



# M. Flom Associates, Inc.

## International Compliance Testing Laboratory

3356 N. San Marcos Place, Suite 107  
Chandler, AZ 85225

toll-free: (866) 311-3268  
fax: (480) 926-3598

<http://www.mflom.com>  
[info@mflom.com](mailto:info@mflom.com)

Date: August 16, 2005

Federal Communications Commission  
Via: Electronic Filing

Attention: Authorization & Evaluation Division

Applicant: Raveon Technologies Corporation  
Equipment: RRE  
FCC ID: TJ2-RRE  
FCC Rules: 95J

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.

Filing fees are attached.

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,

David E. Lee, Quality Assurance Manager

enclosure(s)  
cc: Applicant  
DEL/del



# M. Flom Associates, Inc.

## International Compliance Testing Laboratory

3356 N. San Marcos Place, Suite 107  
Chandler, AZ 85225

toll-free: (866) 311-3268  
fax: (480) 926-3598

<http://www.mflom.com>  
[info@mflom.com](mailto:info@mflom.com)

### Transmitter Certification

of

**Model:** RRE  
**FCC ID:** TJ2-RRE

to

### Federal Communications Commission

Rule Part(s) 95J, Modular and Confidentiality

Date of report: August 16, 2005

#### On the Behalf of the Applicant:

CALSENSE

#### At the Request of:

P.O. 1135

Raveon Technologies Corporation  
2722 Loker Avenue West, Suite D  
Carlsbad, CA 92008

#### Attention of:

John Sonnenberg  
760-931-8001; fax: 760-931-8004  
Email: [js@raveontech.com](mailto:js@raveontech.com)

#### Supervised by:

David E. Lee, Quality Assurance Manager

## List of Exhibits

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

Applicant: Raveon Technologies Corporation

FCC ID: TJ2-RRE

### 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 Report

### By M.F.A. Inc.:

- A. Testimonial & Statement of Certification

**The Applicant has been cautioned as to the following:**

**15.21 Information to the 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.

## Table of Contents

| <u>Rule</u>   | <u>Description</u>                                 | <u>Page</u> |
|---------------|--|-------------|
| 2.1033(c)(14) | Rule Summary                                       | 2           |
|               | Standard Test Conditions and Engineering Practices | 3           |
| 2.1033(c)     | General Information Required                       | 5           |
| 2.1046(a)     | Carrier Output Power (Conducted)                   | 8           |
| 2.1051        | Unwanted Emissions (Transmitter Conducted)         | 10          |
| 2.1053(a)     | Field Strength of Spurious Radiation               | 12          |
| 2.1049(c)(1)  | Emission Masks (Occupied Bandwidth)                | 17          |
| 2.1055(a)(1)  | Frequency Stability (Temperature Variation)        | 25          |
| 2.1055(b)(1)  | Frequency Stability (Voltage Variation)            | 27          |
| 2.202(g)      | Necessary Bandwidth and Emission Bandwidth         | 29          |

*Required information per ISO/IEC Guide 25-1990, paragraph 13.2:*

a) **Test Report**

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

c) Report Number: d0580020

d) Client: Raveon Technologies Corporation  
2722 Loker Avenue West, Suite D  
Carlsbad, CA 92008

e) Identification: RRE  
FCC ID: TJ2-RRE  
EUT Description: MURS Data Modem

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

g) Report Date: August 16, 2005  
EUT Received: August 2, 2005

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

i) Sampling method: No sampling procedure used.

l) Uncertainty: In accordance with MFA internal quality manual.

m) Supervised by:



David E. Lee, Quality Assurance 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.

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:

- ☐ 21 - Domestic Public Fixed Radio Services
- ☐ 22 - Public Mobile Services
- ☐ 22 Subpart H - Cellular Radiotelephone Service
- ☐ 22.901(d) - Alternative technologies and auxiliary services
- ☐ 23 - International Fixed Public Radiocommunication services
- ☐ 24 - Personal Communications Services
- ☐ 74 Subpart H - Low Power Auxiliary Stations
- ☐ 80 - Stations in the Maritime Services
- ☐ 80 Subpart E - General Technical Standards
- ☐ 80 Subpart F - Equipment Authorization for Compulsory Ships
- ☐ 80 Subpart K - Private Coast Stations and Marine Utility Stations
- ☐ 80 Subpart S - Compulsory Radiotelephone Installations for Small Passenger Boats
- ☐ 80 Subpart T - Radiotelephone Installation Required for Vessels on the Great Lakes
- ☐ 80 Subpart U - Radiotelephone Installations Required by the Bridge-to-Bridge Act
- ☐ 80 Subpart V - Emergency Position Indicating Radio Beacons (EPIRB'S)
- ☐ 80 Subpart W - Global Maritime Distress and Safety System (GMDSS)
- ☐ 80 Subpart X - Voluntary Radio Installations
- ☐ 87 - Aviation Services
- ☐ 90 - Private Land Mobile Radio Services
- ☐ 94 - Private Operational-Fixed Microwave Service
- ☐ 95 Subpart A - General Mobile Radio Service (GMRS)
- ☐ 95 Subpart C - Radio Control (R/C) Radio Service
- ☐ 95 Subpart D - Citizens Band (CB) Radio Service
- ☐ 95 Subpart E - Family Radio Service
- ☒ 95 Subpart J - MURS
- ☐ 97 - Amateur Radio Service
- ☐ 101 - Fixed Microwave Services

## **Standard Test Conditions and Engineering Practices**

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

In accordance with ANSI C63.4-1992/2000, section 6.1.9, 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 M. Flom Associates, 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/IEC 17025 - 1999 'General Requirements for the Competence of Testing and Calibration Laboratories' and any additional program requirements in the identified field of testing."

Certificate Number: **2152-01**



UNITED STATES DEPARTMENT OF COMMERCE  
National Institute of Standards and Technology  
Gaithersburg, Maryland 20899

September 15, 1999

Mr. Moritz Flom  
M. Flom Associates Inc.  
3356 N. San Marcos Place, Suite 107  
Chandler, AZ 85224

Dear Mr. Flom:

I am pleased to inform you that your laboratory has been validated by the Chinese Taipei Bureau of Standards, Metrology, and Inspection (BSMI) under the Asia Pacific Economic Cooperation Mutual Recognition Arrangement (APEC MRA). Your laboratory is now formally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA between the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office (TECRO) in the United States, covering equipment subject to Electro-Magnetic Compatibility (EMC) requirements. The names of all validated and nominated laboratories will be posted on the NIST website at <http://ts.nist.gov/mra> under the "Asia" category.

As of August 1, 1999, you may submit test data to BSMI to verify that the equipment to be imported into Chinese Taipei satisfies the applicable EMC requirements. Your assigned BSMI number is SL2-IN-E-041R; you must use this number when sending test reports to BSMI. Your designation will remain in force as long as your NVLAP and/or A2LA and/or BSMI accreditation remains valid for the CNS 13438.

Please note that BSMI requires that the entity making application for the approval of regulated equipment must make such application in person at their Taipei office. BSMI also requires the names of the authorized signatories who are authorized to sign the test reports. You can send this information via fax to C-Taipei CAB Response Manager at 301-975-5414. I am also enclosing a copy of the cover sheet that, according to BSMI requirements, must accompany every test report.

**NIST**

If you have any questions, please contact Robert Gladhill at 301-975-4273 or Joe Dhillon at 301-975-5523. We appreciate your continued interest in our international conformity assessment activities.

Sincerely,



Hollida L. Collins, Ph.D.  
Director, Office of Standards Services

Enclosure

## NIST

I am pleased to inform you that your laboratory has been validated by the Chinese Taipei Bureau of Standards, Metrology and Inspection (BSMI) under the Asia Pacific Economic Cooperation Mutual Recognition Agreement (APEC MRA). Your laboratory is now formally designated to act as a Conformity Assessment Body (CAB) under Appendix B, Phase I Procedures, of the APEC MRA between the American Institute in Taiwan (AIT) and the Taipei Economic and Cultural Representative Office (TECRO) in the United States, covering equipment subject to Electro-Magnetic Compatibility (EMC) requirements. The names of all validated and nominated laboratories will be posted on the NIST website at <http://ts.nist.gov/mra> under the 'Asia' category."

BSMI Number: **SL2-IN-E-041R**

## List of General Information Required for Certification

In Accordance with FCC Rules and Regulations,  
Volume II, Part 2, Part 95J, Modular, and Confidentiality

Sub-part 2.1033

(c)(1): **Name and Address of Applicant:**

CALSENSE  
2075 Corte del Nogal Suite P  
Carlsbad, CA 92011-1415

**Manufacturer:**

Applicant

(c)(2): **FCC ID:** TJ2-RRE

**Model Number:** RRE

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

Please see attached exhibits

(c)(4): **Type of Emission:** 11K2F1D

(c)(5): **Frequency Range, MHz:** 151.820 to 154.600

(c)(6): **Power Rating, Watts:** 2.0  
                     \_\_\_\_\_ Switchable                      \_\_\_\_\_ Variable                        X   N/A

(c)(7): **Maximum Power Rating, Watts:** 2.0

**DUT Results:** Passes       X       Fails \_\_\_\_\_

## Information for Push-To-Talk Devices

Type and number of antenna to be used for this device:

1

Maximum antenna gain for antenna indicated above:

Unity Gain

Can this device sustain continuous operation with respect to its hardware capabilities and allowable operating functions?

No. 10% Duty Cycle

Other hardware or operating restrictions that could limit a person's RF Exposure:

No.

Source-based time-averaging (see 2.1093 of rules) applicable to reduce the average output power:

No.

If device has headset and belt-clip accessories that would allow body-worn operations, what is the minimum separation distance between the antenna and the user's body in this operating configuration?

N/A

Can device access wire-line services to make phone calls, either directly or through an operator?

No.

Can specific operating instructions be given to users to eliminate any potential RF Exposure concerns for both front-of-the-face and body-worn operating configurations?

N/A

Other applicable information the applicant may provide that can serve as effective means for ensuring RF Exposure compliance:

Installation Instructions.

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   | = | 3.0 |
| Collector Voltage, Vdc | = | 5.0 |
| Supply Voltage, Vdc    | = | 5.0 |

(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:**

|                                     |                   |
|-------------------------------------|-------------------|
| <input type="checkbox"/>            | Attached Exhibits |
| <input checked="" type="checkbox"/> | N/A               |

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

Follows



**Name of Test:** Carrier Output Power (Conducted)

**Measurement Results**  
(Worst case)

Frequency of Carrier, MHz = 151.820, 151.880, 151.940, 154.570,  
154.600  
Ambient Temperature = 23°C ± 3°C

| Power Setting | RF Power, dBm | RF Power, Watts |
|---------------|---------------|-----------------|
| High          | 33.0          | 2.0             |



Performed By: Fred Chastain, Test Technician

**Name of Test:** Unwanted Emissions (Transmitter Conducted)

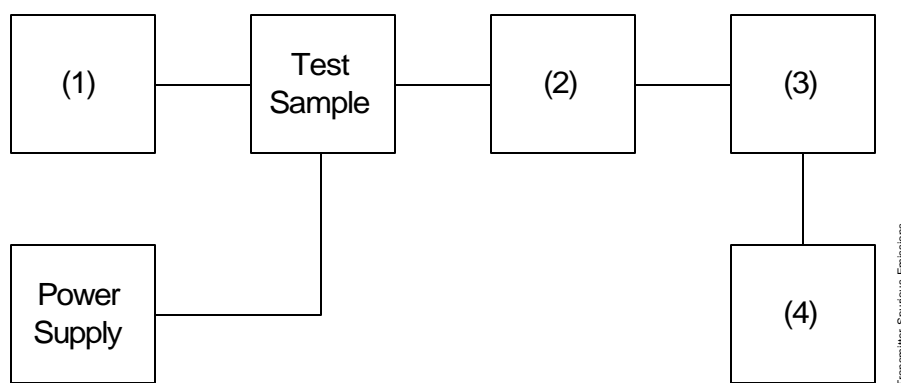
**Specification:** 47 CFR 2.1051

**Guide:** ANSI/TIA/EIA-603-1992, Paragraph 2.2.13

### Measurement Procedure

- A) The emissions were measured for the worst case as follows:
- 1). within a band of frequencies defined by the carrier frequency plus and minus one channel.
  - 2). from the lowest frequency generated in the EUT and to at least the 10th harmonic of the carrier frequency, or 40 GHz, whichever is lower.
- B) The magnitude of spurious emissions that are attenuated more than 20 dB below the permissible value need not be specified.

### Transmitter Test Set-Up: Spurious Emission



| Asset                                 | Description                       | s/n           |        |        |
|---------------------------------------|-----------------------------------|---------------|--------|--------|
| <b>(1) Audio Oscillator/Generator</b> |                                   |               |        |        |
| X i00017                              | HP 8903A Audio Analyzer           | 2216A01753    | 12 mo. | Apr-05 |
| i00002                                | HP 3336B Synthesizer / Level Gen. | 1931A01465    | 12 mo. | Apr-05 |
| <b>(2) Coaxial Attenuator</b>         |                                   |               |        |        |
| X i00231/2                            | PASTERNAK PE7021-30 (30 dB)       | 231 or 232    | NCR    |        |
| i0012/3                               | NARDA 766 (10 dB)                 | 7802 or 7802A | NCR    |        |
| <b>(3) Filters; Notch, HP, LP, BP</b> |                                   |               |        |        |
|                                       | None required                     |               |        |        |
| <b>(4) Spectrum Analyzer</b>          |                                   |               |        |        |
| X i00048                              | HP 8566B Spectrum Analyzer        | 2511A01467    | 12 mo. | Oct-04 |
| i00029                                | HP 8563E Spectrum Analyzer        | 3213A00104    | 12 mo. | May-05 |

**Name of Test:** Unwanted Emissions (Transmitter Conducted)

**Measurement Results**  
(Worst Case)

Summary:

|                           |                                |   |
|---------------------------|--------------------------------|---|
| Frequency of carrier, MHz | =                              | 151.820, 151.880, 151.940, 154.570, 154.600 |
| Spectrum Searched, GHz    | =                              | 0 to 10 x F <sub>c</sub>                    |
| Maximum Response, Hz      | =                              | N/A   |
| All Other Emissions       | =                              | = 20 dB Below Limit                         |
| Limit(s), dBc             | (43 + Log <sub>10</sub> (P)) = | -13dBm                                      |

Tabulated Results follow:

**Measurement Results**

All readings were less than -33dBm



Performed By:

Fred Chastain, Test Technician



**Name of Test:** Field Strength of Spurious Radiation

**Specification:** 47 CFR 2.1053(a)

**Guide:** ANSI/TIA/EIA-603-1992/2001, Paragraph 1.2.12 and Table 16, 47 CFR 22.917

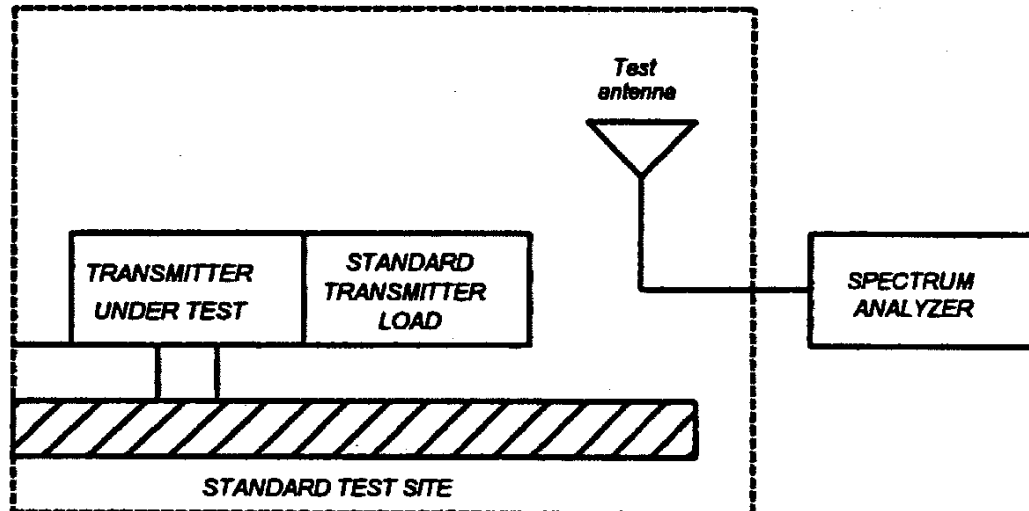
### Measurement Procedure

#### Definition:

Radiated spurious emissions are emissions from the equipment when transmitting into a non-radiating load on a frequency or frequencies which are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

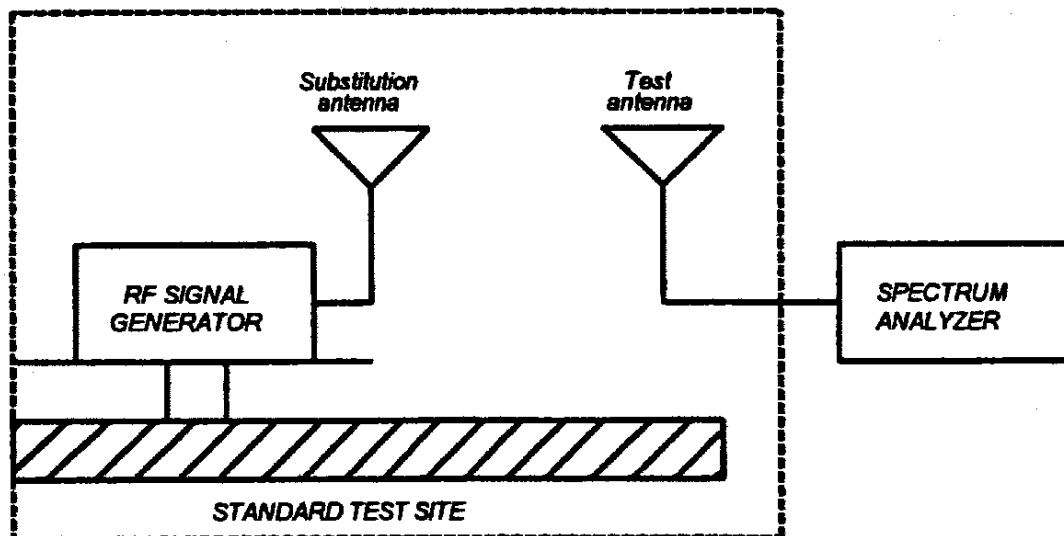
#### Method of Measurement:

- 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 (22.917)
  - 3) Sweep Speed  $\leq 2000$  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.



**Name of Test:** Field Strength of Spurious Radiation (Cont.)

- 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.

**Name of Test:** Field Strength of Spurious Radiation (Cont.)

- 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 =

$$10\log_{10}(\text{TX power in watts}/0.001) - \text{the levels in step I)}$$

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

**Test Equipment**

| Asset                  | Description | s/n                       | Cycle      | Last Cal |        |
|------------------------|-------------|---------------------------|------------|----------|--------|
| Transducer             |             |                           |            |          |        |
|                        | i00088      | EMCO 3109-B 25MHz-300MHz  | 2336       | 24 mo.   | Sep-03 |
| X                      | i00089      | Apriel 2001 200MHz-1GHz   | 001500     | 24 mo.   | Sep-03 |
| X                      | i00103      | EMCO 3115 1GHz-18GHz      | 9208-3925  | 24 mo.   | Jan-04 |
| Amplifier              |             |                           |            |          |        |
| X                      | i00028      | HP 8449A                  | 2749A00121 | 12 mo.   | May-05 |
| Spectrum Analyzer      |             |                           |            |          |        |
| X                      | i00029      | HP 8563E                  | 3213A00104 | 12 mo.   | May-05 |
| X                      | i00033      | HP 85462A                 | 3625A00357 | 12 mo.   | Sep-04 |
| Substitution Generator |             |                           |            |          |        |
| X                      | i00067      | HP 8920A Communication TS | 3345U01242 | 12 mo.   | Jun-05 |
|                        | i00207      | HP 8753D Network Analyzer | 3410A08514 | 12 mo.   | Jul-05 |

**Microphone, Antenna Port, and Cabling**

|                              |            |              |                                  |
|------------------------------|------------|--------------|----------------------------------|
| Microphone                   | <u>No</u>  | Cable Length | <u>          </u> Meters         |
| Antenna Port Terminated      | <u>Yes</u> | Load         | <u>Yes</u> Antenna Gain <u>-</u> |
| All Ports Terminated by Load | <u>Yes</u> | Peripheral   | <u>No</u>                        |

**Name of Test:** Field Strength of Spurious Radiation

### Measurement Results

g0580148: 2005-Aug-23 Tue 12:57:00

STATE: 2:High Power

Ambient Temperature: 23°C ± 3°C

| Frequency Tuned, MHz | Frequency Emission, MHz | ERP, dBm | ERP, dBc |
|----------------------|-------------------------|----------|----------|
| 151.820000           | 303.640000              | -71.50   | -104.50  |
| 154.600000           | 309.178000              | -68.40   | -101.40  |
| 154.600000           | 309.203000              | -65.10   | -98.10   |
| 151.820000           | 455.460000              | -55.00   | -88.00   |
| 154.600000           | 463.710000              | -55.30   | -88.30   |
| 154.600000           | 463.803000              | -55.60   | -88.60   |
| 154.600000           | 618.310000              | -63.90   | -96.90   |
| 154.600000           | 618.403000              | -63.70   | -96.70   |
| 151.820000           | 759.100000              | -63.70   | -96.70   |
| 154.600000           | 772.910000              | -61.00   | -94.00   |
| 154.600000           | 772.978000              | -60.40   | -93.40   |
| 154.600000           | 773.003000              | -58.50   | -91.50   |
| 151.820000           | 910.920000              | -60.80   | -93.80   |
| 154.600000           | 927.510000              | -60.60   | -93.60   |
| 154.600000           | 927.578000              | -59.60   | -92.60   |
| 154.600000           | 927.603000              | -59.10   | -92.10   |
| 151.820000           | 1062.690000             | -58.50   | -91.50   |
| 151.820000           | 1062.690000             | -61.20   | -94.20   |
| 151.940000           | 1063.530000             | -62.10   | -95.10   |
| 151.940000           | 1063.530000             | -60.20   | -93.20   |
| 154.600000           | 1082.150000             | -60.70   | -93.70   |
| 154.600000           | 1082.150000             | -61.60   | -94.60   |
| 151.820000           | 1214.510000             | -59.90   | -92.90   |
| 151.820000           | 1214.510000             | -56.70   | -89.70   |
| 151.940000           | 1215.470000             | -56.50   | -89.50   |
| 151.940000           | 1215.470000             | -62.80   | -95.80   |
| 154.600000           | 1236.750000             | -61.70   | -94.70   |
| 154.600000           | 1236.750000             | -56.00   | -89.00   |
| 151.820000           | 1366.330000             | -60.80   | -93.80   |
| 151.820000           | 1366.330000             | -61.20   | -94.20   |
| 151.940000           | 1367.410000             | -58.90   | -91.90   |
| 151.940000           | 1367.410000             | -58.80   | -91.80   |
| 154.600000           | 1391.350000             | -59.40   | -92.40   |
| 154.600000           | 1391.350000             | -60.60   | -93.60   |

**Name of Test:** Field Strength of Spurious Radiation

Continued

| Frequency Tuned, MHz | Frequency Emission, MHz | ERP, dBm | ERP, dBc |
|----------------------|-------------------------|----------|----------|
| 151.820000           | 1518.150000             | -57.50   | -90.50   |
| 151.820000           | 1518.150000             | -56.10   | -89.10   |
| 151.940000           | 1519.350000             | -58.30   | -91.30   |
| 151.940000           | 1519.350000             | -58.60   | -91.60   |
| 154.600000           | 1545.950000             | -55.60   | -88.60   |
| 154.600000           | 1545.950000             | -57.80   | -90.80   |



Performed By:

Fred Chastain, Test Technician

**Name of Test:** Emission Masks (Occupied Bandwidth)

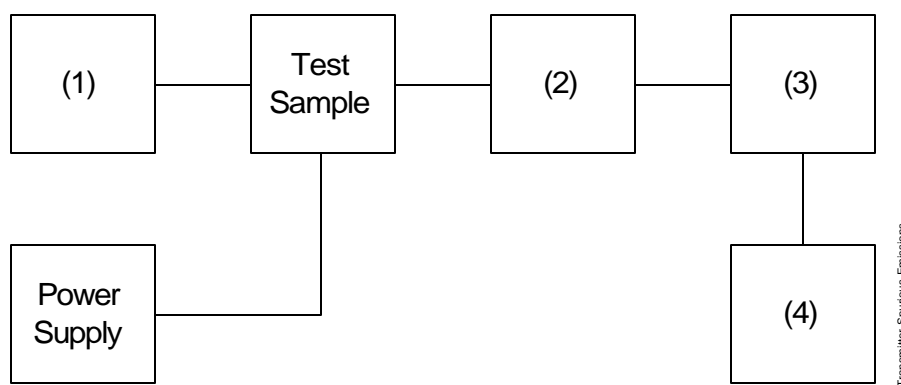
**Specification:** 47 CFR 2.1049(c)(1)

**Guide:** ANSI/TIA/EIA-603-1992, Paragraph 2.2.11

### Measurement Procedure

- A) The EUT and test equipment were set up as shown below
- B) For EUTs supporting audio modulation, the audio signal generator was adjusted to the frequency of maximum response and with output level set for  $\pm 2.5/\pm 1.25$  kHz deviation (or 50% modulation). With level constant, the signal level was increased 16 dB.
- C) For EUTs supporting digital modulation, the digital modulation mode was operated to its maximum extent.
- D) The Occupied Bandwidth was measured with the Spectrum Analyzer controls set as shown on the test results.

### Transmitter Test Set-Up: Occupied Bandwidth



| Asset                                 | Description                    | s/n        | Cycle  | Last Cal |
|---------------------------------------|--------------------------------|------------|--------|----------|
| <b>(1) Audio Oscillator/Generator</b> |                                |            |        |          |
| X i00017                              | HP 8903A Modulation Meter      | 2216A01753 | 12 mo. | Apr-05   |
| <b>(2) Coaxial Attenuator</b>         |                                |            |        |          |
| X i00231/2                            | PASTERNAK PE7021-30 (30 dB)    | 231 or 232 | NCR    |          |
| i00123                                | NARDA 766 (10 dB)              | 7802A      | NCR    |          |
| <b>(3) Interface</b>                  |                                |            |        |          |
| X i00021                              | HP 8954A Transceiver Interface | 2146A00159 | NCR    |          |
| <b>(4) Spectrum Analyzer</b>          |                                |            |        |          |
| X i00048                              | HP 8566B Spectrum Analyzer     | 2511A01467 | 12 mo. | Oct-04   |
| i00029                                | HP 8563E Spectrum Analyzer     | 3213A00104 | 12 mo. | May-05   |

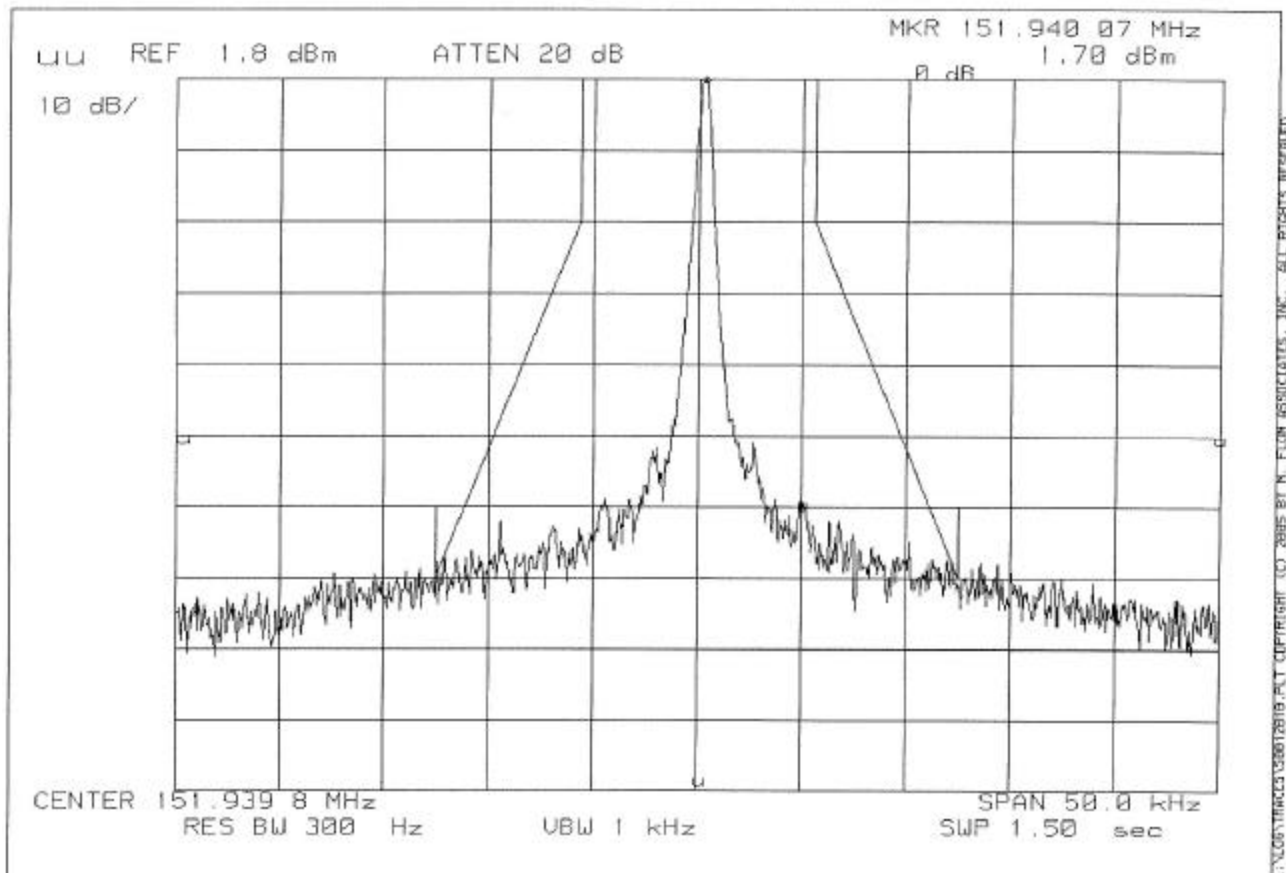
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:55, FRI

POWER: HIGH  
MODULATION:  
REMARK: CW MODE CH 3



*Fred Chastain*

Performed By:

Fred Chastain, Test Technician

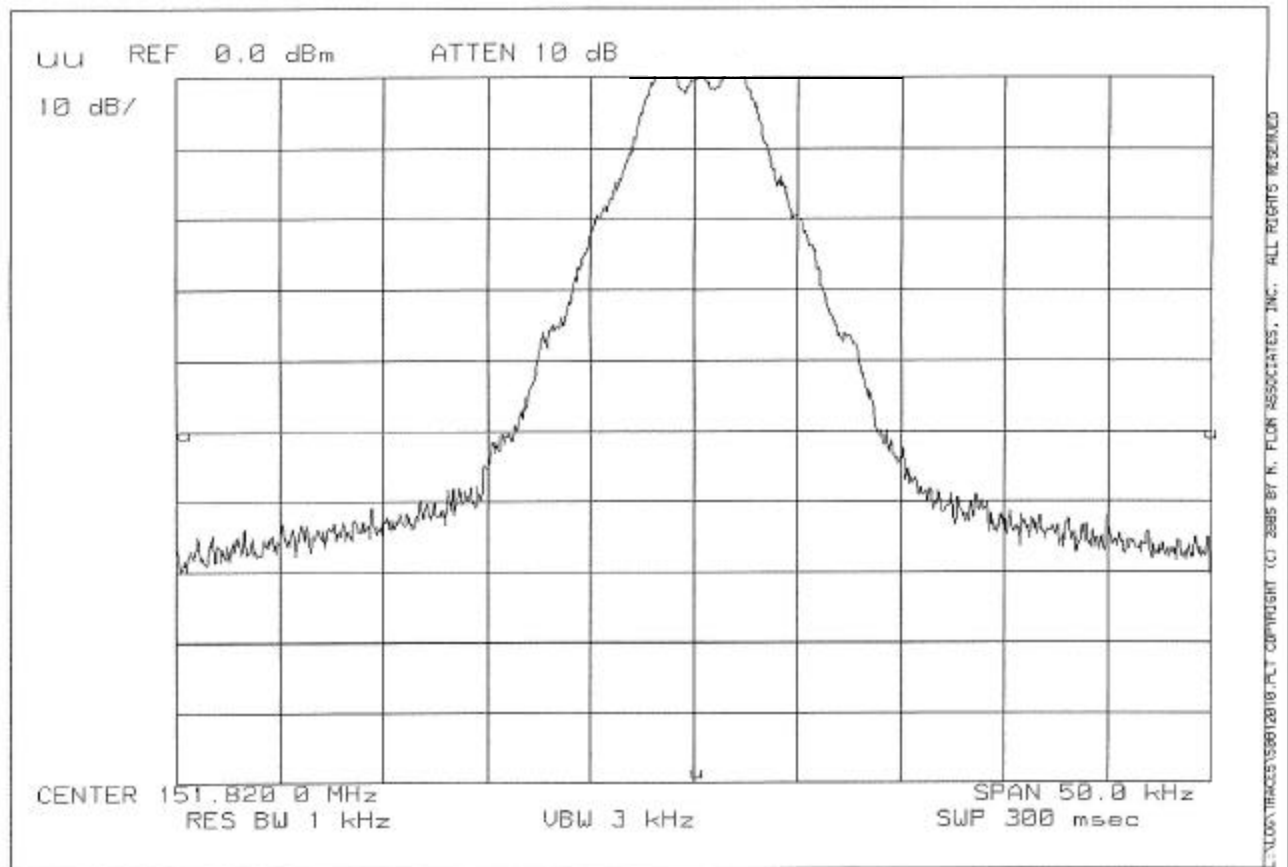
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:24, FRI

POWER: HIGH  
MODULATION: RANDOM DATA  
REMARK: MAX PWR CH 1



Channel 1 Frequency and Level

*Fred Chastain*

Performed By:

Fred Chastain, Test Technician





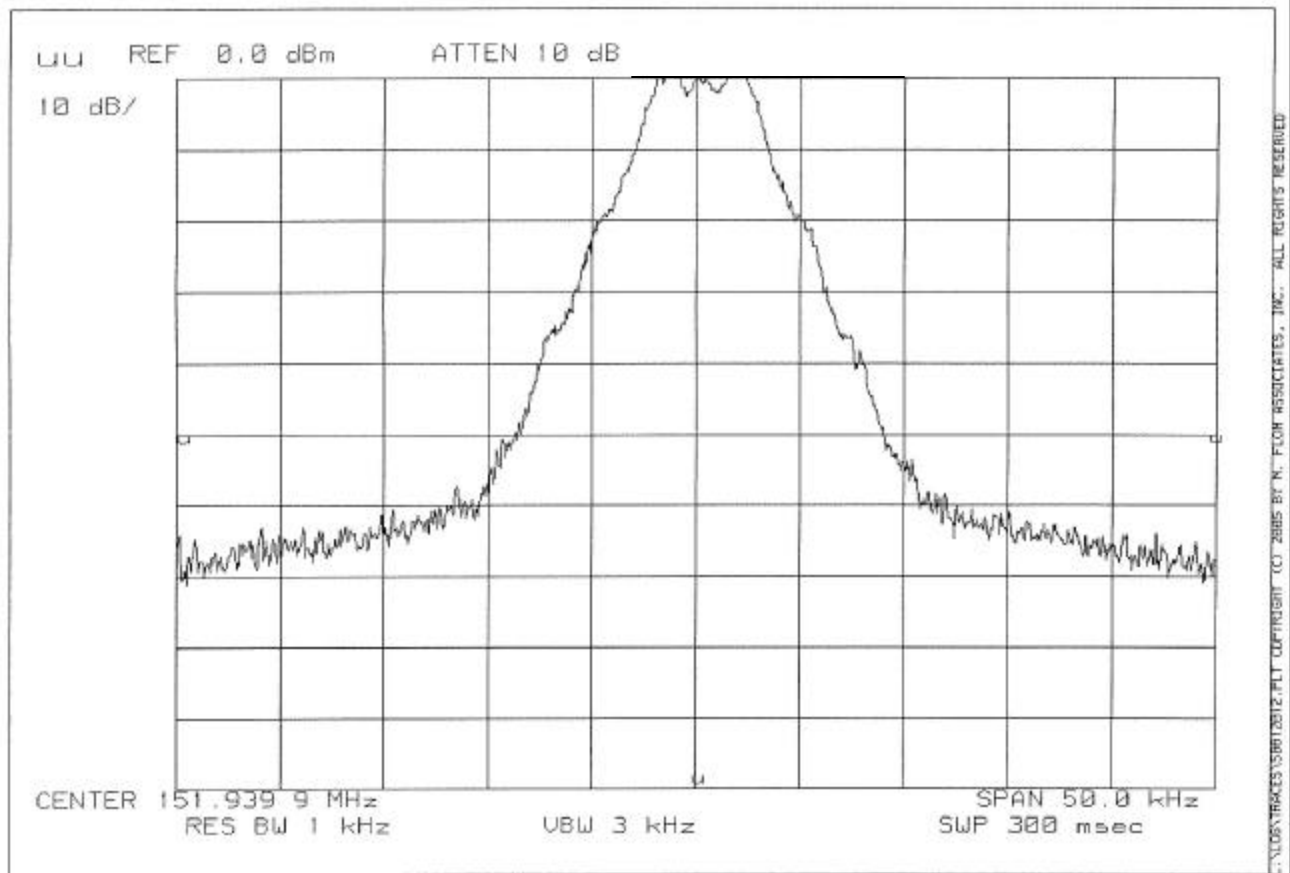
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:31, FRI

POWER: HIGH  
MODULATION: RANDOM DATA  
REMARK: MAX PWR CH 3



Channel 3 Frequency and Level

*Fred Chastain*

Performed By:

Fred Chastain, Test Technician

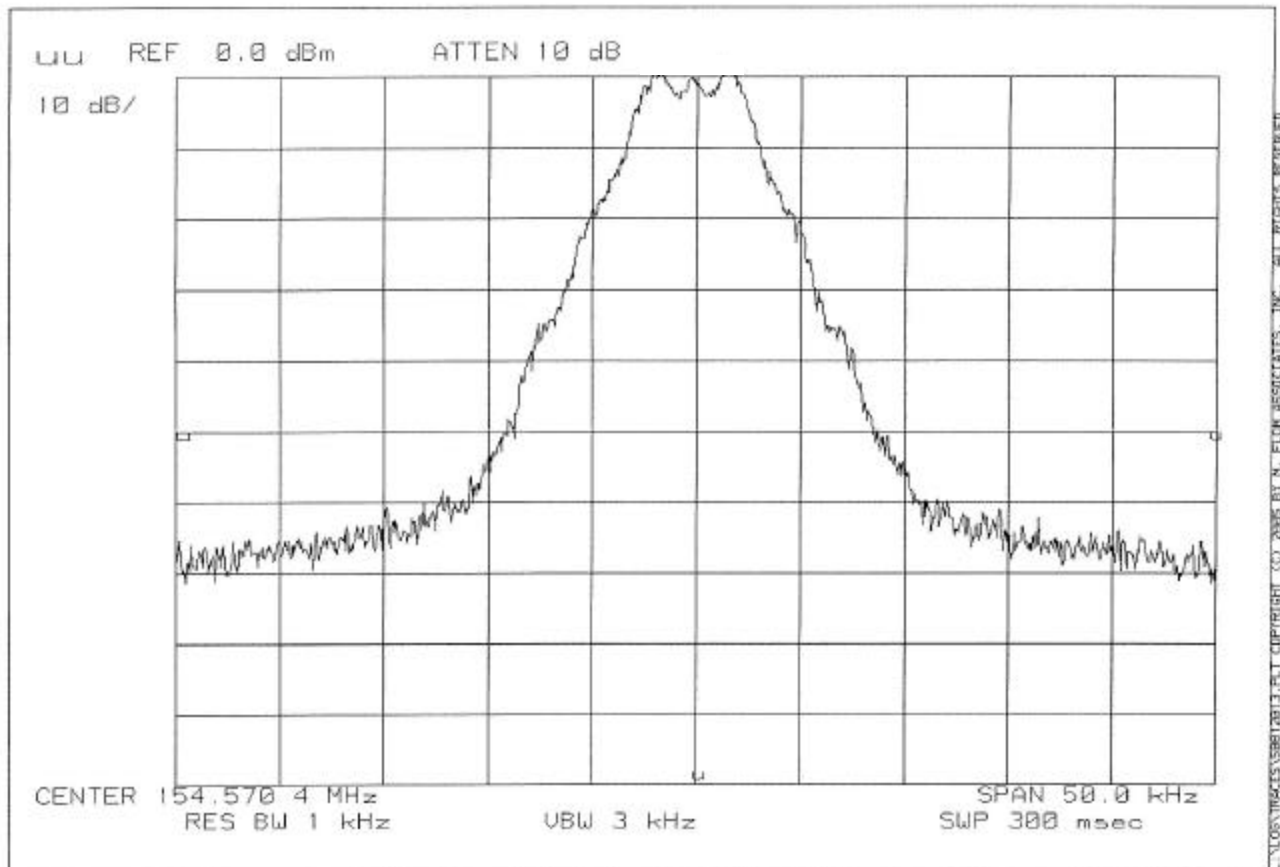
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:34, FRI

POWER: HIGH  
MODULATION: RANDOM DATA  
REMARK: MAX PWR CH 4



Channel 4 Frequency and Level

*Fred Chastain*

Performed By:

Fred Chastain, Test Technician

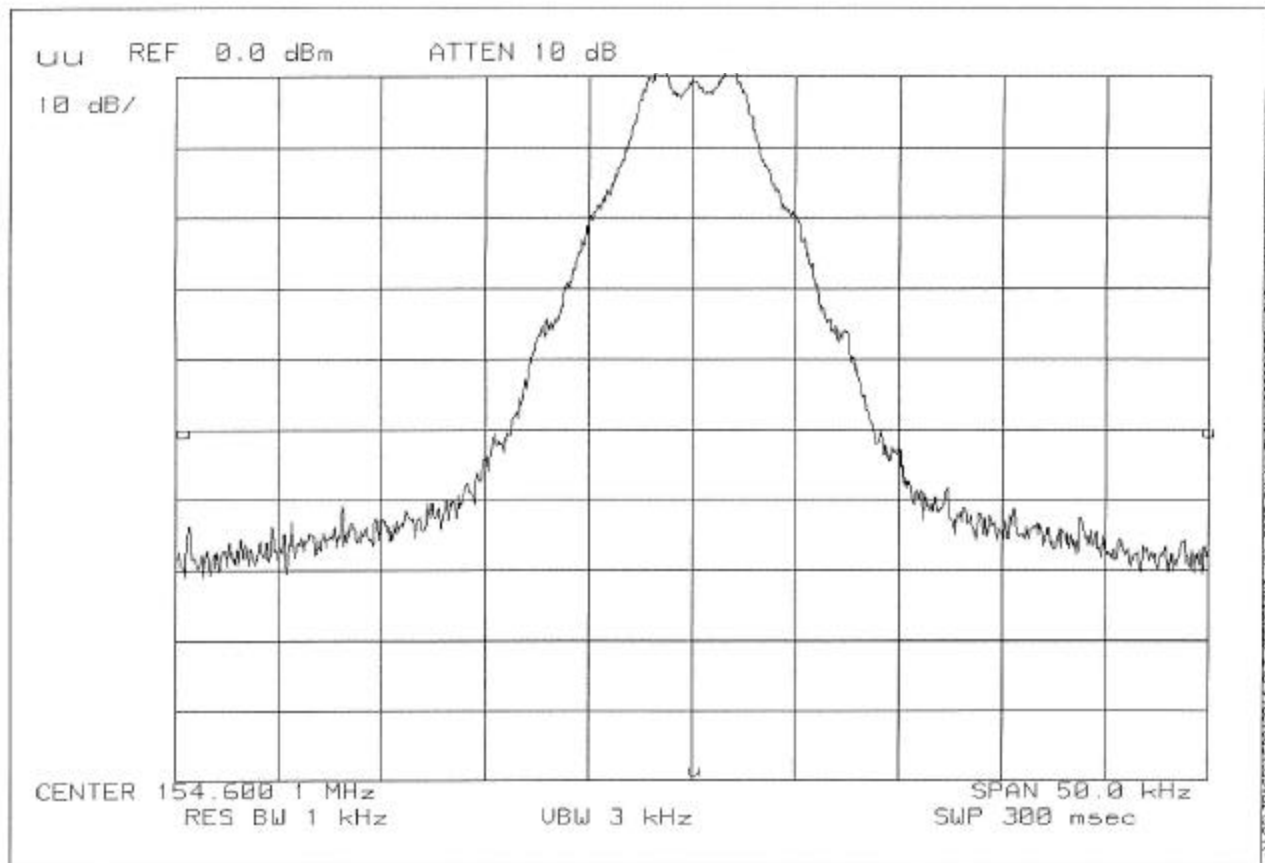
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:36, FRI

POWER: HIGH  
MODULATION: RANDOM DATA  
REMARK: MAX PWR CH 5



Channel 5 Frequency and Level

*Fred Chastain*

Performed By:

Fred Chastain, Test Technician

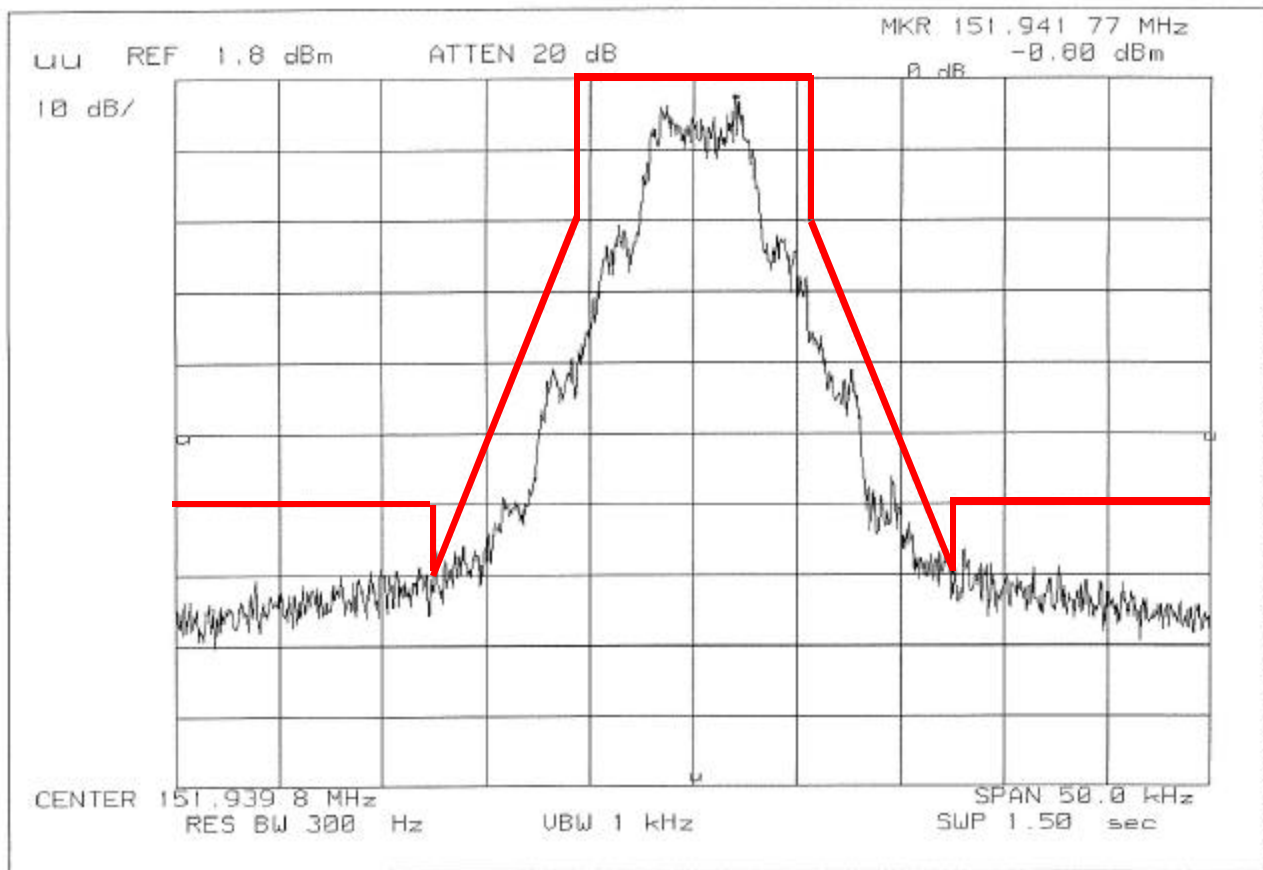
Name of Test: Emission Masks (Occupied Bandwidth)

### Measurement Results

Ambient Temperature: 23°C ± 3°C

2005-AUG-12, 14:53, FRI

POWER: HIGH  
MODULATION: RANDOM DATA  
REMARK: BW CH 3



Occupied Bandwidth 12.5kHz Channel / 11K2F1D, Mask 95J

*Fred Chastain*

Performed By:

Fred Chastain, Test Technician

**Name of Test:** Frequency Stability (Temperature Variation)

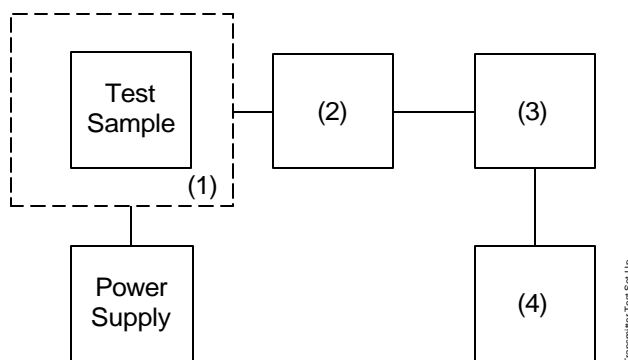
**Specification:** 47 CFR 2.1055(a)(1)

**Guide:** ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

### Measurement Procedure

- A) The EUT and test equipment were set up as shown on the following page.
- B) With all power removed, the temperature was decreased to -30°C and permitted to stabilize for three hours. Power was applied and the maximum change in frequency was noted within one minute.
- C) With power OFF, the temperature was raised in 10°C steps. The sample was permitted to stabilize at each step for at least one-half hour. Power was applied and the maximum frequency change was noted within one minute.
- D) The temperature tests were performed for the worst case.

### Transmitter Test Set-Up: Temperature Variation



| Asset                                       | Description                 | s/n           | Cycle  | Last Cal |
|---|-----------------------------|---------------|--------|----------|
| <b>(1) Temperature, Humidity, Vibration</b> |                             |               |        |          |
| X i00027                                    | Tenney Temp. Chamber        | 9083-765-234  | NCR    |          |
| <b>(2) Coaxial Attenuator</b>               |                             |               |        |          |
| X i00231/2                                  | PASTERNAK PE7021-30 (30 dB) | 231 or 232    | NCR    |          |
| i00122/3                                    | NARDA 766 (10 dB)           | 7802 or 7802A | NCR    |          |
| <b>(3) RF Power</b>                         |                             |               |        |          |
| X i00067                                    | HP 8920A Communications TS  | 3345U01242    | 12 mo. | Jun-05   |
| <b>(4) Frequency Counter</b>                |                             |               |        |          |
| X i00067                                    | HP 8920A Communications TS  | 3345U01242    | 12 mo. | Jun-05   |

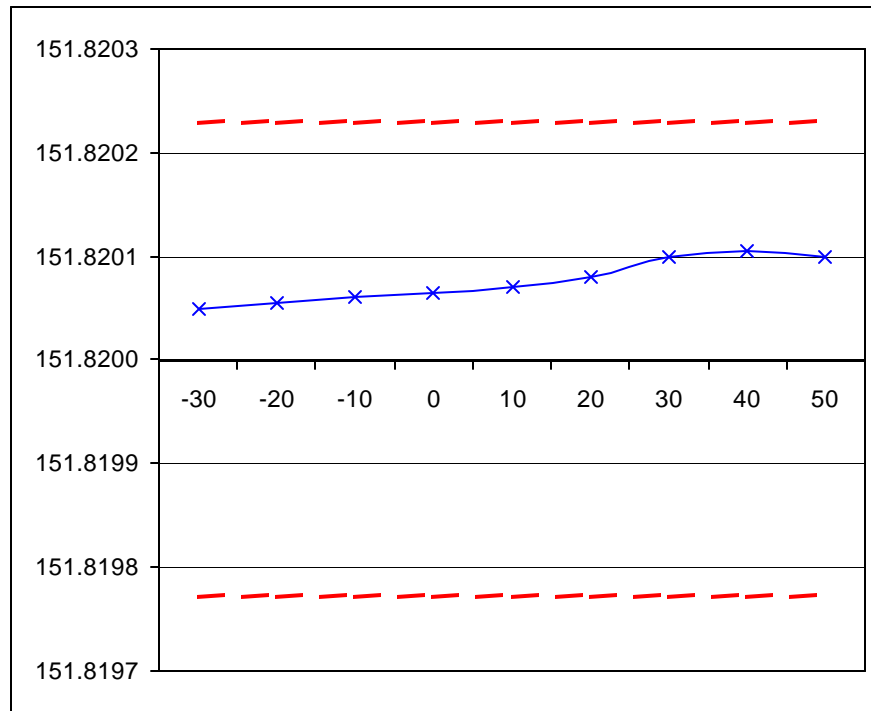
**Name of Test:** Frequency Stability (Temperature Variation)

**Measurement Results**

g0580063: 2005-Aug-12 Fri 15:11:27

State: 0:General

Ambient Temperature: 23°C ± 3°C




Performed By:

Fred Chastain, Test Technician

**Name of Test:** Frequency Stability (Voltage Variation)

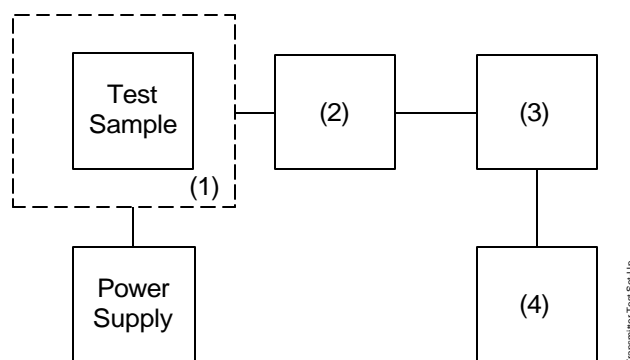
**Specification:** 47 CFR 2.1055(d)(1)

**Guide:** ANSI/TIA/EIA-603-1992, Paragraph 2.2.2

### Measurement Procedure

- A) The EUT was placed in a temperature chamber (if required) at 25±5°C and connected as shown below.
- B) The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
- C) The variation in frequency was measured for the worst case.

### Transmitter Test Set-Up: Voltage Variation



| Asset                                       | Description                 | s/n           | Cycle  | Last Cal |
|---|-----------------------------|---------------|--------|----------|
| <b>(1) Temperature, Humidity, Vibration</b> |                             |               |        |          |
| i00027                                      | Tenney Temp. Chamber        | 9083-765-234  | NCR    |          |
| <b>(2) Coaxial Attenuator</b>               |                             |               |        |          |
| X i00231/2                                  | PASTERNAK PE7021-30 (30 dB) | 231 or 232    | NCR    |          |
| i00122/3                                    | NARDA 766 (10 dB)           | 7802 or 7802A | NCR    |          |
| <b>(3) RF Power</b>                         |                             |               |        |          |
| X i00020                                    | HP 8901A Power Mode         | 2105A01087    | 12 mo. | Apr-05   |
| <b>(4) Frequency Counter</b>                |                             |               |        |          |
| X i00020                                    | HP 8901A Frequency Mode     | 2105A01087    | 12 mo. | Apr-05   |



**Results:** Frequency Stability (Voltage Variation)

State: General

Ambient Temperature: 23°C ± 3°C

Limit, ppm = ± 1.5  
 Limit, Hz = ± 227  
 Battery End Point (Voltage) = 4.2

| % of STV | Voltage | Frequency, MHz | Change, Hz | Change, ppm |
|----------|---------|----------------|------------|-------------|
| 115      | 5.75    | 151.820100     | +100       |             |
| 100      | 5.00    | 151.820080     | +80        | >1.0        |
| 85       | 4.25    | 151.820080     | +80        |             |
| BEP      | 4.20    | 151.820070     | +70        |             |



Performed By:

Fred Chastain, Test Technician

**Name of Test:** Necessary Bandwidth and Emission Bandwidth

**Specification:** 47 CFR 2.202(g)

Modulation = 11K2F1D

**Necessary Bandwidth Calculation:**

|                                    |  |
|------------------------------------|--|
| Maximum Modulation (M), kHz        | 1.875                                    |
| Maximum Deviation (D), kHz         | = 3.75                                   |
| Constant Factor (K)                | = 1                                      |
| Necessary Bandwidth ( $B_N$ ), kHz | = $(2 \times M) + (2 \times D \times K)$ |
|                                    | = 11.2                                   |



Performed By:

Fred Chastain, Test Technician

END OF TEST REPORT

**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 are true and correct.



Certifying Engineer:

David E. Lee, Quality Assurance Manager