

# Compliance Testing, LLC

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http://www.ComplanceTesting.com info@ComplanceTesting.com

# Test Report

Prepared for: Wilson Electronics, Inc.

Model: 460022

## **Description: Quint Band Signal Booster**

FCC ID: PWO460022

То

# FCC Part 20

Date of Issue: December 3, 2014

On the behalf of the applicant:

Wilson Electronics, Inc. 3301 E Deseret Drive St. George, UT 84790

Attention of:

Patrick Cook, Sr Research & Development Engineer Ph: (435) 673-5021 E-Mail: pcook@infowest.com

Prepared By Compliance Testing, LLC 1724 S. Nevada Way Mesa, AZ 85204 (480) 926-3100 phone / (480) 926-3598 fax <u>www.compliancetesting.com</u> Project No: p14b0001

Mike Graffeo Project Test Engineer

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# **Test Report Revision History**

| Revision | Date             | Revised By   | Reason for Revision |
|----------|------------------|--------------|---------------------|
| 1.0      | November 7, 2014 | Mike Graffeo | Original Document   |
|          |                  |              |                     |
|          |                  |              |                     |



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# ILAC / A2LA

Compliance Testing, LLC, has been accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to the joint ISO-ILAC-IAF Communiqué dated January 2009).

The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to http://www.compliancetesting.com/labscope.html for current scope of accreditation.

Testing Certificate Number: 2152.01



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

# **Test and Measurement Data** Sub-part

2.1033(c)(14):

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations, Part 2, Subpart J and the following individual Parts: 20.21 in conjunction with latest version of KDB 935210.

# **Standard Test Conditions and Engineering Practices**

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

In accordance with ANSI/C63.4-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F), unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

| Environmental Conditions |                 |                    |  |  |  |  |  |
|--------------------------|-----------------|--------------------|--|--|--|--|--|
| Temp<br>(ºC)             | Humidity<br>(%) | Pressure<br>(mbar) |  |  |  |  |  |
| 24.9 – 31.0              | 33.5 - 63.0     | 985.5 - 943.0      |  |  |  |  |  |

Measurement results, unless otherwise noted, are worst-case measurements.

### **EUT Description**

Model: 460022

Description: Quint Band Signal Booster

#### Firmware:

#### Software:

# **Additional Information:**

The EUT is an in vehicle, Direct Contact bi-directional amplifier for the boosting of cellular phone signals and data communication devices.

The following frequency bands and emission types are utilized.

| Frequency Band<br>(MHz)  |   |           |           |             |             |  |  |  |  |
|--|---|-----------|-----------|-------------|-------------|--|--|--|--|
| Uplink         698 - 716         776 - 787         824 - 849         1850 - 1915         1710 - 1755 |   |           |           |             |             |  |  |  |  |
| Downlink   | 728 - 746   | 746 - 757 | 869 - 894 | 1930 - 1995 | 2110 - 2155 |  |  |  |  |
| Modulation Type  | Modulation TypeLTEGSM, CDMA, EDGE,<br>HSPA. EVDO, LTECDMA, HSPA, LTE,<br>EDGE, EVDO |           |           |             |             |  |  |  |  |

| Emission Designators        |  |  |  |  |  |  |  |
|-----------------------------|--|--|--|--|--|--|--|
| CDMA HSPA LTE EVDO EDGE GSM |  |  |  |  |  |  |  |
| F9W F9W G7D F9W G7W GXW     |  |  |  |  |  |  |  |

The modulation types and emission designators listed in the tables represent the modulations that the cell phone providers use for each frequency band. GSM, CDMA, and WCDMA represent all the modulation types (phase and amplitude or a combination thereof) utilized within the industry. EDGE, HSPA, LTE etc. are all protocols or multiplexing techniques using the base modulations.

# EUT Operation during Tests

The EUT was in a normal operating condition.



# **Test Result Summary**

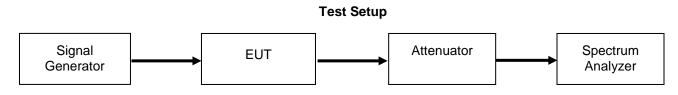
| Specification   | Test Name                       | Pass,<br>Fail, N/A | Comments   |
|---|---------------------------------|--------------------|--|
| 20.21(e)(3)   | Authorized<br>Frequency Band    | Pass               |  |
| 20.21(e)(8)(i)(B)<br>20.21(e)(8)(i)(C)<br>20.21(e)(8)(i)(D)                       | Maximum Power<br>and Gain       | Pass               |  |
| 20.21(e)(8)(i)(F)   | Intermodulation                 | Pass               |  |
| 20.21(e)(8)(i)(E)   | Out-of-Band<br>Emissions        | Pass               |  |
| 2.1051<br>22.917(a)<br>24.238((a)<br>27.53(c)<br>27.53(e)<br>27.53(f)<br>27.53(g) | Conducted Spurious<br>Emissions | Pass               |  |
| 20.21(e)(8)(i)(A)   | Noise Limits                    | Pass               | per rule 20.21e if noise is less than -70dBm/MHz<br>("Transmit Power OFF Mode") then EUT will not<br>shut off, therefore the following tests will not be<br>performed:<br>1) Variable Uplink Noise Power Tests,<br>2) Variable Downlink Noise Power Tests,<br>3) Noise timing test |
| 20.21(e)(8)(i)(l)   | Uplink Inactivity               | Pass               | per rule 20.21e if noise is less than -70dBm/MHz<br>("Transmit Power OFF Mode") then EUT will not<br>shut off, therefore this test will not be performed   |
| 20.21(e)(8)(i)(C)(1)<br>20.21(e)(8)(i)(H)<br>20.21(e)(8)(i)(C)(2)(iii) (Mobile)   | Variable Gain                   | Pass               |  |
| 2.1049  | Occupied Bandwidth              | Pass               |  |
| 20.21(e)(8)(ii)(A)  | Oscillation Detection           | Pass               |  |
| 2.1053  | Radiated Spurious               | Pass               |  |
| 20.21(e)(8)(i)(B)   | Spectrum Block<br>Filtering     | N/A                | This only applies to devices utilizing spectrum block filtering  |



Authorized Frequency Band Engineer: Mike Graffeo Test Date: 11/4/14

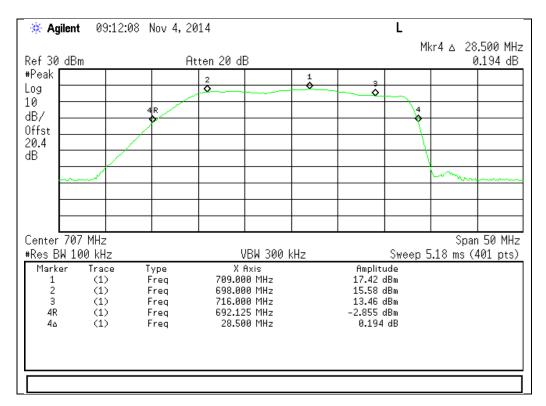
#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as needed to ensure accurate readings. A signal generator was utilized to produce a CW input signal tuned to the center channel of the operational band. The RF input level was increased to a point just prior to the AGC being in control of the power. The Signal generator was set to sweep across 2X the operational band of the EUT while the spectrum analyzer was set to MAX HOLD. Two markers were placed at the edges of the operational band and a third marker was placed at the highest point within the band no closer than 2.5 MHz from the band edge.



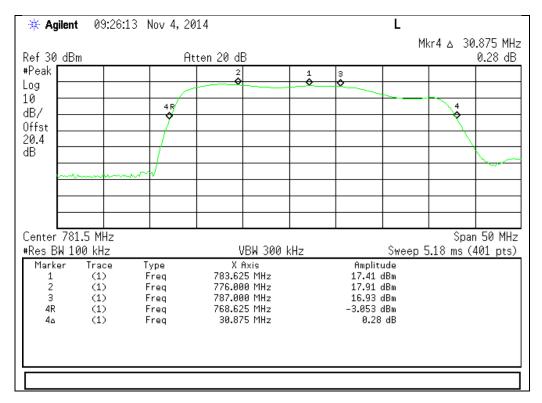


# **Uplink Test Results**

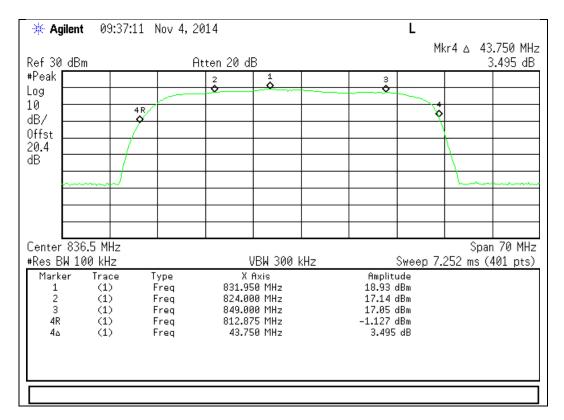


#### 698 - 716 MHz Band

776 - 787 MHz Band





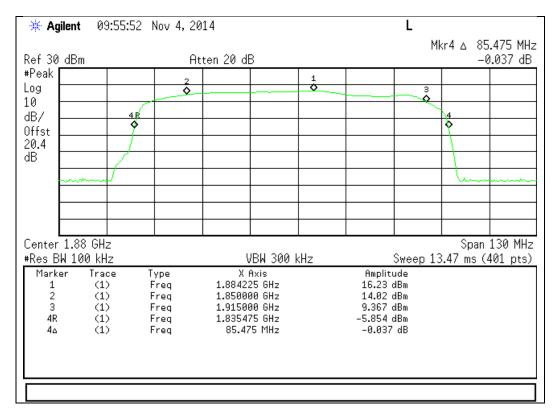


824 - 849 MHz Band

1710 - 1755 MHz Band

| 🔆 Ag          | jilent ( | 9:49:28 | Nov 4, 20    | 14          |                | L<br>Mkr4 ∆ 90.350 MHz |                    |    |                |                       |
|---------------|----------|---------|--------------|-------------|----------------|------------------------|--------------------|----|----------------|-----------------------|
| Ref 30        | dBm      |         | At           | ten 20 d    | В              | _                      |                    | M  |                | 0.350 MHZ<br>0.751 dB |
| #Peak<br>Log  |          |         |              | 2           | 1<br>©         |                        | 3                  |    |                |                       |
| 10<br>dB/     |          | 4 R     |              |             |                |                        |                    |    | 4              |                       |
| Offst<br>20.4 |          |         |              |             |                |                        |                    |    | + <sup>°</sup> |                       |
| dB            |          | 1/      |              |             |                |                        |                    |    |                |                       |
|               |          | 1       |              |             |                |                        |                    |    | \<br>\         |                       |
|               |          |         |              |             |                |                        |                    |    |                |                       |
|               | 1.732 (  |         |              |             |                |                        |                    |    |                | 130 MHz               |
|               | W 100 k  |         | _            |             | /BW 300 I      | KHZ                    |                    |    | 3.47 ms (      | 401 pts)              |
| Mark<br>1     |          |         | Type<br>Freg | X<br>1.7204 | Axis<br>7⊑ cu⊐ |                        | Amplitu<br>15.86 d |    |                |                       |
| 1<br>2<br>3   |          |         | Freq         | 1.7100      |                |                        | 13.00 0            |    |                |                       |
| 3             |          |         | Freq         | 1.7550      |                |                        | 15.14 0            |    |                |                       |
| 4R            |          |         | Freq         | 1.6886      |                |                        | -6.055 (           |    |                |                       |
| 40            | C        | 1)      | Freq         | 90.35       | 50 MHz         |                        | 0.751              | dB |                |                       |
|               |          |         |              |             |                |                        |                    |    |                |                       |
|               |          |         |              |             |                |                        |                    |    |                |                       |
|               |          |         |              |             |                |                        |                    |    |                |                       |
|               |          |         |              |             |                |                        |                    |    |                |                       |

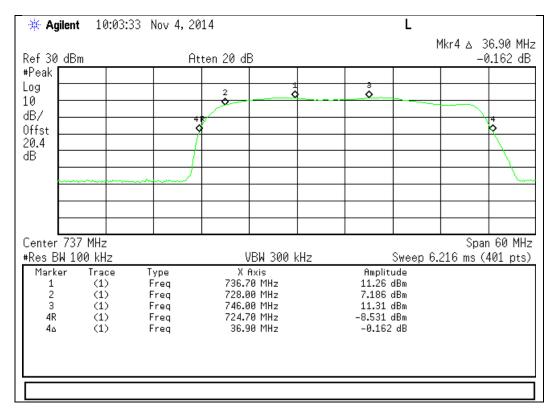




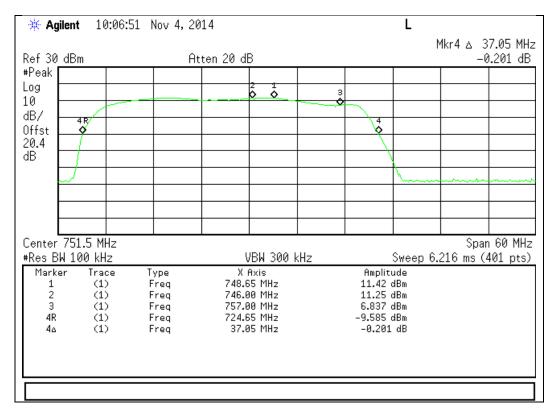
1850 - 1915 MHz Band

#### **Downlink Test Results**

#### 728 - 746 MHz Band





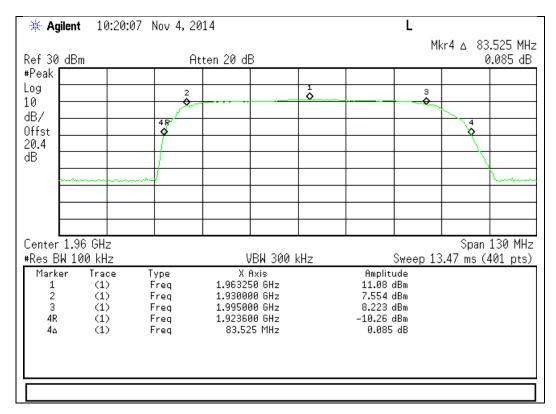


746 - 757 MHz Band

#### 869 - 894 MHz Band

| 🔆 Ag                            | j <b>ilent</b> 1 | 0:15:20        | Nov 4, 201                                   | L4                               |  | L<br>Mkr4 ∆ 39.90 MHz |   |                          |        |                       |
|---------------------------------|------------------|----------------|--|----------------------------------|--|-----------------------|---|--------------------------|--------|-----------------------|
| Ref 30                          | dBm              |                | Att  | ten 20 dB                        |  |                       |   |                          | Mkr4 ∆ | 39.90 MHz<br>0.044 dB |
| #Peak<br>Log                    |                  |                | 2  |                                  |  |                       |   | 3                        |        |                       |
| 10<br>dB/                       |                  | 48             |  |                                  |  |                       |   |                          | *      |                       |
| Offst<br>20.4<br>dB             |                  | ļ)             |  |                                  |  |                       |   |                          | Ň.     |                       |
| 45                              |                  |                |  |                                  |  |                       |   |                          |        |                       |
|                                 |                  |                |  |                                  |  |                       |   |                          |        |                       |
| Contor                          | 881.5 M          |                |  |                                  |  |                       |   |                          |        | an 60 MHz             |
| #Res B                          | W 100 kł         | Ηz             |  |                                  | /BW 300  | kHz                   |   |                          |        | (401 pts)             |
| Маrk<br>1<br>2<br>3<br>4R<br>4A | (1<br>(1<br>(1   | .)<br>.)<br>.) | Type<br>Freq<br>Freq<br>Freq<br>Freq<br>Freq | 879.5<br>869.8<br>894.8<br>859.9 | Axis<br>55 MHz<br>30 MHz<br>30 MHz<br>30 MHz<br>30 MHz |                       | Amplit<br>11.6<br>9.688<br>8.516<br>-8.814<br>0.044 | dBm<br>dBm<br>dBm<br>dBm |        |                       |
|                                 |                  |                |  |                                  |  |                       |   |                          |        |                       |





#### 1930 - 1995 MHz Band

# 2110 - 2155 MHz Band

| 🔆 Ag                            | jilent 1            | 0:25:00             | Nov 4, 20                                    | 14  |                                    |   |   | L                               |                   |                       |
|---------------------------------|---------------------|---------------------|--|---|------------------------------------|---|---|---------------------------------|-------------------|-----------------------|
| Ref 30                          | dBm                 | _                   | Att  | ten 20 di                                   | В                                  | -   |   | h                               |                   | 55000 GHz<br>.869 dBm |
| #Peak<br>Log                    |                     |                     | 2  |   |                                    |   |   | 3                               |                   |                       |
| 10<br>dB/                       |                     | 4R                  | <b>*</b>                                     |   |                                    |   |   |                                 | 5                 |                       |
| Offst<br>20.4<br>dB             | ,                   | ľ –                 |  |   |                                    |   |   |                                 |                   |                       |
| QD.                             |                     |                     |  |   |                                    |   |   |                                 |                   | <u></u>               |
|                                 |                     |                     |  |   |                                    |   |   |                                 |                   |                       |
|                                 |                     |                     |  |   |                                    |   |   |                                 |                   |                       |
|                                 | 2.132 G<br>W 100 kH |                     |  | l   | /BW 300 I                          | <hz< td=""><td></td><td>Sween</td><td>Span<br/>11.4 ms (</td><td>110 MHz<br/>(401 nts)</td></hz<> |   | Sween                           | Span<br>11.4 ms ( | 110 MHz<br>(401 nts)  |
| Mark<br>1<br>2<br>3<br>4R<br>4A |                     | ce 1<br>)<br>)<br>) | ſype<br>Freq<br>Freq<br>Freq<br>Freq<br>Freq | X<br>2.1289:<br>2.1100<br>2.1550<br>2.0904: | Axis<br>25 GHz<br>00 GHz<br>00 GHz | <b>11 I</b>   | Amplitu<br>12.34 d<br>10.15 d<br>9.869 d<br>-8.144 d<br>0.692 | 1de<br>18m<br>18m<br>18m<br>18m | 11.7 m3 (         | (101 pts)             |
|                                 |                     |                     |  |   |                                    |   |   |                                 |                   |                       |

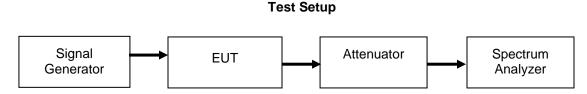


Maximum Power and Gain Engineer: Mike Graffeo Test Date: 11/4/14

#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as needed to ensure accurate readings. The spectrum analyzer and signal generator were tuned to the frequency with the highest power level in the band, as determined by the Authorized Frequency Band test. The RF input level was increased to a point just prior to the AGC being in control of the power for both pulsed single time slot GSM modulation and 4.1 MHz AWGN modulation. The maximum power was measured and verified to meet the minimum and maximum levels allowed, with the maximum gain being computed from these values. The uplink and downlink gain under each condition were verified to be within 9 dB of each other.

For Direct Contact installations the gain is fixed at 23 dB.



#### **Uplink Power Test Results**

| Frequency Band<br>(MHz)    | Input Level<br>(dBm) | Output Power<br>(dBm) | Lower Limit<br>(dBm) | Upper Limit<br>(dBm) | Result |
|----------------------------|----------------------|-----------------------|----------------------|----------------------|--------|
| 698 - 716 MHz Pulsed GSM   | 6.3                  | 24.28                 | 17                   | 30                   | Pass   |
| 698 - 716 MHz AWGN         | 6.5                  | 23.15                 | 17                   | 30                   | Pass   |
| 776 - 787 MHz Pulsed GSM   | 7.2                  | 24.35                 | 17                   | 30                   | Pass   |
| 776 - 787 MHz AWGN         | 5.0                  | 21.67                 | 17                   | 30                   | Pass   |
| 824 - 849 MHz Pulsed GSM   | 6.4                  | 24.44                 | 17                   | 30                   | Pass   |
| 824 - 849 MHz AWGN         | 3.0                  | 21.25                 | 17                   | 30                   | Pass   |
| 1710 - 1755 MHz Pulsed GSM | 7.9                  | 25.14                 | 17                   | 30                   | Pass   |
| 1710 - 1755 MHz AWGN       | 6.2                  | 22.09                 | 17                   | 30                   | Pass   |
| 1850 – 1915 MHz Pulsed GSM | 8.0                  | 24.25                 | 17                   | 30                   | Pass   |
| 1850 - 1915 MHz AWGN       | 4.2                  | 20.08                 | 17                   | 30                   | Pass   |



| Frequency Band<br>(MHz)    | Input Level<br>(dBm) | Output Power<br>(dBm) | Upper Limit<br>(dBm) | Result |
|----------------------------|----------------------|-----------------------|----------------------|--------|
| 728 - 746 MHz Pulsed GSM   | -8.4                 | 10.84                 | 17                   | Pass   |
| 728 - 746 MHz AWGN         | -9.0                 | 10.24                 | 17                   | Pass   |
| 746 - 757 MHz Pulsed GSM   | -8.1                 | 11.23                 | 17                   | Pass   |
| 746 - 757 MHz AWGN         | -8.8                 | 10.26                 | 17                   | Pass   |
| 869 - 894 MHz Pulsed GSM   | -7.5                 | 11.72                 | 17                   | Pass   |
| 869 - 894 MHz AWGN         | -7.1                 | 11.31                 | 17                   | Pass   |
| 1930 - 1995 MHz Pulsed GSM | -6.6                 | 10.96                 | 17                   | Pass   |
| 1930 - 1995 MHz AWGN       | -6.9                 | 10.27                 | 17                   | Pass   |
| 2110 - 2155 MHz Pulsed GSM | -6.6                 | 12.35                 | 17                   | Pass   |
| 2110 - 2155 MHz AWGN       | -7.1                 | 11.13                 | 17                   | Pass   |

#### **Downlink Power Test Results**

# Uplink and Downlink Gain Test Results

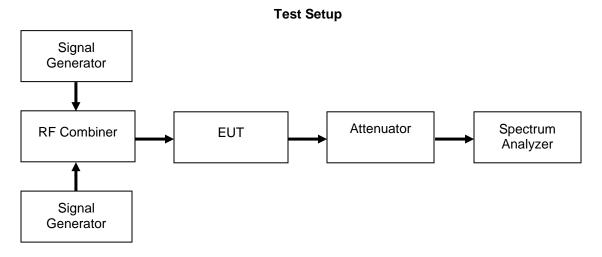
| Modulation | Uplink<br>Frequency<br>(MHz) | Downlink<br>Frequency<br>(MHz) | Uplink<br>Gain<br>(dB) | Uplink<br>Limit<br>(dB) | Downlink<br>Gain<br>(dB) | Downlink<br>Limit<br>(dB) | Delta<br>(dB) | Limit<br>(dB) | Margin<br>(dB) |
|------------|------------------------------|--------------------------------|------------------------|-------------------------|--------------------------|---------------------------|---------------|---------------|----------------|
| Pulsed GSM | 709                          | 736.7                          | 17.98                  | 23                      | 19.2                     | 23                        | 1.26          | 9             | -7.74          |
| AWGN       | 709                          | 736.7                          | 16.65                  | 23                      | 19.2                     | 23                        | 2.59          | 9             | -6.41          |
| Pulsed GSM | 783.63                       | 748.65                         | 17.15                  | 23                      | 19.3                     | 23                        | 2.18          | 9             | -6.82          |
| AWGN       | 783.63                       | 748.65                         | 16.67                  | 23                      | 19.1                     | 23                        | 2.39          | 9             | -6.61          |
| Pulsed GSM | 831.95                       | 879.5                          | 18.04                  | 23                      | 19.2                     | 23                        | 1.18          | 9             | -7.82          |
| AWGN       | 831.95                       | 879.5                          | 18.25                  | 23                      | 18.4                     | 23                        | 0.16          | 9             | -8.84          |
| Pulsed GSM | 1720.5                       | 2128.9                         | 17.24                  | 23                      | 19.0                     | 23                        | 1.71          | 9             | -7.29          |
| AWGN       | 1720.5                       | 2128.9                         | 15.89                  | 23                      | 18.2                     | 23                        | 2.34          | 9             | -6.66          |
| Pulsed GSM | 1884.2                       | 1963.3                         | 16.25                  | 23                      | 17.6                     | 23                        | 1.31          | 9             | -7.69          |
| AWGN       | 1884.2                       | 1963.3                         | 15.88                  | 23                      | 17.2                     | 23                        | 1.29          | 9             | -7.71          |



Intermodulation Engineer: Mike Graffeo Test Date: 11/4/14

#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator. Two signal generators were utilized to produce two CW signals 600 kHz apart and centered in the operational band. Attenuator and cable insertion loss correction factors were input to either the signal generator or the spectrum analyzer as required to ensure that accurate measurements were recorded. The input power was set at the maximum allowable power and the RMS intermodulation products were measured to ensure they were less than -19 dBm in a 3 kHz RBW. The uplink and downlink intermodulation products were plotted, with the levels being listed in the summary tables.



#### **Uplink Test Results**

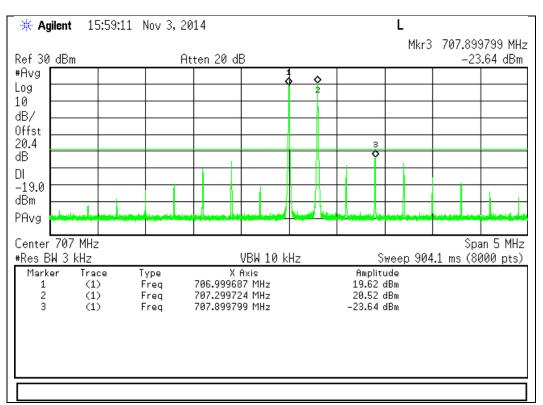
| Frequency Band<br>(MHz) | Intermodulation Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|--------------------------------|----------------|--------|
| 698 - 716 MHz           | -23.64                         | -19            | Pass   |
| 776 - 787 MHz           | -20.49                         | -19            | Pass   |
| 824 - 849 MHz           | -19.44                         | -19            | Pass   |
| 1710 - 1755 MHz         | -19.16                         | -19            | Pass   |
| 1850 - 1915 MHz         | -20.46                         | -19            | Pass   |

#### **Downlink Test Results**

| Frequency Band<br>(MHz) | Intermodulation Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|--------------------------------|----------------|--------|
| 728 - 746 MHz           | -20.66                         | -19            | Pass   |
| 746 - 757 MHz           | -24.98                         | -19            | Pass   |
| 869 - 894 MHz           | -22.41                         | -19            | Pass   |
| 1930 - 1995 MHz         | -20.65                         | -19            | Pass   |
| 2110 - 2155 MHz         | -20.32                         | -19            | Pass   |

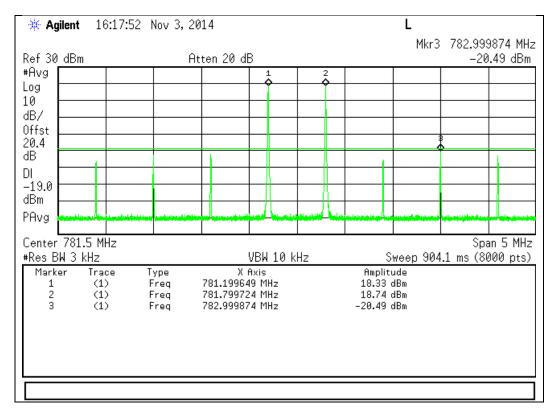


# **Uplink Test Results**

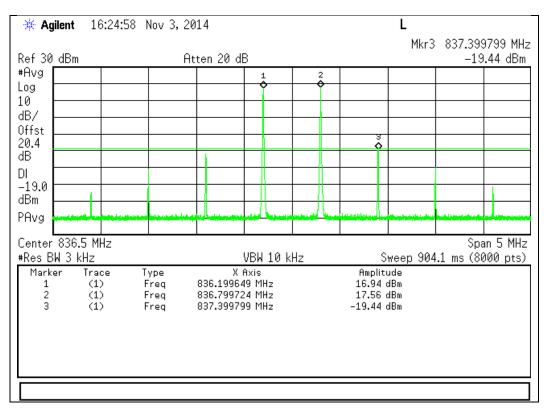


698 - 716 MHz Band

#### 776 - 787 MHz Band

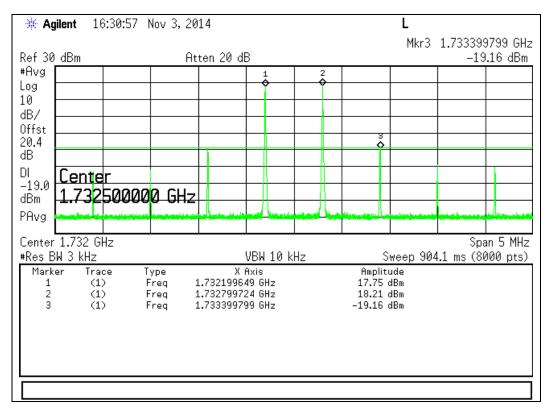




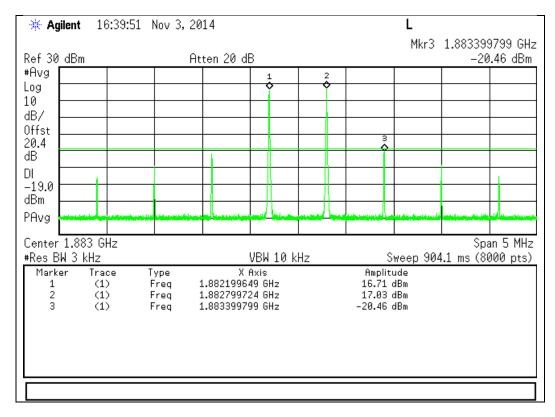


#### 824 - 849 MHz Band

#### 1710 - 1755 MHz Band



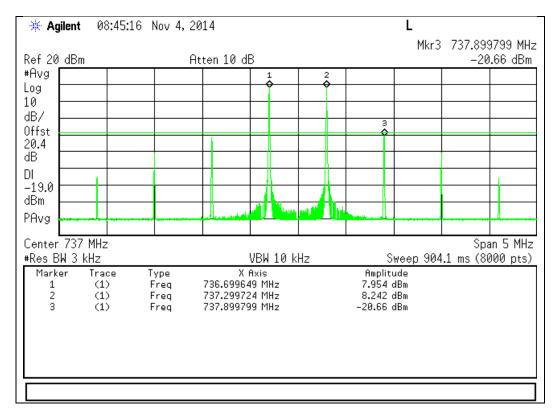




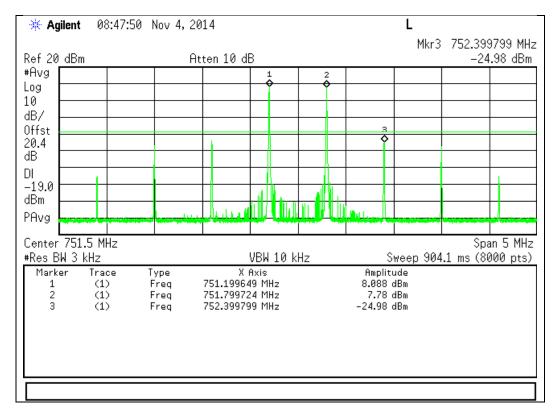
1850 - 1915 MHz Band

#### **Downlink Test Results**

#### 728 - 746 MHz Band

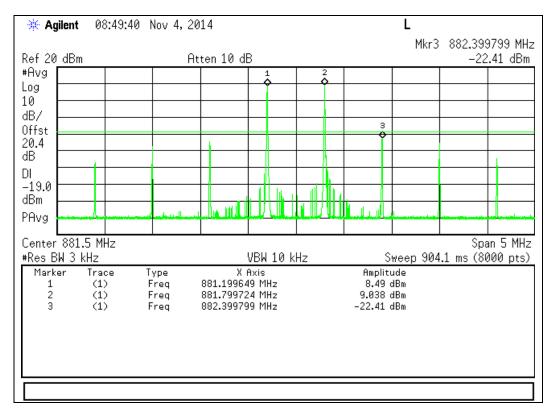




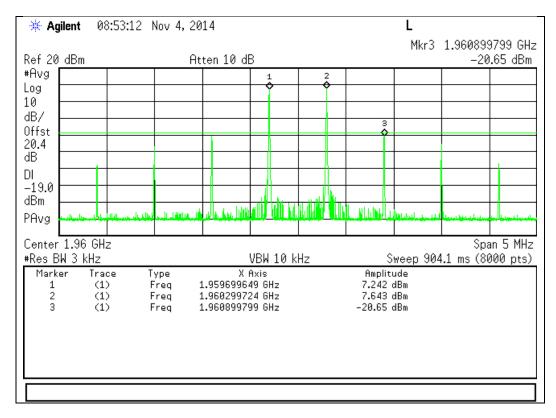


746 - 757 MHz Band

#### 869 - 894 MHz Band

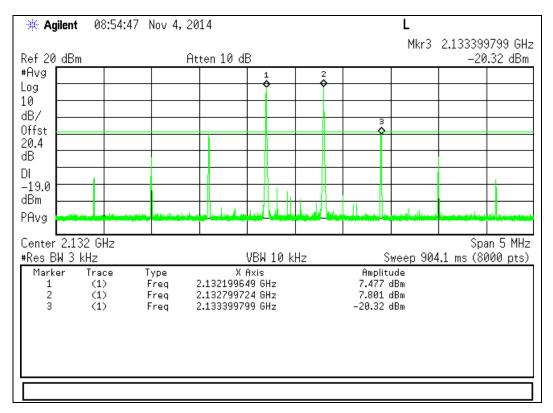






#### 1930 - 1995 MHz Band

#### 2110 - 2155 MHz Band





Out-of-Band Emissions Engineer: Mike Graffeo Test Date: 11/4/14

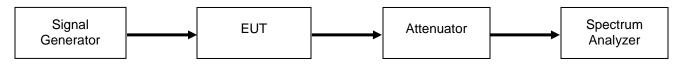
## **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor in order to ensure accurate readings. A signal generator was utilized to produce the following signals: GSM, CDMA, and WCDMA. The signal generator was tuned to the lowest allowable lower channel and highest allowable upper channel within the EUT operational band for each respective modulation type. The RF input level was increased to a point just prior to the AGC being in control of the power. For each modulation type the Out of Band Emissions were measured to ensure they met the limits.

The following formula was used for calculating the limits:

Limit = P1 - 6 - (43+10Log(P2)) = -19dBmP1 = power in dBm P2 = power in Watts







| Frequency Band<br>(MHz) | Band Edge    | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|--------------|-------------------------|----------------|--------|
| 698 - 716               | Lower        | -21.15                  | -19            | Pass   |
| 698 - 716               | Upper        | -23.33                  | -19            | Pass   |
| 776 - 787               | Lower        | -21.07                  | -19            | Pass   |
| 776 - 787               | Upper -23.01 |                         | -19            | Pass   |
| 824 - 849               | Lower        | -31.27                  | -19            | Pass   |
| 824 - 849               | Upper        | -36.21                  | -19            | Pass   |
| 1710 - 1755             | Lower        | -41.12                  | -19            | Pass   |
| 1710 - 1755             | Upper        | -35.67                  | -19            | Pass   |
| 1850 - 1915             | Lower        | -51.77                  | -19            | Pass   |
| 1850 - 1915             | Upper        | -40.49                  | -19            | Pass   |

# **GSM Uplink Test Results**

# **CDMA Uplink Test Results**

| Frequency Band<br>(MHz) | Band Edge | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------|-------------------------|----------------|--------|
| 698 - 716               | Lower     | -38.30                  | -19            | Pass   |
| 698 - 716               | Upper     | -42.45                  | -19            | Pass   |
| 776 - 787               | Lower     | -37.62                  | -19            | Pass   |
| 776 - 787               | Upper     | -36.04                  | -19            | Pass   |
| 824 - 849               | Lower     | -38.62                  | -19            | Pass   |
| 824 - 849               | Upper     | -39.47                  | -19            | Pass   |
| 1710 - 1755             | Lower     | -37.50                  | -19            | Pass   |
| 1710 - 1755             | Upper     | -37.95                  | -19            | Pass   |
| 1850 - 1915             | Lower     | -38.42                  | -19            | Pass   |
| 1850 - 1915             | Upper     | -47.21                  | -19            | Pass   |



| Frequency Band<br>(MHz) | Band Edge | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------|-------------------------|----------------|--------|
| 698 - 716               | Lower     | -45.74                  | -19            | Pass   |
| 698 - 716               | Upper     | -45.59                  | -19            | Pass   |
| 776 - 787               | Lower     | -41.60                  | -19            | Pass   |
| 776 - 787               | Upper     | -38.89                  | -19            | Pass   |
| 824 - 849               | Lower     | -39.94                  | -19            | Pass   |
| 824 - 849               | Upper     | -38.17                  | -19            | Pass   |
| 1710 - 1755             | Lower     | -33.25                  | -19            | Pass   |
| 1710 - 1755             | Upper     | -33.76                  | -19            | Pass   |
| 1850 - 1915             | Lower     | -34.53                  | -19            | Pass   |
| 1850 - 1915             | Upper     | -42.32                  | -19            | Pass   |

# WCDMA Uplink Test Results

# **GSM** Downlink Test Results

| Frequency Band<br>(MHz) | Band Edge | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------|-------------------------|----------------|--------|
| 728 - 746               | Lower     | -35.91                  | -19            | Pass   |
| 728 - 746               | Upper     | -29.10                  | -19            | Pass   |
| 746 - 757               | Lower     | -31.60                  | -19            | Pass   |
| 746 - 757               | Upper     | -35.54                  | -19            | Pass   |
| 869 - 894               | Lower     | -41.99                  | -19            | Pass   |
| 869 - 894               | Upper     | -39.75                  | -19            | Pass   |
| 1930 - 1995             | Lower     | -44.83                  | -19            | Pass   |
| 1930 - 1995             | Upper     | -43.64                  | -19            | Pass   |
| 2110 - 2155             | Lower     | -42.43                  | -19            | Pass   |
| 2110 - 2155             | Upper     | -42.54                  | -19            | Pass   |



| Frequency Band<br>(MHz) | Band Edge | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------|-------------------------|----------------|--------|
| 728 - 746               | Lower     | -43.42                  | -19            | Pass   |
| 728 - 746               | Upper     | -39.43                  | -19            | Pass   |
| 746 - 757               | Lower     | -37.77                  | -19            | Pass   |
| 746 - 757               | Upper     | -47.67                  | -19            | Pass   |
| 869 - 894               | Lower     | -52.62                  | -19            | Pass   |
| 869 - 894               | Upper     | -43.89                  | -19            | Pass   |
| 1930 - 1995             | Lower     | -49.30                  | -19            | Pass   |
| 1930 - 1995             | Upper     | -48.75                  | -19            | Pass   |
| 2110 - 2155             | Lower     | -44.93                  | -19            | Pass   |
| 2110 - 2155             | Upper     | -45.42                  | -19            | Pass   |

#### **CDMA Downlink Test Results**

# WCDMA Downlink Test Results

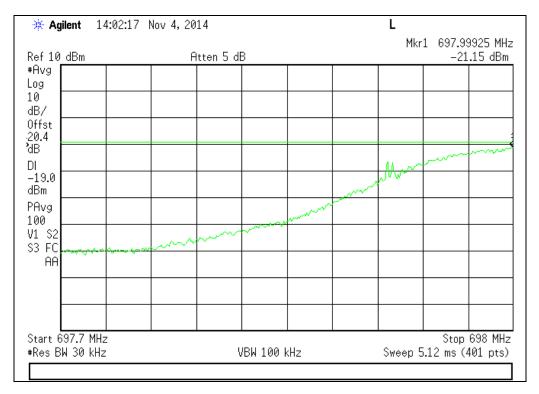
| Frequency Band<br>(MHz) | Band Edge | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------|-------------------------|----------------|--------|
| 728 - 746               | Lower     | -37.91                  | -19            | Pass   |
| 728 - 746               | Upper     | -33.51                  | -19            | Pass   |
| 746 - 757               | Lower     | -43.55                  | -19            | Pass   |
| 746 - 757               | Upper     | Upper -49.66 -19        |                | Pass   |
| 869 - 894               | Lower     | -48.28                  | -19            | Pass   |
| 869 - 894               | Upper     | -43.35                  | -19            | Pass   |
| 1930 - 1995             | Lower     | -43.74                  | -19            | Pass   |
| 1930 - 1995             | Upper     | -41.98                  | -19            | Pass   |
| 2110 - 2155             | Lower     | -39.27                  | -19            | Pass   |
| 2110 - 2155             | Upper     | -39.65                  | -19            | Pass   |

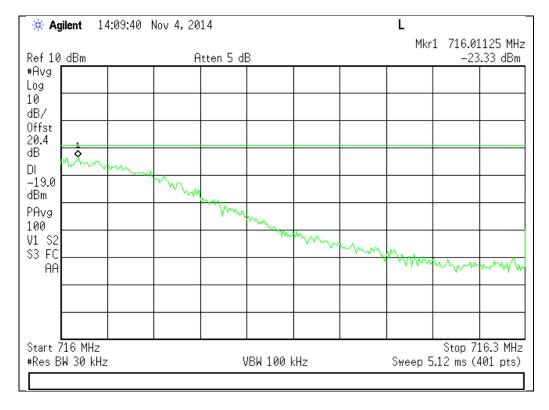


# GSM Uplink Test Plots

# 698 - 716 MHz Band

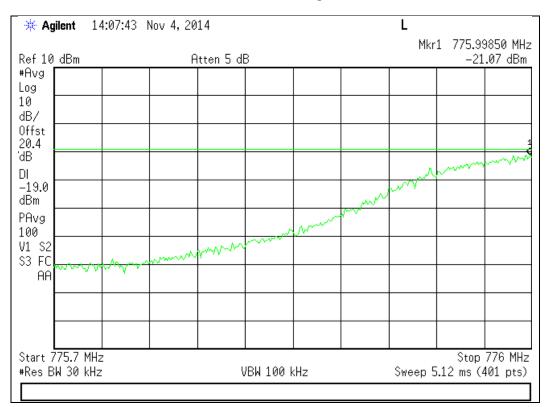
#### Lower Band Edge





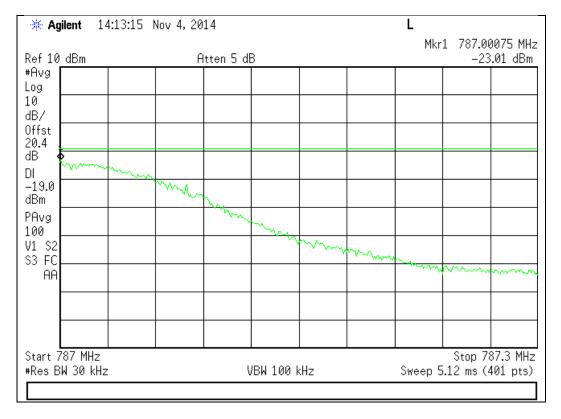


# 776 - 787 MHz Band



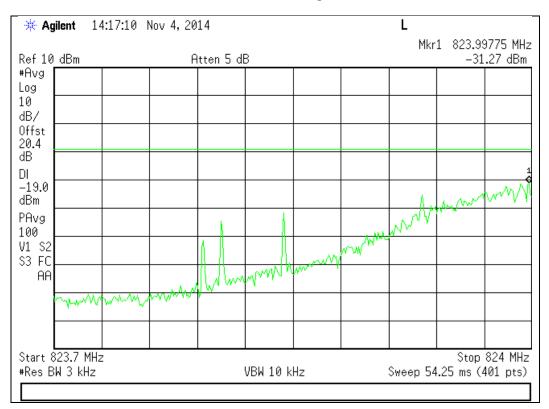
#### Lower Band Edge

**Upper Band Edge** 



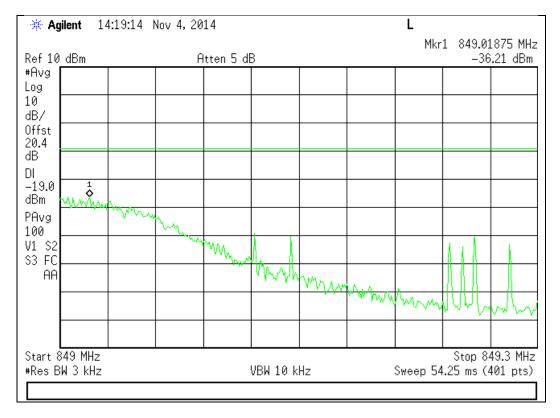


### 824 - 849 MHz Band



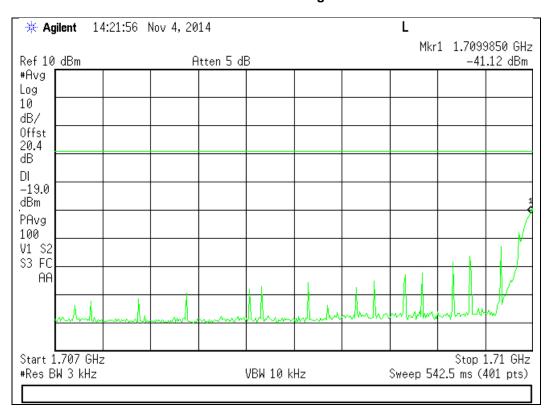
#### Lower Band Edge

Upper Band Edge



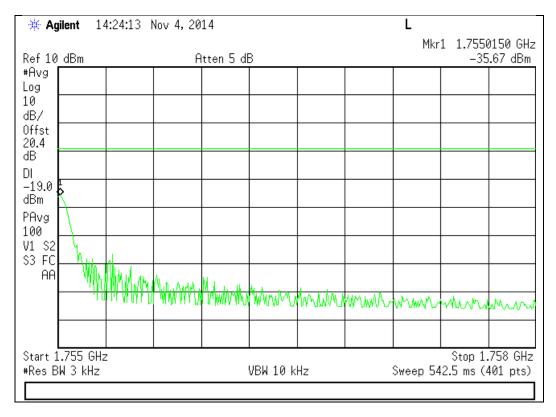


# 1710 - 1755 MHz Band



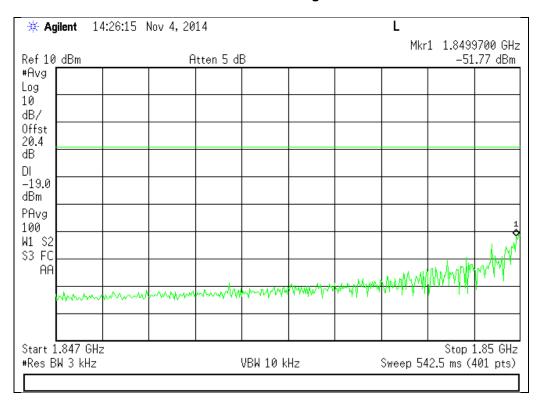
# Lower Band Edge

Upper Band Edge

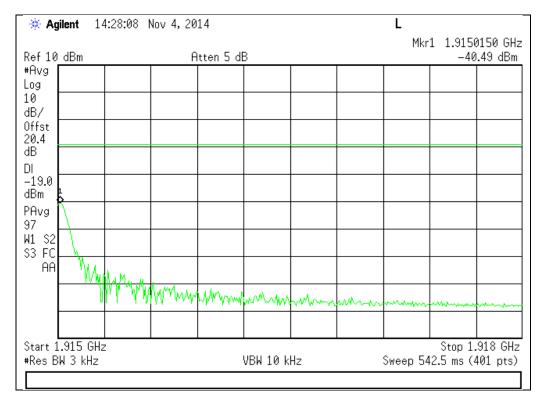




# 1850 - 1915 MHz Band



# Lower Band Edge

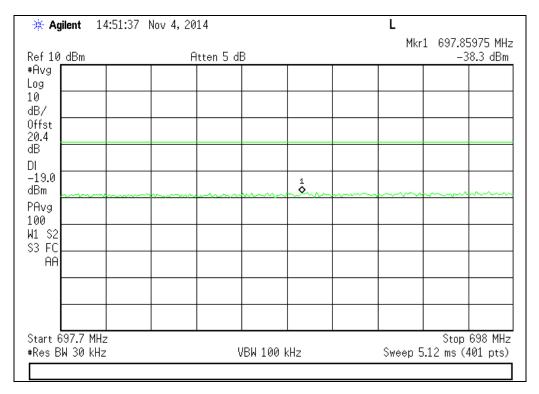




# CDMA Uplink Test Plots

# 698 - 716 MHz Band

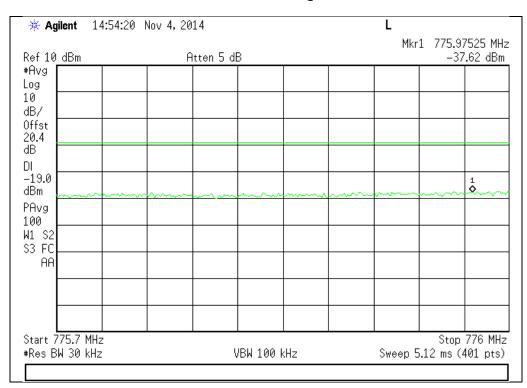
#### Lower Band Edge



| ₩ Agilent 14:52:52 Nov 4, 2 | 014                                       |   | L         |                             |
|-----------------------------|---|---|-----------|-----------------------------|
|                             | Atten 5 dB                                |   | Mkr1      | 716.11025 MHz<br>-42.45 dBm |
| #Avg<br>Log                 |   |   |           |                             |
| 10<br>dB/                   |   |   |           |                             |
| Offst<br>20.4               |   |   |           |                             |
| dB                          |   |   |           |                             |
| DI<br>-19.0<br>dBm          |   |   |           |                             |
| PAvg                        | 1<br>•••••••••••••••••••••••••••••••••••• | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |           |                             |
| 100<br>W1 S2                |   |   |           |                             |
| S3 FC                       |   |   |           |                             |
|                             |   |   |           |                             |
|                             |   |   |           |                             |
| Start 716 MHz               |   |   |           | Stop 716.3 MHz              |
| #Res BW 30 kHz              | VBW 100 kHz                               | 2                                       | Sweep 5.1 | .2 ms (401 pts)             |
|                             |   |   |           |                             |



# 776 - 787 MHz Band

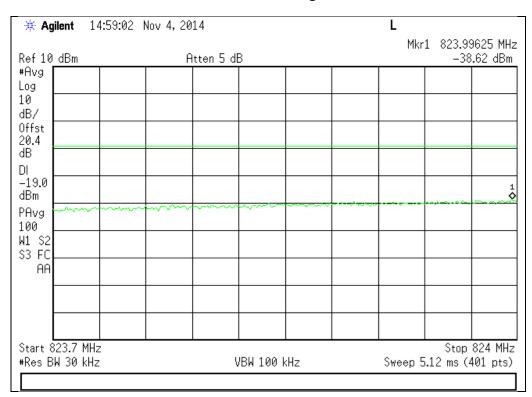


# Lower Band Edge

| 🔆 Agilent                  | 14:55:16 | lov 4, 2014 |           |     |      | L       | 1 707 00            |                      |
|----------------------------|----------|-------------|-----------|-----|------|---------|---------------------|----------------------|
| Ref 10_dBm                 |          | Atten 5 (   | dB        |     |      | Mkr     |                     | )150 MHz<br>.04 dBm  |
| #Avg<br>Log                |          |             |           |     |      |         |                     |                      |
| 10<br>dB/                  |          |             |           |     |      |         |                     |                      |
| Offst                      |          |             |           |     |      |         |                     |                      |
| 20.4                       |          |             |           |     |      |         |                     |                      |
| DI                         |          |             |           |     |      |         |                     |                      |
| dBm K~~~~                  |          |             |           |     | ~~~~ | ·····   | ······              | ~~~~                 |
| PAvg<br>100                |          |             |           |     |      |         |                     |                      |
| W1 S2                      |          |             |           |     |      |         |                     |                      |
| S3 FC                      |          |             |           |     |      |         |                     |                      |
|                            |          |             |           |     |      |         |                     |                      |
|                            |          |             |           |     |      |         |                     |                      |
|                            |          |             |           |     |      |         | Star 74             | 7.2 MIL-             |
| Start 787 MH<br>#Res BW 30 |          |             | VBW 100 H | кНz |      | Sweep 5 | Stop /≀<br>12 ms (4 | 37.3 MHz<br>401 pts) |
|                            |          |             |           |     |      |         |                     |                      |



# 824 - 849 MHz Band

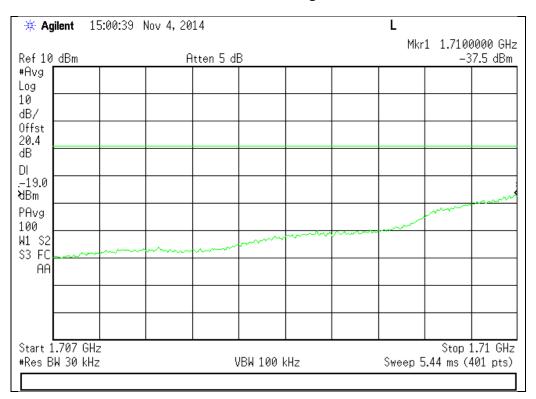


# Lower Band Edge

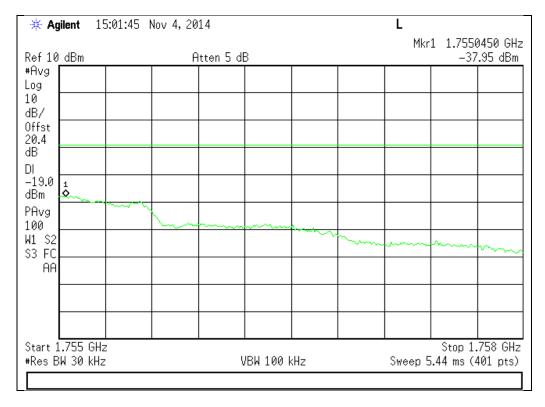
| 🔆 Ag         | ₩ Agilent 14:57:56 Nov 4, 2014 |               |   |           |           |       |       | L       | 1 0/0 0    | 0450 MHz |
|--------------|--------------------------------|---------------|---|-----------|-----------|-------|-------|---------|------------|----------|
| Ref 10       | dBm                            |               | A | tten 5 di | В         |       |       | PIKI    |            | 1.47 dBm |
| #Avg<br>Log  |                                |               |   |           |           |       |       |         |            |          |
| 10           |                                |               |   |           |           |       |       |         |            |          |
| dB/<br>Offst |                                |               |   |           |           |       |       |         |            |          |
| 20.4<br>dB   |                                |               |   |           |           |       |       |         |            |          |
| DI           |                                |               |   |           |           |       |       |         |            |          |
| -19.0<br>dBm | 1<br><b>◊</b>                  |               |   |           |           |       |       |         |            |          |
| PAvg         | ×                              | ( <del></del> |   |           | ~~~~~     | ~~~~~ | ~~~~~ |         |            |          |
| 100<br>W1 S2 |                                |               |   |           |           |       |       |         |            |          |
| S3 FC        |                                |               |   |           |           |       |       |         |            |          |
| AA           |                                |               |   |           |           |       |       |         |            |          |
|              |                                |               |   |           |           |       |       |         |            |          |
|              |                                |               |   |           |           |       |       |         |            |          |
| Start 8      |                                |               | 1 |           |           |       | I     |         |            | 49.3 MHz |
| #Res B       | W 30 k                         | :Hz           |   | (         | /BW 100 H | (Hz   |       | Sweep 5 | 5.12 ms (4 | 401 pts) |
|              |                                |               |   |           |           |       |       |         |            |          |



# 1710 - 1755 MHz Band

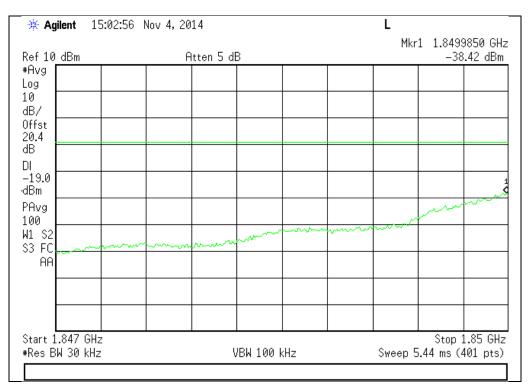


#### Lower Band Edge

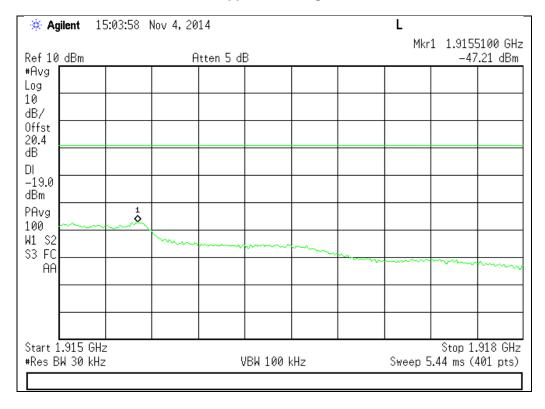




### 1850 - 1915 MHz Band

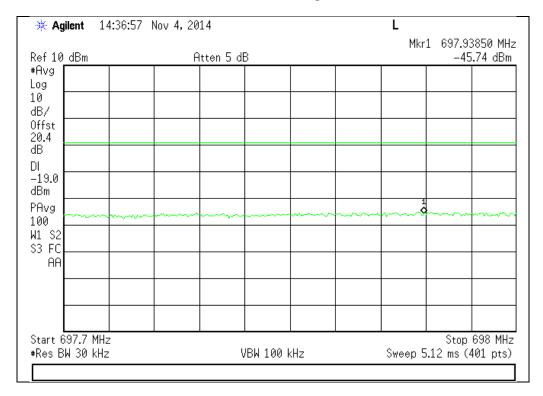


#### Lower Band Edge





#### WCDMA Uplink Test Plots 698 - 716 MHz Band Lower Band Edge

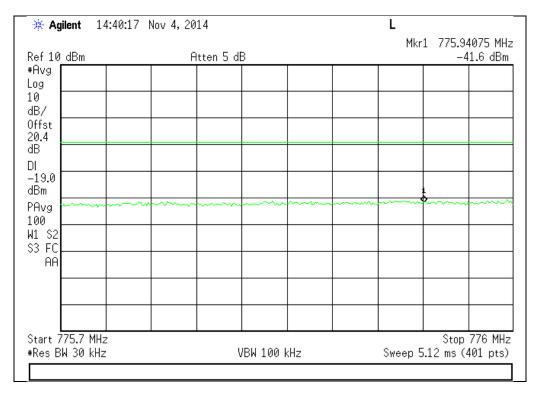


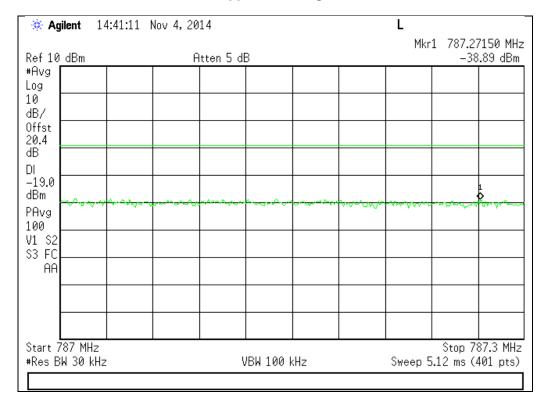
| i∰ Ag         |  | 4:38:38 1 | Nov 4, 20 |           |   |  |  | L<br>Mkr |         | 5900 MHz |
|---------------|--|-----------|-----------|-----------|---|--|--|----------|---------|----------|
| Ref 10        | dBm  |           | A         | tten 5 di | 3 |  |  |          | -45     | 59 dBm   |
| #Avg          |  |           |           |           |   |  |  |          |         |          |
| Log           |  |           |           |           |   |  |  |          |         |          |
| 10            |  |           |           |           |   |  |  |          |         |          |
| dB/           |  |           |           |           |   |  |  |          |         |          |
| Offst<br>20.4 |  |           |           |           |   |  |  |          |         |          |
| 20.4<br>dB    |  |           |           |           |   |  |  |          |         |          |
| DI            |  |           |           |           |   |  |  |          |         |          |
| -19.0         |  |           |           |           |   |  |  |          |         |          |
| dBm           |  |           |           |           |   |  |  |          |         |          |
| PAvg          |  |           |           |           |   |  |  |          |         |          |
| 100           |  |           |           |           |   |  |  |          |         |          |
| W1 S2         |  |           |           |           |   |  |  |          |         |          |
| S3 FC         |  |           |           |           |   |  |  |          |         |          |
| AA            |  |           |           |           |   |  |  |          |         |          |
|               |  |           |           |           |   |  |  |          |         |          |
|               |  |           |           |           |   |  |  |          |         |          |
|               |  |           |           |           |   |  |  |          |         |          |
|               |  |           |           |           |   |  |  |          |         |          |
|               | 716 MHz  |           |           |           |   |  |  |          | Stop 73 | 16.3 MHz |
| #Res B        | #Res BW 30 kHz VBW 100 kHz Sweep 5.12 ms (401 pts) |           |           |           |   |  |  |          |         |          |
|               |  |           |           |           |   |  |  |          |         |          |



# 776 - 787 MHz Band

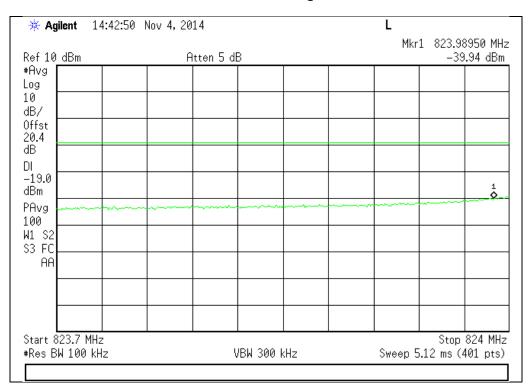
#### Lower Band Edge







#### 824 - 849 MHz Band



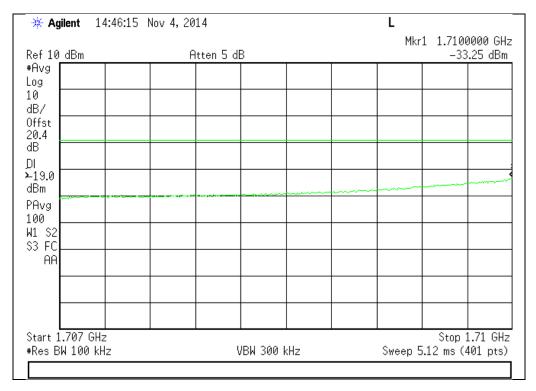
#### Lower Band Edge

| <b>₩ Agilent</b> 14:44:14 N | Nov 4, 2014 |     | L            |                           |
|-----------------------------|-------------|-----|--------------|---------------------------|
| Ref 10_dBm                  | Atten 5 dB  |     | Mkrl 84      | 9.00000 MHz<br>-38.17 dBm |
| #Avg<br>Log                 |             |     |              |                           |
| 10<br>dB/                   |             |     |              |                           |
| Offst<br>20.4               |             |     |              |                           |
| dB<br>DI                    |             |     |              |                           |
| -19.0<br>dBm •              |             |     |              |                           |
| PAvg                        |             |     |              |                           |
| 100<br>W1 S2                |             |     |              |                           |
| S3 FC                       |             |     |              |                           |
|                             |             |     |              |                           |
|                             |             |     |              |                           |
| Start 849 MHz               |             |     | 0+2          | p 849.3 MHz               |
| #Res BW 100 kHz             | VBW 300 H   | (Hz | Sweep 5.12 m |                           |
|                             |             |     |              |                           |



#### 1710 - 1755 MHz Band

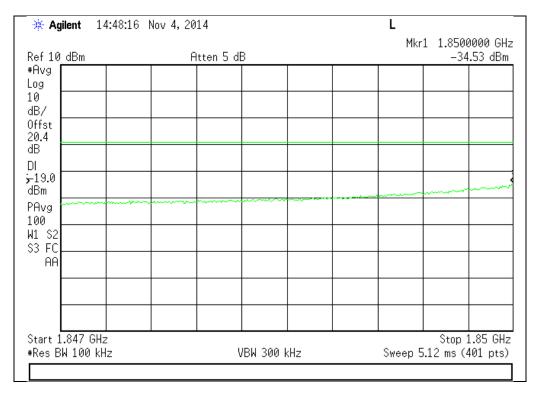
#### Lower Band Edge



| 🔆 Agilent 14:47:05                 | Nov 4, 2014 | L   |
|------------------------------------|-------------|---|
| Ref 10 dBm                         | Atten 5 dB  | Mkr1 1.7550000 GHz<br>–33.76 dBm            |
| #Avg<br>Log                        |             |   |
| 10<br>dB/                          |             |   |
| Offst<br>20.4                      |             |   |
| dB                                 |             |   |
| DI<br>-19.0                        |             |   |
| dBm PAvg                           |             |   |
| 100<br>W1 S2                       |             |   |
| \$3 FC                             |             |   |
| AA                                 |             |   |
|                                    |             |   |
|                                    |             |   |
| Start 1.755 GHz<br>#Res BW 100 kHz | VBW 300 kHz | Stop 1.758 GHz<br>z Sweep 5.12 ms (401 pts) |
|                                    |             |   |



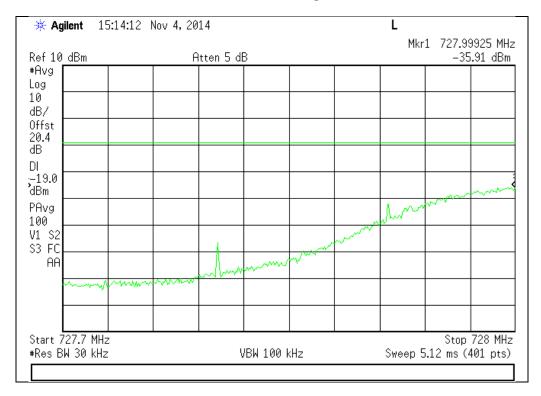
#### Lower Band Edge



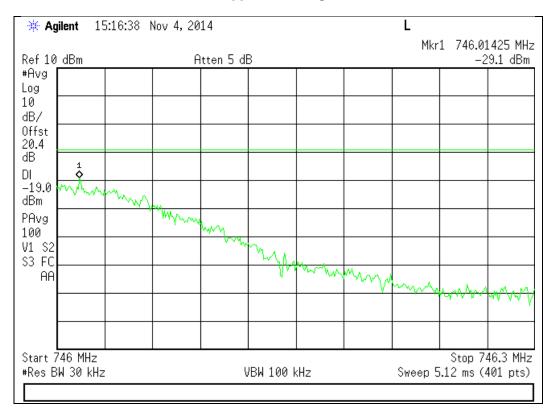
| 🔆 🔆 Agilent 14:49:03 Nov           | 4,2014     |       | L                                      | -                                      |
|------------------------------------|------------|-------|--|--|
| Ref 10_dBm                         | Atten 5 dB |       | Mkr1                                   | 1.9150300 GHz<br>-42.32 dBm            |
| #Avg<br>Log                        |            |       |  |  |
| 10<br>dB/                          |            |       |  |  |
| Offst<br>20.4                      |            |       |  |  |
| dB<br>DI                           |            |       |  |  |
| -19.0                              |            |       |  |  |
| PAvg<br>100                        |            |       |  |  |
| W1 S2                              |            | ····· | ************************************** | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |
| S3 FC                              |            |       |  |  |
|                                    |            |       |  |  |
|                                    |            |       |  |  |
| Start 1.915 GHz<br>#Res BW 100 kHz | VBW 300 1  | r r   | Sweep 5.                               | Stop 1.918 GHz<br>12 ms (401 pts)      |
|                                    |            |       |  |  |



#### GSM Downlink Test Plots 728 - 746 MHz Band Lower Band Edge

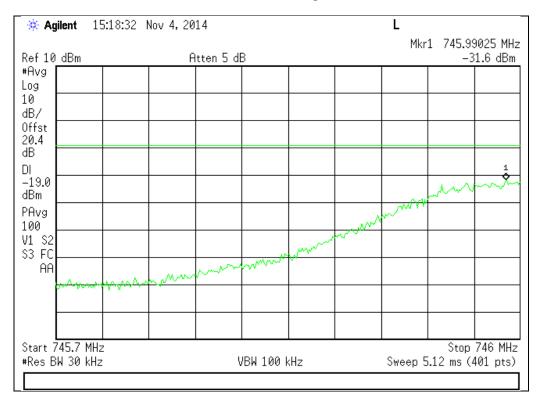


**Upper Band Edge** 



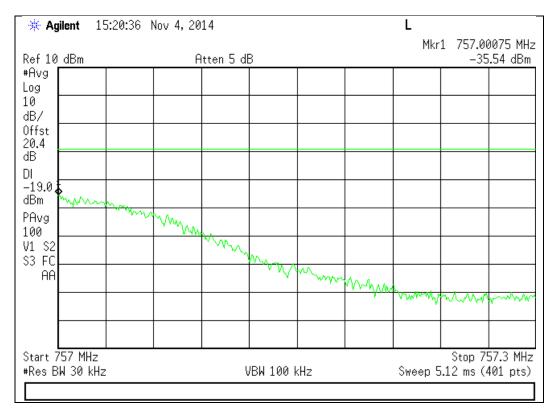


#### 746 - 757 MHz Band



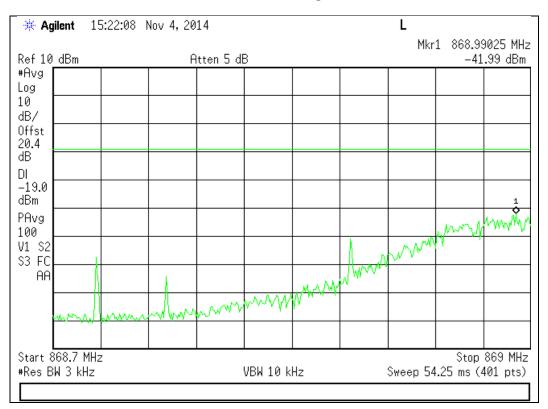
#### Lower Band Edge

Upper Band Edge



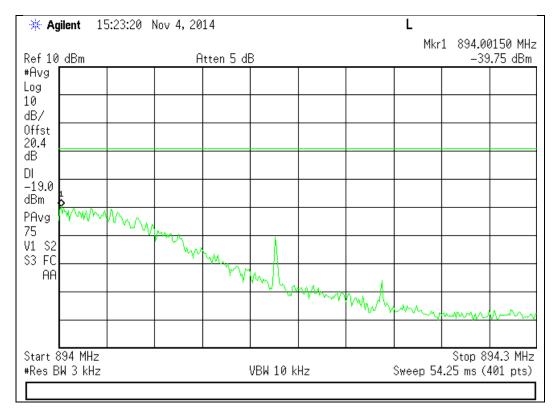


#### 869 - 894 MHz Band

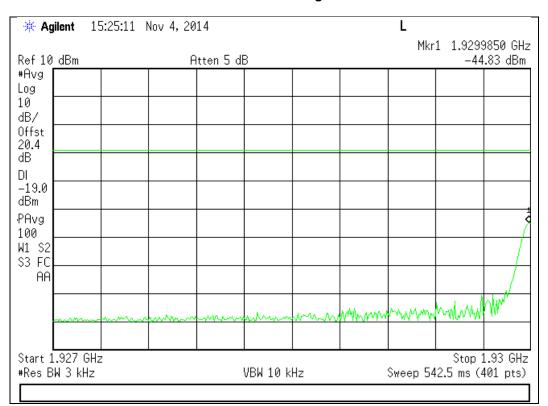


#### Lower Band Edge

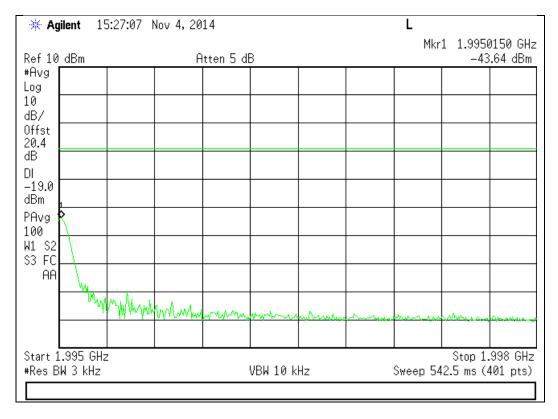
Upper Band Edge





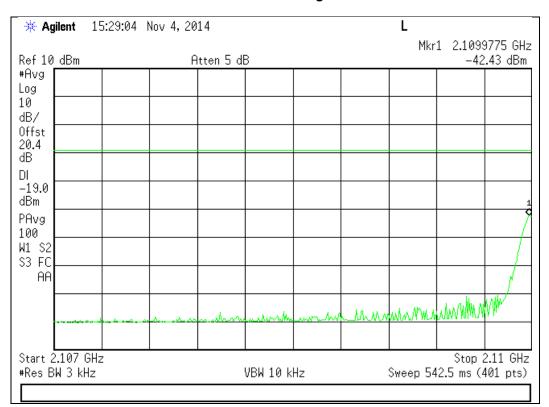


#### Lower Band Edge

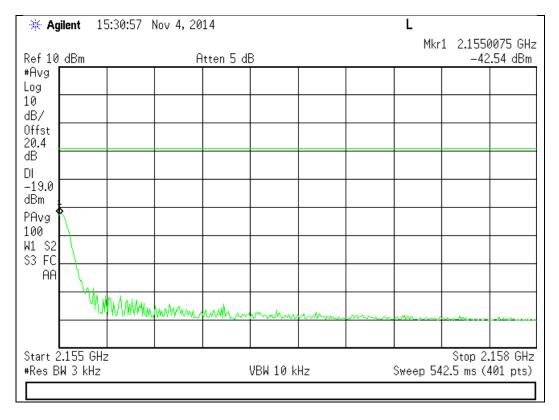




#### 2110 - 2155 MHz Band



#### Lower Band Edge

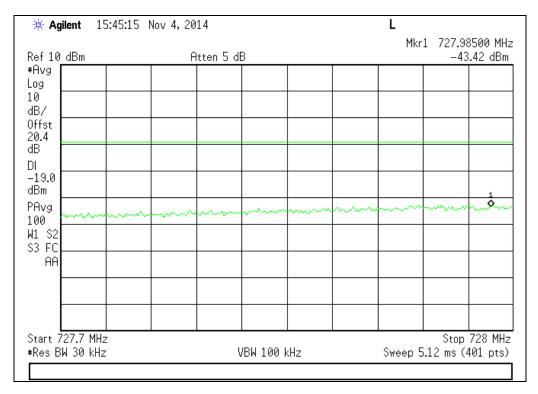




#### **CDMA Downlink Test Plots**

#### 728 - 746 MHz Band

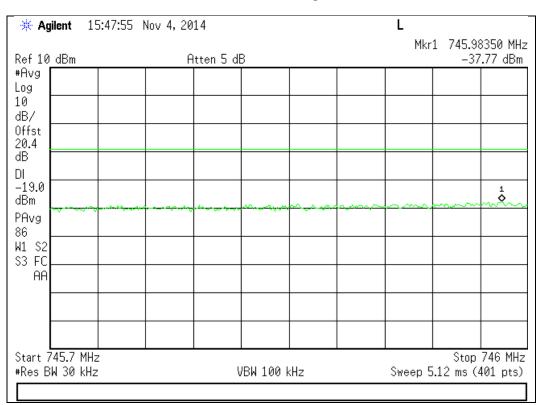
#### Lower Band Edge



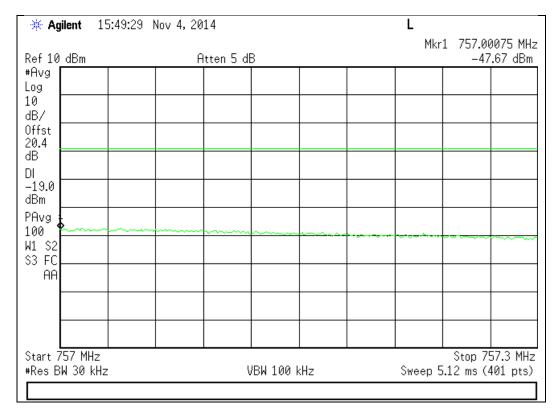
| ★ Agilent 15:46:55 N            | ov 4, 2014 | L<br>Mkr1 746.24300 Mł |          |                               |     |
|---------------------------------|------------|------------------------|----------|-------------------------------|-----|
| Ref 10 dBm                      | Atten 5 dB |                        | 1 11/1 1 | -39.43 dE                     |     |
| #Avg                            |            |                        |          |                               |     |
| Log<br>10                       |            |                        |          |                               |     |
| dB/                             |            |                        |          |                               |     |
| Offst                           |            |                        |          |                               |     |
| 20.4                            |            |                        |          |                               |     |
| dB<br>DI                        |            |                        |          |                               |     |
| -19.0                           |            |                        |          |                               |     |
| dBm                             | ·····      | ······                 |          | 1<br>2                        | un. |
| PAvg                            |            |                        |          |                               |     |
| 100                             |            |                        |          |                               |     |
| W1 S2<br>S3 FC                  |            |                        |          |                               |     |
| AA                              |            |                        |          |                               |     |
|                                 |            |                        |          |                               |     |
|                                 |            |                        |          |                               |     |
|                                 |            |                        |          |                               |     |
|                                 |            |                        |          |                               |     |
| Start 746 MHz<br>#Res BW 30 kHz | VBW 100 k  | :Hz                    | Sweep 5. | Stop 746.3 M<br>12 ms (401 pt |     |
|                                 |            |                        |          |                               |     |



#### 746 - 757 MHz Band

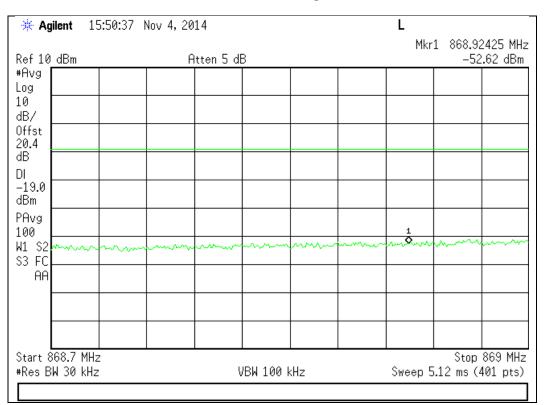


#### Lower Band Edge





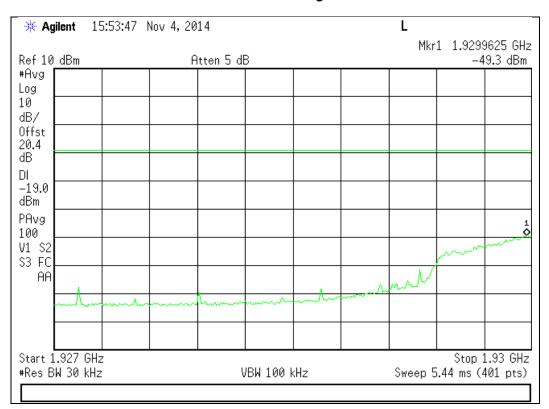
#### 869 - 894 MHz Band



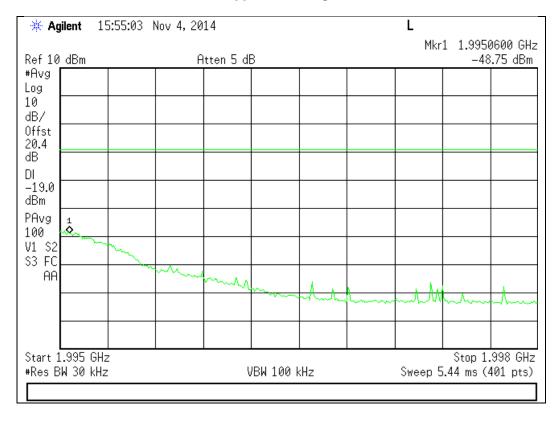
#### Lower Band Edge

| 🔆 🔆 Ag         | ✤ Agilent 15:51:36 Nov 4, 201 |       |    |          |         |   |  | L       | 1 0010              |                      |
|----------------|-------------------------------|-------|----|----------|---------|---|--|---------|---------------------|----------------------|
| Ref 10         | dBm                           |       | At | tten 5 d | В       | -   |  | Mkr     |                     | 3825 MHz<br>3.89 dBm |
| #Avg<br>Log    |                               |       |    |          |         |   |  |         |                     |                      |
| 10<br>dB/      |                               |       |    |          |         |   |  |         |                     |                      |
| 0ffst<br>20.4  |                               |       |    |          |         |   |  |         |                     |                      |
| dB             |                               |       |    |          |         |   |  |         |                     |                      |
| DI<br>-19.0    |                               |       |    |          |         |   |  |         |                     |                      |
| dBm<br>PAvg    |                               |       |    |          |         |   |  |         |                     |                      |
| 100            |                               |       |    |          |         |   |  |         |                     |                      |
| W1 S2<br>S3 FC |                               |       |    |          |         |   |  |         |                     |                      |
| AA             |                               |       |    |          |         |   |  |         |                     |                      |
|                |                               |       |    |          |         |   |  |         |                     |                      |
|                |                               |       |    |          |         |   |  |         |                     |                      |
|                | 394 MHz<br>W 30 kH            | <br>z |    | (        | /BW 100 | <hz< td=""><td></td><td>Sweep 5</td><td>Stop 8<br/>5.12 ms (</td><td>94.3 MHz<br/>401 pts)</td></hz<> |  | Sweep 5 | Stop 8<br>5.12 ms ( | 94.3 MHz<br>401 pts) |
|                |                               |       |    |          |         |   |  |         |                     | • •                  |



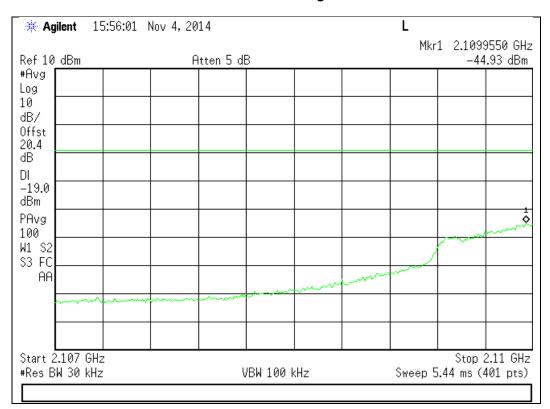


#### Lower Band Edge

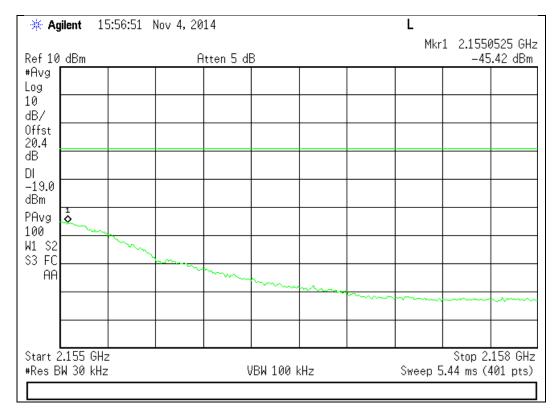




#### 2110 - 2155 MHz Band



#### Lower Band Edge

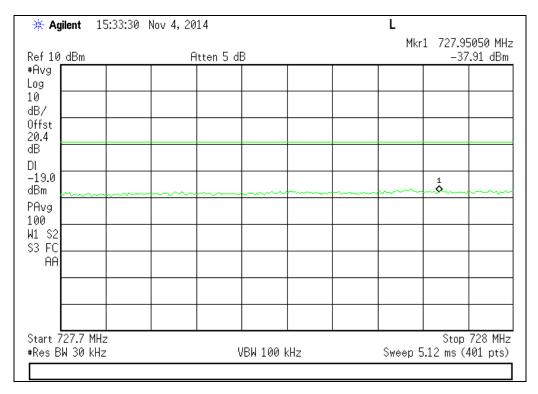




#### WCDMA Downlink Test Plots

#### 728 - 746 MHz Band

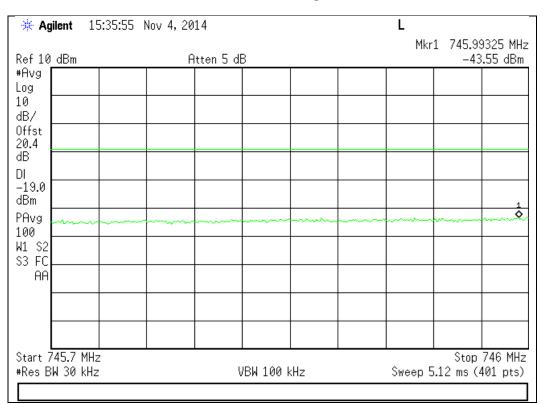
#### Lower Band Edge



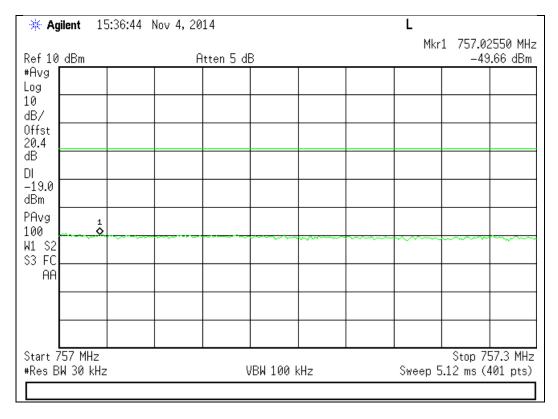
| 🔆 Agilent 15:                   | 34:26 Nov 4, 2014 |   | L   |
|---------------------------------|-------------------|---|---|
| Ref 10_dBm                      | Atten 5 dB        |   | Mkr1 746.09675 MHz<br>-33.51 dBm          |
| #Avg<br>Log                     |                   |   |   |
| 10<br>dB/                       |                   |   |   |
| 0ffst<br>20.4                   |                   |   |   |
| dB<br>DI                        | 1                 |   |   |
| -19.0<br>dBm                    |                   | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ | ~~~~~~                                    |
| PAvg<br>100                     |                   |   |   |
| W1 S2<br>S3 FC                  |                   |   |   |
| AA                              |                   |   |   |
|                                 |                   |   |   |
|                                 |                   |   |   |
| Start 746 MHz<br>#Res BW 30 kHz | VB                | 3W 100 kHz                              | Stop 746.3 MHz<br>Sweep 5.12 ms (401 pts) |
|                                 |                   |   |   |



#### 746 - 757 MHz Band

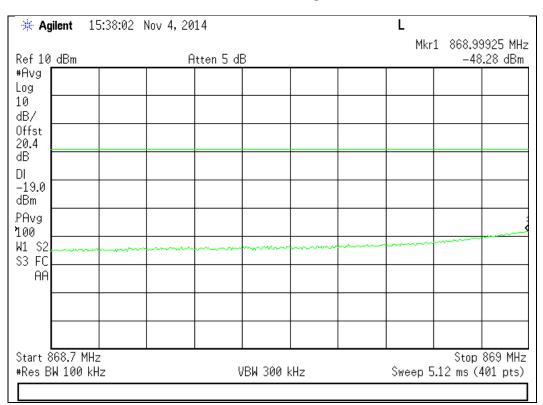


#### Lower Band Edge





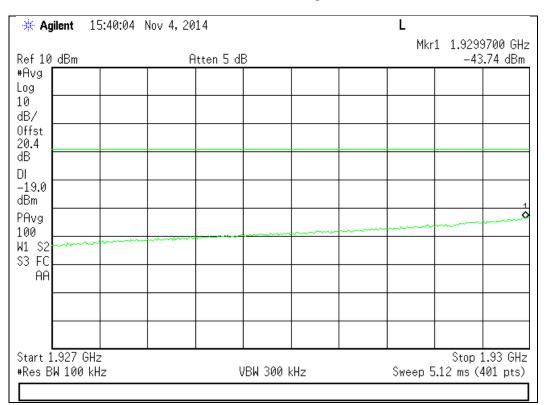
#### 869 - 894 MHz Band



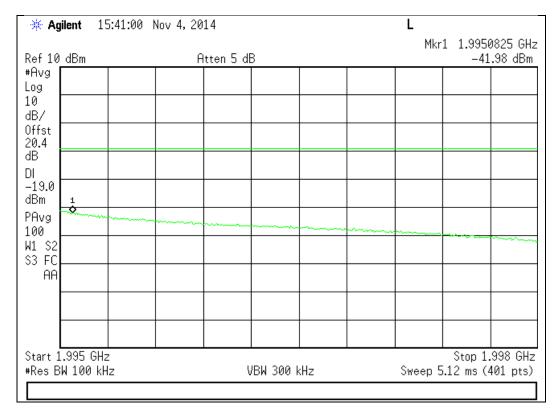
#### Lower Band Edge

| 🔆 Agilent      | 15:38:58 N                              | √ov 4, 2014 |         |     |  | L<br>Mkr1 894.00675 MHz |           |          |
|----------------|---|-------------|---------|-----|--|-------------------------|-----------|----------|
| Ref 10 dBm     |   | Atten 5     | dB      |     |  | LINI                    |           | 3.35 dBm |
| #Avg           |   |             |         |     |  |                         |           |          |
| Log<br>10      |   |             |         |     |  |                         |           |          |
| dB/            |   |             |         |     |  |                         |           |          |
| Offst<br>20.4  |   |             |         |     |  |                         |           |          |
| dB             |   |             | _       |     |  |                         |           |          |
|                |   |             |         |     |  |                         |           |          |
| -19.0<br>dBm ₁ |   |             |         |     |  |                         |           |          |
| PAvg &         | ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ |             |         |     |  |                         |           |          |
| 100            |   |             |         |     |  |                         |           |          |
| W1 S2<br>S3 FC |   |             |         |     |  |                         |           |          |
| AA             |   |             |         |     |  |                         |           |          |
|                |   |             |         |     |  |                         |           |          |
|                |   |             |         |     |  |                         |           |          |
|                |   |             |         |     |  |                         |           |          |
| Start 894 M    | Hz                                      |             |         | 1   |  | 1                       | Stop 8    | 94.3 MHz |
| #Res BW 10     |   |             | VBW 300 | kHz |  | Sweep 5                 | 5.12 ms ( |          |
|                |   |             |         |     |  |                         |           |          |



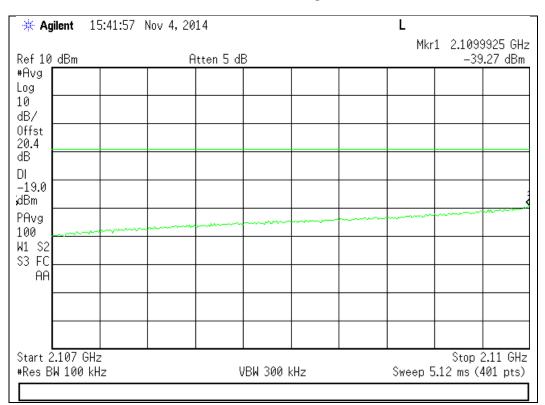


#### Lower Band Edge

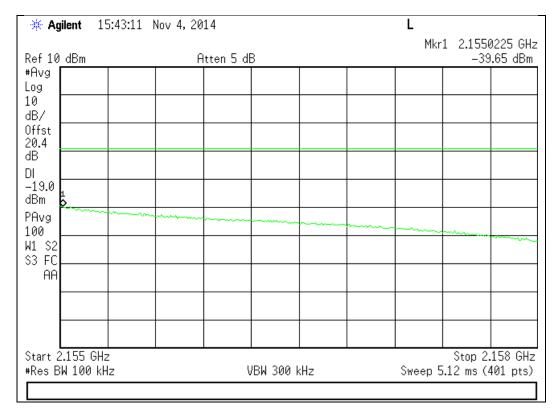




#### 2110 - 2155 MHz Band



#### Lower Band Edge





#### Conducted Spurious Emissions Engineer: Mike Graffeo Test Date: 11/4/14

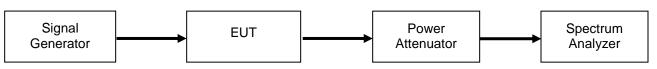
#### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator, with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as needed to ensure accurate readings. A signal generator was utilized to produce a 4.1 MHz AWGN signal operating at the maximum allowable power. The conducted spurious emissions from 9 kHz to 10 times the highest tunable frequency for each operational band were measured (excluding the band defined by the Out of band emissions test). The emissions were plotted and the highest level was recorded in the summary table.

The following formulas are used for calculating the limits.

Conducted Spurious Emissions Limit = P1 - (43 + 10Log(P2)) = -13 dBmP1 = power in dBm P2 = power in Watts

#### **Test Setup**



#### **Uplink Test Results**

| Frequency Band<br>(MHz) | Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------------------------|-------------------------|----------------|--------|
| 698 - 716               | 716.10                      | -29.92                  | -13            | Pass   |
| 776 - 787               | 787.10                      | -13.83                  | -13            | Pass   |
| 824 - 849               | 2993.4                      | -38.56                  | -13            | Pass   |
| 1710 - 1755             | 2999.4                      | -39.98                  | -13            | Pass   |
| 1850 - 1915             | 1721.4                      | -40.11                  | -13            | Pass   |

#### **Downlink Test Results**

| Frequency Band<br>(MHz) | Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-------------------------|-----------------------------|-------------------------|----------------|--------|
| 728 - 746               | 746.10                      | -36.67                  | -13            | Pass   |
| 746 - 757               | 757.10                      | -26.95                  | -13            | Pass   |
| 869 - 894               | 2991.9                      | -38.99                  | -13            | Pass   |
| 1930 - 1995             | 8030.3                      | -41.02                  | -13            | Pass   |
| 2110 - 2155             | 21937.7                     | -40.74                  | -13            | Pass   |



## For the 746 – 758 downlink and 776 – 788 Uplink bands of operation, the following additional spurious emissions requirements apply.

#### FCC 27.53(c)

For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

The test is performed using a 10 kHz RBW. Since the limit is referenced to a 6.25 kHz BW, the following correction factor is applied to the measured data.

BW correction Factor = 10Log B1/B2 BW correction Factor =10Log 6.25 / 10 = - 2.0 dB

Final Value (dBm) = conducted measurement +BW correction factor

#### 776 – 787 MHz Uplink Band

| Spurious<br>Frequency Range<br>(MHz) | Measured<br>Frequency<br>(MHz) | Measured Value<br>(dBm) | Bandwidth<br>Correction Factor<br>(dB) | Final<br>Value<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|--------------------------------|-------------------------|--|-------------------------|----------------|----------------|
| 763 – 775                            | 774.57                         | -52.04                  | -2.0                                   | -54.08                  | -35            | -19.08         |
| 793 – 805                            | 793.09                         | -65.14                  | -2.0                                   | -67.18                  | -35            | -32.18         |

#### 746 - 757 MHz Downlink Band

| Spurious<br>Frequency Range<br>(MHz) | Measured<br>Frequency<br>(MHz) | Measured Value<br>(dBm) | Bandwidth<br>Correction Factor<br>(dB) | Final<br>Value<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|--------------------------------|-------------------------|--|-------------------------|----------------|----------------|
| 763 – 775                            | 765.07                         | -85.74                  | -2.0                                   | -87.78                  | -35            | -52.78         |
| 793 – 805                            | 800.39                         | -85.83                  | -2.0                                   | -87.87                  | -35            | -52.87         |



#### FCC 27.53(f)

For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Since the limit is referenced to EIRP, the final data is computed using the Conducted Spurious Emission data and adding the BW correction factor plus the final gain/loss data from the antenna kitting information supplied by the manufacturer.

For the Narrowband measurement, the test is performed using a 10 kHz RBW. Since the limit is referenced to a 700 Hz BW, the following correction factor is applied to the measured data.

BW correction Factor = 10Log B1/B2 BW correction Factor =10Log 700 / 10000 = -11.55 dB

Final Value (dBm) = conducted measurement +BW correction factor + final gain/loss from Antenna Kitting document

The Limit for discreet (narrowband) emissions is -80dBW (-50 dBm) in 700 MHz BW. The Limit for (wideband Emissions) is -70 dBW (-40 dBm) in a 1 MHz BW.

| Spurious<br>Frequency Range<br>(MHz) | Measured<br>Frequency<br>(MHz) | Measured<br>Value<br>(dBm) | Bandwidth<br>Correction Factor<br>(dB) | Gain/Loss from<br>Antenna Kitting<br>Information<br>(dB) | Final<br>Value<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|--------------------------------|----------------------------|--|--|-------------------------|----------------|----------------|
| 1559 – 1610<br>(Wideband)            | 1562.7                         | -45.44                     | 0                                      | 0  | -45.44                  | -40            | -5.44          |
| 1559 – 1610<br>(Narrowband)          | 1563.2                         | -73.19                     | -11.55                                 | 0  | -84.74                  | -50            | -34.74         |

#### 776 – 787 MHz Uplink Band

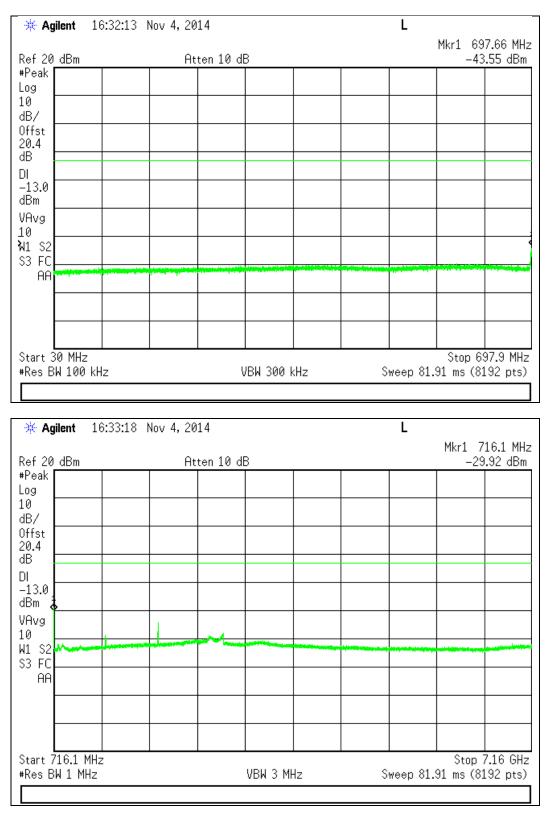
#### 746 - 757 MHz Downlink Band

| Spurious<br>Frequency Range<br>(MHz) | Measured<br>Frequency<br>(MHz) | Measured<br>Value<br>(dBm) | Bandwidth<br>Correction Factor<br>(dB) | Gain/Loss from<br>Antenna Kitting<br>information<br>(dB) | Final<br>Value<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------------------------|--------------------------------|----------------------------|--|--|-------------------------|----------------|----------------|
| 1559 – 1610<br>(Wideband)            | 1604.1                         | -58.83                     | 0                                      | 10.00  | -48.83                  | -40            | -8.83          |
| 1559 – 1610<br>(Narrowband)          | 1595.2                         | -81.91                     | -11.55                                 | 10.00  | -83.46                  | -50            | -33.46         |

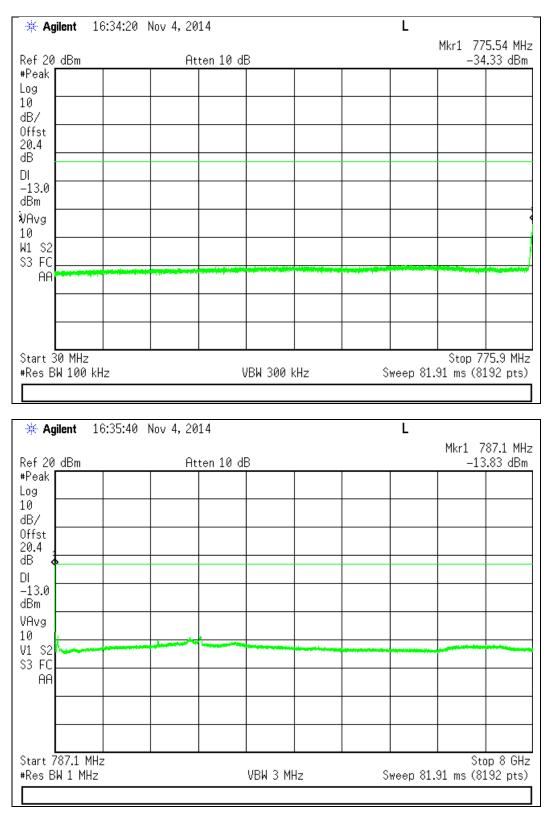


#### **Uplink Test Plots**



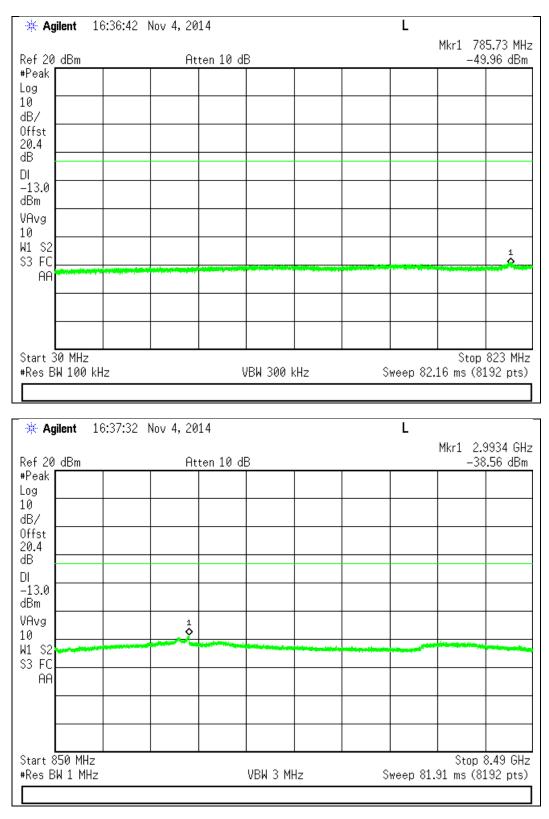






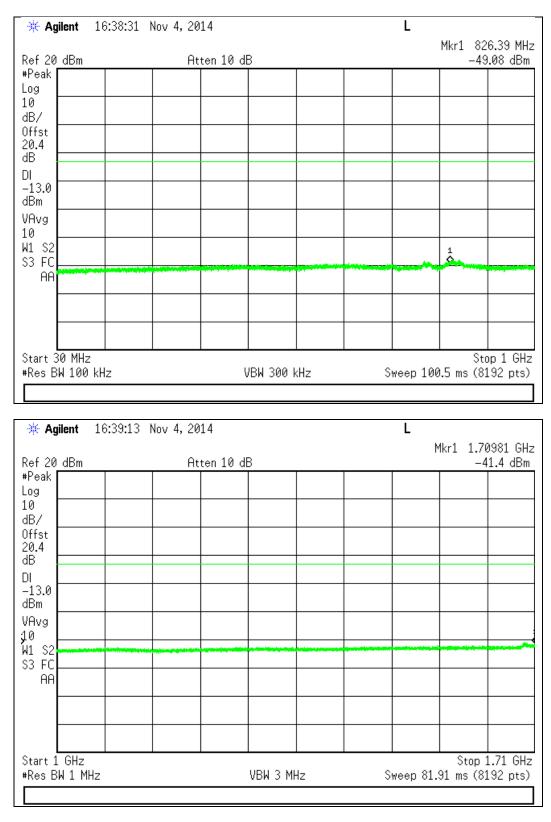
776 - 787 MHz Band





824 - 849 MHz Band





<sup>1710 - 1755</sup> MHz Band



#### 1710 - 1755 MHz Band (cont)

| <b>Agilent</b> 16:39                                       | 9:53 Nov 4, 2014             |           |   | L        | MLr1 2       | .9994 GHz            |
|--|------------------------------|-----------|---|----------|--------------|----------------------|
| ⊧f 20 dBm  | Atten 10                     | ) dB      |   |          |              | 9.98 dBm             |
| 'eak   |                              |           |   |          |              |                      |
| g  |                              |           |   |          |              |                      |
|  |                              |           |   |          |              |                      |
| 3/   |                              |           |   |          |              |                      |
| ).4  |                              |           |   |          |              |                      |
| 3  |                              |           |   |          |              |                      |
|  |                              |           |   |          |              |                      |
| 13.0<br>3m   |                              |           |   |          |              |                      |
| lvg  |                              |           |   |          |              | +                    |
| )  | <b></b>                      |           |   |          |              |                      |
| . S2   |                              | *****     |   |          |              | -                    |
| FC   |                              |           |   |          |              | +                    |
| AA   |                              |           |   |          |              |                      |
|  |                              |           |   |          |              |                      |
|  |                              |           |   |          |              |                      |
|  |                              |           |   |          |              |                      |
| es BW 1 MHz  |                              | VBW 3 MHz | 2 | weep 81. | .01 113 (0   | •                    |
|  | 0:25 Nov 4, 2014             | VBW 3 MHz |   | L        |              |                      |
| <b>∦ Agilent</b> 16:40<br>∋f 20 dBm                        | 0:25 Nov 4, 2014<br>Atten 10 |           |   |          | Mkr1 8.      | 0068 GH:             |
| <mark>∲Agilent</mark> 16:40<br>ef20dBm<br>'eak <b> </b>    |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| <mark>∲Agilent</mark> 16:40<br>∍f20dBm<br>'eak             |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40<br>9f 20 dBm<br>9 9<br>9                     |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| ★ Agilent 16:40 F 20 dBm Peak 9 3/                         |                              |           |   |          | Mkr1 8.      | .0068 GH             |
| Agilent 16:40<br>ef 20 dBm<br>eak<br>g<br>3/<br>fst<br>0.4 |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | .0068 GH             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:<br>1.05 dBm |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | 0068 GH:             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.      | .0068 GH             |
| Agilent 16:40  |                              |           |   |          | Mkr1 8.<br>4 | 0068 GH              |

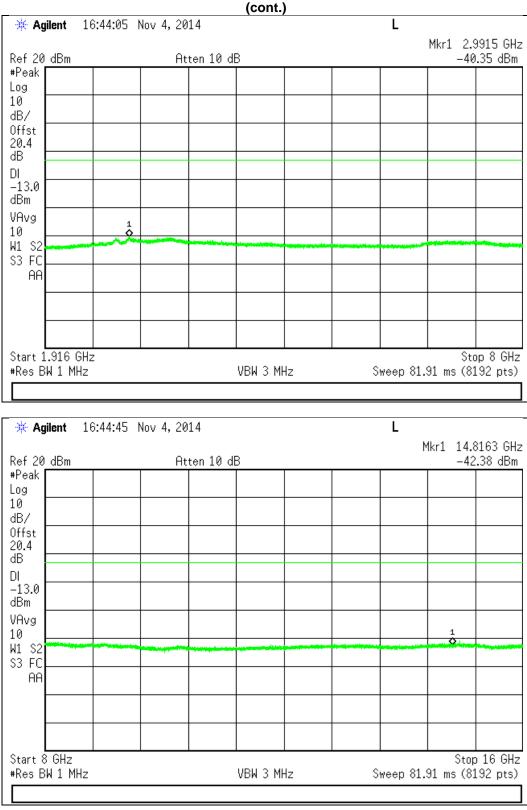


|                              |          |             |         | (cont)   |    |   |          |          |                       |
|------------------------------|----------|-------------|---------|----------|----|---|----------|----------|-----------------------|
| 🔆 Agilent                    | 16:41:06 | Nov 4, 2014 | 1       |          |    |   | L        | 11 .01   | 0007 01-              |
| Ref 20 dBm                   |          | Atte        | n 10 dB |          |    |   | ٣        |          | .9927 GHz<br>0.56 dBm |
| #Peak<br>Log                 |          |             |         |          |    |   |          |          |                       |
| 10                           |          |             |         |          |    |   |          |          |                       |
| dB/<br>Offst                 |          |             |         |          |    |   |          |          |                       |
| 20.4<br>dB                   |          |             |         |          |    |   |          |          |                       |
| DI                           |          |             |         |          |    |   |          |          |                       |
| -13.0<br>dBm                 |          |             |         |          |    |   |          |          |                       |
| VAvg                         | -        |             |         |          |    |   |          |          |                       |
| 10                           |          |             |         |          |    |   |          |          |                       |
| W1 S2<br>S3 FC               |          |             |         |          |    |   |          |          |                       |
| AA                           |          |             |         |          |    |   |          |          |                       |
|                              |          |             |         |          |    |   |          |          |                       |
|                              |          |             |         |          |    |   |          |          |                       |
| Share 10 CU-                 |          |             |         |          |    |   |          | <u> </u> |                       |
| Start 16 GHz<br>#Res BW 1 MH | z        |             | ļ       | VBW 3 MH | łz | S | weep 81. |          | p 22 GHz<br>3192 pts) |
|                              |          |             |         |          |    |   |          |          |                       |



| Agilent 16:42:1  | L7 Nov 4, 2014             |            |    | L     | Mkr1     | 835.75              |
|--|----------------------------|------------|----|-------|----------|---------------------|
| 20 dBm   | Atten 10                   | ) dB       |    |       |          | -48.31 d            |
| ak 🛛 👘   |                            |            |    |       |          |                     |
|  |                            |            |    |       |          |                     |
| /  |                            |            |    |       |          |                     |
| st   |                            |            |    |       |          |                     |
| 4  |                            |            |    |       |          |                     |
|  |                            |            |    |       |          |                     |
| 3.0  |                            |            |    |       |          |                     |
| n  |                            |            |    |       |          |                     |
| /g   |                            |            |    |       |          |                     |
| S2   |                            |            |    |       | 1        |                     |
| FC   |                            |            |    |       |          |                     |
| AA   |                            |            |    |       |          |                     |
|  |                            |            |    |       | _        |                     |
|  |                            |            |    |       |          |                     |
|  |                            |            |    |       |          |                     |
| rt 30 MHz<br>s BW 100 kHz  |                            | VBW 300 kł | Hz | Sweep | 100.5 ms | (0192 h             |
| ∍s BW 100 kHz  | 08 Nov 4, 2014             | VBW 300 ki | Hz | Sweep |          |                     |
| •s BW 100 kHz<br>• <b>Agilent</b> 16:43:0  | 08 Nov 4, 2014<br>Atten 10 |            | Hz |       | Mkr1     | 1.72141<br>-40.11 d |
| s BW 100 kHz<br>→ <b>Agilent</b> 16:43:0<br>÷ 20 dBm<br>≈ak  |                            |            | Hz |       | Mkr1     | 1.72141             |
| Agilent 16:43:6     20 dBm   |                            |            | Hz |       | Mkr1     | 1.72141             |
| •s BW 100 kHz<br>• Agilent 16:43:0<br>• 20 dBm<br>• ak   |                            |            | Hz |       | Mkr1     | 1.72141             |
| •s BW 100 kHz<br>• Agilent 16:43:0<br>• 20 dBm<br>• ak   |                            |            | Hz |       | Mkr1     | 1.72141             |
| •s BW 100 kHz<br>• Agilent 16:43:0<br>• 20 dBm<br>• ak   |                            |            | Hz |       | Mkr1     | 1.72141             |
| BW 100 kHz     Agilent 16:43:0     dBm     ak     st 4   |                            |            |    |       | Mkr1     | 1.72141             |
| Agilent 16:43:0  |                            |            | Hz |       | Mkr1     | 1.72141             |
| SBW 100 kHz           Agilent         16:43:0           20 dBm           sak           /           3.0   |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| SBW 100 kHz           Agilent         16:43:0           20 dBm           sak           /           3.0           n           /g  |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| S BW 100 kHz     Agilent 16:43:0     Agilent 16:43:0     St  |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| Agilent 16:43:0<br>Agilent 16:43:0<br>Agilent 16:43:0<br>Compared by the set of the   |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| S BW 100 kHz     Agilent 16:43:0     Agilent 16:43:0     St  |                            |            | Hz |       | Mkr1     | 1.72141<br>-40.11 d |
| Agilent 16:43:0<br>Agilent 16:43:0<br>Agilent 16:43:0<br>Compared by the set of the   |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| Agilent 16:43:0<br>Agilent 16:43:0<br>Agilent 16:43:0<br>Compared by the set of the   |                            |            |    |       | Mkr1     | 1.72141<br>-40.11 d |
| Agilent 16:43:0<br>Agilent 16:43:0<br>Agilen |                            |            | Hz |       | Mkr1     | 1.72141<br>-40.11 d |
| Agilent 16:43:0<br>Agilent 16:43:0<br>Agilent 16:43:0<br>Compared by the set of the   |                            |            |    | L     | Mkr1     | 1.72141<br>-40.11 d |



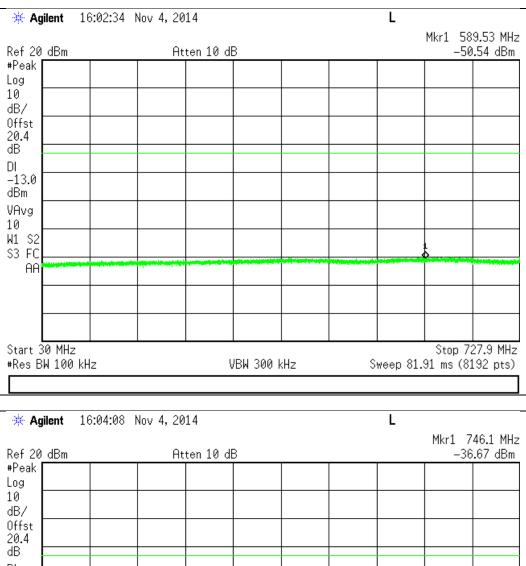




|                            |          |             | (cont.)  |    |       |         |            |                      |
|----------------------------|----------|-------------|----------|----|-------|---------|------------|----------------------|
| 🔆 Agilent                  | 16:45:25 | Nov 4, 2014 |          |    |       | L       |            |                      |
| Ref 20 dBm                 |          | Atten 10    | dB       |    |       | ١       |            | 9905 GHz<br>0.77 dBm |
| #Peak                      |          |             |          |    |       |         | -4,        |                      |
| Log                        |          |             |          |    |       |         |            |                      |
| 10<br>dB/                  |          |             |          |    |       |         |            |                      |
| Offst                      |          |             |          |    |       |         |            |                      |
| 20.4<br>dB                 |          |             |          |    |       |         |            |                      |
|                            |          |             |          |    |       |         |            |                      |
| -13.0                      |          |             |          |    |       |         |            |                      |
| dBm                        |          |             |          |    |       |         |            |                      |
| VAvg<br>10                 |          |             |          |    |       |         |            |                      |
| W1 S2                      |          | ·           |          |    |       | -       |            |                      |
| S3 FC                      |          |             |          |    |       |         |            |                      |
|                            |          |             |          |    |       |         |            |                      |
|                            |          |             |          |    |       |         |            |                      |
|                            |          |             |          |    |       |         |            |                      |
|                            |          |             |          |    |       |         |            |                      |
| Start 16 GH<br>#Res BW 1 N |          |             | VBW 3 MH | 17 | S     | ween 81 |            | p 22 GHz<br>192 pts) |
|                            |          |             | 100 0 10 |    | · · · |         | • <u> </u> | 102 (0.0)            |
|                            |          |             |          |    |       |         |            |                      |



#### **Downlink Test Plots**



#### 728 - 746 MHz Band

 Agilent
 16:04:08
 Nov 4, 2014
 L

 Mkr1 746.1 MHz

 Agilent 16:04:08
 Nov 4, 2014

 Mkr1 746.1 MHz

 Peak

 Wkr1 746.1 MHz

 Peak

 Offst

 Log
 Image: Colspan="2">Image: Colspan="2">Mkr1 746.1 MHz

 Peak

 Uog
 Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Mkr1 746.1 MHz

 Peak

 Uog
 Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Mkr1 746.1 MHz

 Peak

 Uof
 Image: Colspan="2">Image: Colspan="2">Image: Colspan="2">Mkr1 746.1 MHz

 VBW 3 MHz

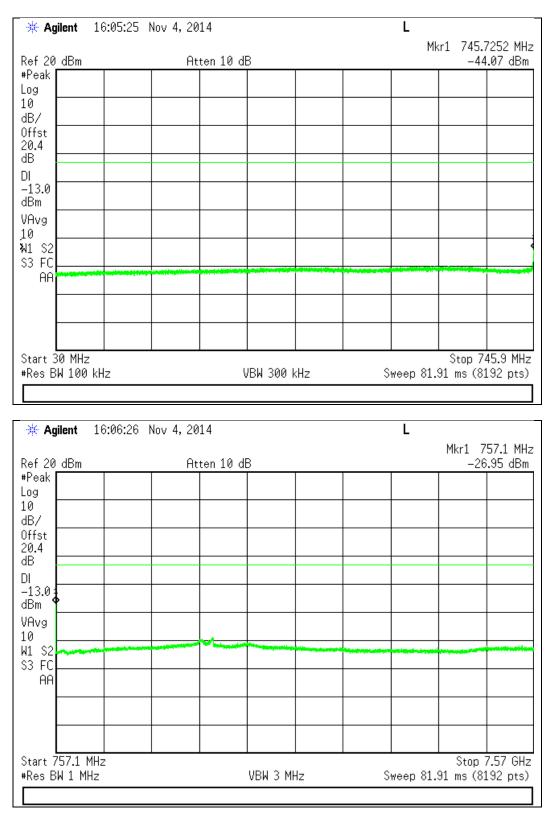
 Start 746.1 MHz

 \*Res BW 1 MHz

 VBW 3 MHz

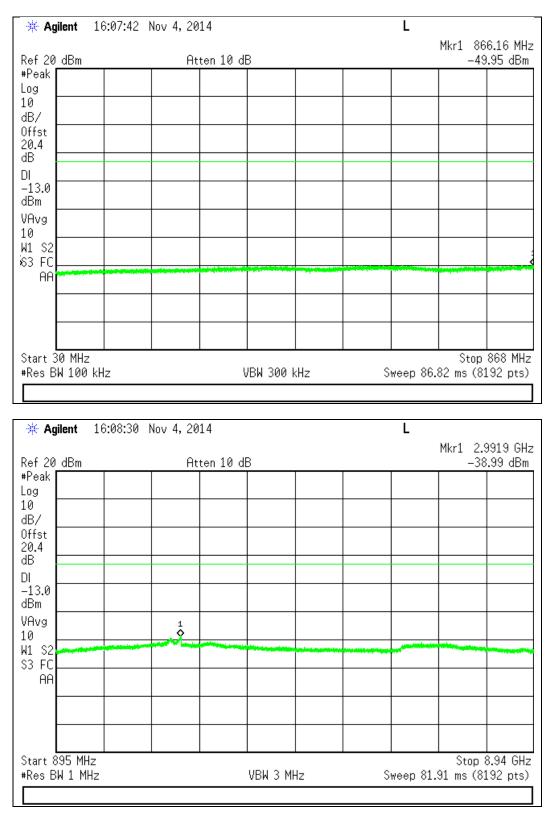
 Sweep 81.91 ms (8192 pts)





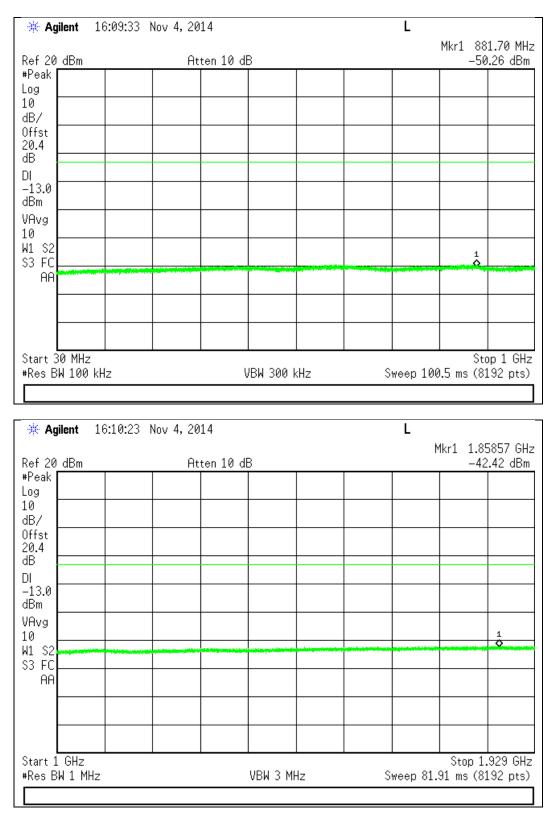
746 - 757 MHz Band





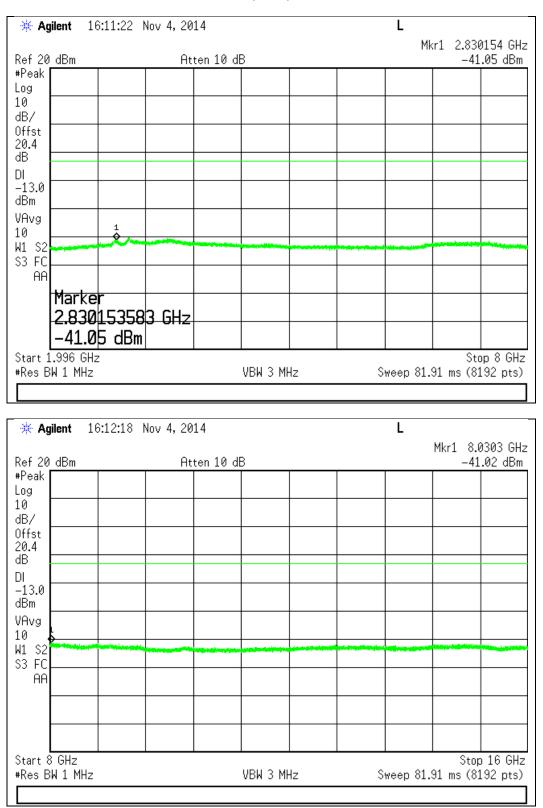
<sup>869 - 894</sup> MHz Band







1930 - 1995 MHz Band (cont.)

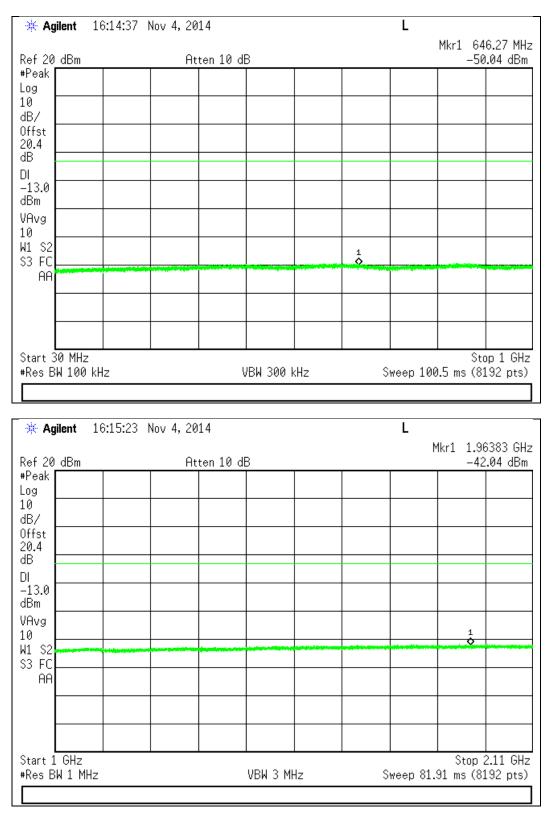




#### 1930 - 1995 MHz Band (cont.)

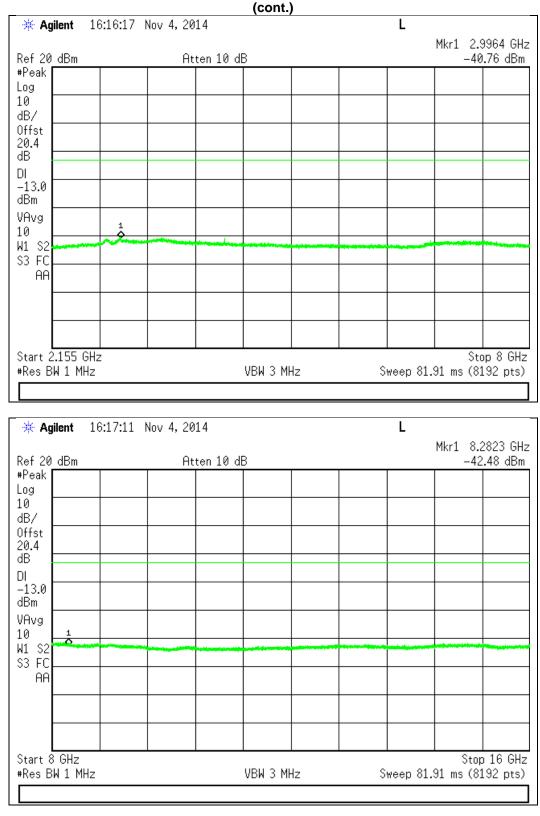
| <b>Agilent</b> 16:13:40 Nov | v 4,2014    | L       | Mkr1 21.9077 GHz   |
|-----------------------------|-------------|---------|--------------------|
| Ref 20_dBm                  | Atten 10 dB |         | -40.51 dBm         |
| #Peak<br>Log                |             |         |                    |
| 10                          |             |         |                    |
| dB/<br>Offst                |             |         |                    |
| 20.4<br>dB                  |             |         |                    |
| DI                          |             |         |                    |
| -13.0<br>dBm                |             |         |                    |
| VAvg                        |             |         |                    |
| 10<br>W1 S2                 |             |         | - à                |
| S3 FC                       |             |         |                    |
| AA                          |             |         |                    |
|                             |             |         |                    |
|                             |             |         |                    |
| Start 16 GHz                |             |         | Stop 22 GHz        |
| #Res BW 1 MHz               | VBW 3 MHz   | Sweep 8 | 1.91 ms (8192 pts) |
|                             |             |         |                    |





#### 2110 - 2155 MHz Band





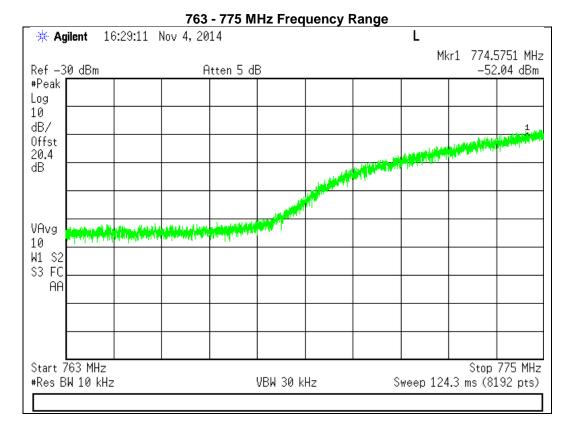
2110 - 2155 MHz Band



| 🔆 Agilent 16:17:59            | Nov 4, 2014 |           | L        |                     |                   |
|-------------------------------|-------------|-----------|----------|---------------------|-------------------|
| Ref 20 dBm                    | Atten 10 dB |           |          | Mkr1 21.93<br>-40.7 | 377 GH<br>74 dBm  |
| #Peak<br>Log                  |             |           |          |                     |                   |
| 10<br>dB/                     |             |           |          |                     |                   |
| Offst                         |             |           |          |                     |                   |
| 20.4<br>dB                    |             |           |          |                     |                   |
| DI                            |             |           |          |                     |                   |
| dBm                           |             |           |          |                     |                   |
| VAvg<br>10                    |             |           |          |                     |                   |
| W1 S2<br>S3 FC                |             |           |          |                     |                   |
| AA                            |             |           |          |                     |                   |
|                               |             |           |          |                     |                   |
|                               |             |           |          |                     |                   |
| Start 16 GHz<br>#Res BW 1 MHz | <u> </u>    | IBW 3 MHz | Sweep 81 | Stop<br>.91 ms (819 | 22 GH:<br>92 pts) |
|                               |             |           |          |                     |                   |

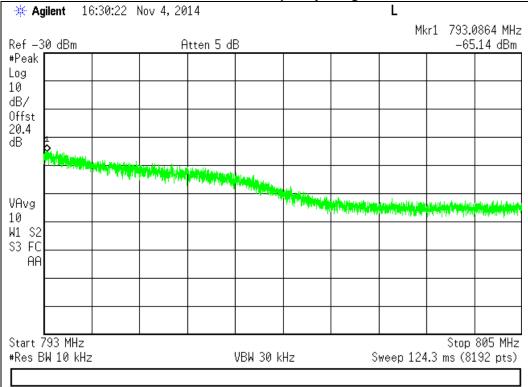
### 2110 - 2155 MHz Band (cont.)



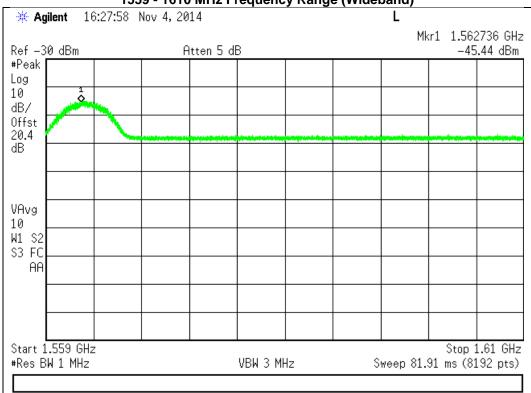


776 – 787 MHz Uplink Test Plots for the

#### 793 - 805 MHz Frequency Range



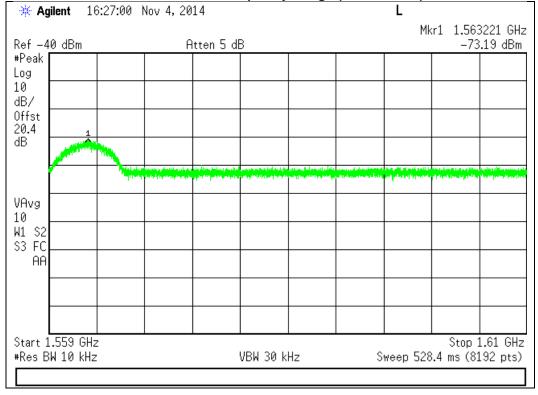




# 776 – 787 MHz Uplink Test Plots for the

1559 - 1610 MHz Frequency Range (Wideband)

1559 - 1610 MHz Frequency Range (Narrowband)





| 🔆 🔆 Ag         | jilent 1             | 6:21:00 | Nov 4, 20 | 14        |          |    |   | L        |                   |                     |
|----------------|----------------------|---------|-----------|-----------|----------|----|---|----------|-------------------|---------------------|
| Ref -6         | i0 dBm               |         | A         | tten 5 di | В        |    |   | Mk       |                   | 0686 MHz<br>.74 dBm |
| #Peak<br>Log   |                      |         |           |           |          |    |   |          |                   |                     |
| 10<br>dB/      |                      |         |           |           |          |    |   |          |                   |                     |
| Offst<br>20.4  |                      |         |           |           |          |    |   |          |                   |                     |
| dB             |                      |         |           |           |          |    |   |          |                   |                     |
|                |                      |         |           |           |          |    |   |          |                   |                     |
| VAvg<br>10     |                      |         |           |           |          |    |   |          |                   |                     |
| W1 S2<br>S3 FC |                      |         |           |           |          |    |   |          |                   |                     |
| ÂA             |                      |         |           |           |          |    |   |          |                   |                     |
|                |                      |         |           |           |          |    |   |          |                   |                     |
|                |                      |         |           |           |          |    |   |          |                   |                     |
|                | 763 MHz<br>WW 10 kHz | <br>:   |           |           | VBW 30 k | Hz | s | weep 124 | Stop<br>.3 ms (81 | 775 MHz<br>92 pts)  |

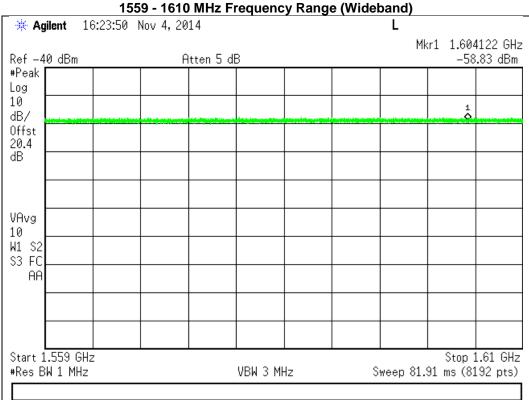
# 746 - 757 MHz Downlink Test Plots for the

# 763 - 775 MHz Frequency Range

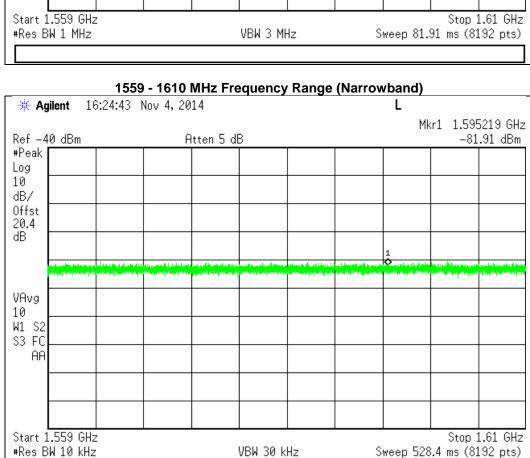
# 793 - 805 MHz Frequency Range

| 🔆 🔆 Ag         | jilent 1            | 6:22:43 I | Vov 4, 20 |           |          |    | Ŭ | L        |                    |                     |
|----------------|---------------------|-----------|-----------|-----------|----------|----|---|----------|--------------------|---------------------|
| Ref -6         | 0 dBm               |           | A         | tten 5 df | 3        |    |   | Mk       |                    | 3998 MHz<br>.83 dBm |
| #Peak<br>Log   |                     |           |           |           |          |    |   |          |                    |                     |
| 10<br>dB/      |                     |           |           |           |          |    |   |          |                    |                     |
| Offst<br>20.4  |                     |           |           |           |          |    |   |          |                    |                     |
| dB             |                     |           |           |           |          |    |   |          |                    |                     |
|                |                     |           |           |           |          |    |   |          |                    |                     |
| VAvg<br>10     |                     |           |           |           |          |    |   |          |                    |                     |
| W1 S2<br>S3 FC |                     |           |           |           |          |    |   |          |                    |                     |
| ÂÂ             |                     |           |           |           |          |    |   |          |                    |                     |
|                |                     |           |           |           |          |    |   |          |                    |                     |
|                |                     |           |           |           |          |    |   |          |                    |                     |
|                | '93 MHz<br>W 10 kHz | :         |           |           | VBW 30 k | Hz | s | weep 124 | Stop<br>4.3 ms (81 | 805 MHz<br>192 pts) |
|                |                     |           |           |           |          |    |   |          |                    |                     |





# 746 - 757 MHz Downlink Test Plots for the





Noise Limits Engineer: Mike Graffeo Test Date: 11/4/14

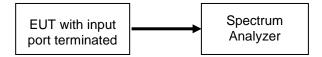
# **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as necessary to ensure accurate readings were obtained. Tests are performed to measure the maximum uplink and downlink noise. The detailed procedures from KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516c were followed.

Noise Power limit =-59 dBm/MHz for Mobile devices

#### **Test Setup**

#### **Maximum Noise Power**





# Maximum Uplink Noise Test Results

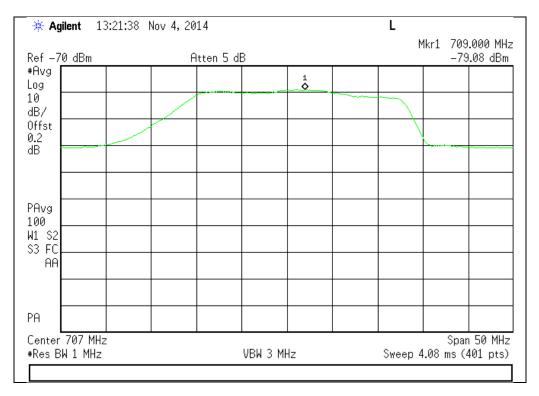
| Frequency Band<br>(MHz) | Measured Noise<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Result |
|-------------------------|-------------------------|----------------|----------------|--------|
| 698 - 716               | -79.08                  | -59.0          | -20.1          | Pass   |
| 776 - 787               | -79.62                  | -59.0          | -20.6          | Pass   |
| 824 - 849               | -80.26                  | -59.0          | -21.3          | Pass   |
| 1710 - 1755             | -80.53                  | -59.0          | -21.5          | Pass   |
| 1850 - 1915             | -79.91                  | -59.0          | -20.9          | Pass   |

# Maximum Downlink Noise Test Results

| Frequency Band<br>(MHz) | Measured Noise<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) | Result |
|-------------------------|-------------------------|----------------|----------------|--------|
| 728 - 746               | -86.46                  | -59.0          | -27.5          | Pass   |
| 746 - 757               | -86.64                  | -59.0          | -27.6          | Pass   |
| 869 - 894               | -86.85                  | -59.0          | -27.9          | Pass   |
| 1930 - 1995             | -87.4                   | -59.0          | -28.4          | Pass   |
| 2110 - 2155             | -84.71                  | -59.0          | -25.7          | Pass   |

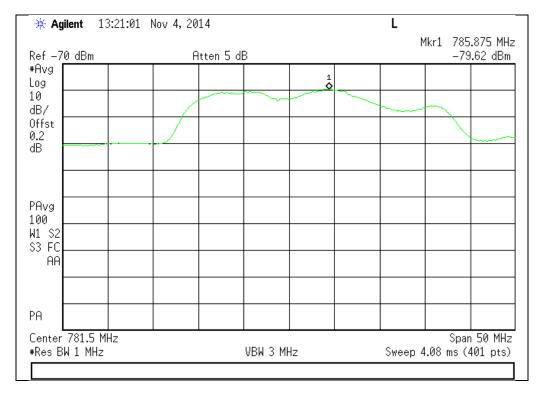


### Maximum Uplink Noise Test Plots

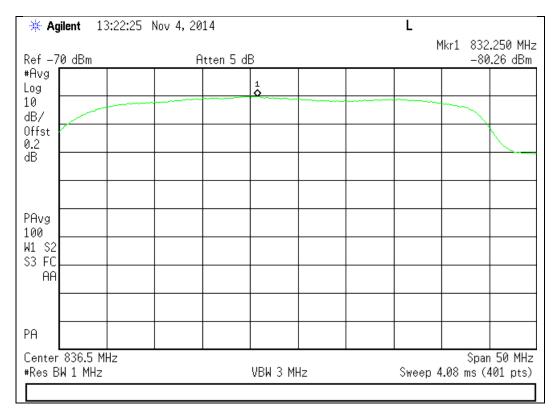


#### 698 - 716 MHz Band

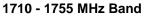
776 - 787 MHz Band

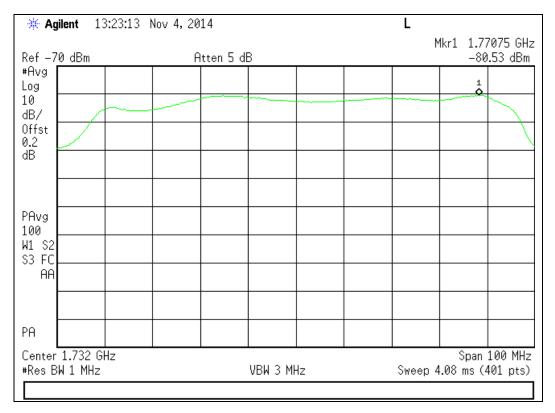




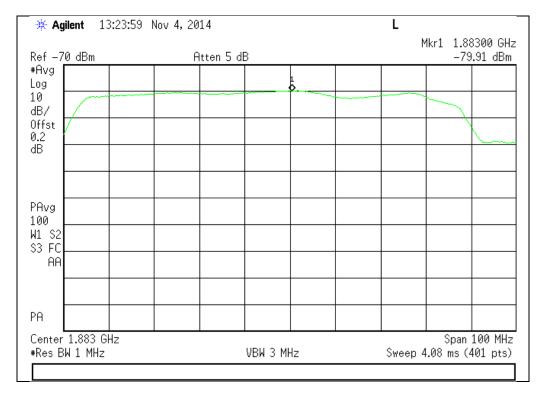


824 - 849 MHz Band





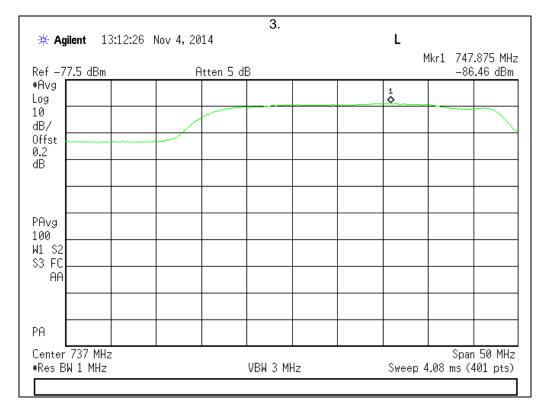




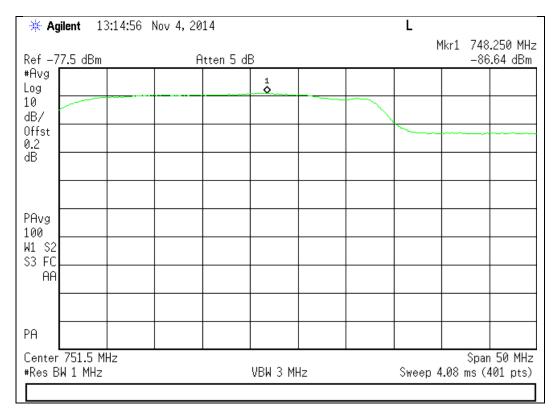
1850 - 1915 MHz Band

# Maximum Downlink Noise Test Plots

728 - 746 MHz Band

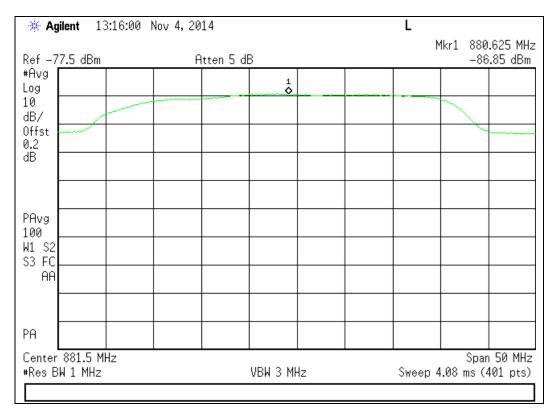




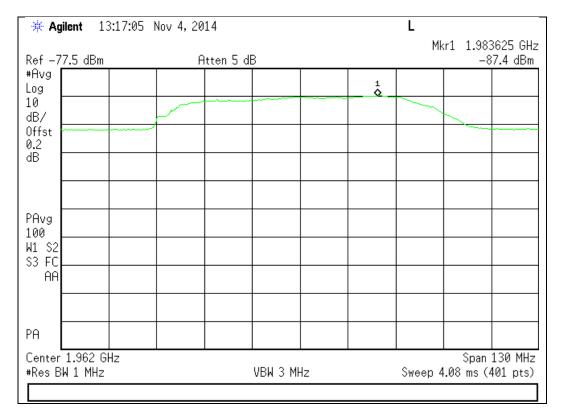


746 - 757 MHz Band

#### 869 - 894 MHz Band







1930 - 1995 MHz Band

2110 - 2155 MHz Band

| 🔆 🔆 Ag                    | jilent 🔅                          | L6:17:04 | Nov 12, 2 | 014       |           |  |       |   |                                |  |  |
|---------------------------|-----------------------------------|----------|-----------|-----------|-----------|--|-------|---|--------------------------------|--|--|
|                           | '7.5 dBn                          | 1        | A         | tten 5 dl | В         |  |       | 1                                       | Mkr1 2.12850 GHz<br>_84.83 dBm |  |  |
| #Avg<br>Log               | Log                               |          |           |           |           |  |       |   |                                |  |  |
| 10<br>dB/<br>Offst<br>0.2 |                                   |          |           |           |           |  | ~~~~~ | ~~~~~                                   | •                              |  |  |
| dB                        |                                   |          |           |           |           |  |       |   |                                |  |  |
| PAvg<br>100<br>W1 S2      |                                   |          |           |           |           |  |       |   |                                |  |  |
| S3 FC<br>AA               |                                   |          |           |           |           |  |       |   |                                |  |  |
| PA                        |                                   |          |           |           |           |  |       |   |                                |  |  |
|                           | Center 2.132 GHz<br>#Res BW 1 MHz |          |           |           | VBW 3 MHz |  |       | Span 100 MHz<br>Sweep 4.08 ms (401 pts) |                                |  |  |
|                           |                                   |          |           |           |           |  |       |   |                                |  |  |



Variable Gain Engineer: Mike Graffeo Test Date: 11/4/14

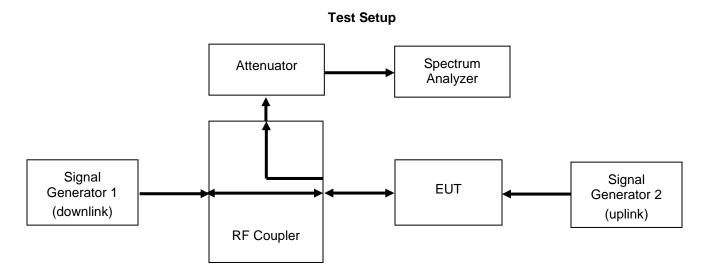
### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor in order to ensure accurate readings were obtained. The uplink gain in the presence of a downlink signal was measured for each operational uplink band using the detailed procedures from KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516.

The following formula is used for calculating the limits:

Variable Gain = -34 dB - RSSI +MSCL

Direct Connect Mobile Booster gain limit = 23 dB



#### **Uplink Test Results**

|               | 698 - 716 MHz |                     |                |                 |              |                |  |  |  |
|---------------|---------------|---------------------|----------------|-----------------|--------------|----------------|--|--|--|
| RSSI<br>(dBm) | MSCL<br>(dB)  | Gain Limit<br>(dBm) | P(in)<br>(dBm) | P(out)<br>(dBm) | Gain<br>(dB) | Margin<br>(dB) |  |  |  |
| -43           | 10.0          | 19.0                | 1.5            | 15.5            | 14.0         | -5.0           |  |  |  |
| -42           | 10.0          | 18.0                | 1.5            | 14.5            | 13.0         | -5.0           |  |  |  |
| -57           | 10.0          | 23.0                | 1.5            | 18.2            | 16.7         | -6.3           |  |  |  |
| -56           | 10.0          | 23.0                | 1.5            | 18.2            | 16.7         | -6.3           |  |  |  |
| -55           | 10.0          | 23.0                | 1.5            | 18.2            | 16.7         | -6.3           |  |  |  |
| -54           | 10.0          | 23.0                | 1.5            | 18.2            | 16.7         | -6.3           |  |  |  |

| 776 - 787 MHz |              |                     |                |                 |              |                |  |  |
|---------------|--------------|---------------------|----------------|-----------------|--------------|----------------|--|--|
| RSSI<br>(dBm) | MSCL<br>(dB) | Gain Limit<br>(dBm) | P(in)<br>(dBm) | P(out)<br>(dBm) | Gain<br>(dB) | Margin<br>(dB) |  |  |
| -45           | 10.0         | 21.0                | 0.0            | 15.5            | 15.5         | -5.5           |  |  |
| -44           | 10.0         | 20.0                | 0.0            | 14.5            | 14.5         | -5.5           |  |  |
| -57           | 10.0         | 23.0                | 0.0            | 17.4            | 17.4         | -5.6           |  |  |
| -56           | 10.0         | 23.0                | 0.0            | 17.4            | 17.4         | -5.6           |  |  |
| -55           | 10.0         | 23.0                | 0.0            | 17.4            | 17.4         | -5.6           |  |  |
| -54           | 10.0         | 23.0                | 0.0            | 17.4            | 17.4         | -5.6           |  |  |

# \_ \_ \_ \_ \_ \_ \_ \_ \_

|               | 824 - 849 MHZ |                     |                |                 |              |                |  |  |  |
|---------------|---------------|---------------------|----------------|-----------------|--------------|----------------|--|--|--|
| RSSI<br>(dBm) | MSCL<br>(dB)  | Gain Limit<br>(dBm) | P(in)<br>(dBm) | P(out)<br>(dBm) | Gain<br>(dB) | Margin<br>(dB) |  |  |  |
| -44           | 10.0          | 20.0                | -2.0           | 13.7            | 15.7         | -4.3           |  |  |  |
| -43           | 10.0          | 19.0                | -2.0           | 12.7            | 14.7         | -4.3           |  |  |  |
| -54.0         | 10.0          | 23.0                | -2.0           | 17.2            | 19.2         | -3.8           |  |  |  |
| -53.0         | 10.0          | 23.0                | -2.0           | 17.2            | 19.2         | -3.8           |  |  |  |
| -52.0         | 10.0          | 23.0                | -2.0           | 17.2            | 19.2         | -3.8           |  |  |  |
| -51.0         | 10.0          | 23.0                | -2.0           | 17.2            | 19.2         | -3.8           |  |  |  |

# 824 - 849 MHz

#### 1710 - 1755 MHz

| RSSI<br>(dBm) | MSCL<br>(dB) | Gain Limit<br>(dBm) | P(in)<br>(dBm) | P(out)<br>(dBm) | Gain<br>(dB) | Margin<br>(dB) |  |  |
|---------------|--------------|---------------------|----------------|-----------------|--------------|----------------|--|--|
| -41.0         | 10.0         | 16.0                | 1.2            | 12.2            | 11.0         | -5.0           |  |  |
| -40.0         | 10.0         | 16.0                | 1.2            | 12.2            | 11.0         | -5.0           |  |  |
| -63.0         | 10.0         | 23.0                | 1.2            | 17.4            | 16.2         | -6.8           |  |  |
| -62.0         | 10.0         | 23.0                | 1.2            | 17.4            | 16.2         | -6.8           |  |  |
| -61.0         | 10.0         | 23.0                | 1.2            | 17.4            | 16.2         | -6.8           |  |  |
| -60.0         | 10.0         | 23.0                | 1.2            | 17.4            | 16.2         | -6.8           |  |  |

# 1850 - 1915 MHz

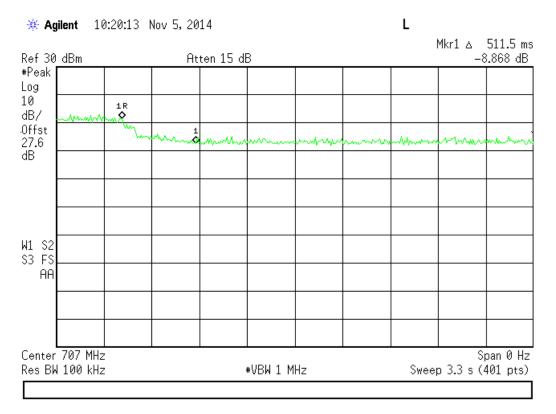
| RSSI<br>(dBm) | MSCL<br>(dB) | Gain Limit<br>(dBm) | P(in)<br>(dBm) | P(out)<br>(dBm) | Gain<br>(dB) | Margin<br>(dB) |
|---------------|--------------|---------------------|----------------|-----------------|--------------|----------------|
| -45           | 10.0         | 21.0                | -0.8           | 16.2            | 17.0         | -4.0           |
| -44           | 10.0         | 20.0                | -0.8           | 15.0            | 15.8         | -4.2           |
| -61.0         | 10.0         | 23.0                | -0.8           | 17.3            | 18.1         | -4.9           |
| -60.0         | 10.0         | 23.0                | -0.8           | 17.3            | 18.1         | -4.9           |
| -59.0         | 10.0         | 23.0                | -0.8           | 17.3            | 18.1         | -4.9           |
| -58.0         | 10.0         | 23.0                | -0.8           | 17.3            | 18.1         | -4.9           |

# Uplink Gain Timing Test Results

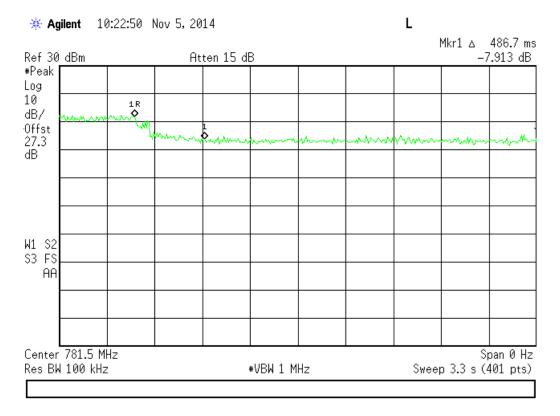
| Frequency Band<br>(MHz) | Measured Timing<br>(milliseconds) | Limit<br>(milliseconds) | Result |
|-------------------------|-----------------------------------|-------------------------|--------|
| 698 - 716               | 511.50                            | 1000                    | Pass   |
| 776 - 787               | 486.70                            | 1000                    | Pass   |
| 824 - 849               | 687.20                            | 1000                    | Pass   |
| 1710 - 1755             | 943.80                            | 1000                    | Pass   |
| 1850 - 1915             | 422.20                            | 1000                    | Pass   |





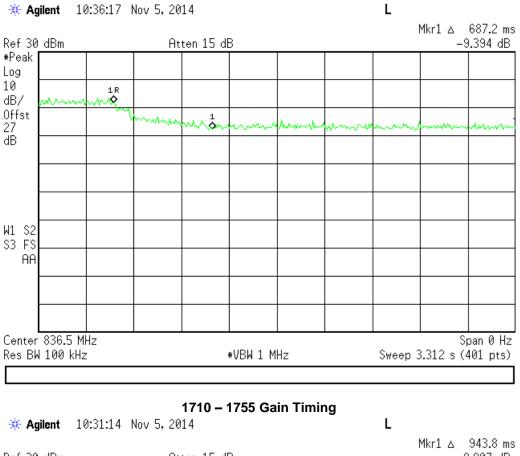


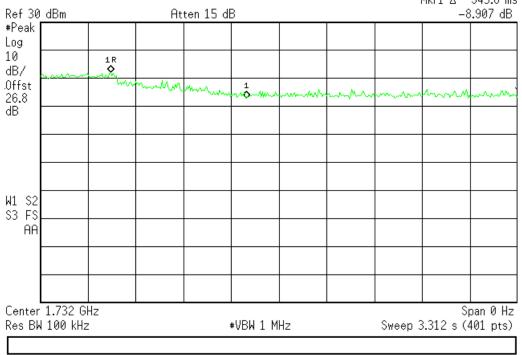
#### 776 - 787 Gain Timing



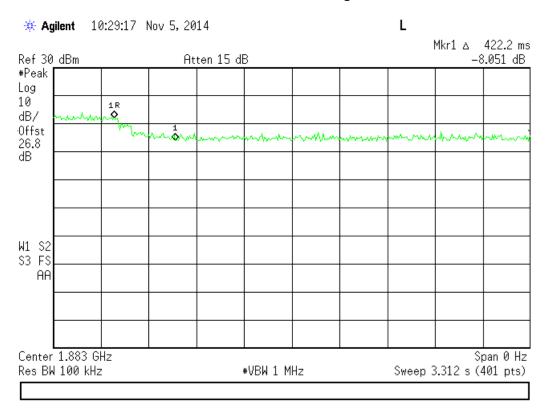












### 1850 – 1915 Gain Timing

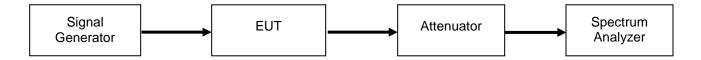


Occupied Bandwidth Engineer: Mike Graffeo Test Date: 11/4/14

### **Test Procedure**

The EUT was connected to a spectrum analyzer through an attenuator with the losses being input into the spectrum analyzer as a combination of reference level offset and correction factor as required to ensure that accurate readings were obtained. A signal generator was utilized to produce the following signals: GSM, CDMA, and WCDMA. The signal generator was tuned to the center channel of each of the EUT operational uplink and downlink bands with the RF level set at a point just prior to the AGC being in control of the power. For each modulation type, the input and output signal was measured and plotted to ensure that the signals were similar.



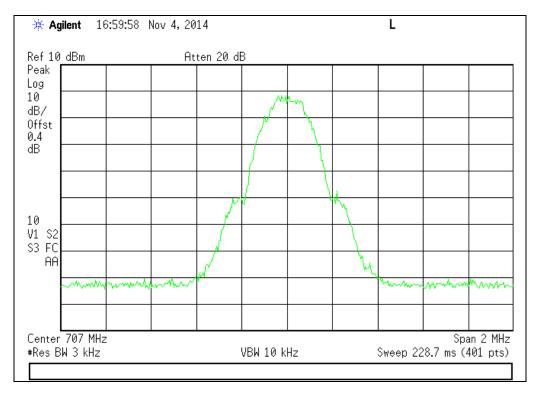




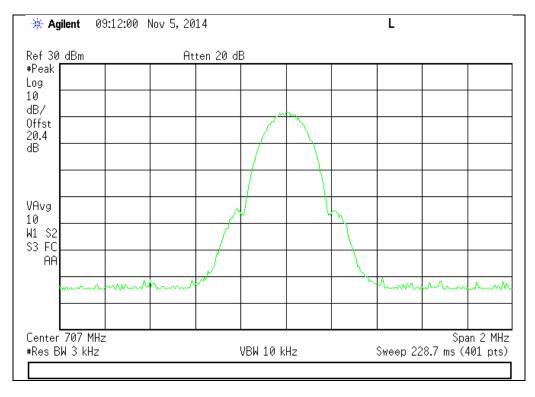
# GSM Uplink Test Plots

## 698 - 716 MHz Band

Input



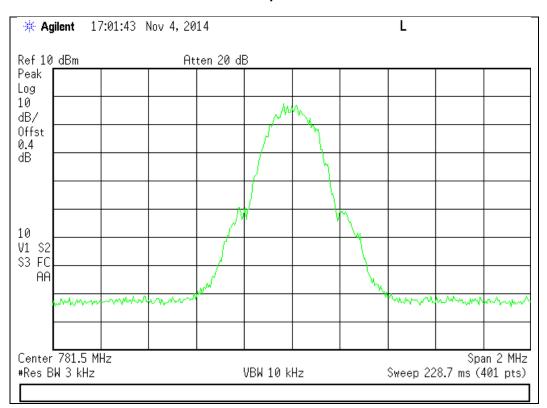




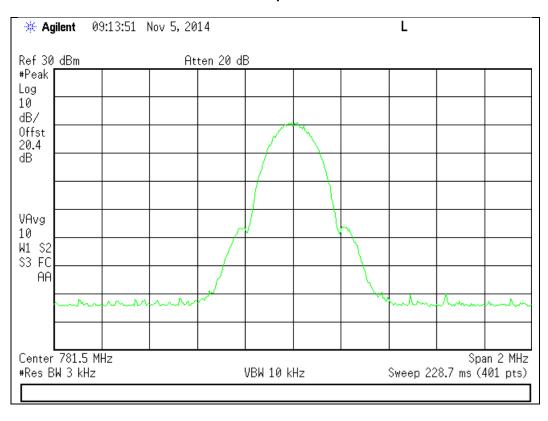


# 776 - 787 MHz Band





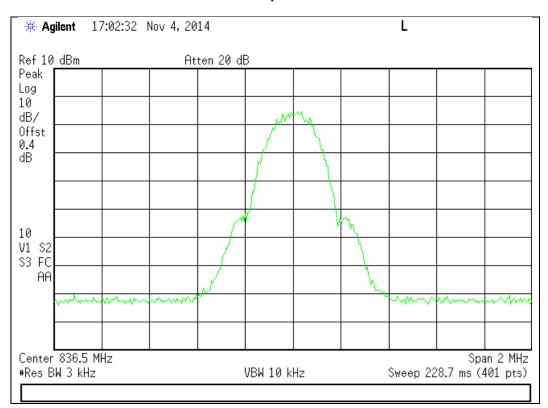




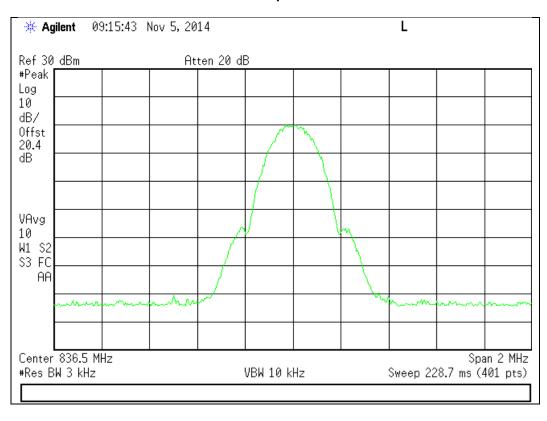


### 824 - 849 MHz Band





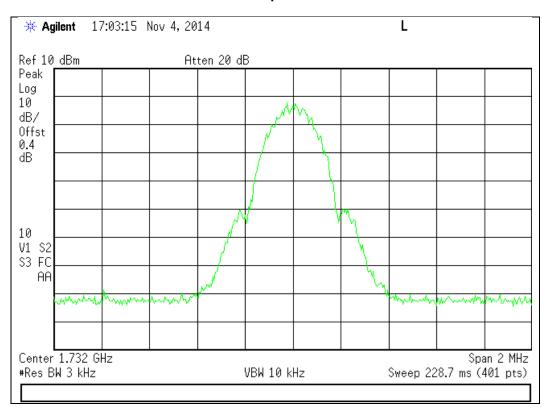




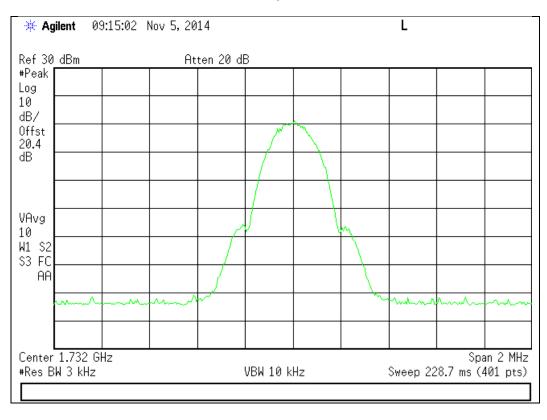


# 1710 - 1755 MHz Band





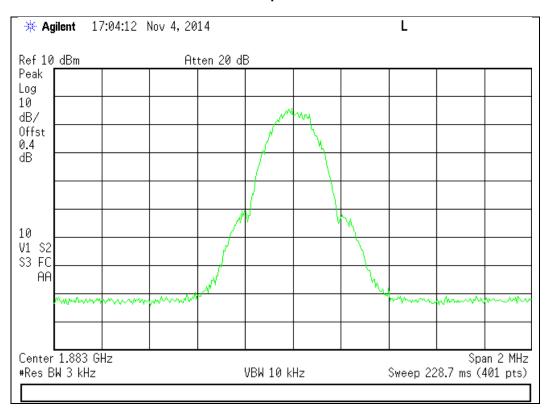




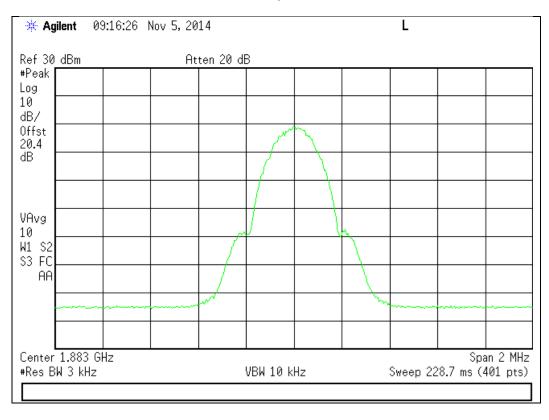


### 1850 - 1915 MHz Band







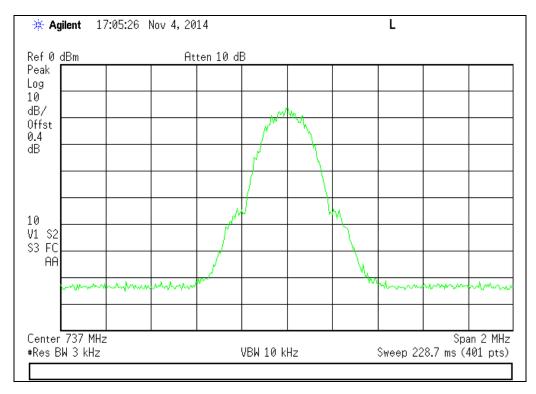




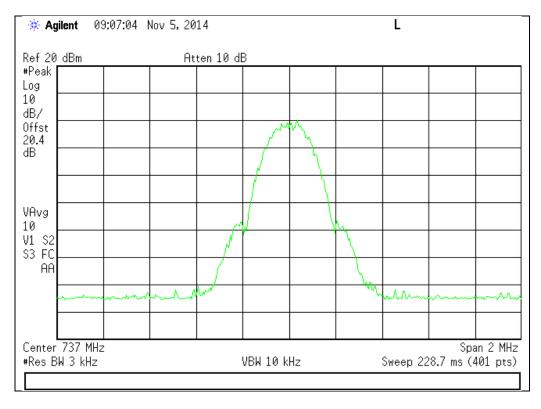
## **GSM Downlink Test Plots**

# 728 - 746 MHz Band

Input



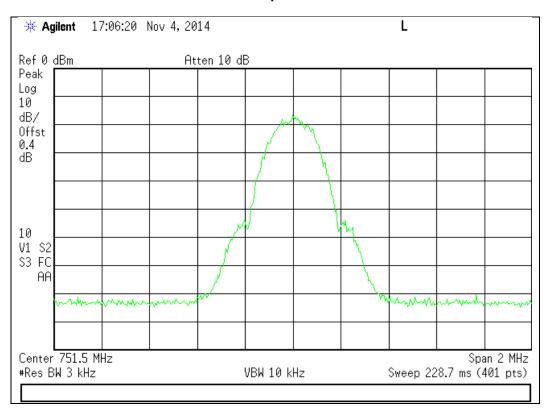




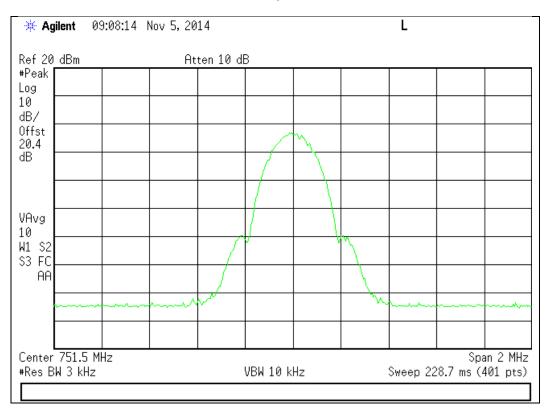


## 746 - 757 MHz Band





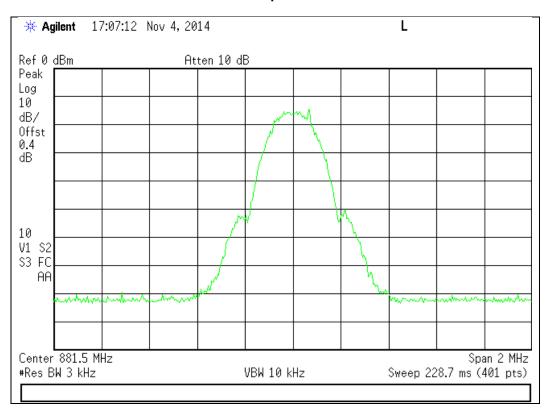




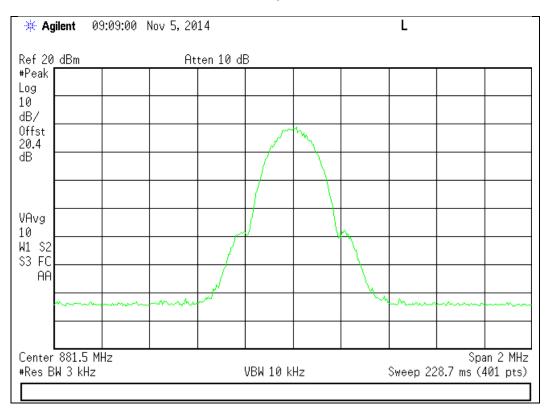


#### 869 - 894 MHz Band





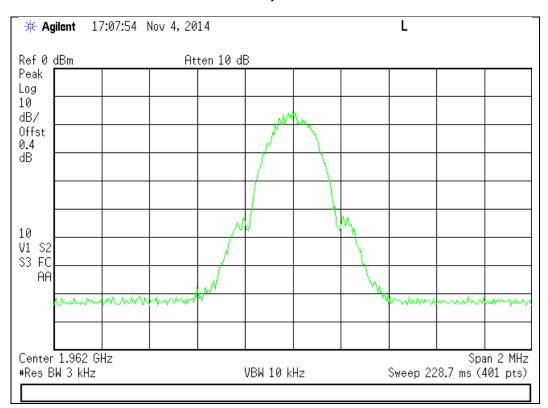




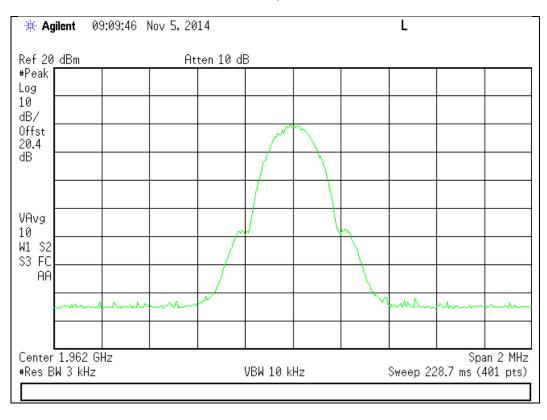


### 1930 - 1995 MHz Band





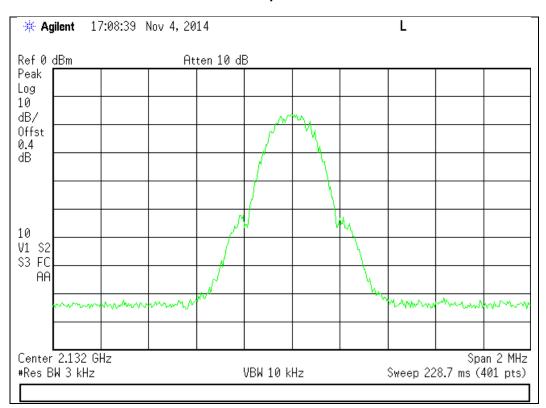




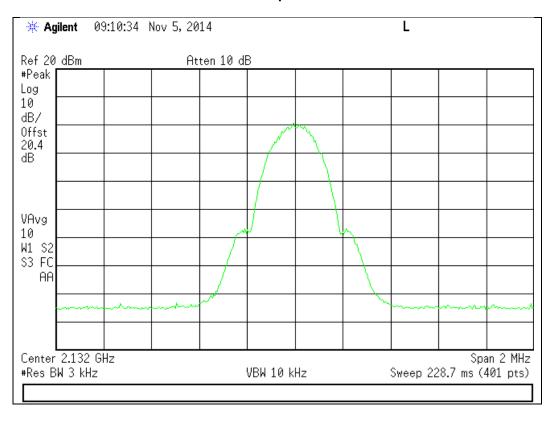


# 2110 - 2155 MHz Band





Output

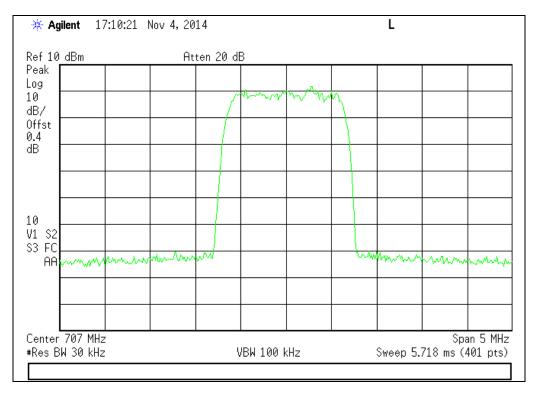




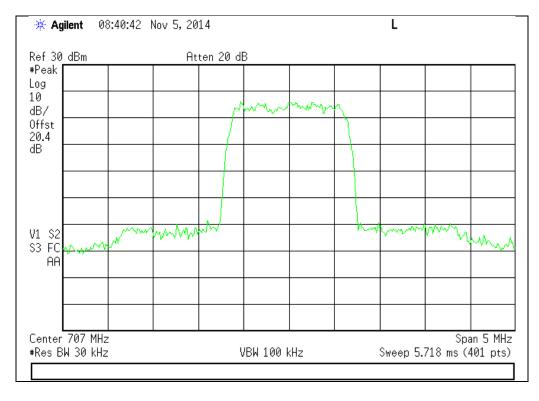
# CDMA Uplink Test Plots

# 698 - 716 MHz Band

Input



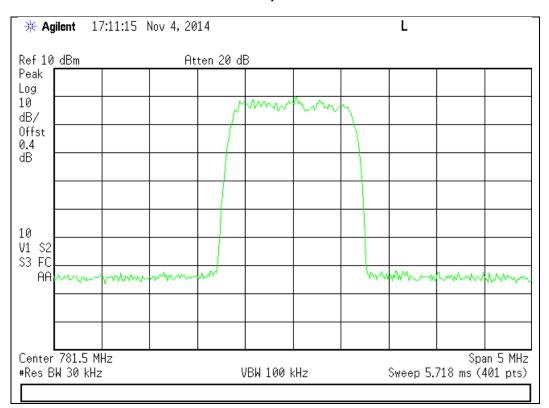
### Output



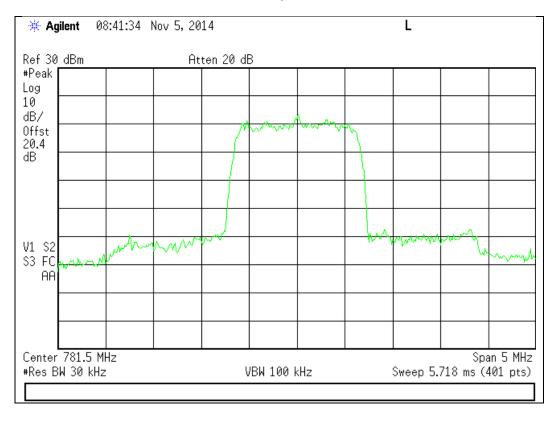


# 776 - 787 MHz Band





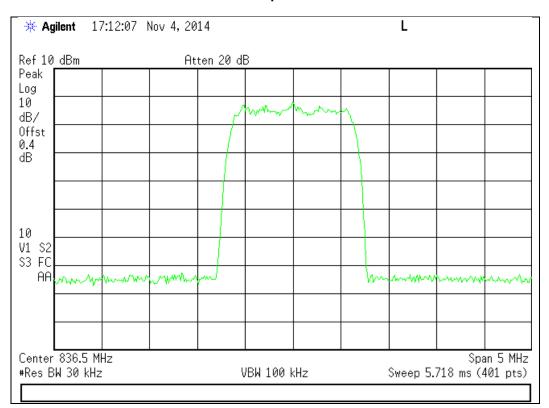
### Output



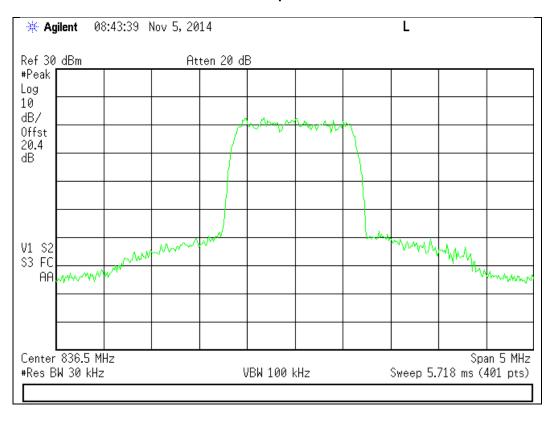


### 824 - 849 MHz Band





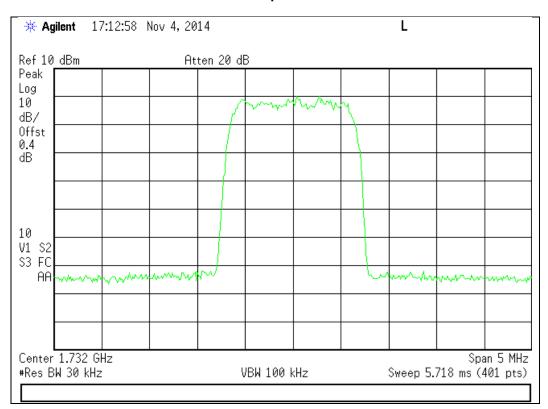




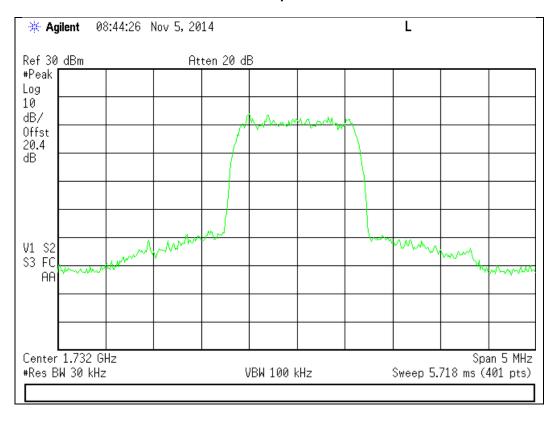


## 1710 - 1755 MHz Band





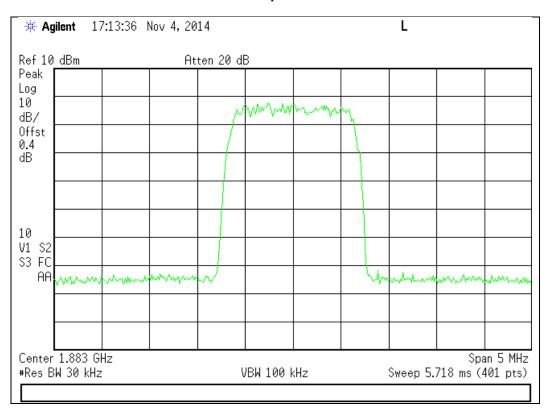
Output



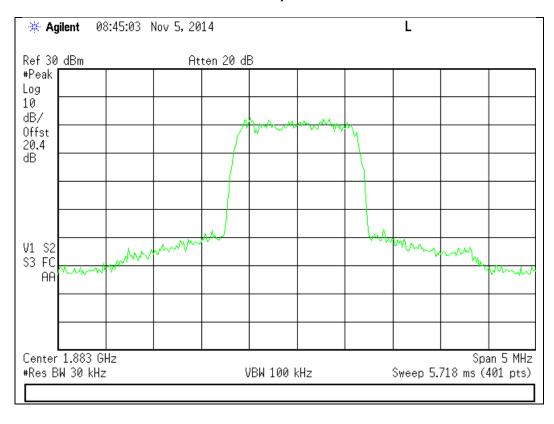


### 1850 - 1915 MHz Band





## Output

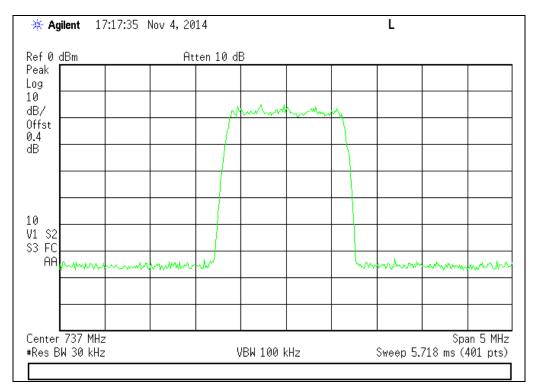




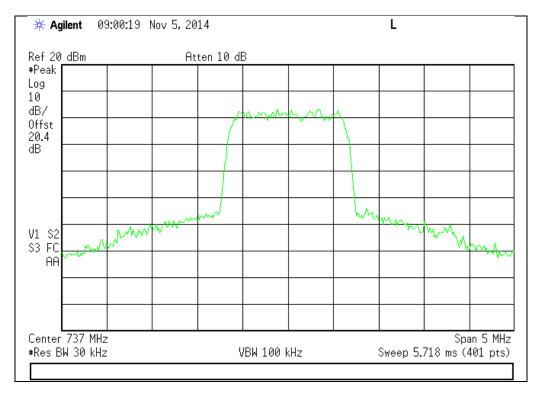
### **CDMA Downlink Test Plots**

# 728 - 746 MHz Band

Input



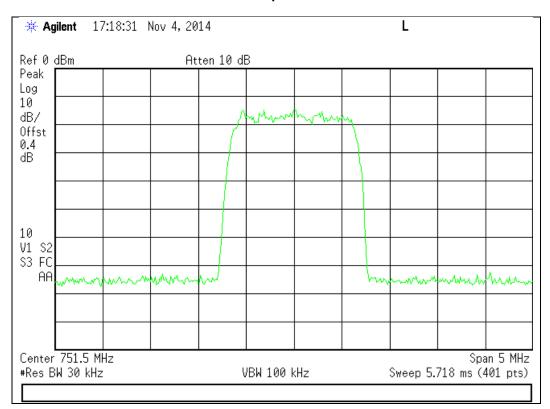
### Output



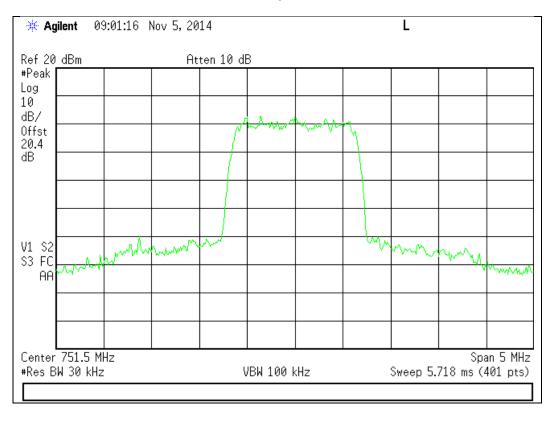


## 746 - 757 MHz Band





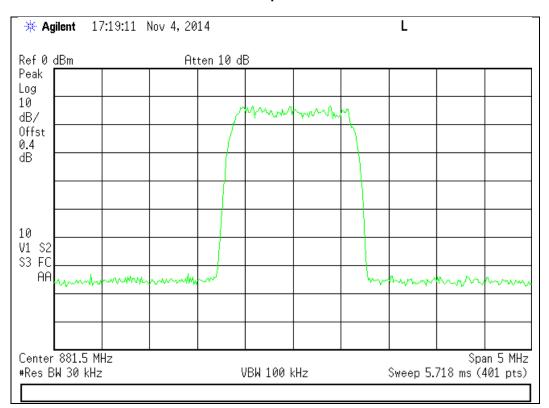




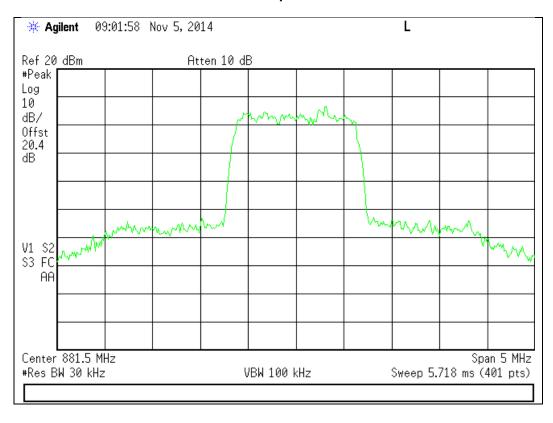


### 869 - 894 MHz Band





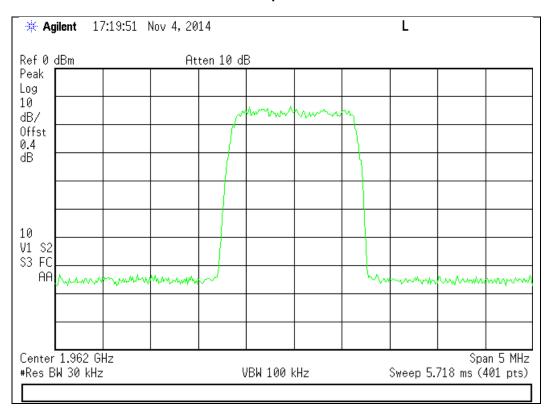
Output



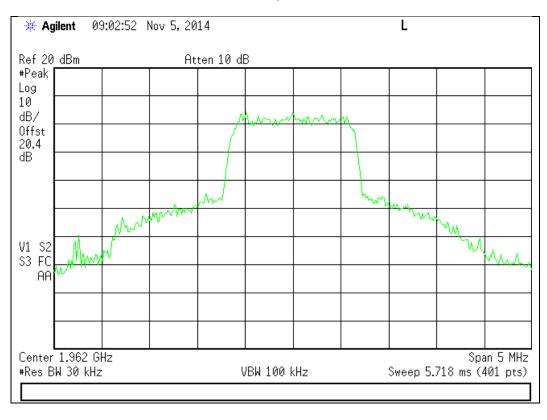


## 1930 - 1995 MHz Band





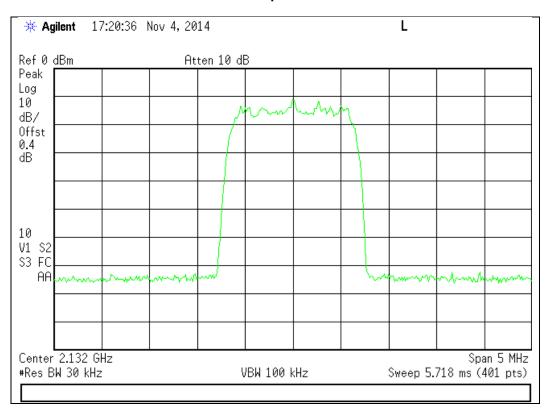




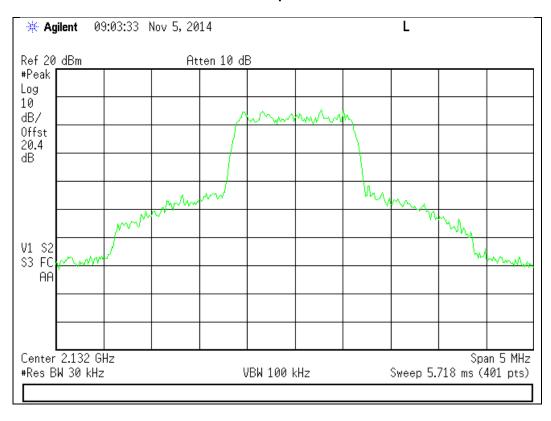


## 2110 - 2155 MHz Band





Output

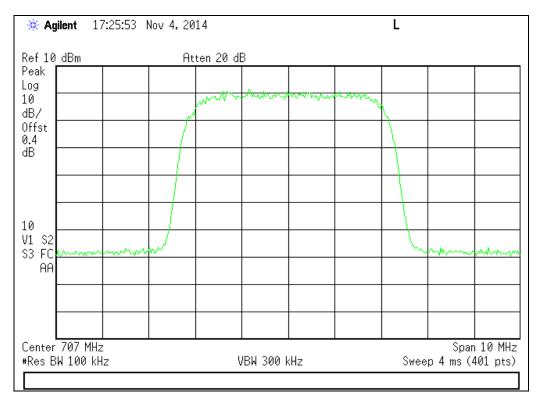




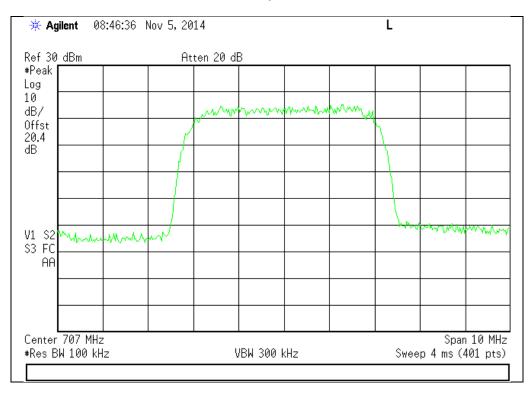
# WCDMA Uplink Test Plots

## 698 - 716 MHz Band

Input



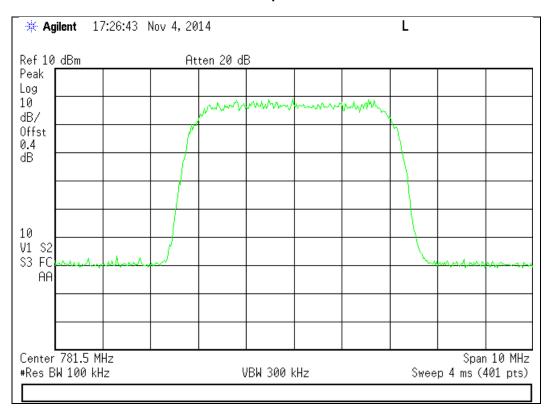




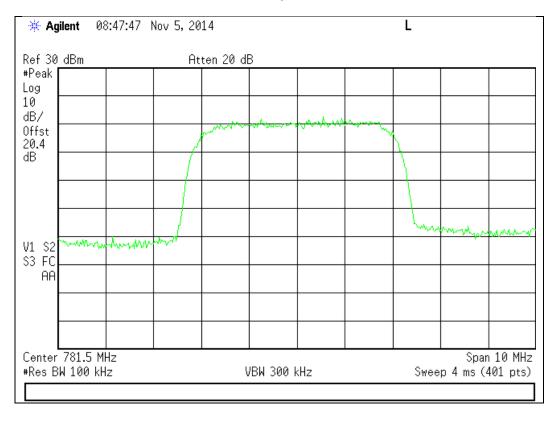


## 776 - 787 MHz Band





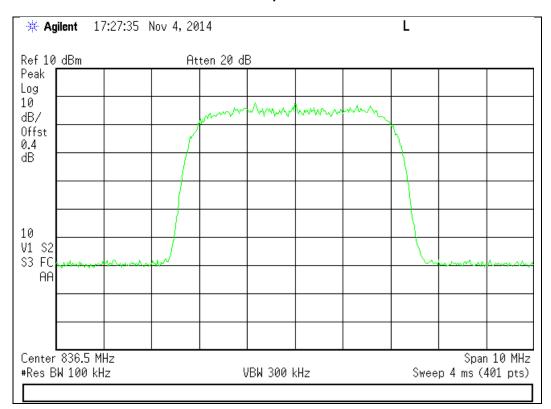
### Output



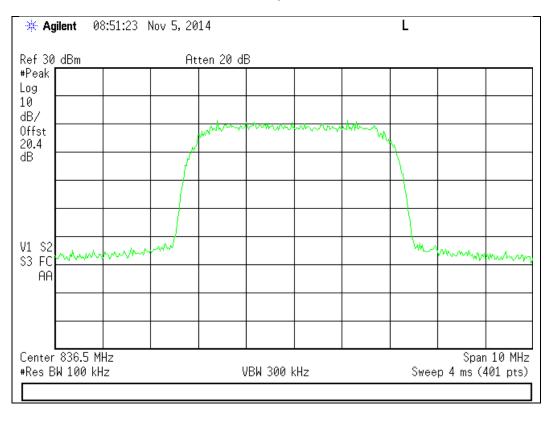


## 824 - 849 MHz Band





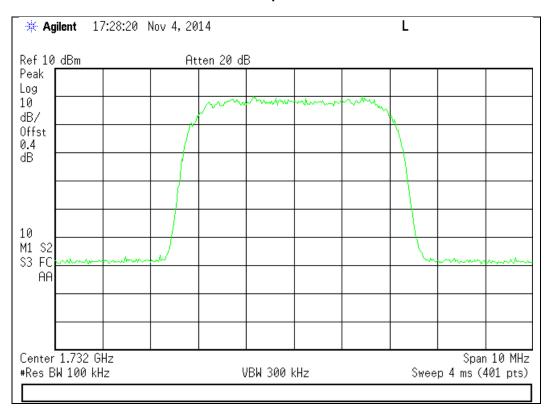




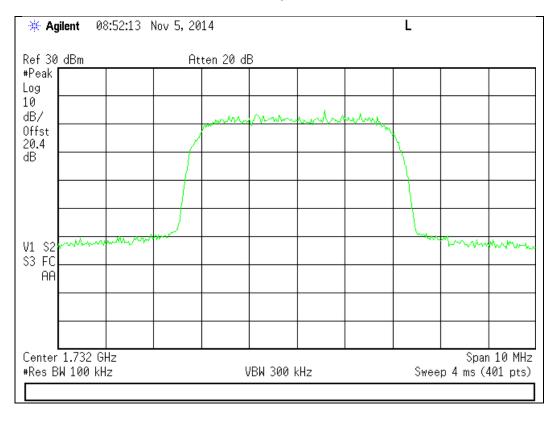


## 1710 - 1755 MHz Band





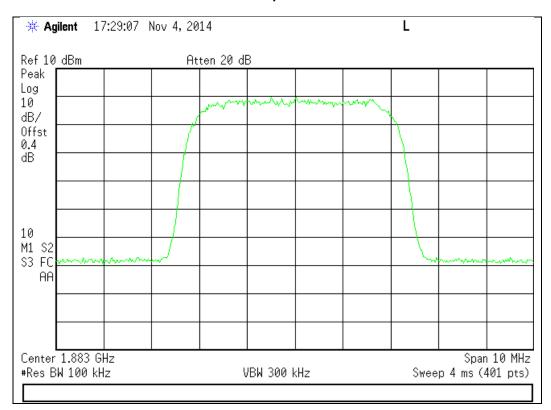
### Output



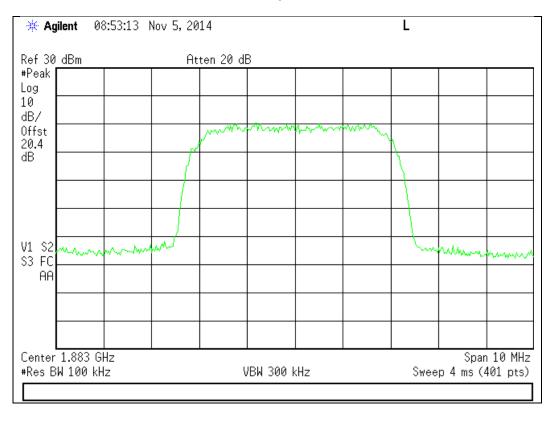


## 1850 - 1915 MHz Band







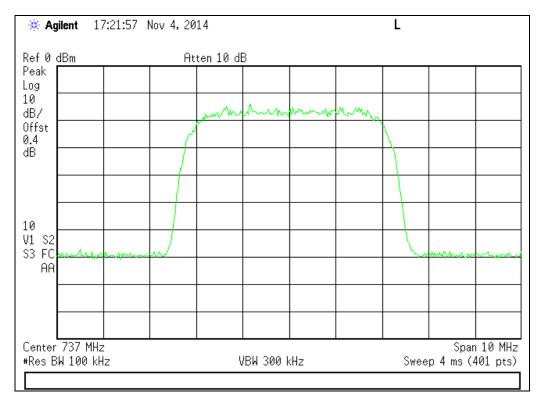




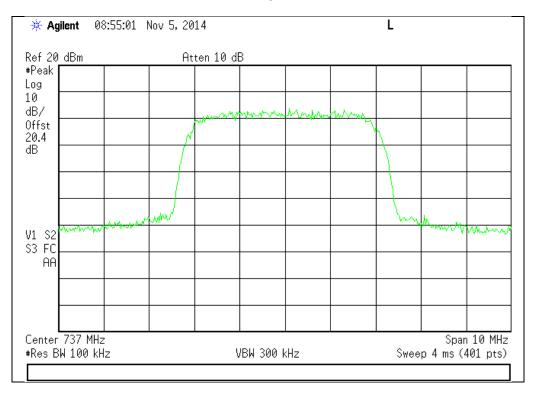
## WCDMA Downlink Test Plots

# 728 - 746 MHz Band

Input



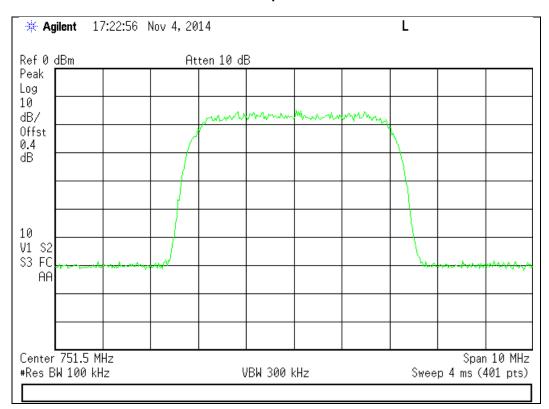




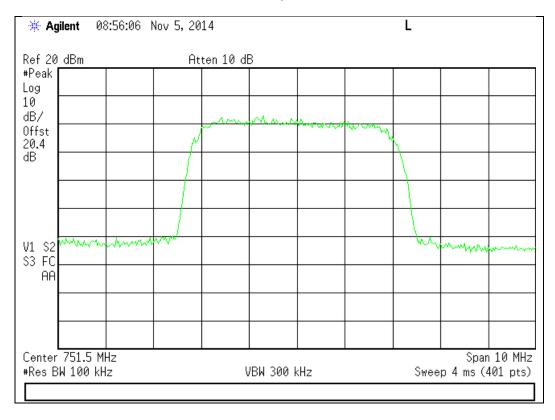


## 746 - 757 MHz Band





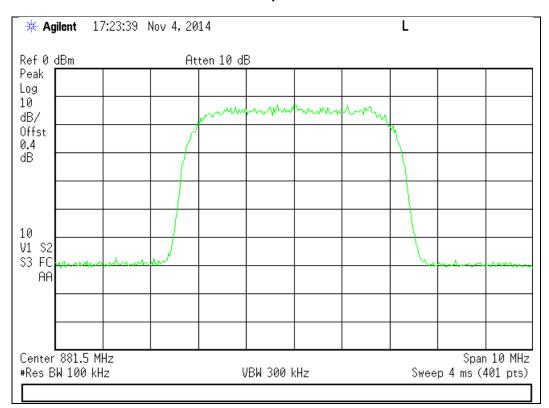
Output



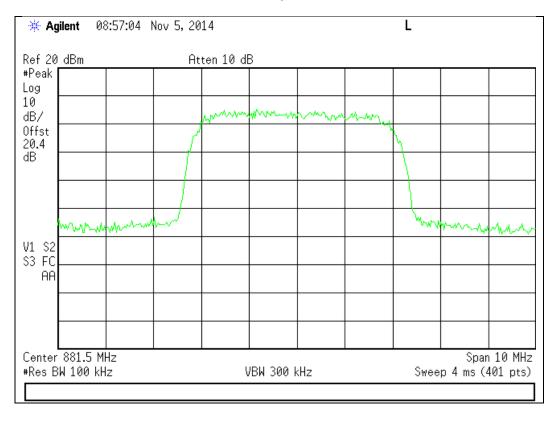


### 869 - 894 MHz Band





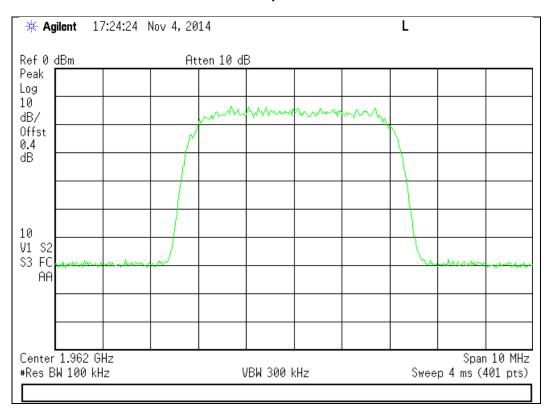
Output



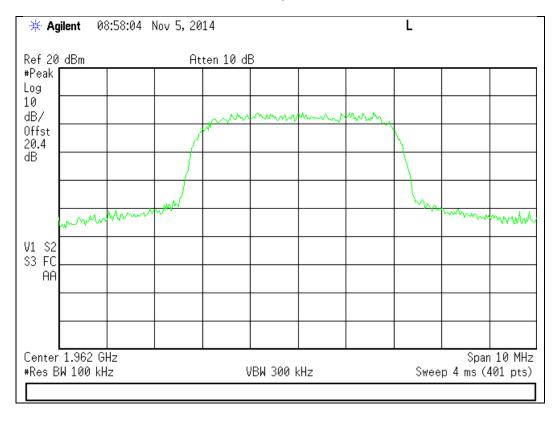


## 1930 - 1995 MHz Band





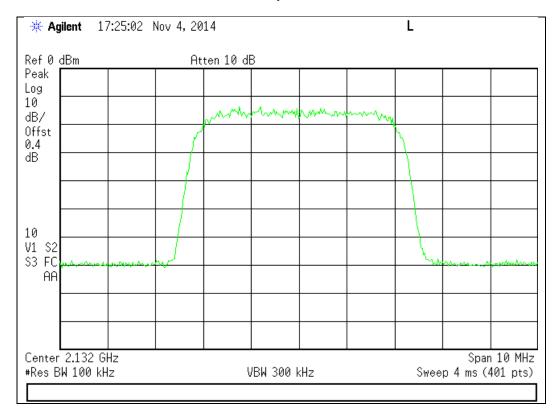
Output



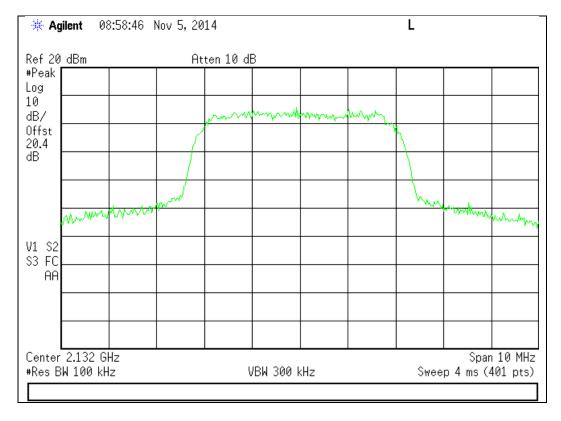


## 2110 - 2155 MHz Band





Output



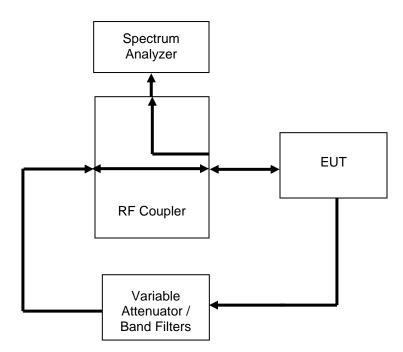


Oscillation Detection Engineer: Mike Graffeo Test Date: 11/4/14

### **Test Procedure**

The EUT was connected to a spectrum analyzer set for 0 Hz operation. The EUT uplink and downlink were fed back upon each other through a selectable band pass filter and variable attenuator. The EUT uplink and downlink were tested to ensure that the presence of oscillation was detected and that the EUT output turned off within 300 mS for the Uplink and 1 second for the Downlink and remained off for 1 minute. A EUT with test software was utilized to ensure that the EUT only had a maximum of 5 attempts at restart from oscillation before permanently shutting off.





### **Uplink Detection Time Test Results**

| Frequency Band<br>(MHz) | Measured Time<br>(mS) | Limit<br>(mS) | Result |
|-------------------------|-----------------------|---------------|--------|
| 698 - 716               | 79.75                 | 300           | Pass   |
| 776 - 787               | 57.75                 | 300           | Pass   |
| 824 - 849               | 93.5                  | 300           | Pass   |
| 1710 - 1755             | 52.25                 | 300           | Pass   |
| 1850 - 1915             | 104.5                 | 300           | Pass   |

### **Downlink Detection Time Test Results**

| Frequency Band<br>(MHz) | Measured Time<br>(mS) | Limit<br>(mS) | Result |
|-------------------------|-----------------------|---------------|--------|
| 728 - 746               | 167.8                 | 1000          | Pass   |
| 746 - 757               | 107.3                 | 1000          | Pass   |
| 869 - 894               | 96.25                 | 1000          | Pass   |
| 1930 - 1995             | 93.5                  | 1000          | Pass   |
| 2110 - 2155             | 99.0                  | 1000          | Pass   |



| Uplink Res | start Time | Test | Res | ults |
|------------|------------|------|-----|------|
|            |            |      |     |      |

| Frequency Band<br>(MHz) | Measured Time<br>(S) | Limit<br>(S) | Result |
|-------------------------|----------------------|--------------|--------|
| 698 - 716               | 70                   | ≥60          | Pass   |
| 776 - 787               | 70                   | ≥60          | Pass   |
| 824 - 849               | 70                   | ≥60          | Pass   |
| 1710 - 1755             | 70                   | ≥60          | Pass   |
| 1850 - 1915             | 70                   | ≥60          | Pass   |

#### Downlink Restart Time Test Results

| Frequency Band<br>(MHz) | Measured Time<br>(S) | Limit<br>(S) | Result |
|-------------------------|----------------------|--------------|--------|
| 728 - 746               | 70                   | ≥60          | Pass   |
| 746 - 757               | 70                   | ≥60          | Pass   |
| 869 - 894               | 70                   | ≥60          | Pass   |
| 1930 - 1995             | 70                   | ≥60          | Pass   |
| 2110 - 2155             | 70                   | ≥60          | Pass   |

## Uplink Restart Count Test Results

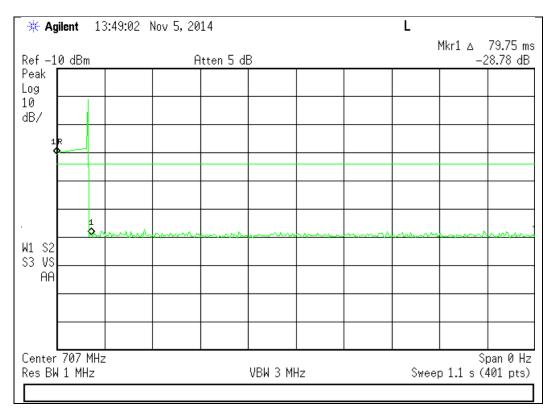
| Frequency Band<br>(MHz) | Restarts | Limit | Result |
|-------------------------|----------|-------|--------|
| 698 - 716               | 5        | ≤5    | Pass   |
| 776 - 787               | 5        | ≤5    | Pass   |
| 824 - 849               | 5        | ≤5    | Pass   |
| 1710 - 1755             | 5        | ≤5    | Pass   |
| 1850 - 1915             | 5        | ≤5    | Pass   |

## Downlink Restart Count Test Results

| Frequency Band<br>(MHz) | Restarts | Limit | Result |
|-------------------------|----------|-------|--------|
| 728 - 746               | 5        | ≤5    | Pass   |
| 746 - 757               | 5        | ≤5    | Pass   |
| 869 - 894               | 5        | ≤5    | Pass   |
| 1930 - 1995             | 5        | ≤5    | Pass   |
| 2110 - 2155             | 5        | ≤5    | Pass   |

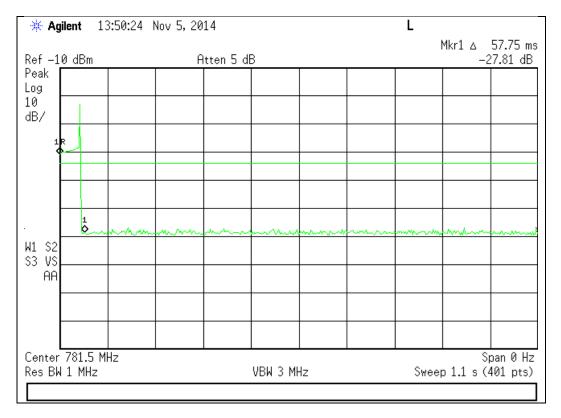


## **Uplink Detection Time Test Results**

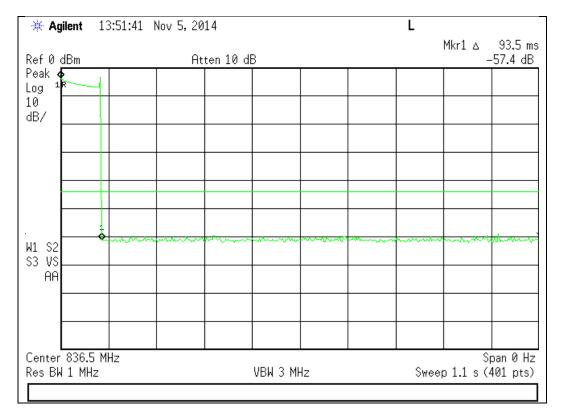


#### 698 - 716 MHz Band

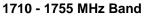
776 - 787 MHz Band

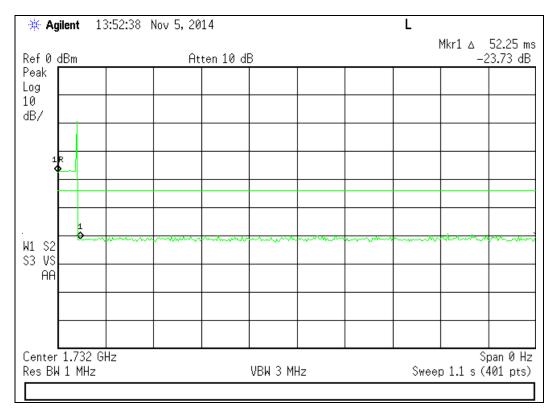




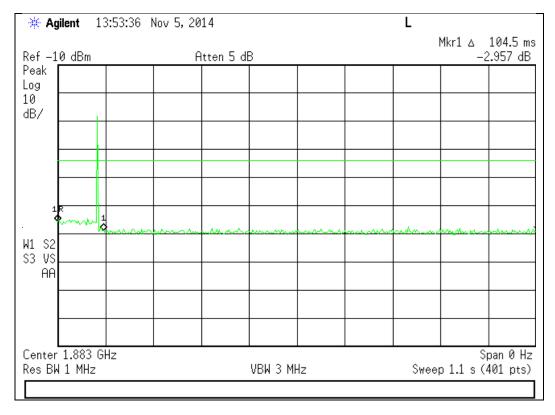


824 - 849 MHz Band





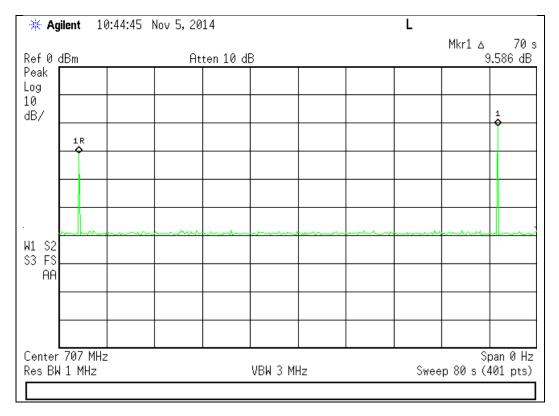




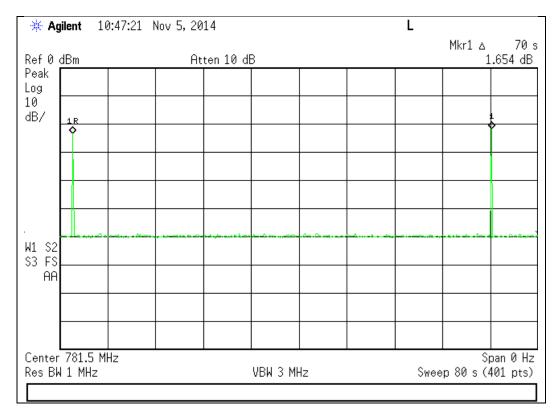
1850 - 1915 MHz Band



698 - 716 MHz Band

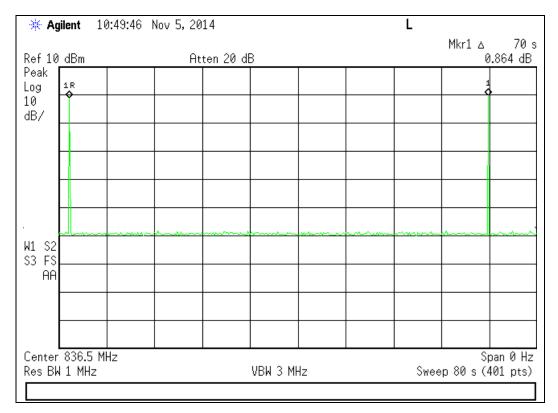




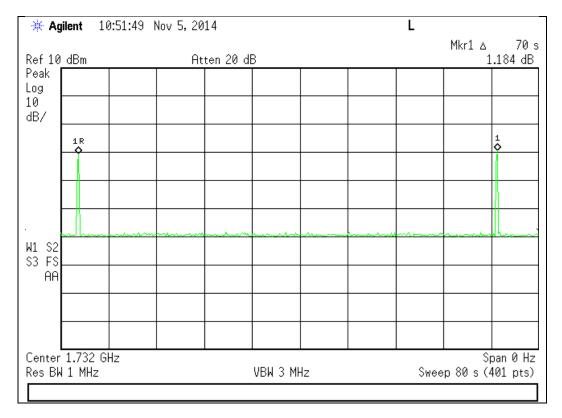


776 - 787 MHz Band

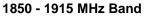


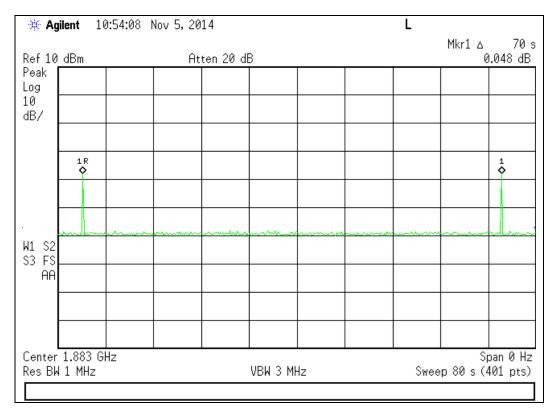






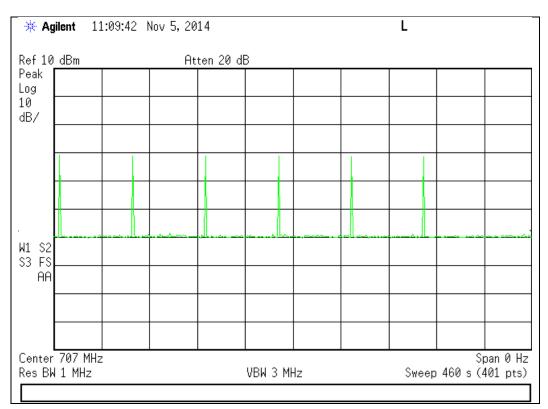
1710 - 1755 MHz Band





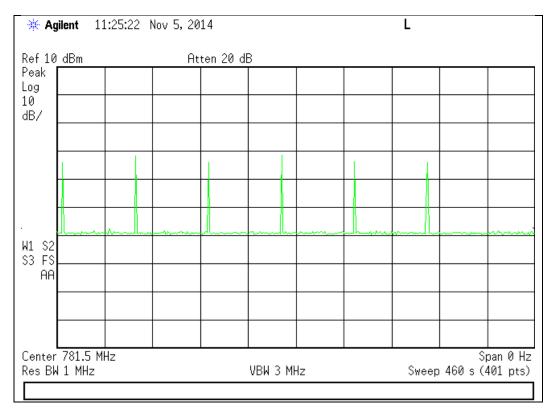


## **Uplink Restart Count Test Results**

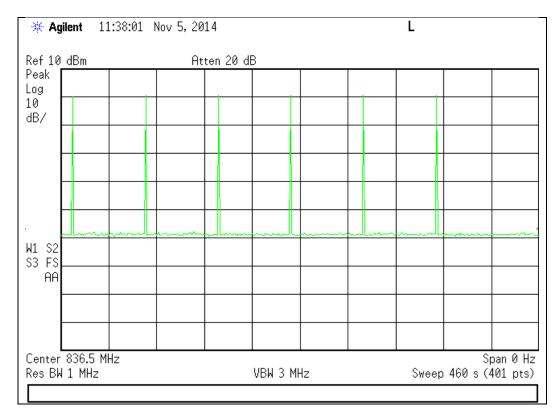


#### 698 - 716 MHz Band

776 - 787 MHz Band

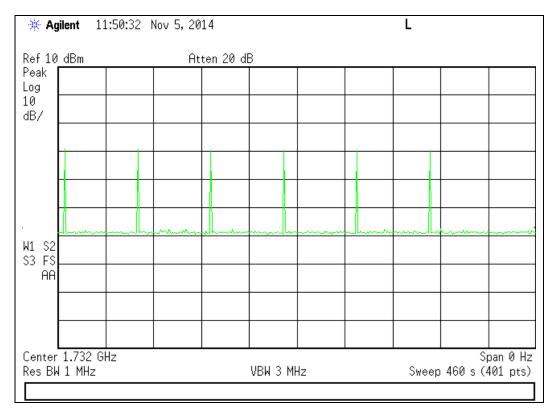




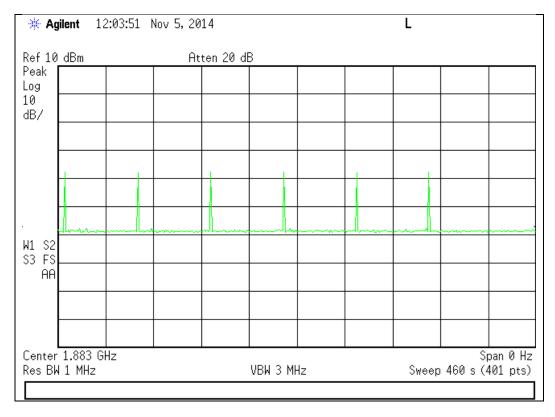


824 - 849 MHz Band





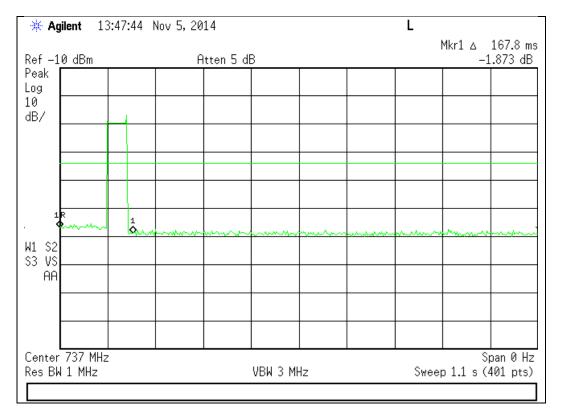




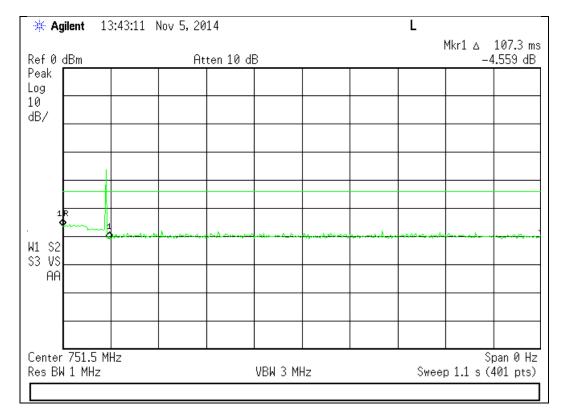
1850 - 1915 MHz Band



728 - 746 MHz Band

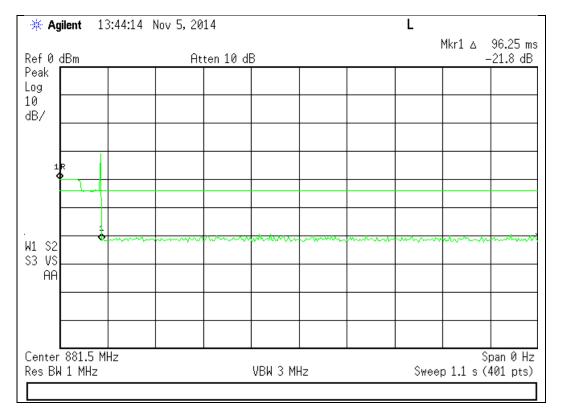




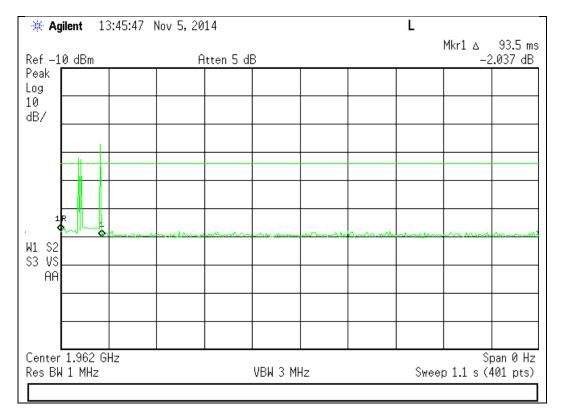


746 - 757 MHz Band

869 - 894 MHz Band

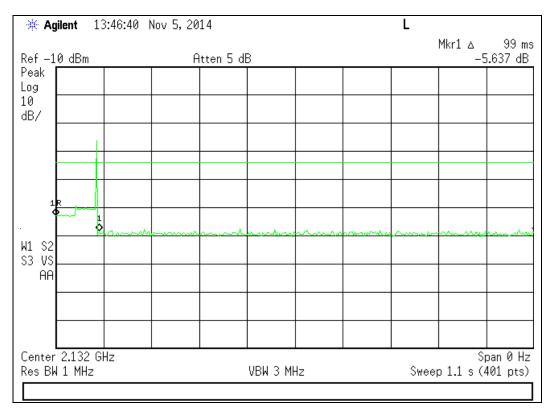






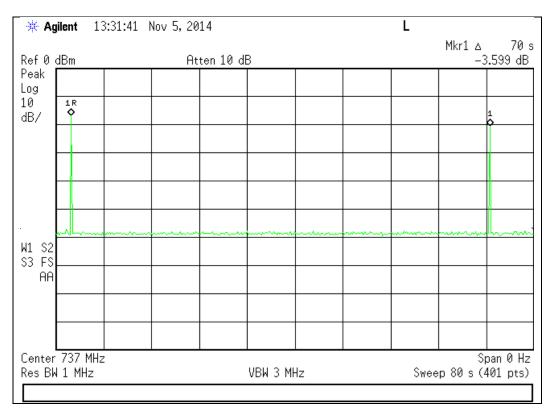
1930 - 1995 MHz Band





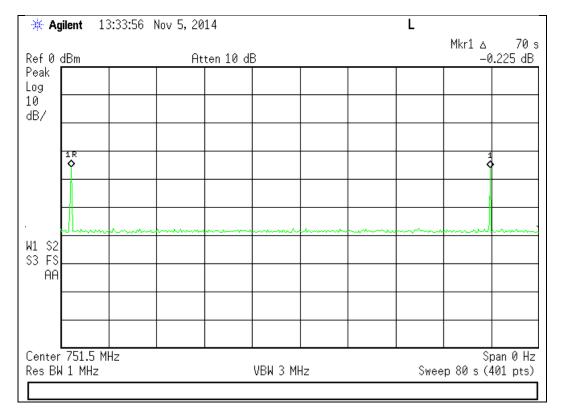


## **Downlink Restart Time Test Results**

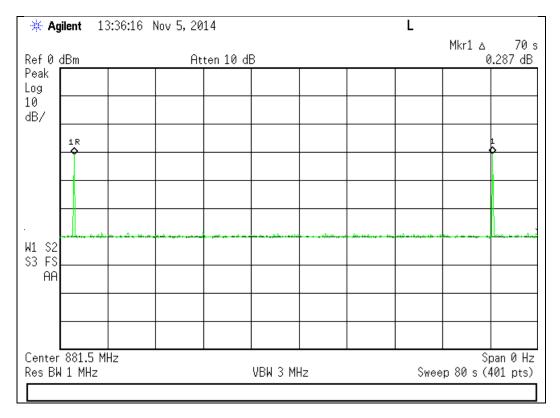


### 728 - 746 MHz Band

746 - 757 MHz Band

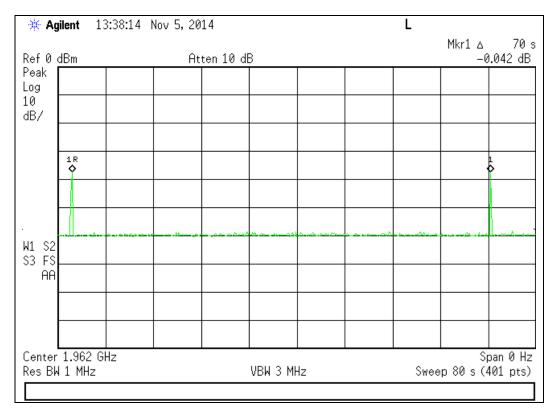




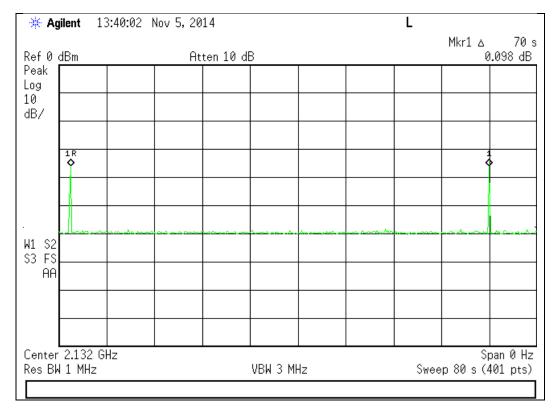


869 - 894 MHz Band





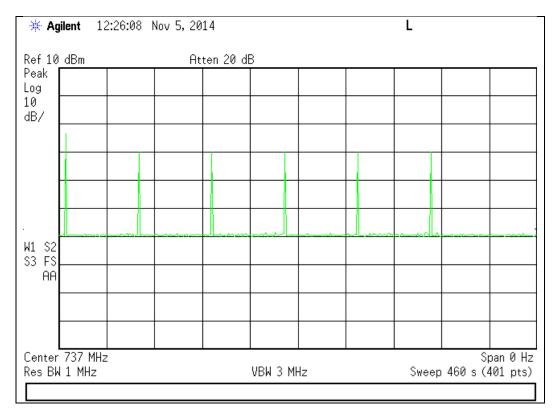




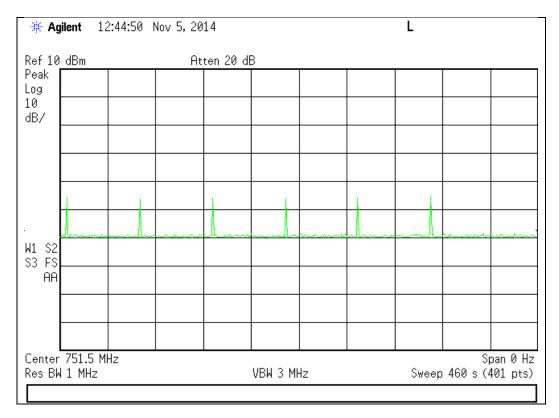
2110 - 2155 MHz Band



728 - 746 MHz Band

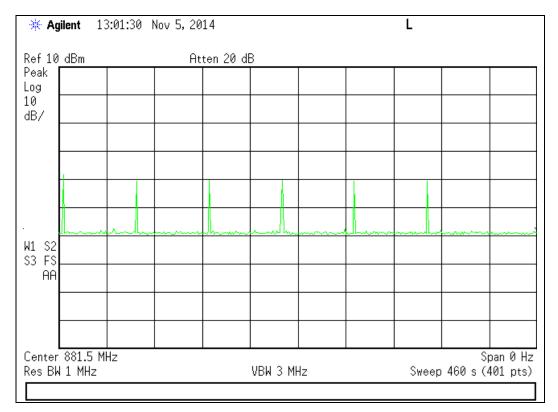




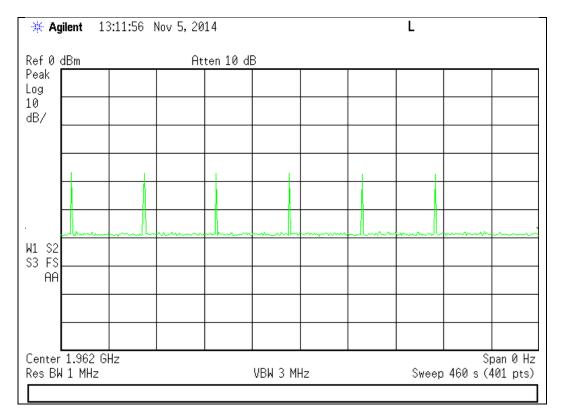


746 - 757 MHz Band

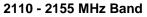


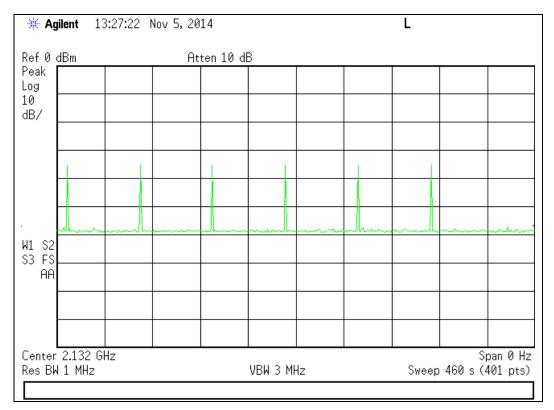






#### 1930 - 1995 MHz Band







Radiated Spurious Engineer: Mike Graffeo Test Date: 11/6/14

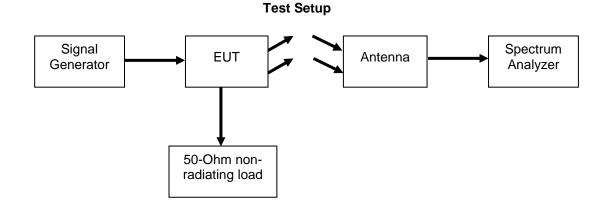
## **Test Procedure**

The EUT was tested in a semi-anechoic chamber with the turntable set 3m from the receiving antenna. A spectrum analyzer was used to verify that the EUT met the requirements for Radiated Emissions. The EUT was tested by rotating it 360 degrees with the antenna in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure that the signal levels were maximized. All cable and antenna correction factors were input into the spectrum analyzer ensuring an accurate measurement in ERP/EIRP with the resultant power in dBm. A signal generator was used to provide a CW signal centered in each operational uplink and downlink band. The EUT output was terminated into a 50 Ohm non-radiating load.

The following formula was used for calculating the limits:

Radiated Spurious Emissions Limit = P1 - (43 + 10Log(P2)) = -13dBmP1 = power in dBm

P2 = power in Watts





## **Uplink Test Results**

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1414                        | -55.21                  | -13            | Pass   |
| 2121                        | -52.58                  | -13            | Pass   |
| 2828                        | -44.11                  | -13            | Pass   |

## 698 - 716 MHz Band 707 MHz Tuned Frequency

## 776 - 787 MHz Band 781.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1563                        | -53.50                  | -13            | Pass   |
| 2344.5                      | -49.65                  | -13            | Pass   |
| 3126                        | -43.38                  | -13            | Pass   |

## 824 - 849 MHz Band 836.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1673                        | -56.64                  | -13            | Pass   |
| 2509.5                      | -49.49                  | -13            | Pass   |
| 3344                        | -44.43                  | -13            | Pass   |

## 1710 - 1755 MHz Band 1732.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 3465                        | -47.88                  | -13            | Pass   |
| 5197.5                      | -42.56                  | -13            | Pass   |
| 6930                        | -38.24                  | -13            | Pass   |

# 1850 - 1915 MHz Band 1882.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 3765                        | -45.02                  | -13            | Pass   |
| 5647.5                      | -40.26                  | -13            | Pass   |
| 7530                        | -32.32                  | -13            | Pass   |

## **Downlink Test Results**

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1474                        | -55.58                  | -13            | Pass   |
| 2211                        | -47.60                  | -13            | Pass   |
| 2948                        | -46.13                  | -13            | Pass   |

## 728 - 746 MHz Band 737 MHz Tuned Frequency

#### 746 - 757 MHz Band 751.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1503                        | -55.89                  | -13            | Pass   |
| 2254.5                      | -49.83                  | -13            | Pass   |
| 3006                        | -47.83                  | -13            | Pass   |

## 869 - 894 MHz Band 881.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 1763                        | -55.35                  | -13            | Pass   |
| 2644.5                      | -47.08                  | -13            | Pass   |
| 3526                        | -47.63                  | -13            | Pass   |

## 1930 - 1995 MHz Band 1960.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 3921                        | -42.79                  | -13            | Pass   |
| 5881.5                      | -41.45                  | -13            | Pass   |
| 7842                        | -33.87                  | -13            | Pass   |

## 2110 - 2155 MHz Band 2132.5 MHz Tuned Frequency

| Measured Frequency<br>(MHz) | Measured Level<br>(dBm) | Limit<br>(dBm) | Result |
|-----------------------------|-------------------------|----------------|--------|
| 4265                        | -42.03                  | -13            | Pass   |
| 6397.5                      | -39.33                  | -13            | Pass   |
| 8530                        | -35.05                  | -13            | Pass   |

No other emissions were detected. All emissions were lower than -13 dBm. All emissions were system noise floor.



## **Test Equipment Utilized**

| Description             | Manufacturer       | Model #     | CT Asset # | Last Cal Date       | Cal Due Date |
|-------------------------|--------------------|-------------|------------|---------------------|--------------|
| Horn Antenna, Amplified | ARA                | DRG-118/A   | i00271     | 5/8/14              | 5/8/16       |
| Bi-Log Antenna          | Schaffner          | CBL 6111D   | i00349     | 10/8/13             | 10/8/15      |
| Humidity / Temp Meter   | Newport            | IBTHX-W-5   | i00282     | 3/24/14             | 3/24/15      |
| Voltmeter               | Fluke              | 75111       | i00320     | 3/24/14             | 3/24/15      |
| EMI Analyzer            | Agilent            | E7405A      | i00379     | 1/14/14             | 1/14/15      |
| Spectrum Analyzer *     | Tektronix          | RSA5126A    | i00424     | 9/22/13             | 9/22/14      |
| Non-radiating load      | Termaline          | 8201        | i00334     | Verified on: 9/1/14 |              |
| Signal Generator        | Rohde &<br>Schwarz | SMU200A     | i00405     | 12/11/13            | 12/11/14     |
| RF Directional Coupler  | Меса               | CS06-1.500V | i00412     | Verified c          | n: 9/1/14    |

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

\* Lab Manager has approved a 60 day extension on this piece of equipment

END OF TEST REPORT