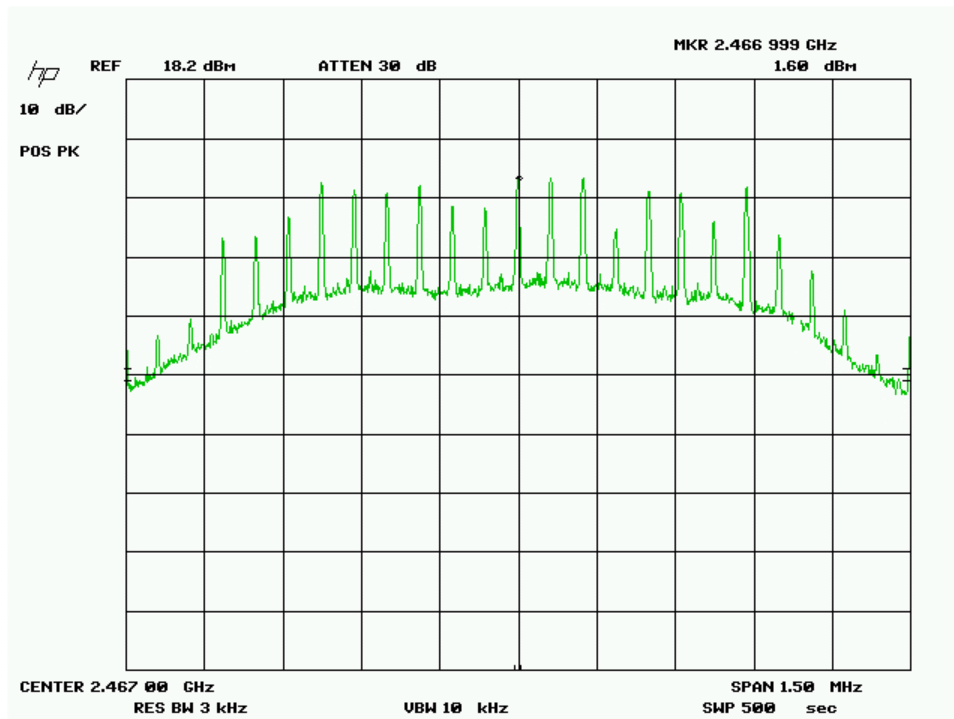
PSD 2404 MHz



PSD 2434 MHz



PSD 2467 MHz

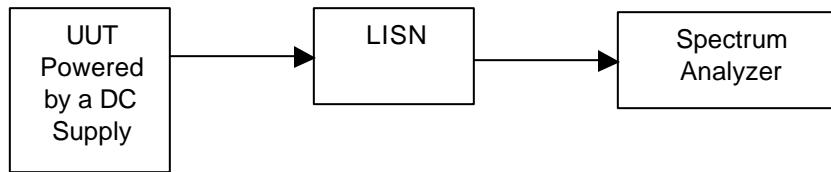


Name of Test: AC Conducted Emissions
Specification: 15.207
Test Equipment: i00033, i00270

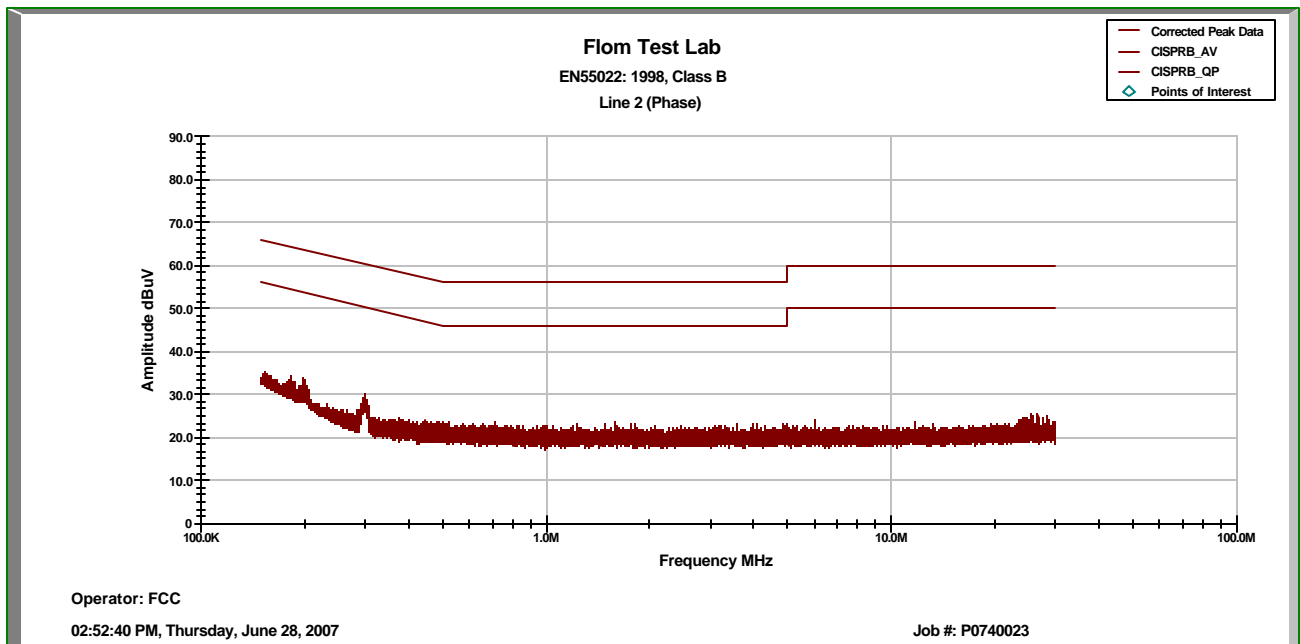
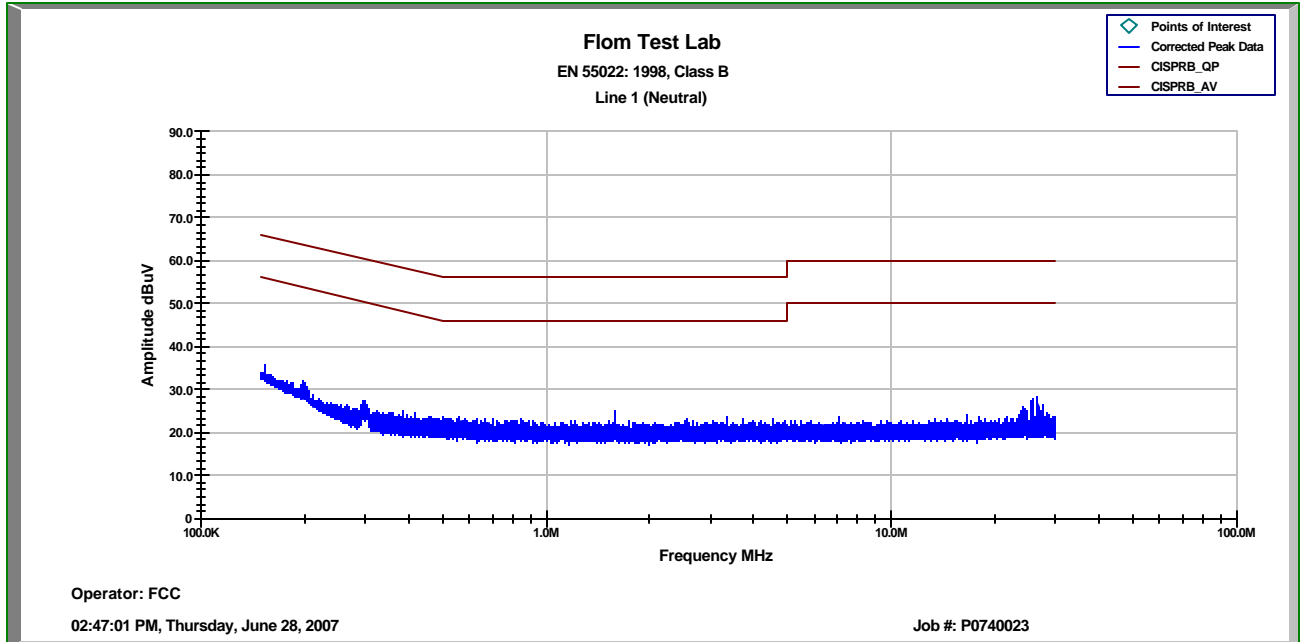
Test Procedure

The UUT was tested by connecting an AC powered DC Supply through a LISN and monitoring the AC Conducted Emissions with a spectrum analyzer. Emissions from 150kHz to 30 MHz were monitored in peak detection mode. As no peak levels were within 20 dB of the average or quasi-peak limits on values were recorded and only peak plots are provided.

Test Setup



Test Results



No emissions were within 20 dB of the limit.

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	1/26/06	1/26/07
Spectrum Analyzer	HP	85462A	i00033	11/03/06	11/03/07
Bi-conical Antenna	EMCO	3109B	i00088	10/14/05	10/14/07
Log Periodic Antenna	Aprel	2001	i00089	10/20/05	10/20/07
Horn Antenna	EMCO	3115	i00103	9/5/06	9/5/07
Power Sensor	HP	E4418B	i00228	8/1/06	8/1/07
LISN	FCC	FCC-LISN-50-32-2-01	i00270	10/25/05	10/25/07
Horn Antenna	ARA	DRG-1181A	i00271	2/1/04	2/1/07
Spectrum Analyzer	HP	8566B	i00290	6/16/06	6/16/07
Power Meter	HP	8481A	i00317	10/1/06	10/1/07
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