



Test Report

Prepared for: Wilson Electronics, Inc.

Model: 273470

Description: Quint-Band Signal Booster

To

FCC Part 22H, 24E, 27

Date of Issue: July 26, 2012

On the behalf of the applicant:

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Project Test Engineer

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	7/26/12	John Erhard	Original Document
2.0	8/20/12	John Erhard	Correct typographical error in frequency Replace incorrect pass band plot



Table of Contents

<u>Description</u>	<u>Page</u>
Standard Test Conditions and Engineering Practices	5
Test Result Summary	6
Carrier Output Power	7
Spurious Emissions (Transmitter Conducted)	10
Spurious Emissions (Transmitter Radiated)	16
Intermodulation	20
Occupied Bandwidth	45
Out of Band Rejection	76
Test Equipment Utilized	82



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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 OATS Reg, #933597

IC Reg. #2044A-1

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, Sub-part J and the following individual Parts: 22H, 24E, 27 Signal Booster.

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 specify 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 (°C)	Humidity (%)	Pressure (mbar)
21.6 - 29.0	40.2 - 57.9	964.7 - 969.4

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

EUT Description

Model: 273470

Description: Quint-Band Signal Booster

Firmware: N/A

Software: N/A

Accessories: None

Cables: None

Modifications: None

Additional Information:

The EUT is a 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 (MHz)					
Uplink	698 - 716	776 - 787	824 - 849	1850 - 1910	1710 - 1755
Downlink	728 - 746	746 - 757	869 - 894	1930 - 1990	2110 - 2155
Modulation Type	LTE		GSM, CDMA, EDGE, HSPA, EVDO, LTE		CDMA, HSPA, LTE, EDGE, EVDO

EUT Operation during Tests

The EUT was in a normal operating condition.



Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
Part 22H, 24E, 27	Carrier Output Power	Pass	
Part 22H, 24E, 27	Spurious Emissions (Transmitter Conducted)	Pass	
Part 22H, 24E, 27	Spurious Emissions (Transmitter Radiated)	Pass	
Part 22H, 24E, 27	Intermodulation	Pass	
Part 22H, 24E, 27	Occupied Bandwidth	Pass	
Part 22H, 24E, 27	Out of Band Rejection	Pass	
Part 22H, 24E, 27	Frequency Stability (Temperature Variation)	N/A	The EUT does not perform frequency translation
Part 22H, 24E, 27	Frequency Stability (Voltage Variation)	N/A	The EUT does not perform frequency translation



Carrier Output Power

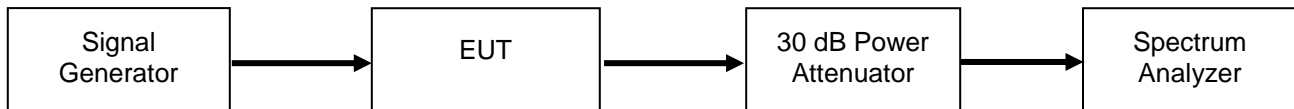
Name of Test: Carrier Output Power
Test Equipment Utilized: i00331, i00348, i00347

Engineer: John Erhard
Test Date: 7/19/2012

Test Procedure

The EUT was connected to a spectrum analyzer through a 30 dB power attenuator. A signal generator was utilized to produce a CW input signal. The RF input level was increased while monitoring the output power. The input RF drive level was increased until the EUT output reached saturation (the output stopped increasing) whereby the maximum power level and gain was achieved. The uplink / downlink power and gain levels for the low, middle, and high channels are recorded in the following tables.

Test Setup





Uplink Test Results

698 - 716 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
698	-43.1	26.5	69.6
707	-44.3	28.3	72.6
716	-38.4	29.1	67.5

776 - 787 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
776	-40.5	28.4	68.9
781.5	-40.8	27.9	68.7
787	-39.5	26.9	66.4

824 - 849 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
824	-39.5	26.4	65.9
836	-40.4	28.5	68.9
849	-37.3	29.1	66.4

1710 - 1755 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
1710	-33.4	25.9	59.3
1742	-34.4	26.3	60.7
1755	-32.6	27.1	59.7

1850 - 1910 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
1850	-36.5	29.1	65.6
1880	-43.4	28.3	71.7
1910	-38.4	27.2	65.6



Downlink Test Results

728 - 746 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
728	-41.6	22.6	64.2
737	-41.3	23.7	65
746	-41.6	23.1	64.7

746 - 757 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
746	-41.5	23.1	64.6
751.5	-41.5	23.7	65.2
757	-39.4	22.9	62.3

869 - 894 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
869	-38.5	22.1	60.6
881	-43.6	22.7	66.3
894	-41.5	22.7	64.2

1930 - 1990 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
1930	-42.4	21.8	64.2
1960	-47.6	22.8	70.4
1990	-46.4	21.8	68.2

2110 - 2155 MHz Band

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
2110	-44.4	21.5	65.9
2132	-44.6	22.8	67.4
2155	-41.6	19.5	61.1



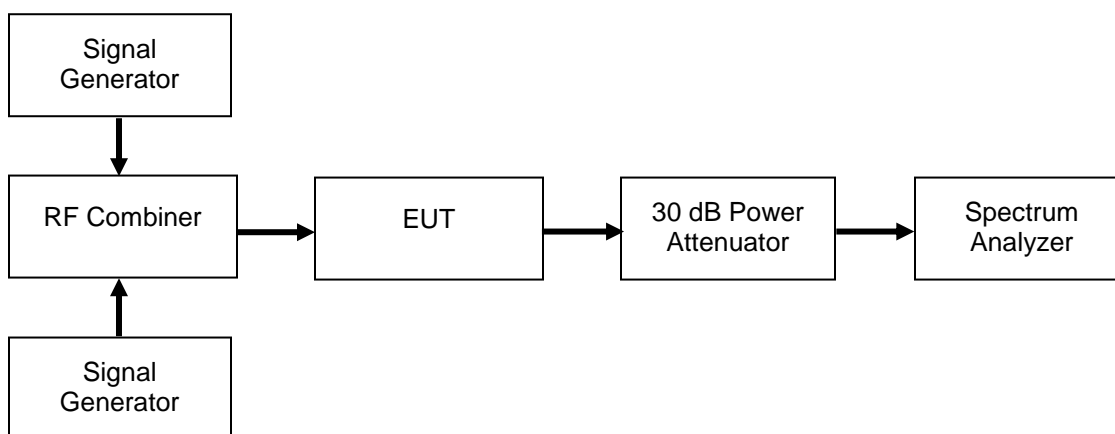
Spurious Emissions (Transmitter Conducted)

Name of Test: Spurious Emissions (Transmitter Conducted) **Engineer:** John Erhard
Test Equipment Utilized: i00266, i00331, i00348, i00347 **Test Date:** 7/23/2012

Test Procedure

The EUT was connected to a spectrum analyzer through a 30 dB power attenuator. Two signal generators were utilized to produce a two tone signal with the channel spacing set so the intermodulation products fell within the operational band. The input signal level was increased until the intermodulation products were as close as possible to the maximum allowable level of -13 dBm without being greater than that limit. The uplink / downlink conducted spurious emissions were examined to beyond the 10th harmonic of the fundamental signal and no spurious emissions were detected. The two tones selected were near the center of the operational band and as there were no detectable emissions only a single test was performed per operational band. The worst case out of band emission for each operational band is indicated in the tables below. Plots are provided to show there are no additional emissions.

Test Setup



Uplink Test Results

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
698 - 716	-28.18	-13	-15.18	Pass
776 - 787	-29.60	-13	-16.60	Pass
824 - 849	-28.97	-13	-15.97	Pass
1710 - 1755	-36.24	-13	-23.24	Pass
1850 - 1910	-37.11	-13	-24.11	Pass

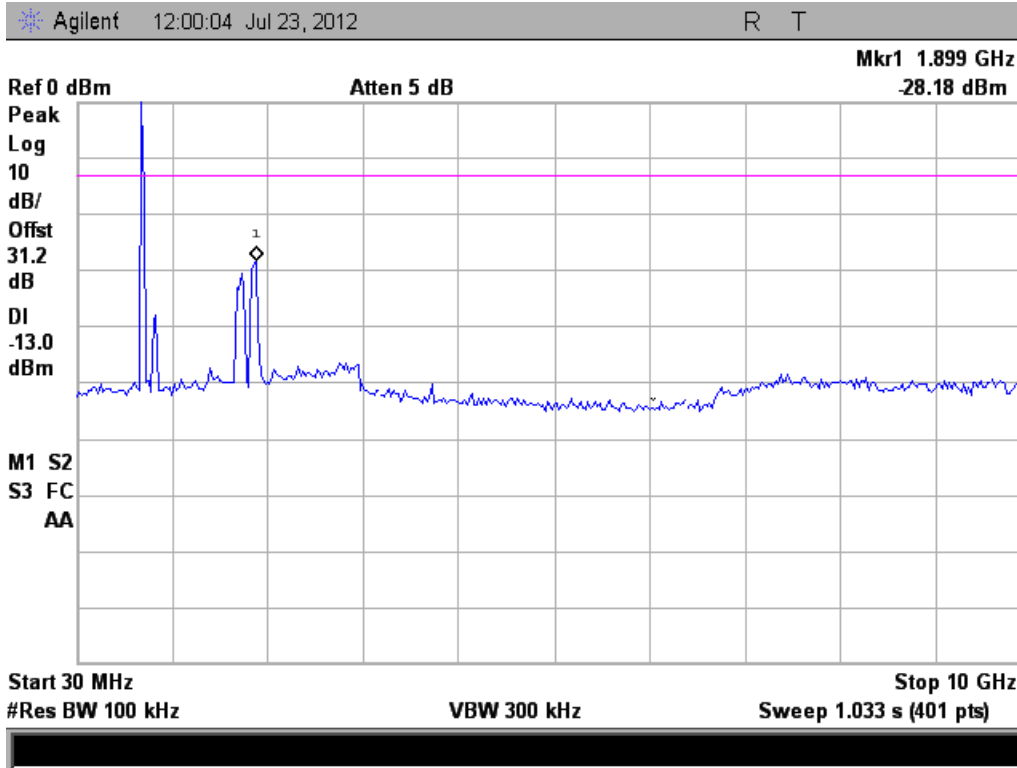
Downlink Test Results

Frequency Band (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
728 - 746	-31.85	-13	-18.85	Pass
746 - 757	-33.11	-13	-20.11	Pass
869 - 894	-33.89	-13	-20.89	Pass
1930 - 1990	-37.29	-13	-24.29	Pass
2110 - 2155	-36.27	-13	-23.27	Pass

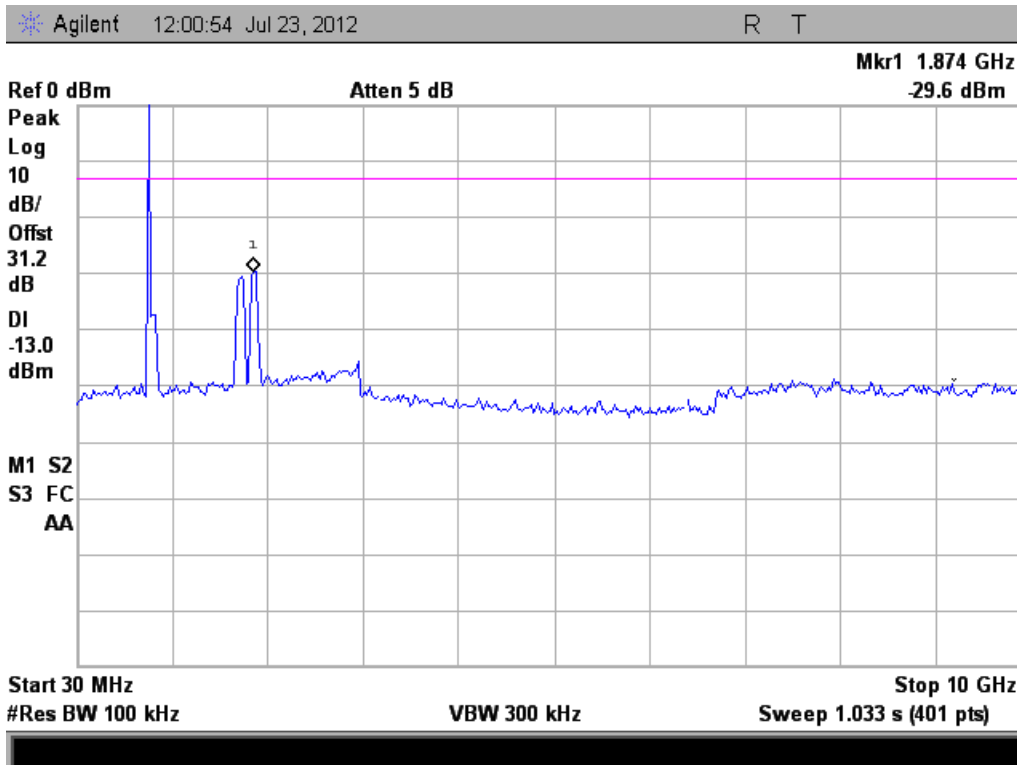


Uplink Test Plots

698 - 716 MHz Band

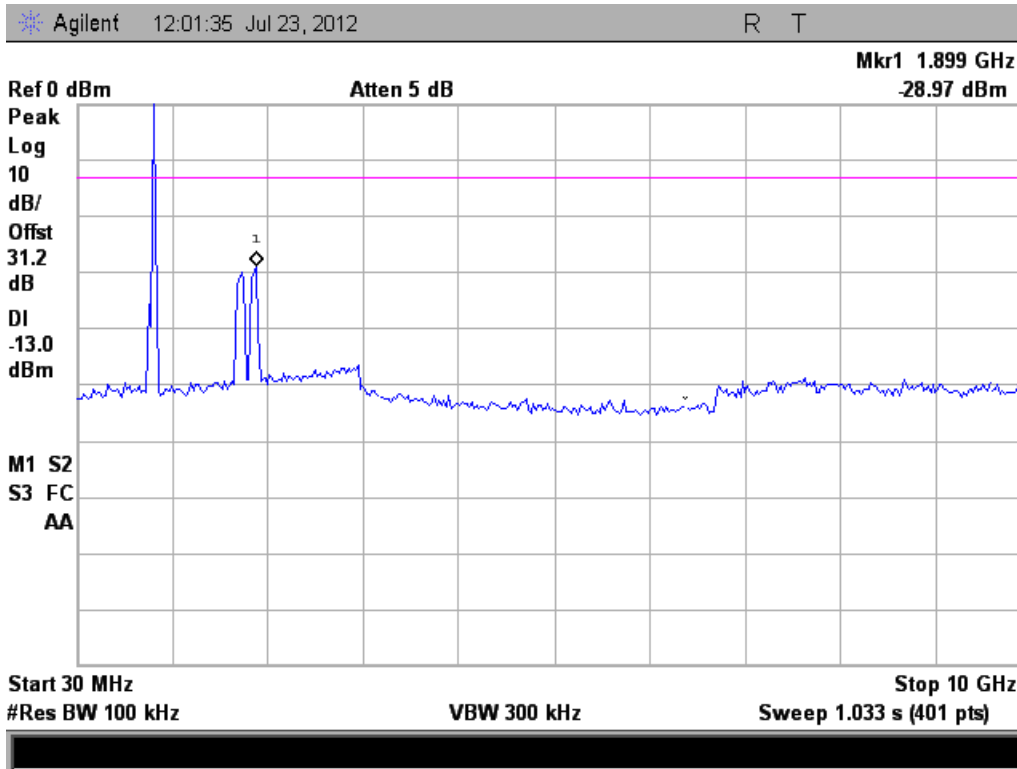


776 - 787 MHz Band

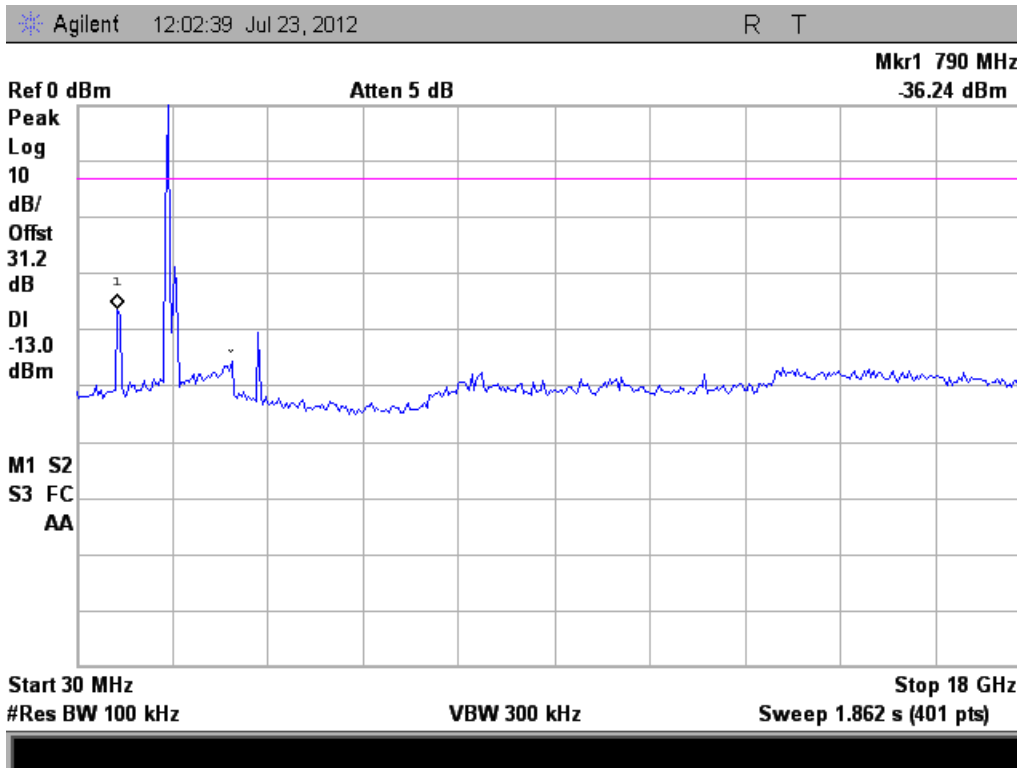




824 - 849 MHz Band

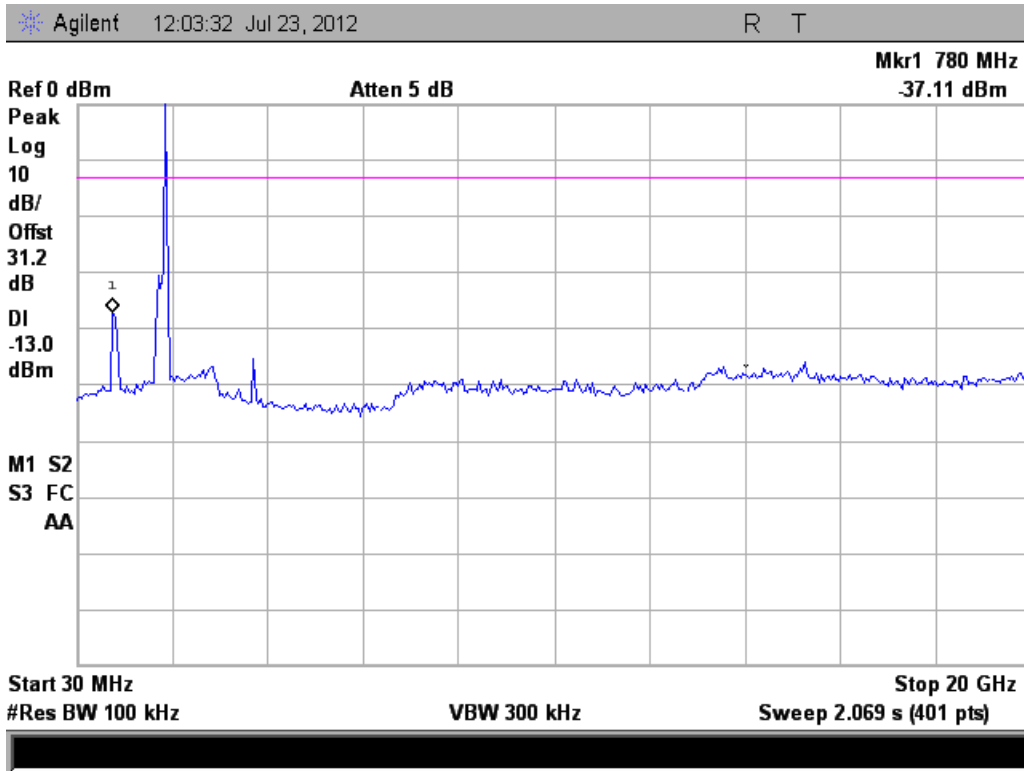


1710 - 1755 MHz Band



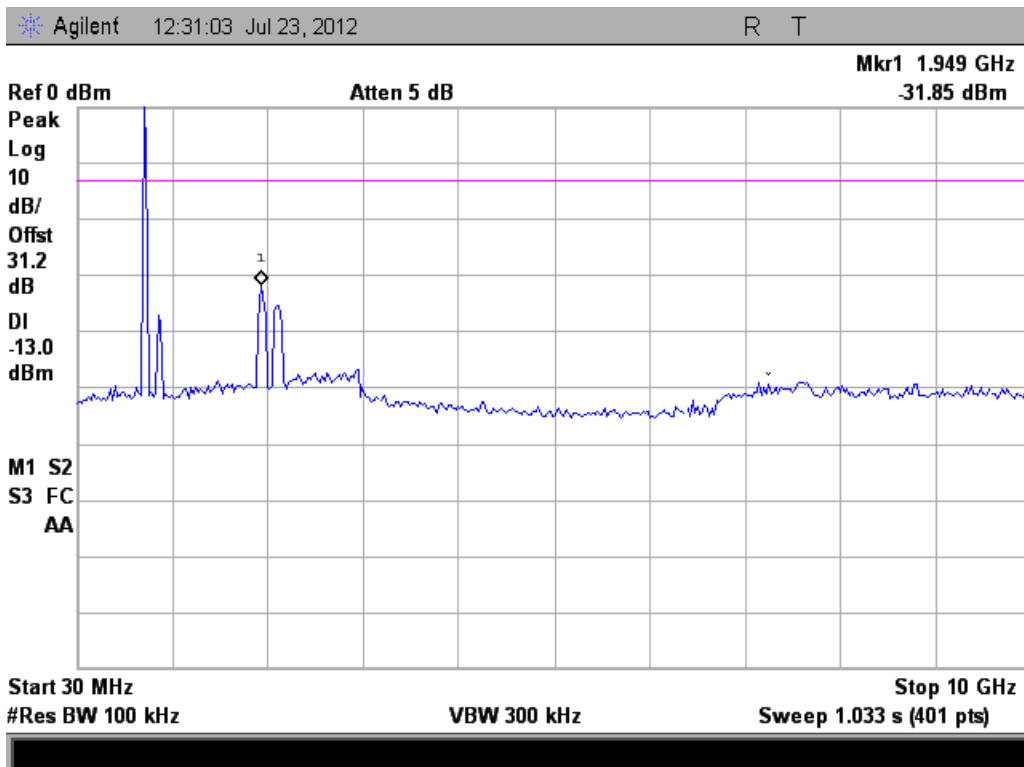


1850 - 1910 MHz Band



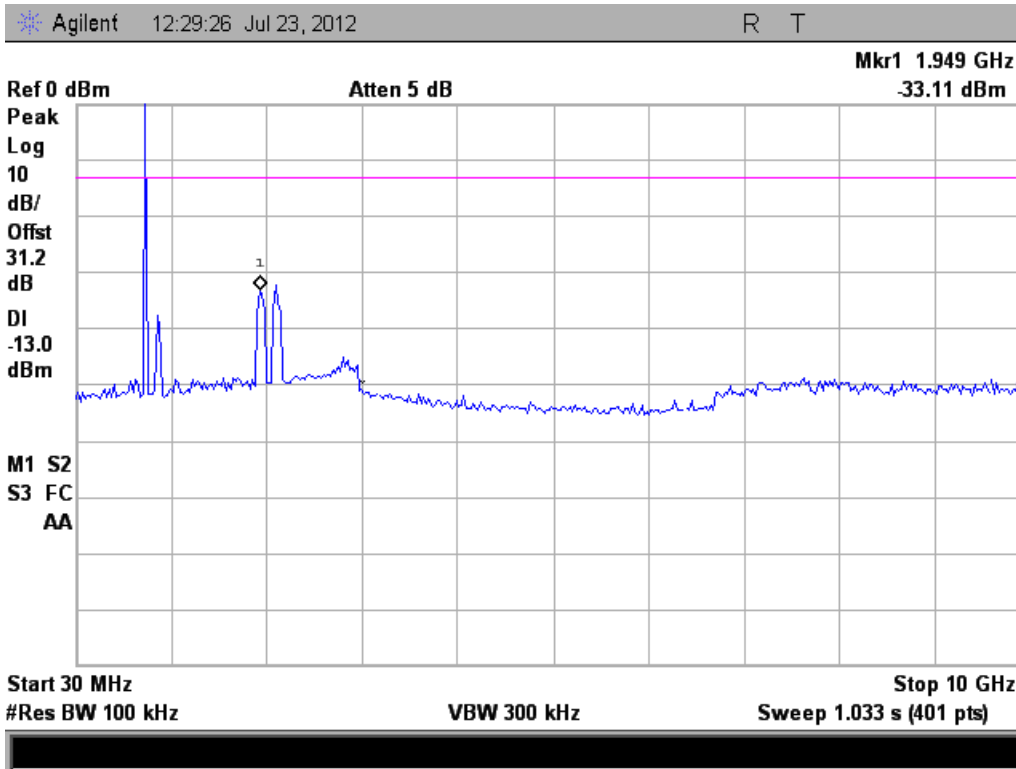
Downlink Test Plots

728 - 746 MHz Band

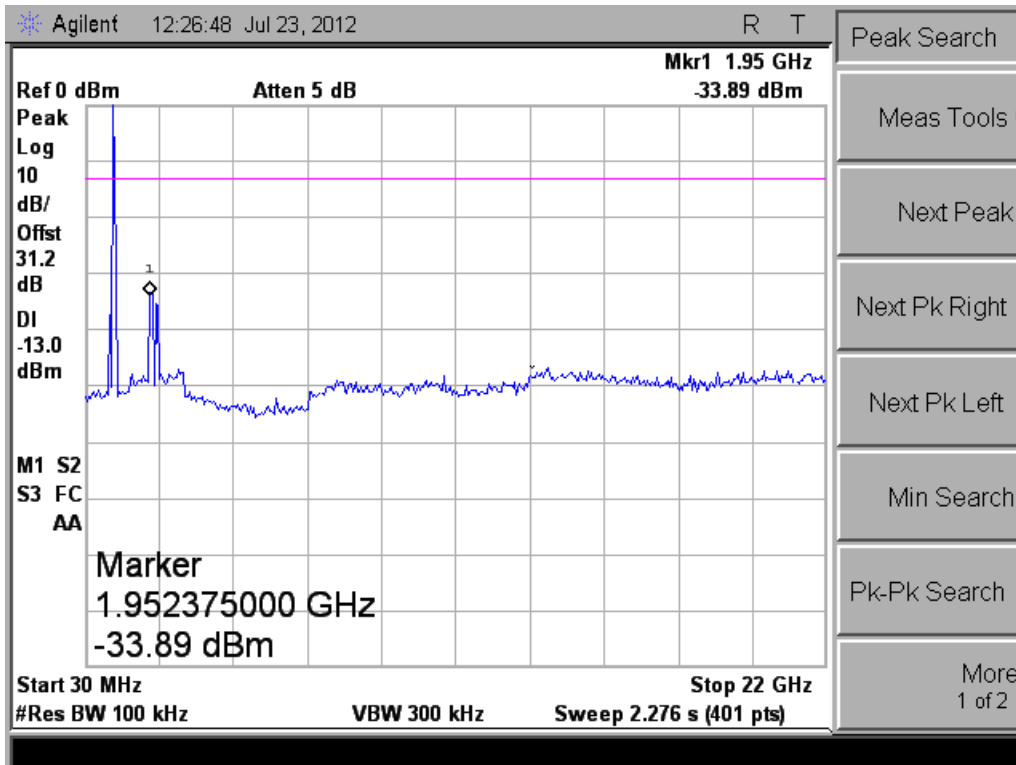




746 - 757 MHz Band

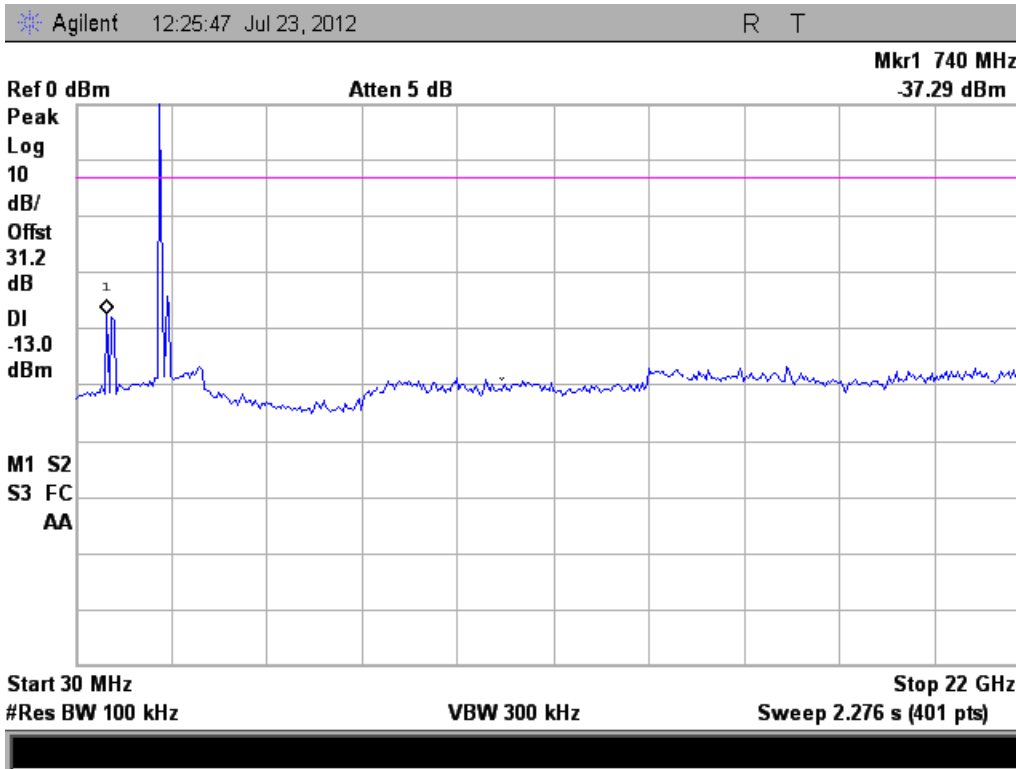


869 - 894 MHz Band

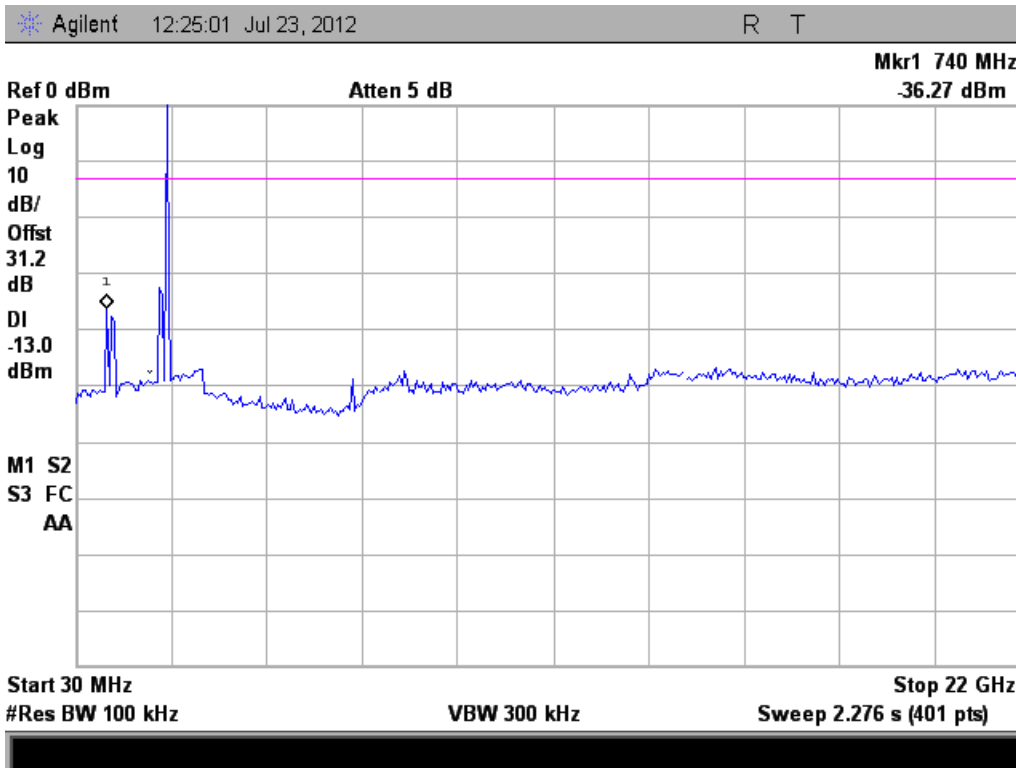




1930 - 1990 MHz Band



2110 - 2155 MHz Band





Spurious Emissions (Transmitter Radiated)

Name of Test: Spurious Emissions (Transmitter Radiated)

Engineer: John Erhard

Test Equipment Utilized: i00103, i00331, i00348

Test Date: 7/25/2012

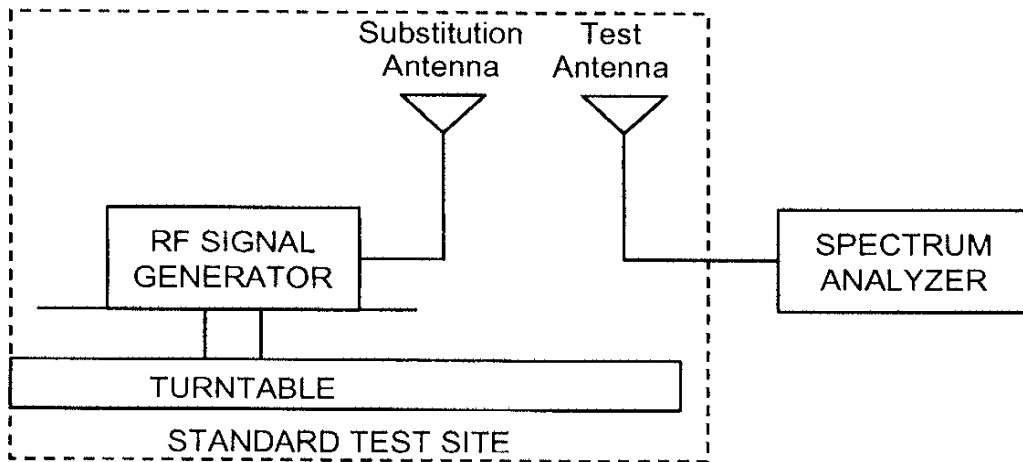
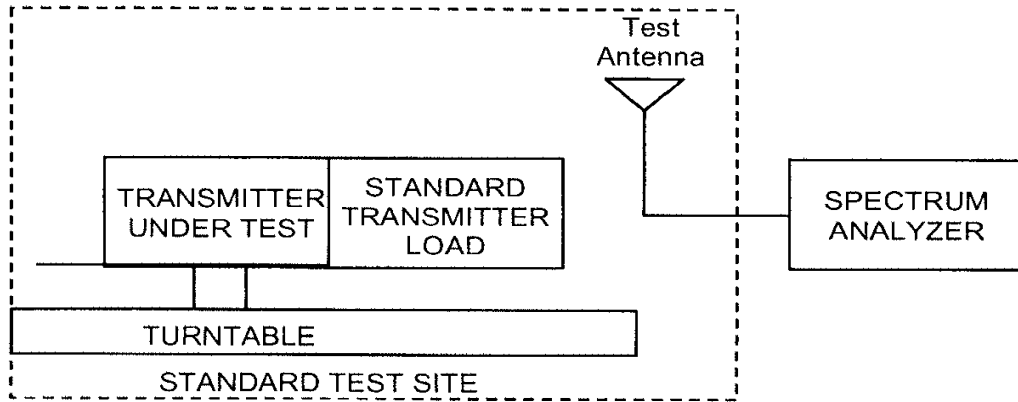
Test Procedure

- A) Connect the equipment as illustrated below.
- B) Adjust the spectrum analyzer to the following settings:
 - 1) Resolution Bandwidth 100 kHz (< 1 GHz), 1 MHz (> 1GHz)
 - 2) Video Bandwidth ≥ 3 times Resolution Bandwidth, or 30 kHz
 - 3) Sweep Speed ≤ 2000 Hz/second
 - 4) Detector Mode = Mean or Average Power
- C) Place the transmitter to be tested on the turntable in the standard test site. The transmitter is transmitting into a non- radiating load that is placed on the turntable. The RF cable to this load should be of minimum length.
- D) For each spurious measurement the test antenna should be adjusted to the correct length for the frequency involved. This length may be determined from a calibration ruler supplied with the equipment. Measurements shall be made from the lowest radio frequency generated in the equipment to the tenth harmonic of the carrier, except for the region close to the carrier equal to \pm the test bandwidth (see Section 1.3.4.4).
- E) For each spurious frequency, raise and lower the test antenna from 1 m to 4 m to obtain a maximum reading on the spectrum analyzer with the test antenna at horizontal polarity. Repeat this procedure to obtain the highest possible reading. Record this maximum reading.
- F) Repeat Step E) for each spurious frequency with the test antenna polarized vertically.
- G) Reconnect the equipment as illustrated.
- H) Keep the spectrum analyzer adjusted as in Step B).
- I) Remove the transmitter and replace it with a substitution antenna (the antenna should be half wavelength for each frequency involved). The center of the substitution antenna should be approximately at the same location as the center of the transmitter. At lower frequencies, where the substitution antenna is very long, this will be impossible to achieve when the antenna is polarized vertically. In such case the lower end of the antenna should be 0.3 m above the ground.
- J) Feed the substitution antenna at the transmitter end with a signal generator connected to the antenna by means of a non-radiating cable. With the antennas at both ends horizontally polarized and with the signal generator tuned to a particular spurious frequency, raise and lower the test antenna to obtain a maximum reading at the spectrum analyzer. Adjust the level of the signal generator output until the previously recorded maximum reading for this set of conditions is obtained. This should be done carefully repeating the adjustment of the test antenna and generator output.
- K) Repeat Step J) with both antennas vertically polarized for each spurious frequency.
- L) Calculate power in dBm into a reference ideal half-wave dipole antenna by reducing the readings obtained in Steps J) and K) by the power loss in the cable between the generator and the antenna and further corrected for the gain of the substitution antenna used relative to an ideal half-wave dipole antenna.
- M) The levels recorded in Step L) are absolute levels of radiated spurious emissions in dBm. The radiated spurious emissions in dB can be calculated by the following:
$$\text{Radiated spurious emissions dB} = 10\log_{10}(\text{TX power in watts}/0.001) - \text{the levels in Step I)}$$

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



Test Setup





Uplink Test Results

698 - 716 MHz Band 707 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1414	-46.03	-13	-33.03	Pass
2121	-52.31	-13	-39.31	Pass
2828	-53.47	-13	-40.47	Pass

776 - 787 MHz Band 781.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1563	-49.48	-13	-36.48	Pass
2344.5	-50.88	-13	-37.88	Pass
3126	-51.38	-13	-38.38	Pass

824 - 849 MHz Band 836 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1672	-57.30	-13	-44.3	Pass
2508	-52.16	-13	-39.16	Pass
3344	-46.50	-13	-33.5	Pass

1710 - 1755 MHz Band 1742 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
3484	-57.95	-13	-44.95	Pass
5226	-45.16	-13	-32.16	Pass
6968	-41.44	-13	-28.44	Pass

1850 - 1910 MHz Band 1880 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
3760	-42.84	-13	-29.84	Pass
5640	-43.61	-13	-30.61	Pass
7520	-31.84	-13	-18.84	Pass

The conducted spurious emissions testing did not indicate any potential failures therefore only the center channel of each operational band was evaluated.

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



Downlink Test Results

728 - 746 MHz Band 737 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1474	-54.61	-13	-41.61	Pass
2211	-52.98	-13	-39.98	Pass
2948	-50.22	-13	-37.22	Pass

746 - 757 MHz Band 751 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1502	-57.60	-13	-44.6	Pass
2253	-55.47	-13	-42.47	Pass
3004	-49.22	-13	-36.22	Pass

869 - 894 MHz Band 881 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
1762	-56.44	-13	-43.44	Pass
2643	-51.24	-13	-38.24	Pass
3524	-43.80	-13	-30.8	Pass

1930 - 1990 MHz Band 1960 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
3920	-46.83	-13	-33.83	Pass
5880	-42.44	-13	-29.44	Pass
7840	-34.76	-13	-21.76	Pass

2110 - 2155 MHz Band 2132 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Margin (dB)	Result
4264	-43.34	-13	-30.34	Pass
6396	-41.12	-13	-28.12	Pass
8528	-33.6	-13	-20.6	Pass

The conducted spurious emissions testing did not indicate any potential failures therefore only the center channel of each operational band was evaluated.

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



Intermodulation

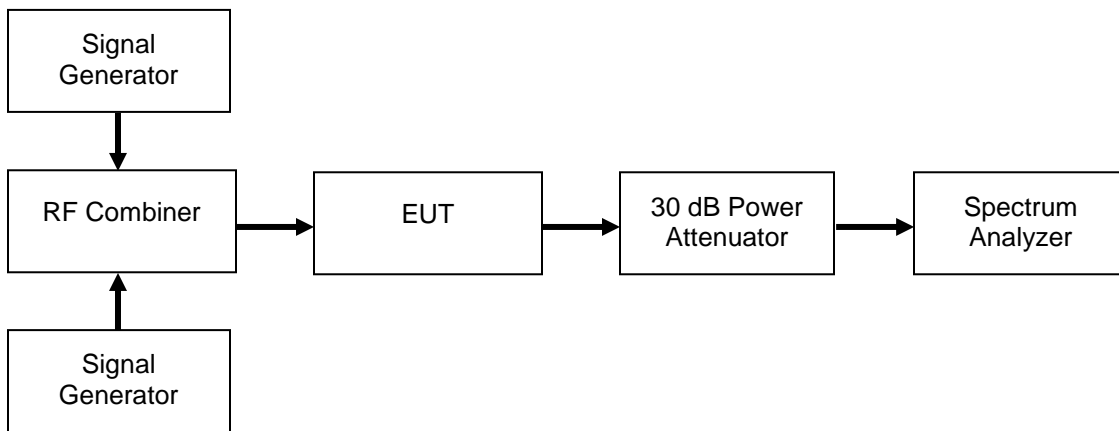
Name of Test: Intermodulation
Test Equipment Utilized: i00266, i00331, i00348, i00347

Engineer: John Erhard
Test Date: 7/20/2012

Test Procedure

The EUT was connected to a spectrum analyzer through a 30 dB power attenuator. Two signal generators were utilized to produce a two tone signal with the channel spacing set so the intermodulation products fell within the operational band. The input signal level was increased until the intermodulation products were as close as possible to the maximum allowable level of -13 dBm without being greater than that limit. The uplink / downlink intermodulation products within the operational band were examined. The two tones near the lower edge and the upper edge were plotted. The input signal level, peak output power, and intermodulation level are listed in the summary tables.

Test Setup





GSM Uplink Test Results

698 - 716 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
703 – 708	-56.3	13.19	18.94	21.94	75.24
706 – 711	-55.3	-13.53	20.12	23.12	75.42

776 - 787 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
779 – 782	-51.9	-13.64	19.48	22.48	71.38
781 – 784	-51.6	-13.51	19.68	22.68	71.28

824 - 849 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
830 – 835	-52.5	-13.32	19.19	22.19	71.69
842 – 845	-54.3	-13.23	16.93	19.93	71.23

1710 - 1755 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1720 – 1725	-59.3	-13.39	15.73	18.73	75.03
1740 – 1745	-60	-13.26	13.33	16.33	73.33

1850 - 1910 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1860 – 1865	-59.2	-13.3	16.34	19.34	75.54
1895 - 1900	-55.7	-13.01	15.35	18.35	71.05



GSM Downlink Test Results

728 - 746 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
733 – 738	-58.9	-13.31	15.1	18.1	74
736 – 741	-58.8	-13.51	15.17	18.17	73.97

746 - 757 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
750 – 752	-57.1	-13.36	14.4	17.4	71.5
752 – 754	-57.6	-13.39	14.19	17.19	71.79

869 - 894 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
875 – 880	-51.1	-13.63	19.94	22.94	71.04
880 – 885	-50.7	-13.16	20.18	23.18	70.88

1930 - 1990 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1940 – 1945	-58.3	-13.38	17.7	20.7	76
1975 - 1980	-56	-13.75	19.14	22.14	75.14

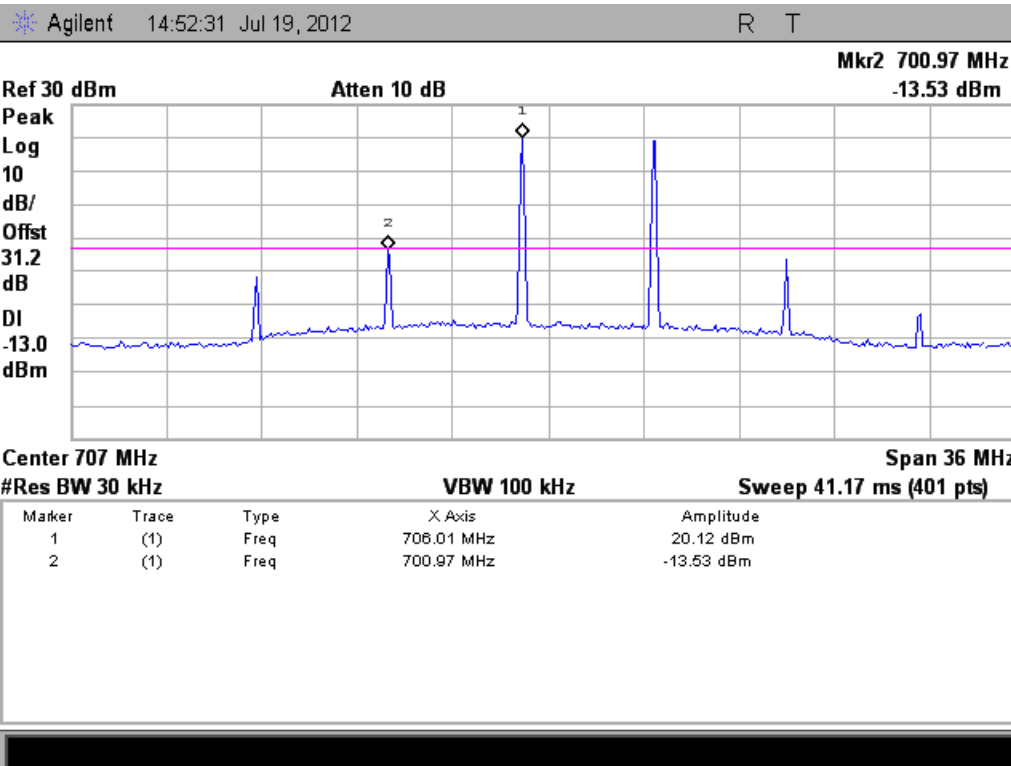
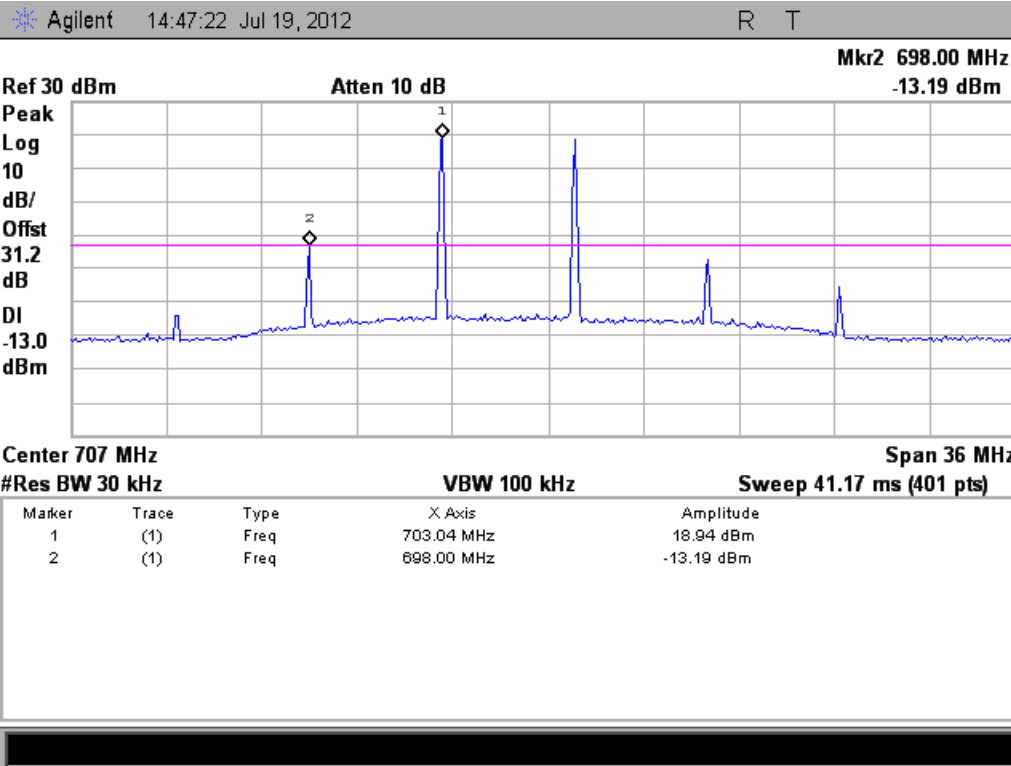
2110 - 2155 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
2120 – 2125	-60.2	-13.28	14.27	17.27	74.47
2140 - 2145	-60.2	-13.1	14.89	17.89	75.09



GSM Uplink Test Plots

698 - 716 MHz Band





776 - 787 MHz Band

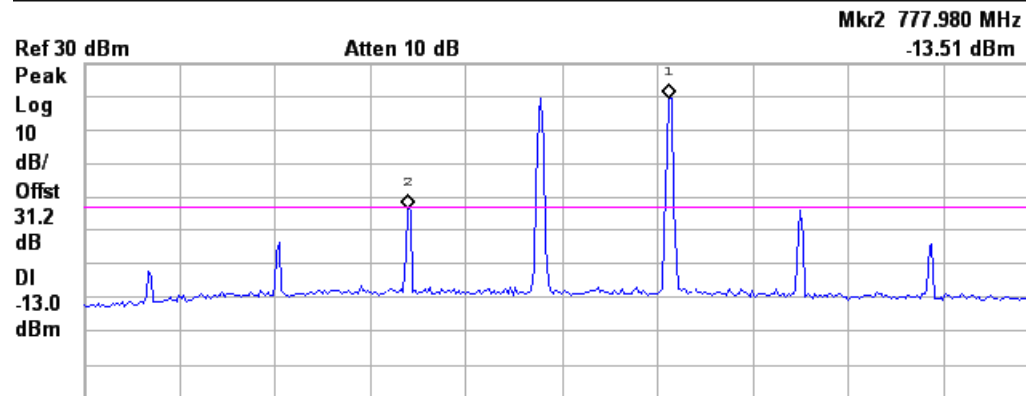
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Center 781.5 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	779.025 MHz	19.47 dBm
2	(1)	Freq	776.000 MHz	-13.64 dBm

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Center 781.5 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

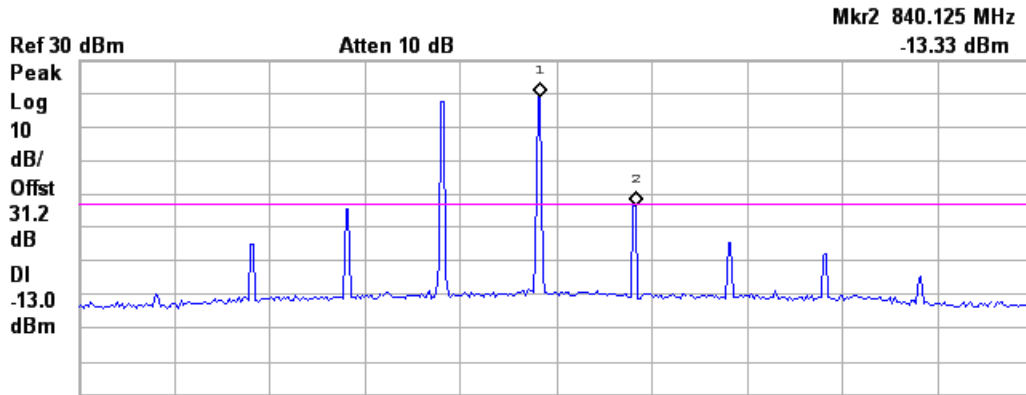
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	783.975 MHz	19.67 dBm
2	(1)	Freq	777.980 MHz	-13.51 dBm

4



824 - 849 MHz Band

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Center 836 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	835.125 MHz	19.18 dBm
2	(1)	Freq	840.125 MHz	-13.33 dBm

Agilent 08:11:43 Jul 20, 2012 R T



Center 836 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	842.125 MHz	16.93 dBm
2	(1)	Freq	839.125 MHz	-13.23 dBm



1710 - 1755 MHz Band

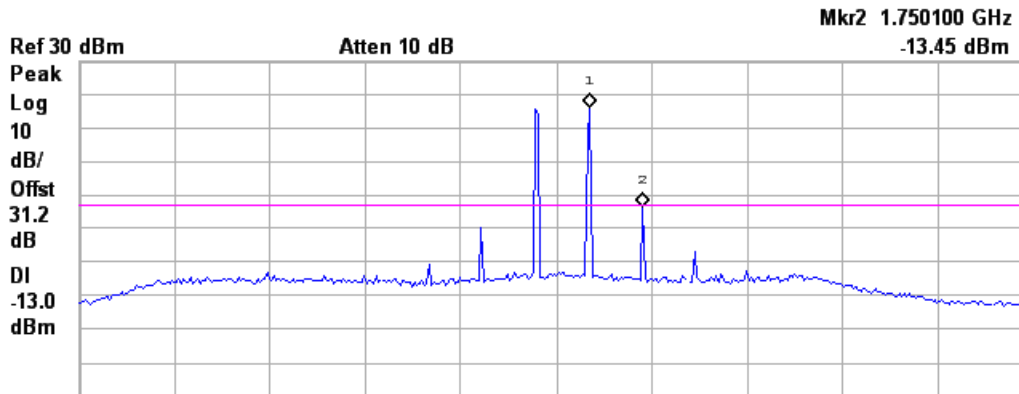
Agilent 08:16:24 Jul 20, 2012 R T



Center 1.742 GHz Span 90 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 102.9 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.720175 GHz	16.73 dBm
2	(1)	Freq	1.730075 GHz	-13.51 dBm

Agilent 08:18:23 Jul 20, 2012 R T



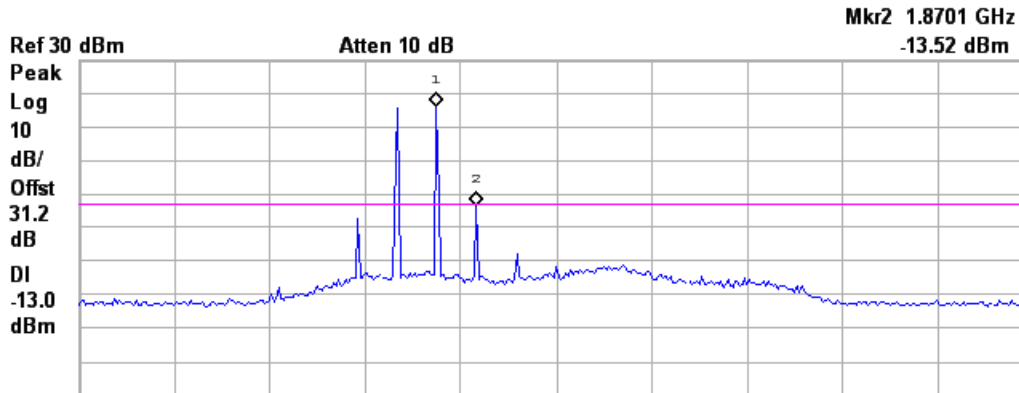
Center 1.742 GHz Span 90 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 102.9 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.745150 GHz	16.33 dBm
2	(1)	Freq	1.750100 GHz	-13.45 dBm



1850 - 1910 MHz Band

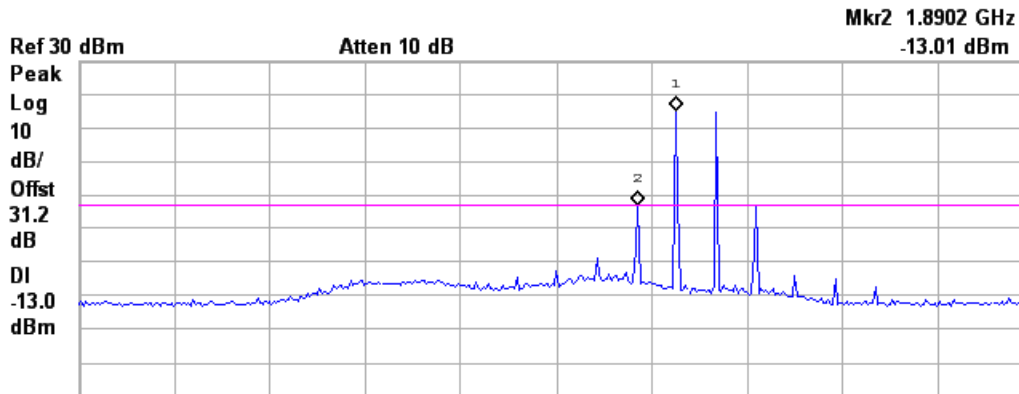
Agilent 08:32:27 Jul 20, 2012 R T



Center 1.88 GHz Span 120 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 137.2 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.8650 GHz	16.34 dBm
2	(1)	Freq	1.8701 GHz	-13.52 dBm

Agilent 08:36:26 Jul 20, 2012 R T



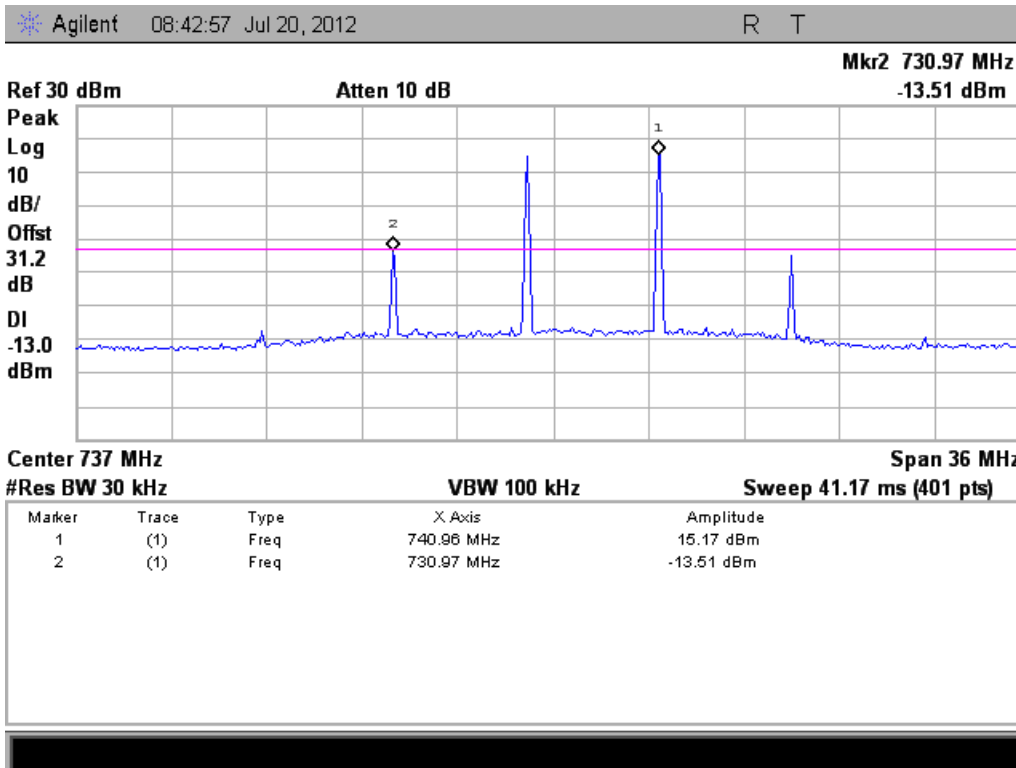
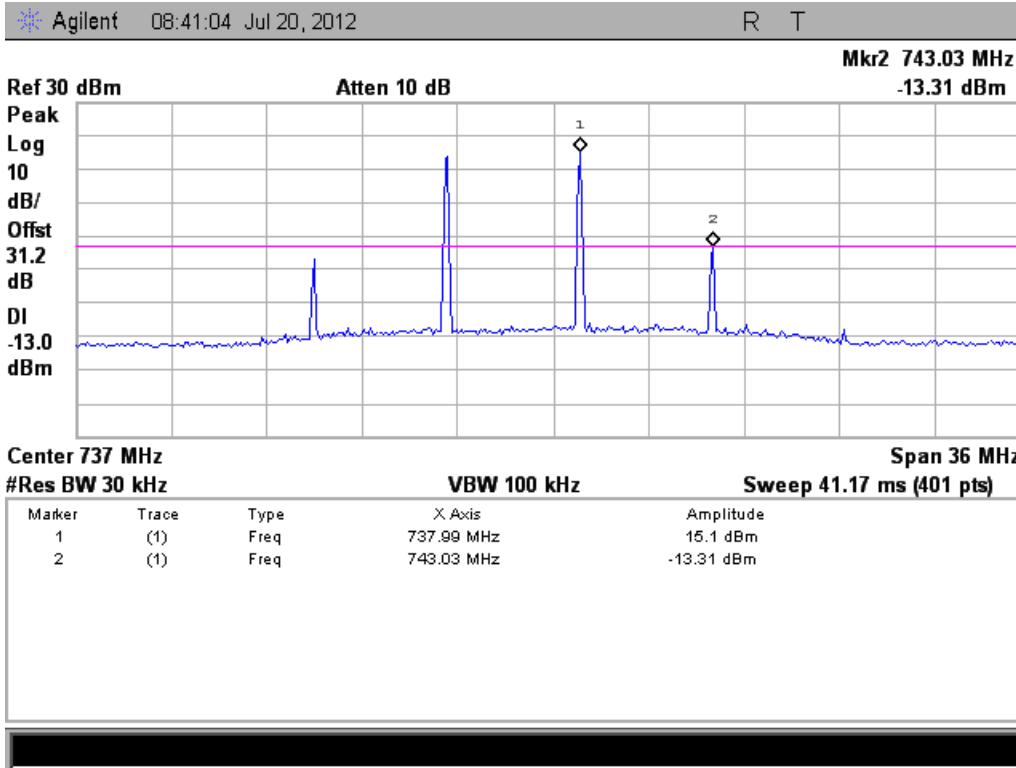
Center 1.88 GHz Span 120 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 137.2 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.8950 GHz	16.35 dBm
2	(1)	Freq	1.8902 GHz	-13.01 dBm



GSM Downlink Test Plots

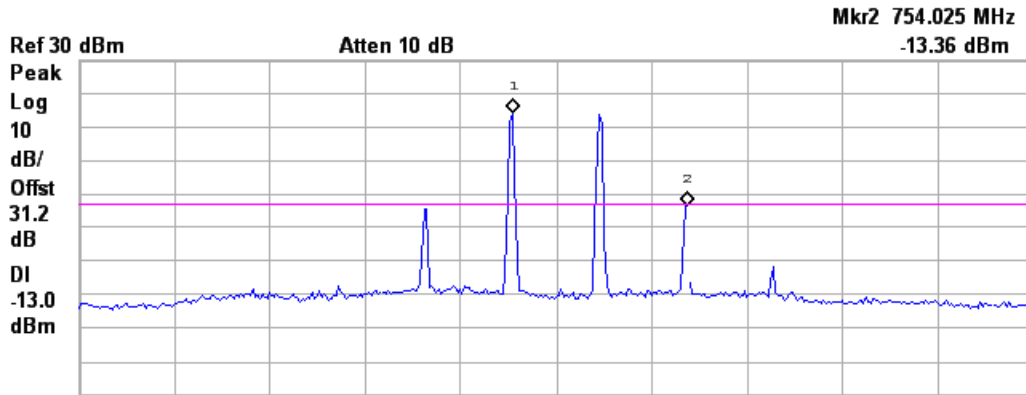
728 - 746 MHz Band





746 - 757 MHz Band

Agilent 08:53:00 Jul 20, 2012 R T



Center 751 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	750.010 MHz	14.4 dBm
2	(1)	Freq	754.025 MHz	-13.36 dBm

Agilent 08:54:27 Jul 20, 2012 R T



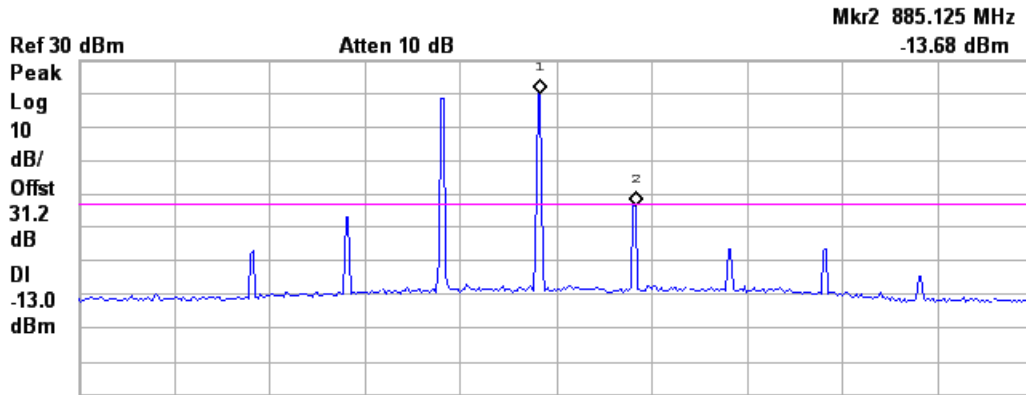
Center 751 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	754.025 MHz	14.19 dBm
2	(1)	Freq	750.010 MHz	-13.39 dBm



869 - 894 MHz Band

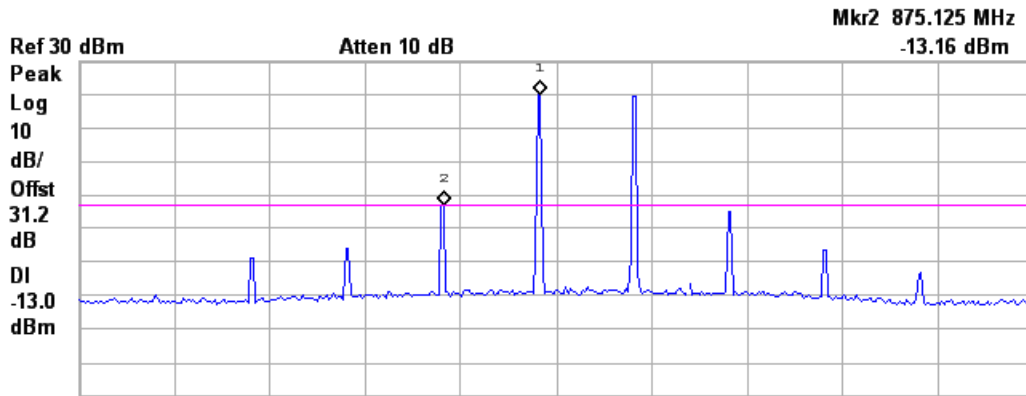
Agilent 09:04:40 Jul 20, 2012 R T



Center 881 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	880.125 MHz	19.93 dBm
2	(1)	Freq	885.125 MHz	-13.68 dBm

Agilent 09:06:32 Jul 20, 2012 R T



Center 881 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	880.125 MHz	20.18 dBm
2	(1)	Freq	875.125 MHz	-13.16 dBm



1930 - 1990 MHz Band

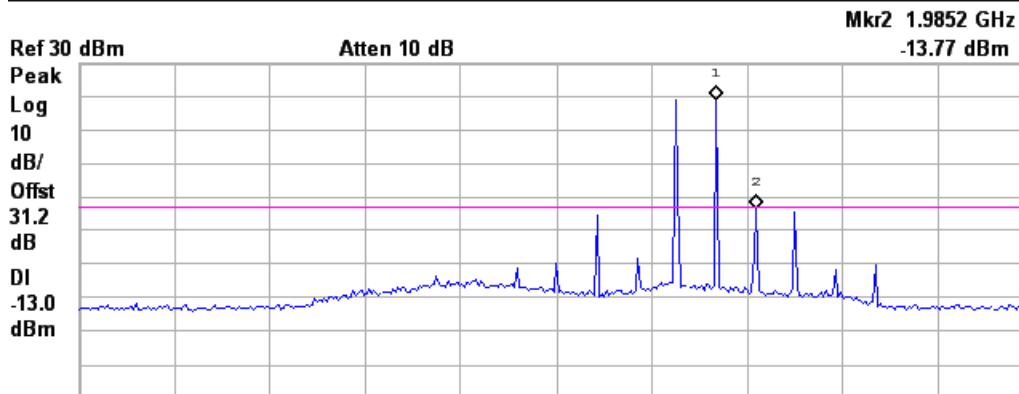
Agilent 09:10:49 Jul 20, 2012 R T



Center 1.96 GHz Span 120 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 137.2 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.9450 GHz	17.7 dBm
2	(1)	Freq	1.9501 GHz	-13.38 dBm

Agilent 09:15:02 Jul 20, 2012 R T



Center 1.96 GHz Span 120 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 137.2 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.9801 GHz	19.14 dBm
2	(1)	Freq	1.9852 GHz	-13.77 dBm



2110 - 2155 MHz Band

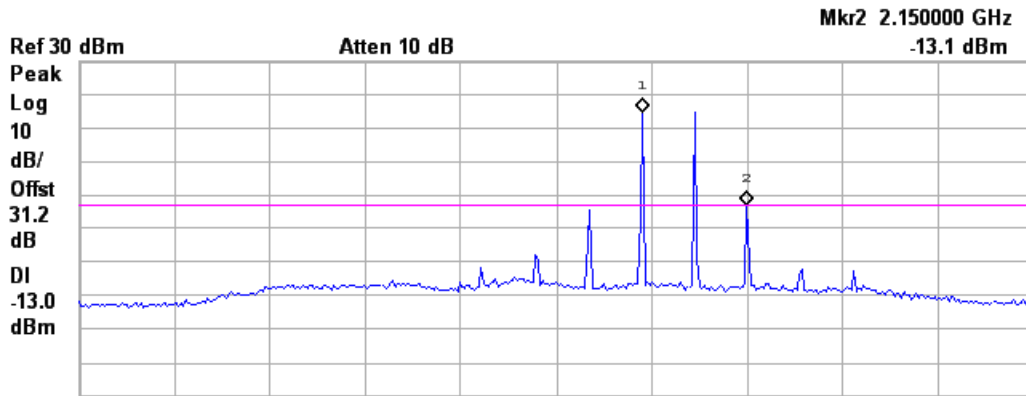
Agilent 09:17:27 Jul 20, 2012 R T



Center 2.132 GHz Span 90 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 102.9 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.125025 GHz	14.27 dBm
2	(1)	Freq	2.129975 GHz	-13.34 dBm

Agilent 09:19:21 Jul 20, 2012 R T



Center 2.132 GHz Span 90 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 102.9 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.140100 GHz	14.89 dBm
2	(1)	Freq	2.150000 GHz	-13.1 dBm



CDMA Uplink Test Results

698 - 716 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
703 – 708	-53.5	-13.78	17.86	20.86	71.36
706 – 711	-53.9	-14.52	17.38	20.38	71.28

776 - 787 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
779 – 782	-51	-14.43	17.42	20.42	68.42
781 – 784	-50.6	-14.35	16.5	19.5	67.1

824 - 849 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
830 – 835	-49.3	-13.44	18.21	21.21	67.51
842 – 845	-49.3	-13.81	17.68	20.68	66.98

1710 - 1755 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1720 – 1725	-55	-13.77	16.85	19.85	71.85
1740 – 1745	-57.4	-14.47	14.3	17.3	71.7

1850 - 1910 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1860 – 1865	-52	-14.6	18.7	21.7	70.7
1895 - 1900	-49.9	-14.52	14.45	17.45	64.35



CDMA Downlink Test Results

728 - 746 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
733 – 738	-57.3	-14.73	12.35	15.35	69.65
736 – 741	-56.6	-13.42	13.1	16.1	69.7

746 - 757 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
750 – 752	-55.7	-14.45	12.62	15.62	68.32
752 – 754	-55.7	-14.21	13.09	16.09	68.79

869 - 894 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
875 – 880	-49.7	-13.88	16.47	19.47	66.17
880 – 885	-49.7	-13.35	17.05	20.05	66.75

1930 - 1990 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
1940 – 1945	-54.1	-13.28	18.29	21.29	72.39
1975 - 1980	-56.1	-14.13	15.07	18.07	71.17

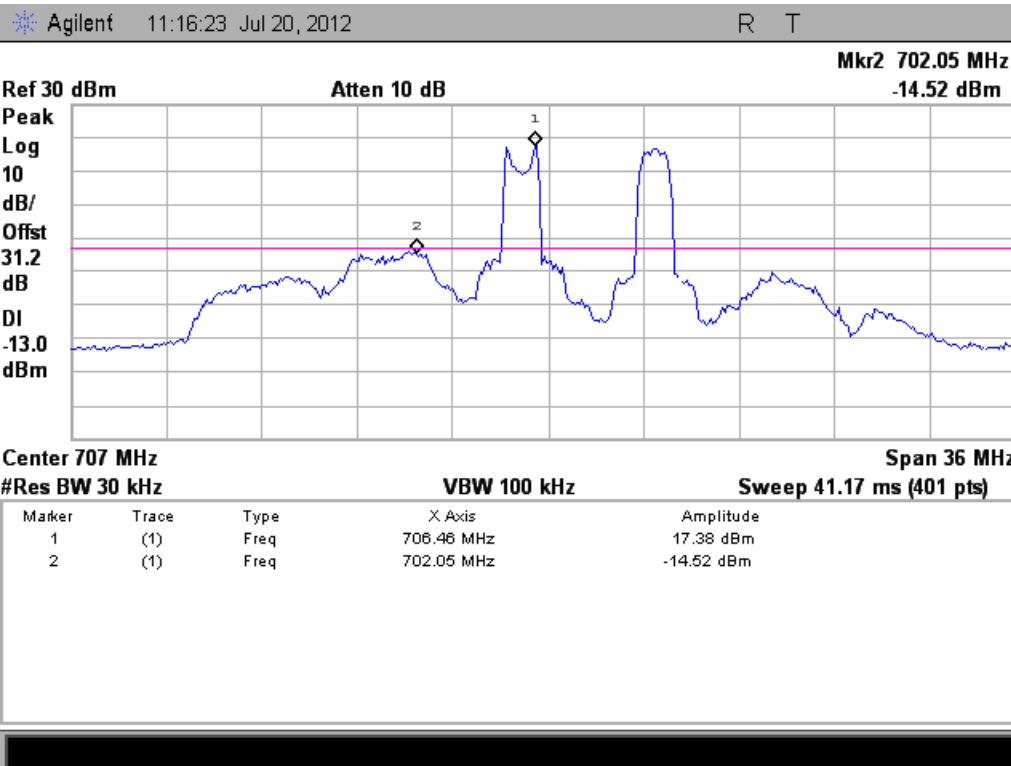
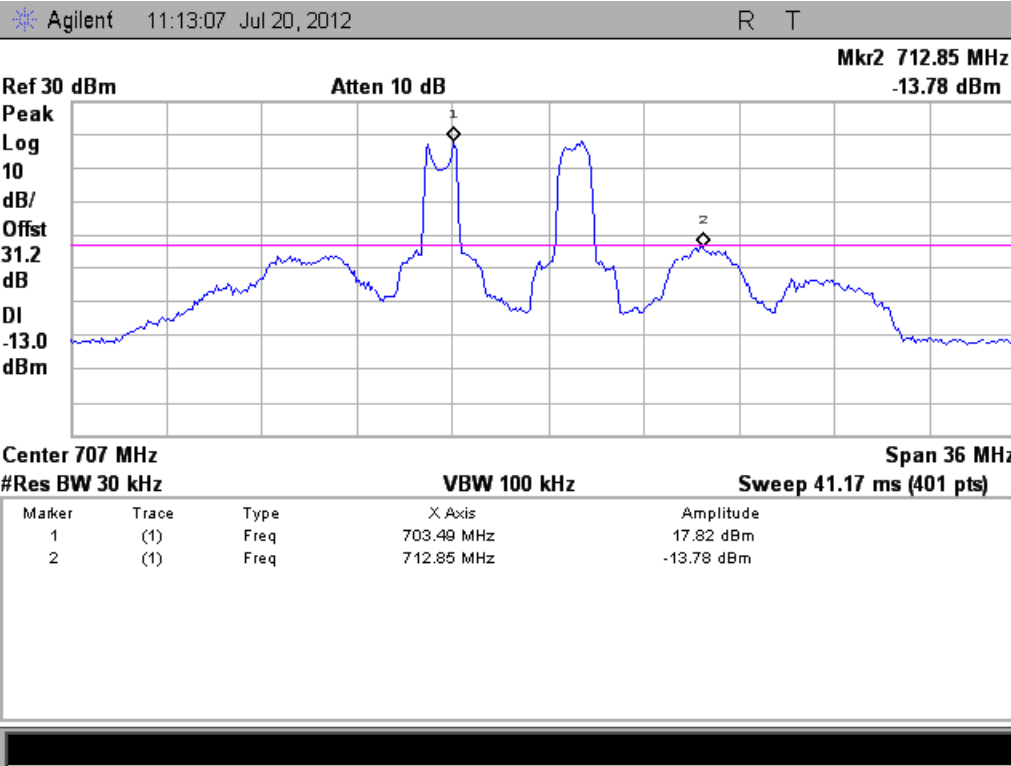
2110 - 2155 MHz Band

P₀₁ – P₀₂ Frequency Pair (MHz)	Input Power (dBm)	Intermodulation Level (dBm)	P₀₁ (dBm)	P_{mean} (dBm)	Gain (dB)
2120 – 2125	-54.7	-13.5	15.9	18.9	70.6
2140 - 2145	-55.1	-13.84	16.14	19.14	71.24



CDMA Uplink Test Plots

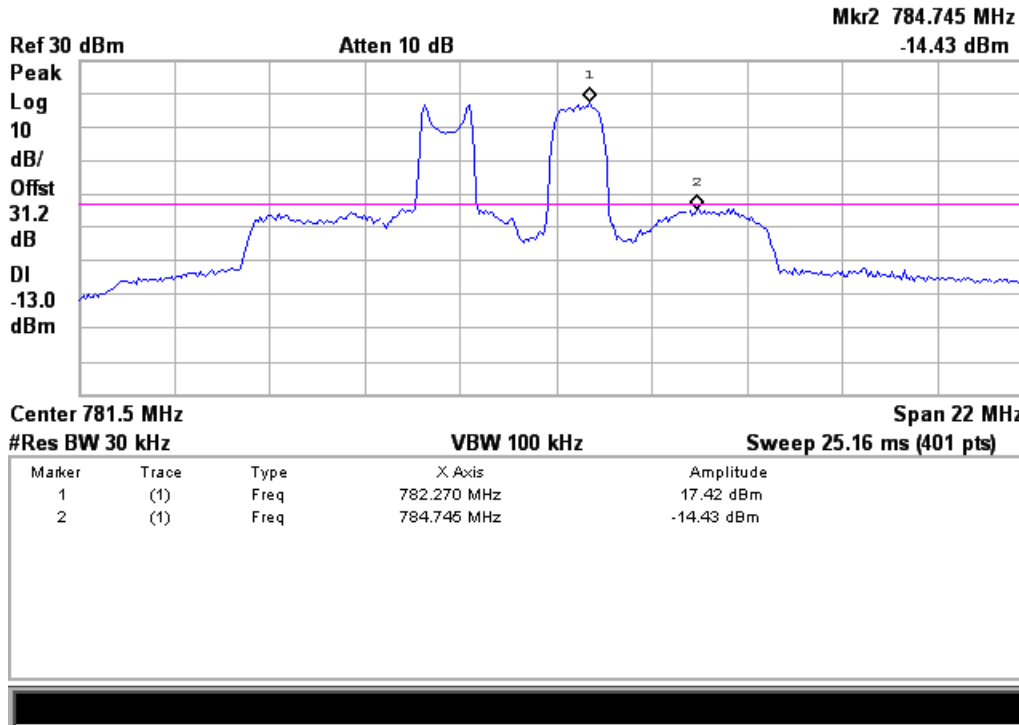
698 - 716 MHz Band



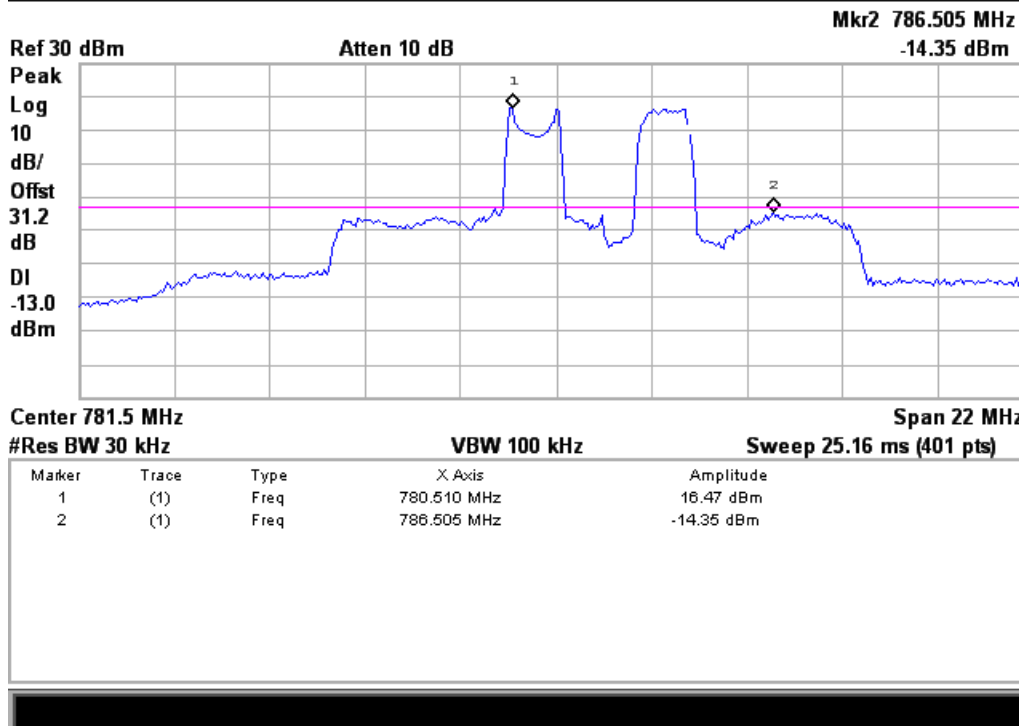


776 - 787 MHz Band

Agilent 11:23:34 Jul 20, 2012 R T



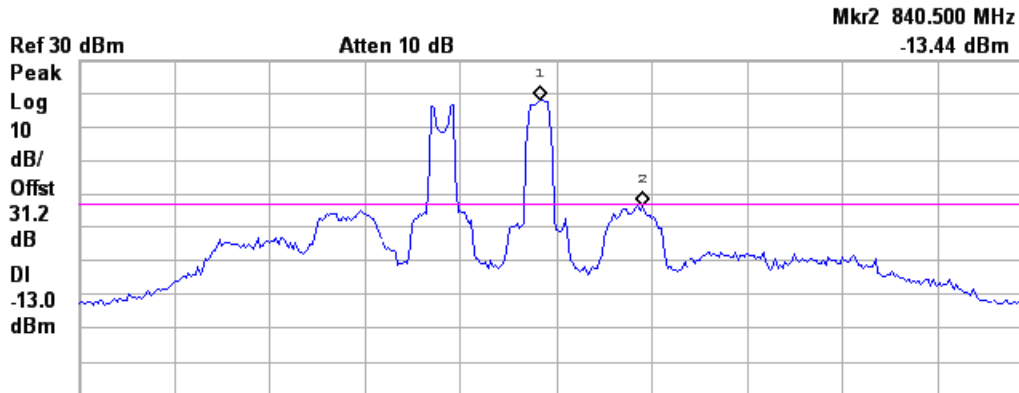
Agilent 11:25:54 Jul 20, 2012 R T





824 - 849 MHz Band

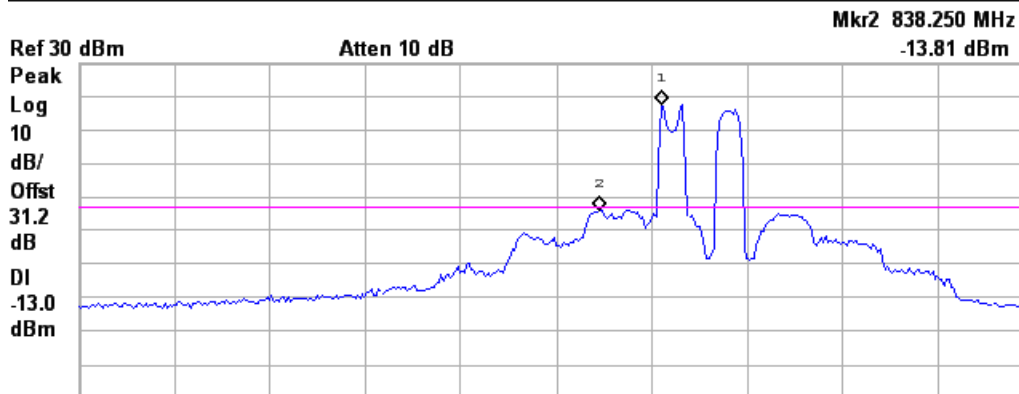
Agilent 11:44:34 Jul 20, 2012 R T



Center 836 MHz Mkr2 840.500 MHz
#Res BW 30 kHz -13.44 dBm
Atten 10 dB Span 50 MHz
VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	835.125 MHz	18.21 dBm
2	(1)	Freq	840.500 MHz	-13.44 dBm

Agilent 11:46:10 Jul 20, 2012 R T



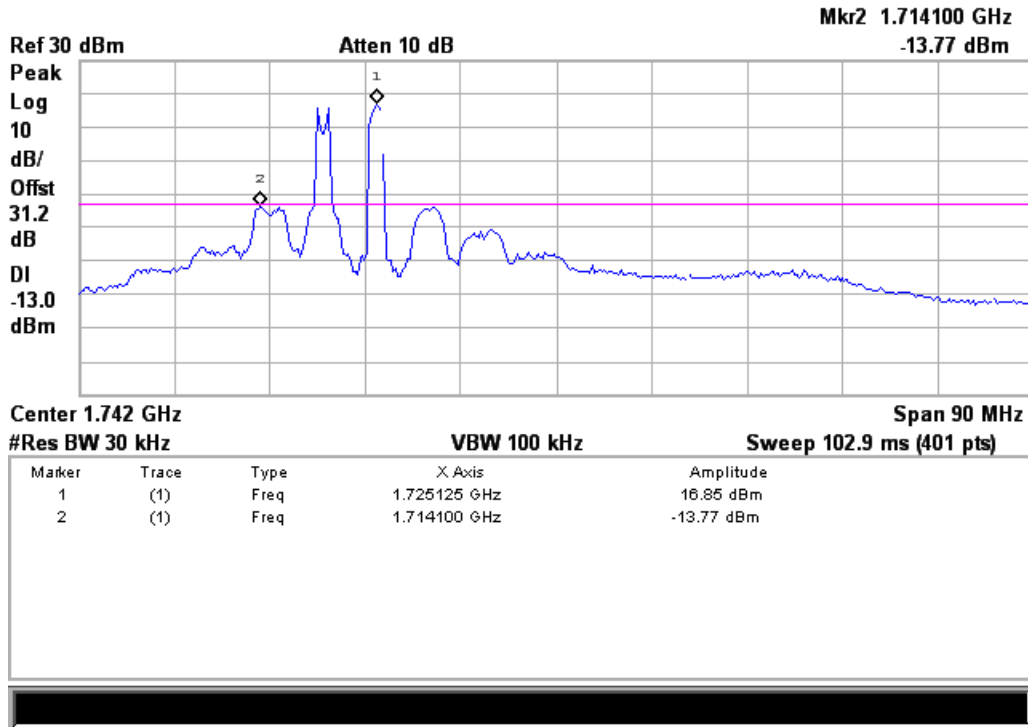
Center 836 MHz Mkr2 838.250 MHz
#Res BW 30 kHz -13.81 dBm
Atten 10 dB Span 50 MHz
VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	841.500 MHz	17.64 dBm
2	(1)	Freq	838.250 MHz	-13.81 dBm

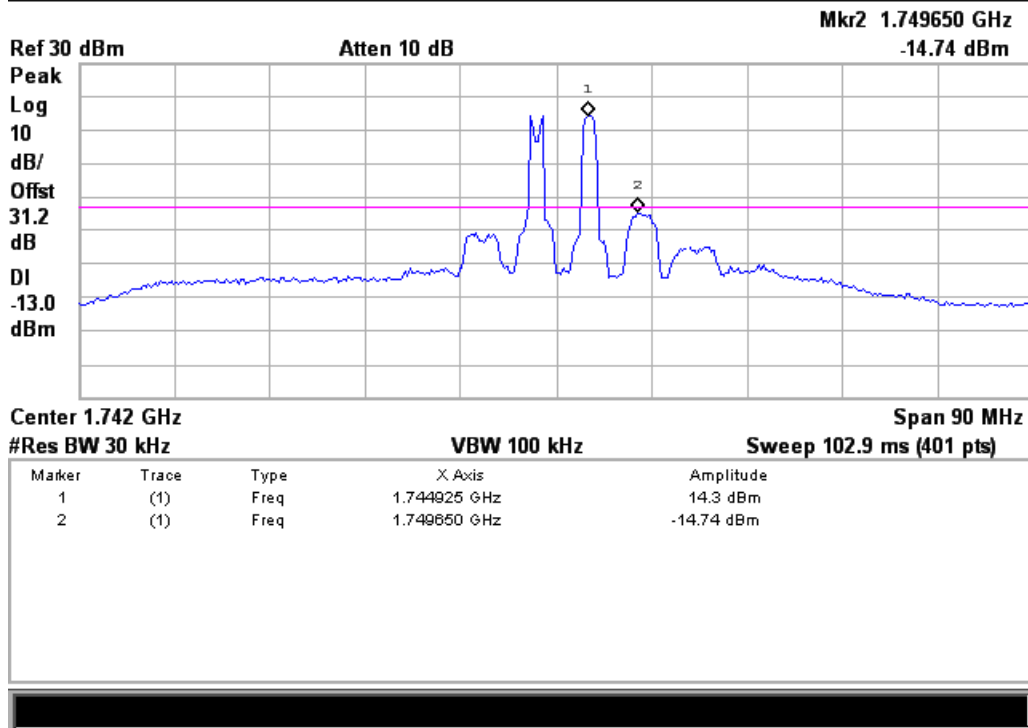


1710 - 1755 MHz Band

Agilent 12:04:18 Jul 20, 2012 R T



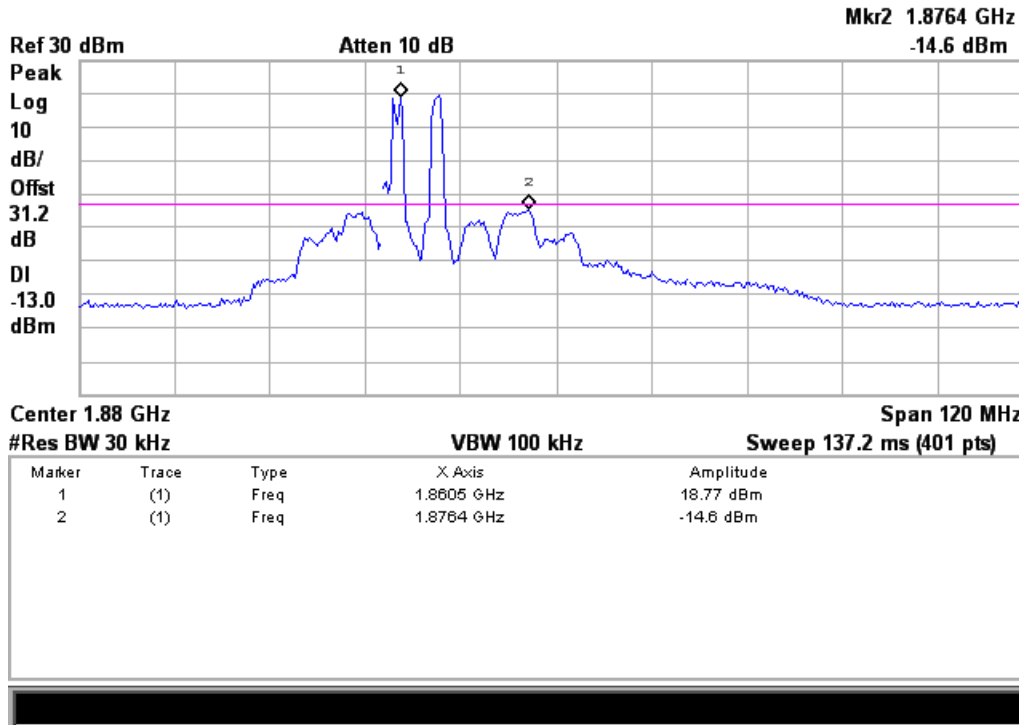
Agilent 12:15:24 Jul 20, 2012 R T



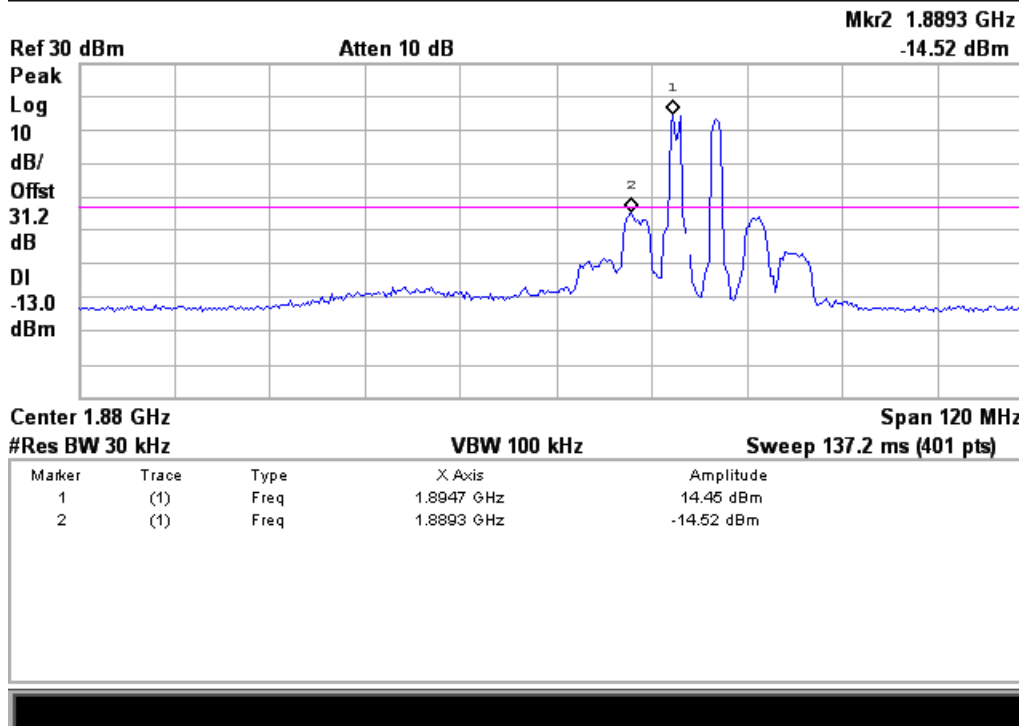


1850 - 1910 MHz Band

Agilent 12:29:52 Jul 20, 2012 R T



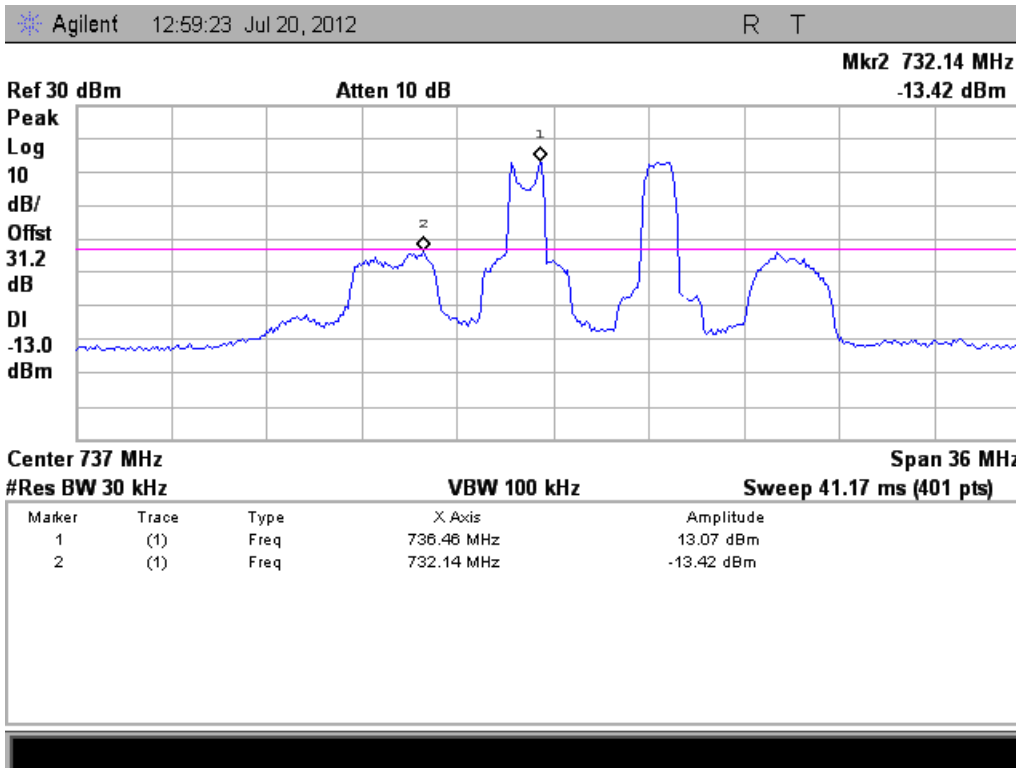
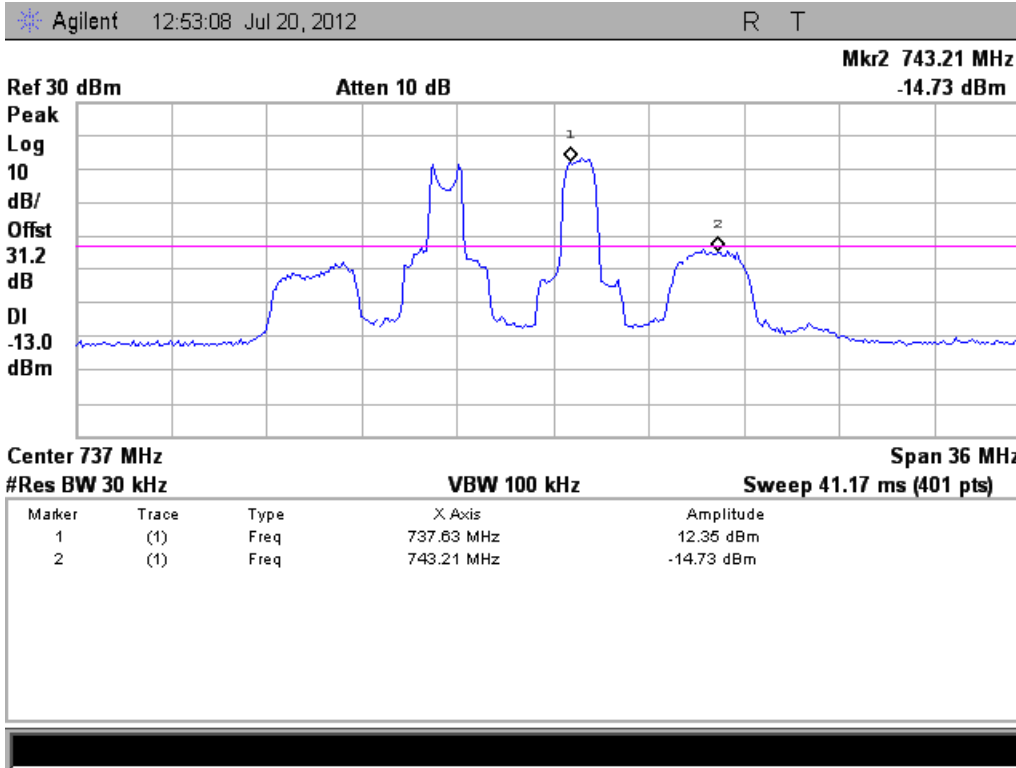
Agilent 12:39:45 Jul 20, 2012 R T





CDMA Downlink Test Plots

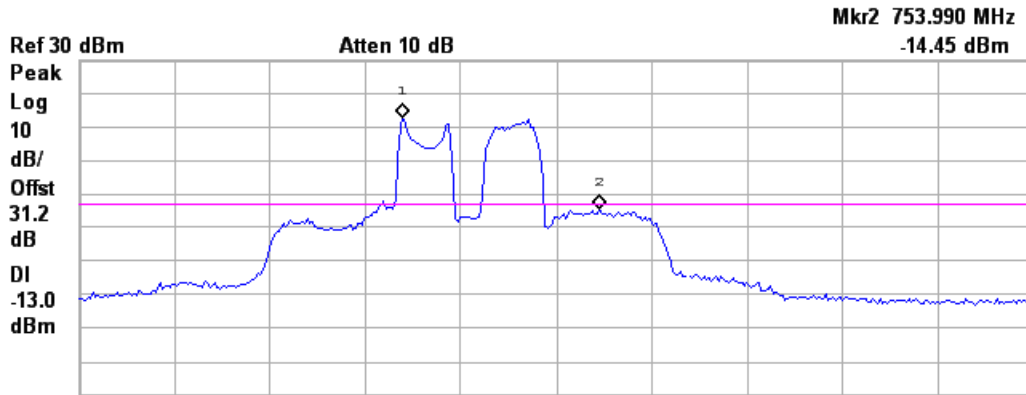
728 - 746 MHz Band





746 - 757 MHz Band

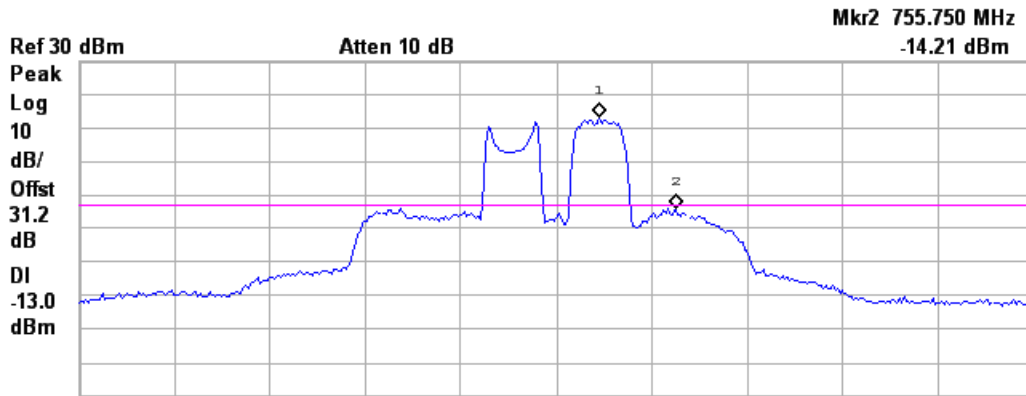
Agilent 13:03:25 Jul 20, 2012 R T



Center 753 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	749.480 MHz	12.59 dBm
2	(1)	Freq	753.990 MHz	-14.45 dBm

Agilent 13:10:53 Jul 20, 2012 R T



Center 753 MHz Span 22 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 25.16 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	753.990 MHz	13.09 dBm
2	(1)	Freq	755.750 MHz	-14.21 dBm



869 - 894 MHz Band

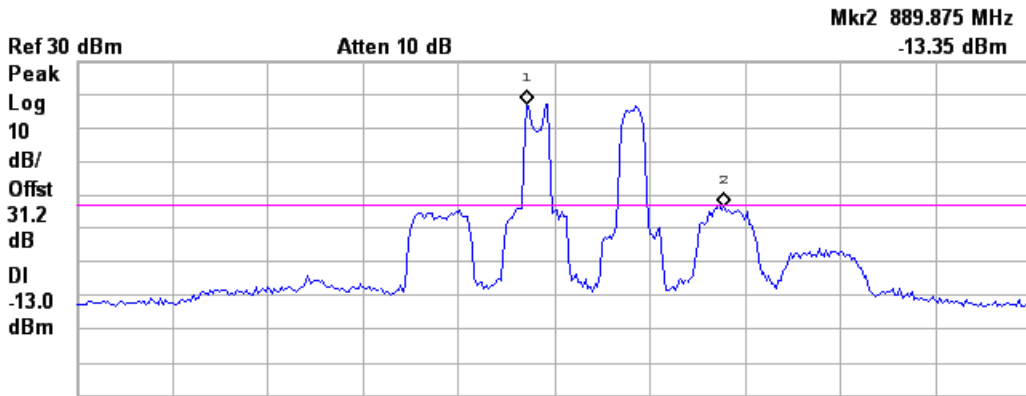
Agilent 13:15:50 Jul 20, 2012 R T



Center 881 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	880.250 MHz	16.47 dBm
2	(1)	Freq	885.500 MHz	-14.16 dBm

Agilent 13:43:11 Jul 20, 2012 R T

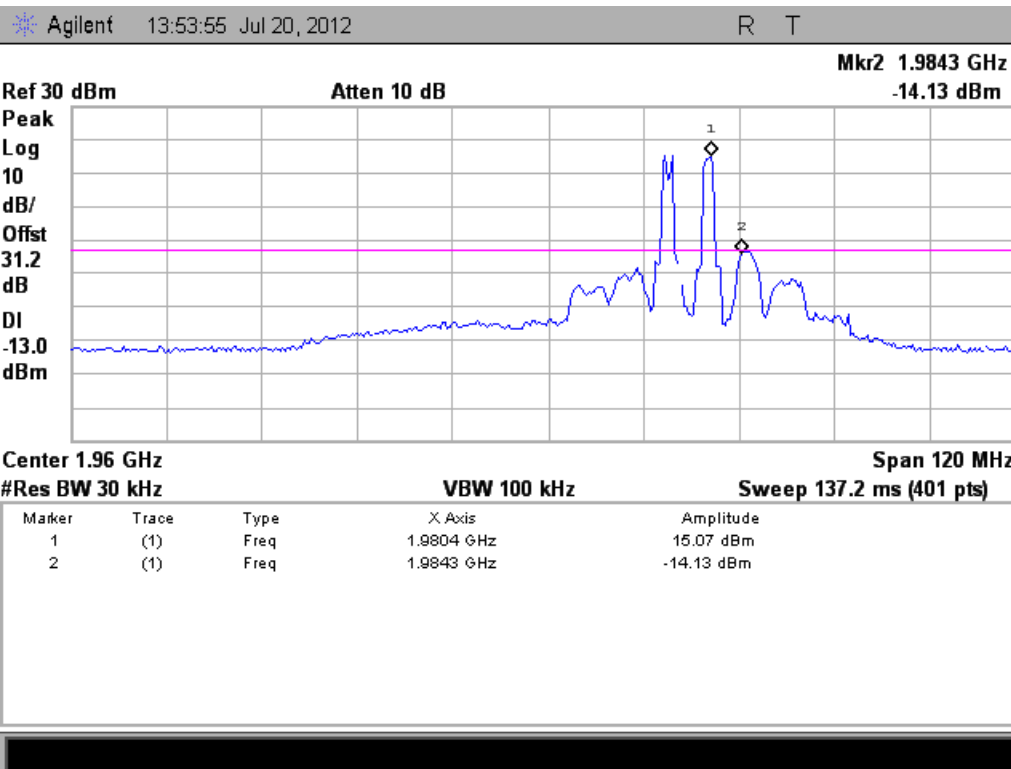
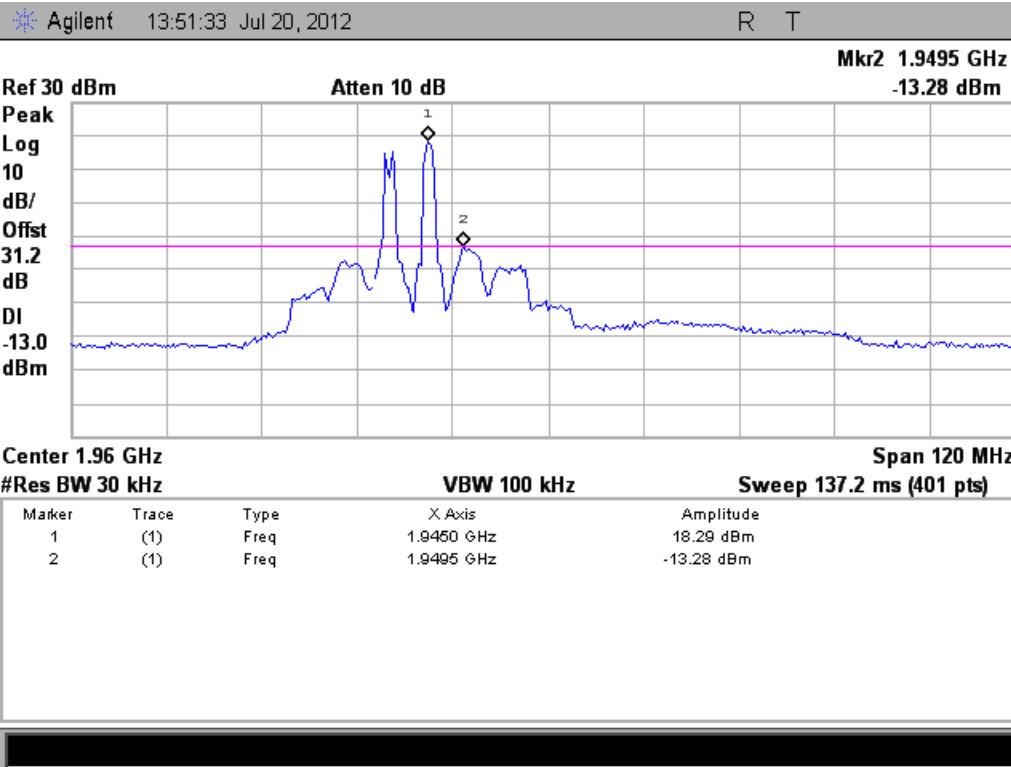


Center 881 MHz Span 50 MHz
#Res BW 30 kHz VBW 100 kHz Sweep 57.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	879.500 MHz	17.05 dBm
2	(1)	Freq	889.875 MHz	-13.35 dBm



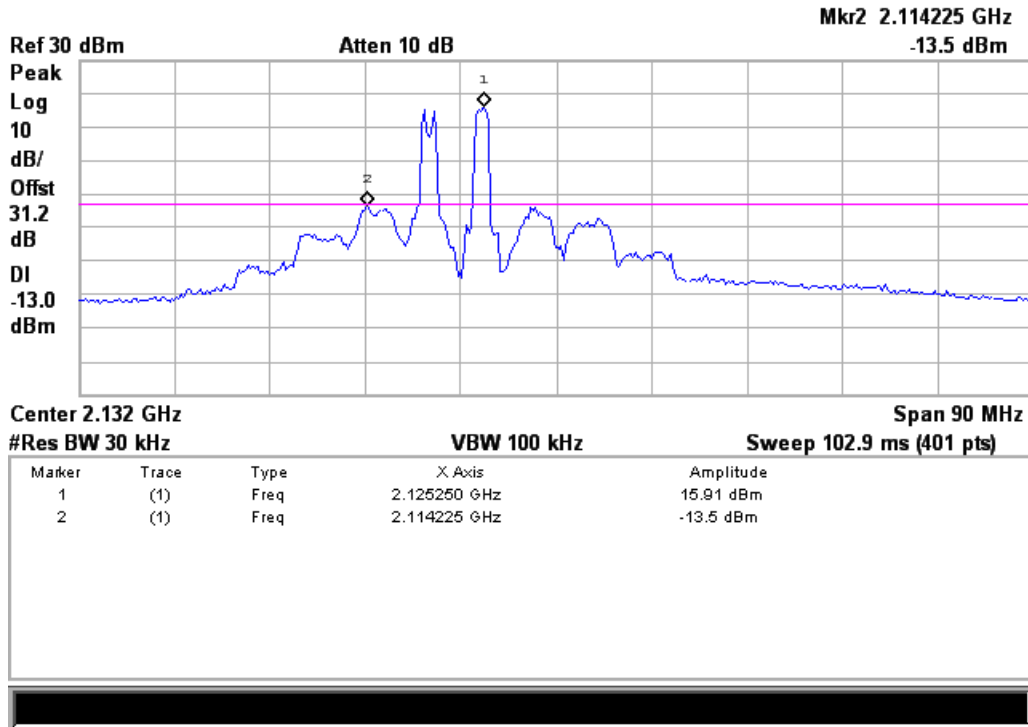
1930 - 1990 MHz Band



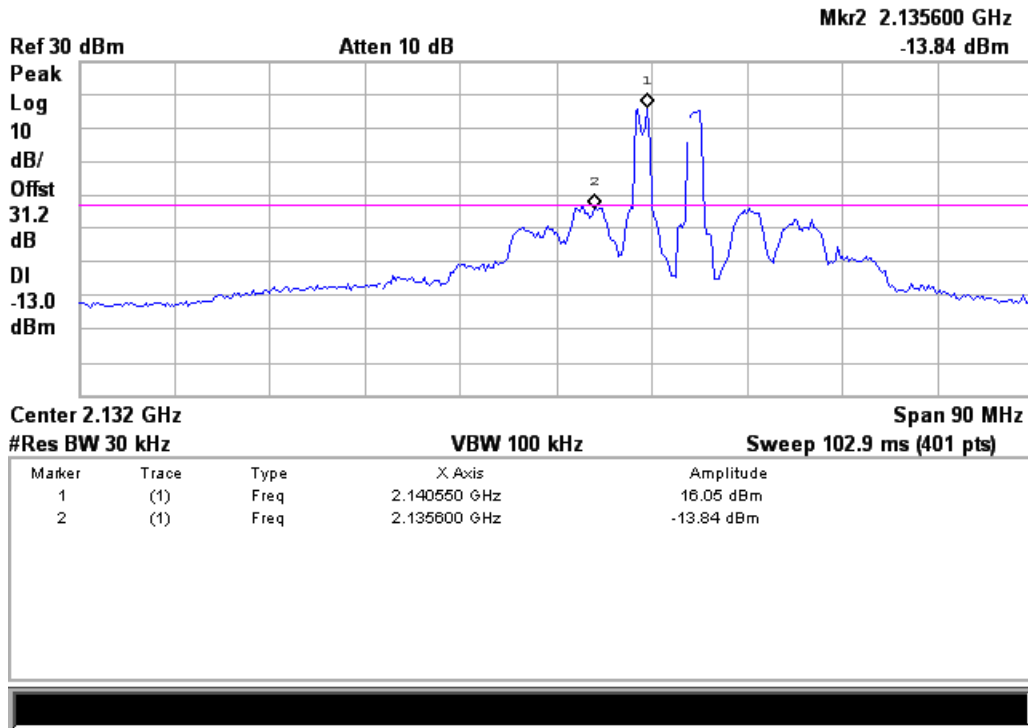


2110 - 2155 MHz Band

Agilent 13:57:17 Jul 20, 2012 R T



Agilent 13:59:51 Jul 20, 2012 R T





Occupied Bandwidth

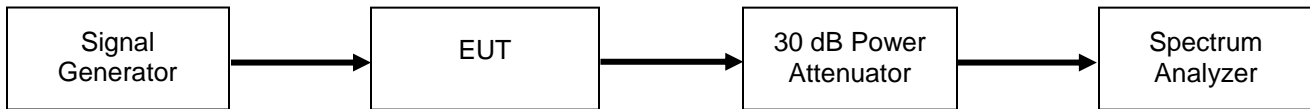
Name of Test: Occupied Bandwidth
Test Equipment Utilized: i00266, i00331, i00348, i00347

Engineer: John Erhard
Test Date: 7/24/2012

Test Procedure

The EUT was connected to a spectrum analyzer through a 30 dB power attenuator. A signal generator was utilized to produce the following signals; GSM, CDMA, and WCDMA. The RF input level was set to the level as determined by the intermodulation testing requirements. The input and output spectrums were observed and the plots captured to ensure that the signals remained similar with minimal non-linearity in accordance to FCC guidelines. The center channel of each band was measured. All emissions are within the pass band.

Test Setup

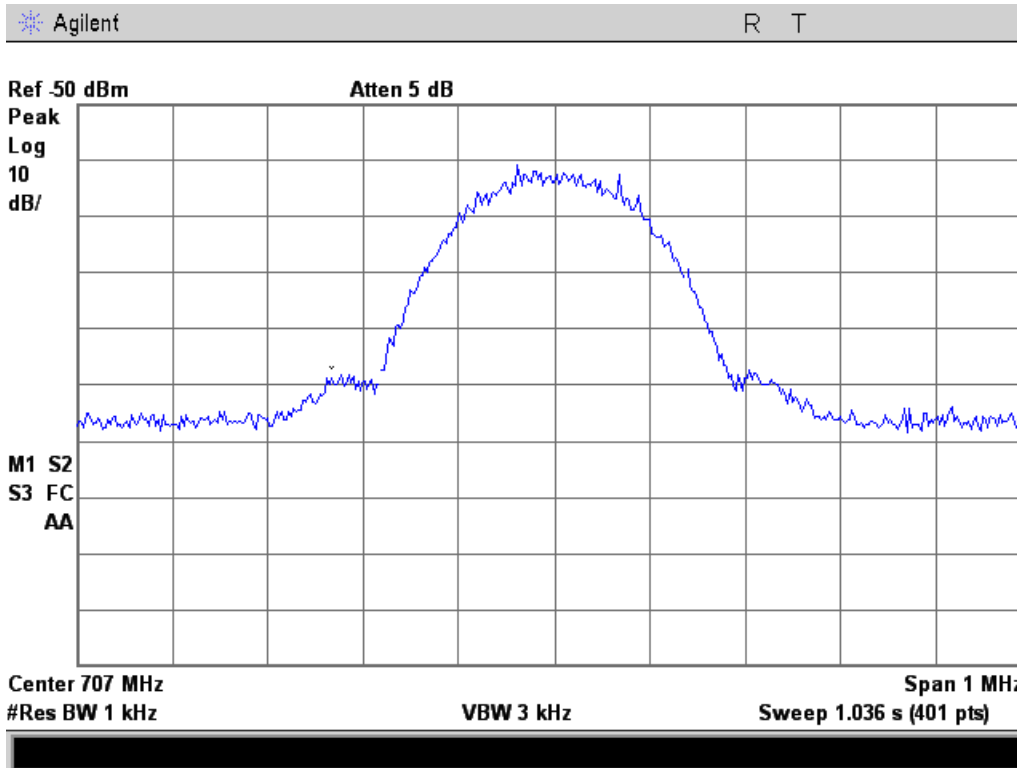




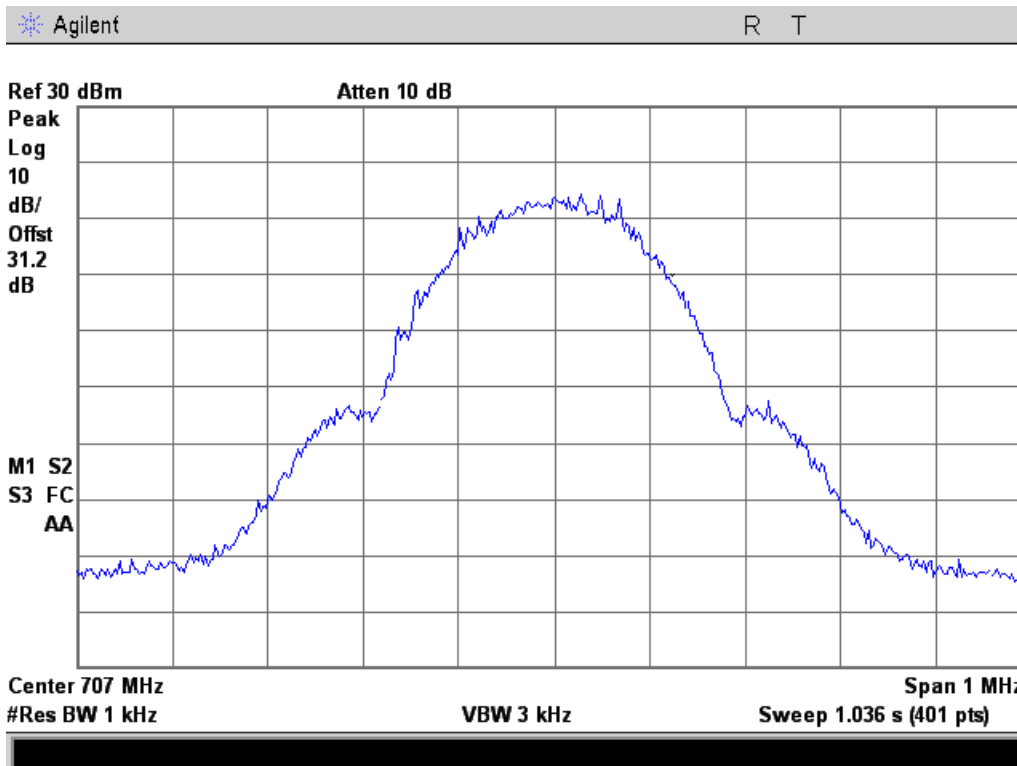
GSM Uplink Test Plots

698 - 716 MHz Band

Input



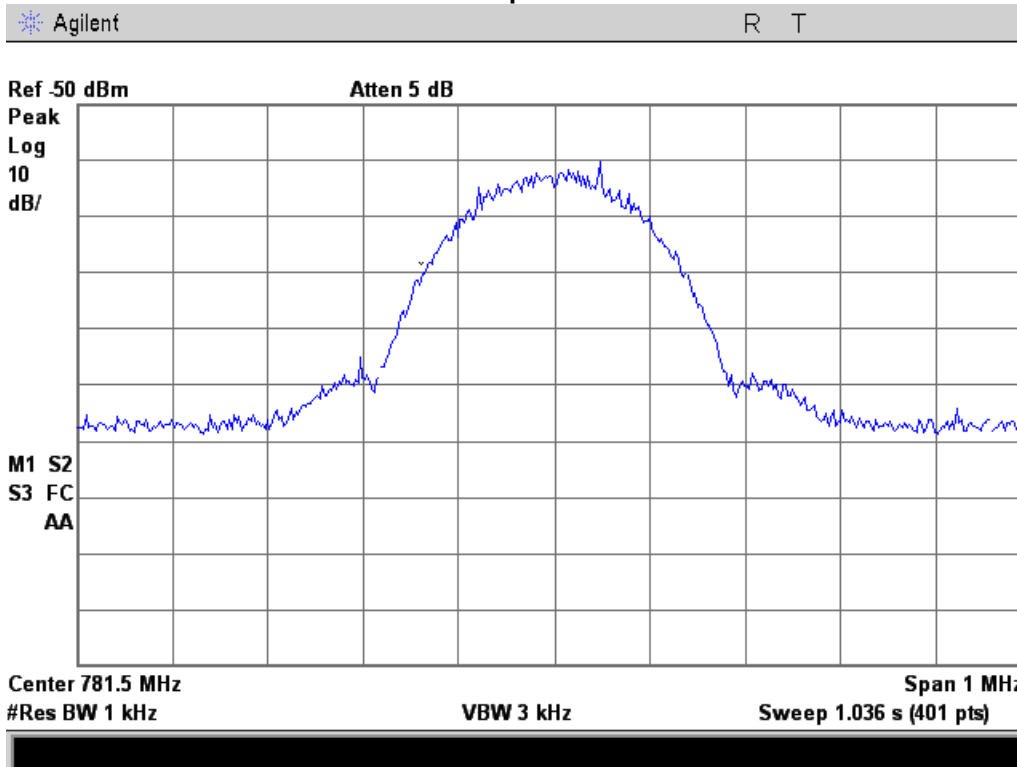
Output



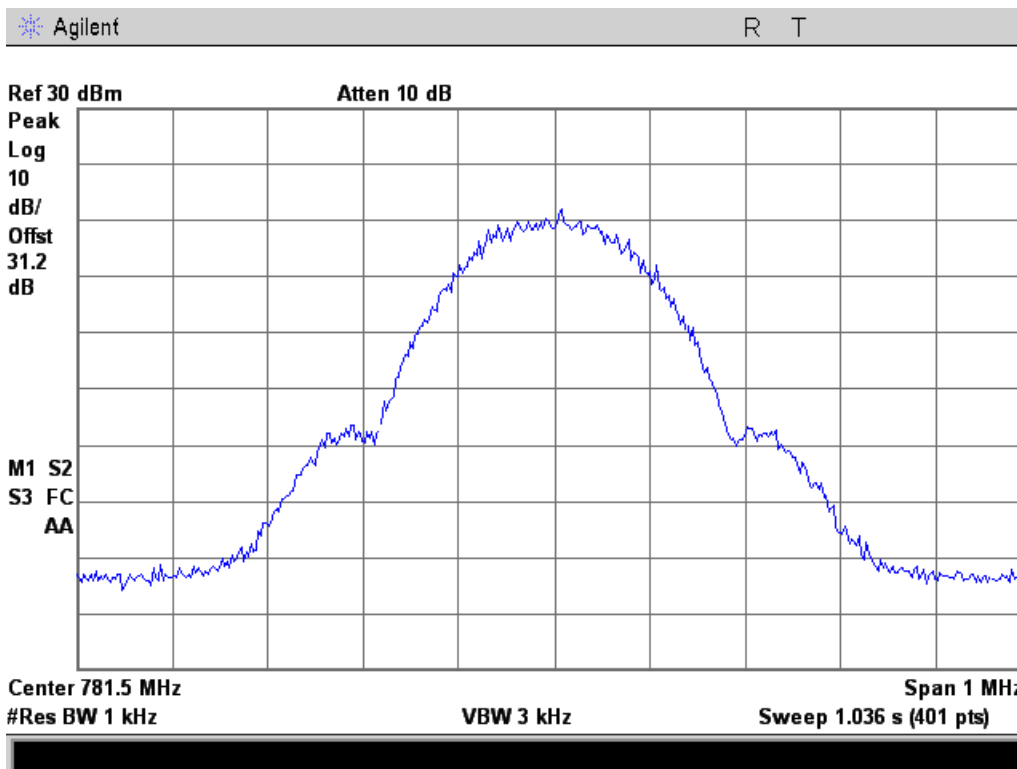


776 - 787 MHz Band

Input



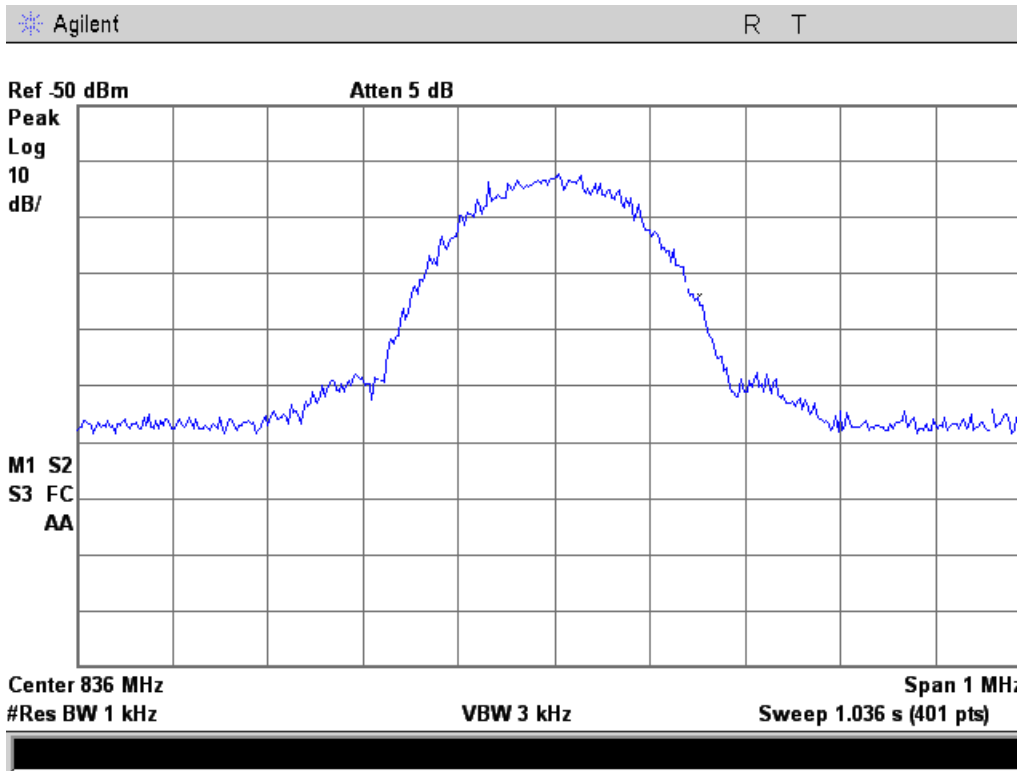
Output



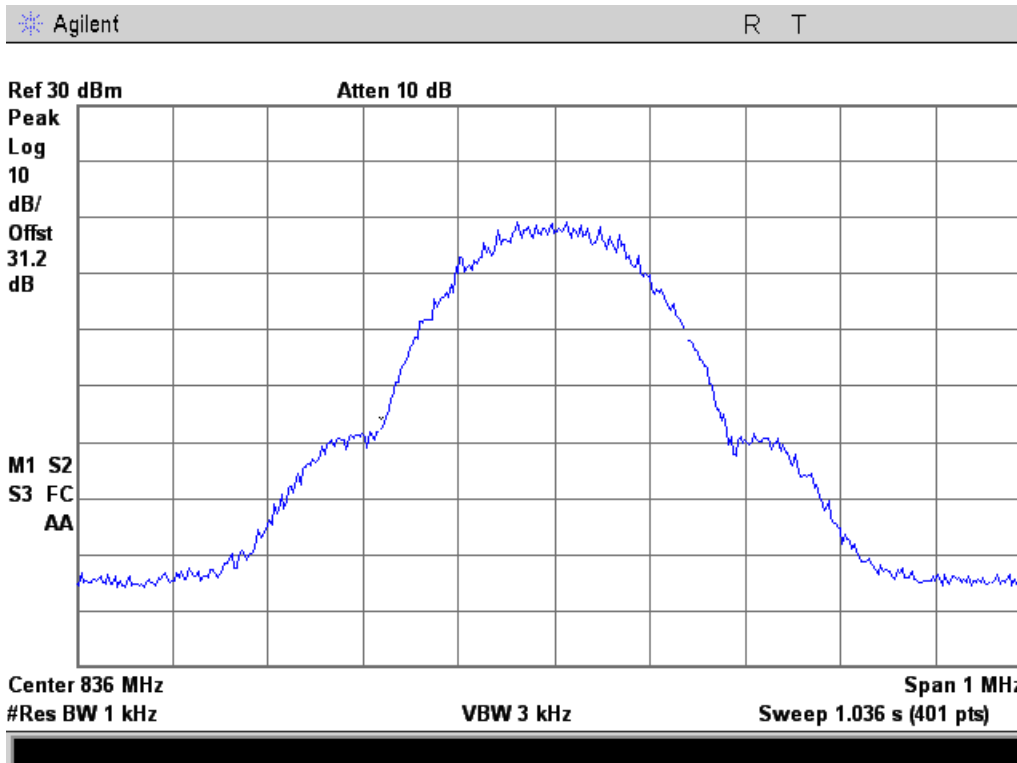


824 - 849 MHz Band

Input



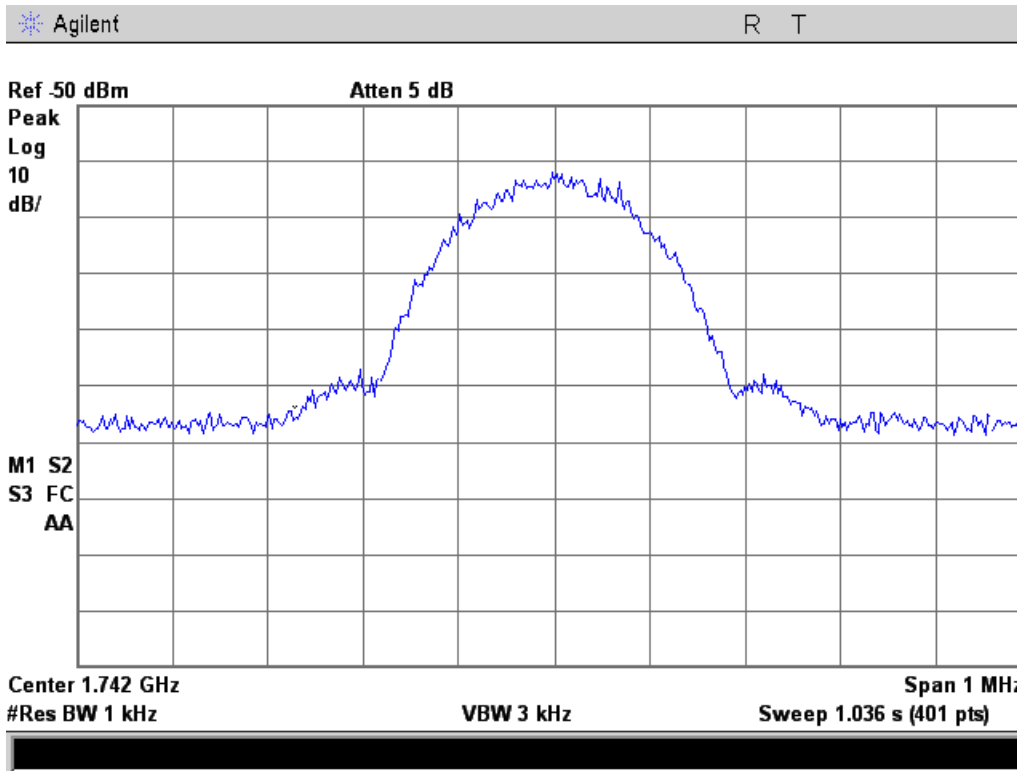
Output



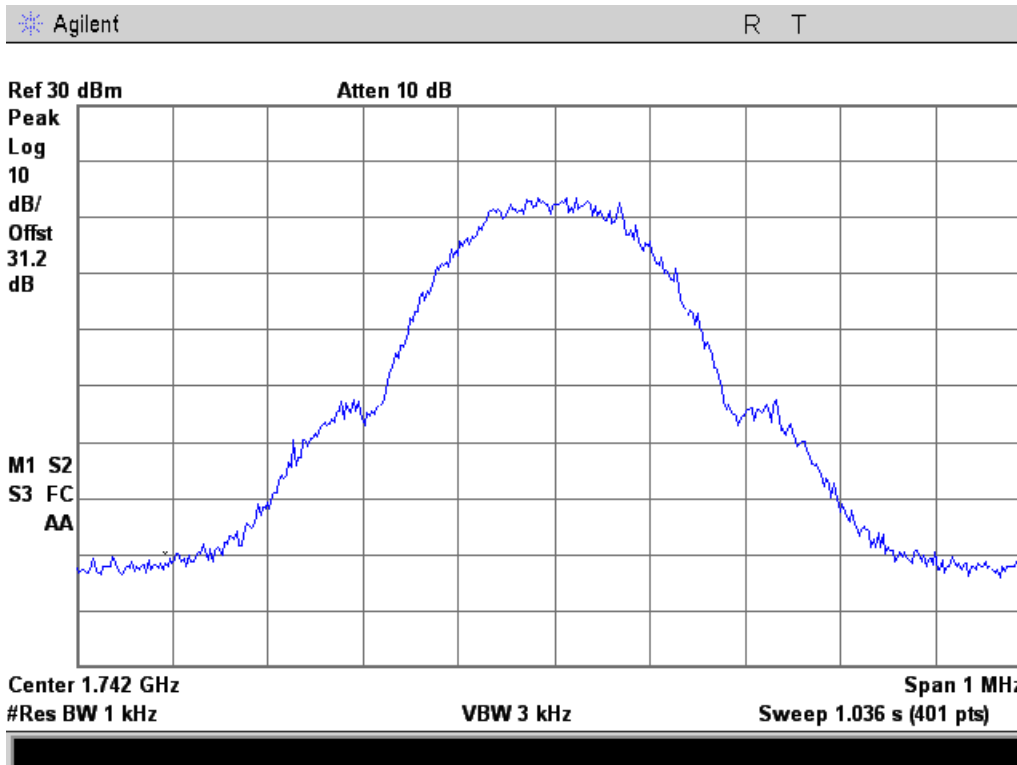


1710 - 1755 MHz Band

Input



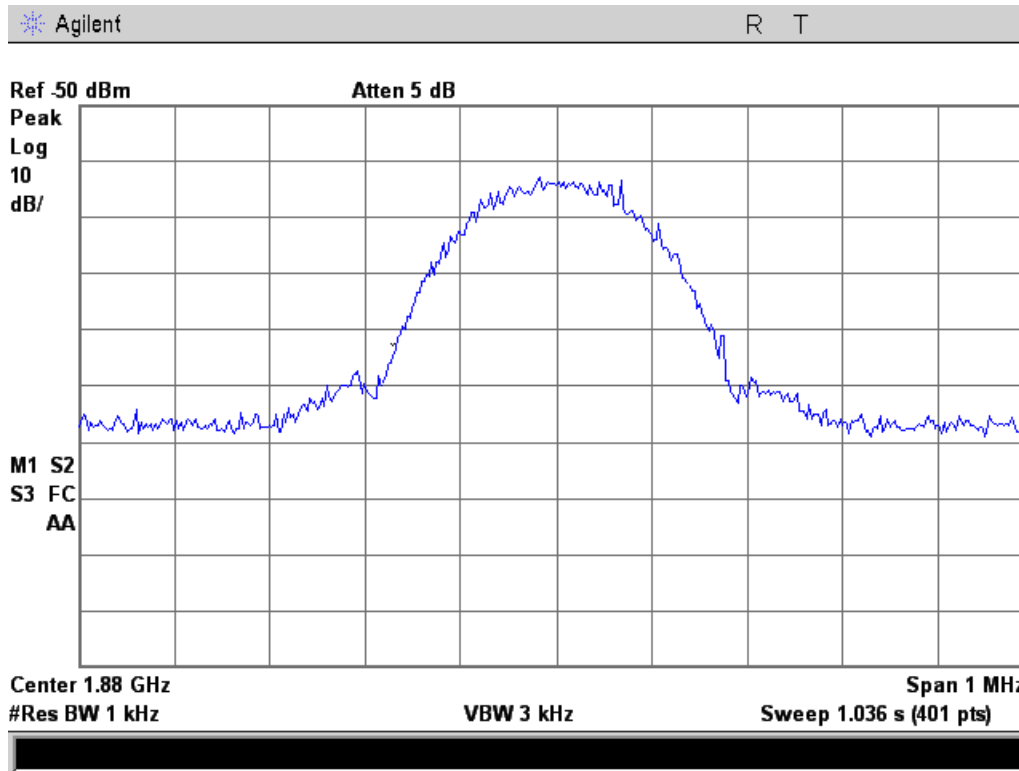
Output



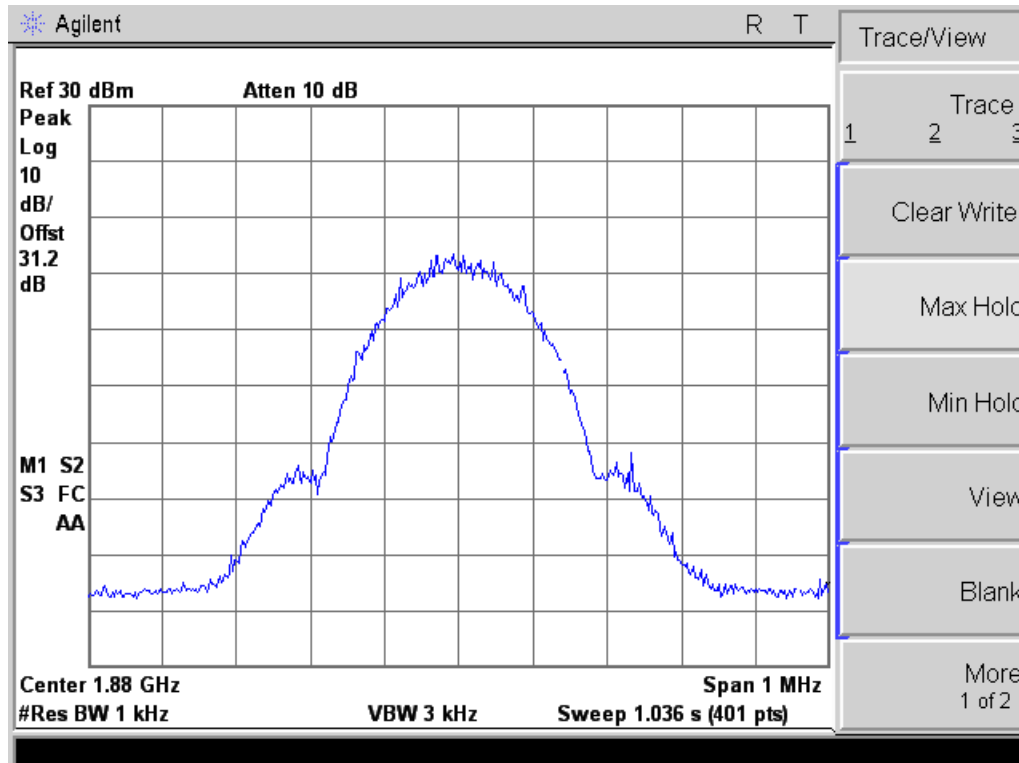


1850 - 1910 MHz Band

Input



Output

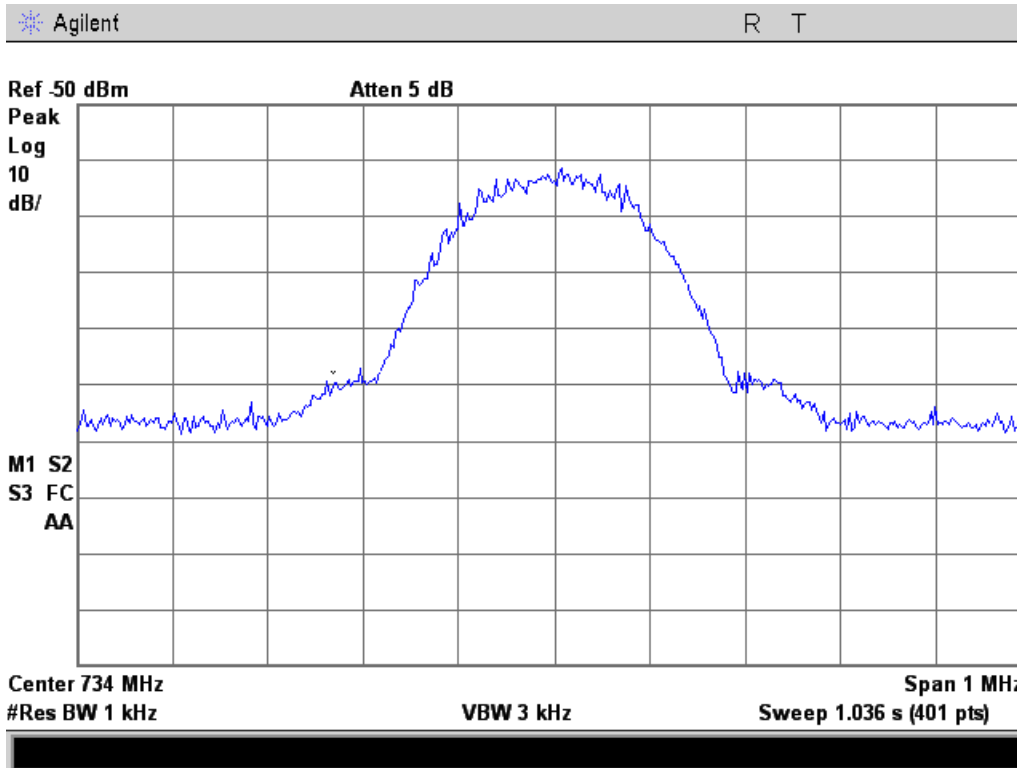




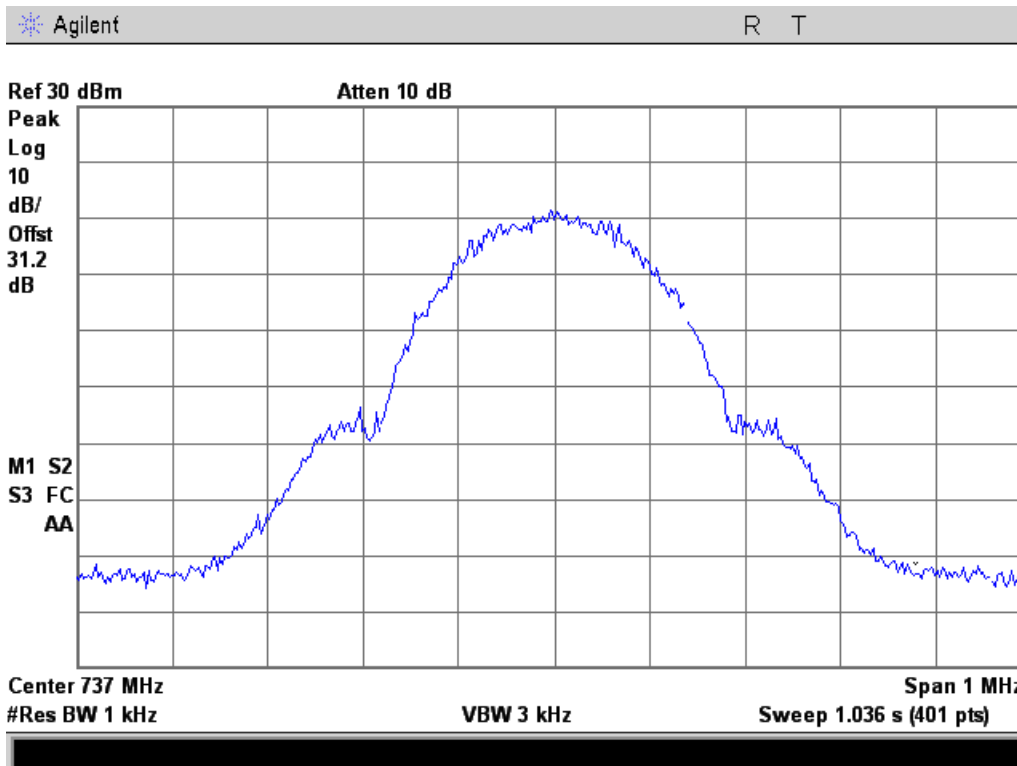
GSM Downlink Test Plots

728 - 746 MHz Band

Input



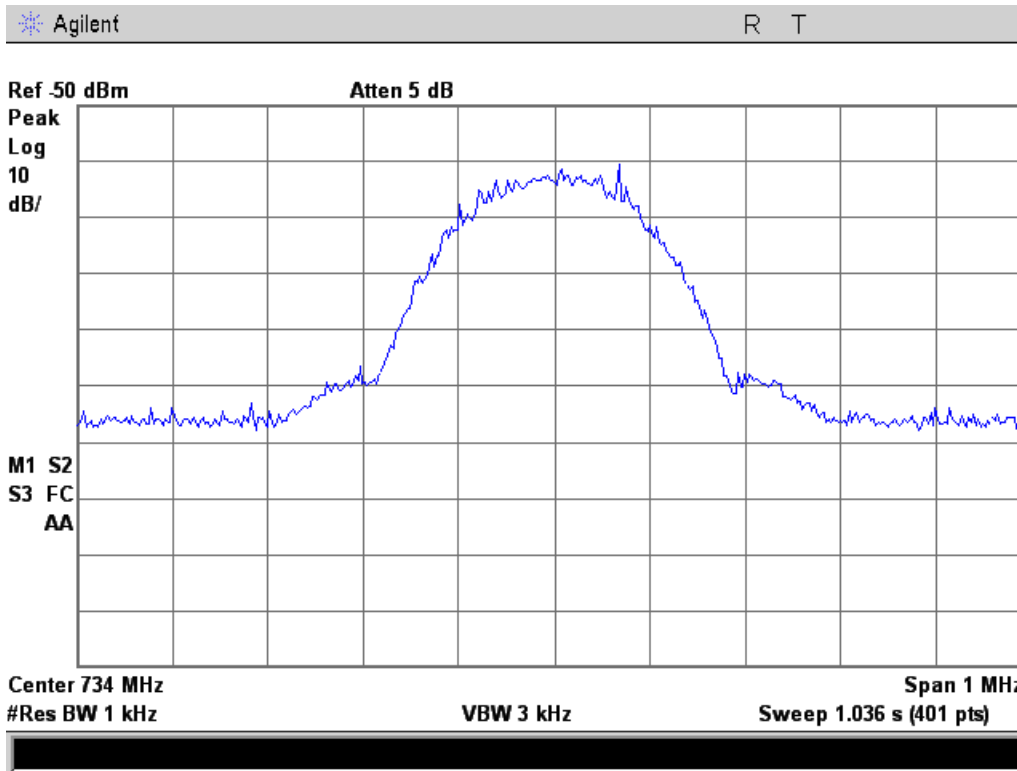
Output



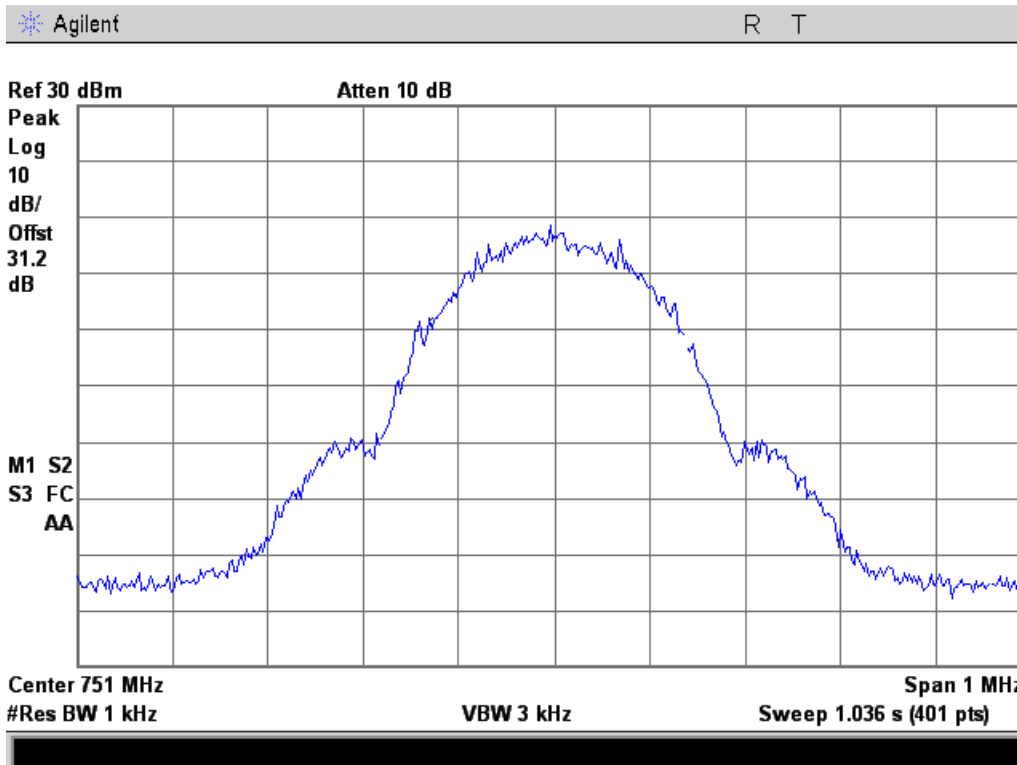


746 - 757 MHz Band

Input



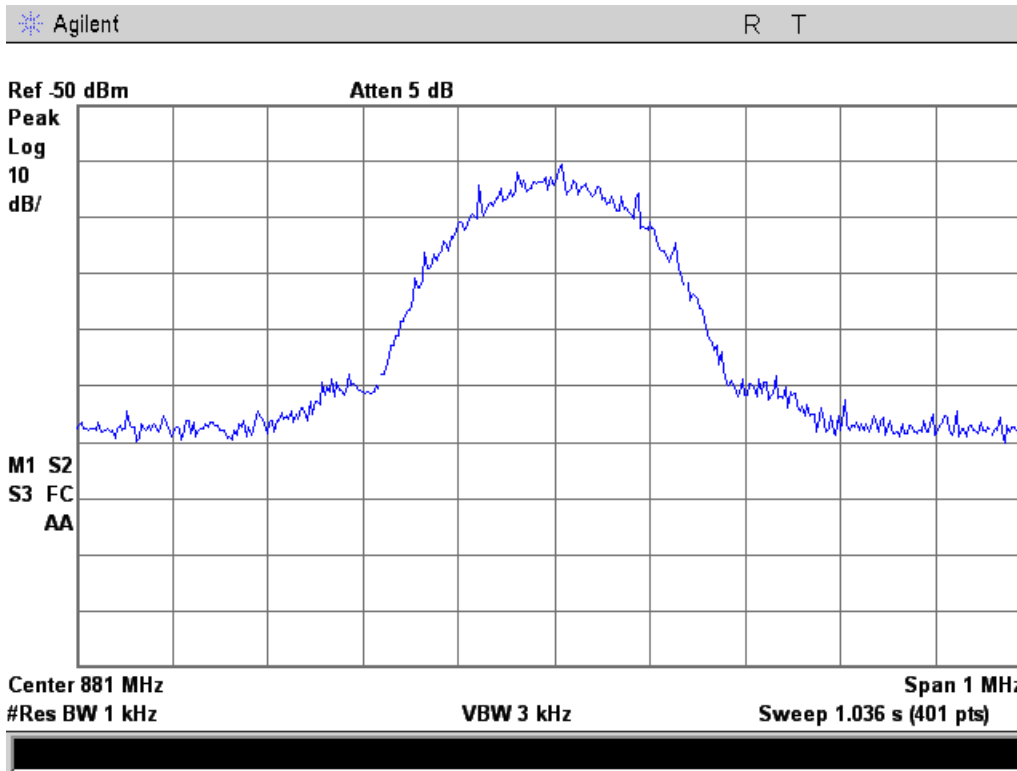
Output



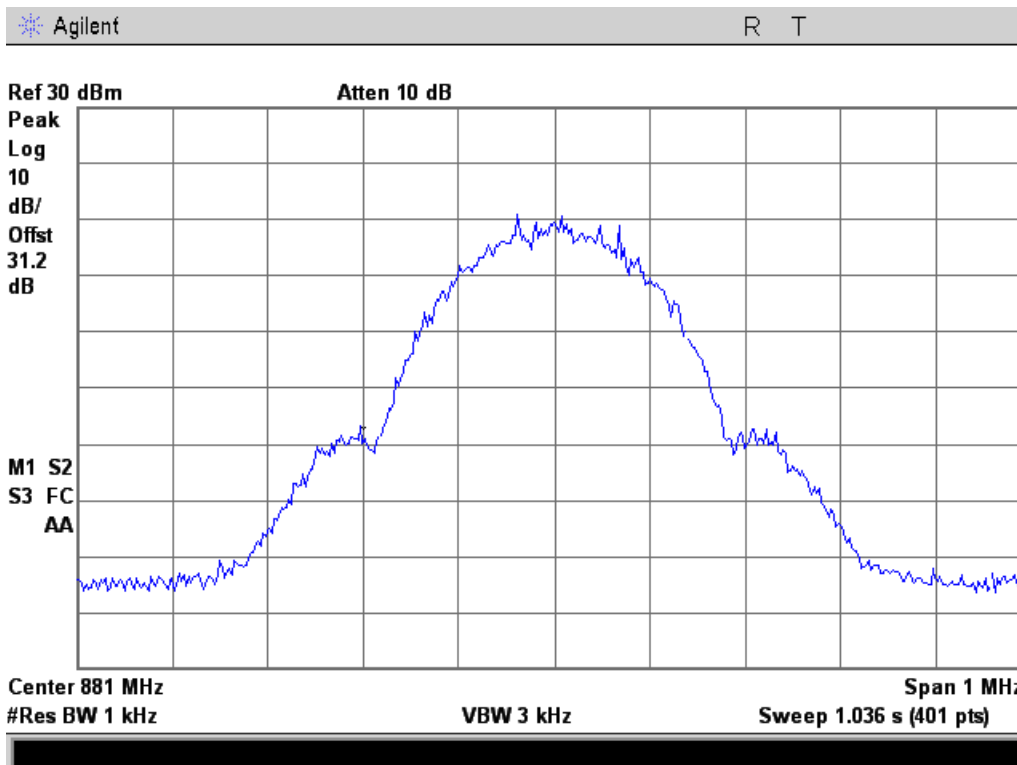


869 - 894 MHz Band

Input



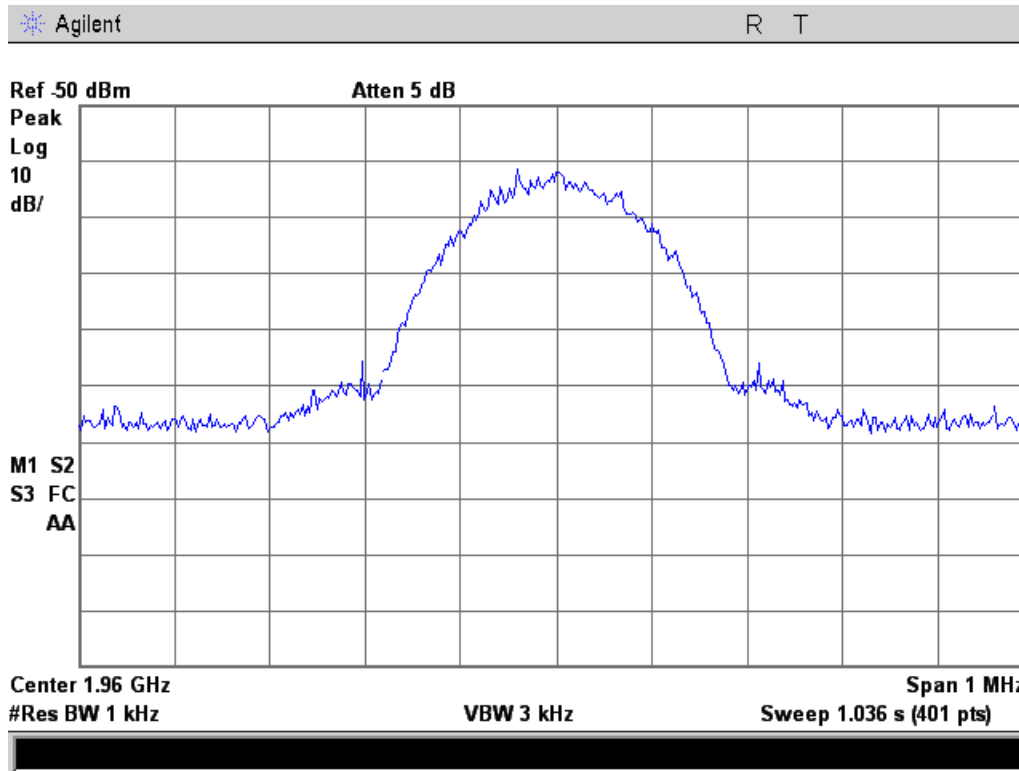
Output



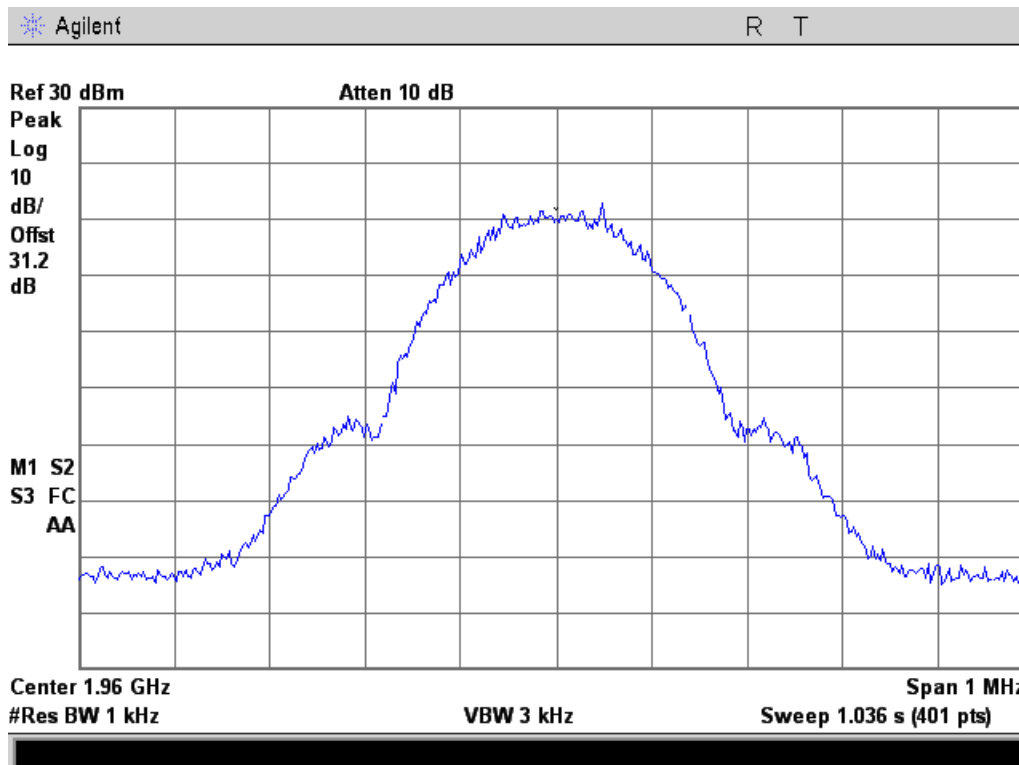


1930 - 1990 MHz Band

Input



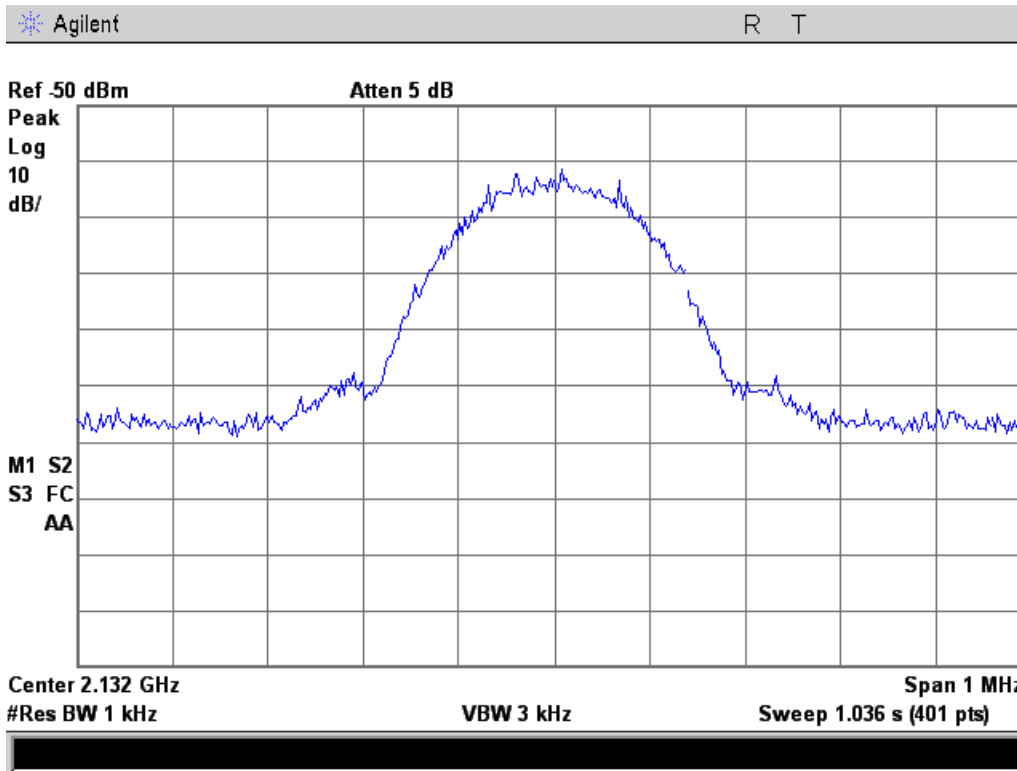
Output



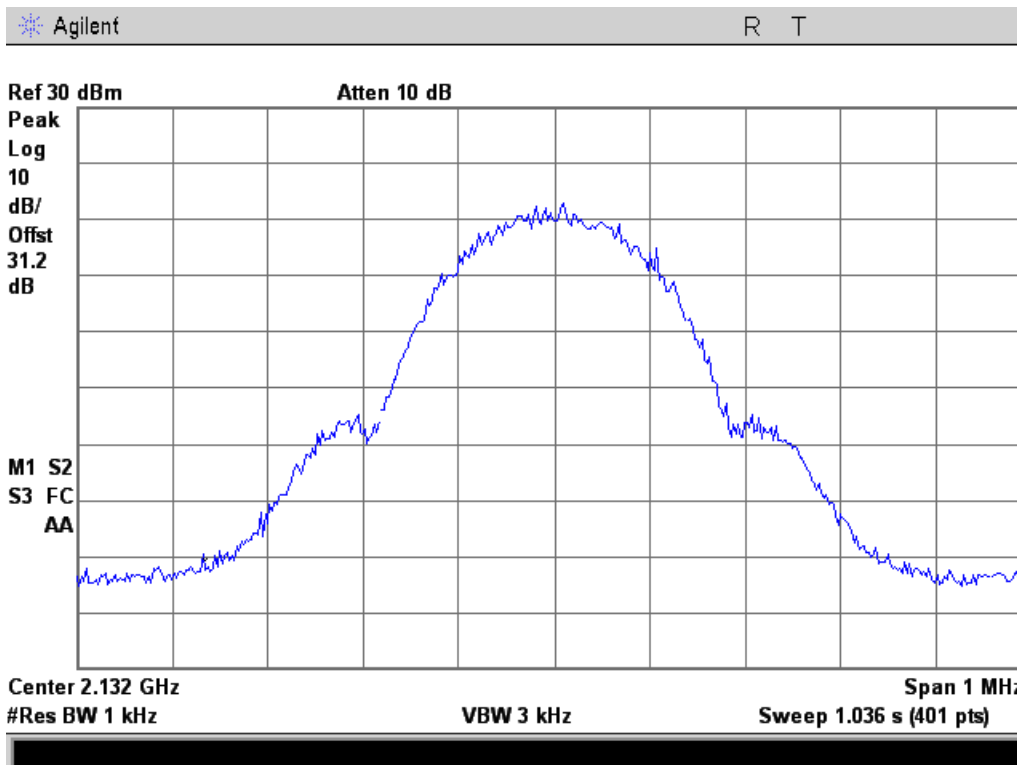


2110 - 2155 MHz Band

Input



Output

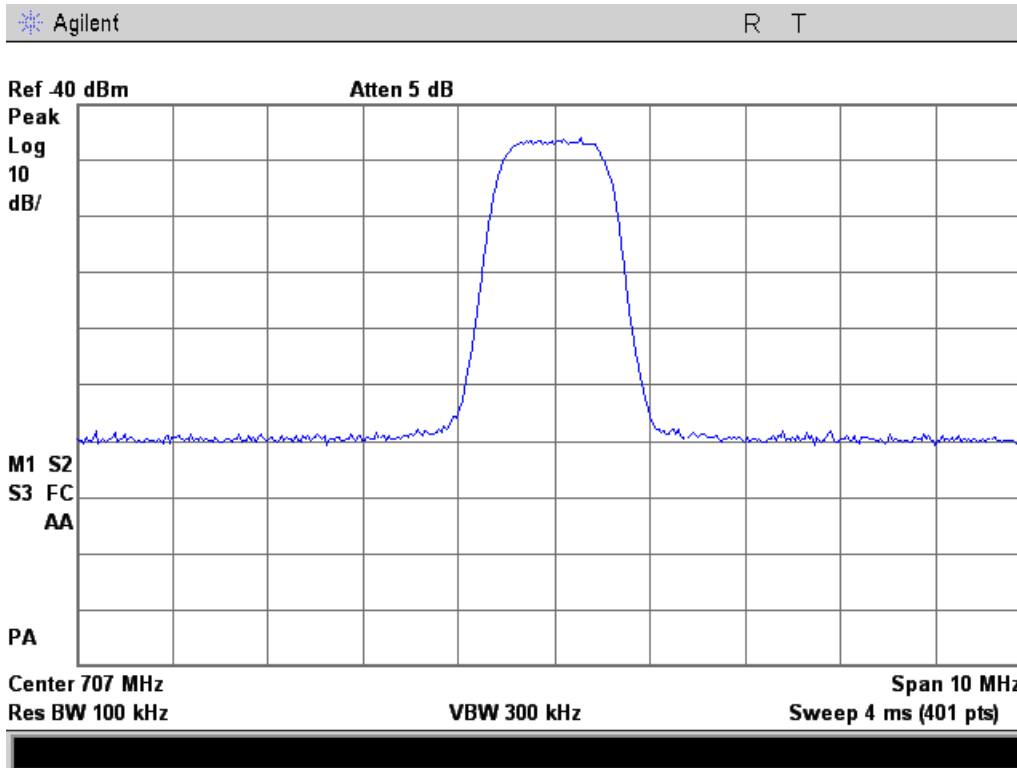




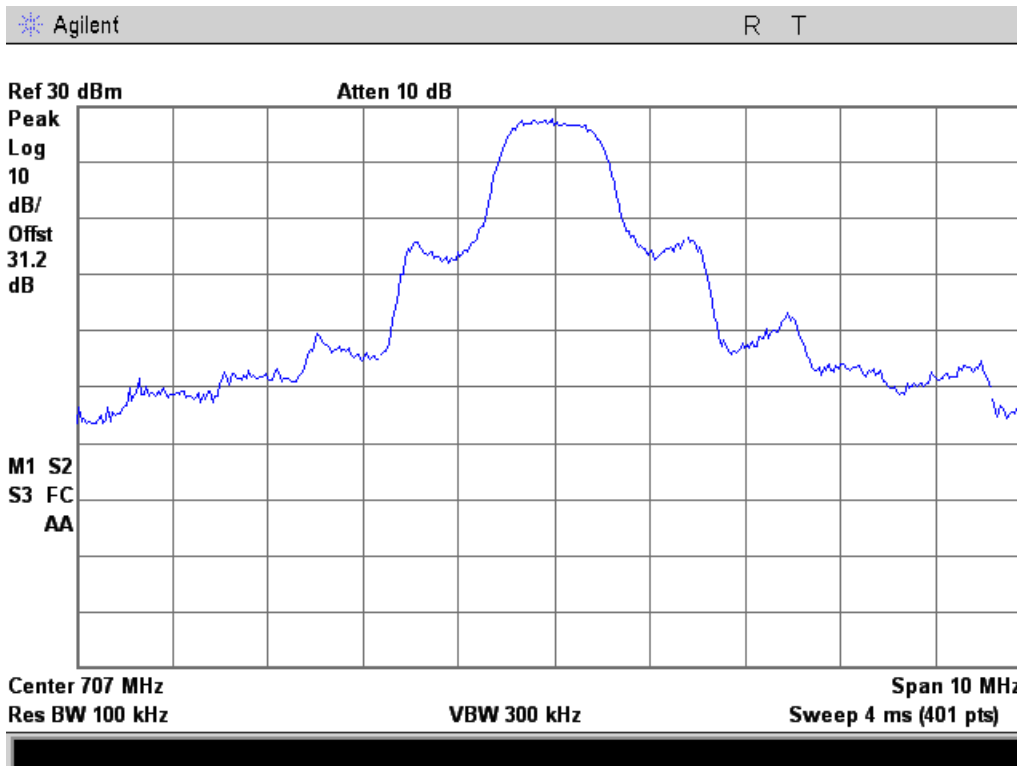
CDMA Uplink Test Plots

698 - 716 MHz Band

Input



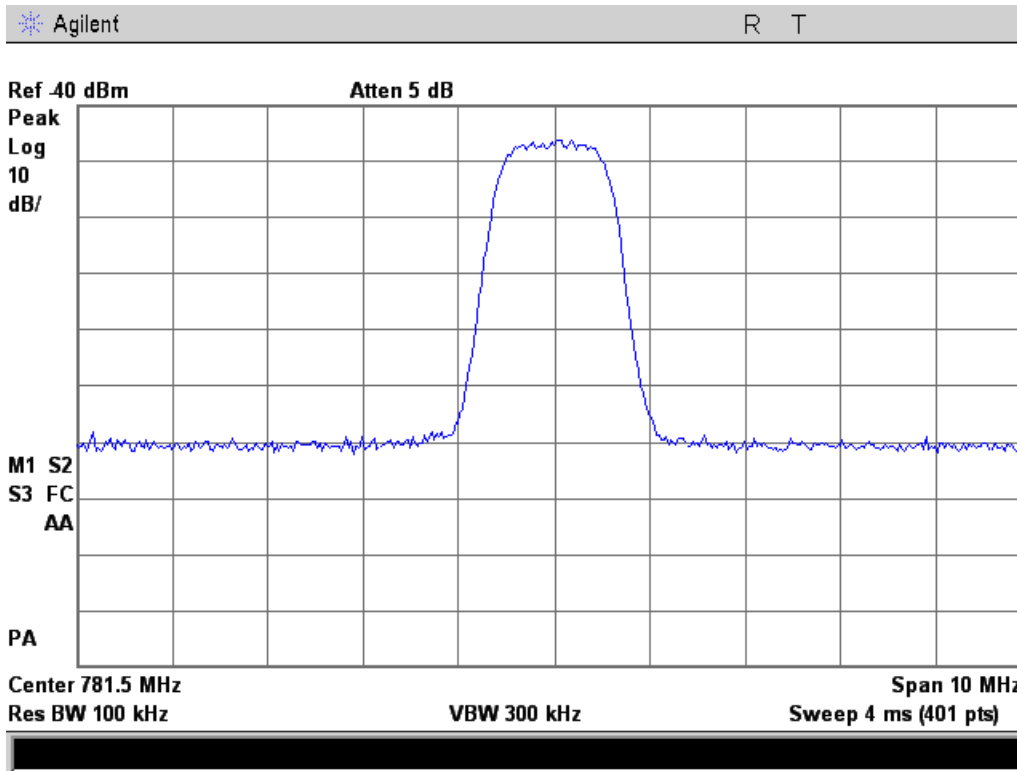
Output



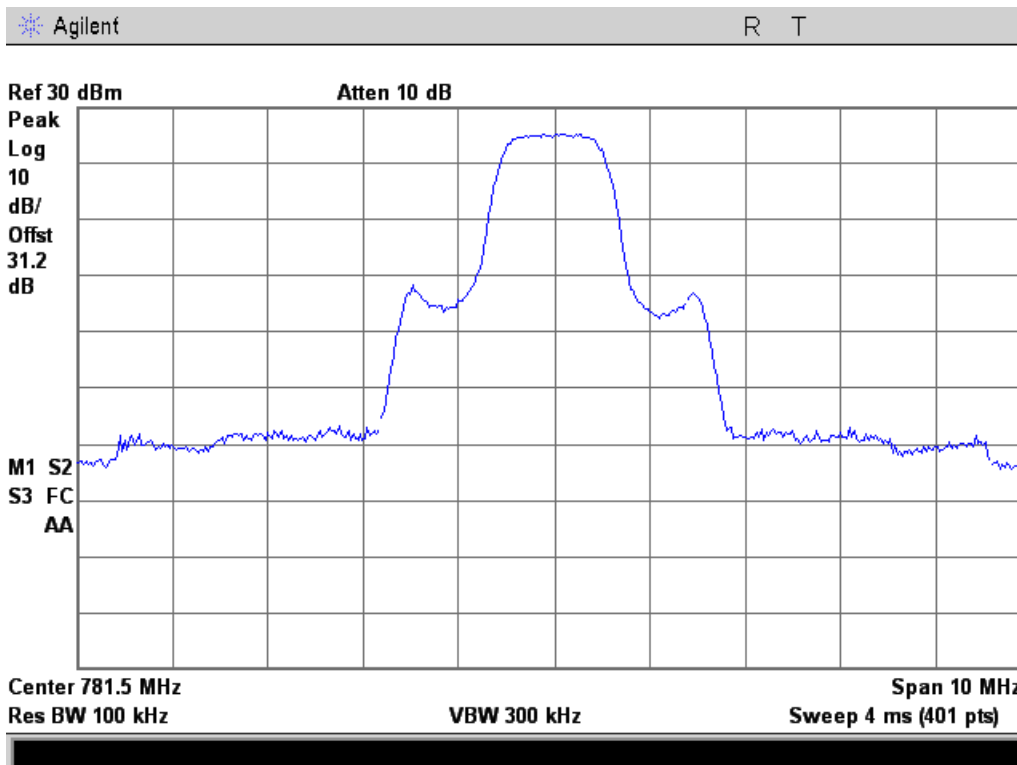


776 - 787 MHz Band

Input



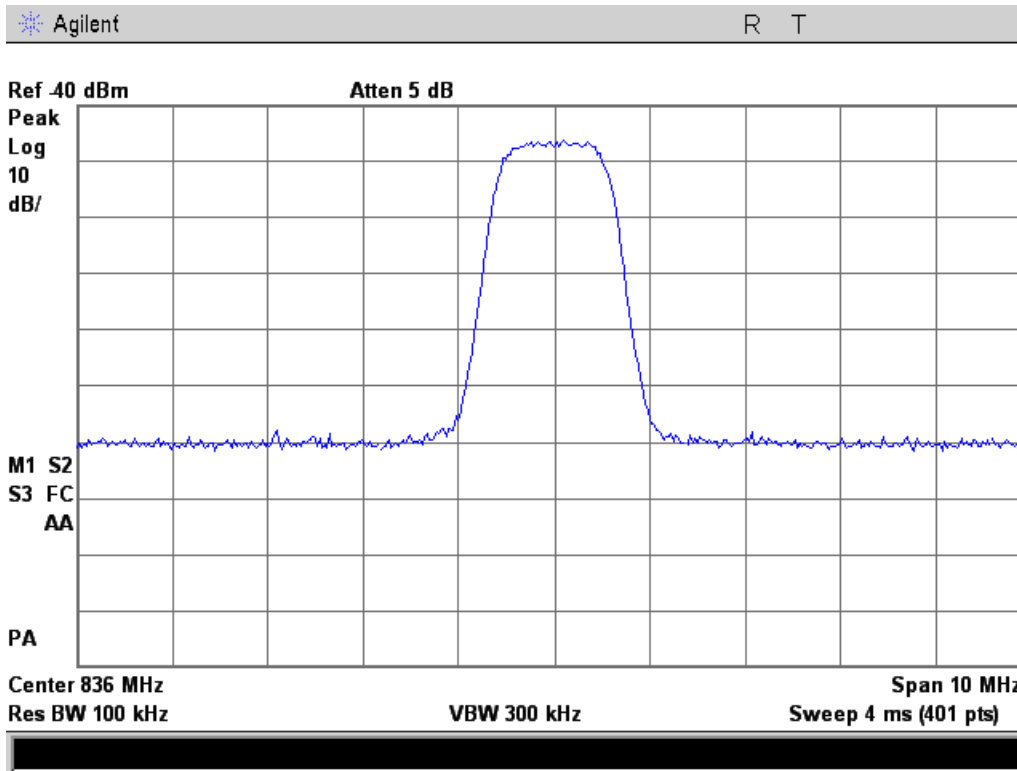
Output



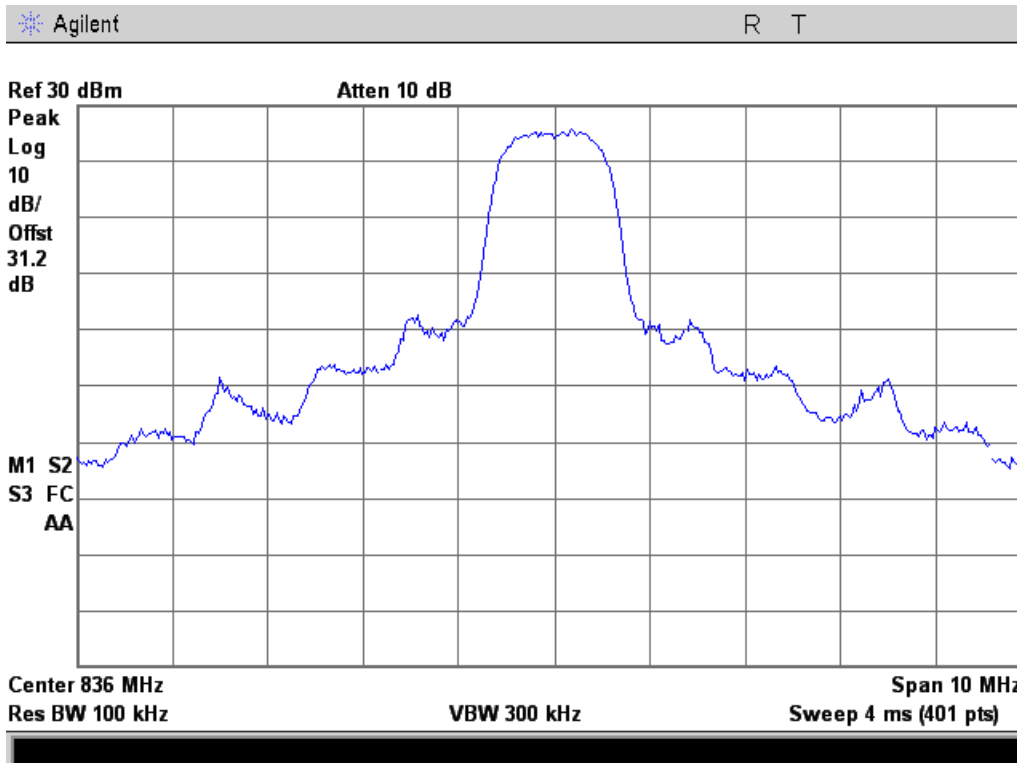


824 - 849 MHz Band

Input



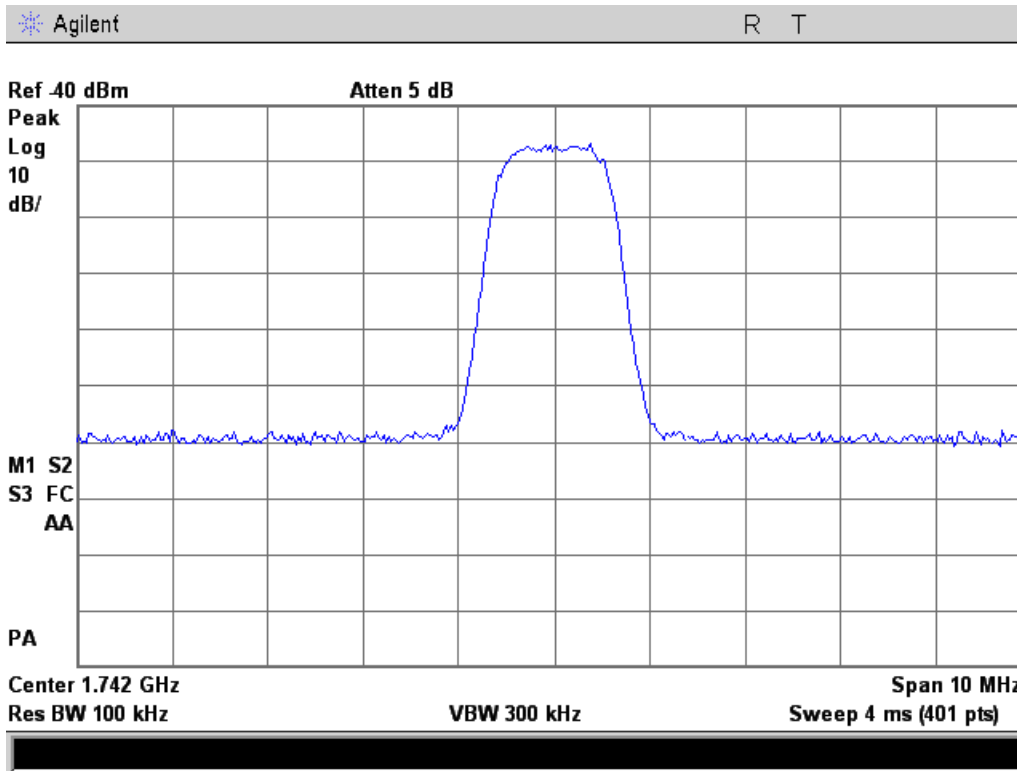
Output



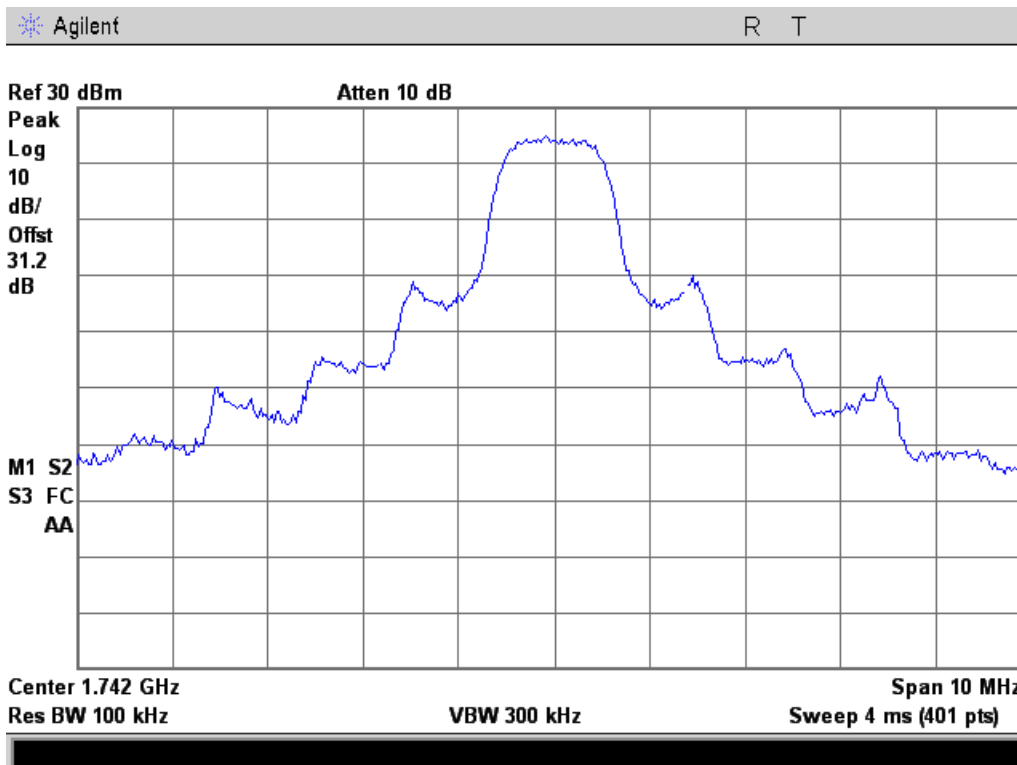


1710 - 1755 MHz Band

Input



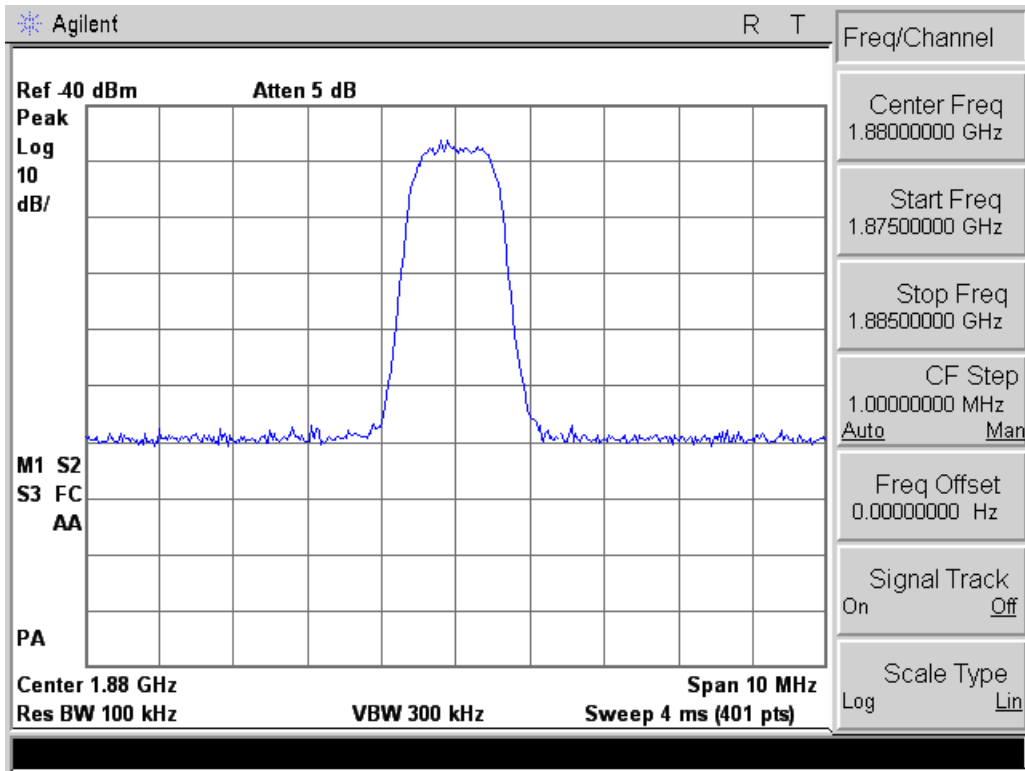
Output



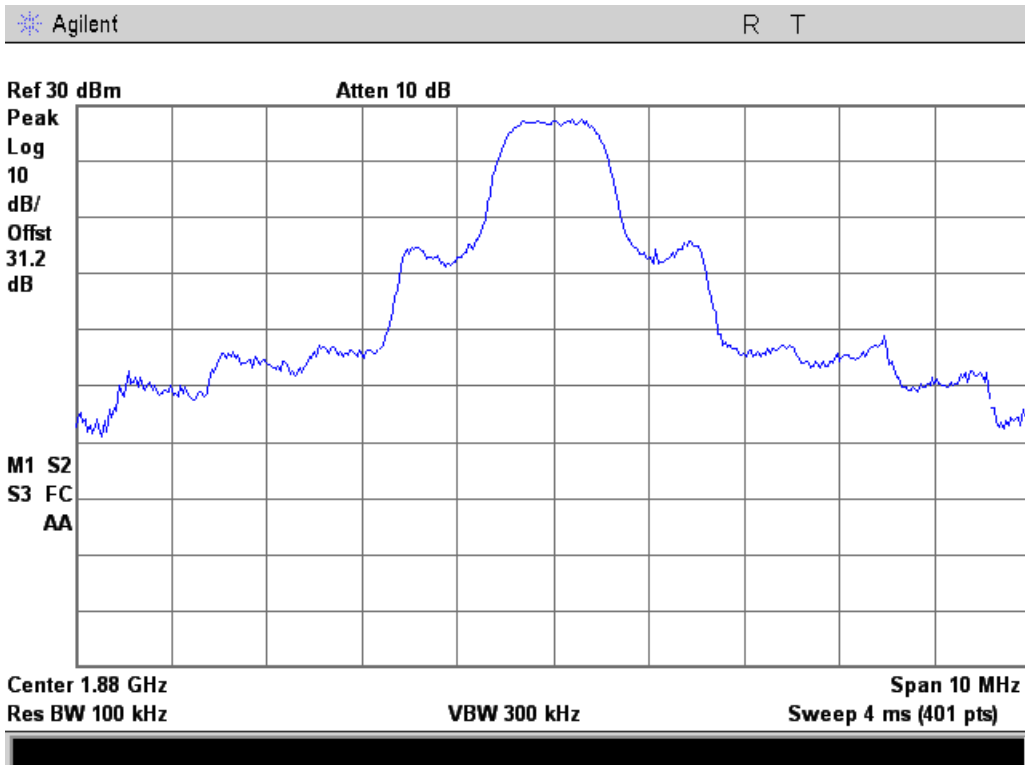


1850 - 1910 MHz Band

Input



Output

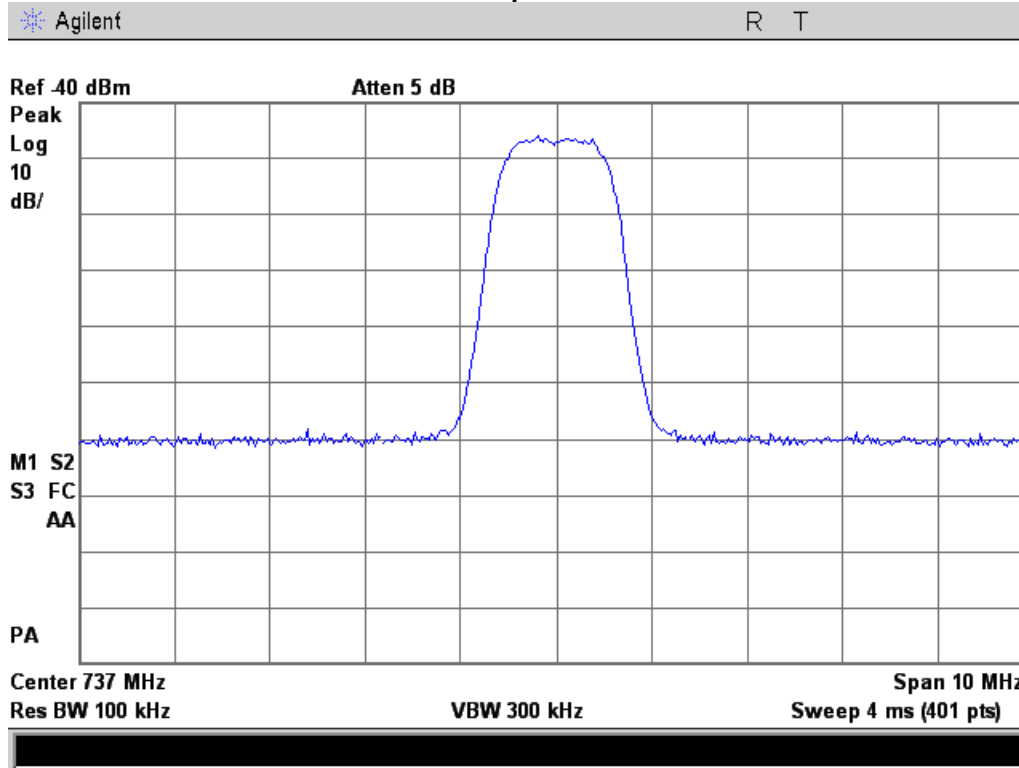




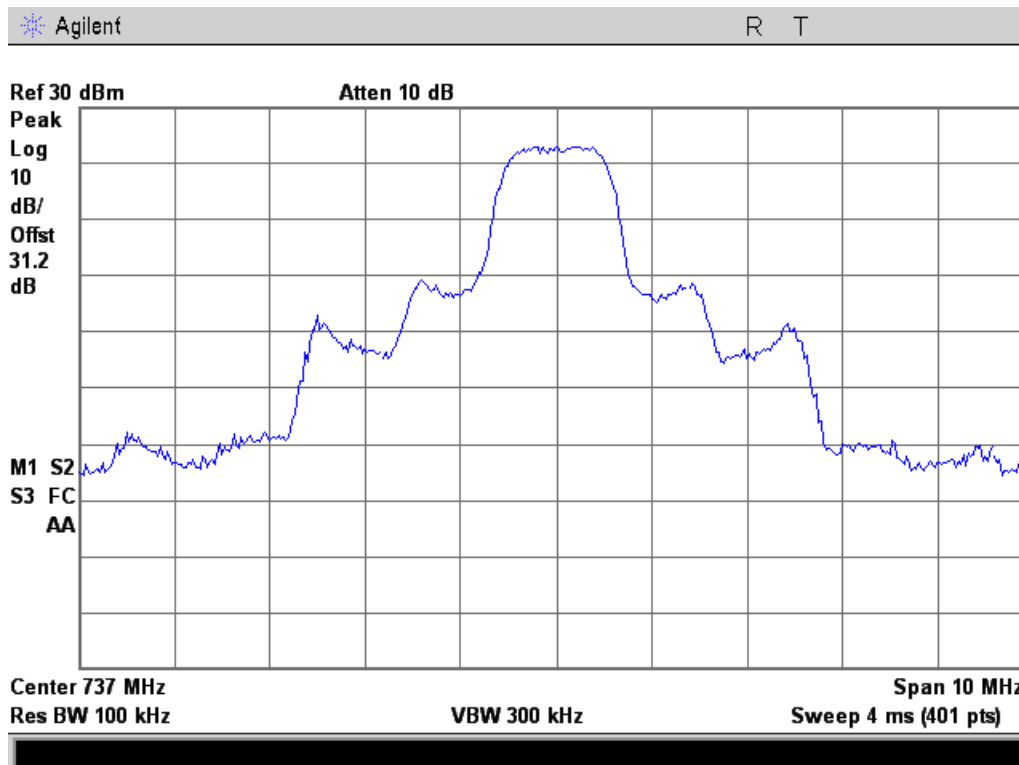
CDMA Downlink Test Plots

728 - 746 MHz Band

Input



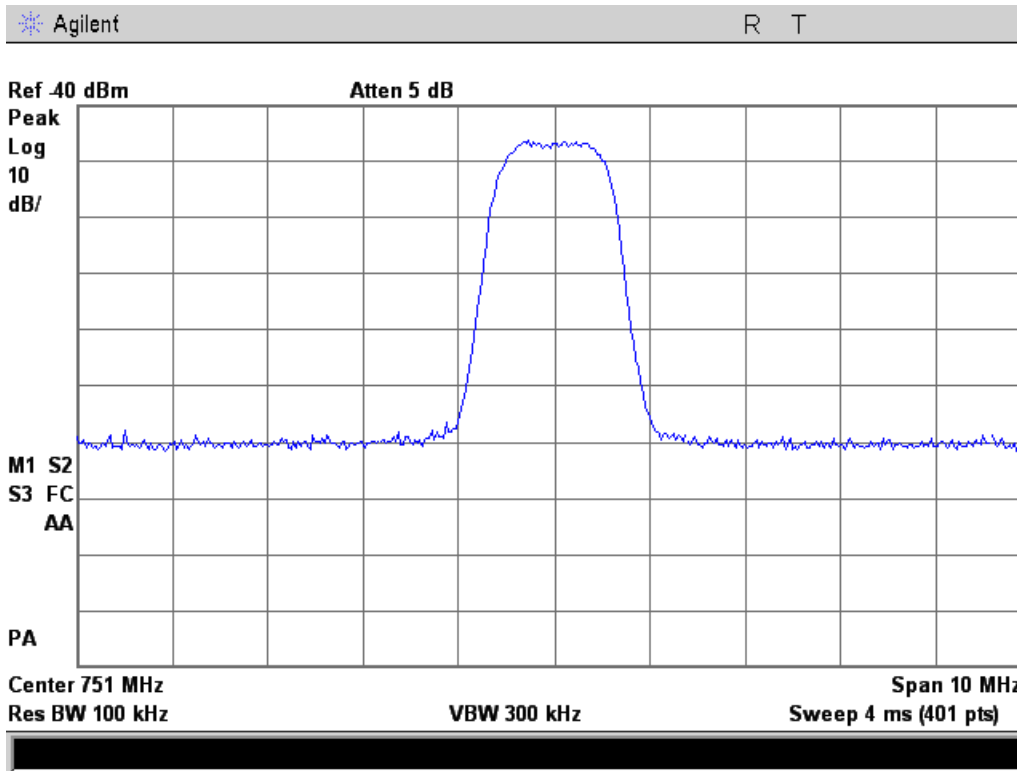
Output



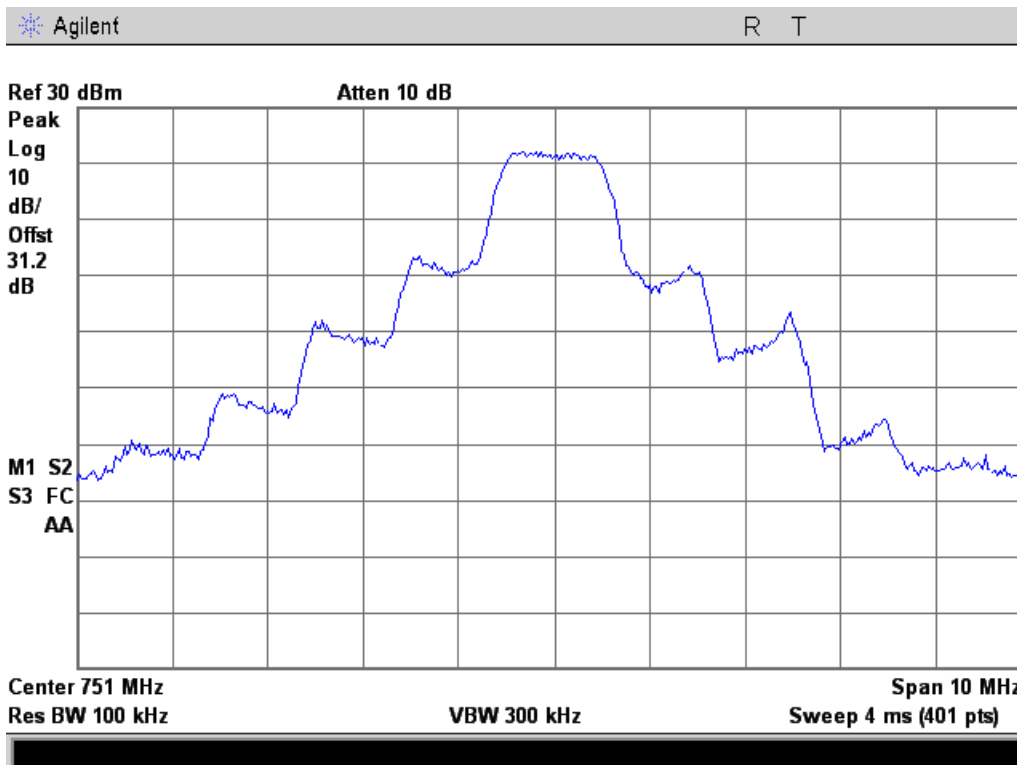


746 - 757 MHz Band

Input



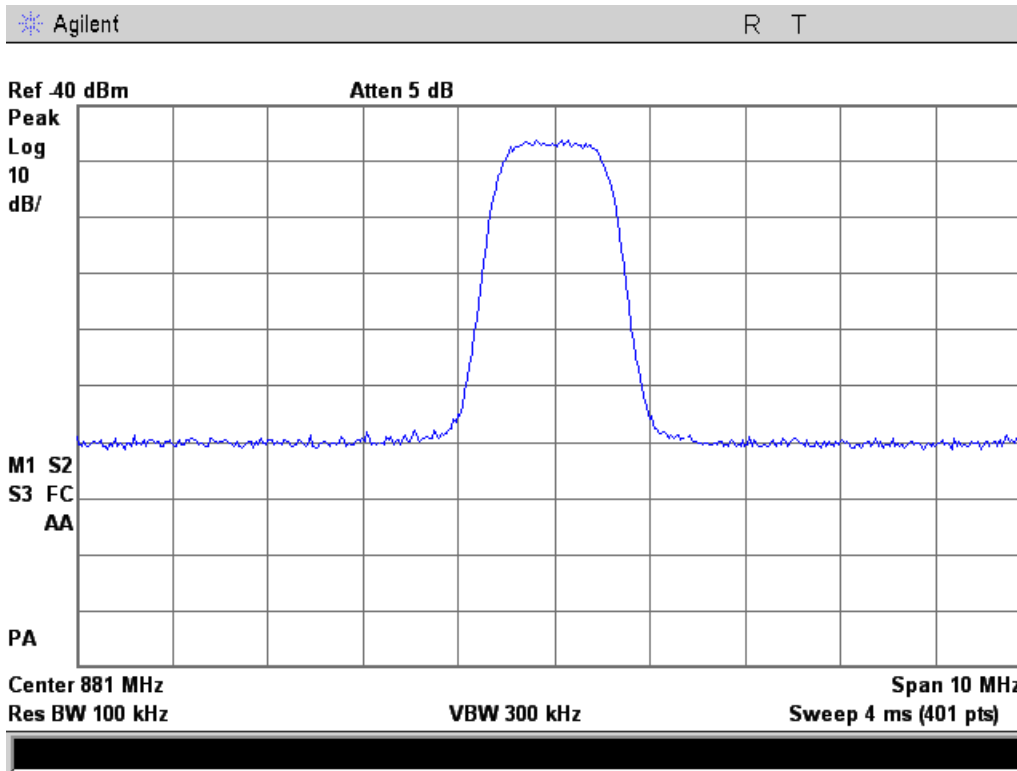
Output



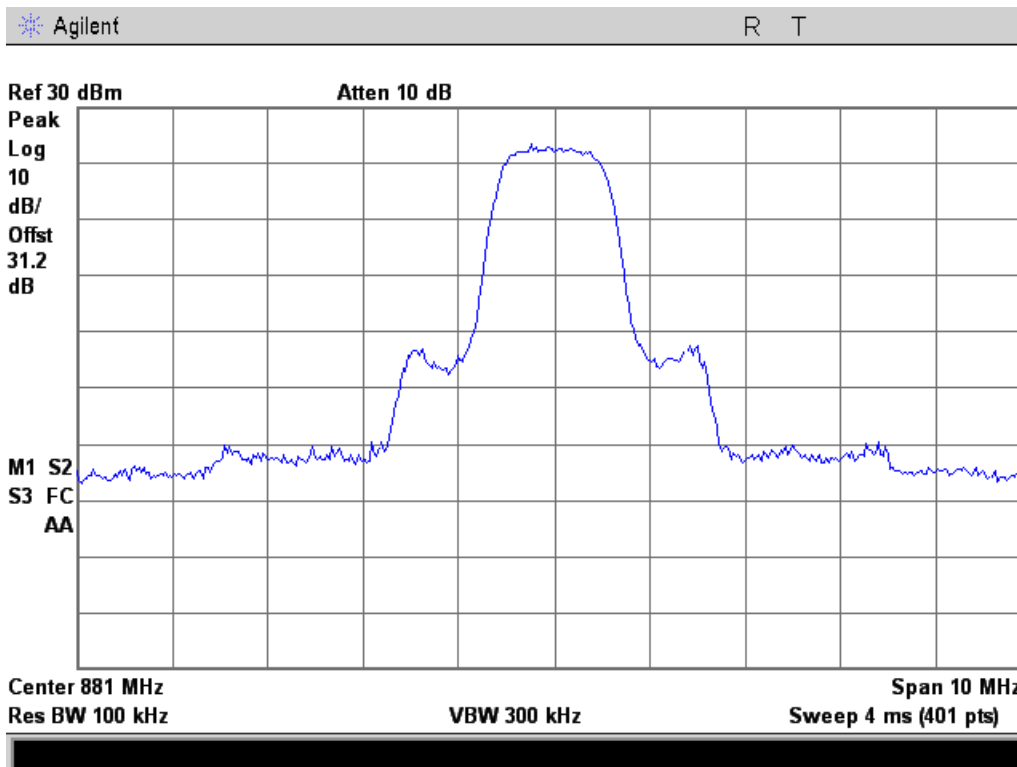


869 - 894 MHz Band

Input



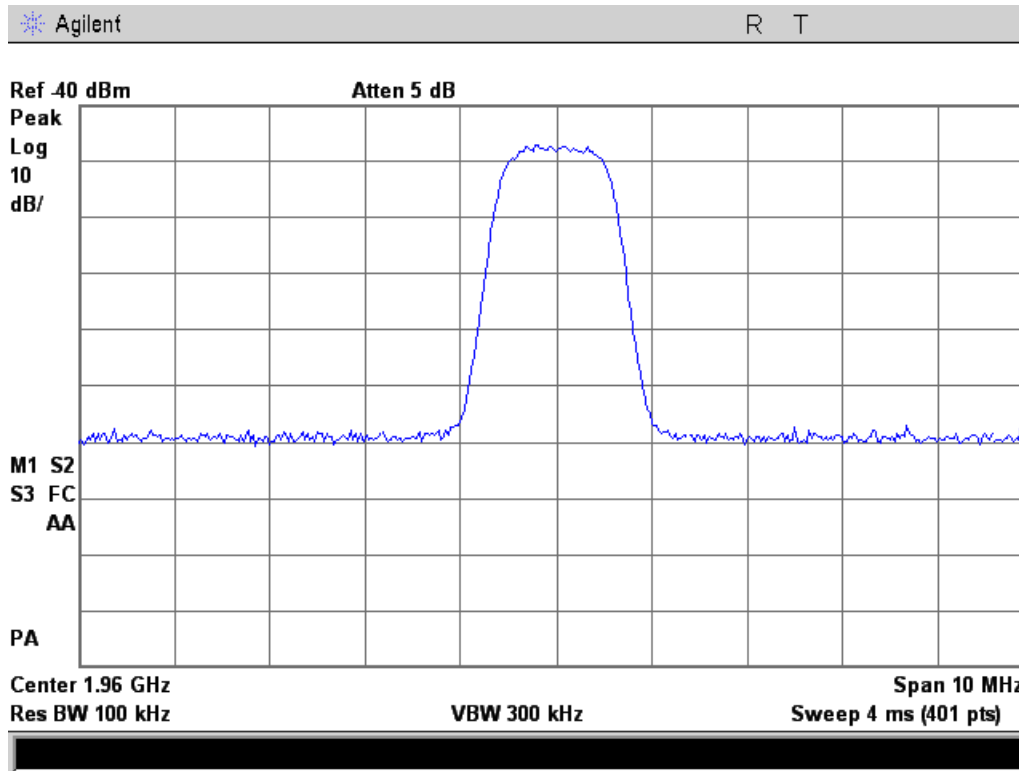
Output



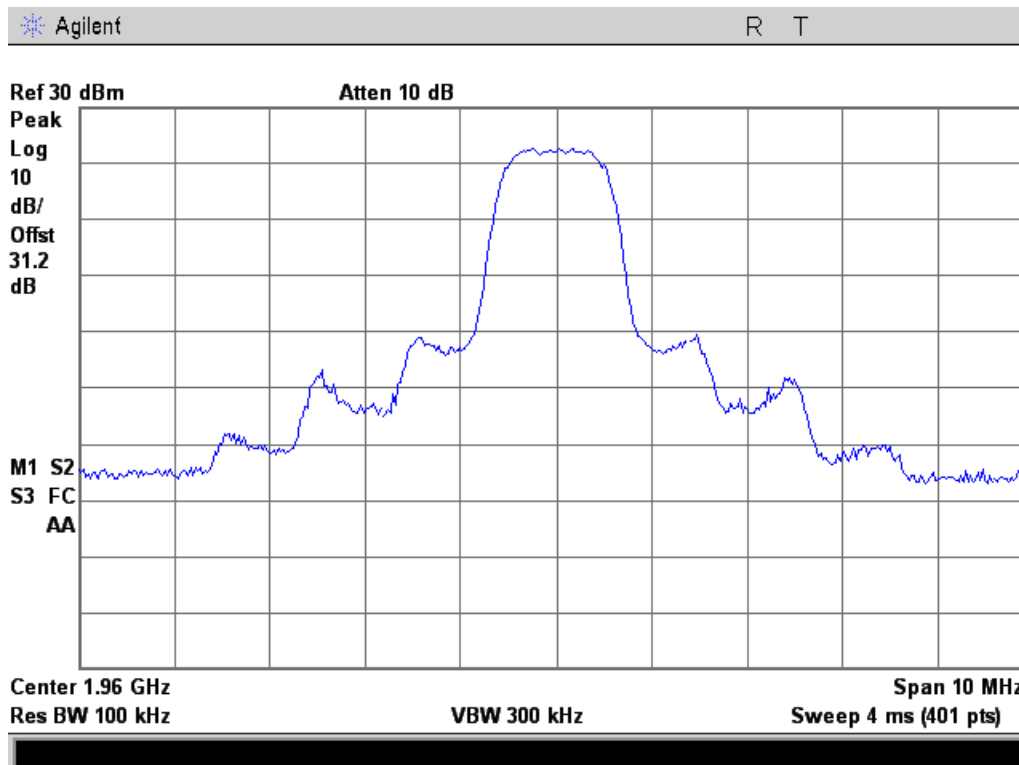


1930 - 1990 MHz Band

Input



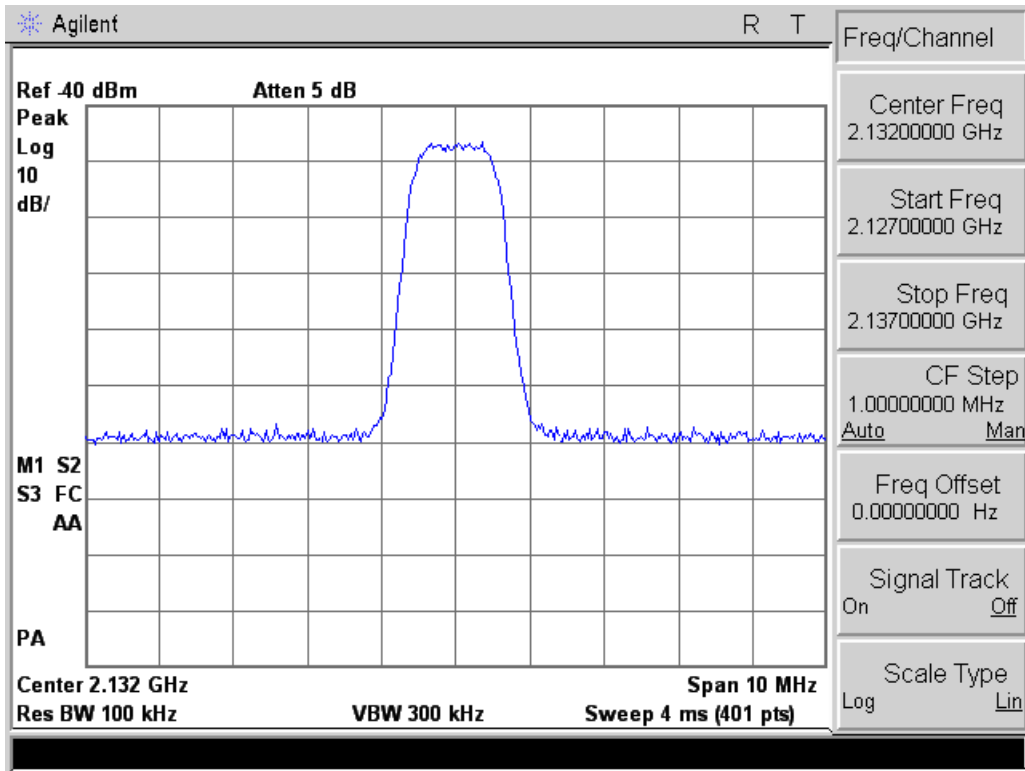
Output



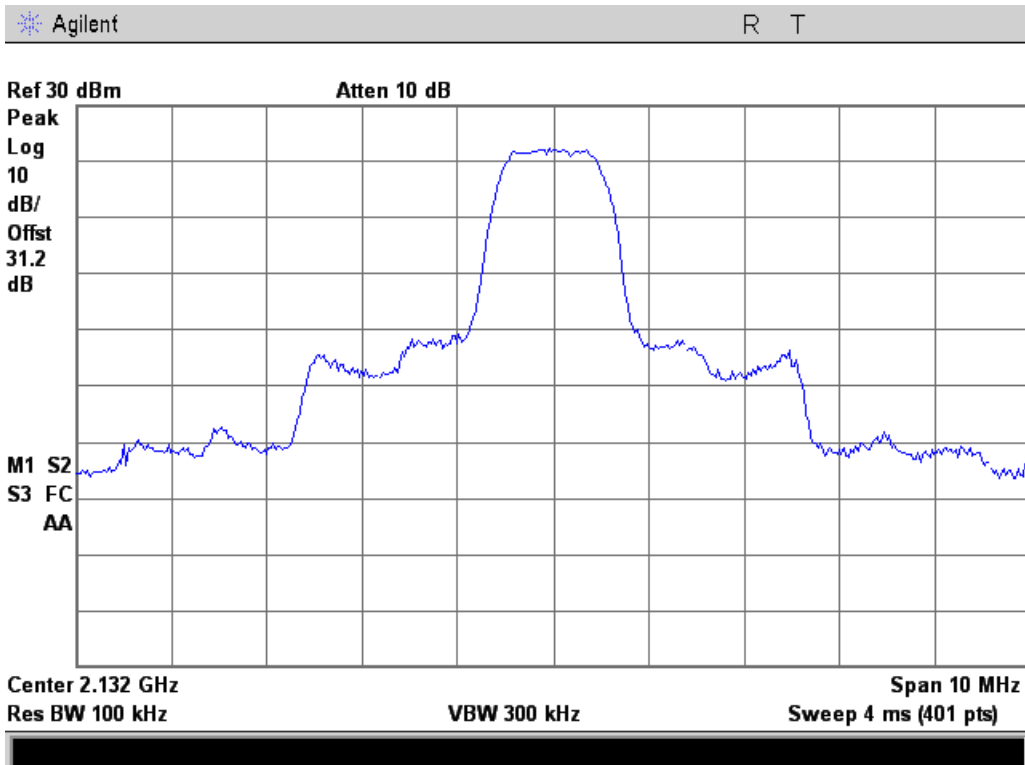


2110 - 2155 MHz Band

Input



Output

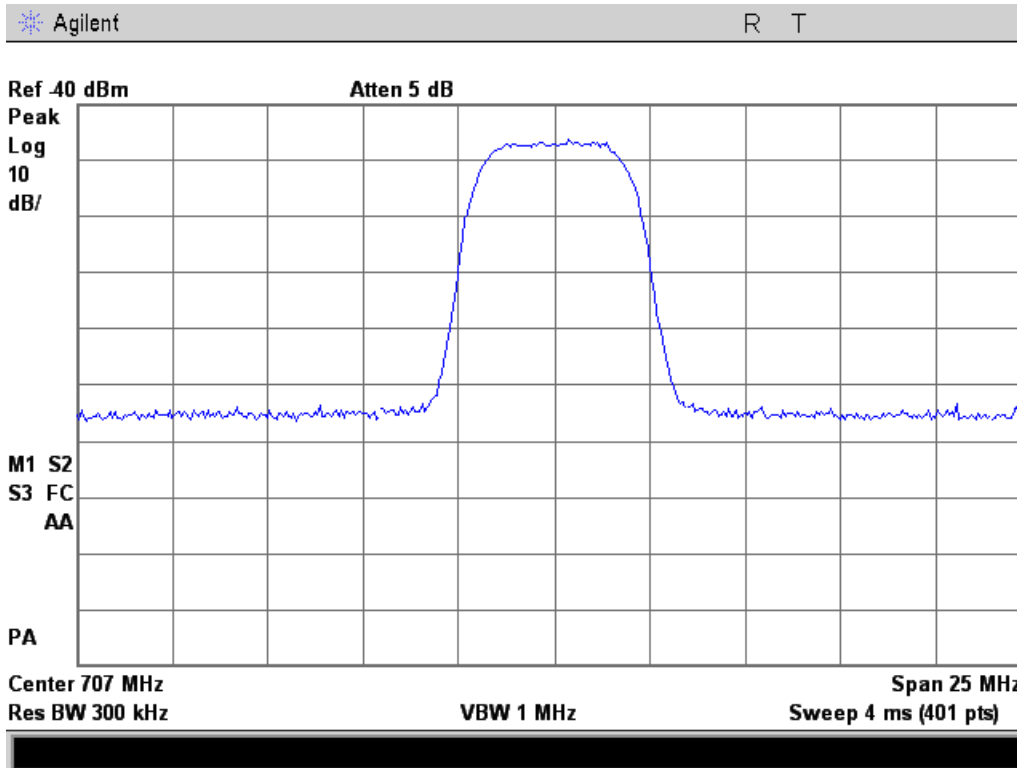




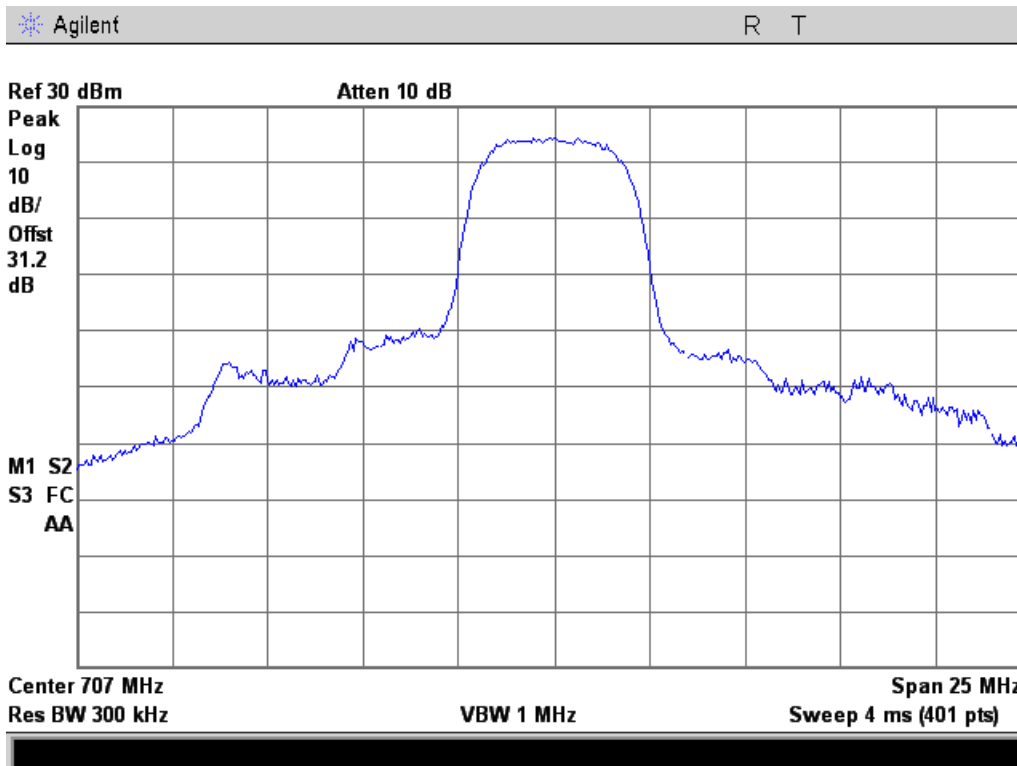
WCDMA Uplink Test Plots

698 - 716 MHz Band

Input



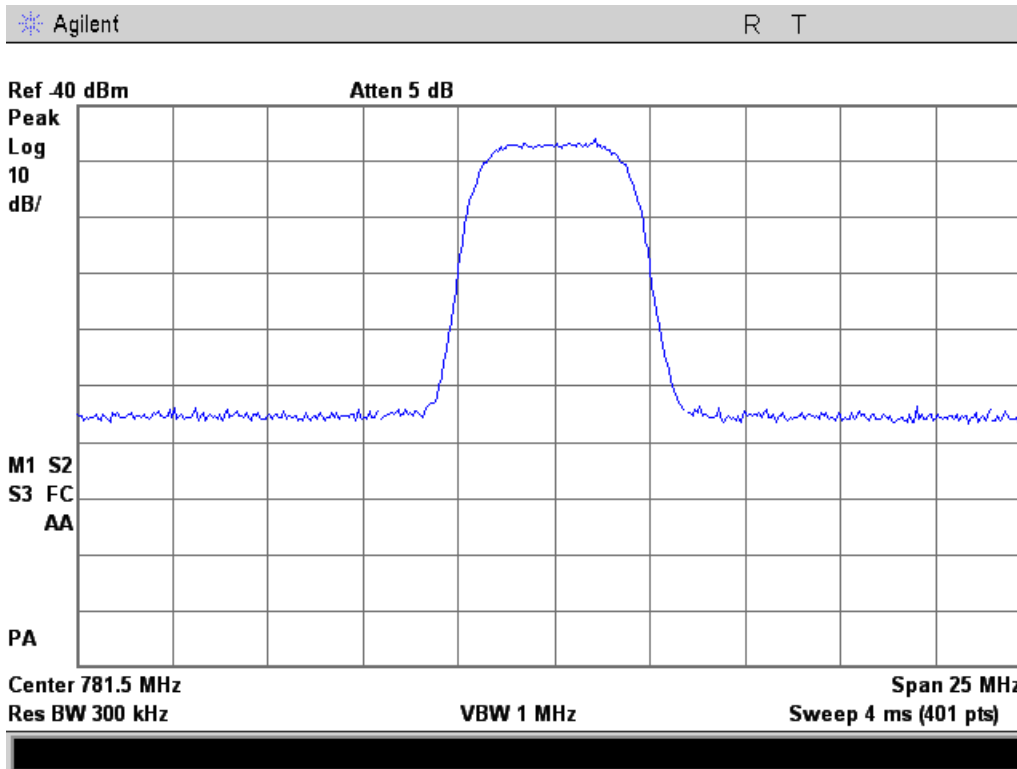
Output



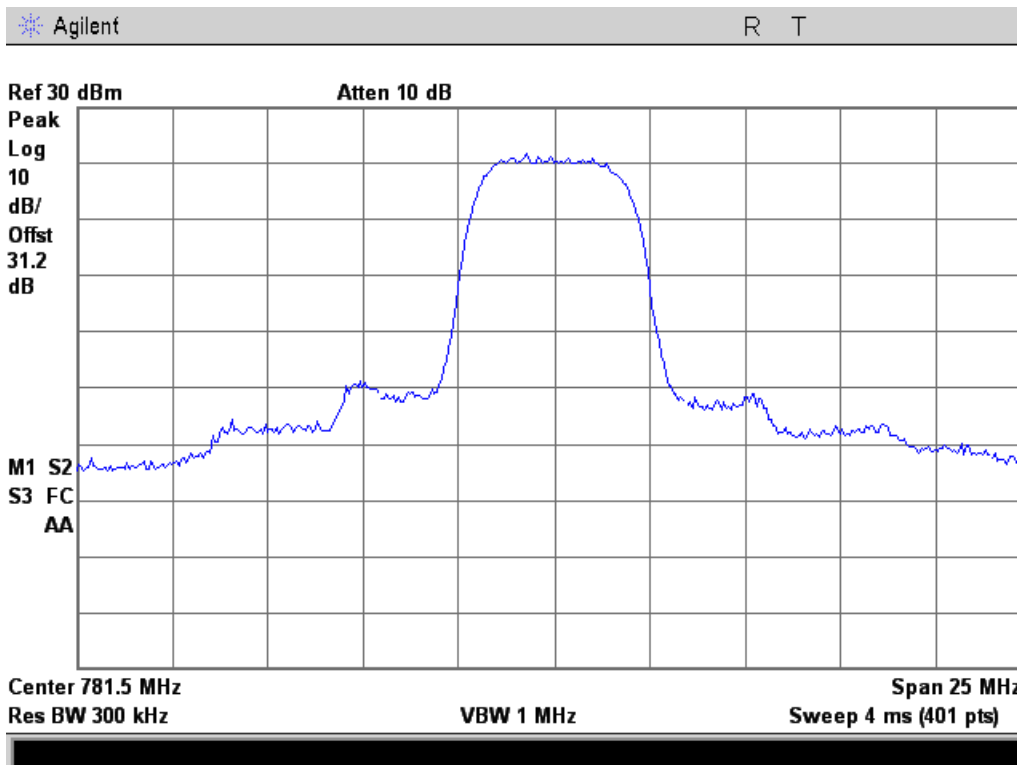


776 - 787 MHz Band

Input



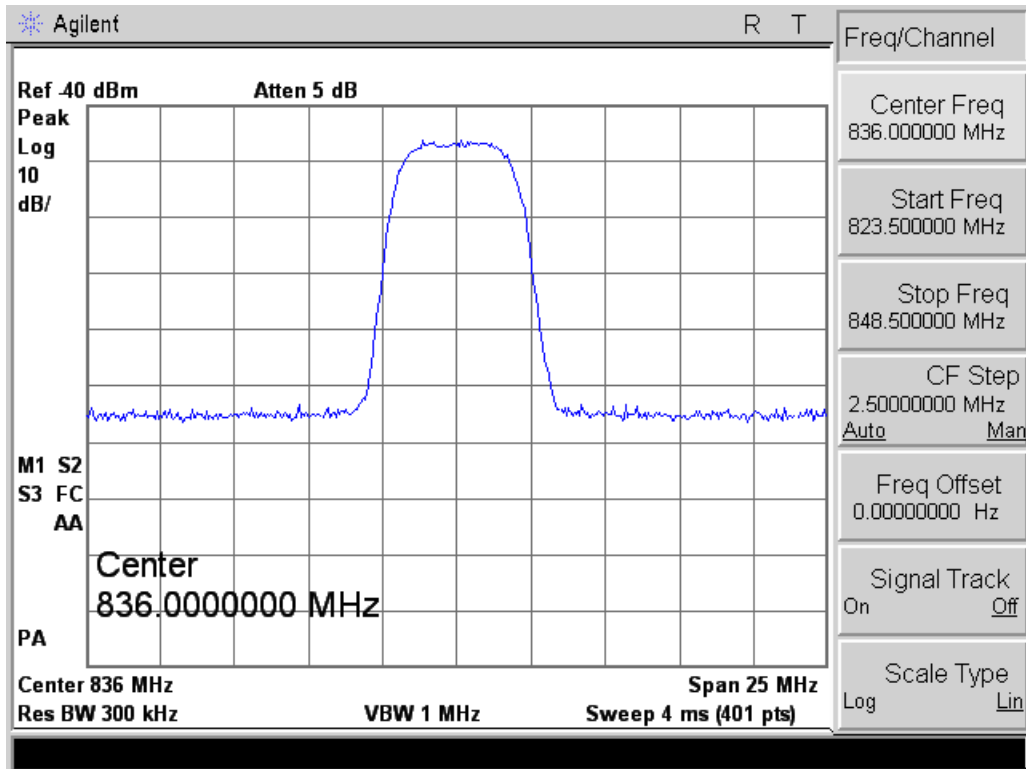
Output



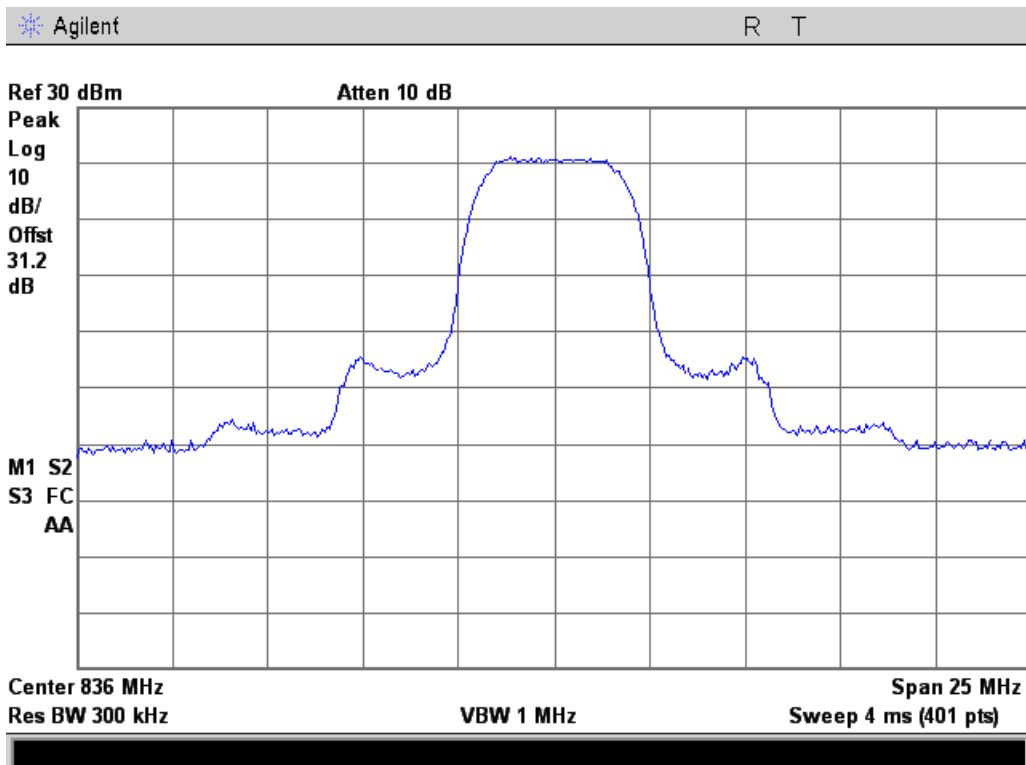


824 - 849 MHz Band

Input



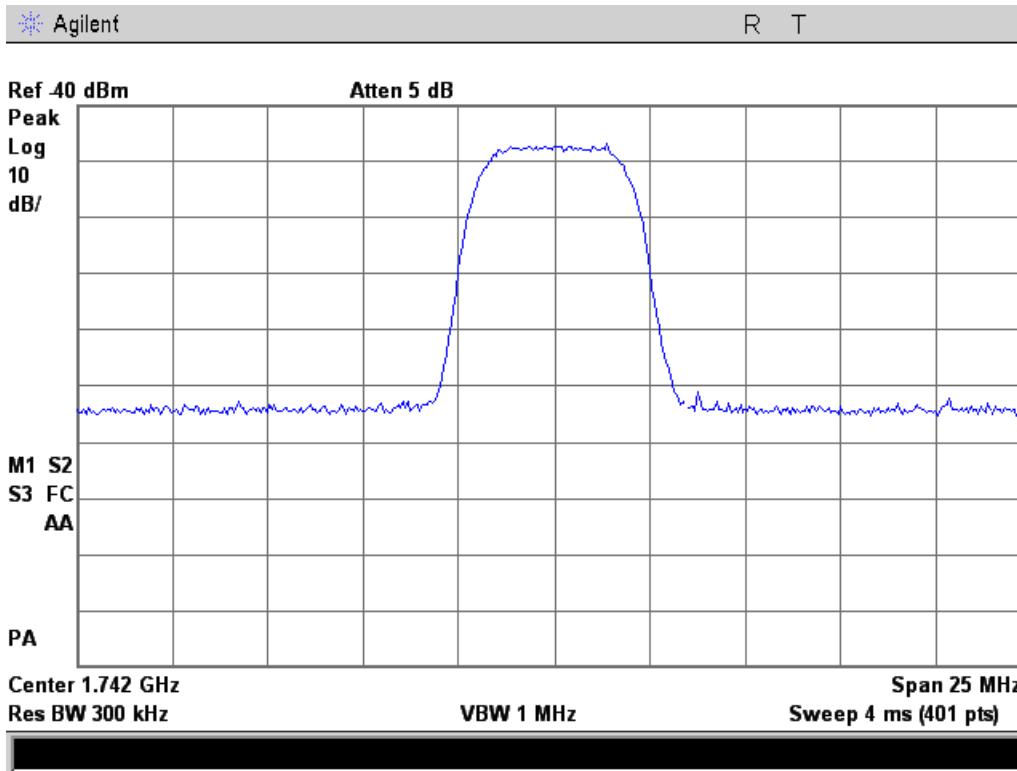
Output



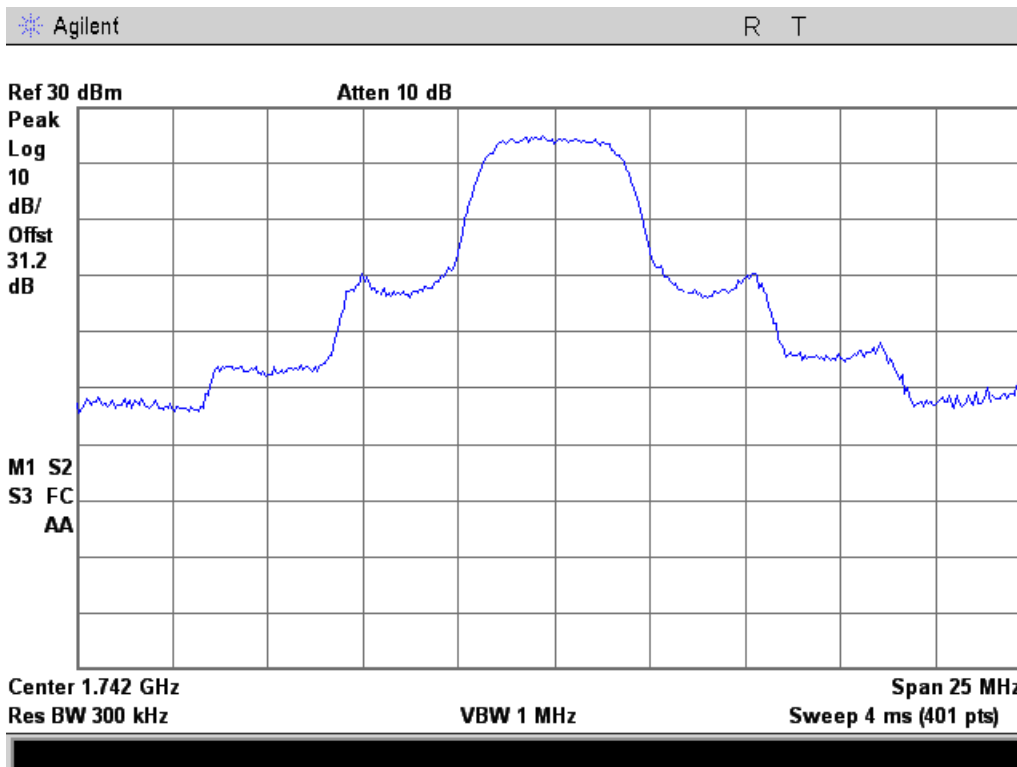


1710 - 1755 MHz Band

Input



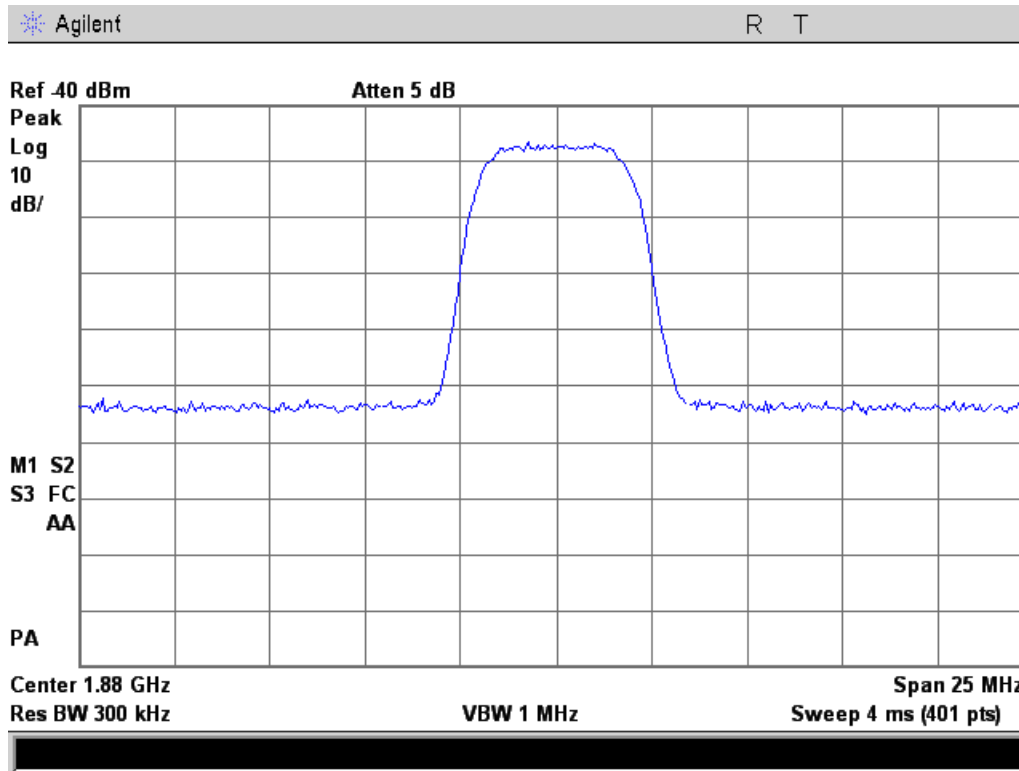
Output



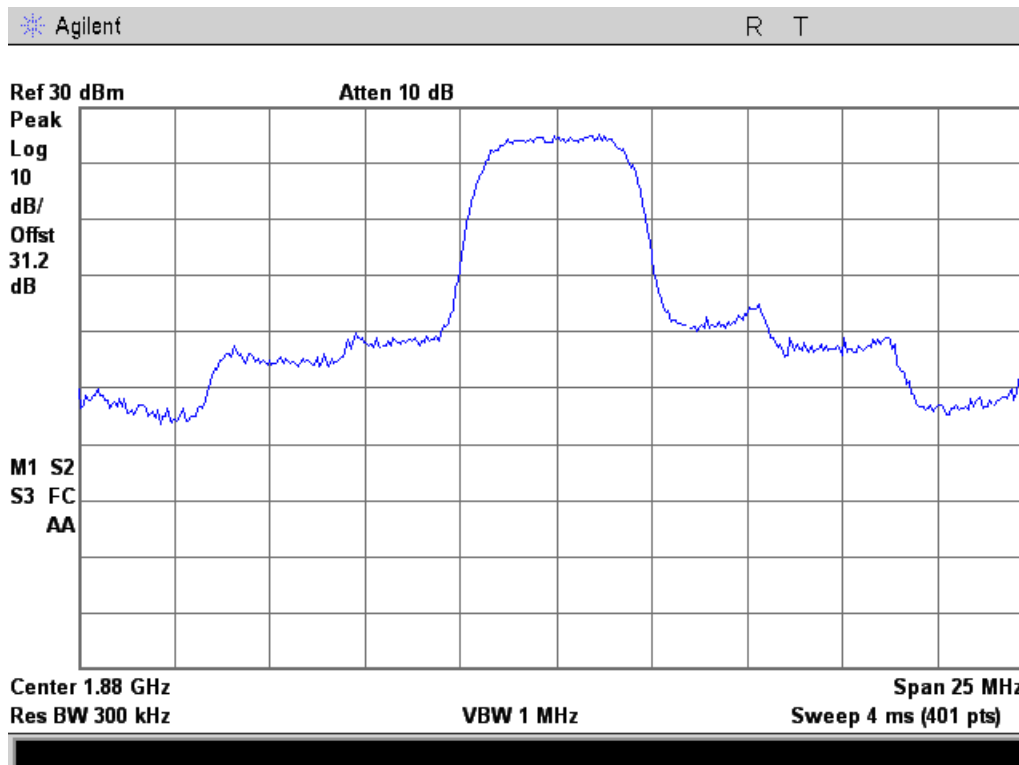


1850 - 1910 MHz Band

Input



Output

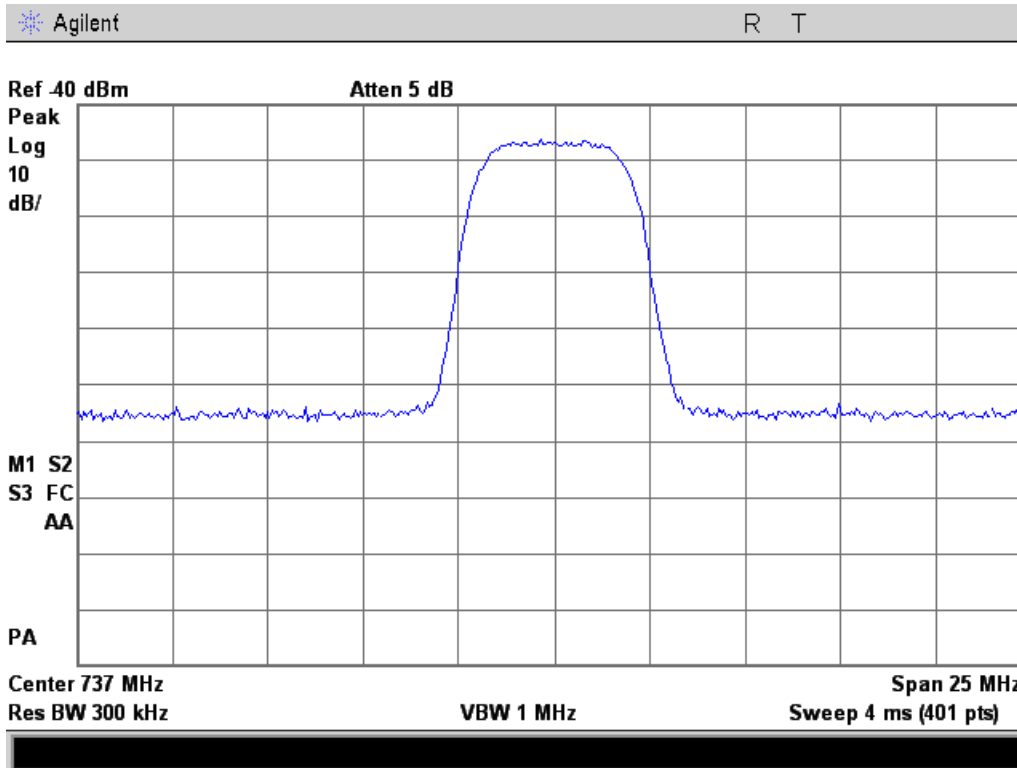




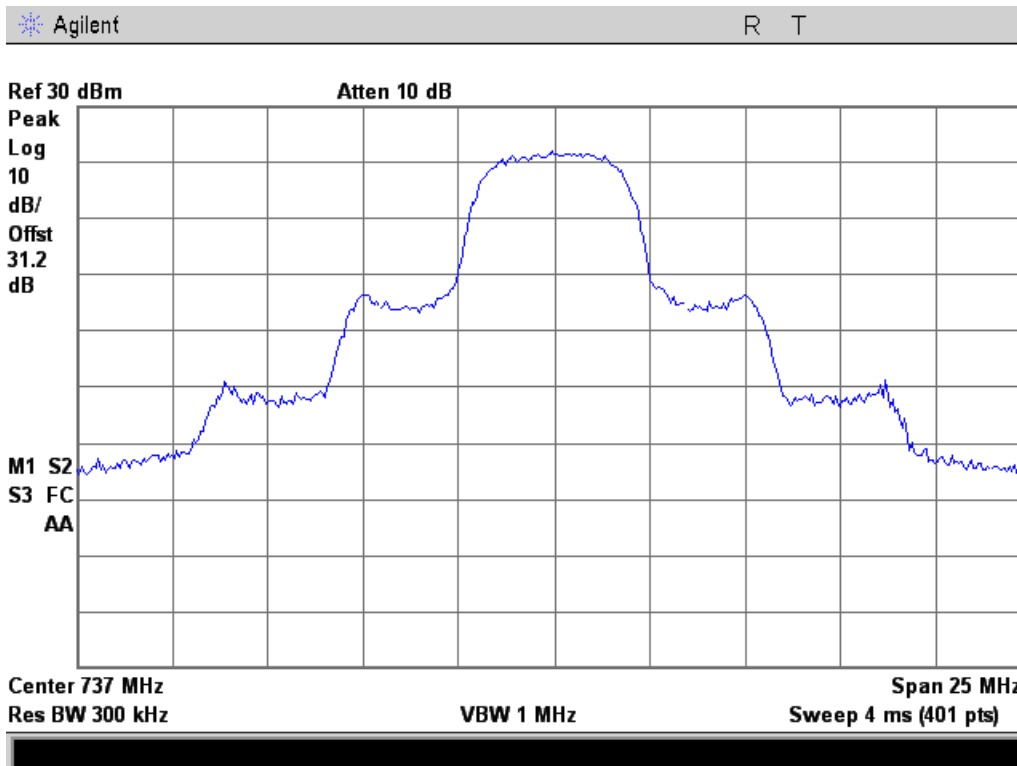
WCDMA Downlink Test Plots

728 - 746 MHz Band

Input



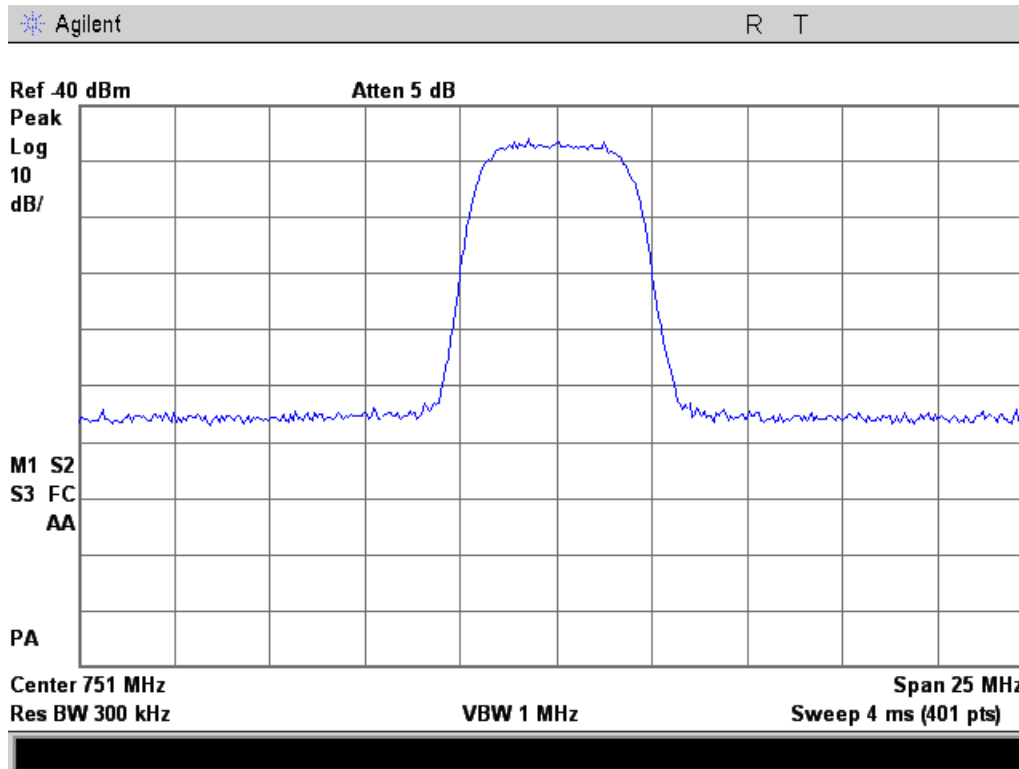
Output



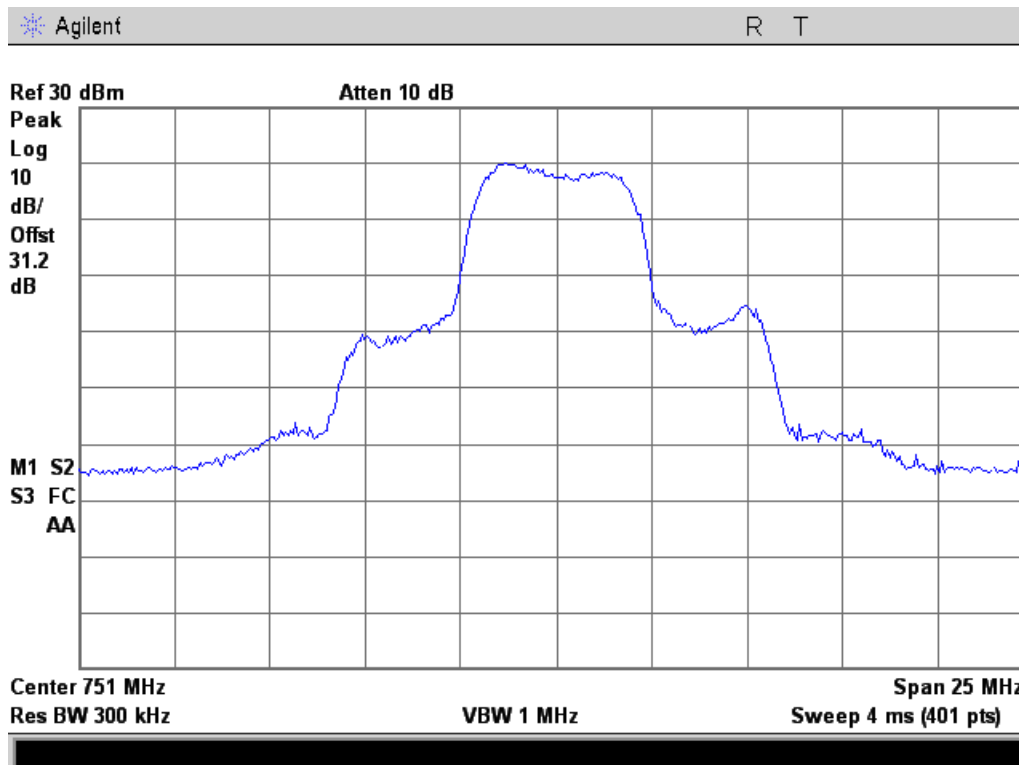


746 - 757 MHz Band

Input



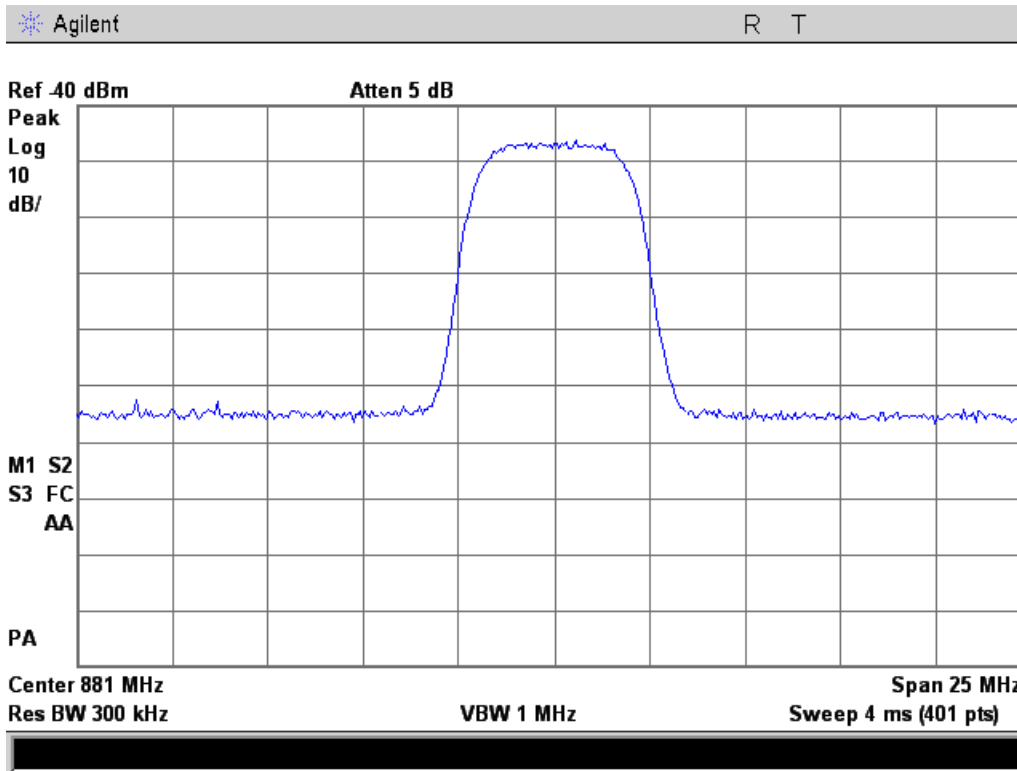
Output



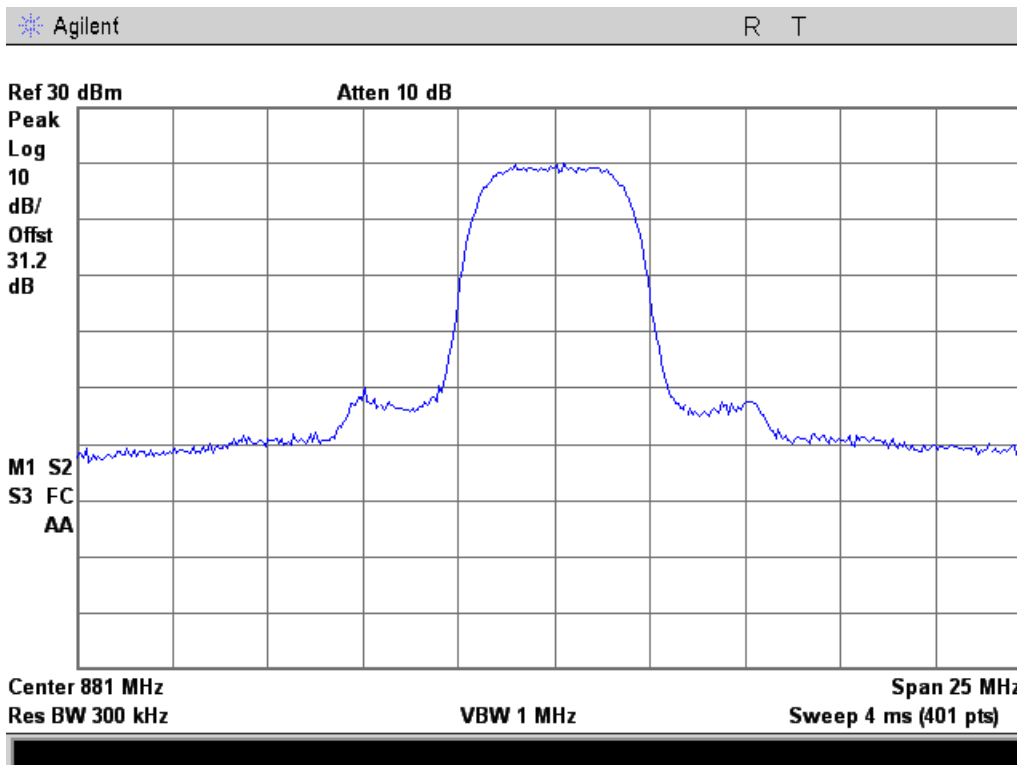


869 - 894 MHz Band

Input



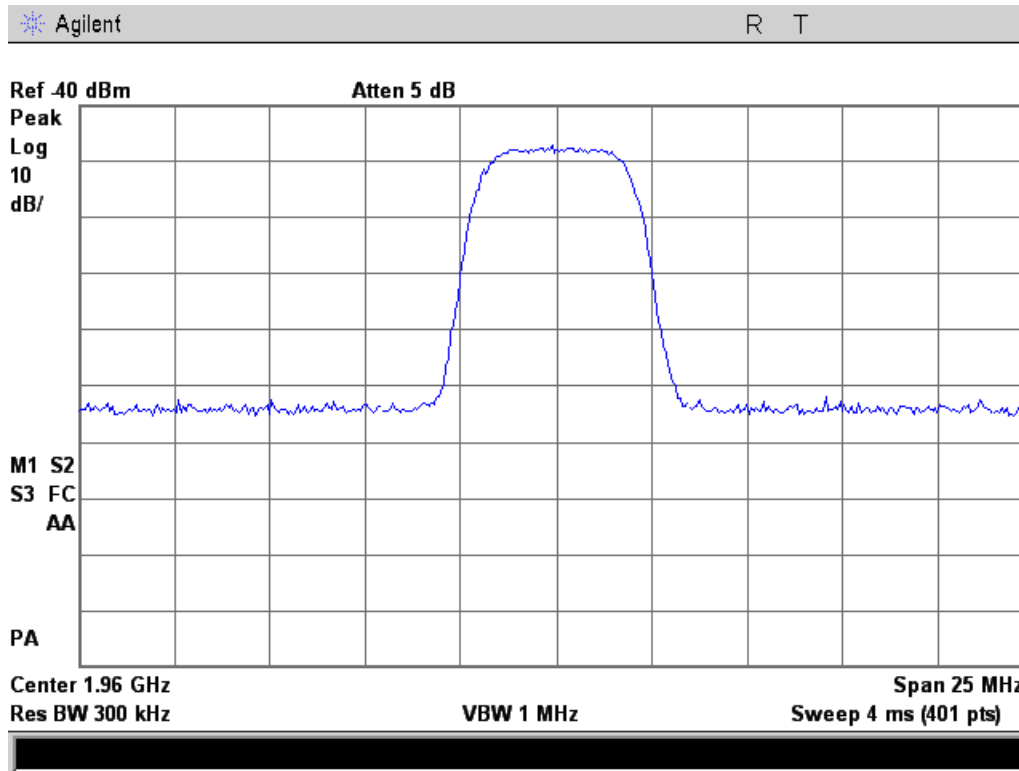
Output



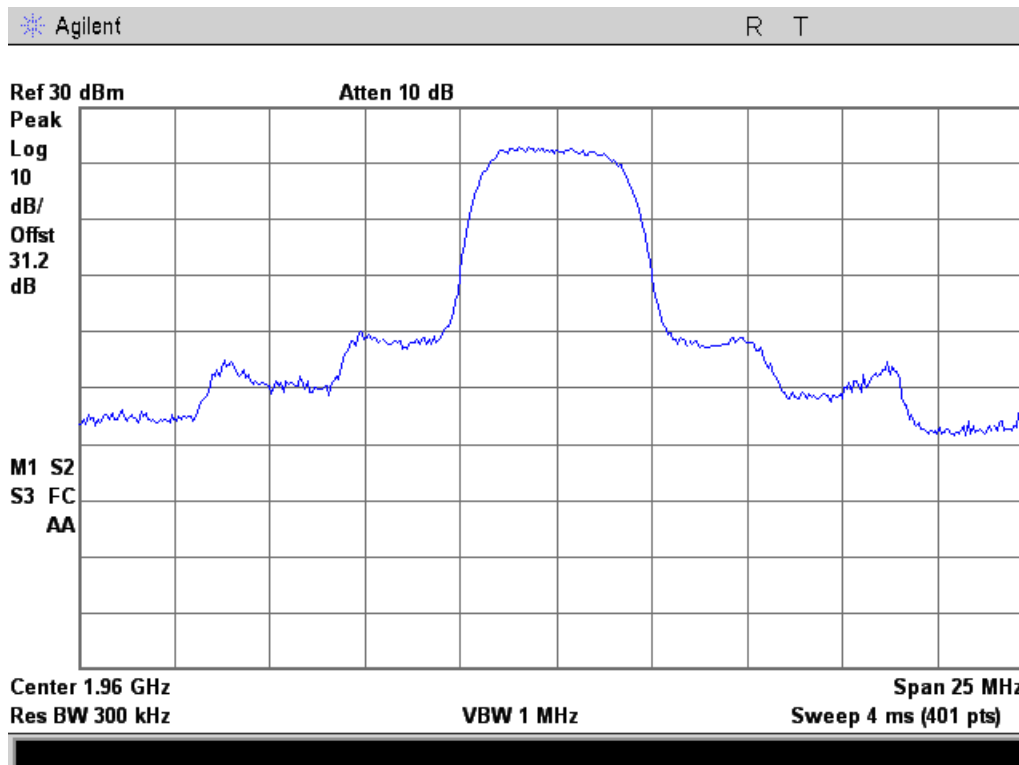


1930 - 1990 MHz Band

Input



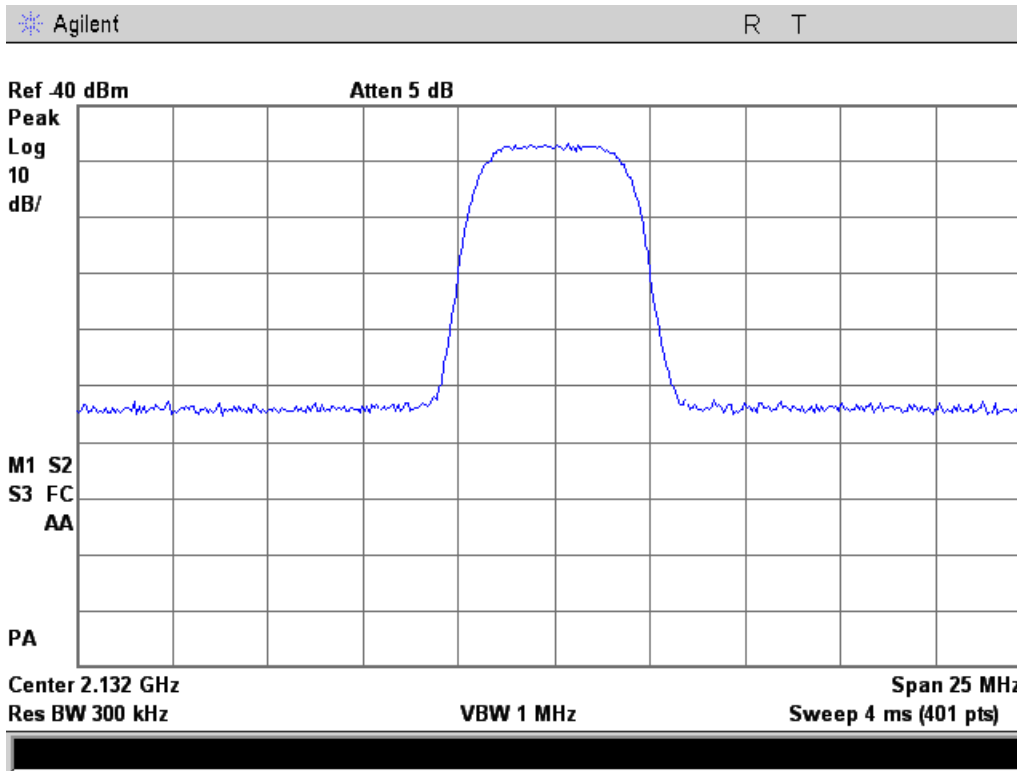
Output



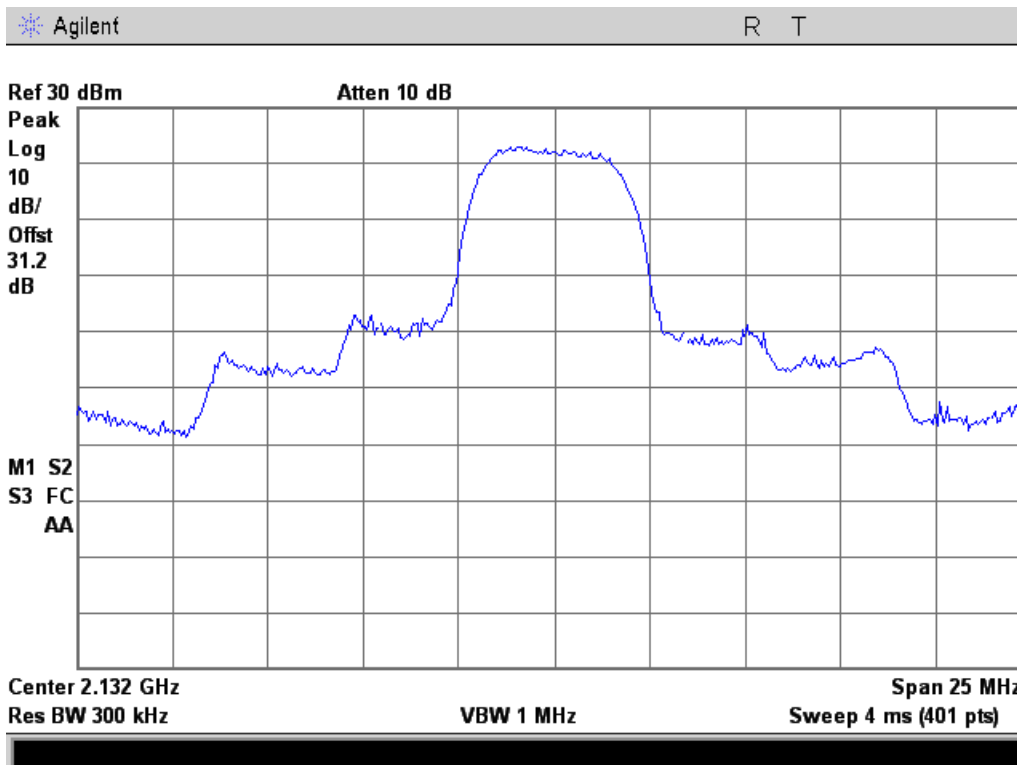


2110 - 2155 MHz Band

Input



Output





Out of Band Rejection

Name of Test: Out of Band Rejection

Engineer: John Erhard

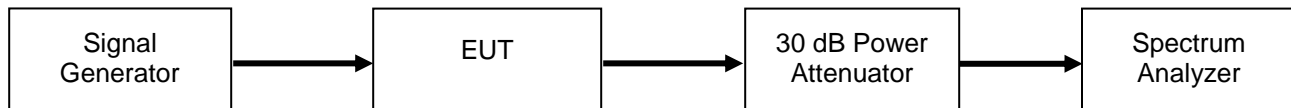
Test Equipment Utilized: i00266, i00331, i00348, i00347

Test Date: 7/19/2012

Test Procedure

The EUT was connected to a spectrum analyzer through a 30 dB power attenuator. A signal generator was utilized to produce a swept CW signal with the RF input level set to the level determined by the intermodulation testing requirements. The uplink and downlink filter response and bandwidth were measured. The marker table function of the spectrum analyzer was used to show the band edges and the 20 dB bandwidth of the pass band filter.

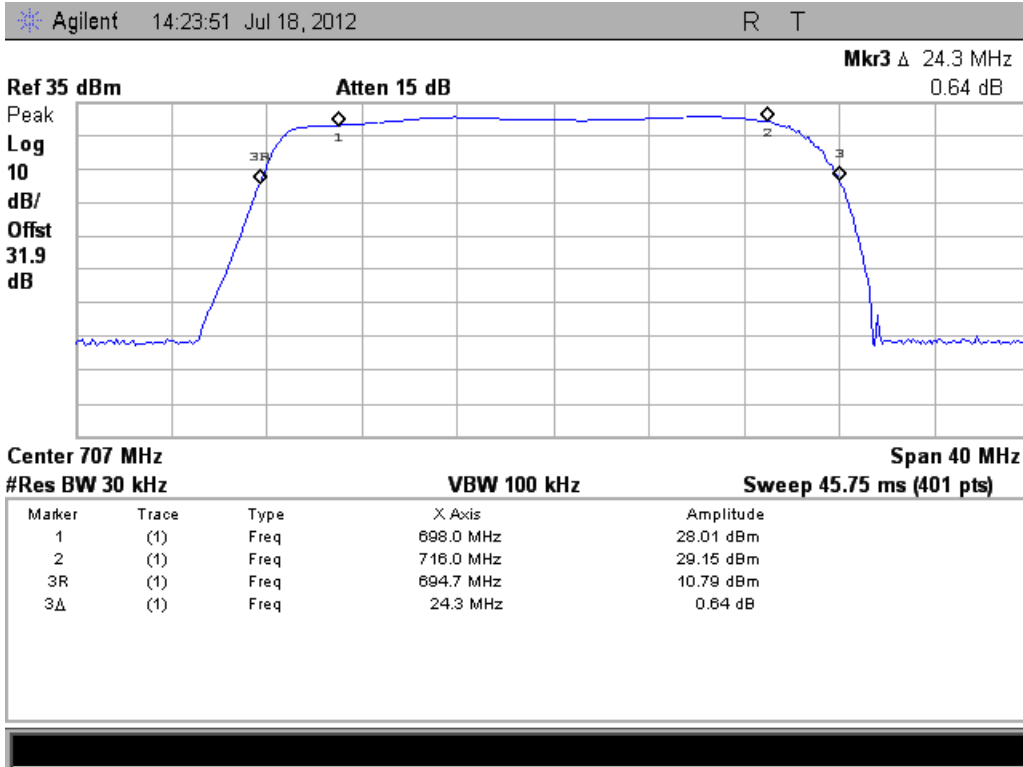
Test Setup



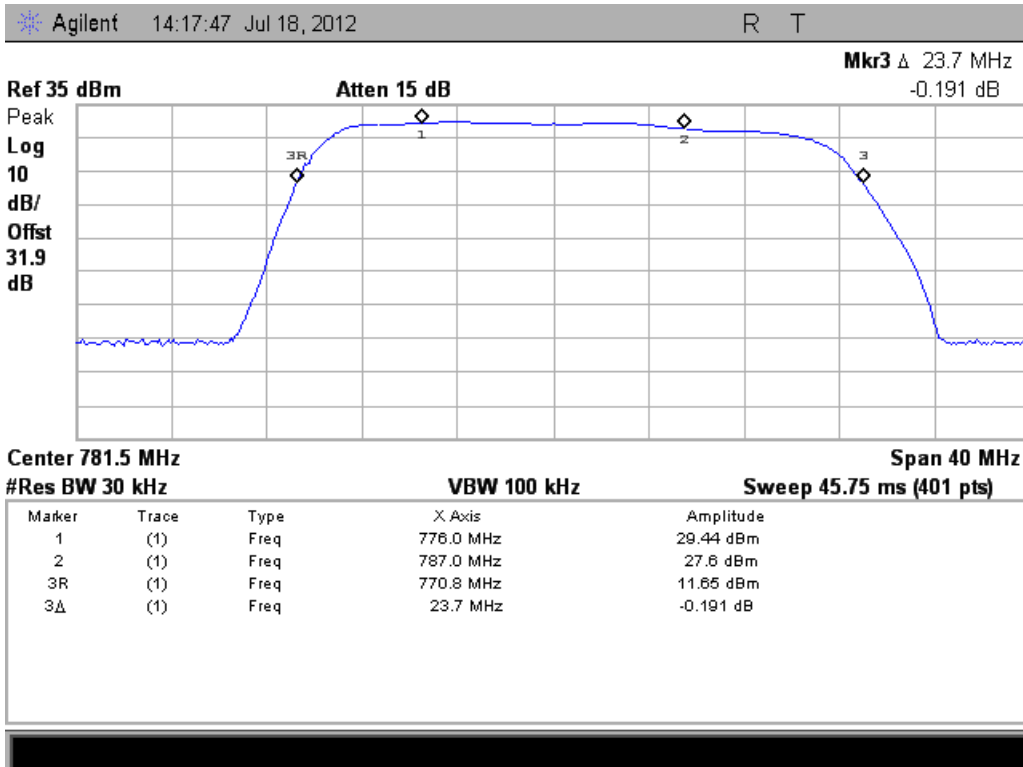


Uplink Test Plots

698 - 716 MHz Band

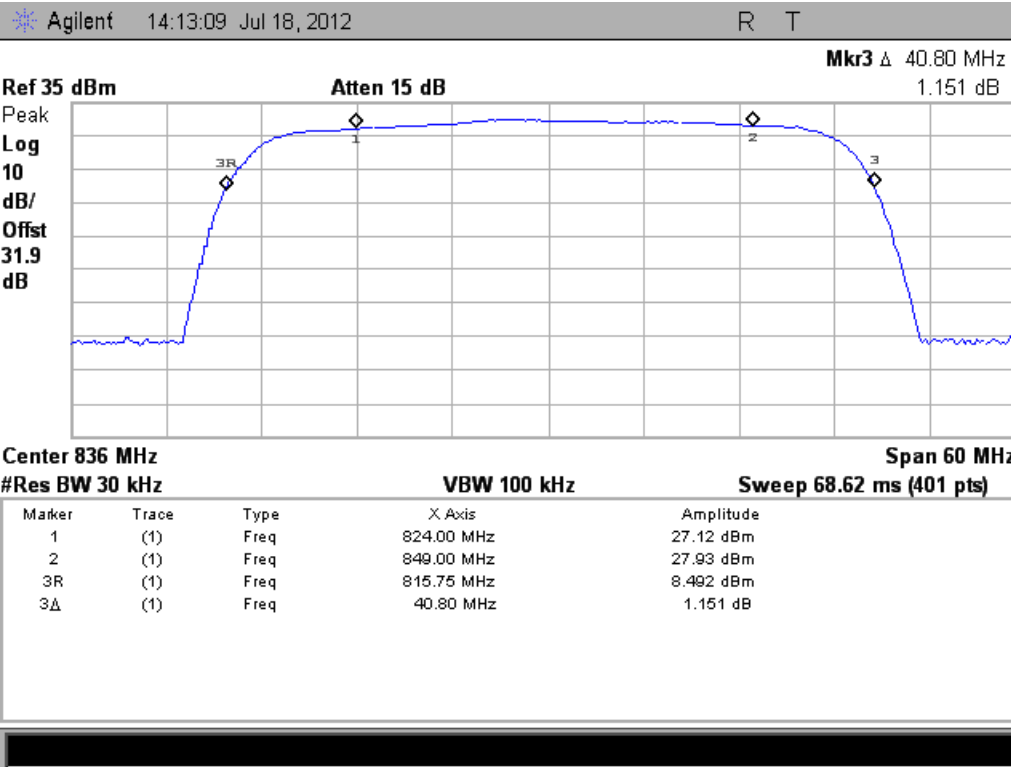


776 - 787 MHz Band

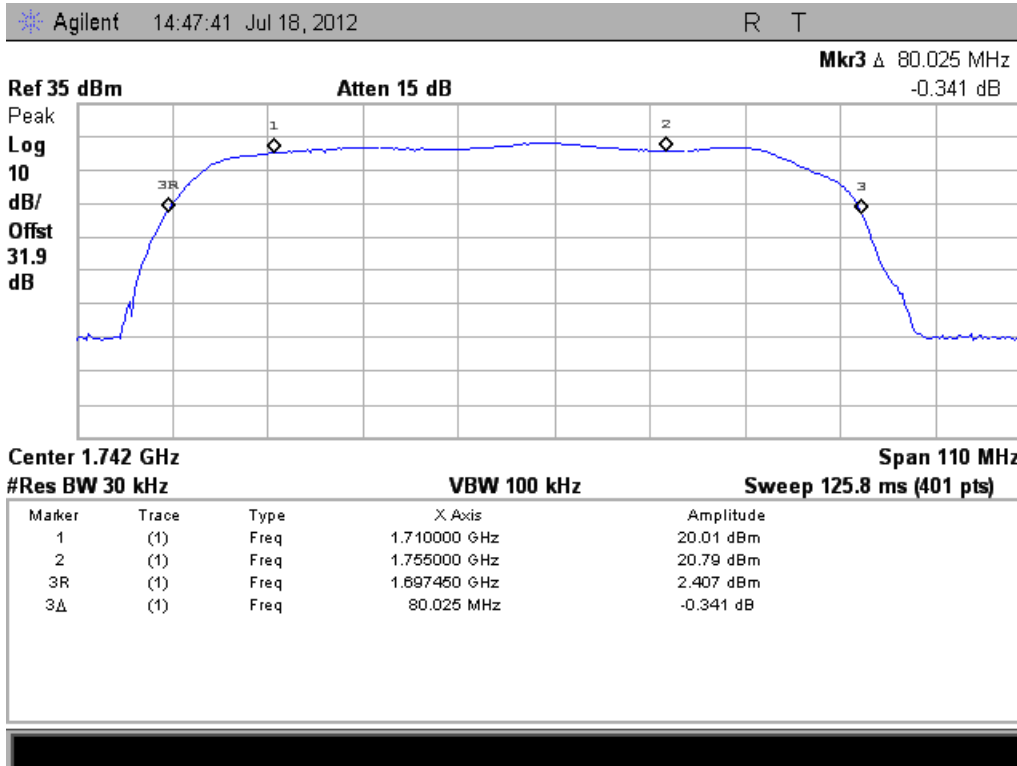




824 - 849 MHz Band

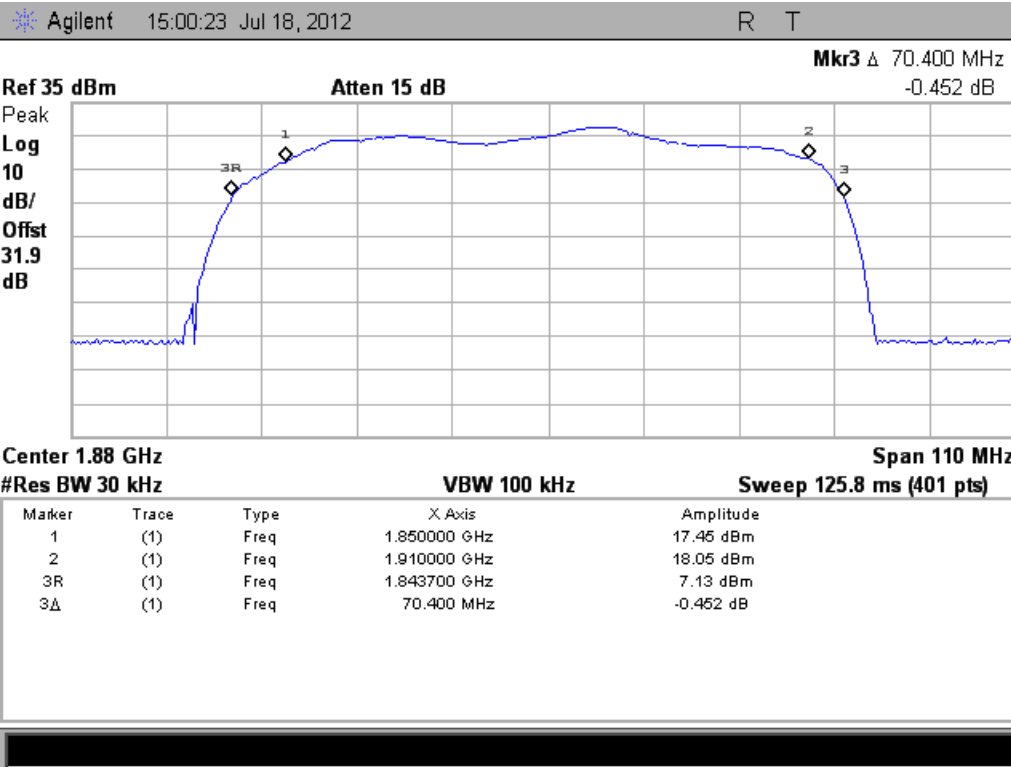


1710 - 1755 MHz Band



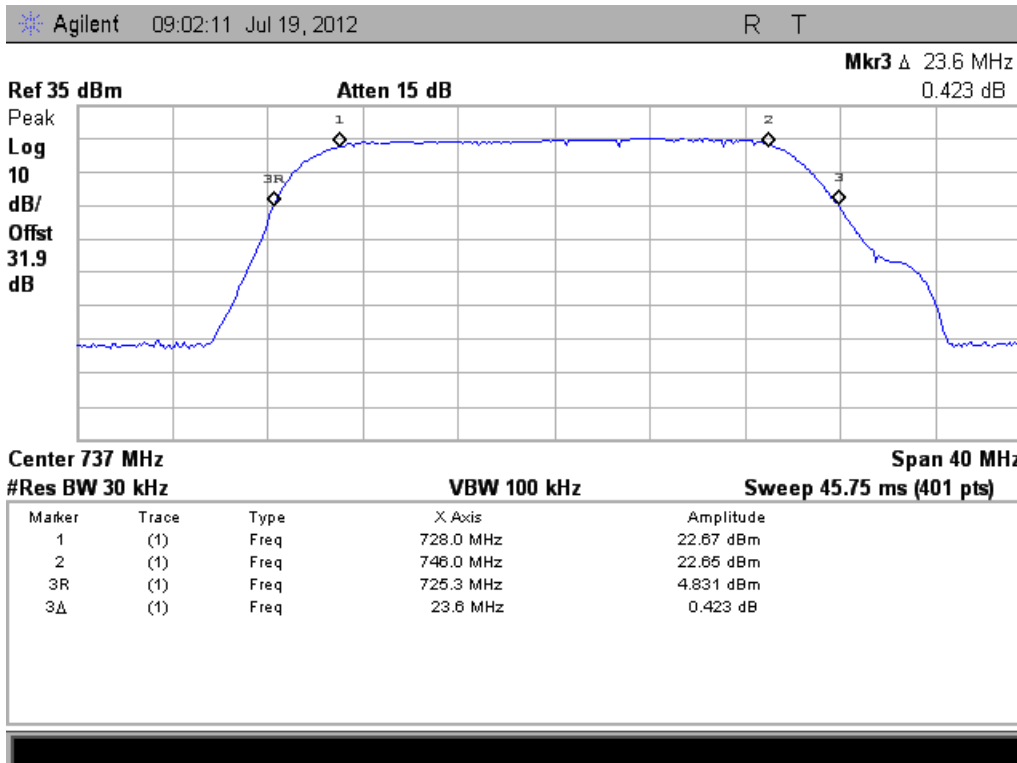


1850 - 1910 MHz Band



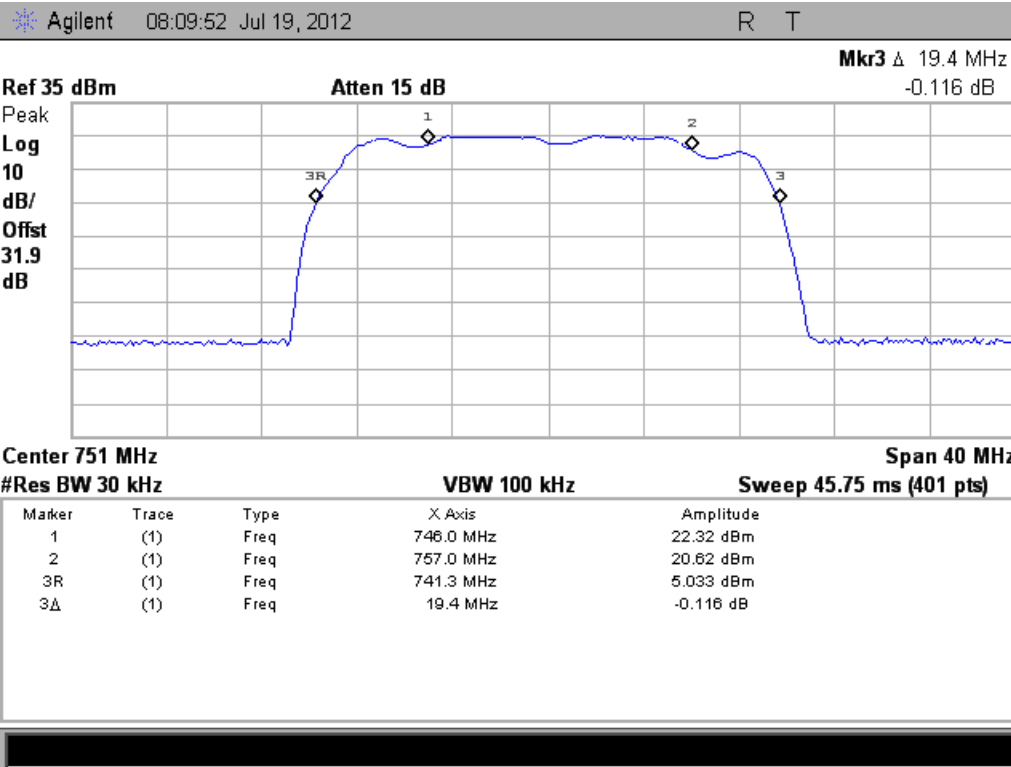
Downlink Test Plots

728 - 746 MHz Band

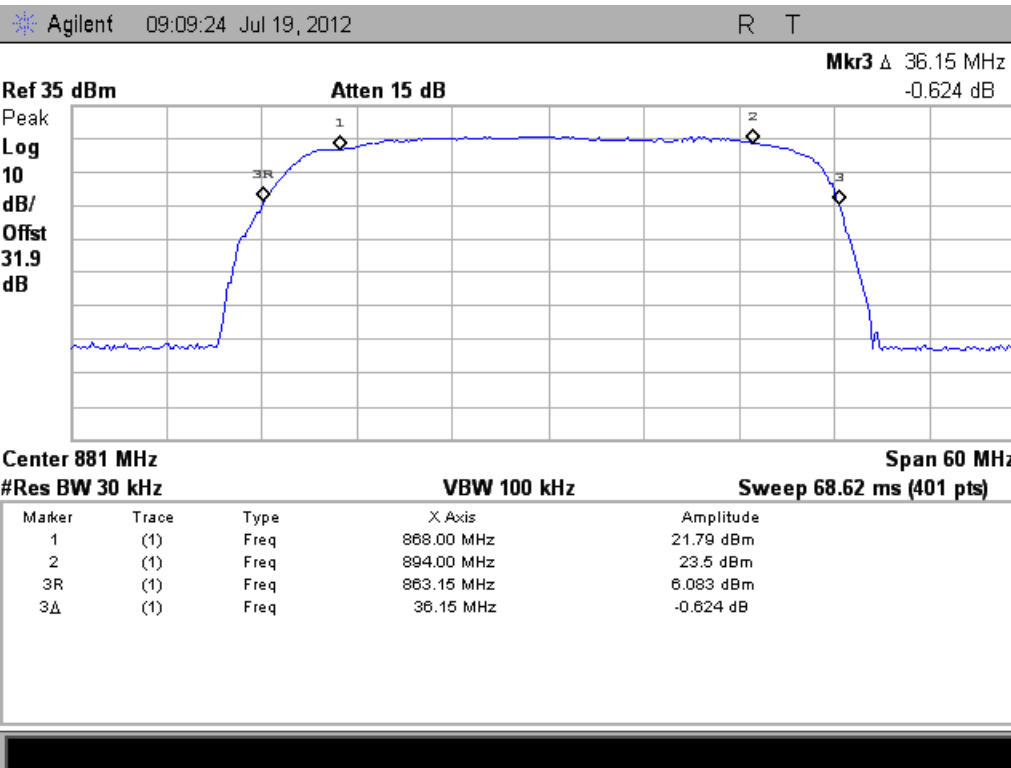




746 - 757 MHz Band

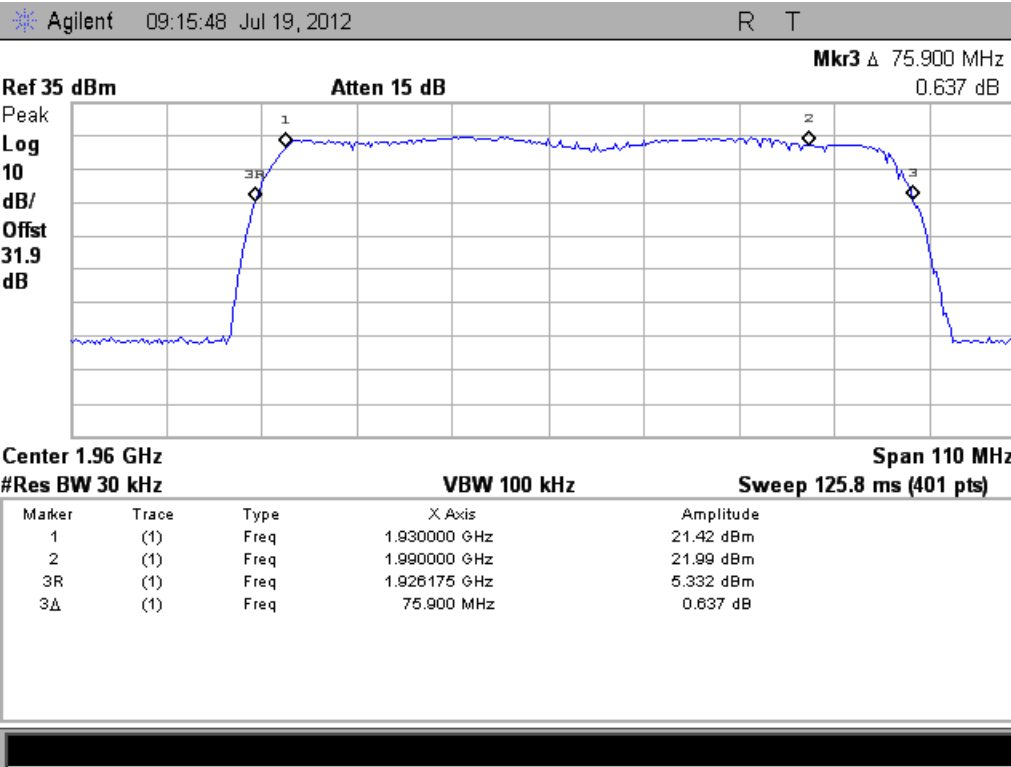


869 - 894 MHz Band

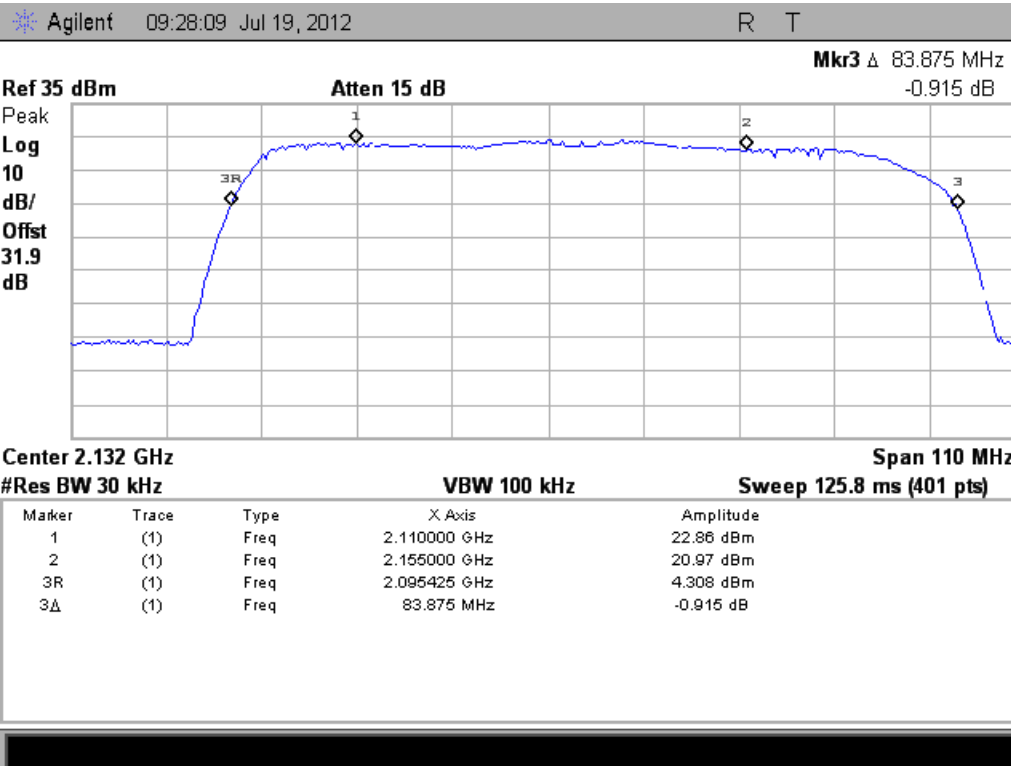




1930 - 1990 MHz Band



2110 - 2155 MHz Band





Test Equipment Utilized

Description	Manufacturer	Model Number	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	EMCO	3115	i00103	11/5/10	11/5/12
Signal Generator	Rohde & Schwarz	SMT-03	i00266	12/13/11	12/13/12
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	11/5/11	11/5/12
Spectrum Analyzer	Agilent	E4407B	i00331	4/20/12	4/20/13
Vector Signal Generator	Agilent	E4438C	i00348	9/27/11	9/27/12
Humidity / Temp Meter	Control Company	4189CC	i00355	1/11/12	1/11/13
Power Attenuator	Narda	769-30	i00347	Verified on: 7/19/12	

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.

END OF TEST REPORT