Lab Code: 200167-0

FCC PART 22H, 24E

TEST AND MEASUREMENT REPORT

For

Wi-Ex Inc.

One Meca Way,

Norcross, GA 30093, USA

FCC ID: SO4YX240-PCS-CEL

Report Type:	Product Type:
Original Report	Bi Directional Amplifier

Test Engineer: Quinn Jiang

Report Number: R1110172-2224

Report Date: 2011-11-21

Victor Zhang

Reviewed By: EMC/RF Lead

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1110172-2224	Original Report	2011-11-21

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Wi-Ex, Inc's* product, model: YX240, FCC ID: SO4YX240-PCS-CEL or the "EUT" as referred to in this report, is a Bi directional Amplifier that operates in Cellular and PCS bands.

General Specifications:

- Operating Frequency: Downlink: 869-894 MHz and 1930-1990 MHz
  Uplink: 824-849 MHz and 1850-1910 MHz
- Emission Designator: F9W, GXW, G7W
- Modulation: GSM/GPRS, EDGE, CDMA/EVDO, WCDMA/HSPA
- Power Source: AC/DC Adaptor, Input: 110V/60Hz; Output: DC 5V

1.2 Mechanical Description

The EUT dimension is approximately 11.5cm (L) x 7cm (W) x 5cm (H) and weighs approximately 103.5g.

The test data gathered are from production sample. Serial number: R1110172-1, assigned by BACL.

1.3 Objective

This type approval report is prepared on behalf of *Wi-Ex, Inc*. in accordance with Part 2, Subpart J, Part 22 Subpart H, and Part 24 Subpart E, of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC rules for RF output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, field strength of spurious radiation, frequency stability, band edge, and conducted and radiated margin.

1.4 Related Submittal(s)/Grant(s)

No Related Submittals

1.5 Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H – Cellular Radiotelephone Service
Part 24 Subpart E – Broadband PCS

Applicable Standards: TIA EIA 98-C, TIA/EIA 603-C, ANSI C63.4-2003.

All radiated and conducted emissions measurement was performed at Bay Area Compliance Laboratory, Corp. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

1.6 Measurement Uncertainty

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

Based on NIS 81, 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 BACL Corp.

1.7 Test Facility

The test site used by BACL Corp. to collect radiated and conducted emissions measurement data is located at its facility in Sunnyvale, California, USA.

The test site at BACL Corp. has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on February 11 and December 10, 1997, and Article 8 of the VCCI regulations on December 25, 1997. The test site also complies with the test methods and procedures set forth in CISPR 22:2008 §10.4 for measurements below 1 GHz and §10.6 for measurements above 1 GHz as well as ANSI C63.4-2003, ANSI C63.4-2009, TIA/EIA-603 & CISPR 24:2010.

The Federal Communications Commission and Voluntary Control Council for Interference have the reports on file and they are listed under FCC registration number: 90464 and VCCI Registration No.: R-3729, C-4176, G-469, and T-1206. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL Corp. is a National Institute of Standards and Technology (NIST) accredited laboratory under the National Voluntary Laboratory Accredited Program (Lab Code 200167-0). The current scope of accreditations can be found at http://ts.nist.gov/Standards/scopes/2001670.htm

2 SYSTEM TEST CONFIGURATION

2.1 Justification

The EUT was configured for testing according to TIA/EIA-603-C.

The final qualification test was performed with the EUT operating at normal mode.

2.2 EUT Exercise Software

NA, signal was sent through EUT using a signal generator, device was set to normal operating mode.

2.3 Equipment Modifications

No modifications were made to the EUT.

2.4 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Agilent	USB power board	E-B94V-0	X45923
Dongguan Fuyuan Electronic Inc	AC/DC Adapter	FY0502000	0B9XC4

2.5 Internal Configuration

Manufacturer	Description	Model	Serial Number
Wireless Extenders, Inc.	Main PCB	YX240 Rev A	FPCB-0039

2.6 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Signal Generator	SMIQ03	849192/0085
HP	Signal Generator	83650B	3614A00276
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	< 1m	Signal Generator	Input/ EUT
RF cable	< 1m	Output/ EUT	Spectrum analyzer

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046 §22.913(a), §24.232	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A[1]
§2.1049 §22.917, §24.238	Occupied Bandwidth / Out of Band Emissions	Compliant
§2.1053 §22.917, §24.238	Spurious Radiated Emissions	Compliant
§2.1051 §22.917, §24.238	Spurious Emissions at Antenna Terminals	Compliant
§22.917, §24.238	Band Edge	Compliant
§2.1055 §22.355, §24.235	Frequency Stability	N/A[2]
§2.1091	RF Exposure Information	Compliant

Note: [1]According to FCC §2.1047(d) and part 22H, 24E there is no specific requirement for digital modulation and no oscillator circuit in this device, therefore modulation characteristic is not presented.
[2] There is no oscillator circuit in the EUT, therefore there is no frequency stability measurement required.

4 FCC §2.1046, §22.913(a) & §24.232 – RF OUTPUT POWER

4.1 Applicable Standard

According to FCC §22.913 (a), the maximum effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts.

According to FCC §24.232 , Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.

4.2 Test Procedure

Conducted:

The RF output of the transmitter was connected to the signal generator and the spectrum analyzer through sufficient attenuation.

4.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2011-05-10
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28

Statement of Traceability*: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

4.4 Test Environmental Conditions

Temperature:	23-25 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

The testing was performed by Quinn Jiang from 2011-10-27 at RF Site.

4.5 Test Results

Maximum Output Power – Modulated Signal

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
GSM/GPRS	850 MHz Uplink	Low	824.2	4.6	21.43	138.99	500
		Middle	836.6	4.6	21.25	133.35	500
		High	848.8	5.6	20.49	111.94	500
	850 MHz Downlink	Low	869.2	-27.4	0.28	1.07	500
		Middle	881.6	-28.4	0.52	1.13	500
		High	893.8	-26.4	0.47	1.11	500
	1900 MHz Uplink	Low	1850.2	6.2	22.27	168.66	2
		Middle	1880.0	5.2	22.30	169.82	2
		High	1909.8	8.2	22.36	172.19	2
	1900 MHz Downlink	Low	1930.2	-19.8	0.53	1.13	2
		Middle	1960.0	-21.8	0.31	1.07	2
		High	1989.8	-19.8	0.73	1.18	2

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
EDGE	850 MHz Uplink	Low	824.2	1.6	21.90	154.88	500
		Middle	836.6	2.6	22.43	174.98	500
		High	848.8	4.6	22.30	169.82	500
	850 MHz Downlink	Low	869.2	-30.4	0.5	1.12	500
		Middle	881.6	-31.4	0.78	1.20	500
		High	893.8	-29.4	0.56	1.14	500
	1900 MHz Uplink	Low	1850.2	3.2	22.45	175.79	2
		Middle	1880.0	2.2	22.52	178.65	2
		High	1909.8	5.2	22.80	190.55	2
	1900 MHz Downlink	Low	1930.2	-22.8	0.61	1.15	2
		Middle	1960.0	-24.8	0.31	1.07	2
		High	1989.8	-22.8	0.75	1.19	2

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
CDMA/EVDO	850 MHz Uplink	Low	824.80	5.6	21.58	143.88	500
		Middle	836.52	5.6	21.5	141.25	500
		High	848.20	7.6	21.28	134.28	500
	850 MHz Downlink	Low	869.80	-27.4	0.33	1.08	500
		Middle	881.52	-28.4	0.53	1.13	500
		High	893.20	-26.4	0.63	1.16	500
	1900 MHz Uplink	Low	1850.8	6.2	22.15	164.06	2
		Middle	1880.0	5.2	22.14	163.68	2
		High	1909.2	8.2	22.18	165.20	2
	1900 MHz Downlink	Low	1930.8	-19.8	0.71	1.18	2
		Middle	1960.0	-21.8	0.05	1.01	2
		High	1989.2	-19.8	0.63	1.16	2

Mode		Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
WCDMA/HSPA	850 MHz Uplink	Low	826.4	5.6	21.7	147.91	500
		Middle	836.4	5.6	21.84	152.76	500
		High	846.6	6.6	21.52	141.91	500
	850 MHz Downlink	Low	871.4	-27.4	0.17	1.04	500
		Middle	881.4	-28.4	0.22	1.05	500
		High	891.6	-26.4	0.93	1.24	500
	1900 MHz Uplink	Low	1852.4	6.2	22.42	174.58	2
		Middle	1880.0	5.2	22.25	167.88	2
		High	1907.6	8.2	22.66	184.50	2
	1900 MHz Downlink	Low	1932.4	-20.8	0.23	1.05	2
		Middle	1960.0	-21.8	0.20	1.05	2
		High	1987.6	-20.8	0.26	1.06	2

5 FCC §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC §2.1047(d), Part 22H and Part 24E, there is no specific requirement for digital modulation and no oscillator circuit, therefore modulation characteristic is not presented.

5.2 Test Result

N/A

6 FCC §2.1049, §22.917 & §24.238 - OCCUPIED BANDWIDTH

6.1 Applicable Standard

Requirements: FCC §2.1049, §22.917 and §24.238.

6.2 Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 30 kHz (Cellular/PCS) and the 26 dB & 99% bandwidth was recorded.

6.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2011-05-10
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28

***Statement of Traceability**: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

6.4 Test Environmental Conditions

Temperature:	23-25 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

The testing was performed by Quinn Jiang from 2011-10-29 at RF Site.

6.5 Test Results

Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (kHz)	Emission Bandwidth 99% (kHz)
GSM/GPRS	850 MHz Uplink	Middle	836.6	318.747	248.1681
	850 MHz Downlink	Middle	881.6	316.654	248.1453
	1900 MHz Uplink	Middle	1880.0	316.376	249.2315
	1900 MHz Downlink	Middle	1960.0	319.931	249.5037

Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (kHz)	Emission Bandwidth 99% (kHz)
EDGE	850 MHz Uplink	Middle	836.6	318.195	245.3606
	850 MHz Downlink	Middle	881.6	319.343	245.8576
	1900 MHz Uplink	Middle	1880.0	321.722	246.9768
	1900 MHz Downlink	Middle	1960.0	319.473	246.2104

Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (MHz)	Emission Bandwidth 99% (MHz)
CDMA/EVDO	850 MHz Uplink	Middle	836.52	1.443	1.2619
	850 MHz Downlink	Middle	881.52	1.445	1.2616
	1900 MHz Uplink	Middle	1880.0	1.444	1.2627
	1900 MHz Downlink	Middle	1960.0	1.446	1.2613

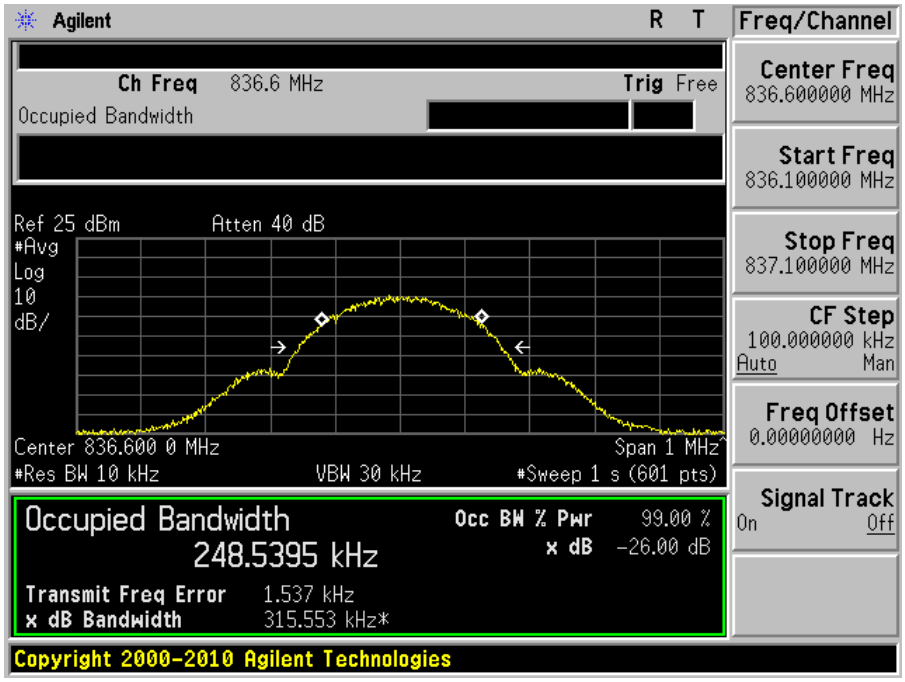
Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (MHz)	Emission Bandwidth 99% (MHz)
WCDMA/HSPA	850 MHz Uplink	Middle	836.4	4.735	4.1877
	850 MHz Downlink	Middle	881.4	4.715	4.163
	1900 MHz Uplink	Middle	1880.0	4.725	4.1761
	1900 MHz Downlink	Middle	1960.0	4.718	4.1776

Please refer to the following plots.

GSM/GPRS 850 MHz Band (Uplink)

Middle Channel (836.6 MHz)

Input



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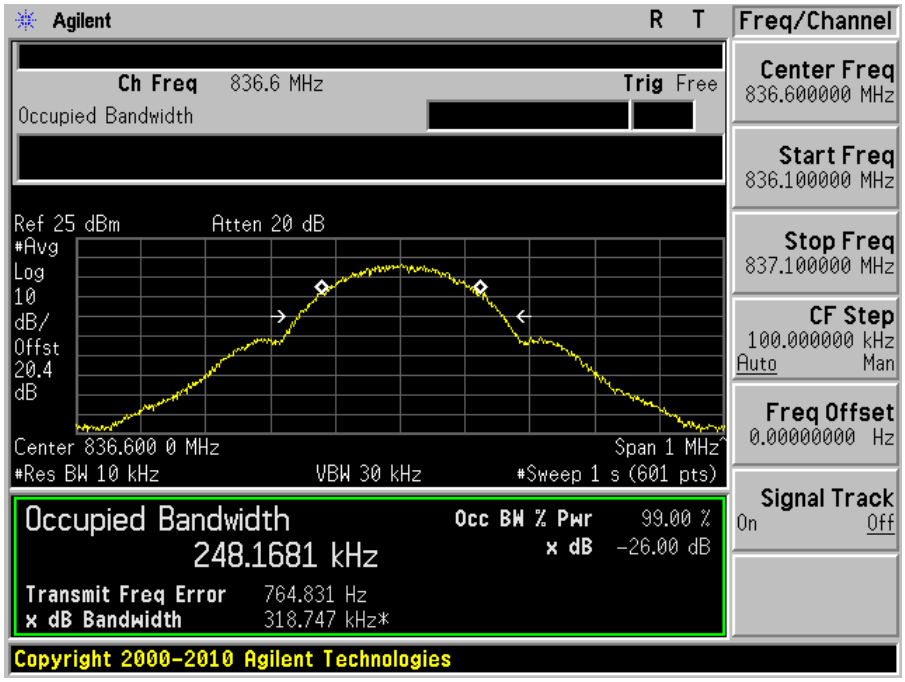
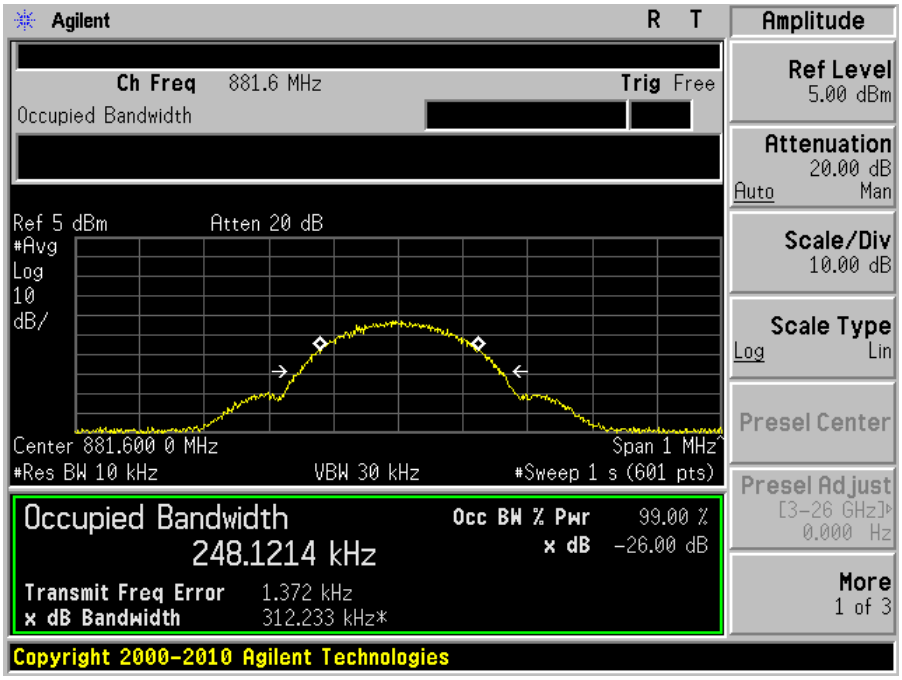


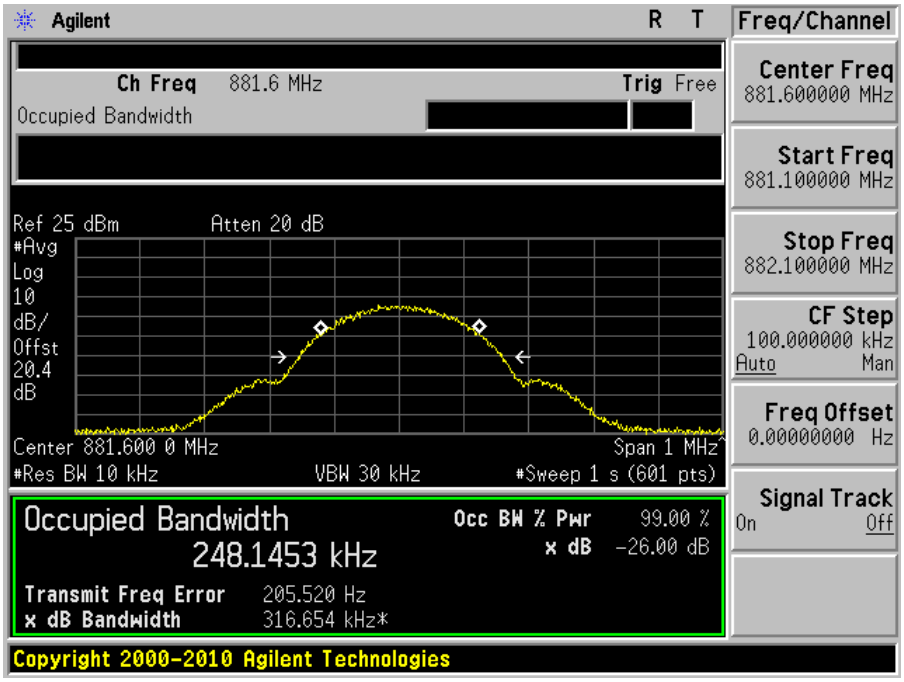
GSM 850 MHz Band (Downlink)

Middle Channel (881.6 MHz)

Input



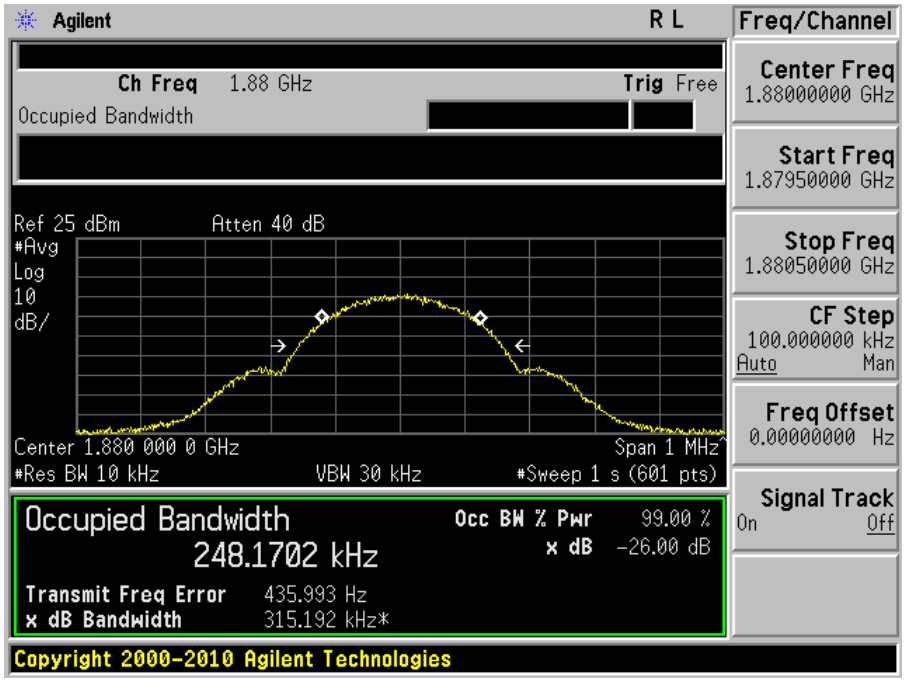
Output



GSM/GPRS 1900 MHz Band (Uplink)

Middle Channel (1880 MHz)

Input



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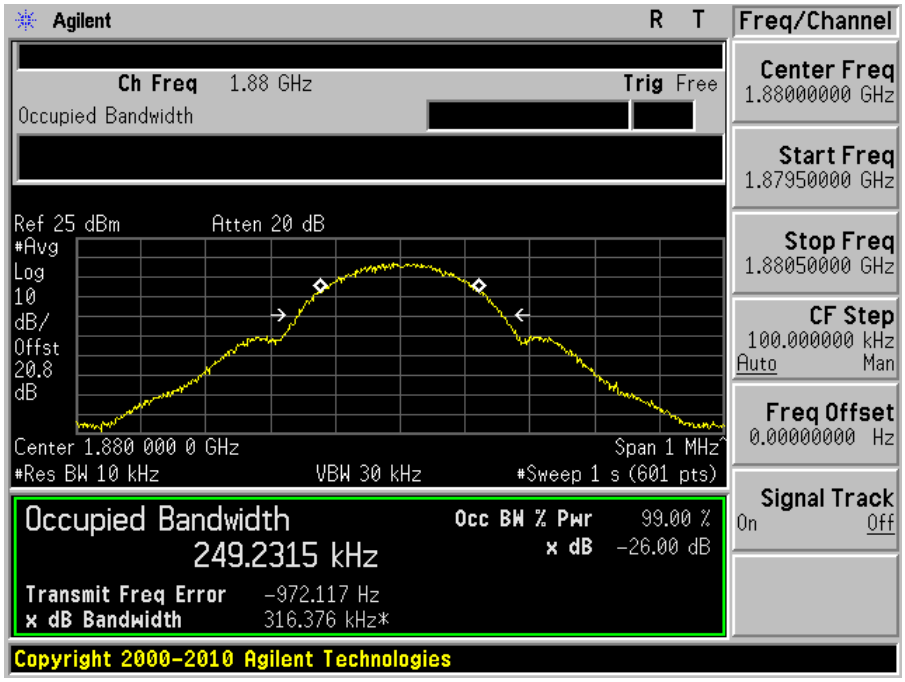
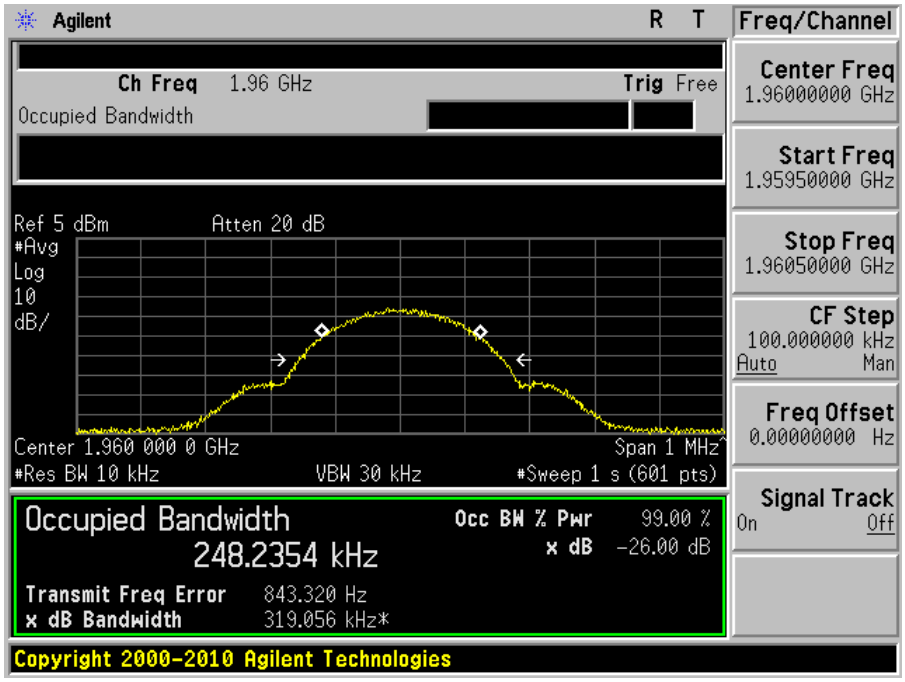


GSM/GPRS 1900 MHz Band (Downlink)

Middle Channel (1960 MHz)

Input



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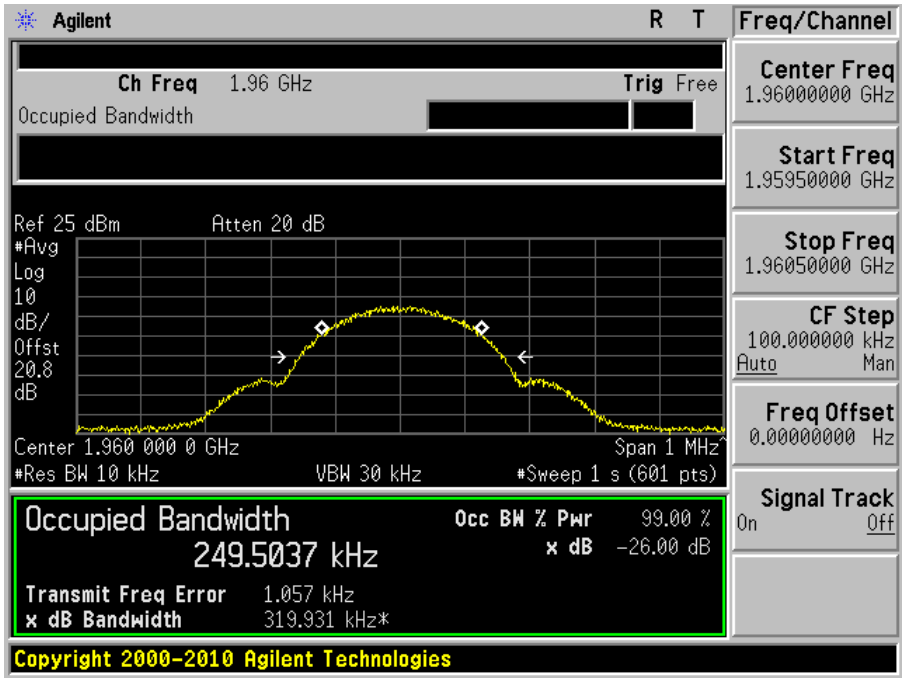
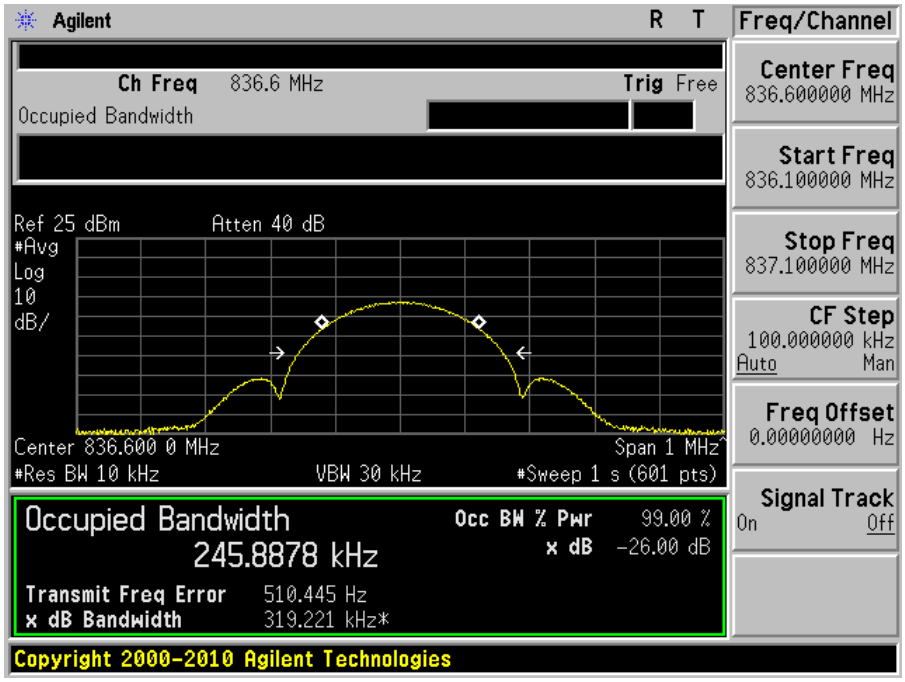


EDGE 850 MHz Band (Uplink)

Middle Channel (836.6 MHz)

Input



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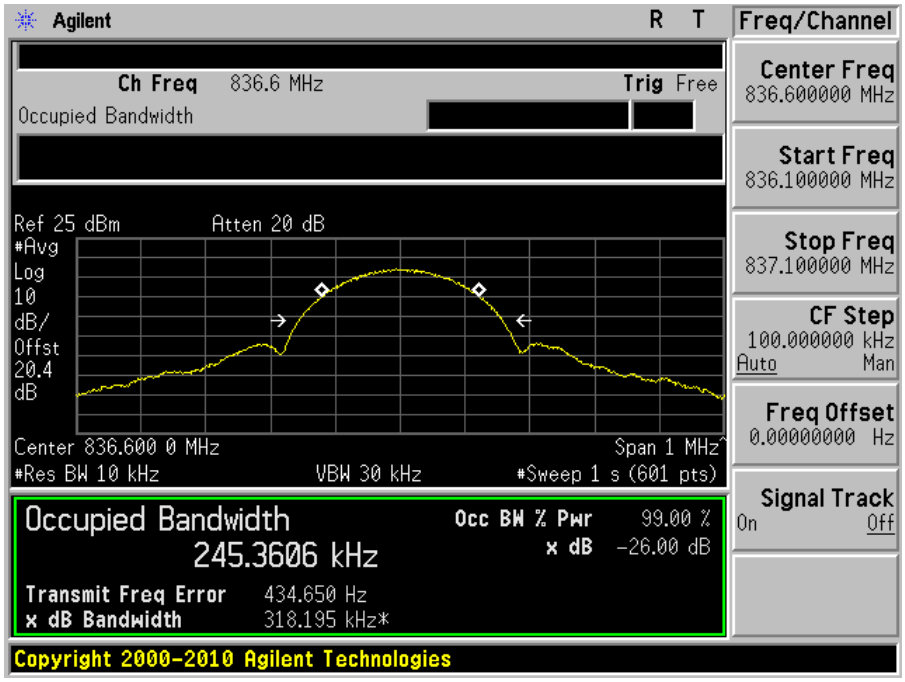
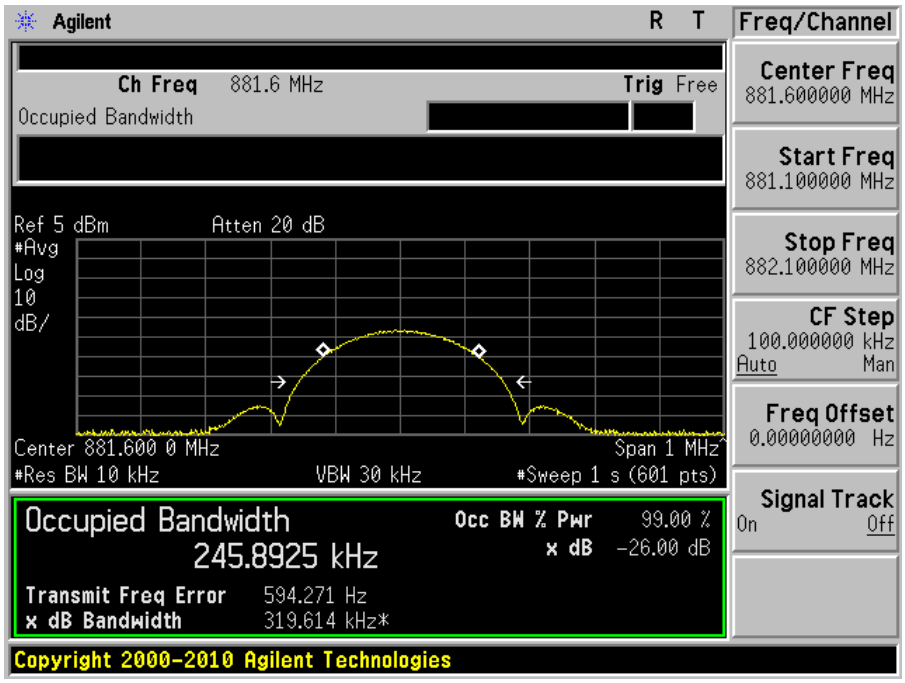


EDGE 850 MHz Band (Downlink)

Middle Channel (881.6 MHz)

Input



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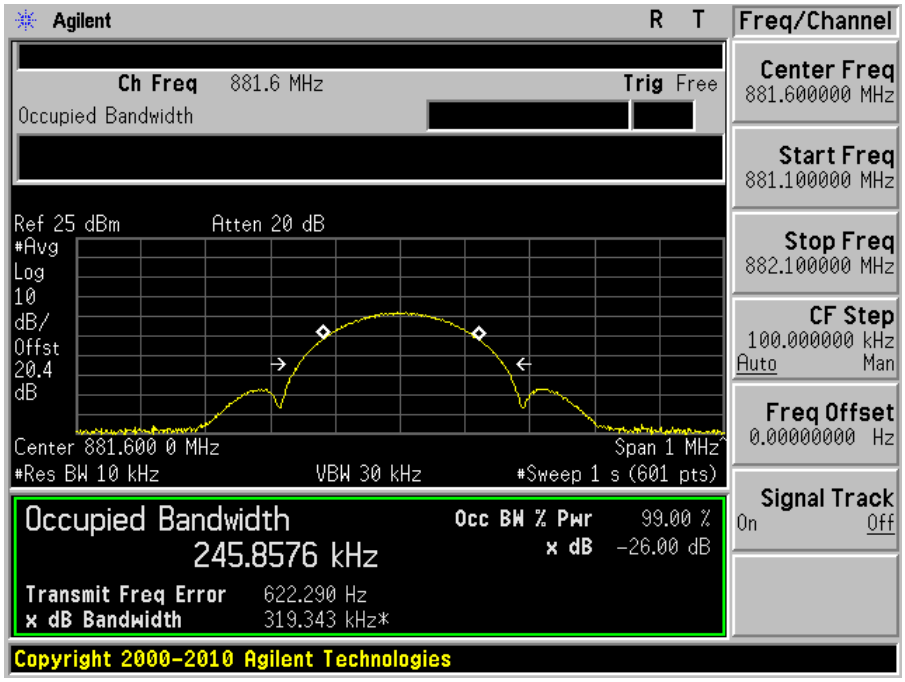
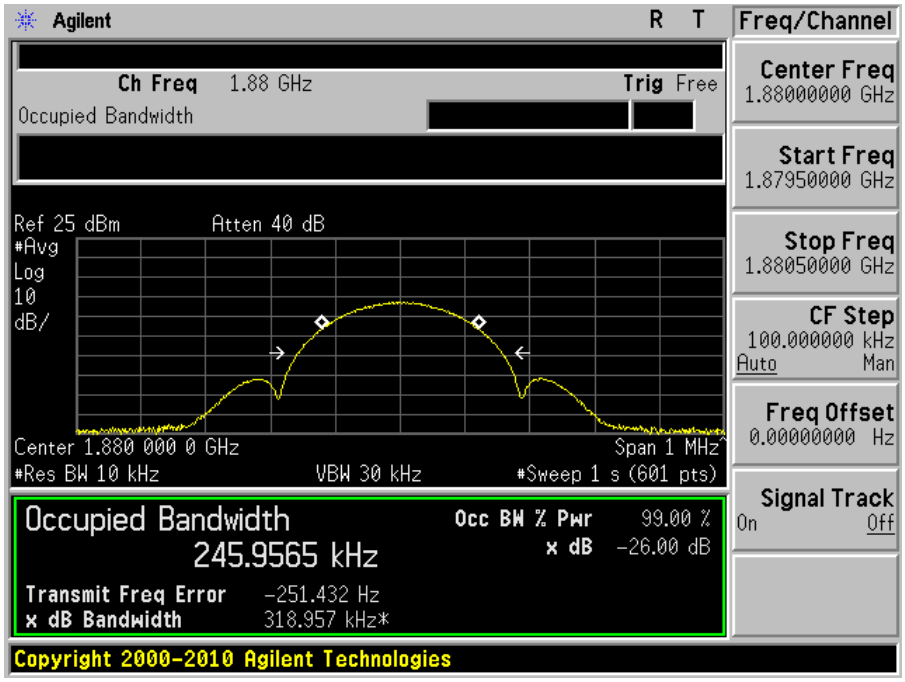


EDGE 1900 MHz Band (Uplink)

Middle Channel (1880 MHz)

Input



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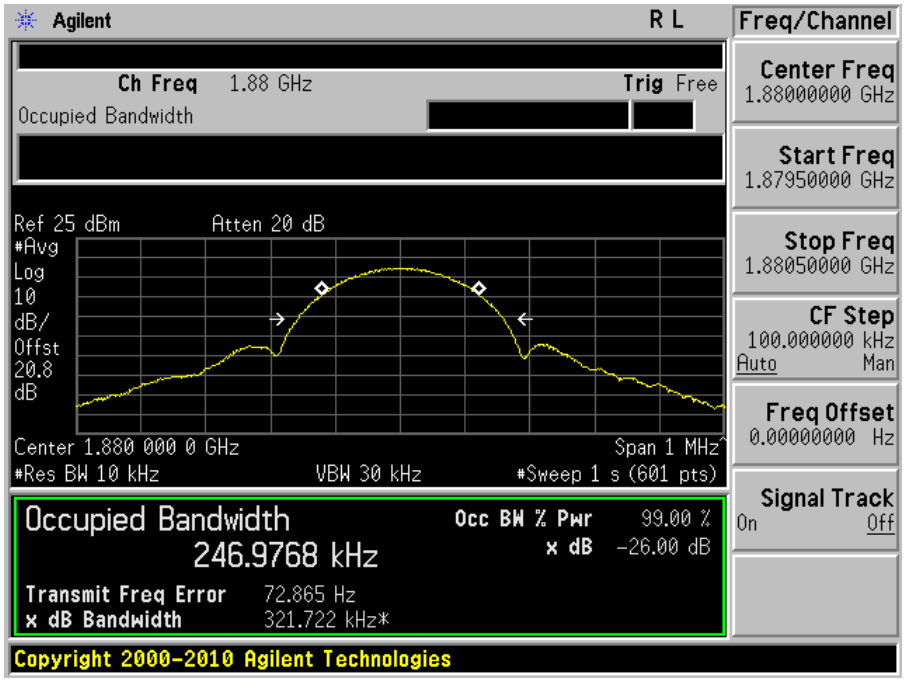
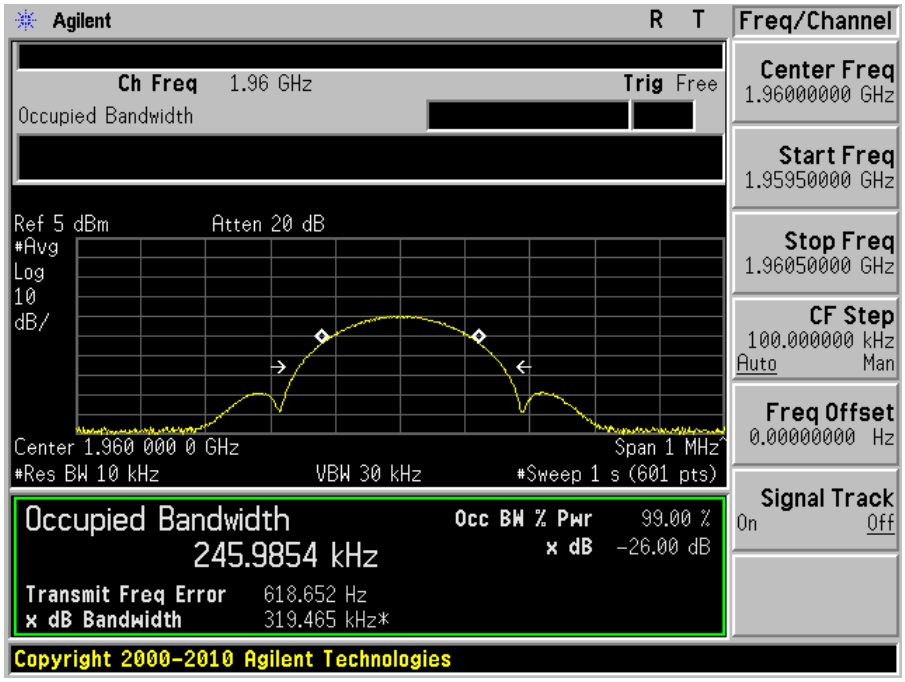


EDGE 1900 MHz Band (Downlink)

Middle Channel (1960 MHz)

Input



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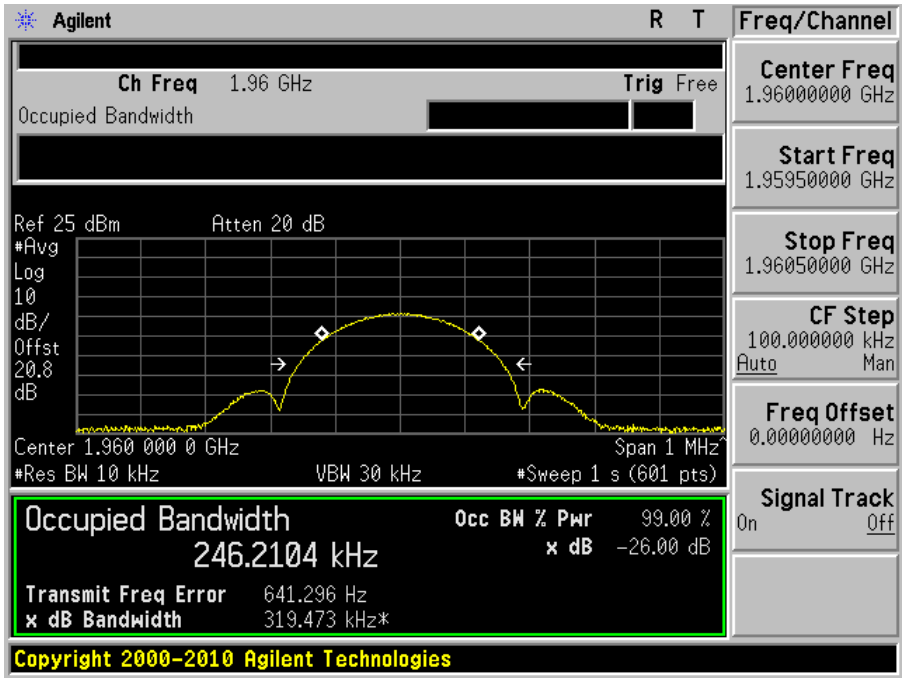
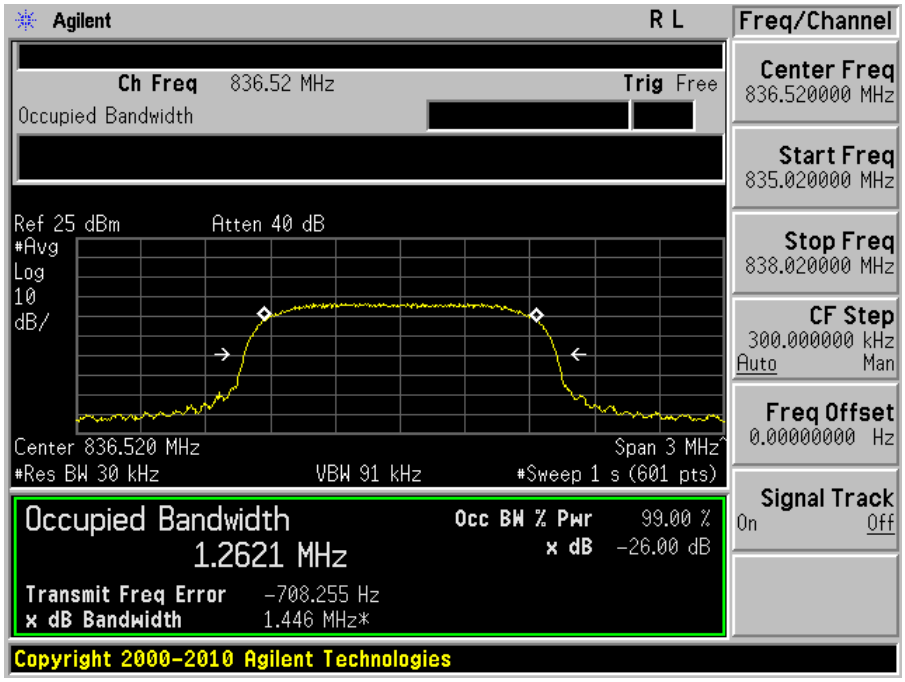


CDMA/EVDO 850 MHz Band (Uplink)

Middle Channel (836.52 MHz)

Input



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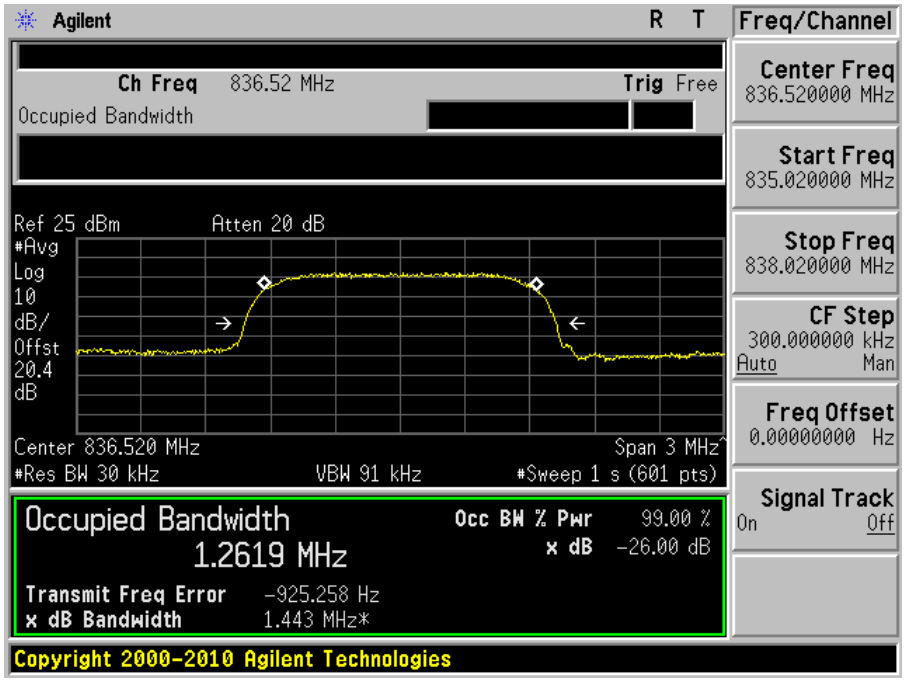
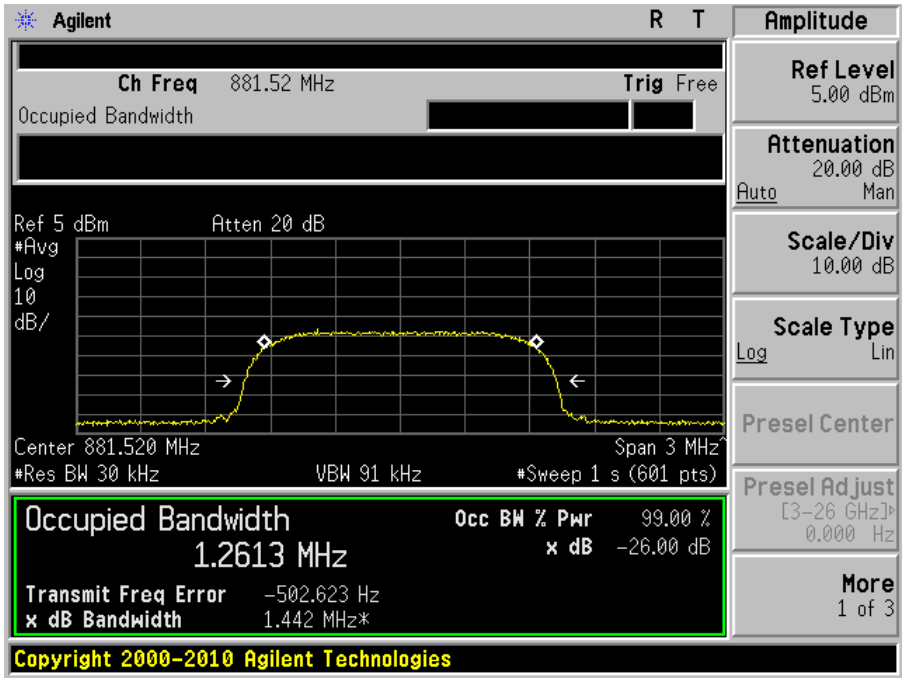


CDMA/EVDO 850 MHz band (Downlink)

Middle Channel (881.52 MHz)

Input



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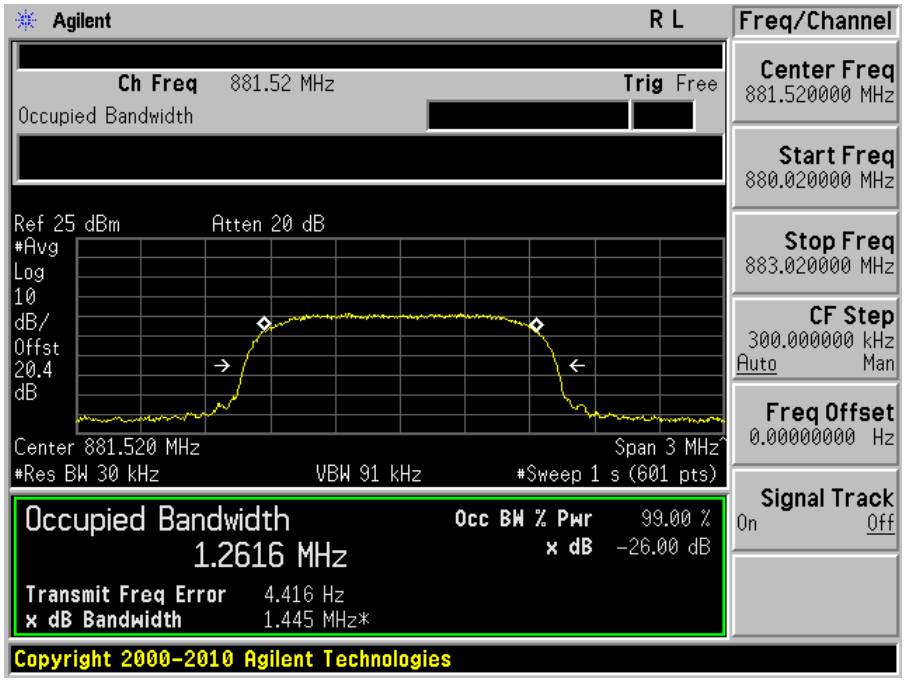
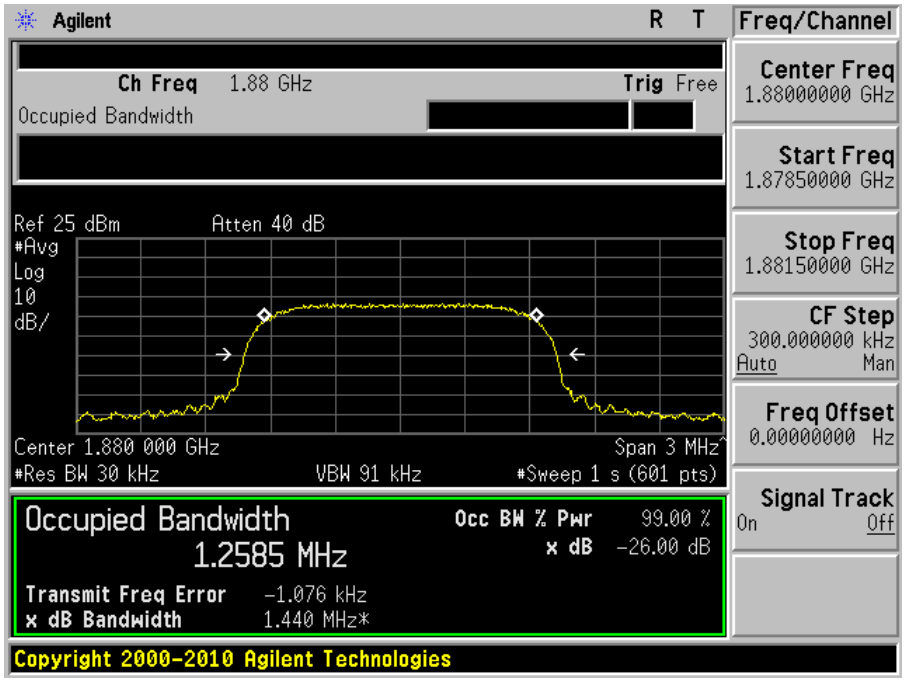


CDMA/EVDO 1900 MHz Band (Uplink)

Middle Channel (1880 MHz)

Input



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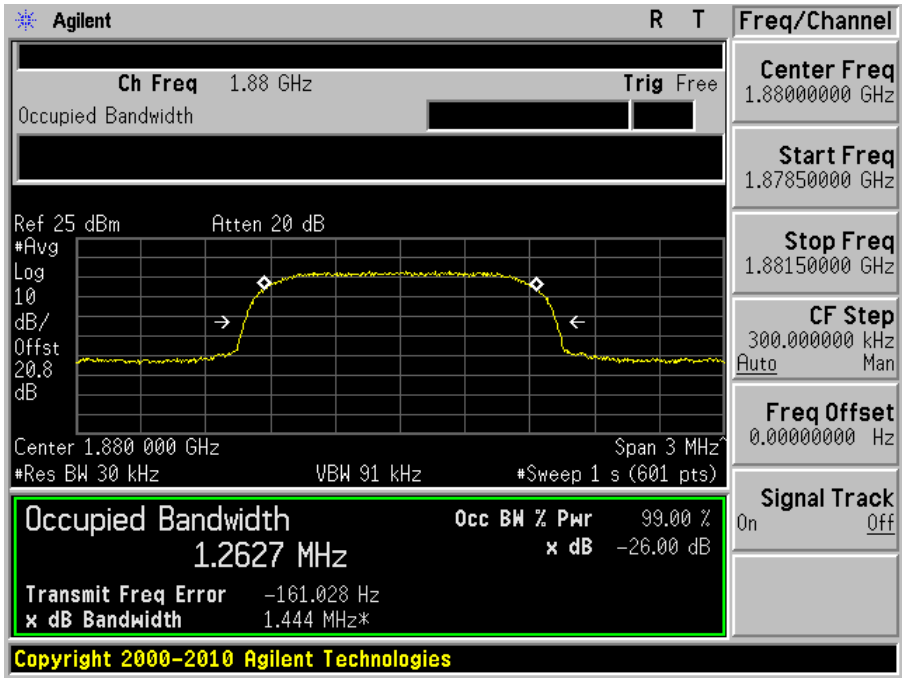
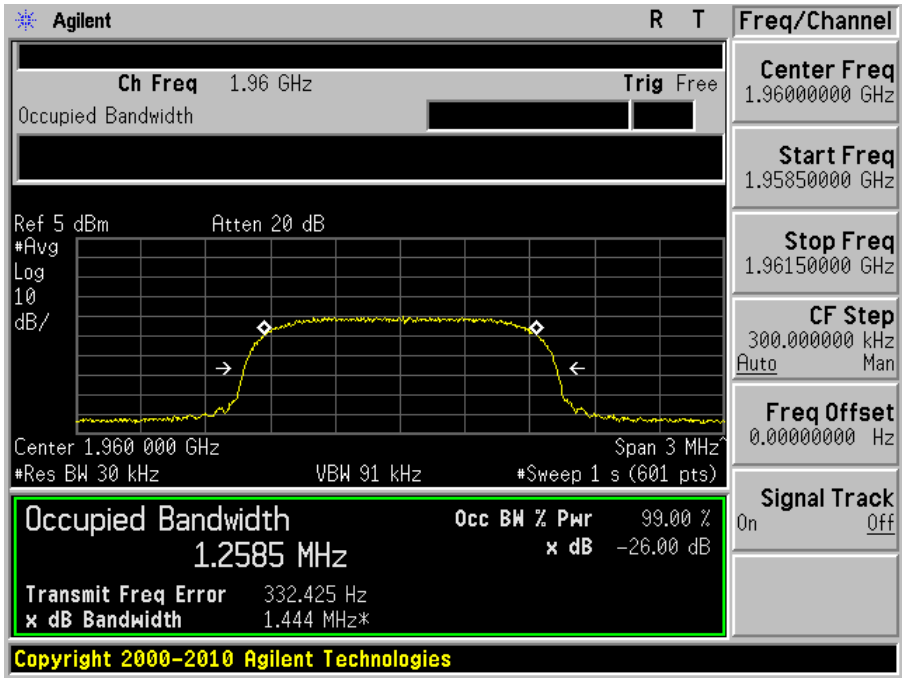


CDMA/EVDO 1900 MHz Band (Downlink)

Middle Channel (1960 MHz)

Input



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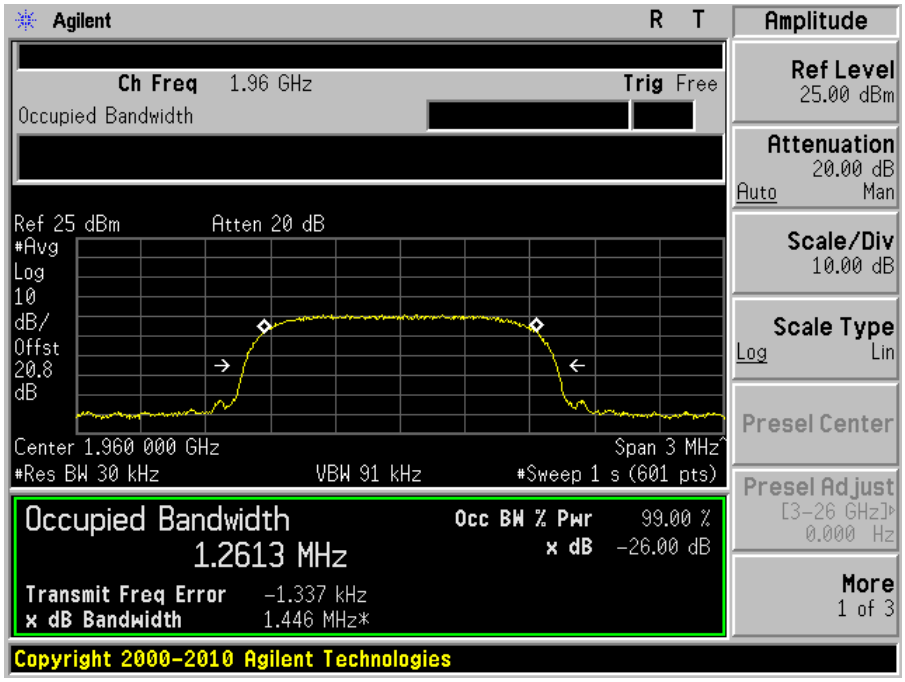

WCDMA/HSPA 850 MHz Band (Uplink)

Middle Channel (836.4 MHz)

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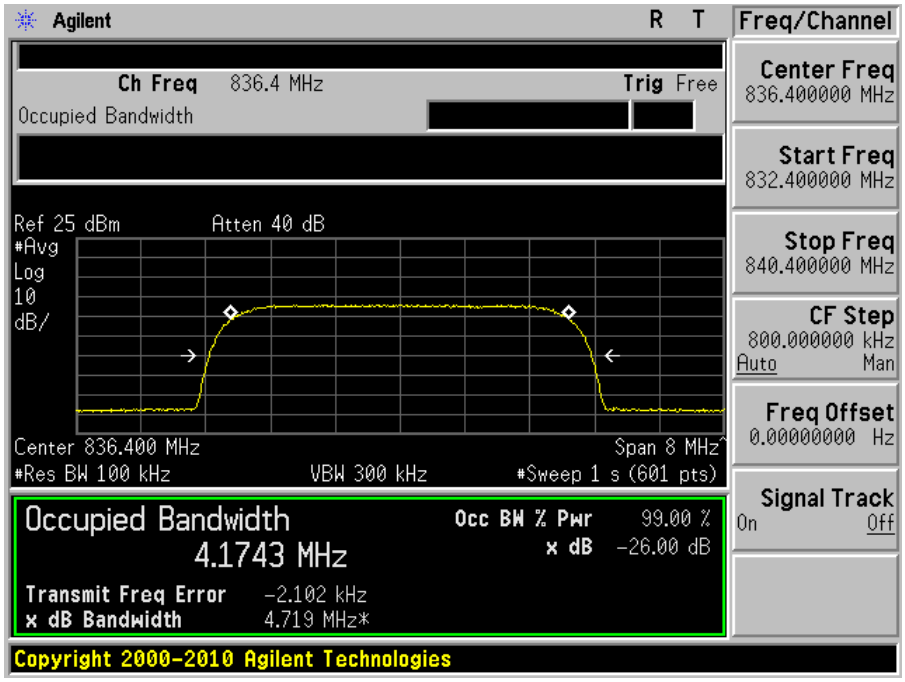
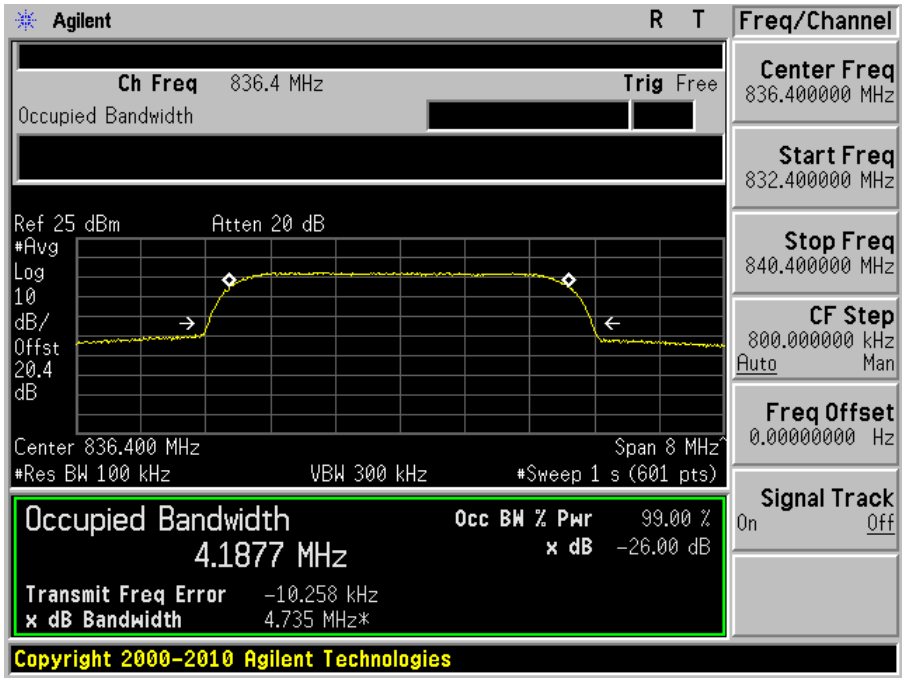


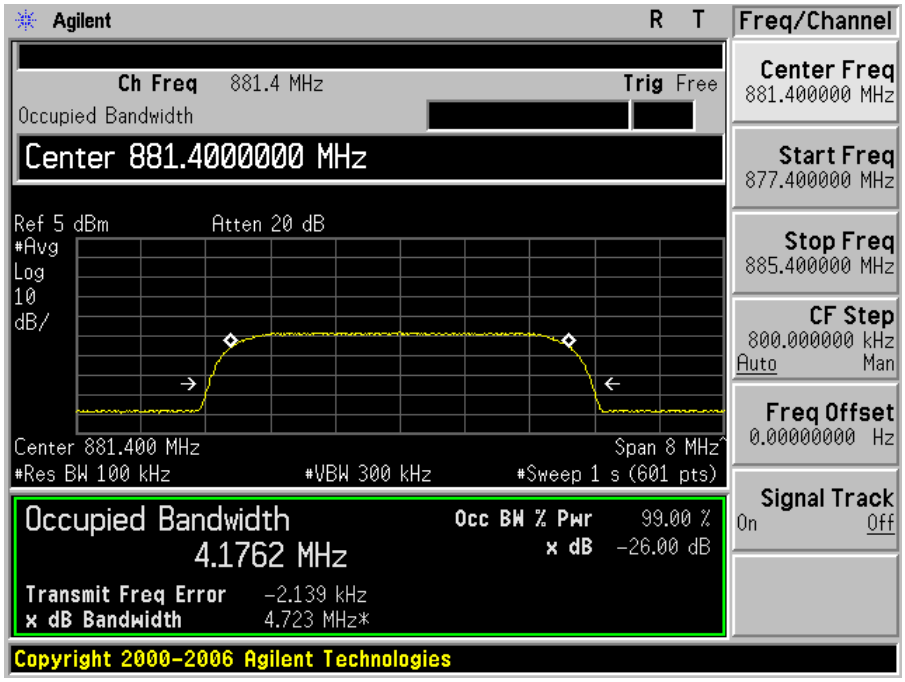
Output



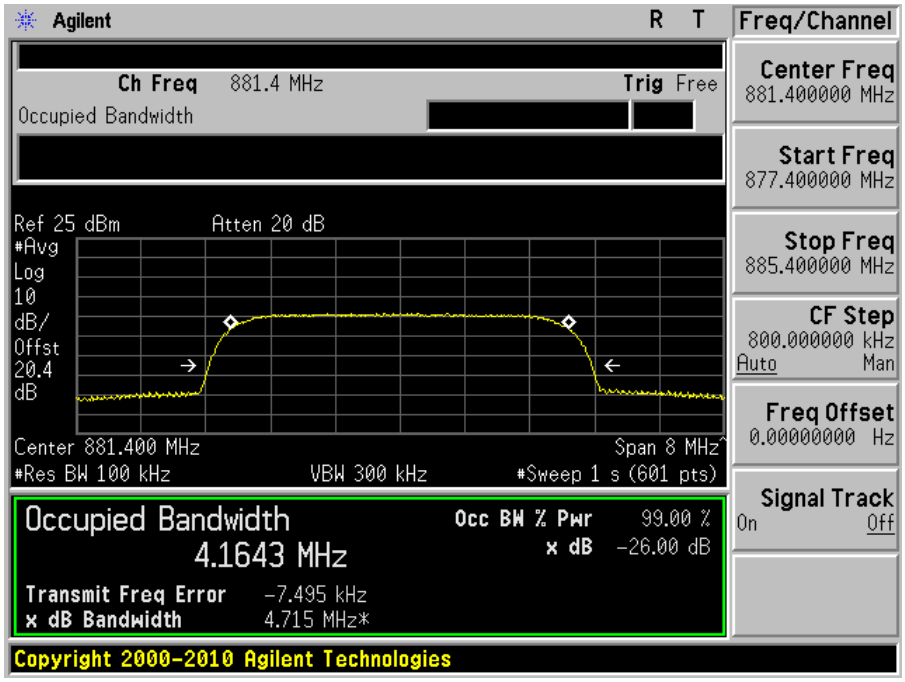
WCDMA/HSPA 850 MHz band (Downlink)

Middle Channel (881.4 MHz)

Input



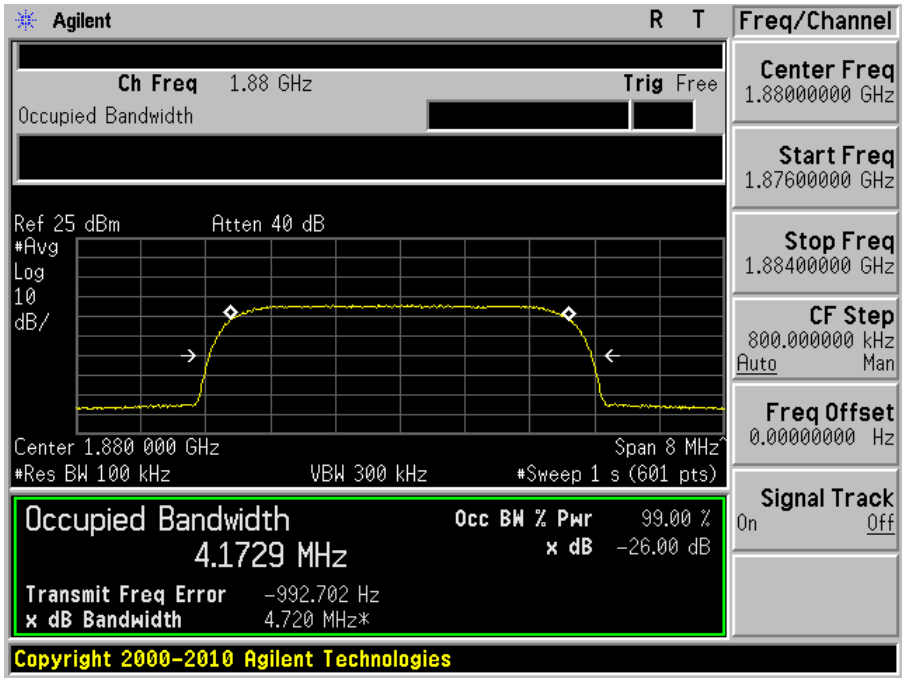
Output



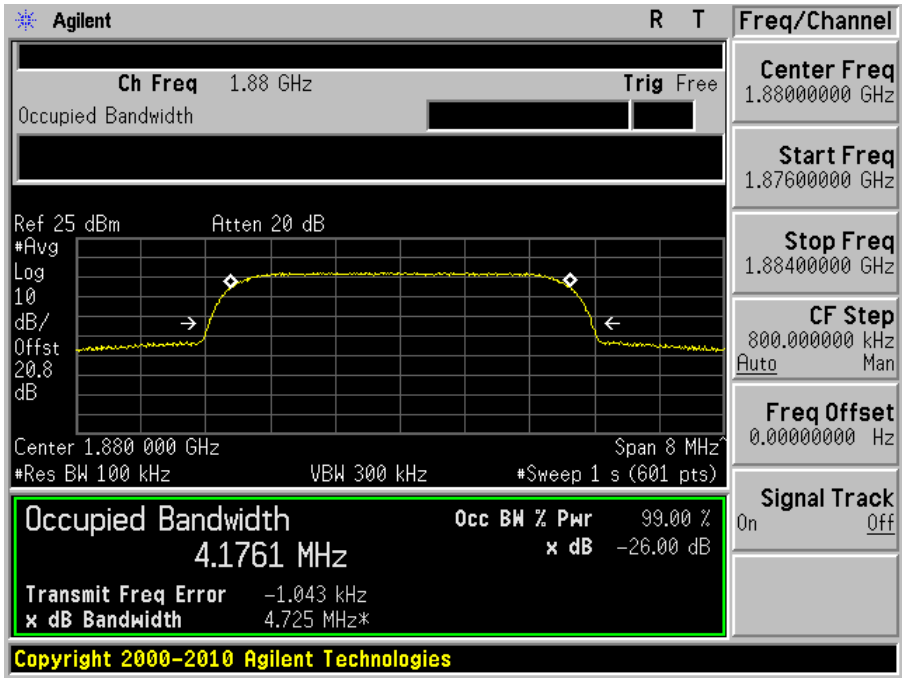
WCDMA/HSPA 1900 MHz Band (Uplink)

Middle Channel (1880 MHz)

Input



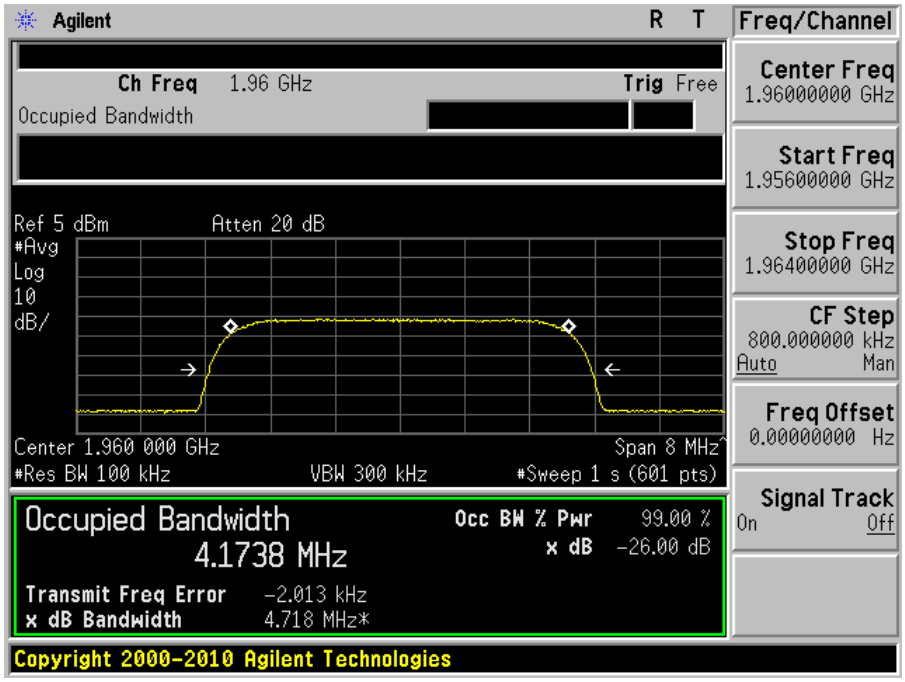
Output



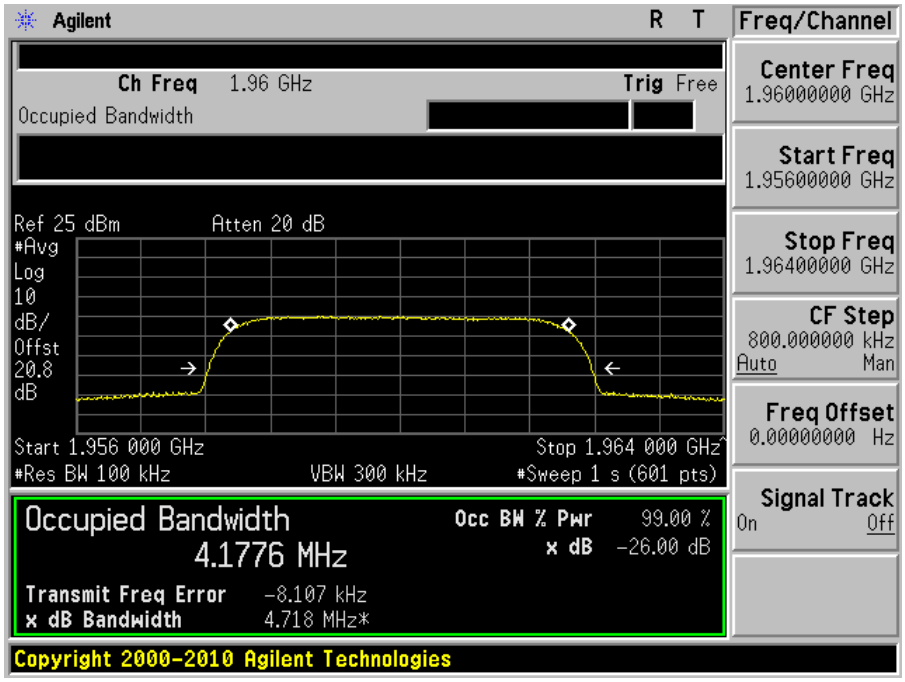
WCDMA/HSPA 1900 MHz Band (Downlink)

Middle Channel (1960 MHz)

Input



Output



7 FCC §2.1053, §22.917 & §24.238 - SPURIOUS RADIATED EMISSIONS

7.1 Applicable Standard

Requirements: FCC §2.1053, §22.917 and §24.238

7.2 Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 log (TX Power in Watts/0.001) – the absolute level
Spurious attenuation limit in dB = 43 + 10 Log10 (power out in Watts)

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Hewlett Packard	Pre-amplifier	8447D	2944A06639	2011-06-09
Mini-Circuits	Pre-amplifier	ZVA-183-S	570400946	2011-05-09
Sunol Sciences	Antenna	JB1	A020106-1	2011-05-17
A.R.A Inc	Horn antenna	DRG-118/A	1132	2010-11-29
Sunol Sciences	Horn Antenna	DRH-118	A052704	2011-02-23
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-31 Note 1
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2011-05-10

***Statement of Traceability**: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

7.4 Test Environmental Conditions

Temperature:	22-25 °C
Relative Humidity:	43 %
ATM Pressure:	101.3 kPa

The testing was performed by Quinn from 2011-10-19 at Chamber3.

7.5 Summary of Test Results

Worst case reading as follows:

Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency (MHz)
Cellular Band, Downlink			
-	-	-	Note
Cellular Band, Uplink			
-23.781	4183	Horizontal	836.6
PCS Band, Downlink			
-	-	-	Note
PCS Band, Uplink			
-24.46	3760	Horizontal	1880

Note: Emissions levels are at the noise floor and/or 20dB below the limit.

7.6 Test Results

Cellular Band, Downlink, Input frequency = 881.6 MHz

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	-	-	-	-	-	-	-	note

Note: Emissions levels are at the noise floor and/or 20dB below the limit.

Cellular Band, Uplink, Input frequency = 836.6 MHz

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
2510	46.44	111	1.28	V	2510	-53.63	9.445	1.5	-45.685	-13	-32.685
2510	47.34	355	1.39	H	2510	-54.13	9.445	1.5	-46.185	-13	-33.185
4183	49.61	45	1.95	V	4183	-47.06	10.699	1.6	-37.961	-13	-24.961
4183	50.53	297	2.13	H	4183	-45.88	10.699	1.6	-36.781	-13	-23.781

PCS Band, Downlink, Input frequency = 1960 MHz

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
-	-	-	-	-	-	-	-	-	-	-	note

Note: Emissions levels are at the noise floor and/or 20dB below the limit.

PCS Band, Uplink, Input frequency = 1880 MHz

Indicated		Turntable Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	S.A. Amp. (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Ant. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760	48.4	287	1.5	V	3760	-48.36	9.45	1.5	-40.41	-13	-27.41
3760	51.43	229	3	H	3760	-45.41	9.45	1.5	-37.46	-13	-24.46

8 FCC §2.1051, §22.917 & §24.238 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

8.1 Applicable Standard

Requirements: FCC §2.1051, §22.917 and §24.238.

The spectrum shall be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1057.

8.2 Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100 kHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

8.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Generator, Signal	83650B	3614A00276	2010-06-21 Note 1
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2011-05-10
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28

Note 1 – Based on a two year calibration cycle

***Statement of Traceability**: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

8.4 Test Environmental Conditions

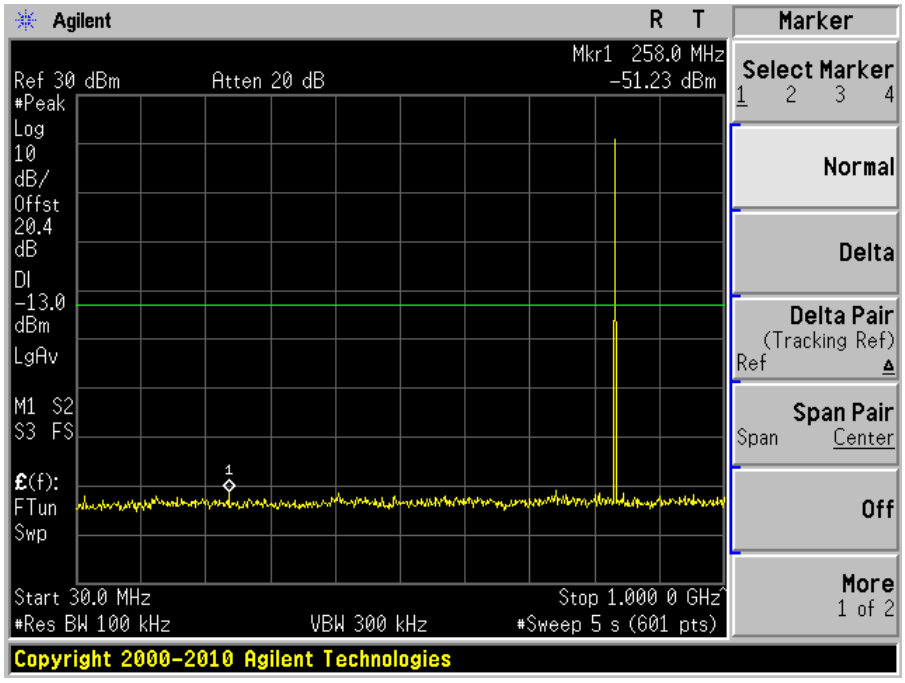
Temperature:	23-25 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

The testing was performed by Quinn Jiang from 2011-10-29 at RF Site.

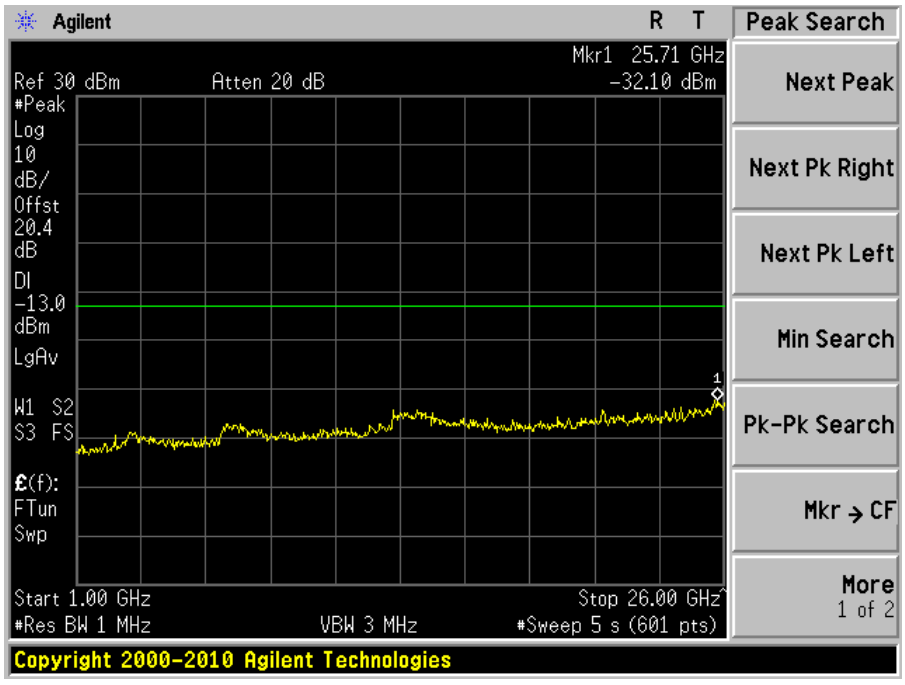
8.5 Test Results

Please refer to the following plots.

850 MHz band Uplink: Middle Channel (836.6 MHz)

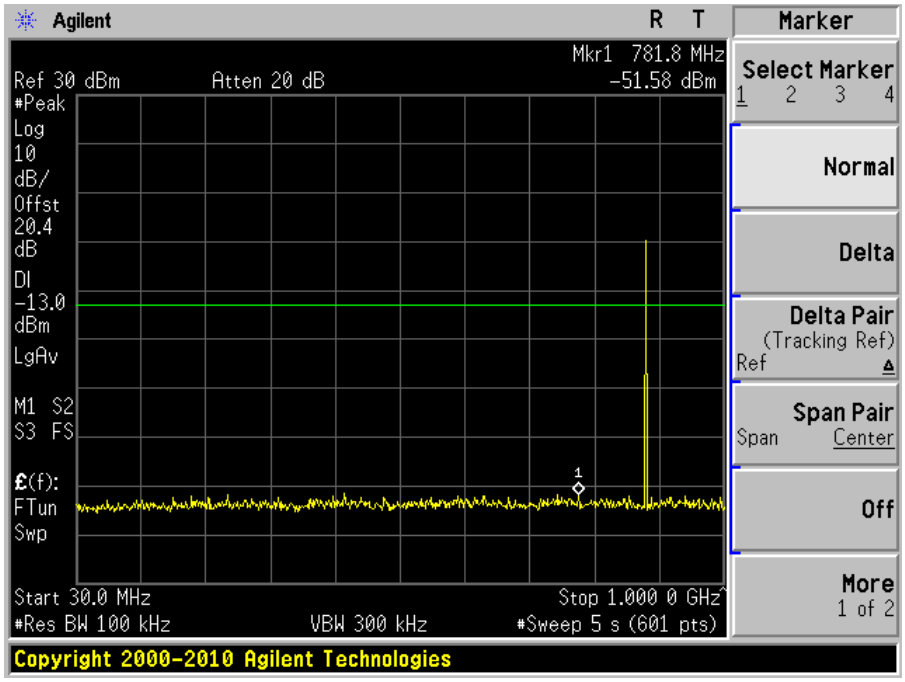


30 MHz to 1 GHz

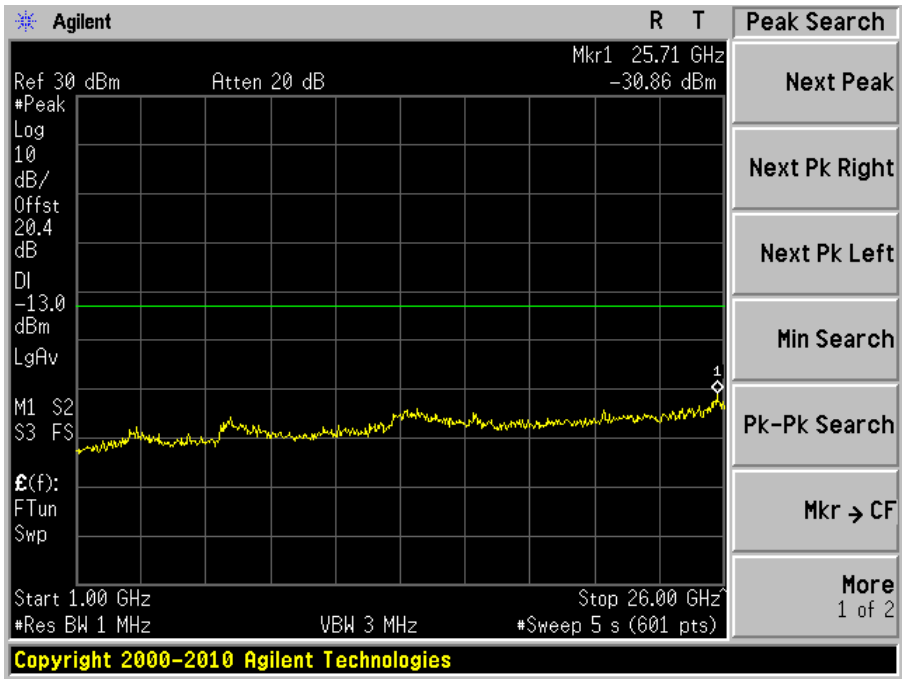


1 GHz to 26 GHz

850 MHz band Downlink: Middle Channel (881.6 MHz)

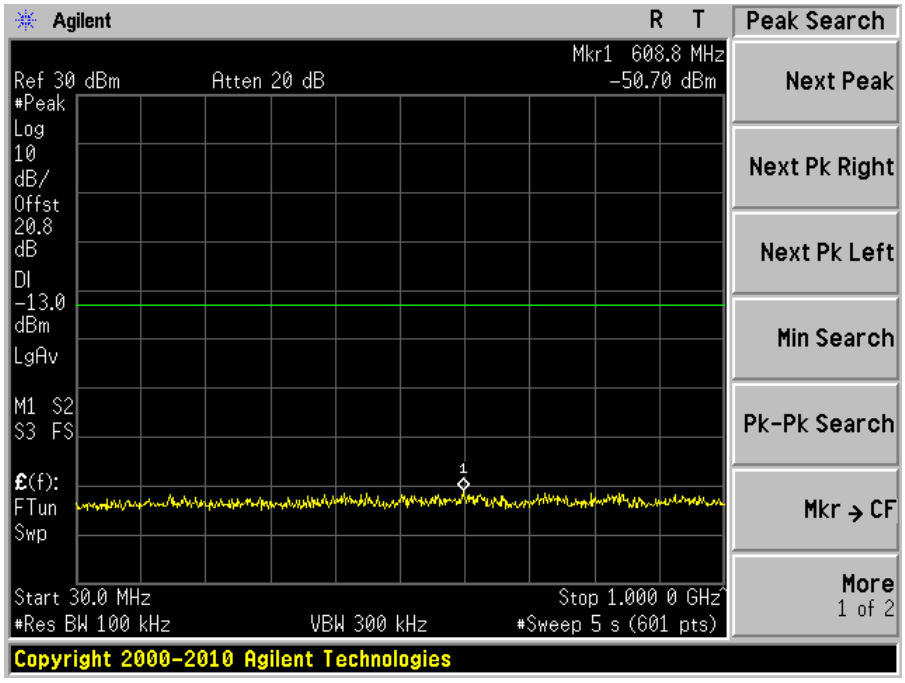


30 MHz to 1 GHz

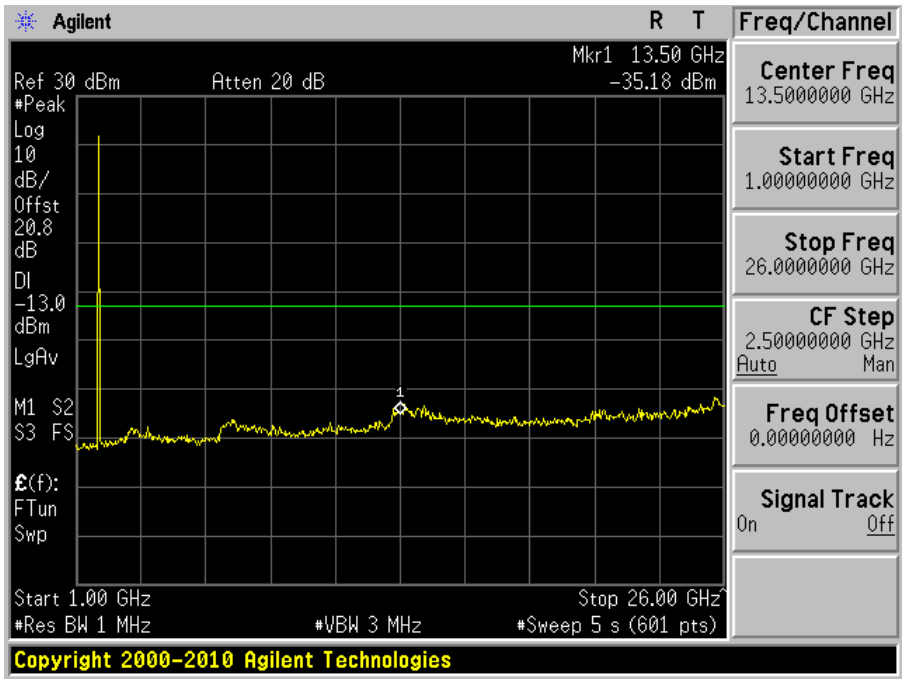


1 GHz to 26 GHz

1900 MHz band Uplink: Middle Channel (1880 MHz)

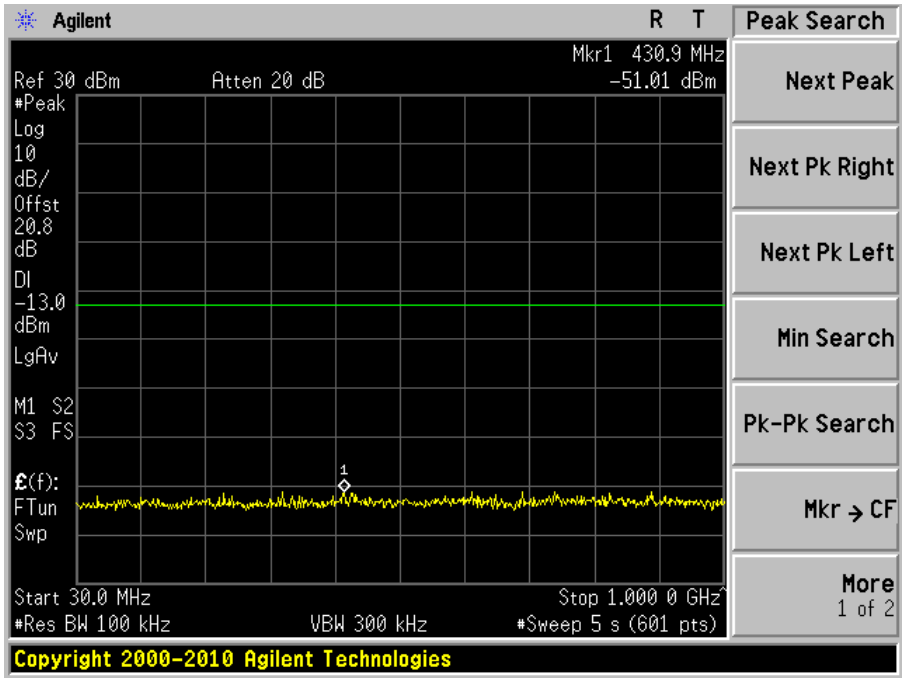


30 MHz to 1 GHz

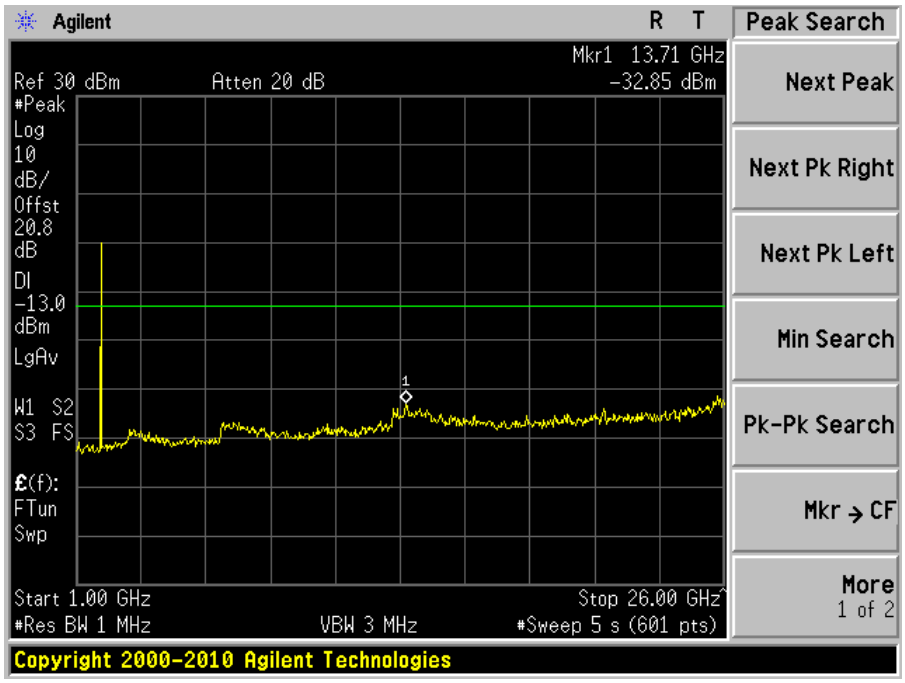


1 GHz to 26 GHz

1900 MHz band Downlink: Middle Channel



30 MHz to 1 GHz

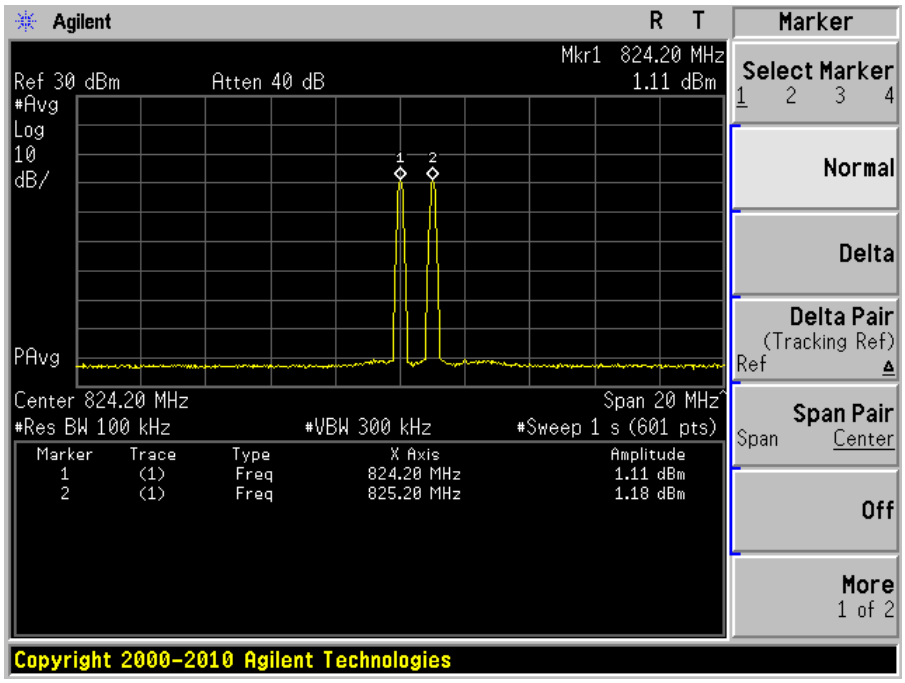


1 GHz to 26 GHz

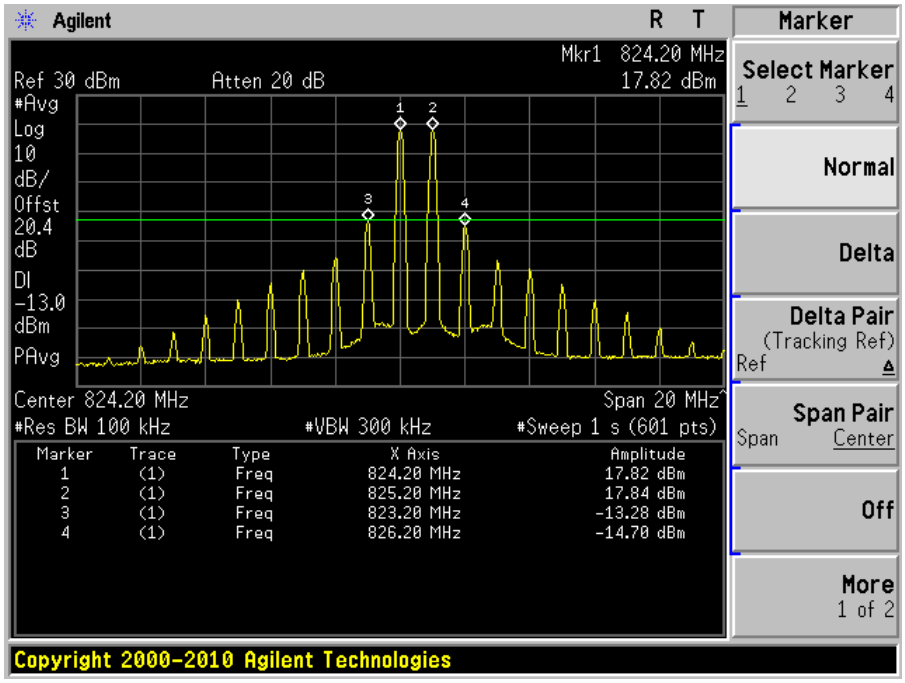
Inter-modulation:

850 MHz band Low Channel Uplink

Input

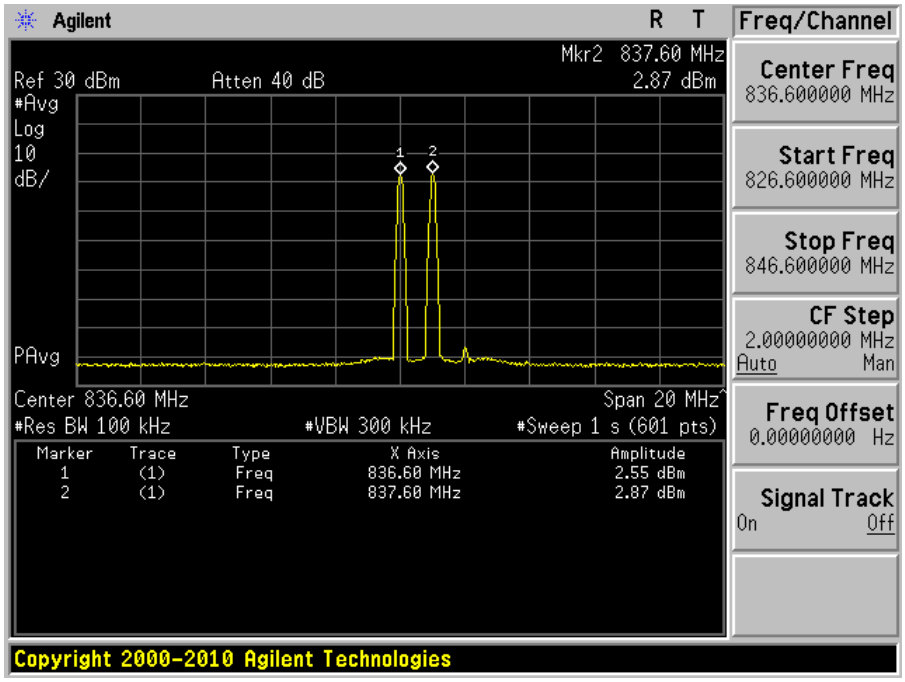


Output

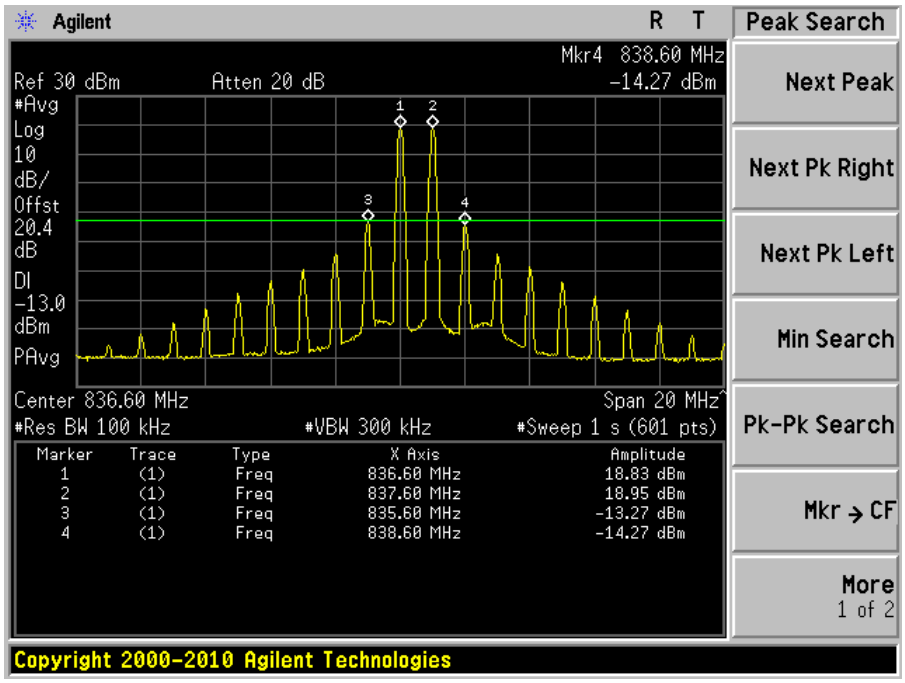


850 MHz band Middle Channel Uplink

Input

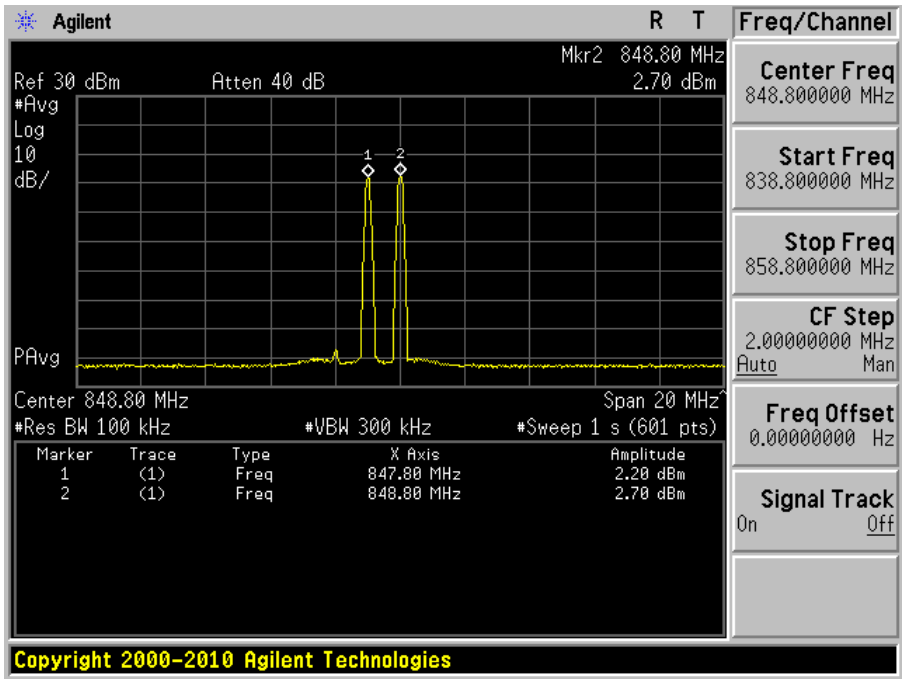


Output

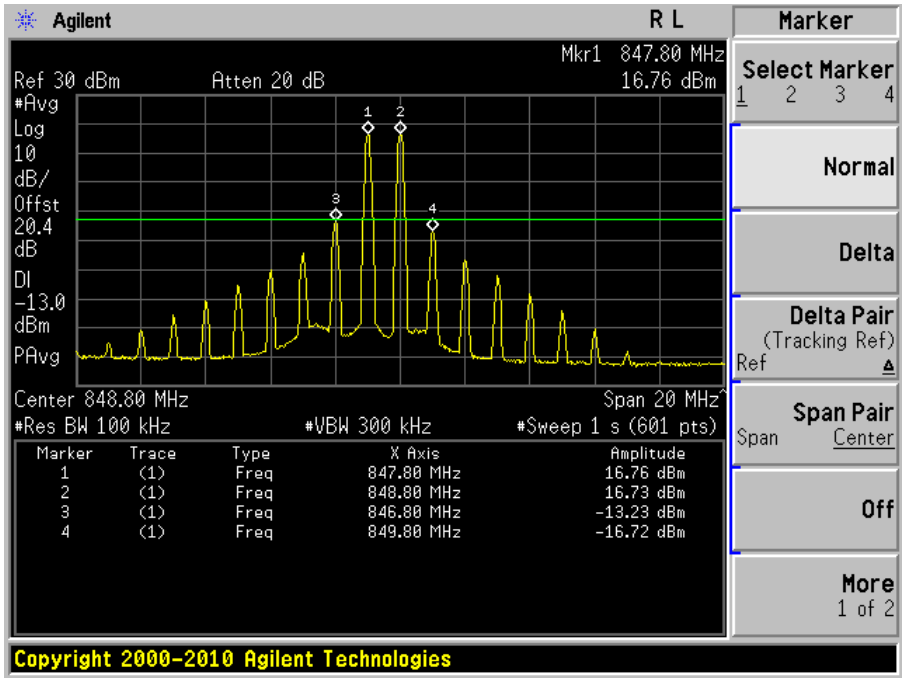


850 MHz band High Channel Uplink

Input

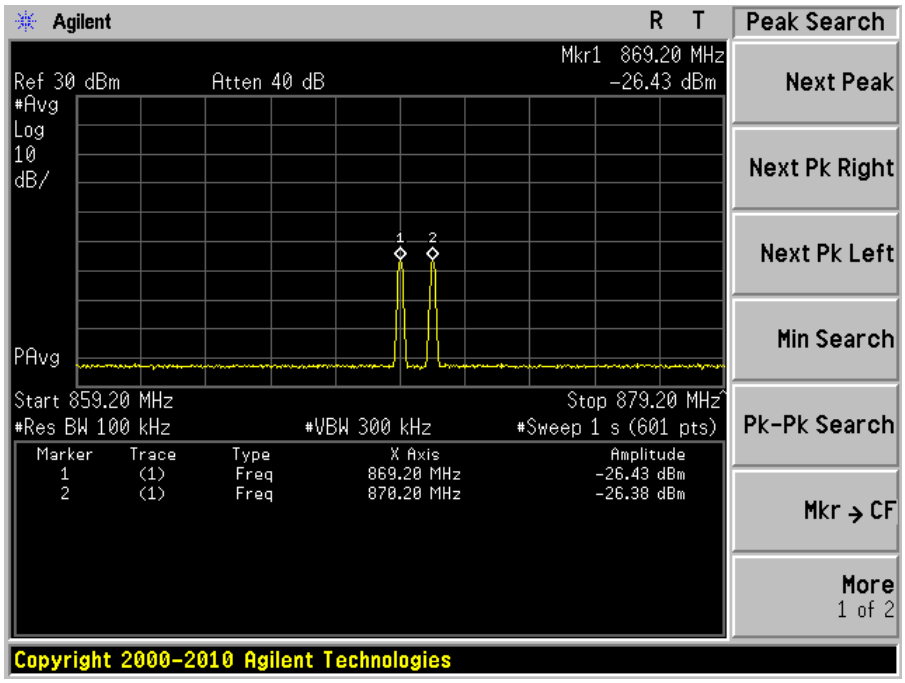


Output

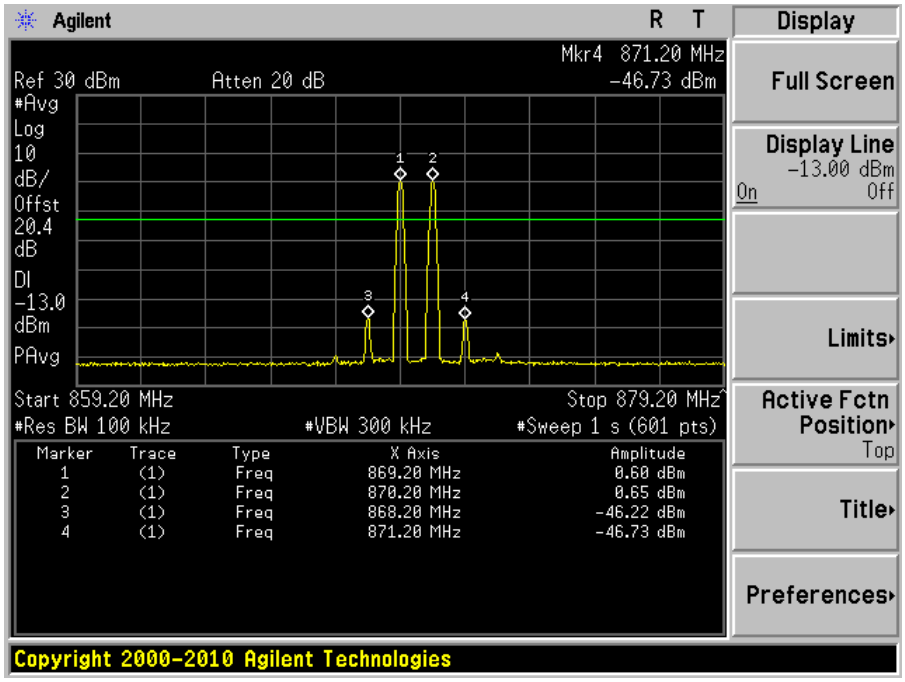


850 MHz band Low Channel Downlink

Input

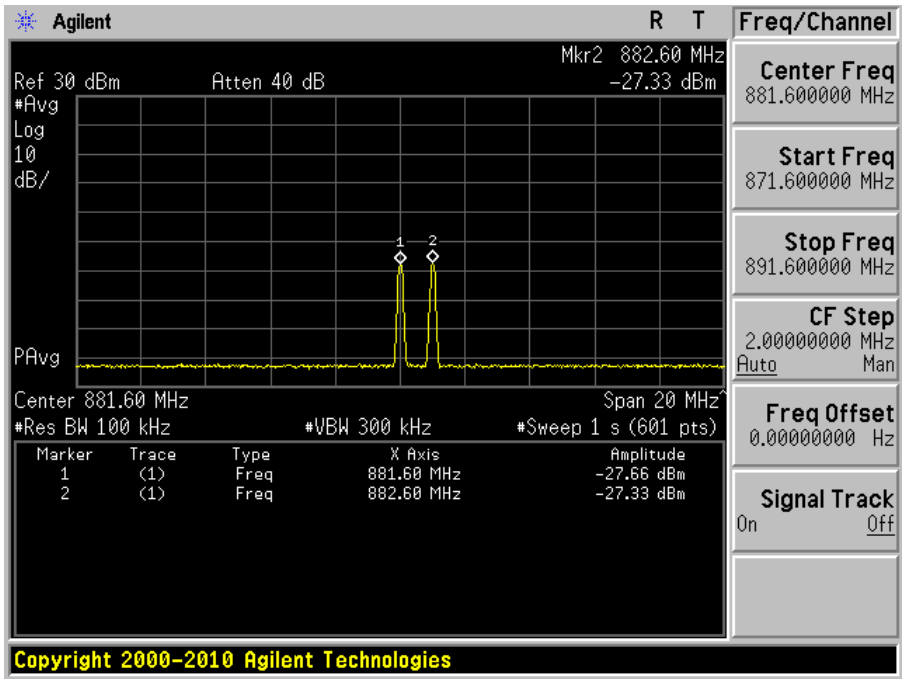


Output

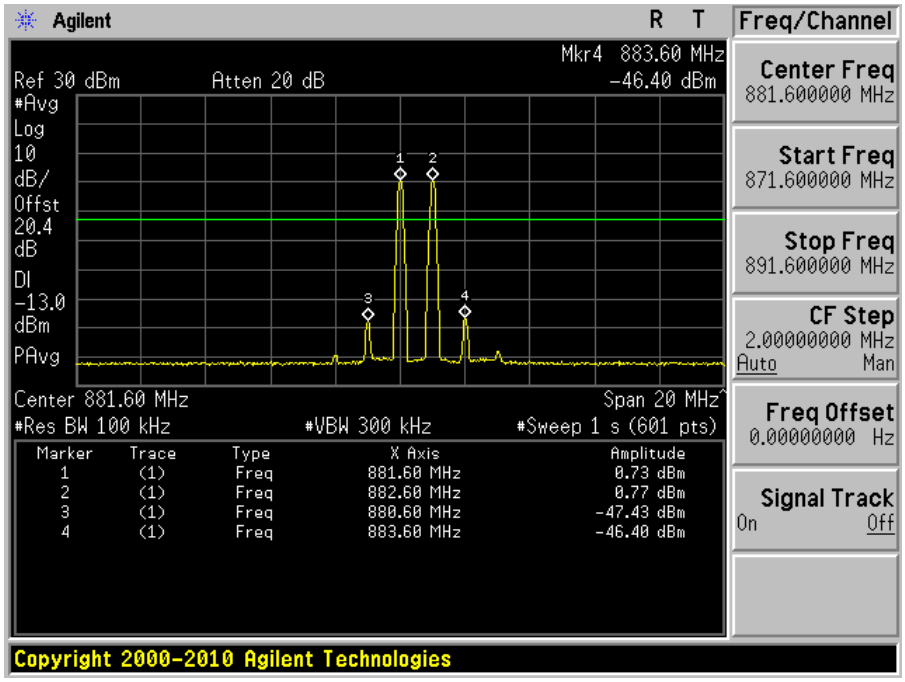


850 MHz band Middle Channel Downlink

Input

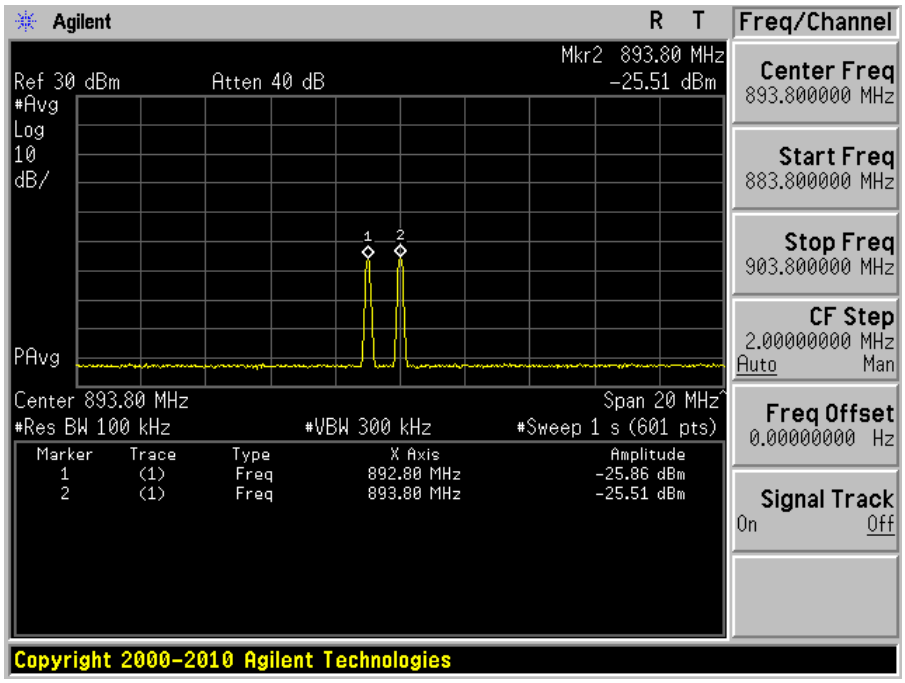


Output

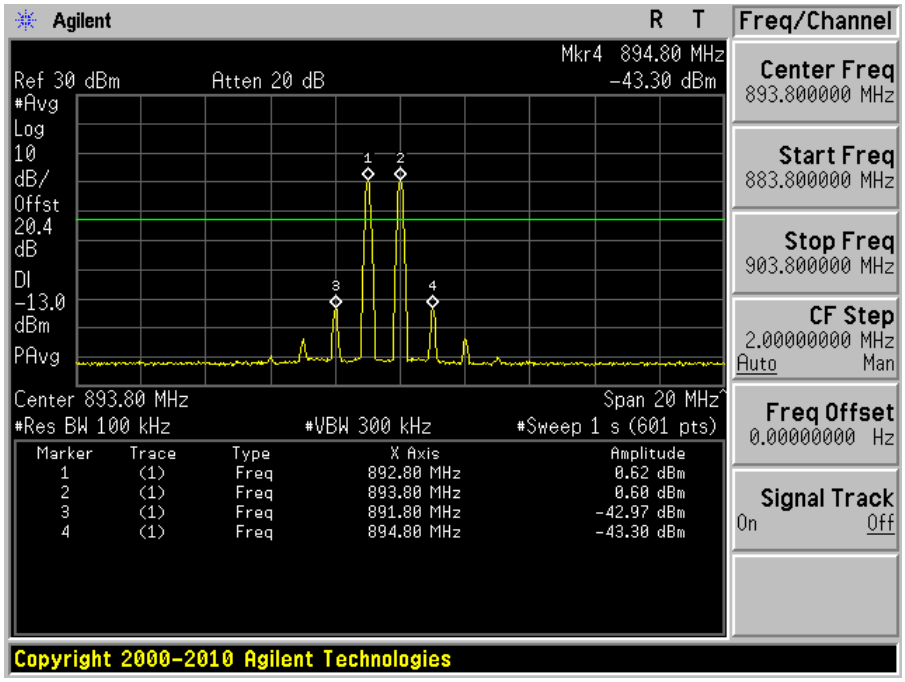


850 MHz band High Channel Downlink

Input

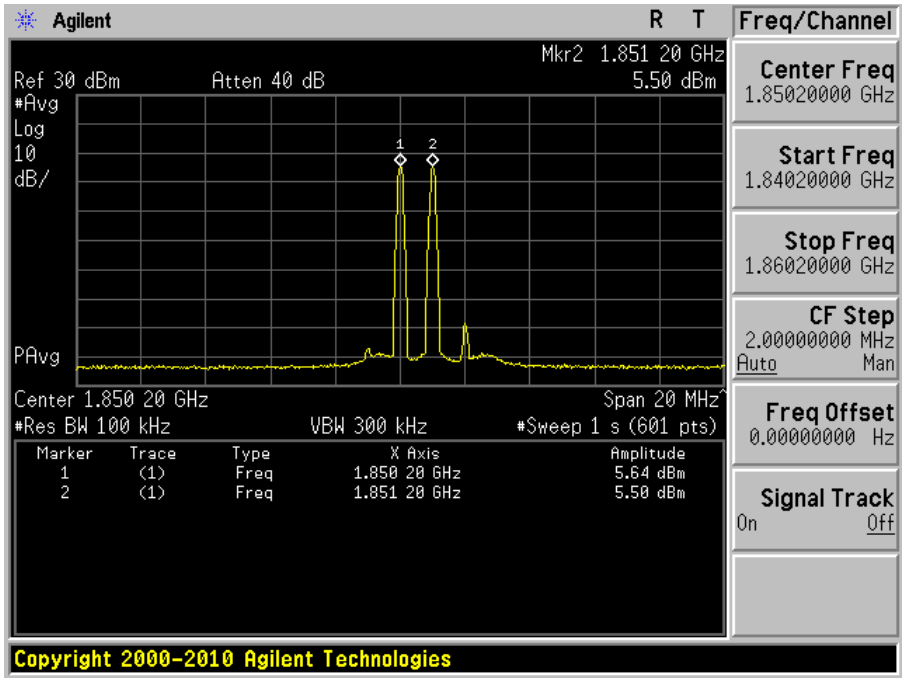


Output

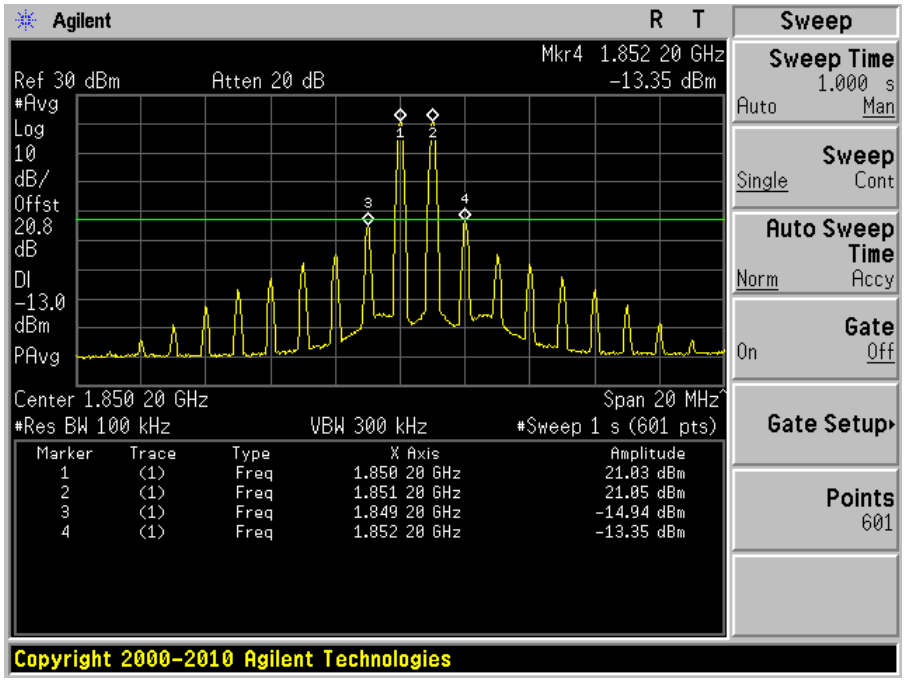


1900 MHz band Low Channel Uplink

Input

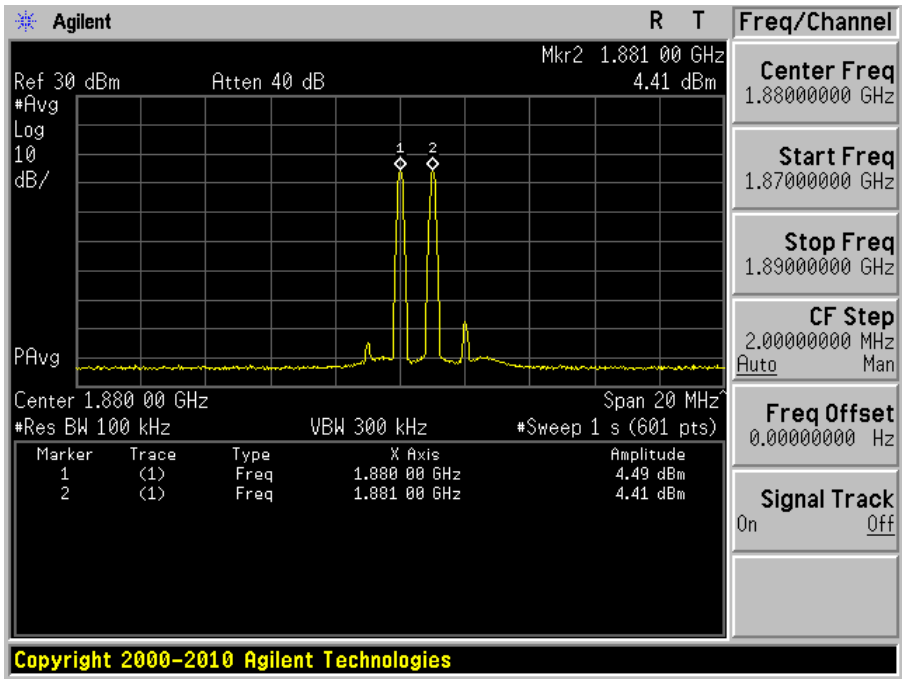


Output

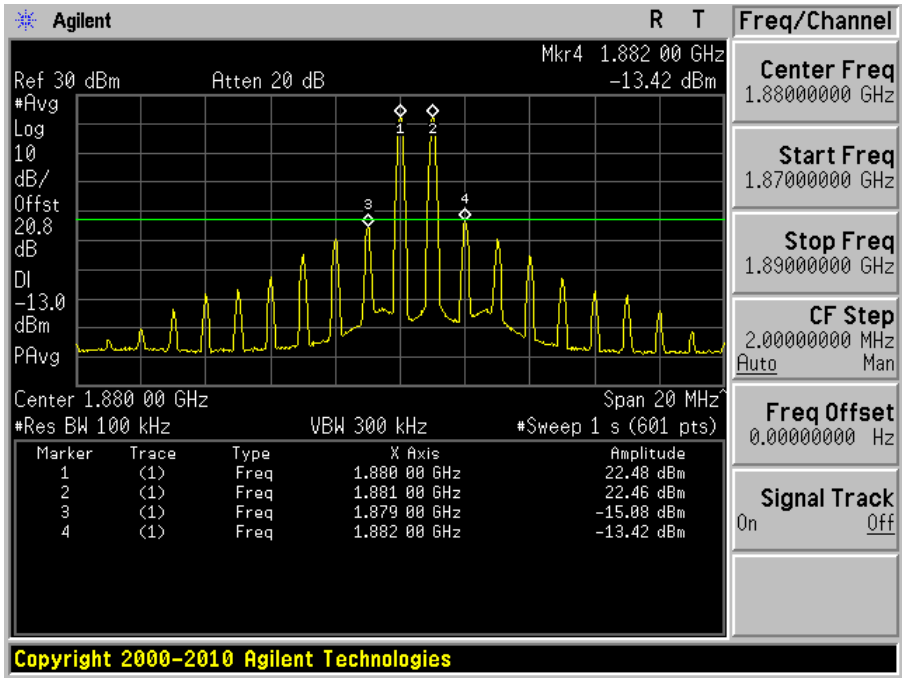


1900 MHz band Middle Channel Uplink

Input

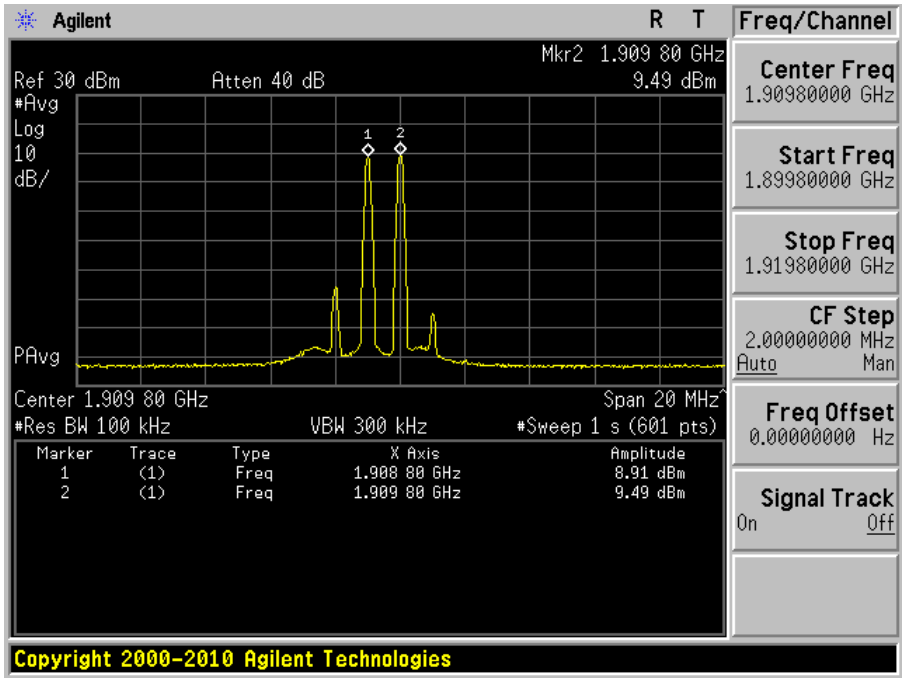


Output

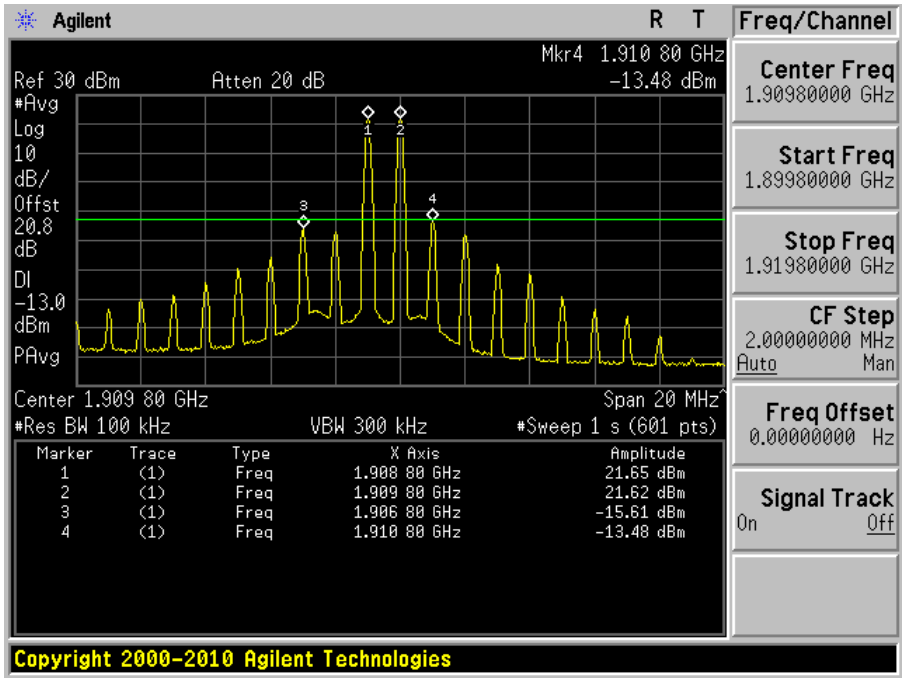


1900 MHz band High Channel Uplink

Input

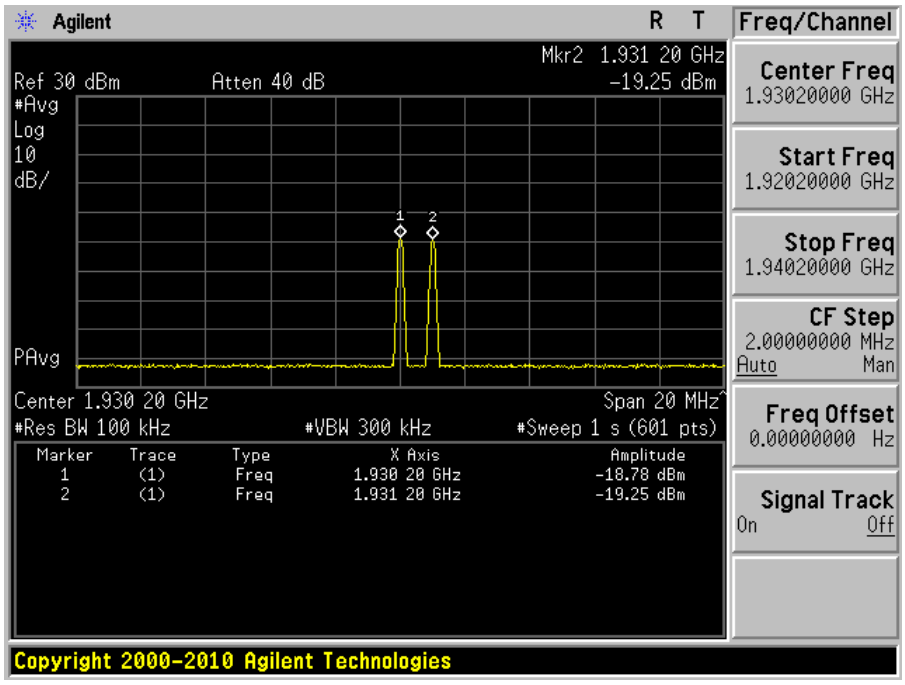


Output

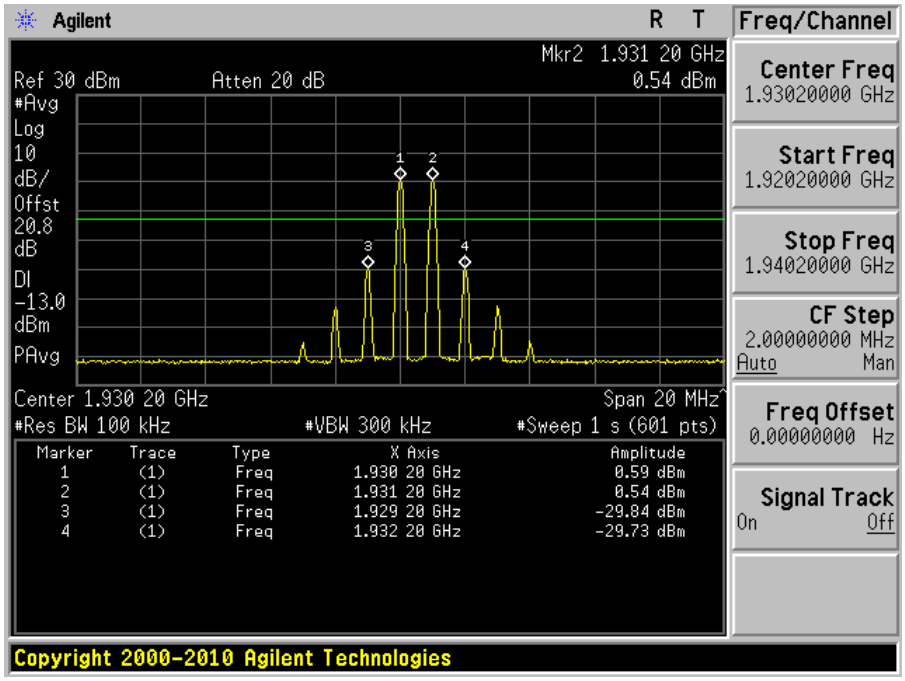


1900 MHz band Low Channel Downlink

Input

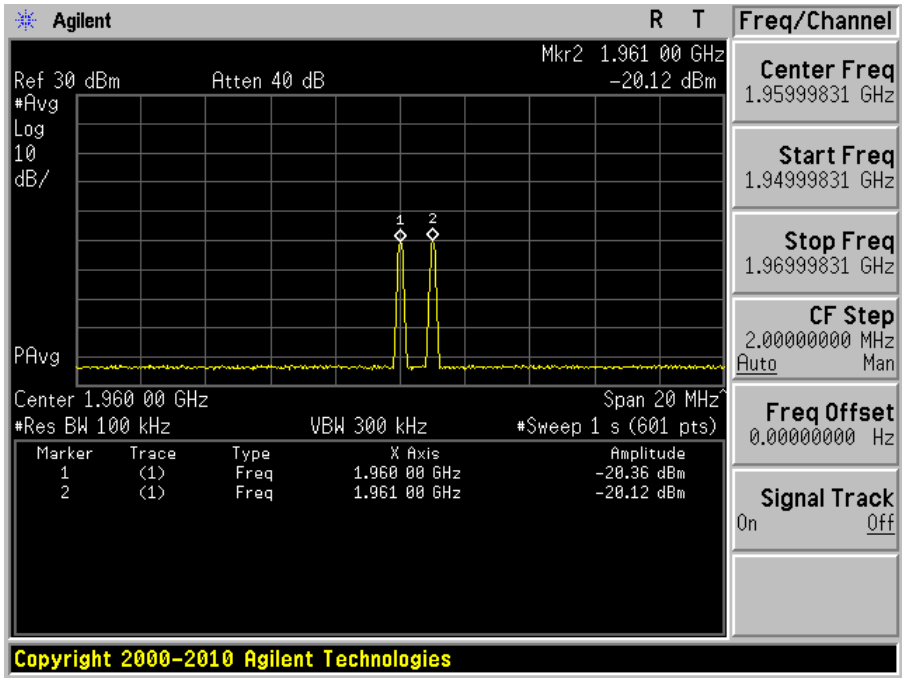


Output

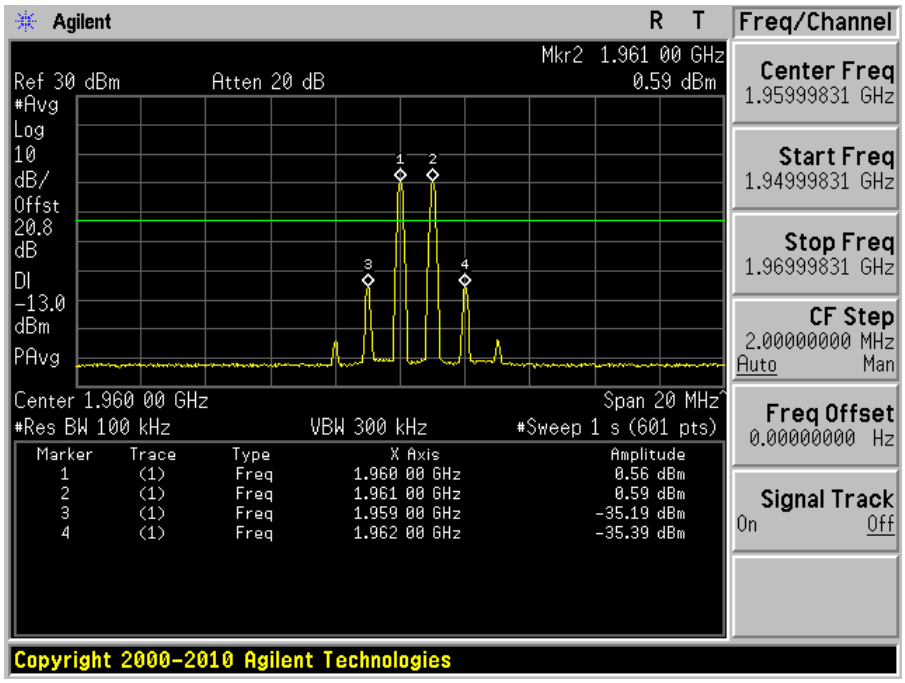


1900 MHz band Middle Channel Downlink

Input

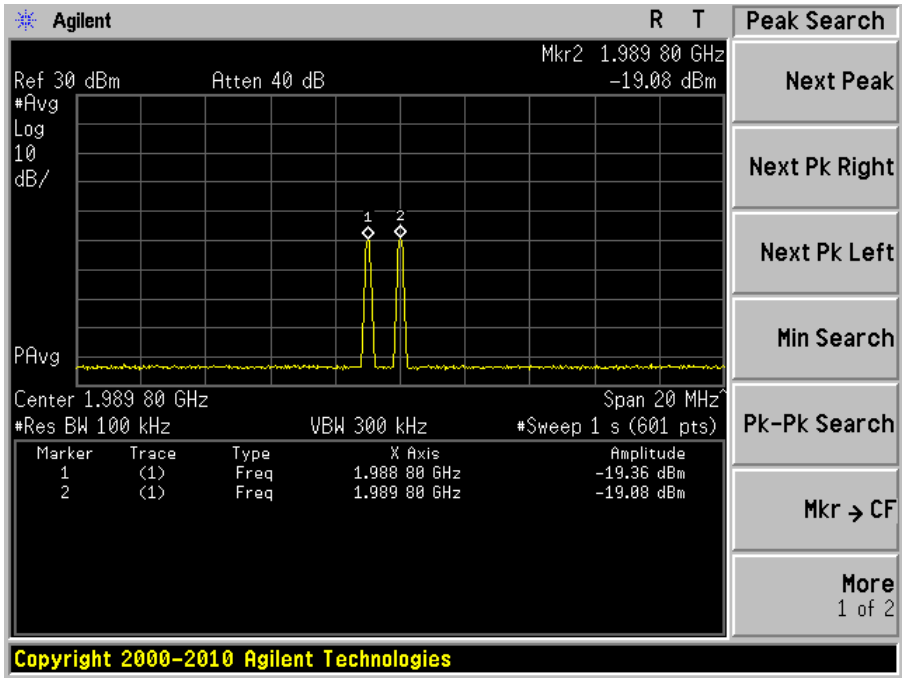


Output

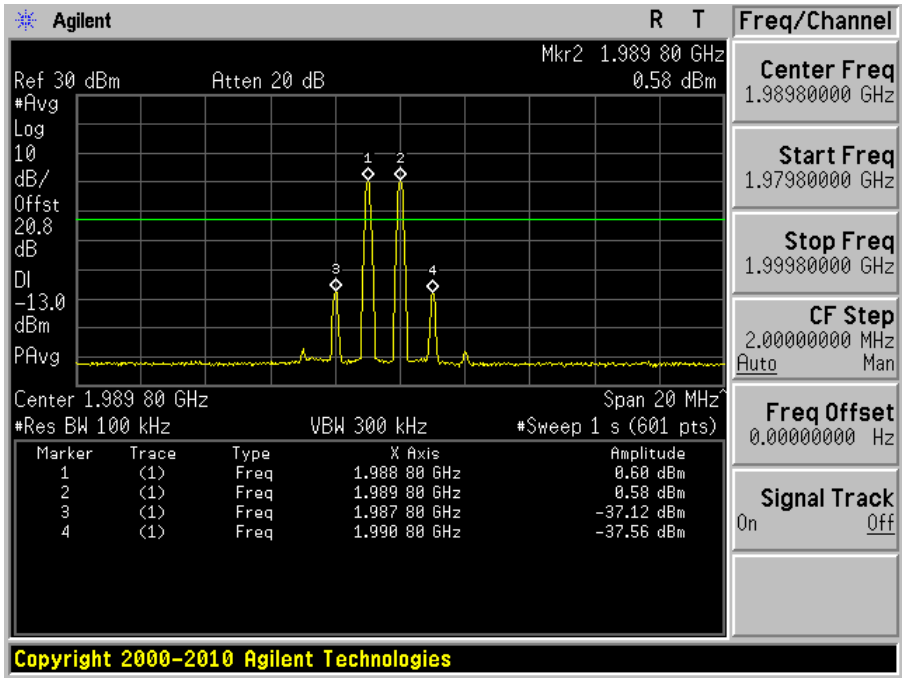


1900 MHz band High Channel Downlink

Input



Output



9 FCC §22.917 & §24.238 – BAND EDGE

9.1 Applicable Standard

According to FCC §22.917, the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

According to FCC §24.238, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

9.2 Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.

9.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	MY44303352	2011-05-10
Agilent	ESG-D Series Signal Generator	E4438C	MY45091309	2011-04-28

***Statement of Traceability**: BACL Corp. attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.*

9.4 Test Environmental Conditions

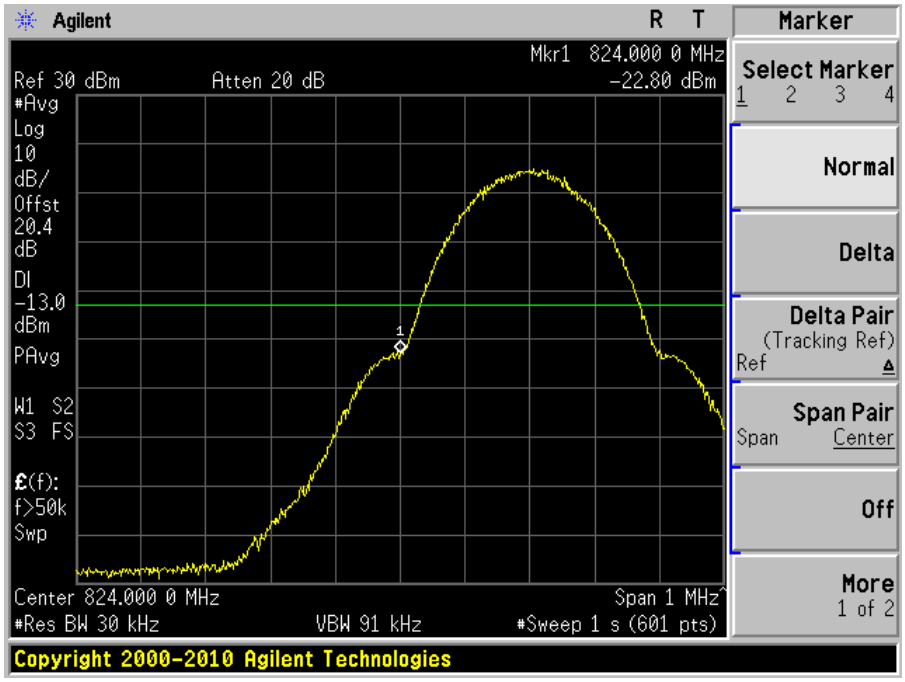
Temperature:	23-25 °C
Relative Humidity:	42 %
ATM Pressure:	101.2 kPa

The testing was performed by Quinn Jiang from 2011-10-29 at RF Site.

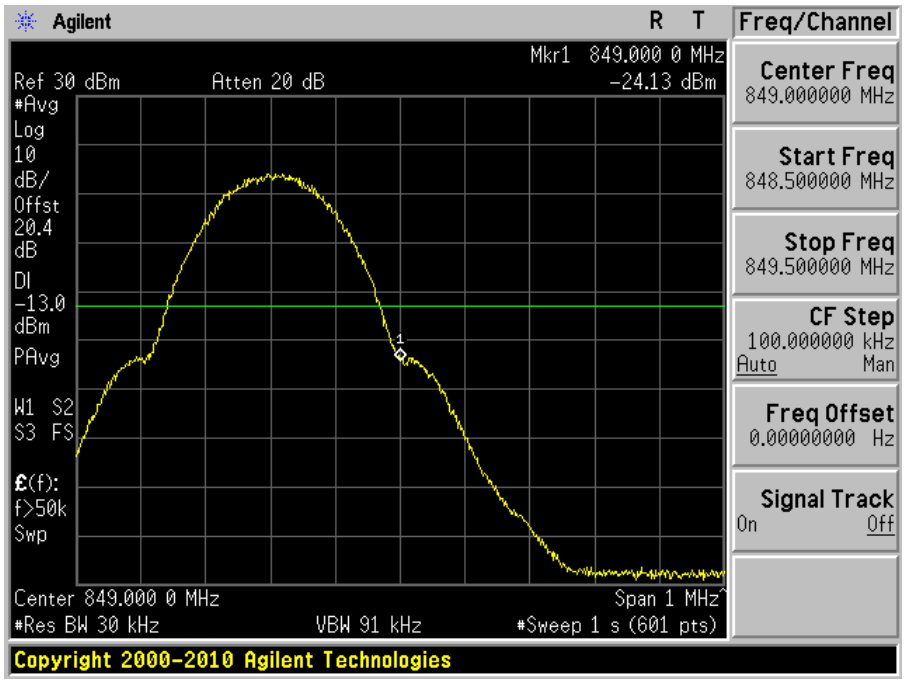
9.5 Test Results

Please refer to the following plots.

GSM/GPRS 850 MHz band Uplink Band Edge

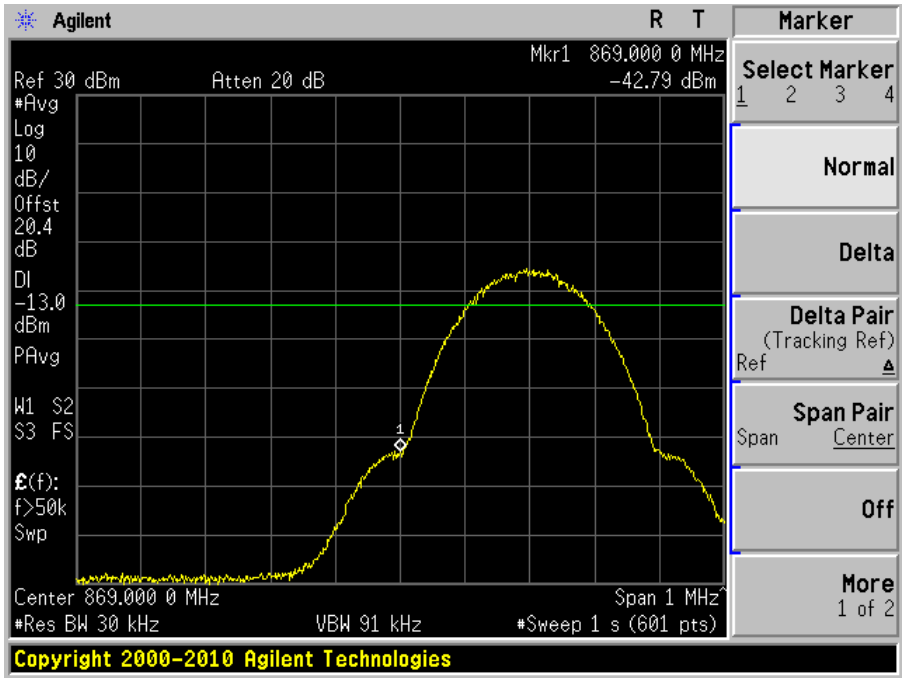


Low Channel

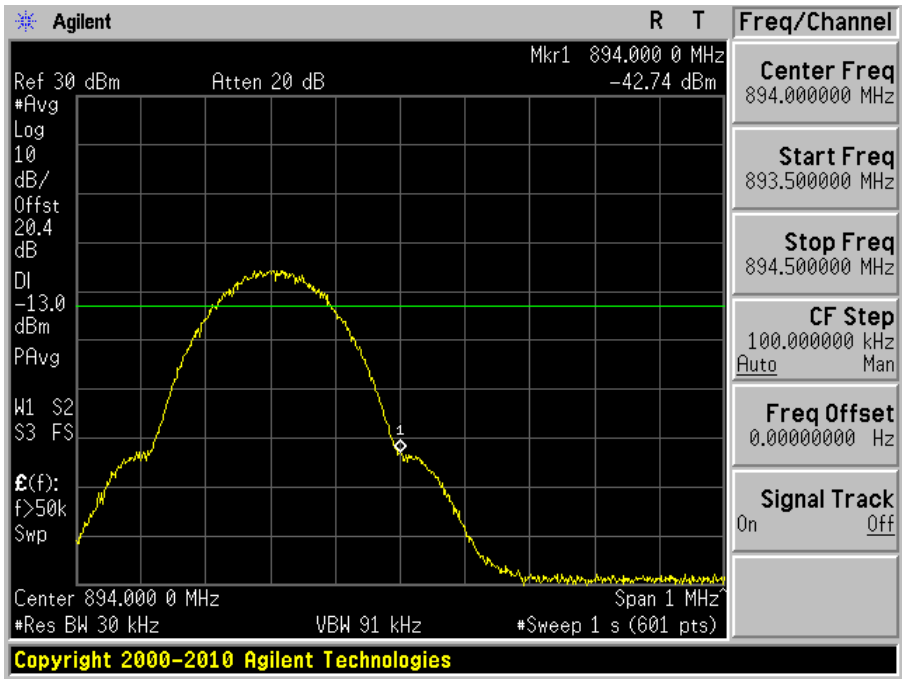


High Channel

GSM/GPRS 850 MHz band Downlink Band Edge

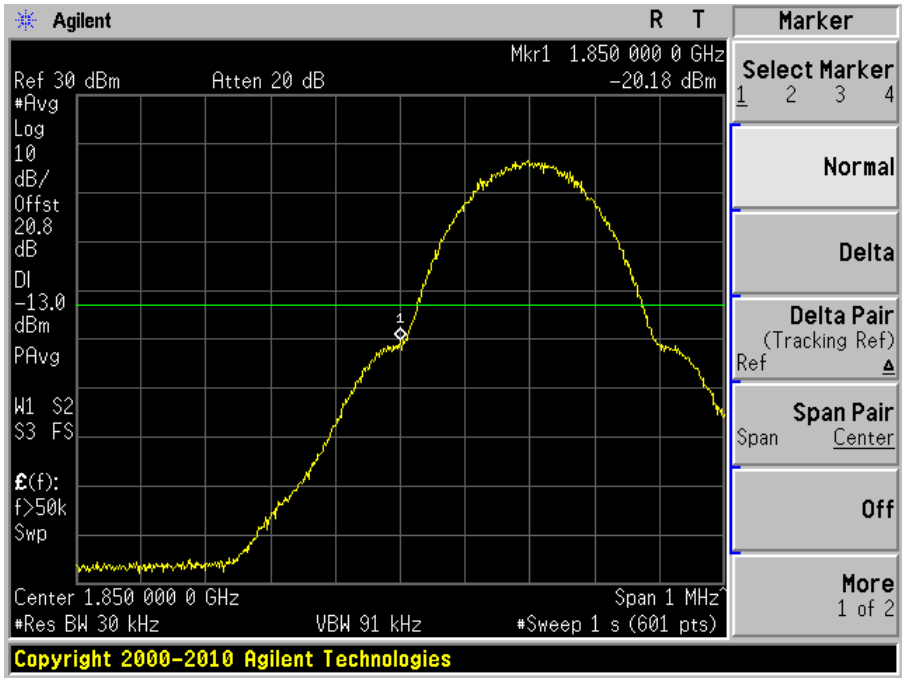


Low Channel

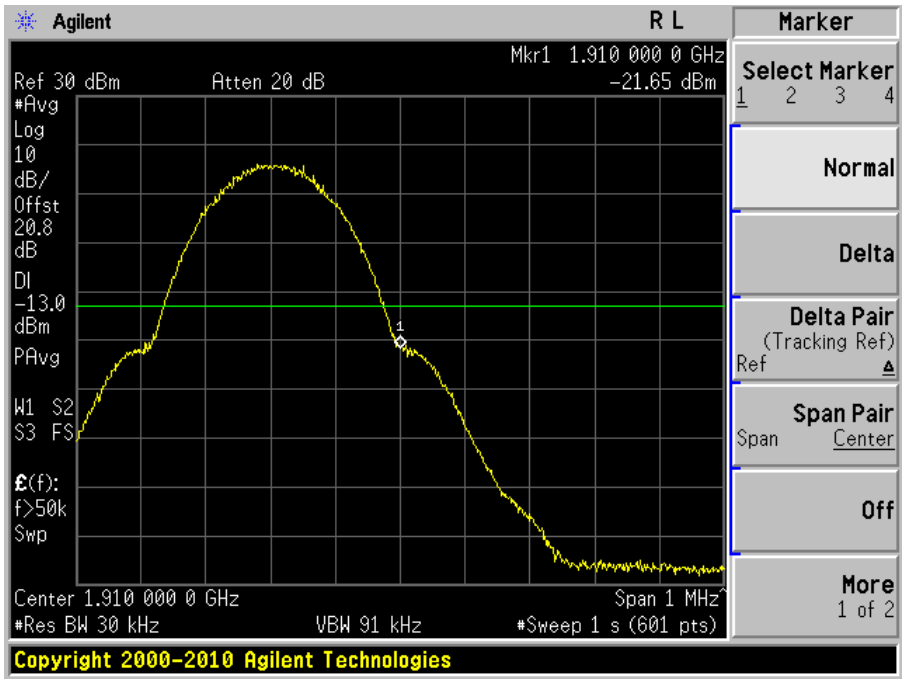


High Channel

GSM/GPRS 1900 MHz band Uplink Band Edge

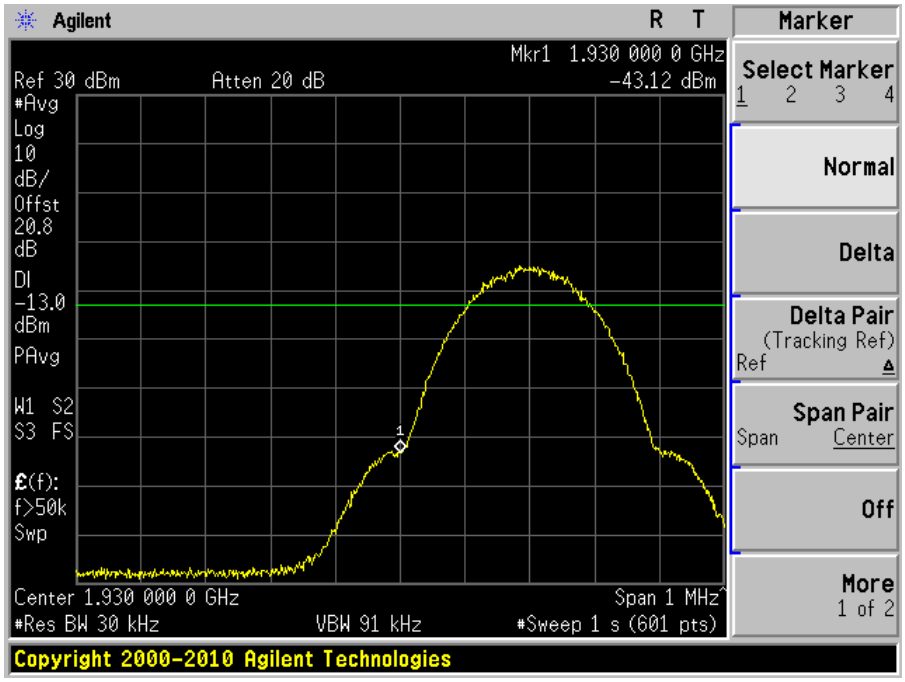


Low Channel

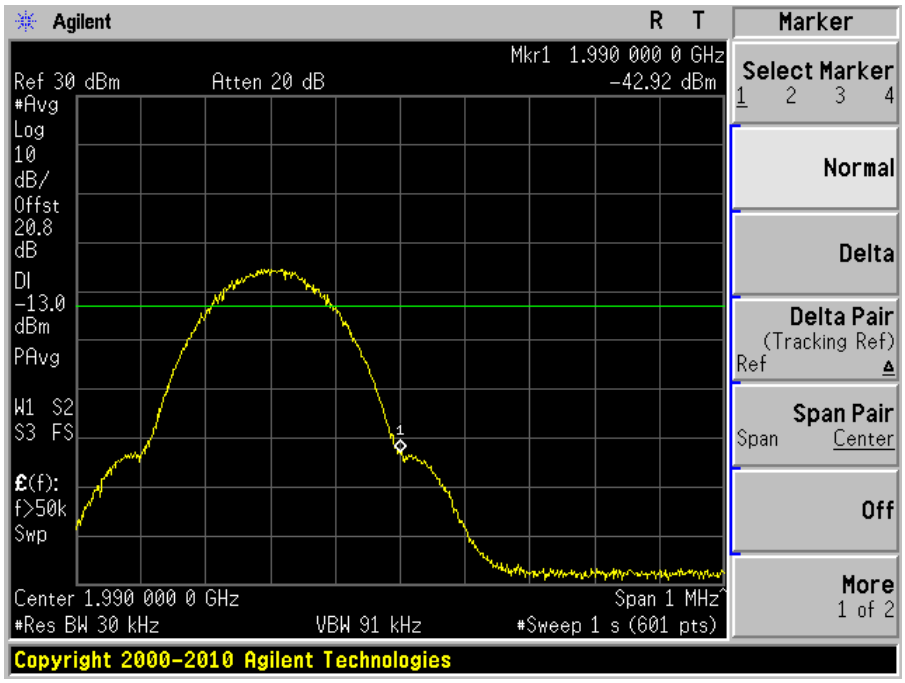


High Channel

GSM/GPRS 1900 MHz band Downlink Band Edge

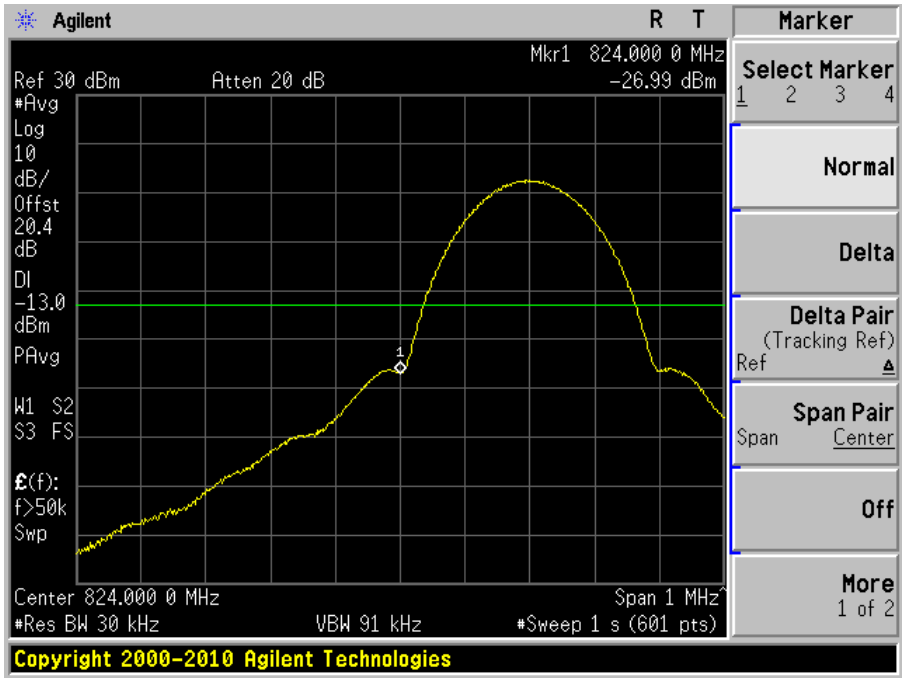


Low Channel

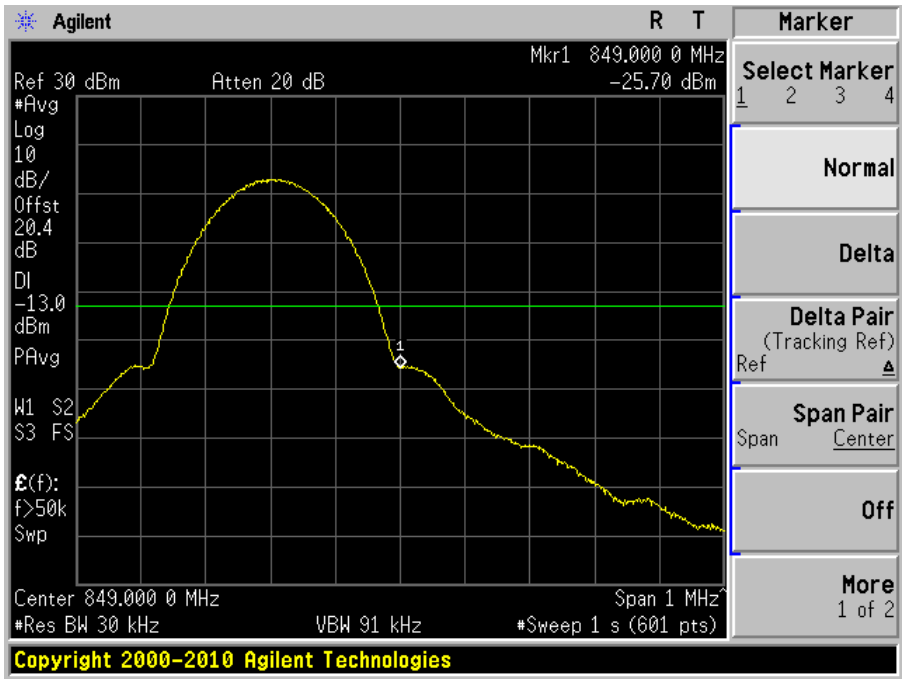


High Channel

EDGE 850 MHz band Uplink Band Edge

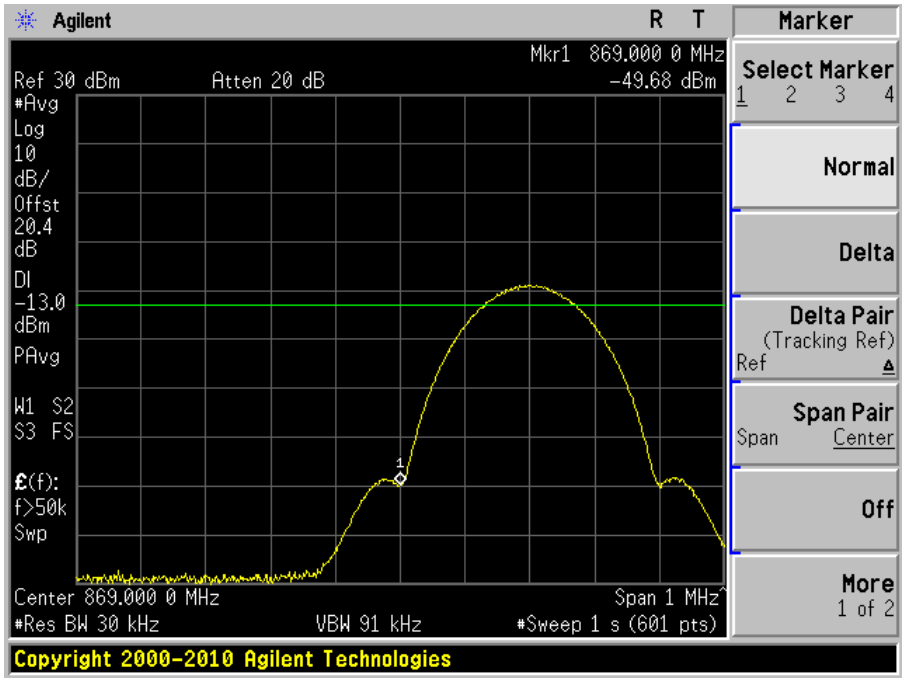


Low Channel

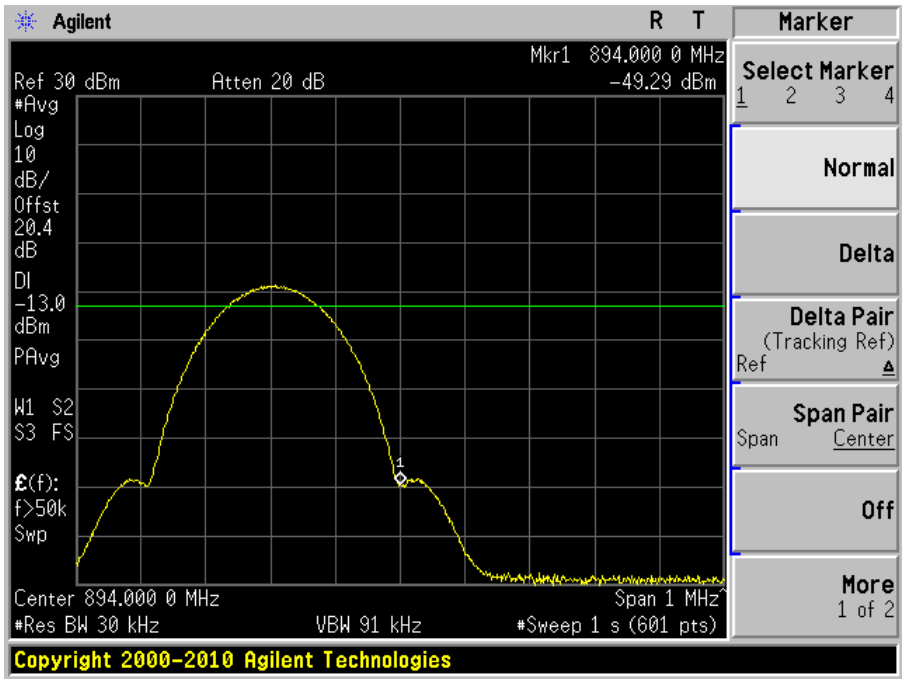


High Channel

EDGE 850 MHz band Downlink Band Edge

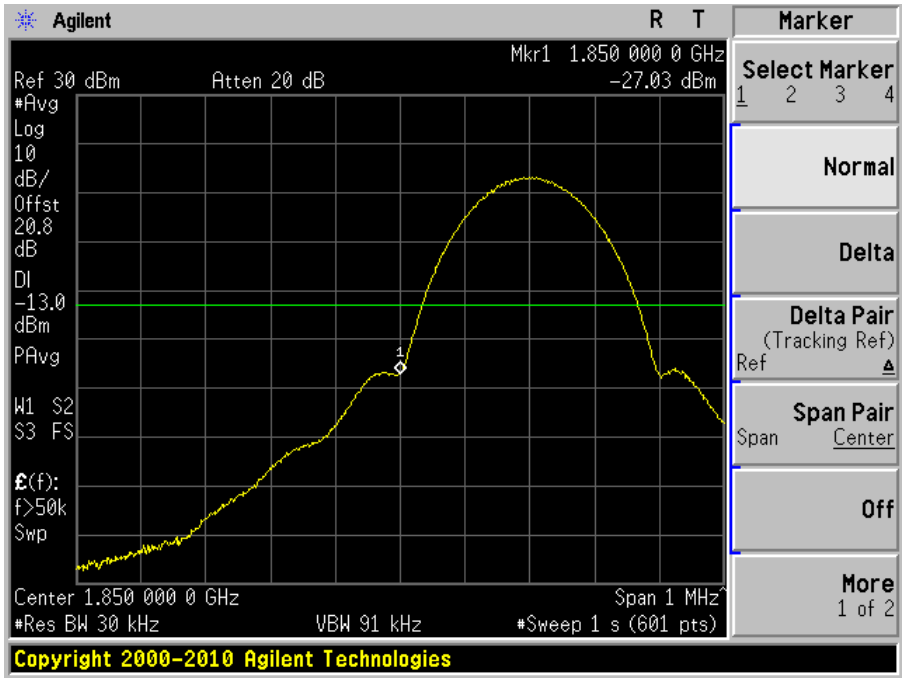


Low Channel

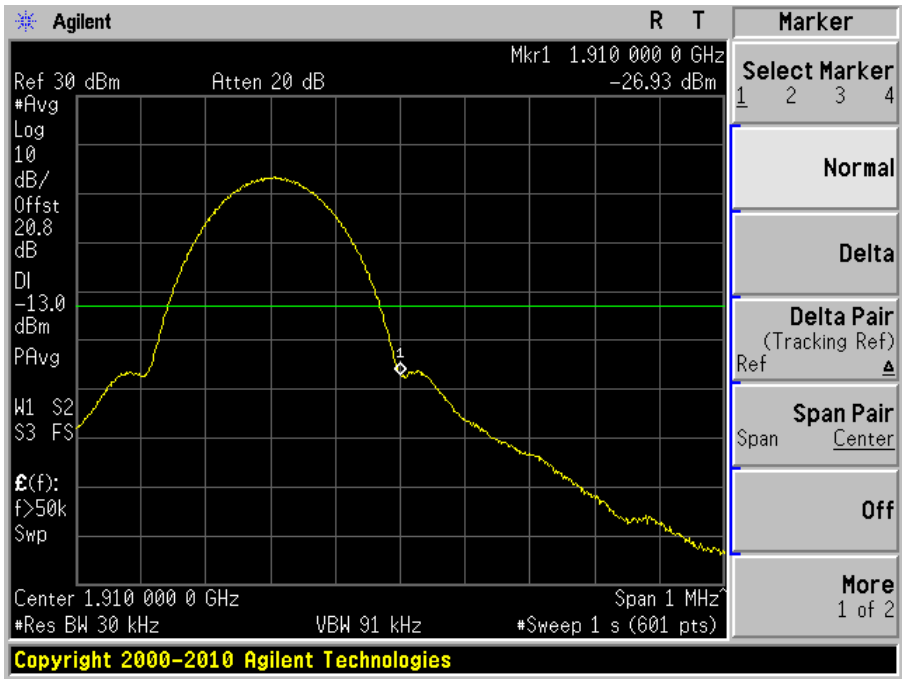


High Channel

EDGE 1900 MHz band Uplink Band Edge

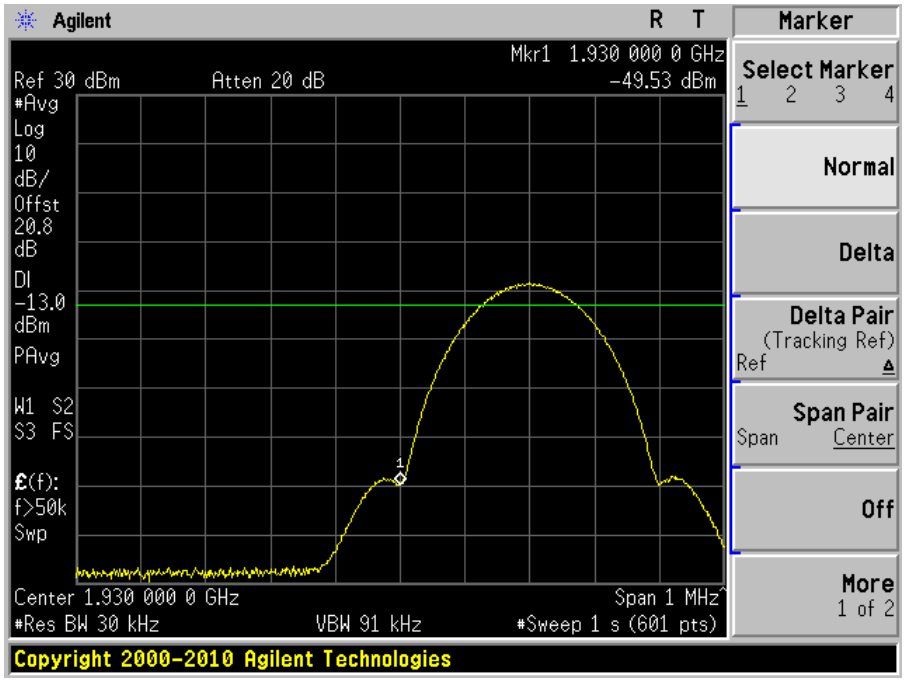


Low Channel

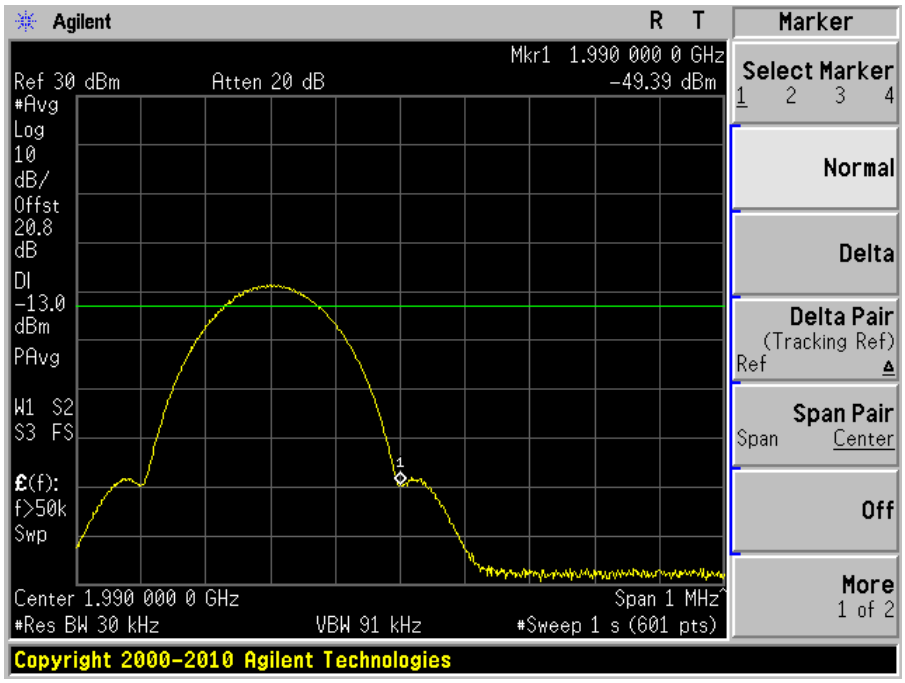


High Channel

EDGE 1900 MHz band Downlink Band Edge

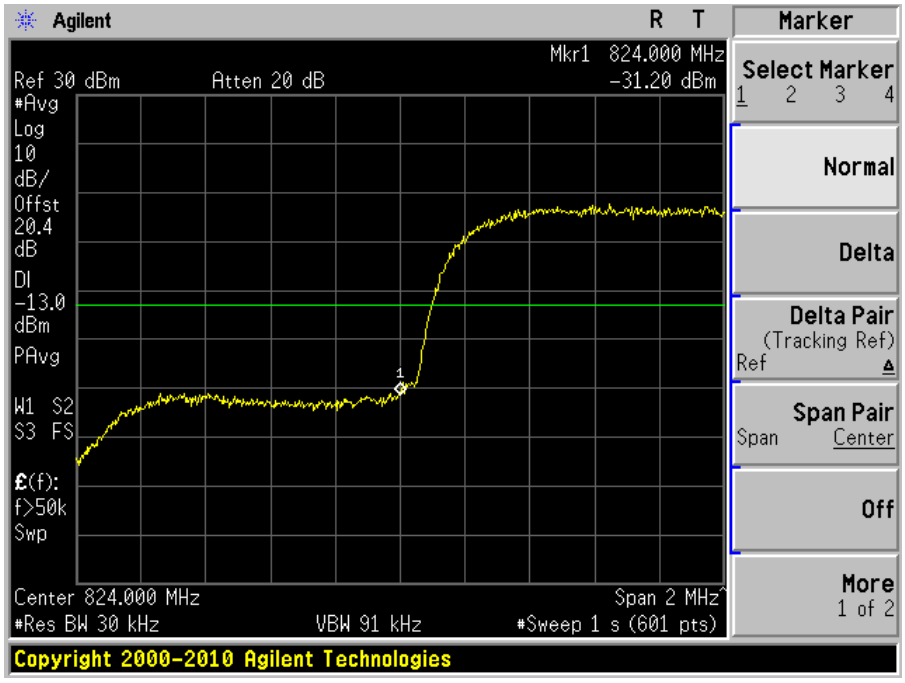


Low Channel

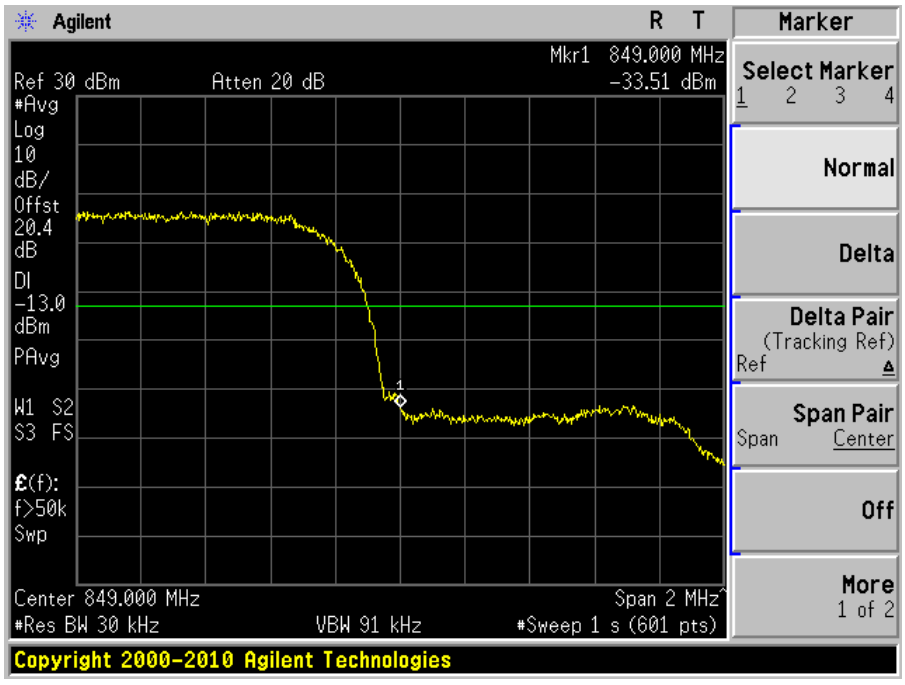


High Channel

CDMA/EVDO 850 MHz band Uplink Band Edge

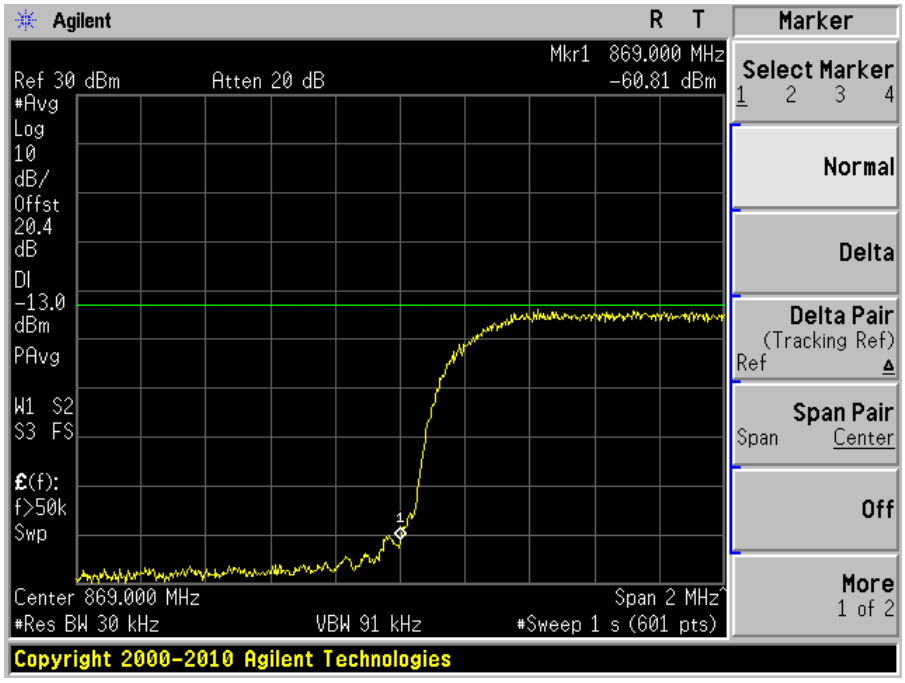


Low Channel

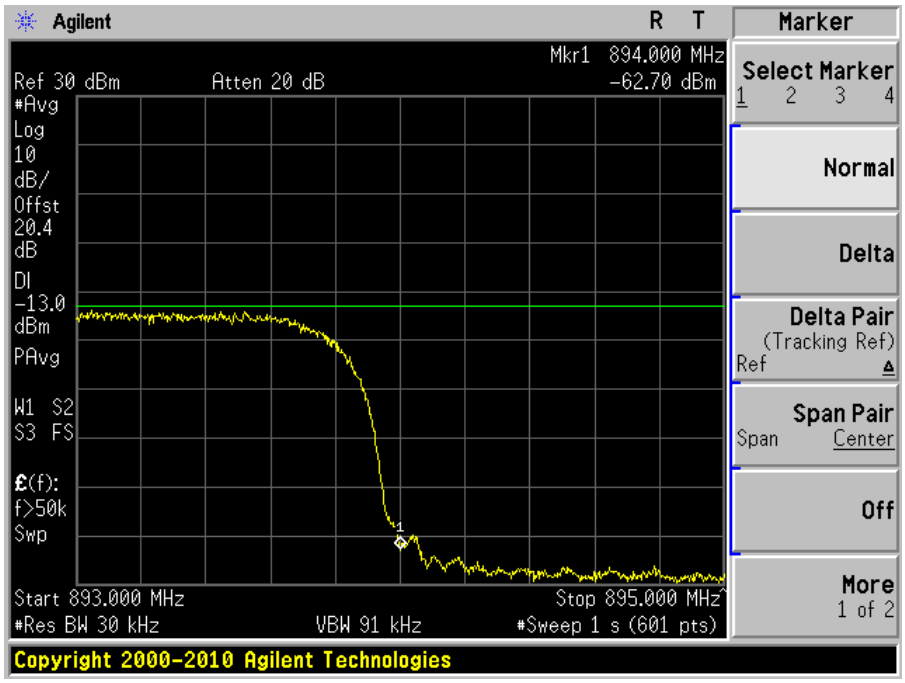


High Channel

CDMA/EVDO 850 MHz band Downlink Band Edge

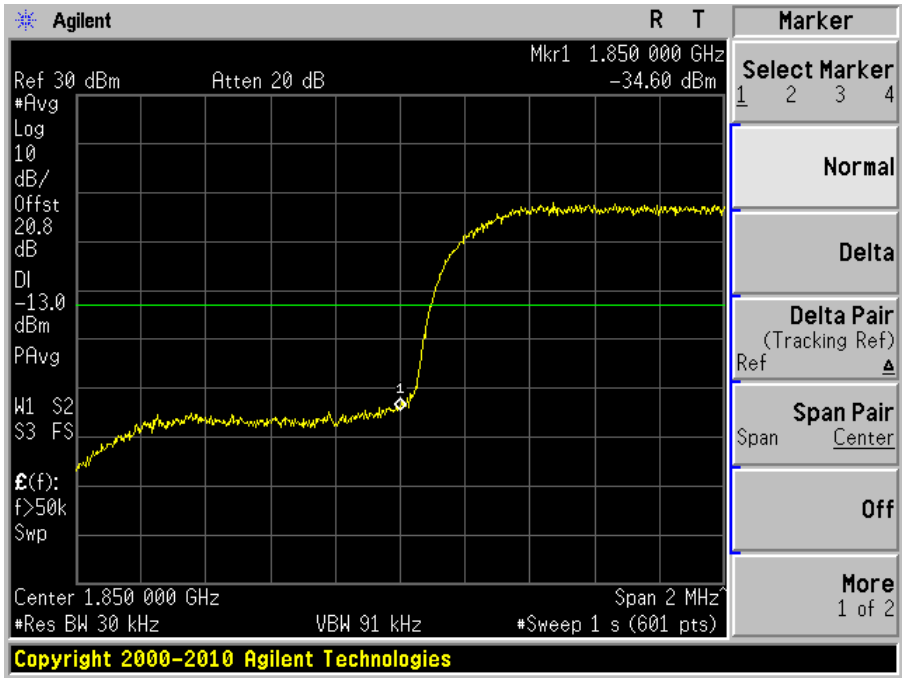


Low Channel

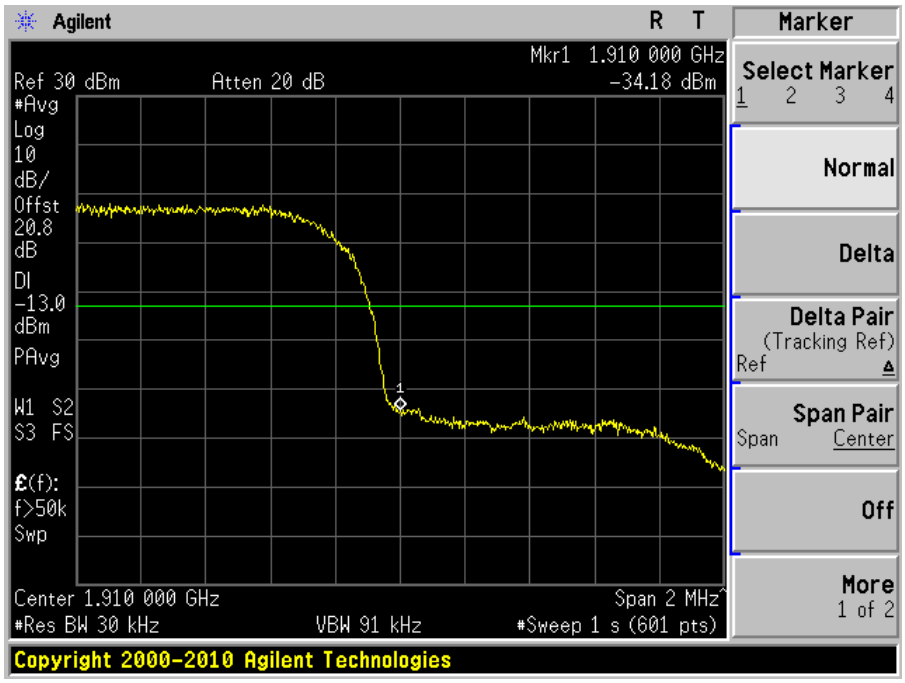


High Channel

CDMA/EVDO 1900 MHz band Uplink Band Edge

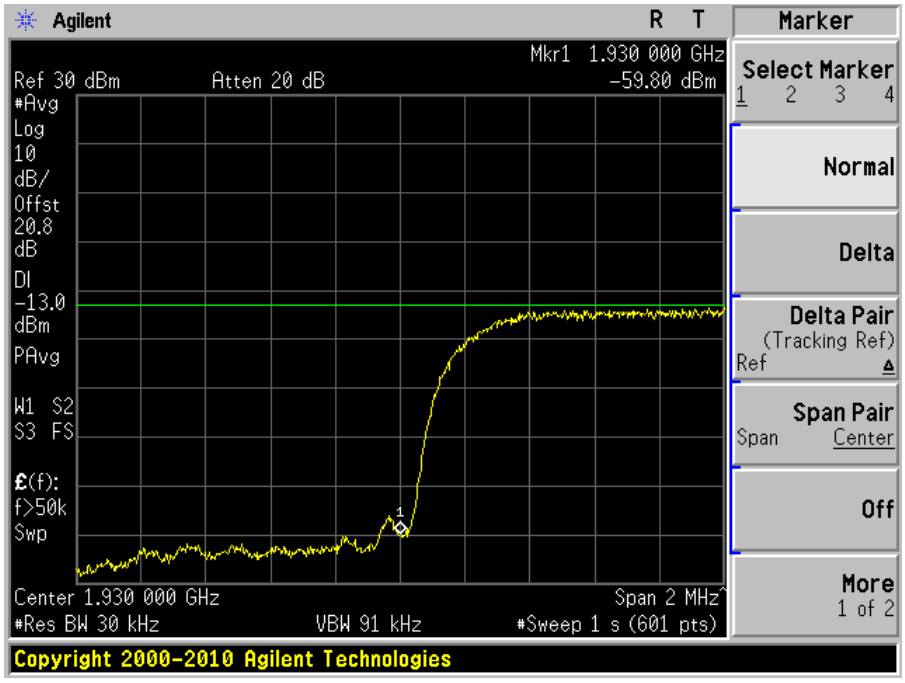


Low Channel

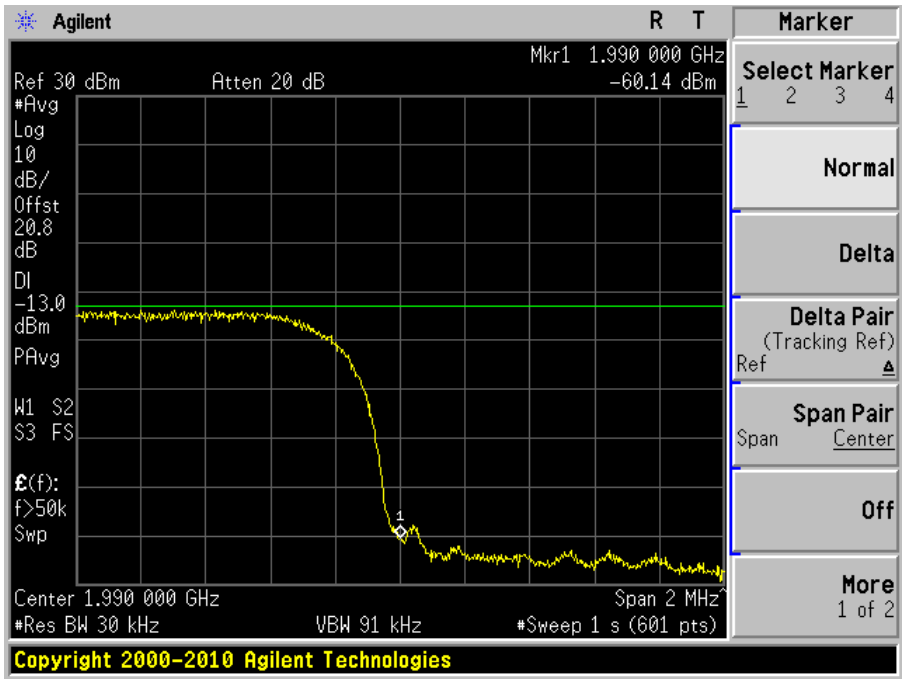


High Channel

CDMA/EVDO 1900 MHz band Downlink Band Edge

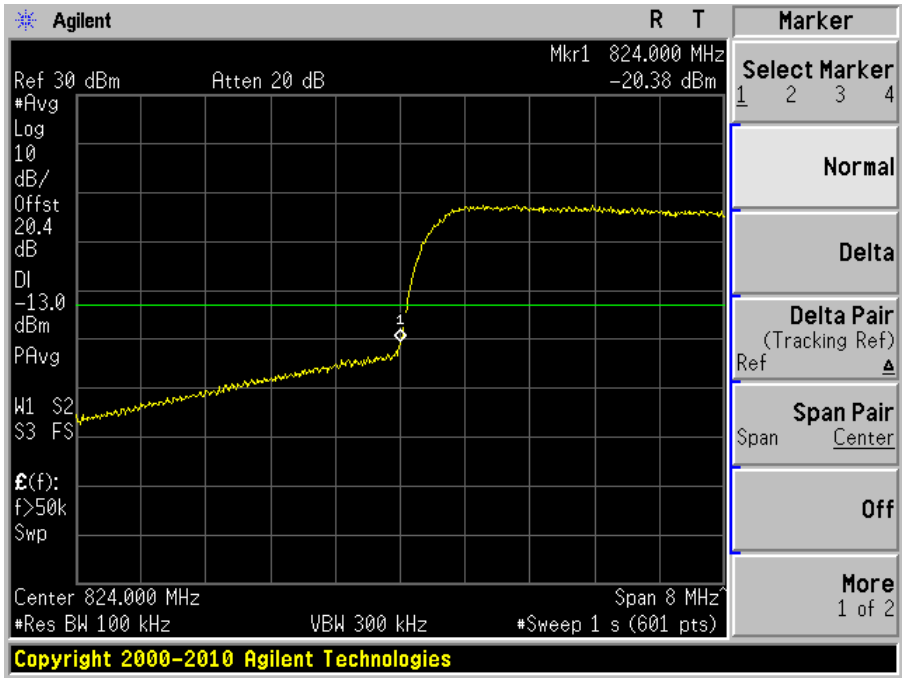


Low Channel

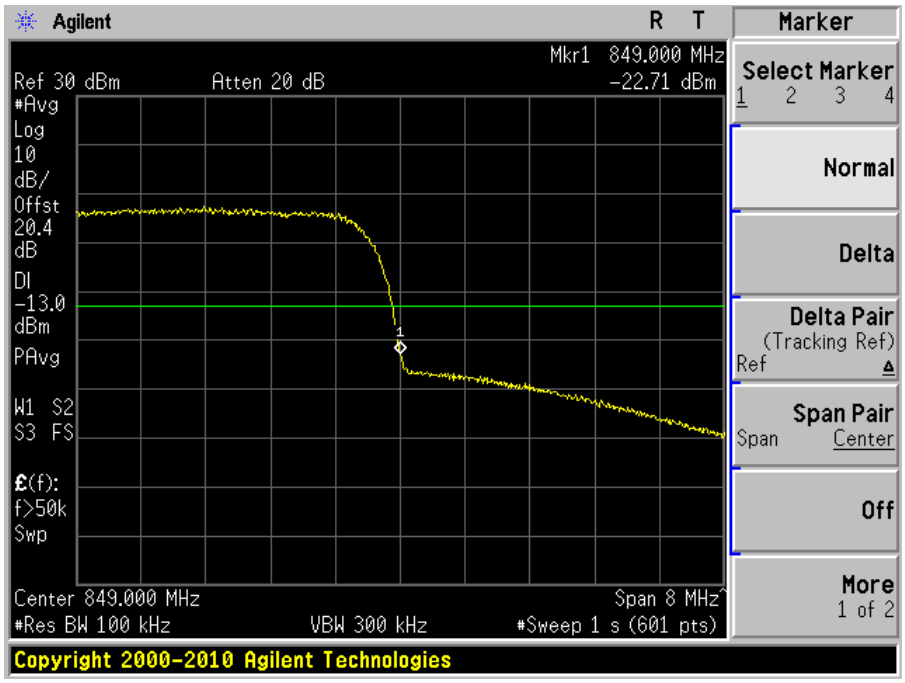


High Channel

WCDMA/HSPA 850 MHz band Uplink Band Edge

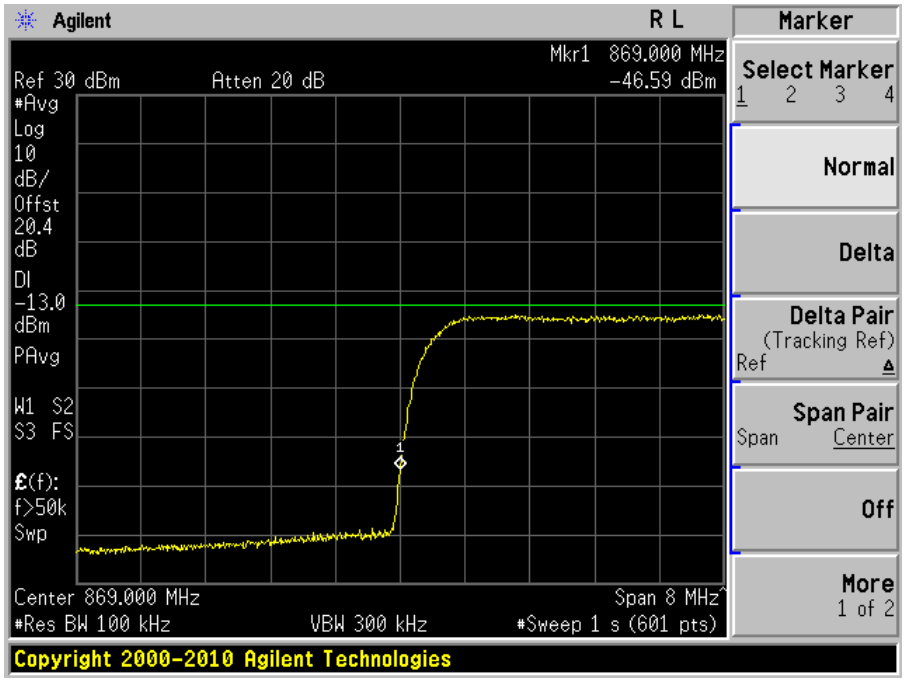


Low Channel

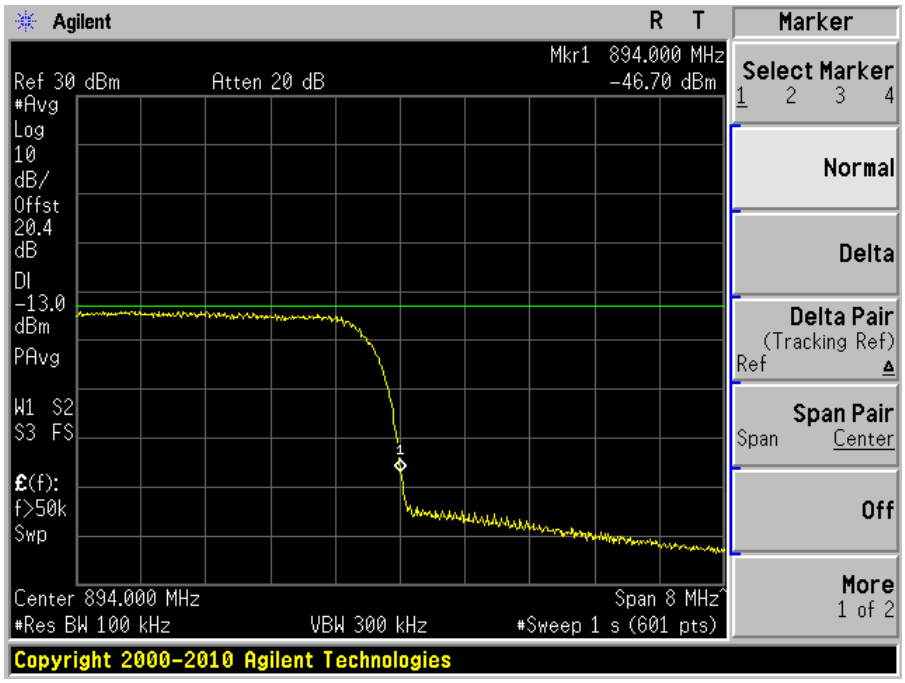


High Channel

WCDMA/HSPA 850 MHz band Downlink Band Edge

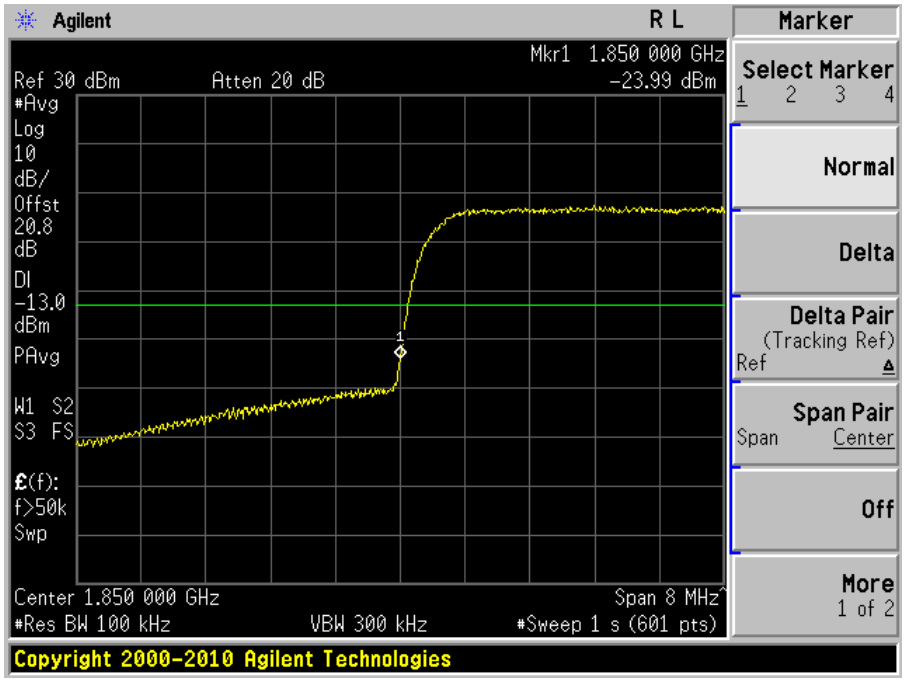


Low Channel

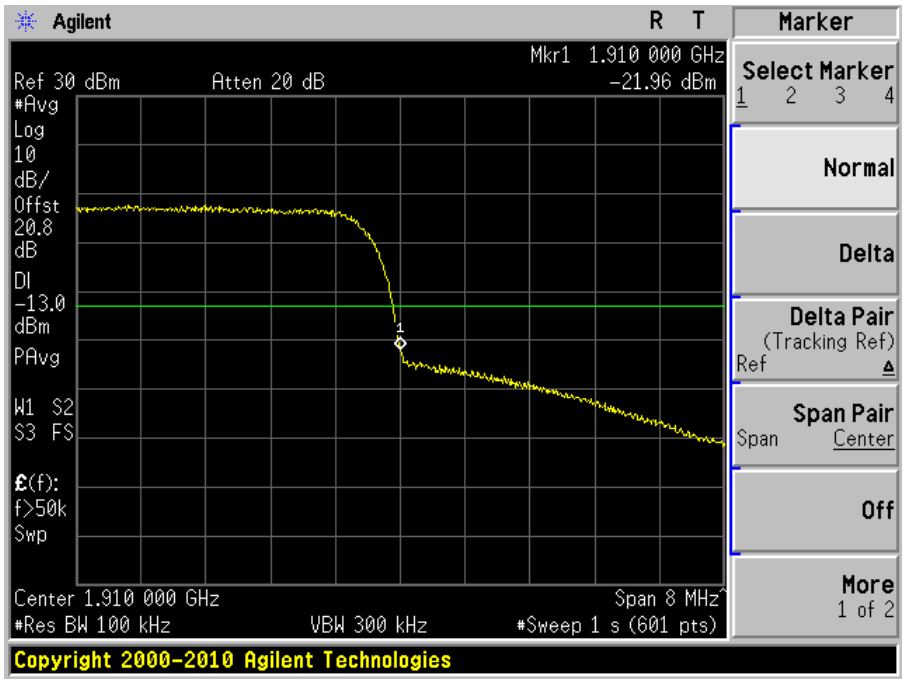


High Channel

WCDMA/HSPA 1900 MHz band Uplink Band Edge

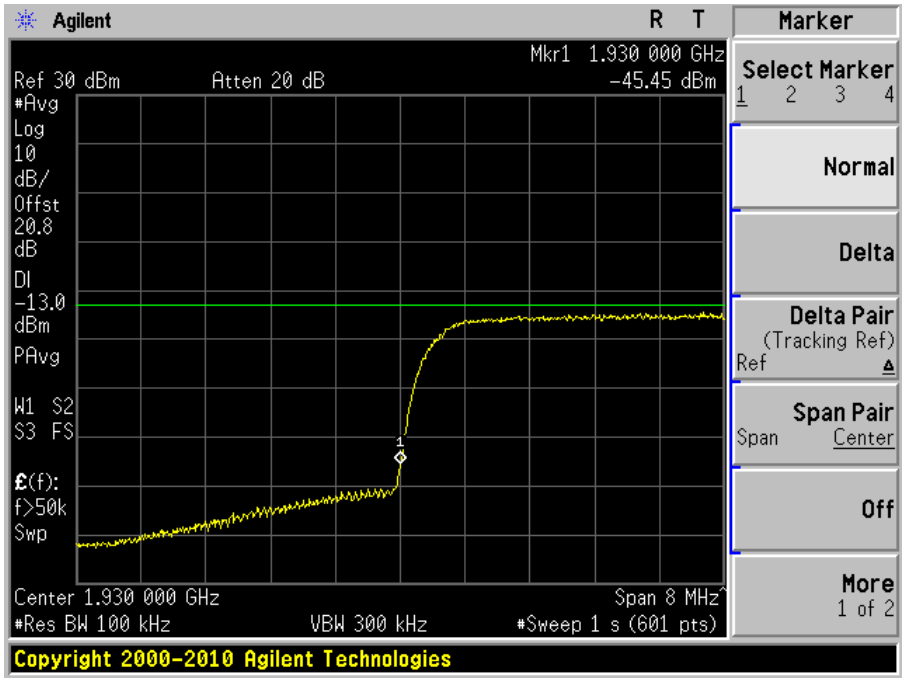


Low Channel

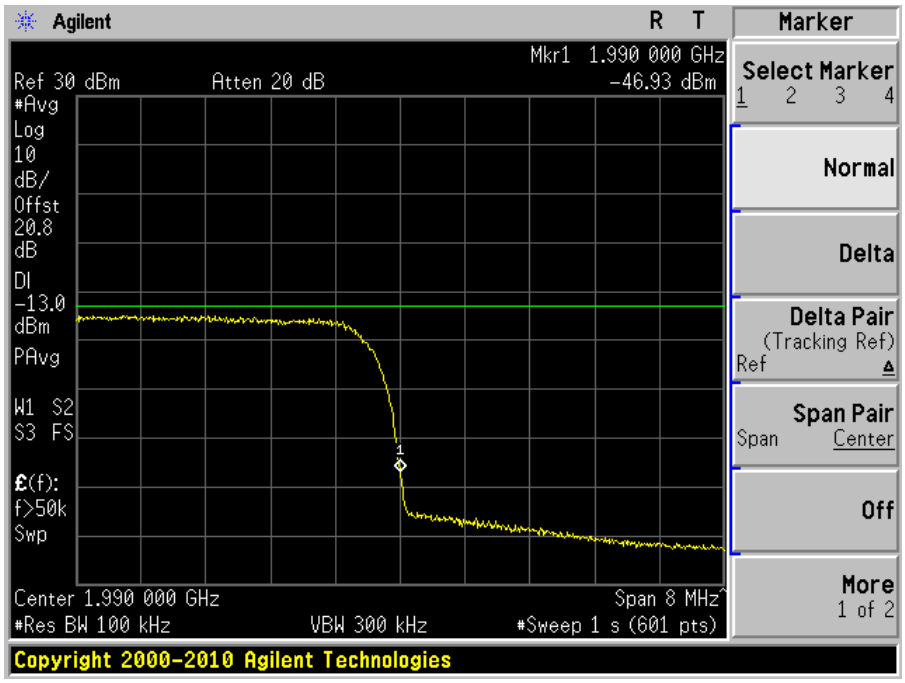


High Channel

WCDMA/HSPA 1900 MHz band Downlink Band Edge



Low Channel



High Channel

10 FCC §2.1055, §22.355 & §24.235 – FREQUENCY STABILITY

This EUT is an amplifier/repeater, not a transmitter. There is no oscillator circuit in the EUT, therefore there is no frequency stability measurement required.

10.1 Test Result

N/A

11 FCC §1.1307(b)(1) & §2.1091 - RF EXPOSURE INFORMATION

11.1 Applicable Standard

According to FCC §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

Note: f = frequency in MHz
* = Plane-wave equivalent power density

11.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density
P = power input to antenna
G = power gain of the antenna in the direction of interest relative to an isotropic radiator
R = distance to the center of radiation of the antenna

Cellular Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	22.43
Maximum peak output power at antenna input terminal (mW):	174.98
Prediction distance (cm):	20
Prediction frequency (MHz):	836.6
Antenna Gain, typical (dBi):	2.0
Cable Loss (dB):	3.0
Power density at predication frequency and distance (mW/cm^2):	0.0277
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5577

Cellular Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	0.93
Maximum peak output power at antenna input terminal (mW):	1.24
Prediction distance (cm):	20
Prediction frequency (MHz):	891.6
Antenna Gain, typical (dBi):	0
Cable Loss (dB):	3.0
Power density at predication frequency and distance (mW/cm^2):	0.000124
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.5944

PCS Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	22.80
Maximum peak output power at antenna input terminal (mW):	190.55
Prediction distance (cm):	20
Prediction frequency (MHz):	1909.8
Antenna Gain, typical (dBi):	2.0
Cable Loss (dB):	5.0
Power density at predication frequency and distance (mW/cm^2):	0.019
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

PCS Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	0.75
Maximum peak output power at antenna input terminal (mW):	1.189
Prediction distance (cm):	20
Prediction frequency (MHz):	1989.8
Antenna Gain, typical (dBi):	0
Cable Loss (dB):	5.0
Power density at predication frequency and distance (mW/cm^2):	0.0000748
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

Results

For Uplink, the highest power density level at 20 cm is below the MPE uncontrolled exposure limit. For Downlink; the highest power density level at 20 cm is below the MPE uncontrolled exposure limit.