



FCC PART 22H, 24E

TEST AND MEASUREMENT REPORT

For

Wilson Electronics, Inc.

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St. George, UT 84790, USA

FCC ID: PWO271265

Report Type: Original Report	Product Type: Bi-Directional Amplifier
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Report Number: <u>R1001071-2224</u>	
Report Date: <u>2010-07-15</u>	
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* This report may contain data that are not covered by the NVLAP accreditation and are marked with an asterisk "*" (Rev.2)

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1001071-2224	Original	2010-07-15

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report was prepared on behalf of *Wilson Electronics, Inc.* and their product *FCC ID: PWO271265*, model: 271265 or the "EUT" as referred to in this report. The EUT is a wireless, mobile and fixed (in-building), dual-band bi-directional amplifier for enhancing the range of cell phones. A 50 Ω SMA connector is used for connecting both outside and inside antenna to the amplifier. The uplink frequency bands are: 824~849 MHz and 1850~1910 MHz. The downlink frequency bands are 869~894 MHz and 1930~1990 MHz. Modulation types are CDMA, GSM, EDGE, EVDO and HSPA. The amplifier is contained in a plastic case.

1.2 Mechanical Description

The EUT Approximate measurement is: 140 mm (L) x 108 mm (W) x 39 mm (H). Weight: 217.5g.

** The test data gathered are from typical production sample, serial number: 801265990, provided by the manufacturer.*

1.3 Objective

This type approval report is prepared on behalf of *Wilson Electronics, 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 characteristics, 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 - Public Mobile Services

Part 24 Subpart E – PCS

Applicable Standards: TIA/EIA603-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.

Detailed instrumentation measurement uncertainties can be found in BACL Corp. report QAP-018.

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 sites at BACL have been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports has 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 facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission, Industry Canada, and Voluntary Control Council for Interference has the reports on file and is listed under FCC registration number: 90464, IC registration number: 3062A, and VCCI Registration Number: C-2463 and R-2698. The test site has been approved by the FCC, IC, and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL 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/ts/htdocs/210/214/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 EUT Internal Configuration

Manufacturer	Description	Model	Serial Number
Wilson Electronics, Inc.	PCB Board	PCB801265 Rev F	-

2.5 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Narda	10dB attenuator pad	768-10	N/A

2.6 EUT Power Supply Information

Manufacturer	Description	Model	Serial Number
Jentec Technology Co., Ltd.	AC/DC Power Adapter	AF1806-B	-

2.7 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	0.2	Signal Generator	Input/ EUT
RF cable	0.2	Output/ EUT	Spectrum Analyzer

3 SUMMARY OF TEST RESULTS

FCC Rules	Description of Tests	Results
§2.1046, §22.913, §24.232	RF Output Power	Compliant
§2.1047	Modulation Characteristics	N/A
§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	Frequency Stability	N/A
§2.1091	RF Exposure	Compliant

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

4.1 Applicable Standard

FCC §22.913(a) and §24.232.

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 Environmental Conditions

Uplink

Temperature:	20-24 °C
Relative Humidity:	35-47 %
ATM Pressure:	101-103kPa

* The testing was performed by Dennis Huang from 2010-04-15 to 2010-04-28 in RF Site.

Downlink

Temperature:	20-22 °C
Relative Humidity:	50-55 %
ATM Pressure:	99-102kPa

* The testing was performed by Dennis Huang from 2010-06-03 to 2010-06-04 in RF Site.

4.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-07-23
HP	Signal Generator	8648C	3426A00417	2009-07-23
R & S	Signal Generator	SMIQ03	849192/0085	2010-03-31

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

4.5 Test Results

Maximum Output Power – Modulated Signal

CDMA: (Cellular 850 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	869.80	-40	25.90
	Middle	881.52	-40	25.42
	High	893.20	-39	23.16
Reverse (Uplink)	Low	824.80	-30	29.61
	Middle	836.52	-31	30.15
	High	848.20	-30	28.53

CDMA: (PCS 1900 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	1930.8	-44	22.41
	Middle	1960.0	-45	24.96
	High	1989.2	-43	23.57
Reverse (Uplink)	Low	1850.8	-31	28.63
	Middle	1880.0	-33	29.31
	High	1909.2	-29	27.51

WCDMA/HSPA: (Cellular 850 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	871.4	-41	25.24
	Middle	881.4	-42	24.79
	High	891.6	-39	24.78
Reverse (Uplink)	Low	826.4	-30	29.19
	Middle	836.4	-31	29.71
	High	846.6	-30	28.79

WCDMA/HSPA: (PCS 1900 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	1932.4	-46	22.09
	Middle	1960.0	-48	24.94
	High	1987.6	-45	22.14
Reverse (Uplink)	Low	1852.4	-30	28.78
	Middle	1880.0	-31	29.57
	High	1907.6	-28	27.67

GSM: (Cellular 850 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	869.2	-40	25.33
	Middle	881.6	-41	25.63
	High	893.8	-39	22.87
Reverse (Uplink)	Low	824.2	-28	30.10
	Middle	836.6	-30	30.57
	High	848.8	-26	29.93

GSM: (PCS 1900 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	1930.2	-44	23.28
	Middle	1960.0	-46	25.17
	High	1989.8	-43	22.73
Reverse (Uplink)	Low	1850.2	-32	30.47
	Middle	1880.0	-34	30.37
	High	1909.8	-29	28.74

EDGE: (Cellular 850 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	869.2	-40	25.96
	Middle	881.6	-42	24.91
	High	893.8	-39	22.80
Reverse (Uplink)	Low	824.2	-31	30.18
	Middle	836.6	-32	30.80
	High	848.8	-28	30.31

EDGE: (PCS 1900 MHz Band)

Frequency Band	Channel	Frequency (MHz)	Input Power (dBm)	Output Power (dBm)
Forward (Downlink)	Low	1930.2	-46	22.43
	Middle	1960.0	-48	25.14
	High	1989.8	-44	23.02
Reverse (Uplink)	Low	1850.2	-30	30.04
	Middle	1880.0	-35	30.01
	High	1909.8	-28	28.72

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, 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 to at least 1% of the BW (Cellular/PCS) and the 26 dB & 99% bandwidth was recorded.

6.3 Test Environmental Conditions

Unlink

Temperature:	20-24 °C
Relative Humidity:	35-47 %
ATM Pressure:	101-103kPa

* The testing was performed by Dennis Huang from 2010-04-15 to 2010-04-28 in RF Site.

Downlink

Temperature:	20-22 °C
Relative Humidity:	50-55 %
ATM Pressure:	99-102kPa

* The testing was performed by Dennis Huang from 2010-06-03 to 2010-06-04 in RF Site.

6.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-07-23
HP	Signal Generator	8648C	3426A00417	2009-07-23
R & S	Signal Generator	SMIQ03	849192/0085	2010-03-31

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

6.5 Test Results

CDMA/EVDO:

Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
CDMA/EVDO (Cellular)	Uplink	Low	824.80	1263.6	1277.0
		Middle	836.52	1264.8	1285.5
		High	848.20	1264.6	1280.3
	Downlink	Low	869.80	1264.1	1260.6
		Middle	881.52	1264.9	1263.9
		High	893.20	1265.2	1264.1
CDMA/EVDO (PCS)	Uplink	Low	1850.80	1264.8	1281.8
		Middle	1880.00	1264.7	1288.3
		High	1909.20	1264.9	1270.7
	Downlink	Low	1930.80	1265.6	1268.8
		Middle	1960.00	1266.1	1267.2
		High	1989.20	1267.8	1268.6

WCDMA/HSPA:

Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
WCDMA/HSPA (Cellular)	Uplink	Low	826.4	4326.8	4388.7
		Middle	836.4	4326.7	4355.5
		High	846.6	4326.7	4351.6
	Downlink	Low	871.4	4340.9	4298.6
		Middle	881.4	4345.5	4336.3
		High	891.6	4335.0	4284.0
WCDMA/HSPA (PCS)	Uplink	Low	1852.4	4326.8	4343.4
		Middle	1880.0	4326.9	4392.3
		High	1907.6	4326.8	4308.0
	Downlink	Low	1932.4	4340.1	4342.6
		Middle	1960.0	4347.8	4343.4
		High	1987.6	4337.7	4323.8

GSM:

Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
GSM (Cellular)	Uplink	Low	824.2	247.2548	246.3062
		Middle	836.6	247.1675	245.7540
		High	848.8	248.0814	246.2541
	Downlink	Low	869.2	249.0649	247.537
		Middle	881.6	248.9817	246.0813
		High	893.8	247.7324	248.5958
GSM (PCS)	Uplink	Low	1850.2	249.2511	245.8760
		Middle	1880.0	247.2736	247.4315
		High	1909.8	250.8844	246.4109
	Downlink	Low	1930.2	253.4845	247.5074
		Middle	1960.0	259.0485	247.5204
		High	1989.8	251.6814	248.7834

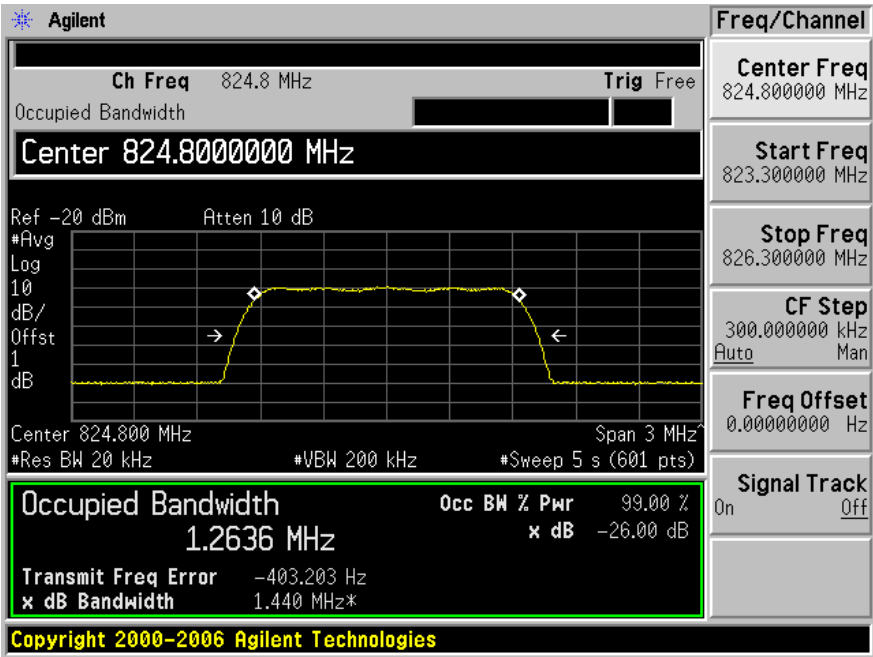
EDGE:

Mode		Channel	Frequency (MHz)	Emission Bandwidth	
				Input (kHz)	Output (kHz)
EDGE (Cellular)	Uplink	Low	824.2	250.1128	257.9515
		Middle	836.6	250.3931	257.7955
		High	848.8	250.4903	258.8813
	Downlink	Low	869.2	250.9254	250.8004
		Middle	881.6	250.5123	251.1640
		High	893.8	250.9218	253.0619
EDGE (PCS)	Uplink	Low	1850.2	249.9599	255.0588
		Middle	1880.0	249.9025	257.7393
		High	1909.8	250.7651	257.9260
	Downlink	Low	1930.2	253.9367	247.9756
		Middle	1960.0	255.9131	248.2046
		High	1989.8	252.3644	247.6105

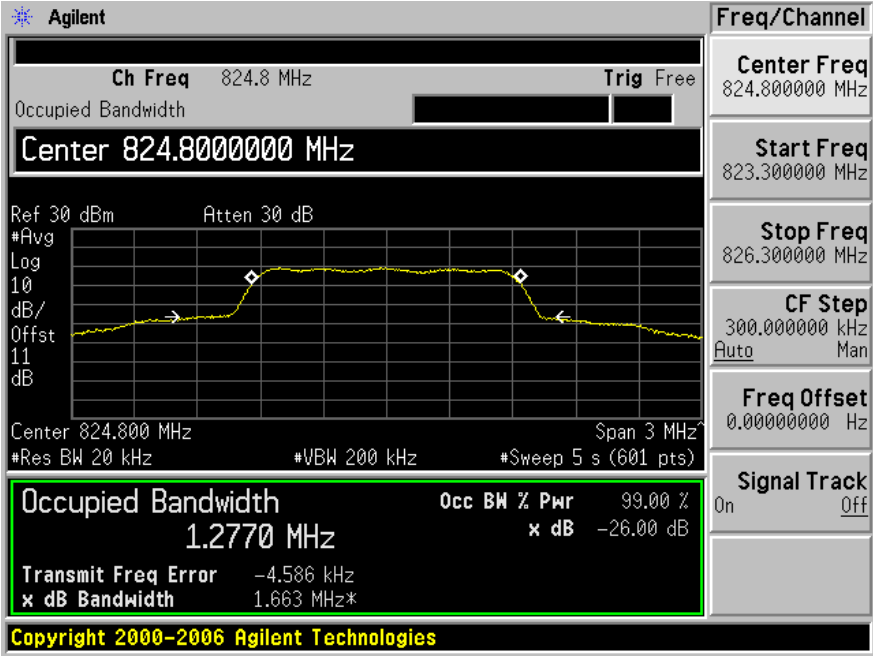
Please refer to the following plots.

CDMA/EVDO Cellular Band Uplink, Low Channel: 824.8 MHz

Input

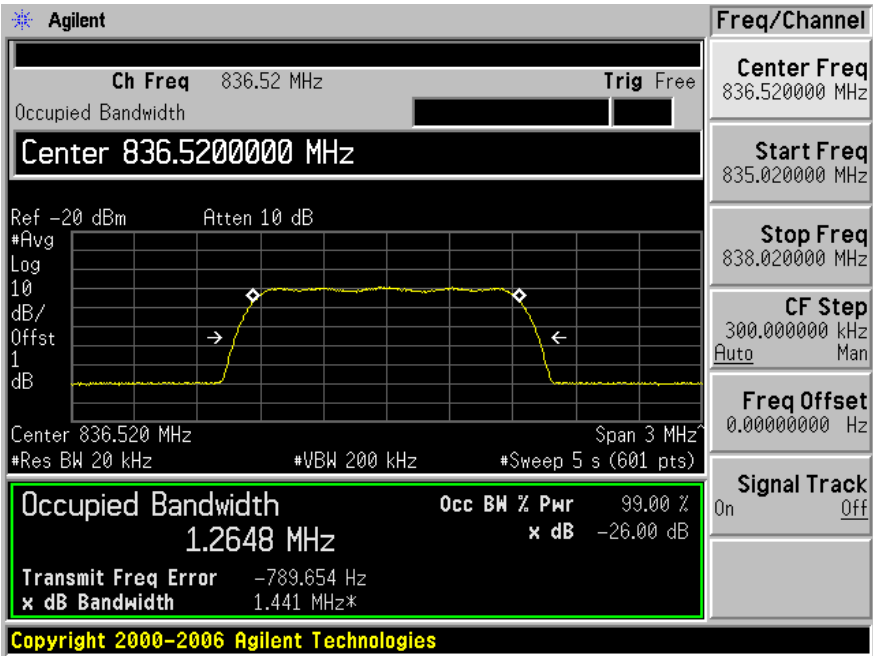


Output

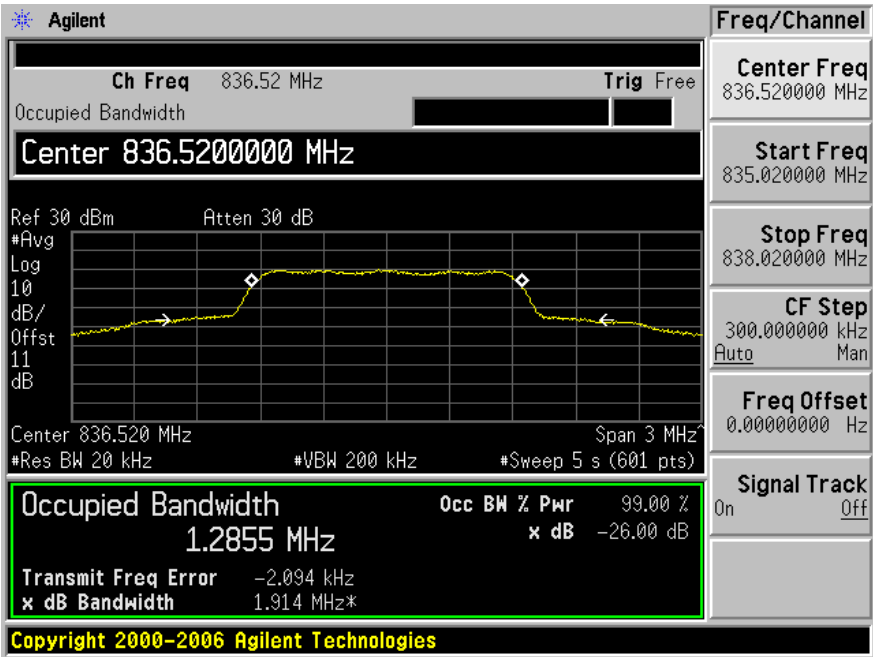


CDMA/EVDO Cellular Band Uplink, Middle Channel: 836.52 MHz

Input

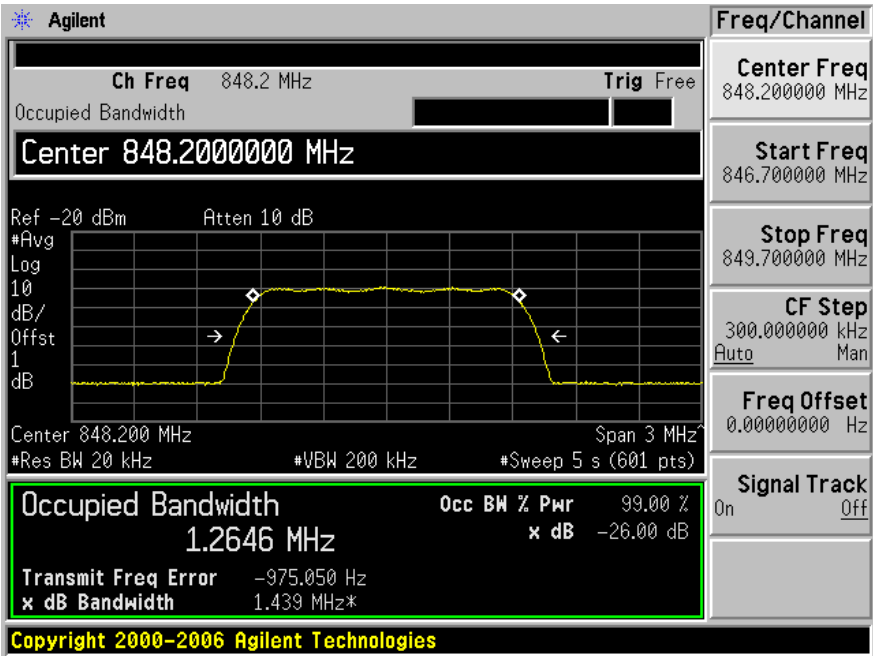


Output

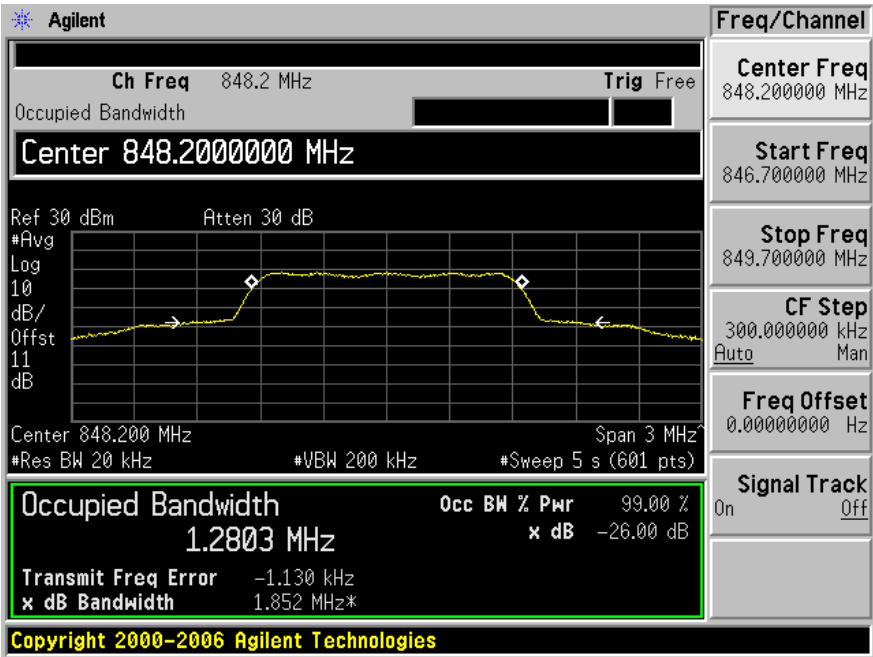


CDMA/EVDO Cellular Band Uplink, High Channel: 848.2 MHz

Input

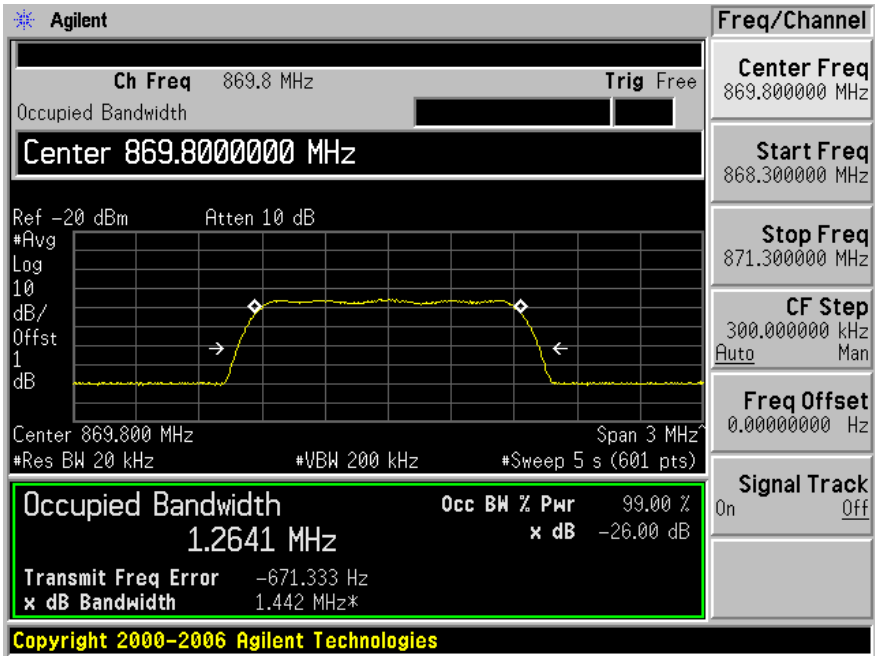


Output

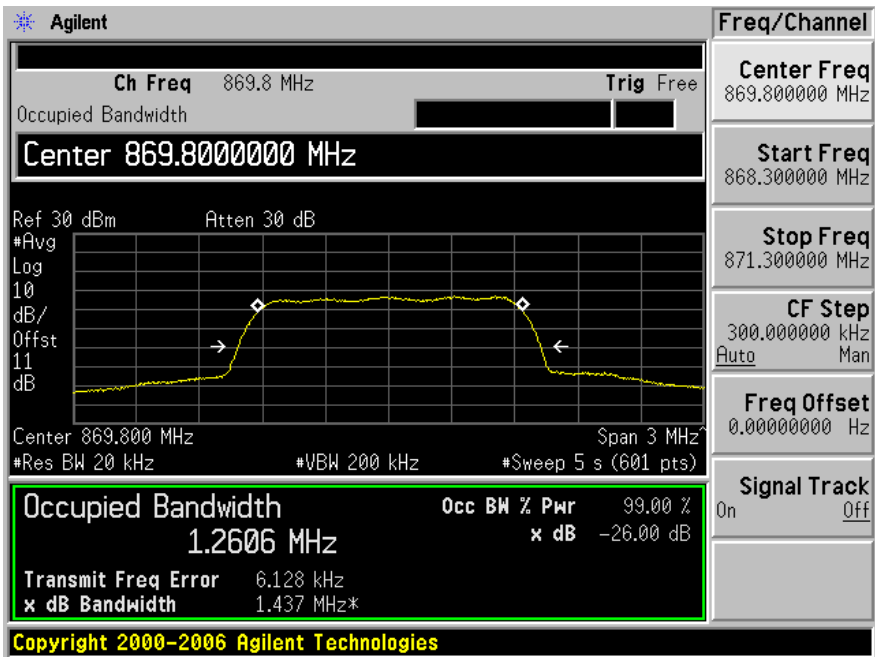


CDMA/EVDO Cellular Band Downlink, Low Channel: 869.8 MHz

Input

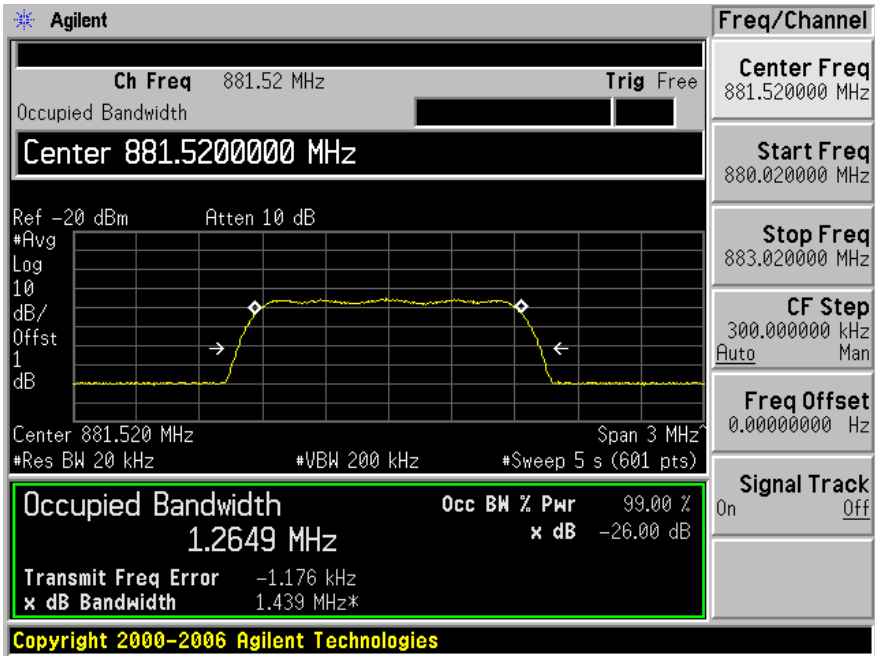


Output

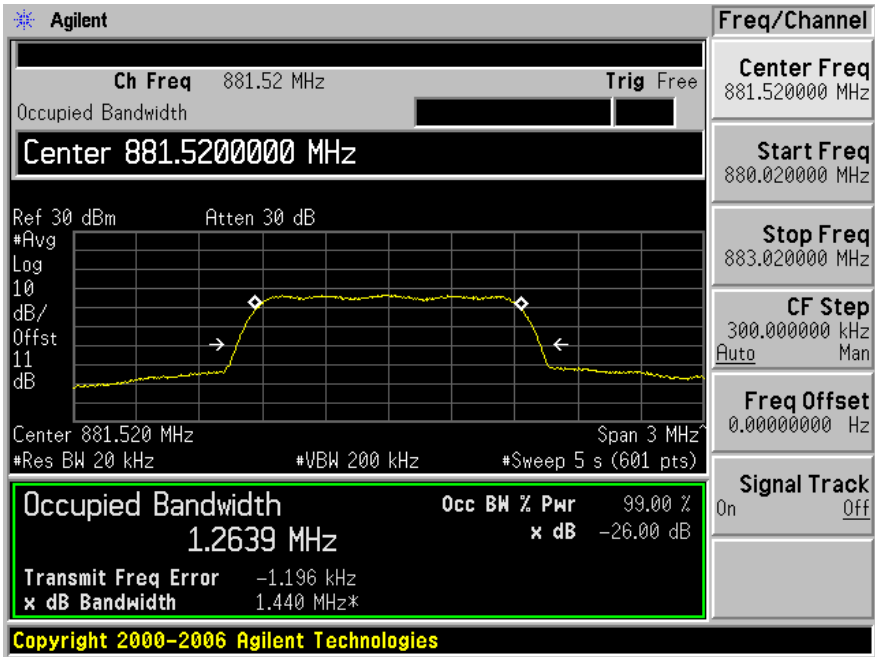


CDMA/EVDO Cellular Band Downlink, Middle Channel: 881.52 MHz

Input

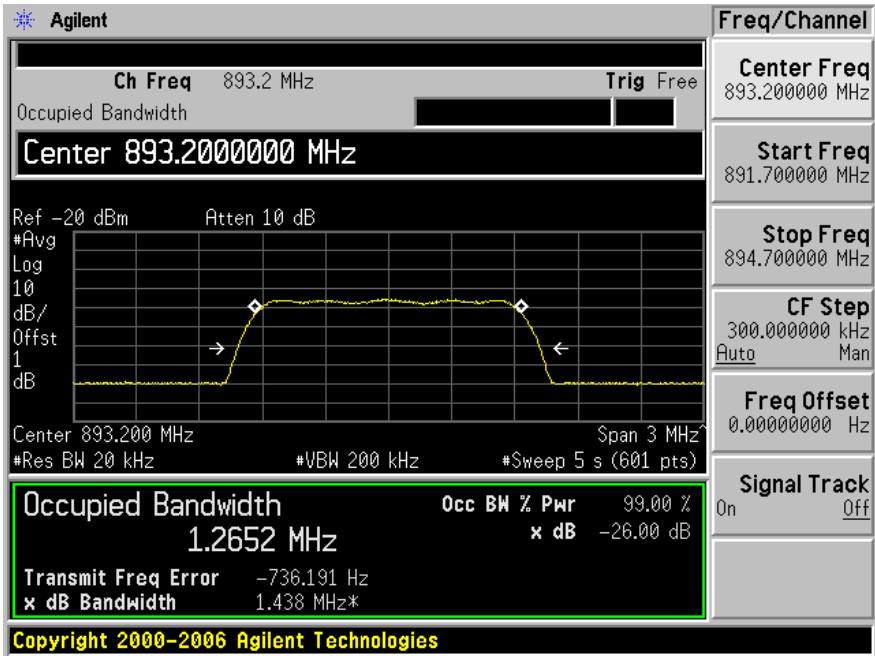


Output

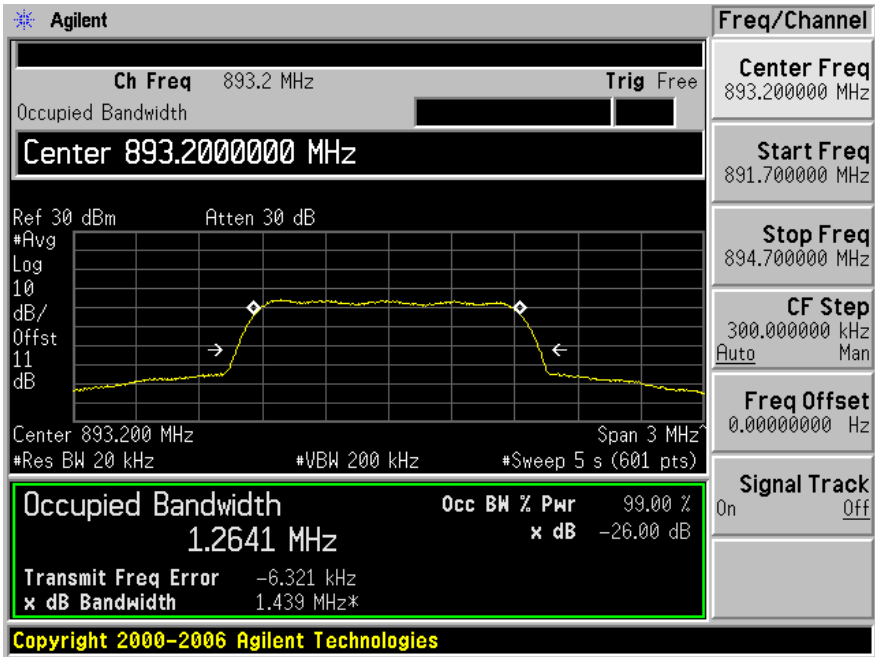


CDMA/EVDO Cellular Band Downlink, High Channel: 893.2 MHz

Input

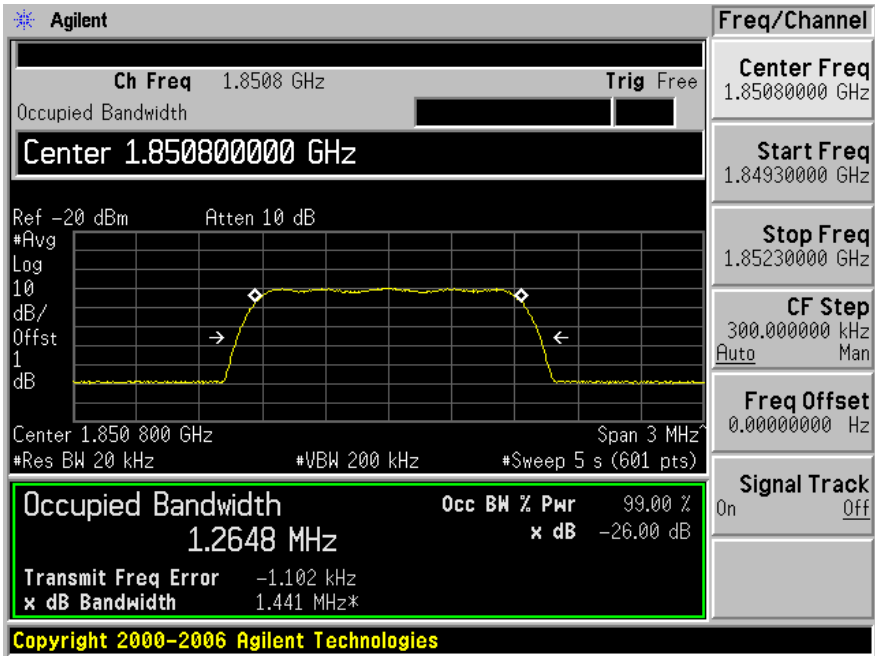


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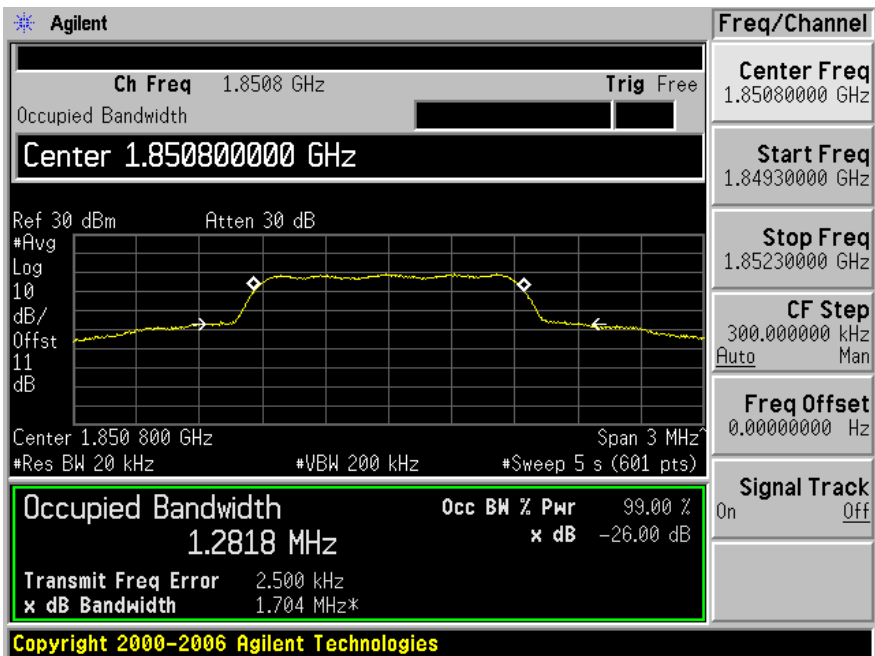


CDMA/EVDO PCS Band Uplink, Low Channel: 1850.8 MHz

Input

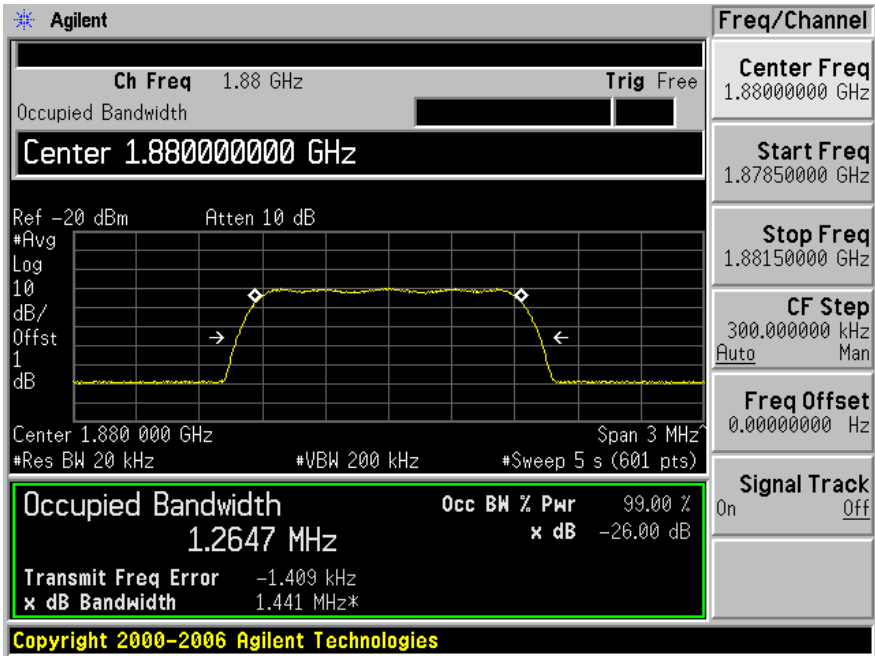


Output

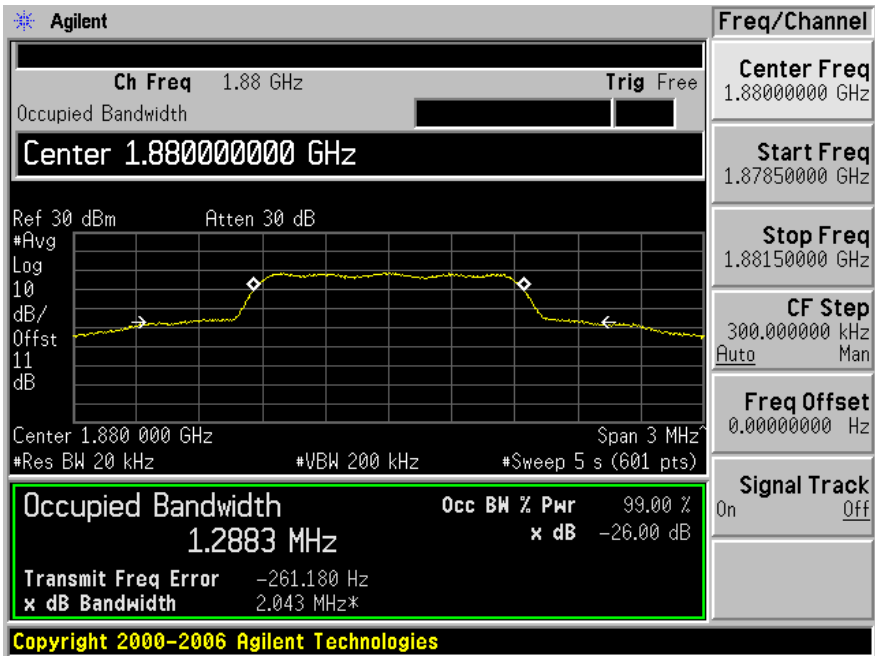


CDMA/EVDO PCS Band Uplink, Middle Channel: 1880 MHz

Input

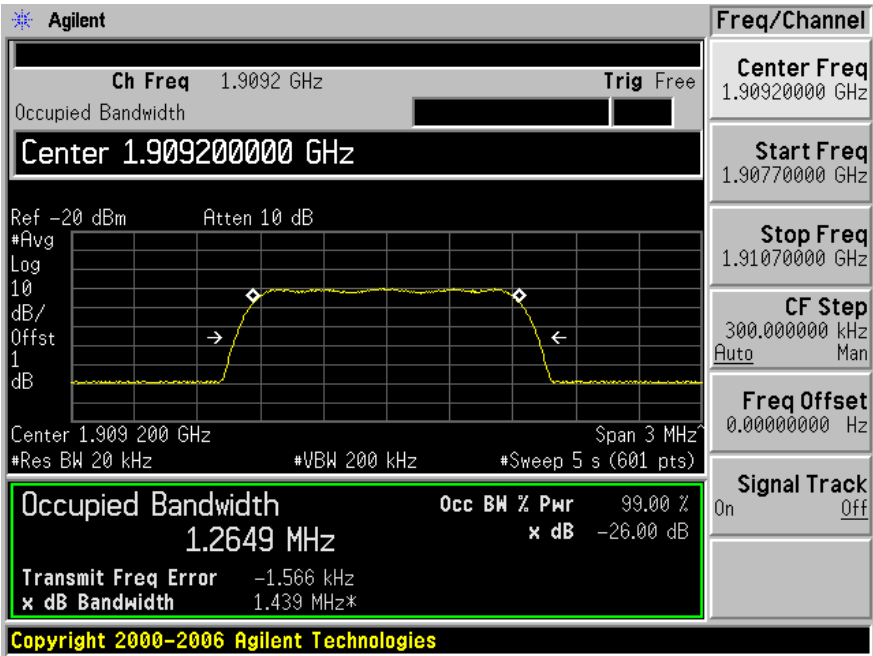


Output

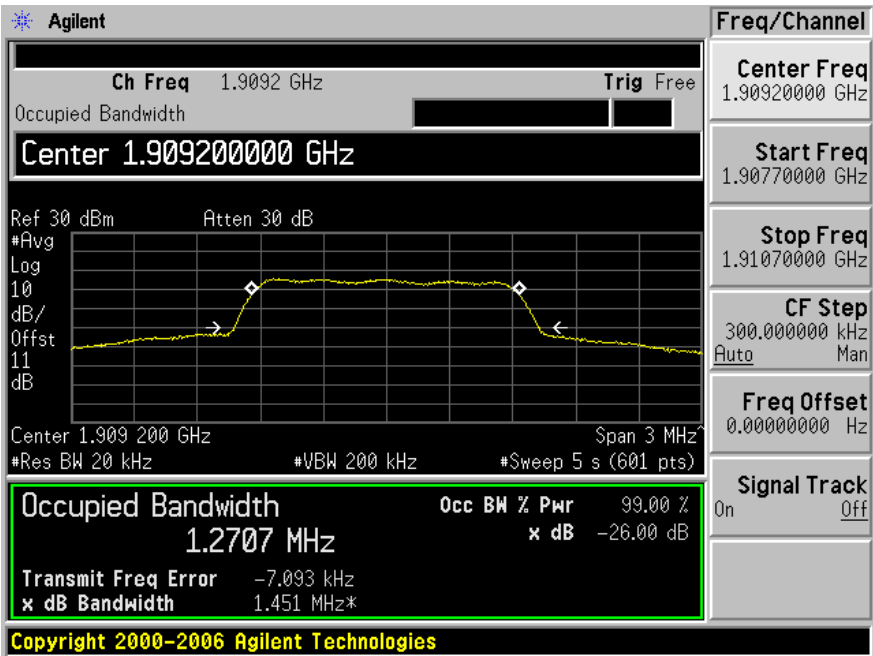


CDMA/EVDO PCS Band Uplink, High Channel: 1909.2 MHz

Input

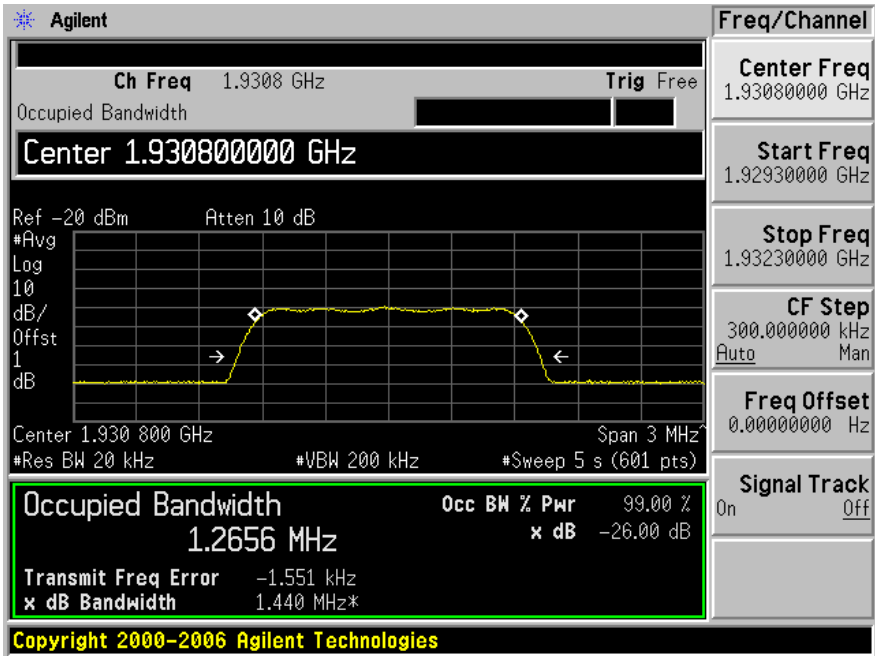


Output

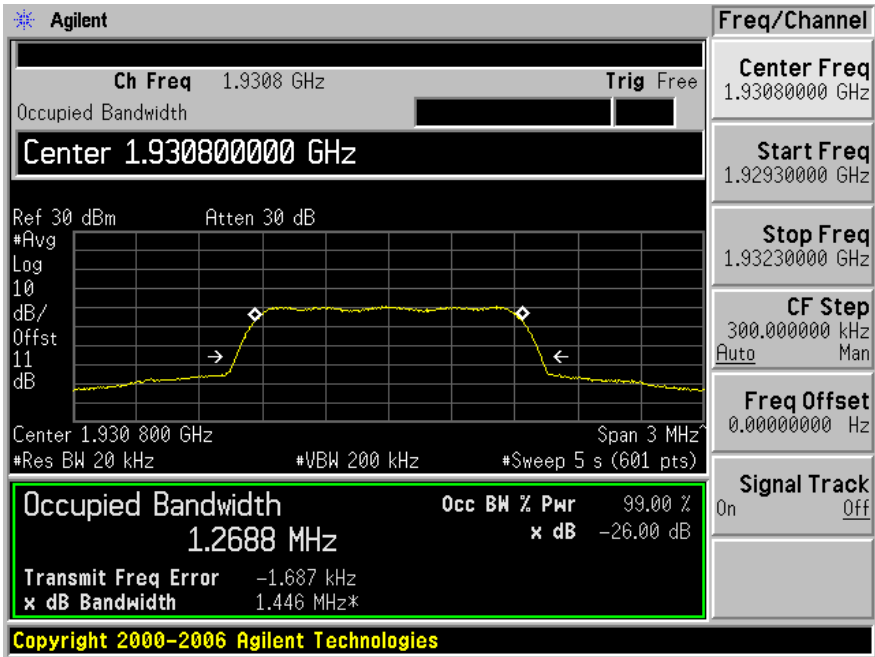


CDMA/EVDO PCS Band Downlink, Low Channel: 1930.8 MHz

Input

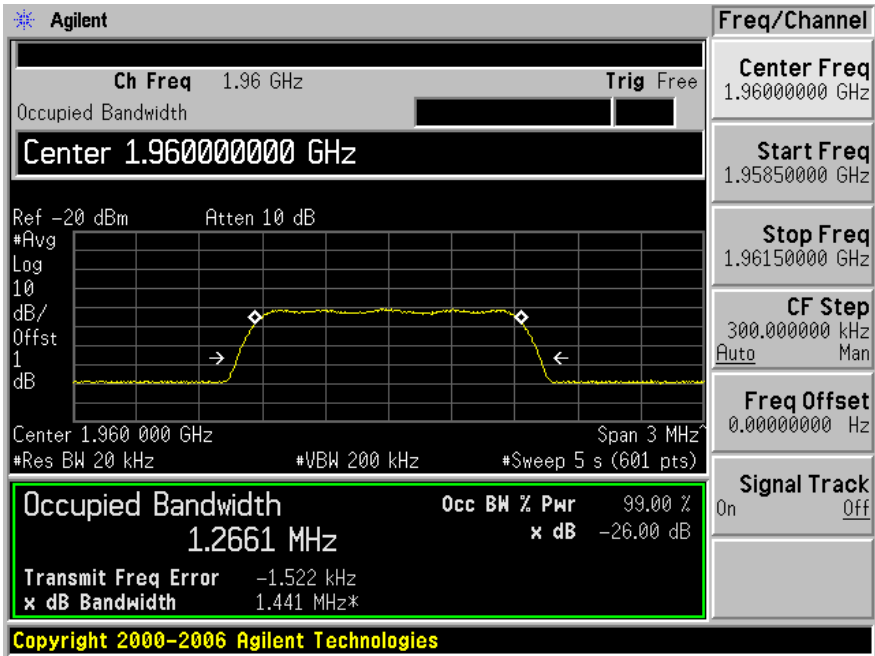


Output

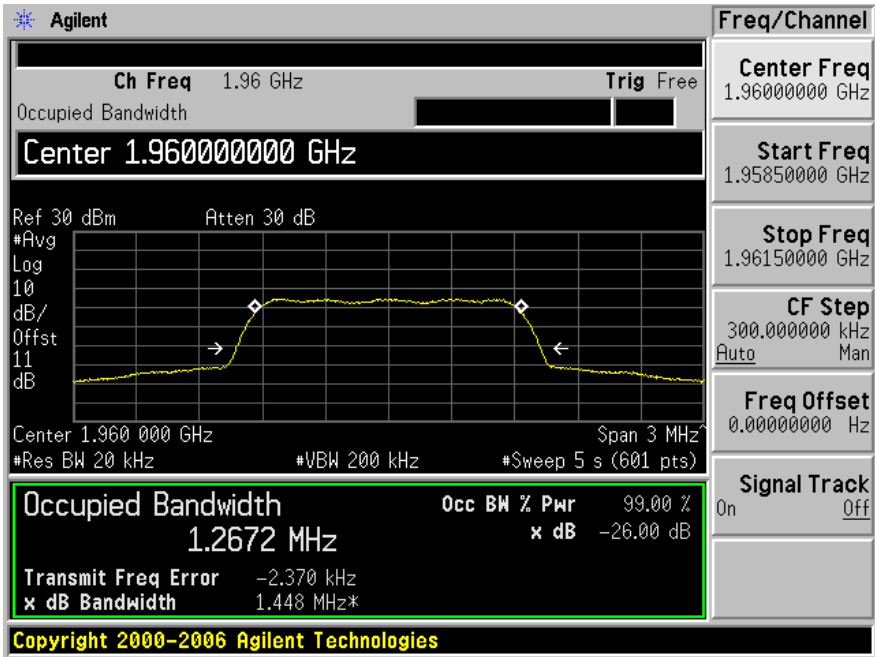


CDMA/EVDO PCS Band Downlink, Middle Channel: 1960 MHz

Input

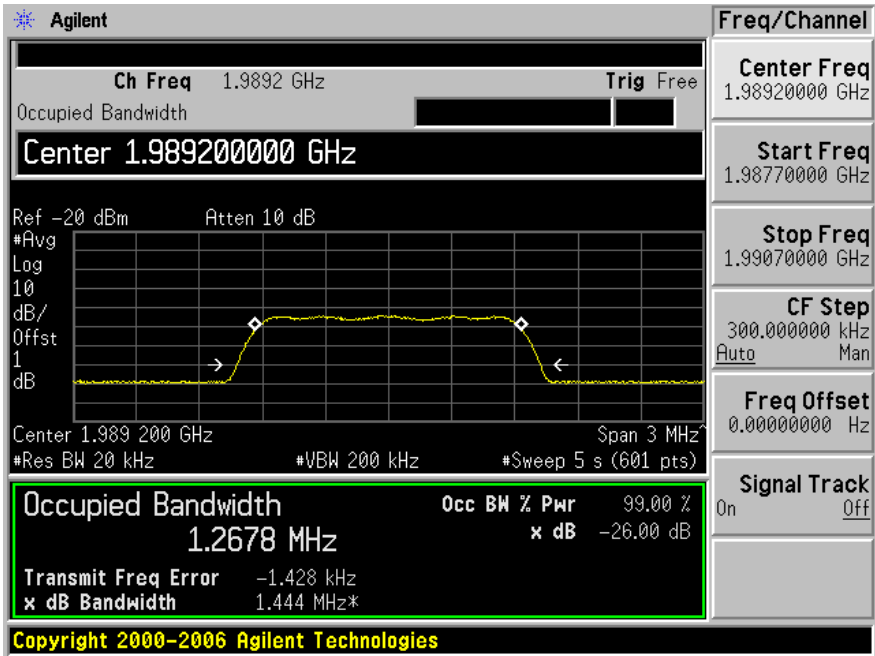


Output

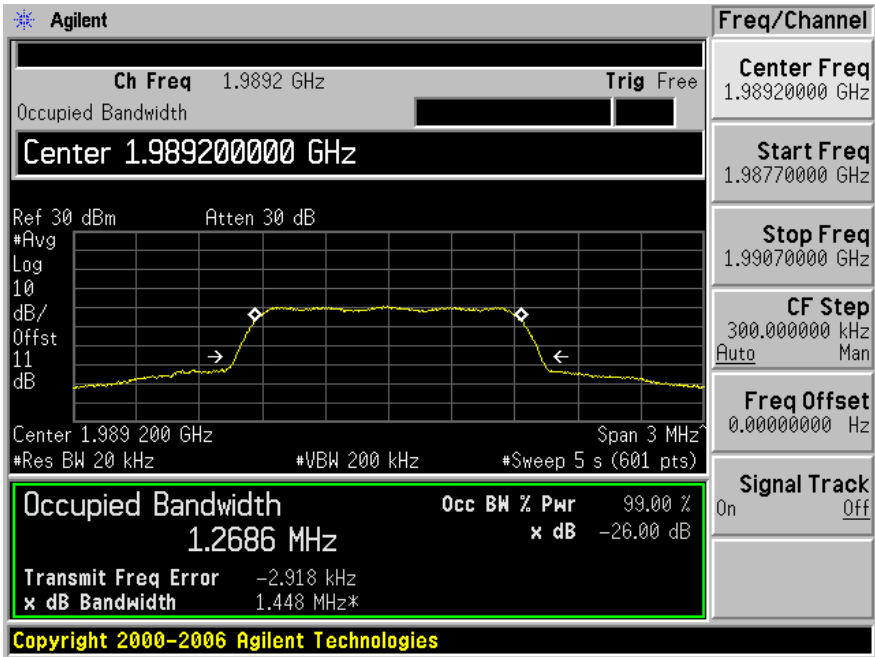


CDMA/EVDO PCS Band Downlink, High Channel: 1989.2 MHz

Input

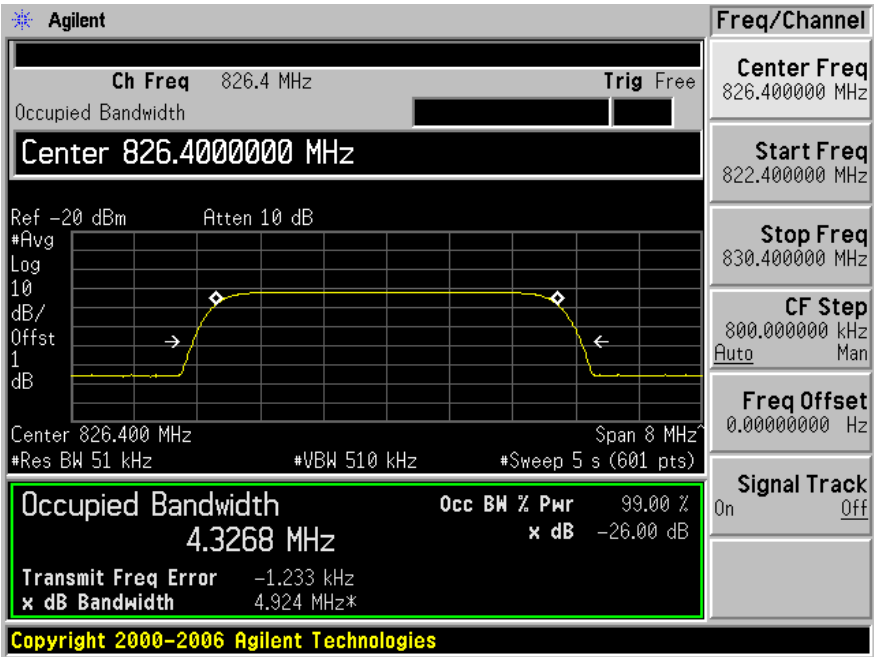


Output

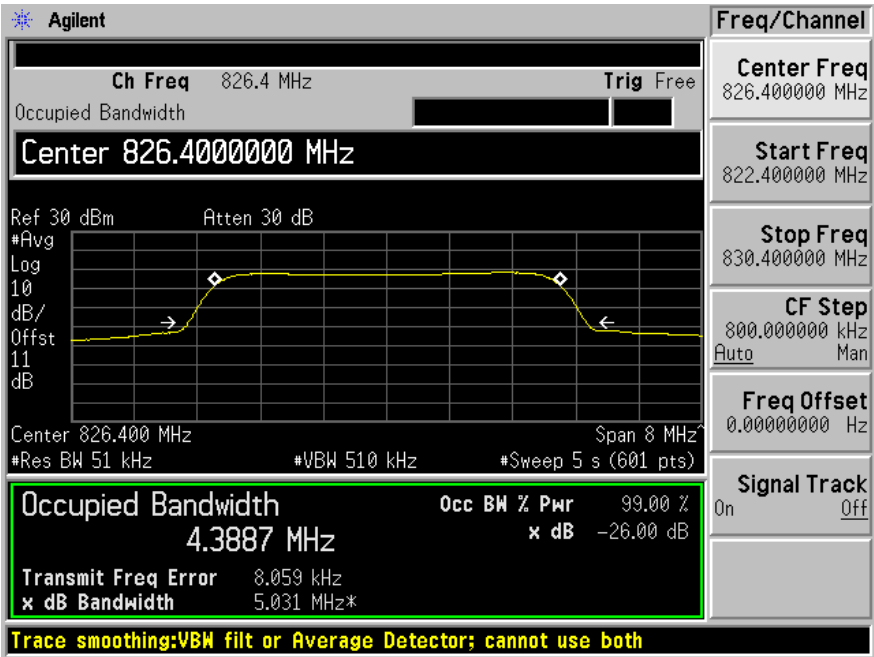


WCDMA/HSPA Cellular Band Uplink, Low Channel: 826.4 MHz

Input

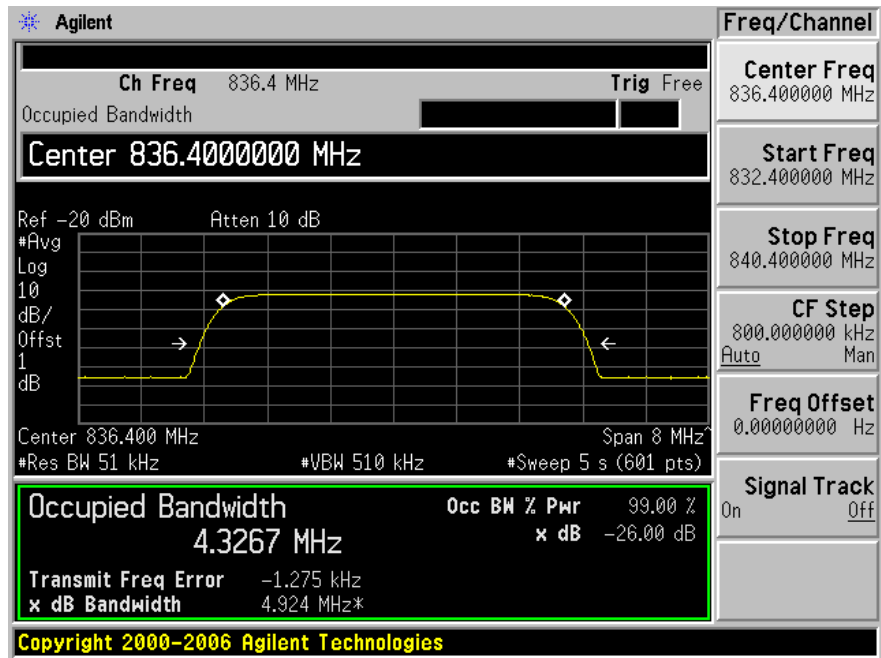


Output

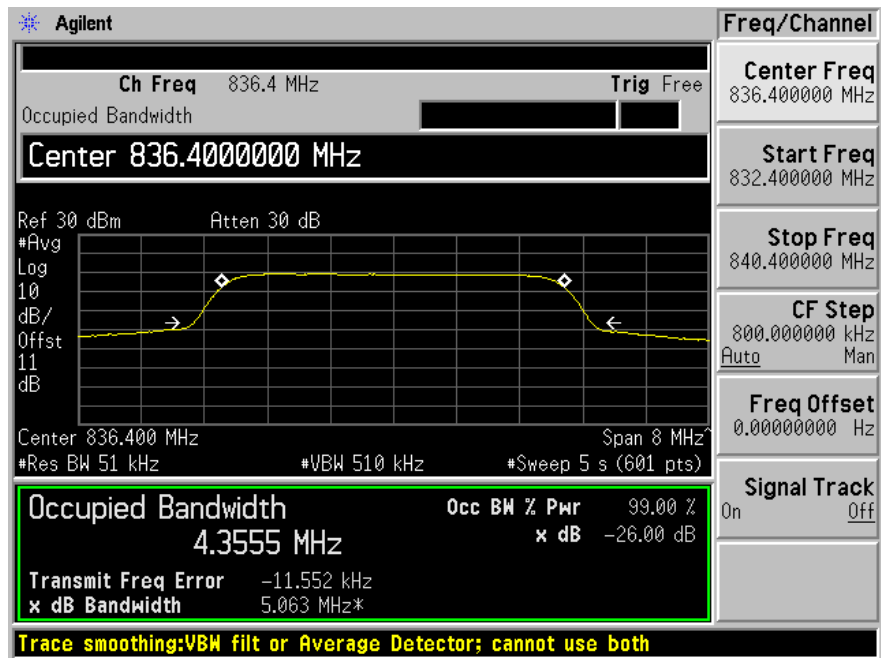


WCDMA/HSPA Cellular Band Uplink, Middle Channel: 836.4 MHz

Input

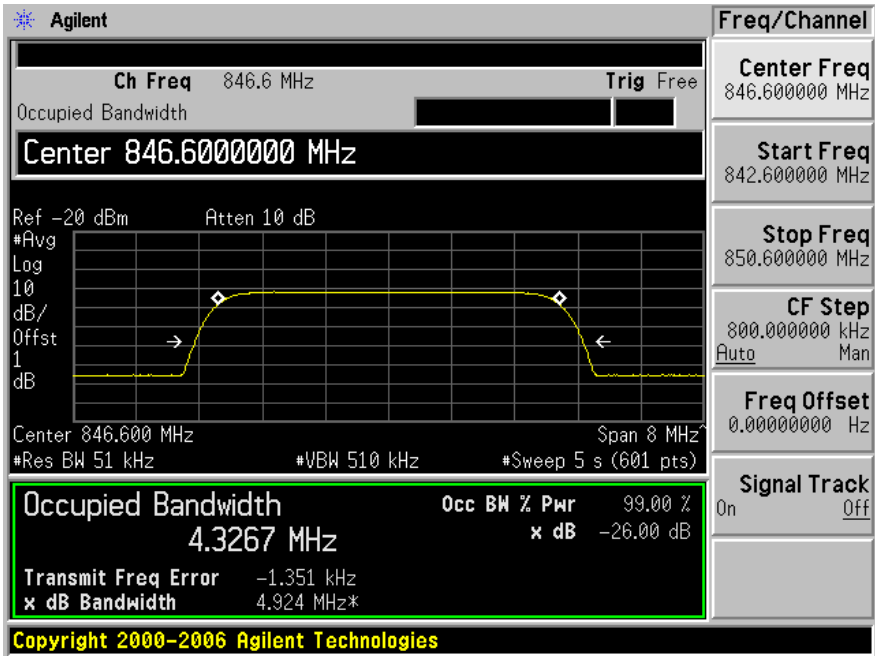


Output

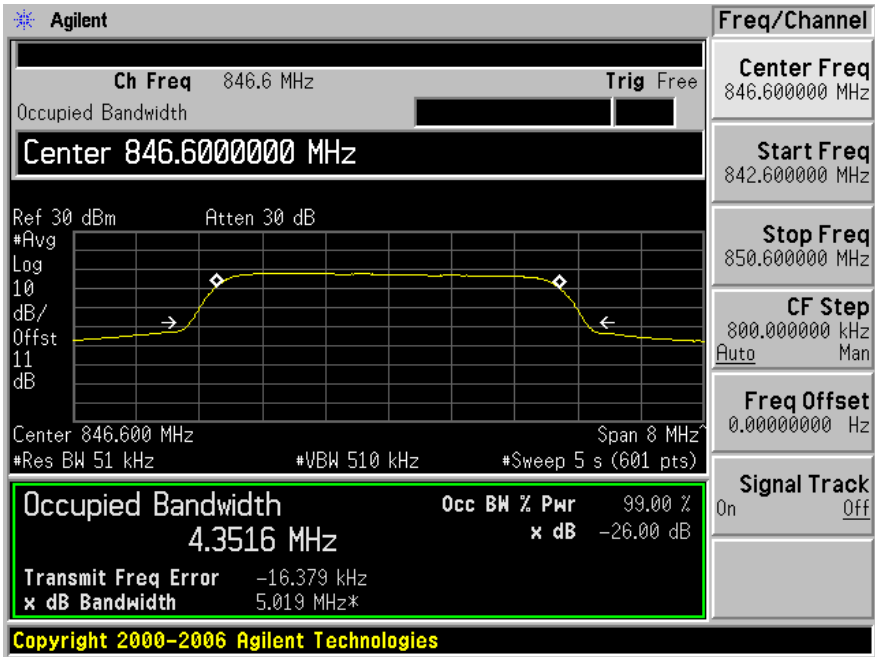


WCDMA/HSPA Cellular Band Uplink, High Channel: 846.6 MHz

Input

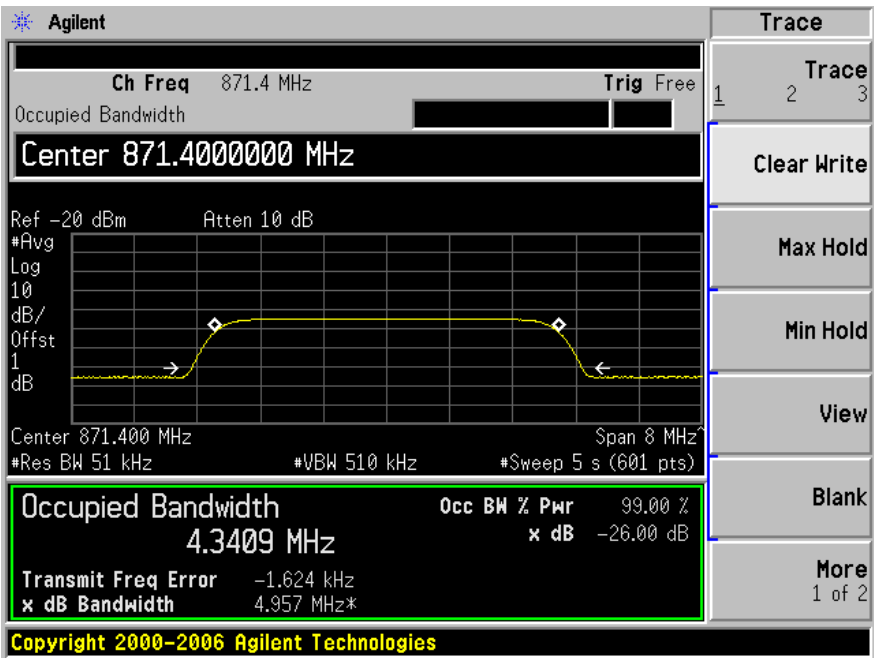


Output

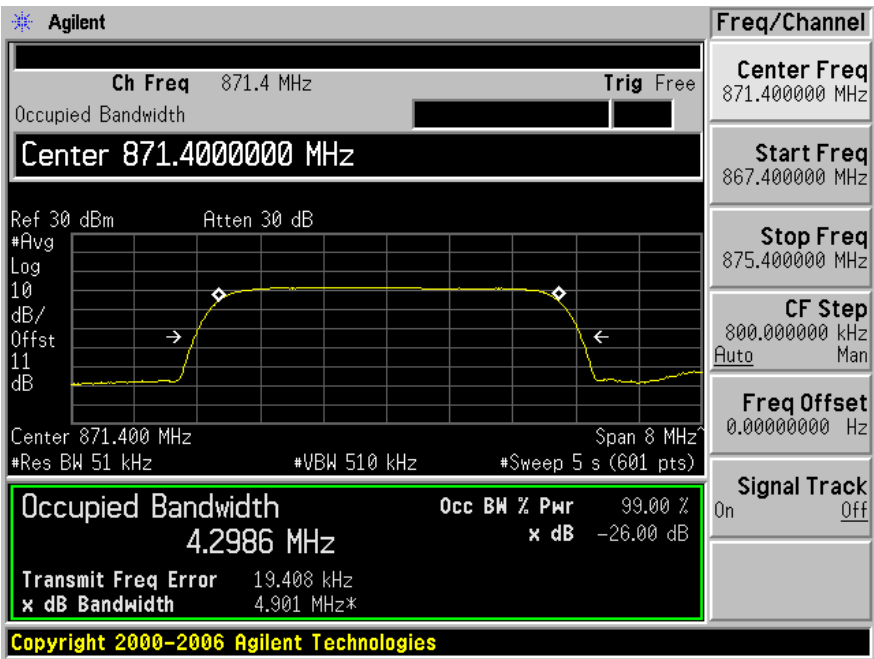


WCDMA/HSPA Cellular Band Downlink, Low Channel: 871.4 MHz

Input

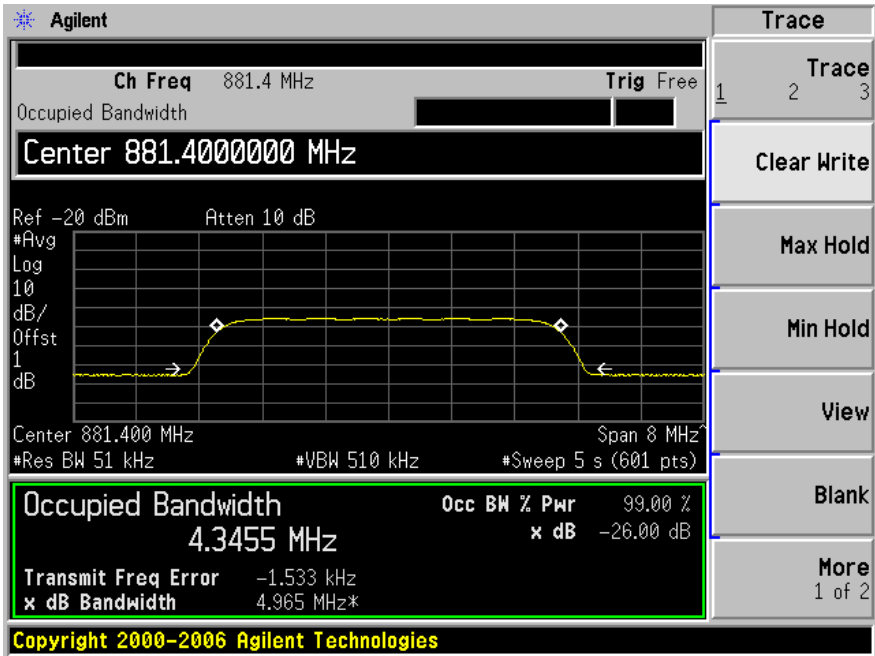


Output

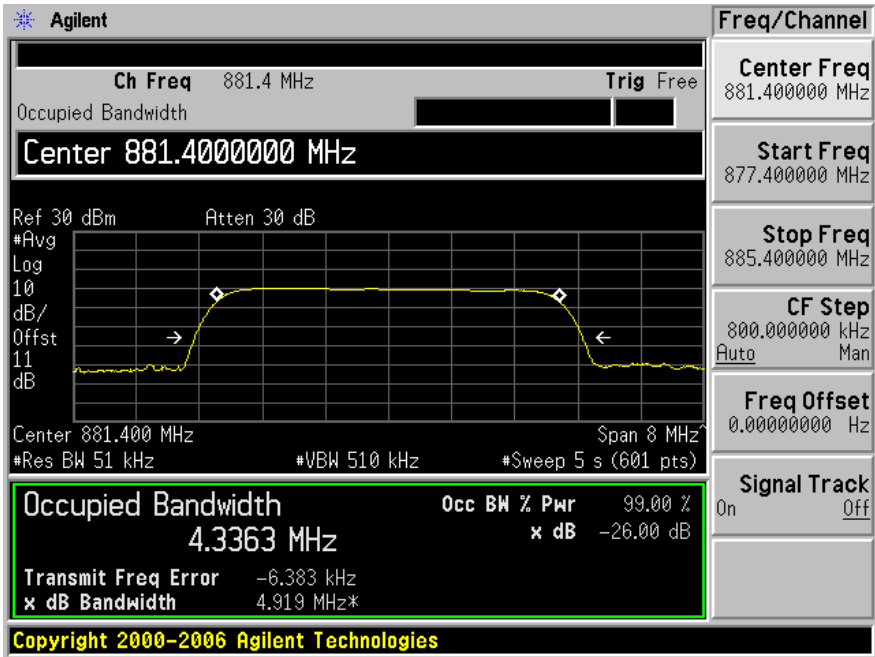


WCDMA/HSPA Cellular Band Downlink, Middle Channel: 881.4 MHz

Input

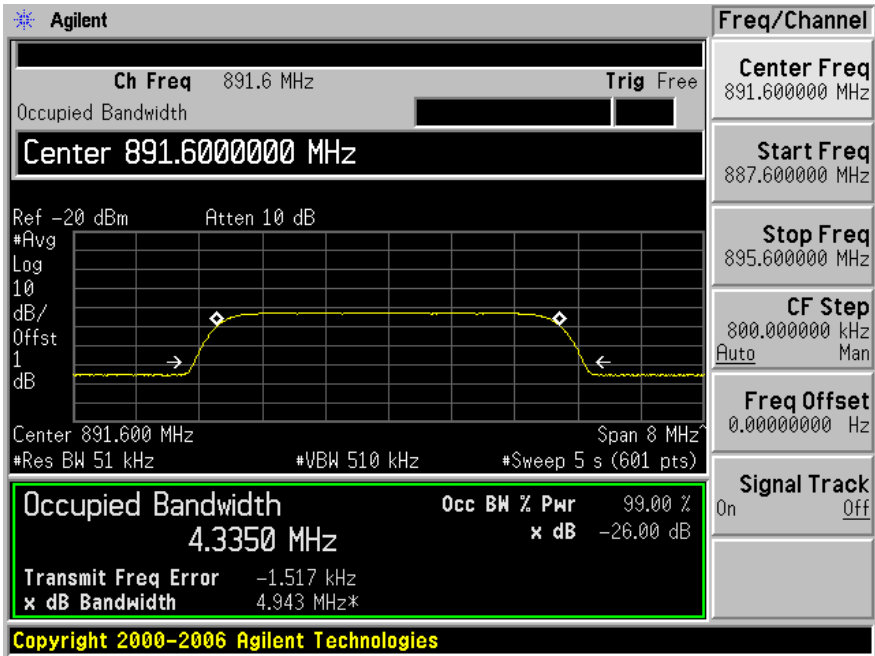


Output

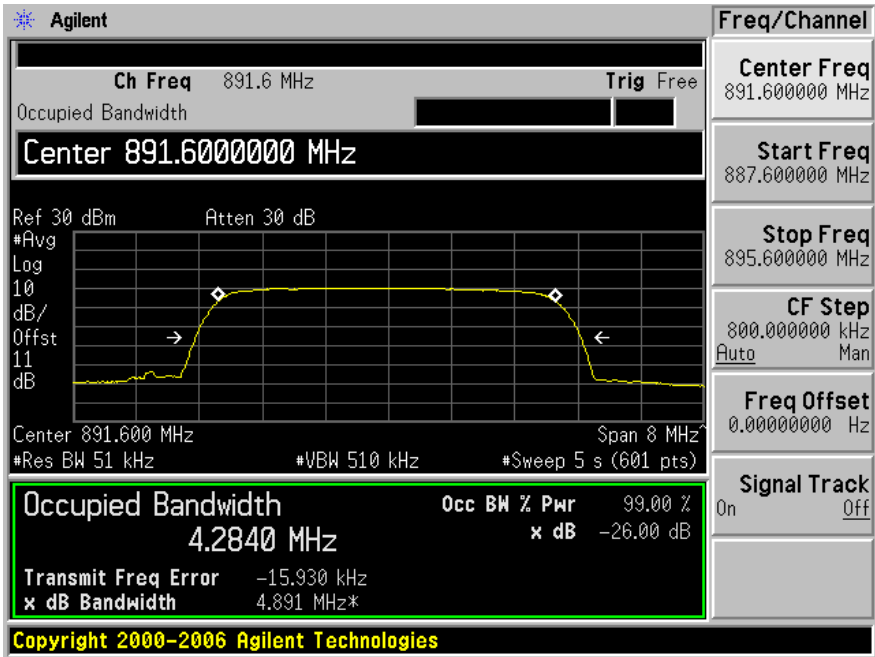


WCDMA/HSPA Cellular Band Downlink, High Channel: 891.6 MHz

Input

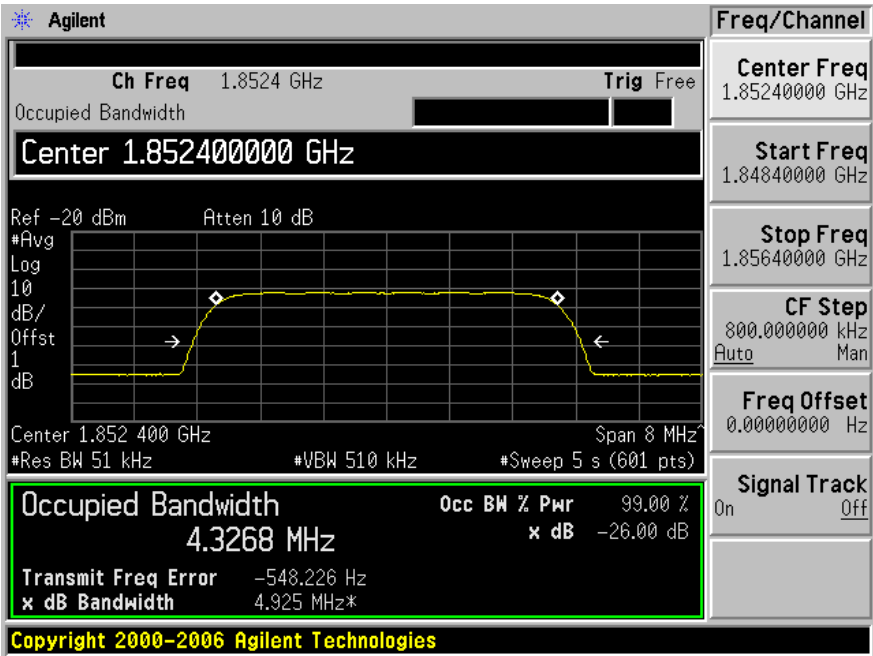


Output

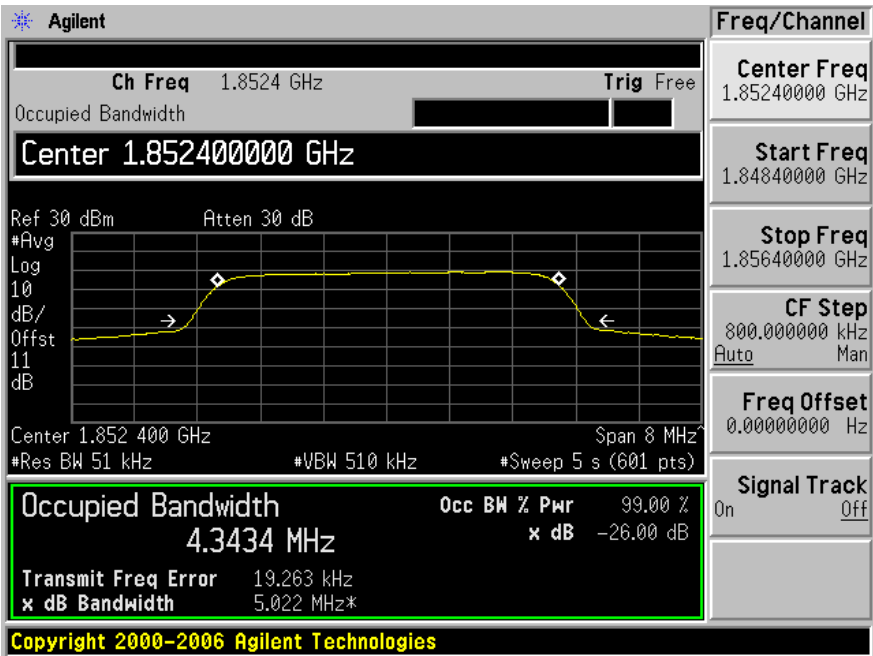


WCDMA/HSPA PCS Band Uplink, Low Channel: 1852.4 MHz

Input

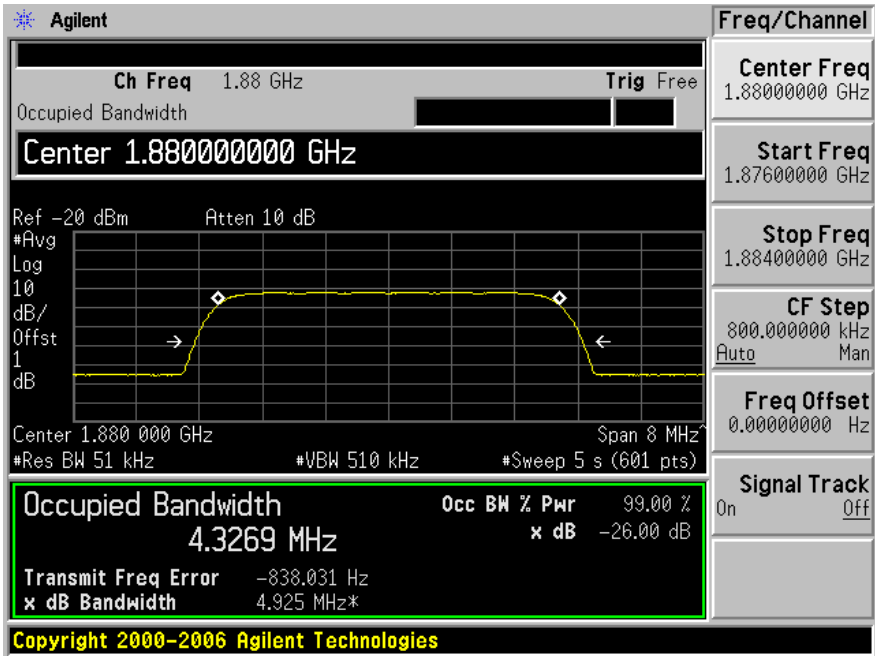


Output

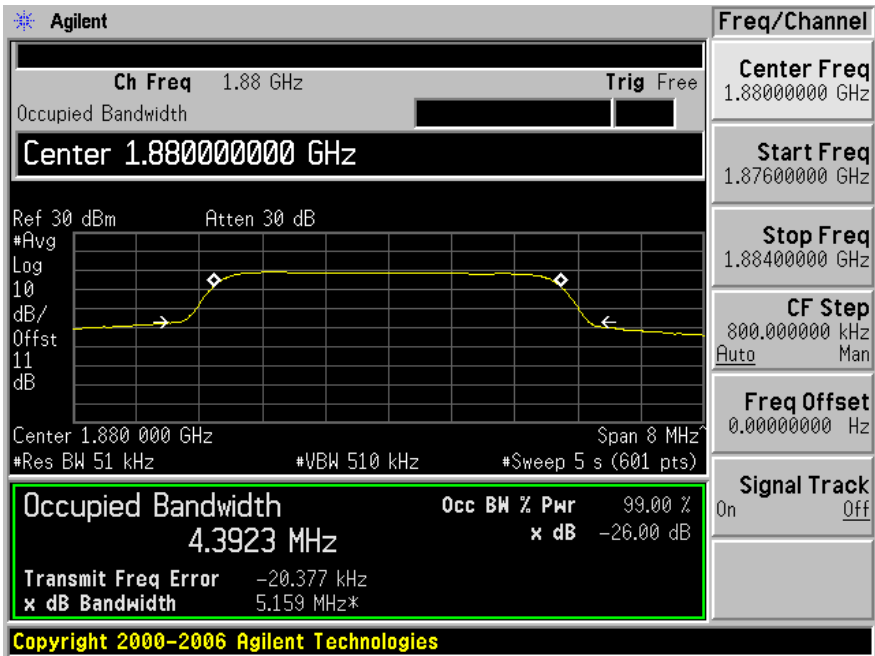


WCDMA/HSPA PCS Band Uplink, Middle Channel: 1880 MHz

Input

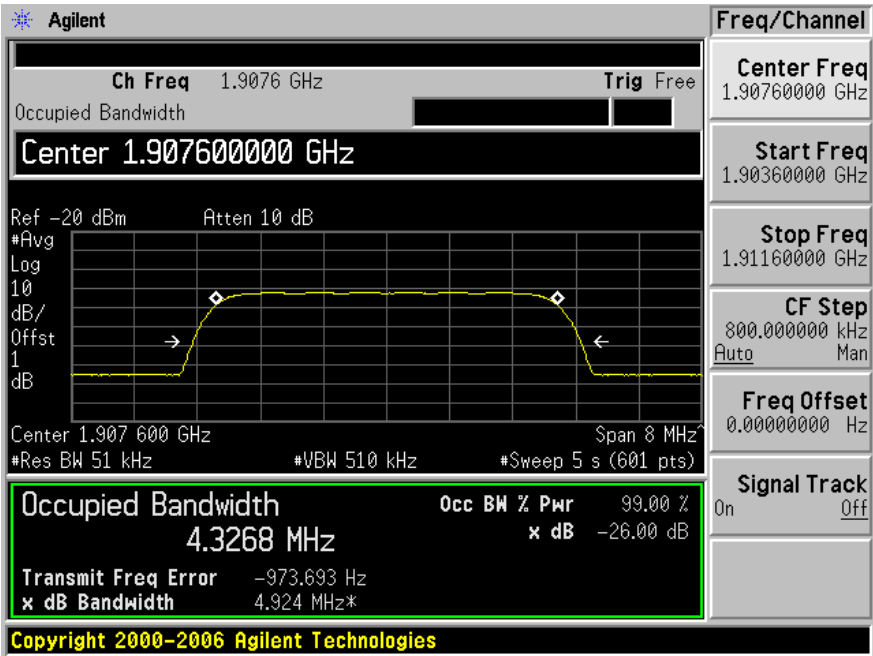


Output

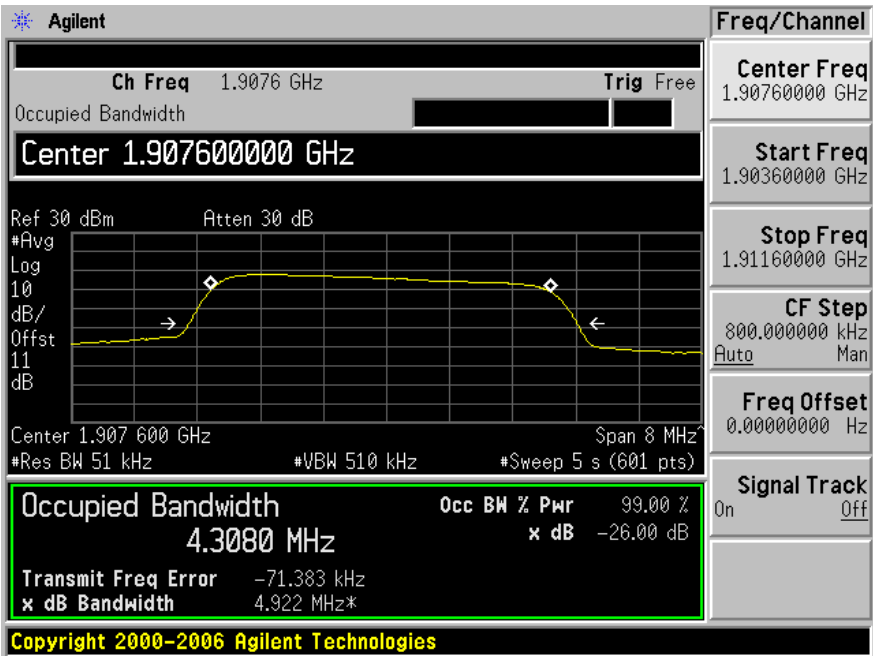


WCDMA/HSPA PCS Band Uplink, High Channel: 1907.6 MHz

Input

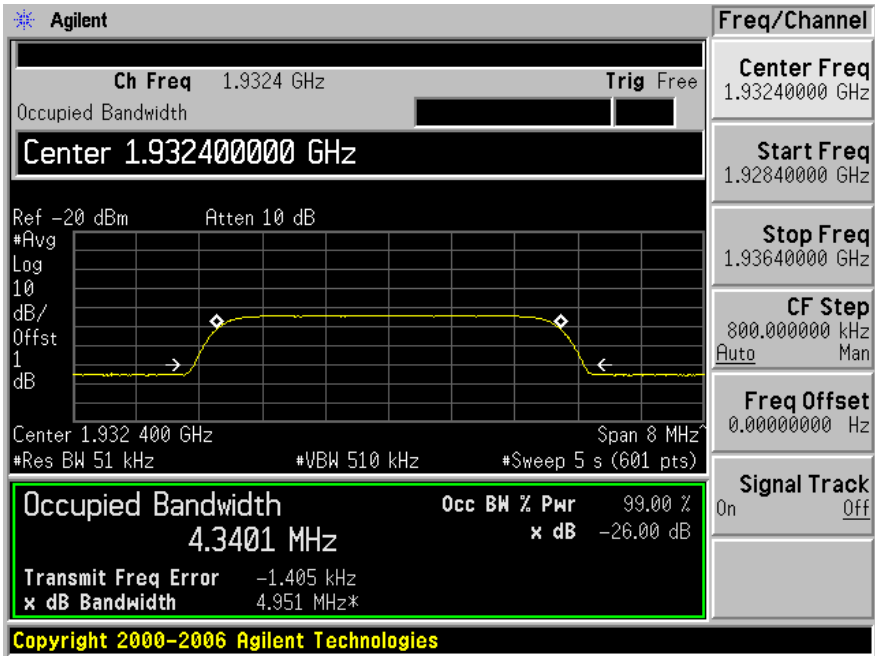


Output

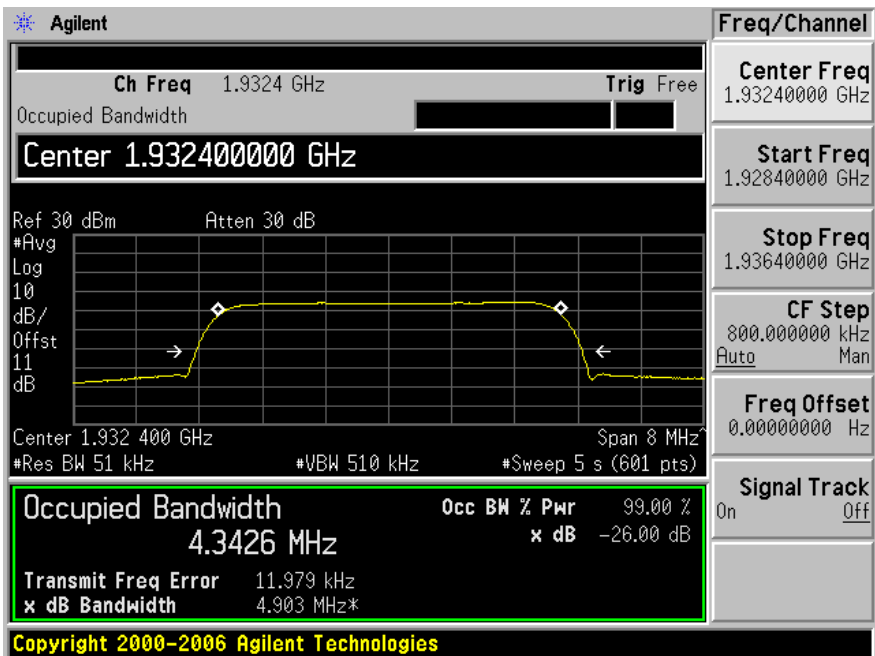


WCDMA/HSPA PCS Band Downlink, Low Channel: 1932.4 MHz

Input

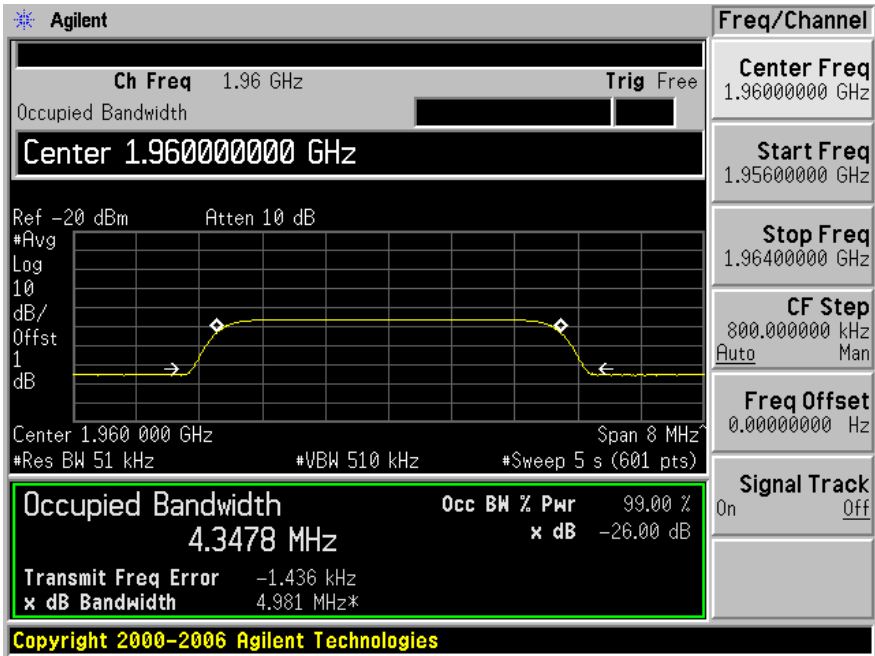


Output

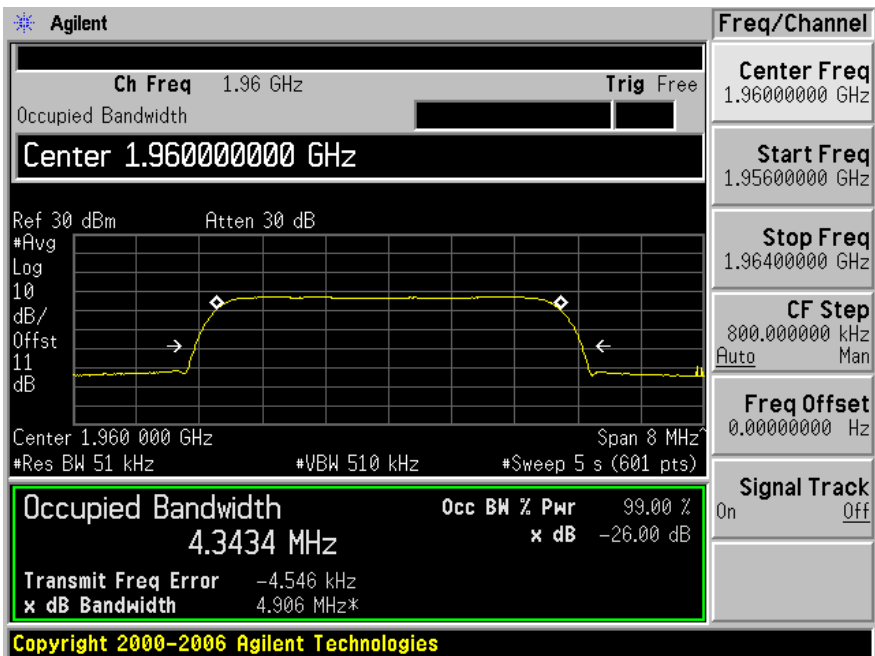


WCDMA/HSPA PCS Band Downlink, Middle Channel: 1960 MHz

Input

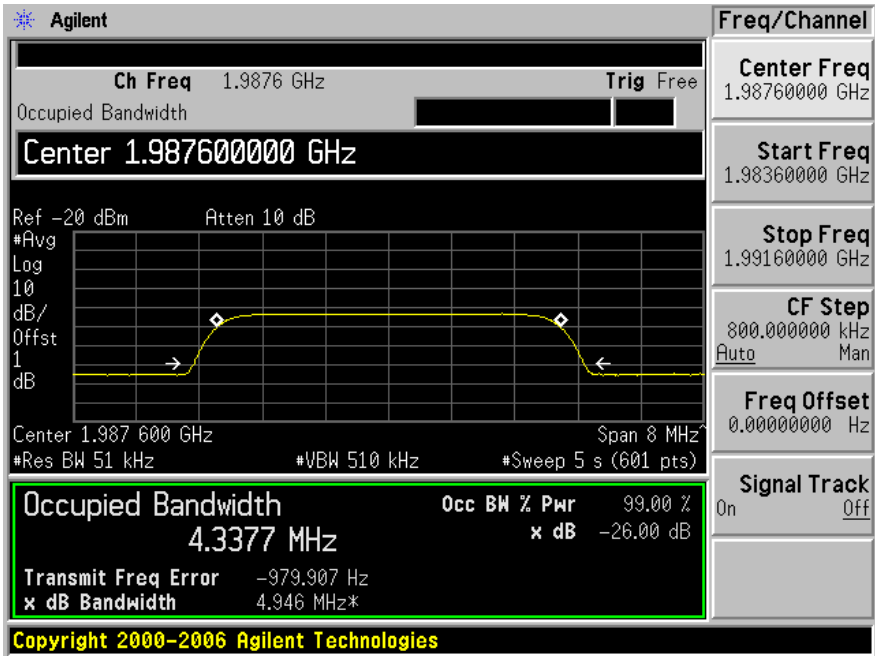


Output

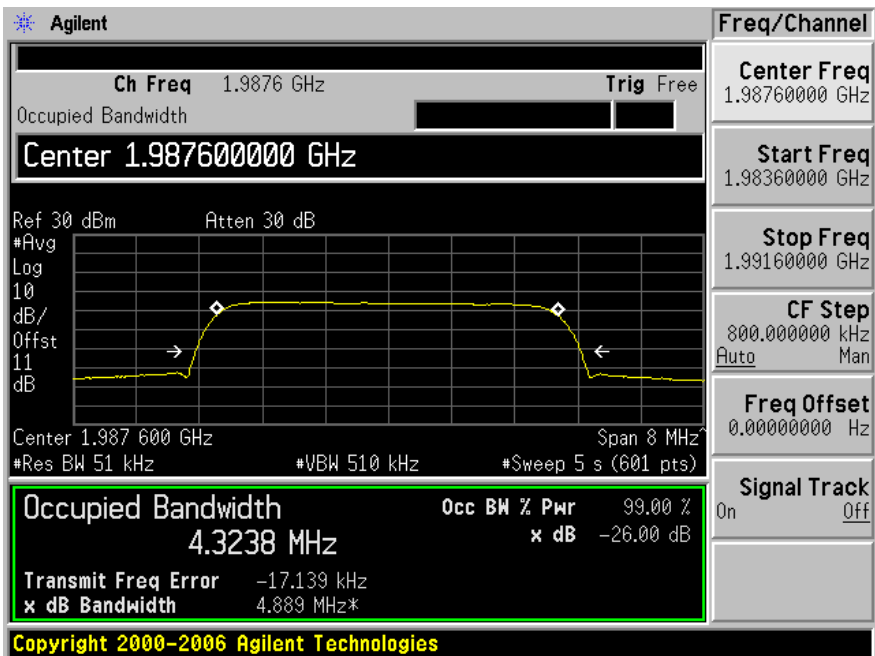


WCDMA/HSPA PCS Band Downlink, High Channel: 1987.6 MHz

Input

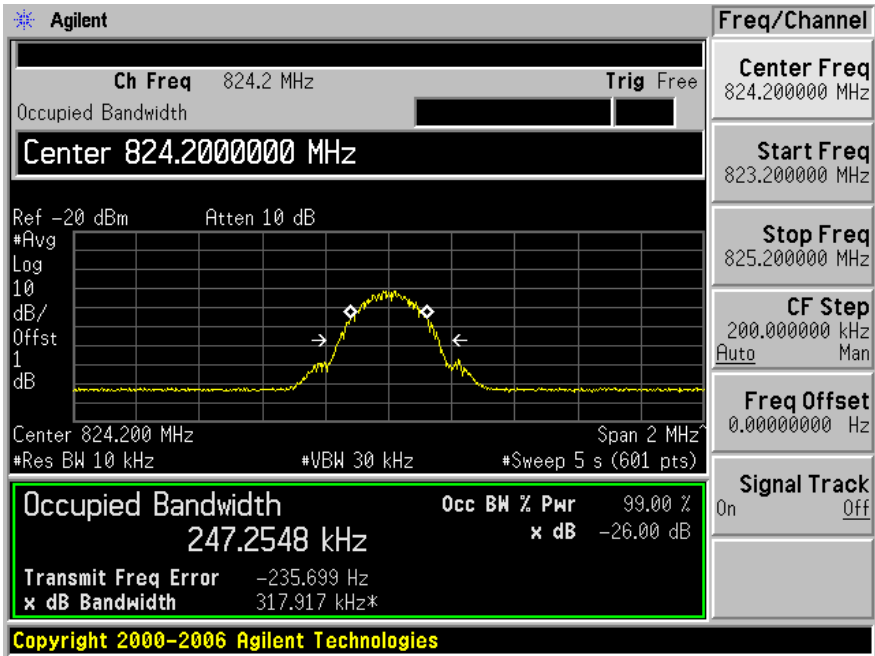


Output

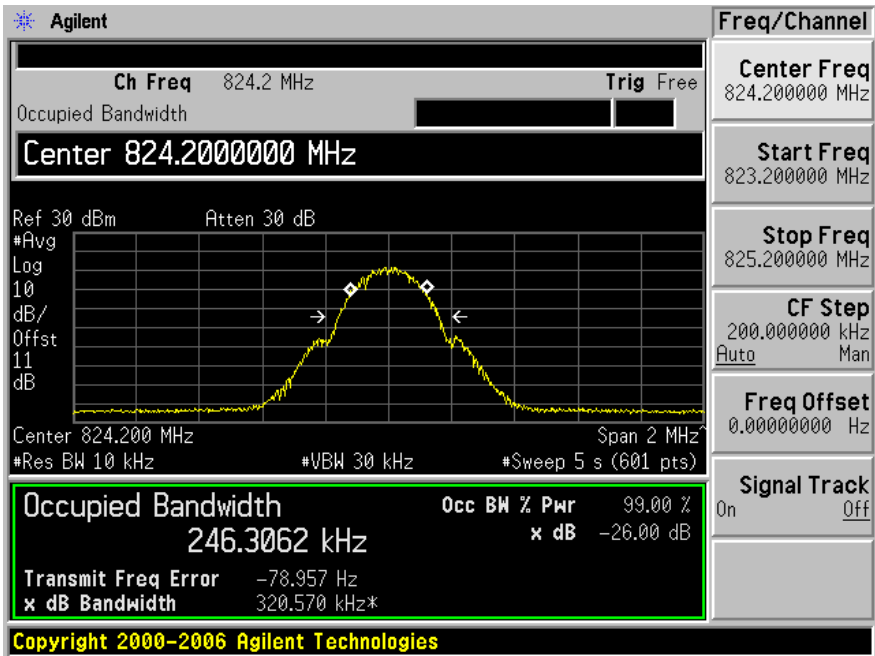


GSM Cellular Band Uplink, Low Channel: 824.2 MHz

Input

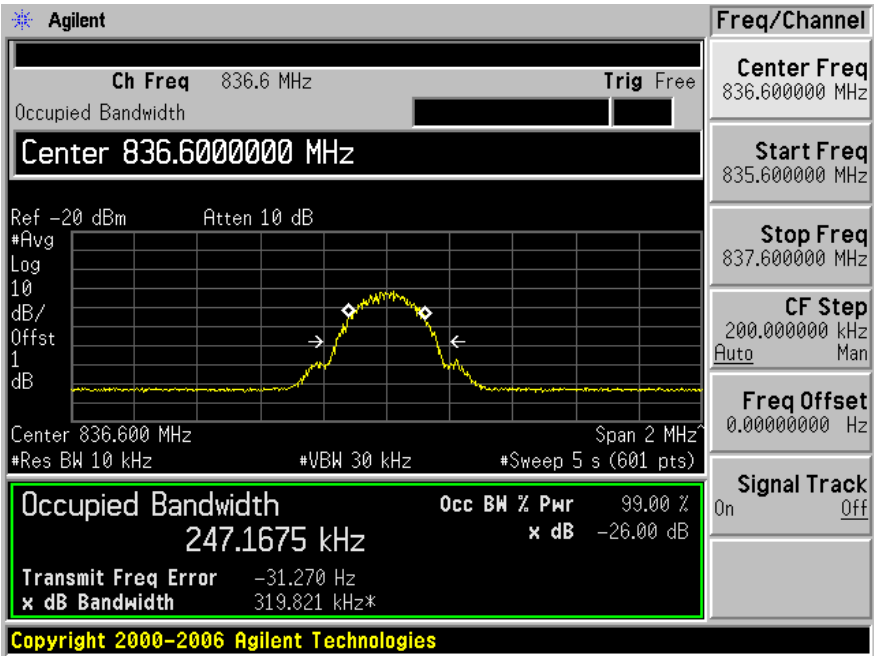


Output

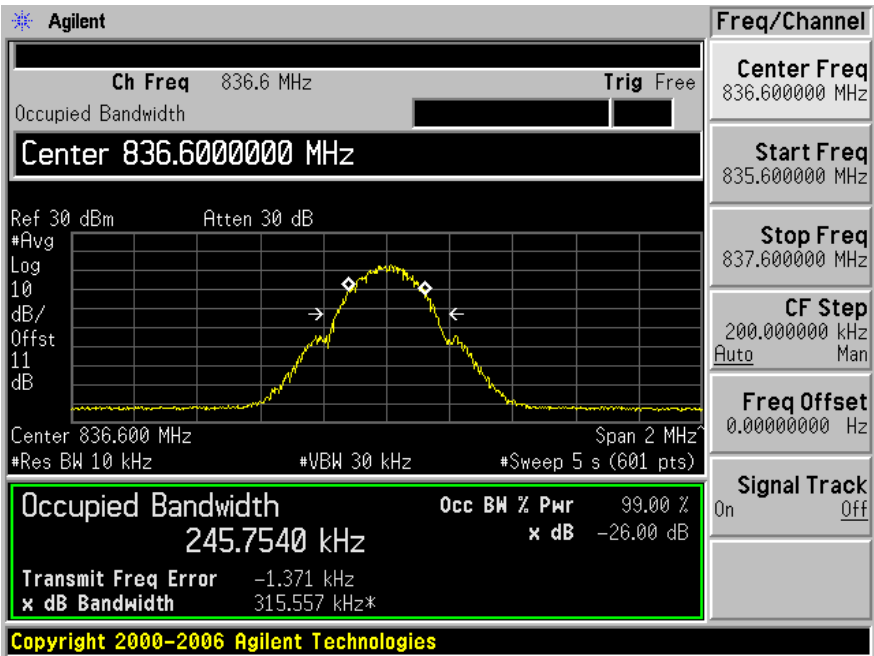


GSM Cellular Band Uplink, Middle Channel: 836.6 MHz

Input

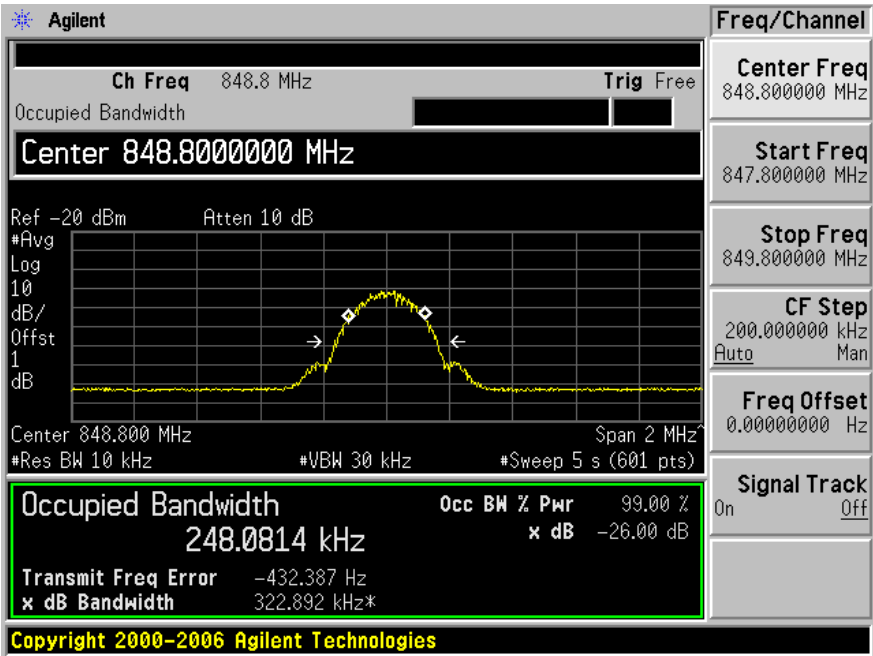


Output

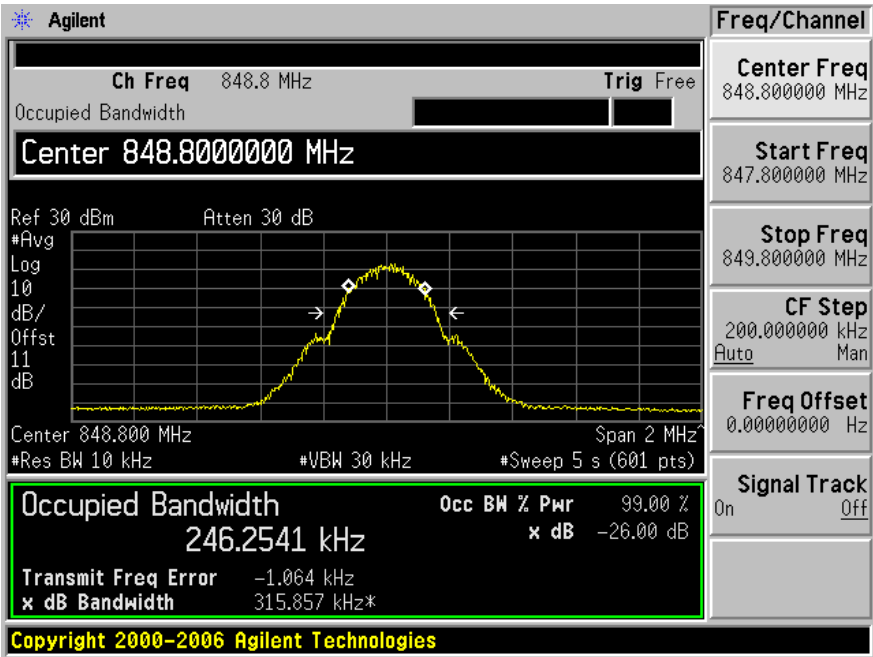


GSM Cellular Band Uplink, High Channel: 848.8 MHz

Input

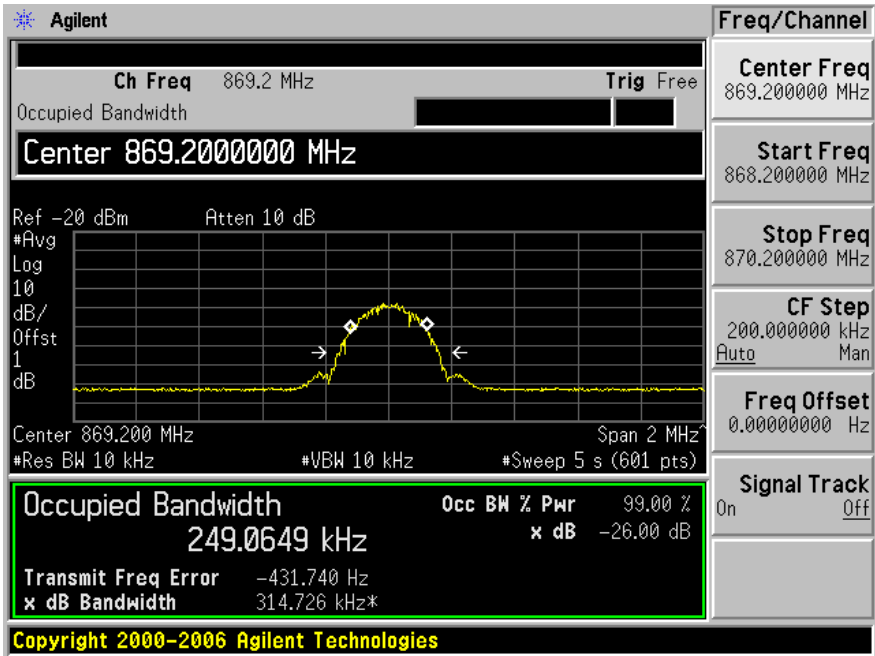


Output

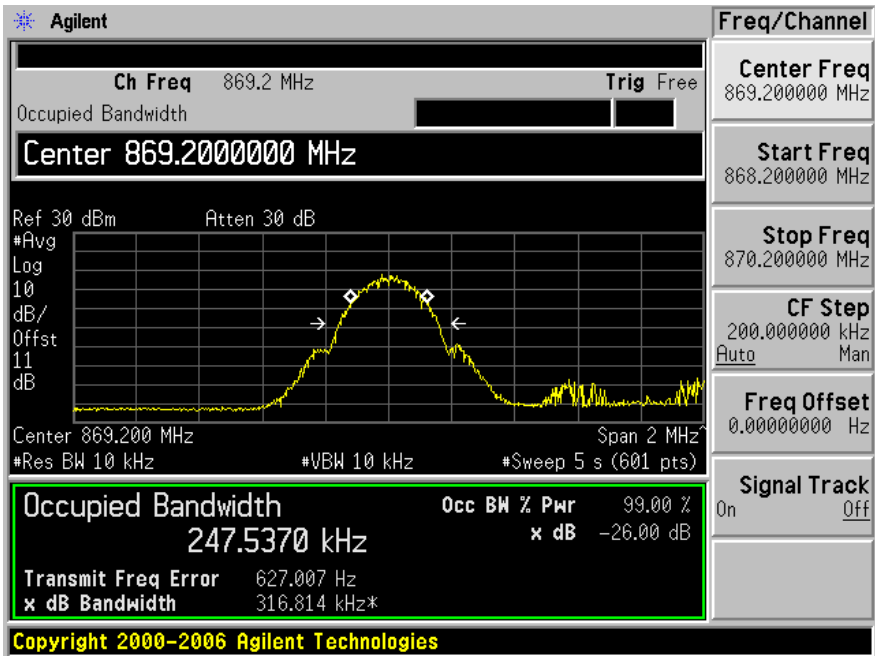


GSM Cellular Band Downlink, Low Channel: 869.2 MHz

Input

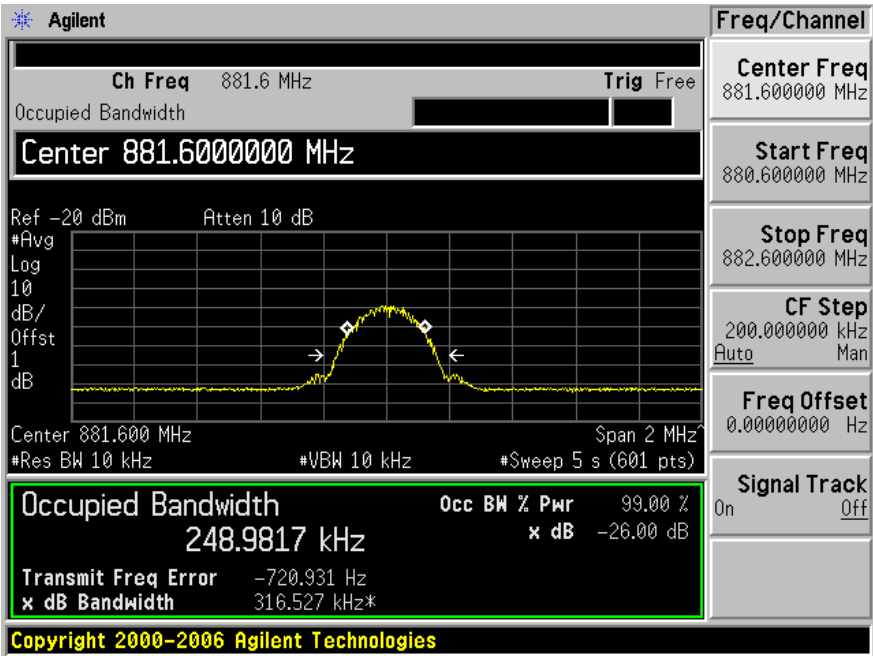


Output

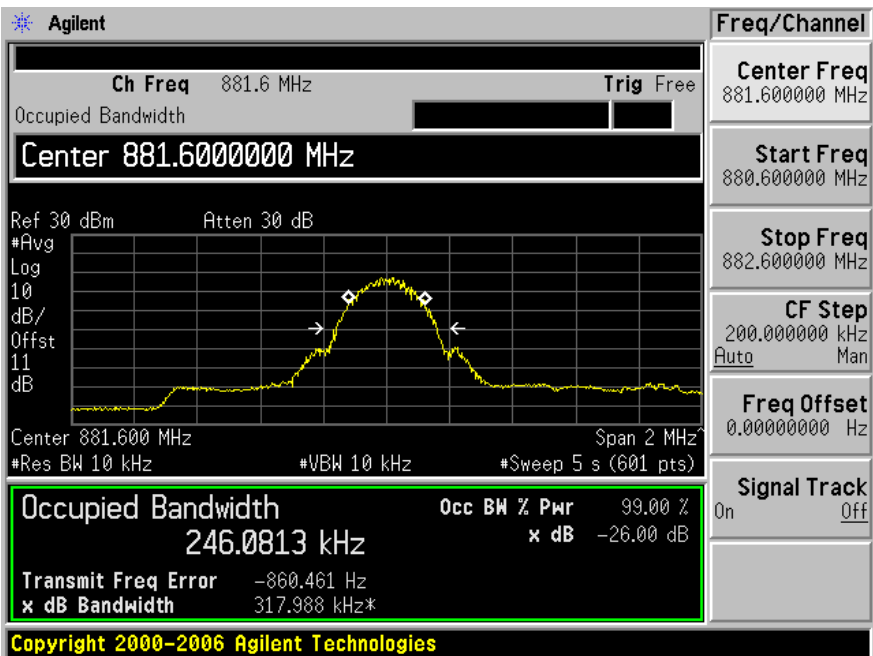


GSM Cellular Band Downlink, Middle Channel: 881.6 MHz

Input

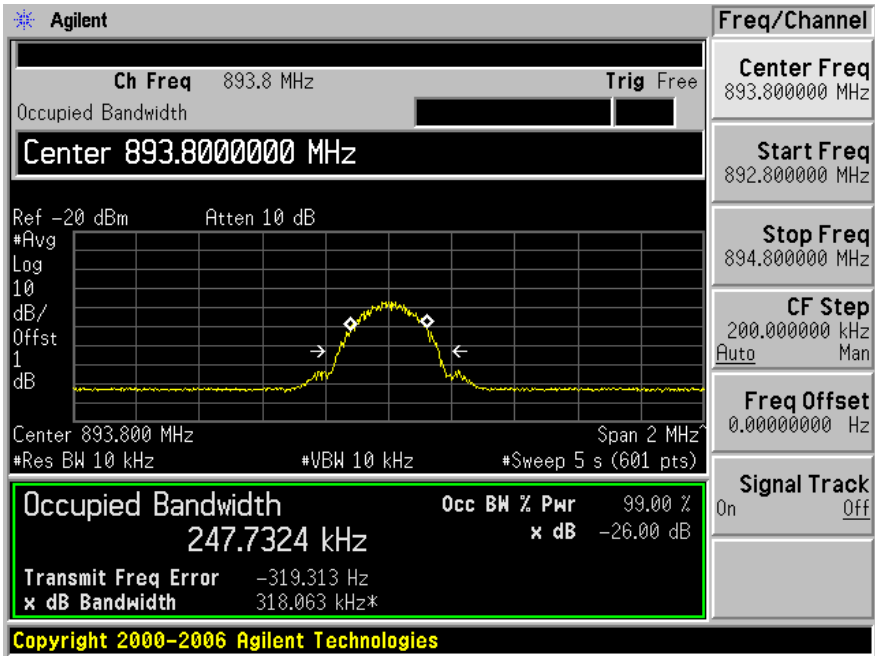


Output

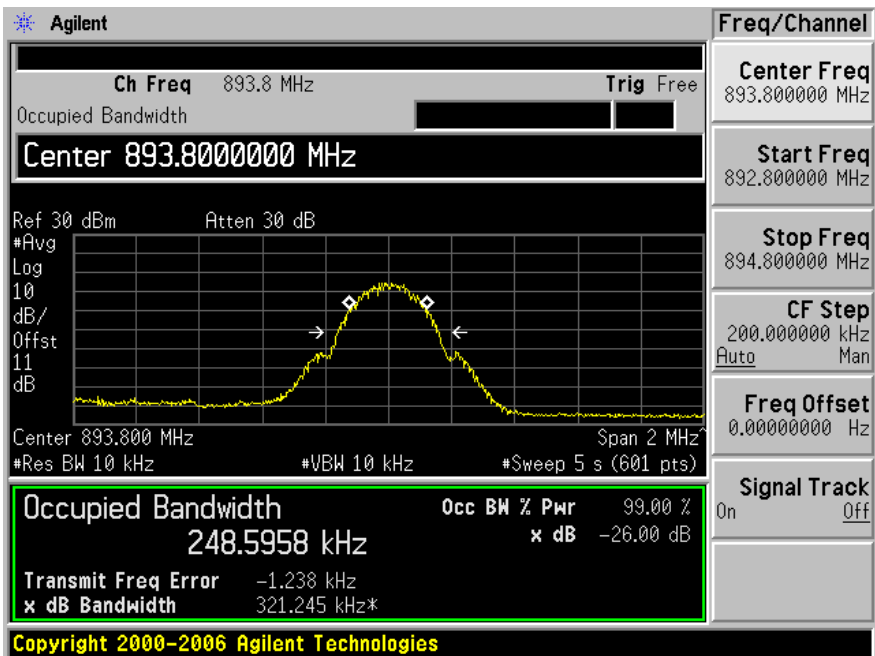


GSM Cellular Band Downlink, High Channel: 893.8 MHz

Input

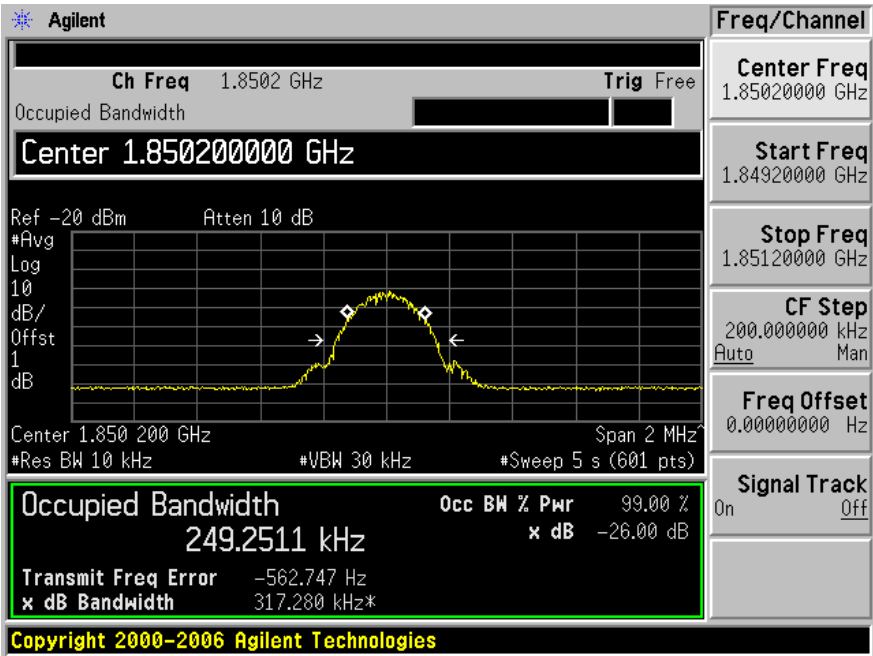


Output

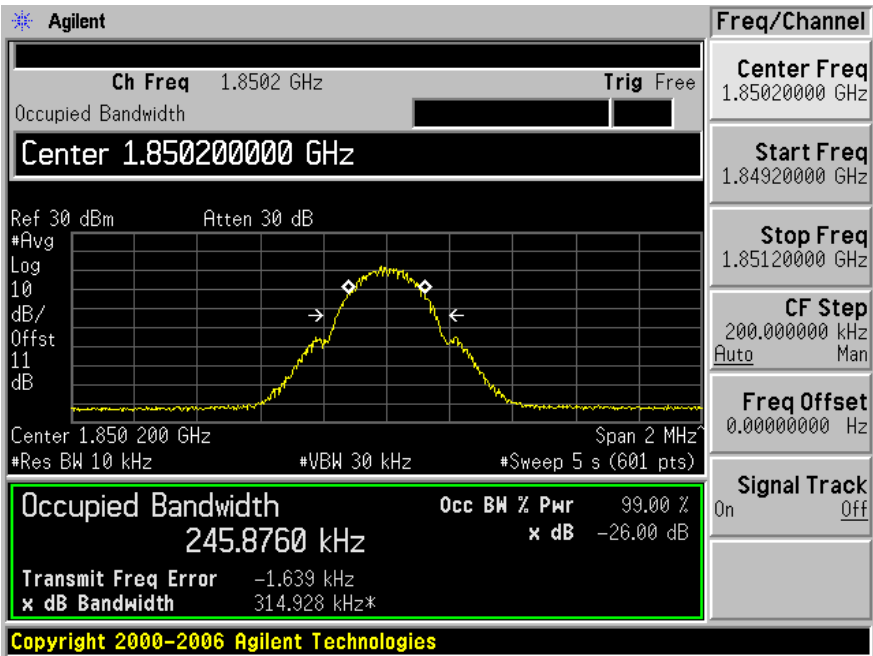


GSM PCS Band Uplink, Low Channel: 1850.2 MHz

Input

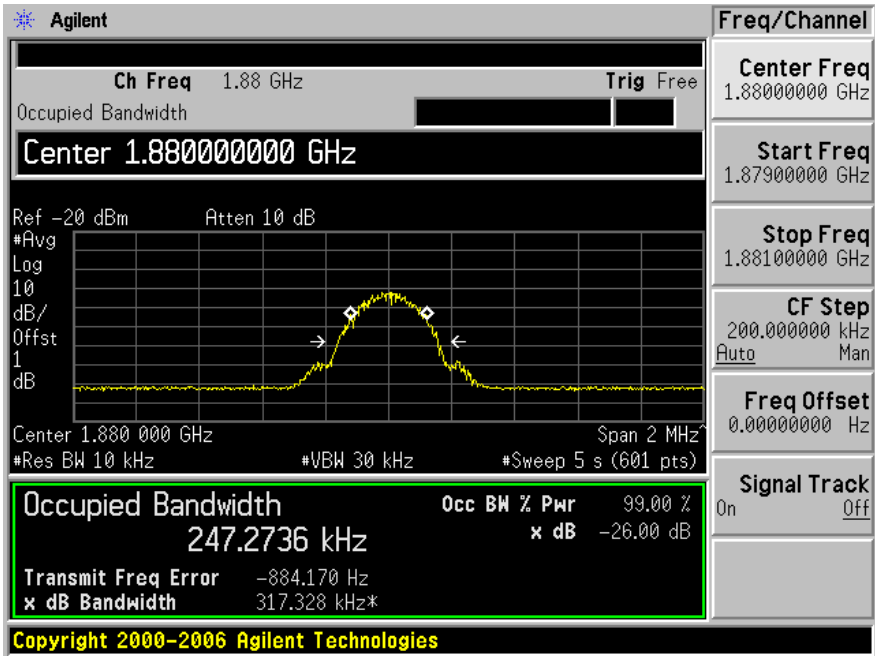


Output

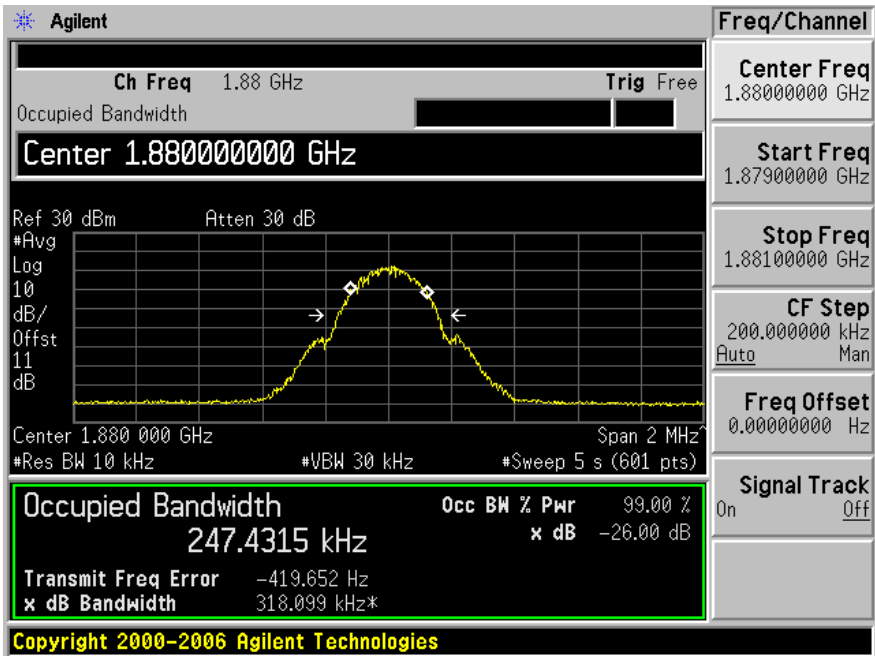


GSM PCS Band Uplink, Middle Channel: 1880 MHz

Input

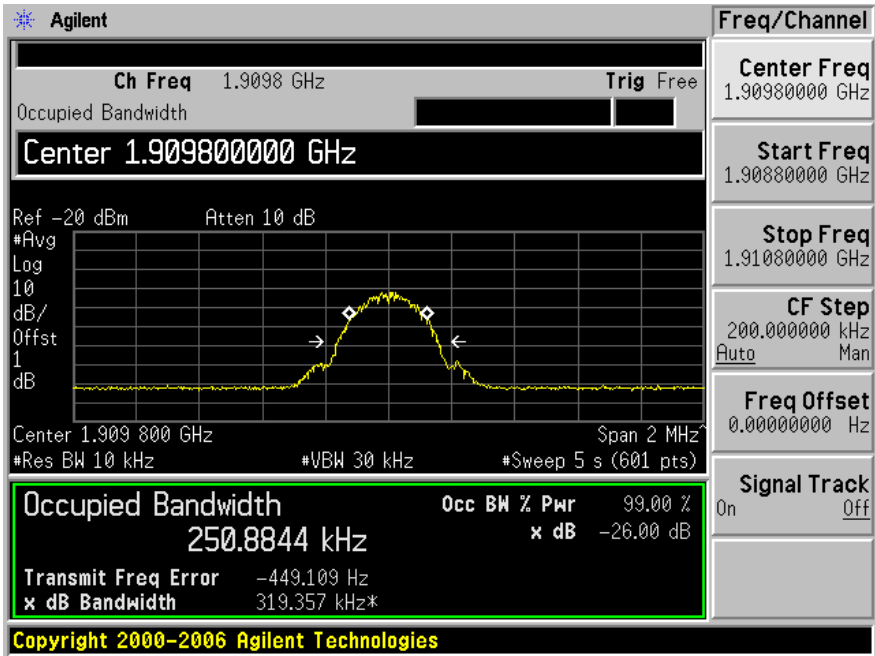


Output

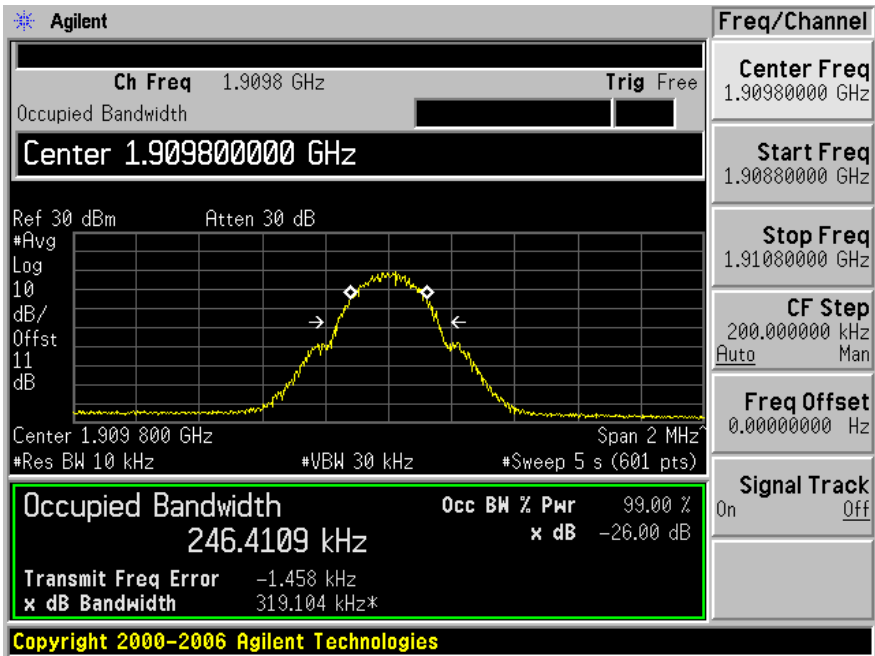


GSM PCS Band Uplink, High Channel: 1909.8 MHz

Input

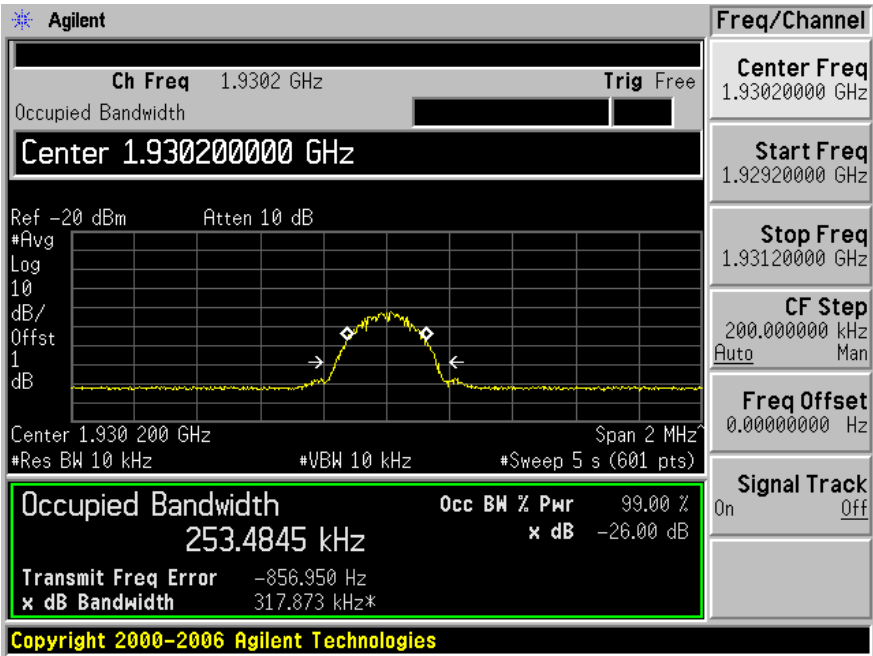


Output

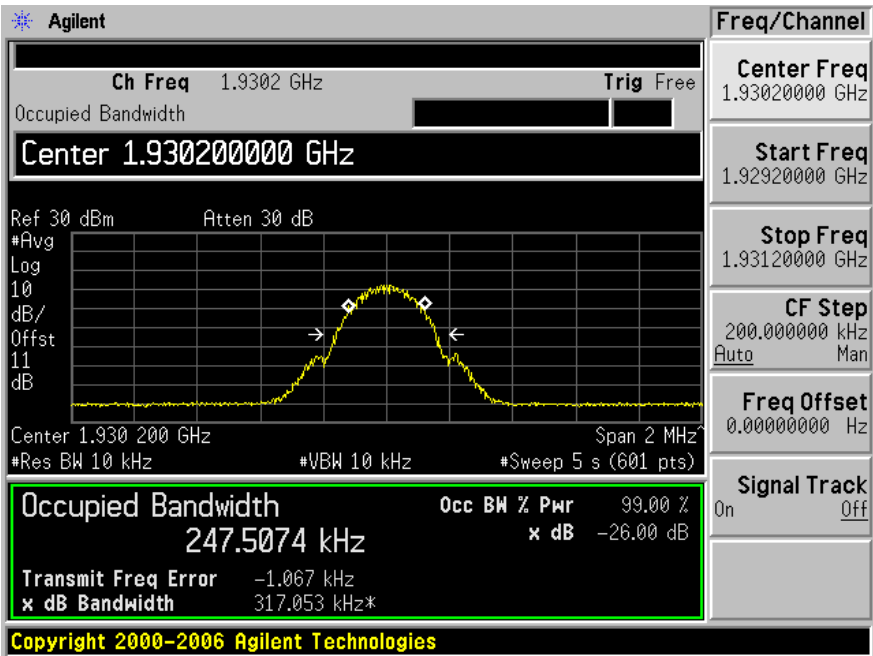


GSM PCS Band Downlink, Low Channel: 1930.2 MHz

Input

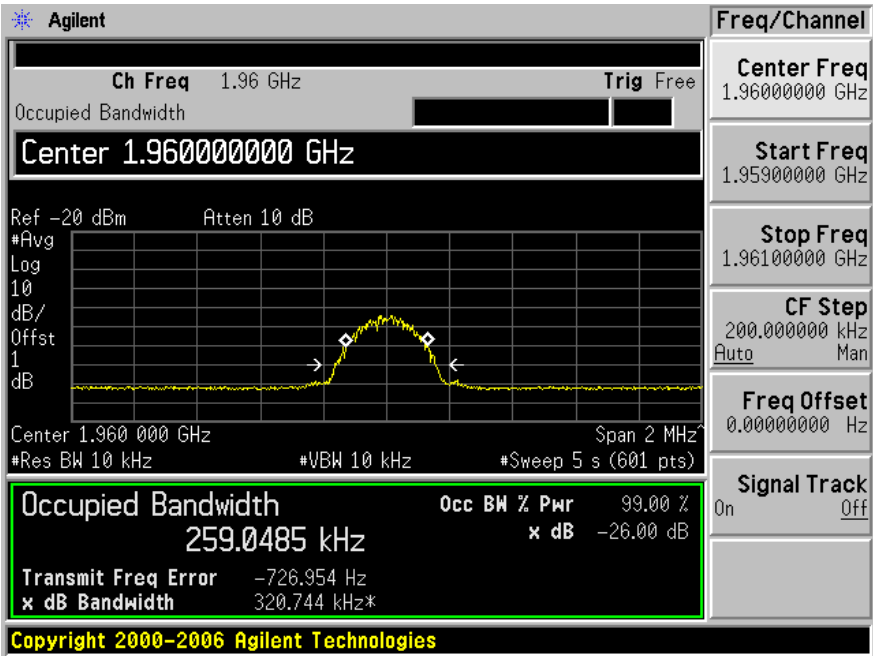


Output

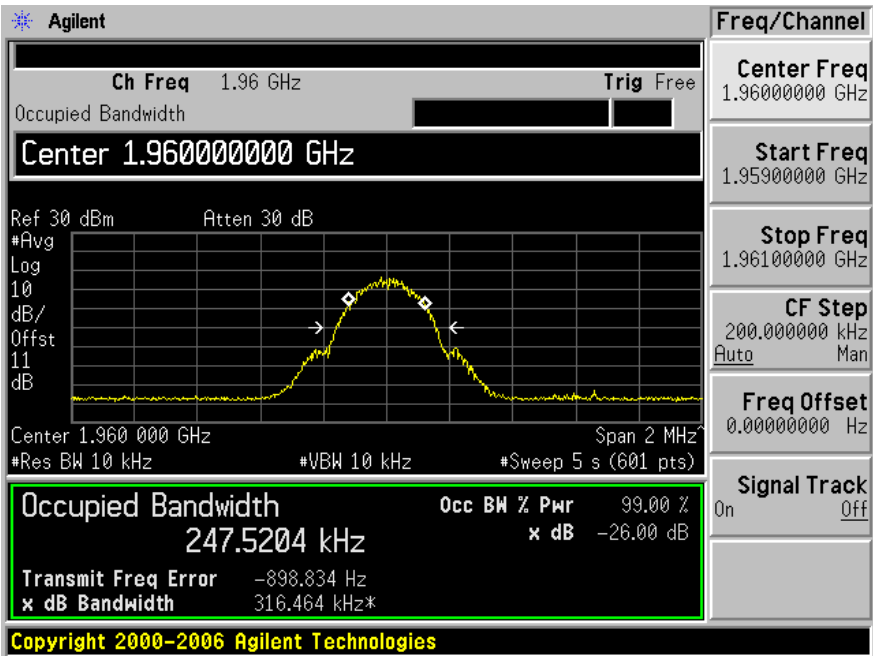


GSM PCS Band Downlink, Middle Channel: 1960 MHz

Input

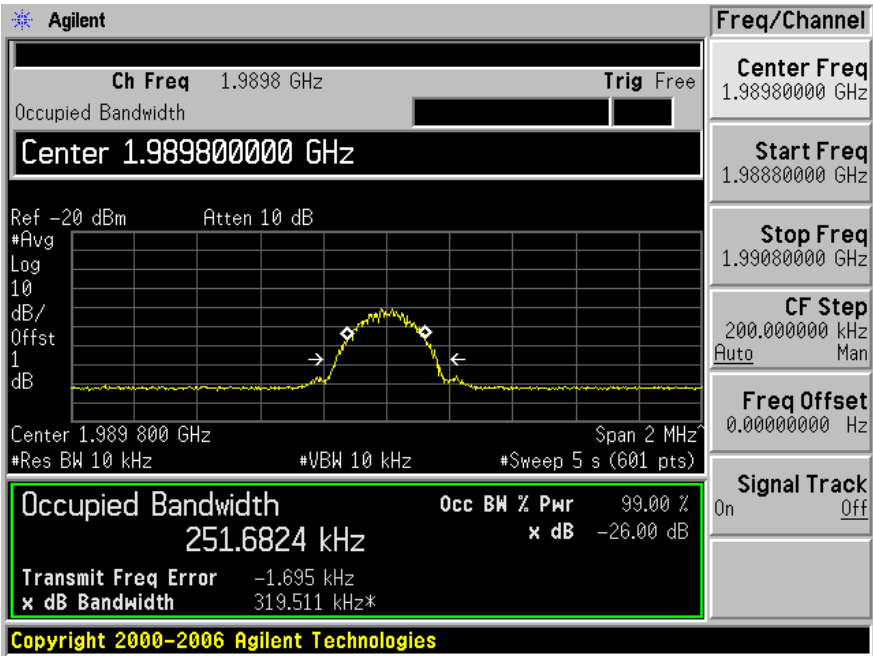


Output

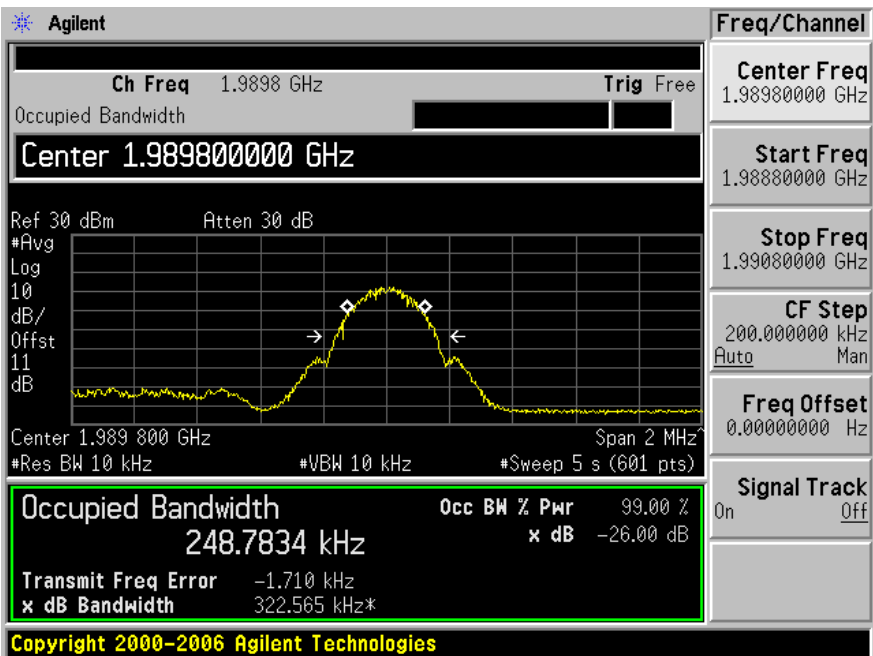


GSM PCS Band Downlink, High Channel: 1989.8 MHz

Input

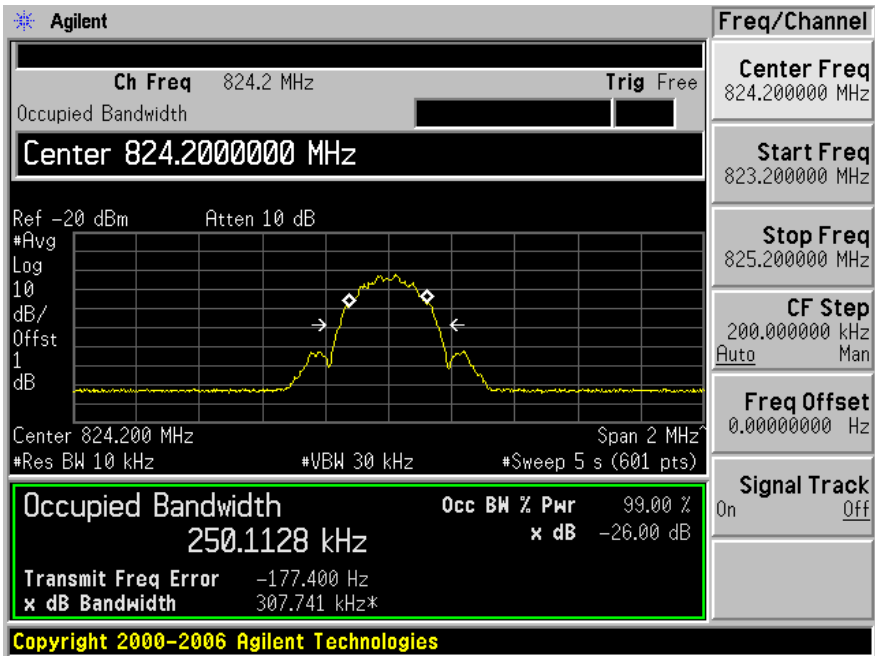


Output

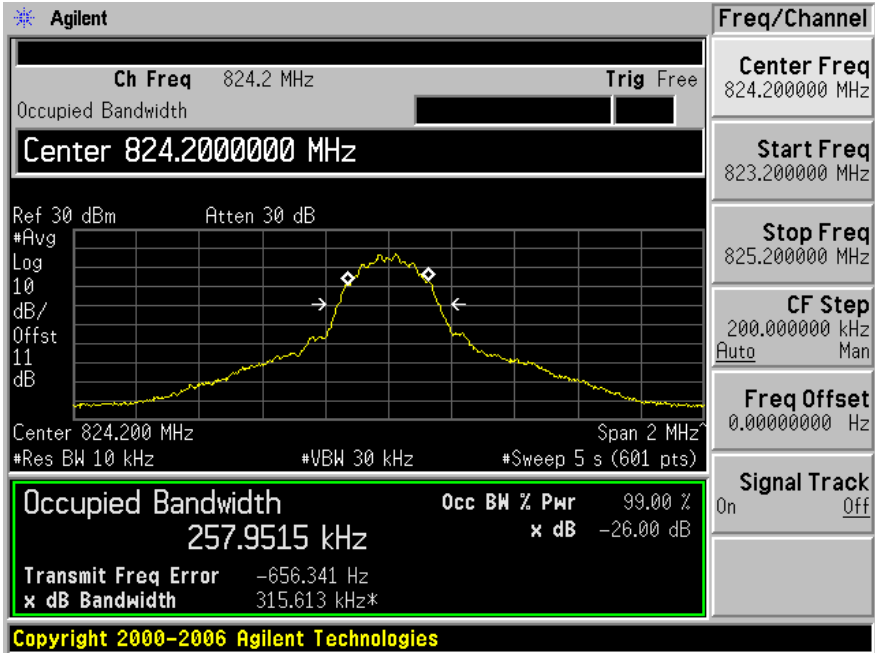


EDGE Cellular Band Uplink, Low Channel: 824.2 MHz

Input

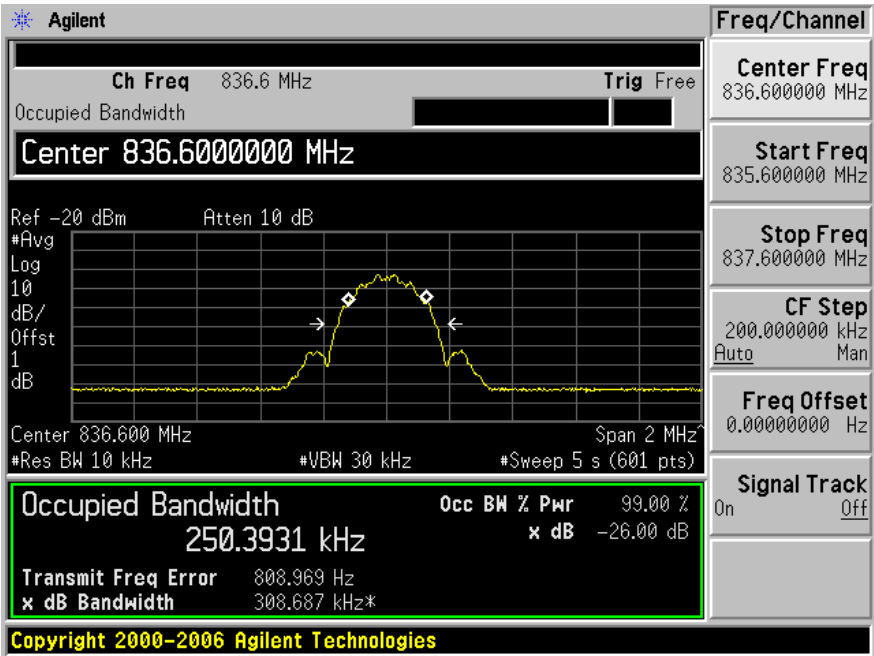


Output

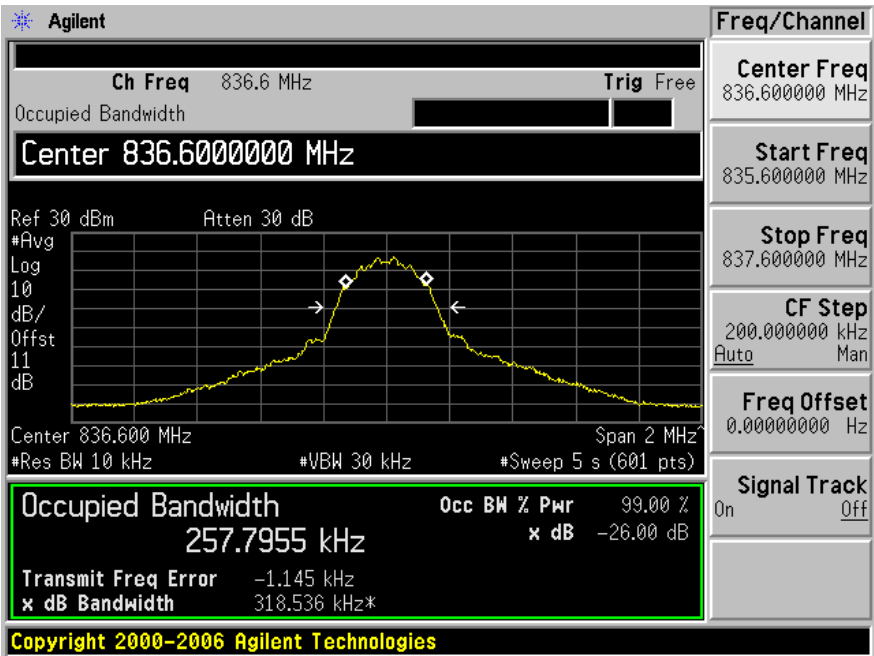


EDGE Cellular Band Uplink, Middle Channel: 836.6 MHz

Input

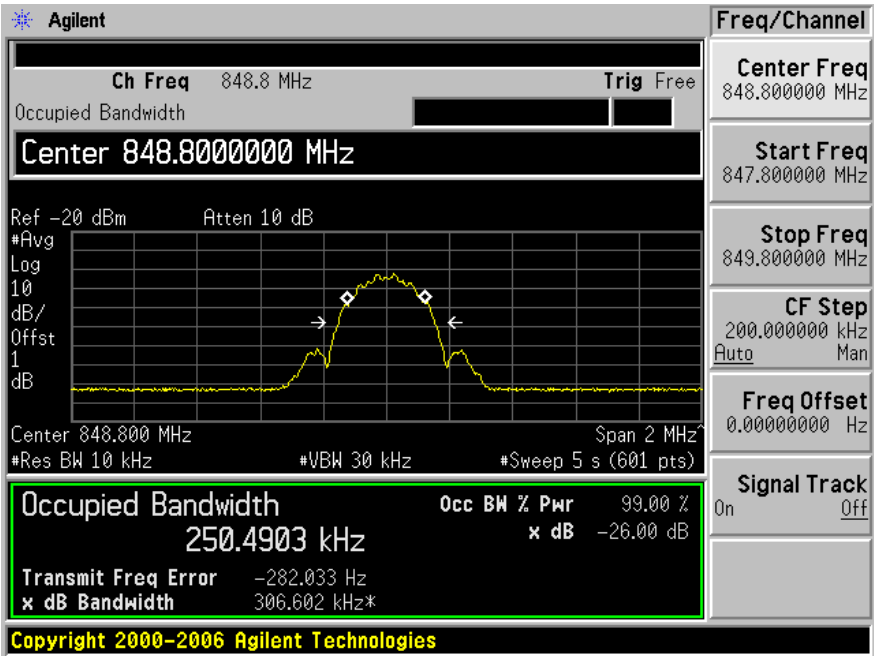


Output

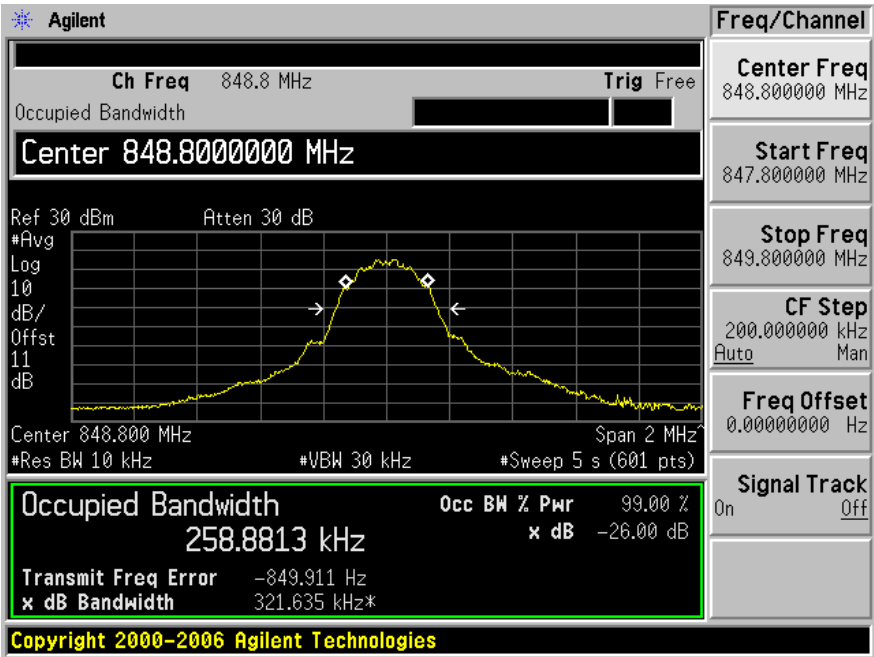


EDGE Cellular Band Uplink, High Channel: 848.8 MHz

Input

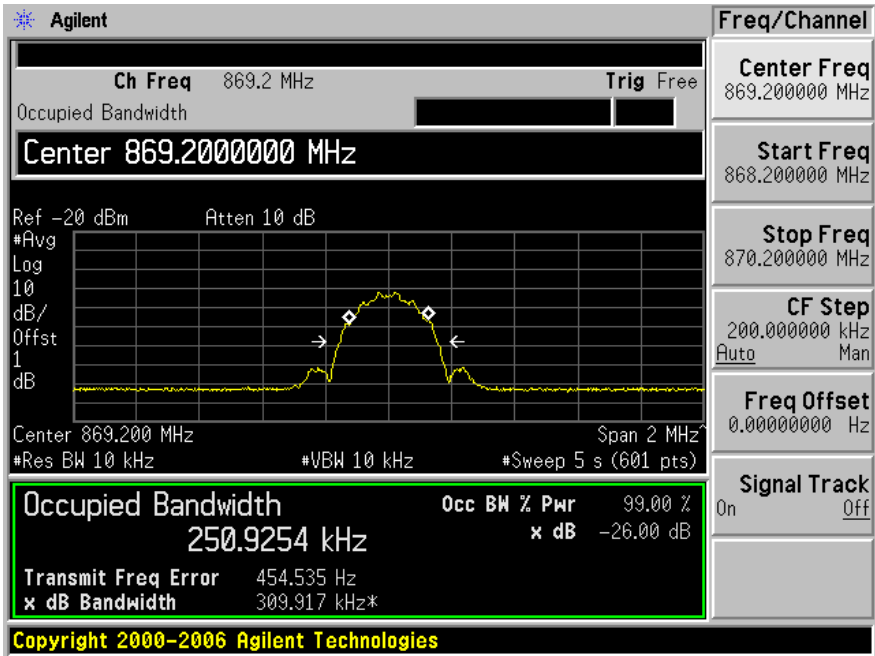


Output

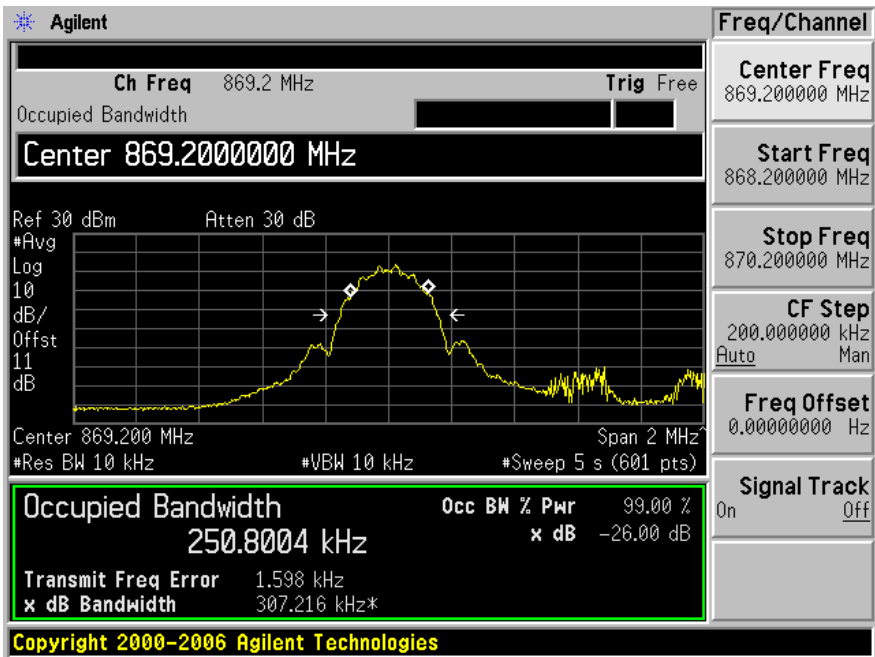


EDGE Cellular Band Downlink, Low Channel: 869.2 MHz

Input

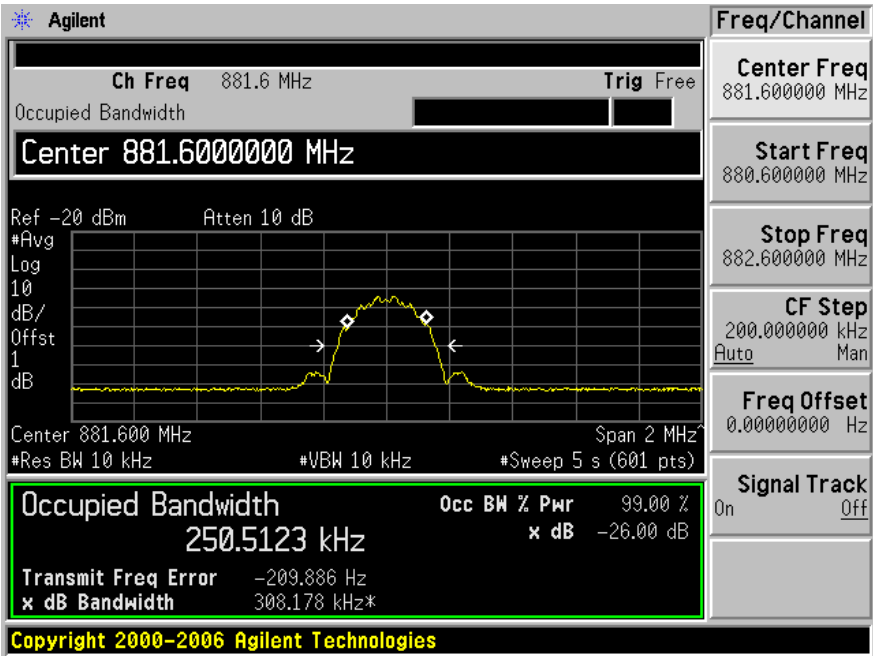


Output

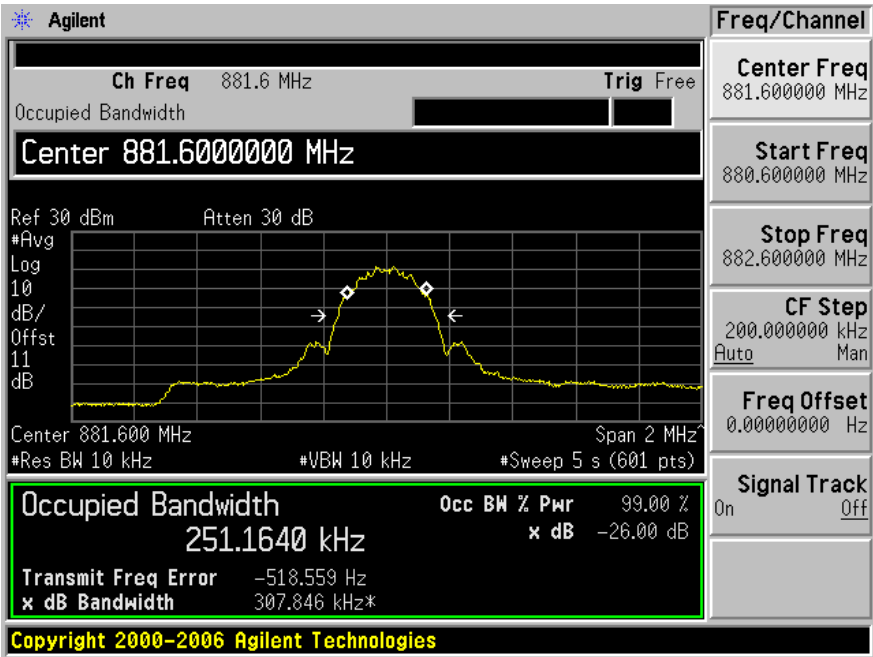


EDGE Cellular Band Downlink, Middle Channel: 881.6 MHz

Input

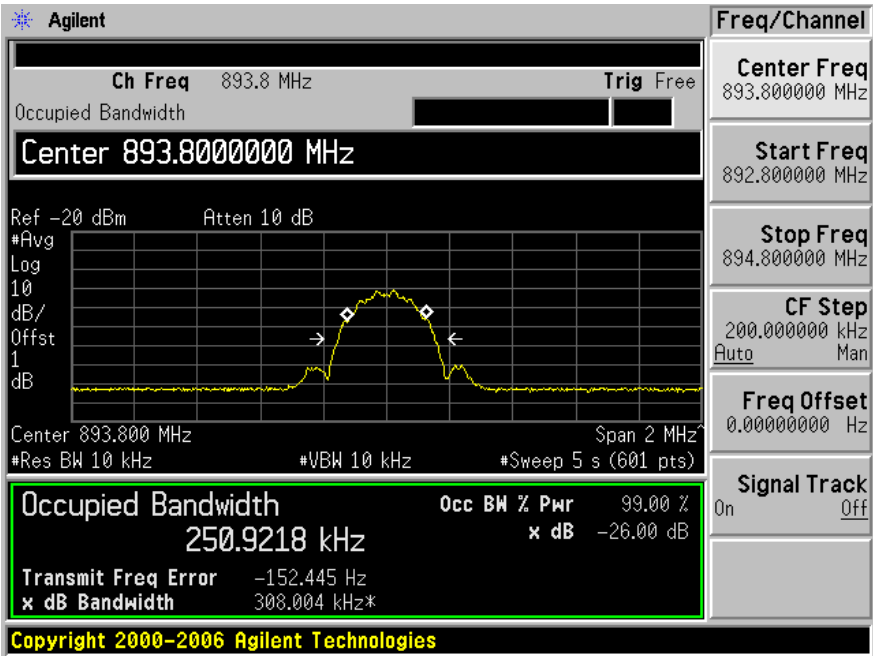


Output

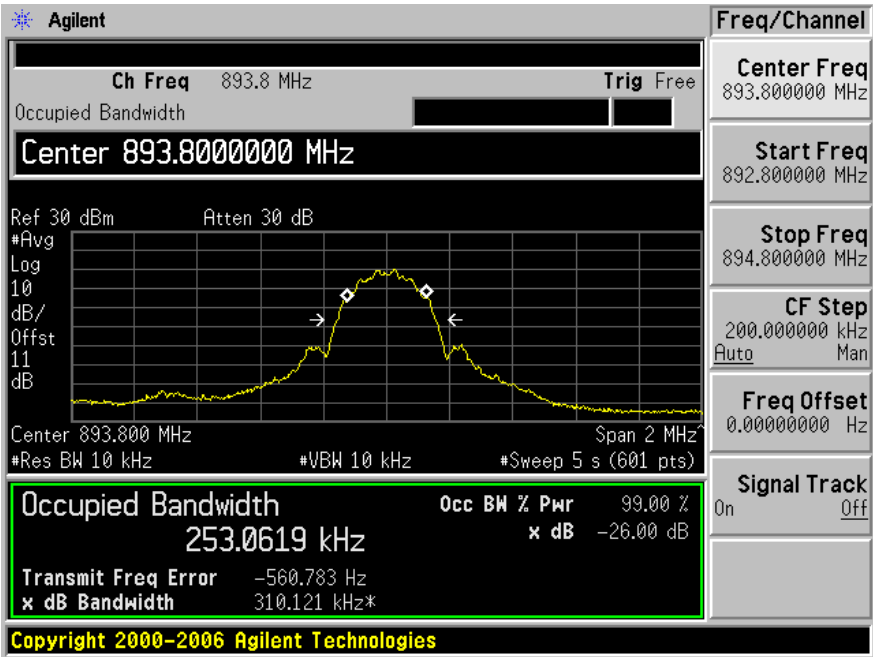


EDGE Cellular Band Downlink, High Channel: 893.8 MHz

Input

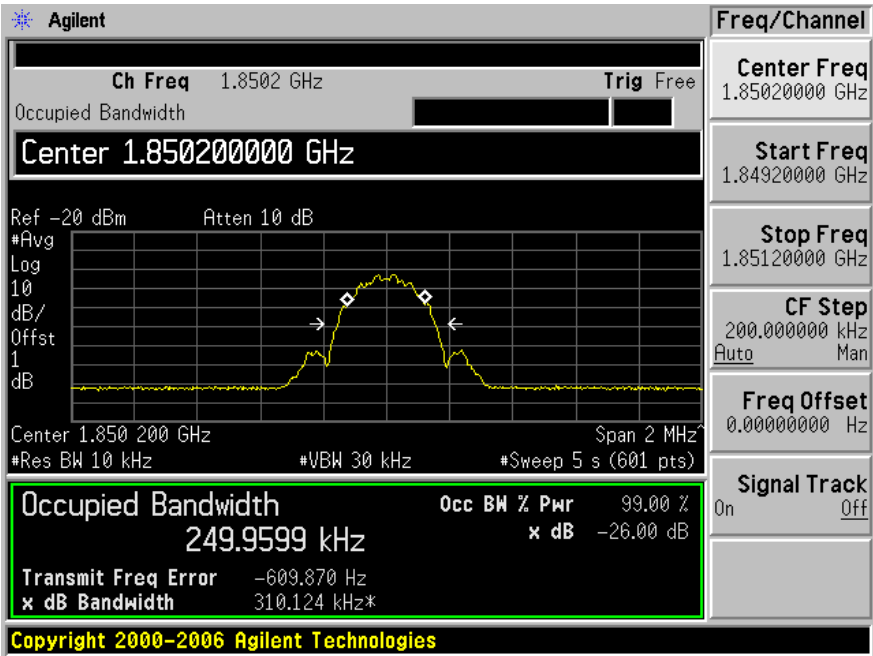


Output

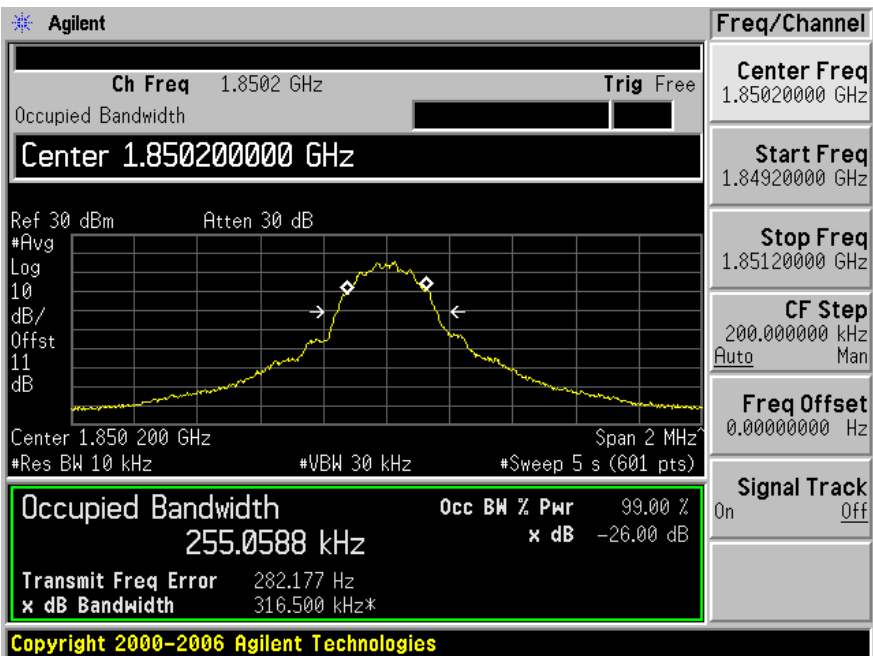


EDGE PCS Band Uplink, Low Channel: 1850.2 MHz

Input

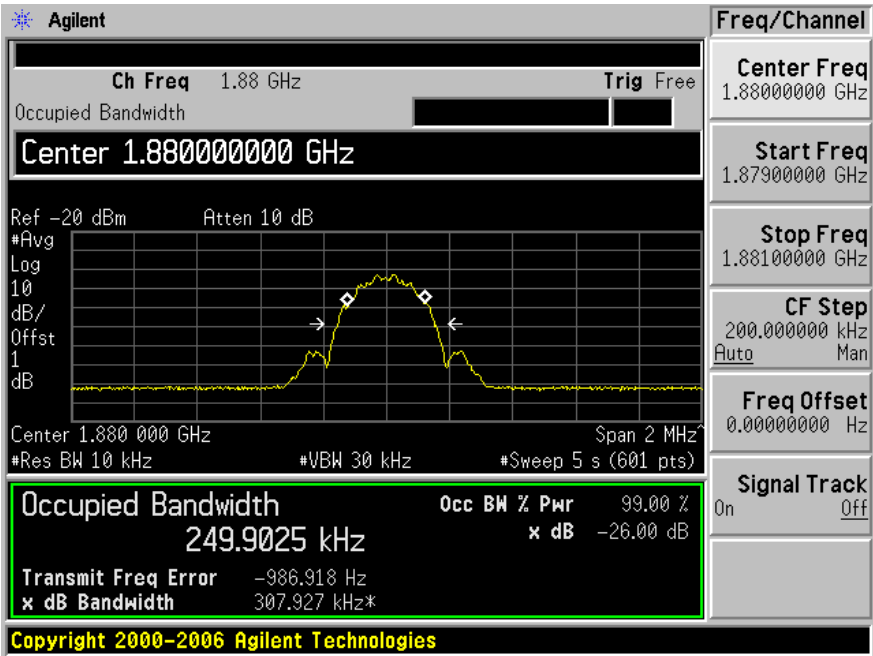


Output

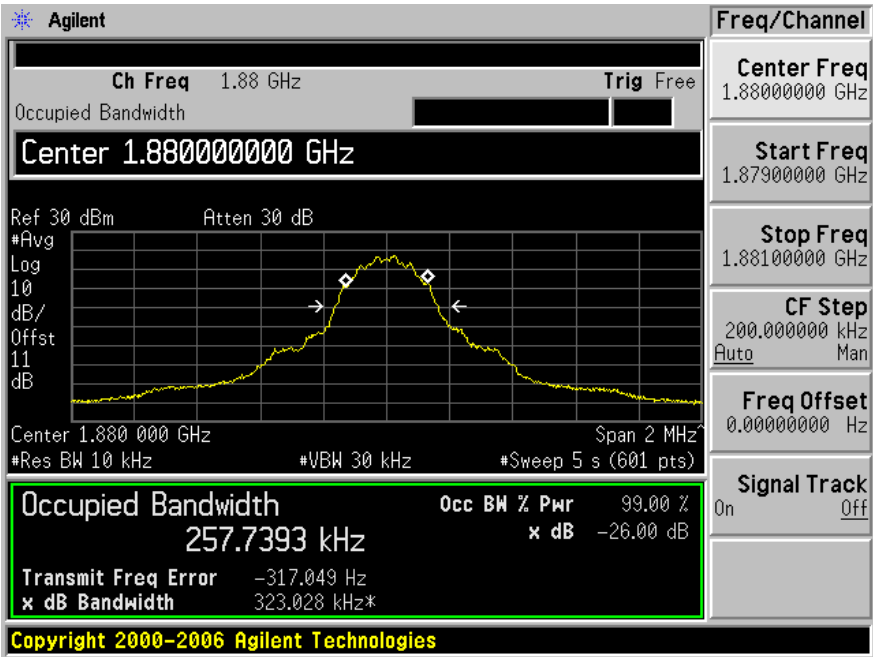


EDGE PCS Band Uplink, Middle Channel: 1880 MHz

Input

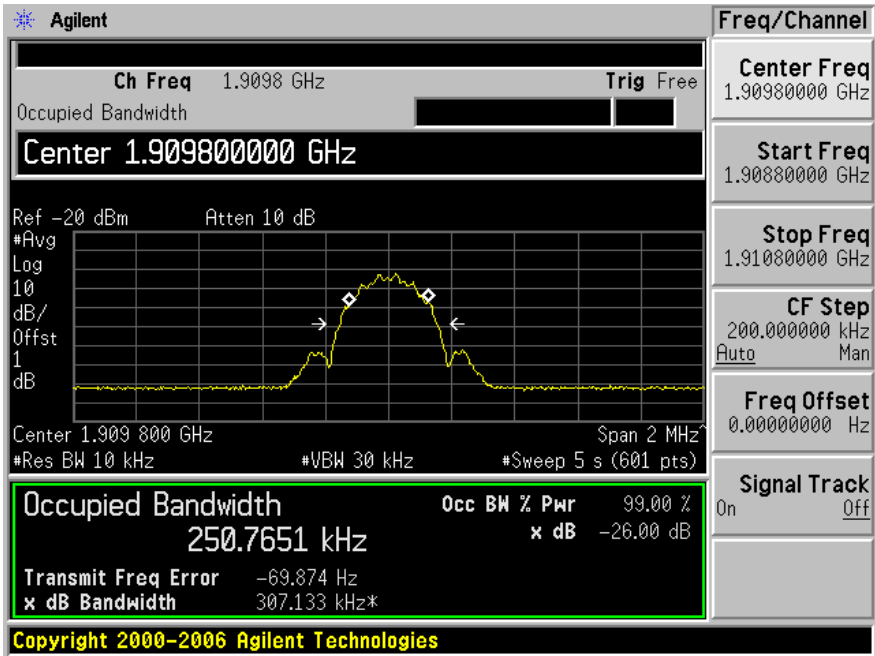


Output

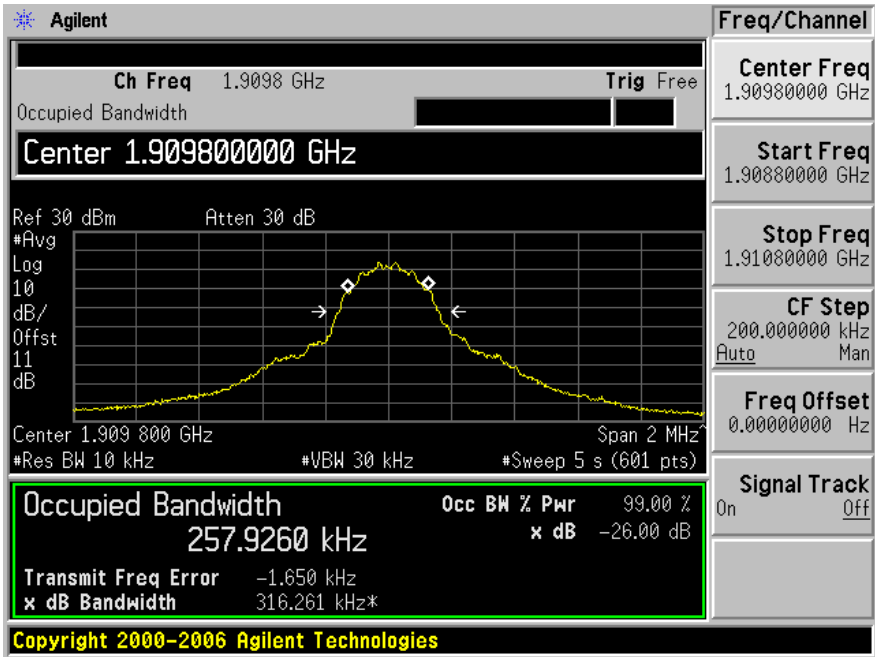


EDGE PCS Band Uplink, High Channel: 1909.8 MHz

Input

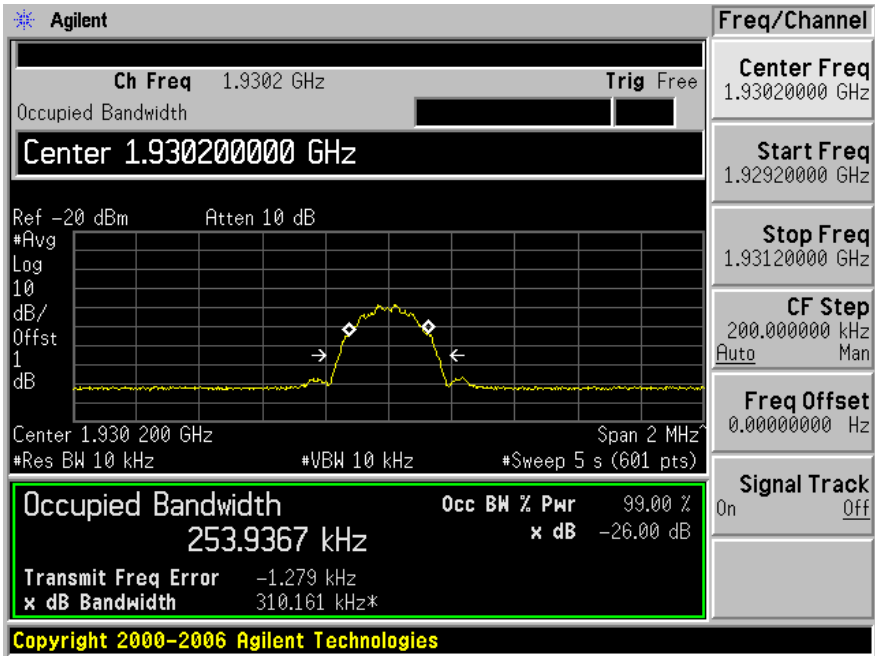


Output

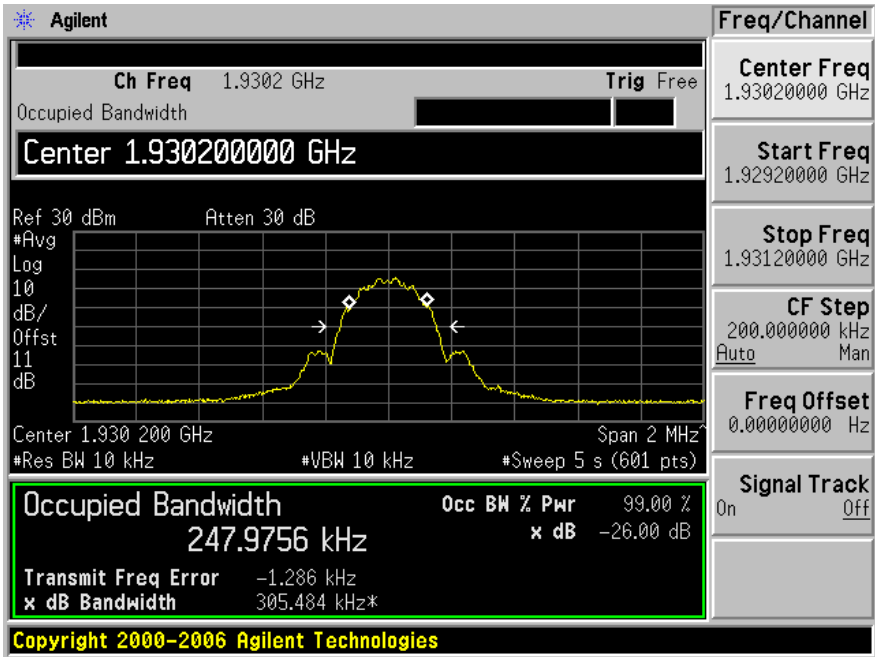


EDGE PCS Band Downlink, Low Channel: 1930.2 MHz

Input

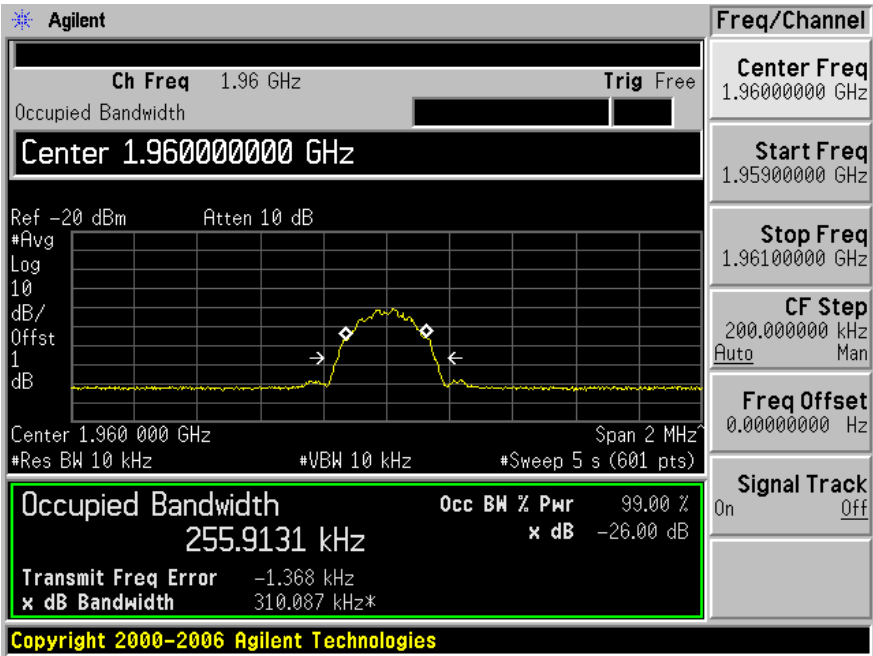


Output

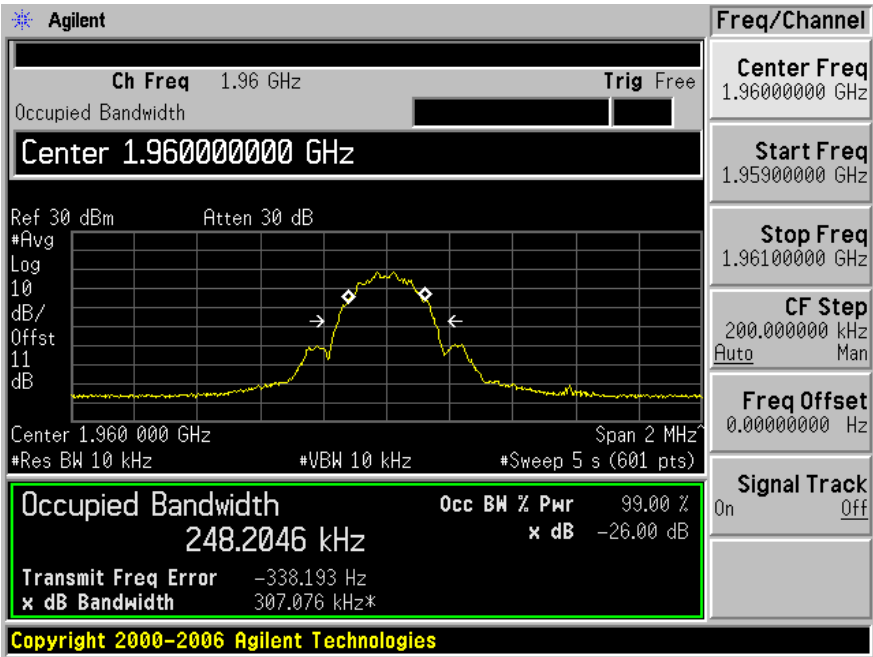


EDGE PCS Band Downlink, Middle Channel: 1960 MHz

Input

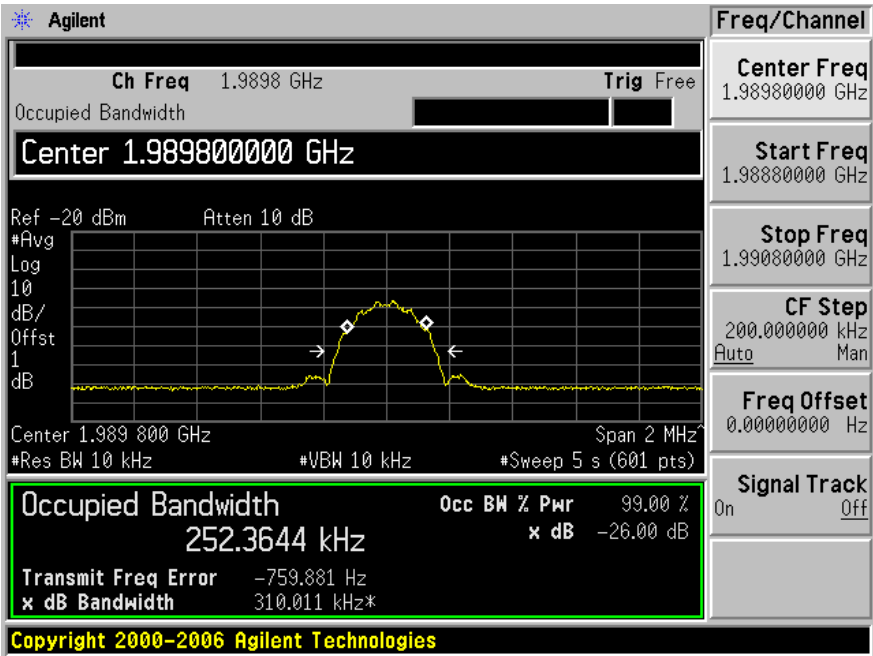


Output

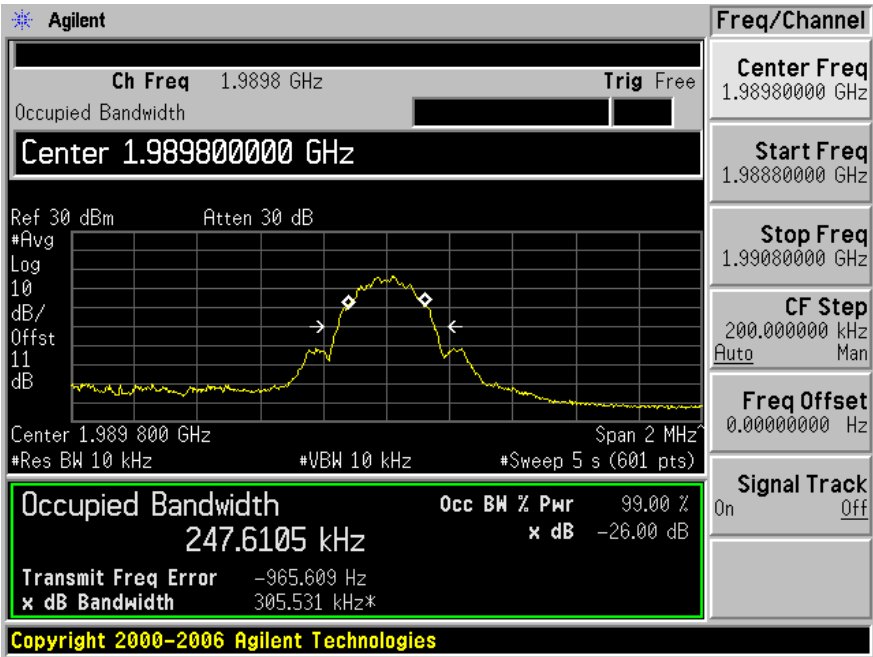


EDGE PCS Band Downlink, High Channel: 1989.8 MHz

Input



Output



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

7.1 Applicable Standard

Requirements: FCC §2.1053, §2.917 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 Environmental Conditions

Temperature:	20-24 °C
Relative Humidity:	37-43 %
ATM Pressure:	101-103kPa

* The testing was performed by Dennis Huang from 2010-04-26 to 2010-04-28 in 5 Meter Chamber #3.

7.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Analyzer, Spectrum	E4446A	US44300386	2009-06-29
HP	Generator, Signal	83650B	3614A00276	2009-05-28
Agilent	Amplifier, Pre	1-26.5GHz	3008A01978	2010-01-29
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2009-09-23
A.R.A.	Antenna, Horn	DRG-118/A	1132	2009-10-27
Rohde & Schwarz	Signal Generator	SMIQ03	849192/0085	2010-03-31

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

7.5 Summary of Test Results

CDMA/EVDO:

Cellular Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-22.9	2509.56	Vertical	836.52 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-21.11	2644.56	Vertical	881.52 MHz

PCS Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-5.63	5640	Vertical	1880 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-8.92	5880	Vertical	1960 MHz

WCDMA/HSPA:

Cellular Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-23.31	2509.2	Vertical	836.4 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-22.14	2644.2	Vertical	881.4 MHz

PCS Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-7.19	5640	Vertical	1880 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-10.91	3920	Vertical	1960 MHz

GSM:

Cellular Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-22.75	2509.8	Vertical	836.6 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-20.63	2644.8	Vertical	881.6 MHz

PCS Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-6.22	5640	Vertical	1880 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-9.65	5880	Vertical	1960 MHz

EDGE:

Cellular Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-23.27	2509.8	Vertical	836.6 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-23.58	2644.8	Vertical	881.6 MHz

PCS Band

Mode: Uplink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-6.69	5640	Vertical	1880 MHz
Mode: Downlink			
Margin (dB)	Frequency (MHz)	Polarization (Horizontal/Vertical)	Input Frequency
-8.09	3920	Vertical	1960 MHz

7.6 Test Results

CDMA/EVDO Cellular Band:

Uplink (Input frequency = 836.52 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1673.04	57.48	75	1.33	H	1673.04	-53.38	9.4	1.34	-45.32	-13	-32.32
1673.04	56.95	254	1.59	V	1673.04	-53.91	9.4	1.34	-45.85	-13	-32.85
2509.56	56.92	356	1	H	2509.56	-46.62	9.5	1.66	-38.78	-13	-25.78
2509.56	59.8	5	1.05	V	2509.56	-43.74	9.5	1.66	-35.9	-13	-22.9
3346.08	46.41	360	1	H	3346.08	-54.5	9.6	1.68	-46.58	-13	-33.58
3346.08	55.33	89	1.32	V	3346.08	-45.58	9.6	1.68	-37.66	-13	-24.66
4182.6	45.49	360	1	H	4182.6	-55.82	10.8	1.66	-46.68	-13	-33.68
4182.6	51.46	333	1.3	V	4182.6	-49.85	10.8	1.66	-40.71	-13	-27.71

Downlink (Input frequency = 881.52 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1763.04	64.45	196	1.32	H	1763.04	-45.65	9.6	1.34	-37.39	-13	-24.39
1763.04	66.07	155	1.17	V	1763.04	-44.03	9.6	1.34	-35.77	-13	-22.77
2644.56	57.99	165	1	H	2644.56	-47.31	9.2	1.66	-39.77	-13	-26.77
2644.56	63.65	62	1.31	V	2644.56	-41.65	9.2	1.66	-34.11	-13	-21.11
3526.08	53.1	217	1	H	3526.08	-50.95	10	1.66	-42.61	-13	-29.61
3526.08	59.89	267	1.3	V	3526.08	-44.16	10	1.66	-35.82	-13	-22.82

CDMA/EVDO PCS Band:

Uplink (Input frequency = 1880 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760	48.84	195	1	H	3760	-53.91	10.9	1.66	-44.67	-13	-31.67
3760	56.96	157	1.04	V	3760	-45.79	10.9	1.66	-36.55	-13	-23.55
5640	60.45	226	1	H	5640	-38.11	10.6	2.34	-29.85	-13	-16.85
5640	71.67	81	1.04	V	5640	-26.89	10.6	2.34	-18.63	-13	-5.63
7520	50.65	10	1	H	7520	-39.85	8.7	3	-34.15	-13	-21.15
7520	58.78	278	1.19	V	7520	-31.72	8.7	3	-26.02	-13	-13.02

Downlink (Input frequency = 1960 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920	59.96	258	1	H	3920	-41.21	10.9	1.68	-31.99	-13	-18.99
3920	69.41	179	1.44	V	3920	-31.76	10.9	1.68	-22.54	-13	-9.54
5880	60.09	29	1	H	5880	-40.01	11	2.34	-31.35	-13	-18.35
5880	69.52	133	1	V	5880	-30.58	11	2.34	-21.92	-13	-8.92
7840	50.02	195	1	H	7840	-44.21	9.7	2.66	-37.17	-13	-24.17
7840	59.94	81	1	V	7840	-34.29	9.7	2.66	-27.25	-13	-14.25

WCDMA/HSPA Cellular Band:

Uplink (Input frequency = 836.4 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1672.8	57.01	252	1.64	H	1672.8	-53.85	9.4	1.34	-45.79	-13	-32.79
1672.8	57.16	76	1.33	V	1672.8	-53.7	9.4	1.34	-45.64	-13	-32.64
2509.2	56.44	358	1	H	2509.2	-47.1	9.5	1.66	-39.26	-13	-26.26
2509.8	59.39	6	1.04	V	2509.8	-44.15	9.5	1.66	-36.31	-13	-23.31
3345.6	47.01	276	1	H	3345.6	-53.9	9.6	1.68	-45.98	-13	-32.98
3345.6	54.49	89	1	V	3345.6	-46.42	9.6	1.68	-38.5	-13	-25.5
4182	44.18	360	1	H	4182	-57.13	10.8	1.66	-47.99	-13	-34.99
4182	51.26	214	1.38	V	4182	-50.05	10.8	1.66	-40.91	-13	-27.91

Downlink (Input frequency = 881.4 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1762.8	55.48	162	1.06	H	1762.8	-54.62	9.6	1.34	-46.36	-13	-33.36
1762.8	59.42	353	1.15	V	1762.8	-50.68	9.6	1.34	-42.42	-13	-29.42
2644.2	57.14	148	1	H	2644.2	-48.16	9.2	1.66	-40.62	-13	-27.62
2644.2	62.62	60	1.31	V	2644.2	-42.68	9.2	1.66	-35.14	-13	-22.14
3525.6	48.92	216	1	H	3525.6	-55.13	10	1.66	-46.79	-13	-33.79
3525.6	54.42	267	1.43	V	3525.6	-49.63	10	1.66	-41.29	-13	-28.29

WCDMA/HSPA PCS Band:

Uplink (Input frequency = 1880 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760	50.12	196	1	H	3760	-52.63	10.9	1.66	-43.39	-13	-30.39
3760	58.42	156	1.59	V	3760	-44.33	10.9	1.66	-35.09	-13	-22.09
5640	63.17	171	1.04	H	5640	-35.39	10.6	2.34	-27.13	-13	-14.13
5640	70.11	268	1.02	V	5640	-28.45	10.6	2.34	-20.19	-13	-7.19
7520	50.22	328	1	H	7520	-40.28	8.7	3	-34.58	-13	-21.58
7520	59.55	78	1	V	7520	-30.95	8.7	3	-25.25	-13	-12.25

Downlink (Input frequency = 1960 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920	59.96	258	1	H	3920	-41.21	10.9	1.68	-31.99	-13	-18.99
3920	68.04	185	1.75	V	3920	-33.13	10.9	1.68	-23.91	-13	-10.91
5880	57.17	10	1	H	5880	-42.93	11	2.34	-34.27	-13	-21.27
5880	64.57	133	1	V	5880	-35.53	11	2.34	-26.87	-13	-13.87
7840	48.65	188	1	H	7840	-45.58	9.7	2.66	-38.54	-13	-25.54
7840	54.92	81	1	V	7840	-39.31	9.7	2.66	-32.27	-13	-19.27

GSM Cellular Band:

Uplink (Input frequency = 836.6 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1673.2	58.34	73	1.35	H	1673.2	-52.52	9.4	1.34	-44.46	-13	-31.46
1673.2	57.69	254	1.63	V	1673.2	-53.17	9.4	1.34	-45.11	-13	-32.11
2509.8	57.01	57	1.16	H	2509.8	-46.53	9.5	1.66	-38.69	-13	-25.69
2509.8	59.95	5	1.06	V	2509.8	-43.59	9.5	1.66	-35.75	-13	-22.75
3346.4	47.49	122	1	H	3346.4	-53.42	9.6	1.68	-45.5	-13	-32.5
3346.4	55.45	89	1.2	V	3346.4	-45.46	9.6	1.68	-37.54	-13	-24.54
4183	45.05	360	1	H	4183	-56.26	10.8	1.66	-47.12	-13	-34.12
4183	54.6	327	1.2	V	4183	-46.71	10.8	1.66	-37.57	-13	-24.57

Downlink (Input frequency = 881.6 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1763.2	58.05	169	1	H	1763.2	-52.05	9.6	1.34	-43.79	-13	-30.79
1763.2	61.37	354	1.12	V	1763.2	-48.73	9.6	1.34	-40.47	-13	-27.47
2644.8	58.31	164	1	H	2644.8	-46.99	9.2	1.66	-39.45	-13	-26.45
2644.8	64.13	62	1.3	V	2644.8	-41.17	9.2	1.66	-33.63	-13	-20.63
3526.4	49.33	270	1.29	H	3526.4	-54.72	10	1.66	-46.38	-13	-33.38
3526.4	55.37	267	1.32	V	3526.4	-48.68	10	1.66	-40.34	-13	-27.34

GSM PCS Band:

Uplink (Input frequency = 1880 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760	49.29	196	1	H	3760	-53.46	10.9	1.66	-44.22	-13	-31.22
3760	52.2	355	1.1	V	3760	-50.55	10.9	1.66	-41.31	-13	-28.31
5640	59.74	227	1	H	5640	-38.82	10.6	2.34	-30.56	-13	-17.56
5640	71.08	80	1.03	V	5640	-27.48	10.6	2.34	-19.22	-13	-6.22
7520	48.64	206	1	H	7520	-41.86	8.7	3	-36.16	-13	-23.16
7520	57.59	277	1.14	V	7520	-32.91	8.7	3	-27.21	-13	-14.21

Downlink (Input frequency = 1930 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920	60.09	276	1	H	3920	-41.08	10.9	1.68	-31.86	-13	-18.86
3920	70.36	184	1.51	V	3920	-30.81	10.9	1.68	-21.59	-13	-8.59
5880	60.55	14	1	H	5880	-39.55	11	2.34	-30.89	-13	-17.89
5880	68.79	102	1.07	V	5880	-31.31	11	2.34	-22.65	-13	-9.65
7840	55.63	193	1	H	7840	-38.6	9.7	2.66	-31.56	-13	-18.56
7840	63.21	82	1	V	7840	-31.02	9.7	2.66	-23.98	-13	-10.98

EDGE Cellular Band:

Uplink (Input frequency = 836.6 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1673.2	57.44	72	1.3	H	1673.2	-53.42	9.4	1.34	-45.36	-13	-32.36
1673.2	56.79	72	1	V	1673.2	-54.07	9.4	1.34	-46.01	-13	-33.01
2509.8	56.85	357	1	H	2509.8	-46.69	9.5	1.66	-38.85	-13	-25.85
2509.8	59.43	6	1.04	V	2509.8	-44.11	9.5	1.66	-36.27	-13	-23.27

Downlink (Input frequency = 881.6 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1763.2	53.98	154	1	H	1763.2	-56.12	9.6	1.34	-47.86	-13	-34.86
1763.2	58.4	352	1.14	V	1763.2	-51.7	9.6	1.34	-43.44	-13	-30.44
2644.8	55.3	163	1	H	2644.8	-50	9.2	1.66	-42.46	-13	-29.46
2644.8	61.18	61	1.3	V	2644.8	-44.12	9.2	1.66	-36.58	-13	-23.58
3526.4	48.09	247	1	H	3526.4	-55.96	10	1.66	-47.62	-13	-34.62
3526.4	53.92	268	1.29	V	3526.4	-50.13	10	1.66	-41.79	-13	-28.79

EDGE PCS Band:

Uplink (Input frequency = 1880 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760	49.3	192	1	H	3760	-53.45	10.9	1.66	-44.21	-13	-31.21
3760	52.71	355	1.1	V	3760	-50.04	10.9	1.66	-40.8	-13	-27.8
5640	59.31	226	1	H	5640	-39.25	10.6	2.34	-30.99	-13	-17.99
5640	70.61	80	1.03	V	5640	-27.95	10.6	2.34	-19.69	-13	-6.69
7520	48.24	206	1	H	7520	-42.26	8.7	3	-36.56	-13	-23.56
7520	56.23	277	1.14	V	7520	-34.27	8.7	3	-28.57	-13	-15.57

Downlink (Input frequency = 1930 MHz)

Indicated		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. Gain Correction (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920	60.35	277	1	H	3920	-40.82	10.9	1.68	-31.6	-13	-18.6
3920	70.86	185	1.6	V	3920	-30.31	10.9	1.68	-21.09	-13	-8.09
5880	60.42	12	1	H	5880	-39.68	11	2.34	-31.02	-13	-18.02
5880	68.48	102	1	V	5880	-31.62	11	2.34	-22.96	-13	-9.96
7840	55.65	196	1	H	7840	-38.58	9.7	2.66	-31.54	-13	-18.54
7840	63.98	82	1	V	7840	-30.25	9.7	2.66	-23.21	-13	-10.21

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.

As per FCC §22.917 and §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

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 Environmental Conditions

Uplink

Temperature:	20-24 °C
Relative Humidity:	35-47 %
ATM Pressure:	101-103kPa

* The testing was performed by Dennis Huang from 2010-04-15 to 2010-04-28 in RF Site.

Downlink

Temperature:	20-22 °C
Relative Humidity:	50-55 %
ATM Pressure:	99-102kPa

* The testing was performed by Dennis Huang from 2010-06-03 to 2010-06-04 in RF Site.

8.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-007-23
HP	Signal Generator	8648C	3426A00417	2009-07-23
R & S	Signal Generator	SMIQ03	849192/0085	2010-03-31*

* Based on two year calibration Cycle.

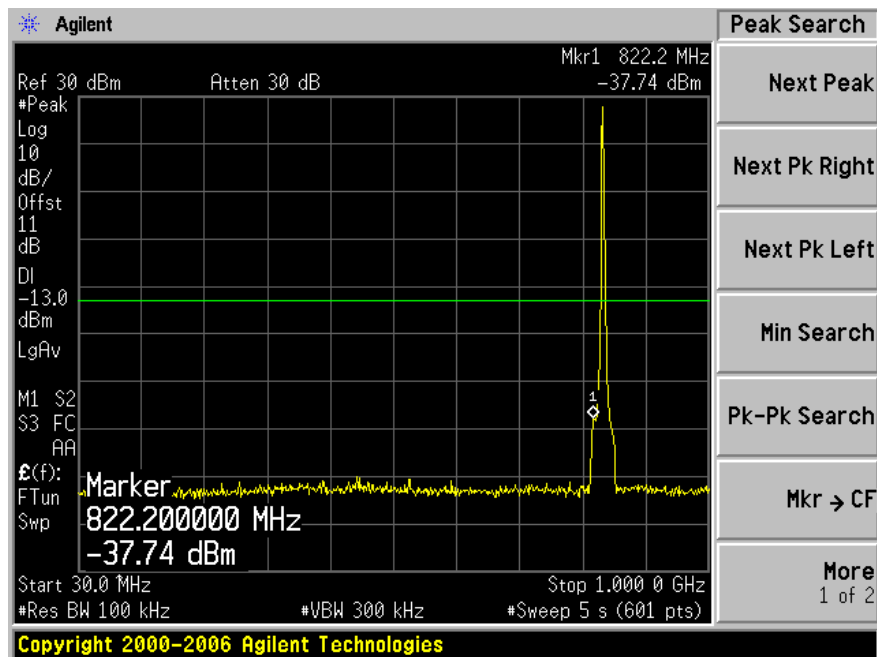
* **Statement of Traceability: BACL Corp.** attests that all calibrations have been performed per the NVLAP requirements, traceable to the NIST.

8.5 Test Results

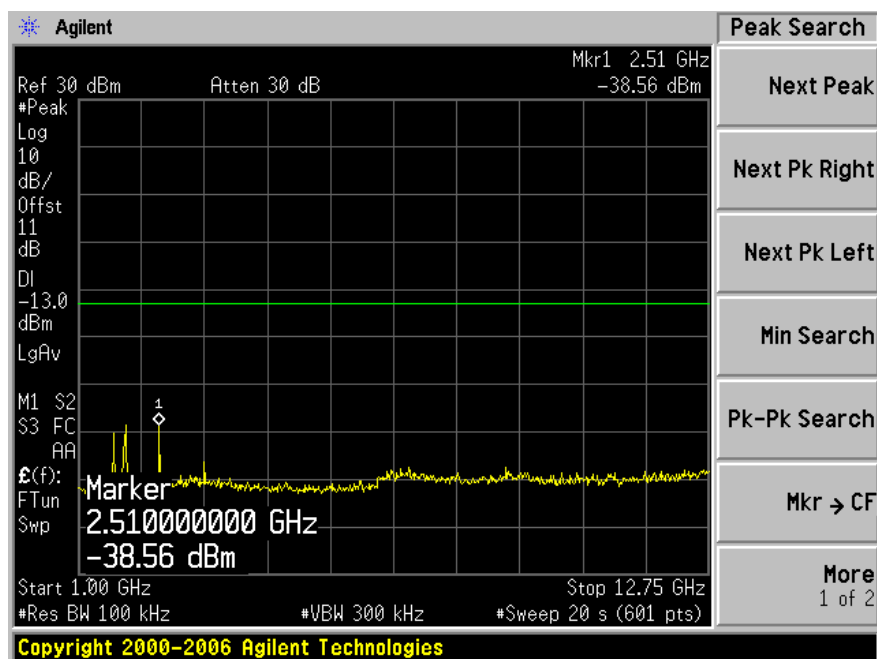
Please refer to the following plots.

CDMA/EVDO Cellular Band Uplink, Middle Channel: 836.52 MHz:

Plot 1: 30 MHz to 1 GHz

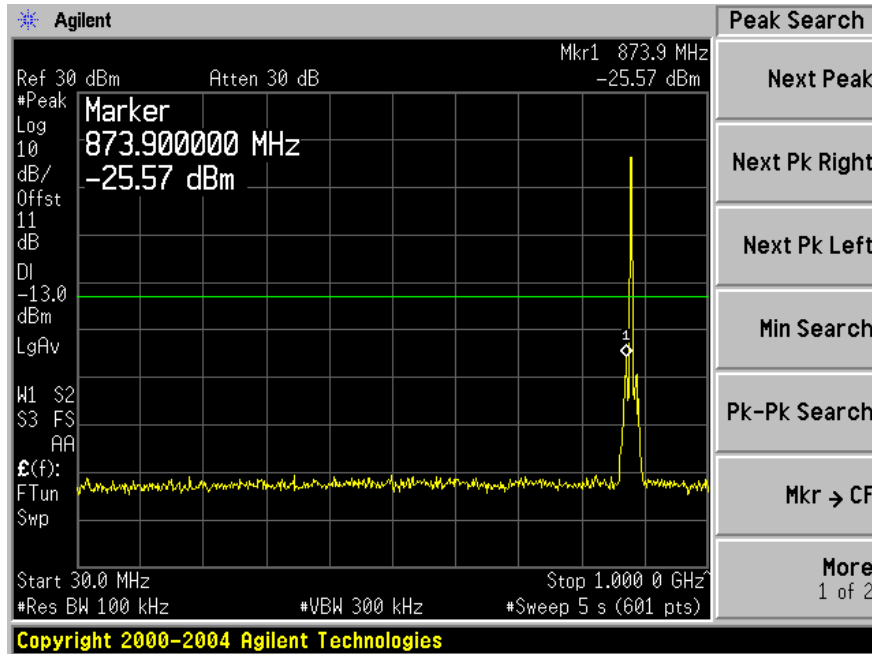


Plot 2: Above 1 GHz

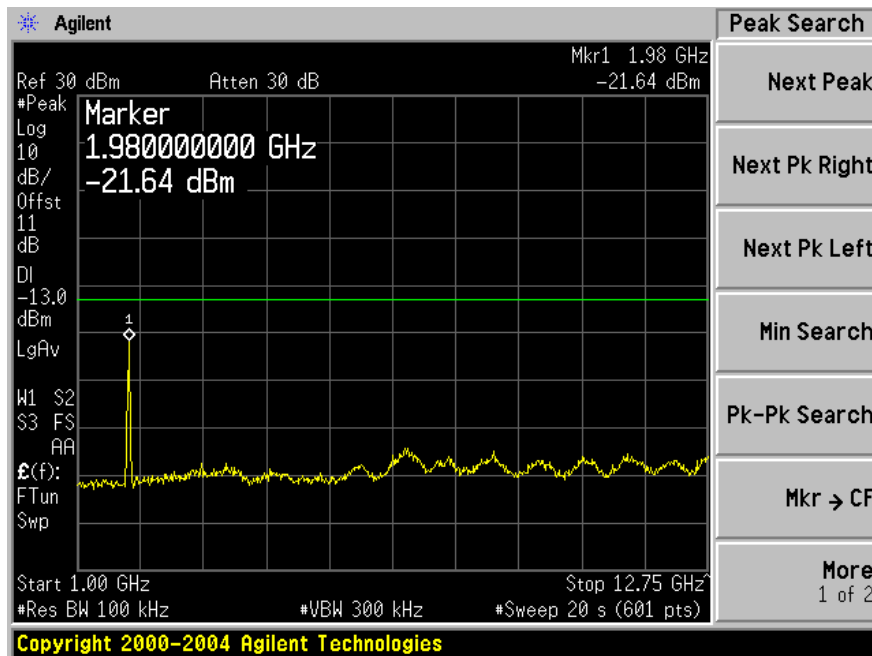


CDMA/EVDO Cellular Band Downlink, Middle Channel: 881.52 MHz:

Plot 1: 30 MHz to 1 GHz

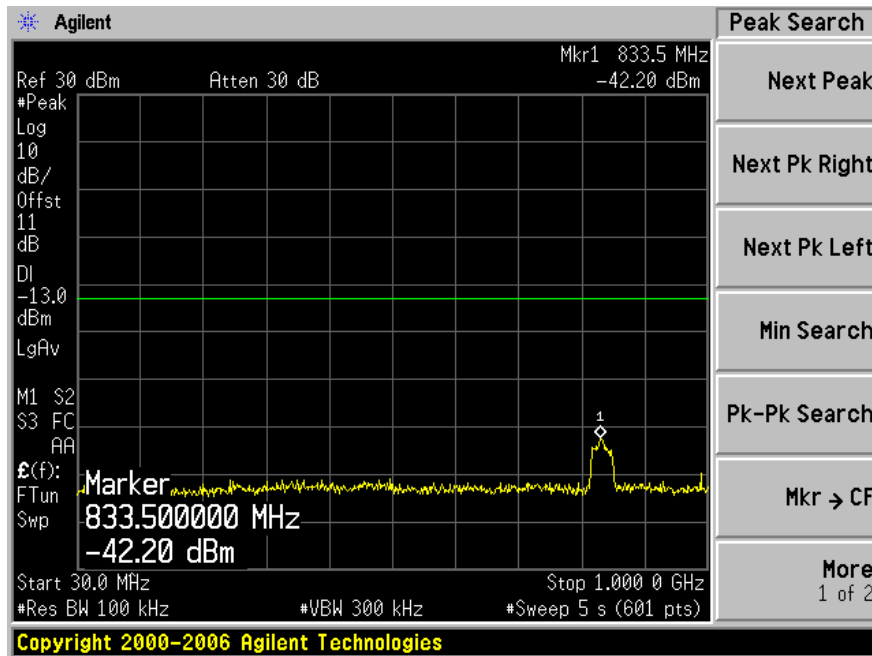


Plot 2: Above 1 GHz

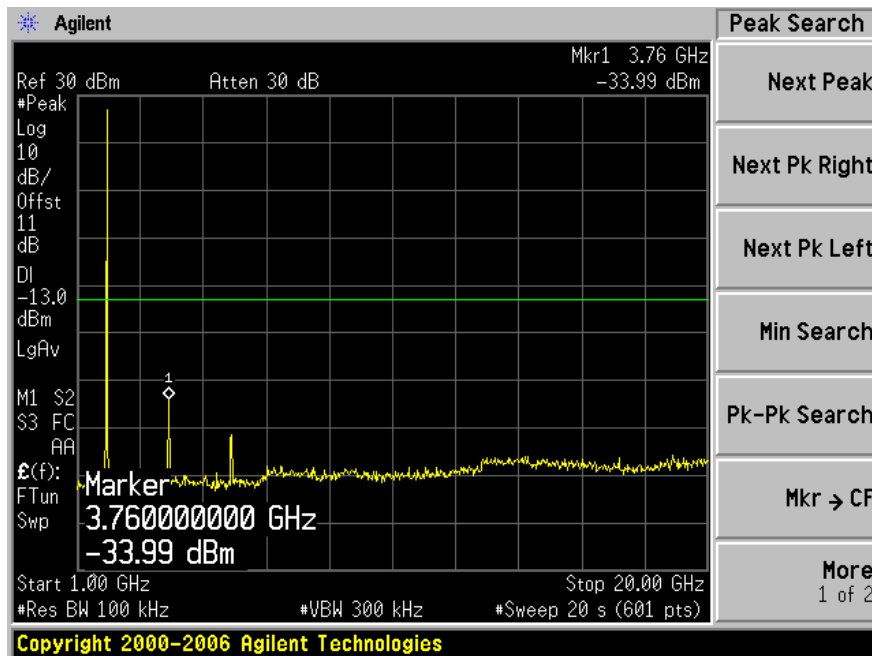


CDMA/EVDO PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

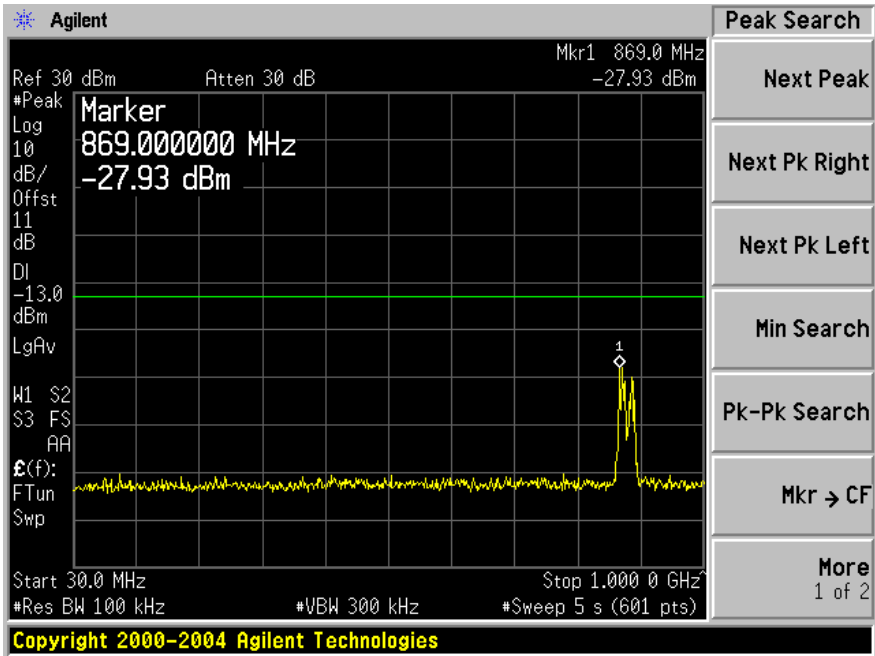


Plot 2: Above 1 GHz

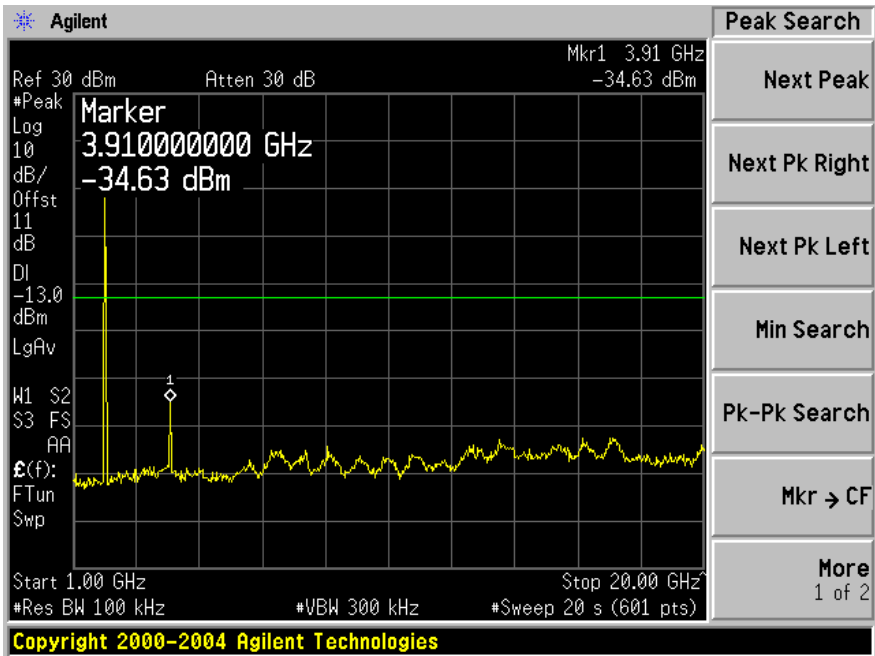


CDMA/EVDO PCS Band Downlink, Middle Channel: 1960 MHz:

Plot 1: 30 MHz to 1 GHz

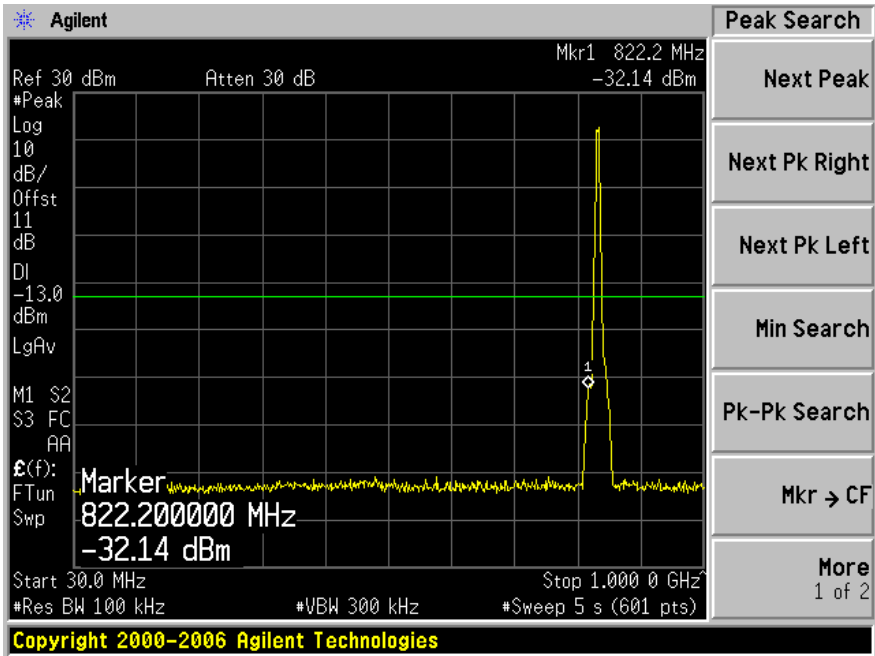


Plot 2: Above 1 GHz

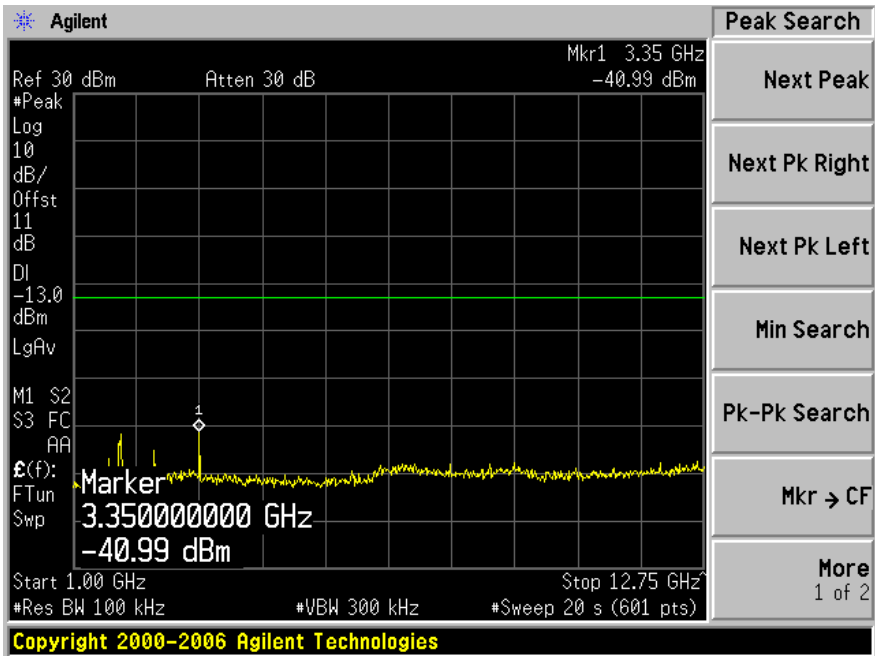


WCDMA/HSPA Cellular Band Uplink, Middle Channel: 836.42 MHz:

Plot 1: 30 MHz to 1 GHz

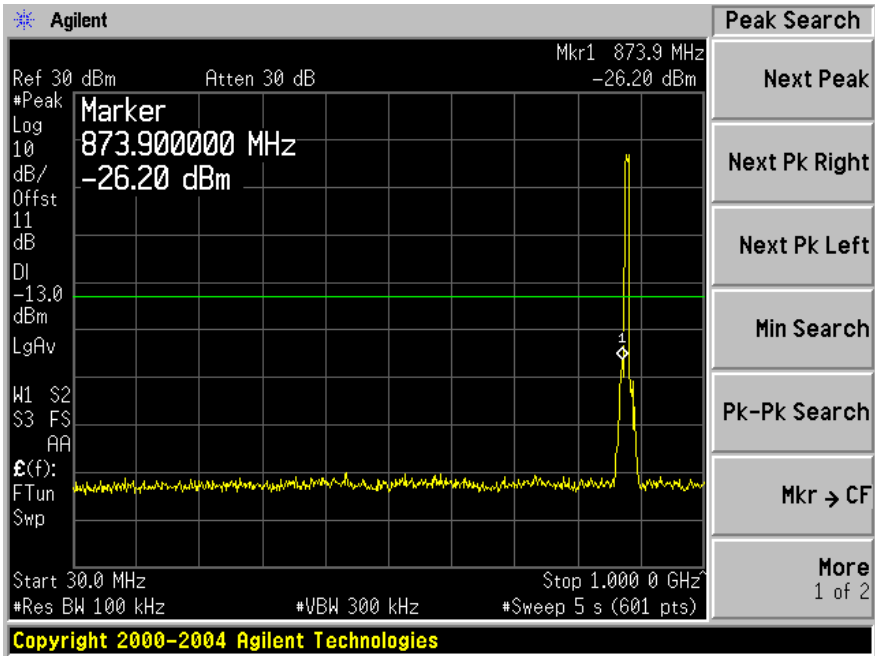


Plot 2: Above 1 GHz

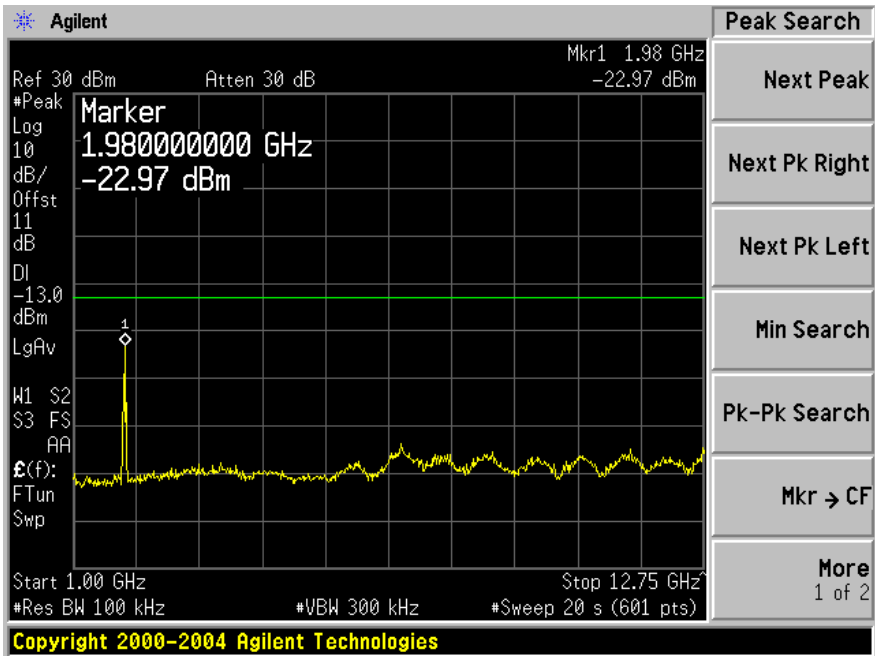


WCDMA/HSPA Cellular Band Downlink, Middle Channel: 881.4 MHz:

Plot 1: 30 MHz to 1 GHz

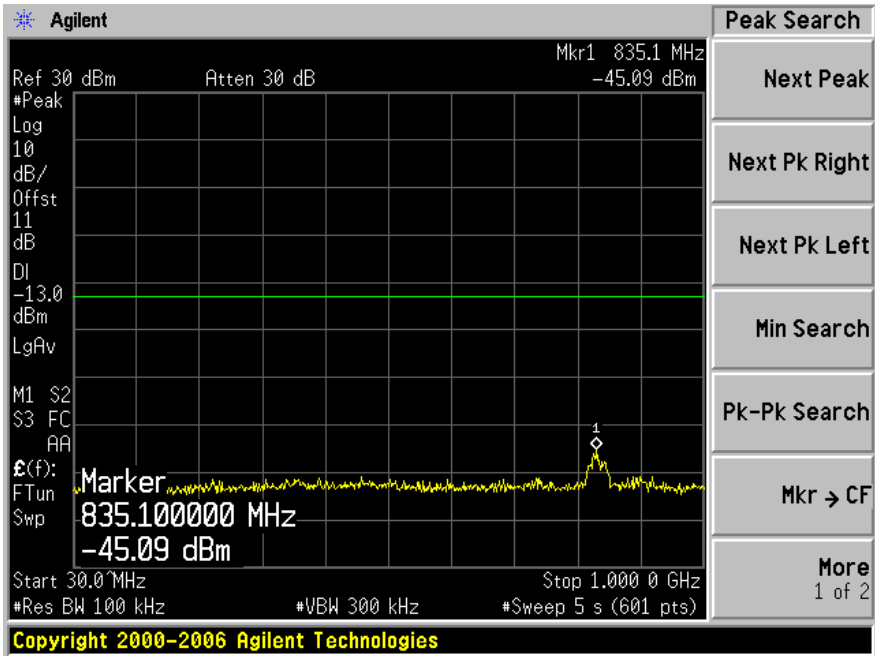


Plot 2: Above 1 GHz

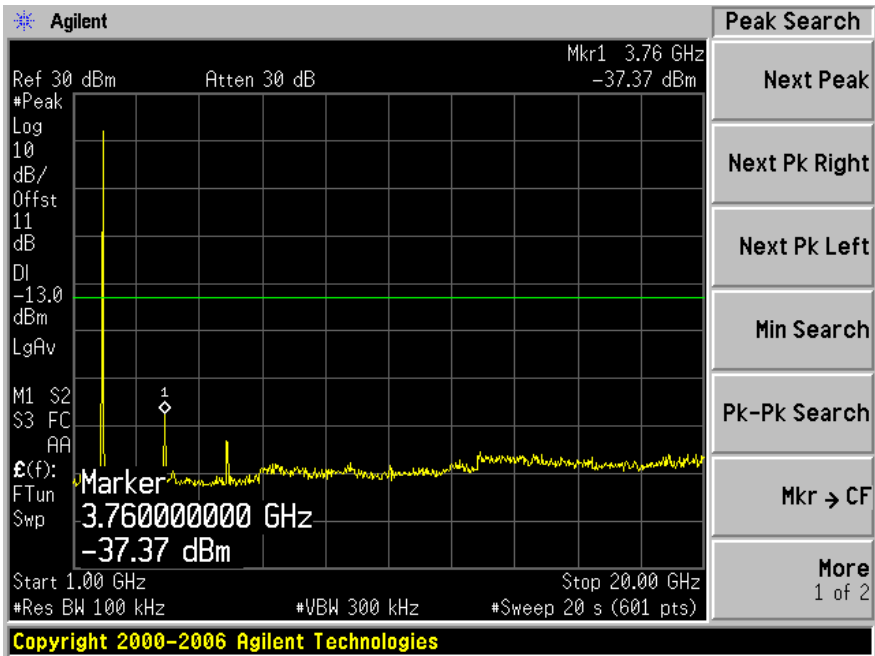


WCDMA/HSPA PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

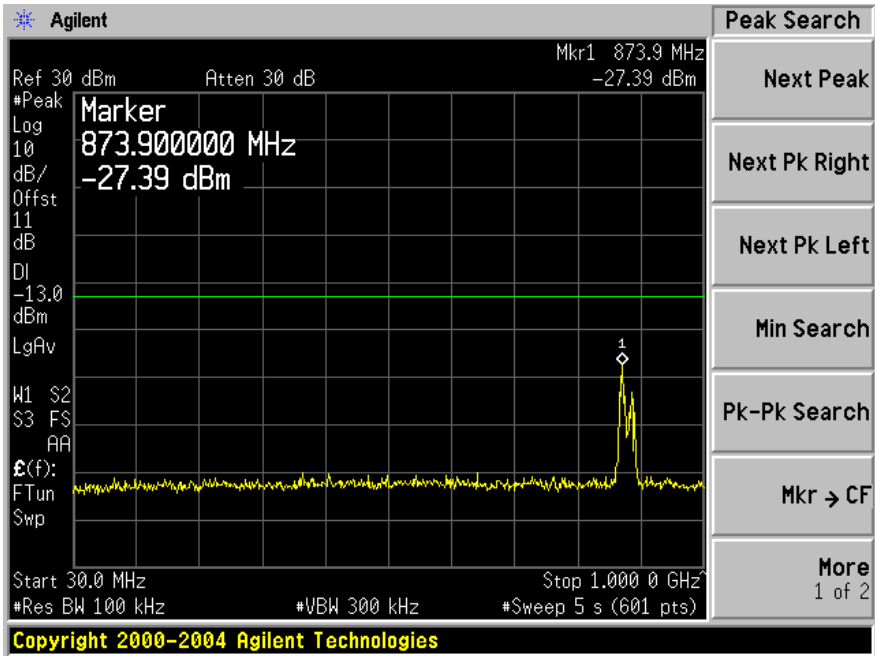


Plot 2: Above 1 GHz

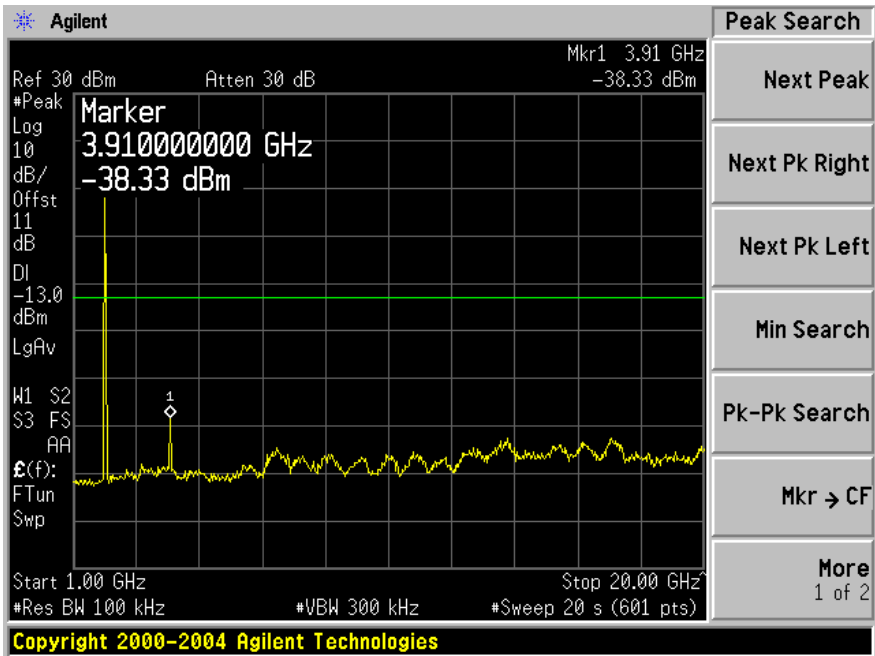


WCDMA/HSPA PCS Band Downlink, Middle Channel: 1960 MHz:

Plot 1: 30 MHz to 1 GHz

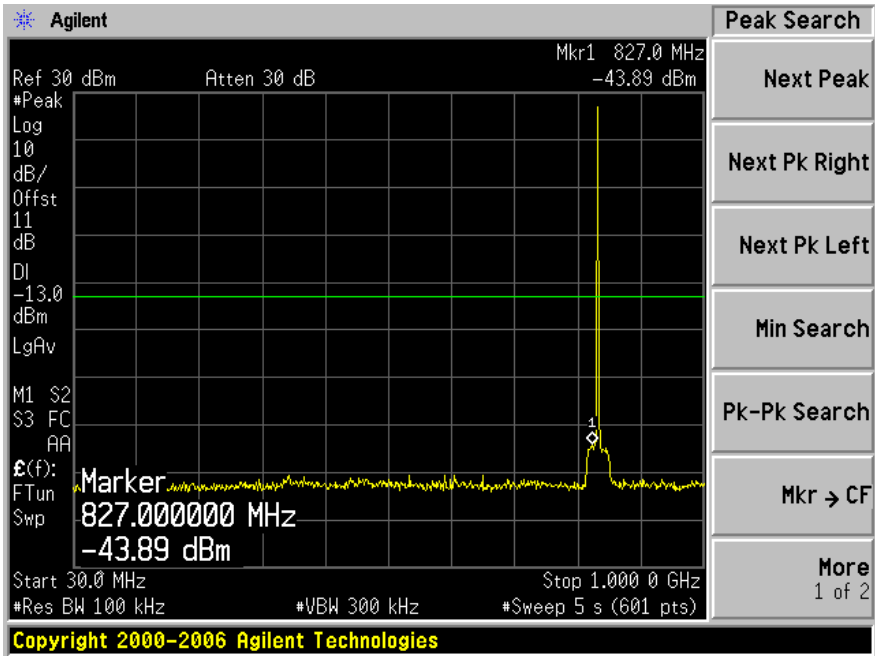


Plot 2: Above 1 GHz

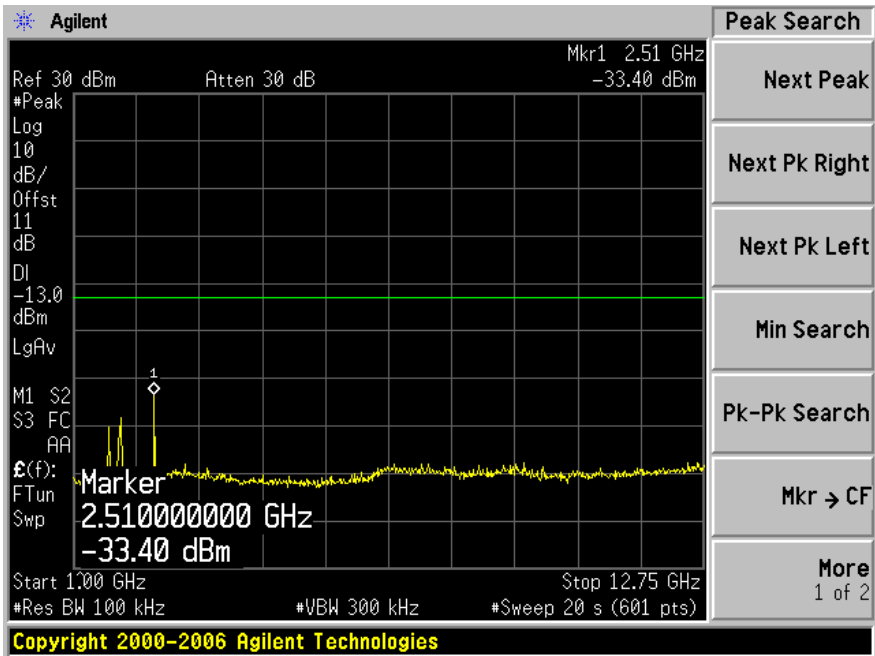


GSM Cellular Band Uplink, Middle Channel: 836.6MHz:

Plot 1: 30 MHz to 1 GHz

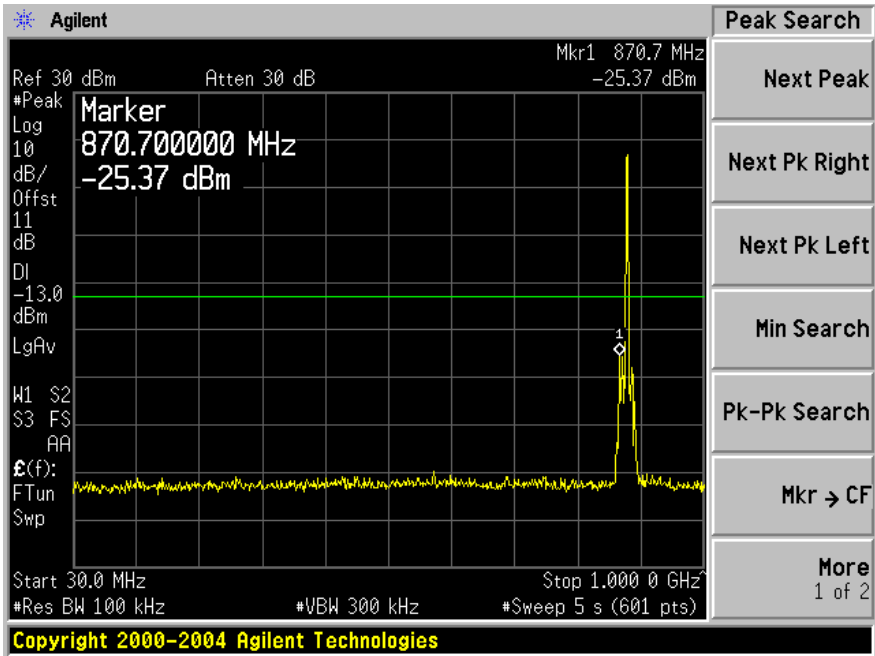


Plot 2: Above 1 GHz

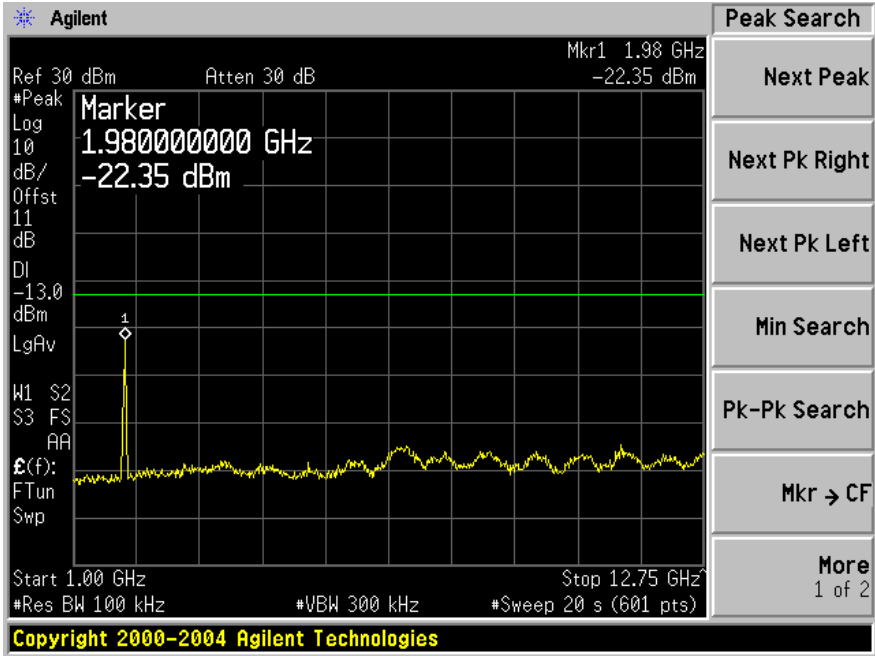


GSM Cellular Band Downlink, Middle Channel: 881.6 MHz:

Plot 1: 30 MHz to 1 GHz

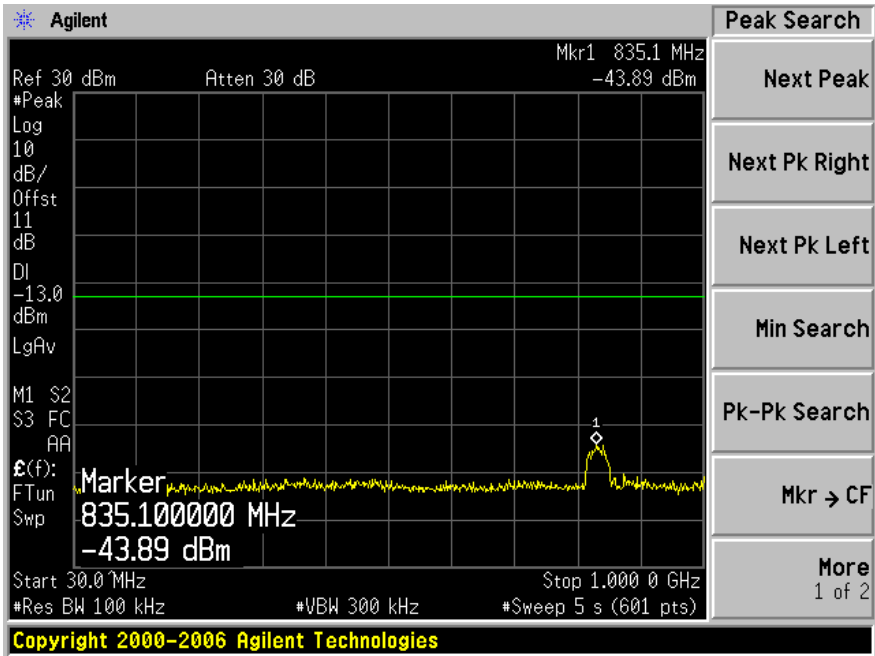


Plot 2: Above 1 GHz

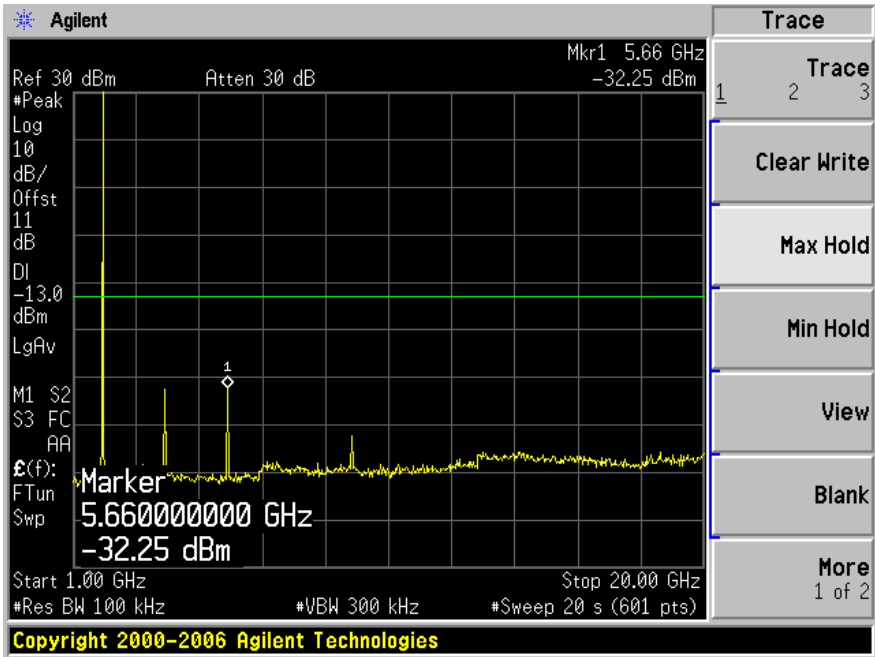


GSM PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

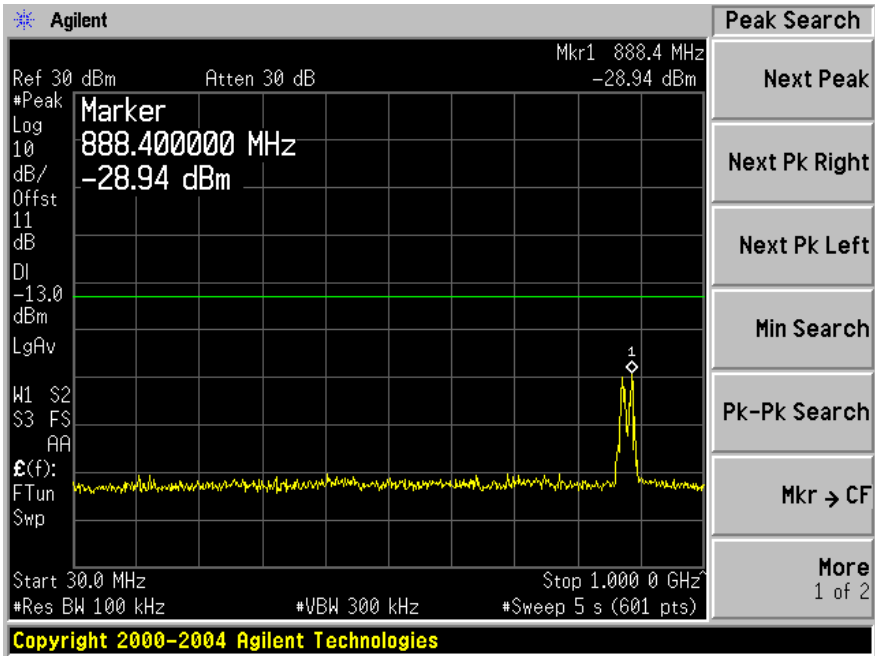


Plot 2: Above 1 GHz

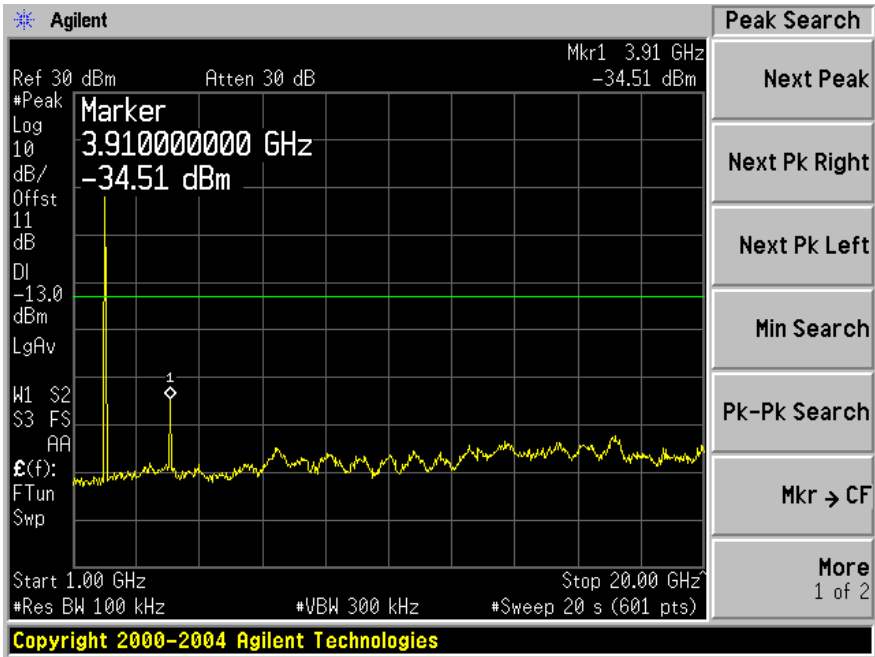


GSM PCS Band Downlink, Middle Channel: 1960 MHz:

Plot 1: 30 MHz to 1 GHz

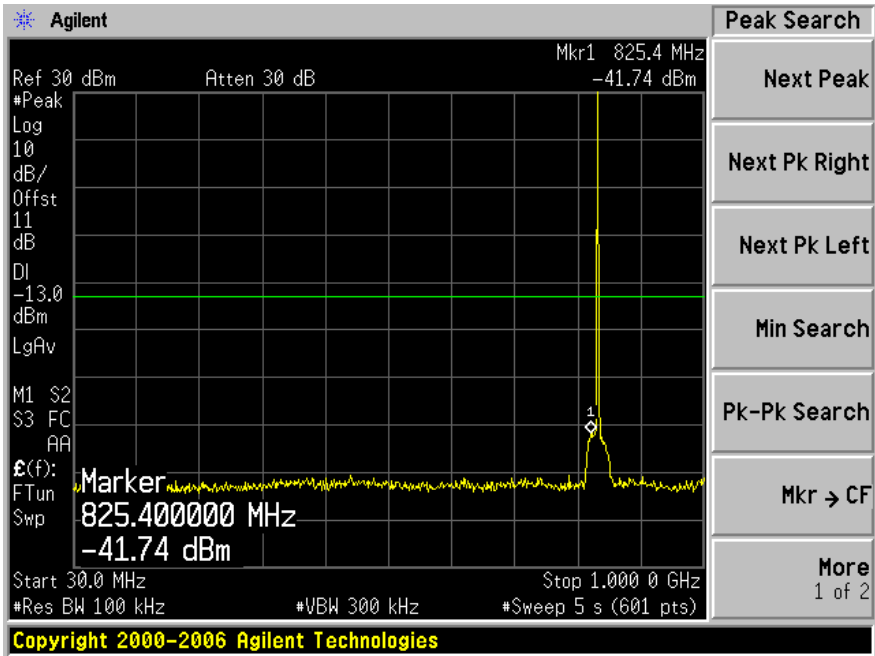


Plot 2: Above 1 GHz

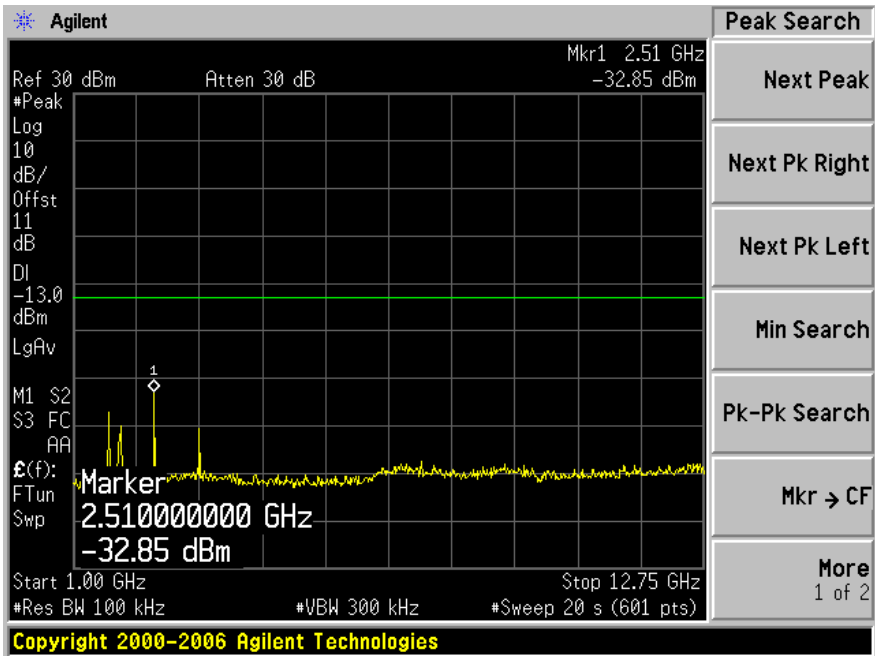


EDGE Cellular Band Uplink, Middle Channel: 836.6 MHz:

Plot 1: 30 MHz to 1 GHz

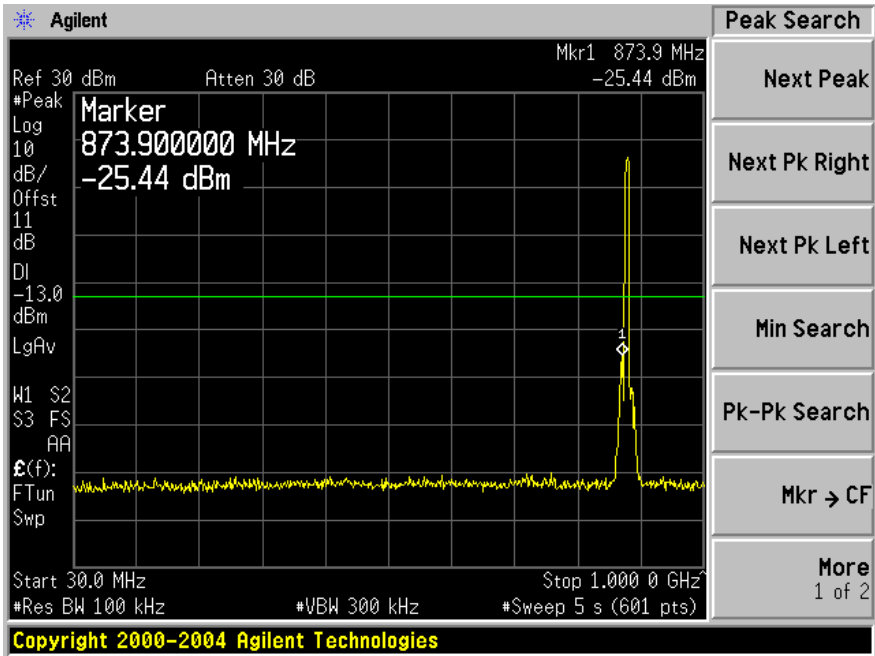


Plot 2: Above 1 GHz

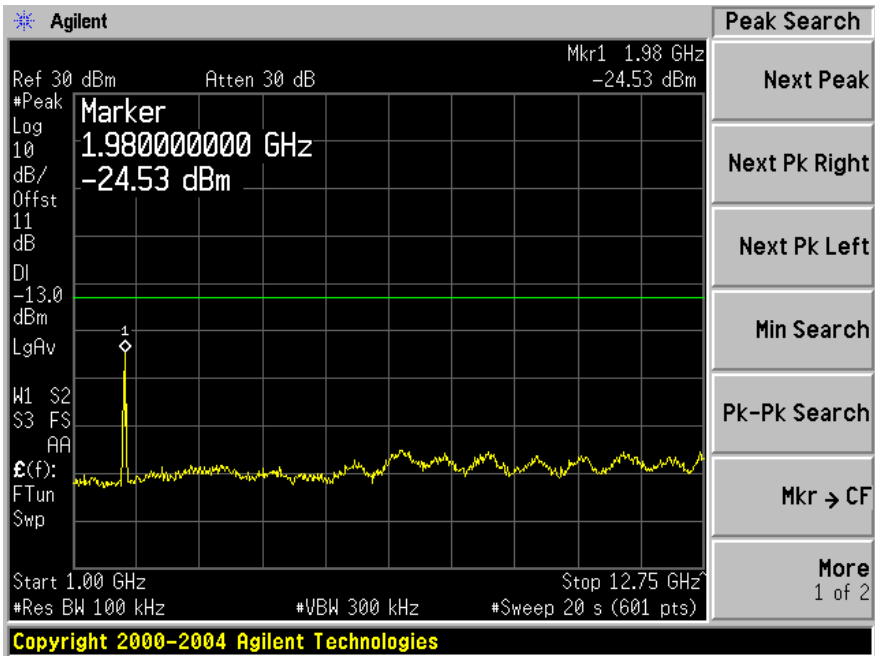


EDGE Cellular Band Downlink, Middle Channel: 881.6 MHz:

Plot 1: 30 MHz to 1 GHz

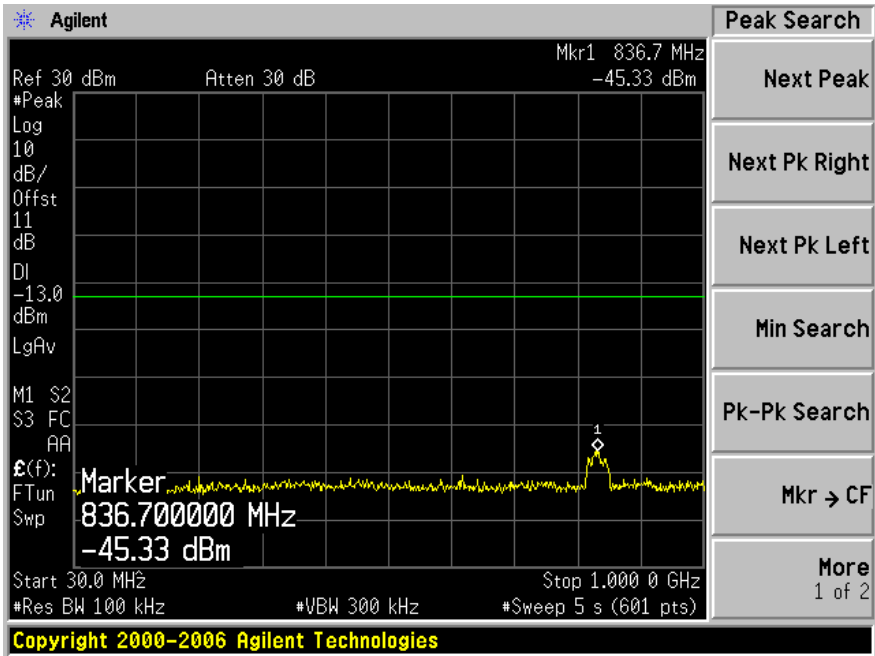


Plot 2: Above 1 GHz

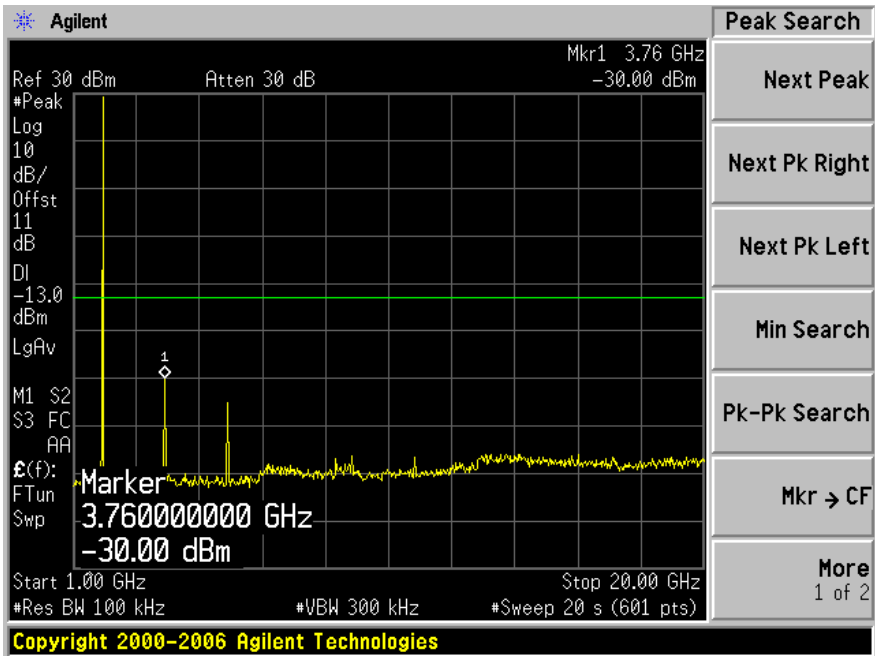


EDGE PCS Band Uplink, Middle Channel: 1880 MHz:

Plot 1: 30 MHz to 1 GHz

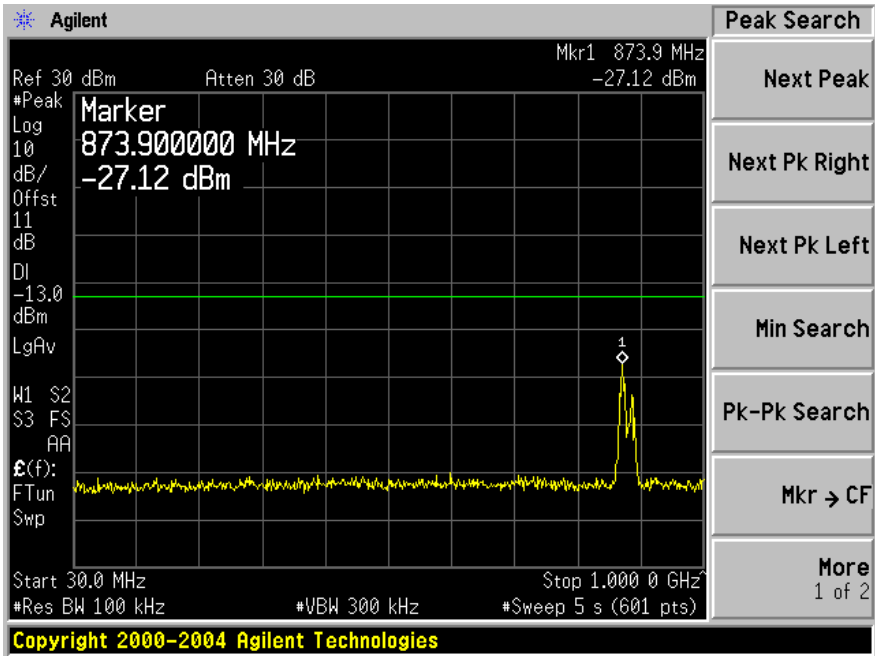


Plot 2: Above 1 GHz

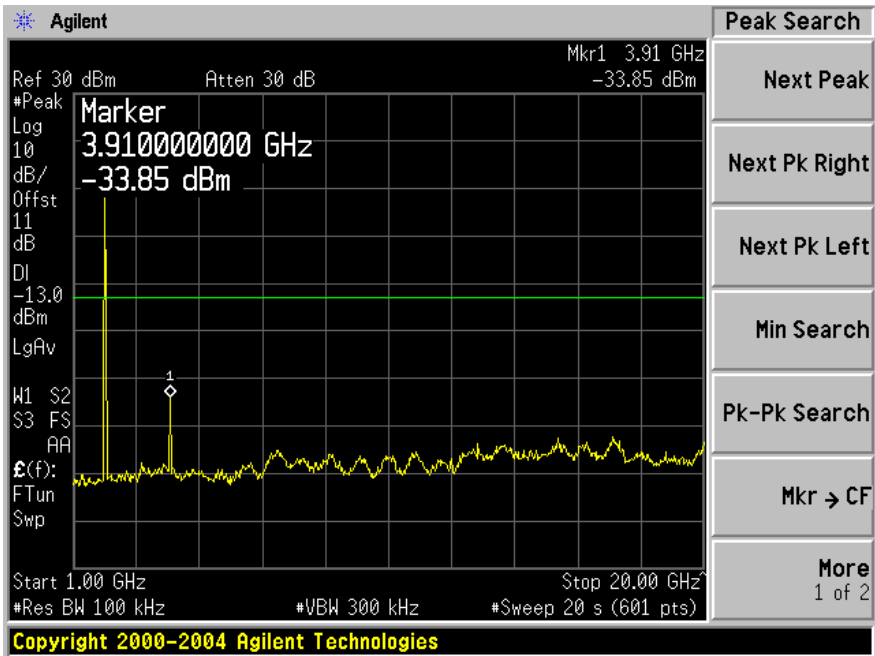


EDGE PCS Band Downlink, Middle Channel: 1960 MHz:

Plot 1: 30 MHz to 1 GHz

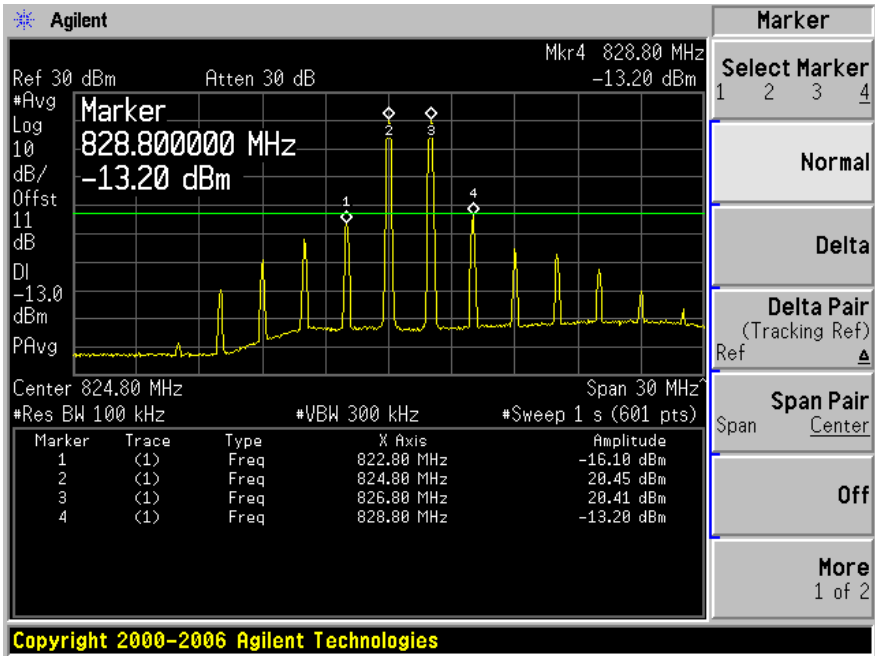


Plot 2: Above 1GHz

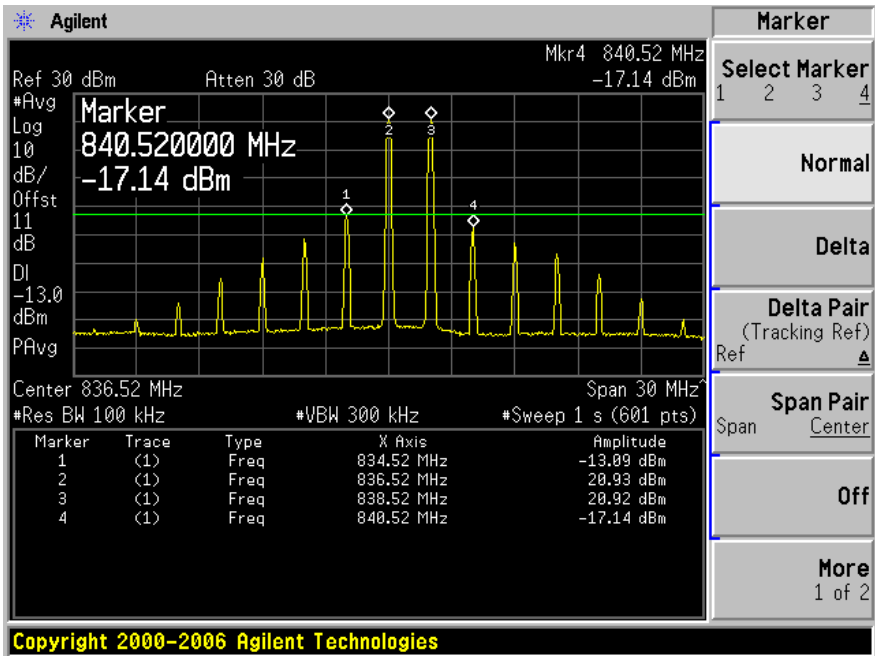


Inter-modulation

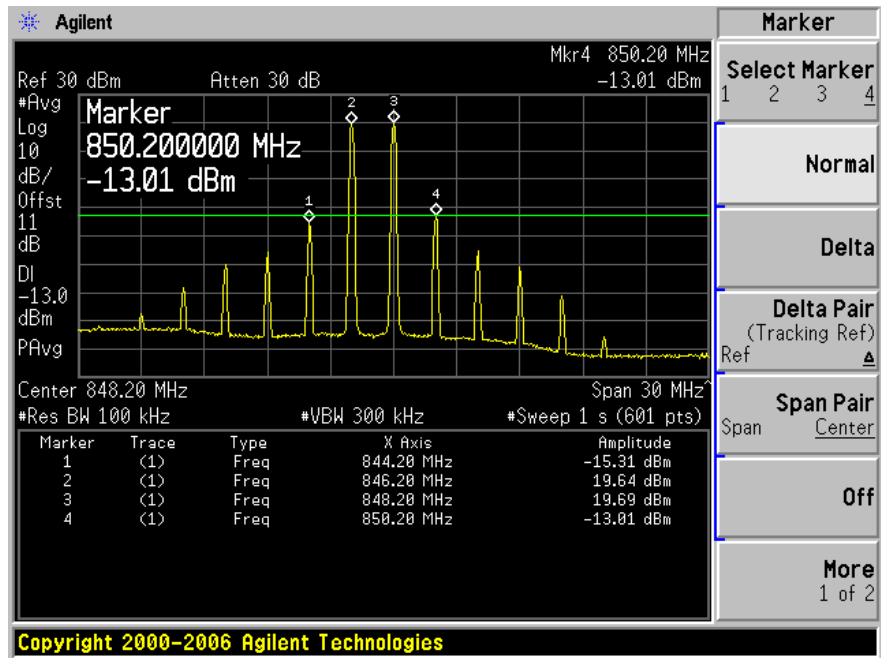
CDMA/EVDO Cellular Band Uplink, Low Channel: 824.8 MHz:



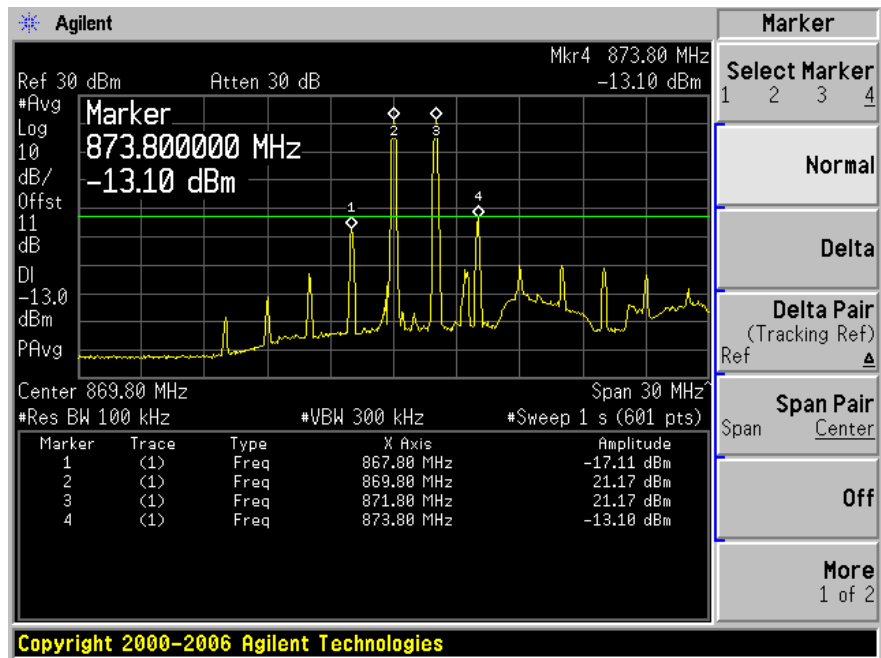
CDMA/EVDO Cellular Band Uplink, Middle Channel: 836.52 MHz:



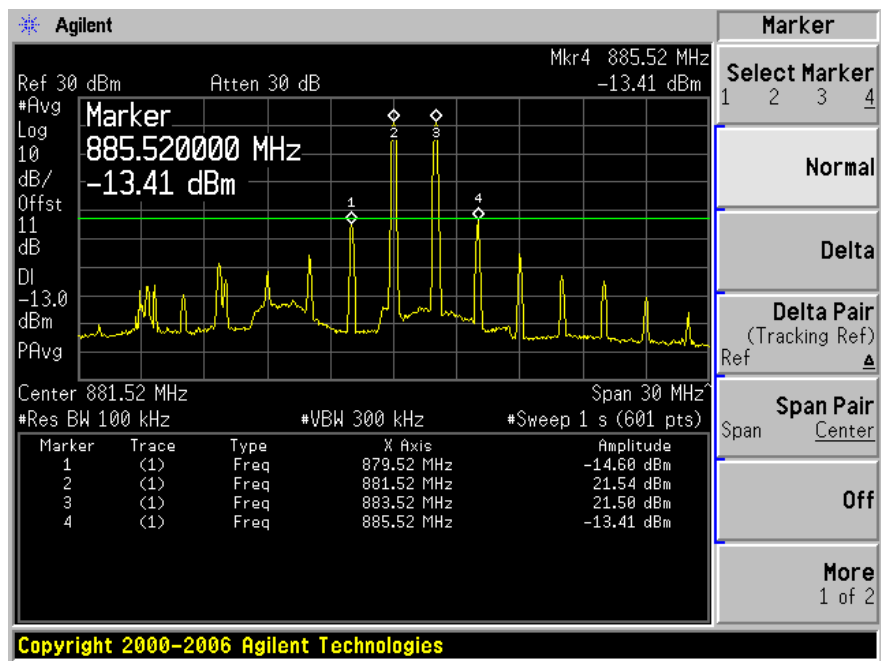
CDMA/EVDO Cellular Band Uplink, High Channel: 848.2 MHz:



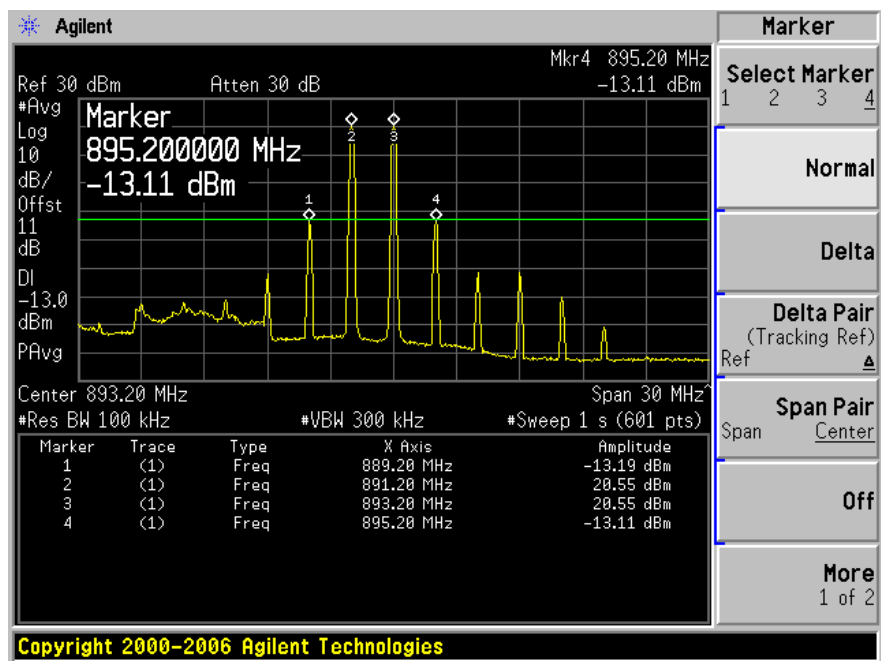
CDMA/EVDO Cellular Band Downlink, Low Channel: 869.8 MHz:



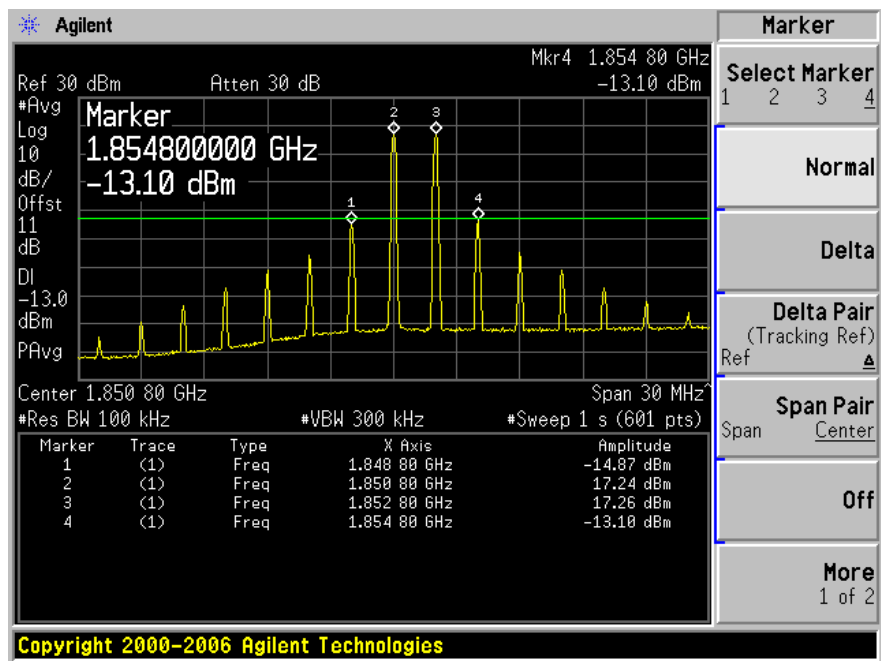
CDMA/EVDO Cellular Band Downlink, Middle Channel: 881.52 MHz:



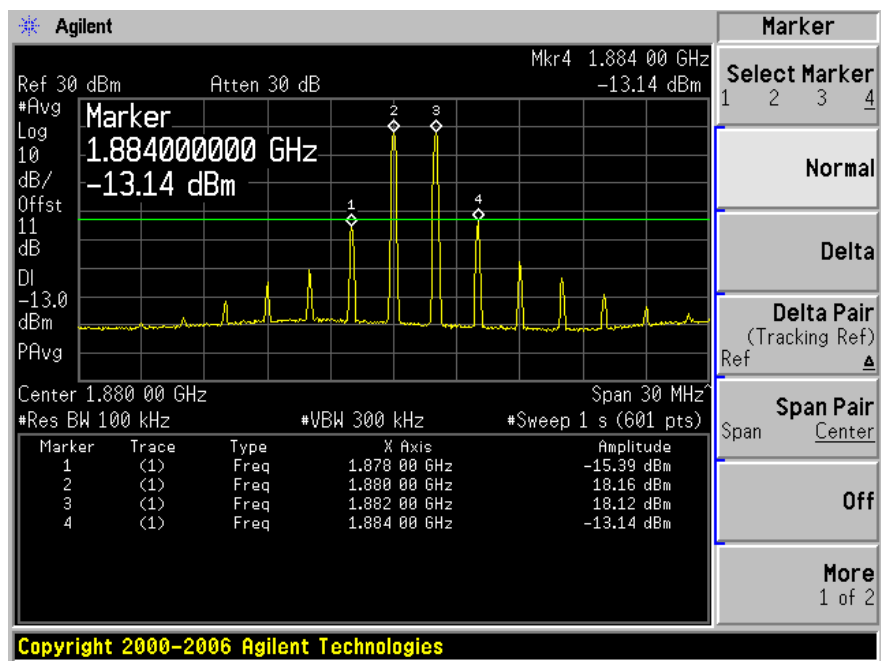
CDMA/EVDO Cellular Band Downlink, High Channel: 893.2 MHz:



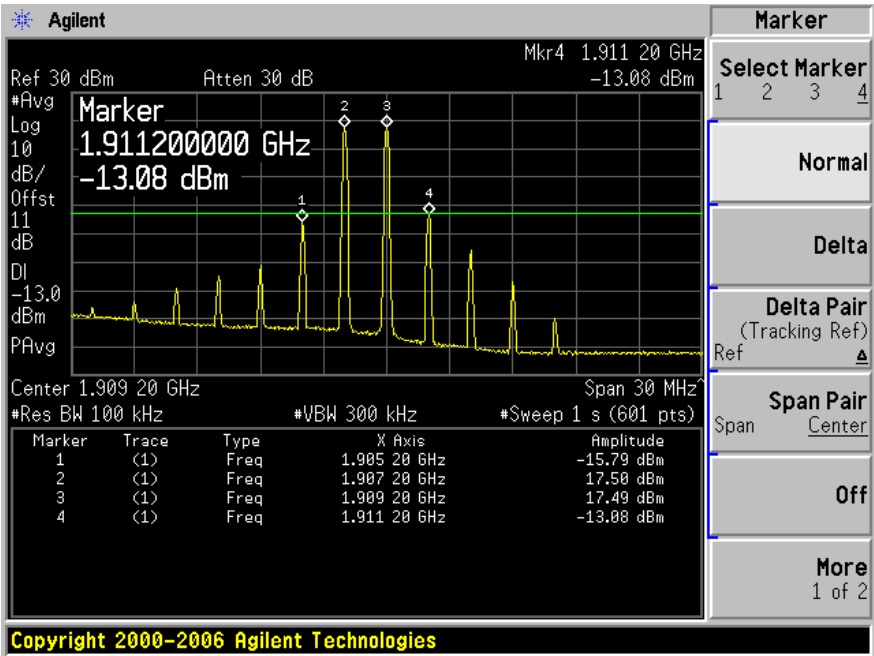
CDMA/EVDO PCS Band Uplink, Low Channel: 1850.8 MHz:



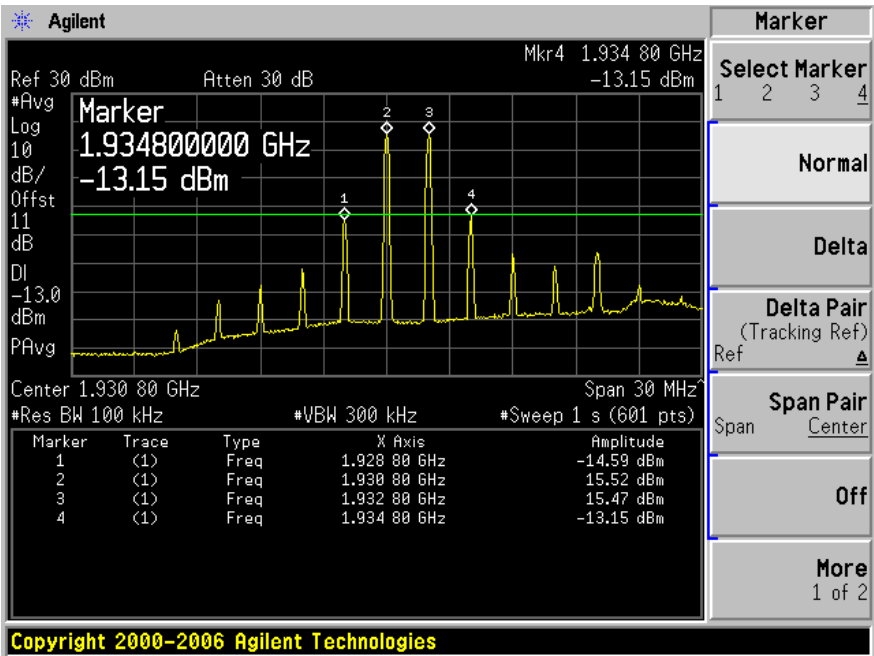
CDMA/EVDO PCS Band Uplink, Middle Channel: 1880 MHz:



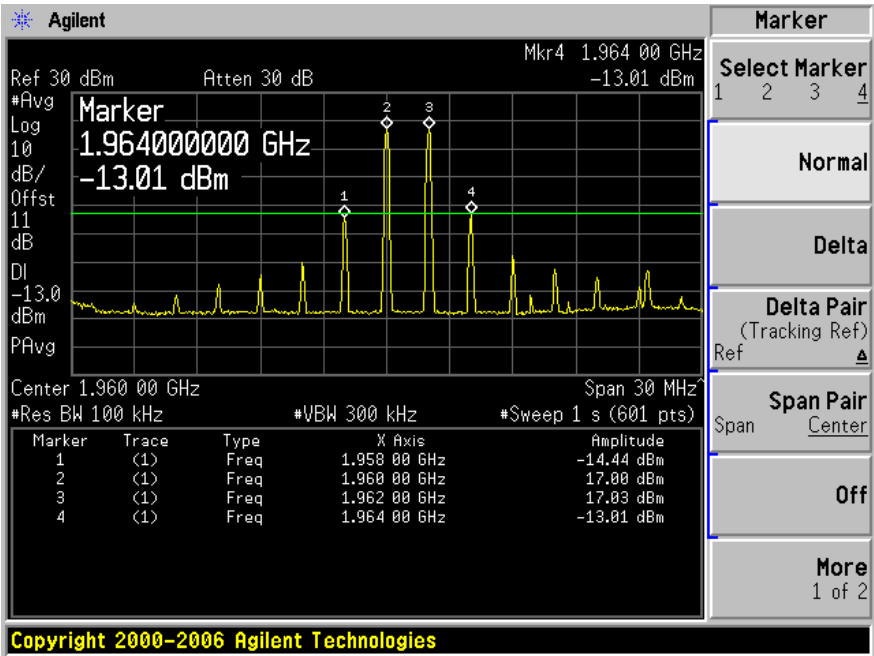
CDMA/EVDO PCS Band Uplink, High Channel: 1909.2 MHz:



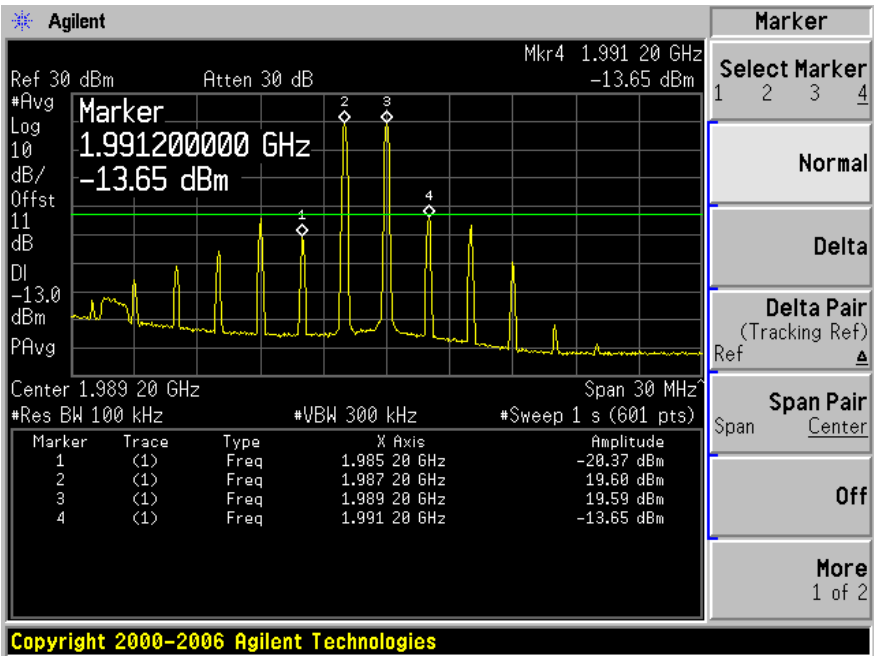
CDMA/EVDO PCS Band Downlink, Low Channel: 1930.8 MHz:



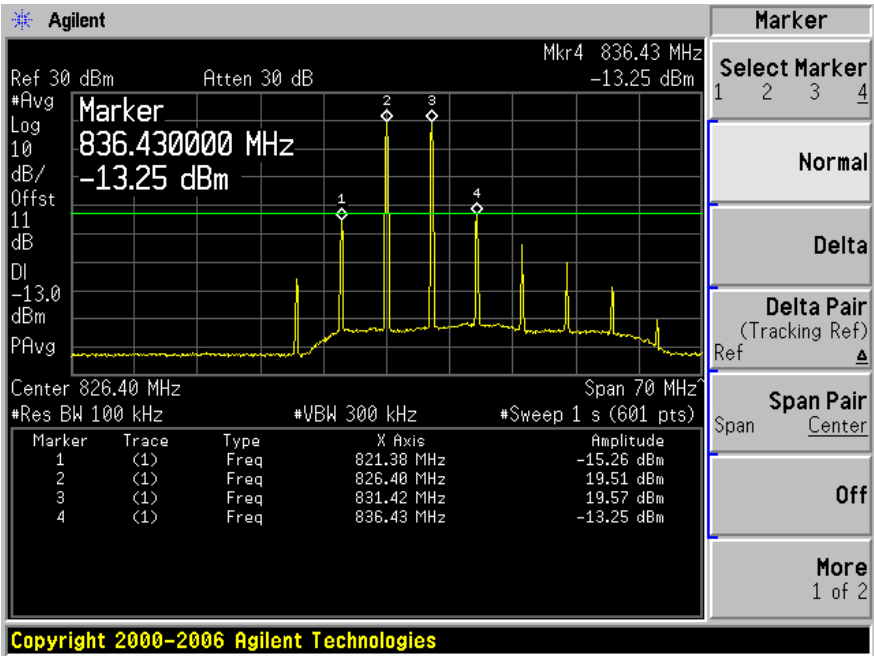
CDMA/EVDO PCS Band Downlink, Middle Channel: 1960 MHz:



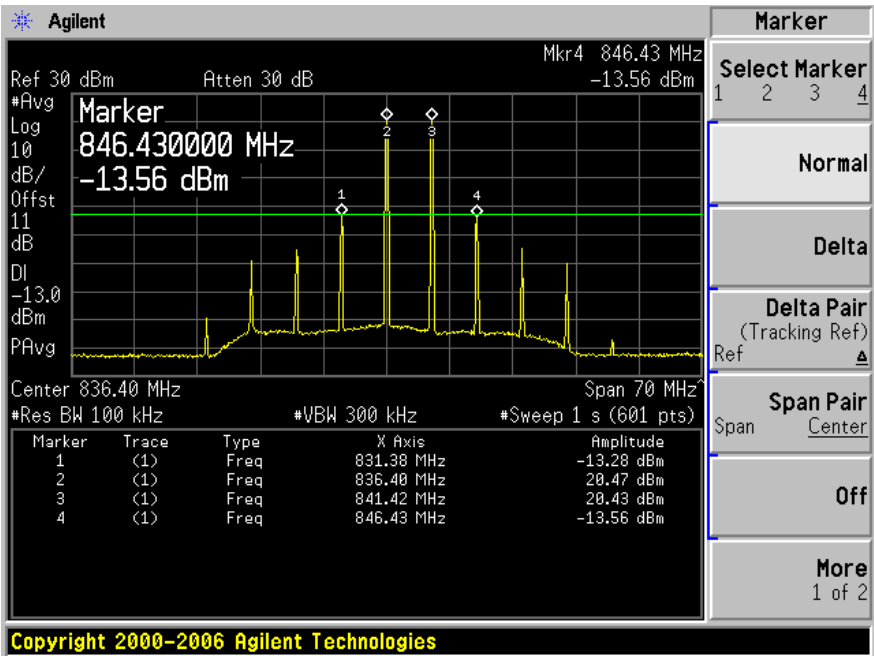
CDMA/EVDO PCS Band Downlink, High Channel: 1989.2 MHz:



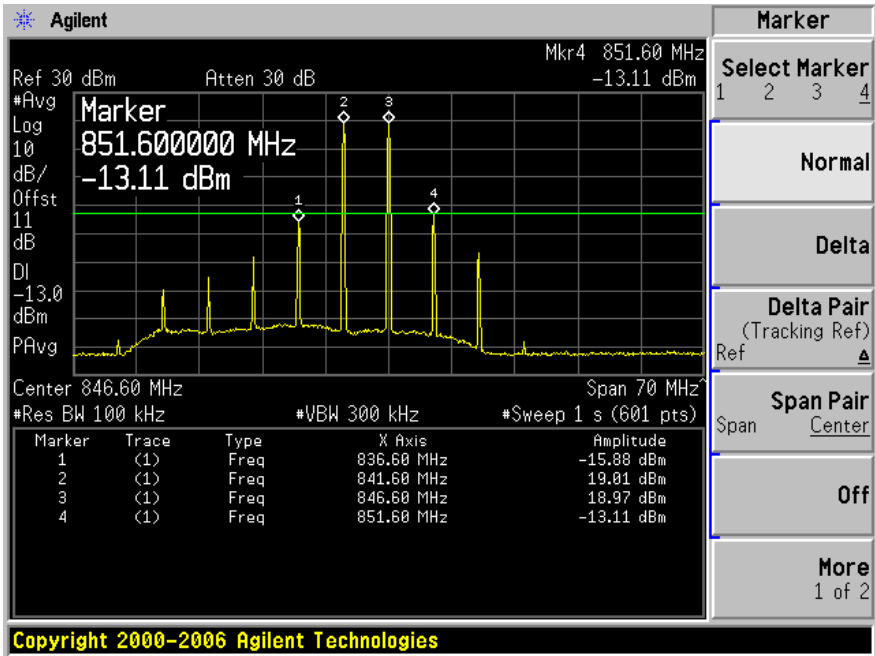
WCDMA/HSPA Cellular Band Uplink, Low Channel: 826.4 MHz:



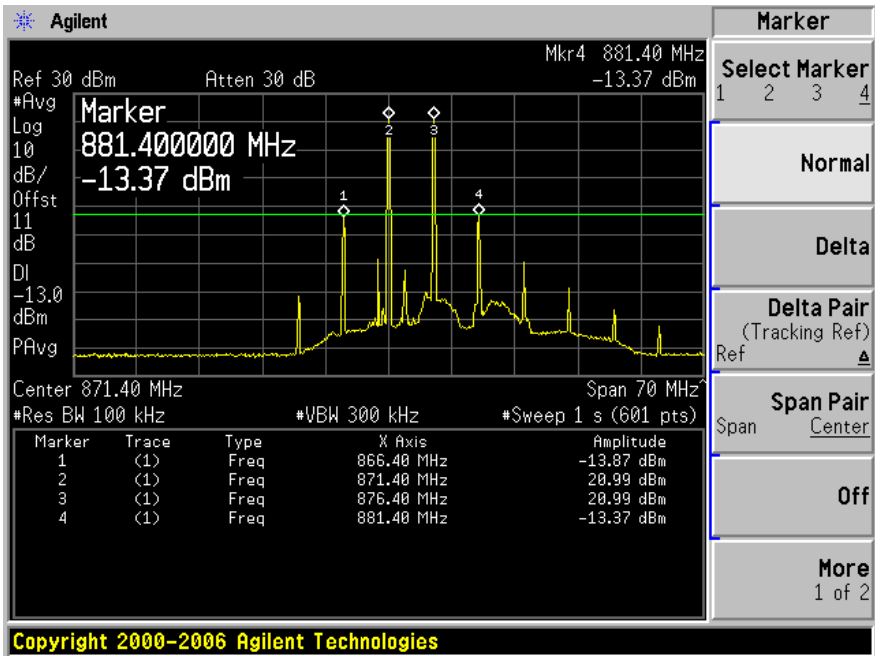
WCDMA/HSPA Cellular Band Uplink, Middle Channel: 836.4 MHz:



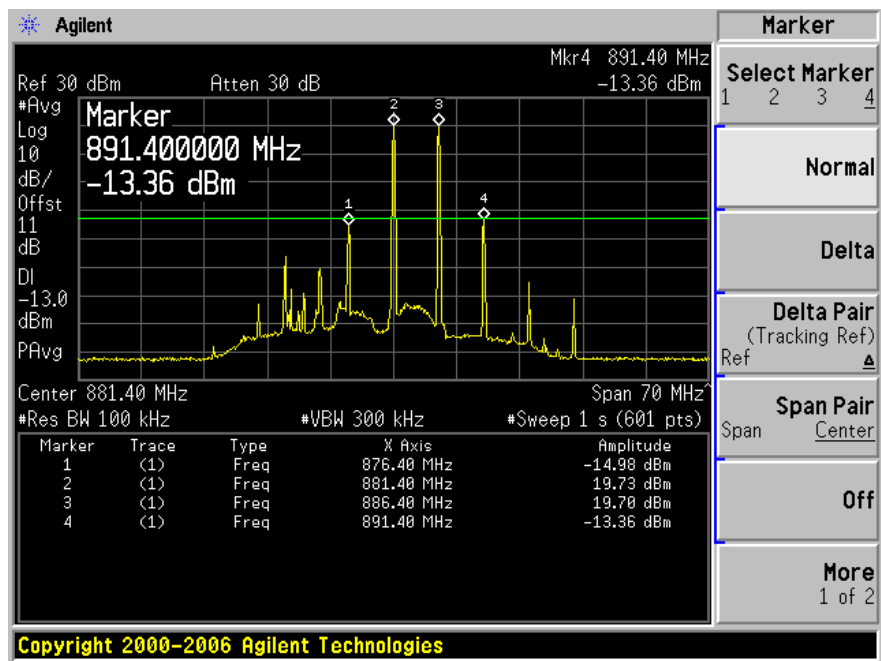
WCDMA/HSPA Cellular Band Uplink, High Channel: 846.6 MHz:



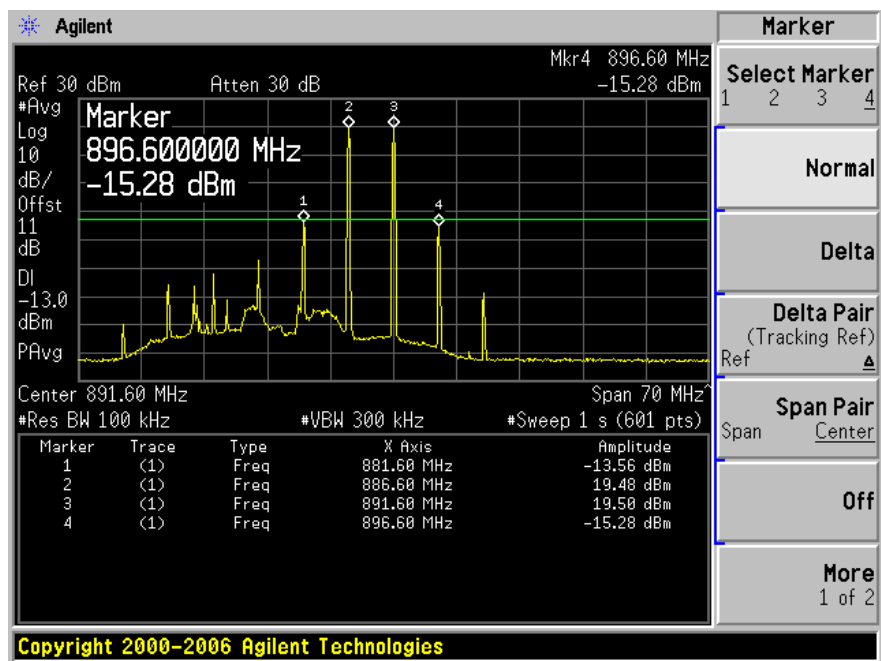
WCDMA/HSPA Cellular Band Downlink, Low Channel: 871.4 MHz:



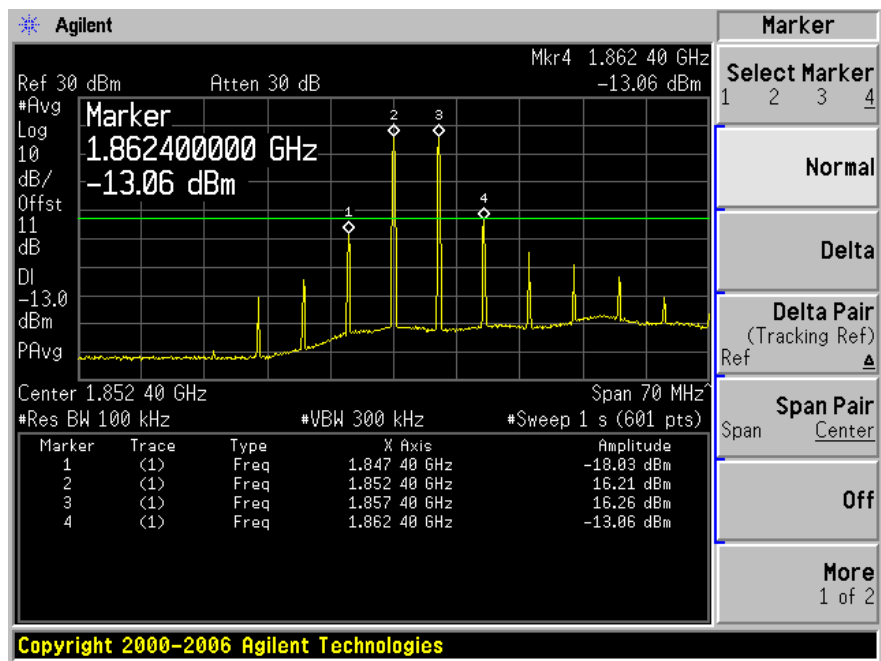
WCDMA/HSPA Cellular Band Downlink, Middle Channel: 881.4 MHz:



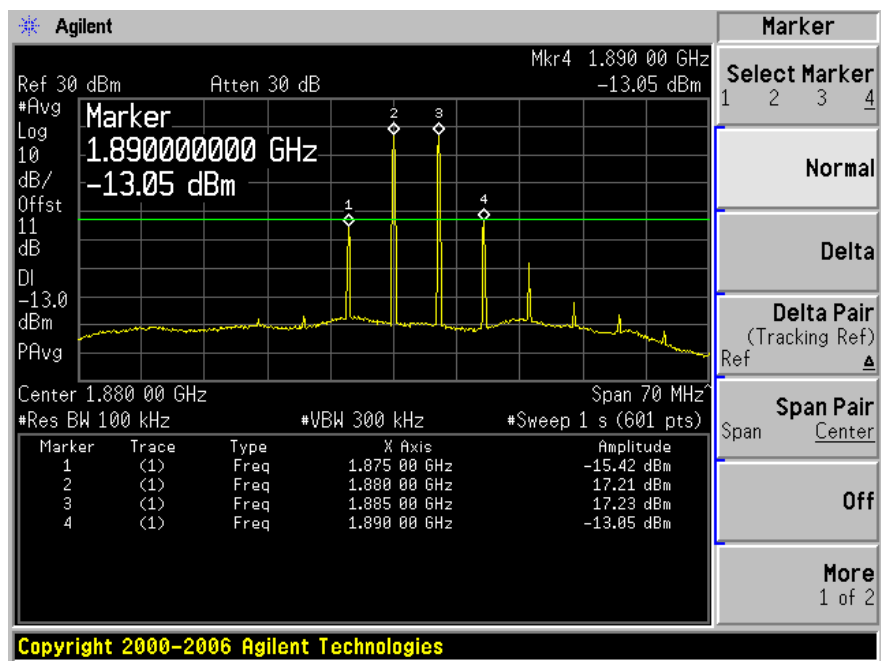
WCDMA/HSPA Cellular Band Downlink, High Channel: 891.6 MHz:



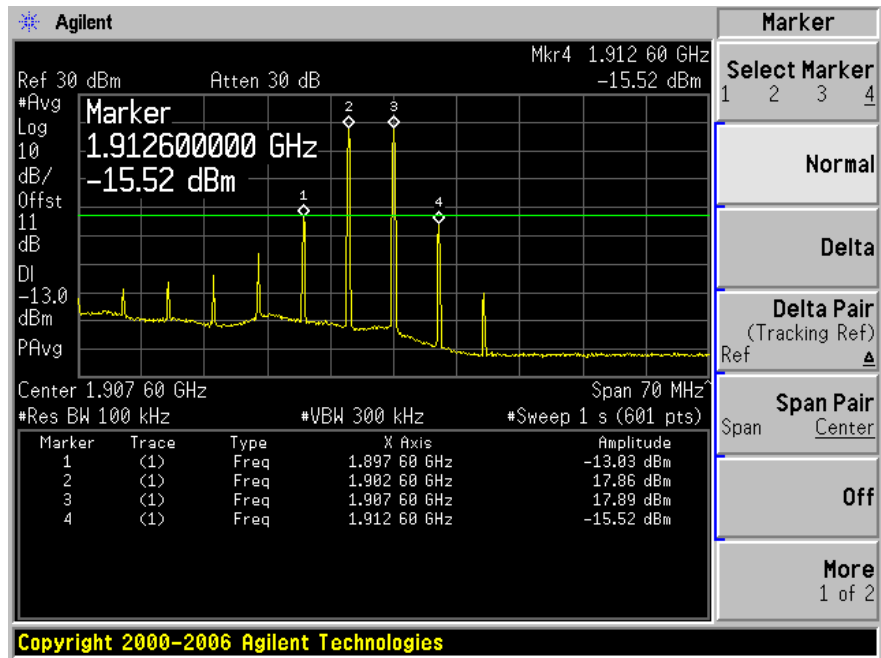
WCDMA/HSPA PCS Band Uplink, Low Channel: 1852.4 MHz:



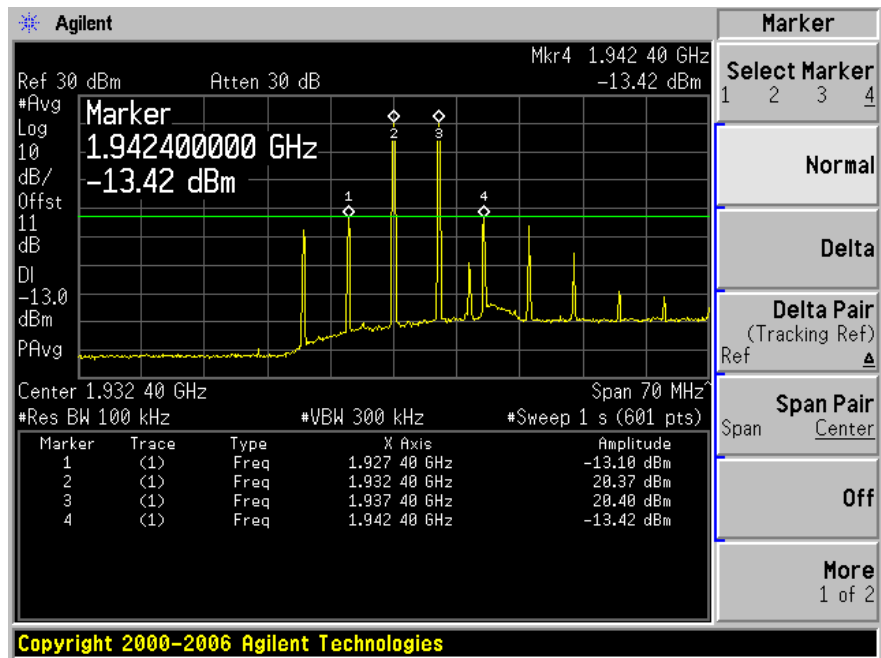
WCDMA/HSPA PCS Band Uplink, Middle Channel: 1880 MHz:



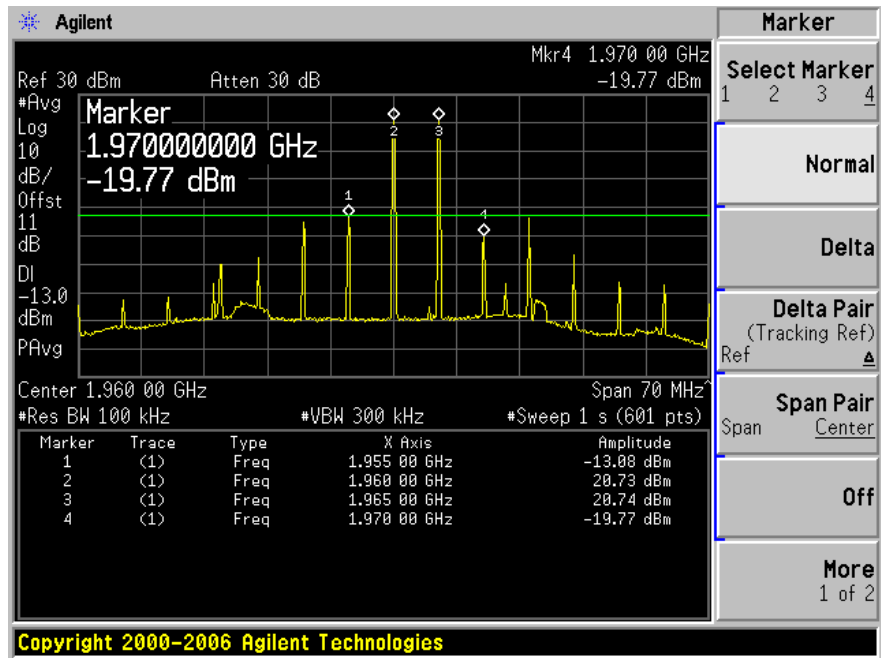
WCDMA/HSPA PCS Band Uplink, High Channel: 1907.6 MHz:



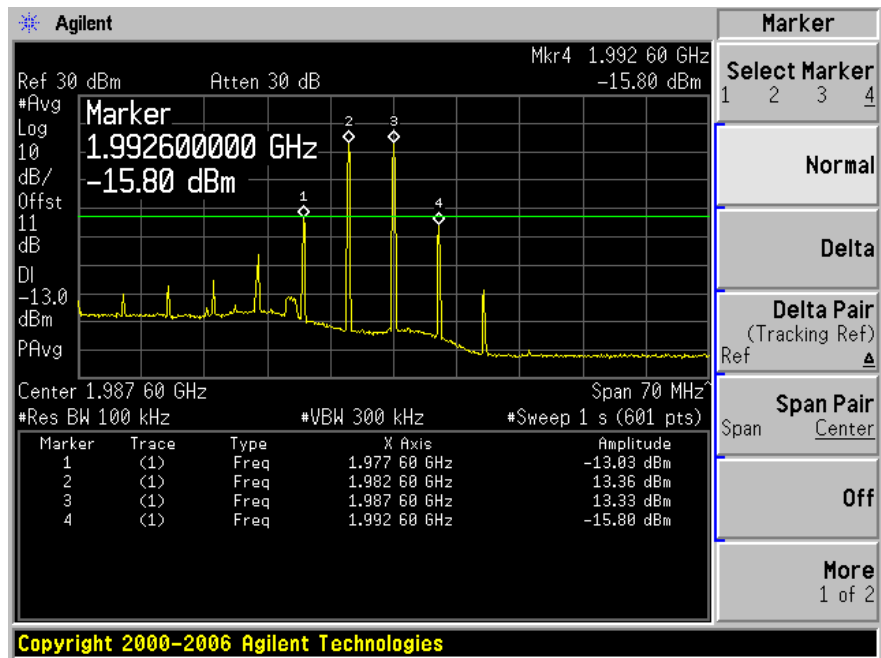
WCDMA/HSPA PCS Band Downlink, Low Channel: 1932.4 MHz:



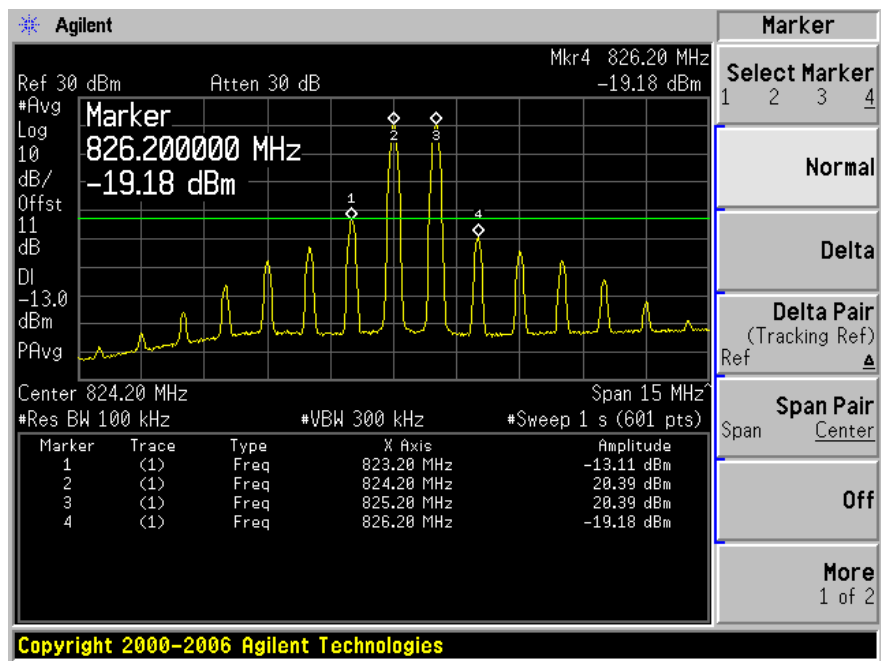
WCDMA/HSPA PCS Band Downlink, Middle Channel: 1960 MHz:



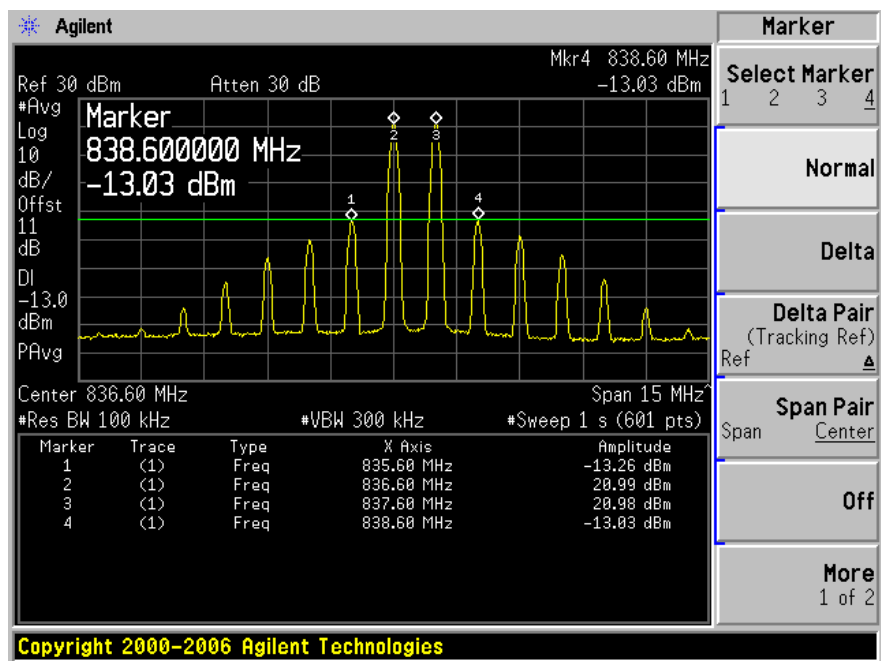
WCDMA/HSPA PCS Band Downlink, High Channel: 1987.6 MHz:



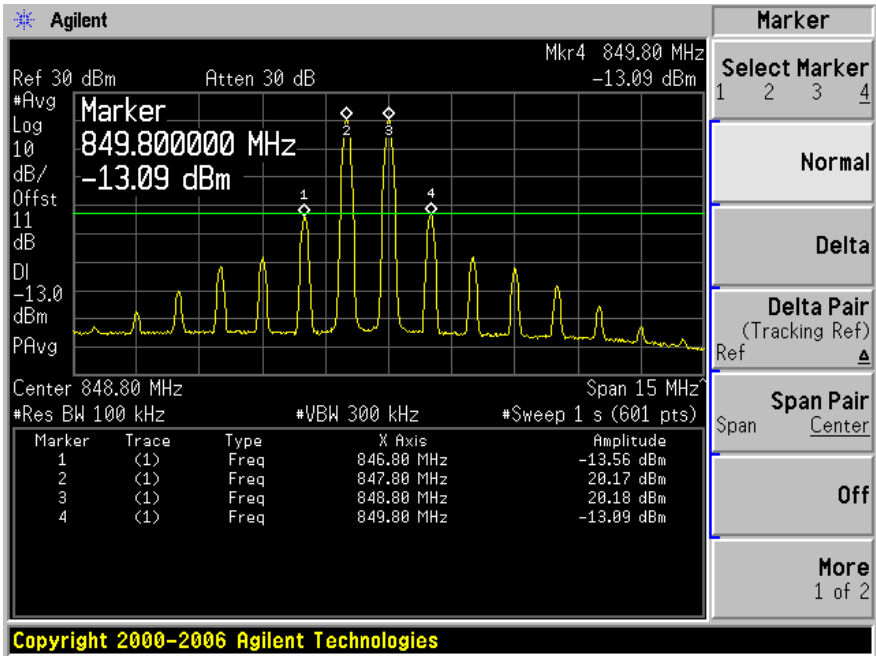
GSM/EDGE Cellular Band Uplink, Low Channel: 824.2 MHz:



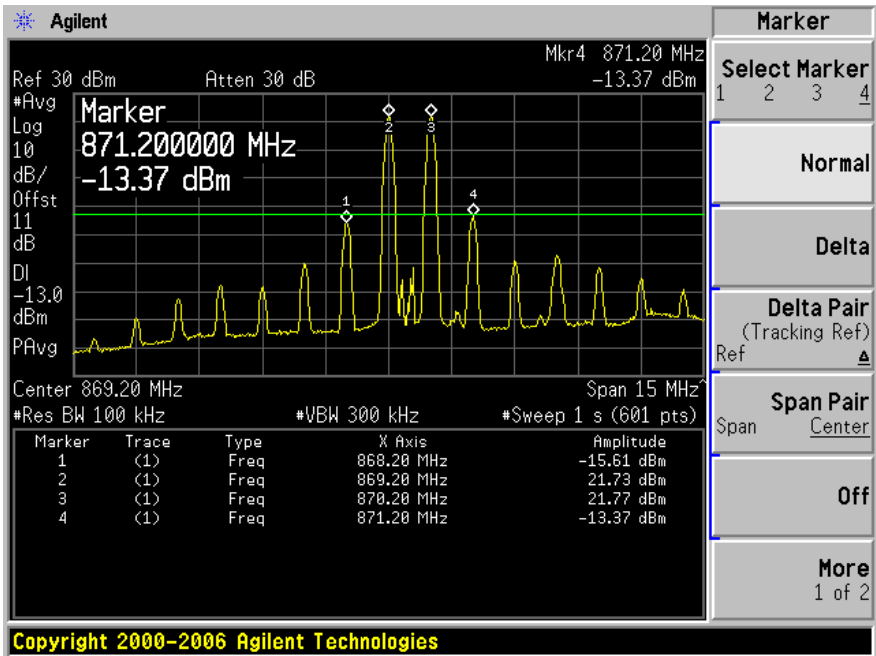
GSM/EDGE Cellular Band Uplink, Middle Channel: 836.6 MHz:



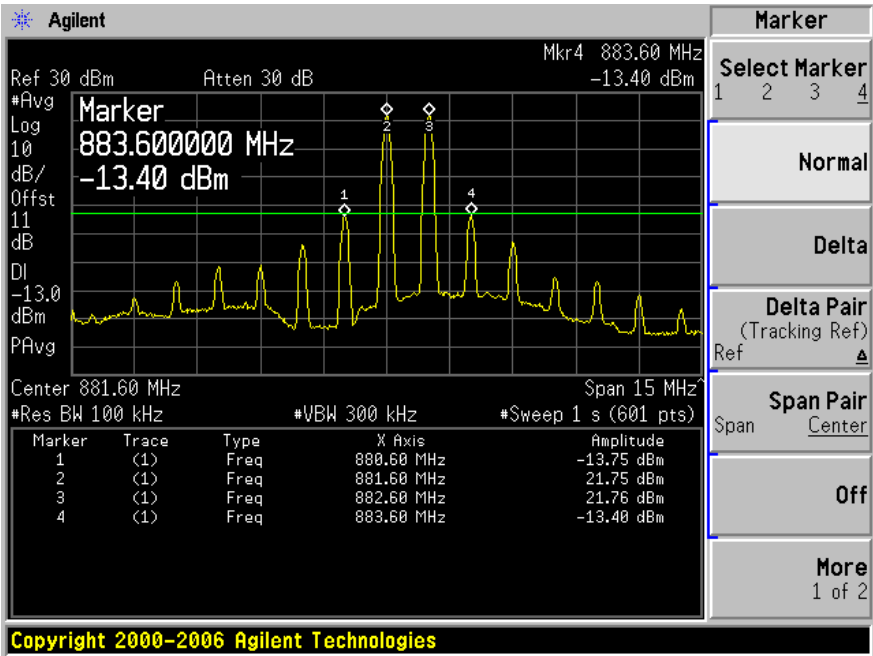
GSM/EDGE Cellular Band Uplink, High Channel: 848.8 MHz:



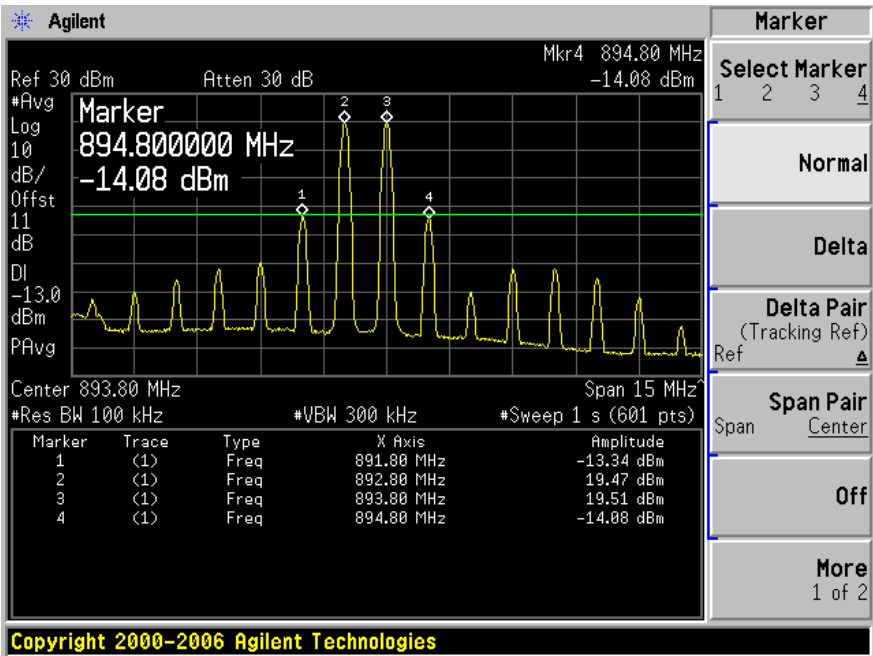
GSM/EDGE Cellular Band Downlink, Low Channel: 869.2 MHz:



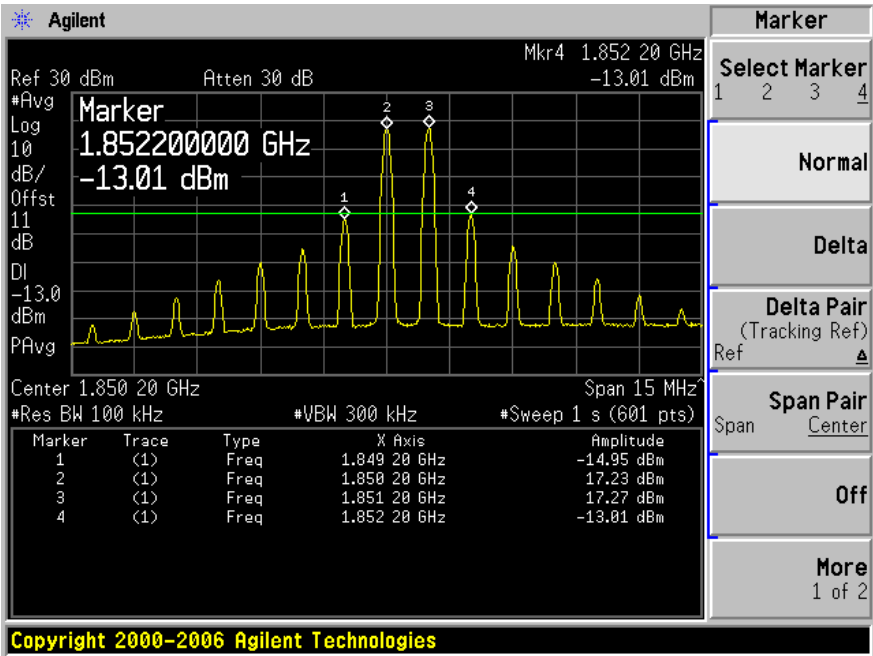
GSM/EDGE Cellular Band Downlink, Middle Channel: 881.6 MHz:



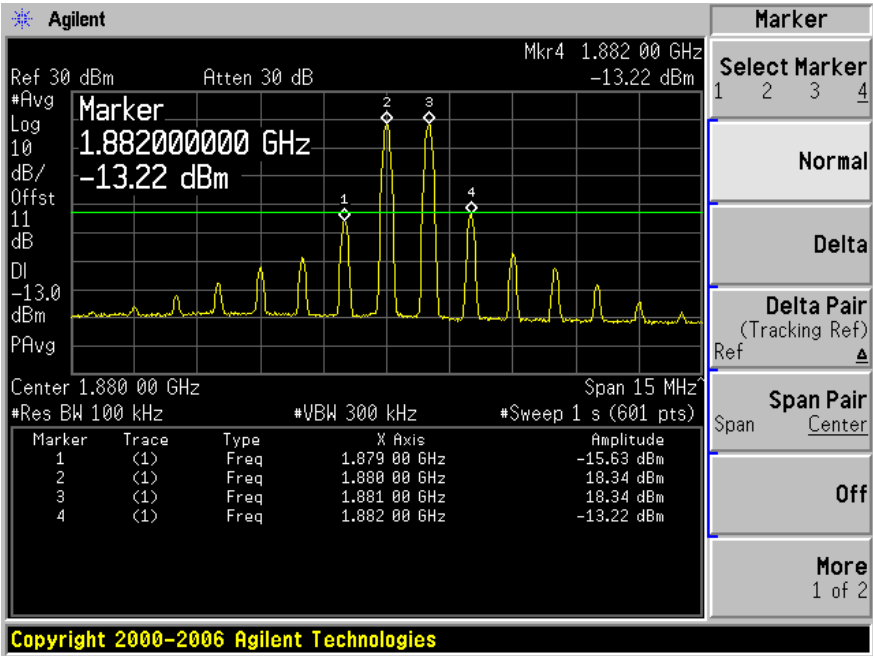
GSM/EDGE Cellular Band Downlink, High Channel: 893.8 MHz:



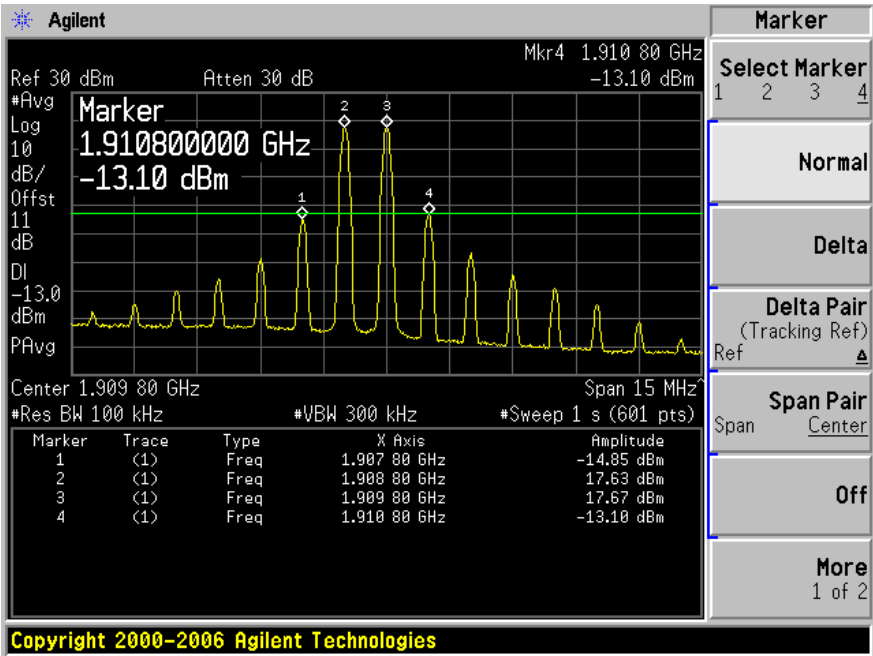
GSM/EDGE PCS Band Uplink, Low Channel: 1850.2 MHz:



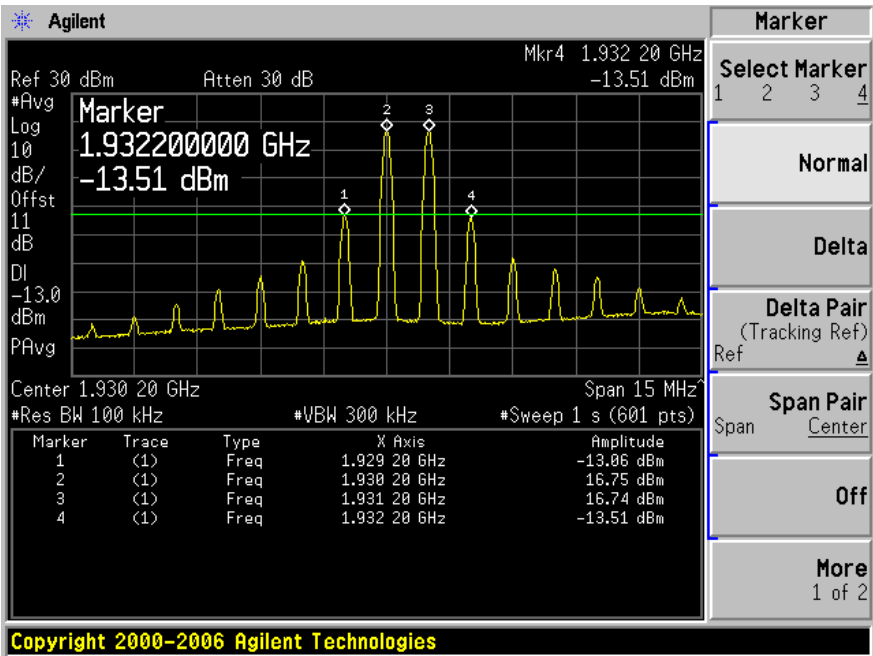
GSM/EDGE PCS Band Uplink, Middle Channel: 1880 MHz:



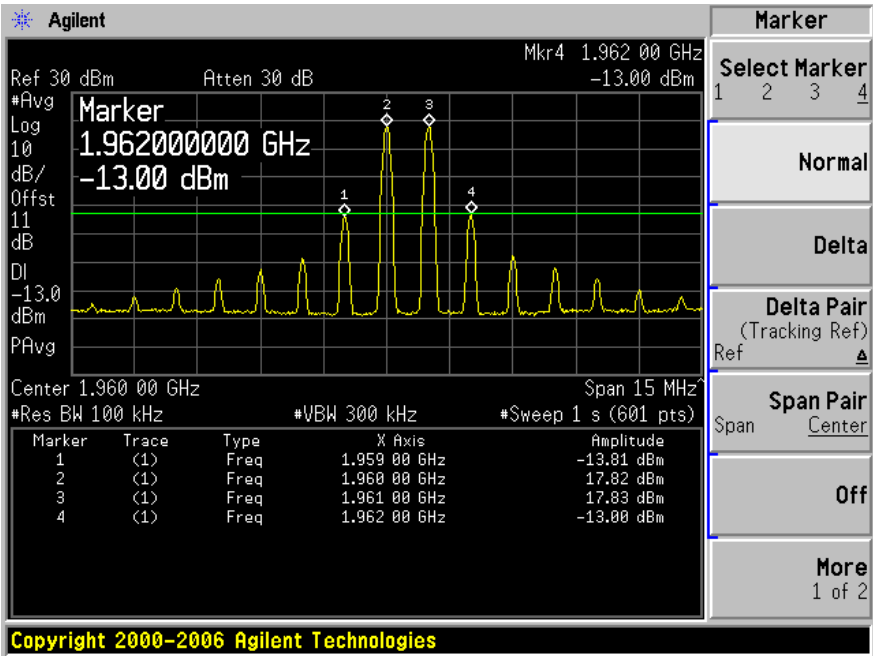
GSM/EDGE PCS Band Uplink, High Channel: 1909.8 MHz:



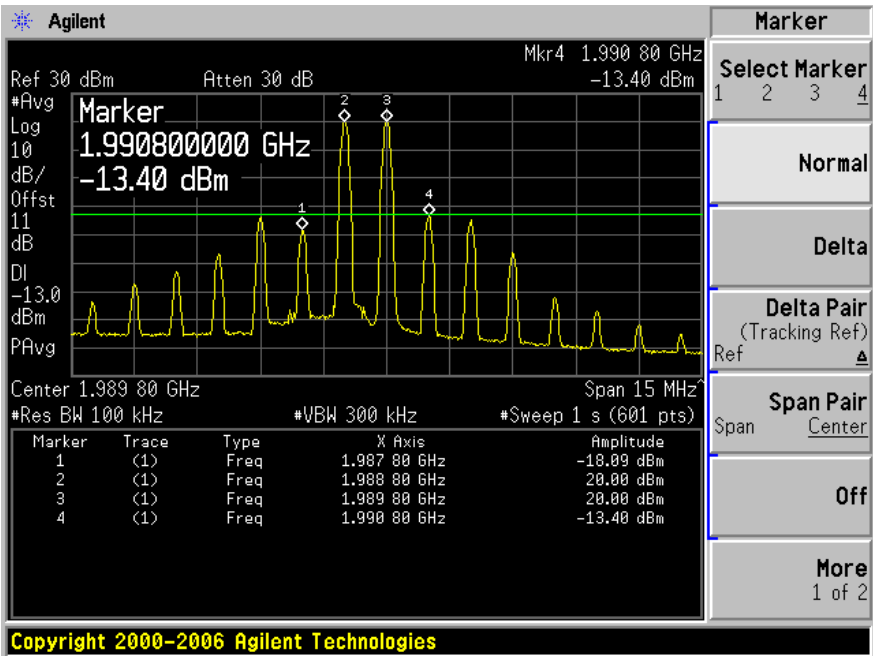
GSM/EDGE PCS Band Downlink, Low Channel: 1930.2 MHz:



GSM/EDGE PCS Band Downlink, Middle Channel: 1960 MHz:



GSM/EDGE PCS Band Downlink, High Channel: 1989.8 MHz:



9 FCC §22.917 & §24.238 – BAND EDGE

9.1 Applicable Standard

According to FCC §22.917 and §24.238, 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.

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 Environmental Conditions

Uplink

Temperature:	20-24 °C
Relative Humidity:	35-47 %
ATM Pressure:	101-103kPa

* The testing was performed by Dennis Huang from 2010-04-15 to 2010-04-28 in RF Site.

Downlink

Temperature:	20-22 °C
Relative Humidity:	50-55 %
ATM Pressure:	99-102kPa

* The testing was performed by Dennis Huang from 2010-06-03 to 2010-06-04 in RF Site.

9.4 Test Equipment List and Details

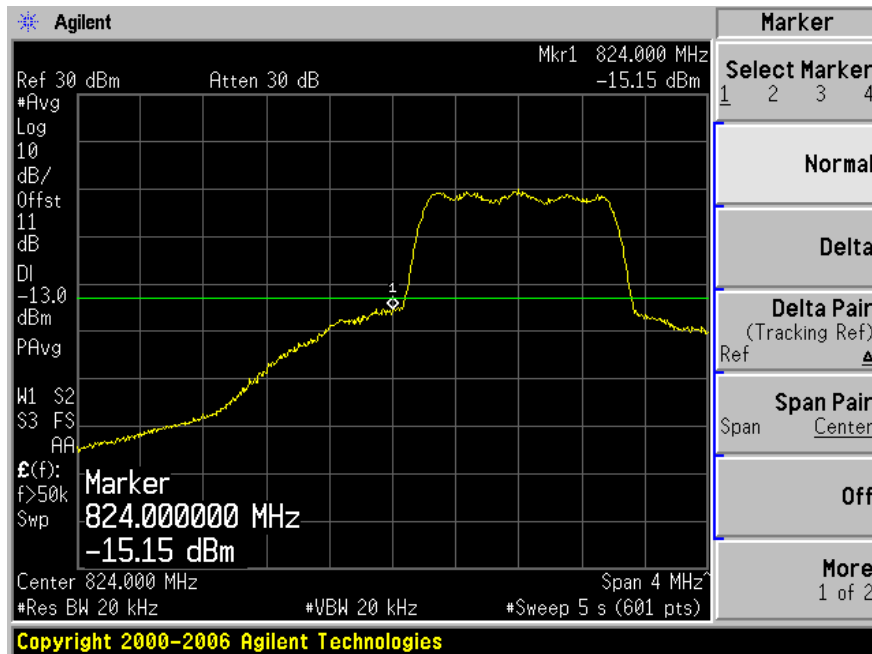
Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Agilent	Spectrum Analyzer	E4440A	US45303156	2009-007-23
HP	Signal Generator	8648C	3426A00417	2009-07-23
R & S	Signal Generator	SMIQ03	849192/0085	2010-03-31

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

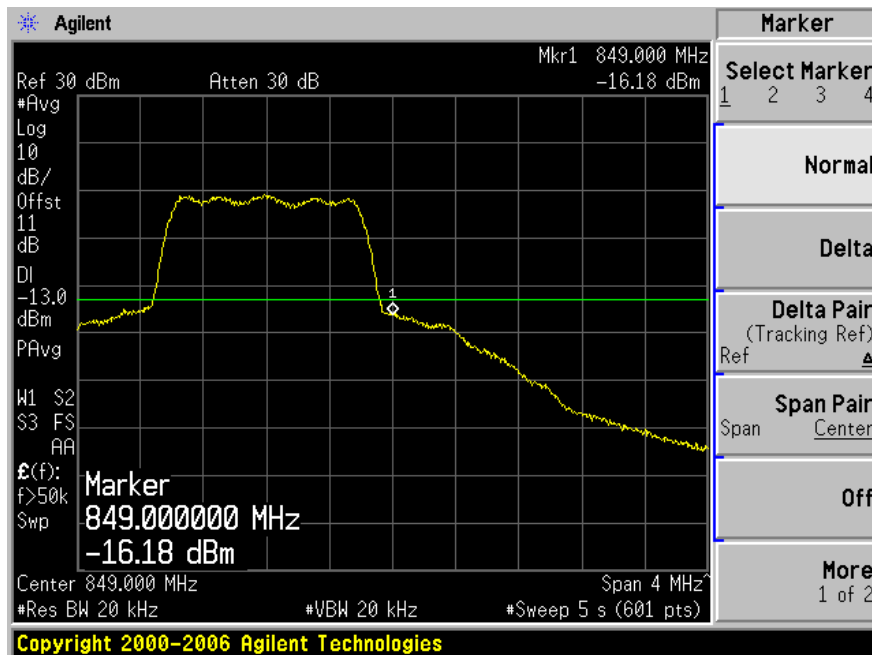
9.5 Test Results

Please refer to the following plots.

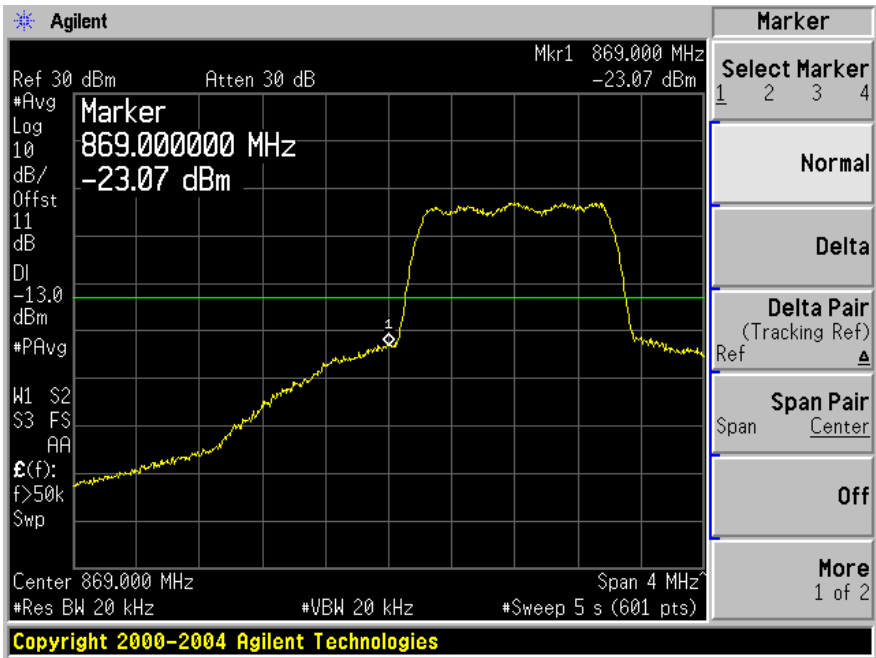
CDMA/EVDO Cellular Band Uplink: Lowest Channel



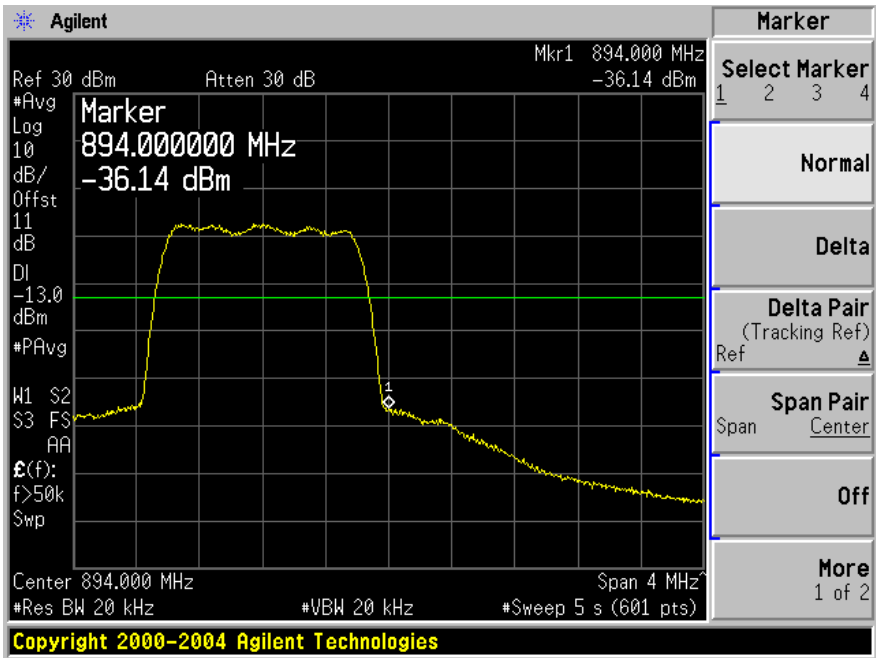
CDMA/EVDO Cellular Band Uplink: Highest Channel



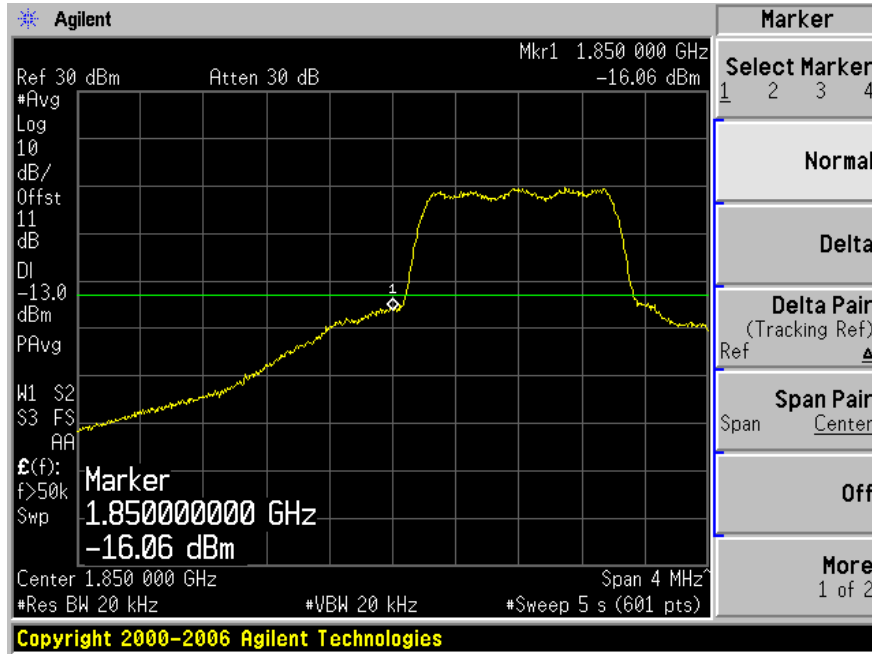
CDMA/EVDO Cellular Band Downlink: Lowest Channel



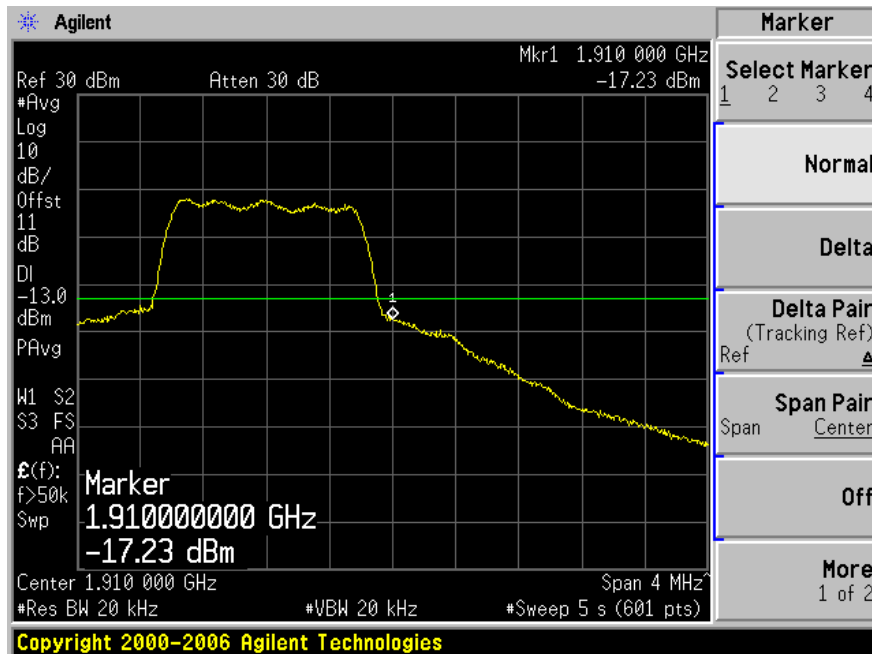
CDMA/EVDO Cellular Band Downlink: Highest Channel



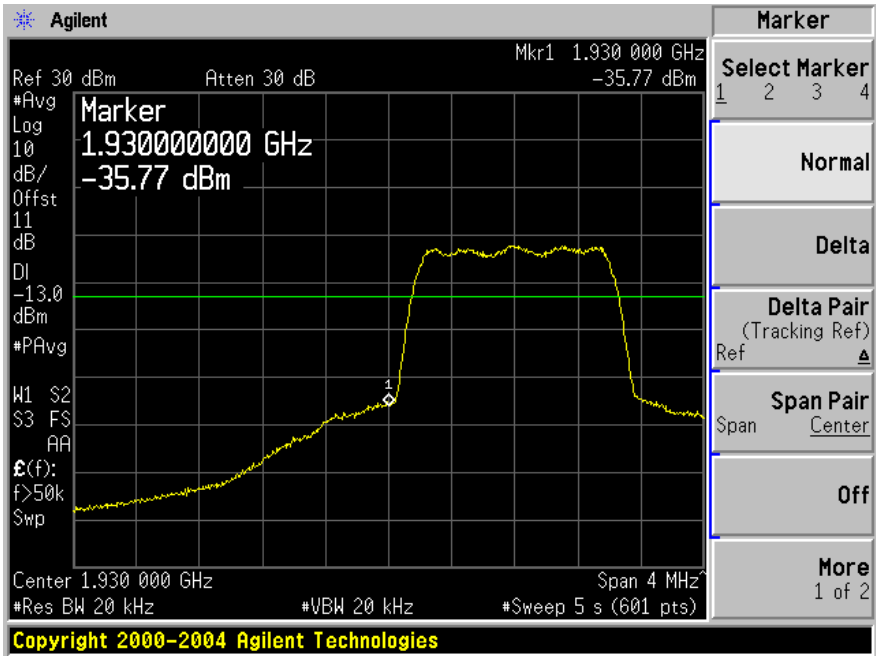
CDMA/EVDO PCS Band Uplink: Lowest Channel



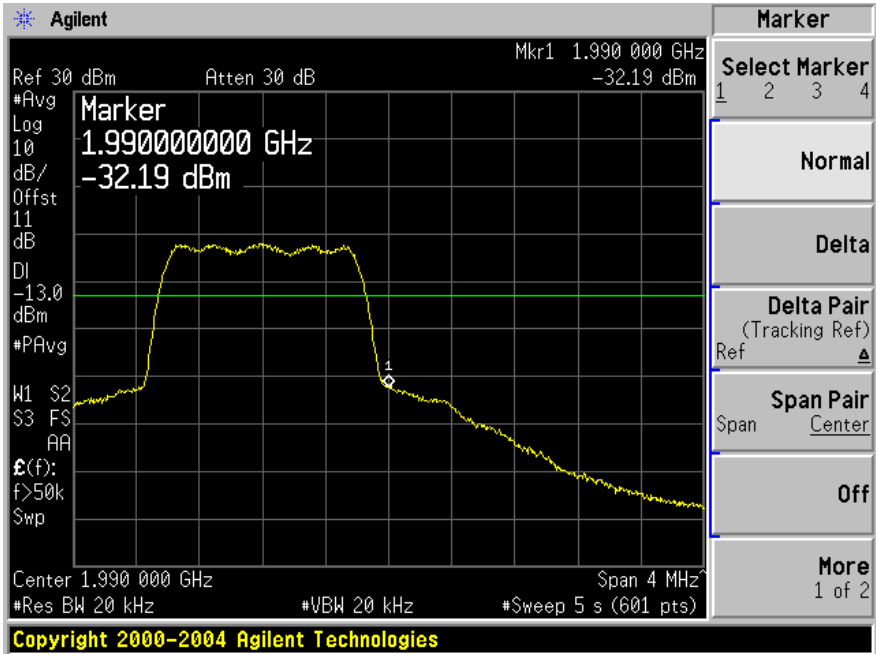
CDMA/EVDO PCS Band Uplink: Highest Channel



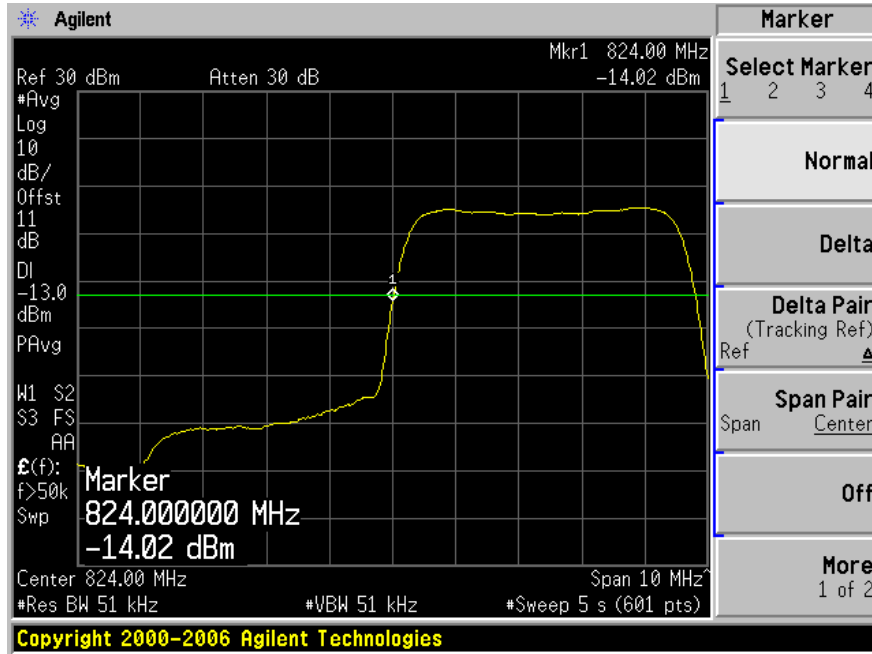
CDMA/EVDO PCS Band Downlink: Lowest Channel



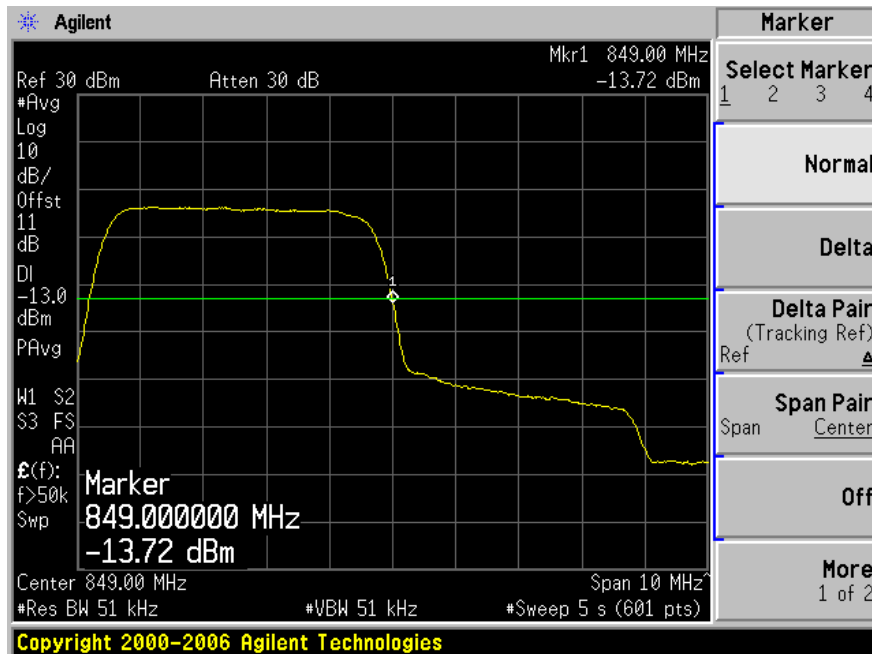
CDMA/EVDO PCS Band Downlink: Highest Channel



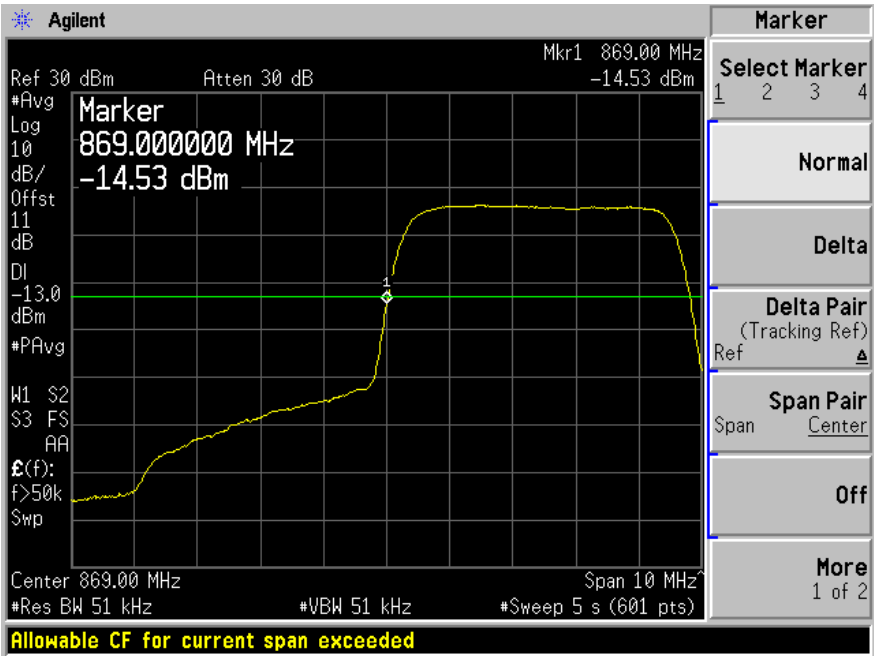
WCDMA/HSPA Cellular Band Uplink: Lowest Channel



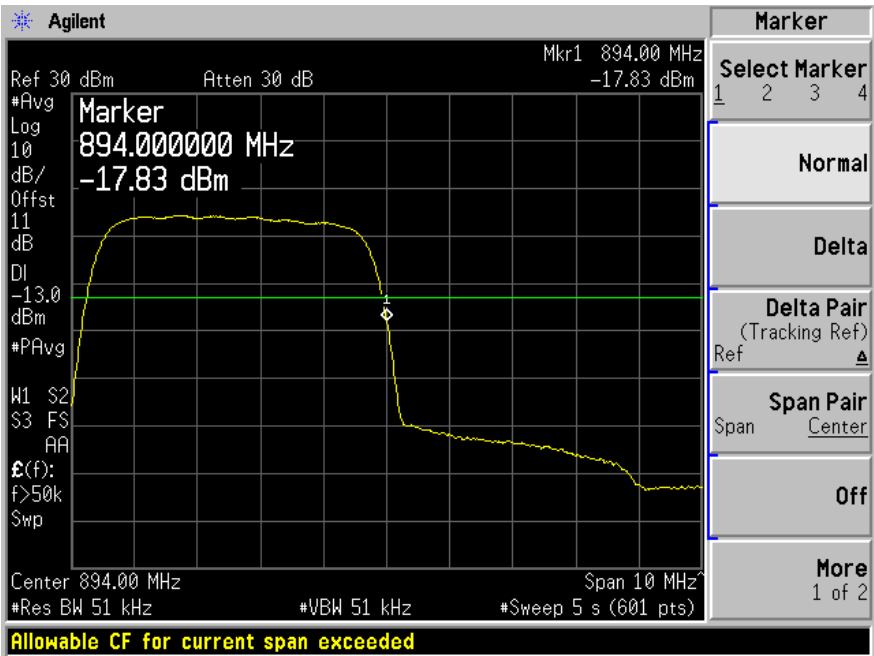
WCDMA/HSPA Cellular Band Uplink: Highest Channel



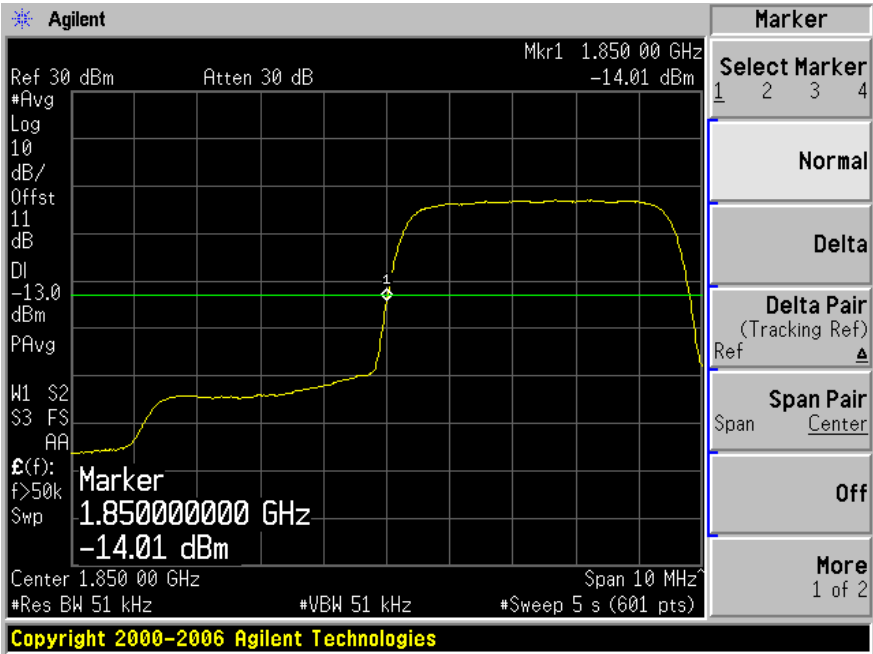
WCDMA/HSPA Cellular Band Downlink: Lowest Channel



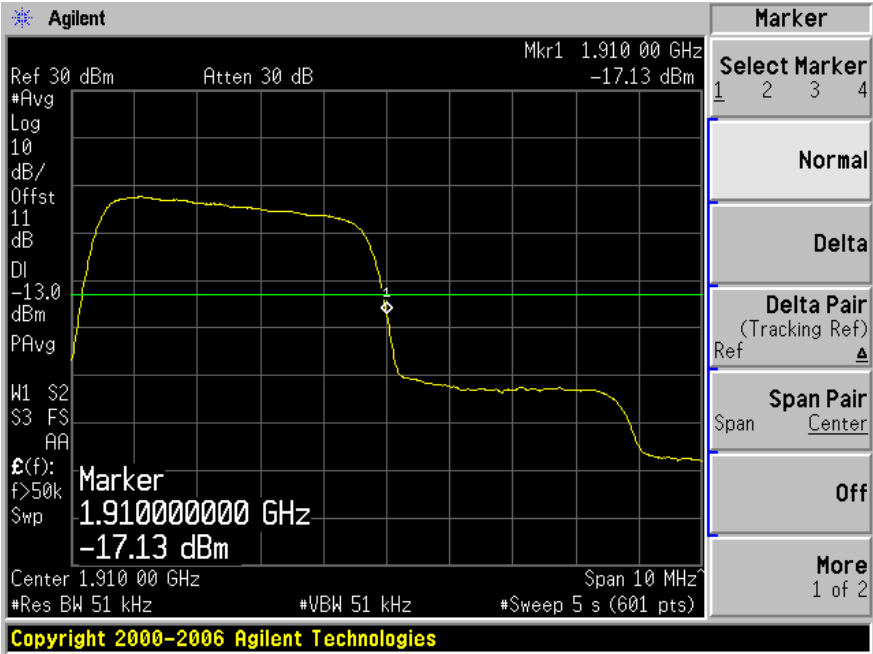
WCDMA/HSPA Cellular Band Downlink: Highest Channel



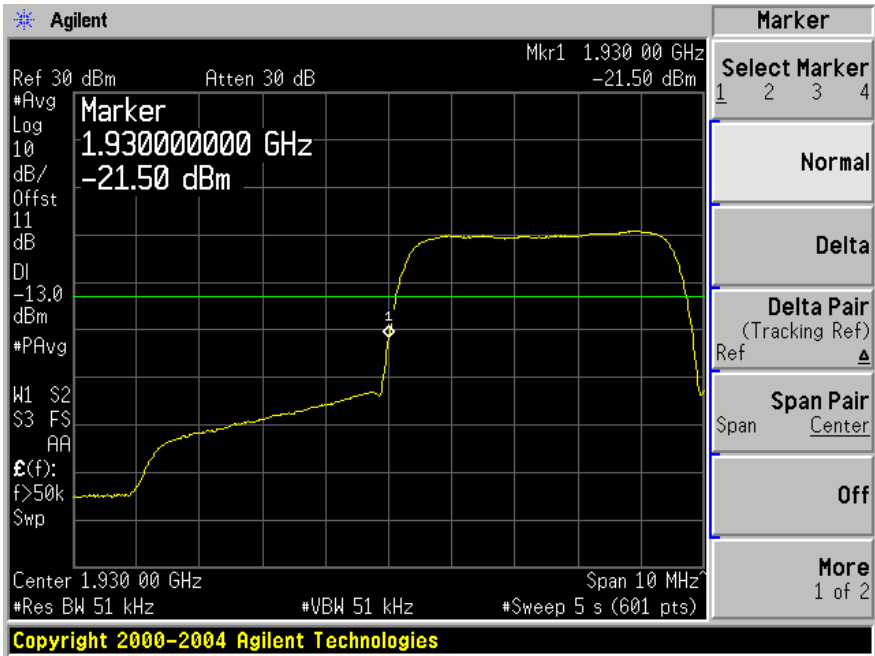
WCDMA/HSPA PCS Band Uplink: Lowest Channel



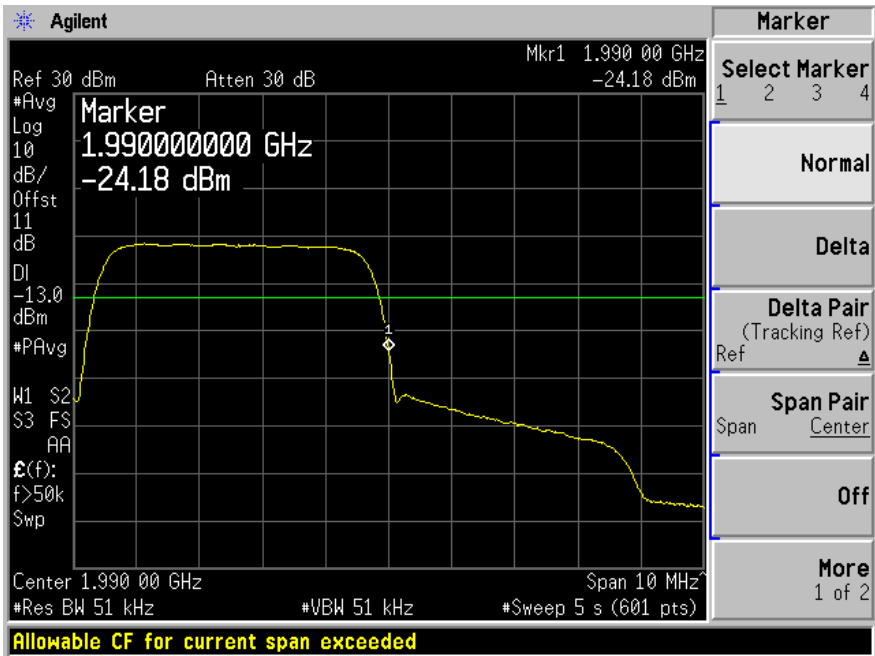
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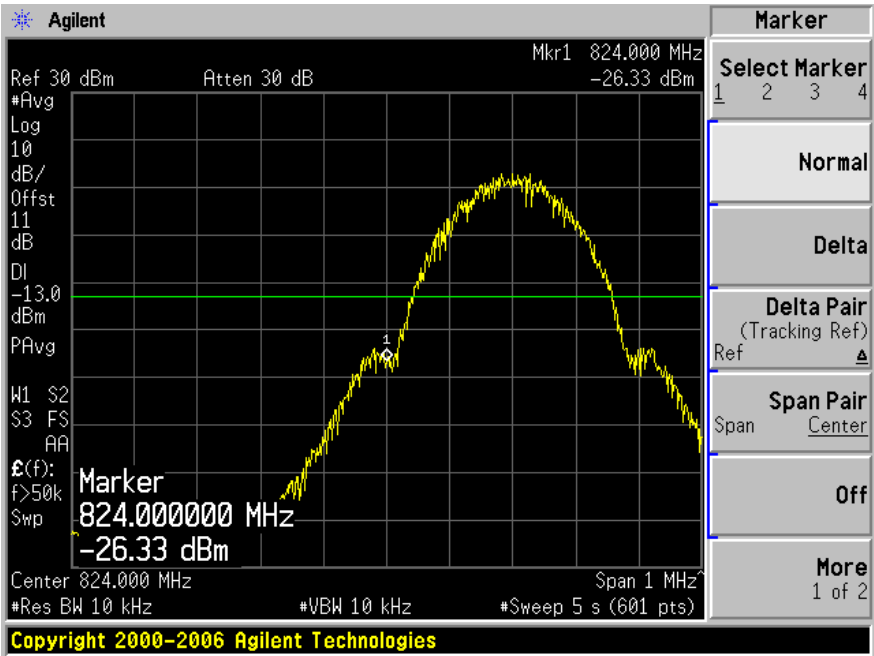
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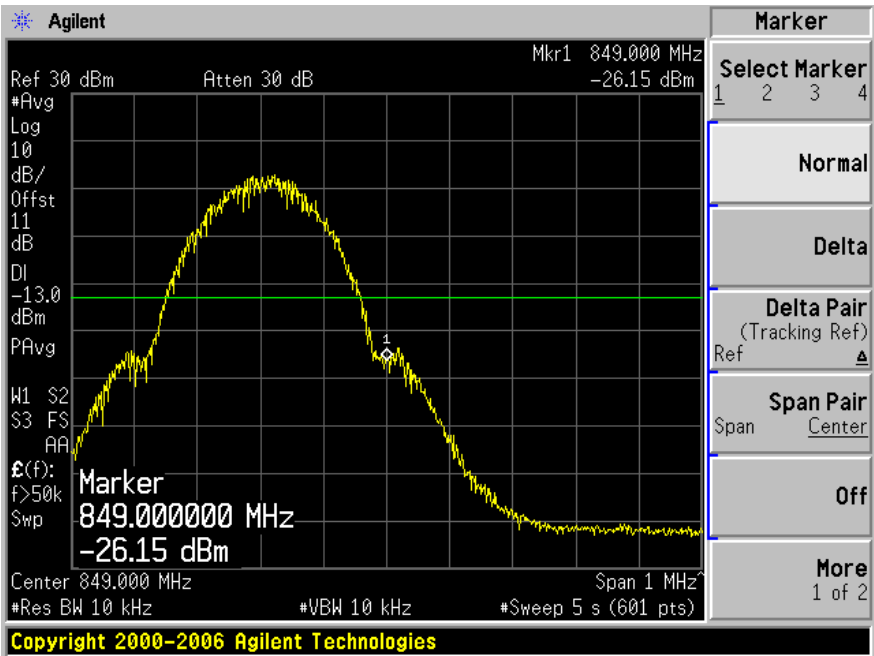
WCDMA/HSPA PCS Band Downlink: Highest Channel



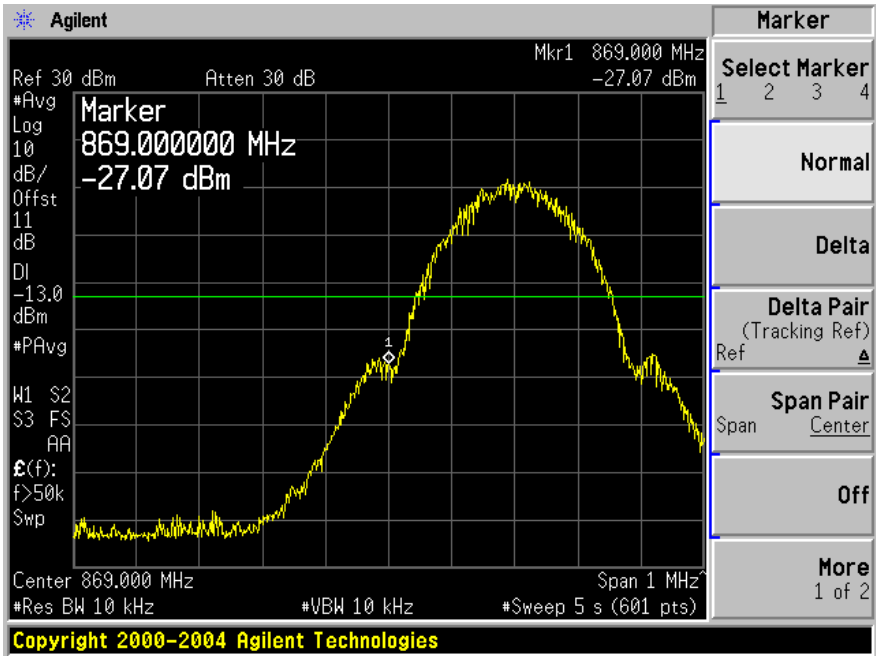
GSM Cellular Band Uplink: Lowest Channel



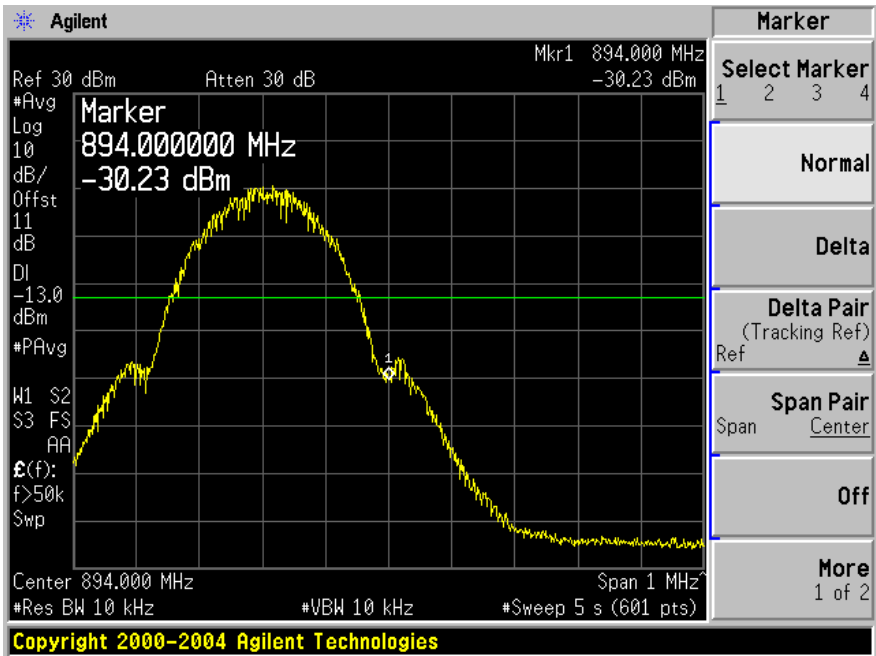
GSM Cellular Band Uplink: Highest Channel



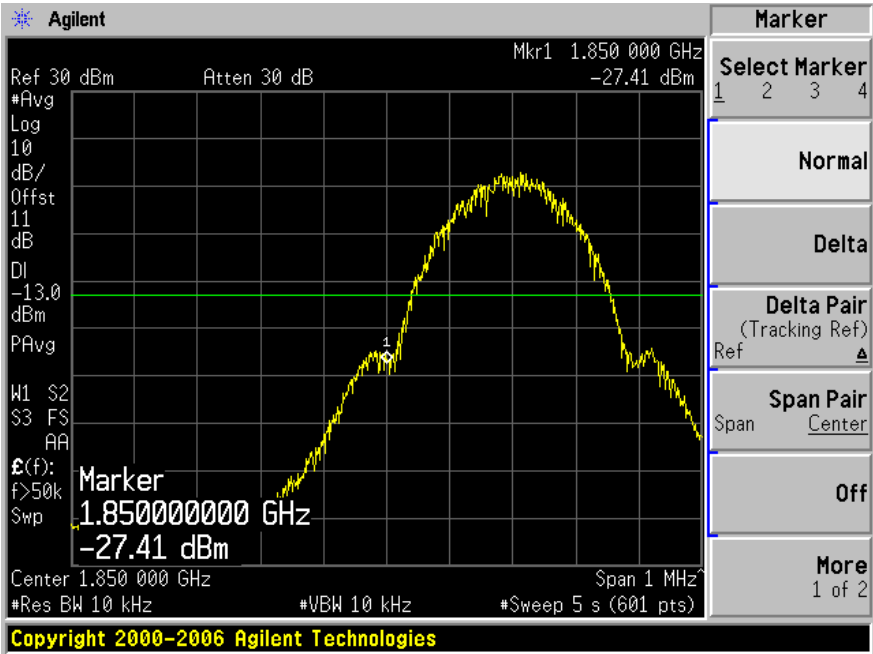
GSM Cellular Band Downlink: Lowest Channel



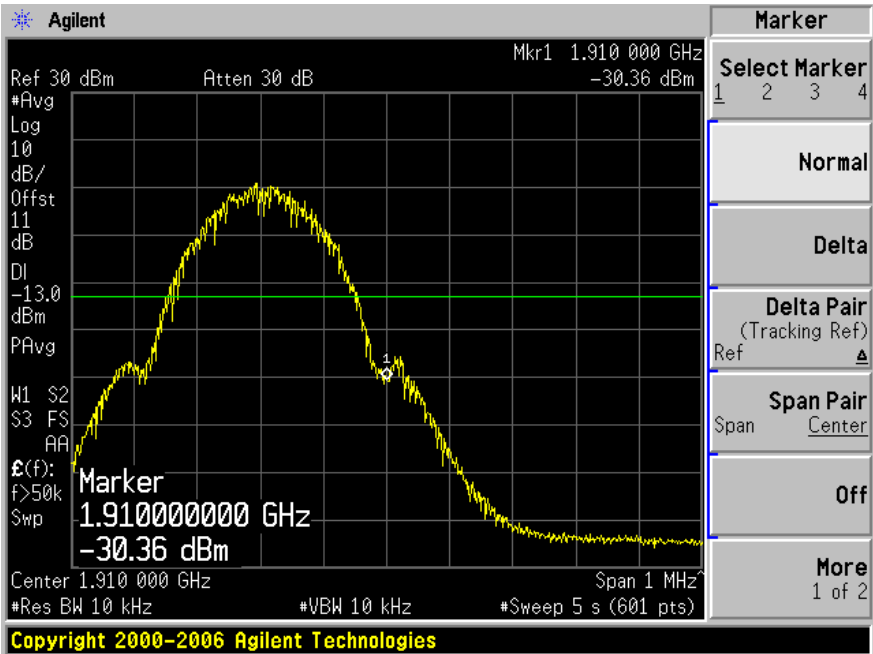
GSM Cellular Band Downlink: Highest Channel



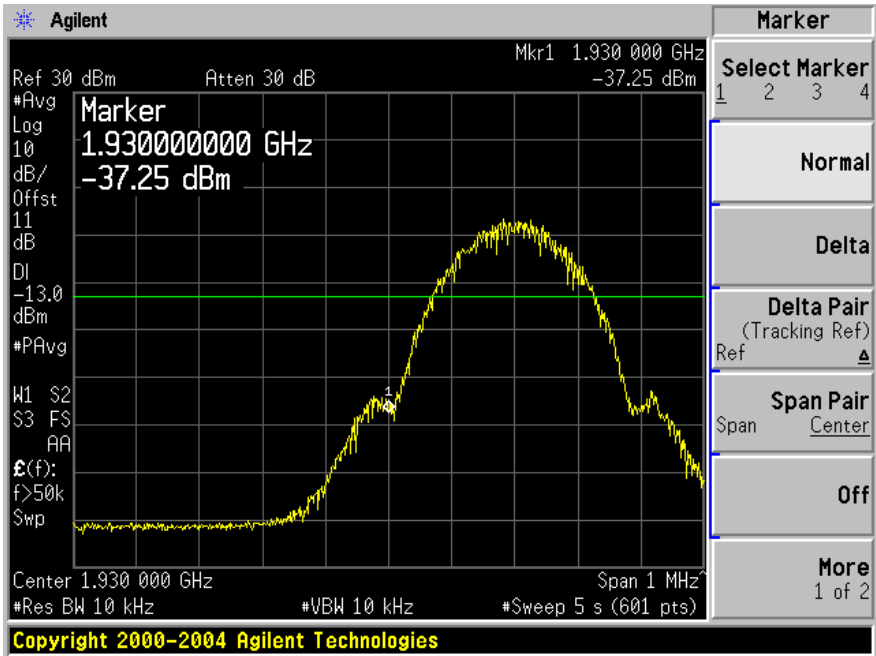
GSM PCS Band Uplink: Lowest Channel



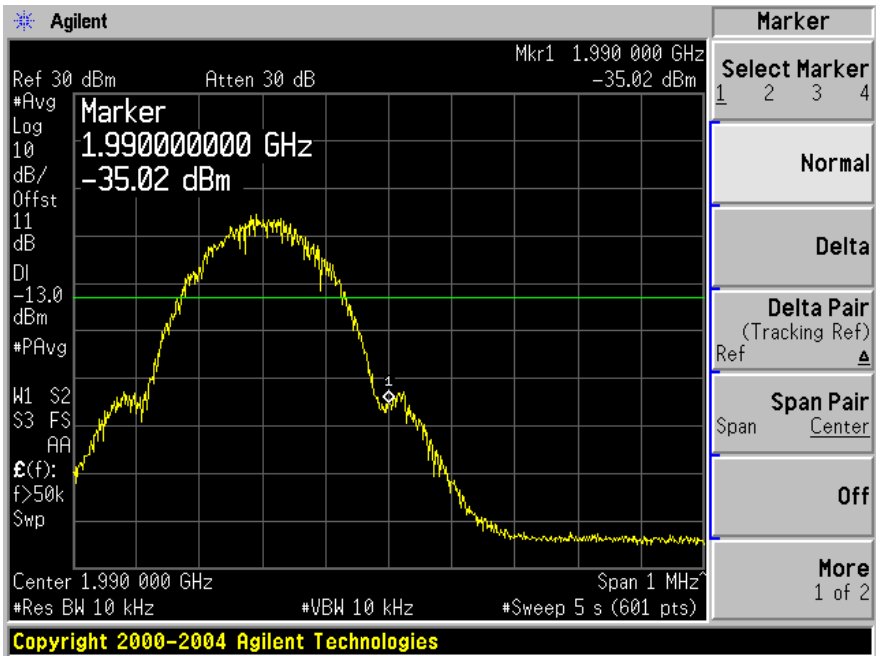
GSM PCS Band Uplink: Highest Channel



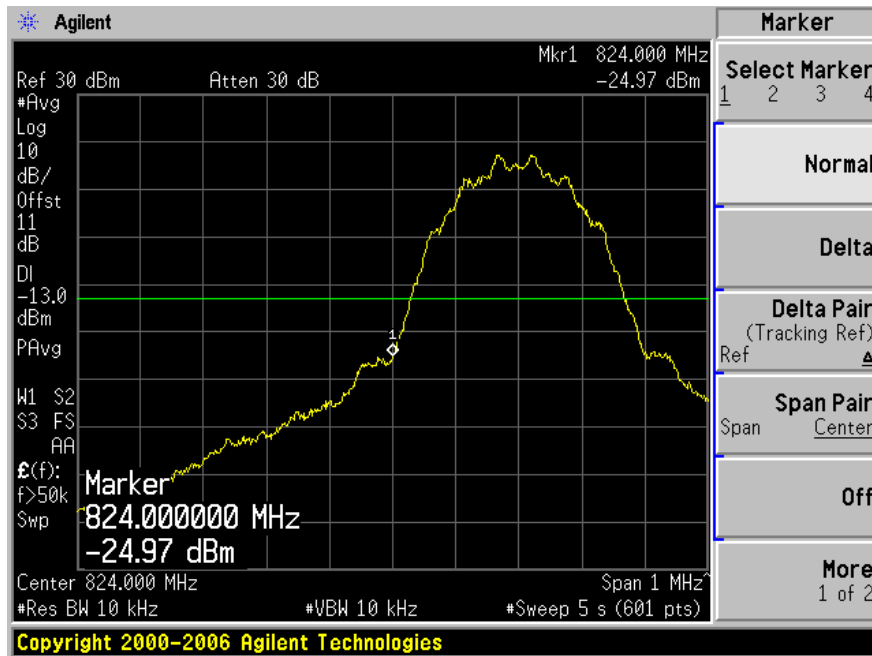
GSM PCS Band Downlink: Lowest Channel



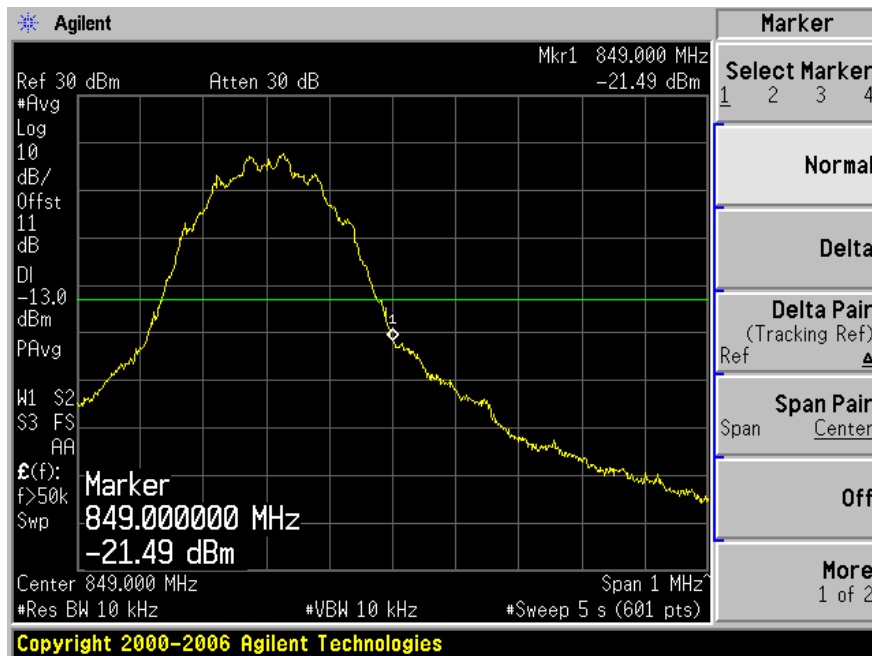
GSM PCS Band Downlink: Highest Channel



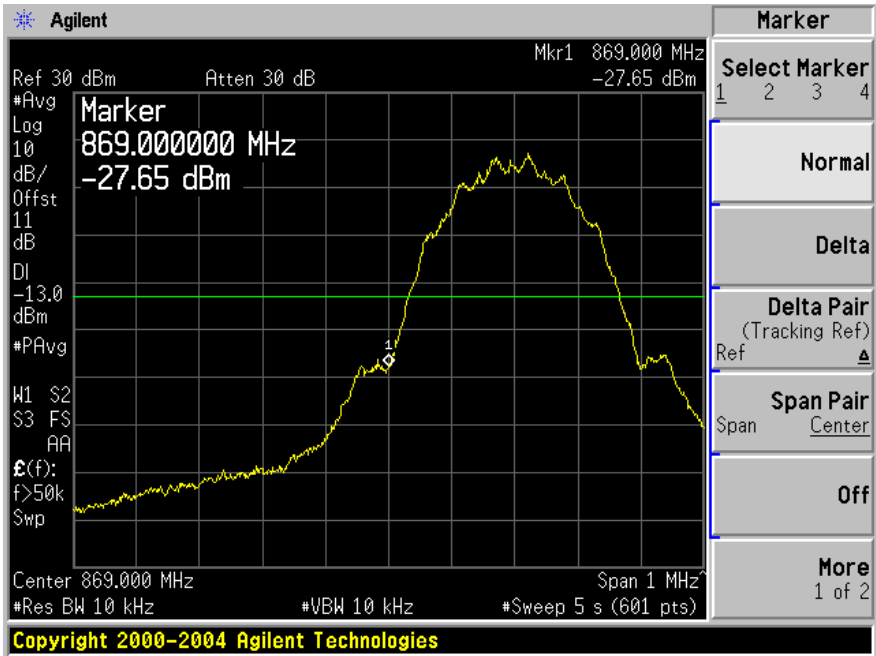
EDGE Cellular Band Uplink: Lowest Channel



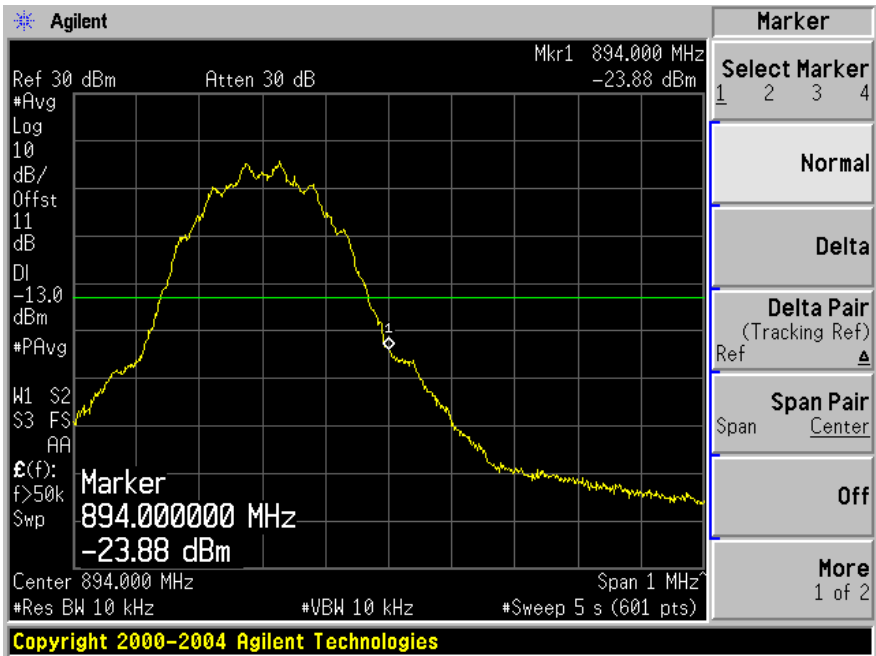
EDGE Cellular Band Uplink: Highest Channel



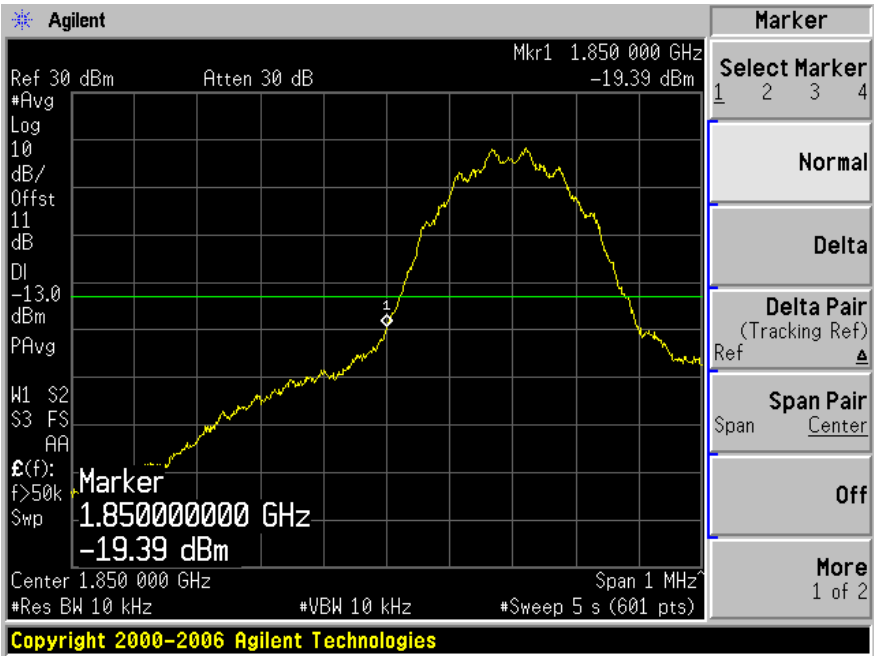
EDGE Cellular Band Downlink: Lowest Channel



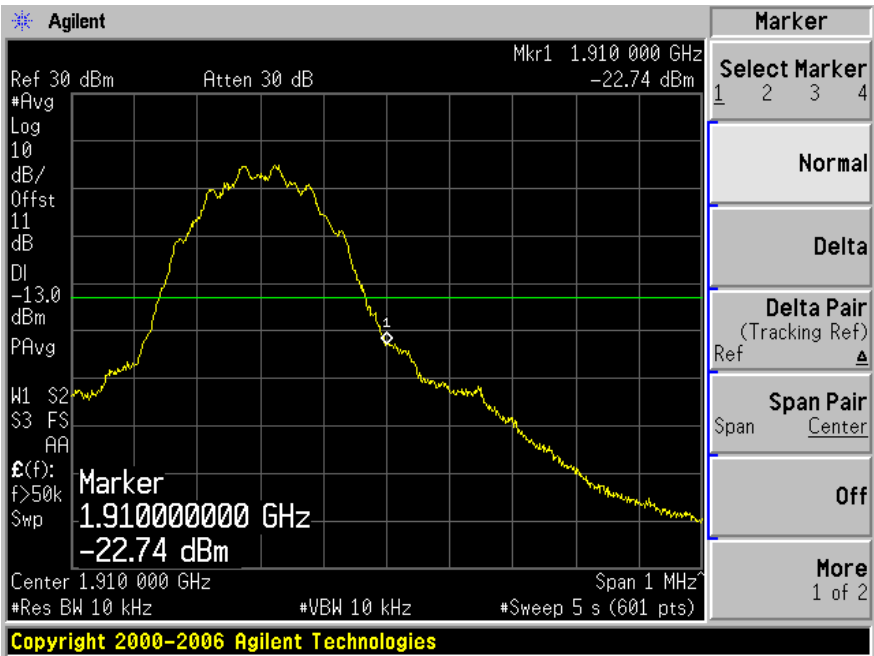
EDGE Cellular Band Downlink: Highest Channel



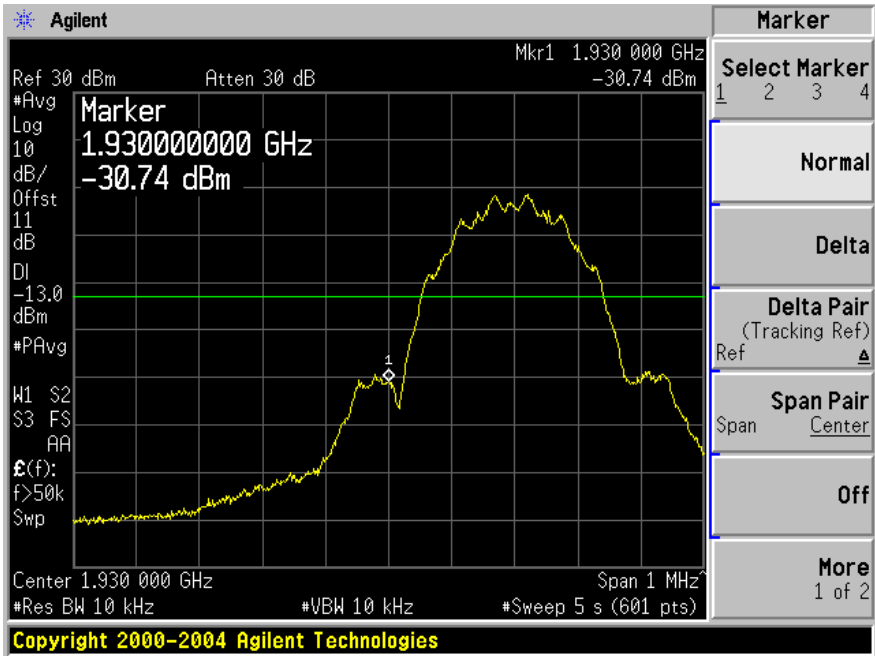
EDGE PCS Band Uplink: Lowest Channel



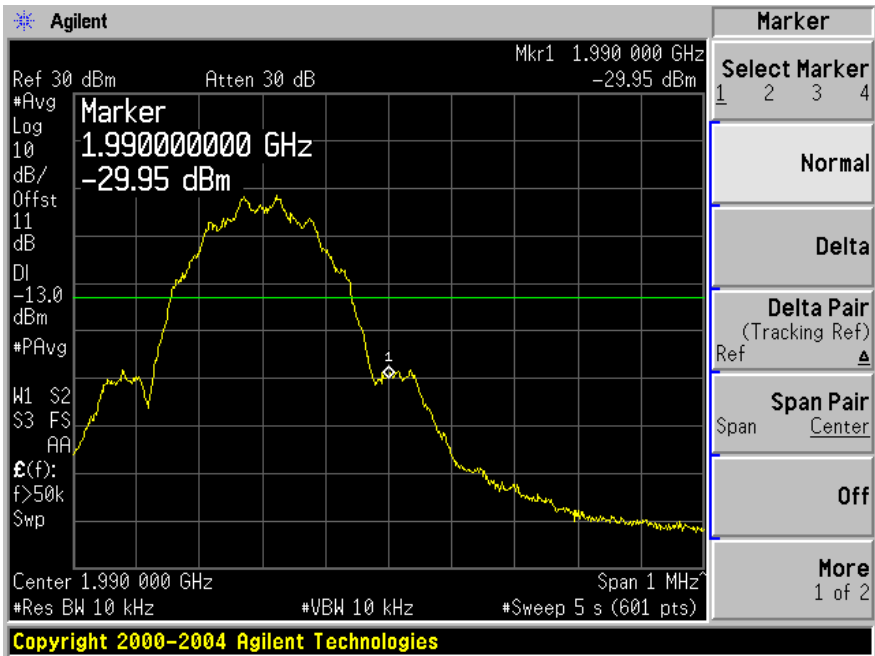
EDGE PCS Band Uplink: Highest Channel



EDGE PCS Band Downlink: Lowest Channel



EDGE PCS Band Downlink: Highest Channel



10 FCC §2.1055 – FREQUENCY STABILITY

This EUT is an amplifier, 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

11.1 Applicable Standard

According to §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

Test Result

Please see the following MPE calculation for details.

Cellular Band Outside:

Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	824
Pout Watts	1.20200
Duty Cycle Percent	100.0%
Ant. Gain dBi	15.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	29.21
Min. Distance Centimeters	74.20
ERP (Watts)	23.1772
EIRP (Watts)	38.0106

REFERENCE DATA

Pout dBm	30.80
FCC Limit (mW/cm ²)	1/1500
Calculated limit (mW/cm ²)	0.55

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas and fixed inside antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances and fixed indoor antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas.
- (5) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (FCC rules §24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	271265
Frequency Band (MHz)	800
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss does not exceed 15 dBi
Safe Distance (Inches):	30 inches
Signature:	<i>Richard M. Shaw</i>
Date:	April 28, 2010

4/30/2010, 5:39 PM

271265 MPE 800 Outside.xls

Cellular Band Inside:



Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	800
Pout Watts	0.39450
Duty Cycle Percent	100.0%
Ant. Gain dBi	7.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	6.49
Min. Distance Centimeters	16.48
ERP (Watts)	1.2056
EIRP (Watts)	1.9772

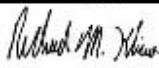
REFERENCE DATA

Pout dBm	25.96
FCC Limit (mw/cm ²)	f/1500
Calculated limit (mw/cm ²)	0.58

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas and fixed inside antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances and fixed indoor antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas.
- (5) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (FCC rules §24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	271265
Frequency Band (MHz)	800
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Inside
Antenna Type:	Any antenna whose gain less cable losses does not exceed 7 dBi
Safe Distance (inches):	8.00
Signature:	
Date:	June 9, 2010

6/9/2010, 11:22 AM

271265 MPE 800 Fixed Inside.xls

PCS Band Outside:



Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1850
Pout Watts	1.11400
Duty Cycle Percent	100.0%
Ant. Gain dBi	15.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	20.85
Min. Distance Centimeters	52.95
ERP (Watts)	21.4803
EIRP (Watts)	35.2278

REFERENCE DATA

Pout dBm	30.47
FCC Limit (mW/cm ²)	1.00
Calculated limit (mW/cm ²)	1.00

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas and fixed inside antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances and fixed indoor antenna distances shall be no less than 6 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas.
- (5) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (FCC rules §24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	271265
Frequency Band (MHz)	1900
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Outside
Antenna Type:	Any antenna whose gain less cable loss does not exceed 15 dBi
Safe Distance (Inches):	30 inches
Signature:	<i>Richard M. Xhina</i>
Date:	April 28, 2010

4/30/2010, 5:42 PM

271265 MPE 1900 Outside.xls

PCS Band Inside:



Minimum Safe Distance From Antennas

Based upon FCC OET Bulletin 65 and other FCC Sources

INPUT DATA

Frequency MHz	1930
Pout Watts	0.32900
Duty Cycle Percent	100.0%
Ant. Gain dBi	10.00
Coax Loss dB	0.00

RESULTS OF CALCULATIONS

Min. Distance Inches	8.37
Min. Distance Centimeters	16.18
ERP (Watts)	2.0061
EIRP (Watts)	3.2900

REFERENCE DATA

Pout dBm	25.17
FCC Limit (mw/cm ²)	1.00
Calculated limit (mw/cm ²)	1.00

NOTES:

- (1) Valid only between 300 MHz - 100,000 MHz.
- (2) Calculations are sufficient for determining antenna safe distance for mobile antennas and fixed inside antennas provided that calculated ERP < 1.5 watts for frequencies equal to or below 1.5 GHz, and calculated ERP < 3 watts for frequencies above 1.5 GHz.
- (3) Mobile antenna distances and fixed indoor antenna distances shall be no less than 8 inches.
- (4) There are no predefined ERP and distance limitations for fixed outside (building) antennas.
- (5) Mobile/portable stations are limited to 2 watts EIRP peak power in the 1900 MHz band (FCC rules §24.232[c]).

SUMMARY FOR PUBLICATION

For Amplifier Model Number:	271265
Frequency Band (MHz)	1900
Mobile or Fixed?	Fixed
Outside or Inside Antenna?	Inside
Antenna Type:	Any antenna whose gain less cable losses does not exceed 10 dBi
Safe Distance (inches):	8.00
Signature:	
Date:	June 9, 2010

6/9/2010, 11:24 AM

271265 MPE 1900 Fixed Inside.xls