

TEST REPORT  
FROM  
**SIEMIC**

For

WirelessGRID

To

FCC Part 90 Subpart Y

Test Report Serial No.:  
SL05020802-ARY

This report supersedes NONE

**Remarks:**

Equipment complied with the specification  [X]  
Equipment did not comply with the specification  [ ]

**This Test Report is Issued Under the Authority of:**

.....  
*Alvarina*  
.....

Tested by: Alvin Alvarina, Test Engineer

.....  
*Leslie*  
.....

Reviewed by: Leslie Bai, Lab Manager

Issue date: 20 April 2005

*Equipment Details:*

Manufacturer: AIRAYA, CORP



Registration No. 783147



Registration No. 4842



Registration No. 2195

This test report may be reproduced in full only.



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## **Executive Summary**

The purpose of this test programme was to demonstrate compliance of the AIRAYA, CORP, WirelessGRID against the current FCC Part 90 Subpart Y. The WirelessGRID demonstrated compliance with the FCC Part 90 Subpart Y.

AIRAYA, CORP is the applicant and claimed manufacturer of this tested product. For the detailed description of this product, please refer to the WirelessGRID User Manual.

Below is the photograph of the system that was tested.



The test has demonstrated that this unit complies with stipulated standards.



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## **1 Technical Details**

**Purpose** Compliance testing of WirelessGRID with FCC Part 90 Subpart Y

**Applicant / Client** **AIRAYA, CORP**  
637 Adair Court  
Morgan Hill, CA 95037

**Manufacturer** AIRAYA, CORP

**Laboratory performing the tests** SIEMIC Labs  
2206 Ringwood Avenue  
San Jose, CA 95131

**Test location(s)** SIEMIC Labs  
2206 Ringwood Avenue  
San Jose, CA 95131

**Test report reference number** SL05020802-ARY  
**Date EUT received** 13 Mar 2005  
**Standard applied** FCC Part 90 Subpart Y  
**Dates of test (from – to)** 13 Mar 2005 to 19 Apr 2005  
**No of Units:** 1  
**Equipment Category:** Licensed Non-Broadcast Station Transmitter

**Trade/Product Name:** WirelessGRID  
**Type/Model Name/No:** AI108  
**Technical Variants:** None

**FCC ID No.** QDE-GRID



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## **2 Tests Required**

The product was tested in accordance with the following specifications.  
The test results recorded in this Test Report are exclusively referred to the tested sample(s).

| <b>Test Standard</b>      | <b>Description</b>                          | <b>Pass / Fail</b> |
|---------------------------|---|--------------------|
| 47 CFR Part 90, Subpart Y |   |                    |
| 2.1046; 90.1215(a)        | Peak Output Power                           | Pass               |
| 2.1046; 90.1215(a)        | Peak Power Spectral Density                 | Pass               |
| 2.1049; 90.210(m)         | Occupied Bandwidth; Emissions Mask          | Pass               |
| 2.1051; 90.210(m)         | Spurious Emissions at Antenna Terminals     | Pass               |
| 2.1053; 90.210(m)         | Radiated Spurious Emissions                 | Pass               |
| 2.1055(a)(1); 90.213      | Frequency Stability; Temperature Variations | Pass               |
| 2.1055(d)(1); 90.213      | Frequency Stability; Voltage Variations     | Pass               |
| TIA/EIA-603-A-2001        |   |                    |
| ANSI C63.4: 2001          |   |                    |
|                           |   |                    |
|                           |   |                    |
|                           |   |                    |
|                           |   |                    |
|                           |   |                    |

*Notes: Deviations to above standards are outlined in specific test sections if applicable.  
Cable loss and external attenuation are compensated for in the measurement system when applicable.*



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### **3 Measurements, Examinations and Derived Results**

#### **3.1 General observations**

| Equipment serial number(s) |              |                |
|----------------------------|--------------|----------------|
| Module:                    | Part number: | Serial number: |
| WirelessGRID               | AI108        | 01966          |
|                            |              |                |



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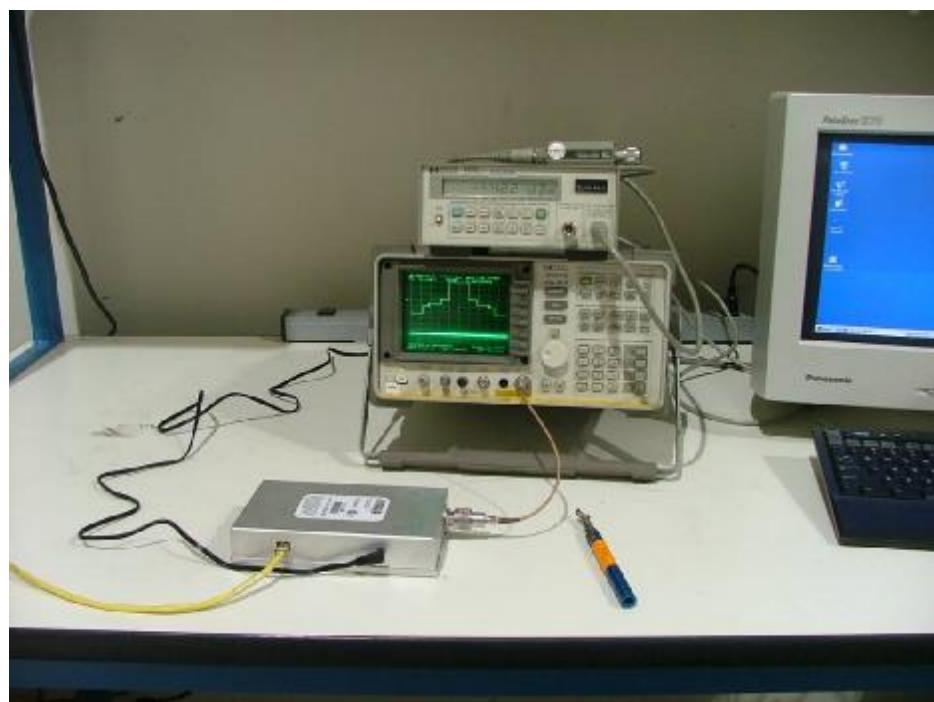
### **3.2 Test Results**

#### **3.2.1 Peak Output Power**

**Requirement(s):** 47 CFR §2.1046 and §90.1215(a)

**Procedures:** The peak output power was measured at the antenna terminal using Acceptable Procedures: Peak conducted transmit output power outlined in FCC DA 02-2138 Appendix A. The Average Power measurements were taken using a power meter with a sensor capable of measuring the entire bandwidth of the signal. The measurements were made for the 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, and 50MHz bandwidths at the center frequency of the channel.

**Setup:**





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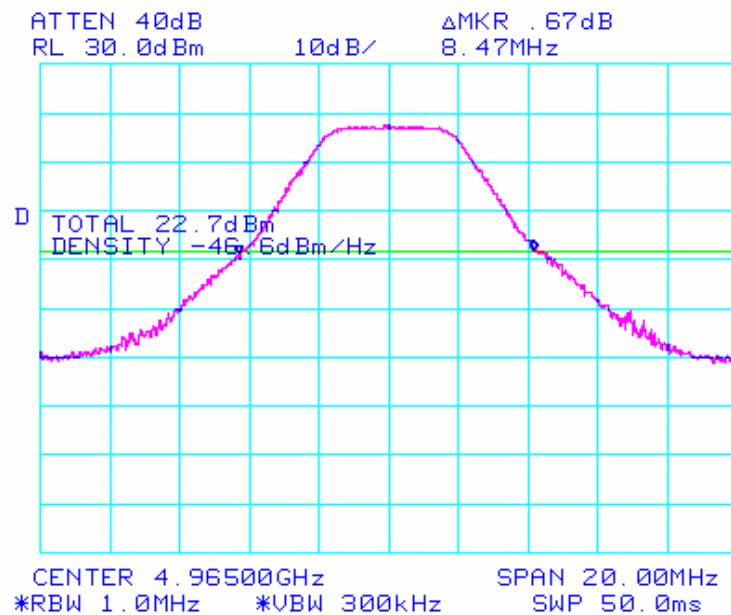
**Results:**

| Plot # | Frequency (MHz) | Channel Bandwidth (MHz) | Peak Power (dBm) | Peak Limit (dBm) | Average Power(dBm) |
|--------|-----------------|-------------------------|------------------|------------------|--------------------|
| 1      | 4965            | 5                       | 22.7             | 27               | 18.8               |
| 2      | 4965            | 10                      | 25.1             | 30               | 21.2               |
| 3      | 4965            | 15                      | 26.3             | 31.8             | 23.1               |
| 4      | 4965            | 20                      | 27.5             | 33               | 22.8               |
| 5      | 4965            | 30                      | 26.5             | 33               | 22.7               |
| 6      | 4965            | 40                      | 26.8             | 33               | 22.8               |
| 7      | 4965            | 50                      | 26.8             | 33               | 22.7               |

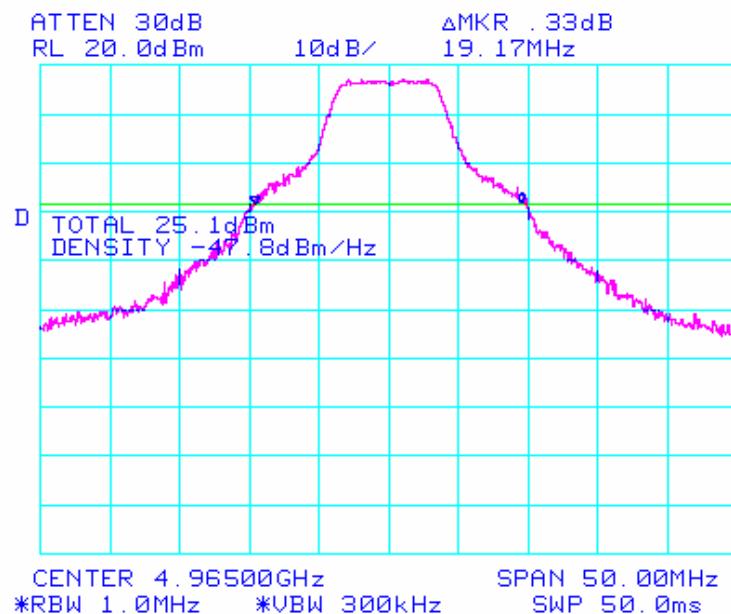


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Plot 1: Peak Power 5MHz Bandwidth

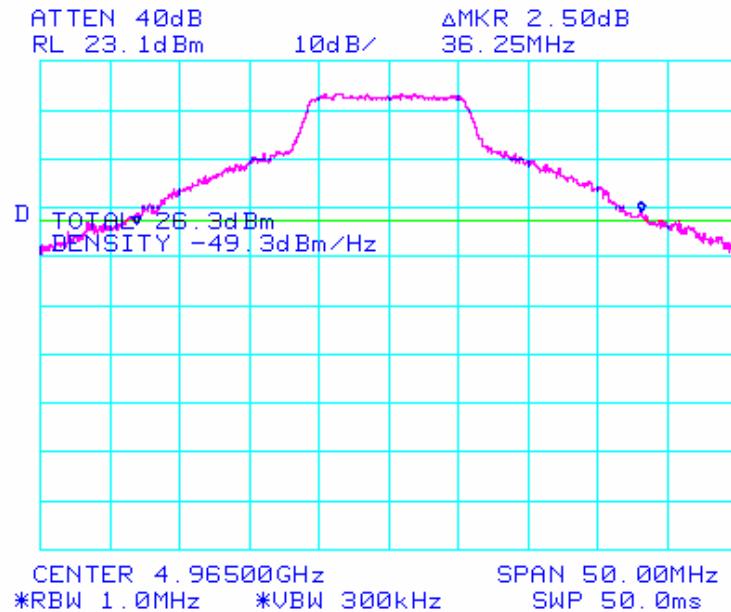


Plot 2: Peak Power 10MHz Bandwidth

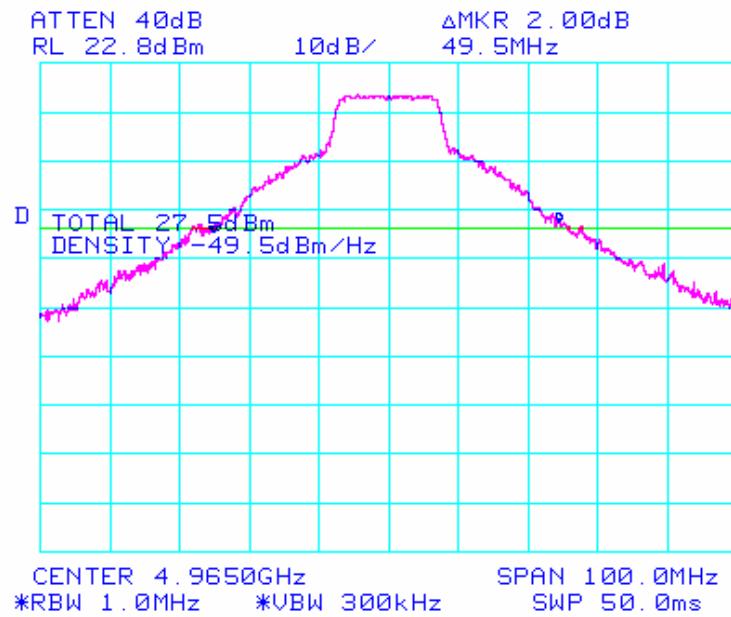


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Plot 3: Peak Power 15MHz Bandwidth

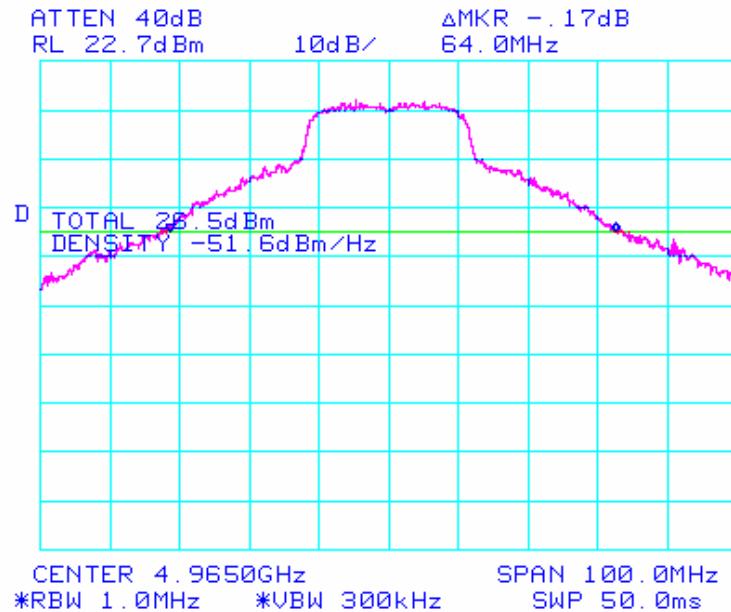


Plot 4: Peak Power 20MHz Bandwidth

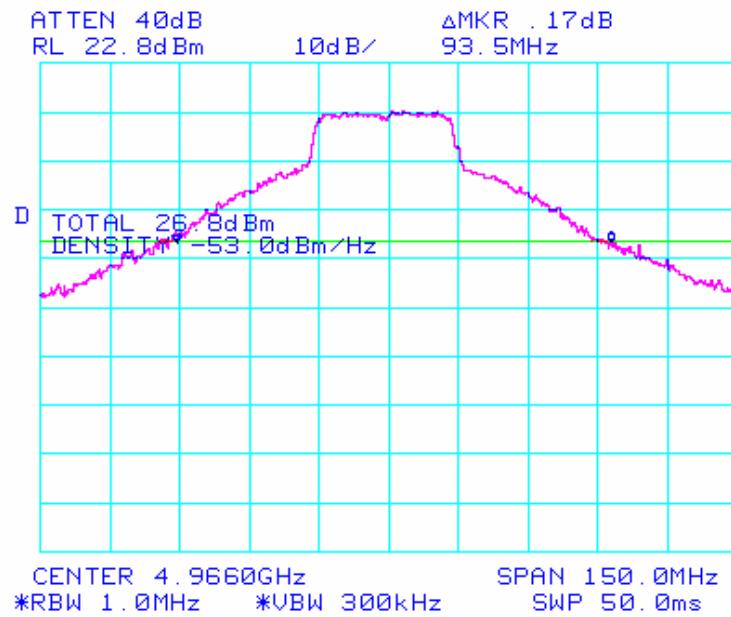


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Plot 5: Peak Power 30MHz

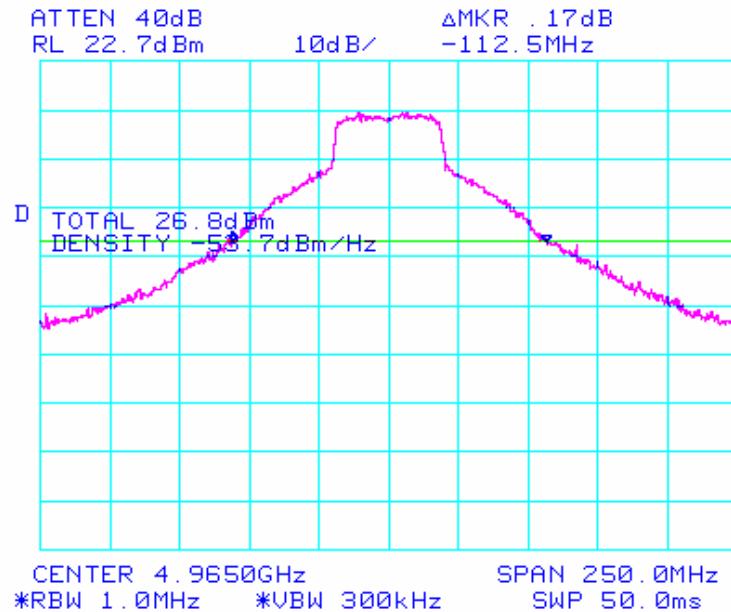


Plot 6: Peak Power 40MHz



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Plot 7: Peak Power 50MHz

Tested By: Alvin Ilarina

Date Tested: 18 Apr 2005



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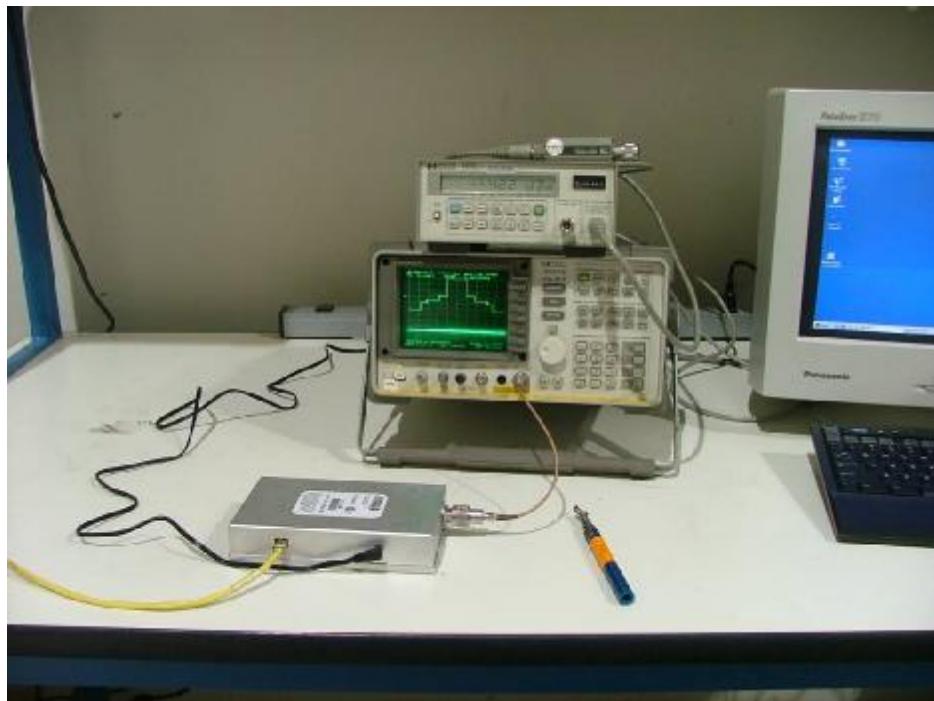
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### 3.2.2 Peak Power Spectral Density

**Requirement(s):** 47 CFR §2.1046 and §90.1215(a)

**Procedures:** The peak power spectral density measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, and 50MHz bandwidths at the center frequency of the channel.

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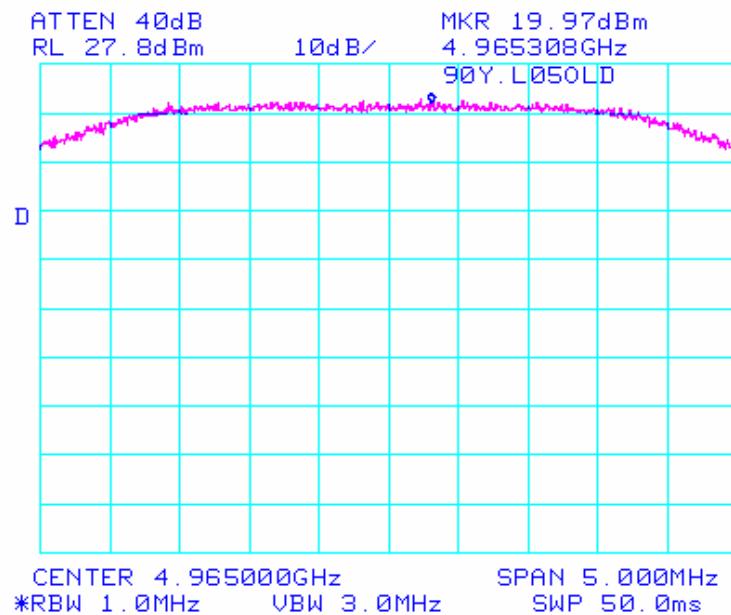
**Results:**

| Plot # | Frequency (MHz) | Channel Bandwidth (MHz) | PPSD (dBm) | Limit (dBm) |
|--------|-----------------|-------------------------|------------|-------------|
| 8      | 4965            | 5                       | 19.97      | 20          |
| 9      | 4965            | 10                      | 19.83      | 20          |
| 10     | 4965            | 15                      | 20.0       | 20          |
| 11     | 4965            | 20                      | 18.5       | 20          |
| 12     | 4965            | 30                      | 16.53      | 20          |
| 13     | 4965            | 40                      | 15.6       | 20          |
| 14     | 4965            | 50                      | 14.7       | 20          |

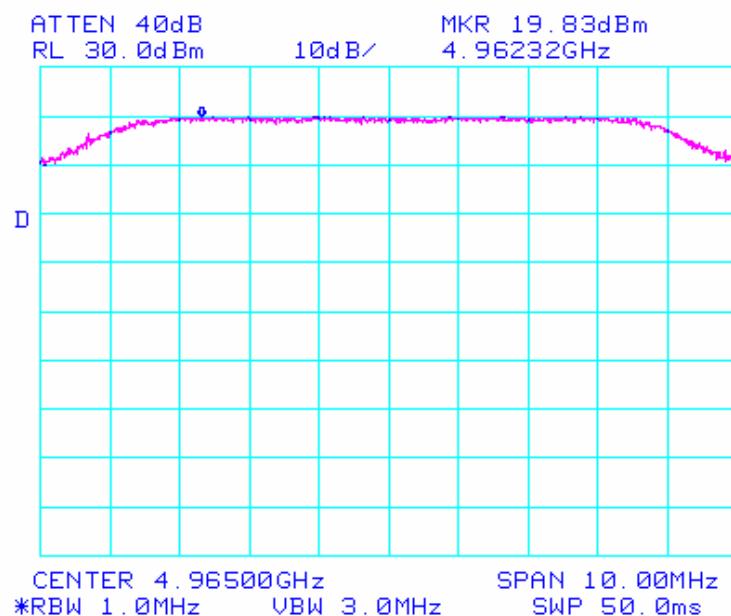


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**Plot 8: Peak Power Spectral Density 5MHz Bandwidth**

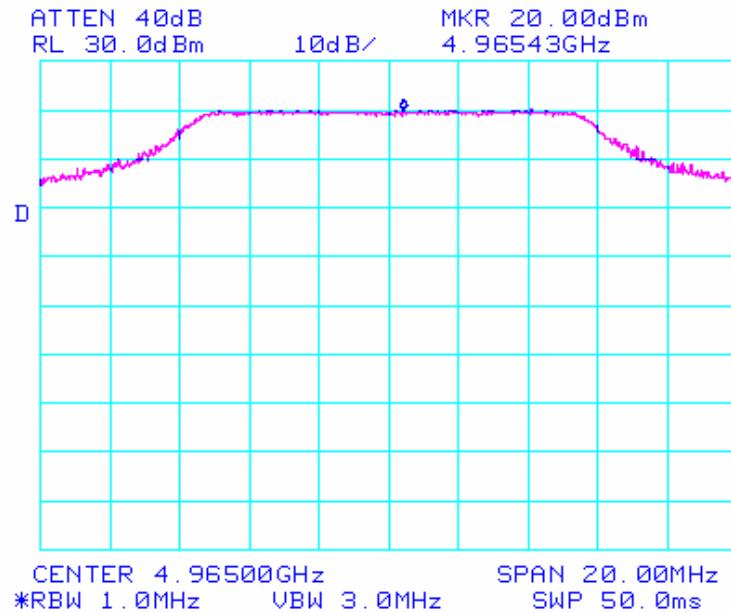


**Plot 9: Peak Power Spectral Density 10MHz Bandwidth**

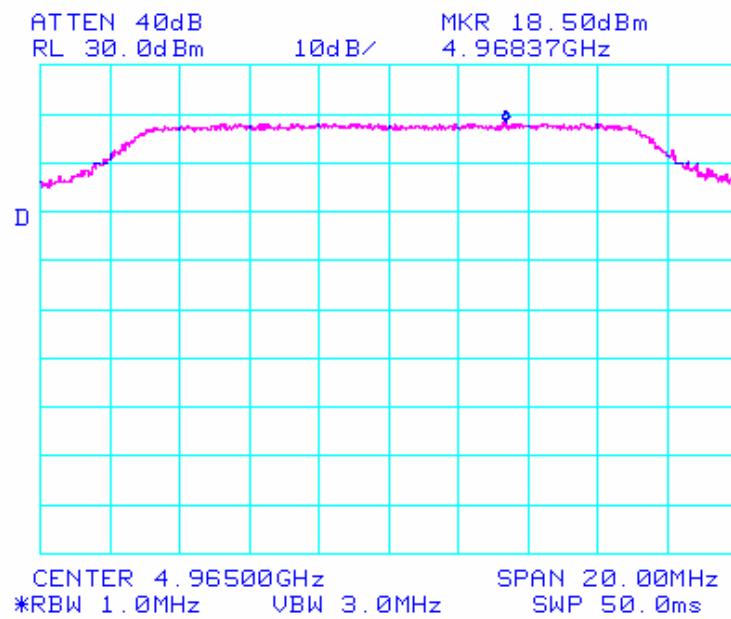


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Plot 10: Peak Power Spectral Density 15MHz Bandwidth

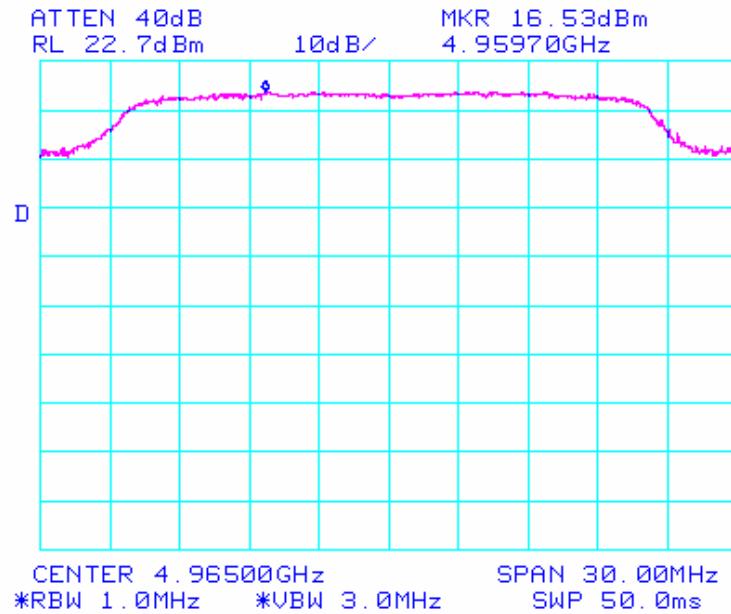


Plot 11: Peak Power Spectral Density 20MHz Bandwidth

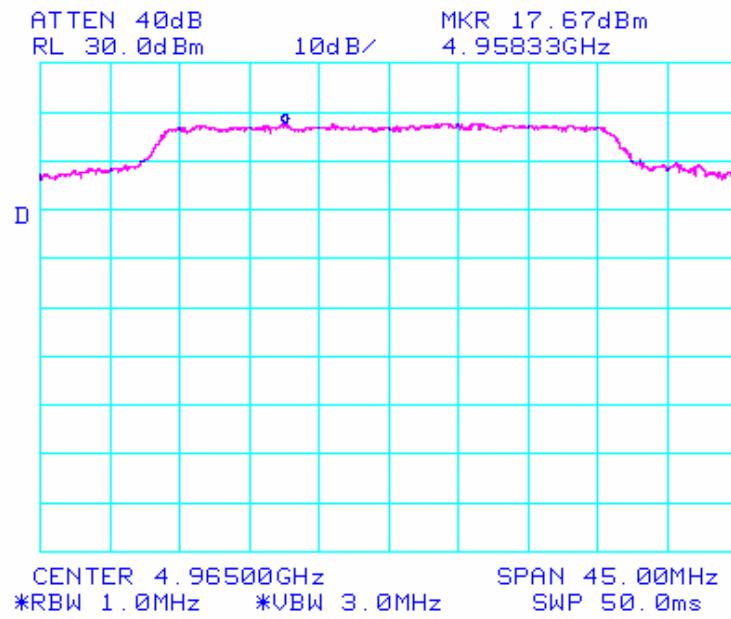


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Plot 12: Peak Power Spectral Density 30MHz Bandwidth

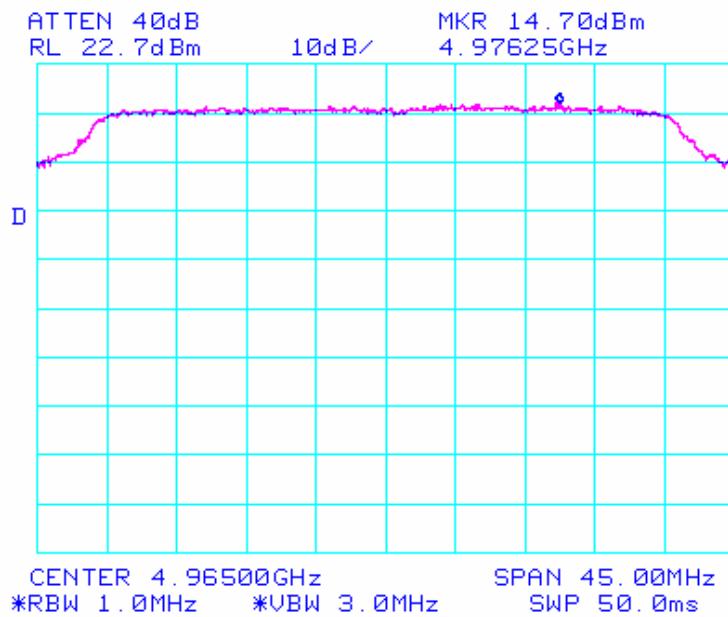


Plot 13: Peak Power Spectral Density 40MHz Bandwidth



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**Plot 14: Peak Power Spectral Density 50MHz Bandwidth**

**Tested By: Alvin Ilarina**

**Date Tested: 18 Apr 2005**



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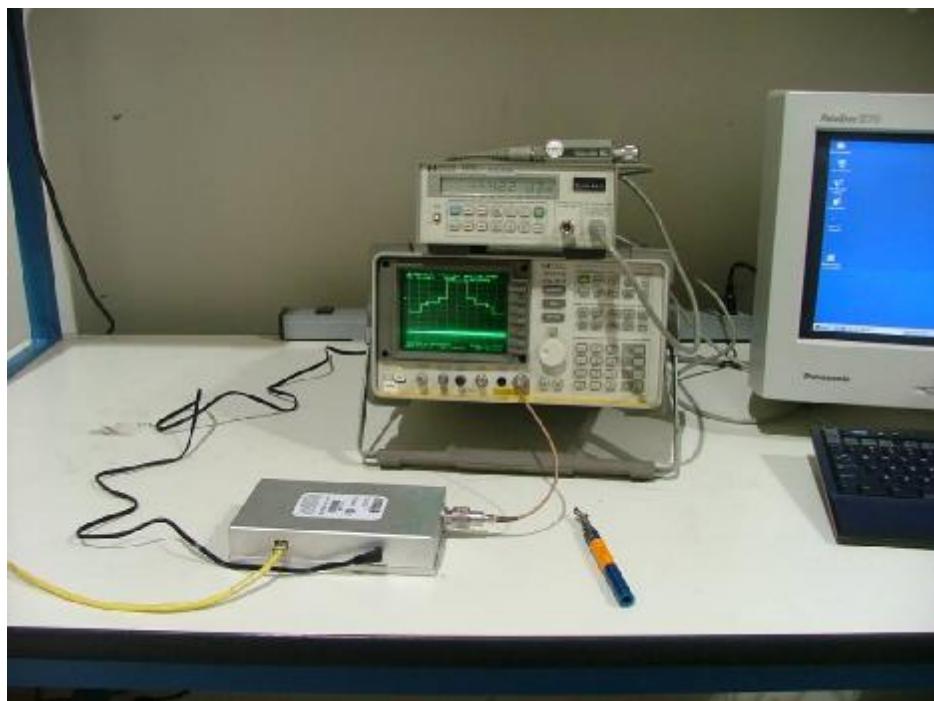
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### 3.2.3 Occupied Bandwidth; Emission Mask

**Requirement(s):** 47 CFR §2.1049 and §90.210(l)

**Procedures:** The Emission Masks were measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, and 50MHz bandwidths at the center frequency of the channel.

**Setup:**





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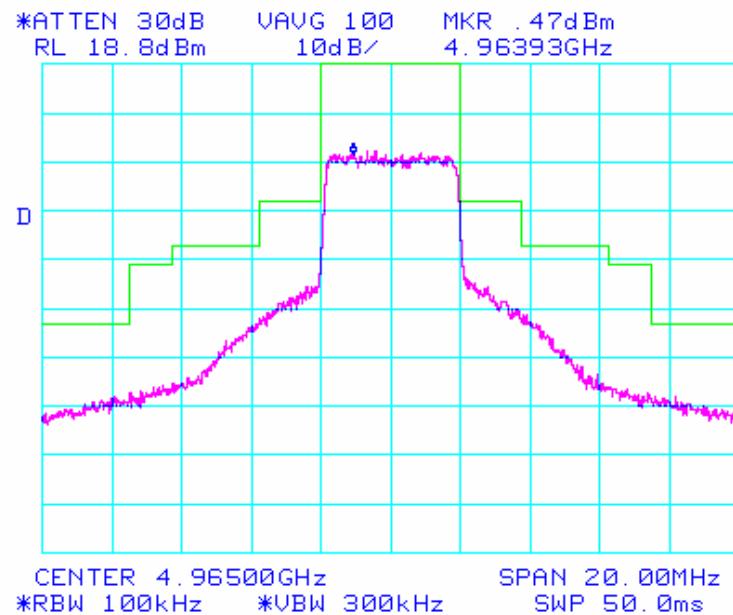
**Results:**

| Plot # | Frequency (MHz) | Channel Bandwidth (MHz) | Pass/Fail |
|--------|-----------------|-------------------------|-----------|
| 15     | 4965            | 5                       | Pass      |
| 16     | 4965            | 10                      | Pass      |
| 17     | 4965            | 15                      | Pass      |
| 18     | 4965            | 20                      | Pass      |
| 19     | 4965            | 30                      | Pass      |
| 20     | 4965            | 40                      | Pass      |
| 21     | 4965            | 50                      | Pass      |

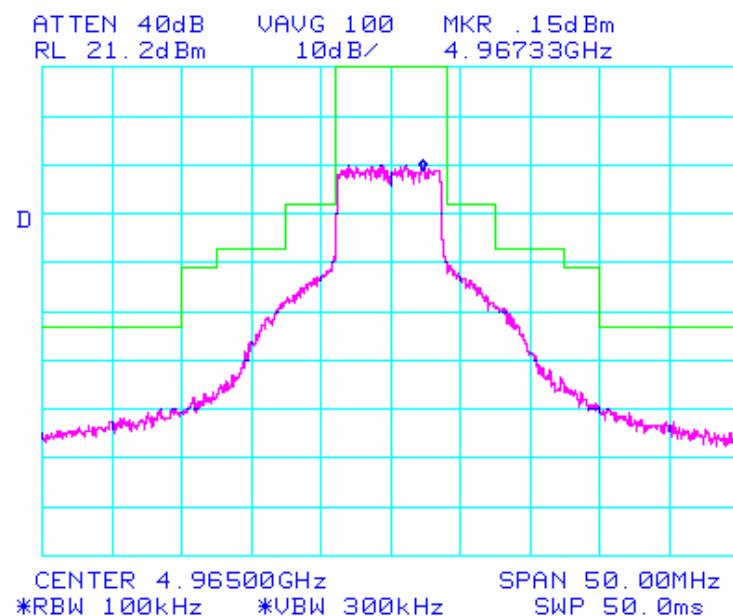


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Plot 15: Emission Mask L – 5MHz Bandwidth

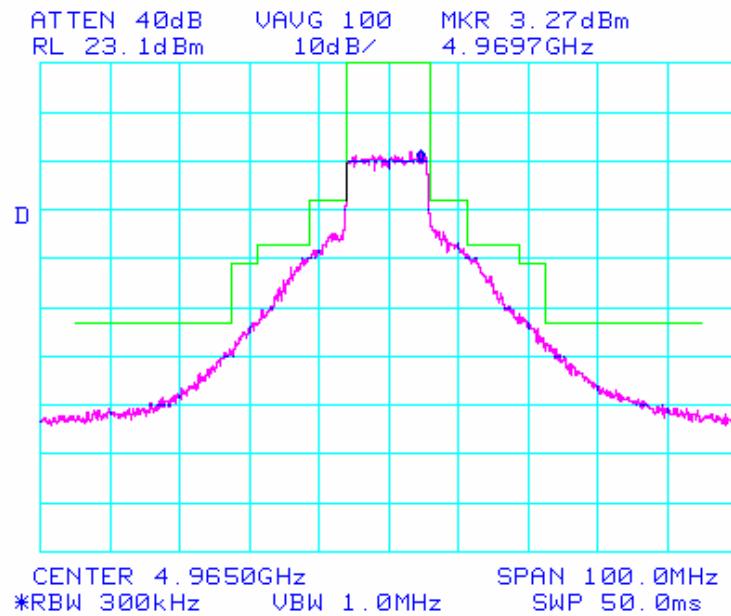


Plot 16: Emission Mask L – 10MHz Bandwidth

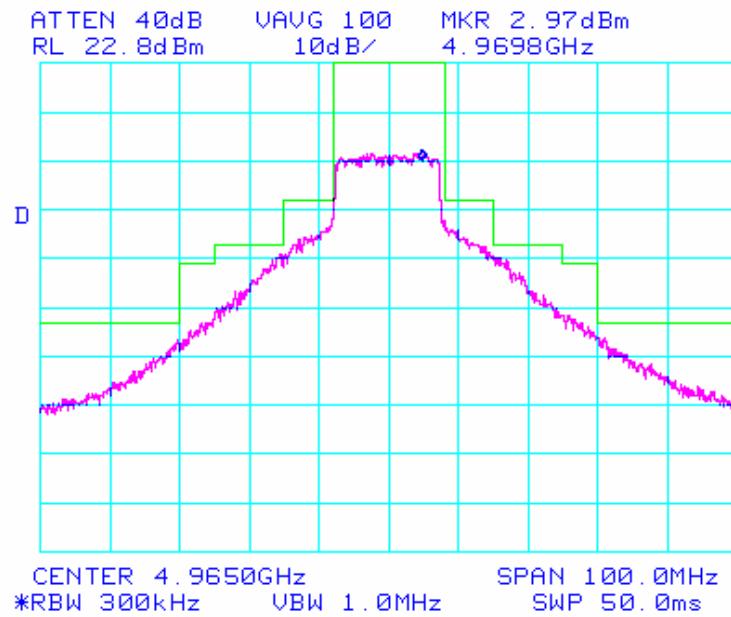


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Plot 17: Emission Mask L – 15MHz Bandwidth

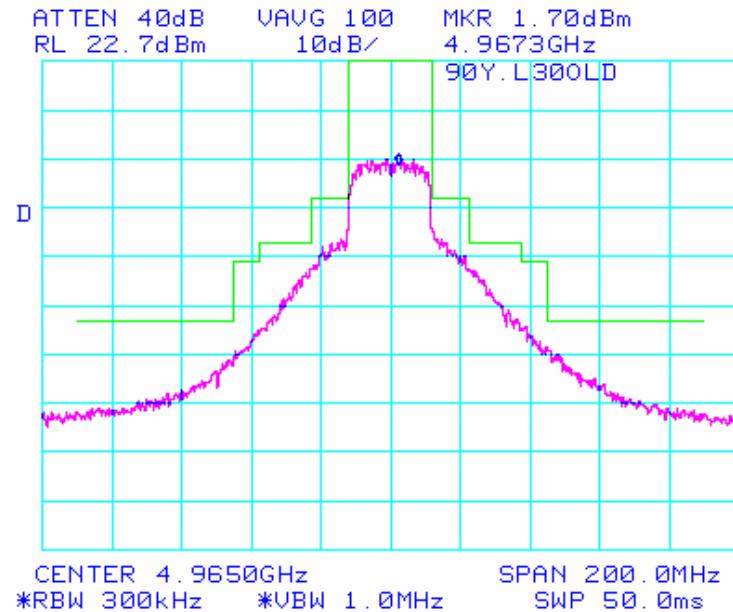


Plot 18: Emission Mask L – 20MHz Bandwidth

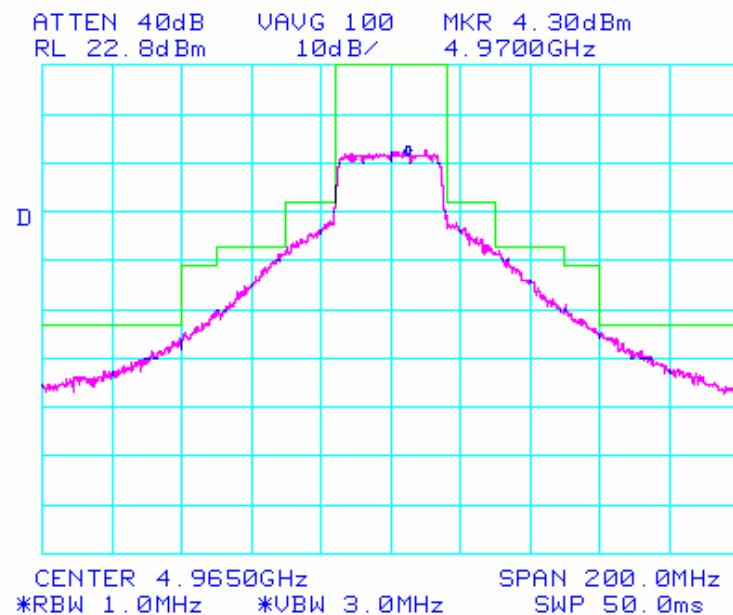


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Plot 19: Emission Mask L – 30MHz Bandwidth

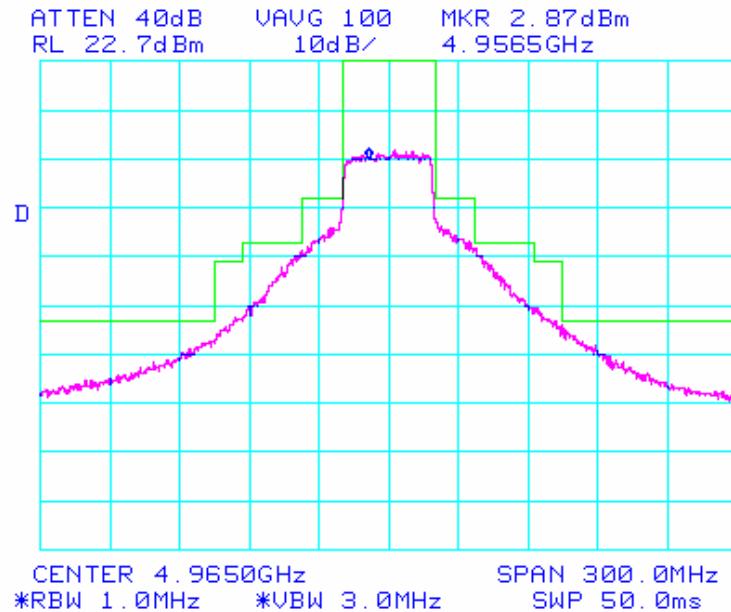


Plot 20: Emission Mask L – 40MHz Bandwidth



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Plot 21: Emission Mask L – 50MHz Bandwidth

Tested By: Alvin Ilarina

Date Tested: 18 Apr 2005



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### 3.2.4 Spurious Emissions at Antenna Terminals

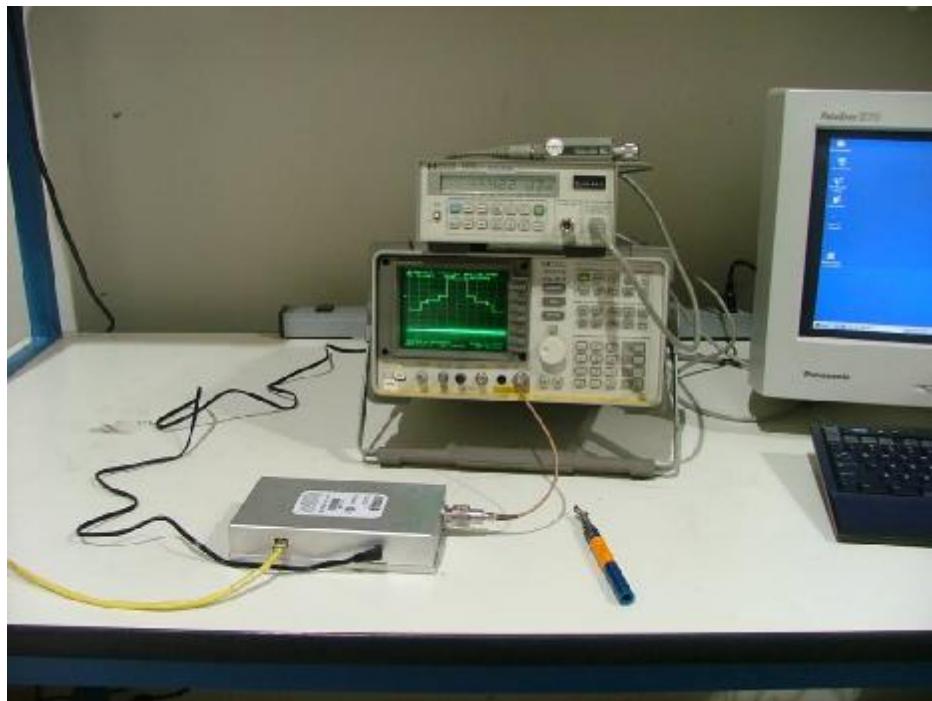
**Requirement(s):** 47 CFR §2.1051 and §90.210(l)

**Procedures:** The spurious emissions at the antenna terminal as measured at the antenna terminal using a spectrum analyzer. The measurements were made for the 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, and 50MHz bandwidths at the center frequency of the channel.

The spurious limit was determined by:

Measured Average Output Power of EUT – 53 dBm/MHz

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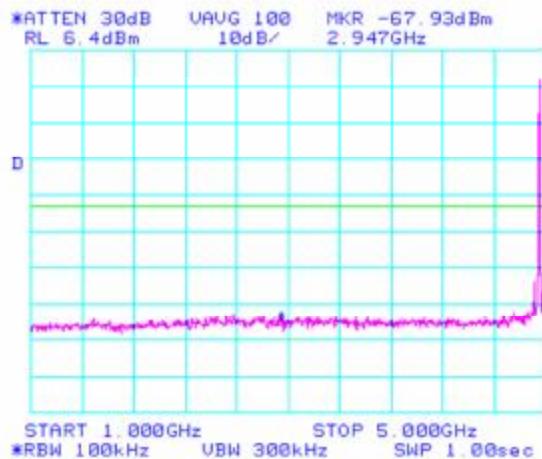
**Results:**

| <b>Plots #</b> | <b>Frequency (MHz)</b> | <b>Channel Bandwidth (MHz)</b> | <b>Pass/Fail</b> |
|----------------|------------------------|--------------------------------|------------------|
| 22 to 26       | 4965                   | 5                              | Pass             |
| 27 to 31       | 4965                   | 10                             | Pass             |
| 32 to 36       | 4965                   | 15                             | Pass             |
| 37 to 41       | 4965                   | 20                             | Pass             |
| 42 to 46       | 4965                   | 30                             | Pass             |
| 47 to 51       | 4965                   | 40                             | Pass             |
| 52 to 56       | 4965                   | 50                             | Pass             |

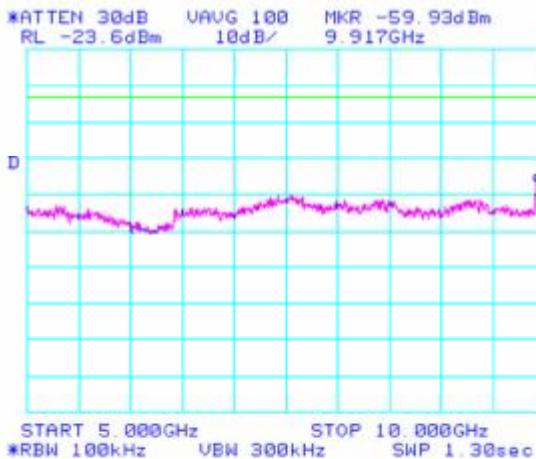


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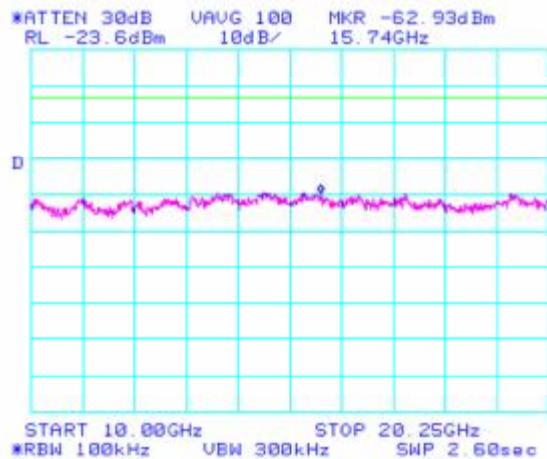
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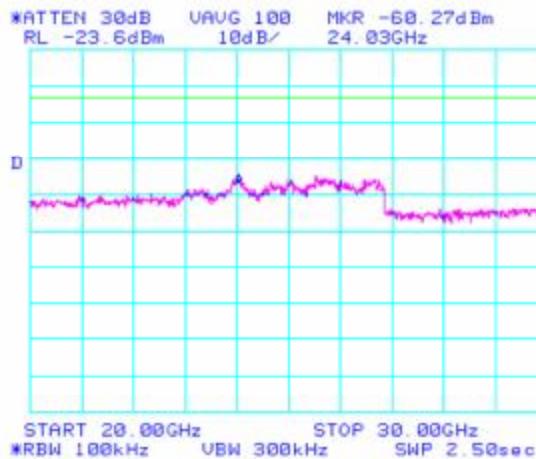
Plot 22: Conducted Spurious 5MHz BW 1 of 5



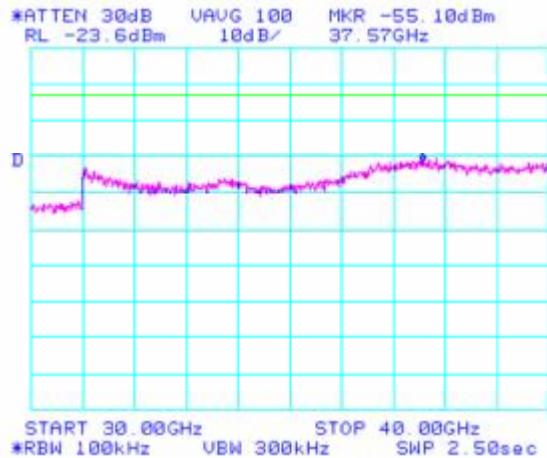
Plot 23: Conducted Spurious 5MHz BW 2 of 5



Plot 24: Conducted Spurious 5MHz BW 3 of 5



Plot 25: Conducted Spurious 5MHz BW 4 of 5

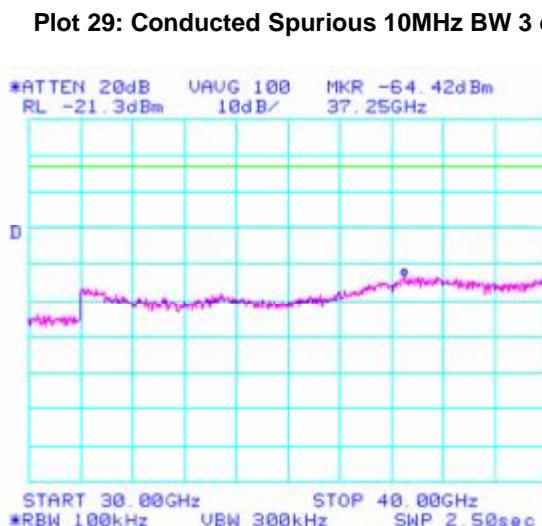
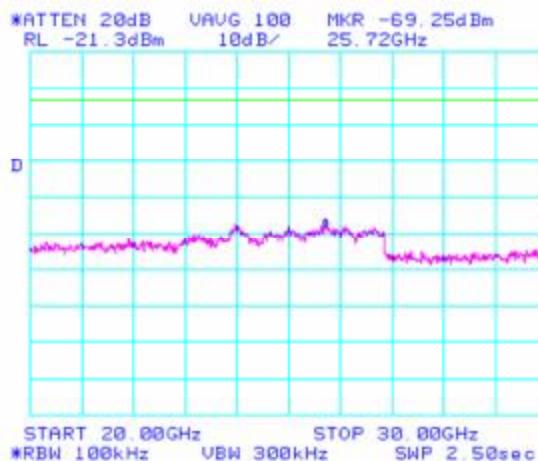
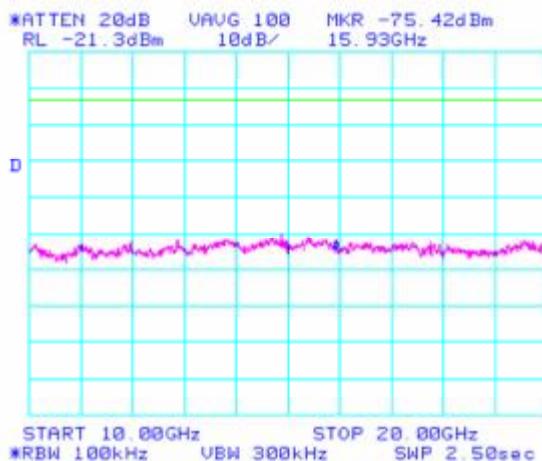
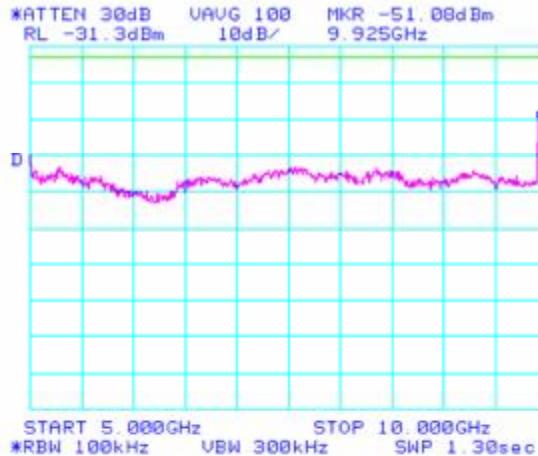
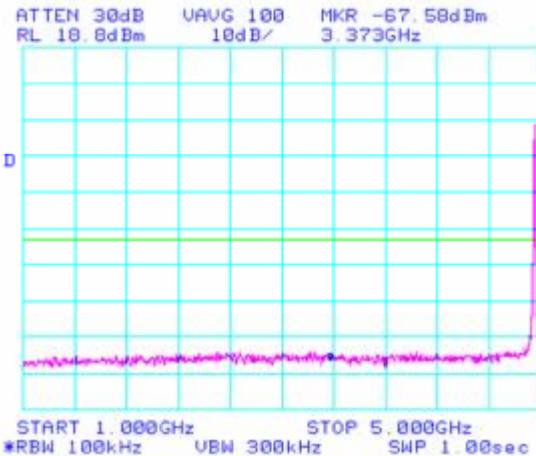


Plot 26: Conducted Spurious 5MHz BW 5 of 5



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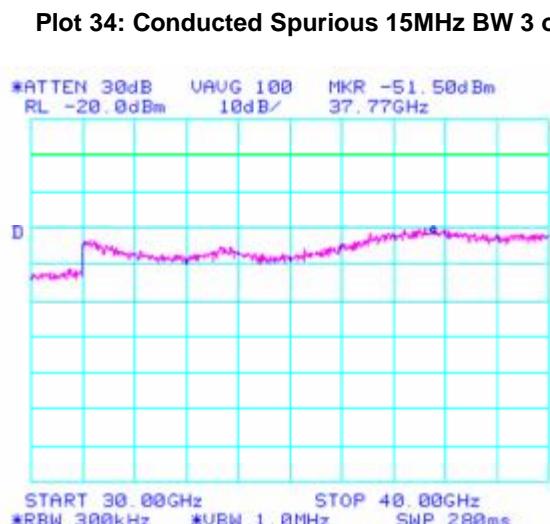
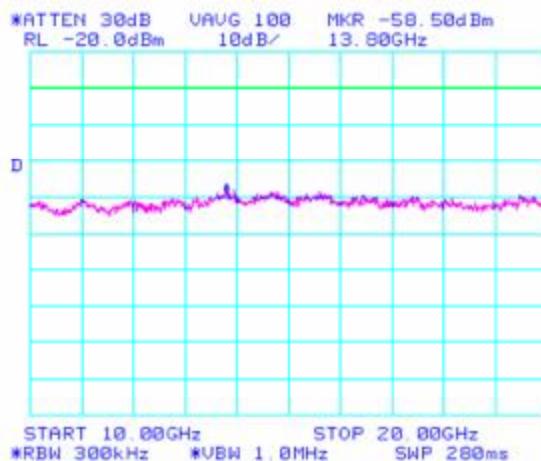
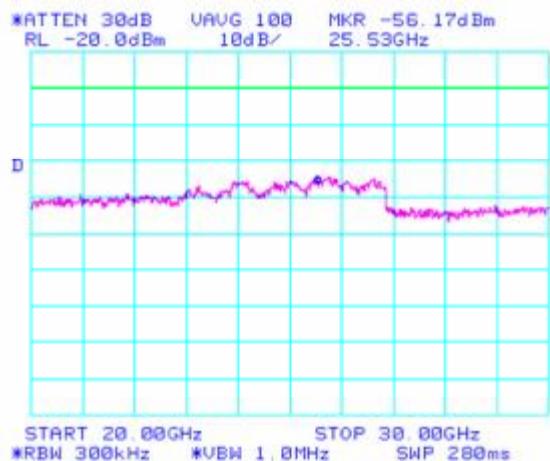
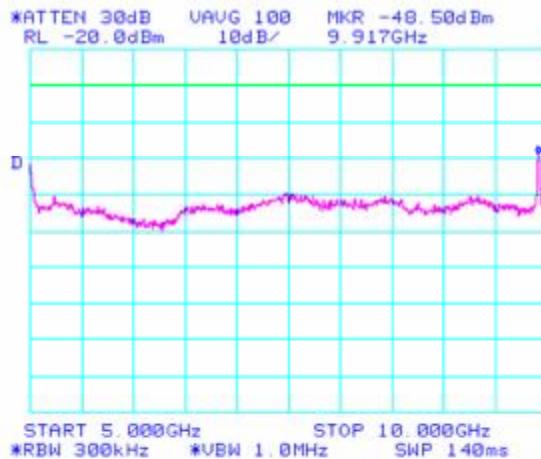
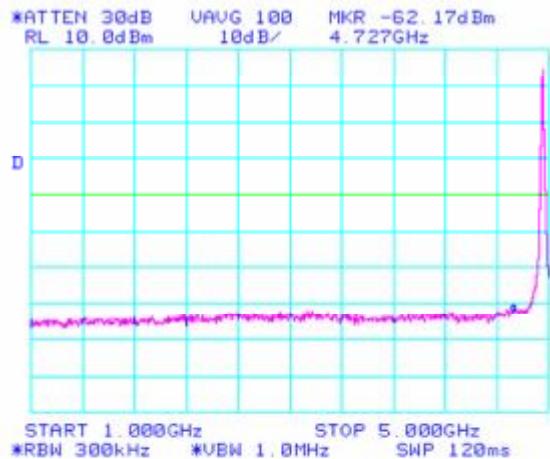
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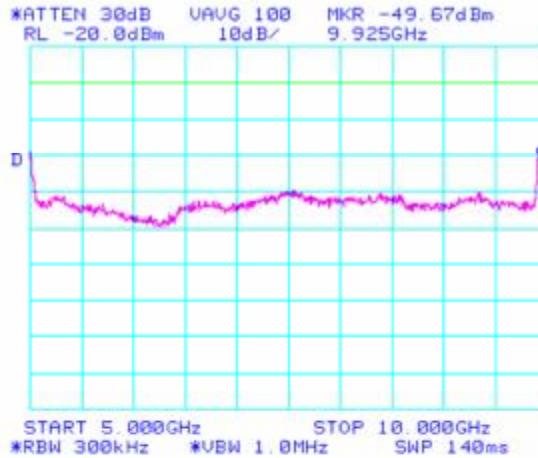
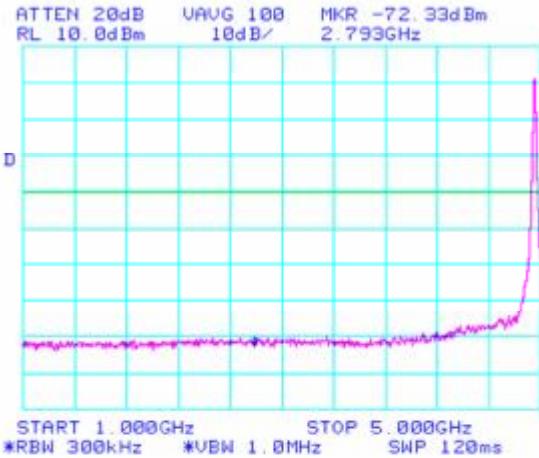
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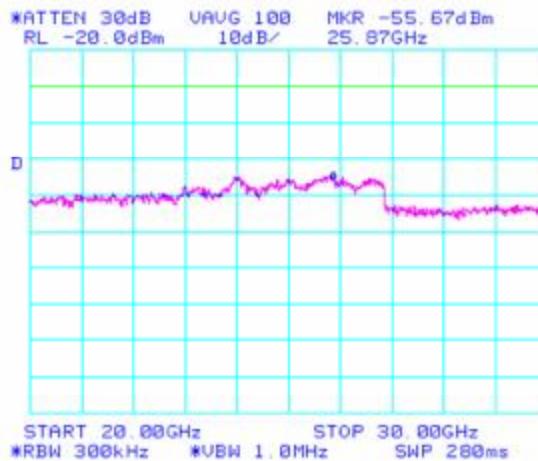
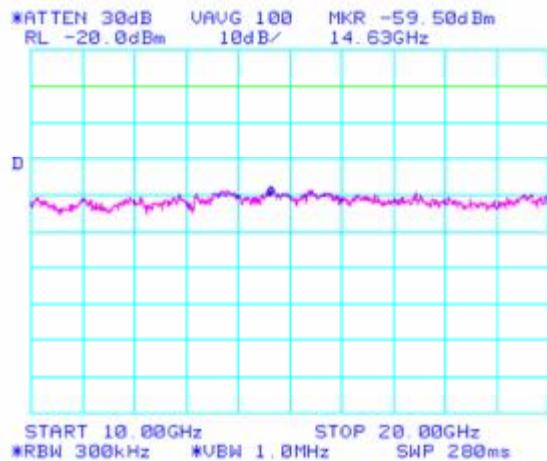
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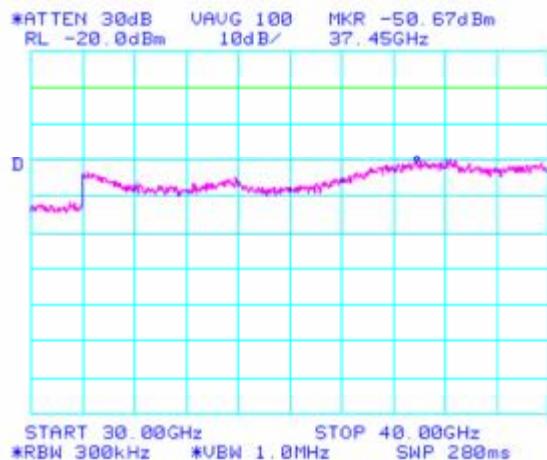
Plot 37: Conducted Spurious 20MHz BW 1 of 5

Plot 38: Conducted Spurious 20MHz BW 2 of 5



Plot 39: Conducted Spurious 20MHz BW 3 of 5

Plot 40: Conducted Spurious 20MHz BW 4 of 5

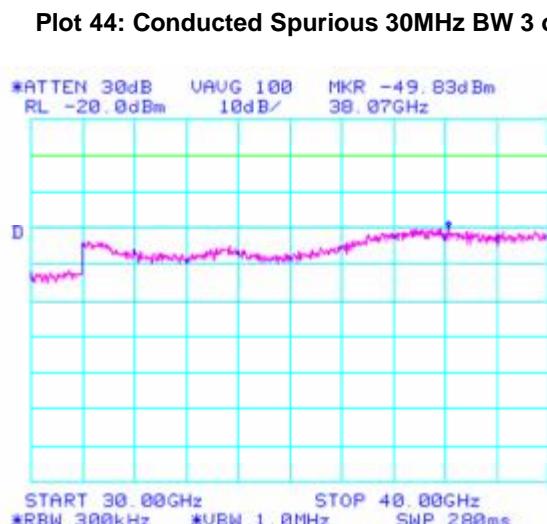
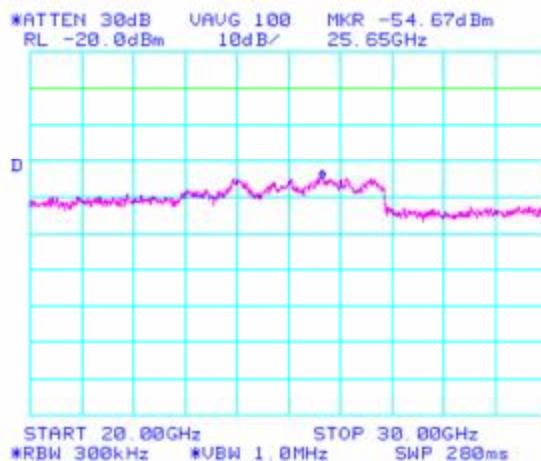
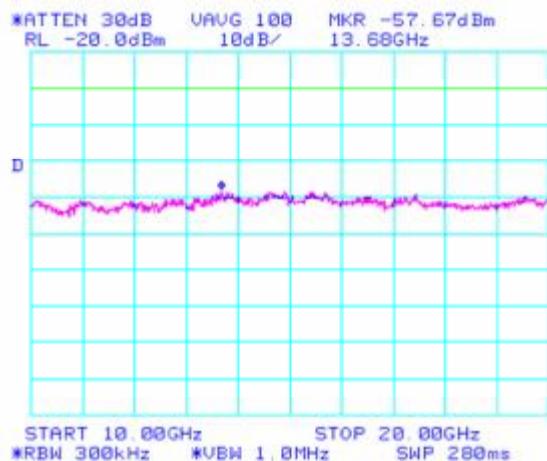
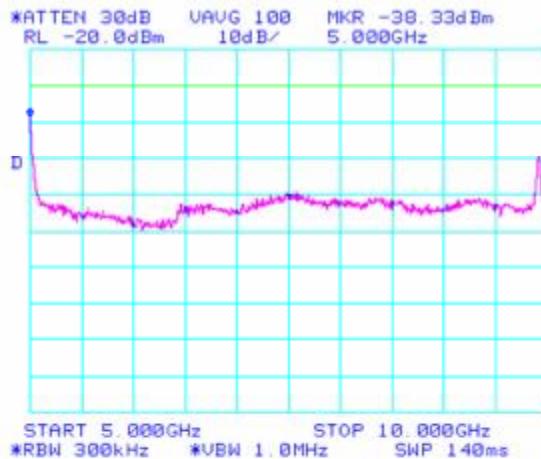
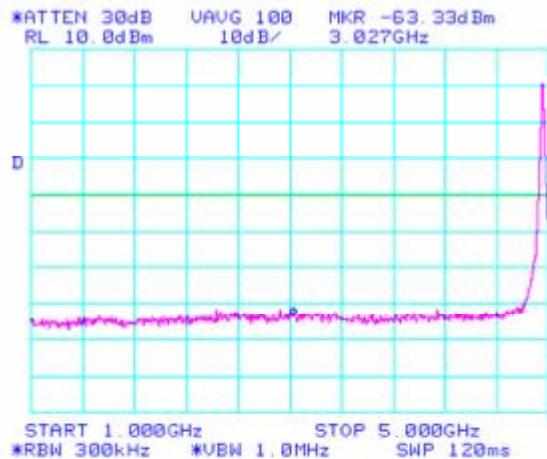


Plot 41: Conducted Spurious 20MHz BW 5 of 5



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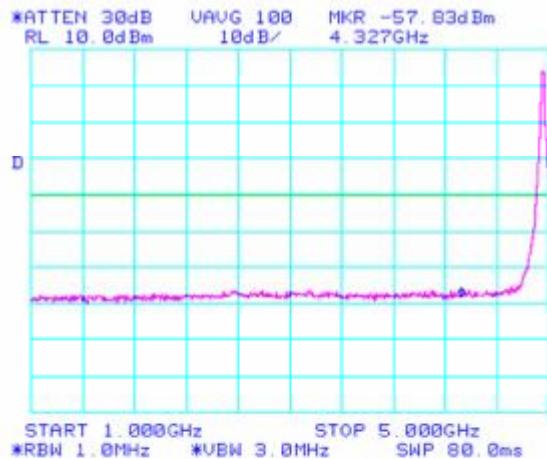
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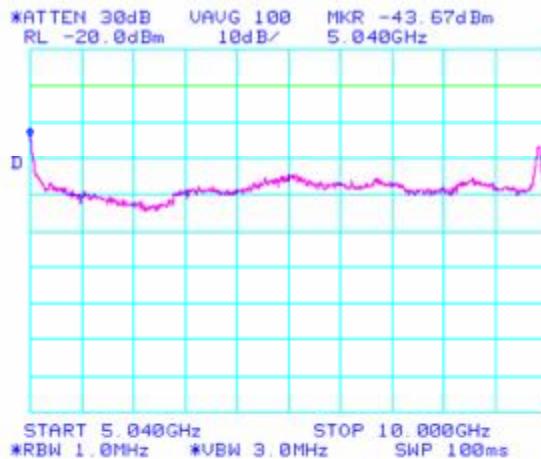


Title: AIRAYA, CORP  
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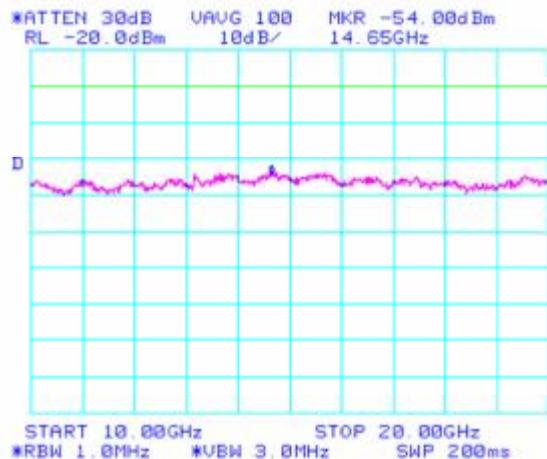
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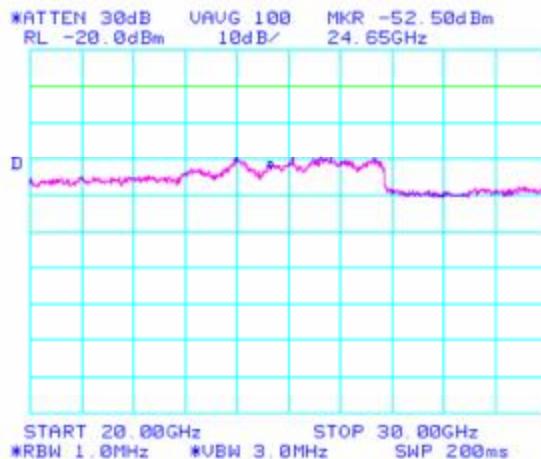
Plot 47: Conducted Spurious 40MHz BW 1 of 5



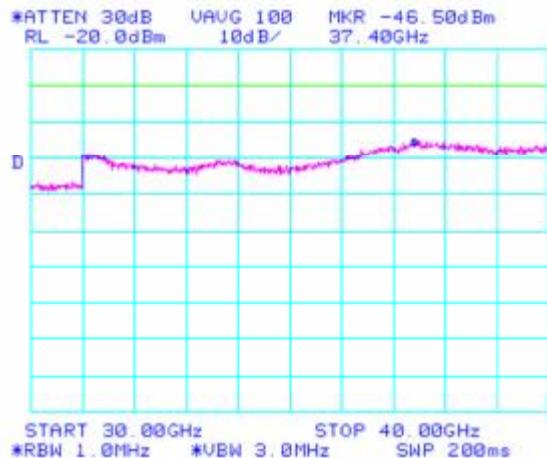
Plot 48: Conducted Spurious 40MHz BW 2 of 5



Plot 49: Conducted Spurious 40MHz BW 3 of 5



Plot 50: Conducted Spurious 40MHz BW 4 of 5

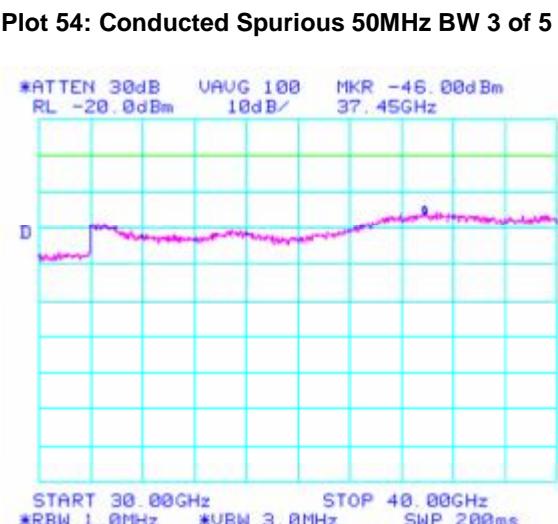
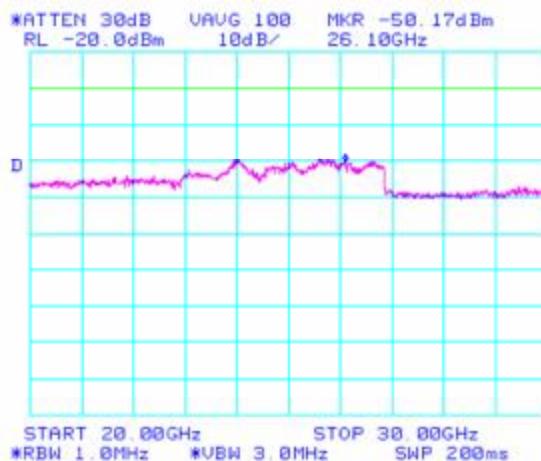
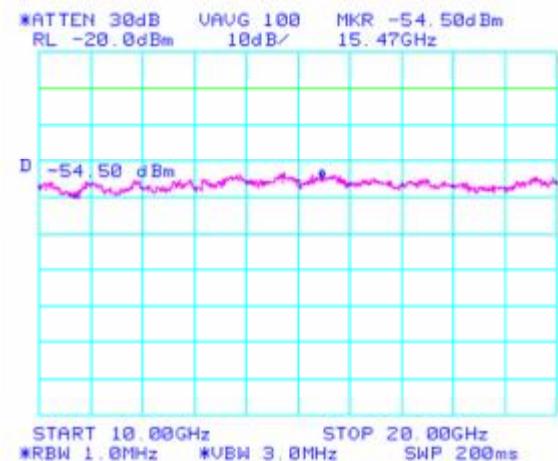
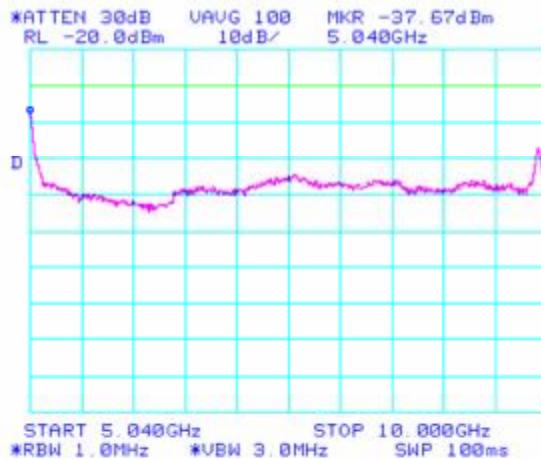
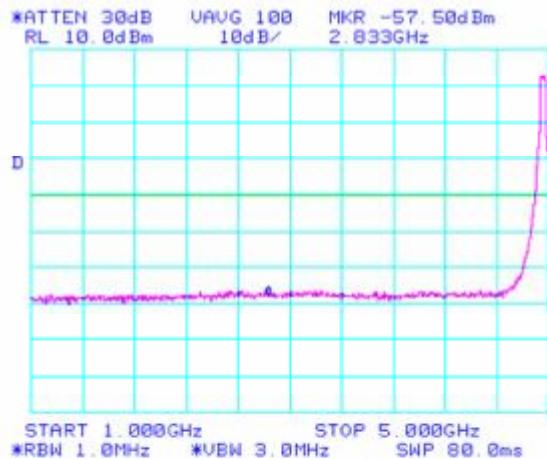


Plot 51: Conducted Spurious 40MHz BW 5 of 5



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**Tested By:** Alvin Ilarina

**Date Tested:** 18 Apr 2005



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### 3.2.5 Radiated Spurious Emissions

**Requirement(s):** 47 CFR §2.1053 and §90.210(l)

**Procedures:** The radiated spurious emissions were measured using signal substitution. Any spurious emission amplitude was recorded. The emission amplitude was then reproduced with another antenna and signal generator. The output power at the substitution antenna was then measured with a power meter. This reading was then added with the antenna gain to determine the EIRP of the spurious emission. The measurements were made for the 5MHz, 10MHz, 15MHz, 20MHz, 30MHz, 40MHz, and 50MHz bandwidths at the center frequency of the channel.

The spurious limit was determined by:

Measured Average Output Power of EUT – 53 dBm/MHz

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**Results:**

| EBW   | Frequency | Polarization | Azimuth   | Power Meter | Antenna Gain | EIRP  | Limit | Margin      |
|-------|-----------|--------------|-----------|-------------|--------------|-------|-------|-------------|
| (MHz) | (MHz)     | V/H          | (degrees) | (dBm)       | (dBi)        | (dBm) | (dBm) | (dB)        |
| 5     | 9920      | V            | 200       | -62.4       | 11.6         | -50.8 | -34.2 | -16.6       |
| 5     | 9920      | H            | 200       | -63.6       | 11.5         | -52.1 | -34.2 | -17.9       |
| 5     | 14890     | V            | 200       | -71.6       | 11.6         | -60.0 | -34.2 | -25.8       |
| 5     | 14890     | H            |           |             |              |       |       | Noise Floor |
| 10    | 9920      | V            | 200       | -63.4       | 11.6         | -51.8 | -31.8 | -20.0       |
| 10    | 9920      | H            | 200       | -62.8       | 11.5         | -51.3 | -31.8 | -19.5       |
| 10    | 14890     | V            | 200       | -75.3       | 11.6         | -61.7 | -31.8 | -29.9       |
| 10    | 14890     | H            |           |             |              |       |       | Noise Floor |
| 15    | 9920      | V            | 200       | -63.4       | 11.6         | -51.8 | -29.9 | -21.9       |
| 15    | 9920      | H            | 200       | -65.6       | 11.5         | -54.1 | -29.9 | -24.2       |
| 15    | 14890     | V            |           |             |              |       |       | Noise Floor |
| 15    | 14890     | H            |           |             |              |       |       | Noise Floor |
| 20    | 9920      | V            | 200       | -65.3       | 11.6         | -53.7 | -30.2 | -23.5       |
| 20    | 9920      | H            | 200       | -66.4       | 11.5         | -54.9 | -30.2 | -24.7       |
| 20    | 14890     | V            |           |             |              |       |       | Noise Floor |
| 20    | 14890     | H            |           |             |              |       |       | Noise Floor |

**Notes:**

NF = Noise Floor

EIRP = Power Meter reading + Antenna Gain

Margin = EIRP - Limit



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| EBW   | Frequency | Polarization | Azimuth     | Power Meter | Antenna Gain | EIRP  | Limit | Margin |
|-------|-----------|--------------|-------------|-------------|--------------|-------|-------|--------|
| (MHz) | (MHz)     | V/H          | (degrees)   | (dBm)       | (dBi)        | (dBm) | (dBm) | (dB)   |
| 30    | 9920      | V            | 200         | -66.3       | 11.6         | -54.7 | -30.3 | -24.4  |
| 30    | 9920      | H            | 200         | -63.4       | 11.5         | -51.9 | -30.3 | -21.6  |
| 30    | 14890     | V            | Noise Floor |             |              |       |       |        |
| 30    | 14890     | H            | Noise Floor |             |              |       |       |        |
| 40    | 9920      | V            | 200         | -69.8       | 11.6         | -58.2 | -30.2 | -28.0  |
| 40    | 9920      | H            | 200         | -64.4       | 11.5         | -52.9 | -30.2 | -22.7  |
| 40    | 14890     | V            | Noise Floor |             |              |       |       |        |
| 40    | 14890     | H            | Noise Floor |             |              |       |       |        |
| 50    | 9920      | V            | 200         | -68.9       | 11.6         | -57.3 | -30.3 | -27.0  |
| 50    | 9920      | H            | 200         | -66.7       | 11.5         | -55.2 | -30.3 | -24.9  |
| 50    | 14890     | V            | Noise Floor |             |              |       |       |        |
| 50    | 14890     | H            | Noise Floor |             |              |       |       |        |
|       |           |              |             |             |              |       |       |        |
|       |           |              |             |             |              |       |       |        |

**Notes:**

NF = Noise Floor

EIRP = Power Meter reading + Antenna Gain

Margin = EIRP - Limit

Tested By: Alvin Ilarina

Date Tested: 12 Apr 2005



### 3.2.6 Frequency Stability; Temperature Variations

**Requirement(s):** 47 CFR §2.1055(a)(1) and §90.213

**Procedure:** The frequency stability was measured at the antenna terminal using a spectrum analyzer. The measurements were made at the 5MHz bandwidths using the frequency counter function of the spectrum analyzer. The temperature was varied from -30°C to +50°C at 10°C increments with suitable time allowed for temperature stability between measurements.

**Setup:**





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**Results:**

| Temperature (°C) | Frequency (GHz) | ppm  |
|------------------|-----------------|------|
| +50              | 4.964995850     | 4.8  |
| +40              | 4.964972643     | 0.2  |
| +30              | 4.964965353     | 1.2  |
| +20              | 4.964971544     | 0    |
| +10              | 4.964987828     | 3.2  |
| 0                | 4.964995952     | 4.9  |
| -10              | 4.964996837     | 5.1  |
| -20              | 4.965005546     | 6.8  |
| -30              | 4.965030186     | 11.8 |

**Tested By:** Alvin Ilarina

**Date Tested:** 14 Mar 2005

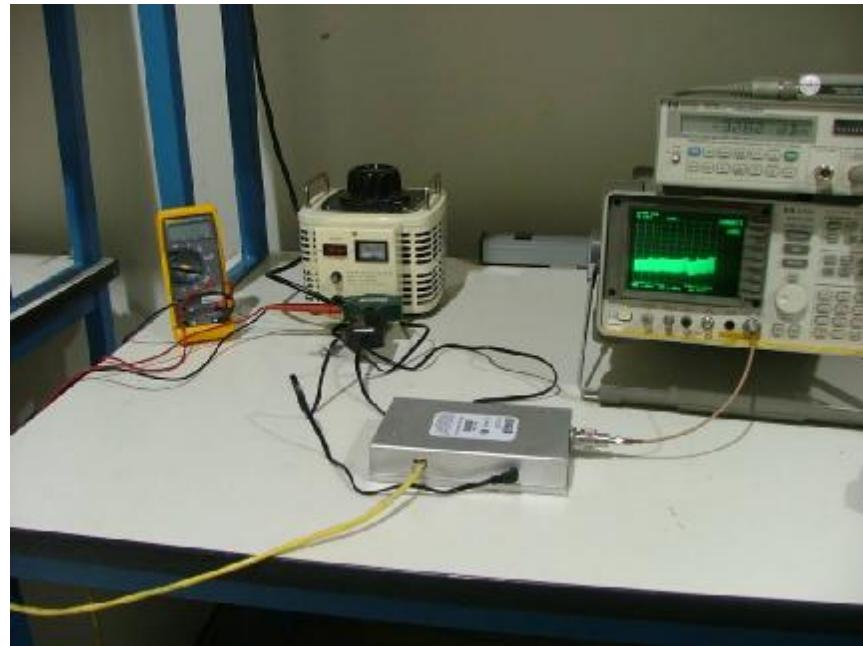


### 3.2.7 Frequency Stability: Voltage Variations

**Requirement(s):** 47 CFR §2.1055(d)(1) and §90.213

**Procedures:** The frequency stability was measured at the antenna terminal using a spectrum analyzer. The measurements were made at the 5MHz bandwidth using the frequency counter function of the spectrum analyzer. The voltage was varied from +/- 15% of the nominal.

**Setup:**



**Results:**

| Voltage (VAC) | Frequency (GHz) | ppm  |
|---------------|-----------------|------|
| 125.5         | 4.96496192      | 0.79 |
| 110           | 4.964965848     | 0    |
| 93.5          | 4.964966022     | 0.03 |

External Power Supply



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| Voltage (VAC) | Frequency (GHz) | ppm  |
|---------------|-----------------|------|
| 125.5         | 4.964966870     | 0.34 |
| 110           | 4.964968583     | 0    |
| 93.5          | 4.964967182     | 0.28 |

**Powered over Ethernet**

**Tested By:** Alvin Ilarina

**Date Tested:** 14 Mar 2005



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## 4 TEST INSTRUMENTATION

## 4.1 TEST INSTRUMENTATION



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## **APPENDIX A: EUT TEST CONDITIONS**

The following is the description of supporting equipment and details of cables used with the EUT.

| Equipment Description<br>(Including Brand Name) | Cable Description            |
|---|------------------------------|
| PC Laptop                                       | 1. Power cord<br>2. Ethernet |

|                                       |
|---------------------------------------|
| EUT Description : AIRAYA WirelessGRID |
| Model No : AI108                      |
| Serial No : 01966                     |

The following is the description of how the EUT is exercised during testing.

| Test | Description Of Operation   |
|------|--|
|      | The EUT was controlled and monitored via Ethernet by a PC running a radio test program. The data rate was set at maximum at each bandwidth to simulate worse case conditions during the equipment operation. |



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## **APPENDIX B: External Photos**

See Attachment



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## **APPENDIX C: CIRCUIT/BLOCK DIAGRAMS**

See Attachment



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## **APPENDIX D: Internal Photos**

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## **APPENDIX F: PRODUCT DESCRIPTION**

Detail description of this product is shown in the User's Guide.



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## **APPENDIX H: FCC LABEL LOCATION**

See Attachment



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## **APPENDIX I: USER MANUAL**

See Attachment