Compliance Testing, LLC
Previously Flom Test Lab
EMI, EMC, RF Testing Experts Since 1963

toll-free: (866) 311-3268
fax: (480) 926-3598
http://www.ComplianceTesting.com
info@ComplianceTesting.com

Test Report

Prepared for: Wireless Engineering Ltd Co.

Model: sohoBoost™

Description: SOHO Dual Band Industrial Booster by WirEng®

FCC ID: 2AEL-SB-850-1900

To

FCC Parts 22, 24

Date of Issue: April 6, 2015

On the behalf of the applicant:	**Wireless Engineering Ltd Co** **16840 Clay Road** **Suite 107** **Houston, TX, 77804**
Attention of:	**Sabino R. Leone, General Manager, Engineering** **Ph: (832) 316-7770** **Email: generalengineeringmanager@gmail.com**

Prepared By
Compliance Testing, LLC
1724 S. Nevada Way
Mesa, AZ 85204
(480) 926-3100 phone / (480) 926-3598 fax
www.compliancetesting.com
Project No: p14c0008

Mike Graffeo
Project Test Engineer

Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	February 20, 2015	Mike Graffeo	Original Document
2.0	March 16, 2015	Greg Corbin	Updated graphs on pages 21, 23, 27, 29
3.0	April 2,2015	Greg Corbin	Removed EIRP power tables from page 16

Table of Contents

ILAC / A2LA

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

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

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

Testing Certificate Number: **2152.01**

ACCREDITED
TESTING CERT
#2152.01

FCC Site Reg. #349717

IC Site Reg. #2044A-2

Non-accredited tests contained in this report:

N/A

The Applicant has been cautioned as to the following:

15.21: **Information to the User**

The user's manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a): **Special Accessories**

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without an additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

Test and Measurement Data

All tests and measurement data shown were performed in accordance with FCC Rules and Regulations Part 90.219, KDB 935210 D03 Booster, and FCC Part 2, Part 20.21, Part 22, Part 24, and C63-26D13 where appropriate.

Standard Test Conditions and Engineering Practices

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

In accordance with ANSI/TIA 603C, 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 (ºC)	**Humidity (%)**	**Pressure (mbar)**
23.0 – 29.4	23.3 – 38.1	960.8 – 968.5

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

EUT Description
Model: sohoBoost™
Description: SOHO Dual Band Industrial Booster by WirEng®
Firmware: N/A
Software: N/A

Additional Information: N/A

The signal booster uses the following frequency bands.
The emission designators listed are representative emission designators used by transmitters whose signal is amplified by this booster.

Frequency Band (MHz)		
Uplink	824 - 849	1850 - 1915
Downlink	869 - 894	1930 - 1995
Modulation Type	GSM, CDMA, EDGE, HSPA. EVDO, LTE	

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

EUT Operation during Tests
The output power was set to the maximum level available for all the tests, when applicable.

AGC Threshold
Several tests reference the AGC Threshold level.
The AGC Threshold was measured as follows:

- Connect a signal generator to the input of the EUT.
- Connect a spectrum analyzer to the output of the EUT using appropriate attenuation.
- While monitoring the output of the EUT, increase the input level until the output stops increasing or drops a few 10^{th}'s of a dB.
- This is the AGC threshold level of the EUT.
- When the procedure calls out to set the RF Input to just below the AGC Threshold, The AGC Threshold is measured using the procedure listed above, and then the RF Input is backed off 0.2 dB below this threshold level.

Test Result Summary

Specification	Test Name	Pass, Fail, N/A	Comments
KDB 935210-D03	Authorized Frequency Band	Pass	
2.1046	Output Power (Conducted)	Pass	
2.1051 22.219(a) 24.238(a)	Spurious Emissions (Transmitter Conducted)	Pass	
2.1053	Radiated Spurious Emissions	Pass	
2.1049	Occupied Bandwidth	Pass	
KDB 935210-D03	Intermodulation	Pass	

Authorized Frequency Band

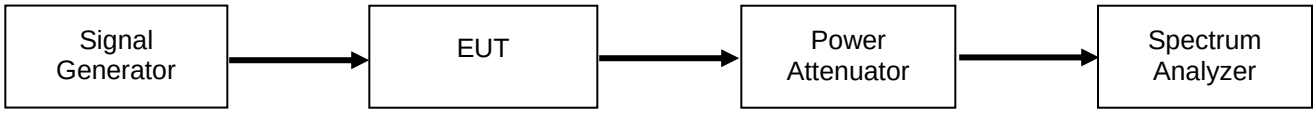
Name of Test:	Authorized Frequency Band	**Engineer:** Mike Graffeo
Test Equipment Utilized:	i00457, i00331	**Test Date:** 2/2/15

Test Procedure

The EUT was connected to a spectrum analyzer through a power attenuator. A signal generator was utilized to produce a swept CW signal with the RF input level set to 3 dB below the AGC Threshold level. The Uplink and Downlink filter response and the -20 dB bandwidth were measured. The marker table function of the spectrum analyzer was used to show the peak amplitude in the passband and the -20 dB bandwidth of the pass band filter.

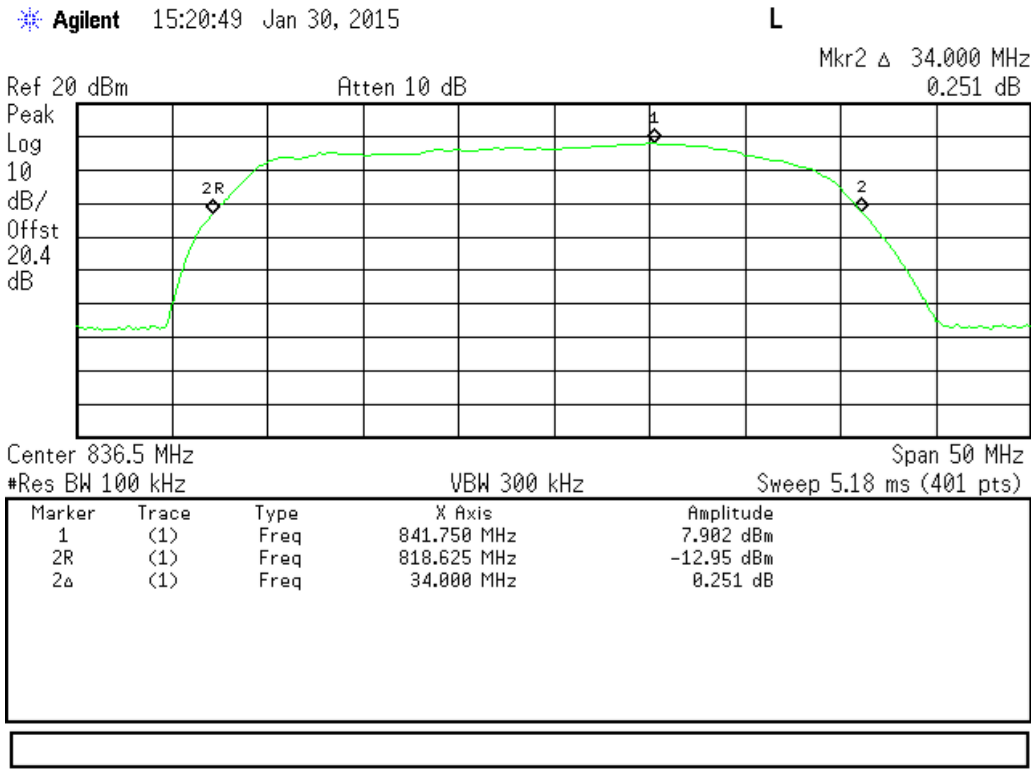
RBW = 100 KHz
Video BW = 3x RBW

Test Setup

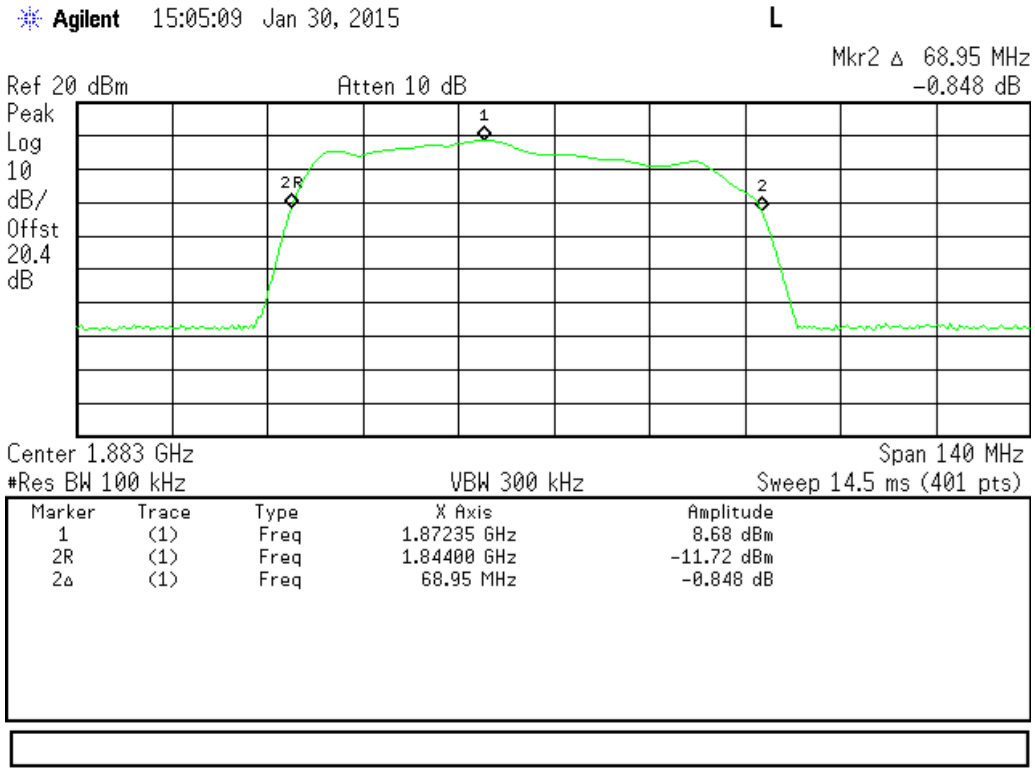


Authorized Frequency Band Test Results

824-849 MHz Band

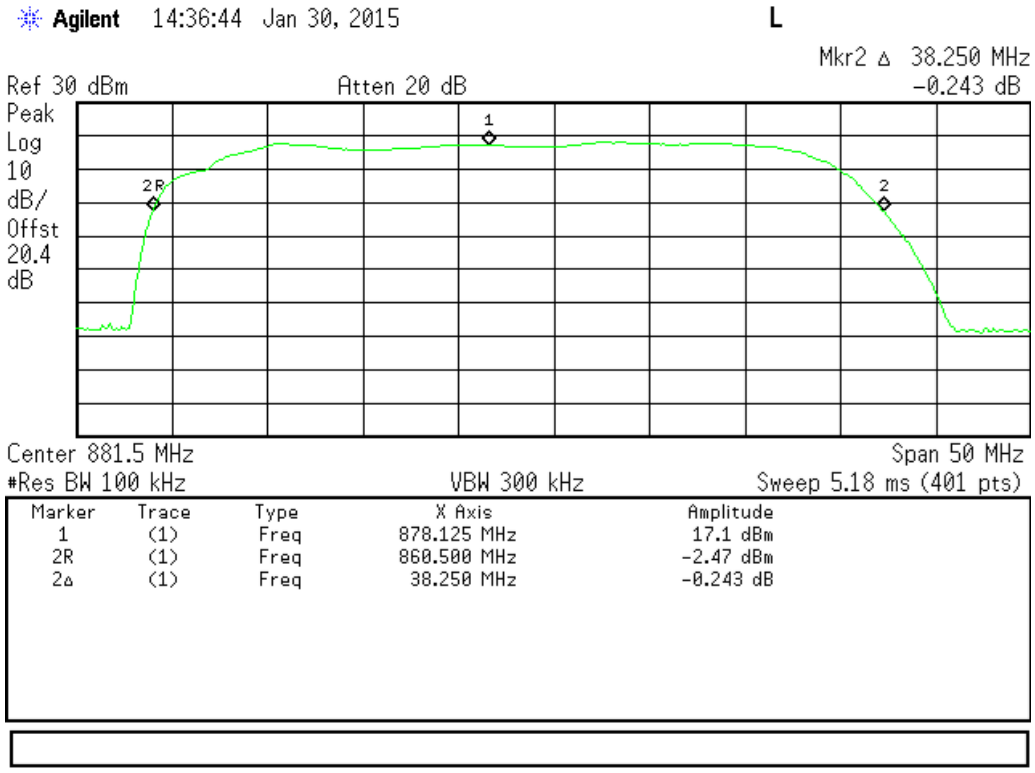


1850-1915 MHz Band

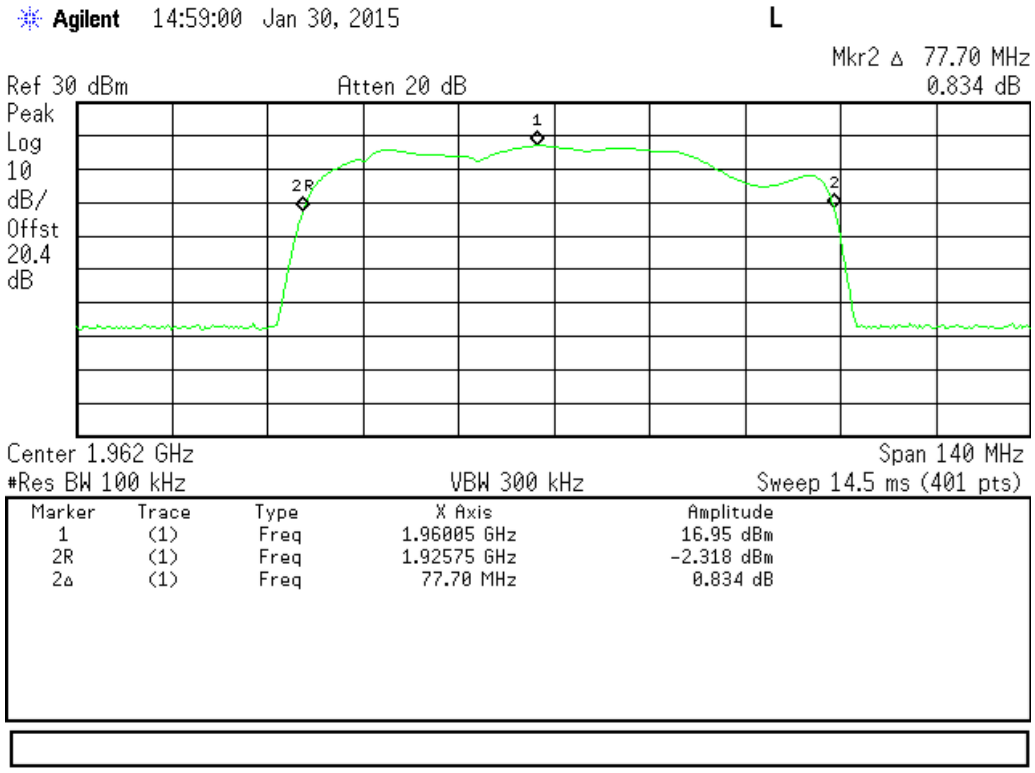


Downlink

869-894 MHz Band



1930-1995 MHz Band



Conducted Output Power and Amplifier Gain

Name of Test:	Conducted Output Power and Amplifier Gain	**Engineer:** Mike Graffeo
Test Equipment Utilized:	i00457, i00331	**Test Date:** 2/3/15

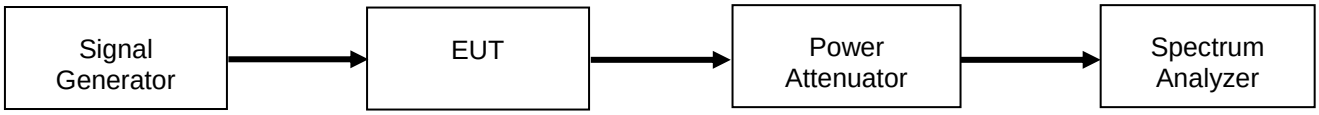
Test Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer through a power attenuator. All cable and attenuator losses were input into the spectrum analyzer as a reference level offset to ensure accurate readings were obtained. Both narrow band (GSM 250 KHz) and wide bands (CDMA 4.1MHz) and (WCDMA 4.1MHz) signals were utilized. The RF input signal level was set to 0.2 dB below the AGC Threshold.

The Input and Output power levels were recorded and the gain was calculated using the following formula:

Gain (dB) = Output Power (dBm) – Input Power (dBm)

Test Setup



Uplink Output Power and Gain

824-849 MHz Band
GSM

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 824.20	-51.90	7.17	59.10
Tuned to 836.50	-50.00	10.47	60.50
Tuned to 848.80	-49.80	9.21	59.00

1850-1915 MHz Band
GSM

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1850.20	-49.30	11.30	60.60
Tuned to 1882.50	-49.70	10.38	60.10
Tuned to 1914.80	-38.10	6.02	44.10

Uplink Output Power and Gain
824-849 MHz Band
CDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 825.25	-48.80	8.47	57.27
Tuned to 836.50	-49.10	11.31	60.41
Tuned to 847.75	-47.20	9.55	56.75

1850-1915 MHz Band
CDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1851.25	-48.80	11.21	60.01
Tuned to 1882.50	-48.80	10.26	59.06
Tuned to 1913.75	-37.50	8.75	46.25

Uplink Output Power and Gain
824-849 MHz Band
WCDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 825.50	-49.60	7.86	57.46
Tuned to 836.50	-50.10	10.67	60.77
Tuned to 846.50	-49.60	8.49	58.09

1850-1915 MHz Band
WCDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1852.50	-48.90	10.48	59.38
Tuned to 1882.50	-48.80	10.22	59.02
Tuned to 1912.50	-35.00	9.77	44.77

Downlink Output Power and Gain

869-894 MHz Band
GSM

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 869.20	-45.20	17.43	62.63
Tuned to 881.50	-45.40	19.17	64.57
Tuned to 893.80	-45.40	18.85	64.25

1930-1995 MHz Band
GSM

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1930.20	-36.40	16.93	53.33
Tuned to 1962.50	-45.90	19.02	64.92
Tuned to 1994.80	-34.20	19.22	53.42

Downlink Output Power and Gain

869-894 MHz Band
CDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 870.25	-48.20	16.73	64.93
Tuned to 881.50	-44.90	19.00	63.90
Tuned to 892.75	-45.10	19.13	64.23

Downlink Output Power and Gain

1930-1995 MHz Band
CDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1931.25	-46.20	19.08	65.28
Tuned to 1962.50	-44.10	19.40	63.50
Tuned to 1993.75	-42.20	19.25	61.45

Downlink Output Power and Gain

869-894 MHz Band
WCDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 871.50	-47.90	16.34	64.24
Tuned to 881.50	-45.50	19.01	64.51
Tuned to 891.50	-46.70	18.55	65.25

1930-1995 MHz Band
WCDMA

Tuned Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Gain (dB)
Tuned to 1931.50	-37.80	18.68	56.48
Tuned to 1962.50	-43.90	19.05	62.95
Tuned to 1992.50	-30.20	19.18	49.38

Conducted Spurious Emissions

Name of Test:	Conducted Spurious Emissions	**Engineer:** Mike Graffeo
Test Equipment Utilized:	i00457, i00331	**Test Date:** 2/6/15

Test Procedure

The Equipment Under Test (EUT) was connected to a spectrum analyzer through a power attenuator. All cable and attenuator losses were input into the spectrum analyzer as a combination of reference level offset and correction factor as needed to ensure accurate readings were obtained.
The RF input signal level was set to 0.2 dB below the AGC Threshold.
The RBW was set to 100 kHz for measurements below 1 GHz and 1 MHz for measurements above 1 GHz.
The VBW was set to 3 times the RBW.

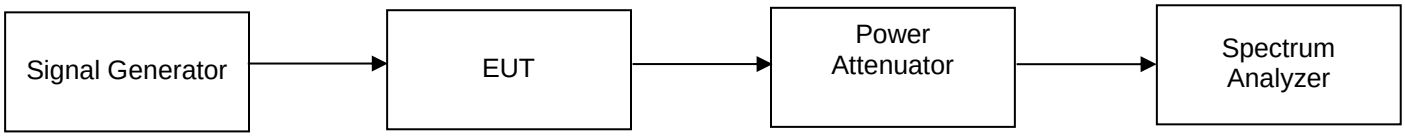
The frequency range from 30 MHz to the 10^{th} harmonic of the passband frequency was observed and plotted.

The following formula was used for calculating the limits.

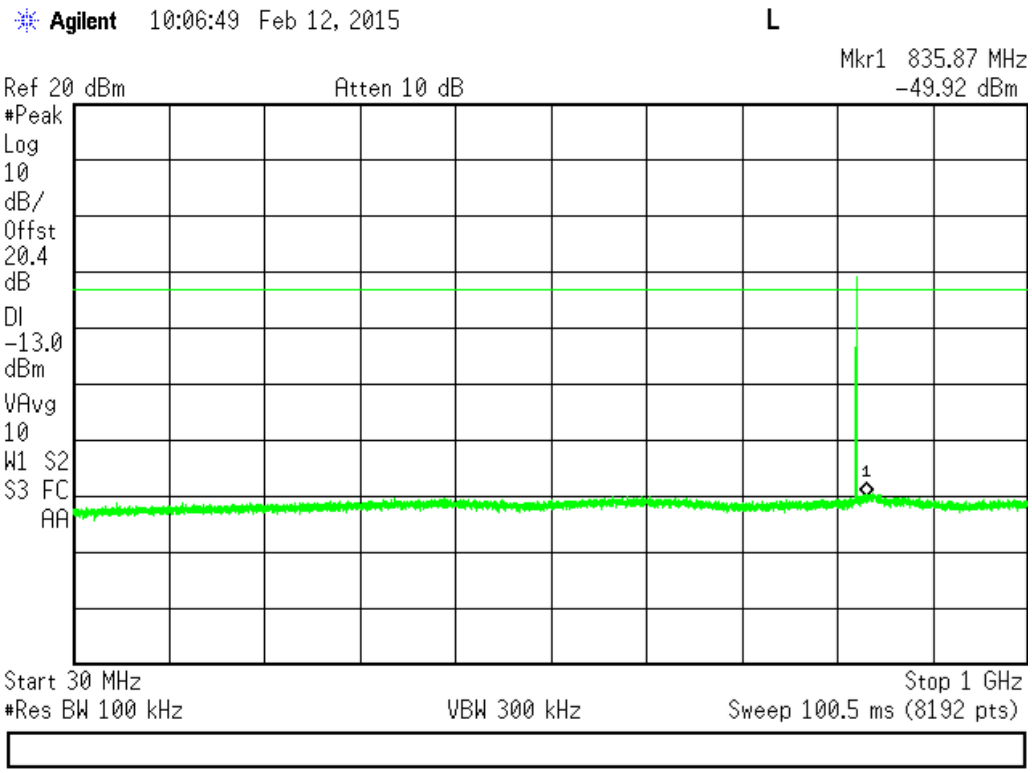
Conducted Spurious Emissions Limit = P1 – (43+ 10Log(P2)) = -13 dBm
P1 = power in dBm
P2 = power in Watts

Tests were performed at low, mid and high frequencies and with both narrow band (GSM 250 KHz) and wide band (WCDMA 4.1MHz) signals

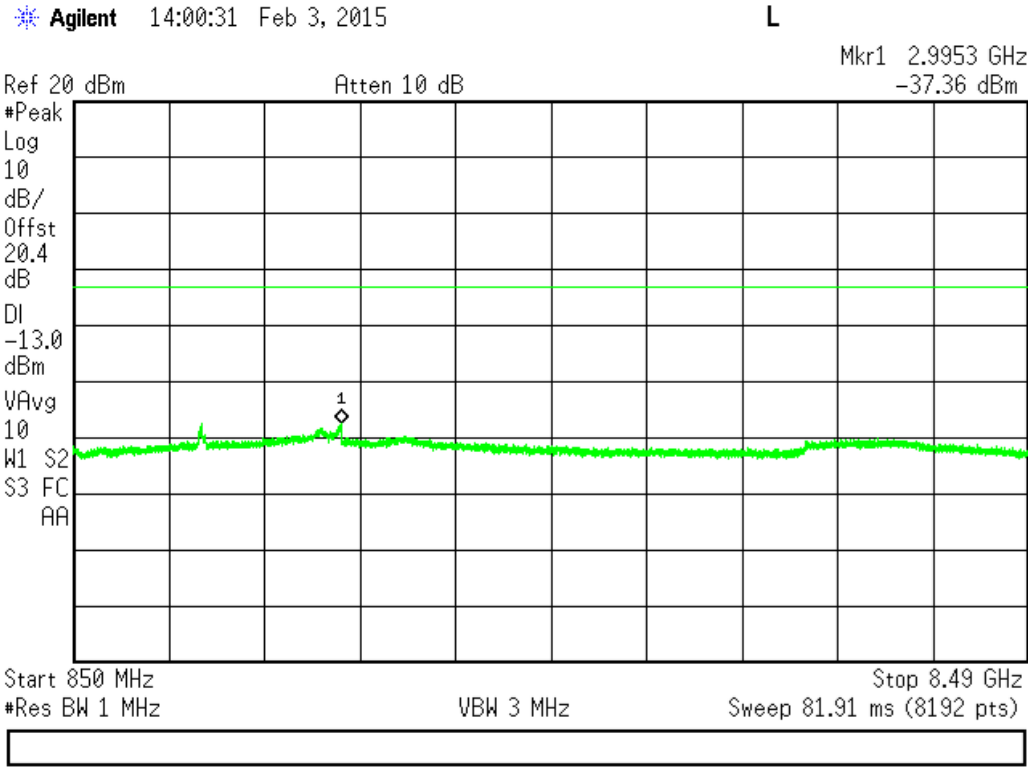
Test Setup



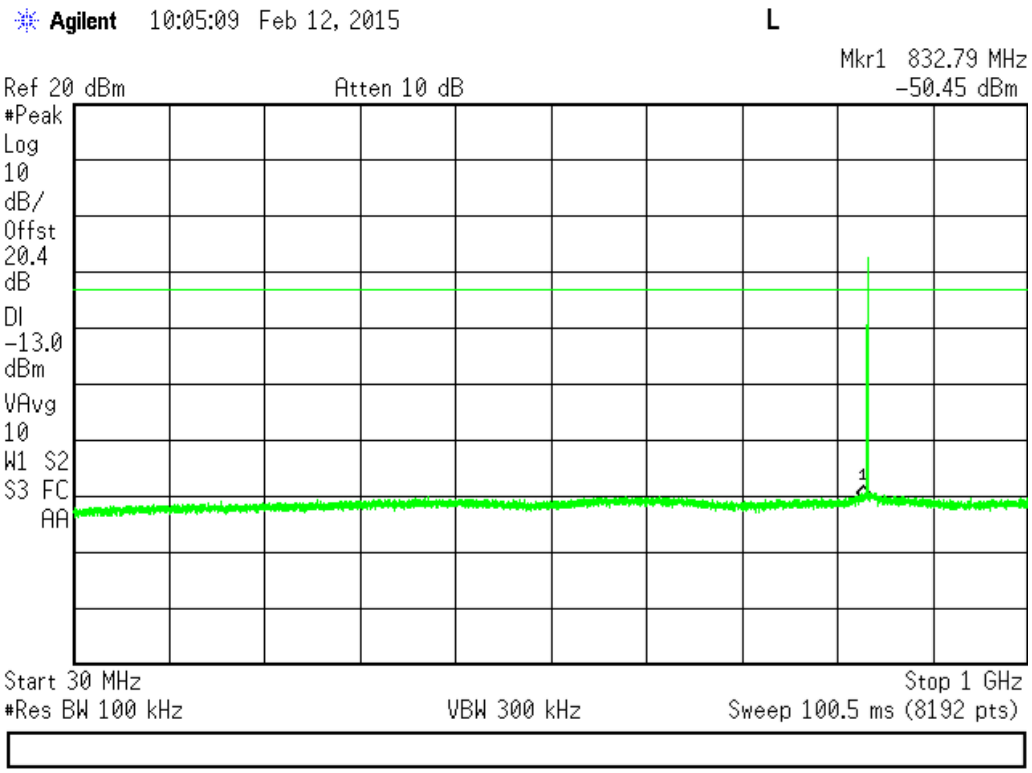
Uplink GSM Signal
824-849 MHz Band (Low Frequency)



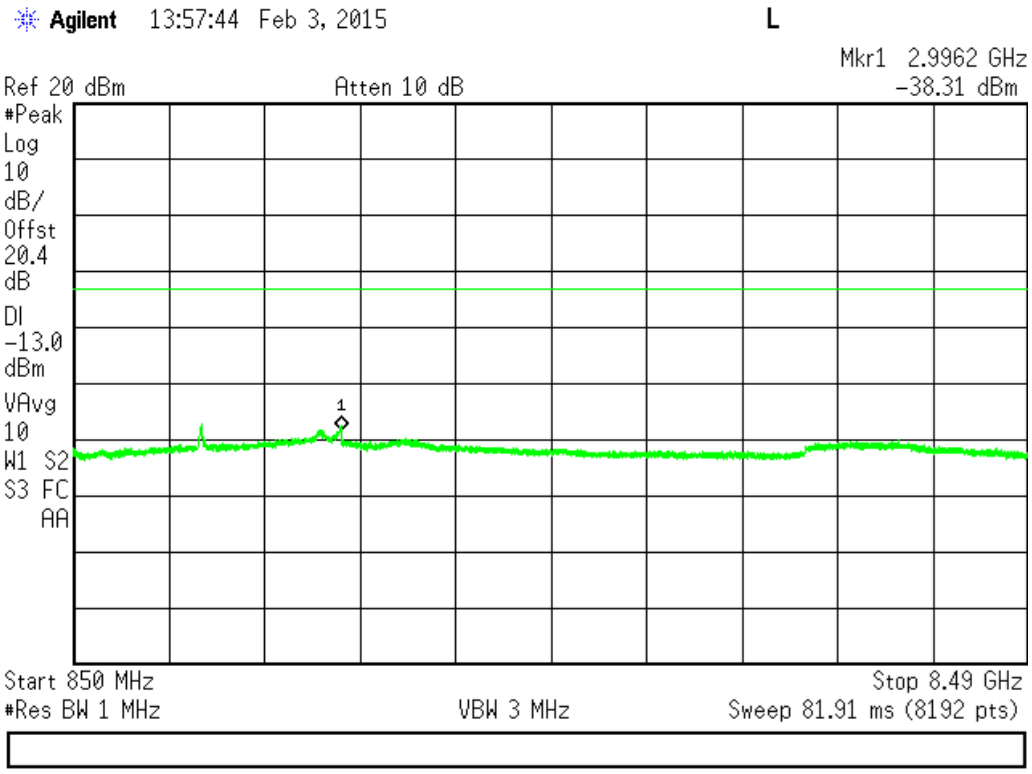
824-849 MHz Band (Low Frequency) (Cont)



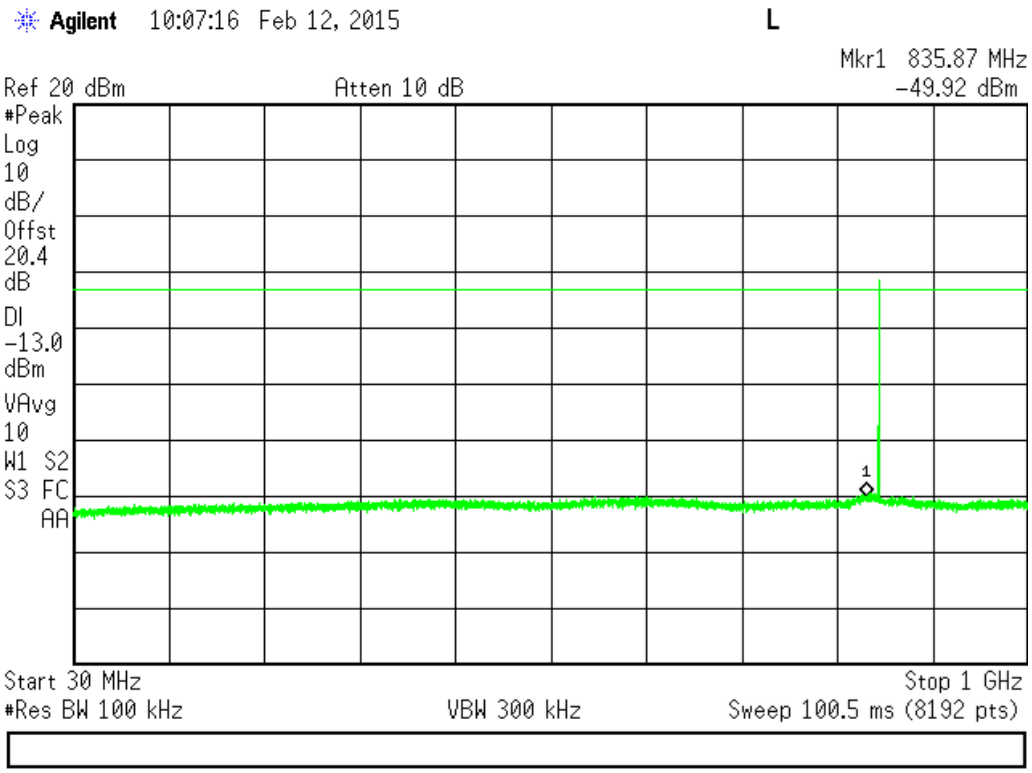
824-849 MHz Band (Mid Frequency)



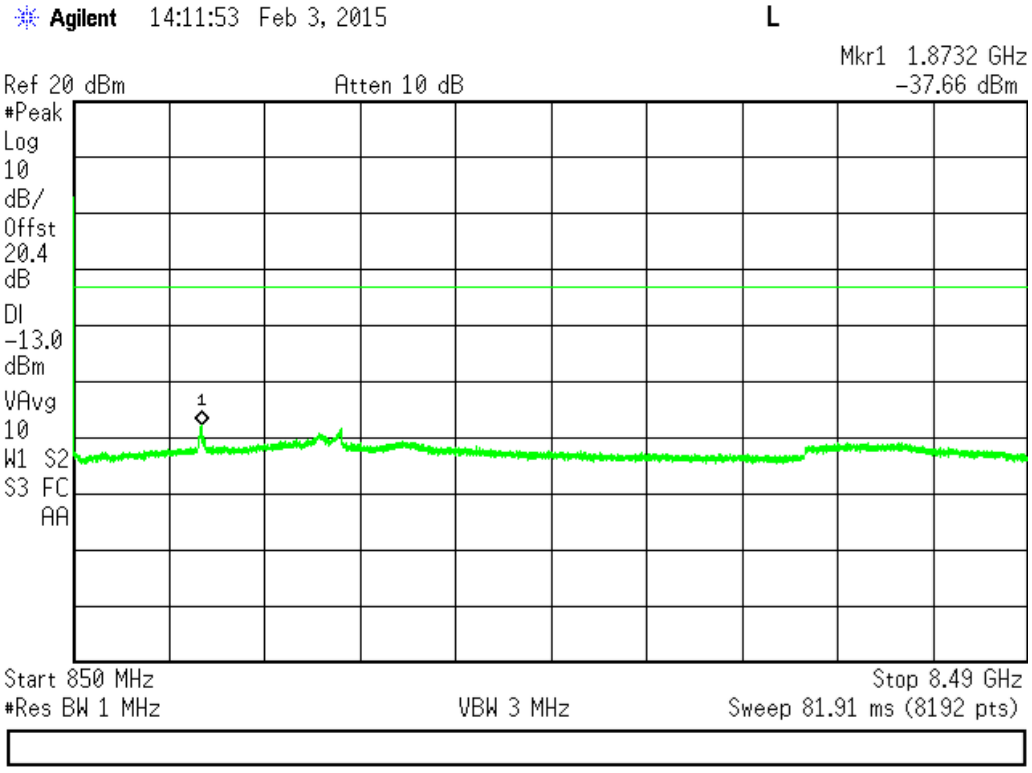
824-849 MHz Band (Mid Frequency) (Cont)



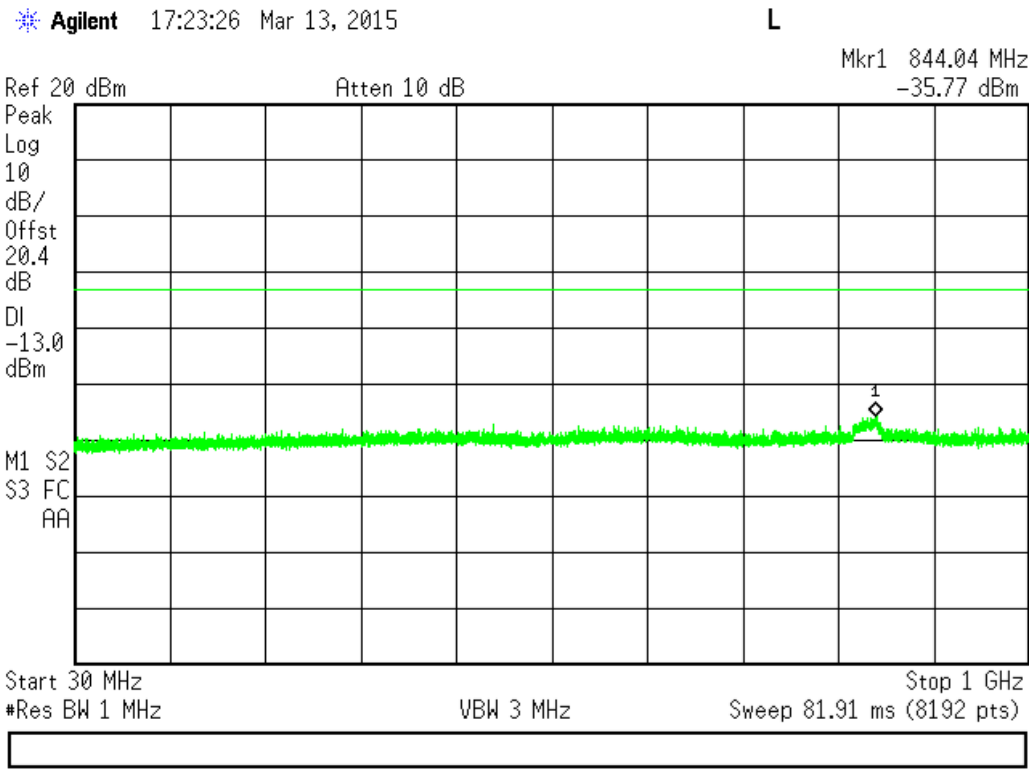
824-849 MHz Band (High Frequency)



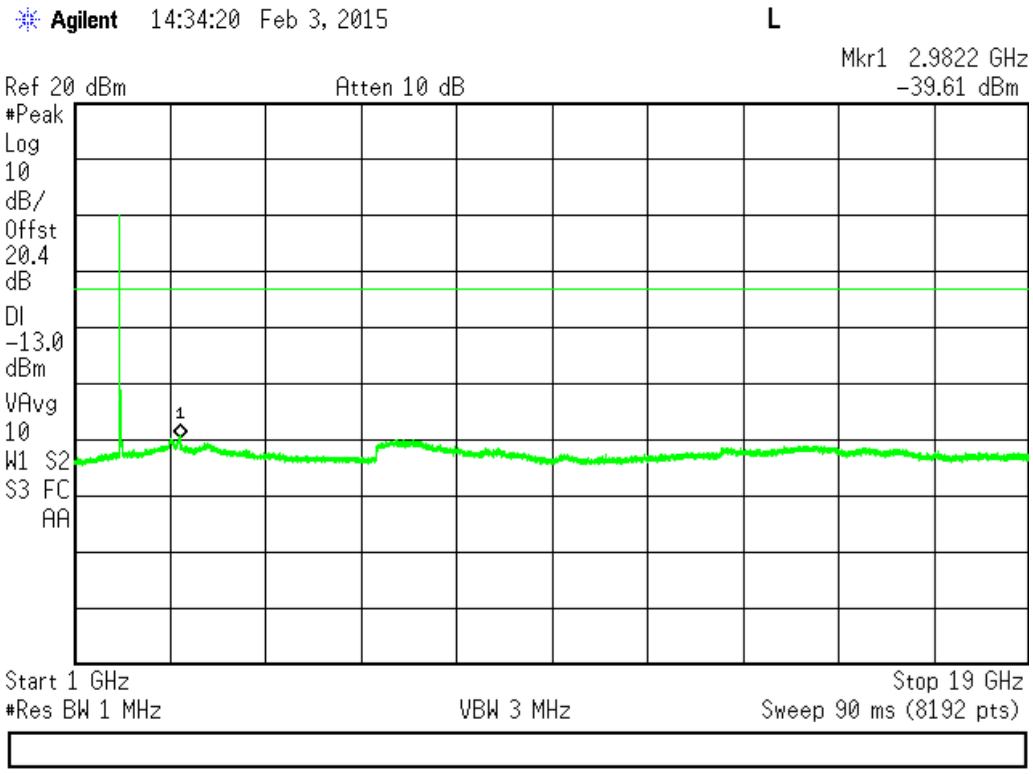
824-849 MHz Band (High Frequency) (Cont)



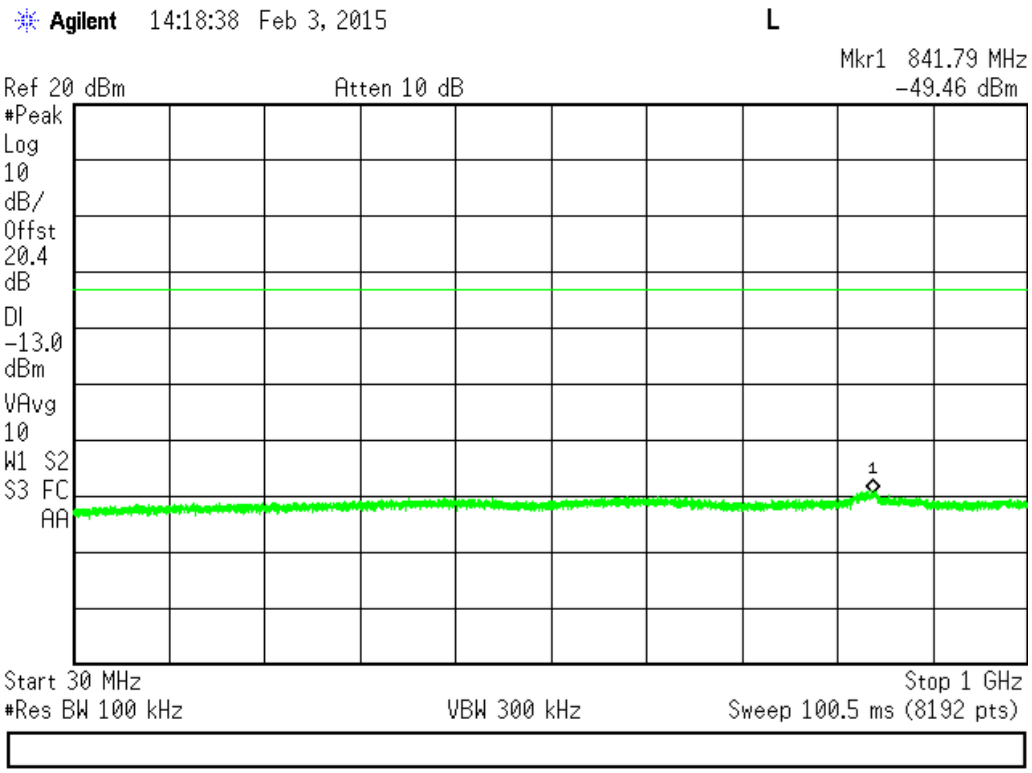
Uplink GSM Signal
1850-1915 MHz Band (Low Frequency)



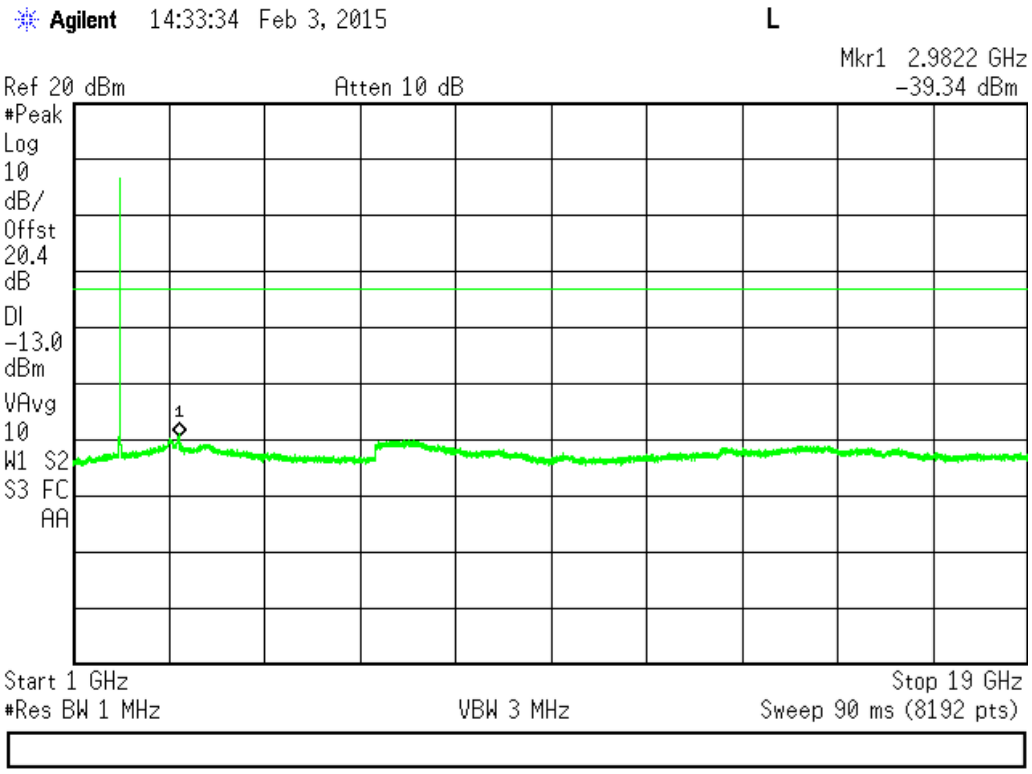
1850-1915 MHz Band (Low Frequency) (Cont)



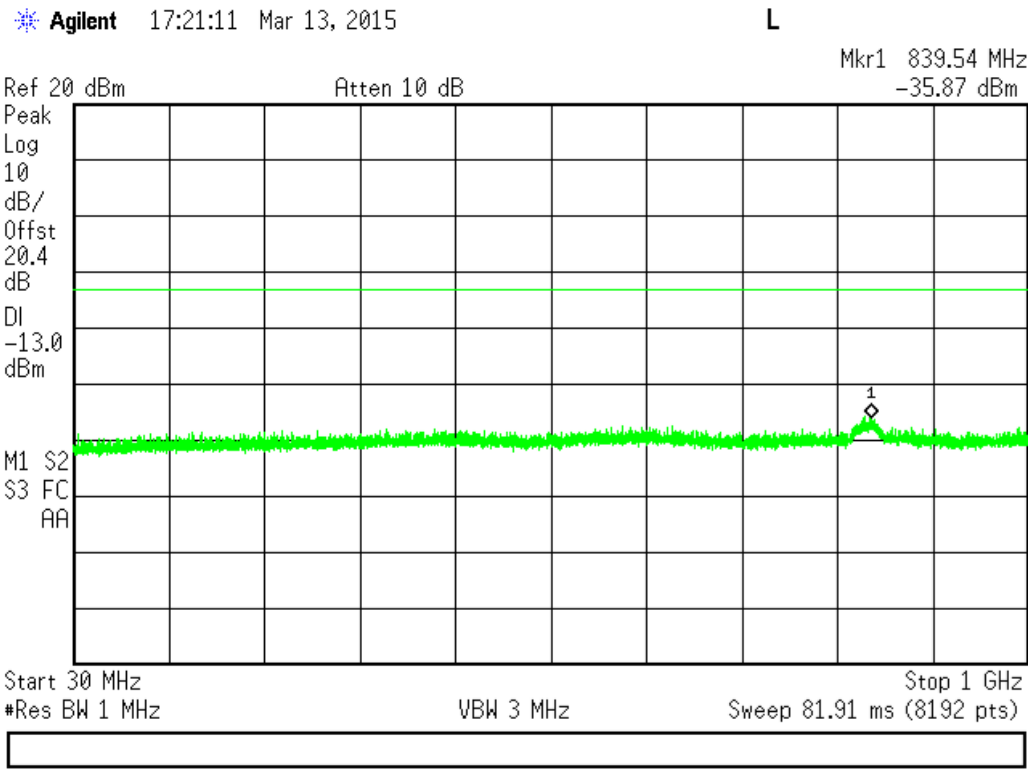
1850-1915 MHz Band (Mid Frequency)



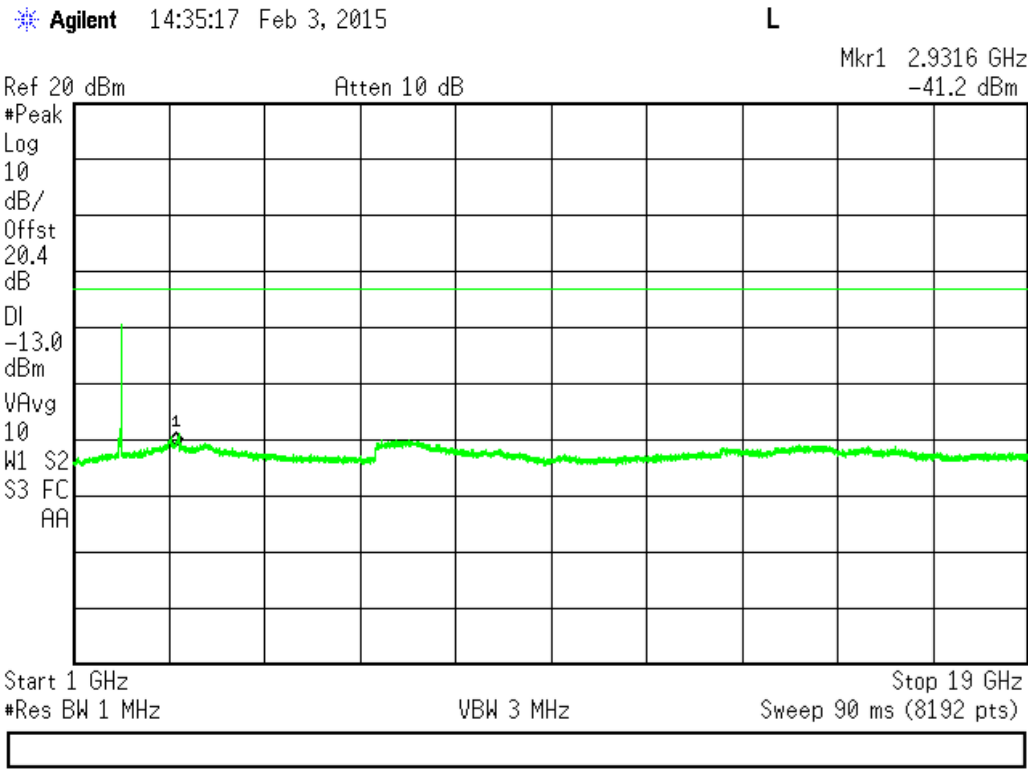
1850-1915 MHz Band (Mid Frequency) (Cont)



1850-1915 MHz Band (High Frequency)

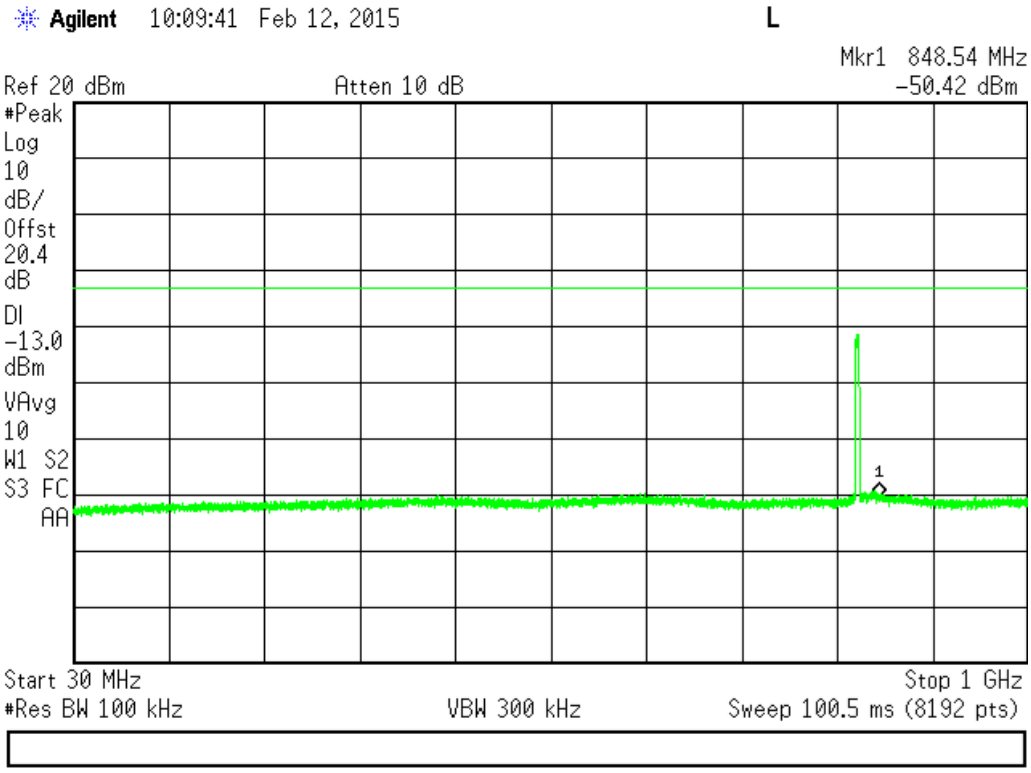


1850-1915 MHz Band (High Frequency) (Cont)

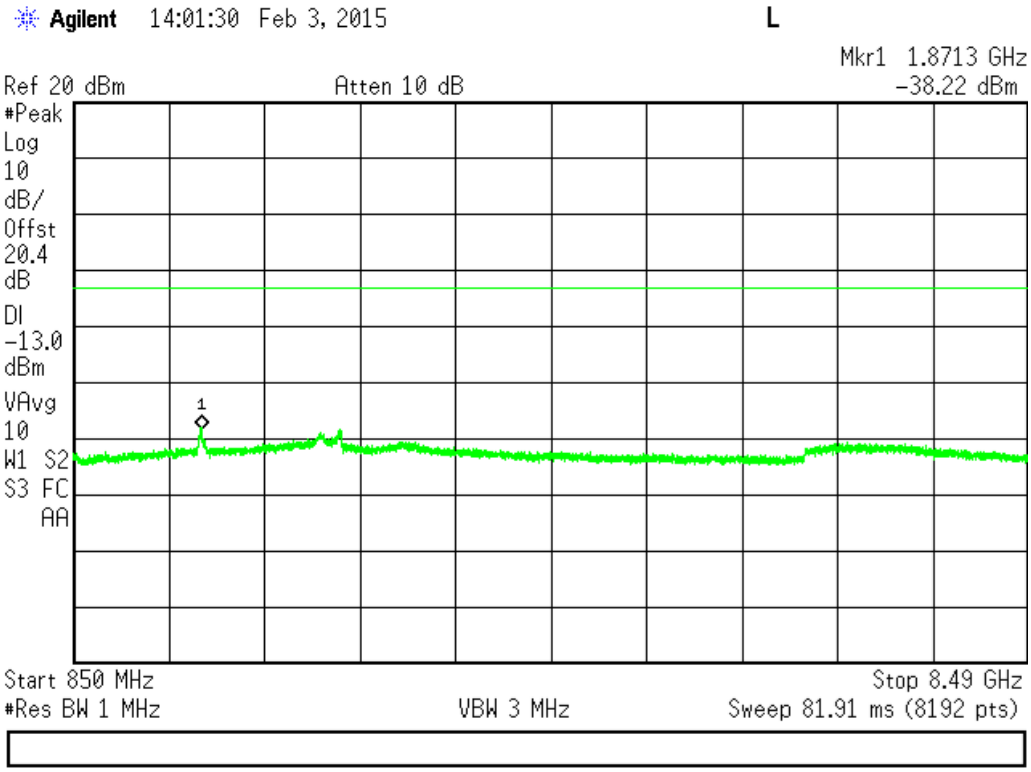


Uplink WCDMA Signal

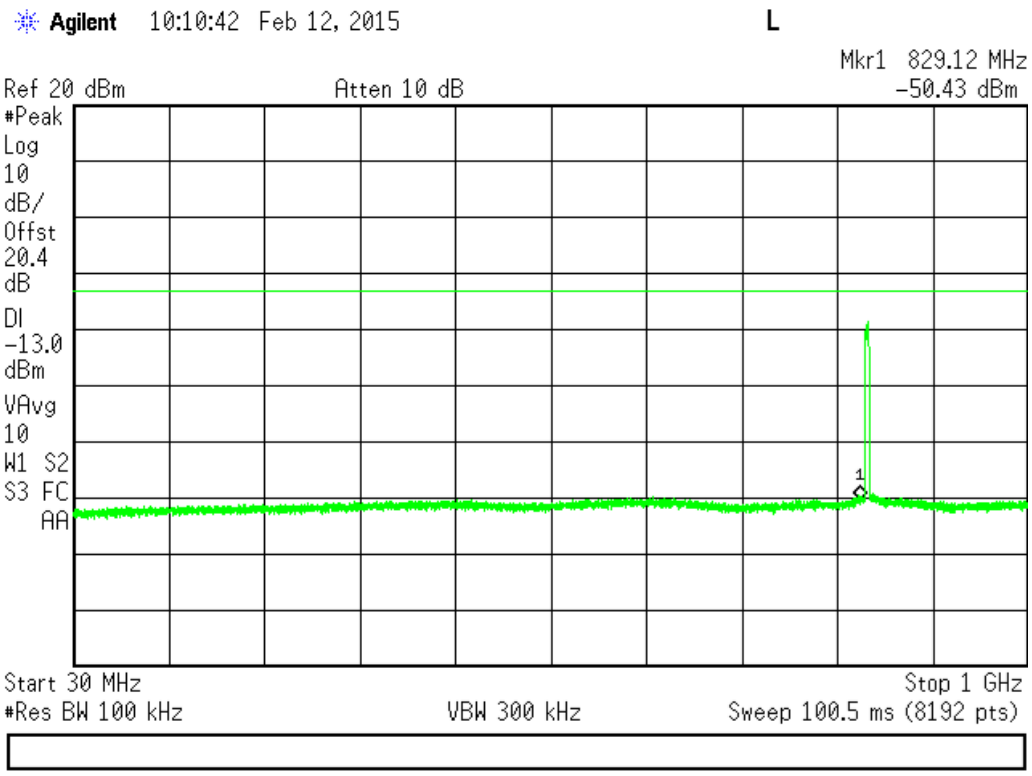
824-849 MHz Band (Low Frequency)



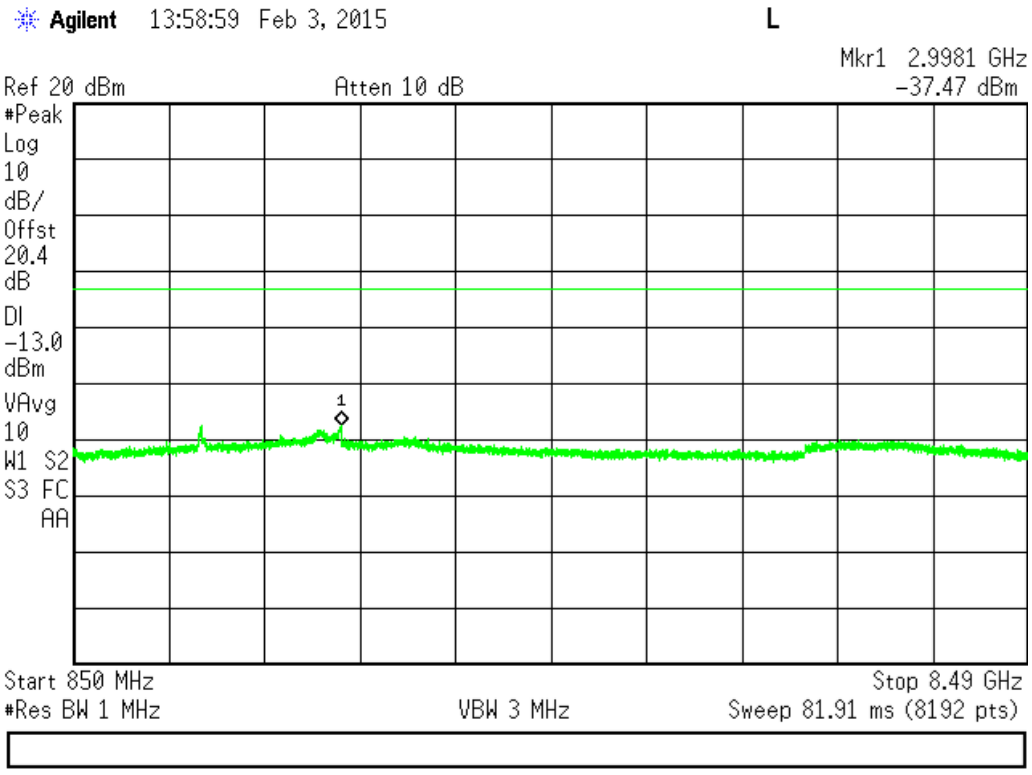
824-849 MHz Band (Low Frequency) (Cont)



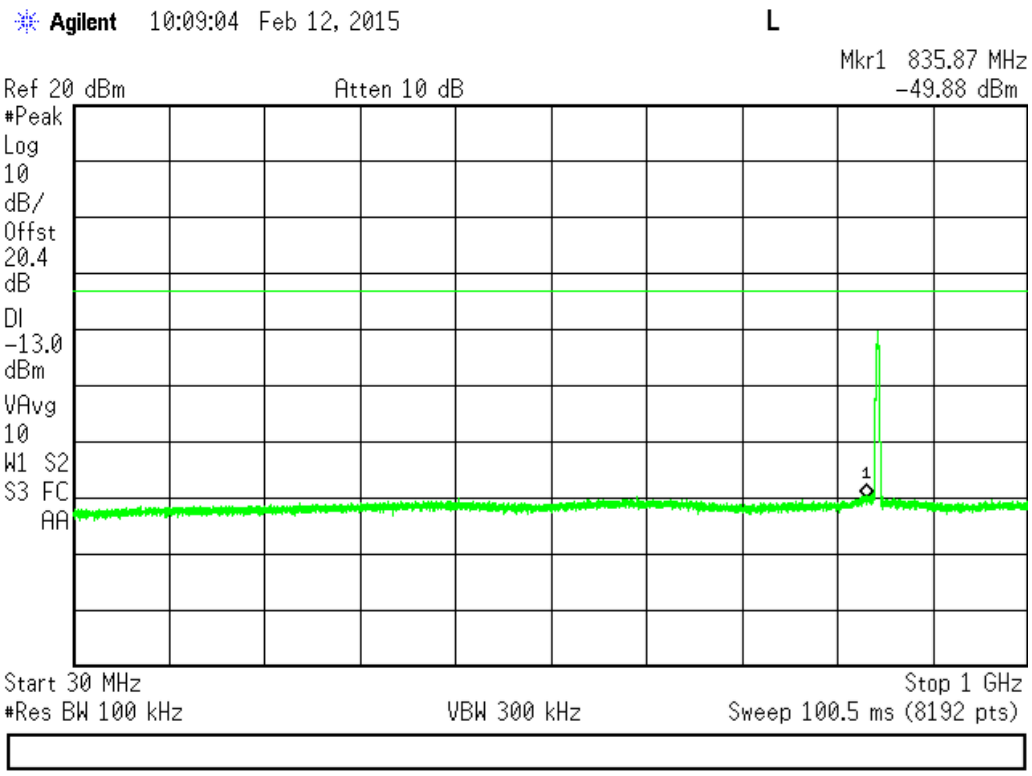
824-849 MHz Band (Mid Frequency)



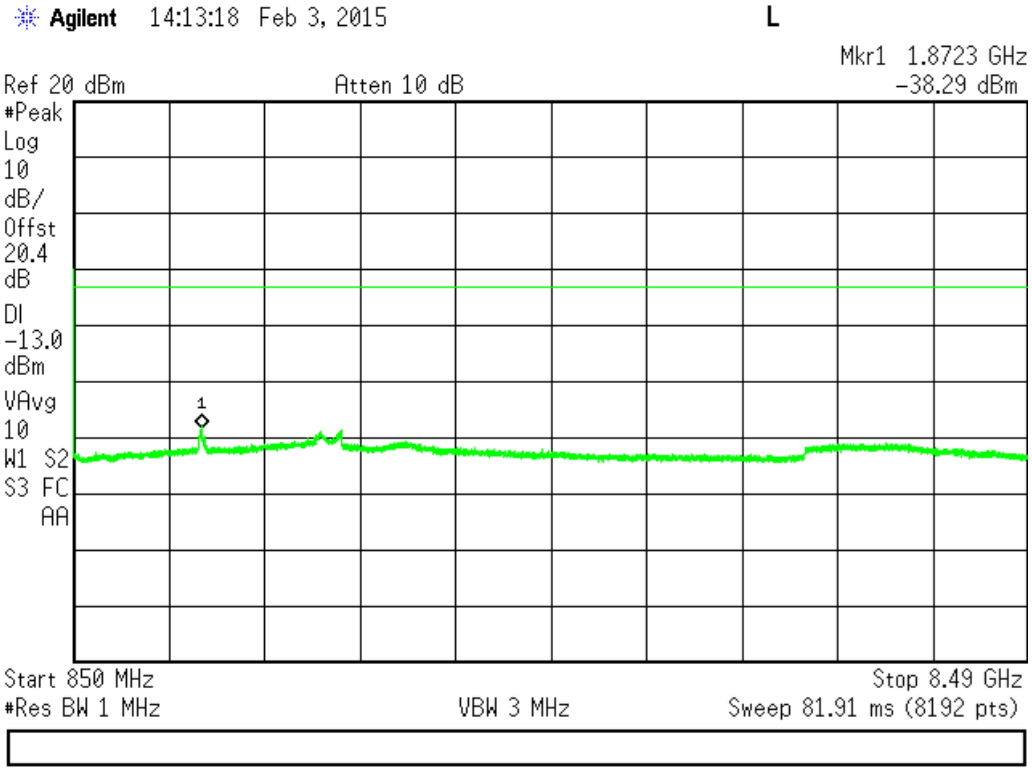
824-849 MHz Band (Mid Frequency) (Cont)



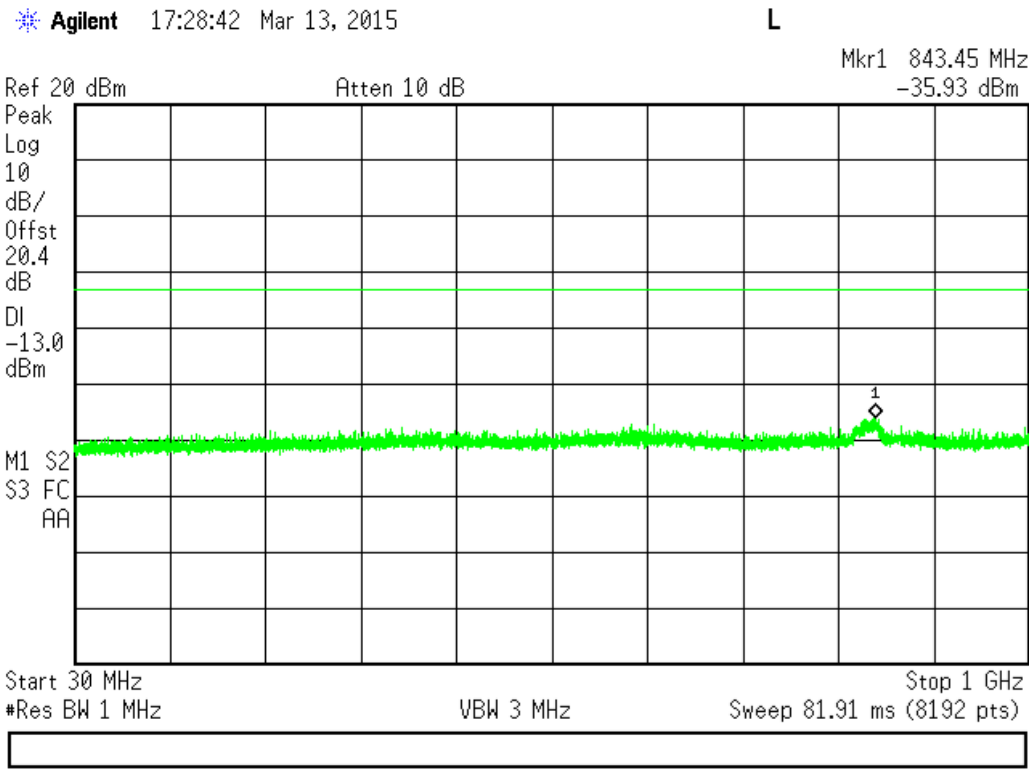
824-849 MHz Band (High Frequency)



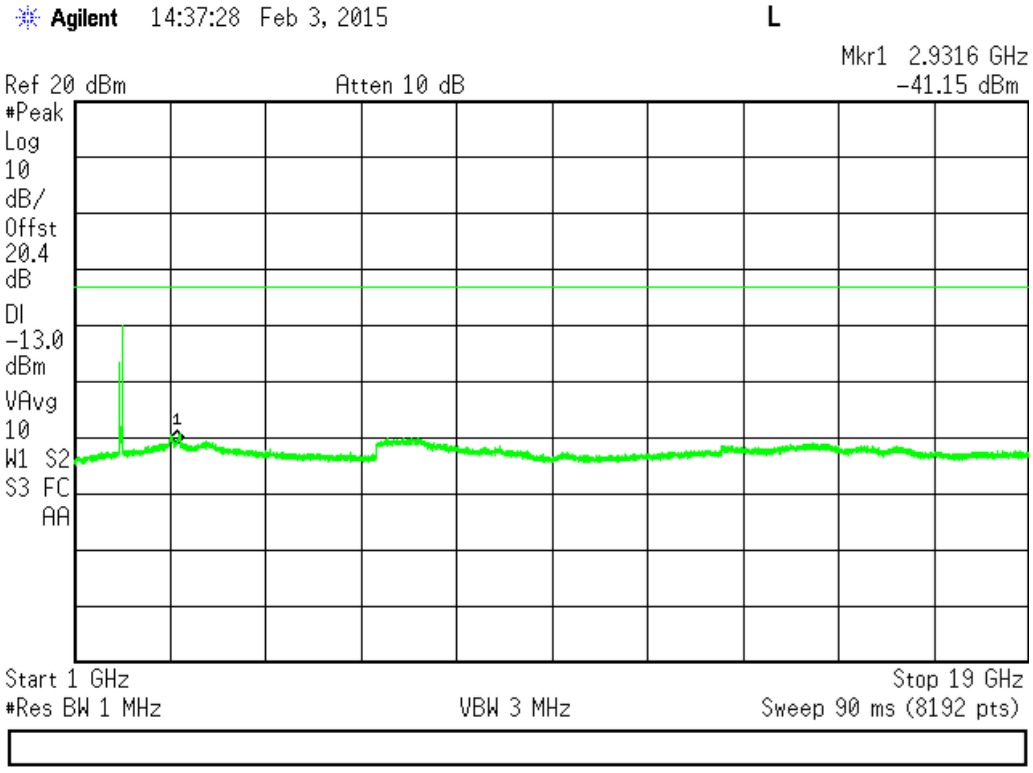
824-849 MHz Band (High Frequency) (Cont)



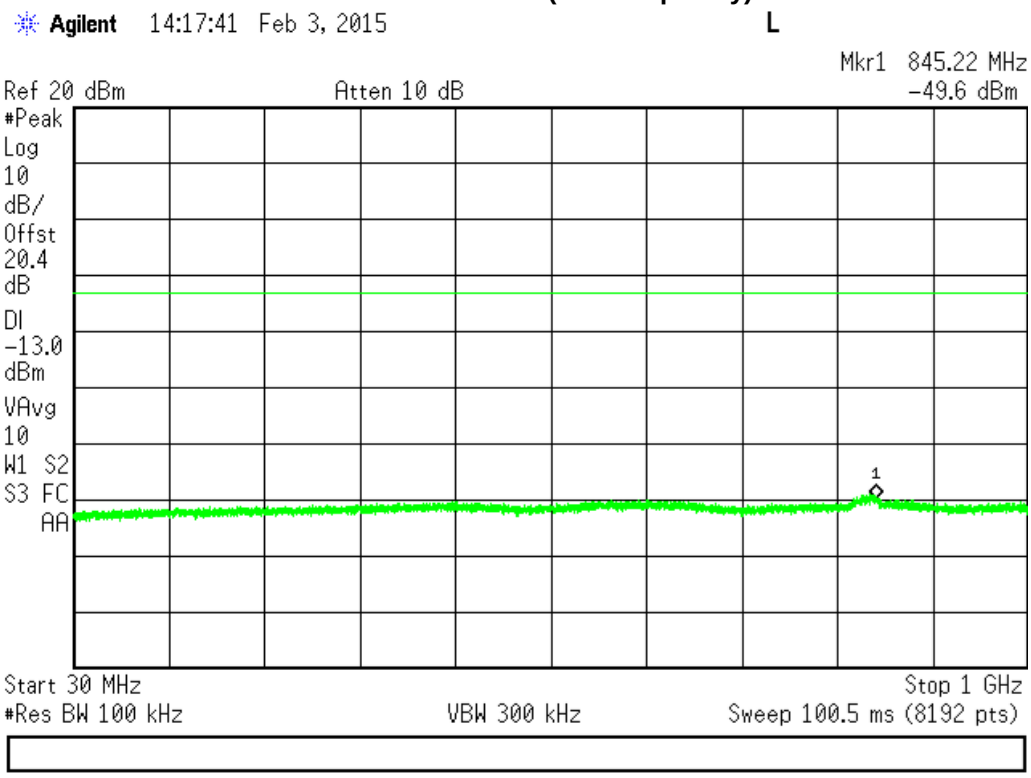
Uplink WCDMA Signal
1850-1915 MHz Band (Low Frequency)



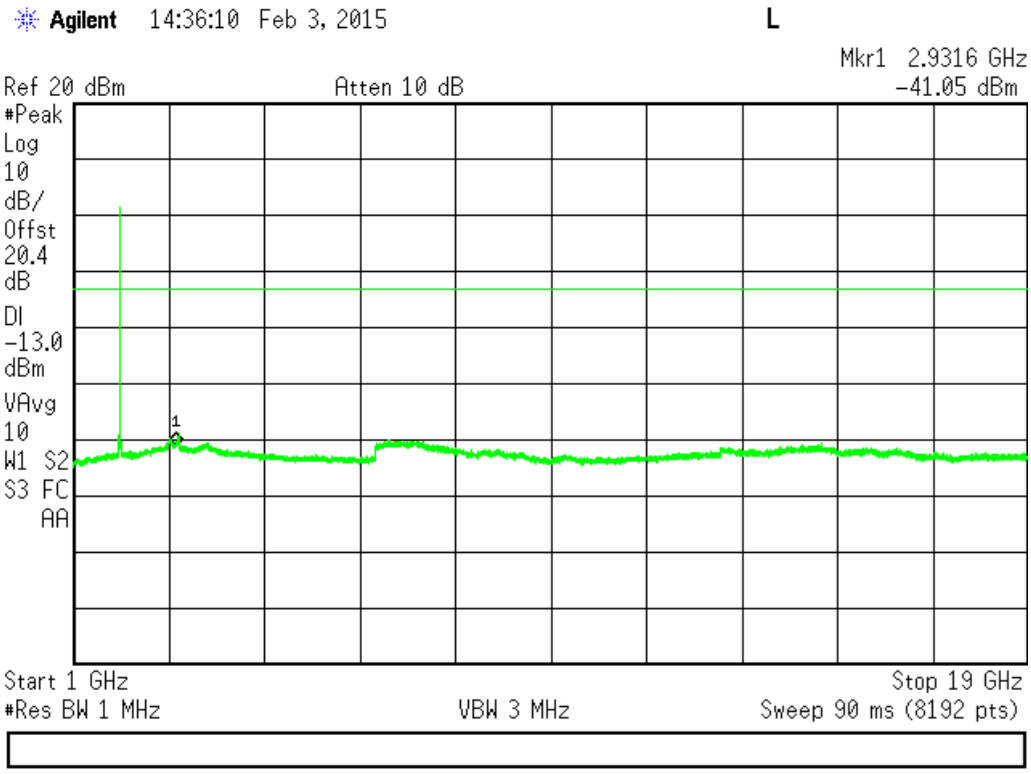
1850-1915 MHz Band (Low Frequency) (Cont)



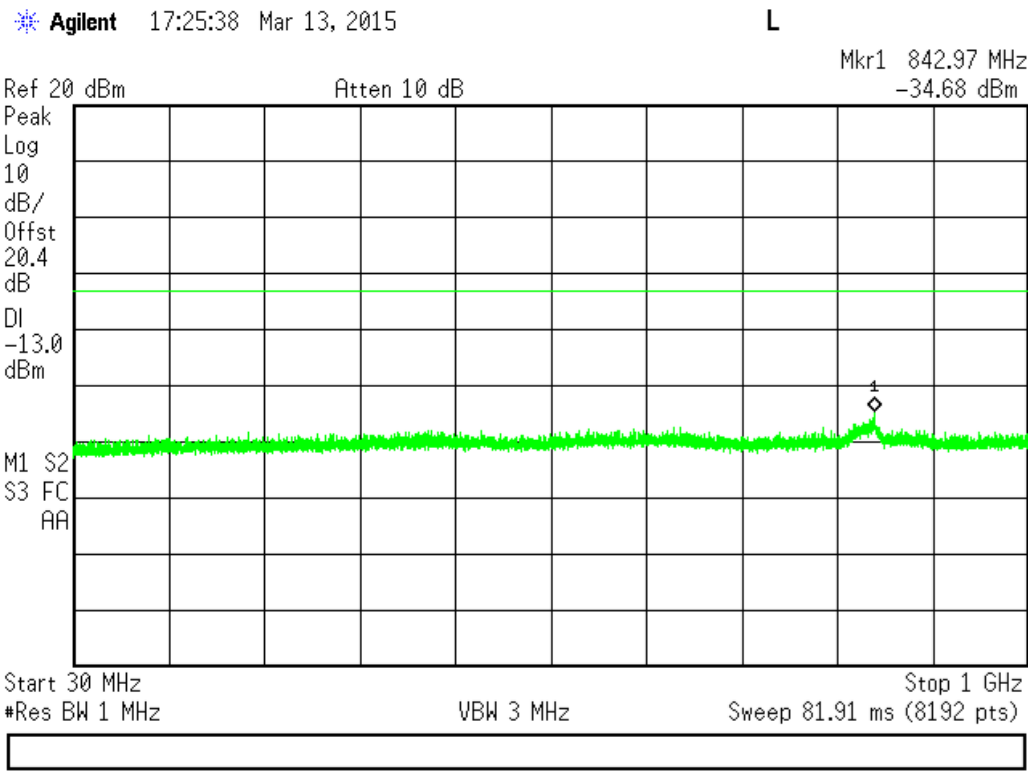
1850-1915 MHz Band (Mid Frequency)



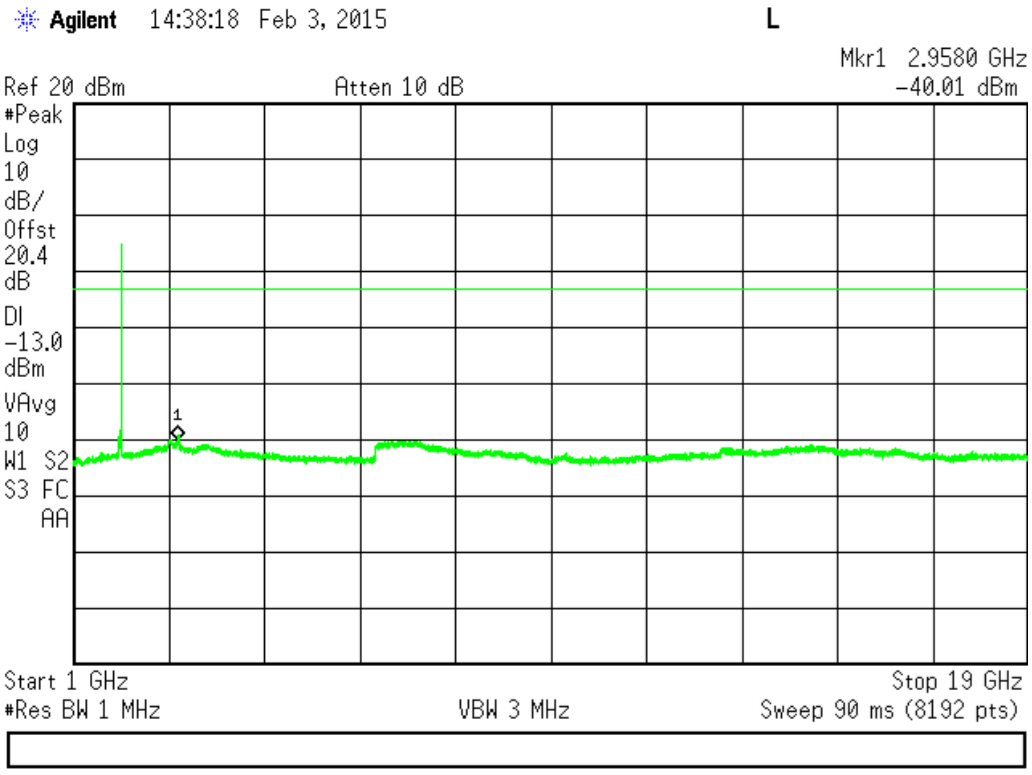
1850-1915 MHz Band (Mid Frequency) (Cont)



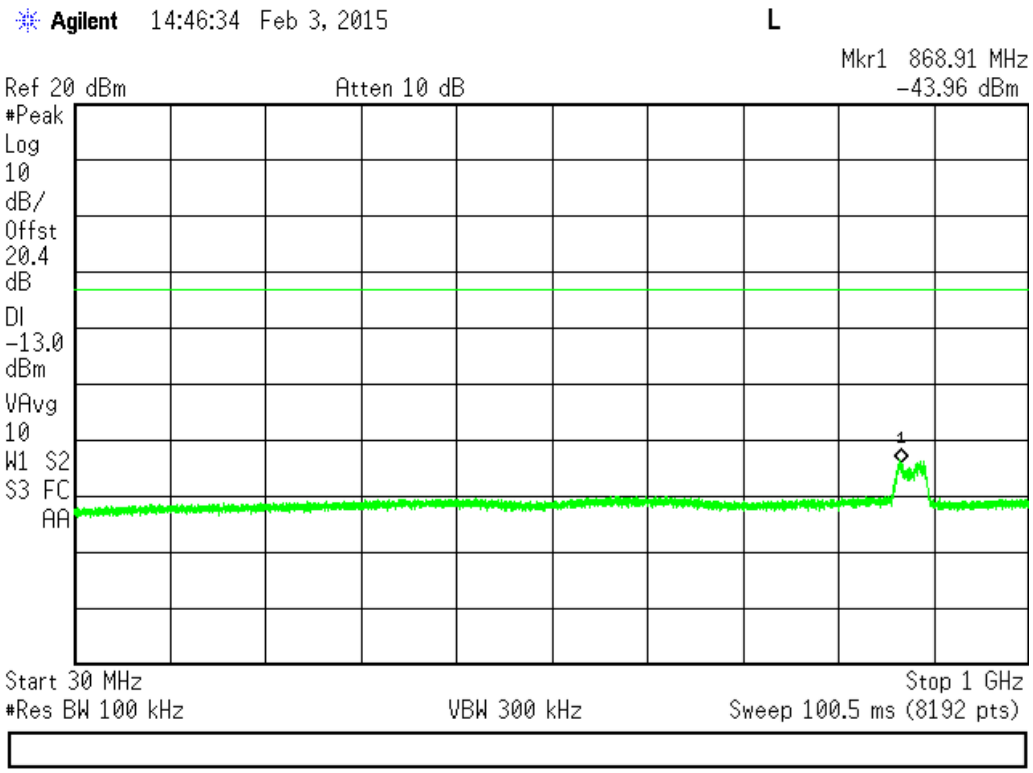
1850-1915 MHz Band (High Frequency)



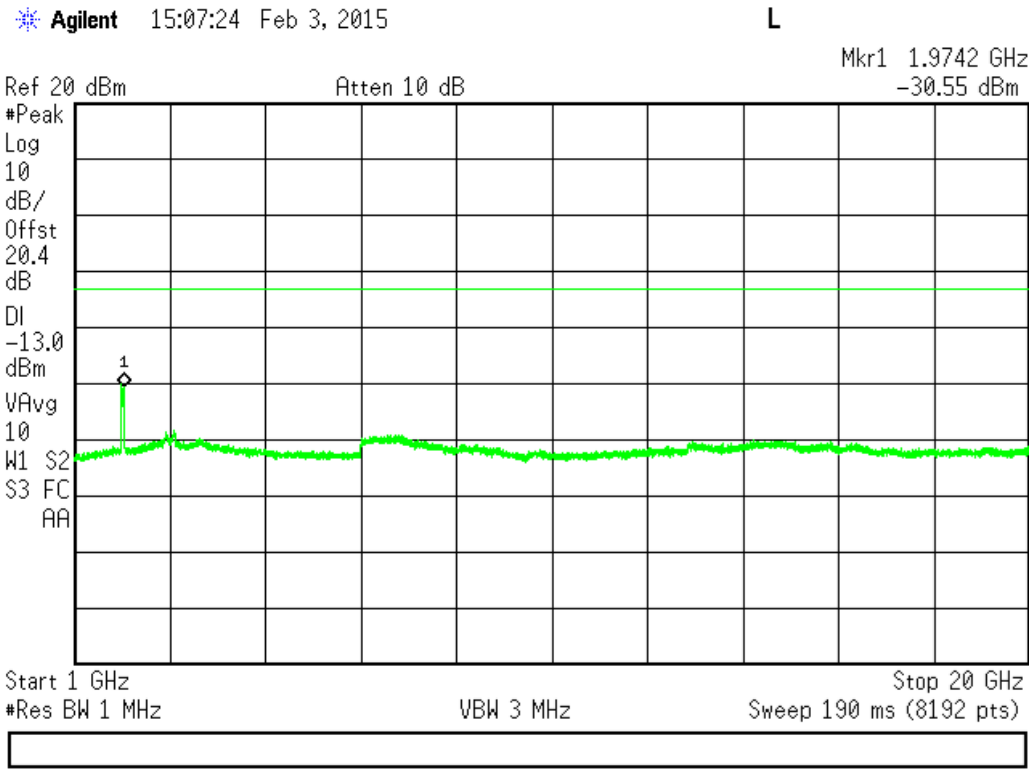
1850-1915 MHz Band (High Frequency) (Cont)



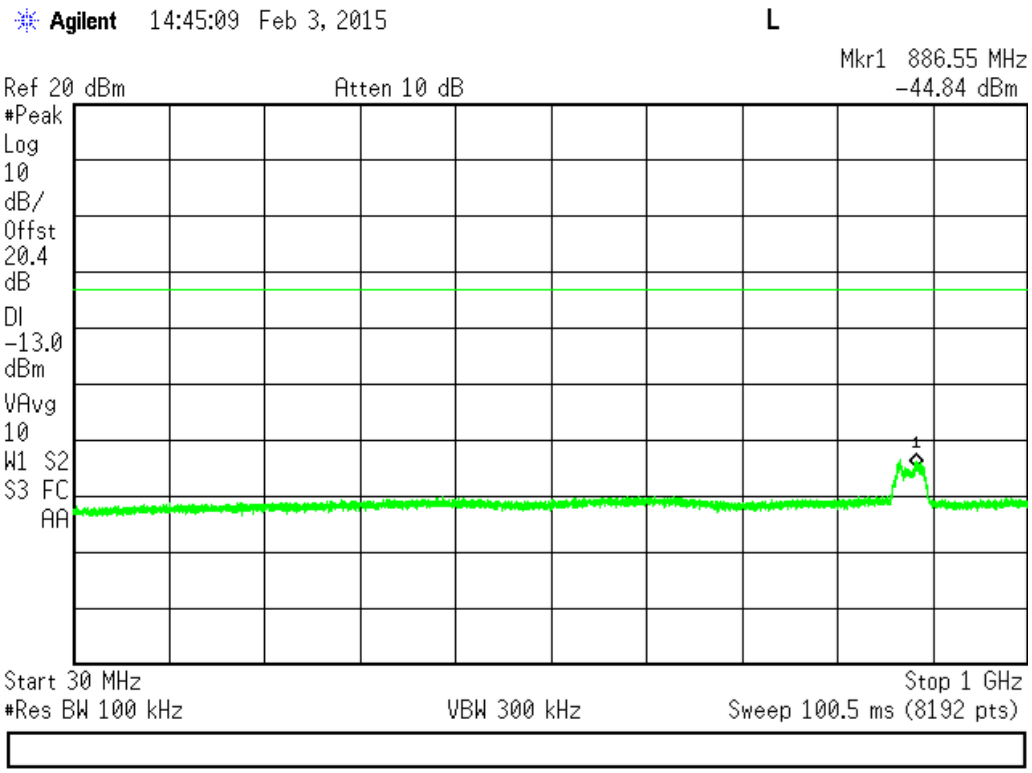
Downlink GSM Signal
869-894 MHz Band (Low Frequency)



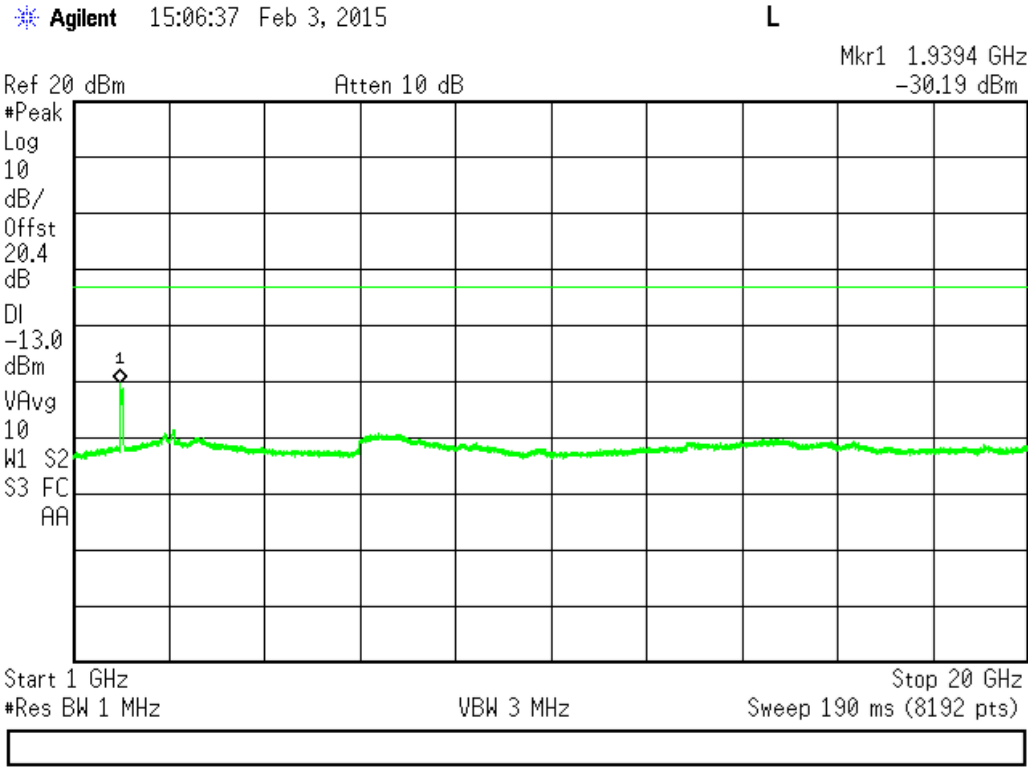
869-894 MHz Band (Low Frequency) (Cont)



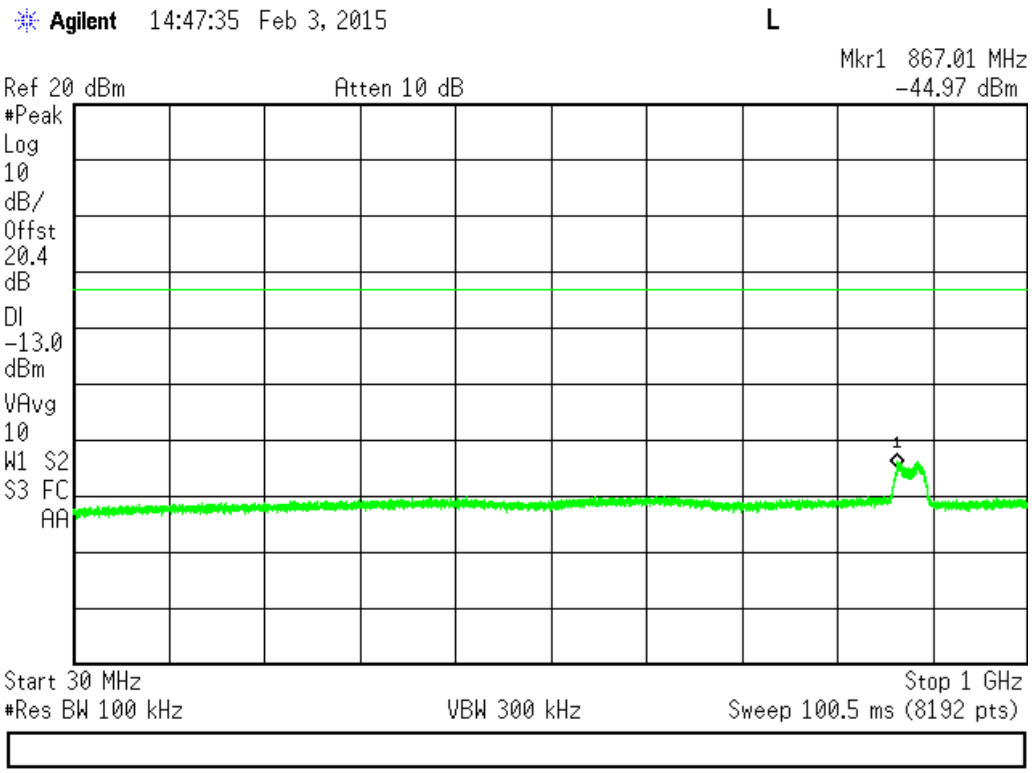
869-894 MHz Band (Mid Frequency)



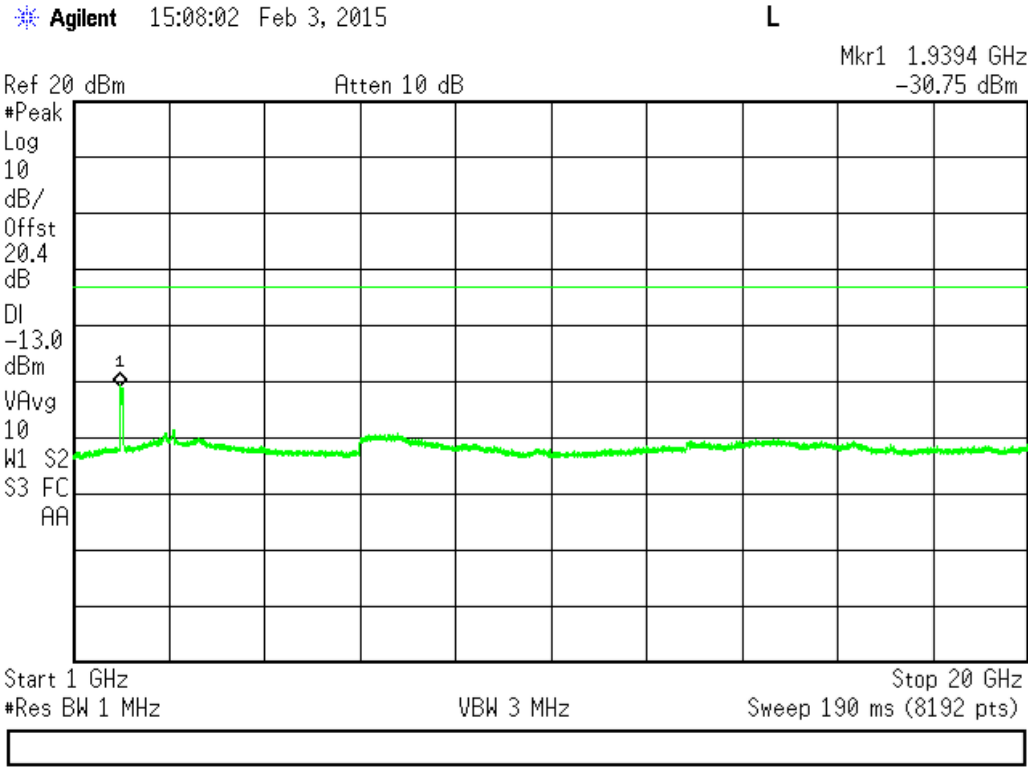
869-894 MHz Band (Mid Frequency) (Cont)



869-894 MHz Band (High Frequency)

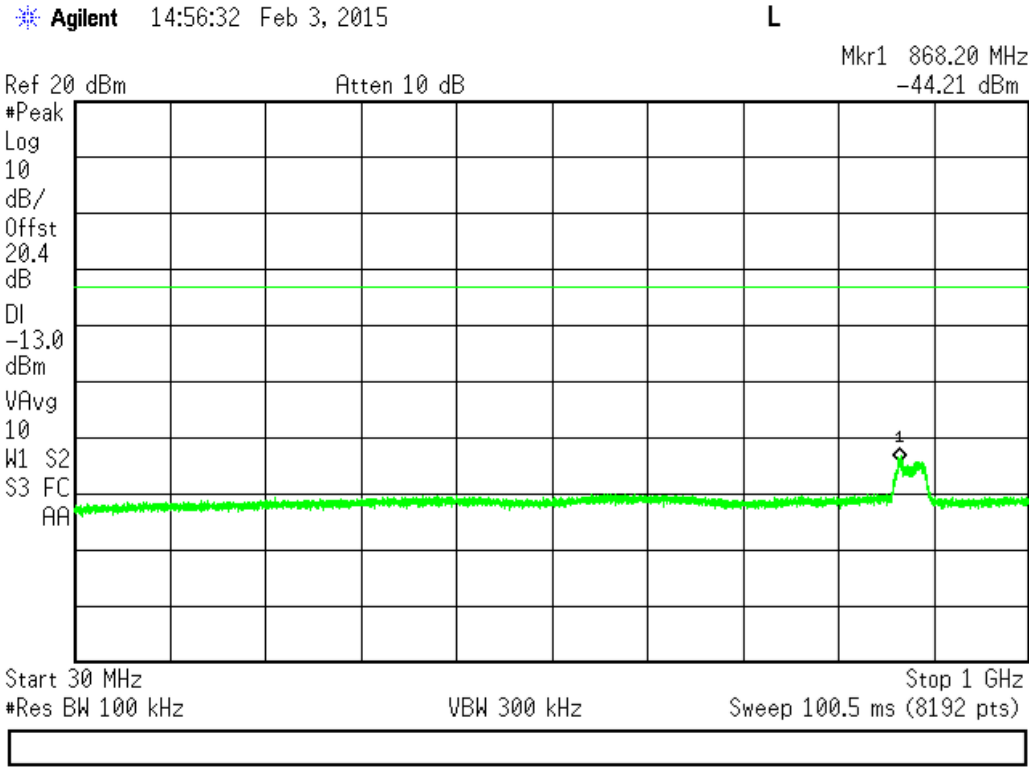


869-894 MHz Band (High Frequency) (Cont)

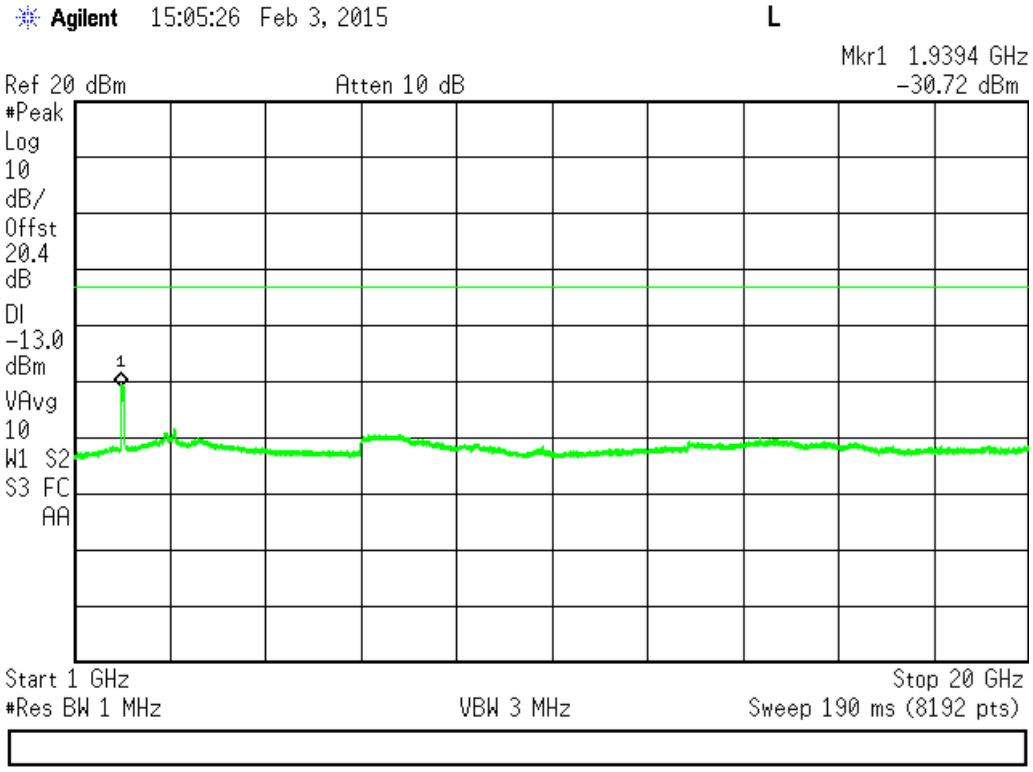


Downlink GSM Signal

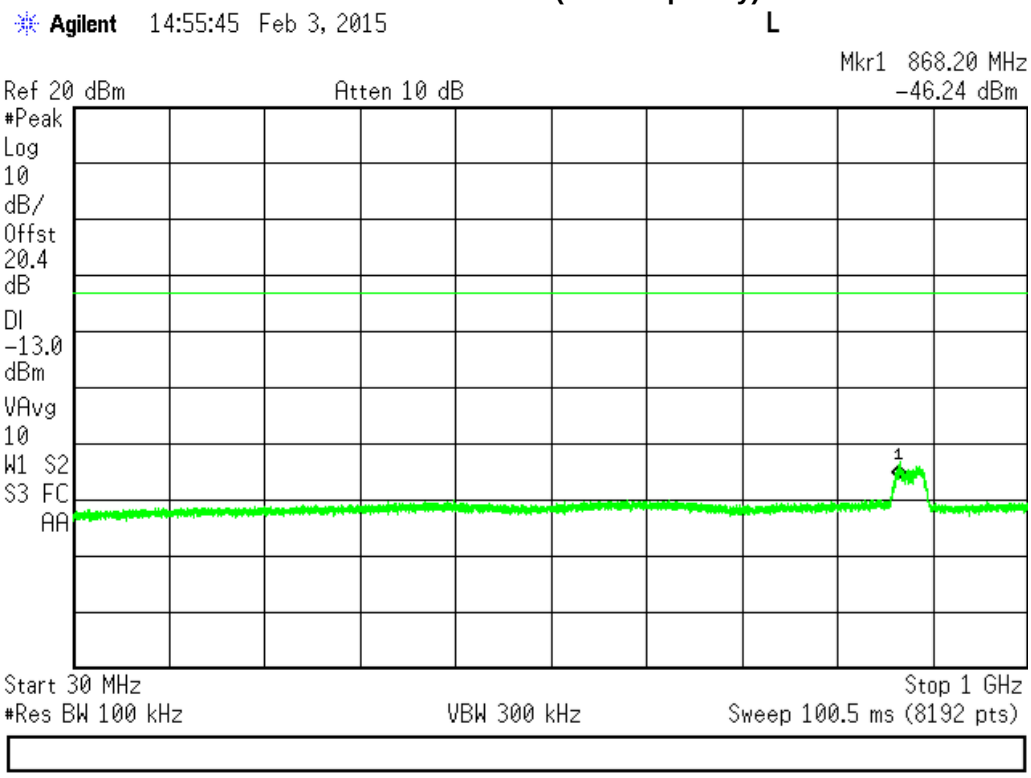
1930 - 1995 MHz Band (Low Frequency)



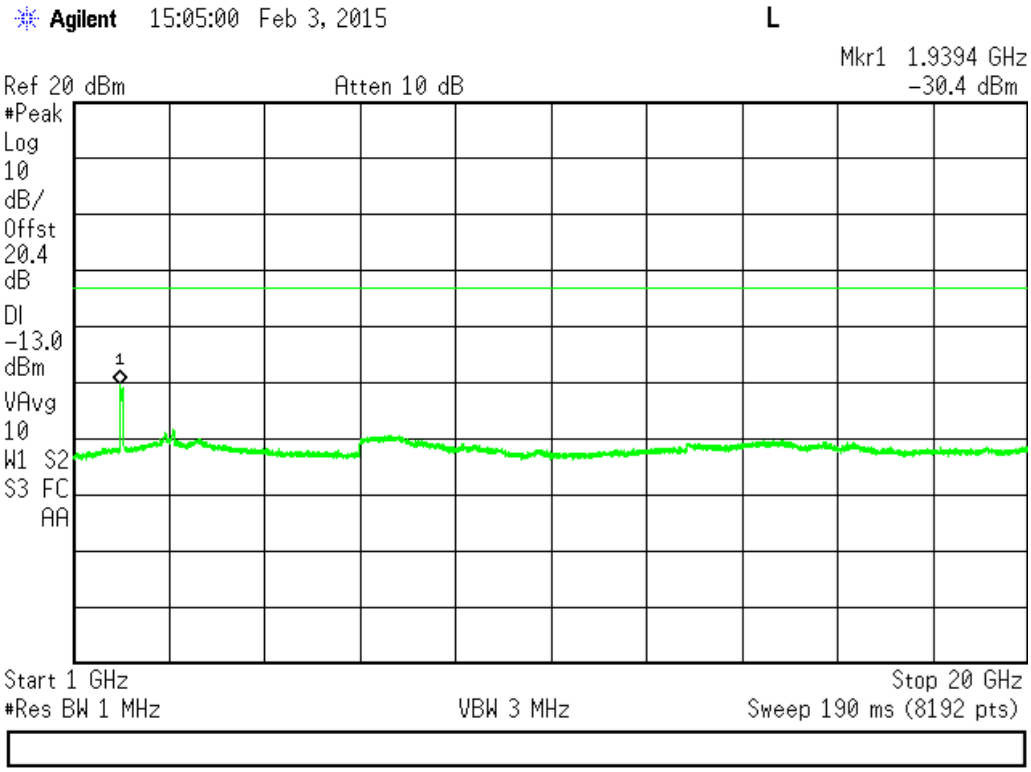
1930 - 1995 MHz Band (Low Frequency) (Cont)



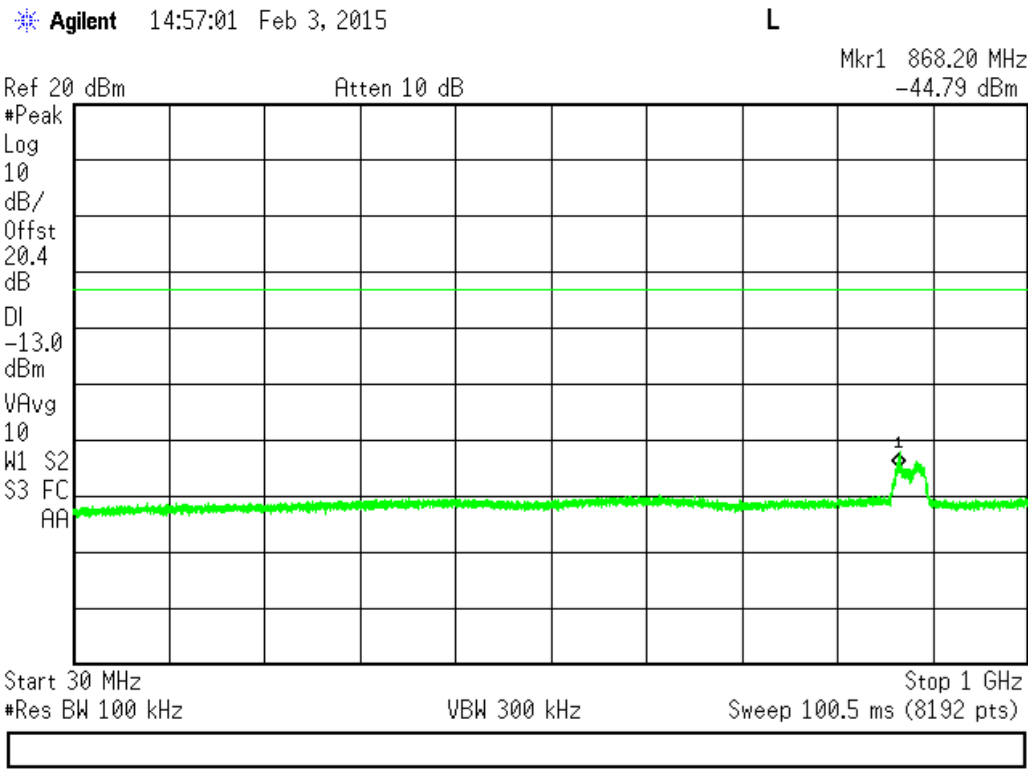
1930 - 1995 MHz Band (Mid Frequency)



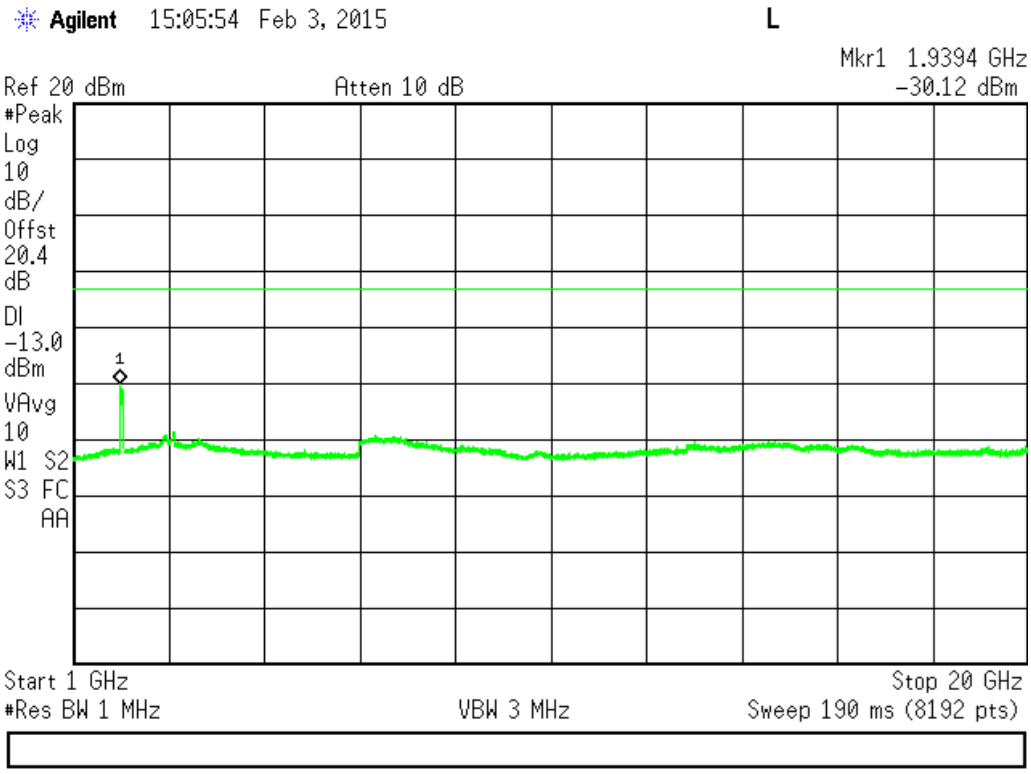
1930 - 1995 MHz Band (Mid Frequency) (Cont)



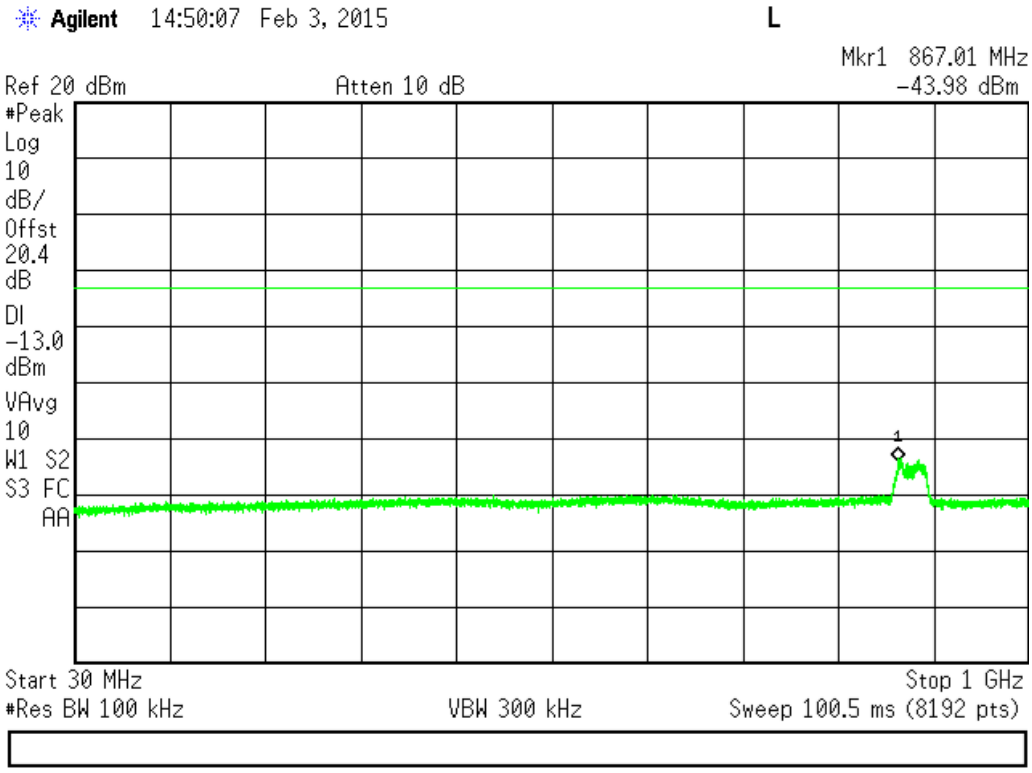
1930 - 1995 MHz Band (High Frequency)



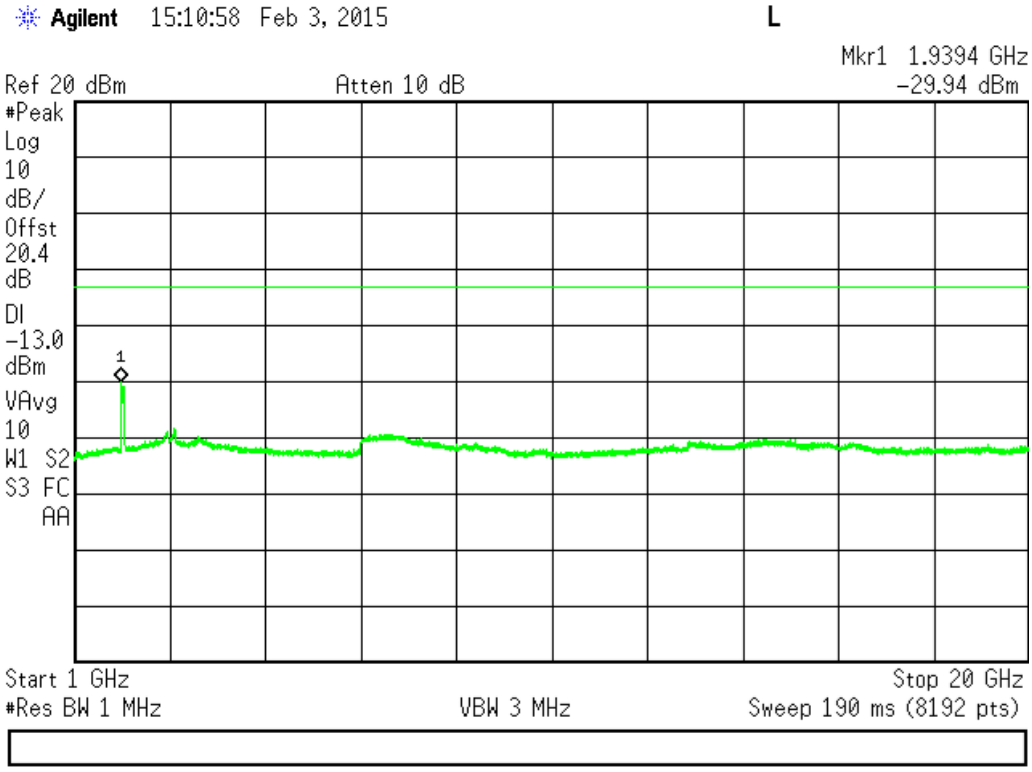
1930 - 1995 MHz Band (High Frequency) (Cont)



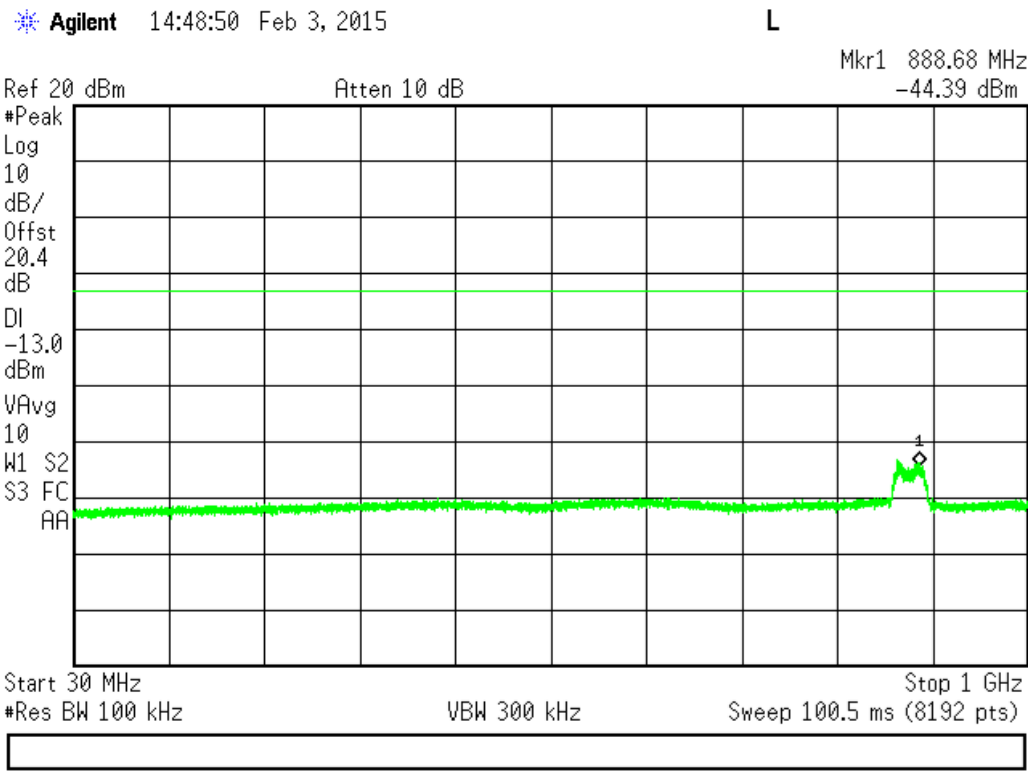
Downlink WCDMA Signal
869-894 MHz Band (Low Frequency)



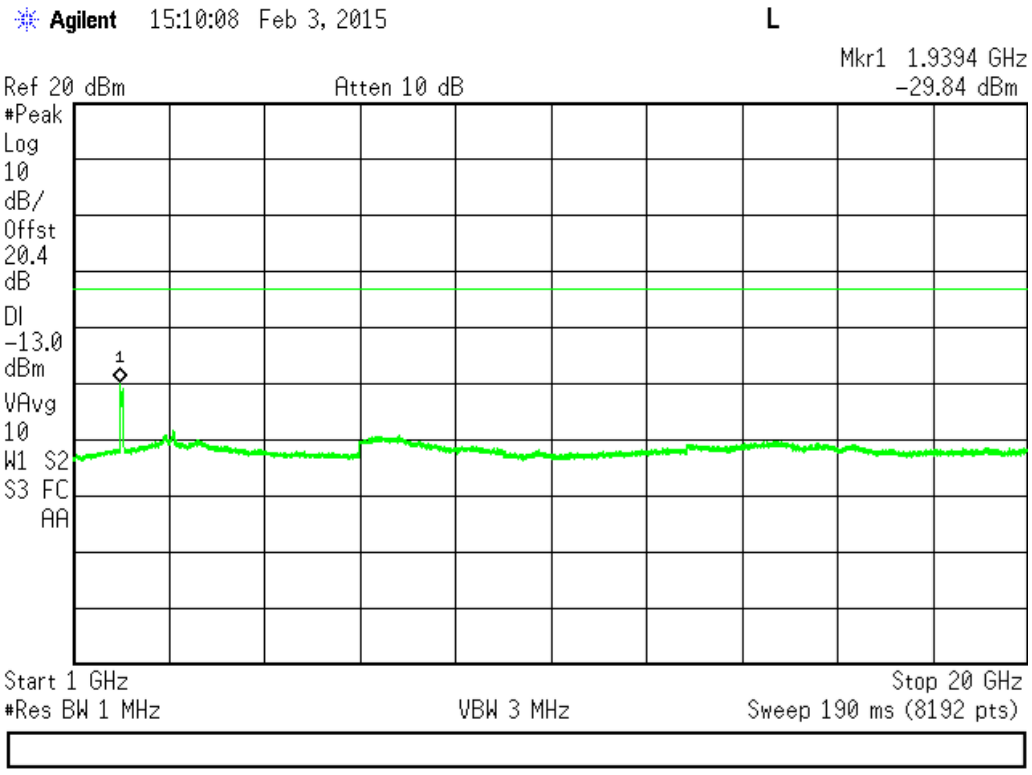
869-894 MHz Band (Low Frequency) (Cont)



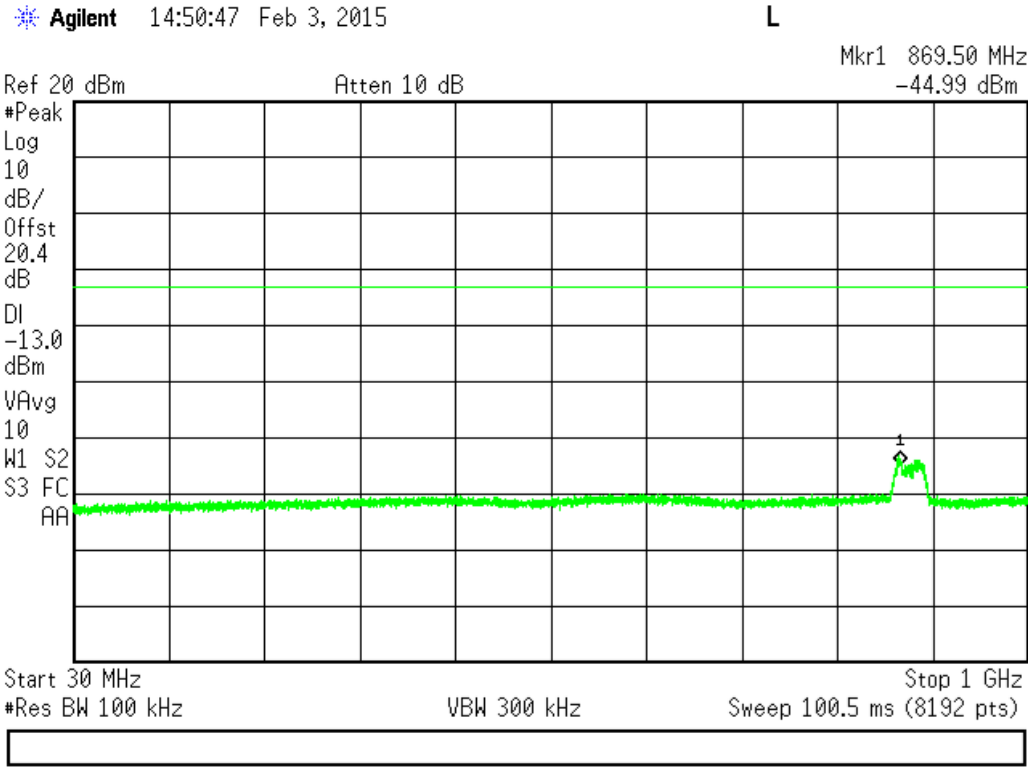
869-894 MHz Band (Mid Frequency)



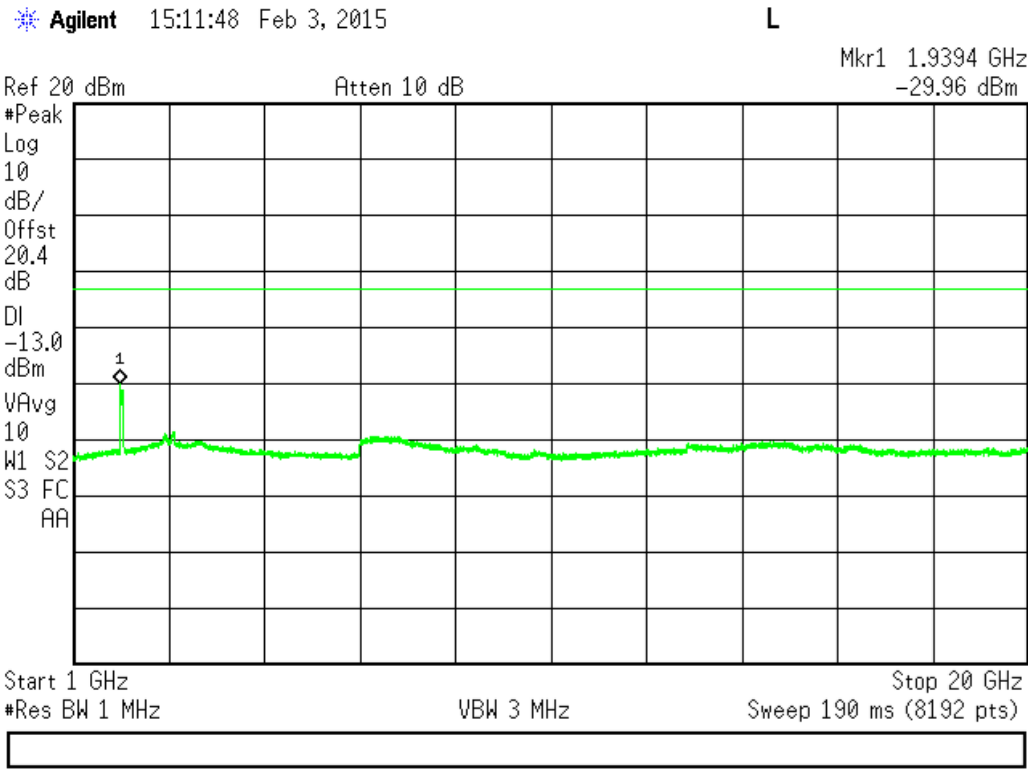
869-894 MHz Band (Mid Frequency) (Cont)



869-894 MHz Band (High Frequency)

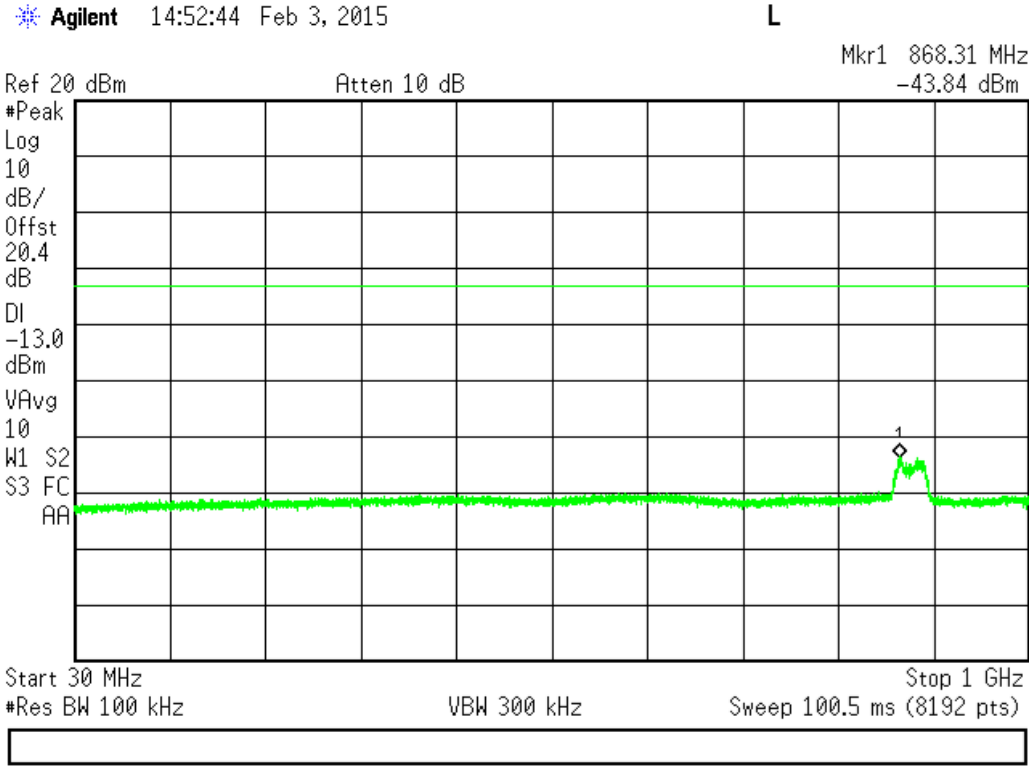


869-894 MHz Band (High Frequency) (Cont)

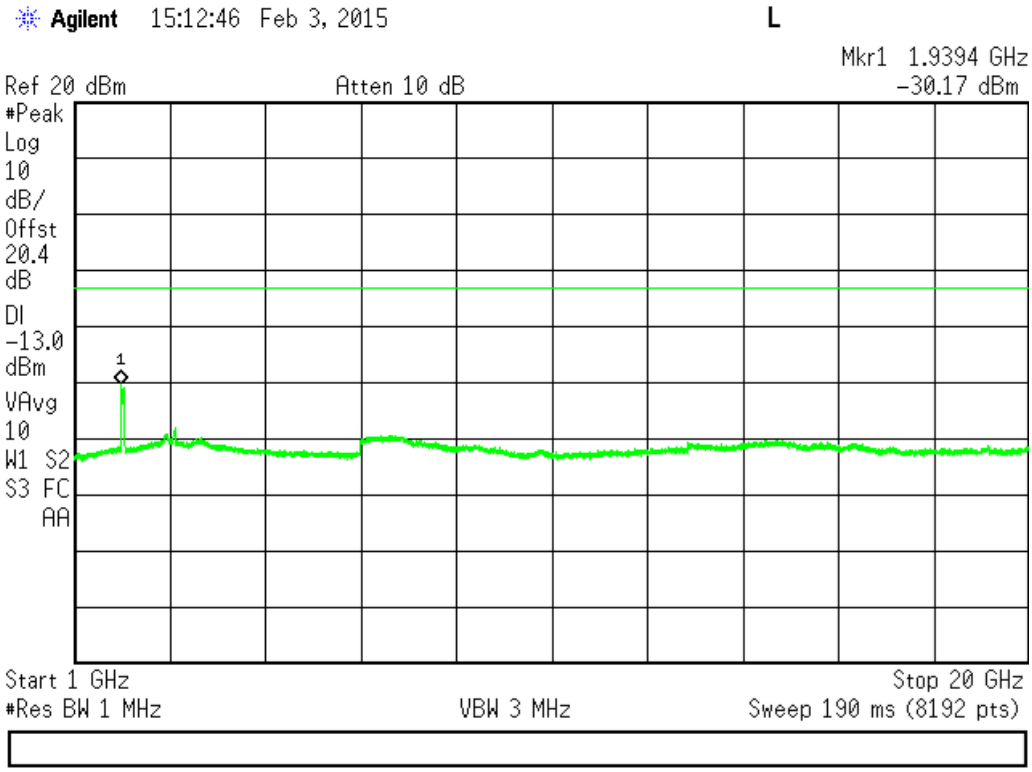


Downlink WCDMA Signal

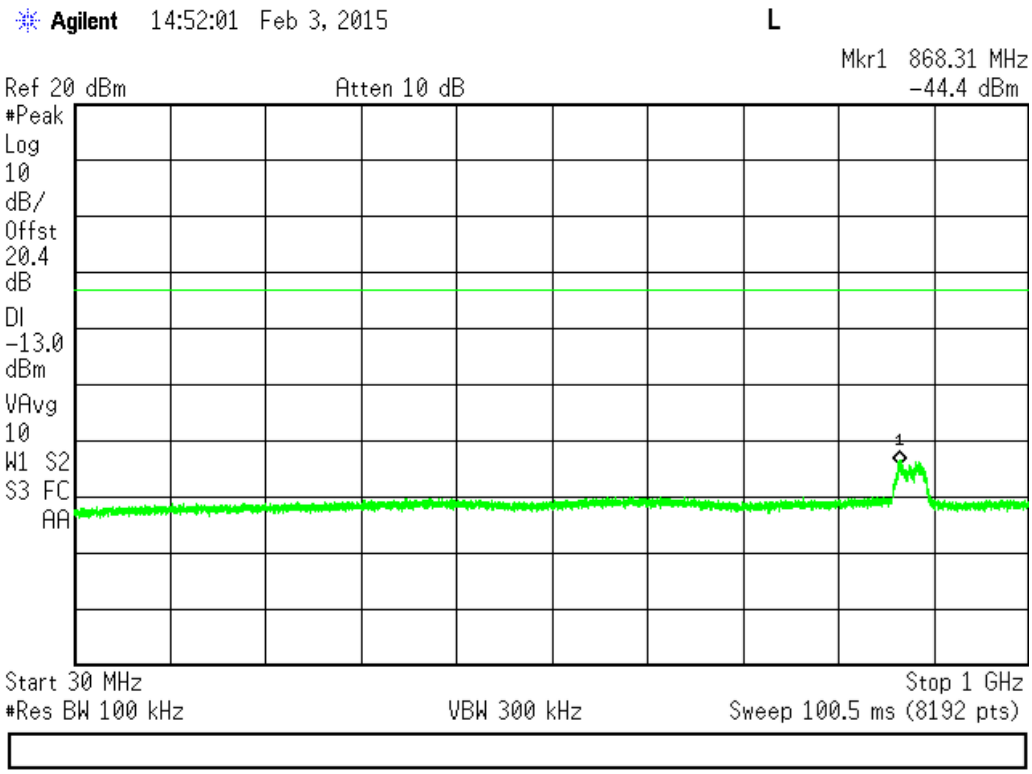
1930 - 1995 MHz Band (Low Frequency)



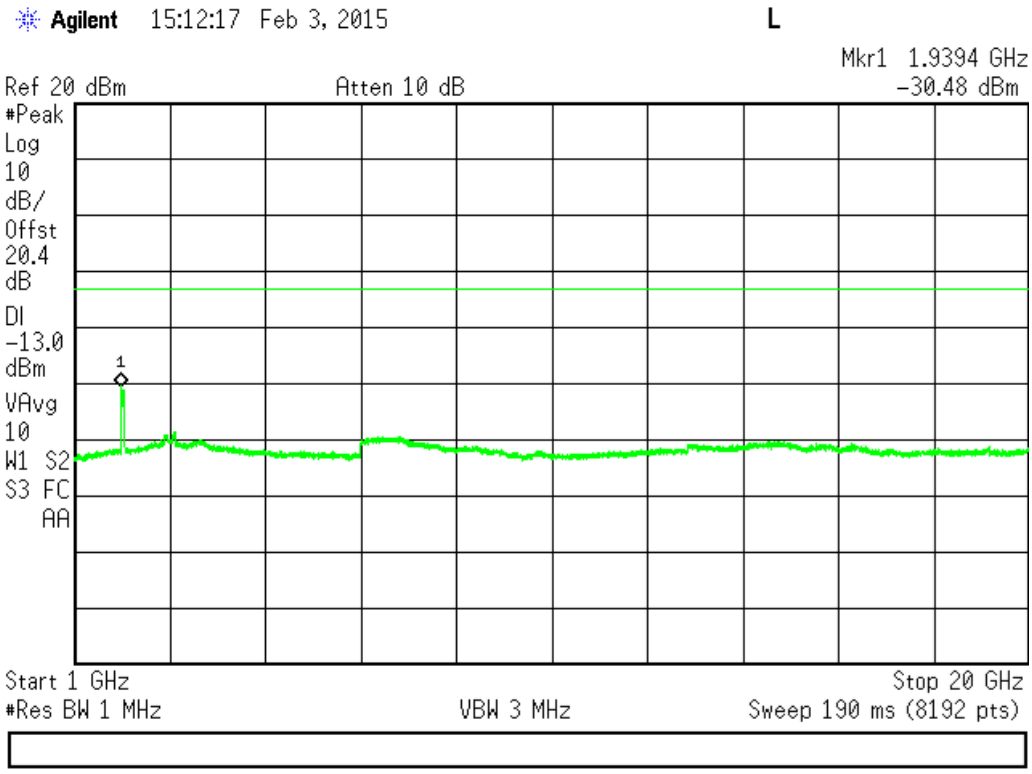
1930 - 1995 MHz Band (Low Frequency) (Cont)



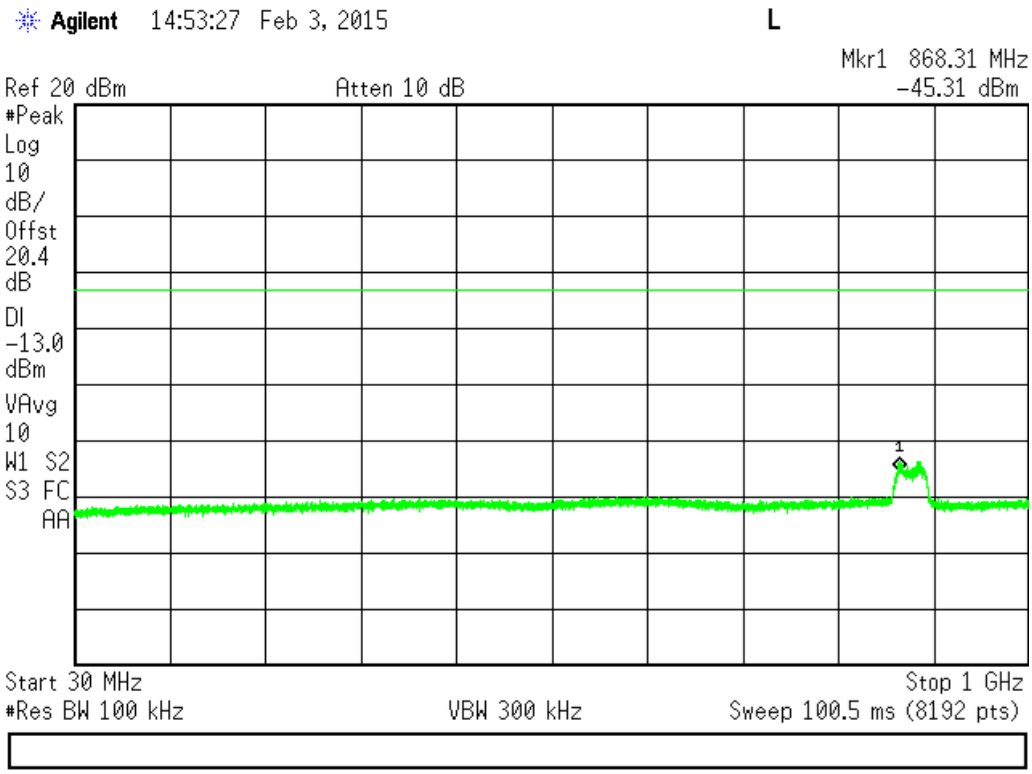
1930 - 1995 MHz Band (Mid Frequency)



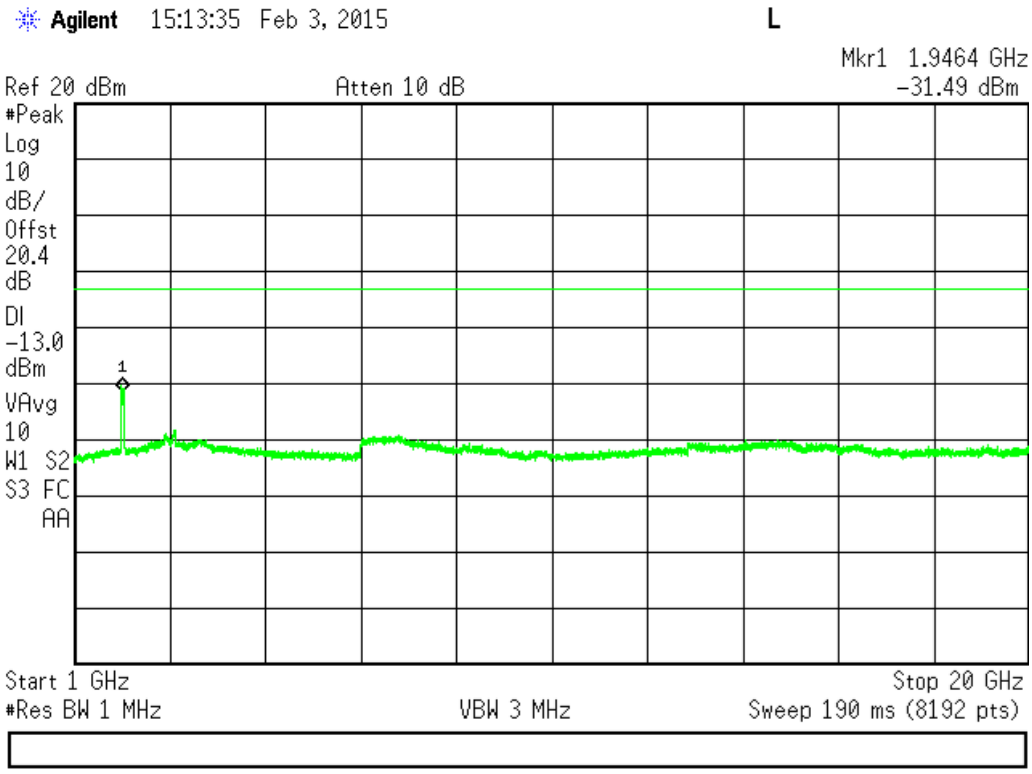
1930 - 1995 MHz Band (Mid Frequency) (Cont)



1930 - 1995 MHz Band (High Frequency)



1930 - 1995 MHz Band (High Frequency) (Cont)



Radiated Spurious Emissions

Name of Test:	Radiated Spurious Emissions	**Engineer:** Mike Graffeo
Test Equipment Utilized:	i00103, i00349, i00428, i00457, i00331	**Test Date:** 2/6/15

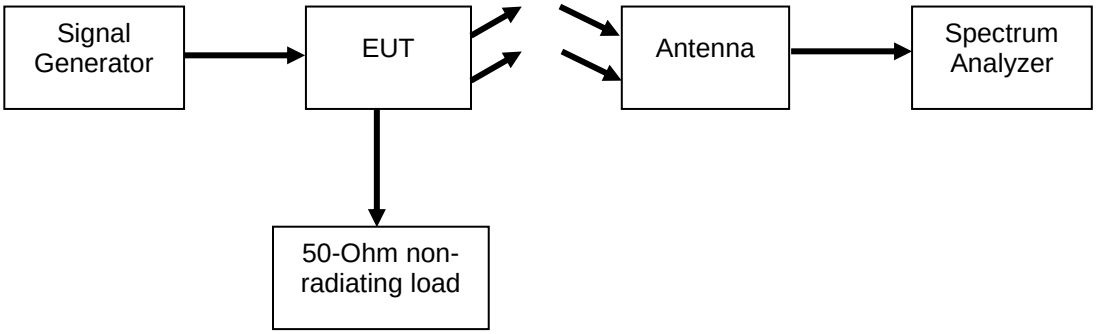
Test Procedure

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

The RBW was set to 100 kHz for measurements below 1 GHz and 1 MHz for measurements above 1 GHz.
The VBW was set to 3 times the RBW.

The following formula was used for calculating the limits:
Radiated Spurious Emissions Limit = P1 – (43+ 10Log(P2)) = -13dBm
P1 = power in dBm
P2 = power in Watts

Test Setup



UPLINK BANDS

824 - 849 MHz Band 836.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1673	-63.52	-13	Pass
2509.5	-63.49	-13	Pass
3346	-66.07	-13	Pass

1850 - 1915 MHz Band 1882.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3765	-63.05	-13	Pass
5647.5	-65.35	-13	Pass
7530	-64.70	-13	Pass

DOWNLINK BANDS

869 - 894 MHz Band 881.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
1763	-64.56	-13	Pass
2644.5	-64.08	-13	Pass
3526	-60.40	-13	Pass

1930 - 1995 MHz Band 1962.5 MHz Tuned Frequency

Measured Frequency (MHz)	Measured Level (dBm)	Limit (dBm)	Result
3925	-61.47	-13	Pass
5887.5	-62.69	-13	Pass
7850	-65.45	-13	Pass

No other emissions were detected. All emissions were 20 below the limit of –13 dBm.

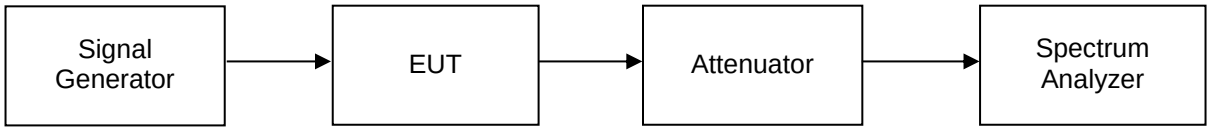
Occupied Bandwidth

Name of Test:	Occupied Bandwidth	**Engineer:** Mike Graffeo
Test Equipment Utilized	i00457, i00331	**Test Date:** 2/6/15

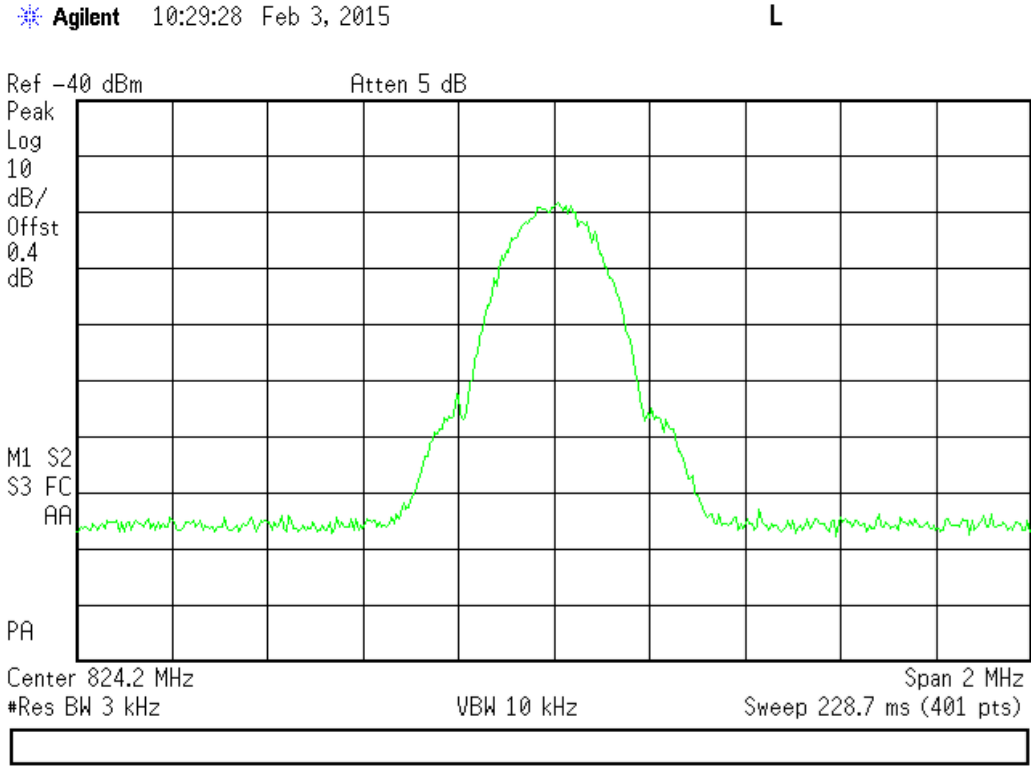
Test Procedure

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

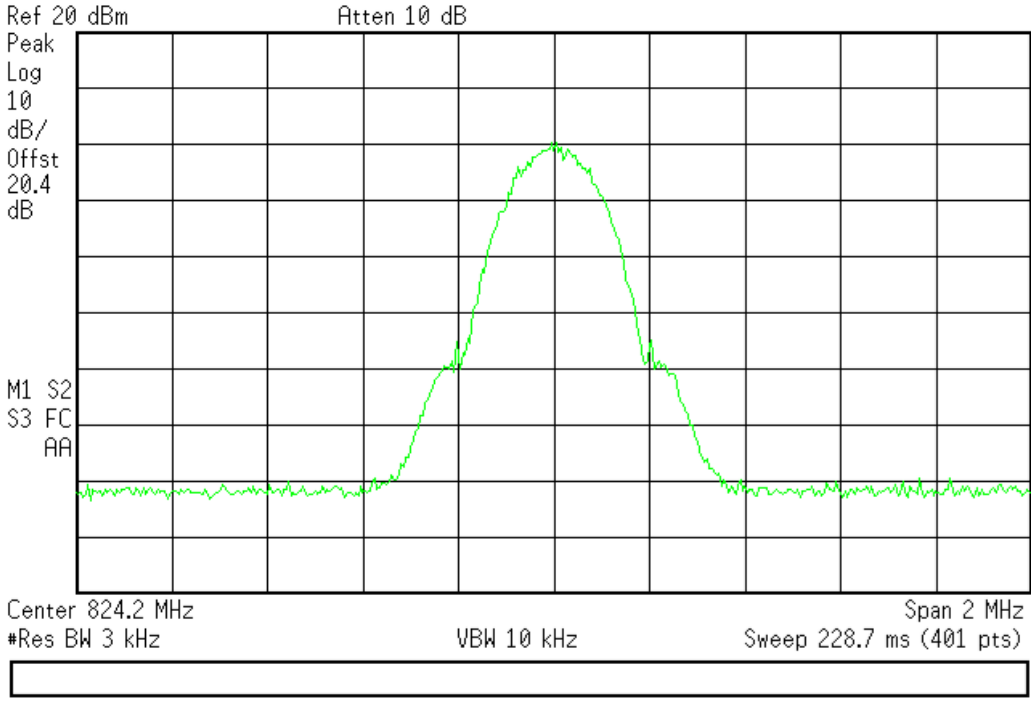
Test Setup



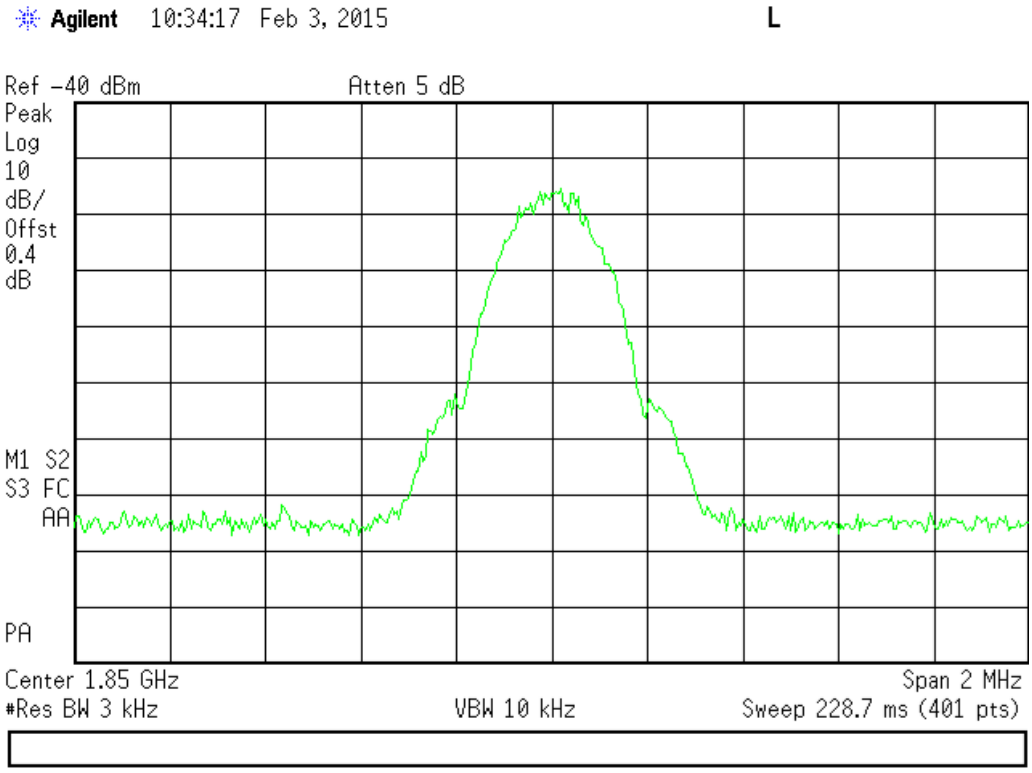
Uplink (GSM Signal Low band)
824-849 MHz Band
Input



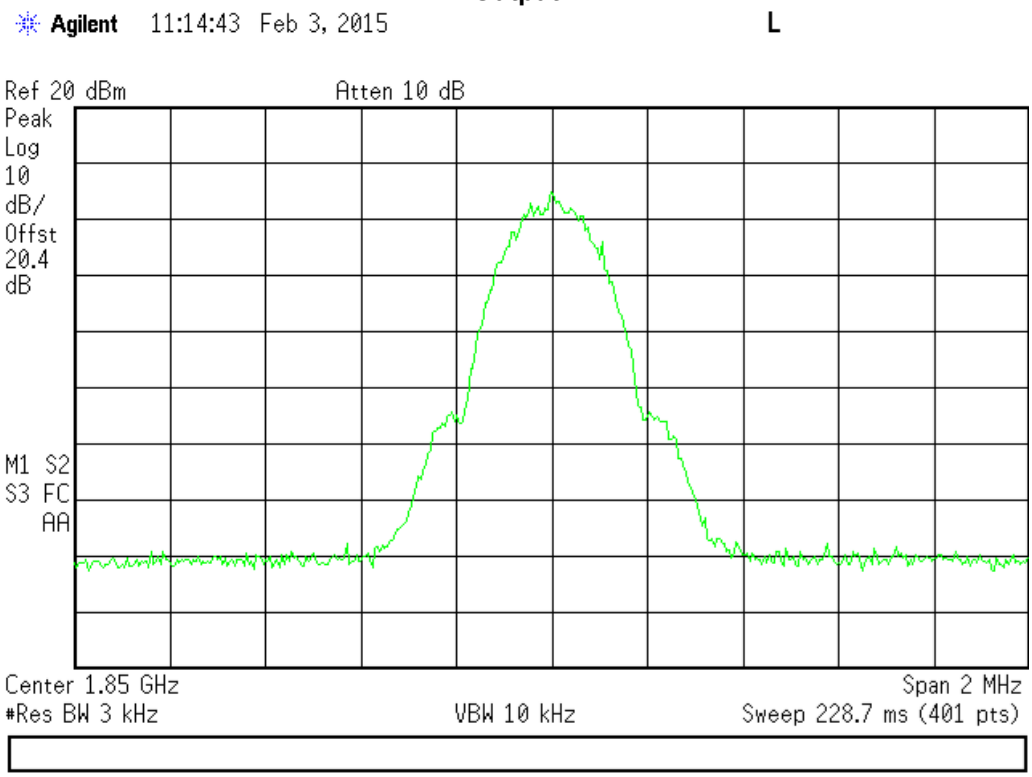
Output



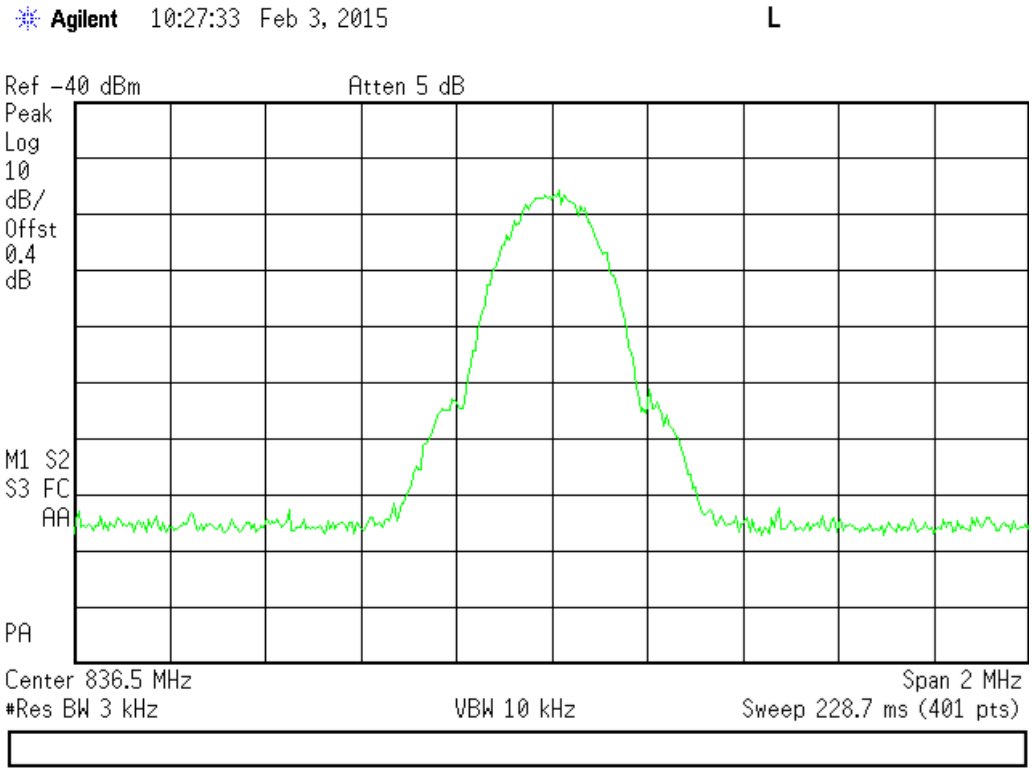
Uplink (GSM Signal Low band)
1850-1915 MHz Band
Input



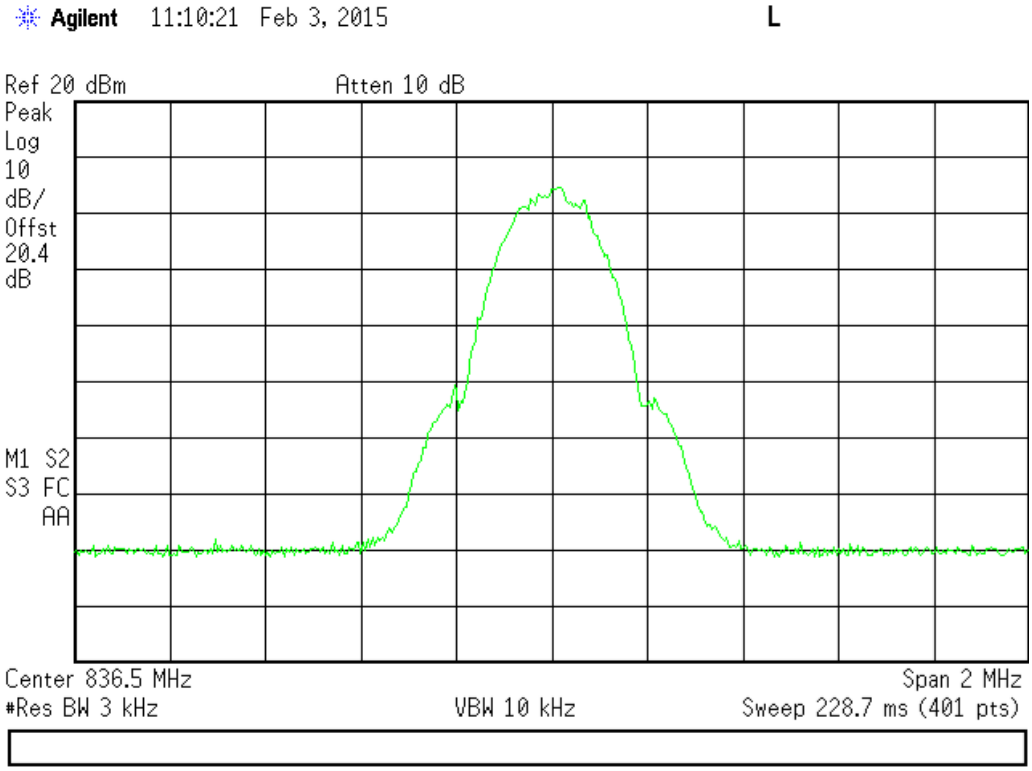
Output



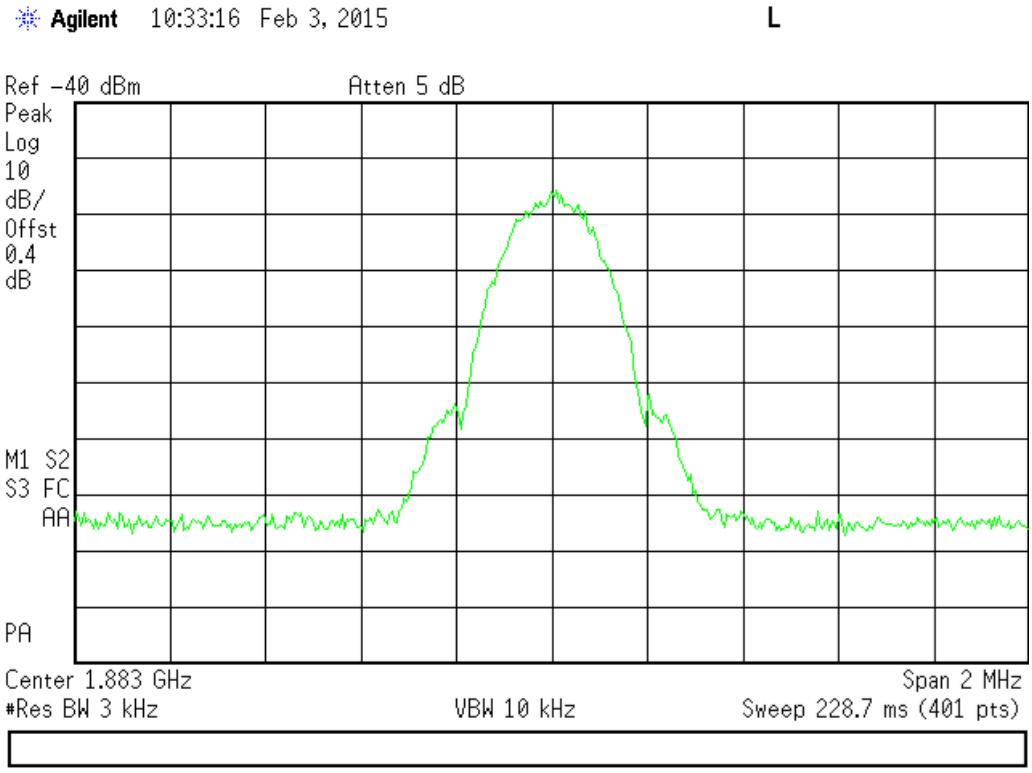
Uplink (GSM Signal Mid band)
824-849 MHz Band
Input



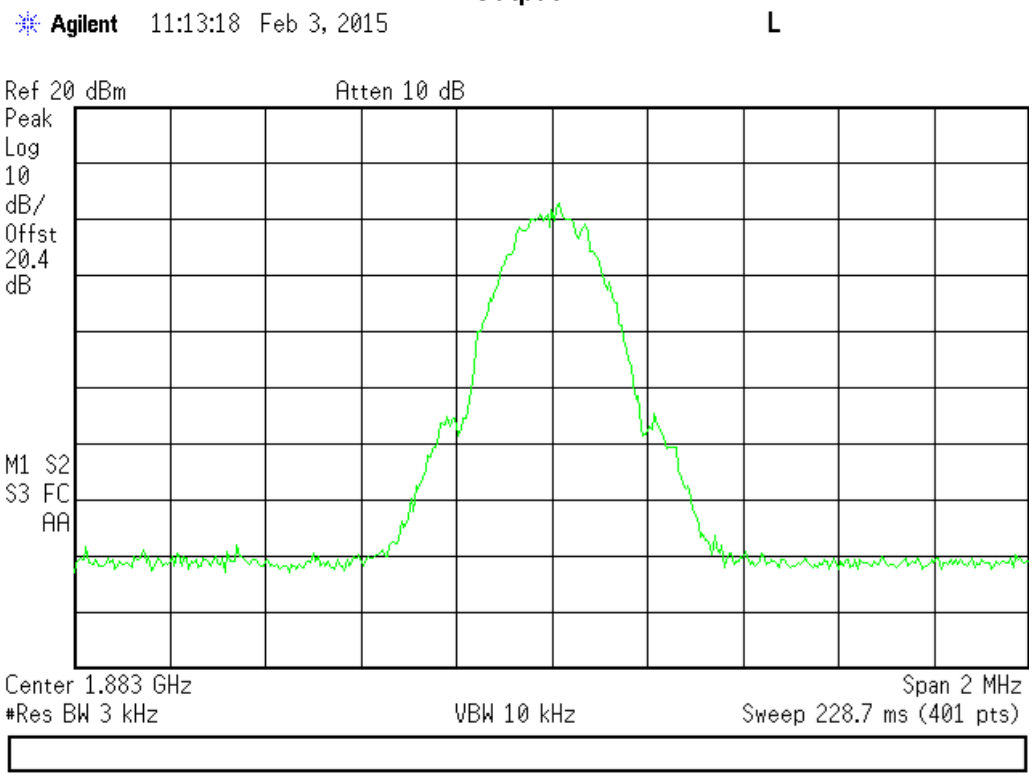
Output



Uplink (GSM Signal Mid band)
1850-1915 MHz Band
Input

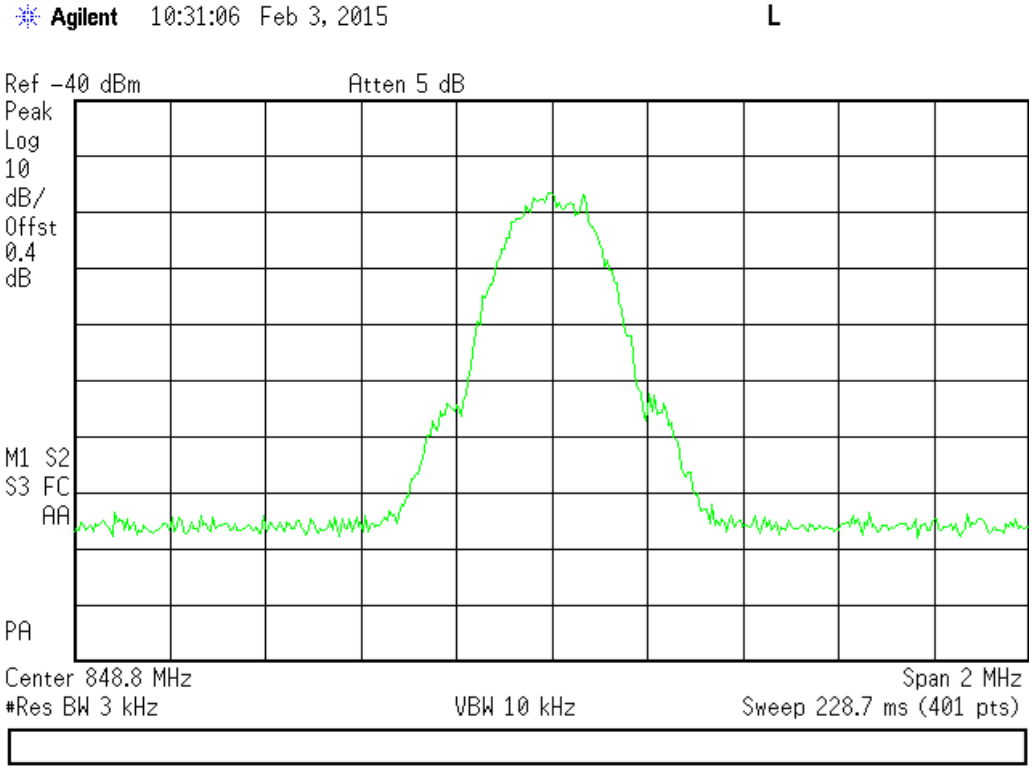


Output

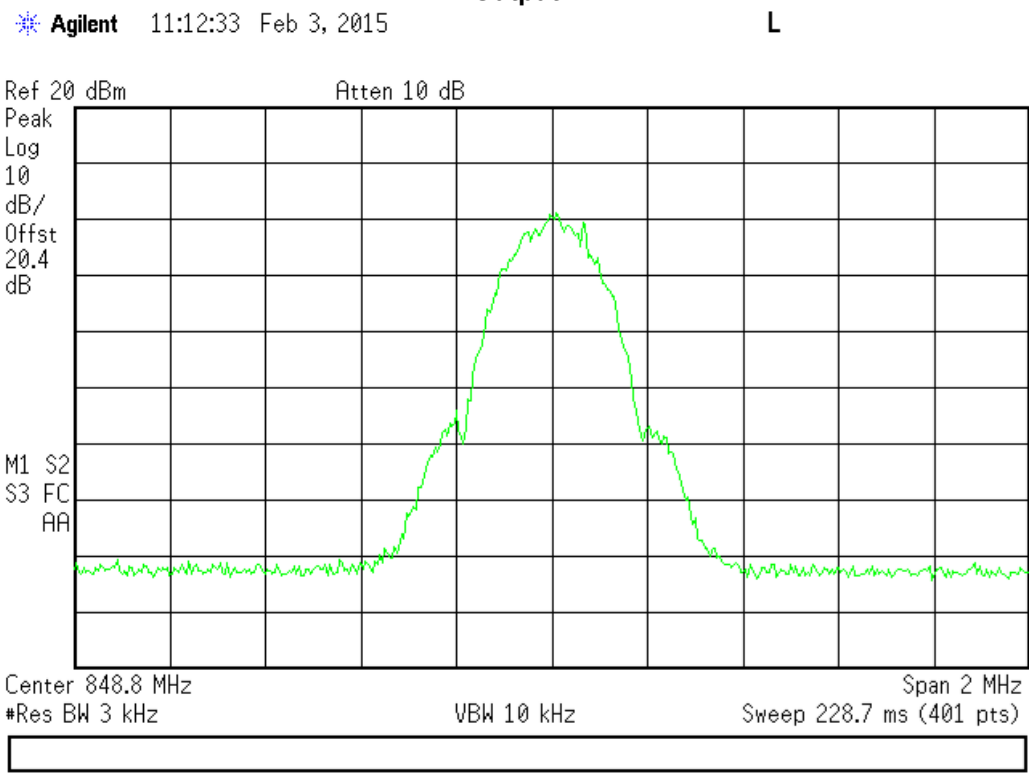


Uplink (GSM Signal High band)

824-849 MHz Band
Input

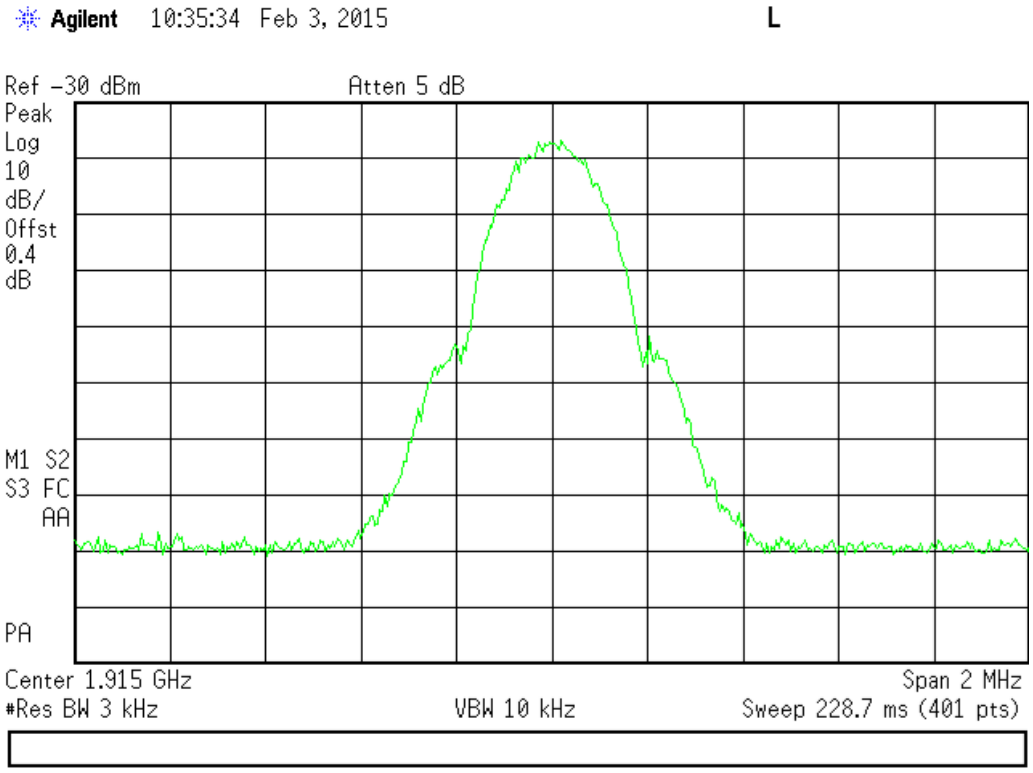


Output

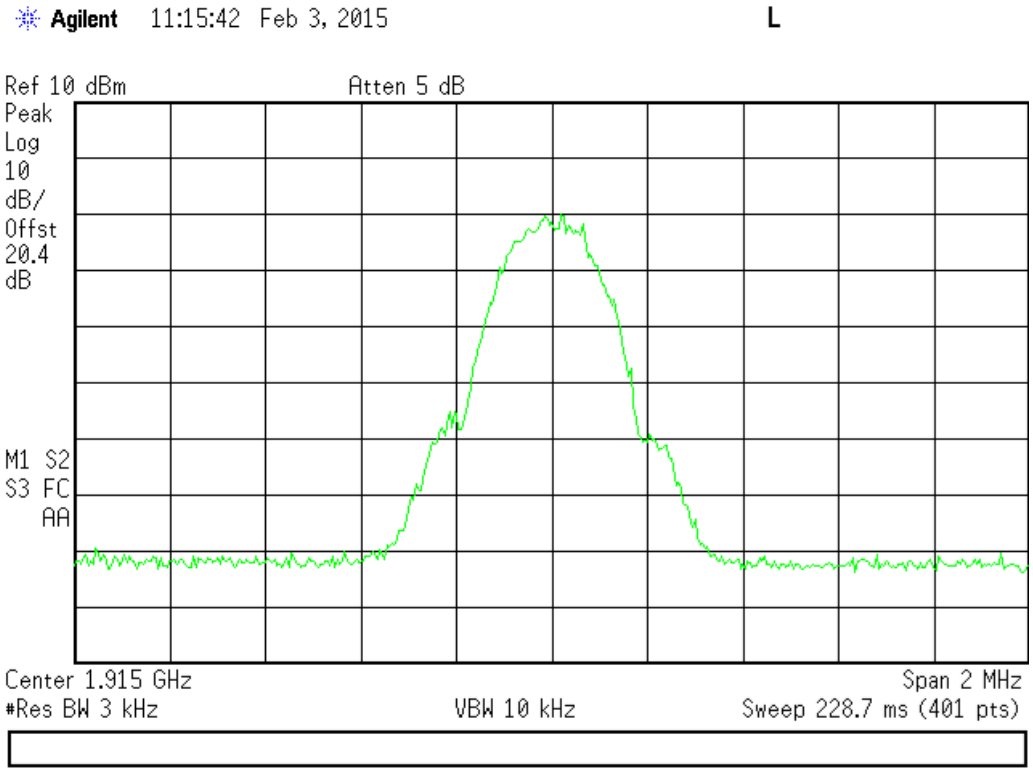


Uplink (GSM Signal High band)

1850-1915 MHz Band
Input

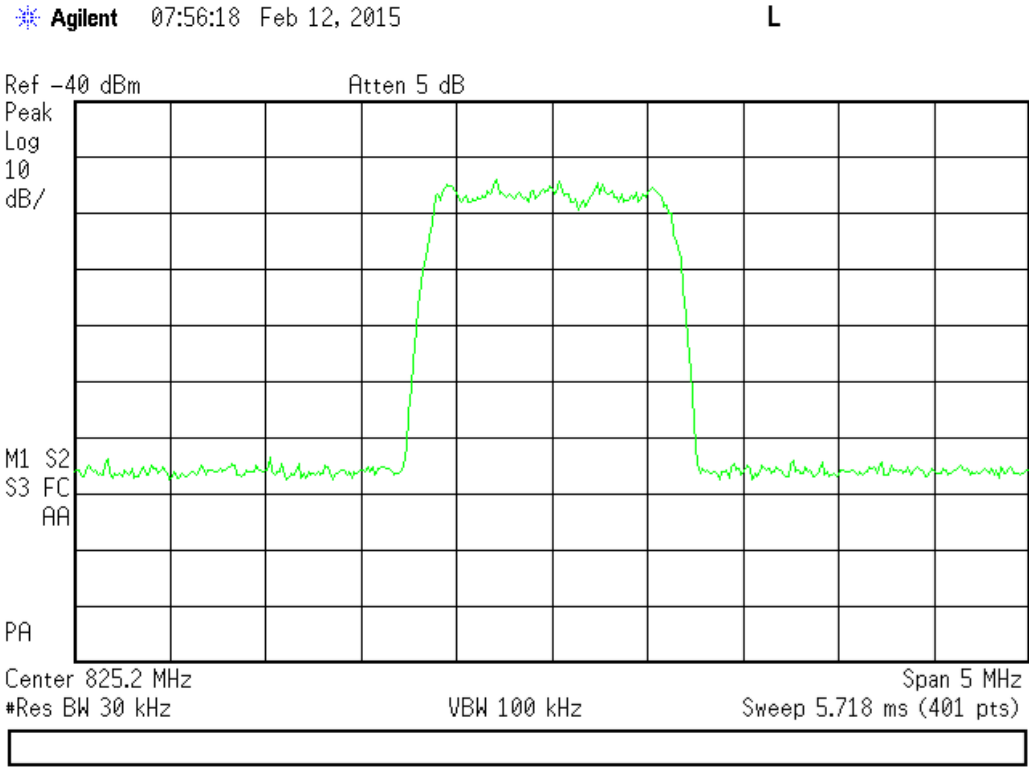


Output

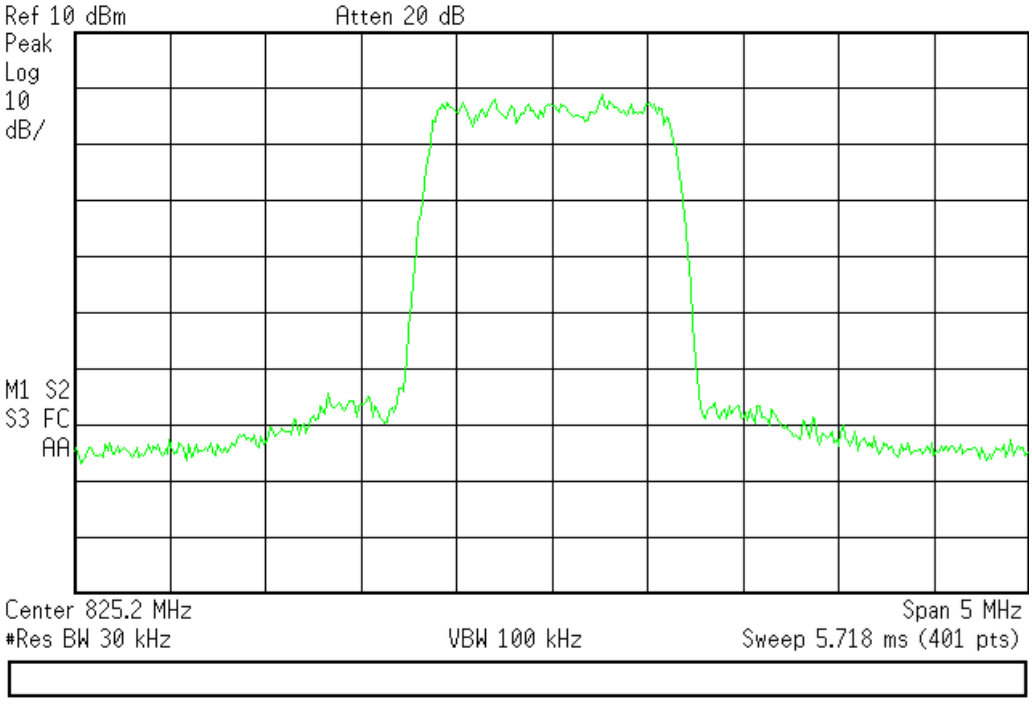


Uplink (CDMA Signal Low band)

824-849 MHz Band
Input

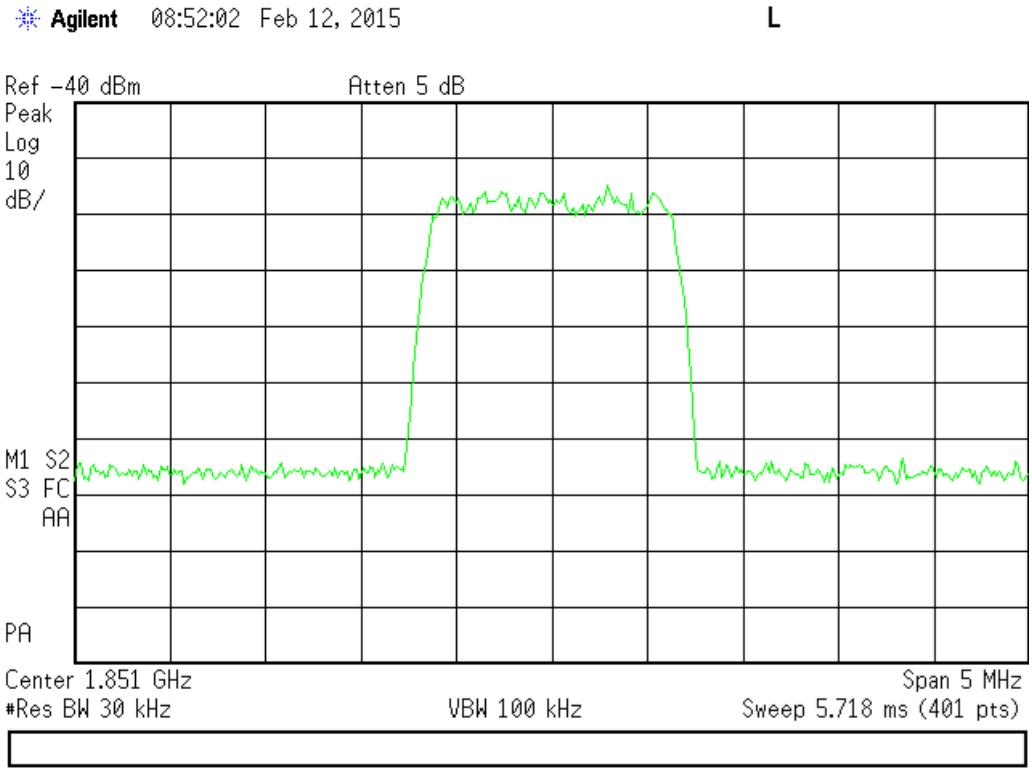


Output

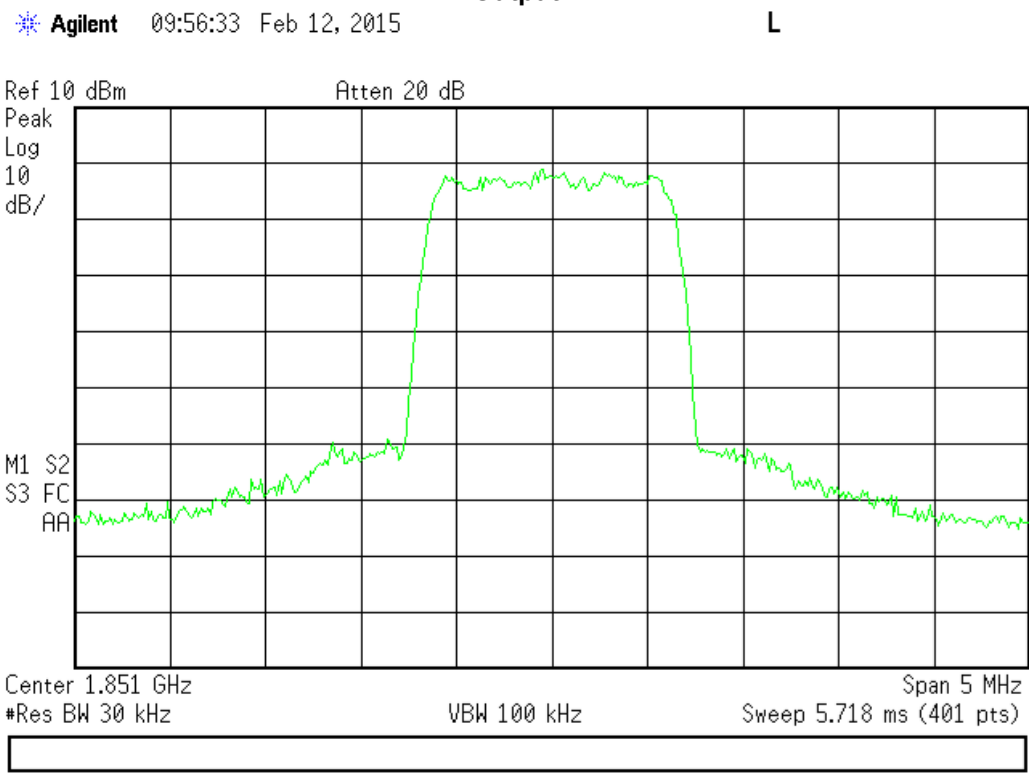


Uplink (CDMA Signal low band)

1850-1915 MHz Band
Input

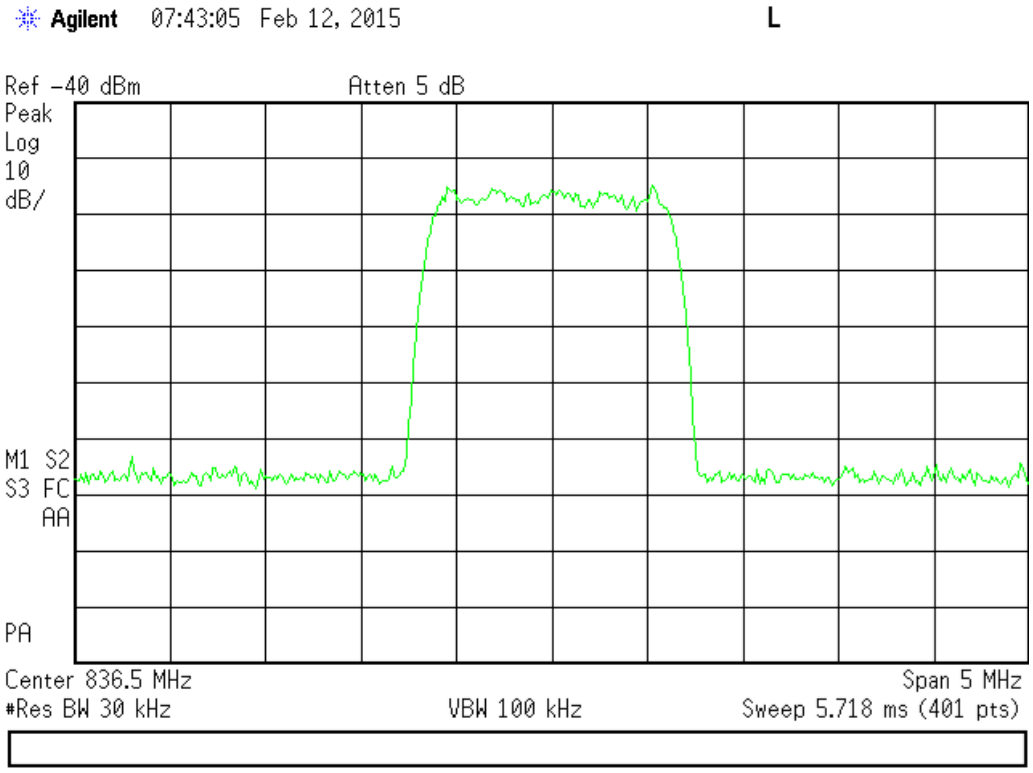


Output

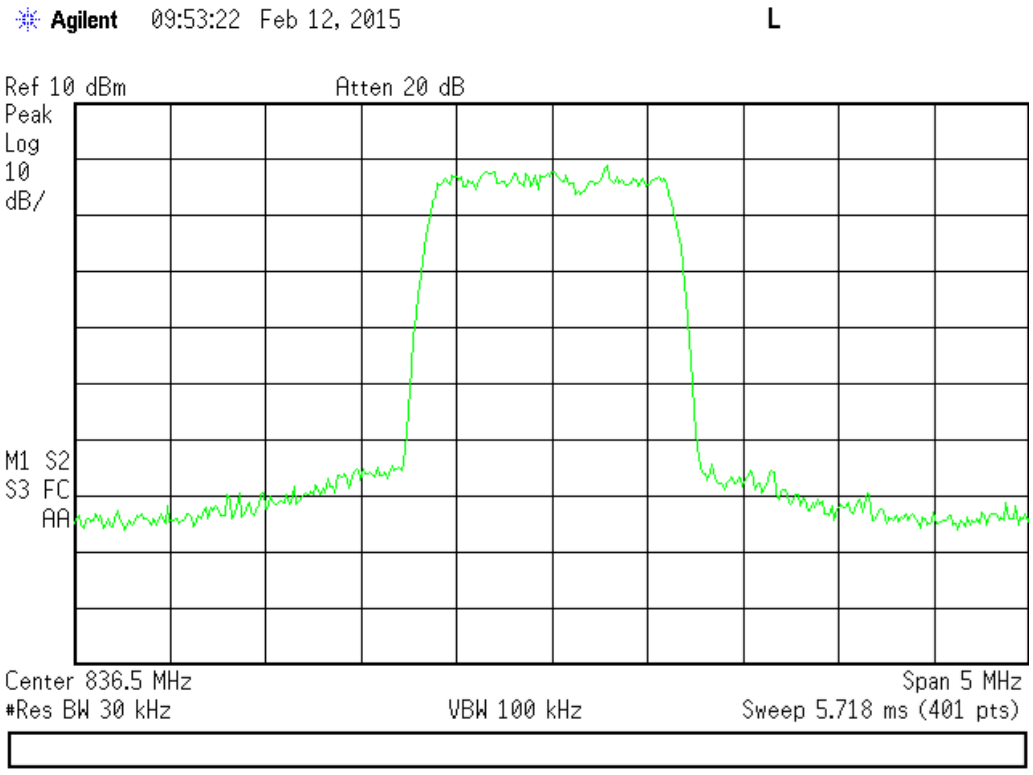


Uplink (CDMA Signal mid band)

824-849 MHz Band
Input

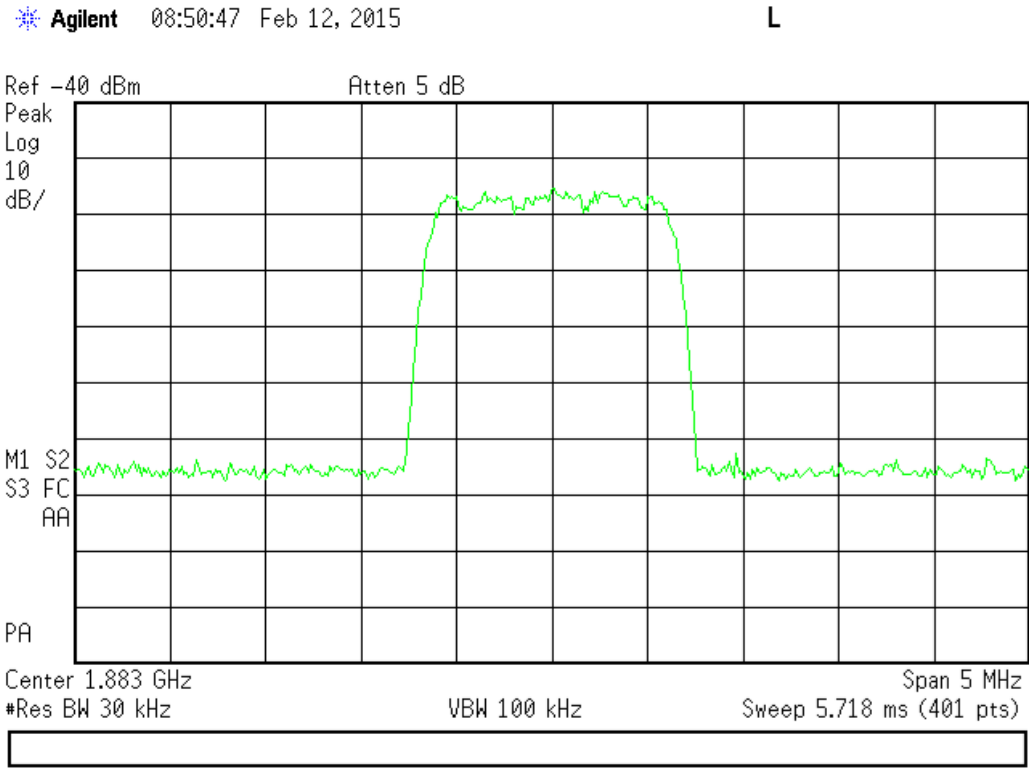


Output

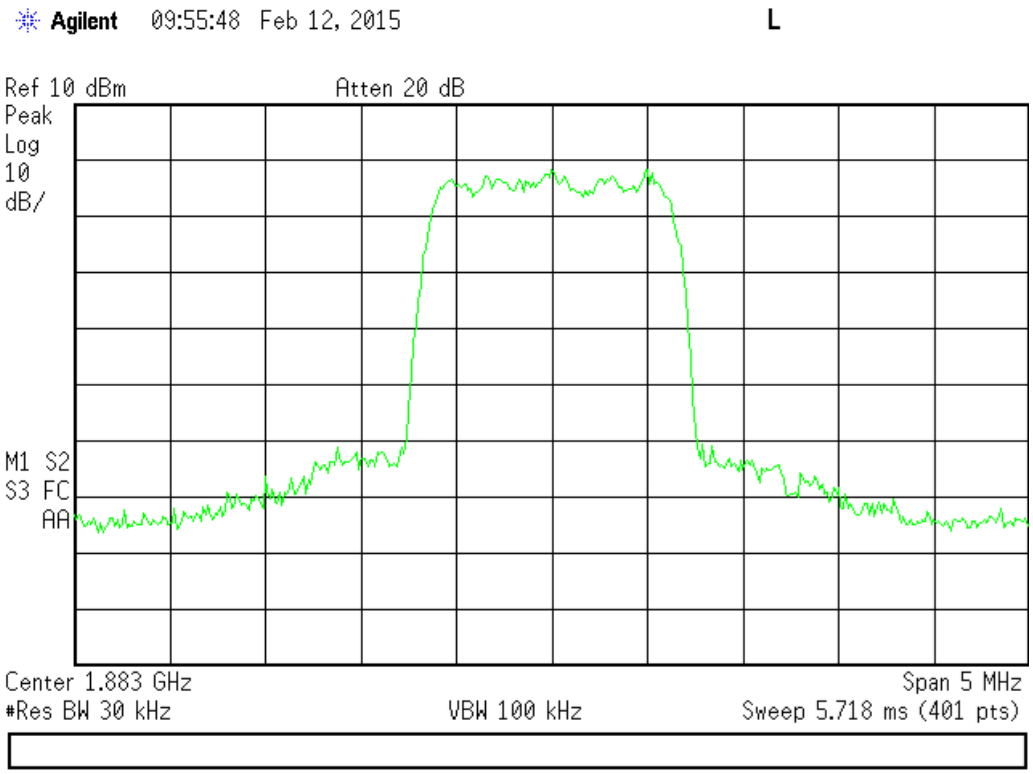


Uplink (CDMA Signal mid band)

1850-1915 MHz Band
Input

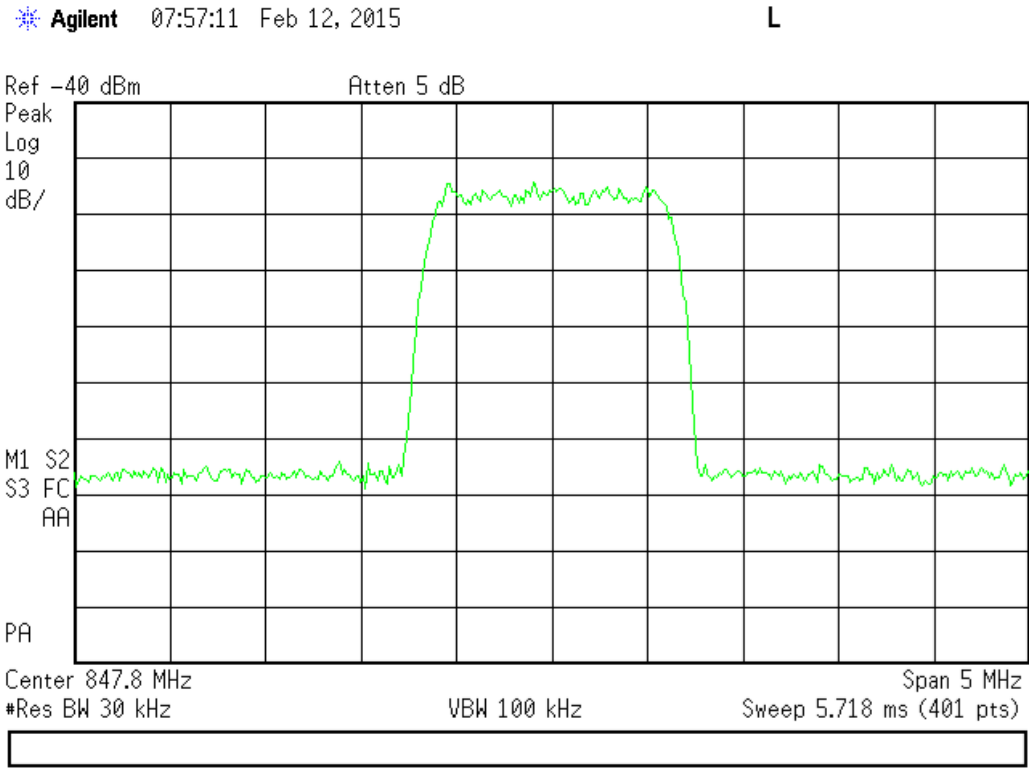


Output

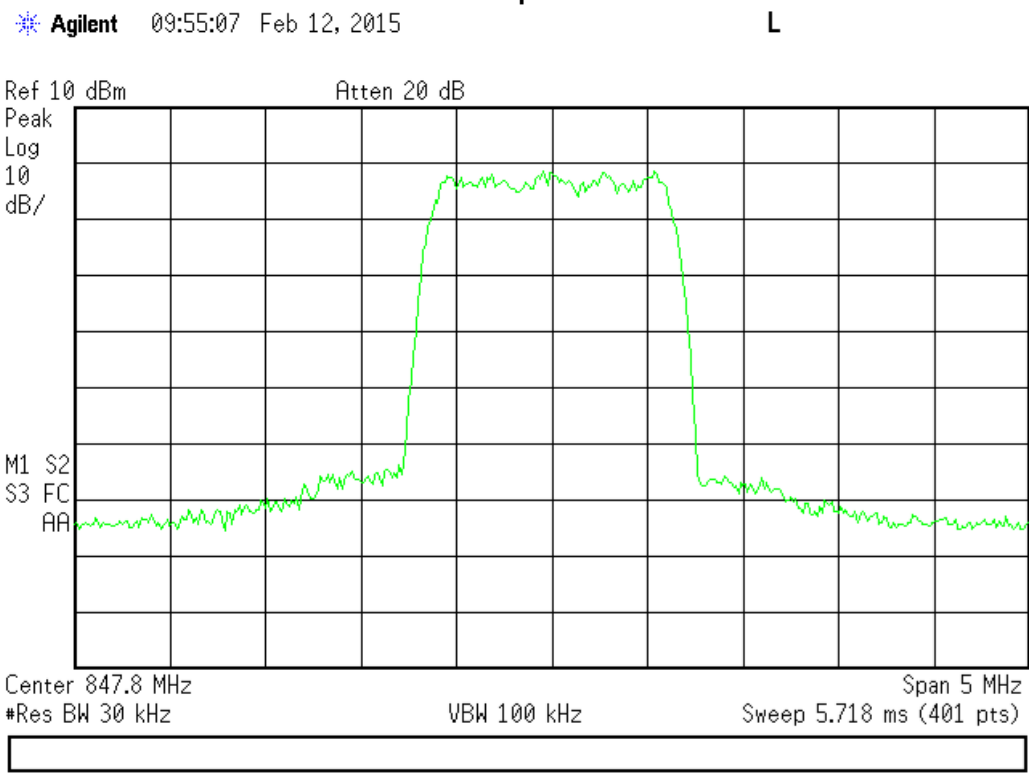


Uplink (CDMA Signal high band)

824-849 MHz Band
Input

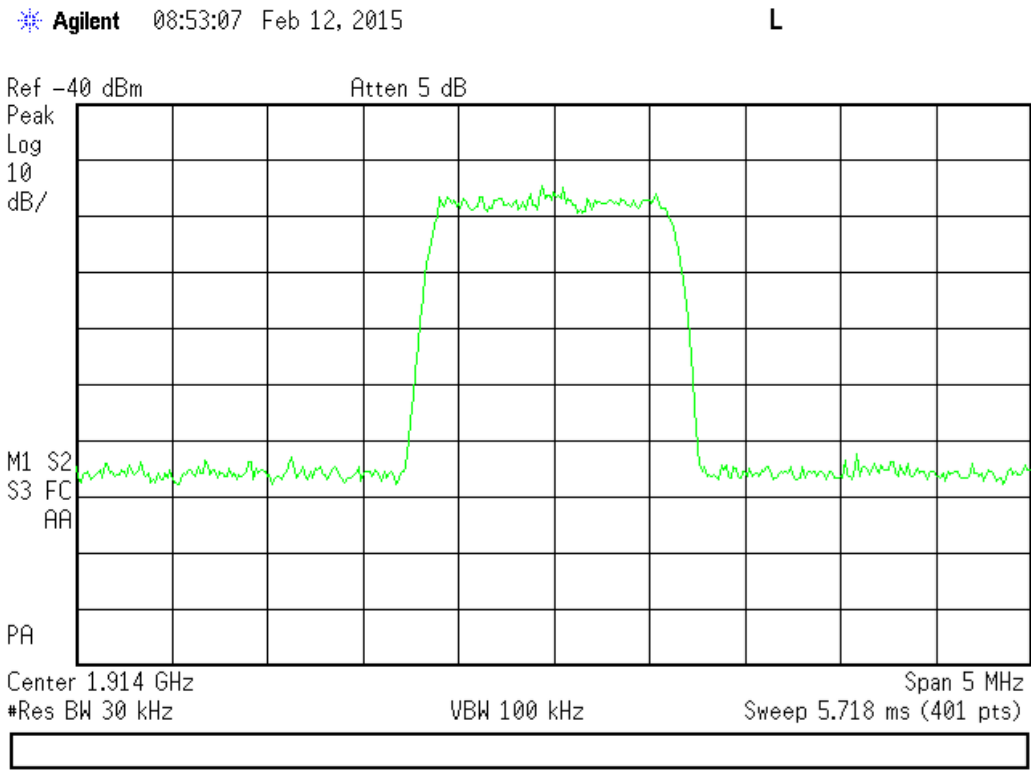


Output

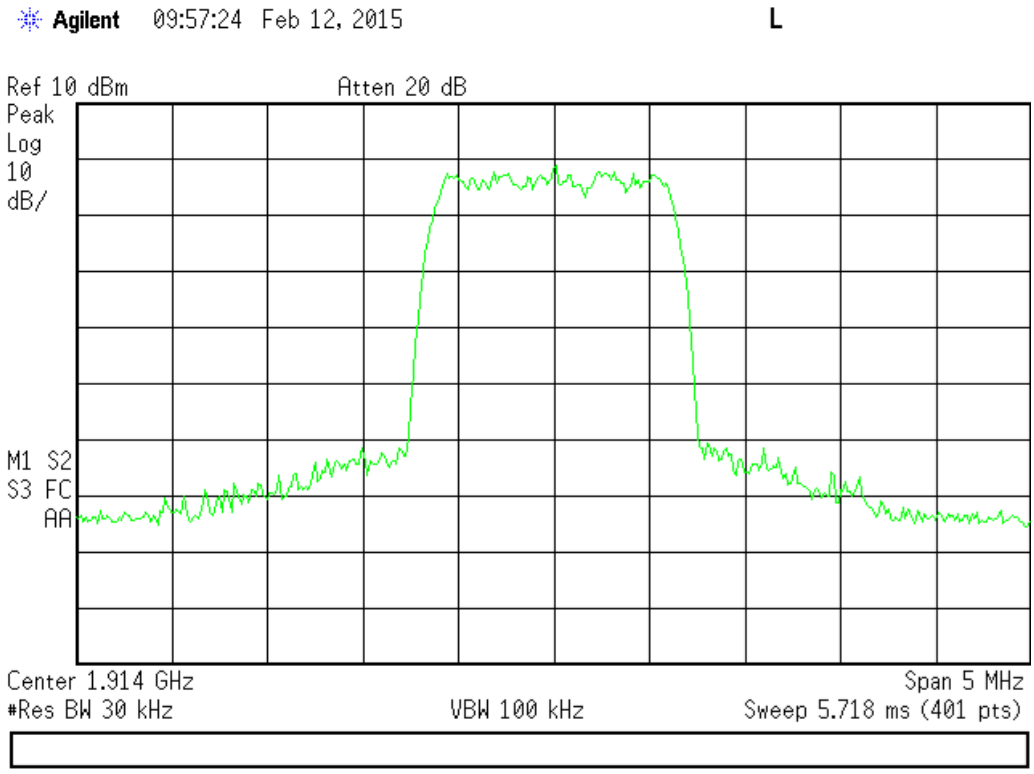


Uplink (CDMA Signal high band)

1850-1915 MHz Band
Input

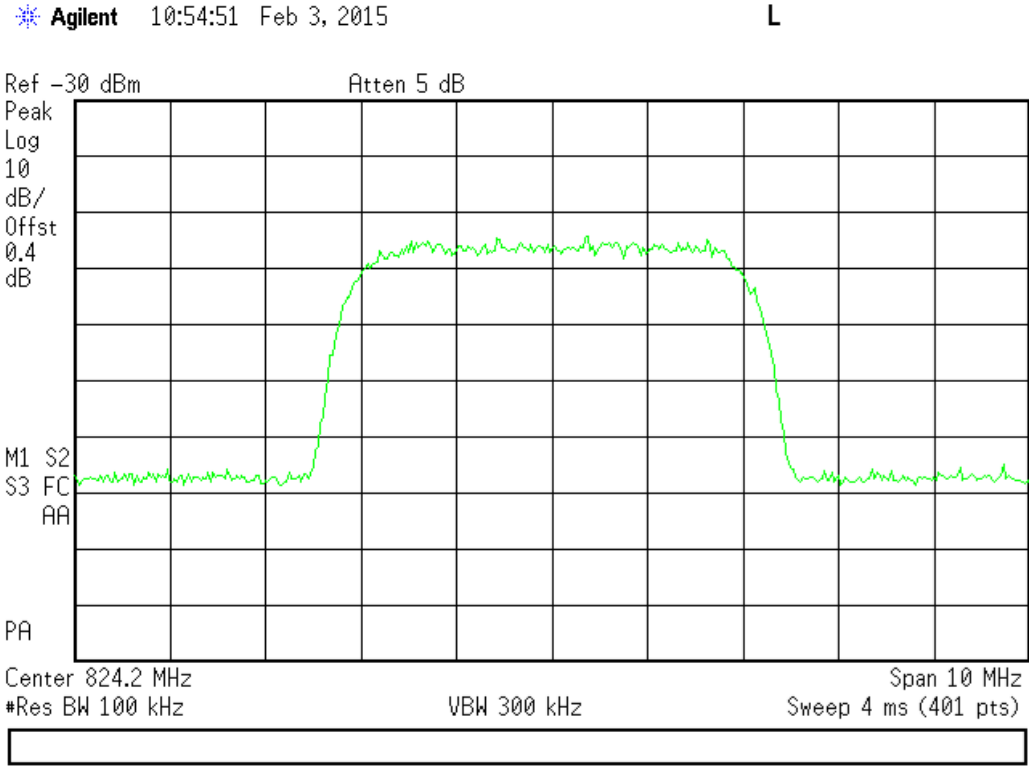


Output

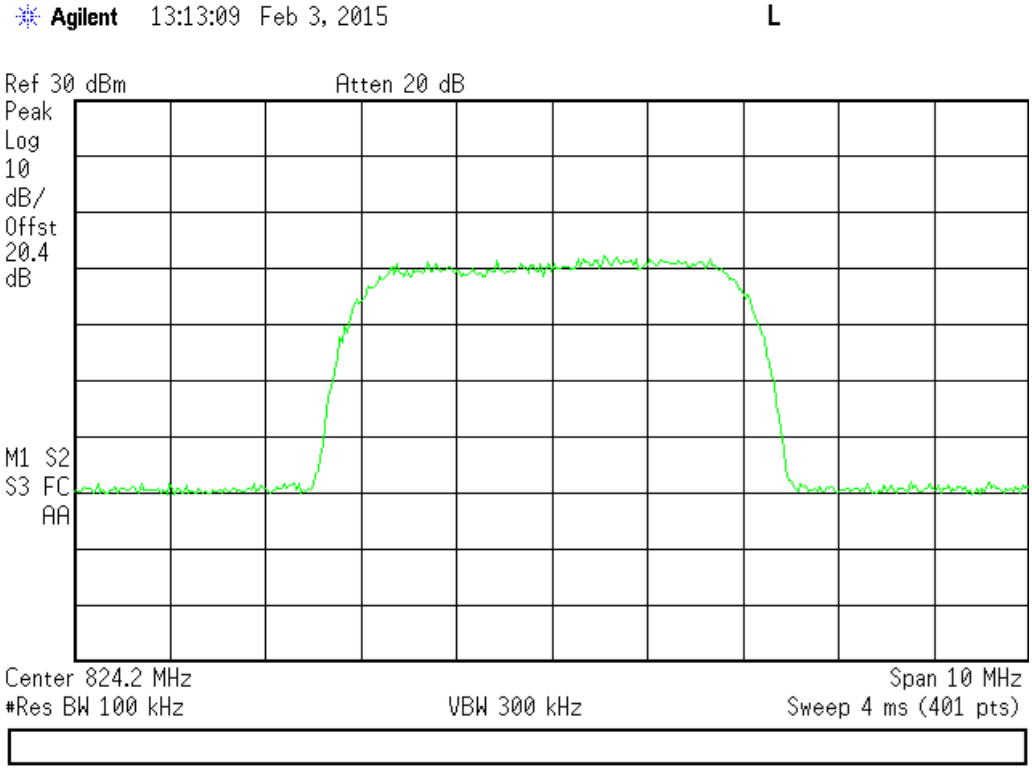


Uplink (WCDMA Signal Low band)

824-849 MHz Band
Input

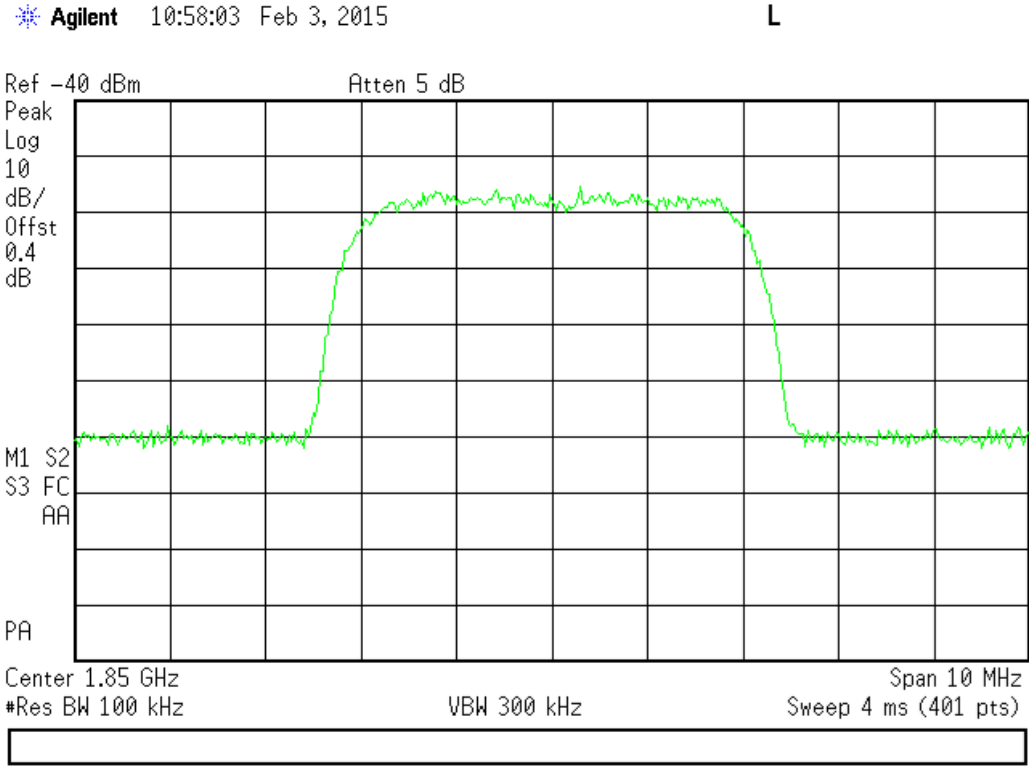


Output

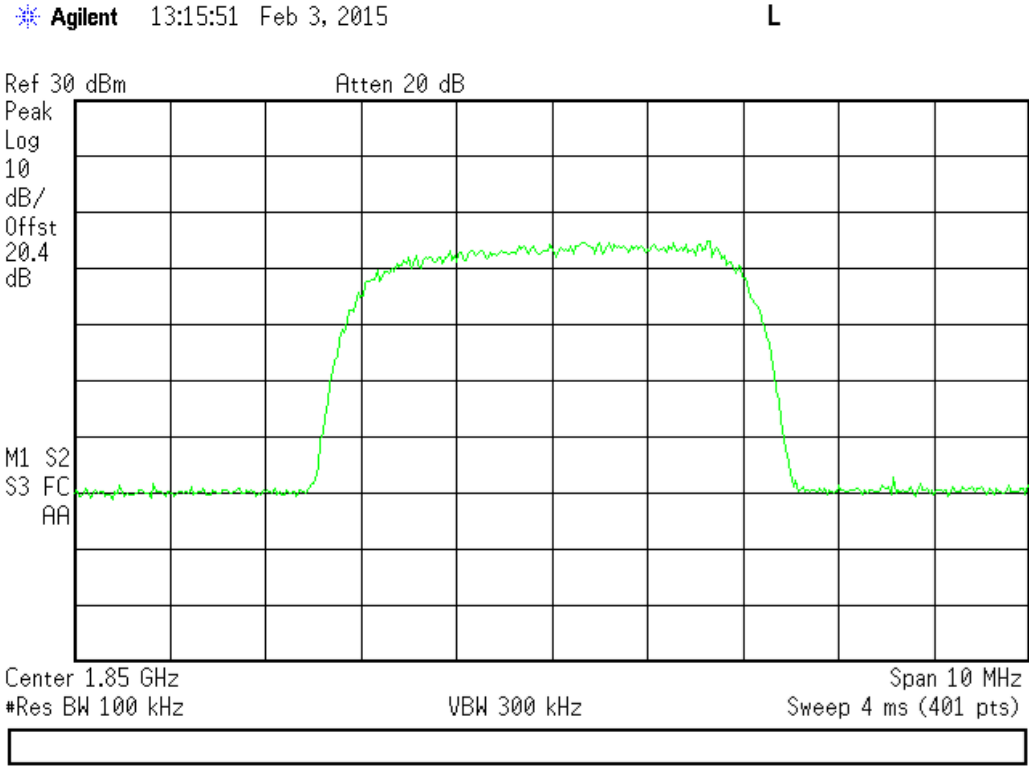


Uplink (WCDMA Signal Low band)

1850-1915 MHz Band
Input

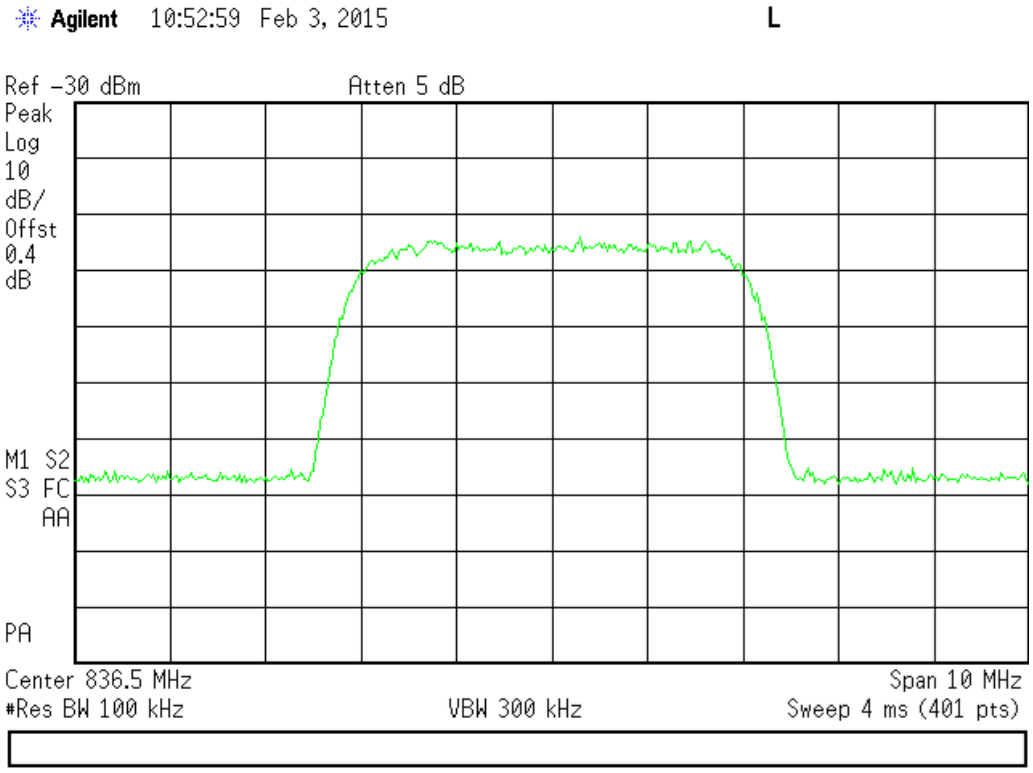


Output

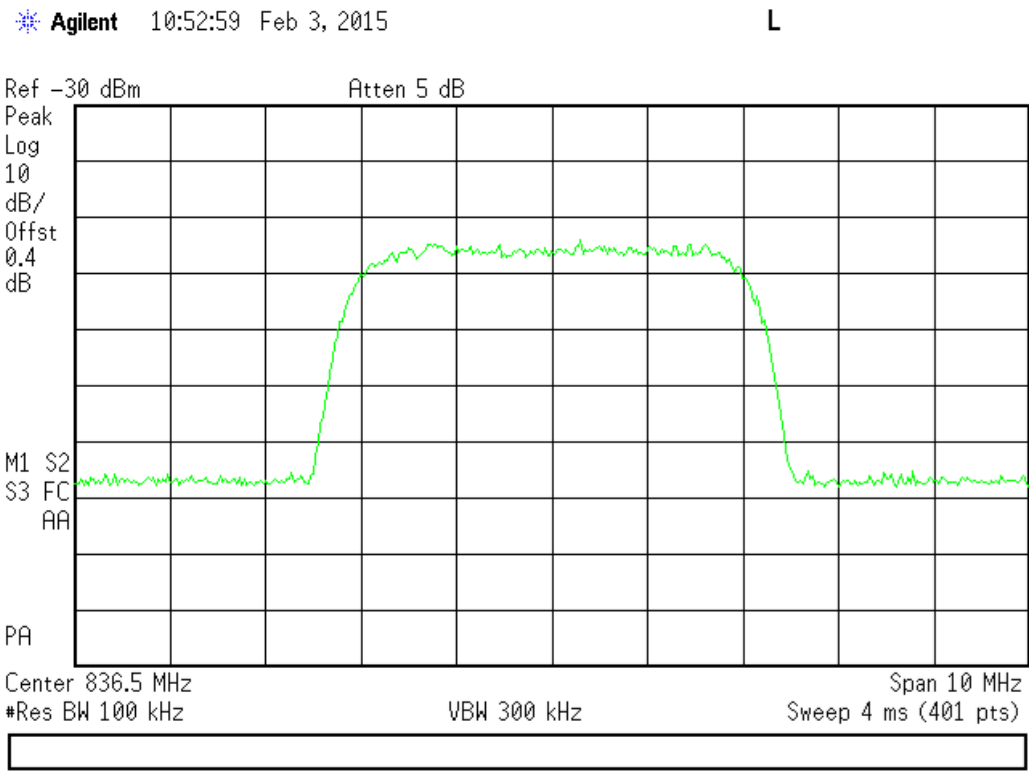


Uplink (WCDMA Signal Mid band)

824-849 MHz Band
Input

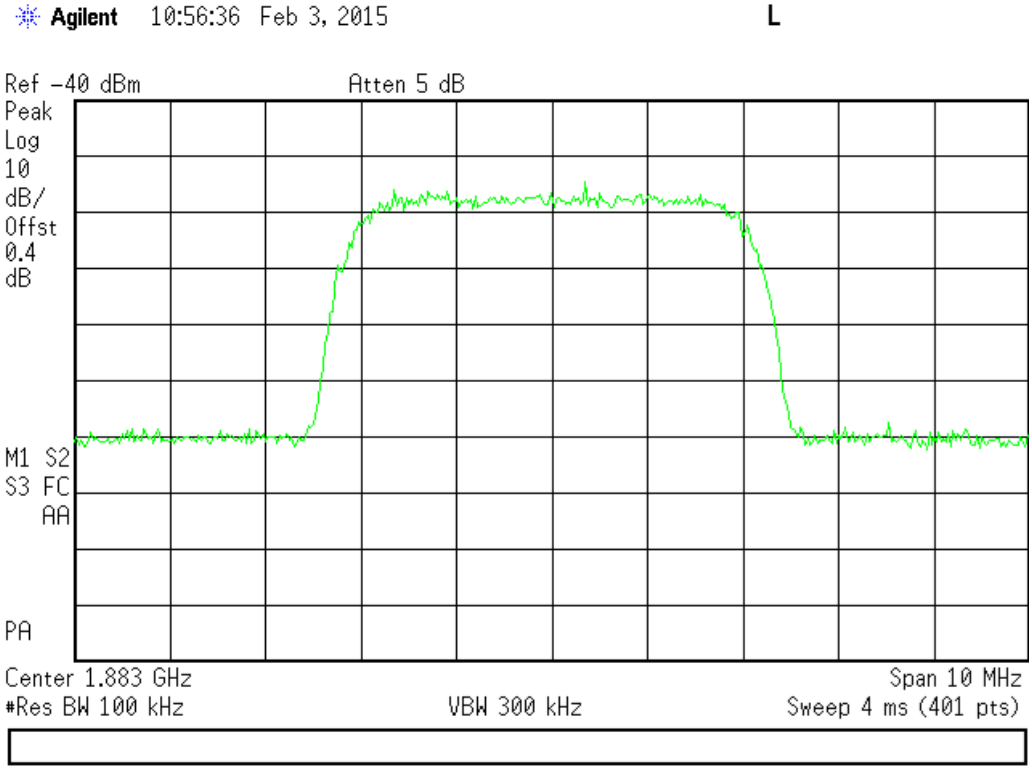


Output

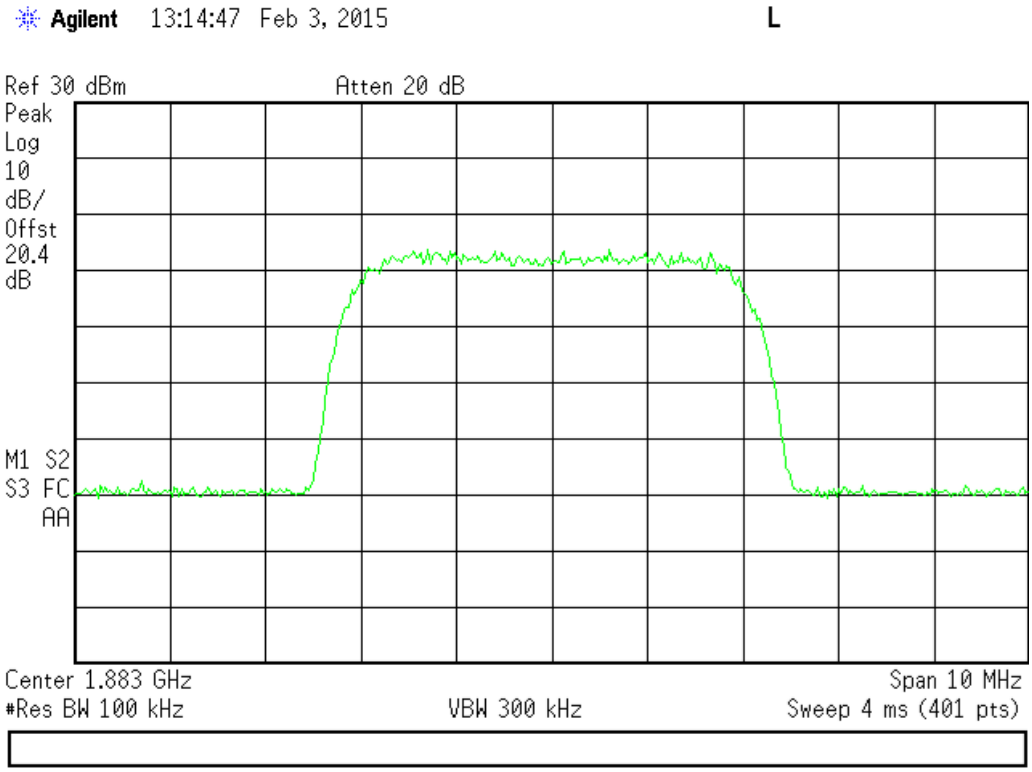


Uplink (WCDMA Signal Mid band)

1850-1915 MHz Band
Input

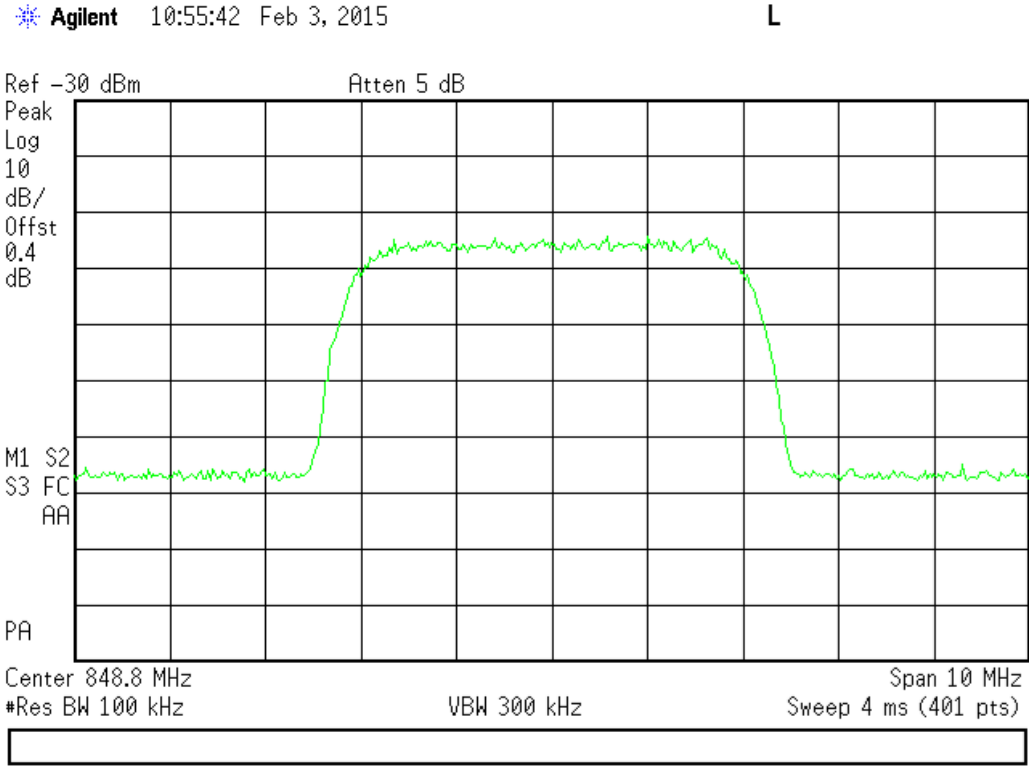


Output

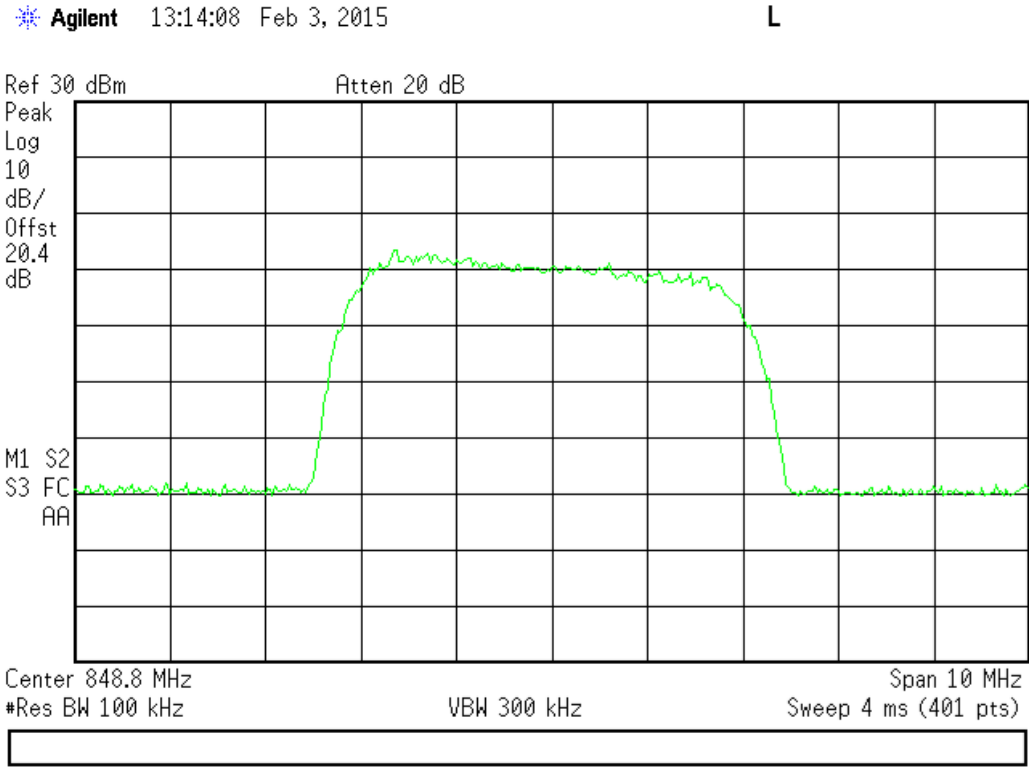


Uplink (WCDMA Signal High band)

824-849 MHz Band
Input

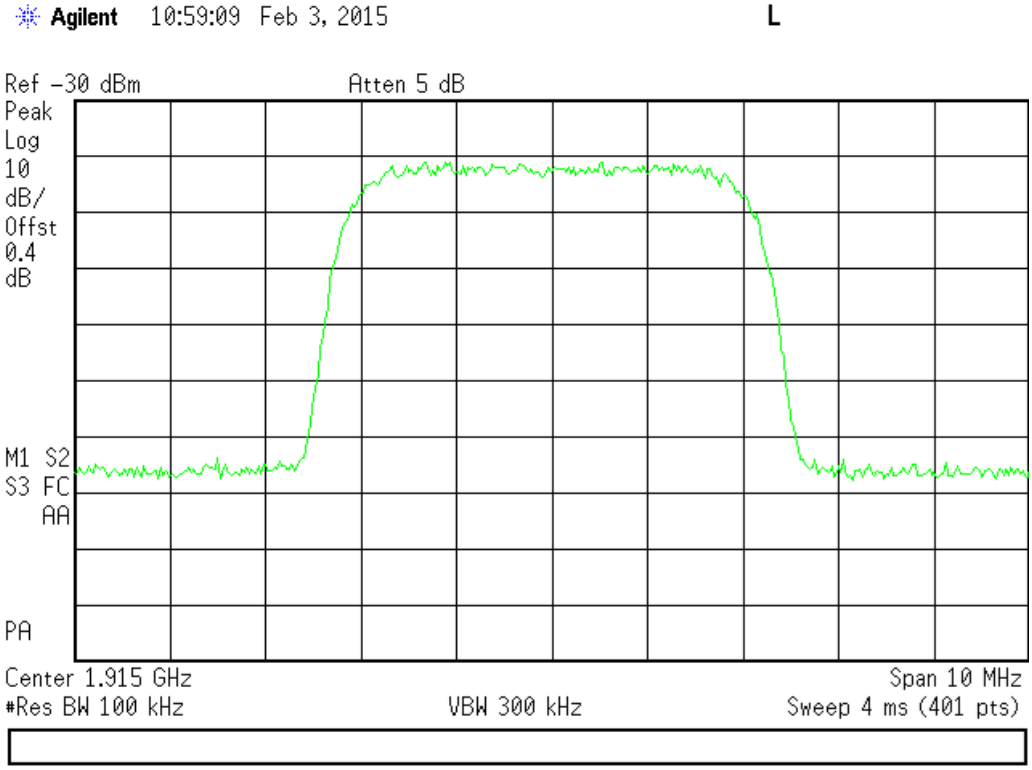


Output

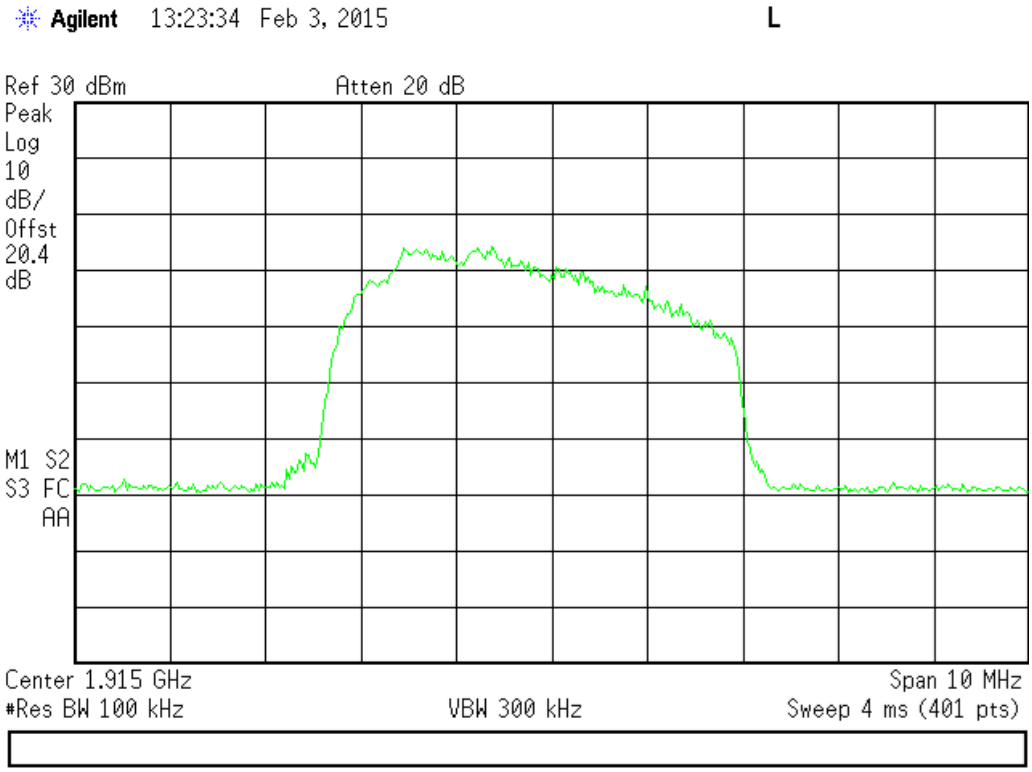


Uplink (WCDMA Signal High band)

1850-1915 MHz Band
Input

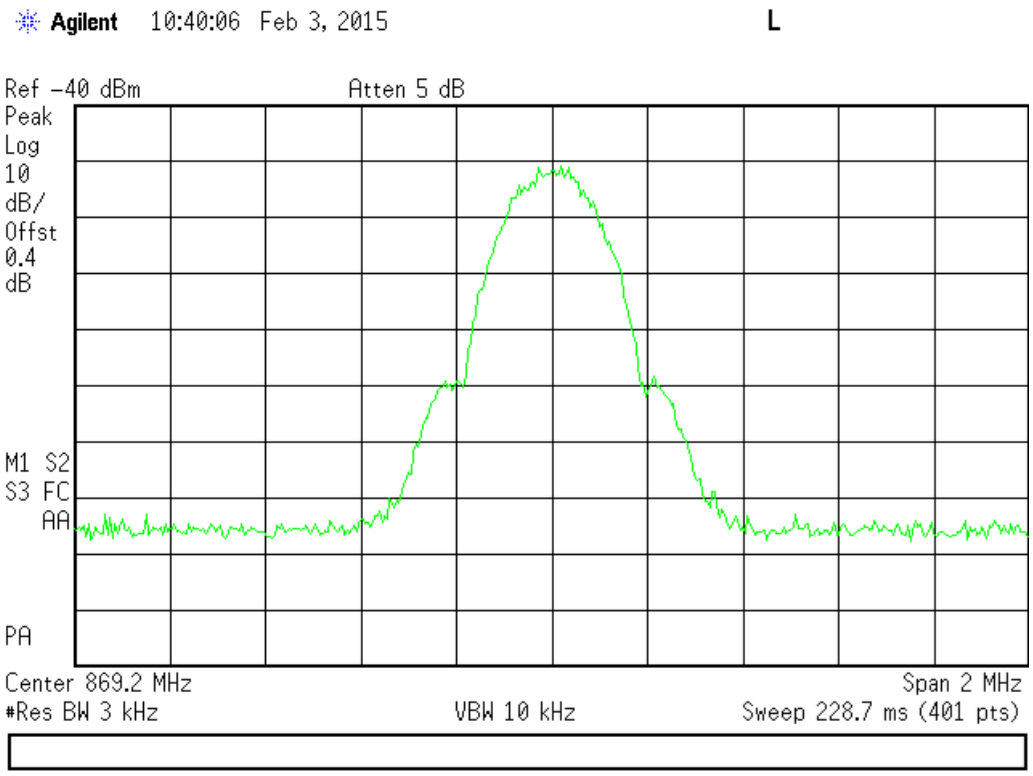


Output

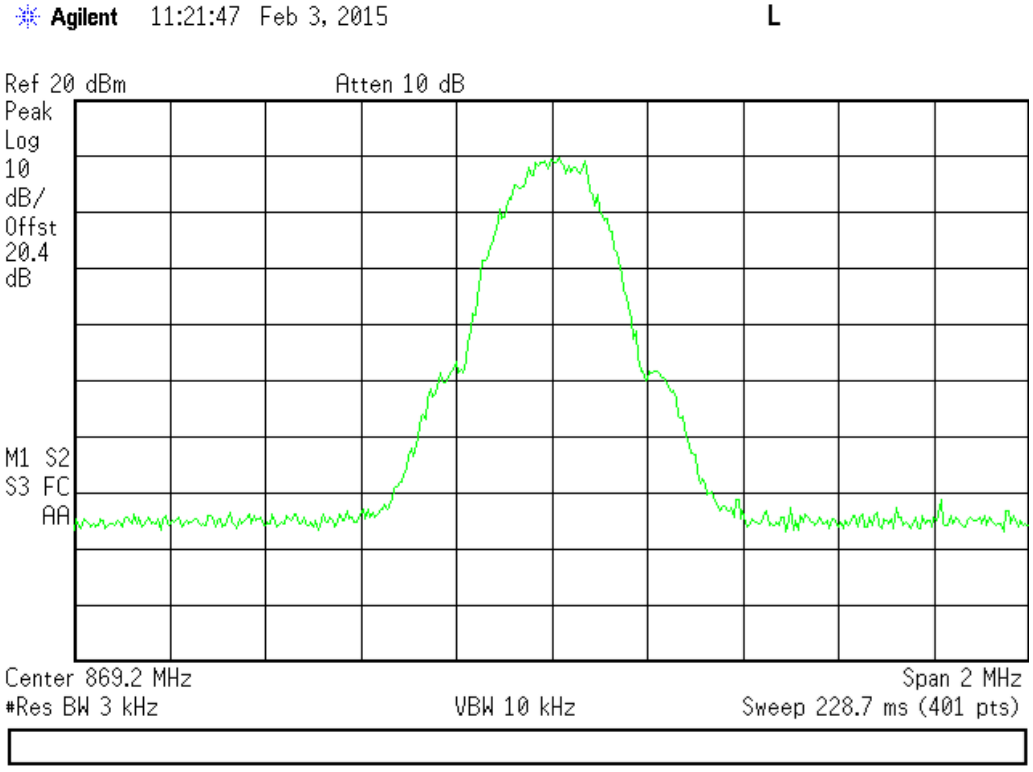


Downlink (GSM Signal low band)

869-894 MHz Band
Input

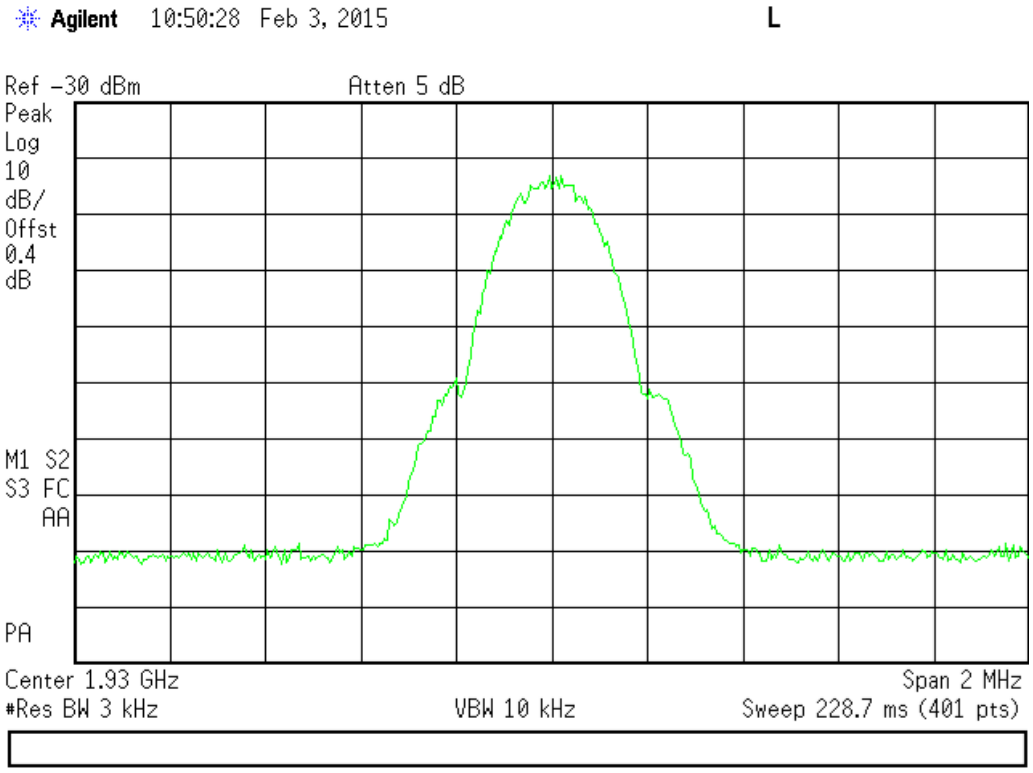


Output

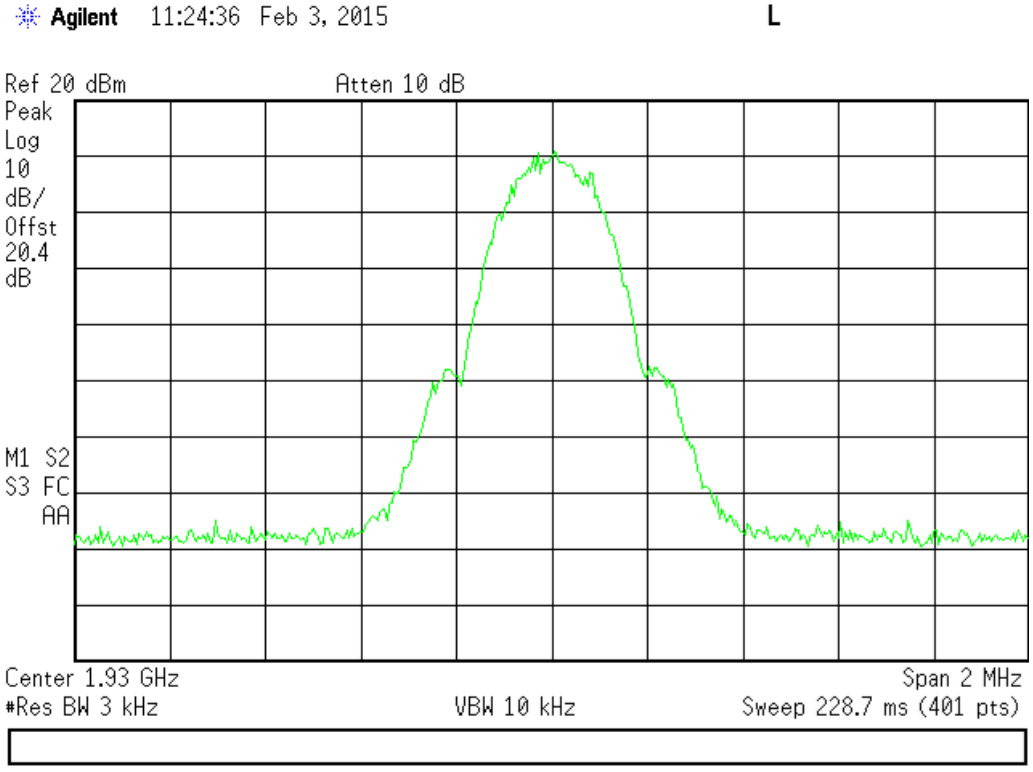


Downlink (GSM Signal low band)

1930-1995 MHz Band
Input

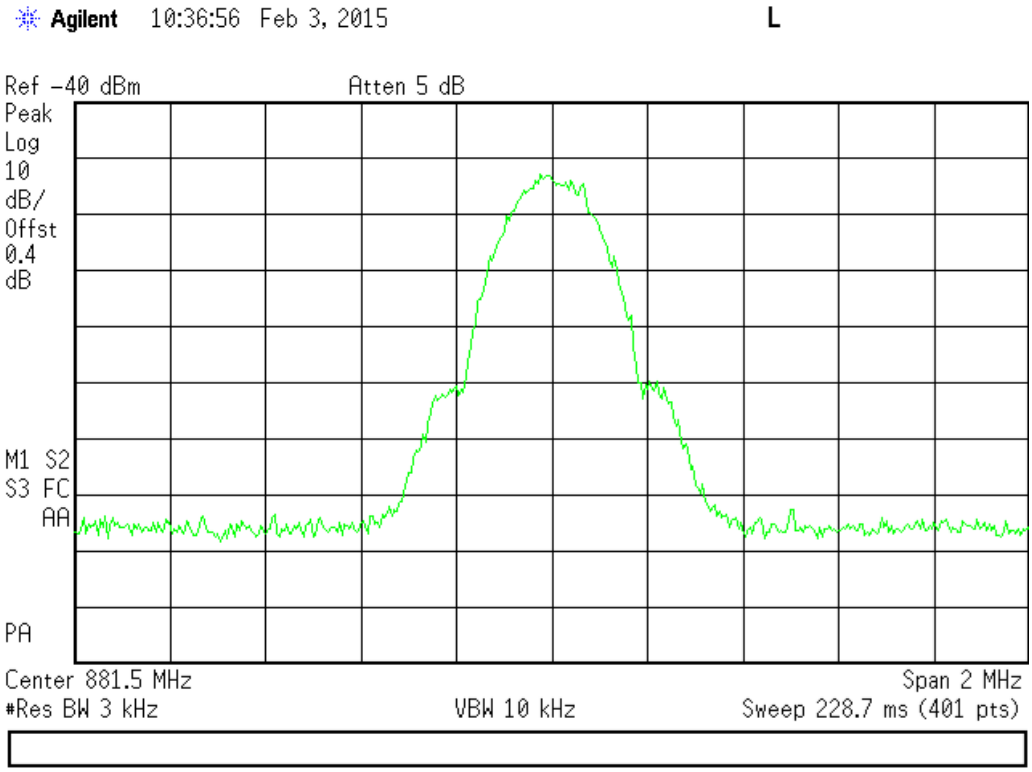


Output

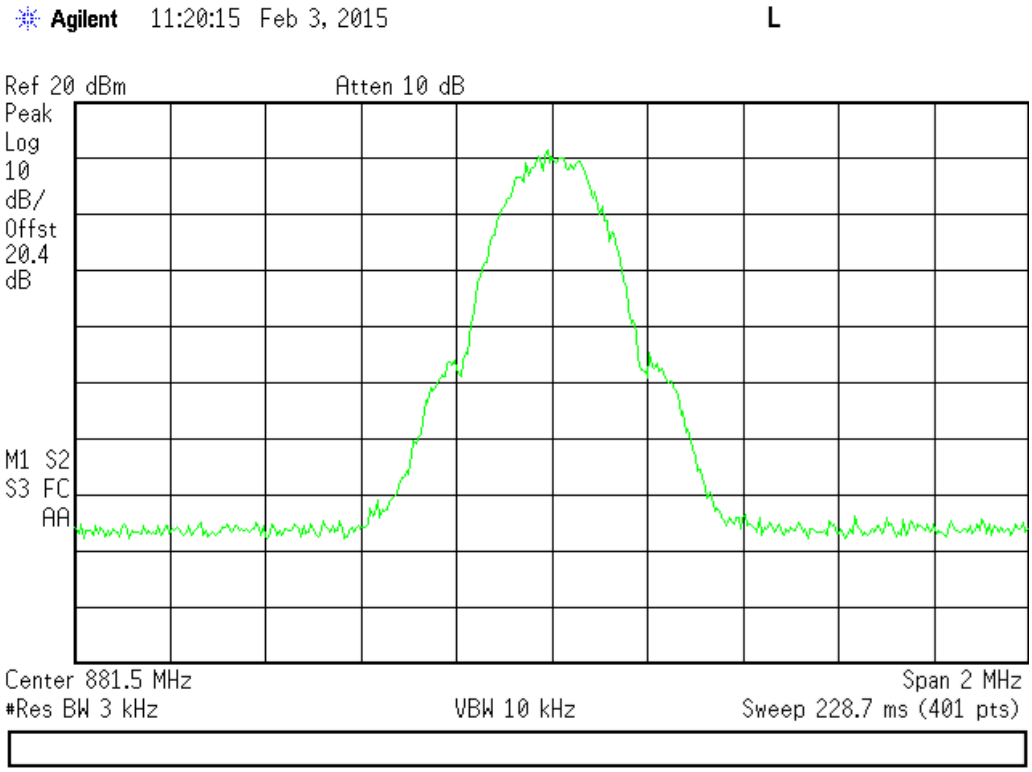


Downlink (GSM Signal mid band)

869-894 MHz Band
Input

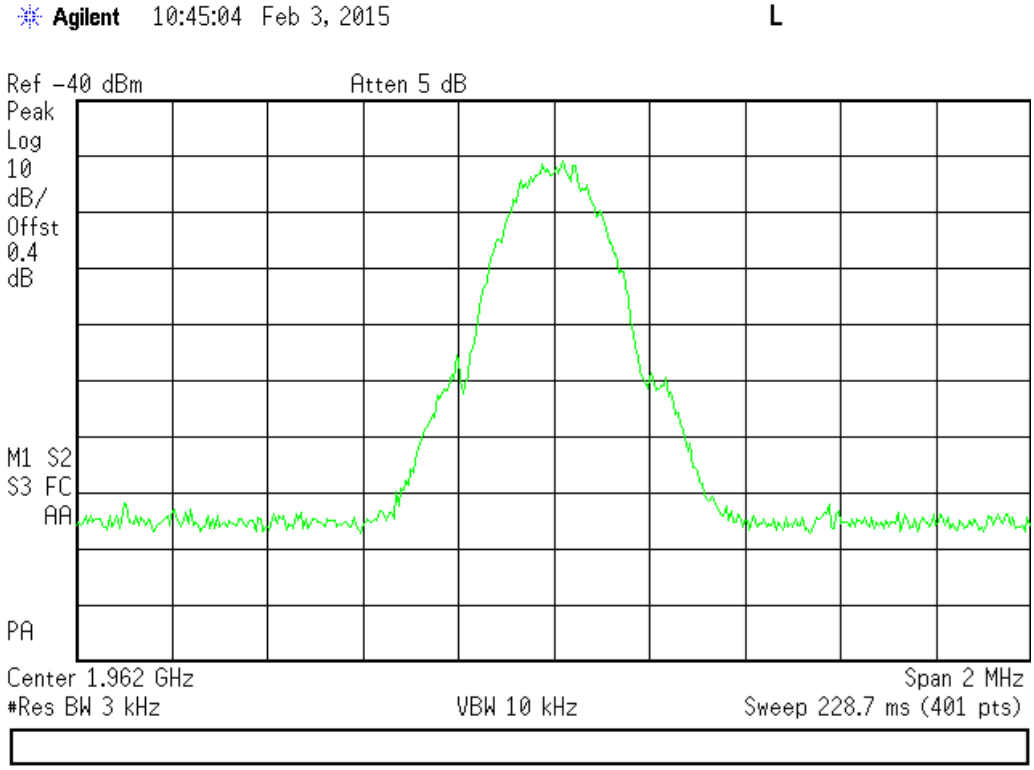


Output

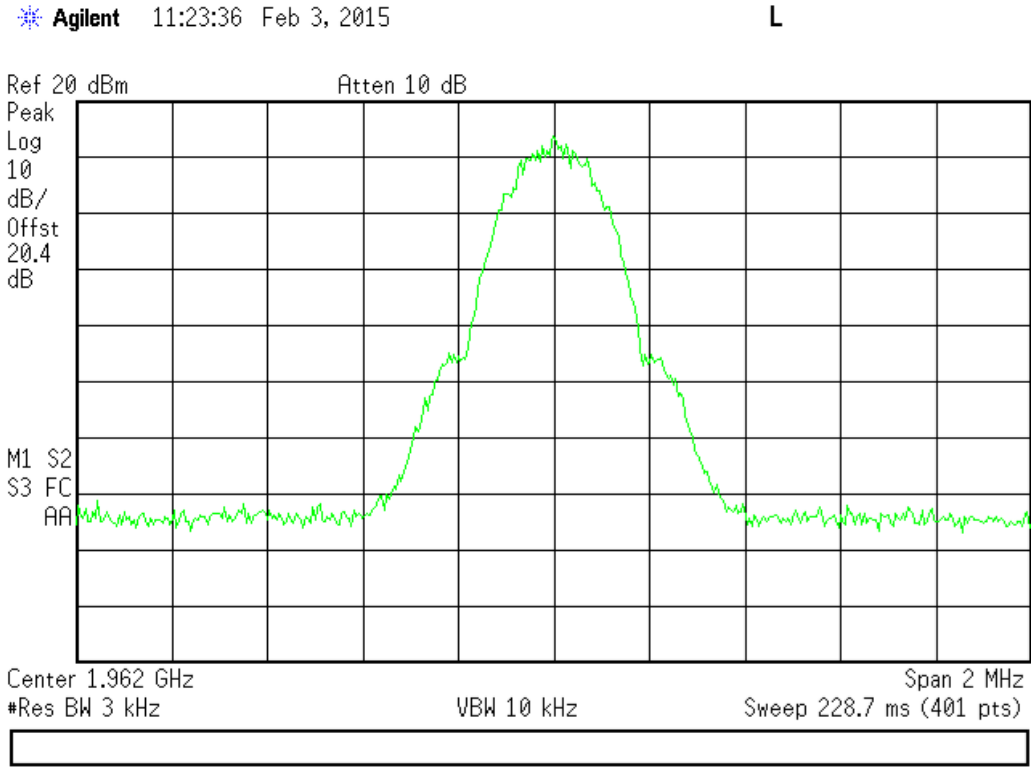


Downlink (GSM Signal mid band)

1930-1995 MHz Band
Input

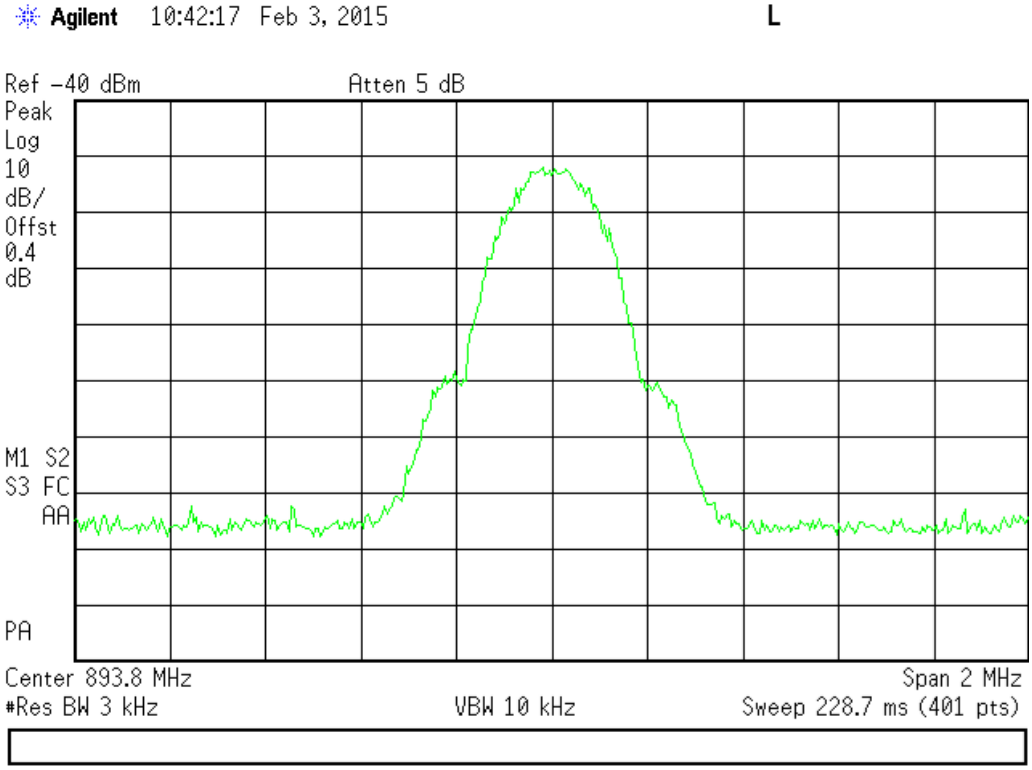


Output

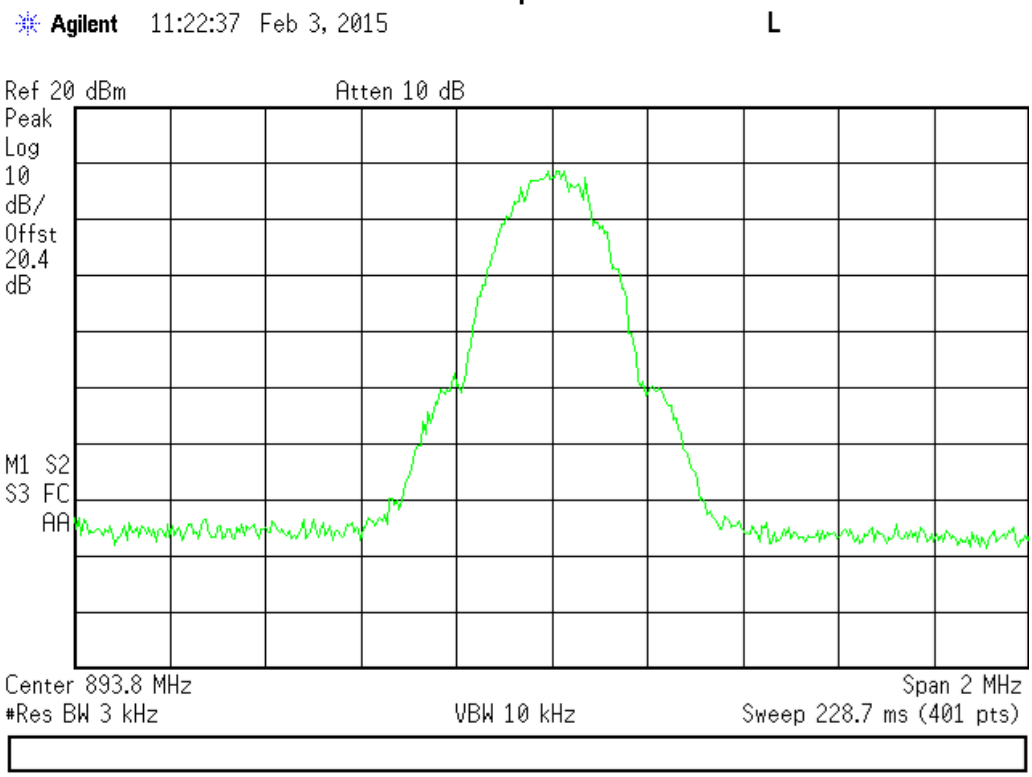


Downlink (GSM Signal high band)

869-894 MHz Band
Input

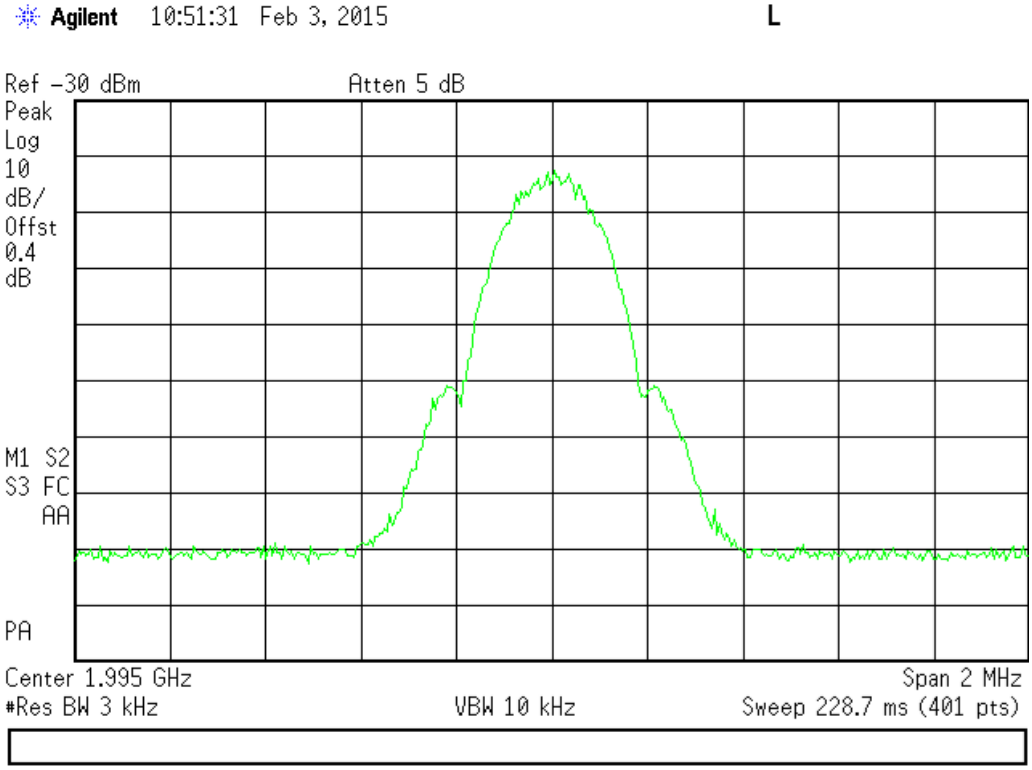


Output

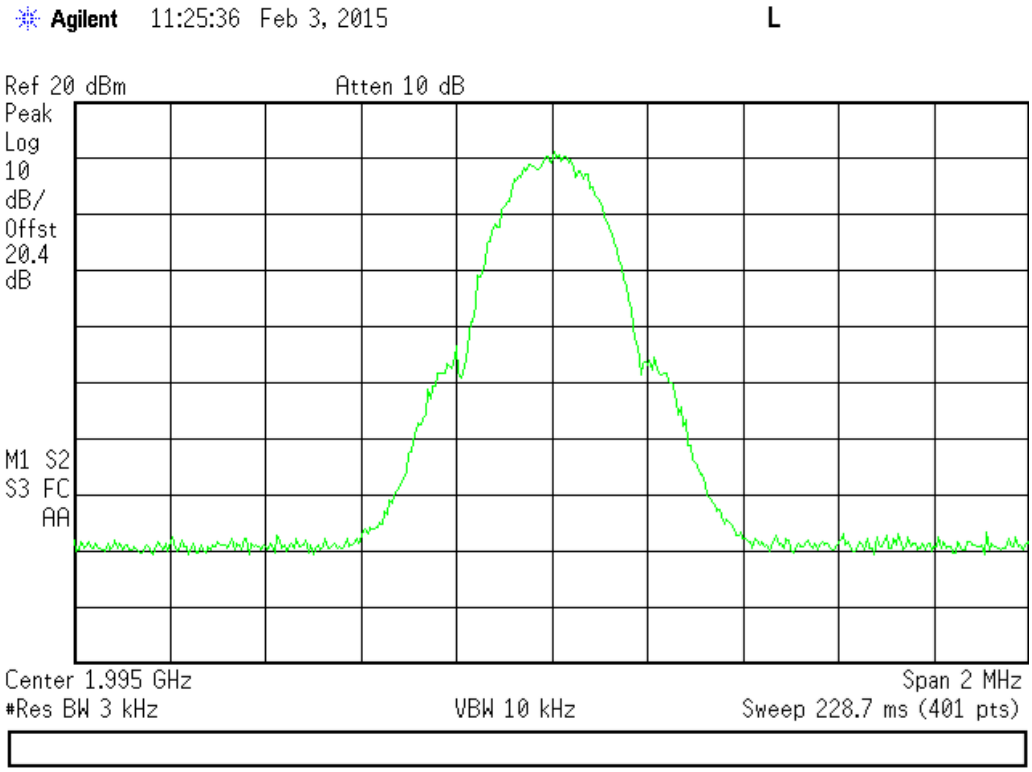


Downlink (GSM Signal high band)

1930-1995 MHz Band
Input

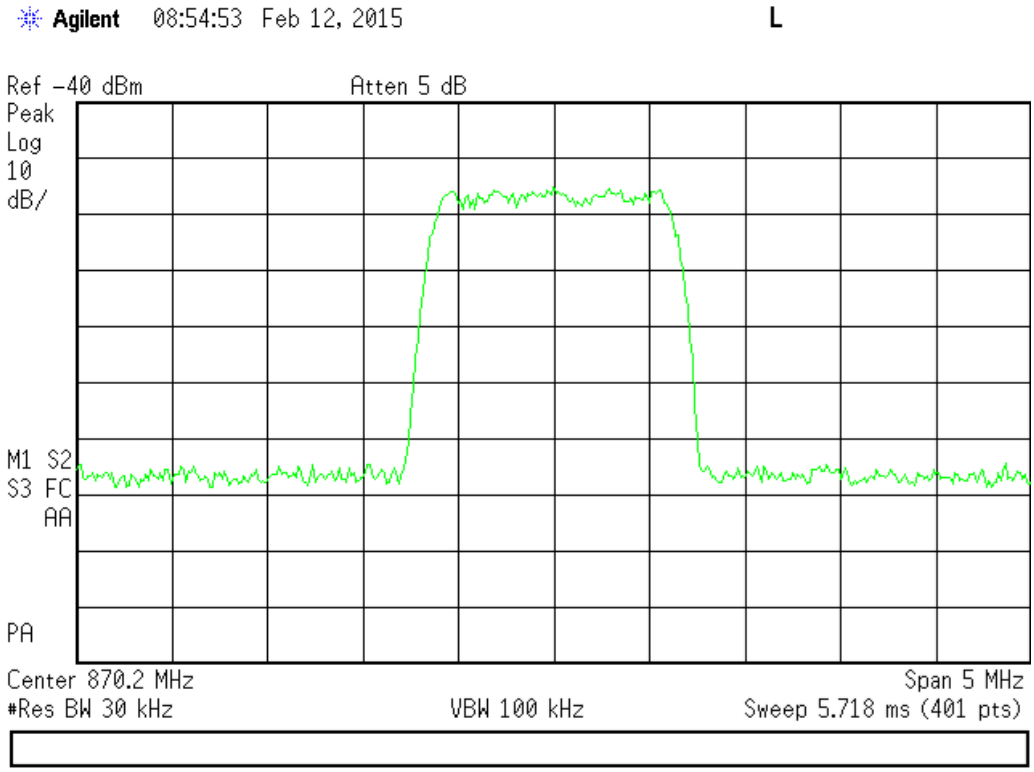


Output

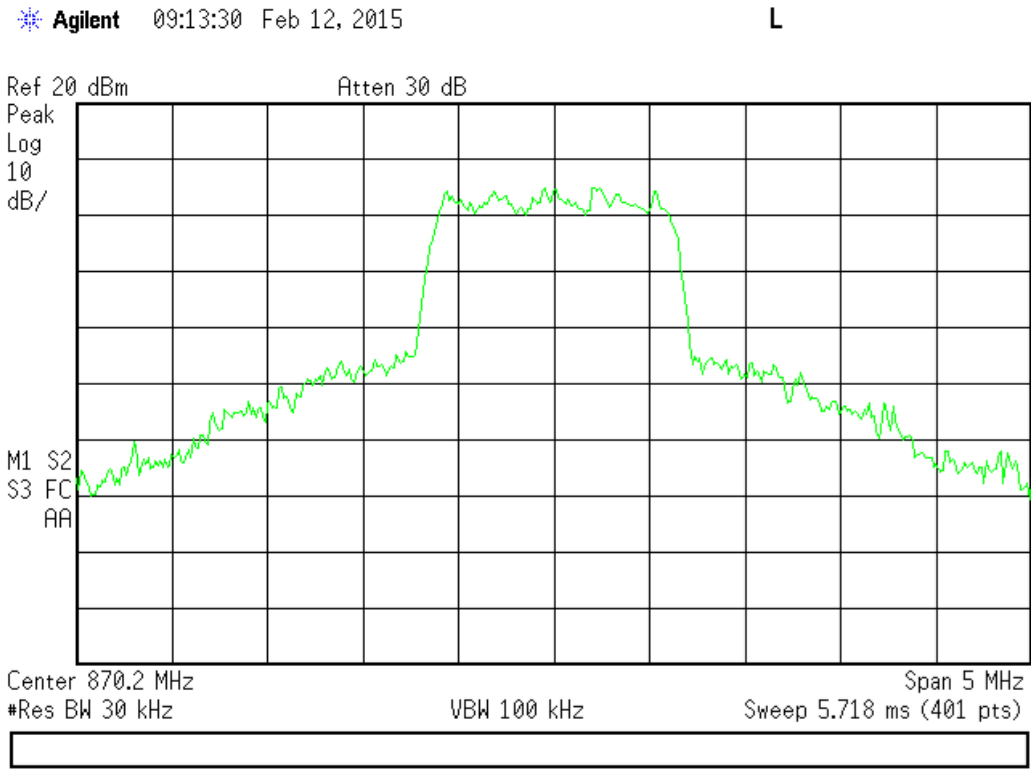


Downlink (CDMA Signal low band)

869-894 MHz Band
Input



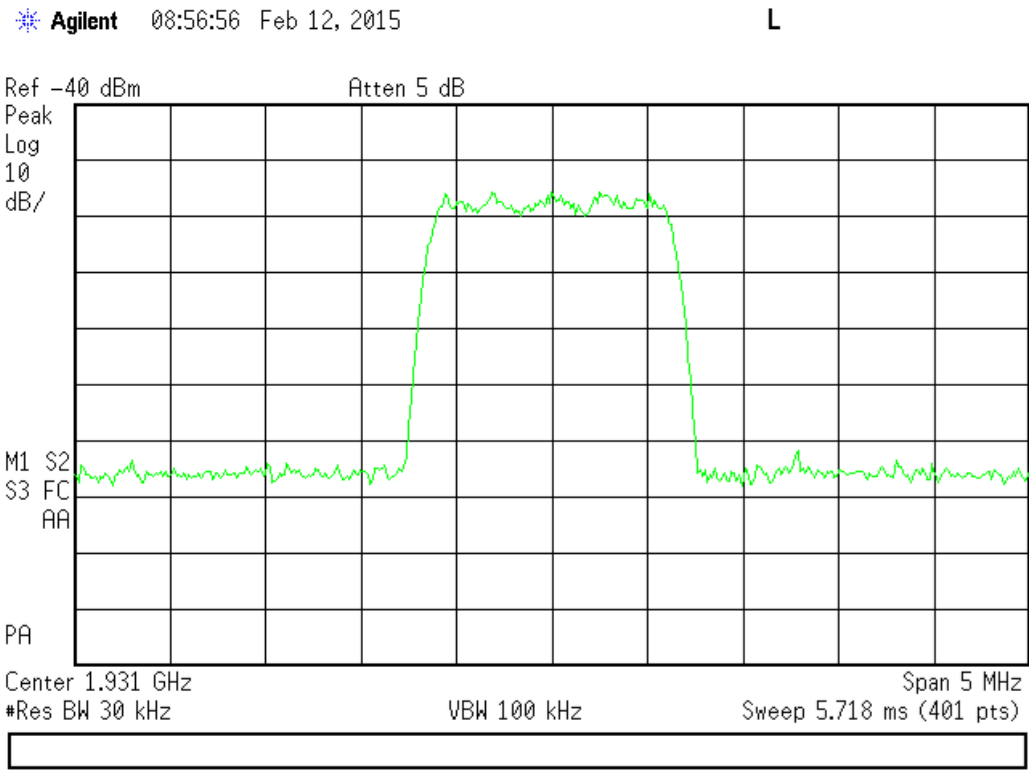
Output



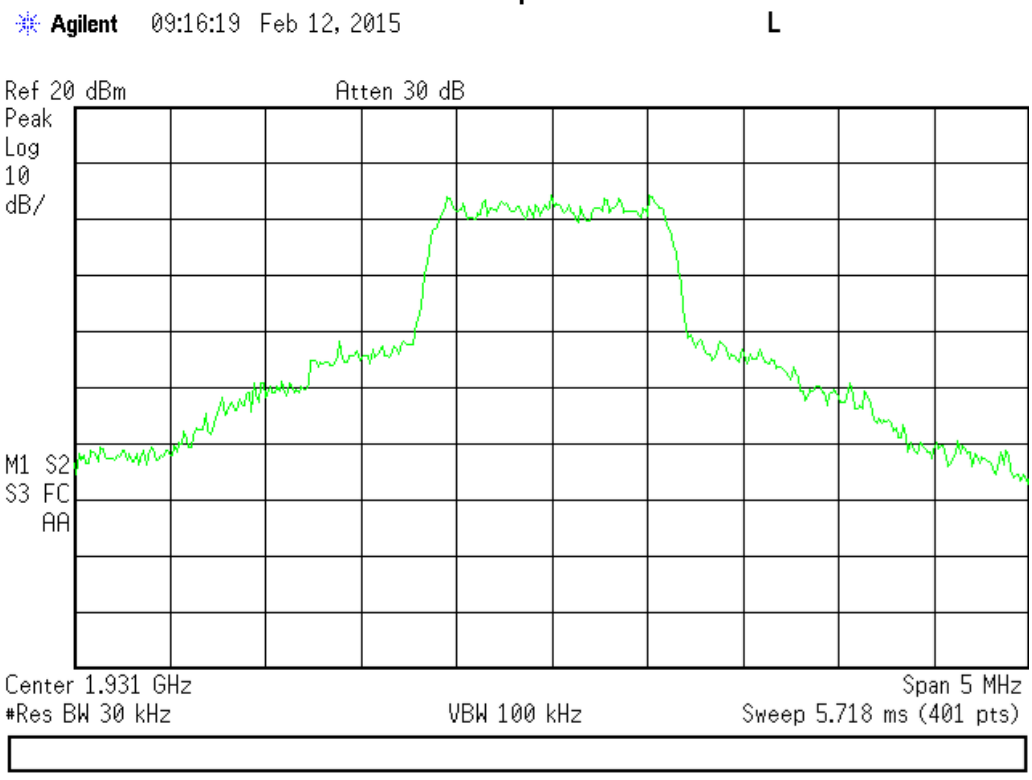
Downlink (CDMA Signal low band)

1930-1995 MHz Band

Input

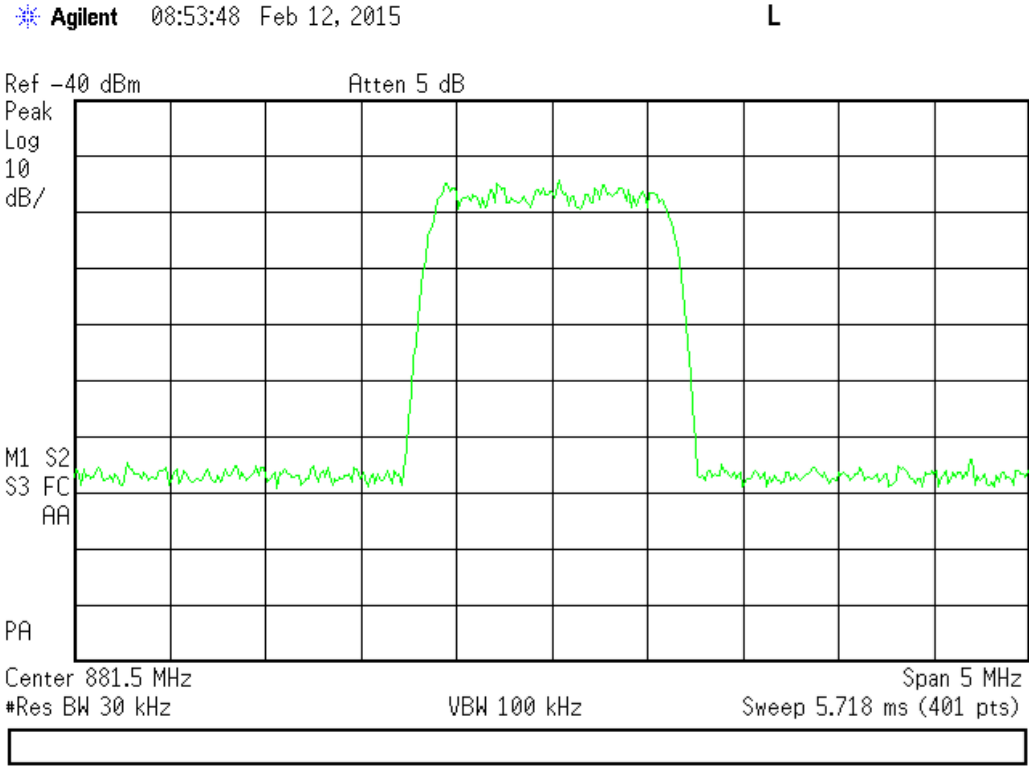


Output

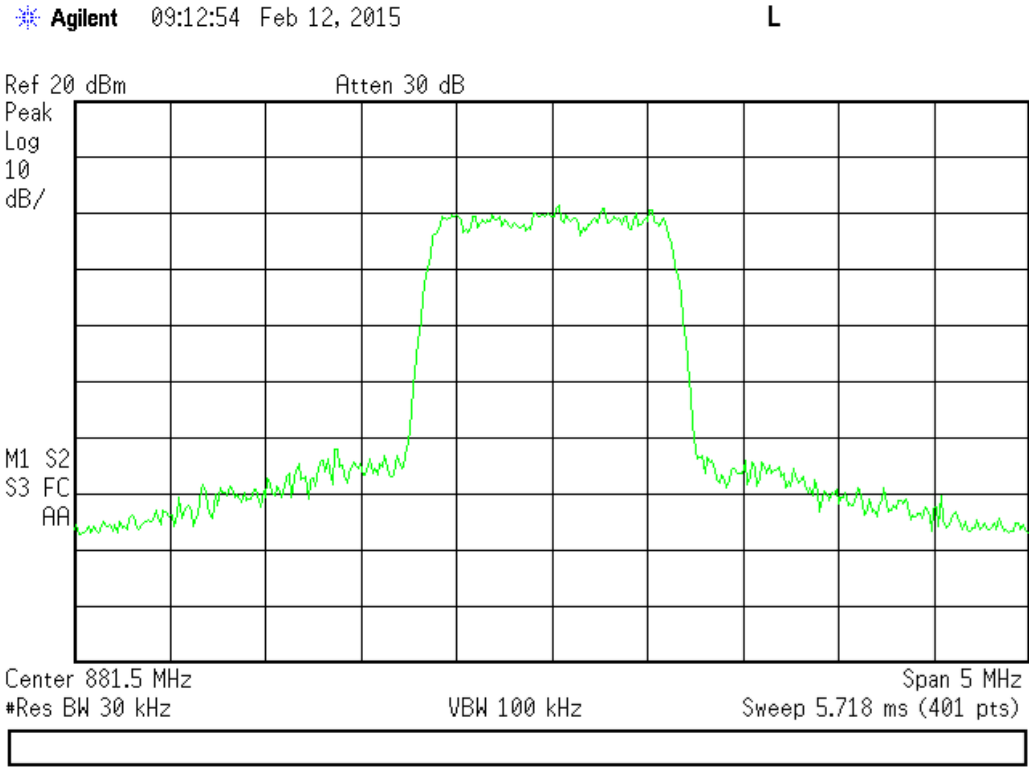


Downlink (CDMA Signal mid band)

869-894 MHz Band
Input



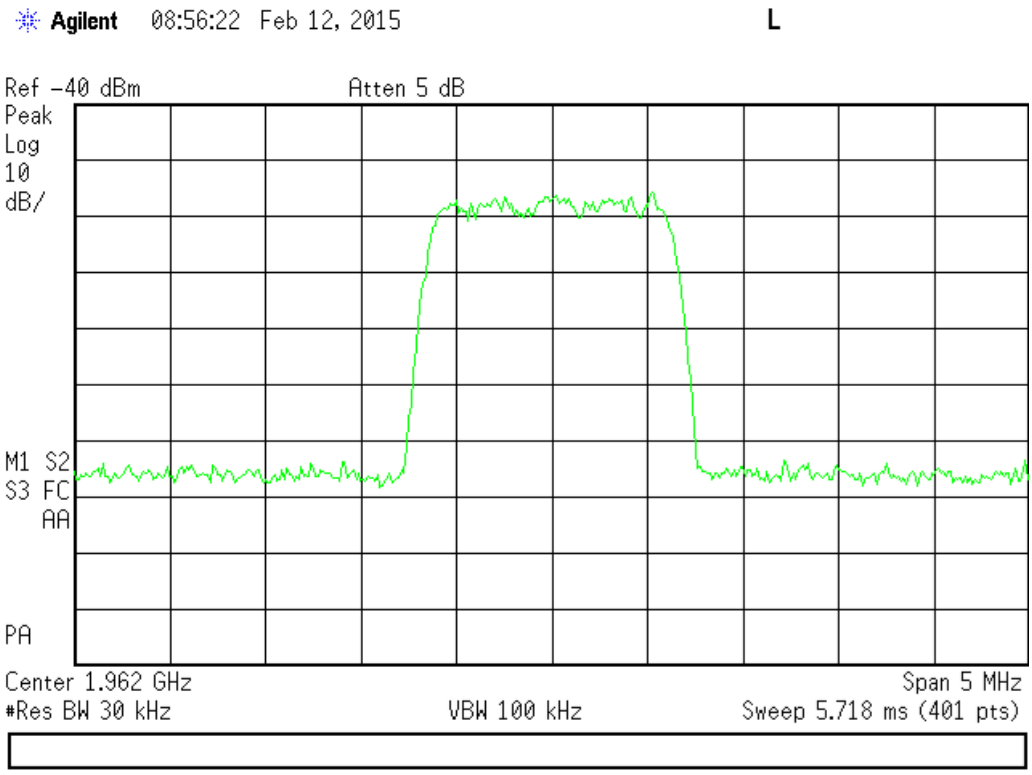
Output



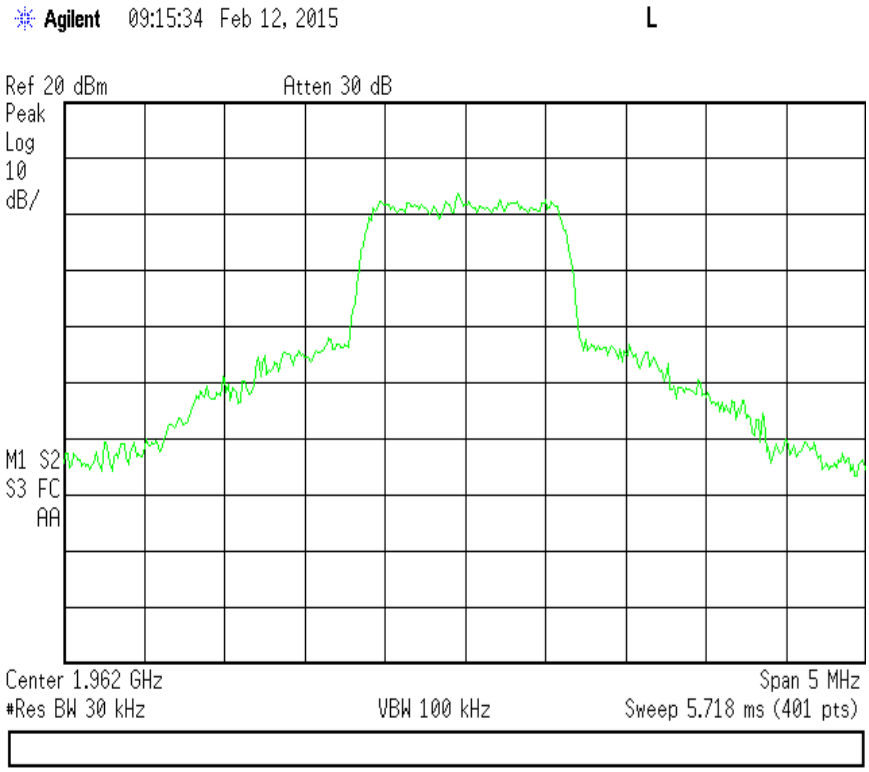
Downlink (CDMA Signal mid band)

1930-1995 MHz Band

Input

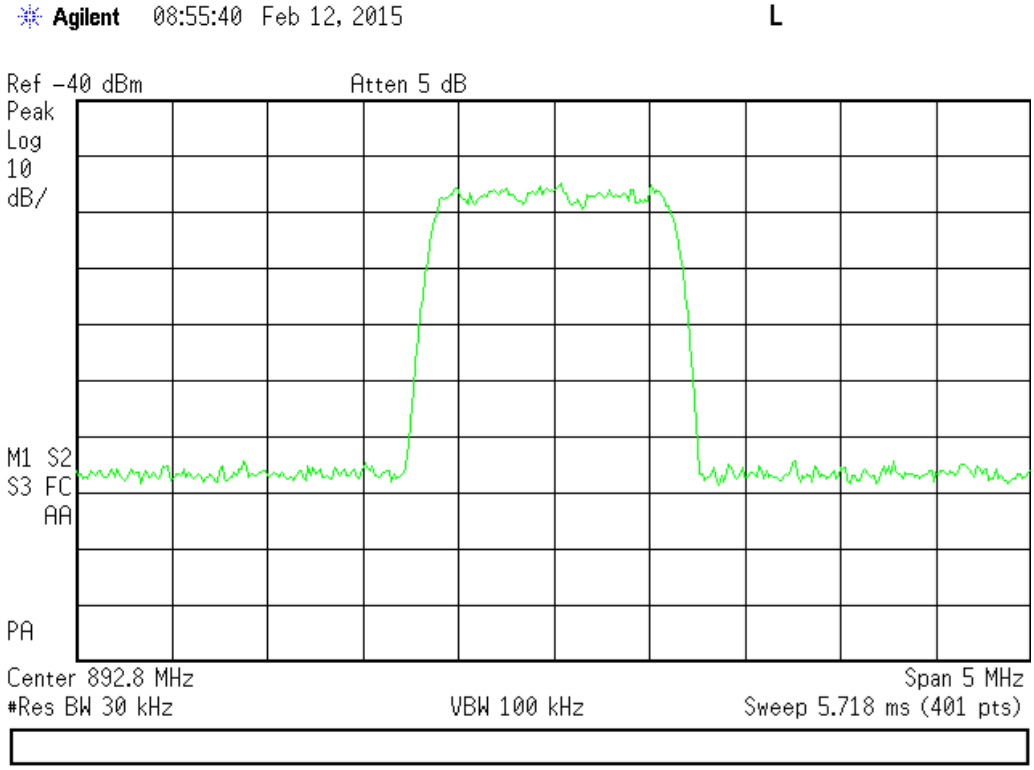


Output

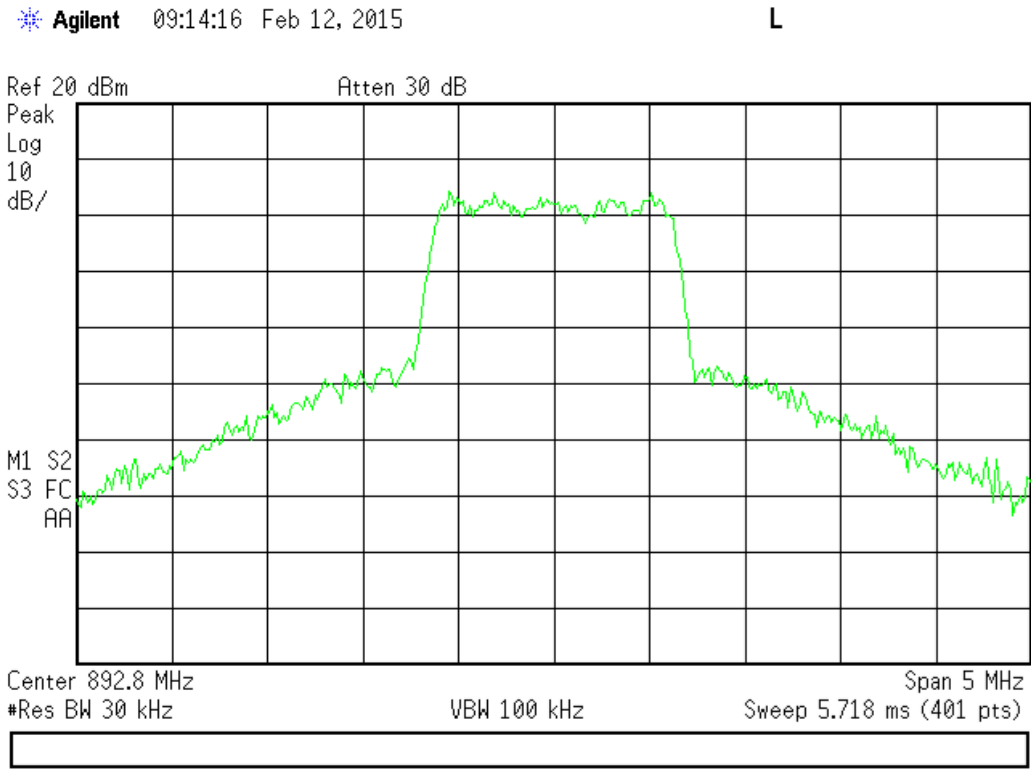


Downlink (CDMA Signal high band)

869-894 MHz Band
Input



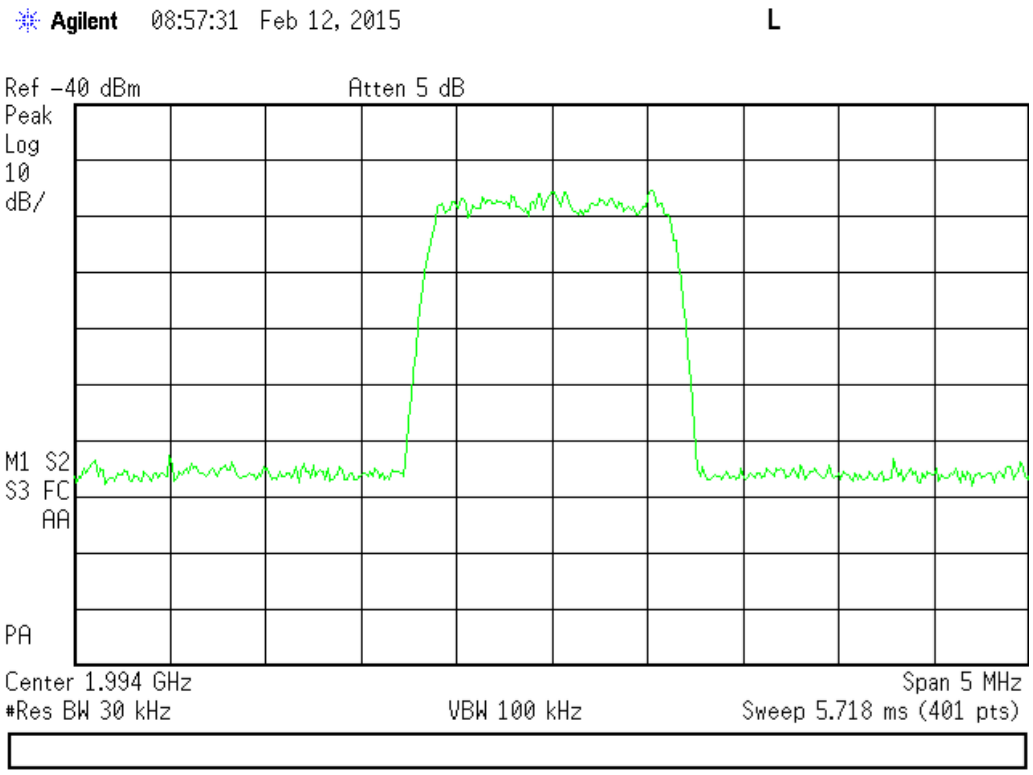
Output



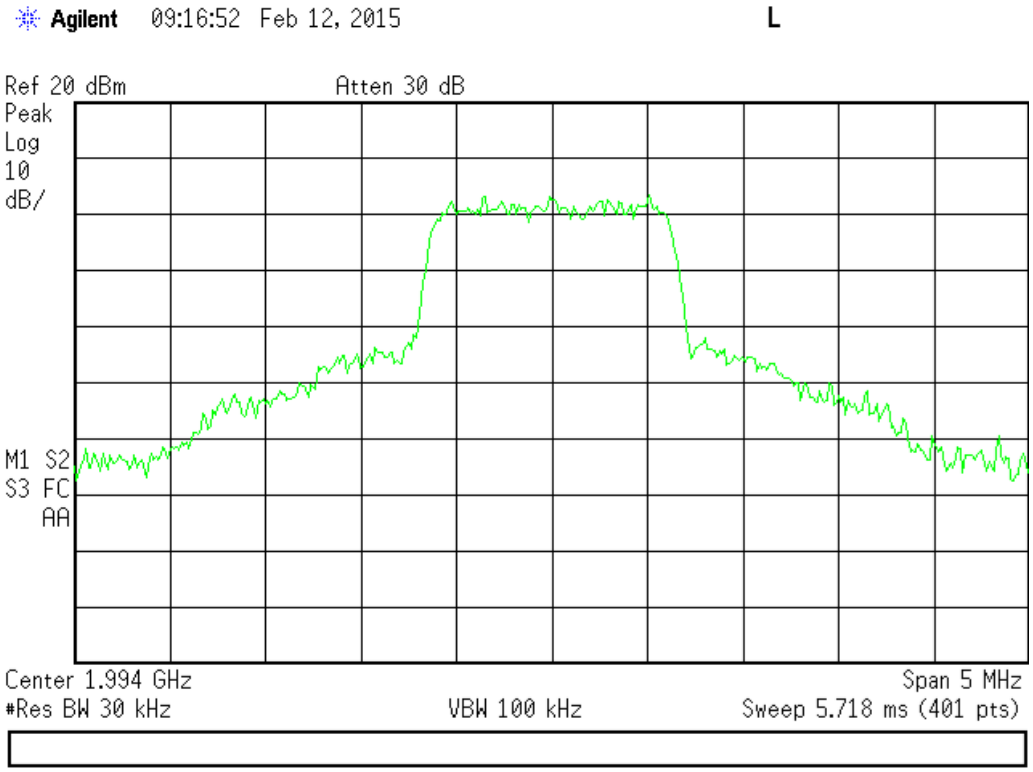
Downlink (CDMA Signal high band)

1930-1995 MHz Band

Input

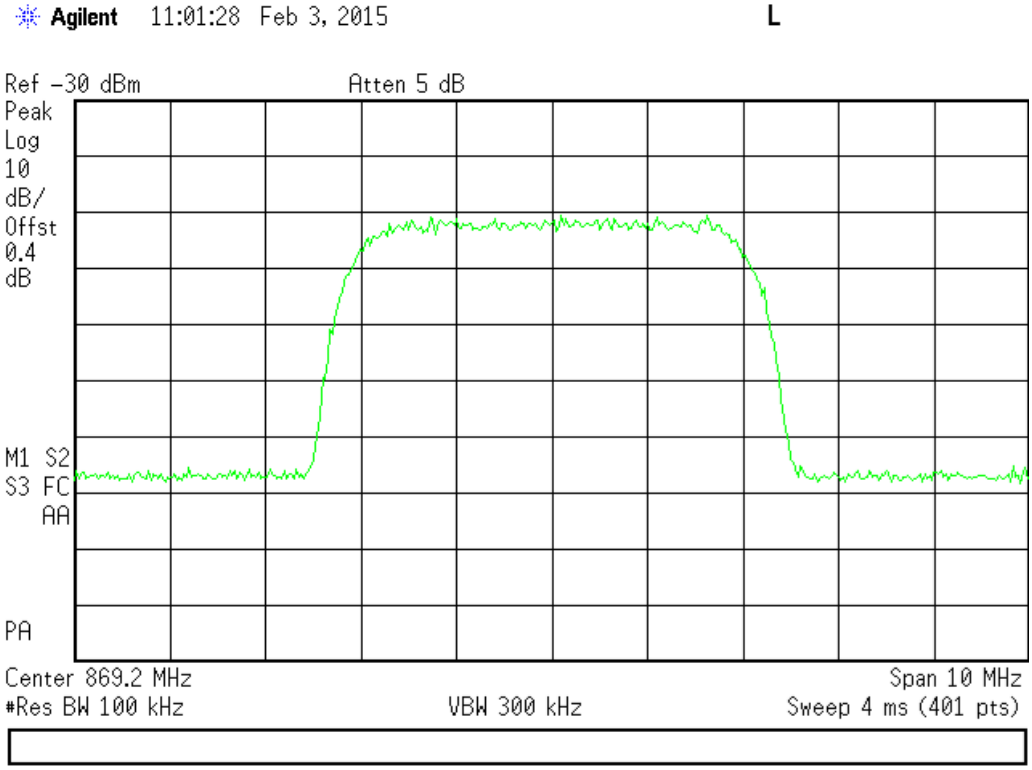


Output

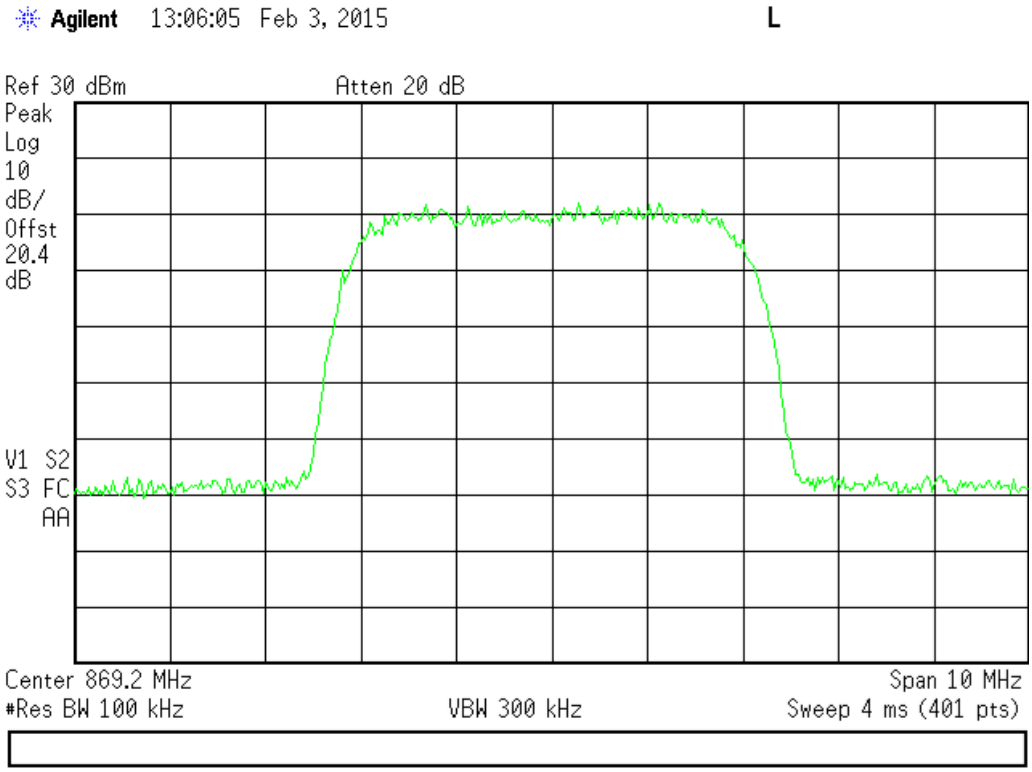


Downlink (WCDMA Signal low band)

869-894 MHz Band
Input

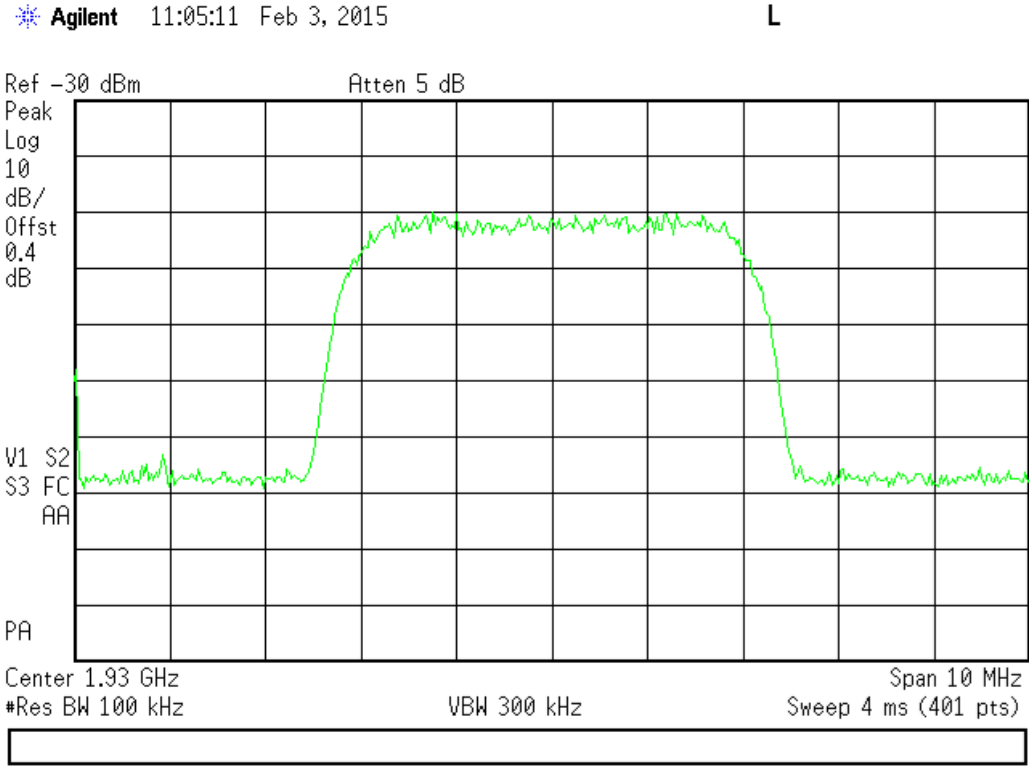


Output

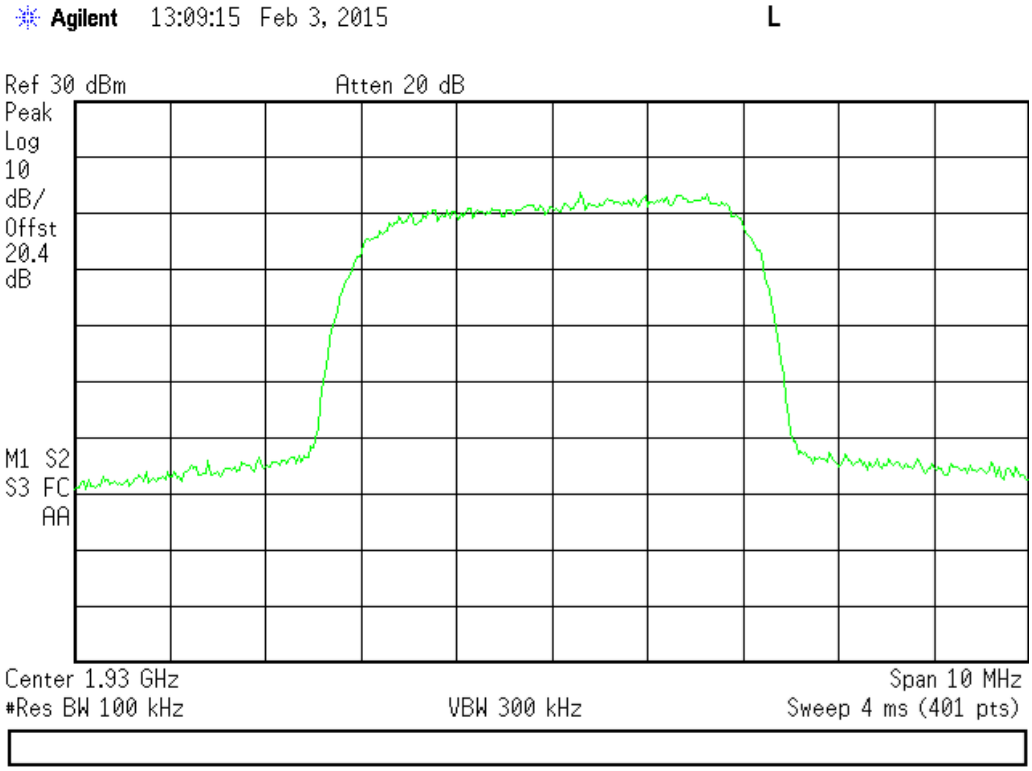


Downlink (WCDMA Signal low band)

1930-1995 MHz Band
Input

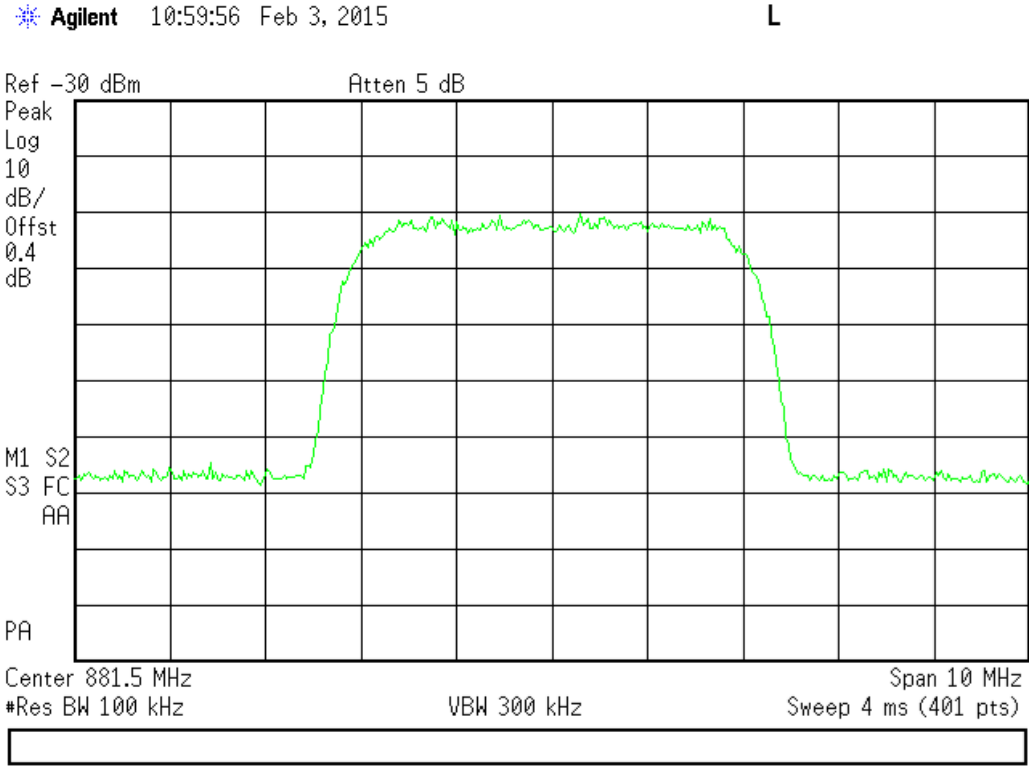


Output

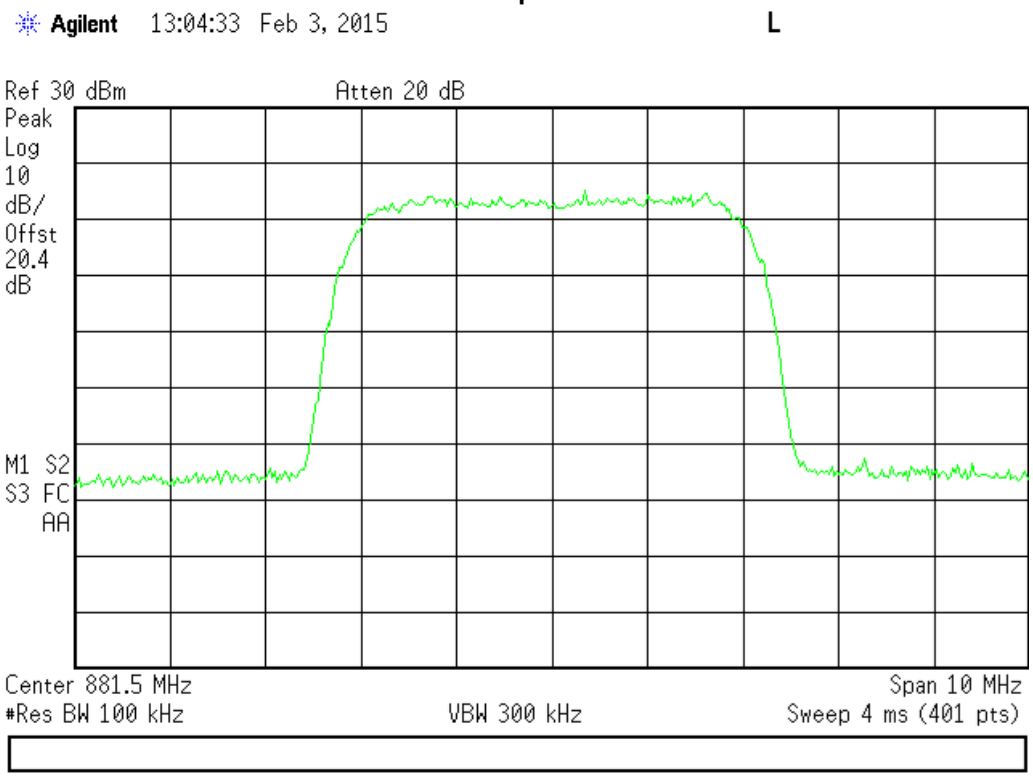


Downlink (WCDMA Signal mid band)

869-894 MHz Band
Input

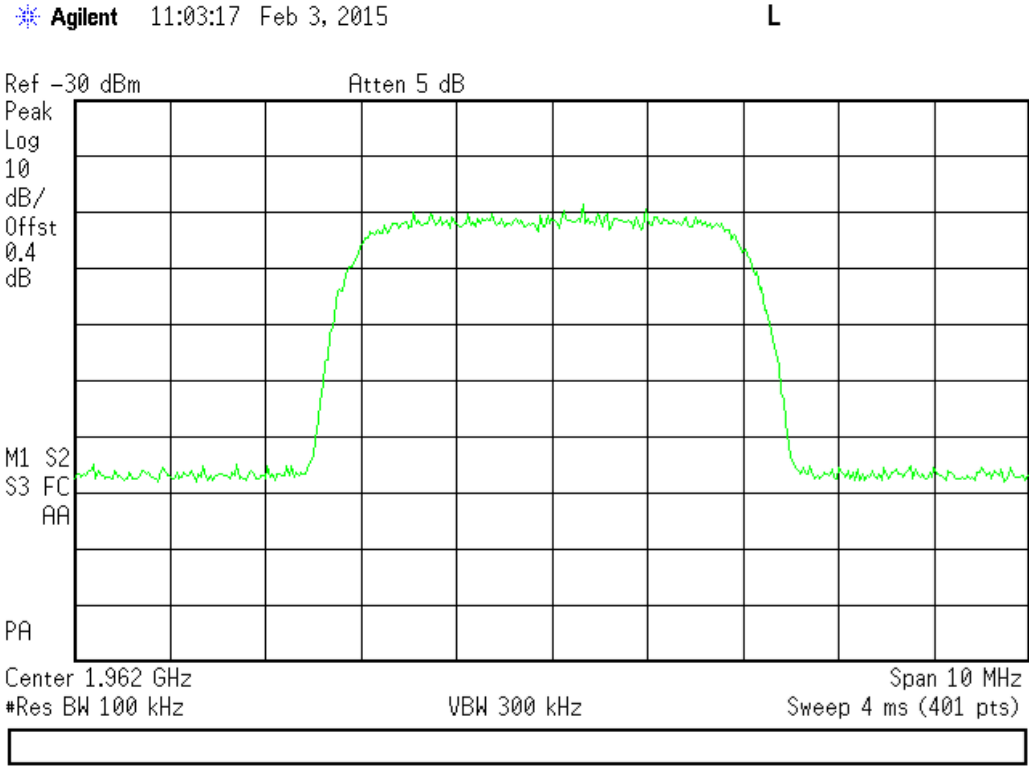


Output

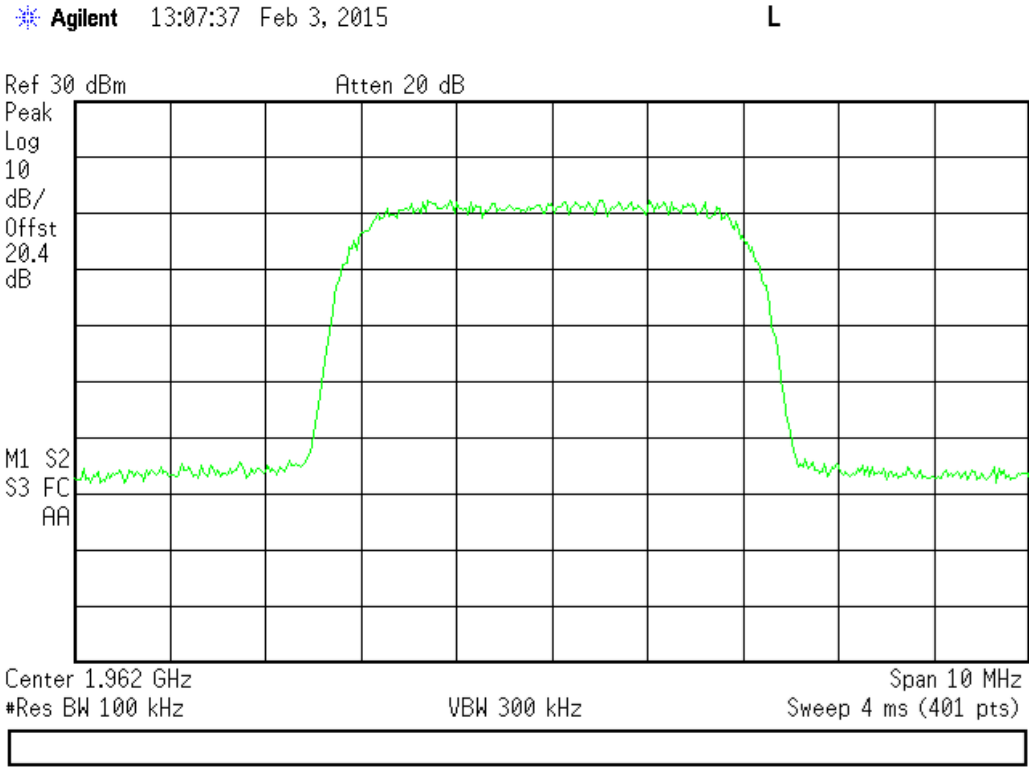


Downlink (WCDMA Signal mid band)

1930-1995 MHz Band
Input

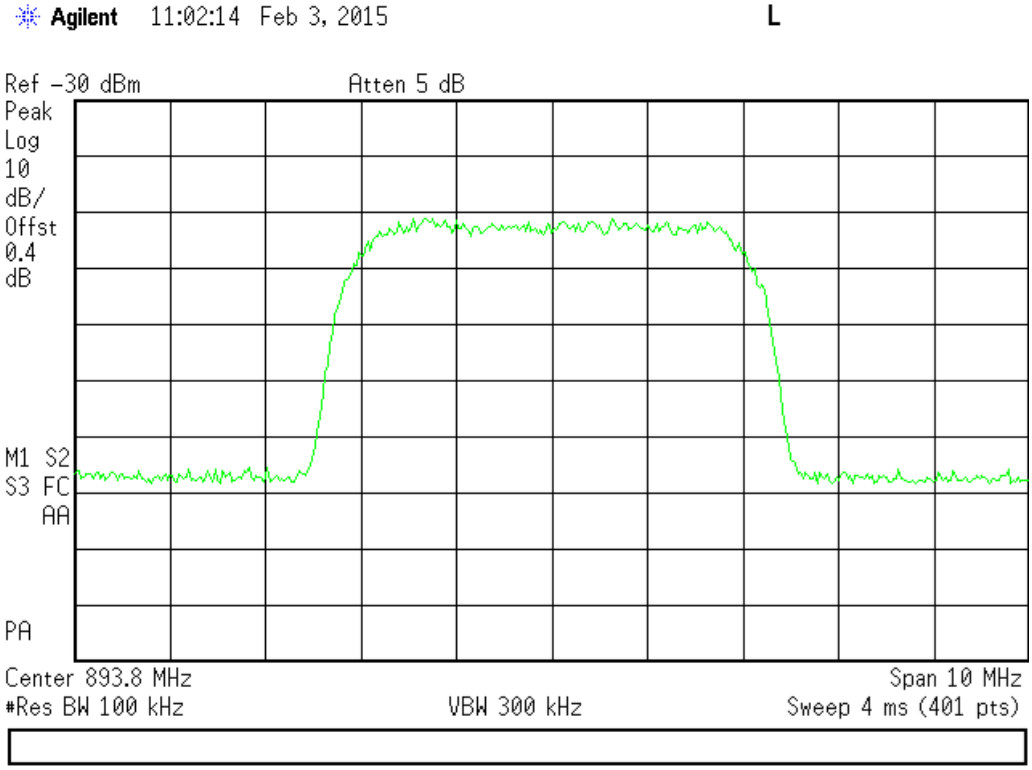


Output

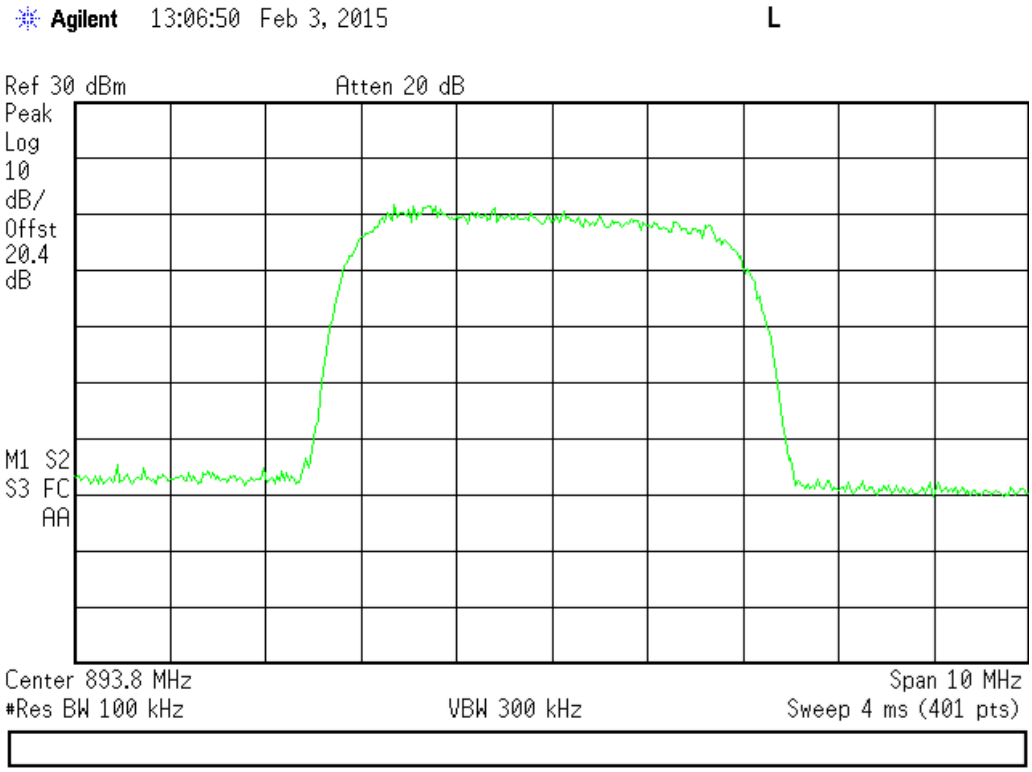


Downlink (WCDMA Signal high band)

869-894 MHz Band
Input

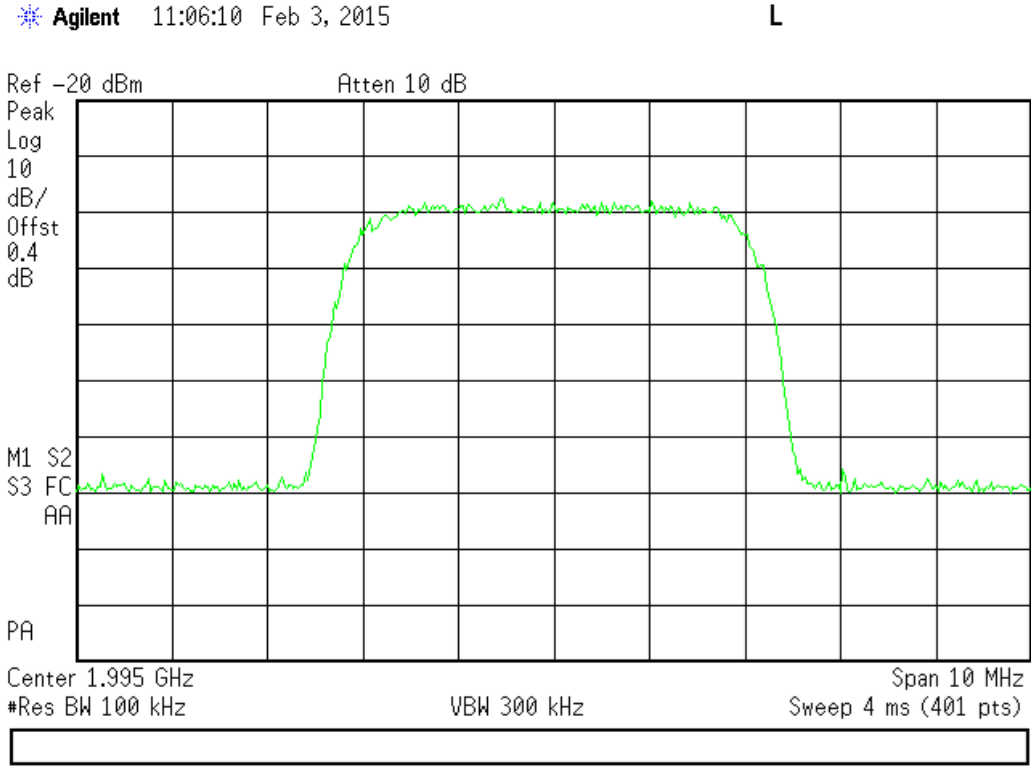


Output

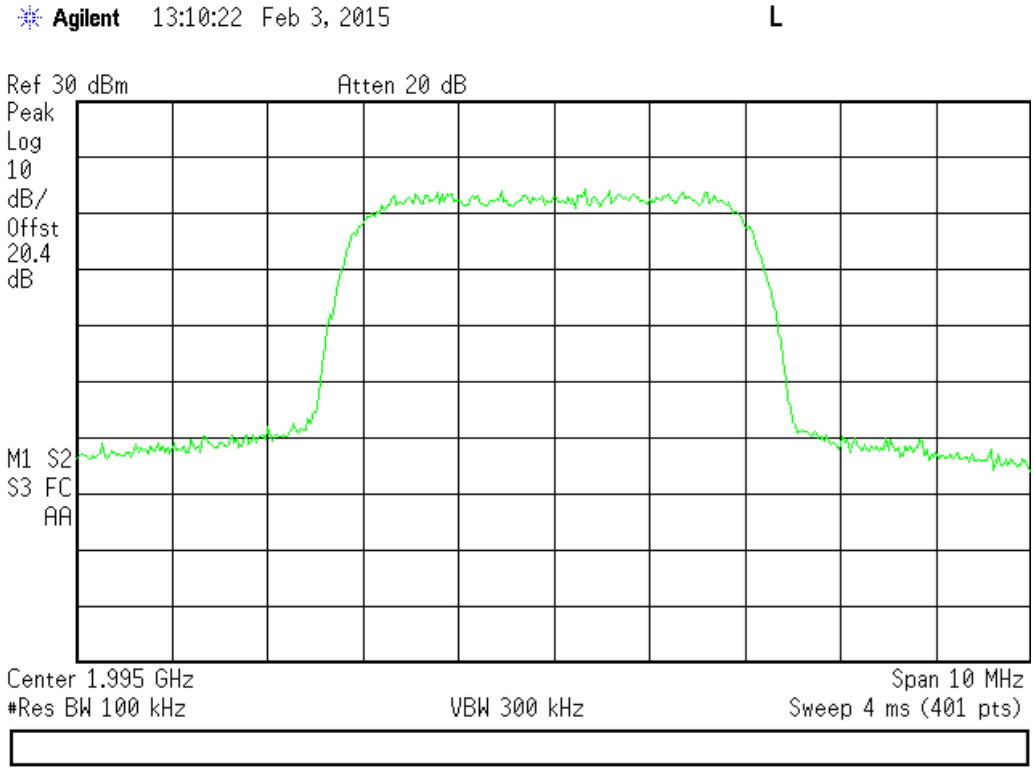


Downlink (WCDMA Signal high band)

1930-1995 MHz Band
Input



Output



Intermodulation

Name of Test:	Intermodulation	**Engineer:** Mike Graffeo
Test Equipment Utilized:	i00405, i00331	**Test Date:** 2/6/15

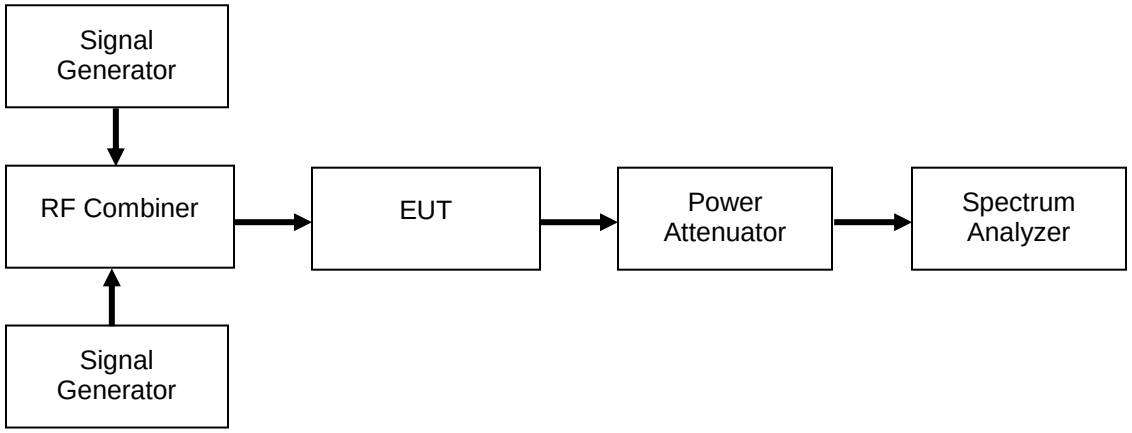
Test Procedure

The EUT was connected to a spectrum analyzer through a power attenuator. Two signal generators were utilized to produce a two tone signal set so the intermodulation products fell within the operational band. Frequency at the maximum power from out of band rejection was utilized.

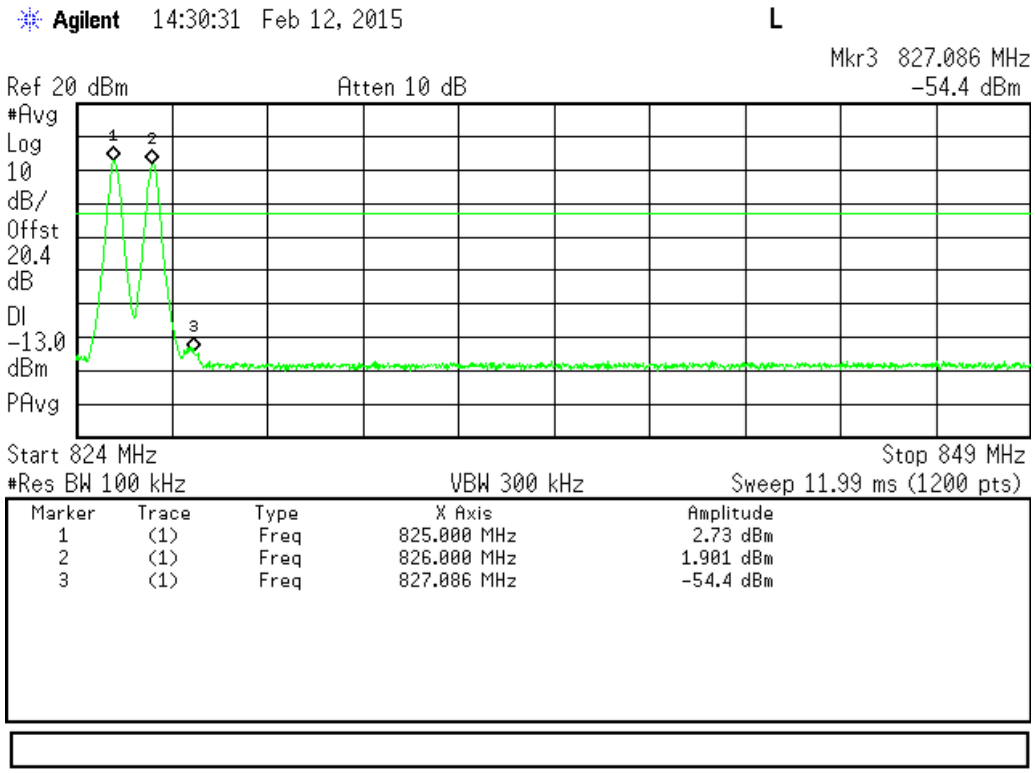
The RF input signal level was set to 0.2 dB below the AGC Threshold.

All losses for the combiner, attenuator and cables were accounted for.

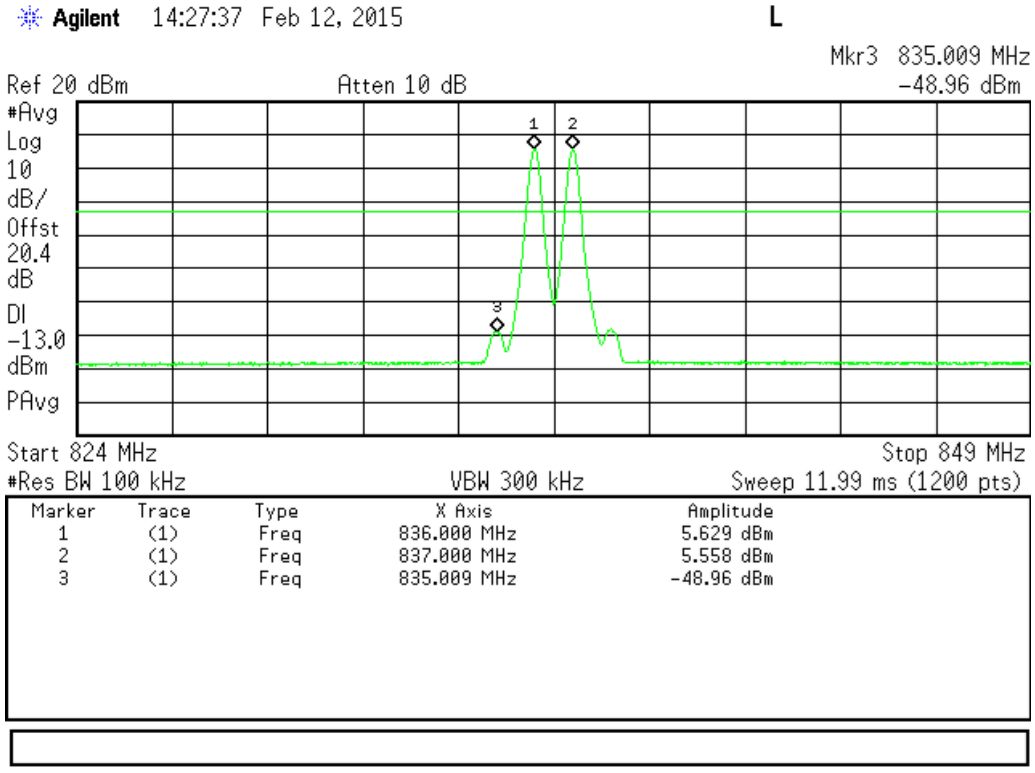
Test Setup



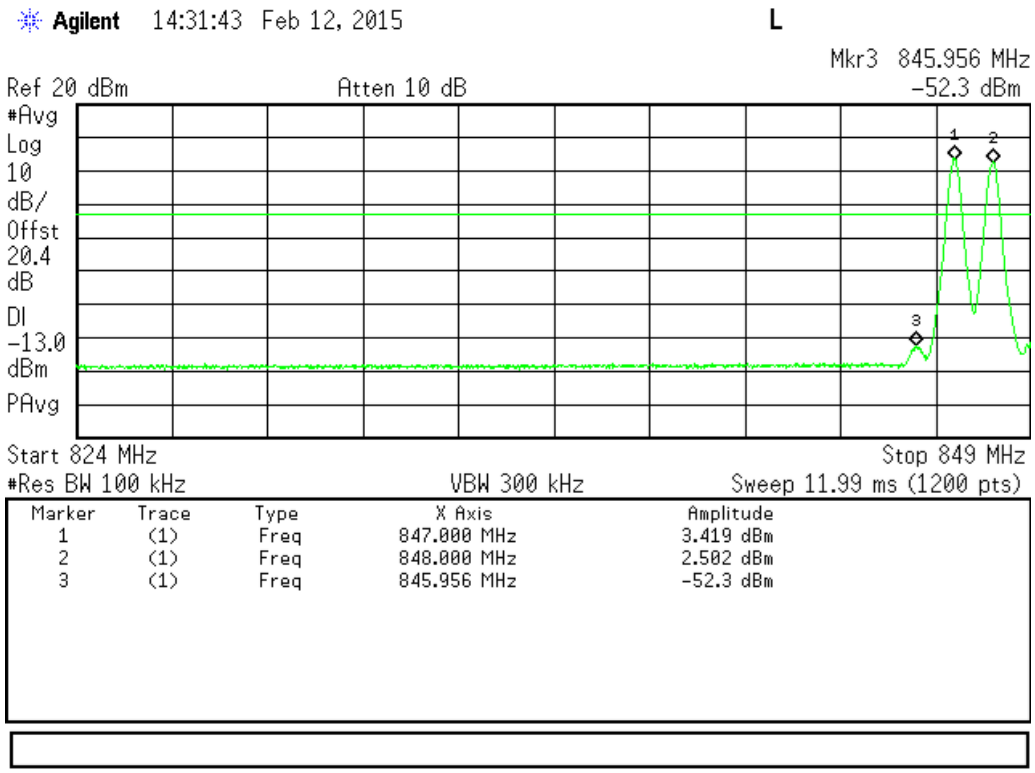
Intermodulation Uplink Test Results (Two GSM Signals)
824-849 MHz Band (Low Band)



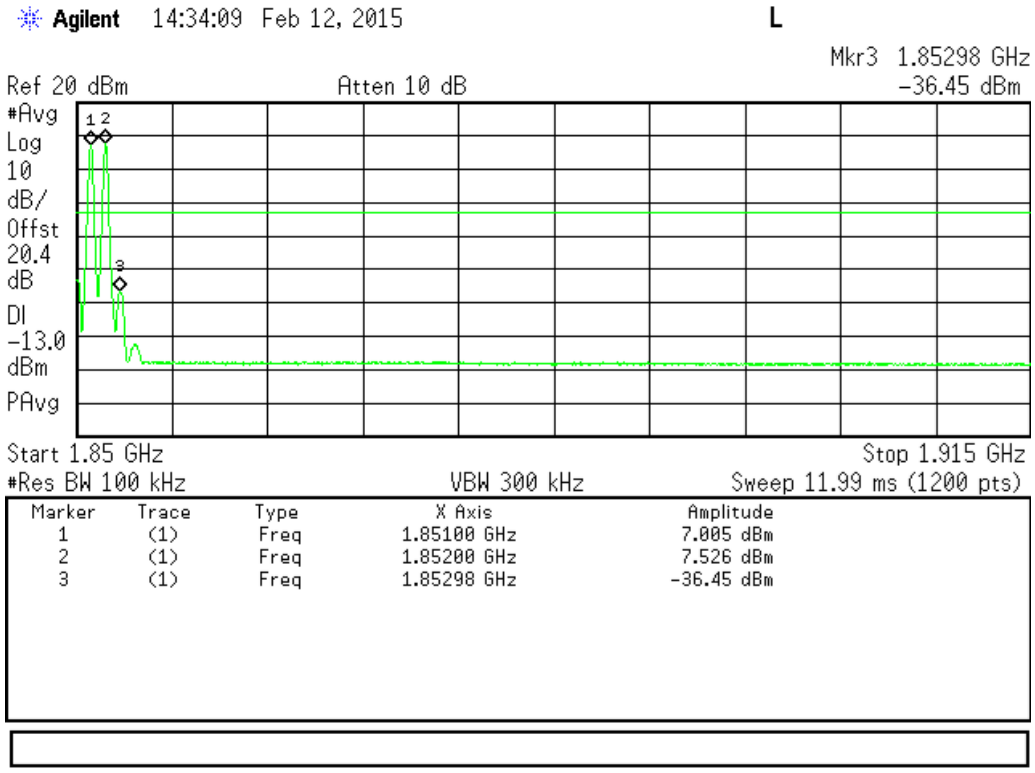
Intermodulation Uplink Test Results (Two GSM Signals)
824-849 MHz Band (Mid Band)



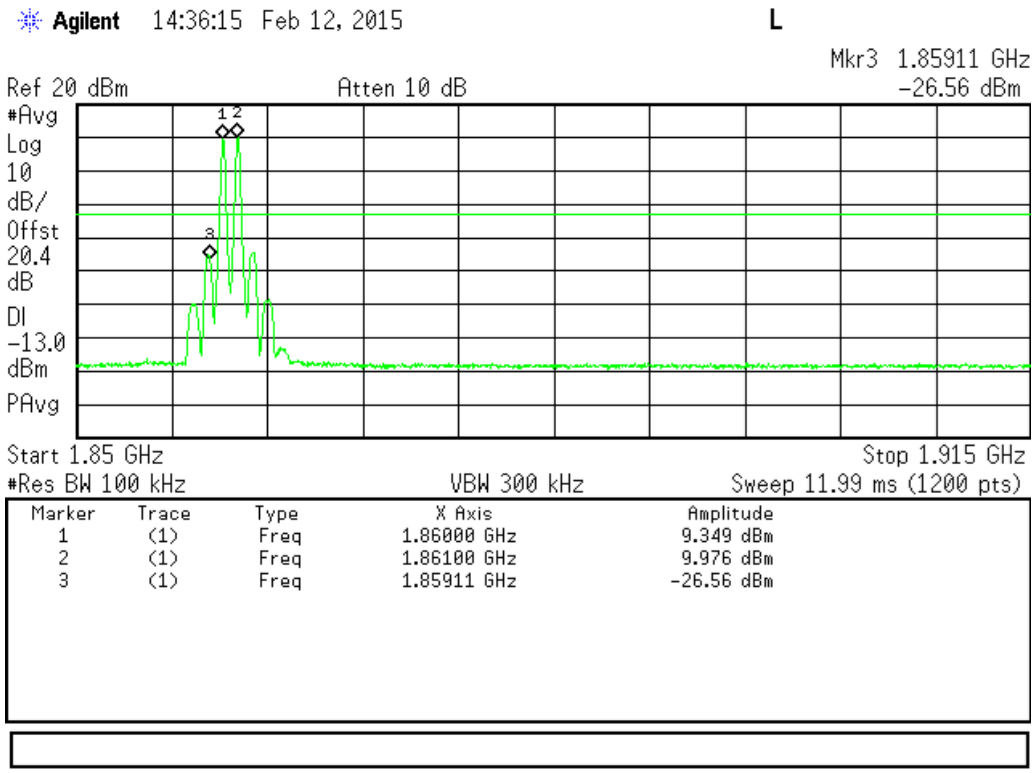
Intermodulation Uplink Test Results (Two GSM Signals)
824-849 MHz Band (High Band)



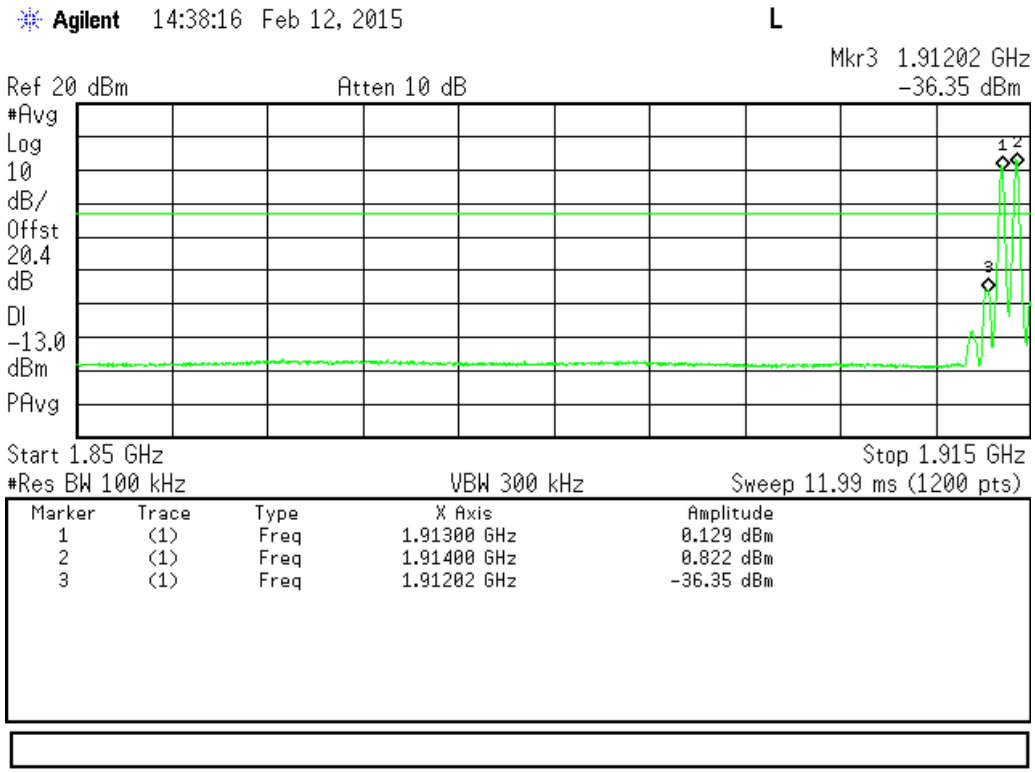
Intermodulation Uplink Test Results (Two GSM Signals)
1850-1915 MHz Band (Low Band)



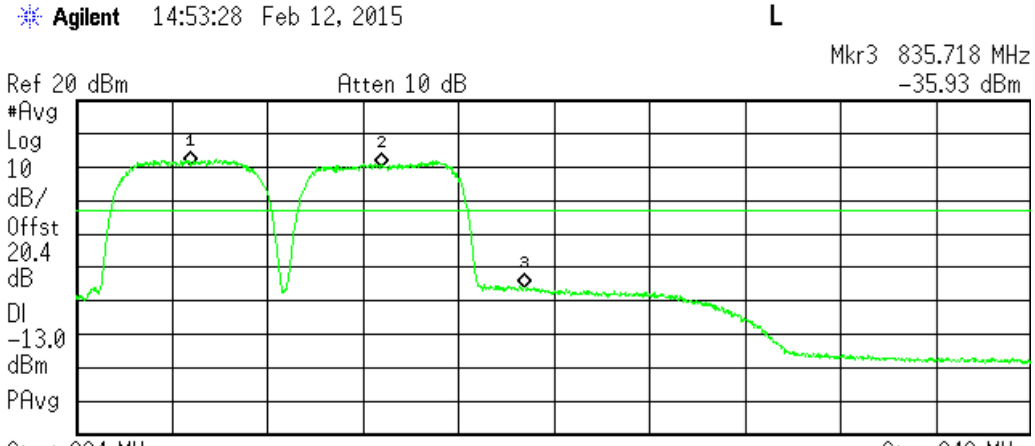
Intermodulation Uplink Test Results (Two GSM Signals)
1850-1915 MHz Band (Mid Band)



Intermodulation Uplink Test Results (Two GSM Signals)
1850-1915 MHz Band (High Band)

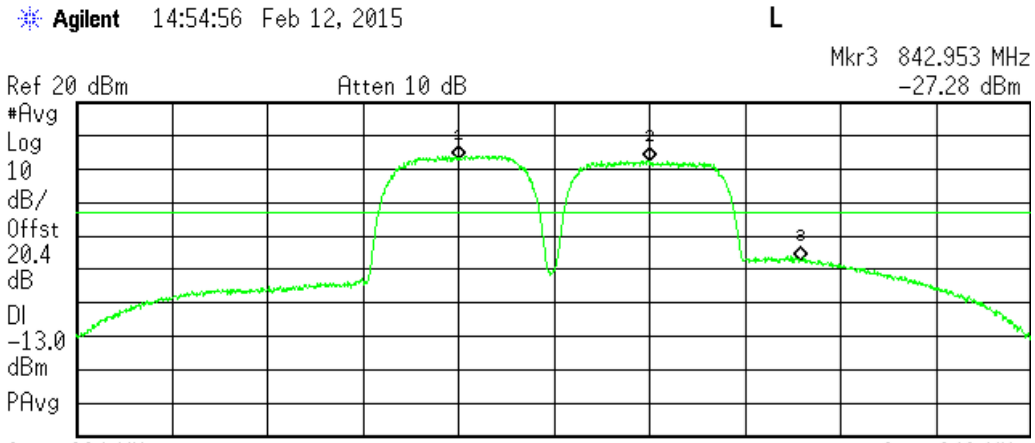


Intermodulation Uplink Test Results (Two WCDMA Signals)
824-849 MHz Band (Low Band)



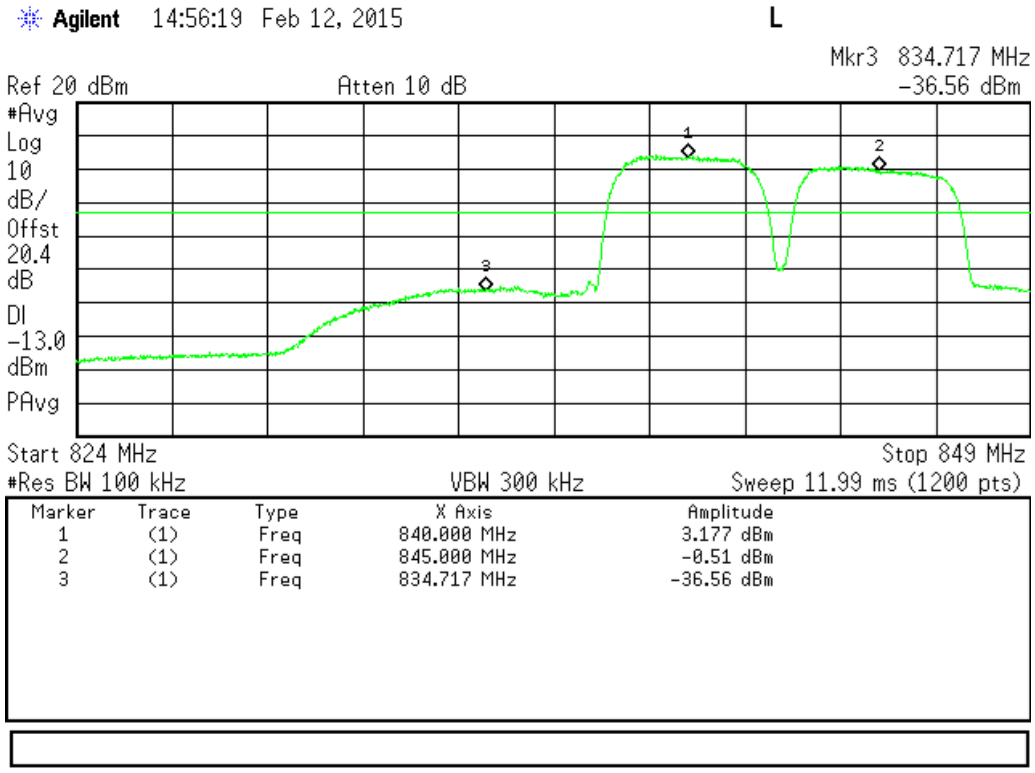
Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	827.000 MHz	0.585 dBm
2	(1)	Freq	832.000 MHz	-0.155 dBm
3	(1)	Freq	835.718 MHz	-35.93 dBm

Intermodulation Uplink Test Results (Two WCDMA Signals)
824-849 MHz Band (Mid Band)

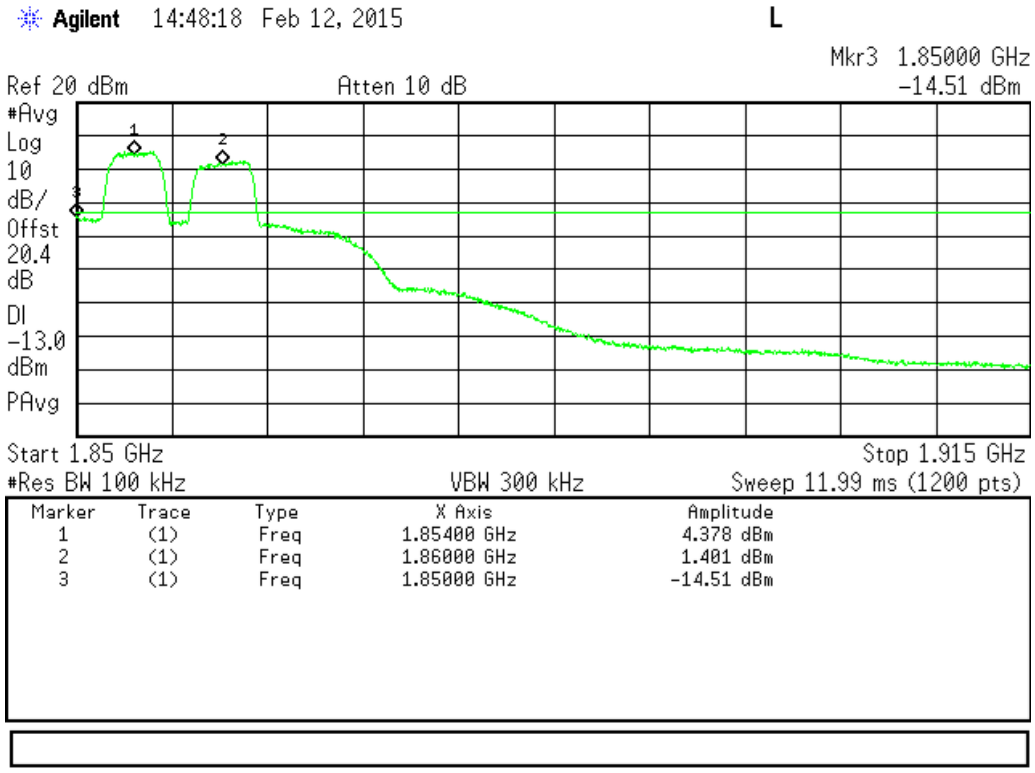


Marker	Trace	Type	X Axis	Amplitude
1	(1)	Freq	834.000 MHz	3 dBm
2	(1)	Freq	839.000 MHz	2.104 dBm
3	(1)	Freq	842.953 MHz	-27.28 dBm

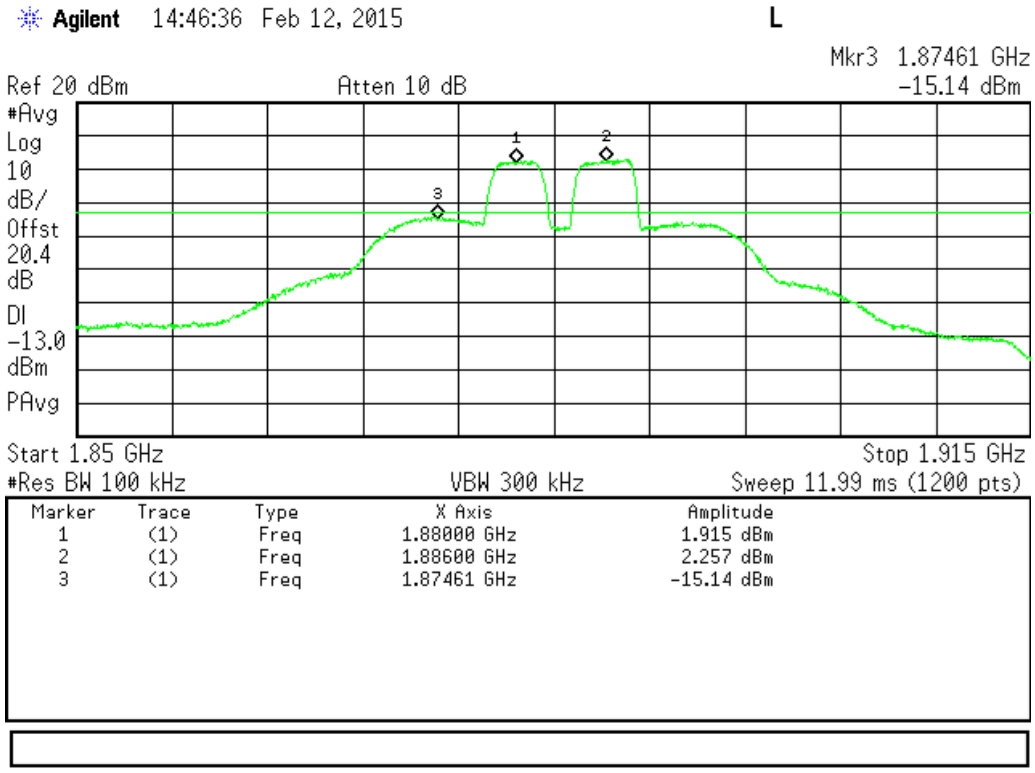
Intermodulation Uplink Test Results (Two WCDMA Signals)
824-849 MHz Band (High Band)



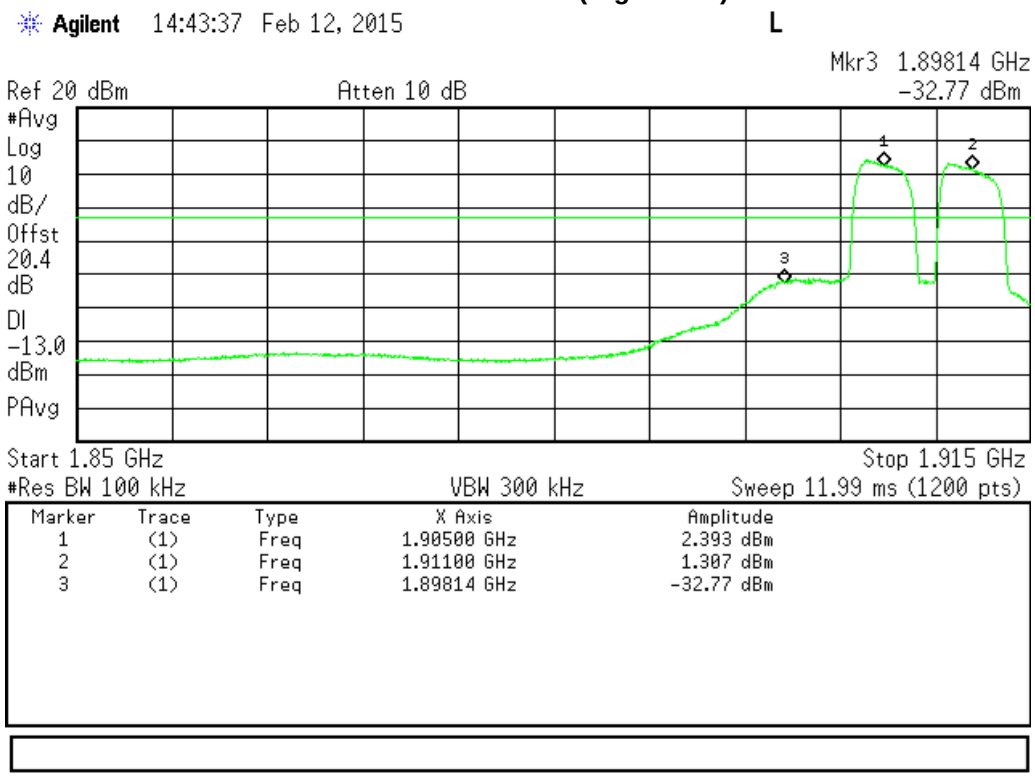
Intermodulation Uplink Test Results (Two WCDMA Signals)
1850-1915 MHz Band (Low Band)



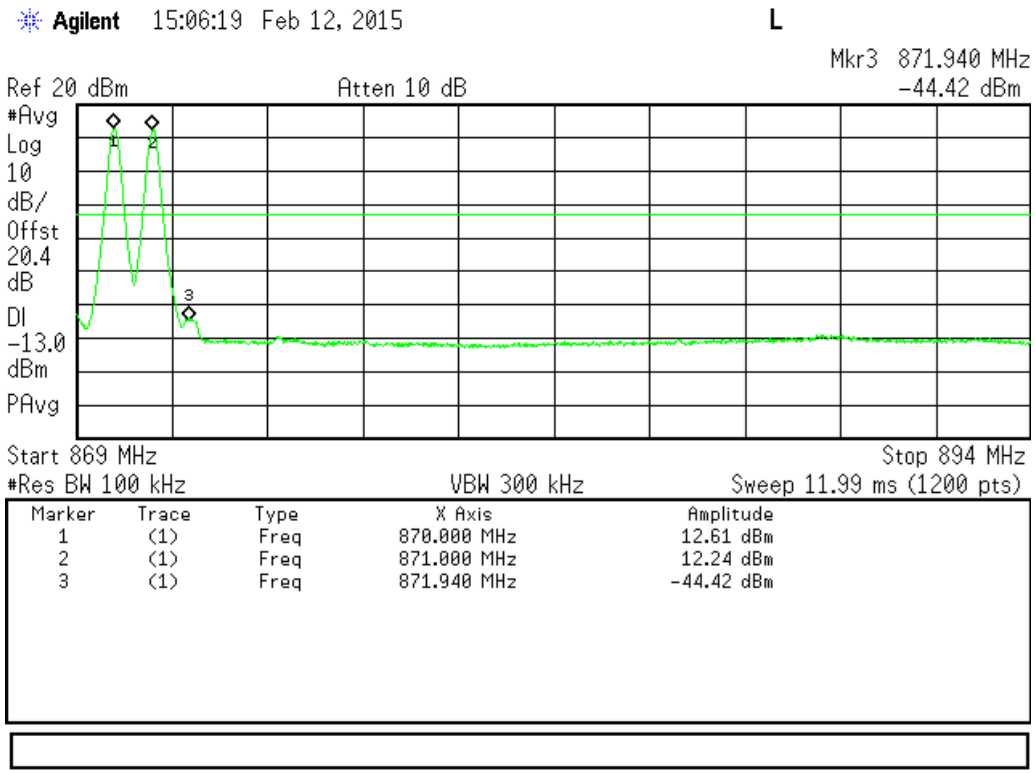
Intermodulation Uplink Test Results (Two WCDMA Signals)
1850-1915 MHz Band (Mid Band)



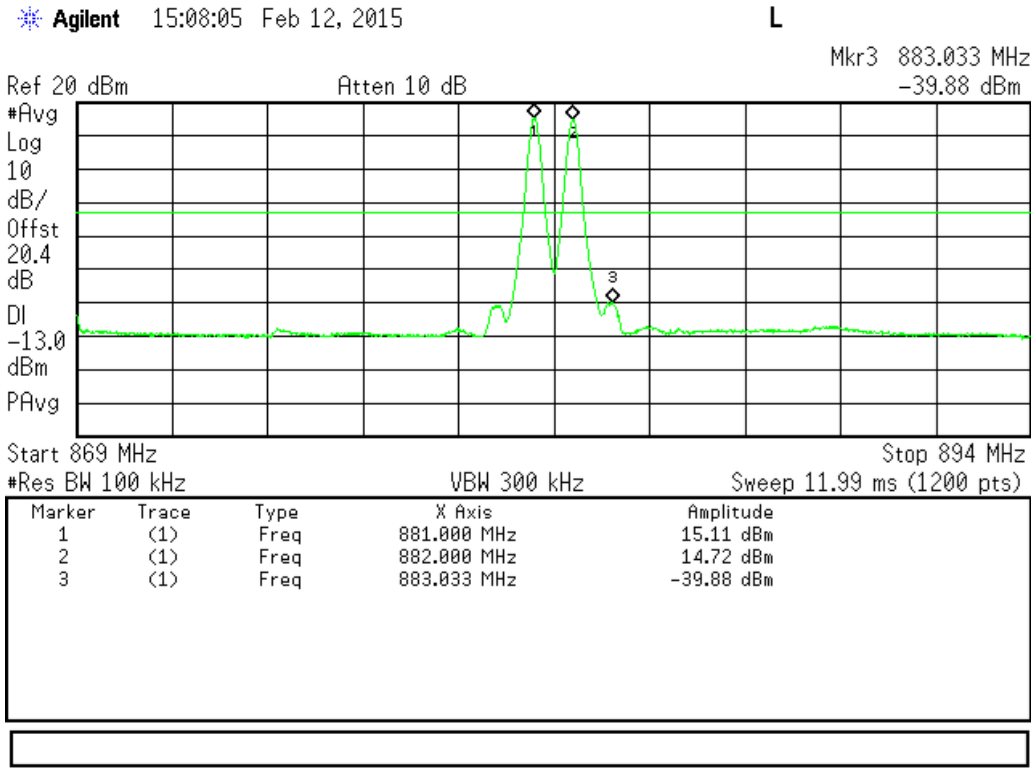
Intermodulation Uplink Test Results (Two WCDMA Signals)
1850-1915 MHz Band (High Band)



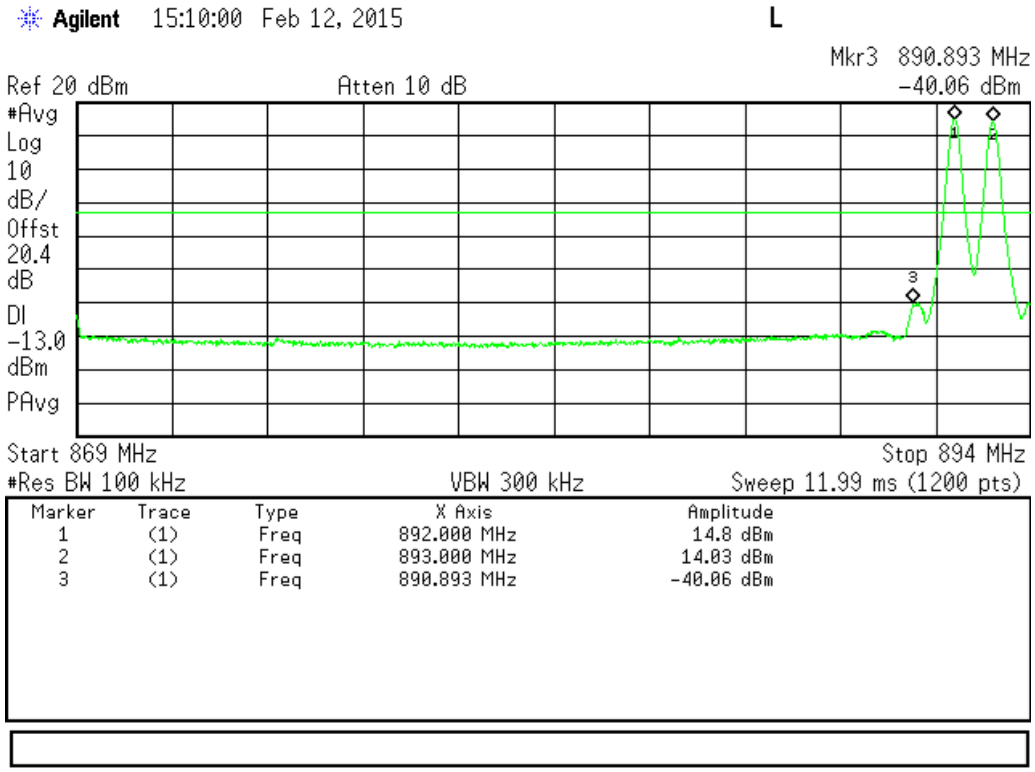
Intermodulation Downlink Test Results (Two GSM Signals)
869-894 MHz Band (Low Band)



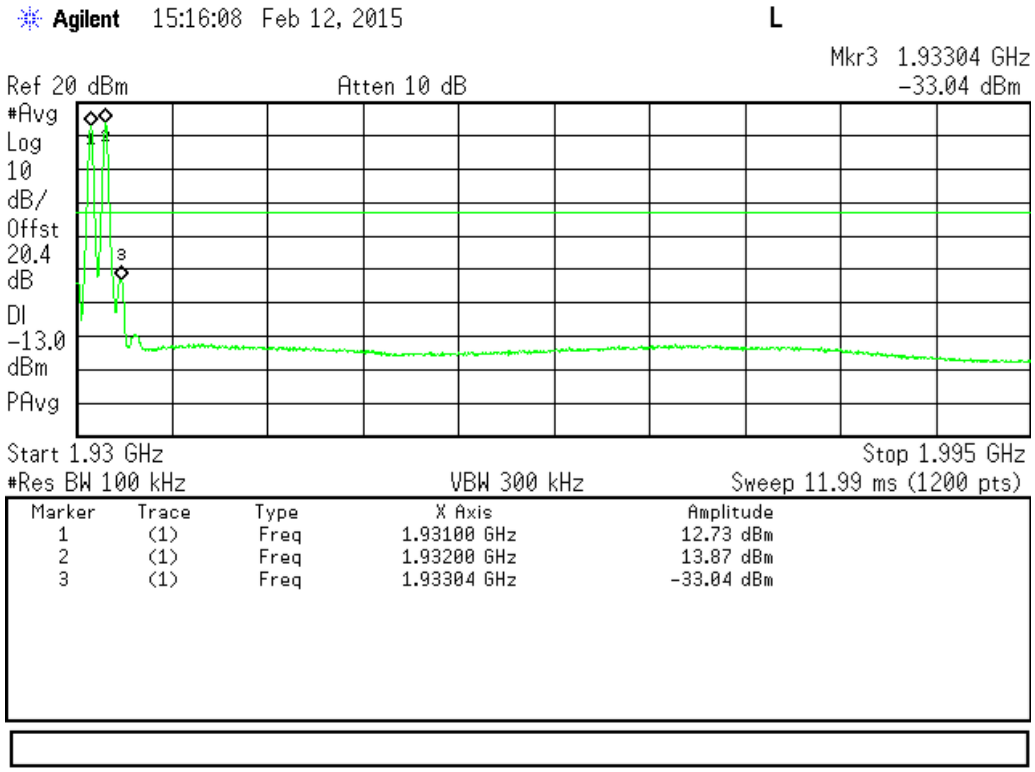
Intermodulation Downlink Test Results (Two GSM Signals)
869-894 MHz Band (Mid Band)



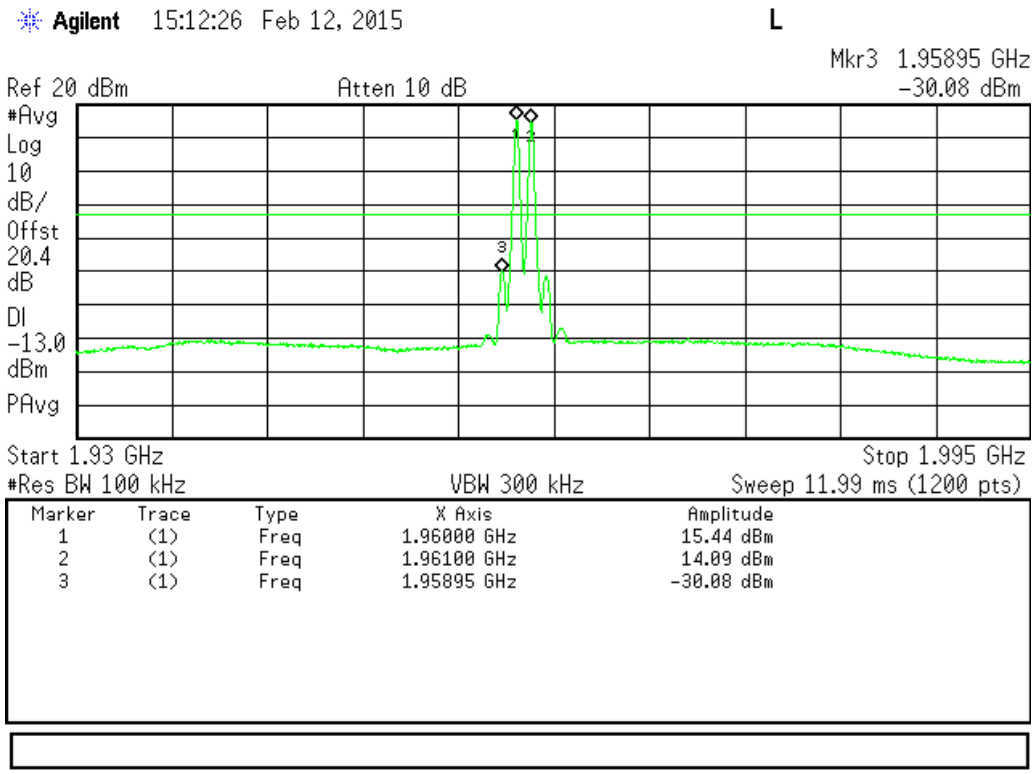
Intermodulation Downlink Test Results (Two GSM Signals)
869-894 MHz Band (High Band)



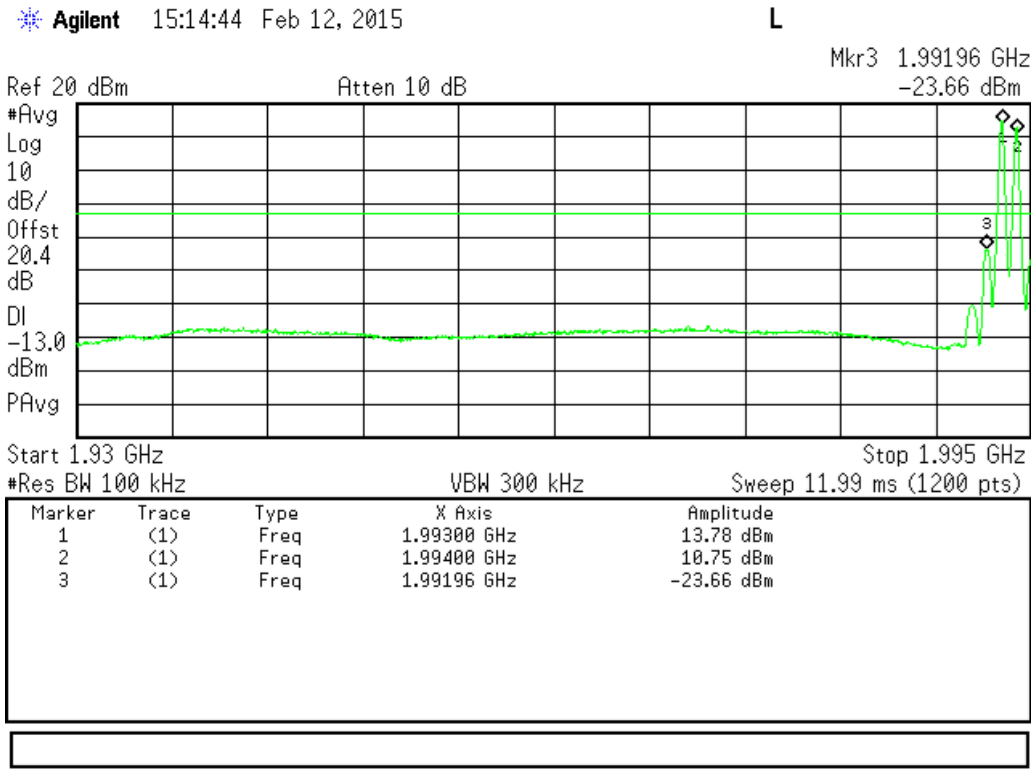
Intermodulation Downlink Test Results (Two GSM Signals)
1930-1995 MHz Band (Low Band)



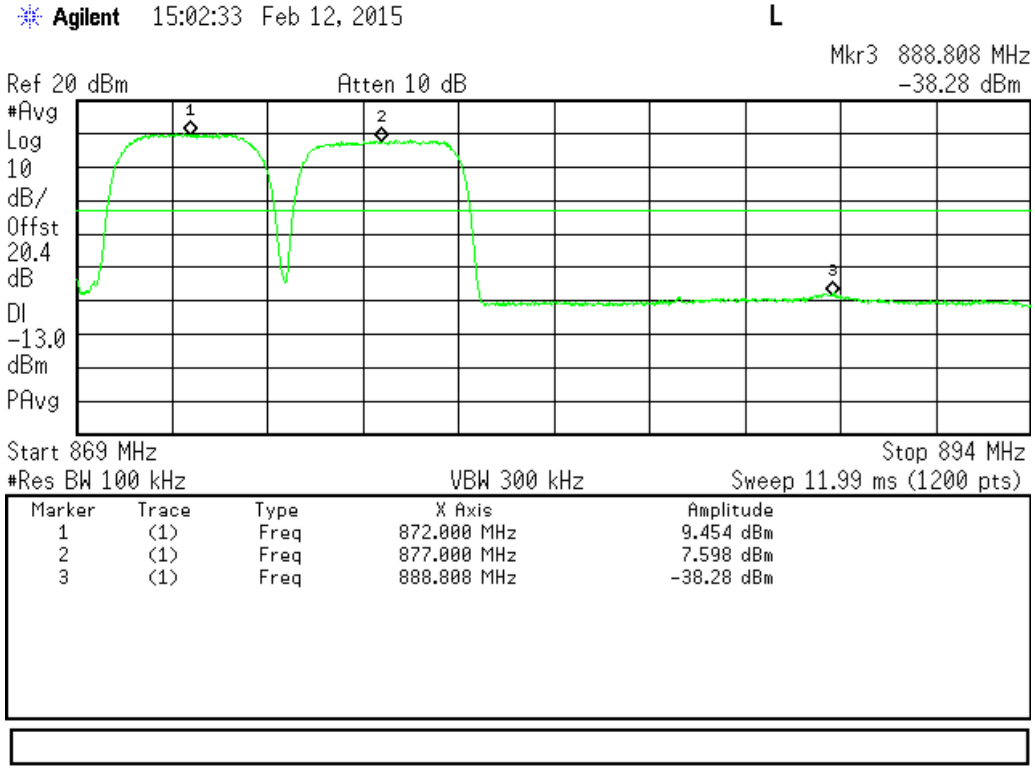
Intermodulation Downlink Test Results (Two GSM Signals)
1930-1995 MHz Band (Mid Band)



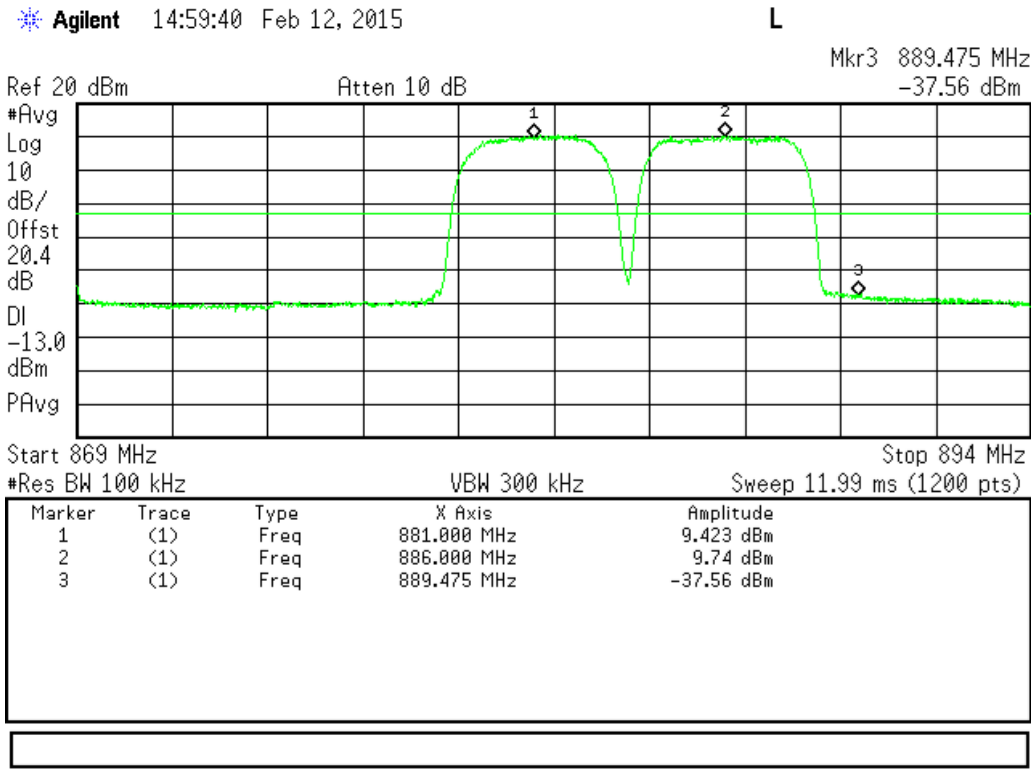
Intermodulation Downlink Test Results (Two GSM Signals)
1930-1995 MHz Band (High Band)



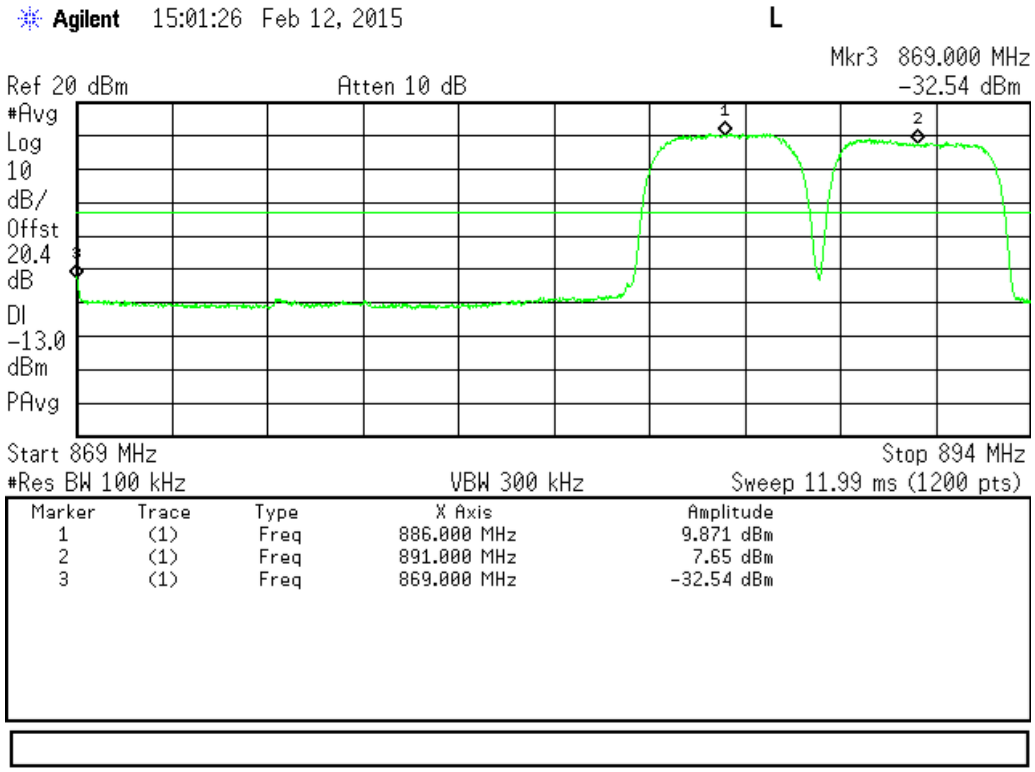
Intermodulation Downlink Test Results (Two WCDMA Signals)
869-894 MHz Band (Low Band)



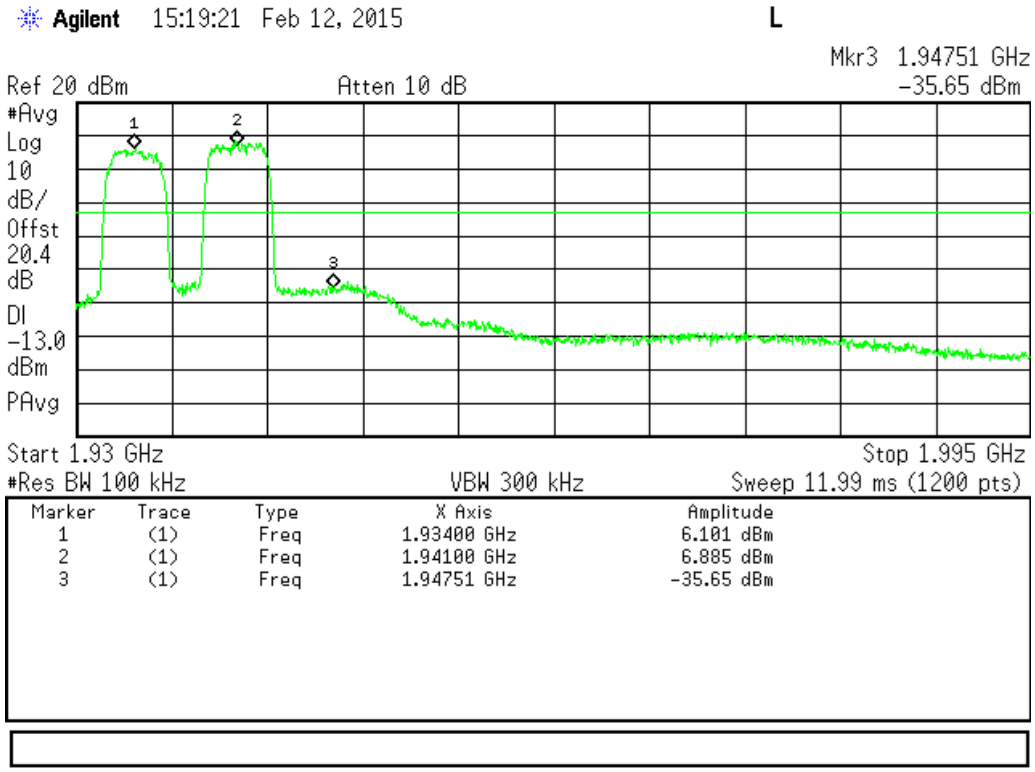
Intermodulation Downlink Test Results (Two WCDMA Signals)
869-894 MHz Band (Mid Band)



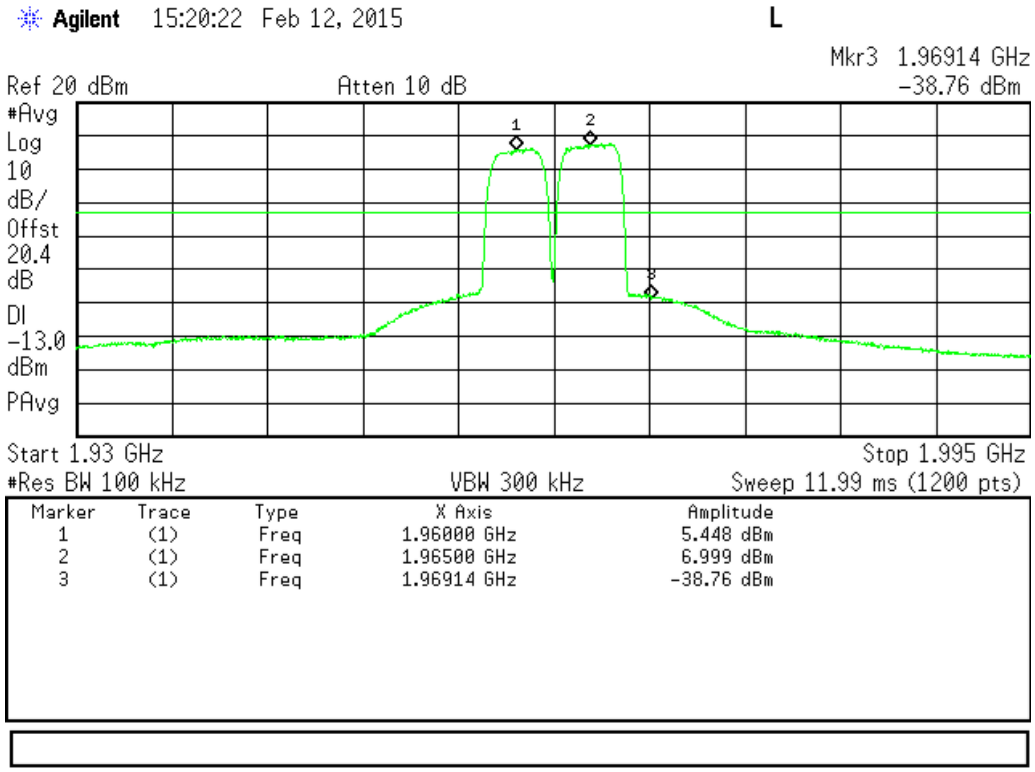
Intermodulation Downlink Test Results (Two WCDMA Signals)
869-894 MHz Band (High Band)



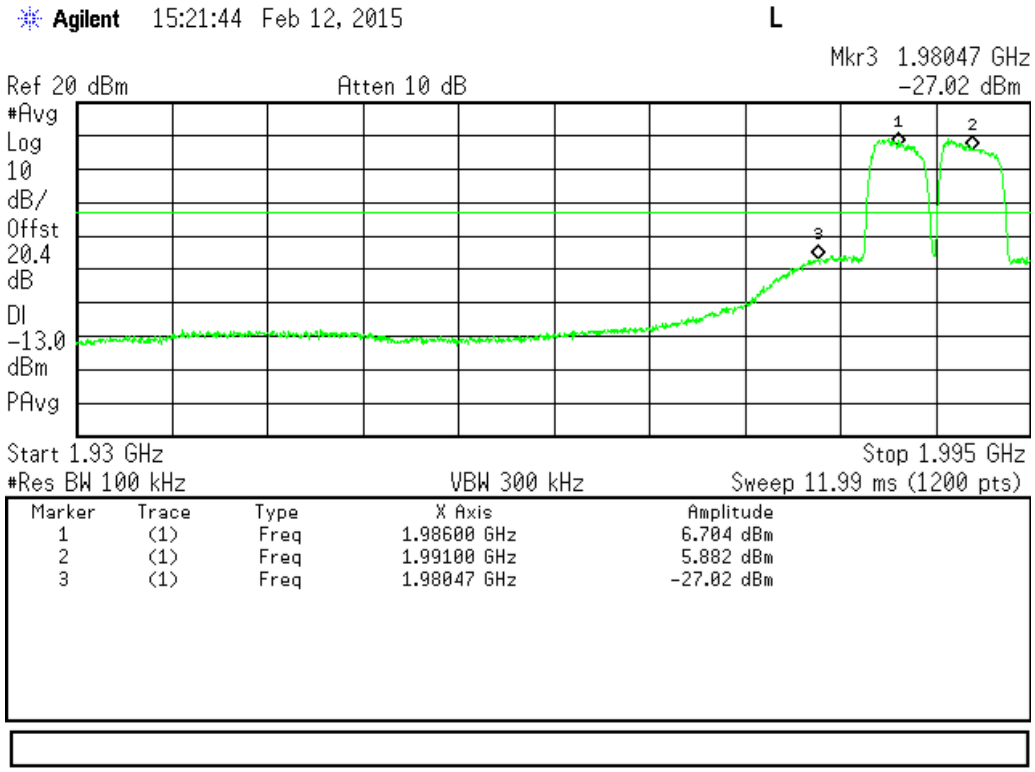
Intermodulation Up Downlink link Test Results (Two WCDMA Signals)
1930-1995 MHz Band (Low Band)



Intermodulation Downlink Test Results (Two WCDMA Signals)
1930-1995 MHz Band (Mid Band)



Intermodulation Downlink Test Results (Two WCDMA Signals)
1930-1995 MHz Band (High Band)



Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna, Amplified	ARA	DRG-118/A	i00271	5/8/14	5/8/16
Bi-Log Antenna	Schaffner	CBL 6111D	i00349	10/8/13	10/8/15
Humidity / Temp Meter	Newport	IBTHX-W-5	i00282	3/24/14	3/24/15
Voltmeter	Fluke	75III	i00320	3/24/14	3/24/15
Spectrum Analyzer	Agilent	E4407B	i00331	6/13/2014	6/13/2016
Non-radiating load	Termaline	8201	i00334	Verified on: 1/10/15	
Signal Generator	Keysight (Agilent)	E4438C	i00457	9/26/2014	9/26/2016
RF Directional Coupler	Meca	CS06-1.500V	i00412	Verified on: 1/10/15	

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

END OF TEST REPORT