

FCC TEST REPORT

FCC Rules & Regulations Part 20.21

For:

Mobile Communications, Inc
 230 Earl Stewart Dr., Aurora, ON, Canada L4G6V8

FCC ID: S4RBMU650


Report Type: Original Report	Product Type: Consumer wide-band booster
Test Engineer:	Roman Gurvich
Report Number:	BMUX650
Report Date:	May 5, 2016
Test Procedure:	As specified in KDB publication 935210 D03 V04 and IEEE C63.26/D14 with FCC PBA 942758
Prepared By:	<p>Signature: </p> <p>NAME: Roman Gurvich</p> <p>TITLE: RF Engineer</p>

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1 General Information

1.1 Product Description Equipment Under Test (EUT)

This test and measurement report has been compiled on behalf of Mobile Communications Inc. and their product models: BMUX650 and BMUZ650
FCC ID: S4RBMU650, which will be henceforth in this report to as the EUT (Equipment Under Test). The EUT is a consumer wide-band bi-directional coupling booster.

EUT Description	Consumer Booster
FCC ID	S4RBMU650
Operation Frequency	Bands 2, 4, 5, 12, 13, 17, 25
Modulations	CDMA, WCDMA, LTE, HSPA, GSM, GPRS, EDGE
Type of Equipment	Wideband Consumer Signal Booster

1.2 Mechanical Description

The EUT measures approximately 4.56” (L) x 2.15” (W) x 1.25” (H), and weighs approximately 1.2 Lbs.

1.3 Objective

This type approval report is prepared on behalf of Mobile Communications Inc. in accordance with Part 20.21 of the Federal Communication Commissions rules.

The objective is to determine compliance FCC rules.

1.4 Test Methodology

All tests and measurements indicated in this document were performed at Mobile Communications Inc in accordance with the Code of Federal Regulations Title 20.21.

The “Wideband Consumer Signal Booster Measurement Guidance” draft, KDB publication 935210 D03 V04, was used in test procedure to test EUT.

1.5 Measurement Uncertainty

All measurements involve certain level of uncertainties, especially in the field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration and antenna directivity, antenna factor variation with height, antenna phase centre variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS81, The Treatment of Uncertainty in EMC Measurements, the values ranging from ± 2.0 dB for Conducted Emissions tests and ± 4.0 dB for Radiated Emissions tests are the most accurate estimates pertaining to uncertainty of EMC measurements at Mobile Communications, Inc.

1.6 Test Facility

The test conducted at Mobile Communications Inc. located at 230 Earl Stewart Drive, Aurora, Ontario, Canada, L4G6V8. Conducted emissions measurement data collected and presented in this report.

1.7 Test Equipment

#	Description	Manufacturer	Model No	Serial No	Calibration Date
1	Spectrum Analyzer	Agilent	E4440A	MY46188068	2/23/2016
2	Signal Generator #1	Agilent	E4438C	MY42081328	10/14/2015
3	Signal Generator #2	Agilent	E4438C	MY42081331	11/25/2014
4	Power Supply	Instek	GPS-3303	E877636	N/A
5	Bi-Directional Coupler	Minicircuits	ZABDC10-25HP	N/A	N/A
6	Bi-Directional Coupler	Minicircuits	ZFBDC20-900HP	N/A	N/A
7	Variable RF Attenuator	Fairview Microwave	SA3101N	N/A	N/A
8	Fixed RF Attenuator	Weinschel	5W-10	N/A	N/A
9	RF Test Cables	Smoothtalker	SEMRC205	N/A	N/A
10	Co-Ax Cable	Smoothtalker	ACX100	N/A	N/A

2 Summary of Test Results

2.1 Rules Applied

FCC Rules	Description of Tests	Results
§ 20.21 (e)(3)	Authorized Frequency Band	Comply
§ 20.21 (e)(8)(i)(B)	Bidirectional Capability	Comply
§ 20.21 (e)(8)(i)(D)	Power Limits	Comply
§ 20.21 (e)(8)(i)(C)(2)	Booster Gain Limits	Comply
§ 20.21 (e)(8)(i)(F)	Intermodulation Limits	Comply
§ 20.21 (e)(8)(i)(E)	Out of Band Emission Limits	Comply
2.1051 22.917 (a) 24.234 (a) 27.53 (c) 27.53 (e) 27.53 (f) 27.53 (g) 27.53 (h)	Conducted Spurious Emissions	Comply
§ 20.21 (e)(8)(i)(A)	Noise Limits	Comply
§ 20.21 (e)(8)(i)(I)	Uplink Inactivity	Comply
§ 20.21 (e)(8)(i)(H)	Transmit Power OFF Mode	Note i
§ 20.21 (e)(8)(i)(C)(1)	Variable Booster Gain Limits	Comply
§ 2.1049	Occupied Bandwidth	Comply
§ 20.21 (e)(8)(ii)(A)	Anti-Oscillation	Comply
§ 20.21 (e)(8)(ii)(B)	Gain Control	Comply
2.1053	Radiated Spurious Emissions	Comply
20.21 (e)(8)(i)(B)	Spectrum Block Filtering	Note ii
§ 20.21 (e)(8)(i)(G)	Booster Antenna Kitting	Note iii

2.2 Notes

i) EUT meets requirements for Noise and Gain limits. Thus Part 20.21 § (e)(8)(i)(H) does not apply.

ii) Does not apply to EUT

iii) EUT user manual specifies all antennas and cables to be used. All technical documentation provided with the application for FCC equipment authorization that shows compliance of all antennas, cables and/or coupling devices with the requirements of this section.

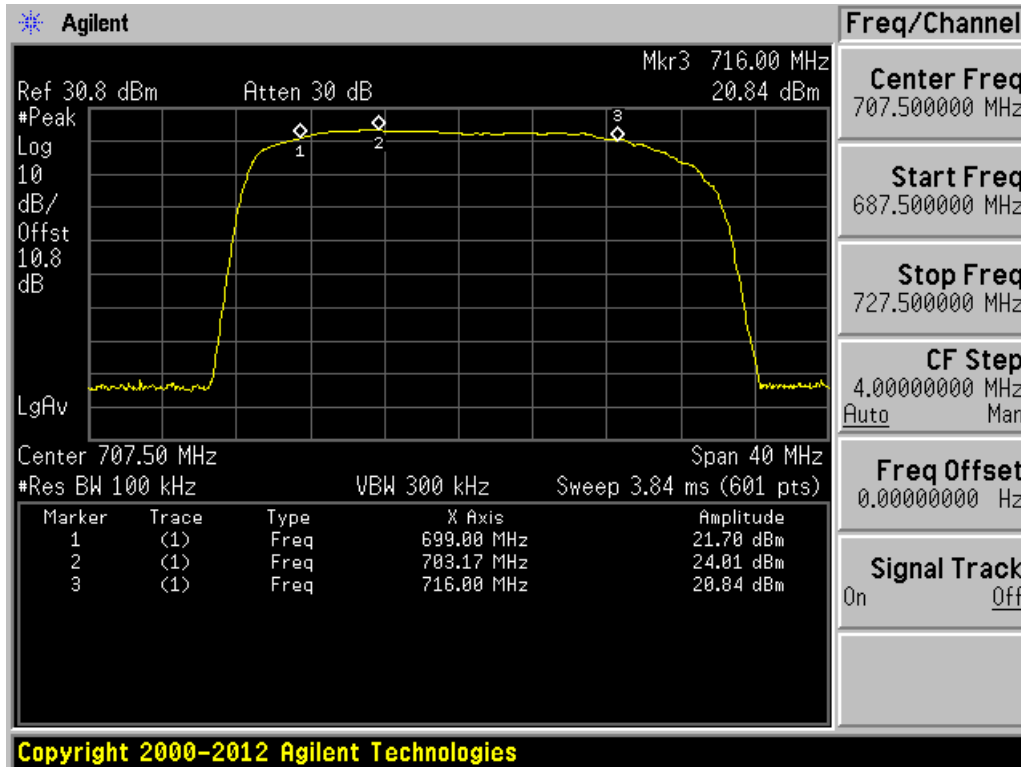
3 Test Report

3.1 Authorized Frequency Band Verification Test

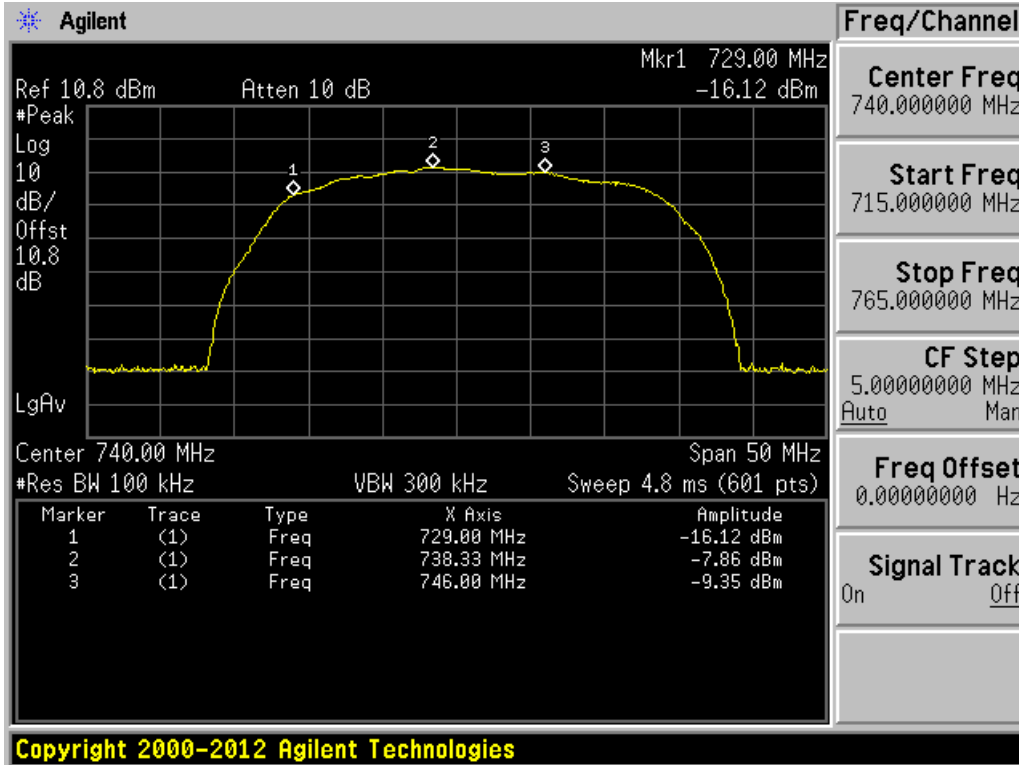
This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.1

This comply with FCC Rule: § 20.21(e)(3) Frequency Bands

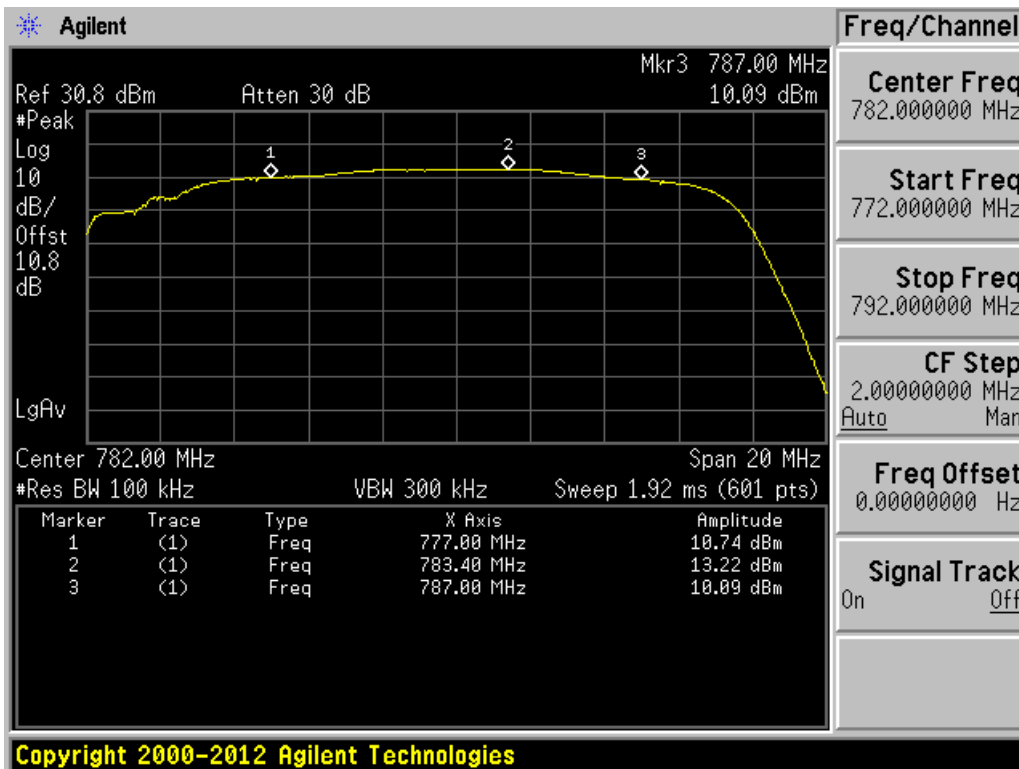
3.1.1 Authorized frequency band test results



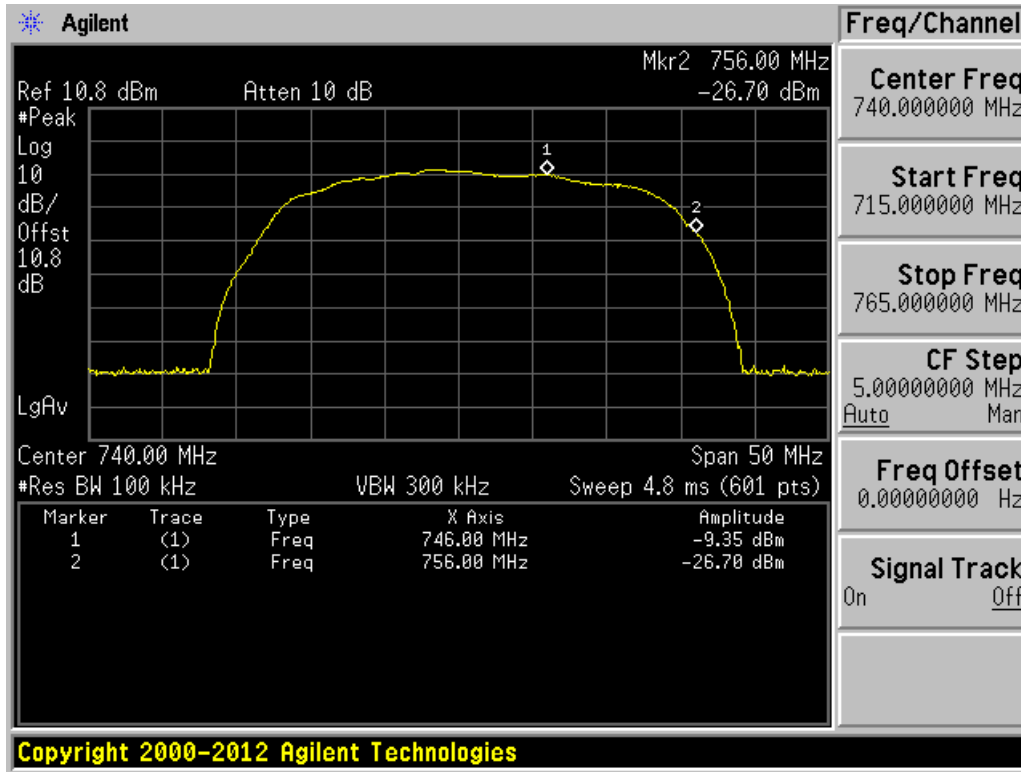
Uplink Band 12 & 17



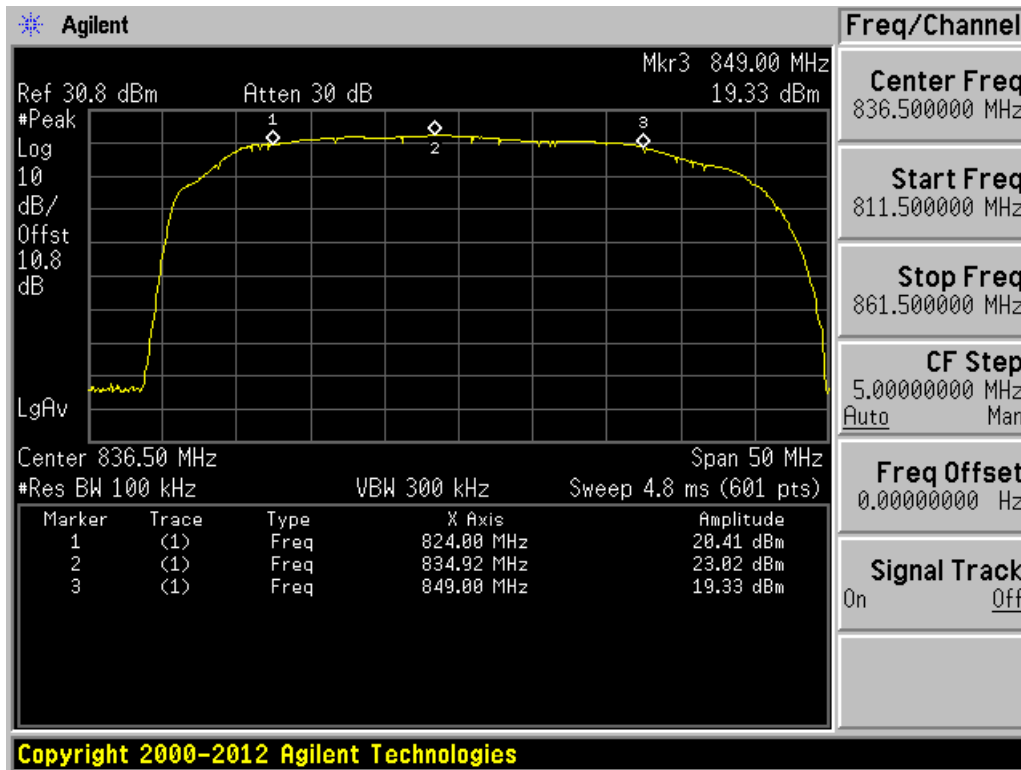
Downlink Band 12 & 17



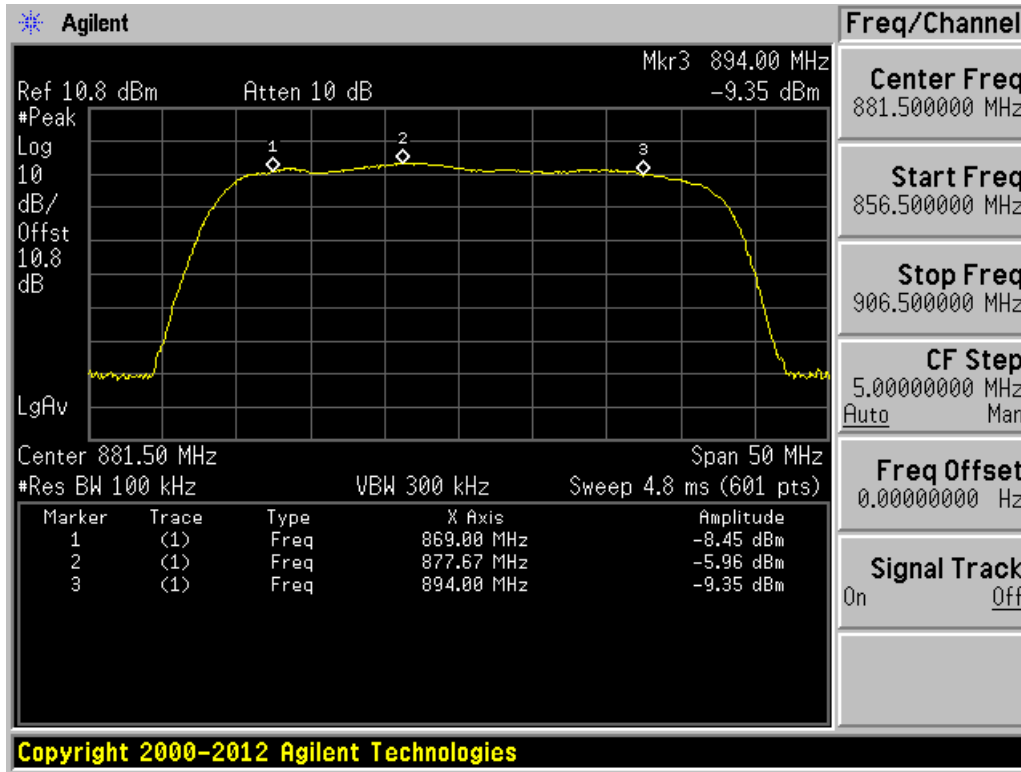
Uplink Band 13



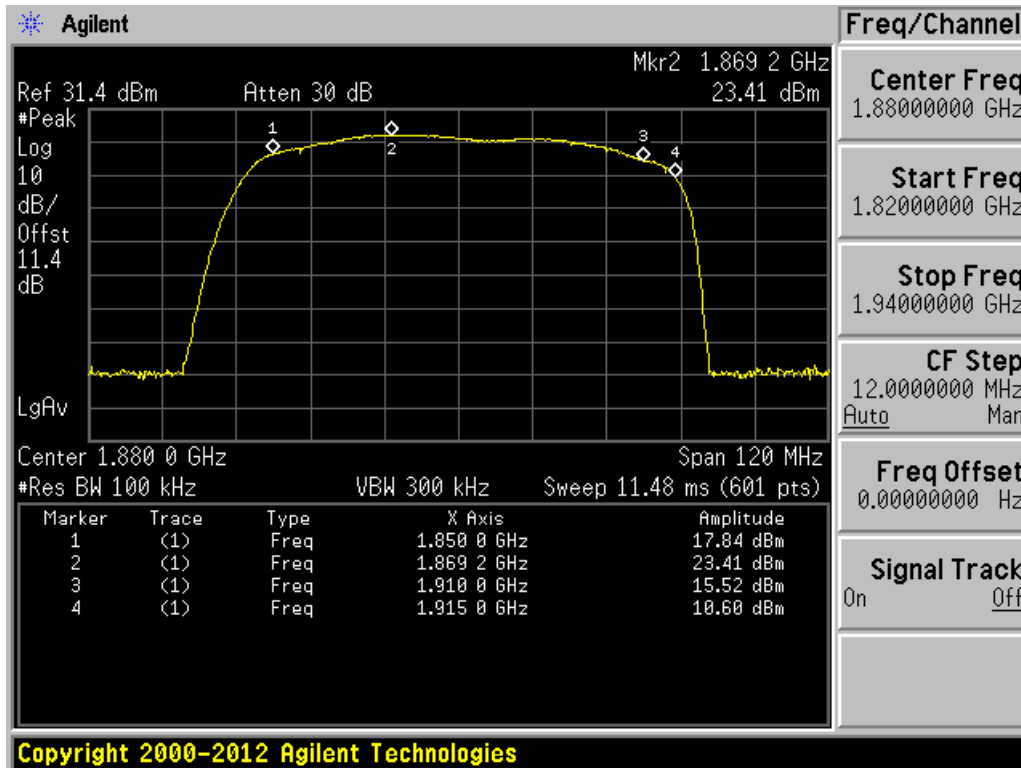
Downlink Band 13



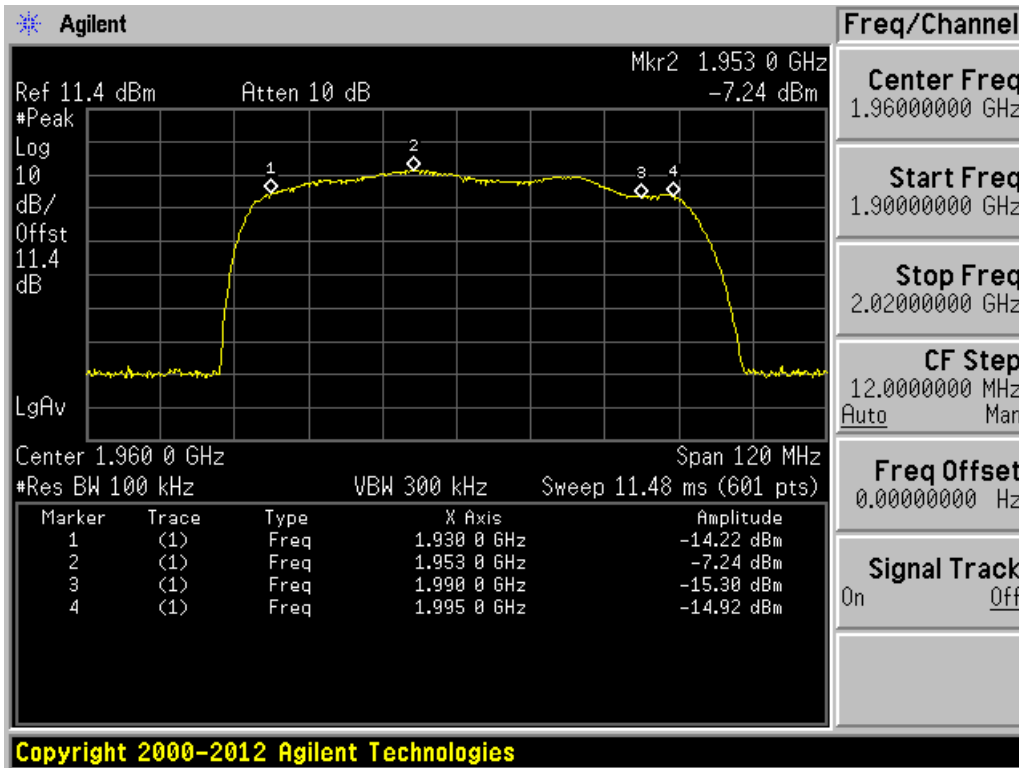
Uplink Band 5



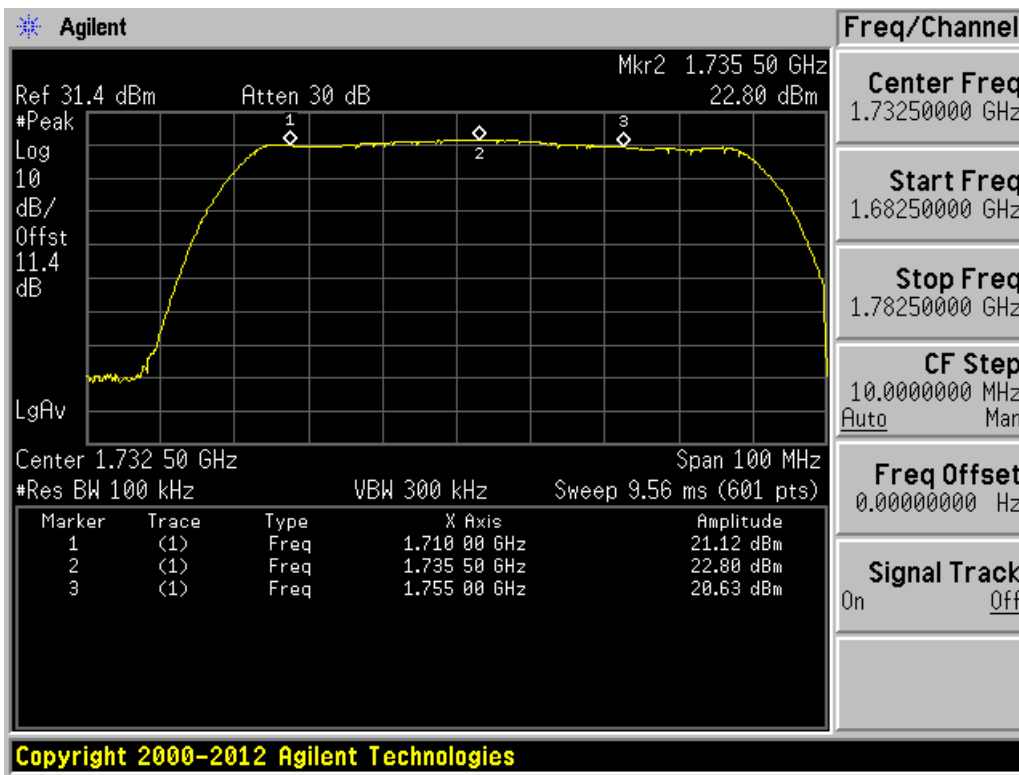
Downlink Band 5



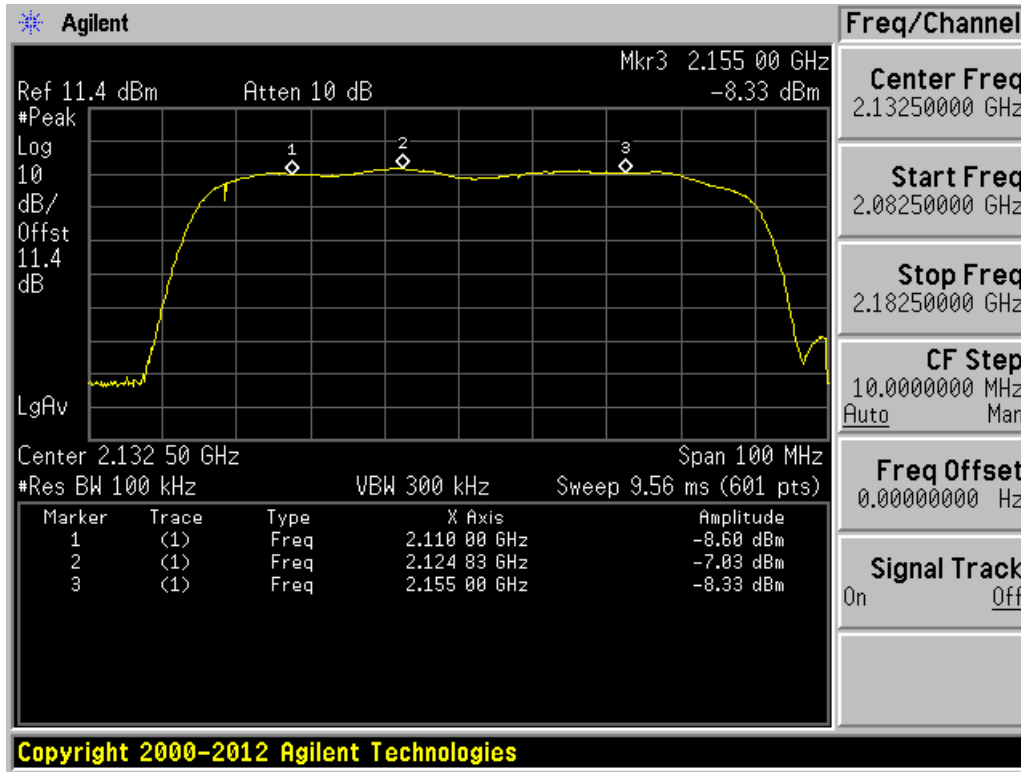
Uplink Band 2 & 25



Downlink Band 2 & 25



Uplink Band 4



Downlink Band 4

3.2 Maximum Power Measurement Test

This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.2

This comply with FCC Rule: § 20.21(e)(8)(i)(D) Power Limits and § 20.21(e)(8)(i)(B) Bidirectional Capability

3.2.1 Maximum power test results

Table 1: Burst power (Pulsed CW)

Band	Path	Freq (MHz)	P in (dBm)	Pout (dBm)	Lower Limit (dBm)	Upper Limit (dBm)	Result
5	Tx	834.9	-19.8	25.6	17	30	Pass
	Rx	877.7	-49.7	0.0	NA	17	Pass
12 & 17	Tx	703.2	-18.8	26.3	17	30	Pass
	Rx	738.3	-50.3	-1.3	NA	17	Pass
13	Tx	783.4	-17.9	25.9	17	30	Pass
	Rx	748.5	-52.9	-3.7	NA	17	Pass
2 & 25	Tx	1869.2	-19.4	26.0	17	30	Pass
	Rx	1953.0	-50.1	-0.1	NA	17	Pass
4	Tx	1735.5	-17.9	27.4	17	30	Pass
	Rx	2124.8	-50.9	-1.0	NA	17	Pass

Table 2: Channel power (AWGN 4.1 MHz)

Band	Path	Freq (MHz)	P in (dBm)	Pout (dBm)	Lower Limit (dBm)	Upper Limit (dBm)	Result
5	Tx	834.9	-18.8	25.1	17	30	Pass
	Rx	877.7	-49.7	-0.6	NA	17	Pass
12 & 17	Tx	703.2	-19.8	24.4	17	30	Pass
	Rx	738.3	-52.1	-2.6	NA	17	Pass
13	Tx	783.4	-18.4	24.6	17	30	Pass
	Rx	748.5	-50.1	-2.5	NA	17	Pass
2 & 25	Tx	1869.2	-19.4	25.7	17	30	Pass
	Rx	1953.0	-52.4	-2.6	NA	17	Pass
4	Tx	1735.5	-17.4	26.9	17	30	Pass
	Rx	2124.8	-51.9	-2.4	NA	17	Pass

3.2.2 Maximum input test results

Table 3

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
834.9	5 Tx	-10.0	25.0	834.9	5 Tx	-10.0	25.4
834.9	5 Tx	-8.0	24.9	834.9	5 Tx	-8.0	26.4
834.9	5 Tx	-6.0	24.8	834.9	5 Tx	-6.0	25.6
834.9	5 Tx	-4.0	25.2	834.9	5 Tx	-4.0	25.7
834.9	5 Tx	-2.0	25.2	834.9	5 Tx	-2.0	25.8
834.9	5 Tx	0.0	25.2	834.9	5 Tx	0.0	25.7
834.9	5 Tx	2.0	25.2	834.9	5 Tx	2.0	25.7
834.9	5 Tx	4.0	24.9	834.9	5 Tx	4.0	25.6
834.9	5 Tx	6.0	25.0	834.9	5 Tx	6.0	25.6
834.9	5 Tx	8.0	24.9	834.9	5 Tx	8.0	26.3
834.9	5 Tx	10.0	25.2	834.9	5 Tx	10.0	26.2

Table 4

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
703.2	12/17 Tx	-10.0	24.9	703.2	12/17 Tx	-10.0	25.9
703.2	12/17 Tx	-8.0	25.2	703.2	12/17 Tx	-8.0	26.0
703.2	12/17 Tx	-6.0	25.0	703.2	12/17 Tx	-6.0	26.2
703.2	12/17 Tx	-4.0	25.0	703.2	12/17 Tx	-4.0	26.2
703.2	12/17 Tx	-2.0	24.7	703.2	12/17 Tx	-2.0	25.8
703.2	12/17 Tx	0.0	25.2	703.2	12/17 Tx	0.0	26.2
703.2	12/17 Tx	2.0	25.1	703.2	12/17 Tx	2.0	26.3
703.2	12/17 Tx	4.0	25.2	703.2	12/17 Tx	4.0	26.3
703.2	12/17 Tx	6.0	24.9	703.2	12/17 Tx	6.0	25.8
703.2	12/17 Tx	8.0	25.1	703.2	12/17 Tx	8.0	26.2
703.2	12/17 Tx	10.0	25.2	703.2	12/17 Tx	10.0	26.2

Table 5

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
783.4	13 Tx	-10.0	25.1	783.4	13 Tx	-10.0	26.3
783.4	13 Tx	-8.0	24.7	783.4	13 Tx	-8.0	25.9
783.4	13 Tx	-6.0	24.8	783.4	13 Tx	-6.0	25.8
783.4	13 Tx	-4.0	24.7	783.4	13 Tx	-4.0	25.7
783.4	13 Tx	-2.0	25.0	783.4	13 Tx	-2.0	26.2
783.4	13 Tx	0.0	25.2	783.4	13 Tx	0.0	26.2
783.4	13 Tx	2.0	24.9	783.4	13 Tx	2.0	25.9
783.4	13 Tx	4.0	24.7	783.4	13 Tx	4.0	25.8
783.4	13 Tx	6.0	24.8	783.4	13 Tx	6.0	25.7
783.4	13 Tx	8.0	25.2	783.4	13 Tx	8.0	26.2
783.4	13 Tx	10.0	25.6	783.4	13 Tx	10.0	26.2

Table 6

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
1869.2	2/25 Tx	-10.0	25.7	1869.2	2/25 Tx	-10.0	25.4
1869.2	2/25 Tx	-8.0	25.7	1869.2	2/25 Tx	-8.0	26.0
1869.2	2/25 Tx	-6.0	25.8	1869.2	2/25 Tx	-6.0	25.9
1869.2	2/25 Tx	-4.0	25.7	1869.2	2/25 Tx	-4.0	25.8
1869.2	2/25 Tx	-2.0	25.8	1869.2	2/25 Tx	-2.0	25.5
1869.2	2/25 Tx	0.0	25.4	1869.2	2/25 Tx	0.0	25.5
1869.2	2/25 Tx	2.0	26.0	1869.2	2/25 Tx	2.0	25.7
1869.2	2/25 Tx	4.0	25.9	1869.2	2/25 Tx	4.0	25.5
1869.2	2/25 Tx	6.0	26.1	1869.2	2/25 Tx	6.0	25.6
1869.2	2/25 Tx	8.0	25.6	1869.2	2/25 Tx	8.0	25.9
1869.2	2/25 Tx	10.0	25.5	1869.2	2/25 Tx	10.0	25.8

Table 7

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
1735.5	4 Tx	-10.0	26.7	1735.5	4 Tx	-10.0	27.4
1735.5	4 Tx	-8.0	27.5	1735.5	4 Tx	-8.0	27.6
1735.5	4 Tx	-6.0	27.1	1735.5	4 Tx	-6.0	27.9
1735.5	4 Tx	-4.0	27.3	1735.5	4 Tx	-4.0	28.1
1735.5	4 Tx	-2.0	27.4	1735.5	4 Tx	-2.0	27.5
1735.5	4 Tx	0.0	27.4	1735.5	4 Tx	0.0	28.0
1735.5	4 Tx	2.0	27.9	1735.5	4 Tx	2.0	27.9
1735.5	4 Tx	4.0	27.1	1735.5	4 Tx	4.0	27.9
1735.5	4 Tx	6.0	27.5	1735.5	4 Tx	6.0	27.6
1735.5	4 Tx	8.0	27.3	1735.5	4 Tx	8.0	27.6
1735.5	4 Tx	10.0	27.1	1735.5	4 Tx	10.0	27.4

Table 8

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
877.7	5 Rx	-40.0	0.6	877.7	5 Rx	-40.0	3.7
877.7	5 Rx	-38.0	-0.4	877.7	5 Rx	-38.0	3.8
877.7	5 Rx	-36.0	0.0	877.7	5 Rx	-36.0	3.7
877.7	5 Rx	-34.0	-1.0	877.7	5 Rx	-34.0	3.7
877.7	5 Rx	-32.0	0.4	877.7	5 Rx	-32.0	3.8
877.7	5 Rx	-30.0	0.9	877.7	5 Rx	-30.0	4.2
877.7	5 Rx	-28.0	0.4	877.7	5 Rx	-28.0	3.9
877.7	5 Rx	-26.0	0.8	877.7	5 Rx	-26.0	4.3
877.7	5 Rx	-24.0	0.8	877.7	5 Rx	-24.0	4.1
877.7	5 Rx	-22.0	1.3	877.7	5 Rx	-22.0	3.3
877.7	5 Rx	-20.0	1.1	877.7	5 Rx	-20.0	3.7

Table 9

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
738.3	12/17 Rx	-40.0	-4.1	738.3	12/17 Rx	-40.0	2.8
738.3	12/17 Rx	-38.0	-2.6	738.3	12/17 Rx	-38.0	3.1
738.3	12/17 Rx	-36.0	-1.6	738.3	12/17 Rx	-36.0	2.9
738.3	12/17 Rx	-34.0	-2.3	738.3	12/17 Rx	-34.0	4.0
738.3	12/17 Rx	-32.0	-2.7	738.3	12/17 Rx	-32.0	3.6
738.3	12/17 Rx	-30.0	-2.8	738.3	12/17 Rx	-30.0	3.5
738.3	12/17 Rx	-28.0	-2.7	738.3	12/17 Rx	-28.0	3.2
738.3	12/17 Rx	-26.0	-3.3	738.3	12/17 Rx	-26.0	3.6
738.3	12/17 Rx	-24.0	-3.2	738.3	12/17 Rx	-24.0	2.3
738.3	12/17 Rx	-22.0	-2.9	738.3	12/17 Rx	-22.0	4.1
738.3	12/17 Rx	-20.0	-2.3	738.3	12/17 Rx	-20.0	3.2

Table 10

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
748.5	13 Rx	-40.0	-3.1	748.5	13 Rx	-40.0	2.1
748.5	13 Rx	-38.0	-1.7	748.5	13 Rx	-38.0	2.4
748.5	13 Rx	-36.0	-1.8	748.5	13 Rx	-36.0	3.2
748.5	13 Rx	-34.0	-1.0	748.5	13 Rx	-34.0	2.5
748.5	13 Rx	-32.0	-1.0	748.5	13 Rx	-32.0	2.7
748.5	13 Rx	-30.0	-0.9	748.5	13 Rx	-30.0	2.6
748.5	13 Rx	-28.0	-2.0	748.5	13 Rx	-28.0	2.8
748.5	13 Rx	-26.0	-2.1	748.5	13 Rx	-26.0	1.9
748.5	13 Rx	-24.0	-2.3	748.5	13 Rx	-24.0	2.6
748.5	13 Rx	-22.0	-0.8	748.5	13 Rx	-22.0	2.8
748.5	13 Rx	-20.0	-1.8	748.5	13 Rx	-20.0	3.7

Table 11

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
1953.0	2/25 Rx	-40.0	-0.8	1953.0	2/25 Rx	-40.0	3.0
1953.0	2/25 Rx	-38.0	-1.2	1953.0	2/25 Rx	-38.0	3.2
1953.0	2/25 Rx	-36.0	0.2	1953.0	2/25 Rx	-36.0	2.9
1953.0	2/25 Rx	-34.0	-0.5	1953.0	2/25 Rx	-34.0	2.7
1953.0	2/25 Rx	-32.0	0.2	1953.0	2/25 Rx	-32.0	2.4
1953.0	2/25 Rx	-30.0	0.0	1953.0	2/25 Rx	-30.0	2.8
1953.0	2/25 Rx	-28.0	-0.2	1953.0	2/25 Rx	-28.0	2.5
1953.0	2/25 Rx	-26.0	-1.1	1953.0	2/25 Rx	-26.0	3.3
1953.0	2/25 Rx	-24.0	-1.2	1953.0	2/25 Rx	-24.0	2.8
1953.0	2/25 Rx	-22.0	-1.0	1953.0	2/25 Rx	-22.0	1.8
1953.0	2/25 Rx	-20.0	1.1	1953.0	2/25 Rx	-20.0	2.9

Table 12

AWGN				Pulsed CW			
Freq	Band	P in (dBm)	P out (dBm)	Freq	Band	P in (dBm)	P out (dBm)
2124.8	4 Rx	-40.0	-3.0	2124.8	4 Rx	-40.0	1.7
2124.8	4 Rx	-38.0	-2.3	2124.8	4 Rx	-38.0	1.8
2124.8	4 Rx	-36.0	-2.4	2124.8	4 Rx	-36.0	2.1
2124.8	4 Rx	-34.0	-2.6	2124.8	4 Rx	-34.0	2.2
2124.8	4 Rx	-32.0	-2.7	2124.8	4 Rx	-32.0	2.3
2124.8	4 Rx	-30.0	-0.7	2124.8	4 Rx	-30.0	2.3
2124.8	4 Rx	-28.0	-2.2	2124.8	4 Rx	-28.0	2.1
2124.8	4 Rx	-26.0	-0.6	2124.8	4 Rx	-26.0	2.1
2124.8	4 Rx	-24.0	0.5	2124.8	4 Rx	-24.0	1.8
2124.8	4 Rx	-22.0	-1.6	2124.8	4 Rx	-22.0	2.1
2124.8	4 Rx	-20.0	-0.7	2124.8	4 Rx	-20.0	1.8

3.3 Maximum Booster Gain Computation

This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.3

This comply with FCC Rule: § 20.21(e)(8)(i)(C)(2) Booster Gain Limits and § 20.21(e)(8)(i)(B) Bidirectional Capability

3.3.1 Maximum gain test results

Table 13: Maximum Booster Gain

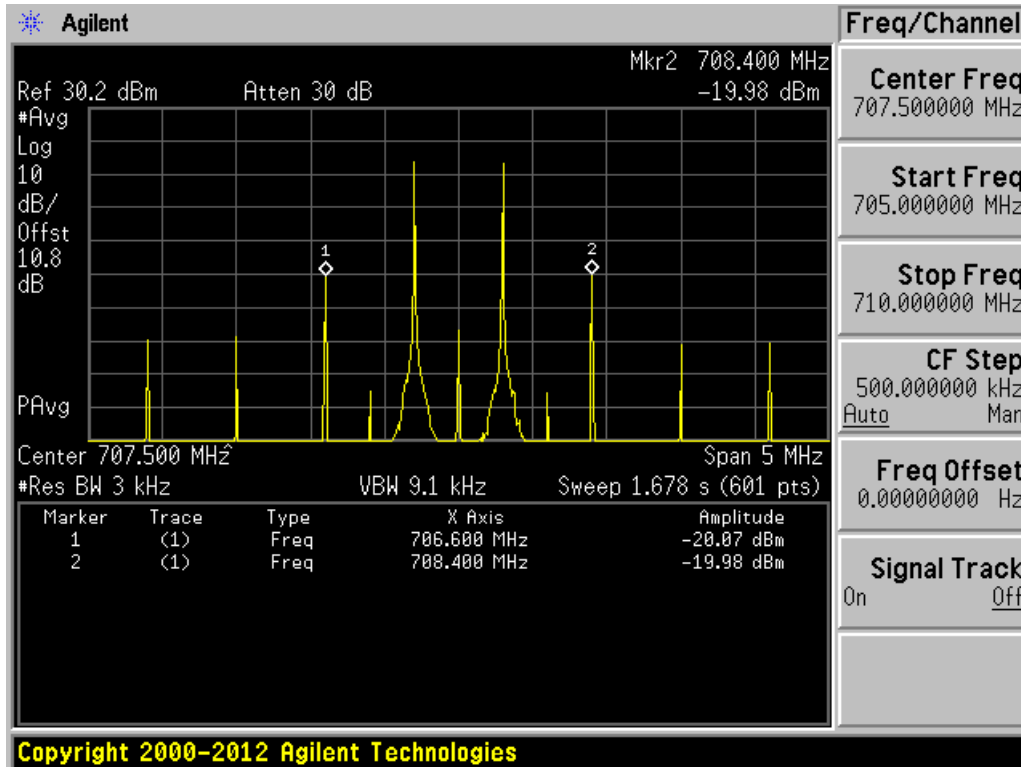
Calculated Gain for Pulsed CW signal						
Freq (MHz)	P in (dBm)	Pout (dBm)	Max Gain (dB)	Limit (dB)		Result
				Mobile	Fixed	
834.9	-19.8	25.6	45.4	50	64.9	Pass
877.7	-49.7	0.0	49.7	50	64.9	Pass
703.2	-18.8	26.3	45.1	50	63.5	Pass
738.3	-50.3	-1.3	49.0	50	63.5	Pass
783.4	-17.9	25.9	43.8	50	64.4	Pass
748.5	-52.9	-3.7	49.2	50	64.4	Pass
1869.2	-19.4	26.0	45.4	50	72.0	Pass
1953.0	-50.1	-0.1	50.0	50	72.0	Pass
1735.5	-17.9	27.4	45.3	50	71.3	Pass
2124.8	-50.9	-1.0	49.9	50	71.3	Pass
Calculated Gain for AWGN signal						
Freq (MHz)	P in (dBm)	Pout (dBm)	Max Gain (dB)	Limit (dB)		Result
				Mobile	Fixed	
834.9	-18.8	25.1	43.9	50	64.9	Pass
877.7	-49.7	-0.6	49.1	50	64.9	Pass
703.2	-19.8	24.4	44.2	50	63.5	Pass
738.3	-52.1	-2.6	49.5	50	63.5	Pass
783.4	-18.4	24.6	43.0	50	64.4	Pass
748.5	-50.1	-2.5	47.6	50	64.4	Pass
1869.2	-19.4	25.7	45.1	50	72.0	Pass
1953.0	-52.4	-2.6	49.8	50	72.0	Pass
1735.5	-17.4	26.9	44.3	50	71.3	Pass
2124.8	-51.9	-2.4	49.5	50	71.3	Pass

3.4 Intermodulation Product Test

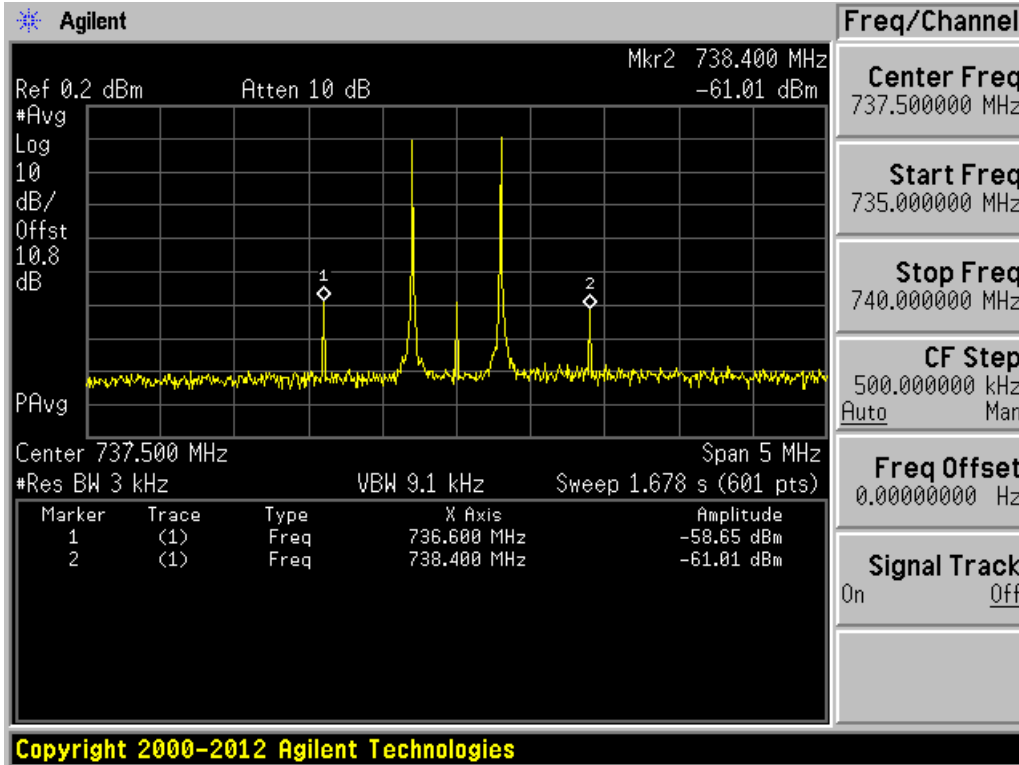
This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.4

This comply with FCC Rule: § 20.21(e)(8)(i)(F) Intermodulation Limits

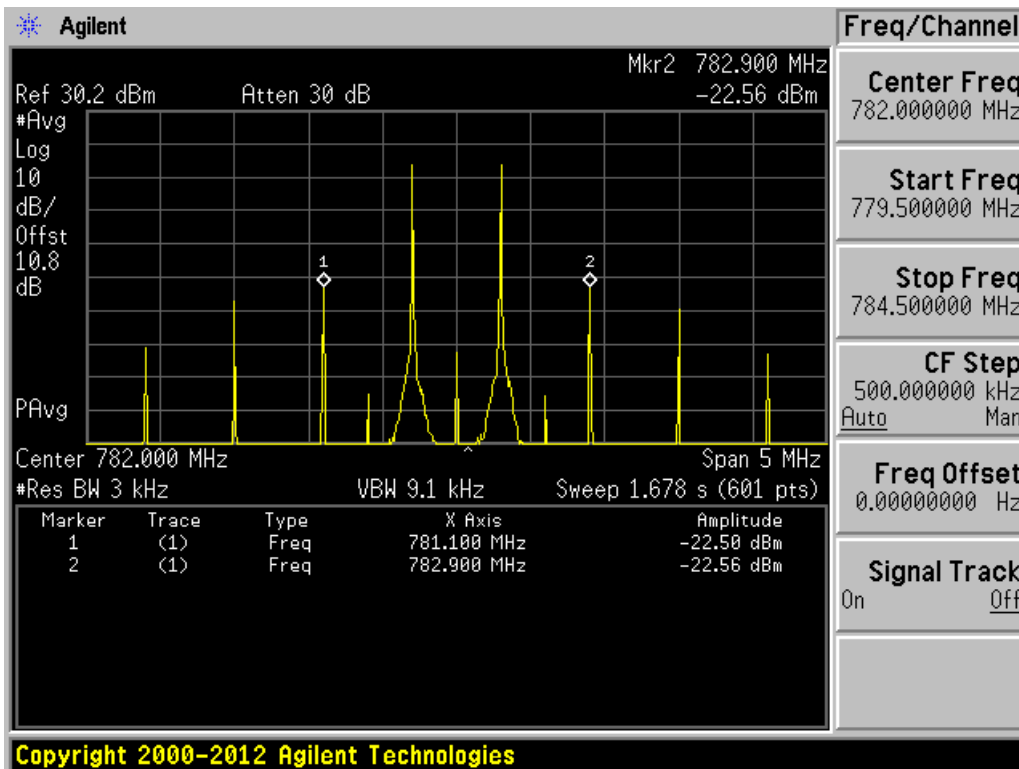
3.4.1 Intermodulation product test results



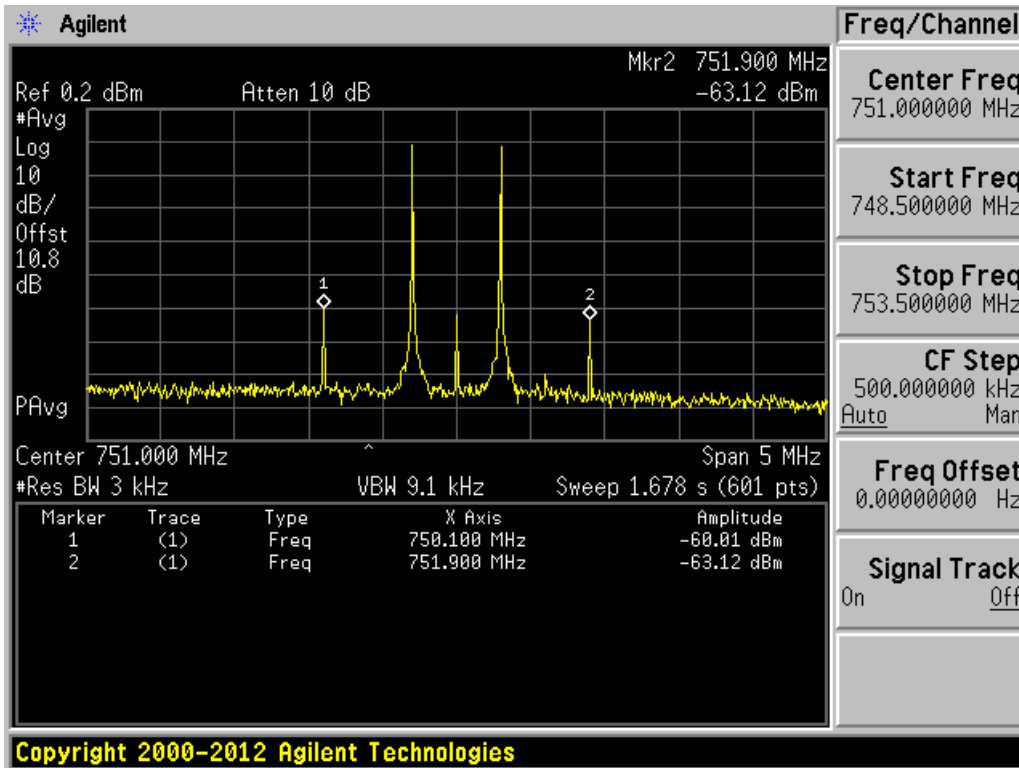
Uplink Band 12 & 17



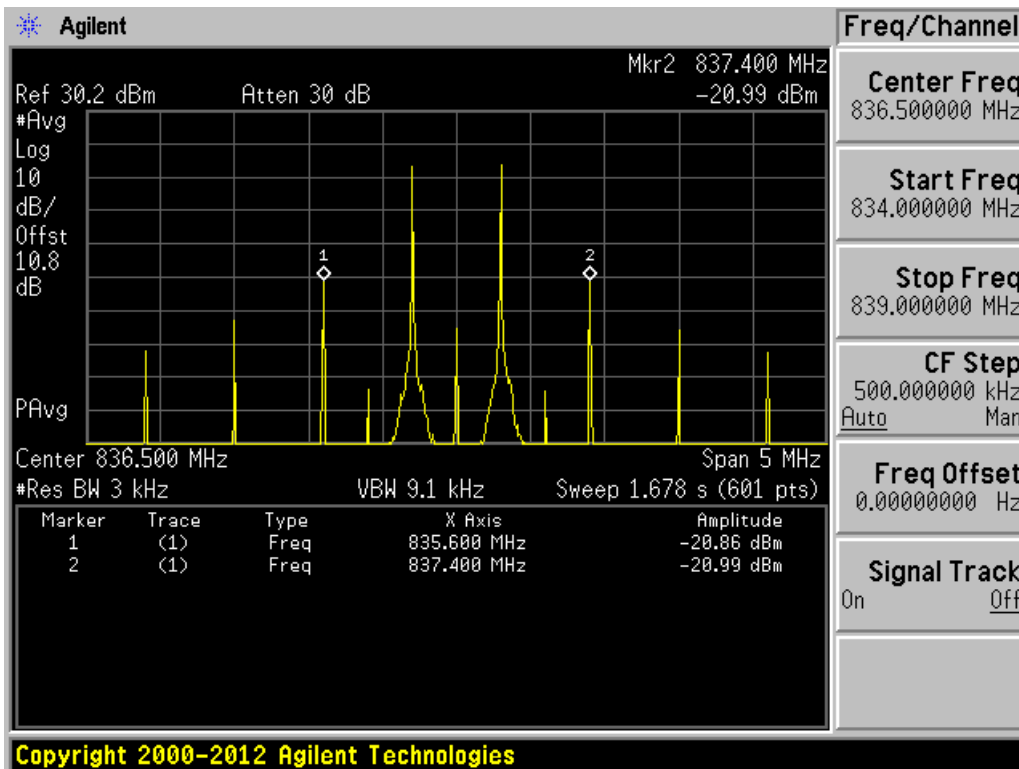
Downlink Band 12 & 17



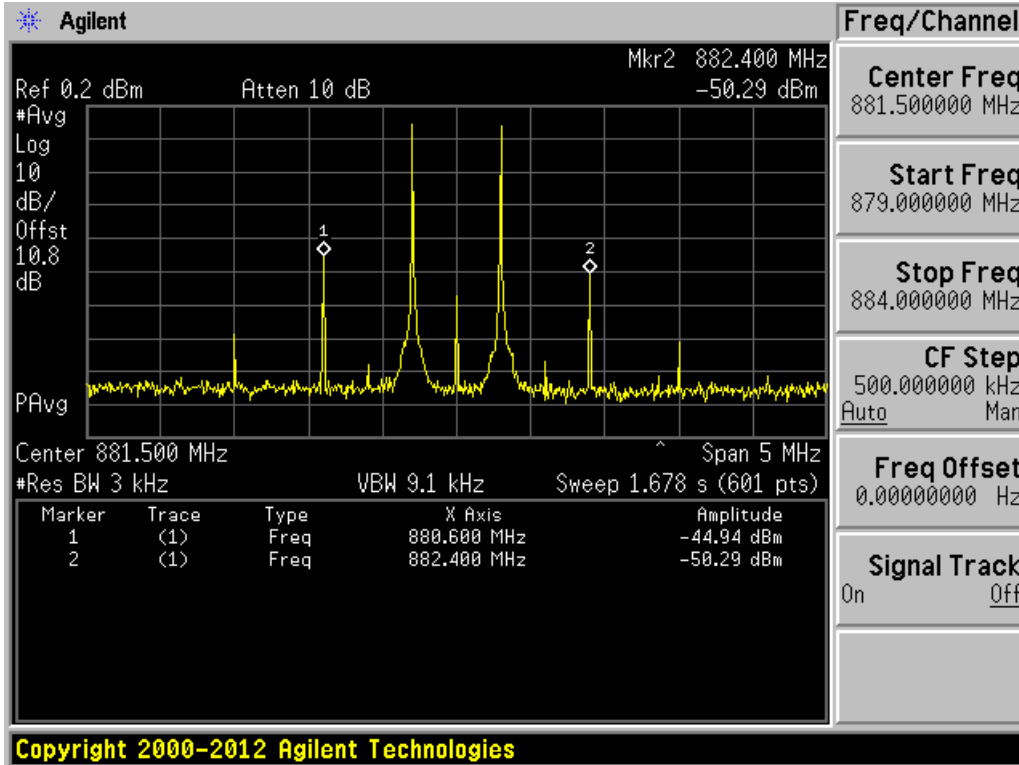
Uplink Band 13



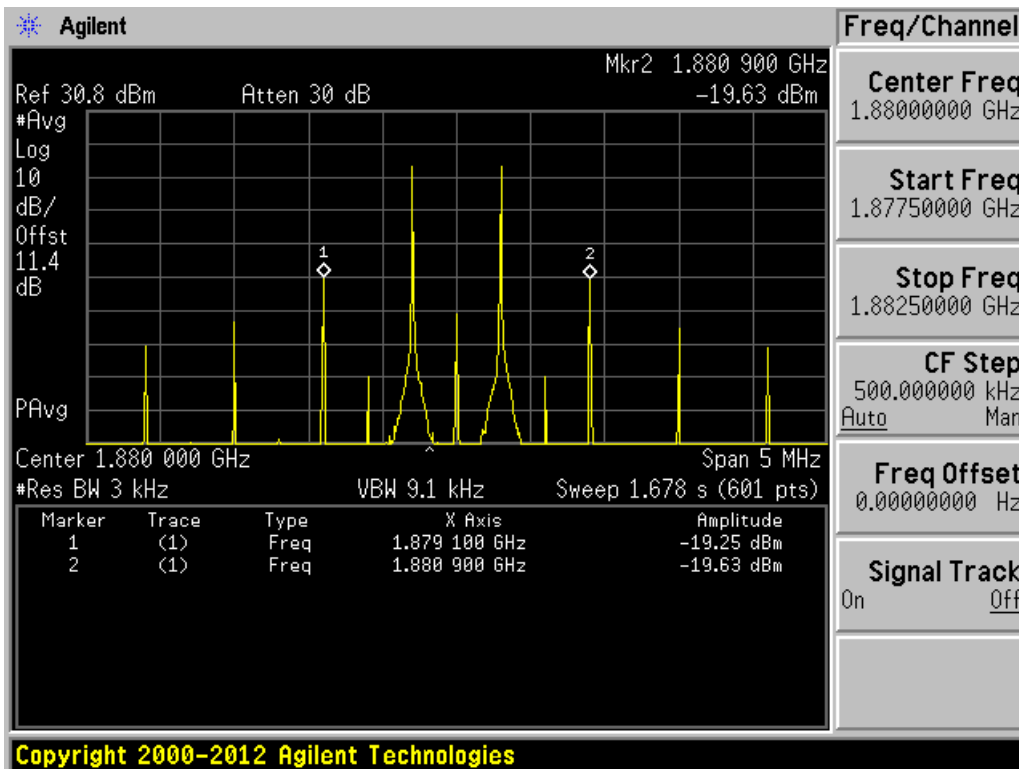
Downlink Band 13



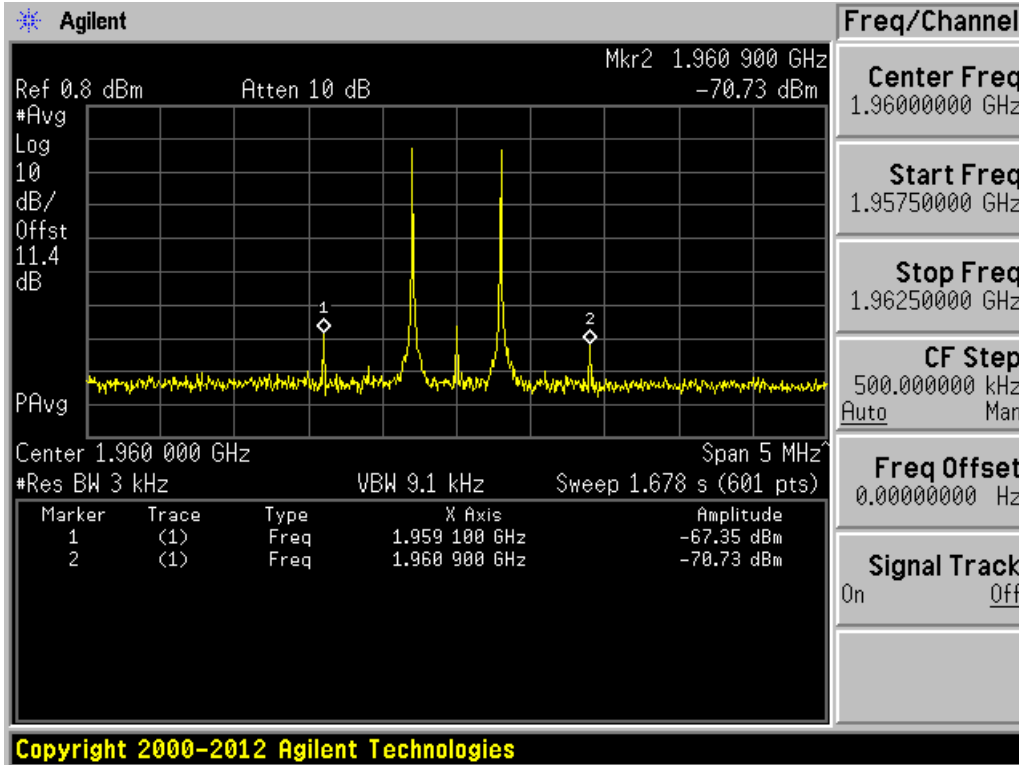
Uplink Band 5



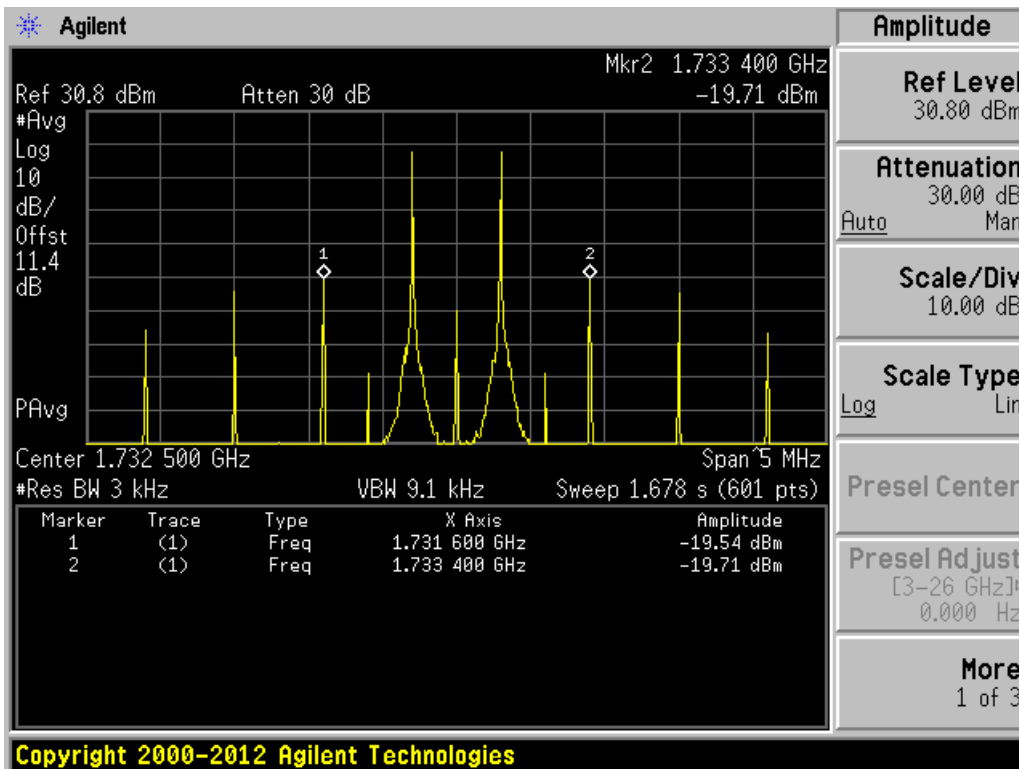
Downlink Band 5



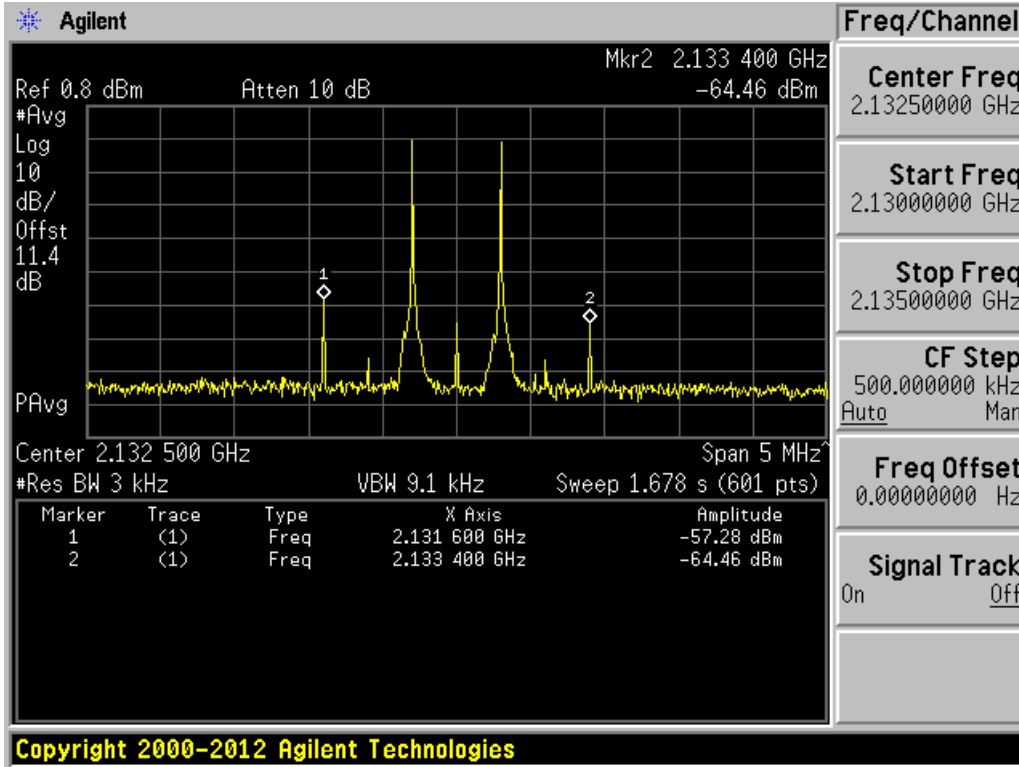
Uplink Band 2 & 25



Downlink Band 2 & 25



Uplink Band 4



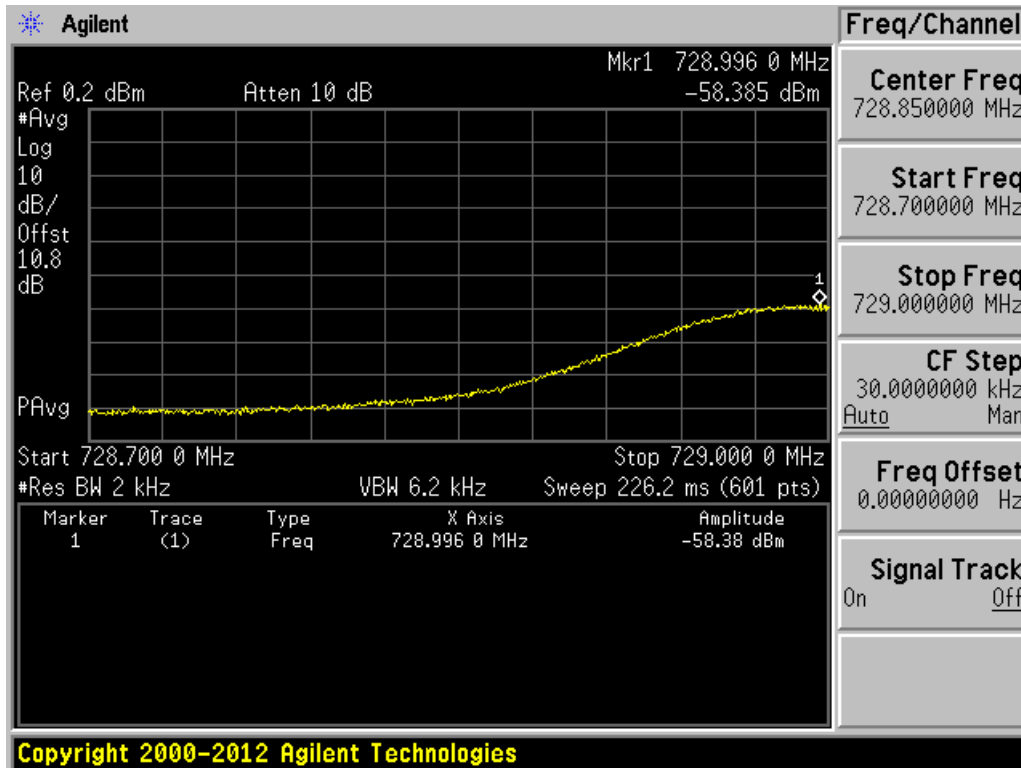
Downlink Band 4

3.5 Out-Of-Band Emissions Test

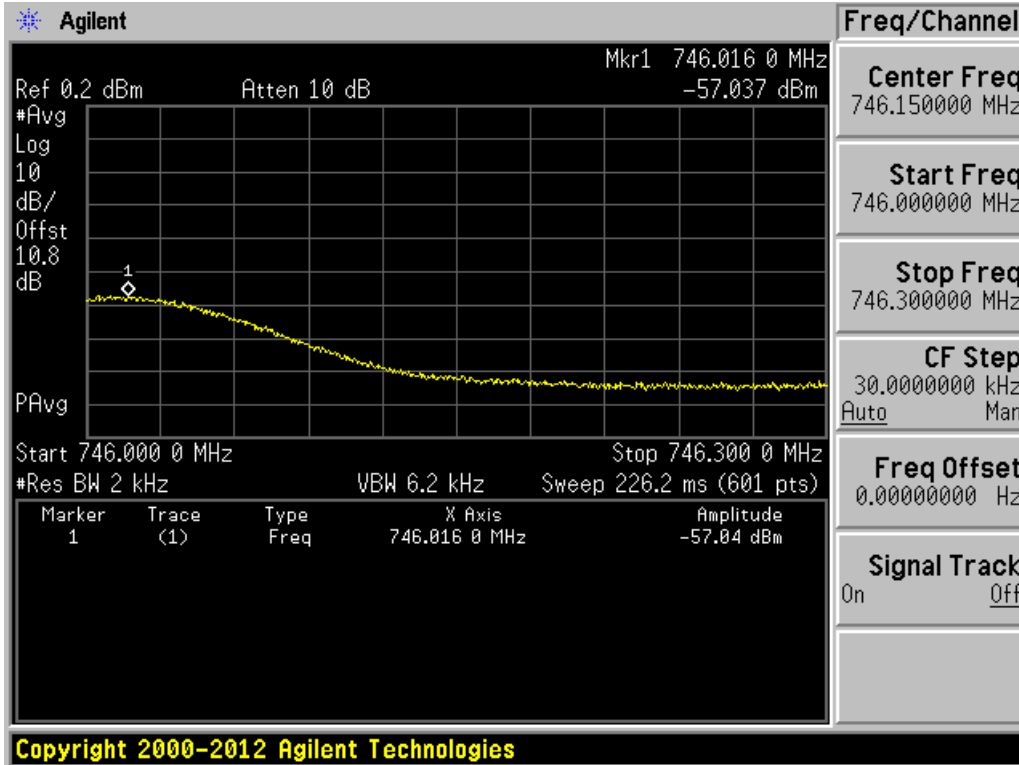
This test conducted in accordance with KDB 935210 D03 V04, Signal Booster Measurements, § 7.5

This comply with FCC Rule: § 20.21(e)(8)(i)(E) Out of Band Emission Limits

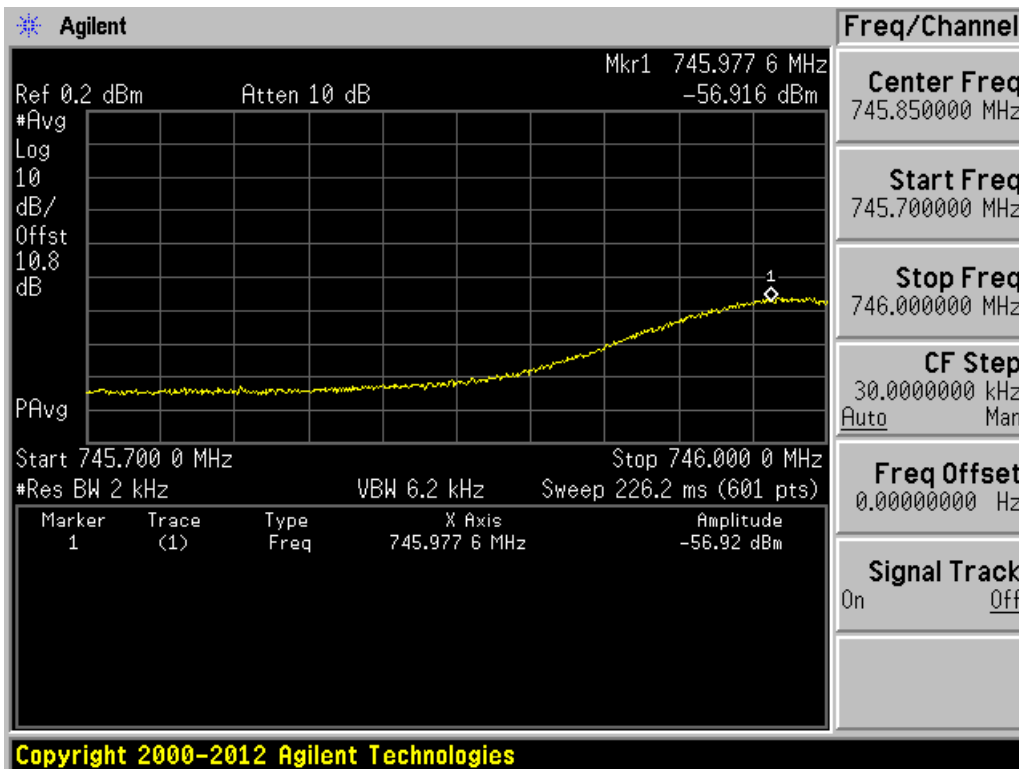
3.5.1 Out of band emissions test results



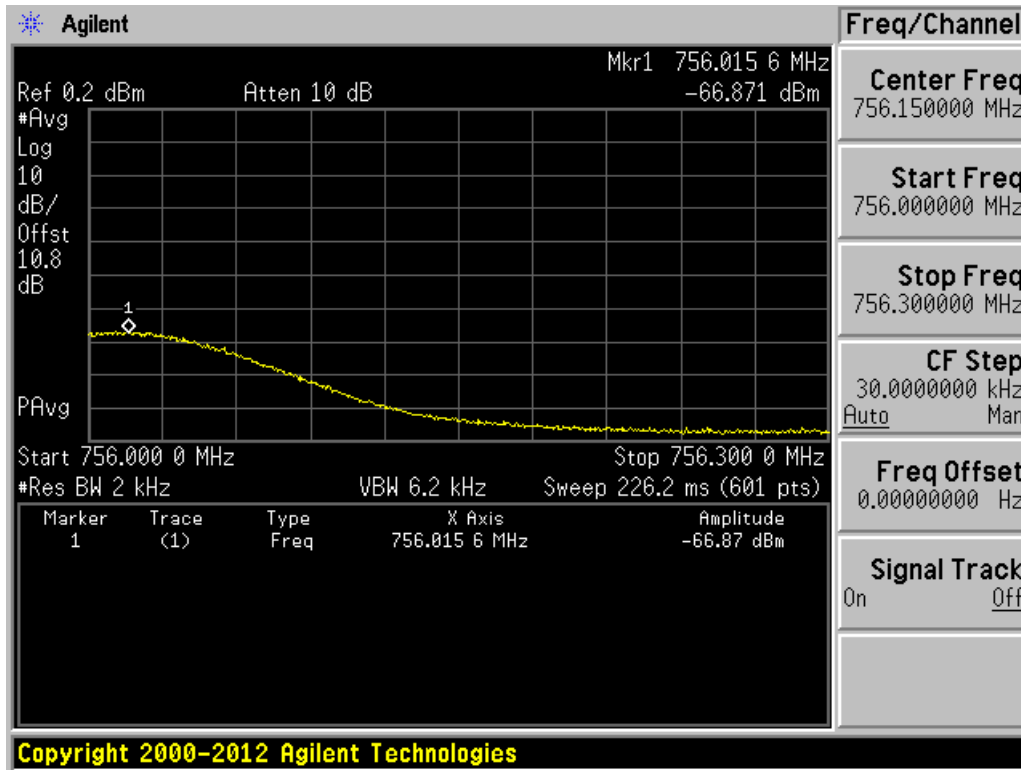
Downlink, Band 12 & 17, GSM 729.2 MHz



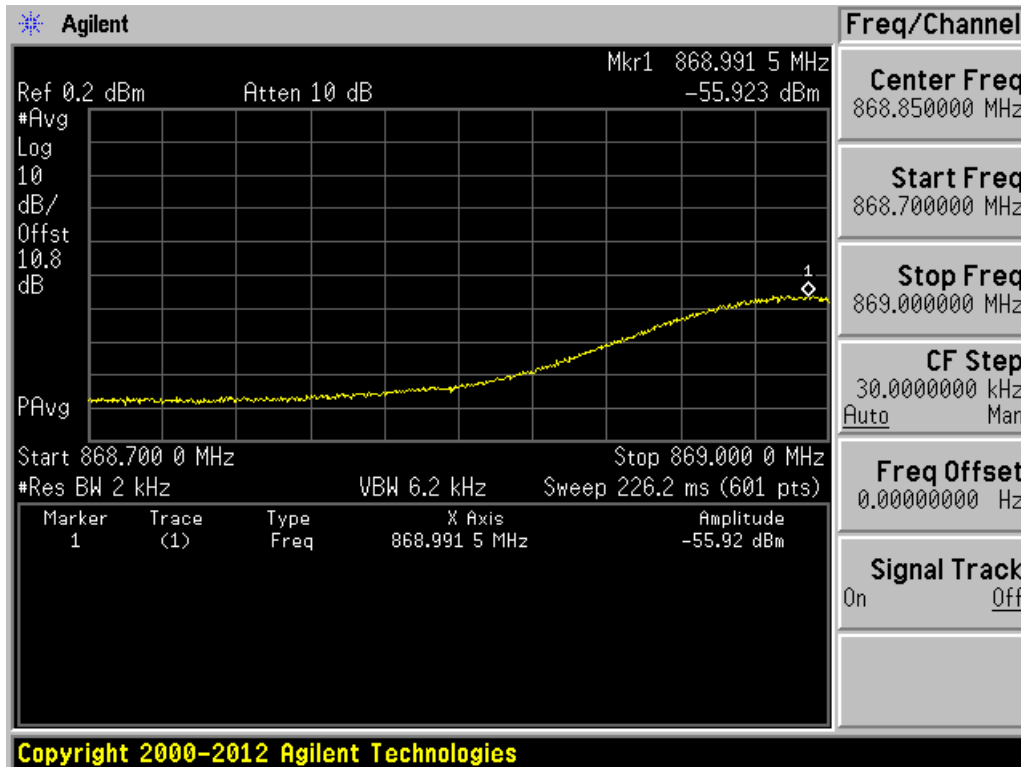
Downlink, Band 12 & 17, GSM 745.8 MHz



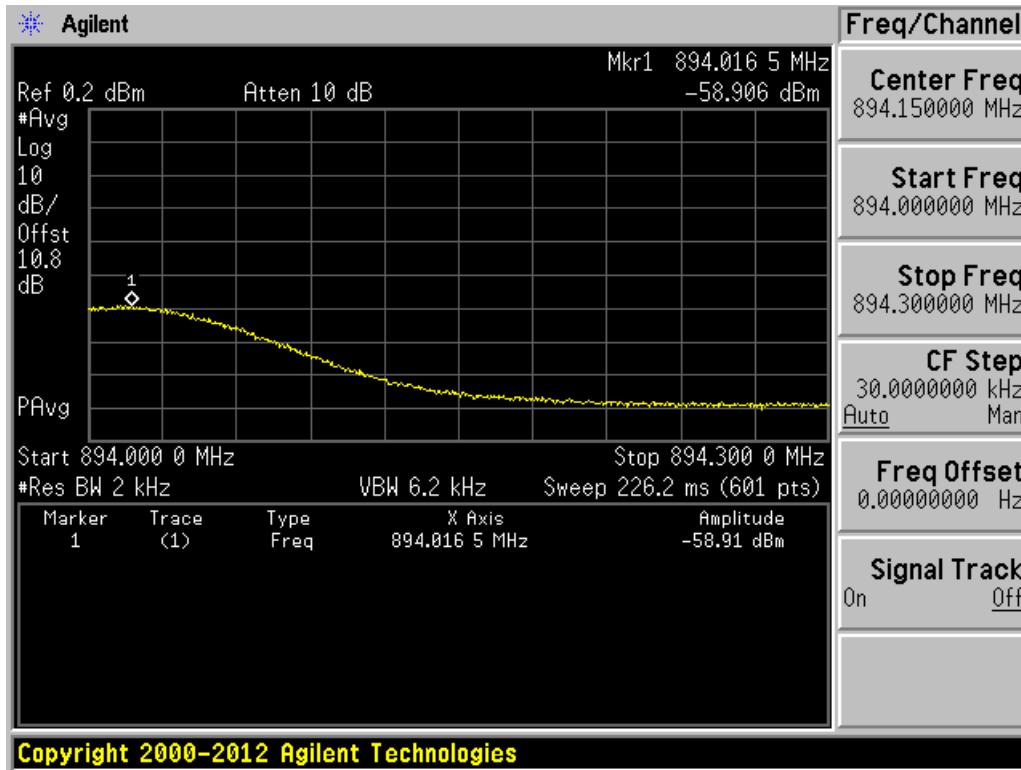
Downlink, Band 13, GSM 746.2 MHz



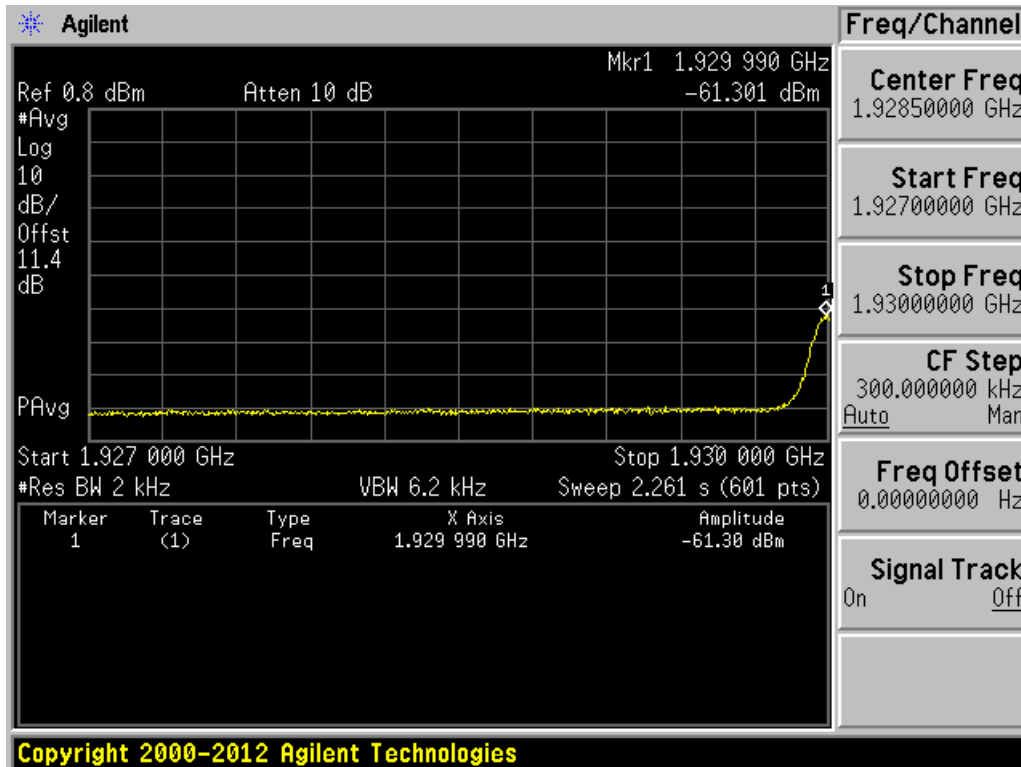
Downlink, Band 13, GSM 755.8 MHz



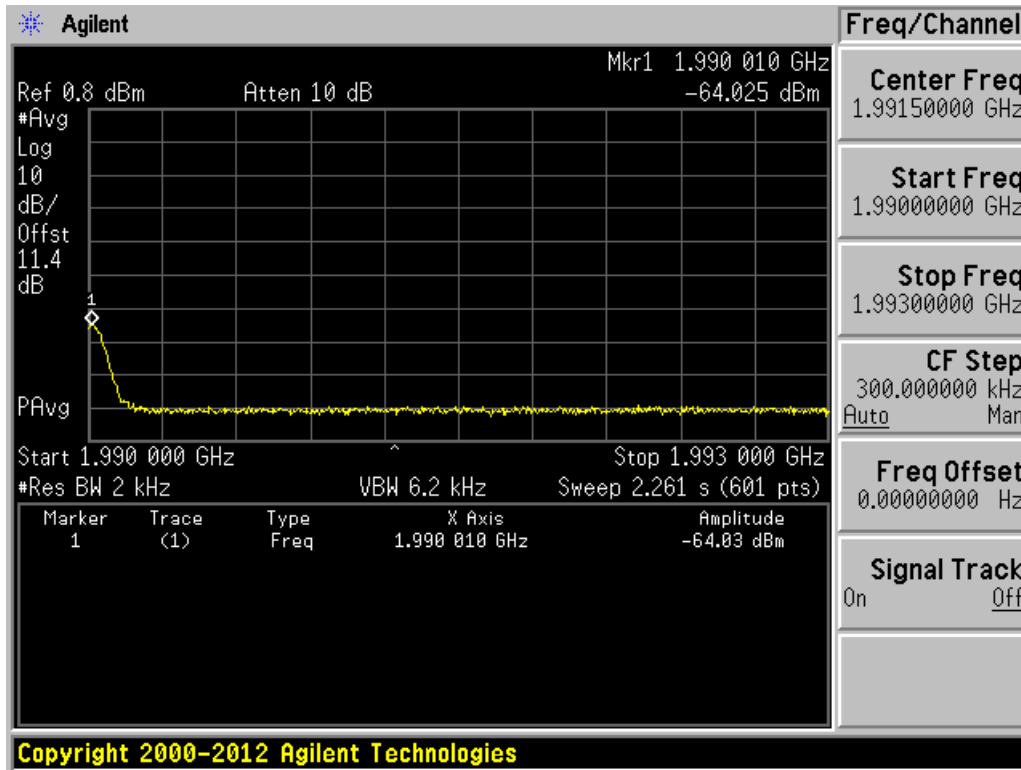
Downlink, Band 5, GSM 869.2 MHz



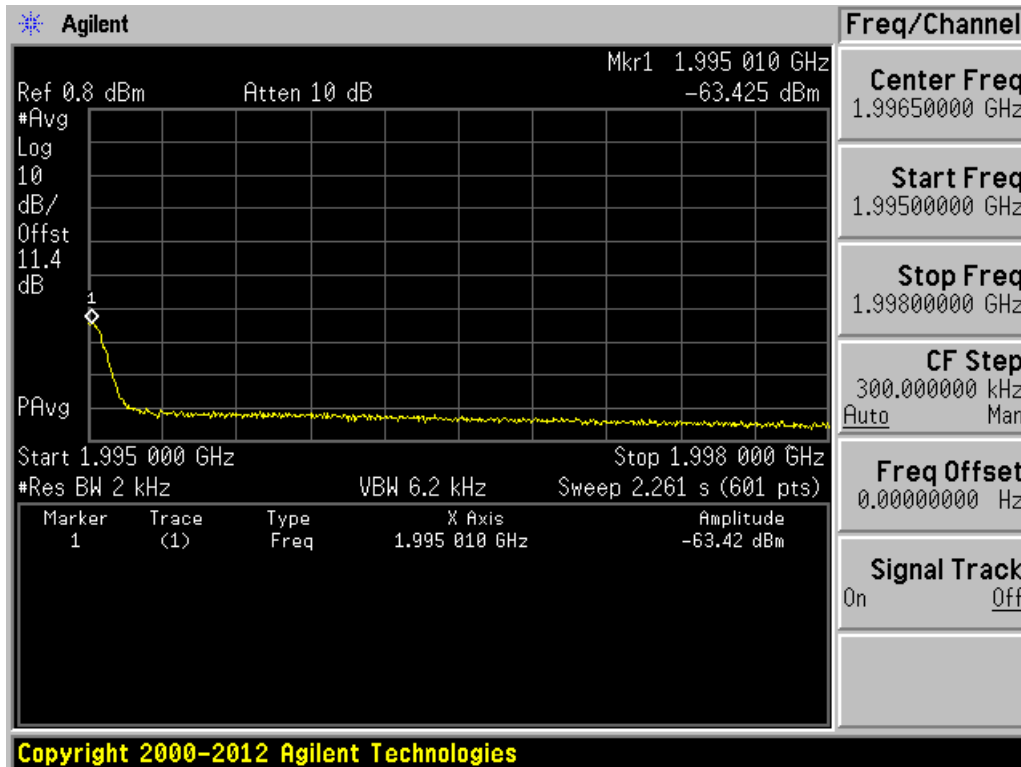
Downlink, Band 5, GSM 893.8 MHz



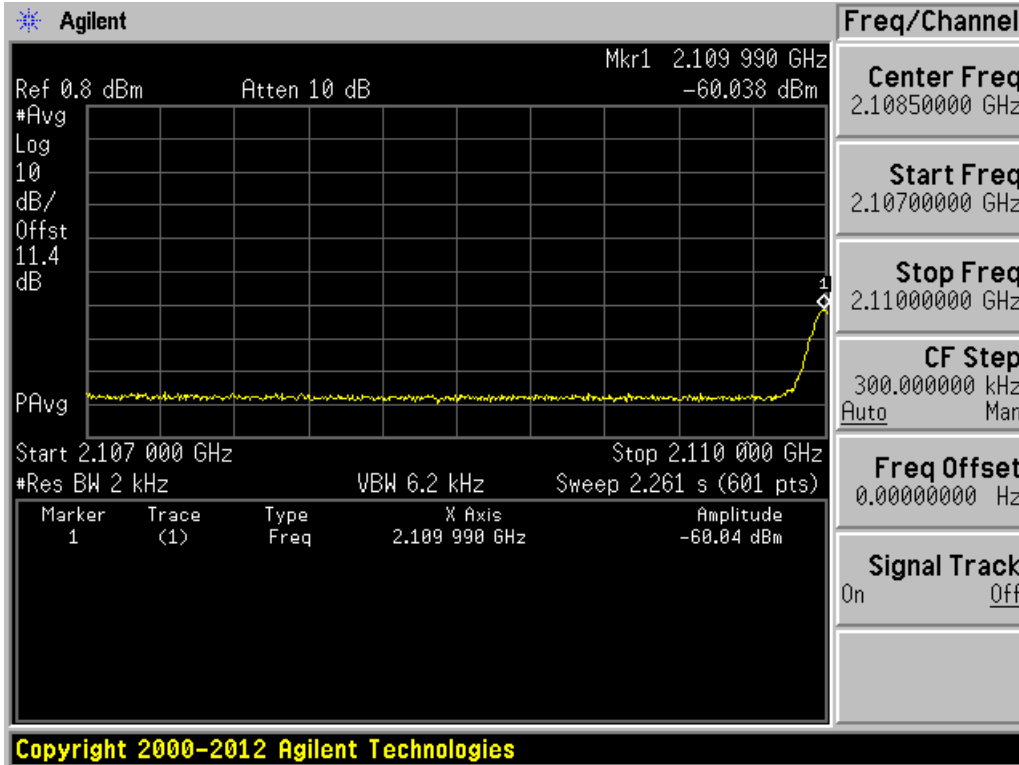
Downlink, Band 2 & 25, GSM 1930.2 MHz



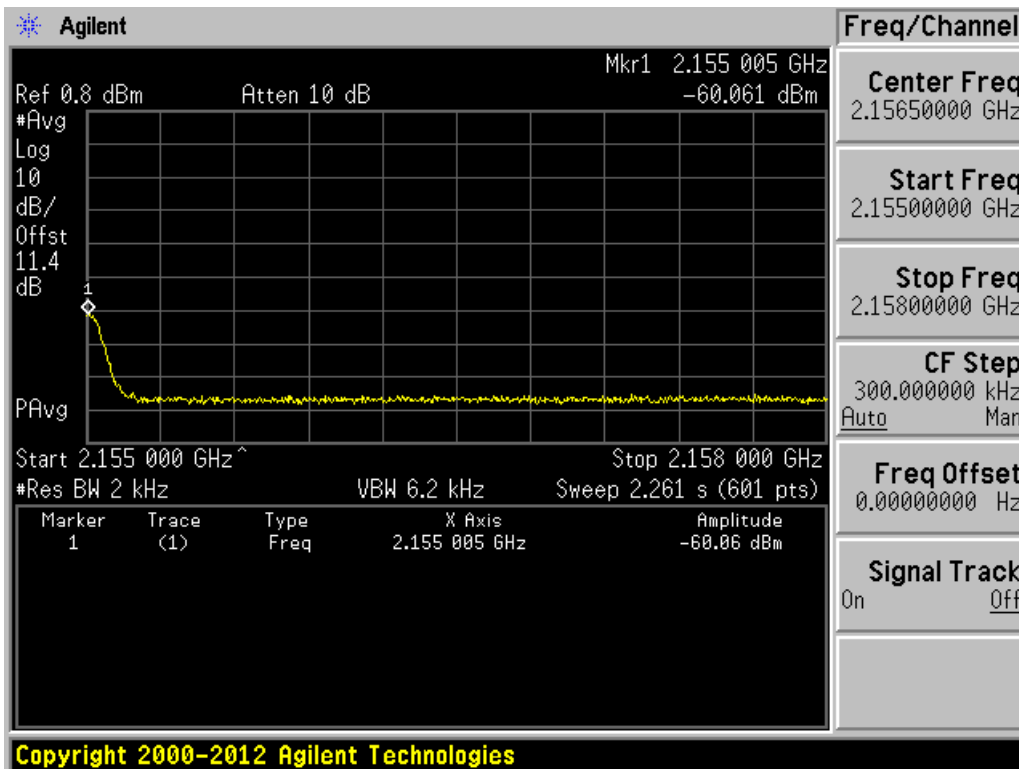
Downlink, Band 2, GSM 1989.8 MHz



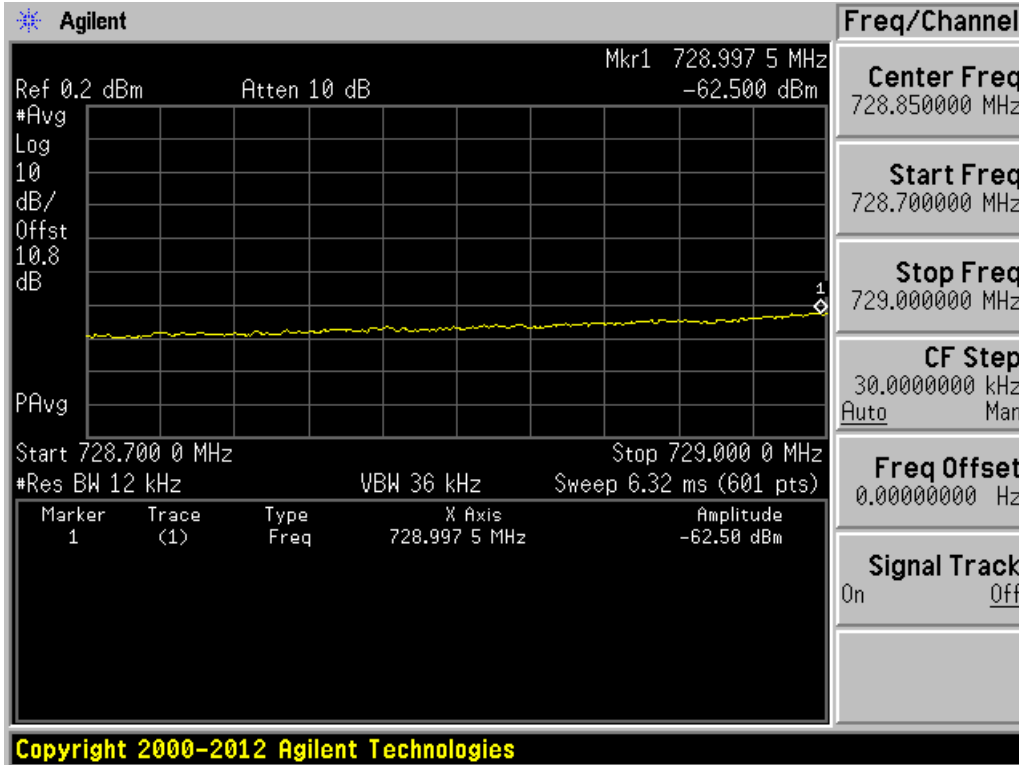
Downlink, Band 25, GSM 1994.8 MHz



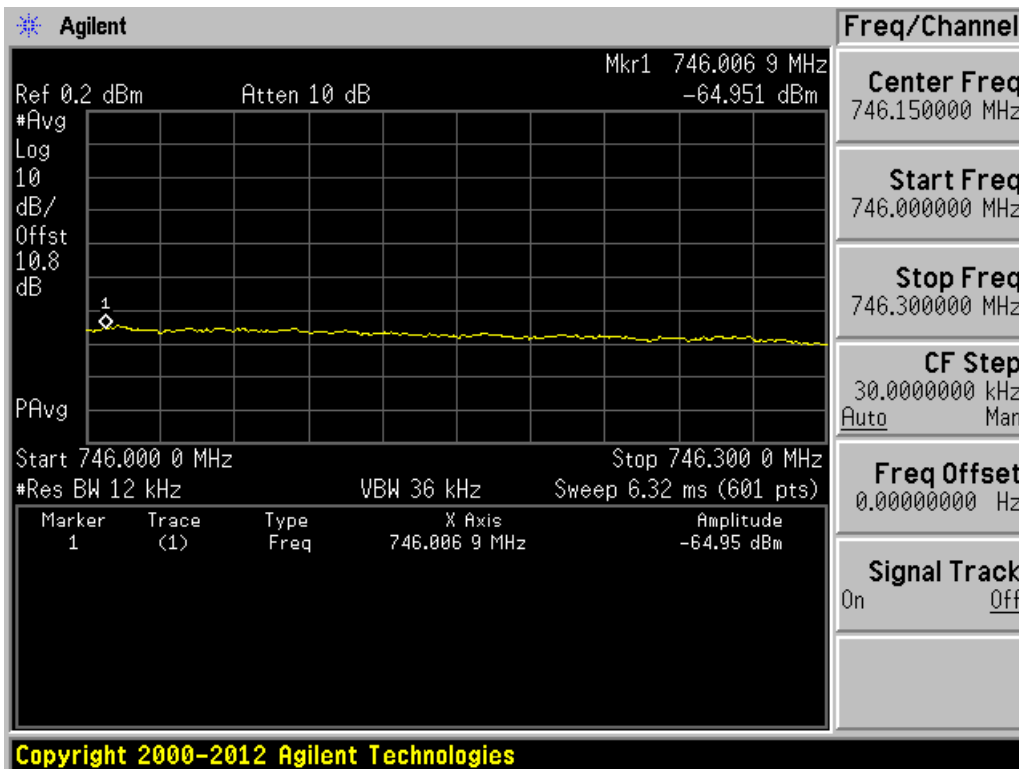
Downlink, Band 4, GSM 2110.2 MHz



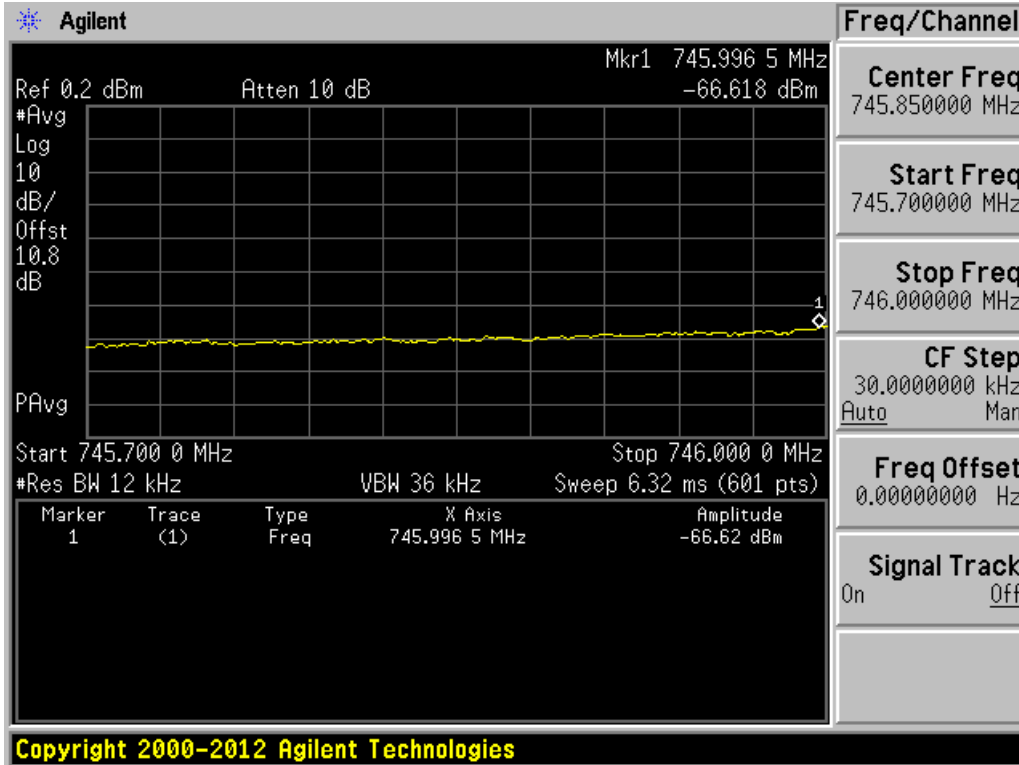
Downlink, Band 4, GSM 2154.8 MHz



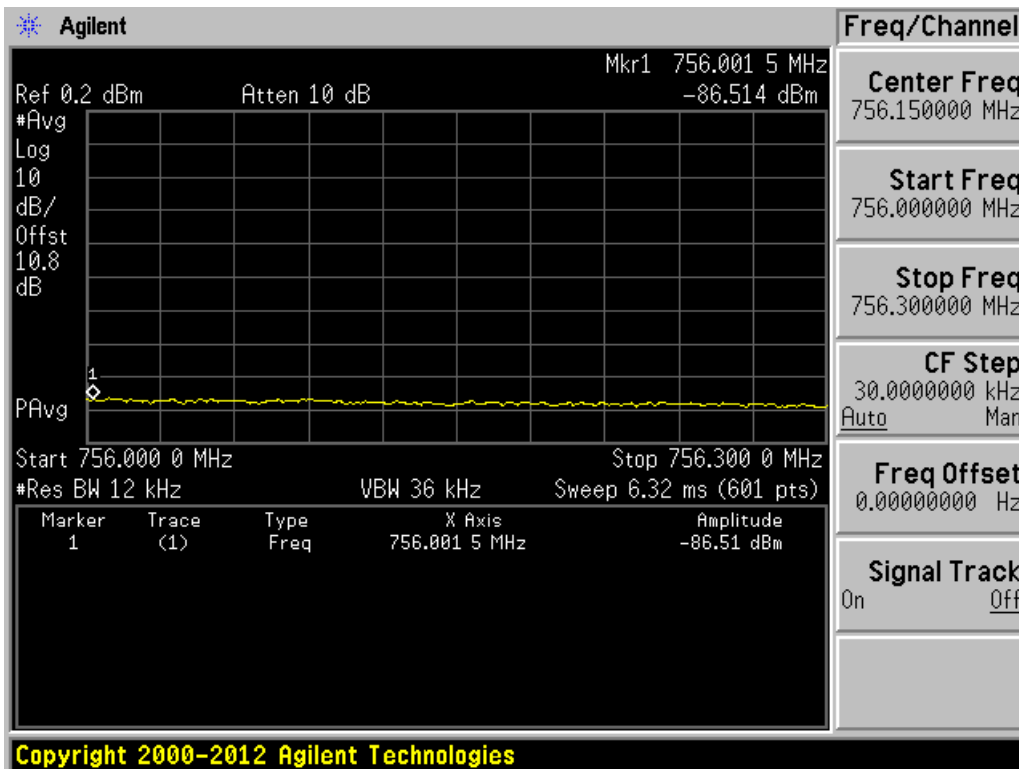
Downlink, Band 12 & 17, CDMA 730.25 MHz



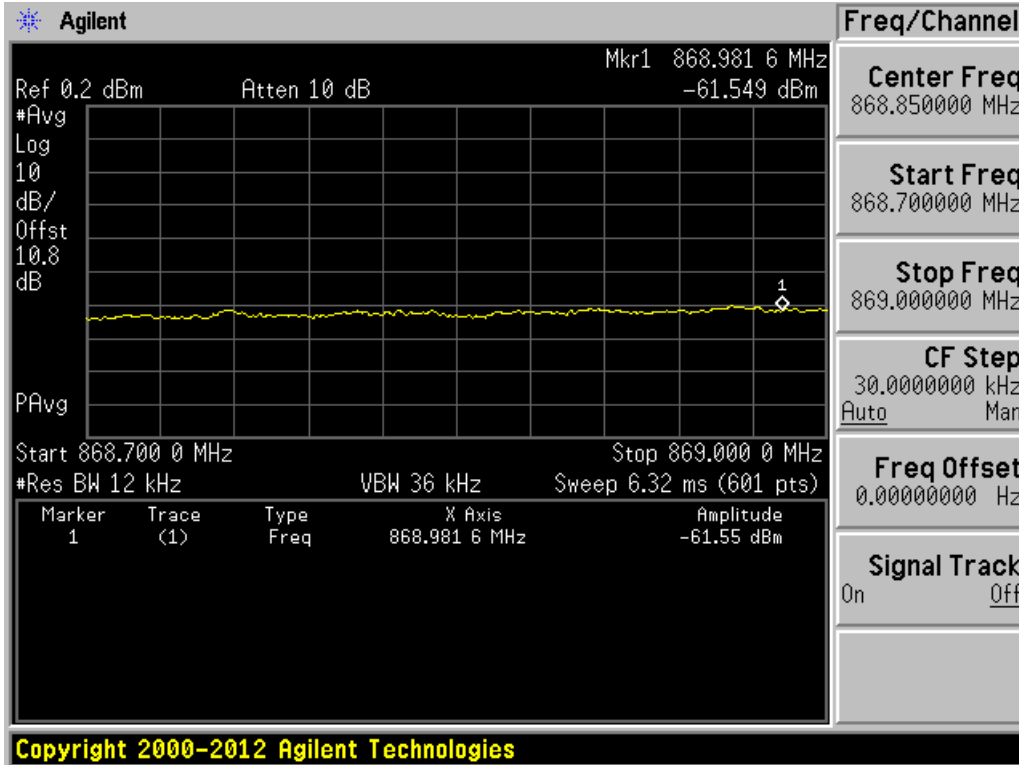
Downlink, Band 12 & 17, CDMA 744.75 MHz



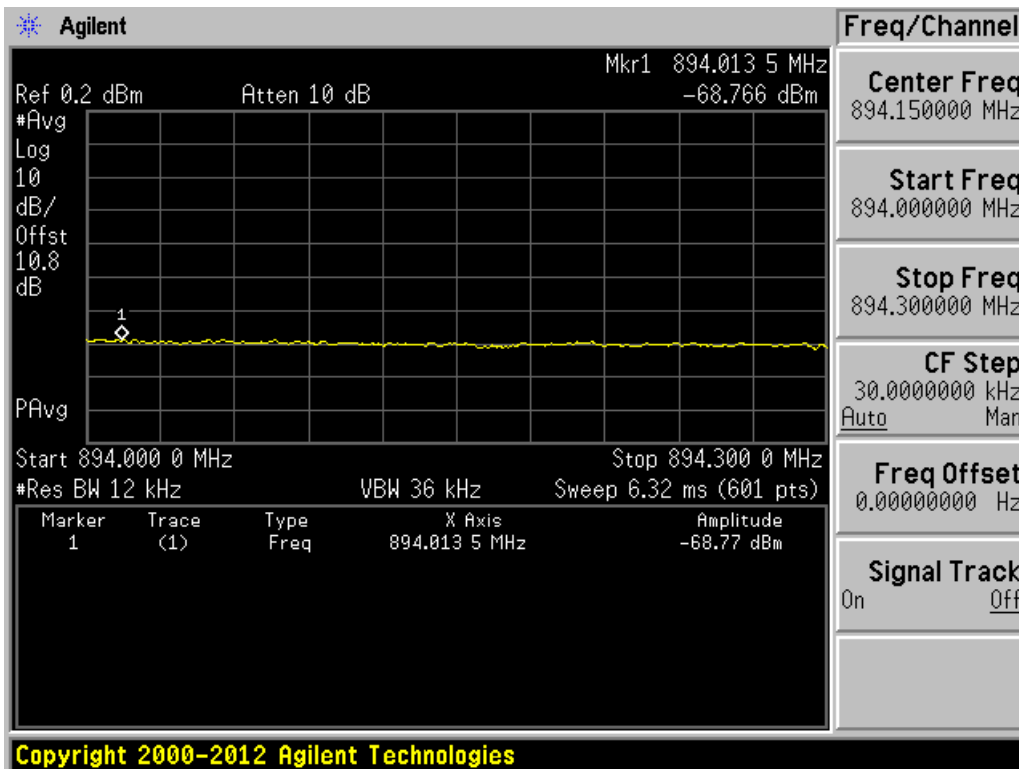
Downlink, Band 13, CDMA 747.25 MHz



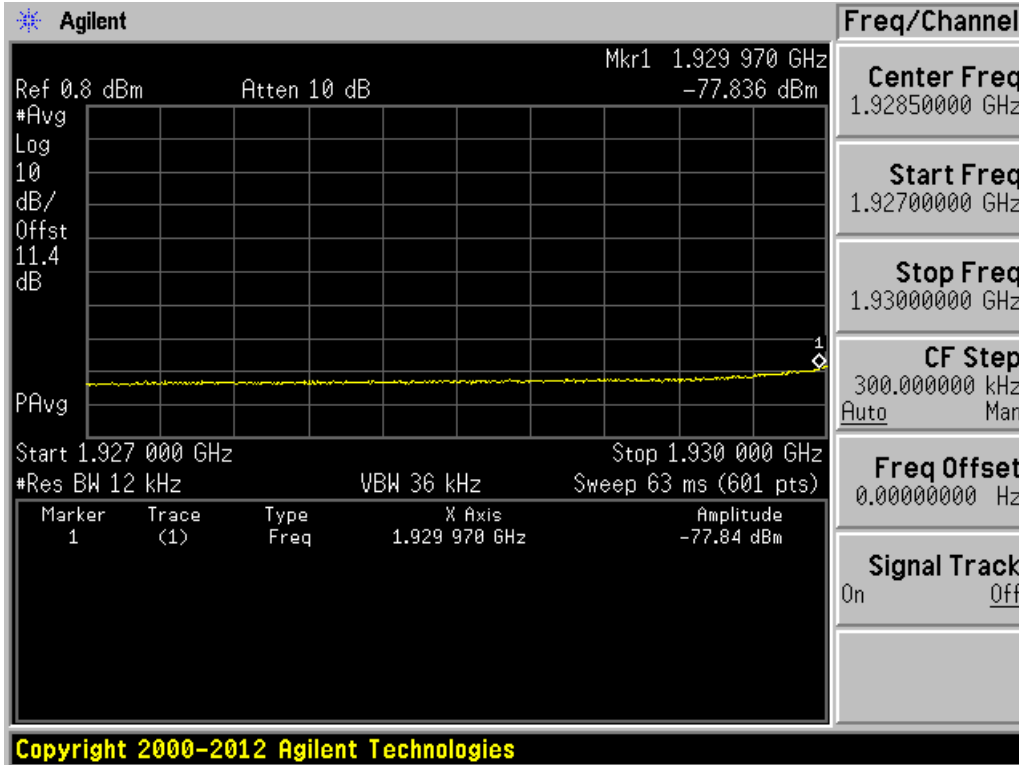
Downlink, Band 13, CDMA 754.75 MHz



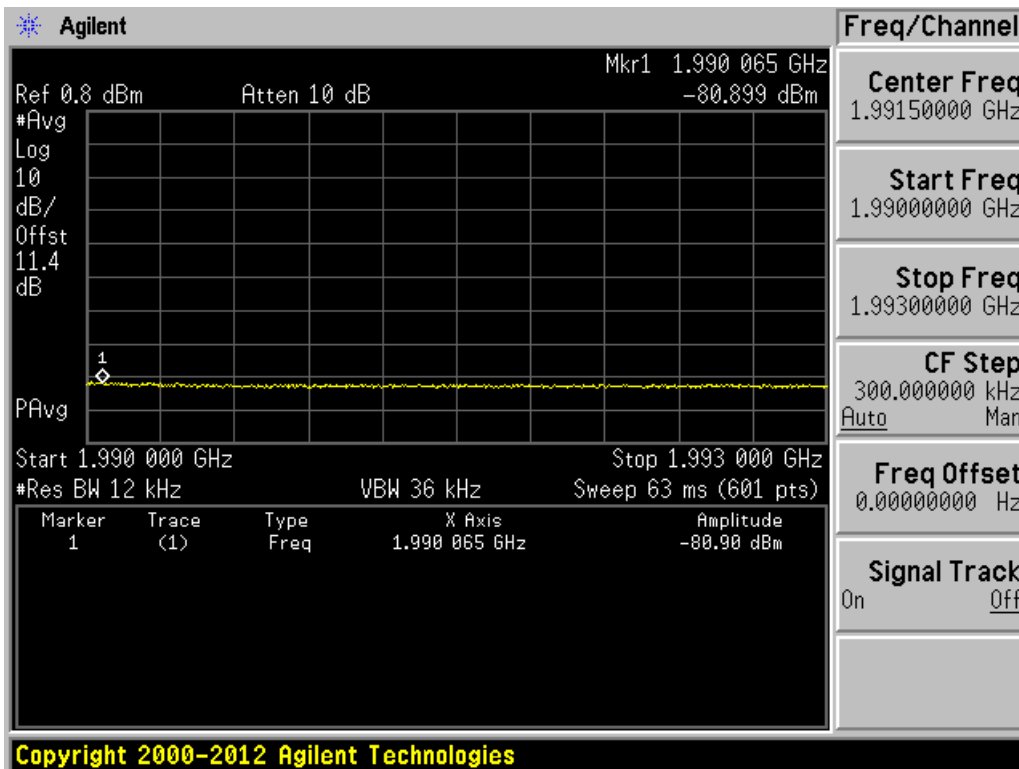
Downlink, Band 5, CDMA 869.88 MHz



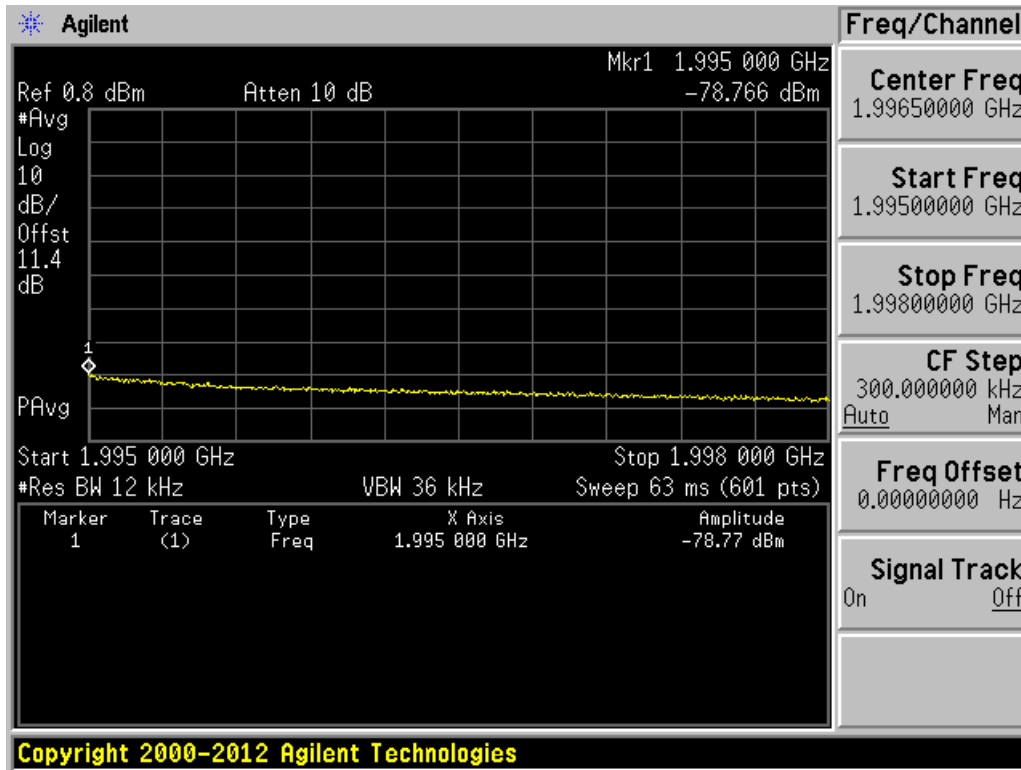
Downlink, Band 5, CDMA 893.1 MHz



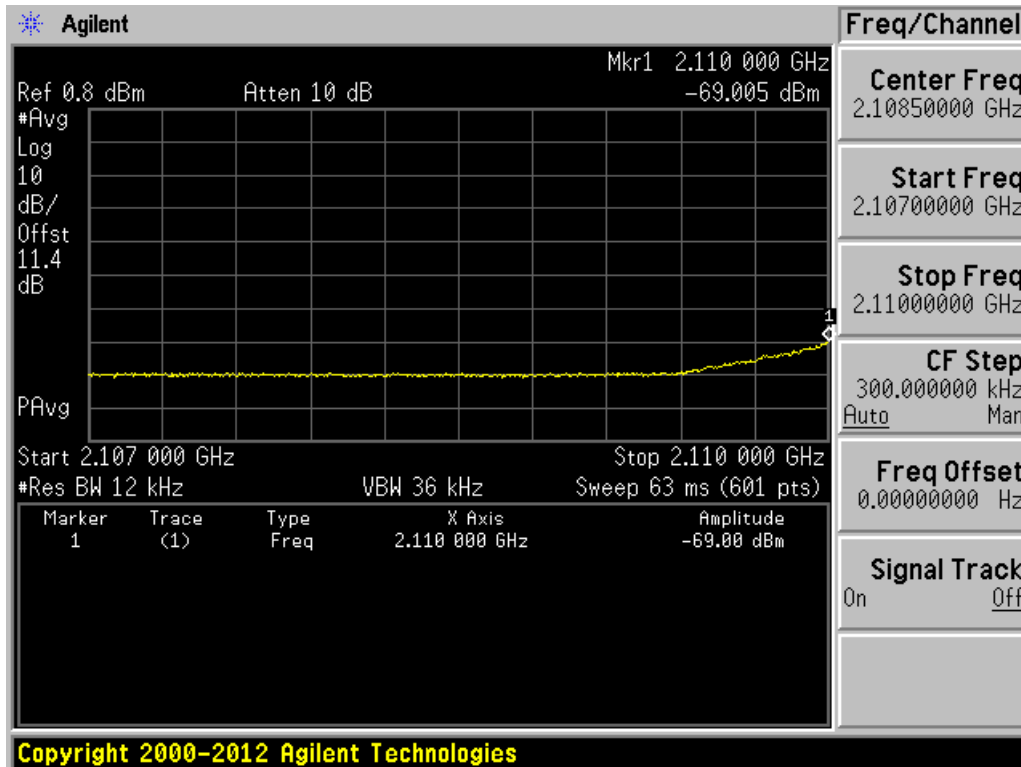
Downlink, Band 2 & 25, CDMA 1931.25 MHz



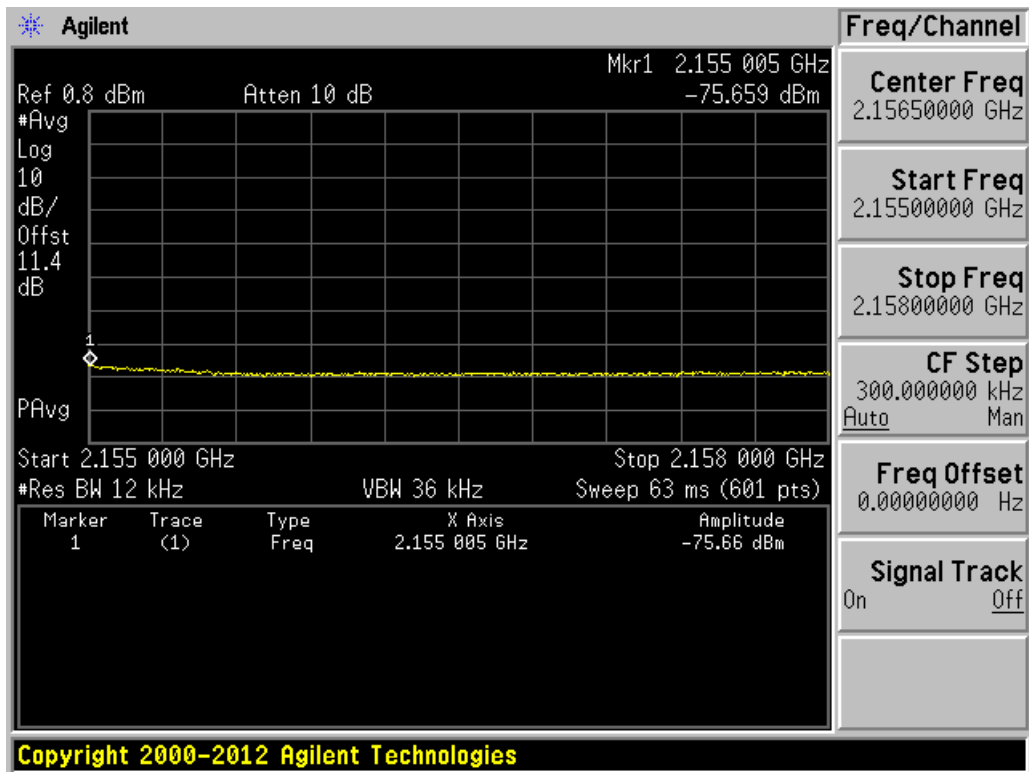
Downlink, Band 2, CDMA 1988.75 MHz



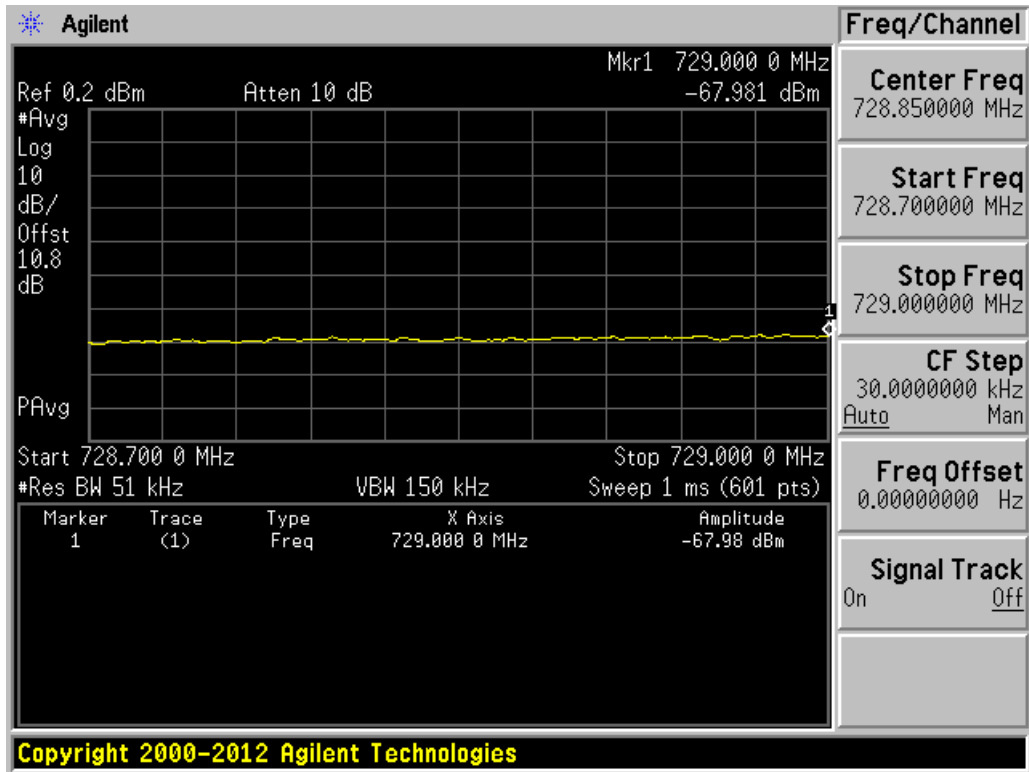
Downlink, Band 25, CDMA 1993.75 MHz



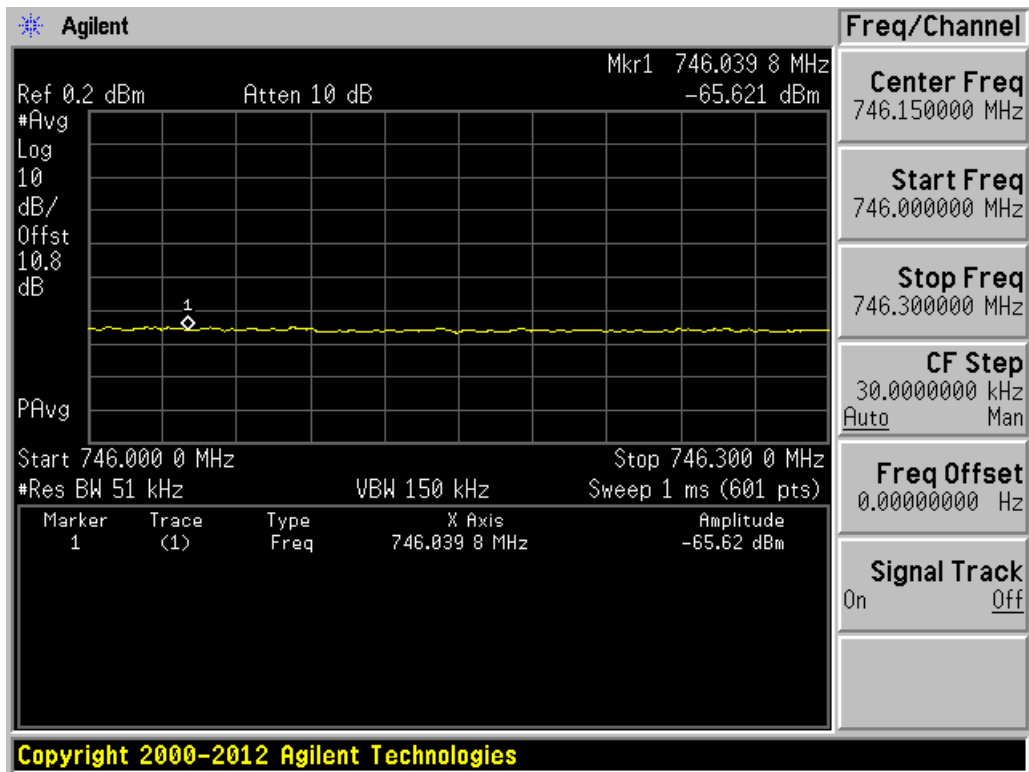
Downlink, Band 4, CDMA 2111.25 MHz



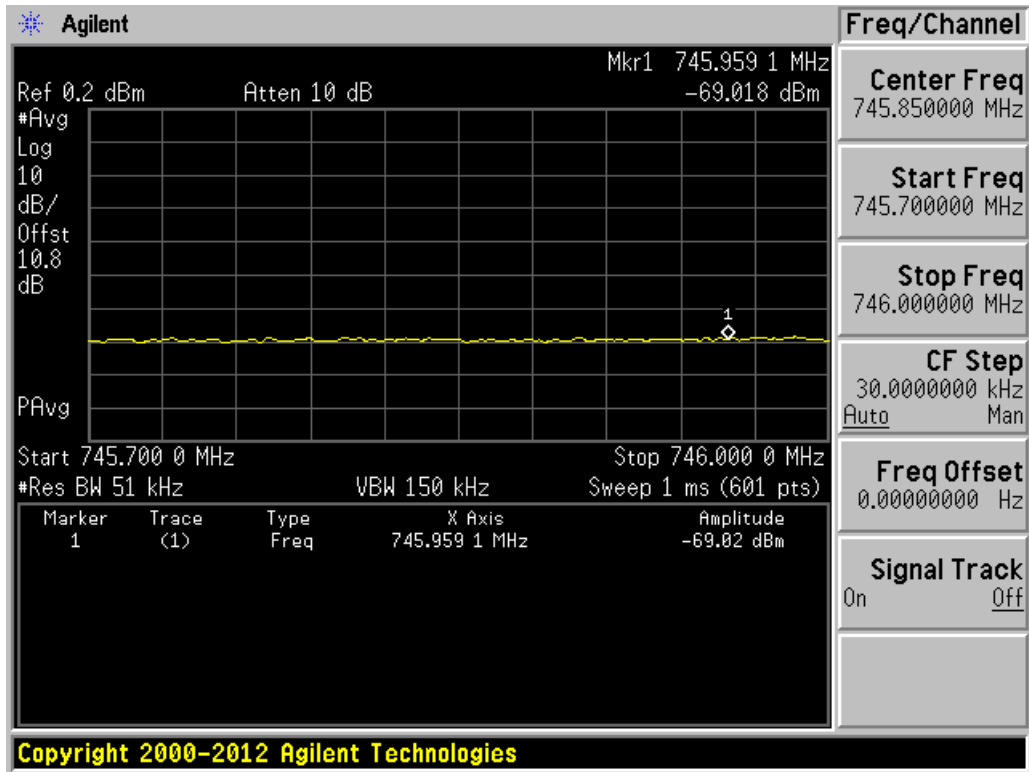
Downlink, Band 4, CDMA 2153.75 MHz



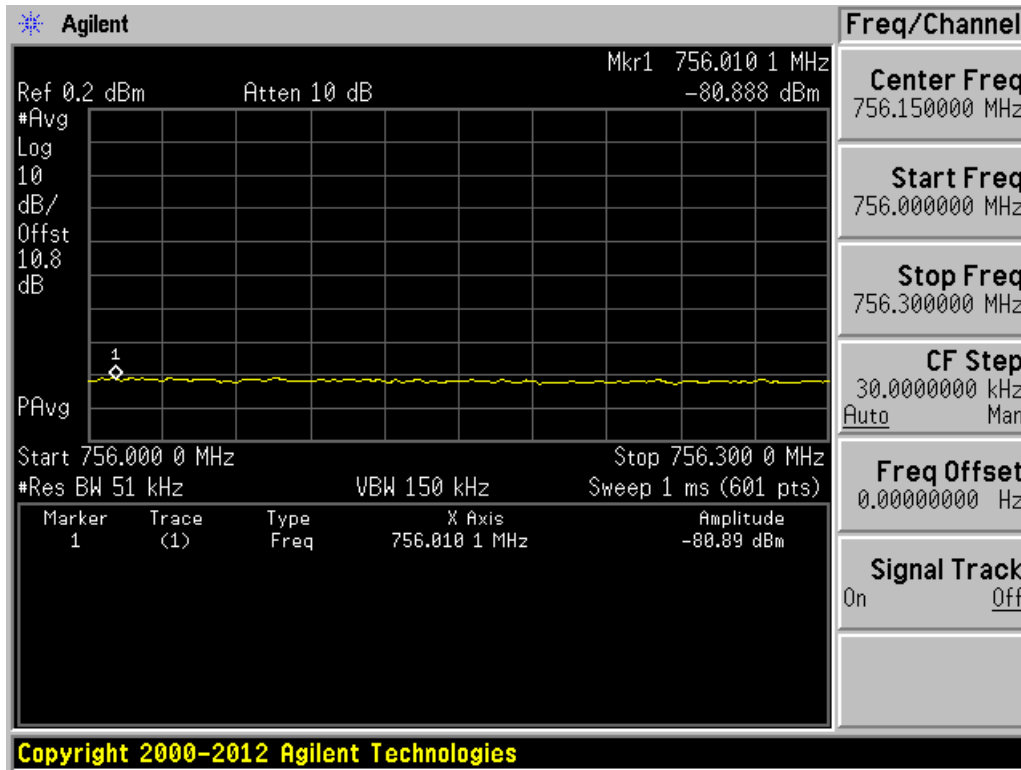
Downlink, Band 12 & 17, WCDMA/LTE 731.5 MHz



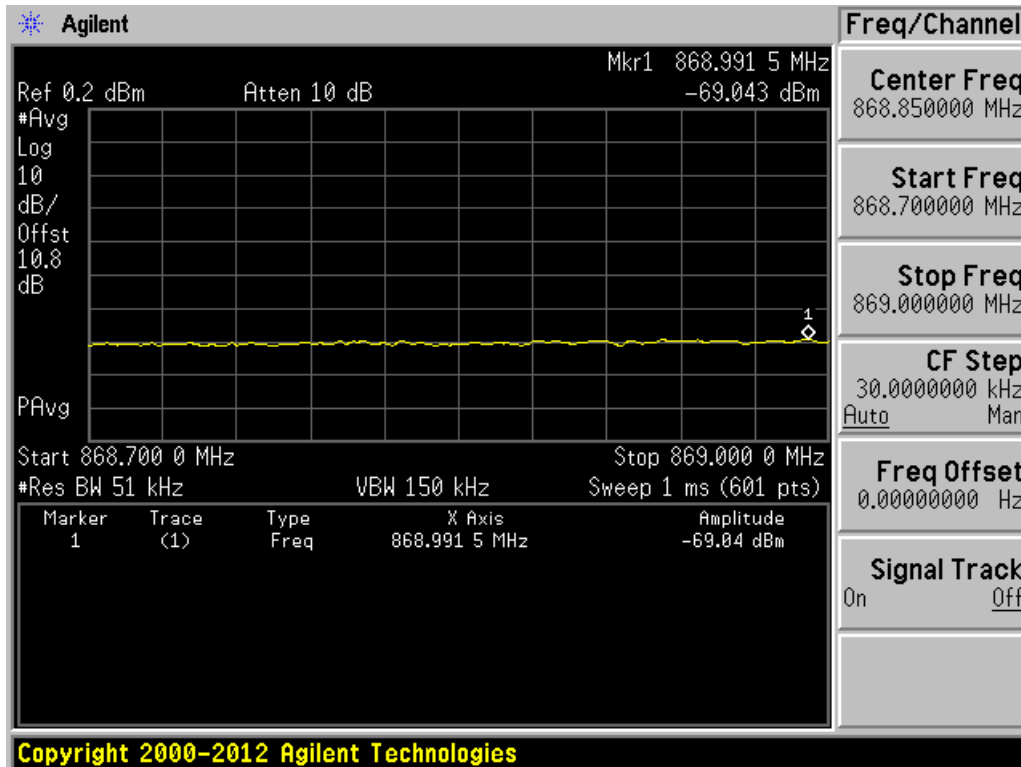
Downlink, Band 12 & 17, WCDMA/LTE 743.5 MHz



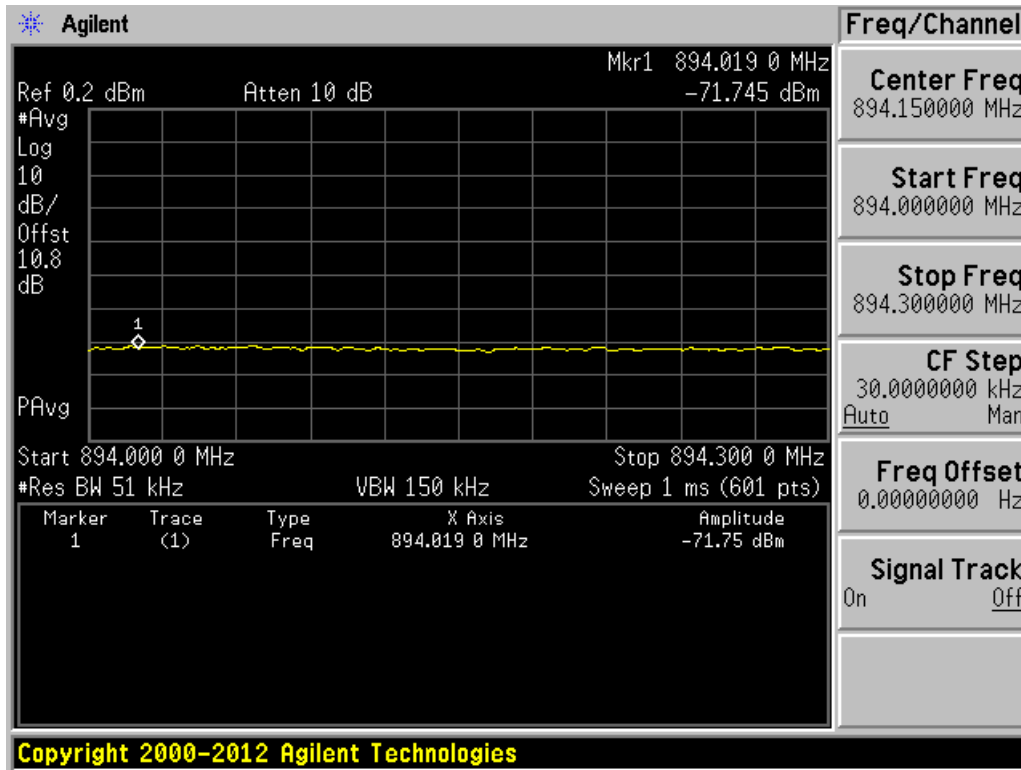
Downlink, Band 13, WCDMA/LTE 748.5 MHz



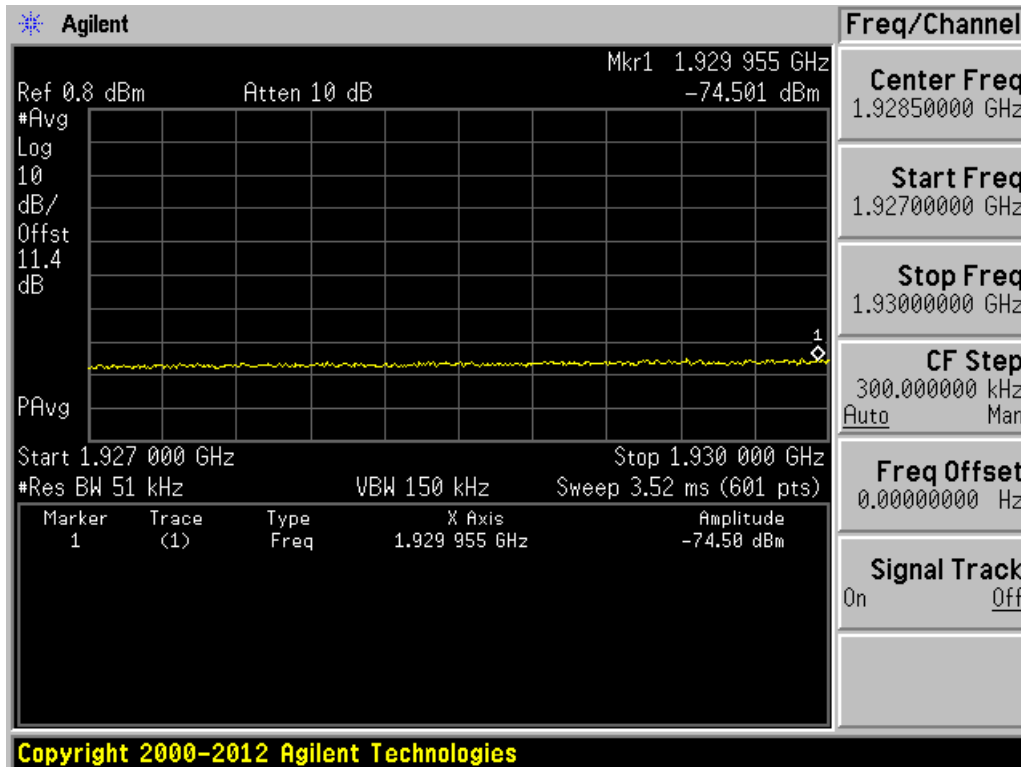
Downlink, Band 13, WCDMA/LTE 753.5 MHz



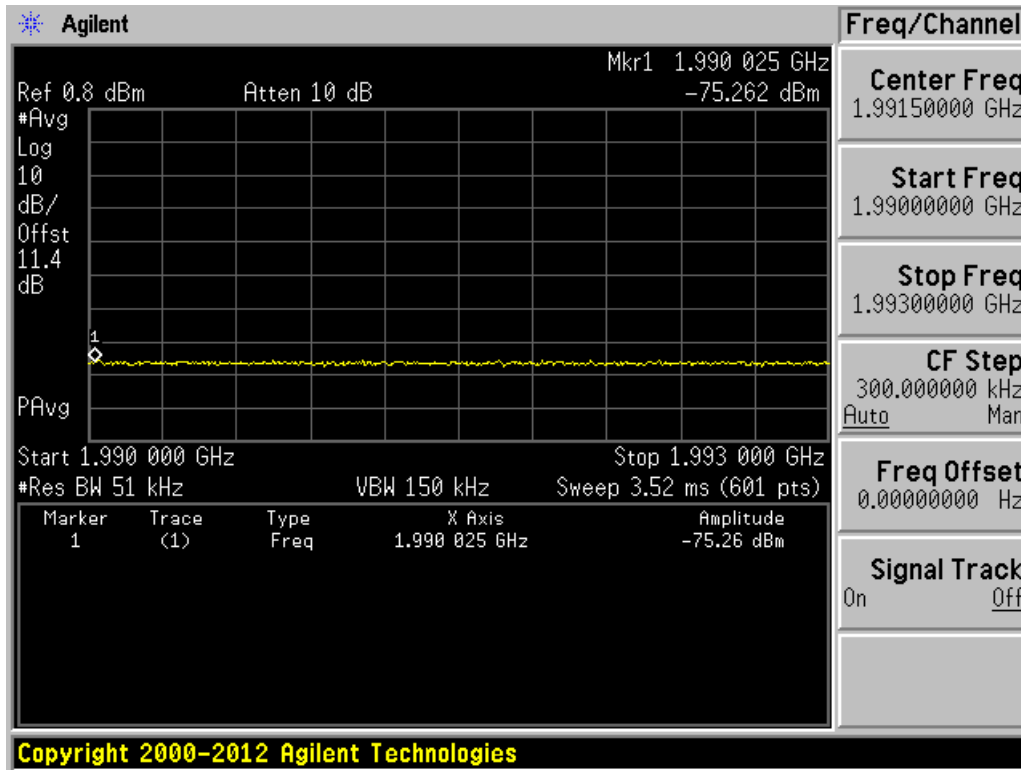
Downlink, Band 5, WCDMA/LTE 871.5 MHz



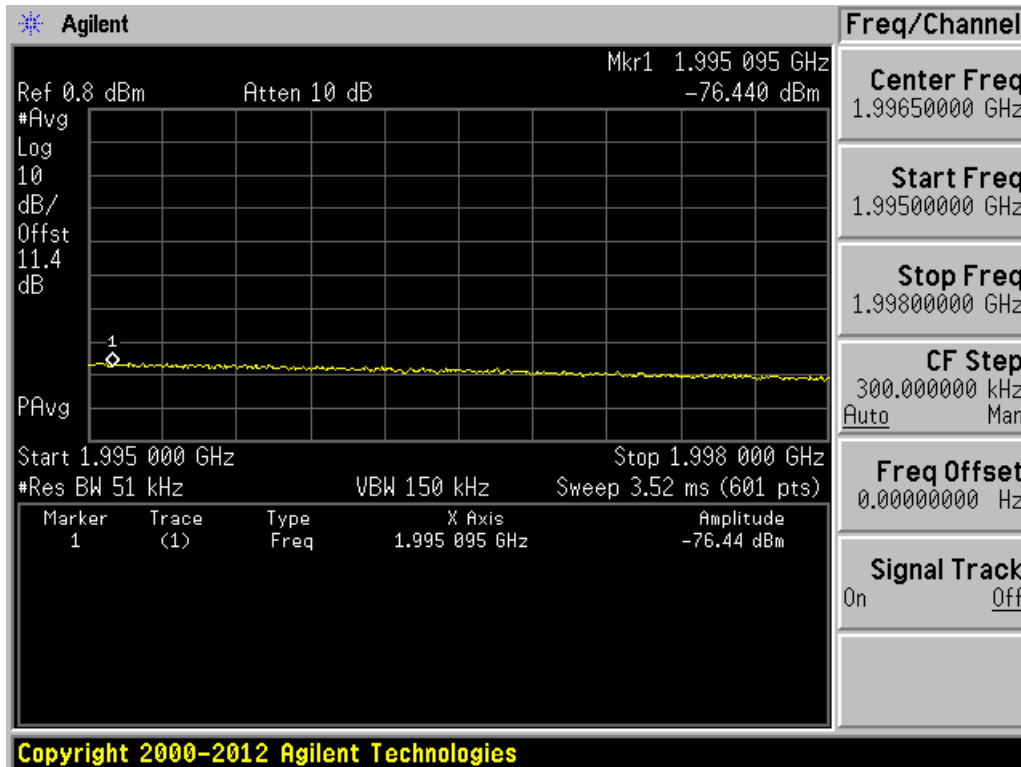
Downlink, Band 5, WCDMA/LTE 891.5 MHz



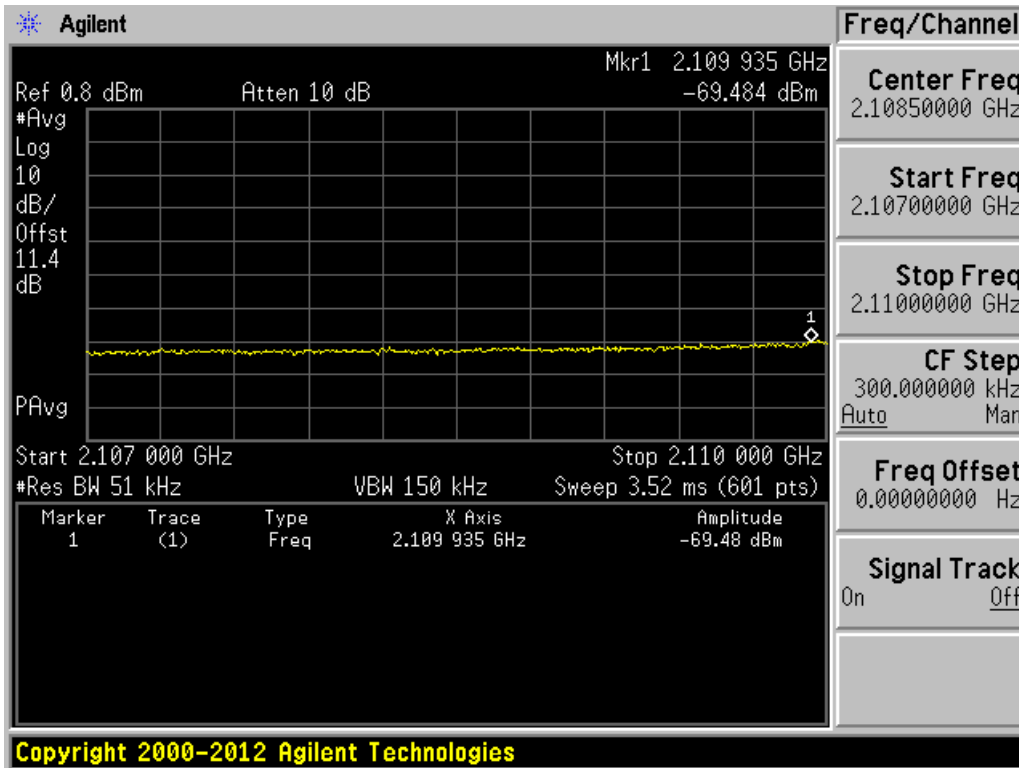
Downlink, Band 2 & 25, WCDMA/LTE 1932.5 MHz



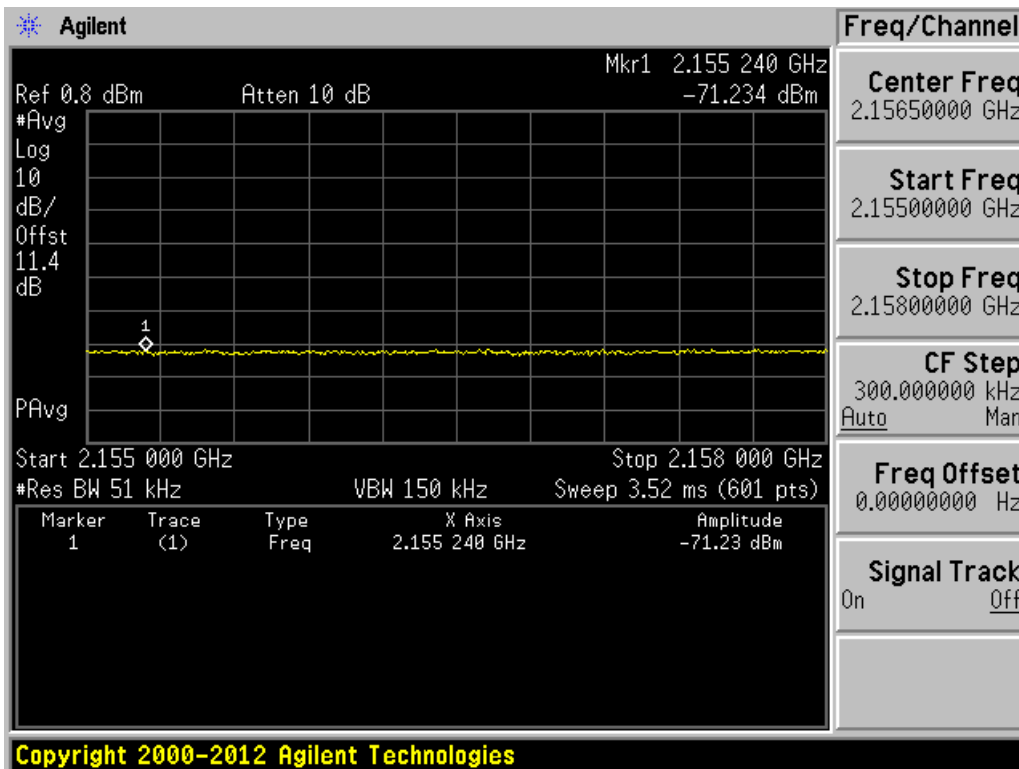
Downlink, Band 2, WCDMA/LTE 1987.5 MHz



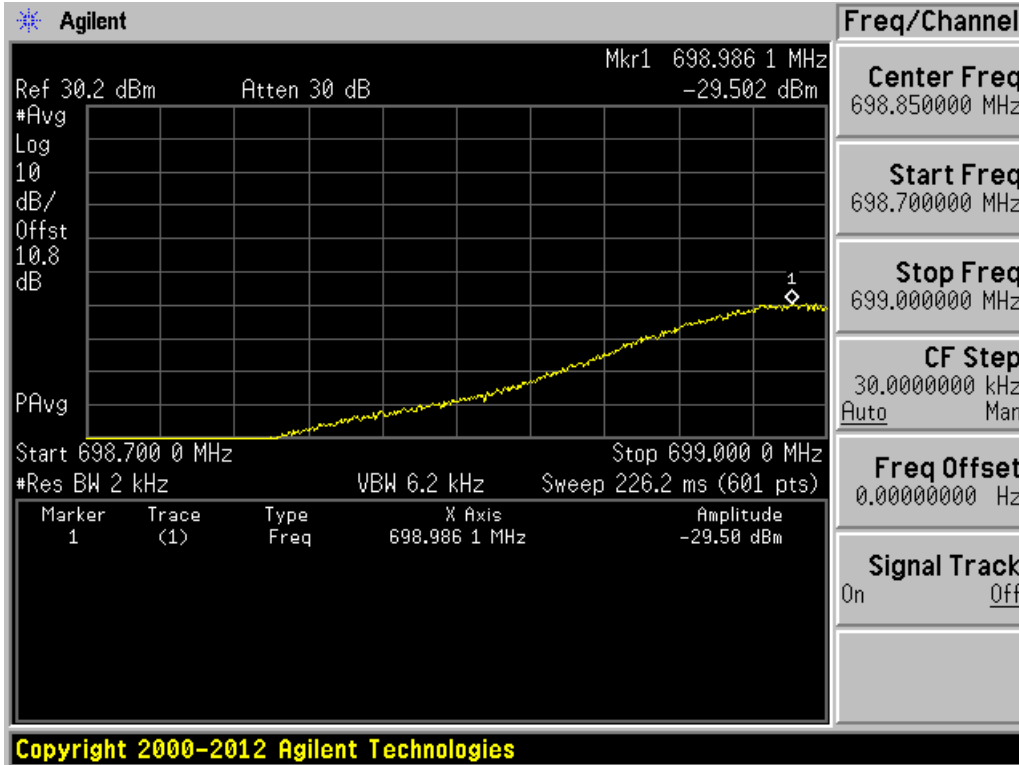
Downlink, Band 25, WCDMA/LTE 1992.5 MHz



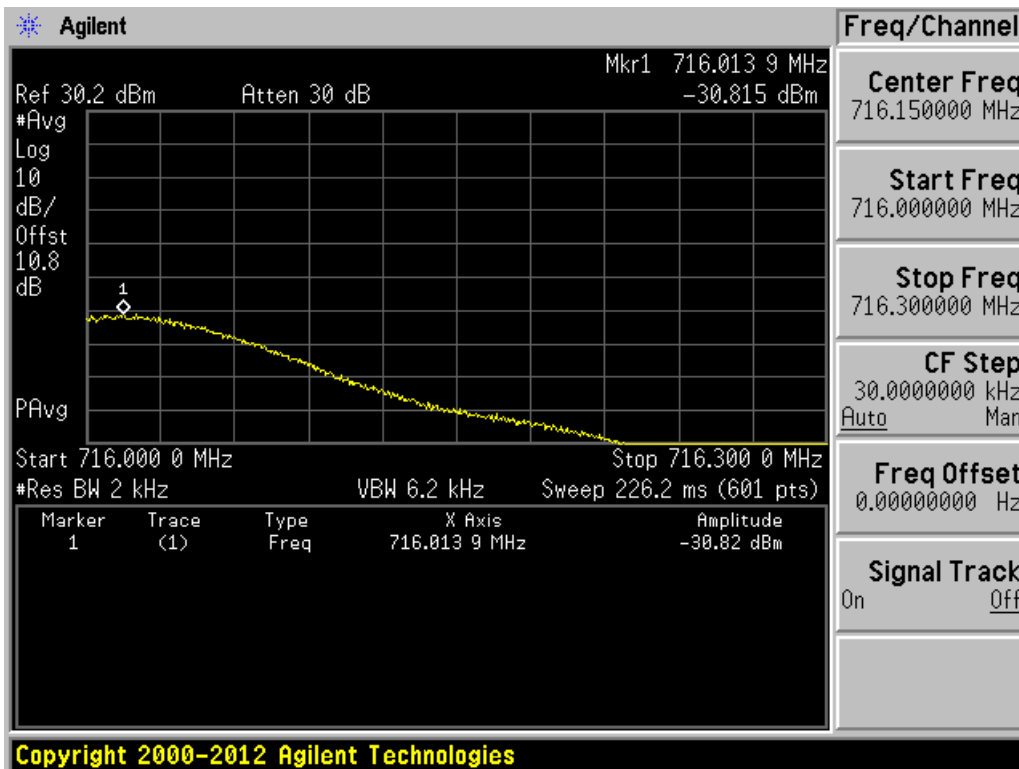
Downlink, Band 4, WCDMA/LTE 2112.5 MHz



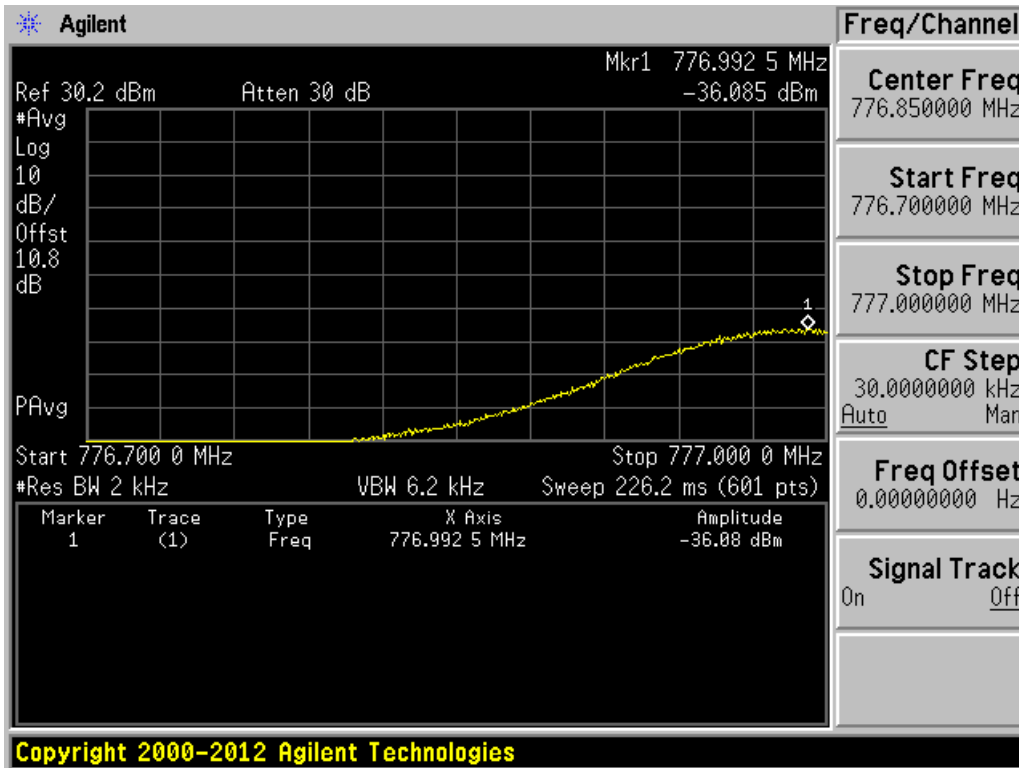
Downlink, Band 4, WCDMA/LTE 2152.5 MHz



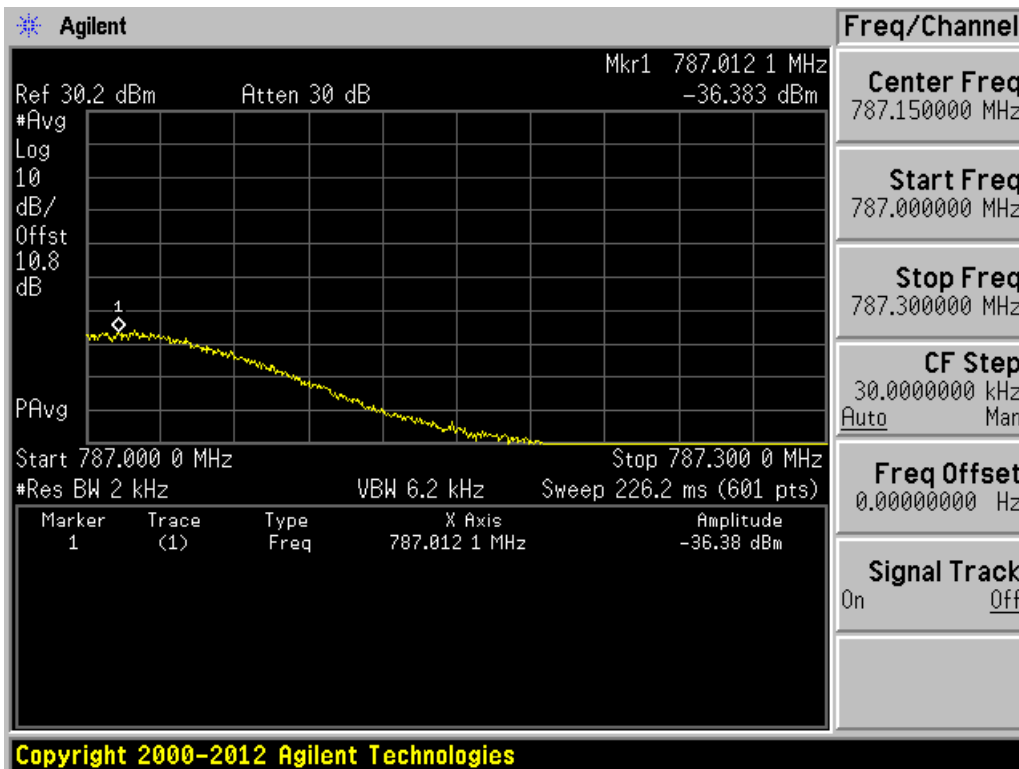
Uplink, Band 12 & 17, GSM 699.2 MHz



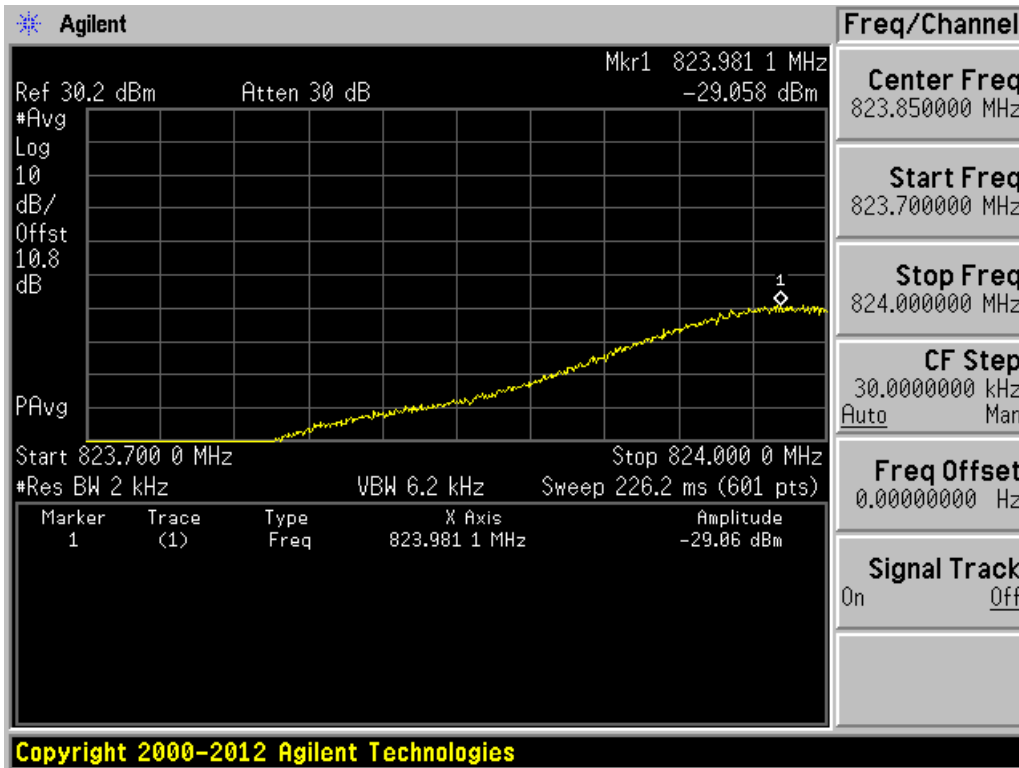
Uplink, Band 12 & 17, GSM 715.8 MHz



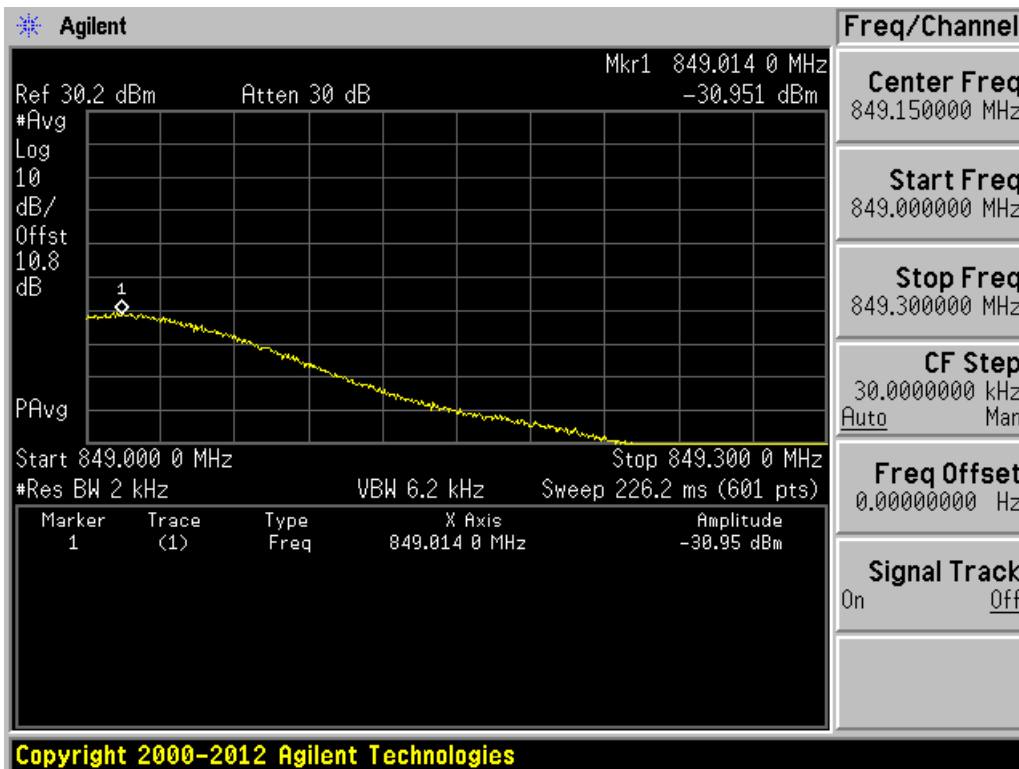
Uplink, Band 13, GSM 777.2 MHz



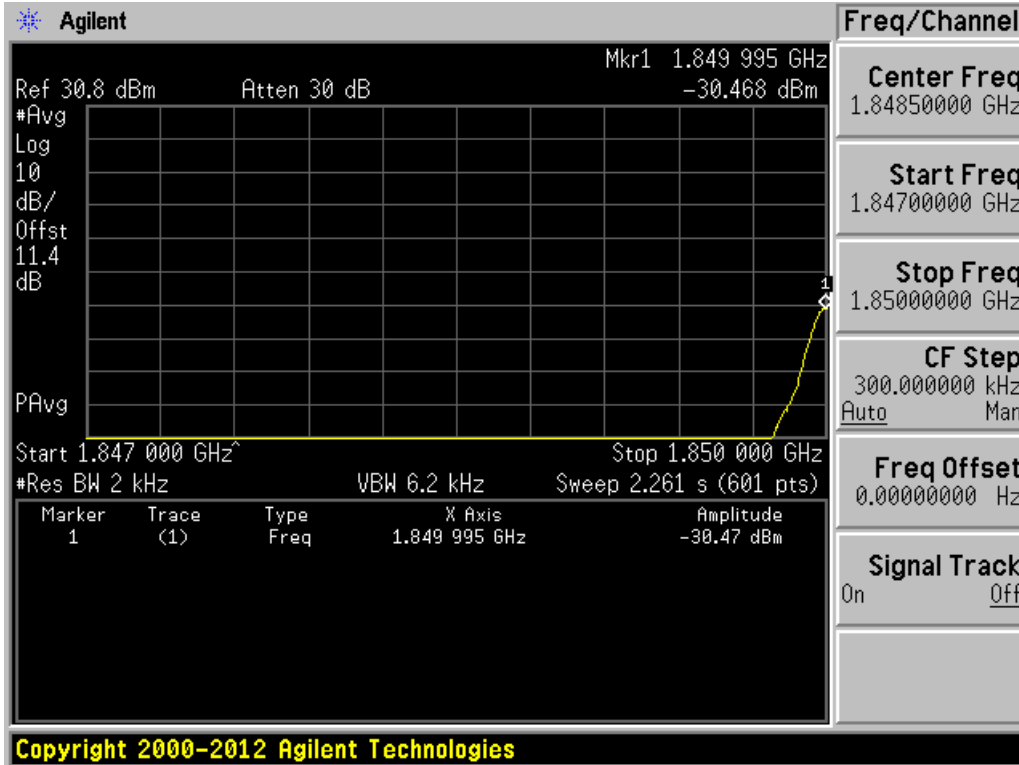
Uplink, Band 13, GSM 786.8 MHz



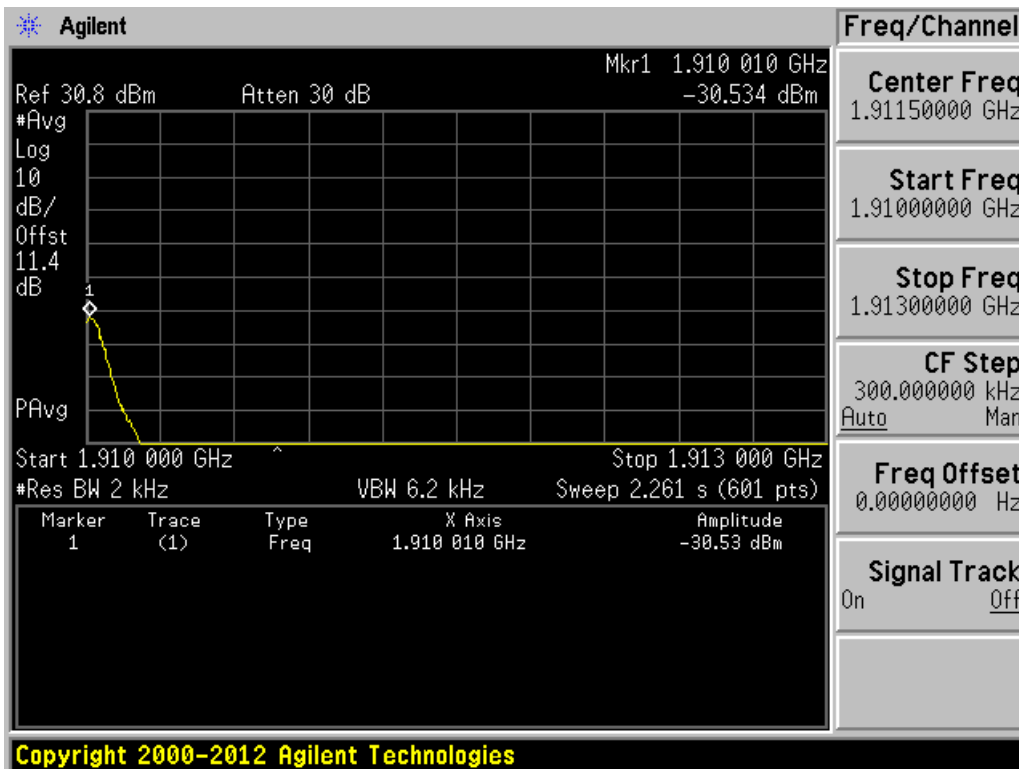
Uplink, Band 5, GSM 824.2 MHz



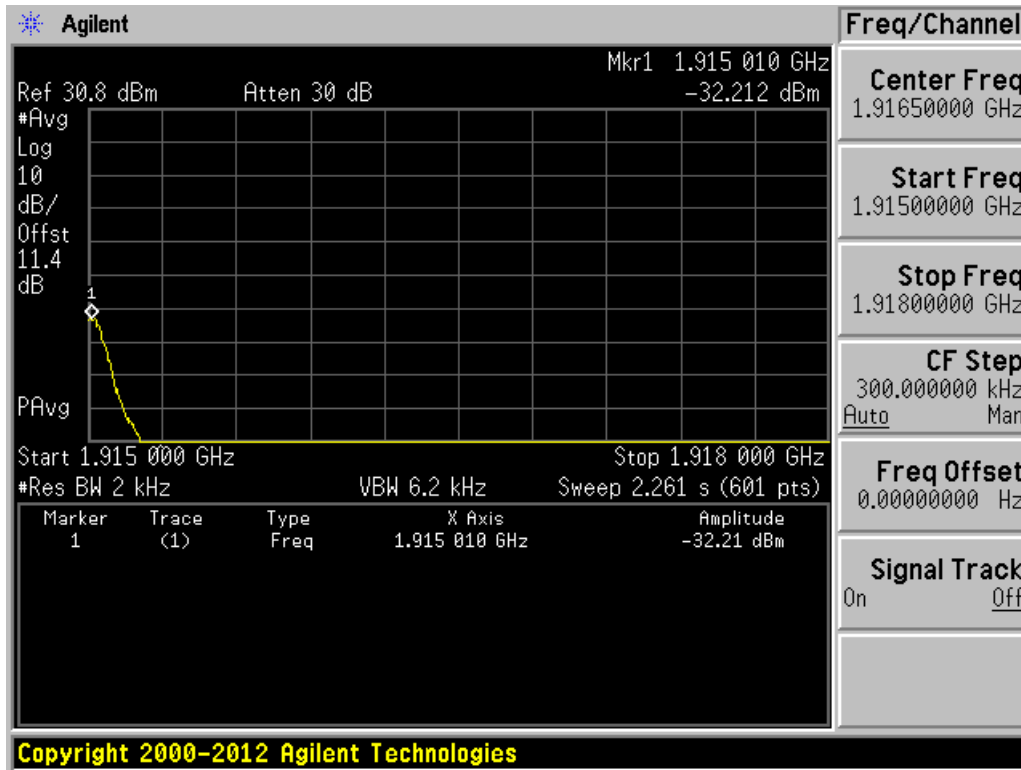
Uplink, Band 5, GSM 848.8 MHz



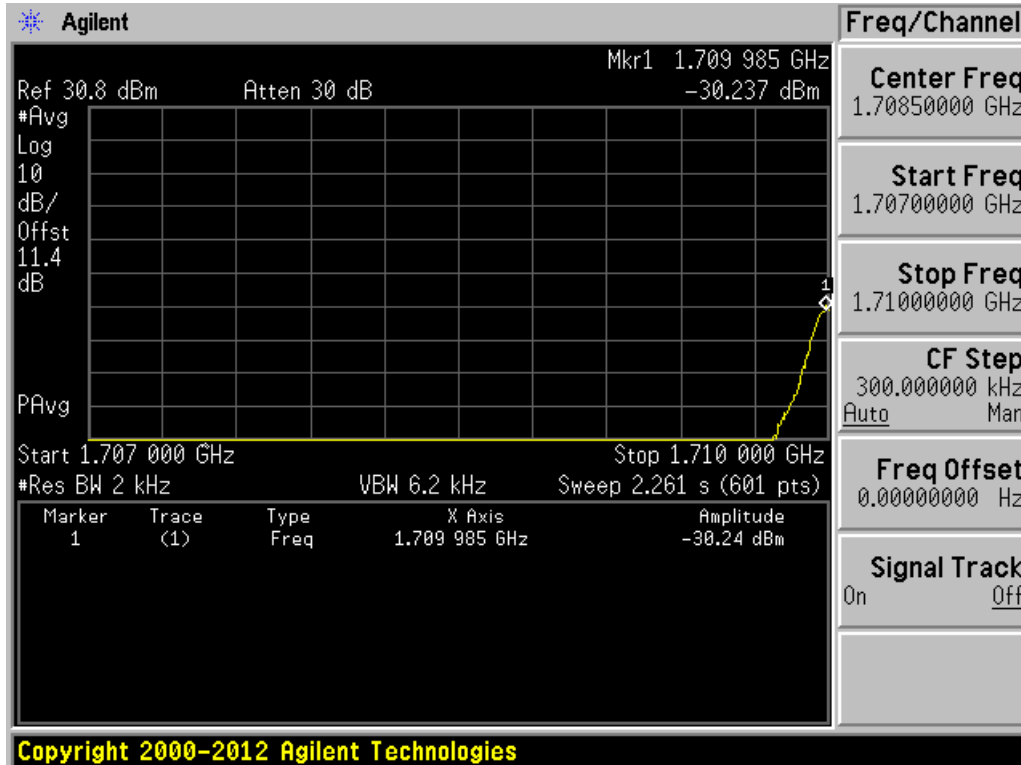
Uplink, Band 2 & 25, GSM 1850.2 MHz



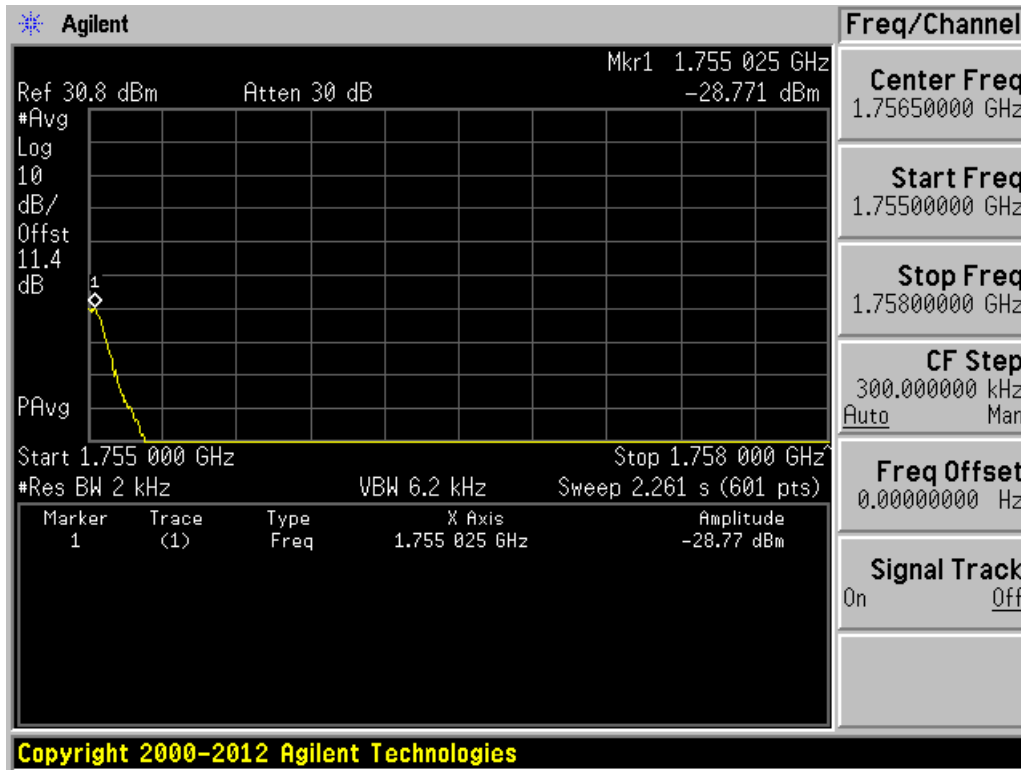
Uplink, Band 2, GSM 1909.8 MHz



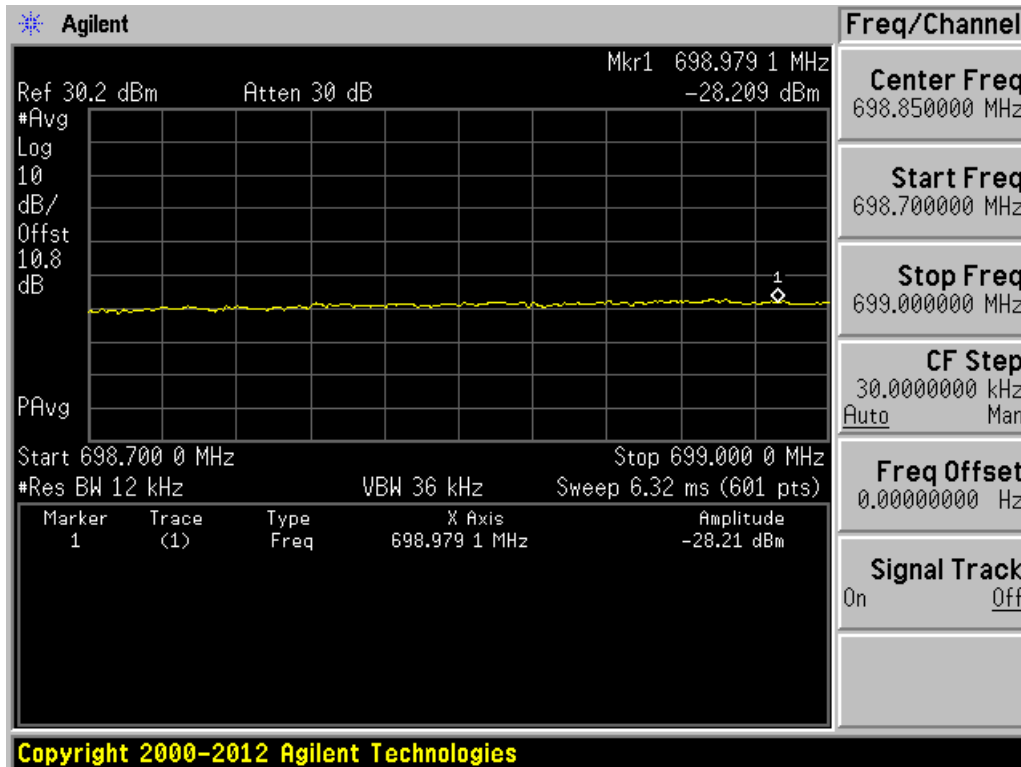
Uplink, Band 25, GSM 1914.8 MHz



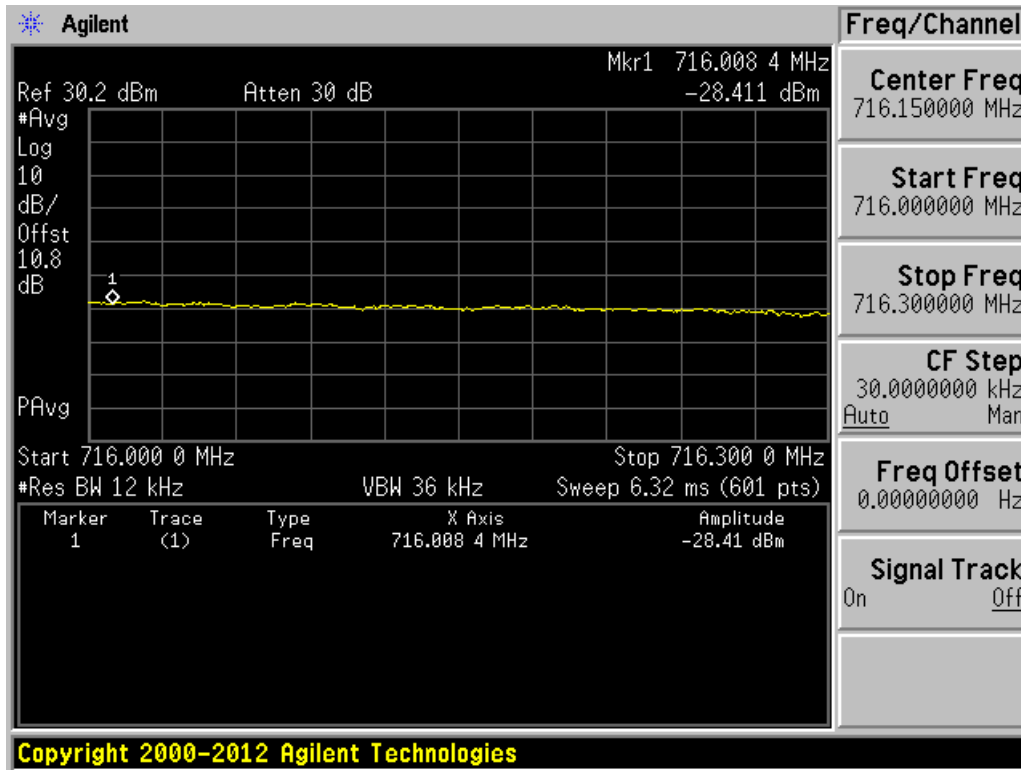
Uplink, Band 4, GSM 1710.2 MHz



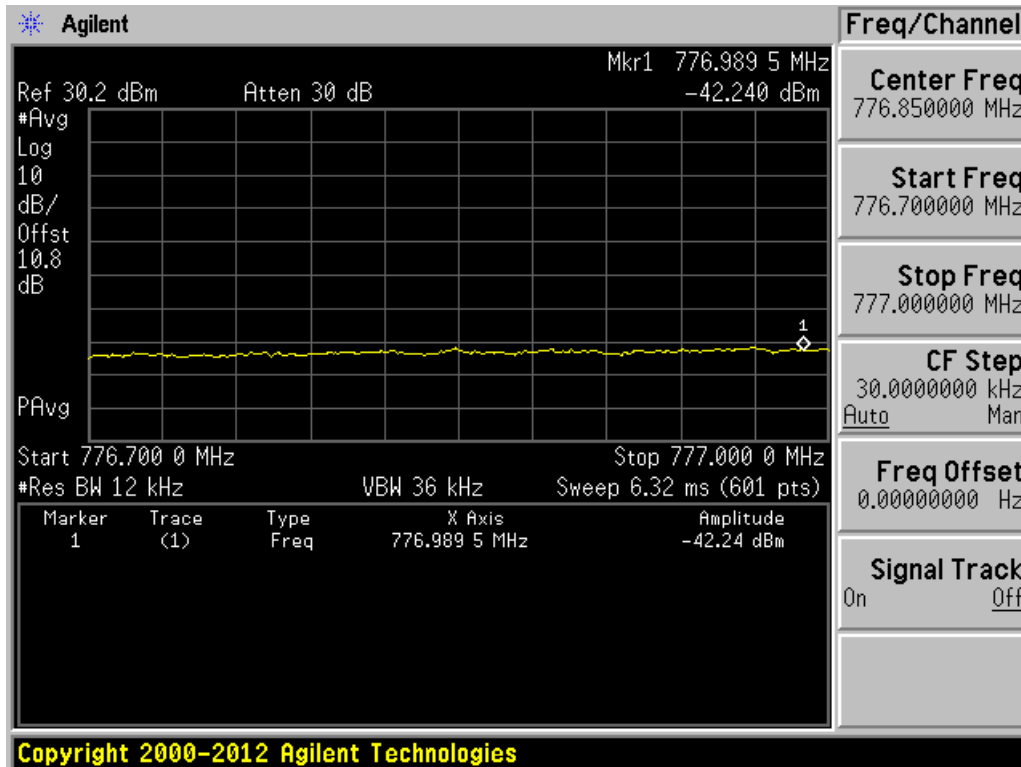
Uplink, Band 4, GSM 1754.8 MHz



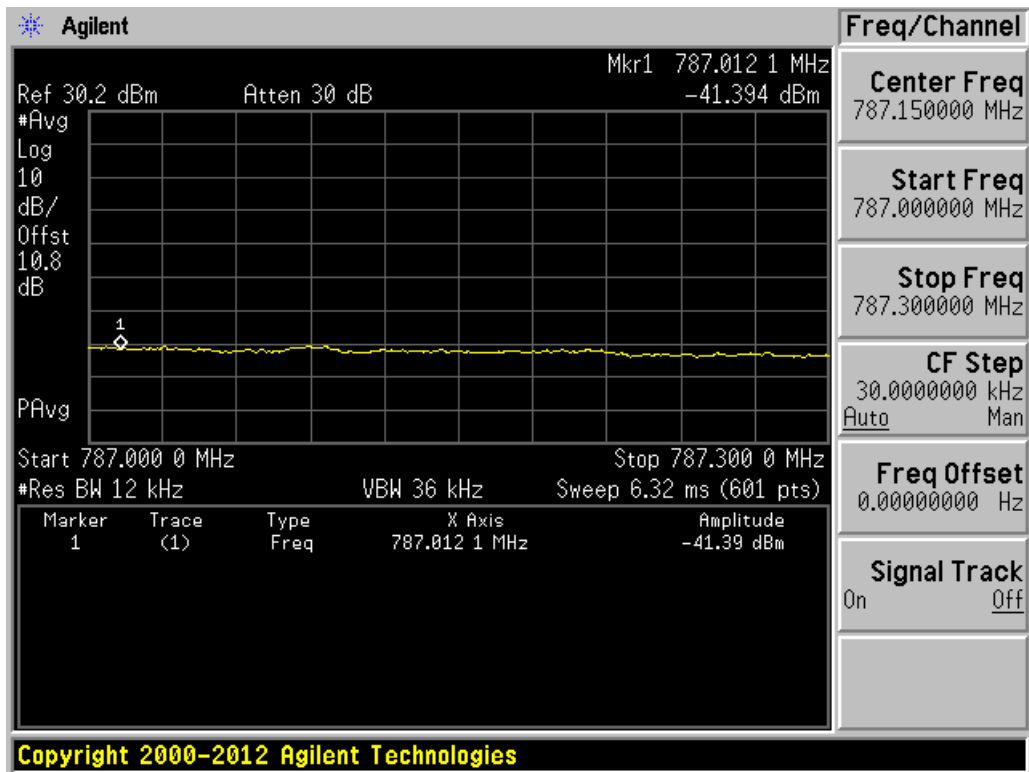
Uplink, Band 12 & 17, CDMA 700.25 MHz



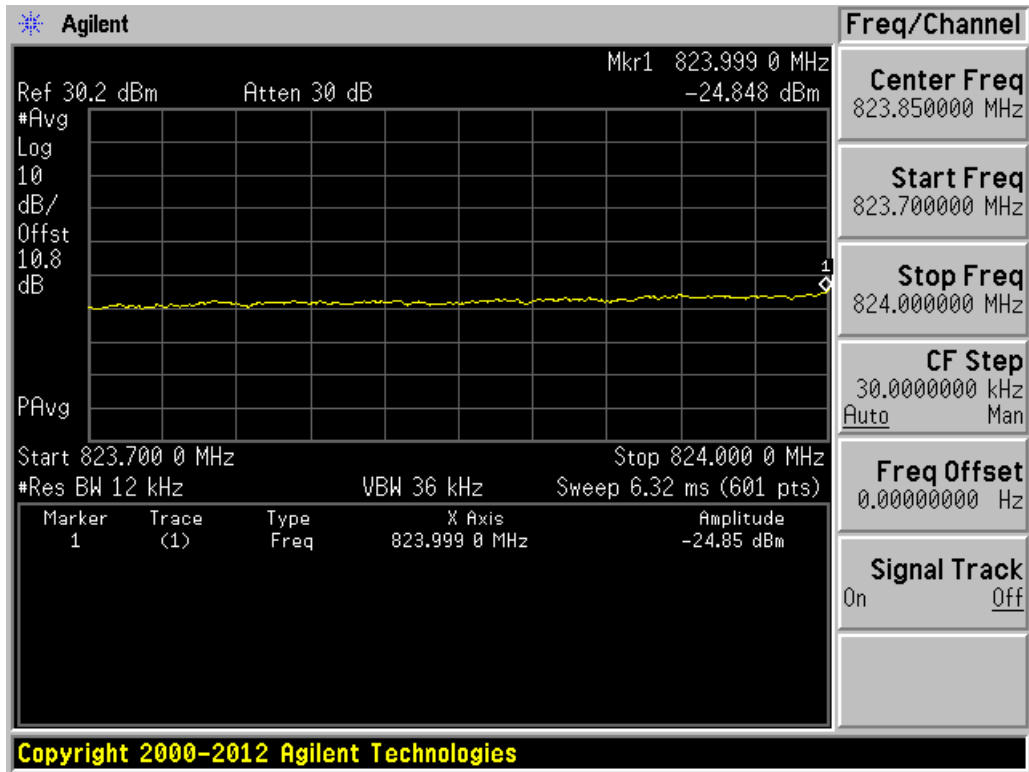
Uplink, Band 12 & 17, CDMA 714.75 MHz



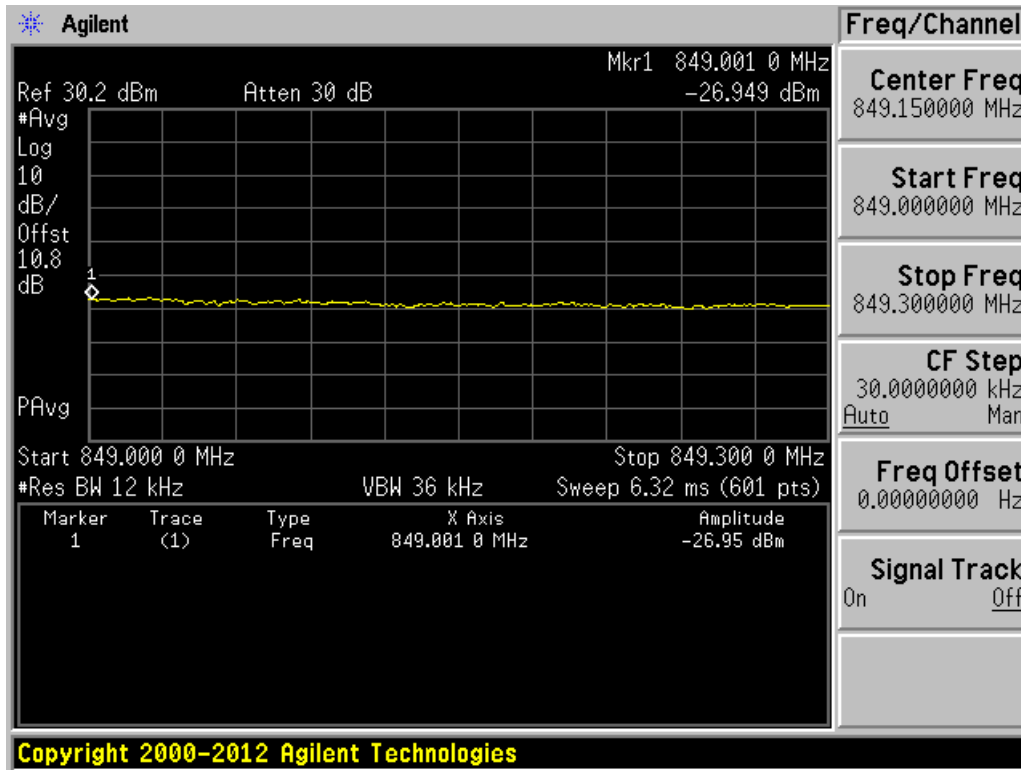
Uplink, Band 13, CDMA 778.25 MHz



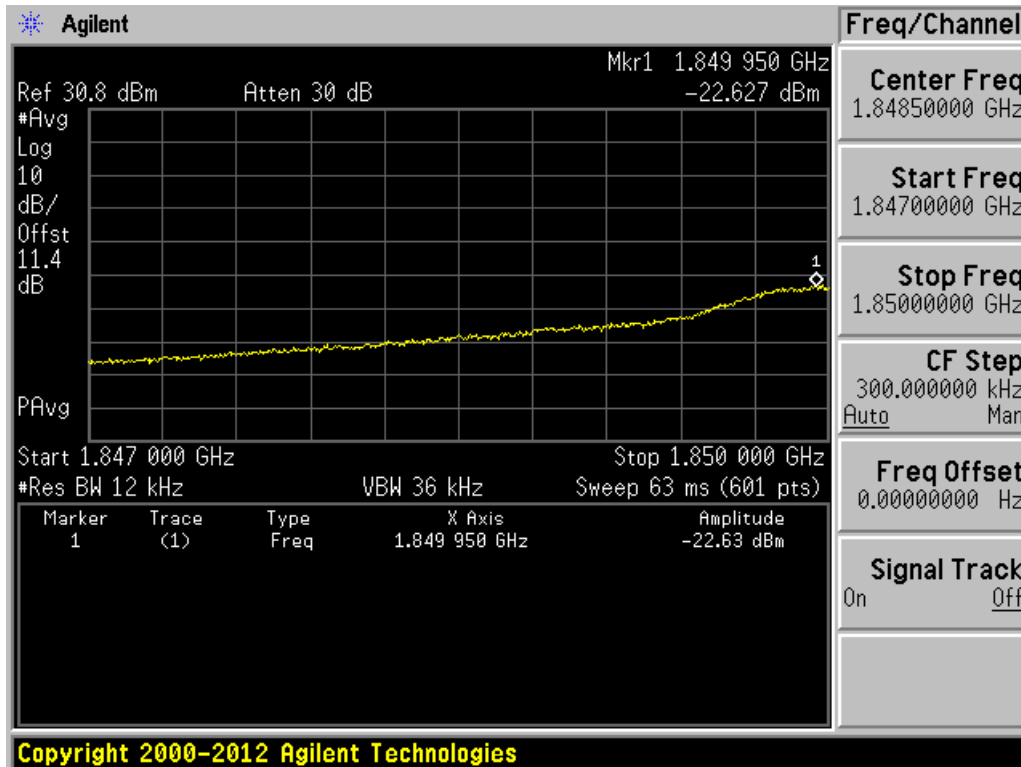
Uplink, Band 13, CDMA 785.75 MHz



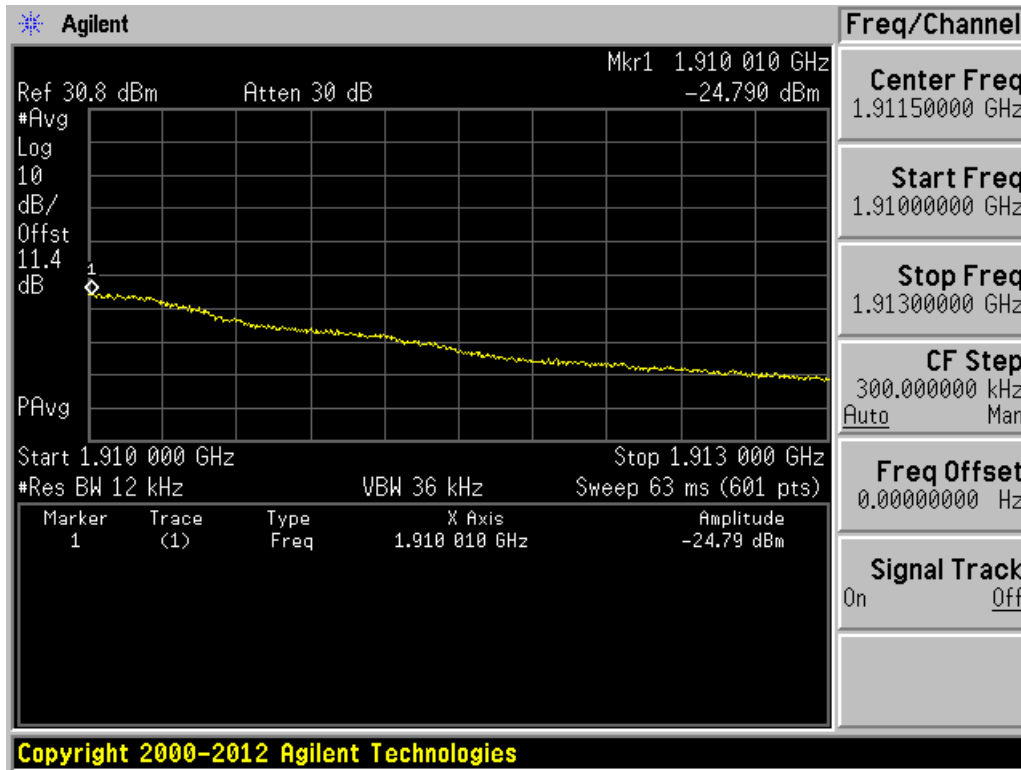
Uplink, Band 5, CDMA 824.88 MHz



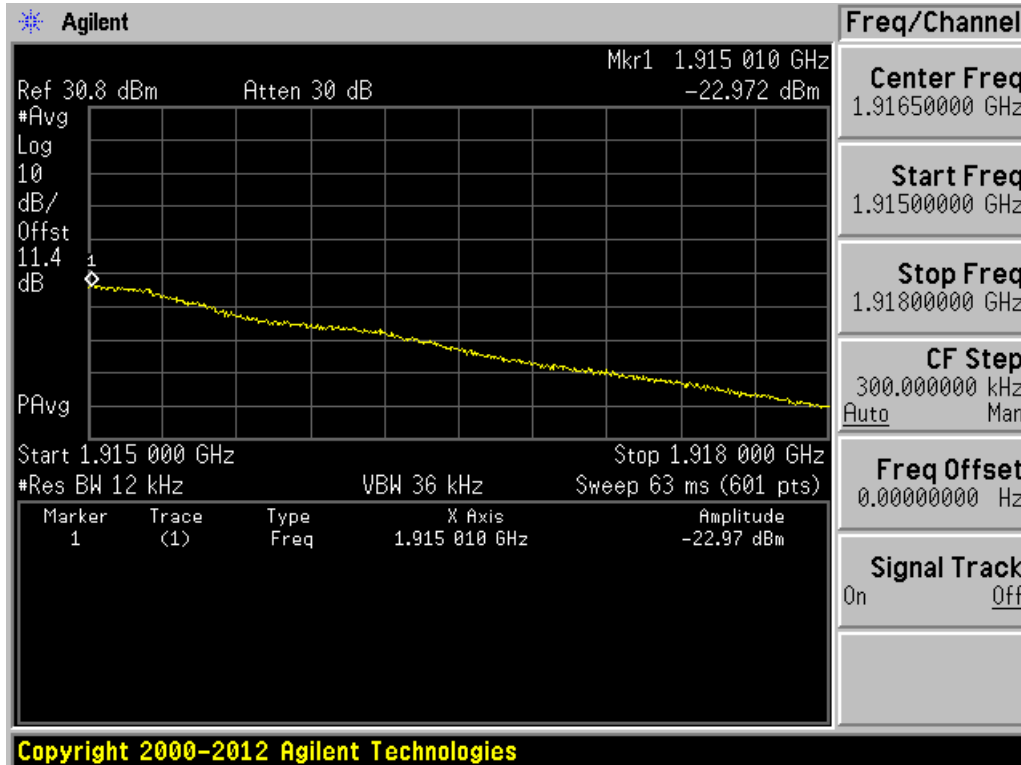
Uplink, Band 5, CDMA 848.1 MHz



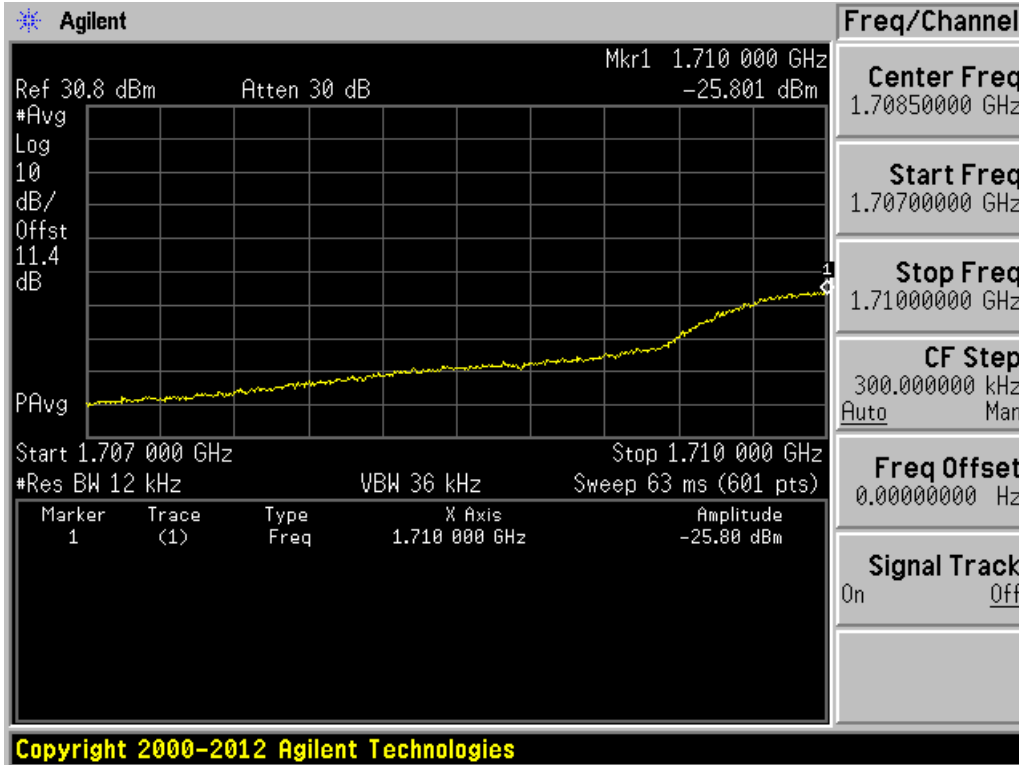
Uplink, Band 2 & 25, CDMA 1851.25 MHz



Uplink, Band 2, CDMA 1908.75 MHz



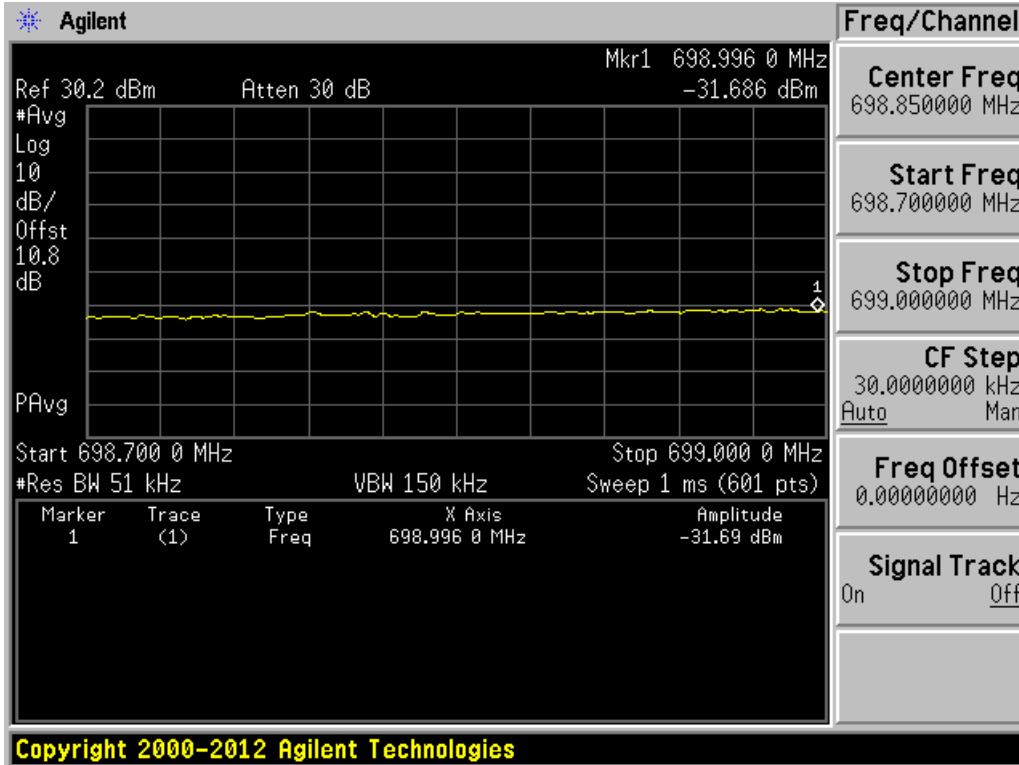
Uplink, Band 25, CDMA 1913.75 MHz



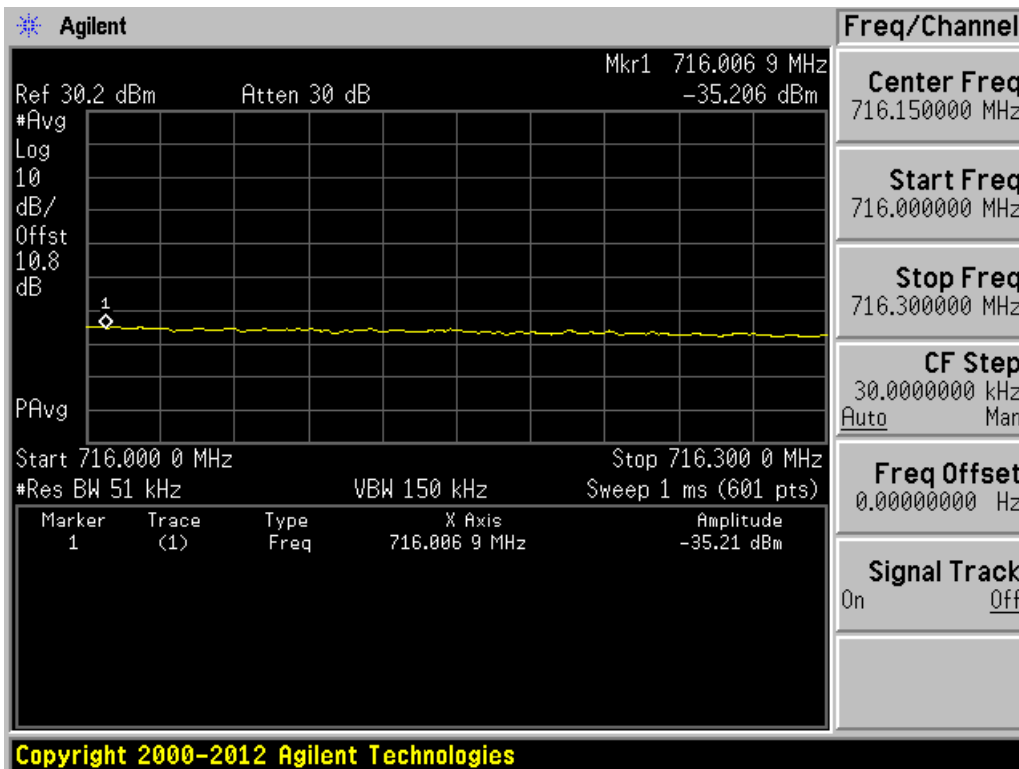
Uplink, Band 4, CDMA 1711.25 MHz



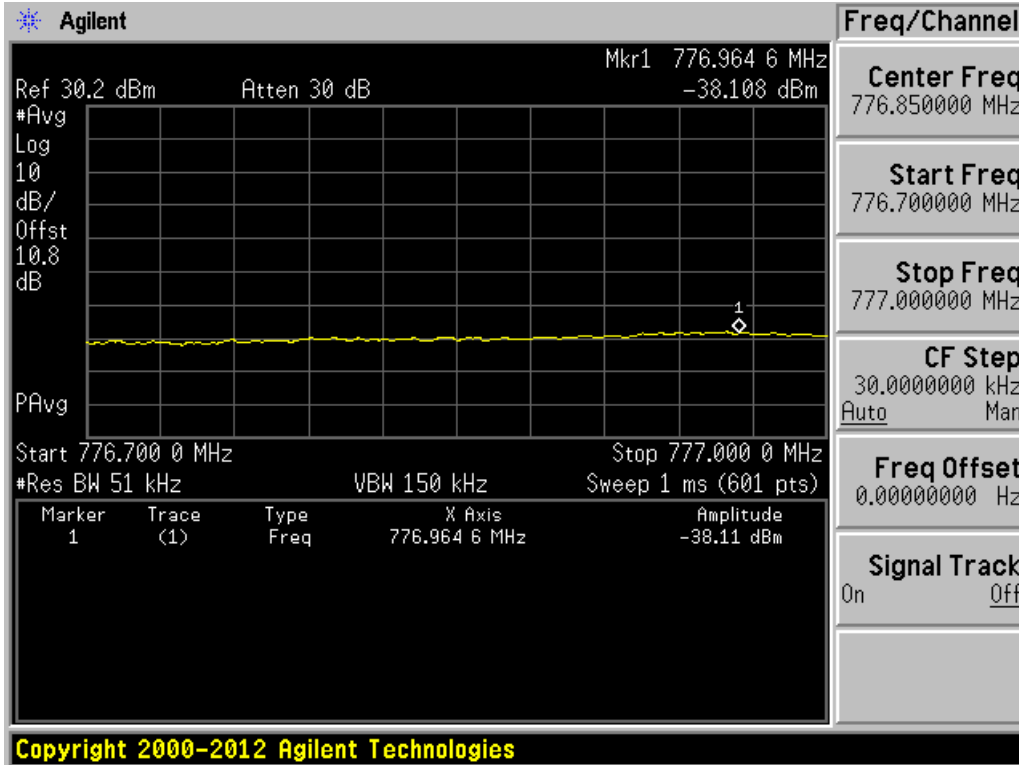
Uplink, Band 4, CDMA 1753.75 MHz



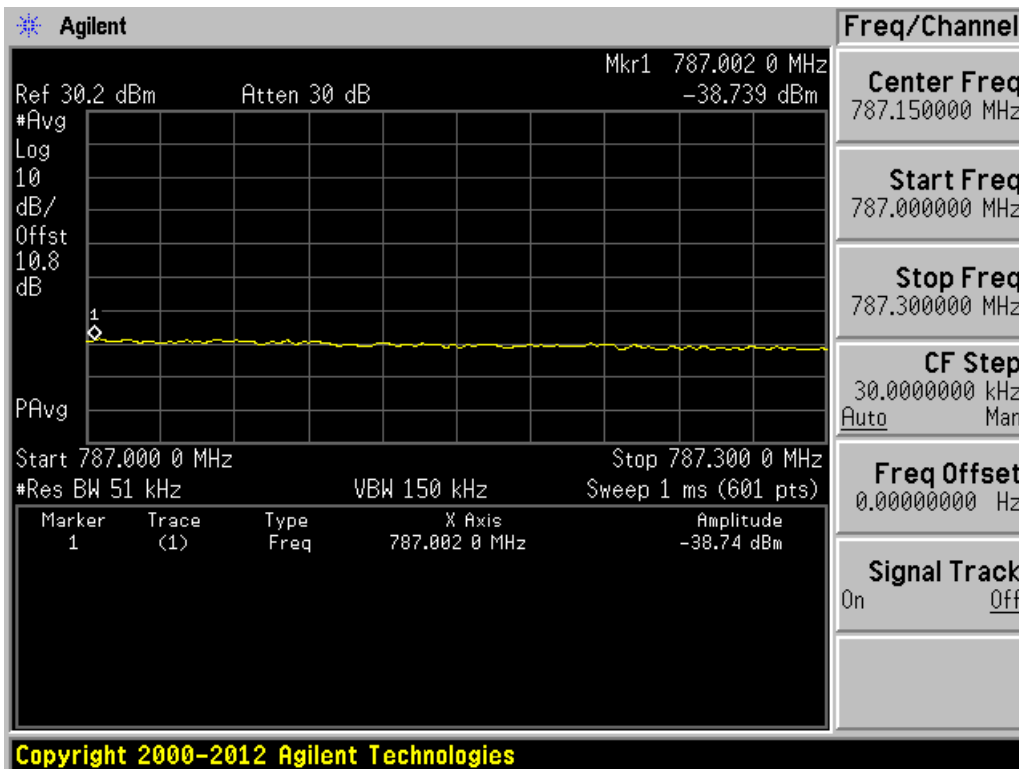
Uplink, Band 12 &17, WCDMA/LTE 701.5 MHz



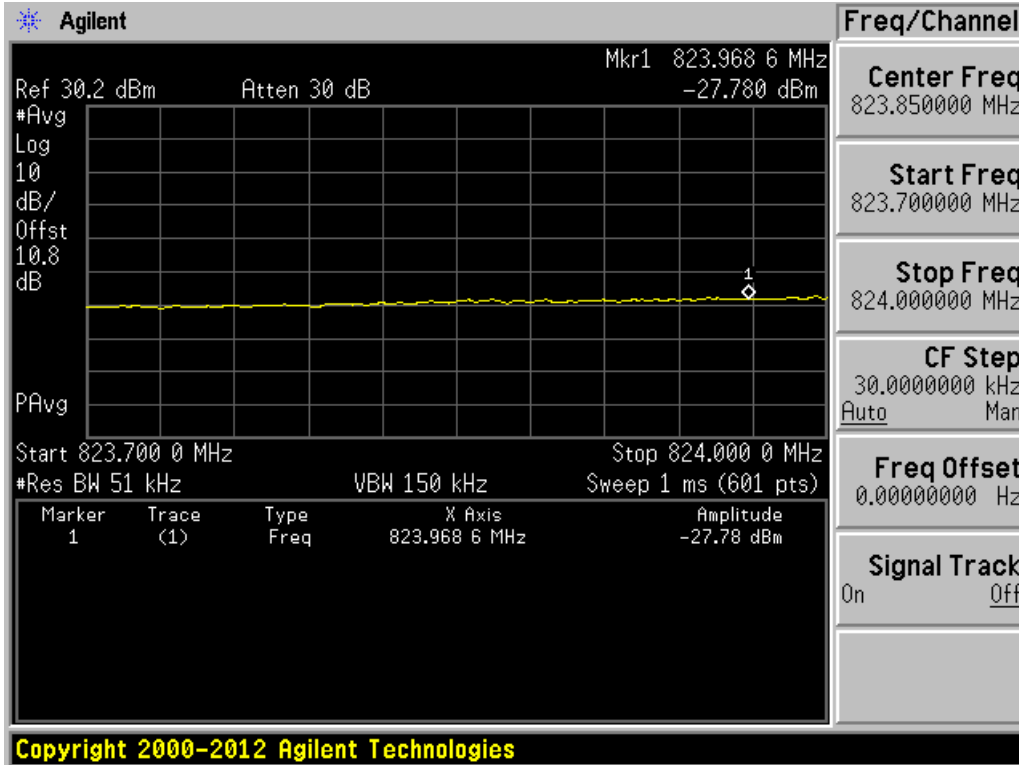
Uplink, Band 12 & 17, WCDMA/LTE 713.5 MHz



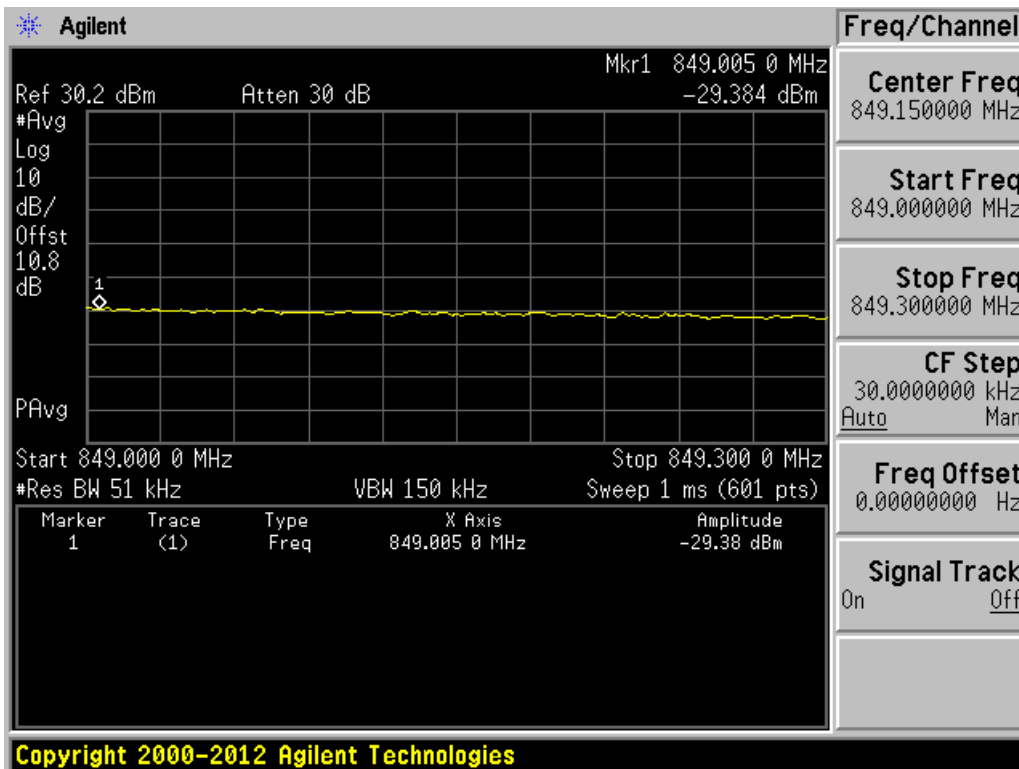
Uplink, Band 13, WCDMA/LTE 779.5 MHz



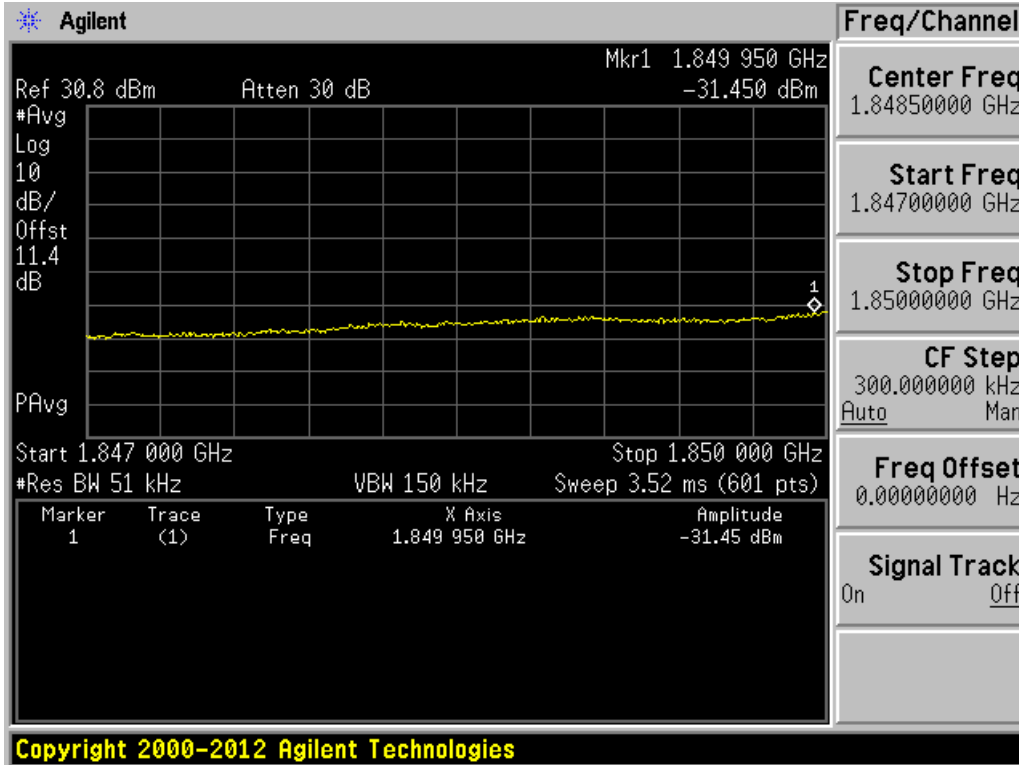
Uplink, Band 13, WCDMA/LTE 784.5 MHz



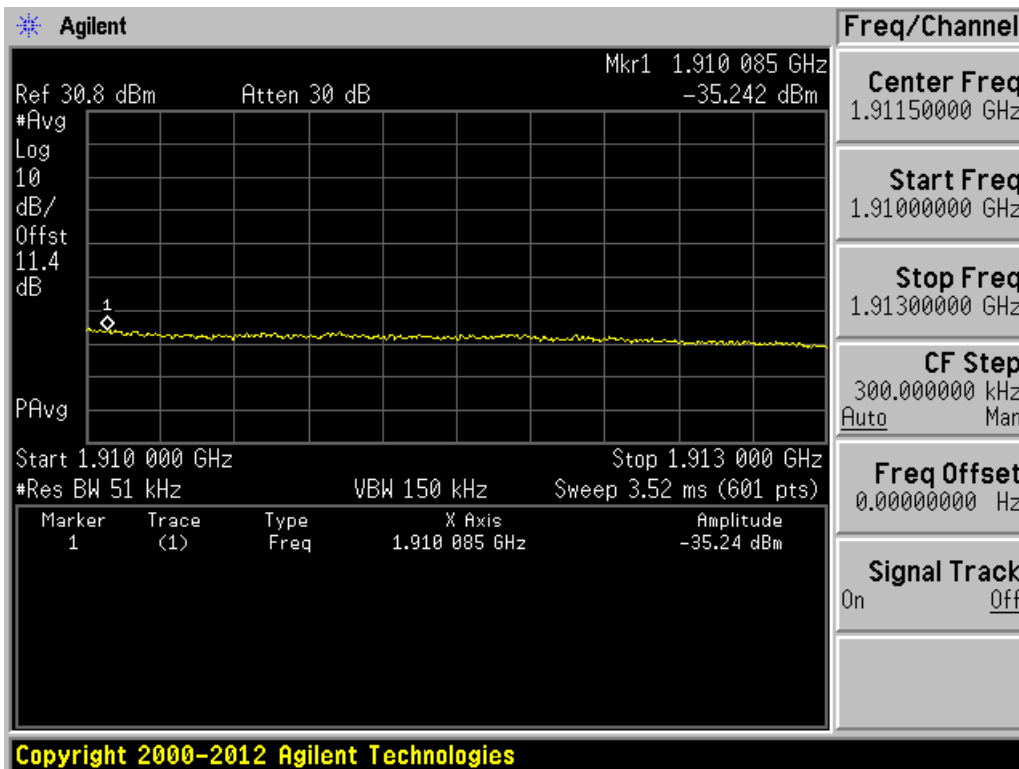
Uplink, Band 5, WCDMA/LTE 826.5 MHz



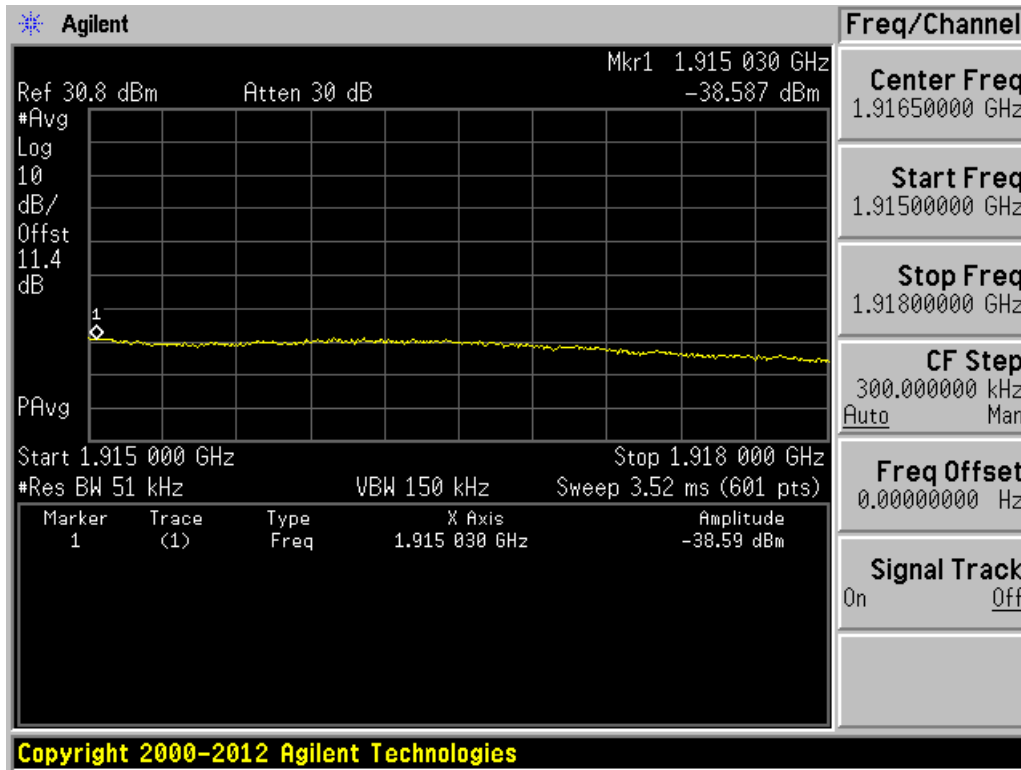
Uplink, Band 5, WCDMA/LTE 846.5 MHz



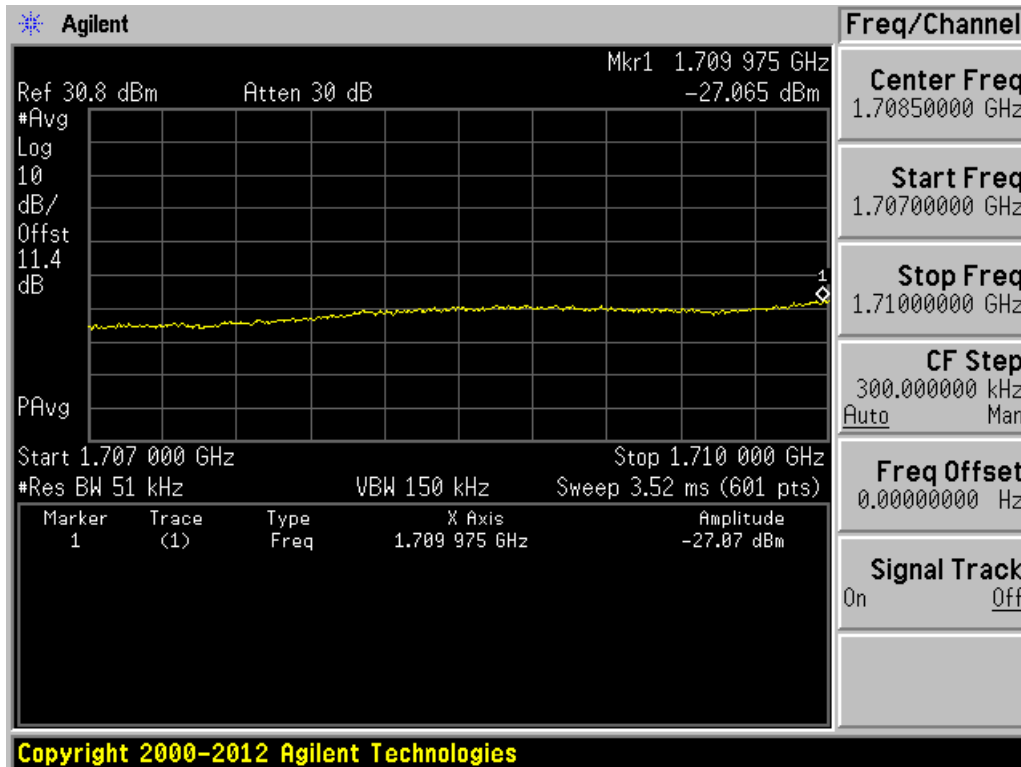
Uplink, Band 2 & 25, WCDMA/LTE 1852.5 MHz



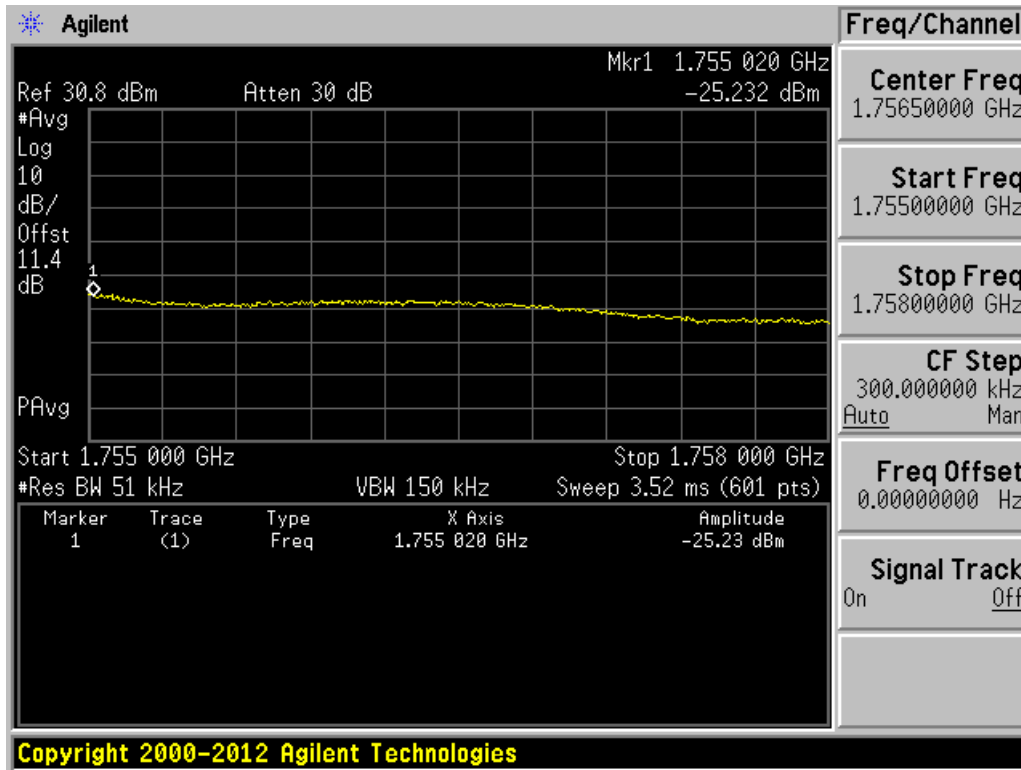
Uplink, Band 2, WCDMA/LTE 1907.5 MHz



Uplink, Band 25, WCDMA/LTE 1912.5 MHz



Uplink, Band 4, WCDMA/LTE 1712.5 MHz



Uplink, Band 4, WCDMA/LTE 1752.5 MHz

3.6 Conducted Spurious Emissions Test

This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.6.

This complies with FCC Rule: § 2.1051 Measurements required: Spurious emissions at antenna terminals.

3.6.1 Conducted spurious emissions test results

Table 14

Frequency of Operation (MHz)	Highest Emission (dBm)	Measured Frequency (MHz)	Limit	Result
1850-1915	-37.8	3750.0	-13	Pass
1930-1995	-55.6	739.0	-13	Pass
1710-1755	-38.3	1756.0	-13	Pass
2110-2155	-55.6	737.0	-13	Pass
824-849	-31.8	850.0	-13	Pass
869-894	-55.2	738.0	-13	Pass
699-716	-23.4	698.0	-13	Pass
729-746	-56.6	747.0	-13	Pass
777-787	-23.6	788.0	-13	Pass
746-756	-20.4	757.0	-13	Pass

Table 15

Operation in 777-787 MHz. FCC Rule 27.53(c)						
Emissions Frequency Range	Measured Frequency (MHz)	RBW (kHz)	Correction Factor	Measured Level (dBm)	Limit (dBm)	Result
764-776	776	6.25	0	-46.1	-35	Pass
794-806	794	6.25	0	-69.3	-35	Pass

Table 16

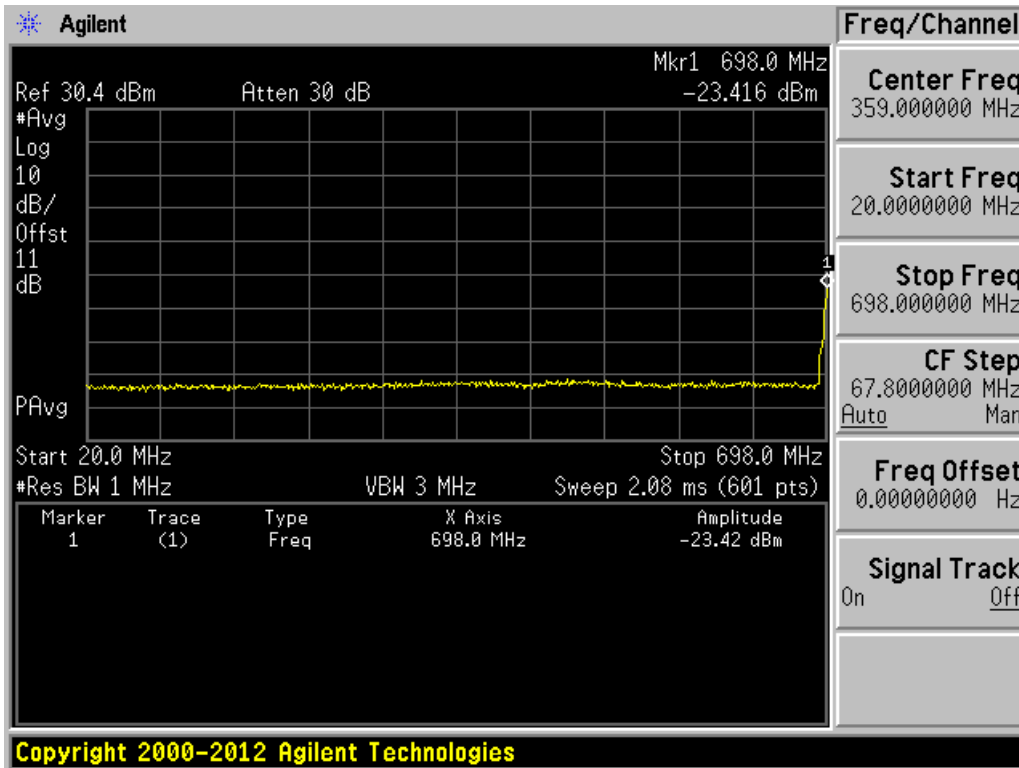
Operation in 777-787 MHz. FCC Rule 27.53(e)						
Emissions Frequency Range	Measured Frequency (MHz)	Measured Level (dBm/MHz)	Net Antenna Gain (dB)	Calculated EIRP (dBm/MHz)	Limit (dBm/MHz)	Result
1559-1610	1564.1	-45.8	1	-44.8	-40	Pass

Table 17

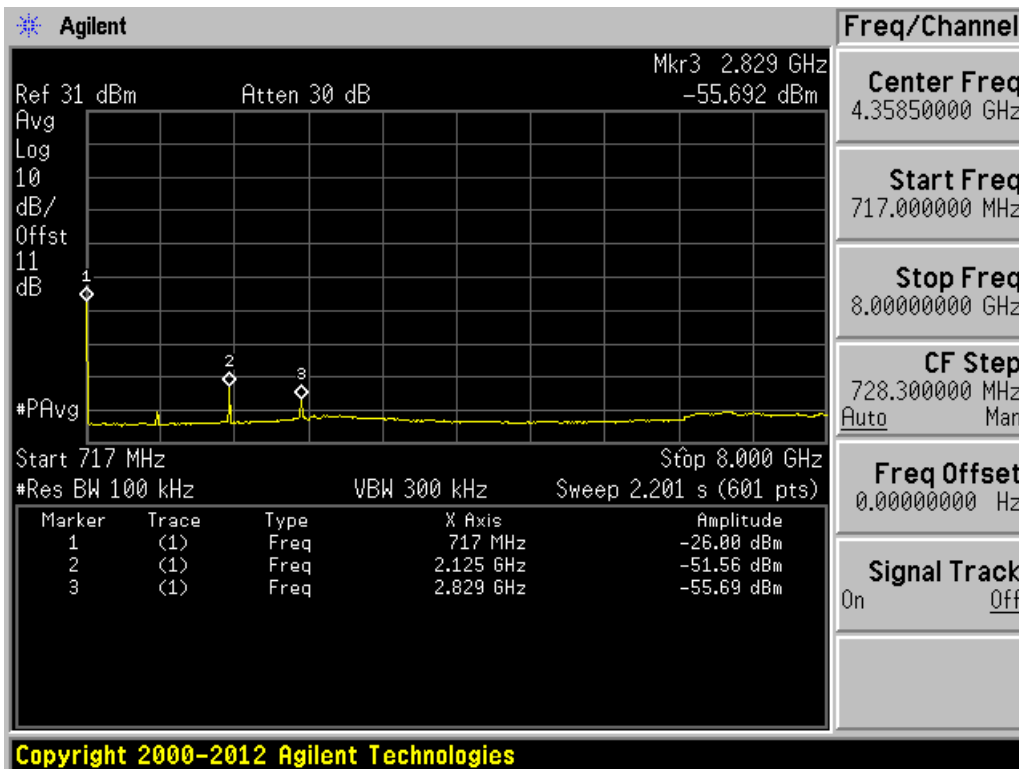
Operation in 746-756 MHz. FCC Rule 27.53(c)						
Emissions Frequency Range	Measured Frequency (MHz)	RBW (kHz)	Correction Factor	Measured Level (dBm)	Limit (dBm)	Result
764-776	770.8	6.25	0	-94.9	-35	Pass
794-806	799.5	6.25	0	-94.2	-35	Pass

Table 18

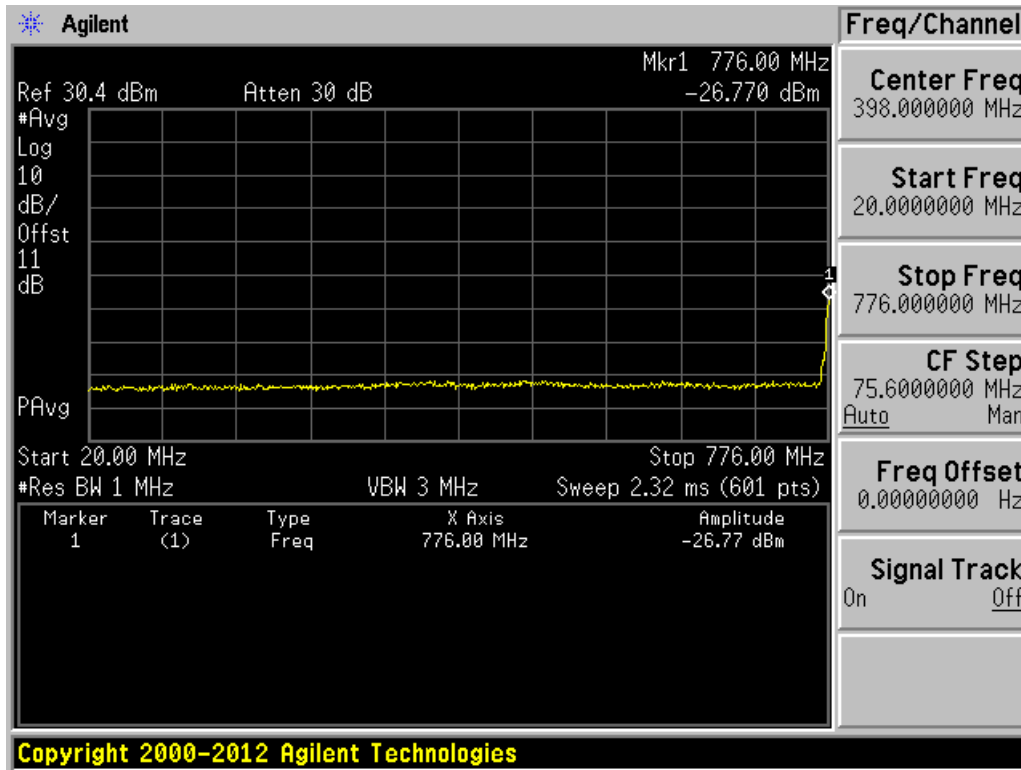
Operation in 746-756 MHz. FCC Rule 27.53(e)						
Emissions Frequency Range	Measured Frequency (MHz)	Measured Level (dBm/MHz)	Net Antenna Gain (dB)	Calculated EIRP (dBm/MHz)	Limit (dBm/MHz)	Result
1559-1610	1577.9	-72.7	1	-71.7	-40	Pass



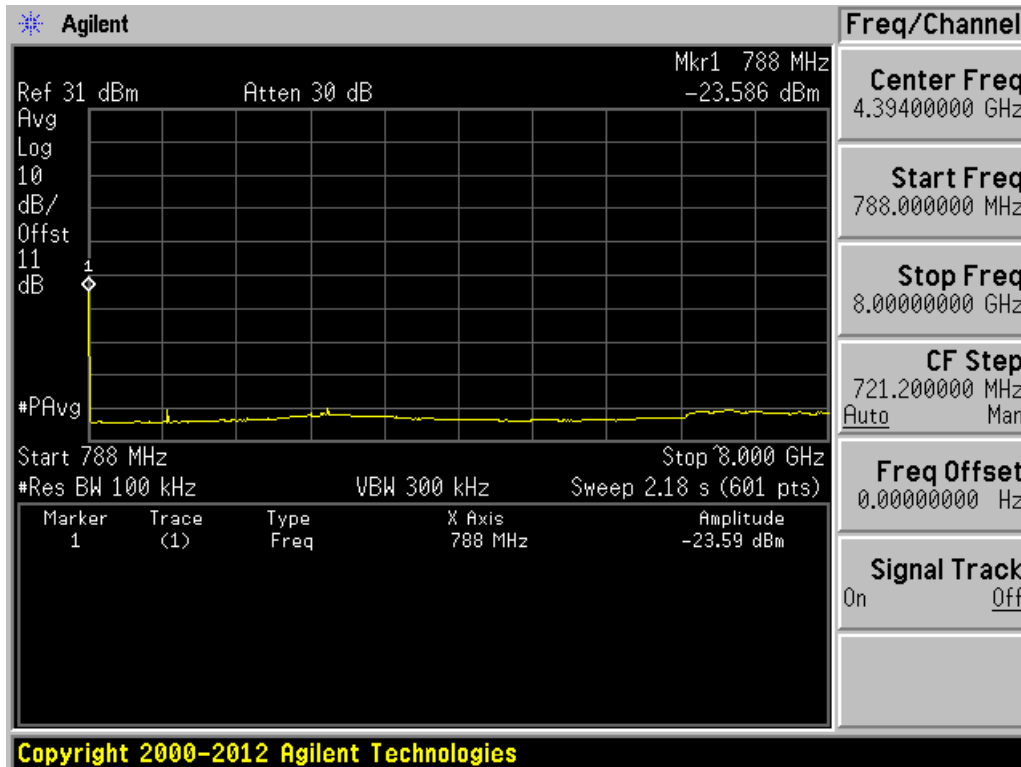
FCC Rule Part 27.53(f). Uplink. Band 12 & 17. 20 MHz to 698 MHz



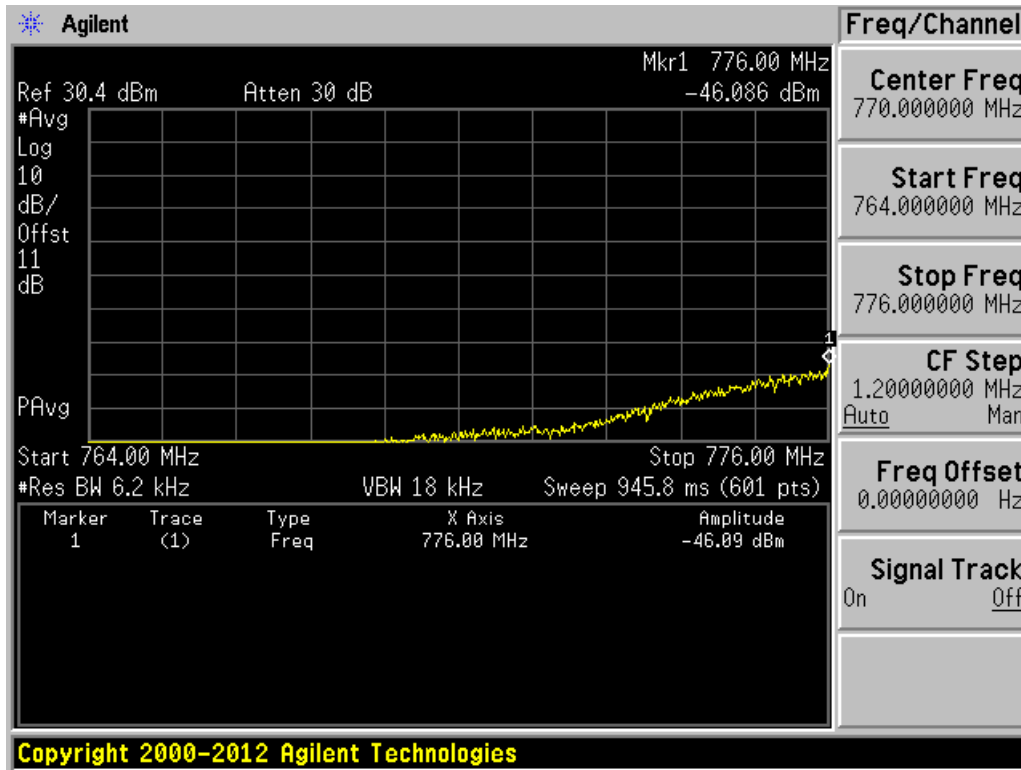
FCC Rule Part 27.53(f). Uplink. Band 12 & 17. 747 MHz to 8 GHz



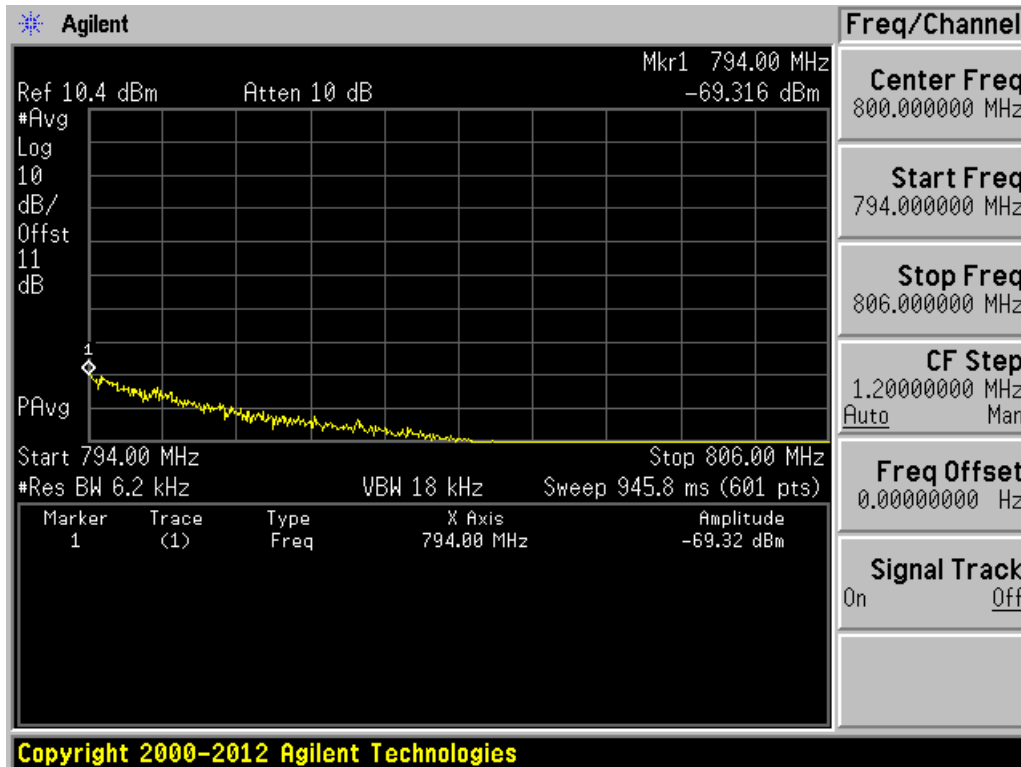
FCC Rule Part 27.53(c). Uplink. Band 13. 20 MHz to 776 MHz



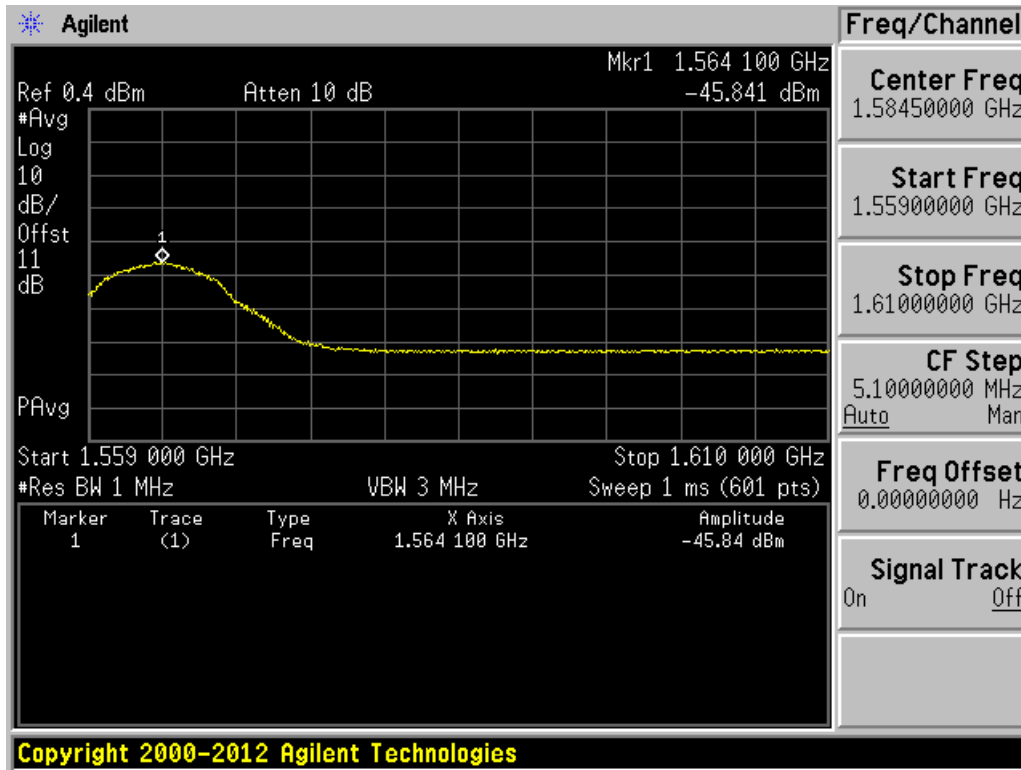
FCC Rule Part 27.53(c). Uplink. Band 13. 788 MHz to 8 GHz



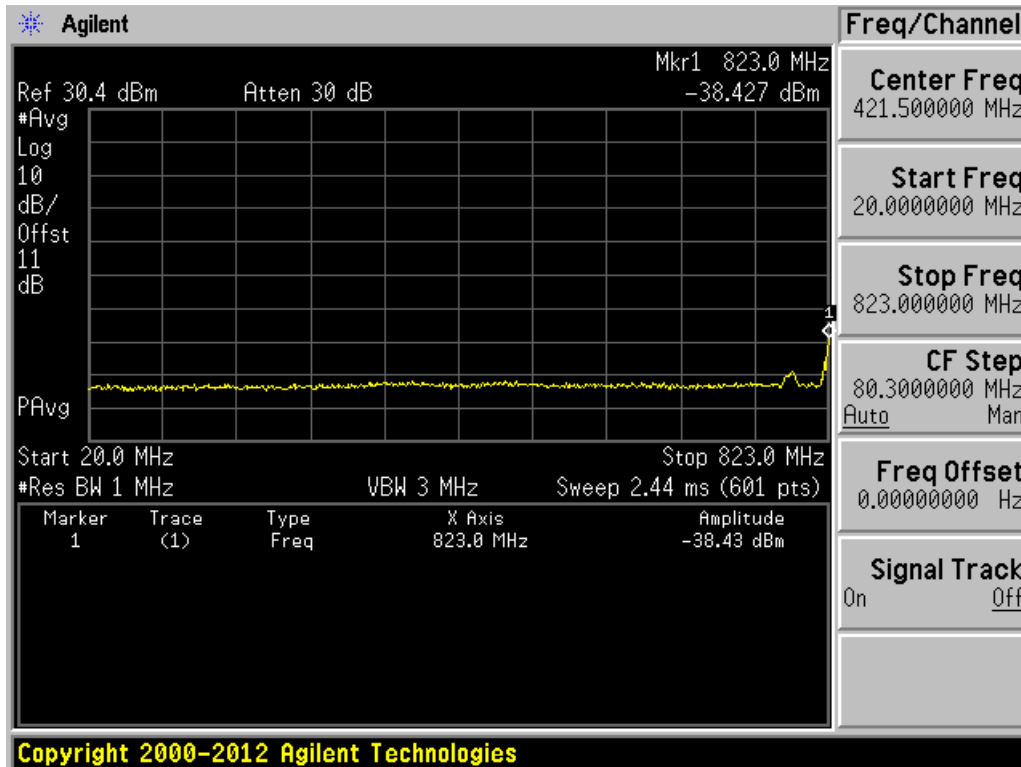
FCC Rule Part 27.53(c). Uplink. Band 13. 764 MHz to 776 MHz



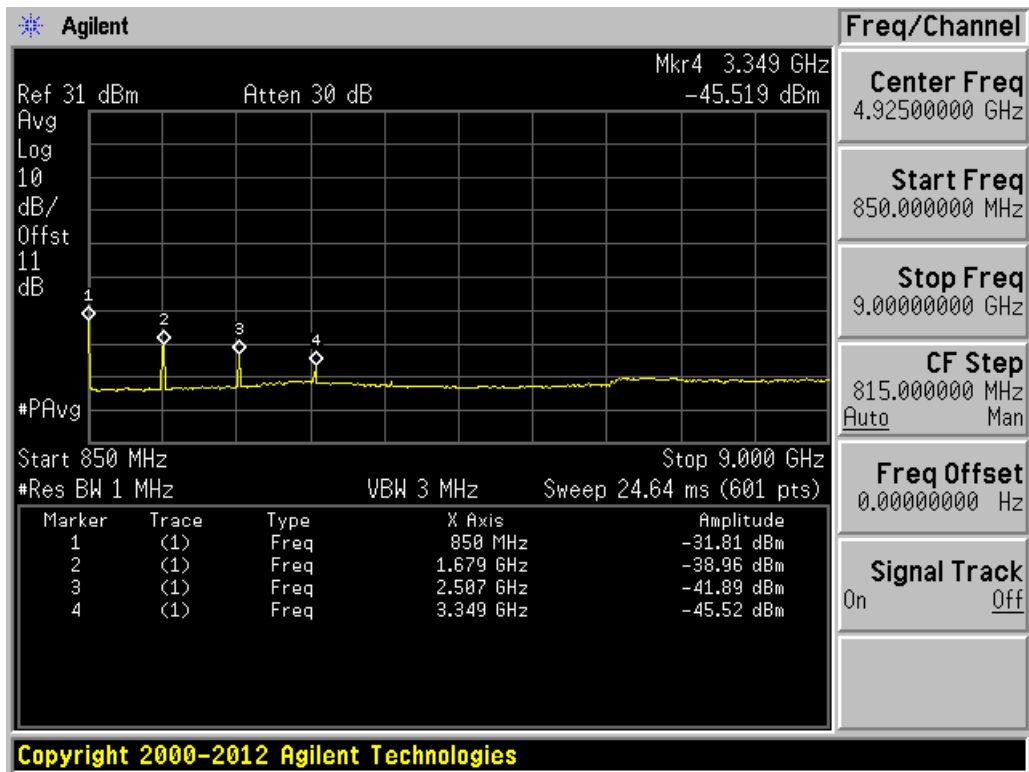
FCC Rule Part 27.53(c). Uplink. Band 13. 794 MHz to 806 MHz



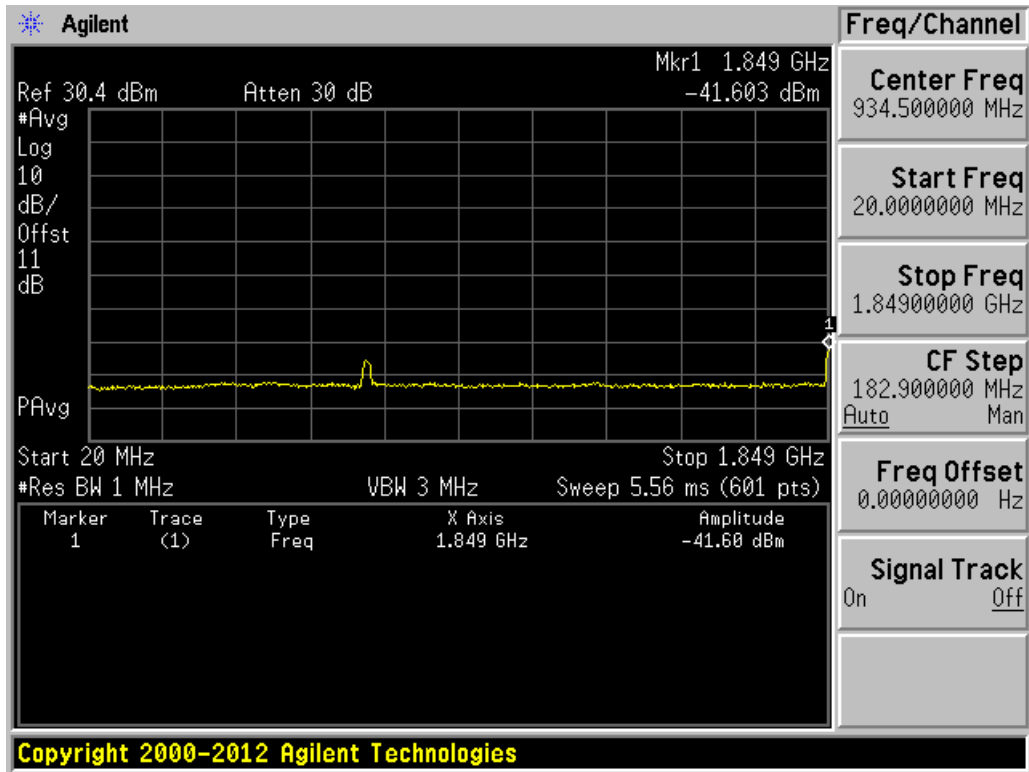
FCC Rule Part 27.53(e). Uplink. Band 13. 1559 MHz to 1610 MHz



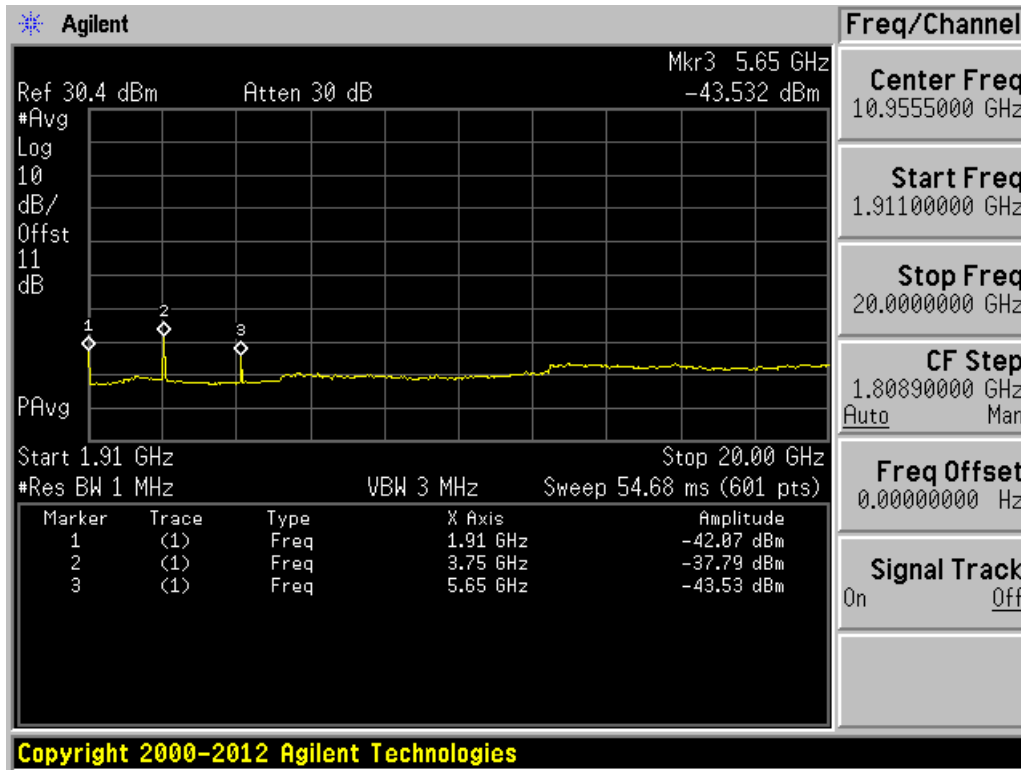
FCC Rule Part 22.917. Uplink. Band 5. 20 MHz to 823 MHz



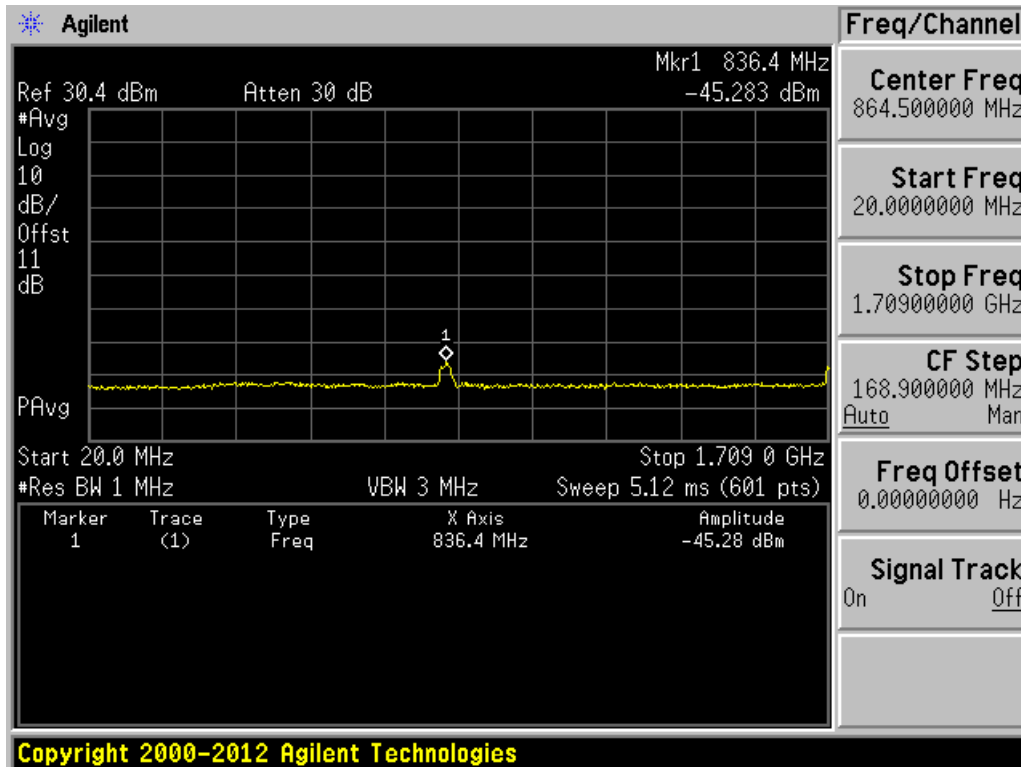
FCC Rule Part 22.917. Uplink. Band 5. 850 MHz to 9 GHz



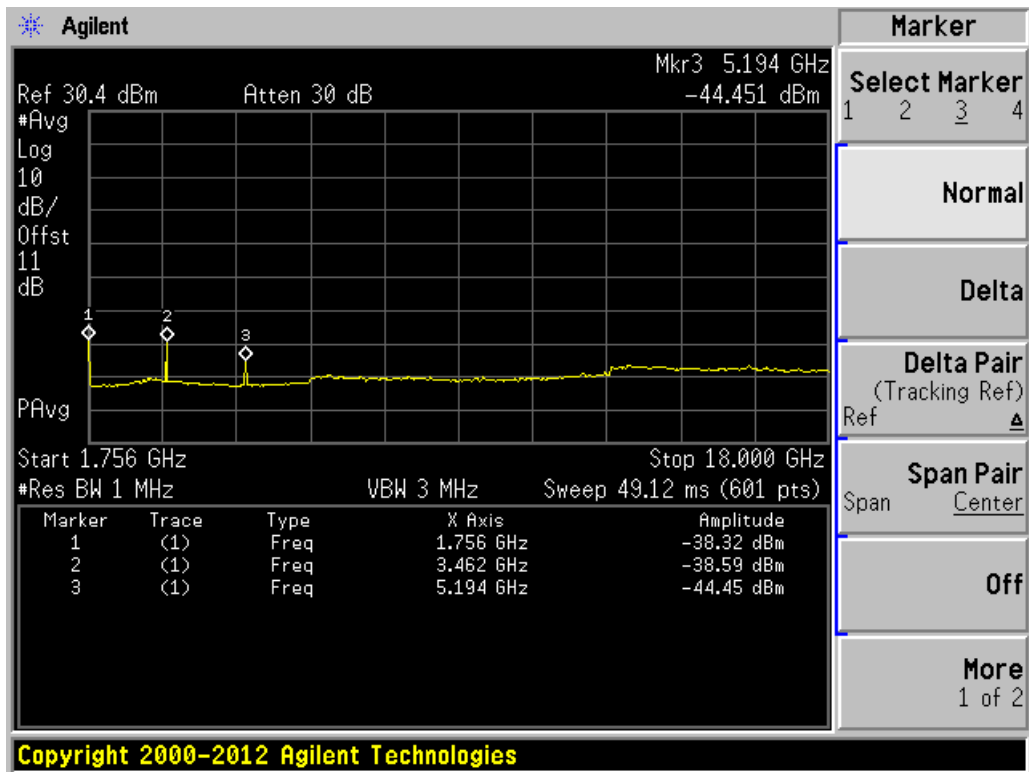
FCC Rule Part 24.238. Uplink. Band 2 & 25. 20 MHz to 1849 MHz



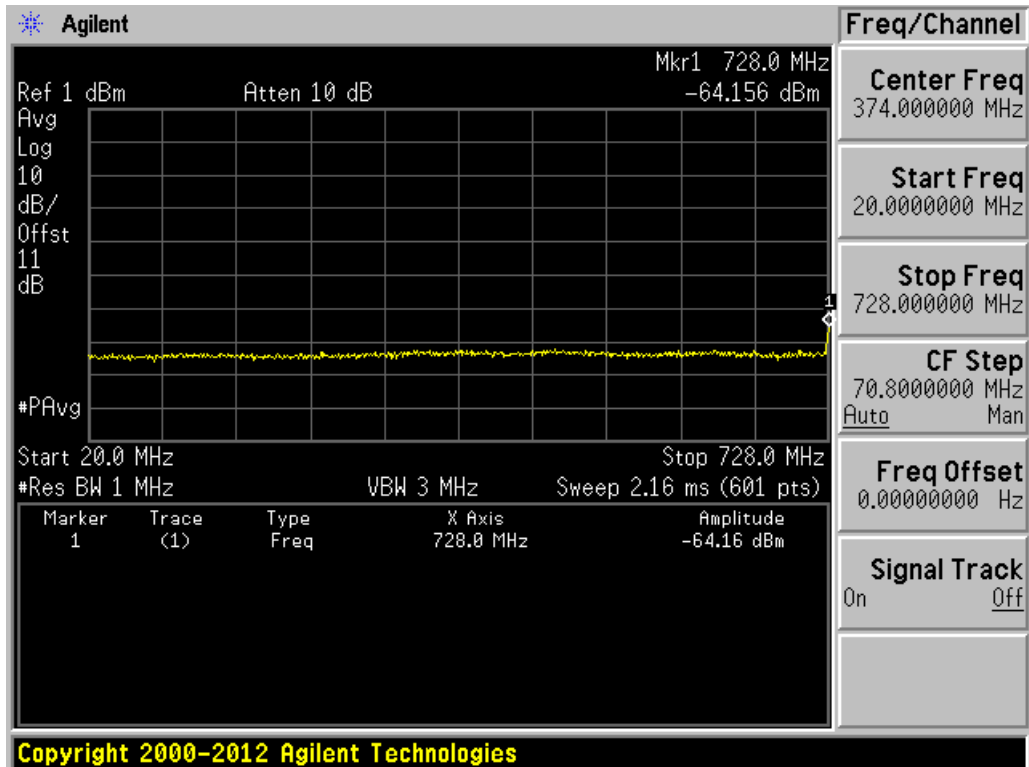
FCC Rule Part 24.238. Uplink. Band 2 & 25. 1911 MHz to 20 GHz



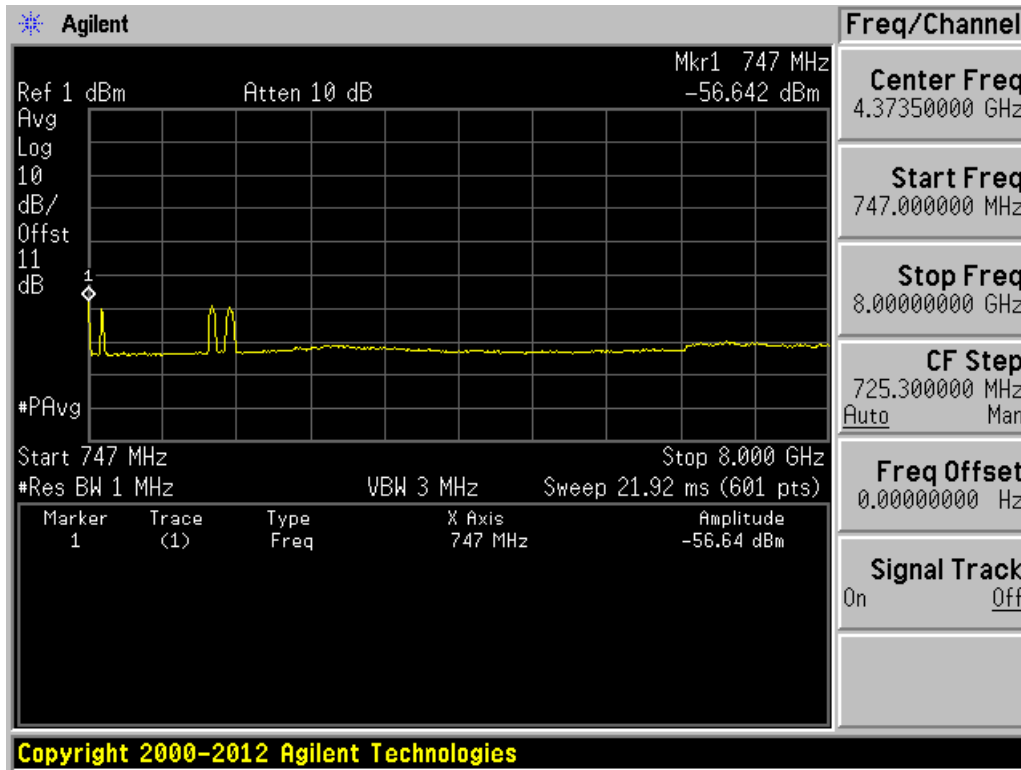
FCC Rule Part 27.53(h). Uplink. Band 4. 20 MHz to 1709 MHz



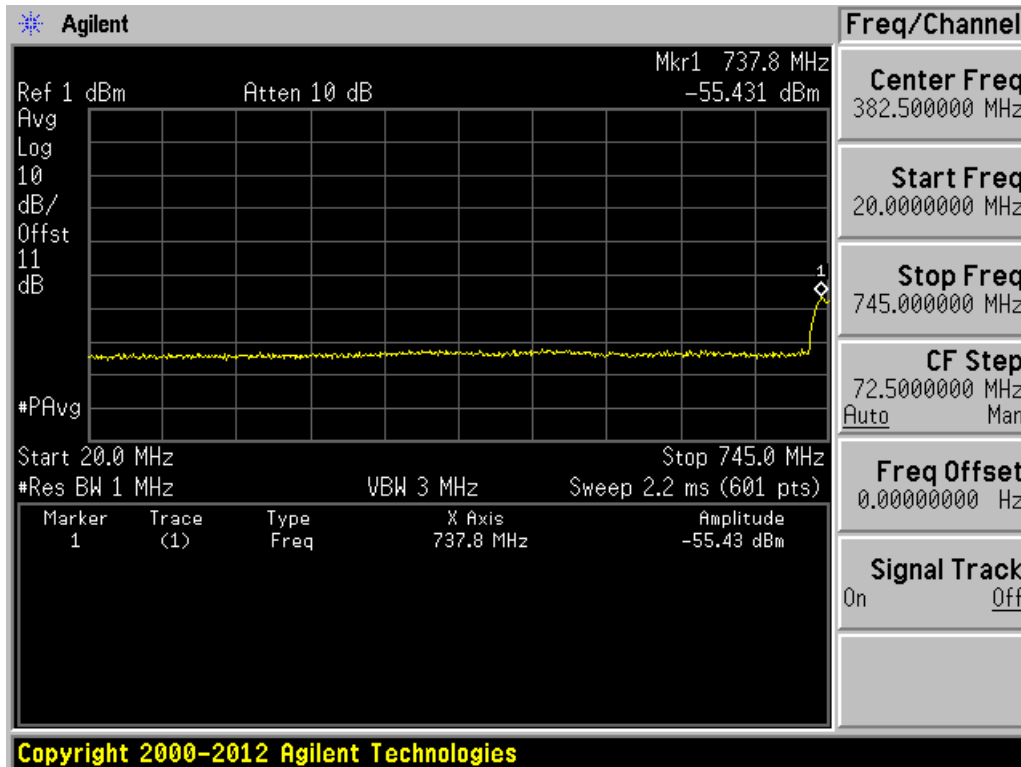
FCC Rule Part 27.53(h). Uplink. Band 4. 1756 MHz to 18 GHz



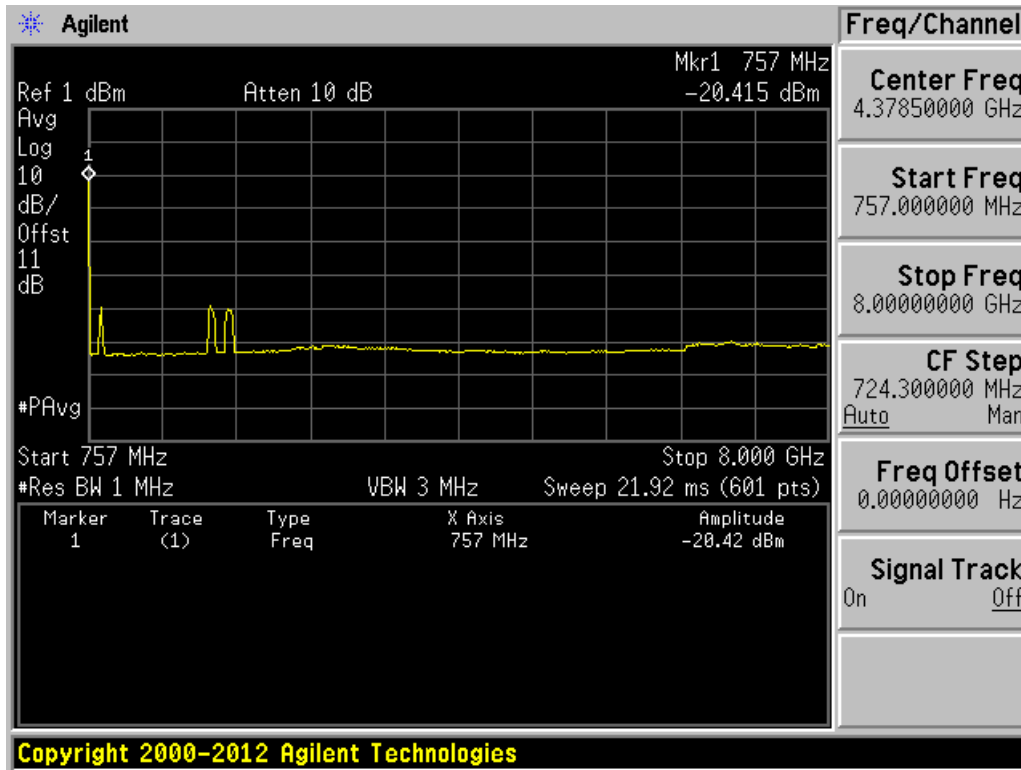
FCC Rule Part 27.53(f). Downlink. Band 12 & 17. 20 MHz to 728 MHz



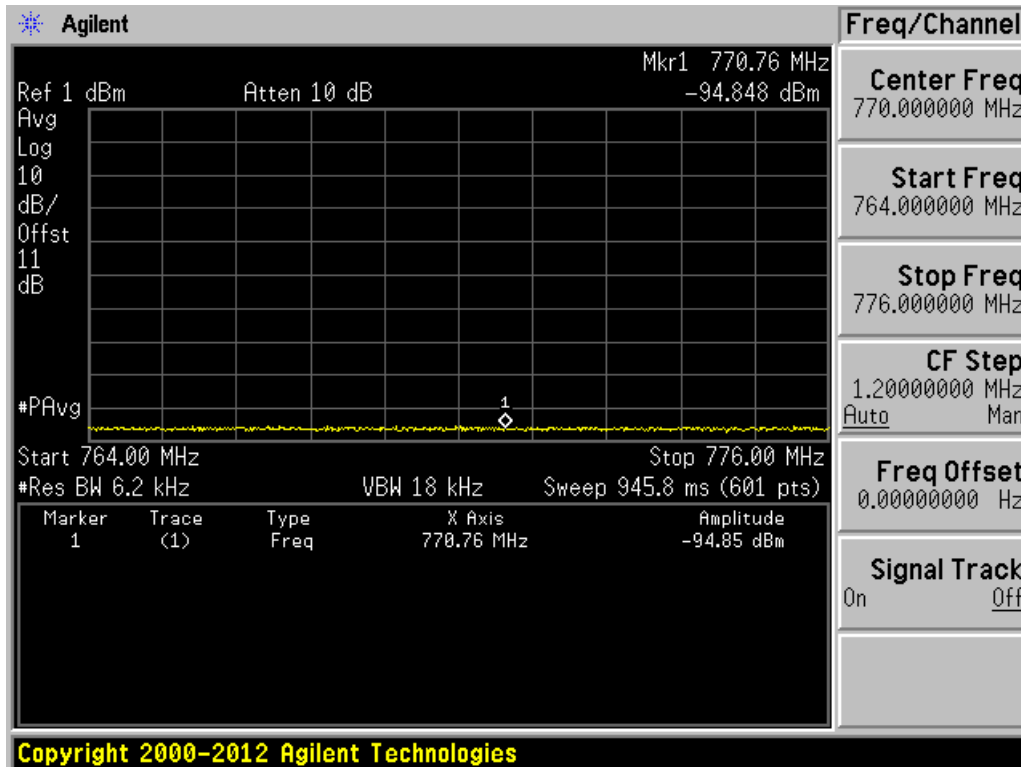
FCC Rule Part 27.53(f). Downlink. Band 12 & 17. 747 MHz to 8 GHz



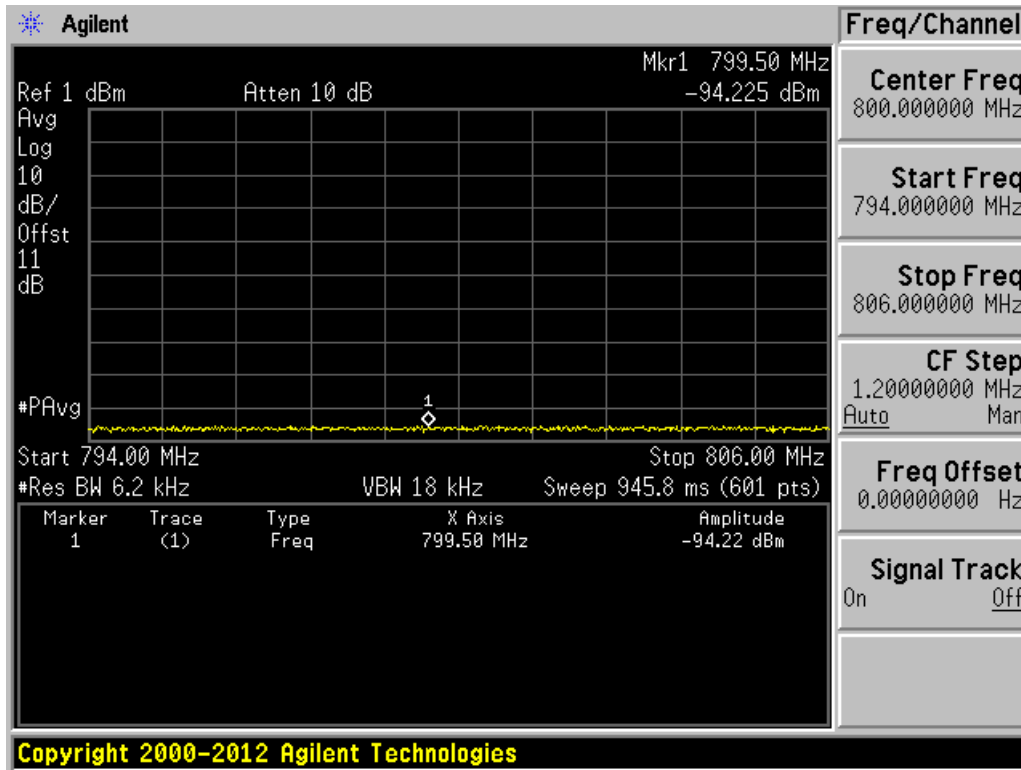
FCC Rule Part 27.53(c). Downlink. Band 13. 20 MHz to 745 MHz



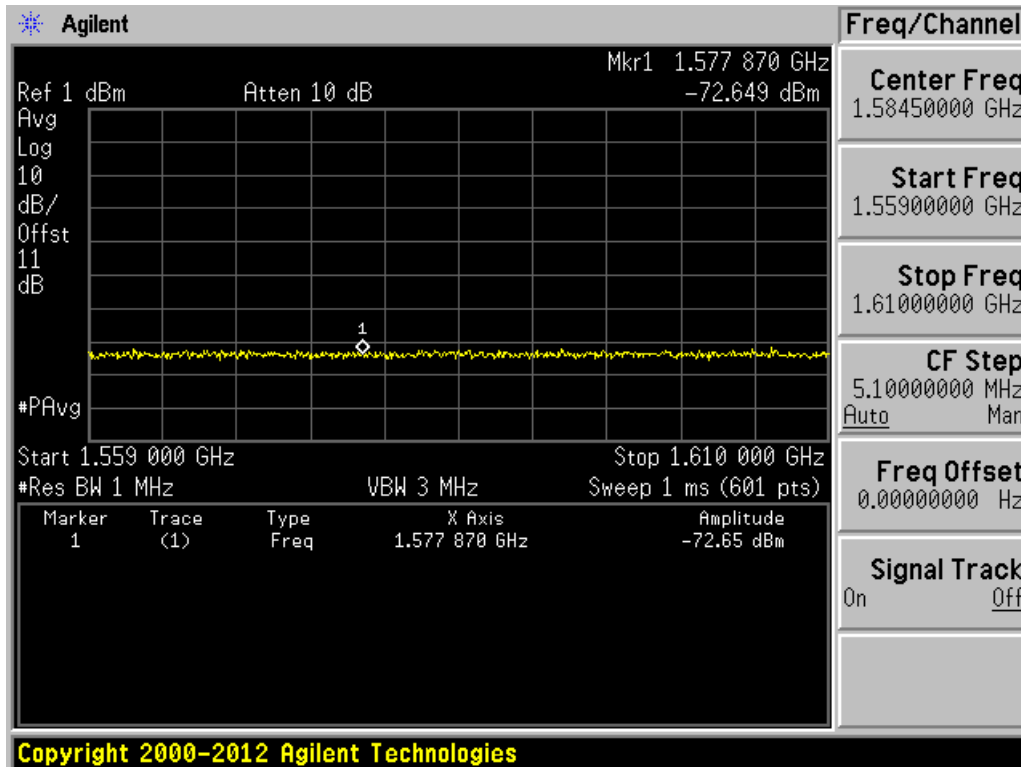
FCC Rule Part 27.53(c). Downlink. Band 13. 758 MHz to 8 GHz



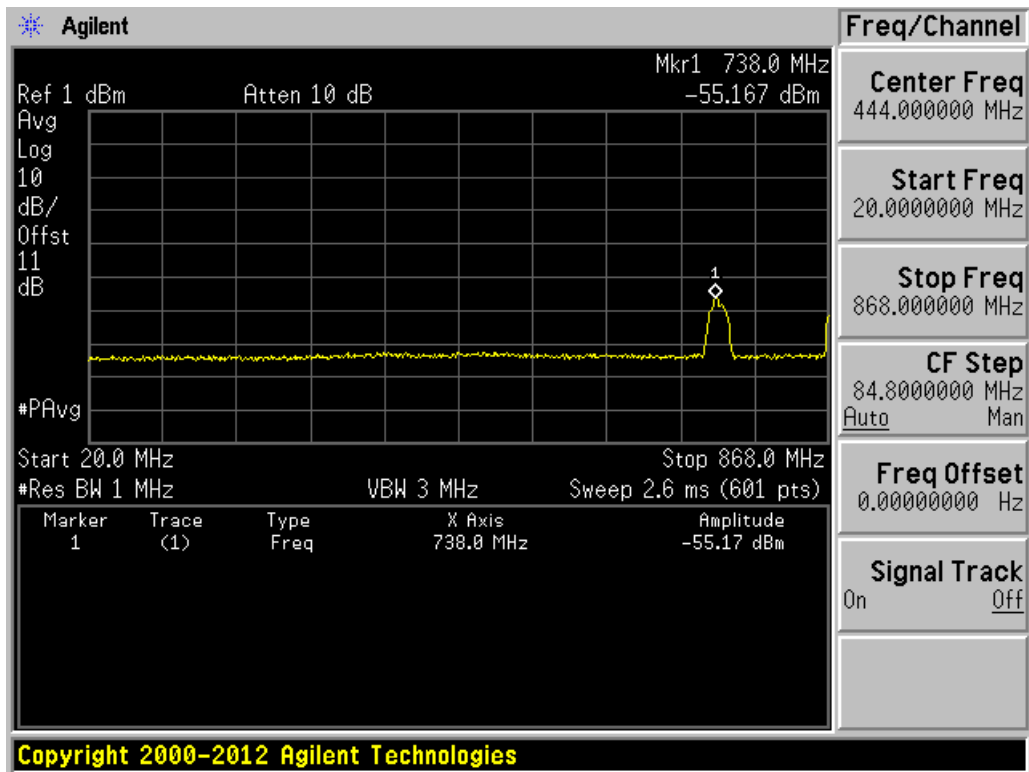
FCC Rule Part 27.53(c). Downlink. Band 13. 764 MHz to 776 MHz



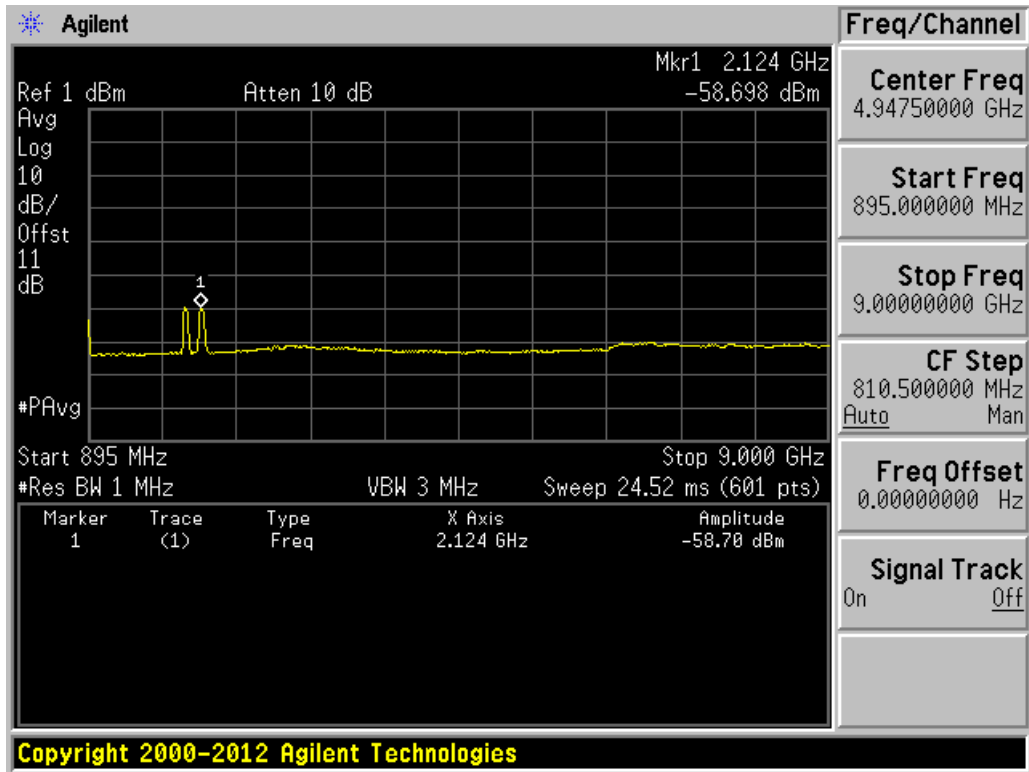
FCC Rule Part 27.53(c). Downlink. Band 13. 794 MHz to 806 MHz



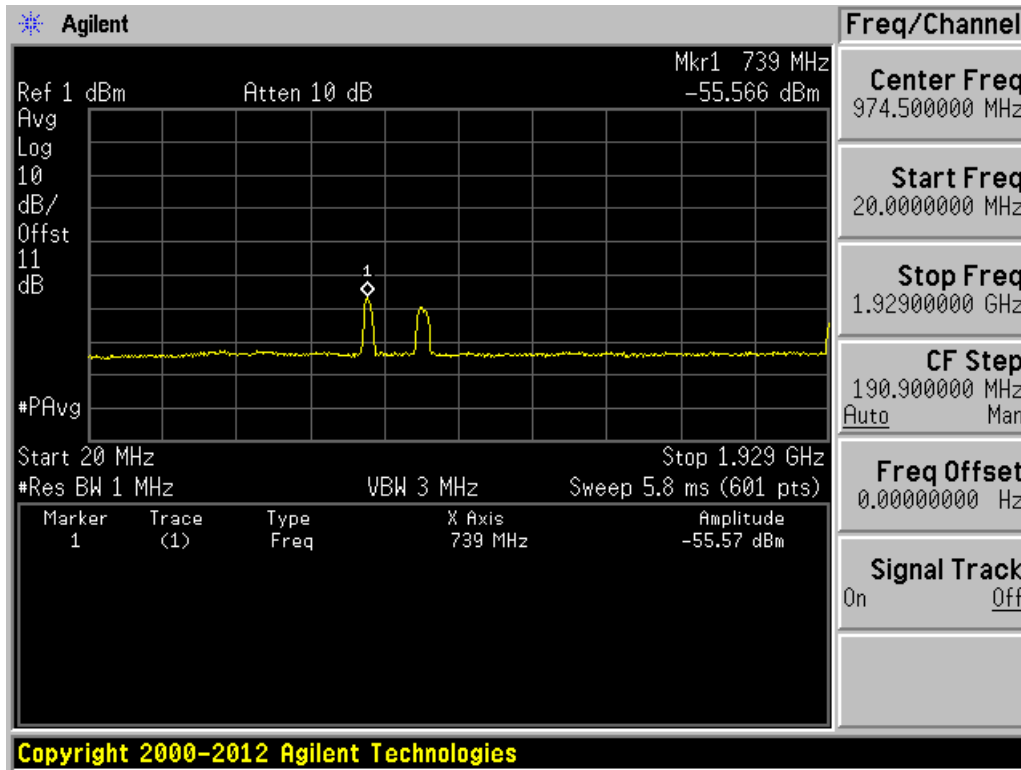
FCC Rule Part 27.53(e). Downlink. Band 13. 1559 MHz to 1610 MHz



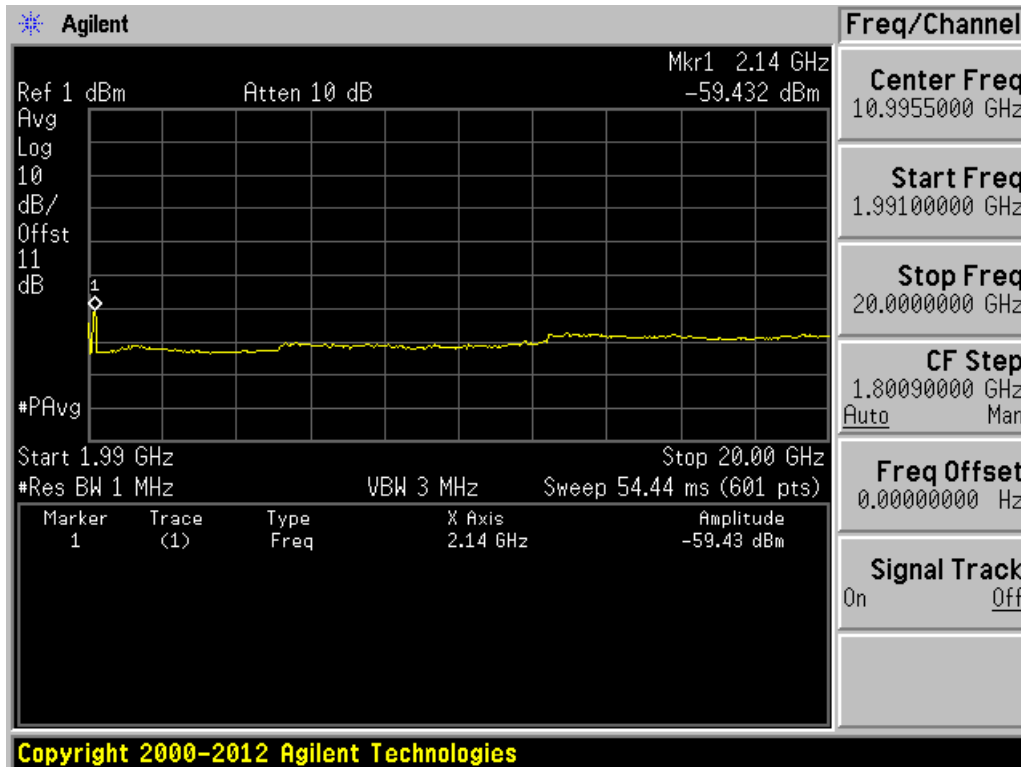
FCC Rule Part 22.917. Downlink. Band 5. 20 MHz to 868 MHz



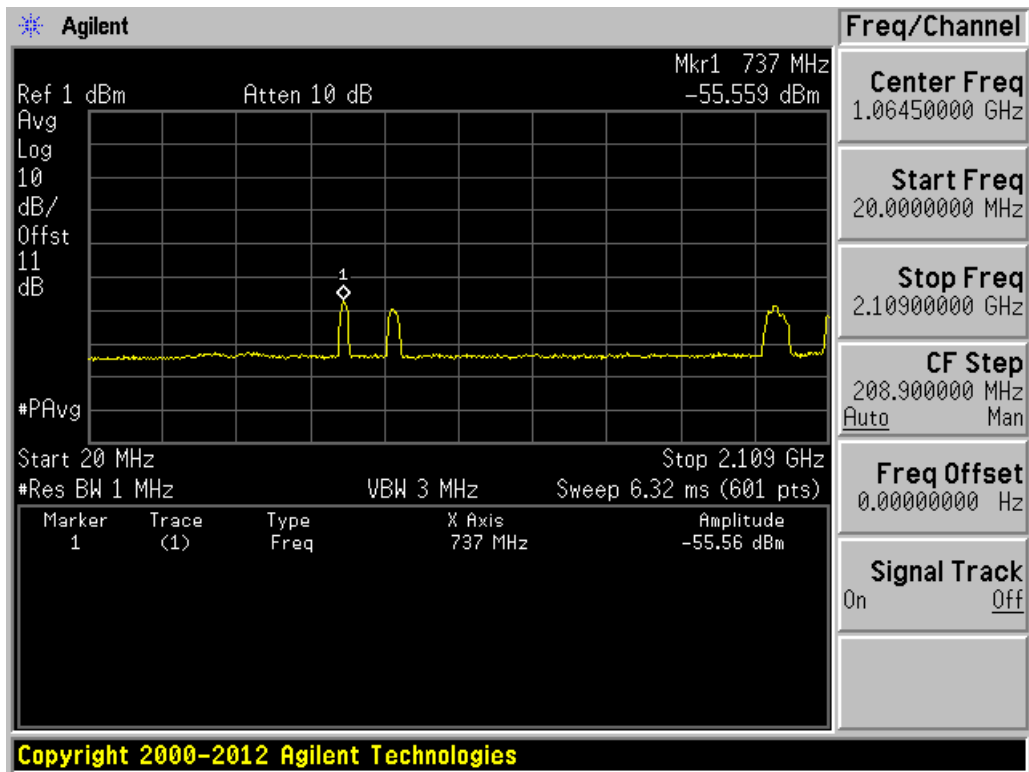
FCC Rule Part 22.917. Downlink. Band 5. 895 MHz to 9 GHz



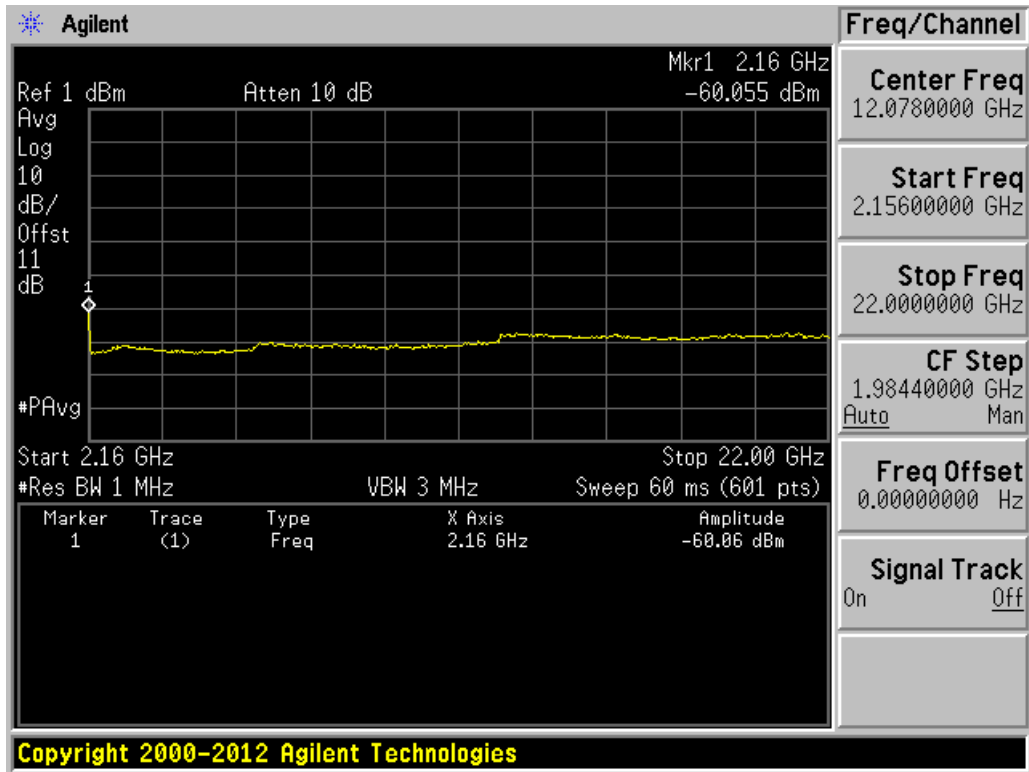
FCC Rule Part 24.238, Downlink, Band 2 & 25, 20 MHz to 1929 MHz



FCC Rule Part 24.238, Downlink, Band 2 & 25, 1991 MHz to 20 GHz



FCC Rule Part 27.53(h). Downlink. Band 4. 20 MHz to 2109 MHz



FCC Rule Part 27.53(h). Downlink. Band 4. 2156 MHz to 22 GHz

3.7 Noise Limits Test

This test conducted in accordance with KDB 935210 D03V04 Signal Booster Measurements, § 7.7

This comply with FCC Rule: § 20.21(e)(8)(i)(A) Noise Limits and § 20.21(e)(8)(i)(H) Transmit Power Off Mode

3.7.1 Test results for noise power in presence of downlink signal

Table 19

Variable Noise Limits. Band 12 & 17				
RSSI (dBm)	Limit (dBm/MHz)		Measured Uplink Noise (dBm/MHz)	Result
	Mobile	Fixed		
-90	-59.0	-45.0	-59.7	Pass
-70	-59.0	-45.0	-59.9	Pass
-50	-59.0	-53.0	-60.1	Pass
-45	-59.0	-58.0	-65.7	Pass
-43	-60.0	-60.0	-65.8	Pass
-42	-61.0	-61.0	-65.5	Pass

Table 20

Variable Noise Limits. Band 13				
RSSI (dBm)	Limit (dBm/MHz)		Measured Uplink Noise (dBm/MHz)	Result
	Mobile	Fixed		
-90	-59.0	-44.1	-61.1	Pass
-70	-59.0	-44.1	-60.9	Pass
-50	-59.0	-53.0	-60.9	Pass
-45	-59.0	-58.0	-61.0	Pass
-43	-60.0	-60.0	-61.0	Pass
-42	-61.0	-61.0	-66.0	Pass

Table 21

Variable Noise Limits. Band 5				
RSSI (dBm)	Limit (dBm/MHz)		Measured Uplink Noise (dBm/MHz)	Result
	Mobile	Fixed		
-90	-59.0	-43.6	-61.5	Pass
-70	-59.0	-43.6	-61.3	Pass
-50	-59.0	-53.0	-61.2	Pass
-45	-59.0	-58.0	-61.2	Pass
-43	-60.0	-60.0	-61.3	Pass
-42	-61.0	-61.0	-65.3	Pass

Table 22

Variable Noise Limits. Band 2 & 25				
RSSI (dBm)	Limit (dBm/MHz)		Measured Uplink Noise (dBm/MHz)	Result
	Mobile	Fixed		
-90	-59.0	-36.5	-60.6	Pass
-70	-59.0	-36.5	-60.6	Pass
-50	-59.0	-53.0	-60.4	Pass
-45	-59.0	-58.0	-68.7	Pass
-43	-60.0	-60.0	-68.8	Pass
-42	-61.0	-61.0	-68.7	Pass

Table 23

Variable Noise Limits. Band 4				
RSSI (dBm)	Limit (dBm/MHz)		Measured Uplink Noise (dBm/MHz)	Result
	Mobile	Fixed		
-90	-59.0	-37.2	-59.9	Pass
-70	-59.0	-37.2	-59.8	Pass
-50	-59.0	-53.0	-59.9	Pass
-45	-59.0	-58.0	-59.8	Pass
-43	-60.0	-60.0	-68.4	Pass
-42	-61.0	-61.0	-68.5	Pass

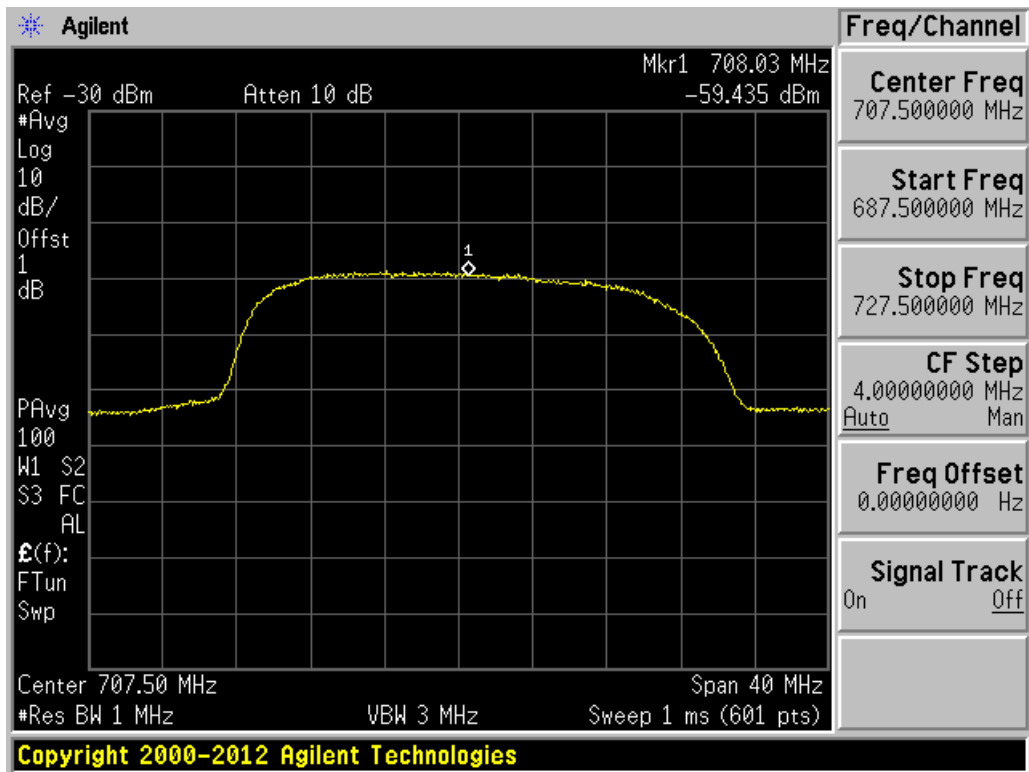
Notes: RSSI dependent area shown in gray.

3.7.2 Maximum noise power test results

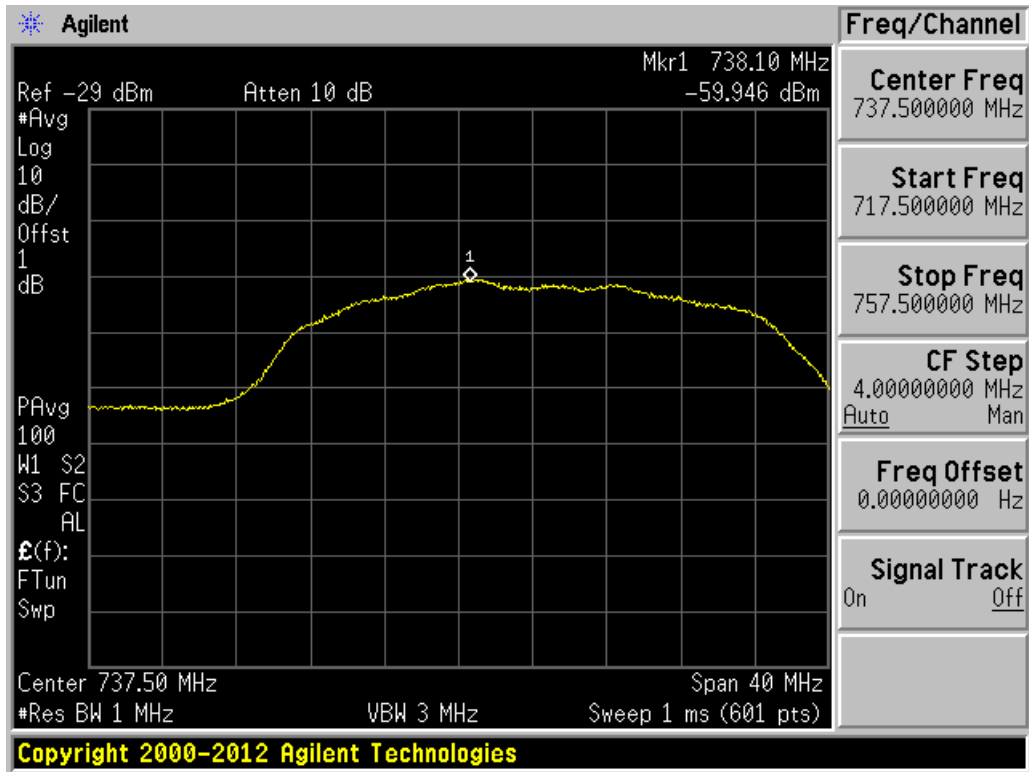
Spectrum Analyzer screenshots for EUT with terminated input ports. Output port connected to Spectrum Analyzer.

Table 24

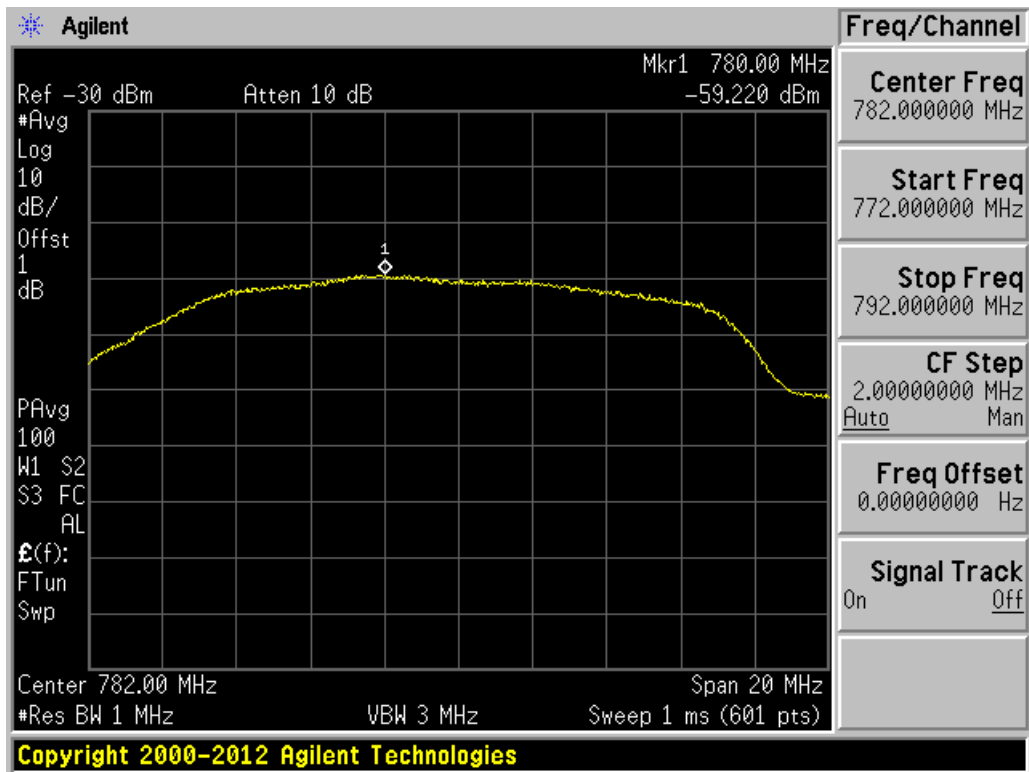
Mobile Booster Maximum Noise				
Operational Band	Limit (dBm/MHz)		Measured Noise (dBm/MHz)	Result
	Mobile	Fixed		
Band 12 & 17 TX	-59.0	-45.0	-59.4	Pass
Band 12 & 17 RX	-59.0	-45.0	-59.9	Pass
Band 13 TX	-59.0	-44.1	-59.2	Pass
Band 13 RX	-59.0	-44.1	-60.8	Pass
Band 5 TX	-59.0	-43.6	-61.5	Pass
Band 5 RX	-59.0	-43.6	-61.0	Pass
Band 2 & 25 TX	-59.0	-36.5	-59.5	Pass
Band 2 & 25 RX	-59.0	-36.5	-60.3	Pass
Band 4 TX	-59.0	-37.2	-59.7	Pass
Band 4 RX	-59.0	-37.2	-61.5	Pass



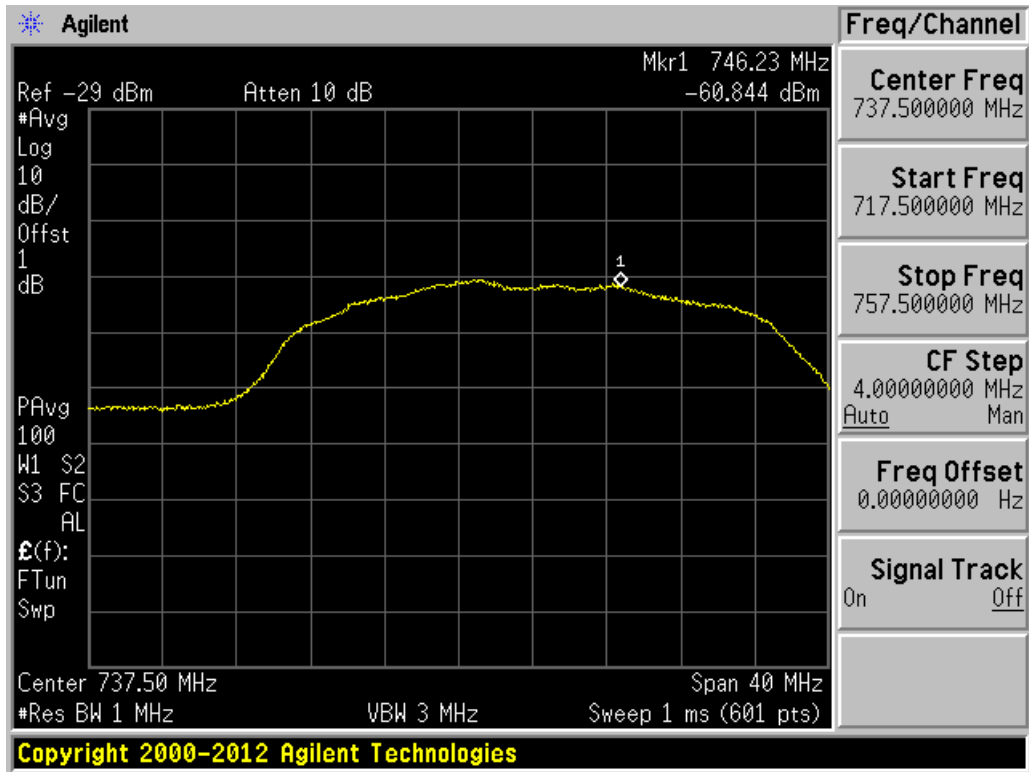
Uplink. Band 12 & 17



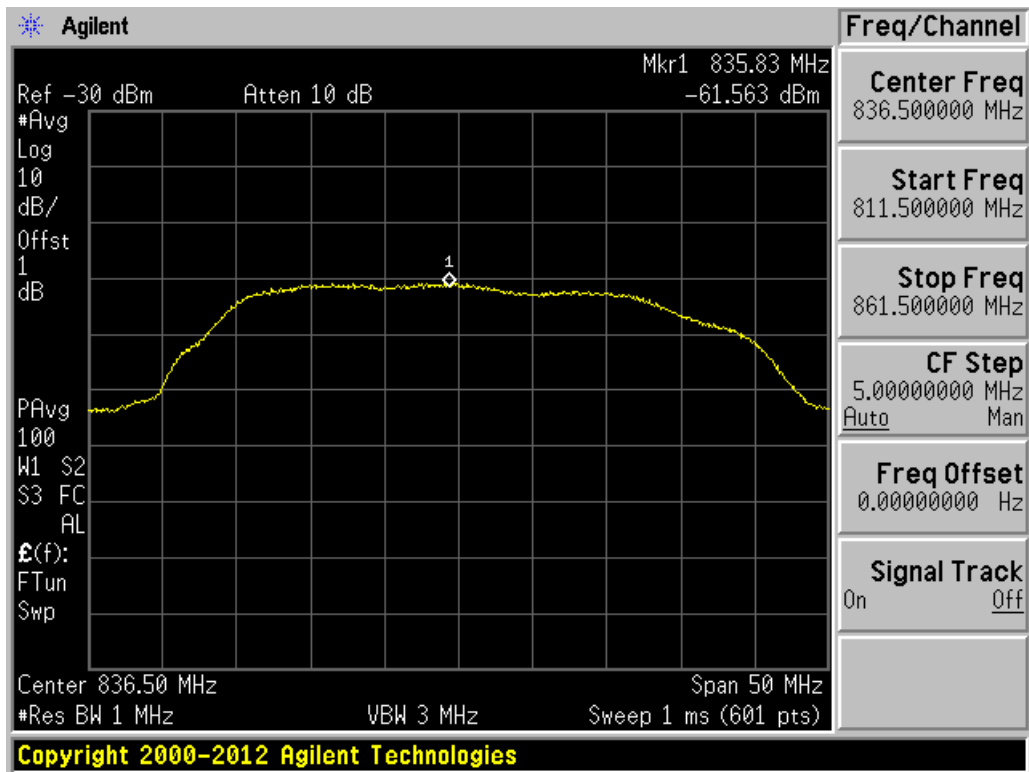
Downlink. Band 12 & 17



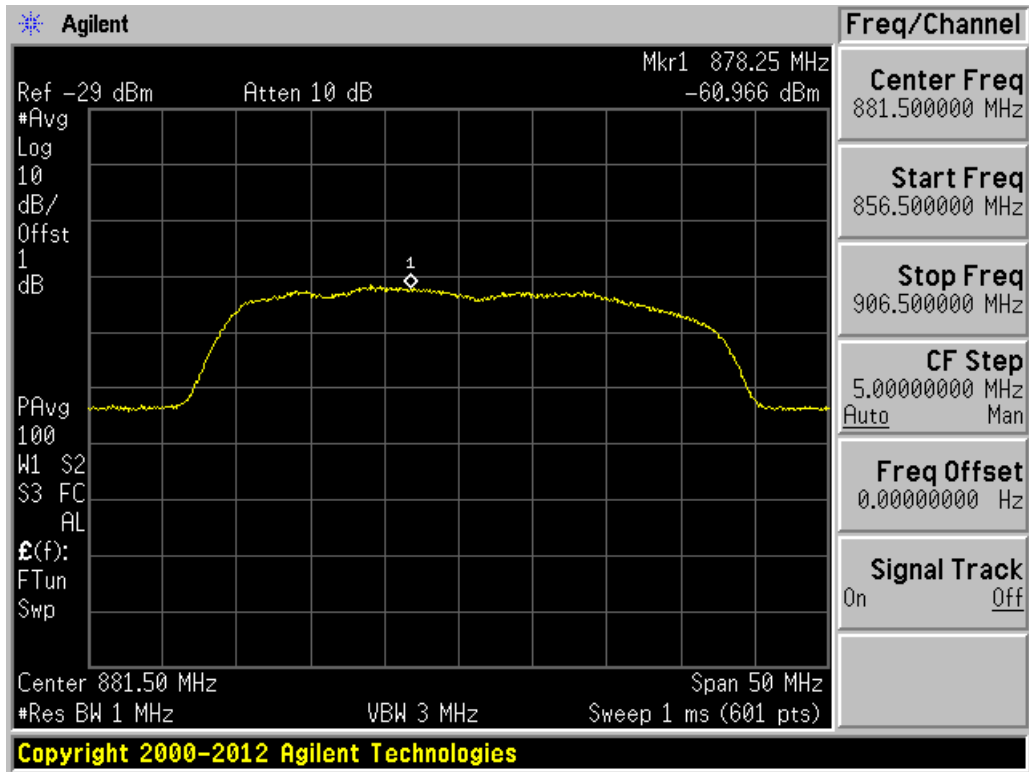
Uplink, Band 13



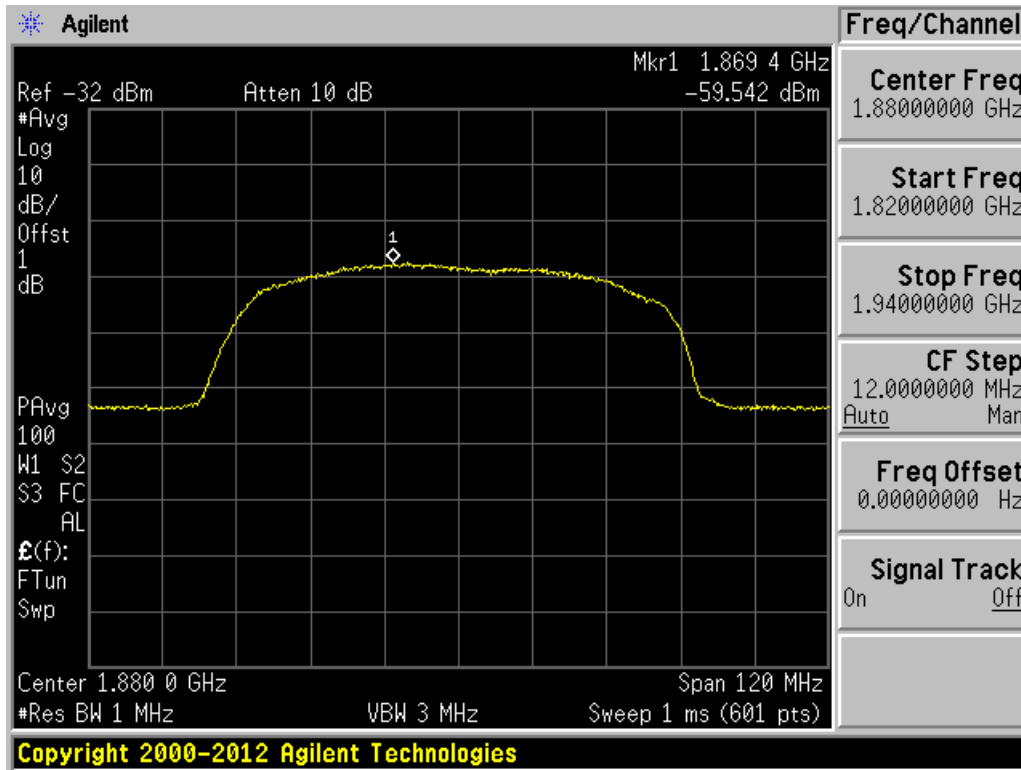
Downlink, Band 13



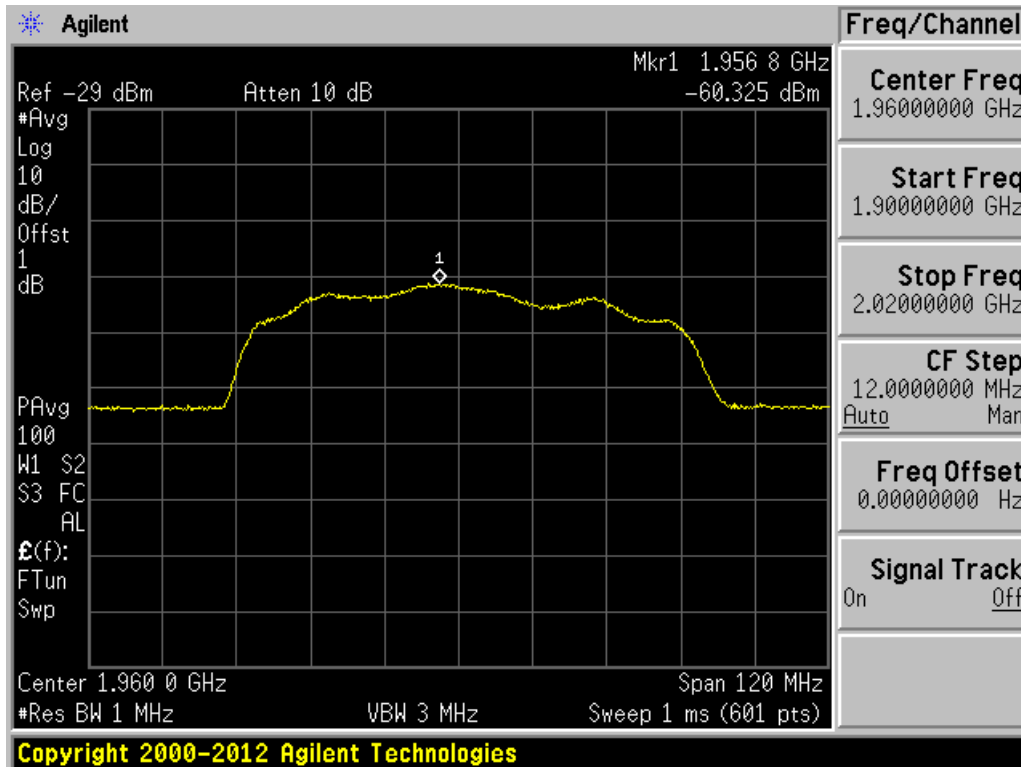
Uplink, Band 5



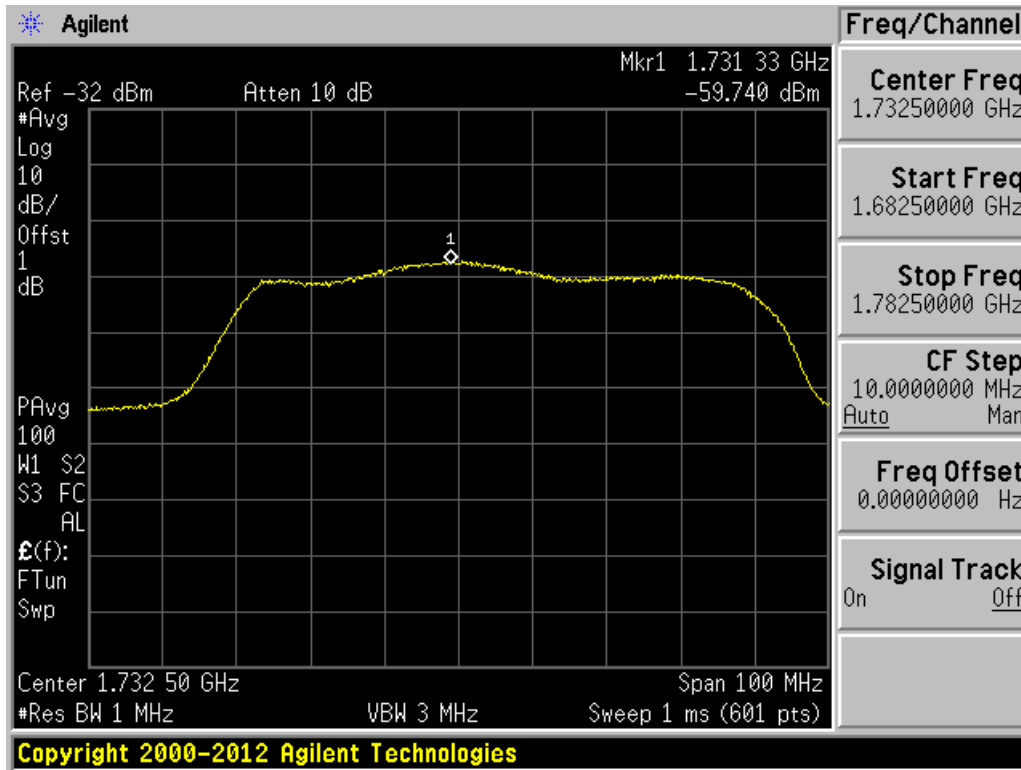
Downlink, Band 5



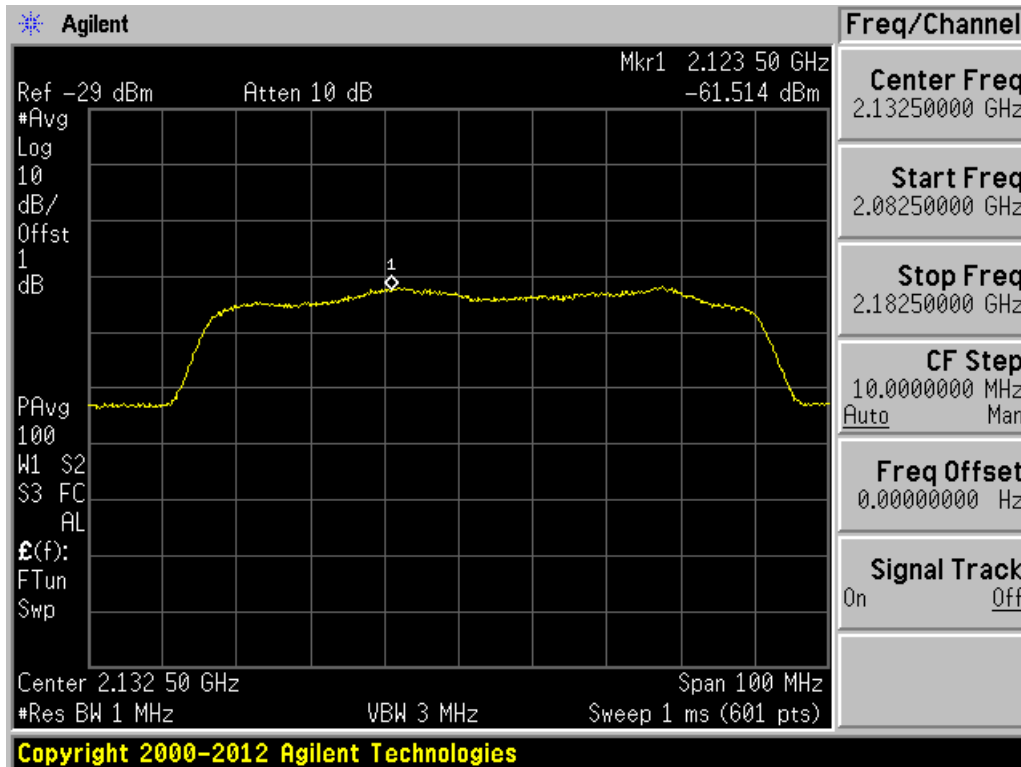
Uplink. Band 2 & 25



Downlink. Band 2 & 25



Uplink, Band 4

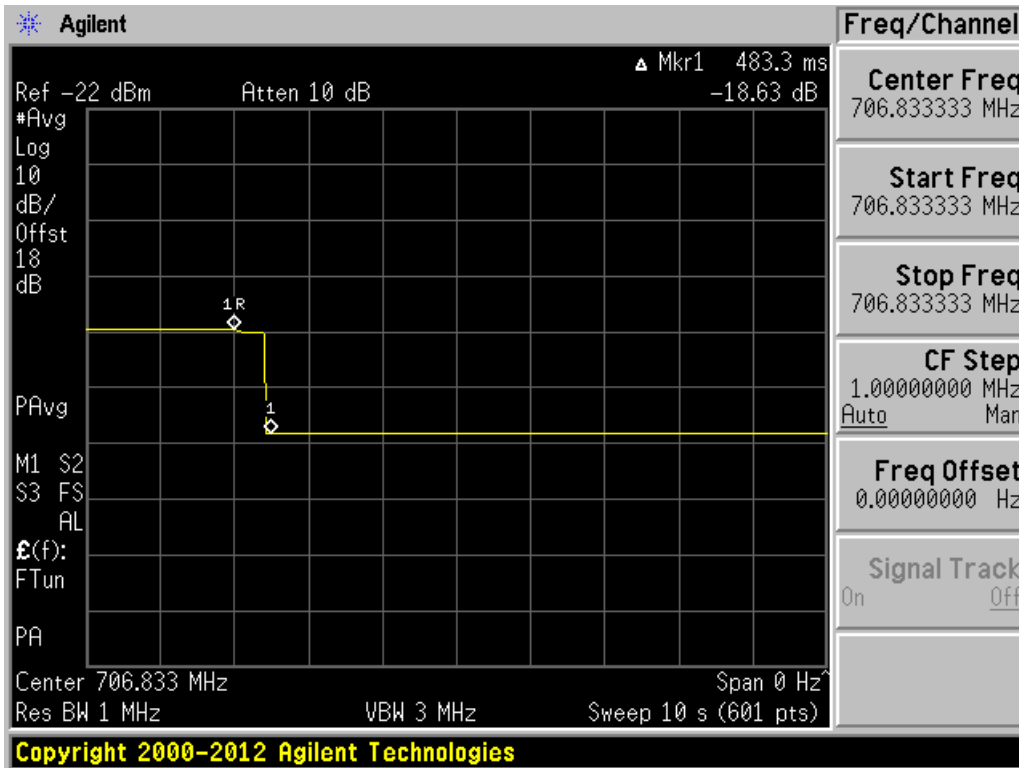


Downlink, Band 4

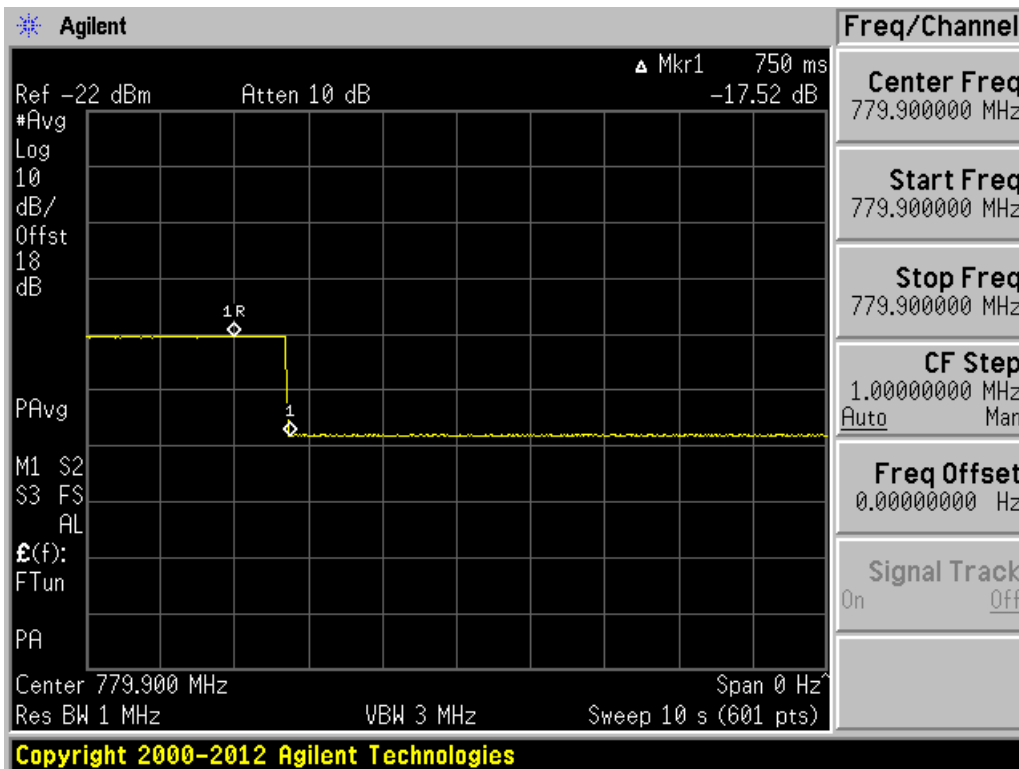
3.7.3 Variable uplink noise timing test results.

25

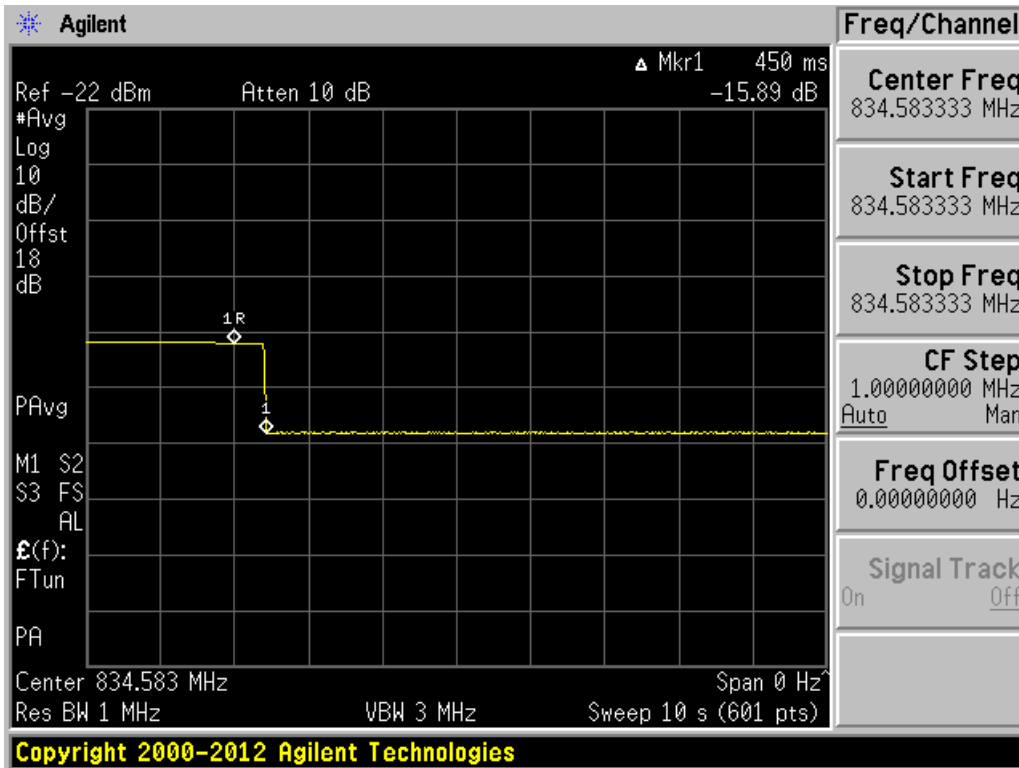
Variable uplink noise timing				
Uplink Band	Time Measured	Limit (seconds)		Result
		Mobile	Fixed	
12 & 17	0.48	1.0	3.0	Pass
13	0.75	1.0	3.0	Pass
5	0.45	1.0	3.0	Pass
2 & 25	0.88	1.0	3.0	Pass
4	0.75	1.0	3.0	Pass



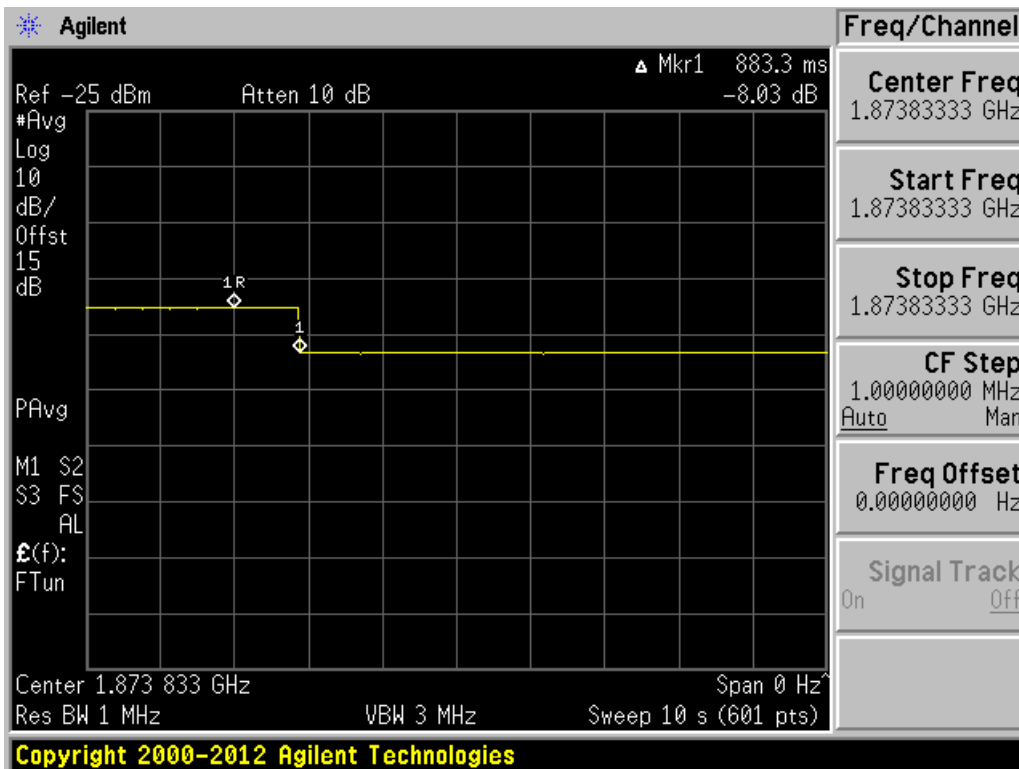
Uplink. Band 12 & 17



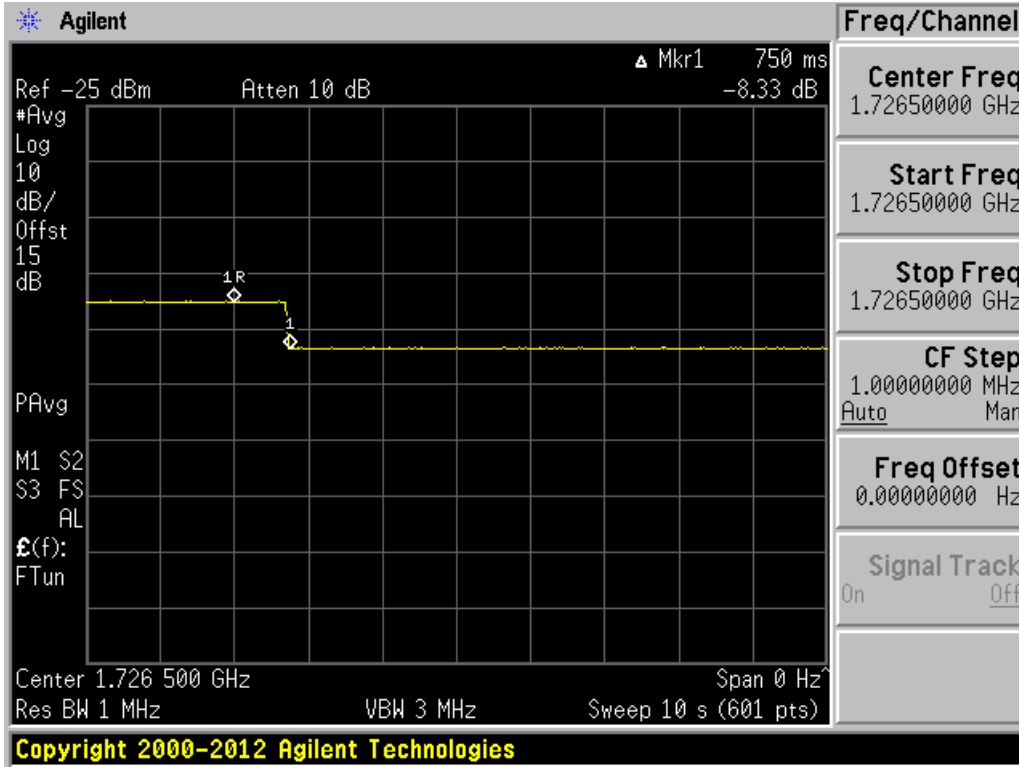
Uplink. Band 13



Uplink, Band 5



Uplink, Band 2 & 25



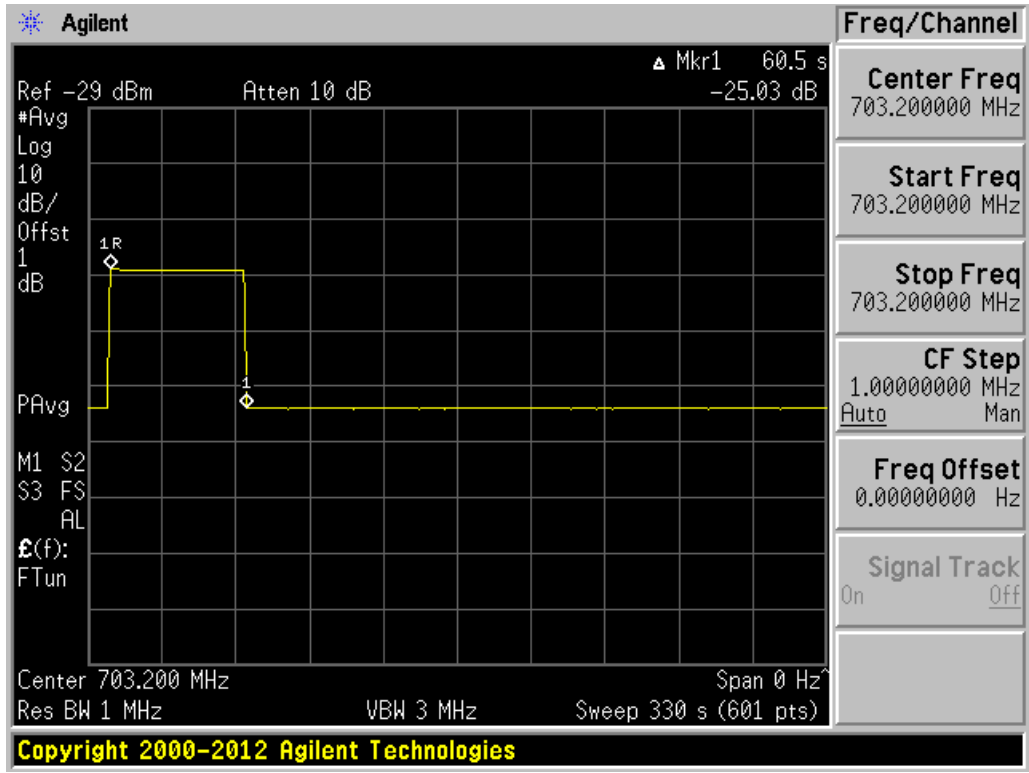
Uplink, Band 4

3.8 Uplink Inactivity Test

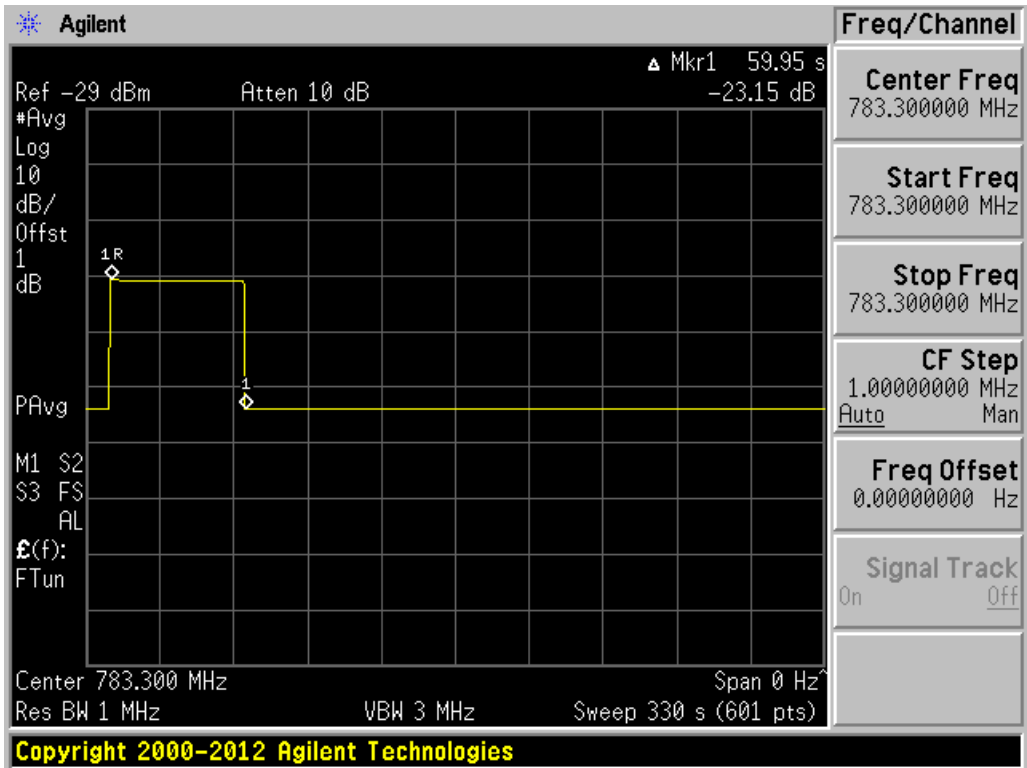
This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.8

This comply with FCC Rule: § 20.21(e)(8)(i)(I) Uplink Inactivity.

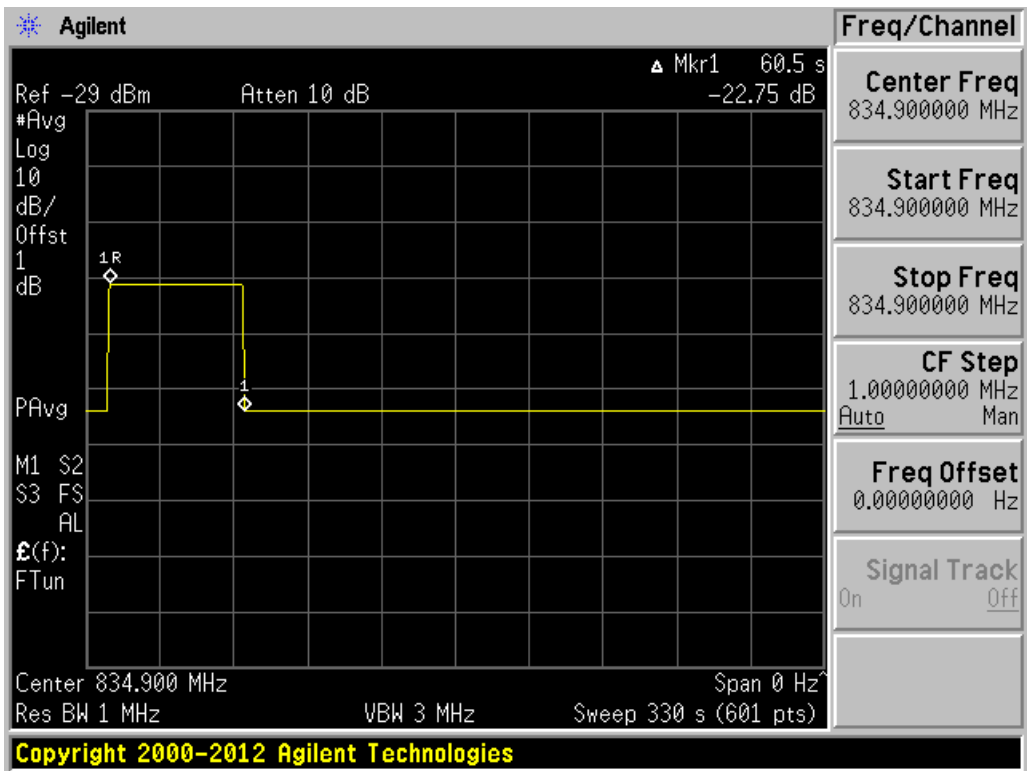
3.8.1 Uplink inactivity test results



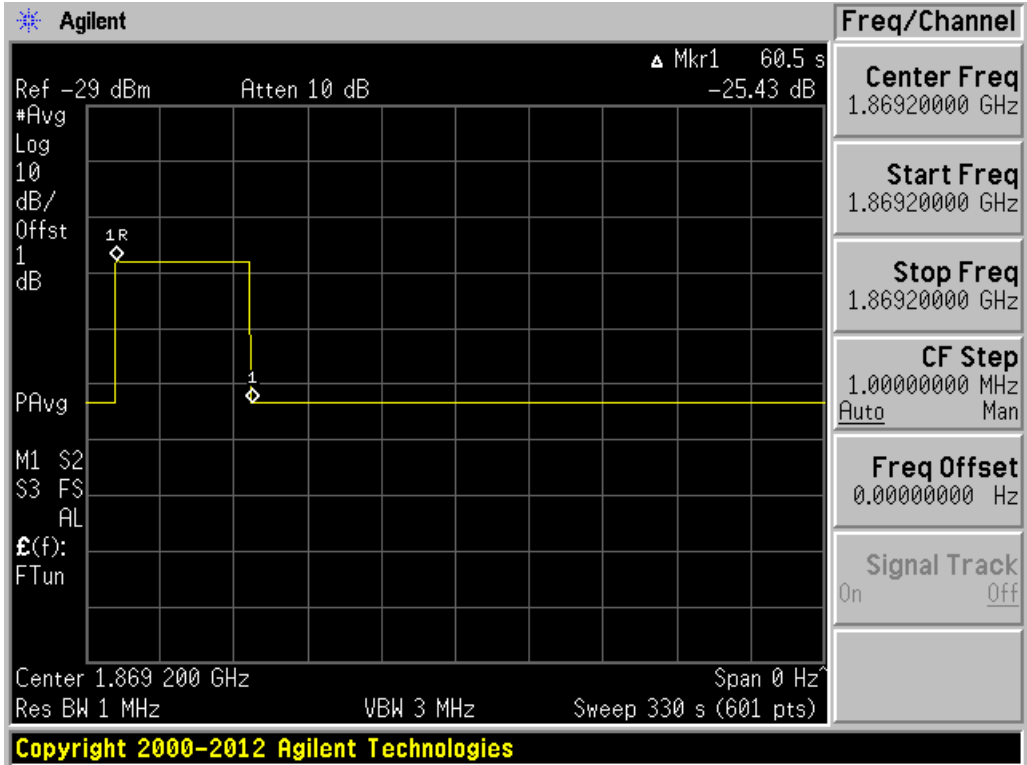
Tx Inactivity. Band 12 & 17



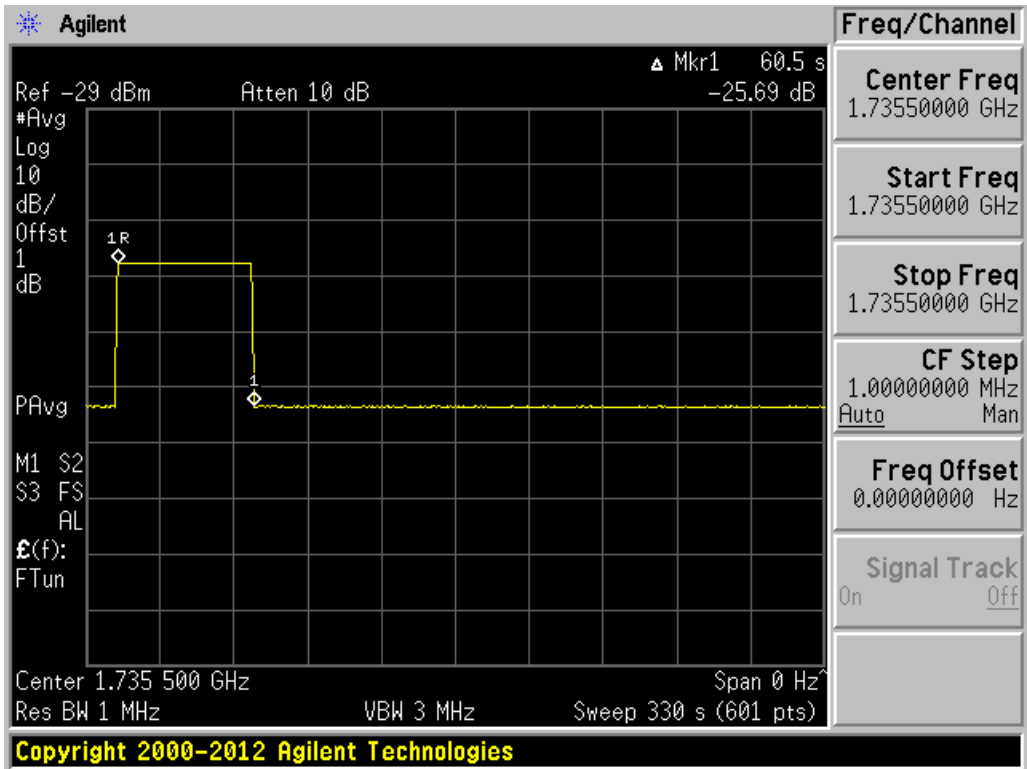
Tx Inactivity. Band 13



Tx Inactivity. Band 5



Tx Inactivity. Band 2 & 25



Tx Inactivity. Band 4

3.9 Variable Booster Gain Test

This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.9

This comply with FCC Rule: § 20.21(e)(8)(i)(C)(1) Booster Gain Limits and § 20.21(e)(8)(i)(H) Transmit Power Off Mode

3.9.1 Variable booster gain test results

Table 26: Band 12 & 17

Uplink Variable Gain 703.2 MHz						
RSSI (dBm)	MSCL (dB)	P in (dBm)	P out (dBm)	Gain (dB)	Max Gain Limit	
					Mobile	Fixed
-90	30.0	-22.7	21.9	44.6	50.0	63.5
-70	30.0	-22.7	21.9	44.6	50.0	63.5
-60	30.0	-22.7	21.9	44.6	50.0	56.0
-50	30.0	-22.7	19.3	42.0	46.0	46.0
-40	30.0	-22.7	10.7	33.4	36.0	36.0
-30	30.0	-22.7	1.9	24.6	26.0	26.0

Table 27: Band 13

Uplink Variable Gain 783.4 MHz						
RSSI (dBm)	MSCL (dB)	P in (dBm)	P out (dBm)	Gain (dB)	Max Gain Limit	
					Mobile	Fixed
-90	30.0	-22.9	20.1	43.0	50.0	64.4
-70	30.0	-22.9	20.1	43.0	50.0	64.4
-60	30.0	-22.9	20.0	42.9	50.0	56.0
-50	30.0	-22.9	18.5	41.4	46.0	46.0
-40	30.0	-22.9	8.5	31.4	36.0	36.0
-30	30.0	-22.9	2.3	25.2	26.0	26.0

Table 28: Band 5

Uplink Variable Gain 834.9 MHz						
RSSI (dBm)	MSCL (dB)	P in (dBm)	P out (dBm)	Gain (dB)	Max Gain Limit	
					Mobile	Fixed
-90	30.0	-23.7	20.5	44.2	50.0	64.9
-70	30.0	-23.7	20.6	44.3	50.0	64.9
-60	30.0	-23.7	20.5	44.2	50.0	56.0
-50	30.0	-23.7	20.4	44.1	46.0	46.0
-40	30.0	-23.7	11.5	35.2	36.0	36.0
-30	30.0	-23.7	2.2	25.9	26.0	26.0

Table 29: Band 2 & 25

Uplink Variable Gain 1869.2 MHz						
RSSI (dBm)	MSCL (dB)	P in (dBm)	P out (dBm)	Gain (dB)	Max Gain Limit	
					Mobile	Fixed
-90	30.0	-24.4	20.8	45.2	50.0	72.0
-70	30.0	-24.4	20.7	45.1	50.0	66.0
-60	30.0	-24.4	20.8	45.2	50.0	56.0
-50	30.0	-24.4	17.8	42.2	46.0	46.0
-40	30.0	-24.4	7.5	31.9	36.0	36.0
-30	30.0	-24.4	-2.3	22.1	26.0	26.0

Table 30: Band 4

Uplink Variable Gain 1735.5 MHz						
RSSI (dBm)	MSCL (dB)	P in (dBm)	P out (dBm)	Gain (dB)	Max Gain Limit	
					Mobile	Fixed
-90	30.0	-22.7	21.9	44.6	50.0	71.3
-70	30.0	-22.7	21.9	44.6	50.0	66.0
-60	30.0	-22.7	21.8	44.5	50.0	56.0
-50	30.0	-22.7	22.0	44.7	46.0	46.0
-40	30.0	-22.7	12.8	35.5	36.0	36.0
-30	30.0	-22.7	3.2	25.9	26.0	26.0

Note: RSSI dependent area shown in gray.

3.9.2 Variable uplink gain timing test results

Table 31

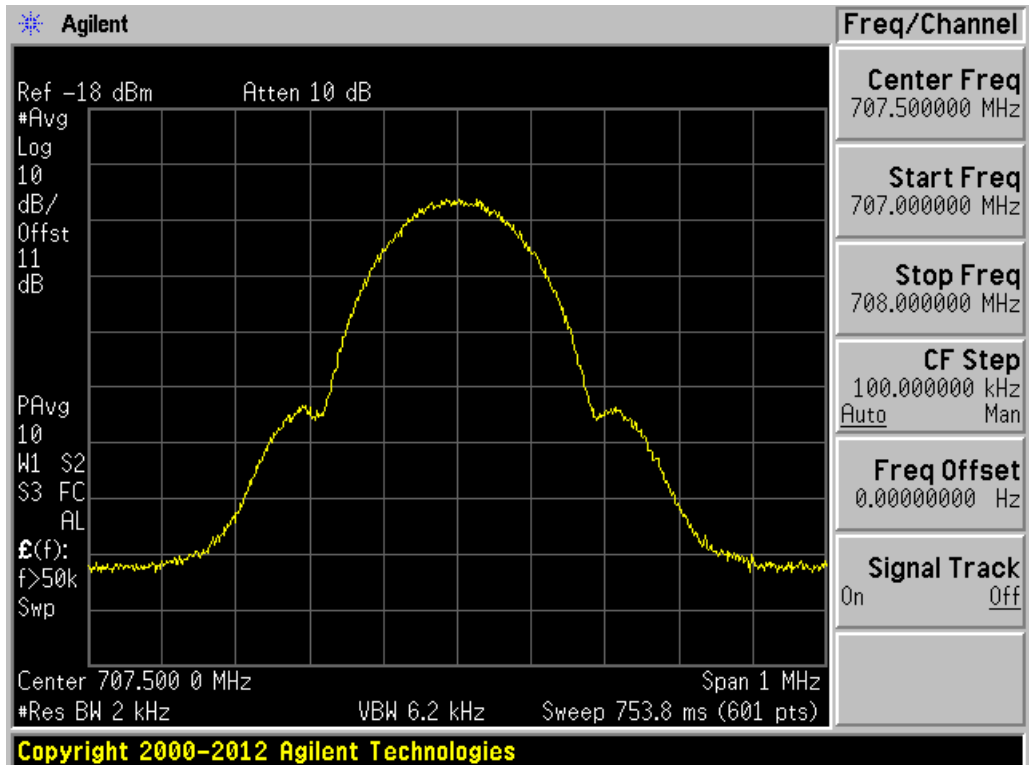
Operational Band	Variable Gain Timing			Measured (s)	Result
	Max Rule (s)				
	Mobile	Fixed			
Band 12 & 17 TX	1.0	3.0	0.03	Pass	
Band 13 TX	1.0	3.0	0.03	Pass	
Band 5 TX	1.0	3.0	0.03	Pass	
Band 2 & 25 TX	1.0	3.0	0.03	Pass	
Band 4 TX	1.0	3.0	0.03	Pass	

3.10 Occupied Bandwidth Test

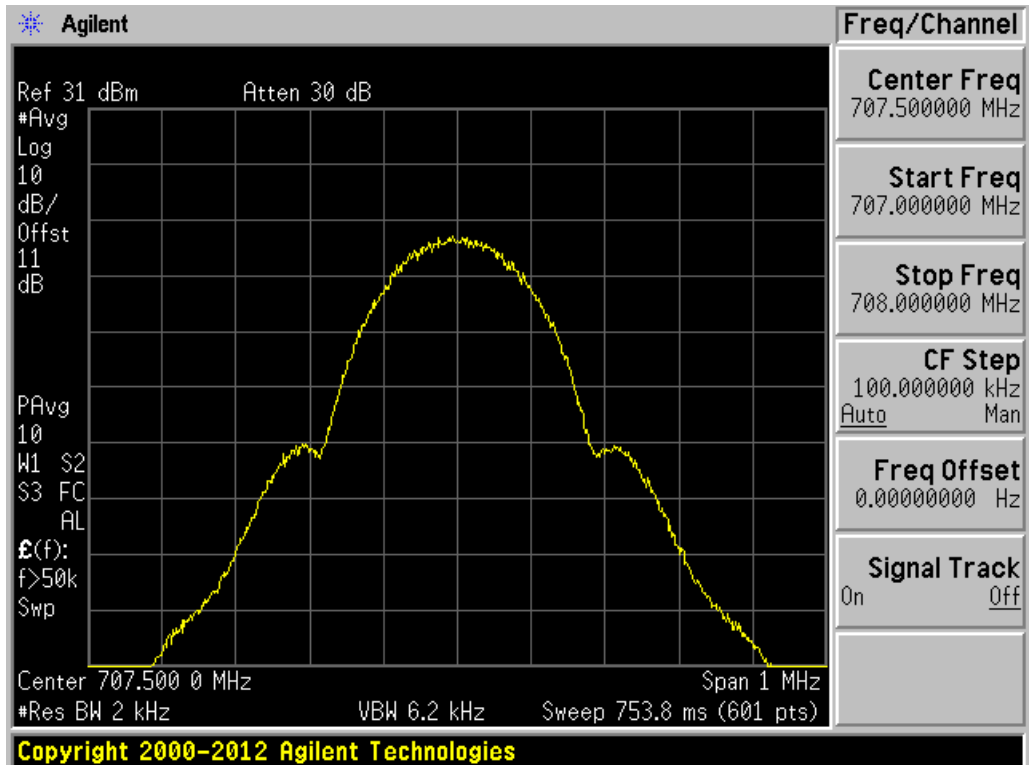
This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.10

This complies with FCC Rule: § 2.1049 Measurements required: Occupied bandwidth

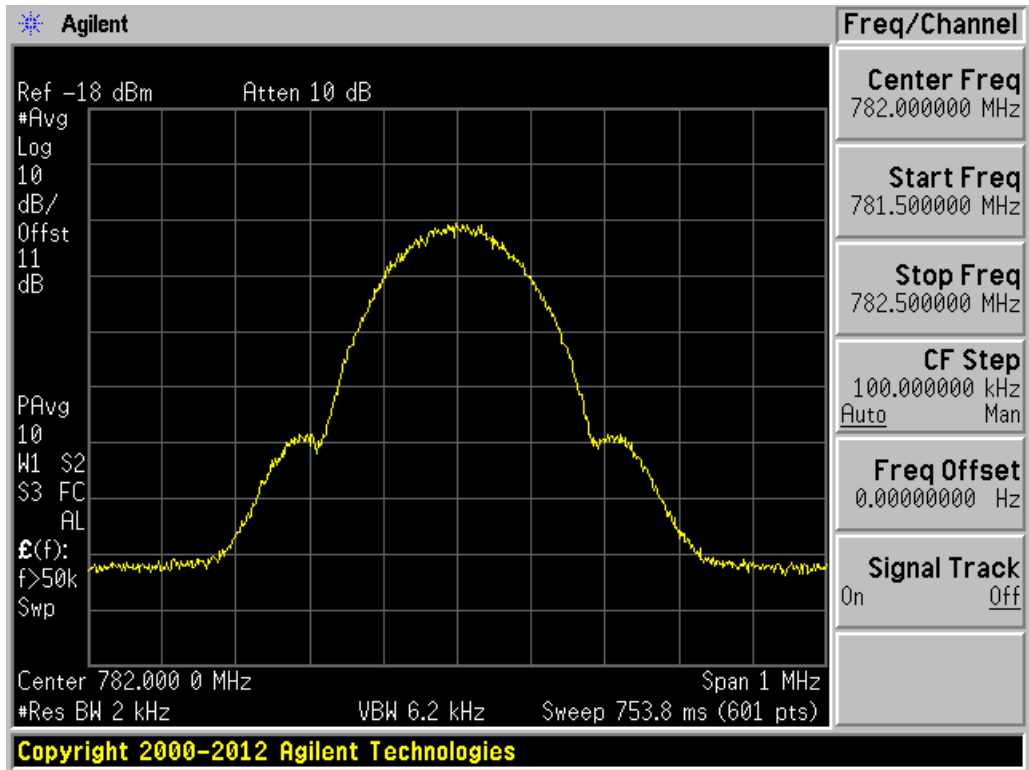
3.10.1 Occupied bandwidth Test Results.



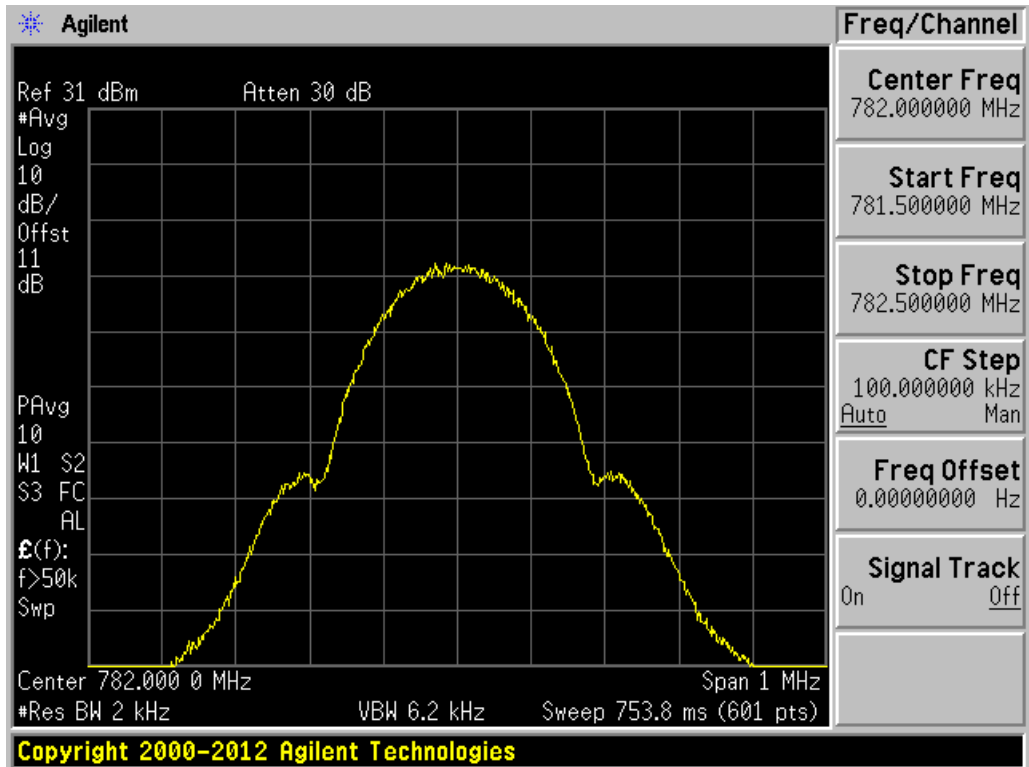
Uplink, Band 12 & 17, GSM Input.



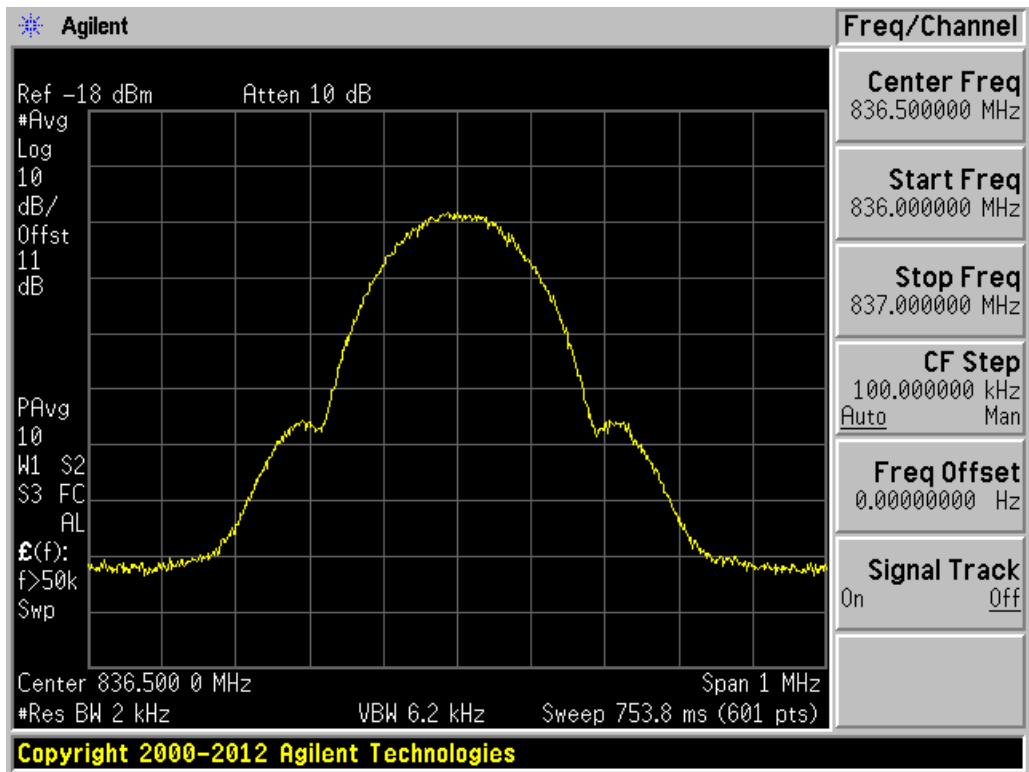
Uplink, Band 12 & 17, GSM Output.



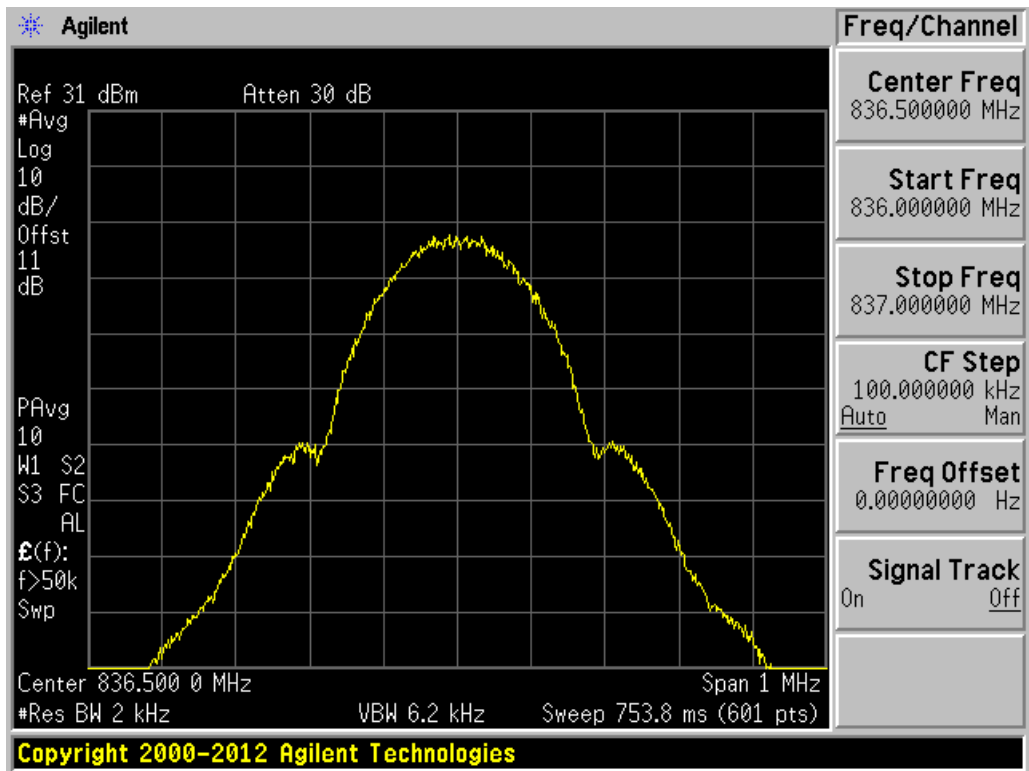
Uplink, Band 13, GSM Input.



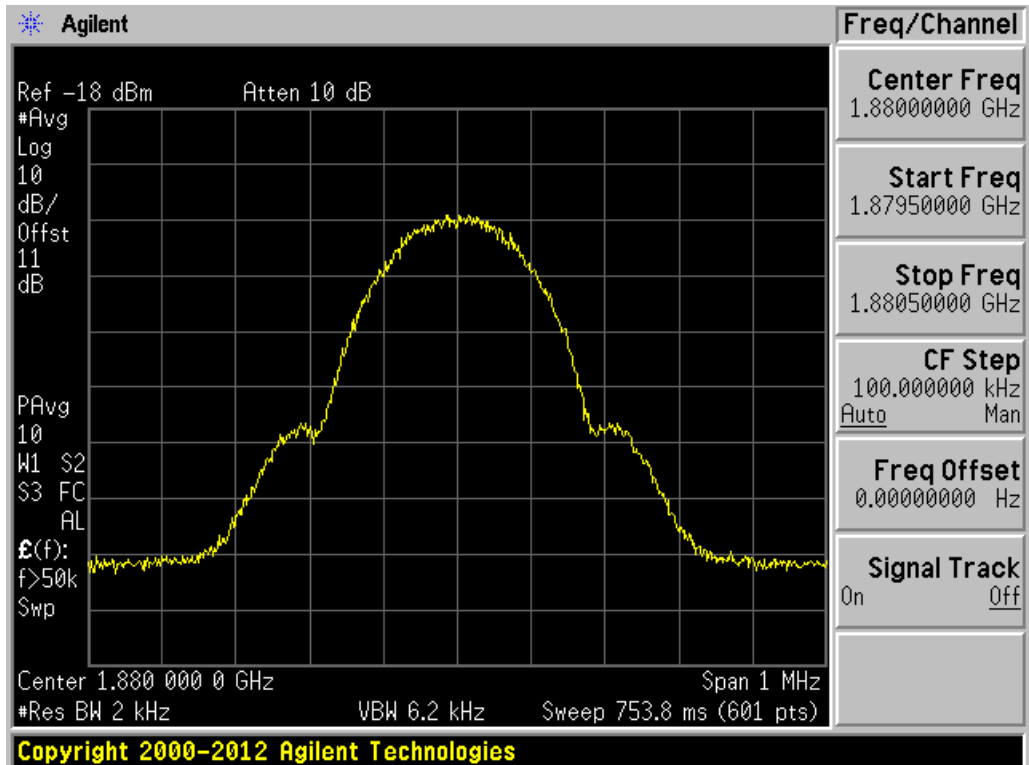
Uplink, Band 13, GSM Output.



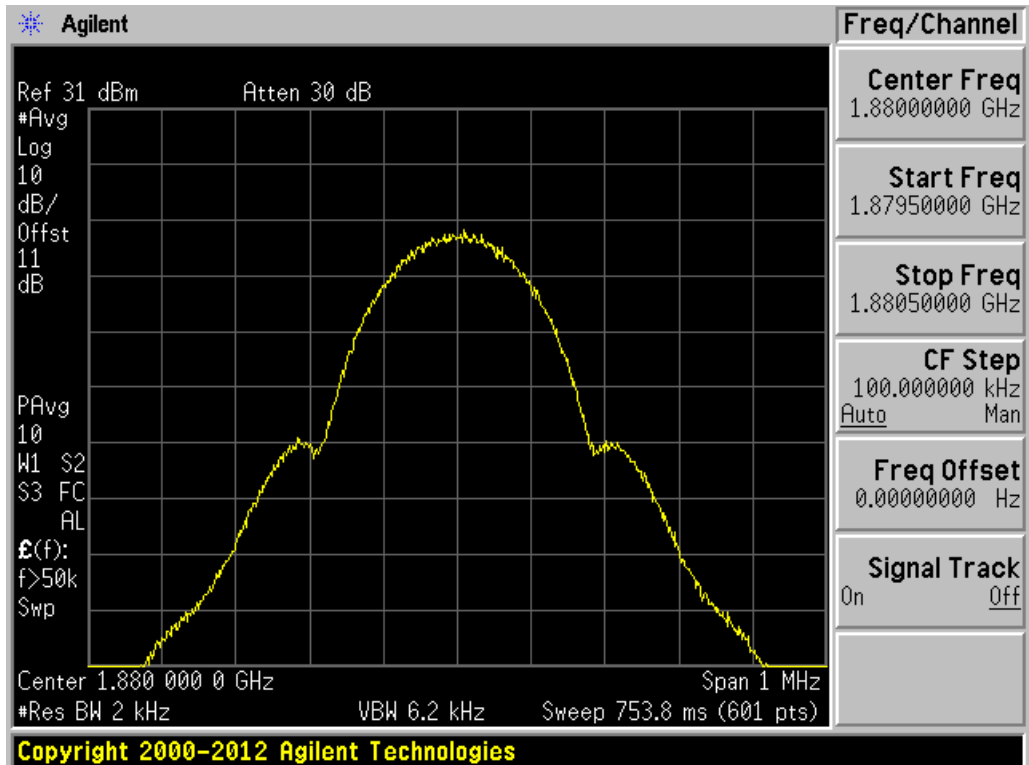
Uplink, Band 5, GSM Input.



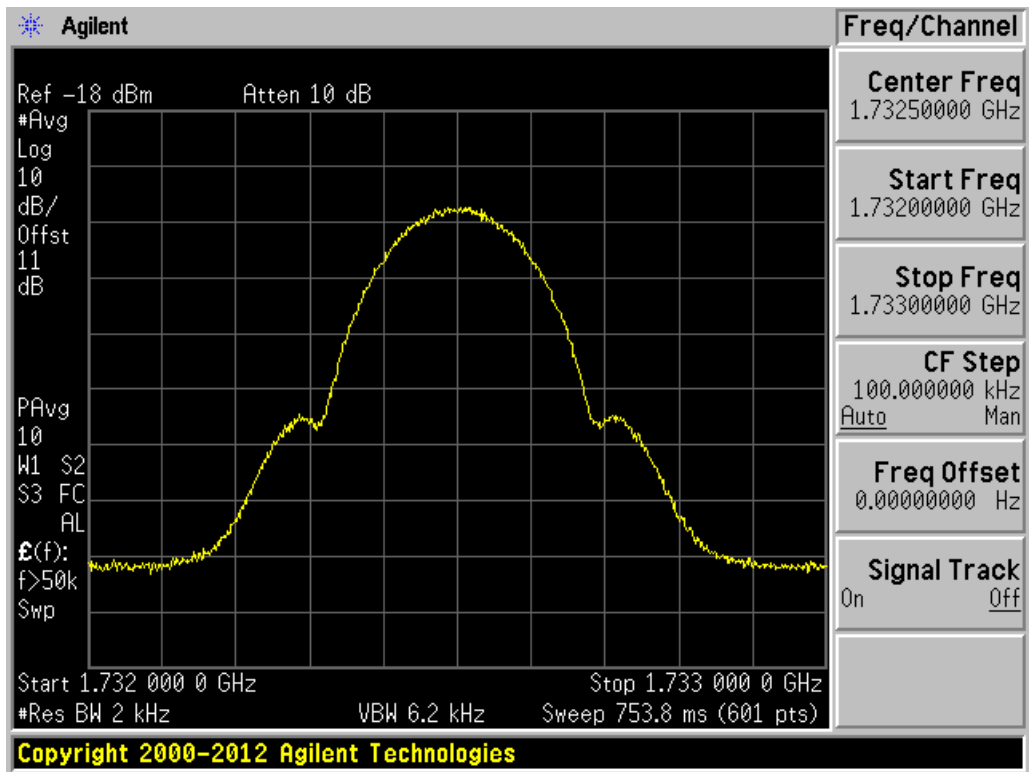
Uplink, Band 5, GSM Output.



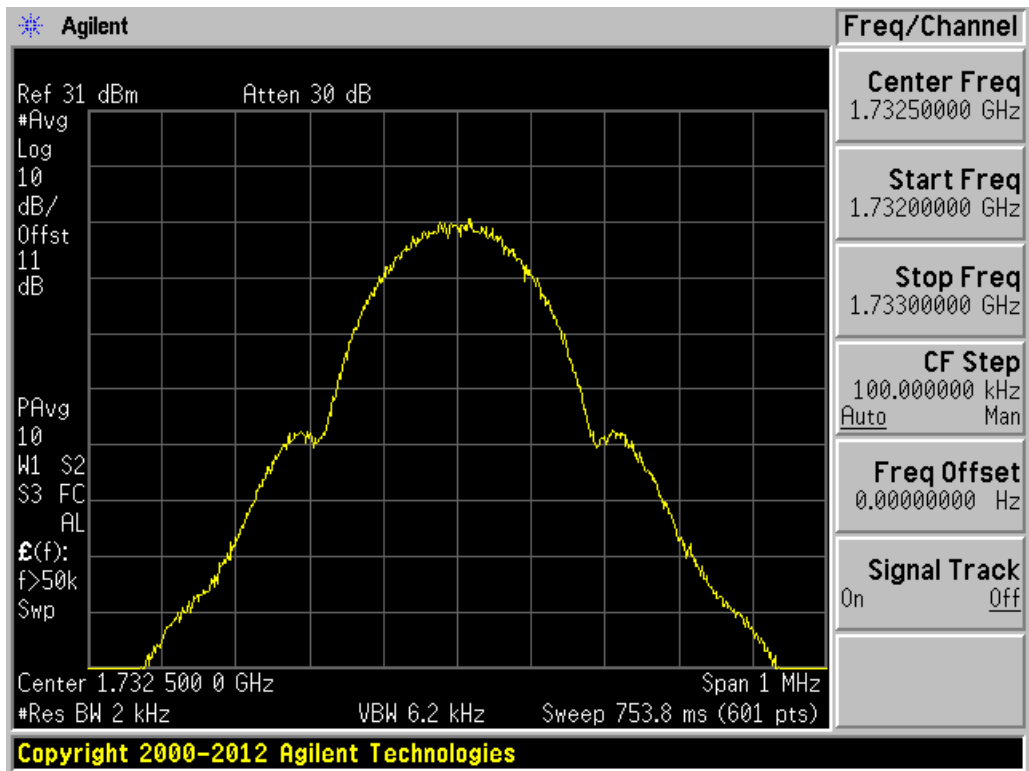
Uplink, Band 2 & 25. GSM Input.



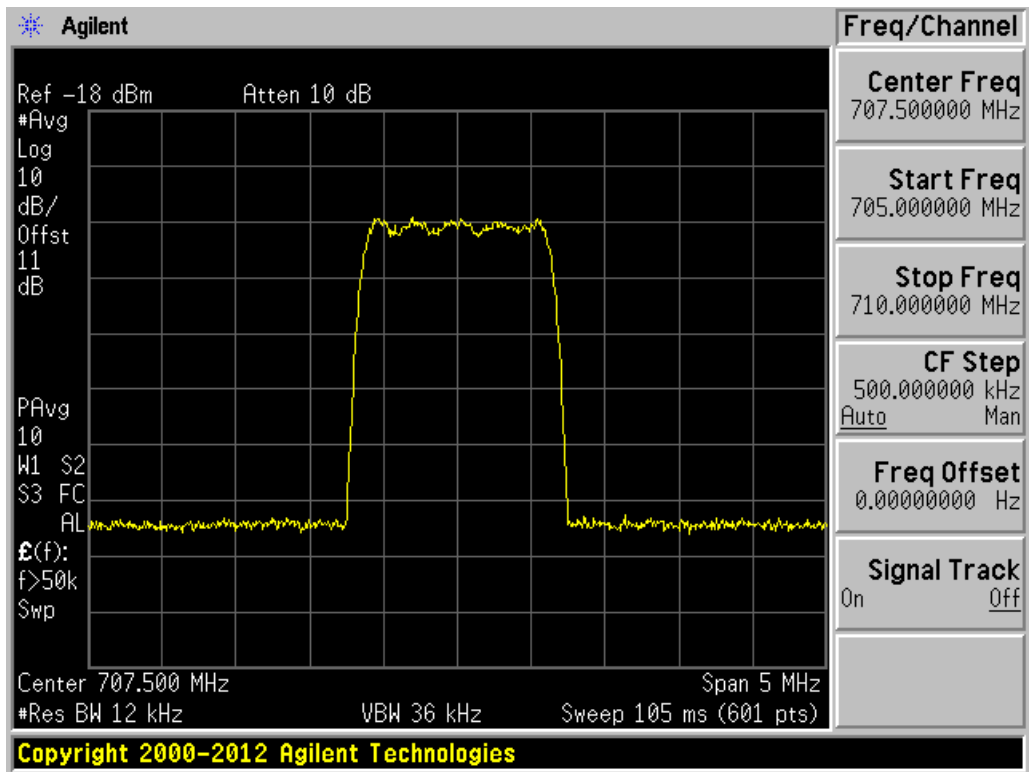
Uplink, Band 2 & 25. GSM Output.



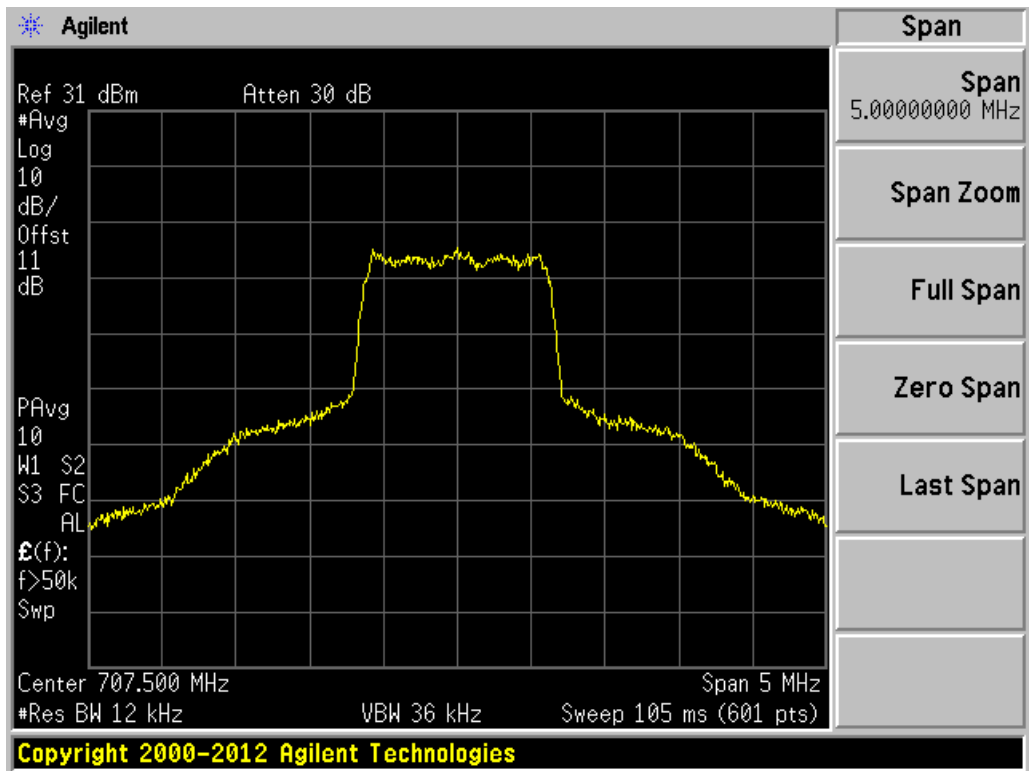
Uplink, Band 4, GSM Input.



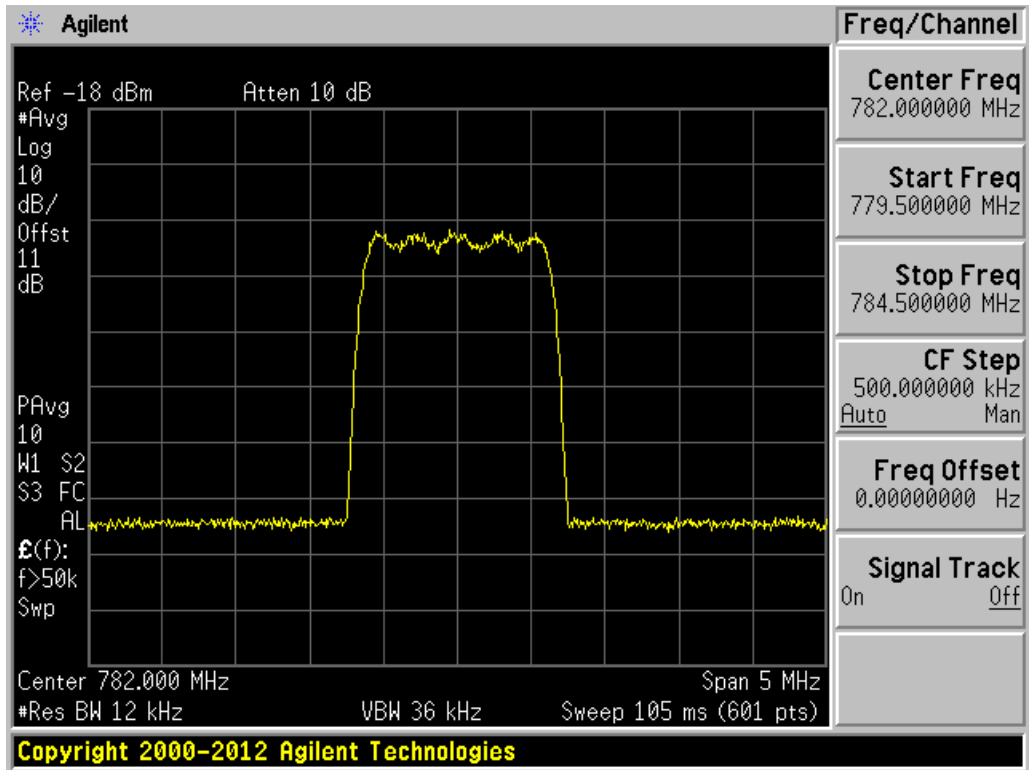
Uplink, Band 4, GSM Output.



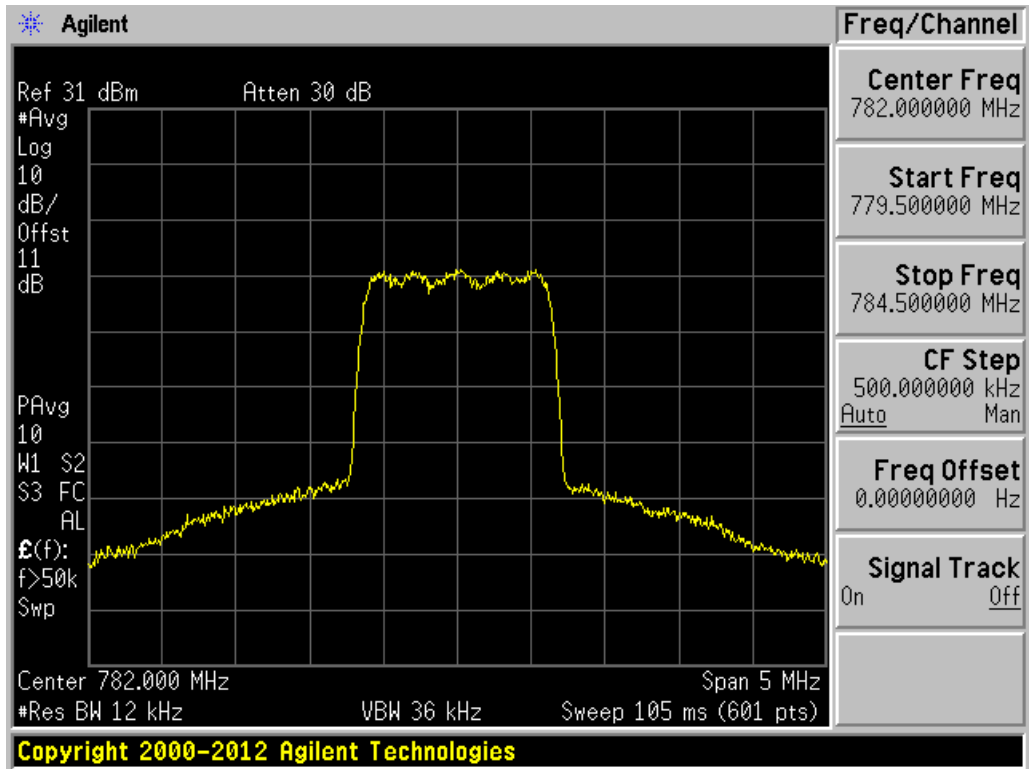
Uplink, Band 12 & 17. CDMA Input.



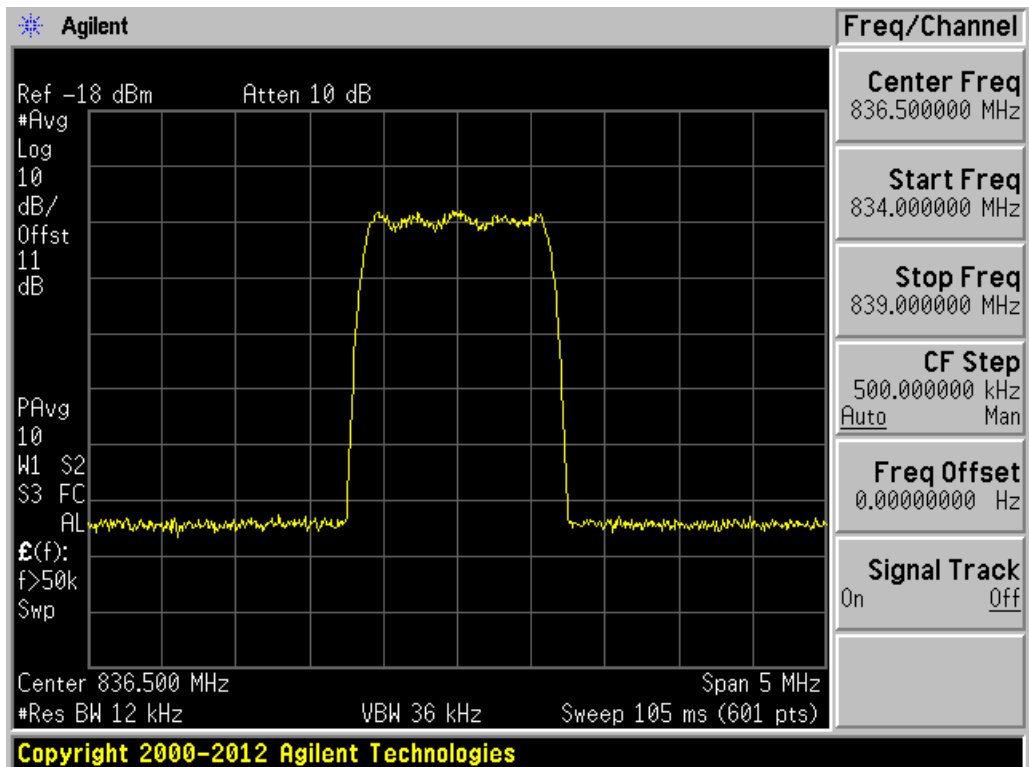
Uplink, Band 12 & 17. CDMA Output.



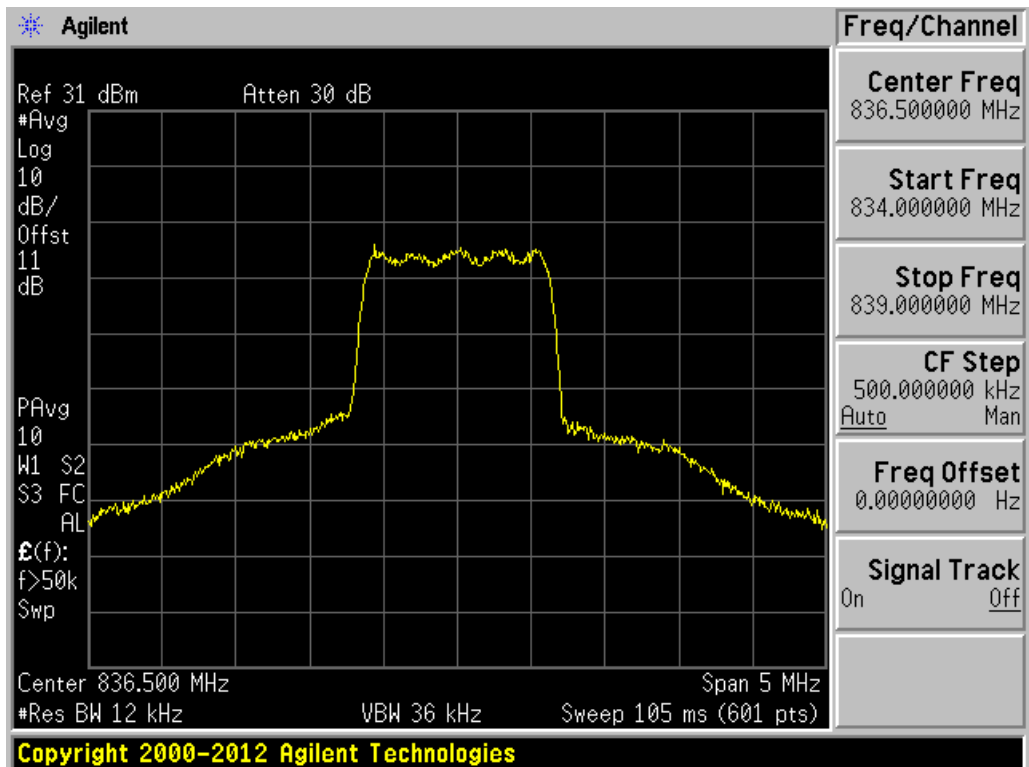
Uplink, Band 13, CDMA Input.



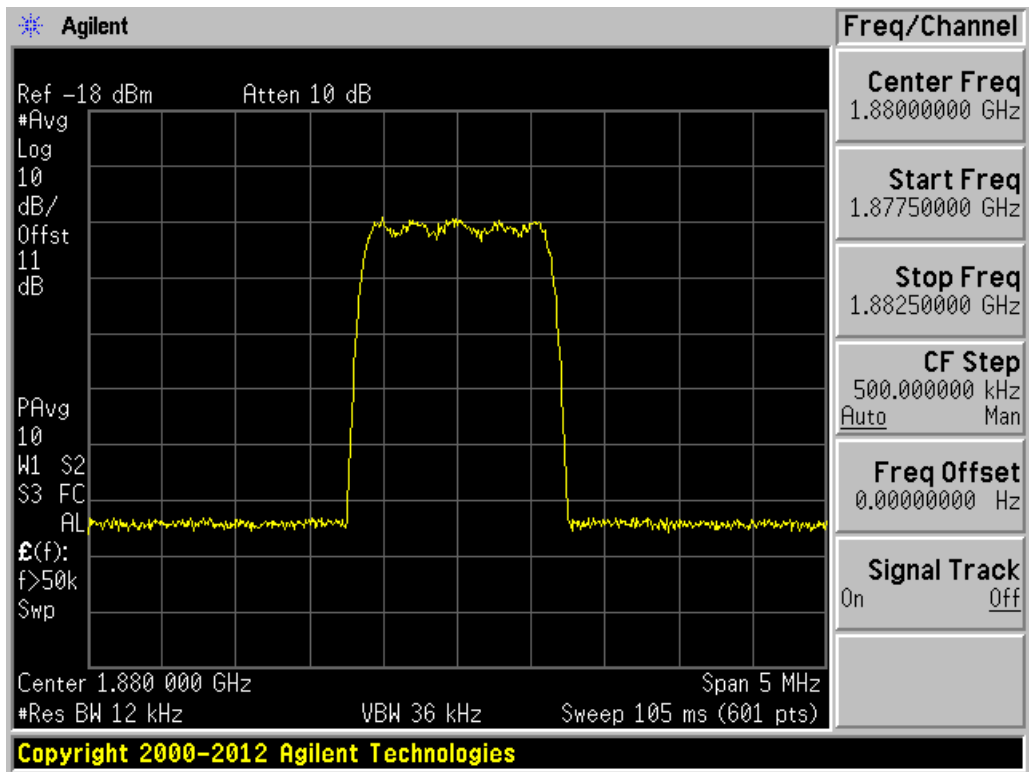
Uplink, Band 13, CDMA Output.



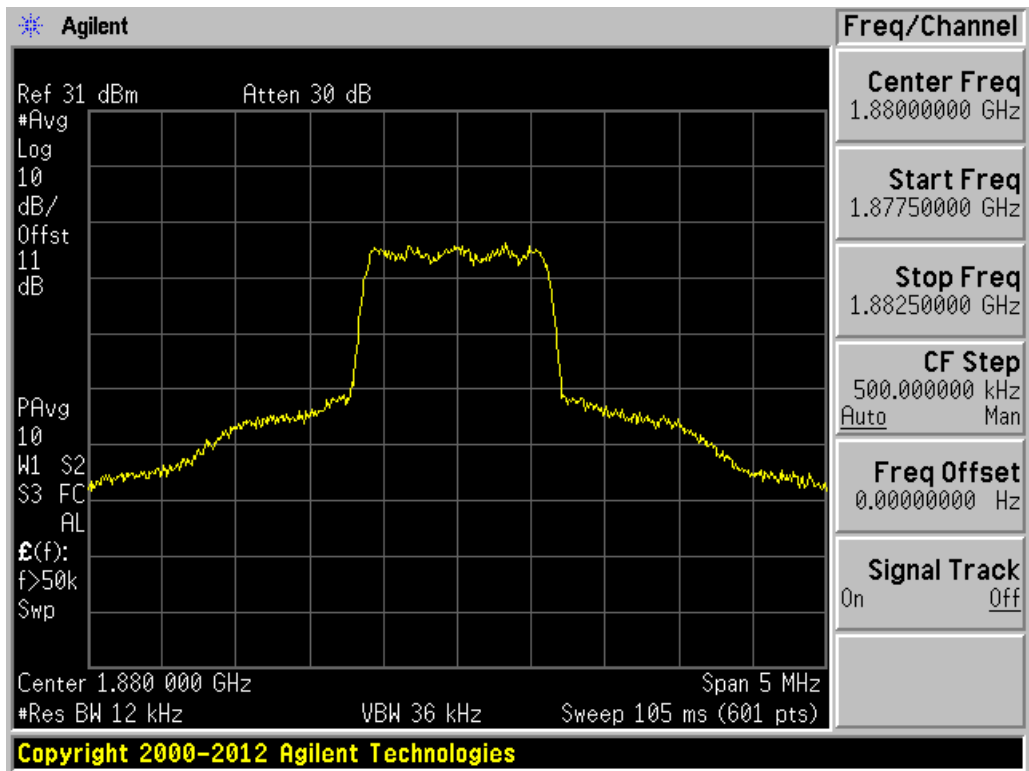
Uplink, Band 5, CDMA Input.



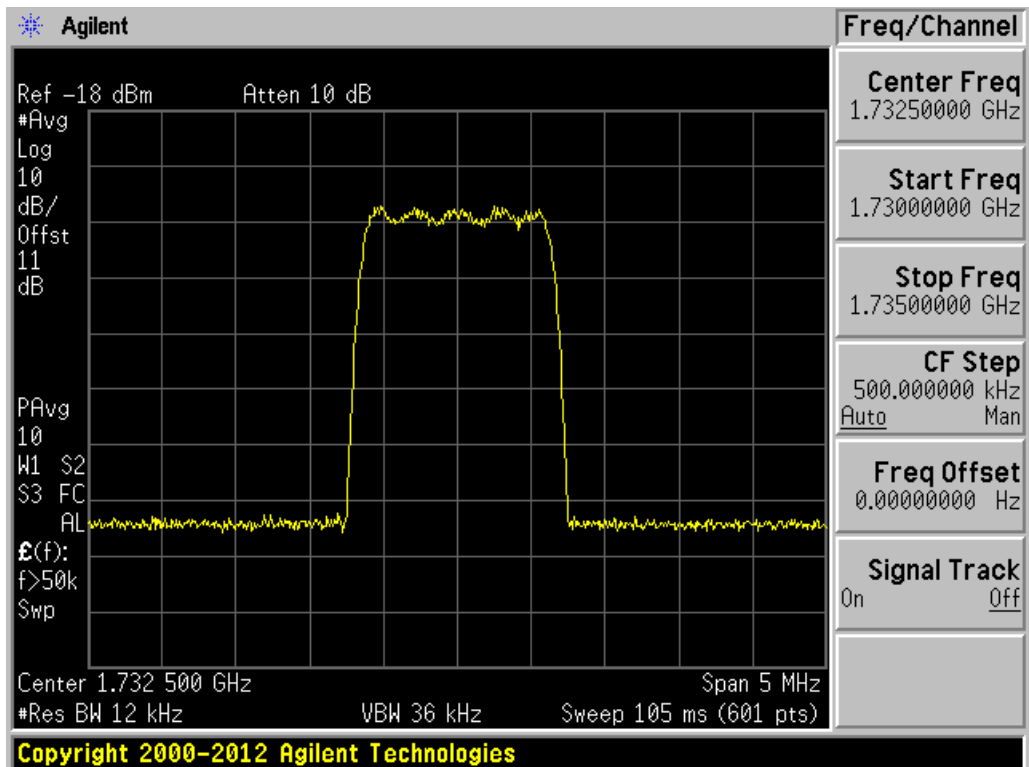
Uplink, Band 5, CDMA Output.



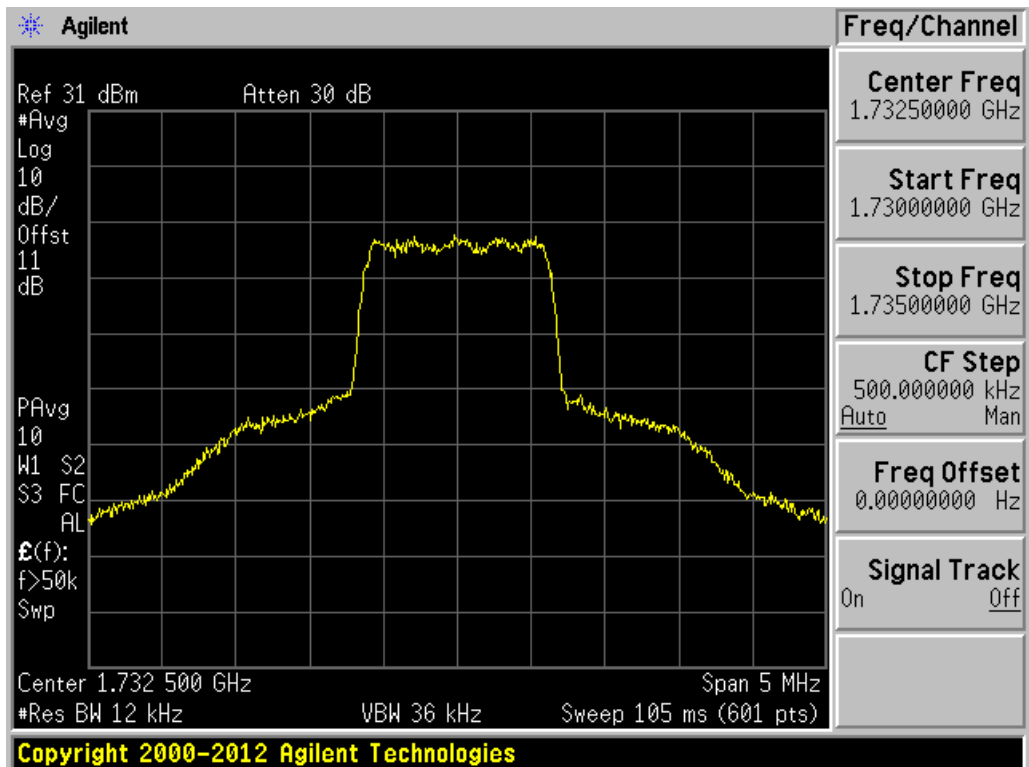
Uplink, Band 2 & 25. CDMA Input.



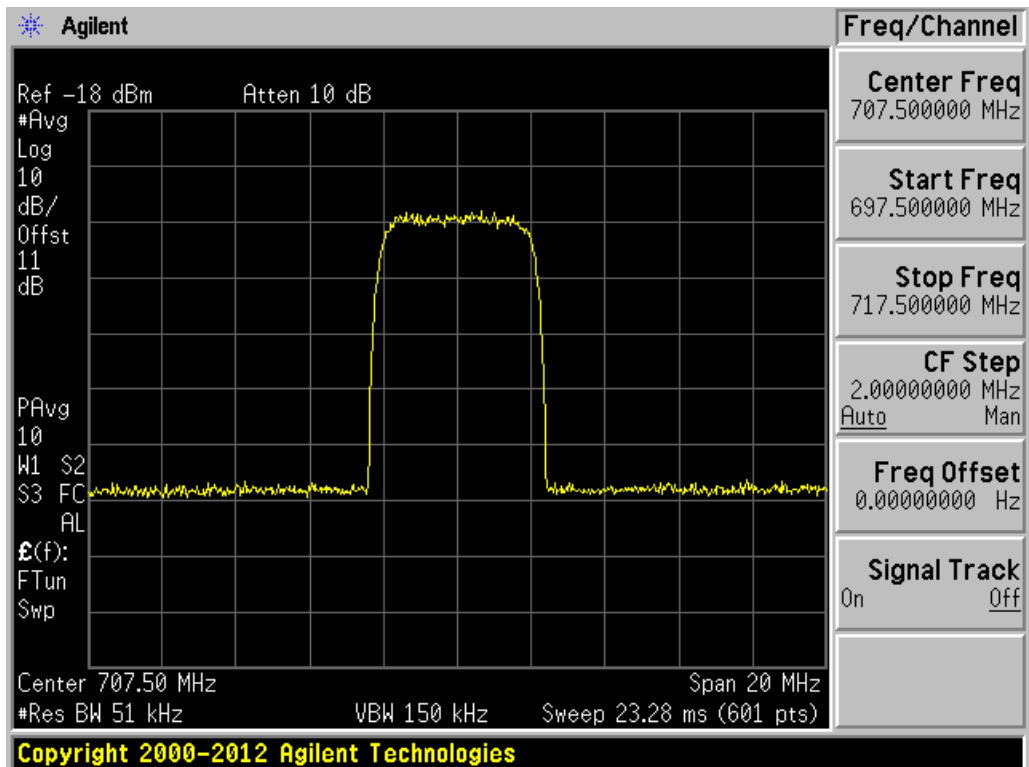
Uplink, Band 2 & 25. CDMA Output.



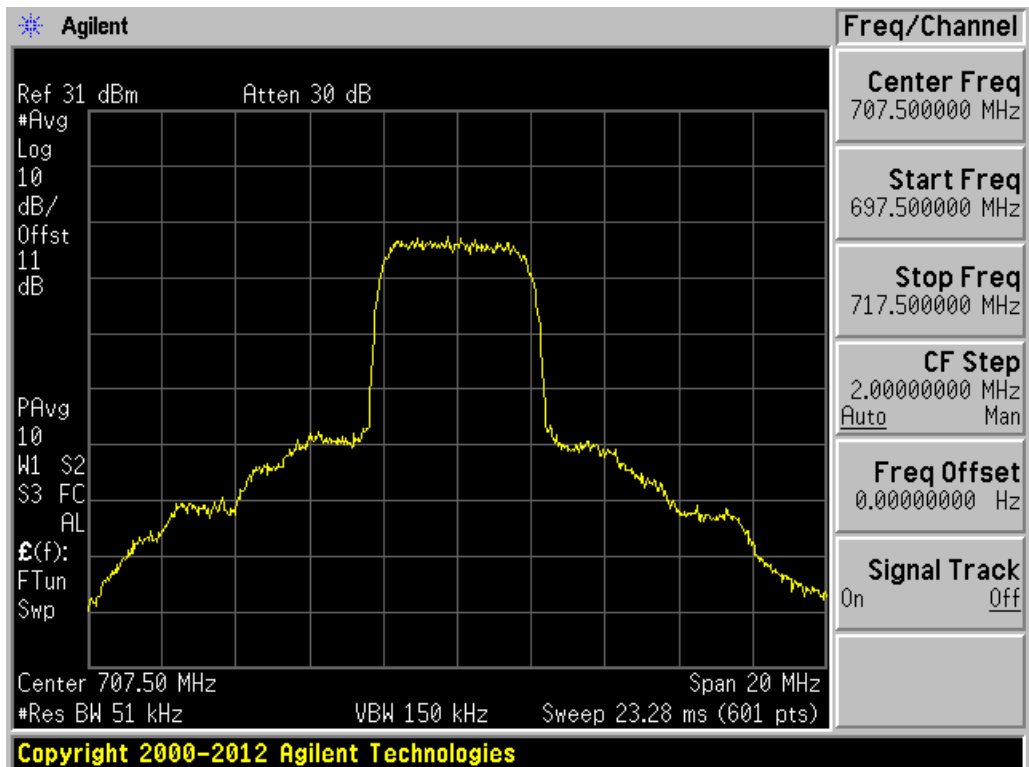
Uplink, Band 4, CDMA Input.



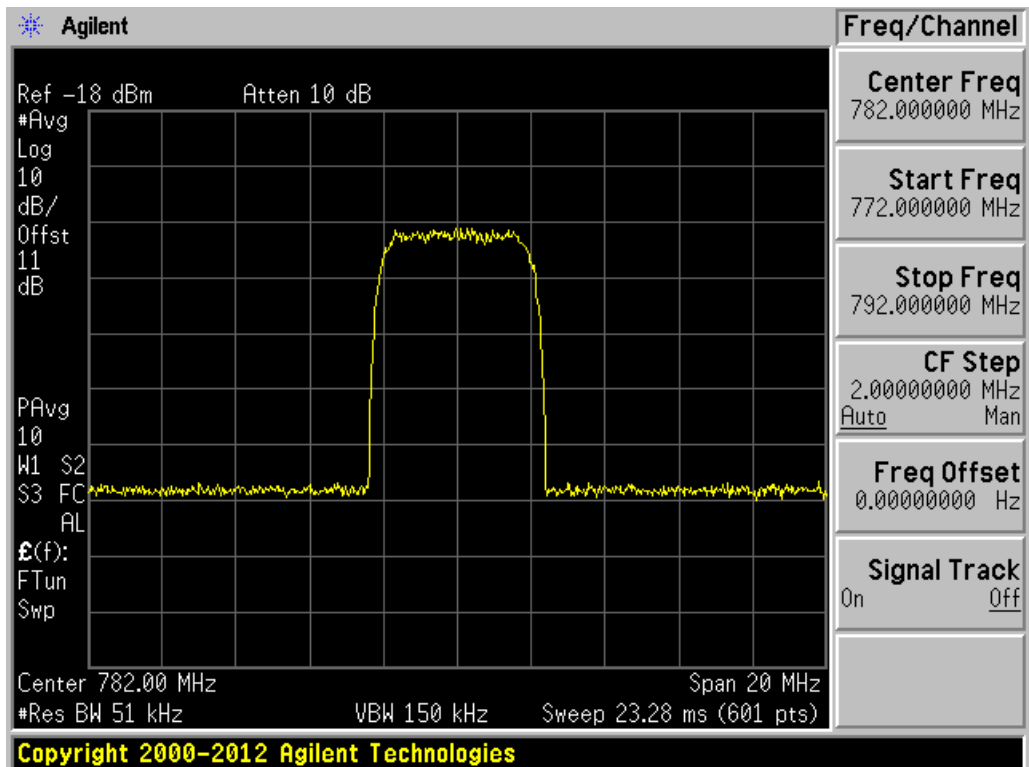
Uplink, Band 4, CDMA Output.



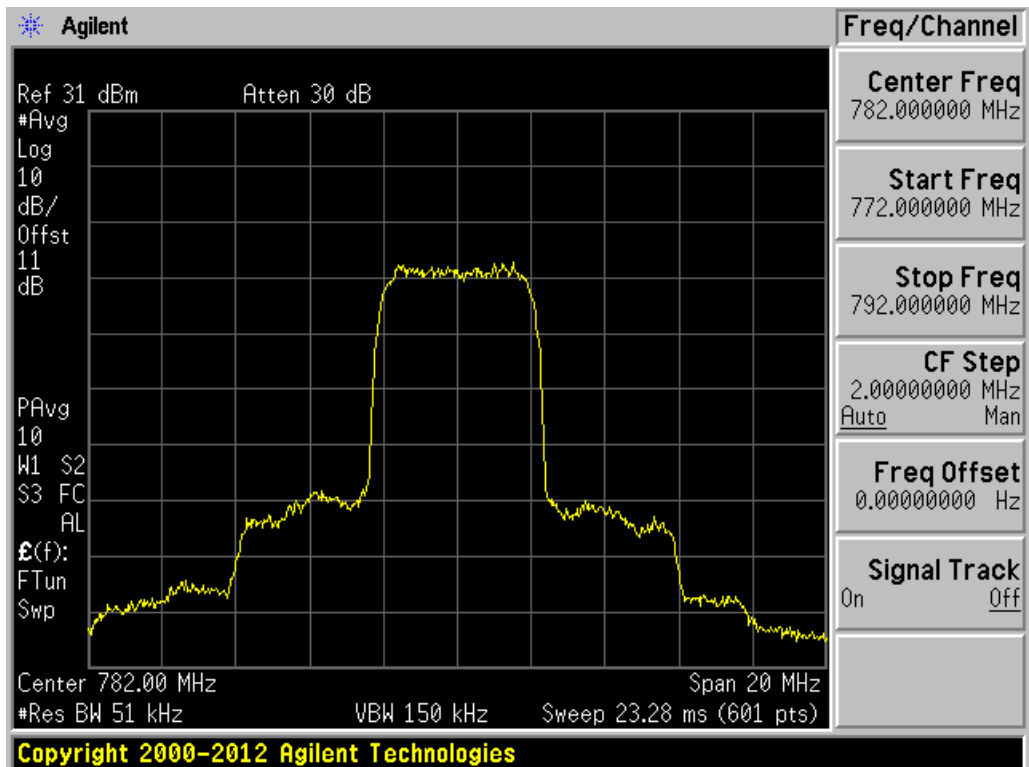
Uplink, Band 12 & 17, LTE/WCDMA Input.



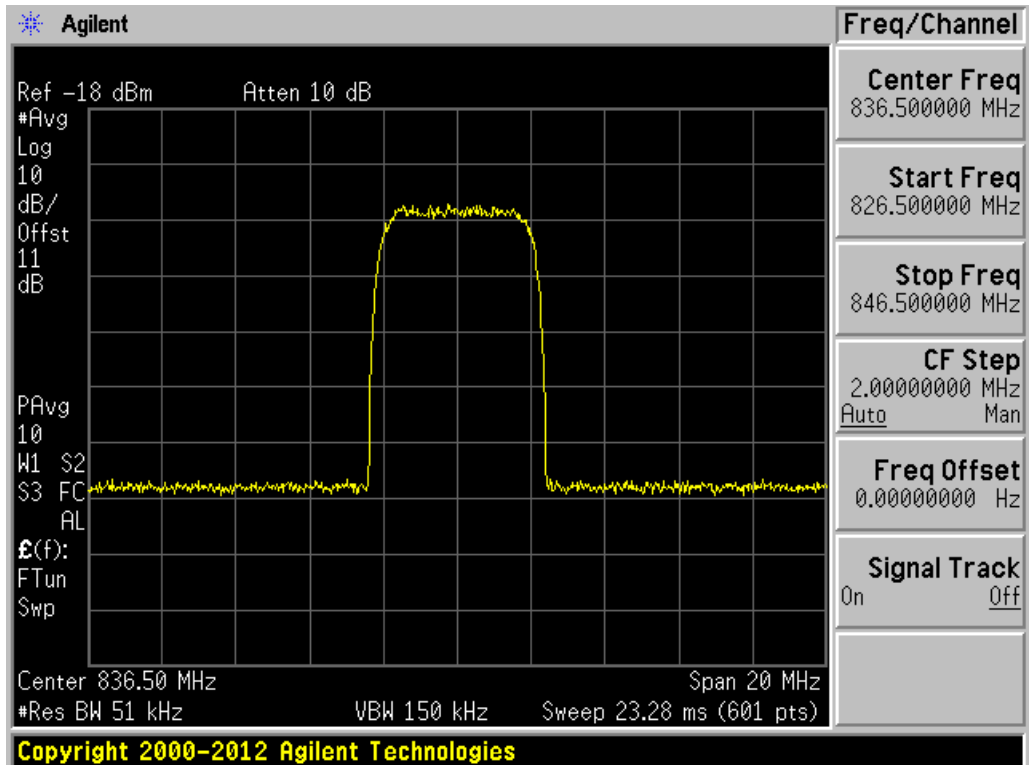
Uplink, Band 12 & 17, LTE/WCDMA Output.



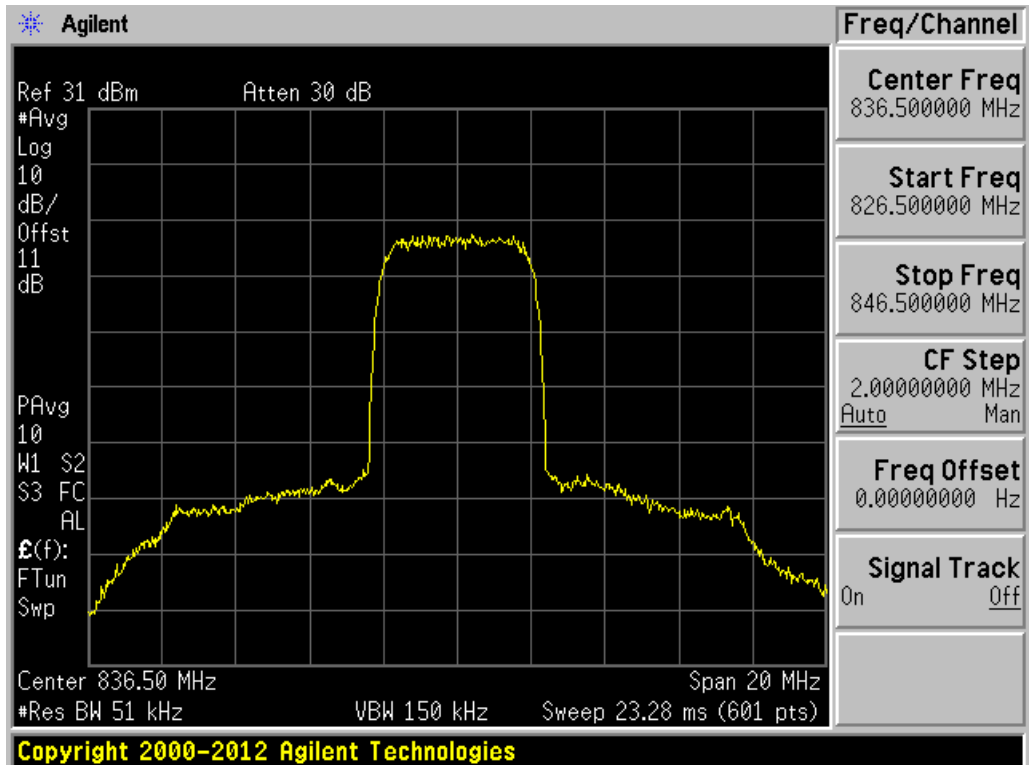
Uplink, Band 13, LTE/WCDMA Input.



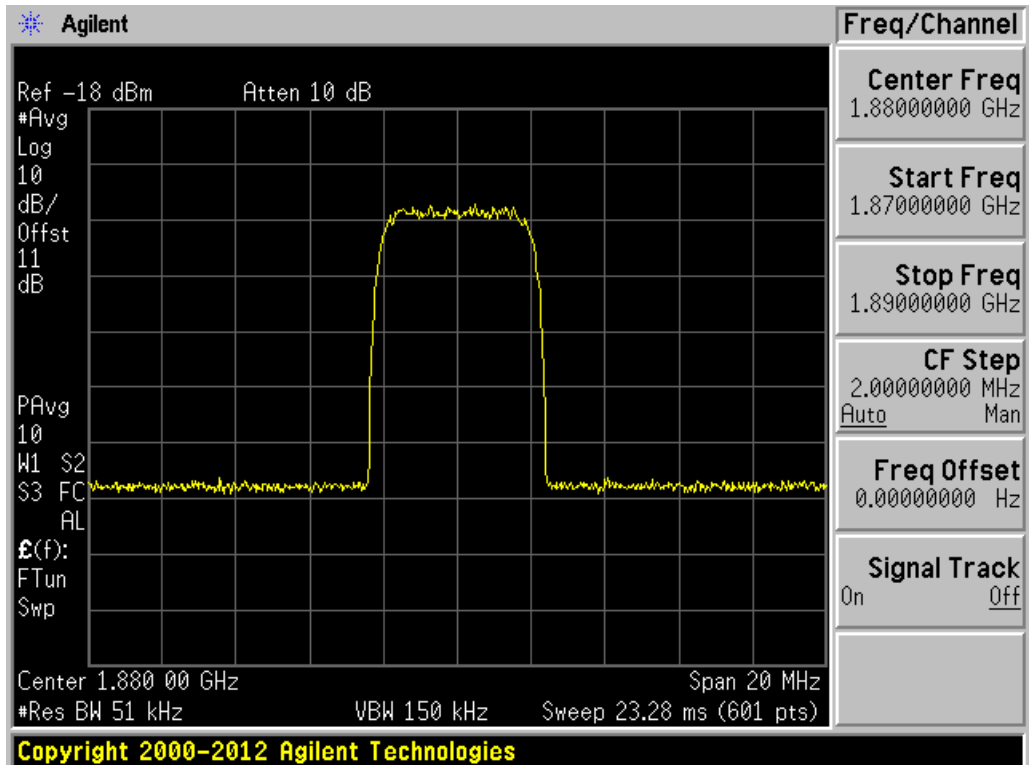
Uplink, Band 13, LTE/WCDMA Output.



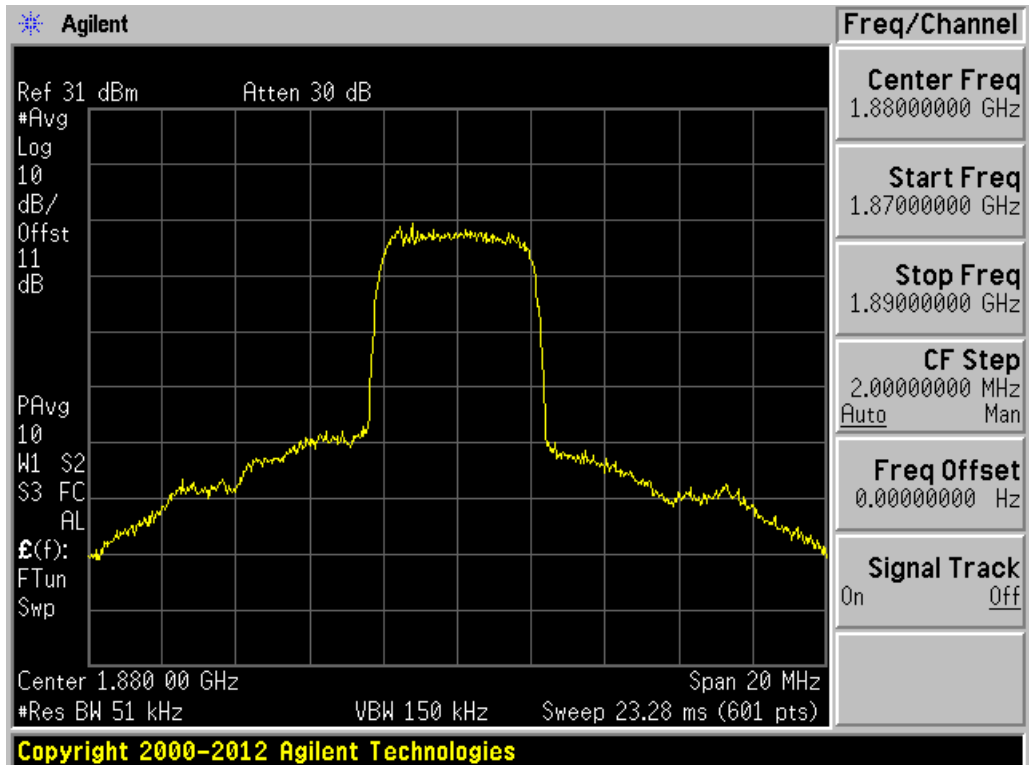
Uplink, Band 5, LTE/WCDMA Input.



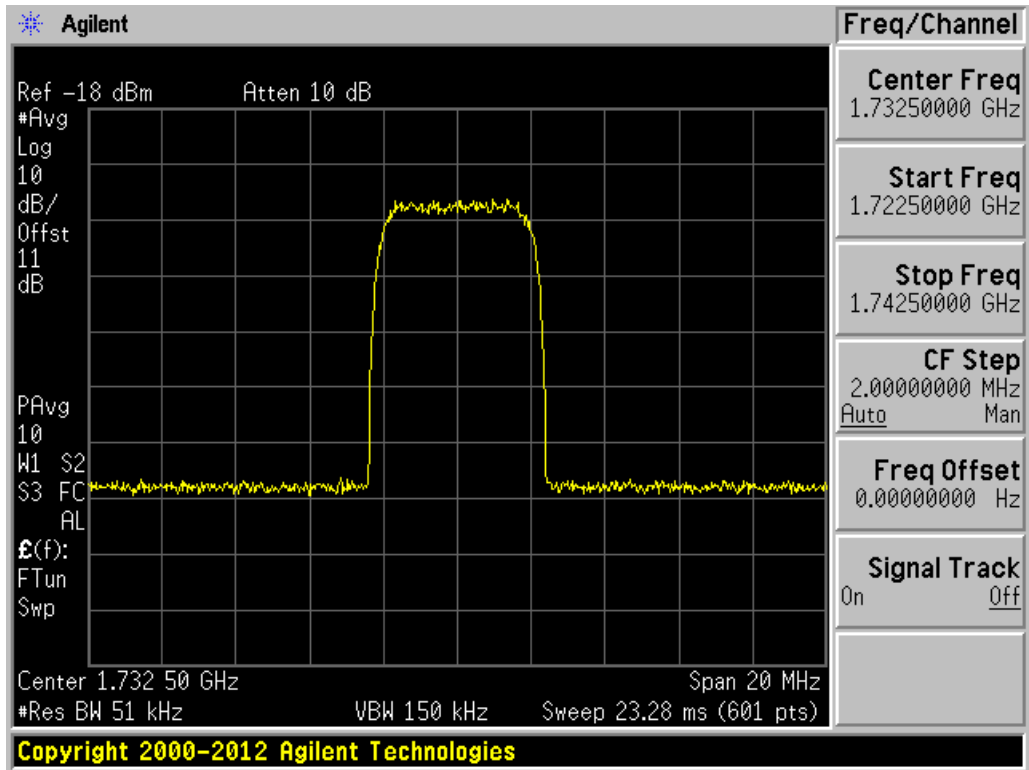
Uplink, Band 5, LTE/WCDMA Output.



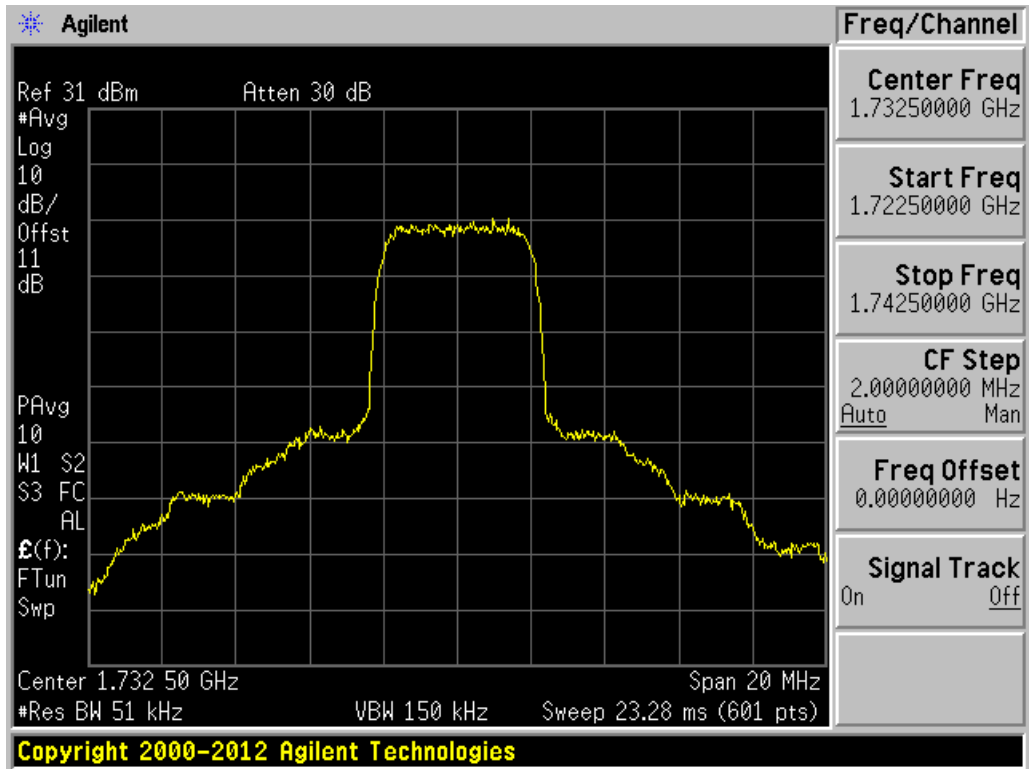
Uplink, Band 2 & 25. LTE/WCDMA Input.



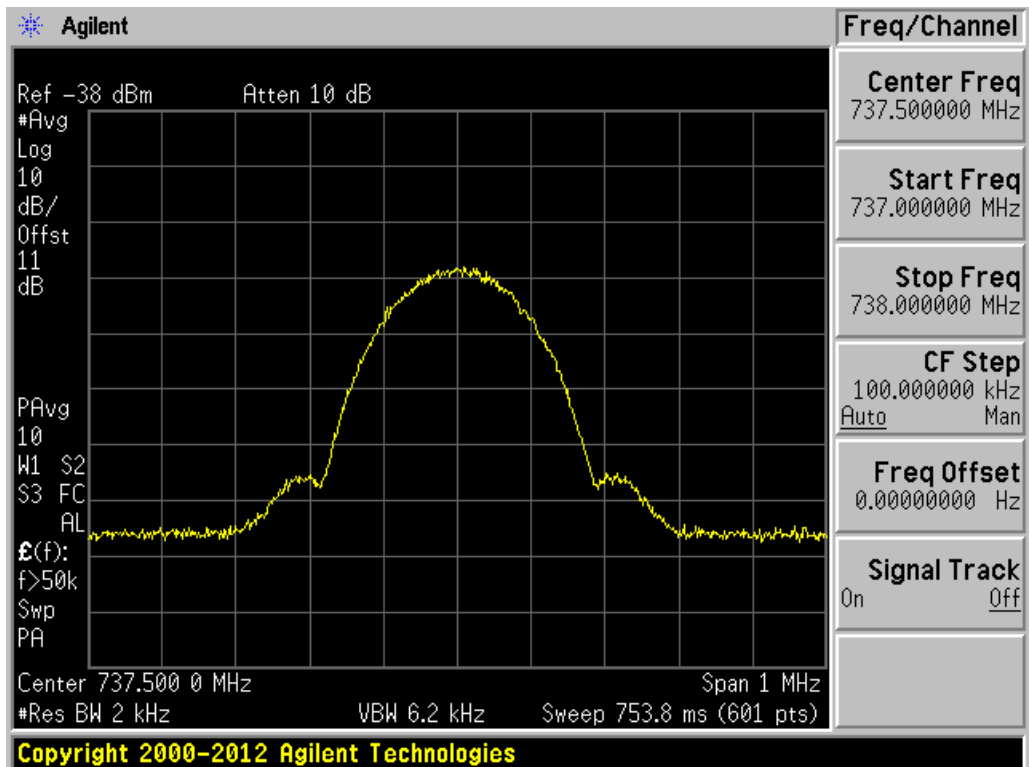
Uplink, Band 2 & 25. LTE/WCDMA Output.



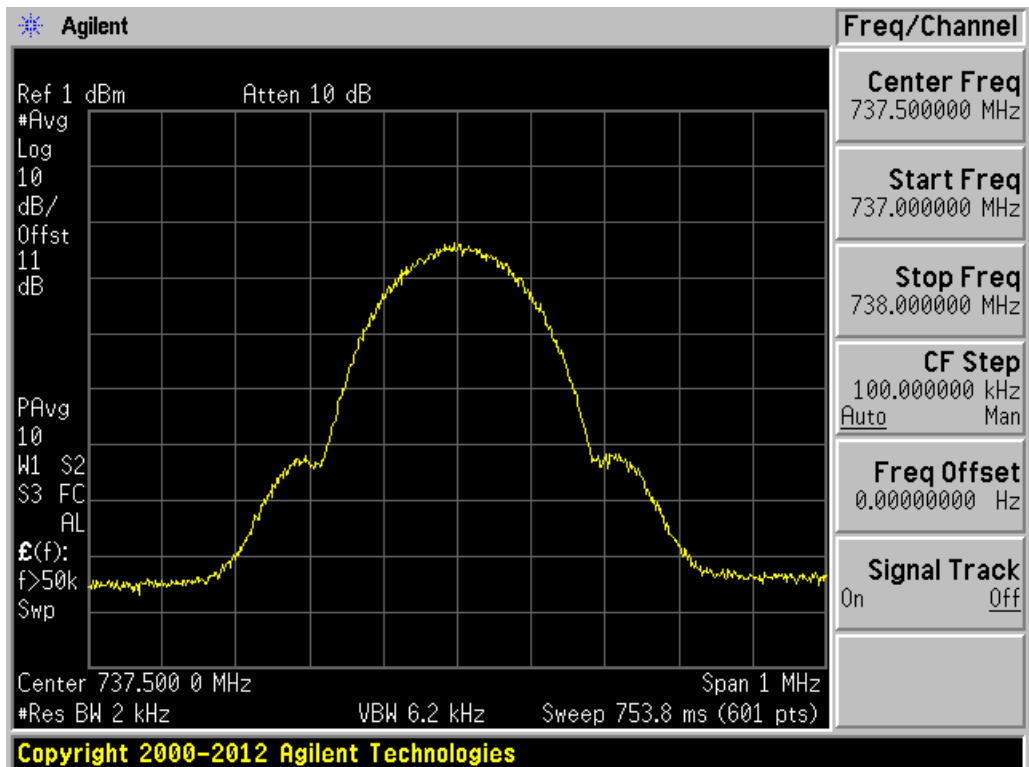
Uplink, Band 4, LTE/WCDMA Input.



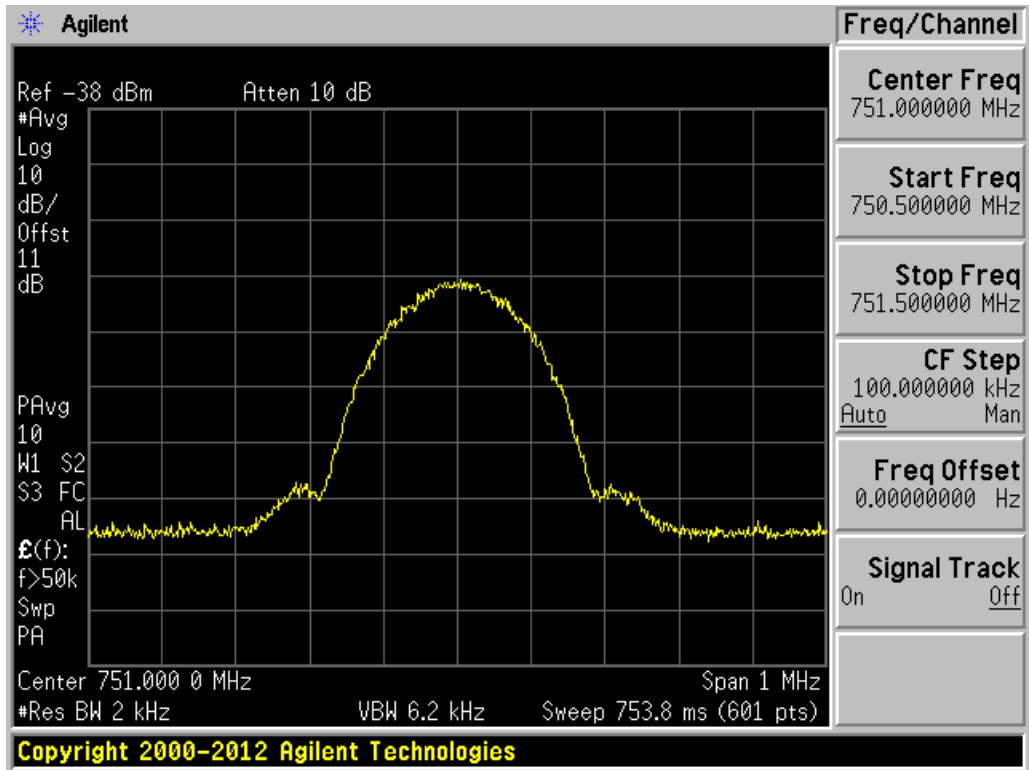
Uplink, Band 4, LTE/WCDMA Output.



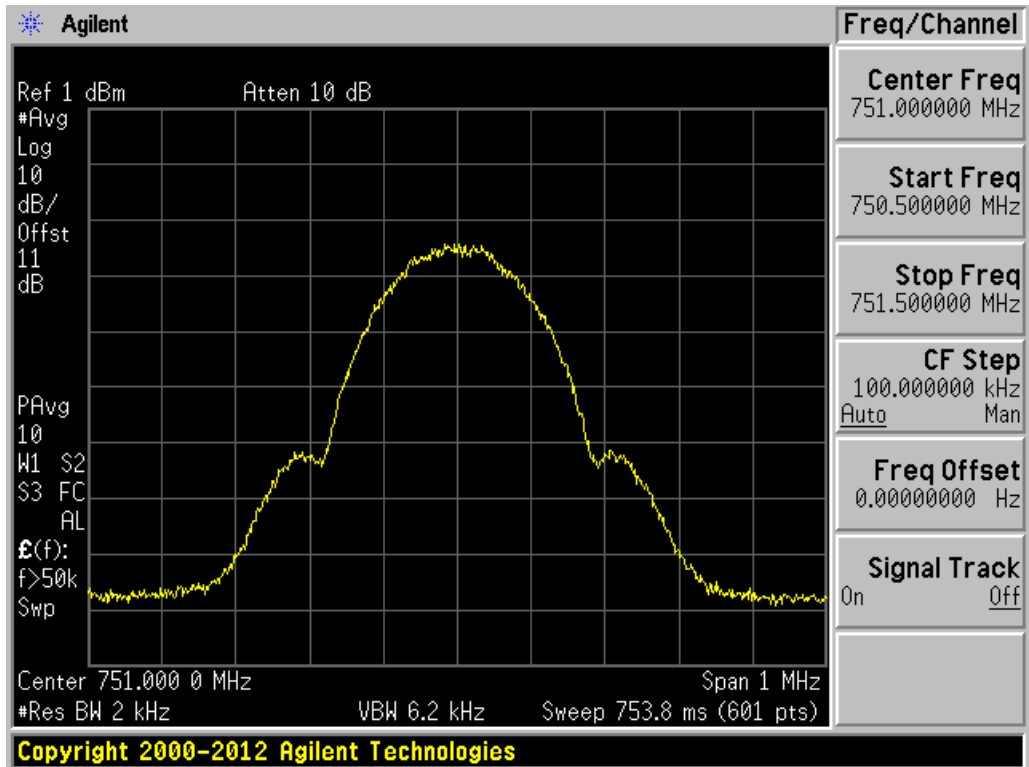
Downlink. Band 12 & 17. GSM Input.



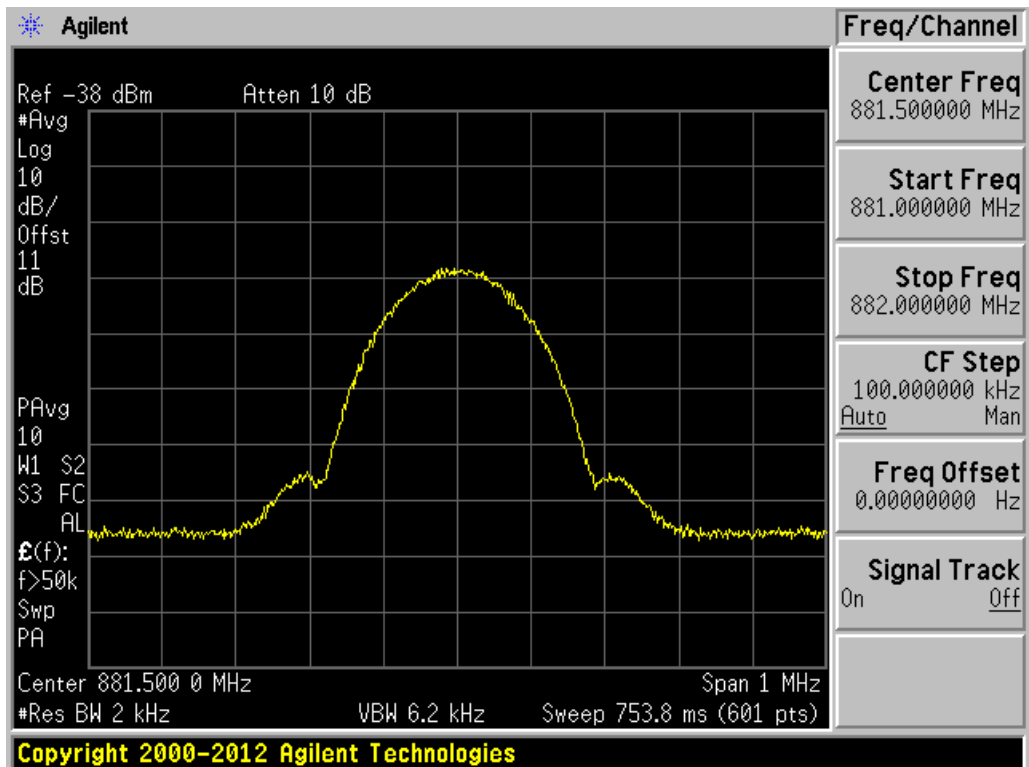
Downlink. Band 12 & 17. GSM Output.



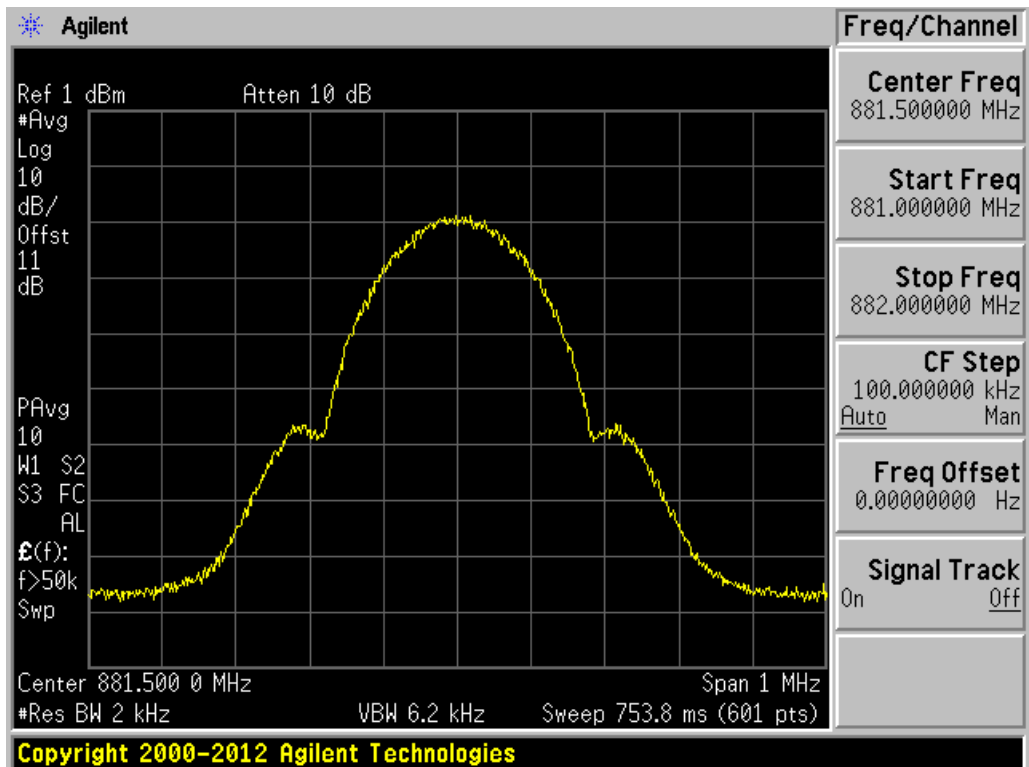
Downlink. Band 13. GSM Input.



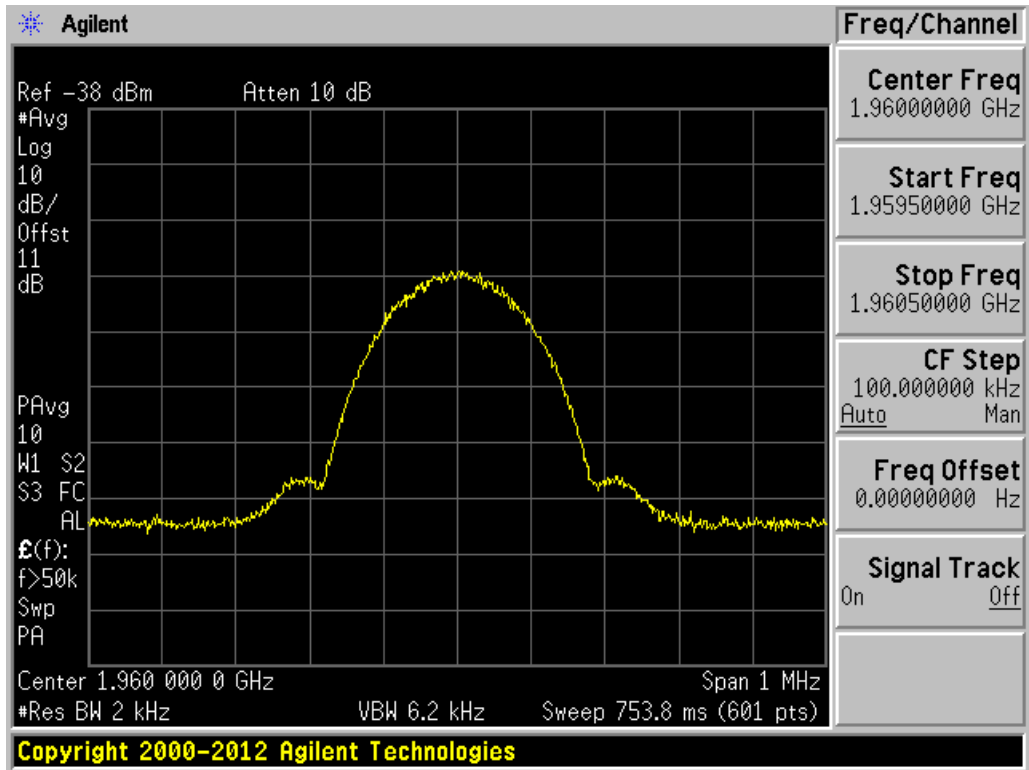
Downlink. Band 13. GSM Output.



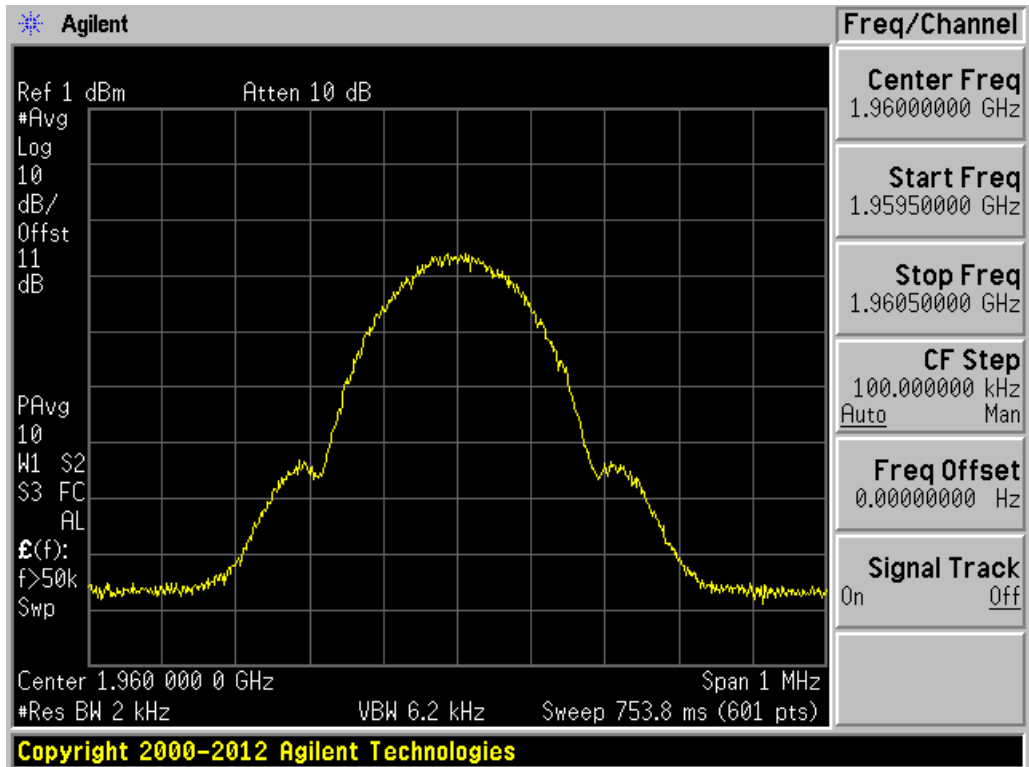
Downlink. Band 5. GSM Input.



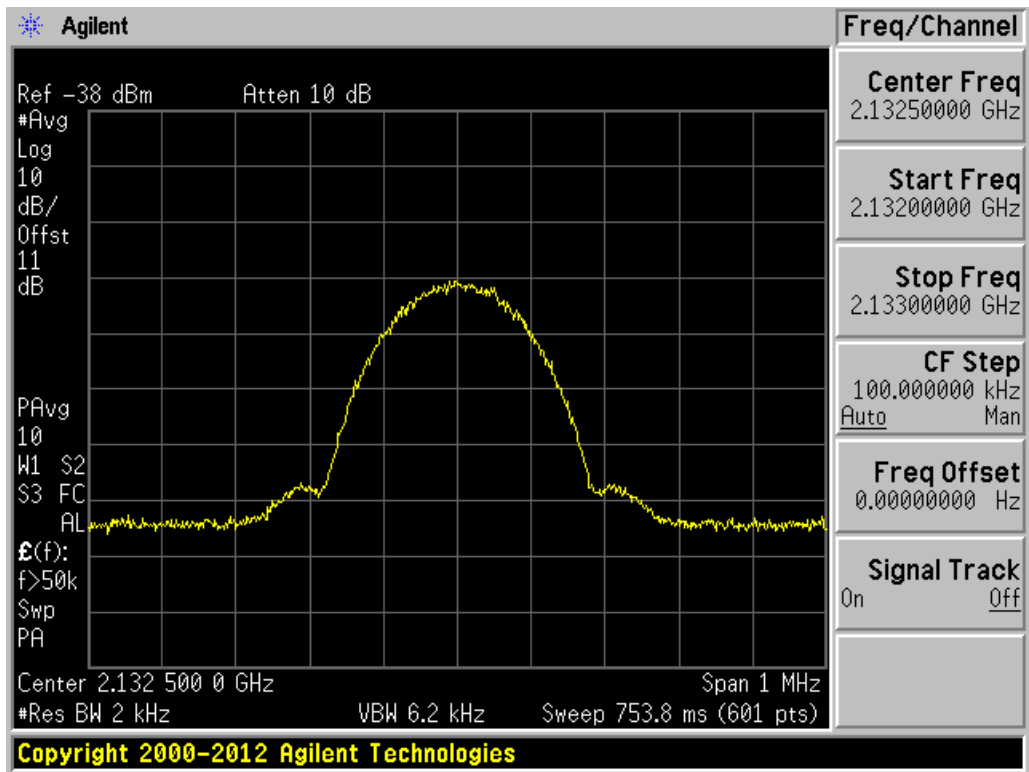
Downlink. Band 5. GSM Output.



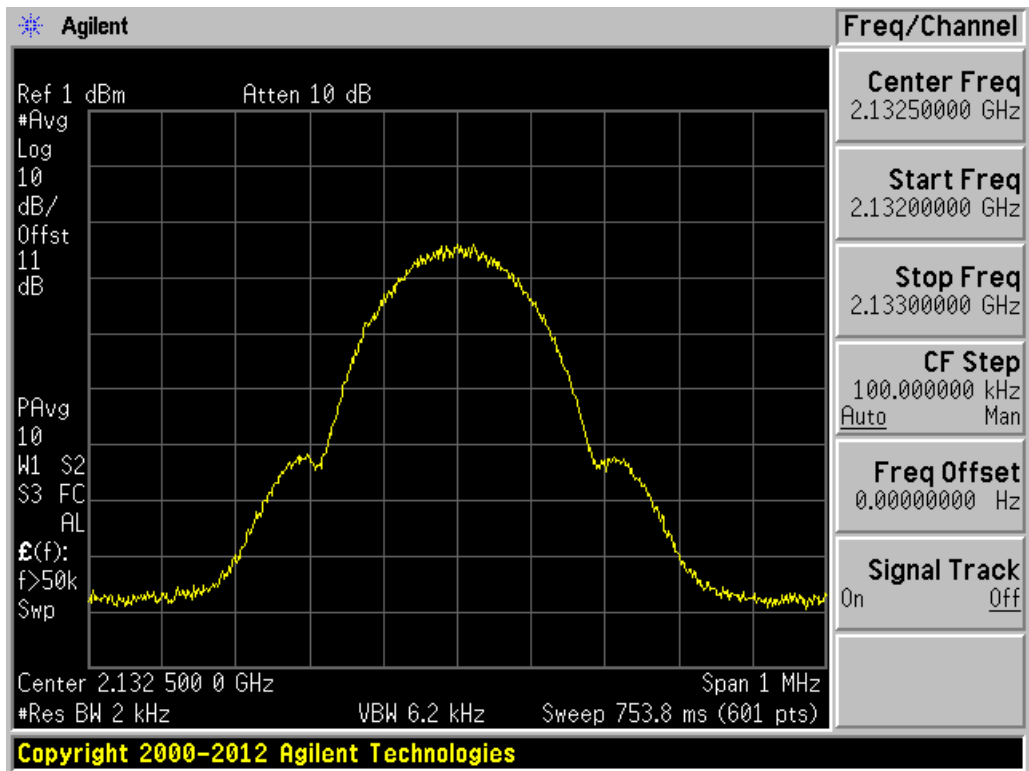
Downlink. Band 2 & 25. GSM Input.



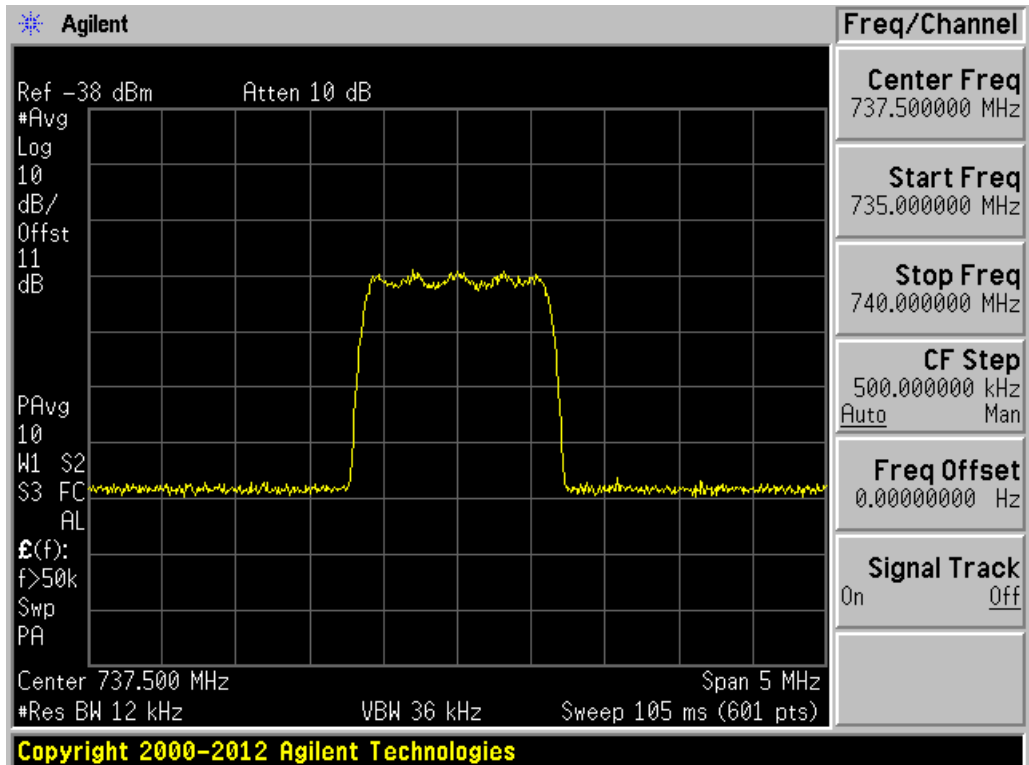
Downlink. Band 2 & 25. GSM Output.



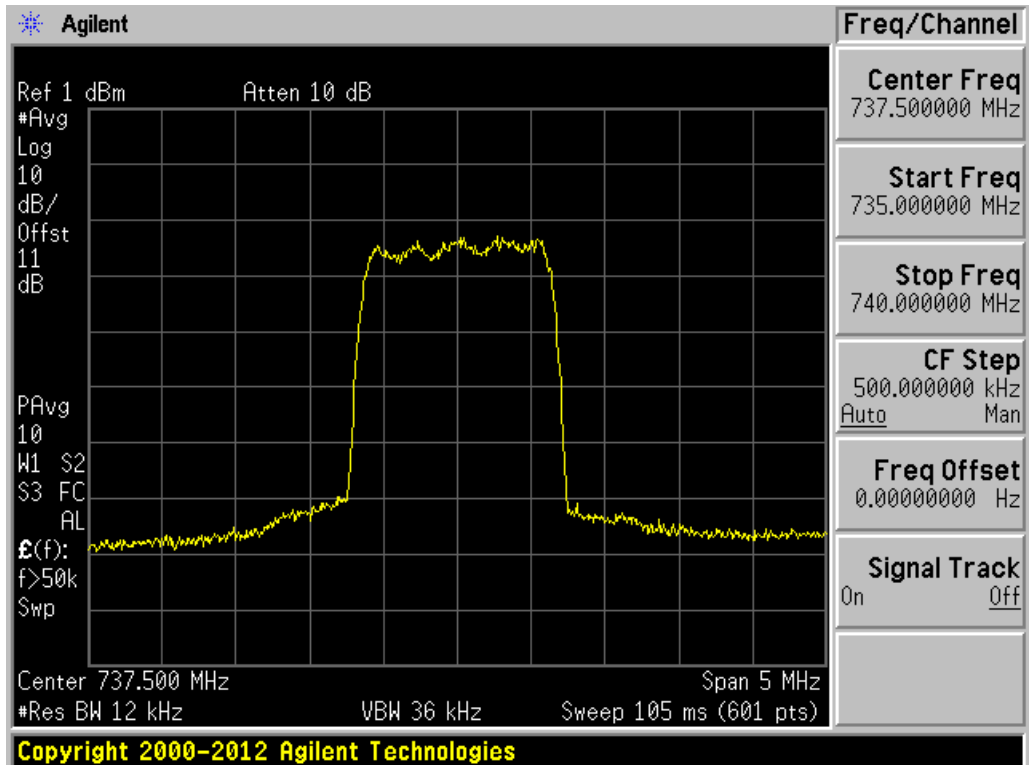
Downlink. Band 4. GSM Input.



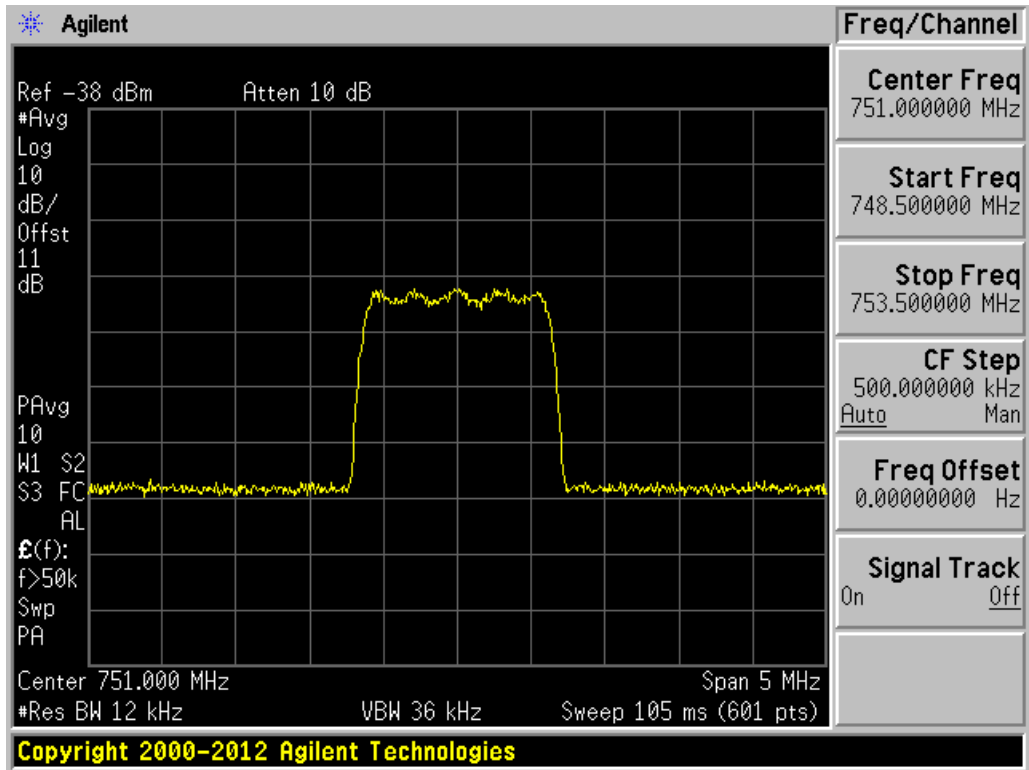
Downlink. Band 4. GSM Output.



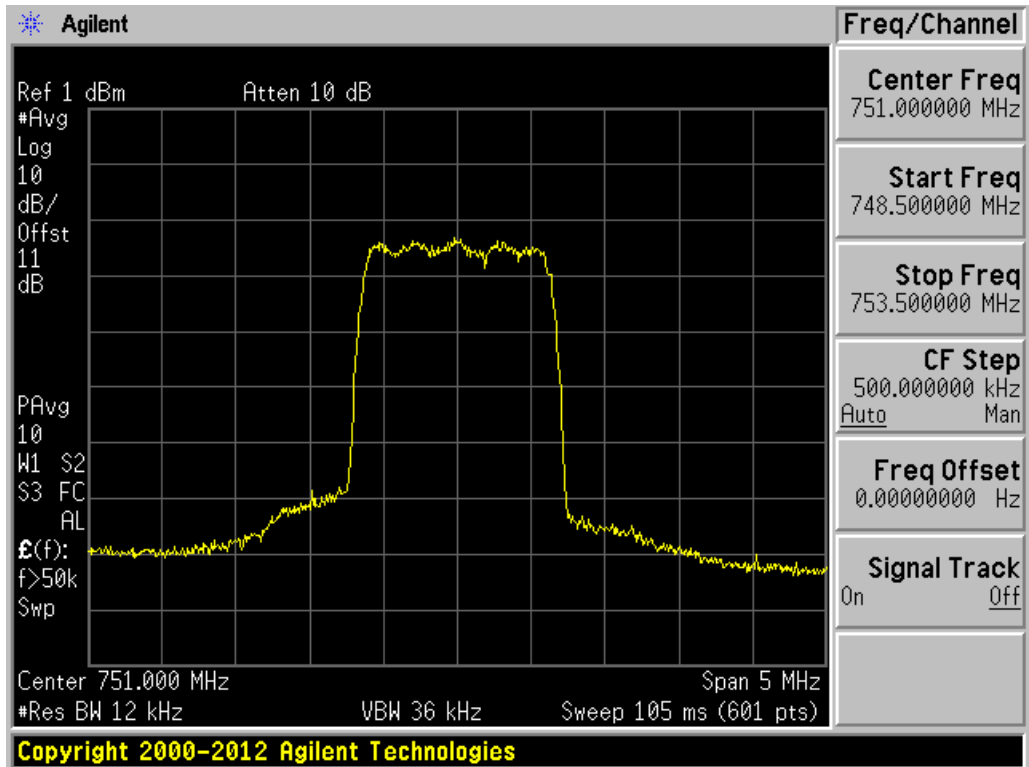
Downlink. Band 12 & 17. CDMA Input.



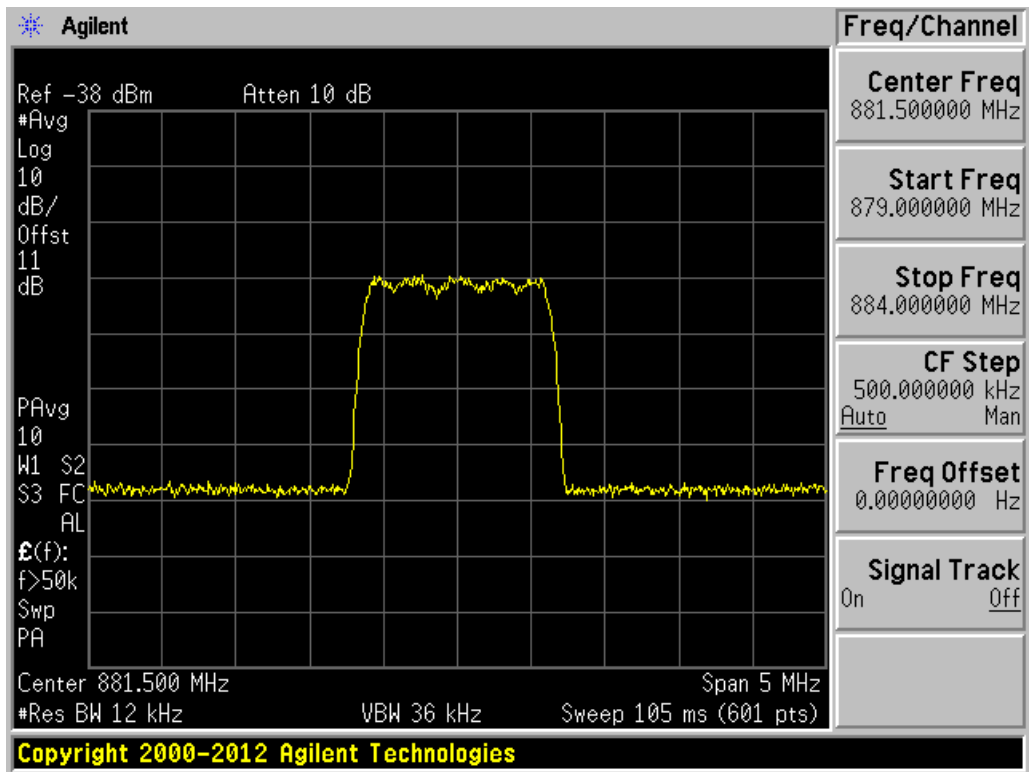
Downlink. Band 12 & 17. CDMA Output.



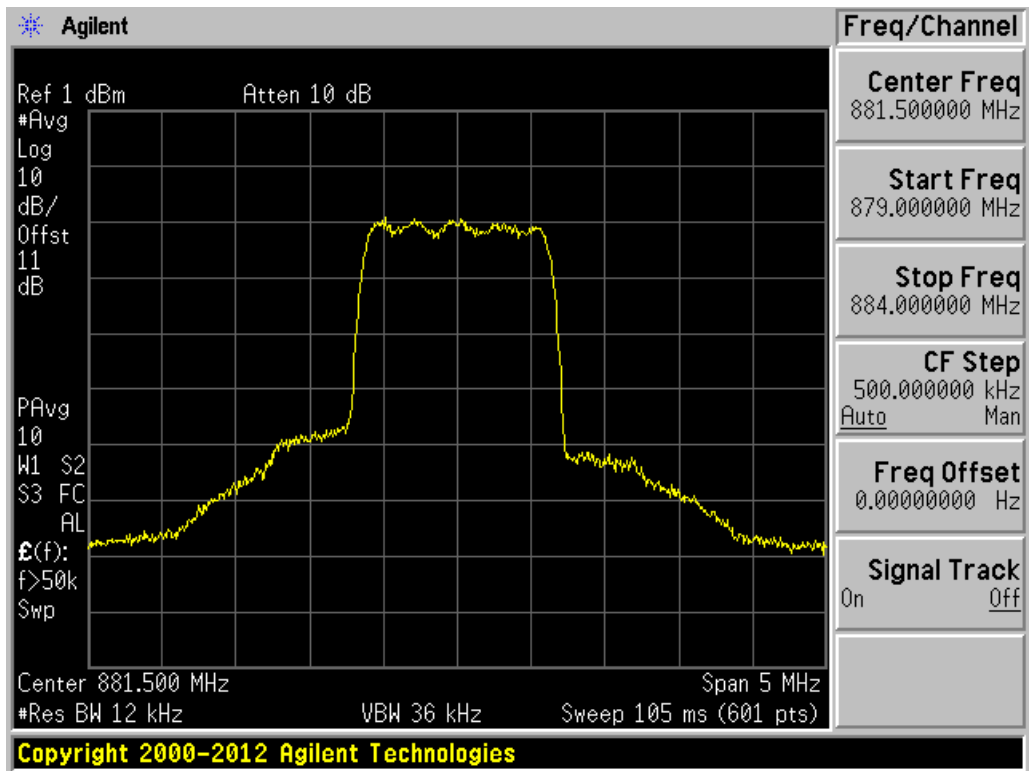
Downlink. Band 13. CDMA Input.



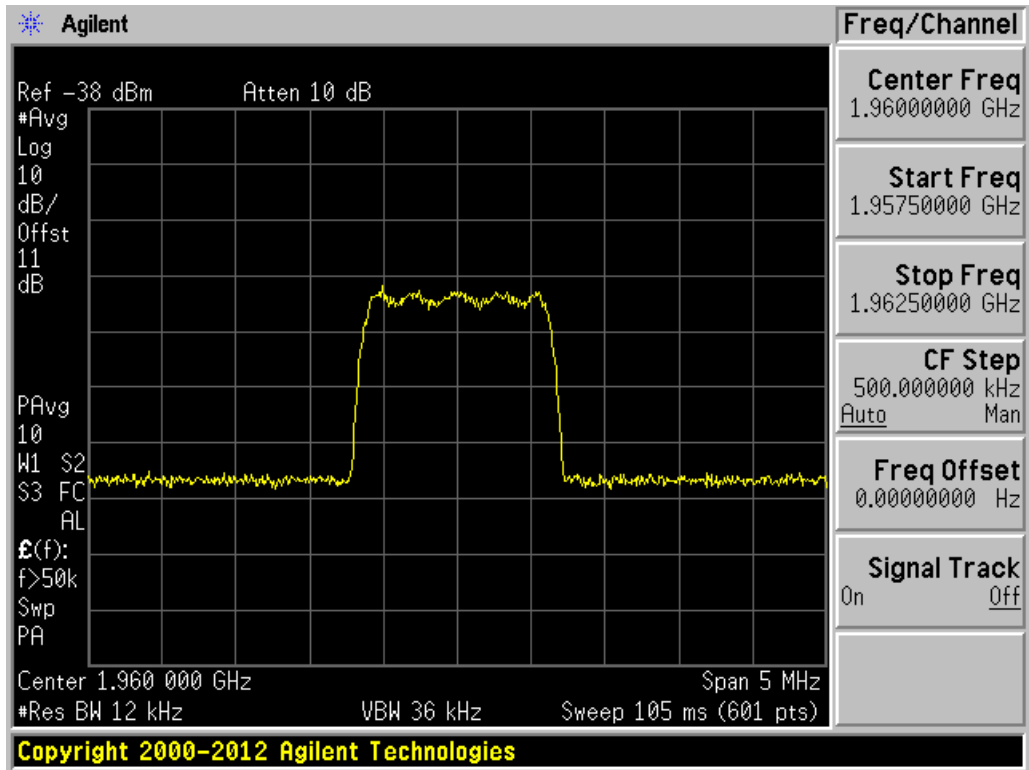
Downlink. Band 13. CDMA Output.



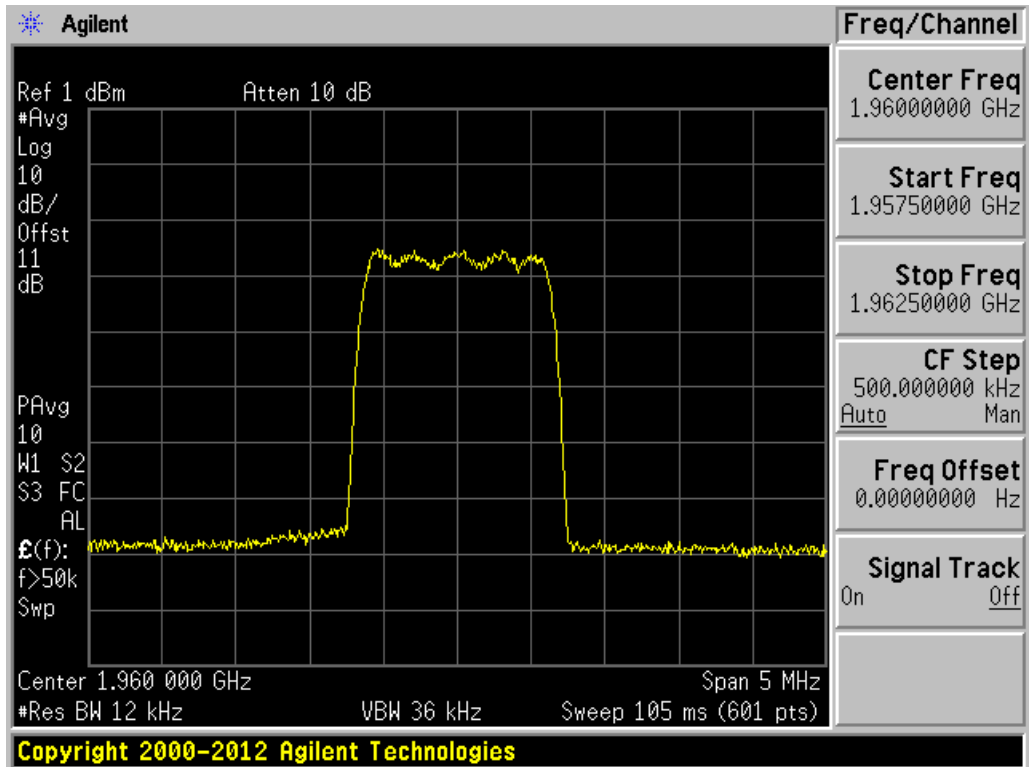
Downlink. Band 5. CDMA Input.



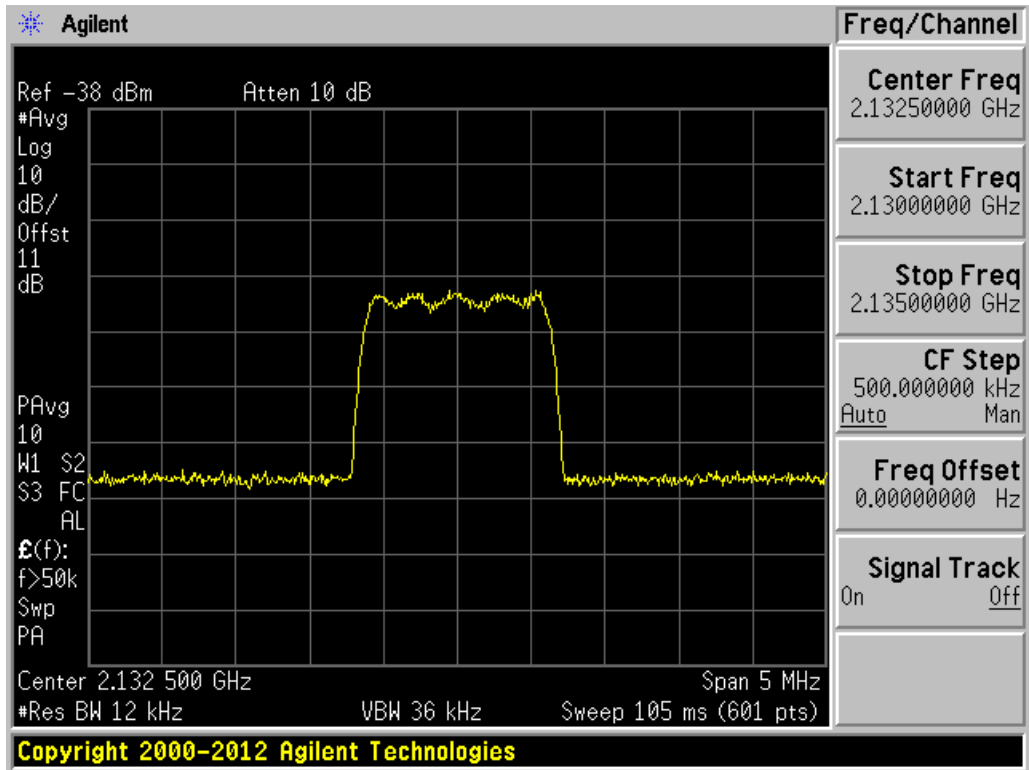
Downlink. Band 5. CDMA Output.



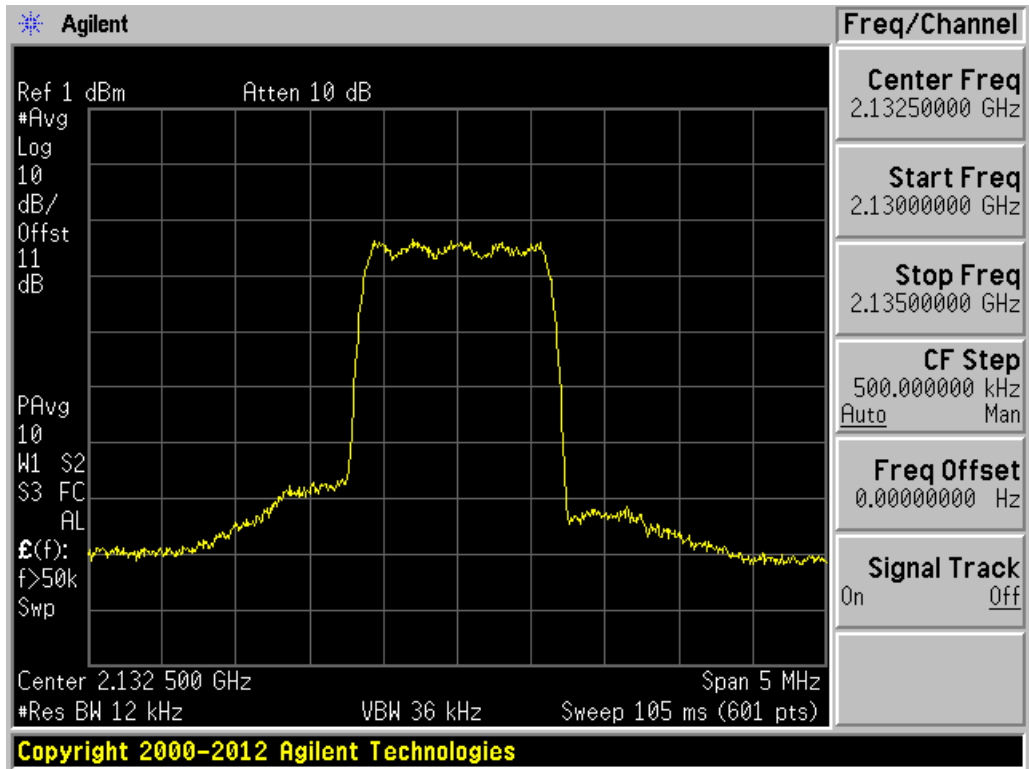
Downlink. Band 2 & 25. CDMA Input.



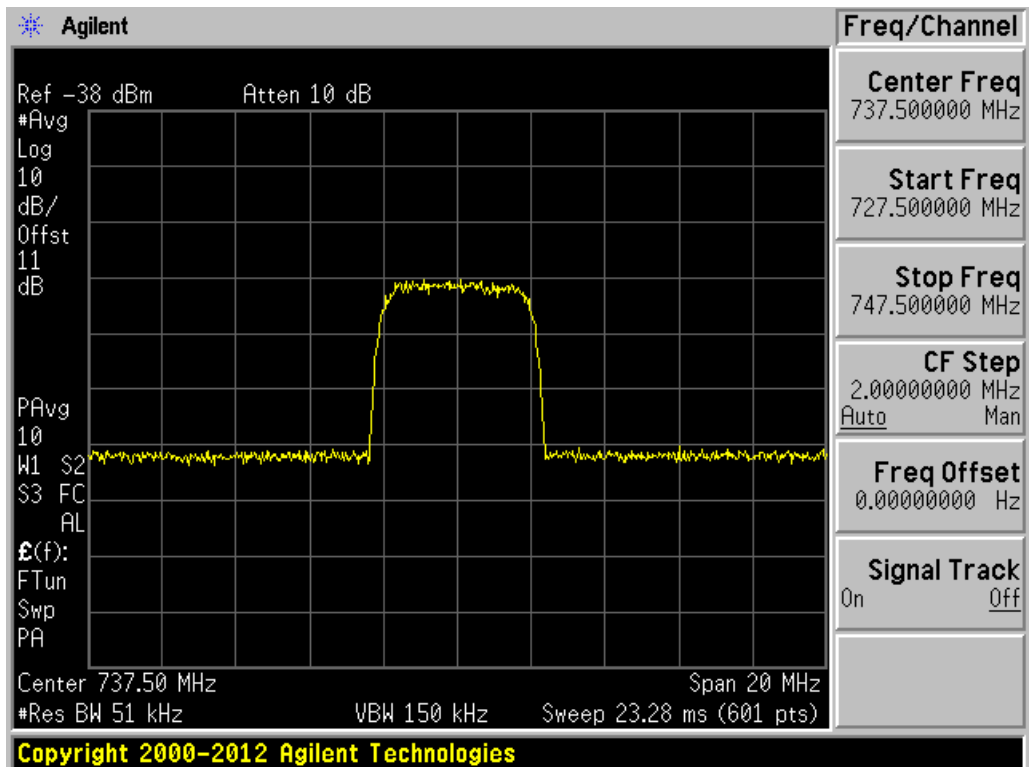
Downlink. Band 2 & 25. CDMA Output.



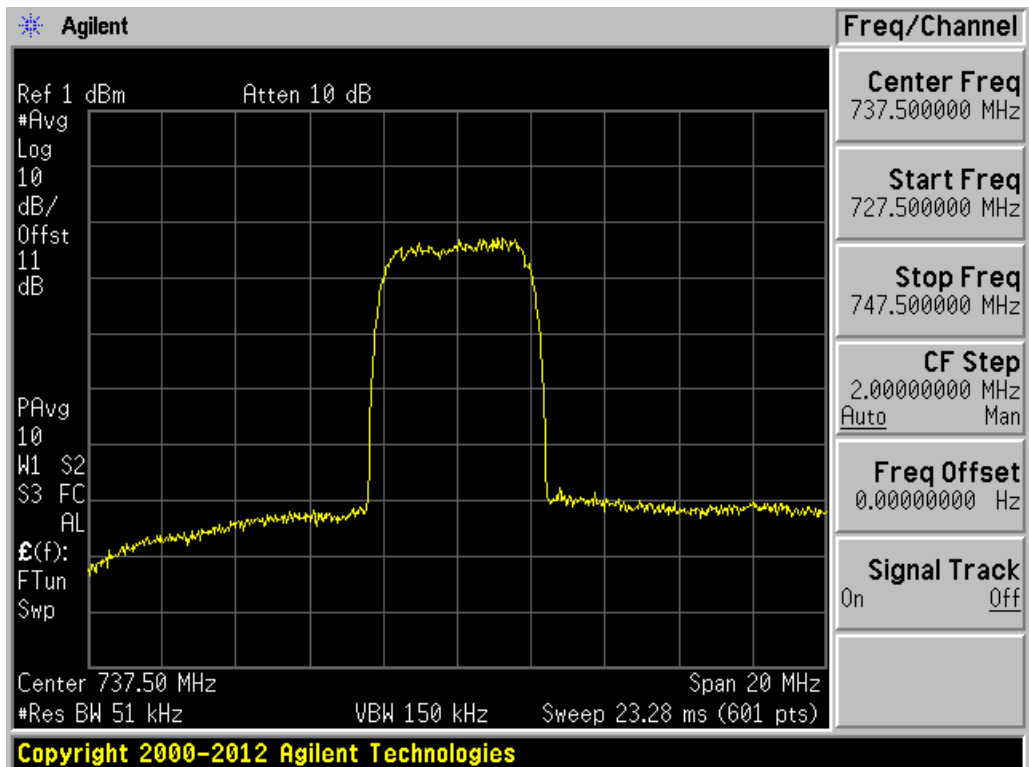
Downlink. Band 4. CDMA Input.



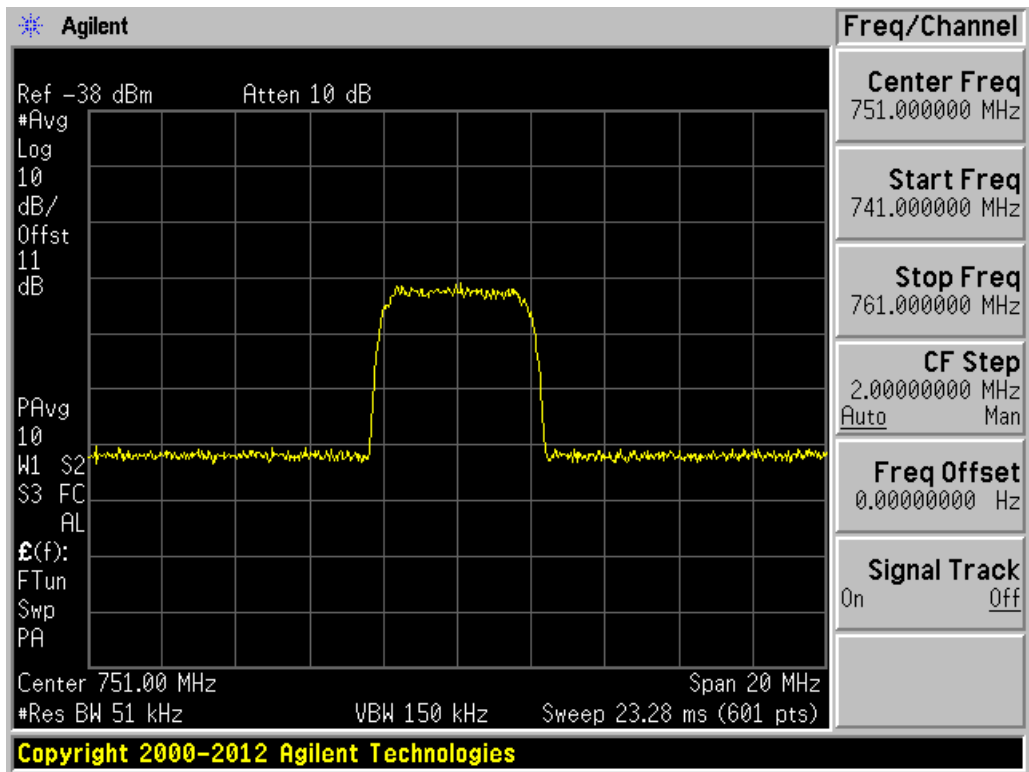
Downlink. Band 4. CDMA Output.



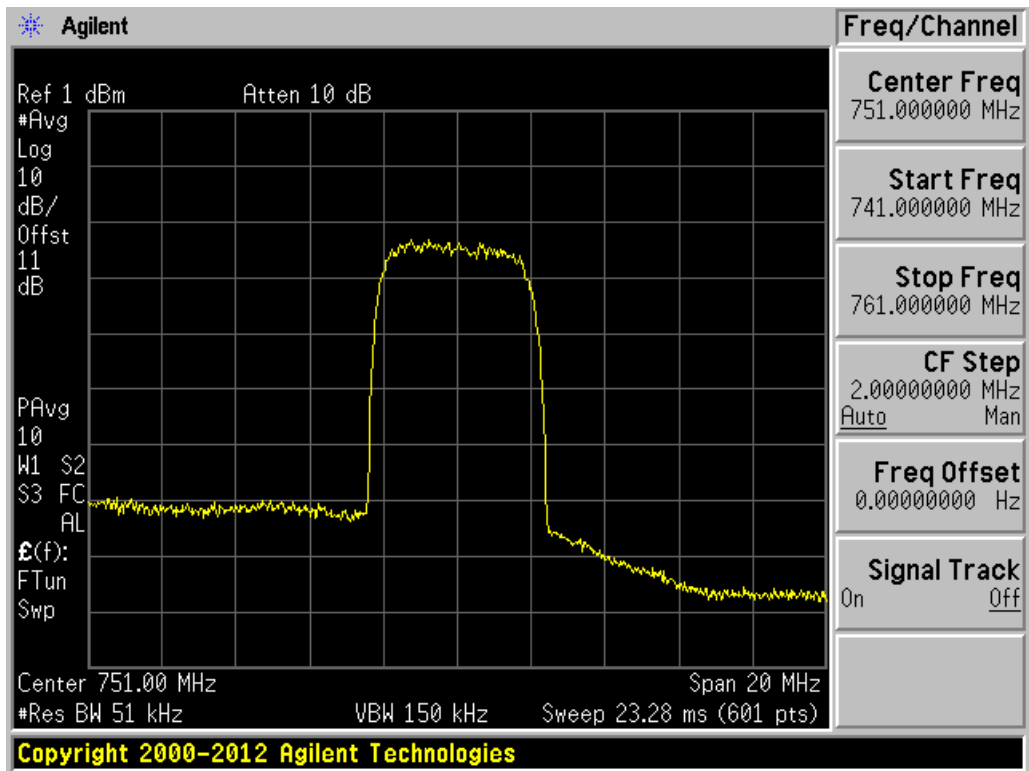
Downlink. Band 12 & 17. LTE/WCDMA Input.



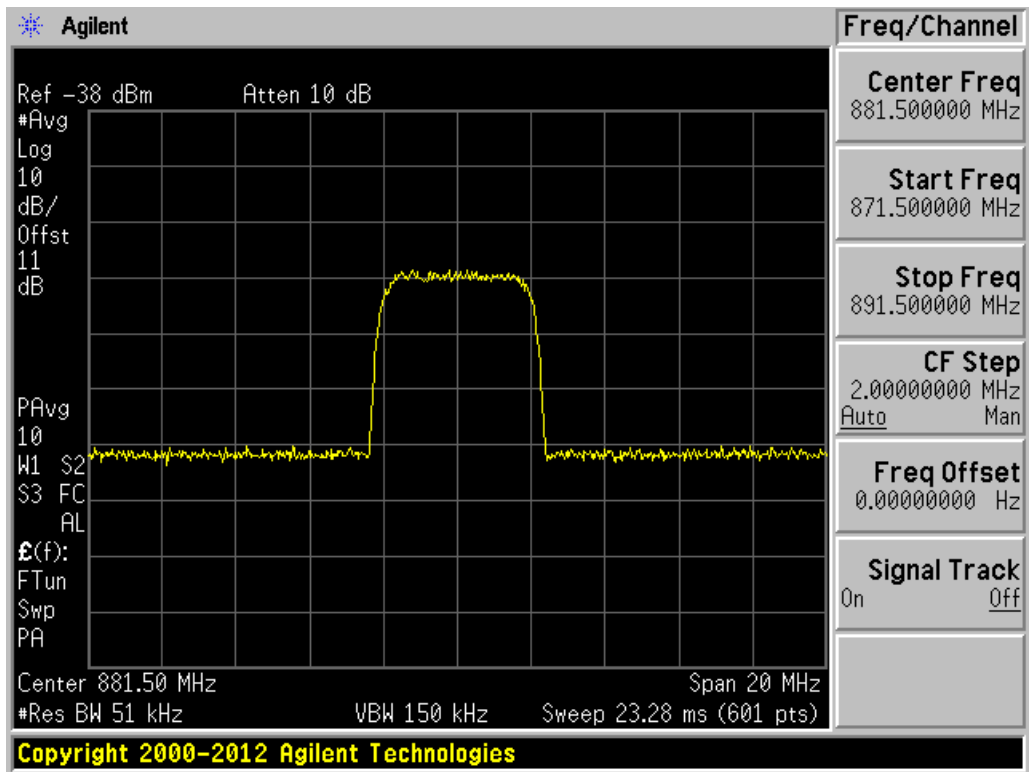
Downlink. Band 12 & 17. LTE/WCDMA Output.



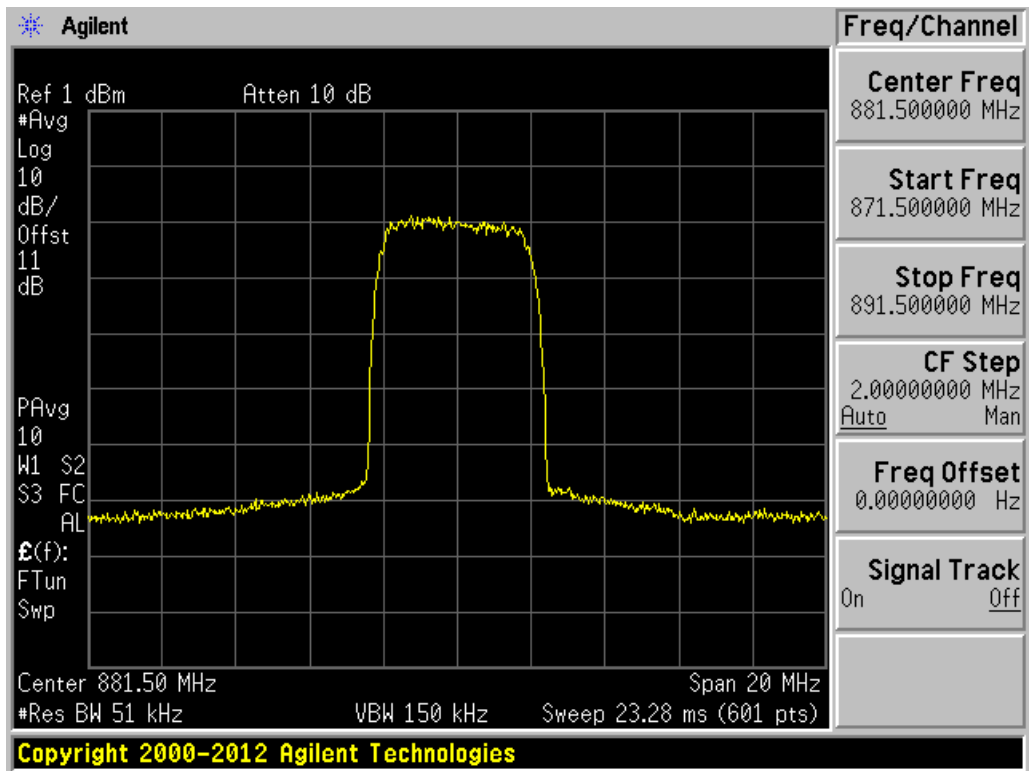
Downlink. Band 13. LTE/WCDMA Input.



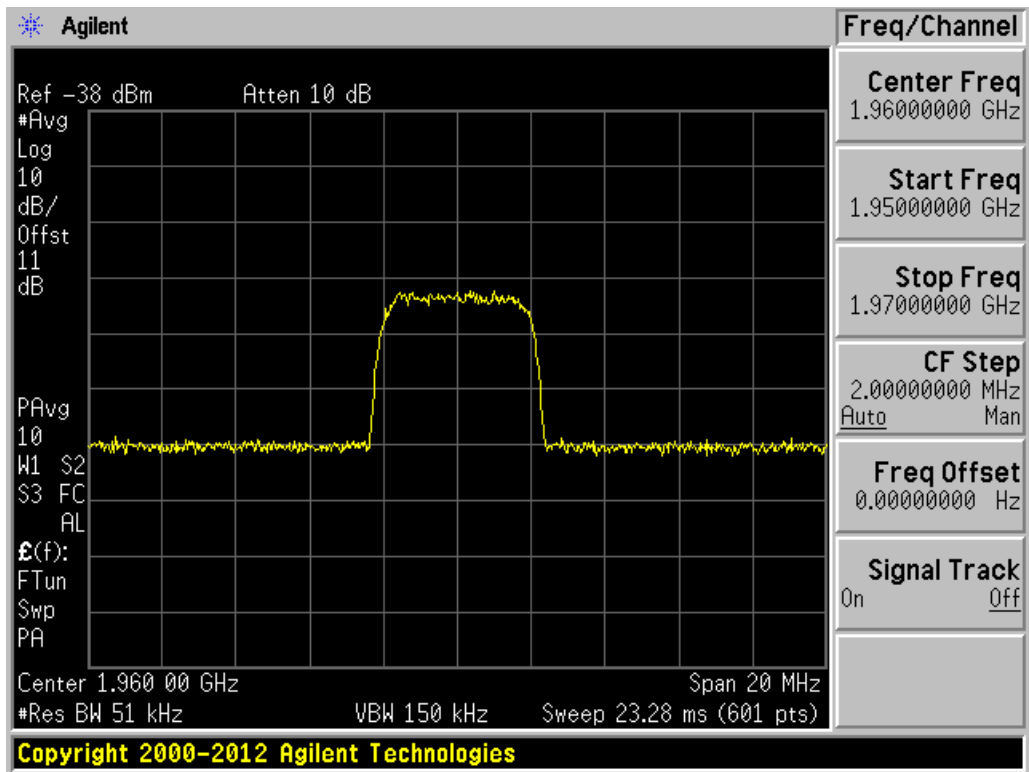
Downlink. Band 13. LTE/WCDMA Output.



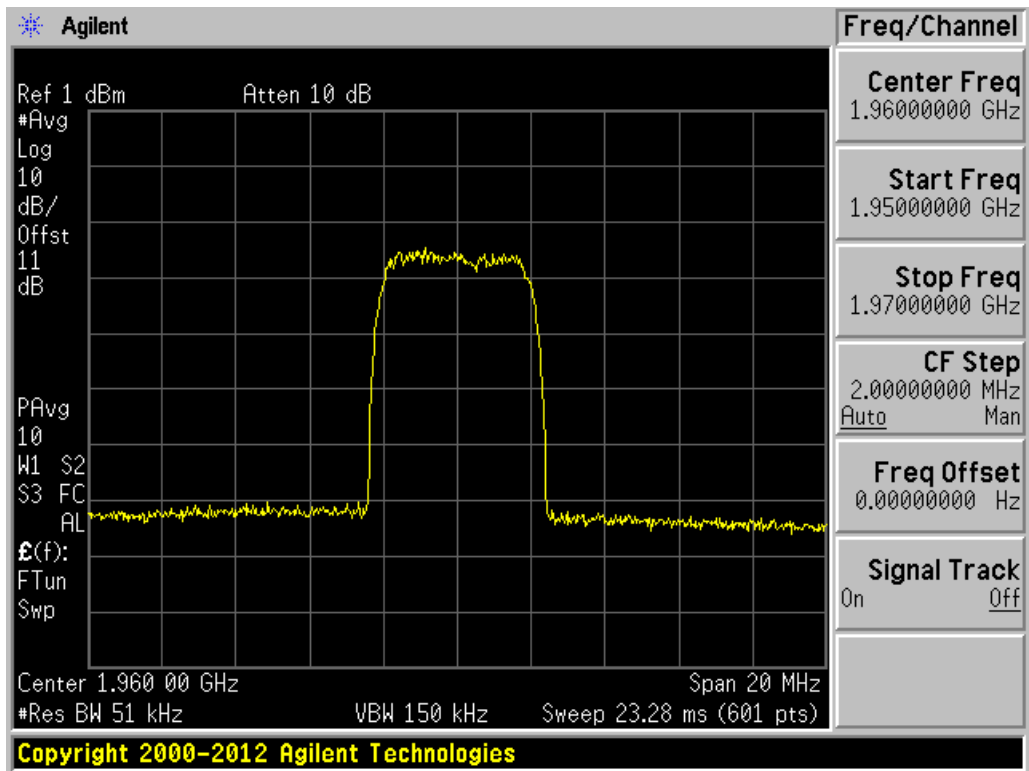
Downlink. Band 5. LTE/WCDMA Input.



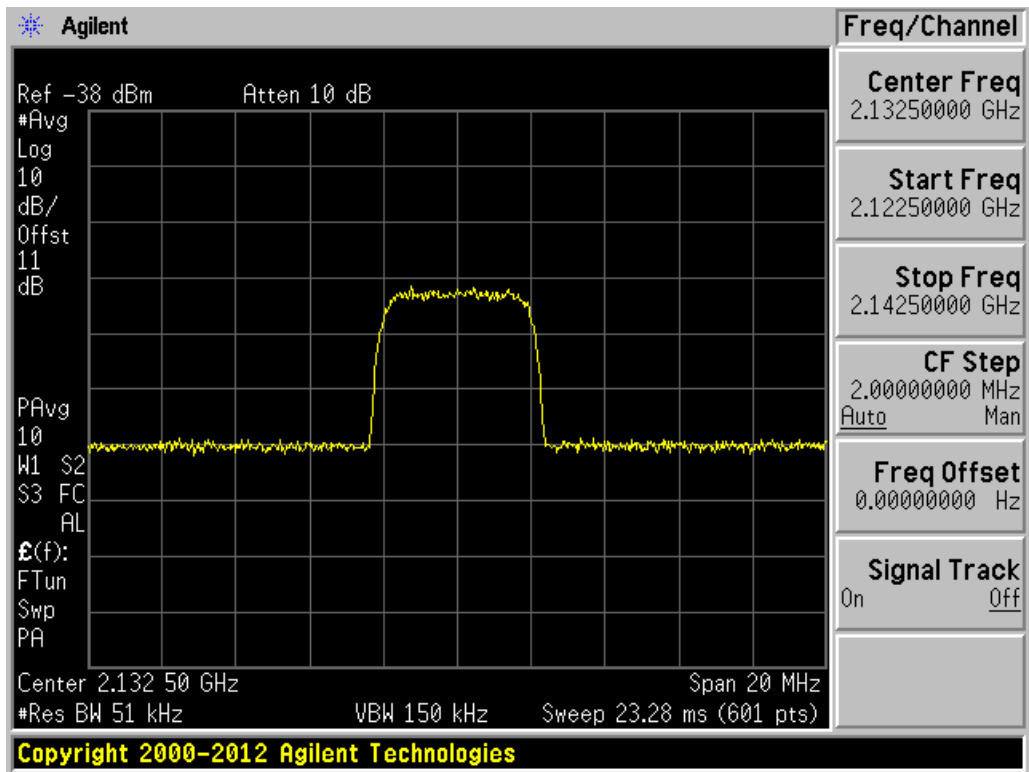
Downlink. Band 5. LTE/WCDMA Output.



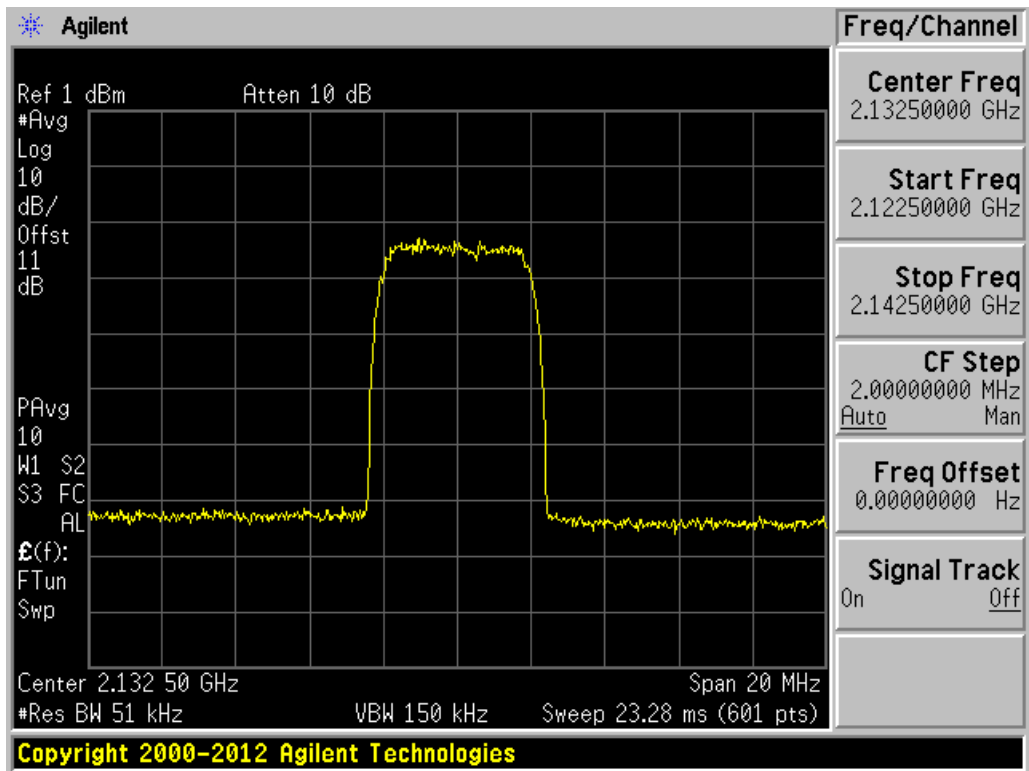
Downlink, Band 2 & 25, LTE/WCDMA Input.



Downlink, Band 2 & 25, LTE/WCDMA Output.



Downlink. Band 4. LTE/WCDMA Input.



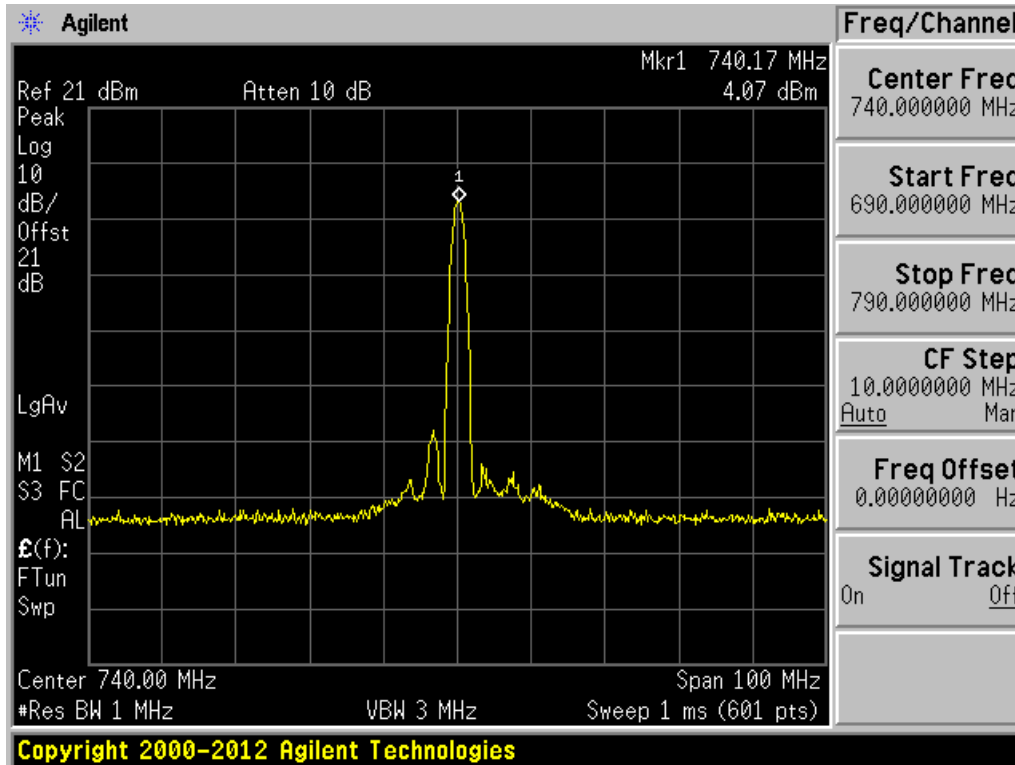
Downlink. Band 4. LTE/WCDMA Output.

3.11 Oscillation Detection Test

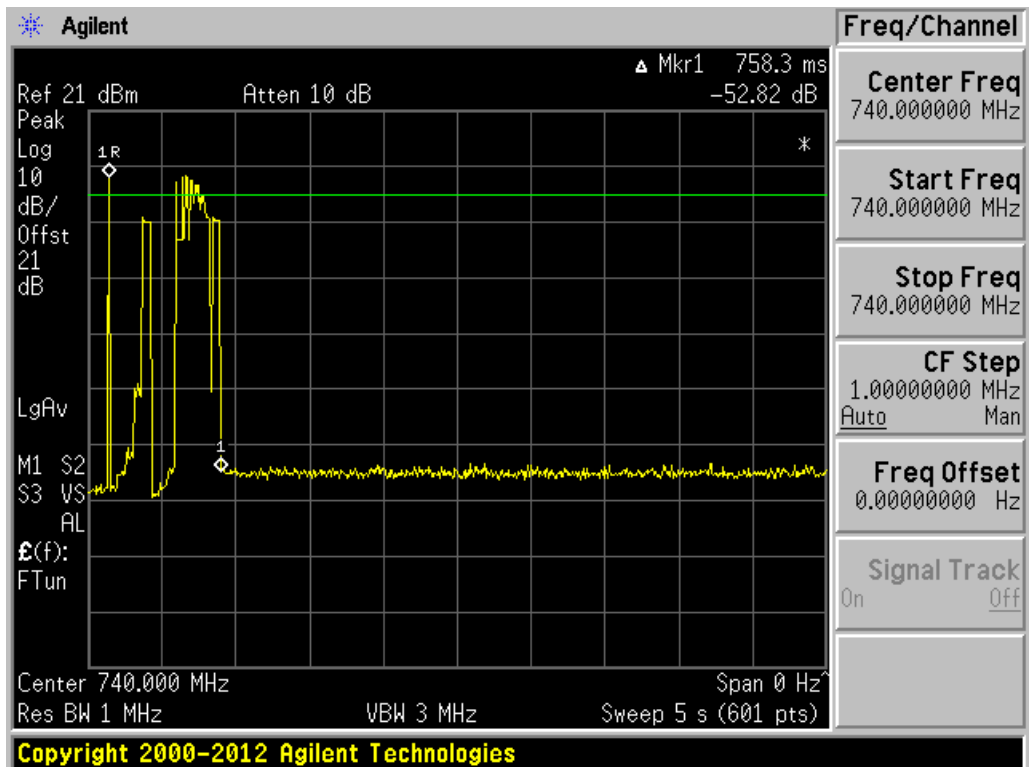
This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.11 and FCC inquiry #942758

This comply with FCC Rule: § 20.21(e)(8)(ii)(A) Anti-Oscillation

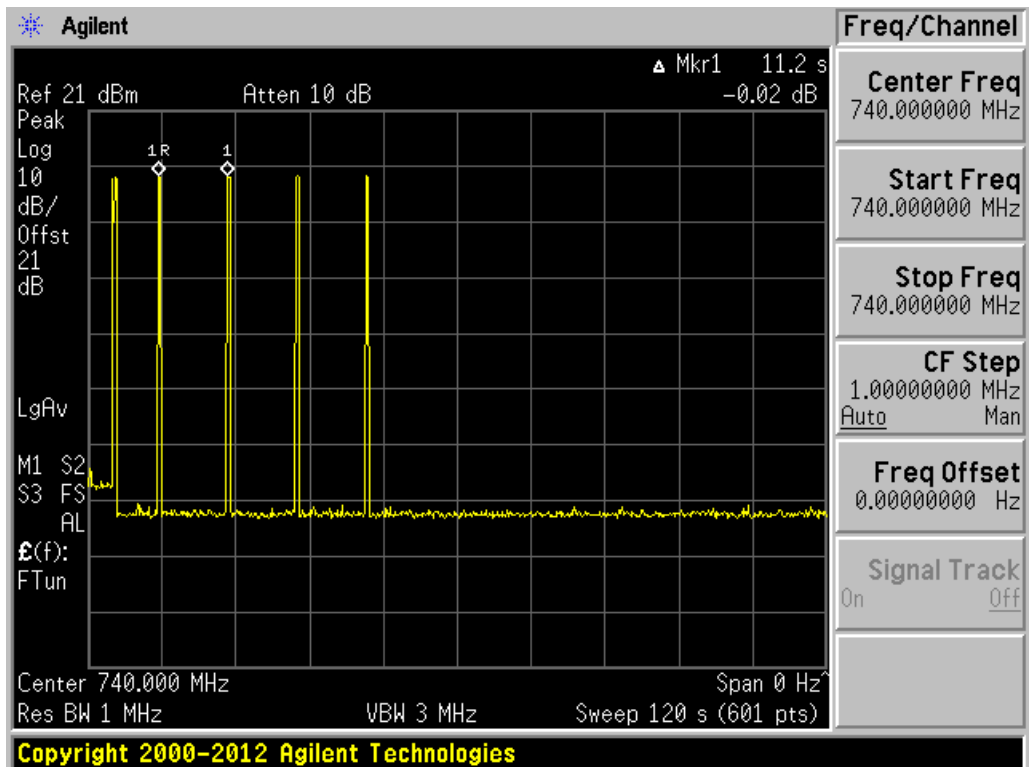
3.11.1 Oscillation Detection and Restart Test results



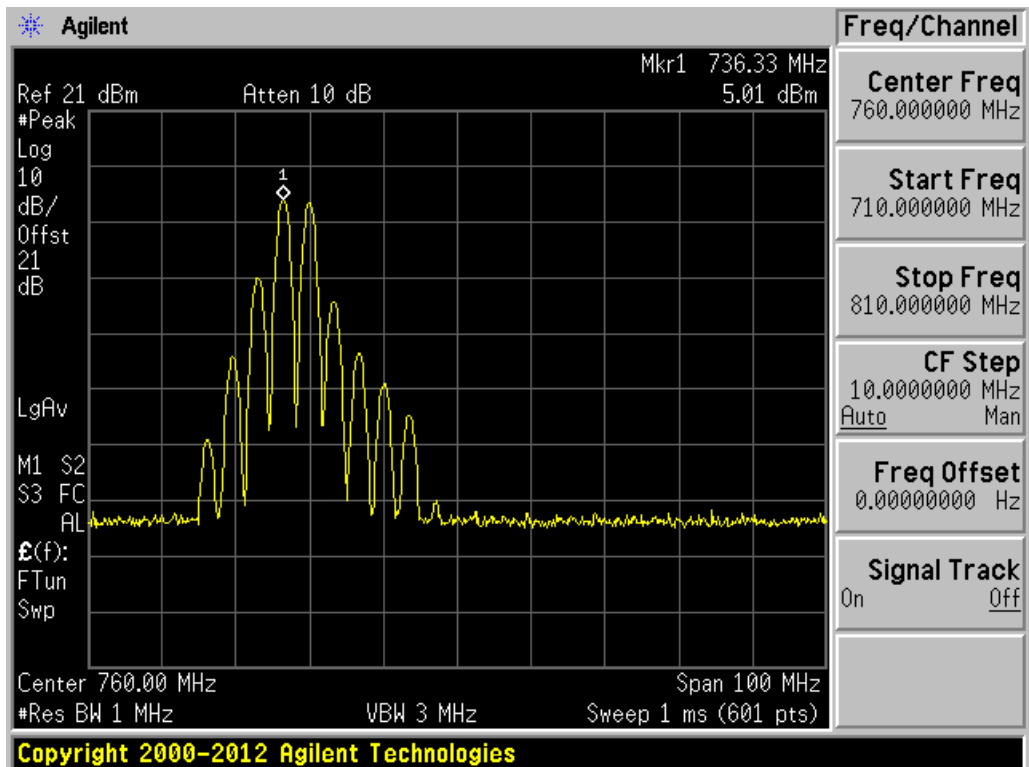
Band 12 & 17. Frequency of oscillation



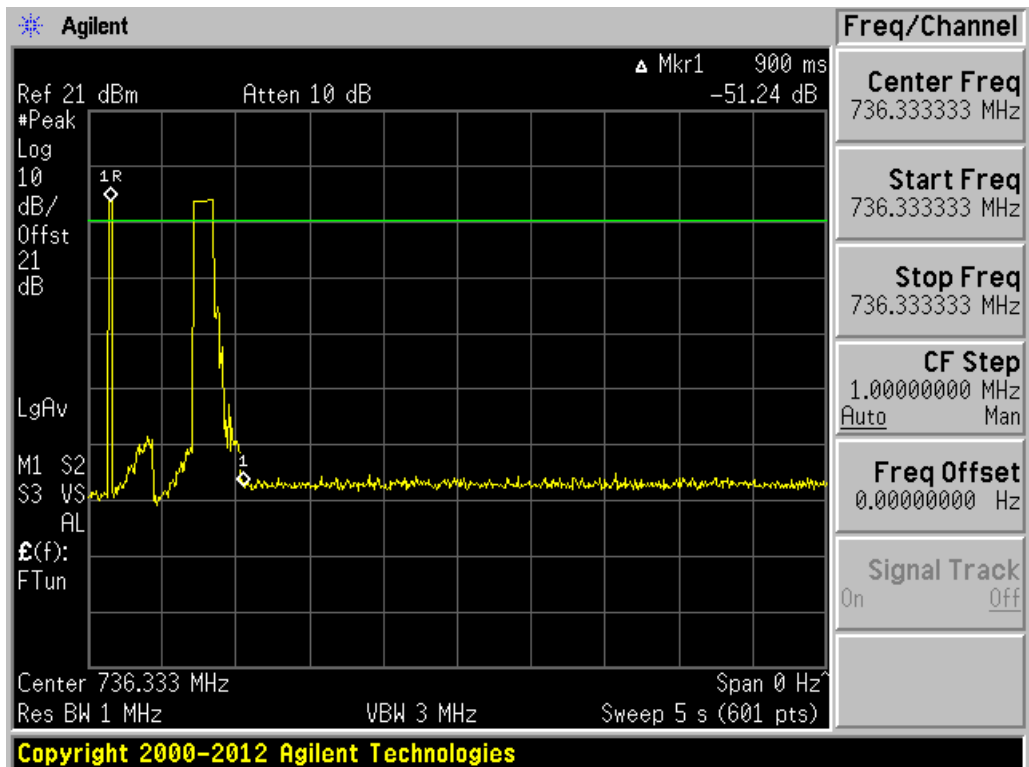
Band 12 & 17. Oscillation detection and control



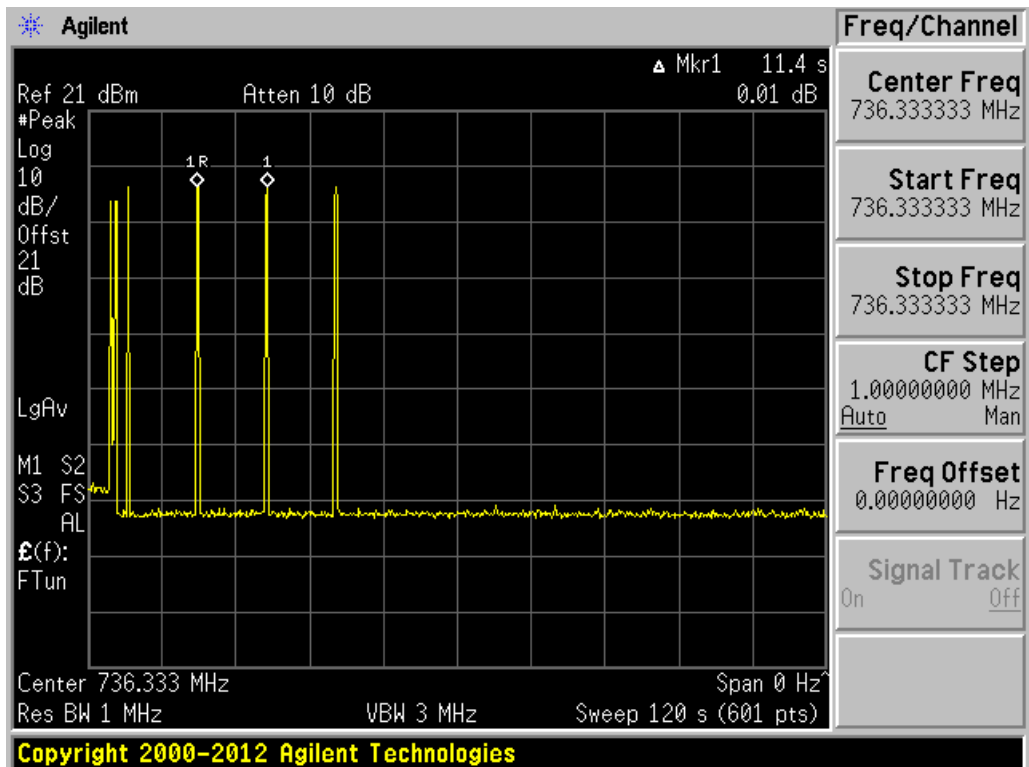
Band 12 & 17. 120 seconds sweep. (DUT in the Test Mode)



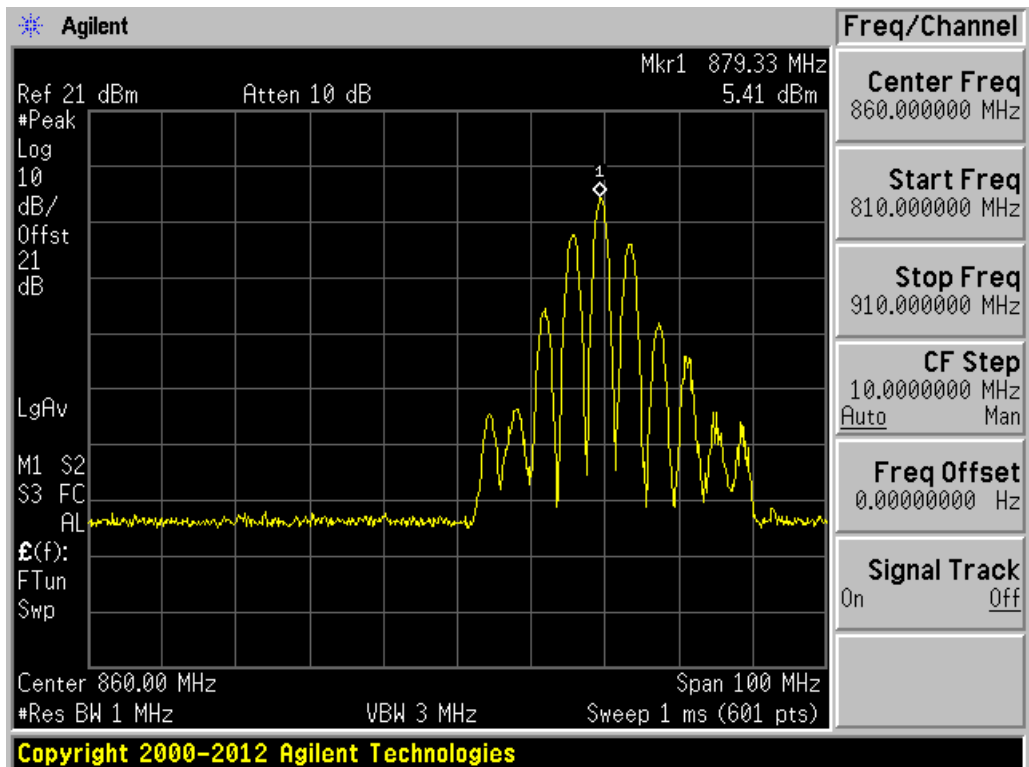
Band 13. Frequency of oscillation



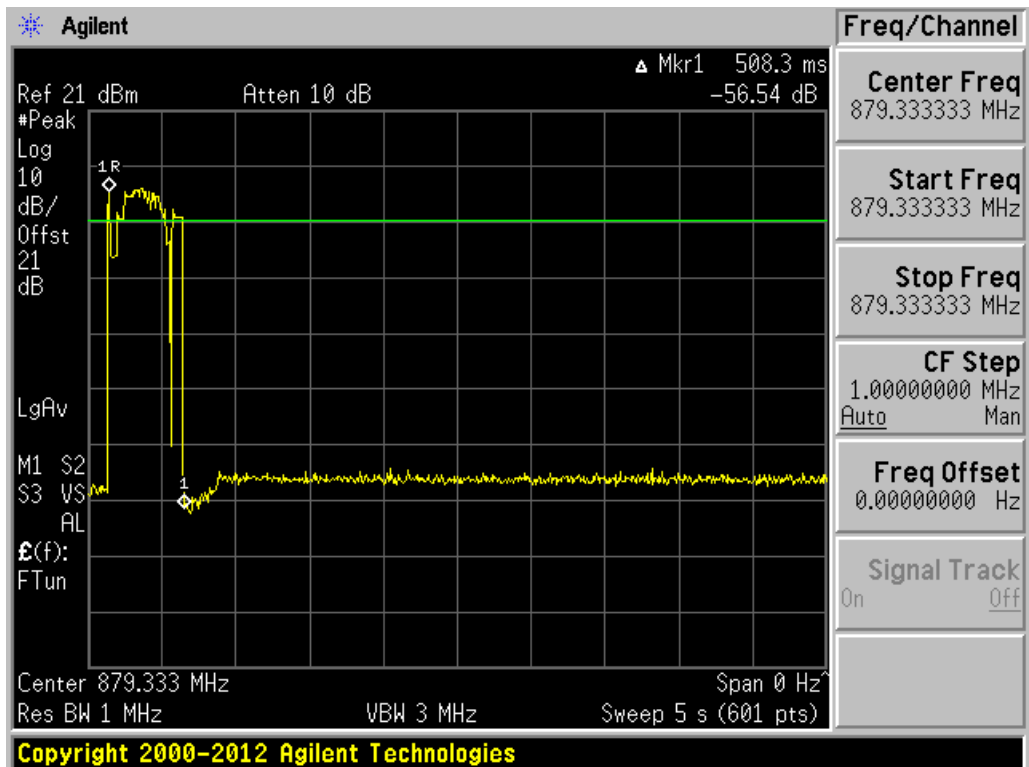
Band 13. Oscillation detection and control



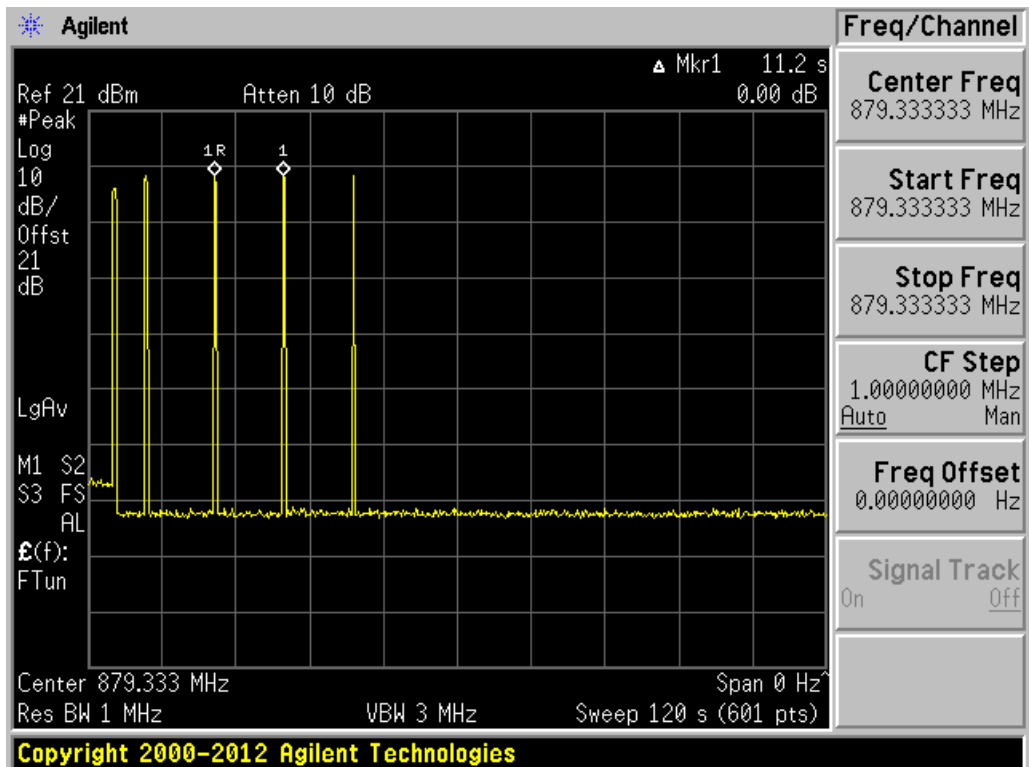
Band 13. 120 seconds sweep. (DUT in the Test Mode)



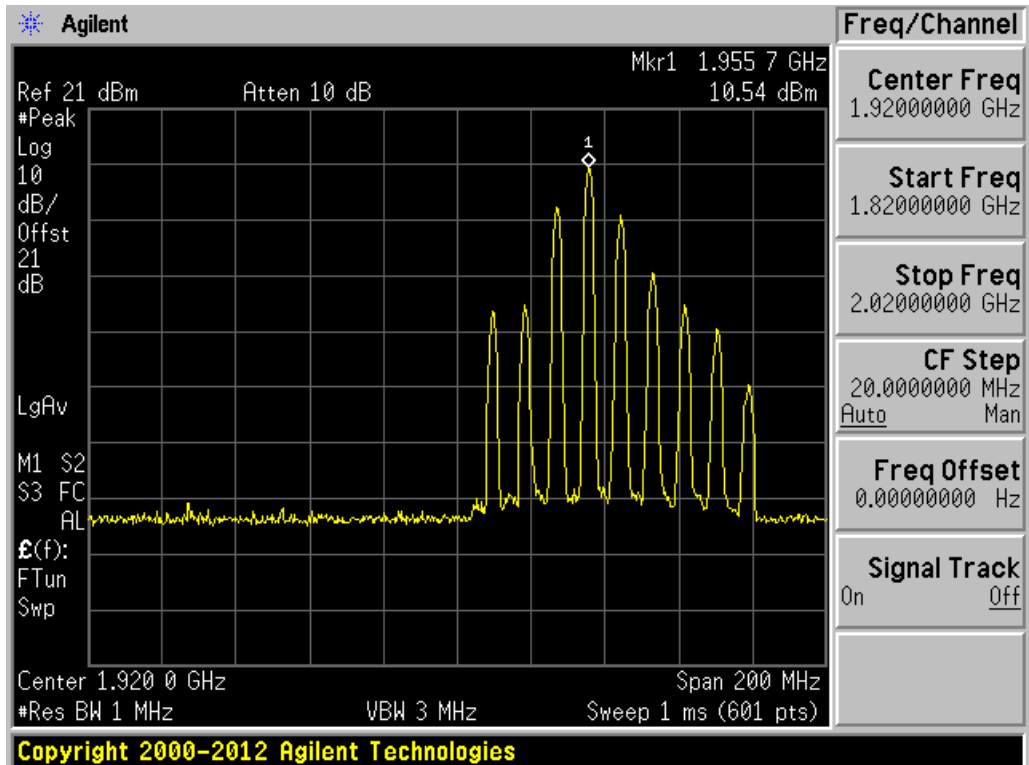
Band 5. Frequency of oscillation



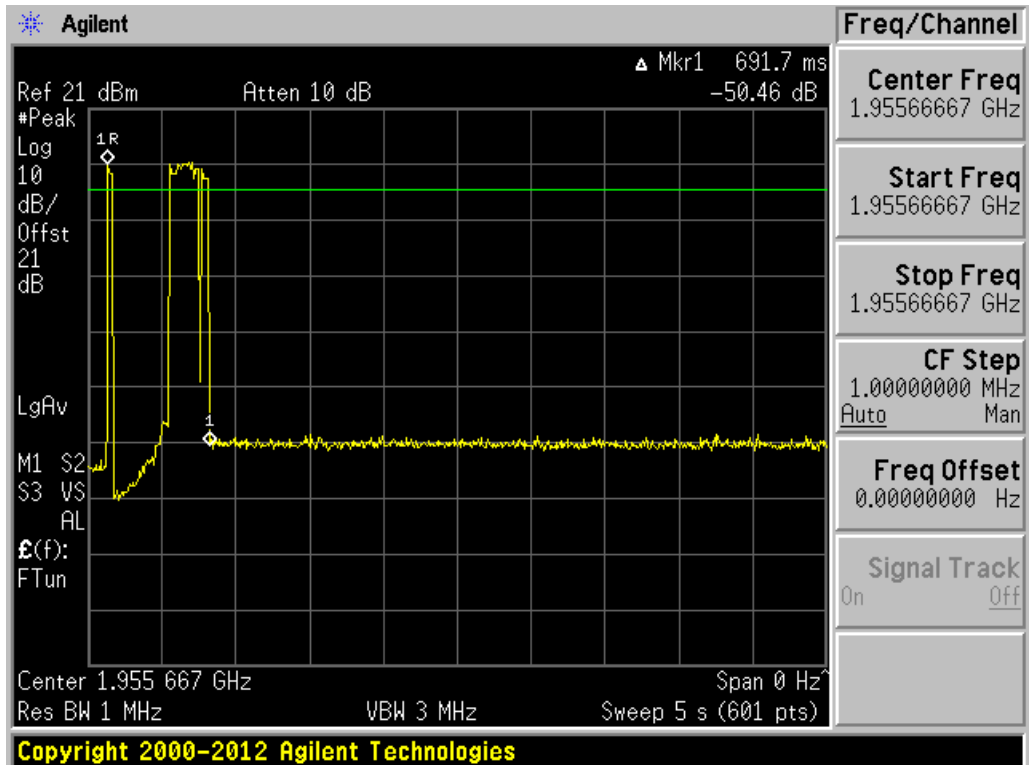
Band 5. Oscillation detection and control



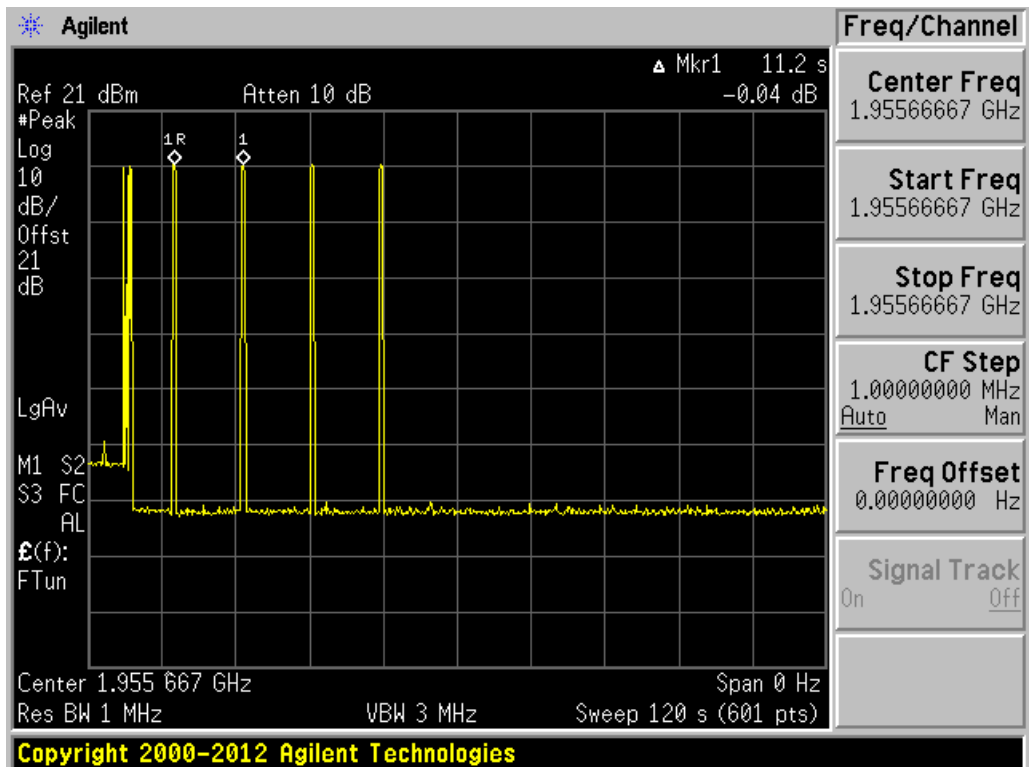
Band 5. 120 seconds sweep. (DUT in the Test Mode)



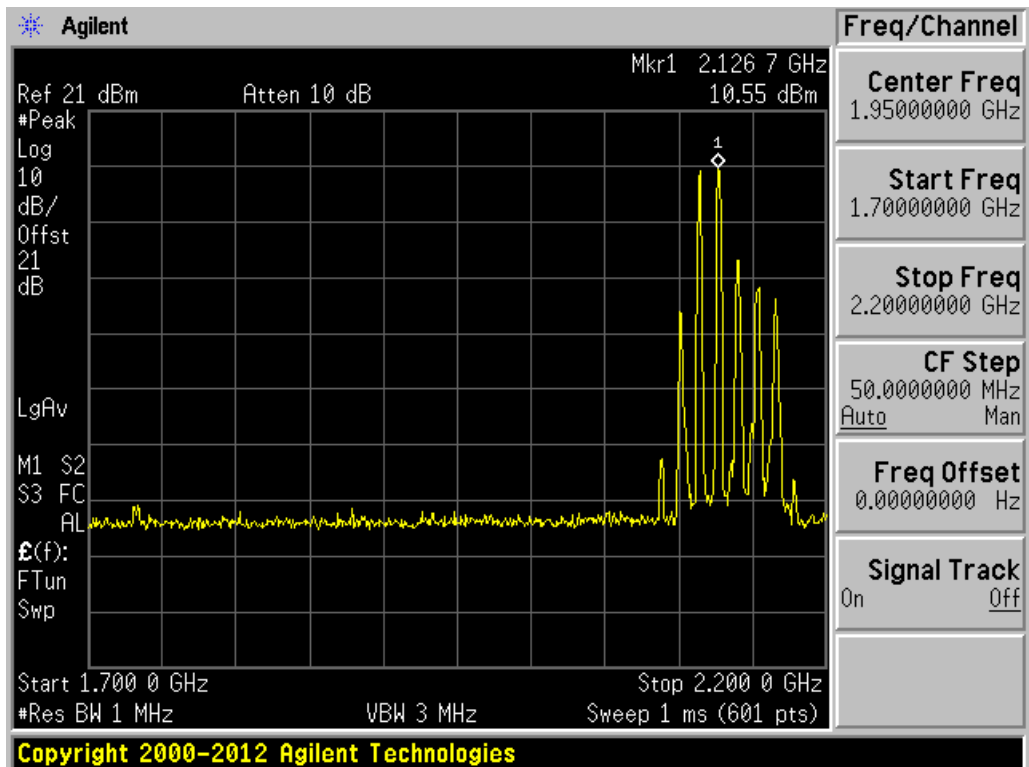
Band 2 & 25. Frequency of oscillation



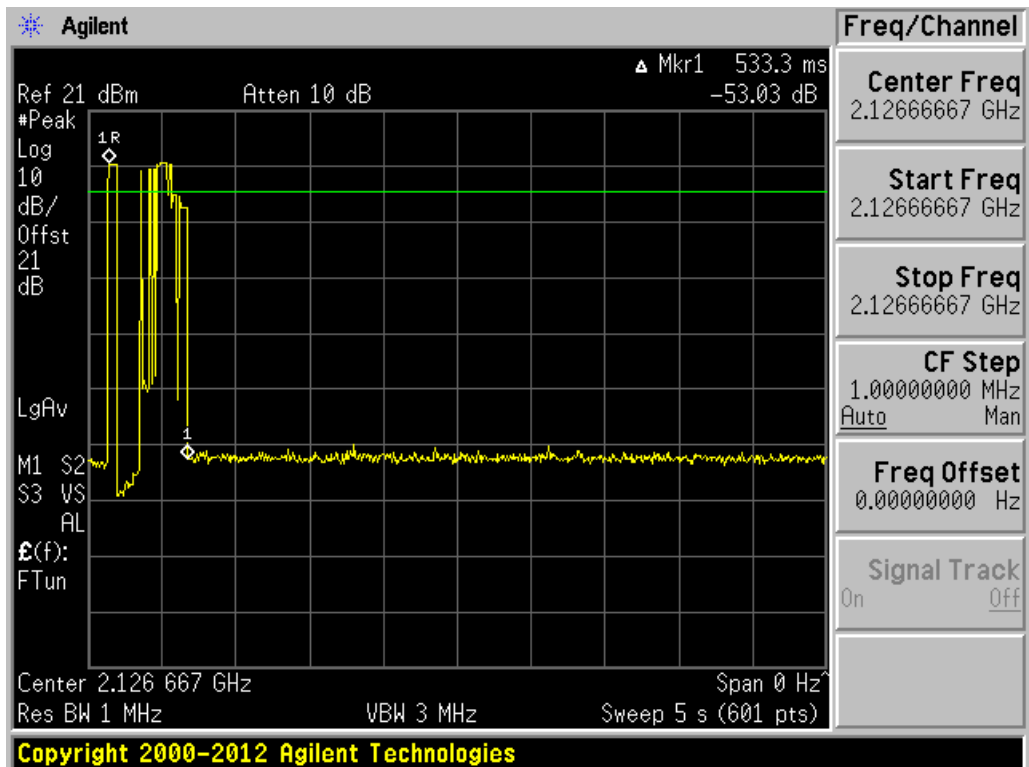
Band 2 & 25. Oscillation detection and control



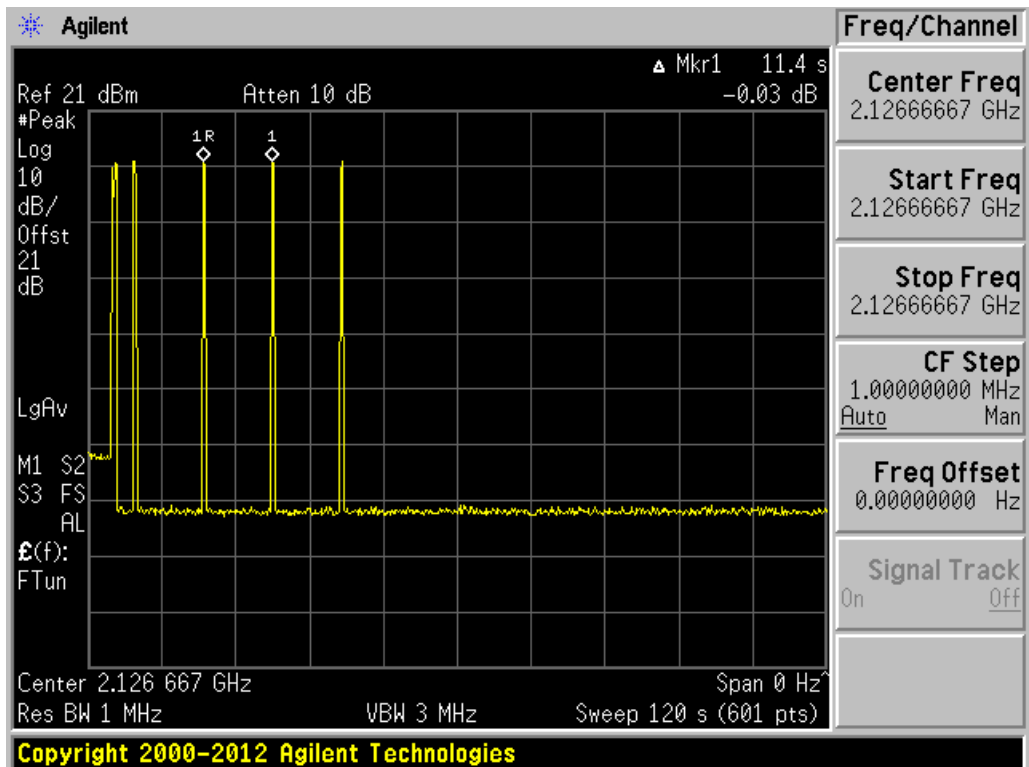
Band 2 & 25. 120 seconds sweep. (DUT in the Test Mode)



Band 4. Frequency of oscillation



Band 4. Oscillation detection and control



Band 4. 120 seconds sweep. (DUT in the Test Mode)

3.11.2 Oscillation Mitigation Test results

Note: All delta measurements were taken within 300 seconds as per 7.11.3(f).6 of KDB 935210 D03 Signal Booster Measurements v04.

Table 32: Band 12 & 17

4.1 MHz AWGN signal @ Pout 0 dBm, 701.5 MHz							
699-716							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	708.6	-69.0	710.4	-74.8	5.8	12	Pass
4	708.6	-68.8	710.4	-74.6	5.8	12	Pass
3	708.6	-68.0	710.4	-74.6	6.6	12	Pass
2	708.6	-67.1	710.4	-75.1	8.0	12	Pass
1	708.6	-70.0	710.4	-74.5	4.5	12	Pass
0	708.6	-69.0	710.4	-74.7	5.7	12	Pass
-1	708.6	-68.0	710.4	-74.3	6.3	12	Pass
-2	708.6	-67.3	710.4	-75.0	7.7	12	Pass
-3	708.6	-69.0	710.4	-74.4	5.4	12	Pass
-4	708.6	-68.8	710.4	-74.8	6.0	12	Pass
-5	708.6	-68.5	710.4	-74.6	6.1	12	Pass
4.1 MHz AWGN signal @ Pout -25 dBm, 731.5 MHz							
729-746							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	738.9	-66.8	737.1	-76.7	9.9	12	Pass
4	738.9	-64.7	737.1	-76.8	4.9	12	Pass
3	738.9	-62.2	737.1	-77.2	5.4	12	Pass
2	738.9	-48.4	737.1	-77.0	6.1	12	Pass
1	738.9	-67.0	737.1	-77.8	7.6	12	Pass
0	738.9	-62.8	737.1	-77.6	7.8	12	Pass
-1	738.9	-47.0	737.1	-77.6	8.9	12	Pass
-2	738.9	-76.9	737.1	-77.9	1.0	12	Pass
-3	738.9	-75.9	737.1	-78.2	2.3	12	Pass
-4	738.9	-75.9	737.1	-78.0	2.1	12	Pass
-5	738.9	-75.3	737.1	-78.2	2.9	12	Pass

Table 33: Band 13

CW signal @ Pout 0 dBm, 778 MHz							
777-787							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	780.1	-71.0	782.1	-75.1	4.1	12	Pass
4	780.1	-70.5	782.1	-75.3	4.8	12	Pass
3	780.1	-70.2	782.1	-75.6	5.4	12	Pass
2	780.1	-70.5	782.1	-75.6	5.1	12	Pass
1	780.1	-70.5	782.1	-75.3	4.8	12	Pass
0	780.1	-70.2	782.1	-75.6	5.4	12	Pass
-1	780.1	-69.8	782.1	-76.7	6.9	12	Pass
-2	780.1	-69.7	782.1	-76.9	7.2	12	Pass
-3	780.1	-72.0	782.1	-75.3	3.3	12	Pass
-4	780.1	-72.1	782.1	-75.5	3.4	12	Pass
-5	780.1	-71.5	782.1	-75.0	3.5	12	Pass
CW signal @ Pout -25 dBm, 747 MHz							
746-756							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	749.7	-70.0	750.9	-75.2	5.2	12	Pass
4	749.7	-70.1	750.9	-75.9	5.8	12	Pass
3	749.7	-75.2	750.9	-77.0	1.8	12	Pass
2	749.7	-74.7	750.9	-77.0	2.3	12	Pass
1	749.7	-74.3	750.9	-77.4	3.1	12	Pass
0	749.7	-73.5	750.9	-76.7	3.2	12	Pass
-1	749.7	-73.0	750.9	-76.8	3.8	12	Pass
-2	749.7	-72.8	750.9	-77.3	4.5	12	Pass
-3	749.7	-71.0	750.9	-77.6	6.6	12	Pass
-4	749.7	-78.7	750.9	-78.8	0.1	12	Pass
-5	749.7	-78.0	750.9	-78.1	0.1	12	Pass

Table 34: Band 5

4.1 MHz AWGN signal @ Pout 0 dBm, 846.5 MHz							
824-849							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	836.8	-70.7	839.2	-75.4	4.7	12	Pass
4	836.8	-69.5	839.2	-75.8	6.3	12	Pass
3	836.8	-69.0	839.2	-76.0	7.0	12	Pass
2	836.8	-68.7	839.2	-76.3	7.6	12	Pass
1	836.8	-72.6	839.2	-75.4	2.8	12	Pass
0	836.8	-71.2	839.2	-75.8	4.6	12	Pass
-1	836.8	-71.5	839.2	-75.8	4.3	12	Pass
-2	836.8	-70.7	839.2	-76.6	5.9	12	Pass
-3	836.8	-70.4	839.2	-76.4	6.0	12	Pass
-4	836.8	-72.2	839.2	-75.8	3.6	12	Pass
-5	836.8	-71.0	839.2	-76.1	5.1	12	Pass
4.1 MHz AWGN signal @ Pout -25 dBm, 891.5 MHz							
869-894							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	878.2	-65.1	880.1	-75.4	10.3	12	Pass
4	878.2	-63.0	880.1	-74.9	11.9	12	Pass
3	878.2	-59.9	880.1	-76.5	4.0	12	Pass
2	878.2	-73.0	880.1	-77.0	4.0	12	Pass
1	878.2	-72.0	880.1	-77.1	5.1	12	Pass
0	878.2	-70.2	880.1	-77.3	7.1	12	Pass
-1	878.2	-70.0	880.1	-77.6	7.6	12	Pass
-2	878.2	-68.0	880.1	-77.3	9.3	12	Pass
-3	878.2	-63.1	880.1	-77.3	0.7	12	Pass
-4	878.2	-76.2	880.1	-77.8	1.6	12	Pass
-5	878.2	-75.9	880.1	-77.9	2.0	12	Pass

Table 35: Band 2 & 25

4.1 MHz AWGN signal @ Pout 0 dBm, 1907.5 MHz							
1850-1910							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	1879.0	-67.3	1886.8	-72.4	5.1	12	Pass
4	1879.0	-67.0	1886.8	-72.5	5.5	12	Pass
3	1879.0	-66.8	1886.8	-72.9	6.1	12	Pass
2	1879.0	-65.8	1886.8	-73.3	7.5	12	Pass
1	1879.0	-67.5	1886.8	-72.5	5.0	12	Pass
0	1879.0	-66.7	1886.8	-73.0	6.3	12	Pass
-1	1879.0	-66.5	1886.8	-72.6	6.1	12	Pass
-2	1879.0	-65.7	1886.8	-72.9	7.2	12	Pass
-3	1879.0	-67.0	1886.8	-72.9	5.9	12	Pass
-4	1879.0	-66.3	1886.8	-73.2	6.9	12	Pass
-5	1879.0	-66.3	1886.8	-73.1	6.8	12	Pass
4.1 MHz AWGN signal @ Pout -25 dBm, 1932.5 MHz							
1930-1990							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	1957.4	-61.8	1953.1	-72.2	10.4	12	Pass
4	1957.4	-60.2	1953.1	-72.4	7.2	12	Pass
3	1957.4	-58.2	1953.1	-73.3	7.7	12	Pass
2	1957.4	-55.2	1953.1	-73.4	8.2	12	Pass
1	1957.4	-71.3	1953.1	-76.0	4.7	12	Pass
0	1957.4	-70.8	1953.1	-76.2	5.4	12	Pass
-1	1957.4	-70.0	1953.1	-76.5	6.5	12	Pass
-2	1957.4	-72.5	1953.1	-76.0	3.5	12	Pass
-3	1957.4	-73.0	1953.1	-77.0	4.0	12	Pass
-4	1957.4	-72.5	1953.1	-77.3	4.8	12	Pass
-5	1957.4	-71.1	1953.1	-77.7	6.6	12	Pass

Table 36: Band 4

4.1 MHz AWGN signal @ Pout 0 dBm, 1752.5 MHz							
1710-1755							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	1724.1	-65.2	1715.3	-73.4	8.2	12	Pass
4	1724.1	-64.5	1715.3	-73.6	9.1	12	Pass
3	1724.1	-63.0	1715.3	-73.9	10.9	12	Pass
2	1724.1	-62.0	1715.3	-73.9	11.9	12	Pass
1	1724.1	-65.2	1715.3	-73.2	8.0	12	Pass
0	1724.1	-64.0	1715.3	-72.6	8.6	12	Pass
-1	1724.1	-62.5	1715.3	-73.5	11.0	12	Pass
-2	1724.1	-64.3	1715.3	-73.1	8.8	12	Pass
-3	1724.1	-64.0	1715.3	-73.9	9.9	12	Pass
-4	1724.1	-63.8	1715.3	-74.0	10.2	12	Pass
-5	1724.1	-63.0	1715.3	-74.1	11.1	12	Pass
4.1 MHz AWGN signal @ Pout -25 dBm, 2112.5 MHz							
2110-2155							
Isolation to Gain	Peak Freq	Peak Level	Valley Freq	Valley Level	Delta	Limit	Result
5	2128.8	-60.9	2136.8	-72.6	11.7	12	Pass
4	2128.8	-59.2	2136.8	-73.0	6.5	12	Pass
3	2128.8	-57.4	2136.8	-73.0	6.5	12	Pass
2	2128.8	-53.0	2136.8	-73.2	7.8	12	Pass
1	2128.8	-37.3	2136.8	-73.8	8.7	12	Pass
0	2128.8	-70.0	2136.8	-76.2	6.2	12	Pass
-1	2128.8	-69.5	2136.8	-76.5	7.0	12	Pass
-2	2128.8	-69.3	2136.8	-76.7	7.4	12	Pass
-3	2128.8	-67.0	2136.8	-76.3	9.3	12	Pass
-4	2128.8	-65.0	2136.8	-76.9	11.9	12	Pass
-5	2128.8	-62.3	2136.8	-76.8	5.8	12	Pass

3.12 Radiated Spurious Emissions Test.

This test conducted in accordance with KDB 935210 D03 V04 Signal Booster Measurements, § 7.12

This comply with FCC Rule: § 2.1053 Measurements required: Field strength of spurious radiation

3.12.1 Radiated spurious emissions test results.

These tests are provided on a separate document.

4 MSCL Calculations and Measurements

4.1 Test Methodology for Coupling Holders:

MSCL was calculated using the free air loss calculation. The user manual states the user must keep a separation distance of 3ft. (1 meter) between the booster and the booster server antenna. Free air loss over a distance of 3ft. at 836 MHz is >30dB. This is the minimum free air loss for the operating bands of the booster.

The server antennas submitted for approval have a maximum net gain of -1.5dB.

Given the free air loss of 30dB added to the server antenna net gain of -1.5dB equals 30.5dB MSCL, it is considered reasonable that for this submission and test procedures in this report, MSCL of 30dB has been used.

Table Definitions:

MSCL - Mobile Station Coupling Loss

CMRS - Commercial Mobile Radio Service (Mobile phone)

BTS - Base Transceiver Station (In test Rohde & Schwarz CMU-200 Radio Communication Test Set used to determine MSCL)

5 Antenna Kitting

(G) Booster Antenna Kitting. All consumer boosters must be sold with user manuals specifying all antennas and cables that meet the requirements of this section. All consumer boosters must be sold together with antennas, cables, and/or coupling devices that meet the requirements of this section. The grantee is required to submit a technical document with the application for FCC equipment authorization that shows compliance of all antennas, cables and/or coupling devices with the requirements of this section, including any antenna or equipment upgrade options that may be available at initial purchase or as a subsequent upgrade.

Cables:

Cables:	Description	Cable	Minimum Cable loss in dB
ACX100	extension cable	4 ft. C105	-0.44
ACX900	extension cable	9 ft. C105	-1.00
CBXmaXfe10	extension cable	10 ft. C205	-1.00
CBXmaXfe20	extension cable	20 ft. C205	-2.00
CBXmaXfe30	extension cable	30 ft. C205	-3.00
CBXmaXfe40	extension cable	40 ft. C205	-4.00
CBXmaXfe50	extension cable	50 ft. C205	-5.00
CBXmaXfe60	extension cable	60 ft. C205	-6.00

Antennas:

Antenna Part #	Description	Cable	Minimum Cable loss in dB	Maximum Antenna Gain (dBi)	Net gain (dBi)
SEMiniX1	Antenna	10ft RG174U	-2.5	0	-2.5
SEM2M series	Antenna	10 ft. C105	-2.5	0	-2.5
SEM11M series	Antenna	10 ft. C105	-2.5	2	-0.5
SEM14M series	Antenna	10 ft. C105	-2.5	3	0.5
SEM2LGM series	Antenna	11 ft. C205	-2.0	0	-2.0
SEM11LGM series	Antenna	11 ft. C205	-2.0	2	0.0
SEM14LGM series	Antenna	11 ft. C205	-2.0	3	1.0
SEM26LGM series	Antenna	11 ft. C205	-2.0	3	1.0
SEM2LGML series	Antenna	18 ft. C205	-2.5	0	-2.5
SEM11LGML series	Antenna	18 ft. C205	-2.5	2	-0.5
SEM14LGML series	Antenna	18 ft. C205	-2.5	3	0.5
SEM26LGML series	Antenna	18 ft. C205	-2.5	3	0.5
SEM2TH series	Antenna	14 ft. C205	-2.0	0	-2.0
SEM11TH series	Antenna	14 ft. C205	-2.0	2	0.0
SEM14TH series	Antenna	14 ft. C205	-2.0	3	1.0
SEM26TH series	Antenna	14 ft. C205	-2.0	3	1.0
SEM2THL series	Antenna	25 ft. C205	-3.0	0	-2.75
SEM11THL series	Antenna	25 ft. C205	-3.0	2	-1.0
SEM14THL series	Antenna	25 ft. C205	-3.0	3	0
SEM26THL series	Antenna	25 ft. C205	-3.0	3	0
SEMD1 series	Antenna	18 ft. C205	-3.0	3	0
SEMDA2 series	Antenna	18 ft. C205	-3.0	3	0
SEMO series	Antenna	18 ft. C205	-2.5	0	-2.5
SEMDP1 series	Antenna	20 ft. C205	-3.0	3	0
SEMRP1X	Antenna	4 ft. C105	-1.0	-1	-2
SEMRP1XL	Antenna	7 ft. C105	-1.8	-1	-2.8