



Compliance Testing, LLC

Previously Flom Test Lab

RF, EMC and Safety Testing Experts Since 1963

toll-free: (866) 311-3268

fax: (480) 926-3598

<http://www.ComplianceTesting.com>

info@ComplianceTesting.com

Date: May 27, 2010

Applicant: COMTEK Communications Technology, Inc.
357 W. 2700 South
Salt Lake City, UTAH 84115

Attention of: Ralph Belgique, President
Ph: (800) 496-3463, Fax: (801) 484-6956
(800) 496-3463
ralph@comtek.com

Equipment: BST 75-216
FCC ID: C6ZBST75-216
FCC Rules: Part 95

To Whom It May Concern:

Enclosed please find your copy of the Engineering Test Report for which you are subject to the restrictions as listed on the attached summary.

Once a Telecommunication Certification Body (TCB) issues a Grant the Federal Communication Commission (FCC) has 30 days to review the application and request added information. It is your decision whether or not to market the equipment subject to a possible recall before the end of the 30 days.

If your equipment is still retained by us, it will be returned to you 30 days after approval is achieved. Our invoice for services has been directed to your Accounts Payable Department.

For any additional information please contact us.

Thank you.

Sincerely yours,

John Erhard: Engineering Manager



Summary of Restrictions

1. All submissions to the FCC are subject to **their** Examiner's interpretation.
2. Please allow from 60 to 90 days before hearing from the FCC with regard to any submission.
3. The FCC can set aside any action; modify or set aside any action, within 30 days. (FCC Rule 1.108, 1.113)
4. Under Rule 2.803, if device is not type accepted/certificated then it must **not** be sold, leased, offered for sale, imported, shipped or distributed or advertised for sale.
5. FCC can revoke its certificates at any time if the equipment does not meet or **continue** to meet their Rules. (Rule Parts 2.927, 2.939)
6. FCC can request a sample at any time (2.936).



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Date: May 27, 2010

Federal Communications Commission
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: COMTEK Communications Technology, Inc.
Equipment: BST 75-216
FCC ID: C6ZBST75-216
FCC Rules: Part 95

To Whom It May Concern:

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.

If you should need any further information, please feel free to contact us.

Best regards,

John Erhard: Engineering Manager



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Test Report

for

FCC ID: C6ZBST75-216

Model: BST 75-216

to

Federal Communications Commission

Rule Part(s)

Date of report: May 27, 2010

On the Behalf of the Applicant: COMTEK Communications Technology, Inc.

At the Request of: COMTEK Communications Technology, Inc.
357 W. 2700 South
Salt Lake City, UTAH 84115

Attention of: Ralph Belgique, President
Ph: (800) 496-3463, Fax: (801) 484-6956
(800) 496-3463
ralph@comtek.com

Reviewed by:

John Erhard: Engineering Manager



Test Report Revision History

Revision	Date	Revised By	Reason for revision
1.0	May 27, 2010	J. Erhard	Original Document
2.0	June 21, 2010	J. Erhard	Correct typo for power rating



List of Exhibits

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

Applicant: COMTEK Communications Technology, Inc.

FCC ID: C6ZBST75-216

By Applicant:

1. Letter of Authorization
2. Confidentiality Request: 0.457 And 0.459
3. Identification Drawings, 2.1033(c)(11)
 - Label
 - Location of Label
 - Compliance Statement
 - Location of Compliance Statement
4. Photographs, 2.1033(c)(12)
5. Documentation: 2.1033(c)
 - (3) User Manual
 - (9) Tune Up Info
 - (10) Schematic Diagram
 - (10) Circuit Description
 - Block Diagram
 - Parts List
 - Active Devices
6. MPE/SAR Report

By Compliance Testing:

- A. Testimonial & Statement of Certification



The Applicant has been cautioned as to the following:

15.21 Information to the User

The user's 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 § 2.959 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:

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 is true and correct.

A handwritten signature in black ink, appearing to read "John Erhard".

Certifying Engineer:

John Erhard: Engineering Manager



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Required information per ISO 17025-2005, paragraph 5.10.2:

a) **Test Report**

b) Laboratory: Compliance Testing
(FCC: 933597) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044-A) Chandler, AZ 85225

c) Report Number: d1050024

d) Client: COMTEK Communications Technology, Inc.
357 W. 2700 South
Salt Lake City, UTAH 84115

e) Identification: BST 75-216
FCC ID: C6ZBST75-216

EUT Description: Mini Base Station Transmitter

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

g) Report Date: May 27, 2010

h, j, k): As indicated in individual tests.

i) Sampling method: No sampling procedure used.

l) Measurement Uncertainty: In accordance with Compliance Testing internal quality manual.

m) Reviewed by:

John Erhard: Engineering Manager

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.

Accessories used during testing:

Type	Quantity	Manufacturer	Model	Serial No.	FCC ID
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Sub-part

2.1033(c)(14):

Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Volume II; Part 2, Sub-part J, Sections 2.947, 2.1033(c), 2.1041, 2.1046, 2.1047, 2.1079, 2.1051, 2.1053, 2.1055, 2.1057 and the following individual Parts: 95.



Standard Test Conditions and Engineering Practices

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

In accordance with ANSI/C63.4-2009, 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 Compliance Testing in 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



TESTING CERT# 2152.01

FCC OATS Reg. #933597

IC Reg. # 2044A-1



List of General Information Required for Certification

In Accordance with FCC Rules and Regulations,
Volume II, Part 2 and to Part 95 Sub-part 2.1033

(c)(1):

Name and Address of Applicant: COMTEK Communications Technology, Inc.
357 W. 2700 South
Salt Lake City, UTAH 84115

Manufacturer: COMTEK Communications Technology, Inc.
357 W. 2700 South
Salt Lake City, UTAH 84115

(c)(2): **FCC ID:** C6ZBST75-216

Model Number: BST 75-216

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

Please see attached exhibits

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

(c)(5): **Frequency Range, MHz:** 216.0125 to 216.9750

(c)(6): **Power Rating, Watts:** 0.0835
☒ Switchable ☐ Variable ☐ N/A

FCC Grant Note:

(c)(7): **Maximum Allowable Power, Watts:** 0.100

DUT Results: Passes ☒ Fails ☐



Subpart 2.1033 (continued)

(c)(8): Voltages & currents in all elements in final RF stage, including final transistor or solid-state device:

Collector Current, A	=	10 mA
Collector Voltage, Vdc	=	12 VDC
Supply Voltage, Vdc	=	12 VDC

(c)(9): **Tune-Up Procedure:**

Please see attached exhibits

(c)(10): **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)(11): **Label Information:**

Please see attached exhibits

(c)(12): **Photographs:**

Please see attached exhibits

(c)(13): **Digital Modulation Description:**

☐ Attached Exhibits
☒ N/A

(c)(14): **Test and Measurement Data:**

Follows



Test Results Summary

Specification	Test Name	Pass, Fail, N/A	Comments
2.1046, 95.639	Carrier Output Power (Conducted)	Pass	
2.1051, 95.635	Unwanted Emissions (Transmitter Conducted)	Pass	
2.1053, 95.639, 95.635	Field Strength of Spurious Radiation	Pass	
95.635	Emission Masks (Occupied Bandwidth)	Pass	
2.1047	Audio Low Pass Filter (Voice Input)	Pass	
2.1047	Audio Frequency Response	Pass	
2.1047	Modulation Limiting	Pass	
95.629	Frequency Stability (Temperature Variation)	Pass	
95.629	Frequency Stability (Voltage Variation)	Pass	



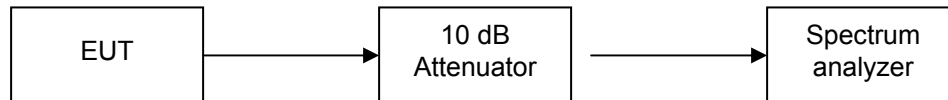
Name of Test: Carrier Output Power (Conducted)
Specification: 2.1046, 95.639
Test Equipment Utilized: i00331

Engineer: J. Erhard
Test Date: 5/25/2010

Measurement Procedure

The Equipment Under Test (EUT) was connected directly to a spectrum analyzer with the RBW set greater than three times the occupied bandwidth. The peak readings were taken and the result was then compared to the limit.

Test Setup



Transmitter Peak Output Power

Tuned Frequency (MHz)	Power Setting	Recorded Measurement (dBm)	Limit (dBm)	Result
216.525	High	19.22	20	Pass
216.525	Mid	16.59	20	Pass
216.525	Low	13.56	20	Pass



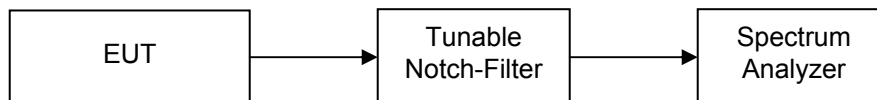
Name of Test: Conducted Spurious Emissions
Specification: 2.1051, 95.635
Test Equipment Utilized: i00331

Engineer: J. Erhard
Test Date: 5/25/2010

Test Procedure

The EUT was connected directly to a spectrum analyzer to verify that the UUT met the requirements for spurious emissions. A tunable notch filter was utilized to ensure the fundamental did not put the spectrum analyzer into compression. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed and plotted.

Test Setup

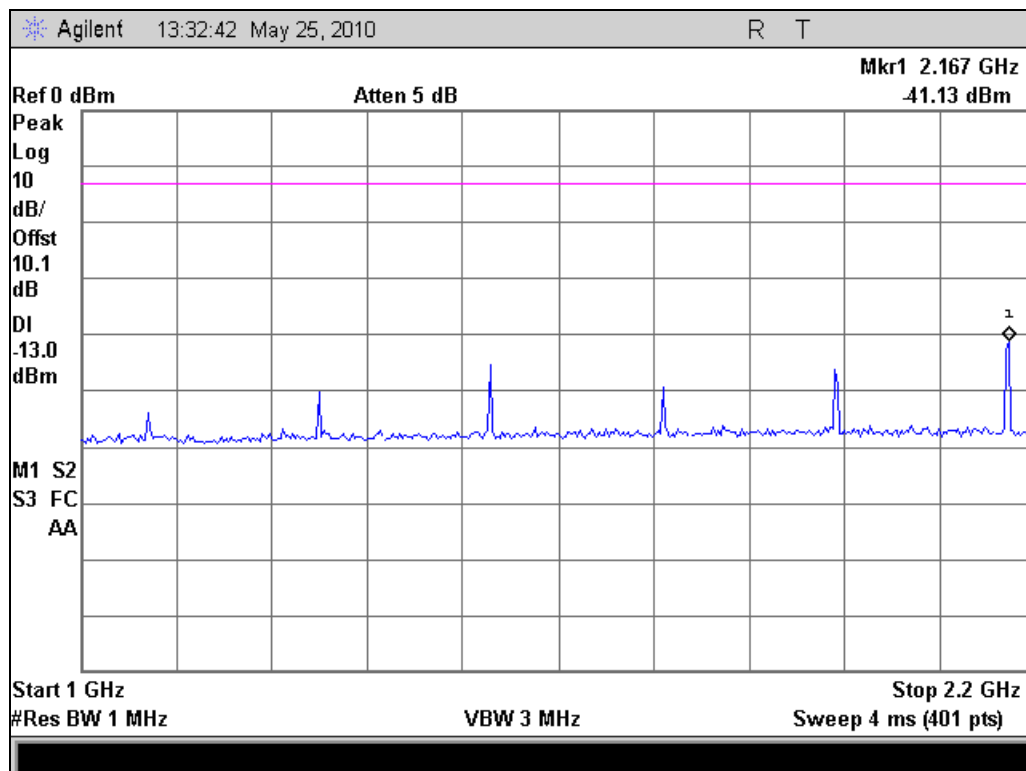
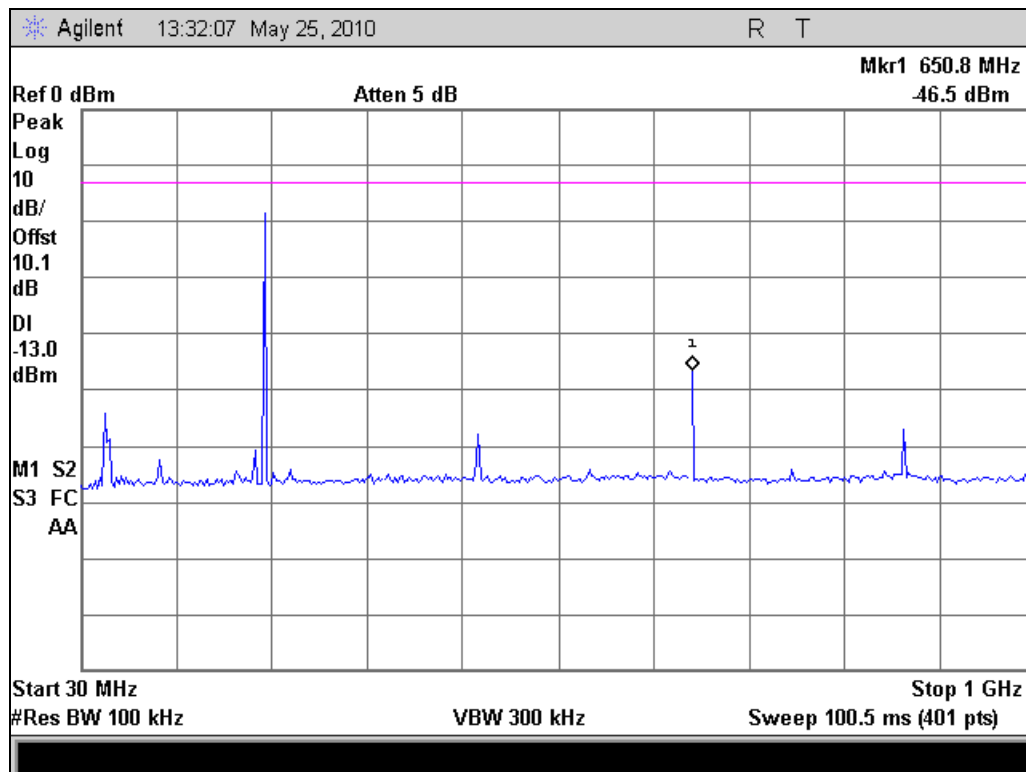


High Power Conducted Spurious Emissions Summary Test Table

Tuned Frequency (MHz)	Power Setting	Spurious Frequency (MHz)	Measured Spurious Level (dBm)	Specification Limit (dBm)	Result
216.525	High	2167	-41.13	-13 dBm	Pass
216.525	Mid	2167	-43.30	-13 dBm	Pass
216.525	Low	2167	-45.38	-13 dBm	Pass

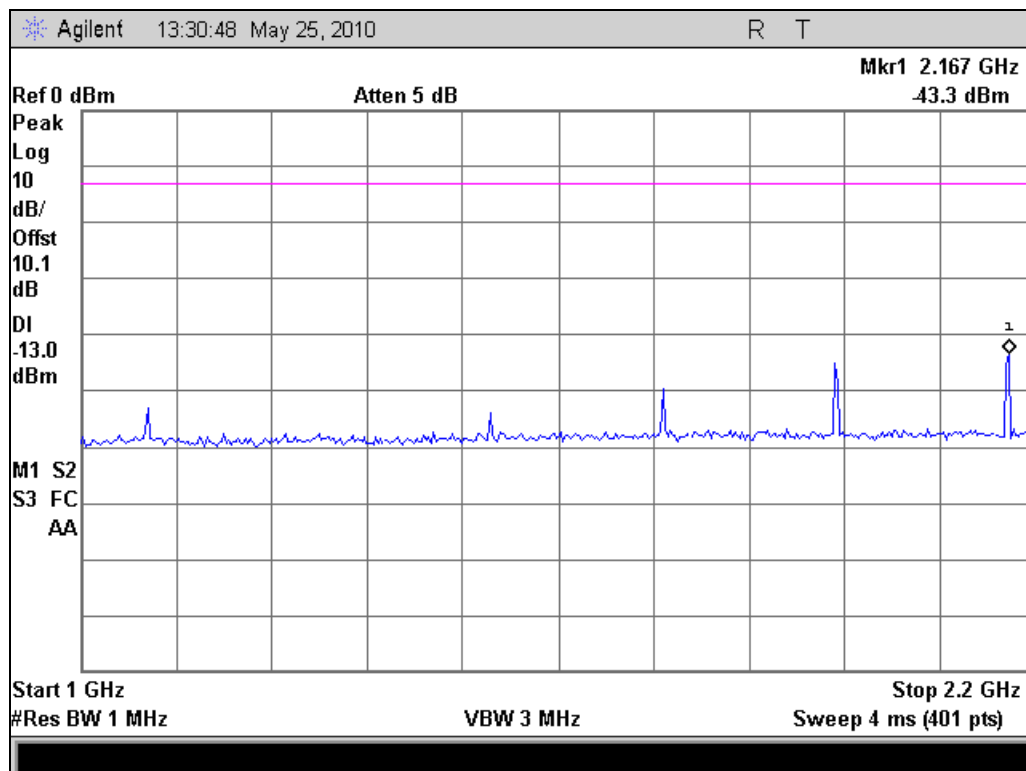
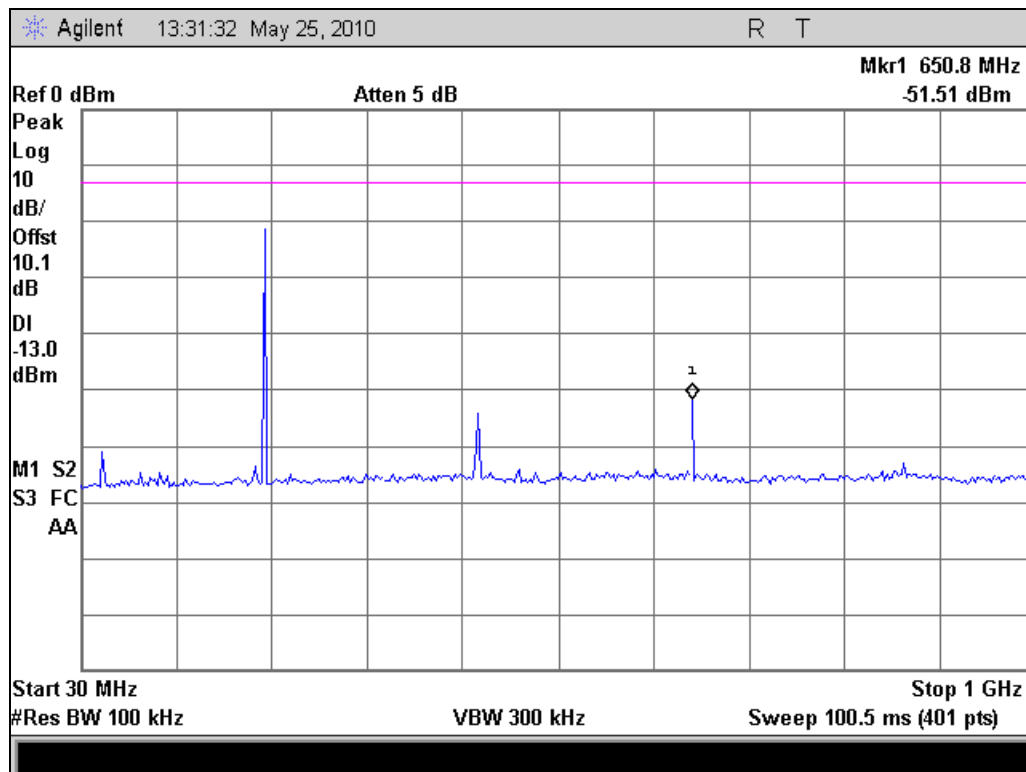


High Power Test Plots



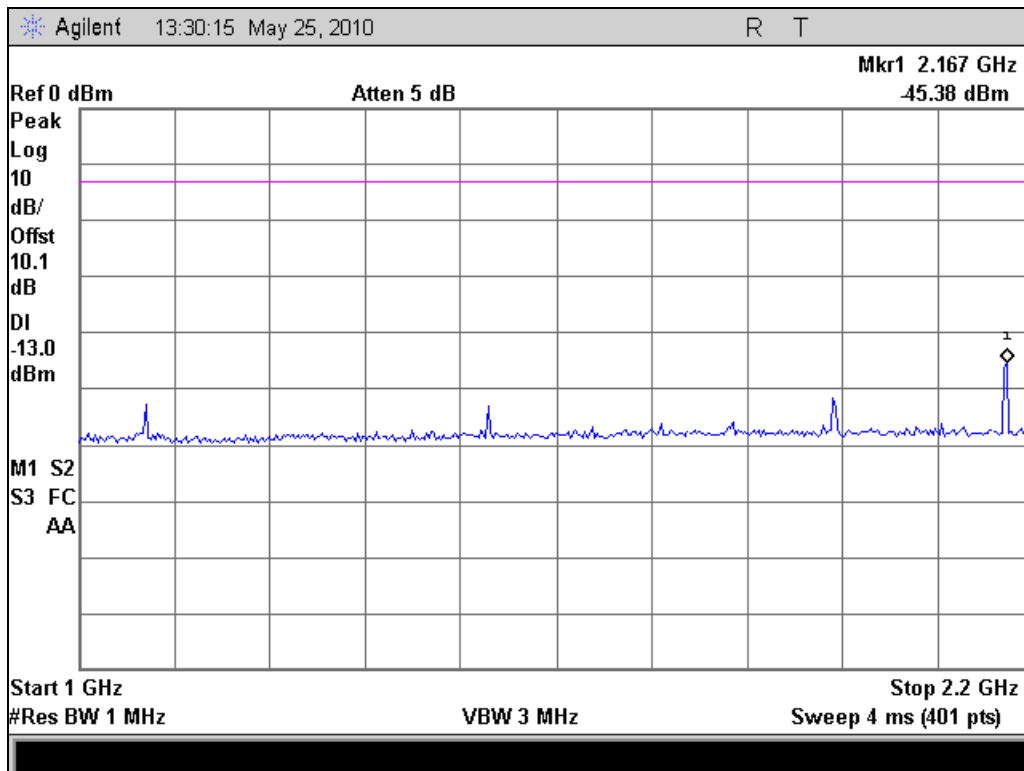
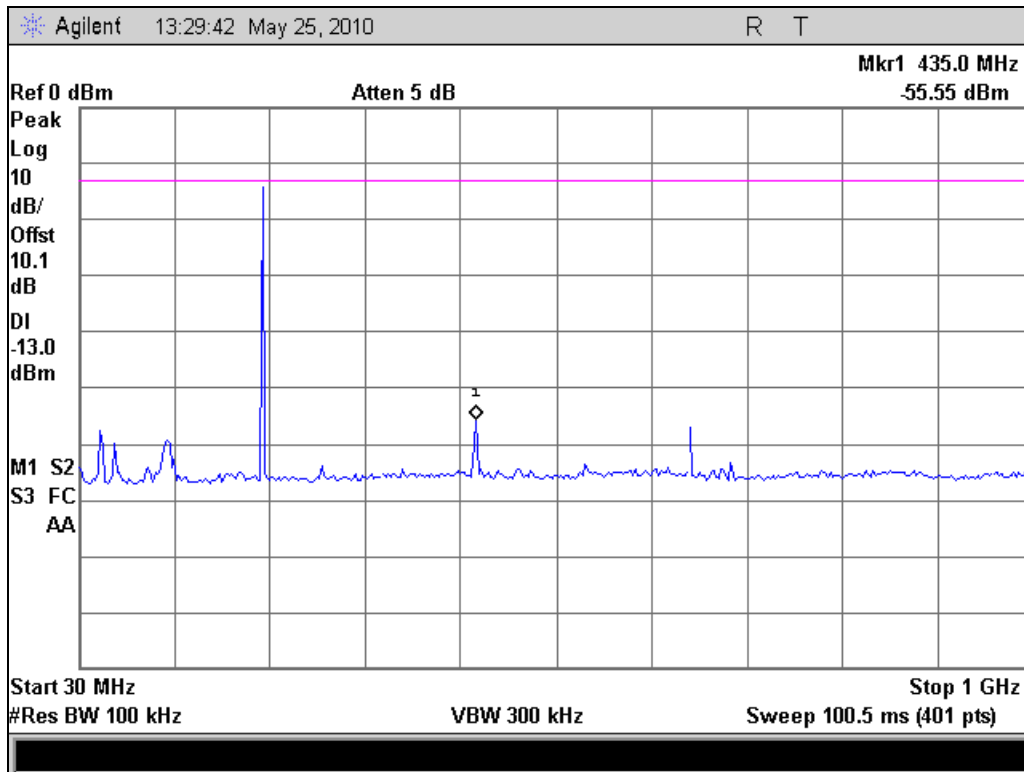


Mid Power Test Plots





Low Power Test Plots





Name of Test: Field Strength of Spurious Radiation
Specification: 2.1053, 95.639, 95.635
Test Equipment Utilized: i00049, i00267

Engineer: J. Erhard
Test Date: 5/25/2010

Test Procedure

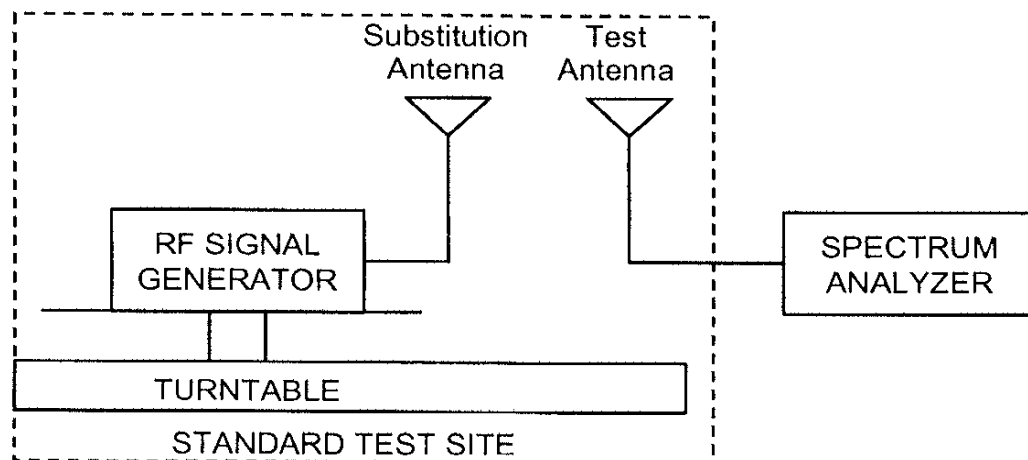
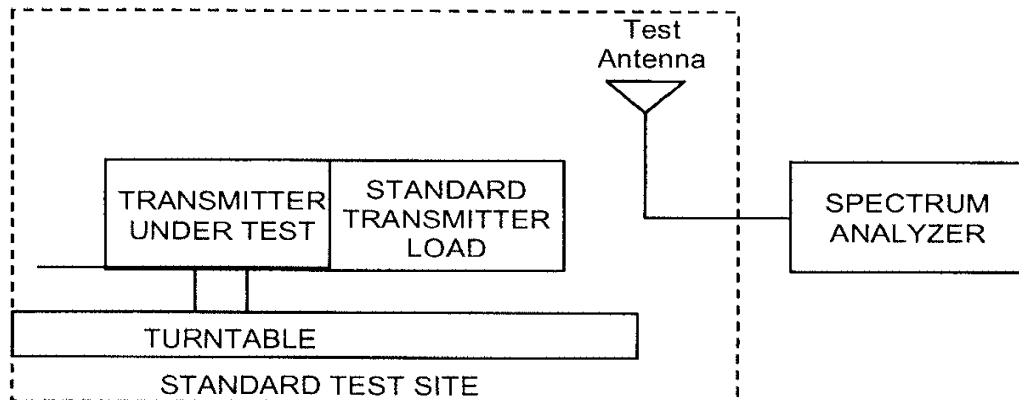
- A) Connect the equipment as illustrated
- B) Adjust the spectrum analyzer for the following settings:
 - 1) Resolution Bandwidth 100 kHz (<1 GHz), 1 MHz (> 1GHz).
 - 2) Video Bandwidth ≥ 3 times Resolution Bandwidth, or 30 kHz
 - 3) Sweep Speed ≤ 2000 Hz/second
 - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non-radiating load that is placed on the turntable. The RF cable to this load should be of minimum length.
- D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to $\pm$ the test bandwidth (see section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat step E) for each spurious frequency with the test antenna polarized vertically.
- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in step B).
- I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half-wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
- M) The levels recorded in step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:

Radiated spurious emissions dB = $10\log_{10}(\text{TX power in watts}/0.001)$ – the levels in step I)

NOTE: It is permissible that other antennas provided can be referenced to a dipole.



Test Setup



**High Power Test Results**

Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm)	Result
216.525	3.1	12.5	15.6	20	Pass
433.08	-57.7	19.4	-38.3	-13	Pass
649.61	-59.2	23.5	-35.7	-13	Pass
866.13	-55.3	26.3	-29.0	-13	Pass

Mid Power Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm)	Result
216.525	-0.2	12.5	12.3	20	Pass
433.08	-58.4	19.4	-39.0	-13	Pass
649.61	-59.0	23.5	-35.5	-13	Pass
866.13	-57.4	26.3	-31.1	-13	Pass

Low Power Test Results

Emission Frequency (MHz)	Measured Level (dBm)	Correction Factor (dB)	Corrected Value (dBm)	Limit (dBm)	Result
216.525	-2.1	12.5	10.4	20	Pass
433.08	-58.4	19.4	-39.0	-13	Pass
649.61	-58.7	23.5	-35.2	-13	Pass
866.13	-55.3	26.3	-29.0	-13	Pass

No other emissions were detected.

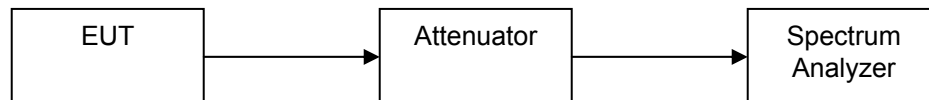


Name of Test: Emission Masks (Occupied Bandwidth)
Specification: 95.635
Test Equipment Utilized: i00331

Engineer: J. Erhard
Test Date: 5/25/2010

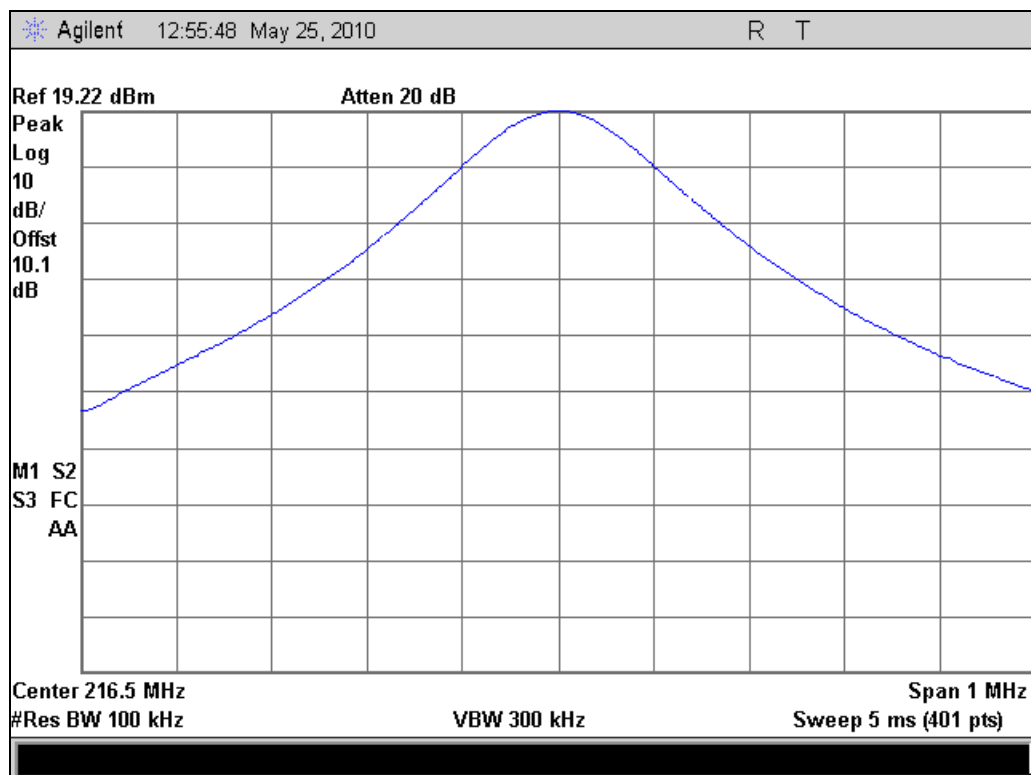
The EUT was connected directly to a spectrum analyzer to verify that the EUT meets the required emissions mask. A reference level plot is provided to verify that the peak power was established prior to testing the mask. A modulation frequency of 2.5 kHz at a level of 500 mVPP was input into the EUT for the analog tests and an internal test pattern was utilized for the digital input.

Test Setup



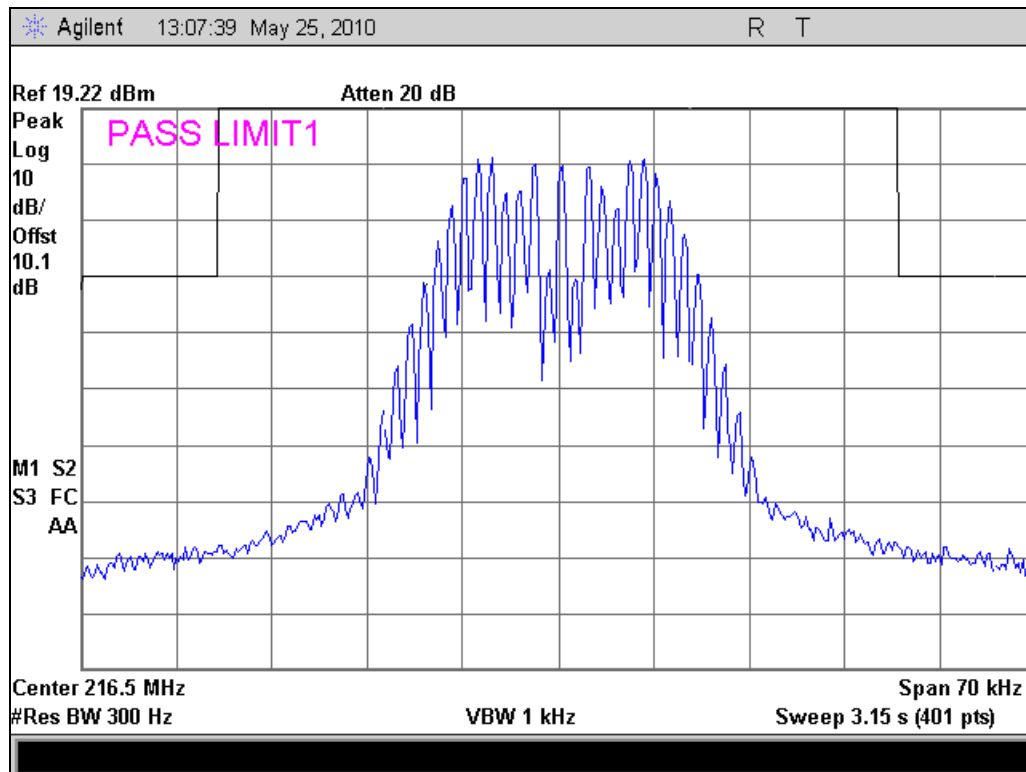
High Power Occupied Bandwidth Plots

Reference 216.525 MHz



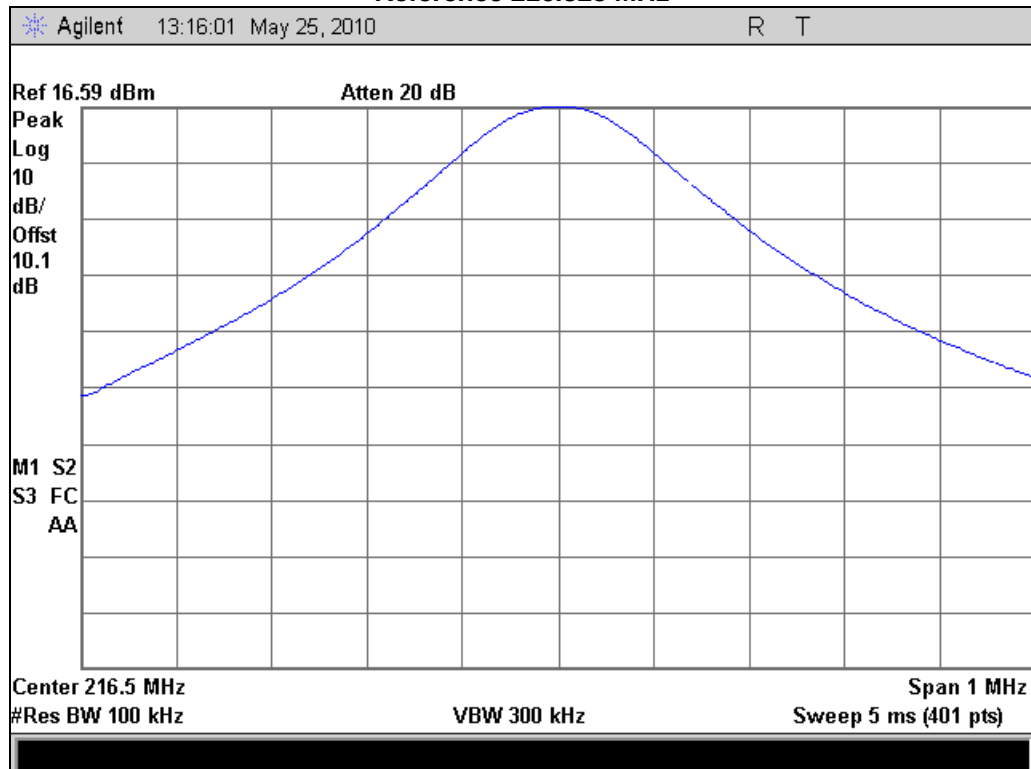


Mask 216.525 MHz



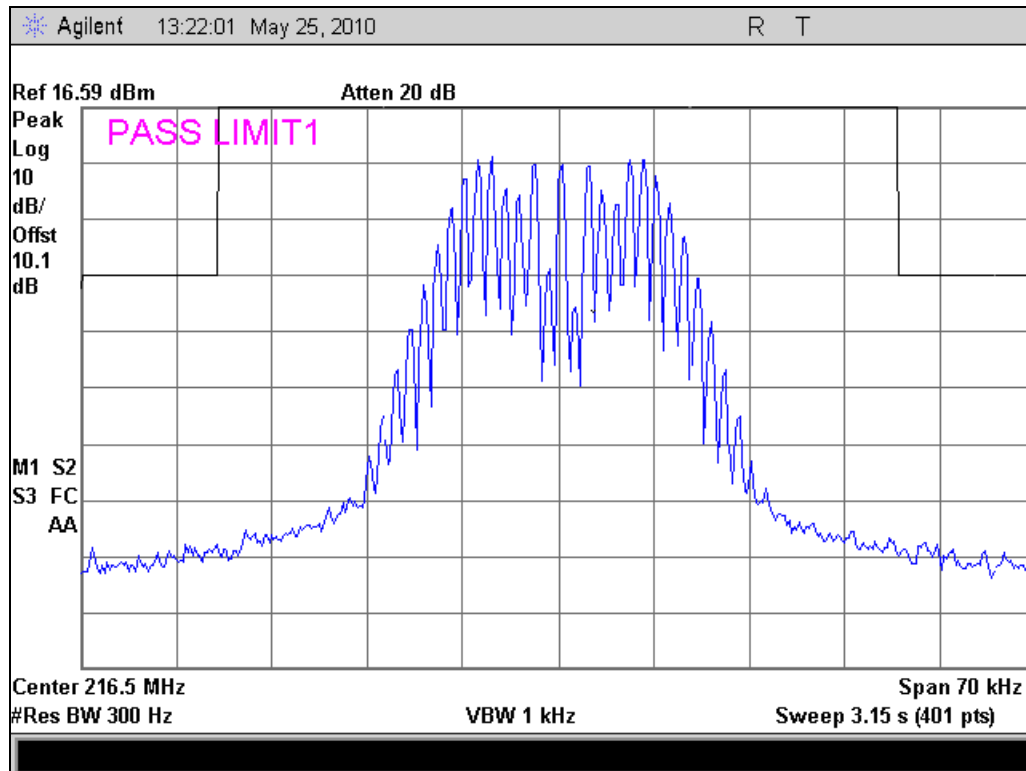
Mid Power Occupied Bandwidth Plots

Reference 216.525 MHz



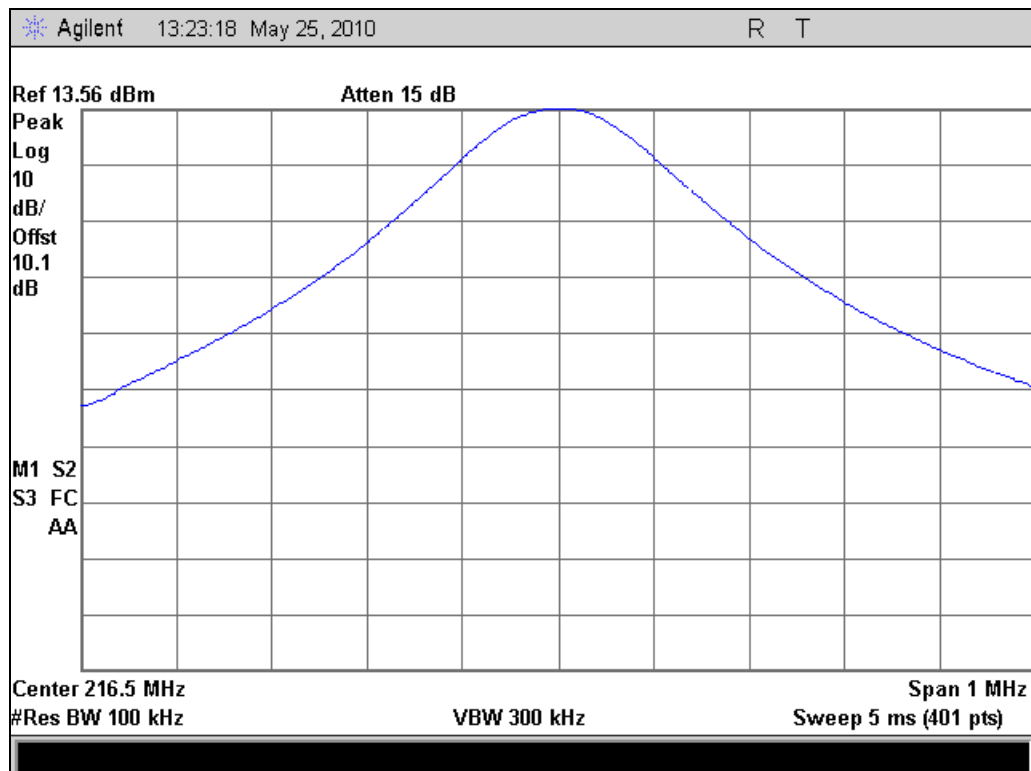


Mask 216.525 MHz



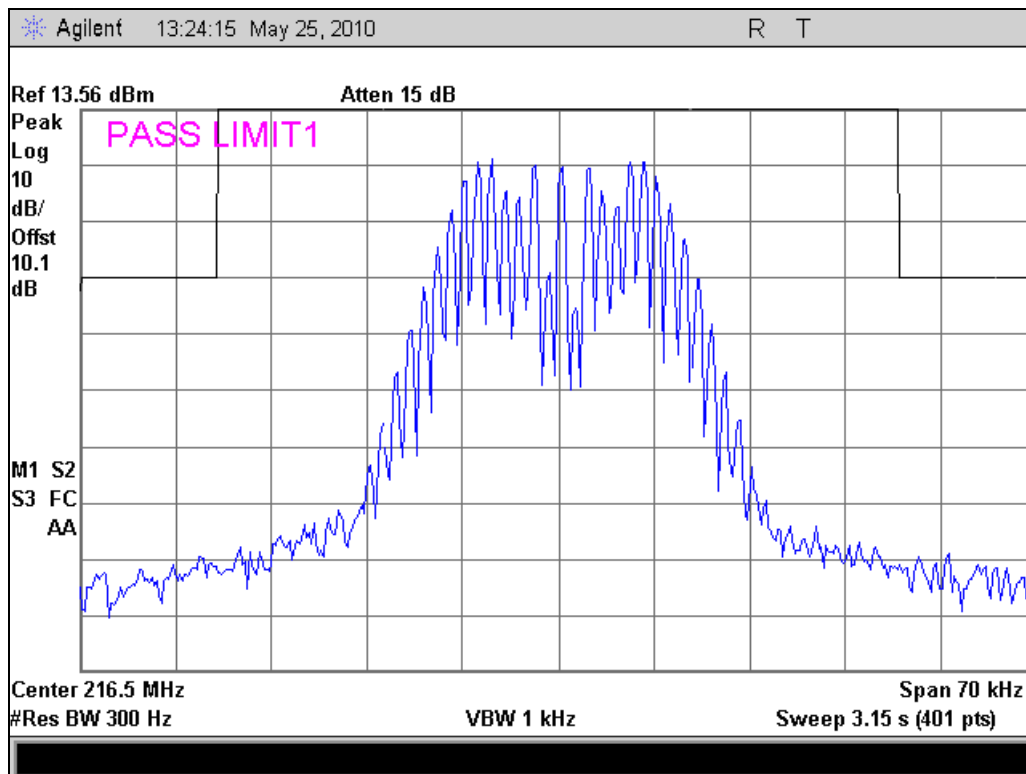
Low Power Occupied Bandwidth Plots

Reference 216.525 MHz





Mask 216.525 MHz





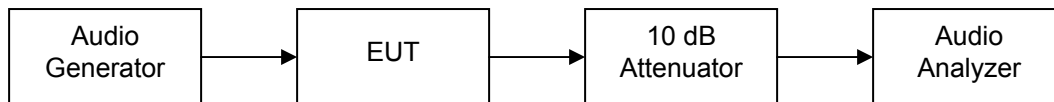
Name of Test: Audio Low Pass Filter (Voice Input)
Specification: 2.1047
Test Equipment Utilized: i00118, i00345

Engineer: J. Erhard
Test Date: 5/27/2010

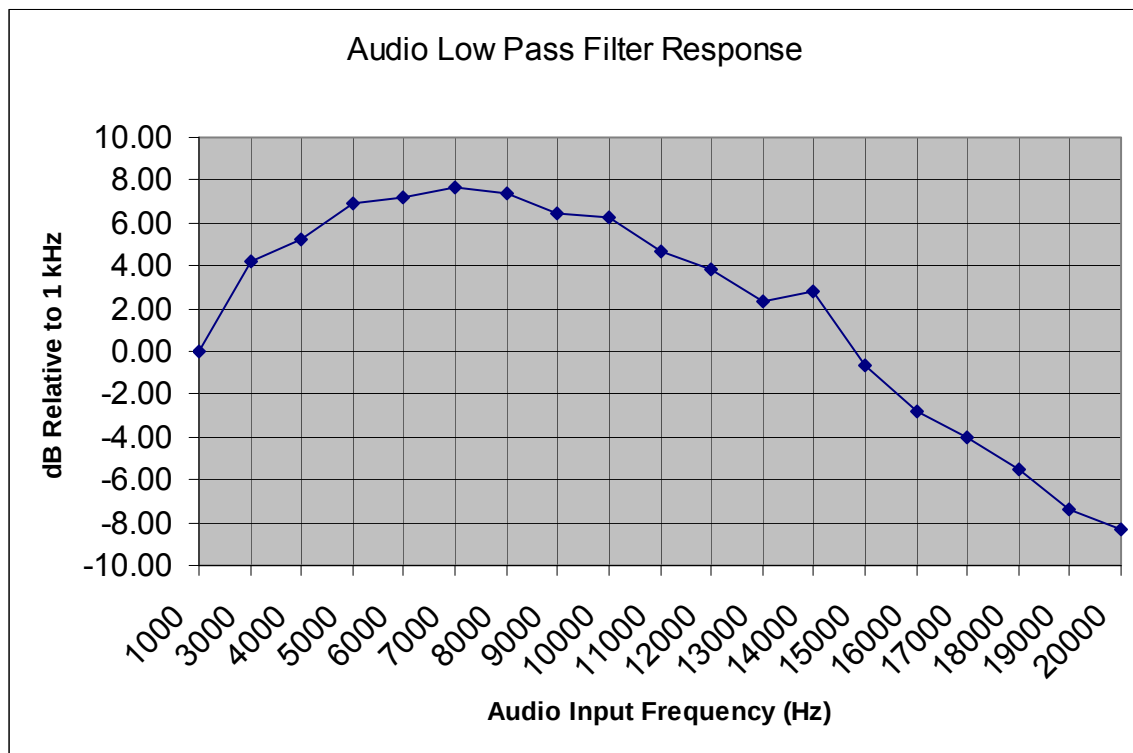
Measurement Procedure

- A) The UUT and test equipment were set up such that the audio input was connected at the input to the modulation limiter, and the modulated stage.
- B) The audio output was connected at the output to the modulated stage.

Transmitter Test Set-Up



Measurement Results





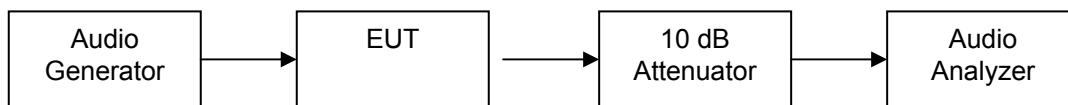
Name of Test: Audio Frequency Response
Specification: 2.1047
Test Equipment Utilized: i00118, i00345

Engineer: J. Erhard
Test Date: 5/27/2010

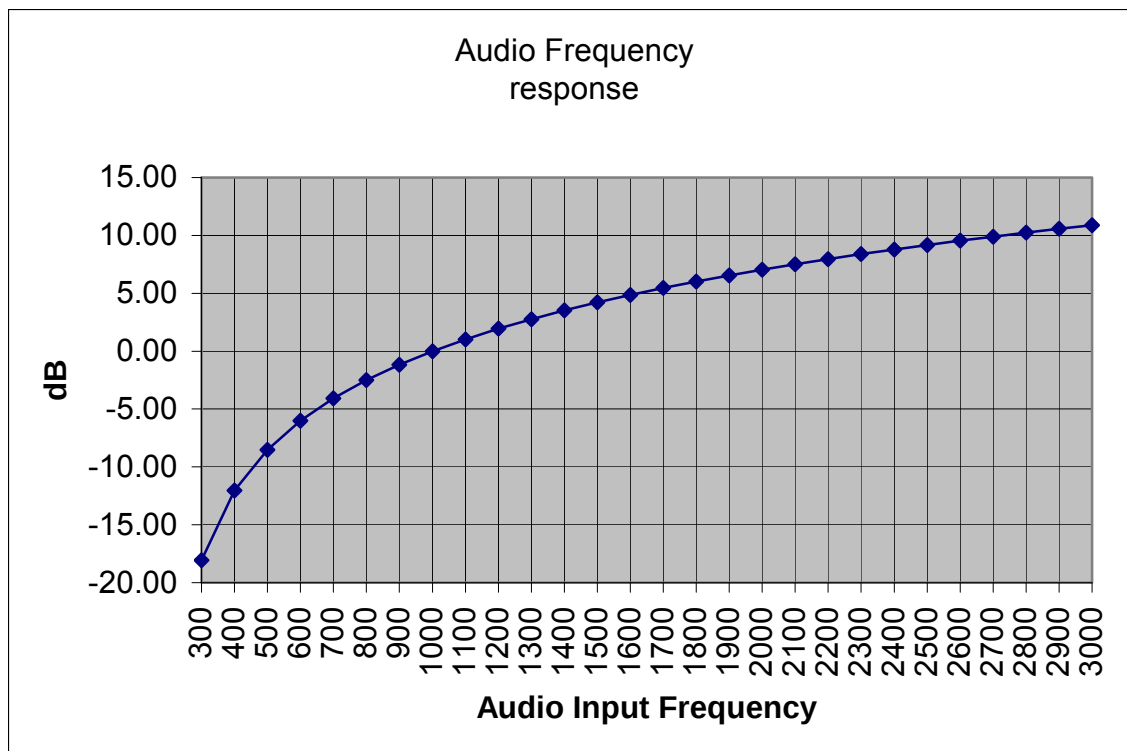
Measurement Procedure

- A) The EUT and test equipment were set up as shown below.
- B) The audio signal generator was connected to the audio input circuit/microphone of the EUT.
- C) The audio signal input was adjusted to obtain 20% modulation at 1 kHz, and this point was taken as the 0 dB reference level.
- D) With input levels held constant and below limiting at all frequencies, the audio signal generator was varied from 300 Hz to 3 kHz.
- E) The response in dB relative to 1 kHz was measured, using the HP 8951A Modulation Meter.

Test Setup



Test Results





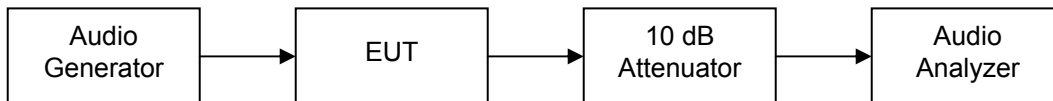
Name of Test: Modulation Limiting
Specification: 2.1047(a)
Test Equipment Utilized: i00118, i00345

Engineer: J. Erhard
Test Date: 5/26/2010

Measurement Procedure

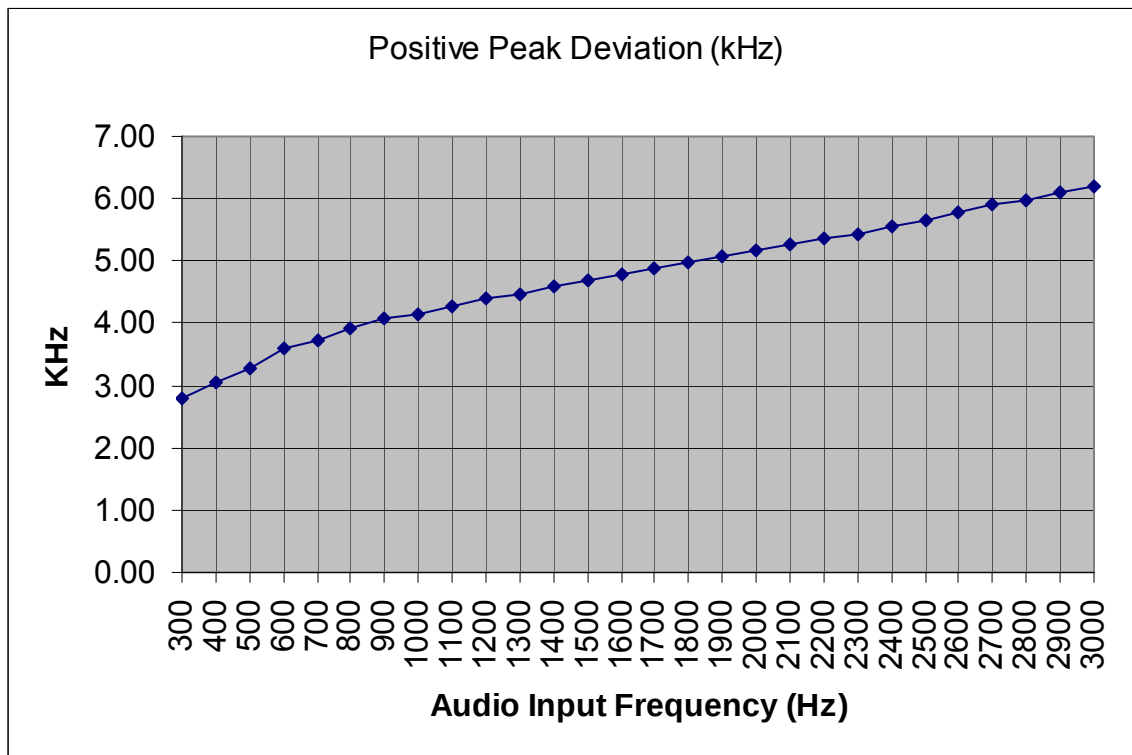
- A) The signal generator was connected to the input of the EUT as shown below.
- B) Tuned Frequency = 216.525 MHz
- C) The modulation response was measured for each of three frequencies (one of which was the frequency of maximum response), and the input voltage was varied and was observed on an HP 8951A Modulation Analyzer.
- D) The input level was varied from 30% modulation (± 1.5 kHz deviation) to at least 20 dB higher than the saturation point.
- E) Measurements were performed for both negative and positive modulation and the respective results were recorded.

Test Setup

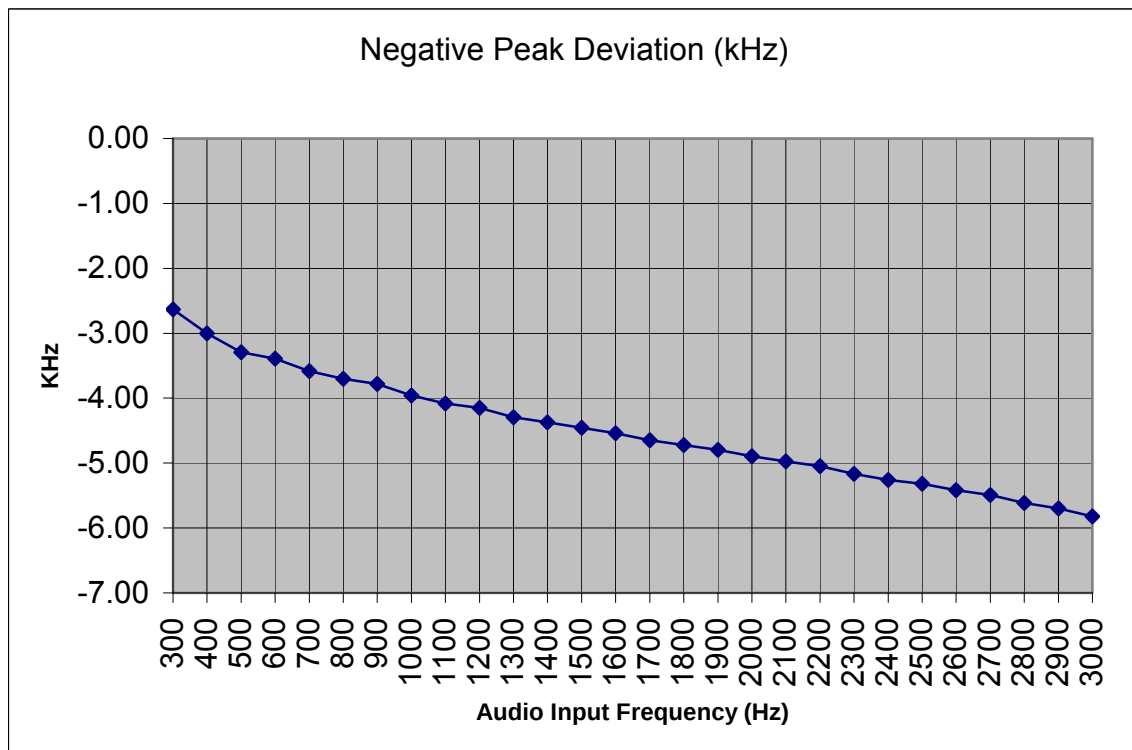




Results Positive Peaks



Test Results Negative Peaks





Name of Test: Frequency Stability (Temperature Variation)

Specification: 95.629

Test Equipment Utilized: i00027, i00331

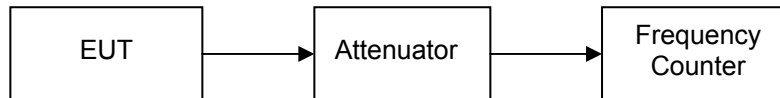
Engineer: J. Erhard

Test Date: 5/20/2010

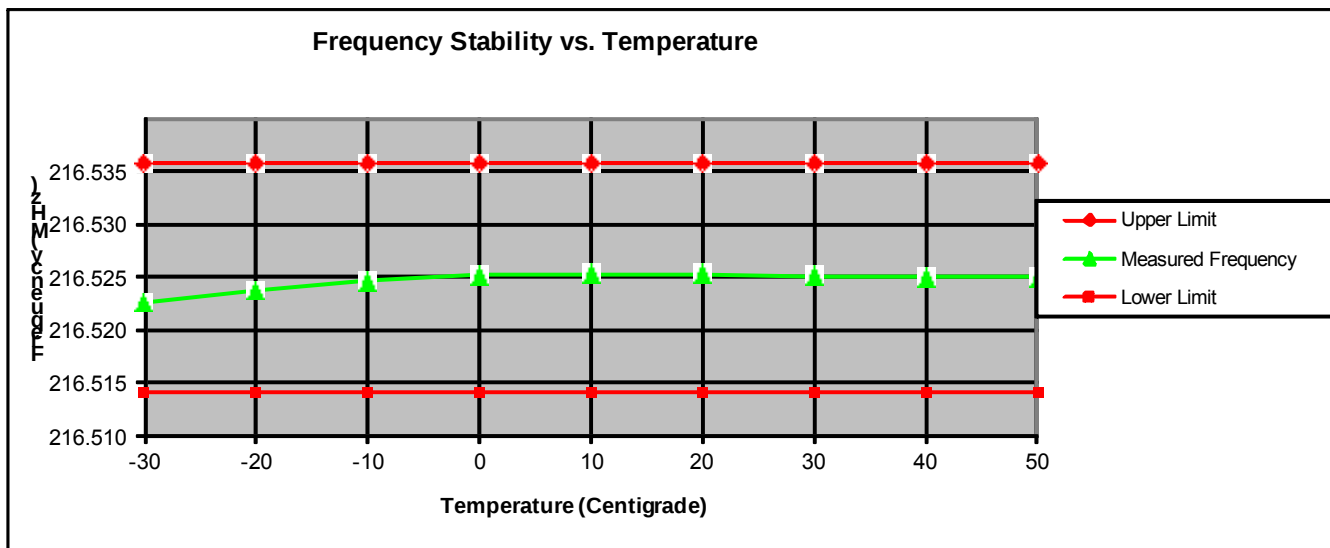
Measurement Procedure

The EUT was placed in an environmental test chamber and the RF output was connected directly to a frequency counter. The temperature was varied from -30°C to 50°C in 10°C increments. After a sufficient time for temperature stabilization the RF output frequency was measured.

Measurement Setup



Measurement Results





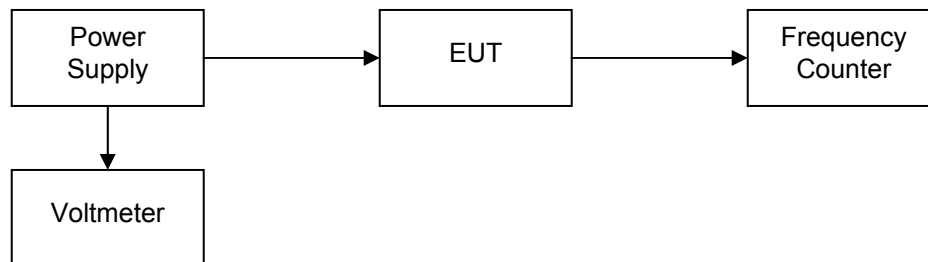
Name of Test: Frequency Stability (Voltage Variation)
Specification: 95.213
Test Equipment Utilized: i00027, i00108, i00319, i00331

Engineer: J. Erhard
Test Date: 5/20/2010

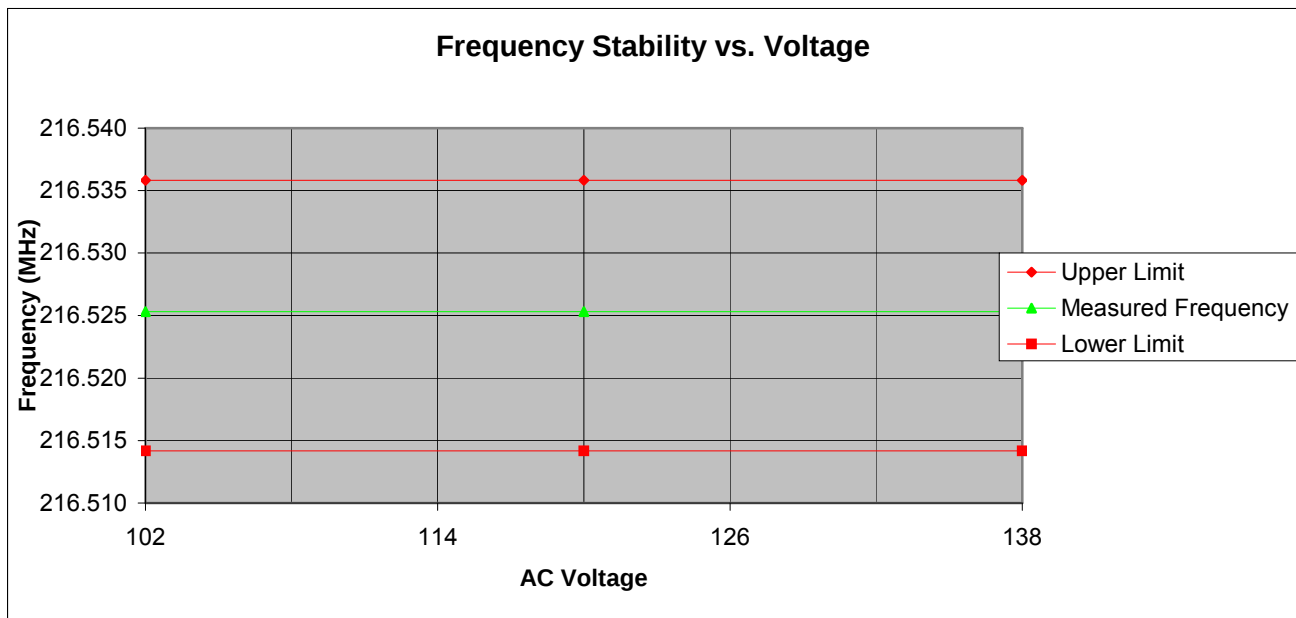
Measurement Procedure

The EUT was placed in a temperature chamber at $25 \pm 5^\circ\text{C}$ and connected directly to a frequency counter and variable power supply. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value and the RF output was measured.

Measurement Setup



Measurement Results



**Test Equipment Utilized**

Description	MFG	Model Number	CT Asset	Last Cal Date	Cal Due Date
Temperature Chamber	Tenney	Tenney Jr.	i00027	12/8/2009	12/8/2010
Spectrum Analyzer	HP	8566B	i00049	10/9/2009	10/9/2010
VARIAC	Powerstat	3PN126	i00108	NCR	NCR
Arbirtaty Waveform Generator	HP	33120A	i00118	Verify When Used	Verify When Used
Tunable Notch Filter	Eagle	TNF-1	i00124	NCR	NCR
Bilog Antenna	Schaffne	CBL6111C	i00267	11/21/2009	11/21/2011
DMM	Fluke	87III	i00319	6/8/2009	6/8/2010
Spectrum Analyzer	Agilent	E4407B	i00331	11/3/2009	11/3/2010
Real Time Spectrum Analyzer	Tektronix	RSA 3308A	i00345	10/21/2009	10/21/2010

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