



Test Report

Prepared for: Wilson Electronics, Inc.

Model: 460001

Description: Quint Band DT 4G

FCC ID: PWO460001

To

FCC Part 20

Date of Issue: January 14, 2014

On the behalf of the applicant:

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

To the attention of:

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

Prepared By
Compliance Testing, LLC
3356 N San Marcos Pl, Suite 107
Chandler, AZ 85225-7176
(866) 311-3268 phone / (480) 926-3598 fax
www.compliancetesting.com
Project No: p1350020

John Erhard
Project Test Engineer

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	August 3, 2013	John Erhard	Original Document
2.0	September 12, 2013	John Erhard	Correct report template items including limits or frequency bands of operation.
3.0	September 25, 2013	John Erhard	Add "DRAFT" to the KDB revision number
4.0	January 14, 2014	John Erhard	Add additional OOBE data for Part 27



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ILAC / A2LA

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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: 20.21 in conjunction with latest version of Draft KDB 935210 D03 v01.

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)
24.9 – 31.0	33.5 – 63.0	985.5 - 943.0

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

EUT Description

Model: 460001
Description: Quint Band DT 4G
Firmware: 460001RA
Software: D460001A

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	704 - 716	777 - 787	824 - 849	1850 – 1915	1710 - 1755
Downlink	734 - 746	746 - 756	869 - 894	1930 - 1995	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
20.21(e)(3)	Authorized Frequency Band	Pass	
20.21(e)(8)(i)(B) 20.21(e)(8)(i)(C) 20.21(e)(8)(i)(D)	Maximum Power and Gain	Pass	
20.21(e)(8)(i)(F)	Intermodulation	Pass	
20.21(e)(8)(i)(E)	Out-of-Band Emissions	Pass	
2.1051 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Conducted Spurious Emissions	Pass	
20.21(e)(8)(i)(A)	Noise Limits	Pass	
20.21(e)(8)(i)(I)	Uplink Inactivity	Pass	
21(e)(8)(i)(C)	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)(iii)(B)	Spectrum Block Filtering	N/A	This only applies to devices utilizing spectrum block filtering



Out of Band Rejection

Name of Test: Out of Band Rejection

Engineer: John Erhard

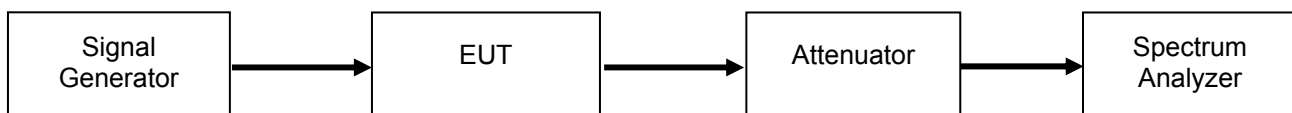
Test Equipment Utilized: i00331, i00405

Test Date: 7/3/2013

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. 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.

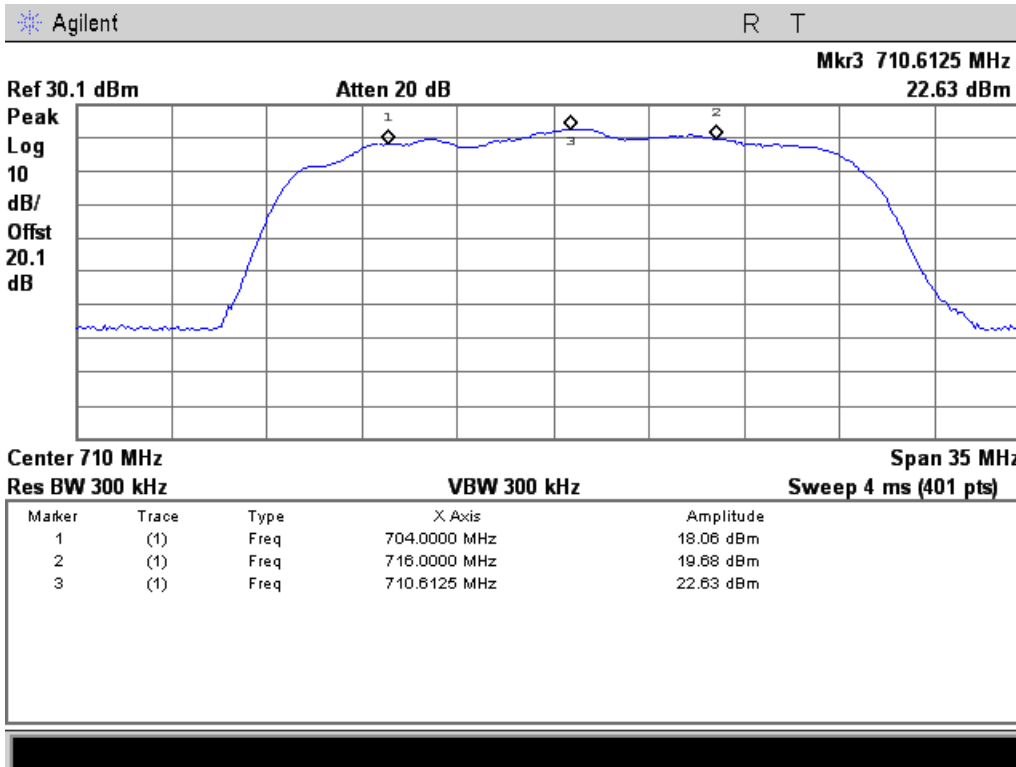
Test Setup



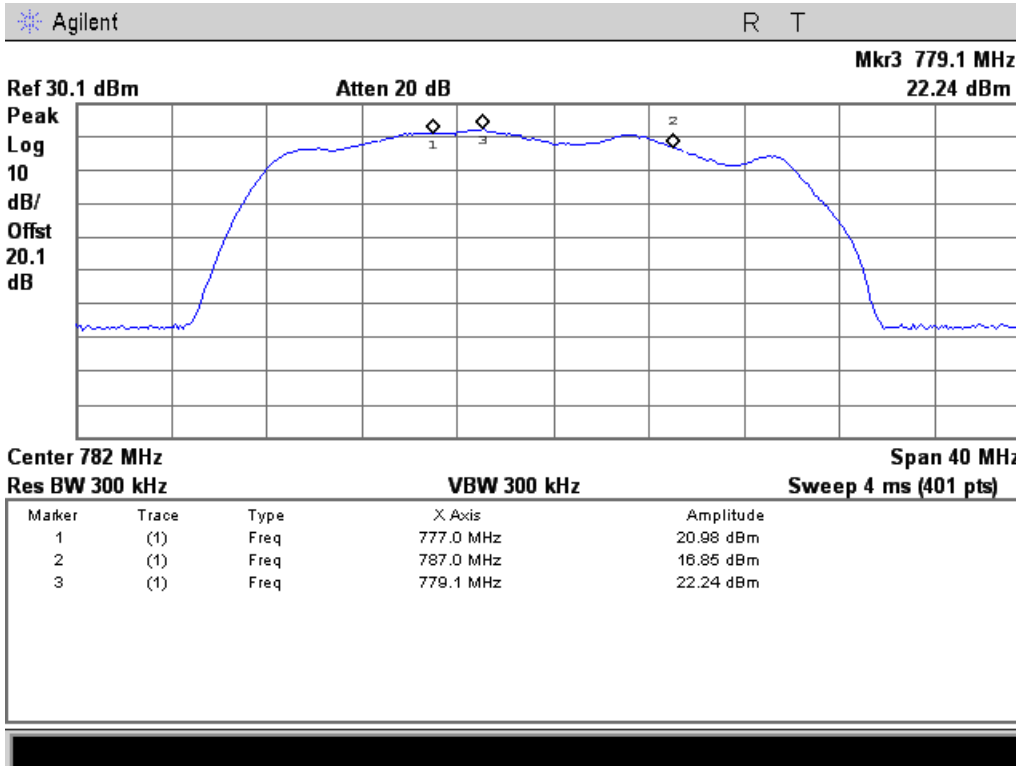


Uplink Test Results

704 - 716 MHz Band

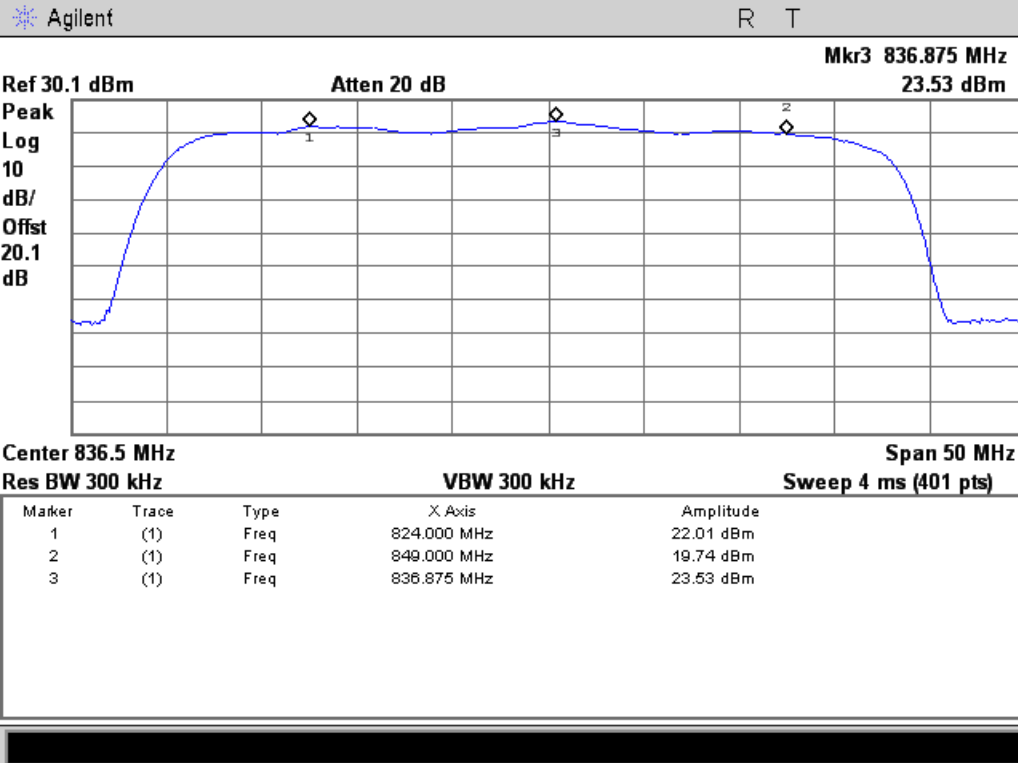


777 - 787 MHz Band

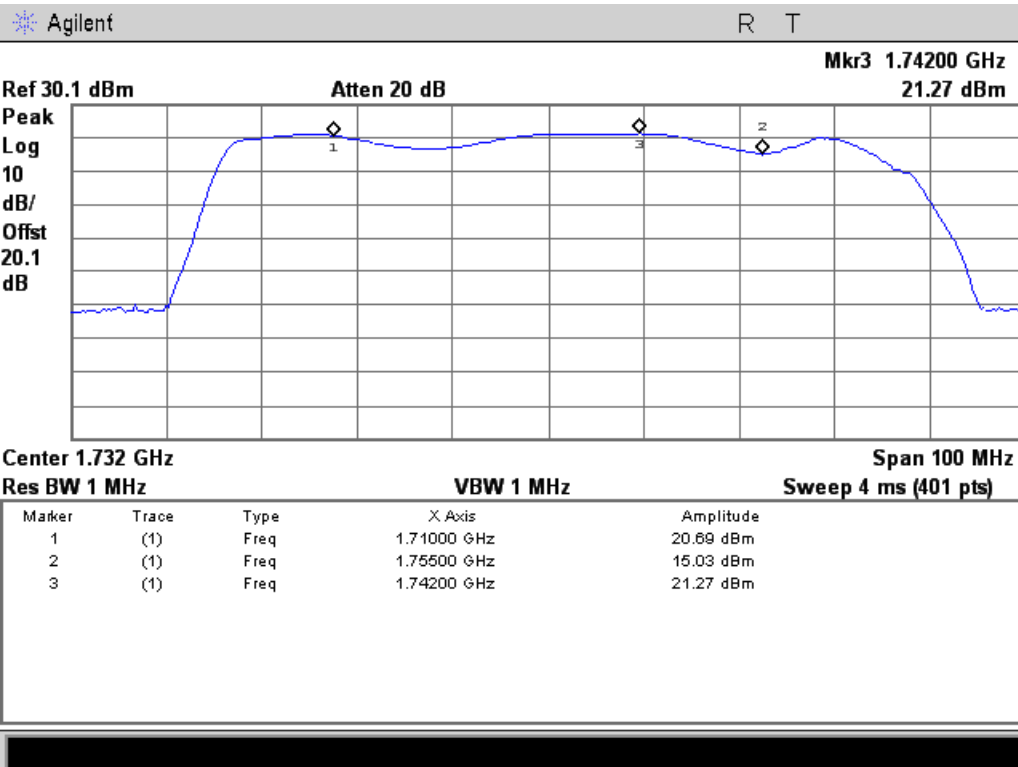




824 - 849 MHz Band

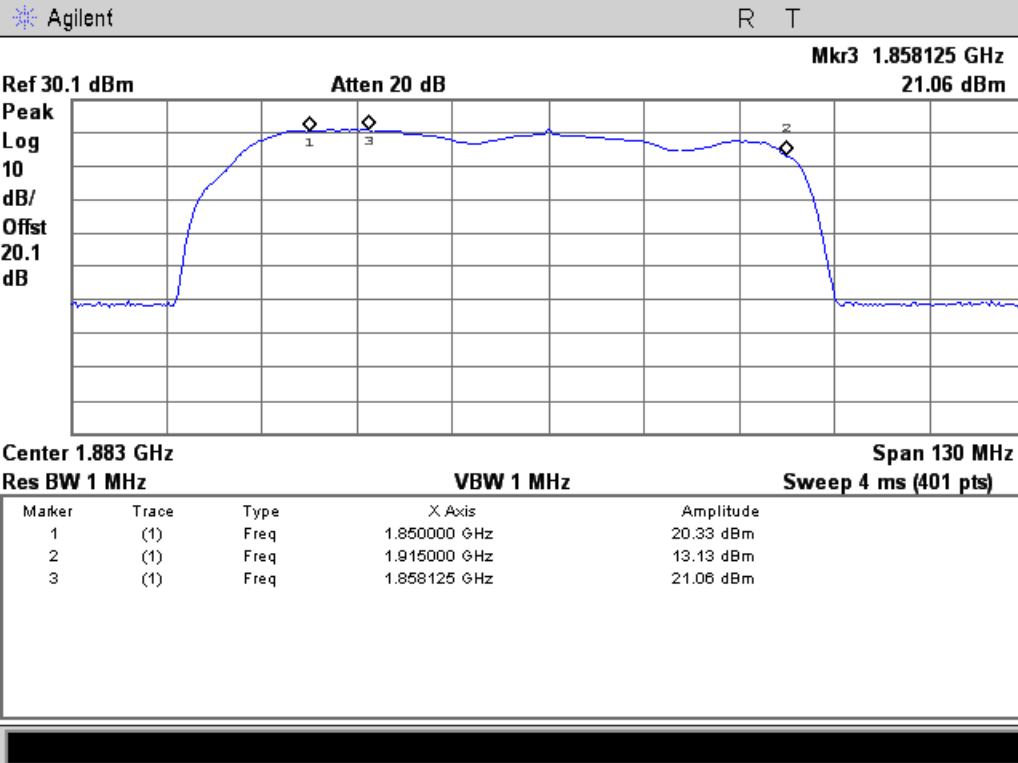


1710 - 1755 MHz Band



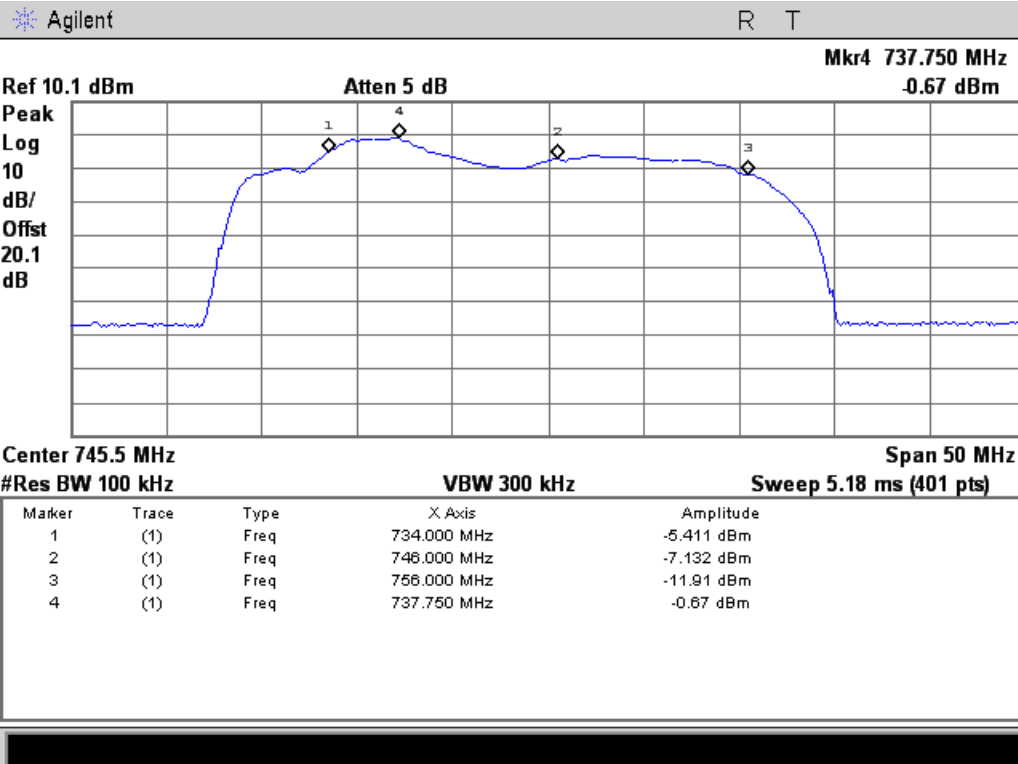


1850 - 1910 MHz Band



Downlink Test Results

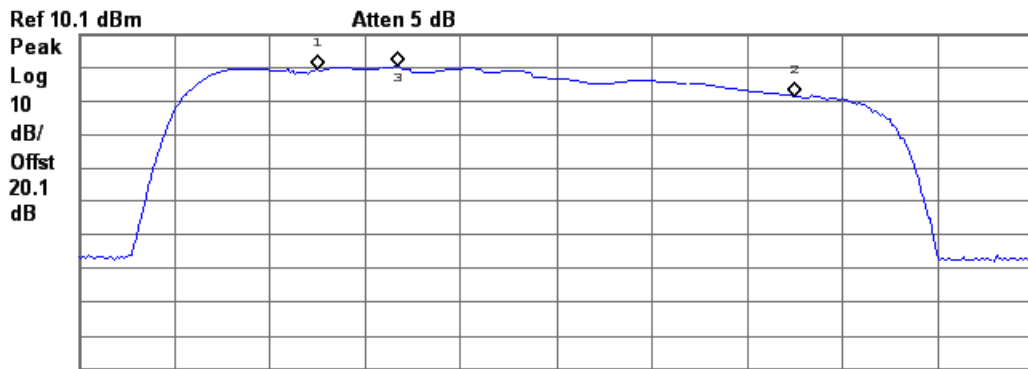
728 - 746 MHz Band





869 - 894 MHz Band

Agilent R T

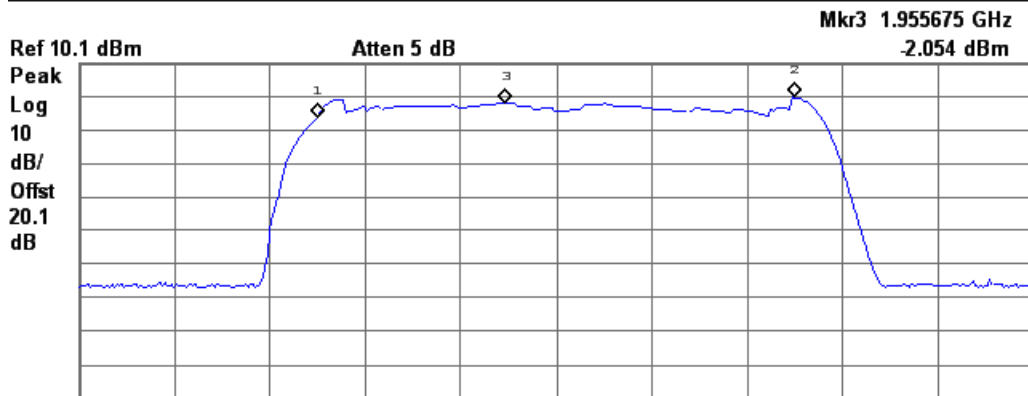


Center 881.5 MHz Span 50 MHz
#Res BW 100 kHz VBW 300 kHz Sweep 5.18 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	869.000 MHz	-0.266 dBm
2	(1)	Freq	894.000 MHz	-8.41 dBm
3	(1)	Freq	873.250 MHz	0.385 dBm

1930 - 1990 MHz Band

Agilent R T



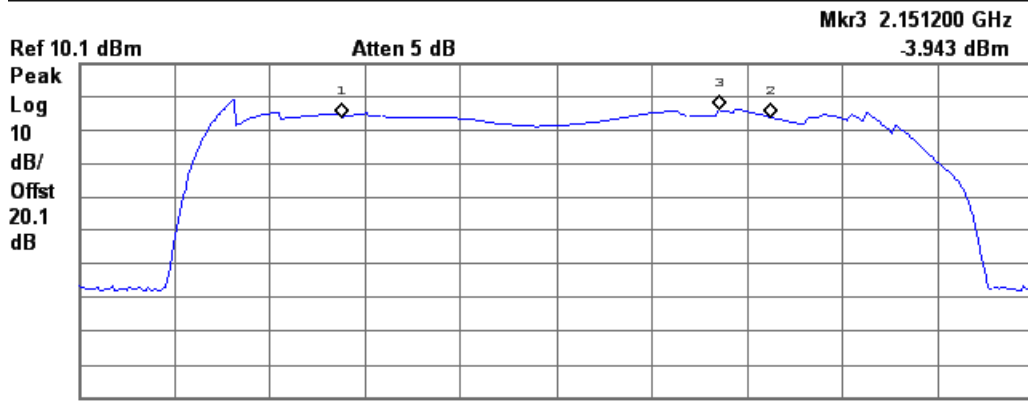
Center 1.962 GHz Span 130 MHz
#Res BW 100 kHz VBW 300 kHz Sweep 13.47 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	1.930000 GHz	-6.036 dBm
2	(1)	Freq	1.995000 GHz	-0.184 dBm
3	(1)	Freq	1.955675 GHz	-2.054 dBm



2110 - 2155 MHz Band

Agilent R T



Center 2.132 GHz Span 110 MHz
#Res BW 100 kHz VBW 300 kHz Sweep 11.4 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	2.107750 GHz	-5.954 dBm
2	(1)	Freq	2.157250 GHz	-6.072 dBm
3	(1)	Freq	2.151200 GHz	-3.943 dBm



Maximum Power and Gain

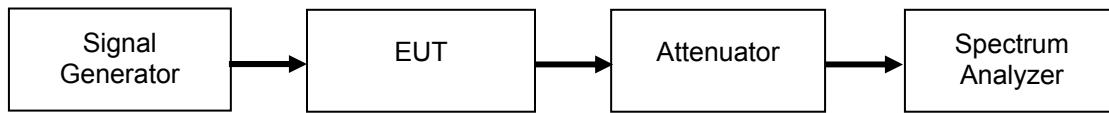
Name of Test: Maximum Power and Gain
Test Equipment Utilized: i00331, i00405

Engineer: John Erhard
Test Date: 7/3/2013

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. The spectrum analyzer and signal generator were tuned to the highest frequency in the band as determined by the out of band rejection test. The RF input level was increased to a point just prior to the AGC being in control of the power with both a 540 μ S 12.5% duty-cycle pulsed CW 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 was computed from these values. The uplink and downlink gain under each condition was verified to be within 9 dB of each other.

Test Setup



Uplink Power Test Results

Frequency Band (MHz)	Input Level (dBm)	Output Power (dBm)	Lower Limit (dBm)	Upper Limit (dBm)	Result
704 - 716 MHz Pulsed CW	-33.5	23.7	17	30	Pass
704 - 716 MHz AWGN	-33.1	19.4	17	30	Pass
777 - 787 MHz Pulsed CW	-35.1	23.6	17	30	Pass
777 - 787 MHz AWGN	-33.8	19.2	17	30	Pass
824 - 849 MHz Pulsed CW	-33.6	24.6	17	30	Pass
824 - 849 MHz AWGN	-35.6	20.4	17	30	Pass
1710 - 1755 MHz Pulsed CW	-37.6	24.9	17	30	Pass
1710 - 1755 MHz AWGN	-40.6	20.1	17	30	Pass
1850 - 1915 MHz Pulsed CW	-38.4	23.3	17	30	Pass
1850 - 1915 MHz AWGN	-42.5	18.8	17	30	Pass



Downlink Power Test Results

Frequency Band (MHz)	Input Level (dBm)	Output Power (dBm)	Upper Limit (dBm)	Result
728 - 746 MHz Pulsed CW	-56.5	0.9	17	Pass
728 - 746 MHz AWGN	-62.9	-4.9	17	Pass
746 - 757 MHz Pulsed CW	-57.4	-1.0	17	Pass
746 - 757 MHz AWGN	-61.5	-5.5	17	Pass
869 - 894 MHz Pulsed CW	-53.6	2.1	17	Pass
869 - 894 MHz AWGN	-61.3	-4.4	17	Pass
1930 - 1995 MHz Pulsed CW	-53.1	6.1	17	Pass
1930 - 1995 MHz AWGN	-62.2	-2.7	17	Pass
2110 - 2155 MHz Pulsed CW	-56.5	5.8	17	Pass
2110 - 2155 MHz AWGN	-67.1	-4.1	17	Pass

Uplink and Downlink Gain Test Results

Modulation	Uplink Frequency (MHz)	Downlink Frequency (MHz)	Uplink Gain (dB)	Uplink Limit (dB)	Downlink Gain (dB)	Downlink limit (dB)	Delta (dB)	Limit (dB)	Margin (dB)
Pulsed CW	710.6	737.7	57.2	63.5	57.4	63.5	0.2	9	-8.8
AWGN	710.6	737.7	52.5	63.5	58.0	63.5	5.5	9	-3.5
Pulsed CW	779.1	748.1	58.7	64	56.4	64	2.3	9	-6.7
AWGN	779.1	748.1	53.0	64	56.0	64	2.98	9	-6.02
Pulsed CW	836.8	873.2	58.2	65	55.7	65	2.47	9	-6.53
AWGN	836.8	873.2	56.0	65	56.9	65	0.88	9	-8.12
Pulsed CW	1742	1955.6	62.5	71	59.2	71	3.3	9	-5.7
AWGN	1742	1955.6	60.7	71	59.5	71	1.2	9	-7.8
Pulsed CW	1858.1	2151.2	61.7	72	62.3	72	0.6	9	-8.4
AWGN	1858.1	2151.2	61.3	72	63.0	72	1.7	9	-7.3



Intermodulation

Name of Test: Intermodulation

Engineer: John Erhard

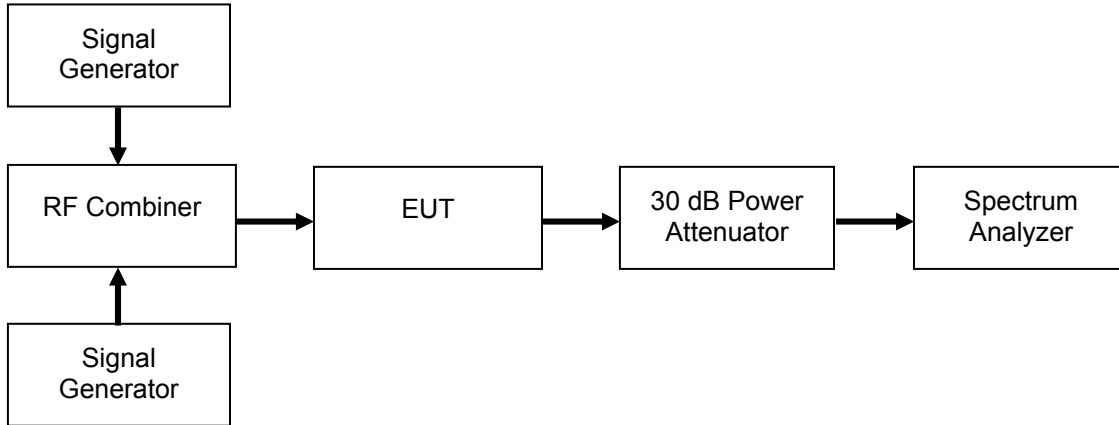
Test Equipment Utilized: i00331, i00405

Test Date: 7/9/2013

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. The input power was set at the maximum allowable power and the 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.

Test Setup



Uplink Test Results

Frequency Band (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Result
704 - 716 MHz	-24.73	-19	Pass
777 - 787 MHz	-34.60	-19	Pass
824 - 849 MHz	-22.40	-19	Pass
1710 - 1755 MHz	-24.41	-19	Pass
1850 - 1910 MHz	-29.28	-19	Pass

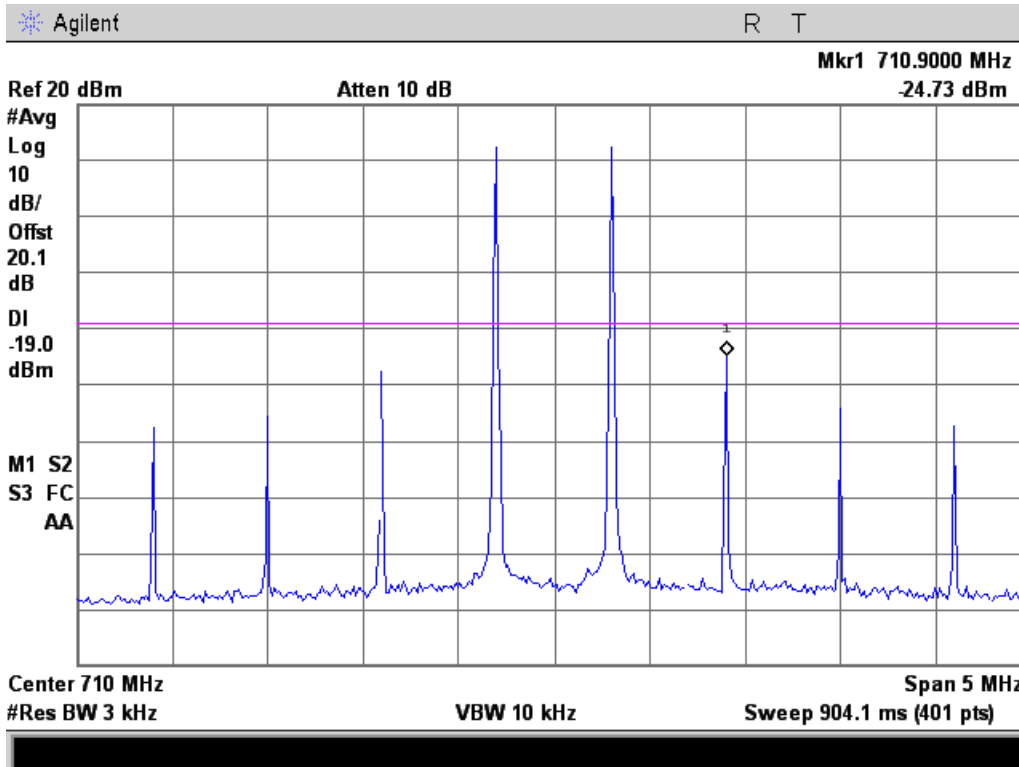
Downlink Test Results

Frequency Band (MHz)	Intermodulation Level (dBm)	Limit (dBm)	Result
728 - 746 MHz	-57.11	-19	Pass
746 - 757 MHz	-76.43	-19	Pass
869 - 894 MHz	-67.02	-19	Pass
1930 - 1990 MHz	-71.25	-19	Pass
2110 - 2155 MHz	-74.11	-19	Pass

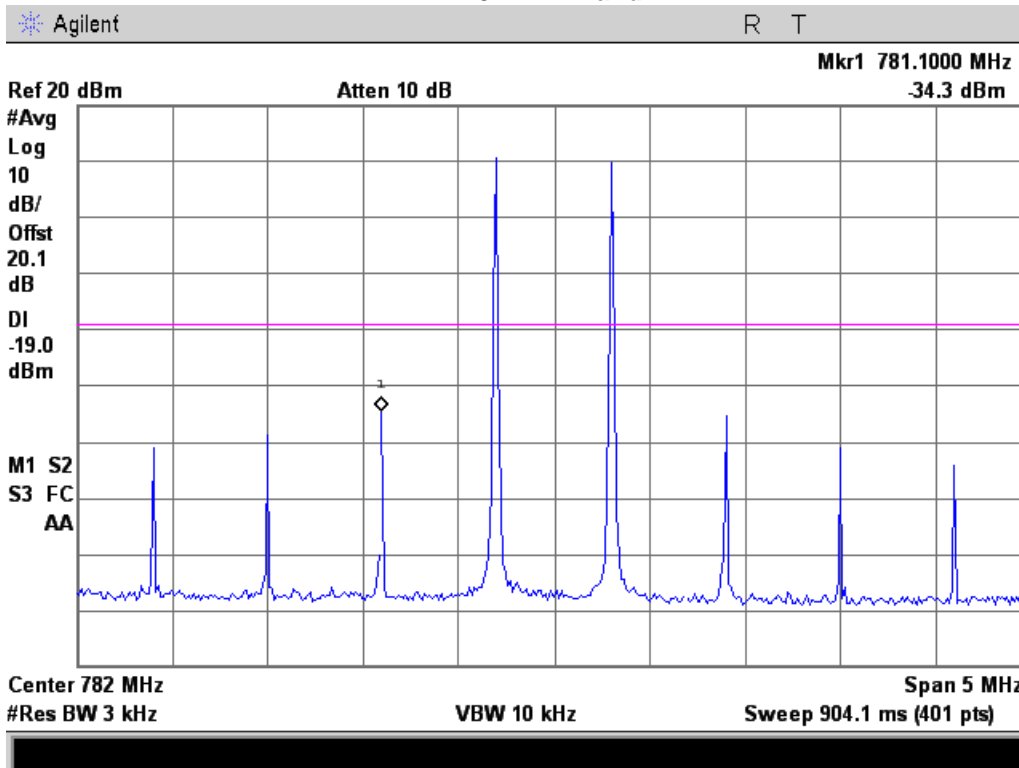


Uplink Test Results

704 - 716 MHz Band

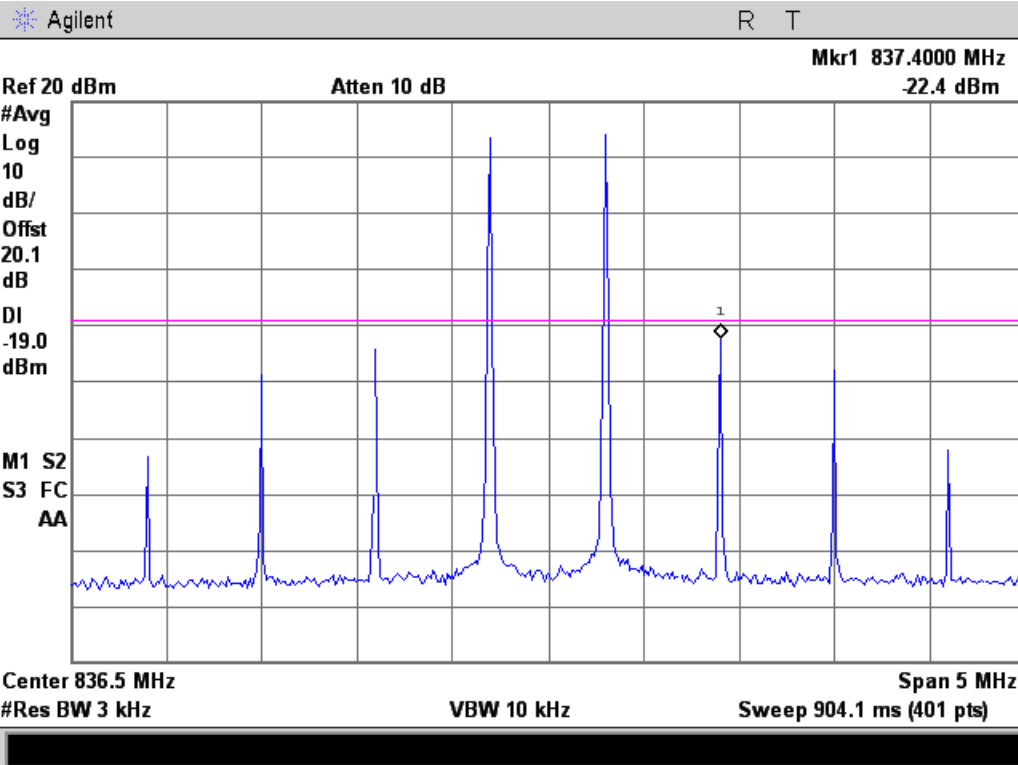


777 - 787 MHz Band

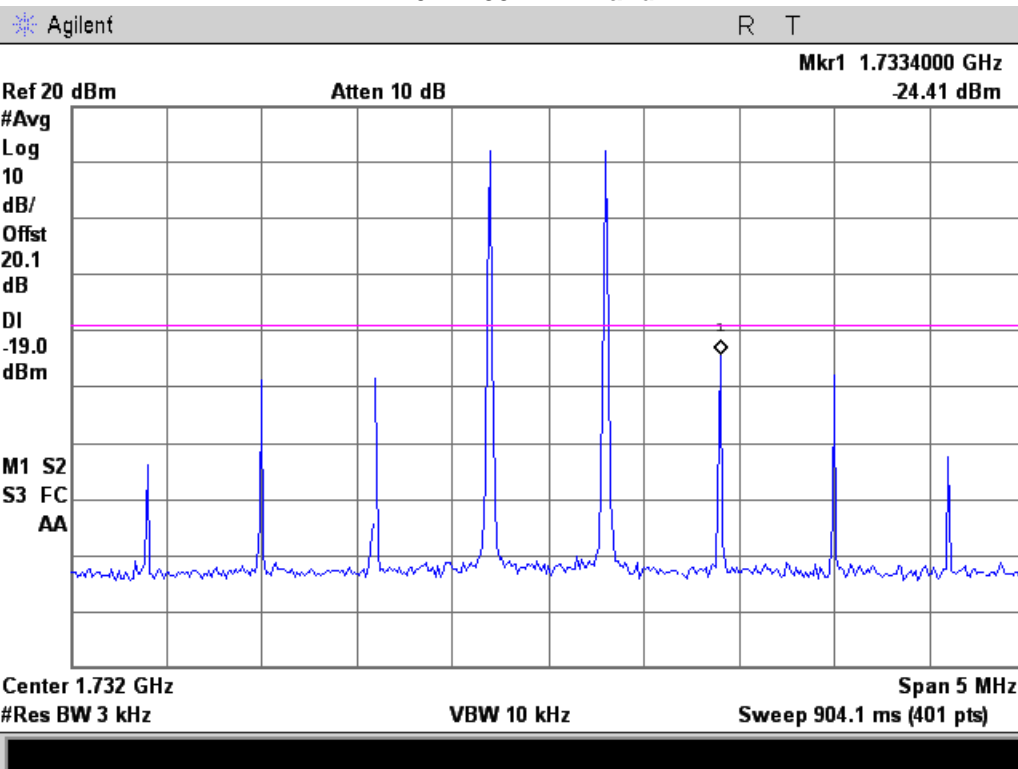




824 - 849 MHz Band

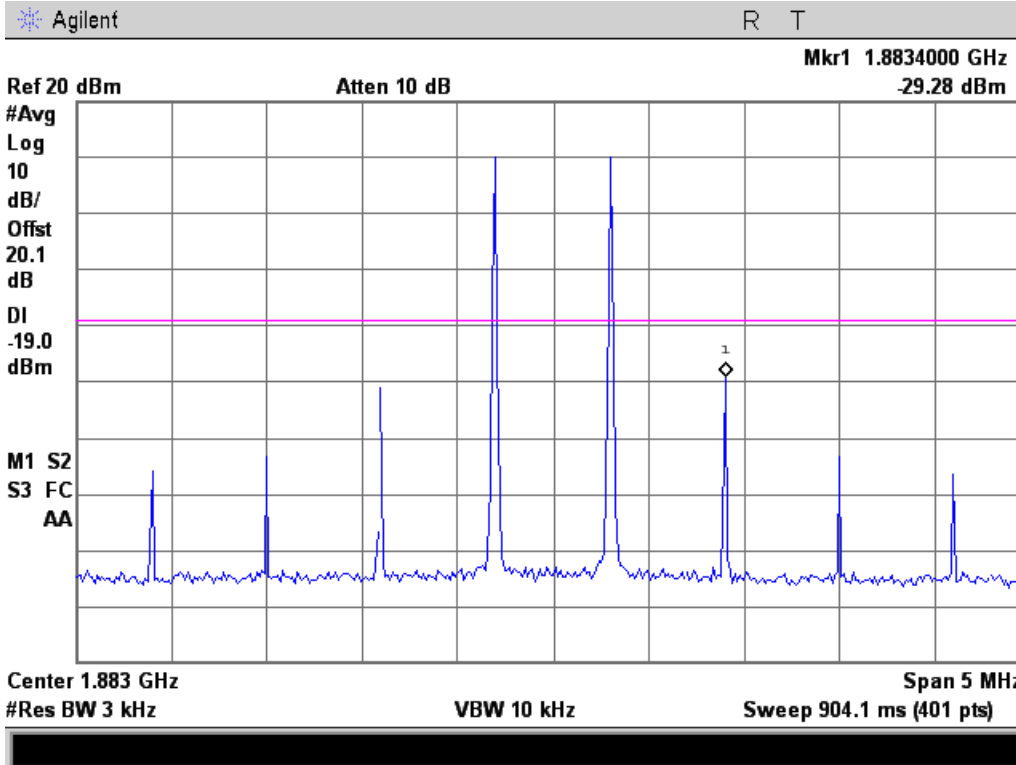


1710 - 1755 MHz Band



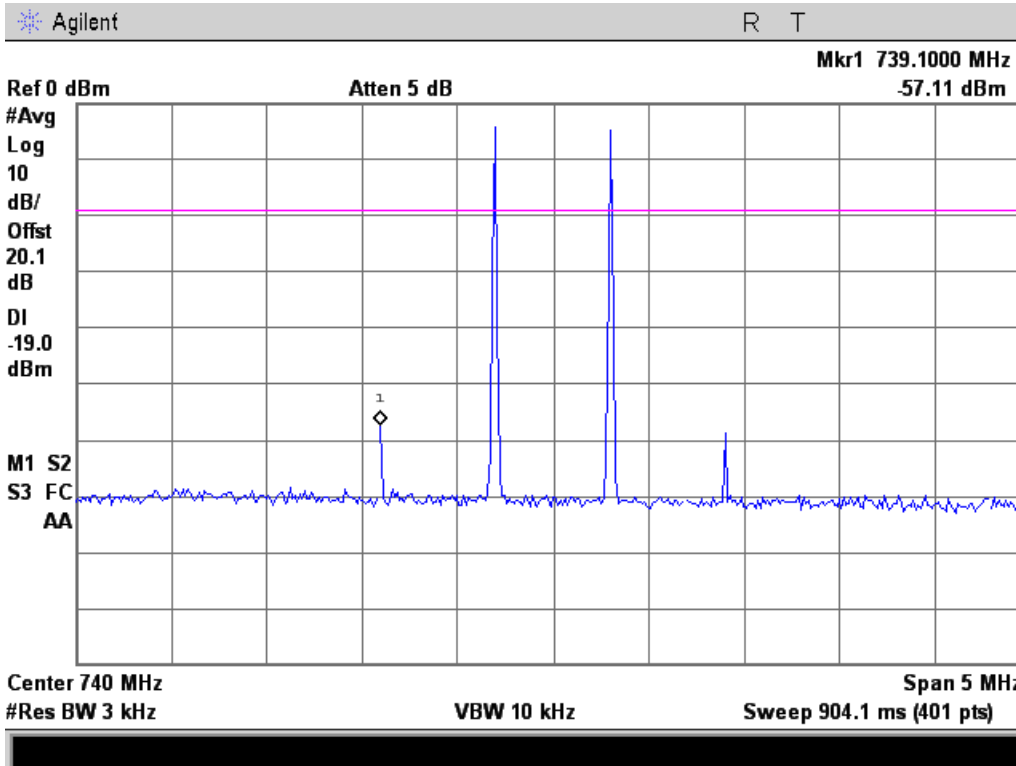


1850 - 1910 MHz Band



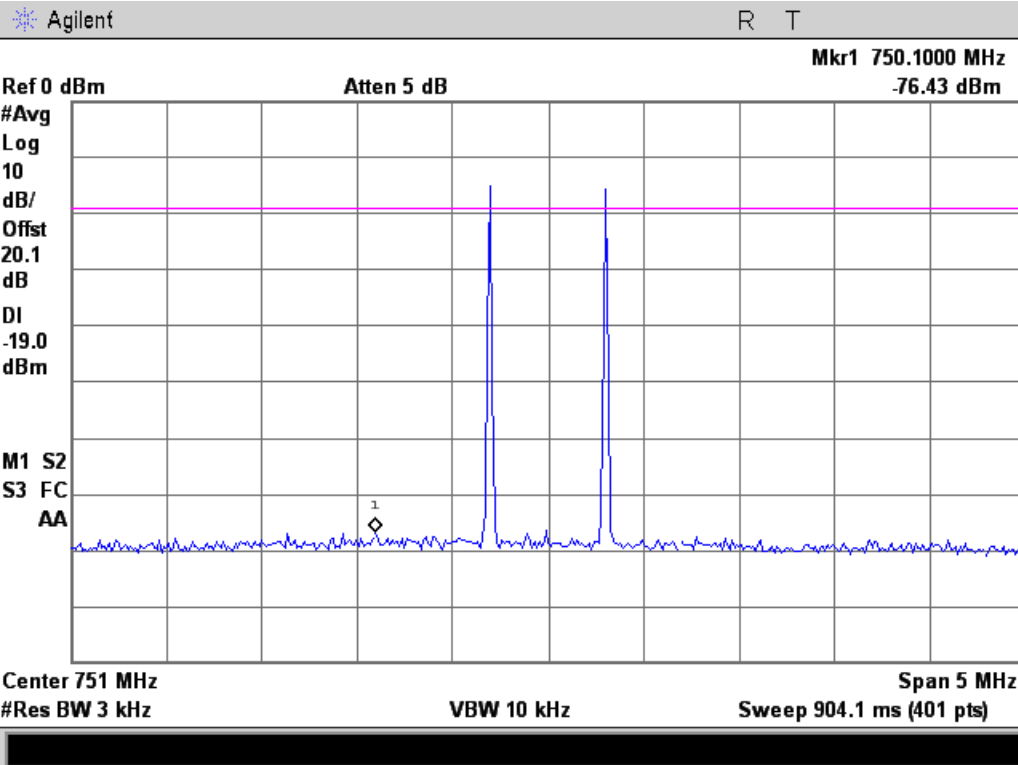
Downlink Test Results

728 - 746 MHz Band

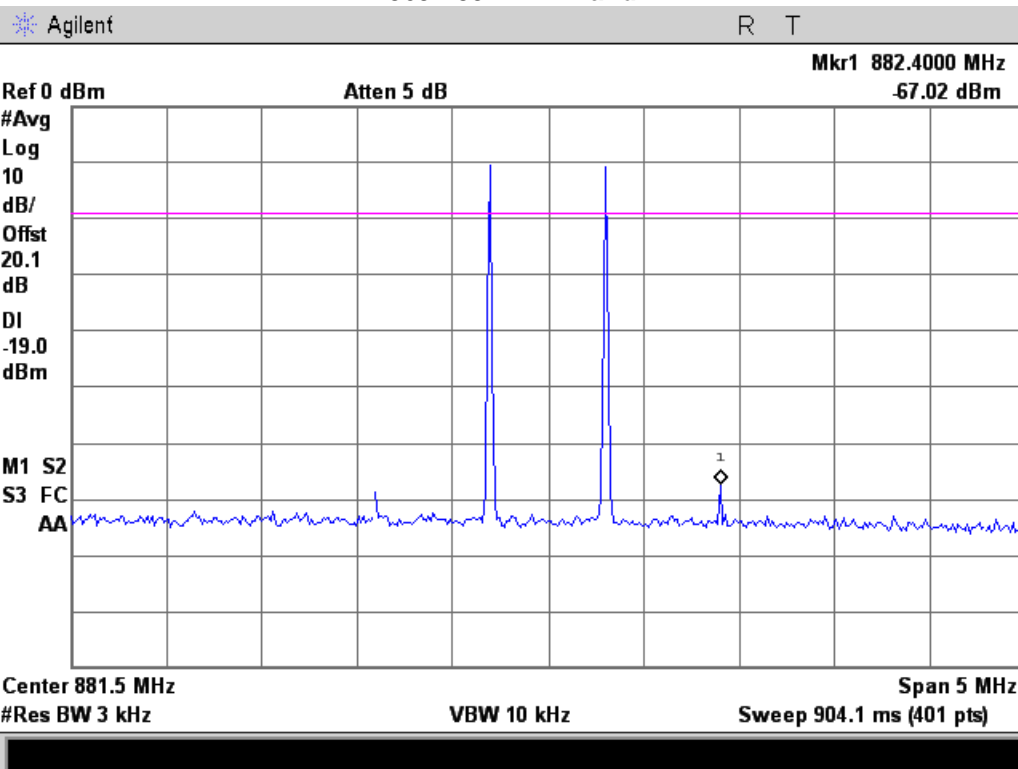




746 - 757 MHz Band

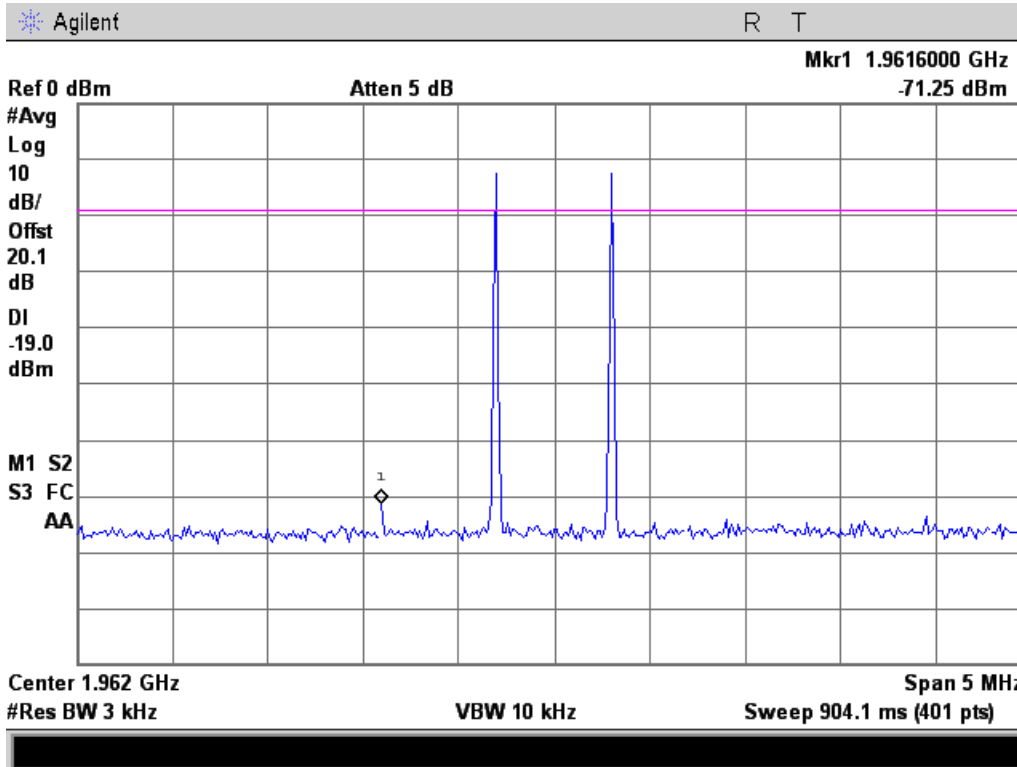


869 - 894 MHz Band

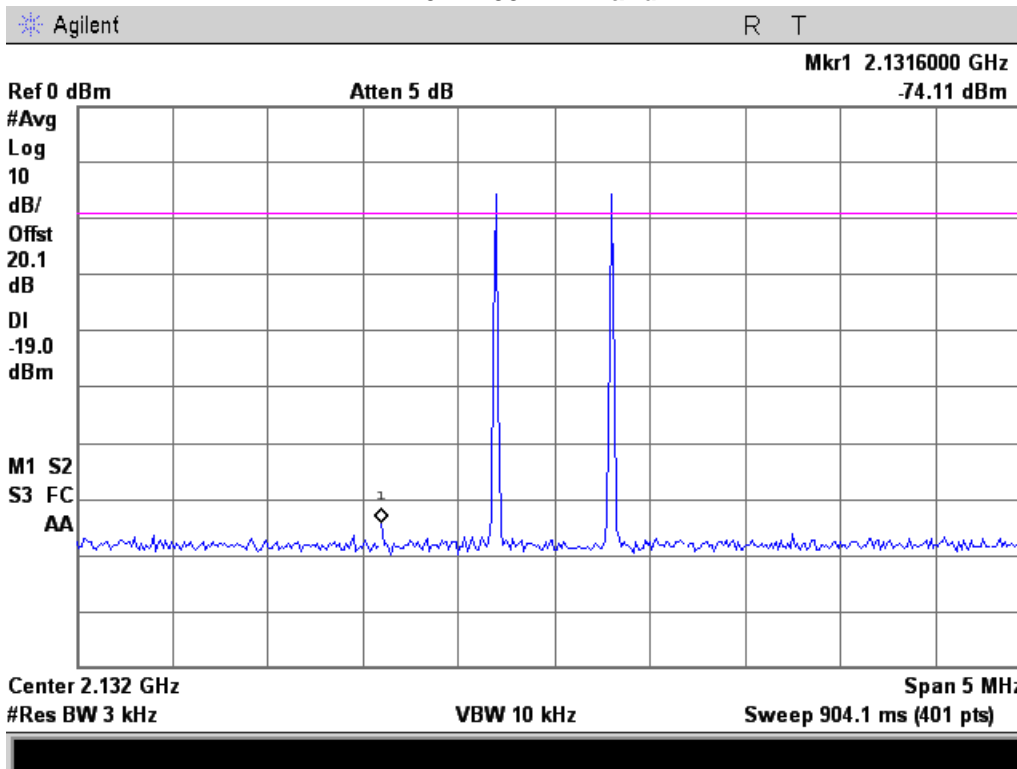




1930 - 1990 MHz Band



2110 - 2155 MHz Band





Out-of-Band Emissions

Name of Test:

Out-of-Band Emissions

Engineer: John Erhard

Test Equipment Utilized:

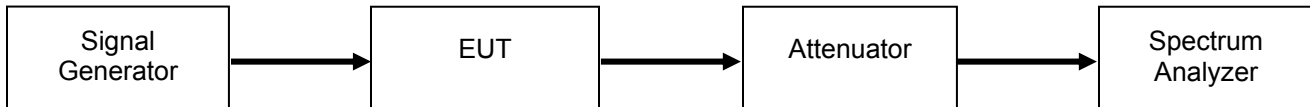
i00331, i00405

Test Date: 7/14/2013

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. A signal generator was utilized to produce the following signals; GSM, CDMA, and WCDMA tuned to the lowest allowable upper and lower 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 was measured ensuring the meet the requirements.

Test Setup





GSM Uplink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-68.89	-19	Pass
704 - 716	Upper	-25.08	-19	Pass
777 - 787	Lower	-60.97	-19	Pass
777 - 787	Upper	-26.80	-19	Pass
824 - 849	Lower	-32.15	-19	Pass
824 - 849	Upper	-33.83	-19	Pass
1710 - 1755	Lower	-33.26	-19	Pass
1710 - 1755	Upper	-38.30	-19	Pass
1850 - 1915	Lower	-33.13	-19	Pass
1850 - 1915	Upper	-39.11	-19	Pass

GSM Downlink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
728 - 746	Lower	-78.32	-19	Pass
728 - 746	Upper	-50.98	-19	Pass
746 - 757	Lower	-50.27	-19	Pass
746 - 757	Upper	-76.36	-19	Pass
869 - 894	Lower	-56.67	-19	Pass
869 - 894	Upper	-59.78	-19	Pass
1930 - 1995	Lower	-60.64	-19	Pass
1930 - 1995	Upper	-60.03	-19	Pass
2110 - 2155	Lower	-61.46	-19	Pass
2110 - 2155	Upper	-60.63	-19	Pass



CDMA Uplink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-70.90	-19	Pass
704 - 716	Upper	-33.34	-19	Pass
777 - 787	Lower	-50.16	-19	Pass
777 - 787	Upper	-46.1	-19	Pass
824 - 849	Lower	-38.45	-19	Pass
824 - 849	Upper	-40.7	-19	Pass
1710 - 1755	Lower	-40.8	-19	Pass
1710 - 1755	Upper	-42.39	-19	Pass
1850 - 1915	Lower	-46.51	-19	Pass
1850 - 1915	Upper	-48.00	-19	Pass

CDMA Downlink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
728 - 746	Lower	-78.54	-19	Pass
728 - 746	Upper	-29.29	-19	Pass
746 - 757	Lower	-29.21	-19	Pass
746 - 757	Upper	-53.38	-19	Pass
869 - 894	Lower	-23.20	-19	Pass
869 - 894	Upper	-26.15	-19	Pass
1930 - 1995	Lower	-31.18	-19	Pass
1930 - 1995	Upper	25.84	-19	Pass
2110 - 2155	Lower	28.56	-19	Pass
2110 - 2155	Upper	-28.28	-19	Pass



WCDMA Uplink Test Results

Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	Lower	-70.12	-19	Pass
704 - 716	Upper	-45.44	-19	Pass
777 - 787	Lower	-49.5	-19	Pass
777 - 787	Upper	-47.46	-19	Pass
824 - 849	Lower	-36.88	-19	Pass
824 - 849	Upper	-33.69	-19	Pass
1710 - 1755	Lower	-37.69	-19	Pass
1710 - 1755	Upper	-39.53	-19	Pass
1850 - 1915	Lower	-40.75	-19	Pass
1850 - 1915	Upper	-41.14	-19	Pass

WCDMA Downlink Test Results

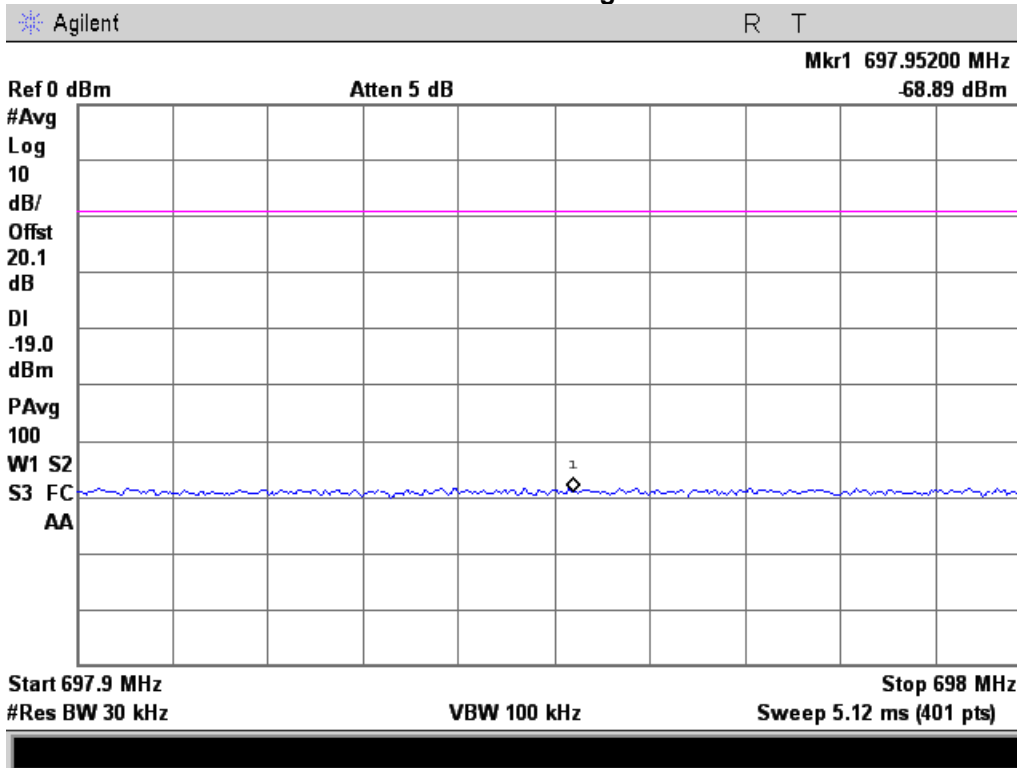
Frequency Band (MHz)	Band Edge	Measured Level (dBm)	Limit (dBm)	Result
728 - 746	Lower	-78.70	-19	Pass
728 - 746	Upper	-74.30	-19	Pass
746 - 757	Lower	-73.46	-19	Pass
746 - 757	Upper	-76.49	-19	Pass
869 - 894	Lower	-66.17	-19	Pass
869 - 894	Upper	-62.51	-19	Pass
1930 - 1995	Lower	-64.06	-19	Pass
1930 - 1995	Upper	-61.12	-19	Pass
2110 - 2155	Lower	-63.88	-19	Pass
2110 - 2155	Upper	-62.40	-19	Pass



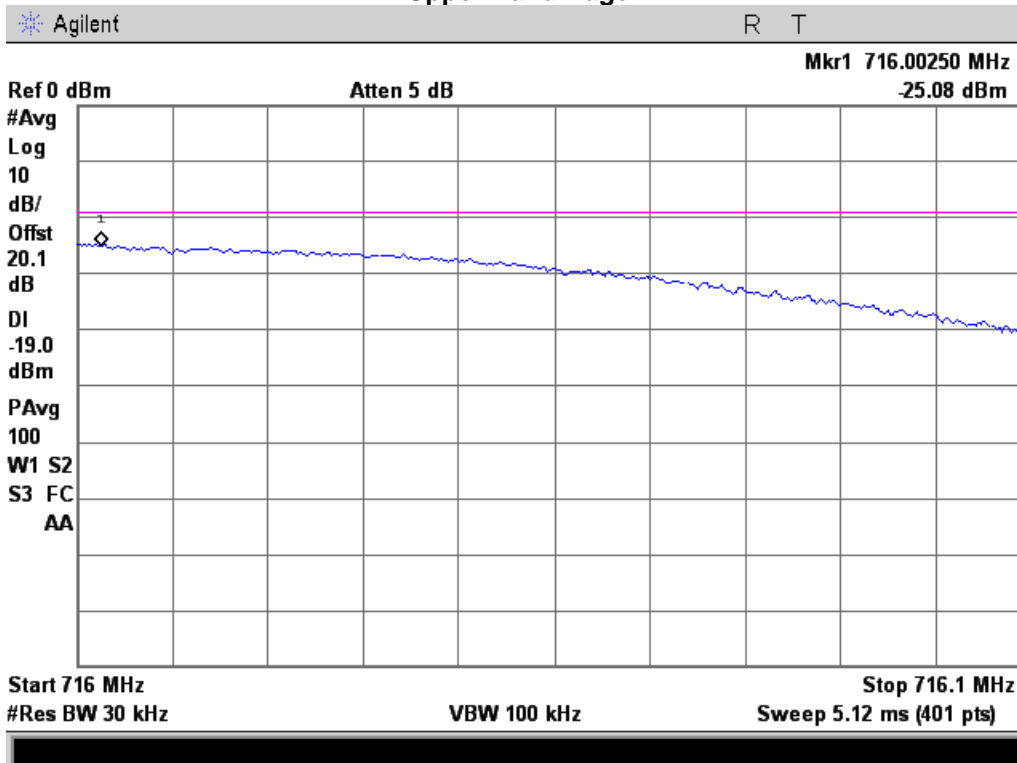
GSM Uplink Test Plots

704 - 716 MHz Band

Lower Band Edge



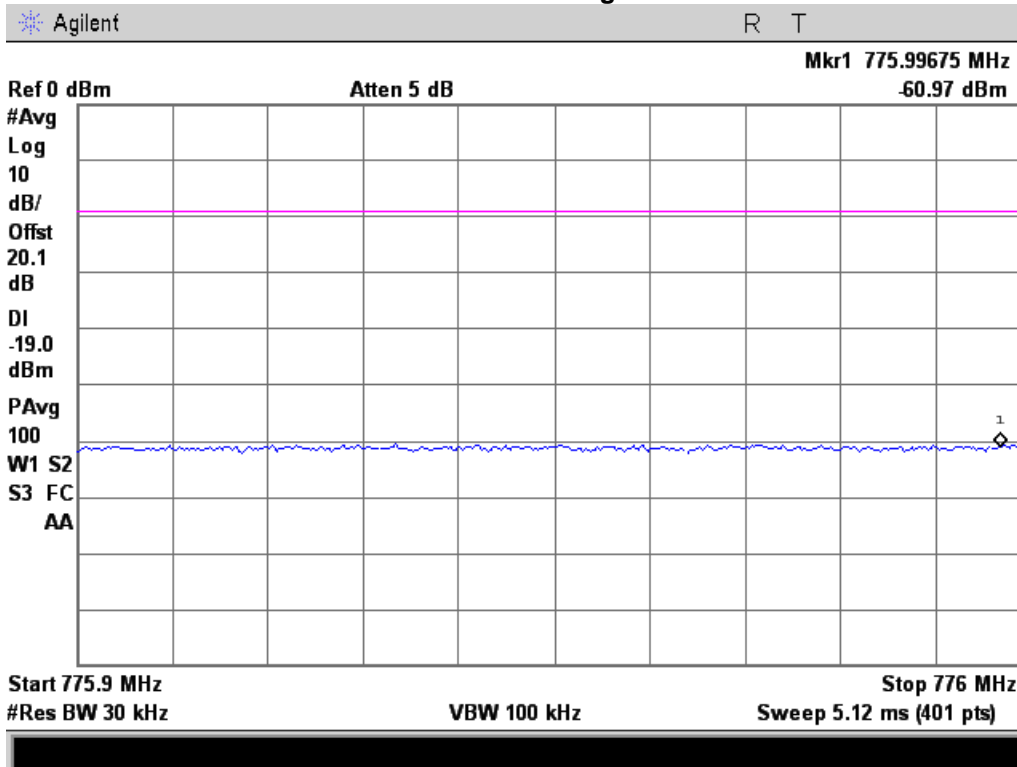
Upper Band Edge



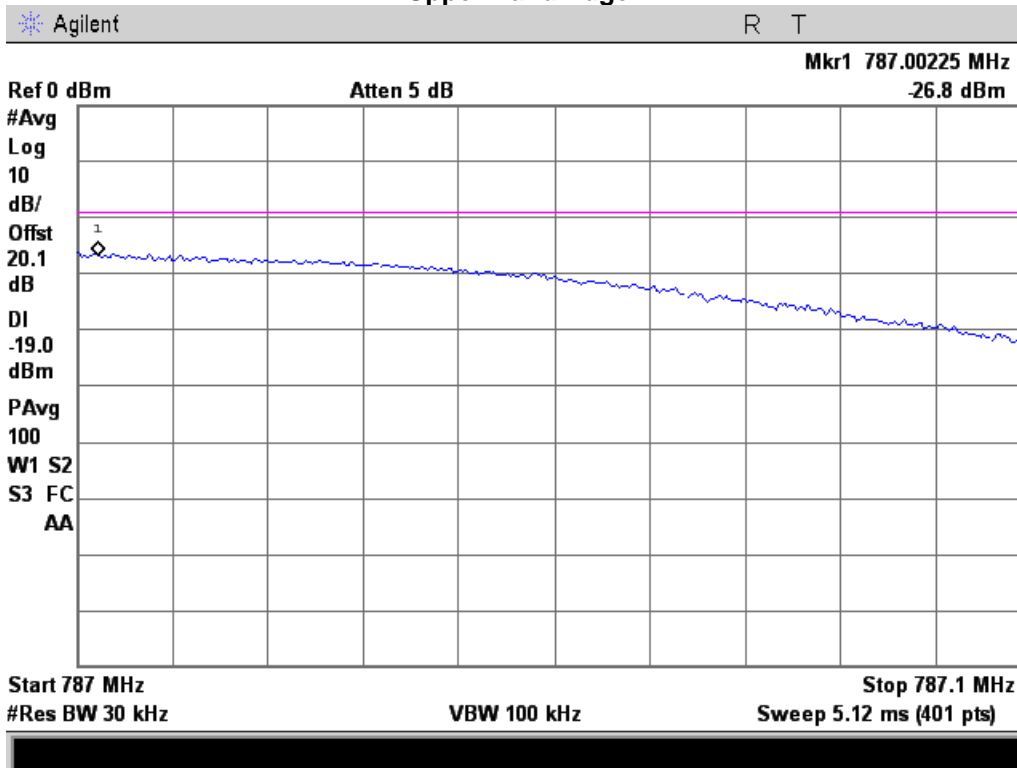


777 - 787 MHz Band

Lower Band Edge



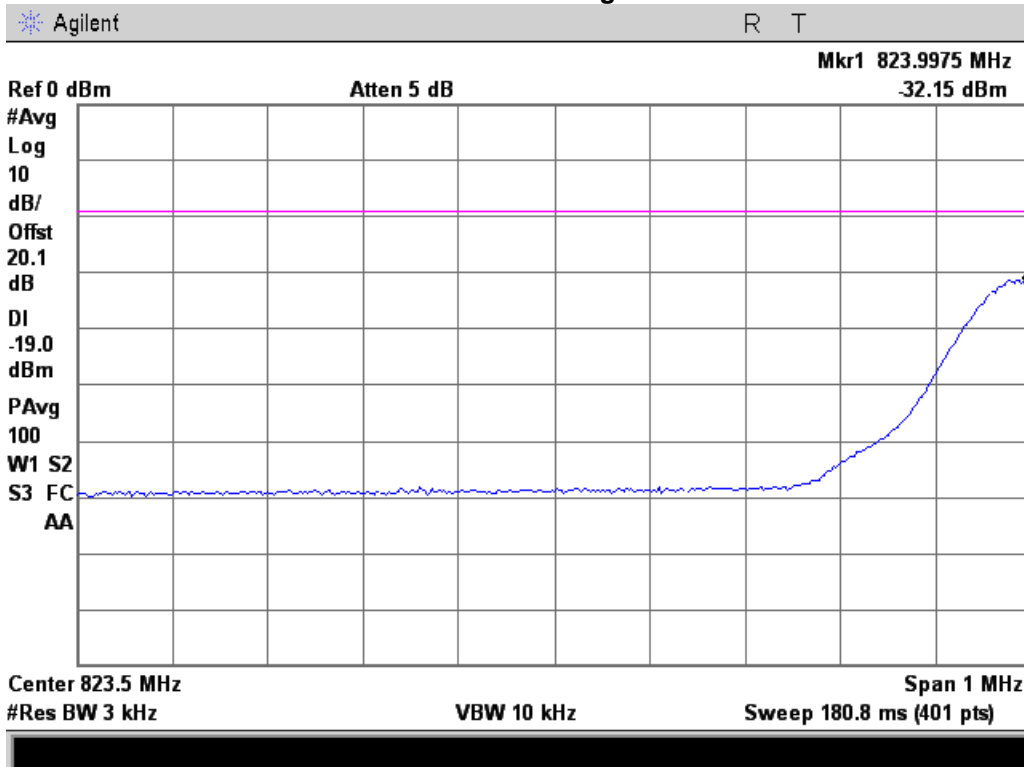
Upper Band Edge



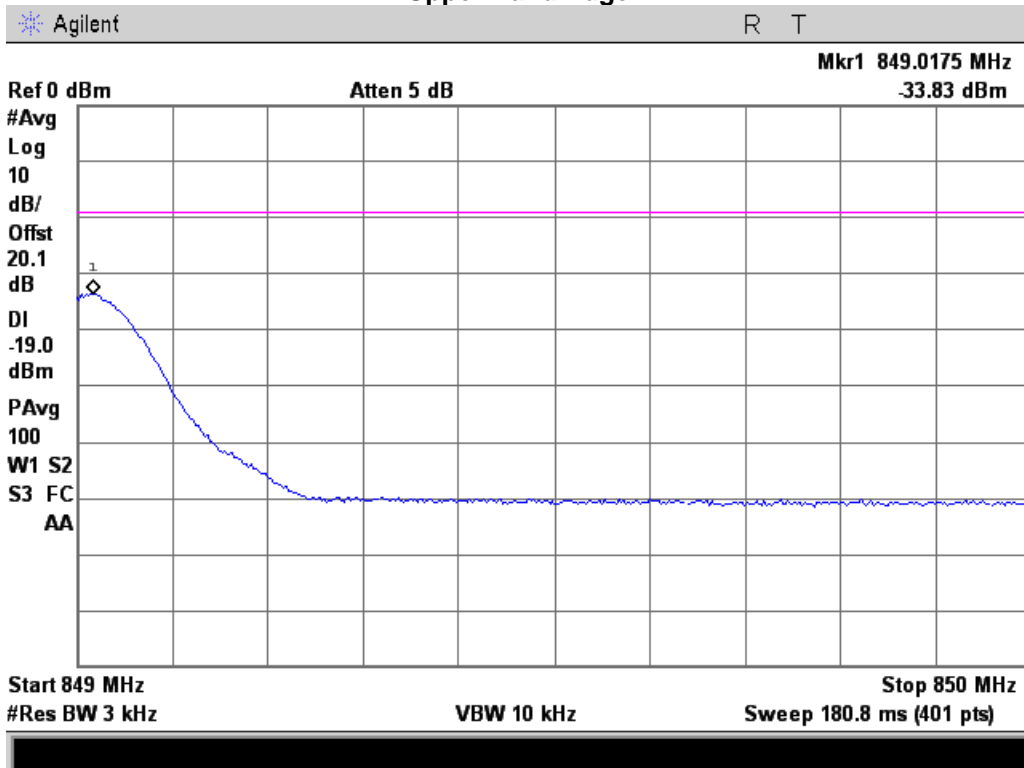


824 - 849 MHz Band

Lower Band Edge



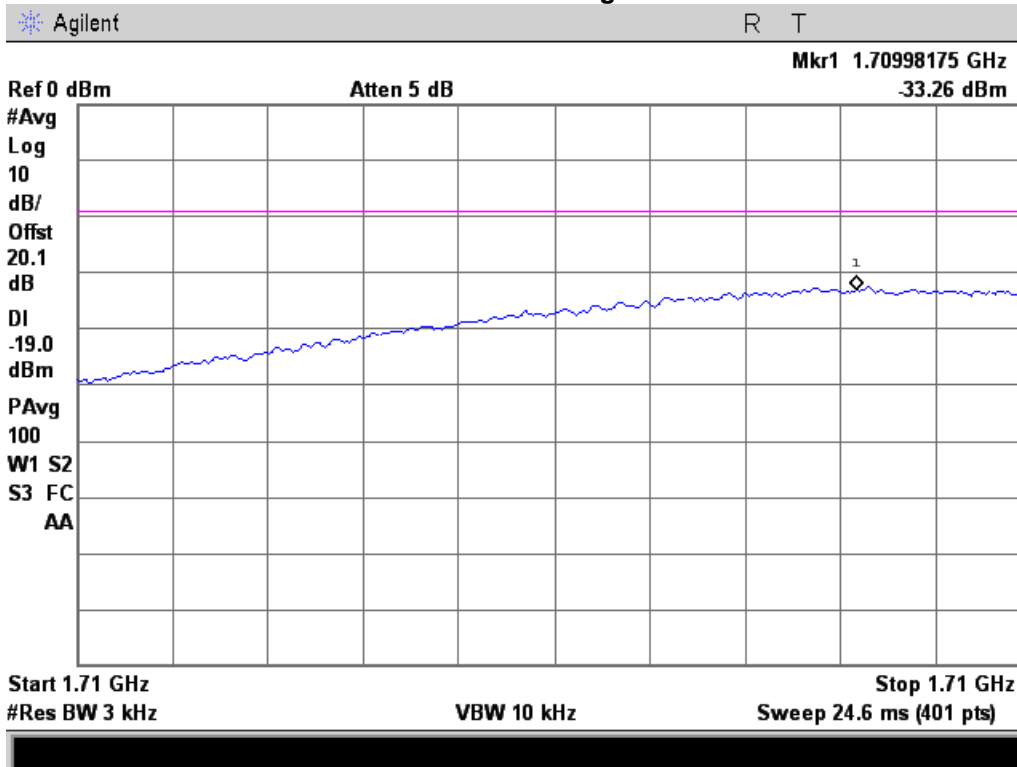
Upper Band Edge



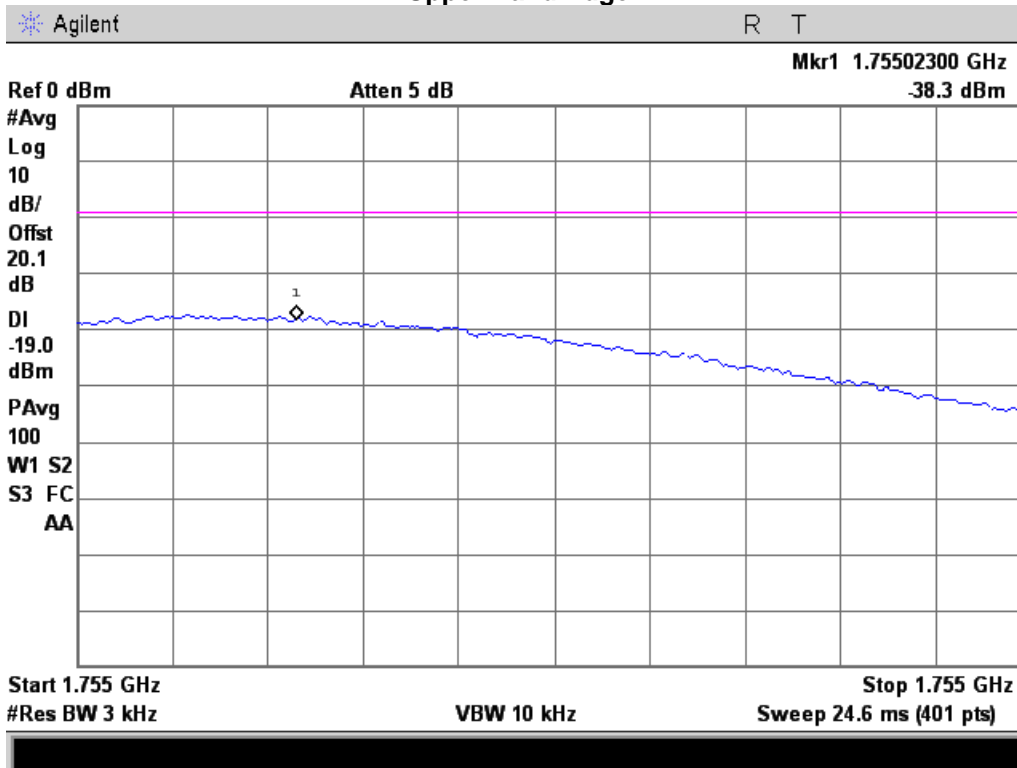


1710 - 1755 MHz Band

Lower Band Edge



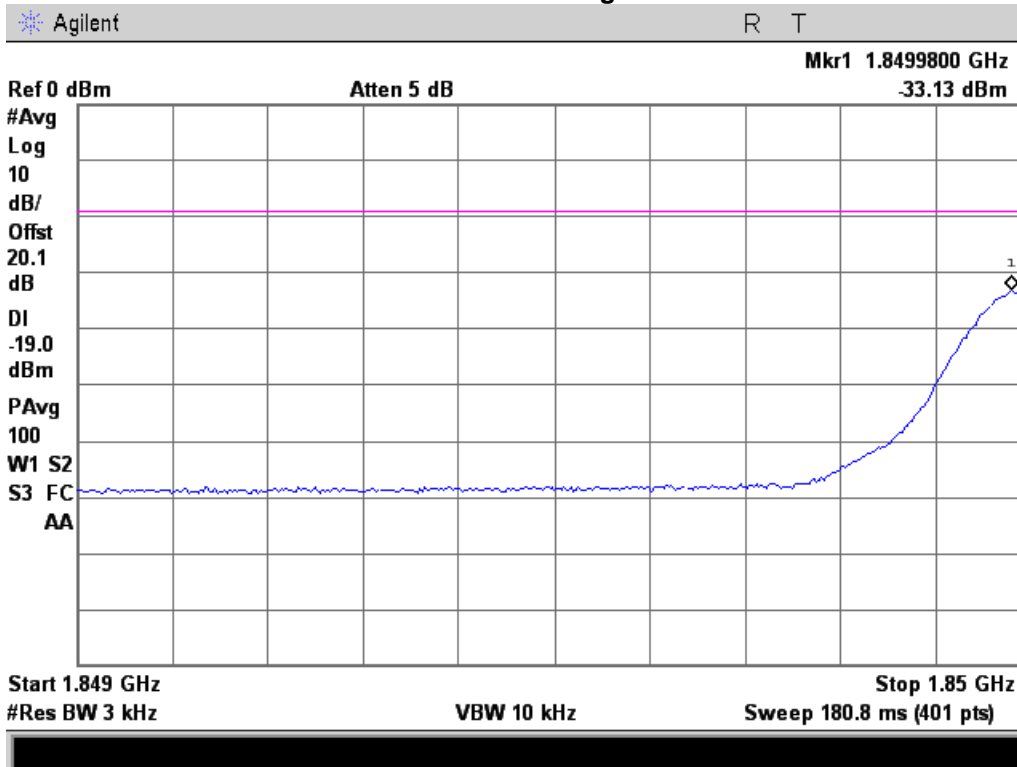
Upper Band Edge



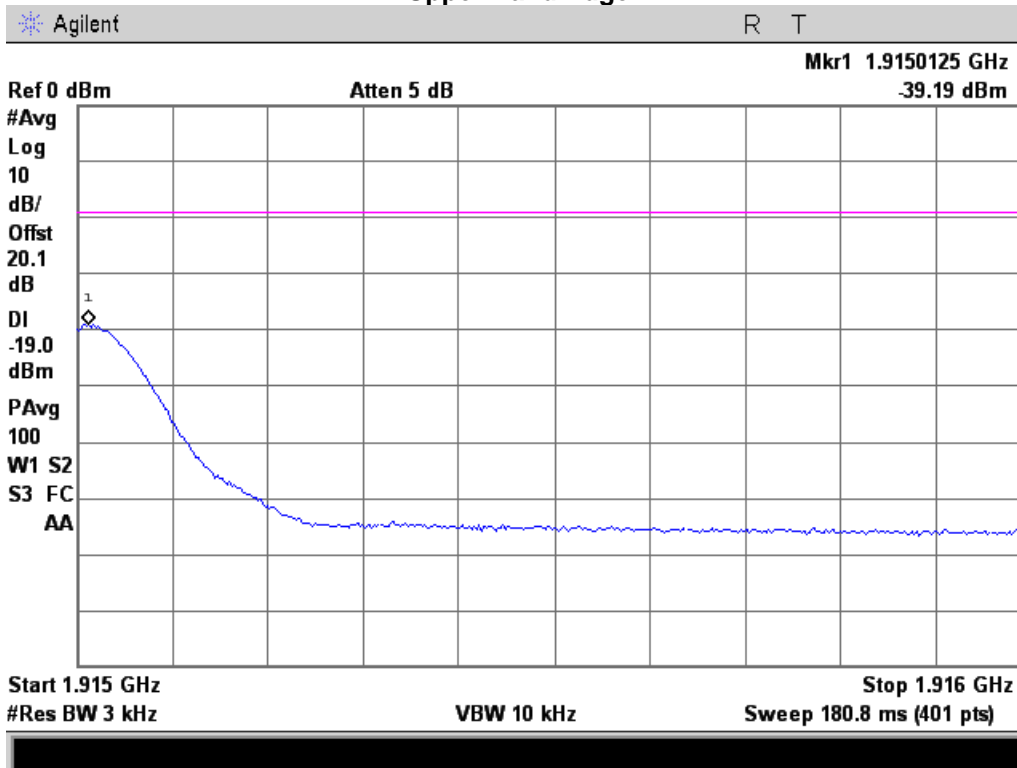


1850 - 1910 MHz Band

Lower Band Edge



Upper Band Edge

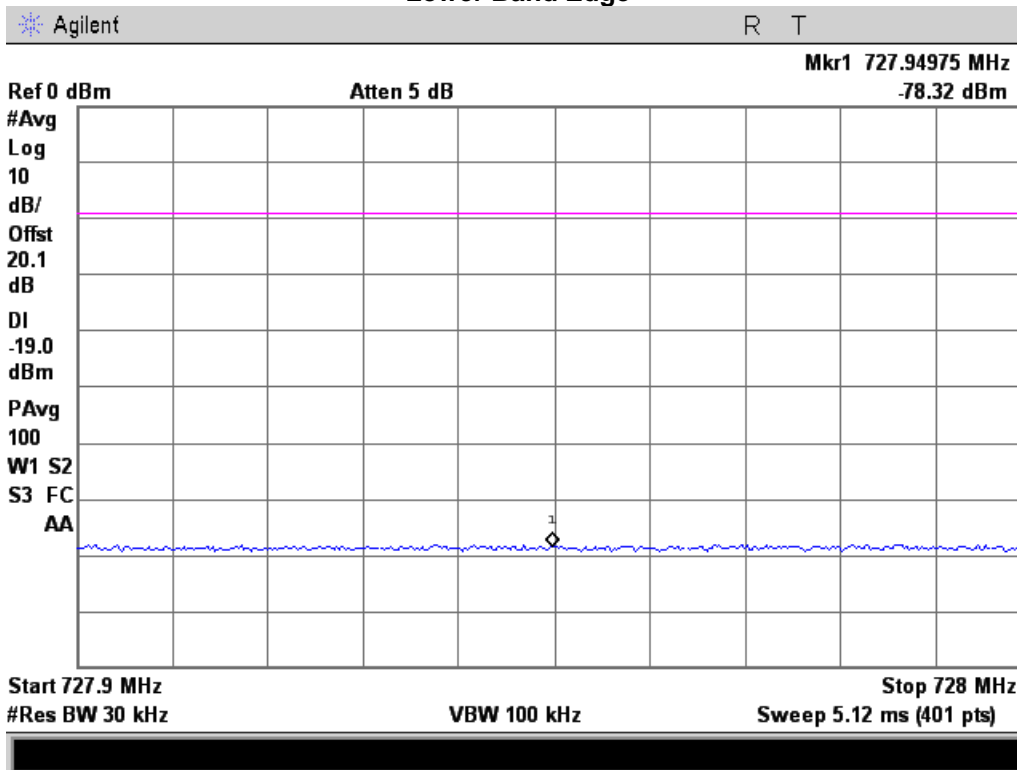




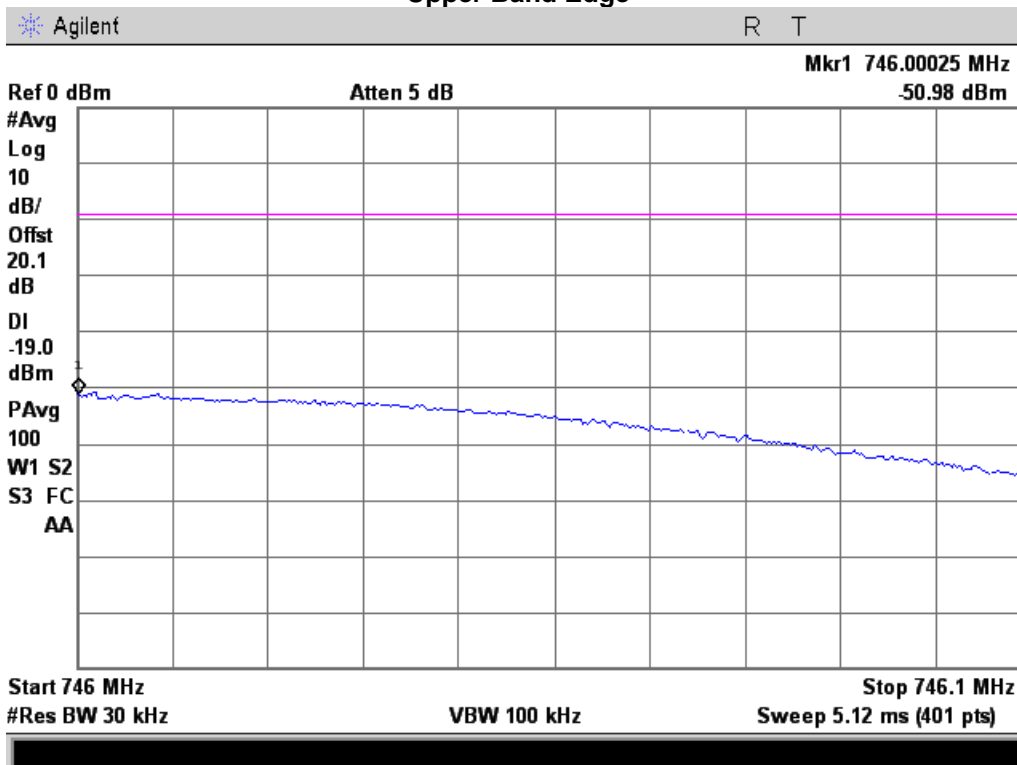
GSM Downlink Test Plots

728 - 746 MHz Band

Lower Band Edge



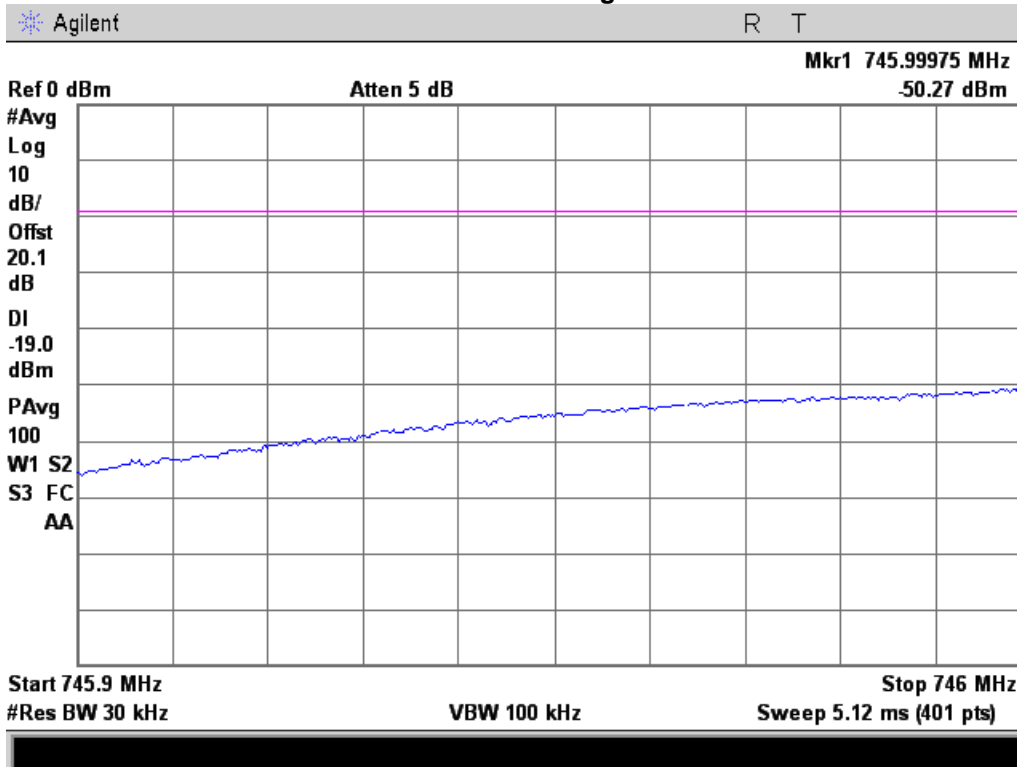
Upper Band Edge



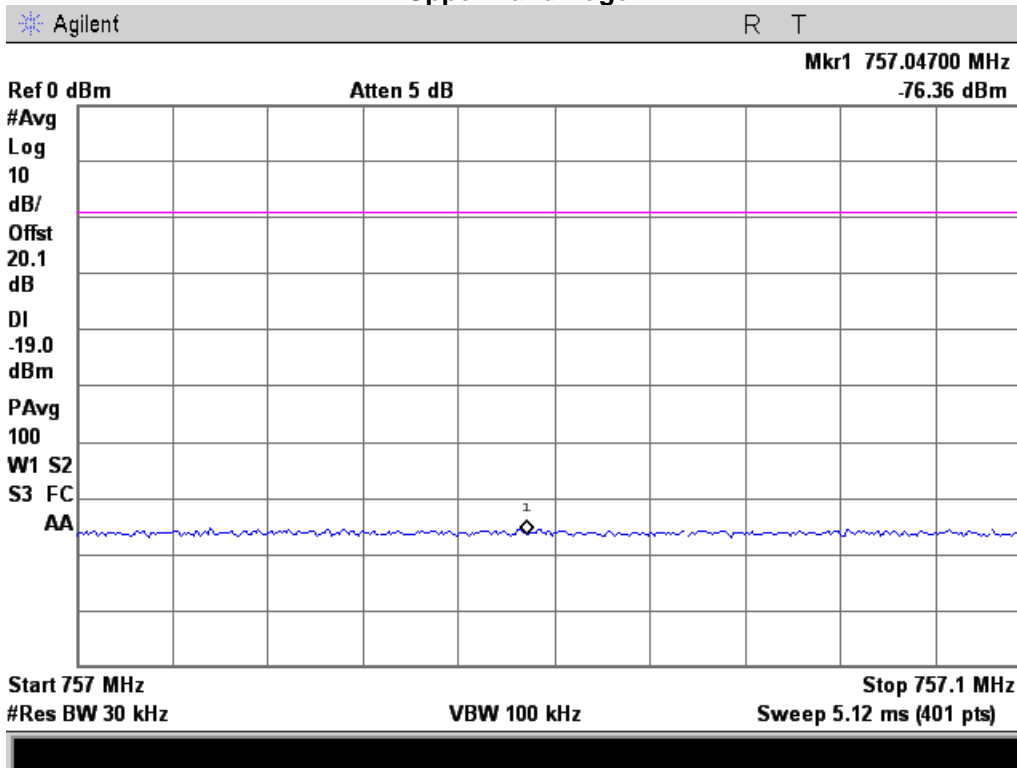


746 - 757 MHz Band

Lower Band Edge



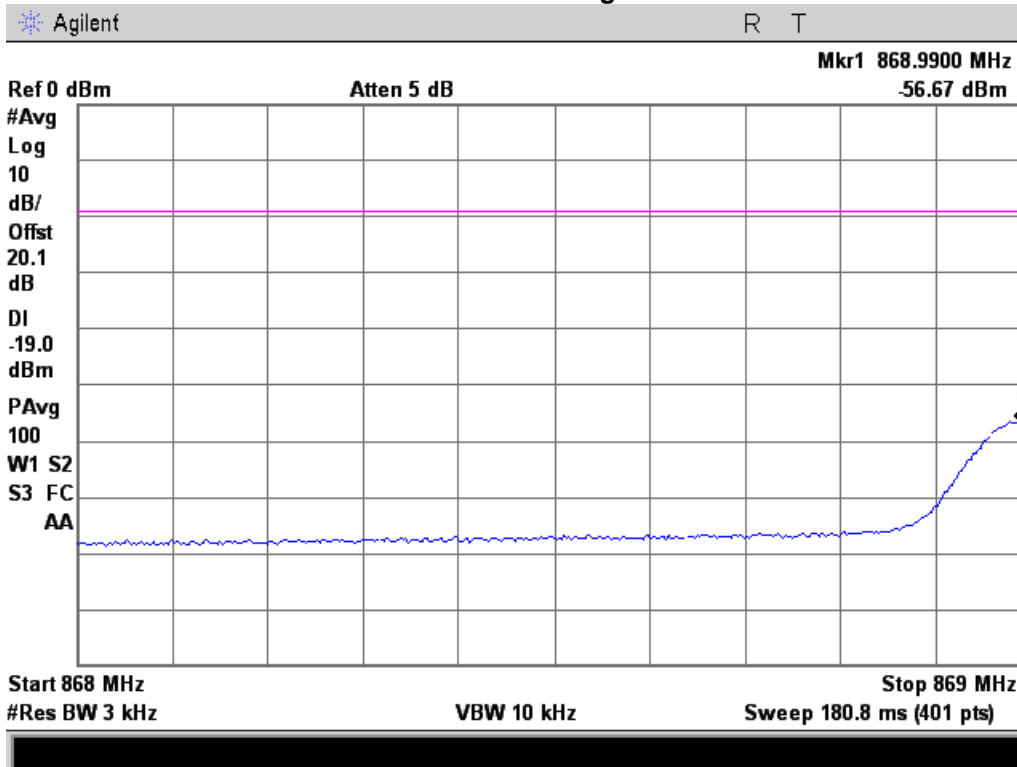
Upper Band Edge



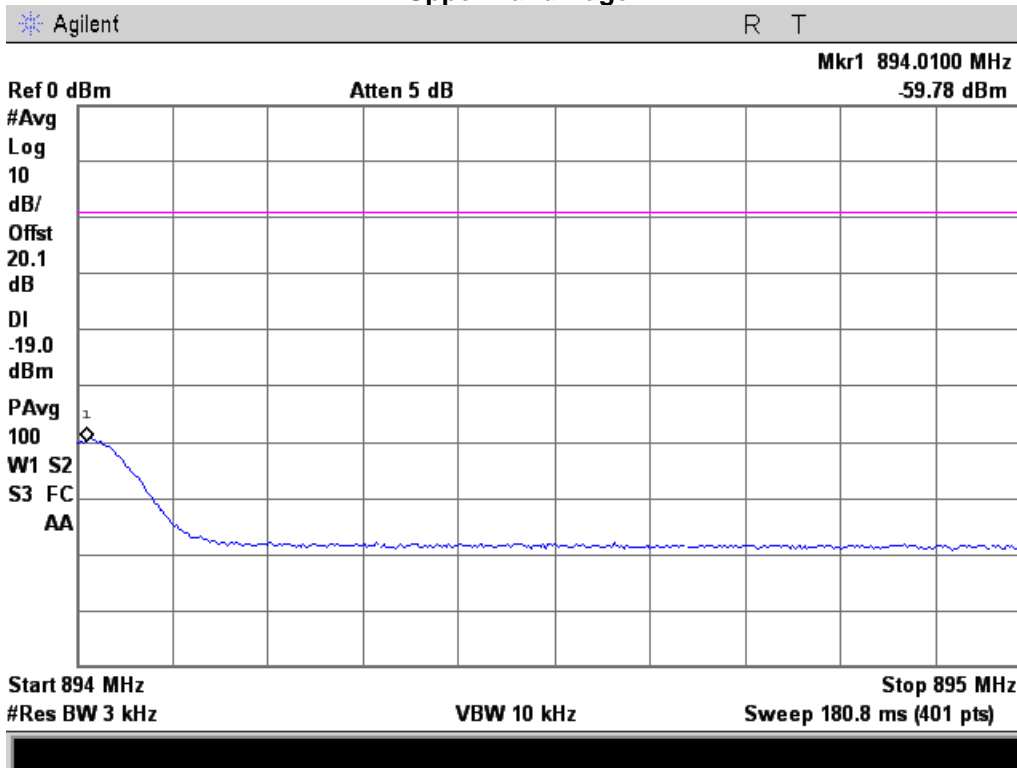


869 - 894 MHz Band

Lower Band Edge



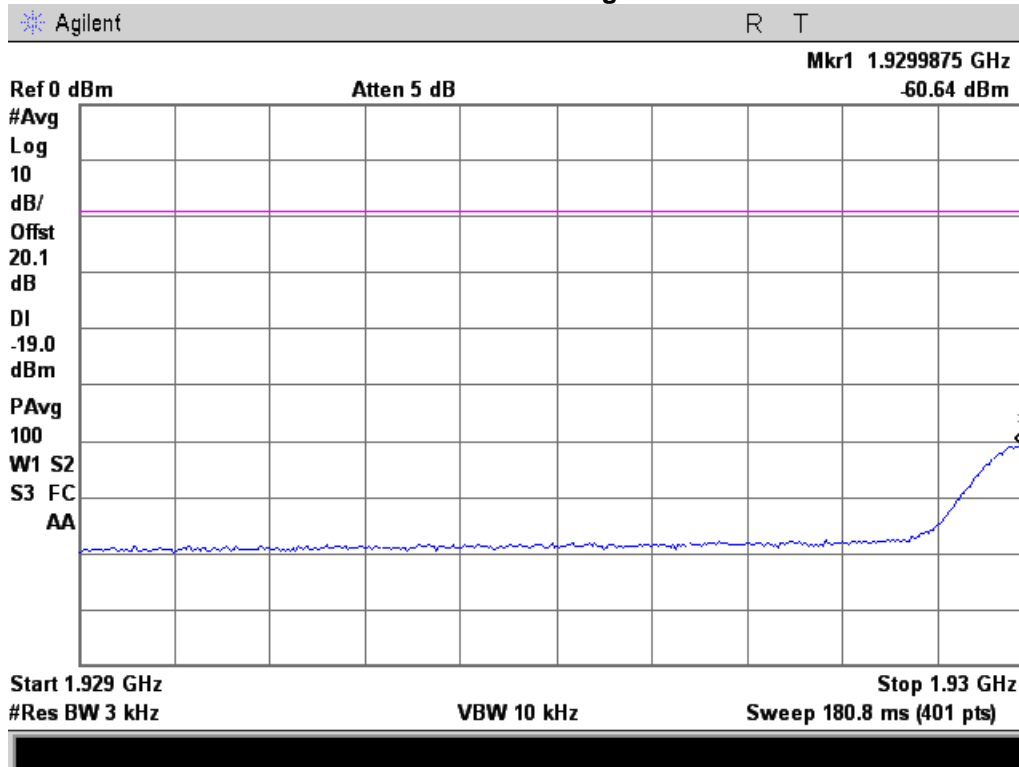
Upper Band Edge



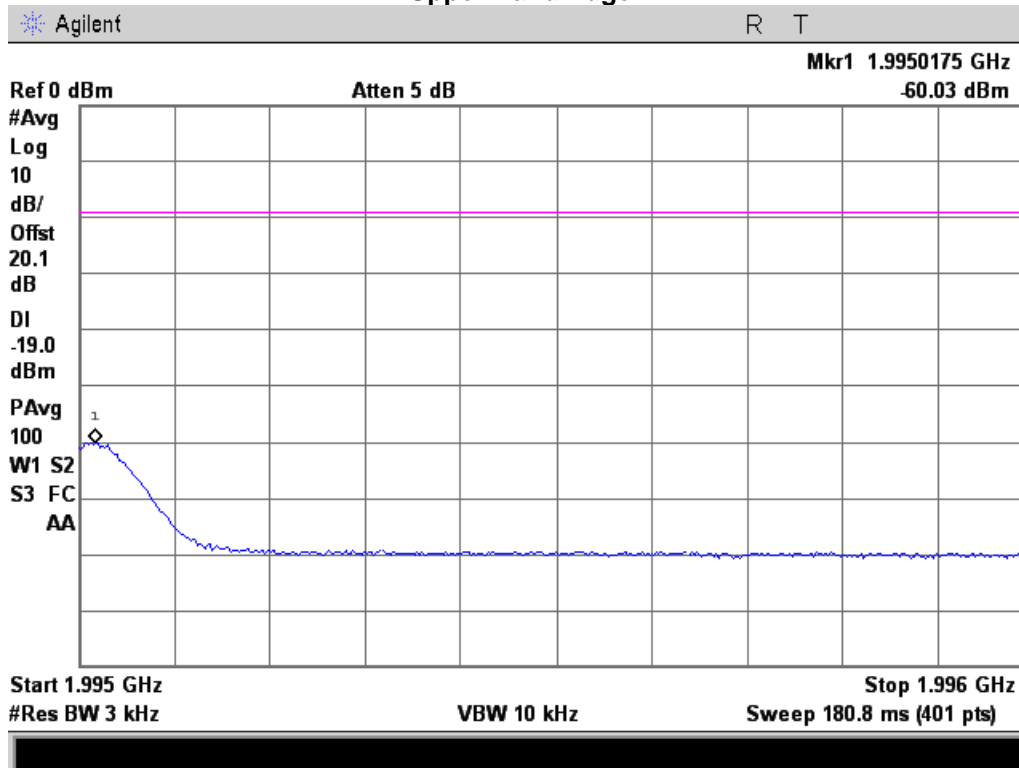


1930 - 1990 MHz Band

Lower Band Edge



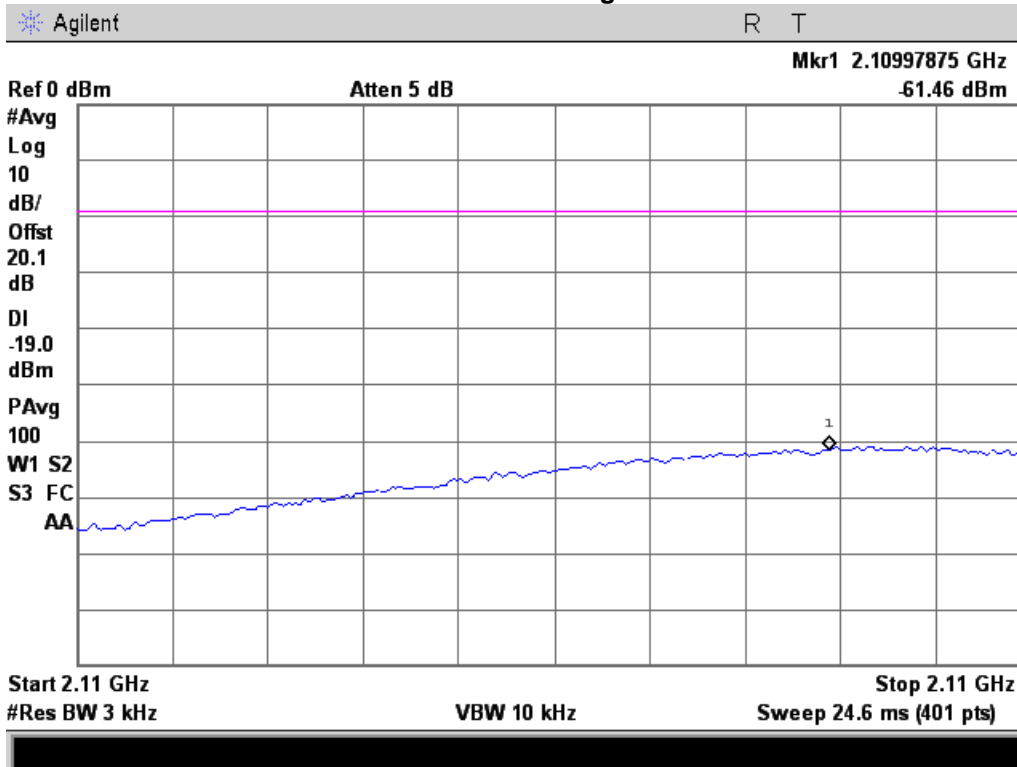
Upper Band Edge



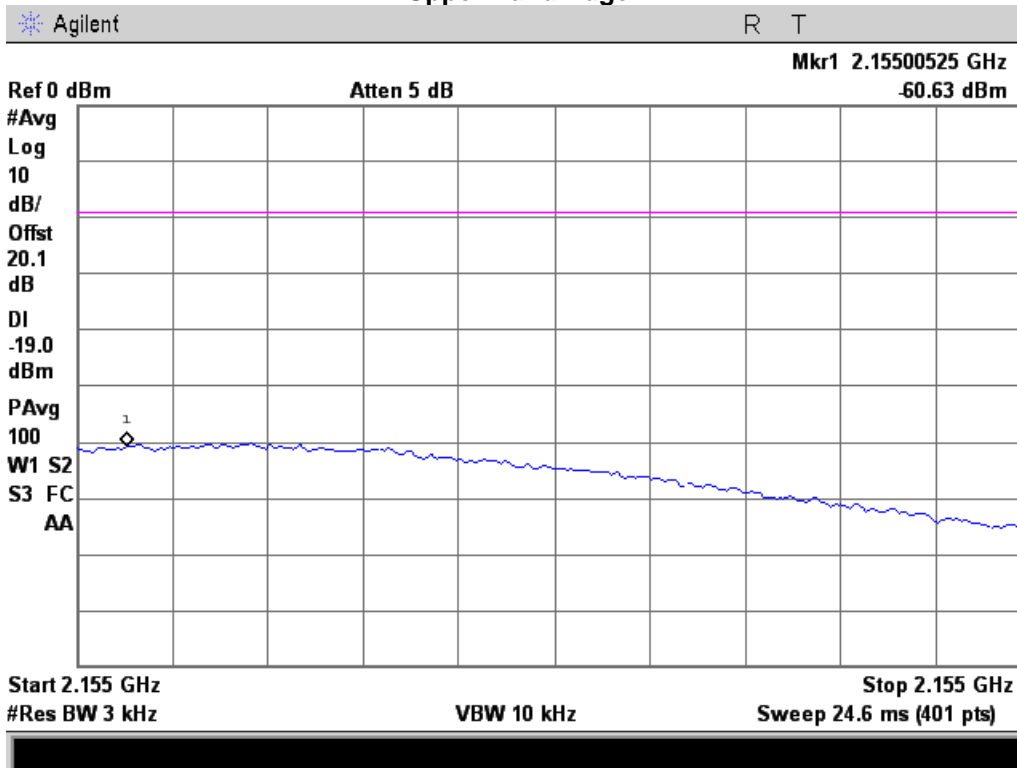


2110 - 2155 MHz Band

Lower Band Edge



Upper Band Edge

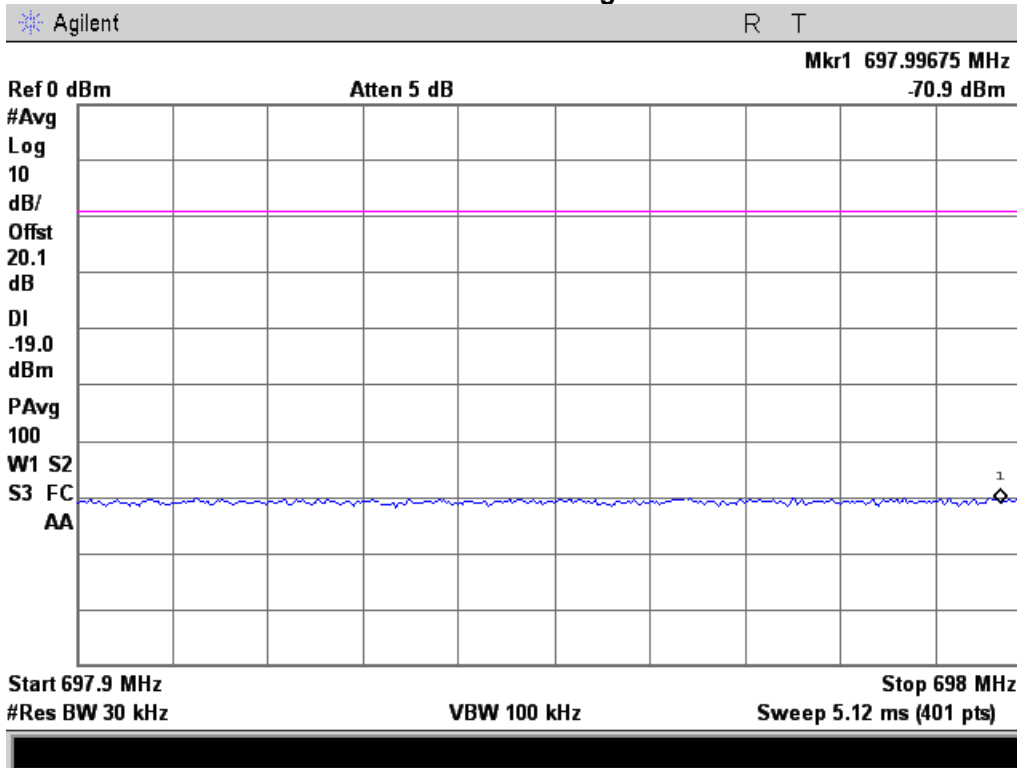




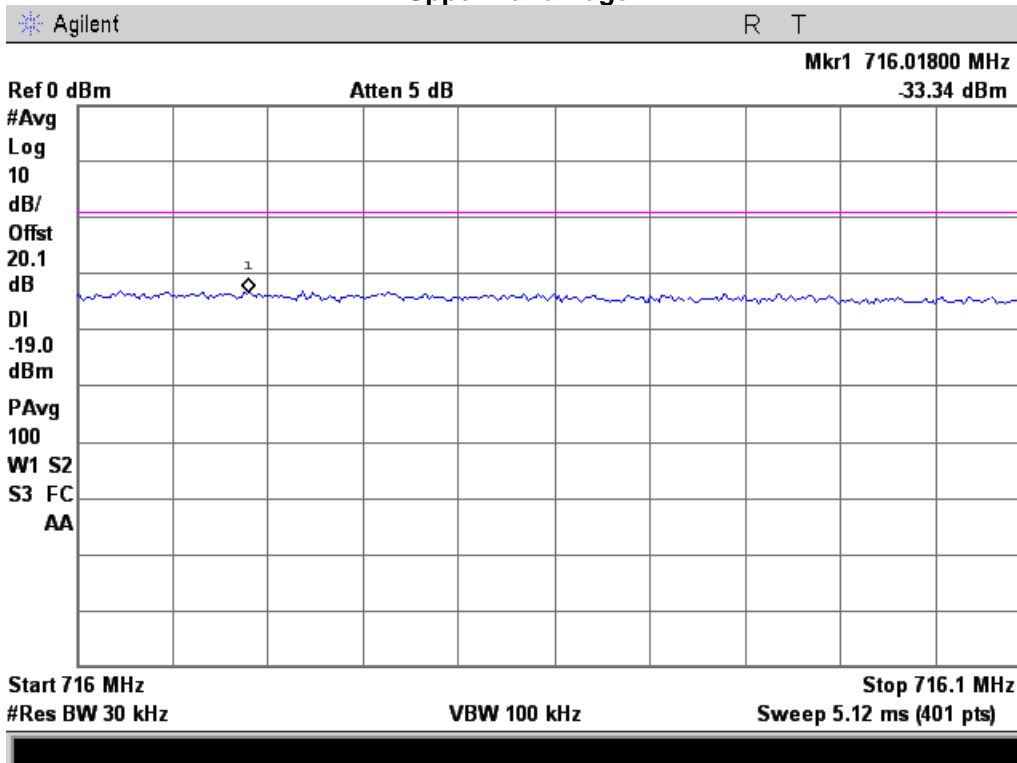
CDMA Uplink Test Plots

704 - 716 MHz Band

Lower Band Edge



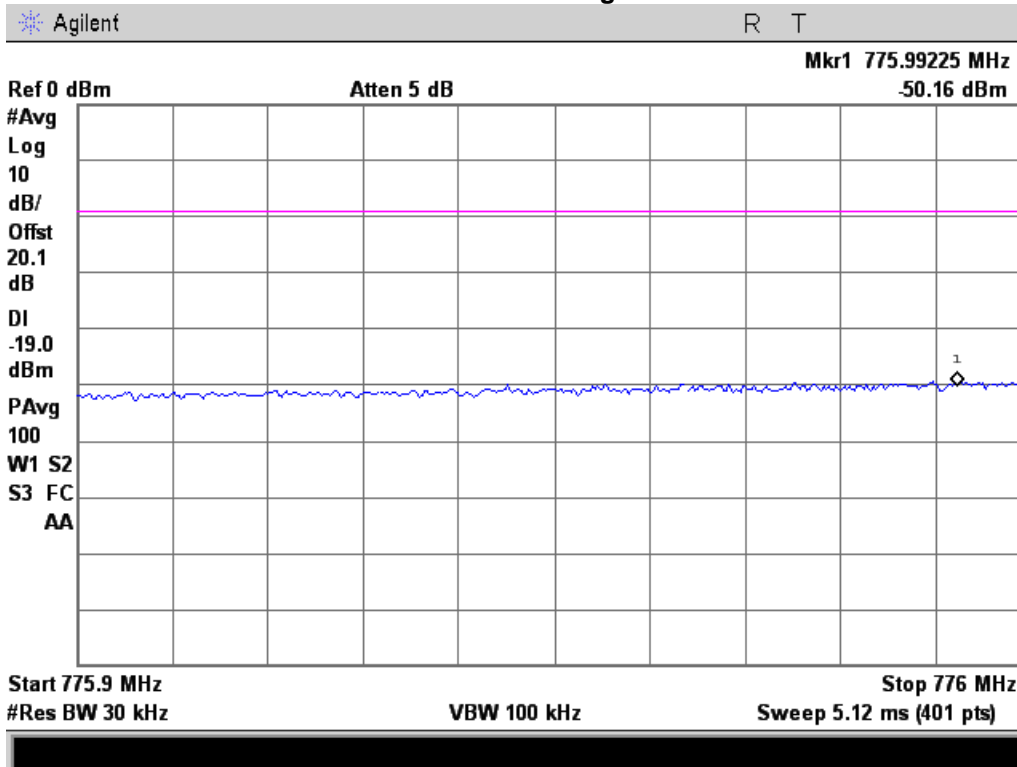
Upper Band Edge



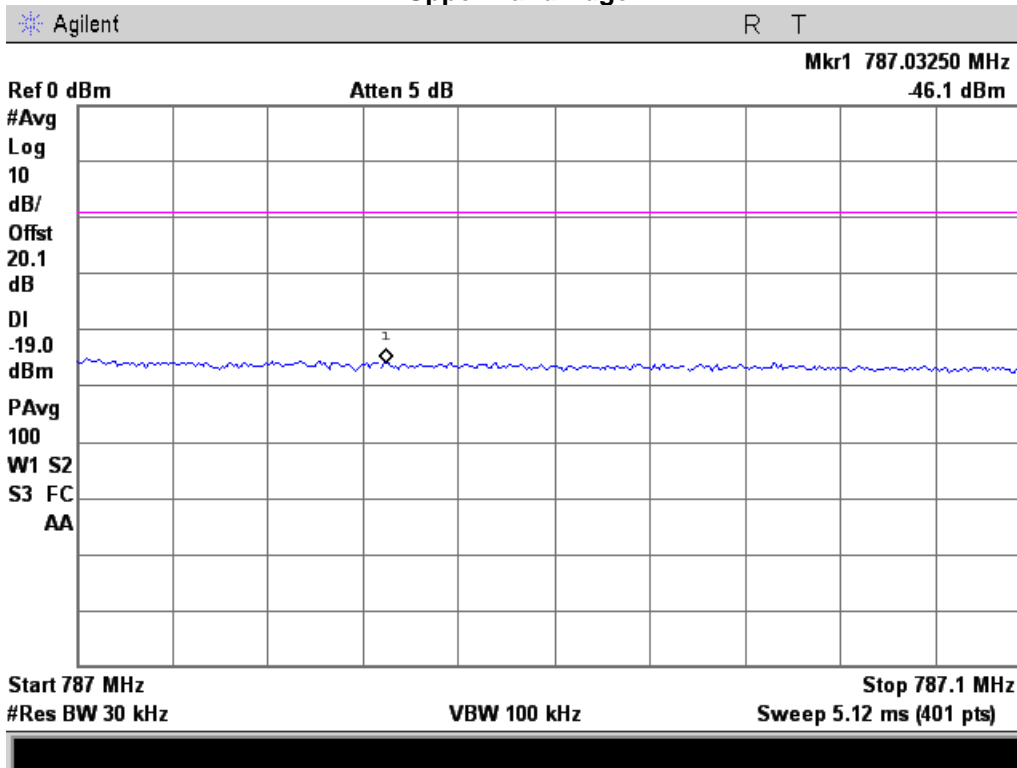


777 - 787 MHz Band

Lower Band Edge



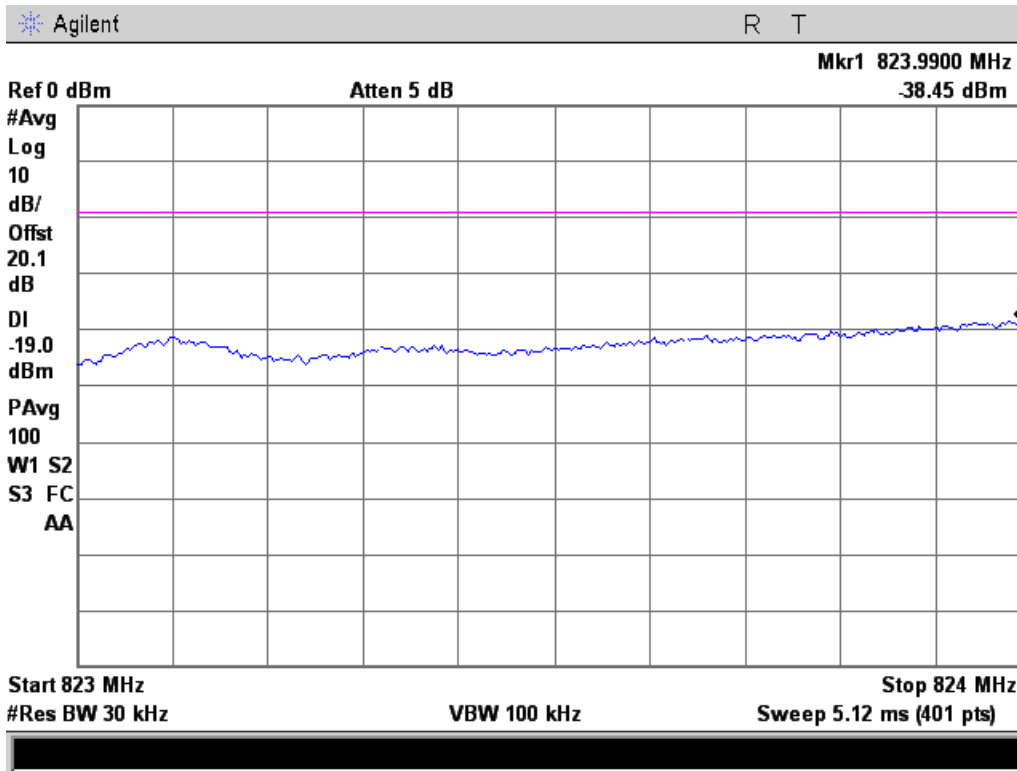
Upper Band Edge



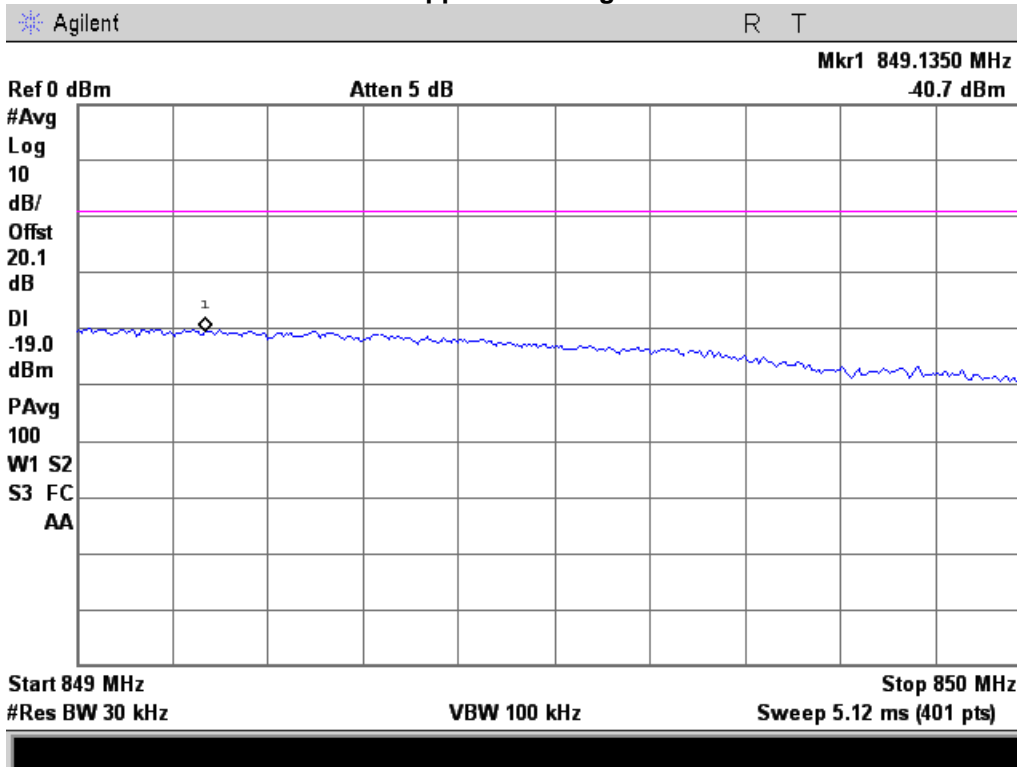


824 - 849 MHz Band

Lower Band Edge



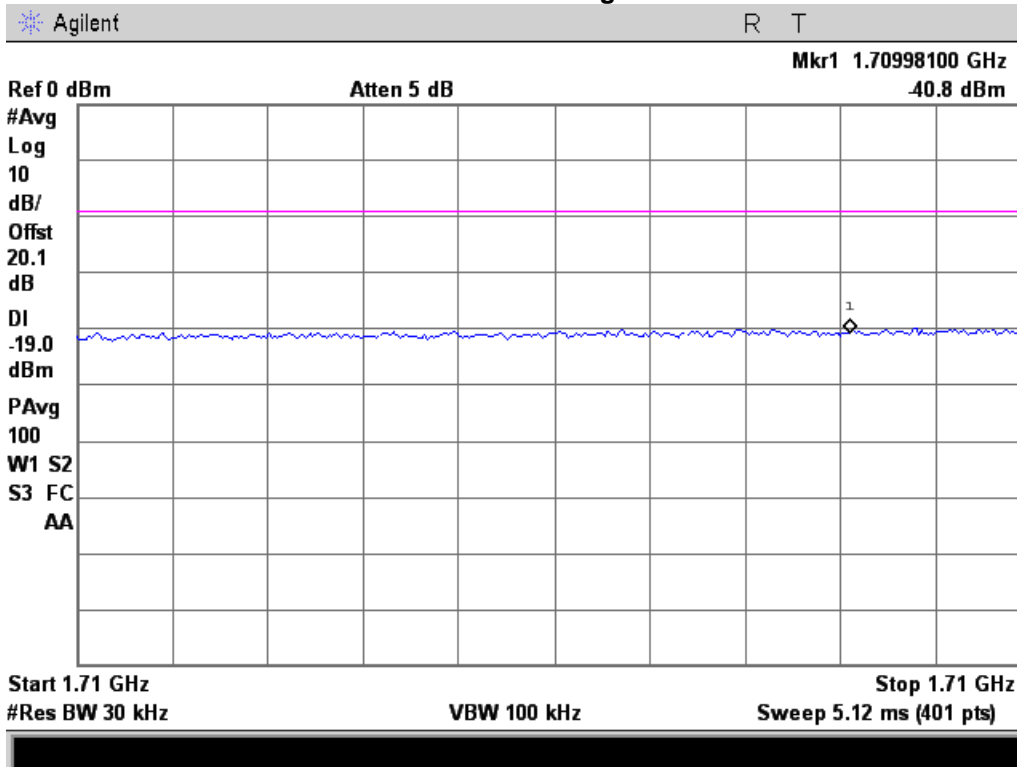
Upper Band Edge



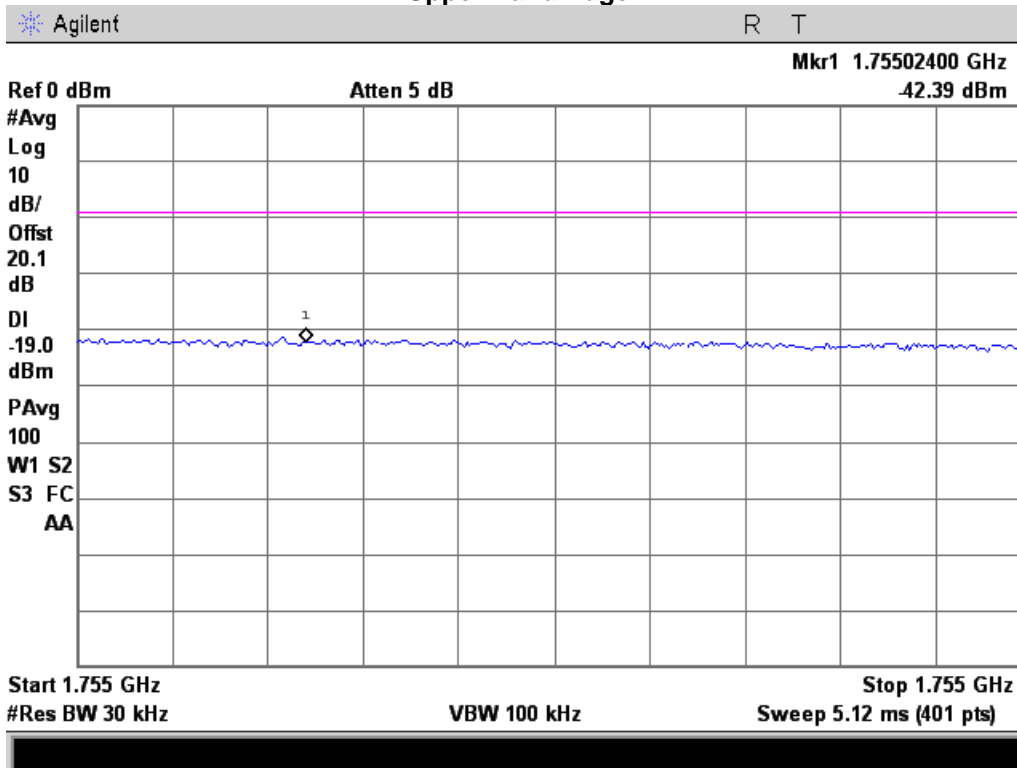


1710 - 1755 MHz Band

Lower Band Edge



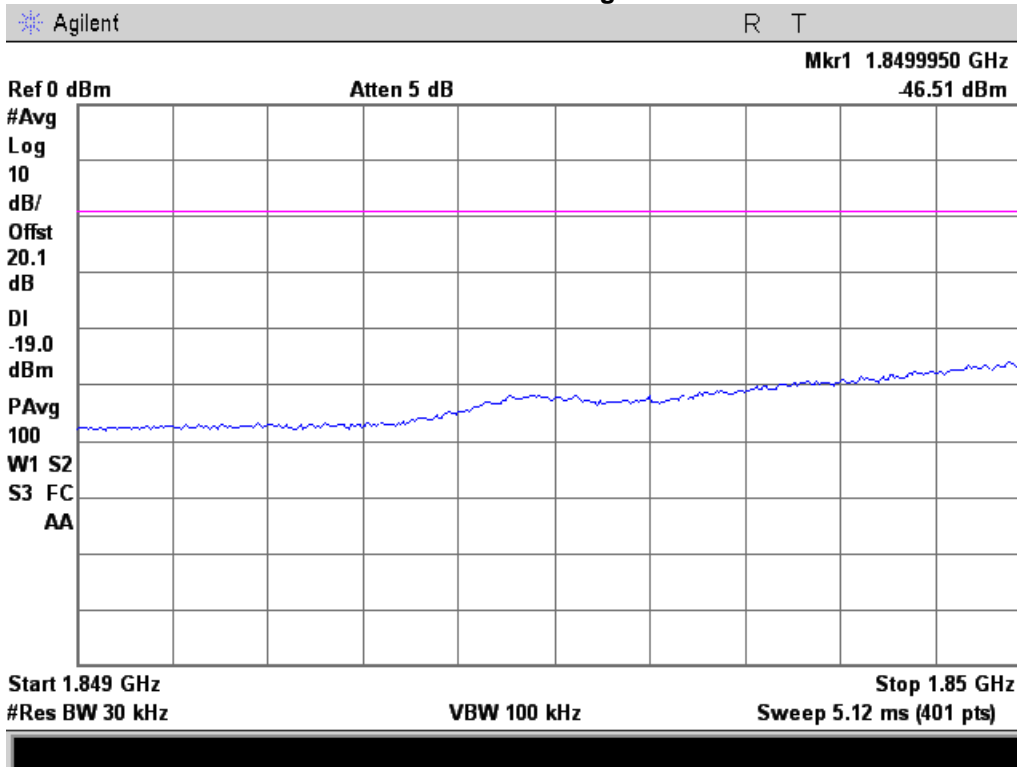
Upper Band Edge



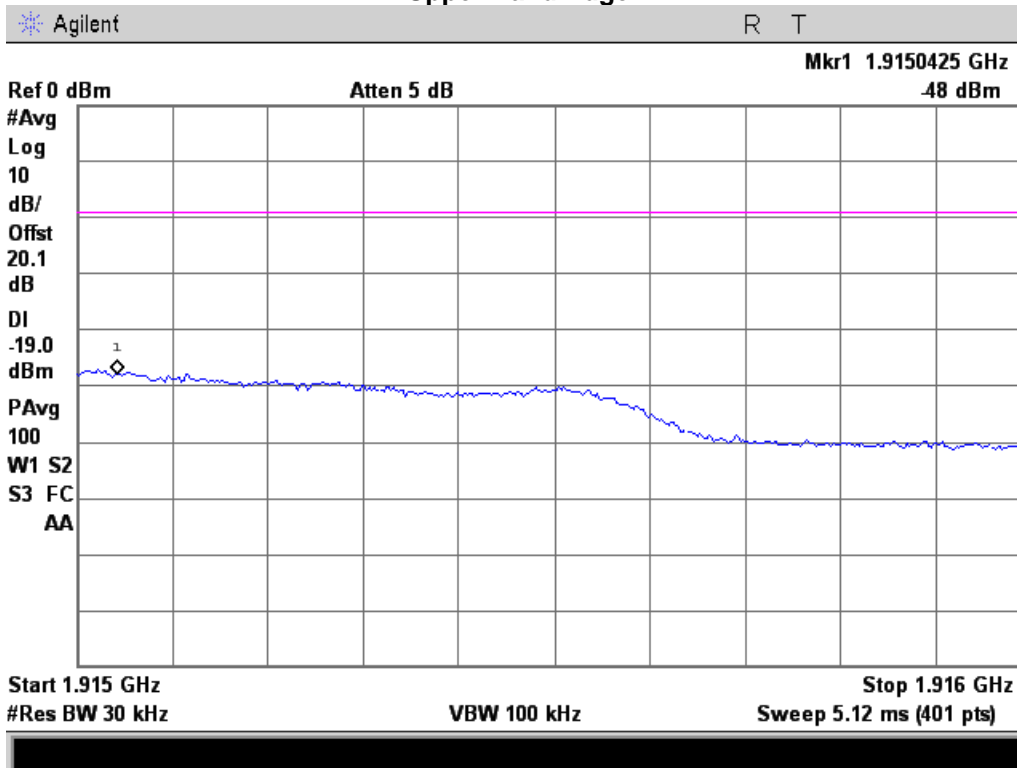


1850 - 1910 MHz Band

Lower Band Edge



Upper Band Edge

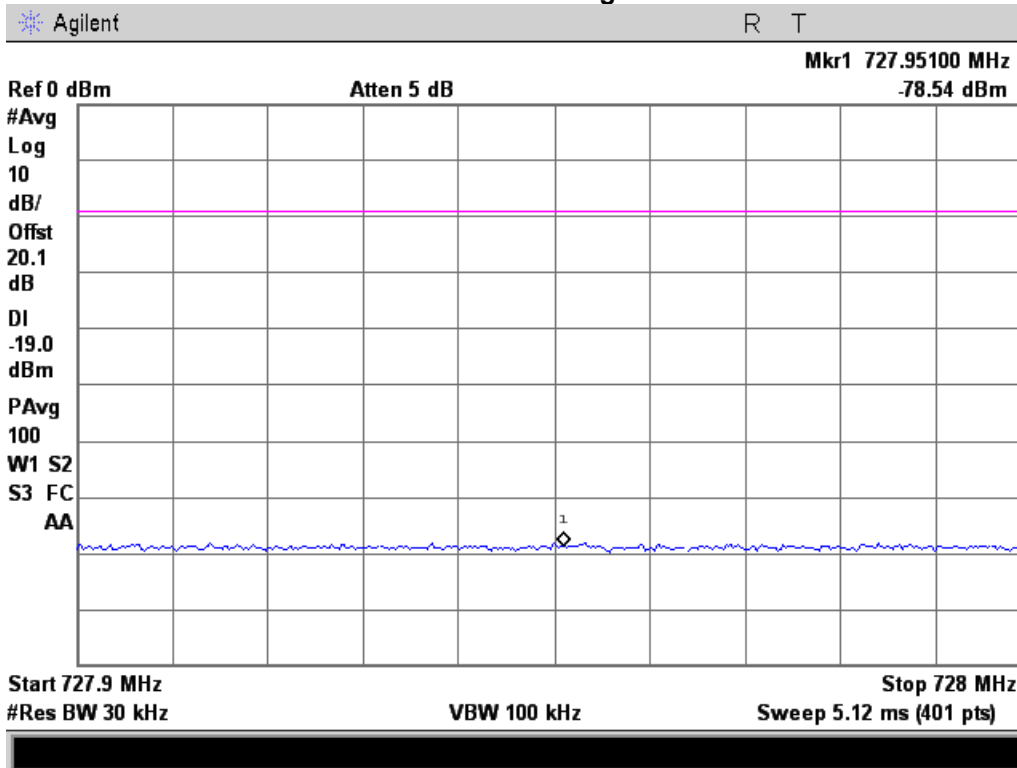




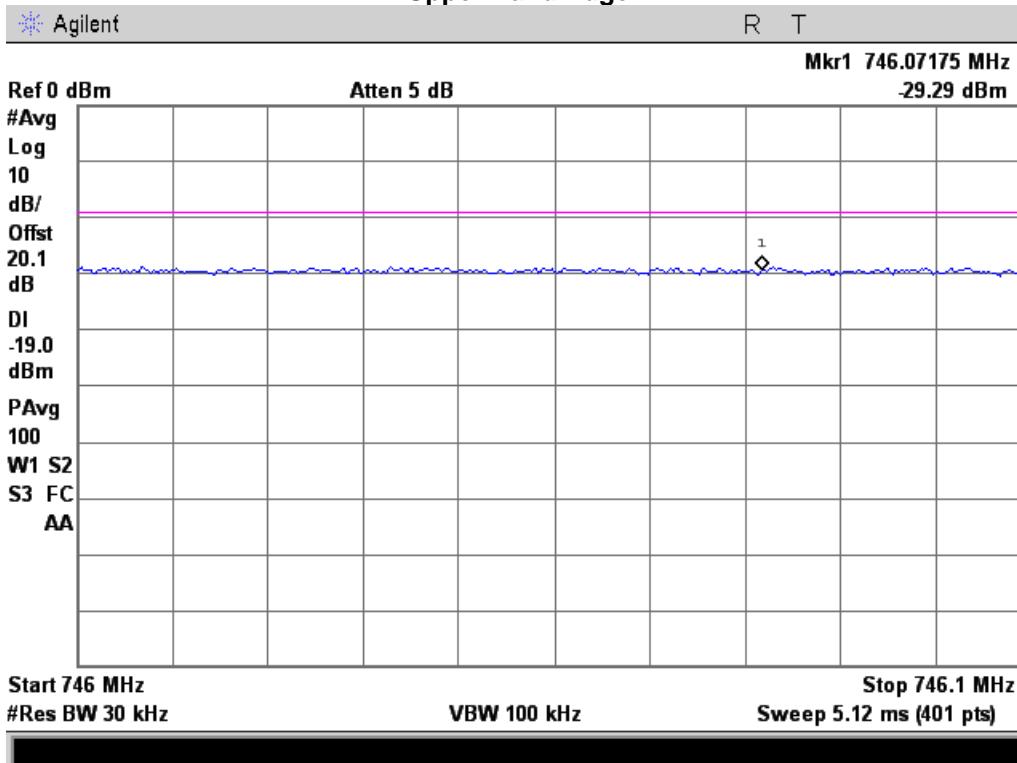
CDMA Downlink Test Plots

728 - 746 MHz Band

Lower Band Edge



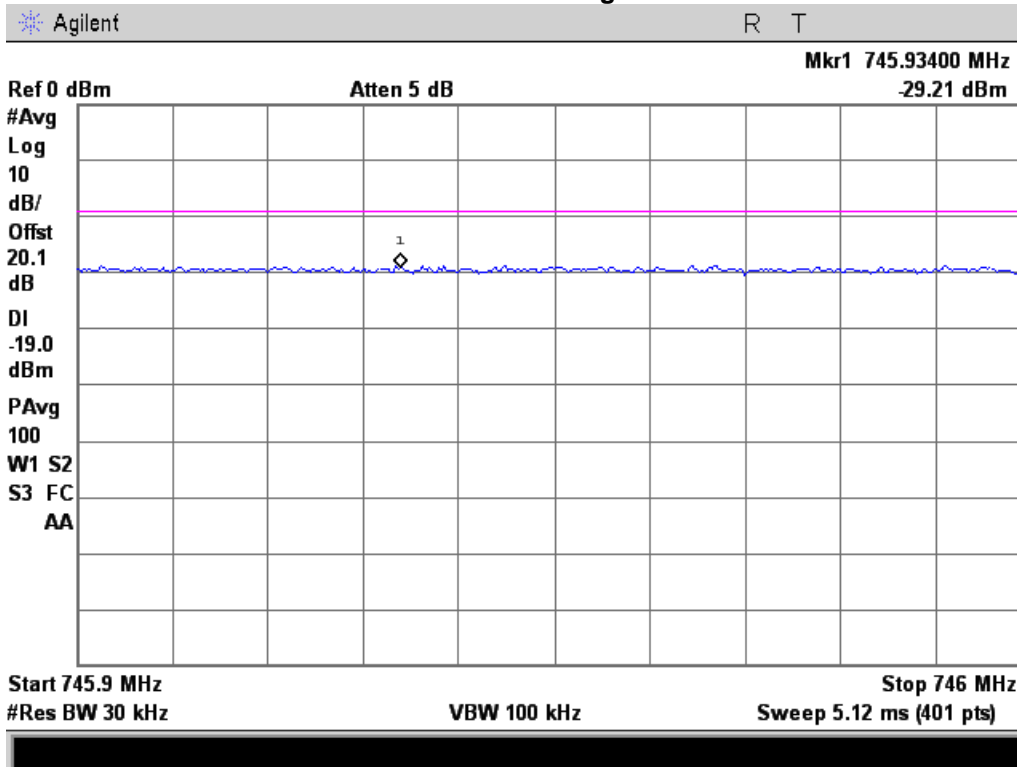
Upper Band Edge



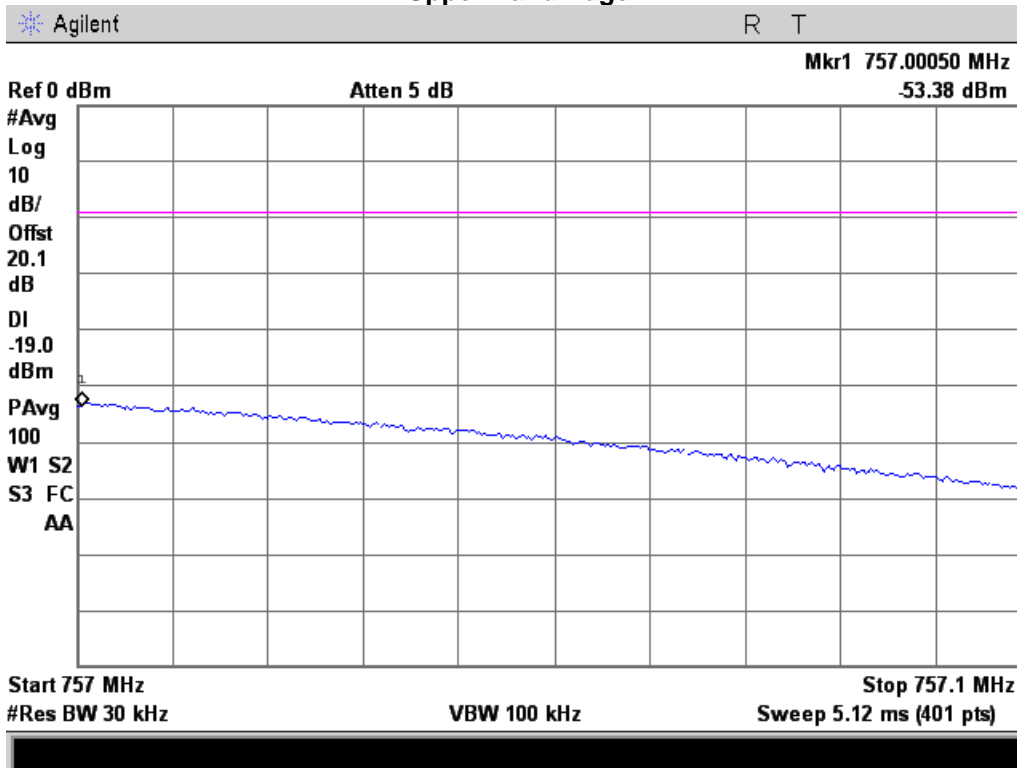


746 - 757 MHz Band

Lower Band Edge



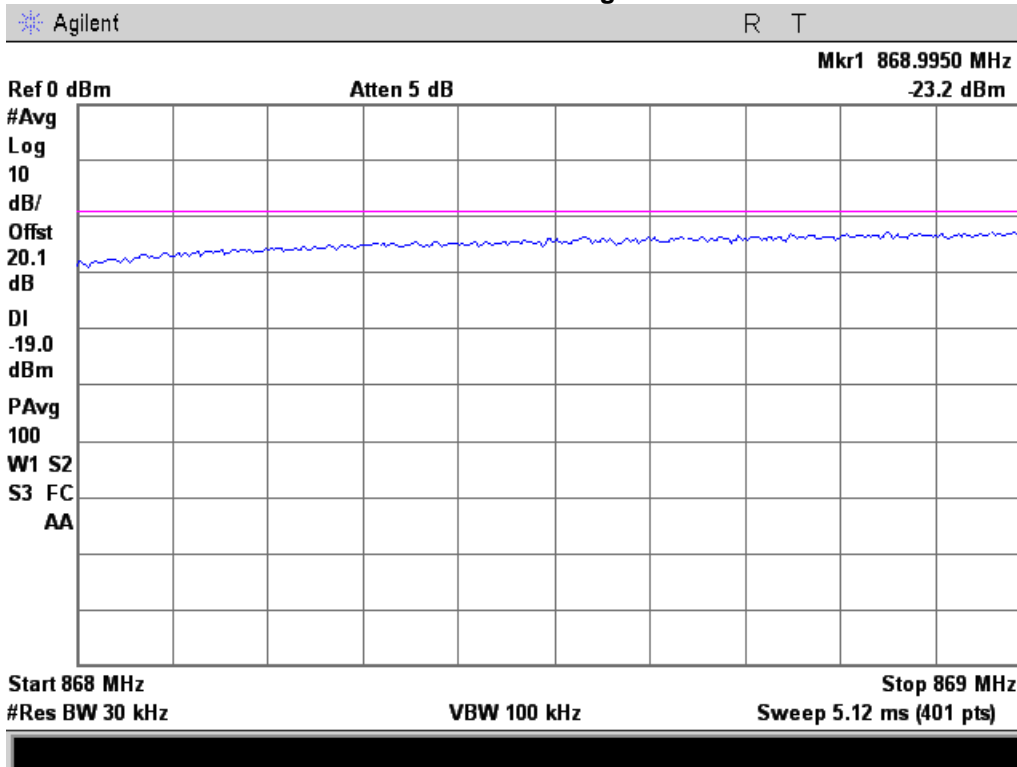
Upper Band Edge



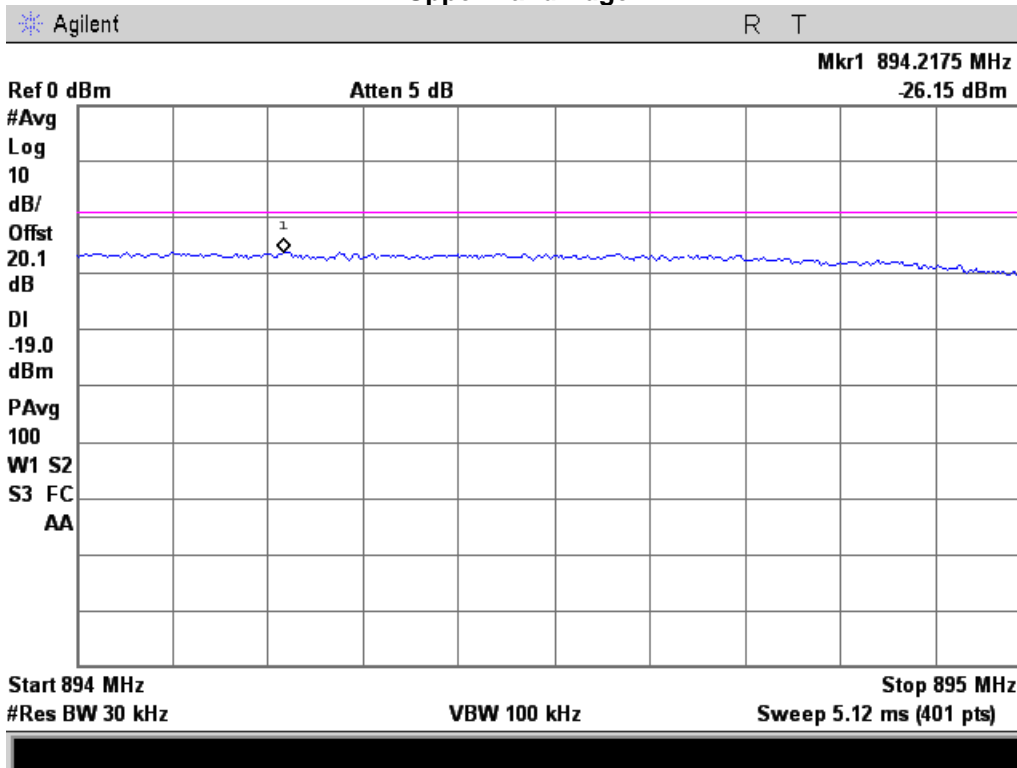


869 - 894 MHz Band

Lower Band Edge



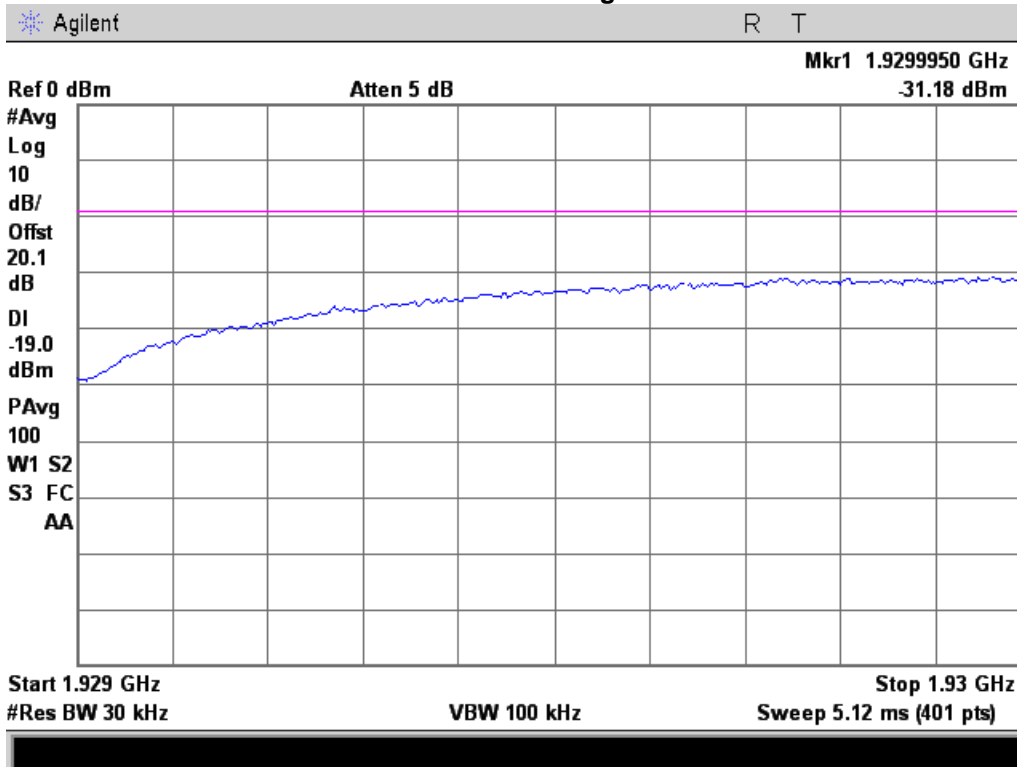
Upper Band Edge



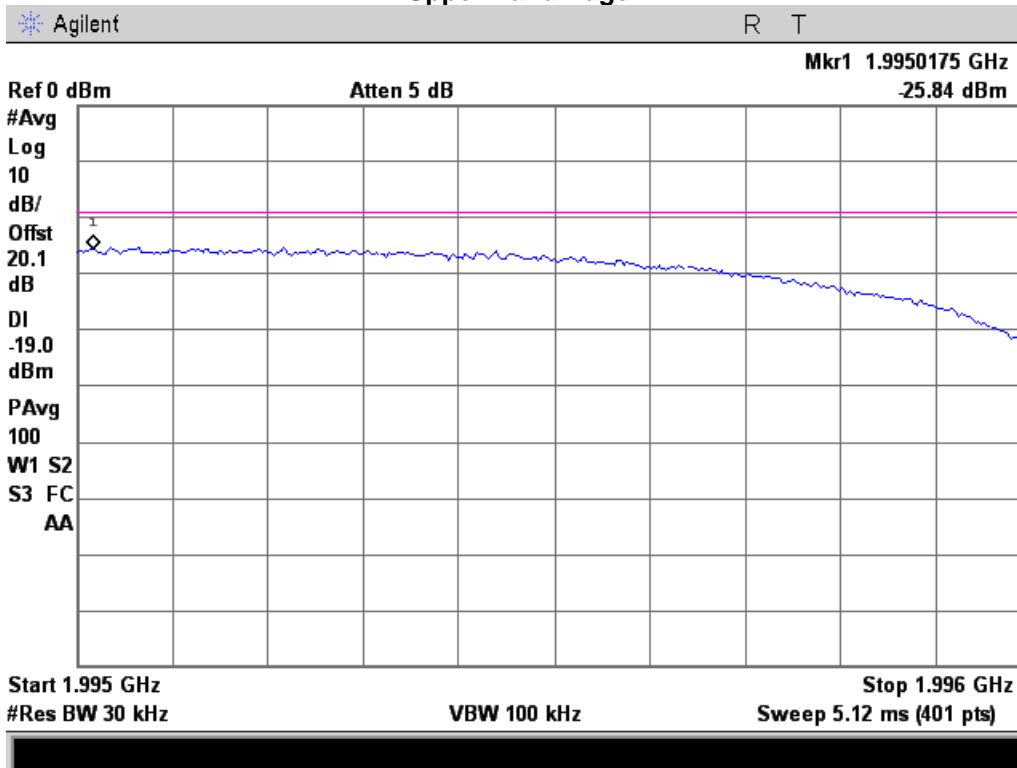


1930 - 1990 MHz Band

Lower Band Edge



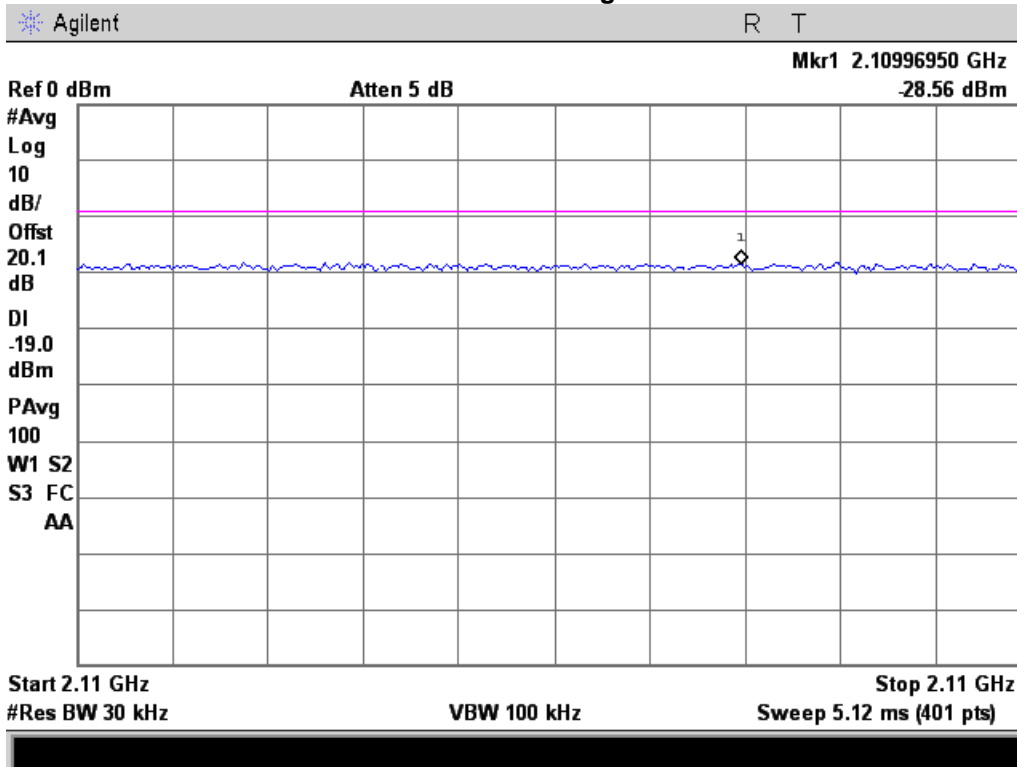
Upper Band Edge



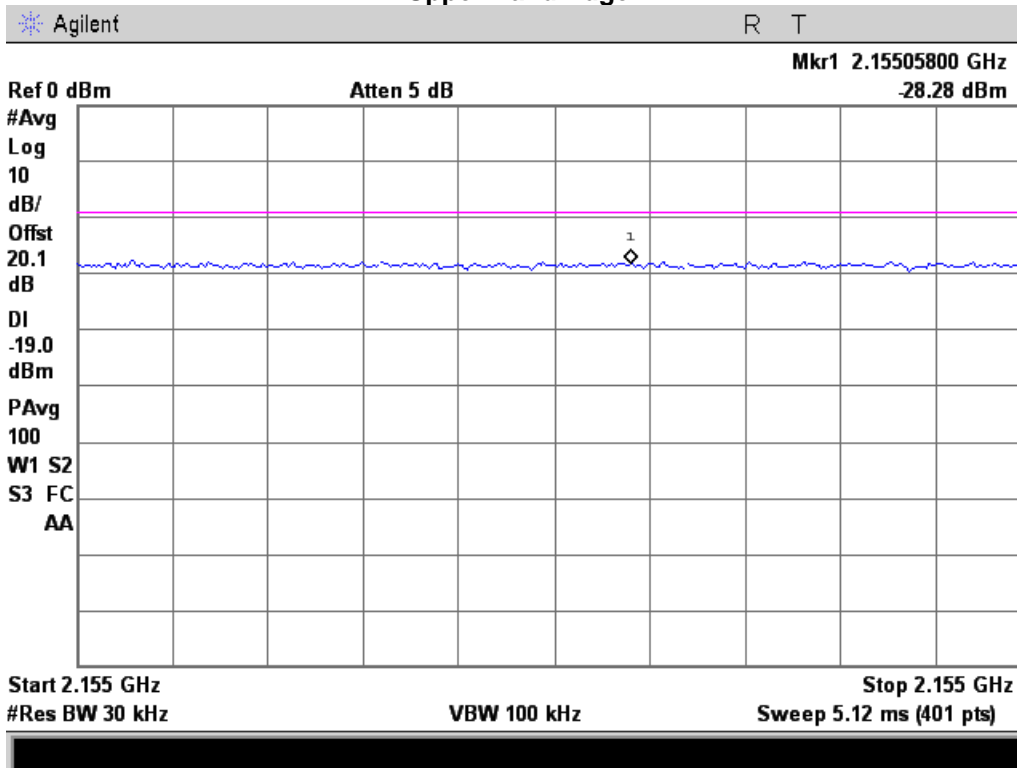


2110 - 2155 MHz Band

Lower Band Edge



Upper Band Edge

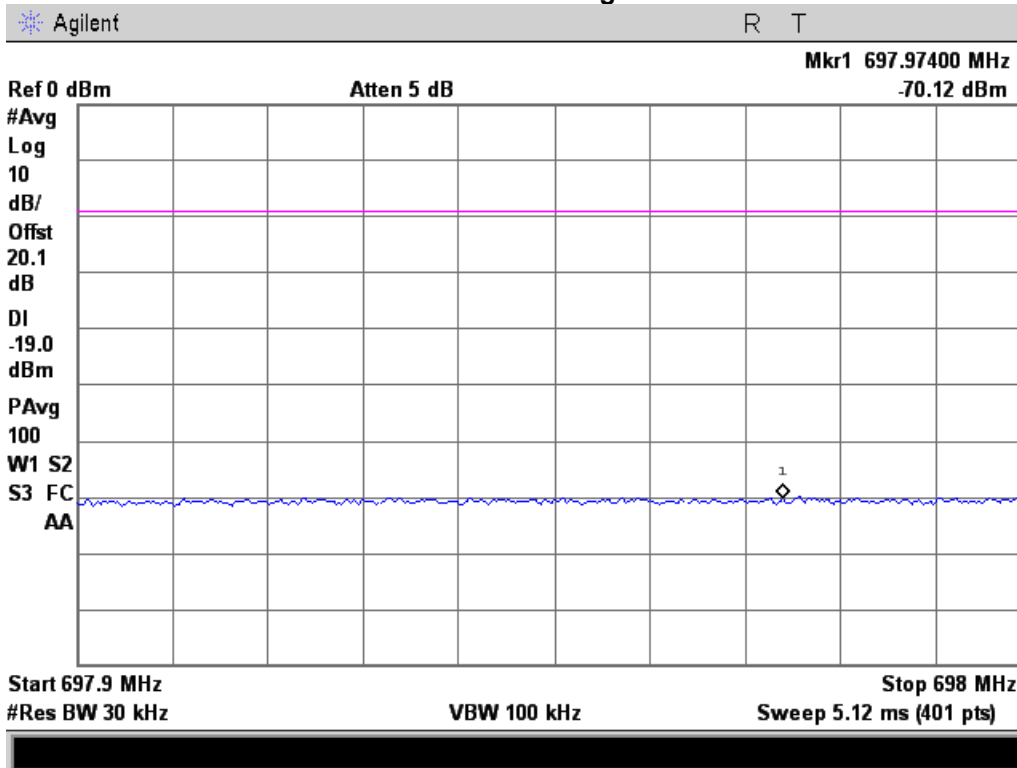




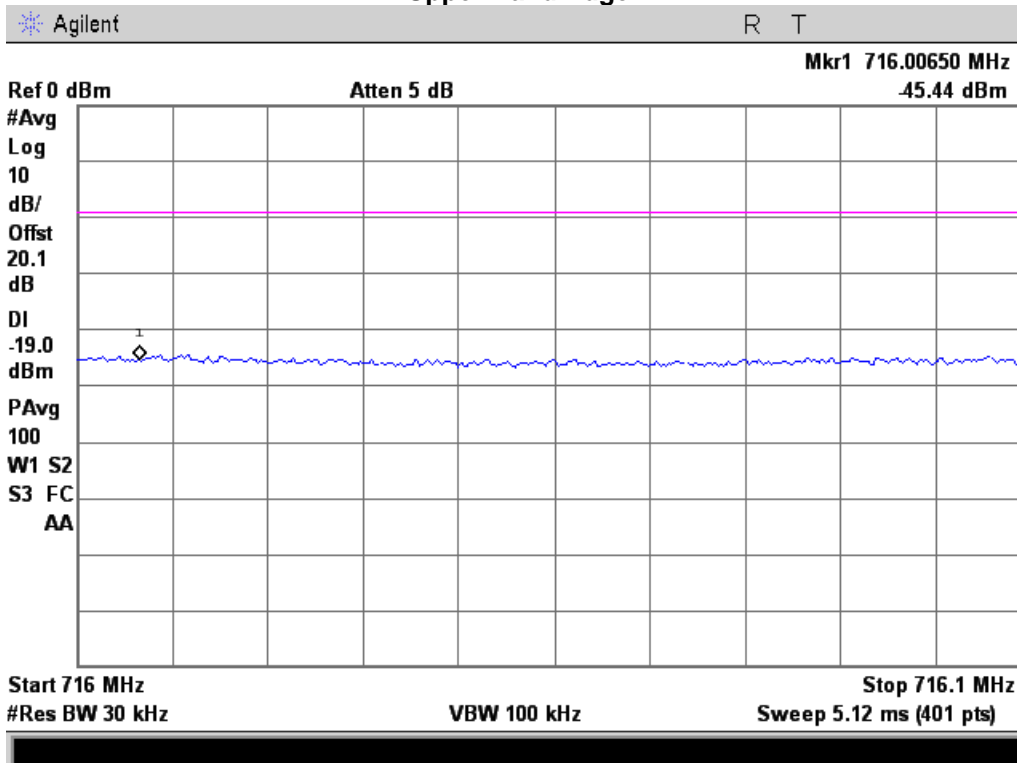
WCDMA Uplink Test Plots

704 - 716 MHz Band

Lower Band Edge



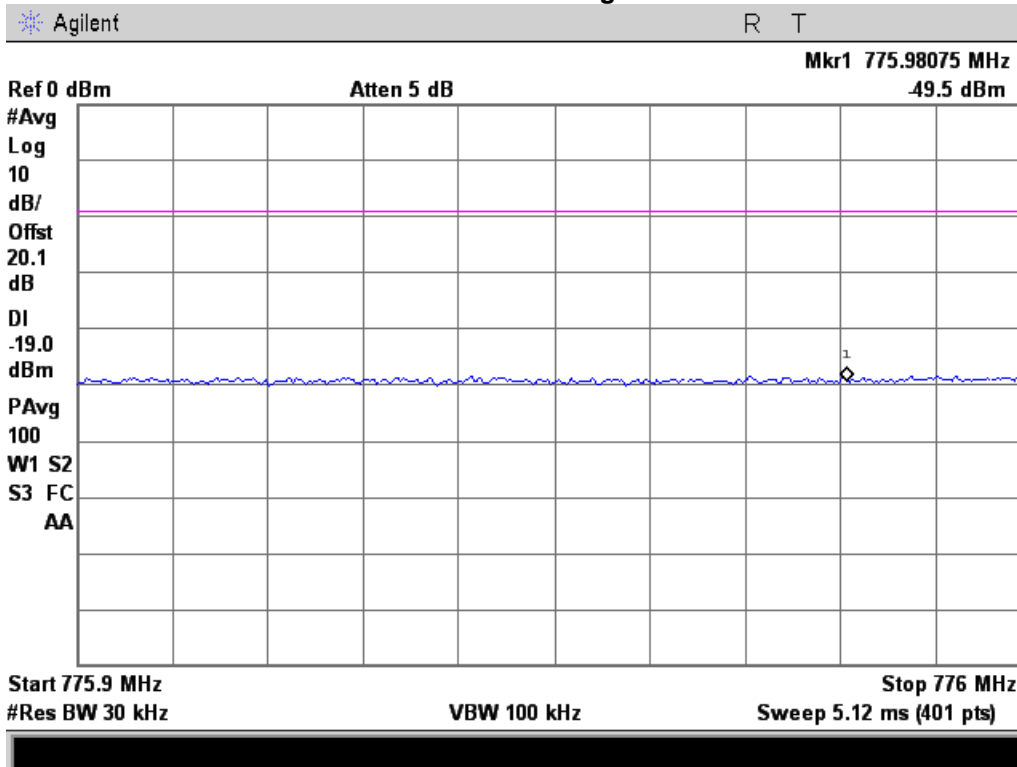
Upper Band Edge



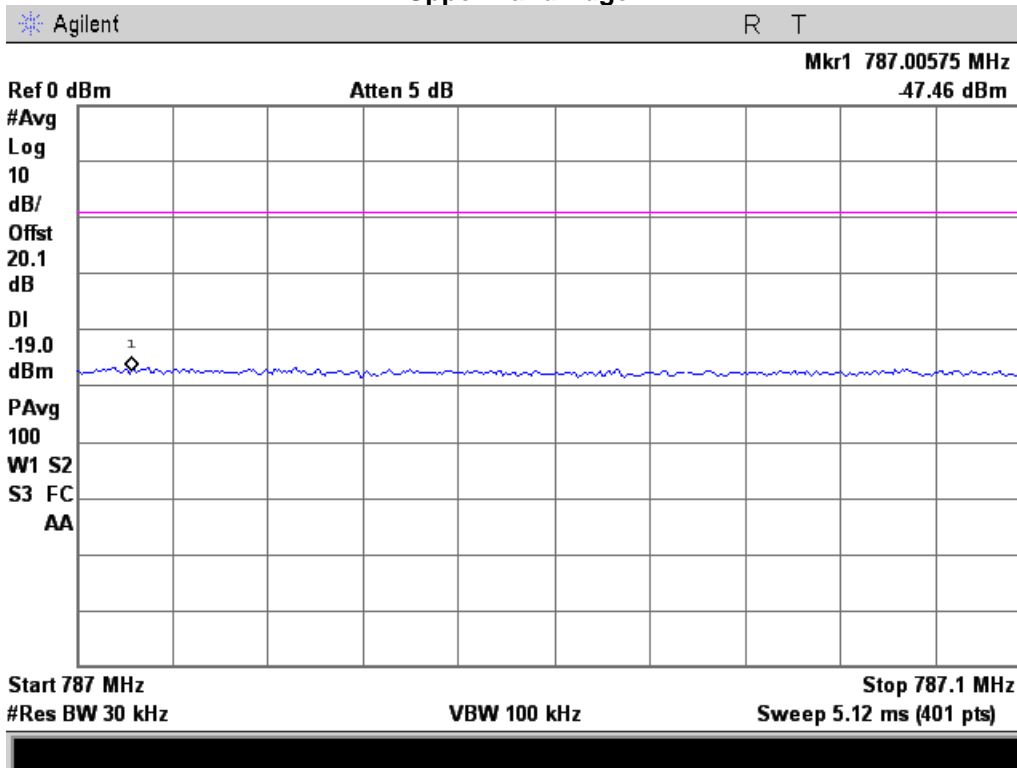


777 - 787 MHz Band

Lower Band Edge



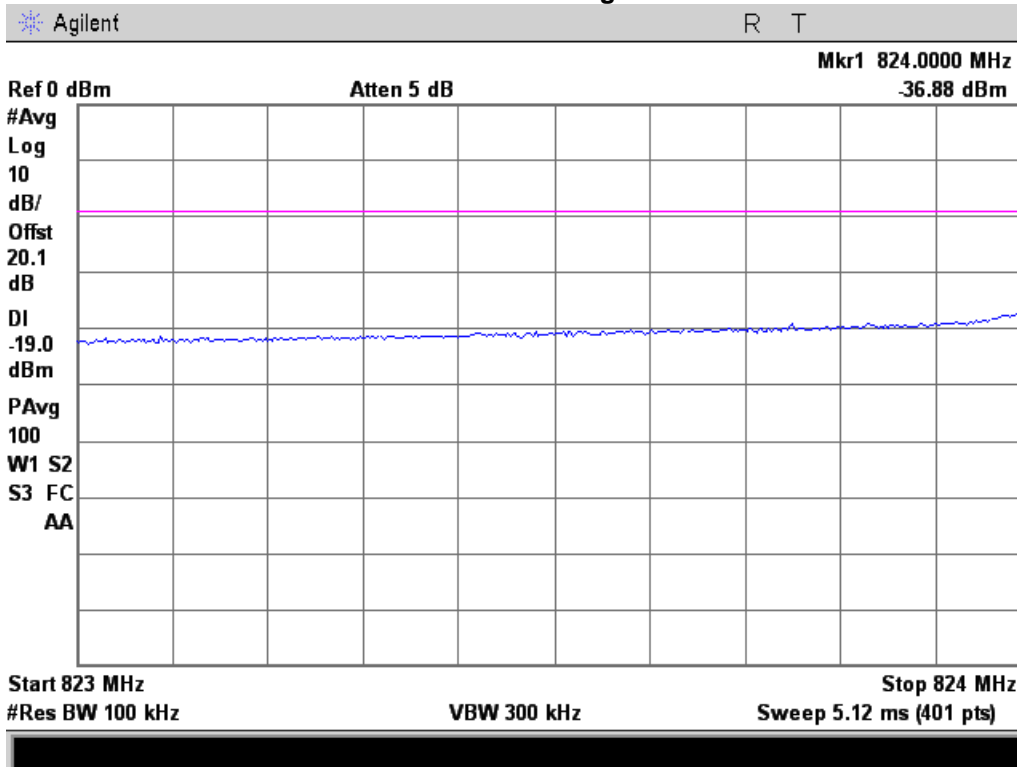
Upper Band Edge



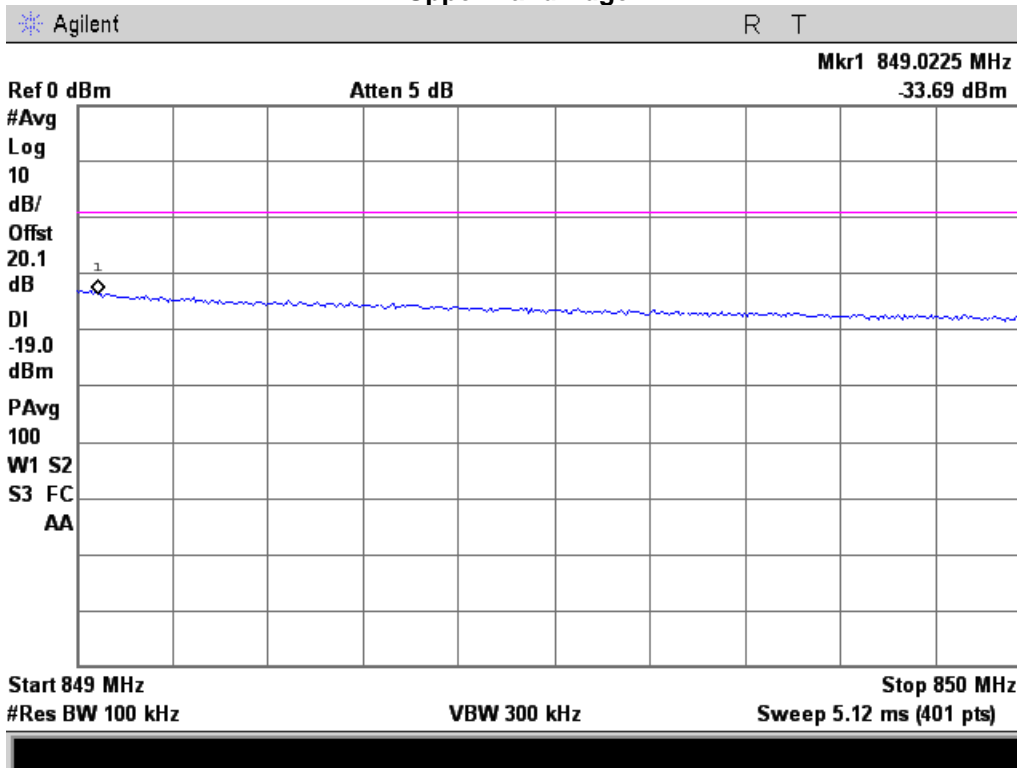


824 - 849 MHz Band

Lower Band Edge



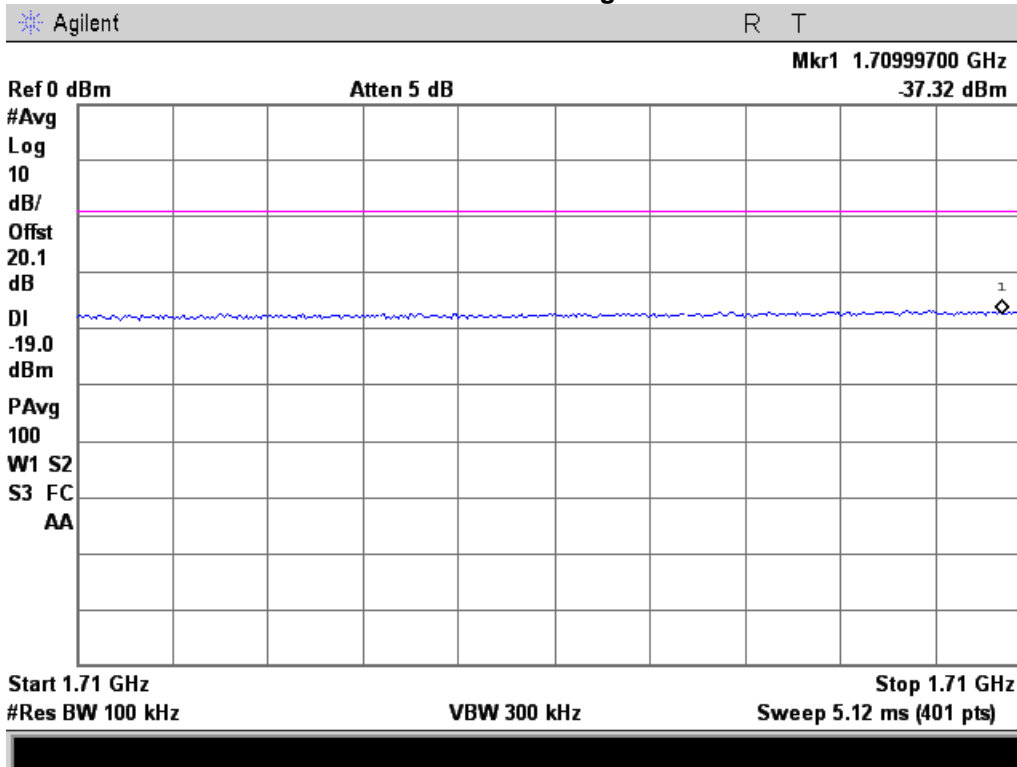
Upper Band Edge



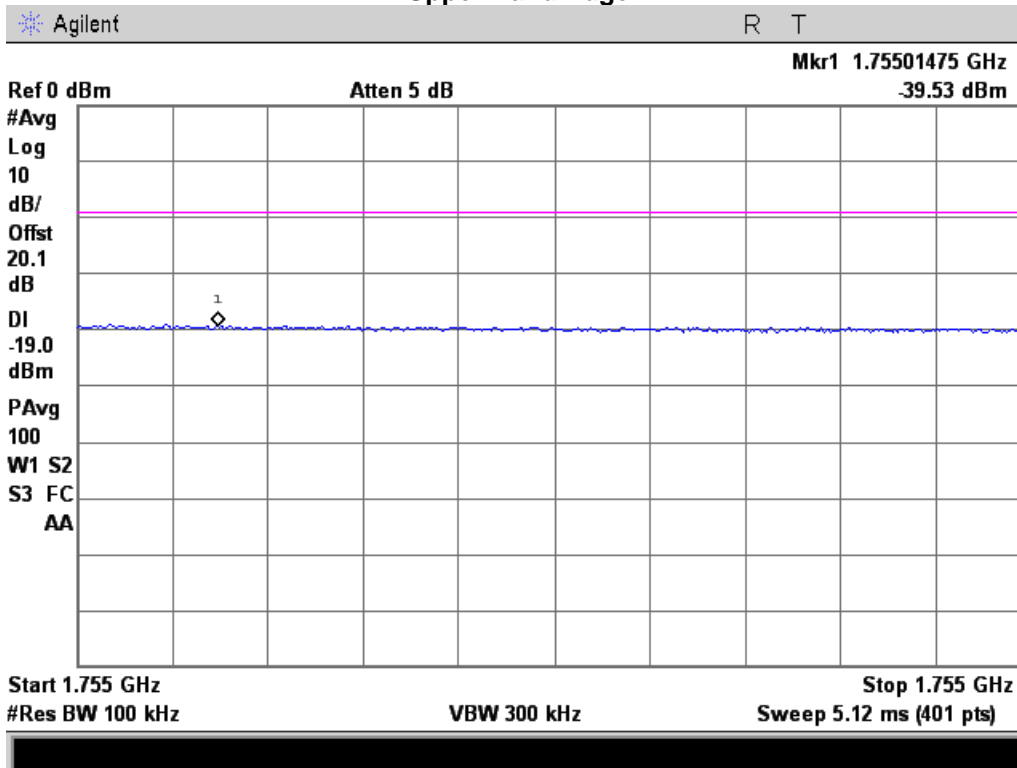


1710 - 1755 MHz Band

Lower Band Edge



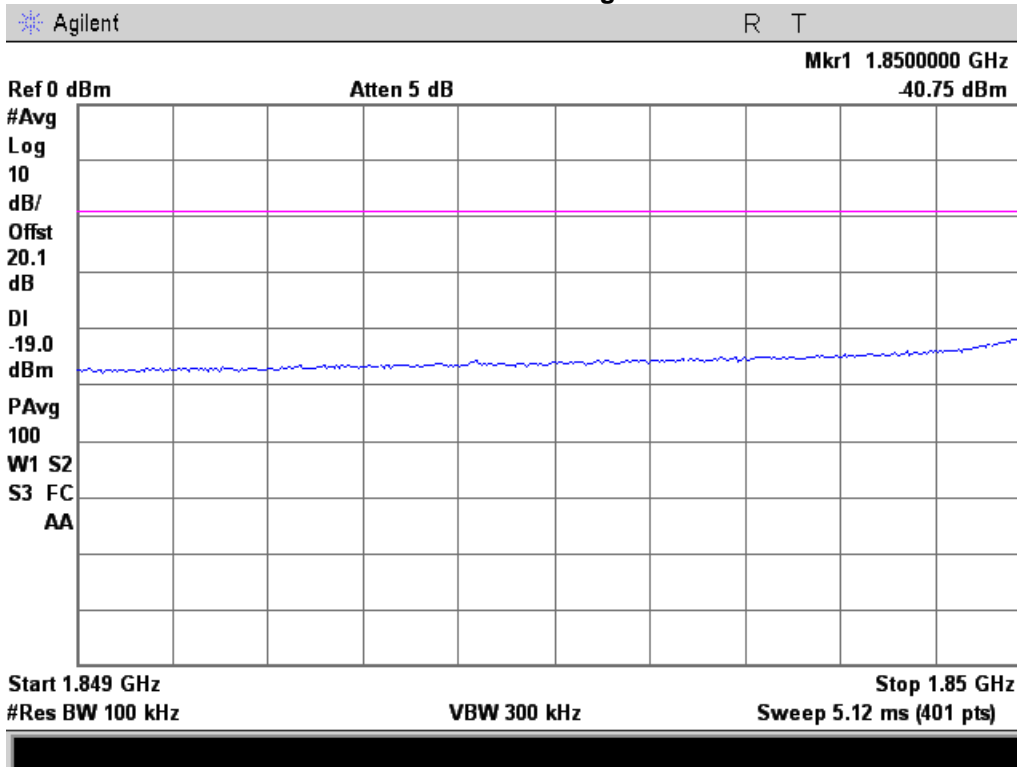
Upper Band Edge



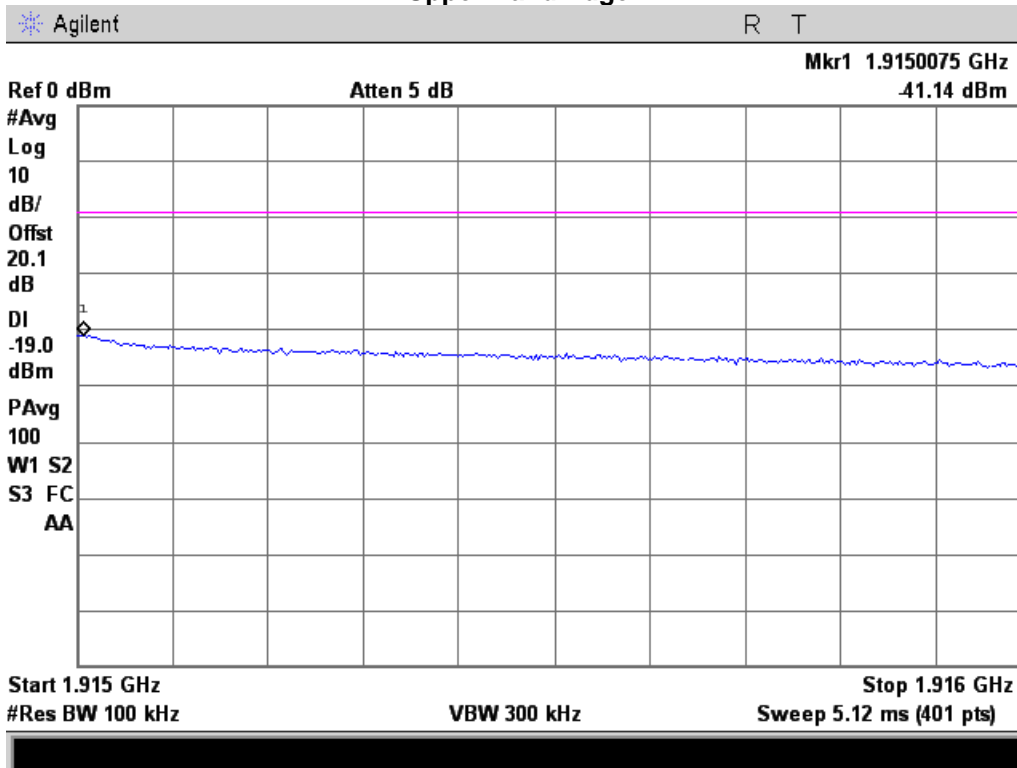


1850 - 1910 MHz Band

Lower Band Edge



Upper Band Edge

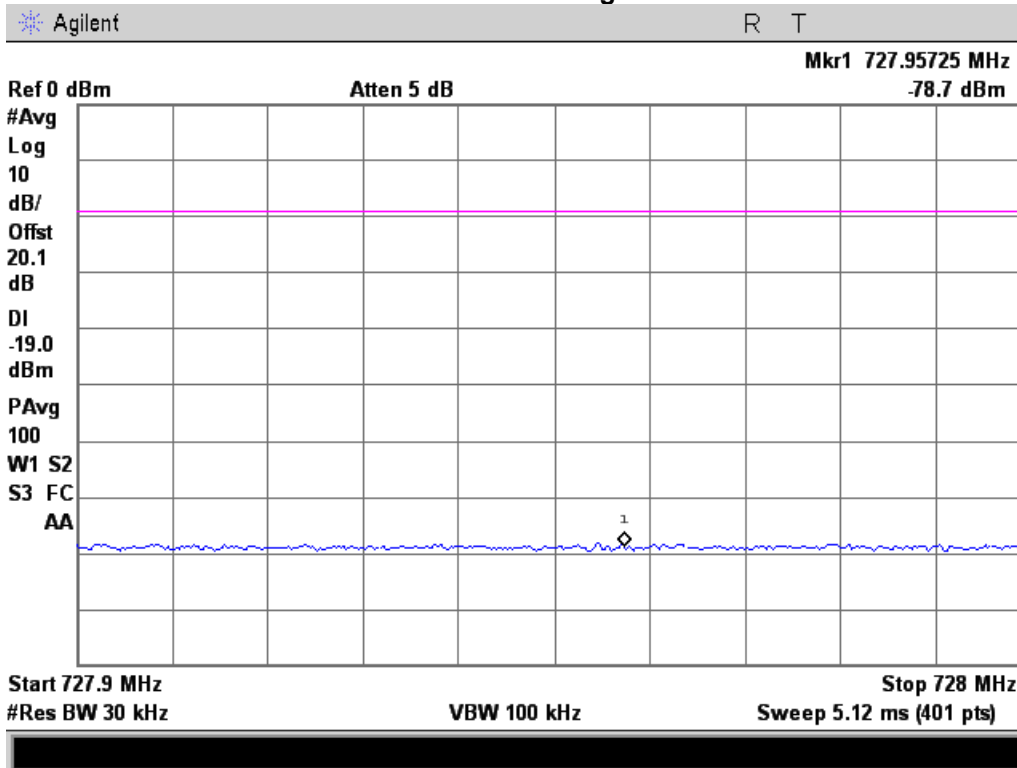




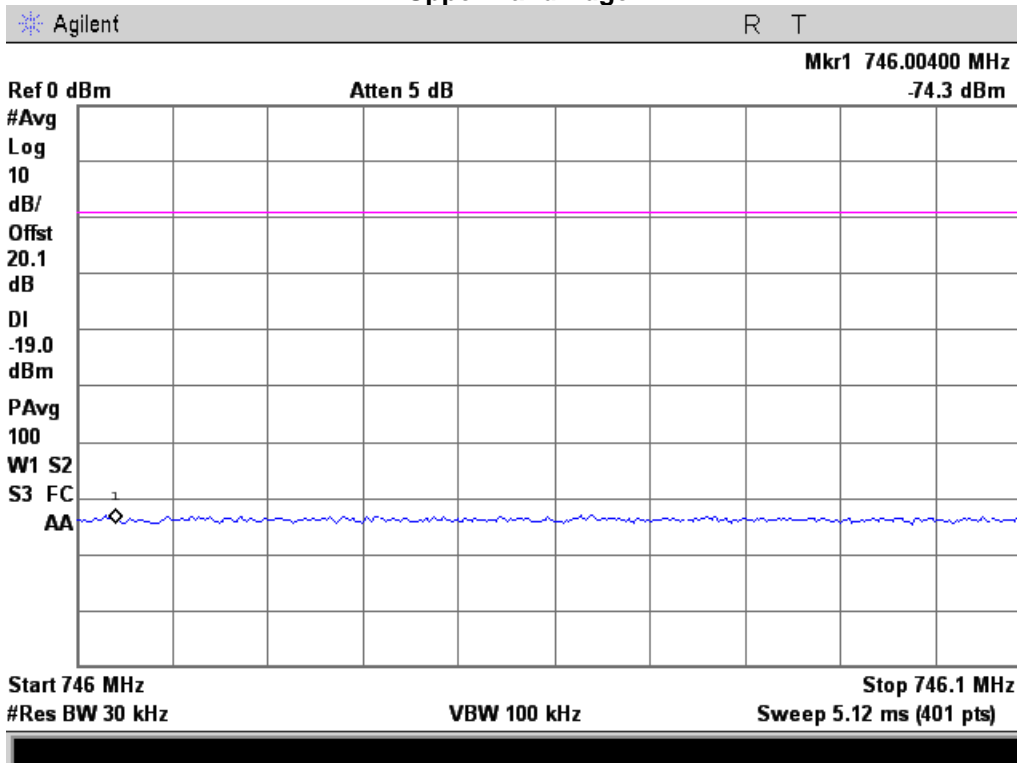
WCDMA Downlink Test Plots

728 - 746 MHz Band

Lower Band Edge



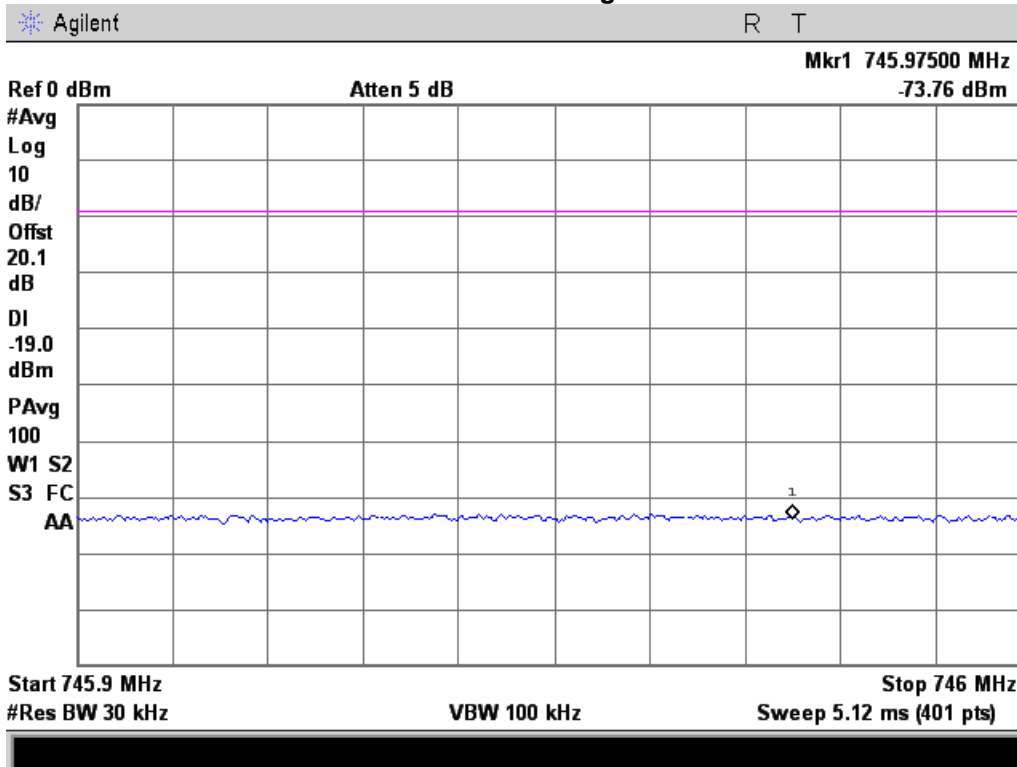
Upper Band Edge



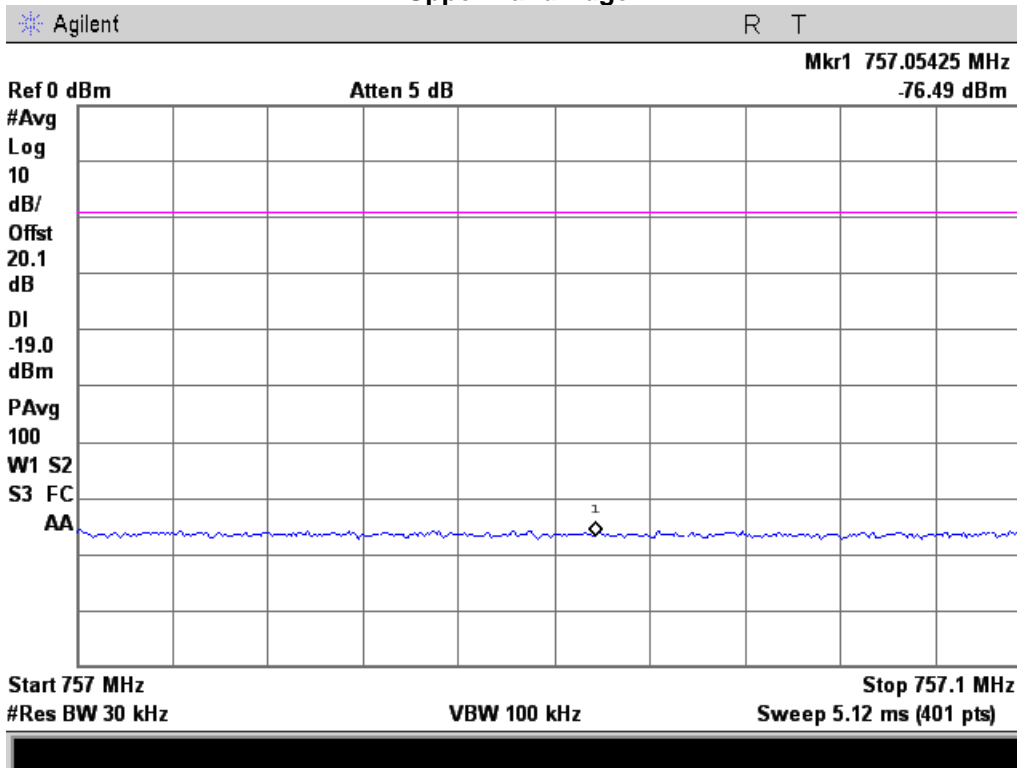


746 - 757 MHz Band

Lower Band Edge



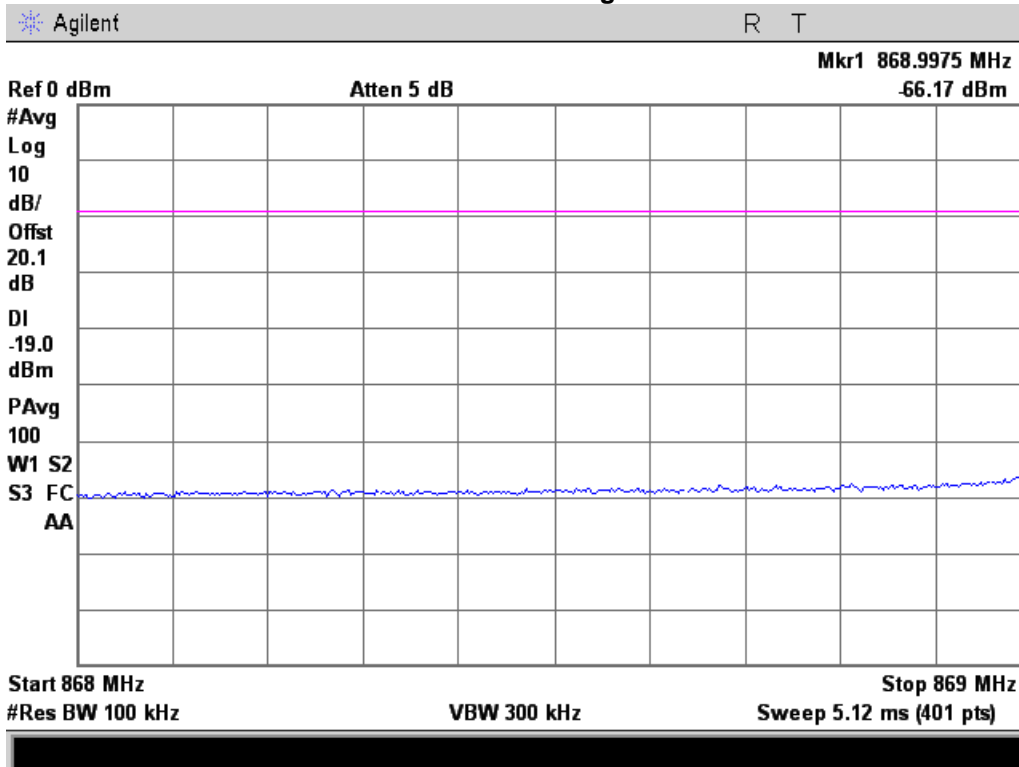
Upper Band Edge



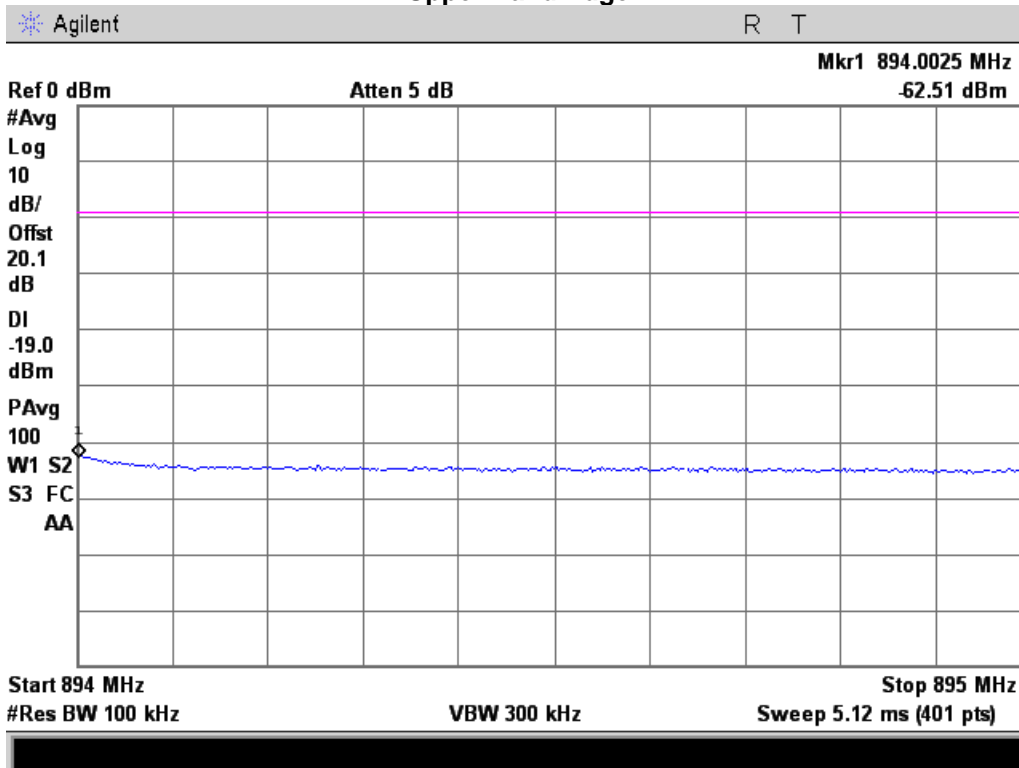


869 - 894 MHz Band

Lower Band Edge



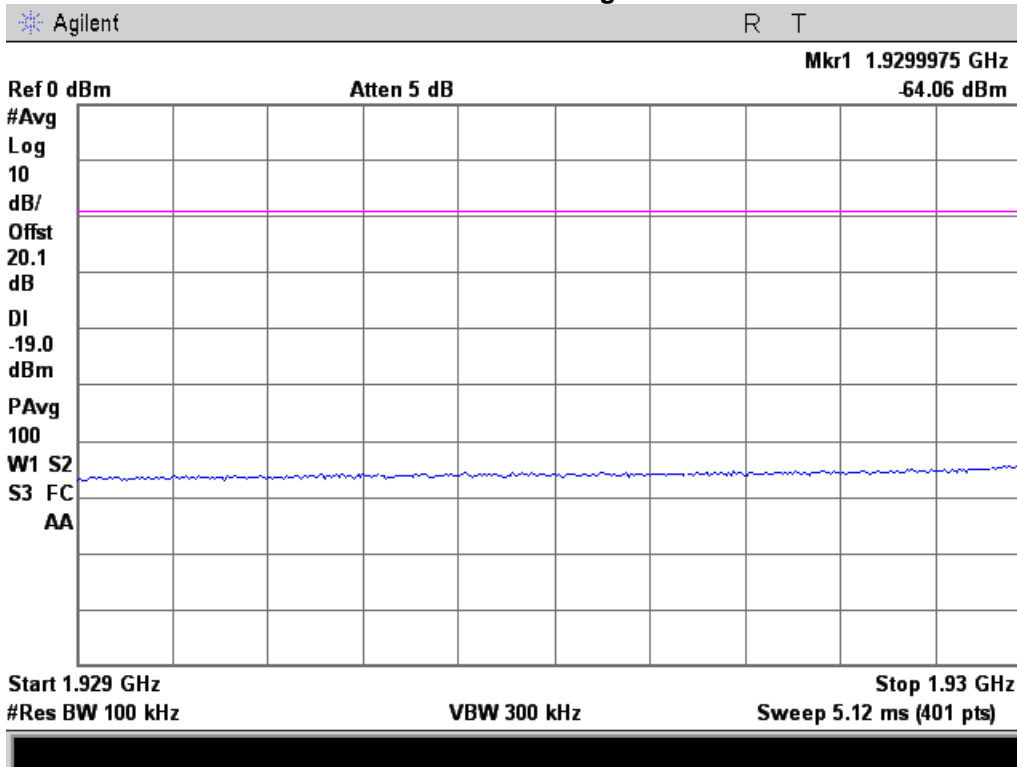
Upper Band Edge



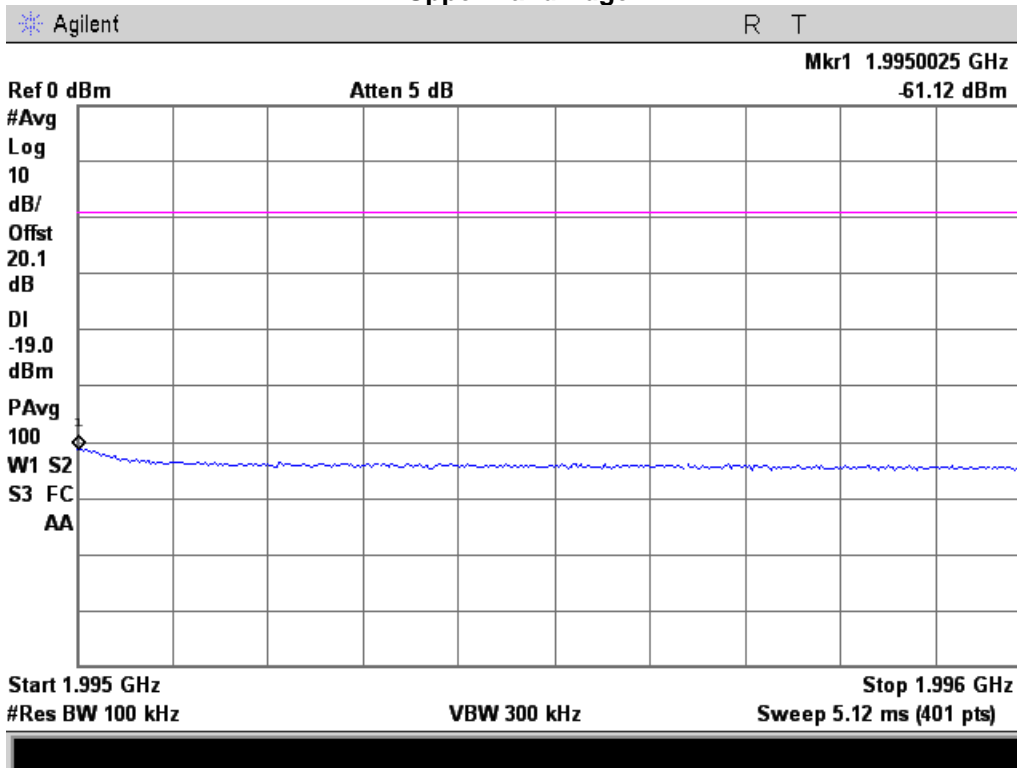


1930 - 1990 MHz Band

Lower Band Edge



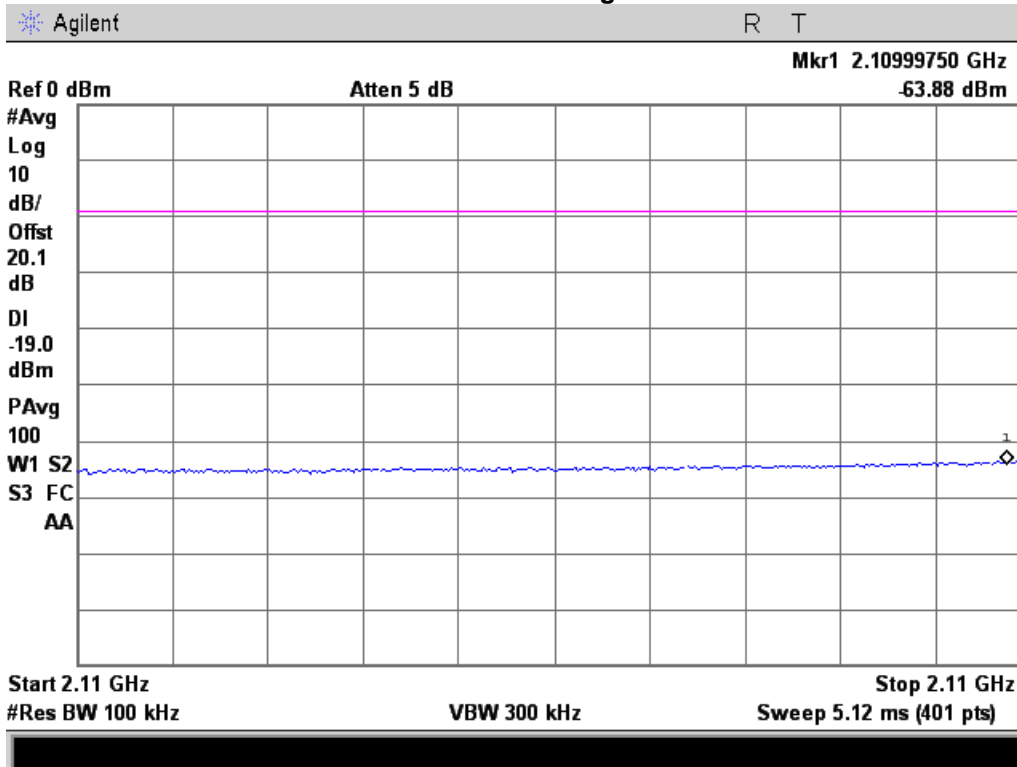
Upper Band Edge



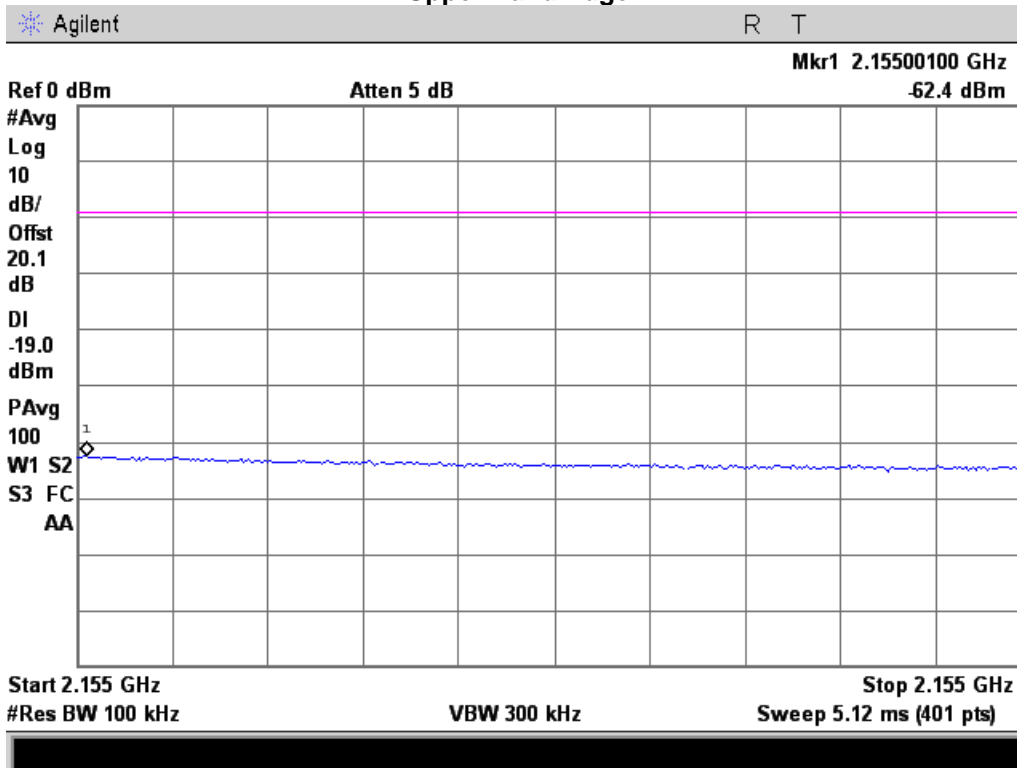


2110 - 2155 MHz Band

Lower Band Edge



Upper Band Edge





Conducted Spurious Emissions

Name of Test: Conducted Spurious Emissions

Engineer: John Erhard

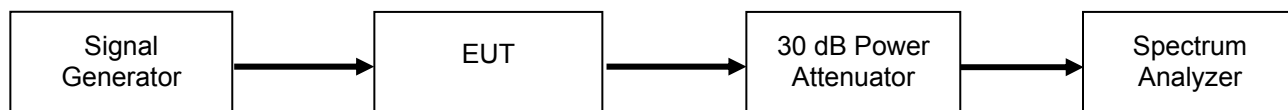
Test Equipment Utilized: i00331, i00405

Test Date: 7/12/2013

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. A signal generator was utilized to produce a 4.1 MHz AWGN signal operating at the maximum allowable power. The conducted spurious emissions from 30 MHz to 10 times the highest tunable frequency for each operational band was 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.

Test Setup



Uplink Test Results

Frequency Band (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
704 - 716	1732.8	-35.13	-13	Pass
777 - 787	1735.9	-35.26	-13	Pass
824 - 849	1732.3	-36.92	-13	Pass
1710 - 1755	1881.8	-39.70	-13	Pass
1850 - 1915	1733.6	-35.33	-13	Pass

Downlink Test Results

Frequency Band (MHz)	Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
728 - 746	2150.4	-36.50	-13	Pass
746 - 757	2150.7	-35.32	-13	Pass
869 - 894	2151.3	-36.10	-13	Pass
1930 - 1995	2148.5	-37.23	-13	Pass
2110 - 2155	2109.3	-38.47	-13	Pass



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

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:

(3)On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log (P)$ dB in a 6.25 kHz band segment, for base and fixed stations;

To show compliance with 27.53 (c)(3) rule section, the limit would be -46 dBm in a 6.25 kHz bandwidth, based on the maximum output power and using the formula $76 + 10 \log (P)$ dB.

The graphs on page 70 of the test report for the 746 – 758 MHz band and page 58 for the 776 – 788 MHz band show the noise floor to be < -50 dBm in a 1 MHz bandwidth.

The original data was recorded in a 1 MHz RBW, since the limit is referenced to a 6.25 kHz BW the measured value has the following bandwidth correction factor added to it.

BW correction Factor = $10\log B1/B2$

BW correction Factor = $10\log 6.25 / 1000 = 22.0$ dB

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

777 – 787 MHz Uplink Band

Spurious Frequency Range (MHz)	Measured Value (dB)	Bandwidth Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
763 – 775	-44	-22.0	-66	-46	-20
793 – 805	-40	-22.0	-62	-46	-16

746 - 756 MHz Downlink Band

Spurious Frequency Range (MHz)	Measured Value (dB)	Bandwidth Correction Factor (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
763 – 775	-47	-22.0	-69	-46	-23
793 – 805	-49	-22.0	-71	-46	-25



27.53(e)

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.

To show compliance with 27.53(f) rule section, the Limit is -70dBW/MHz equivalent EIRP for wideband signals which is -40 dBm/MHz.

The final value for the spurious emissions in the 1559 – 1610 MHz band is calculated using the data provided from the test report and antenna kitting document. ,

Data:

- Conducted measurement = Measured value (-57 dBm in a 1 MHz BW) from the Conducted Spurious Emissions graphs in the test report on page 58,
- The final gain/loss (+1.79 dB from the antenna kitting document) for the 777 – 787 band.
- The original data was recorded in a 1 MHz RBW, since the limit for narrowband emissions is referenced to (< 700Hz BW) , the measured value has the following bandwidth correction factor added to it.
 $BW \text{ correction Factor} = 10\text{Log } B1/B2$
 $BW \text{ correction Factor} = 10\text{Log } 700 / 1,000,000 = 31.5 \text{ dB}$

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.

777 – 787 MHz Uplink Band

Spurious Frequency Range (MHz)	Measured Value (dBm)	Bandwidth Correction Factor (dB)	Gain/Loss from Antenna Kitting Information (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
1559 – 1610 (Narrowband)	-60	-31.5	1.79	-89.71	-50	-39.71
1559 – 1610 (Wideband)	-60	0	1.79	-58.21	-40	-18.21

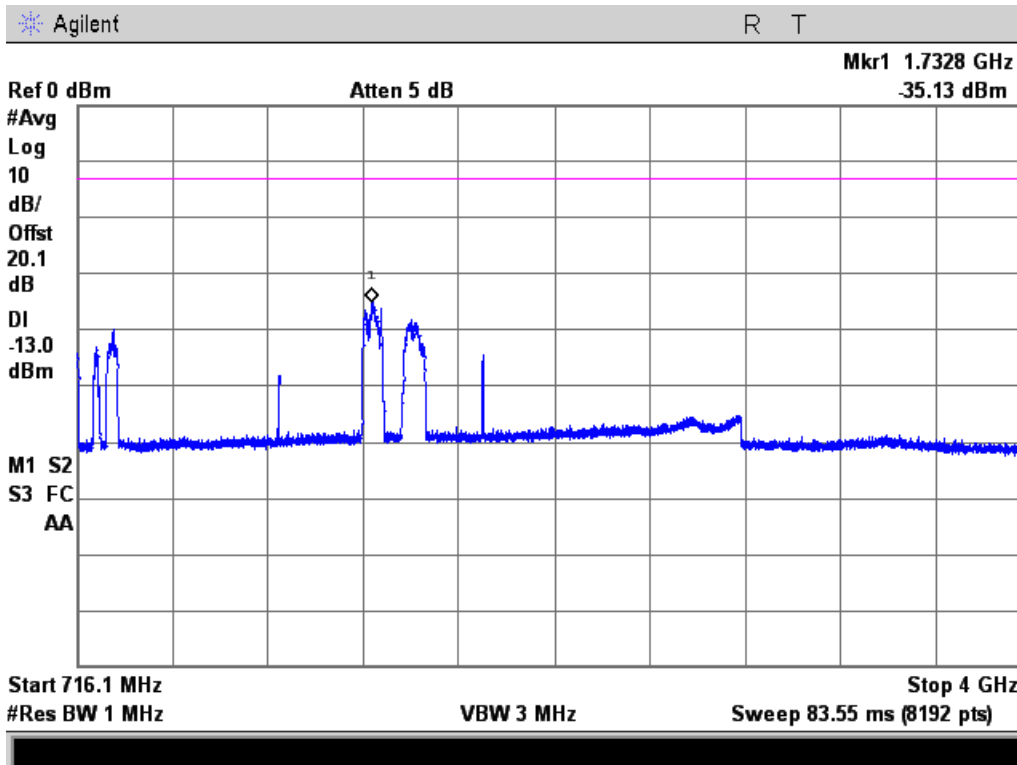
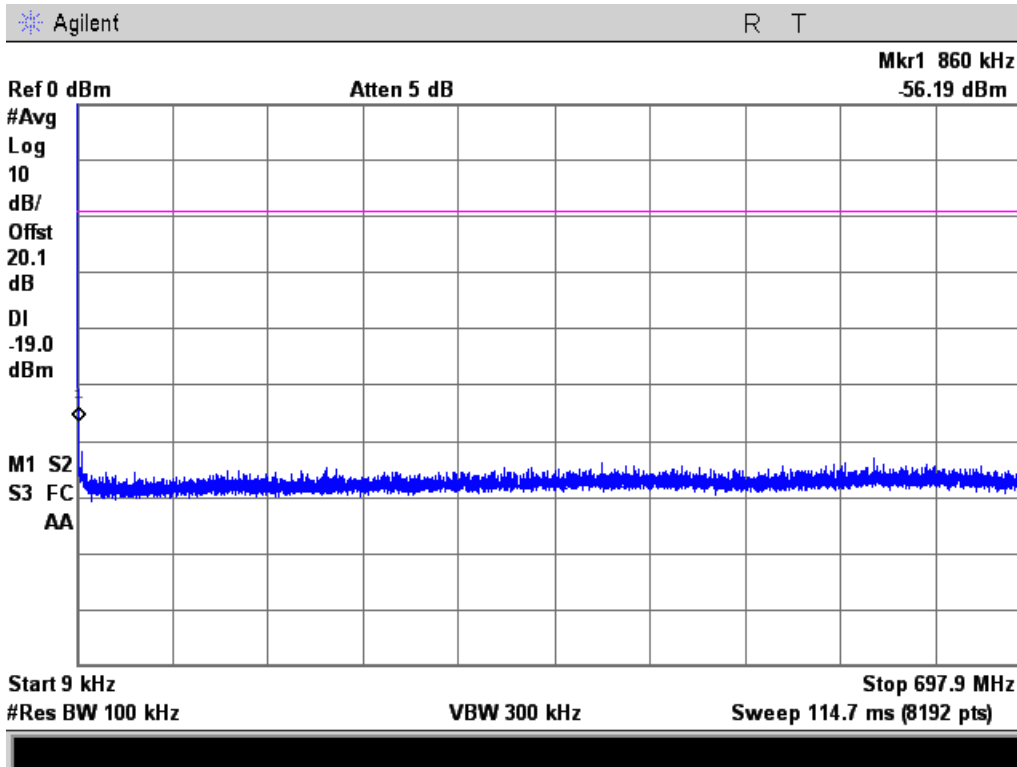
746 - 756 MHz Downlink Band

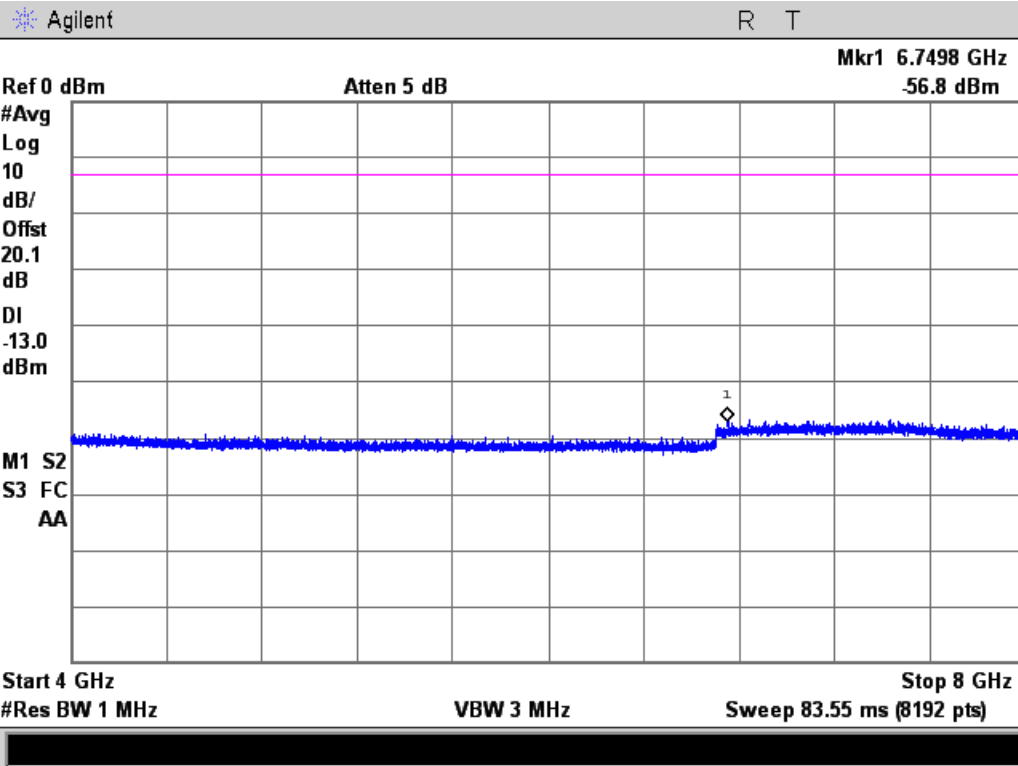
Spurious Frequency Range (MHz)	Measured Value (dBm)	Bandwidth Correction Factor (dB)	Gain/Loss from Antenna Kitting information (dB)	Final Value (dBm)	Limit (dBm)	Margin (dB)
1559 – 1610 (Narrowband)	-60	-31.5	1.79	-89.71	-50	-39.71
1559 – 1610 (Wideband)	-60	0	1.79	-58.21	-40	-18.21



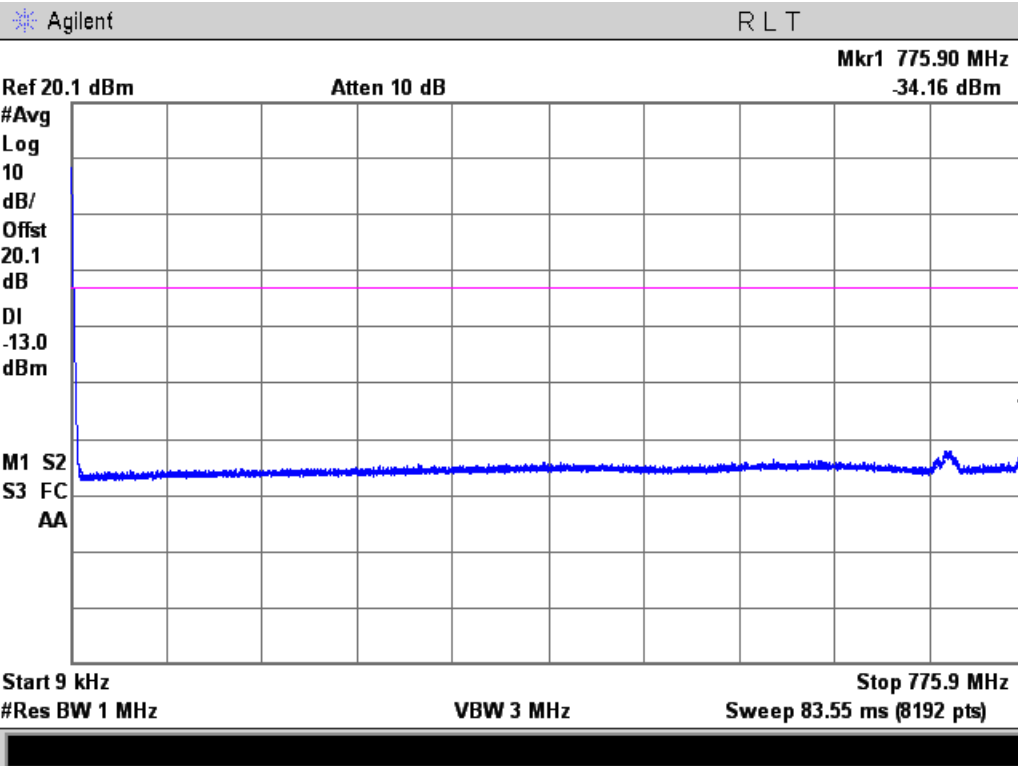
Uplink Test Plots

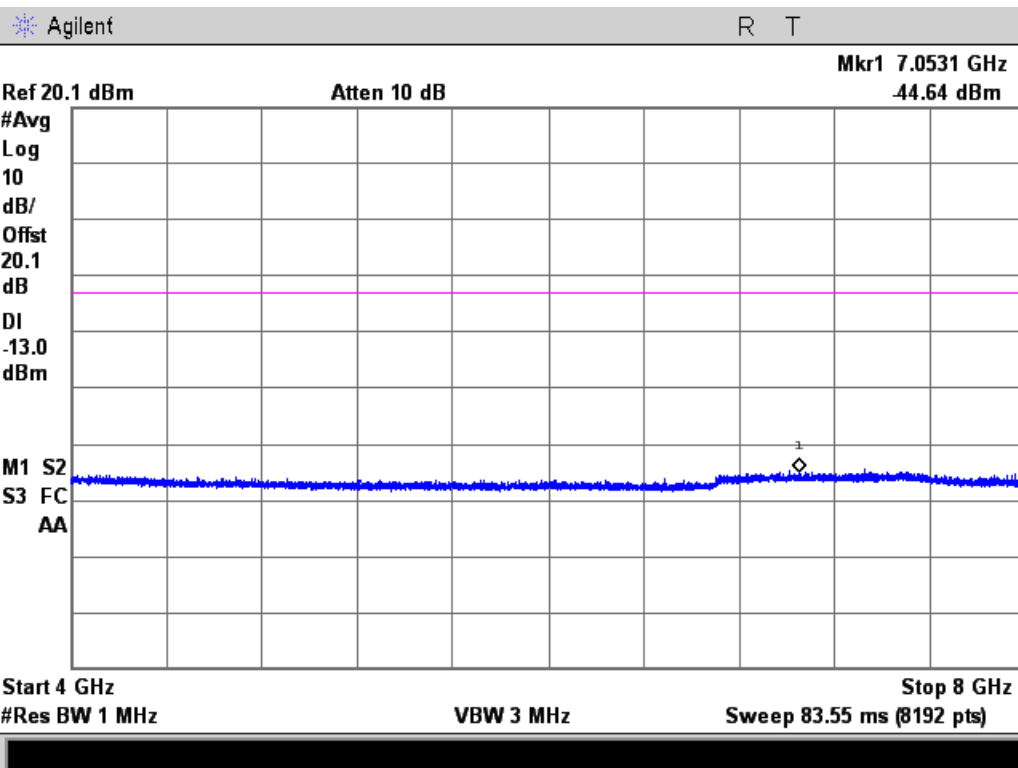
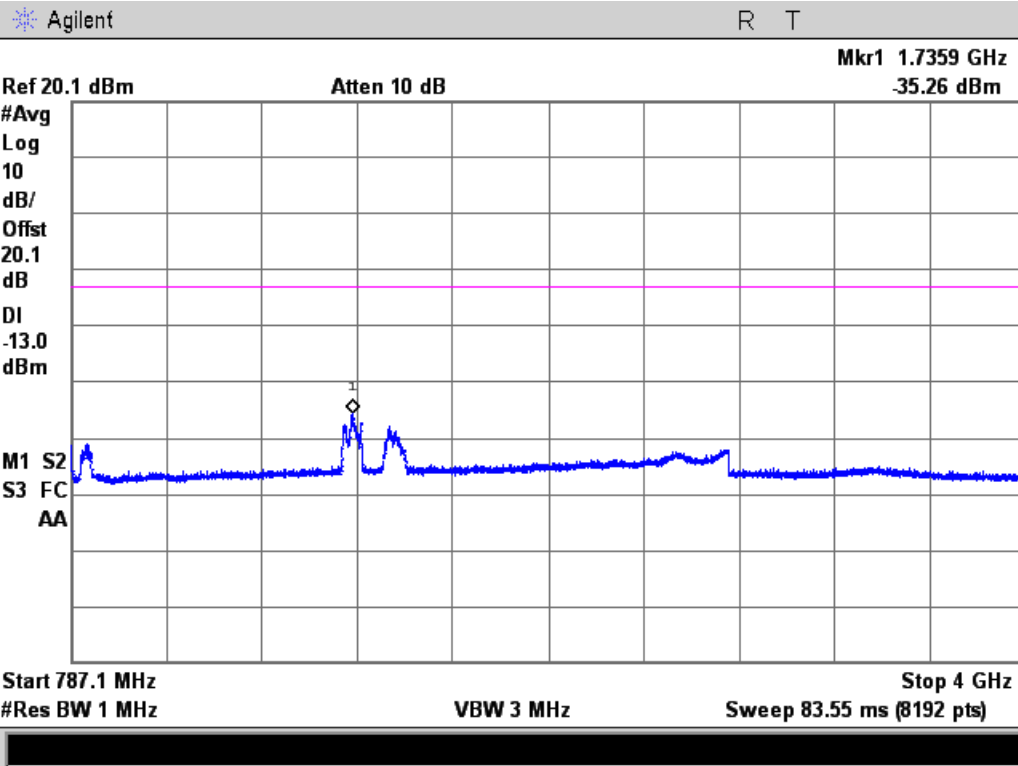
704 - 716 MHz Band





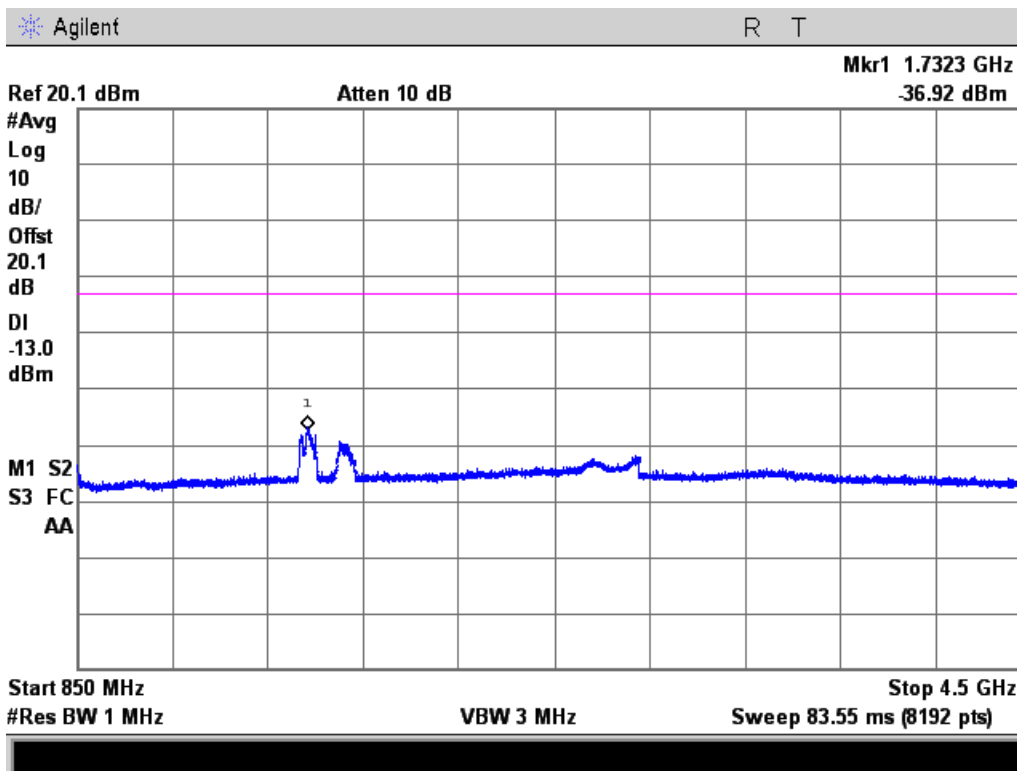
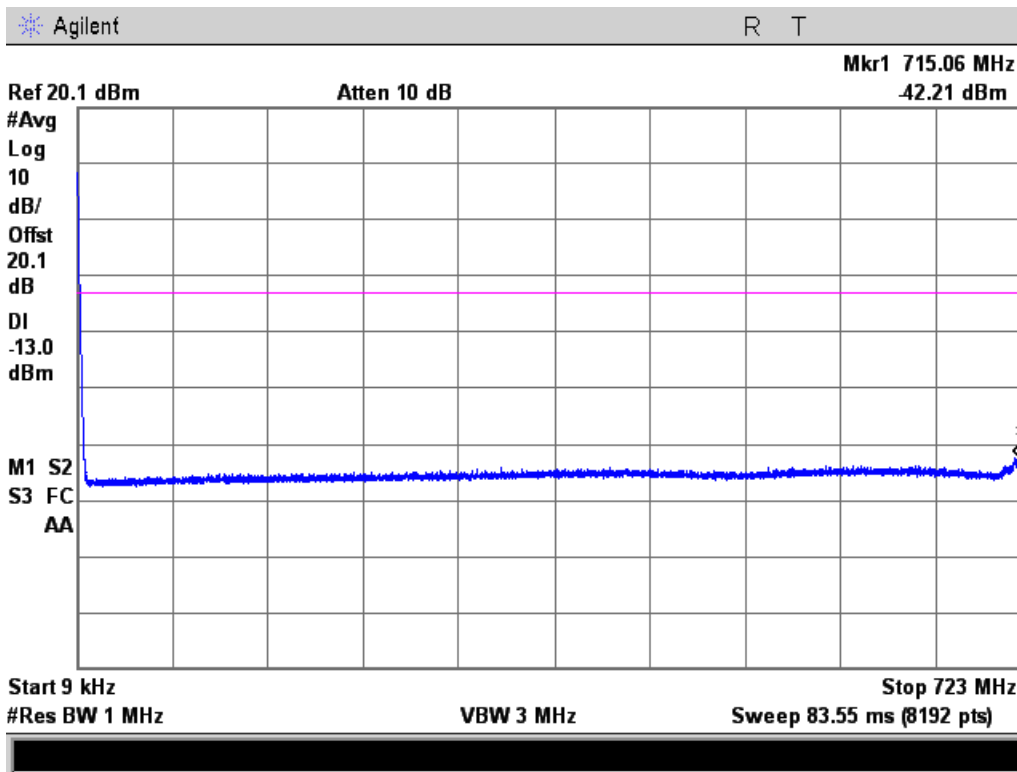
777 - 787 MHz Band

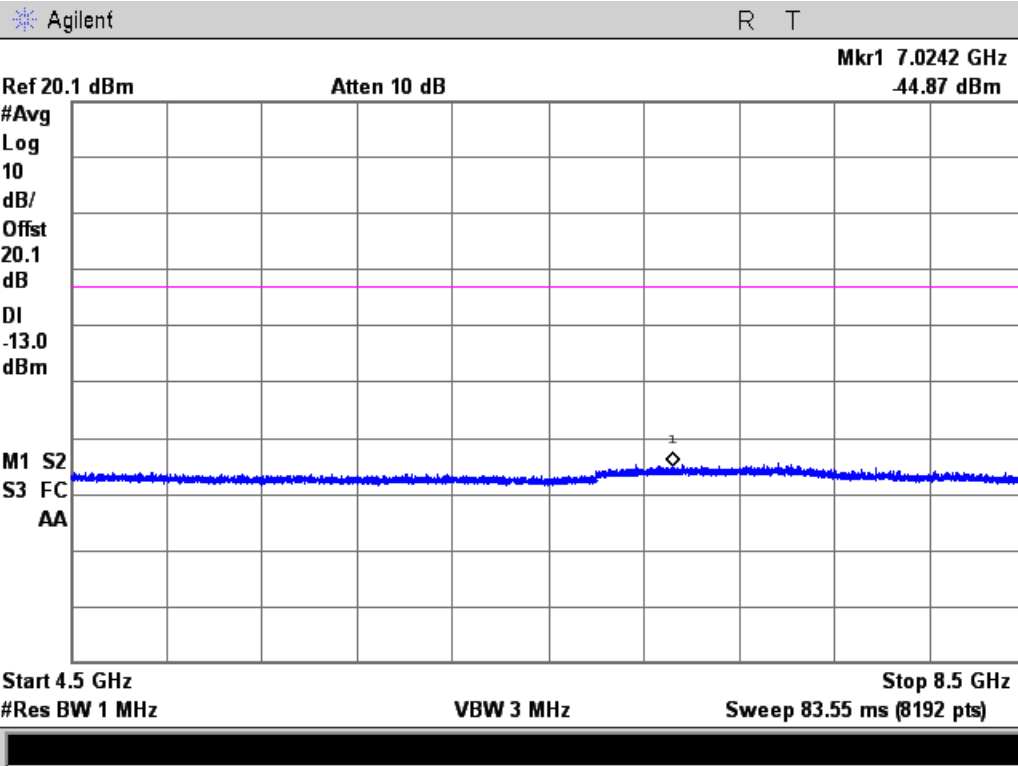




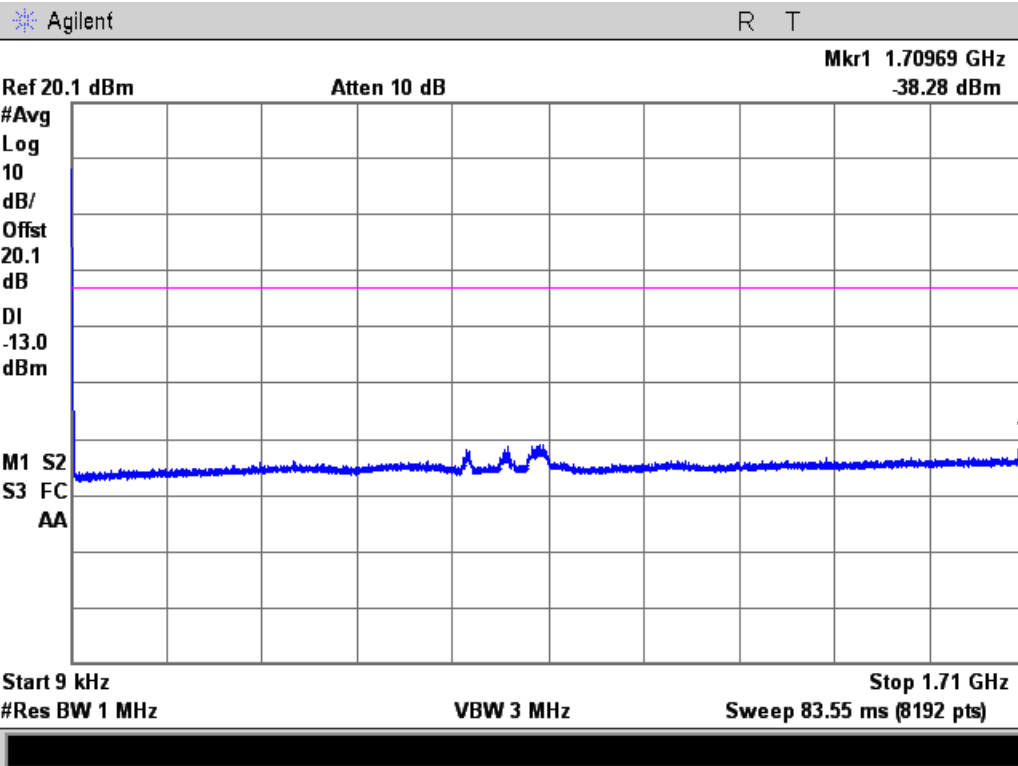


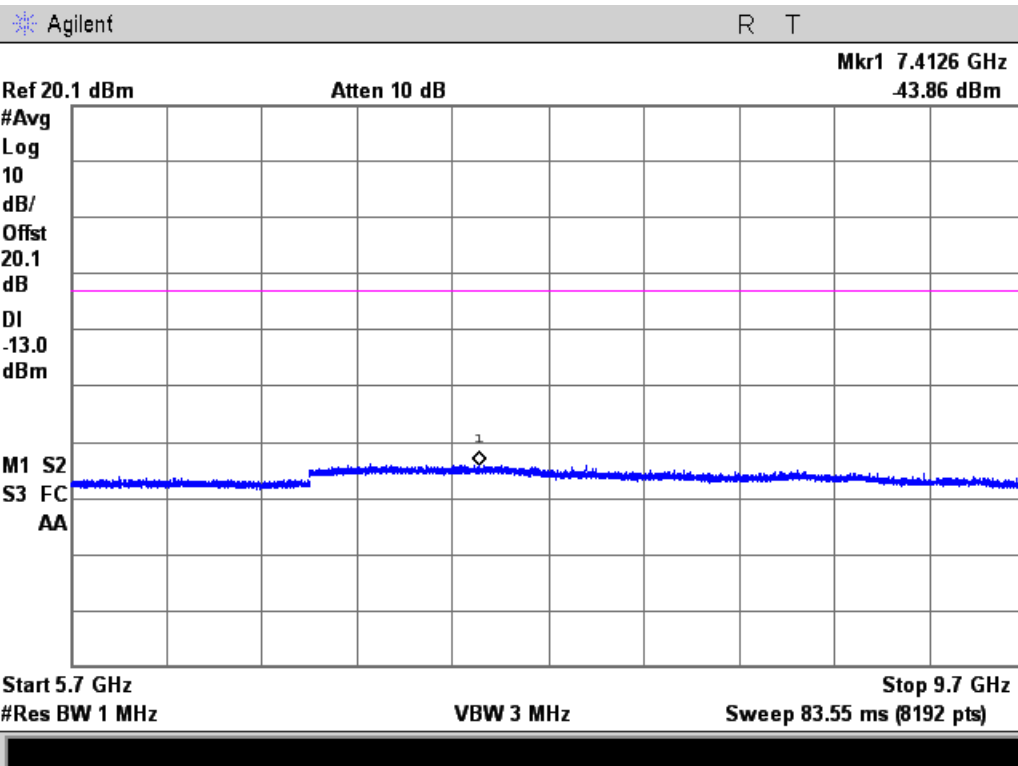
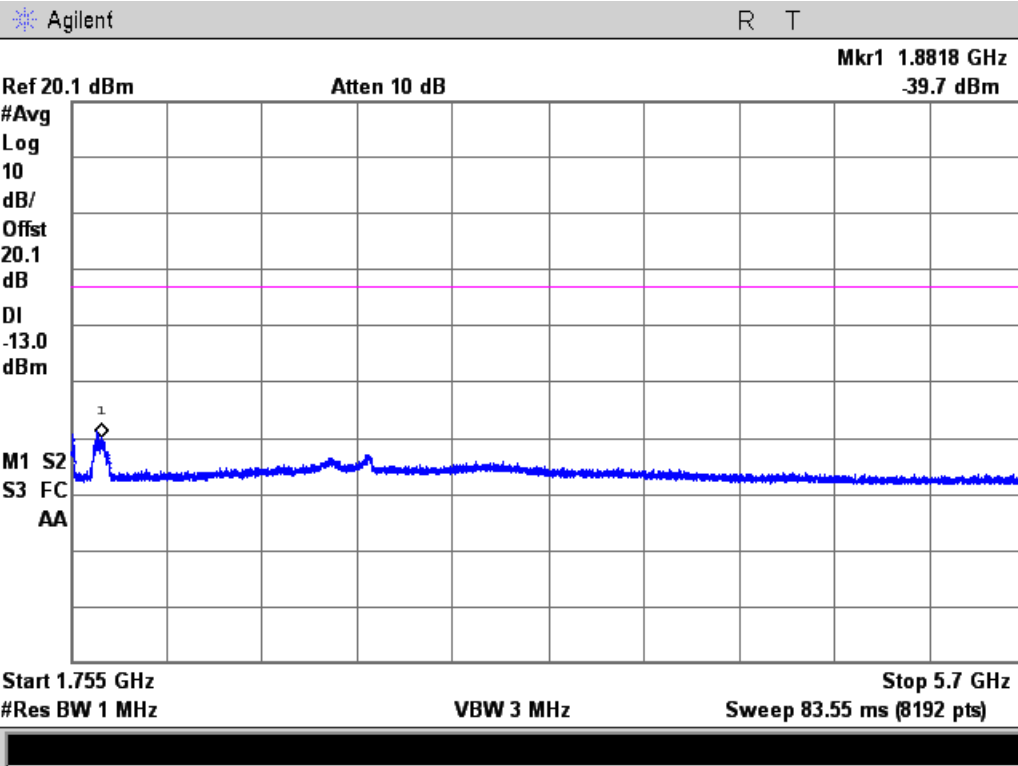
824 - 849 MHz Band

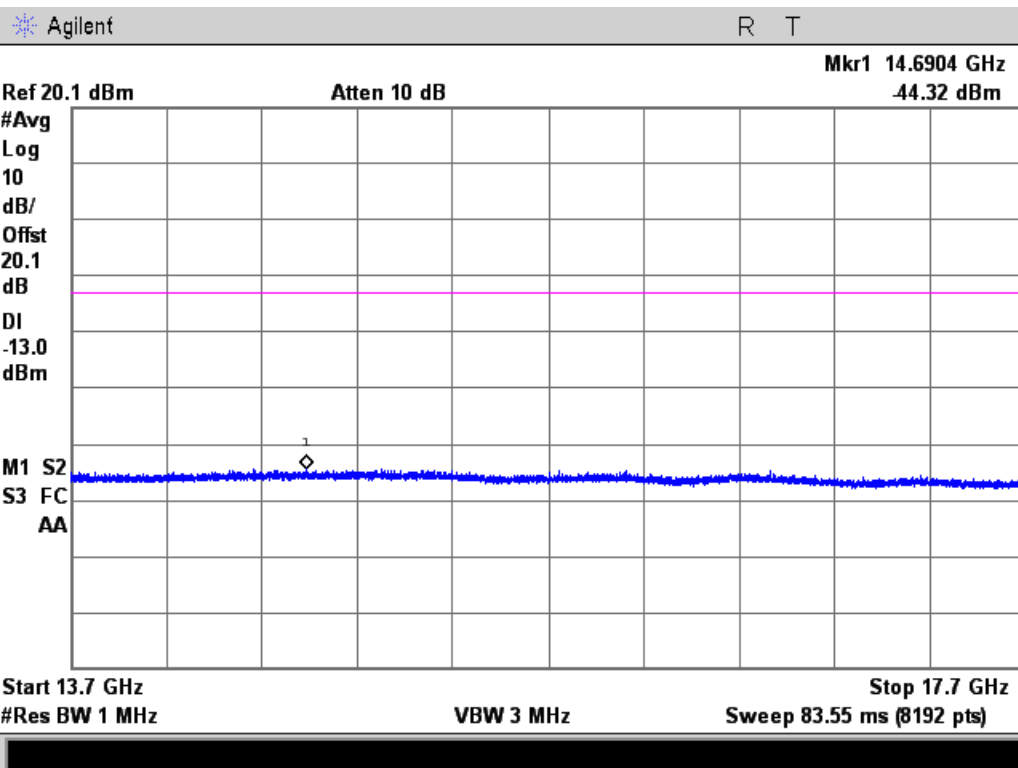
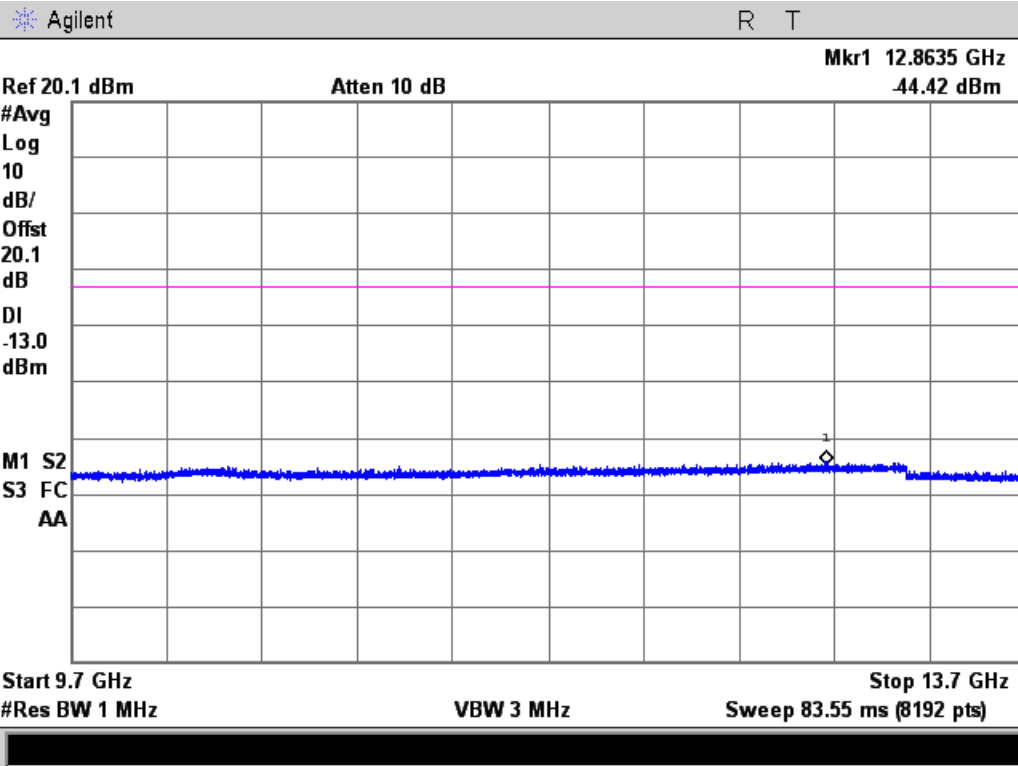




1710 - 1755 MHz Band

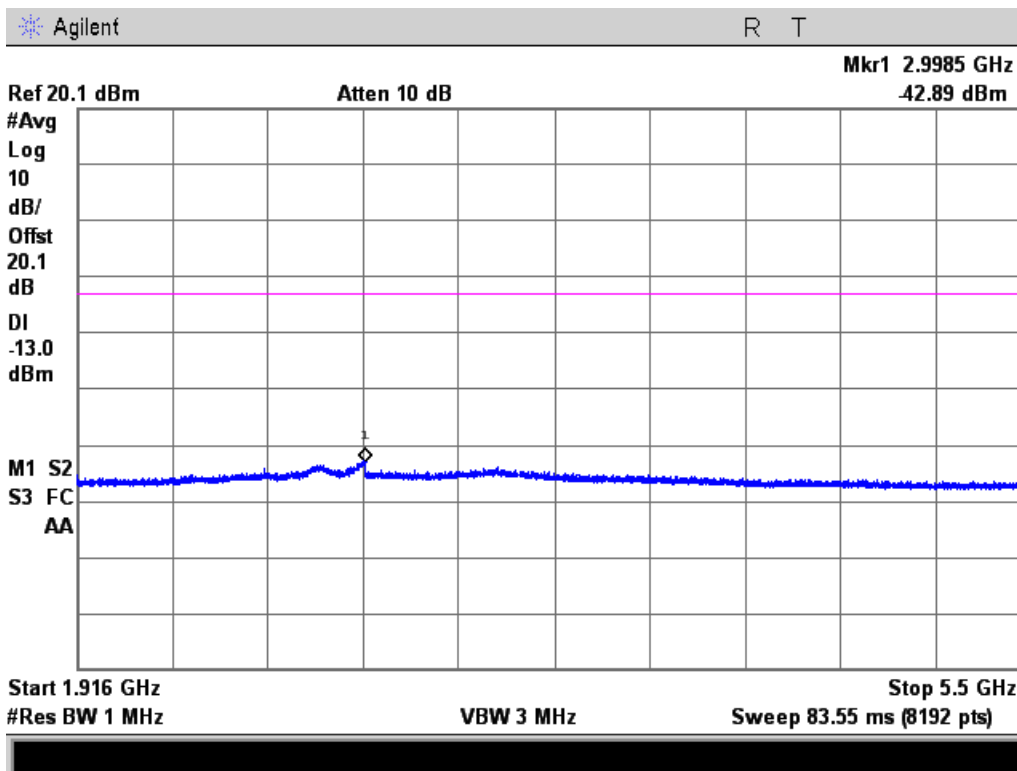
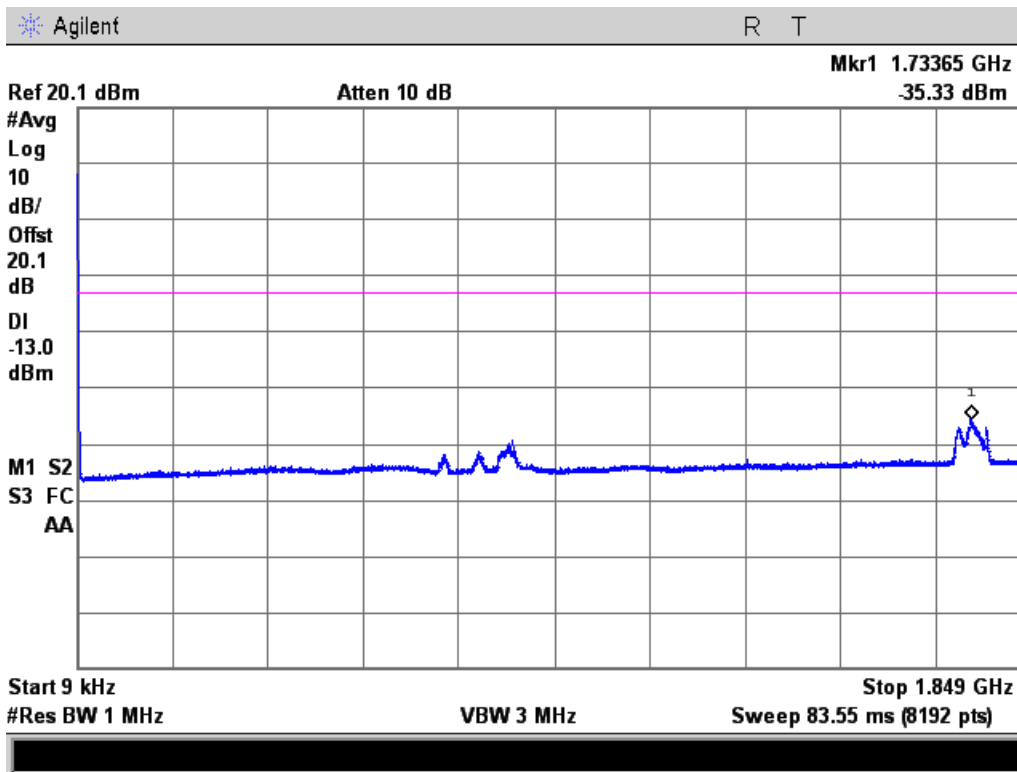


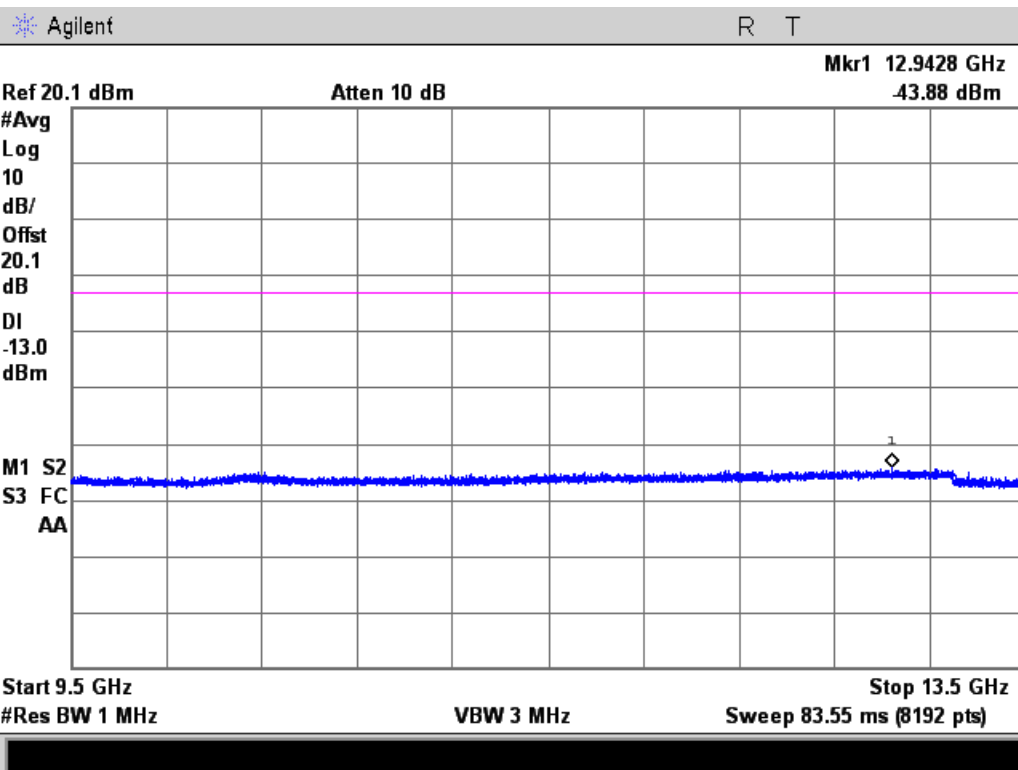
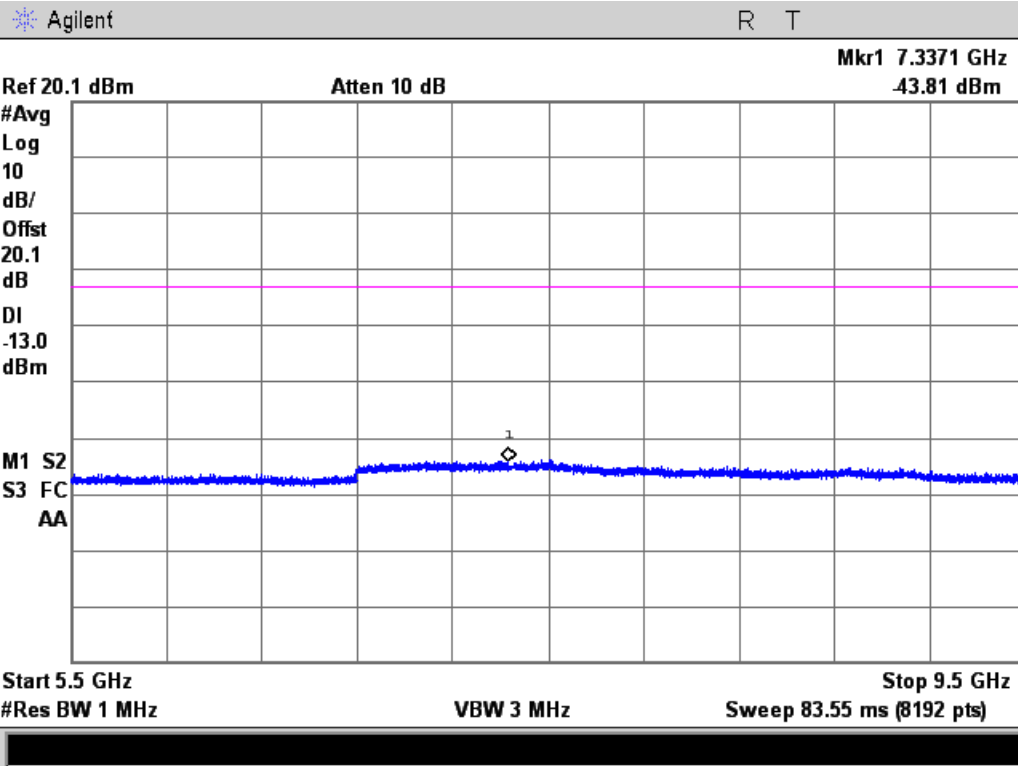


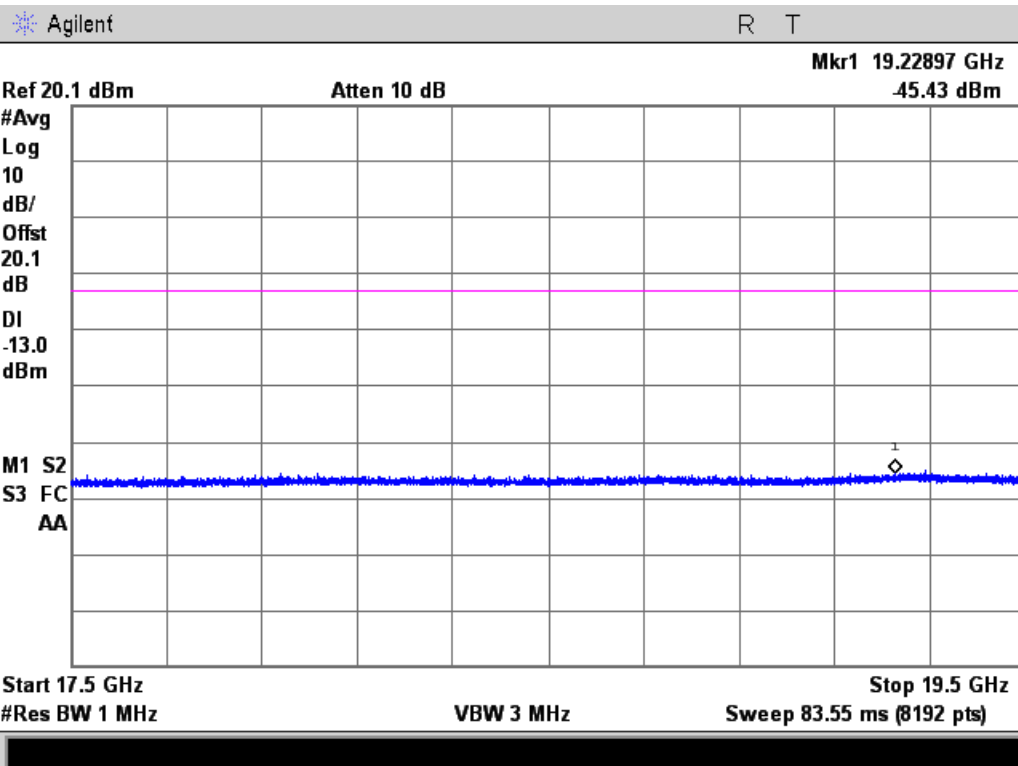
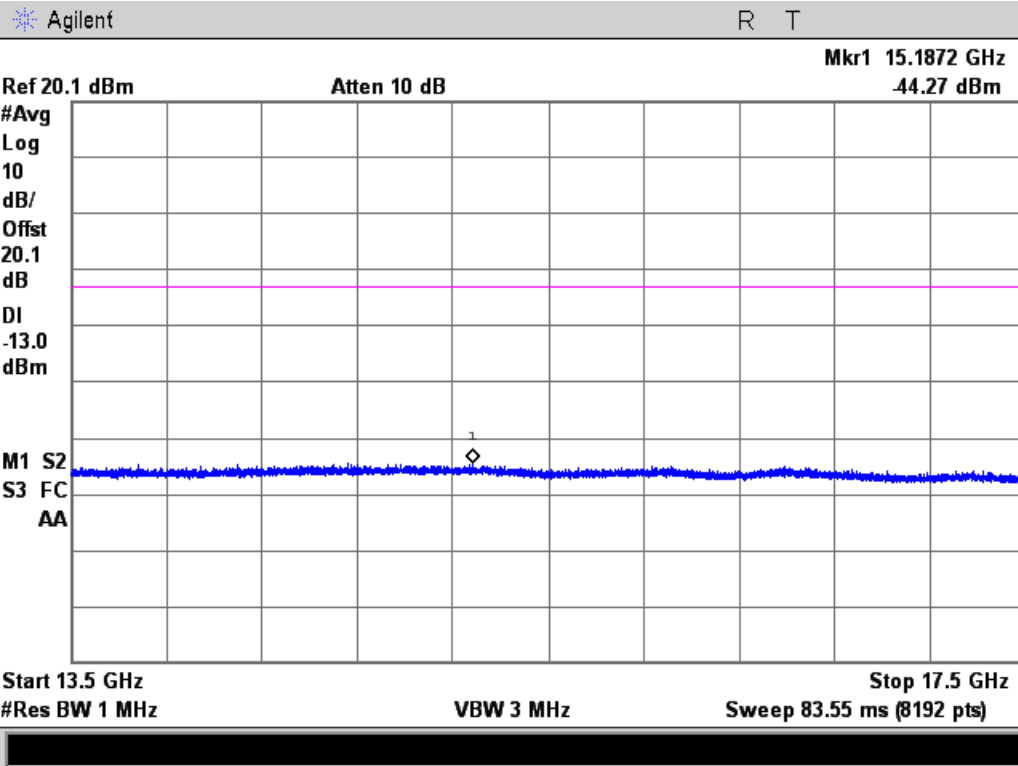




1850 - 1910 MHz Band



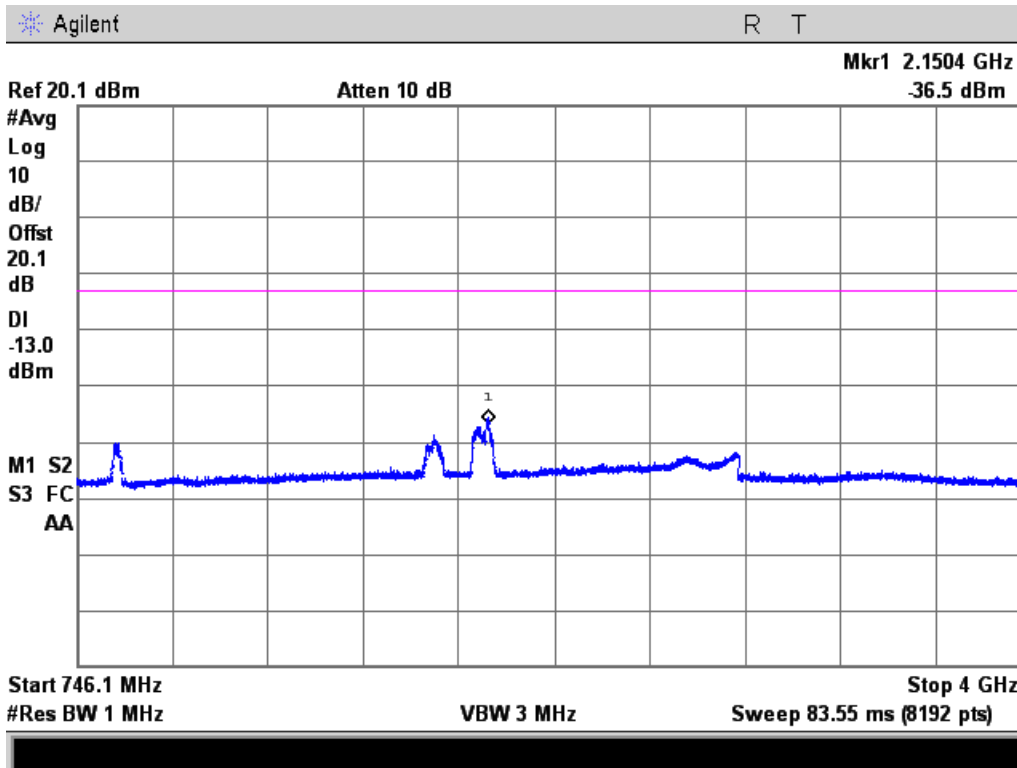
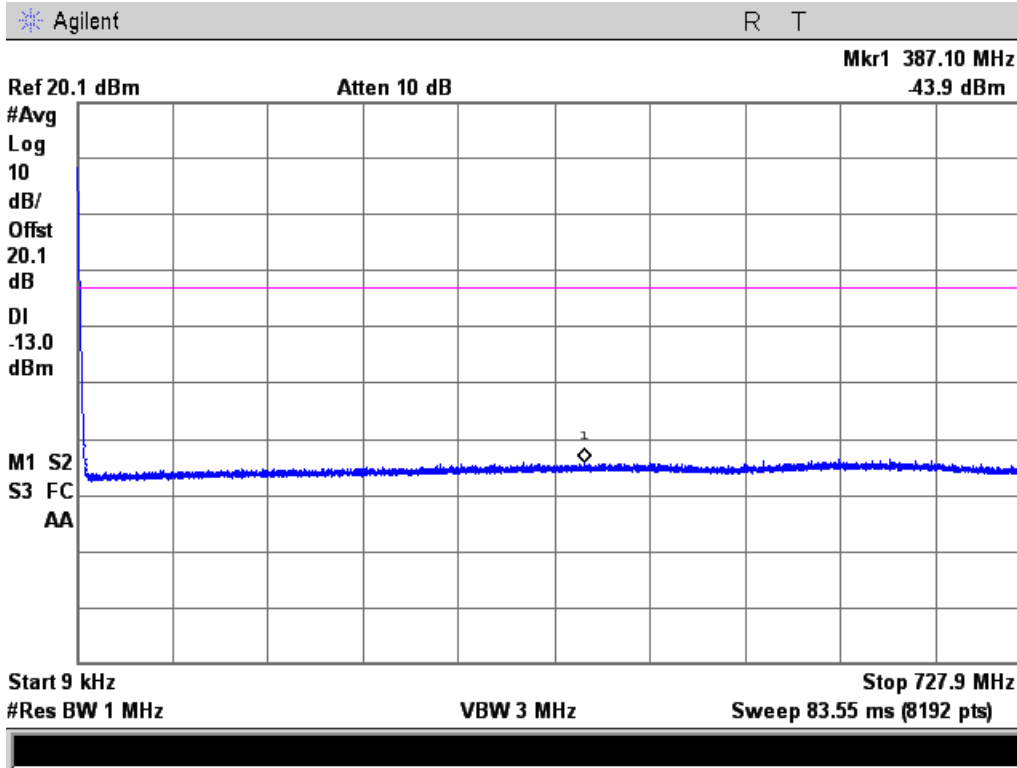


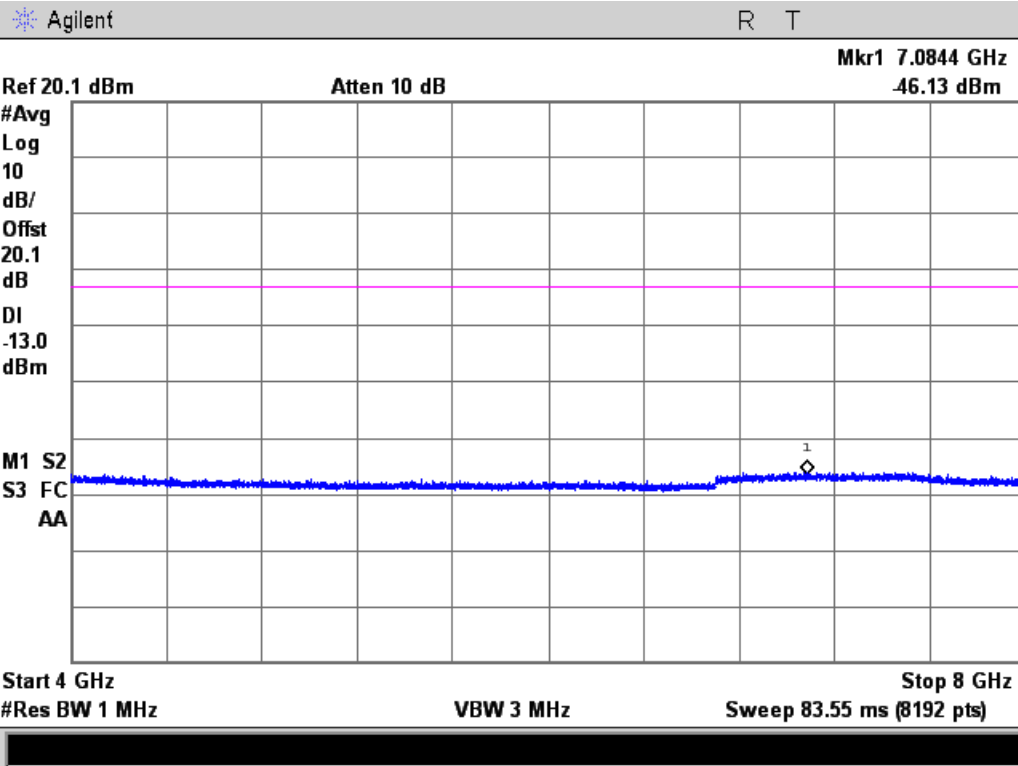




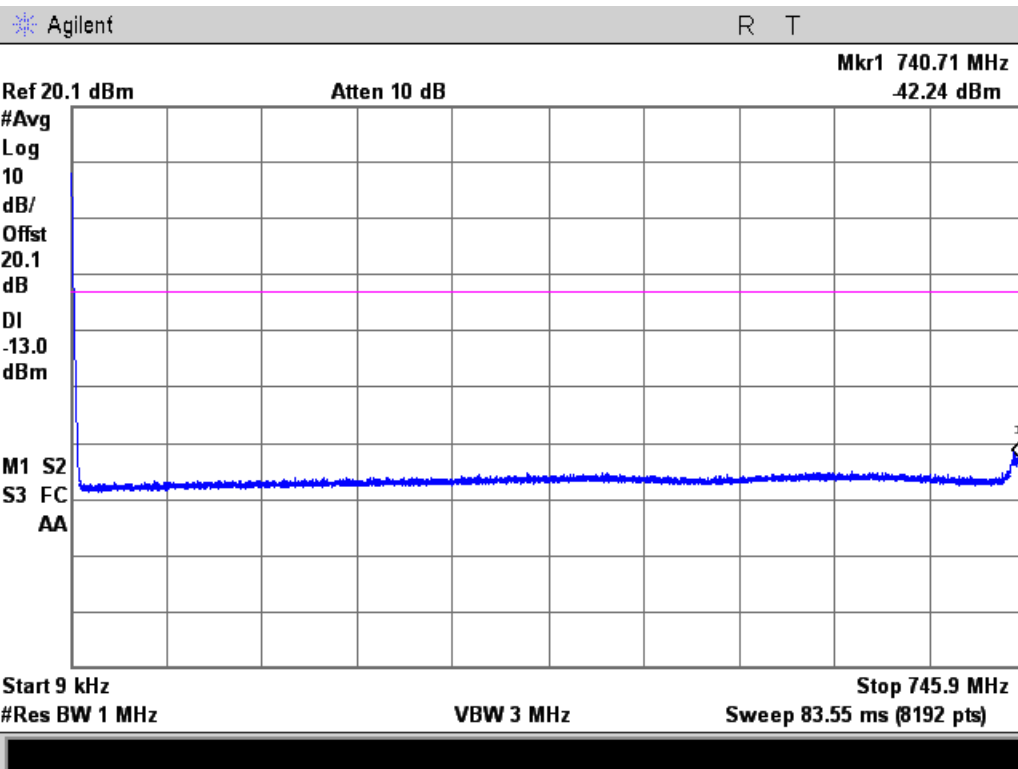
Downlink Test Plots

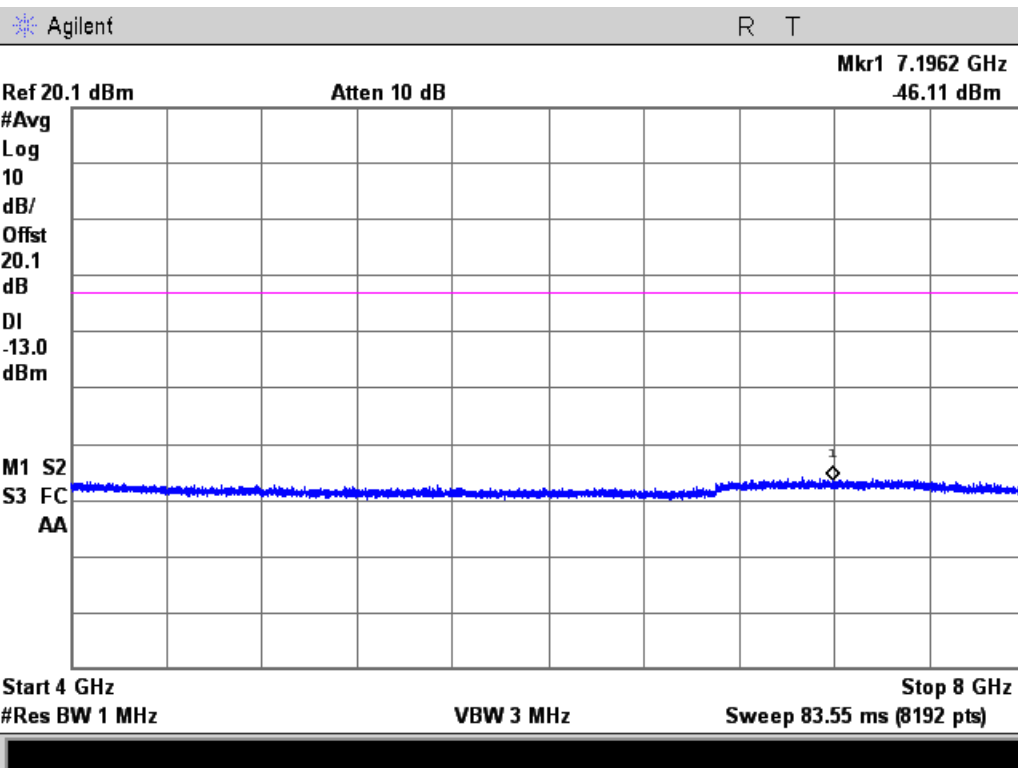
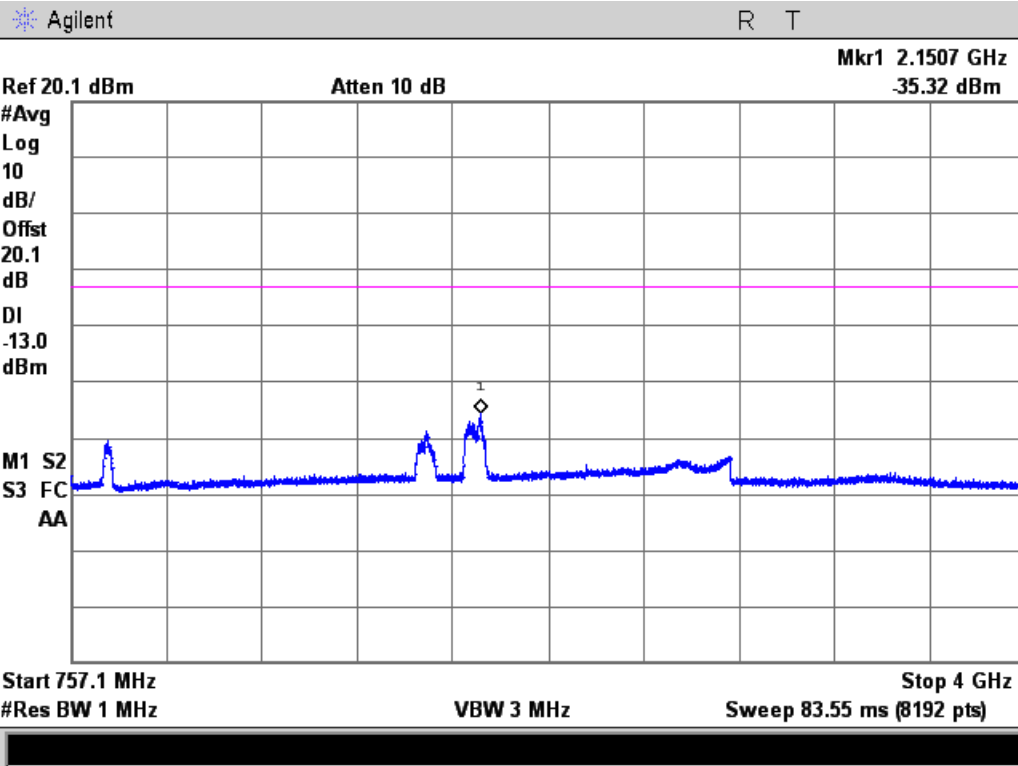
728 - 746 MHz Band





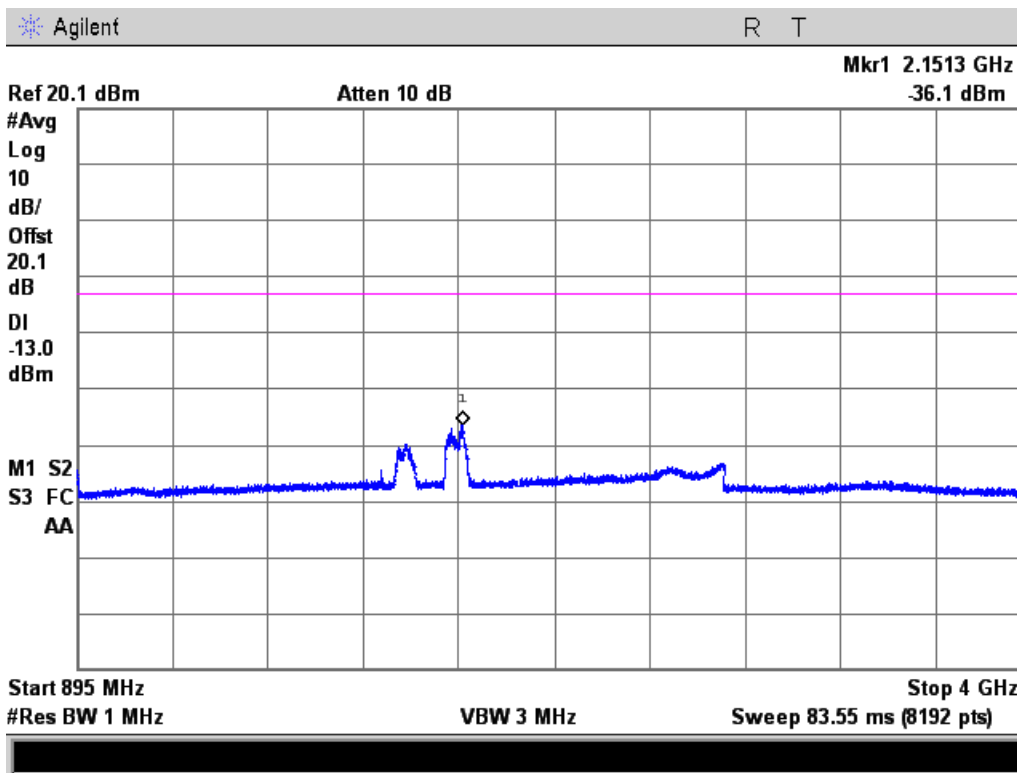
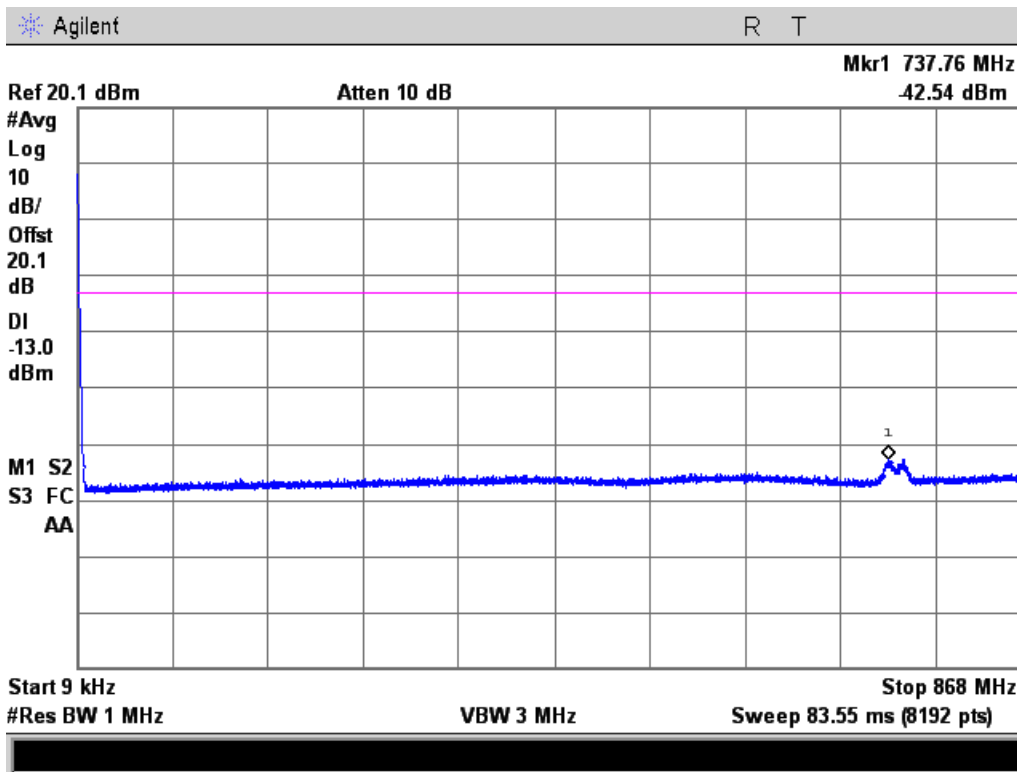
746 - 757 MHz Band

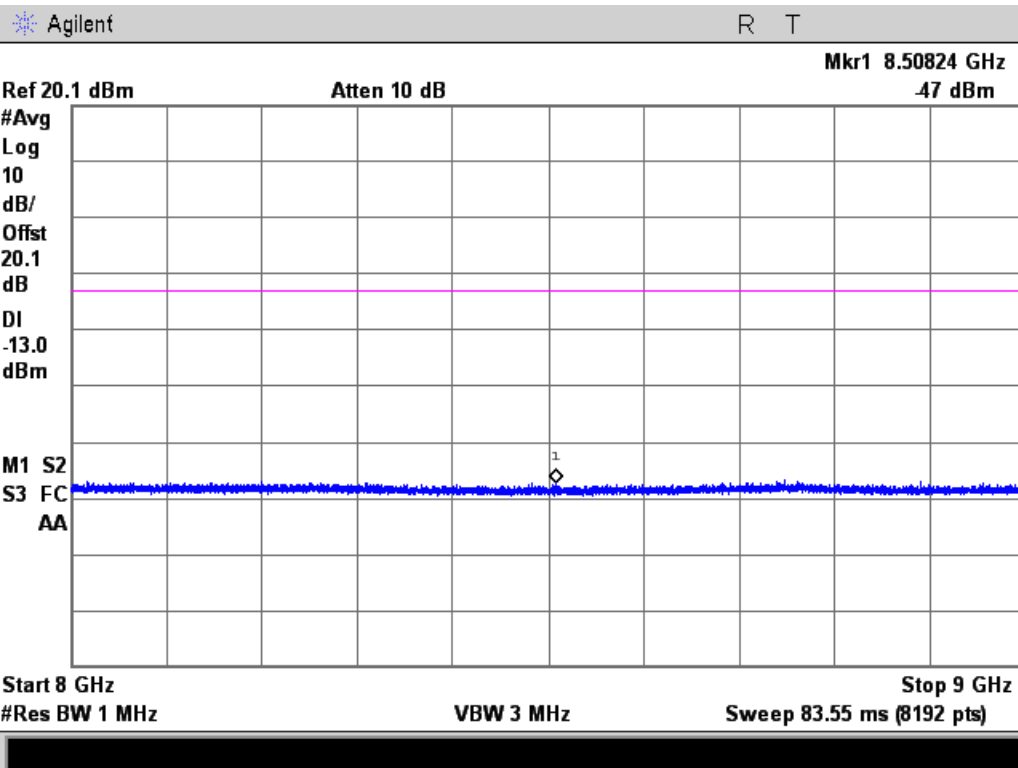
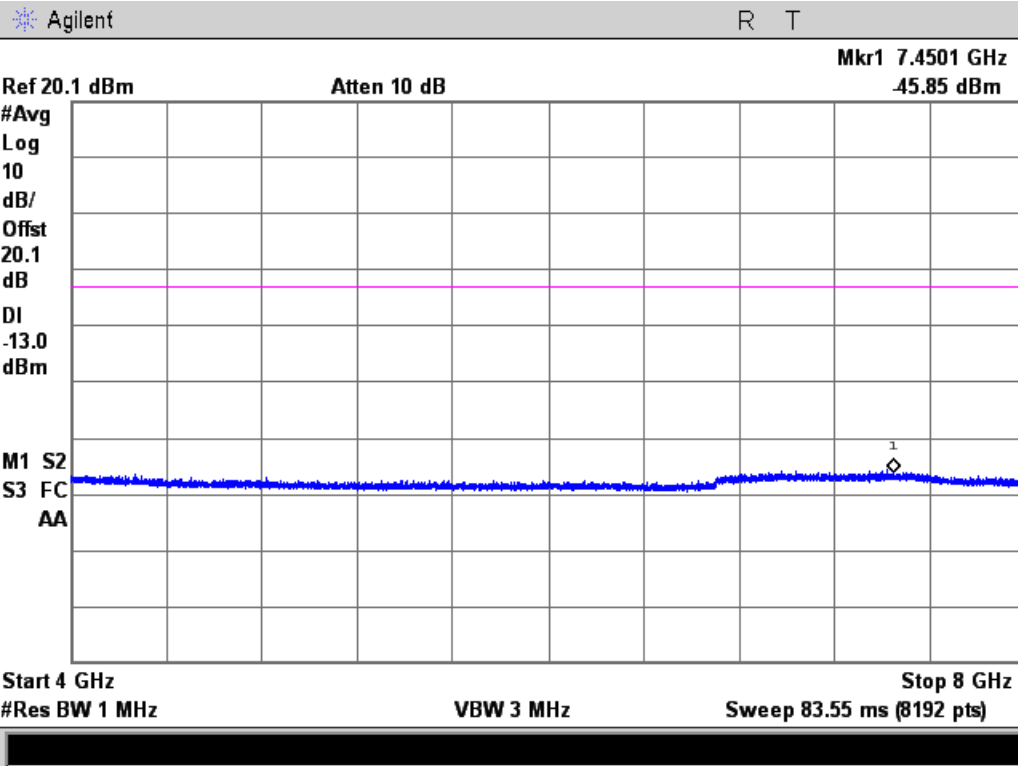






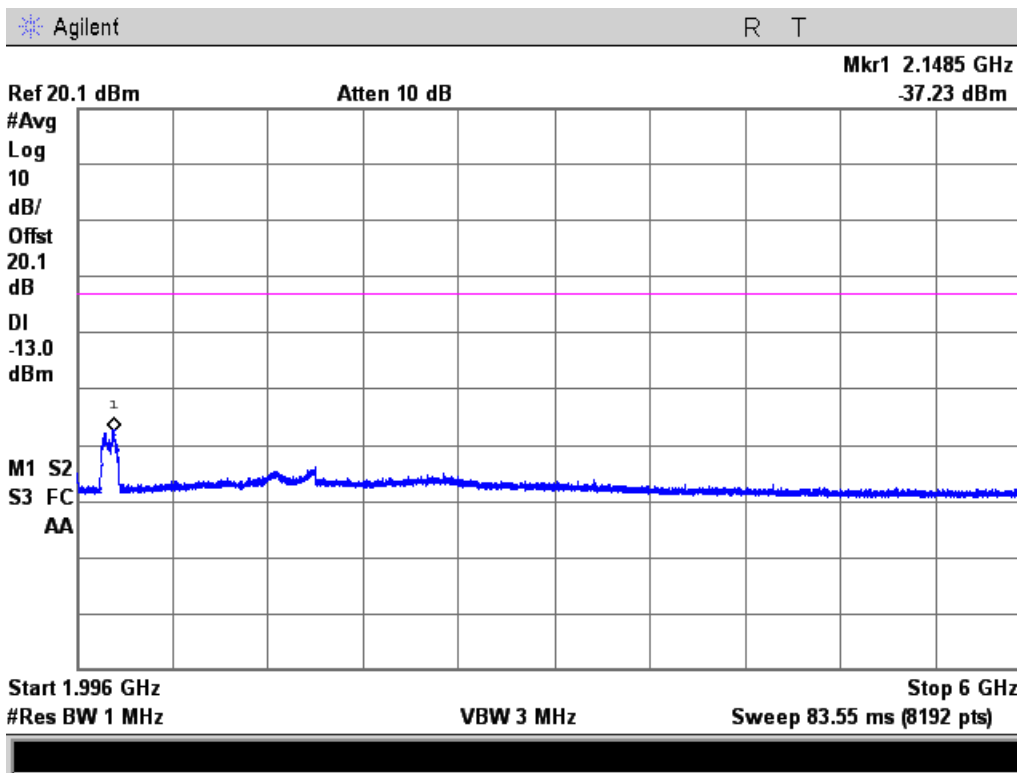
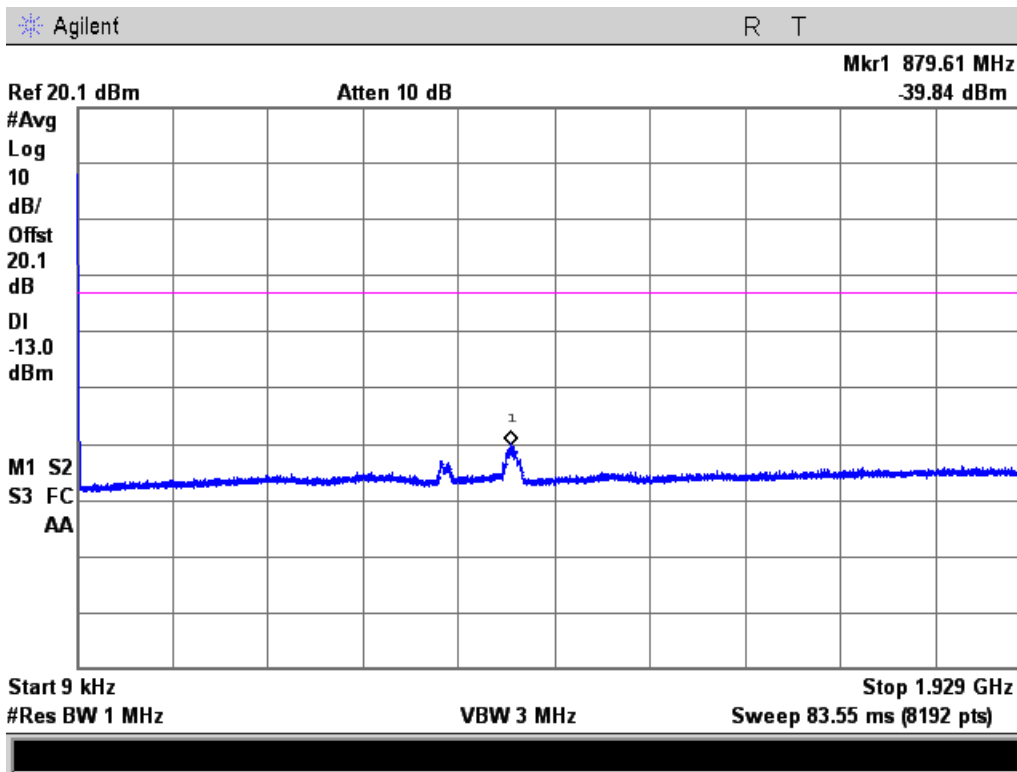
869 - 894 MHz Band

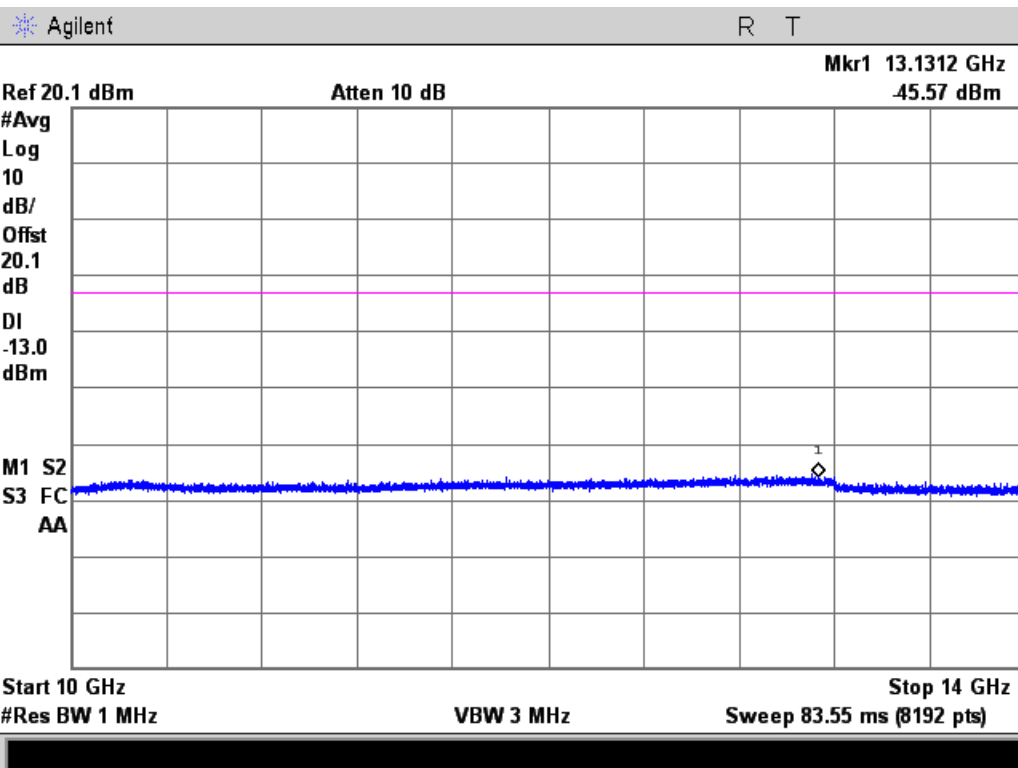
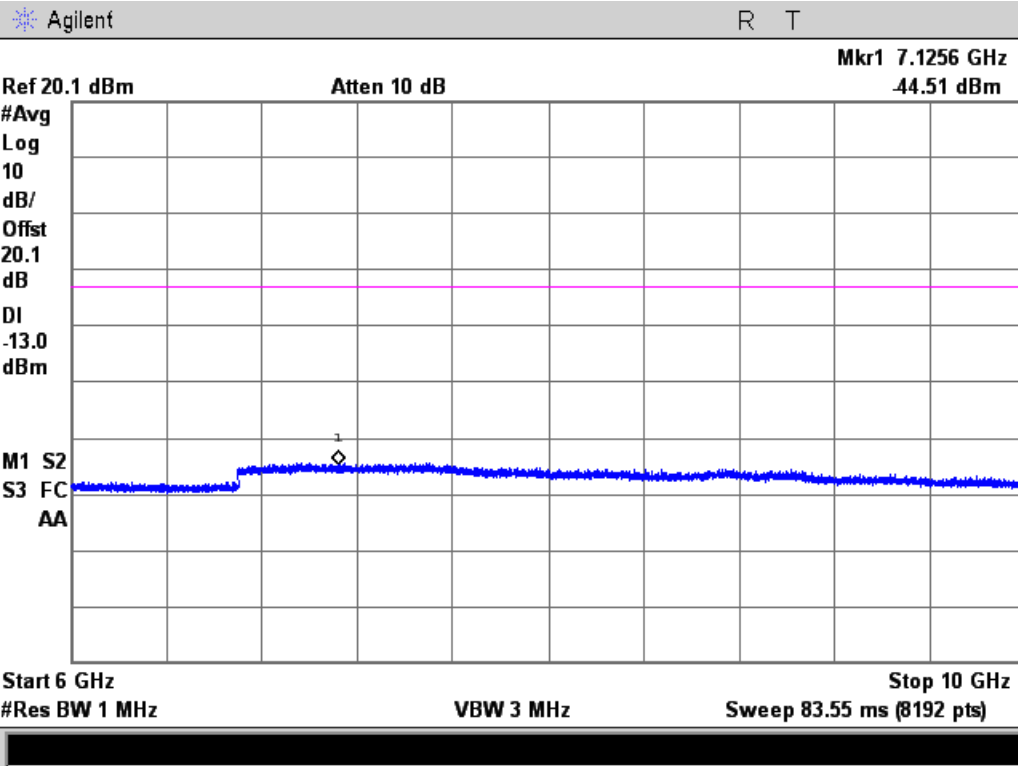


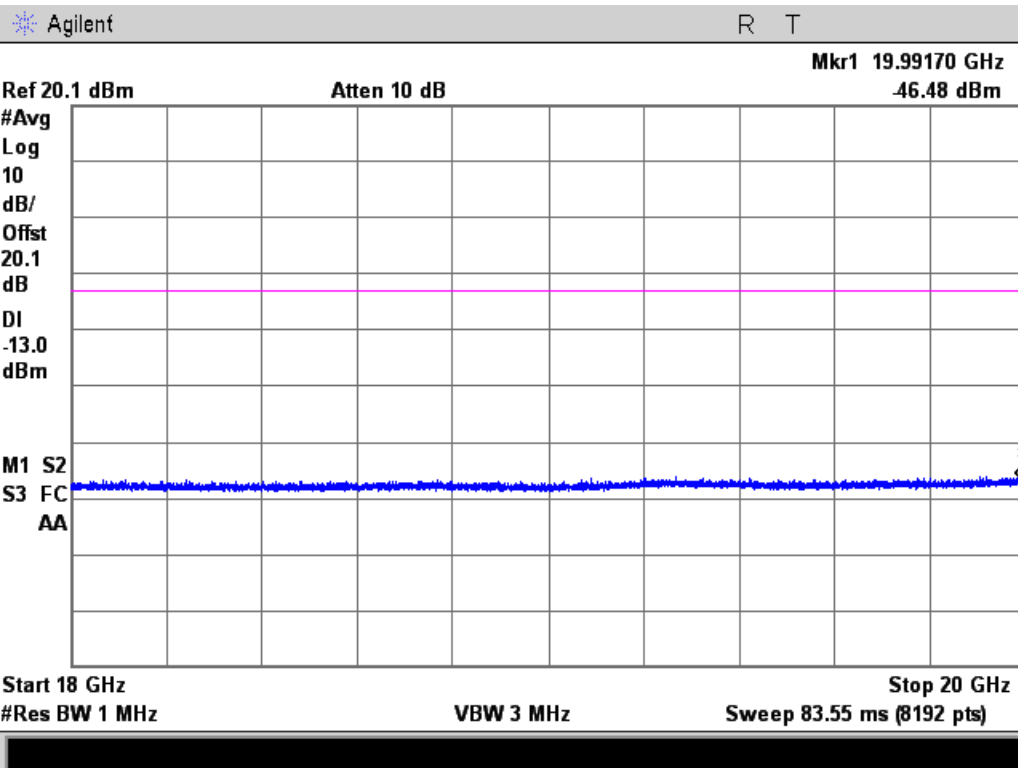
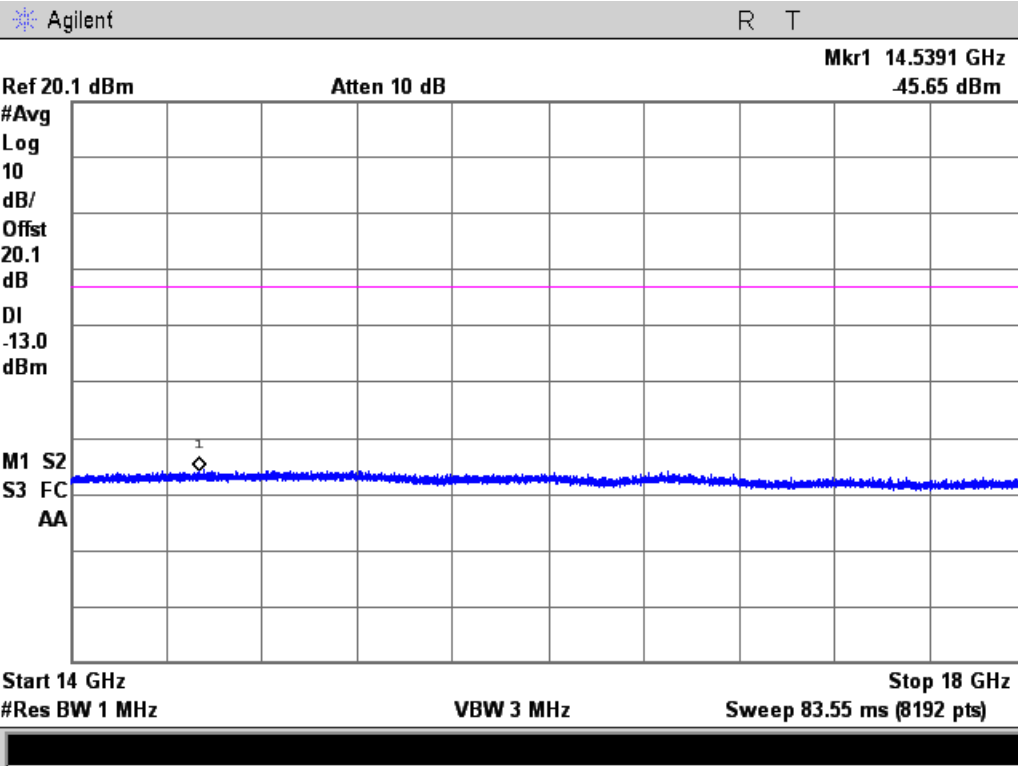




1930 - 1990 MHz Band

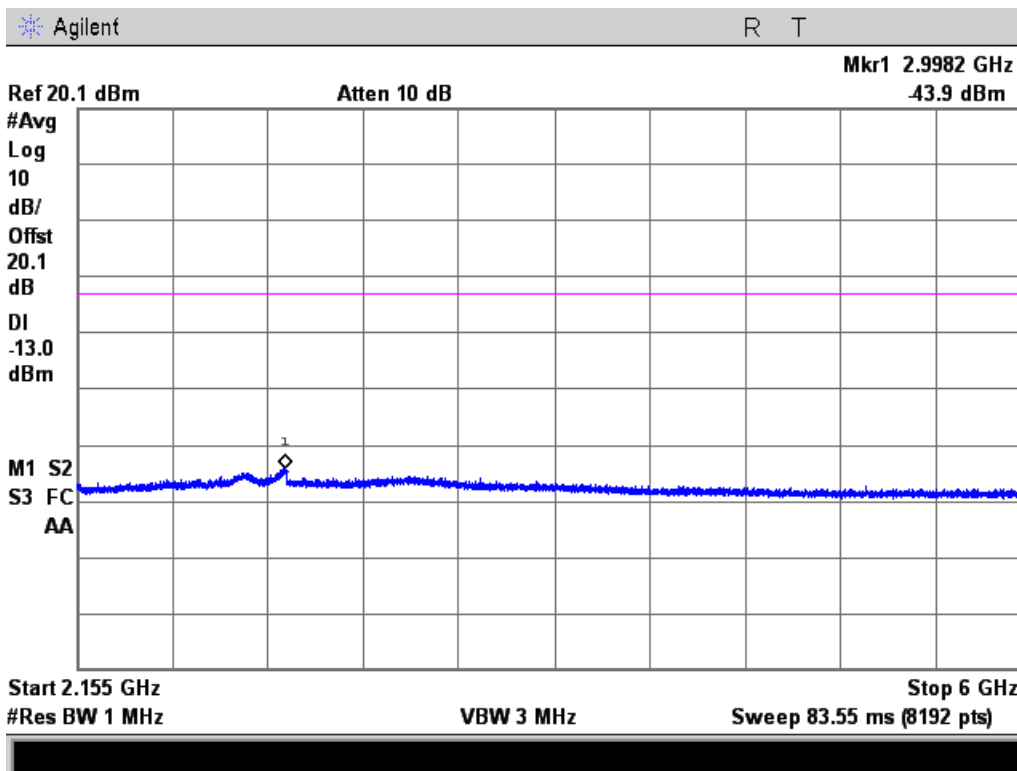
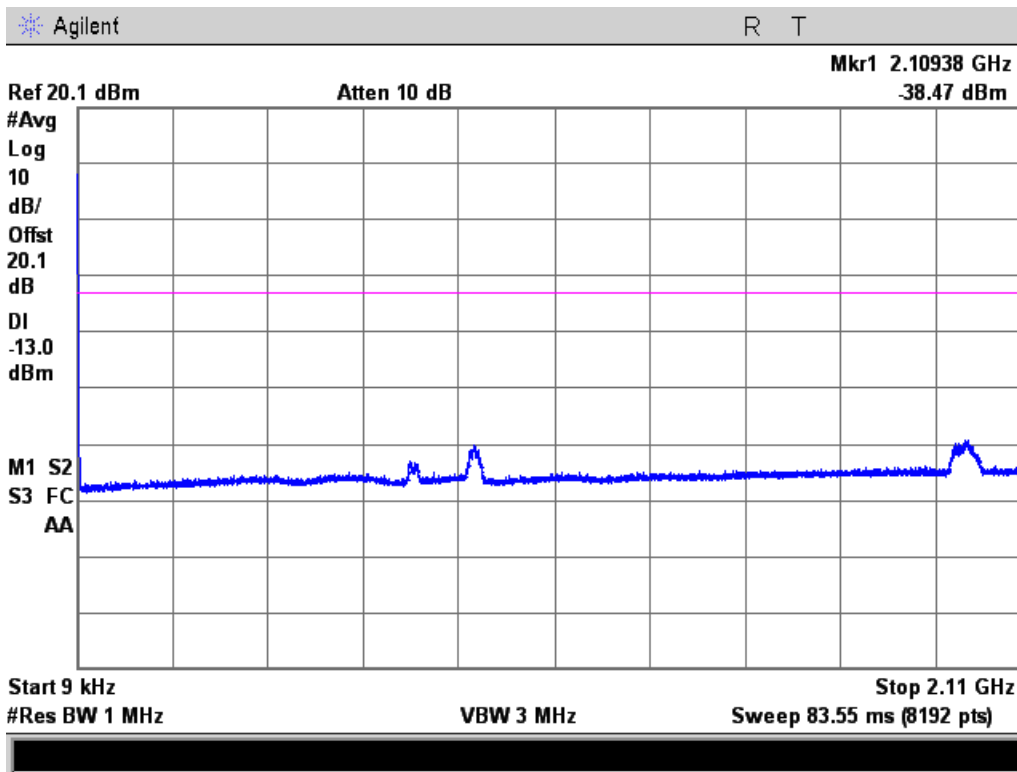


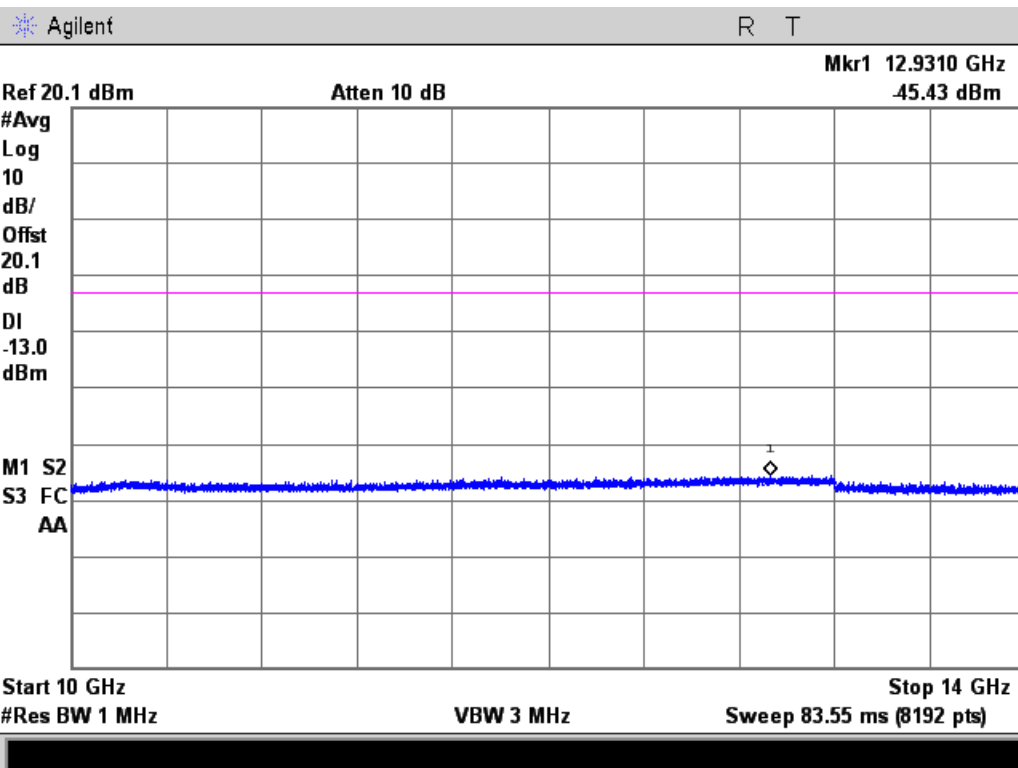
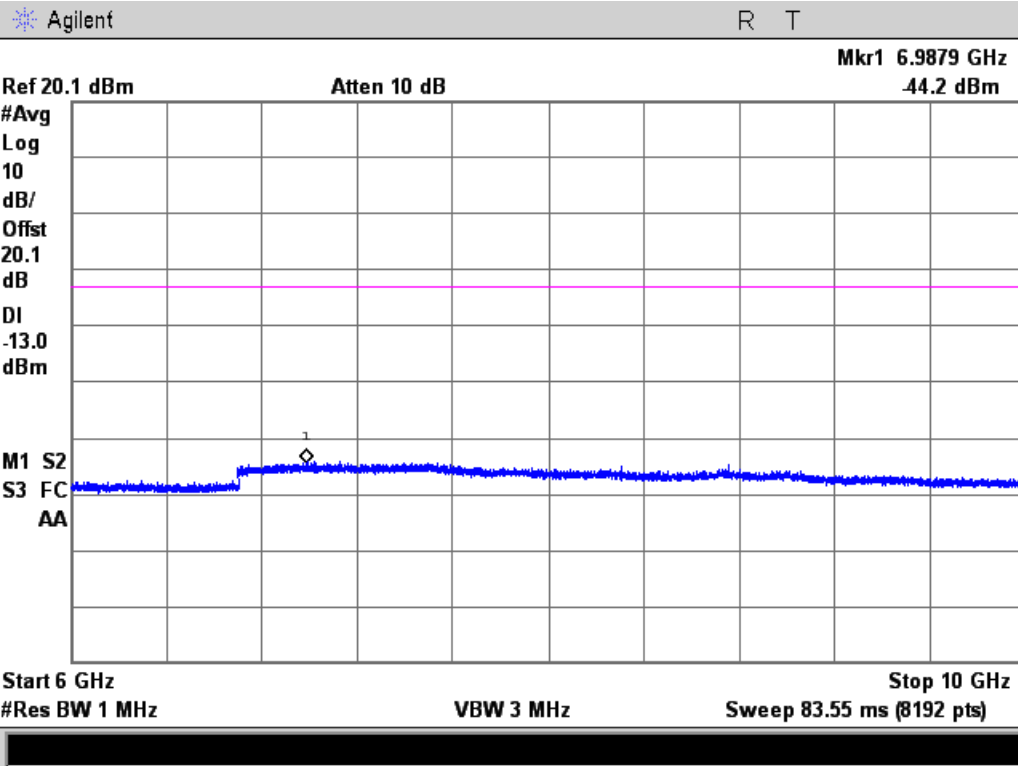


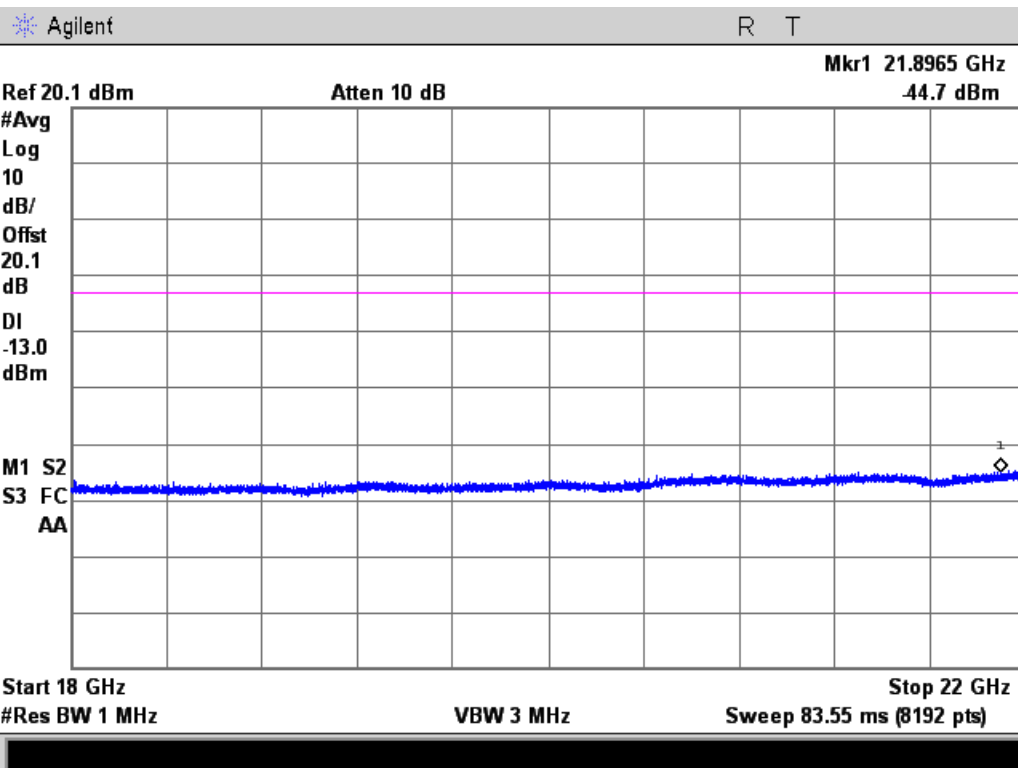
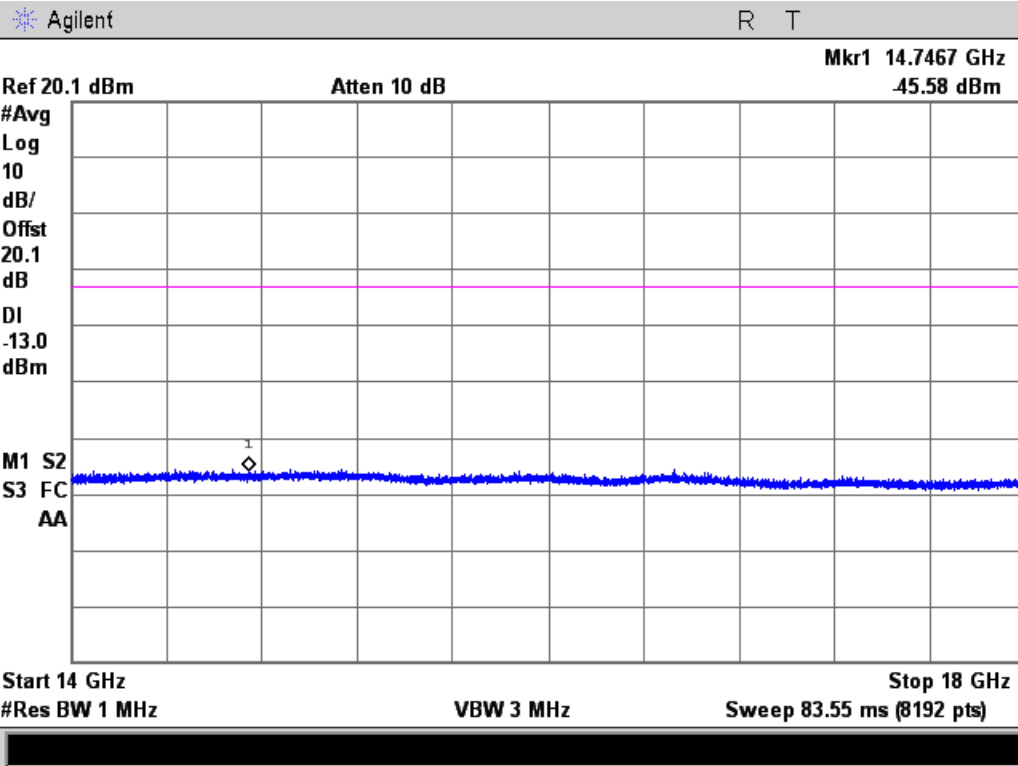




2110 - 2155 MHz Band









Noise Limits

Name of Test: Noise Limits
Test Equipment Utilized: i00331, i00405

Engineer: John Erhard
Test Date: 7/31/2013

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. A series of three tests are performed to measure the maximum uplink and downlink noise and the variable noise for the uplink and downlink in the presence of a downlink signal. The detailed procedures from KDB 935210 were followed.

The following formulas are used for calculating the limits. Note – Downlink noise is calculated with the CF of the associated uplink band.

$$\text{Noise Power} = -102.5 + \text{LOG}_{10}(\text{Band Center Frequency}) * 20$$

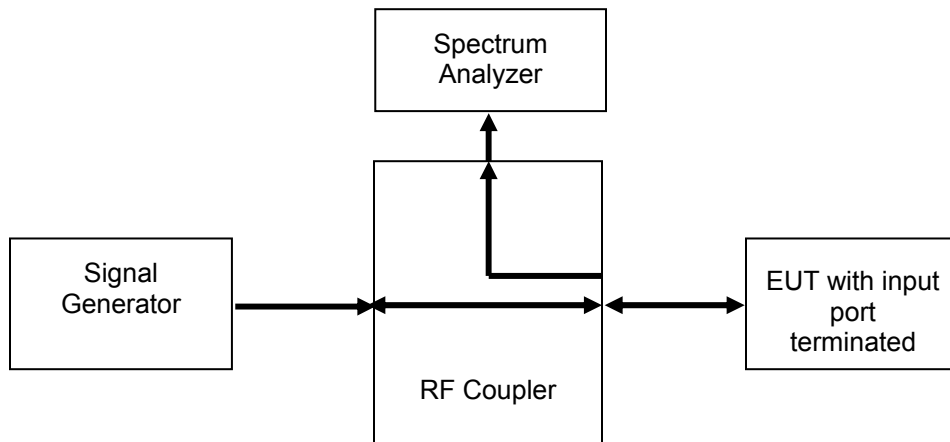
$$\text{Variable Noise} = -103 \text{ dBm/MHz-RSSI}$$

Test Setup

Maximum Noise Power



Variable Uplink Noise Power and Timing



Variable Downlink Noise Power and Timing





Maximum Uplink Noise Test Results

Frequency Band (MHz)	Measured Noise (dBm)	Limit (dBm)	Result
704 - 716	-46.65	-45.5	Pass
777 - 787	-46.75	-44.6	Pass
824 - 849	-46.51	-44.1	Pass
1710 - 1755	-39.62	-37.7	Pass
1850 - 1915	-42.53	-37.0	Pass

Maximum Downlink Noise Test Results

Frequency Band (MHz)	Measured Noise (dBm)	Limit (dBm)	Result
728 - 746	-47.78	-45.5	Pass
746 - 757	-48.19	-44.6	Pass
869 - 894	-44.14	-44.1	Pass
1930 - 1995	-43.29	-37.0	Pass
2110 - 2155	-40.03	-37.0	Pass

Uplink Noise Timing Test Results

Frequency Band (MHz)	Measured Timing (Seconds)	Limit (Seconds)	Result
704 - 716	1.4	3	Pass
776 - 78	2.6	3	Pass
824 - 849	1.7	3	Pass
1710 - 1755	0.625	3	Pass
1850 - 1915	1.8	3	Pass



Variable Uplink Noise Limit Test Results

704 - 716 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-43.0	-60.0	-63.5	-3.5
-44.0	-59.0	-62.7	-3.7
-53.0	-50.0	-54.0	-4.0
-51.0	-52.0	-56.1	-4.1
-45.0	-58.0	-62.1	-4.1
-90.0	-45.0	-49.2	-4.2

777 - 787 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-43.0	-60.0	-68.1	-8.1
-60.0	-45.0	-53.1	-8.1
-45.0	-58.0	-66.2	-8.2
-59.0	-45.0	-53.3	-8.3
-44.0	-59.0	-67.3	-8.3
-55.0	-48.0	-56.4	-8.4

824 - 849 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-45.0	-58.0	-65.2	-7.2
-47.0	-56.0	-63.5	-7.5
-48.0	-55.0	-62.7	-7.7
-46.0	-57.0	-64.9	-7.9
-57.0	-46.0	-54.1	-8.1
-59.0	-44.0	-52.3	-8.3

1710 - 1755 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-49.0	-54.0	-62.2	-8.2
-63.0	-40.0	-48.3	-8.3
-64.0	-39.0	-47.5	-8.5
-62.0	-41.0	-49.7	-8.7
-58.0	-45.0	-54.0	-9.0
-55.0	-48.0	-57.0	-9.0

1850 - 1915 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-46.0	-57.0	-65.0	-8.0
-62.0	-41.0	-49.6	-8.6
-58.0	-45.0	-53.7	-8.7
-55.0	-48.0	-56.7	-8.7
-61.0	-42.0	-50.8	-8.8
-59.0	-44.0	-53.2	-9.2



Variable Downlink Noise Limit Test Results

728 - 746 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-81.0	-45.5	-47.9	-2.4
-59.0	-45.5	-49.5	-4.0
-50.0	-53.0	-58.0	-5.0
-51.0	-52.0	-57.3	-5.3
-54.0	-49.0	-54.6	-5.6
-47.0	-56.0	-61.7	-5.7

746 - 757 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-81.0	-44.6	-48.5	-3.9
-59.0	-44.6	-49.5	-4.9
-60.0	-44.6	-49.6	-5.0
-47.0	-56.0	-61.2	-5.2
-56.0	-47.0	-52.3	-5.3
-46.0	-57.0	-62.5	-5.5

869 - 894 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-81.0	-44.1	-44.6	-0.5
-80.0	-44.1	-44.7	-0.6
-70.0	-44.1	-44.8	-0.7
-69.0	-44.1	-45.2	-1.1
-50.0	-53.0	-58.0	-5.0
-51.0	-52.0	-58.0	-6.0

1930 - 1995 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-58.0	-45.0	-46.9	-1.9
-57.0	-46.0	-48.1	-2.1
-61.0	-42.0	-44.2	-2.2
-62.0	-41.0	-43.3	-2.3
-53.0	-50.0	-52.3	-2.3
-51.0	-52.0	-54.3	-2.3

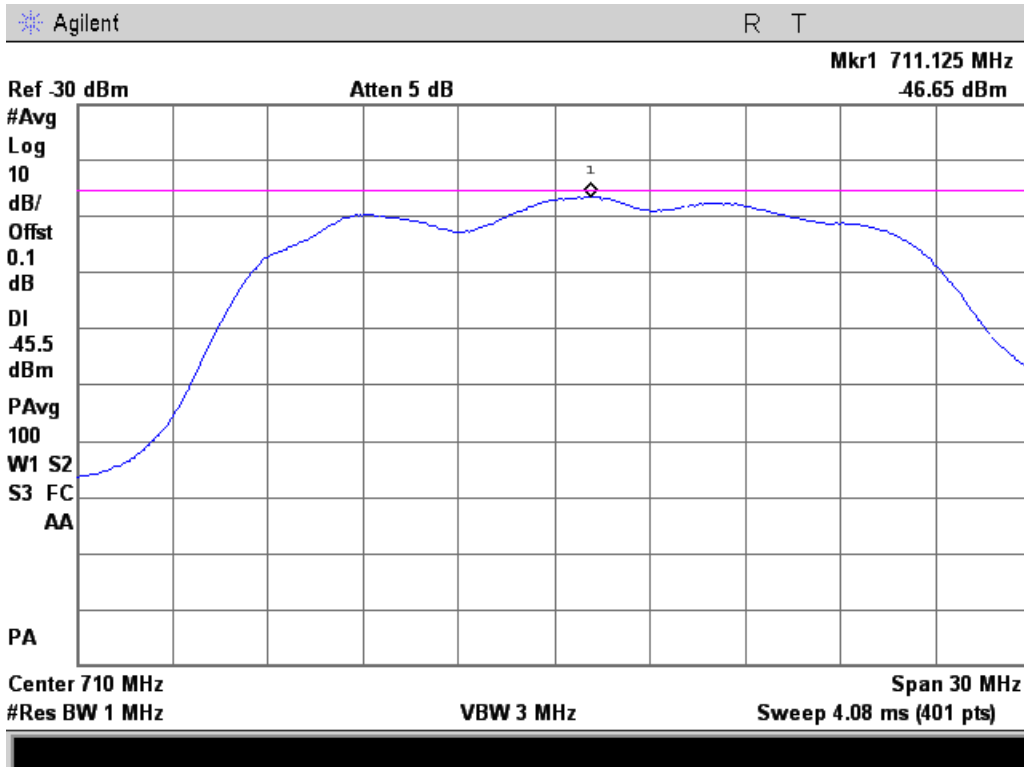
2110 - 2155 MHz

RSSI (dBm)	Noise Limit (dBm)	Measured Noise (dBm)	Margin (dB)
-65.0	-38.0	-39.4	-1.4
-53.0	-50.0	-52.0	-2.0
-52.0	-51.0	-53.1	-2.1
-90.0	-37.0	-39.4	-2.4
-89.0	-37.0	-39.4	-2.4
-88.0	-37.0	-39.4	-2.4

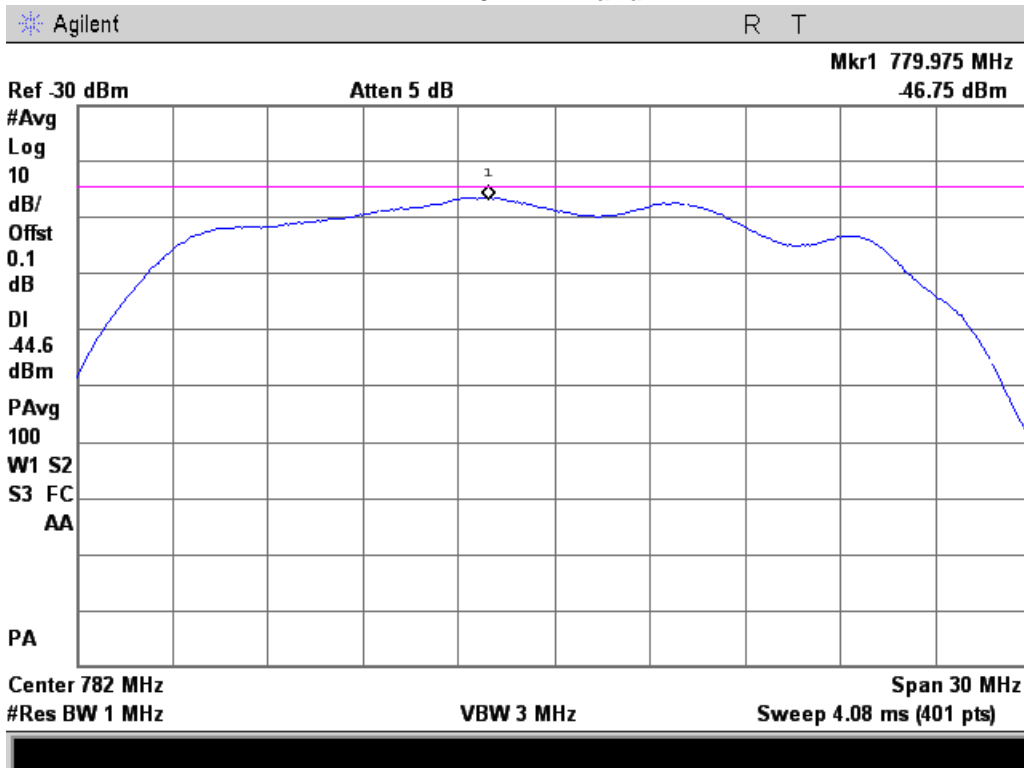


Maximum Uplink Noise Test Plots

704 - 716 MHz Band

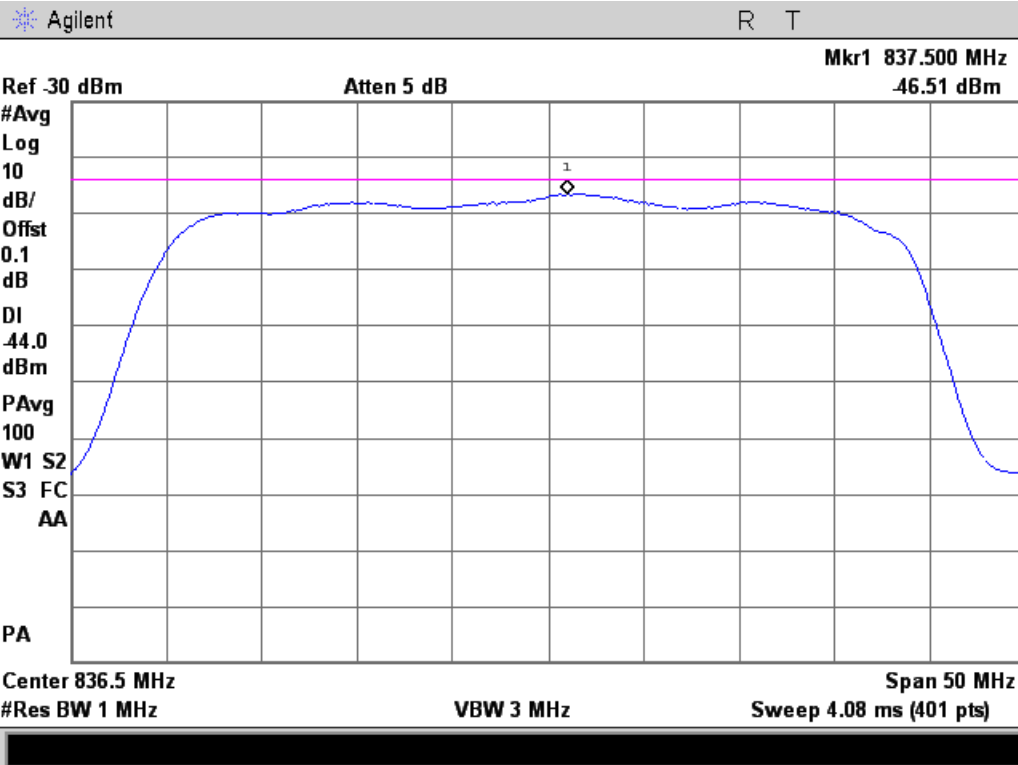


777 - 787 MHz Band

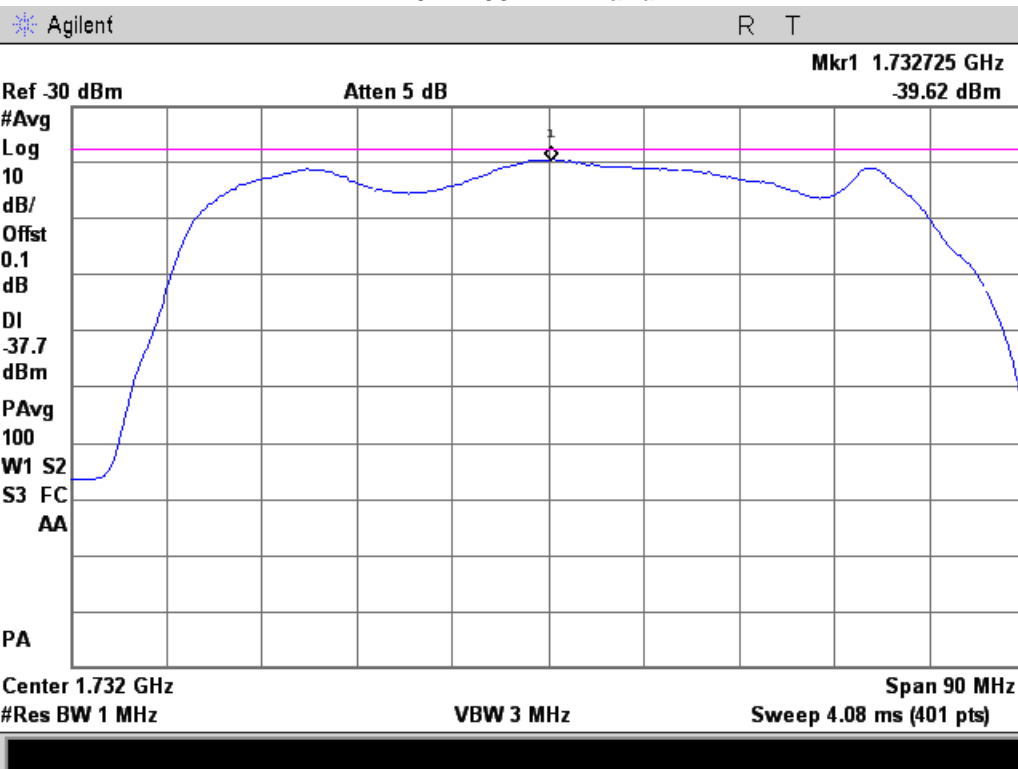




824 - 849 MHz Band

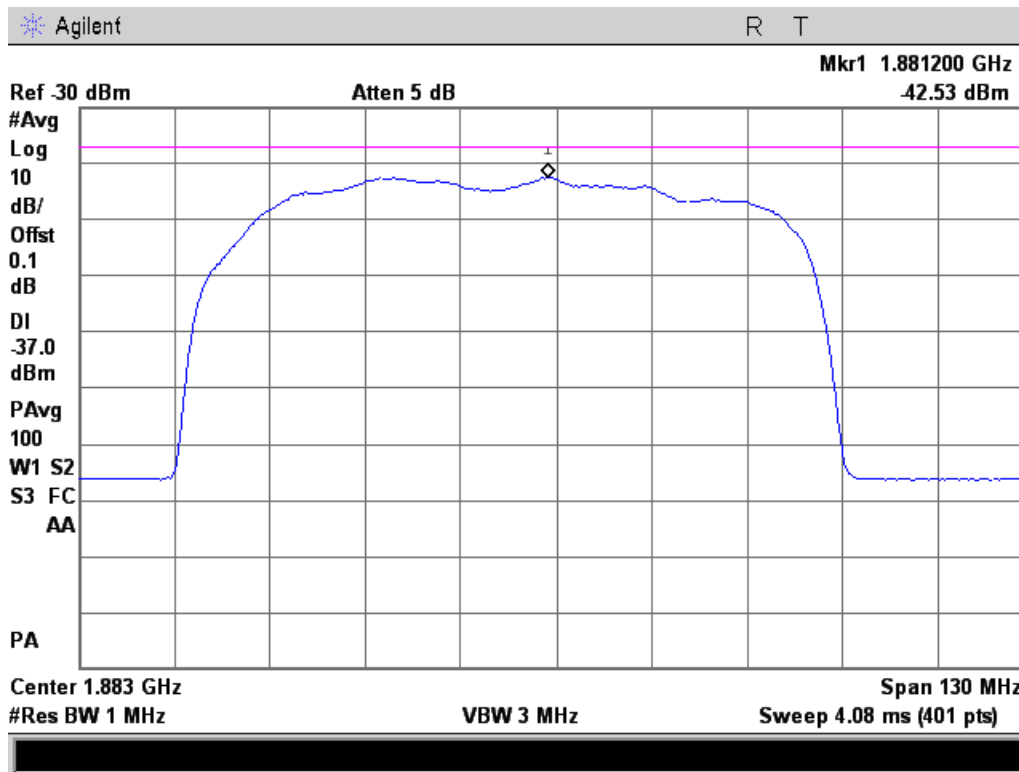


1710 - 1755 MHz Band



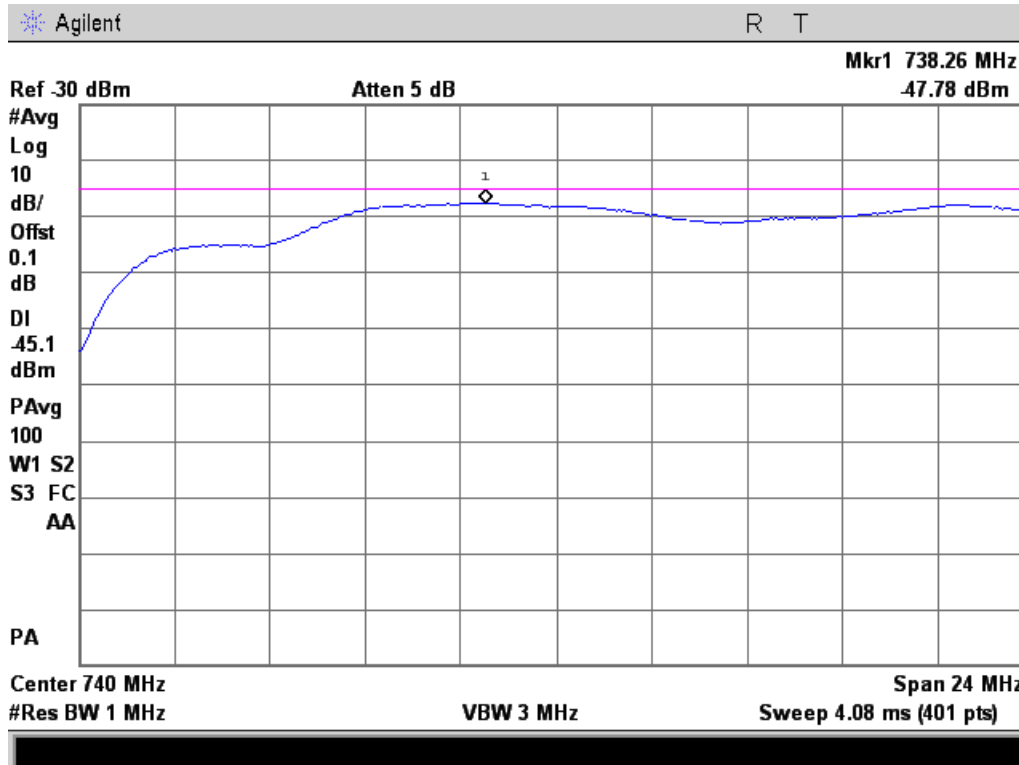


1850 - 1910 MHz Band



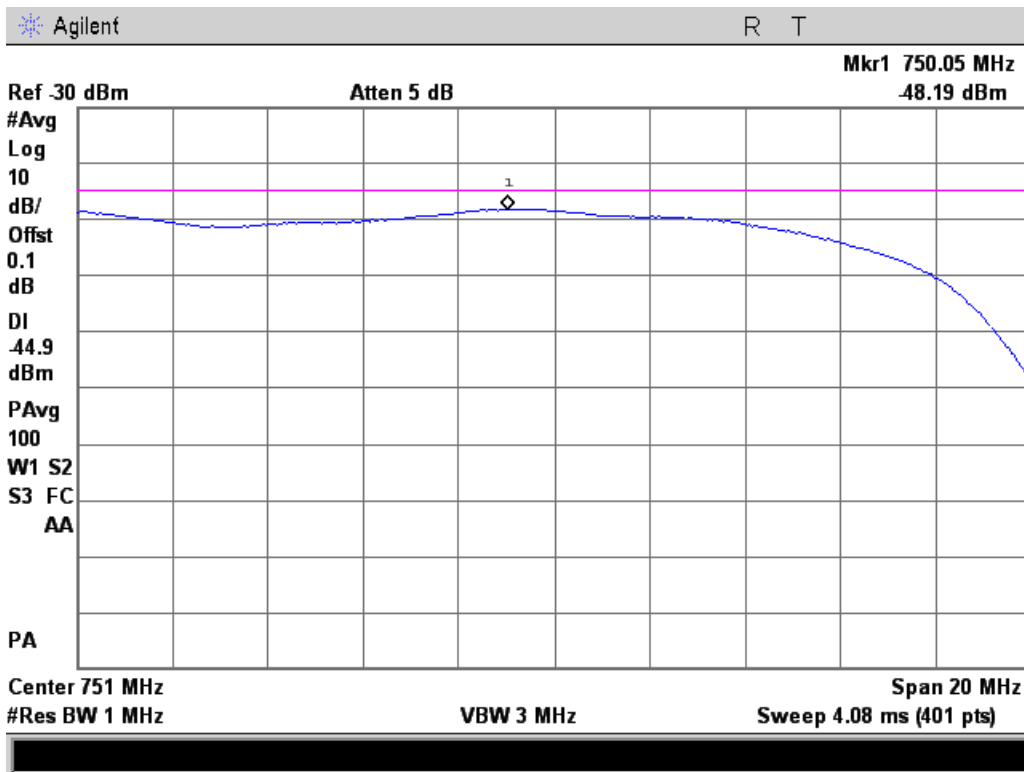
Maximum Downlink Noise Test Plots

728 - 746 MHz Band

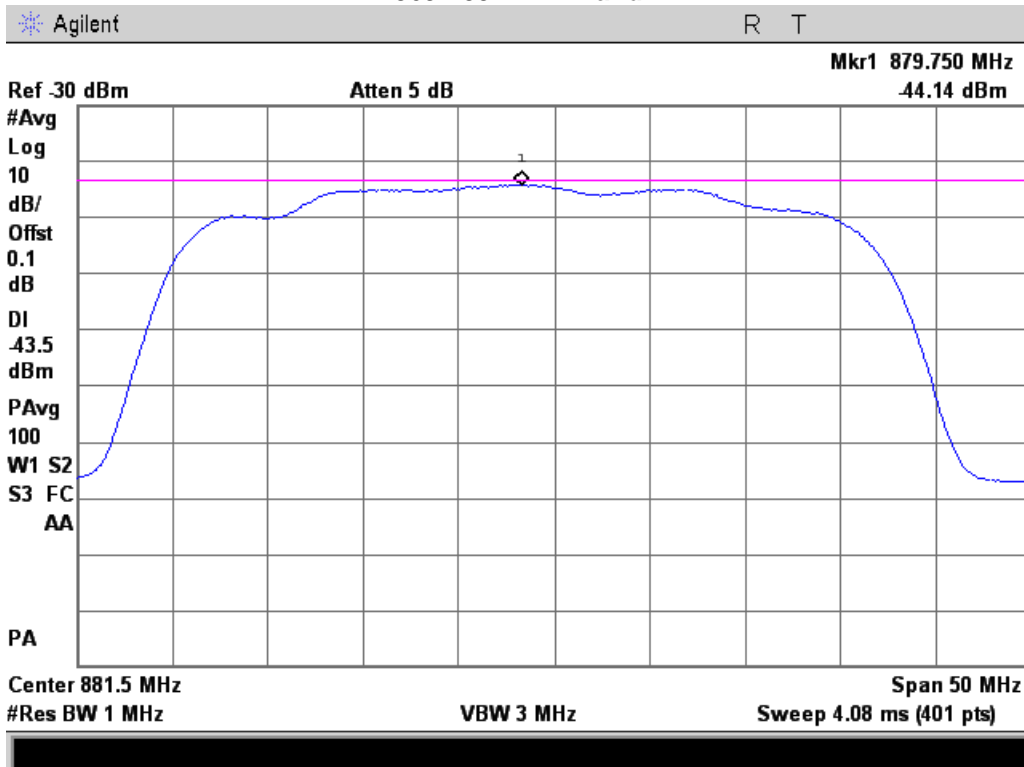




746 - 757 MHz Band

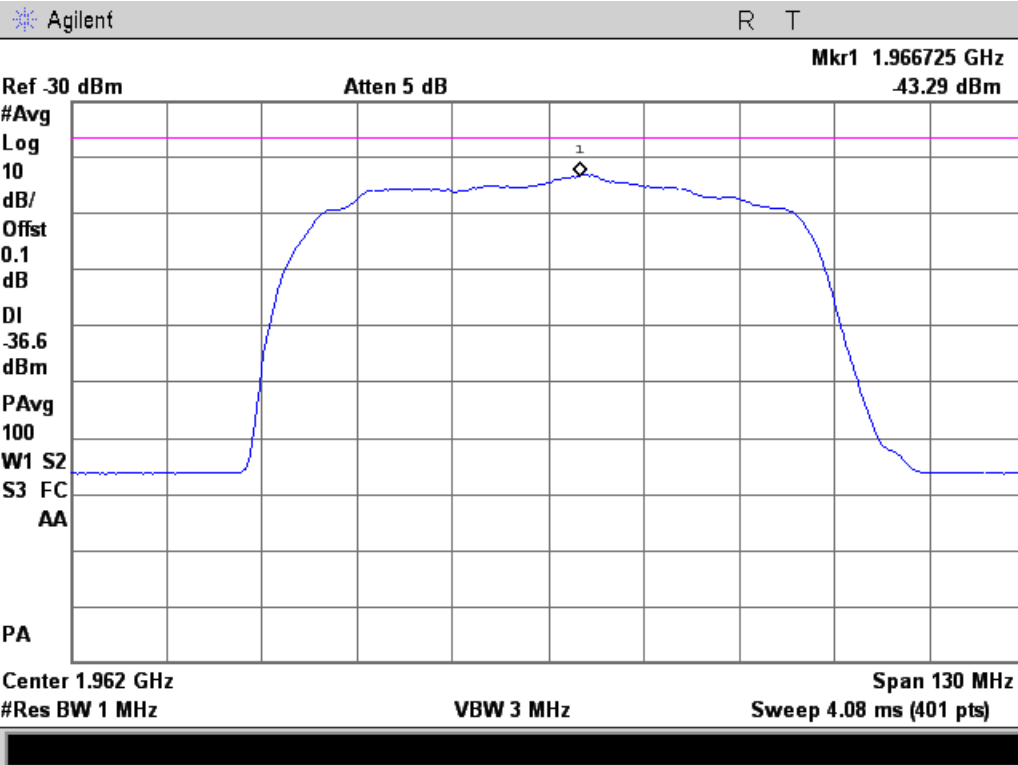


869 - 894 MHz Band

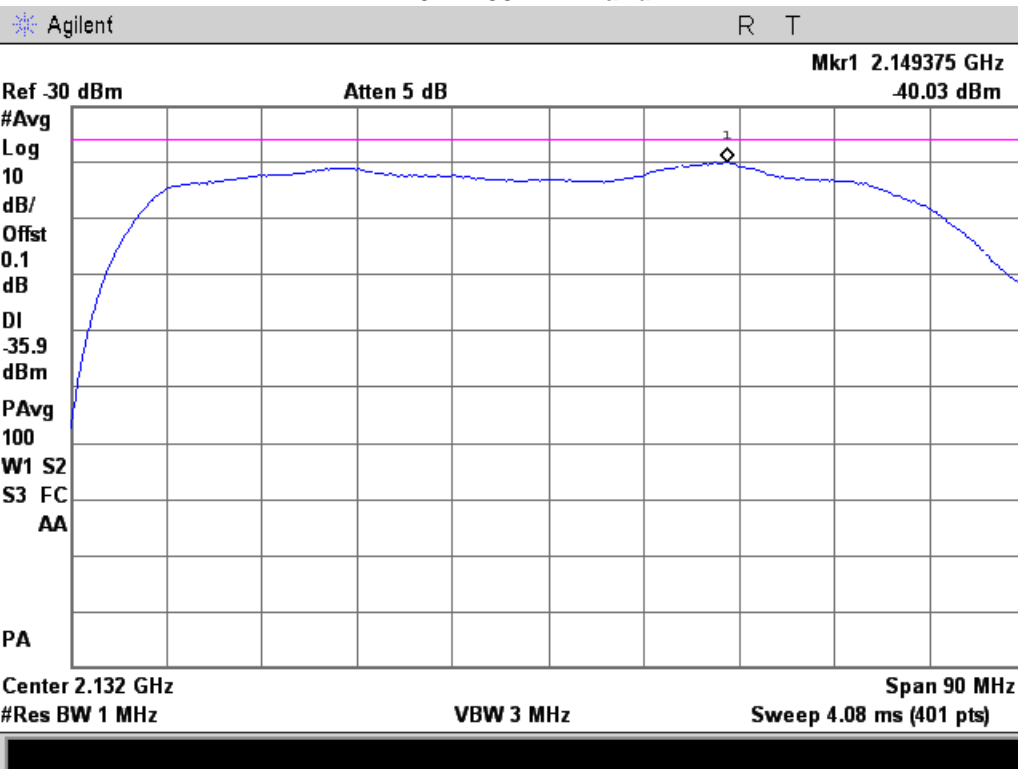




1930 - 1990 MHz Band



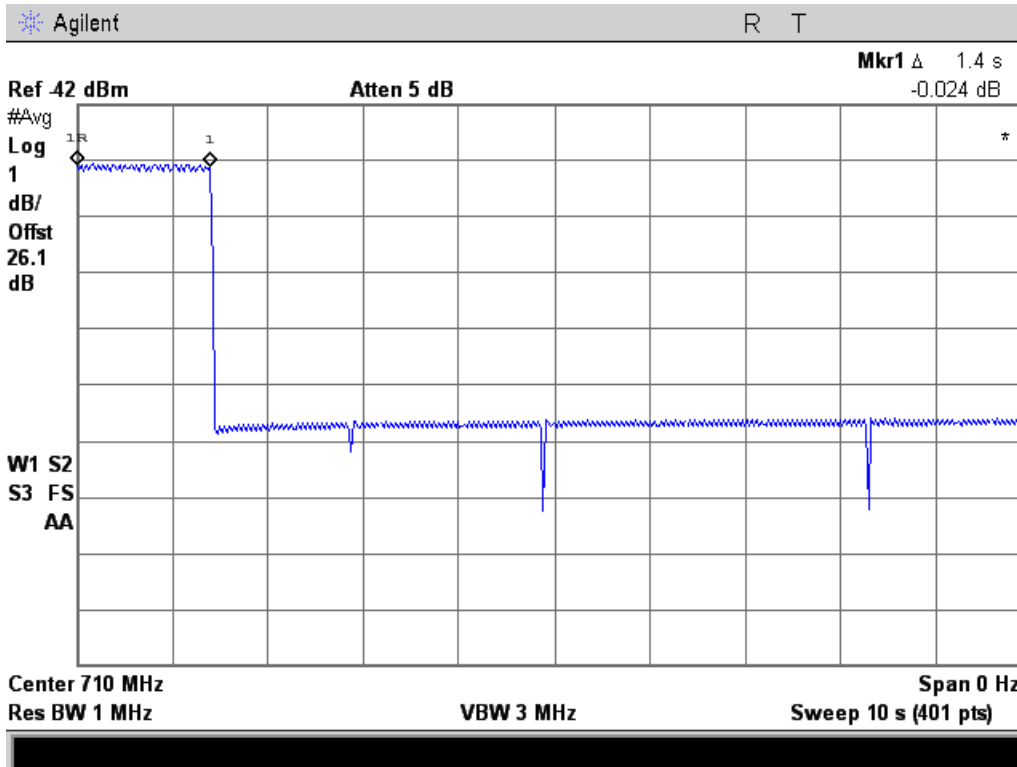
2110 - 2155 MHz Band



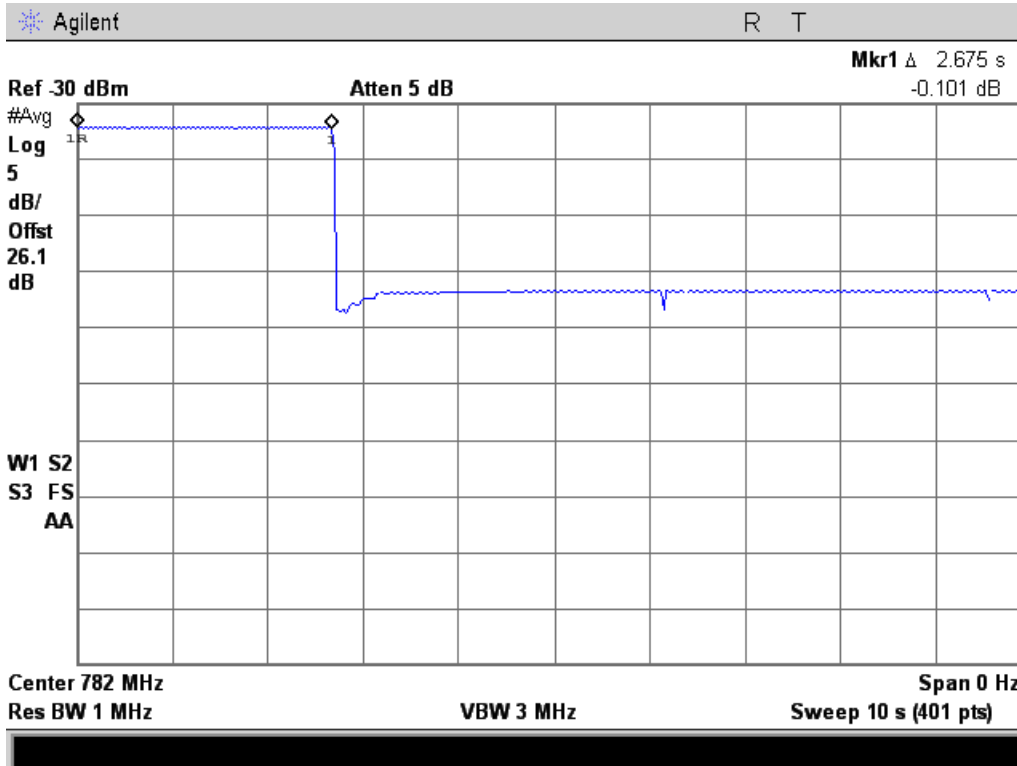


Uplink Noise Timing Test Plots

704 - 716 MHz Band

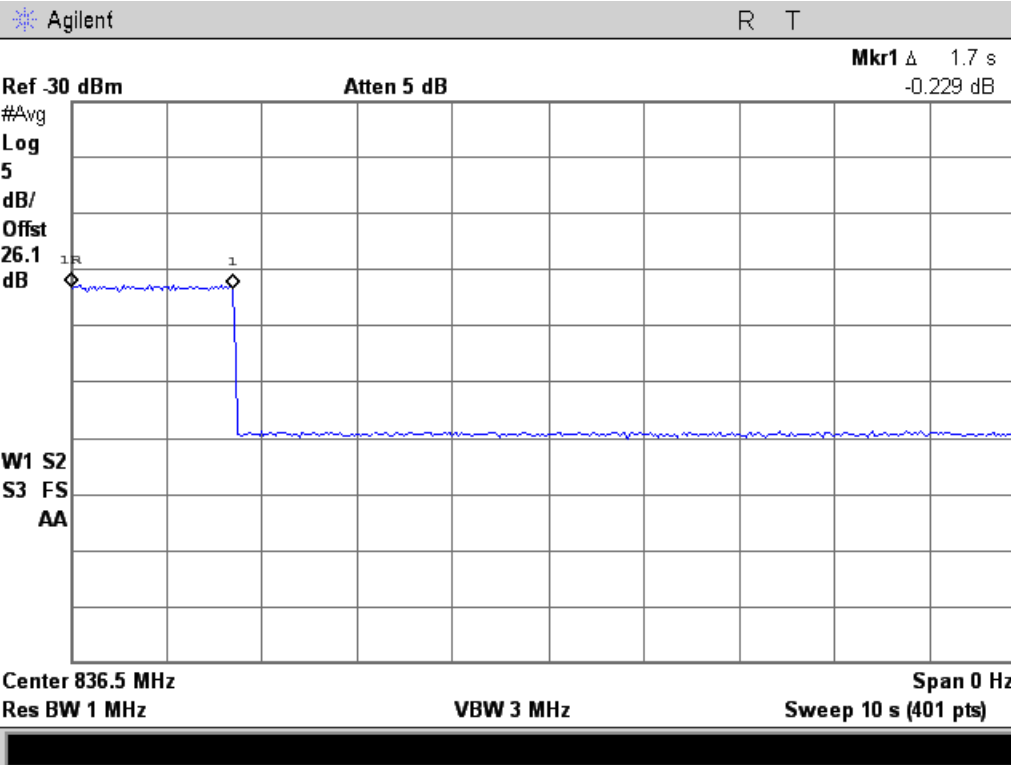


777 - 787 MHz Band

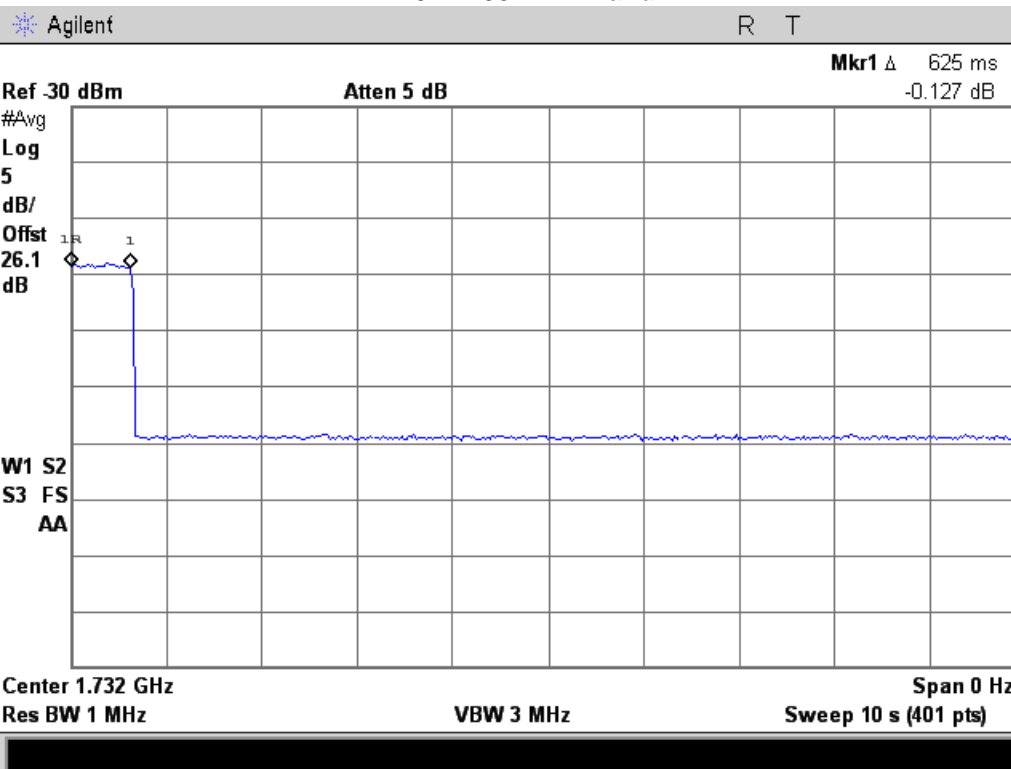




824 - 849 MHz Band

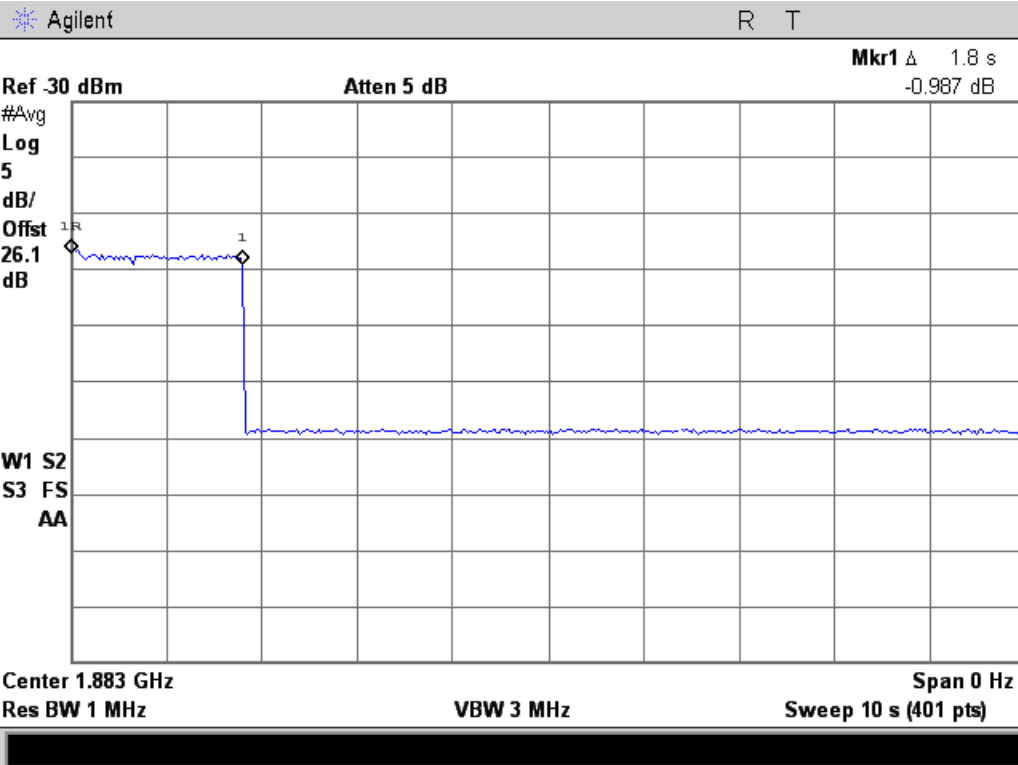


1710 - 1755 MHz Band





1850 - 1910 MHz Band





Uplink Inactivity

Name of Test: Uplink Inactivity

Engineer: John Erhard

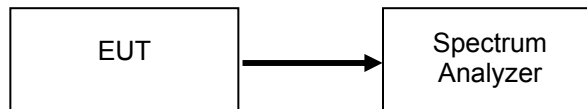
Test Equipment Utilized: i00331, i00405

Test Date: 7/14/2013

Test Procedure

The EUT was connected directly to a spectrum analyzer set to operate in the center of the EUT operational uplink and downlink bands. The span was set to 0 Hz with a sweep time of 330 seconds and MAX HOLD operation. The EUT was powered on and the time for the uplink to return to an inactive state was measured using the DELTA MARKER method was utilized to ensure it was less than 300 seconds. The noise level after the return to an inactive state was less than 70 dBm/MHz.

Test Setup



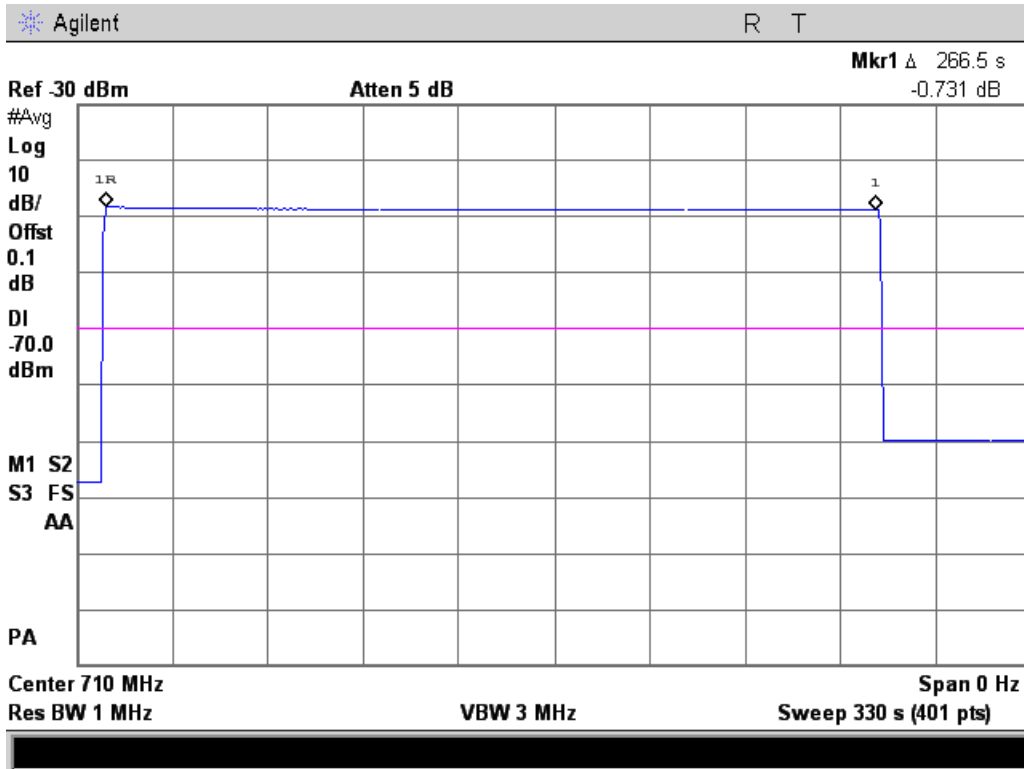
Uplink Test Results

Frequency Band (MHz)	Measured Time (Seconds)	Limit (Seconds)	Result
704 - 716	266.5	300	Pass
777 - 787	267.3	300	Pass
824 - 849	267.3	300	Pass
1710 - 1755	267.3	300	Pass
1850 - 1915	266.5	300	Pass

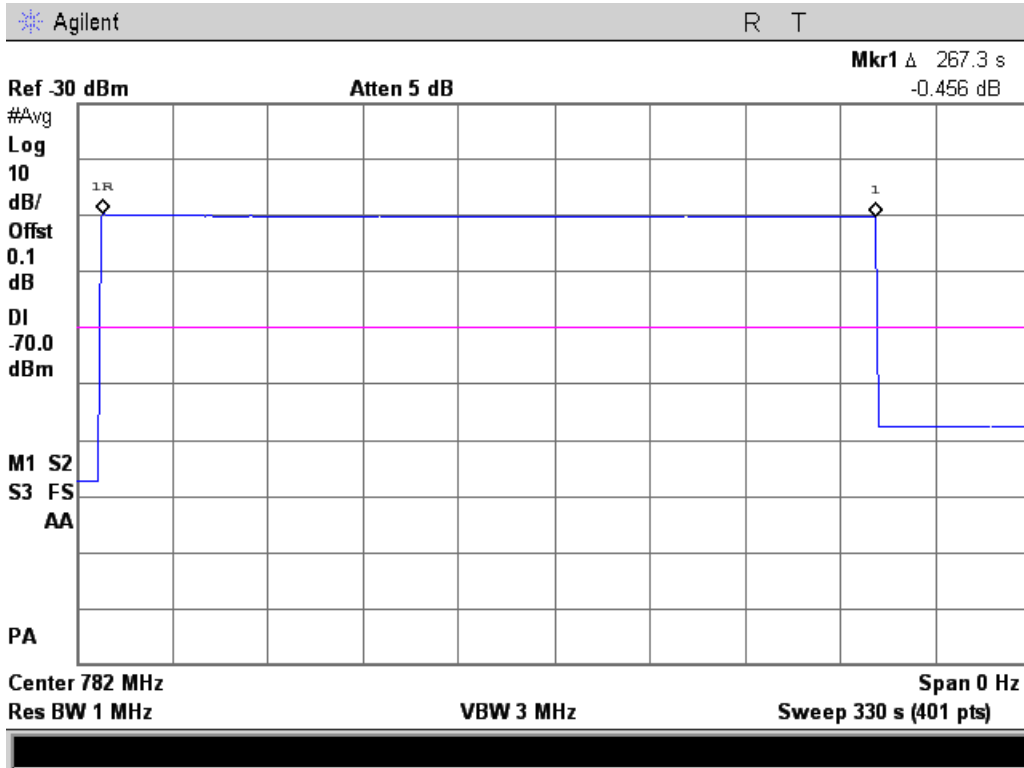


Uplink Test Results

704 - 716 MHz

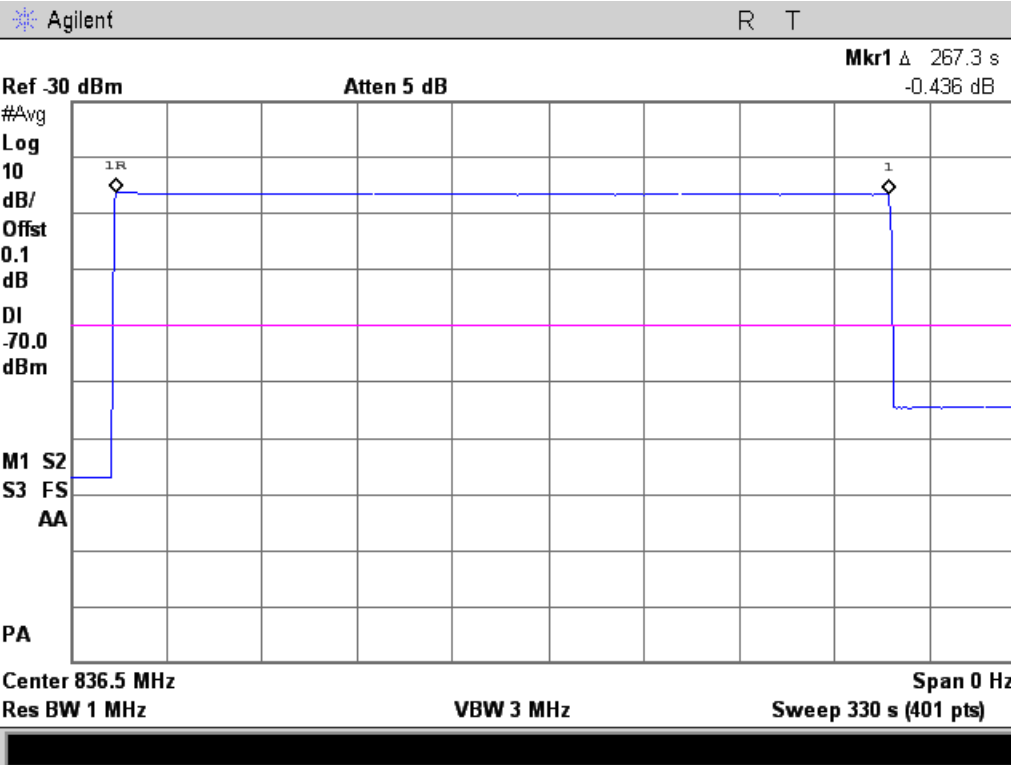


777 - 787 MHz

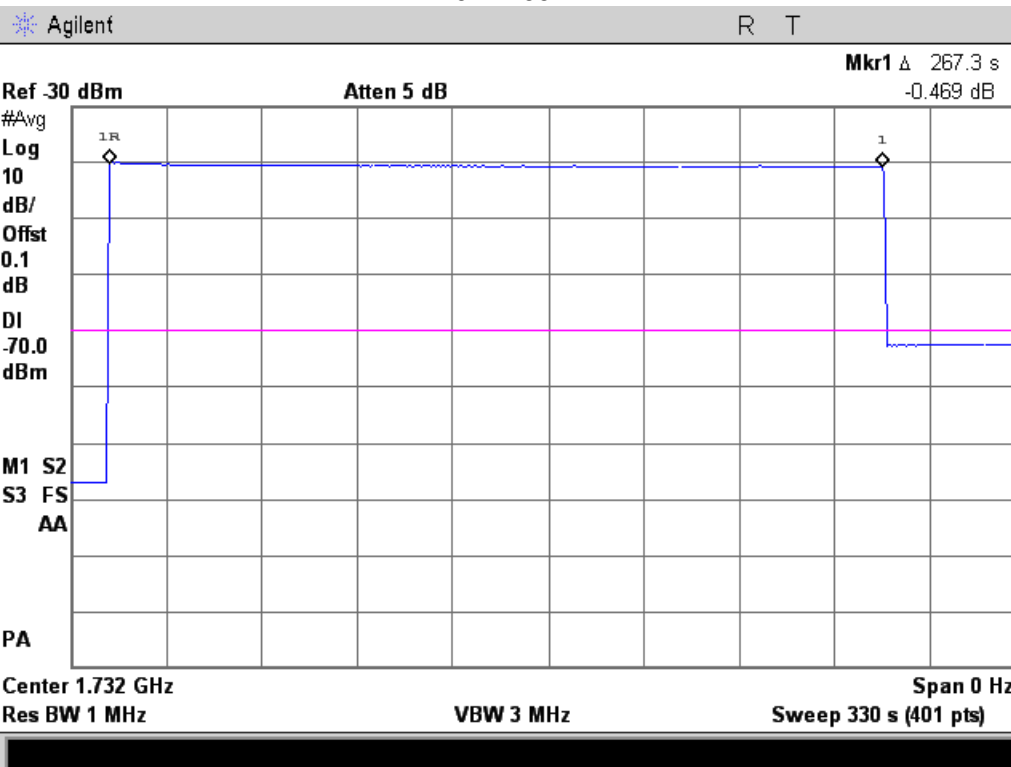




824 - 849 MHz

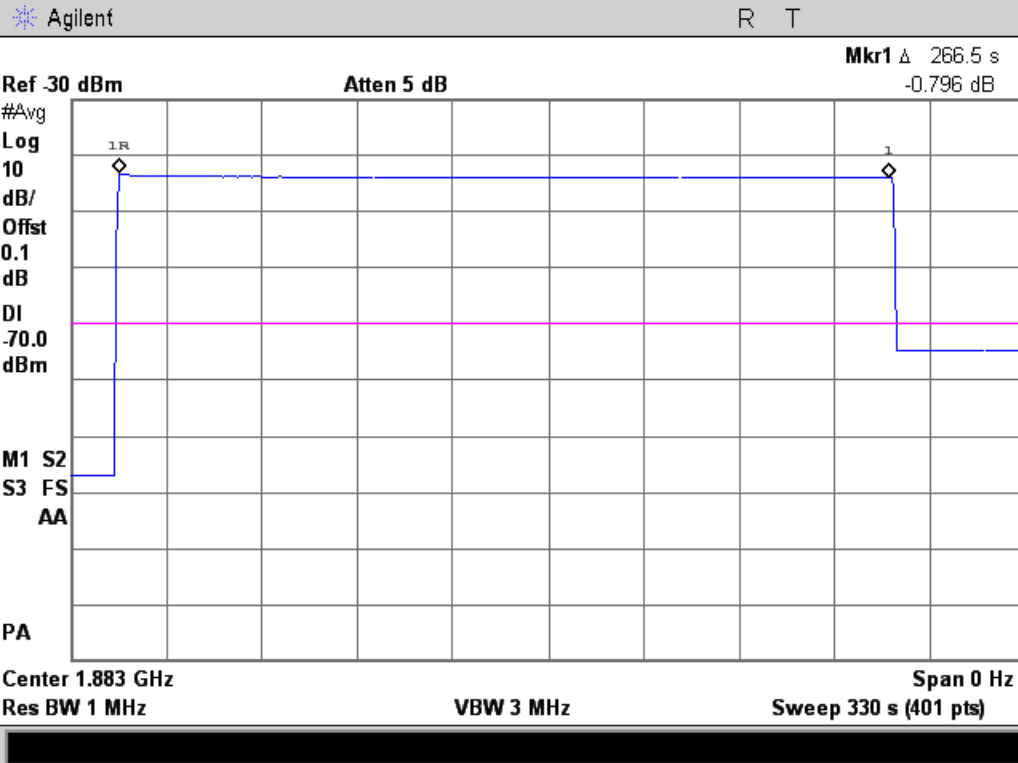


1710 - 1755 MHz





1850 - 1915 MHz





Variable Gain

Name of Test: Variable Gain
Test Equipment Utilized: i00331, i00405

Engineer: John Erhard
Test Date: 7/31/2013

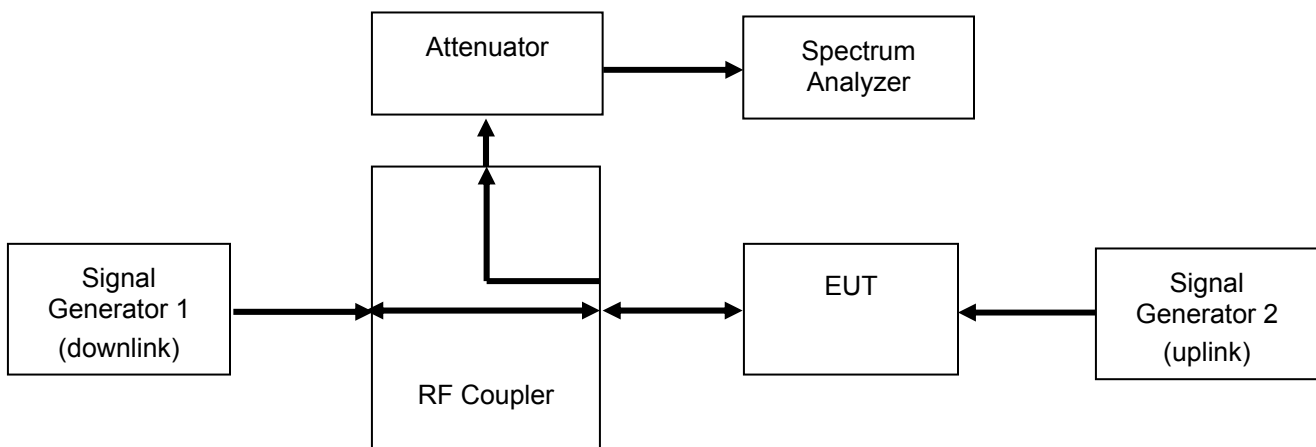
Test Procedure

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. The uplink gain in the presence of a downlink signal was measured for each operational uplink band using the detailed procedures form KDB 935210.

The following formula is used for calculating the limits.

$$\text{Variable Gain} = -34 \text{ dB} - \text{RSSI} + \text{MSCL}$$

Test Setup





Uplink Test Results

704 - 716 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-59	35.8	60.81	-40	16.9	56.9	-3.91
-56	35.8	57.81	-40	13.5	53.5	-4.31
-57	35.8	58.81	-40	14.4	54.4	-4.41
-54	35.8	55.81	-40	11.4	51.4	-4.41
-55	35.8	56.81	-40	12.3	52.3	-4.51
-52	35.8	53.81	-40	9.02	49.02	-4.79

777 - 787 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-56	36.7	58.74	-40	12.4	52.4	-6.34
-59	36.7	61.74	-40	15.3	55.3	-6.44
-57	36.7	59.74	-40	13.3	53.3	-6.44
-55	36.7	57.74	-40	11.3	51.3	-6.44
-54	36.7	56.74	-40	10.3	50.3	-6.44
-53	36.7	55.74	-40	9.3	49.3	-6.44

824 - 849 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-56	35.1	57.1	-40	12.4	52.4	-4.7
-63	35.1	64.1	-40	18.7	58.7	-5.4
-57	35.1	58.1	-40	12.5	52.5	-5.6
-58	35.1	59.1	-40	13.4	53.4	-5.7
-51	35.1	52.1	-40	6.4	46.4	-5.7
-49	35.1	50.1	-40	4.4	44.4	-5.7

1710 - 1755 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-63	45.7	71	-45	14.4	59.4	-11.6
-62	45.7	71	-45	12.7	57.7	-13.3
-54	45.7	65.7	-45	6.3	51.3	-14.4
-60	45.7	71	-45	10.95	55.95	-15.05
-55	45.7	66.7	-45	6.3	51.3	-15.4
-53	45.7	64.7	-45	4.3	49.3	-15.4

1850 - 1915 MHz

RSSI (dBm)	MSCL (dB)	Gain Limit (dBm)	P(in) (dBm)	P(out) (dBm)	Gain (dB)	Margin (dB)
-65	46.1	72	-45	17.4	62.4	-9.6
-80	46.1	72	-45	17.3	62.3	-9.7
-61	46.1	72	-45	12.16	57.16	-14.84
-59	46.1	71.1	-45	10.9	55.9	-15.2
-54	46.1	66.1	-45	5.7	50.7	-15.4
-60	46.1	72	-45	11.1	56.1	-15.9



Occupied Bandwidth

Name of Test: Occupied Bandwidth

Engineer: John Erhard

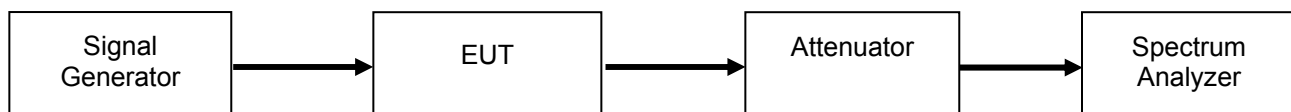
Test Equipment Utilized: i00331, i00405

Test Date: 7/17/2013

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. A signal generator was utilized to produce the following signals; GSM, CDMA, and WCDMA tuned to the center channel of each the EUT operational uplink and downlink band with the RF level set 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.

Test Setup

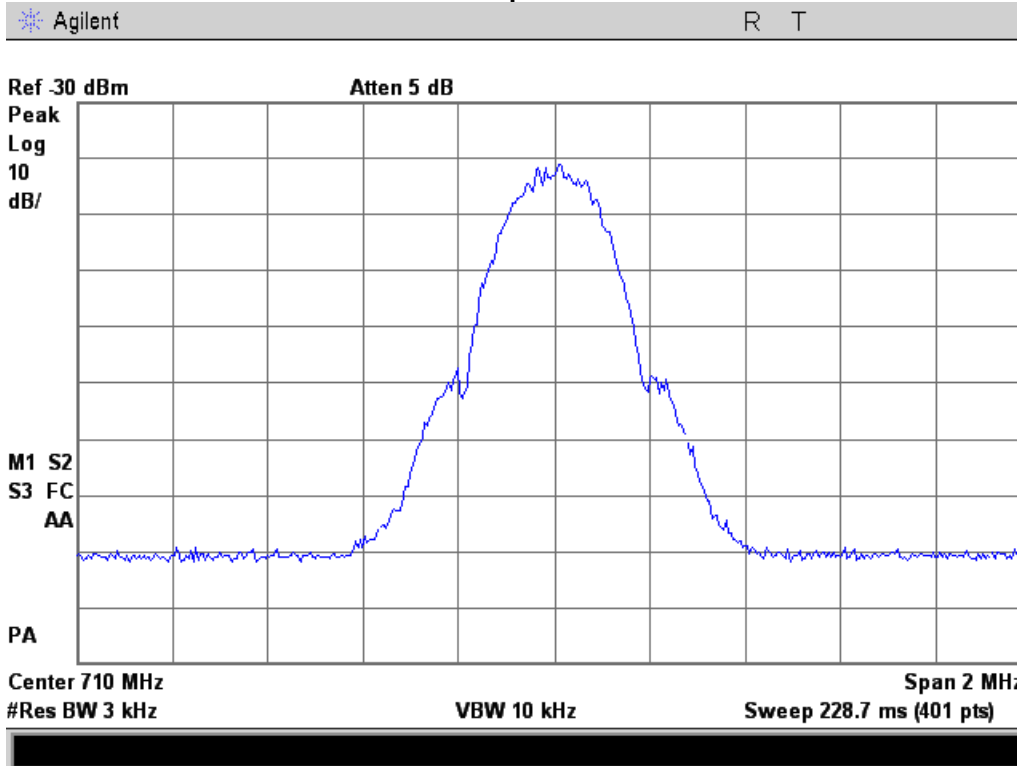




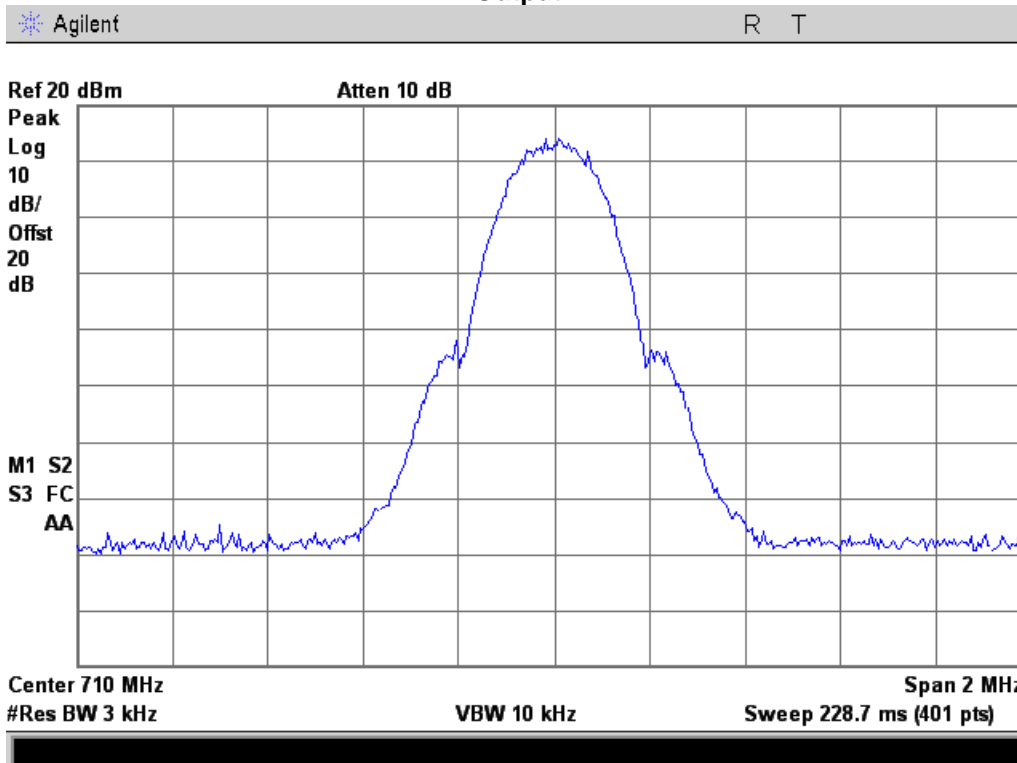
GSM Uplink Test Plots

704 - 716 MHz Band

Input



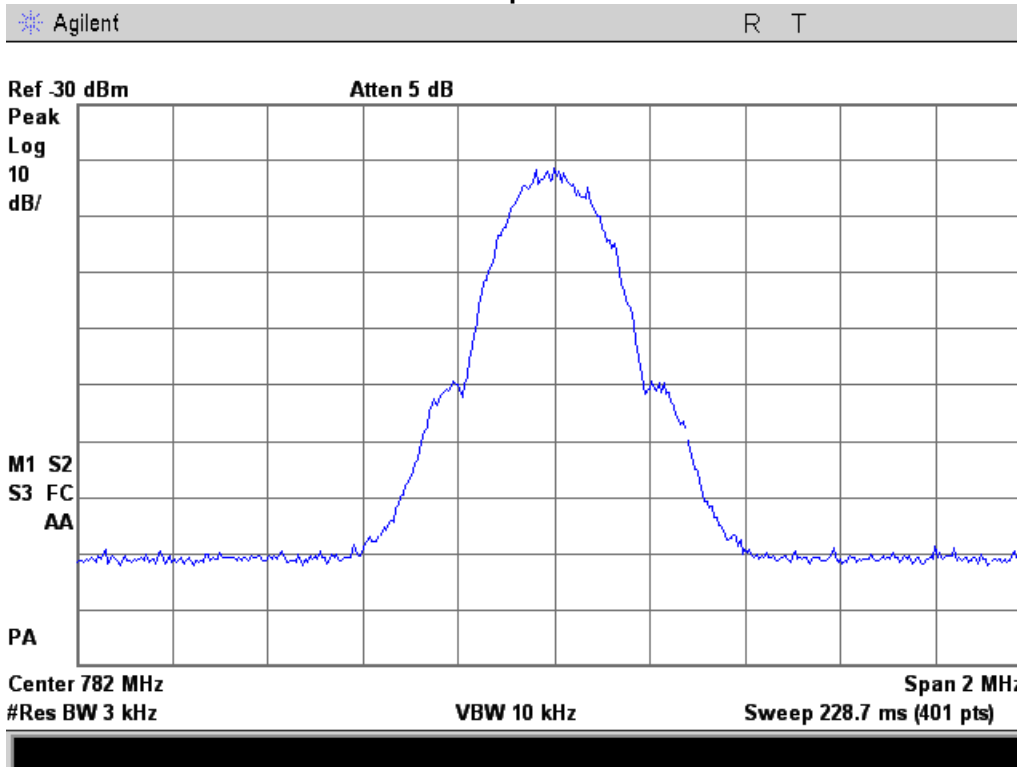
Output



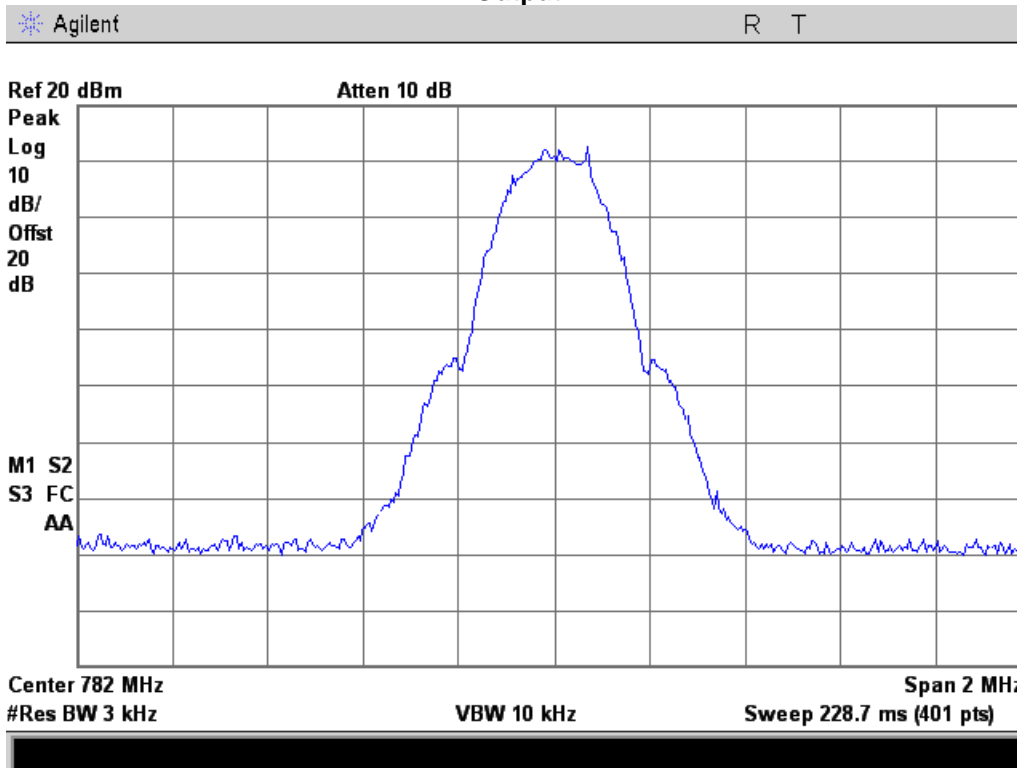


777 - 787 MHz Band

Input



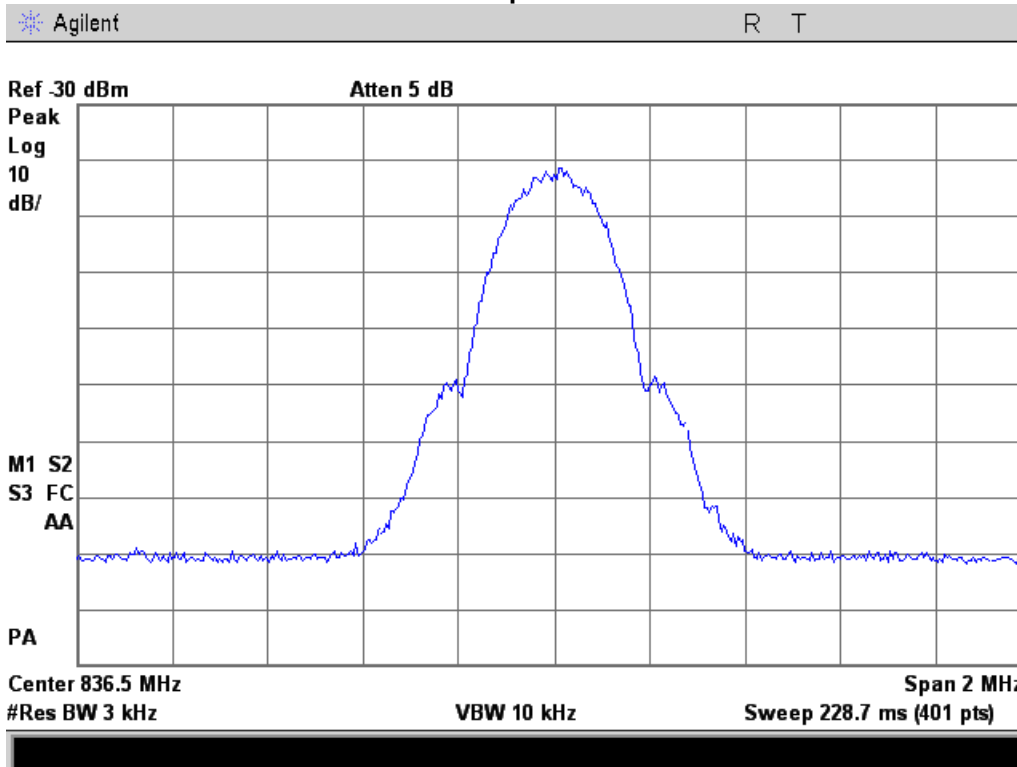
Output



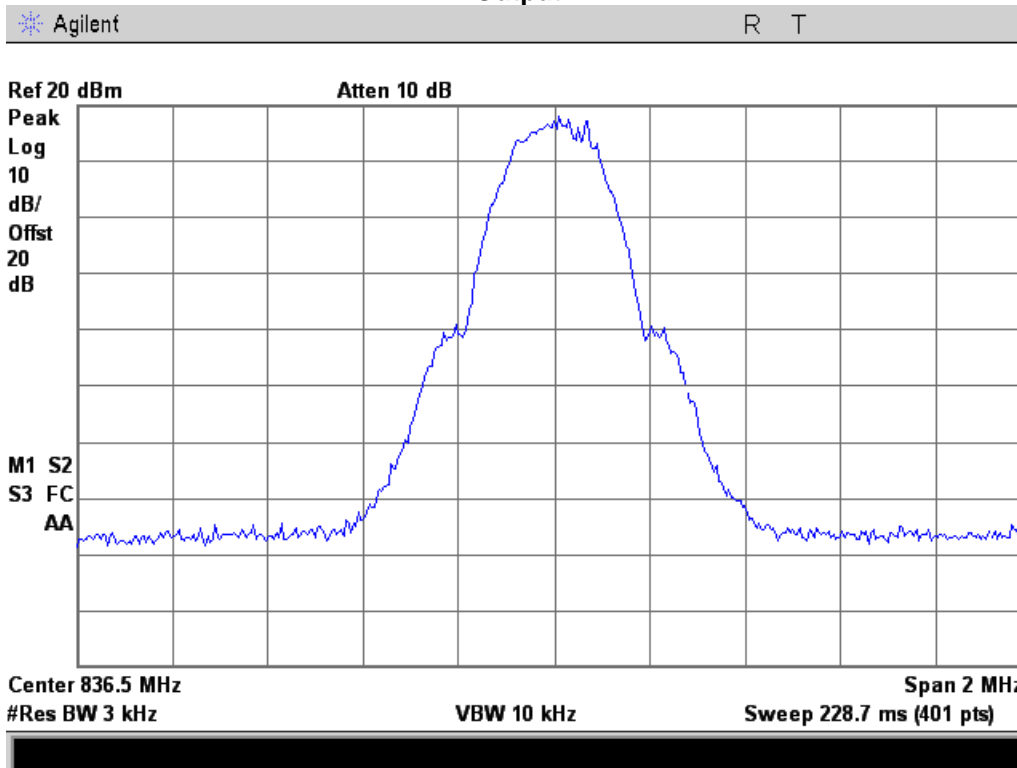


824 - 849 MHz Band

Input



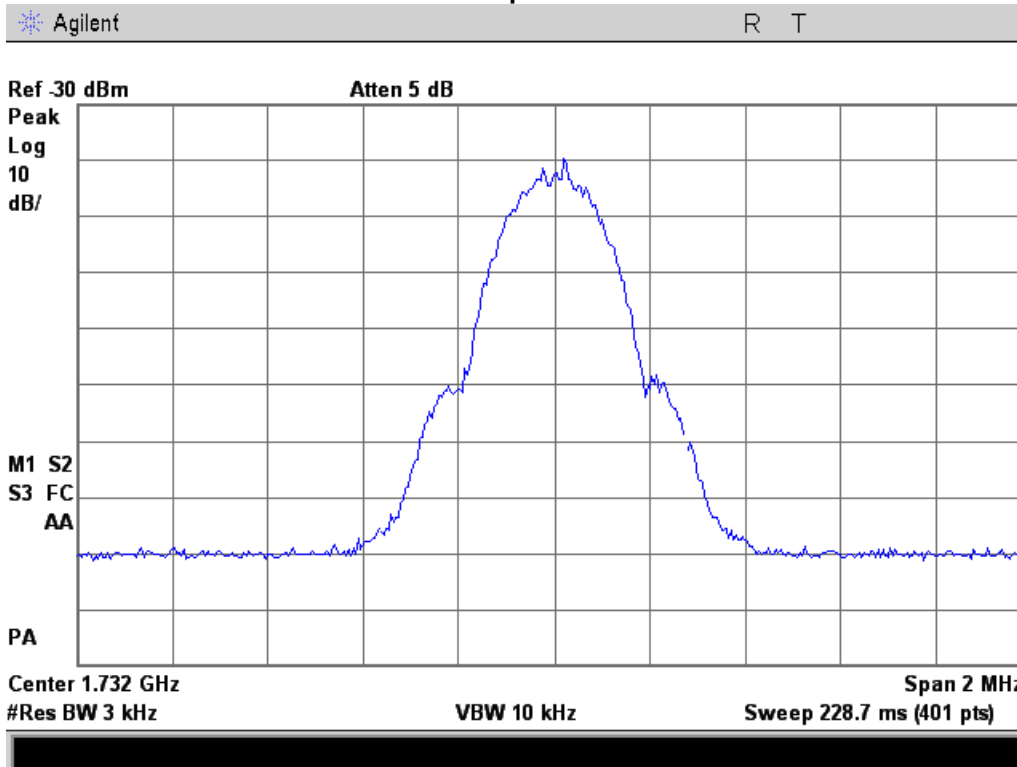
Output



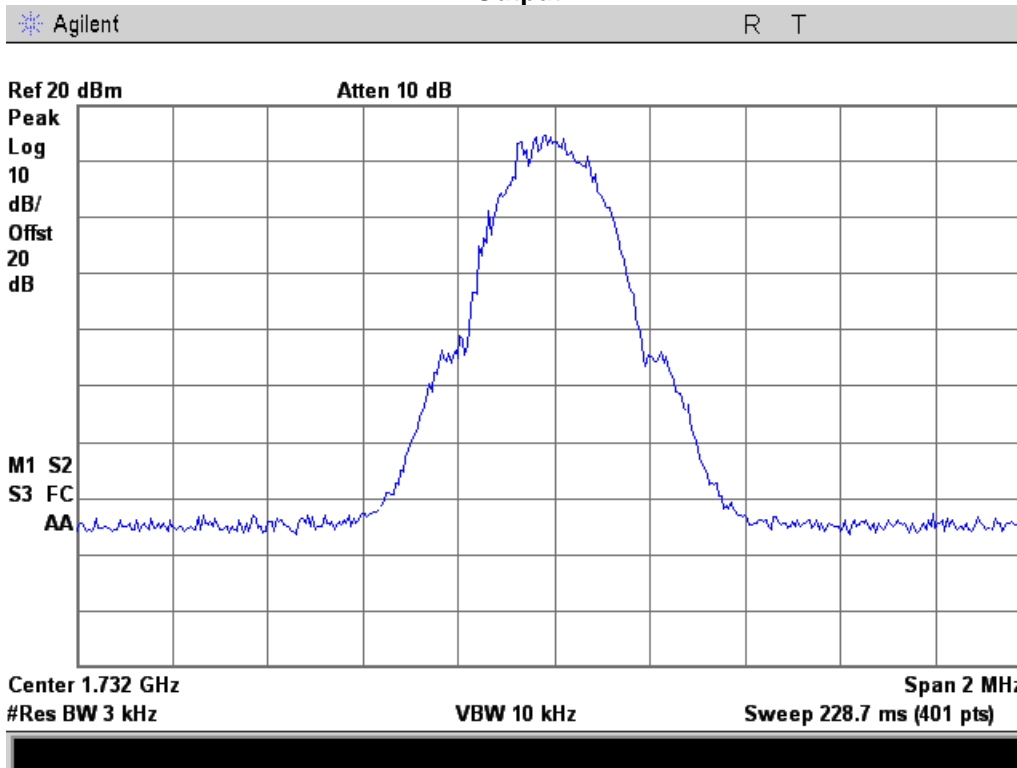


1710 - 1755 MHz Band

Input



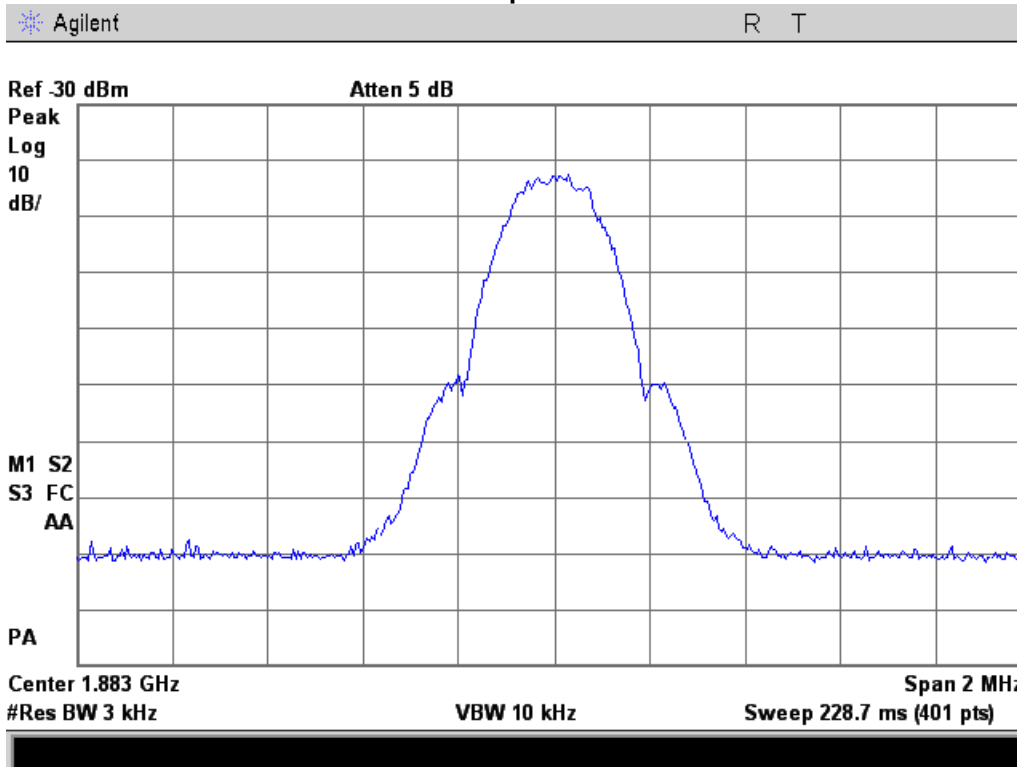
Output



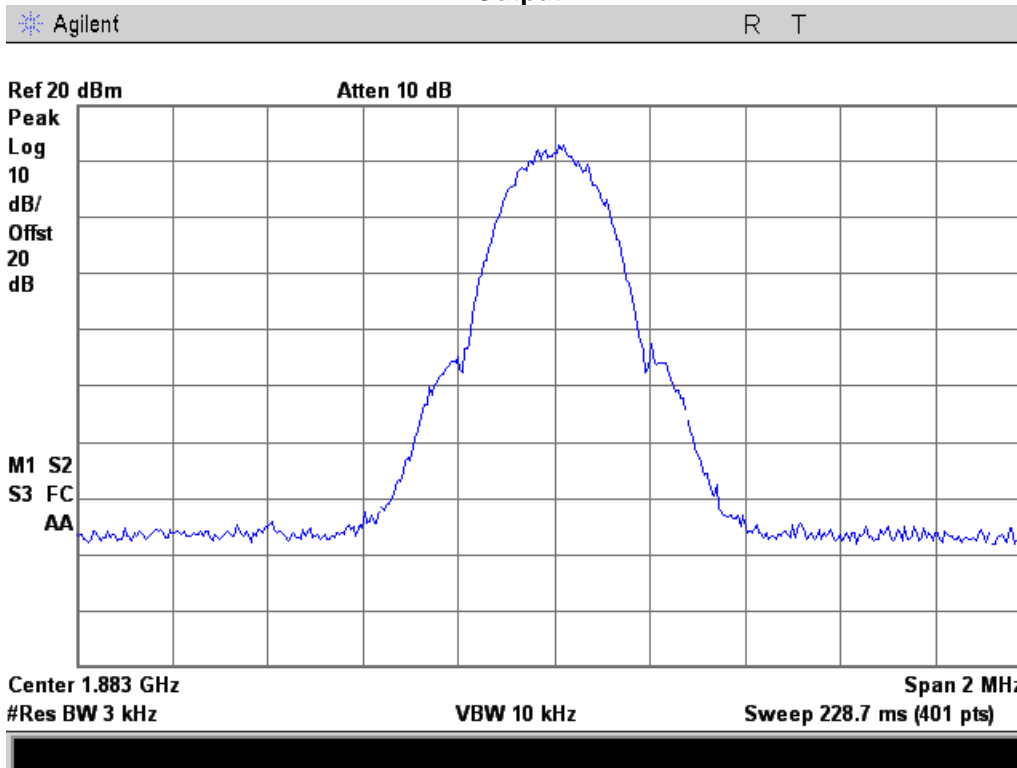


1850 - 1910 MHz Band

Input



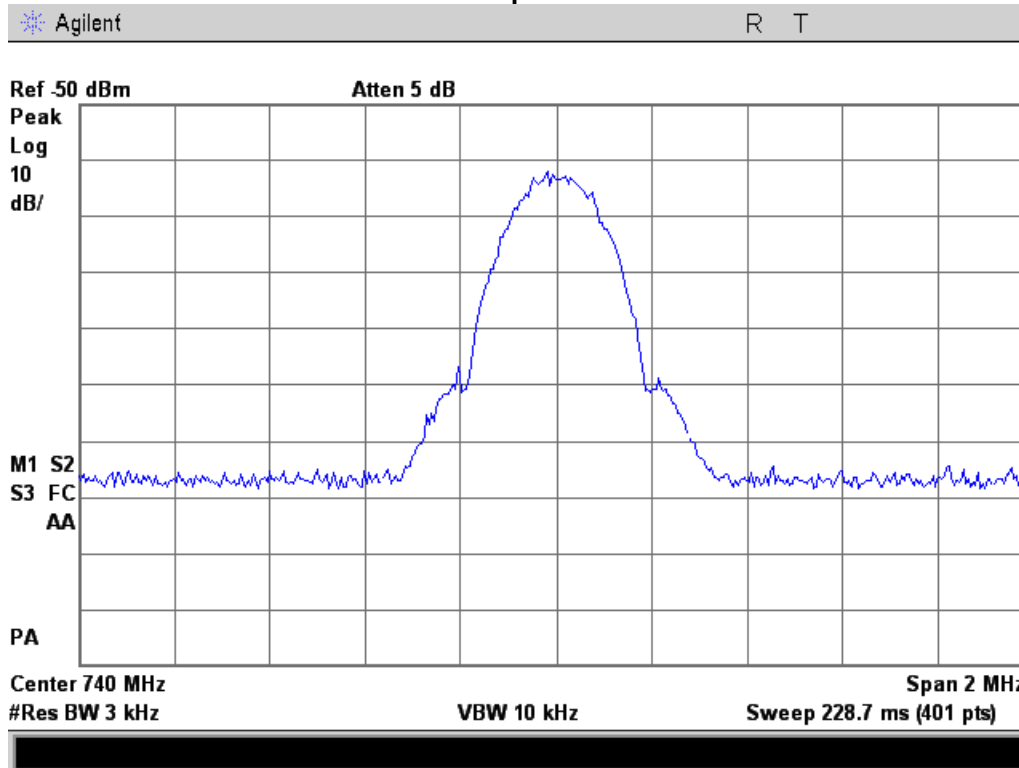
Output



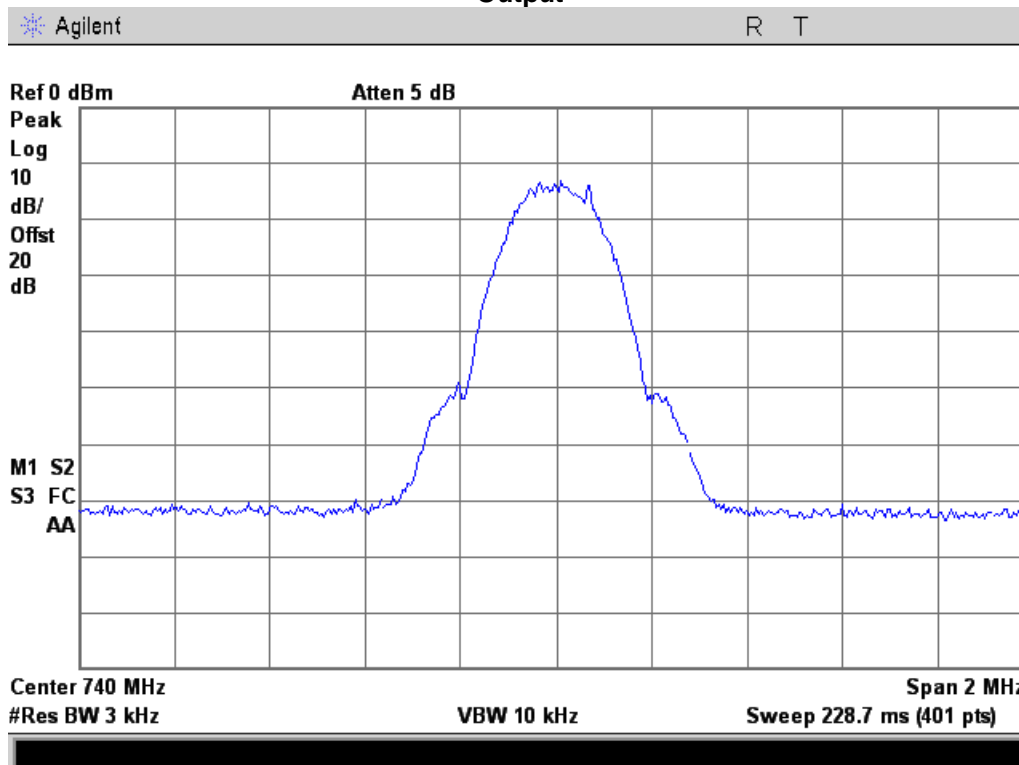


GSM Downlink Test Plots 728 - 746 MHz Band

Input



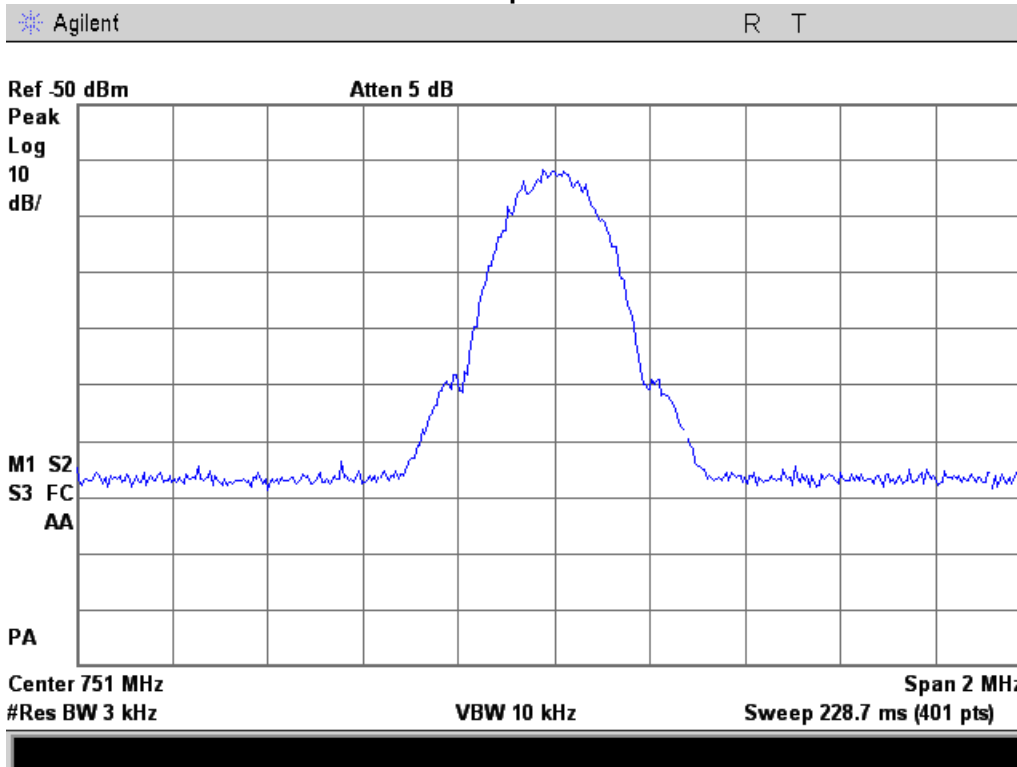
Output



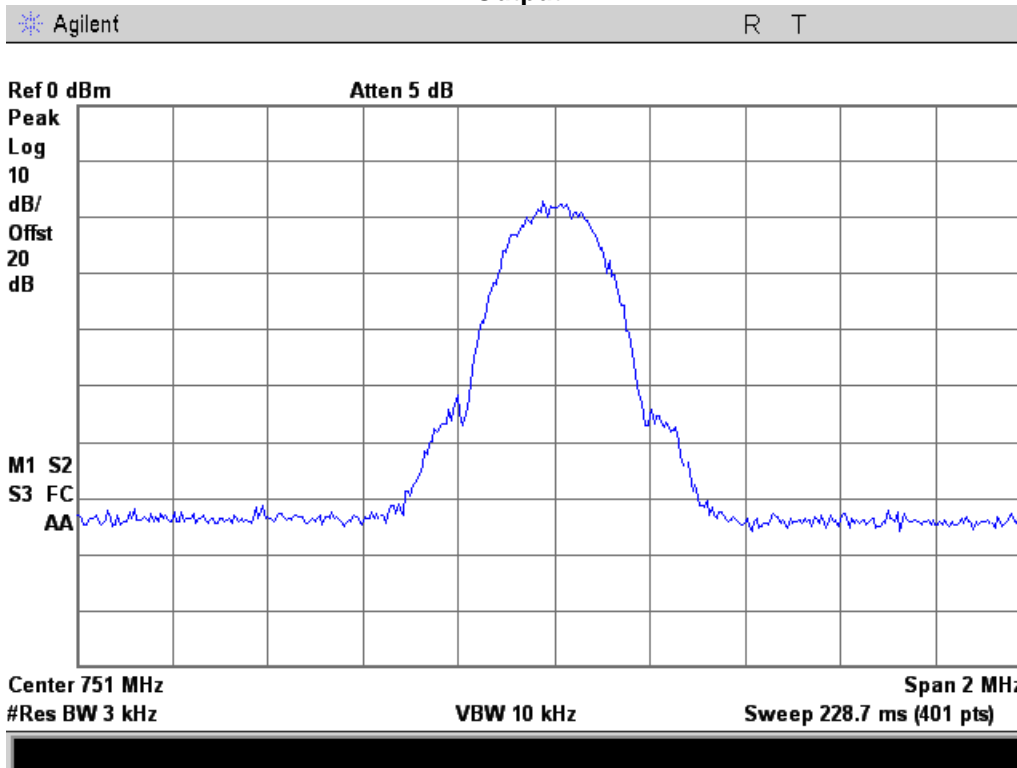


746 - 757 MHz Band

Input



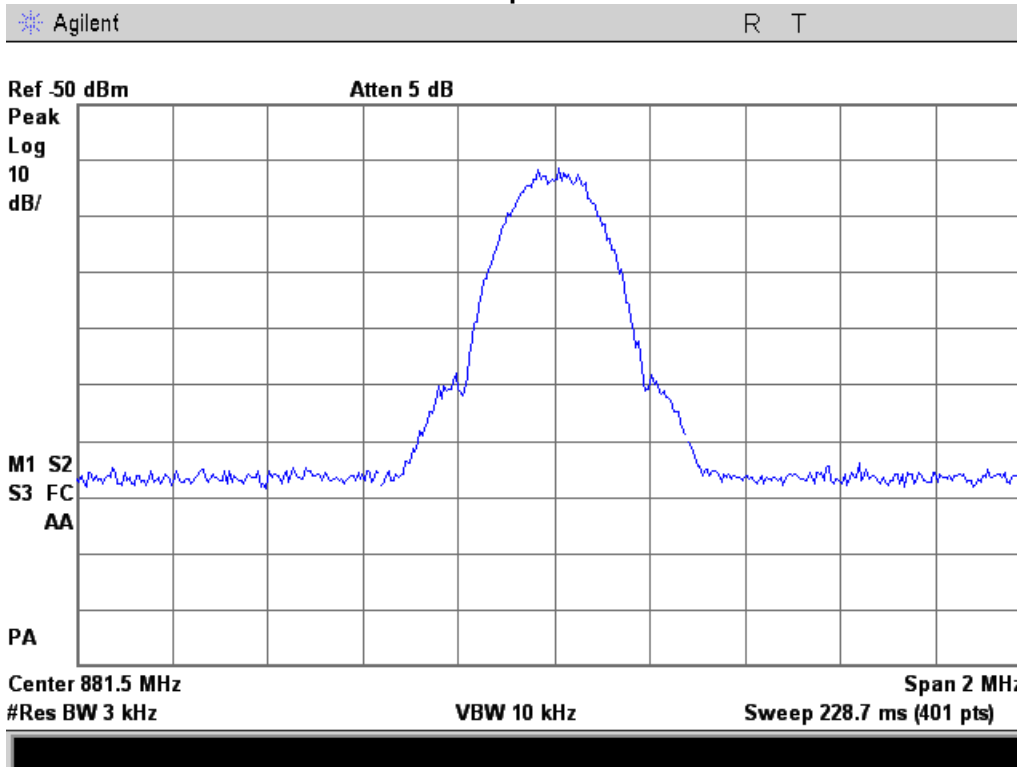
Output



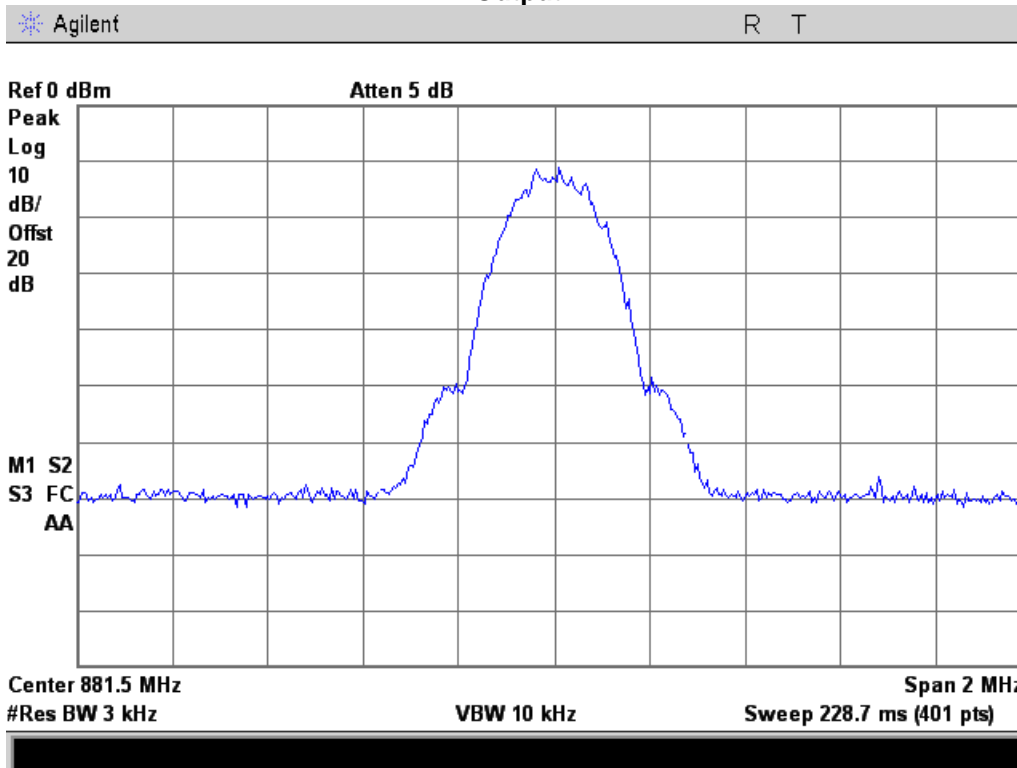


869 - 894 MHz Band

Input



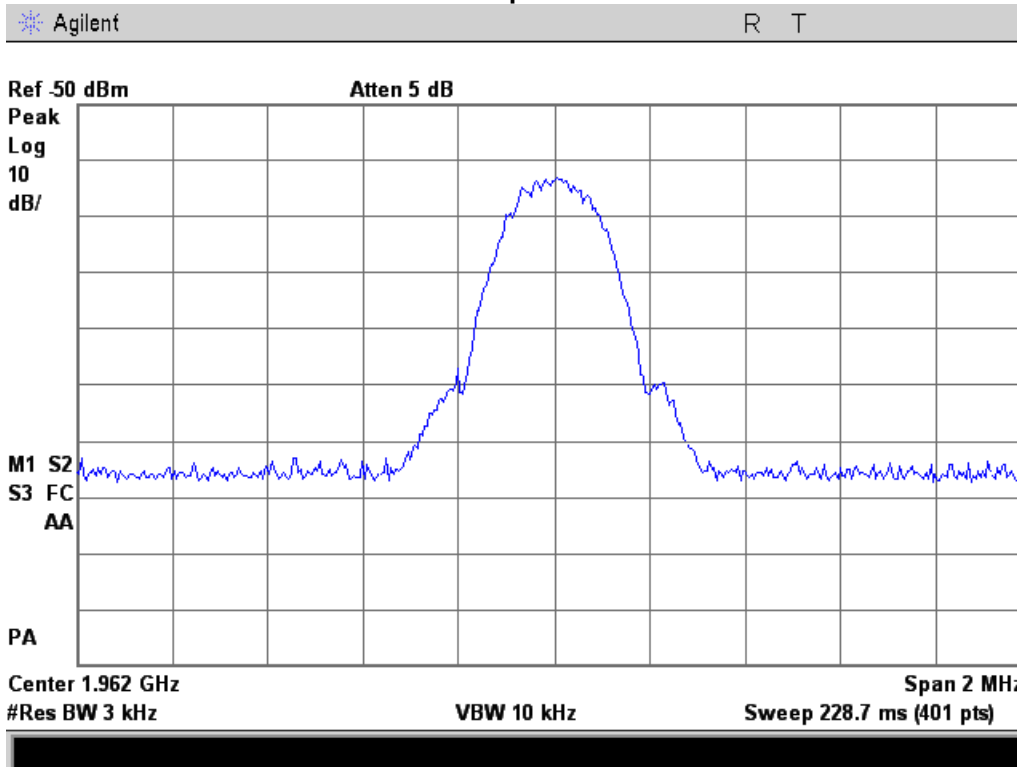
Output



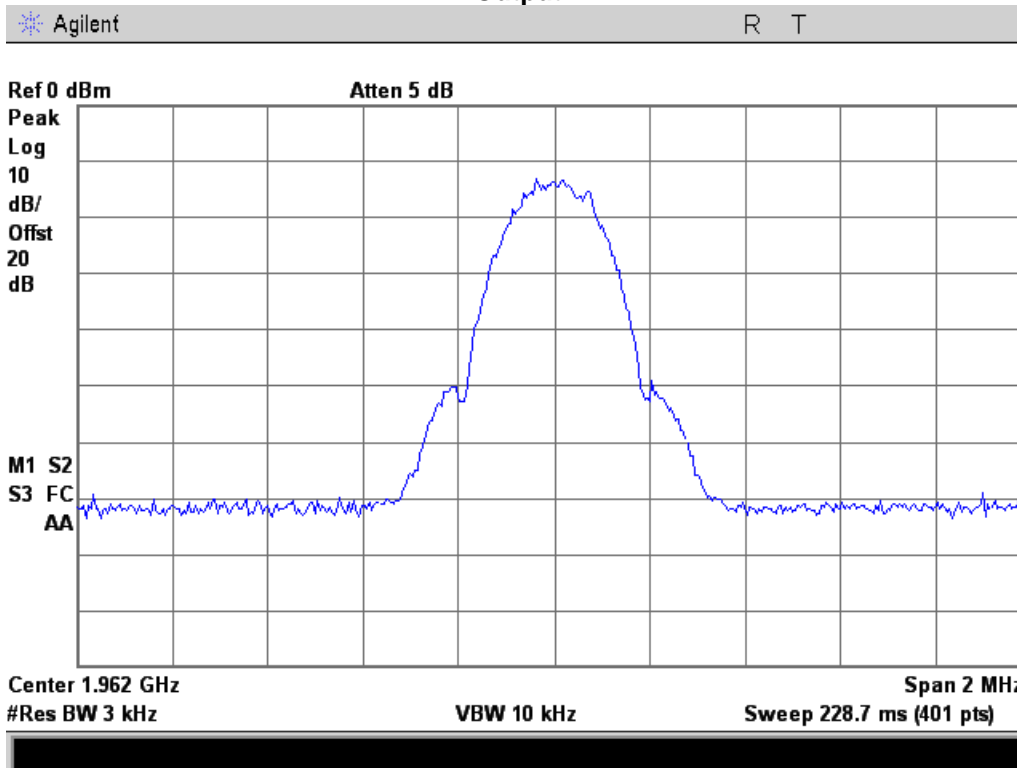


1930 - 1990 MHz Band

Input



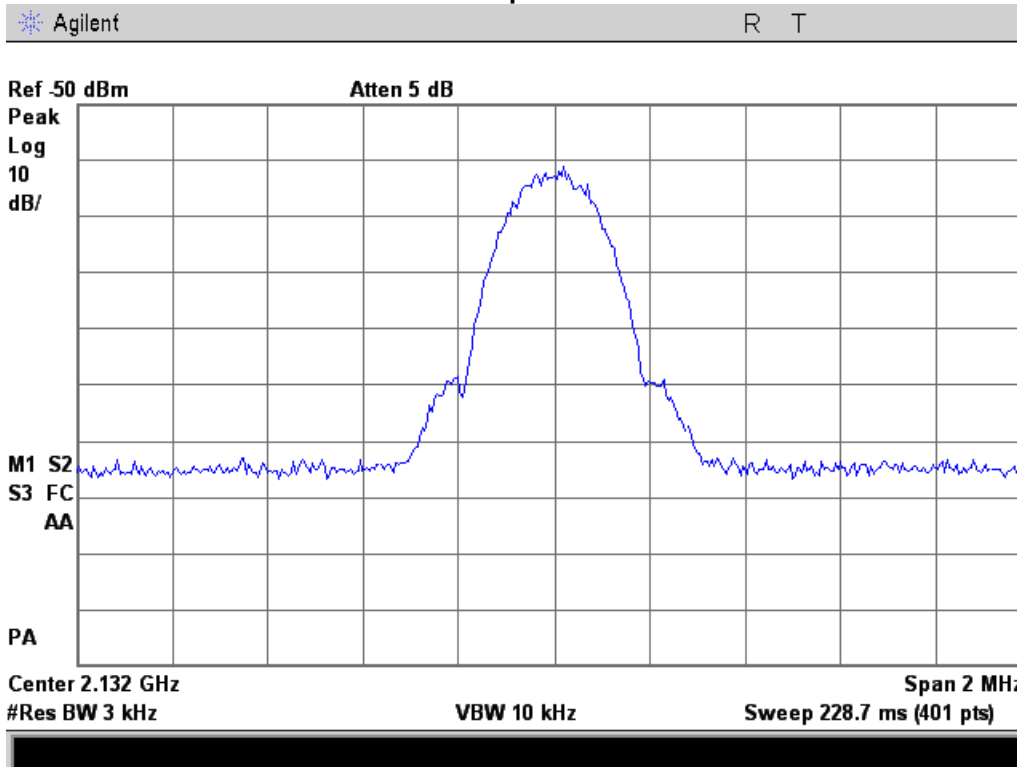
Output



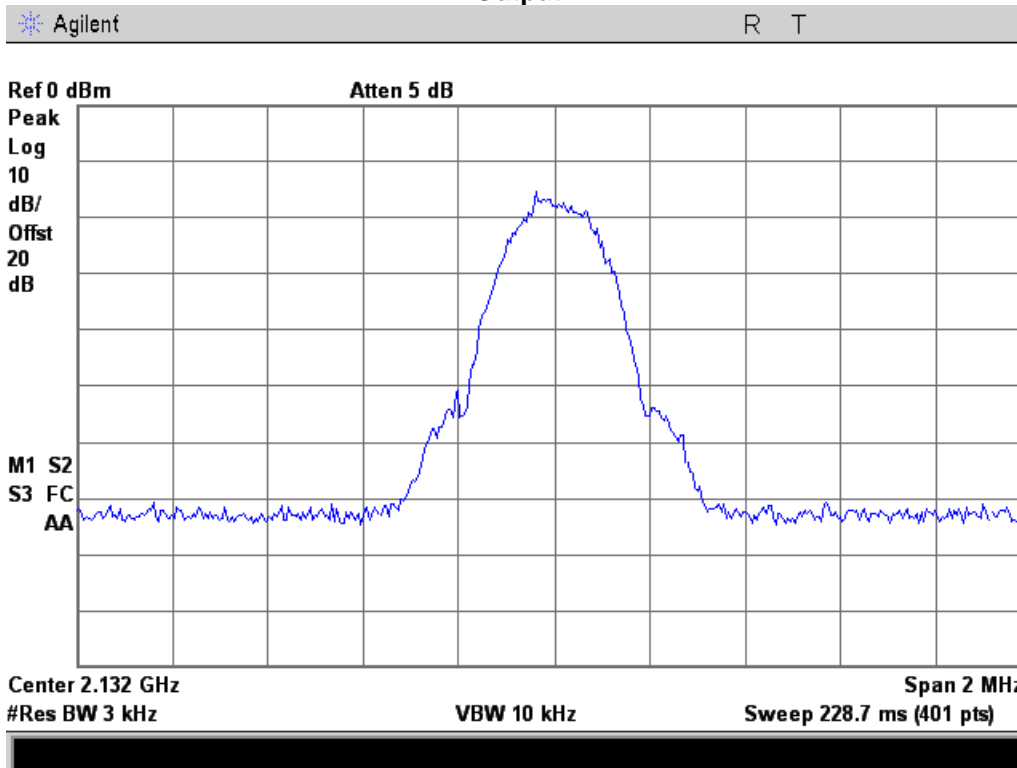


2110 - 2155 MHz Band

Input



Output

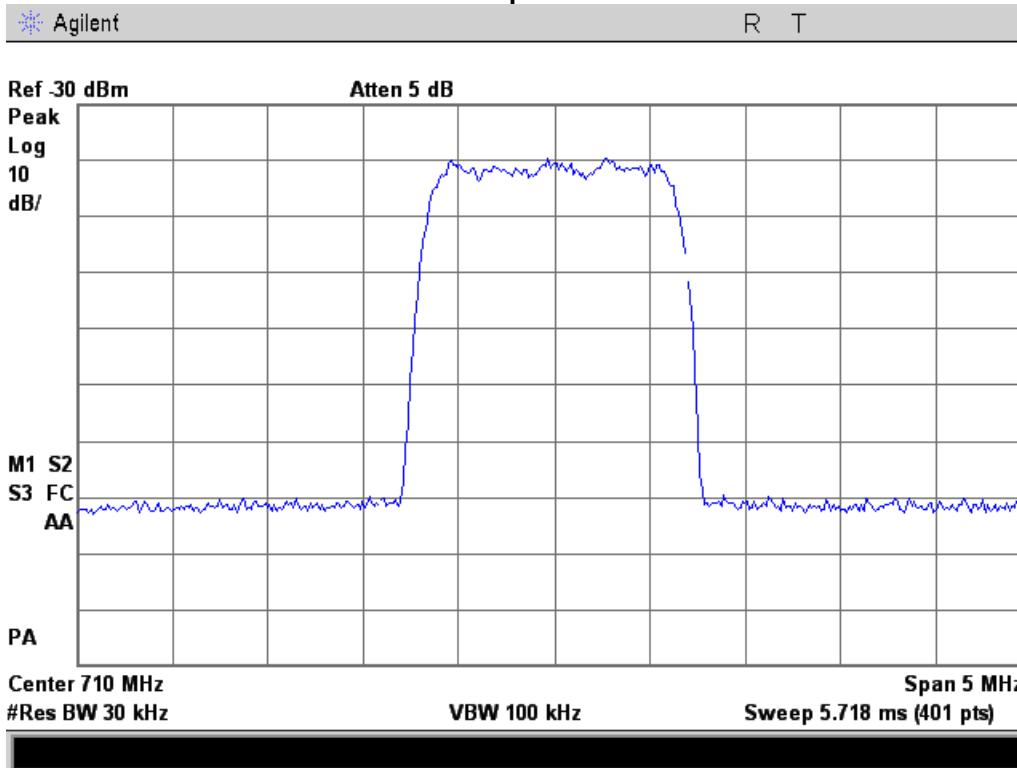




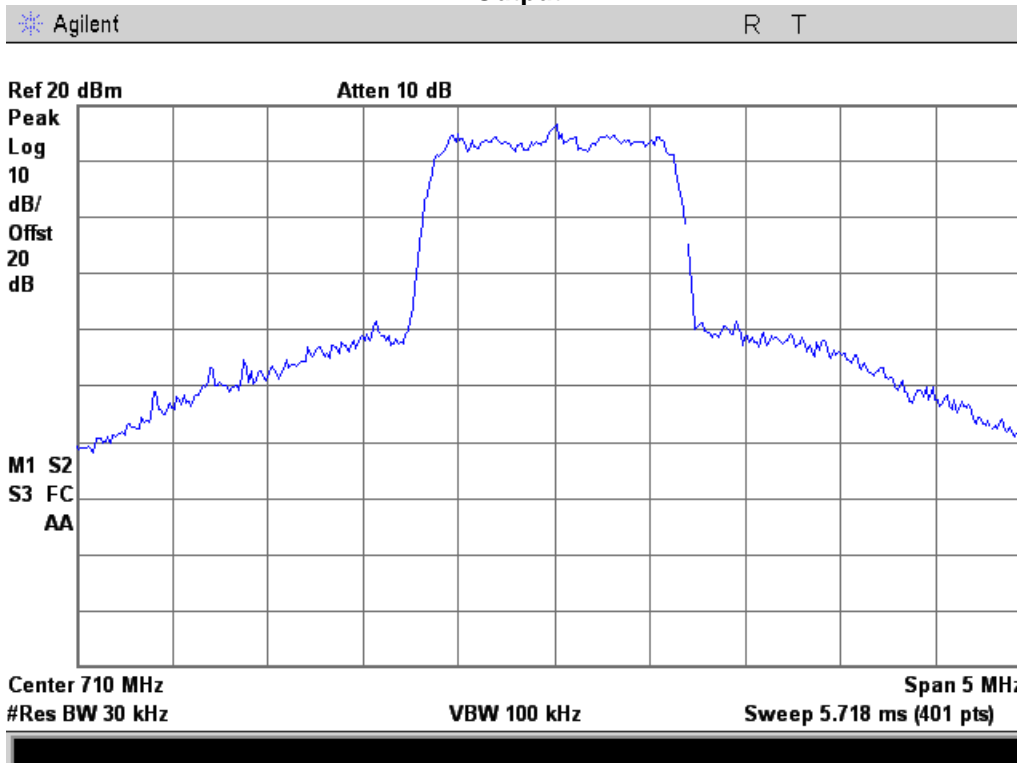
CDMA Uplink Test Plots

704 - 716 MHz Band

Input



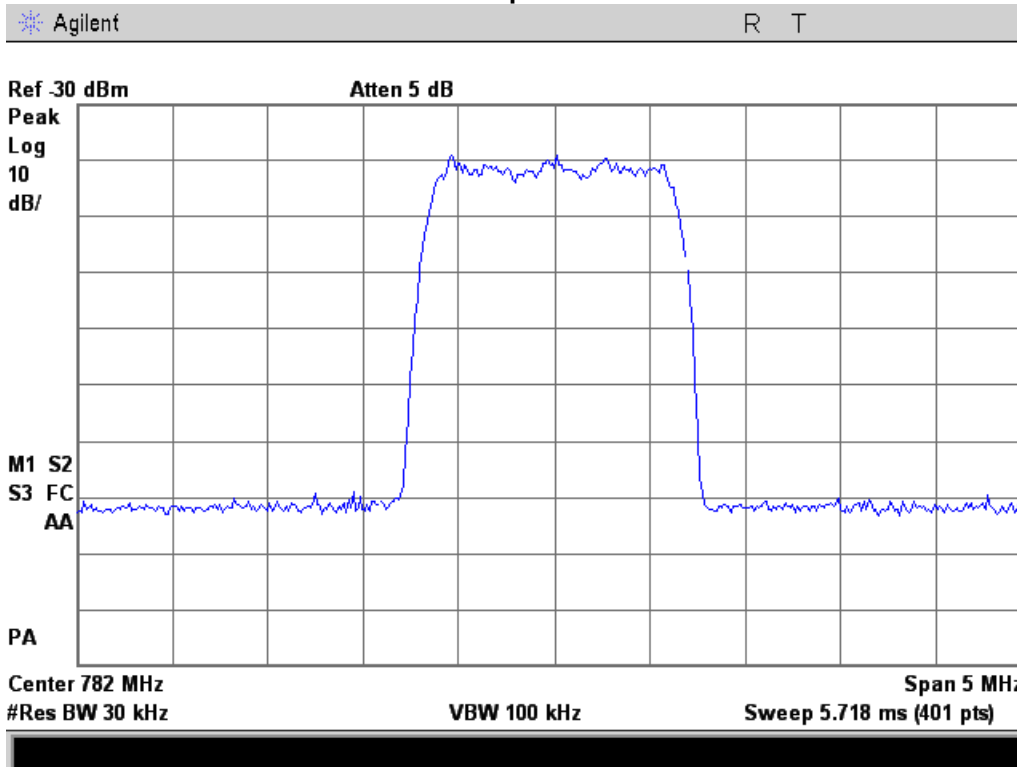
Output



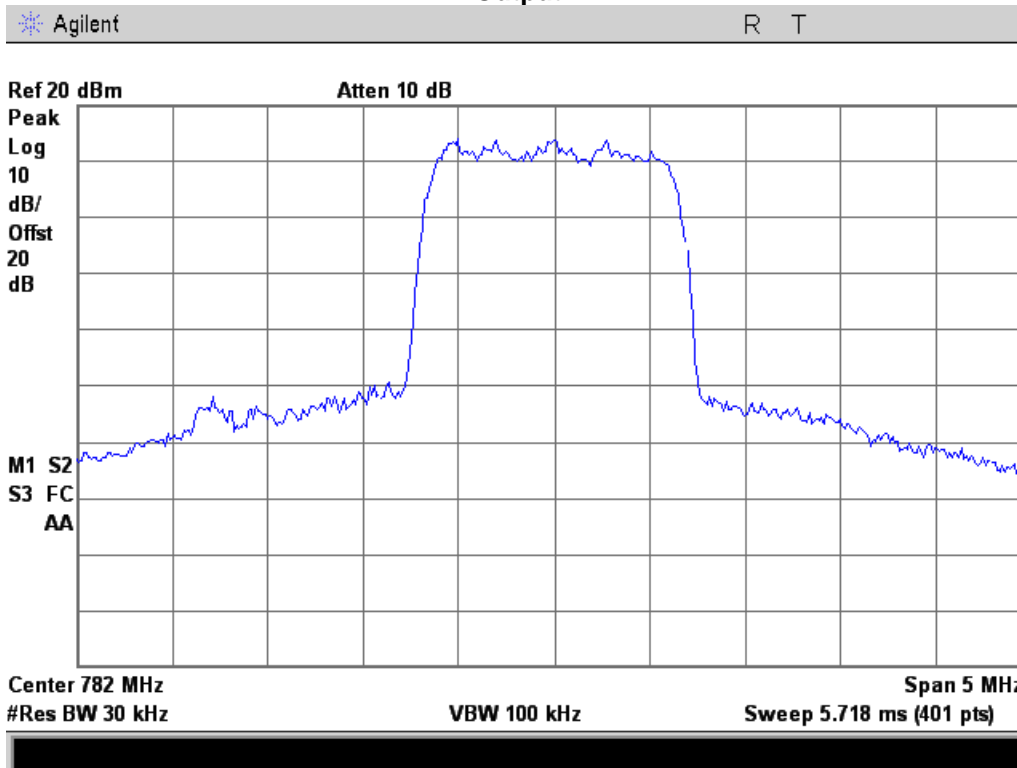


777 - 787 MHz Band

Input



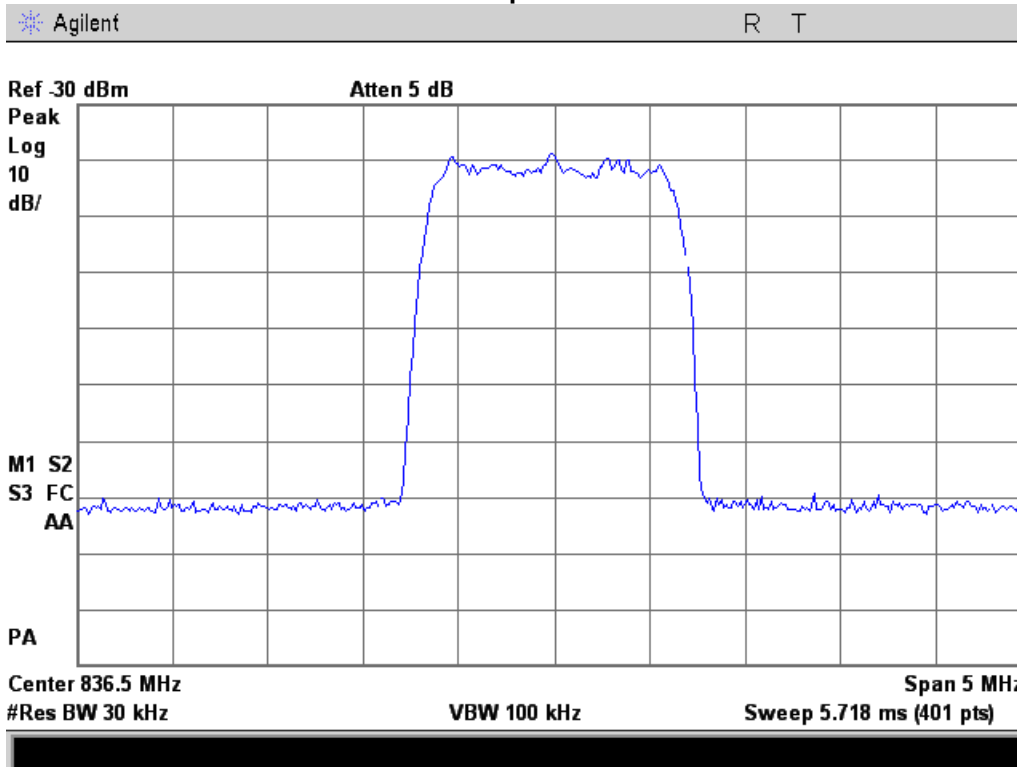
Output



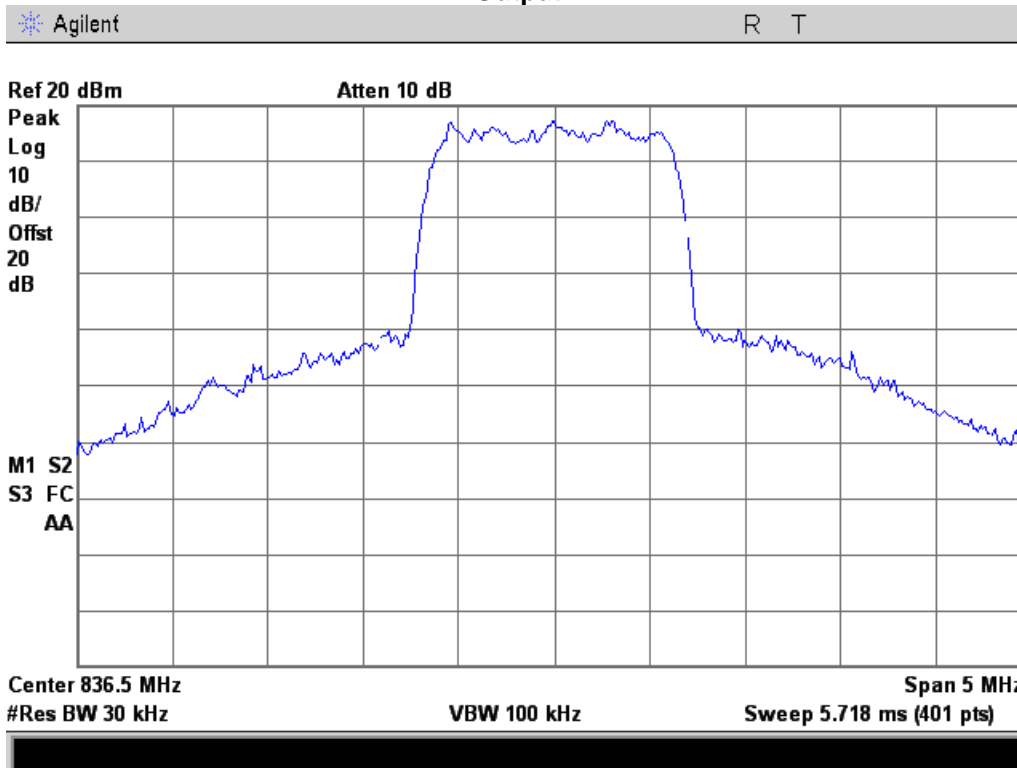


824 - 849 MHz Band

Input



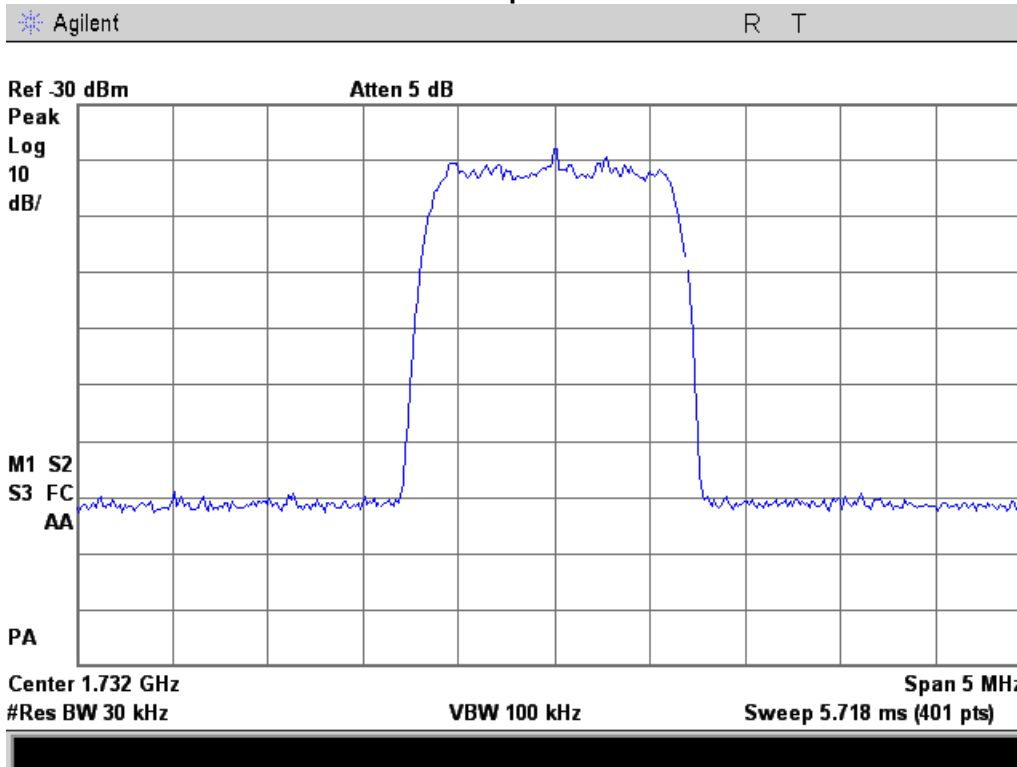
Output



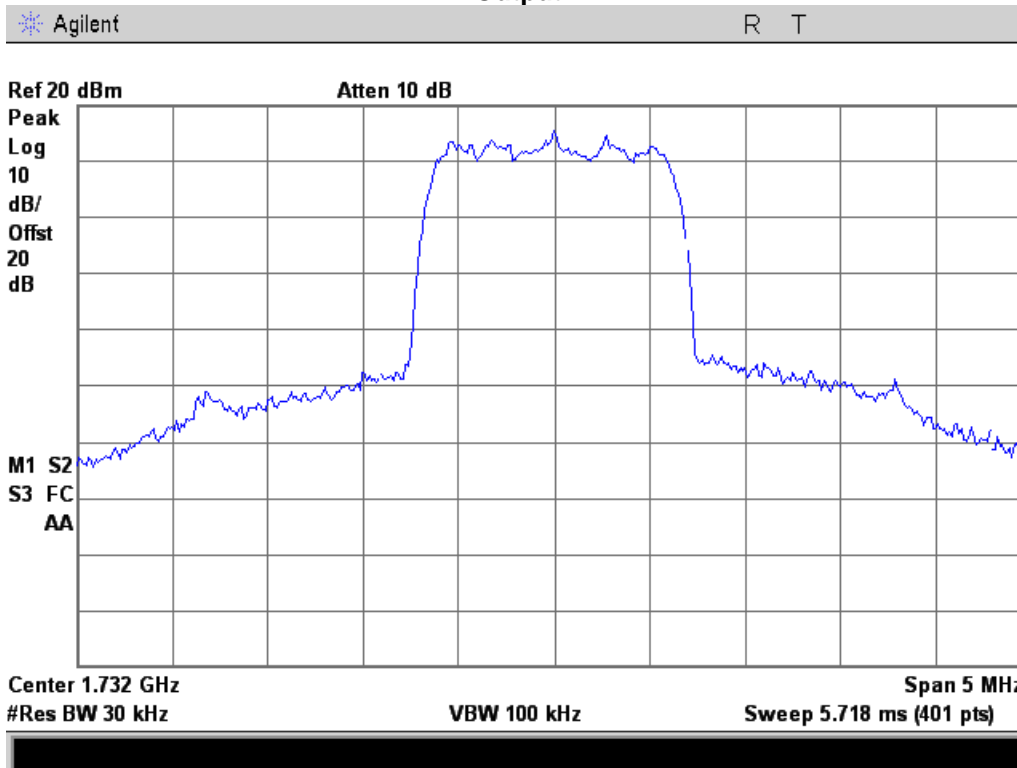


1710 - 1755 MHz Band

Input



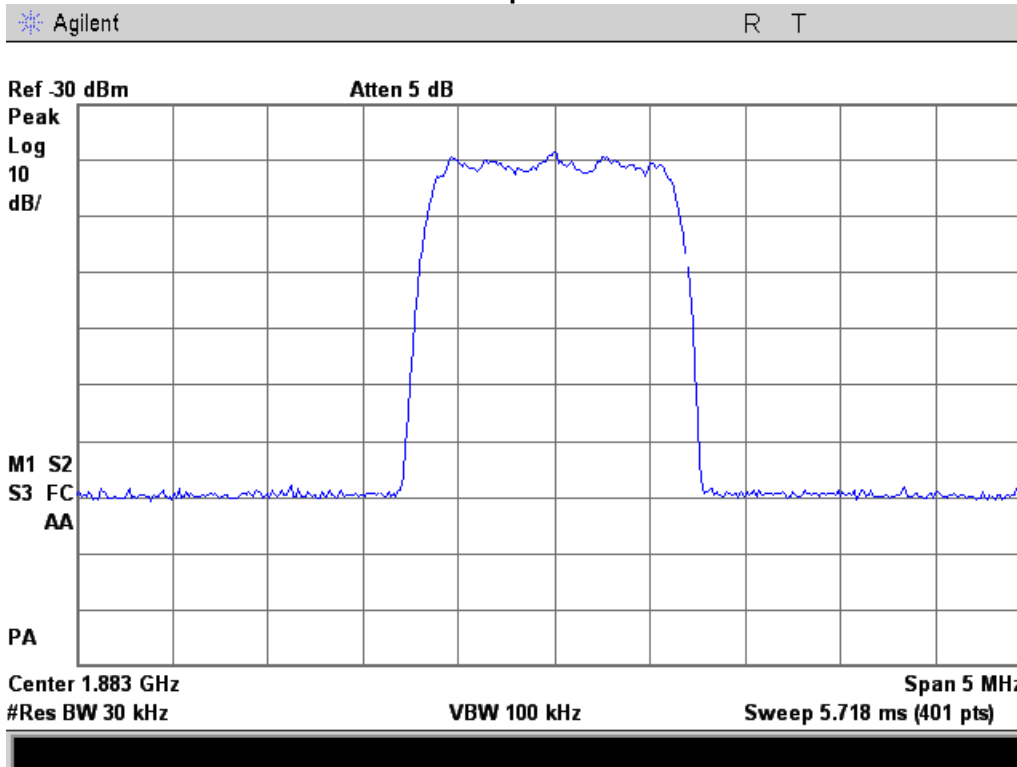
Output



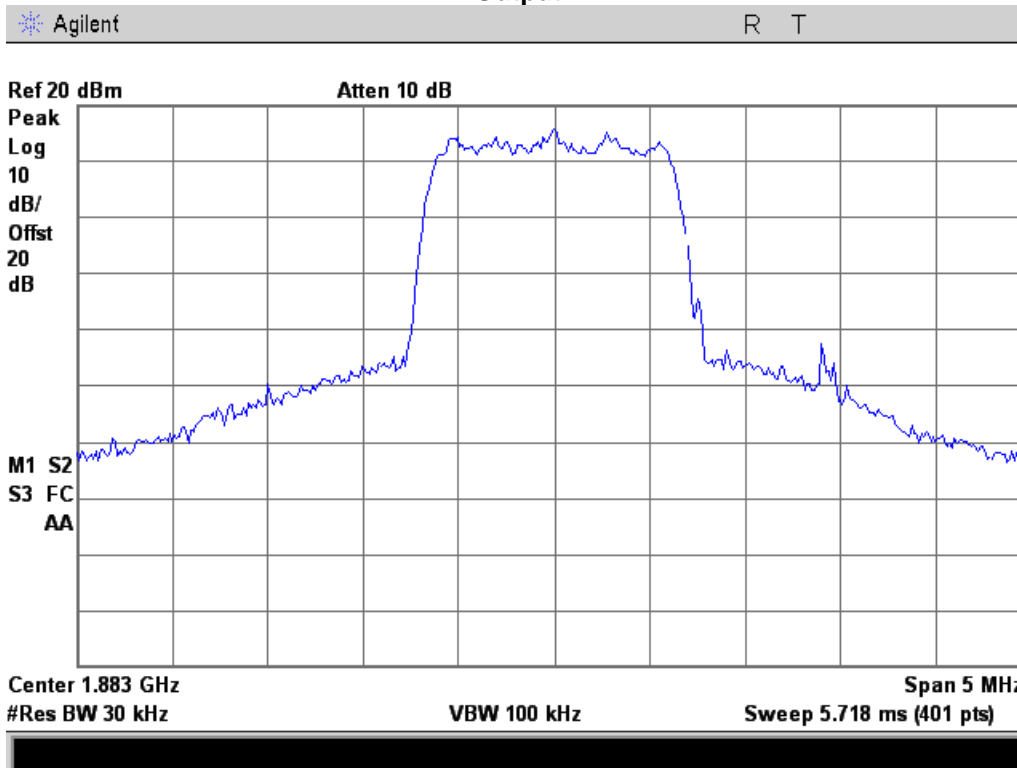


1850 - 1910 MHz Band

Input



Output

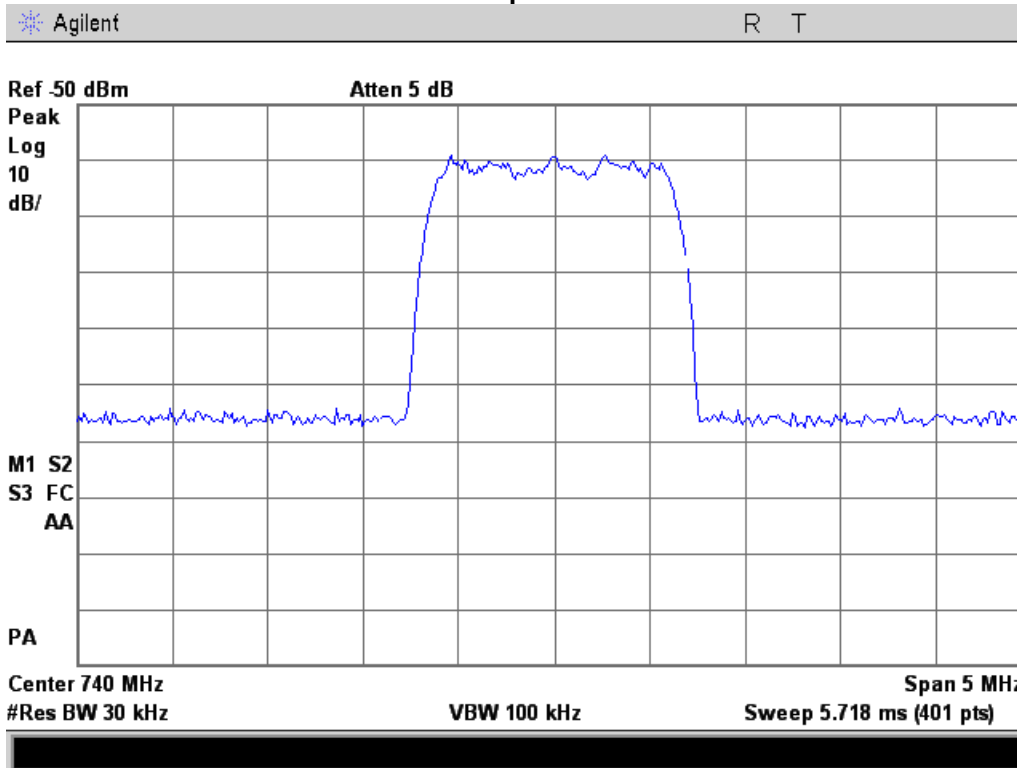




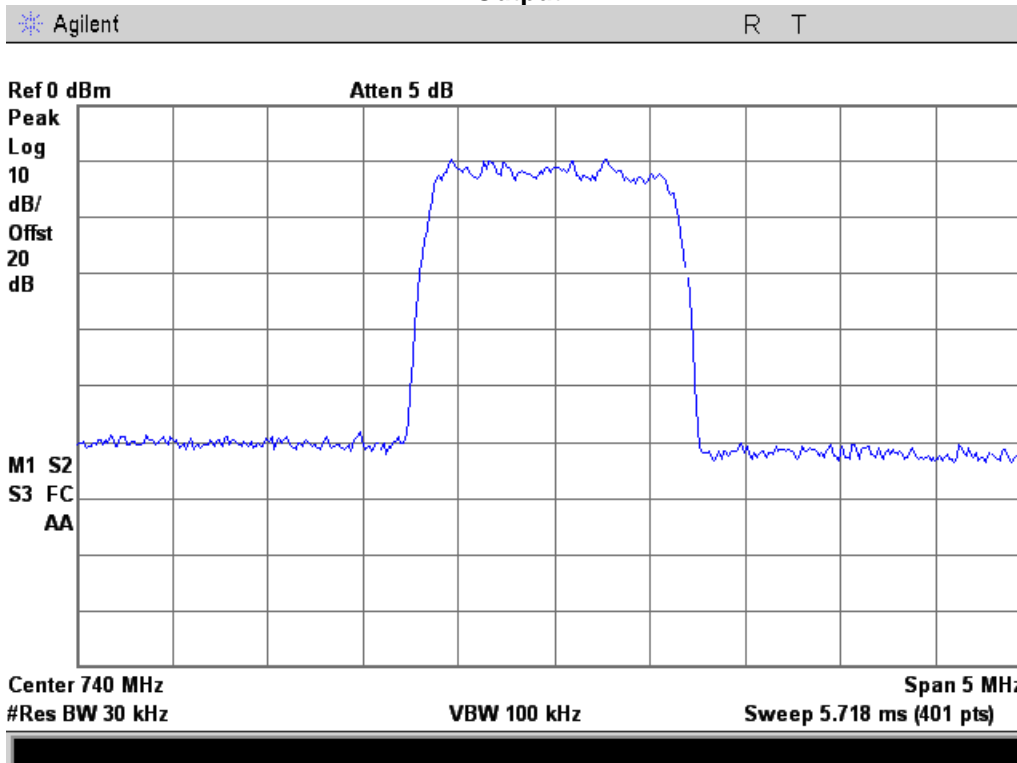
CDMA Downlink Test Plots

728 - 746 MHz Band

Input



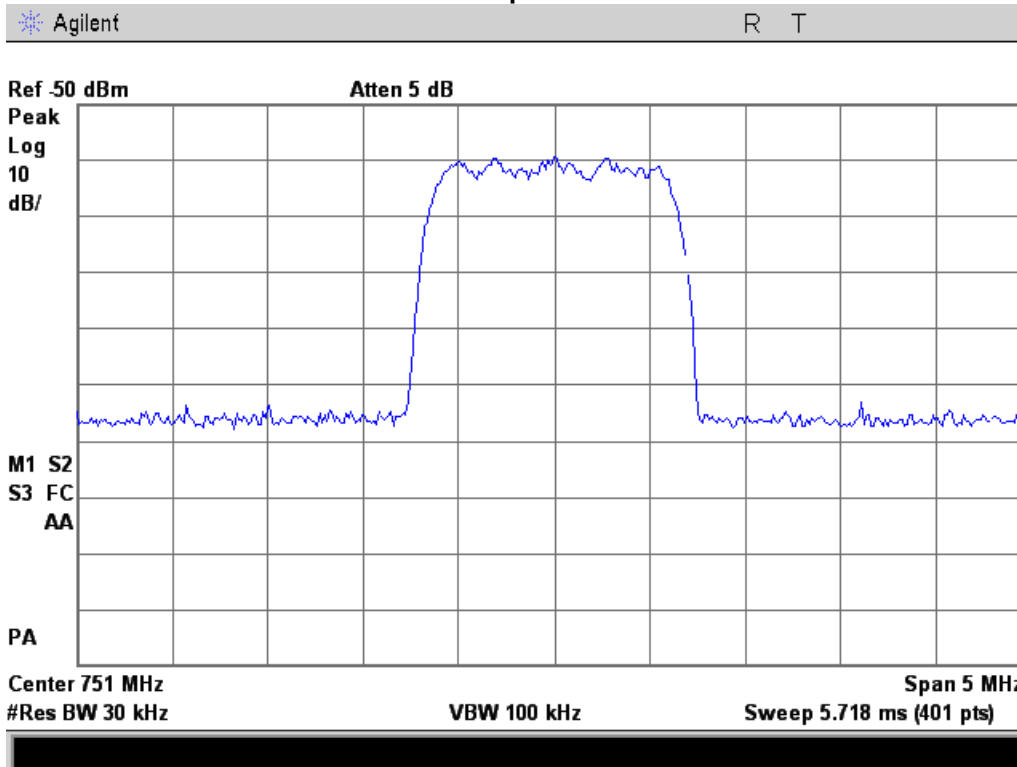
Output



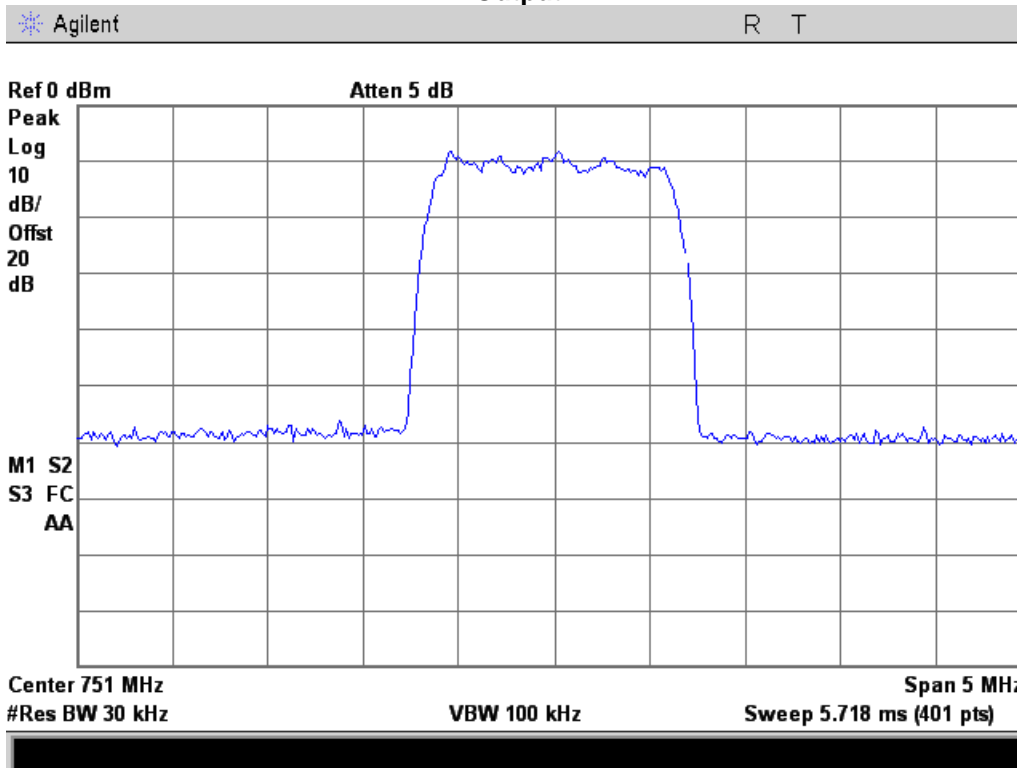


746 - 757 MHz Band

Input



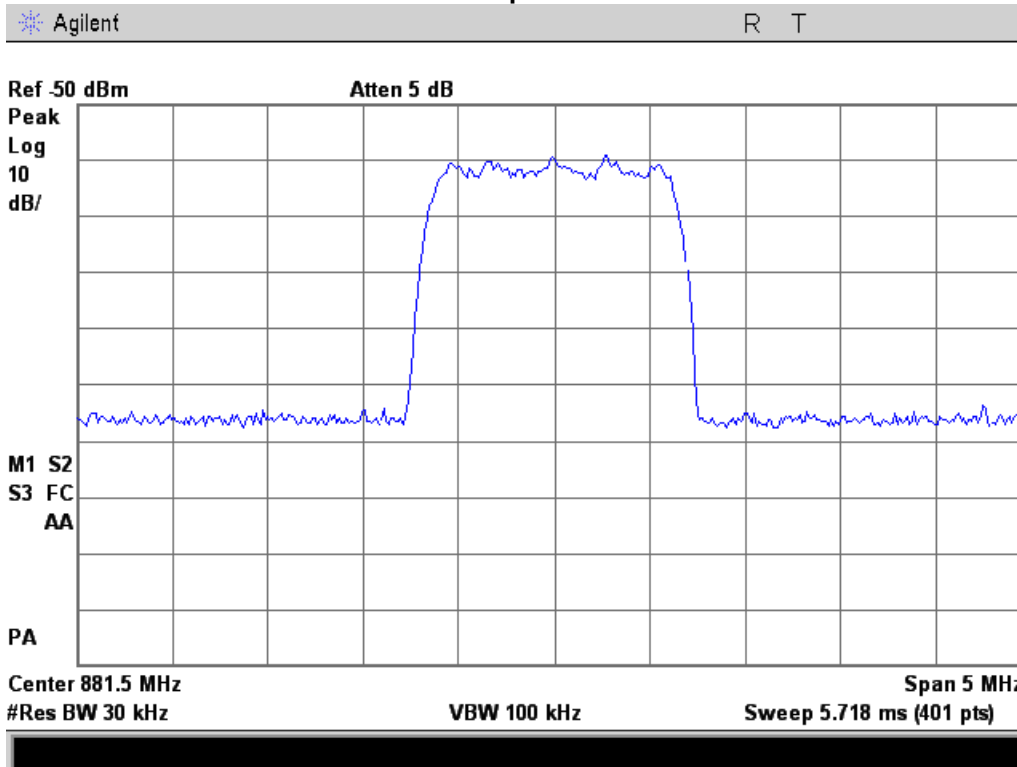
Output



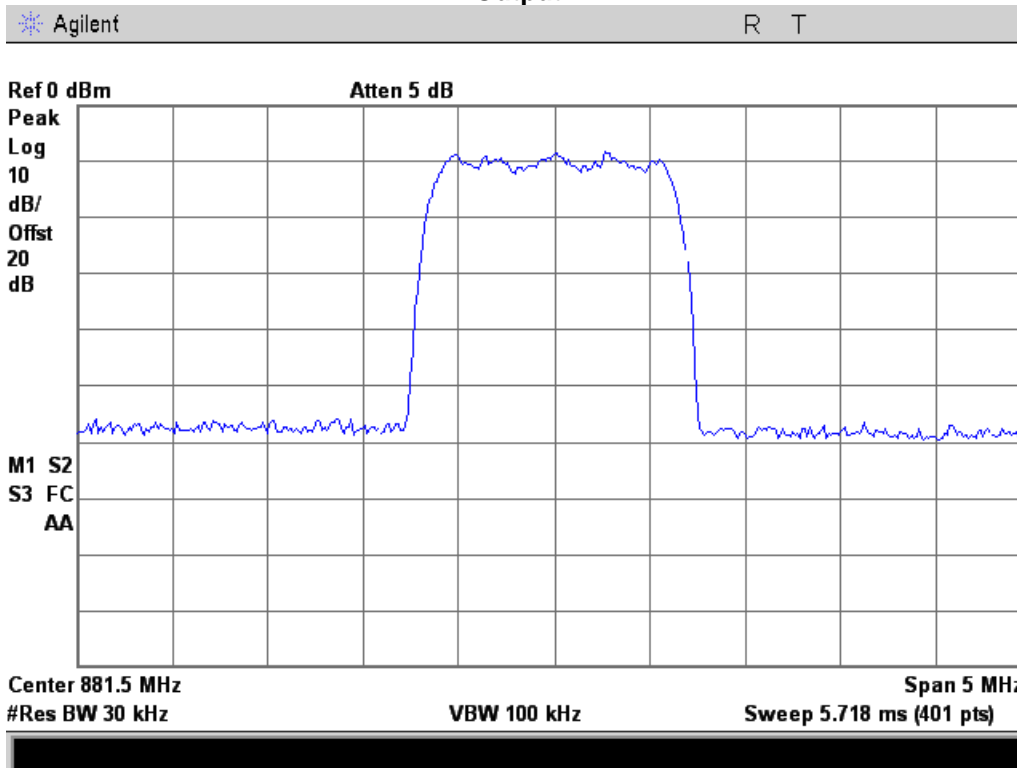


869 - 894 MHz Band

Input



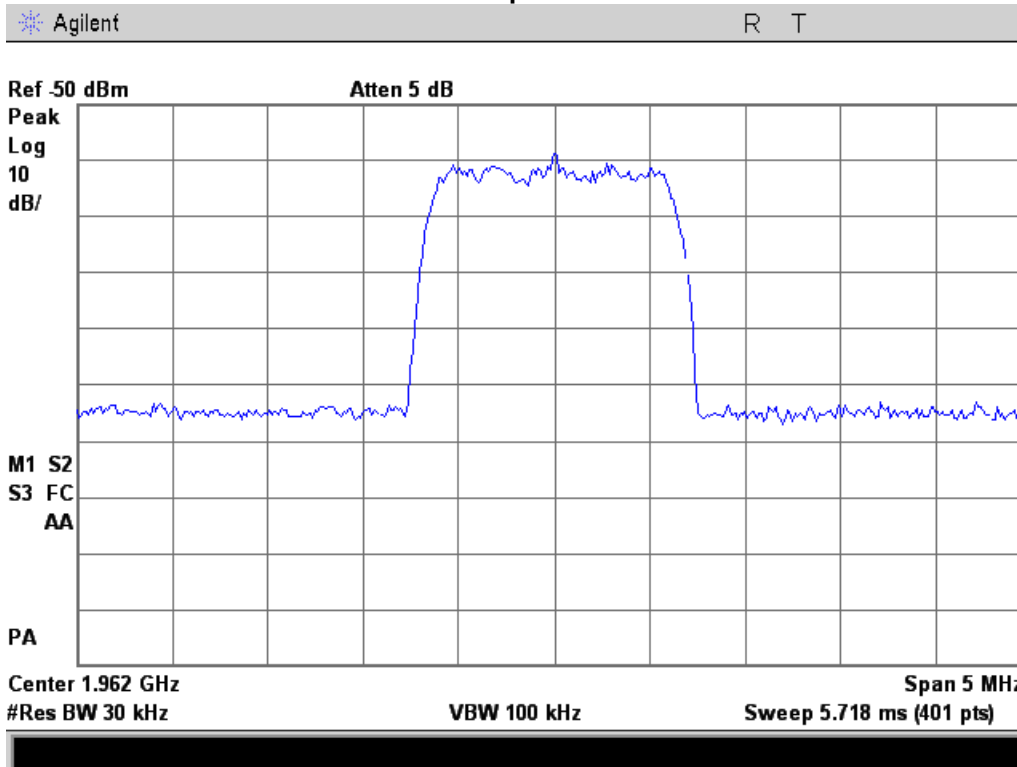
Output



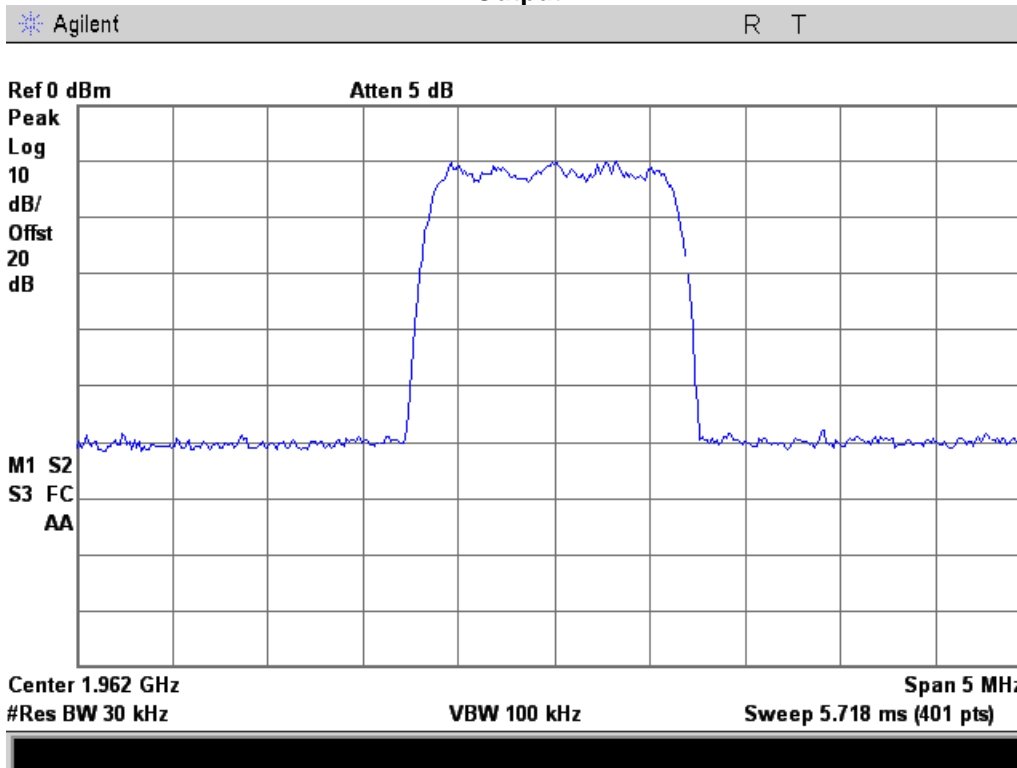


1930 - 1990 MHz Band

Input



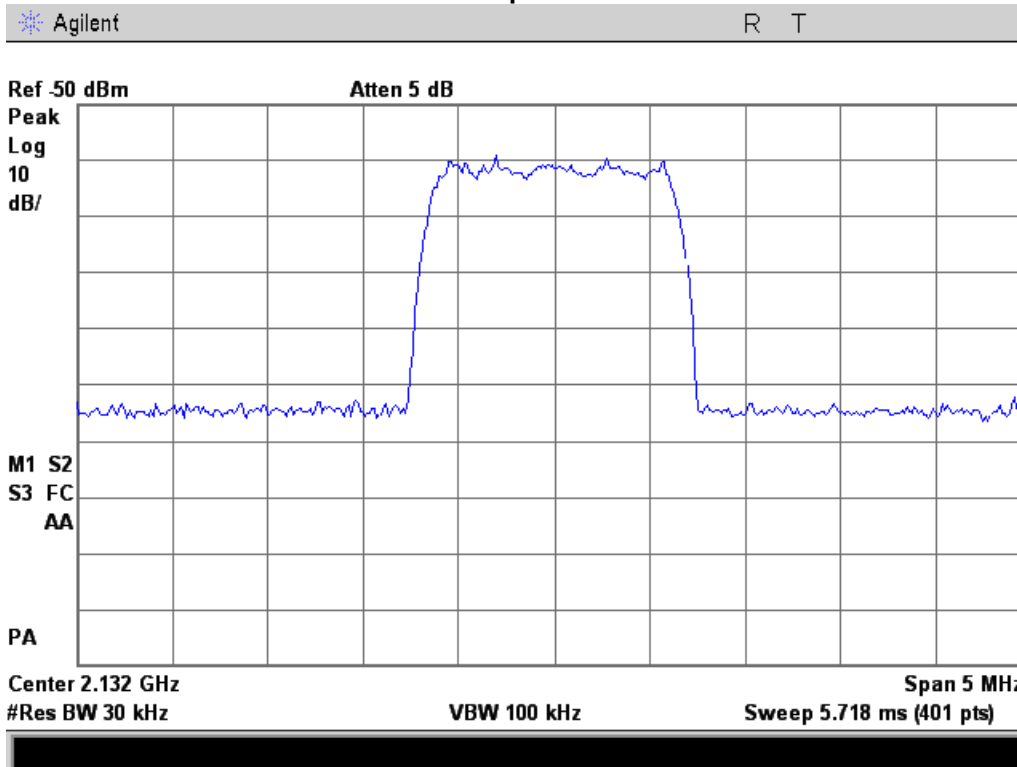
Output



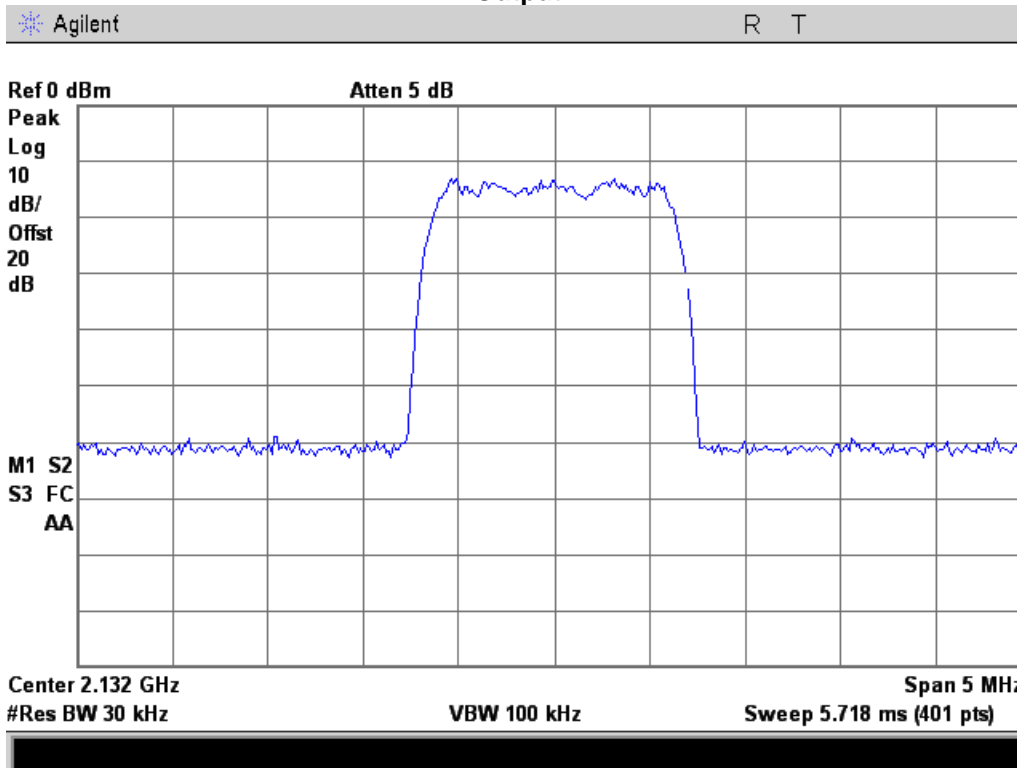


2110 - 2155 MHz Band

Input



Output

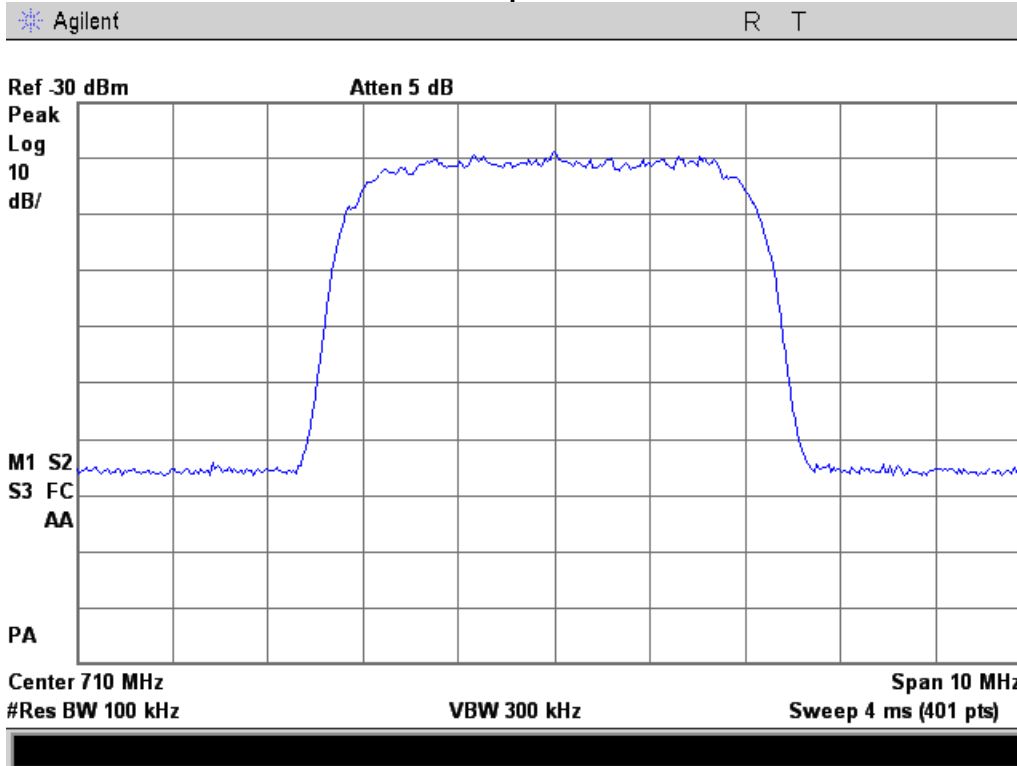




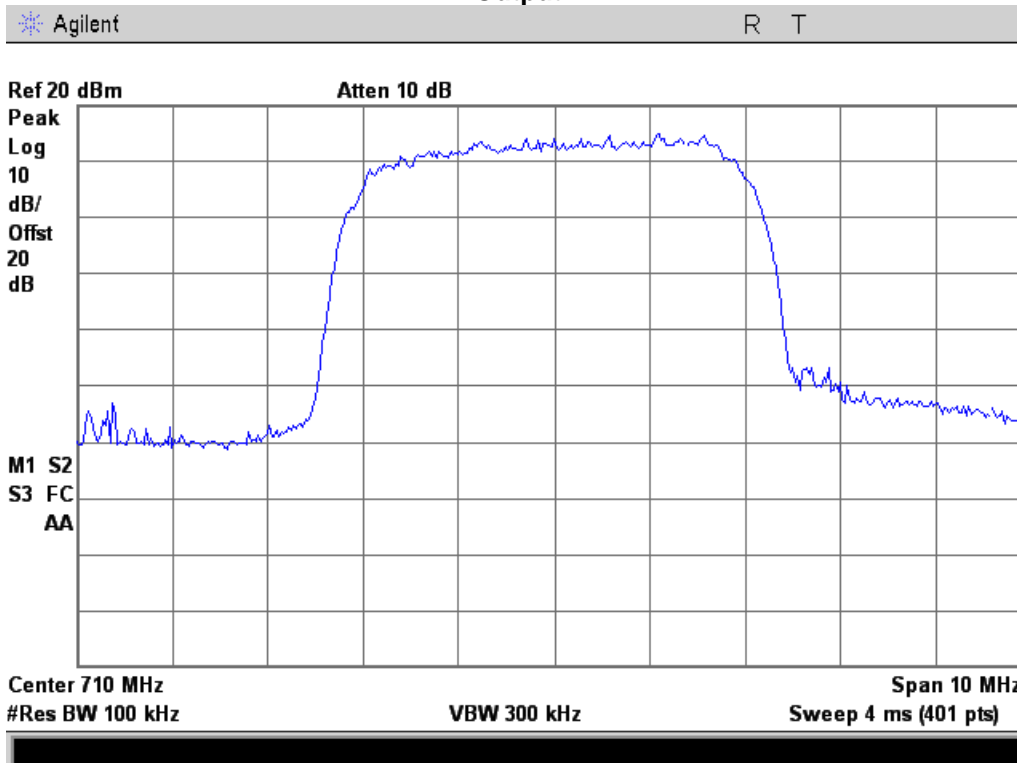
CDMA Uplink Test Plots

704 - 716 MHz Band

Input



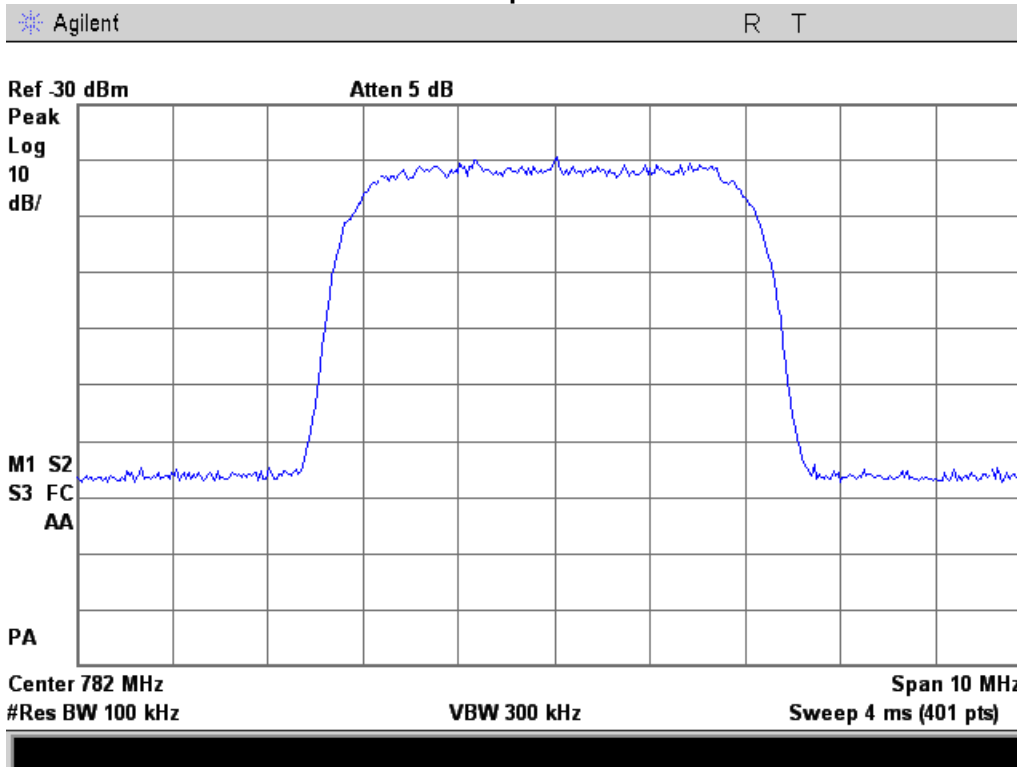
Output



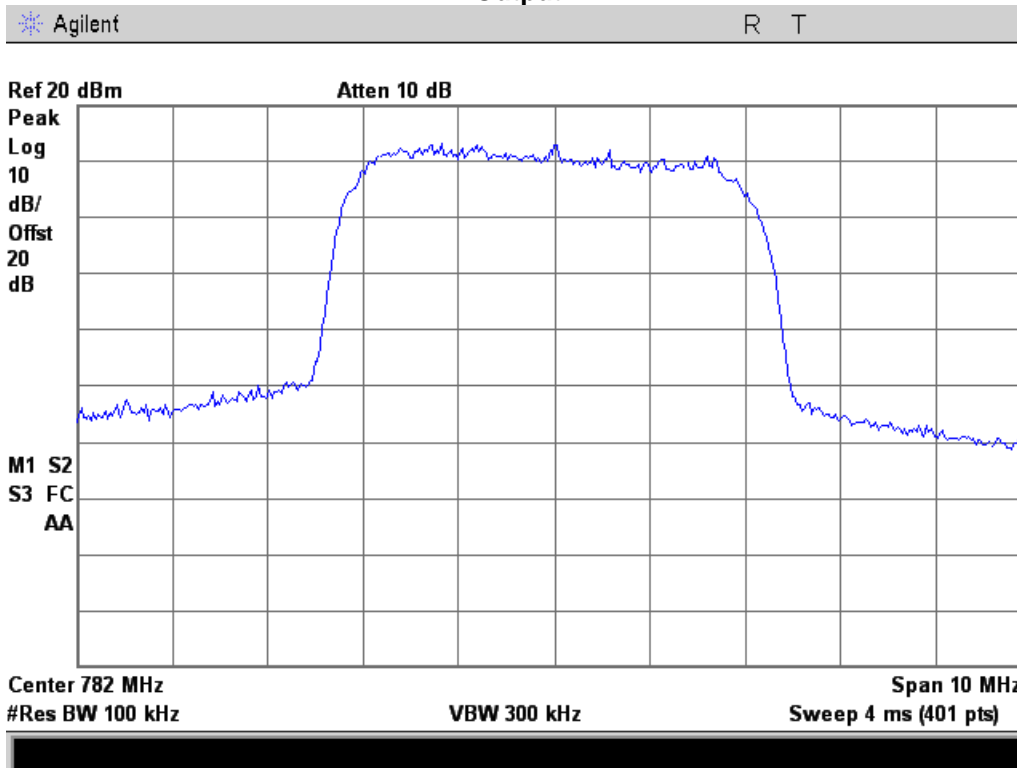


777 - 787 MHz Band

Input



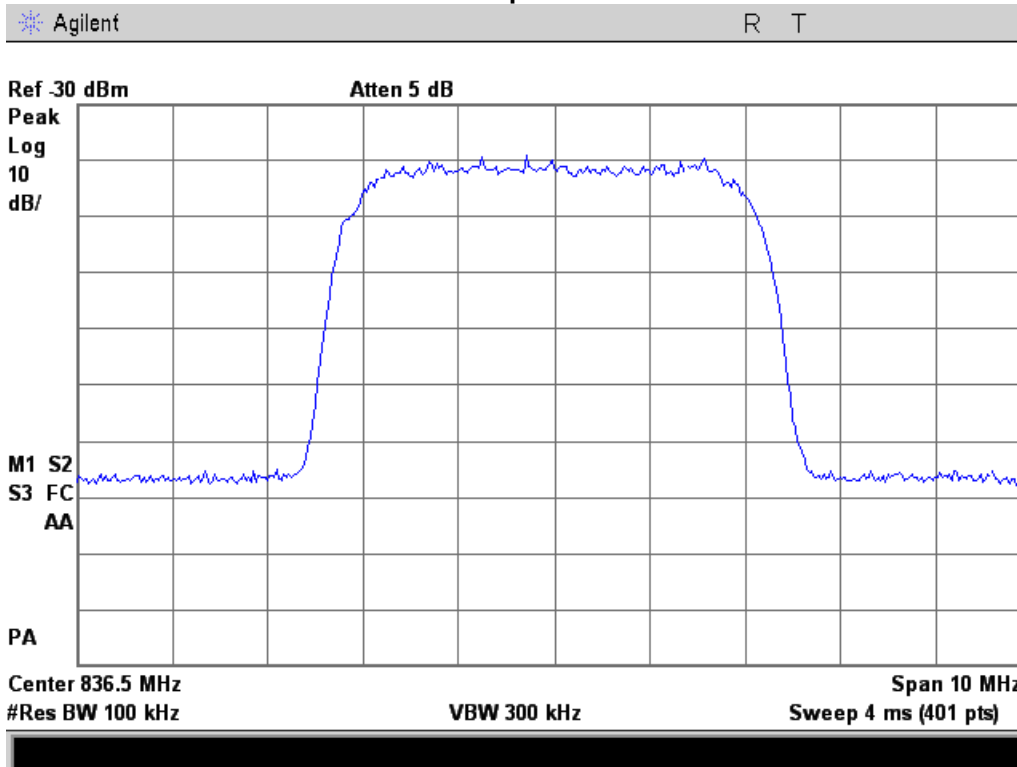
Output



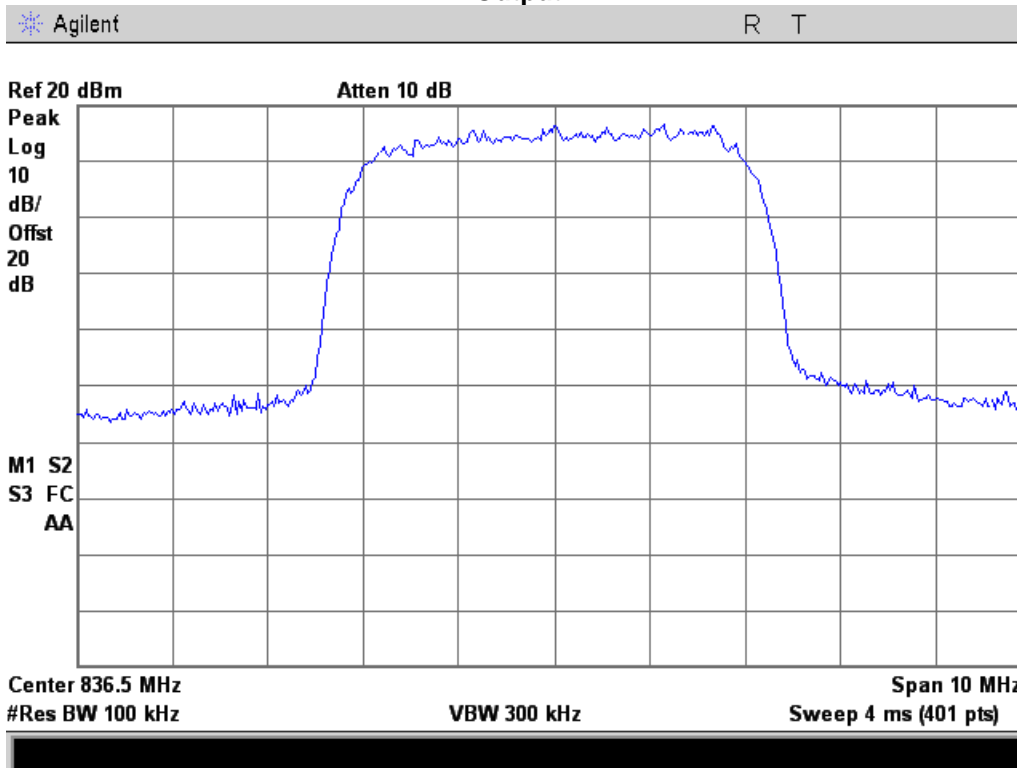


824 - 849 MHz Band

Input



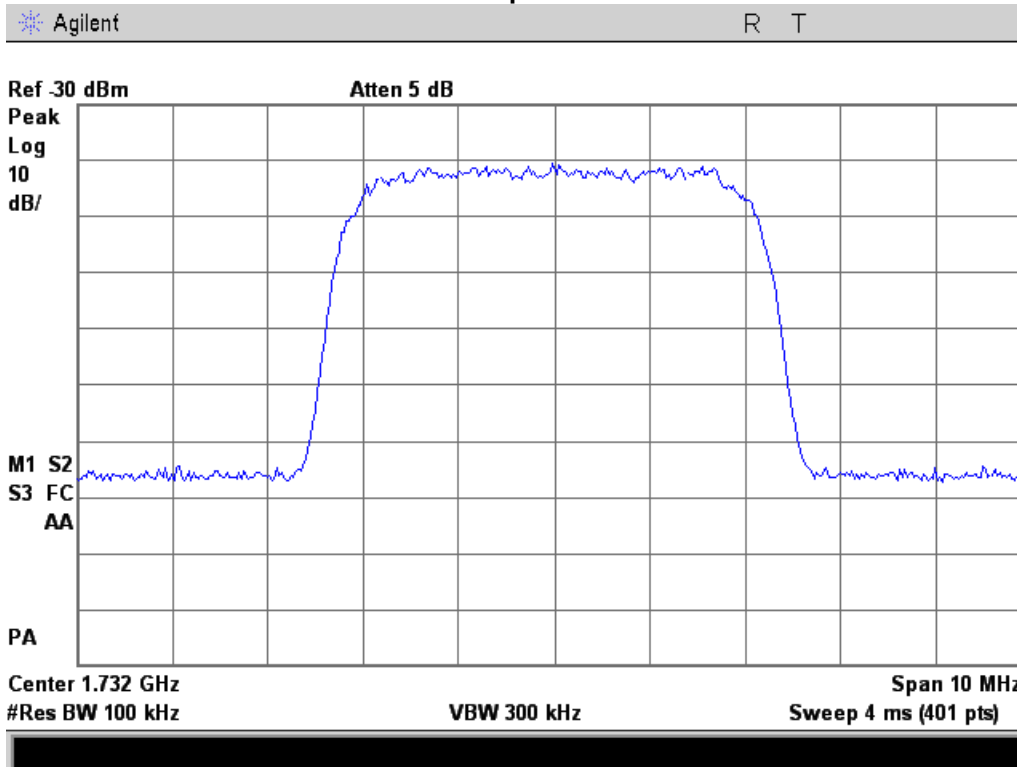
Output



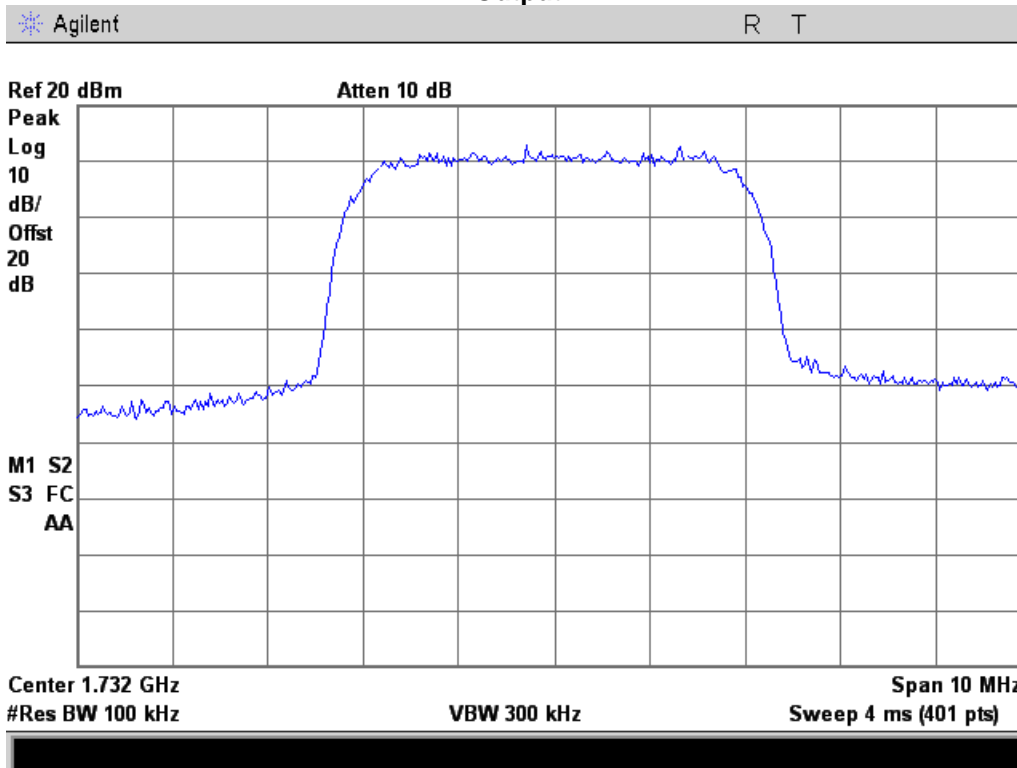


1710 - 1755 MHz Band

Input



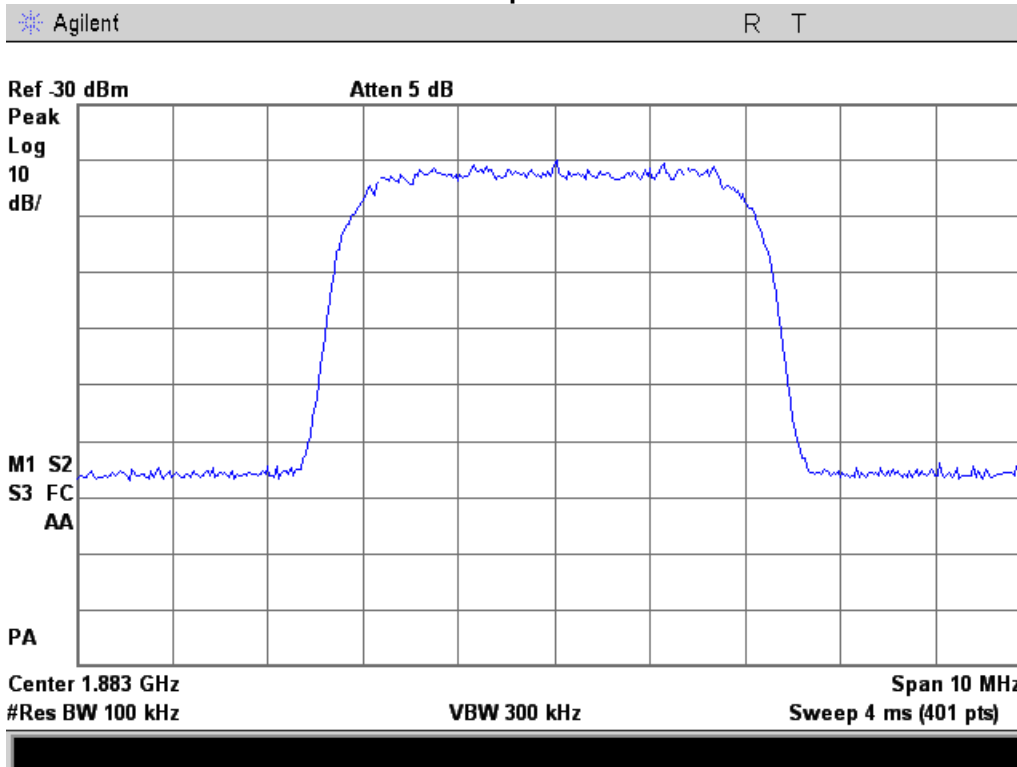
Output



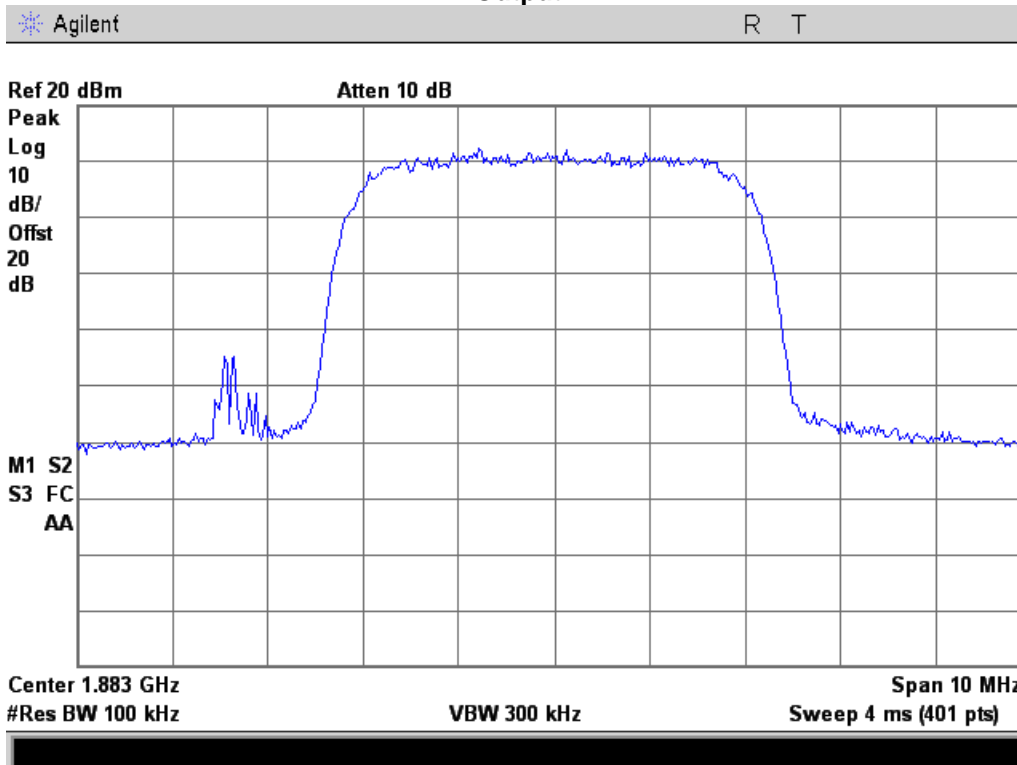


1850 - 1910 MHz Band

Input



Output

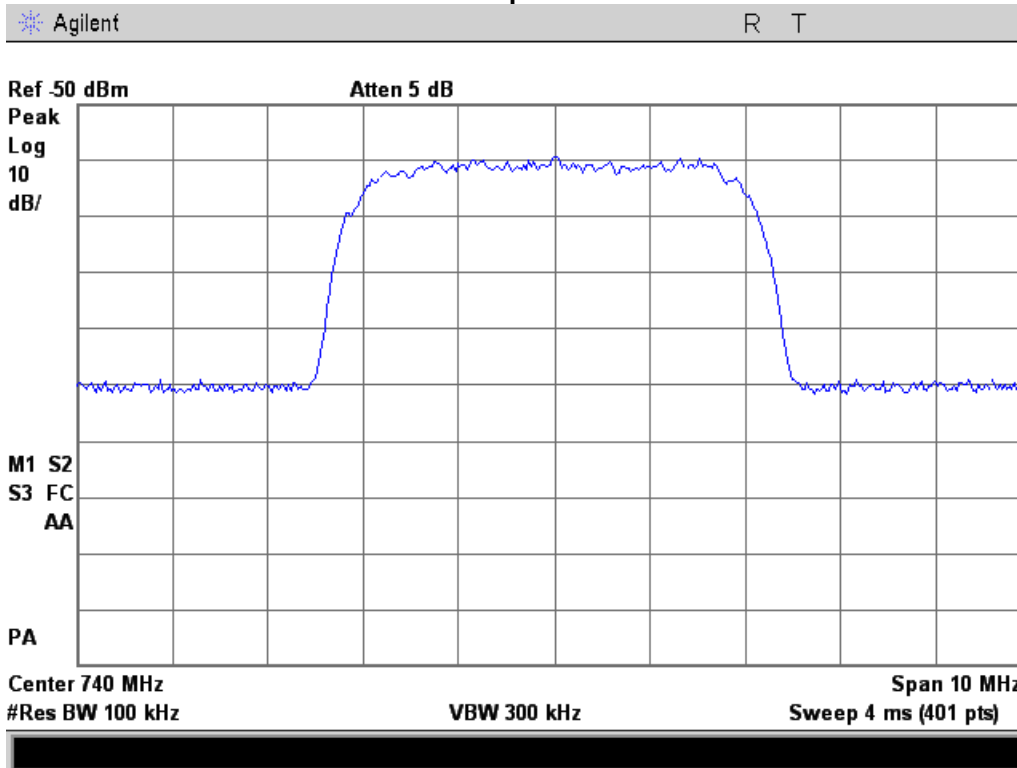




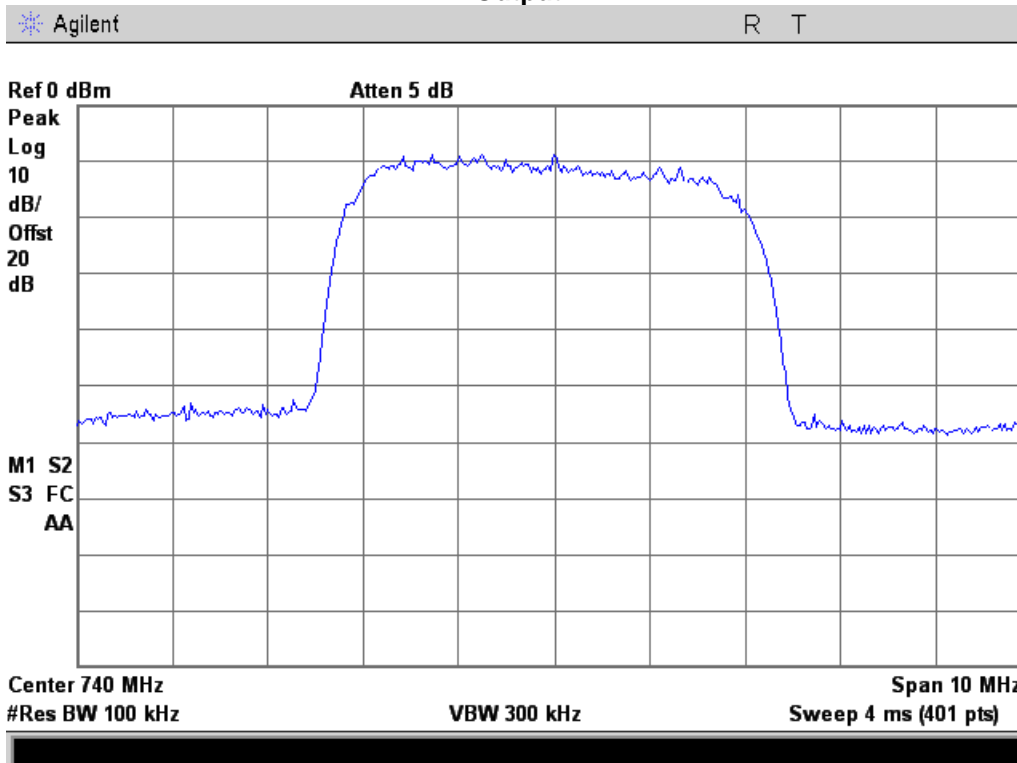
WCDMA Downlink Test Plots

728 - 746 MHz Band

Input



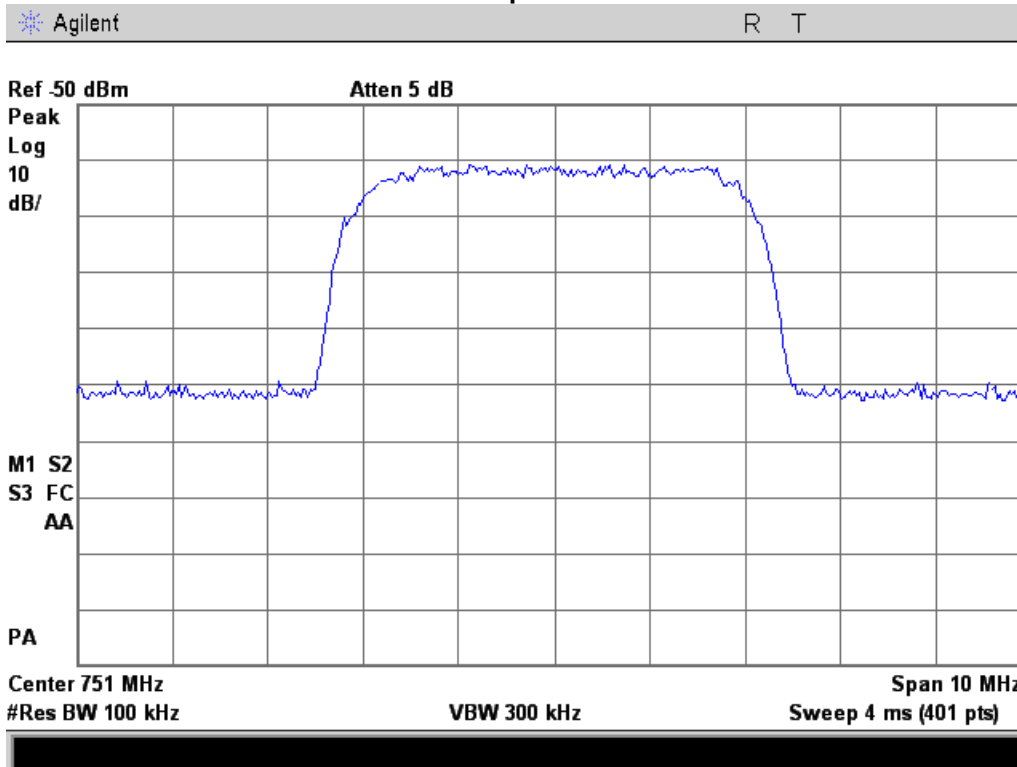
Output



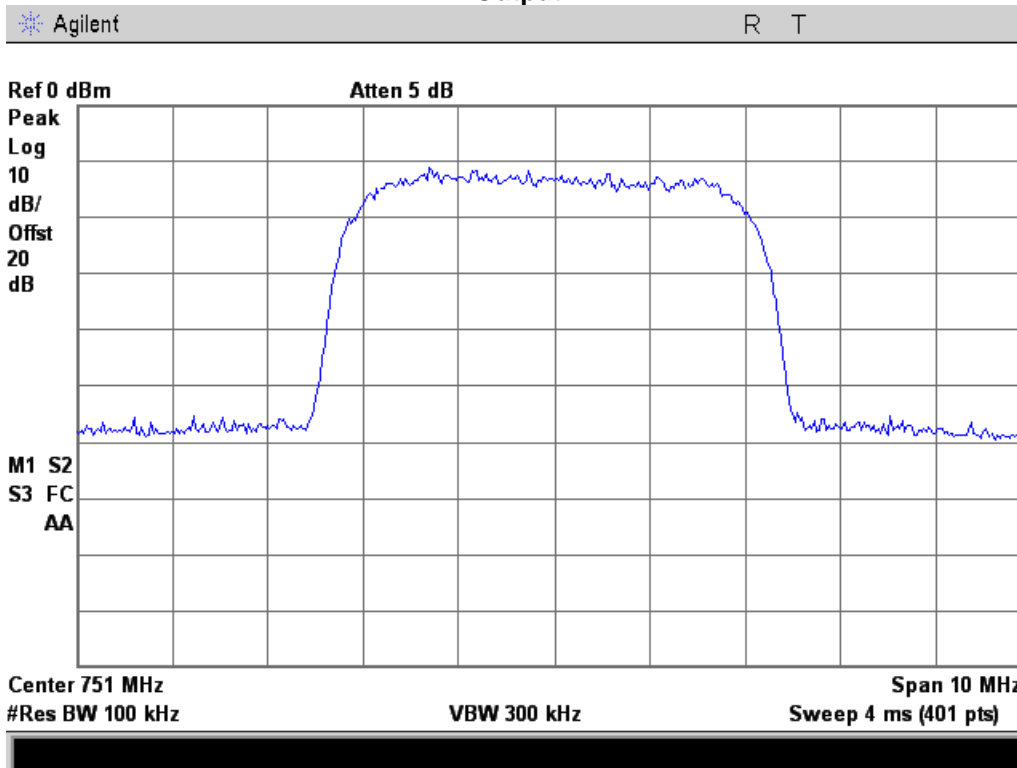


746 - 757 MHz Band

Input



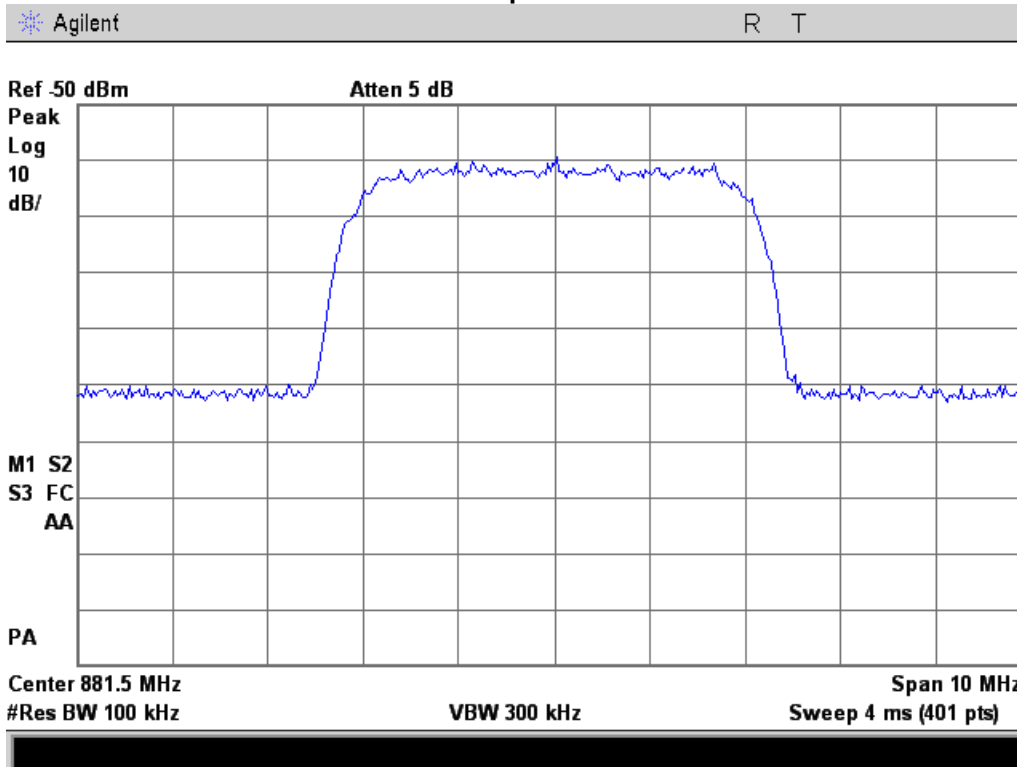
Output



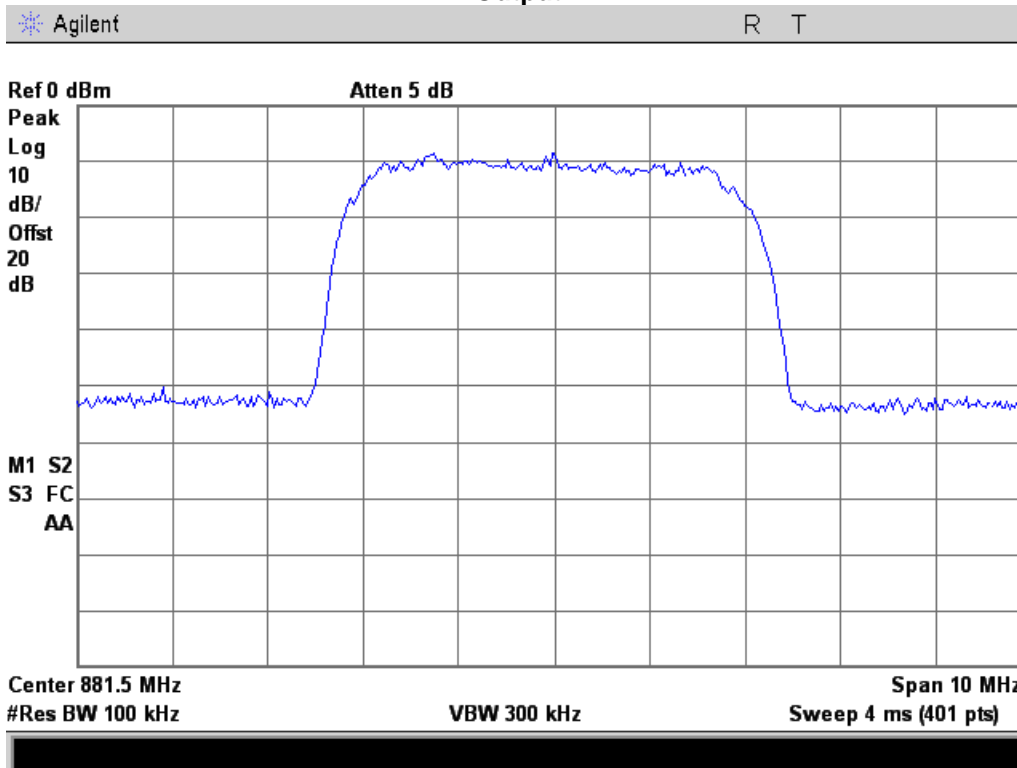


869 - 894 MHz Band

Input



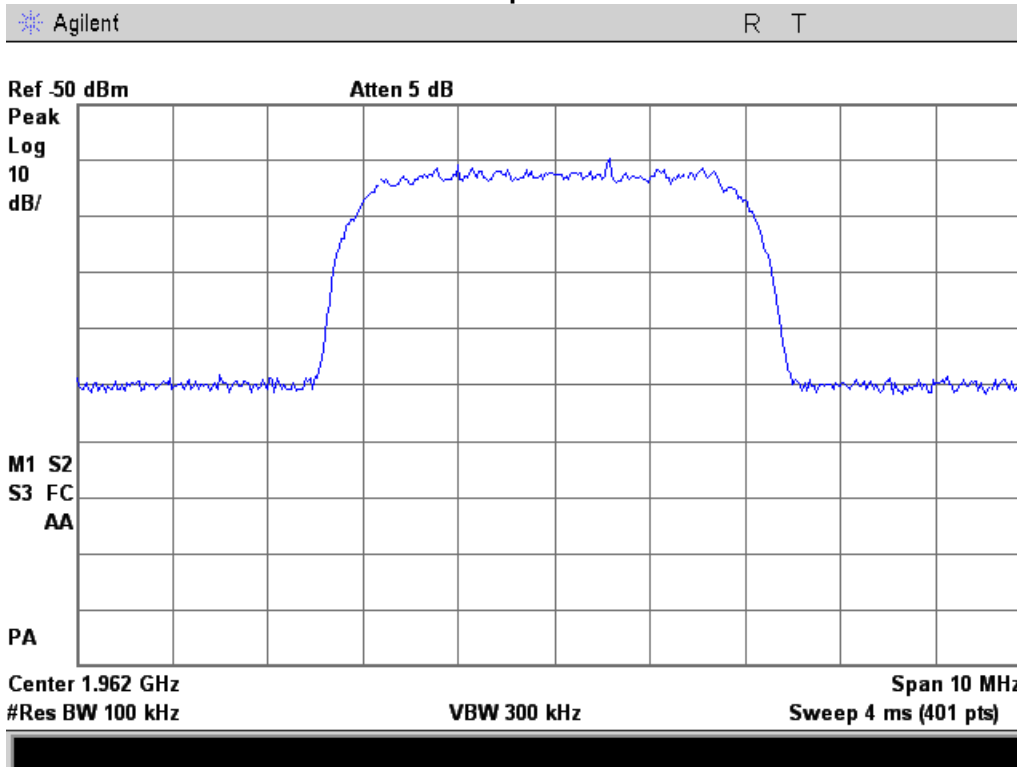
Output



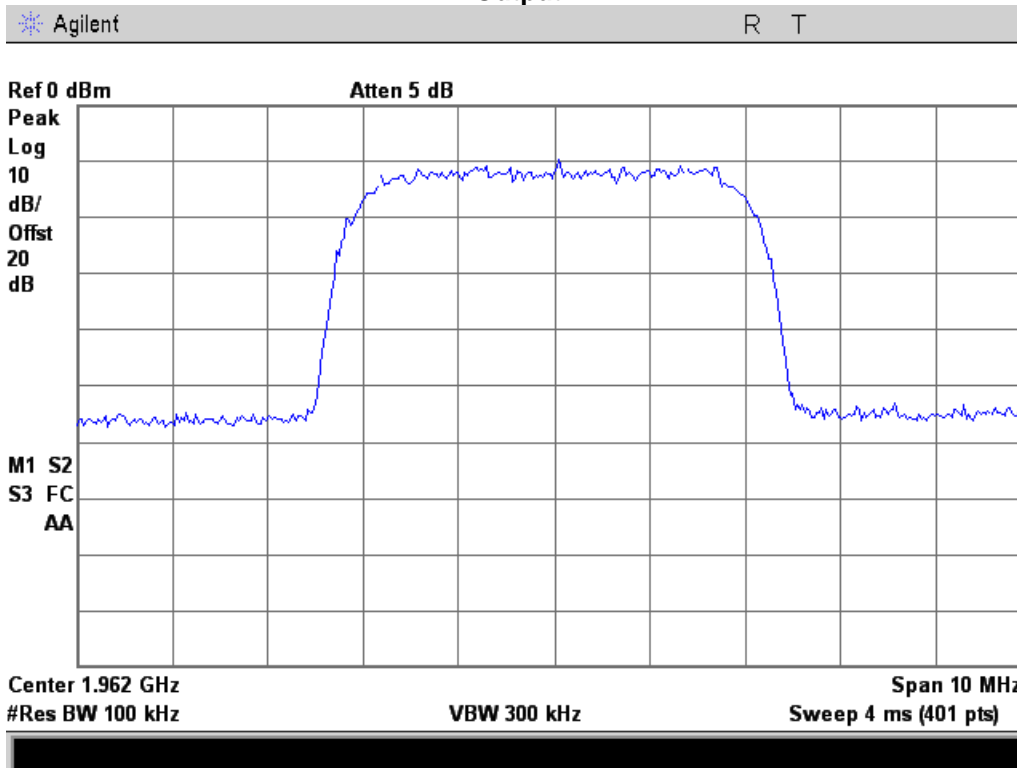


1930 - 1990 MHz Band

Input



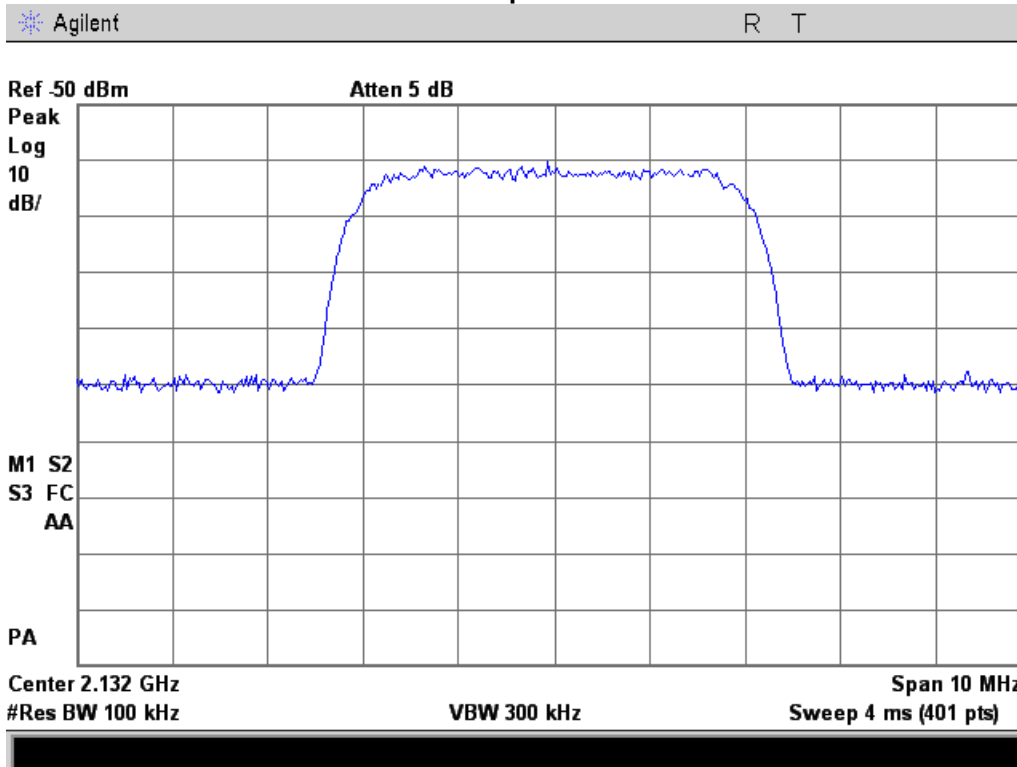
Output



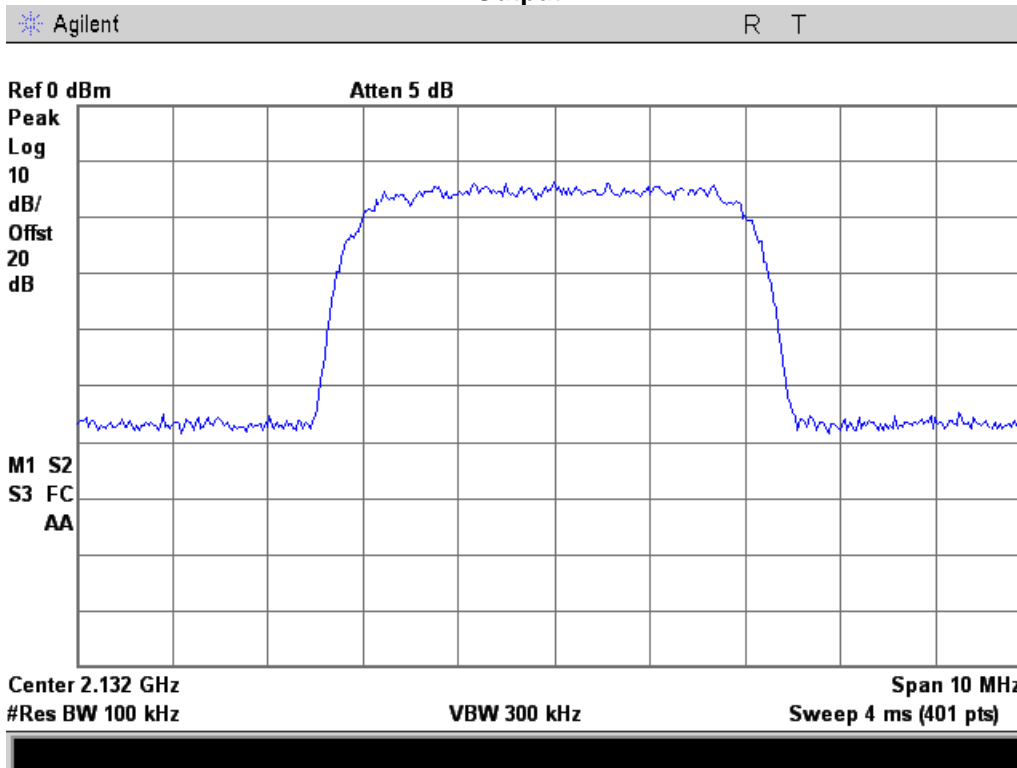


2110 - 2155 MHz Band

Input



Output





Oscillation Detection

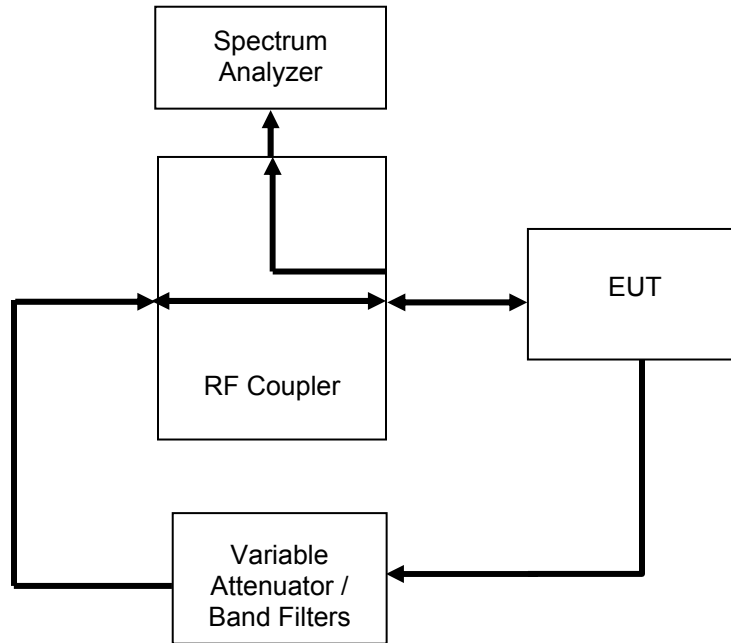
Name of Test: Oscillation Detection
Test Equipment Utilized: i00331, i00411, i00412

Engineer: John Erhard
Test Date: 8/2/2013

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 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.

Test Setup



Uplink Detection Time Test Results

Frequency Band (MHz)	Measured Time (mS)	Limit (mS)	Result
704 - 716	78.75	300	Pass
777 - 787	64.34	300	Pass
824 - 849	45.00	300	Pass
1710 - 1755	47.50	300	Pass
1850 - 1915	60.00	300	Pass

Downlink Detection Time Test Results

Frequency Band (MHz)	Measured Time (mS)	Limit (S)	Result
728 - 746	22.05	1	Pass
746 - 757	42.50	1	Pass
869 - 894	36.25	1	Pass
1930 - 1995	23.62	1	Pass
2110 - 2155	56.25	1	Pass



Uplink Restart Time Test Results

Frequency Band (MHz)	Measured Time (S)	Limit (S)	Result
704 - 716	66.62	≥60	Pass
777 - 787	66.62	≥60	Pass
824 - 849	65.81	≥60	Pass
1710 - 1755	65.62	≥60	Pass
1850 - 1915	66.00	≥60	Pass

Downlink Restart Time Test Results

Frequency Band (MHz)	Measured Time (mS)	Limit (mS)	Result
728 - 746	65.62	≥60	Pass
746 - 757	65.62	≥60	Pass
869 - 894	65.81	≥60	Pass
1930 - 1995	65.62	≥60	Pass
2110 - 2155	65.81	≥60	Pass

Uplink Restart Count Test Results

Frequency Band (MHz)	Restarts	Limit	Result
704 - 716	4	≤5	Pass
777 - 787	4	≤5	Pass
824 - 849	4	≤5	Pass
1710 - 1755	4	≤5	Pass
1850 - 1915	4	≤5	Pass

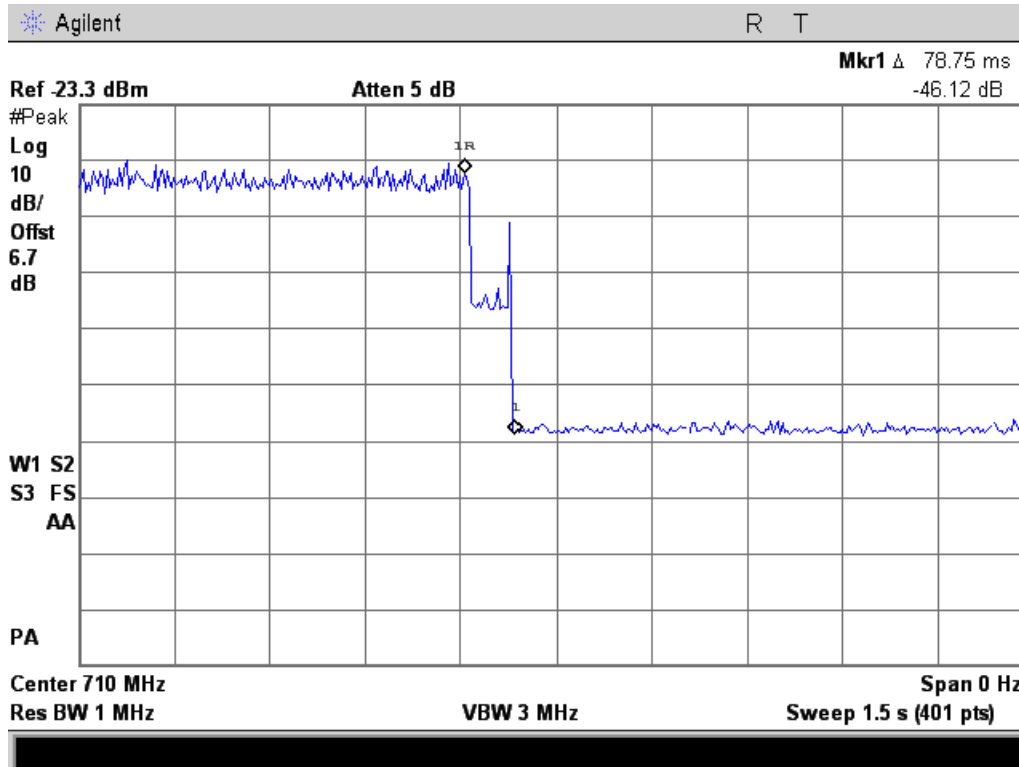
Downlink Restart Count Test Results

Frequency Band (MHz)	Restarts	Limit	Result
728 - 746	4	≤5	Pass
746 - 757	4	≤5	Pass
869 - 894	4	≤5	Pass
1930 - 1995	4	≤5	Pass
2110 - 2155	4	≤5	Pass

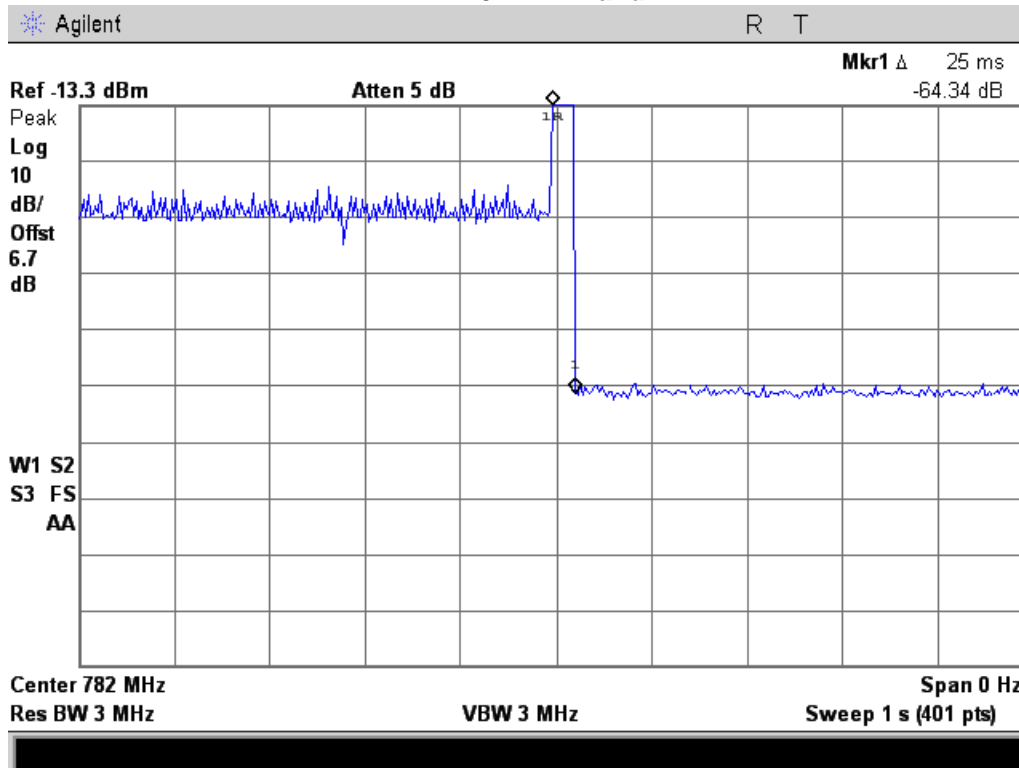


Uplink Detection Time Test Results

704 - 716 MHz Band

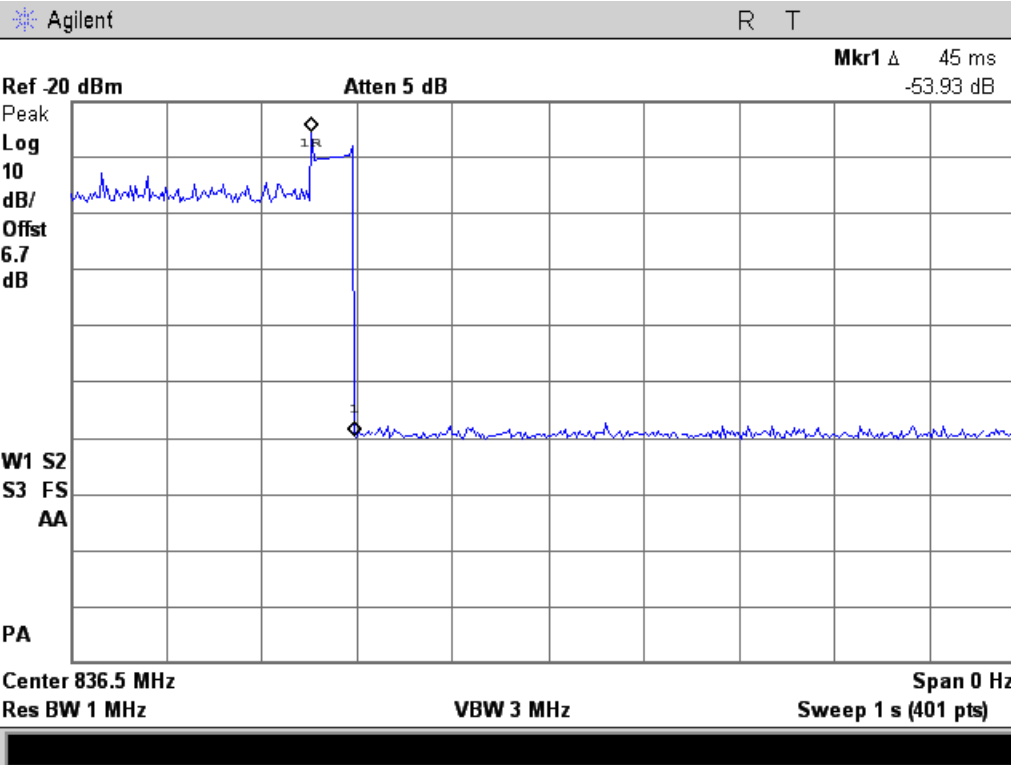


777 - 787 MHz Band

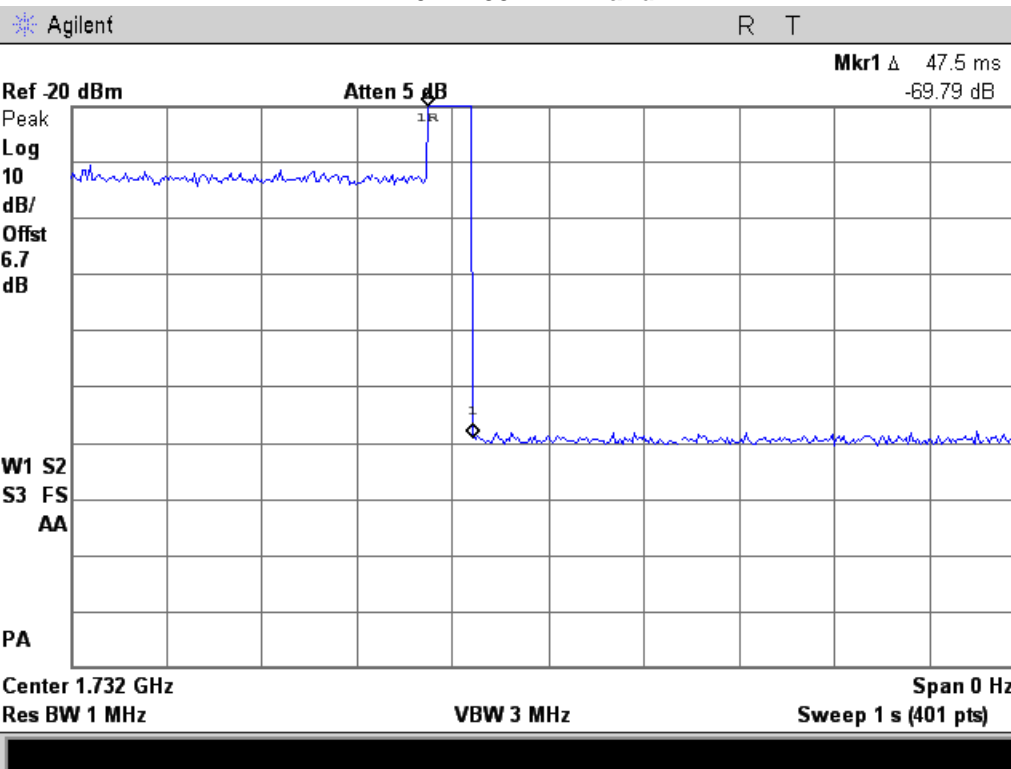




824 - 849 MHz Band

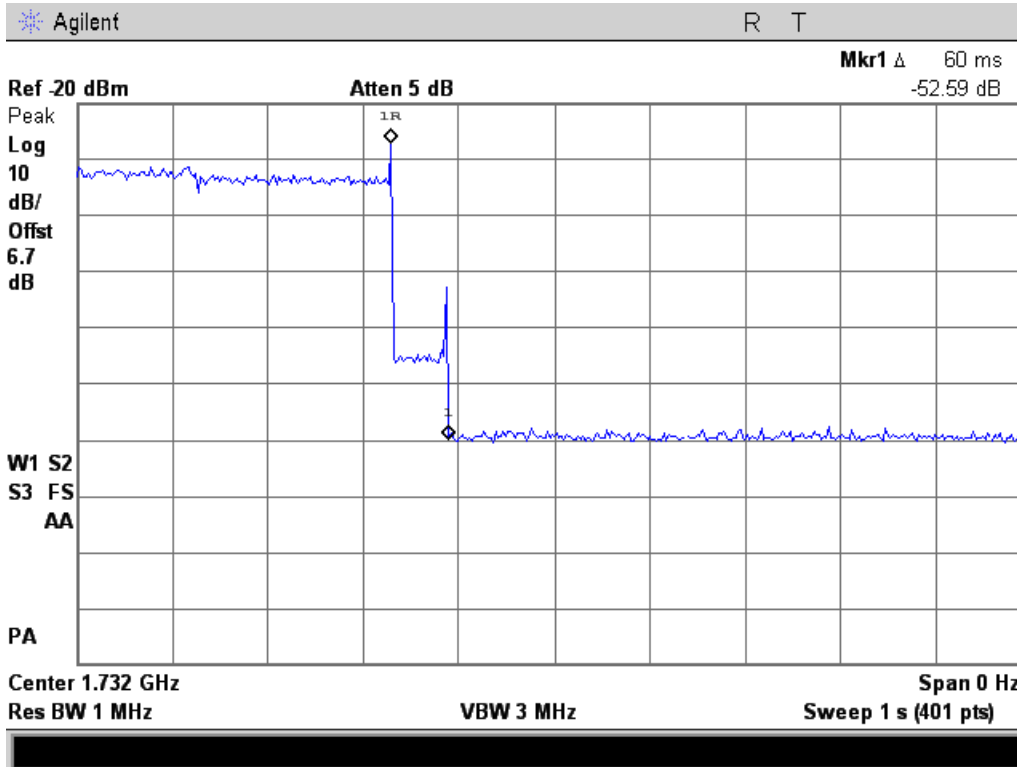


1710 - 1755 MHz Band



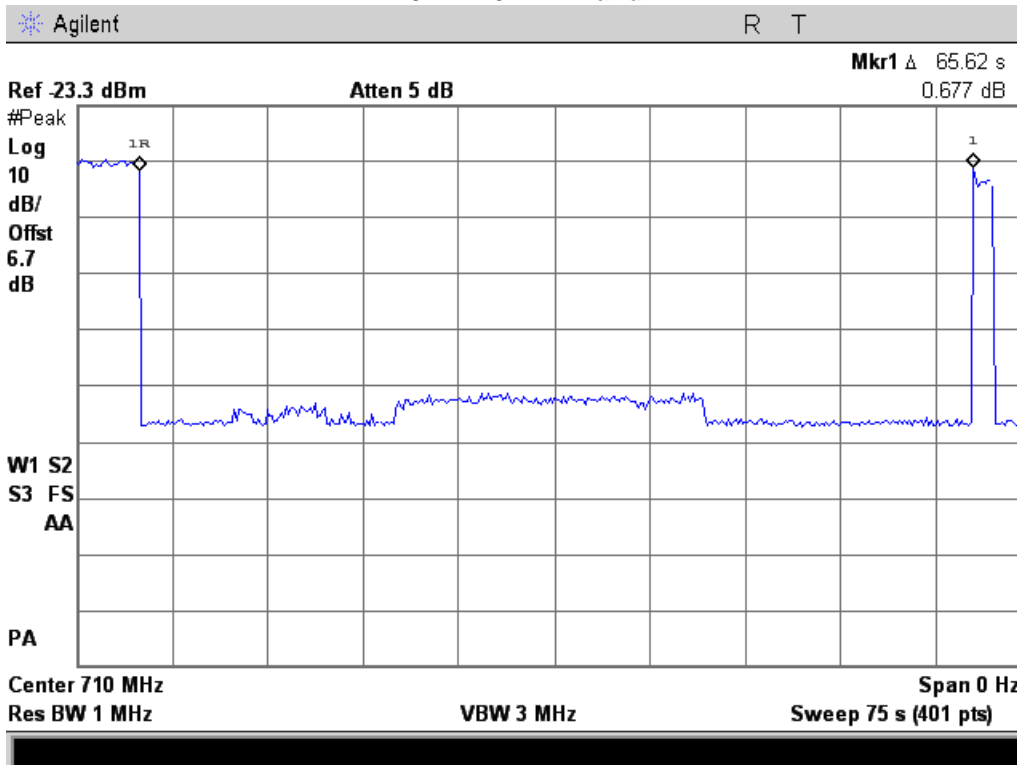


1850 - 1910 MHz Band



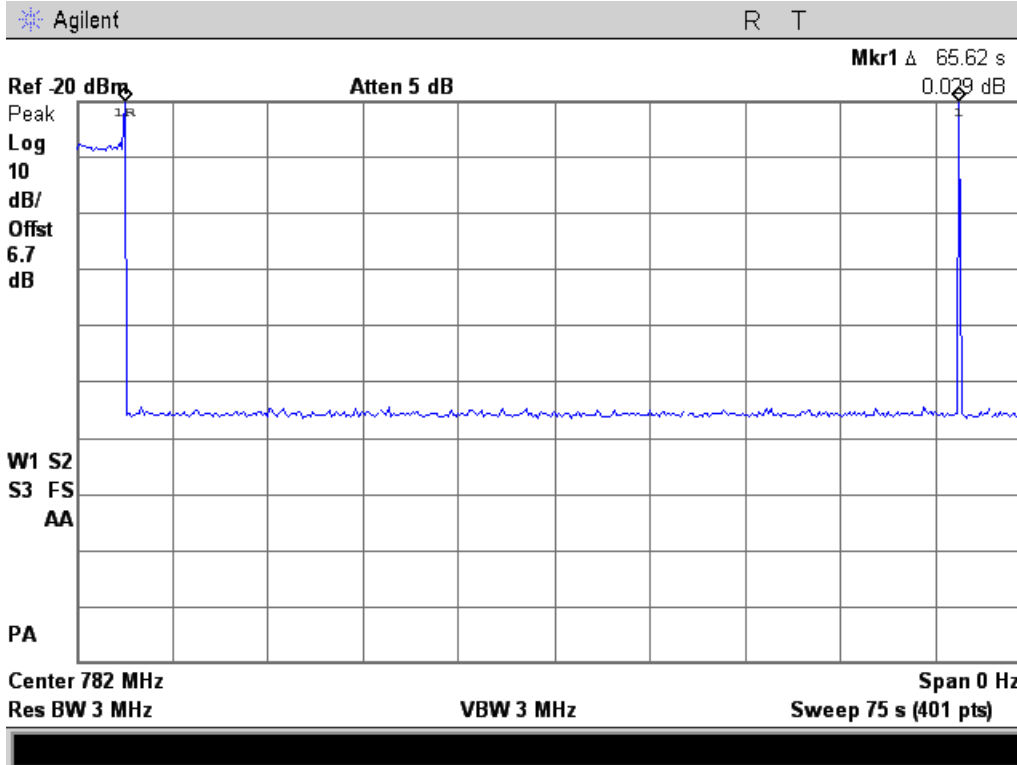
Uplink Restart Time Test Results

704 - 716 MHz Band

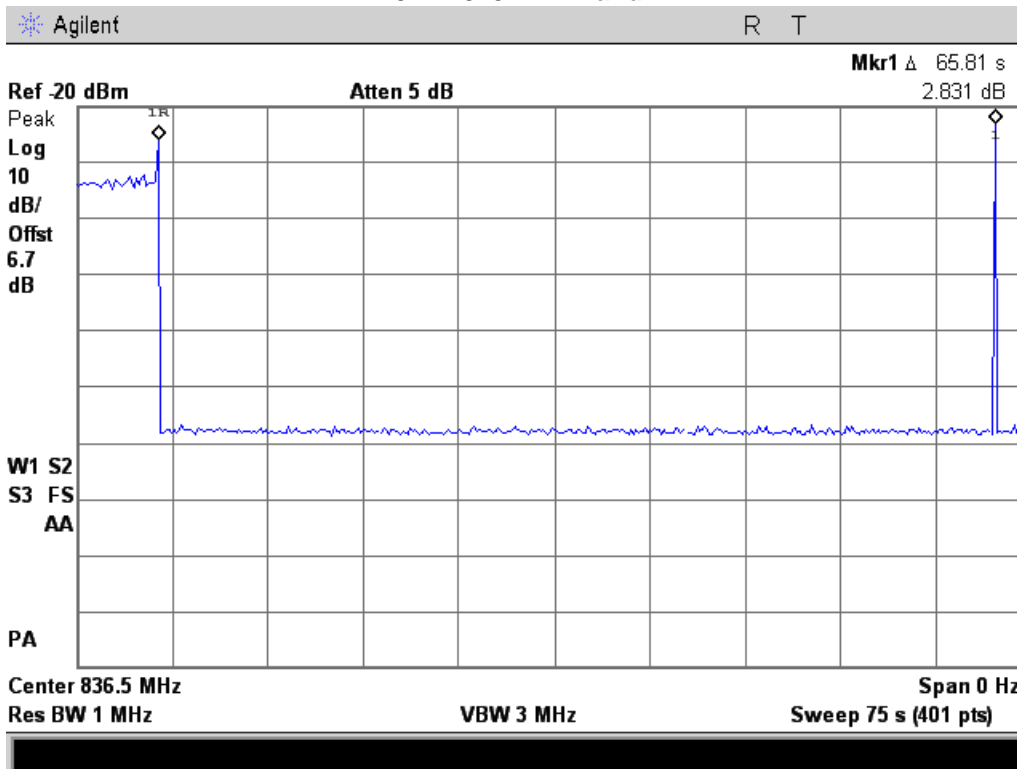




777 - 787 MHz Band

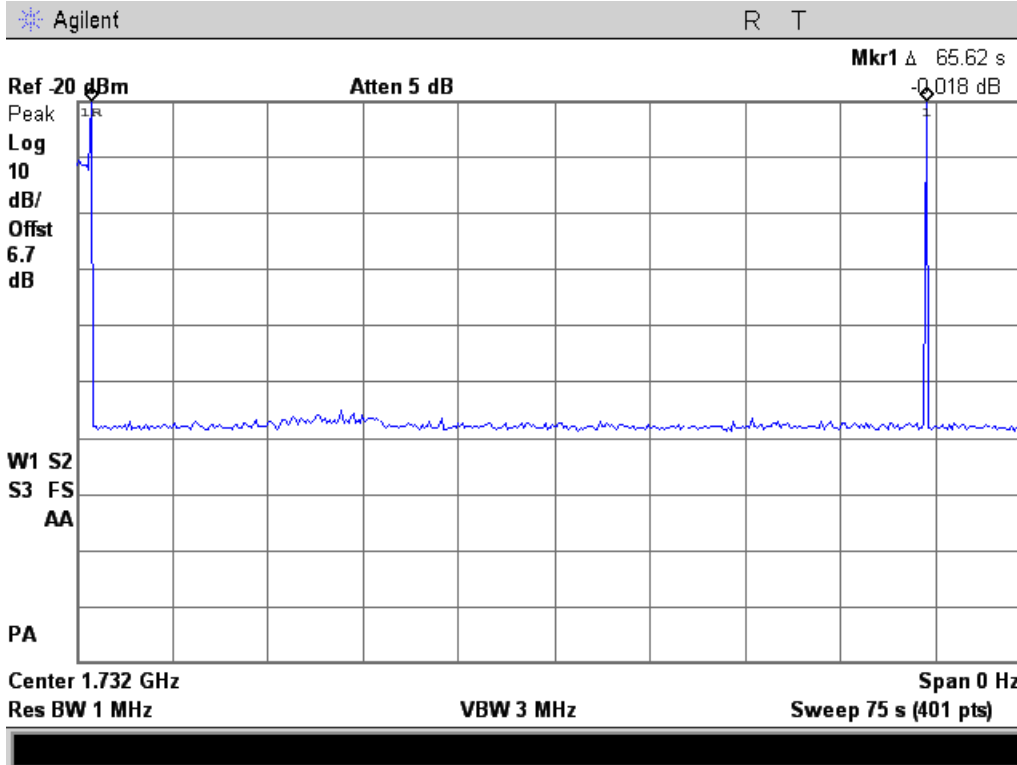


824 - 849 MHz Band

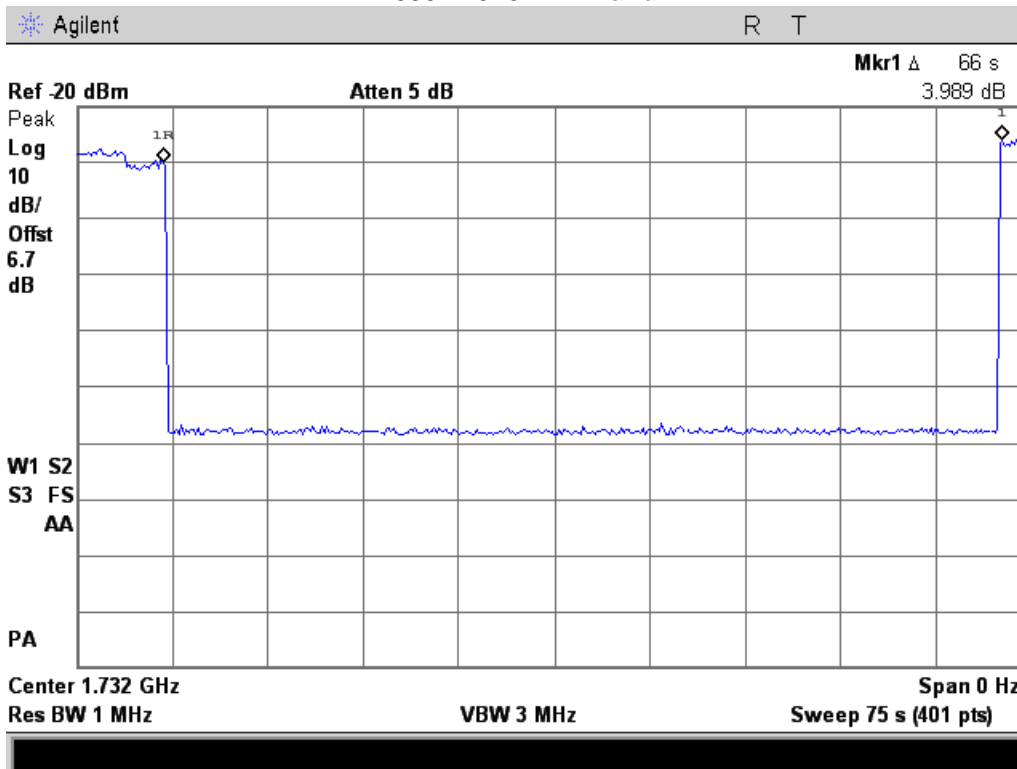




1710 - 1755 MHz Band



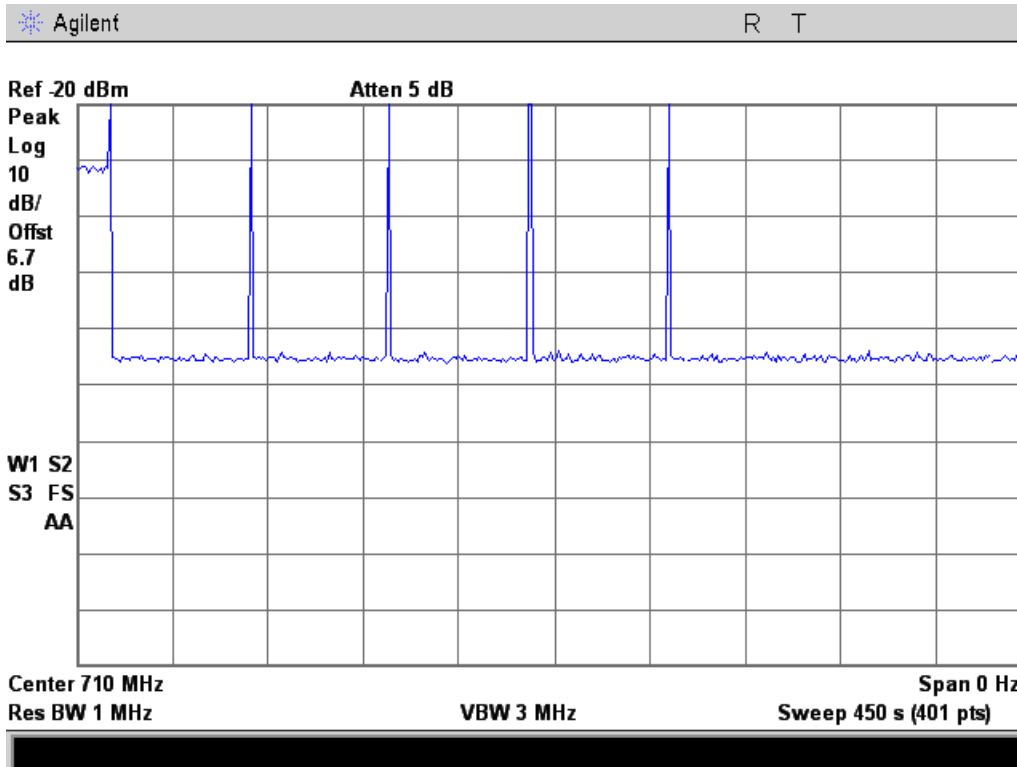
1850 - 1910 MHz Band



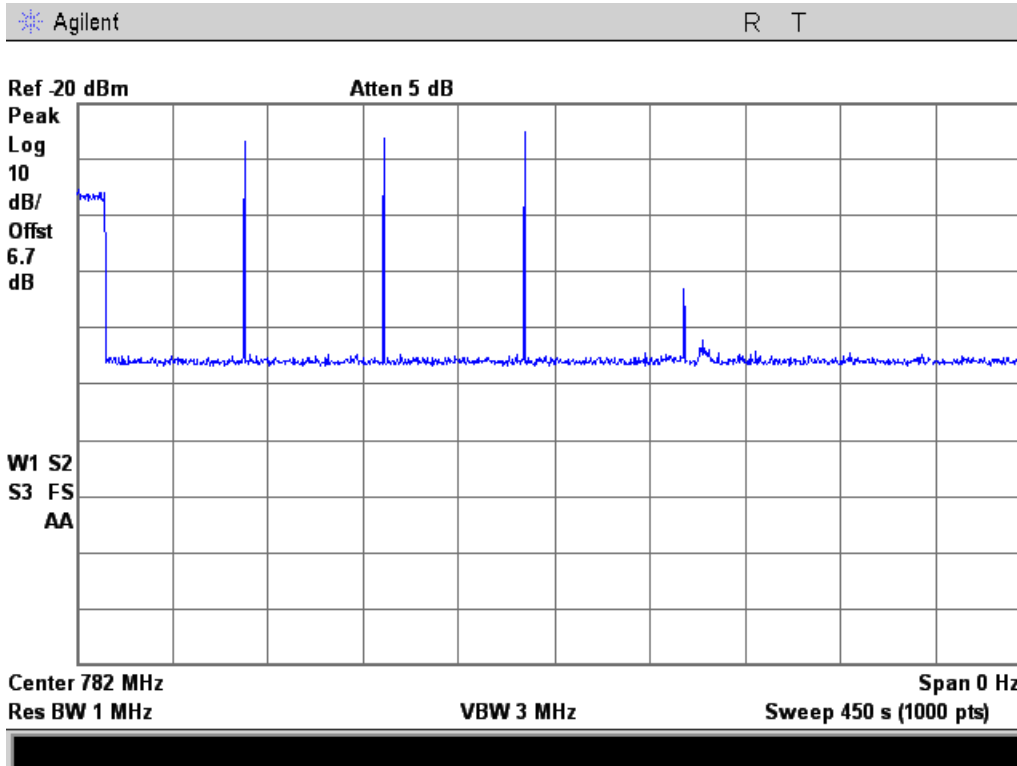


Uplink Restart Count Test Results

704 - 716 MHz Band

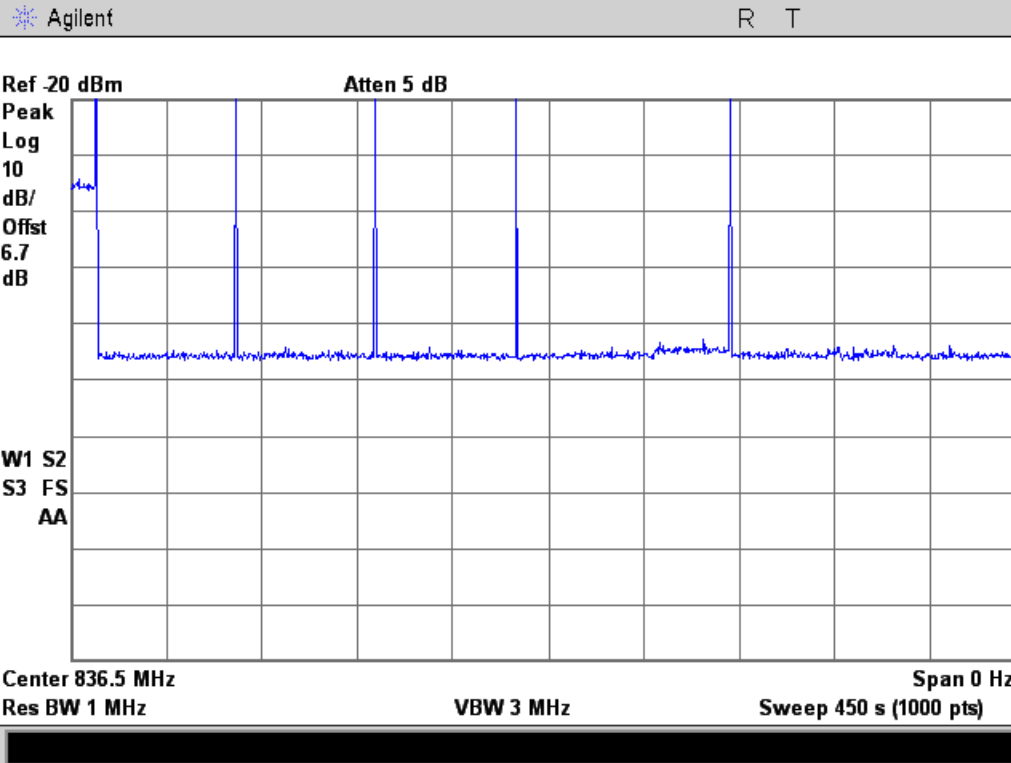


777 - 787 MHz Band

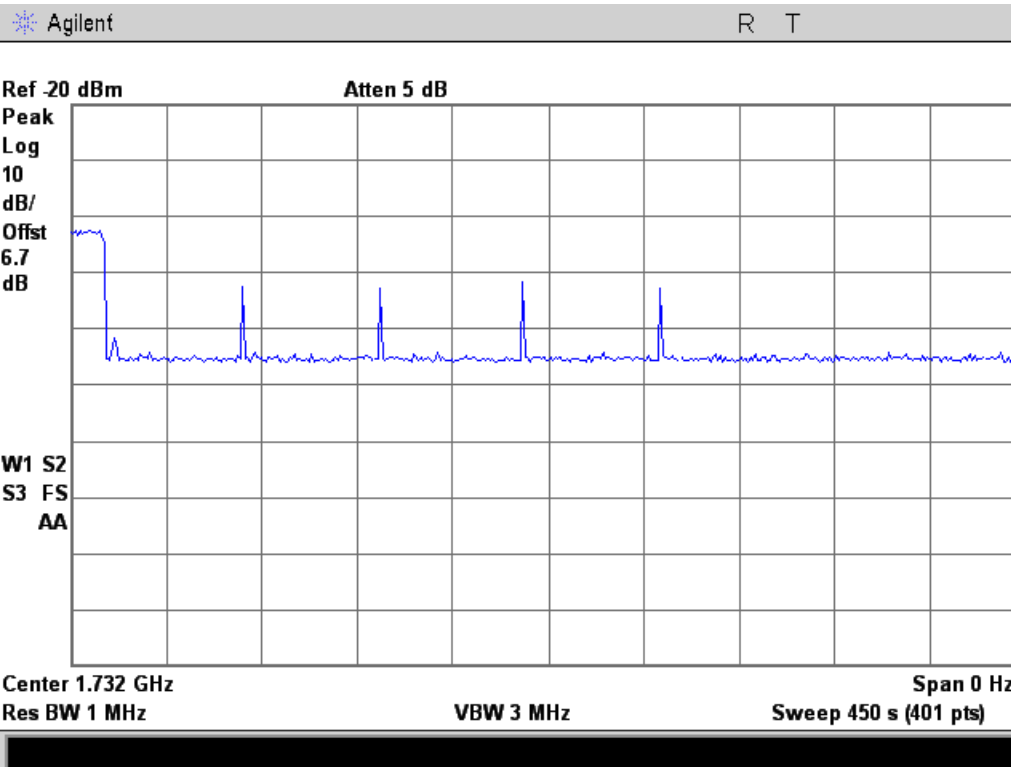




824 - 849 MHz Band

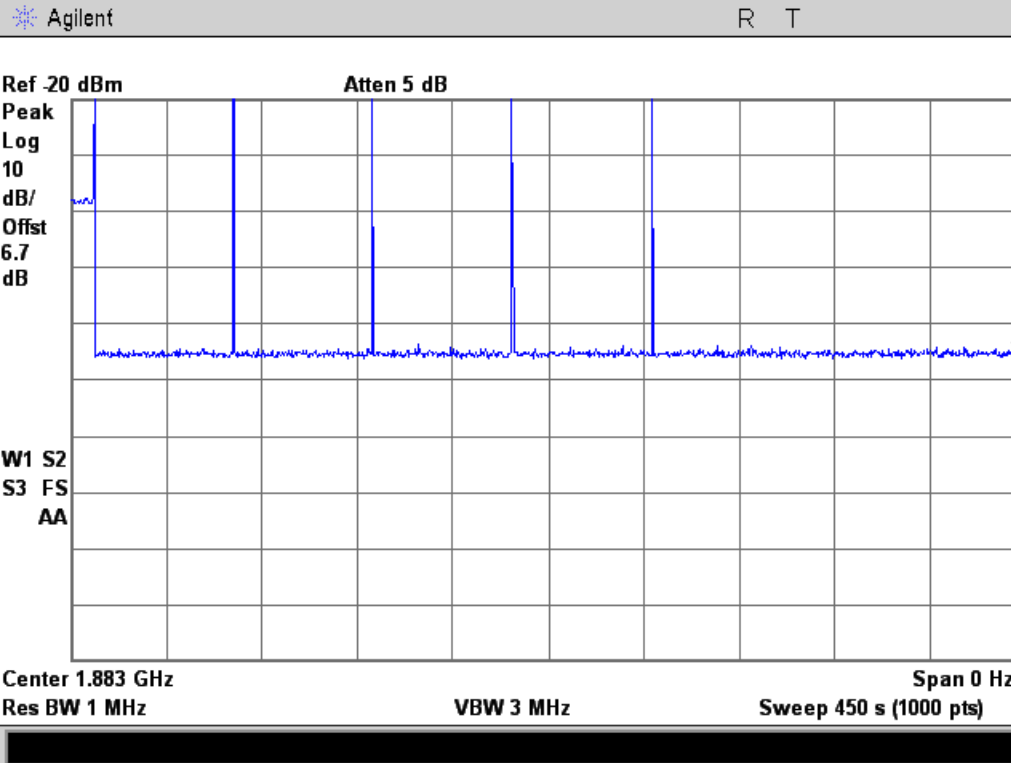


1710 - 1755 MHz Band



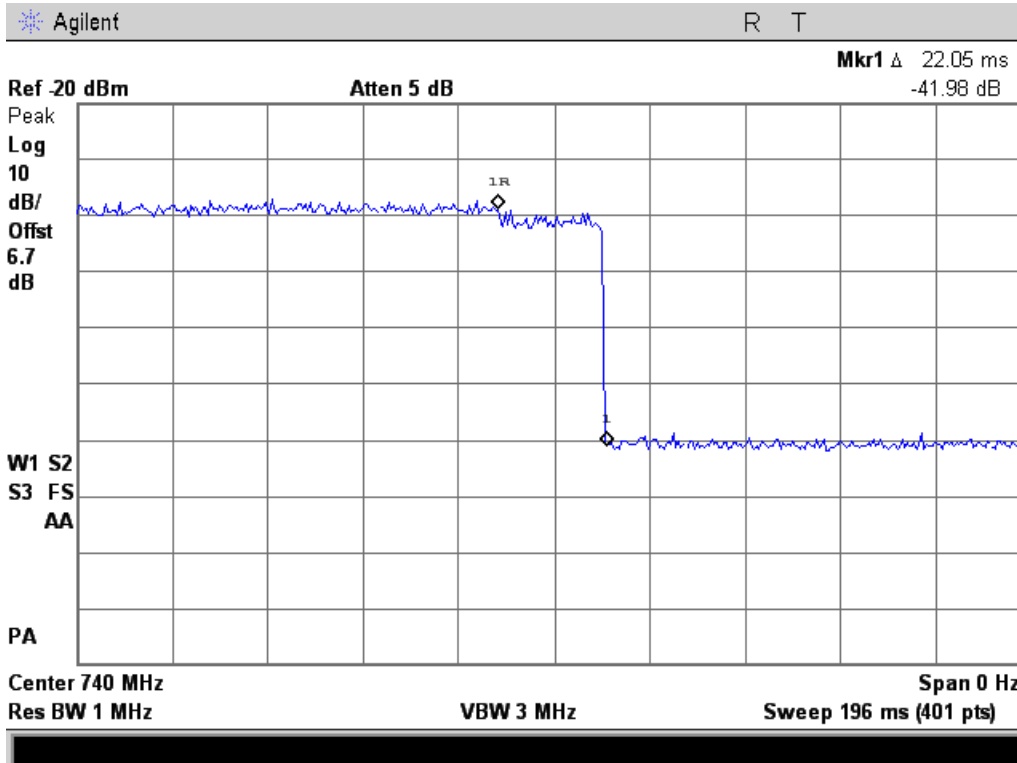


1850 - 1910 MHz Band



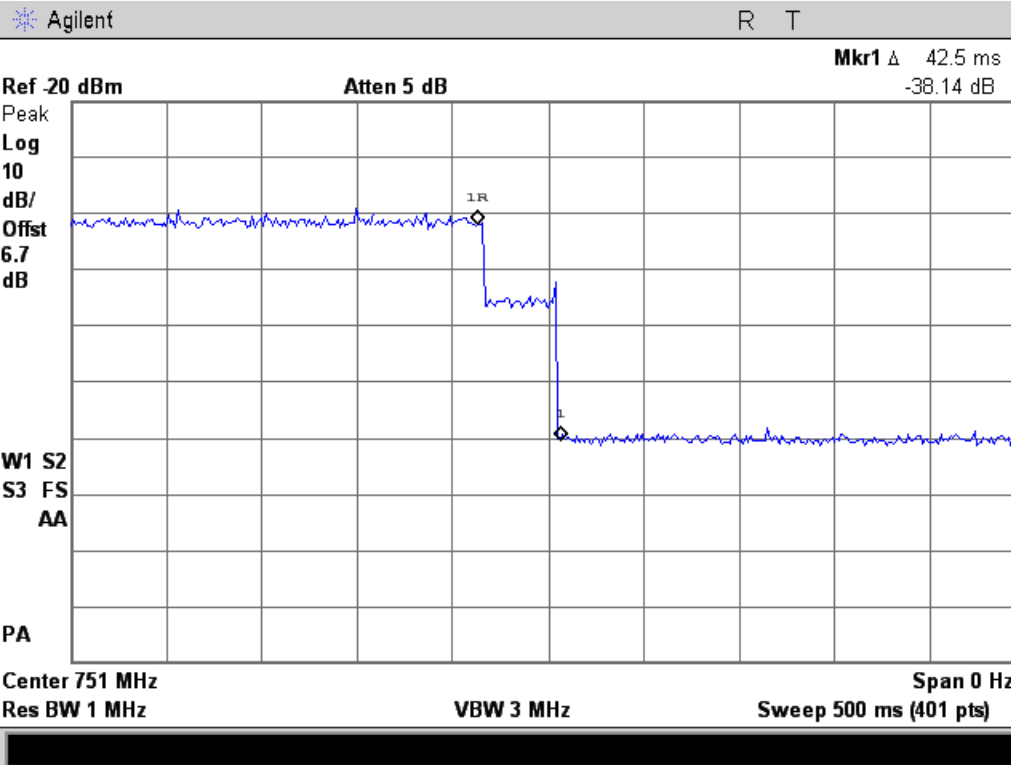
Downlink Detection Time Test Results

728 - 746 MHz Band

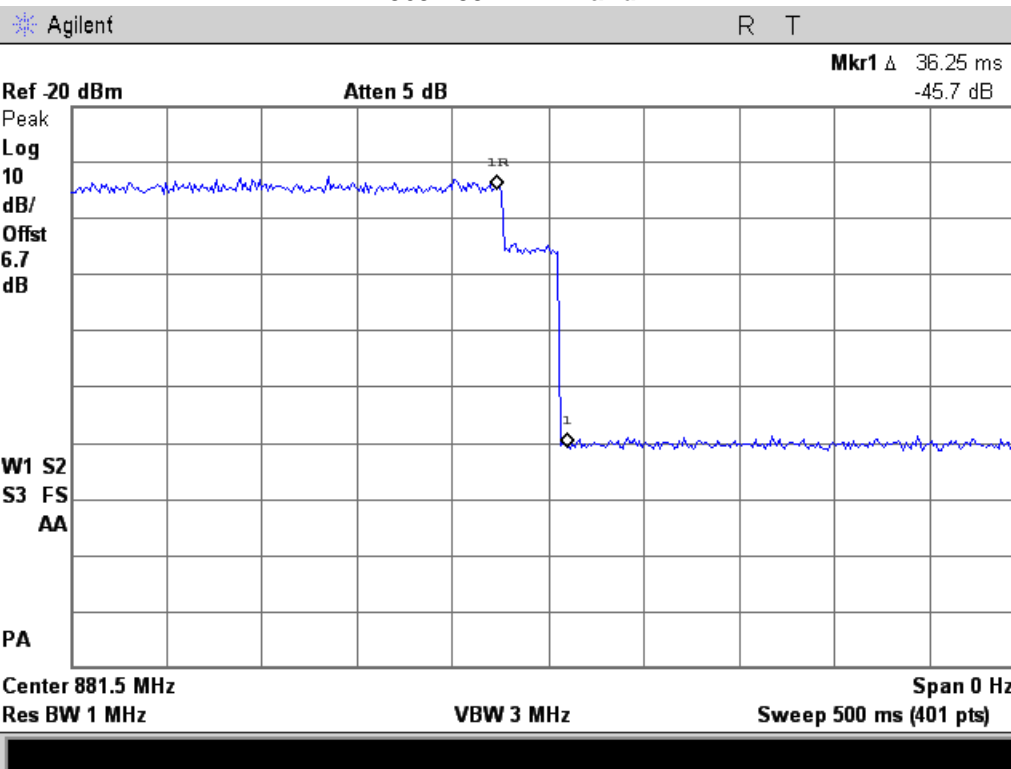




746 - 757 MHz Band

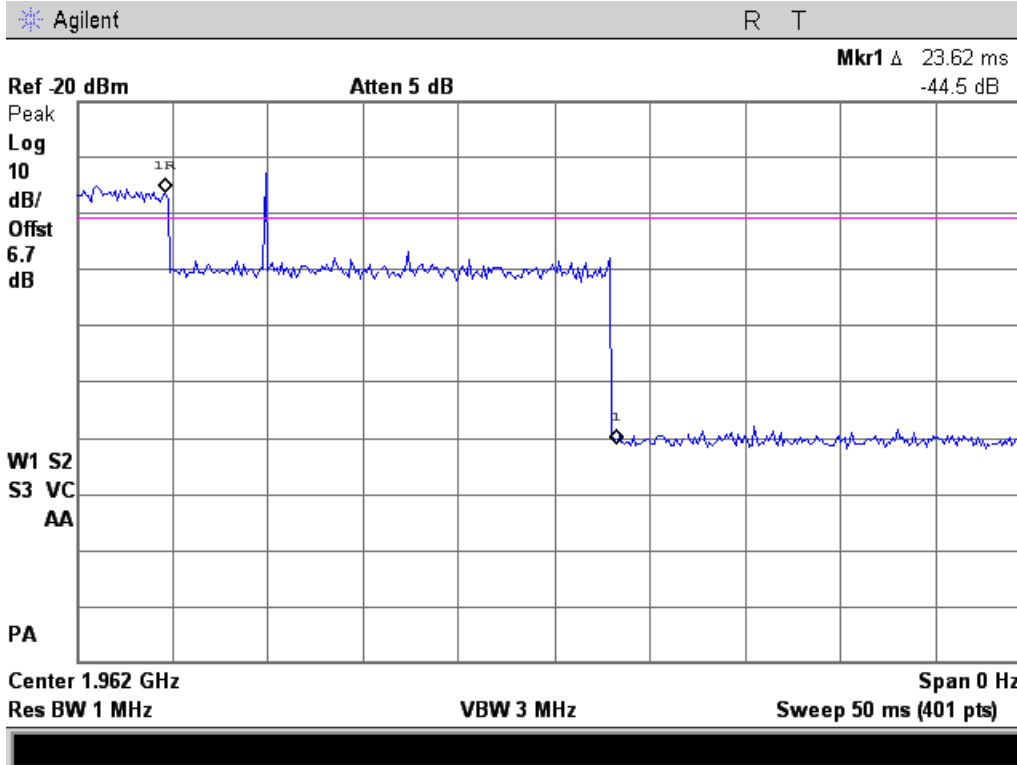


869 - 894 MHz Band

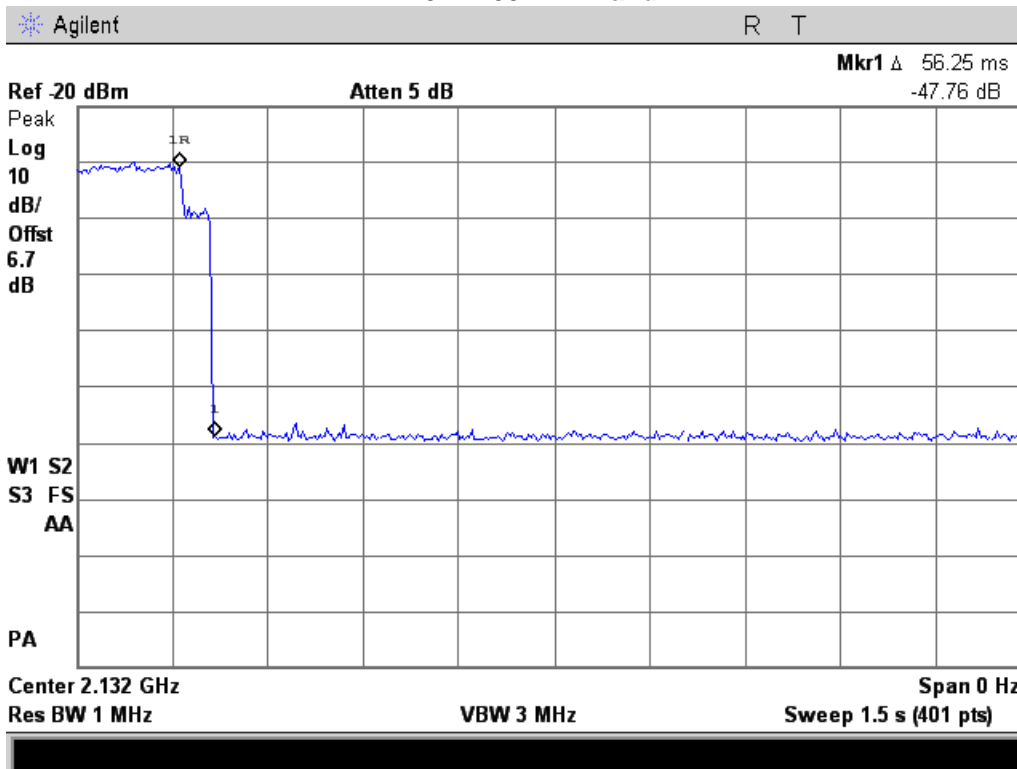




1930 - 1990 MHz Band



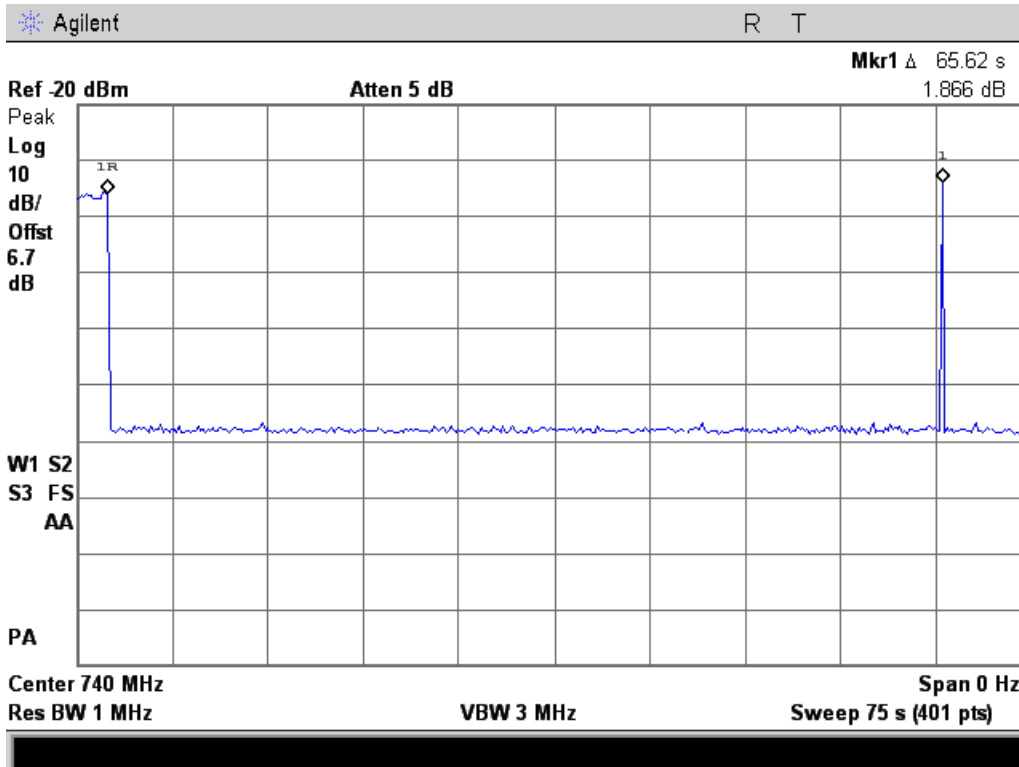
2110 - 2155 MHz Band



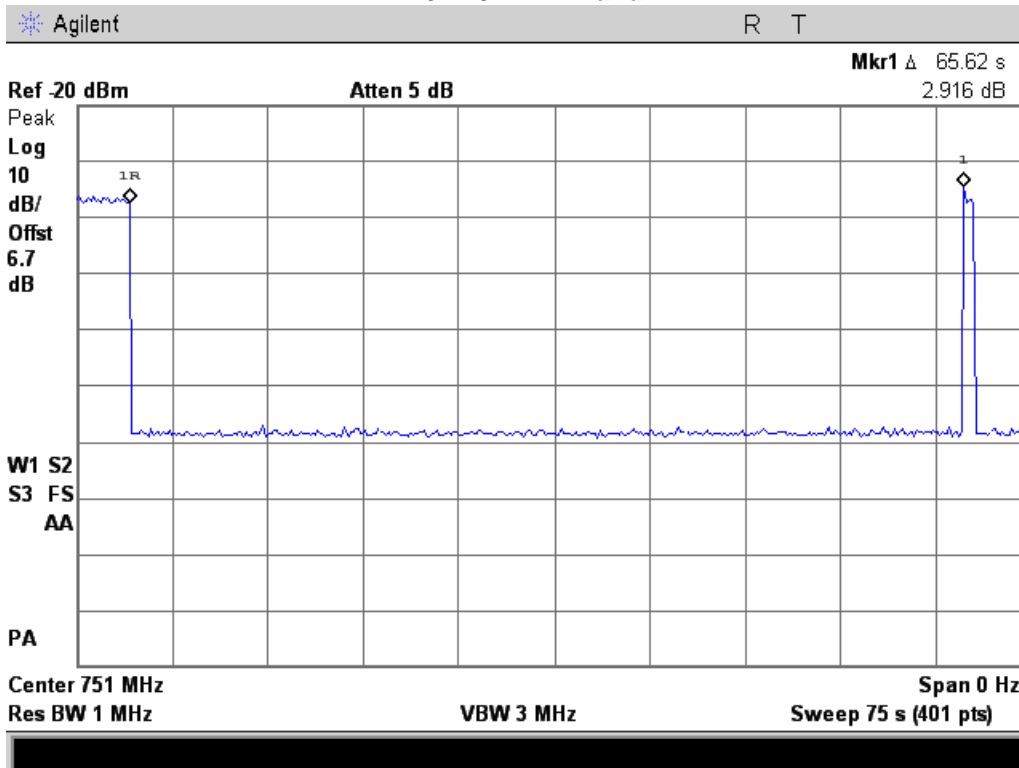


Downlink Restart Time Test Results

728 - 746 MHz Band

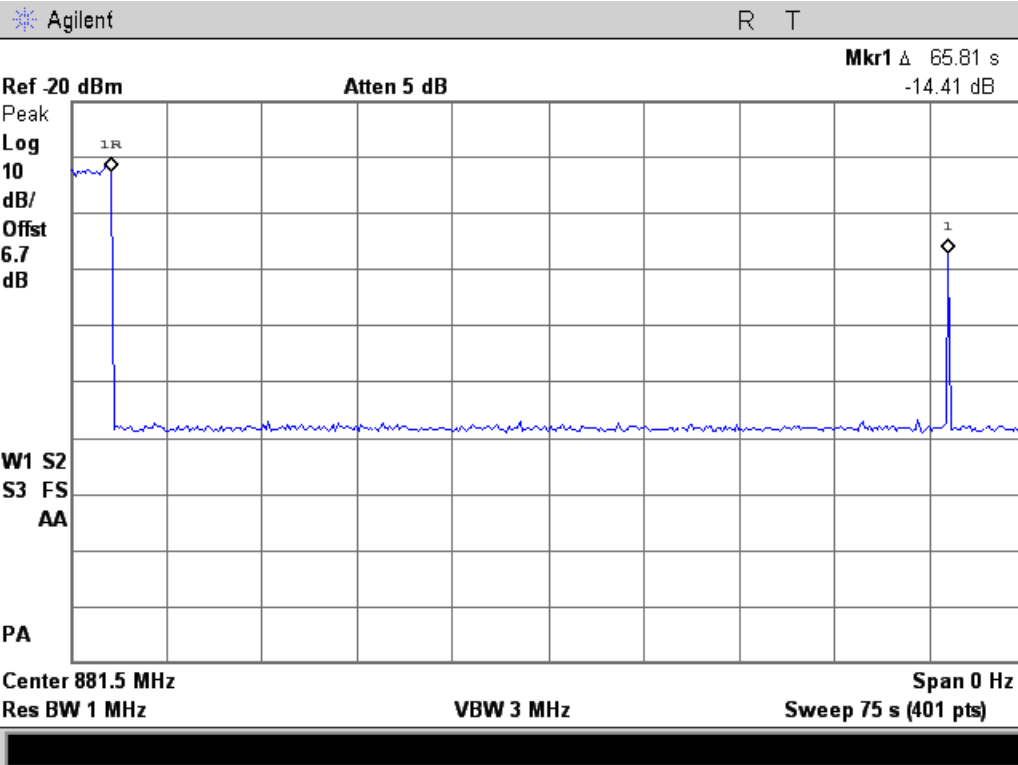


746 - 757 MHz Band

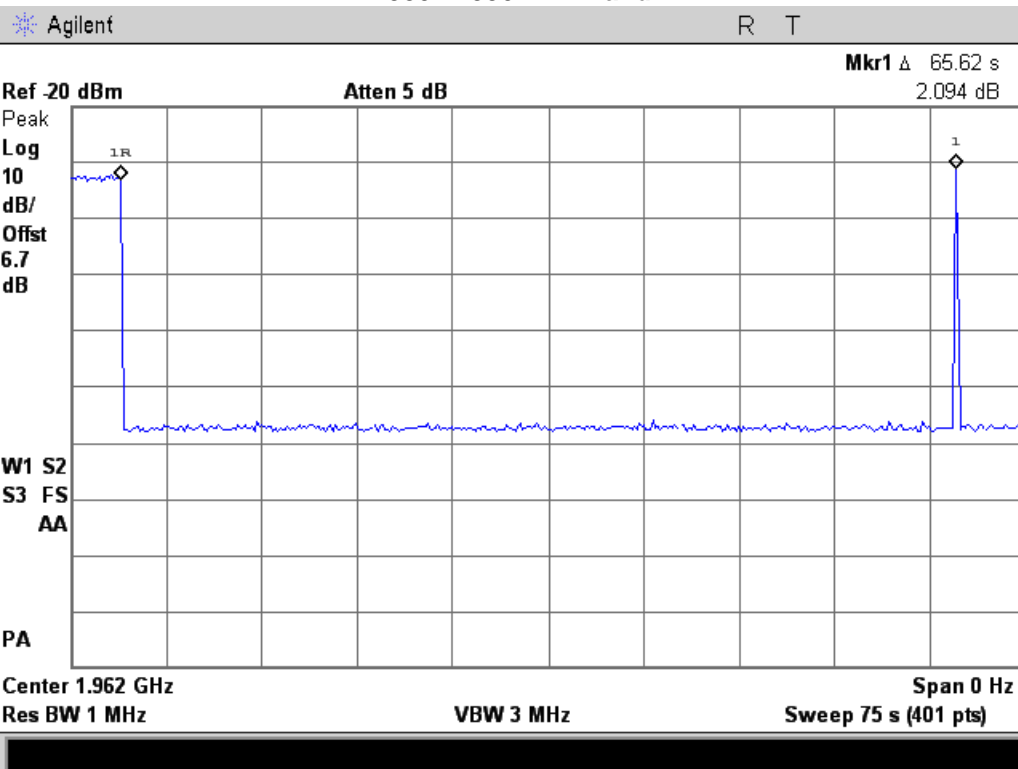




869 - 894 MHz Band

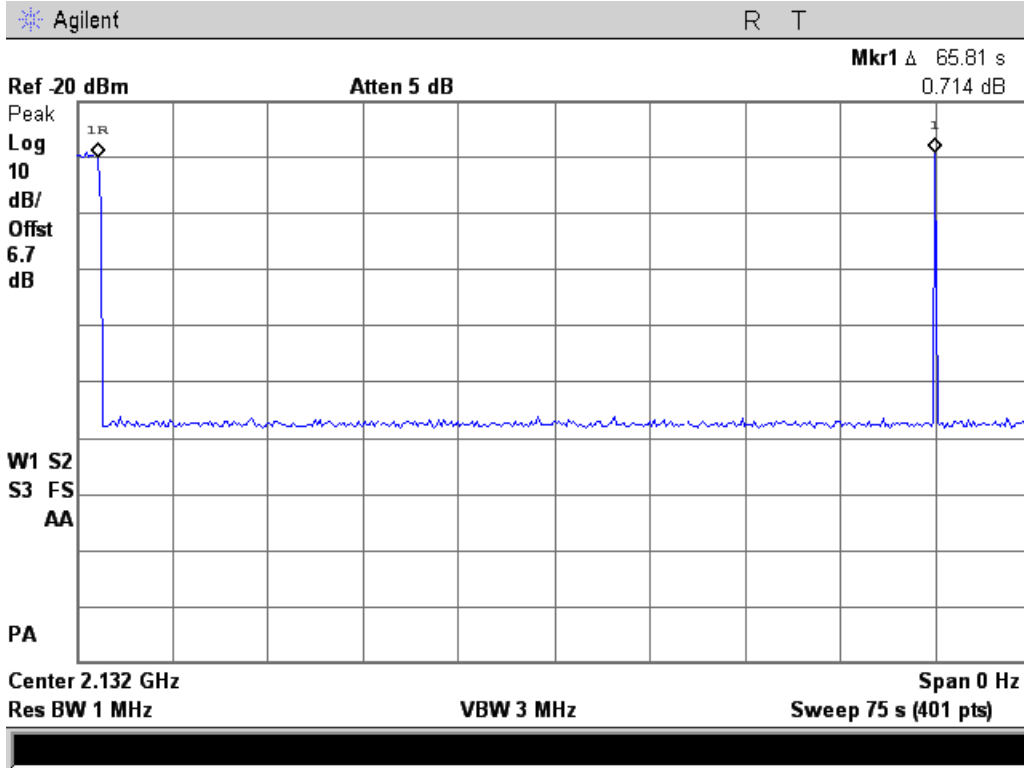


1930 - 1990 MHz Band



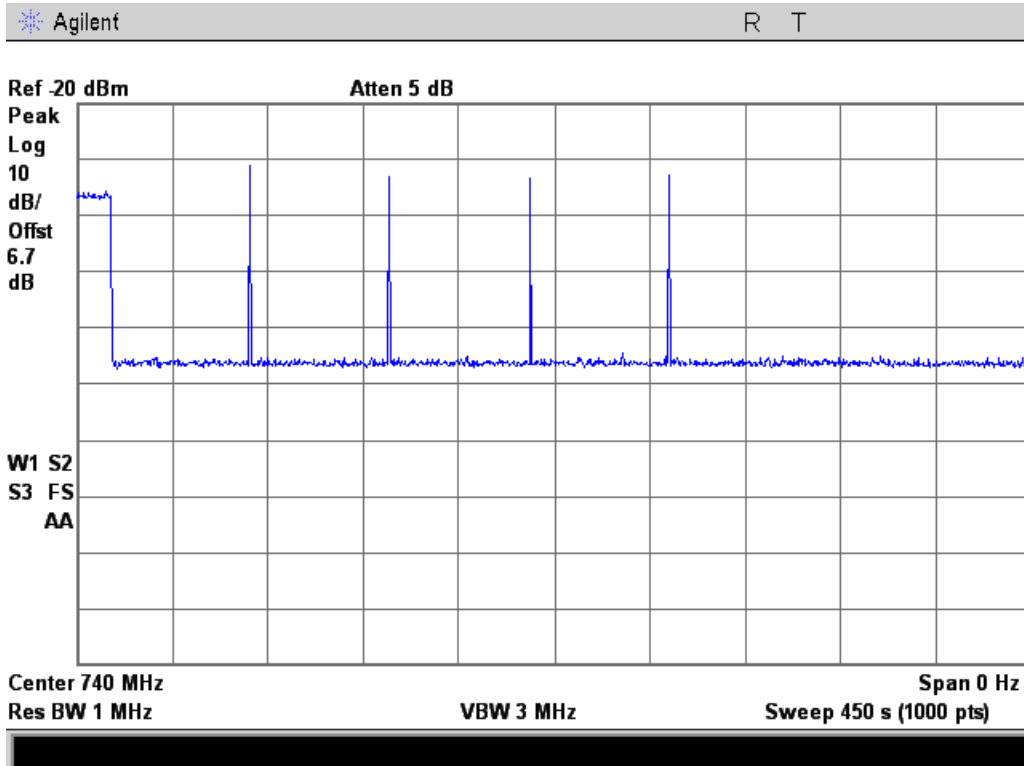


2110 - 2155 MHz Band



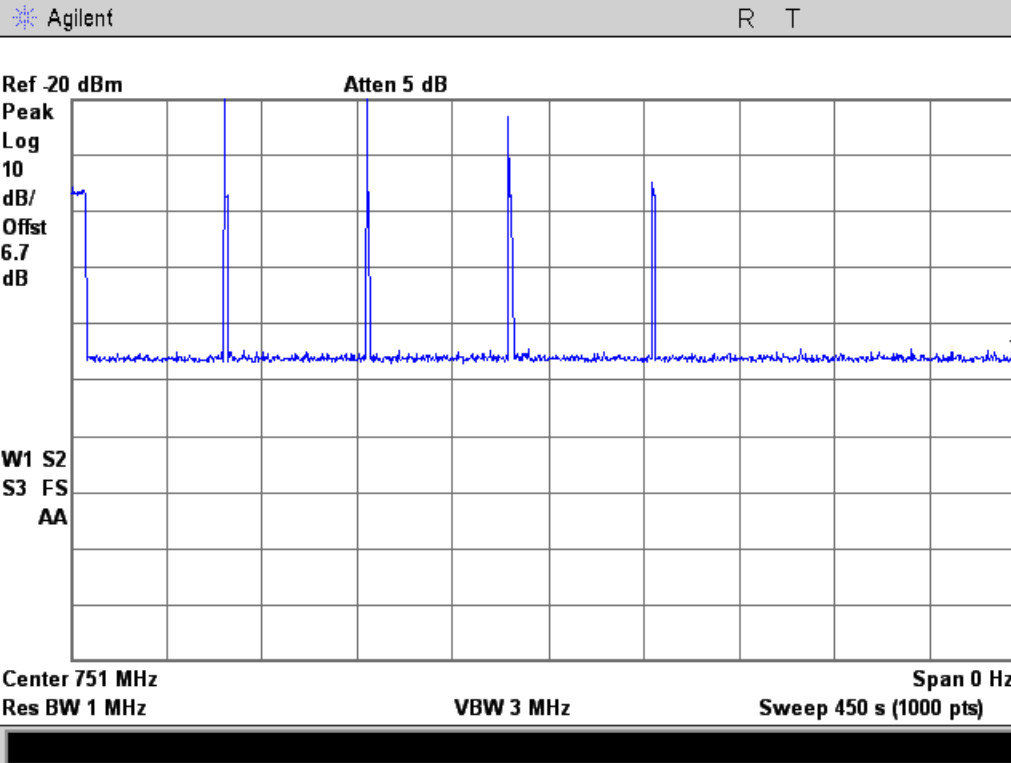
Downlink Restart Count Test Results

728 - 746 MHz Band

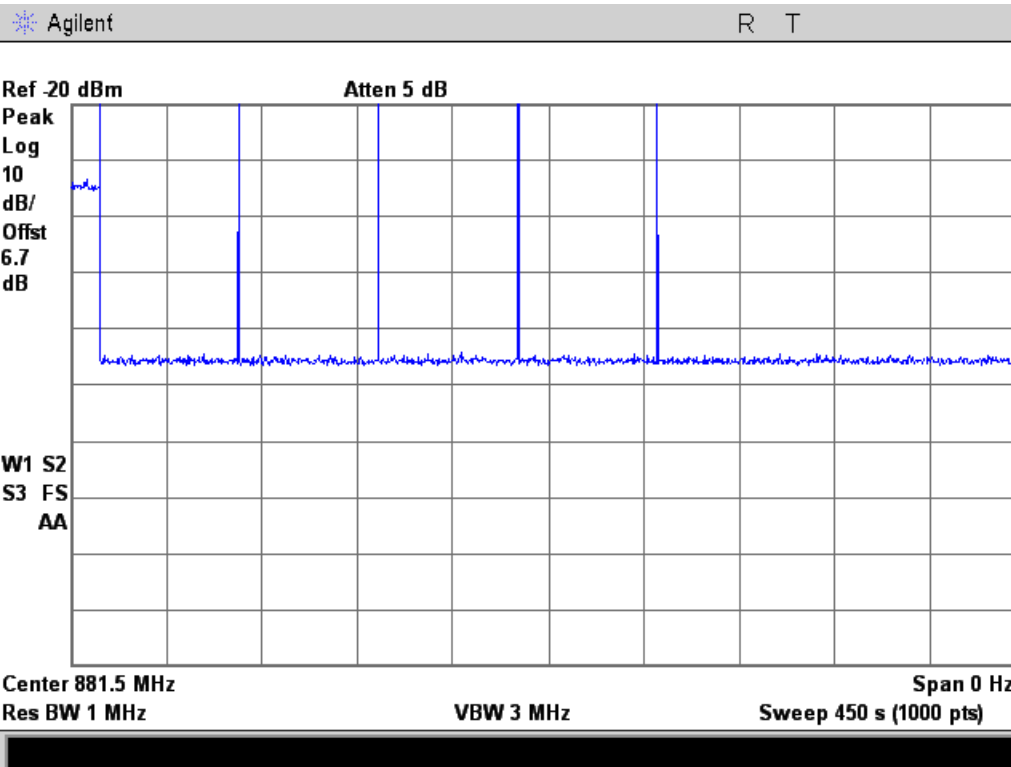




746 - 757 MHz Band

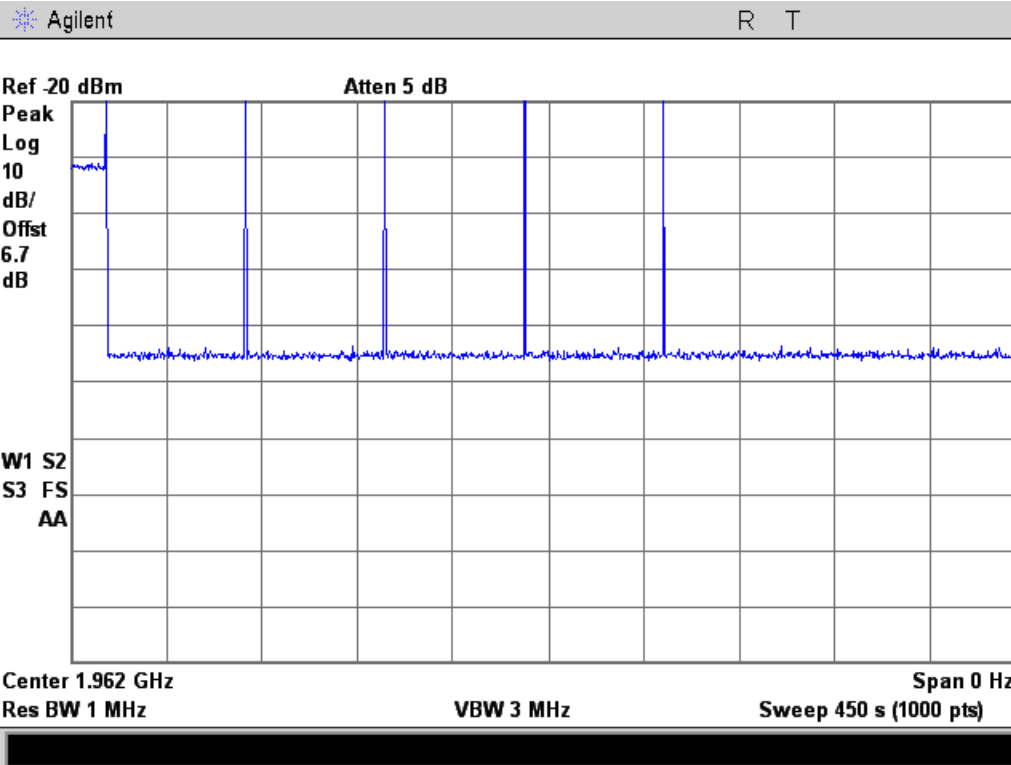


869 - 894 MHz Band

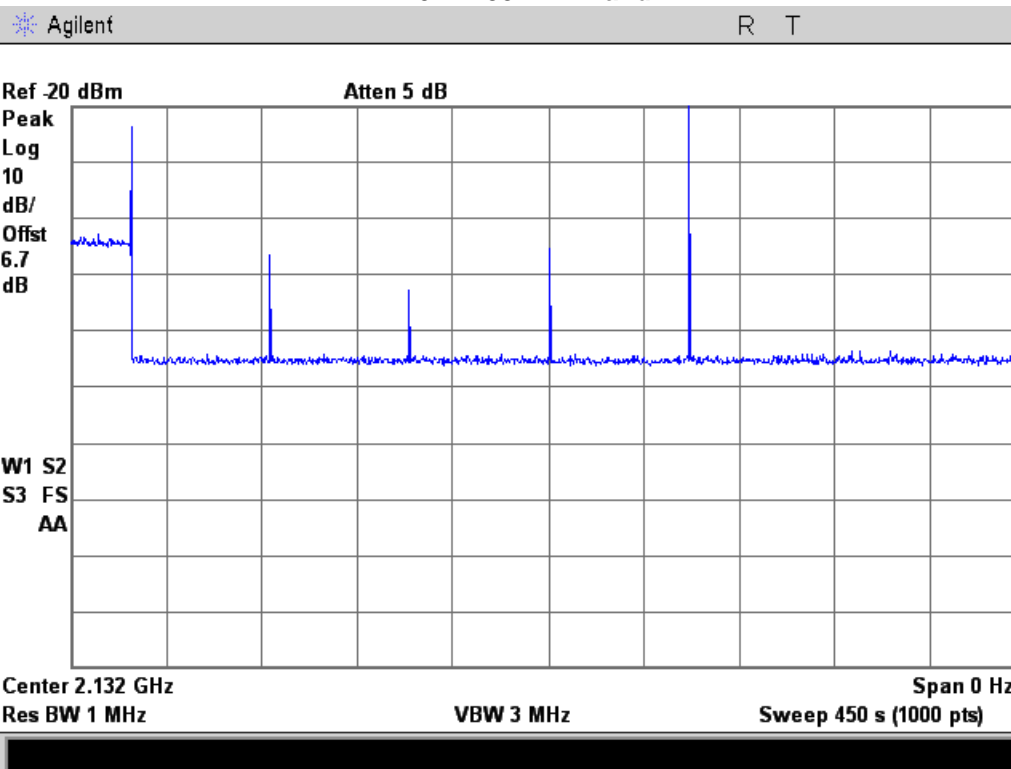




1930 - 1990 MHz Band



2110 - 2155 MHz Band





Radiated Spurious

Name of Test: Radiated Spurious

Engineer: John Erhard

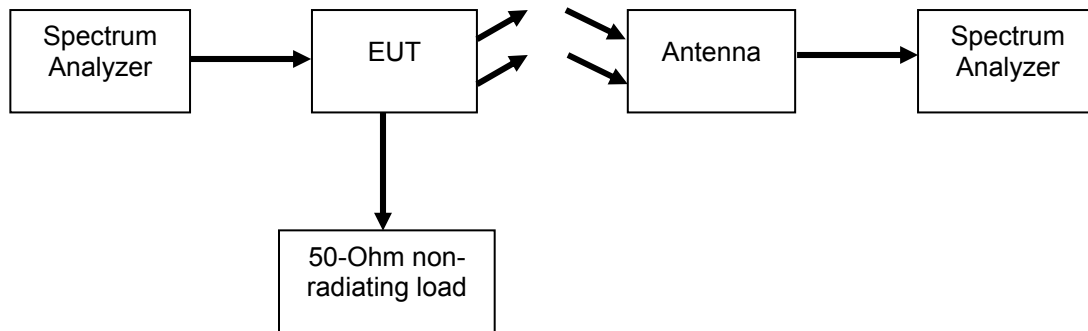
Test Equipment Utilized: i00271, i00379

Test Date: 8/2/2012

Test Procedure

The EUT was tested in an Open Area Test Site (OATS) 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 antennas in both the vertical and horizontal orientation while raised from 1 to 4 meters to ensure 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.

Test Setup





Uplink Test Results

704 - 716 MHz Band 707 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1414	-67.31	-13	Pass
2828	-71.21	-13	Pass

777 - 787 MHz Band 781.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1563	-61.69	-13	Pass
2344.5	-66.15	-13	Pass
3126	-67.54	-13	Pass

824 - 849 MHz Band 836 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1672	-74.3	-13	Pass
2508	-71.12	-13	Pass
3344	-72.74	-13	Pass

1710 - 1755 MHz Band 1742 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3484	-65.71	-13	Pass
5226	-70.69	-13	Pass
6968	-68.08	-13	Pass

1850 - 1910 MHz Band 1880 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3760	-63.86	-13	Pass
5640	-71.9	-13	Pass
7520	-64.96	-13	Pass



Downlink Test Results

728 - 746 MHz Band 737 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1474	-78.4	-13	Pass
2211	-72.64	-13	Pass
2948	-71.55	-13	Pass

746 - 757 MHz Band 751.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1503	-75.7	-13	Pass
2254.5	-74.6	-13	Pass
3006	-72.83	-13	Pass

869 - 894 MHz Band 881.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1763	-74.4	-13	Pass
2644.5	-71.92	-13	Pass
3526	-72.81	-13	Pass

1930 - 1990 MHz Band 1960 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3920	-74.2	-13	Pass
5880	-70.67	-13	Pass
7840	-65.05	-13	Pass

2110 - 2155 MHz Band 2132.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
4265	-72.63	-13	Pass
6397.5	-69.79	-13	Pass
8530	-64.74	-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 Number	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna, Amplified	ARA	DRG-118/A	i00271	4/19/12	4/19/14
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	12/4/12	12/4/13
Voltmeter	Fluke	87III	i00319	7/3/12	7/3/13 **
Spectrum Analyzer	Agilent	E4407B	i00331	4/23/13	4/23/14
Non-radiating load	Termaline	8201	i00334	Verified on:8/2/2013	
Power Supply	HP	6654A	i00350	Verified on:7/1/2013	
Vector Signal Generator	Agilent	E4438C	i00348	1/4/13	1/4/14
EMI Analyzer	Agilent	E7405A	i00379	11/21/12	11/21/13
Signal Generator	Rohde & Schwarz	SMU200A	i00405	10/26/12	10/26/13
Tunable Band Pass Filter	Wilson Electronics	Variable attenuator / Bandpass Filter Switch Assembly	i00411	Verified on: 8/1/2013	
RF Directional Coupler	Meca	CS06-1.500V	i00412	Verified on: 8/1/2013	

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.

** Note this is under a 30-day calibration extension

END OF TEST REPORT