**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
13501 MCCALLEN PASS ● AUSTIN, TX 78753 ● PHONE (512) 287-2500 ● FAX (512) 287-2513

March 16, 2016

Infinet Malta Ltd.
222 Merchants St.
Valletta, Malta VLT1170

Dear Andrey Koynov,

Enclosed is the EMC Wireless test report for compliance testing of the Infinet Malta Ltd., InfiLink XG XM as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Title 47 of the CFR, Part 15.407, Subpart E (UNII 3).

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 feel free to contact me.

Sincerely yours,
MET LABORATORIES, INC.

Jennifer Warnell
Documentation Department

Reference: (\Infinet Malta Ltd.\ EMC85712-FCC407 UNII 3 Rev. 1)

**MET Laboratories, Inc.** *Safety Certification - EMI - Telecom Environmental Simulation*

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# Electromagnetic Compatibility Criteria
# Test Report

for the

**Infinet Malta Ltd.**
**Model InfiLink XG XM**

**Tested under**
The FCC Certification Rules
contained in
Title 47 of the CFR
15.407 Subpart E

**MET Report: EMC85712-FCC407 UNII 3 Rev. 1**

March 16, 2016

**Prepared For:**

**Infinet Malta Ltd.**
**222 Merchants St.**
**Valletta, Malta VLT1170**

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

# Electromagnetic Compatibility Criteria
# Test Report

for the

## Infinet Malta Ltd.
## Model InfiLink XG XM

**Tested under**
The FCC Certification Rules
contained in
Title 47 of the CFR
15.407 Subpart E

Poona Saber, Project Engineer
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 Parts 15B, 15.407, of the FCC Rules under normal use and maintenance.

Asad Bajwa,
Director, Electromagnetic Compatibility Lab

# Report Status Sheet

| Revision | Report Date | Reason for Revision |
|---|---|---|
| ∅ | October 6, 2015 | Initial Issue. |
| 1 | March 16, 2016 | Engineer corrections. |

# Table of Contents



# List of Tables



# List of Figures



# List of Plots



# 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 |
| **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 Infinet Malta Ltd. InfiLink XG XM, with the requirements of Part 15, §15.407. 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 InfiLink XG XM. Infinet Malta Ltd. should retain a copy of this document which should be kept on file for at least two years after the manufacturing of the InfiLink XG XM, 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 15, §15.407, in accordance with Infinet Malta Ltd., purchase order number MET-15. All tests were conducted using measurement procedure ANSI C63.4-2003.

| FCC Reference | Description | Results |
|---|---|---|
| §15.203 | Antenna Requirement | Compliant |
| §15.403(i) | 26 dB Bandwidth | Compliant |
| §15.407 (a)(3) | Maximum Conducted Output Power | Compliant |
| §15.407 (a)(3) | Maximum Power Spectral Density | Compliant |
| §15.407 (b)(4)& (6 - 7) | Undesirable Emissions | Compliant |
| §15.407(b)(6) | Conducted Emission Limits | Compliant |
| §15.407(c) | Automatic Discontinue of Transmitter | Compliant |
| §15.407(e) | 6 dB Bandwidth | Compliant |
| §15.407(f) | RF Exposure | Compliant |
| §15.407(g) | Frequency Stability | Compliant |

**Table 1. Executive Summary of EMC Part 15.407 ComplianceTesting**

# II. Equipment Configuration

# A. Overview

MET Laboratories, Inc. was contracted by Infinet Malta Ltd. to perform testing on the InfiLink XG XM, under Infinet Malta Ltd.'s purchase order number MET-15.

This document describes the test setups, test methods, required test equipment, and the test limit criteria used to perform compliance testing of the Infinet Malta Ltd. InfiLink XG XM.

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

| | | |
|---|---|---|
| **Model(s) Tested:** | InfiLink XG XM | |
| **Model(s) Covered:** | InfiLink XG XM | |
| **EUT Specifications:** | Primary Power: 120 VAC, 60 Hz | |
| | FCC ID: X8Q-UM-5X | |
| | Type of Modulations: | OFDM |
| | Max. RF Output Power (Measured): | 21.87 dBm @ 5755 MHz (28 dBi Antenna) |
| | EUT Frequency Range (U-NII-3): | 5735-5835 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:** | Poona Saber | |
| **Report Date(s):** | March 16, 2016 | |

**Table 2. EUT Summary**

## B. References

| | |
|---|---|
| **CFR 47, Part 15, Subpart E** | Unlicensed National Information Infrastructure Devices (UNII) |
| **ANSI C63.4:2014** | Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical And Electronic Equipment in the Range of 9 kHz to 40 GHz |
| **ISO/IEC 17025:2005** | General Requirements for the Competence of Testing and Calibration Laboratories |
| **ANSI C63.10-2013** | American National Standard for Testing Unlicensed Wireless Devices |
| **789033 D02** | General UNII Test Procedures New Rules |

**Table 3. References**

## C. Test Site

All testing was performed at MET Laboratories, Inc., 914 W. Patapsco Ave., Baltimore, MD 21230. 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). In accordance with §2.948(a)(3), a complete site description is contained at MET Laboratories.

## D. Description of Test Sample

The Infinet Malta Ltd. InfiLink XG XM, Equipment Under Test (EUT), is a High-performance broadband wireless system used for point-to-point applicaitons.

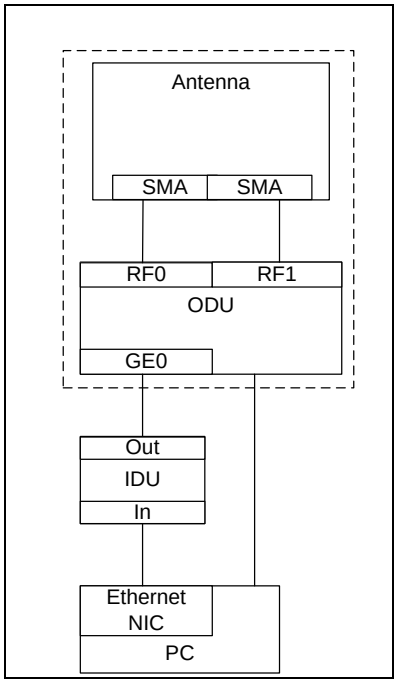



**Figure 1. Block Diagram of Test Configuration**

## Equipment Configuration

The EUT was set up as outlined in Figure 1, Block Diagram of Test Setup. All cards, racks, etc., incorporated as part of the EUT is included in the following list.

| Ref. ID | Name / Description | Model Number | Part Number | Serial Number | Revision |
|---|---|---|---|---|---|
| 1 | Outdoor unit (config. 1) | InfiLink XG | Xm/5.500.2x500.2x23 | 500057 | -- |
| 2 | Outdoor unit (config. 1) | InfiLink XG | Xm/5.500.2x500.2x23 | 500387 | -- |
| 3 | Outdoor unit (config. 2) | InfiLink XG | Xm/5.500.2x500.2x28 | 500386 | -- |

**Table 4. Equipment Configuration**

## E. Support Equipment

The EUT did not require any support equipment for operation or monitoring.

## F. Ports and Cabling Information

| Ref. ID | Port Name on EUT | Cable Description | Qty. | Length (m) | Shielded (Y/N) | Termination Point |
|---|---|---|---|---|---|---|
| 1 | Data | Cat 5e U/UTP Ethernet cable | 1 | 15 | No | 10/100/1000-BaseT port (GE0, data+PoE input) |
| 2 | AC Input | 3 conductor, 18 awg | 1 | 2 | No | (220V/ 50 Hz) |

**Table 5. Ports and Cabling Information**

## G. Mode of Operation

The EUT is intended to operate in point-to-multipoint mode both as a base station sector and as a subscriber terminal unit as well as in point-to-point mode depending on the antenna attached.

## H. Method of Monitoring EUT Operation

The EUT is performing according to the manufacturer's intended operation if it is capable to provide data channel with capacity of 1 Mbps or higher measured for TCP traffic as 1 minute average value.

If the unit is not capable to provide such a channel it is not performing according to the manufacturer's intended operation.

## 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 Infinet Malta Ltd. upon completion of testing.

# III. Electromagnetic Compatibility Criteria for Intentional Radiators

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.203 Antenna Requirement

**Test Requirement:** **§ 15.203:** An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

The structure and application of the EUT were analyzed to determine compliance with Section 15.203 of the Rules. Section 15.203 states that the subject device must meet at least one of the following criteria:

a.) Antenna must be permanently attached to the unit.

b.) Antenna must use a unique type of connector to attach to the EUT.

c.) Unit must be professionally installed. Installer shall be responsible for verifying that the correct antenna is employed with the unit.

**Results:** The EUT as tested is compliant the criteria of §15.203. The EUT is compliant per criteria A.

**Test Engineer(s):** Poona Saber

**Test Date(s):** 08/18/15

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15. 403(i) 26 dB Bandwidth

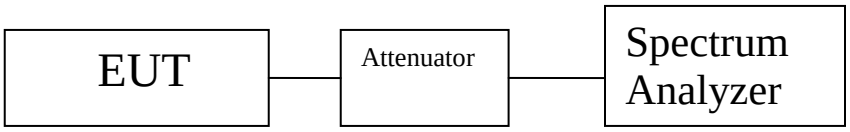
**Test Requirements:** **§ 15.403(i):** For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

**Test Procedure:** The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 26 dB Bandwidth was measured and recorded.

**Test Results** The 26 dB Bandwidth was compliant with the requirements of this section.

**Test Engineer(s):** Poona Saber

**Test Date(s):** 08/18/15



| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Bandwidth Power Port 1 (MHz) | Measured Bandwidth Power Port 2 (MHz) |
|---|---|---|---|---|
| low | 10 | 5740 | 9.30 | 9.27 |
| Mid | 10 | 5780 | 9.28 | 9.27 |
| High | 10 | 5830 | 9.30 | 9.26 |
| Low | 20 | 5745 | 17.67 | 17.38 |
| Mid | 20 | 5785 | 17.67 | 17.34 |
| High | 20 | 5825 | 17.66 | 17.22 |
| Low | 40 | 5755 | 37.04 | 36.78 |
| High | 40 | 5795 | 37.09 | 36.78 |

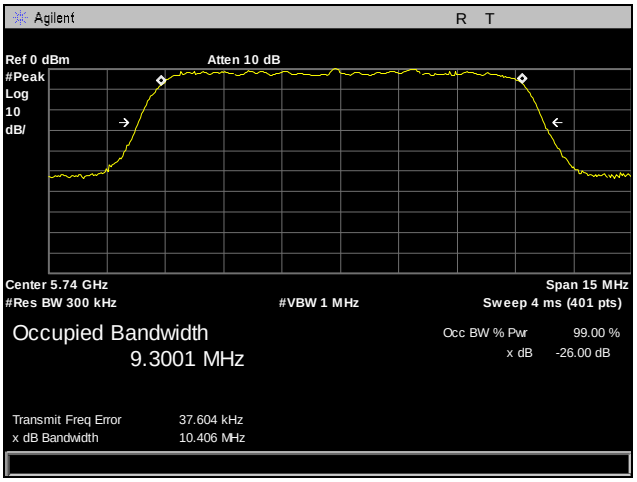
**Table 6. 26dB bandwidth, Test Results, 23 dBi antenna**

| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Bandwidth Power Port 1 (MHz) | Measured Bandwidth Power Port 2 (MHz) |
|---|---|---|---|---|
| low | 10 | 5740 | 9.31 | 9.25 |
| Mid | 10 | 5780 | 9.27 | 9.29 |
| High | 10 | 5830 | 9.27 | 9.29 |
| Low | 20 | 5745 | 17.64 | 17.65 |
| Mid | 20 | 5785 | 17.65 | 17.62 |
| High | 20 | 5825 | 17.66 | 17.60 |
| Low | 40 | 5755 | 37.03 | 37.17 |
| High | 40 | 5795 | 37.16 | 37.31 |

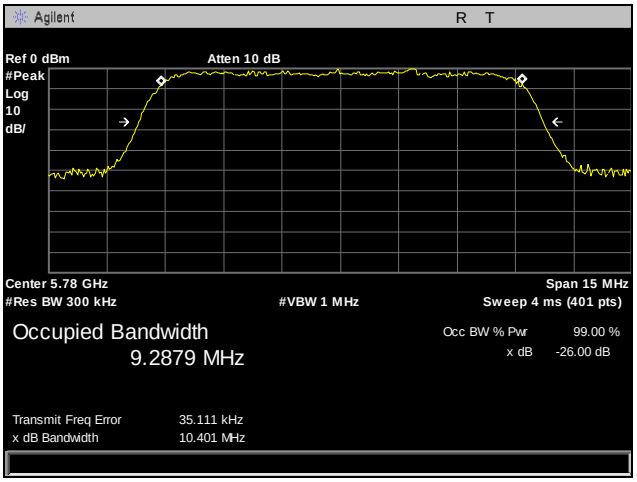
**Table 7. 26dB Bandwidth, Test Results, 28 dBi antenna**

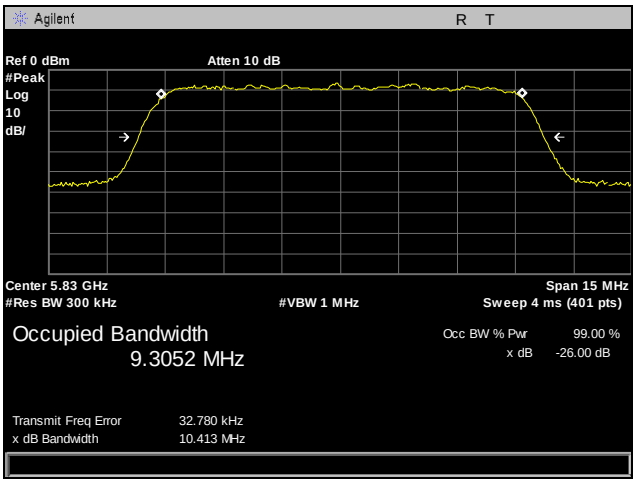
## 26 dB Occupied Bandwidth, 10 MHz, Port 1, 23 dBi antenna




**Plot 1. 26 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 1**



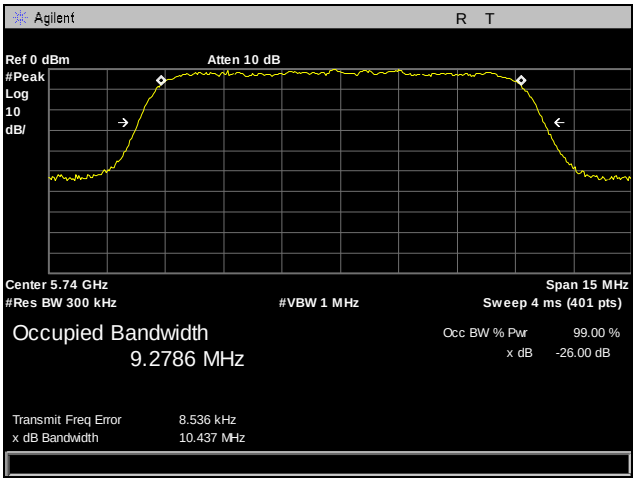

**Plot 2. 26 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 1**



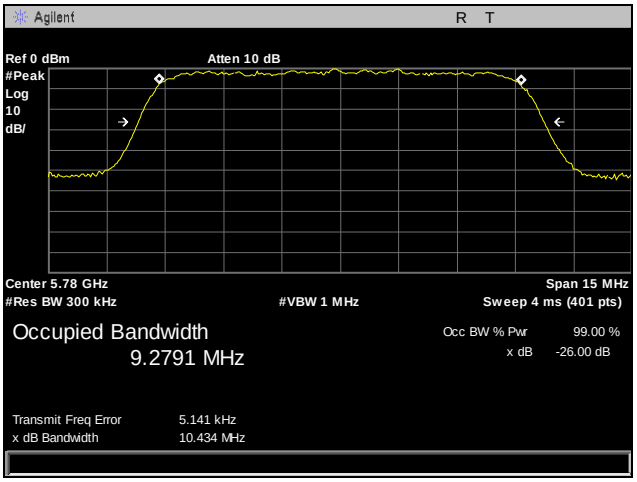

**Plot 3. 26 dB Occupied Bandwidth, High Channel, 10 MHz, Port 1**

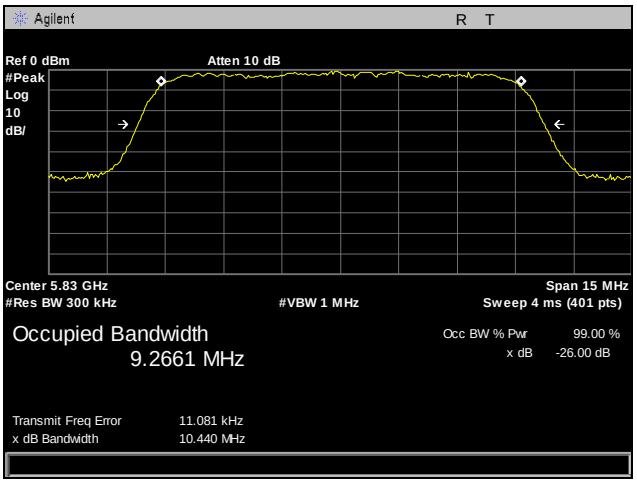
## 26 dB Occupied Bandwidth, 10 MHz, Port 2, 23 dBi antenna




**Plot 4. 26 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 2**



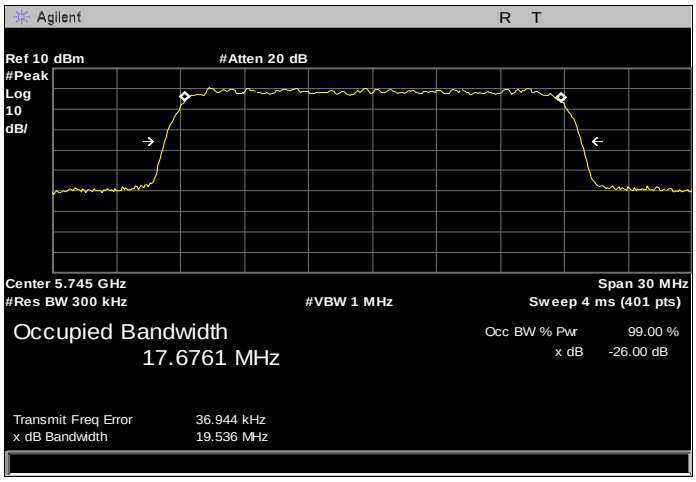

**Plot 5. 26 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 2**



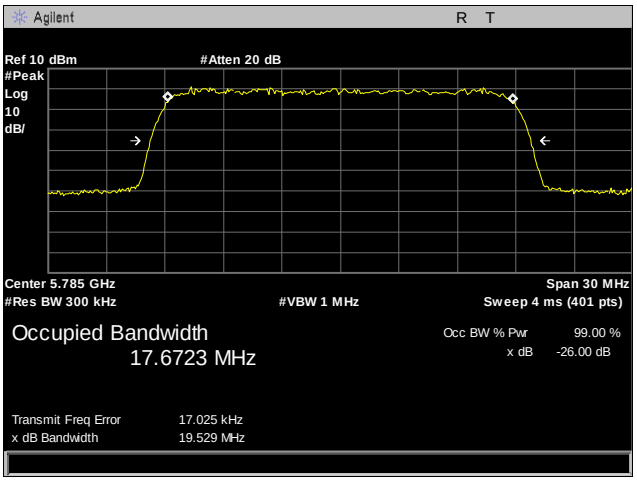

**Plot 6. 26 dB Occupied Bandwidth, High Channel, 10 MHz, Port 2**

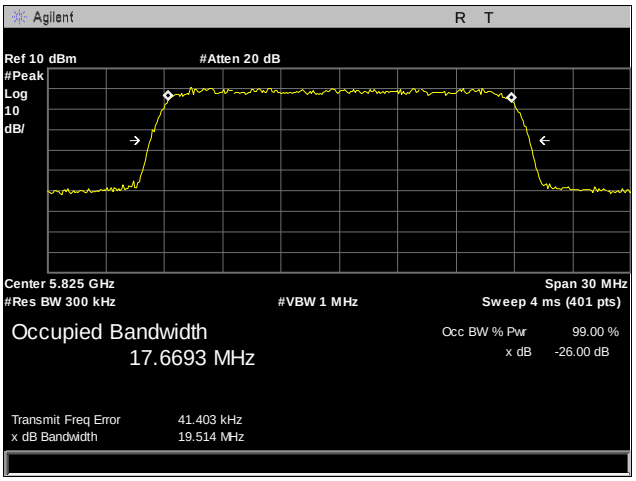
## 26 dB Occupied Bandwidth, 20 MHz, Port 1, 23 dBi antenna




**Plot 7. 26 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 1**



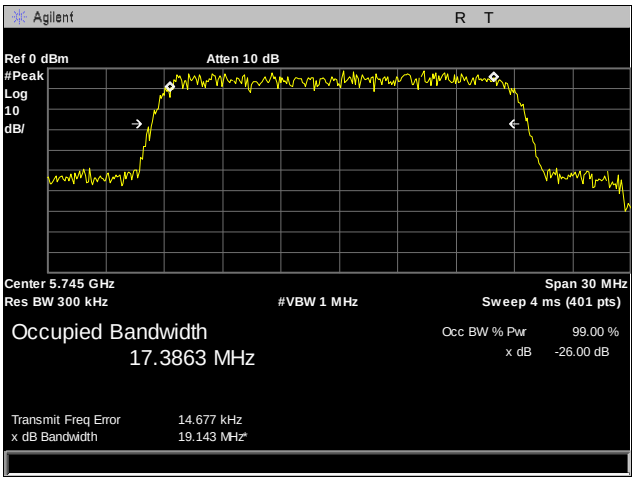

**Plot 8. 26 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 1**



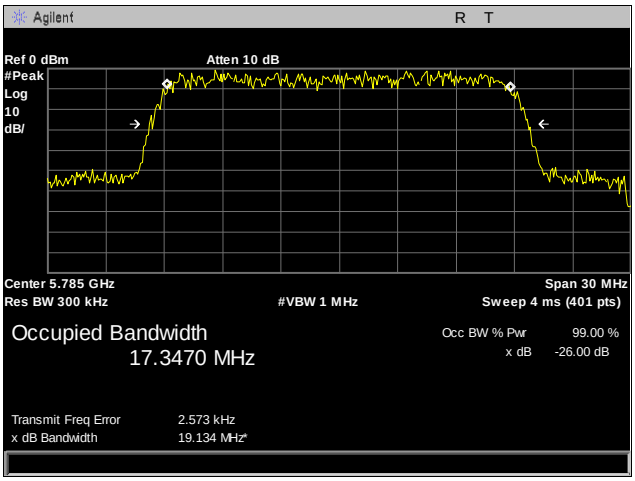

**Plot 9. 26 dB Occupied Bandwidth, High Channel, 20 MHz, Port 1**

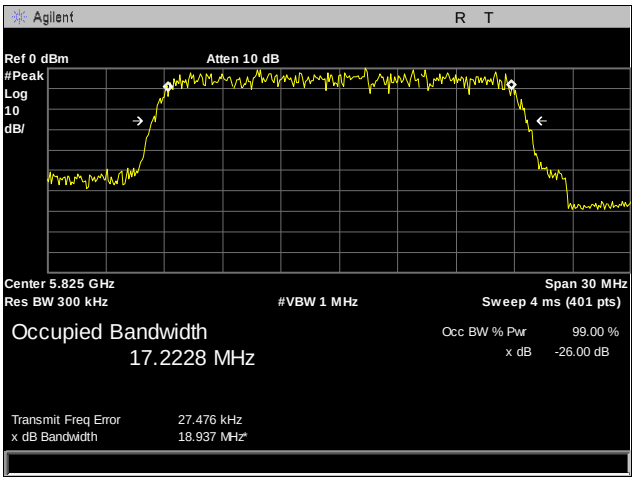
## 26 dB Occupied Bandwidth, 20 MHz, Port 2, 23 dBi antenna




**Plot 10. 26 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 2**



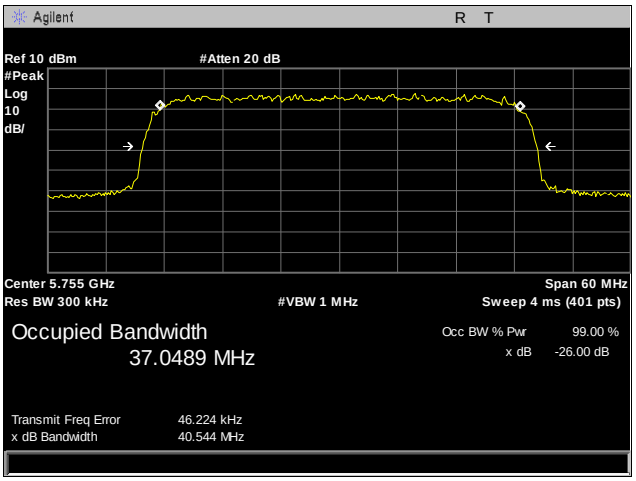

**Plot 11. 26 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 2**



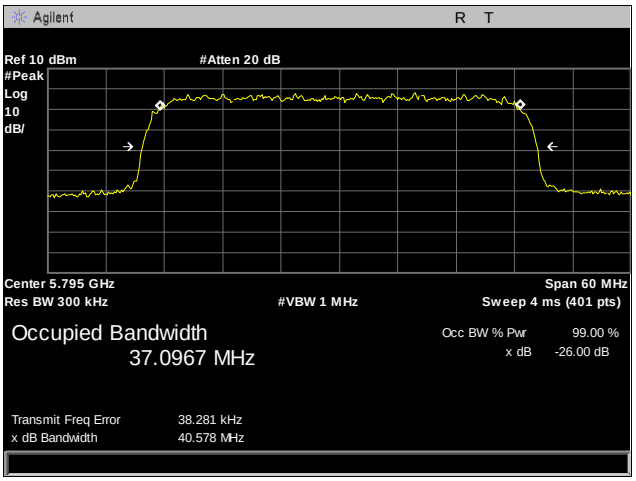

**Plot 12. 26 dB Occupied Bandwidth, High Channel, 20 MHz, Port 2**

## 26 dB Occupied Bandwidth, 40 MHz, Port 1, 23 dBi antenna



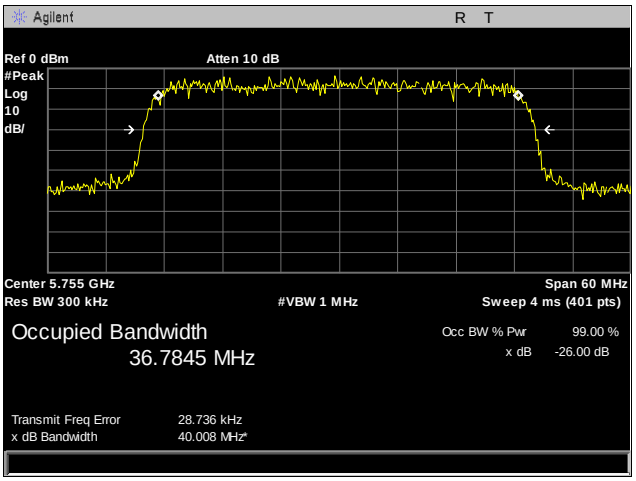

**Plot 13. 26 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 1**



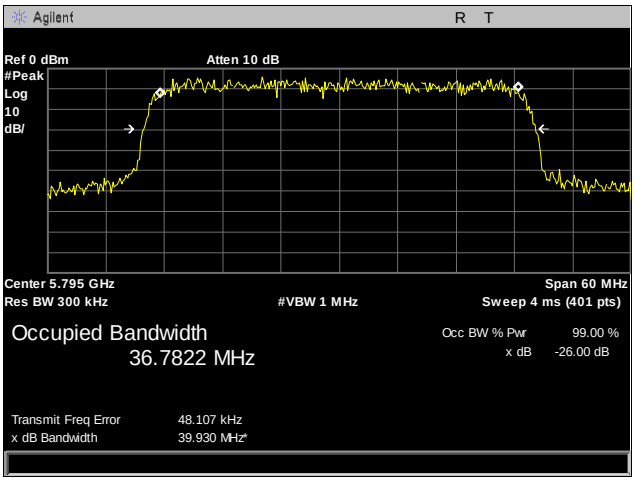

**Plot 14. 26 dB Occupied Bandwidth, High Channel, 40 MHz, Port 1**

## 26 dB Occupied Bandwidth, 40 MHz, Port 2, 23 dBi antenna



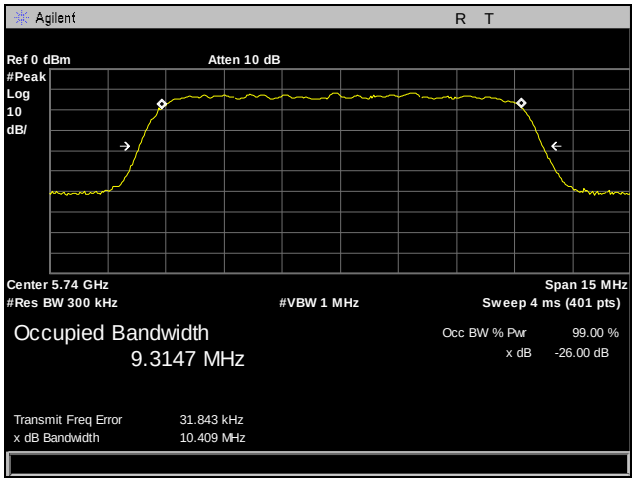

**Plot 15. 26 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 2**



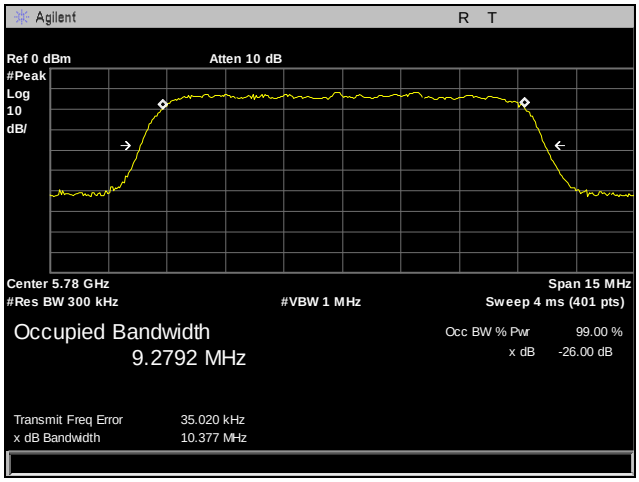

**Plot 16. 26 dB Occupied Bandwidth, High Channel, 40 MHz, Port 2**

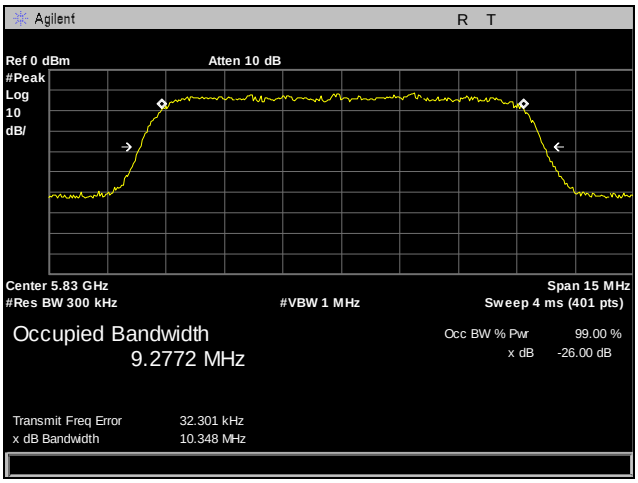
## 26 dB Occupied Bandwidth, 10 MHz, Port 1, 28 dBi antenna




**Plot 17. 26 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 1**



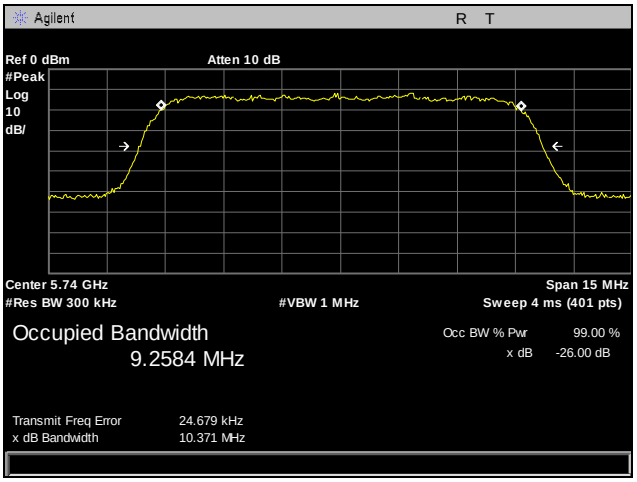

**Plot 18. 26 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 1**



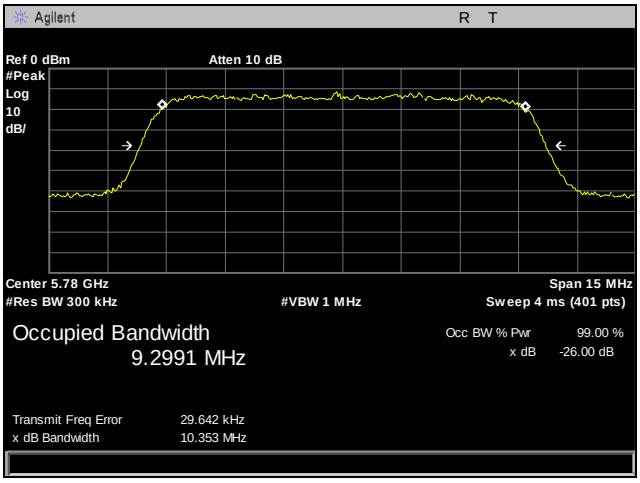

**Plot 19. 26 dB Occupied Bandwidth, High Channel, 10 MHz, Port 1**

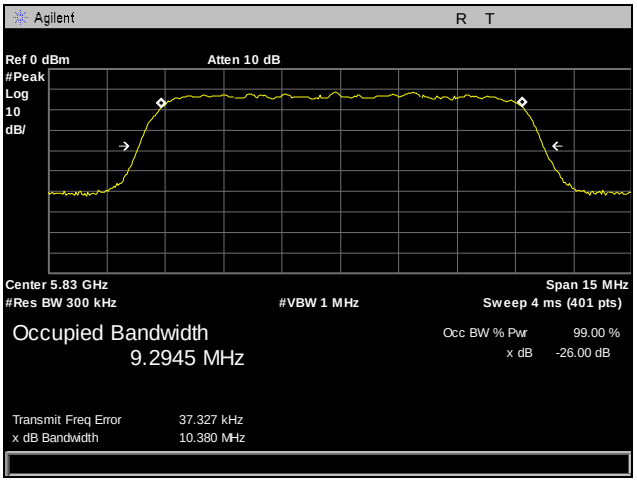
## 26 dB Occupied Bandwidth, 10 MHz, Port 2, 28 dBi antenna




**Plot 20. 26 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 2**



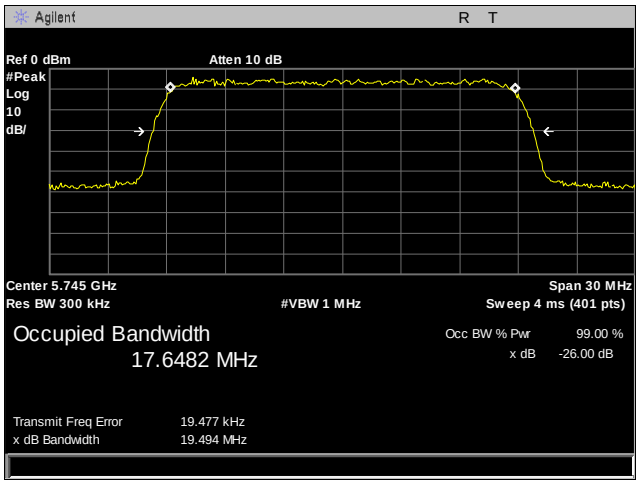

**Plot 21. 26 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 2**



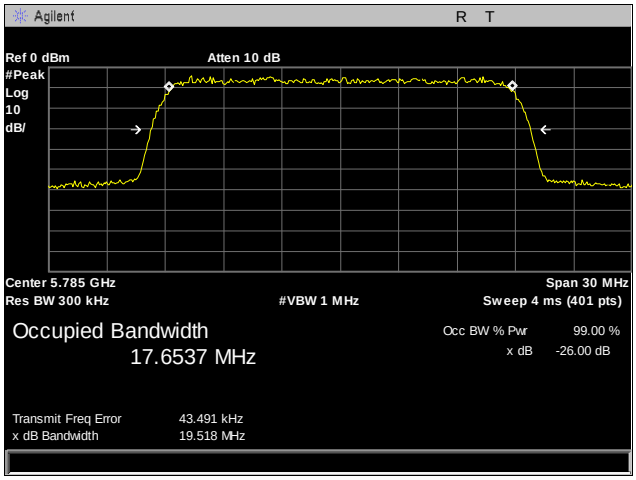

**Plot 22. 26 dB Occupied Bandwidth, High Channel, 10 MHz, Port 2**

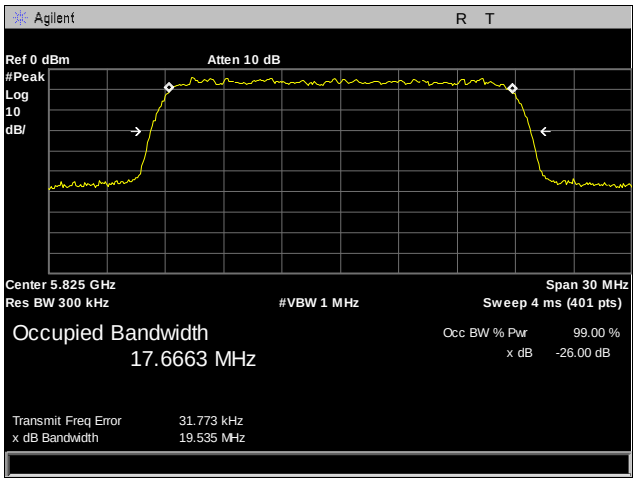
## 26 dB Occupied Bandwidth, 20 MHz, Port 1, 28 dBi antenna




**Plot 23. 26 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 1**



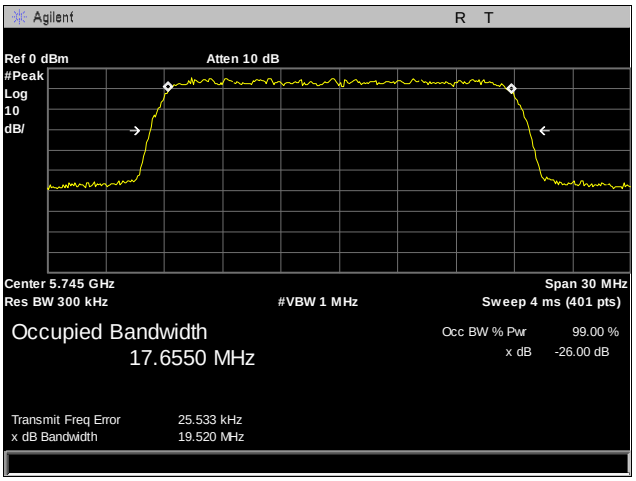

**Plot 24. 26 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 1**



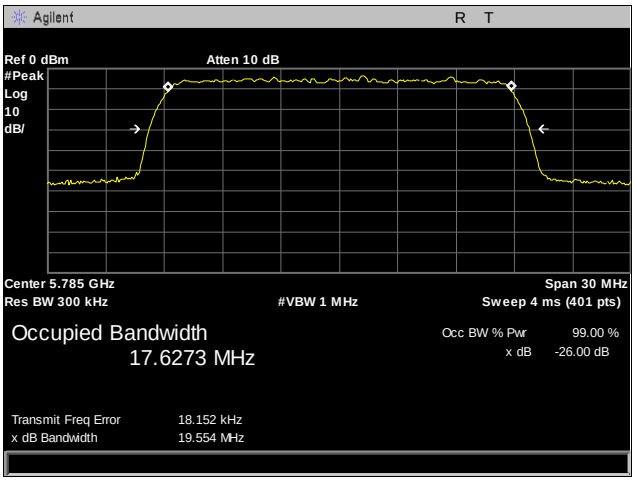

**Plot 25. 26 dB Occupied Bandwidth, High Channel, 20 MHz, Port 1**

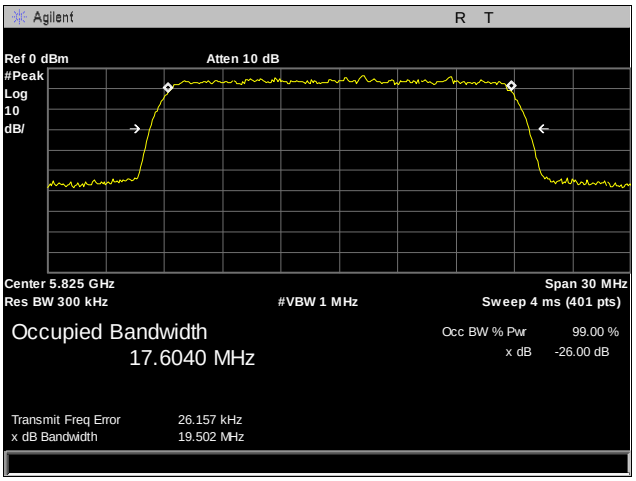
## 26 dB Occupied Bandwidth, 20 MHz, Port 2, 28 dBi antenna




**Plot 26. 26 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 2**



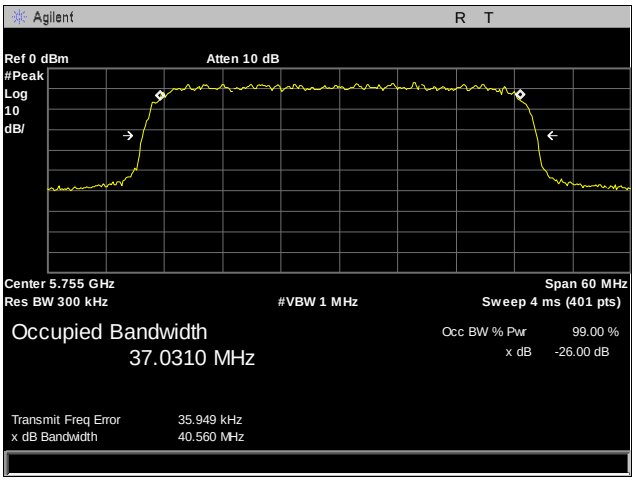

**Plot 27. 26 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 2**



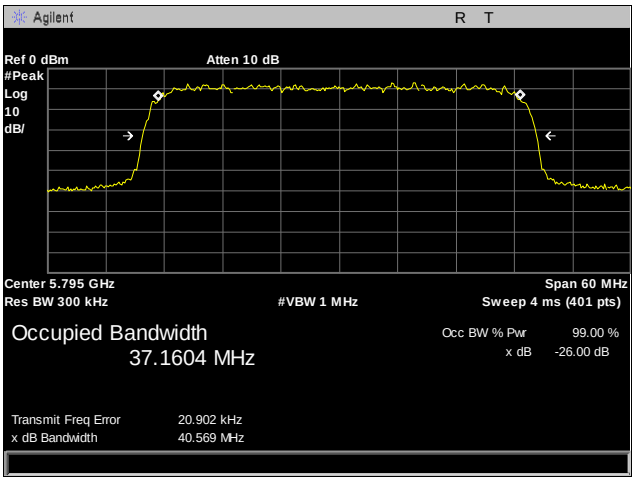

**Plot 28. 26 dB Occupied Bandwidth, High Channel, 20 MHz, Port 2**

## 26 dB Occupied Bandwidth, 40 MHz, Port 1, 28 dBi antenna



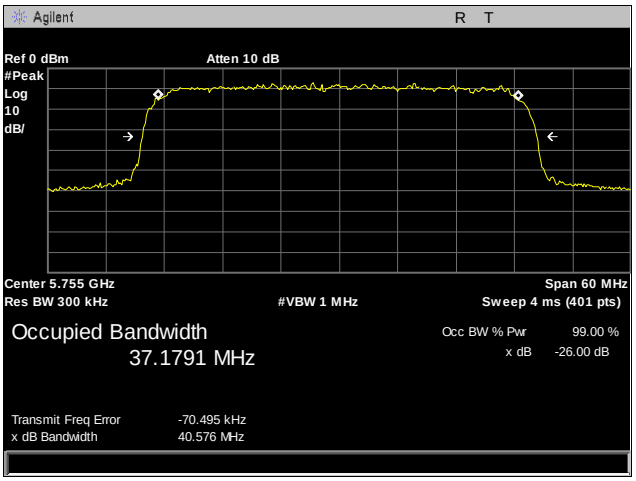

**Plot 29. 26 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 1**



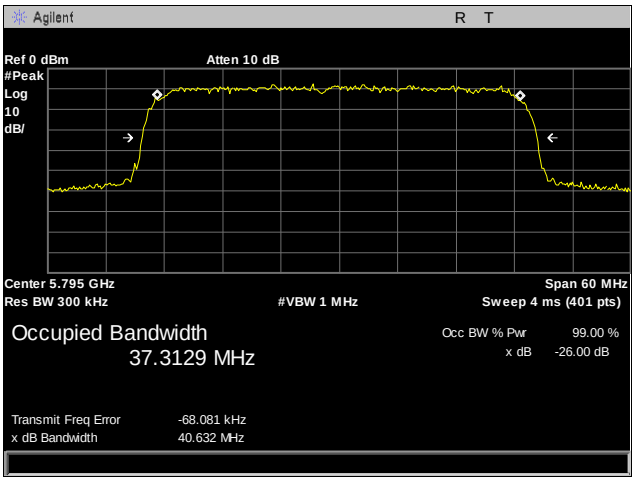

**Plot 30. 26 dB Occupied Bandwidth, High Channel, 40 MHz, Port 1**

## 26 dB Occupied Bandwidth, 40 MHz, Port 2, 28 dBi antenna




**Plot 31. 26 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 2**




**Plot 32. 26 dB Occupied Bandwidth, High Channel, 40 MHz, Port 2**

## Electromagnetic Compatibility Criteria for Intentional Radiators

## §15. 407(a)(3) Maximum Conducted Output Power

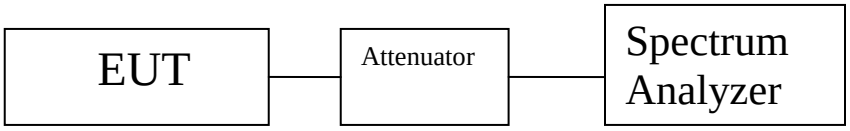
**Test Requirements:** **§15.407(a)(3):** For the band 5.725-5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

**Test Procedure:** The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according to measurement method SA-1, as described in 789033 D02 General UNII Test Procedures v01.

**Test Results:** The EUT as tested is compliant with the requirements of this section.

**Test Engineer(s):** Poona Saber

**Test Date(s):** 08/18/15



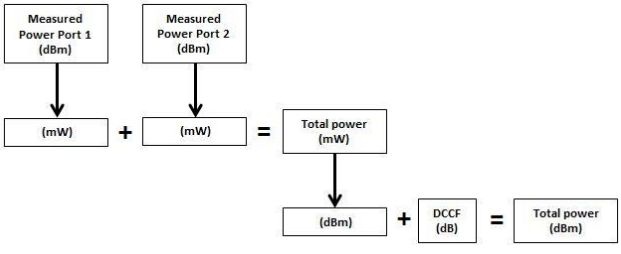
| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Output Power Port 1 (dBm) | Measured Output Power Port 2 (dBm) | DCCF (dB) | Total Power (dBm) | Power Limit (dBm) |
|---|---|---|---|---|---|---|---|
| low | 10 | 5740 | 10.1 | 10.57 | 0.45 | 13.81 | 30 |
| Mid | 10 | 5780 | 8.67 | 8.57 | 0.45 | 12.09 | 30 |
| High | 10 | 5830 | 8.46 | 8.57 | 0.45 | 11.98 | 30 |
| Low | 20 | 5745 | 11.36 | 11.38 | 0.45 | 14.84 | 30 |
| Mid | 20 | 5785 | 9.17 | 9.23 | 0.45 | 12.67 | 30 |
| High | 20 | 5825 | 9.28 | 9.29 | 0.45 | 12.75 | 30 |
| Low | 40 | 5755 | 12.83 | 12.62 | 0.45 | 16.19 | 30 |
| High | 40 | 5795 | 11.58 | 11.45 | 0.45 | 14.97 | 30 |

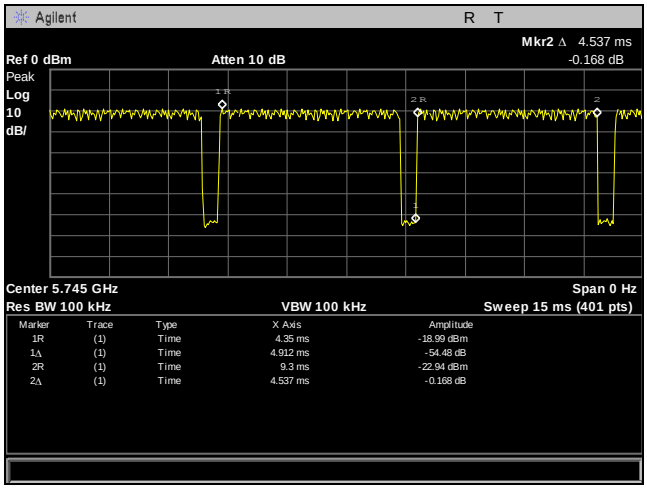
**Table 8. Output Power, Test Results, 28 dBi antenna**

| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Output Power Port 1 (dBm) | Measured Output Power Port 2 (dBm) | DCCF (dB) | Total Power (dBm) | Power Limit (dBm) |
|---|---|---|---|---|---|---|---|
| low | 10 | 5740 | 17.1 | 17.39 | 0.45 | 20.71 | 30 |
| Mid | 10 | 5780 | 15.33 | 15.42 | 0.45 | 18.84 | 30 |
| High | 10 | 5830 | 16.26 | 16.34 | 0.45 | 19.77 | 30 |
| Low | 20 | 5745 | 18.18 | 18.18 | 0.45 | 21.65 | 30 |
| Mid | 20 | 5785 | 18 | 17.98 | 0.45 | 21.46 | 30 |
| High | 20 | 5825 | 17.89 | 18.13 | 0.45 | 21.48 | 30 |
| Low | 40 | 5755 | 18.43 | 18.37 | 0.45 | **21.87** | 30 |
| High | 40 | 5795 | 17.90 | 18.13 | 0.45 | 21.54 | 30 |

**Table 9. Output Power, Test Results, 23 dBi antenna**

Time Period (**T**) = 4.912 ms
Time On (**Ton**) = 4.533
Duty Cycle (**DC**) = 4.533/4.912 = 0.90
Duty Cycle correction factor (**DCCF**) = 10 log (1/DC) = 10 log (1/0.90) = 0.45

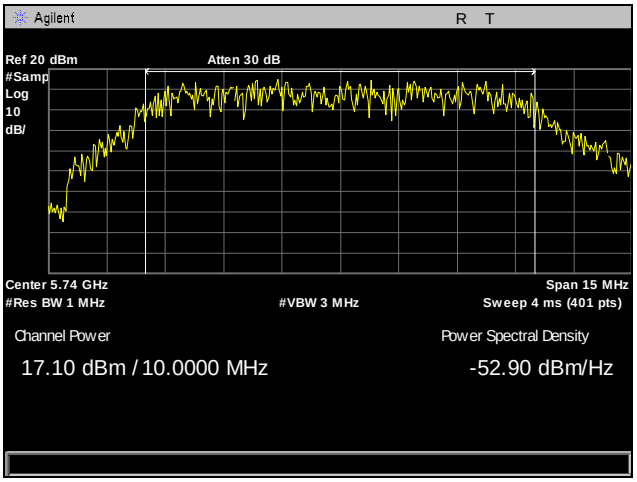


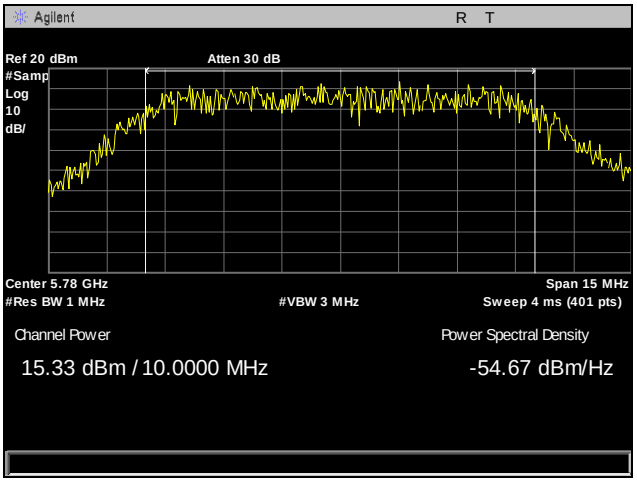

**Plot 33. Duty Cycle Measurements**

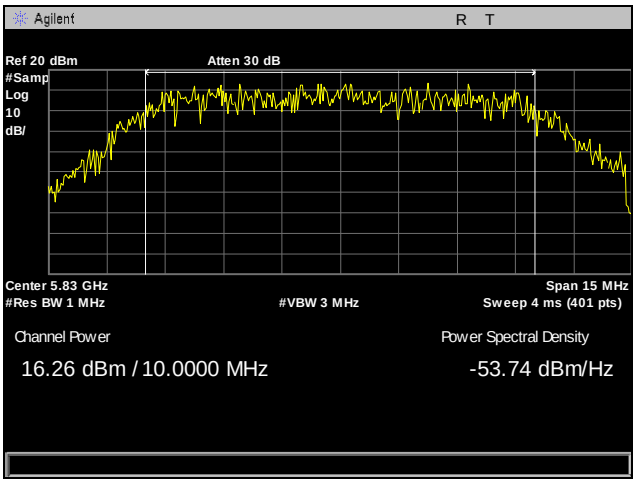
## Output Power, 10 MHz, Port 1, 23 dBi Antenna




**Plot 34. Output Power, Low Channel, 10 MHz, Port 1, 23 dBi Antenna**



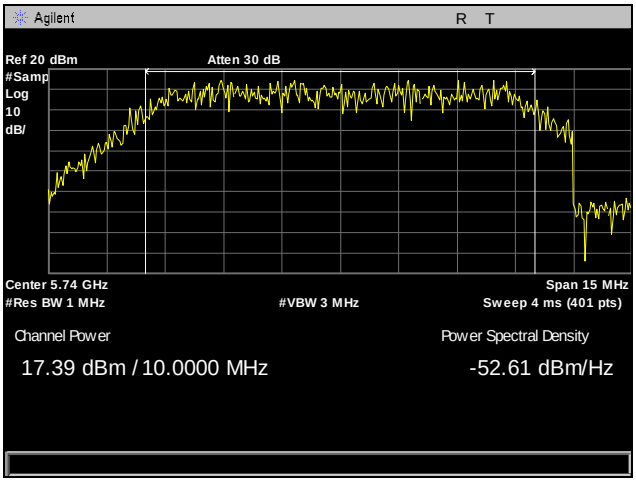

**Plot 35. Output Power, Mid Channel, 10 MHz, Port 1, 23 dBi Antenna**



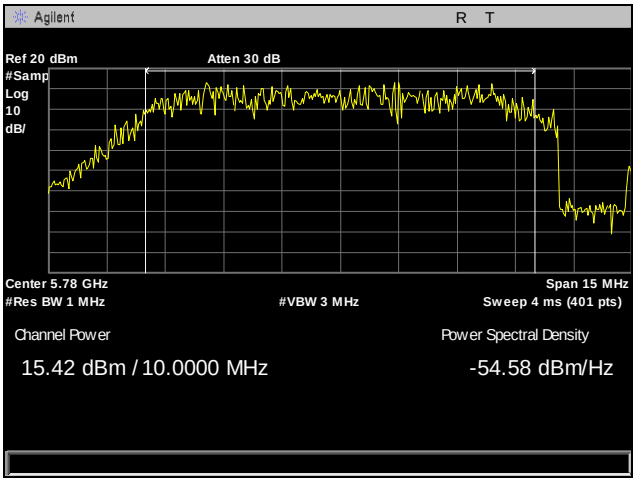

**Plot 36. Output Power, High Channel, 10 MHz, Port 1, 23 dBi Antenna**

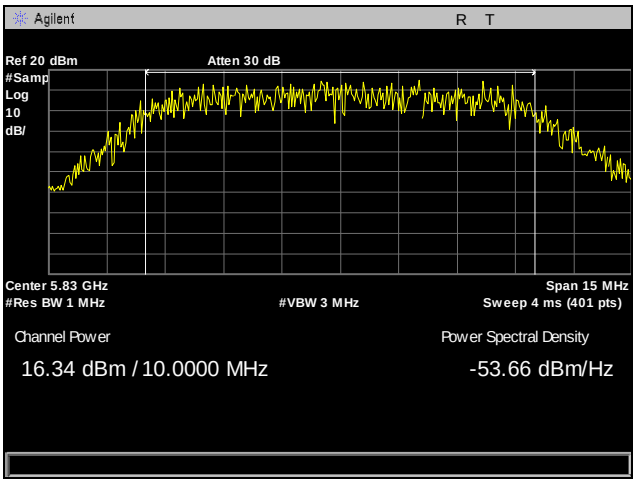
## Output Power, 10 MHz, Port 2, 23 dBi Antenna




**Plot 37. Output Power, Low Channel, 10 MHz, Port 2, 23 dBi Antenna**



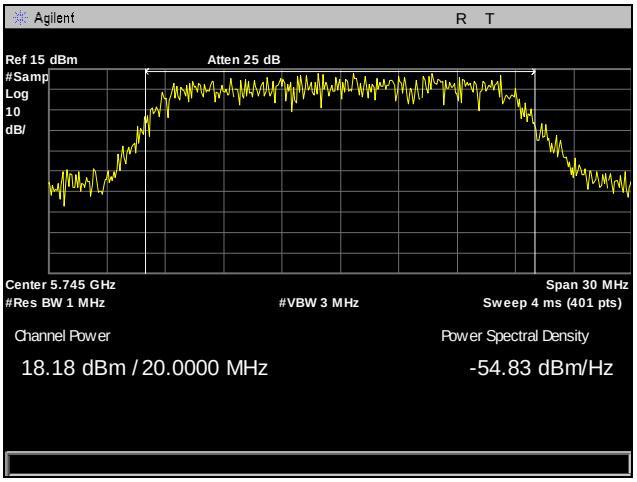

**Plot 38. Output Power, Mid Channel, 10 MHz, Port 2, 23 dBi Antenna**



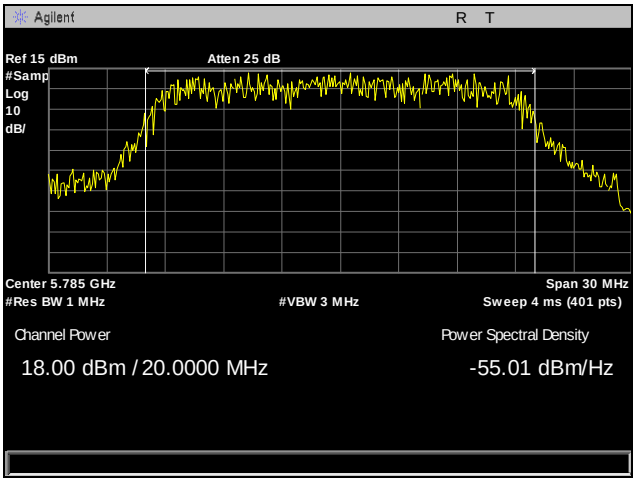

**Plot 39. Output Power, High Channel, 10 MHz, Port 2, 23 dBi Antenna**

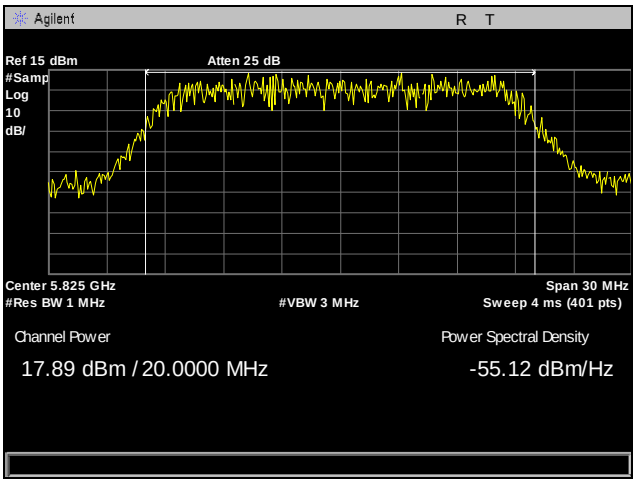
## Output Power, 20 MHz, Port 1, 23 dBi Antenna




**Plot 40. Output Power, Low Channel, 20 MHz, Port 1, 23 dBi Antenna**



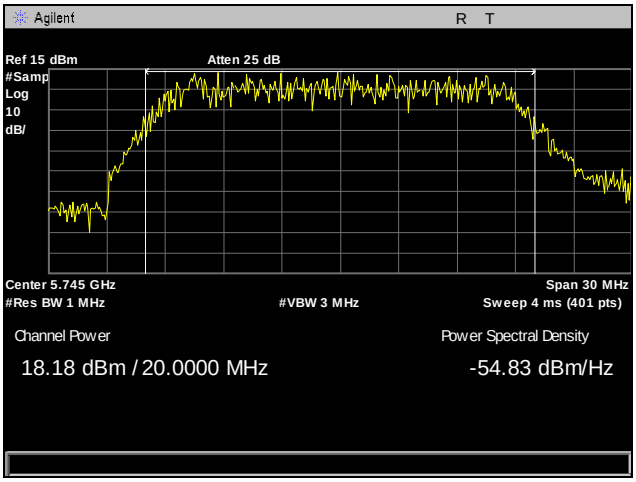

**Plot 41. Output Power, Mid Channel, 20 MHz, Port 1, 23 dBi Antenna**



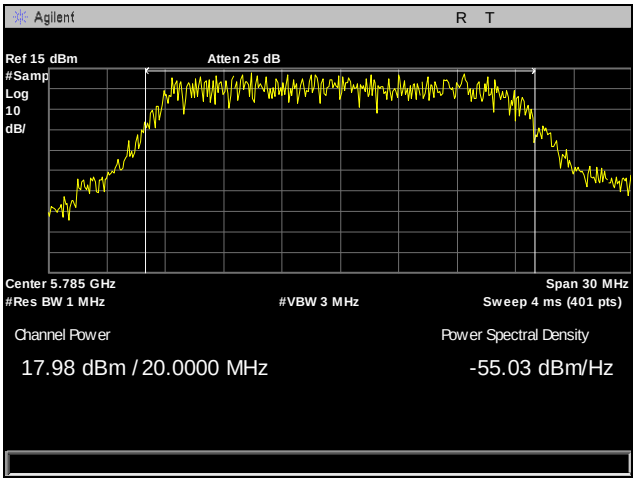

**Plot 42. Output Power, High Channel, 20 MHz, Port 1, 23 dBi Antenna**

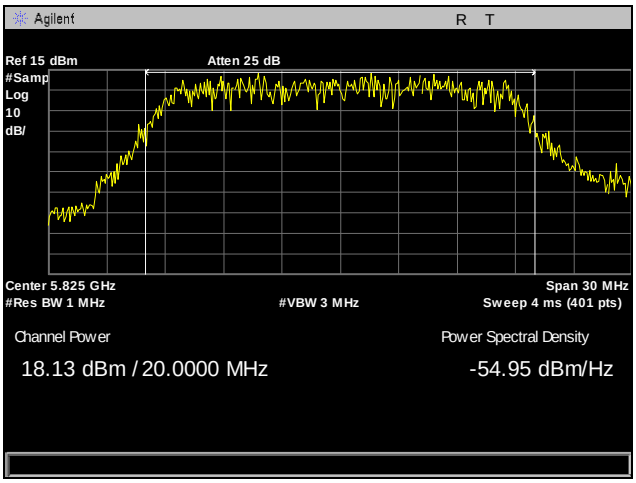
## Output Power, 20 MHz, Port 2, 23 dBi Antenna




**Plot 43. Output Power, Low Channel, 20 MHz, Port 2, 23 dBi Antenna**



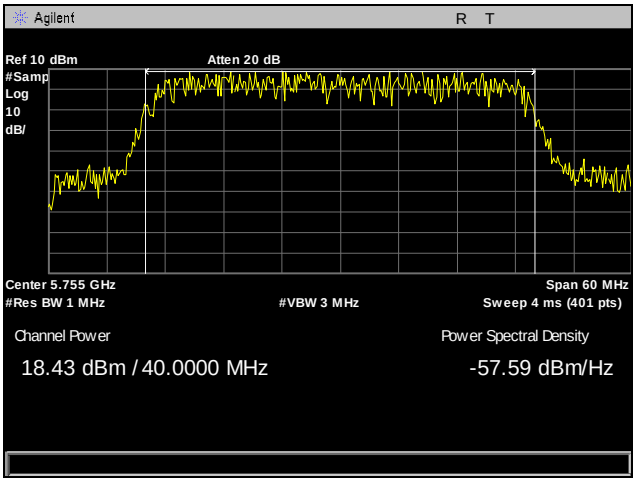

**Plot 44. Output Power, Mid Channel, 20 MHz, Port 2, 23 dBi Antenna**



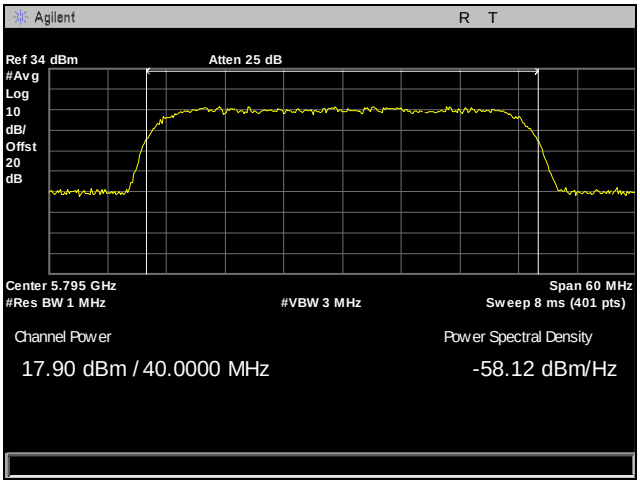

**Plot 45. Output Power, High Channel, 20 MHz, Port 2, 23 dBi Antenna**

## Output Power, 40 MHz, Port 1, 23 dBi Antenna



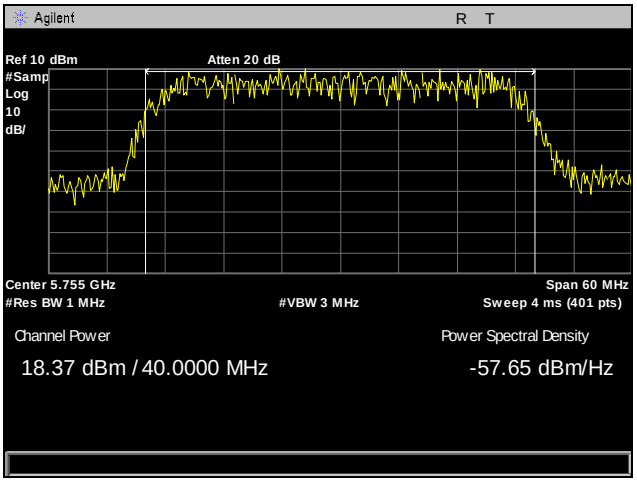

**Plot 46. Output Power, Low Channel, 40 MHz, Port 1, 23 dBi Antenna**



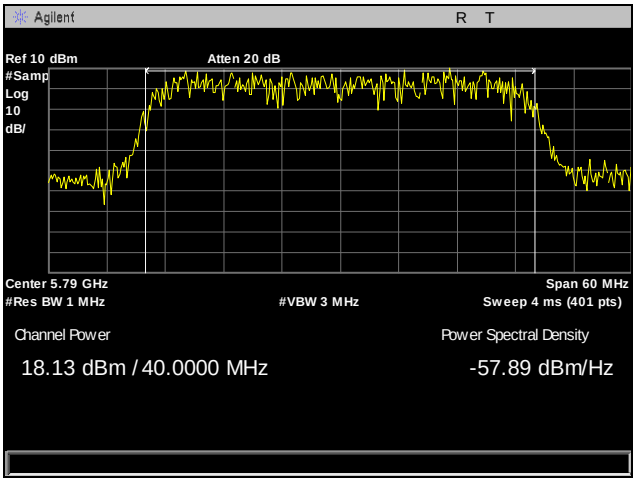

**Plot 47. Output Power, High Channel, 40 MHz, Port 1, 23 dBi Antenna**

## Output Power, 40 MHz, Port 2, 23 dBi Antenna



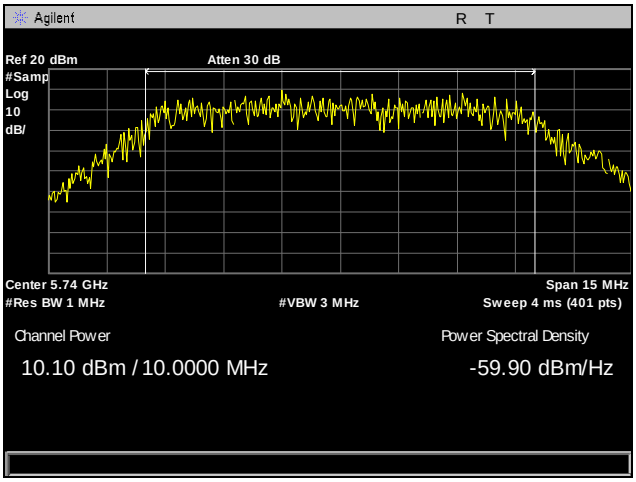

**Plot 48. Output Power, Low Channel, 40 MHz, Port 2, 23 dBi Antenna**



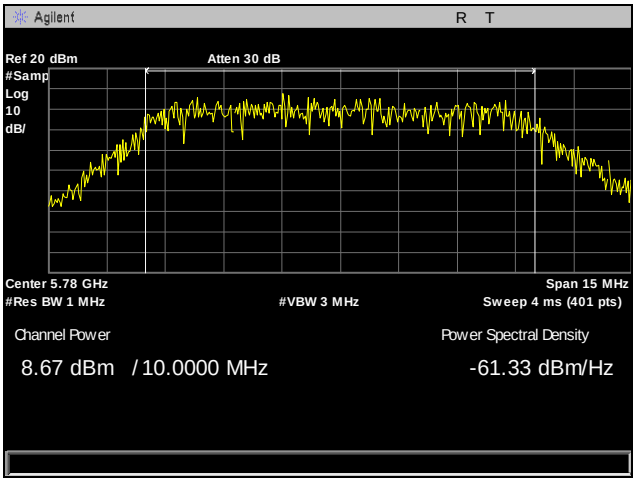

**Plot 49. Output Power, High Channel, 40 MHz, Port 2, 23 dBi Antenna**

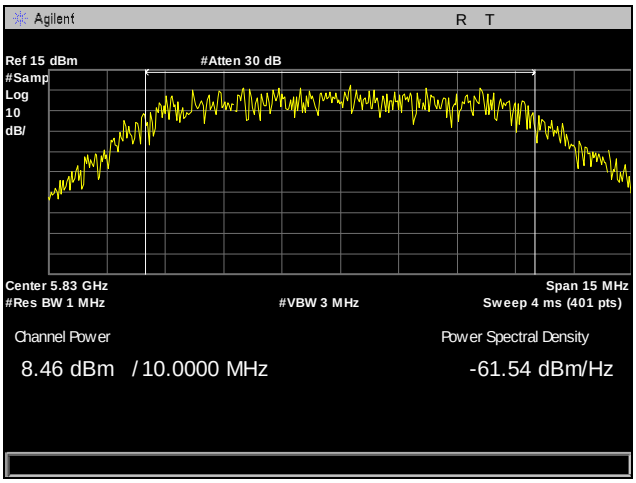
## Output Power, 10 MHz, Port 1, 28 dBi Antenna




**Plot 50. Output Power, Low Channel, 10 MHz, Port 1, 28 dBi Antenna**



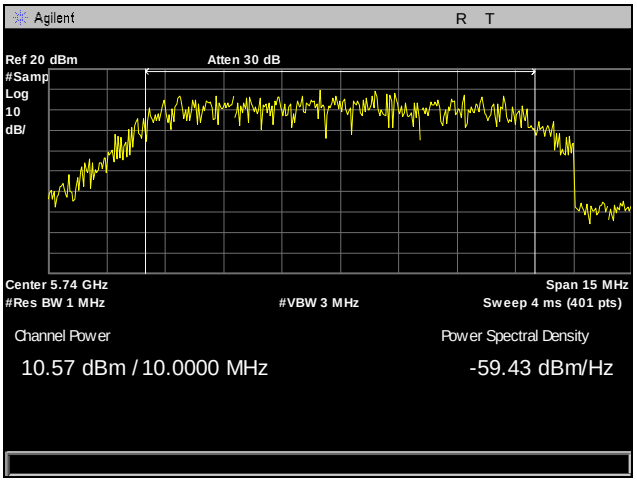

**Plot 51. Output Power, Mid Channel, 10 MHz, Port 1, 28 dBi Antenna**



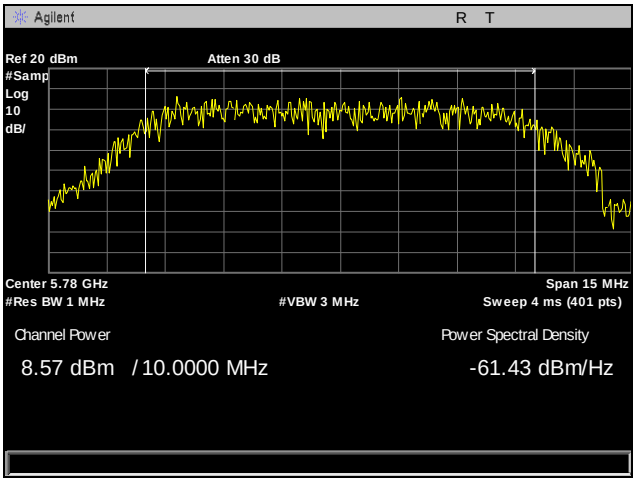

**Plot 52. Output Power, High Channel, 10 MHz, Port 1, 28 dBi Antenna**

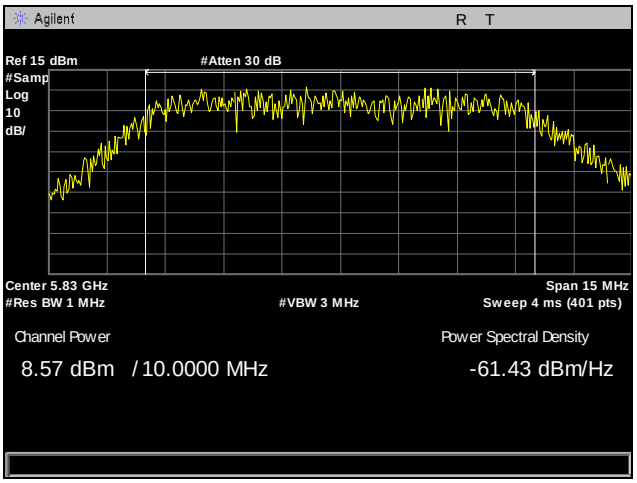
## Output Power, 10 MHz, Port 2, 28 dBi Antenna




**Plot 53. Output Power, Low Channel, 10 MHz, Port 2, 28 dBi Antenna**



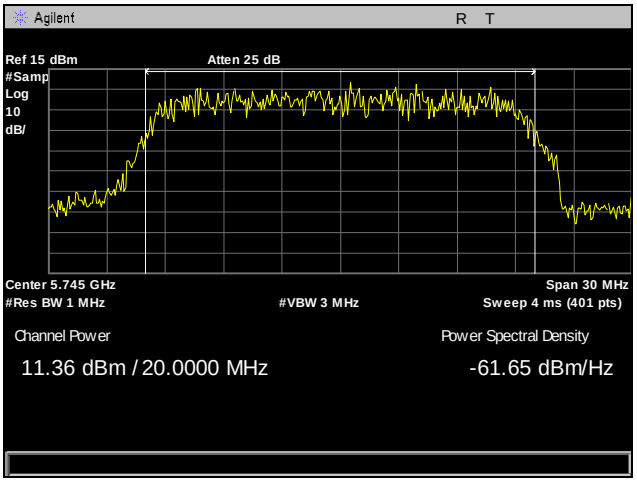

**Plot 54. Output Power, Mid Channel, 10 MHz, Port 2, 28 dBi Antenna**



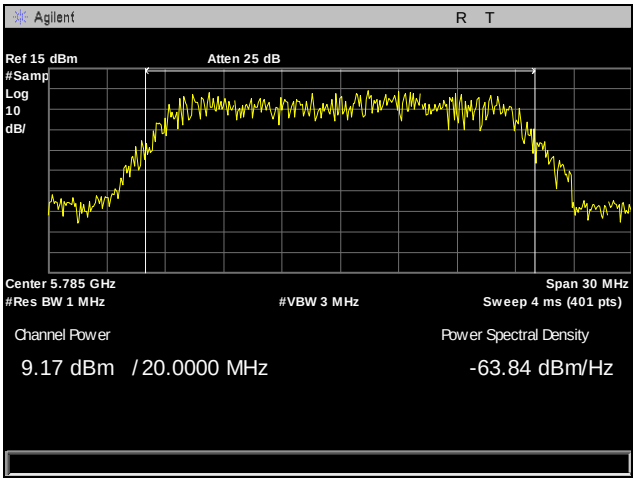

**Plot 55. Output Power, High Channel, 10 MHz, Port 2, 28 dBi Antenna**

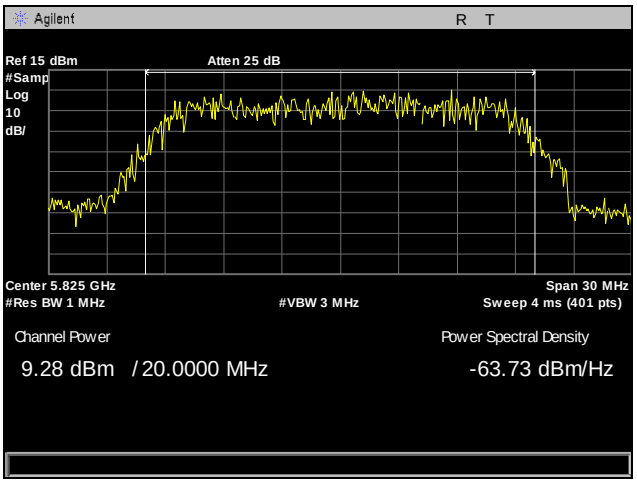
## Output Power, 20 MHz, Port 1, 28 dBi Antenna




**Plot 56. Output Power, Low Channel, 20 MHz, Port 1, 28 dBi Antenna**



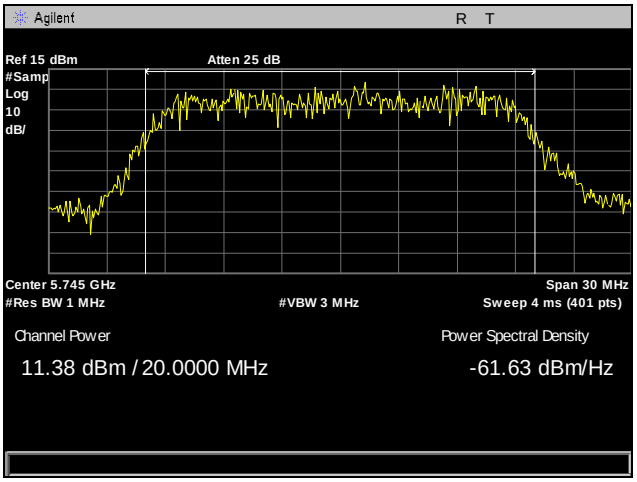

**Plot 57. Output Power, Mid Channel, 20 MHz, Port 1, 28 dBi Antenna**



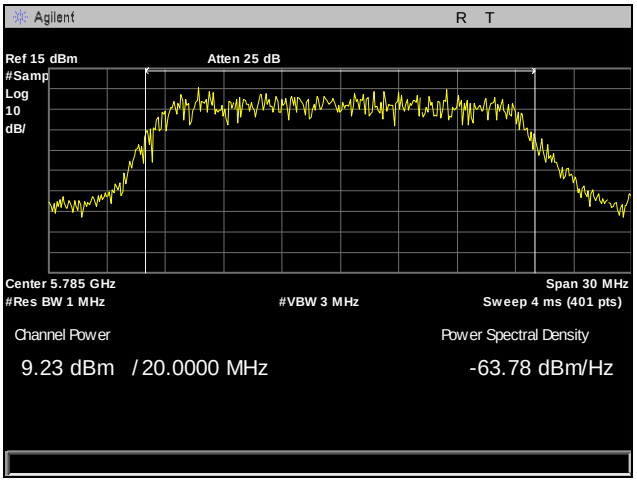

**Plot 58. Output Power, High Channel, 20 MHz, Port 1, 28 dBi Antenna**

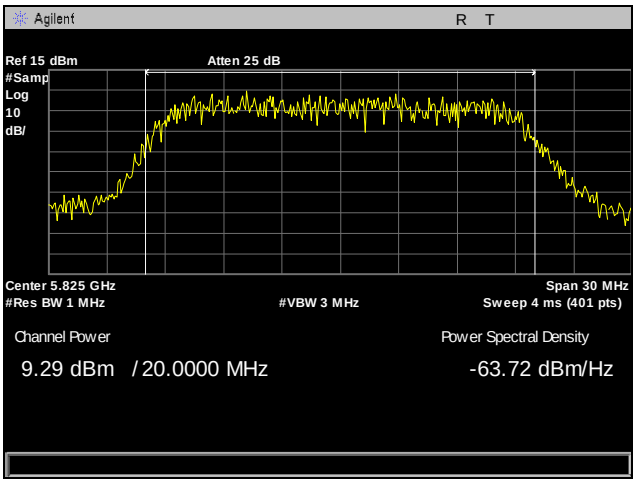
## Output Power, 20 MHz, Port 2, 28 dBi Antenna




**Plot 59. Output Power, Low Channel, 20 MHz, Port 2, 28 dBi Antenna**



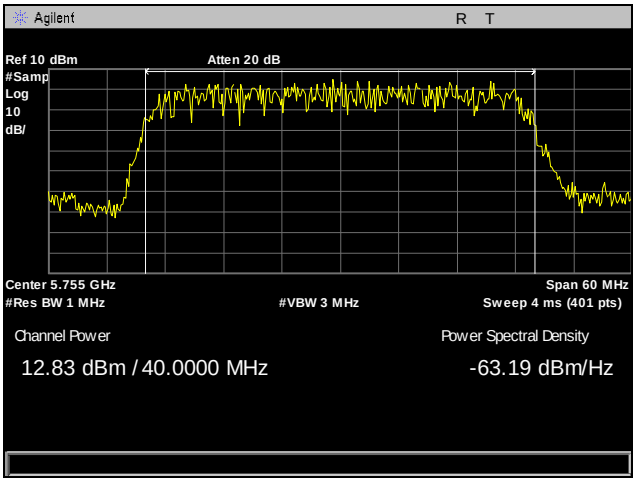

**Plot 60. Output Power, Mid Channel, 20 MHz, Port 2, 28 dBi Antenna**



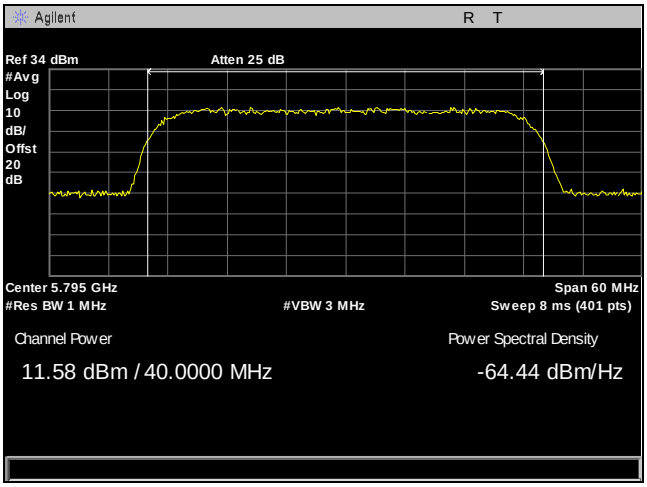

**Plot 61. Output Power, High Channel, 20 MHz, Port 2, 28 dBi Antenna**

## Output Power, 40 MHz, Port 1, 28 dBi Antenna



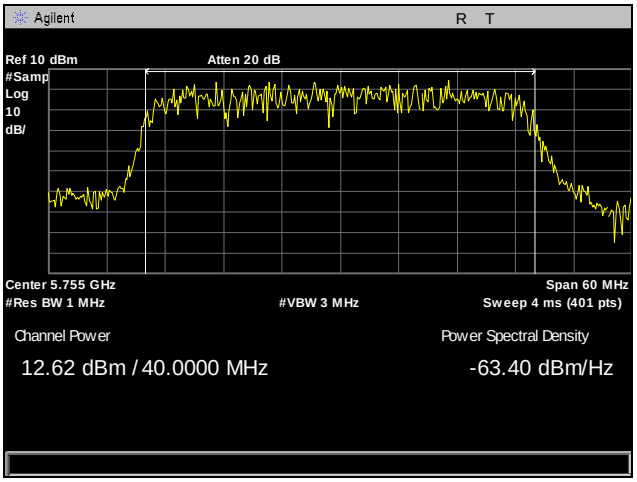

**Plot 62. Output Power, Low Channel, 40 MHz, Port 1, 28 dBi Antenna**



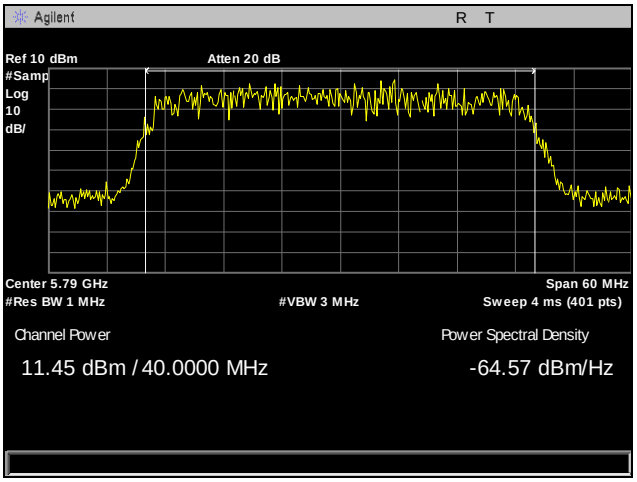

**Plot 63. Output Power, High Channel, 40 MHz, Port 1, 28 dBi Antenna**

## Output Power, 40 MHz, Port 2, 28 dBi Antenna




**Plot 64. Output Power, Low Channel, 40 MHz, Port 2, 28 dBi Antenna**




**Plot 65. Output Power, High Channel, 40 MHz, Port 2, 28 dBi Antenna**

## Electromagnetic Compatibility Criteria for Intentional Radiators

### §15.407(a)(3) Maximum Power Spectral Density

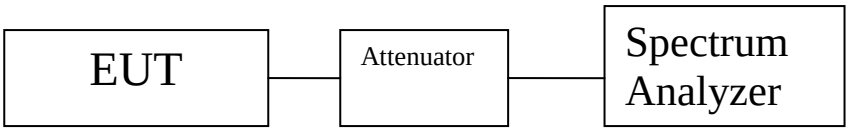
**Test Requirements:** **§15.407(a)(3):** In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.
If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

**Test Procedure:** The EUT was connected to a spectrum analyzer through a cable and attenuator. Measurements were taken with the EUT set to transmit continuously on its low, mid, and high channels. Its power was measured according KDB 789033 D02 General UNII Test Procedures v01. A 1 MHz RBW was used during testing, as this provides a worst-case scenario.

**Test Results:** The EUT as tested is compliant with the requirements of this section.

**Test Engineer(s):** Poona Saber

**Test Date(s):** 08/18/15



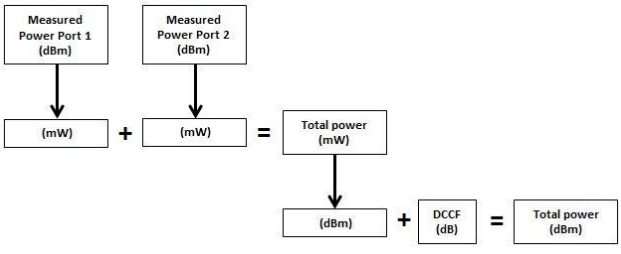
| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured PSD-Port 1 (dBm) | Measured PSD-Port 2 (dBm) | DCCF (dB) | Total Power (dBm) | Power Limit (dBm) |
|---|---|---|---|---|---|---|---|
| low | 10 | 5740 | 8.471 | 8.328 | 0.45 | 11.87 | 30 |
| Mid | 10 | 5780 | 7.013 | 6.685 | 0.45 | 10.32 | 30 |
| High | 10 | 5830 | 7.837 | 7.074 | 0.45 | 10.94 | 30 |
| Low | 20 | 5745 | 6.572 | 6.811 | 0.45 | 10.16 | 30 |
| Mid | 20 | 5785 | 6.697 | 6.362 | 0.45 | 10 | 30 |
| High | 20 | 5825 | 6.755 | 7.188 | 0.45 | 10.44 | 30 |
| Low | 40 | 5755 | 4.463 | 4.426 | 0.45 | 7.91 | 30 |
| High | 40 | 5795 | 3.885 | 3.93 | 0.45 | 7.37 | 30 |

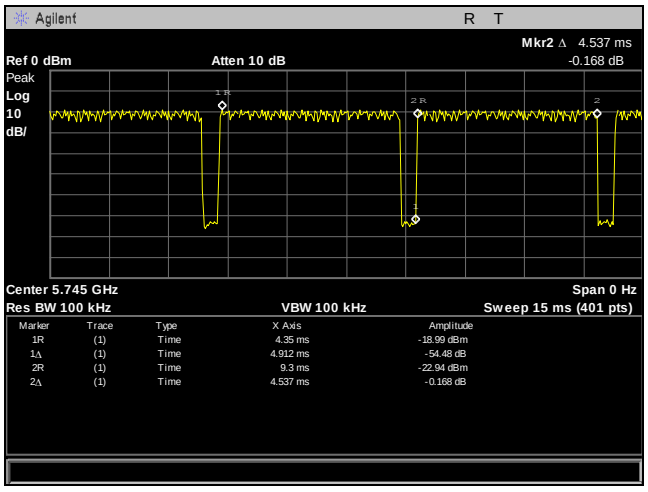
**Table 10. PSD, Test Results, 23 dBi antenna**

| Channel | Bandwidth (dBm) | Frequency (dBm) | Measured PSD-Port 1 (dBm) | Measured PSD-Port 2 (dBm) | DCCF (dB) | Total Power (dBm) | Power Limit (dBm) |
|---|---|---|---|---|---|---|---|
| low | 10 | 5740 | 2.009 | 1.785 | 0.45 | 5.36 | 30 |
| Mid | 10 | 5780 | 2.14 | -0.274 | 0.45 | 4.56 | 30 |
| High | 10 | 5830 | -0.164 | -0.095 | 0.45 | 3.34 | 30 |
| Low | 20 | 5745 | 0.12 | -0.037 | 0.45 | 3.51 | 30 |
| Mid | 20 | 5785 | -1.668 | -1.573 | 0.45 | 1.85 | 30 |
| High | 20 | 5825 | -1.8 | -1.97 | 0.45 | 1.58 | 30 |
| Low | 40 | 5755 | -1.559 | -1.574 | 0.45 | 1.9 | 30 |
| High | 40 | 5795 | -1.88 | -3.132 | 0.45 | 1 | 30 |

**Table 11. PSD, Test Results, 28 dBi antenna**

Time Period (**T**) = 4.912 ms
Time On (**Ton**) = 4.533
Duty Cycle (**DC**) = 4.533/4.912 = 0.90
Duty Cycle correction factor (**DCCF**) = 10 log (1/DC) = 10 log (1/0.90) = 0.45

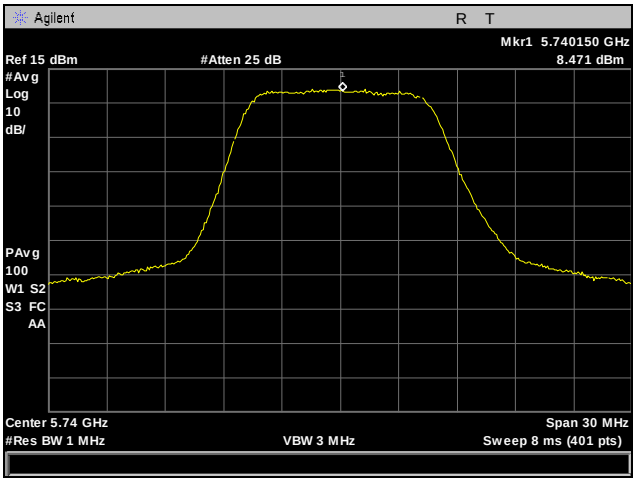


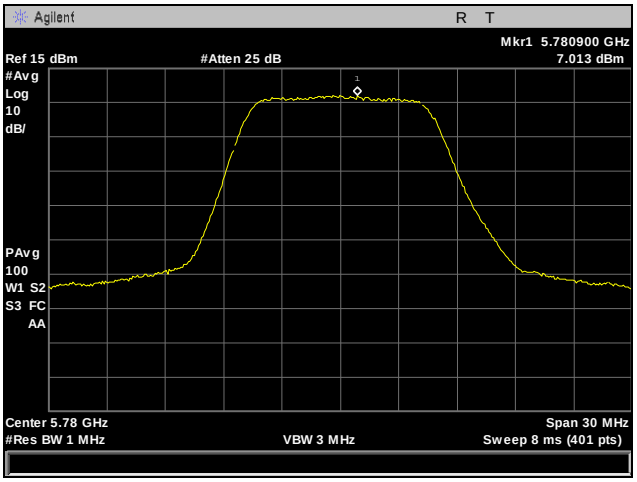

**Plot 66. Duty Cycle Measurements**

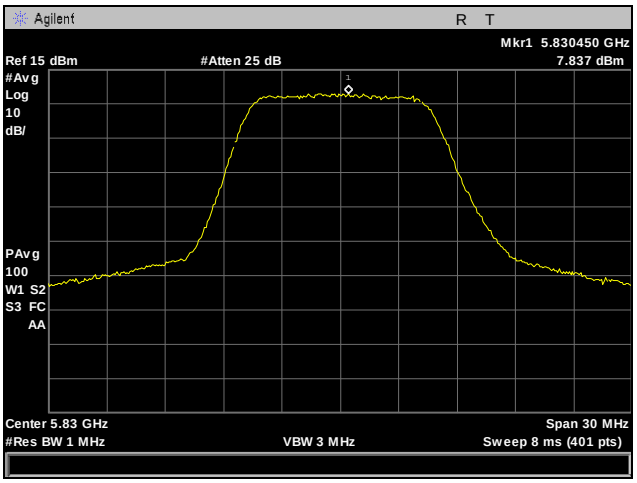
## Peak Power Spectral Density, 10 MHz, Port 1, 23 dBi Antenna




**Plot 67. Peak Power Spectral Density, Low Channel, 10 MHz, Port 1, 23 dBi Antenna**



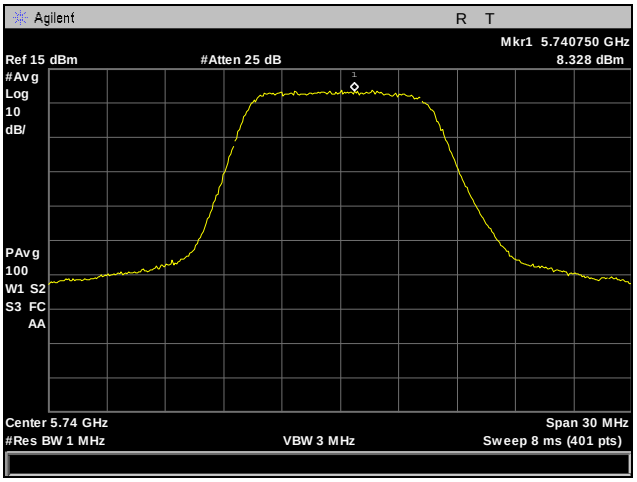

**Plot 68. Peak Power Spectral Density, Mid Channel, 10 MHz, Port 1, 23 dBi Antenna**



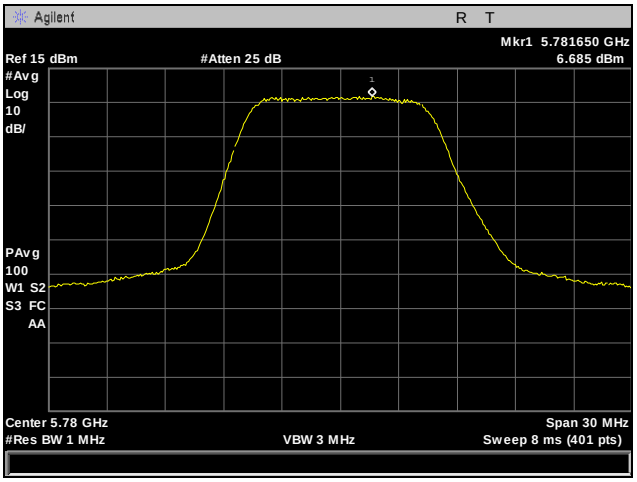

**Plot 69. Peak Power Spectral Density, High Channel, 10 MHz, Port 1, 23 dBi Antenna**

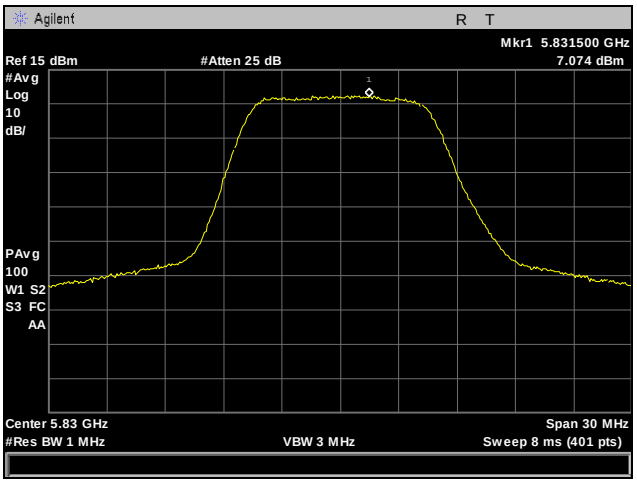
## Peak Power Spectral Density, 10 MHz, Port 2, 23 dBi Antenna




**Plot 70. Peak Power Spectral Density, Low Channel, 10 MHz, Port 2, 23 dBi Antenna**



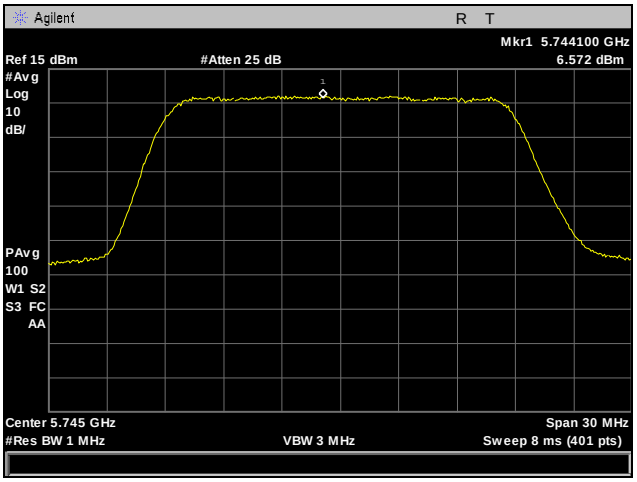

**Plot 71. Peak Power Spectral Density, Mid Channel, 10 MHz, Port 2, 23 dBi Antenna**



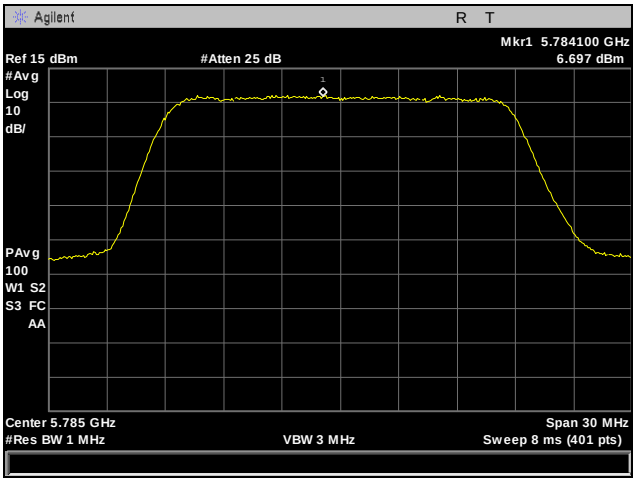

**Plot 72. Peak Power Spectral Density, High Channel, 10 MHz, Port 2, 23 dBi Antenna**

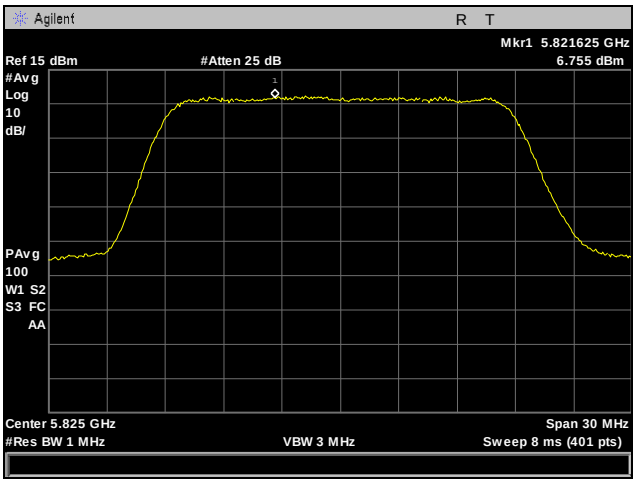
## Peak Power Spectral Density, 20 MHz, Port 1, 23 dBi Antenna




**Plot 73. Peak Power Spectral Density, Low Channel, 20 MHz, Port 1, 23 dBi Antenna**



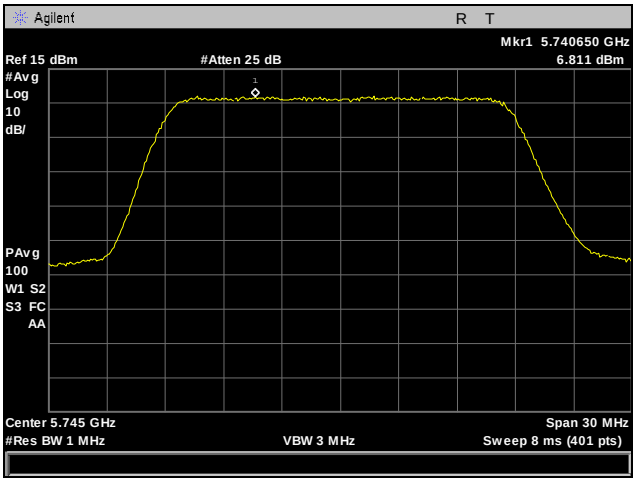

**Plot 74. Peak Power Spectral Density, Mid Channel, 20 MHz, Port 1, 23 dBi Antenna**



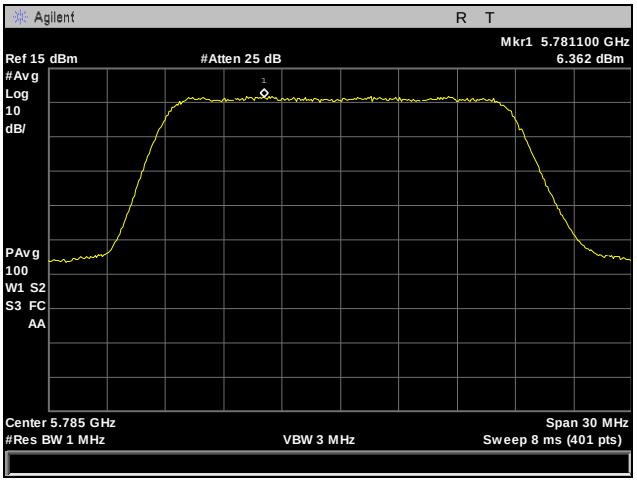

**Plot 75. Peak Power Spectral Density, High Channel, 20 MHz, Port 1, 23 dBi Antenna**

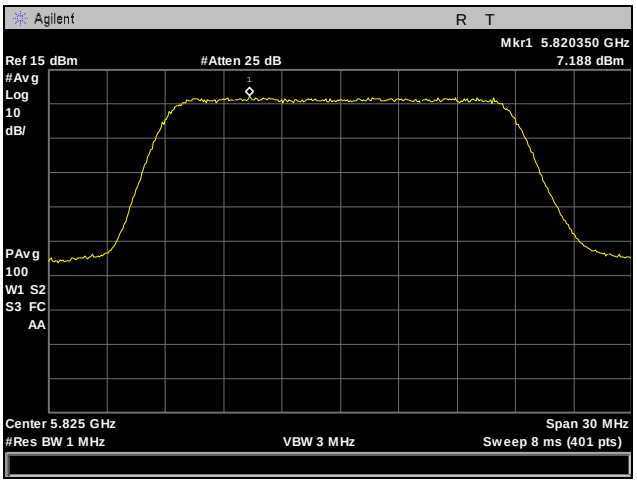
## Peak Power Spectral Density, 20 MHz, Port 2, 23 dBi Antenna




**Plot 76. Peak Power Spectral Density, Low Channel, 20 MHz, Port 2, 23 dBi Antenna**



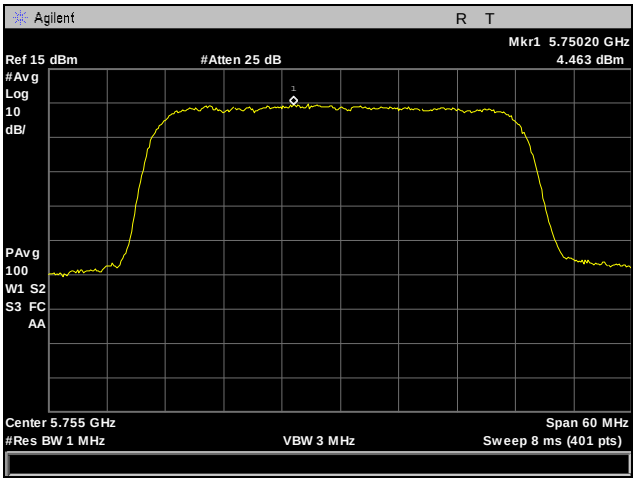

**Plot 77. Peak Power Spectral Density, Mid Channel, 20 MHz, Port 2, 23 dBi Antenna**



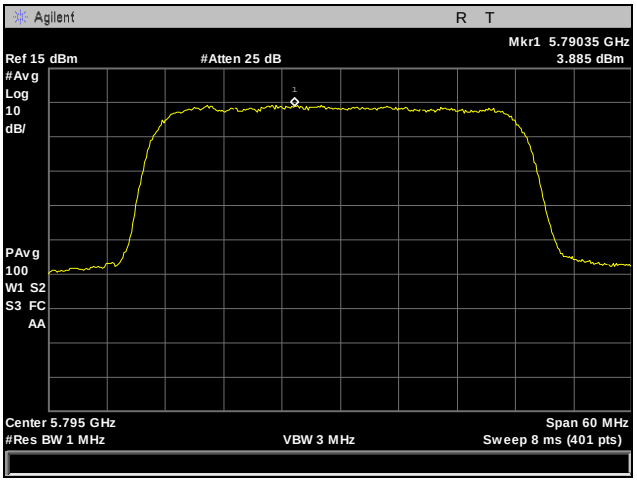

**Plot 78. Peak Power Spectral Density, High Channel, 20 MHz, Port 2, 23 dBi Antenna**

## Peak Power Spectral Density, 40 MHz, Port 1, 23 dBi Antenna

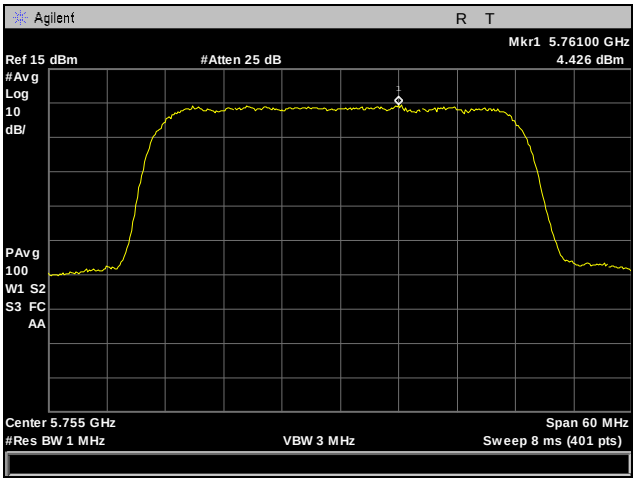



**Plot 79. Peak Power Spectral Density, Low Channel, 40 MHz, Port 1, 23 dBi Antenna**

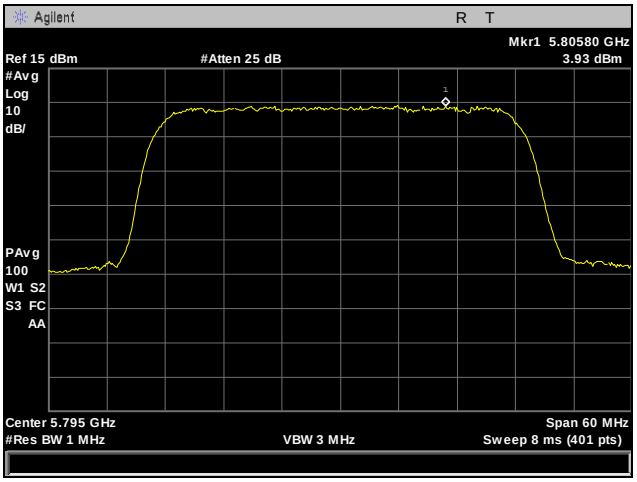



**Plot 80. Peak Power Spectral Density, High Channel, 40 MHz, Port 1, 23 dBi Antenna**

## Peak Power Spectral Density, 40 MHz, Port 2, 23 dBi Antenna



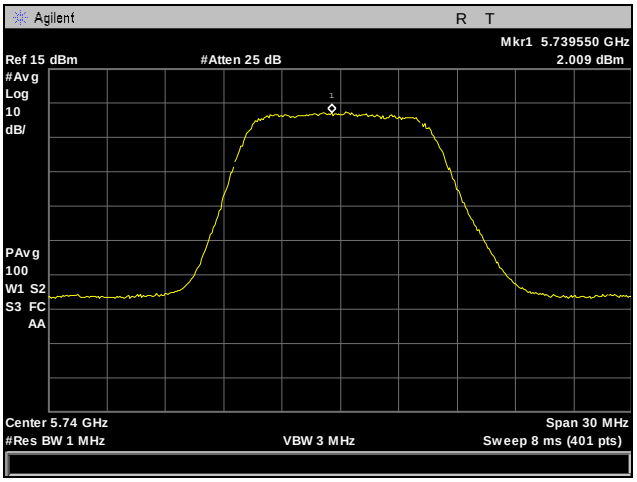

**Plot 81. Peak Power Spectral Density, Low Channel, 40 MHz, Port 2, 23 dBi Antenna**



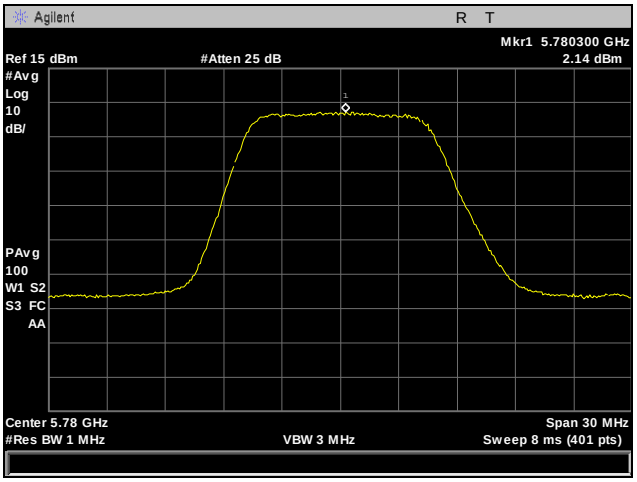

**Plot 82. Peak Power Spectral Density, High Channel, 40 MHz, Port 2, 23 dBi Antenna**

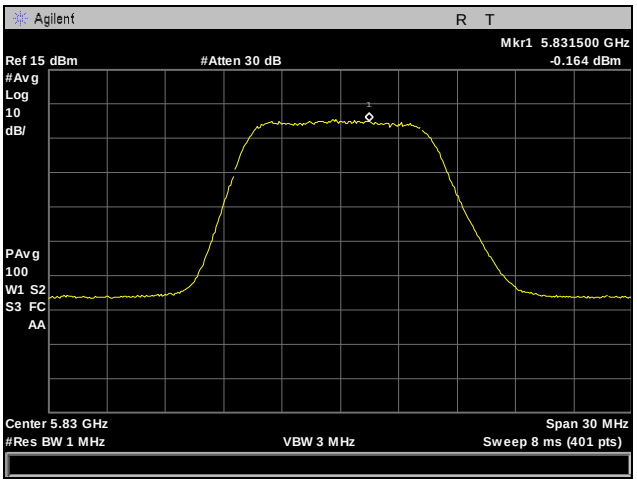
## Peak Power Spectral Density, 10 MHz, Port 1, 28 dBi Antenna




**Plot 83. Peak Power Spectral Density, Low Channel, 10 MHz, Port 1, 28 dBi Antenna**



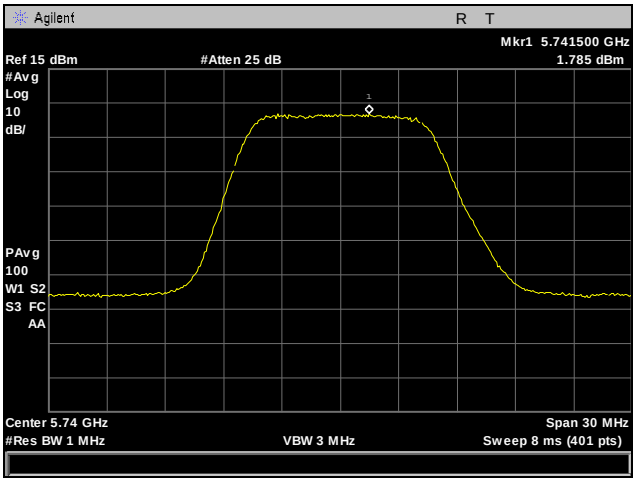

**Plot 84. Peak Power Spectral Density, Mid Channel, 10 MHz, Port 1, 28 dBi Antenna**



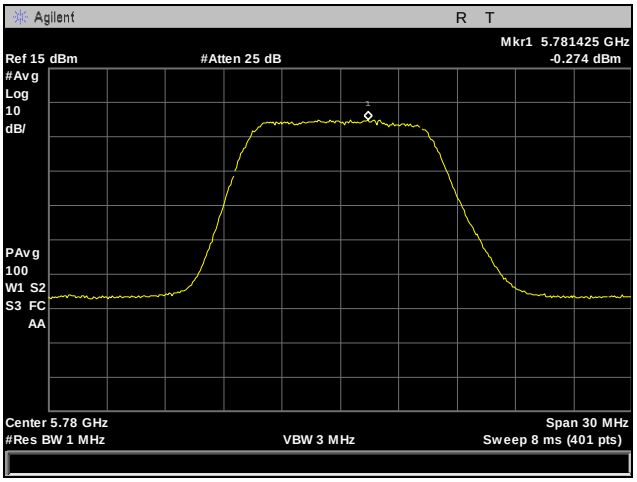

**Plot 85. Peak Power Spectral Density, High Channel, 10 MHz, Port 1, 28 dBi Antenna**

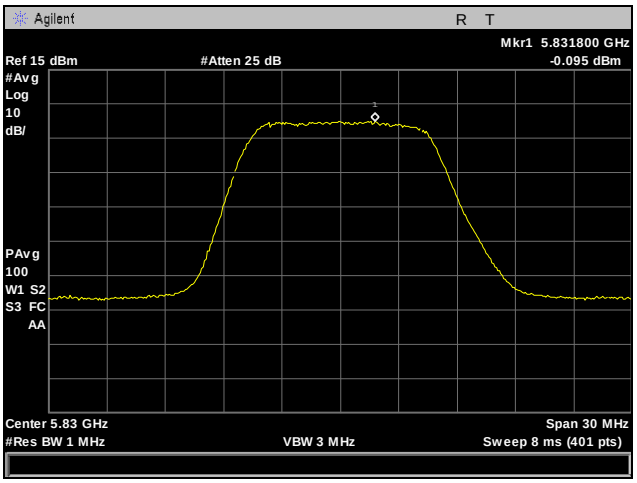
## Peak Power Spectral Density, 10 MHz, Port 2, 28 dBi Antenna




**Plot 86. Peak Power Spectral Density, Low Channel, 10 MHz, Port 2, 28 dBi Antenna**



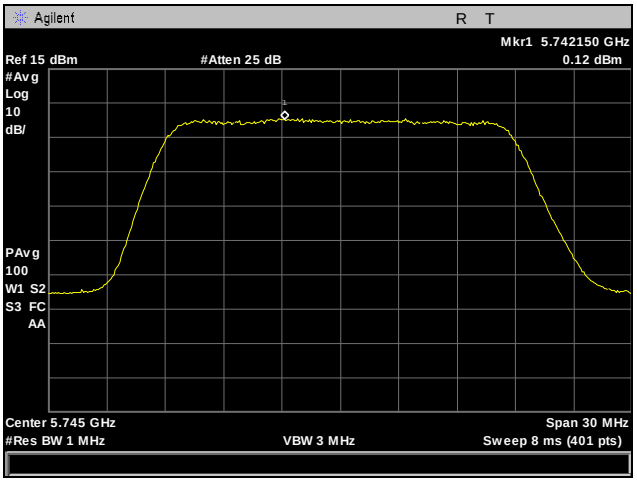

**Plot 87. Peak Power Spectral Density, Mid Channel, 10 MHz, Port 2, 28 dBi Antenna**



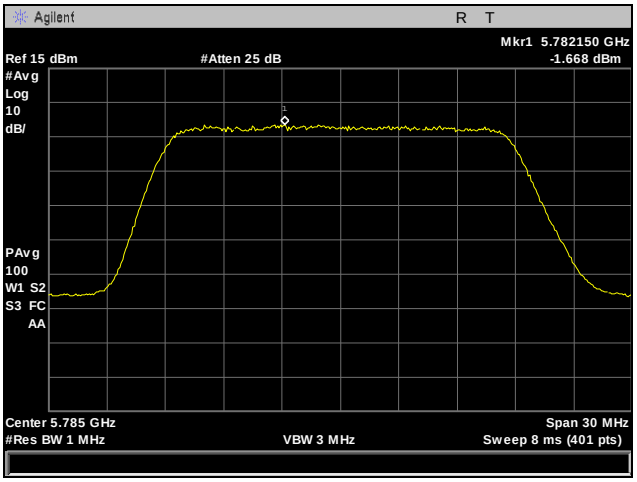

**Plot 88. Peak Power Spectral Density, High Channel, 10 MHz, Port 2, 28 dBi Antenna**

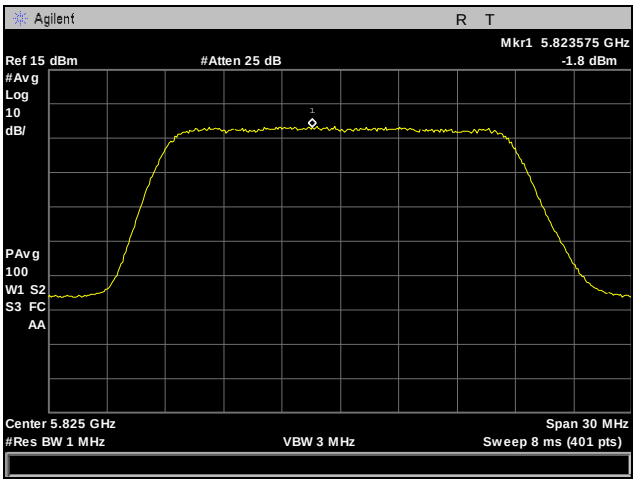
## Peak Power Spectral Density, 20 MHz, Port 1, 28 dBi Antenna




**Plot 89. Peak Power Spectral Density, Low Channel, 20 MHz, Port 1, 28 dBi Antenna**



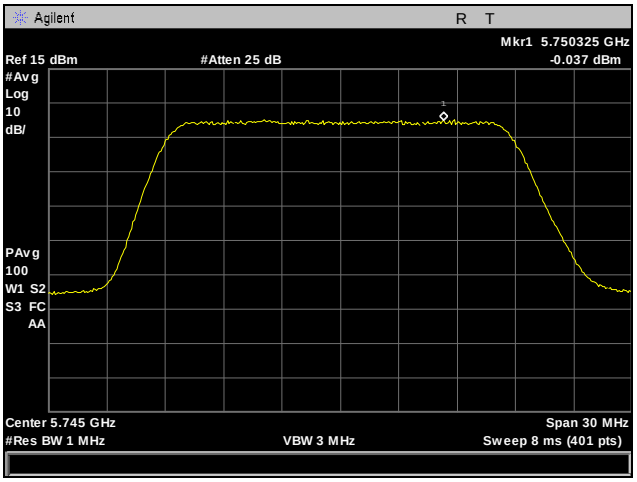

**Plot 90. Peak Power Spectral Density, Mid Channel, 20 MHz, Port 1, 28 dBi Antenna**



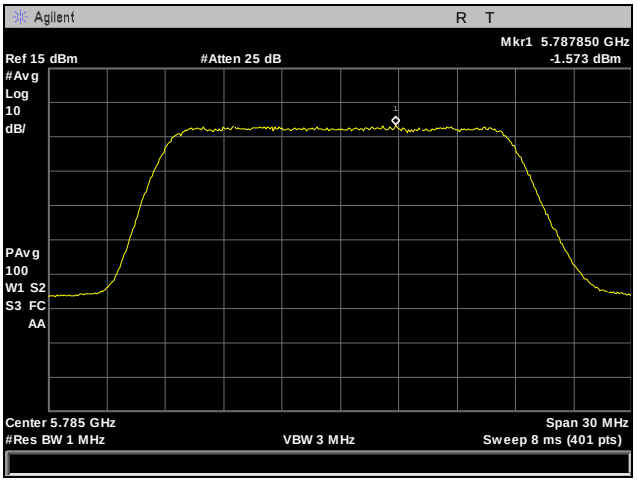

**Plot 91. Peak Power Spectral Density, High Channel, 20 MHz, Port 1, 28 dBi Antenna**

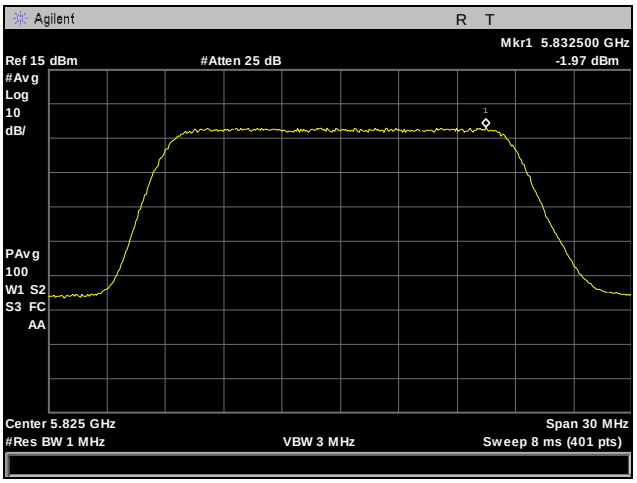
## Peak Power Spectral Density, 20 MHz, Port 2, 28 dBi Antenna




**Plot 92. Peak Power Spectral Density, Low Channel, 20 MHz, Port 2, 28 dBi Antenna**



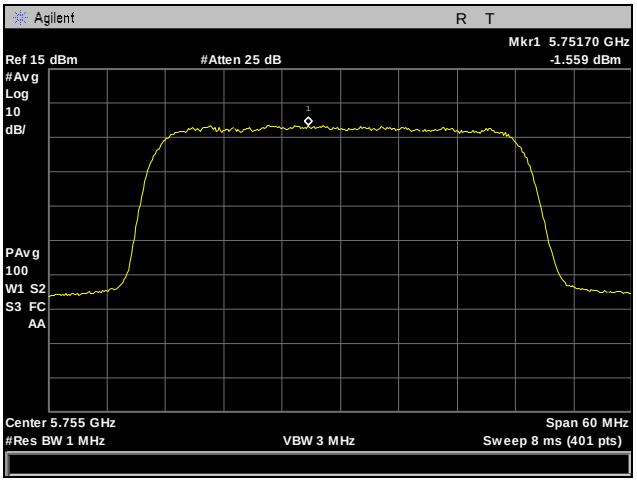

**Plot 93. Peak Power Spectral Density, Mid Channel, 20 MHz, Port 2, 28 dBi Antenna**



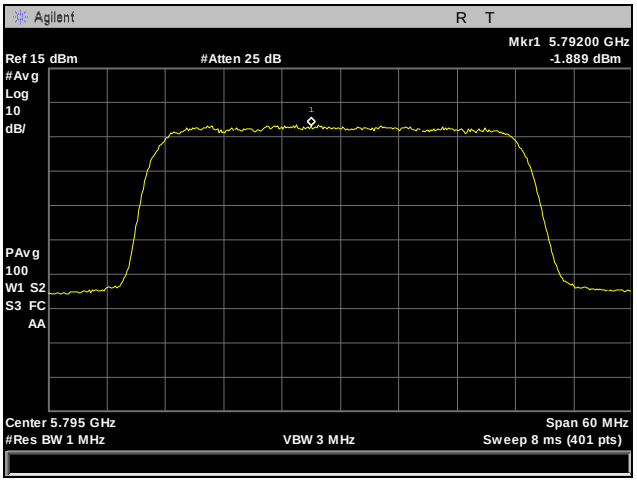

**Plot 94. Peak Power Spectral Density, High Channel, 20 MHz, Port 2, 28 dBi Antenna**

## Peak Power Spectral Density, 40 MHz, Port 1, 28 dBi Antenna



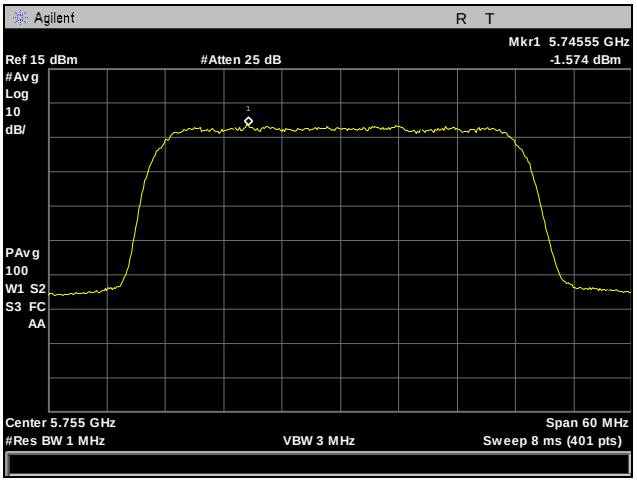

**Plot 95. Peak Power Spectral Density, Low Channel, 40 MHz, Port 1, 28 dBi Antenna**



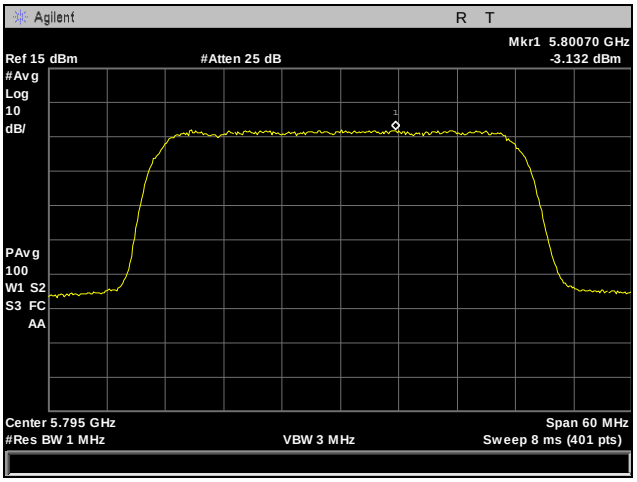

**Plot 96. Peak Power Spectral Density, High Channel, 40 MHz, Port 1, 28 dBi Antenna**

## Peak Power Spectral Density, 40 MHz, Port 2, 28 dBi Antenna




**Plot 97. Peak Power Spectral Density, Low Channel, 40 MHz, Port 2, 28 dBi Antenna**




**Plot 98. Peak Power Spectral Density, High Channel, 40 MHz, Port 2, 28 dBi Antenna**

# Electromagnetic Compatibility Criteria for Intentional Radiators

## §15.407(b)(4) & (6 – 7) Undesirable Emissions

**Test Requirements:**

**§ 15.407(b)(4):** For transmitters operating in the 5.725-5.85 GHz band: All emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions shall not exceed an e.i.r.p. of −27 dBm/MHz.

**§ 15.407(b)(6):** Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in Section 15.209. Further, any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in Section 15.207.

**§ 15.407(b)(7):** The provisions of Section 15.205 of this part apply to intentional radiators operating under this section.

**Test Procedure:**

The EUT was placed on a non-conducting stand on a turntable in a chamber. To find the maximum emission the EUT was set to transmit on low, mid, and high channels. Additionally, the turntable was rotated 360 degrees, the EUT was oriented through its three orthogonal axes, and the receive antenna height was varied in order to maximize emissions.

For frequencies from 30 MHz to 1 GHz, measurements were first made using a peak detector with a 100 kHz resolution bandwidth. Emissions which exceeded the limits were re-measured using a quasi-peak detector with a 120 kHz resolution bandwidth.

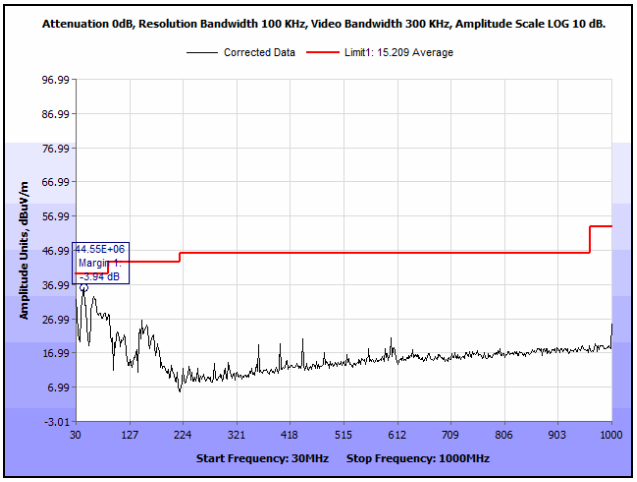
**Test Results:** The EUT was compliant with the requirements of this section.

**Test Engineer(s):** Poona Saber

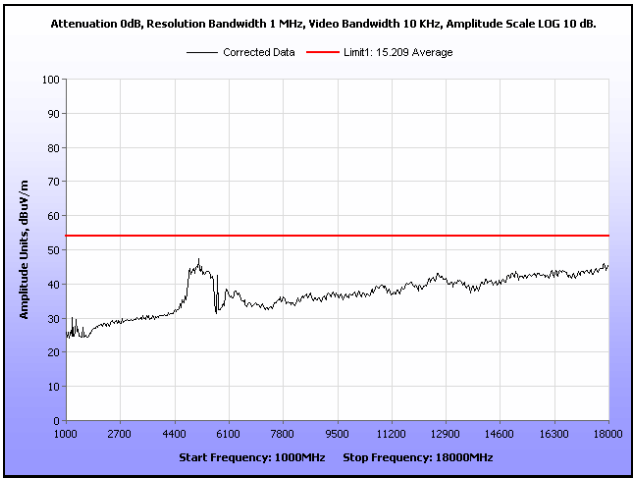
**Test Date(s):** 08/18/15

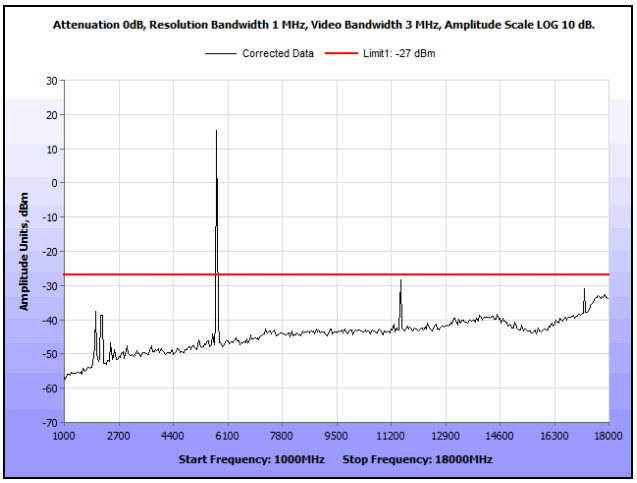
## Radiated Spurious Emissions, 10 MHz, 23 dBi Antenna




**Plot 99. Radiated Spurious Emissions, Low Channel, 10 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**

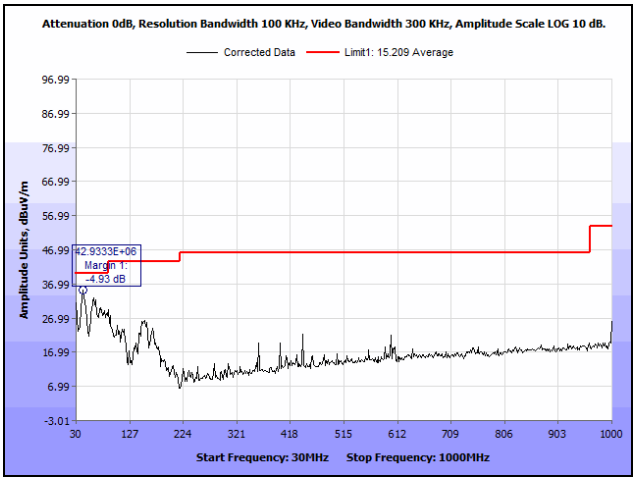



**Plot 100. Radiated Spurious Emissions, Low Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**

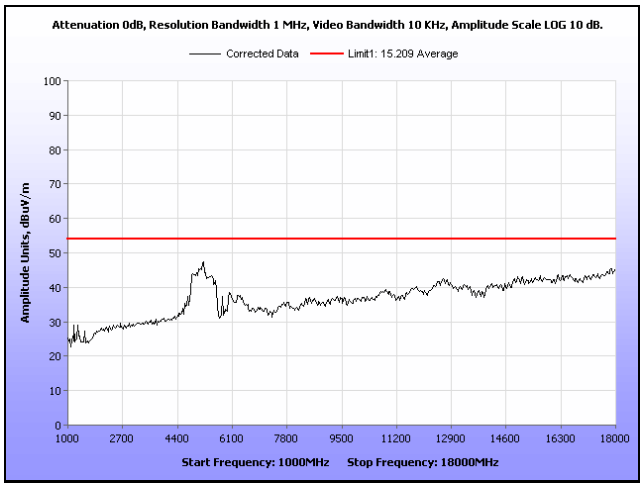



**Plot 101. Radiated Spurious Emissions, Low Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

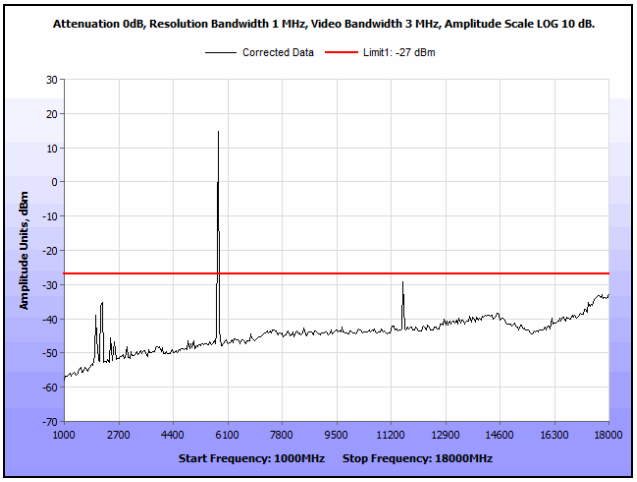
  




**Plot 102. Radiated Spurious Emissions, Mid Channel, 10 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**

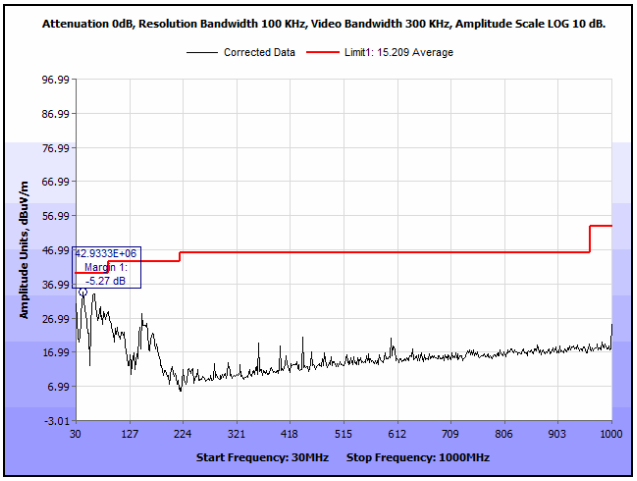



**Plot 103. Radiated Spurious Emissions, Mid Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**

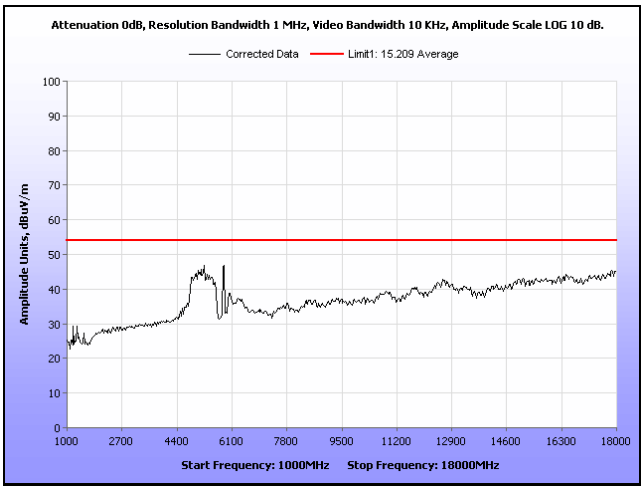



**Plot 104. Radiated Spurious Emissions, Mid Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

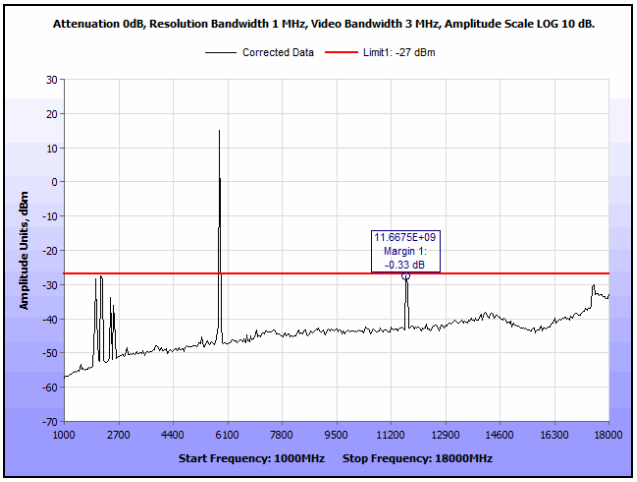
  




**Plot 105. Radiated Spurious Emissions, High Channel, 10 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**



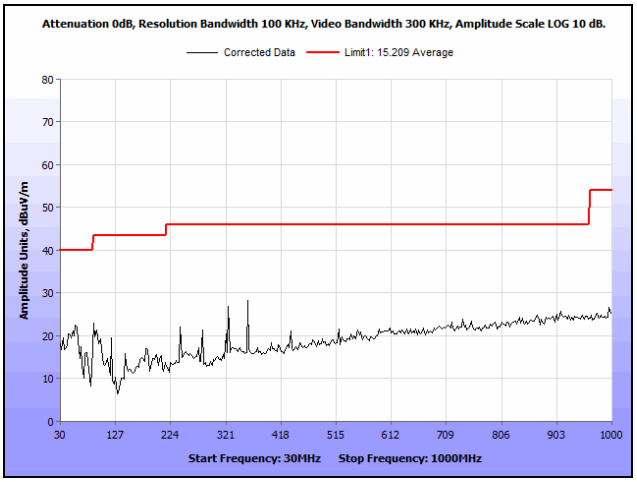

**Plot 106. Radiated Spurious Emissions, High Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**



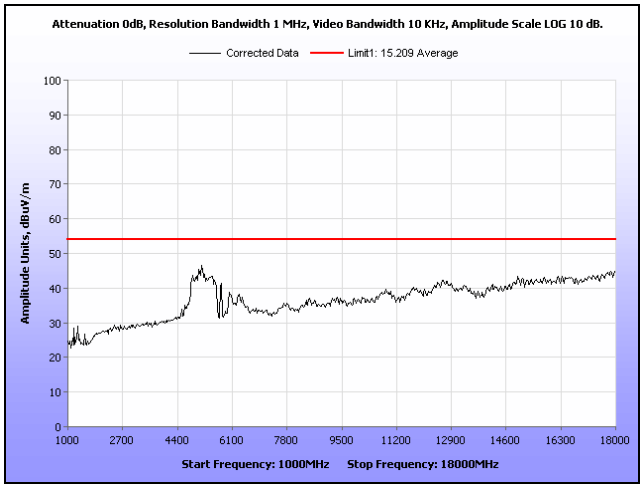

**Plot 107. Radiated Spurious Emissions, High Channel, 10 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

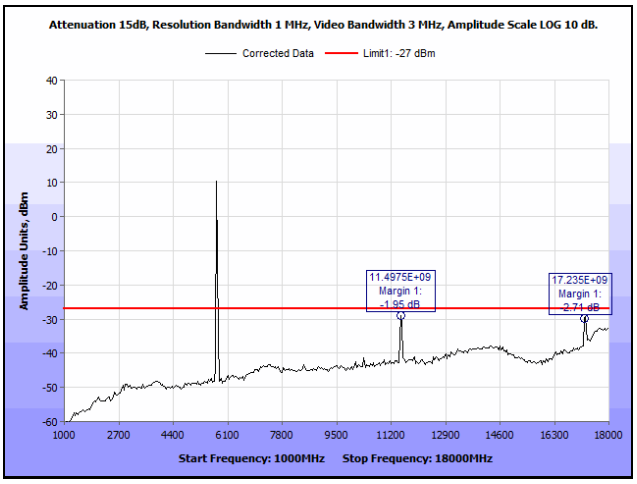
## Radiated Spurious Emissions, 20 MHz, 23 dBi Antenna




**Plot 108. Radiated Spurious Emissions, Low Channel, 20 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**

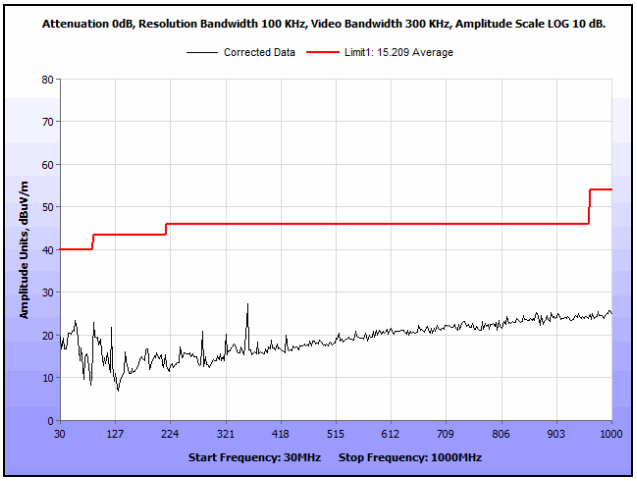



**Plot 109. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**

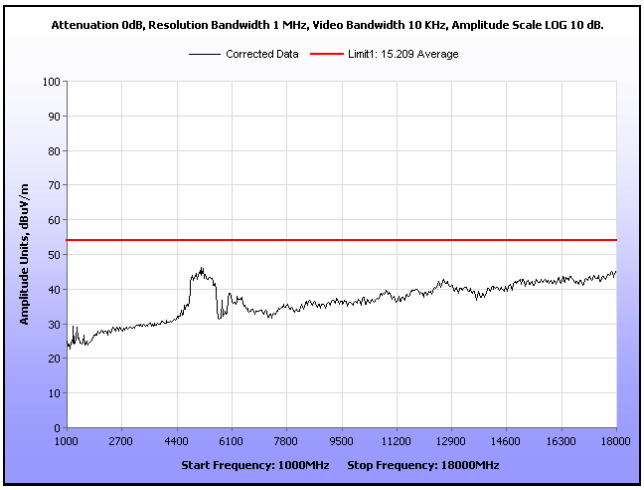



**Plot 110. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

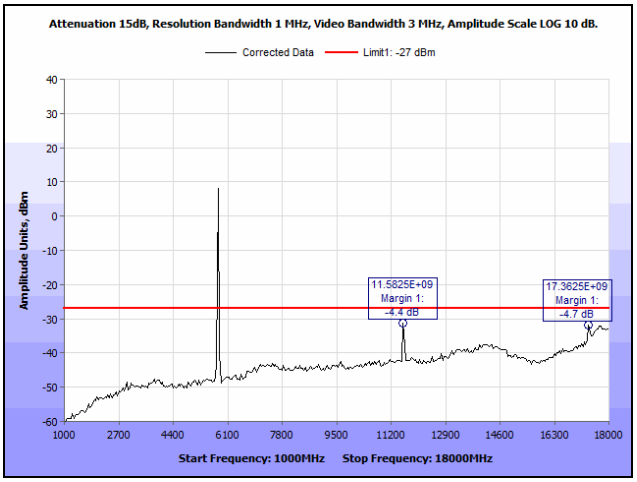
  




**Plot 111. Radiated Spurious Emissions, Mid Channel, 20 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**

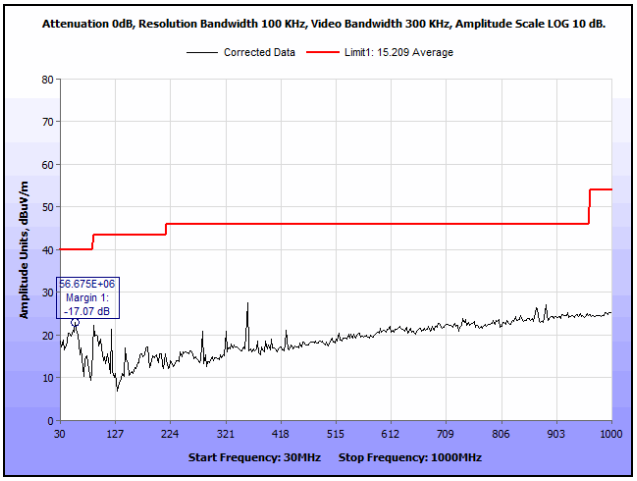



**Plot 112. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

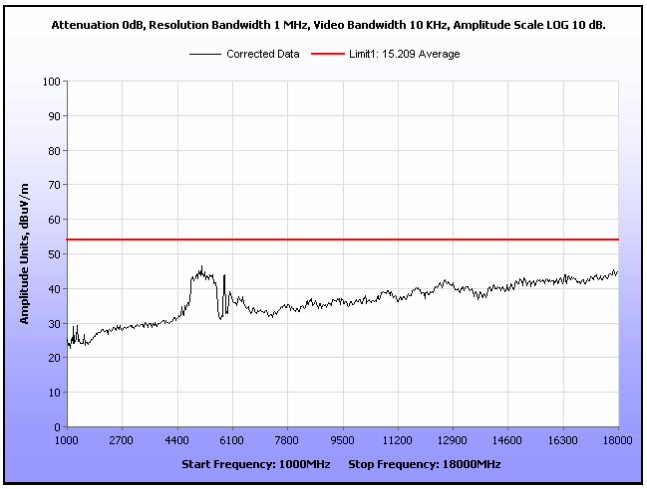



**Plot 113. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

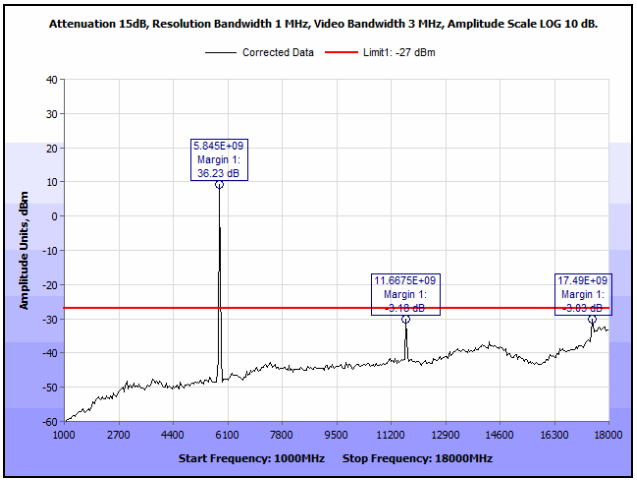
  




**Plot 114. Radiated Spurious Emissions, High Channel, 20 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**



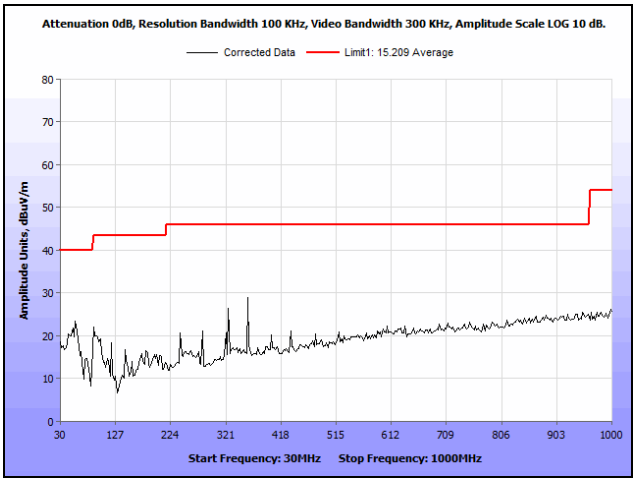

**Plot 115. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**



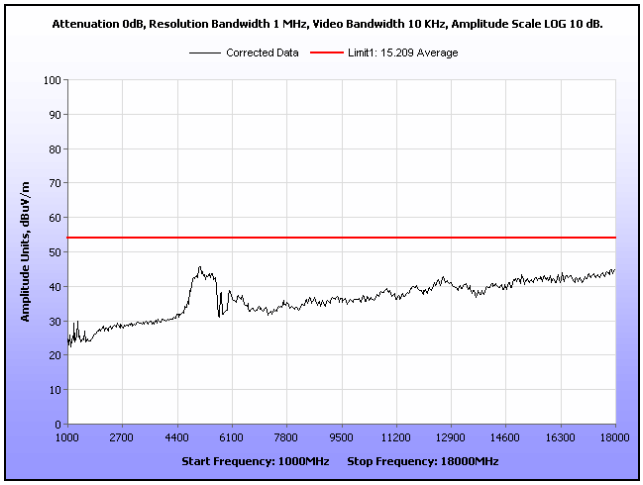

**Plot 116. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

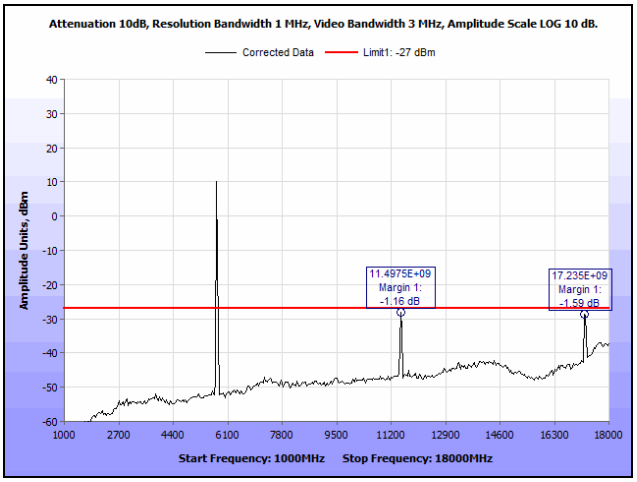
## Radiated Spurious Emissions, 40 MHz, 23 dBi Antenna




**Plot 117. Radiated Spurious Emissions, Low Channel, 40 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**

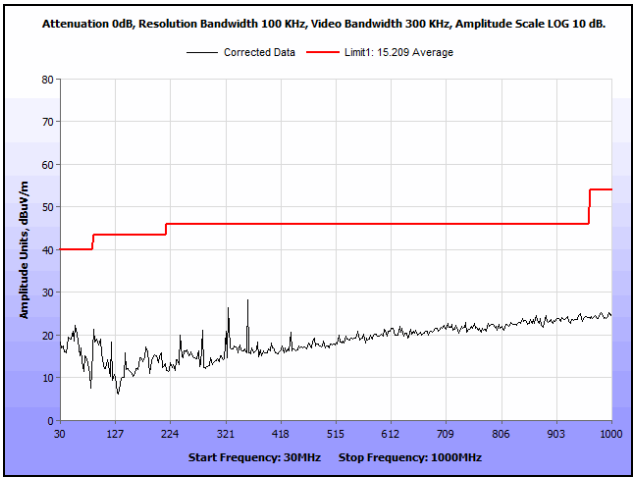



**Plot 118. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

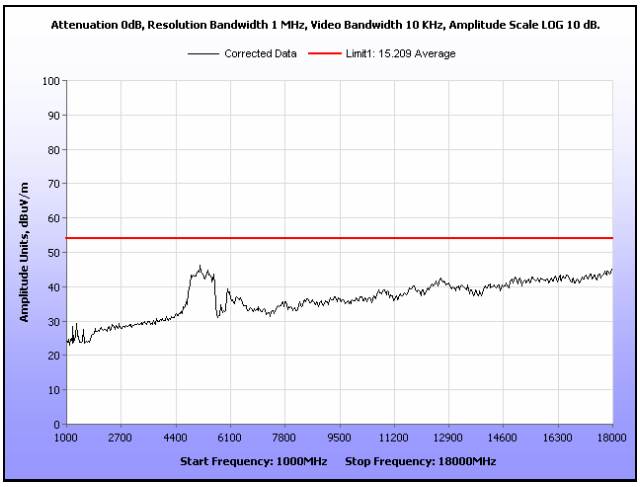



**Plot 119. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

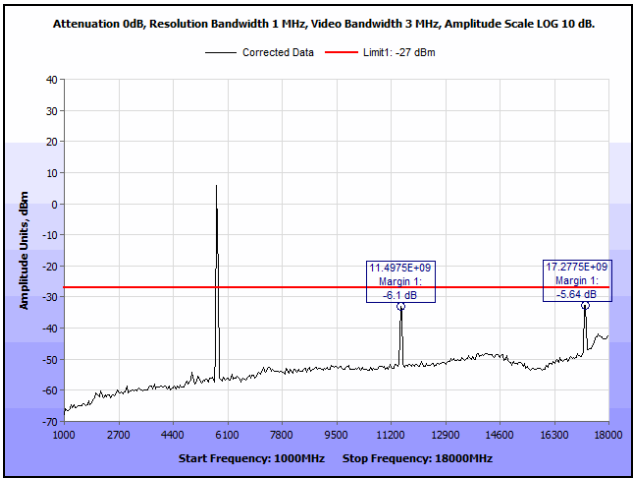
  




**Plot 120. Radiated Spurious Emissions, High Channel, 40 MHz, 30 MHz – 1 GHz, 23 dBi Antenna**



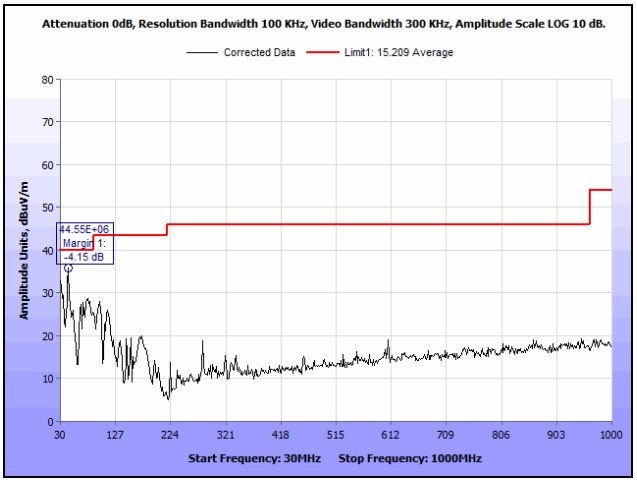

**Plot 121. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 18 GHz, 23 dBi Antenna, Average**



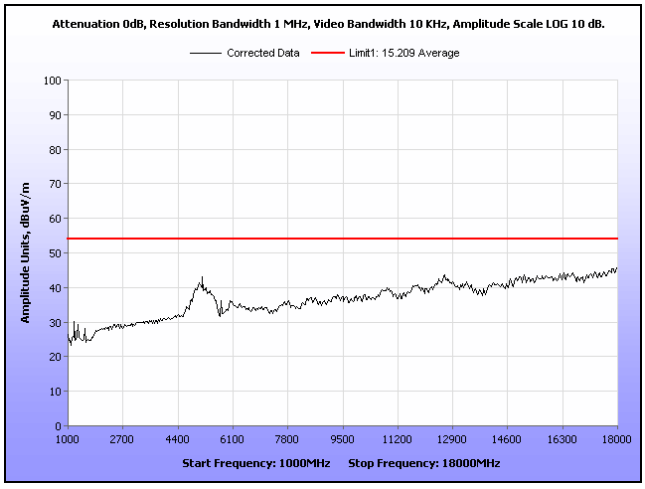

**Plot 122. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 18 GHz, 23 dBi Antenna**

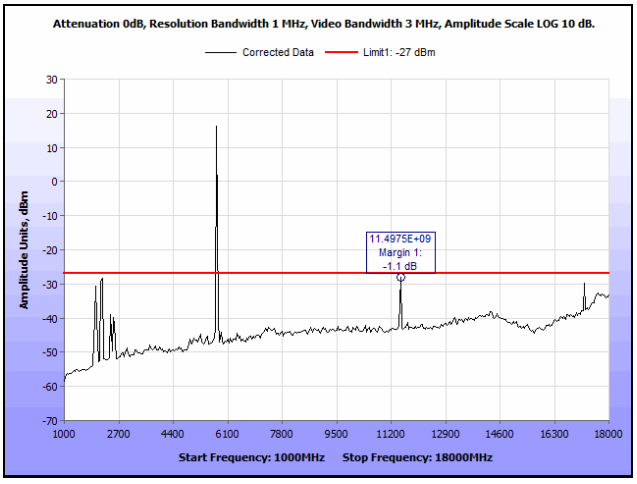
## Radiated Spurious Emissions, 10 MHz, 28 dBi Antenna




**Plot 123. Radiated Spurious Emissions, Low Channel, 10 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**

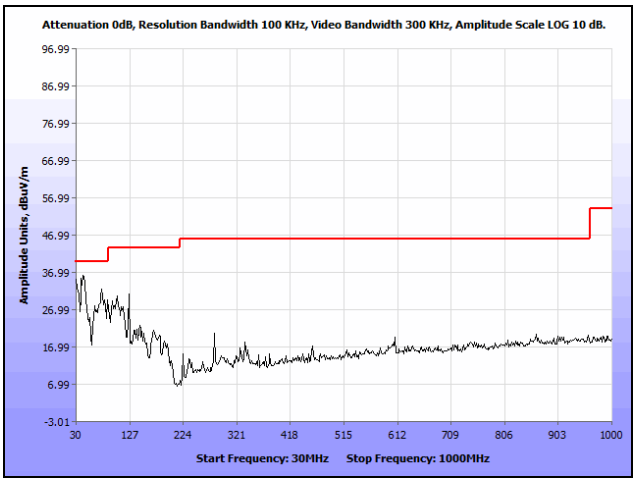



**Plot 124. Radiated Spurious Emissions, Low Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**

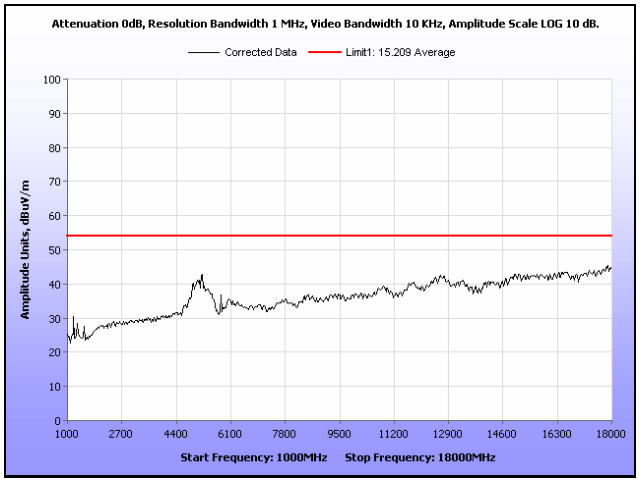



**Plot 125. Radiated Spurious Emissions, Low Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

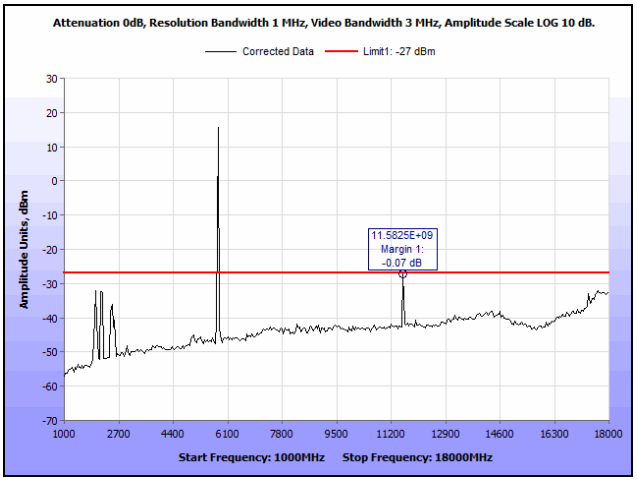
  




**Plot 126. Radiated Spurious Emissions, Mid Channel, 10 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**

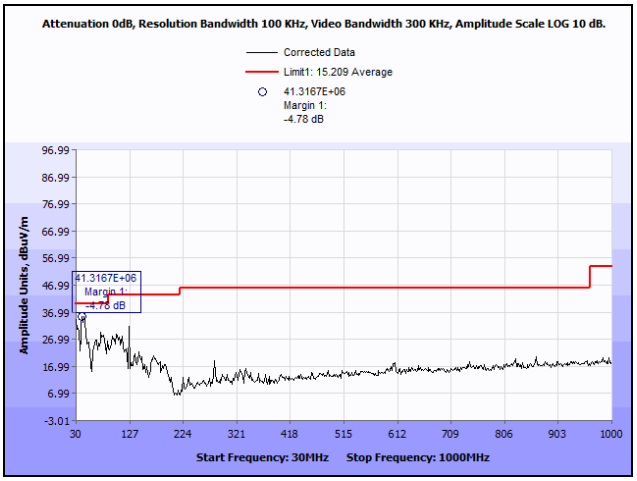



**Plot 127. Radiated Spurious Emissions, Mid Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**

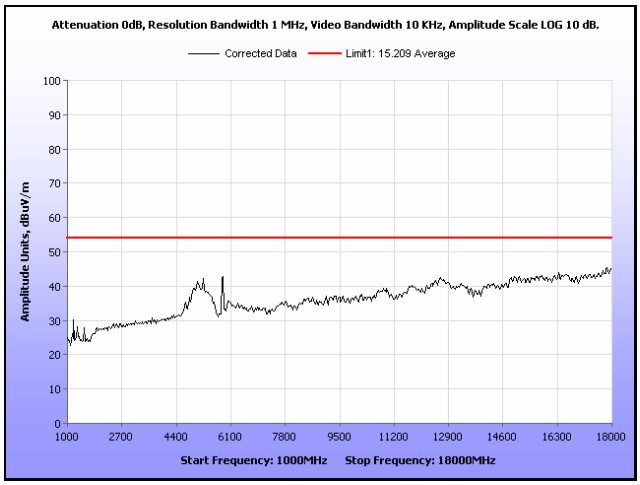



**Plot 128. Radiated Spurious Emissions, Mid Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

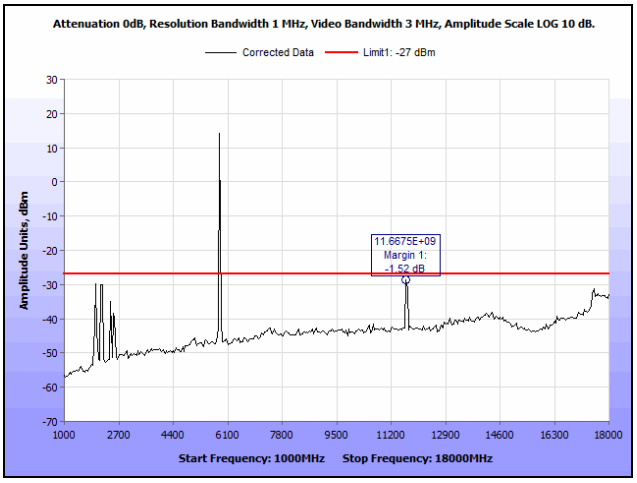
  




**Plot 129. Radiated Spurious Emissions, High Channel, 10 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**



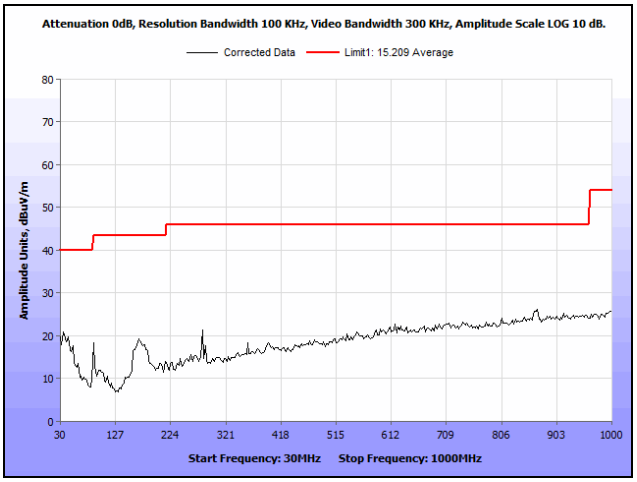

**Plot 130. Radiated Spurious Emissions, High Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**



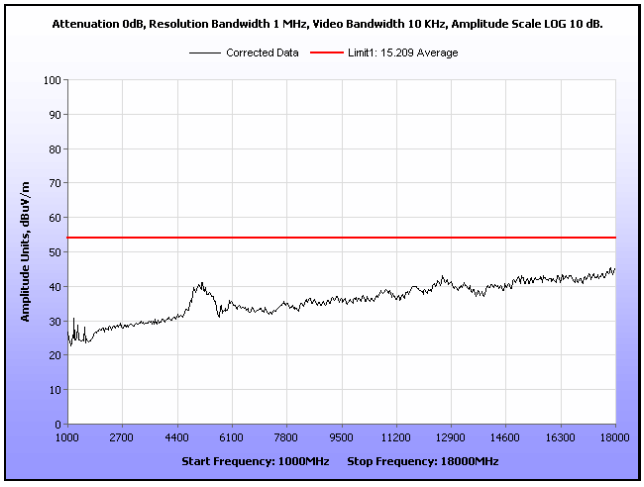

**Plot 131. Radiated Spurious Emissions, High Channel, 10 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

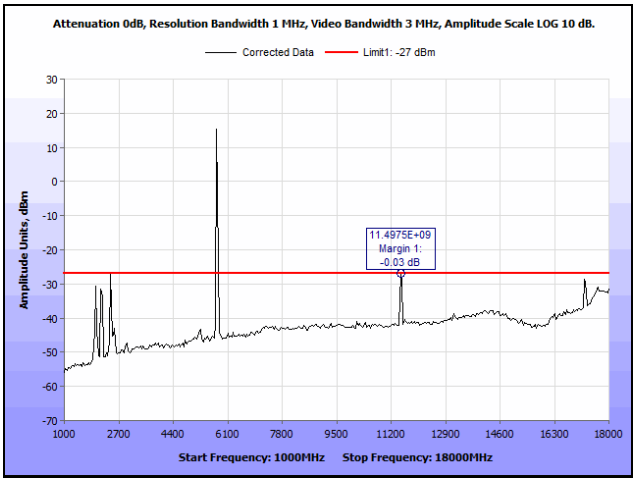
## Radiated Spurious Emissions, 20 MHz, 28 dBi Antenna




**Plot 132. Radiated Spurious Emissions, Low Channel, 20 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**

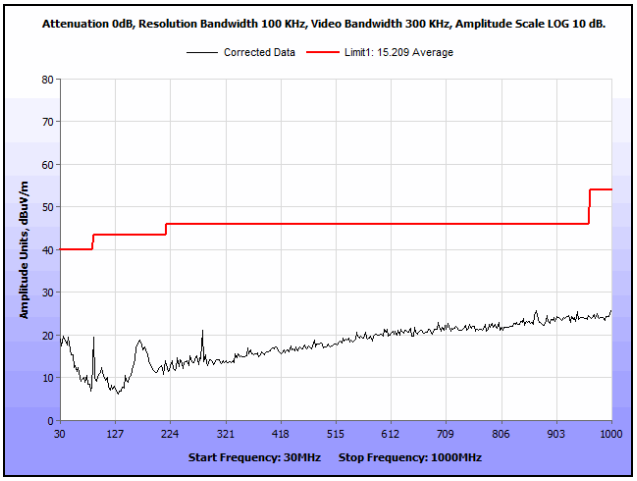



**Plot 133. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**

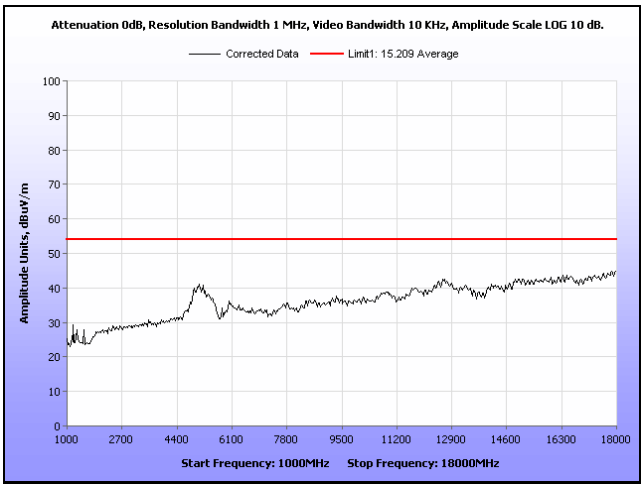



**Plot 134. Radiated Spurious Emissions, Low Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

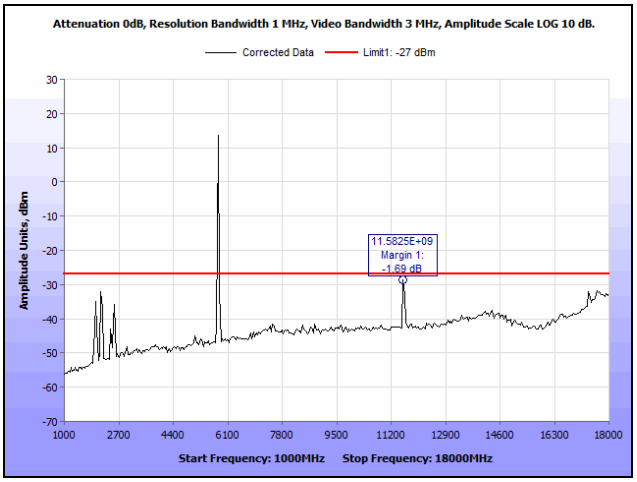
  




**Plot 135. Radiated Spurious Emissions, Mid Channel, 20 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**

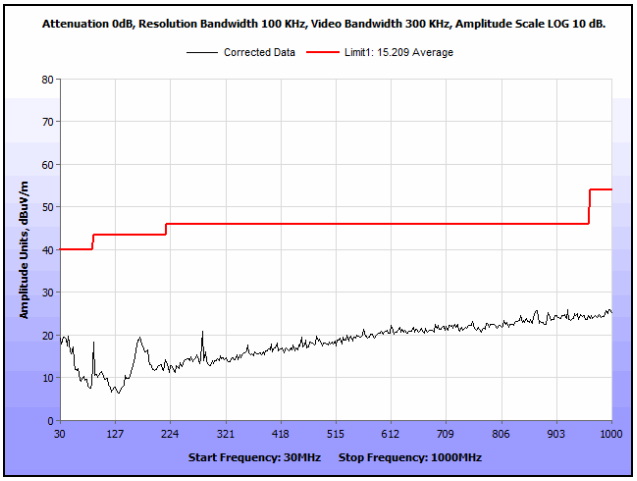



**Plot 136. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**

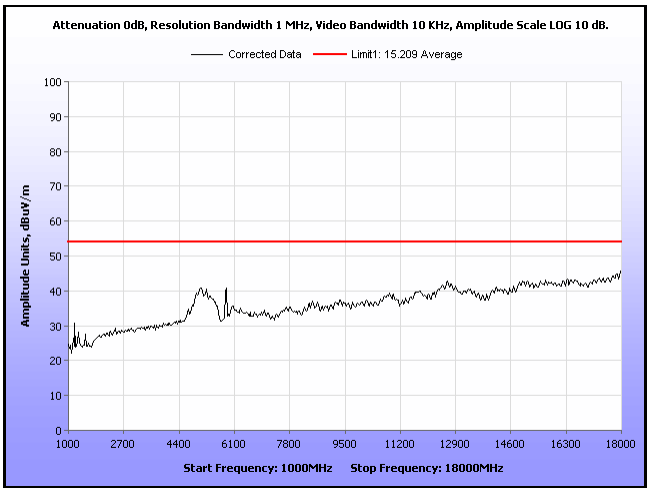



**Plot 137. Radiated Spurious Emissions, Mid Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

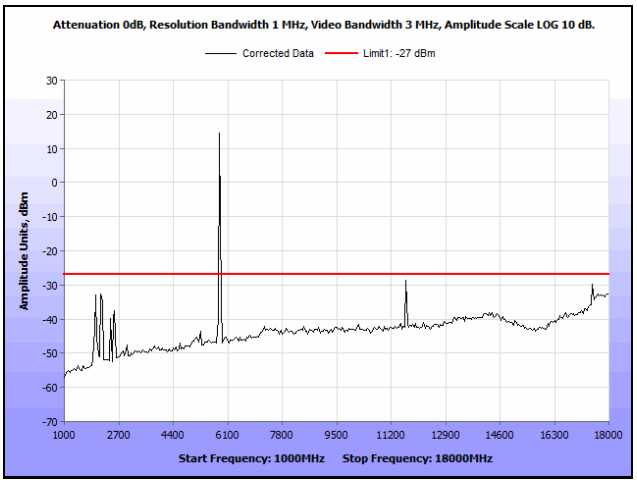
  




**Plot 138. Radiated Spurious Emissions, High Channel, 20 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**



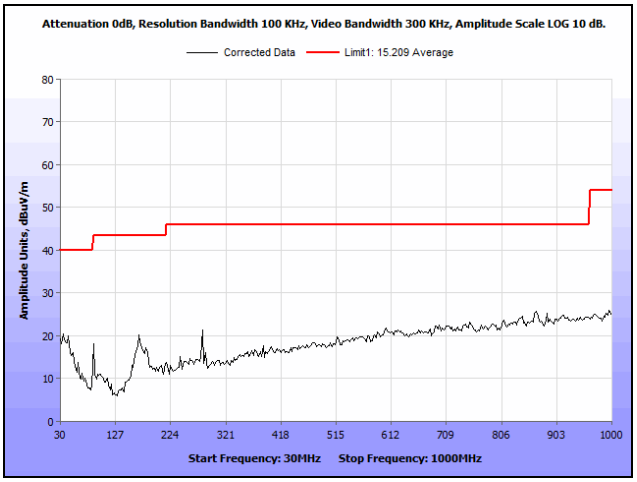

**Plot 139. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**



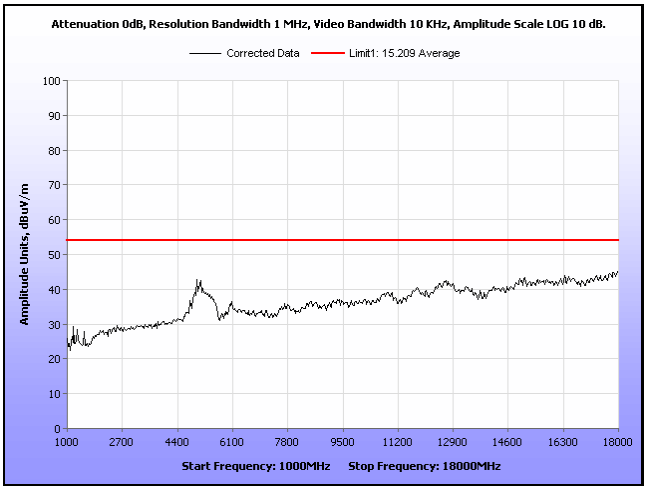

**Plot 140. Radiated Spurious Emissions, High Channel, 20 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

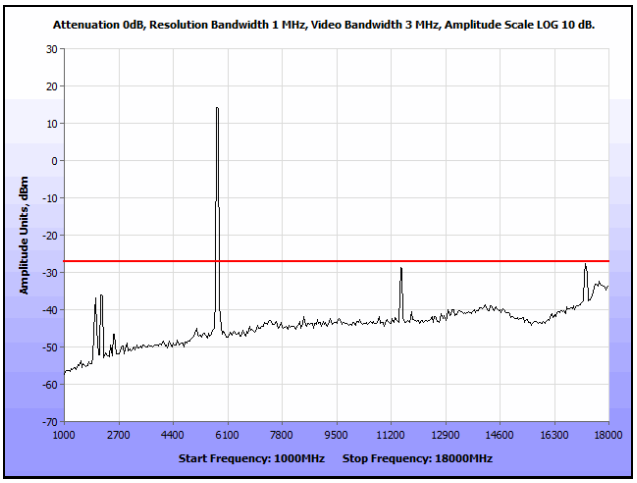
## Radiated Spurious Emissions, 40 MHz, 28 dBi Antenna




**Plot 141. Radiated Spurious Emissions, Low Channel, 40 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**

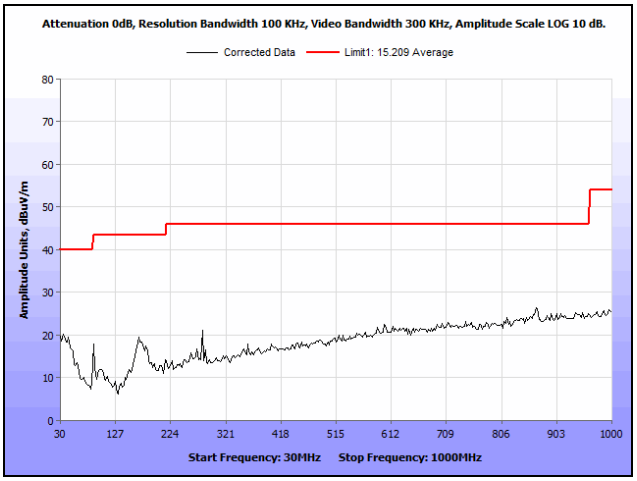



**Plot 142. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**

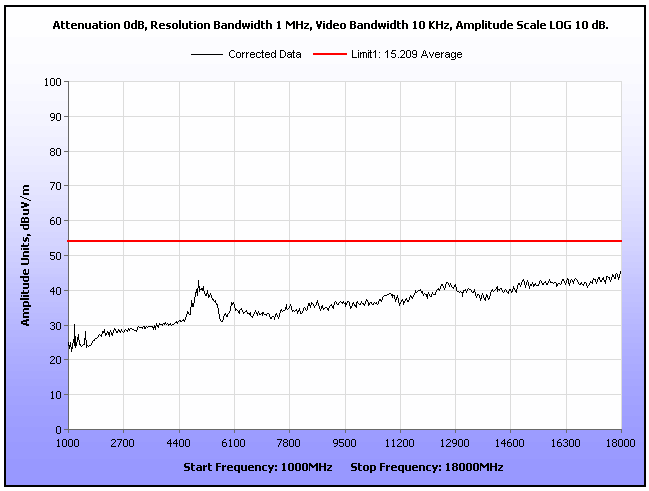



**Plot 143. Radiated Spurious Emissions, Low Channel, 40 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

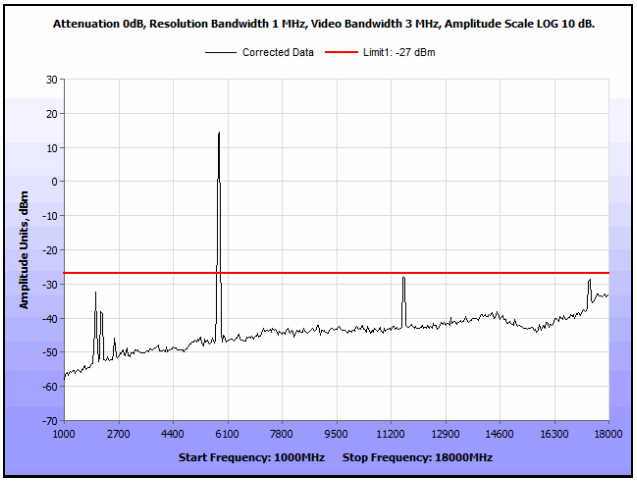
  




**Plot 144. Radiated Spurious Emissions, High Channel, 40 MHz, 30 MHz – 1 GHz, 28 dBi Antenna**



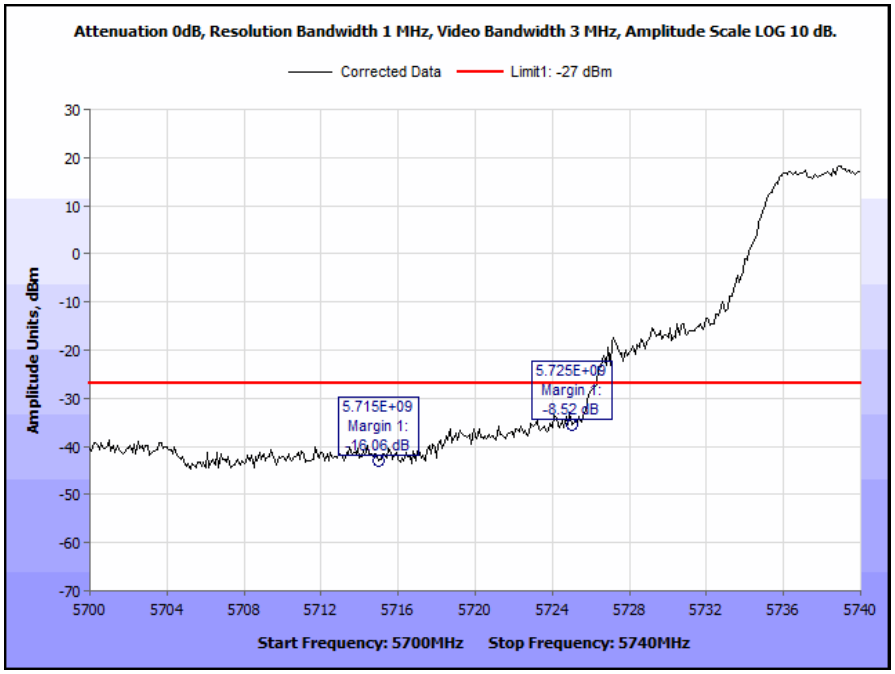

**Plot 145. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 18 GHz, 28 dBi Antenna, Average**



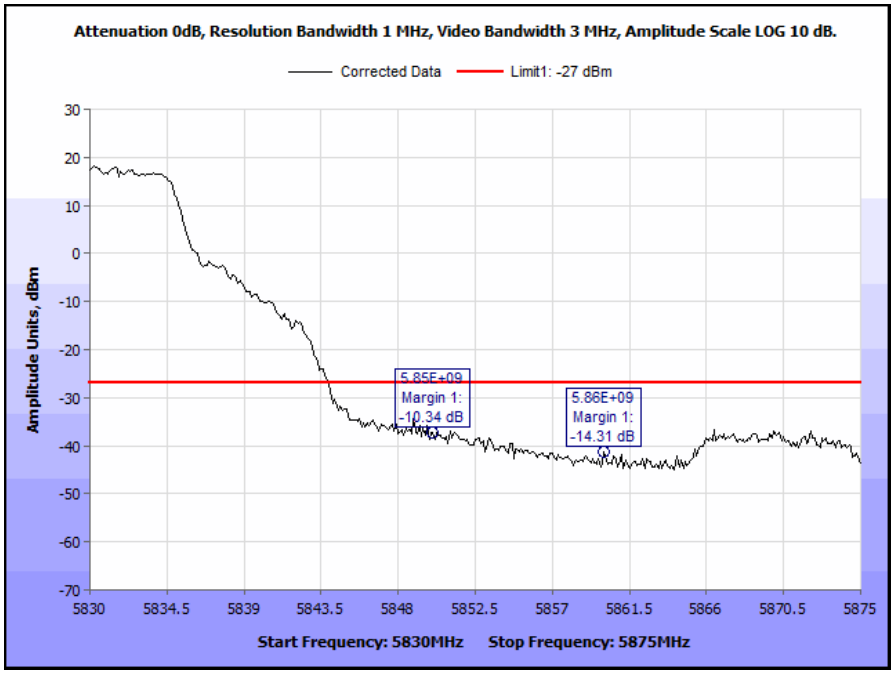

**Plot 146. Radiated Spurious Emissions, High Channel, 40 MHz, 1 GHz – 18 GHz, 28 dBi Antenna**

## Radiated Band Edge, 10 MHz, 23 dBi Antenna

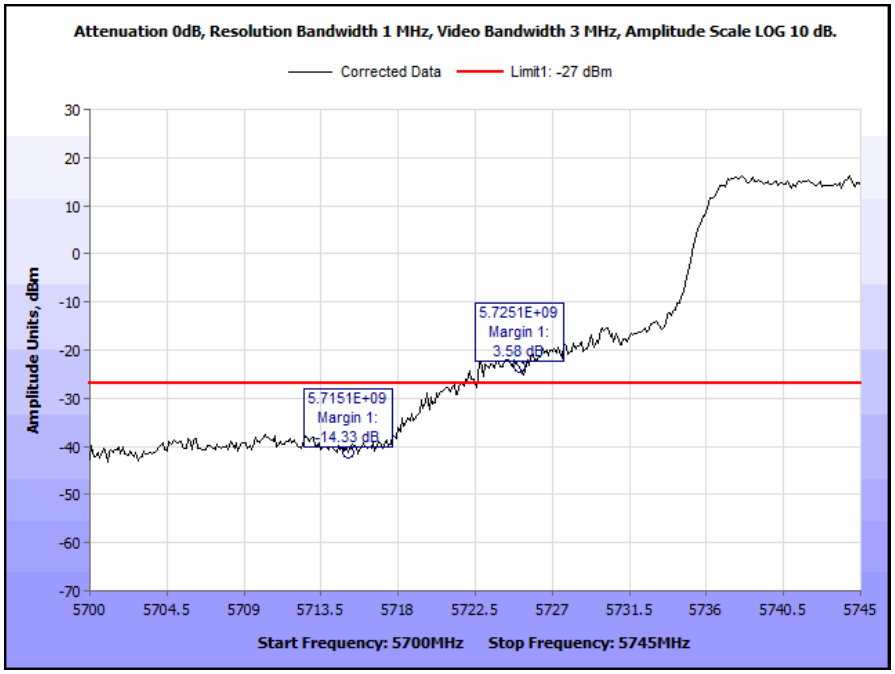



**Plot 147. Radiated Band Edge, Low Channel, 10 MHz, 23 dBi Antenna**

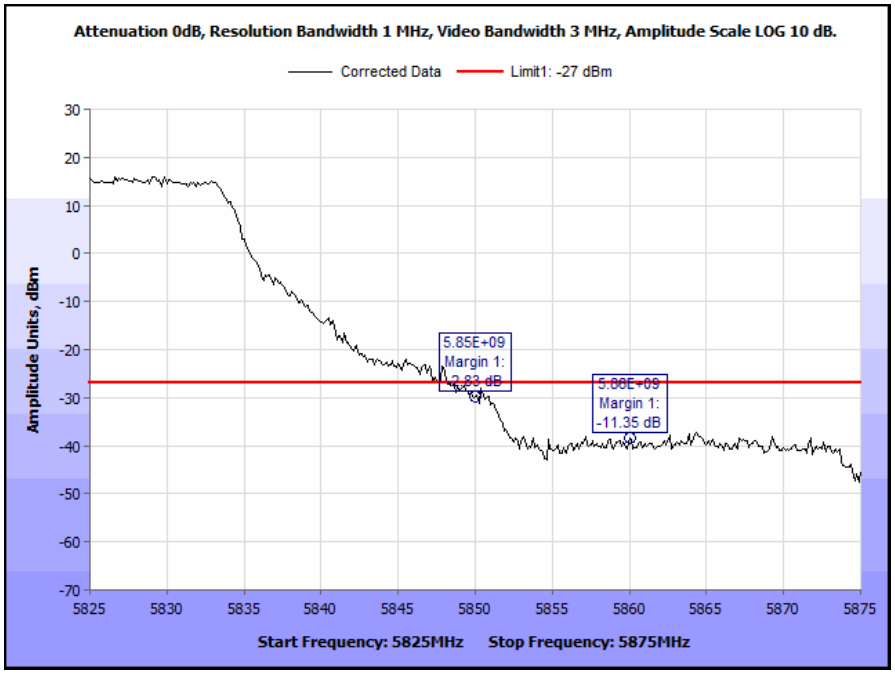



**Plot 148. Radiated Band Edge, High Channel, 10 MHz, 23 dBi Antenna**

## Radiated Band Edge, 20 MHz, 23 dBi Antenna

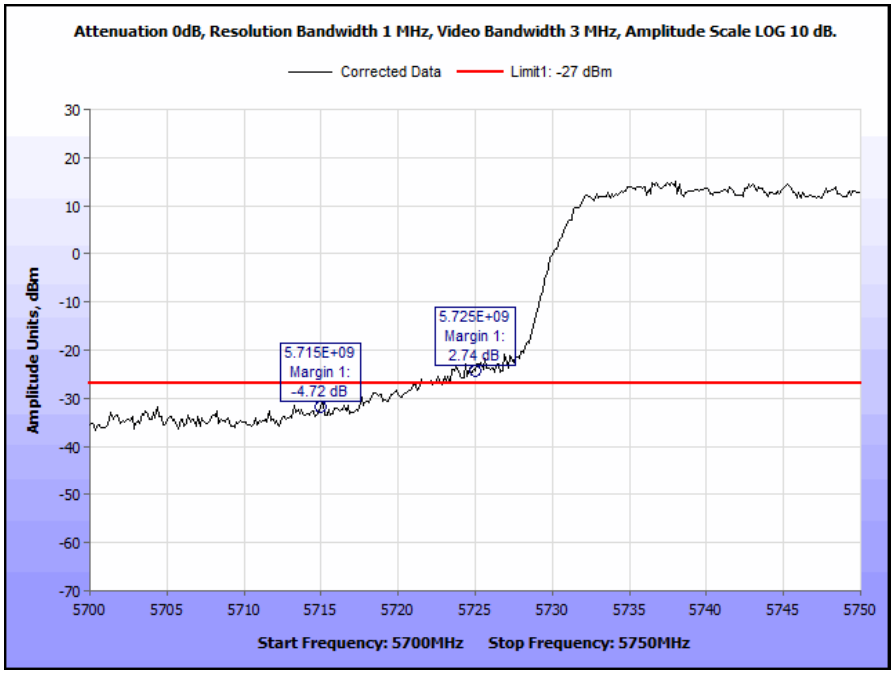



**Plot 149. Radiated Band Edge, Low Channel, 20 MHz, 23 dBi Antenna**

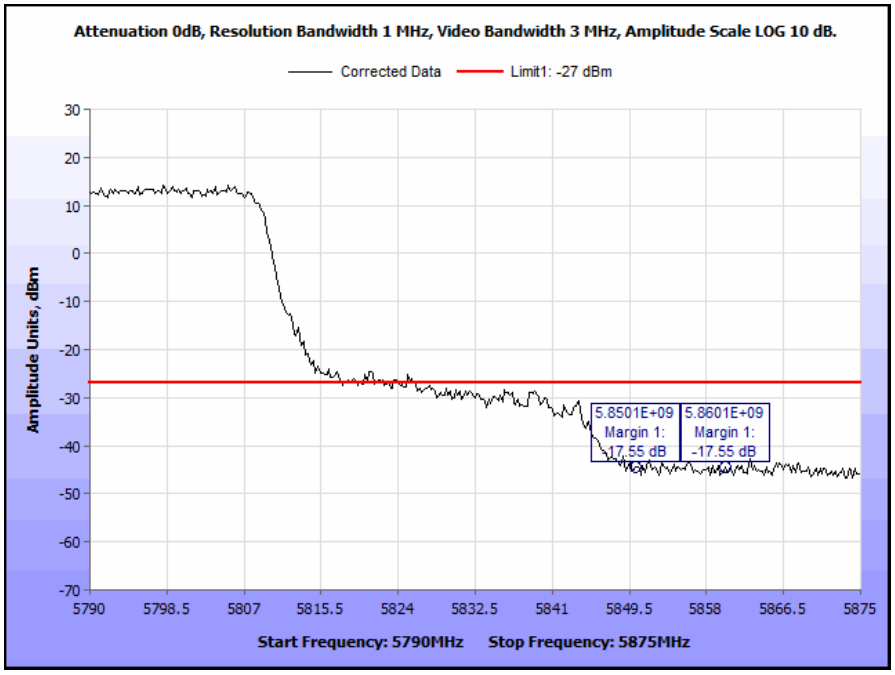



**Plot 150. Radiated Band Edge, High Channel, 20 MHz, 23 dBi Antenna**

## Radiated Band Edge, 40 MHz, 23 dBi Antenna

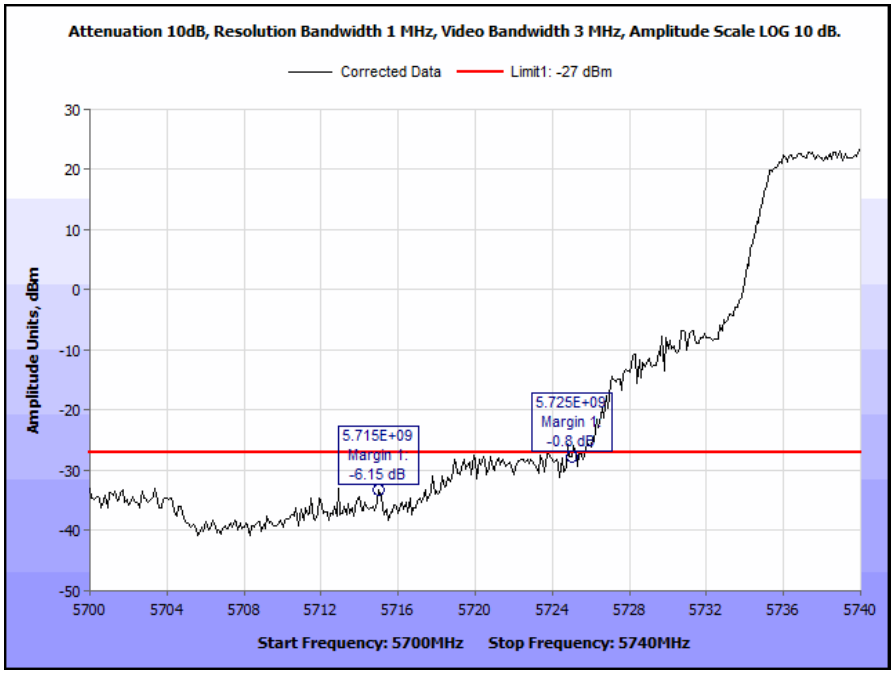



**Plot 151. Radiated Band Edge, Low Channel, 40 MHz, 23 dBi Antenna**

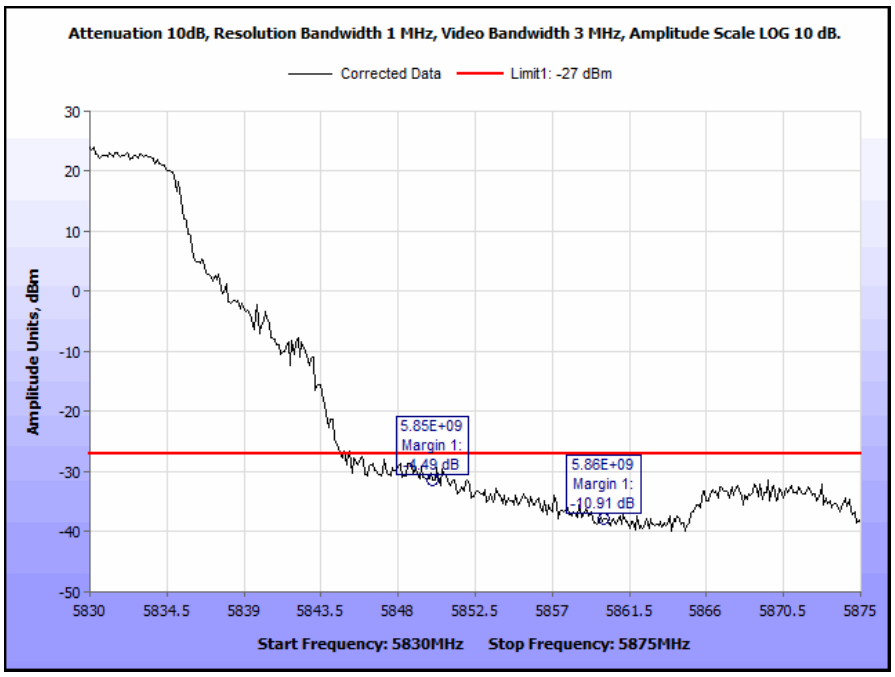



**Plot 152. Radiated Band Edge, High Channel, 40 MHz, 23 dBi Antenna**

## Radiated Band Edge, 10 MHz, 28 dBi Antenna

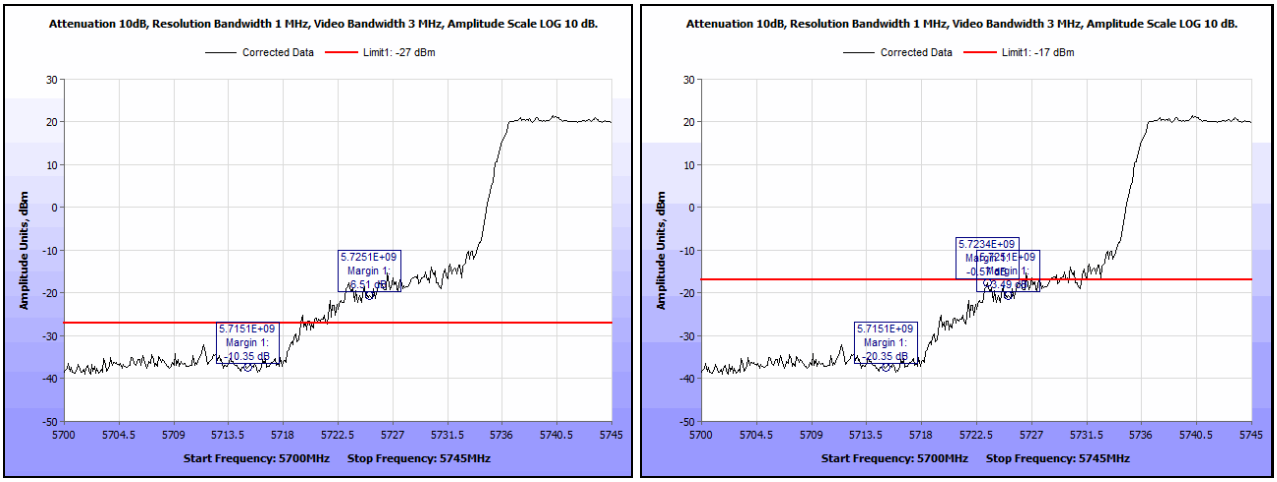



**Plot 153. Radiated Band Edge, Low Channel, 10 MHz, 28 dBi Antenna**

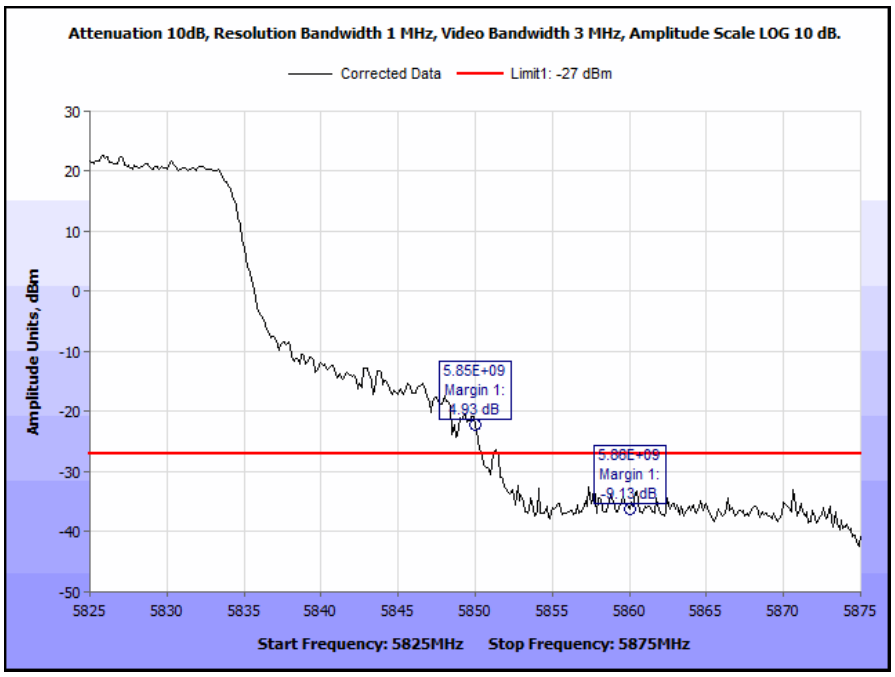



**Plot 154. Radiated Band Edge, High Channel, 10 MHz, 28 dBi Antenna**

## Radiated Band Edge, 20 MHz, 28 dBi Antenna

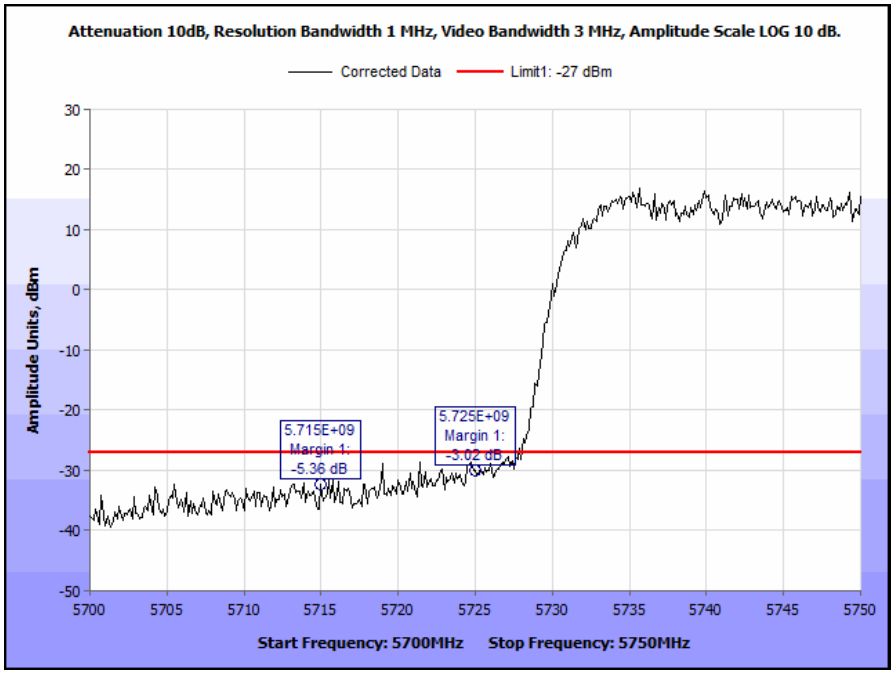



**Plot 155. Radiated Band Edge, Low Channel, 20 MHz, 28 dBi Antenna**

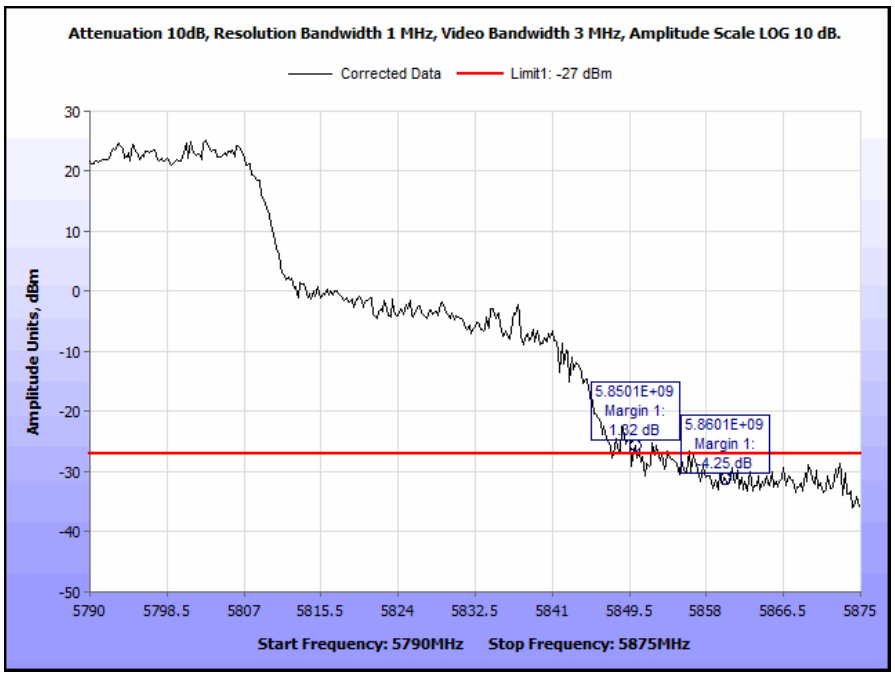



**Plot 156. Radiated Band Edge, High Channel, 20 MHz, 28 dBi Antenna**

## Radiated Band Edge, 40 MHz, 28 dBi Antenna




**Plot 157. Radiated Band Edge, Low Channel, 40 MHz, 28 dBi Antenna**




**Plot 158. Radiated Band Edge, High Channel, 40 MHz, 28 dBi Antenna**

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.407(b)(6) Conducted Emissions

**Test Requirement(s):** **§ 15.407 (b)(6):** Any U-NII devices using an AC power line are required to comply also with the conducted limits set forth in §15.207.

**§ 15.207 (a):** For an intentional radiator 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 30MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 Σ 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 frequency ranges.

| Frequency range (MHz) | § 15.207(a), Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi-Peak | Average |
| * 0.15- 0.45 | 66 – 56 | 56 - 46 |
| 0.45 - 0.5 | 56 | 46 |
| 0.5 - 30 | 60 | 50 |

**Table 12. Conducted Limits for Intentional Radiators from FCC Part 15 § 15.207(a)**

**Test Procedure:** The EUT was placed on a non-metallic table inside a screen room. The EUT was situated such that the back of the EUT was 0.4 m from one wall of the vertical ground plane, and the remaining sides of the EUT were no closer than 0.8 m from any other conductive surface. The EUT was powered from a 50 Ω/50 μH Line Impedance Stabilization Network (LISN). The EMC receiver scanned the frequency range from 150 kHz to 30 MHz. Conducted Emissions measurements were made in accordance with *ANSI C63.4-2014 "Methods and Measurements of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40 GHz"*. Scans were performed with the transmitter on.

**Test Results:** The EUT was compliant with requirements of this section.

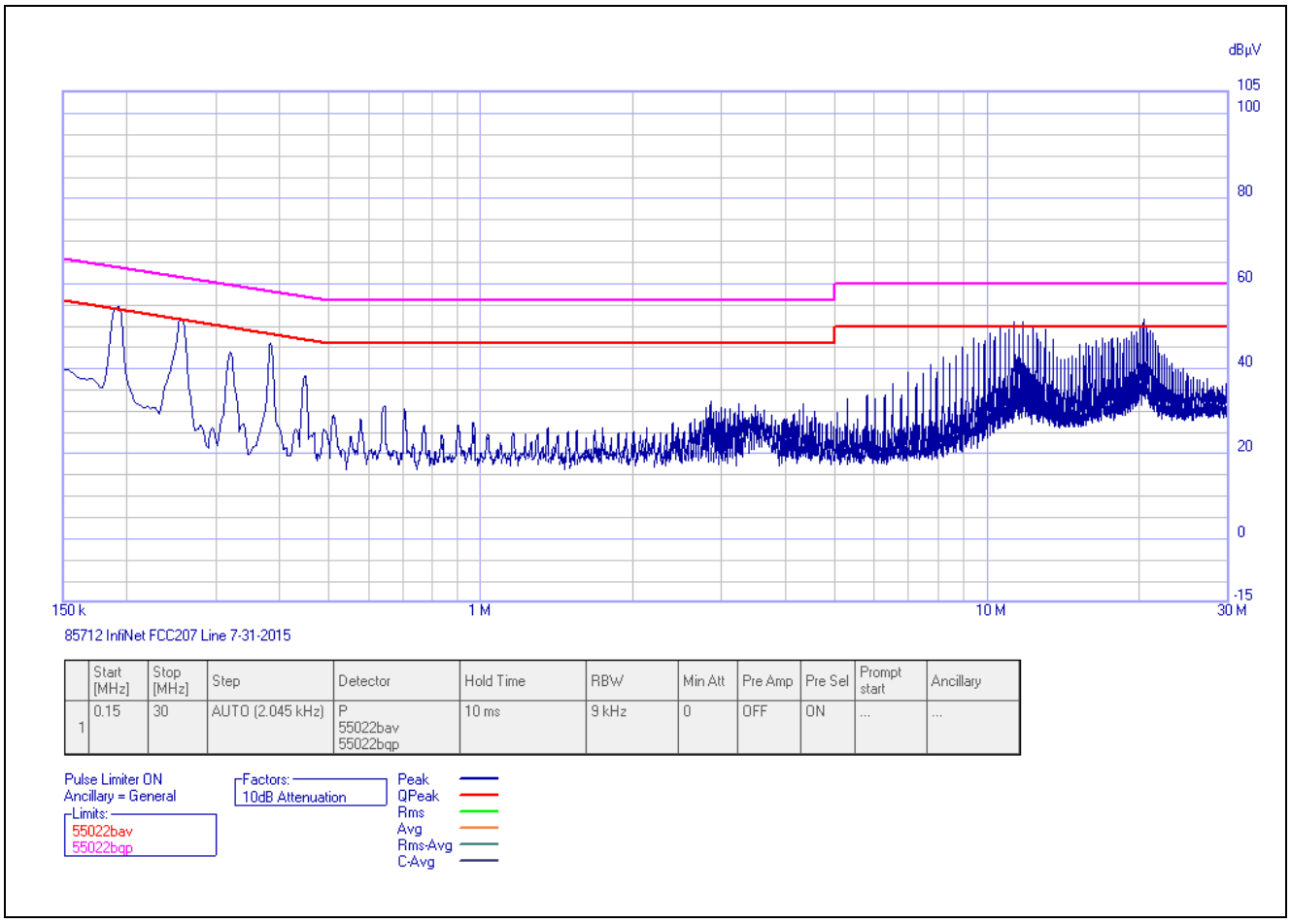
**Test Engineer(s):** Poona Saber

**Test Date(s):** 07/31/15

| Line | Freq. (MHz) | QP Amplitude | QP Limit | Delta | Pass | Average Amplitude | Average Limit | Delta | Pass |
|---|---|---|---|---|---|---|---|---|---|
| FCC 207 Line | 0.192945 | 54.26 | 63.915 | -9.655 | Pass | 51.43 | 53.915 | -2.485 | Pass |
| FCC 207 Line | 0.254295 | 52.76 | 61.628 | -8.868 | Pass | 43.33 | 51.628 | -8.298 | Pass |
| FCC 207 Line | 11.28094 | 49.03 | 60 | -10.97 | Pass | 47.01 | 50 | -2.99 | Pass |
| FCC 207 Line | 11.28094 | 46.9 | 60 | -13.1 | Pass | 46.88 | 50 | -3.12 | Pass |
| FCC 207 Line | 20.40573 | 50.17 | 60 | -9.83 | Pass | 46.26 | 50 | -3.74 | Pass |
| FCC 207 Line | 20.40573 | 50.21 | 60 | -9.79 | Pass | 46.18 | 50 | -3.82 | Pass |

**Table 13. Conducted Emissions, Phase Line**

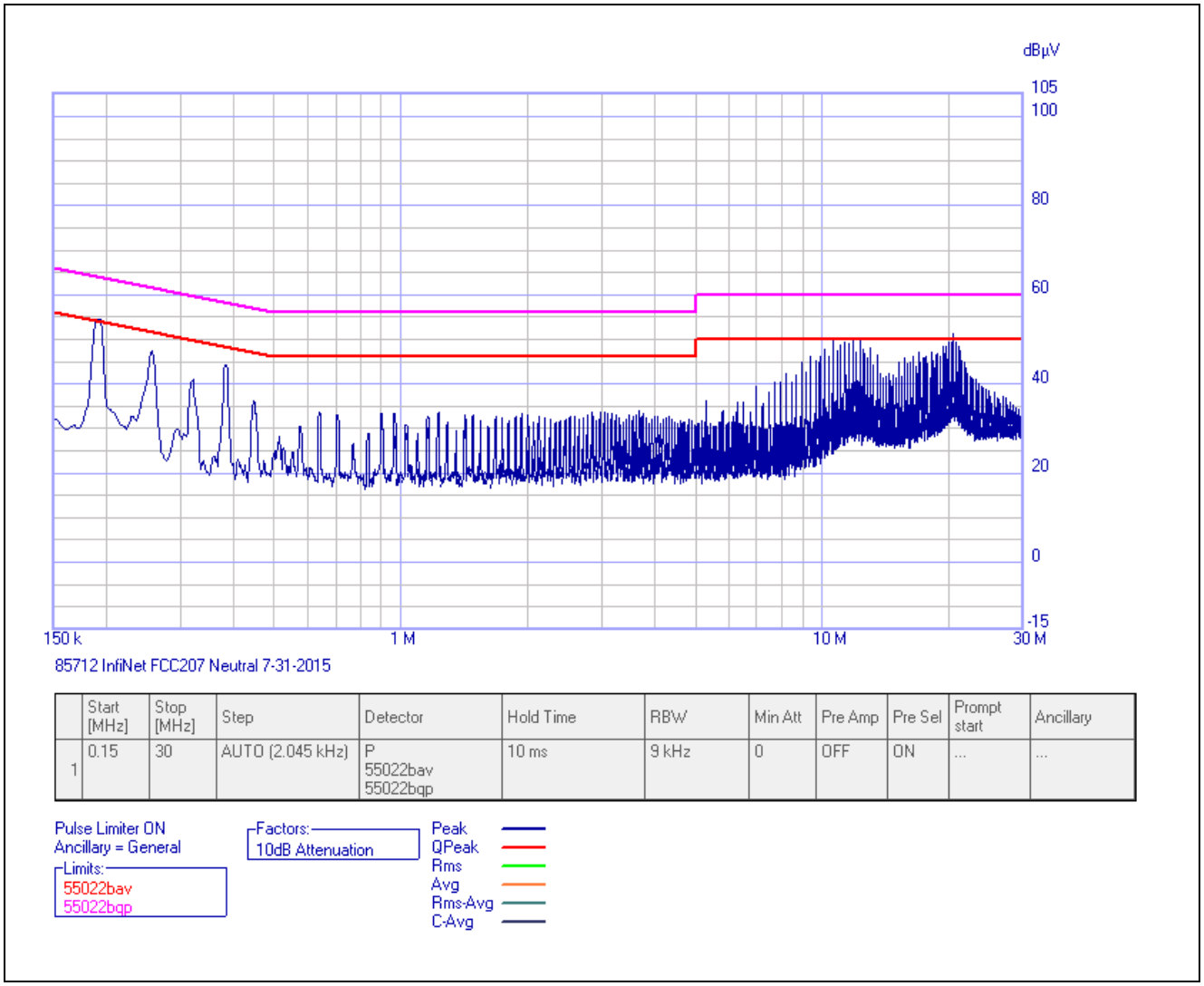



**Plot 159. Conducted Emissions, Phase Line**

| Line | Freq. (MHz) | QP Amplitude | QP Limit | Delta | Pass | Average Amplitude | Average Limit | Delta | Pass |
|---|---|---|---|---|---|---|---|---|---|
| FCC 207 Neutral | 0.1909 | 53.91 | 64.003 | -10.093 | Pass | 51.4 | 54.003 | -2.603 | Pass |
| FCC 207 Neutral | 10.5611 | 48.3 | 60 | -11.7 | Pass | 46.46 | 50 | -3.54 | Pass |
| FCC 207 Neutral | 11.76151 | 49.03 | 60 | -10.97 | Pass | 46.65 | 50 | -3.35 | Pass |
| FCC 207 Neutral | 12.24004 | 47.34 | 60 | -12.66 | Pass | 43.97 | 50 | -6.03 | Pass |
| FCC 207 Neutral | 20.40573 | 49.61 | 60 | -10.39 | Pass | 45.93 | 50 | -4.07 | Pass |
| FCC 207 Neutral | 20.64704 | 47.49 | 60 | -12.51 | Pass | 44.8 | 50 | -5.2 | Pass |

**Table 14. Conducted Emissions, Neutral Line**




**Plot 160. Conducted Emissions, Neutral Line**

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15. 407(e) 6 dB Bandwidth

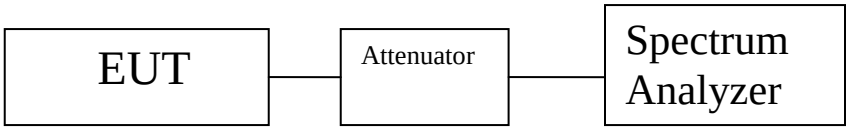
**Test Requirements:** **§ 15.407(e):** Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

**Test Procedure:** The transmitter was set to low, mid, and high operating frequencies at the highest output power and connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using a RBW approximately equal to 1% of the total emission bandwidth, VBW > RBW. The 6 dB Bandwidth was measured and recorded.

**Test Results** The 6 dB Bandwidth was compliant with the requirements of this section.

**Test Engineer(s):** Poona Saber

**Test Date(s):** 08/18/15



| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Bandwidth Power Port 1 (MHz) | Measured Bandwidth Power Port 2 (MHz) |
|---|---|---|---|---|
| low | 10 | 5740 | 12.77 | 9.43 |
| Mid | 10 | 5780 | 8.99 | 9.30 |
| High | 10 | 5830 | 9.09 | 9.32 |
| Low | 20 | 5745 | 17.20 | 17.23 |
| Mid | 20 | 5785 | 17.37 | 17.59 |
| High | 20 | 5825 | 17.18 | 17.24 |
| Low | 40 | 5755 | 36.83 | 36.57 |
| High | 40 | 5795 | 36.96 | 36.80 |

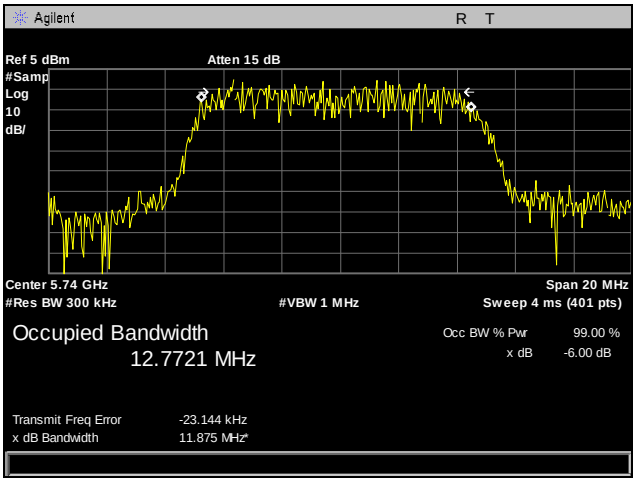
**Table 15. 6dB bandwidth, Test Results, 23 dBi antenna**

| Channel | Bandwidth (MHz) | Frequency (MHz) | Measured Bandwidth Power Port 1 (MHz) | Measured Bandwidth Power Port 2 (MHz) |
|---|---|---|---|---|
| low | 10 | 5740 | 9.13 | 9.42 |
| Mid | 10 | 5780 | 9.05 | 9.26 |
| High | 10 | 5830 | 9.01 | 9.05 |
| Low | 20 | 5745 | 17.28 | 17.84 |
| Mid | 20 | 5785 | 17.13 | 17.57 |
| High | 20 | 5825 | 20.29 | 17.44 |
| Low | 40 | 5755 | 38.23 | 36.63 |
| High | 40 | 5795 | 36.73 | 36.95 |

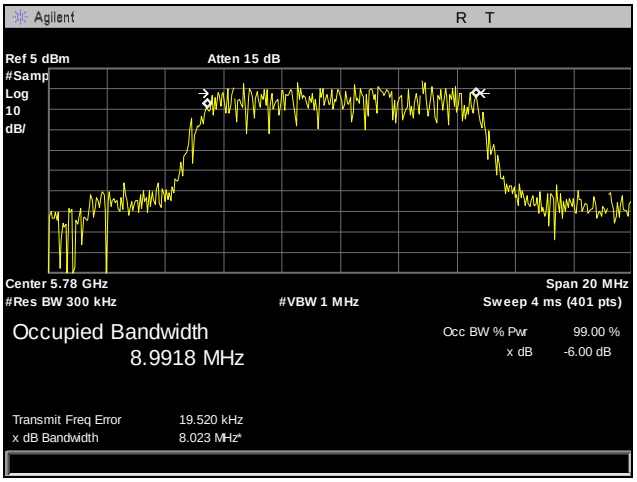
**Table 16. 6dB bandwidth, Test Results, 28 dBi antenna**

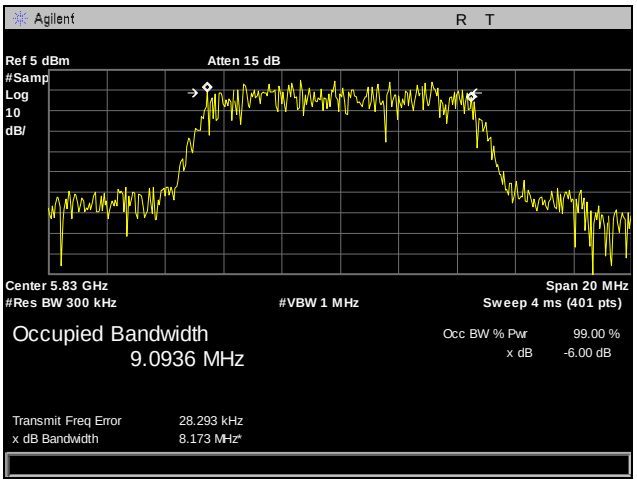
## 6 dB Occupied Bandwidth, 10 MHz, Port 1, 23 dBi antenna




**Plot 161. 6 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 1**



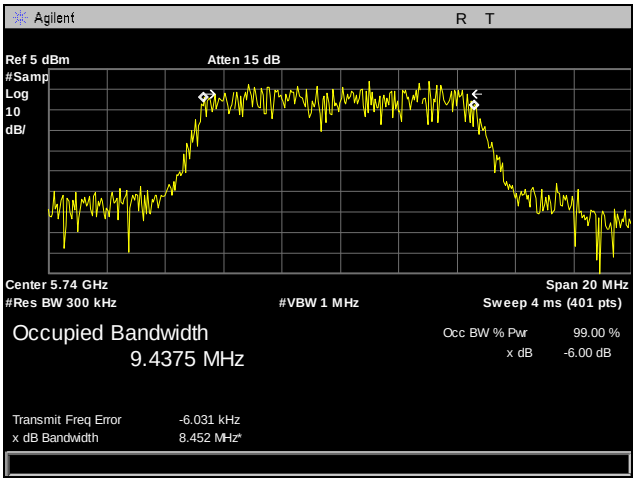

**Plot 162. 6 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 1**



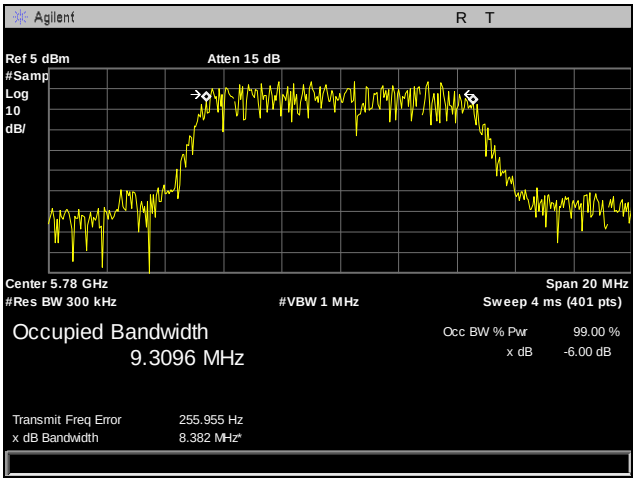

**Plot 163. 6 dB Occupied Bandwidth, High Channel, 10 MHz, Port 1**

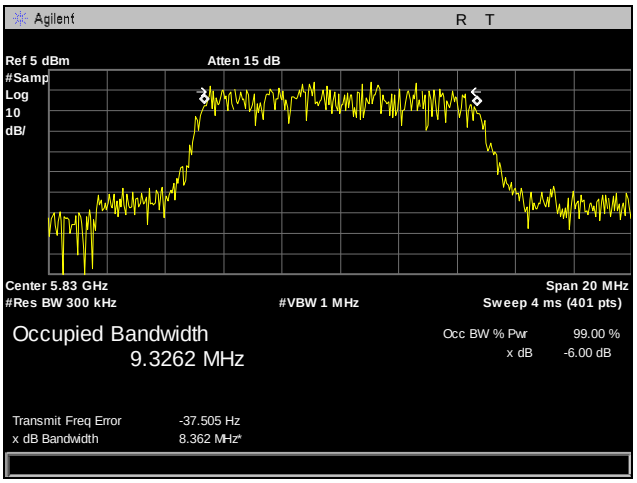
## 6 dB Occupied Bandwidth, 10 MHz, Port 2, 23 dBi antenna




**Plot 164. 6 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 2**



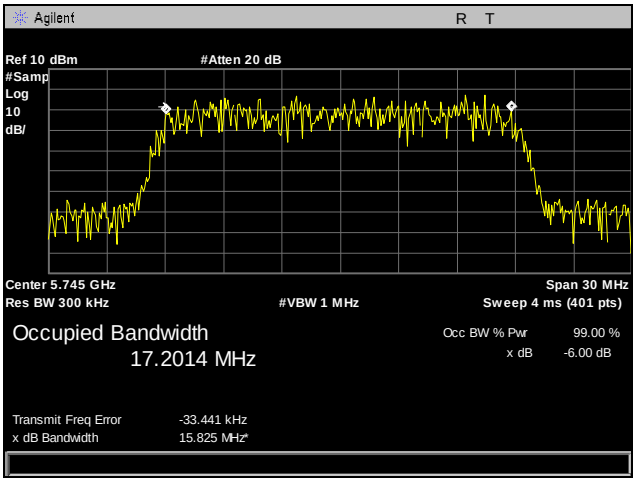

**Plot 165. 6 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 2**



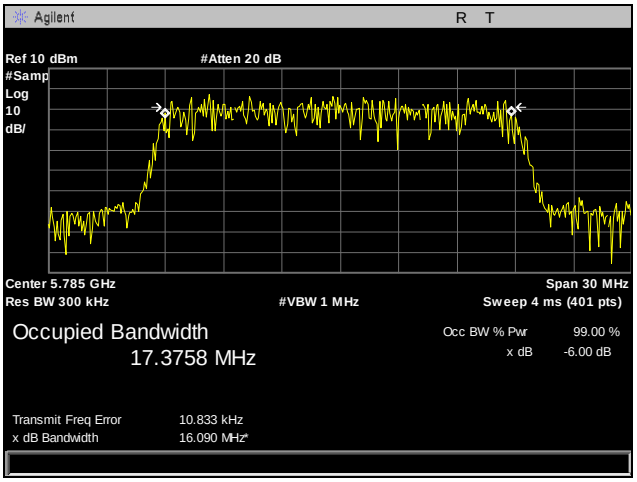

**Plot 166. 6 dB Occupied Bandwidth, High Channel, 10 MHz, Port 2**

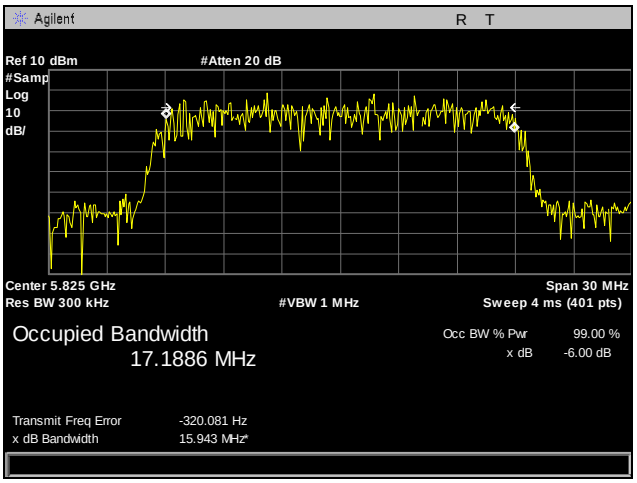
## 6 dB Occupied Bandwidth, 20 MHz, Port 1, 23 dBi antenna




**Plot 167. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 1**



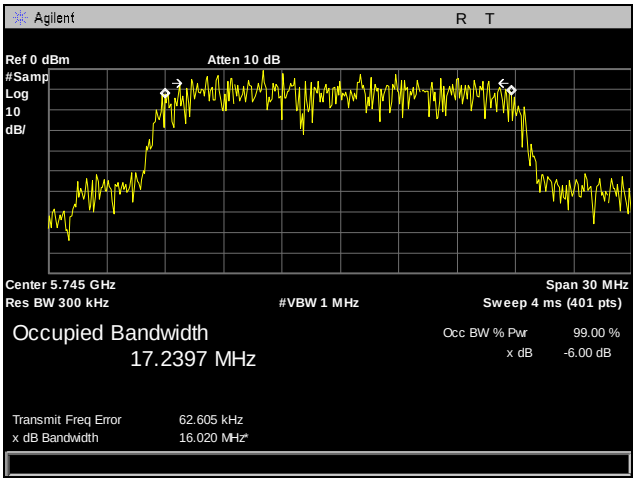

**Plot 168. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 1**



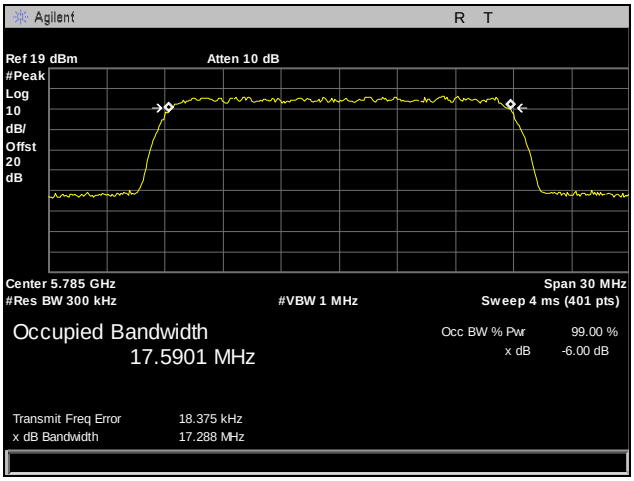

**Plot 169. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 1**

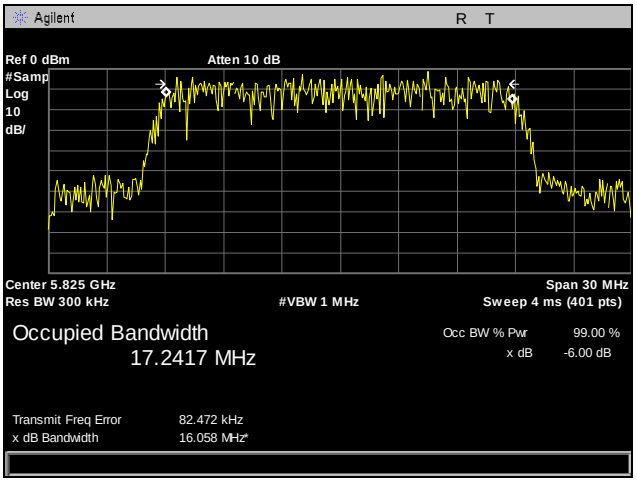
## 6 dB Occupied Bandwidth, 20 MHz, Port 2, 23 dBi antenna




**Plot 170. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 2**



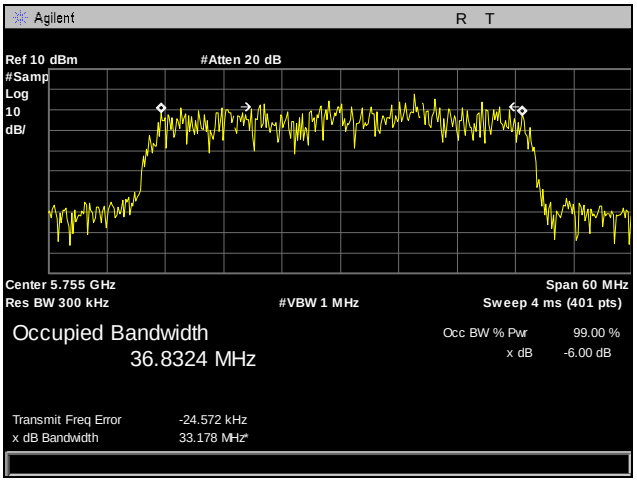

**Plot 171. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 2**



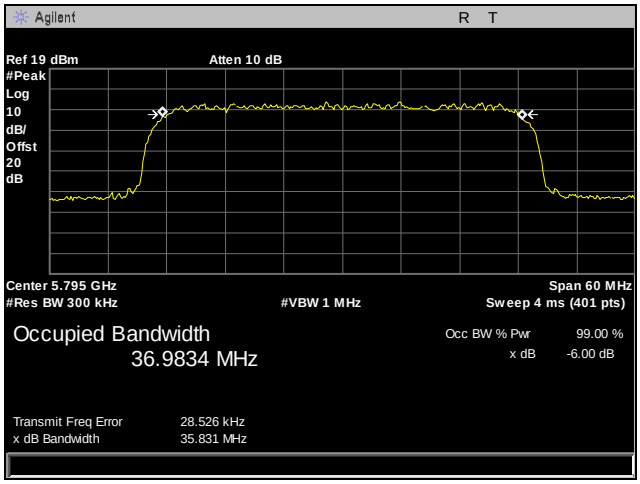

**Plot 172. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 2**

## 6 dB Occupied Bandwidth, 40 MHz, Port 1, 23 dBi antenna



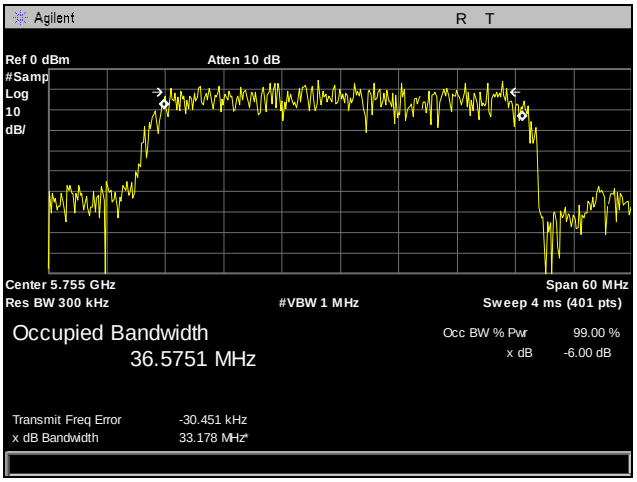

**Plot 173. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 1**



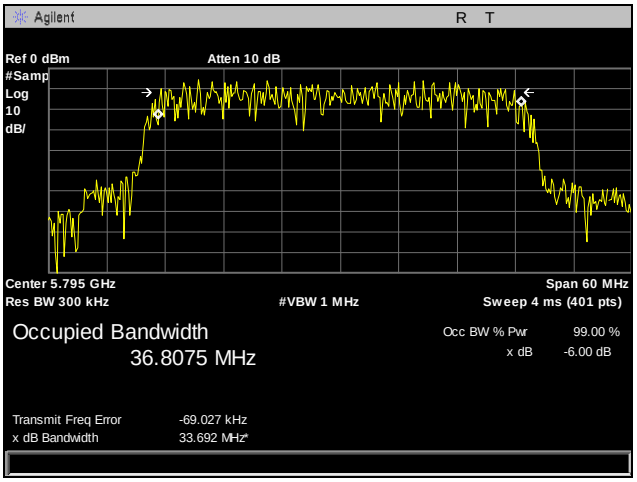

**Plot 174. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 1**

## 6 dB Occupied Bandwidth, 40 MHz, Port 2, 23 dBi antenna



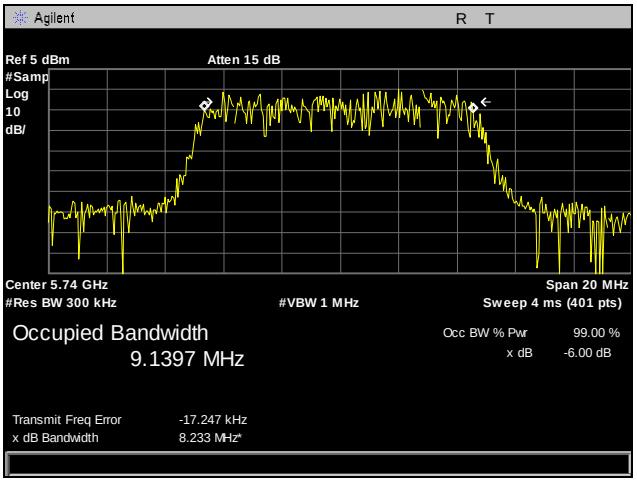

**Plot 175. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 2**



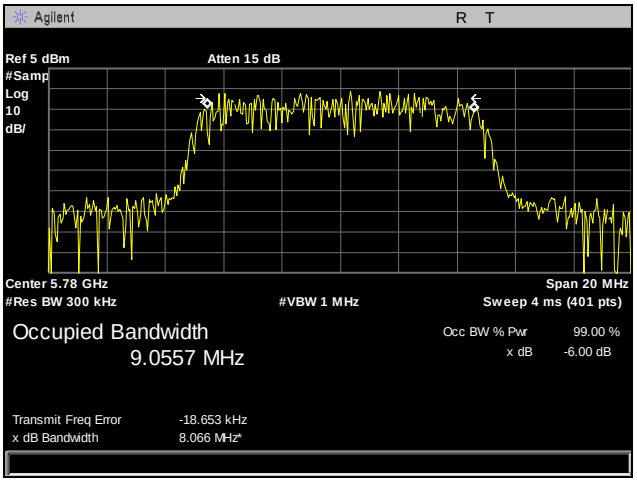

**Plot 176. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 2**

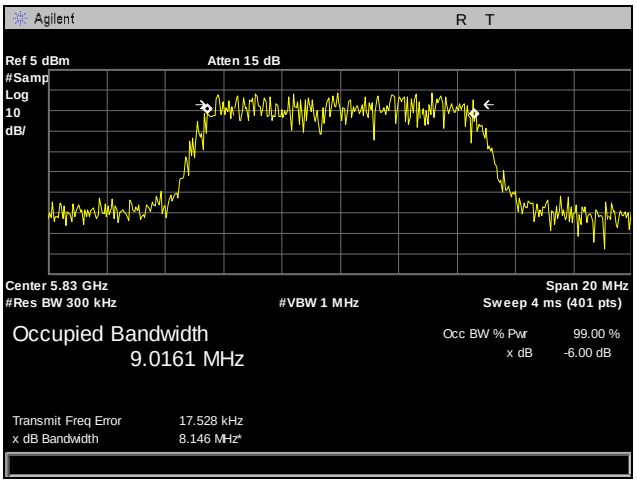
## 6 dB Occupied Bandwidth, 10 MHz, Port 1, 28 dBi antenna




**Plot 177. 6 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 1**



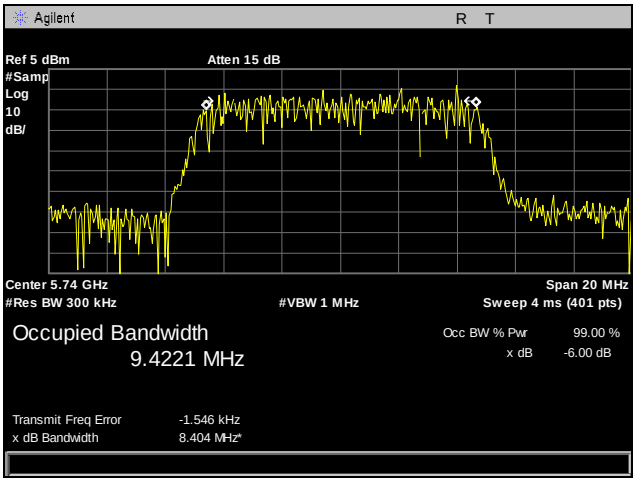

**Plot 178. 6 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 1**



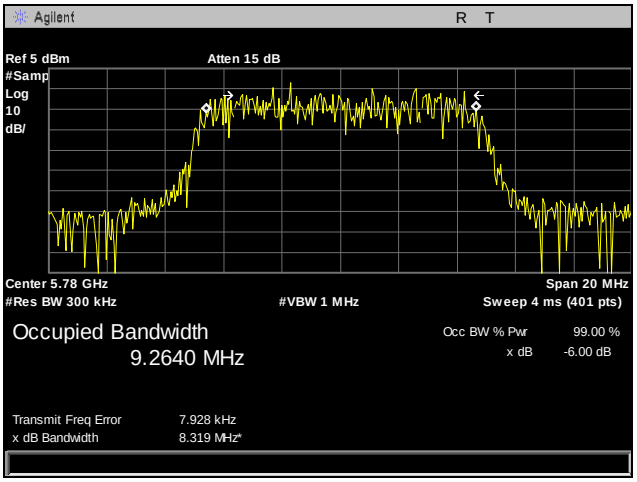

**Plot 179. 6 dB Occupied Bandwidth, High Channel, 10 MHz, Port 1**

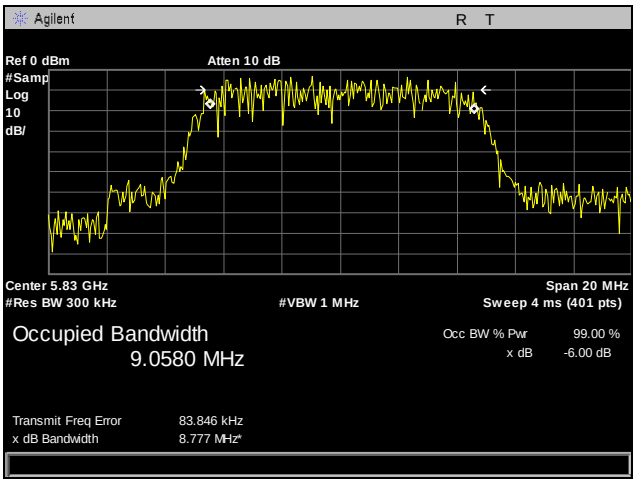
## 6 dB Occupied Bandwidth, 10 MHz, Port 2, 28 dBi antenna




**Plot 180. 6 dB Occupied Bandwidth, Low Channel, 10 MHz, Port 2**



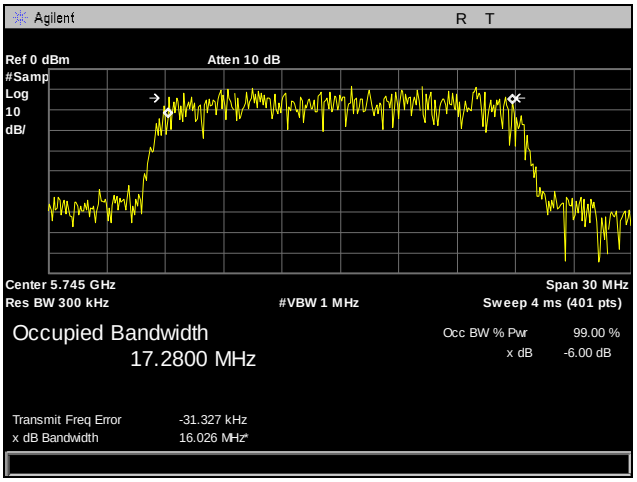

**Plot 181. 6 dB Occupied Bandwidth, Mid Channel, 10 MHz, Port 2**



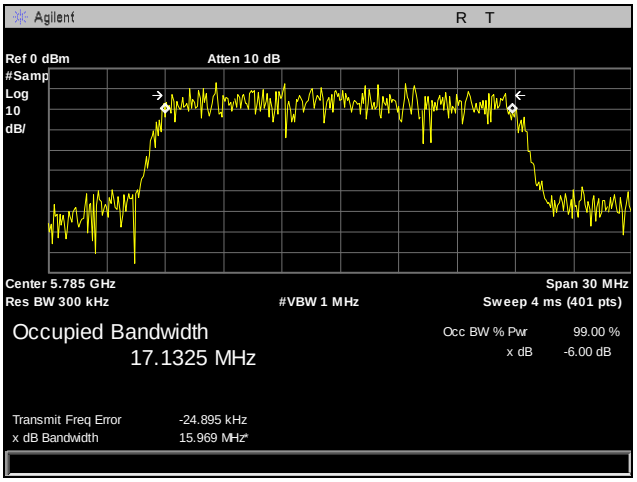

**Plot 182. 6 dB Occupied Bandwidth, High Channel, 10 MHz, Port 2**

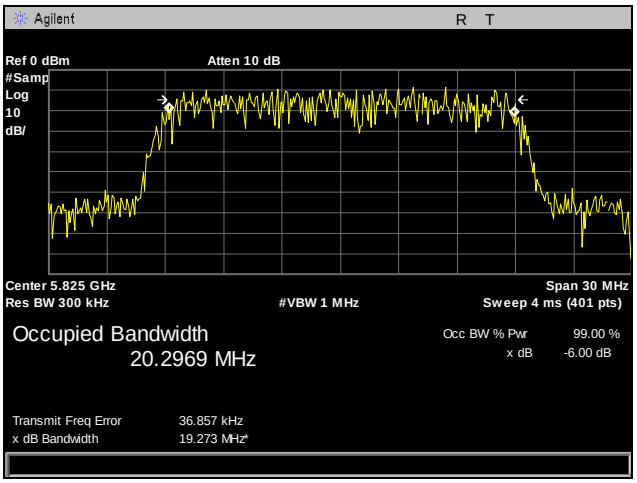
## 6 dB Occupied Bandwidth, 20 MHz, Port 1, 28 dBi antenna




**Plot 183. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 1**



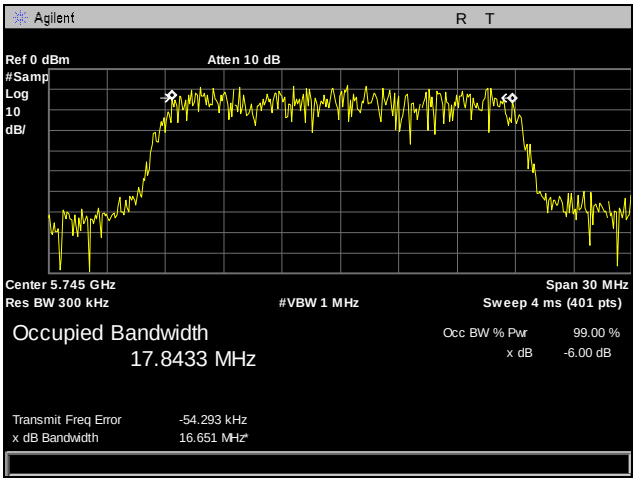

**Plot 184. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 1**



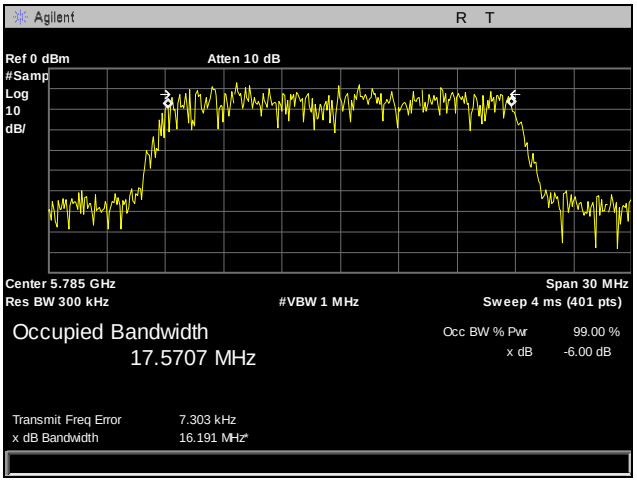

**Plot 185. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 1**

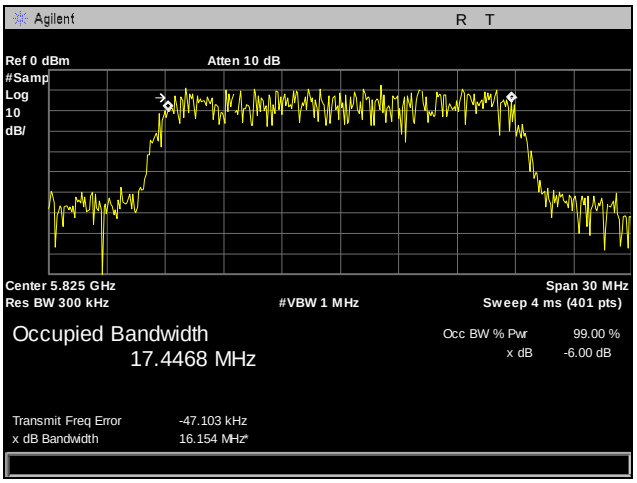
## 6 dB Occupied Bandwidth, 20 MHz, Port 2, 28 dBi antenna




**Plot 186. 6 dB Occupied Bandwidth, Low Channel, 20 MHz, Port 2**



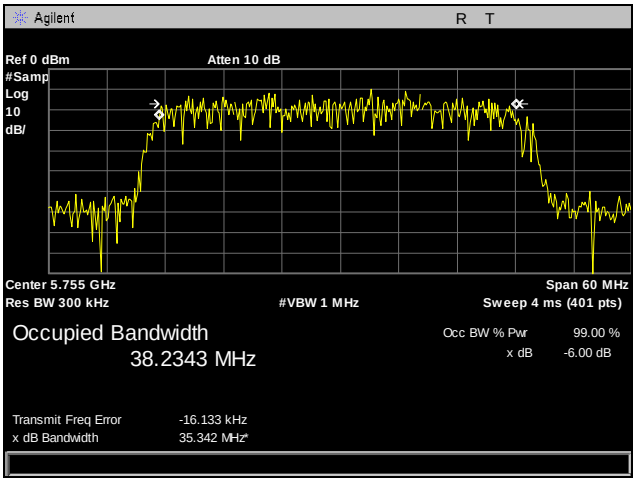

**Plot 187. 6 dB Occupied Bandwidth, Mid Channel, 20 MHz, Port 2**



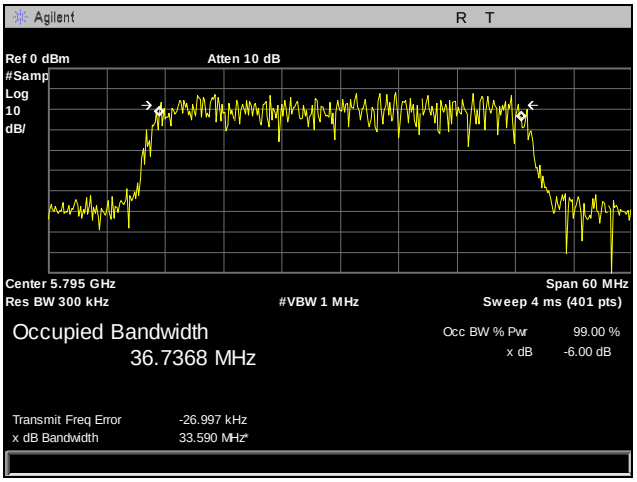

**Plot 188. 6 dB Occupied Bandwidth, High Channel, 20 MHz, Port 2**

## 6 dB Occupied Bandwidth, 40 MHz, Port 1, 28 dBi antenna



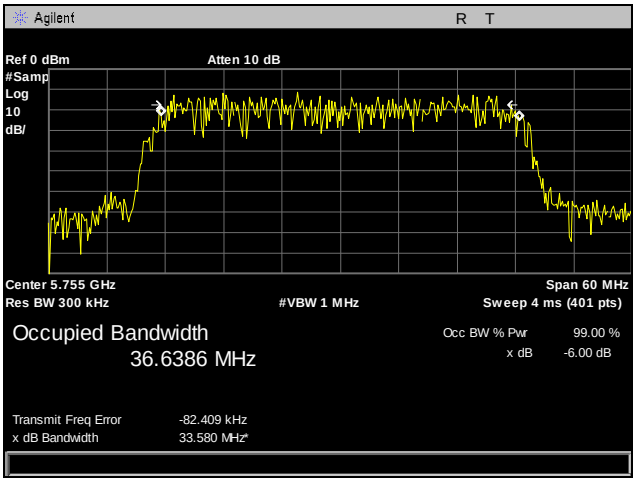

**Plot 189. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 1**



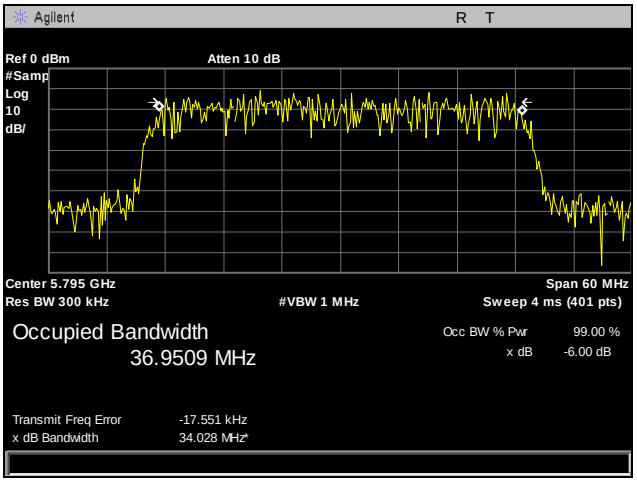

**Plot 190. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 1**

## 6 dB Occupied Bandwidth, 40 MHz, Port 2, 28 dBi antenna




**Plot 191. 6 dB Occupied Bandwidth, Low Channel, 40 MHz, Port 2**




**Plot 192. 6 dB Occupied Bandwidth, High Channel, 40 MHz, Port 2**

## Electromagnetic Compatibility Criteria for Intentional Radiators

## § 15.407(f) RF Exposure

**Test Requirement(s):** **§15.407(f):** U-NII devices are subject to the radio frequency radiation exposure requirements specified in §1.1307(b), §2.1091 and §2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment.

**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 @ 5740-5830MHz; **Limit for Uncontrolled exposure: 1 mW/cm$^2$ or 10 W/m$^2$**

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

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

where, S = Power Density
P = Power Input to antenna
G = Antenna Gain
R = Minimum Distance between User and Antenna (20 cm)

28dBi antenna:
P1= 16.19 dBm = 41.6 mW
G1=28 dBi = 631 linear
S1= 1 mW/cm$^2$
R1=46 cm

23 dBi antenna:
P2=21.87 dBm = 153.8 mW
G2=23 dBi = 200 linear
S2=1 mW/cm$^2$
R2=50 cm

Since S < 1 mW/cm2, the minimum distance (R) is 50 cm.

# IV. Test Equipment

## Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2005.

| MET Asset # | Equipment | Manufacturer | Model | Last Cal Date | Cal Due Date |
|---|---|---|---|---|---|
| 1S2460 | 1-26GHZ SPECTRUM ANALYZER | AGILENT TECHNOLOGIES | E4407B | 2/27/2014 | 8/27/2015 |
| 1S2482 | 5 METER CHAMBER (NSA) | PANASHIELD | 5 METER SEMI-ANECHOIC CHAMBER | 3/12/2015 | 3/12/2016 |
| 1S2600 | BILOG ANTENNA | TESEQ | CBL6112D | 8/29/2013 | 8/29/2015 |
| 1S2603 | DOUBLE RIDGED WAVEGUIDE HORN | ETS-LINDGREN | 3117 | 5/11/2015 | 5/11/2016 |
| 1S2421 | EMI TEST RECEIVER | ROHDE & SCHWARZ | ESIB7 | 9/10/2014 | 9/10/2015 |
| 1S2583 | PSA SPECTRUM ANALYZER | AGILENT | E4448A | 11/19/2014 | 11/19/2015 |
| 1S2121 | PRE-AMPLIFIER | HP | 1S2121 | SEE NOTE | |
| N/A | ATTENUATOR | N/A | N/A | SEE NOTE | |
| N/A | FILTERS | N/A | N/A | SEE NOTE | |
| 1S2678 | LISN, DUAL-LINE V-NETWORK | TESEQ | NNB 51 | 2/3/2015 | 2/3/2016 |
| 1S2460 | 1-26GHZ SPECTRUM ANALYZER | AGILENT TECHNOLOGIES | E4407B | 2/27/2014 | 8/27/2015 |

**Table 17. 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

## K. 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 A 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 A 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 commercial 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. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at own expense.

(b) 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