**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
3162 BELICK STREET ● SANTA CLARA, CALIFORNIA 95054 ● PHONE (408 748-3585 ● FAX (510) 489-6372

May 3, 2011

CalAmp Wireless Networks
101-5540 Ferrier Street
Mont-Royal, QC H4P 1M2

Dear Pierre Olivier,

Enclosed is the EMC Wireless test report for compliance testing of the CalAmp Wireless Networks, Sentry4G 2500 as tested to the requirements of the FCC Certification rules under Title 47 of the CFR Part 27 Subpart M and RSS-199, Issue 1, January 2010 for Broadband Radio Service (BRS) Devices.

Thank you for using the services of MET Laboratories, Inc. If you have any questions regarding these results or if MET can be of further service to you, please contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\CalAmp Wireless Networks\EMCS82989-FCC27 Rev. 4)

**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*
914 WEST PATAPSCO AVENUE ● BALTIMORE, MARYLAND 21230-3432 ● PHONE (410) 354-3300 ● FAX (410) 354-3313
33439 WESTERN AVENUE ● UNION CITY, CALIFORNIA 94587 ● PHONE (510) 489-6300 ● FAX (510) 489-6372
3162 BELICK STREET ● SANTA CLARA, CALIFORNIA 95054 ● PHONE (408 748-3585 ● FAX (510) 489-6372

# Electromagnetic Compatibility Criteria
# Test Report

for the

**CalAmp Wireless Networks**
**Model Sentry4G 2500**

**Tested under**
**FCC Certification Rules**
**Title 47 of the CFR, Part 27 Subpart M**
**& RSS-199, Issue 1, January 2010**

**MET Report: EMCS82989-FCC27 Rev. 4**

May 3, 2011

**Prepared For:**

**CalAmp Wireless Networks**
**101-5540 Ferrier Street**
**Mont-Royal, QC H4P 1M2**

**Prepared By:**
**MET Laboratories, Inc.**
914 W. Patapsco Ave
Baltimore, MD 21230

# Electromagnetic Compatibility Criteria
# Test Report

for the

## CalAmp Wireless Networks
## Model Sentry4G 2500

**Tested Under**

**FCC Certification Rules**
**Title 47 of the CFR, Part 27 Subpart M**
**& RSS-199, Issue 1, January 2010**

Kenshi Chung
Electromagnetic Compatibility Lab

Jennifer Warnell
Documentation Department

**Engineering Statement:** The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of Part 27 M of the FCC Rules and Industry Canada standard RSS-199, Issue 1, January 2010 under normal use and maintenance.

Shawn McMillen, Wireless Manager
Electromagnetic Compatibility Lab

# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| ∅ | March 10, 2011 | Initial Issue. |
| 1 | March 23, 2011 | Revised to reflect engineer corrections. |
| 2 | March 29, 2011 | Revised to reflect engineer corrections. |
| 3 | April 14, 2011 | Revised to include MPE calculation section. |
| 4 | May 3, 2011 | Revised to reflect engineer corrections. |

# Table of Contents



# List of Tables



# List of Figures



# List of Plots



# List of Photographs



# List of Terms and Abbreviations

| | |
|---|---|
| **AC** | **A**lternating **C**urrent |
| **ACF** | **A**ntenna **C**orrection **F**actor |
| **Cal** | **Cal**ibration |
| ***d*** | **M**easurement **D**istance |
| **dB** | **D**eci**b**els |
| **dBµA** | **D**eci**b**els above one **micro**amp |
| **dBµV** | **D**eci**b**els above one **micro**volt |
| **dBµA/m** | **D**eci**b**els above one **micro**amp **per m**eter |
| **dBµV/m** | **D**eci**b**els above one **micro**volt **per m**eter |
| **DC** | **D**irect **C**urrent |
| **E** | **E**lectric Field |
| **DSL** | **D**igital **S**ubscriber **L**ine |
| **ESD** | **E**lectro**s**tatic **D**ischarge |
| **EUT** | **E**quipment **U**nder **T**est |
| ***f*** | **F**requency |
| **FCC** | **F**ederal **C**ommunications **C**ommission |
| **GRP** | **G**round **R**eference **P**lane |
| **H** | Magnetic Field |
| **HCP** | **H**orizontal **C**oupling **P**lane |
| **Hz** | **H**ert**z** |
| **IEC** | **I**nternational **E**lectrotechnical **C**ommission |
| **kHz** | **k**ilo**h**ert**z** |
| **kPa** | **k**ilo**pa**scal |
| **kV** | **k**ilo**v**olt |
| **LISN** | **L**ine **I**mpedance **S**tabilization **N**etwork |
| **MHz** | **M**ega**h**ertz |
| **µH** | **microh**enry |
| **µ** | **microf**arad |
| **µs** | **micros**econds |
| **NEBS** | **N**etwork **E**quipment-**B**uilding **S**ystem |
| **PRF** | **P**ulse **R**epetition **F**requency |
| **RF** | **R**adio **F**requency |
| **RMS** | **R**oot-**M**ean-**S**quare |
| **TWT** | **T**raveling **W**ave **T**ube |
| **V/m** | **V**olts **per m**eter |
| **VCP** | **V**ertical **C**oupling **P**lane |

# I. Executive Summary

## A. Purpose of Test

An EMC evaluation was performed to determine compliance of the CalAmp Wireless Networks Sentry4G 2500, with the requirements of Part 27. All references are to the most current version of Title 47 of the Code of Federal Regulations in effect. In accordance with §2.1033, the following data is presented in support of the Certification of the Sentry4G 2500. CalAmp Wireless Networks should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the Sentry4G 2500, has been **permanently** discontinued.

## B. Executive Summary

The following tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27, in accordance with CalAmp Wireless Networks, purchase order number 002151.

| Reference | IC Reference | Description | Compliance |
|---|---|---|---|
| §2.1046; §27.50(h) | RSS-199, Section 4.4 | RF Power Output | Compliant |
| §2.1047 | RSS-199, Section 4.1 | Modulation Characteristics | Not Applicable |
| §2.1049 | RSS-GEN; RSS-199, Section 4.2 | Occupied Bandwidth | Compliant |
| §27.53 | RSS-199, Section 4.5 | Band-Edge Channel Power | Compliant |
| §2.1051; §27.53(l) | RSS-199, Section 4.5 | Spurious Emissions at Antenna Terminals | Compliant |
| §2.1053 | RSS-199, Section 4.5 | Radiated Spurious Emissions | Compliant |
| §2.1055 | RSS-199, Section 4.3 | Frequency Stability over Temperature Variations | Compliant |
| N/A | RSS-GEN | Receiver Spurious Emissions | Compliant |
| Part 15 Subpart B §15.109(a) | ICES-003 Issue 4 February 2004 | Conducted Emissions | Not Applicable |
| Part 15 Subpart B §15.107(a) | ICES-003 Issue 4 February 2004 | Radiated Emissions | Compliant |

**Table 1. Executive Summary of EMC ComplianceTesting**

# II. Equipment Configuration

# A. Overview

MET Laboratories, Inc. was contracted by CalAmp Wireless Networks to perform testing on the Sentry4G 2500, under CalAmp Wireless Networks's purchase order number 002151.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the CalAmp Wireless Networks, Sentry4G 2500.

The results obtained relate only to the item(s) tested.

| | | |
|---|---|---|
| **Model(s) Tested** | Sentry4G 2500 | |
| **Model(s) Covered:** | Sentry4G 2500 | |
| **EUT Specifications:** | Primary Power: 120 VAC, 60 Hz | |
| | Equipment Code: | PCB |
| | RF Output Power: | 32.74 dBm |
| | EUT Frequency Range: | 2498.5 – 2687.5 MHz |
| **Analysis:** | The results obtained relate only to the item(s) tested. | |
| **Environmental Test Conditions:** | Temperature: 15-35º C | |
| | Relative Humidity: 30-60% | |
| | Barometric Pressure: 860-1060 mbar | |
| **Evaluated by:** | Kenshi Chung | |
| **Date(s):** | May 3, 2011 | |

**Table 2. EUT Summary Table**

# B. References

| | |
|---|---|
| **CFR 47, Part 27** | Federal Communication Commission, Code of Federal Regulations, Title 47, Part 27: Rules and Regulations for Advanced Wireless Services |
| **RSS-199, Issue 1, January 2010** | Broadband Radio Service (BRS) Equipment Operating in the Band 2500-2690 MHz |
| **ANSI C63.4:2003** | Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz |
| **ANSI/NCSL Z540-1-1994** | Calibration Laboratories and Measuring and Test Equipment - General Requirements |
| **ANSI/ISO/IEC 17025:2000** | General Requirements for the Competence of Testing and Calibration Laboratories |
| **EIA/TIA-603-A-2001** | Land Mobile FM or PM Communication Equipment Measurement and Performance Standards |

**Table 3. Standard References**

## C. Test Site

All testing was performed at MET Laboratories, Inc., 3162 Belick Street, Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Radiated Emissions measurements were performed in a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site).

## D. Description of Test Sample

The Sentry4G 2500 is a wireless mobile broadband router designed to operate in the 2.5 GHz band. This router is designed for Machine to Machine (M2M) data communication links for fixed and mobile equipment. This wireless router has internal interfaces (mini-PCI and PCI-E mini card) allowing integration of a Wi-Fi and/or a cellular module (3G). The Sentry4G 2500 also embeds a GPS module for location information. The main wireless interface (4G) is provided by a IEEE 802.16e-2005 SoC that uses SOFDMA channel access for bandwidths ranging from 5 to 10 MHz. This implementation of the IEEE 802.16e-2005 standard supports uplink and downlink 2x2 MIMO. The Sentry4G 2500 sports four external interfaces: two Ethernet port, one serial port and a USB host port. This device is housed in a rugged chassis for immunity to shock, vibration and humidity. Typical installation of this device is in the trunk of a car or other public safety vehicle or utility plant done by a professional, where the location of the antennas is far from the user as per the RF exposure rules set by the FCC and IC.

The 3G module is - PMC-Sierra's MC5727 with the following separate certificates:
FCC: N7N-MC5727
IC: 2417C-MC5727

The Wi-Fi module is - Ubiquiti's SR2 with the following separate certificates:
FCC: SWX-SR2
IC: 6545A-SR2

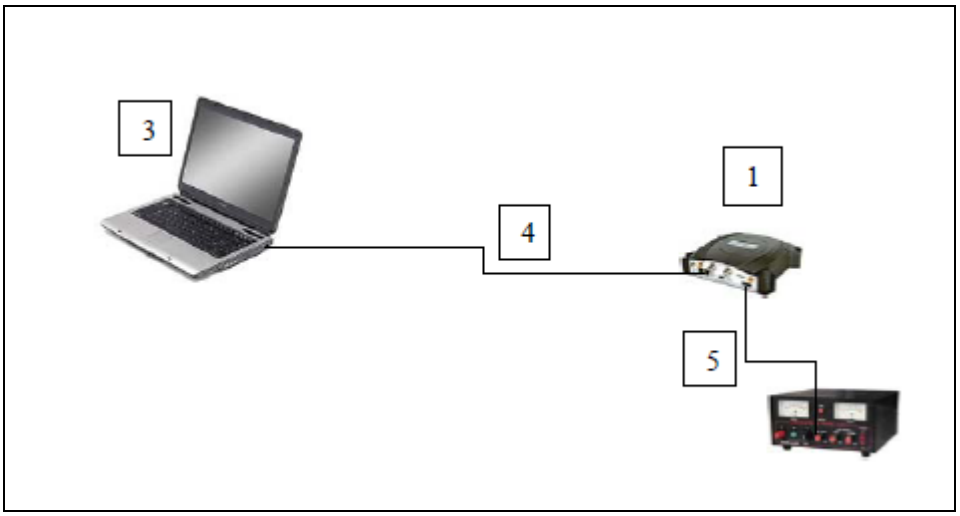



**Figure 1. Block Diagram of Test Configuration**

## E. Equipment Configuration

| Ref. ID | Name / Description | Model Number | Serial Number |
|---|---|---|---|
| 1 | Sentry4G 2500 wireless router | 140-9123 | 431549 |

**Table 4. Equipment Configuration**

## F. Support Equipment

| Ref. ID | Name / Description | Manufacturer | Model Number | Serial Number |
|---|---|---|---|---|
| 3 | Generic Laptop | HP | N/A | N/A |

**Table 5. Support Equipment**

## G. Ports and Cabling Information

| Ref. ID | Port Name on EUT | Cable Description | Qty. | Length (m) | Shielded (Y/N) | Termination Point |
|---|---|---|---|---|---|---|
| 4 | Eth0 | Ethernet Cable | 1 | >2m | Y | NIC on laptop |
| 5 | DC Power | Power cable | 1 | >2m | N | Lab. Power Supply |

**Table 6. Ports and Cabling Information**

## H. Mode of Operation

For normal operation, the Sentry4G 2500 is normally interfaced with a network interface adaptor equipped device such as a laptop through its Ethernet port.

## I. Modifications

**a) Modifications to EUT**

No modifications were made to the EUT.

**b) Modifications to Test Standard**

No modifications were made to the test standard.

## J. Disposition of EUT

The test sample including all support equipment submitted to the Electro-Magnetic Compatibility Lab for testing was returned to CalAmp Wireless Networks upon completion of testing.

# III. Electromagnetic Compatibility Criteria for Unintentional Radiators

## Electromagnetic Compatibility Criteria

### § 15.107 Conducted Emissions Limits

**Test Requirement(s):**

**15.107 (a)** Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 7. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

**15.107 (b)** For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in Table 7. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals. The lower limit applies at the band edges.

**15.207(a)**, Except as shown in paragraphs (b) and (c) of this section*, charging, AC adapters or battery eliminators the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the Table 7, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequencies ranges.

| Frequency range (MHz) | Class A Conducted Limits (dBμV) | | *Class B Conducted Limits (dBμV) | |
|---|---|---|---|---|
| | Quasi-Peak | Average | Quasi-Peak | Average |
| * 0.15- 0.45 | 79 | 66 | 66 - 56 | 56 - 46 |
| 0.45 - 0.5 | 79 | 66 | 56 | 46 |
| 0.5 - 30 | 73 | 60 | 60 | 50 |
| Note 1 — The lower limit shall apply at the transition frequencies.<br>Note 2 — The limit decreases linearly with the logarithm if the frequency in the range 0.15 MHz to 0.5 MHz.<br>* -- Limits per Subsection 15.207(a). | | | | |

**Table 7. Conducted Limits for Radio Frequency Devices calculated from FCC Part 15 Subsections 15.107(a) (b) and 15.207(a)**

**Test Results:** The EUT was not applicable with the Class A requirement(s) of this section. The EUT is DC powered.

## Radiated Emission Limits

### § 15.109 Radiated Emissions Limits

**Test Requirement(s):** **15.109 (a)** Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the Class B limits expressed in Table 8.

**15.109 (b)** The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the Class A limits expressed in Table 8.

| Frequency (MHz) | Field Strength (dBµV/m) | |
|---|---|---|
| | §15.109 (b), Class A Limit (dBµV) @ 10m | §15.109 (a),Class B Limit (dBµV) @ 3m |
| 30 - 88 | 39.00 | 40.00 |
| 88 - 216 | 43.50 | 43.50 |
| 216 - 960 | 46.40 | 46.00 |
| Above 960 | 49.50 | 54.00 |

**Table 8. Radiated Emissions Limits calculated from FCC Part 15, §15.109 (a) (b)**

**Test Procedures:** The EUT was placed on a non-metallic table, 80 cm above the ground plane inside a semi-anechoic chamber. The method of testing and test conditions of ANSI C63.4 were used. An antenna was located 3 m from the EUT on an adjustable mast. A pre-scan was first performed in order to find prominent radiated emissions. For final emissions measurements at each frequency of interest, the EUT was rotated and the antenna height was varied between 1 m and 4 m in order to maximize the emission. Measurements in both horizontal and vertical polarities were made and the data was recorded. Unless otherwise specified, measurements were made using a quasi-peak detector with a 120 kHz bandwidth.

**Test Results:** The EUT was found compliant with the Class A requirement(s) of this section. Measured emissions were below applicable limits

**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/15/11

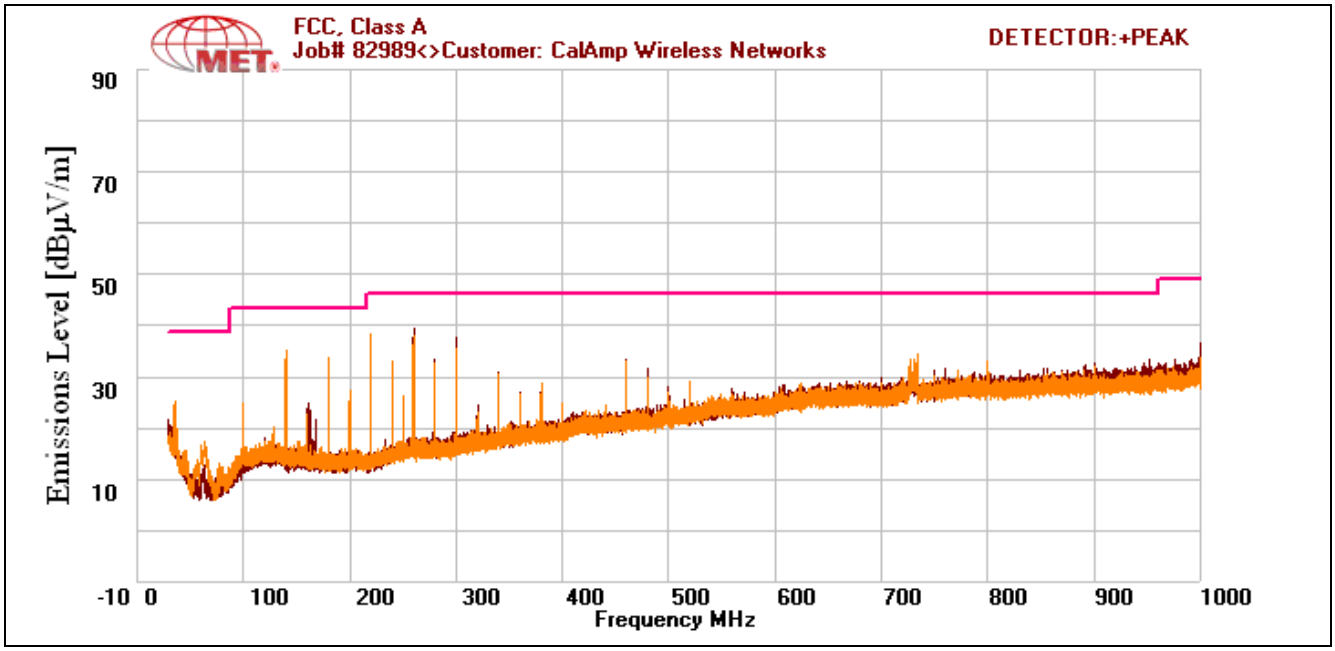
  

## Radiated Emissions Limits Test Results, Class A

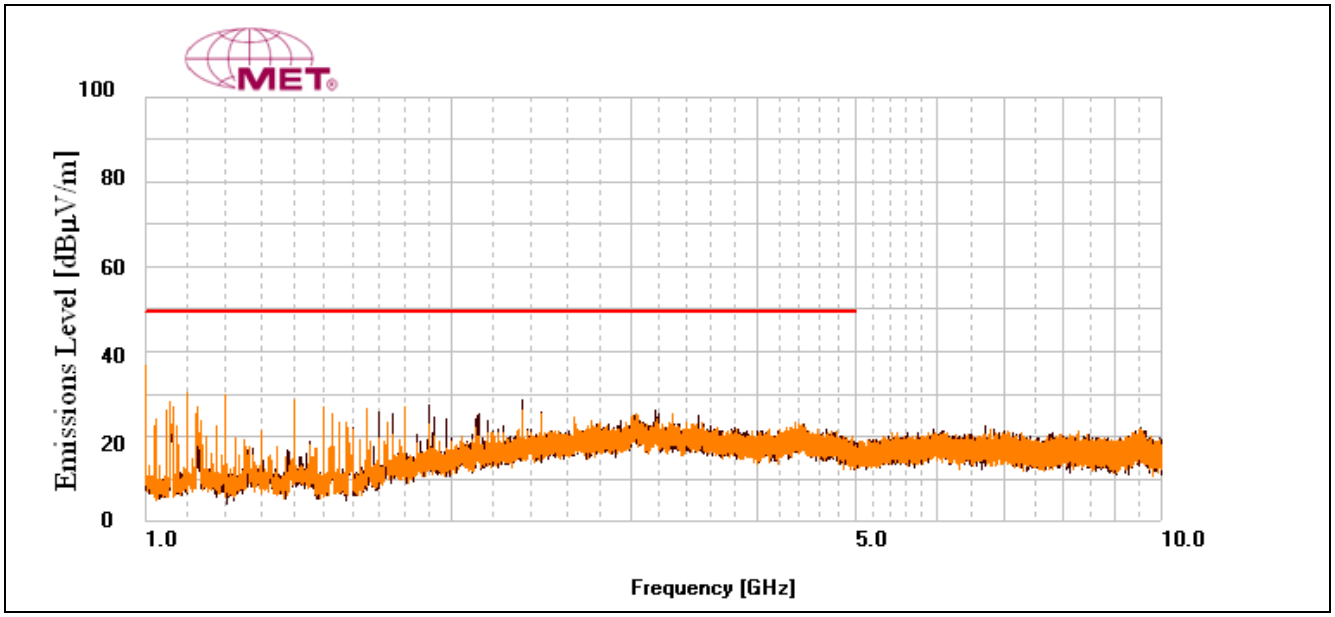
| Frequency (MHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBuV) | ACF (dB/m) | Pre Amp Gain (dB) | CBL (dB) | DCF (dB) | Corrected Amplitude (dBuV) | Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 139.99 | V | 66 | 100 | 32.81 | 12.401 | 0 | 3.274 | -10.46 | 38.025 | 43.5 | -5.475 |
| 180.02 | V | 140 | 100 | 35.9 | 10.299 | 0 | 3.698 | -10.46 | 39.437 | 43.5 | -4.063 |
| 220.02 | V | 324 | 100 | 32.28 | 10.702 | 0 | 3.842 | -10.46 | 36.364 | 46.4 | -10.036 |
| 259.98 | V | 25 | 100 | 29.58 | 13.299 | 0 | 3.706 | -10.46 | 36.125 | 46.4 | -10.275 |
| 733.24 | V | 345 | 156 | 22.13 | 19.9 | 0 | 5.903 | -10.46 | 37.473 | 46.4 | -8.927 |
| 220.02 | H | 309 | 150 | 34.07 | 10.402 | 0 | 3.842 | -10.46 | 37.854 | 46.4 | -8.546 |
| 260.02 | H | 286 | 124.17 | 36.242 | 13.9 | 0 | 3.706 | -10.46 | 43.388 | 46.4 | -3.012 |
| 299.98 | H | 245 | 117 | 31.62 | 13.899 | 0 | 3.57 | -10.46 | 38.629 | 46.4 | -7.771 |
| 1000 | V | 0 | 100 | 86.73 | 27.216 | 77.23 | 7.5 | -10.46 | 33.756 | 49.5 | -15.744 |
| 1200 | V | 0 | 100 | 59.77 | 27.647 | 76.69 | 8.112 | -10.46 | 8.379 | 49.5 | -41.121 |
| 2350 | H | 146 | 136 | 69.1 | 32.05 | 75.242 | 11.61 | -10.46 | 27.061 | 49.5 | -22.439 |

**Table 9. Radiated Emissions Limits, Test Results, FCC Limits**

Note: The EUT was tested at 3 m.




**Plot 1. Radiated Emissions, 30 MHz - 1 GHz, FCC Limits**



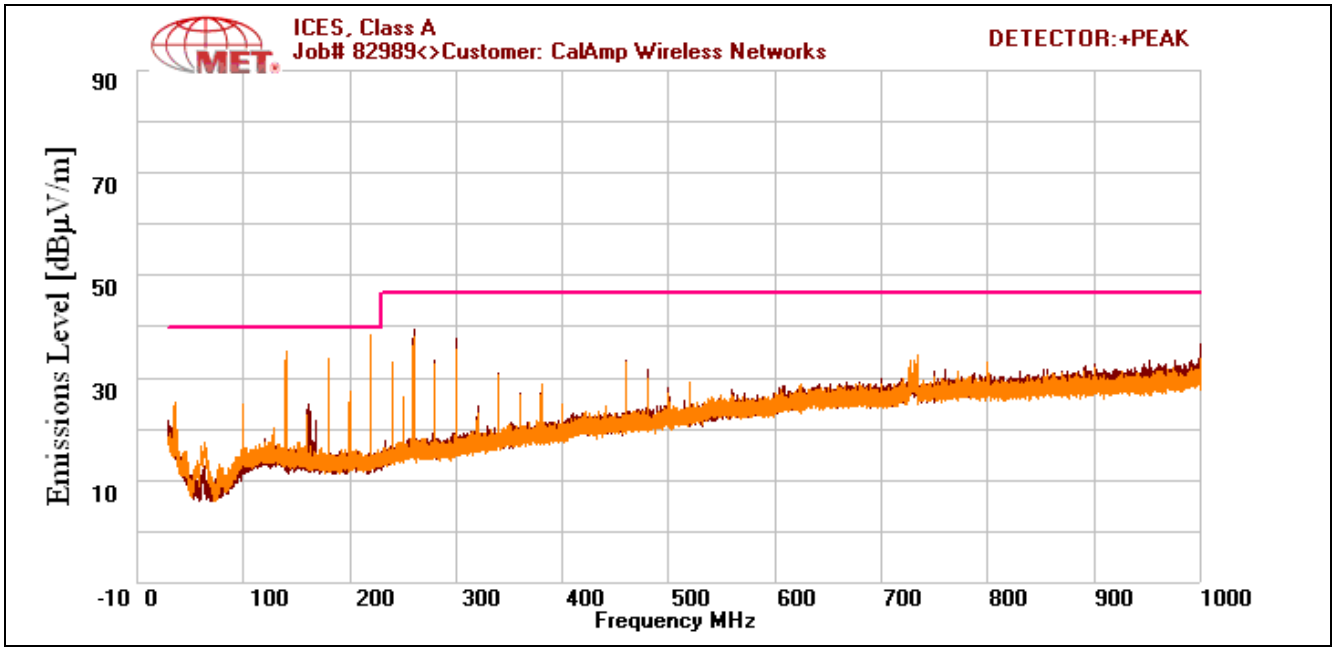

**Plot 2. Radiated Emissions, 1 GHz – 10 GHz, FCC Limits**

## Radiated Emissions Limits Test Results, Class A

| Frequency (MHz) | Antenna Polarity | EUT Azimuth (Degrees) | Antenna Height (cm) | Uncorrected Amplitude (dBuV) | ACF (dB/m) | Pre Amp Gain (dB) | CBL (dB) | DCF (dB) | Corrected Amplitude (dBuV) | Limit (dBuV) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 139.99 | V | 66 | 100 | 32.81 | 12.401 | 0 | 3.274 | -10.46 | 38.025 | 40 | -1.975 |
| 180.02 | V | 140 | 100 | 35.9 | 10.299 | 0 | 3.698 | -10.46 | 39.437 | 40 | -0.563 |
| 220.02 | V | 324 | 100 | 32.28 | 10.702 | 0 | 3.842 | -10.46 | 36.364 | 40 | -3.636 |
| 259.98 | V | 25 | 100 | 29.58 | 13.299 | 0 | 3.706 | -10.46 | 36.125 | 47 | -10.875 |
| 733.24 | V | 345 | 156 | 22.13 | 19.9 | 0 | 5.903 | -10.46 | 37.473 | 47 | -9.527 |
| 220.02 | H | 309 | 150 | 34.07 | 10.402 | 0 | 3.842 | -10.46 | 37.854 | 40 | -2.146 |
| 260.02 | H | 286 | 124.17 | 36.242 | 13.9 | 0 | 3.706 | -10.46 | 43.388 | 47 | -3.612 |
| 299.98 | H | 245 | 117 | 31.62 | 13.899 | 0 | 3.57 | -10.46 | 38.629 | 47 | -8.371 |

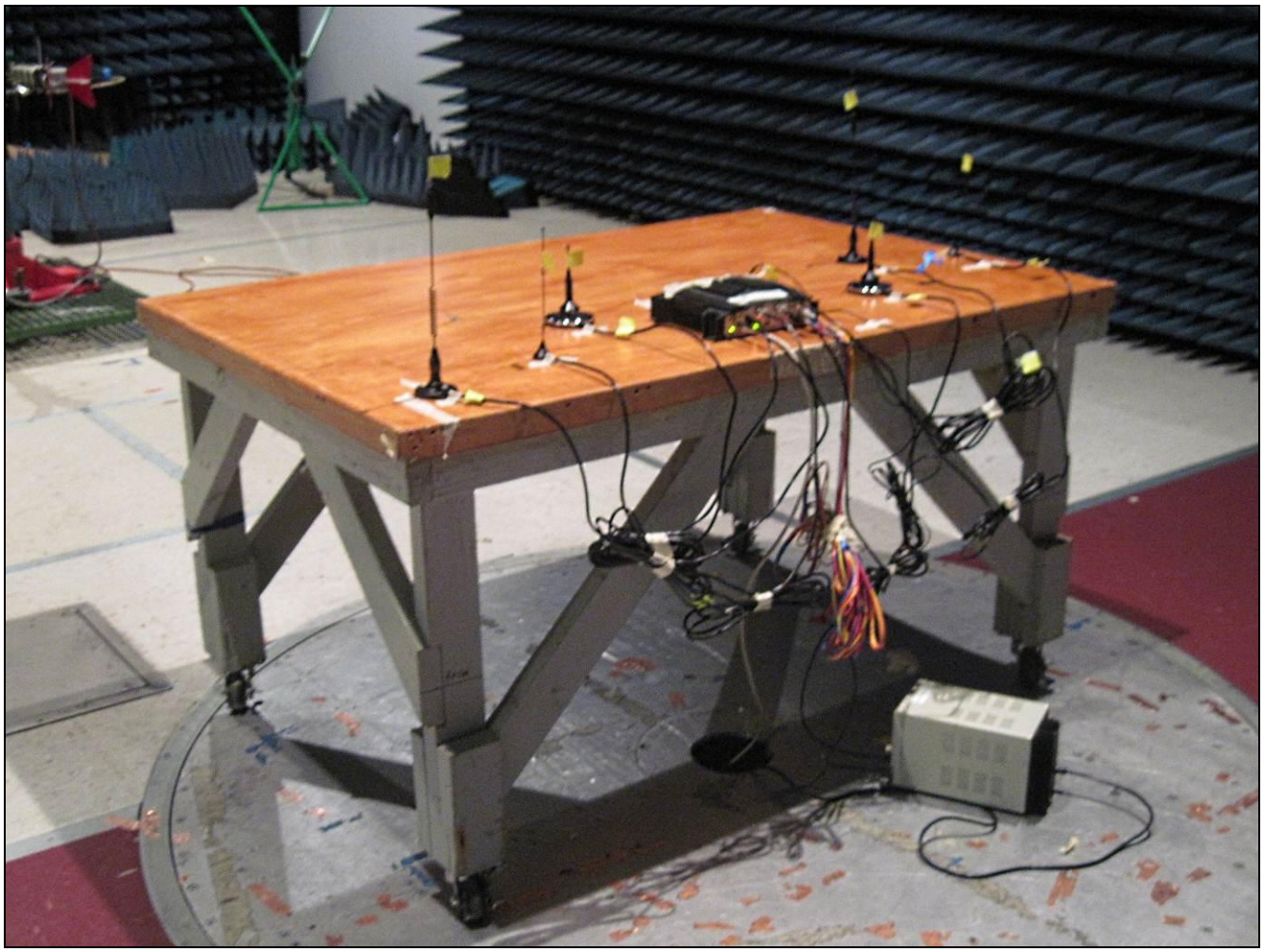
**Table 10. Radiated Emissions Limits, Test Results, ICES-003 Limits**

Note: The EUT was tested at 3 m.




**Plot 3. Radiated Emissions, ICES-003 Limits**

## Radiated Emission Limits Test Setup



**Photograph 1. Radiated Emission, Test Setup**

# IV. Electromagnetic Compatibility Criteria for Intentional Radiators

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 2.1046 RF Power Output

**Test Requirement(s):** §2.1046 and §27.50(h)

**RSS-199, Section 4.4 - Transmitter Output Power and Equivalent Isotropically Radiated Power (e.i.r.p.)**

For base station equipment, refer to GL-07 for the e.i.r.p.

For mobile subscriber equipment, the peak e.i.r.p. shall not exceed 2 watts. For all other subscriber equipment, the peak transmitter output power shall not exceed 2 watts and the e.i.r.p. shall be limited to 40 watts.

**Test Procedures:** *RF power output measurement* was made at the RF output terminal using a spectrum analyzer.

**Test Results:** Equipment complies with 47CFR 2.1046 and 27.50(h).

The following page show measurements of RF Power output which is recorded below:

**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/21/11

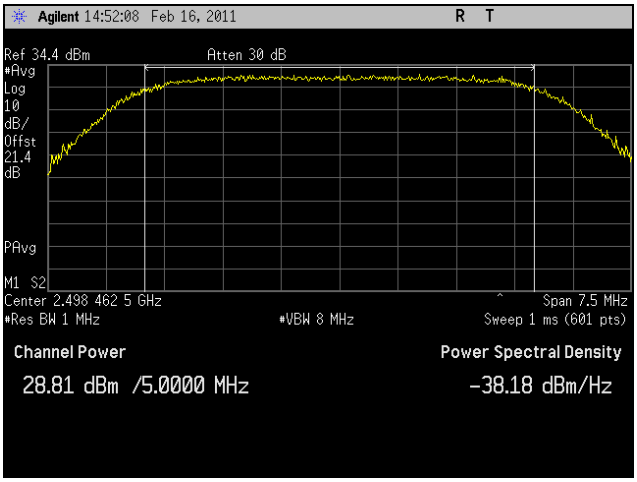
| Channel | Frequency (MHz) | Output 0 (dBm) | Output 1 (dBm) | Sum (dBm) | Limit (dBm) | Delta (dBm) |
|---|---|---|---|---|---|---|
| FCC Low | 2498.5 | 28.81 | 29.18 | 32.00923906 | 33.0 | -0.99 |
| ICES Low | 2502.5 | 28.83 | 29.36 | 32.1133799 | 33.0 | -0.89 |
| FCC Mid | 2593.0 | 28.16 | 28.57 | 31.38013647 | 33.0 | -1.62 |
| FCC High | 2687.5 | 28.45 | 28.35 | 31.41058777 | 33.0 | -1.59 |

**Table 11. RF Output Power, Test Results, 5 MHz**

| Channel | Frequency (MHz) | Output 0 (dBm) | Output 1 (dBm) | Sum (dBm) | Limit (dBm) | Delta (dBm) |
|---|---|---|---|---|---|---|
| FCC Low | 2501.0 | 28.93 | 29.61 | 32.29359533 | 33.0 | -0.71 |
| ICES Low | 2505.0 | 29.73 | 29.73 | 32.74029996 | 33.0 | -0.26 |
| FCC Mid | 2593.0 | 29.34 | 29.80 | 32.58638745 | 33.0 | -0.41 |
| FCC High | 2685.0 | 29.65 | 28.88 | 32.29234269 | 33.0 | -0.71 |

**Table 12. RF Output Power, Test Results, 10 MHz**




**Plot 4. 2498.5 MHz, Low Channel, 5MHz, Output 0, FCC, Channel Power**


**Plot 5. 2593 MHz, Mid Channel, 5MHz, Output 0, FCC, Channel Power**

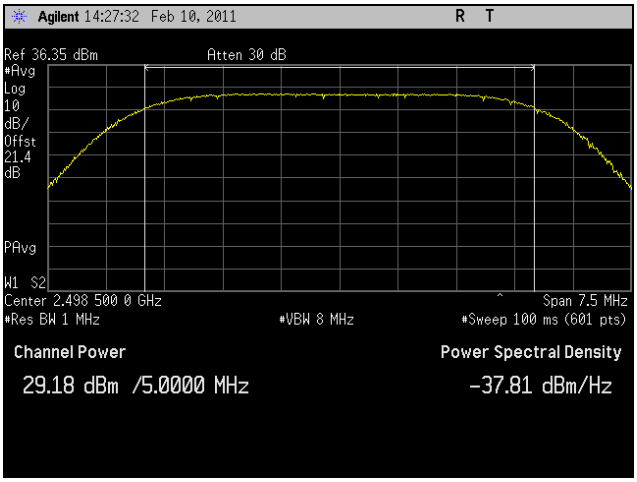

**Plot 6. 2687.5 MHz, High Channel, 5MHz, Output 0, FCC, Channel Power**

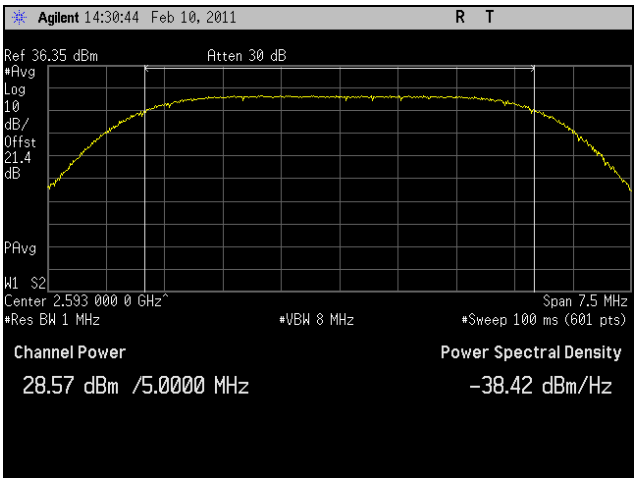

**Plot 7. 2501 MHz, Low Channel, 10MHz, Output 0, FCC, Channel Power**


**Plot 8. 2593 MHz, Mid Channel, 10MHz, Output 0, FCC, Channel Power**

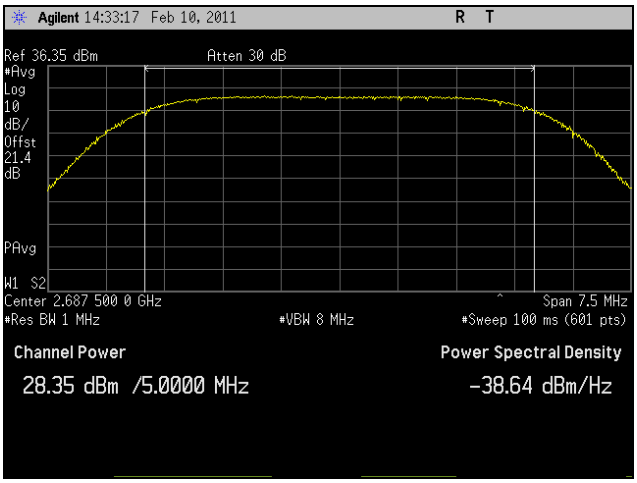

**Plot 9. 2685 MHz, High Channel, 10MHz, Output 0, FCC, Channel Power**




**Plot 10. 2498.5 MHz, Low Channel, 5MHz, Output 1, FCC, Channel Power**




**Plot 11. 2593 MHz, Mid Channel, 5MHz, Output 1, FCC, Channel Power**




**Plot 12. 2687.5 MHz, High Channel, 5MHz, Output 1, FCC, Channel Power**


**Plot 13. 2501 MHz, Low Channel, 10MHz, Output 1, FCC, Channel Power**

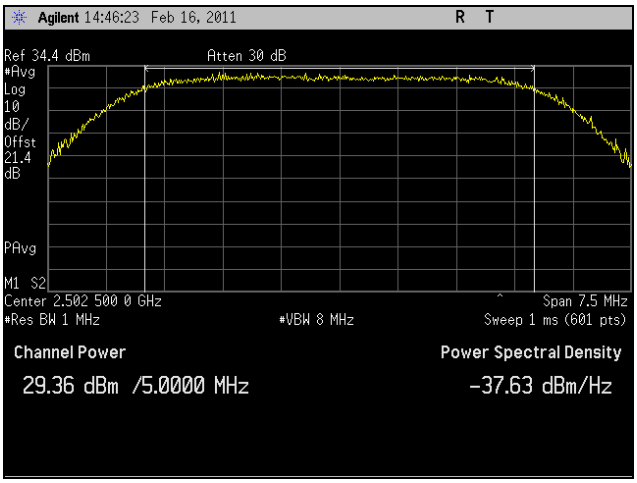

**Plot 14. 2593 MHz, Mid Channel, 10MHz, Output 1, FCC, Channel Power**


**Plot 15. 2685 MHz, High Channel, 10MHz, Output 1, FCC, Channel Power**


**Plot 16. 2502.5 MHz, Low Channel, 5MHz, Output 0, Canada, Channel Power**


**Plot 17. 2505 MHz, Low Channel, 10MHz, Output 0, Canada, Channel Power**




**Plot 18. 2502.5 MHz, Low Channel, 5MHz, Output 1, Canada, Channel Power**


**Plot 19. 2505 MHz, Low Channel, 10MHz, Output 1, Canada, Channel Power**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## Maximum Permissible Exposure

**RF Exposure Requirements:** **§1.1307(b)(1) and §1.1307(b)(2):** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

**RF Radiation Exposure Limit:** **§1.1310:** As specified in this section, the Maximum Permissible Exposure (MPE) Limit shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Sec. 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of Sec. 2.1093 of this chapter.

MPE Limit Calculation: EUT's operating frequencies @ 2498.5–2687.5 MHz (5MHz) and 2501-2685 (10MHz); highest conducted power = 32.11 dBm (peak) and 32.74 dBm (peak) therefore, **Limit for Uncontrolled exposure: 1 mW/cm$^2$ or 10 W/m$^2$**

EUT maximum antenna gain = 5 dBi.

Equation from page 18 of OET 65, Edition 97-01

**EUT with 5dBi Antenna at 5MHz**

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (142.56 mW)
G = Antenna Gain (28.18 numeric)

$R = \sqrt{(1625.55*3.162)/(4*3.14*1.023)}$ = **20.23 cm**

**EUT with 5dBi Antenna at 10MHz**

$S = PG / 4\pi R^2$ or $R = \sqrt{PG / 4\pi S}$

where, S = Power Density (1 mW/cm$^2$)
P = Power Input to antenna (142.56 mW)
G = Antenna Gain (28.18 numeric)

$R = \sqrt{(1879.32*3.162)/(4*3.14*1.182)}$ = **21.75 cm**

## § 2.1049 Occupied Bandwidth

**Test Requirement(s):** **§ 2.1049 Measurements required: Occupied bandwidth:** The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the specified conditions of § 2.1049 (a) through (i) as applicable.

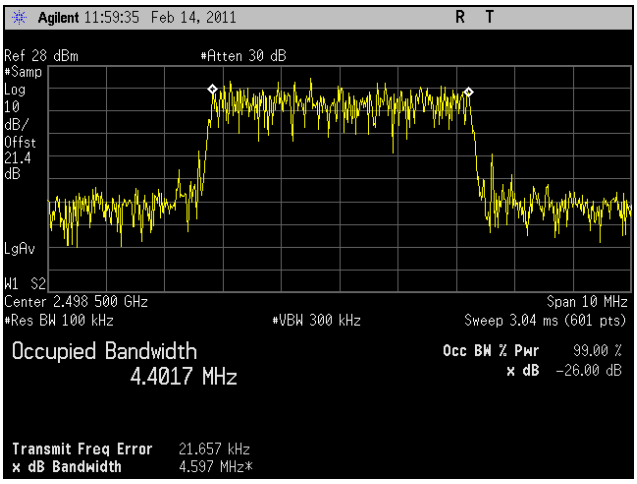
**Test Procedures:** As required by 47 CFR 2.1049, *occupied bandwidth measurements* were made with a Spectrum Analyzer connected to the RF ports.

**Test Results:** Equipment complies with Section 2.1049. The following pages show measurements of 99% and -26 dB Occupied Bandwidth plots.

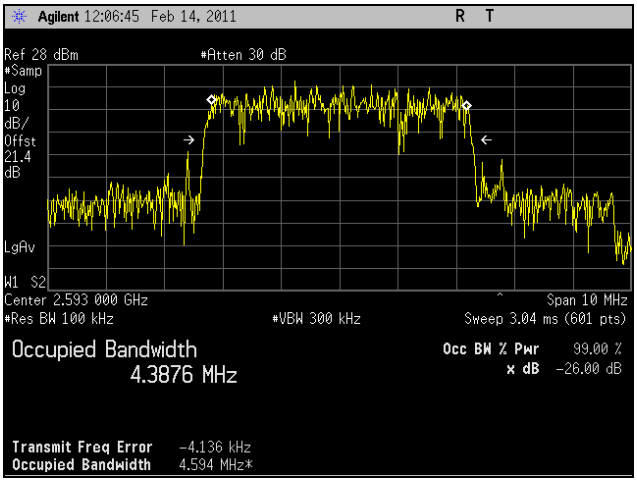
**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/14/11

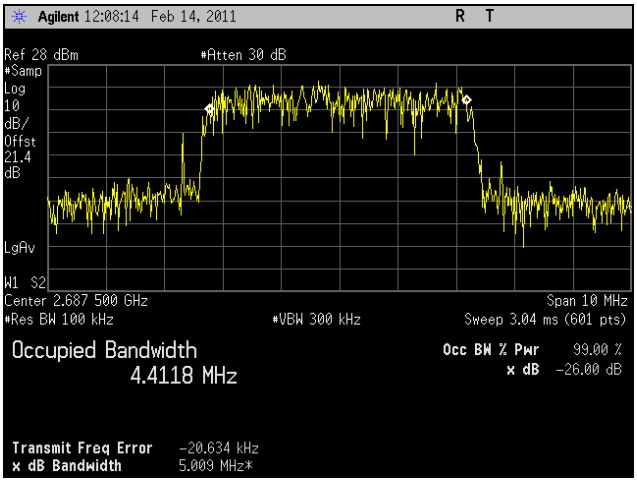
  




**Plot 20. 2498.5 MHz, Low Channel, Output 0, 5 MHz, FCC, Occupied BW**

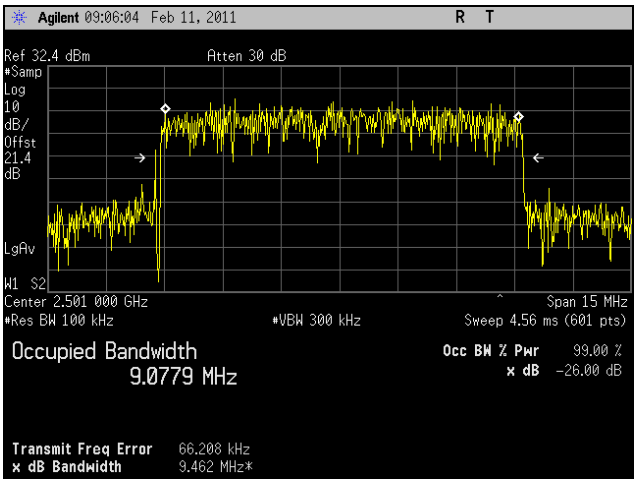



**Plot 21. 2593 MHz, Mid Channel, Output 0, 5 MHz, FCC, Occupied BW**

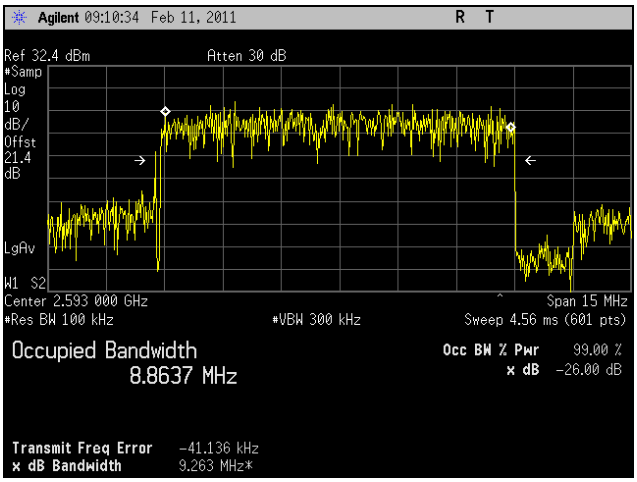



**Plot 22. 2687.5 MHz, High Channel, Output 0, 5 MHz, FCC, Occupied BW**

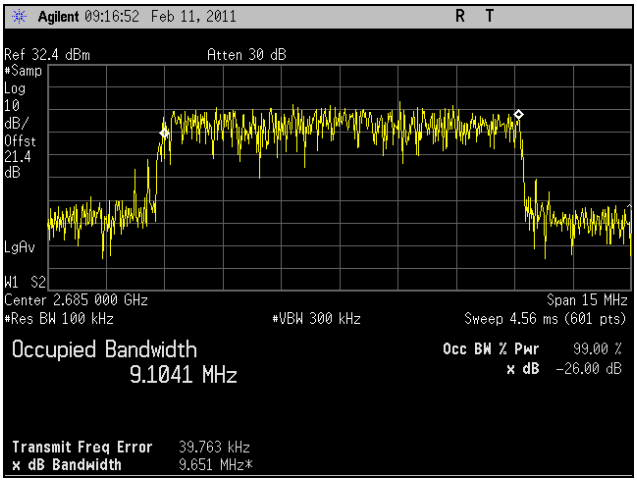
  




**Plot 23. 2501 MHz, Low Channel, Output 0, 10 MHz, FCC, Occupied BW**

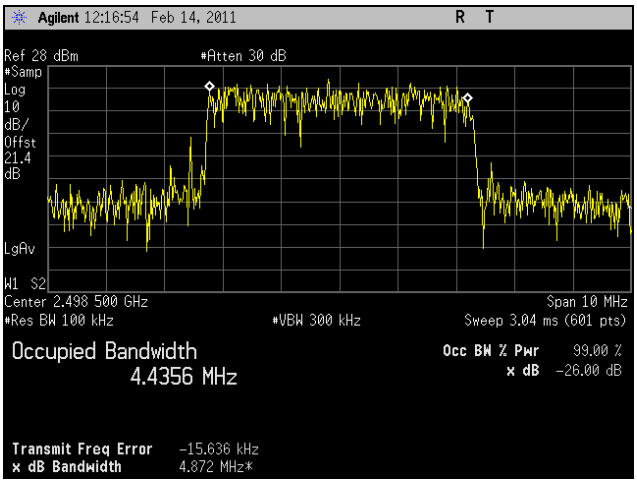



**Plot 24. 2593 MHz, Mid Channel, Output 0, 10 MHz, FCC, Occupied BW**

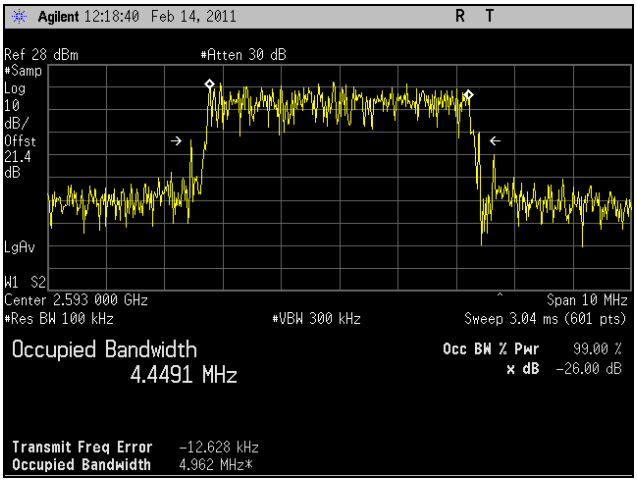



**Plot 25. 2685 MHz, High Channel, Output 0, 10 MHz, FCC, Occupied BW**

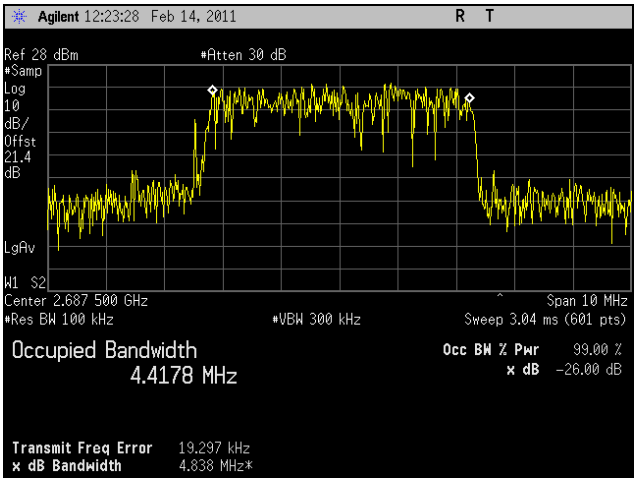
  




**Plot 26. 2498.5 MHz, Low Channel, Output 1, 5 MHz, FCC, Occupied BW**

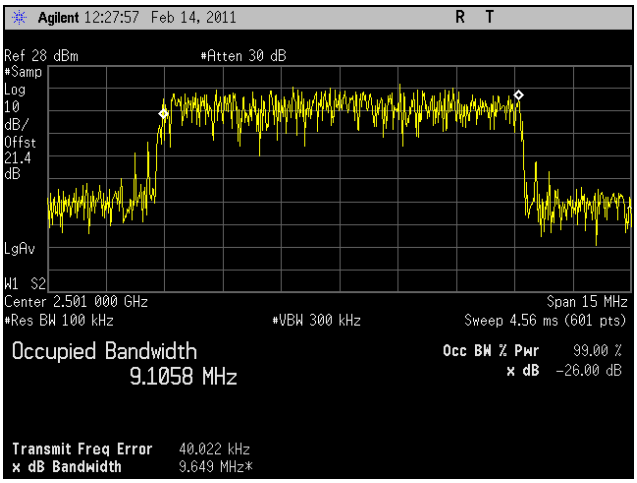



**Plot 27. 2593 MHz, Mid Channel, Output 1, 5 MHz, FCC, Occupied BW**

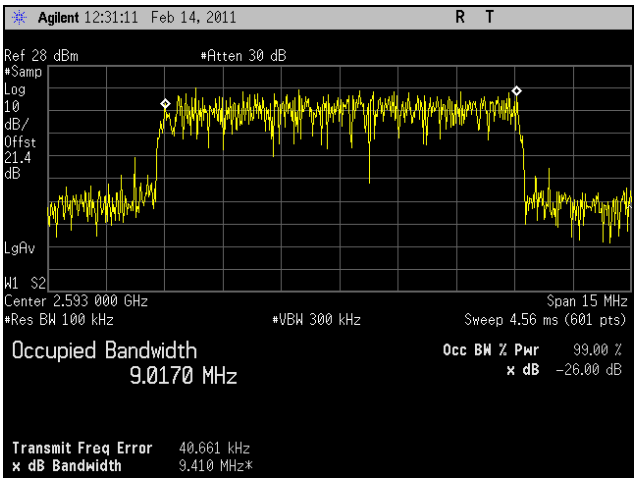



**Plot 28. 2687.5 MHz, High Channel, Output 1, 5 MHz, FCC, Occupied BW**

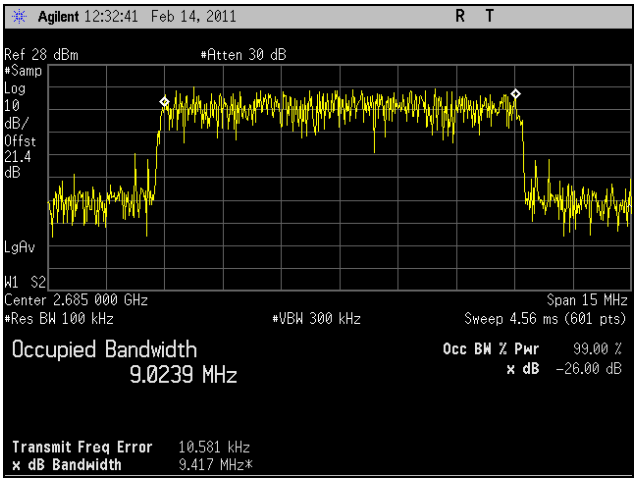
  




**Plot 29. 2501 MHz, Low Channel, Output 1, 10 MHz, FCC, Occupied BW**

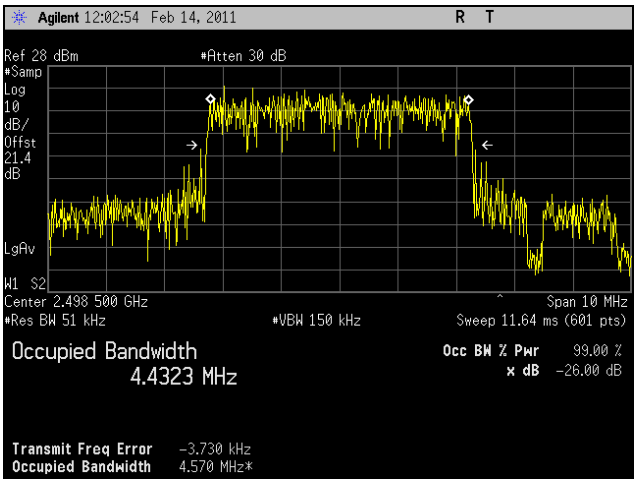



**Plot 30. 2593 MHz, Mid Channel, Output 1, 10 MHz, FCC, Occupied BW**

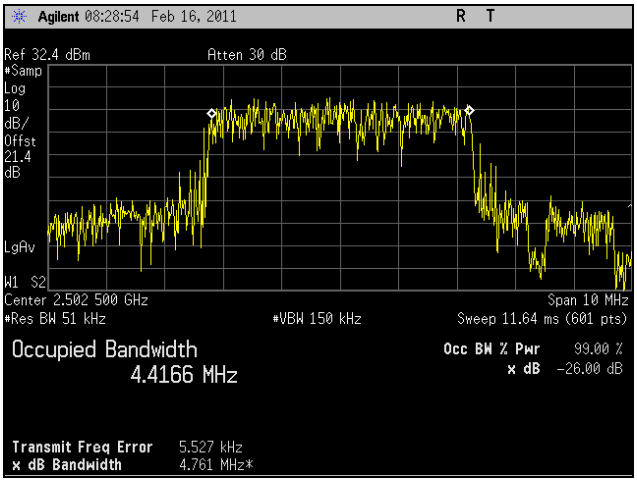



**Plot 31. 2685 MHz, High Channel, Output 1, 10 MHz, FCC, Occupied BW**

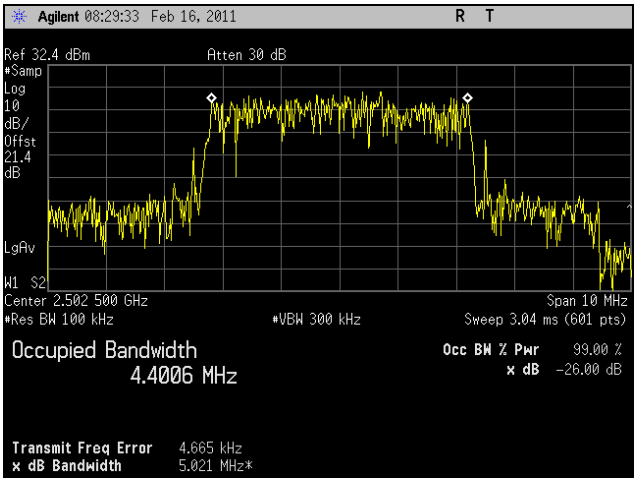
  




**Plot 32. 2498.5 MHz, Low Channel, Output 0, 5 MHz, Canada, Occupied BW**

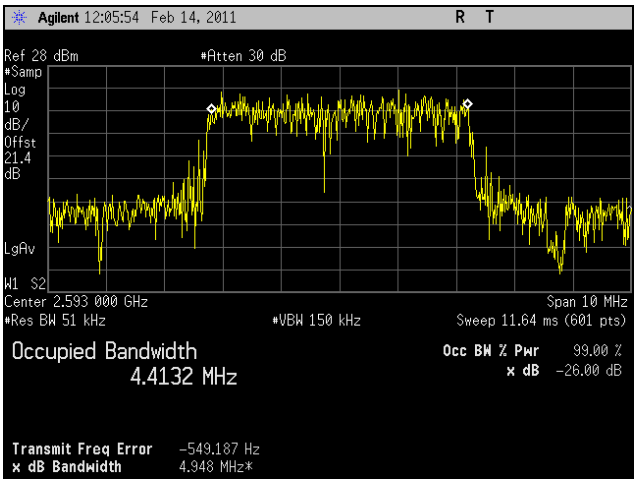



**Plot 33. 2502.5 MHz, Low Channel, Output 0, 5 MHz, Canada, Occupied BW**

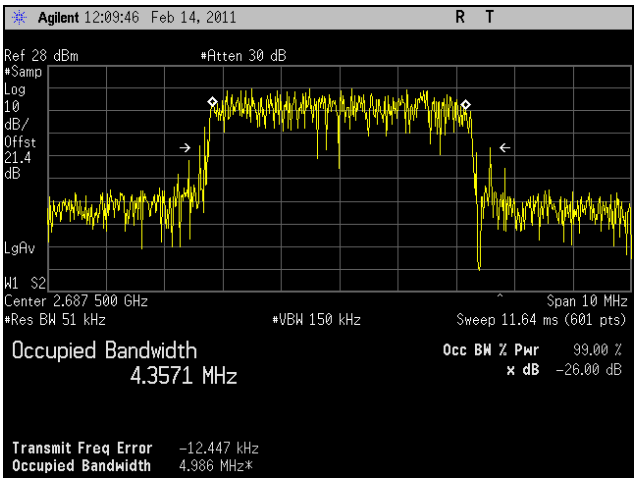



**Plot 34. 2502.5 MHz, Low Channel, Output 0, 5Mhz, Canada, Occupied BW**

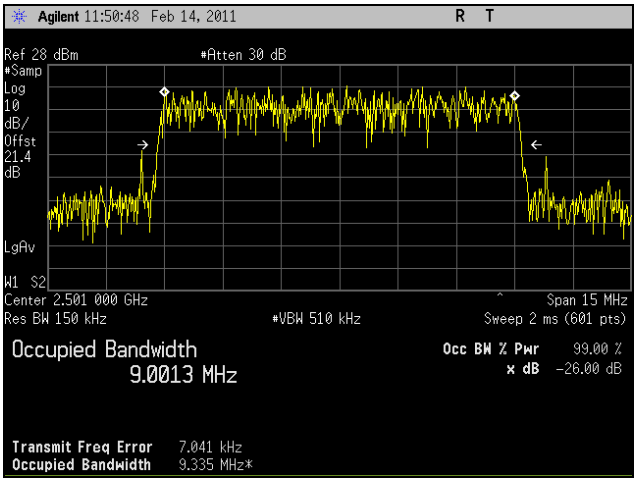
  




**Plot 35. 2593 MHz, Mid Channel, Output 0, 5 MHz, Canada, Occupied BW**

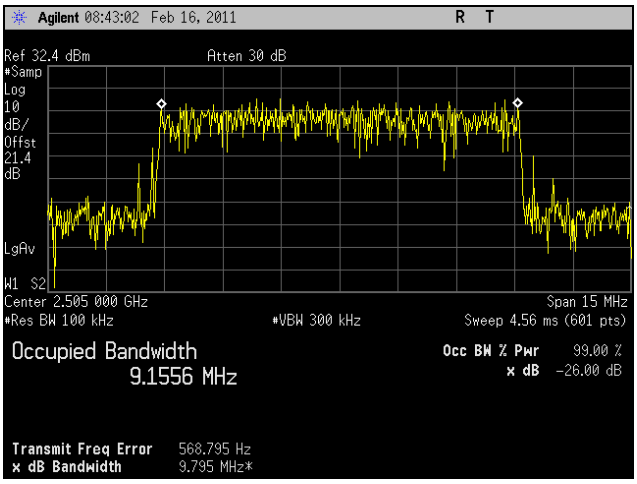



**Plot 36. 2687.5 MHz, High Channel, Output 0, 5 MHz, Canada, Occupied BW**

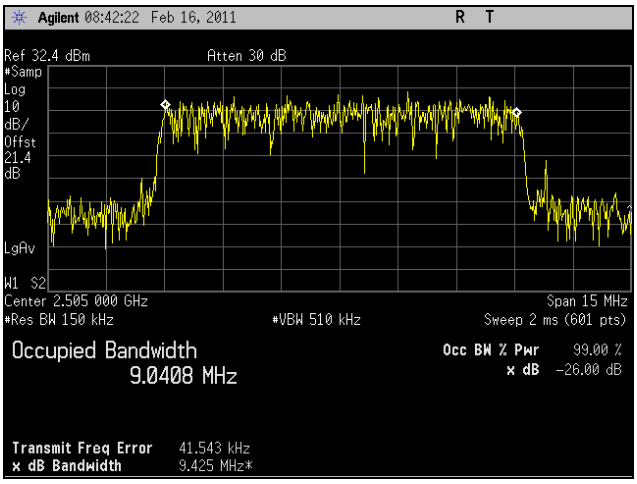



**Plot 37. 2501 MHz, Low Channel, Output 0, 10 MHz, Canada, Occupied BW**

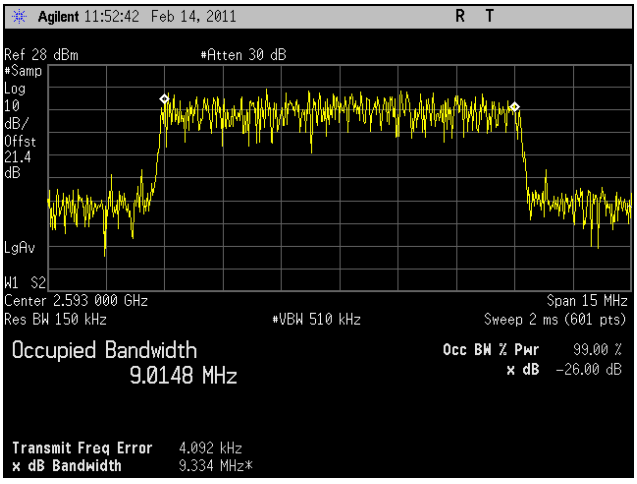
  




**Plot 38. 2505 MHz, Low Channel, Output 0, 10 MHz, Canada, Occupied BW**

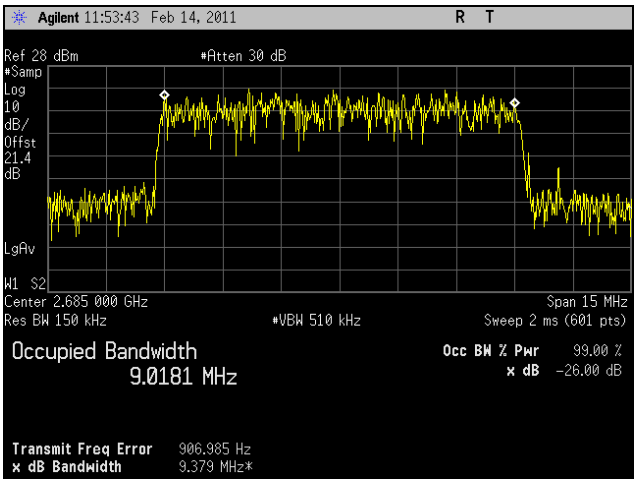



**Plot 39. 2505 MHz, Low Channel, Output 0, 10 MHz, Canada, Occupied BW**

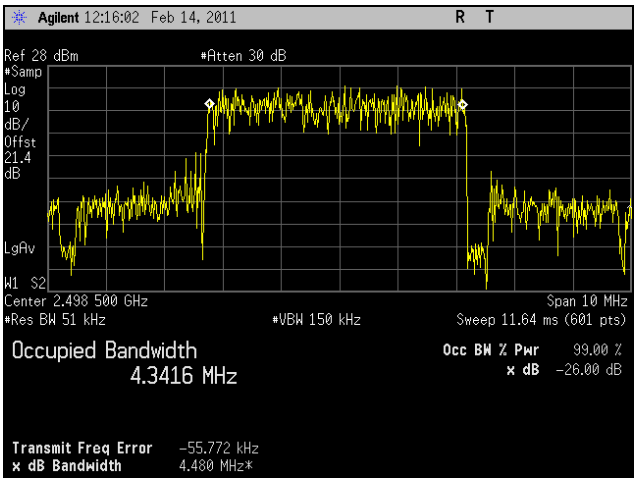



**Plot 40. 2593 MHz, Mid Channel, Output 0, 10 MHz, Canada, Occupied BW**

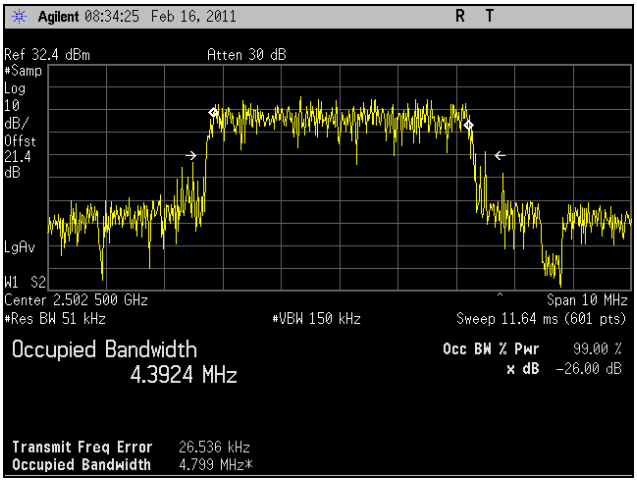
  




**Plot 41. 2685 MHz, High Channel, Output 0, 10 MHz, Canada, Occupied BW**

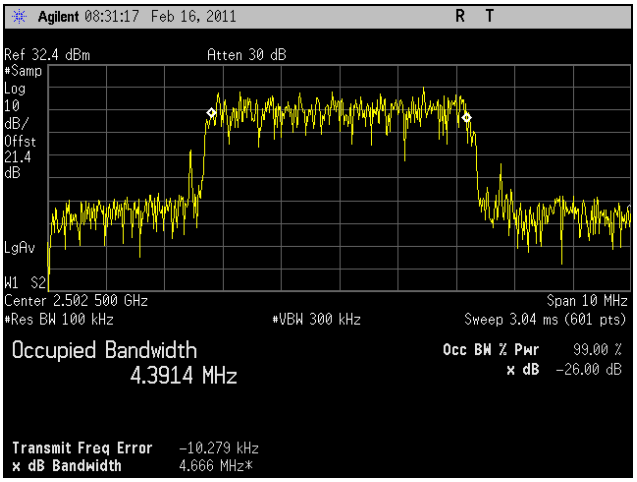



**Plot 42. 2498.5 MHz, Low Channel, Output 1, 5 MHz, Canada, Occupied BW**

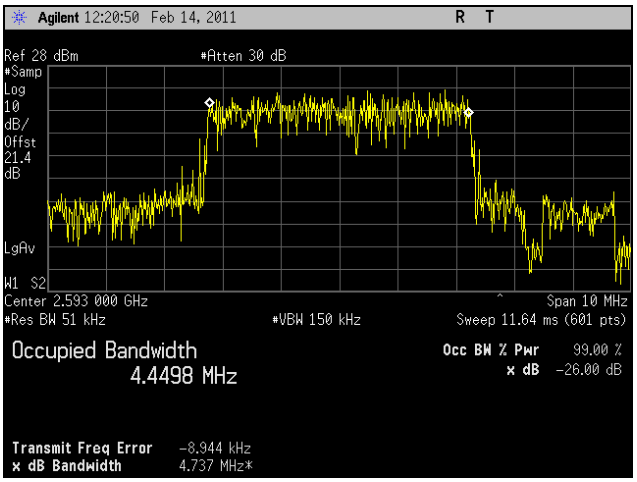



**Plot 43. 2502.5 MHz, Low Channel, Output 1, 5 MHz, Canada, Occupied BW**

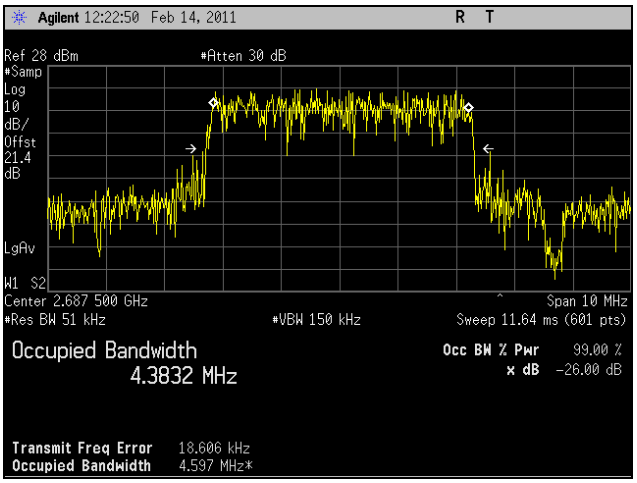
  




**Plot 44. 2502.5 MHz, Low Channel, Output 1, 5 MHz, Canada, Occupied BW**

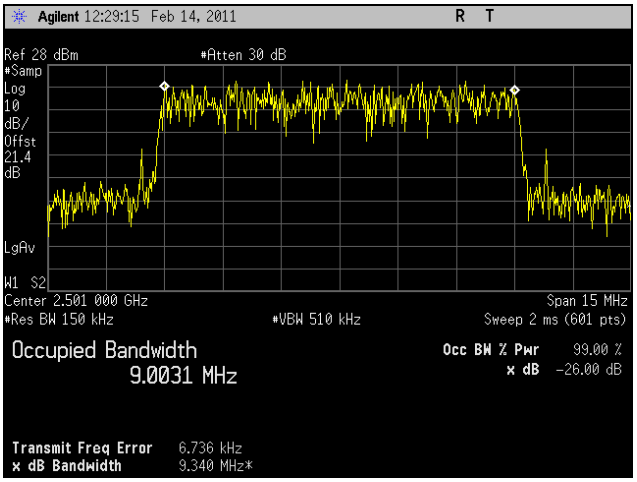



**Plot 45. 2593 MHz, Mid Channel, Output 1, 5 MHz, Canada, Occupied BW**

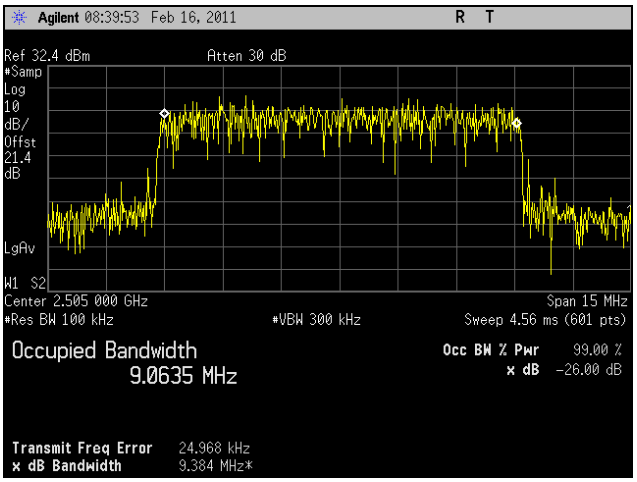



**Plot 46. 2687.5 MHz, High Channel, Output 1, 5 MHz, Canada, Occupied BW**

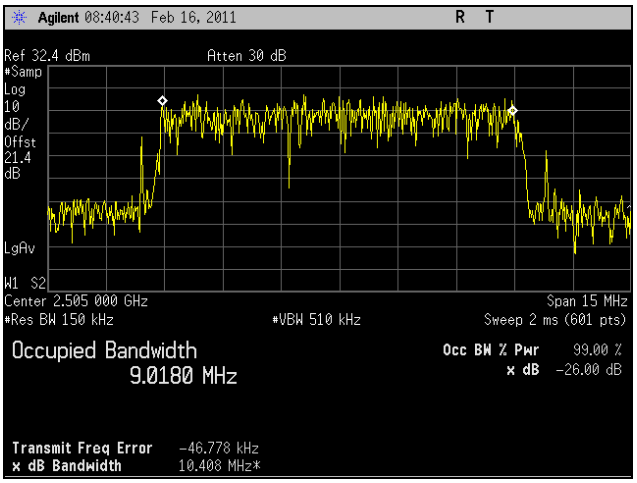
  




**Plot 47. 2501 MHz, Low Channel, Output 1, 10 MHz, Canada, Occupied BW**

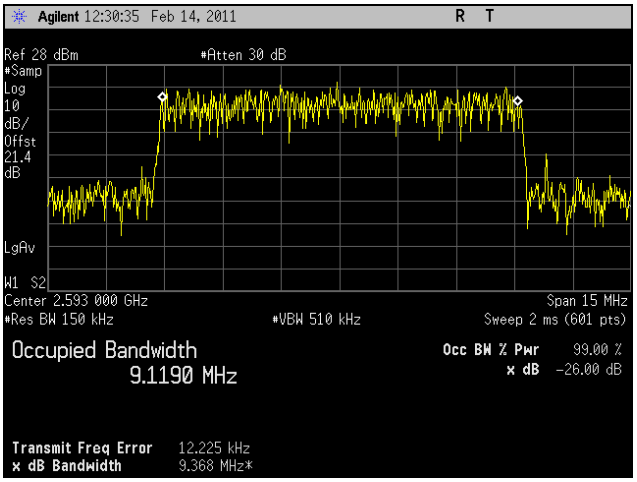



**Plot 48. 2505 MHz, Low Channel, Output 1, 10 MHz, Canada, Occupied BW**

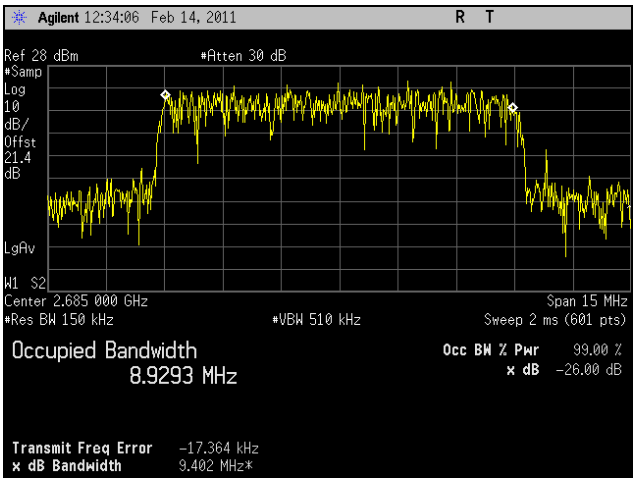



**Plot 49. 2505 MHz, Low Channel, Output 1, 10 MHz, Canada, Occupied BW**




**Plot 50. 2593 MHz, Mid Channel, Output 1, 10 MHz, Canada, Occupied BW**




**Plot 51. 2685 MHz, High Channel, Output 1, 10 MHz, Canada, Occupied BW**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## § 2.1053 Radiated Spurious Emissions

**Test Requirement(s):** **§ 2.1053 Measurements required: Field strength of spurious radiation.**

**§ 2.1053 (a)** Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph (c) of § 2.1049, as appropriate. For equipment operating on frequencies below 890 MHz, an open field test is normally required with the measuring instrument antenna located in the far-field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurements will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of any possible source of reflections which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

**§ 2.1053 (b):** The measurements specified in paragraph (a) of this section shall be made for the following equipment:

**(1)** Those in which the spurious emissions are required to be 60 dB or more below the mean power of the transmitter.

**(2)** All equipment operating on frequencies higher than 25 MHz.

**(3)** All equipment where the antenna is an integral part of, and attached directly to the transmitter.

**(4)** Other types of equipment as required, when deemed necessary by the Commission.

**Test Procedures:** As required by 47 CFR 2.1053, the *field strengths of radiated spurious emissions* were made in accordance with the procedures of TIA/EIA-603-A-2001 "Land Mobile FM or PM Communications Equipment Measurement and Performance Standards".

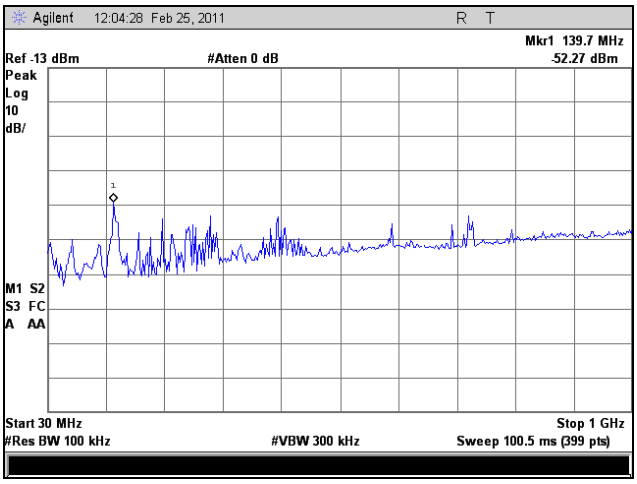
Radiated emission measurements were performed inside a 3 meter semi-anechoic chamber (equivalent to an Open Area Test Site). The distance between the EUT and the test antenna was 3 meters for below 1 GHz and 1m for frequencies above 1 GHz. The EUT's RF port was connected to a dummy load. The intensities of the radiated emissions were maximized by rotating the turntable 360 degrees and varying the receive antenna from 1 to 4m. Measurements were made with the receive antenna in both horizontal and vertical polarizations.

**Test Results:** Equipment complies with Section 2.1053. The limit for spurs is -13 dBm. Measurements revealed that no spurs came even close to this limit. Therefore, measurements using substitution method were not performed. Also, testing was performed using a CW signal with a 5 MHz OB. The following plots have been corrected. Measurements were made with a pre-amp for above 1 GHz.

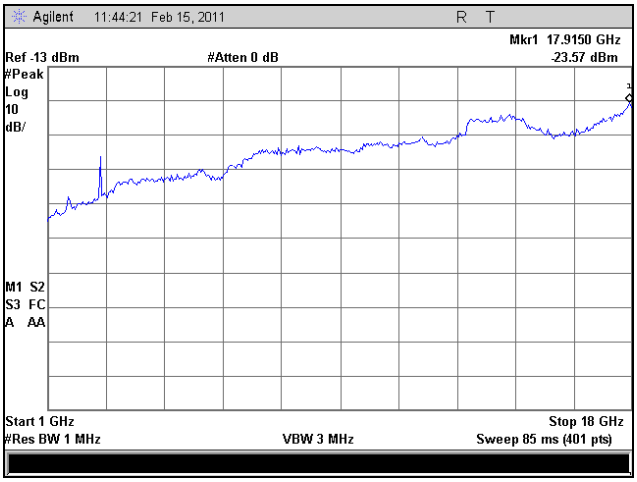
**Test Engineer:** Kenshi Chung

**Test Date(s):** 02/15/11

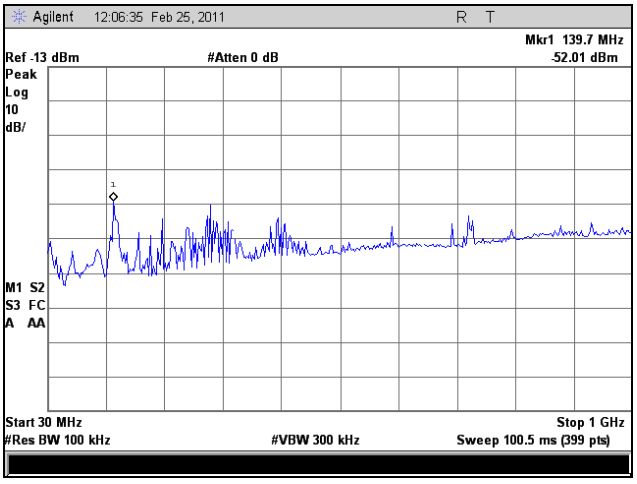
  



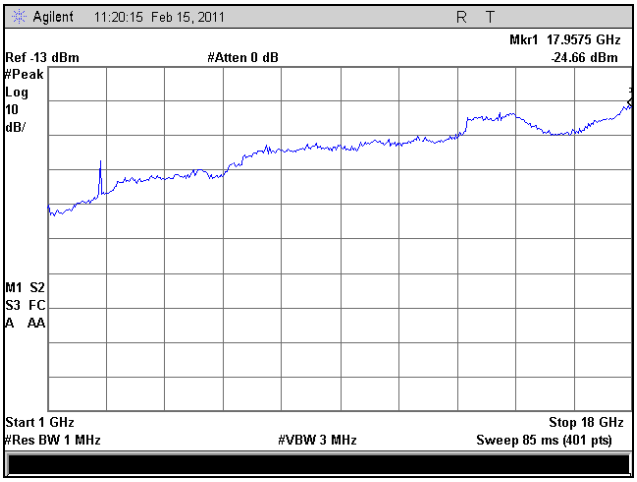

**Plot 52. 2498.5 MHz, Low Channel, Output 0, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



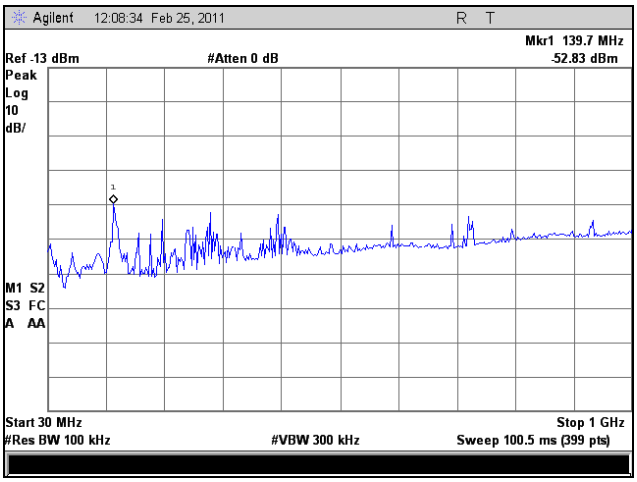

**Plot 53. 2498.5 MHz, Low Channel, Output 0, 5MHz, 1-18GHz, FCC, Radiated Spurious**



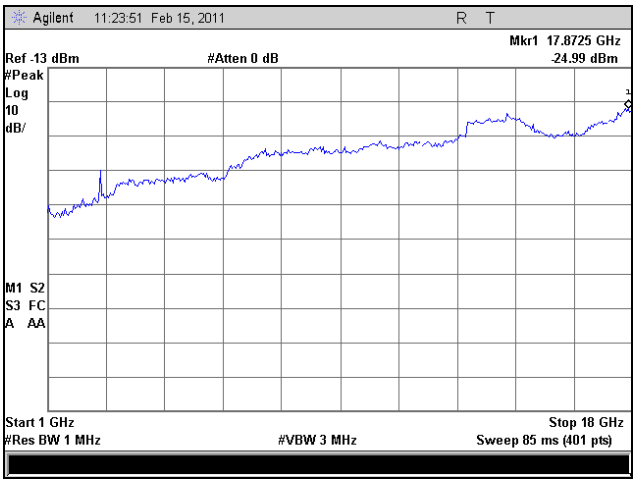

**Plot 54. 2593 MHz, Mid Channel, Output 0, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



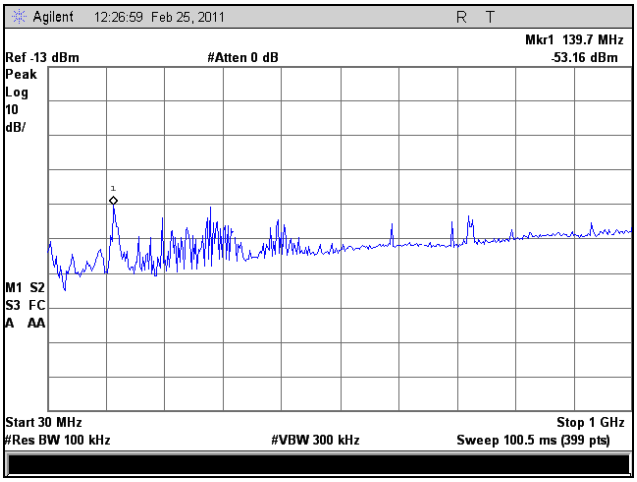

**Plot 55. 2593 MHz, Mid Channel, Output 0, 5MHz, 1-18GHz, FCC, Radiated Spurious**



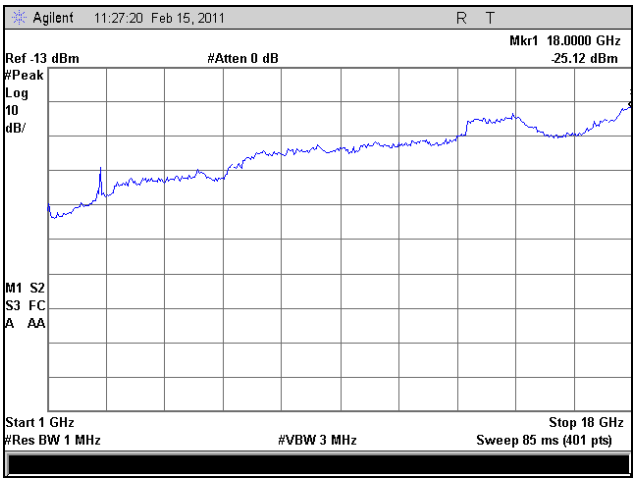

**Plot 56. 2687.5 MHz, High Channel, Output 0, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



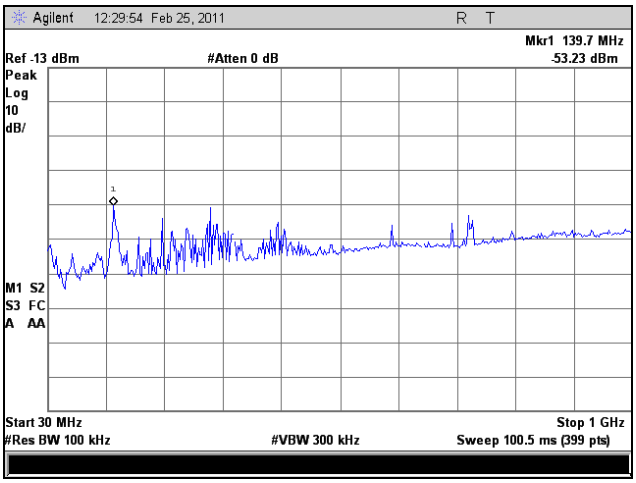

**Plot 57. 2687.5 MHz, High Channel, Output 0, 5MHz, 1-18GHz, FCC, Radiated Spurious**



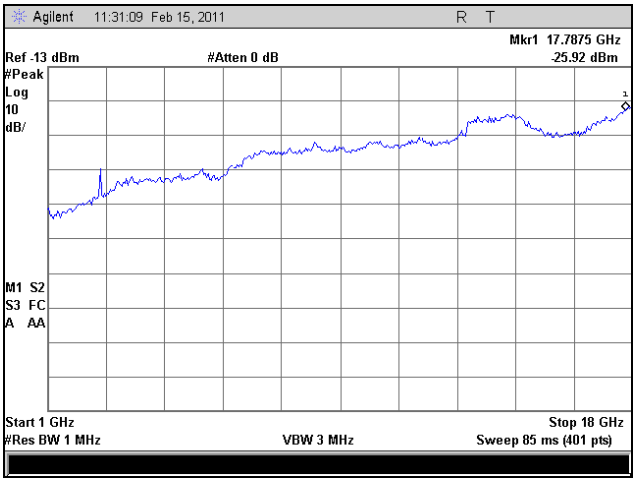

**Plot 58. 2501 MHz, Low Channel, Output 0, 10MHz, 30M-1GHz, FCC, Radiated Spurious**



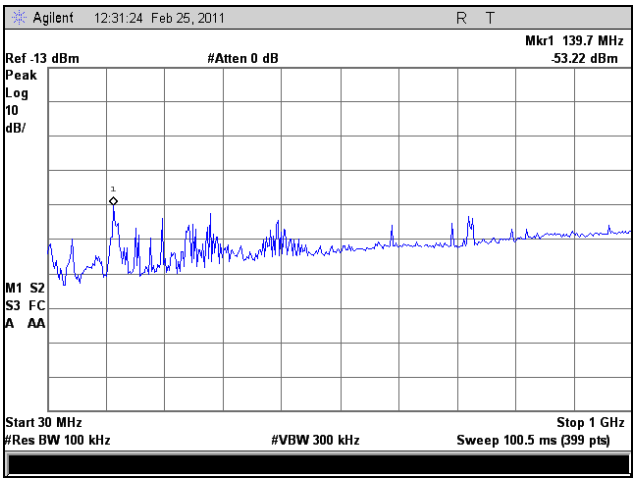

**Plot 59. 2501 MHz, Low Channel, Output 0, 10MHz, 1-18GHz, FCC, Radiated Spurious**



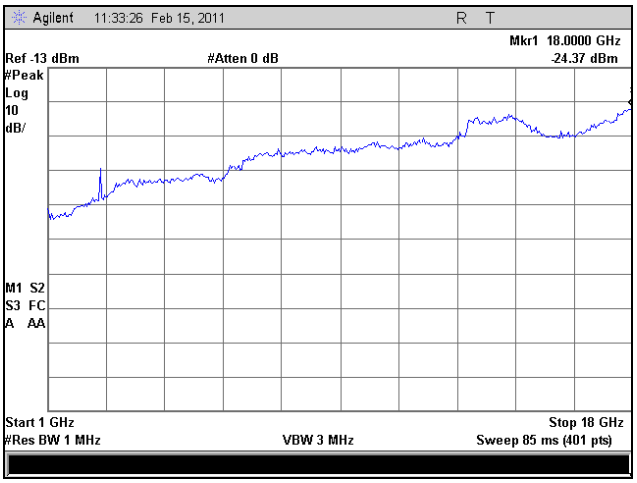

**Plot 60. 2593 MHz, Mid Channel, Output 0, 10MHz, 30-1GHz, FCC, Radiated Spurious**




**Plot 61. 2593 MHz, Mid Channel, Output 0, 10MHz, 1-18GHz, FCC, Radiated Spurious**

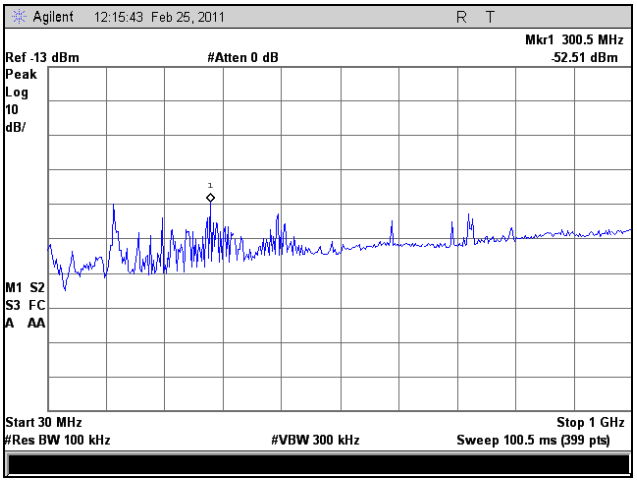



**Plot 62. 2685 MHz, High Channel, Output 0, 10MHz, 30M-1GHz, FCC, Radiated Spurious**

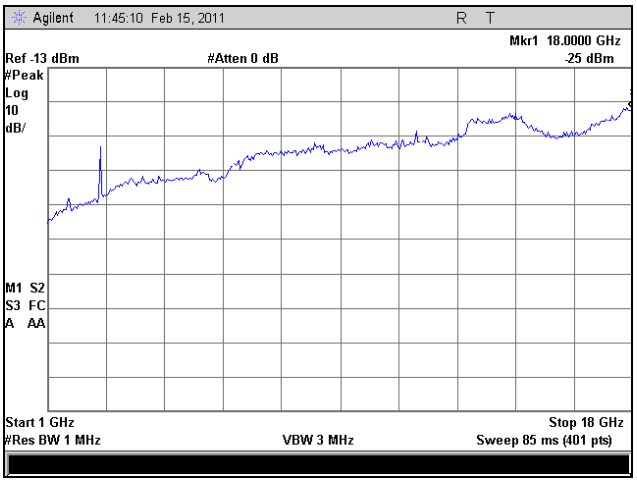



**Plot 63. 2685 MHz, High Channel, Output 0, 10MHz, 1-18GHz, FCC, Radiated Spurious**

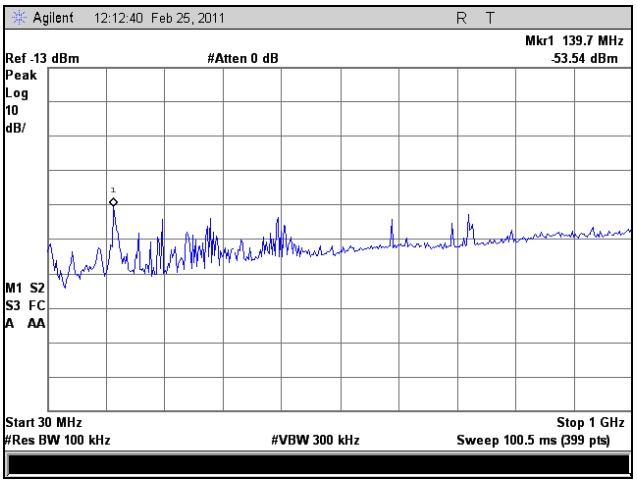
  



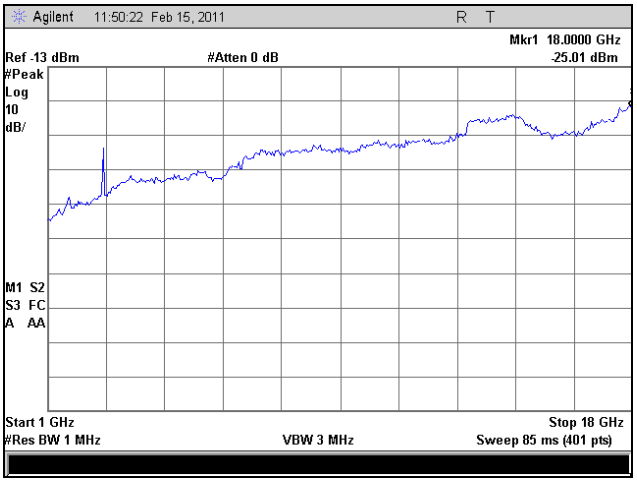

**Plot 64. 2498.5 MHz, Low Channel, Output 1, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



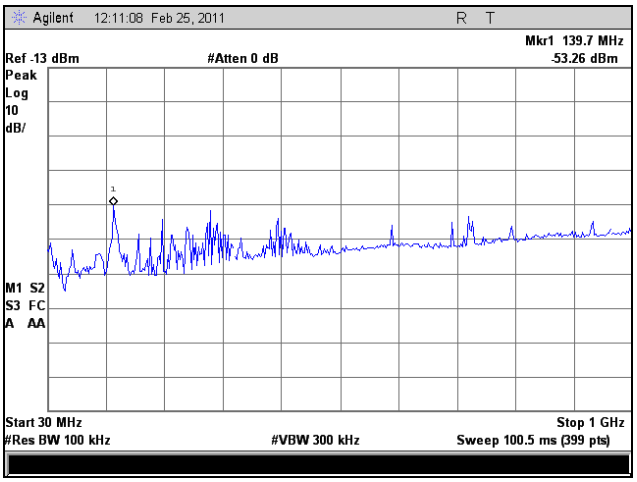

**Plot 65. 2498.5 MHz, Low Channel, Output 1, 5MHz, 1-18GHz, FCC, Radiated Spurious**



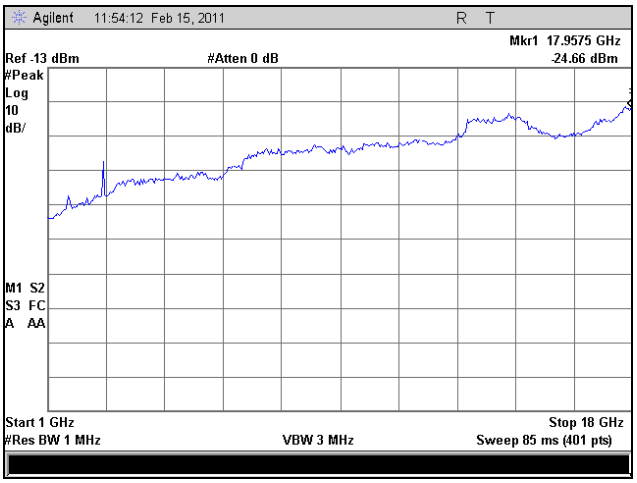

**Plot 66. 2593 MHz, Mid Channel, Output 1, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



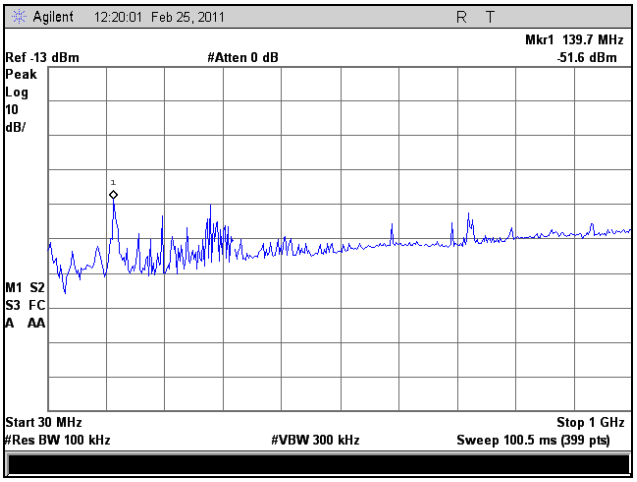

**Plot 67. 2593 MHz, Mid Channel, Output 1, 5MHz, 1-18GHz, FCC, Radiated Spurious**



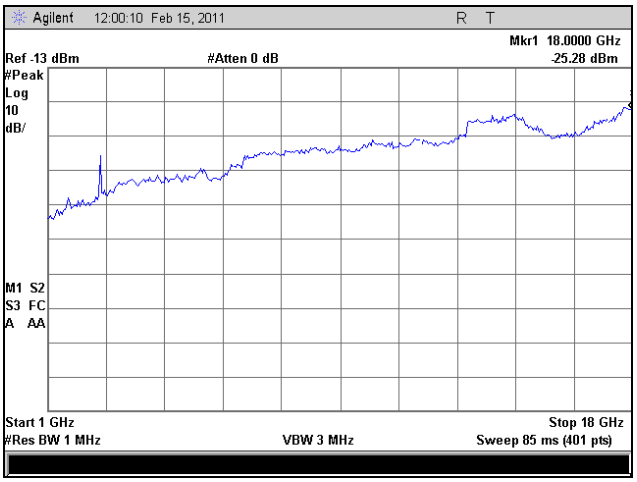

**Plot 68. 2687.5 MHz, High Channel, Output 1, 5MHz, 30M-1GHz, FCC, Radiated Spurious**



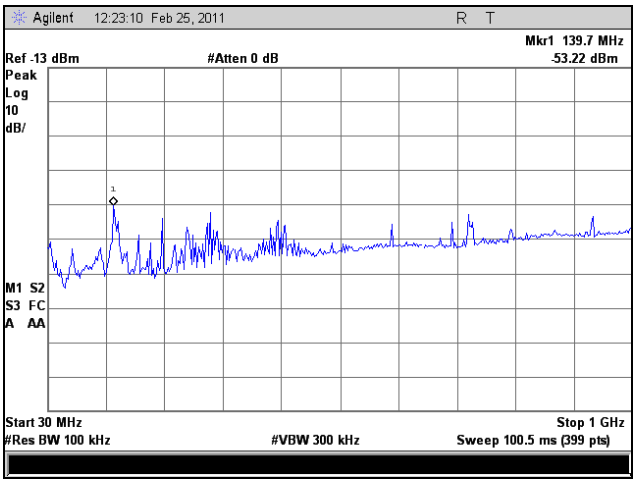

**Plot 69. 2687.5 MHz, High Channel, Output 1, 5MHz, 1-18GHz, FCC, Radiated Spurious**



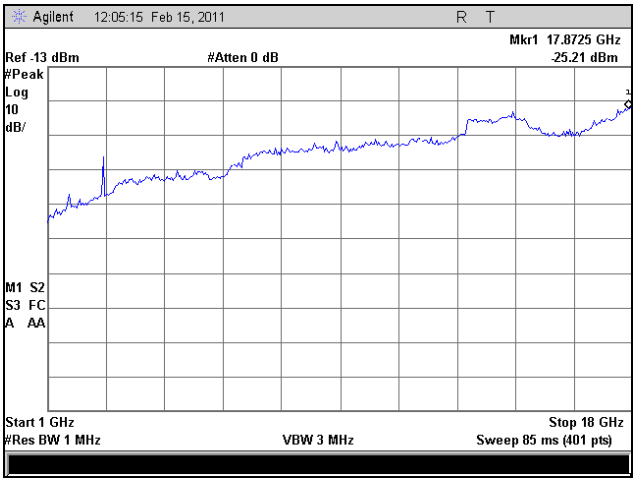

**Plot 70. 2501 MHz, Low Channel, Output 1, 10MHz, 30M-1GHz, FCC, Radiated Spurious**



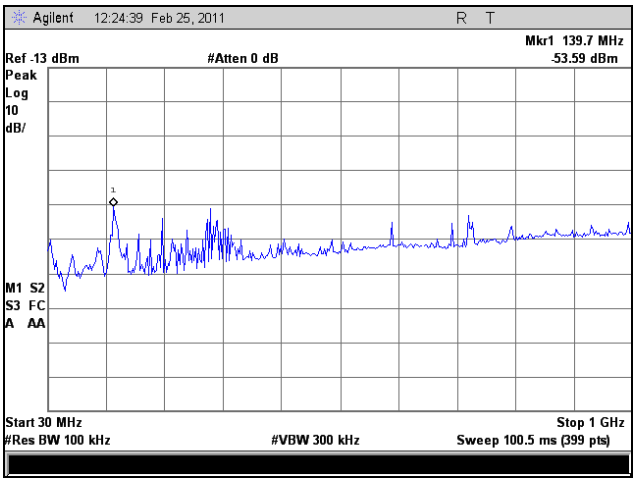

**Plot 71. 2501 MHz, Low Channel, Output 1, 10MHz, 1-18GHz, FCC, Radiated Spurious**



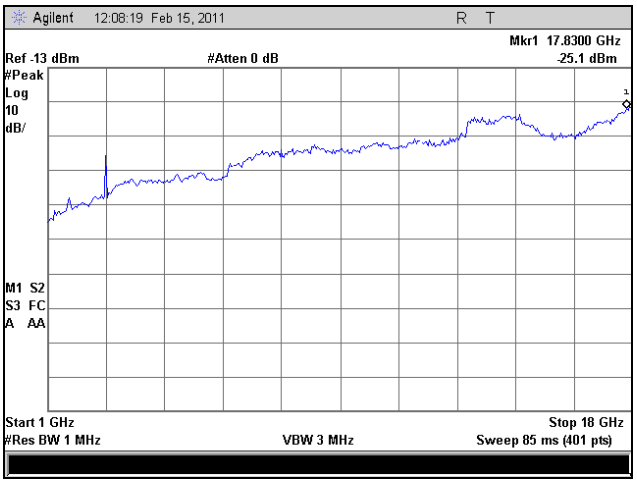

**Plot 72. 2593 MHz, Mid Channel, Output 1, 10MHz, 30M-1GHz, FCC, Radiated Spurious**




**Plot 73. 2593 MHz, Mid Channel, Output 1, 10MHz, 1-18GHz, FCC, Radiated Spurious**

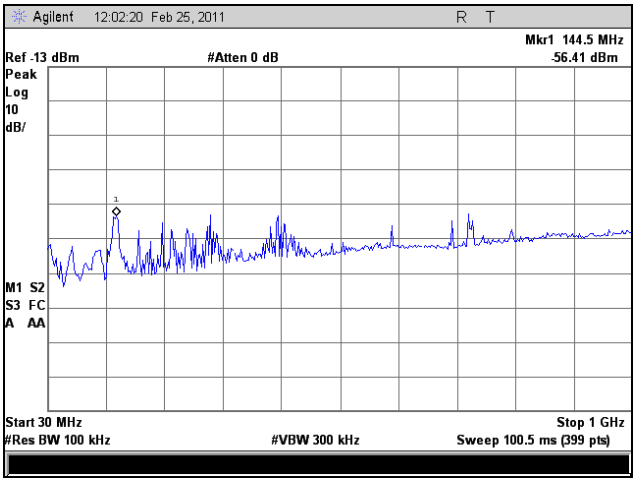



**Plot 74. 2685 MHz, High Channel, Output 1, 10MHz, 30M-1GHz, FCC, Radiated Spurious**

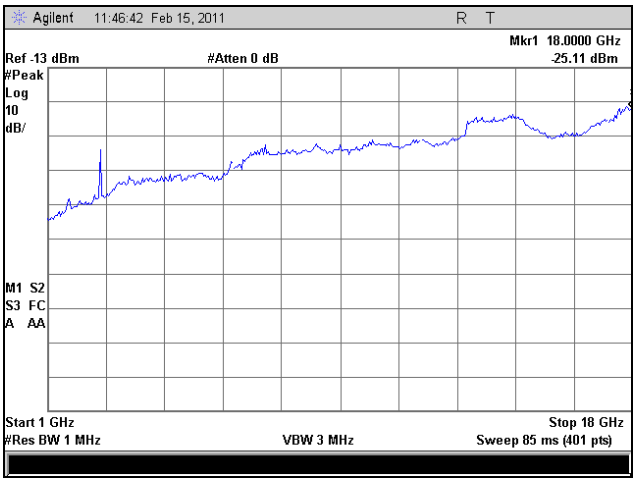



**Plot 75. 2685 MHz, High Channel, Output 1, 10MHz, 1-18GHz, FCC, Radiated Spurious**

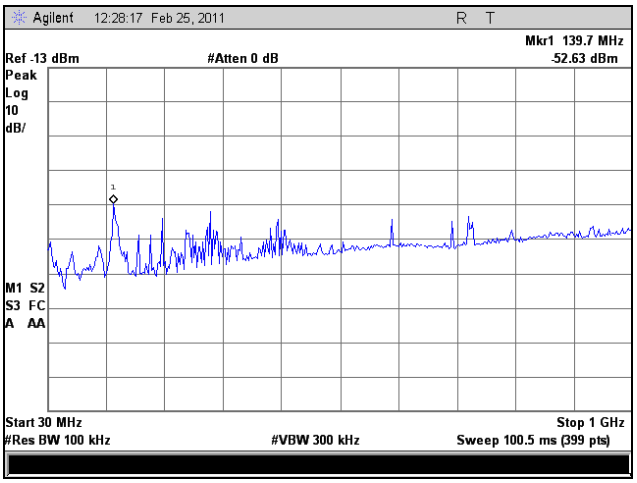
  



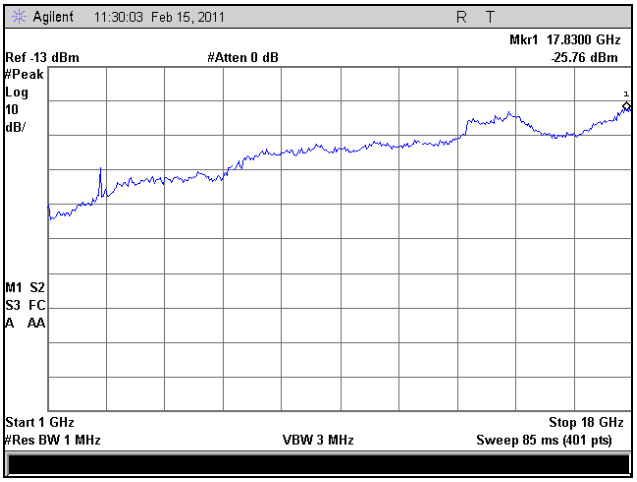

**Plot 76. 2502.5 MHz, Low Channel, Output 0, 5MHz, 30M-1GHz, Canada, Radiated Spurious**



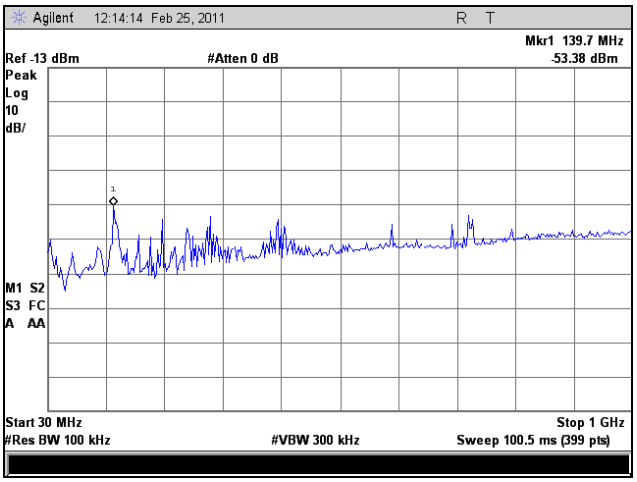

**Plot 77. 2502.5 MHz, Low Channel, Output 0, 5MHz, 1-18GHz, Canada, Radiated Spurious**



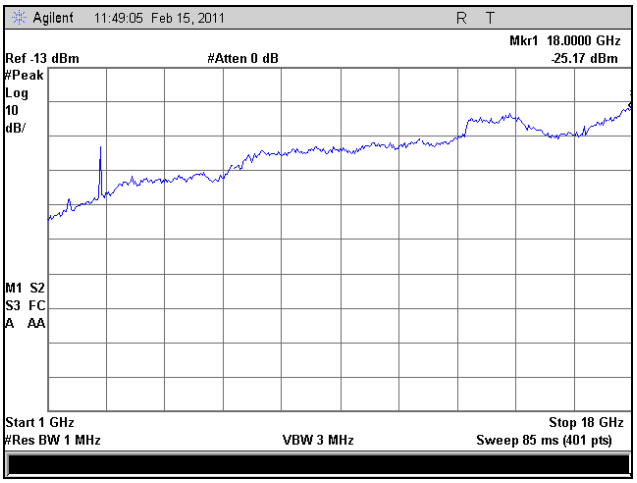

**Plot 78. 2505 MHz, Low Channel, Output 0, 10MHz, 30M-1GHz, Canada, Radiated Spurious**



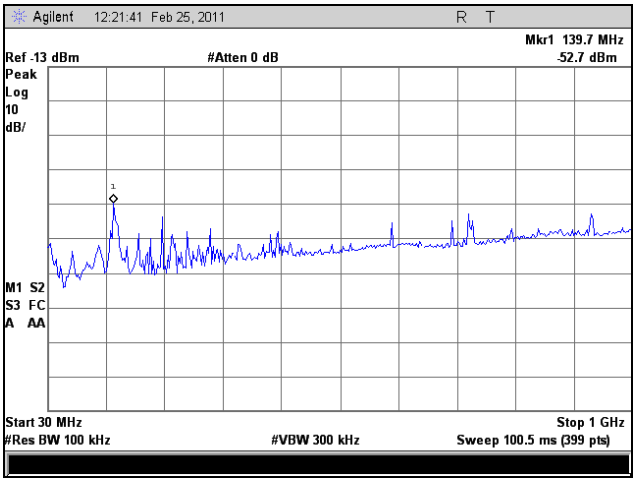

**Plot 79. 2505 MHz, Low Channel, Output 0, 10MHz, 1-18GHz, Canada, Radiated Spurious**



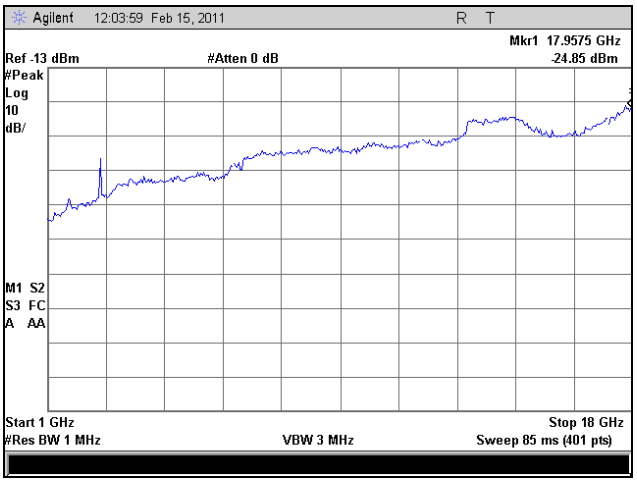

**Plot 80. 2502.5 MHz, Low Channel, Output 1, 5MHz, 30M-1GHz, Canada, Radiated Spurious**




**Plot 81. 2502.5 MHz, Low Channel, Output 1, 5MHz, 1-18GHz, Canada, Radiated Spurious**




**Plot 82. 2505 MHz, Low Channel, Output 1, 10MHz, 30M-1GHz, Canada, Radiated Spurious**




**Plot 83. 2505 MHz, Low Channel, Output 1, 10MHz, 1-18GHz, Canada, Radiated Spurious**

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 2.1051 Spurious Emissions at Antenna Terminals

**Test Requirement(s):** **§ 2.1051and 27.53(l) Measurements required: Spurious emissions at antenna terminals:** The radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in § 2.1049 as appropriate.

**Test Procedures:** The spectrum analyzer was set to 1MHz RBW and 3MHz VBW. The spectrum was investigated from 30MHz to the 10$^{th}$ harmonic of the carrier.

The inter-modulation requirements were performed in a similar manner as described above. The spectrum analyzer was set to 100KHz RBW and 300KHz VBW. Two modulated carriers were injected into the EUT. The in band spurious emissions were investigated.
The filter response has also be measured and recorded.

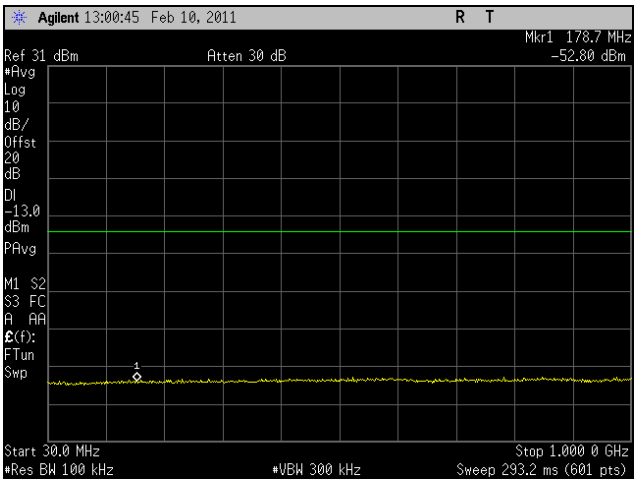
**Test Results:** Equipment complies with Section 2.1051 and 27.53(g). The following pages show measurements of Spurious Emission plots

The following analysis and plots are included below to illustrate compliance with the required rule parts.

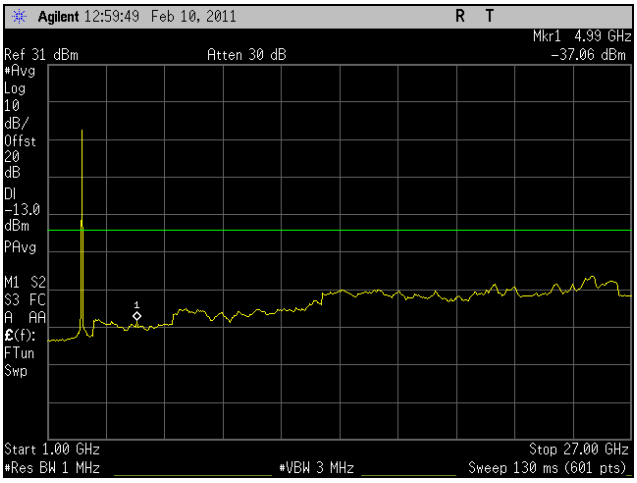
**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/14/11

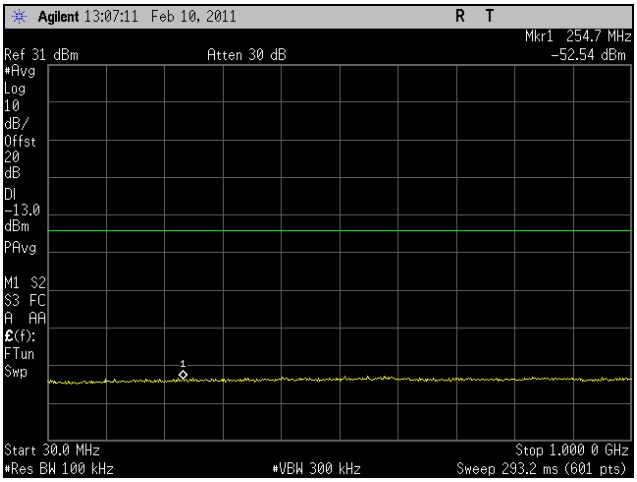
  




**Plot 84. 2498.5 Low Channel, Output 0, QPSK 5MHz, 30M-1GHz**

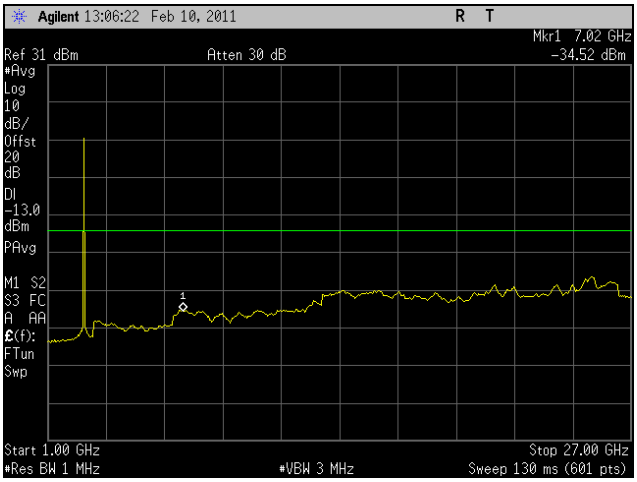



**Plot 85. 2498.5 Low Channel, Output 0, QPSK 5MHz, 1-27GHz**

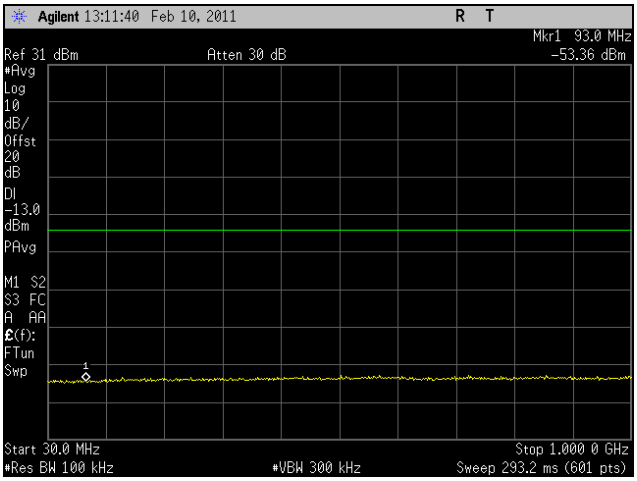



**Plot 86. 2593 MHz, Mid Channel, Output 0, QPSK 5MHz, 30M-1GHz**

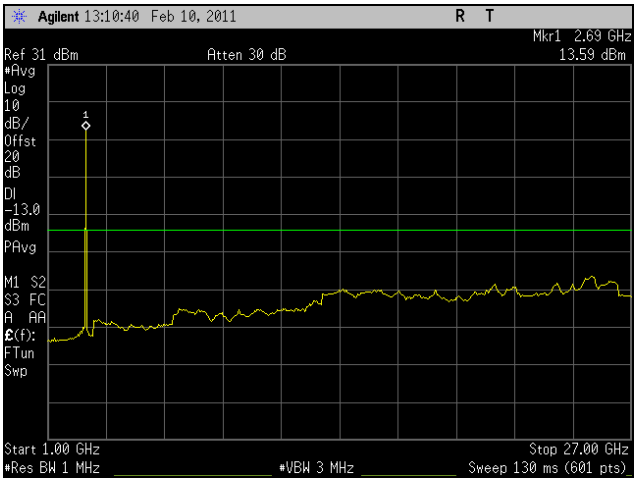
  



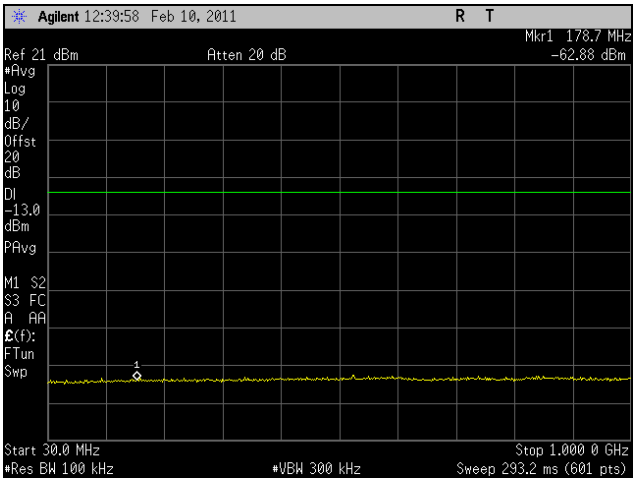

**Plot 87. 2593 MHz, Mid Channel, Output 0, QPSK 5MHz, 1-27GHz**



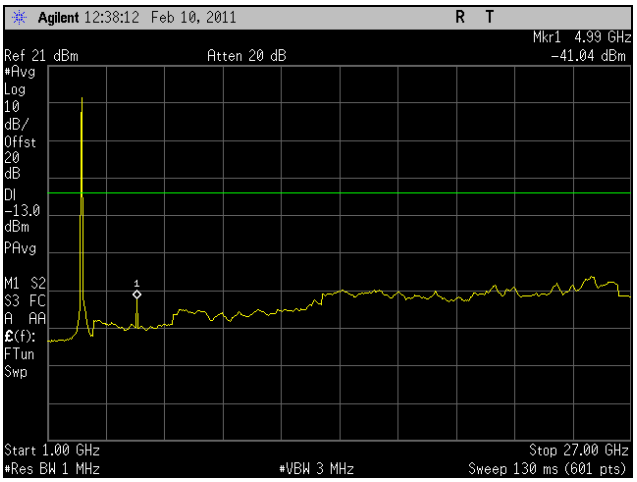

**Plot 88. 2687.5 MHz, High Channel, Output 0, QPSK 5MHz, 30M-1GHz**



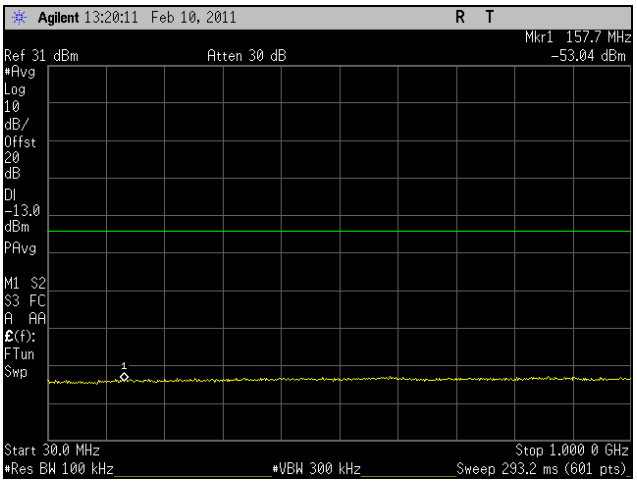

**Plot 89. 2687.5 MHz, High Channel, Output 0, QPSK 5MHz, 1-27GHz**



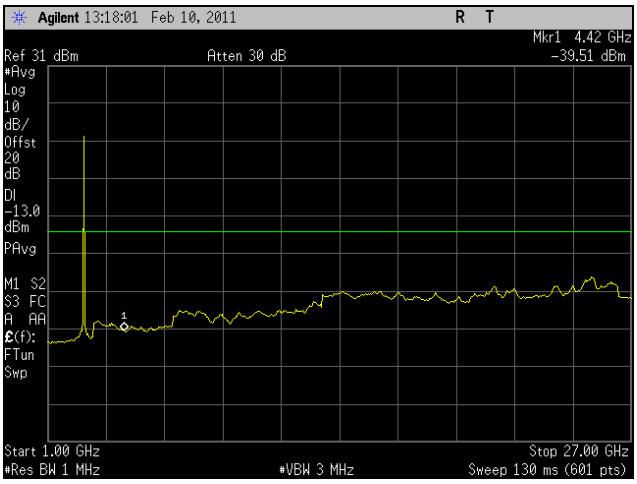

**Plot 90. 2501 MHz, Low Channel, Output 0, QPSK 10MHz, 30M-1GHz**



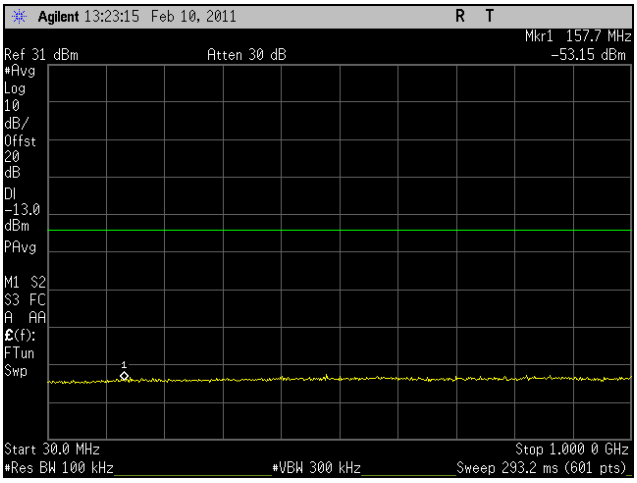

**Plot 91. 2501 MHz, Low Channel, Output 0, QPSK 10MHz, 1-27GHz**



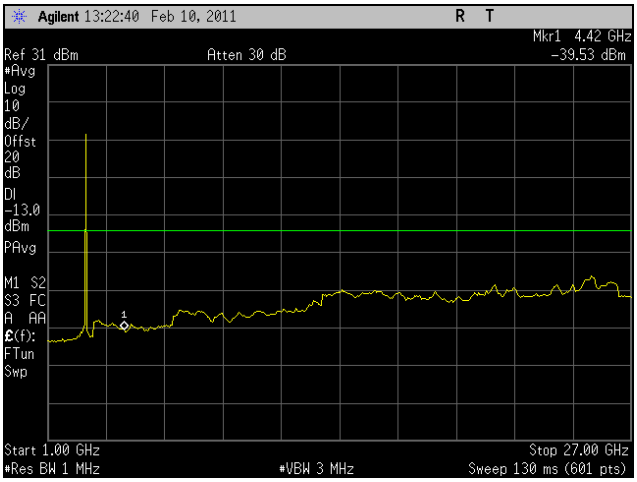

**Plot 92. 2593 MHz, Mid Channel, Output 0, QPSK 10MHz, 30M-1GHz**




**Plot 93. 2593 MHz, Mid Channel, Output 0, QPSK 10MHz, 1-27GHz**

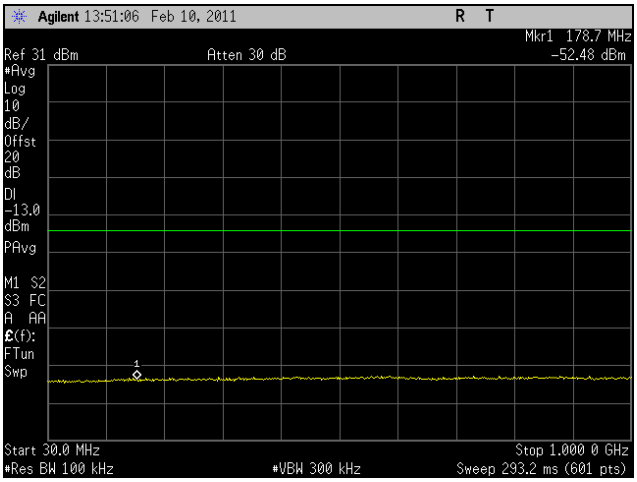



**Plot 94. 2685 MHz, High Channel, Output 0, QPSK 10MHz, 30M-1GHz**

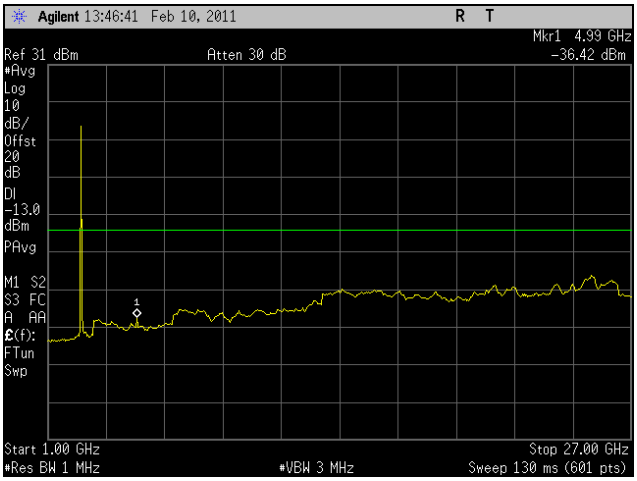



**Plot 95. 2685 MHz, High Channel, Output 0, QPSK 10MHz, 1-27GHz**

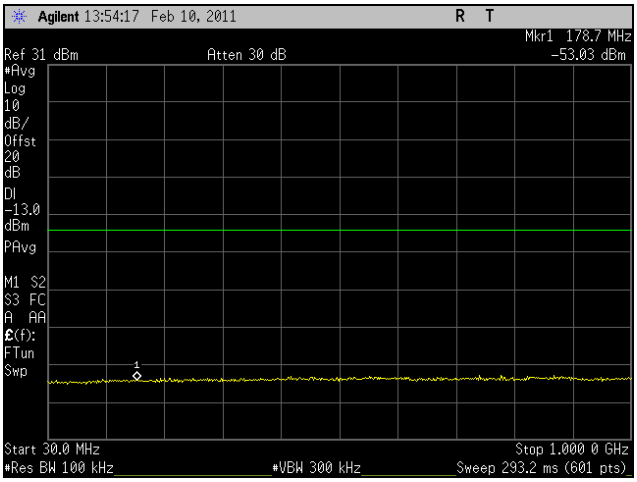
  




**Plot 96. 2498.5 Low Channel, Output 1, QPSK 5MHz, 30M-1GHz**

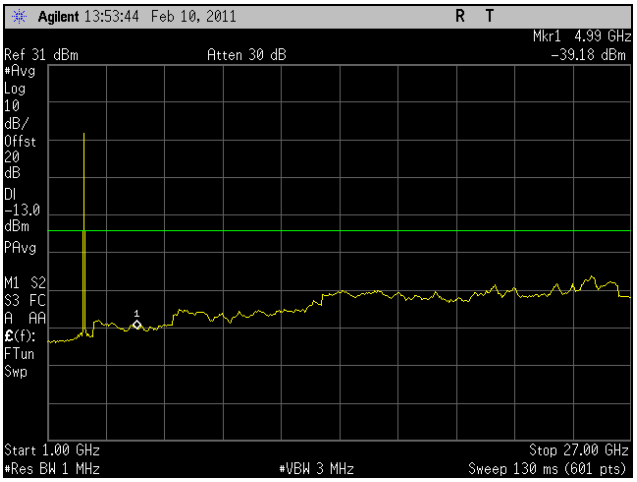



**Plot 97. 2498.5 Low Channel, Output 1, QPSK 5MHz, 1-27GHz**

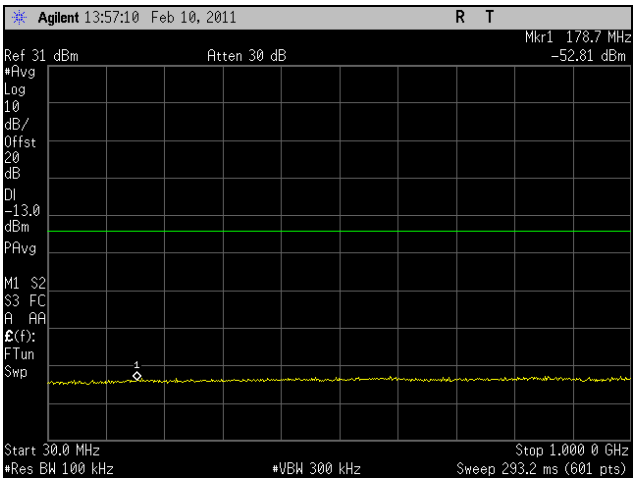



**Plot 98. 2593 MHz, Mid Channel, Output 1, QPSK 5MHz, 30M-1GHz**

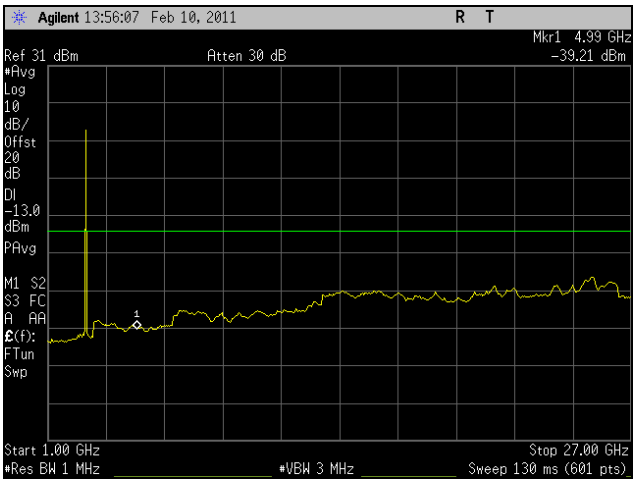
  




**Plot 99. 2593 MHz, Mid Channel, Output 1, QPSK 5MHz, 1-27GHz**

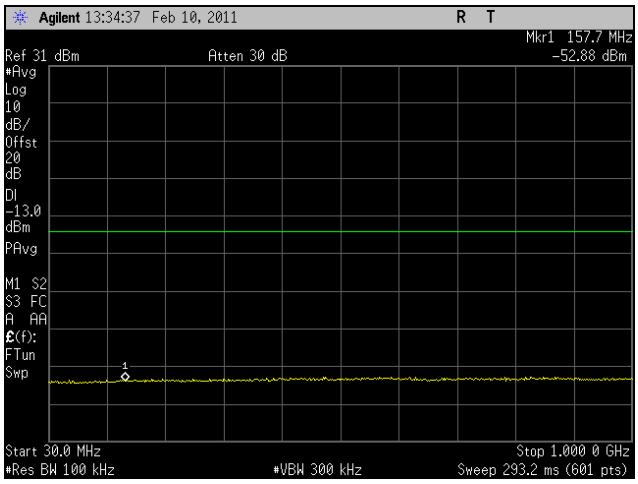



**Plot 100. 2687.5 MHz, High Channel, Output 1, QPSK 5MHz, 30M-1GHz**

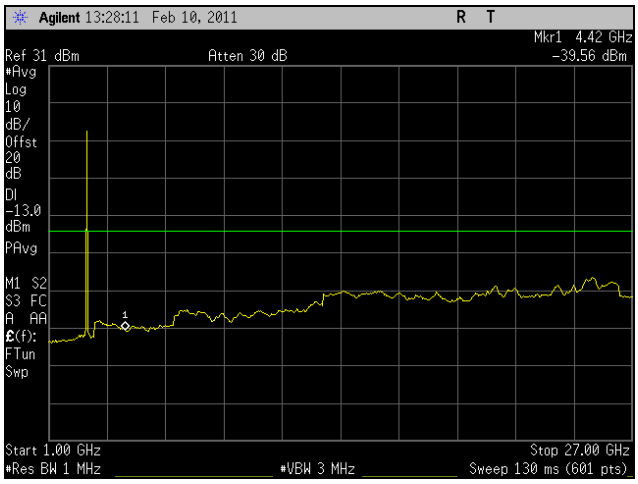



**Plot 101. 2687.5 MHz, High Channel, Output 1, QPSK 5MHz, 1-27GHz**

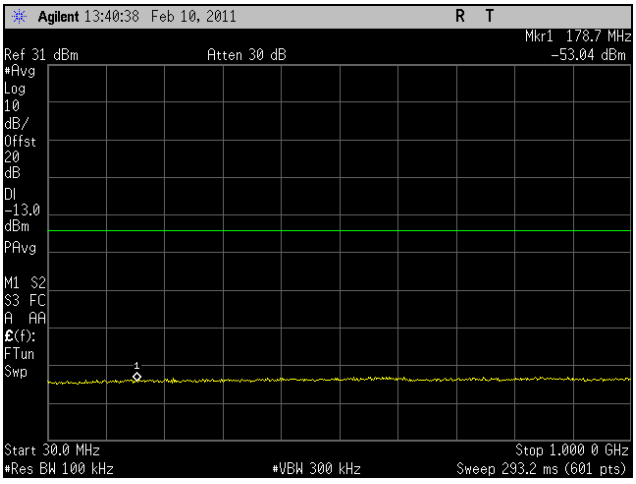
  




**Plot 102. 2501 MHz, Low Channel, Output 1, QPSK 10MHz, 30M-1GHz**

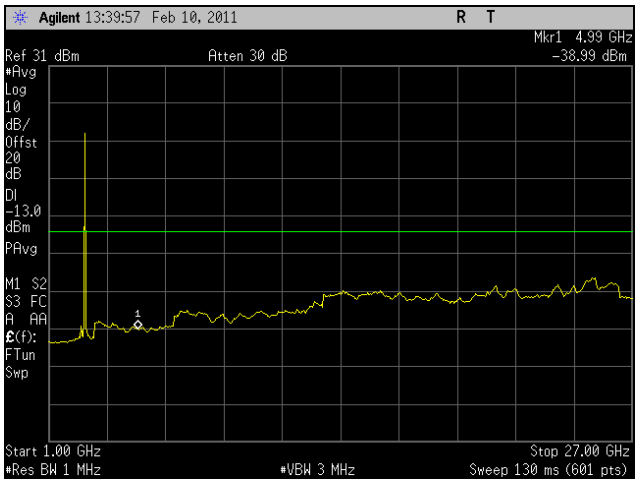



**Plot 103. 2501 MHz, Low Channel, Output 1, QPSK 10MHz, 1-27GHz**

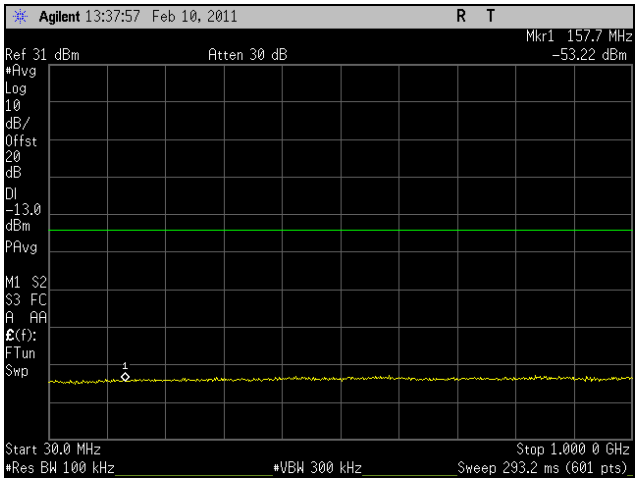



**Plot 104. 2593 MHz, Mid Channel, Output 1, QPSK 10MHz, 30M-1GHz**

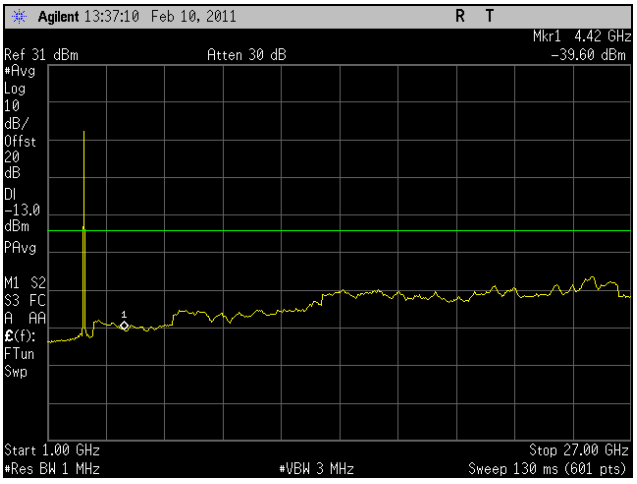
  




**Plot 105. 2593 MHz, Mid Channel, Output 1, QPSK 10MHz, 1-27GHz**

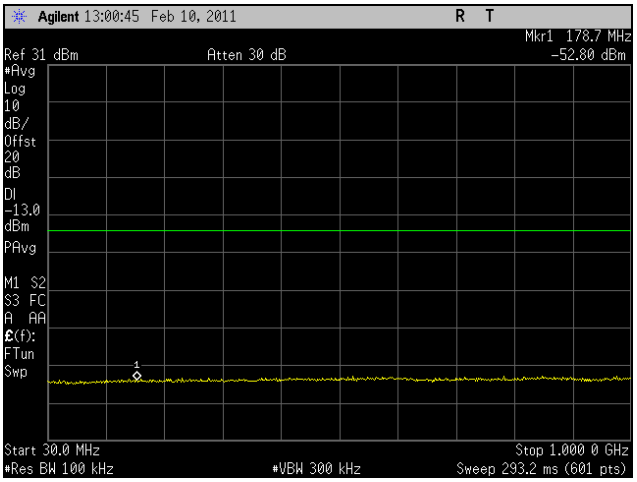



**Plot 106. 2685 MHz, High Channel, Output 1, QPSK 10MHz, 30M-1GHz**

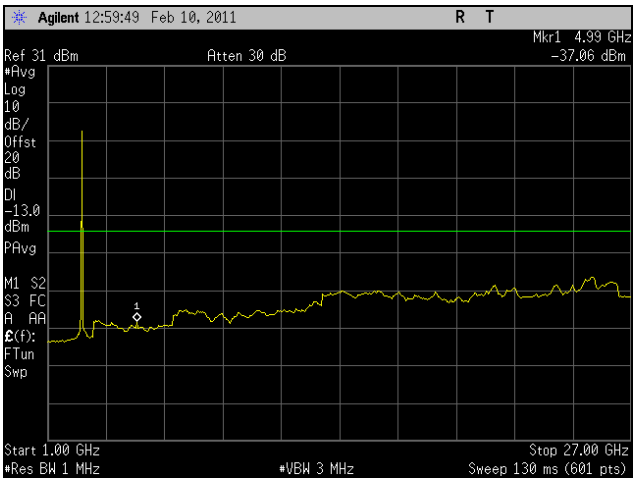



**Plot 107. 2685 MHz, High Channel, Output 1, QPSK 10MHz, 1-27GHz**

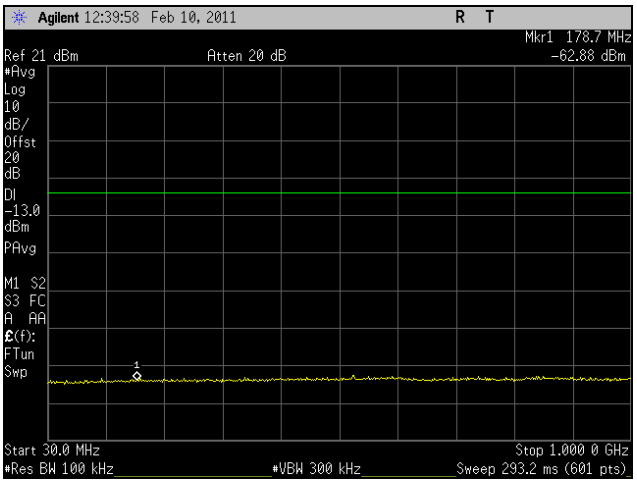
  




**Plot 108. 2502.5 Low Channel, Canada, Output 0, QPSK 5MHz, 30M-1GHz**

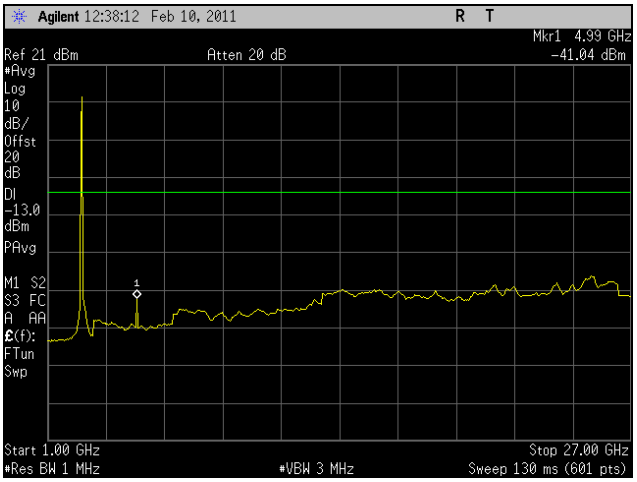



**Plot 109. 2502.5 Low Channel, Canada, Output 0, QPSK 5MHz, 1-27GHz**

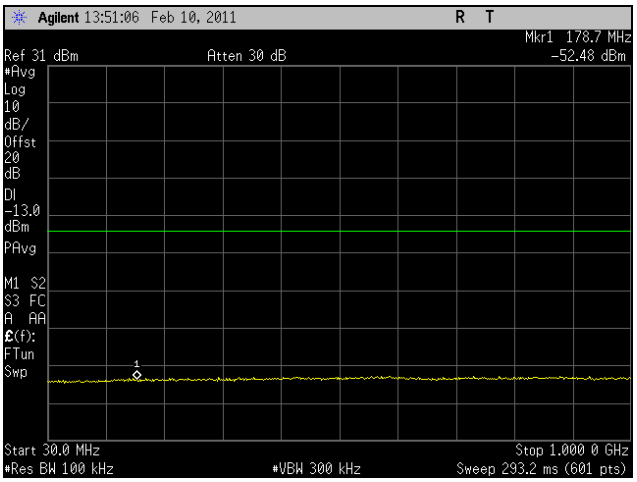



**Plot 110. 2505 MHz, Low Channel, Canada, Output 0, QPSK 10MHz, 30M-1GHz**

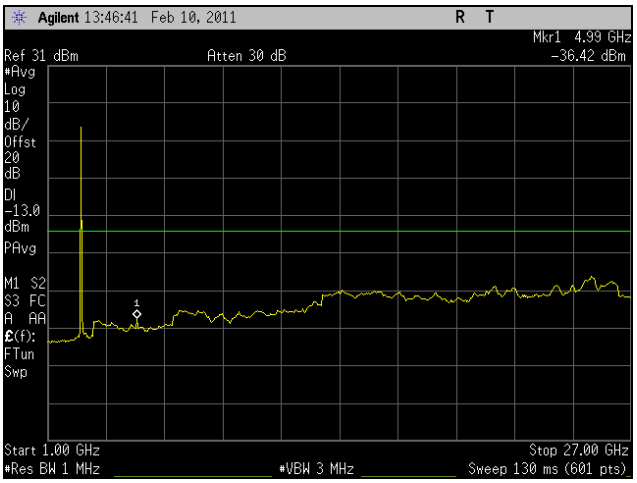
  



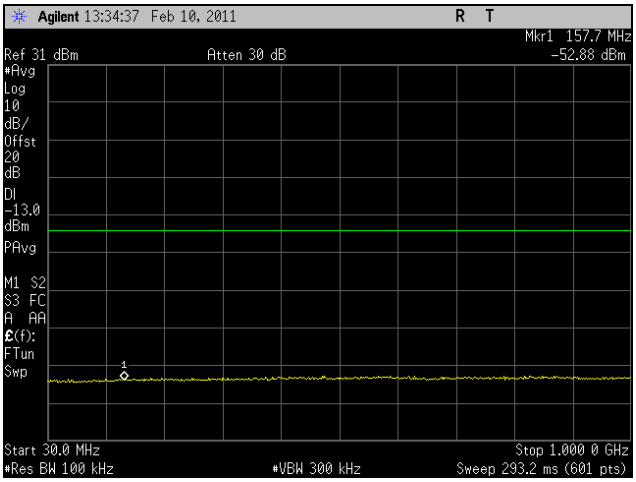

**Plot 111. 2505 MHz, Low Channel, Canada, Output 0, QPSK 10MHz, 1-27GHz**



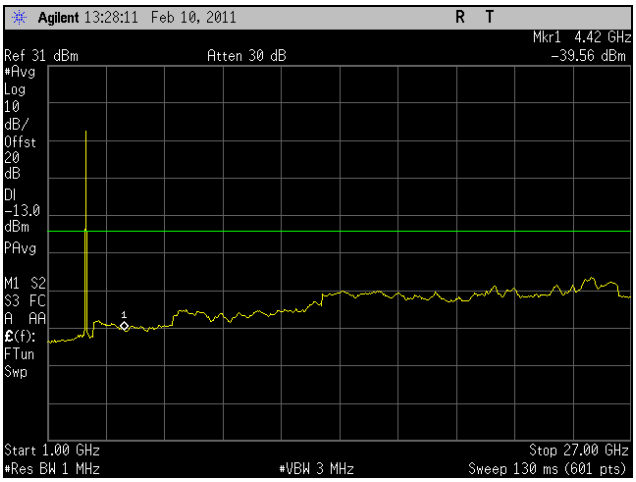

**Plot 112. 2502.5 Low Channel, Canada, Output 1, QPSK 5MHz, 30M-1GHz**




**Plot 113. 2502.5 Low Channel, Canada, Output 1, QPSK 5MHz, 1-27GHz**




**Plot 114. 2505 MHz, Low Channel, Canada, Output 1, QPSK 10MHz, 30M-1GHz**



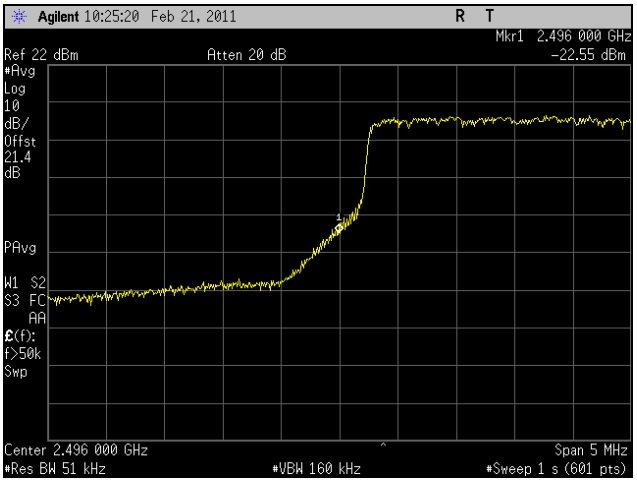

**Plot 115. 2505 MHz, Low Channel, Canada, Output 1, QPSK 10MHz, 1-27GHz**

| Channel | Frequency (MHz) | Output 0 (dBm) | Output 1 (dBm) | Sum (dBm) | Limit (dBm) | Delta (dBm) |
|---|---|---|---|---|---|---|
| FCC Low | 2498.5 | -22.55 | -19.94 | -18.04151348 | -13.0 | -5.04 |
| ICES Low | 2502.5 | -21.84 | -18.81 | -17.05564417 | -13.0 | -4.06 |
| FCC & ICES High | 2687.5 | -22.70 | -21.70 | -19.16098109 | -13.0 | -6.16 |

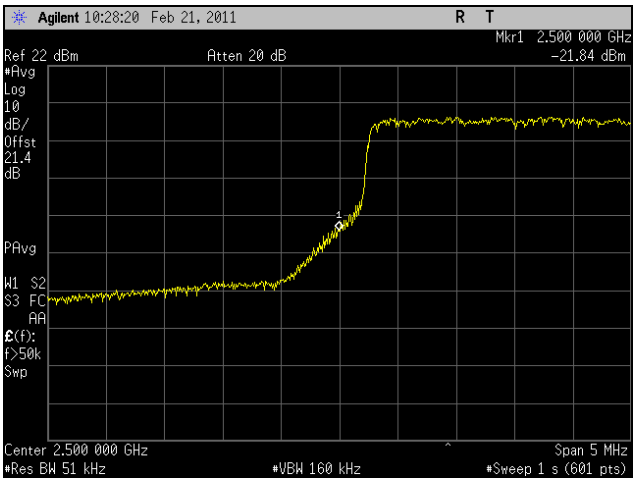
**Table 13. Band Edge, Test Results, 5 MHz**

| Channel | Frequency (MHz) | Output 0 (dBm) | Output 1 (dBm) | Sum (dBm) | Limit (dBm) | Delta (dBm) |
|---|---|---|---|---|---|---|
| FCC Low | 2501.0 | -20.96 | -20.93 | -17.93467414 | -13.0 | -4.93 |
| ICES Low | 2505.0 | -21.62 | -21.00 | -18.2886455 | -13.0 | -5.29 |
| FCC & ICES High | 2685.0 | -23.73 | -20.14 | -18.56385468 | -13.0 | -5.56 |

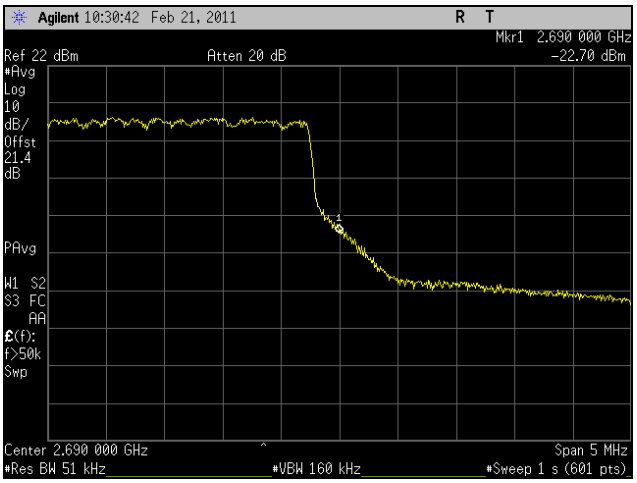
**Table 14. Band Edge, Test Results, 10 MHz**




**Plot 116. 2498.5 MHz, Low Channel, 5MHz, Band Edge, FCC, Output 0**

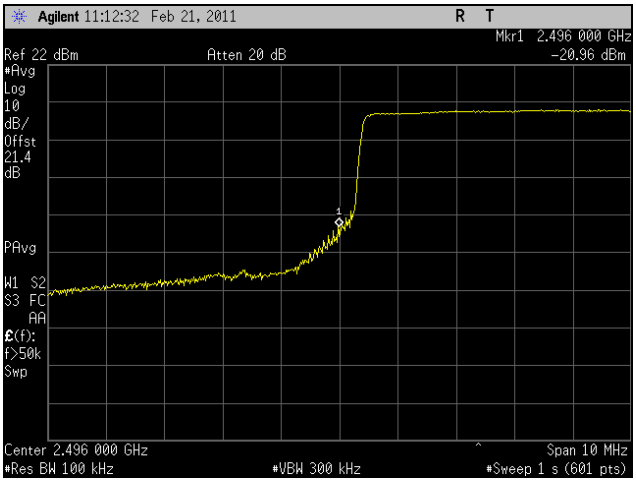



**Plot 117. 2502.5 MHz, Low Channel, 5MHz, Band Edge, Canada, Output 0**

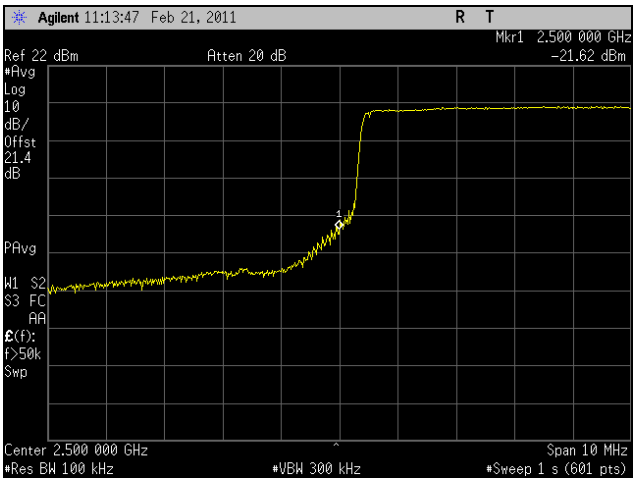



**Plot 118. 2687.5 MHz, High Channel, 5MHz, Band Edge, FCC & Canada, Output 0**

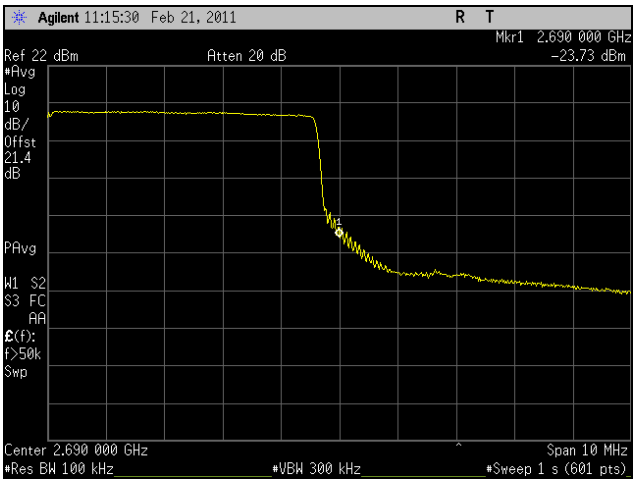
  



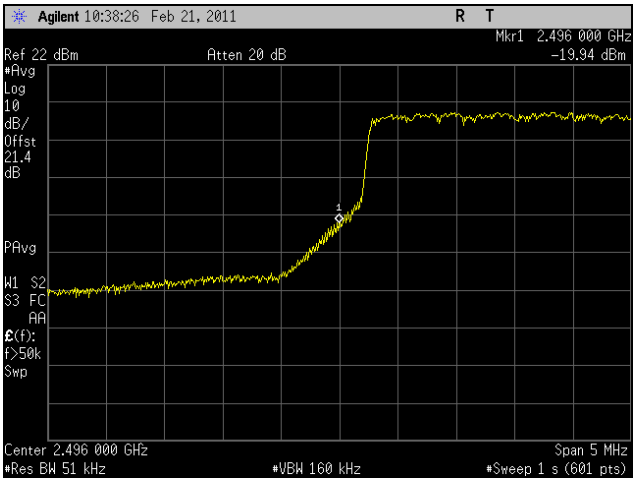

**Plot 119. 2501 MHz, Low Channel, 10MHz, Band Edge, FCC, Output 0**



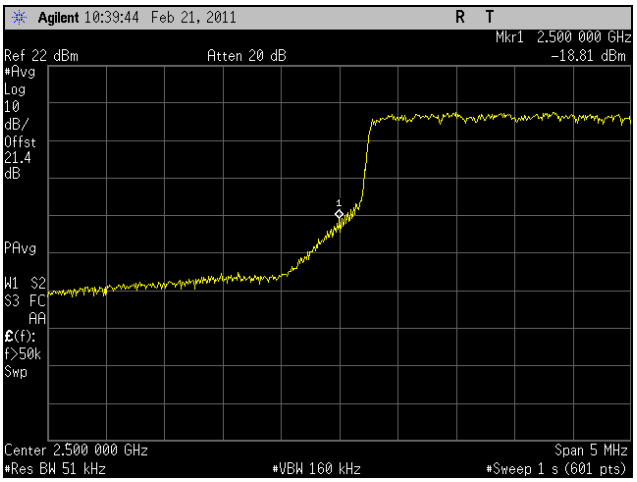

**Plot 120. 2505 MHz, Low Channel, 10MHz, Band Edge, Canada, Output 0**



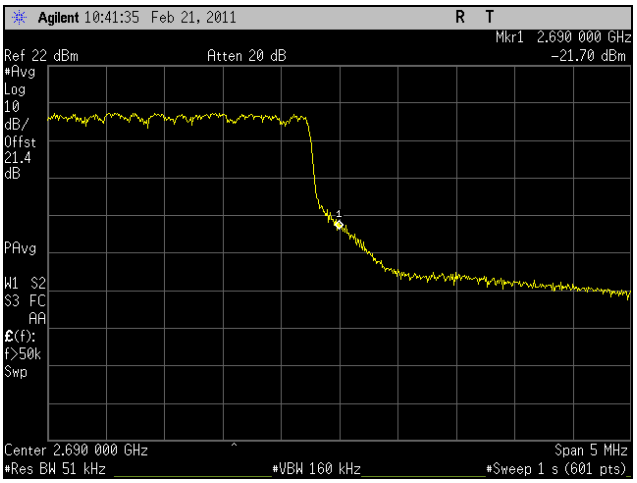

**Plot 121. 2685 MHz, High Channel, 10MHz, Band Edge, FCC & Canada, Output 0**



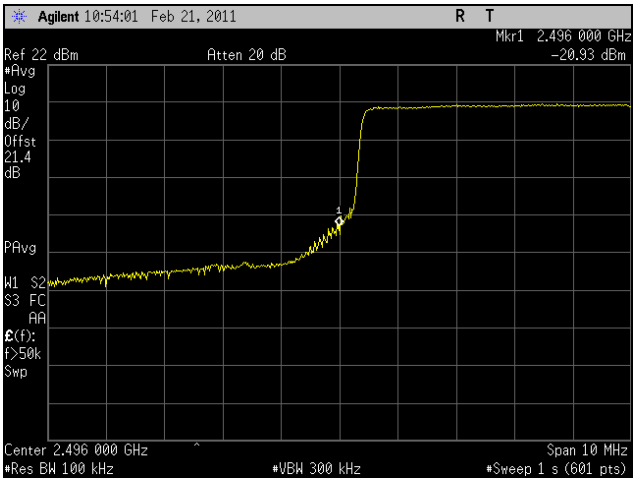

**Plot 122. 2498.5 MHz, Low Channel, 5MHz, Band Edge, FCC, Output 1**



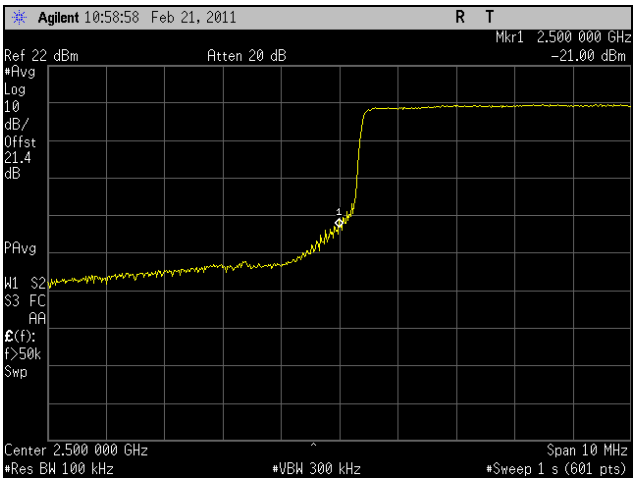

**Plot 123. 2502.5 MHz, Low Channel, 5MHz, Band Edge, Canada, Output 1**



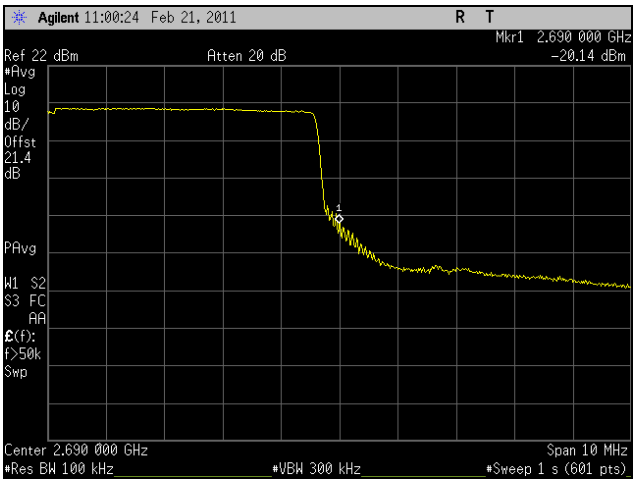

**Plot 124. 2687.5 MHz, High Channel, 5MHz, Band Edge, FCC & Canada, Output 1**




**Plot 125. 2501 MHz, Low Channel, 10MHz, Band Edge, FCC, Output 1**




**Plot 126. 2505 MHz, Low Channel, 10MHz, Band Edge, Canada, Output 1**




**Plot 127. 2685 MHz, High Channel, 10MHz, Band Edge, FCC & Canada, Output 1**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## RSS-GEN Receiver Spurious Emissions Requirements

**Test Requirements:** The following receiver spurious emission limits shall be complied with:

(a) If a radiated measurement is made, all spurious emissions shall comply with the limits of Table 15.

| Spurious Frequency (MHz) | Field Strength (microvolt/m at 3 metres) |
|---|---|
| 30 – 88 | 100 |
| 88 – 216 | 150 |
| 216 – 960 | 200 |
| Above 960 | 500 |

**Table 15. Spurious Emission Limits for Receivers**

(b) If a conducted measurement is made, no spurious output signals appearing at the antenna terminals shall exceed 2 nanowatts per any 4 kHz spurious frequency in the band 30-1000 MHz, or 5 nanowatts above 1 GHz.

**Test Procedures:** The EUT was programmed for receive mode only. The EUT was setup inside an anechoic chamber. The resolution bandwidth was set to 100kHz from 30MHz-1GHz and 1MHz for measurements above 1GHz. All plots were corrected for cable loss.

**Test Results:** Equipment is compliant with the Receiver Spurious Emissions Requirements of RSS-GEN. Measurements were made radiated. Highest measured receiver spurs is 47.92 dBuV/m @ 3m.

**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/18/11

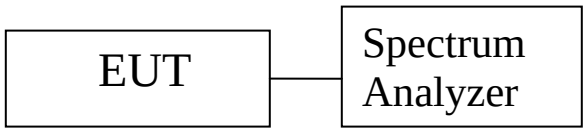
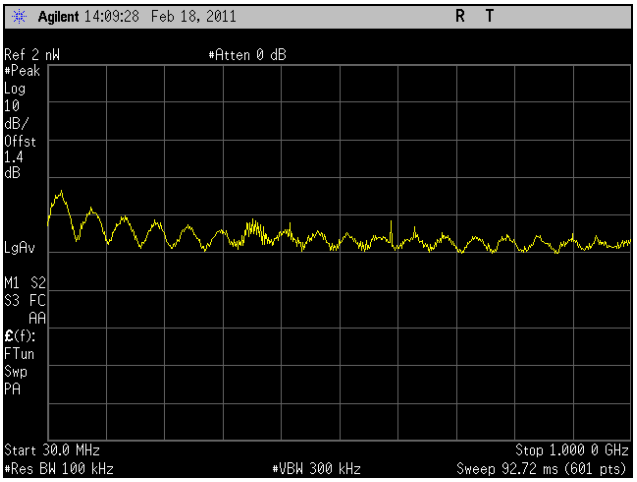
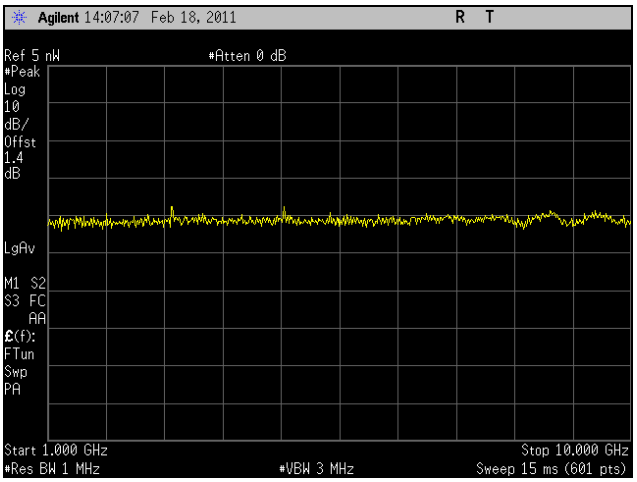


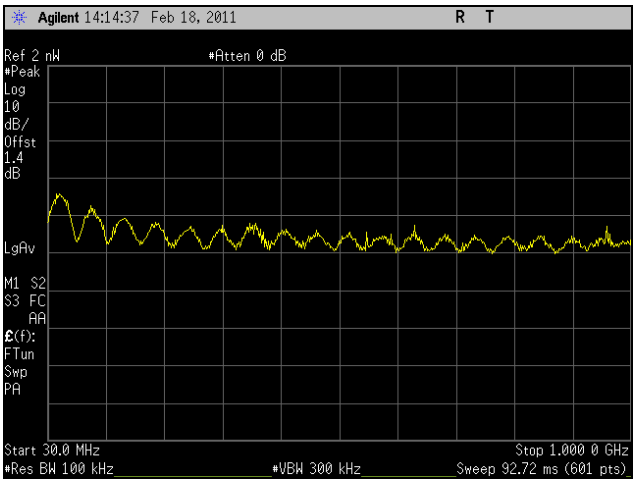

**Figure 2. Block Diagram, Conducted Receiver Spurious Emissions Test Setup**




**Plot 128. Output 0, RX Spurious Emissions 30M-1GHz**

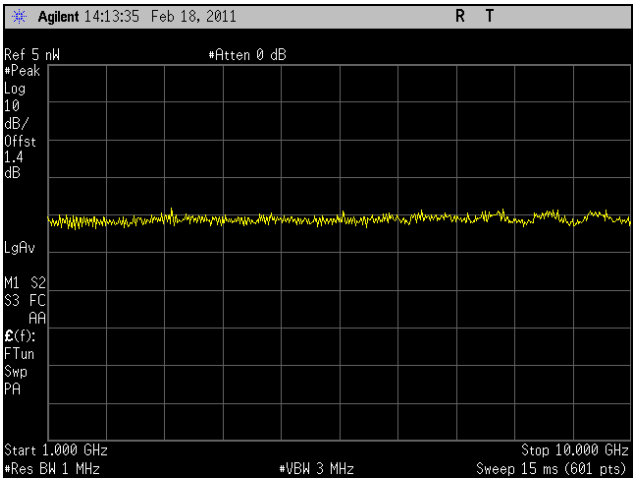



**Plot 129. Output 0, RX Spurious Emissions 1-10GHz**




**Plot 130. Output 1, RX Spurious Emissions 30M-1GHz**




**Plot 131. Output 1, RX Spurious Emissions 1-10GHz**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## §2.1055 Frequency Stability

**Test Requirement(s):** **§2.1055**

**Test Procedures:** As required by 47 CFR 2.1055, *Frequency Stability measurements* were made at the RF output terminals using a Directional Coupler through a Spectrum Analyzer and Power Meter.

The EUT was setup in an Environmental chamber with the support equipment outside the chamber. The EUT was set to transmit on the low channel. The out of band emissions were then compared to the -13dBm limit. The same procedure was repeated on the high channel. This procedure was done at a temperature range of -30C to +50C. At the ambient temperature, in addition to the measurements at the nominal voltage, the voltage was varied to +/- 15% and measurements were taken at those voltages.

**Test Results:** Equipment is compliant with Section 2.1055.

**Test Engineer(s):** Kenshi Chung

**Test Date(s):** 02/17/11

| Output 0 | | | | |
|---|---|---|---|---|
| **2498.5 MHz (5MHz BW)** | | | | |
| | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2498.499213 | 0.029 |
| | 20 | -10 | 2498.499725 | 0.176 |
| | 20 | 0 | 2498.499650 | 0.146 |
| | 20 | 10 | 2498.499237 | 0.019 |
| | 20 | 20 | 2498.499285 | 0.000 |
| | 20 | 30 | 2498.499740 | 0.182 |
| | 20 | 40 | 2498.499127 | 0.063 |
| | 20 | 50 | 2498.498825 | 0.184 |
| 2498.499285 | 10 | 20 | 2498.499163 | 0.049 |
| | 30 | 20 | 2498.499446 | 0.064 |
| **2593 MHz (5MHz BW)** | | | | |
| | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2592.999335 | 0.009 |
| | 20 | -10 | 2592.999221 | 0.035 |
| | 20 | 0 | 2592.999830 | 0.200 |
| | 20 | 10 | 2592.999512 | 0.077 |
| | 20 | 20 | 2592.999312 | 0.000 |
| 2592.999312 | 20 | 30 | 2592.999942 | 0.243 |
| | 20 | 40 | 2592.998741 | 0.220 |
| | 20 | 50 | 2592.998642 | 0.258 |
| | 10 | 20 | 2592.999263 | 0.019 |
| | 30 | 20 | 2592.999127 | 0.071 |
| **2687.5 MHz (5MHz BW)** | | | | |
| | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2687.499510 | 0.085 |
| | 20 | -10 | 2687.499972 | 0.257 |
| | 20 | 0 | 2687.499522 | 0.090 |
| | 20 | 10 | 2687.499839 | 0.208 |
| | 20 | 20 | 2687.499281 | 0.000 |
| 2687.499281 | 20 | 30 | 2687.498744 | 0.200 |
| | 20 | 40 | 2687.498820 | 0.172 |
| | 20 | 50 | 2687.498569 | 0.265 |
| | 10 | 20 | 2687.499179 | 0.038 |
| | 30 | 20 | 2687.499234 | 0.017 |
| **2502.5 MHz (5MHz BW) CANADA** | | | | |
| | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2502.499411 | 0.188 |
| | 20 | -10 | 2502.499347 | 0.163 |
| | 20 | 0 | 2502.499560 | 0.248 |
| | 20 | 10 | 2502.499527 | 0.235 |
| | 20 | 20 | 2502.498940 | 0.000 |
| 2502.498940 | 20 | 30 | 2502.499792 | 0.340 |
| | 20 | 40 | 2502.499229 | 0.115 |
| | 20 | 50 | 2502.498845 | 0.038 |
| | 10 | 20 | 2502.499295 | 0.142 |
| | 30 | 20 | 2502.499117 | 0.071 |

**Table 16. Frequency Stability, Output 0, 5 MHz**

| Output 0 | | | | |
|---|---|---|---|---|
| **2501 MHz (10MHz BW)** | | | | |
| Reference @ 120VAC 20C | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| | 20 | -20 | 2500.999790 | 0.161 |
| | 20 | -10 | 2500.999283 | 0.042 |
| | 20 | 0 | 2500.999796 | 0.164 |
| | 20 | 10 | 2500.999693 | 0.122 |
| | 20 | 20 | 2500.999387 | 0.000 |
| 2500.999387 | 20 | 30 | 2500.999279 | 0.043 |
| | 20 | 40 | 2500.998820 | 0.227 |
| | 20 | 50 | 2500.999238 | 0.060 |
| | 10 | 20 | 2500.999376 | 0.004 |
| | 30 | 20 | 2500.999129 | 0.103 |
| **2593 MHz (10MHz BW)** | | | | |
| Reference @ 120VAC 20C | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| | 20 | -20 | 2592.999578 | 0.325 |
| | 20 | -10 | 2592.999457 | 0.279 |
| | 20 | 0 | 2593.000088 | 0.522 |
| | 20 | 10 | 2592.999827 | 0.422 |
| | 20 | 20 | 2592.998734 | 0.000 |
| 2592.998734 | 20 | 30 | 2592.999379 | 0.249 |
| | 20 | 40 | 2592.999331 | 0.230 |
| | 20 | 50 | 2592.998985 | 0.097 |
| | 10 | 20 | 2592.999273 | 0.208 |
| | 30 | 20 | 2592.999182 | 0.173 |
| **2685 MHz (10MHz BW)** | | | | |
| Reference @ 120VAC 20C | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| | 20 | -20 | 2684.998986 | 0.058 |
| | 20 | -10 | 2684.999242 | 0.154 |
| | 20 | 0 | 2684.999756 | 0.345 |
| | 20 | 10 | 2685.000445 | 0.602 |
| | 20 | 20 | 2684.998829 | 0.000 |
| 2684.998829 | 20 | 30 | 2684.998995 | 0.062 |
| | 20 | 40 | 2684.998765 | 0.024 |
| | 20 | 50 | 2684.998059 | 0.287 |
| | 10 | 20 | 2684.999321 | 0.183 |
| | 30 | 20 | 2684.999026 | 0.073 |
| **2505 MHz (10MHz BW) CANADA** | | | | |
| Reference @ 120VAC 20C | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| | 20 | -20 | 2504.999464 | 0.097 |
| | 20 | -10 | 2504.999322 | 0.041 |
| | 20 | 0 | 2504.999435 | 0.086 |
| | 20 | 10 | 2504.999805 | 0.234 |
| | 20 | 20 | 2504.999220 | 0.000 |
| 2504.999220 | 20 | 30 | 2504.999376 | 0.062 |
| | 20 | 40 | 2504.999231 | 0.004 |
| | 20 | 50 | 2504.998407 | 0.325 |
| | 10 | 20 | 2504.999329 | 0.044 |
| | 30 | 20 | 2504.999689 | 0.187 |

**Table 17. Frequency Stability, Output 0, 10 MHz**

| Output 1 | | | | |
|---|---|---|---|---|
| **2498.5 MHz (5MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2498.497896 | 0.860 |
| | 20 | -10 | 2498.496030 | 0.113 |
| | 20 | 0 | 2498.497358 | 0.644 |
| | 20 | 10 | 2498.497730 | 0.793 |
| | 20 | 20 | 2498.495748 | 0.000 |
| | 20 | 30 | 2498.494344 | 0.562 |
| 2498.495748 | 20 | 40 | 2498.493475 | 0.910 |
| | 20 | 50 | 2498.493602 | 0.859 |
| | 10 | 20 | 2498.497172 | 0.570 |
| | 30 | 20 | 2498.496149 | 0.160 |
| **2593 MHz (5MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2592.997824 | 0.869 |
| | 20 | -10 | 2592.996300 | 0.282 |
| | 20 | 0 | 2592.996374 | 0.310 |
| | 20 | 10 | 2592.998385 | 1.086 |
| | 20 | 20 | 2592.995570 | 0.000 |
| 2592.995570 | 20 | 30 | 2592.994620 | 0.366 |
| | 20 | 40 | 2592.993735 | 0.708 |
| | 20 | 50 | 2592.993796 | 0.684 |
| | 10 | 20 | 2592.995126 | 0.171 |
| | 30 | 20 | 2592.997528 | 0.755 |
| **2687.5 MHz (5MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2687.497465 | 0.828 |
| | 20 | -10 | 2687.496398 | 0.431 |
| | 20 | 0 | 2687.495822 | 0.217 |
| | 20 | 10 | 2687.498734 | 1.300 |
| | 20 | 20 | 2687.495239 | 0.000 |
| 2687.495239 | 20 | 30 | 2687.494142 | 0.408 |
| | 20 | 40 | 2687.493754 | 0.553 |
| | 20 | 50 | 2687.493460 | 0.662 |
| | 10 | 20 | 2687.493824 | 0.527 |
| | 30 | 20 | 2687.493751 | 0.554 |
| **2505 MHz (10MHz BW) CANADA** | | | | |
| | Voltage (DC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 230VAC 20C | 20 | -20 | 2502.497732 | 1.007 |
| | 20 | -10 | 2502.496279 | 0.426 |
| | 20 | 0 | 2502.496607 | 0.557 |
| | 20 | 10 | 2502.497904 | 1.076 |
| | 20 | 20 | 2502.495212 | 0.000 |
| 2502.495212 | 20 | 30 | 2502.493872 | 0.535 |
| | 20 | 40 | 2502.493558 | 0.661 |
| | 20 | 50 | 2502.493725 | 0.594 |
| | 10 | 20 | 2502.497872 | 1.063 |
| | 30 | 20 | 2502.496722 | 0.603 |

**Table 18. Frequency Stability, Output 1, 5 MHz**

| Output 1 | | | | |
|---|---|---|---|---|
| **2501 MHz (10MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 120VAC 20C | 20 | -20 | 2500.996907 | 0.642 |
| | 20 | -10 | 2500.997049 | 0.699 |
| | 20 | 0 | 2500.996748 | 0.578 |
| | 20 | 10 | 2500.997775 | 0.989 |
| | 20 | 20 | 2500.995302 | 0.000 |
| 2500.995302 | 20 | 30 | 2500.994375 | 0.371 |
| | 20 | 40 | 2500.993868 | 0.573 |
| | 20 | 50 | 2500.993573 | 0.691 |
| | 10 | 20 | 2500.996527 | 0.490 |
| | 30 | 20 | 2500.996812 | 0.604 |
| **2593 MHz (10MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 120VAC 20C | 20 | -20 | 2592.996313 | 0.393 |
| | 20 | -10 | 2592.996892 | 0.617 |
| | 20 | 0 | 2592.996697 | 0.541 |
| | 20 | 10 | 2592.998162 | 1.106 |
| | 20 | 20 | 2592.995293 | 0.000 |
| 2592.995293 | 20 | 30 | 2592.994290 | 0.387 |
| | 20 | 40 | 2592.993380 | 0.738 |
| | 20 | 50 | 2592.993558 | 0.669 |
| | 10 | 20 | 2592.997689 | 0.924 |
| | 30 | 20 | 2592.995392 | 0.038 |
| **2685 MHz (10MHz BW)** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 120VAC 20C | 20 | -20 | 2684.996437 | 0.631 |
| | 20 | -10 | 2684.996683 | 0.723 |
| | 20 | 0 | 2684.998269 | 1.314 |
| | 20 | 10 | 2684.997561 | 1.050 |
| | 20 | 20 | 2684.994742 | 0.000 |
| 2684.994742 | 20 | 30 | 2684.993964 | 0.290 |
| | 20 | 40 | 2684.993807 | 0.348 |
| | 20 | 50 | 2684.993192 | 0.577 |
| | 10 | 20 | 2684.996492 | 0.652 |
| | 30 | 20 | 2684.998196 | 1.286 |
| **2505 MHz (10MHz BW) CANADA** | | | | |
| | Voltage (AC) | Temperature ( C ) | Frequency (MHz) | PPM |
| Reference @ 120VAC 20C | 20 | -20 | 2504.996262 | 1.066 |
| | 20 | -10 | 2504.996540 | 0.955 |
| | 20 | 0 | 2504.998139 | 0.317 |
| | 20 | 10 | 2504.998801 | 0.052 |
| | 20 | 20 | 2504.998932 | 0.000 |
| 2504.998932 | 20 | 30 | 2504.994117 | 1.922 |
| | 20 | 40 | 2504.993466 | 2.182 |
| | 20 | 50 | 2504.993293 | 2.251 |
| | 10 | 20 | 2504.998497 | 0.174 |
| | 30 | 20 | 2504.998862 | 0.028 |

**Table 19. Frequency Stability, Output 1, 10 MHz**

# IV. Test Equipment

## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ANSI/NCSL Z540-1-1994 and ANSI/ISO/IEC 17025:2000.

| MET Asset # | Equipment | Manufacturer | Model | Last Cal Date | Cal Due Date |
|---|---|---|---|---|---|
| 1S2501 | EMI TEST RECEIVER | ROHDE & SCHWARZ | ESU40 | 06/03/2010 | 06/03/2011 |
| 1S2603 | HORN ANTENNA | ETS-LINDGREN | 3117 | 04/09/2009 | 04/09/2011 |
| 1S2484 | BILOG ANTENNA | TESEQ | CBL6112D | 01/27/2009 | 01/27/2011 |
| 1S2482 | 5M CHAMBER | PANASHIELD | 5M SEMI-ANECHOIC CHAMBER | 11/17/2010 | 11/17/2011 |
| 1S2121 | PRE-AMPLIFIER | HEWLETT-PACKARD | 8449B | SEE NOTE | |
| 1S2583 | SPECTRUM ANALYZER | AGILENT | E4447A | 01/26/2010 | 03/26/2010 |
| 1S2229 | TEMPERATURE CHAMBER | TENNY ENGINEERING | T63C | 02/18/2011 | 02/18/2012 |

**Table 20. Test Equipment List**

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

# V. Certification & User's Manual Information

# Certification & User's Manual Information

## A. Certification Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart I — Marketing of Radio frequency devices:

**§ 2.801 Radio-frequency device defined.**

As used in this part, a radio-frequency device is any device which in its operation is capable of Emitting radio-frequency energy by radiation, conduction, or other means. Radio- frequency devices include, but are not limited to:

(a) The various types of radio communication transmitting devices described throughout this chapter.

*(b) The incidental, unintentional and intentional radiators defined in Part 15 of this chapter.*

(c) The industrial, scientific, and medical equipment described in Part 18 of this chapter.

(d) Any part or component thereof which in use emits radio-frequency energy by radiation, conduction, or other means.

**§ 2.803 Marketing of radio frequency devices prior to equipment authorization.**

(a) Except as provided elsewhere in this chapter, no person shall sell or lease, or offer for sale or lease (including advertising for sale or lease), or import, ship or distribute for the purpose of selling or leasing or offering for sale or lease, any radio frequency device unless:

(1) In the case of a device subject to certification, such device has been authorized by the Commission in accordance with the rules in this chapter and is properly identified and labeled as required by §2.925 and other relevant sections in this chapter; or

(2) In the case of a device that is not required to have a grant of equipment authorization issued by the Commission, but which must comply with the specified technical standards prior to use, such device also complies with all applicable administrative (including verification of the equipment or authorization under a Declaration of Conformity, where required), technical, labeling and identification requirements specified in this chapter.

(d) Notwithstanding the provisions of paragraph (a) of this section, the offer for sale solely to business, commercial, industrial, scientific or medical users (but not an offer for sale to other parties or to end users located in a residential environment) of a radio frequency device that is in the conceptual, developmental, design or pre-production stage is permitted prior to equipment authorization or, for devices not subject to the equipment authorization requirements, prior to a determination of compliance with the applicable technical requirements *provided* that the prospective buyer is advised in writing at the time of the offer for sale that the equipment is subject to the FCC rules and that the equipment will comply with the appropriate rules before delivery to the buyer or to centers of distribution.

(e)(1) Notwithstanding the provisions of paragraph (a) of this section, prior to equipment authorization or determination of compliance with the applicable technical requirements any radio frequency device may be operated, but not marketed, for the following purposes and under the following conditions:

*(i) Compliance testing;*

(ii) Demonstrations at a trade show provided the notice contained in paragraph (c) of this section is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iii) Demonstrations at an exhibition conducted at a business, commercial, industrial, scientific or medical location, but excluding locations in a residential environment, provided the notice contained in paragraphs (c) or (d) of this section, as appropriate, is displayed in a conspicuous location on, or immediately adjacent to, the device;

(iv) Evaluation of product performance and determination of customer acceptability, provided such operation takes place at the manufacturer's facilities during developmental, design or pre-production states; or

(v) Evaluation of product performance and determination of customer acceptability where customer acceptability of a radio frequency device cannot be determined at the manufacturer's facilities because of size or unique capability of the device, provided the device is operated at a business, commercial, industrial, scientific or medical user's site, but not at a residential site, during the development, design or pre-production stages.

(e)(2) For the purpose of paragraphs (e)(1)(iv) and (e)(1)(v) of this section, the term *manufacturer's facilities* includes the facilities of the party responsible for compliance with the regulations and the manufacturer's premises, as well as the facilities of other entities working under the authorization of the responsible party in connection with the development and manufacture, but not the marketing, of the equipment.

(f) For radio frequency devices subject to verification and sold solely to business, commercial, industrial, scientific and medical users (excluding products sold to other parties or for operation in a residential environment), parties responsible for verification of the devices shall have the option of ensuring compliance with the applicable technical specifications of this chapter at each end user's location after installation, provided that the purchase or lease agreement includes a proviso that such a determination of compliance be made and is the responsibility of the party responsible for verification of the equipment.

## Certification & User's Manual Information

**The following is extracted from Title 47 of the Code of Federal Regulations, Part 2, Subpart J — Equipment Authorization Procedures:**

**§ 2.901 Basis and Purpose**

(a) In order to carry out its responsibilities under the Communications Act and the various treaties and international regulations, and in order to promote efficient use of the radio spectrum, the Commission has developed technical standards for radio frequency equipment and parts or components thereof. The technical standards applicable to individual types of equipment are found in that part of the rules governing the service wherein the equipment is to be operated.[1] *In addition to the technical standards provided, the rules governing the service may require that such equipment be verified by the manufacturer or importer*, be authorized under a Declaration of Conformity, or receive an equipment authorization from the Commission by one of the following procedures: certification or registration.

(b) The following sections describe the verification procedure, the procedure for a Declaration of Conformity, and the procedures to be followed in obtaining certification from the Commission and the conditions attendant to such a grant.

**§ 2.907 Certification.**

(a) Certification is an equipment authorization issued by the Commission, based on representation and test data submitted by the applicant.

(b) Certification attaches to all units subsequently marketed by the grantee which are identical (see Section 2.908) to the sample tested except for permissive changes or other variations authorized by the Commission pursuant to Section 2.1043.

[1] In this case, the equipment is subject to the rules of Part 15. More specifically, the equipment falls under Subpart B (of Part 15), which deals with unintentional radiators.

## Certification & User's Manual Information

**§ 2.948 Description of measurement facilities.**

(a) Each party making measurements of equipment that is subject to an equipment authorization under Part 15 or Part 18 of this chapter, regardless of whether the measurements are filed with the Commission or kept on file by the party responsible for compliance of equipment marketed within the U.S. or its possessions, shall compile a description of the measurement facilities employed.

(1) If the measured equipment is subject to the verification procedure, the description of the measurement facilities shall be retained by the party responsible for verification of the equipment.

*(i) If the equipment is verified through measurements performed by an independent laboratory, it is acceptable for the party responsible for verification of the equipment to rely upon the description of the measurement facilities retained by or placed on file with the Commission by that laboratory. In this situation, the party responsible for the verification of the equipment is not required to retain a duplicate copy of the description of the measurement facilities.*

(ii) If the equipment is verified based on measurements performed at the installation site of the equipment, no specific site calibration data is required. It is acceptable to retain the description of the measurement facilities at the site at which the measurements were performed.

(2) If the equipment is to be authorized by the Commission under the certification procedure, the description of the measurement facilities shall be filed with the Commission's Laboratory in Columbia, Maryland. The data describing the measurement facilities need only be filed once but must be updated as changes are made to the measurement facilities or as otherwise described in this section. At least every three years, the organization responsible for filing the data with the Commission shall certify that the data on file is current.

# Certification & User's Manual Information

## Label and User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart A — General:

**§ 15.19 Labeling requirements.**

*(a) In addition to the requirements in Part 2 of this chapter, a device subject to certification or verification shall be labeled as follows:*

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device:

This device complies with Part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:

This device is verified to comply with Part 15 of the FCC Rules for use with cable television service.

(3) All other devices shall bear the following statement in a conspicuous location on the device:

*This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is not practicable to place the statement specified under paragraph (a) of this section on it, the information required by this paragraph shall be placed in a prominent location in the instruction manual or pamphlet supplied to the user or, alternatively, shall be placed on the container in which the device is marketed. However, the FCC identifier or the unique identifier, as appropriate, must be displayed on the device.

**§ 15.21 Information to user.**

The users manual or instruction manual for an intentional or unintentional 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.

## Verification & User's Manual Information

The following is extracted from Title 47 of the Code of Federal Regulations, Part 15, Subpart B — Unintentional Radiators:

**§ 15.105 Information to the user.**

(a) For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

> Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
>
> – Reorient or relocate the receiving antenna.
>
> – Increase the separation between the equipment and receiver.
>
> – Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
>
> – Consult the dealer or an experienced radio/TV technician for help.

# End of Report