Lab Code: 200167-0

FCC PART 22H, 24E

TEST AND MEASUREMENT REPORT

For

Cellphone-Mate, Inc.

48820 Kato Road, Suite 300B,

Fremont, CA 94539, USA

FCC ID: RSNDUAL-75UNDER

Report Type:	**Product Type:**
Original Report	Universal Building Repeater

Test Engineer: Dennis Huang

Report Number: R1001151-2224

Report Date: 2010-05-12

Victor Zhang

Reviewed By: Test Engineer, Lead

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1001151-2224	Original Report	2010-05-12

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

The *Cellphone-Mate Inc*. product, *CM2020 68dB*, FCC ID: RSNDUAL-75UNDER or the "EUT" as referred to in this report, is a Universal Building Repeater with N female type antenna connector 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
- Modulation: CDMA, GSM
- Power Source: Input: 110V/60Hz; Output: DC 9V

1.2 Mechanical Description

The EUT dimension is approximately 184mm (L) x 187 mm (W) x 51 mm (H) and weighs approximately 2140g.

** The test data gathered are from typical production sample, serial number: R1001, provided by BACL.*

1.3 Objective

This type approval report is prepared on behalf of Cellphone-Mate, 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 - Public Mobile Services
Part 24 Subpart E - PCS

Applicable Standards: TIA EIA 98-C, 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 Power Supply and Line Filters

Manufacturer	Description	Model	Serial Number
Oriental Hero ELE. FTY.	AC/DC Switch Adapter	OH-1048A0904000U-U	0819

2.5 Internal Configuration

Manufacturer	Description	Model	Serial Number
Cellphone-Mate Inc.	PCB Board	CM2000-65 WL V1.0	-

2.6 Interface Ports and Cabling

Cable Description	Length (m)	From	To
RF cable	< 3m	Signal Generator	Input/ EUT
RF cable	< 3m	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	Compliant

Note: [1]According to FCC §2.1047(d) and part 22H, there is no specific requirement for digital modulation and no oscillator circuit, 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 §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 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	372 %
ATM Pressure:	101.7 kPa

The testing was performed by Victor Zhang on 2010-01-28 in RF site.

4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2009-03-31
Agilent	Analyzer, Spectrum	E4440A	US45303156	2009-07-23

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

Mode		Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
GSM	850 MHz Uplink	Low	824.2	18.20	66.07	500
		Middle	836.6	19.14	82.04	500
		High	848.8	18.93	78.16	500
	850 MHz Downlink	Low	869.2	18.31	67.76	500
		Middle	881.6	19.41	87.30	500
		High	893.8	17.55	56.89	500
	1900 MHz Uplink	Low	1850.2	23.76	237.68	2
		Middle	1880.0	22.51	178.24	2
		High	1909.8	20.70	117.49	2
	1900 MHz Downlink	Low	1930.2	20.55	113.50	2
		Middle	1960.0	20.73	118.30	2
		High	1989.8	20.43	110.41	2

Mode		Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mw)	Limit (Watt)
CDMA	850 MHz Uplink	Low	824.73	16.62	45.92	500
		Middle	836.40	17.33	54.08	500
		High	848.19	18.22	66.37	500
	850 MHz Downlink	Low	869.73	17.91	61.80	500
		Middle	881.40	18.20	66.07	500
		High	893.19	17.62	57.81	500
	1900 MHz Uplink	Low	1851.25	21.63	145.55	2
		Middle	1880.00	20.92	123.59	2
		High	1908.75	18.91	77.80	2
	1900 MHz Downlink	Low	1931.25	18.18	65.77	2
		Middle	1960.00	18.83	76.38	2
		High	1988.75	19.50	89.13	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 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	372 %
ATM Pressure:	101.7 kPa

The testing was performed by Victor Zhang on 2010-01-28 in RF site.

6.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2009-03-31
Agilent	Analyzer, Spectrum	E4440A	US45303156	2009-07-23

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

6.5 Test Results

Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (kHz)	Emission Bandwidth 99% (kHz)
GSM	850 MHz Uplink	Low	824.20	313.85	247.6161
		Middle	836.60	311.286	245.1355
		High	848.80	314.568	247.4952
	850 MHz Downlink	Low	869.20	313.821	244.8256
		Middle	881.60	308.597	247.2909
		High	893.80	313.644	244.8889
	1900 MHz Uplink	Low	1850.20	313.601	246.3135
		Middle	1880.00	316.284	243.8442
		High	1909.80	314.848	243.8873
	1900 MHz Downlink	Low	1930.20	317.437	246.0456
		Middle	1960.00	314.761	246.9902
		High	1989.80	310.641	246.3077

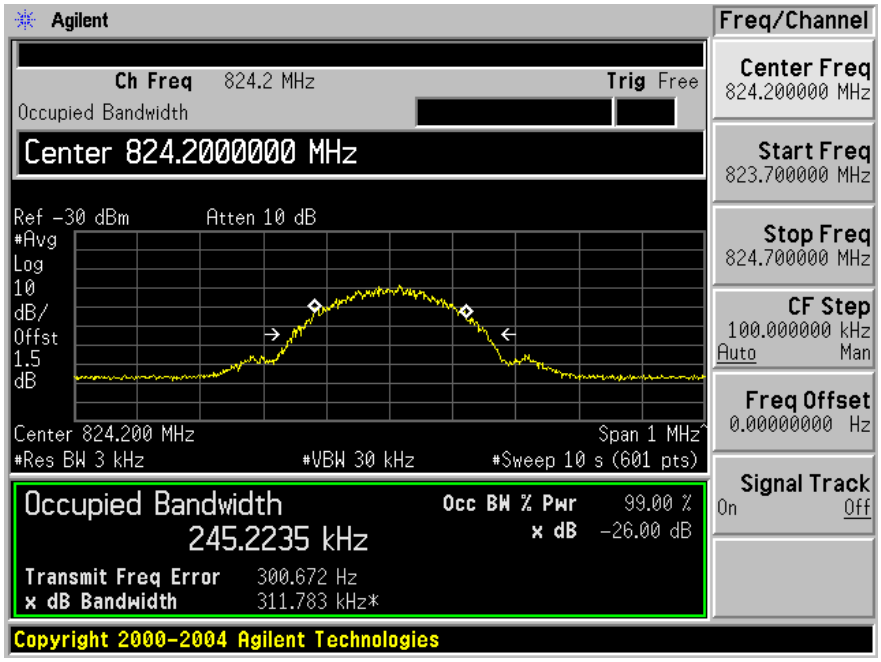
Mode		Channel	Frequency (MHz)	Emission Bandwidth 26 dB (MHz)	Emission Bandwidth 99% (MHz)
CDMA	850 MHz Uplink	Low	824.73	1.444	1.2641
		Middle	836.40	1.442	1.2632
		High	848.19	1.442	1.2656
	850 MHz Downlink	Low	869.73	1.437	1.2665
		Middle	881.40	1.439	1.2687
		High	893.19	1.442	1.2672
	1900 MHz Uplink	Low	1851.25	1.462	1.2711
		Middle	1880.00	1.444	1.2692
		High	1908.75	1.445	1.2668
	1900 MHz Downlink	Low	1931.25	1.463	1.2755
		Middle	1960.00	1.458	1.2743
		High	1988.75	1.481	1.2753

Please refer to the following plots.

GSM 850 MHz Band (Uplink)

Low Channel (824.2 MHz)

Input



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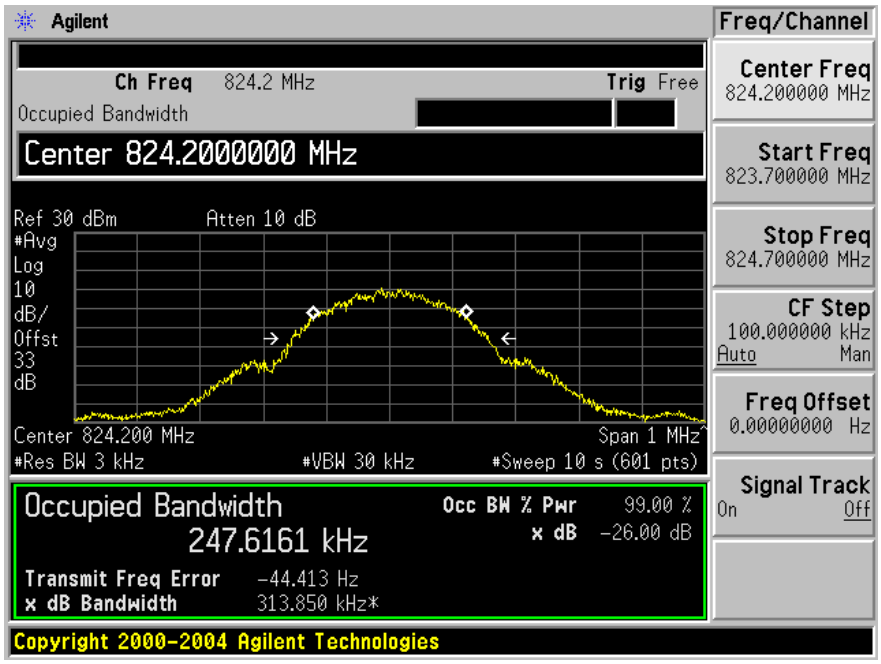
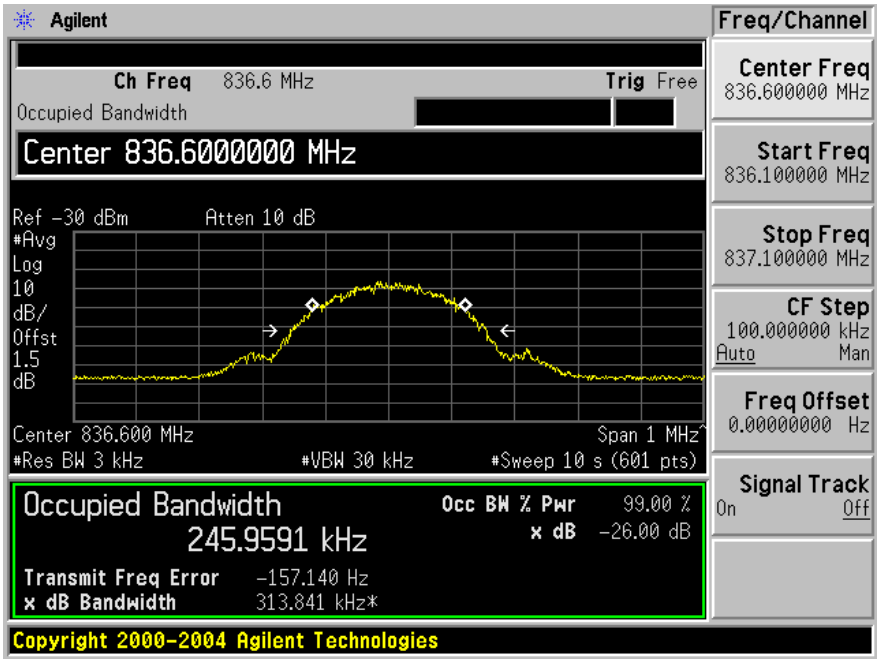


Middle Channel (836.6 MHz)

Input



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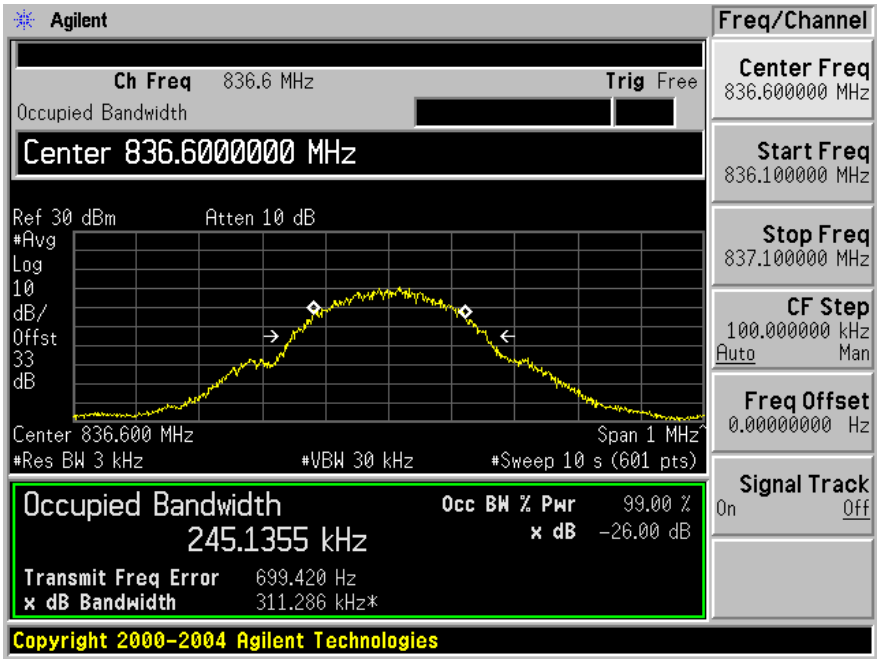
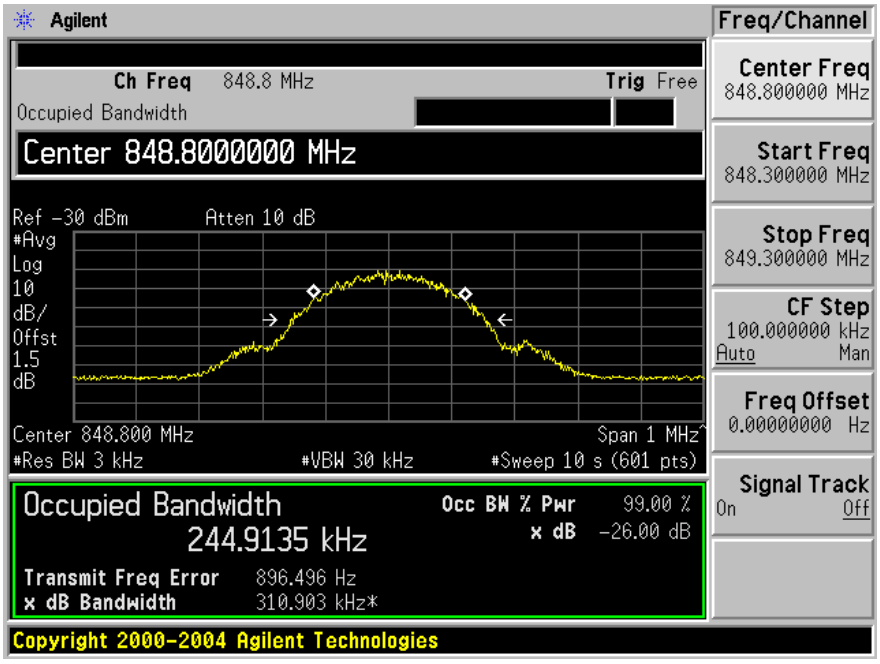
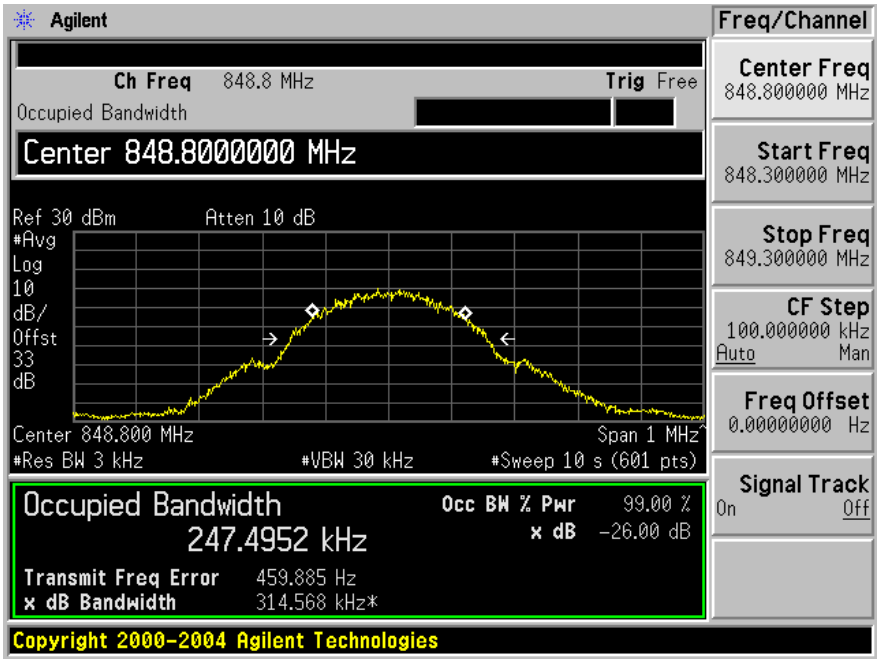


High Channel (848.8 MHz)

Input



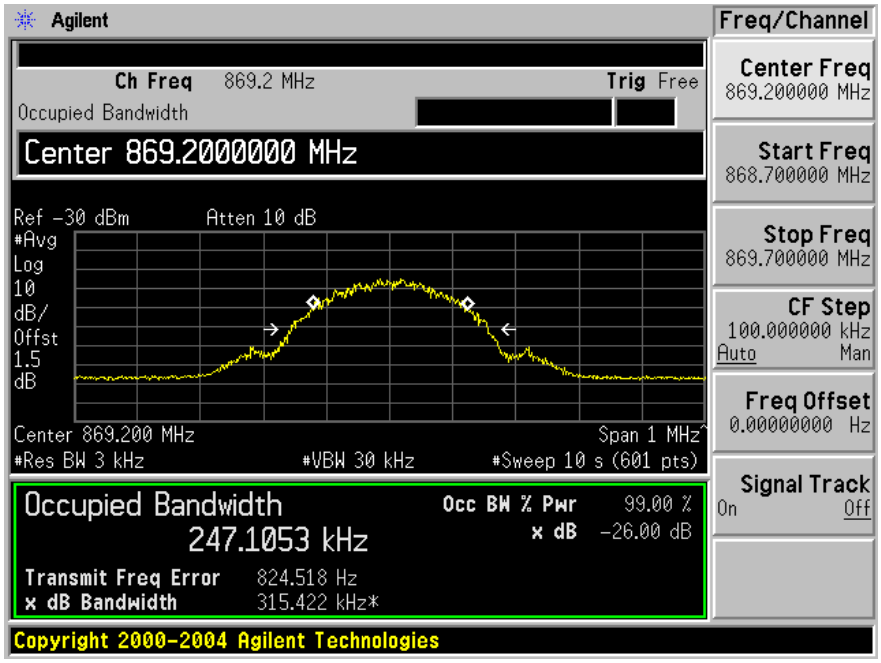
Output



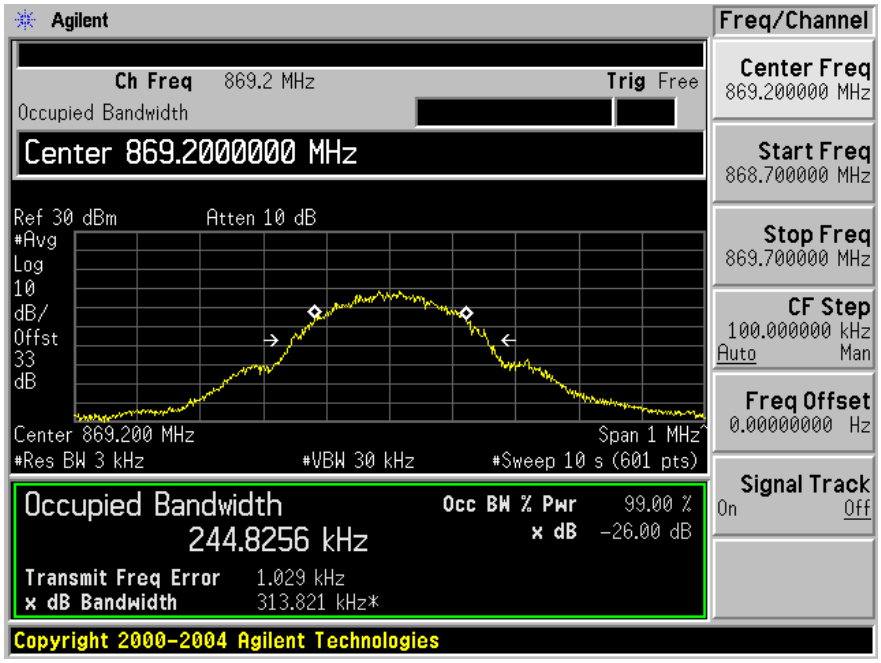
GSM 850 MHz Band (Downlink)

Low Channel (869.2 MHz)

Input

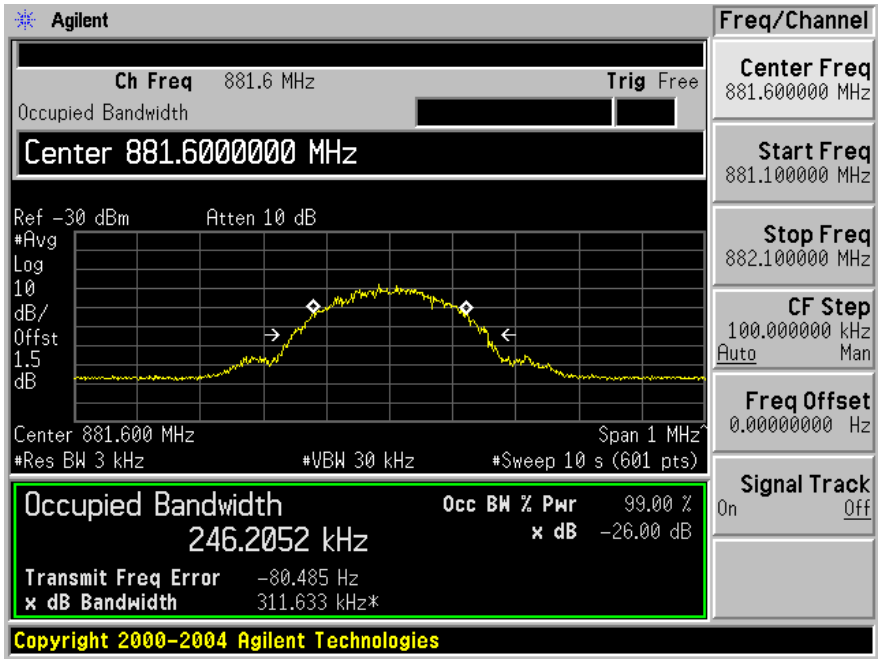


Output

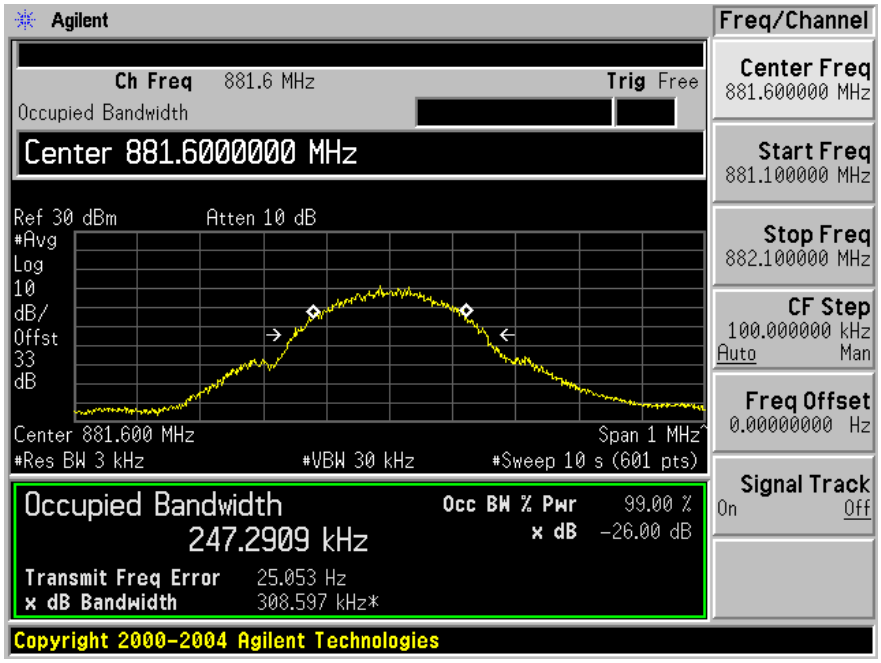


Middle Channel (881.6 MHz)

Input

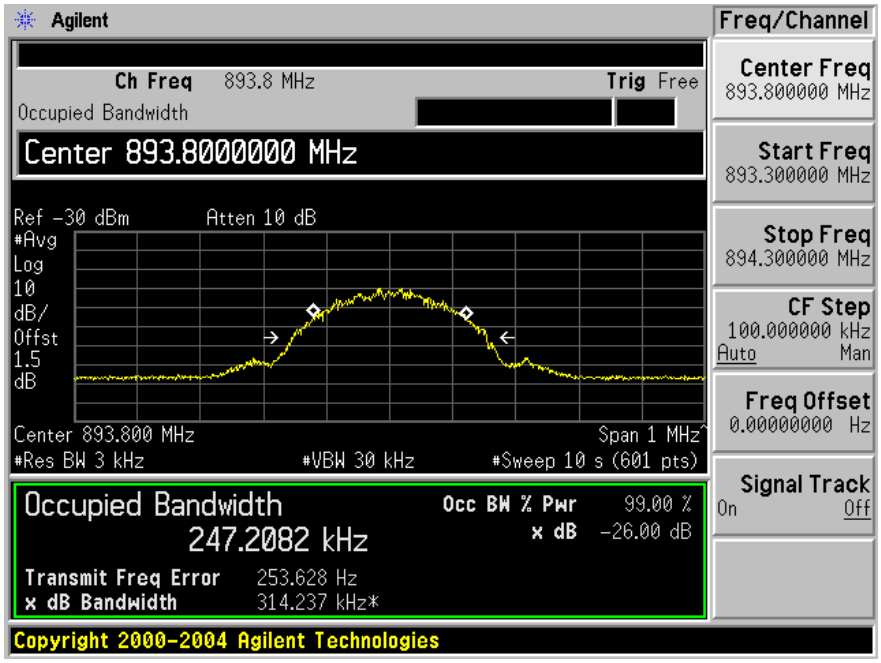


Output

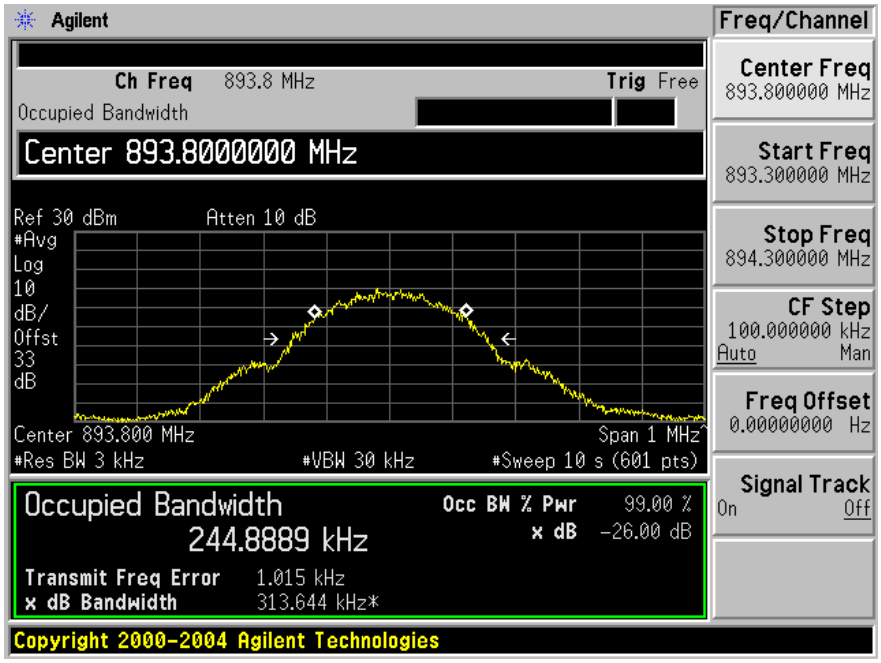


High Channel (893.8 MHz)

Input



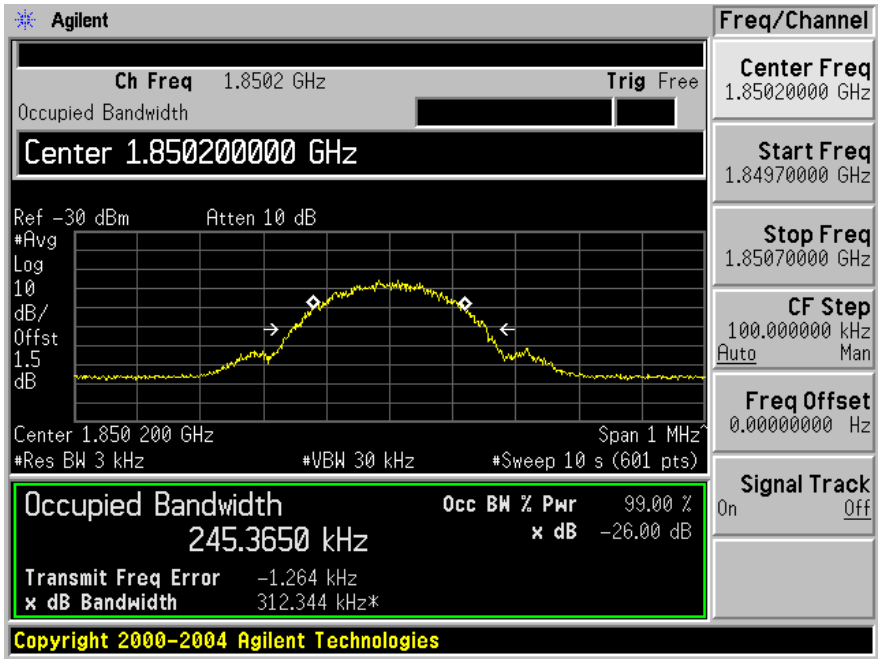
Output



GSM 1900 MHz Band (Uplink)

Low Channel (1850.2 MHz)

Input



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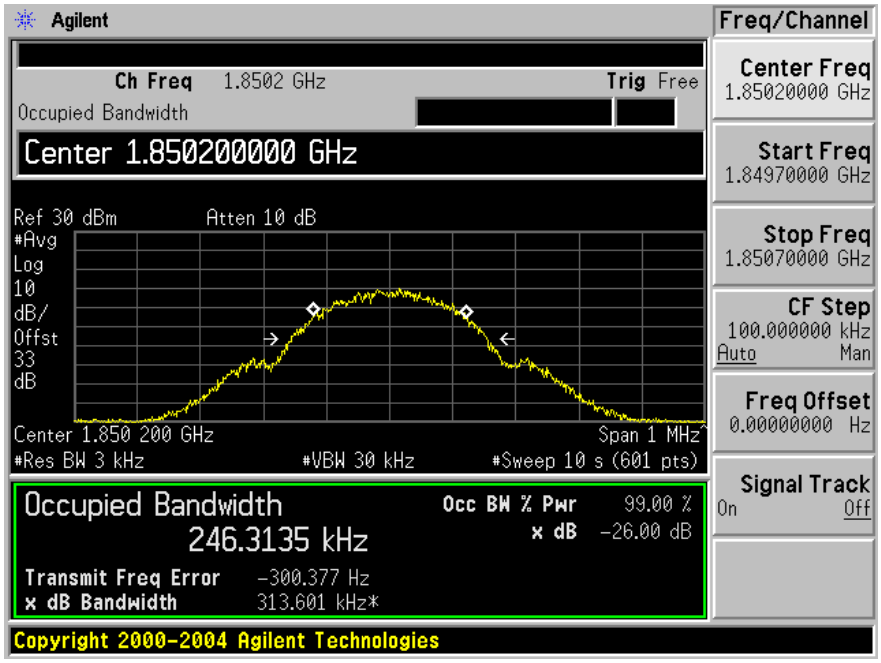
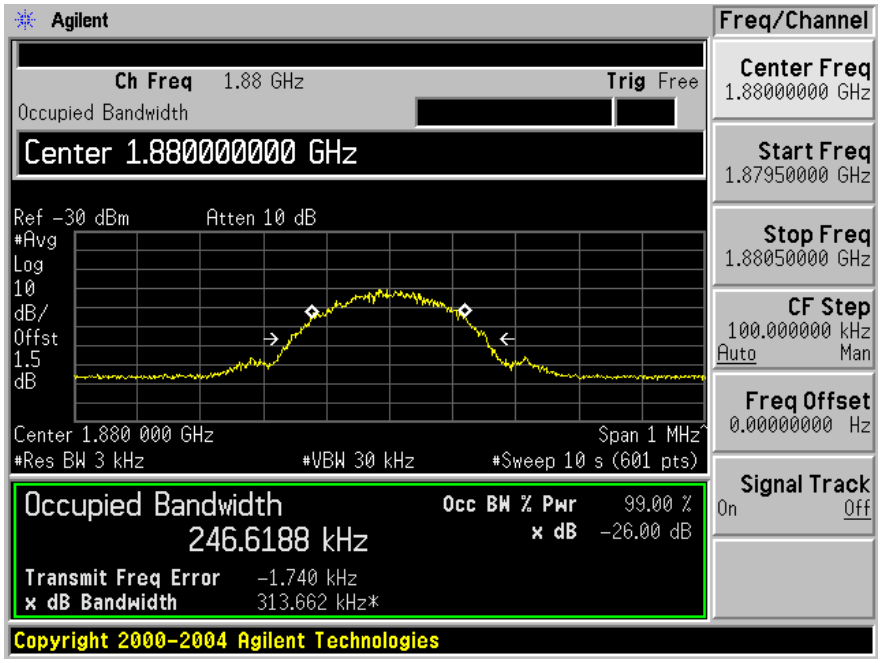


Middle Channel (1880 MHz)

Input



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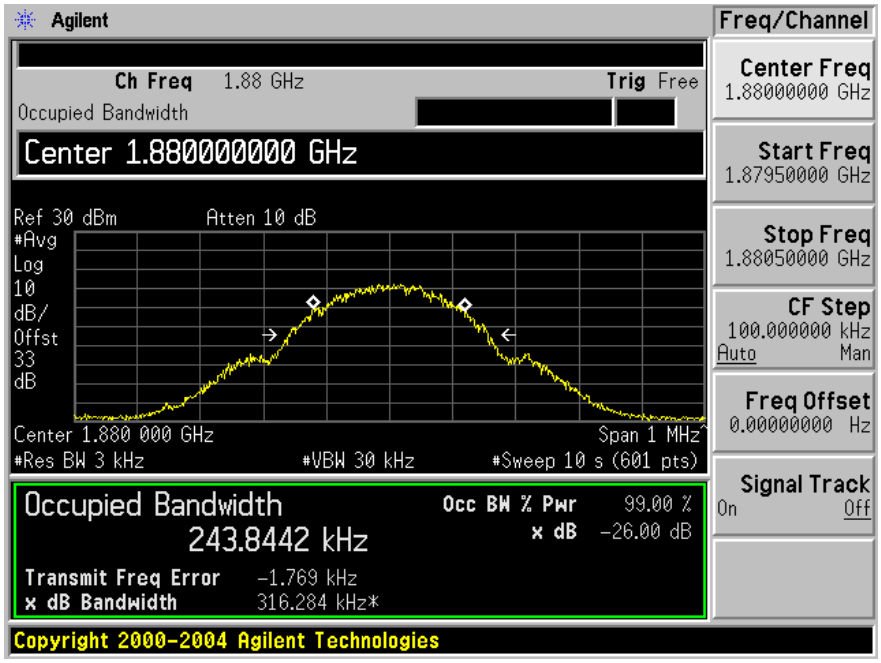
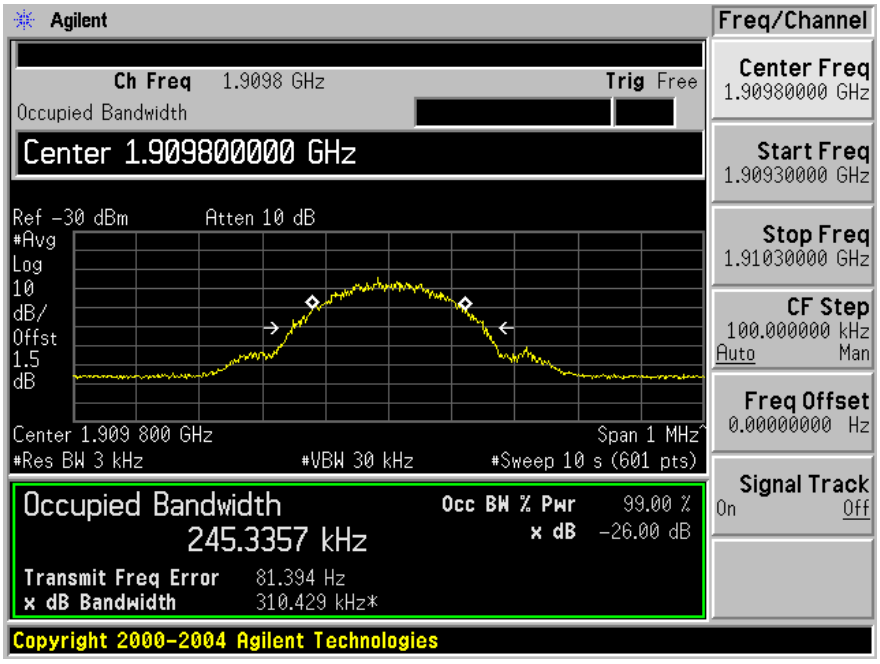


High Channel (1909.8 MHz)

Input



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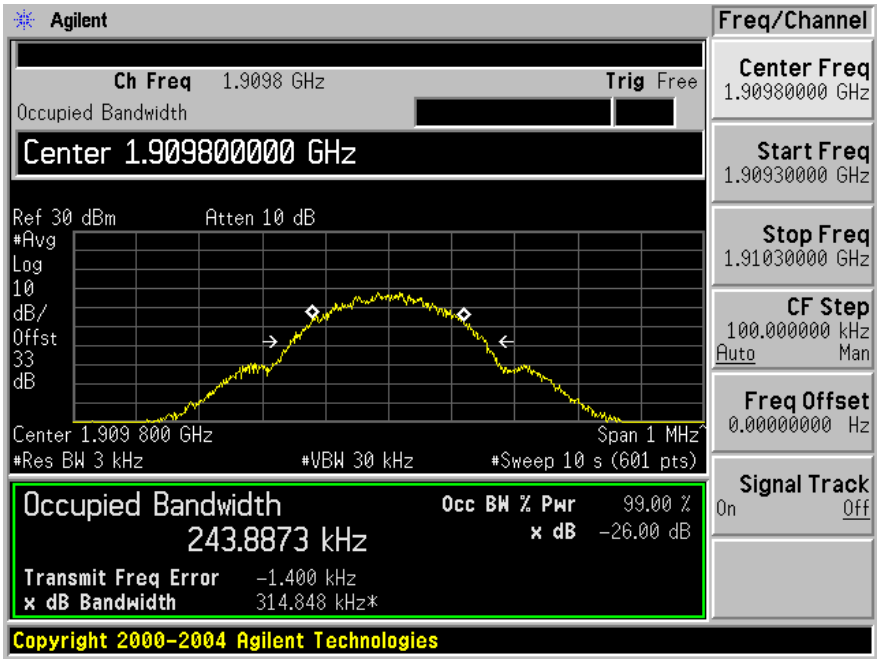
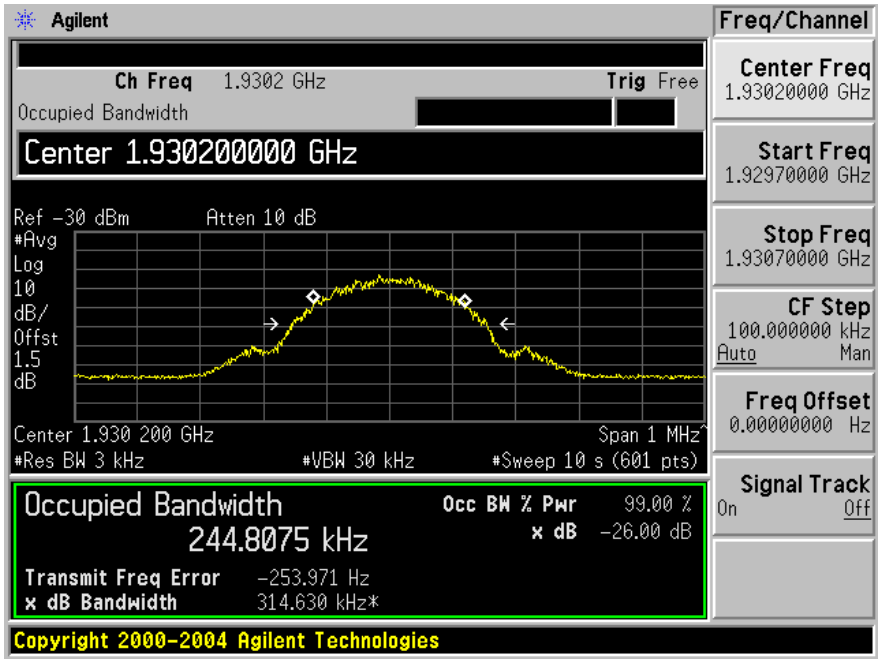


GSM 1900 MHz Band (Downlink)

Low Channel (1930.2 MHz)

Input



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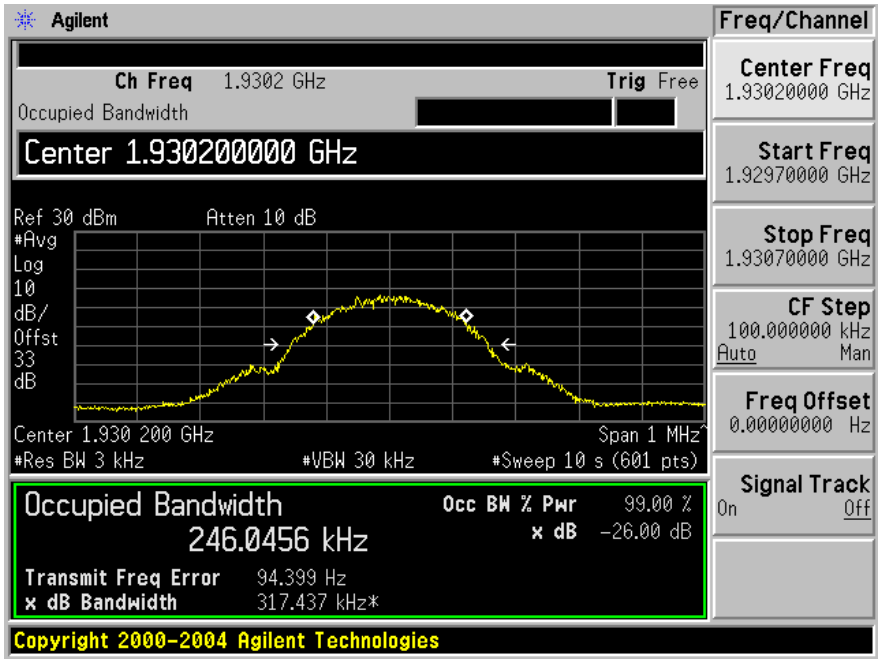
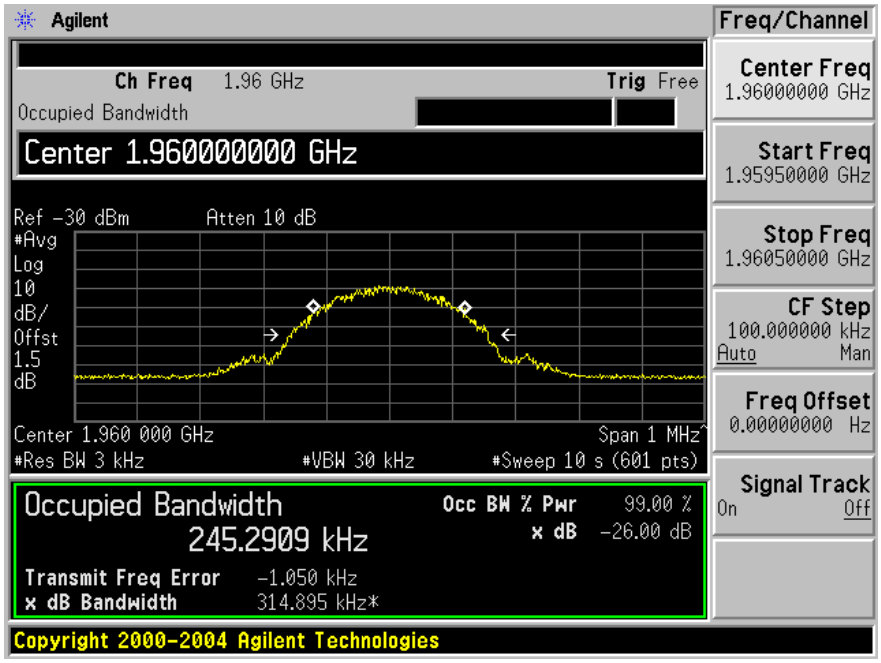
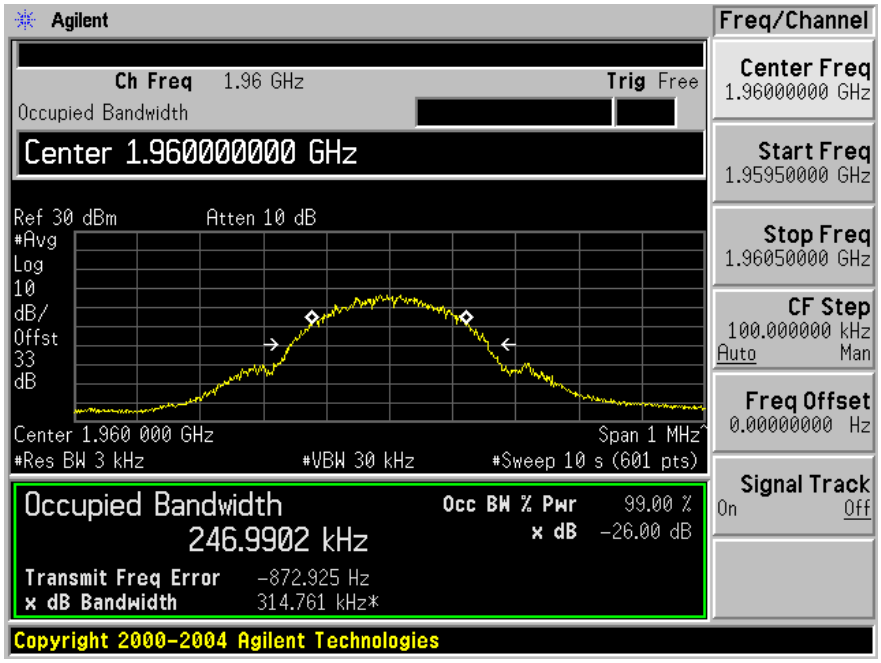


Middle Channel (1960 MHz)

Input

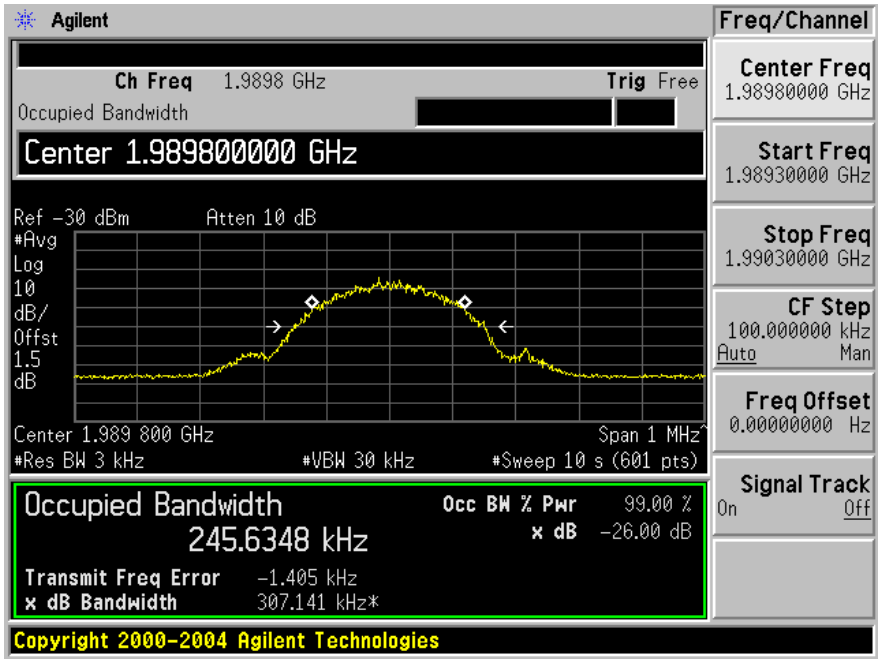


Output



High Channel (1989.8 MHz)

Input



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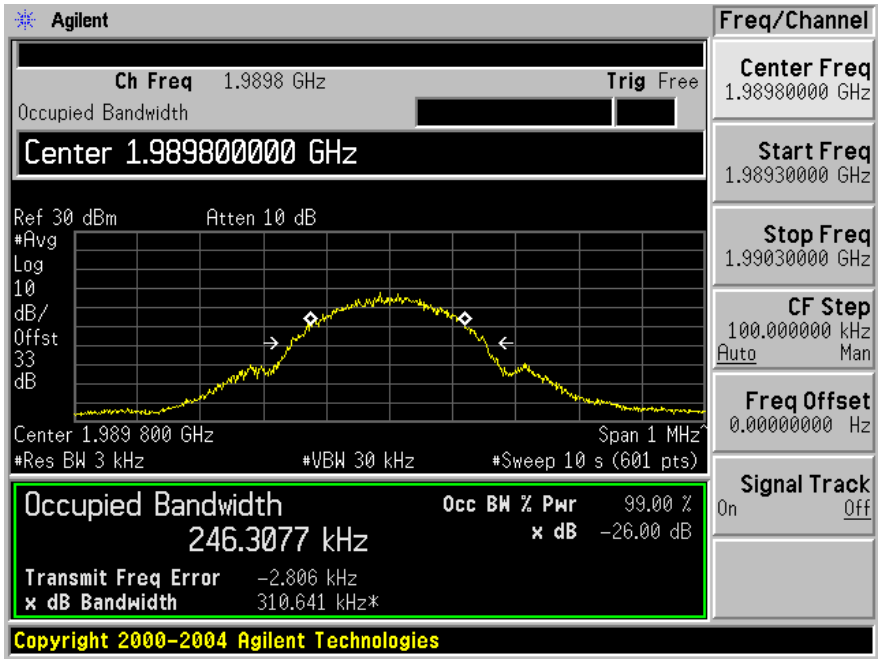
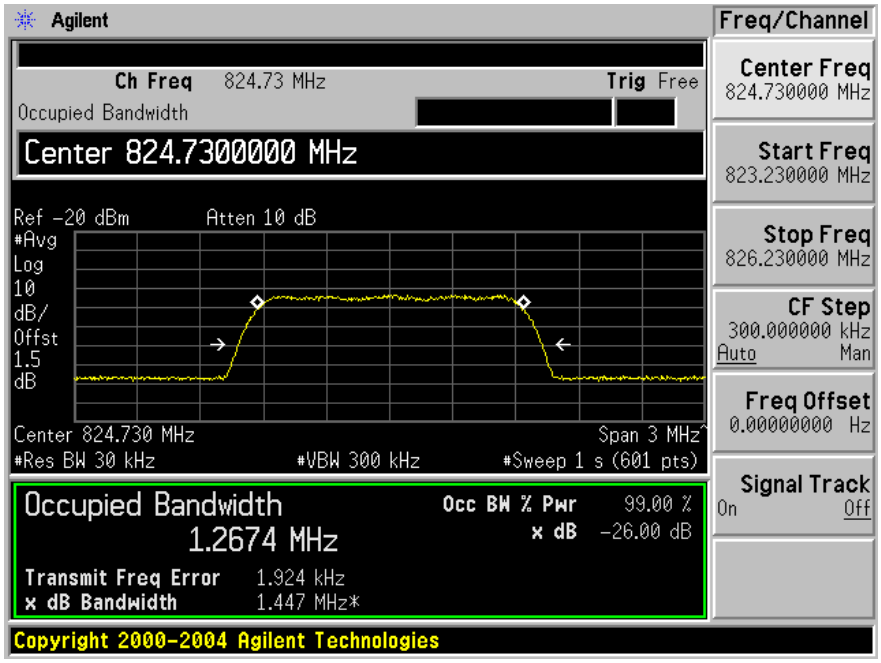


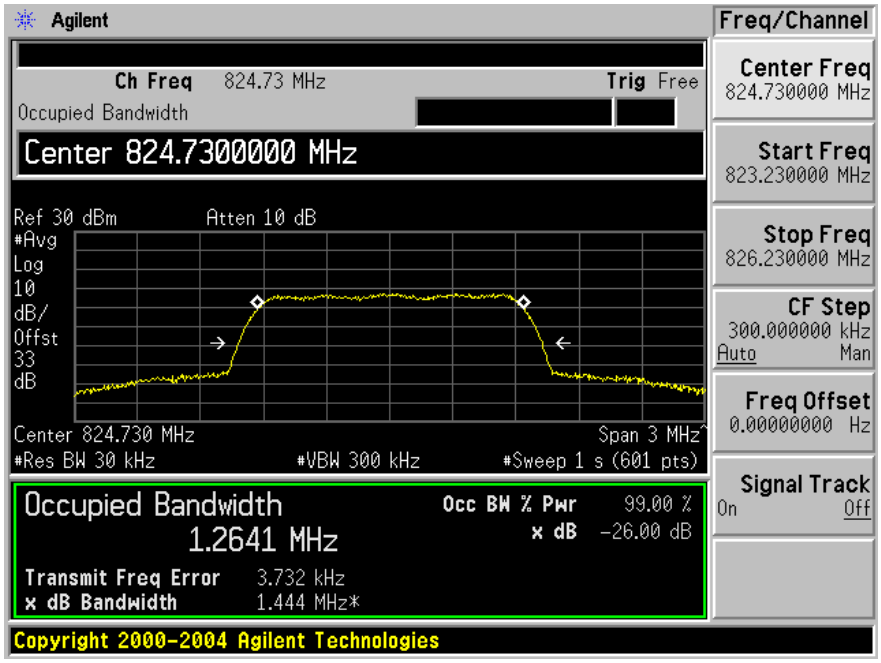
CDMA 850 MHz Band (Uplink)

Low Channel (824.73 MHz)

Input

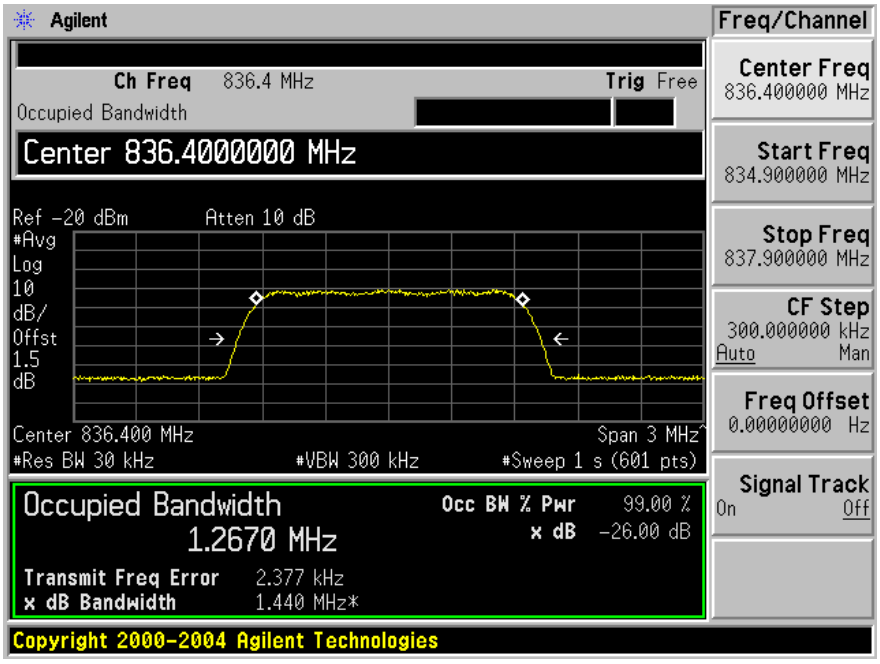


Output

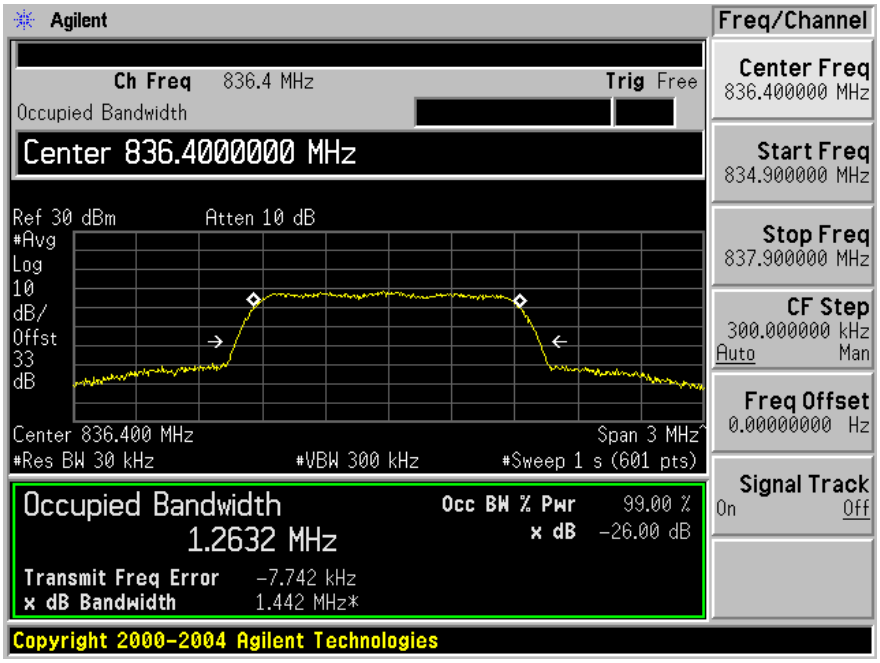


Middle Channel (836.4 MHz)

Input

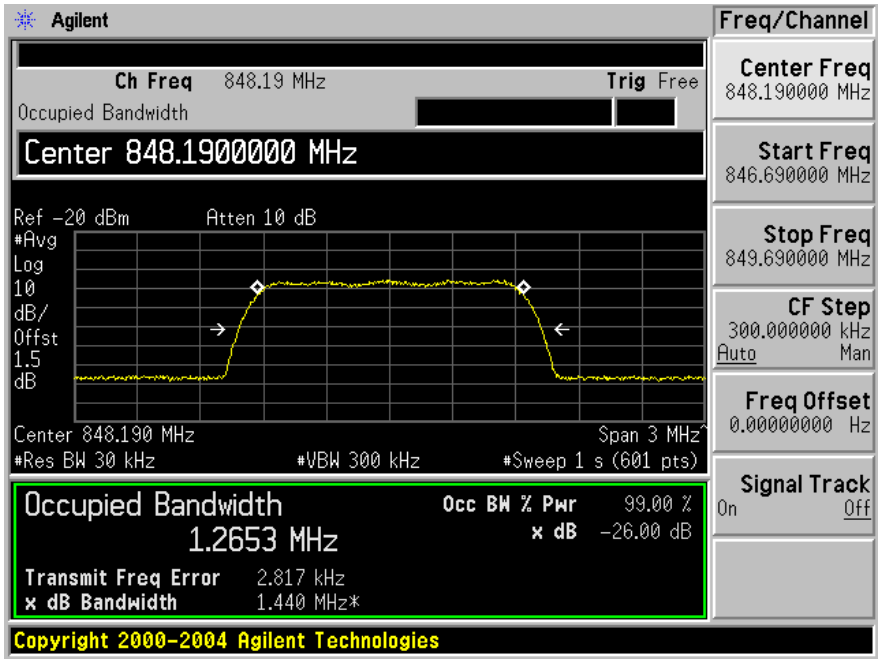


Output



High Channel (848.19 MHz)

Input



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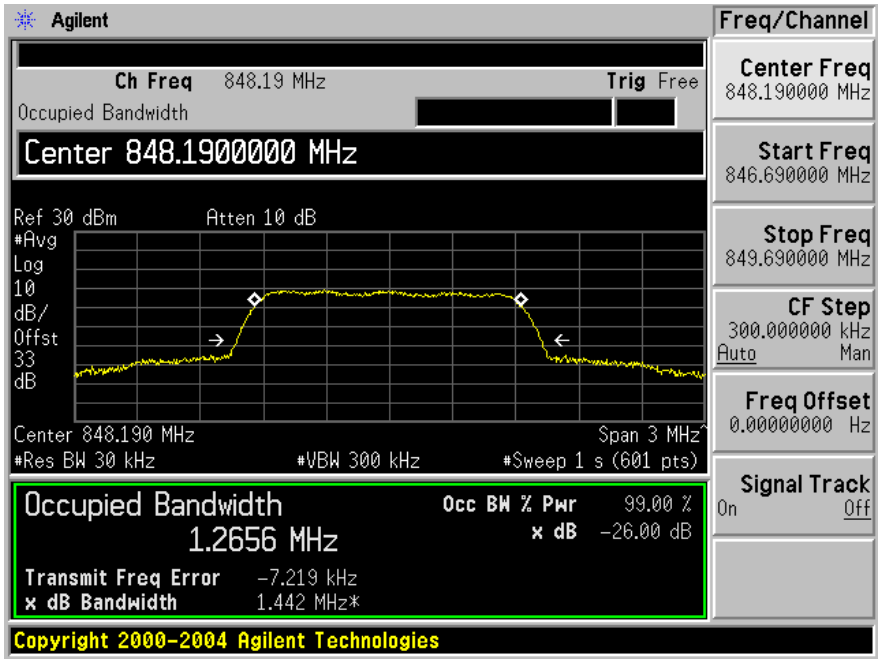
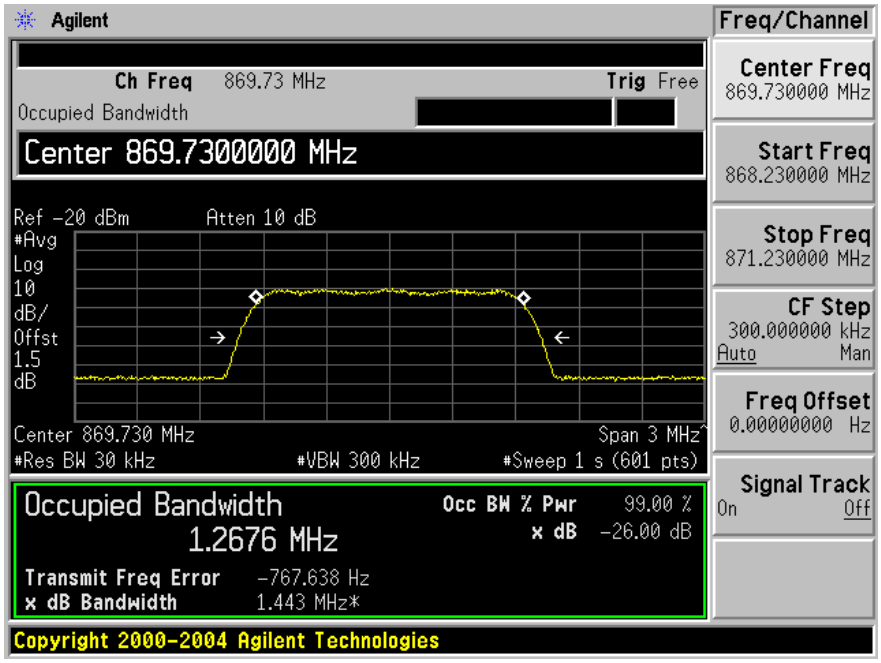


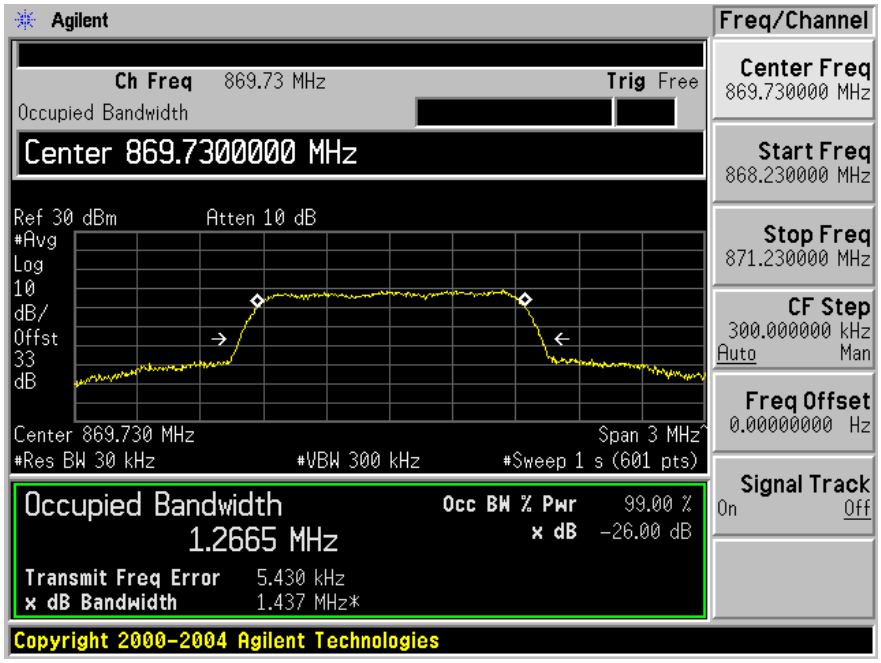
CDMA 850 MHz band (Downlink)

Low Channel (869.73 MHz)

Input

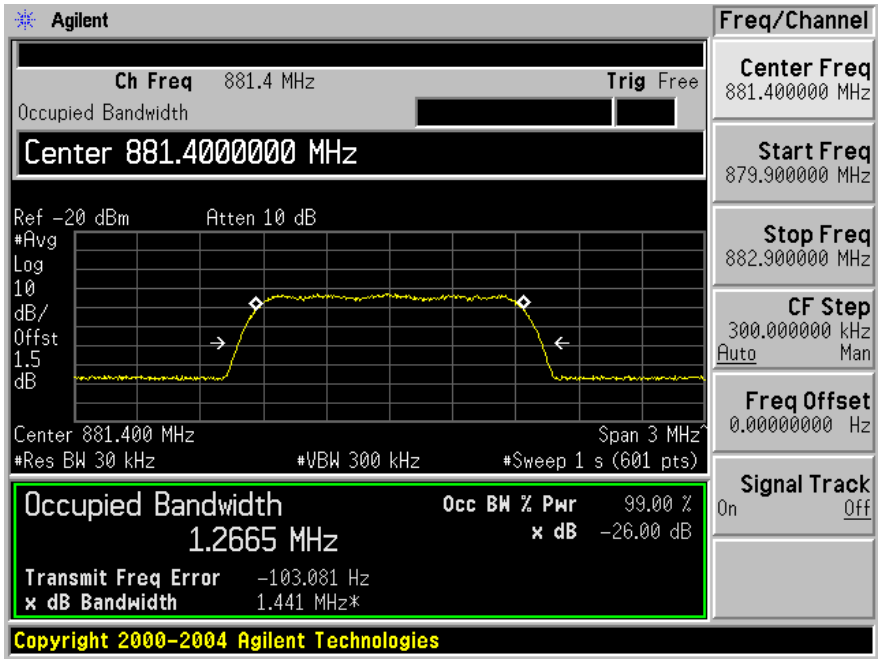


Output

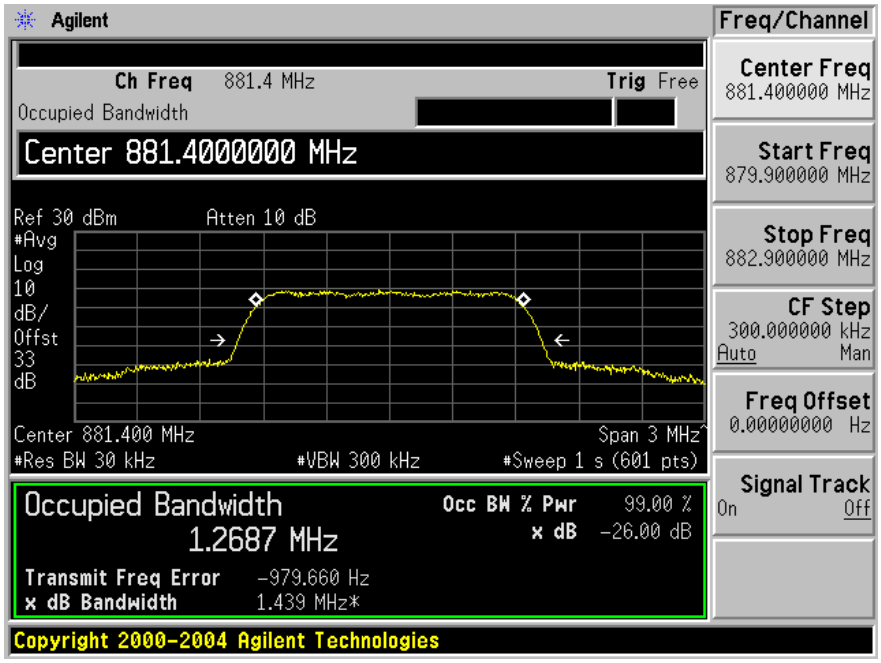


Middle Channel (881.4 MHz)

Input

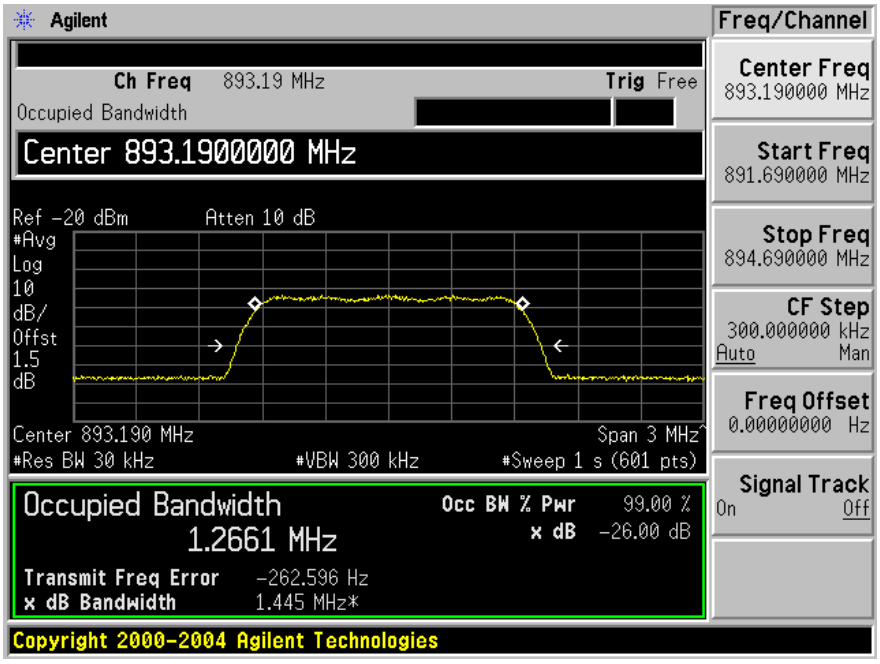


Output

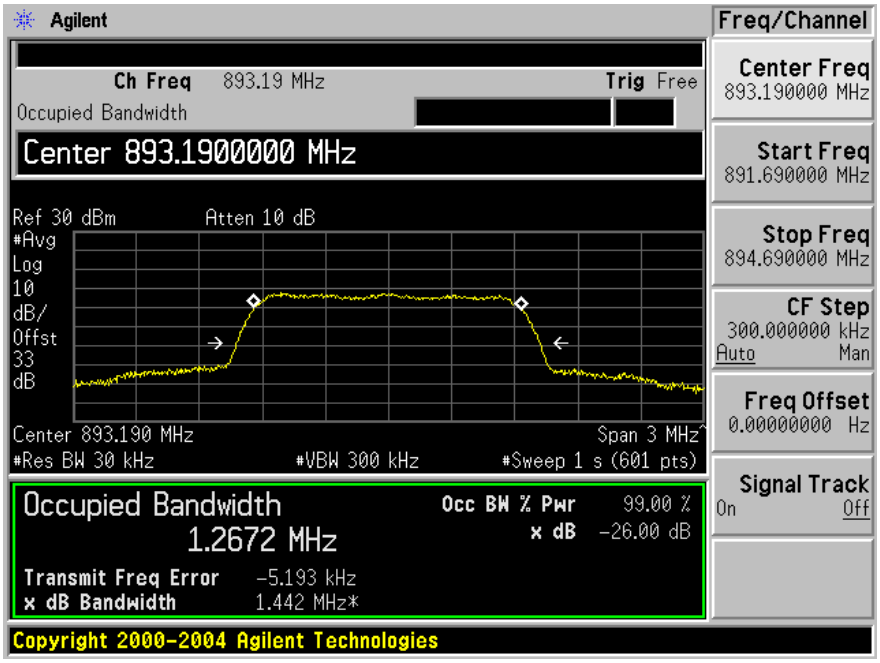


High Channel (893.19 MHz)

Input



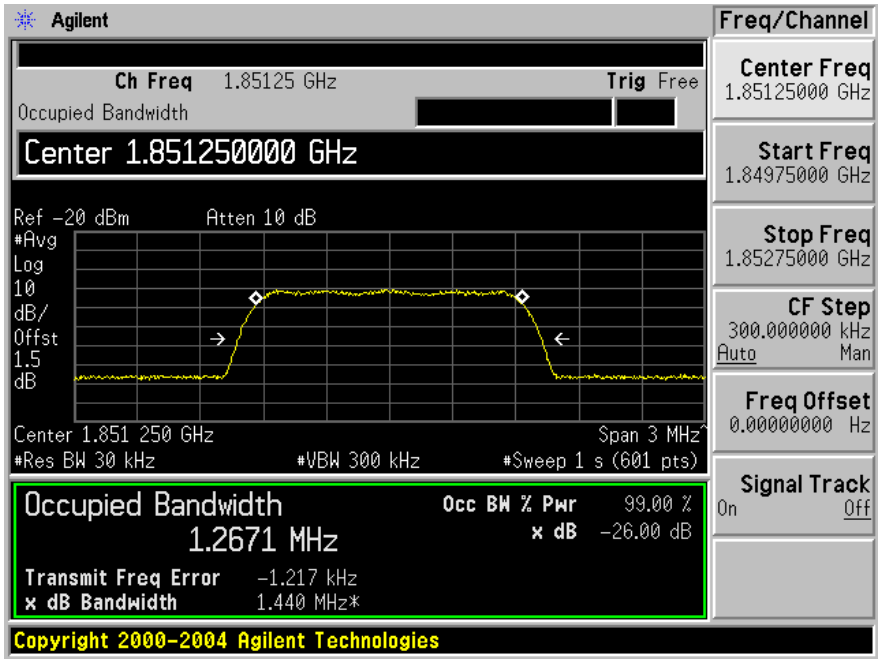
Output



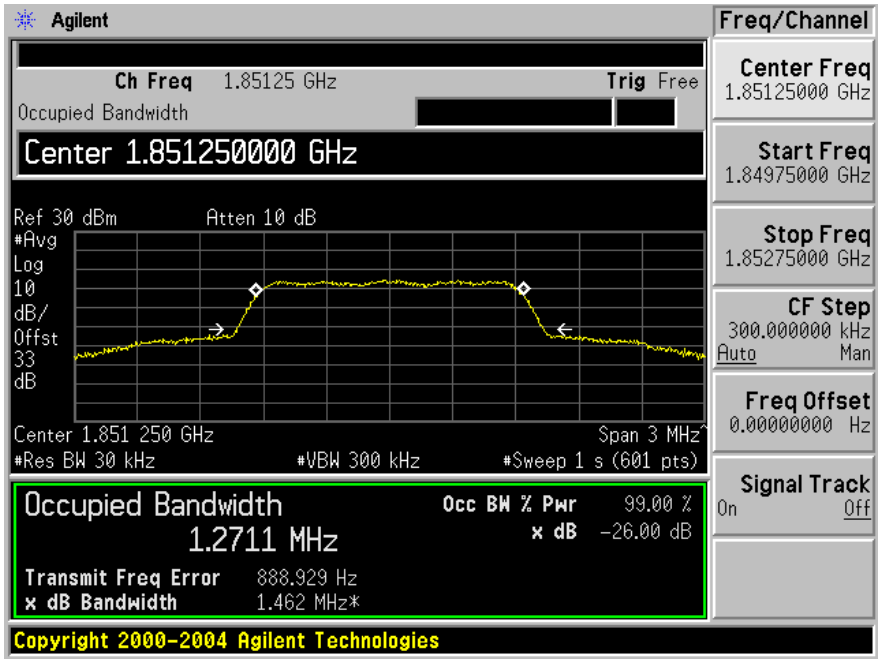
CDMA 1900 MHz Band (Uplink)

Low Channel (1851.25 MHz)

Input

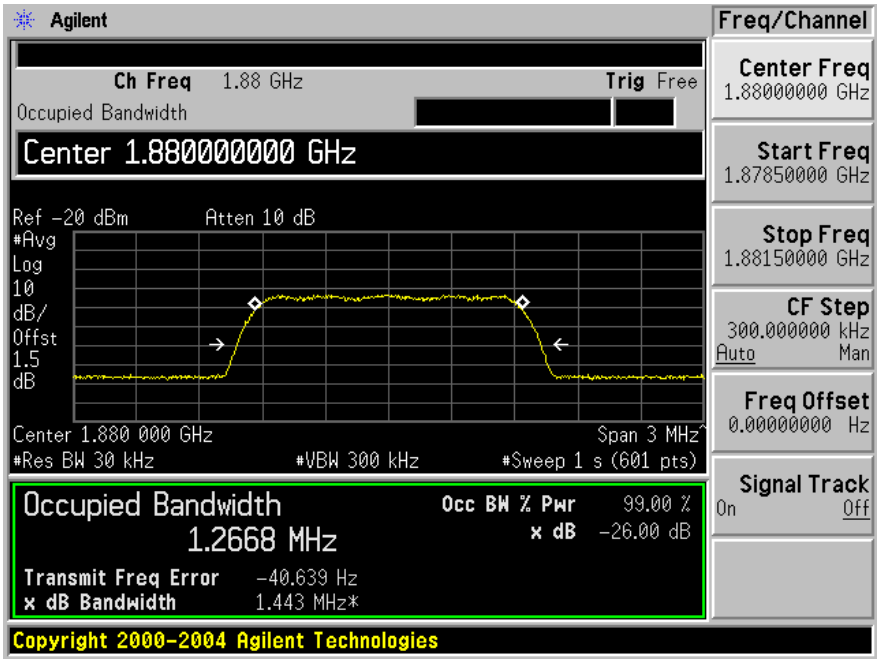


Output

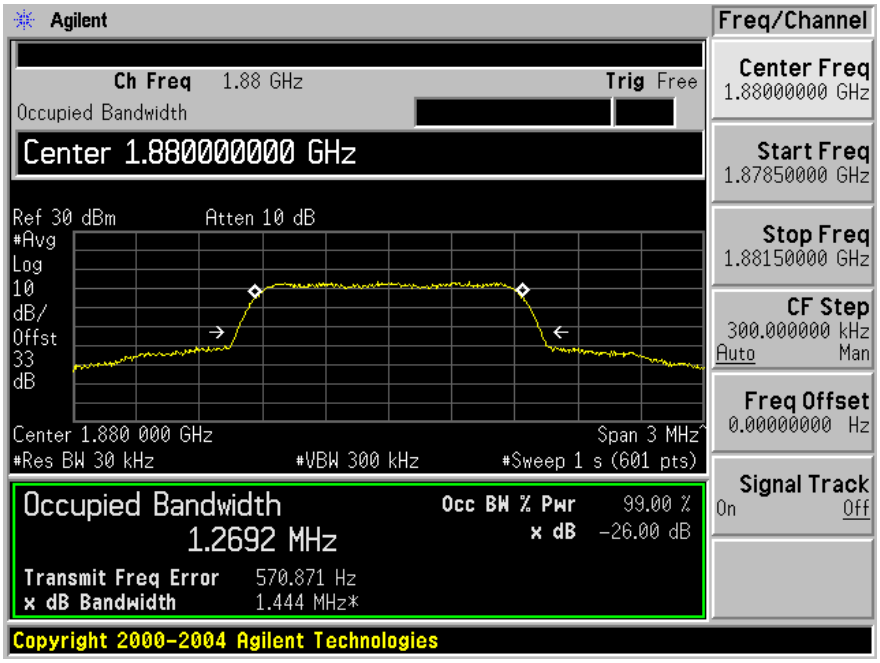


Middle Channel (1880 MHz)

Input

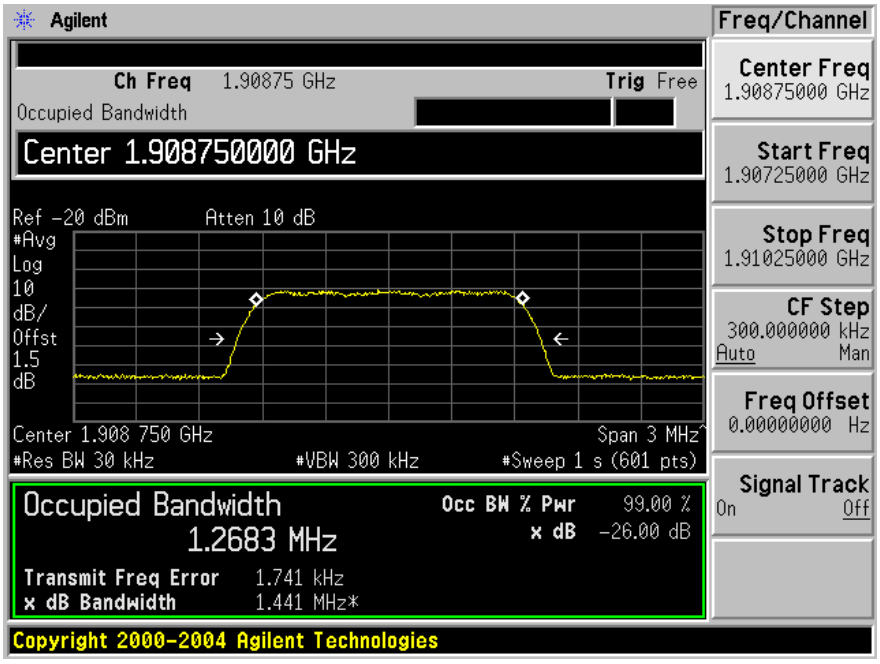


Output

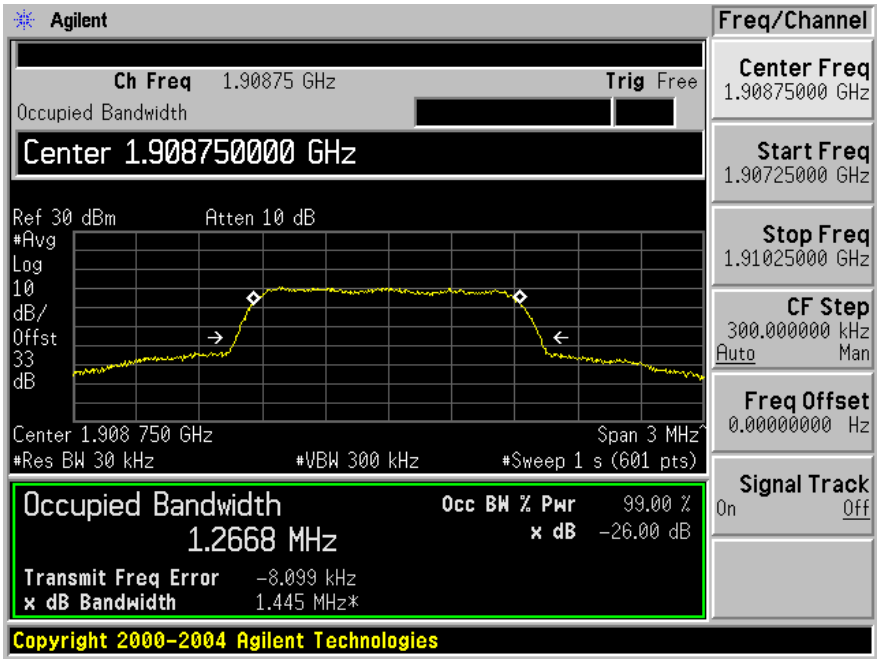


High Channel (1908.75 MHz)

Input



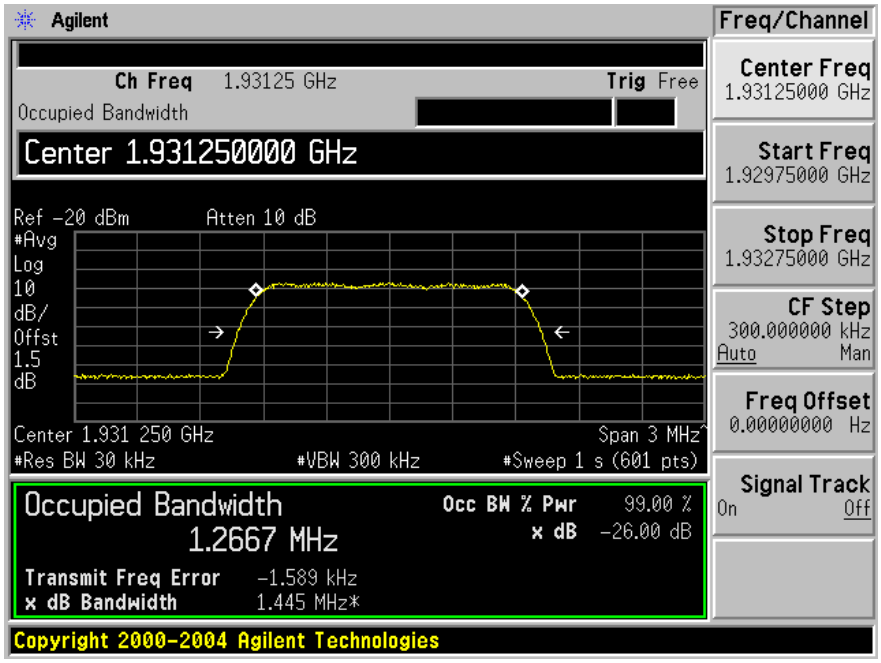
Output



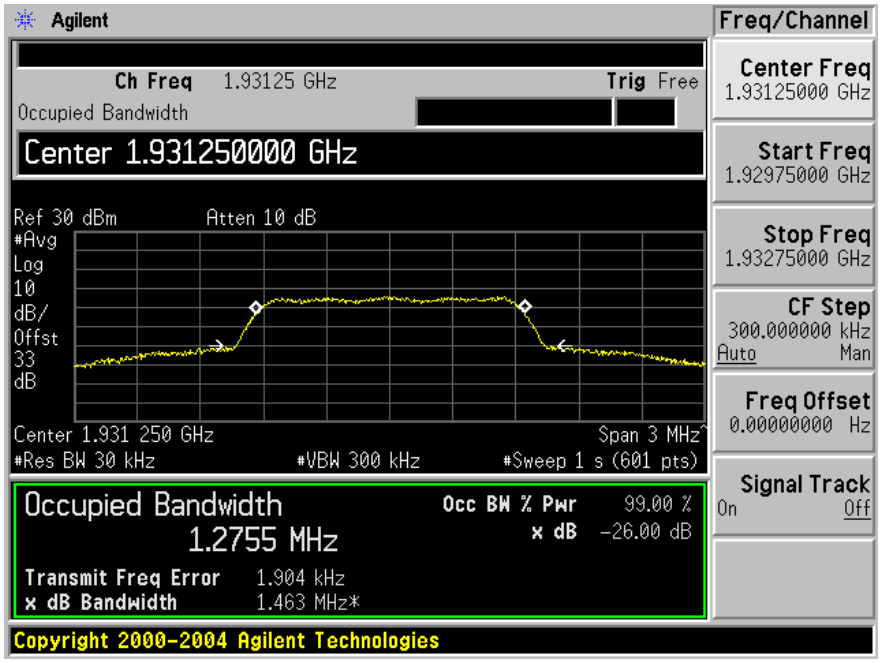
CDMA 1900 MHz Band (Downlink)

Low Channel (1931.25 MHz)

Input

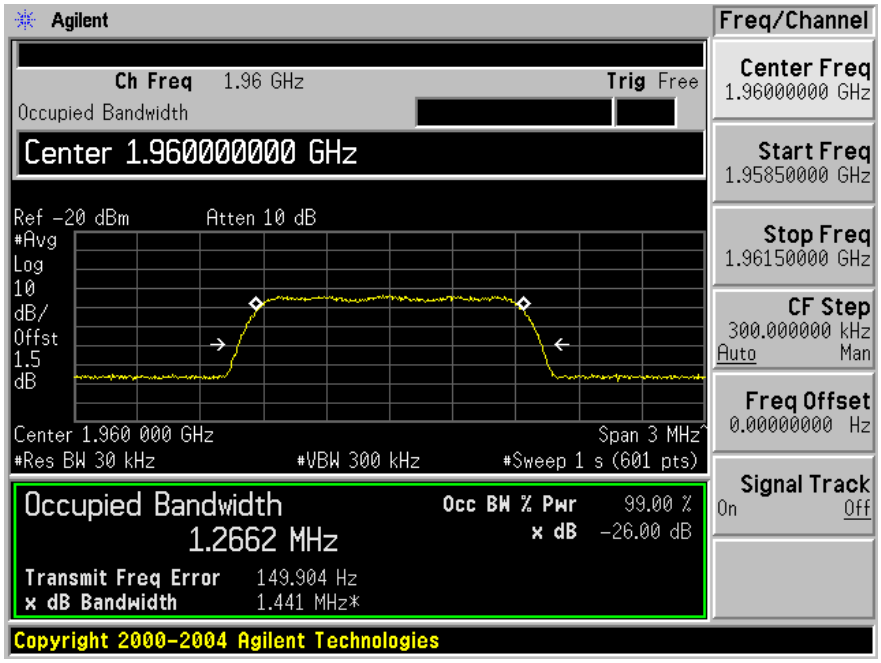


Output

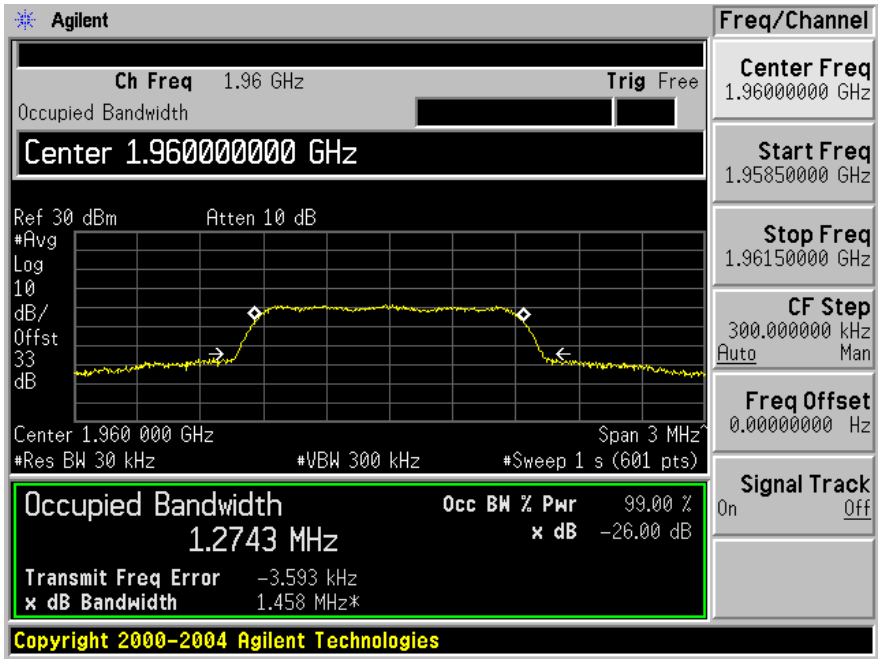


Middle Channel (1960 MHz)

Input

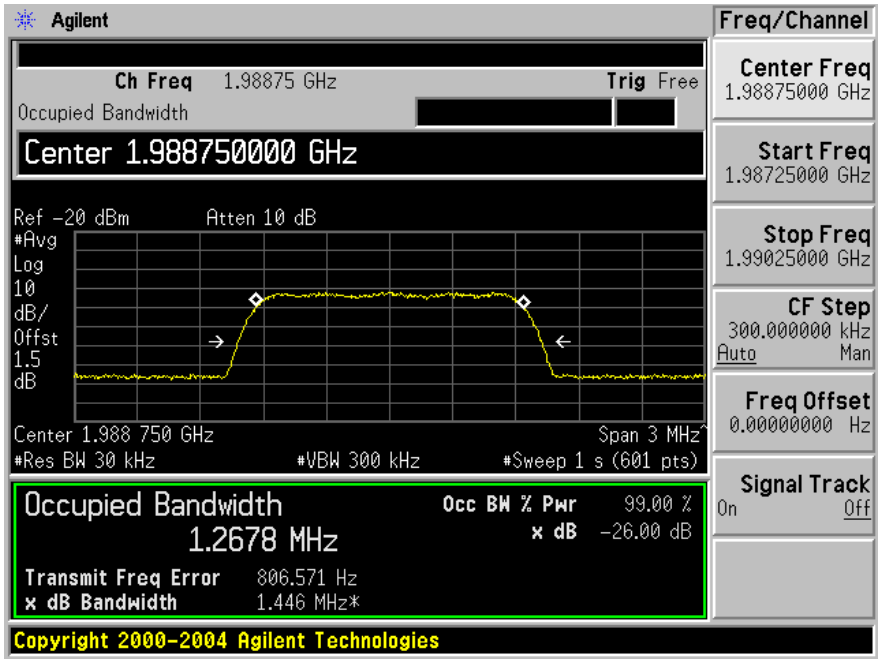


Output

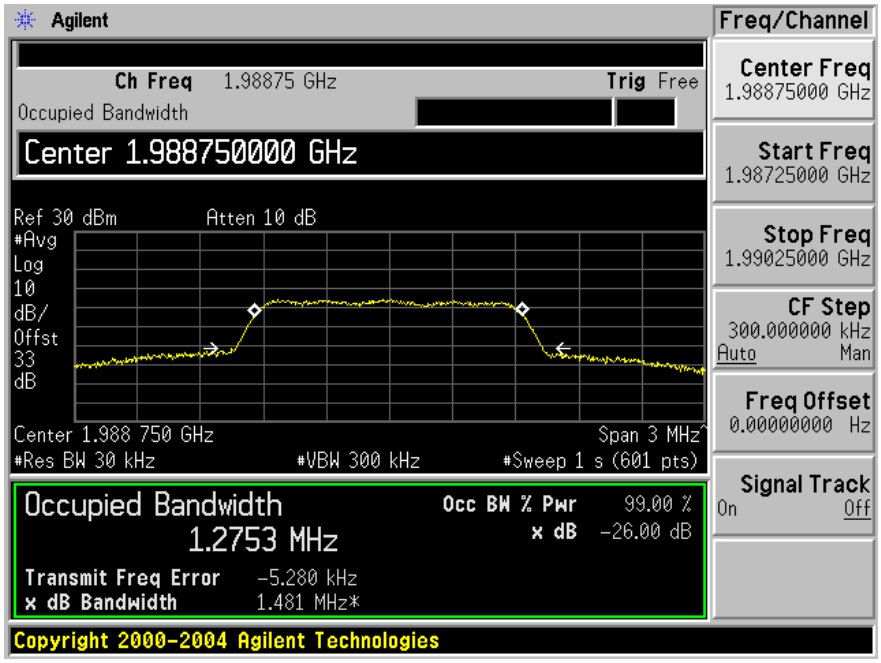


High Channel (1988.75 MHz)

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 Environmental Conditions

Temperature:	23 °C
Relative Humidity:	37 %
ATM Pressure:	101.5 kPa

The testing was performed by Victor Zhang on 2010-02-01 in 5 meter chamber #2

7.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
HP	Pre-Amplifier	8449B	3147A00400	2009-02-06
Sunol Sciences	Antenna	JB3	A020106-3	2009-05-05
A.R.A	Horn Antenna	DRG-118/A	1132	2009-10-27
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	2009-09-23
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2009-03-31
HP	Signal Generator	83650B	3614A00276	2008-05-28[1]
Agilent	Analyzer, Spectrum	E4440A	US45303156	2009-07-23

Note [1] – calibration is based on a two year cycle

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

Worst case reading as follows:

Mode: GSM 850 MHz Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-44.39	1763.2	Horizontal	881.6

Mode: GSM 850 MHz Uplink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-44.12	1673.2	Vertical	836.6

Mode: GSM 1900 MHz Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-46.17	3920	Horizontal	1960

Mode: GSM 1900 MHz Uplink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-44.14	3760	Vertical	1880

Mode: CDMA 850 MHz Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-42.51	1322	Horizontal	881.4

Mode: CDMA 850 MHz Uplink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-39.93	5018.4	Vertical	836.4

Mode: CDMA 1900 MHz Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-46.04	3920	Horizontal	1960

Mode: CDMA 1900 MHz Uplink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency**
-45.90	3760	Horizontal	1880

7.6 Test Results

GSM 850 MHz band 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. Cord. (dB)**	**Cable Loss (dB)**	**Absolute Level (dBm)**		
1763.20	46.08	0	1.10	H	1763.20	-66.52	9.50	0.37	-57.39	-13.00	-44.39
1763.20	46.25	335	1.24	V	1763.20	-66.79	9.50	0.37	-57.66	-13.00	-44.66

GSM 850 MHz 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. Cord. (dB)**	**Cable Loss (dB)**	**Absolute Level (dBm)**		
1673.20	46.98	301	1.10	V	1673.20	-66.06	9.30	0.36	-57.12	-13.00	-44.12
1673.20	46.53	355	1.00	H	1673.20	-66.07	9.30	0.36	-57.13	-13.00	-44.13

GSM 1900 MHz band 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920.00	43.47	0	1.00	H	3920.00	-69.46	10.90	0.61	-59.17	-13.00	-46.17
3920.00	43.92	5	1.20	V	3920.00	-69.66	10.90	0.61	-59.37	-13.00	-46.37

GSM 1900 MHz 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760.00	44.24	0	1.20	V	3760.00	-67.45	10.90	0.59	-57.14	-13.00	-44.14
3760.00	43.82	0	1.00	H	3760.00	-67.56	10.90	0.59	-57.25	-13.00	-44.25

CDMA 850 MHz band 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1762.80	45.13	0	1.00	H	1762.80	-64.64	9.50	0.37	-55.51	-13.00	-42.51
1762.80	45.22	0	1.00	V	1762.80	-64.81	9.50	0.37	-55.68	-13.00	-42.68

CDMA 850 MHz 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1672.80	47.10	350	1.20	V	1672.80	-61.87	9.30	0.36	-52.93	-13.00	-39.93
1672.80	46.33	0	1.00	H	1672.80	-62.36	9.30	0.36	-53.42	-13.00	-40.42

CDMA 1900 MHz band 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3920.00	44.17	0	1.00	H	3920.00	-69.33	10.90	0.61	-59.04	-13.00	-46.04
3920.00	43.75	355	1.42	V	3920.00	-70.30	10.90	0.61	-60.01	-13.00	-47.01

CDMA 1900 MHz 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. Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
3760.00	44.00	0	1.00	H	3760.00	-69.21	10.90	0.59	-58.90	-13.00	-45.90
3760.00	43.90	355	1.40	V	3760.00	-70.11	10.90	0.59	-59.80	-13.00	-46.80

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 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	372 %
ATM Pressure:	101.7 kPa

The testing was performed by Victor Zhang on 2010-01-28in RF site.

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2009-03-31
HP	Signal Generator	83650B	3614A00276	2008-05-28[1]
Agilent	Analyzer, Spectrum	E4440A	US45303156	2009-07-23

Note [1] – calibration is based on a two year cycle

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

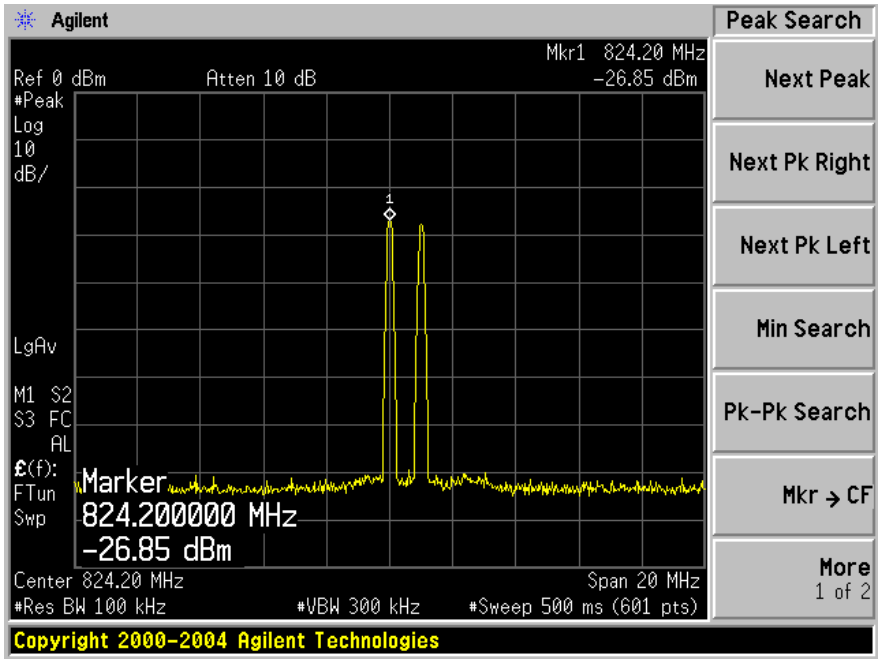
8.5 Test Results

Please refer to the hereinafter plots.

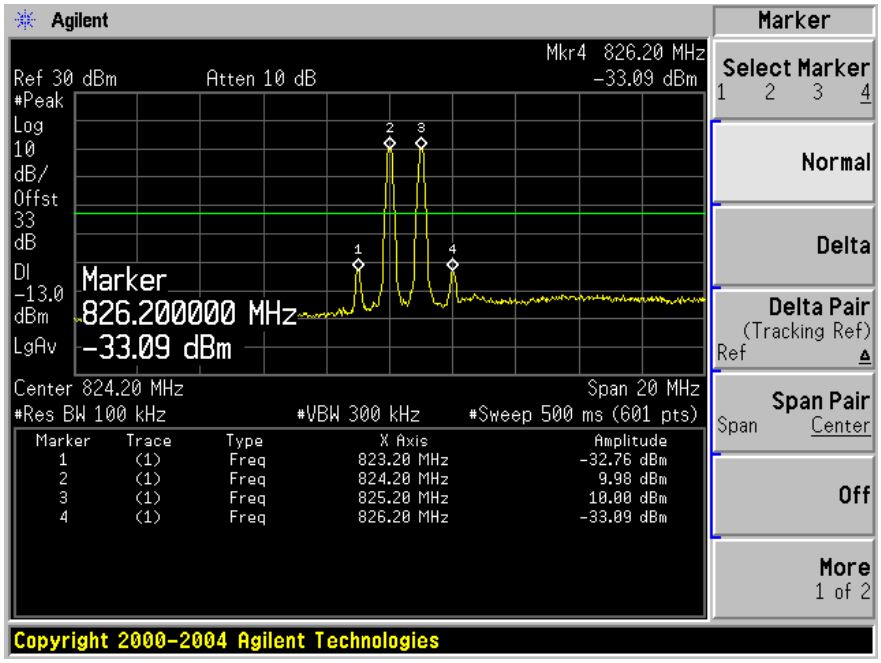
Inter-modulation:

GSM 850 MHz band Low channel Uplink:

Input

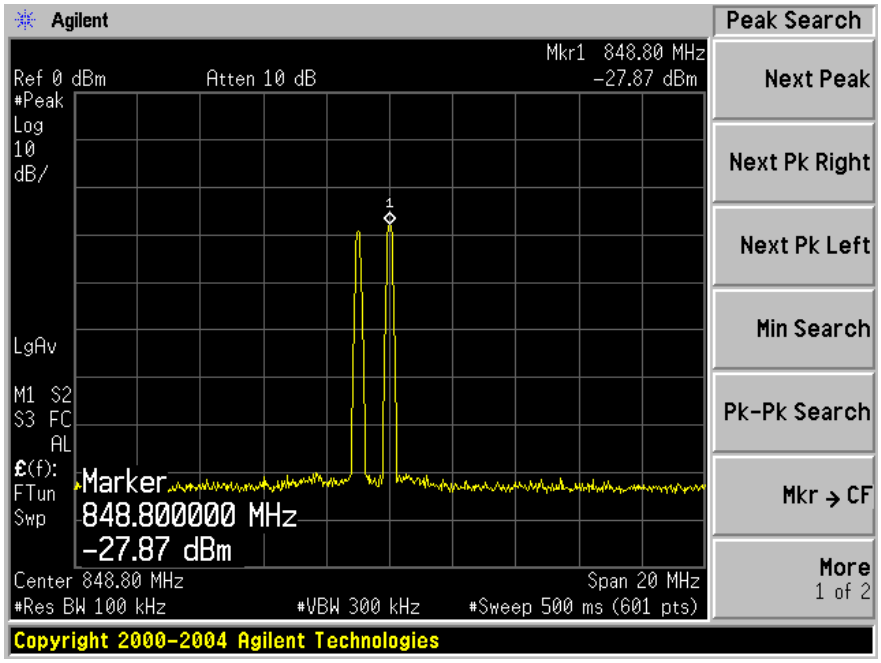


Output

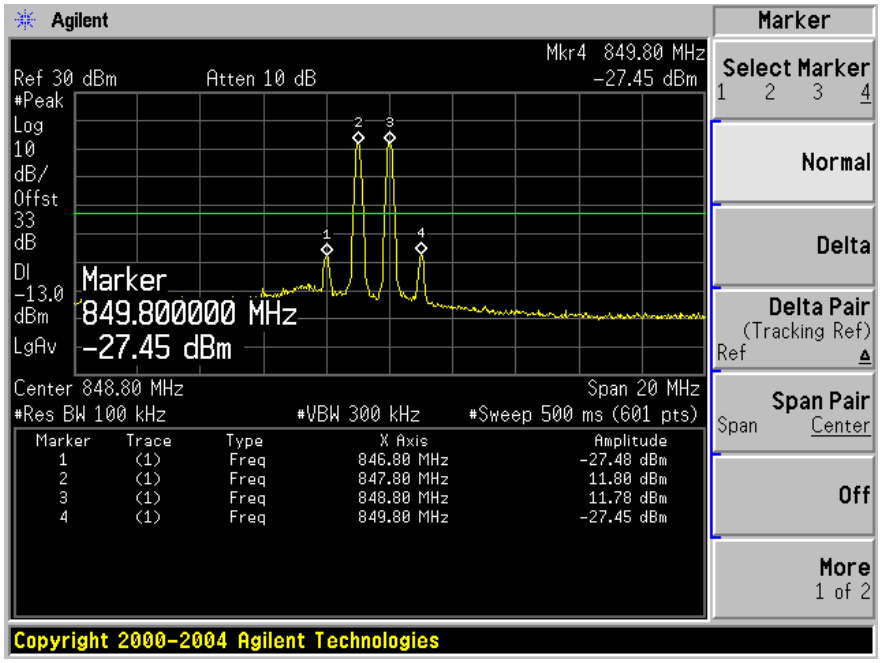


GSM 850 MHz band High channel Uplink:

Input

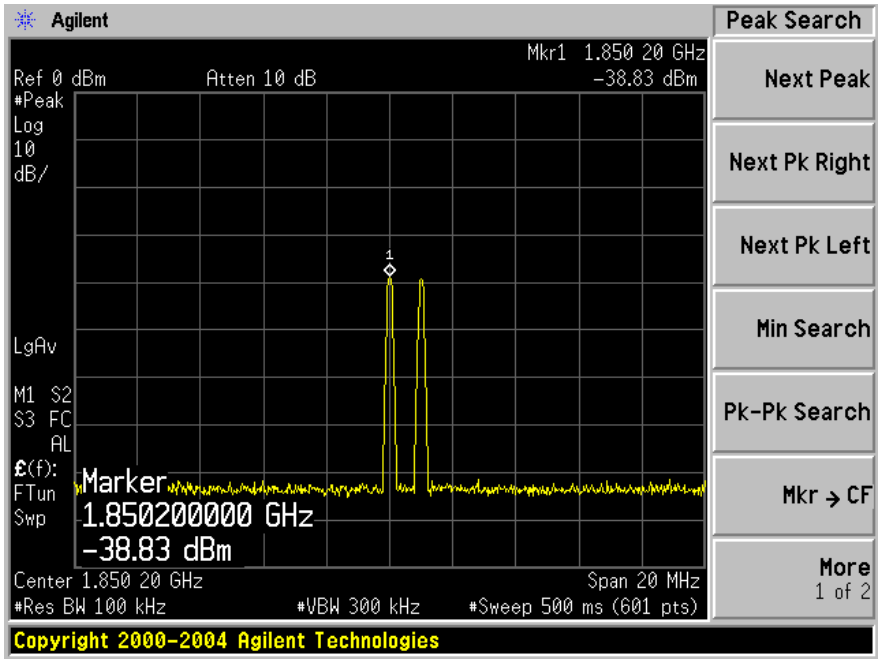


Output

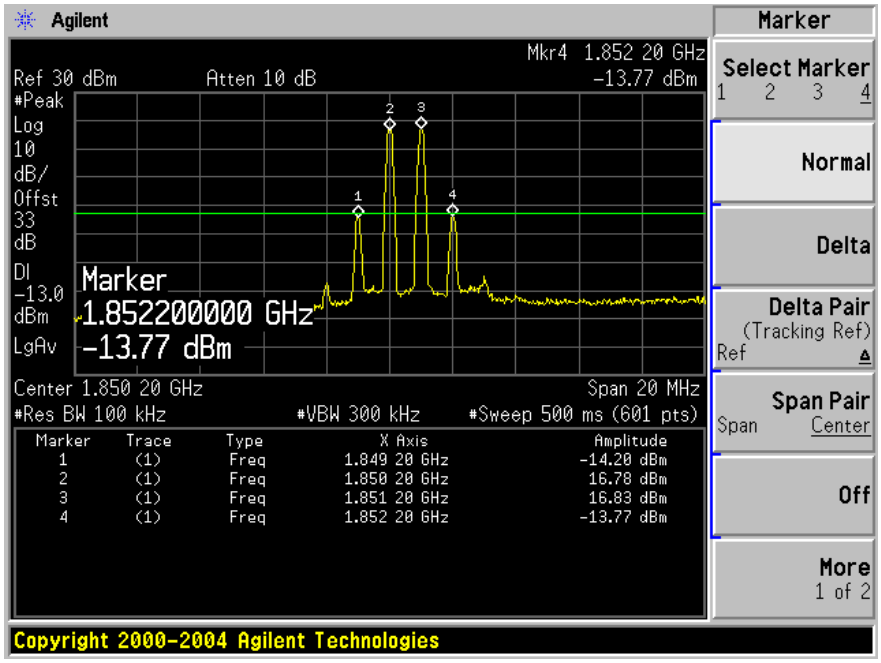


GSM 1900 MHz band Low channel Uplink:

Input

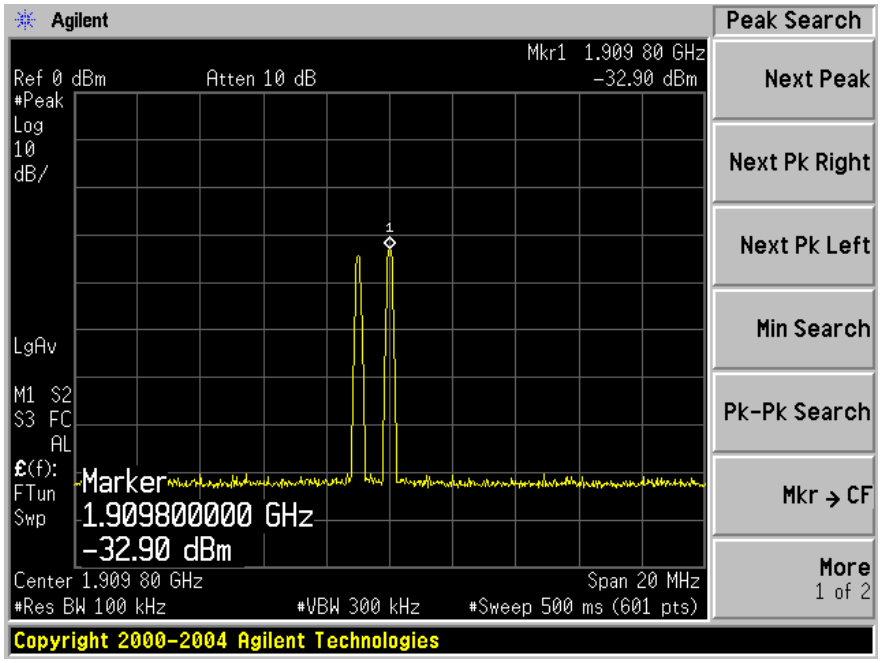


Output

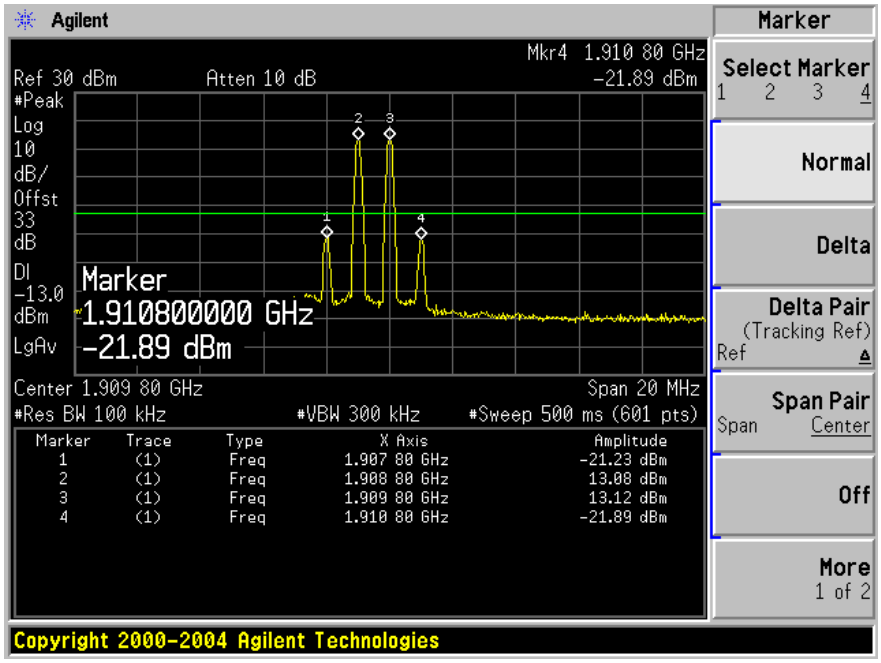


GSM 1900 MHz band High channel Uplink:

Input

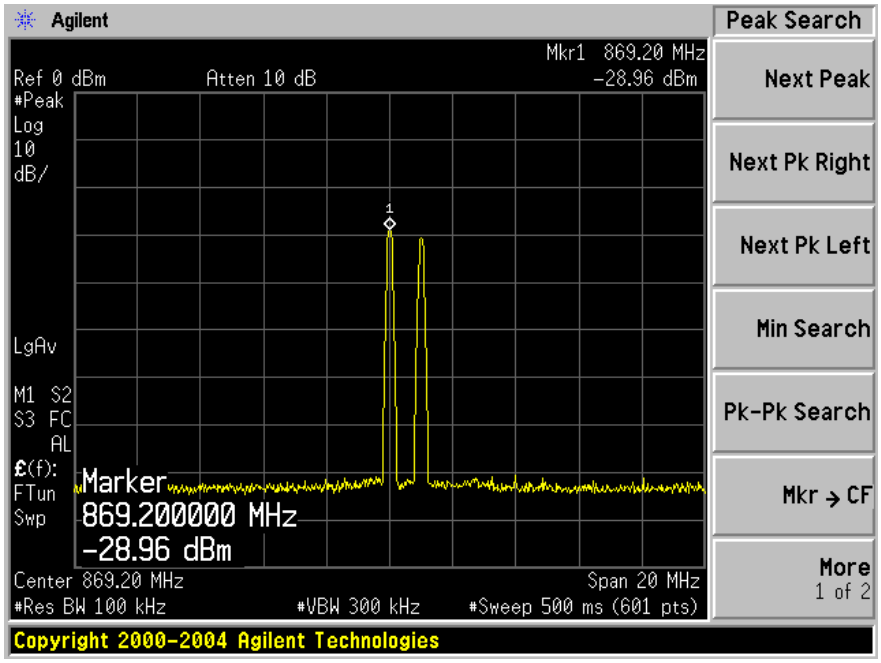


Output

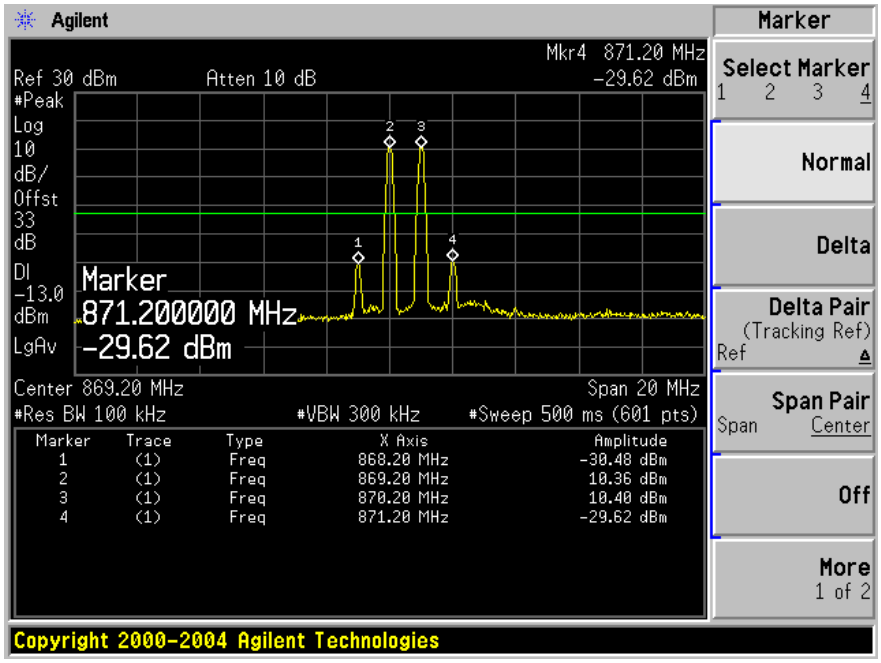


GSM 850 MHz band Low channel Downlink:

Input

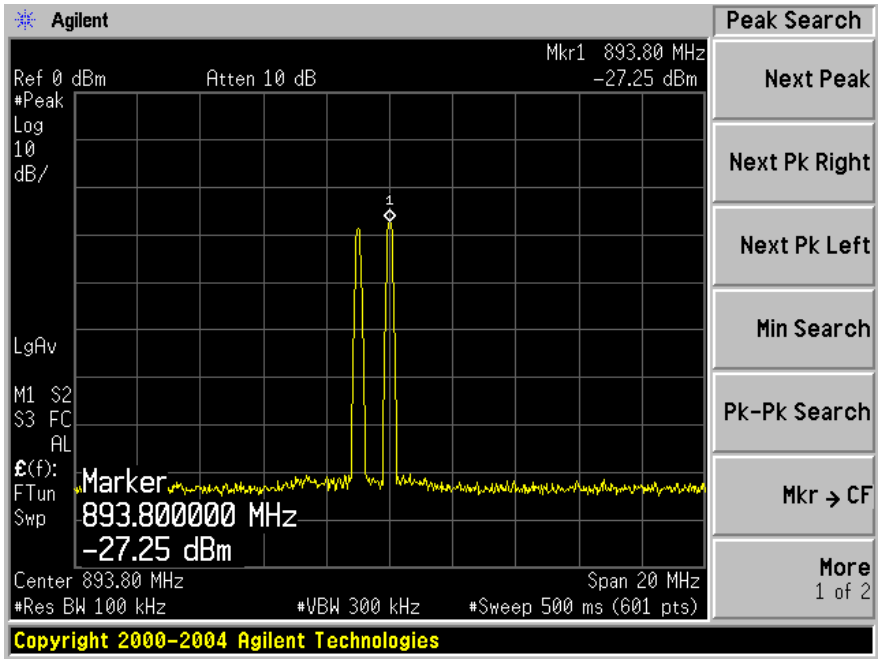


Output

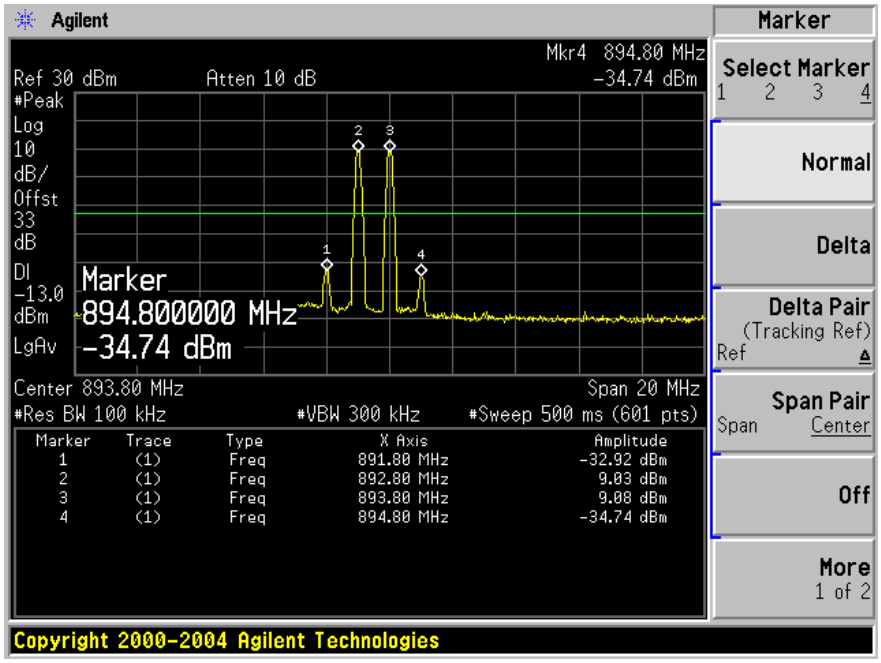


GSM 850 MHz band High channel Downlink:

Input

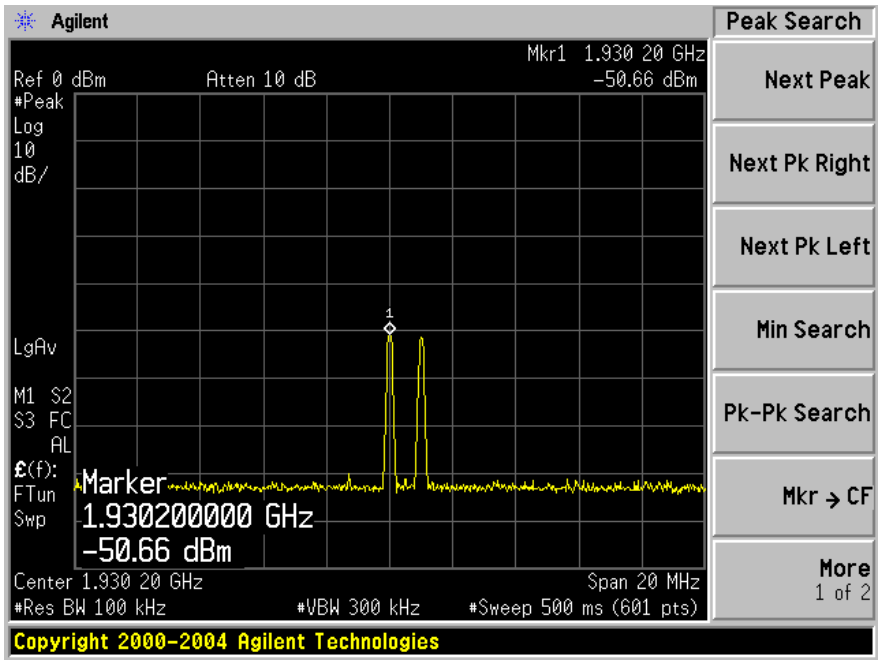


Output

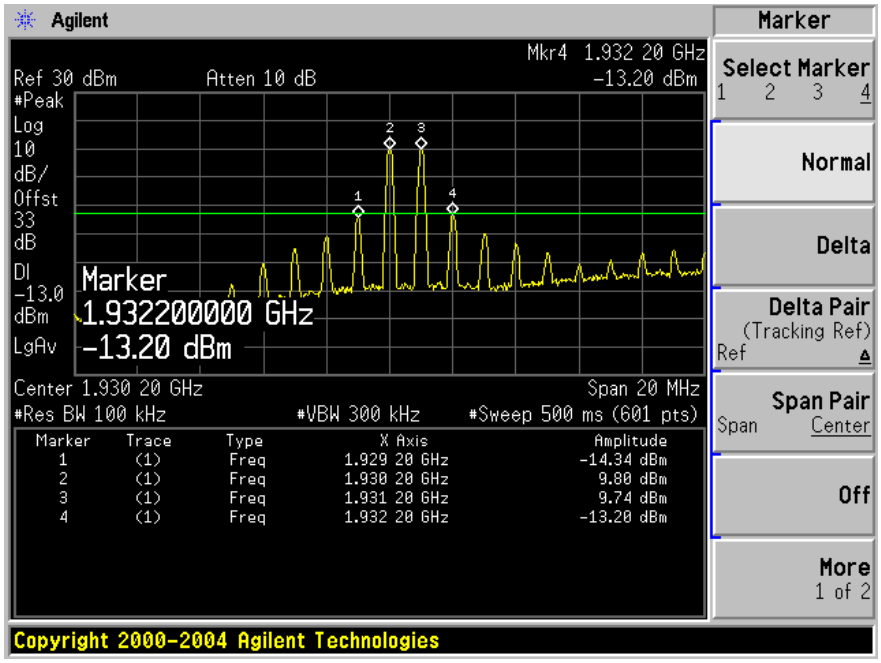


GSM 1900 MHz band Low channel Downlink:

Input

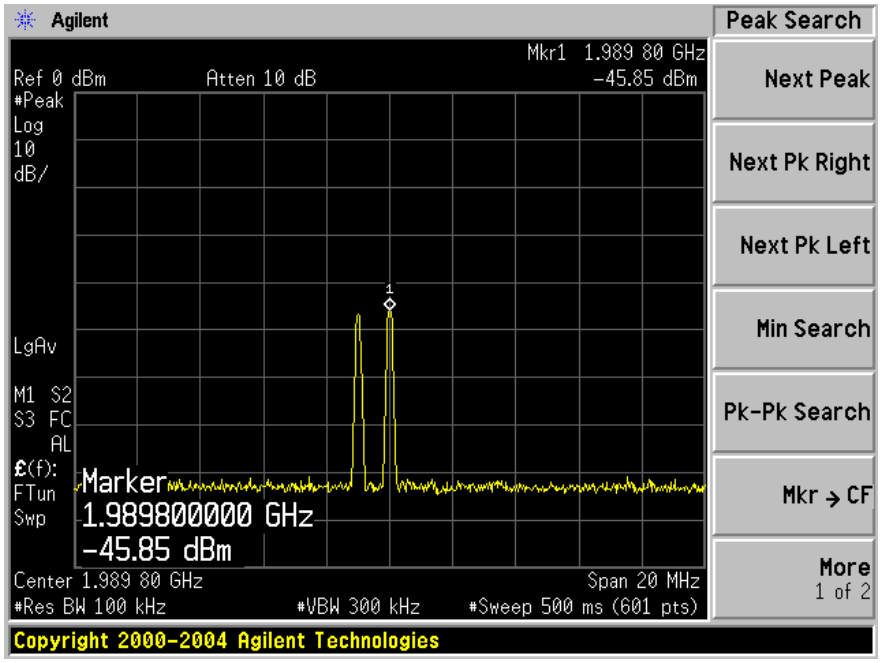


Output

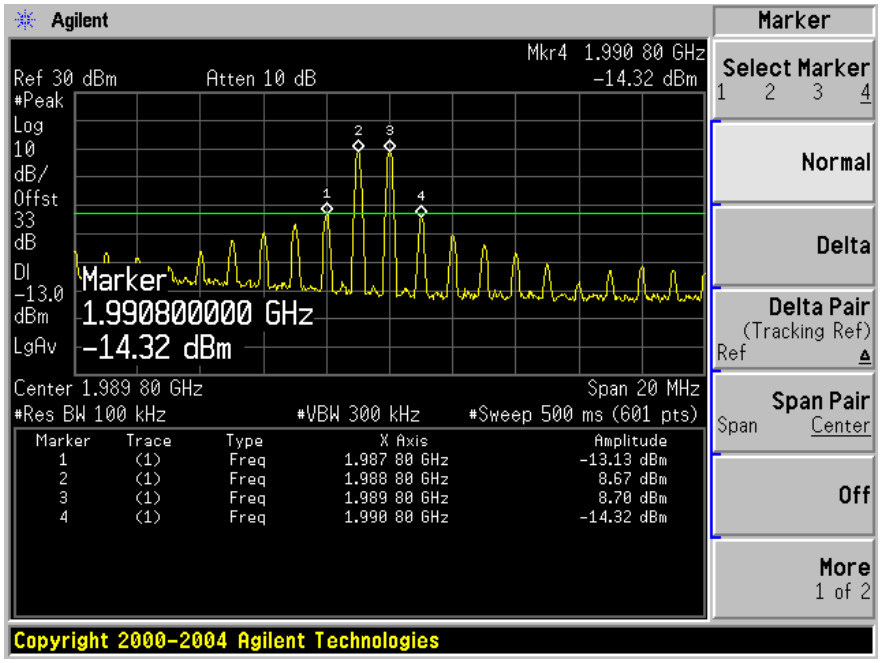


GSM 1900 MHz band High channel Downlink:

Input

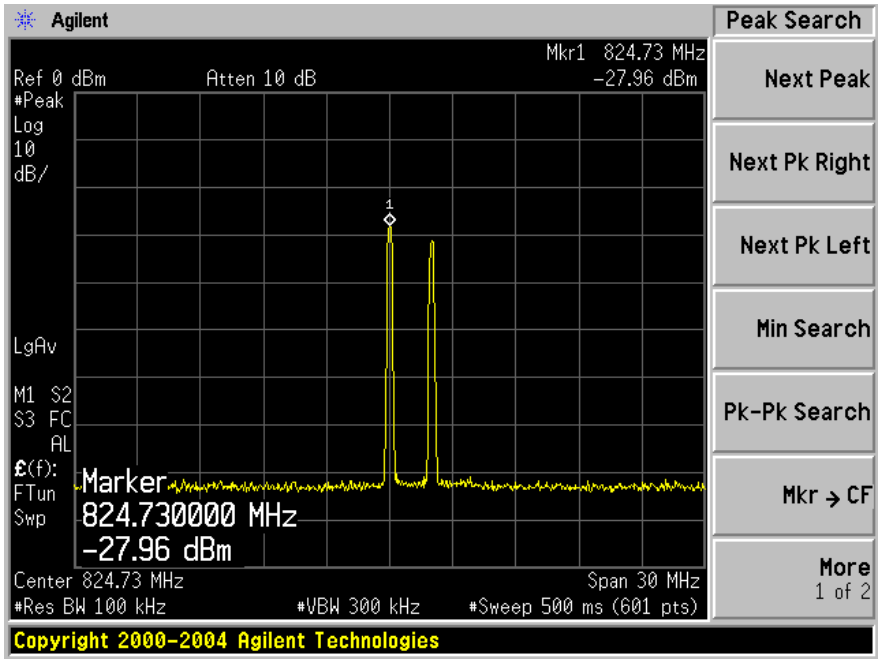


Output

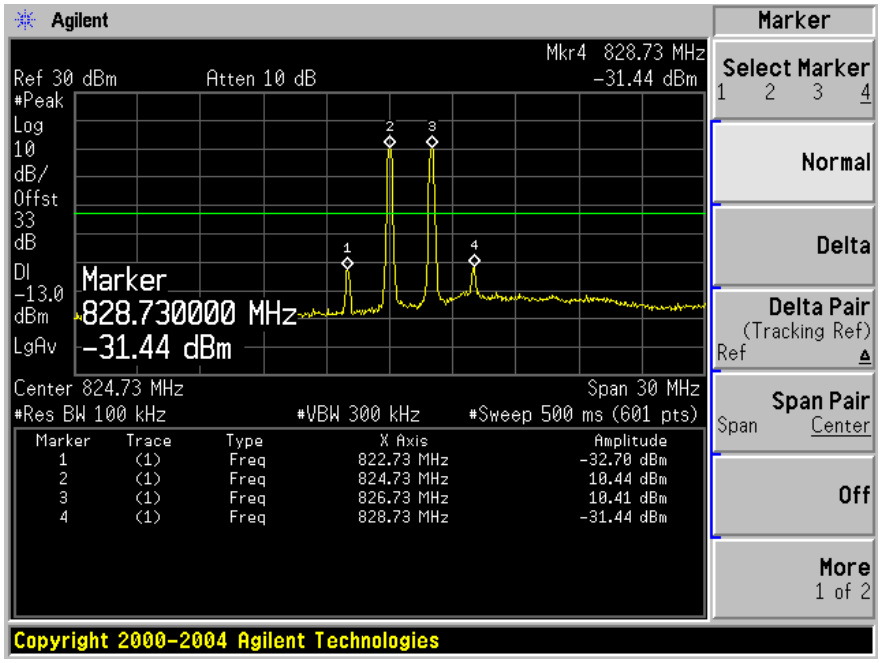


CDMA 850 MHz band Low channel Uplink:

Input

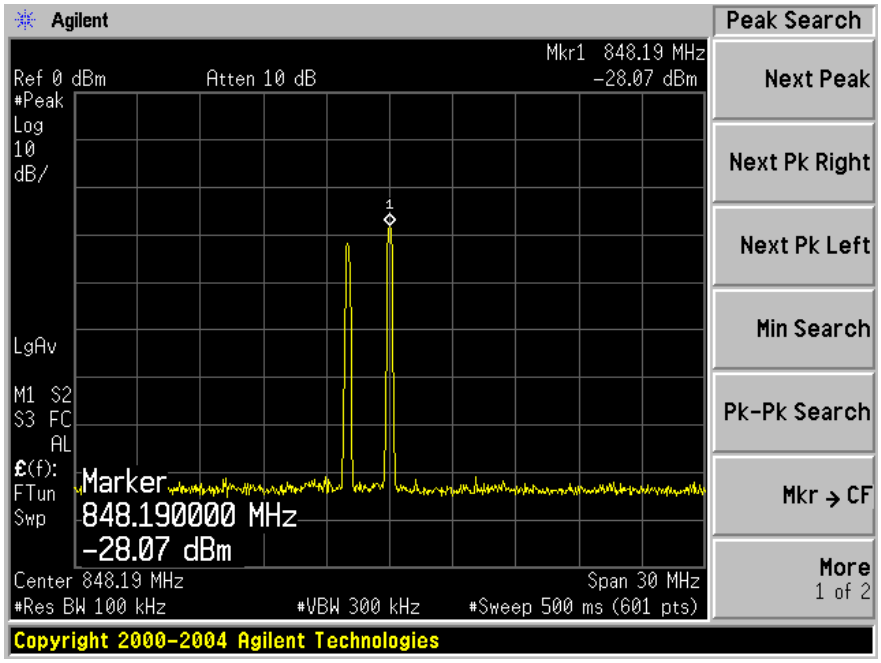


Output

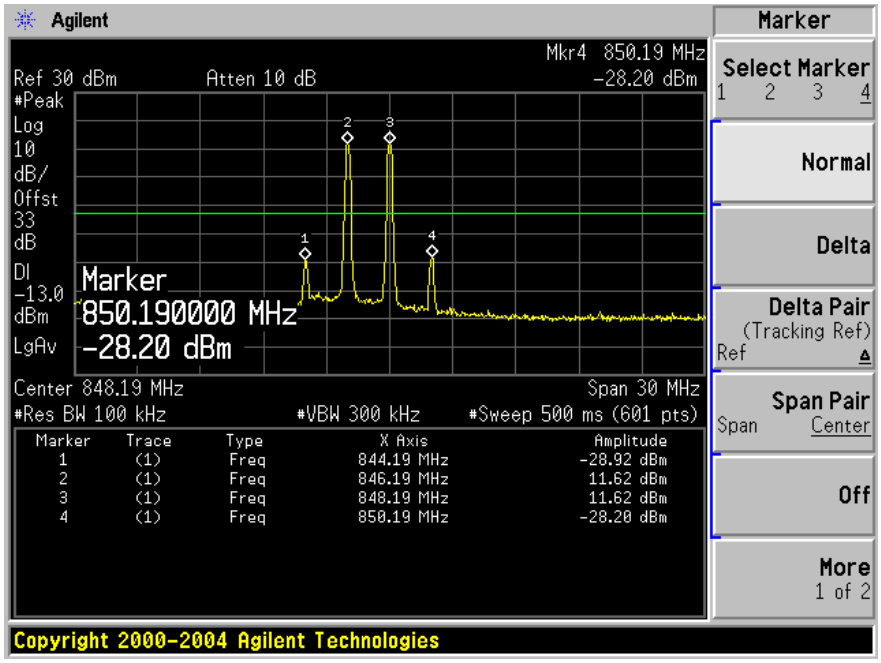


CDMA 850 MHz band High channel Uplink:

Input

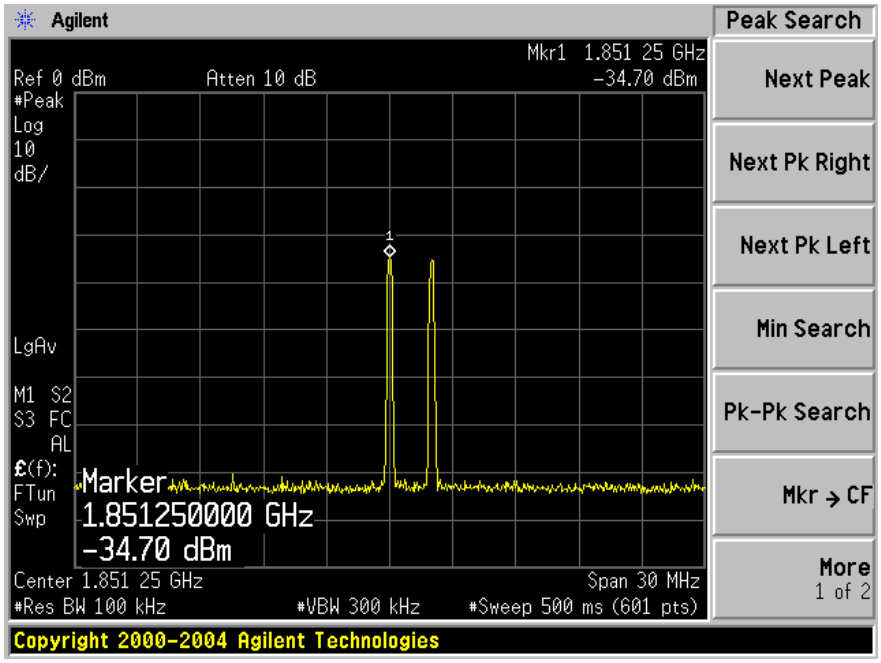


Output

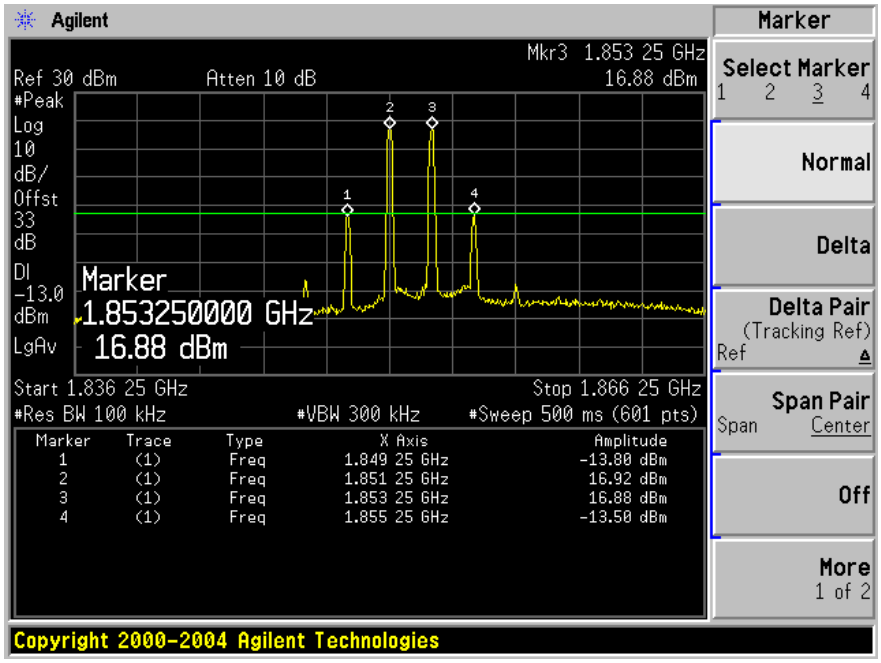


CDMA 1900 MHz band Low channel Uplink:

Input

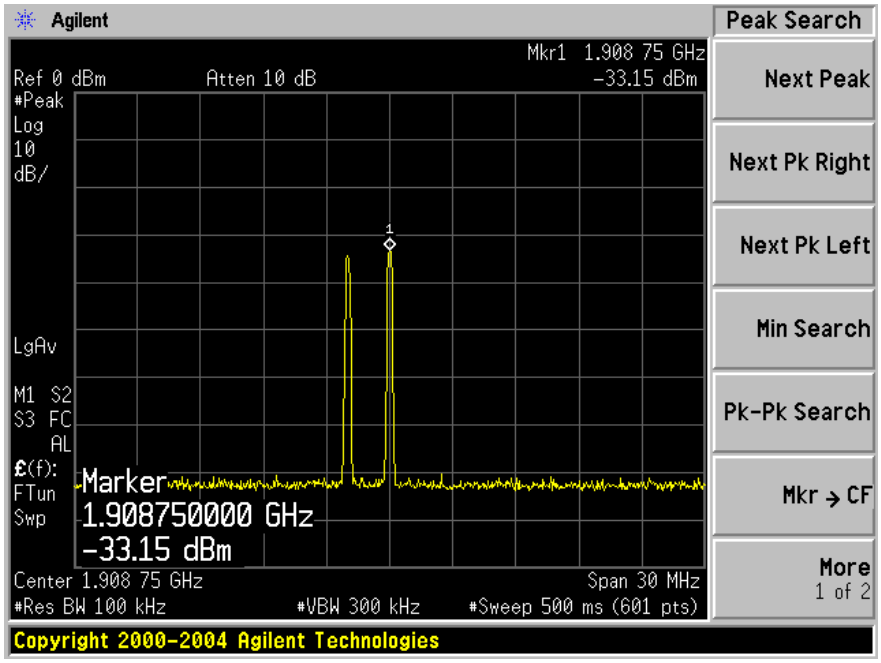


Output

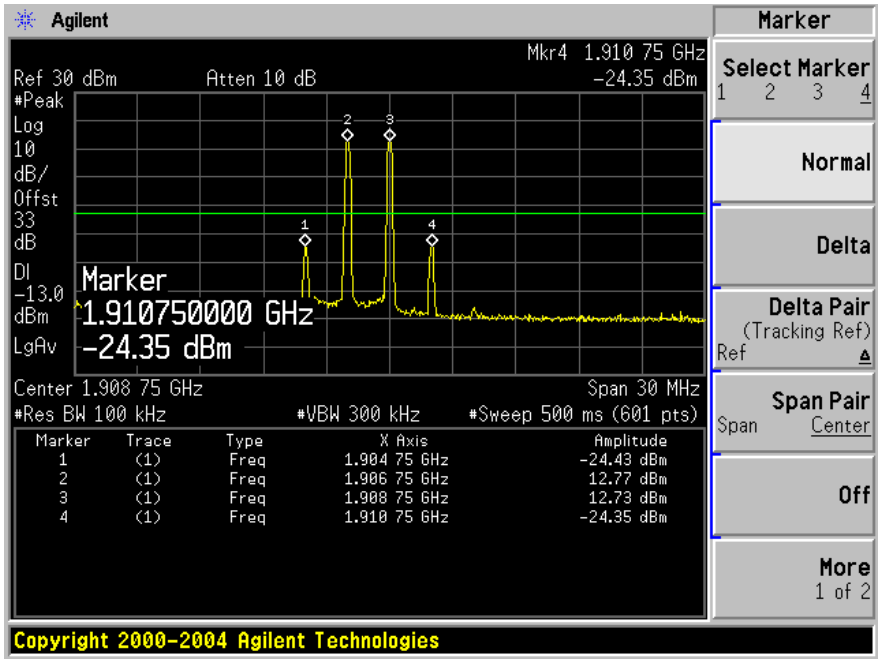


CDMA 1900 MHz band High channel Uplink:

Input

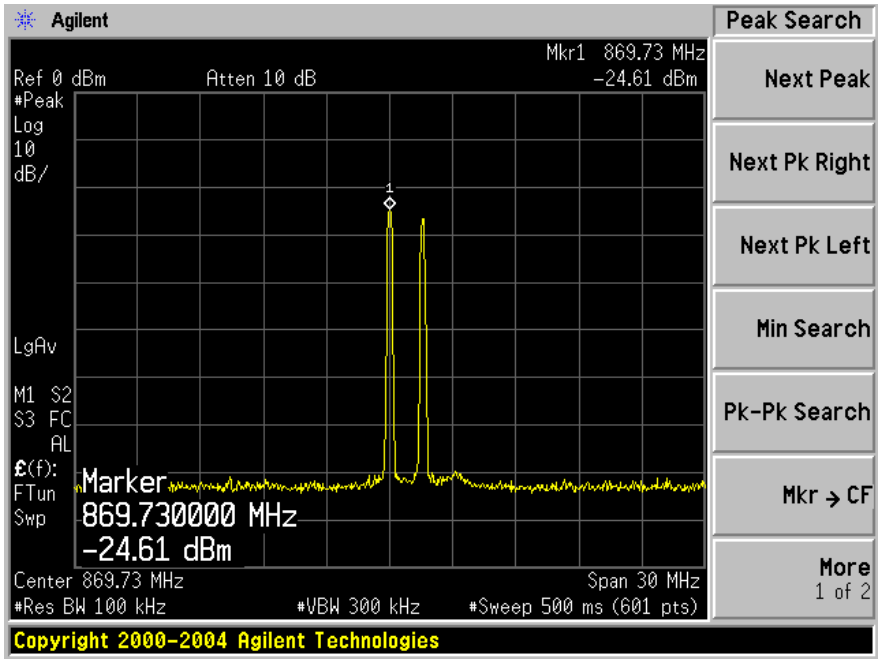


Output

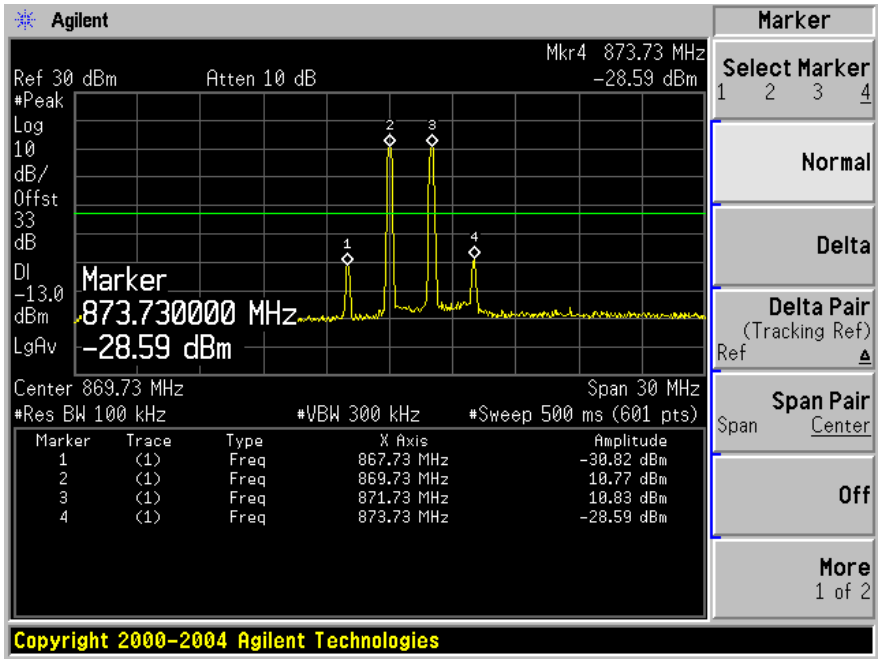


CDMA 850 MHz band Low channel Downlink:

Input

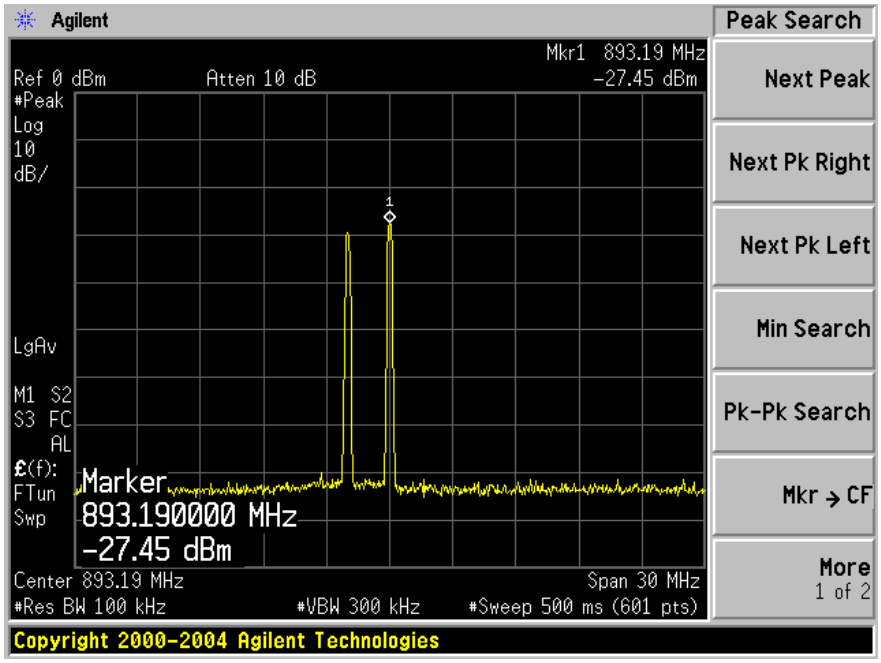


Output

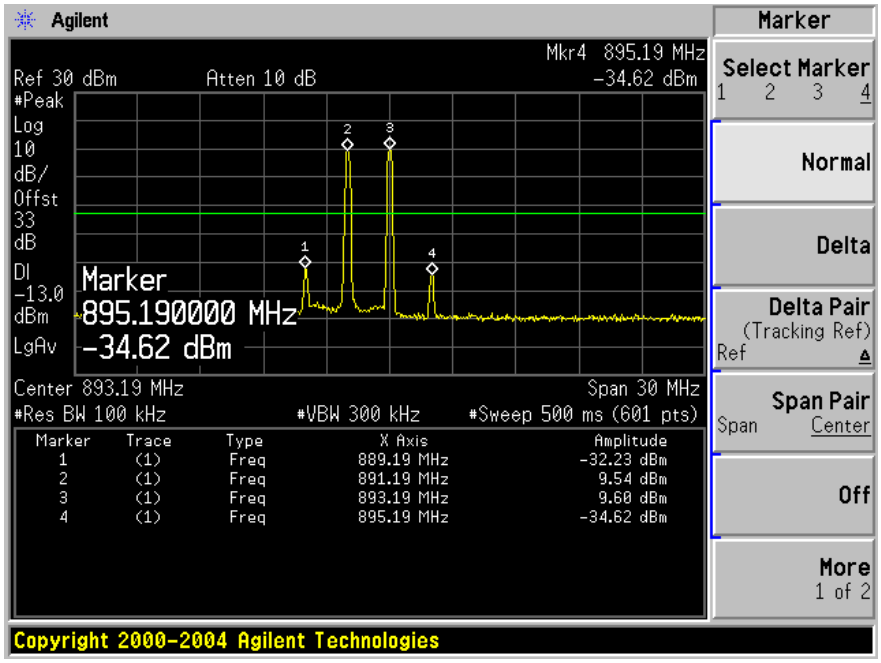


CDMA 850 MHz band High channel Downlink:

Input

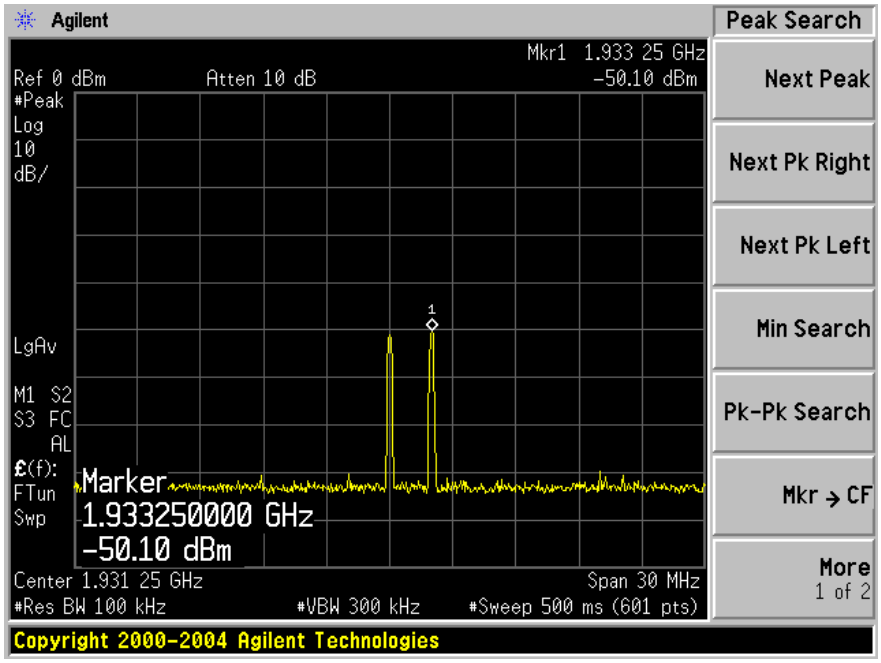


Output

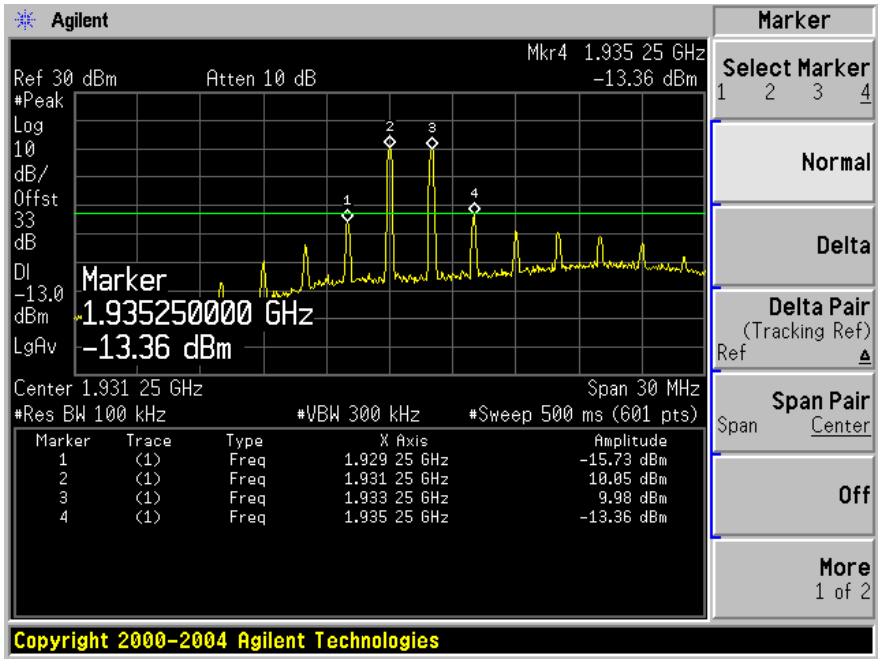


CDMA 1900 MHz band Low channel Downlink:

Input

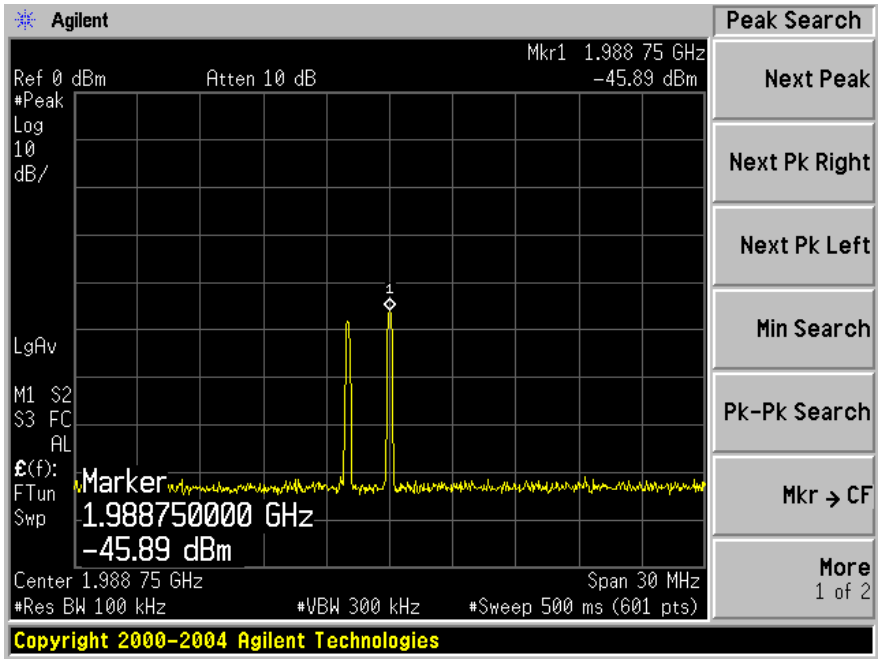


Output

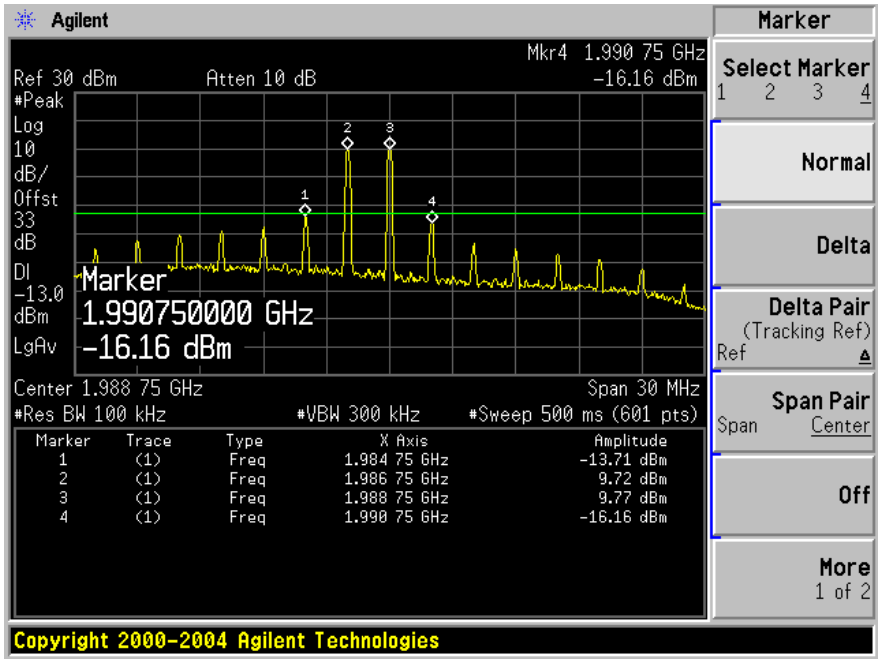


CDMA 1900 MHz band High channel Downlink:

Input

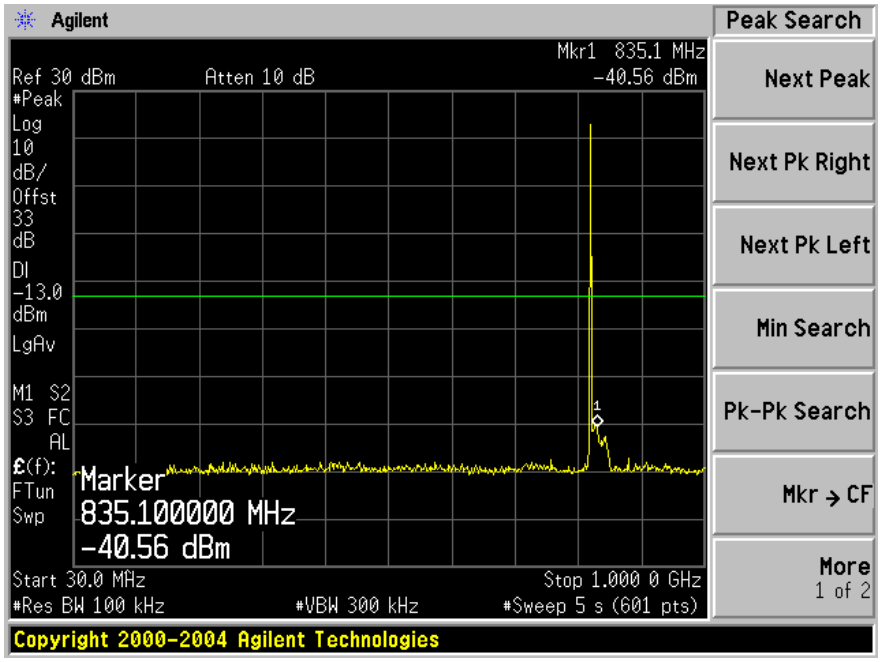


Output

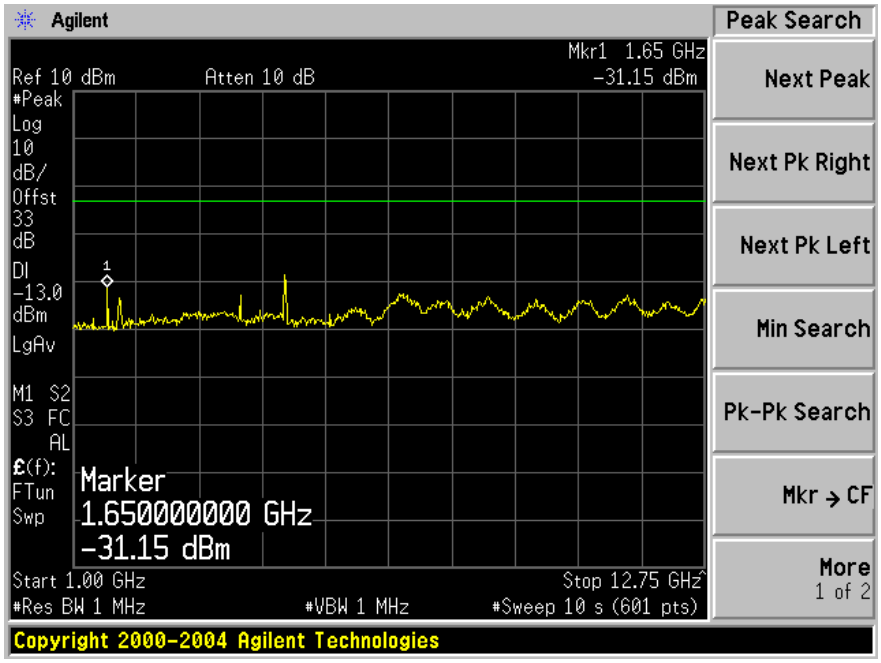


Spurious Emission at antenna terminal:

GSM 850 MHz band Uplink: Low Channel (824.2 MHz)

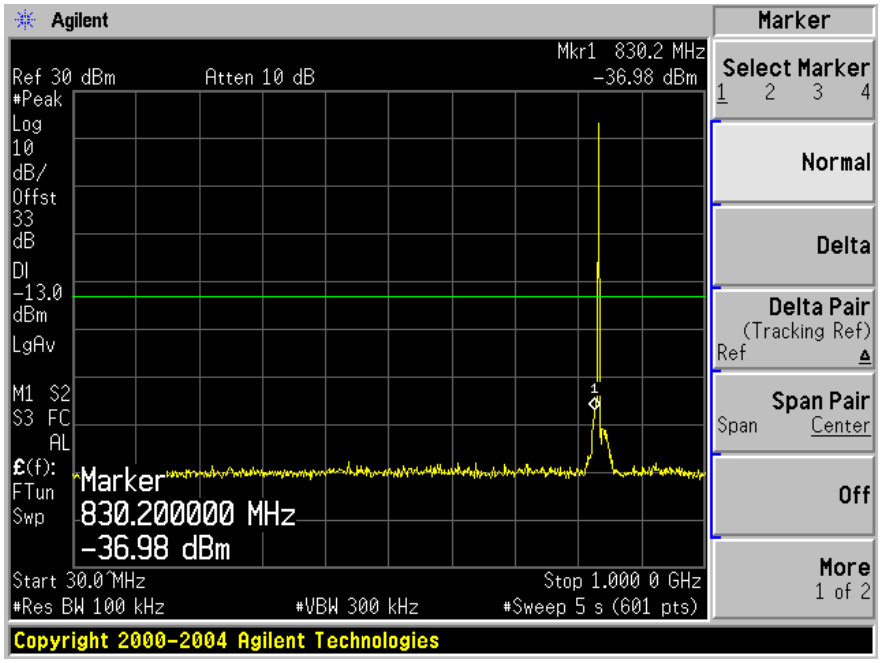


30 MHz to 1 GHz

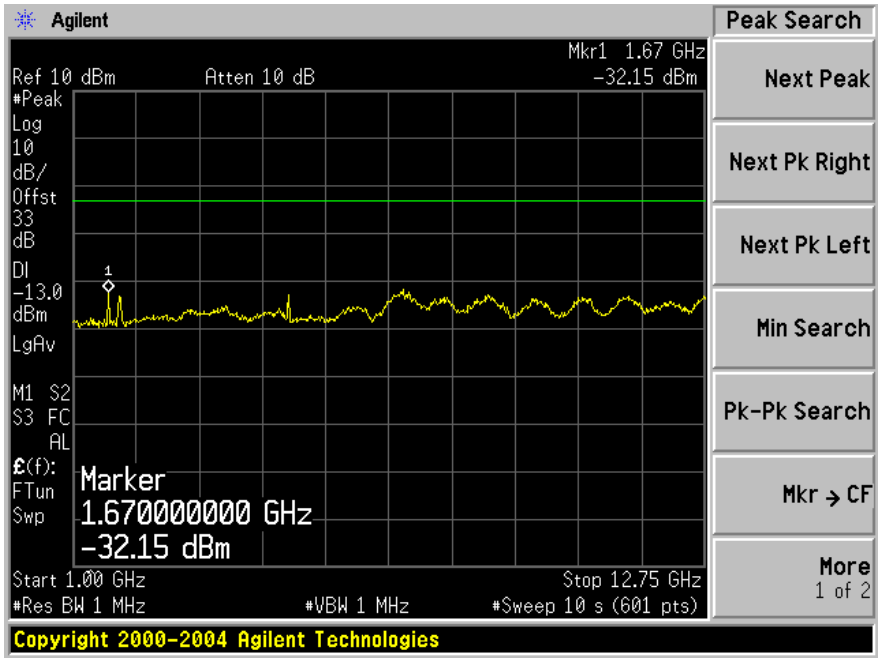


1 GHz to 12.75 GHz

GSM 850 MHz band Uplink: Middle Channel (836.6 MHz)

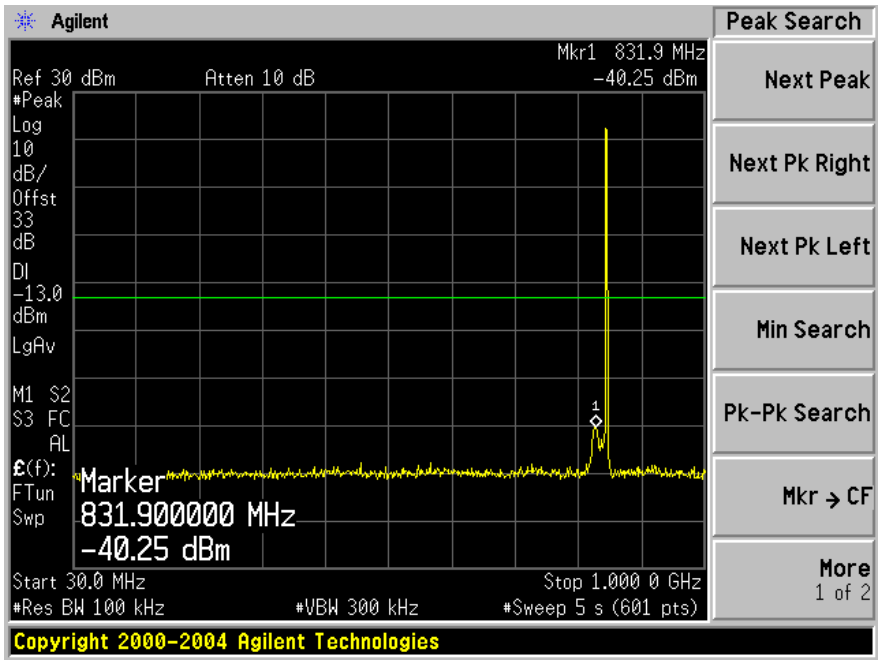


30 MHz to 1 GHz

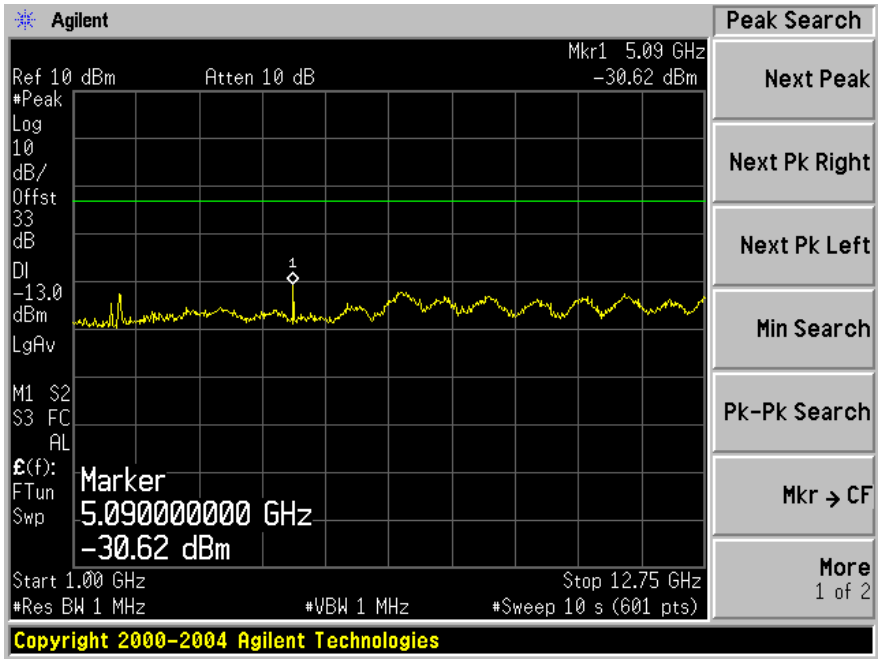


1 GHz to 12.75 GHz

GSM 850 MHz band Uplink: High Channel (848.8 MHz)

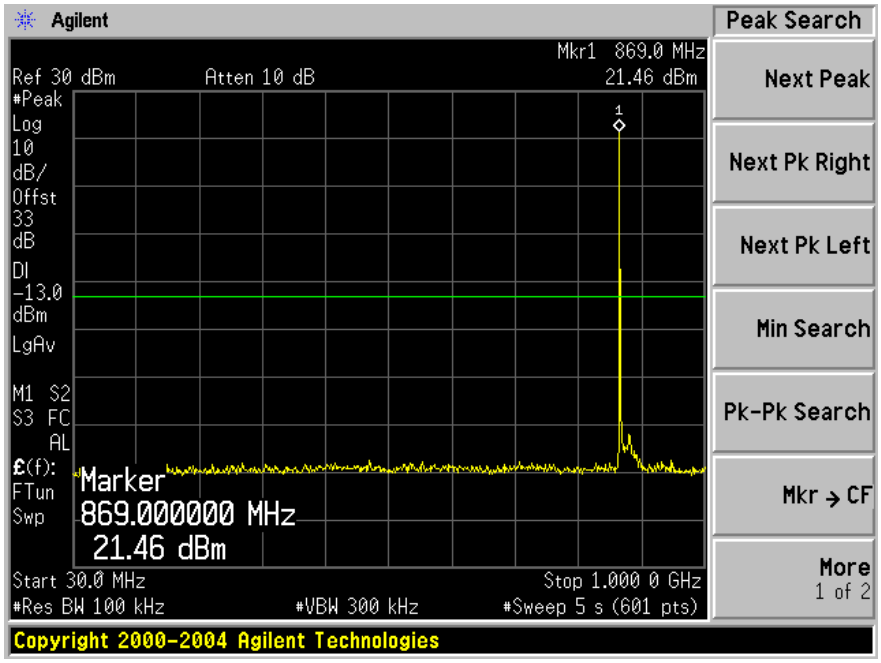


30 MHz to 1 GHz

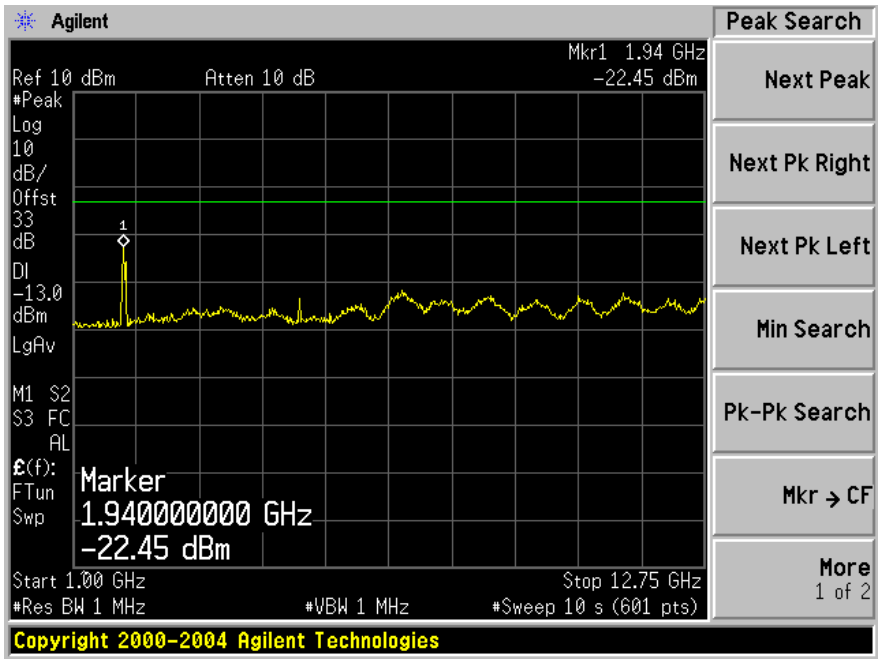


1 GHz to 12.75 GHz

GSM 850 MHz band Downlink: Low Channel (869.2 MHz)

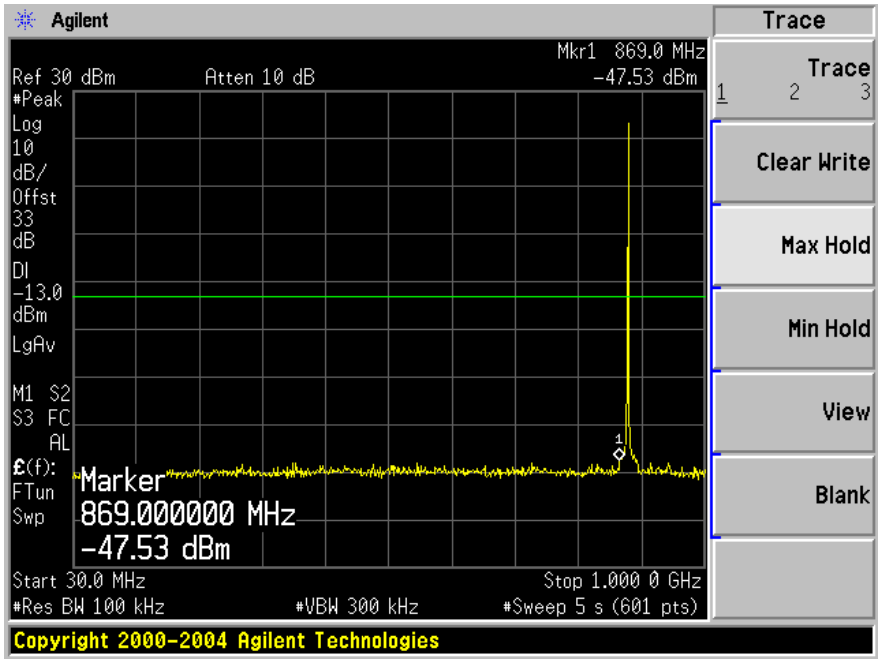


30 MHz to 1 GHz

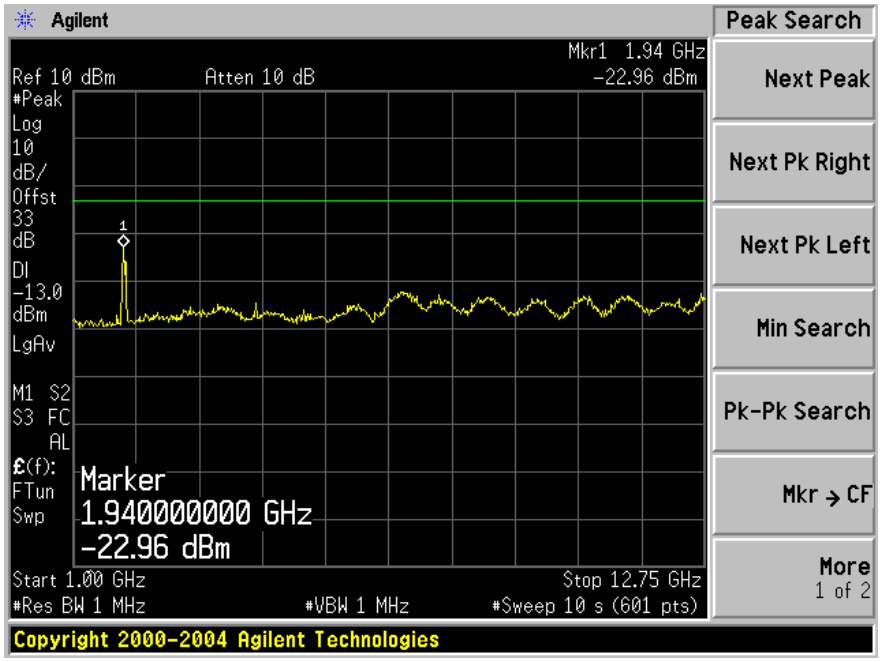


1 GHz to 12.75 GHz

GSM 850 MHz band Downlink: Middle Channel (881.6 MHz)

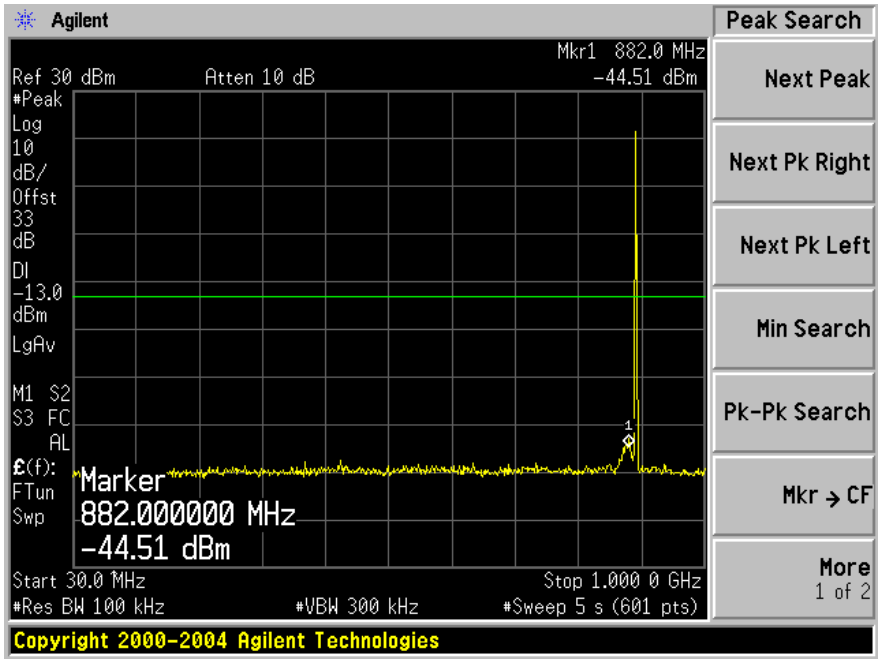


30 MHz to 1 GHz

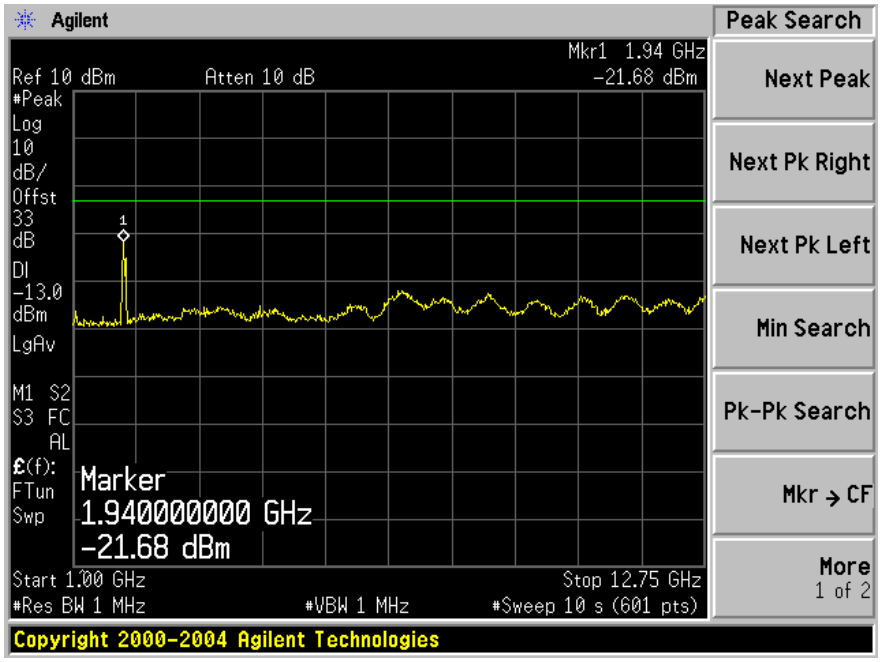


1 GHz to 12.75 GHz

GSM 850 MHz band Downlink: High Channel (893.8 MHz)

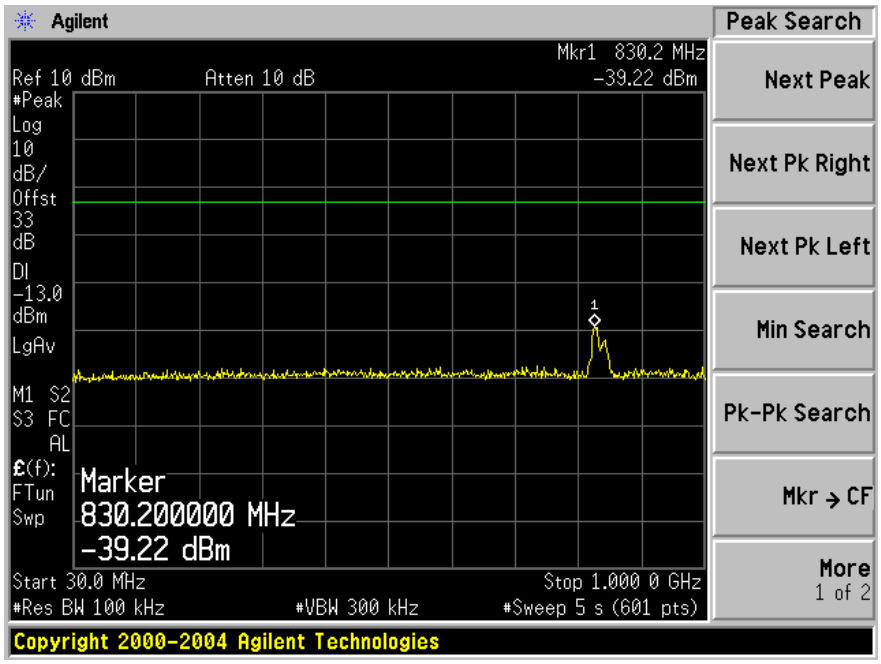


30 MHz to 1 GHz

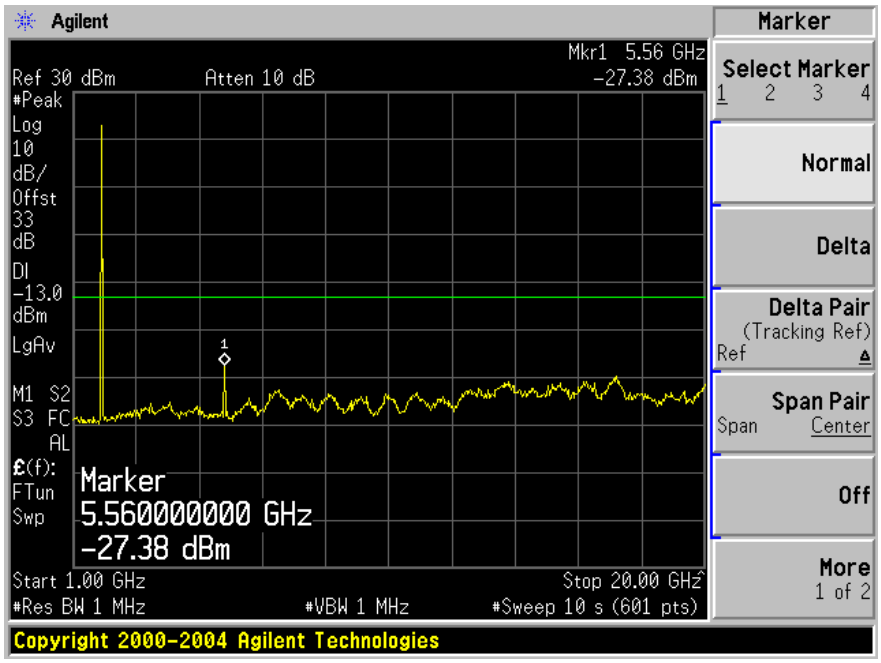


1 GHz to 12.75 GHz

GSM 1900 MHz band Uplink: Low Channel (1850.2 MHz)

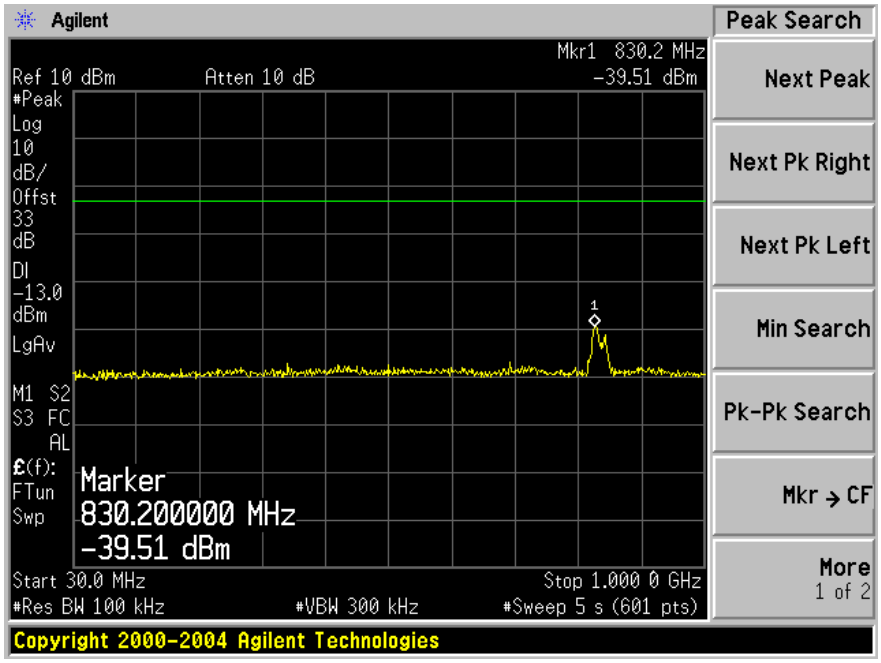


30 MHz to 1 GHz

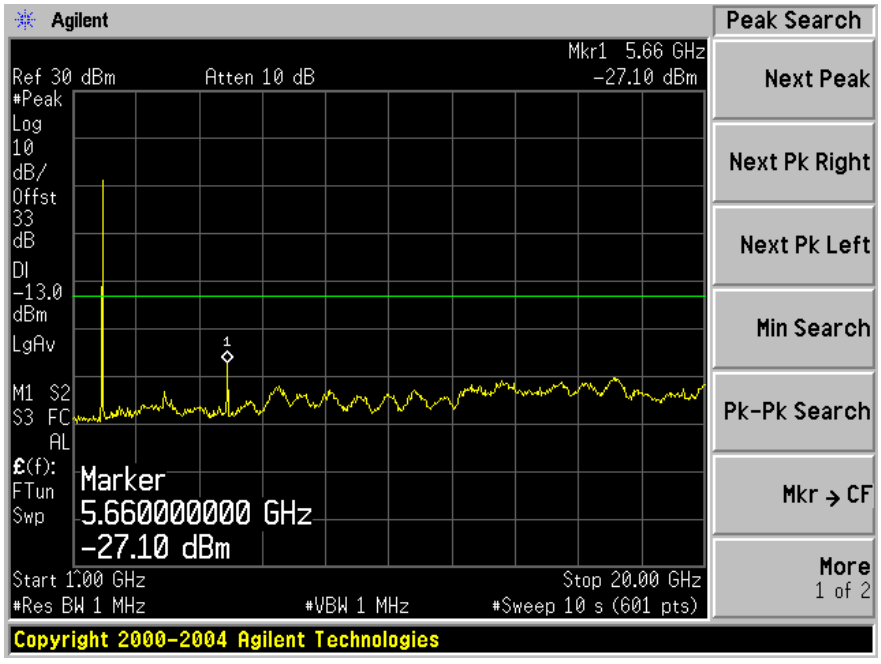


1 GHz to 20 GHz

GSM 1900 MHz band Uplink: Middle Channel (1880 MHz)

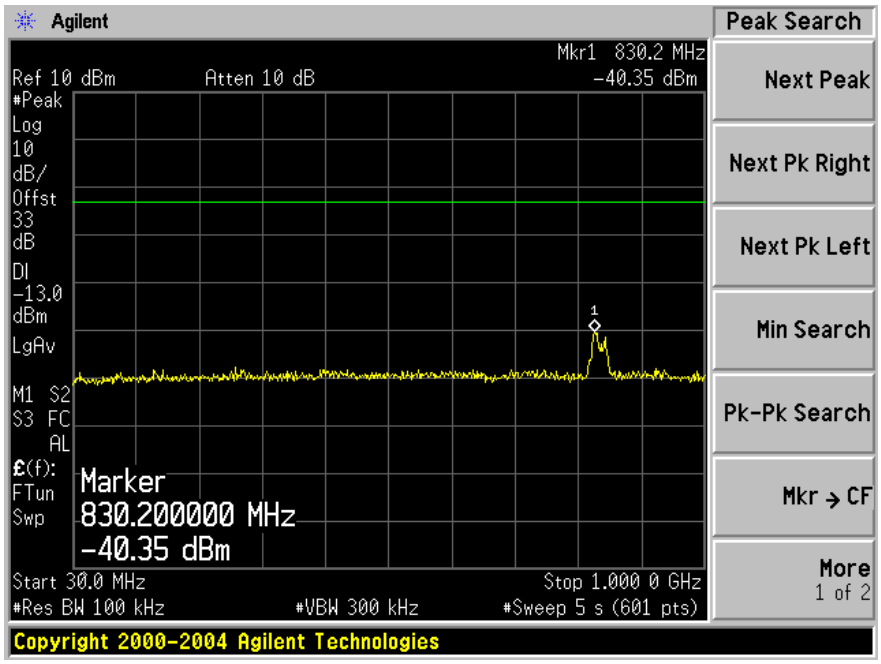


30 MHz to 1 GHz

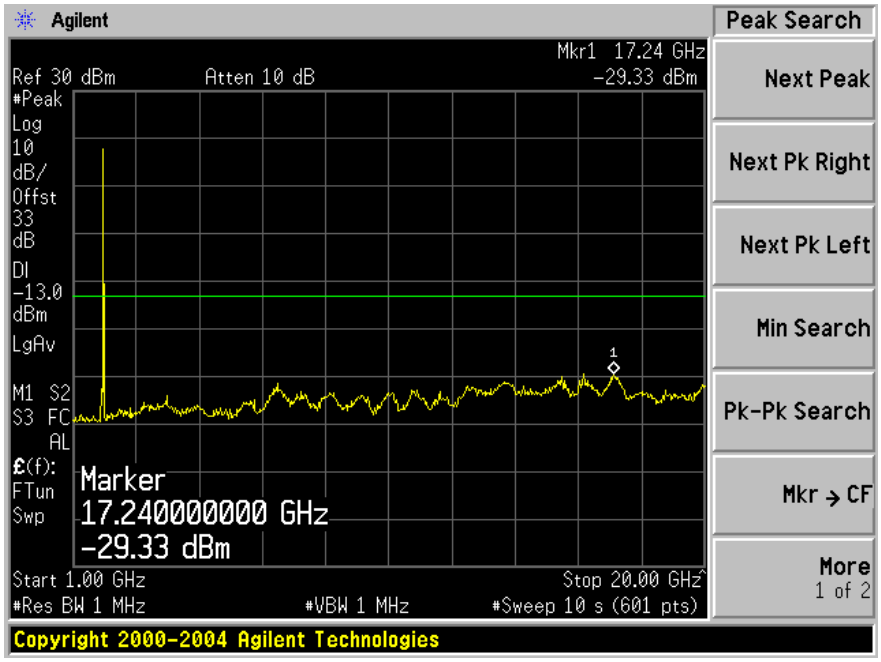


1 GHz to 20 GHz

GSM 1900 MHz band Uplink: High Channel (1909.8 MHz)

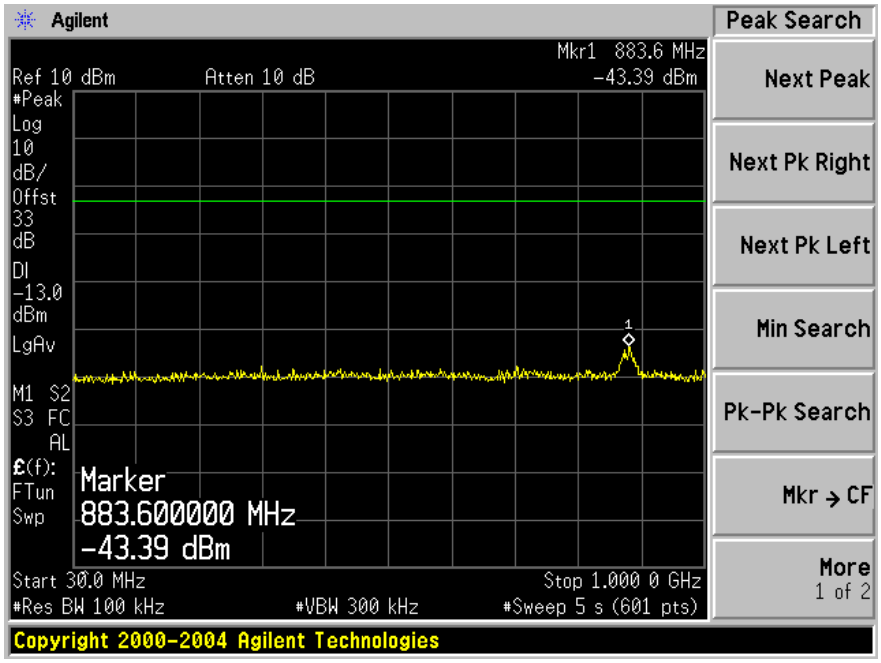


30 MHz to 1 GHz

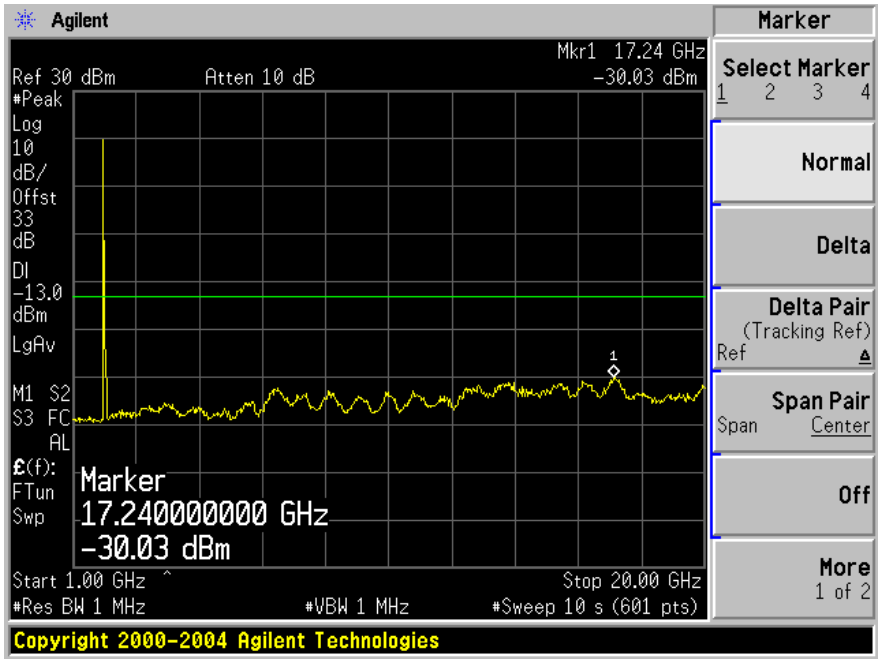


1 GHz to 20 GHz

GSM 1900 MHz band Downlink: Low Channel (1930.2 MHz)

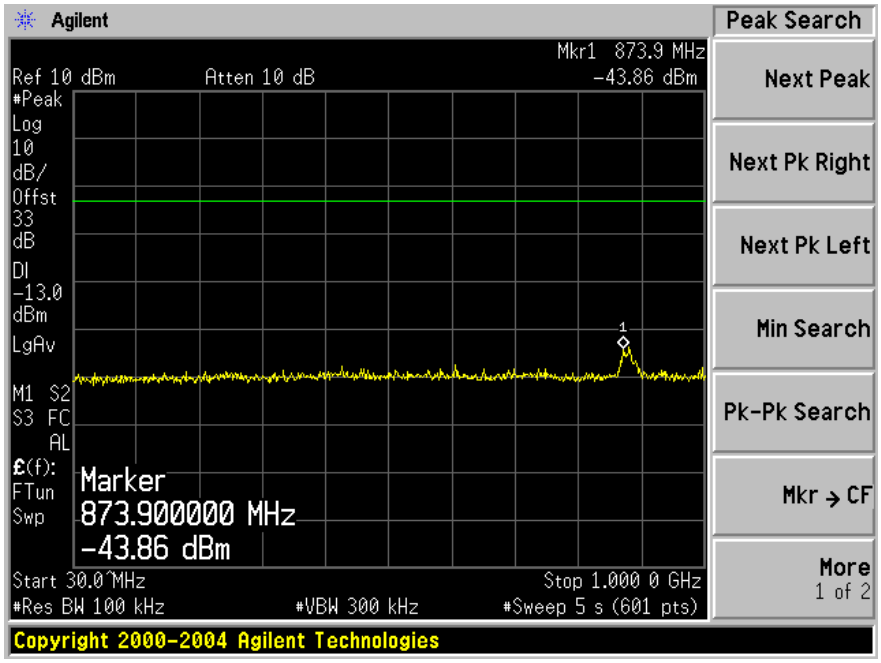


30 MHz to 1 GHz

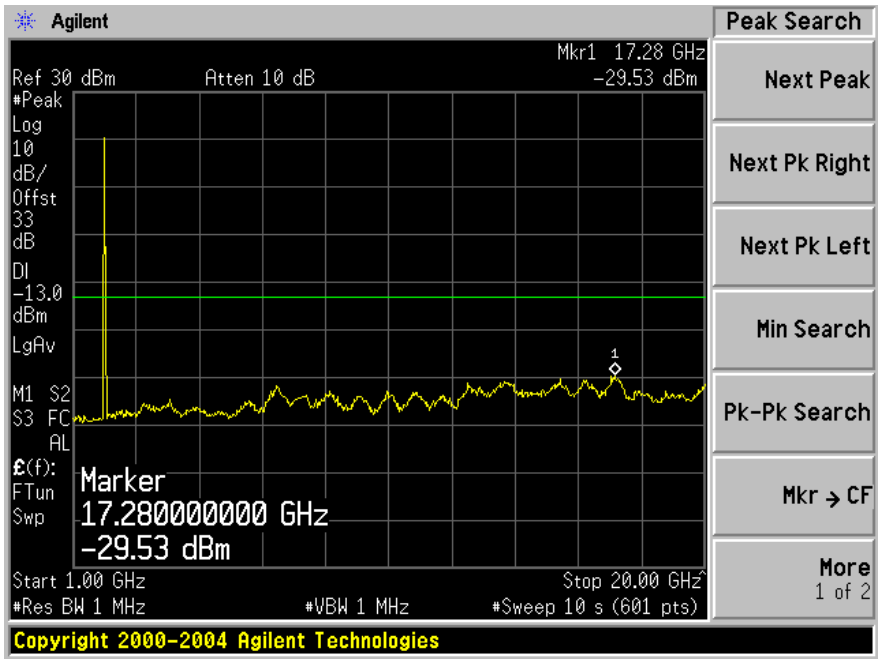


1 GHz to 20 GHz

GSM 1900 MHz band Downlink: Middle Channel (1960 MHz)

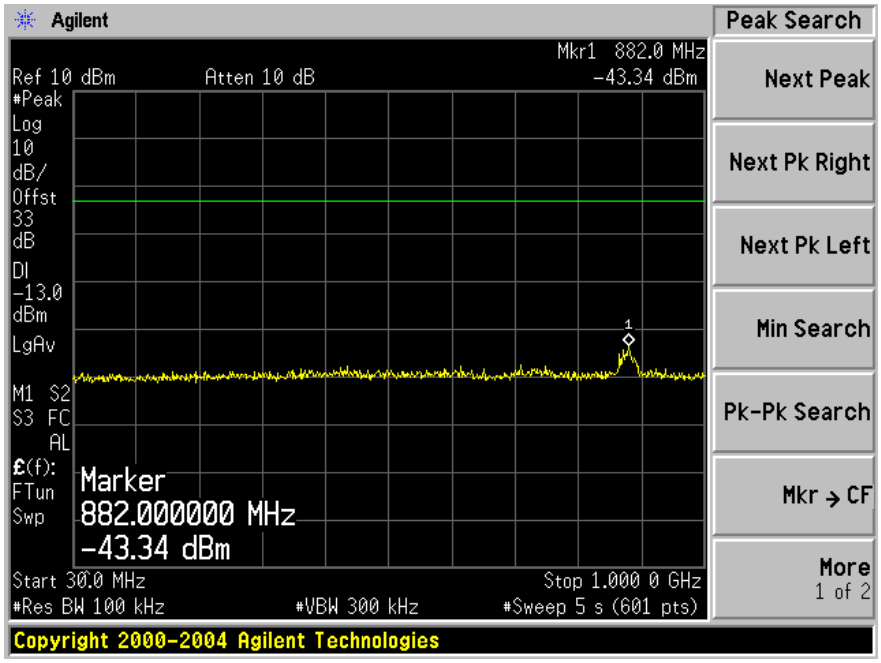


30 MHz to 1 GHz

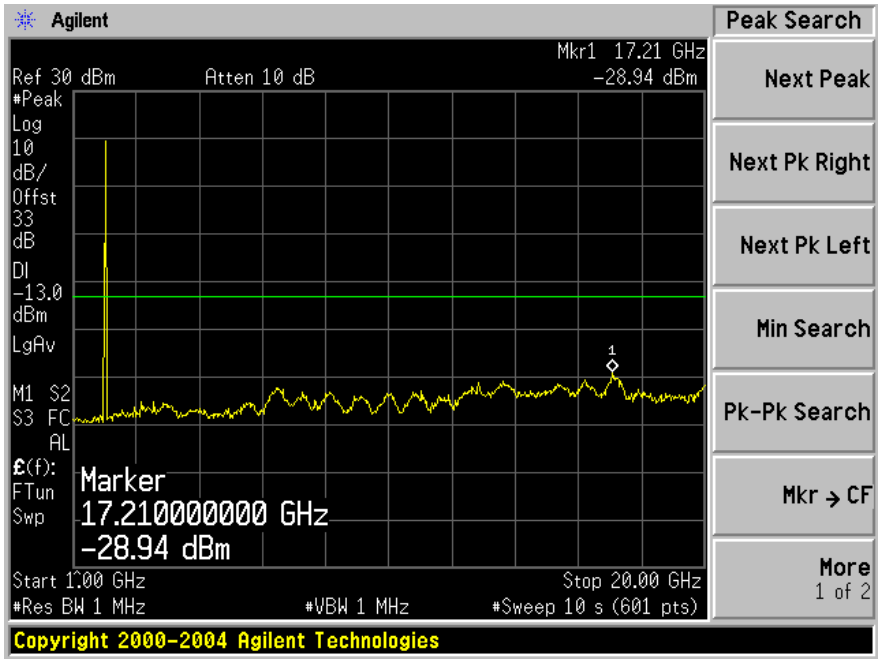


1 GHz to 20 GHz

GSM 1900 MHz band Downlink: High Channel (1989.8 MHz)

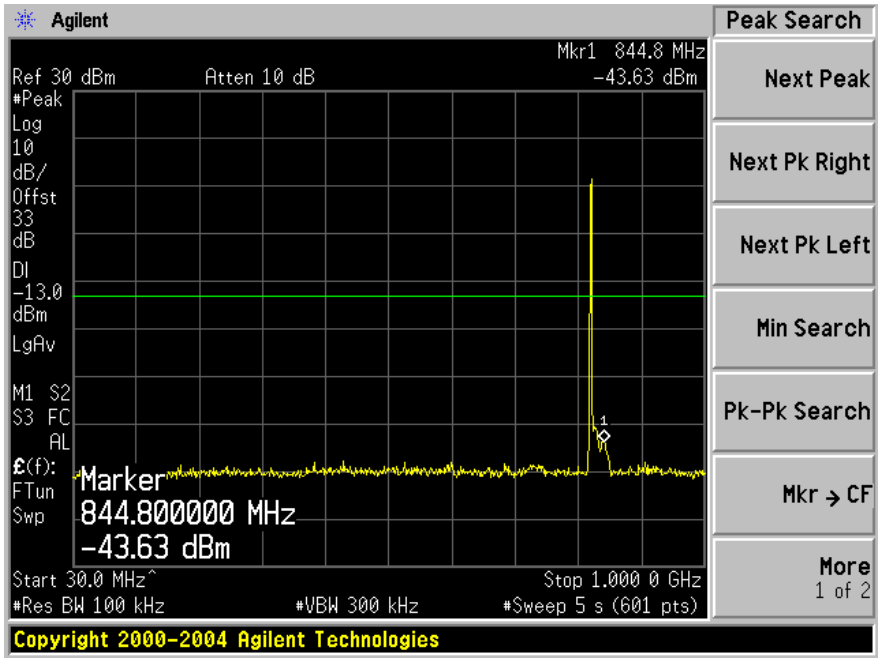


30 MHz to 1 GHz

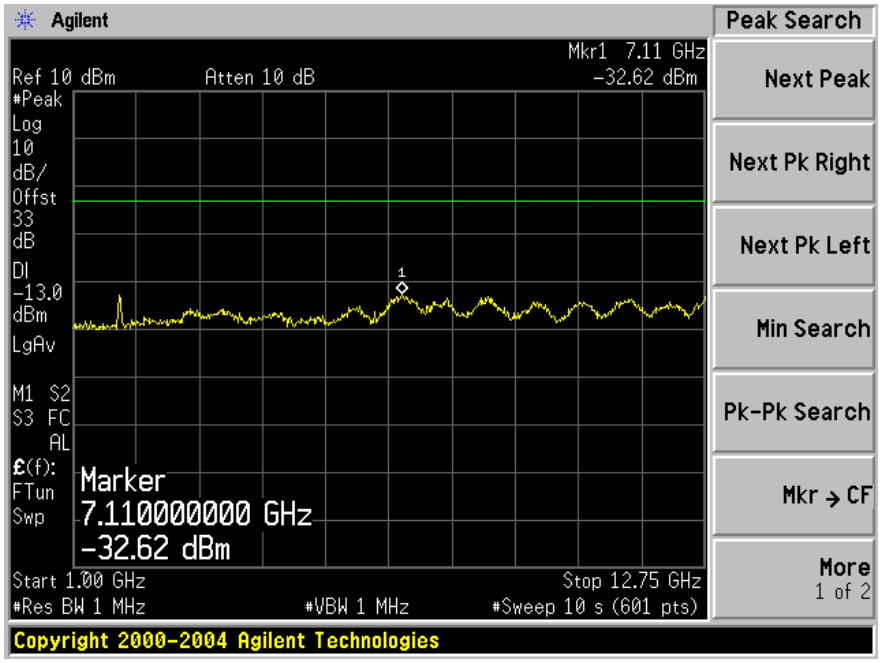


1 GHz to 20 GHz

CDMA 850 MHz band Uplink: Low Channel (824.73 MHz)

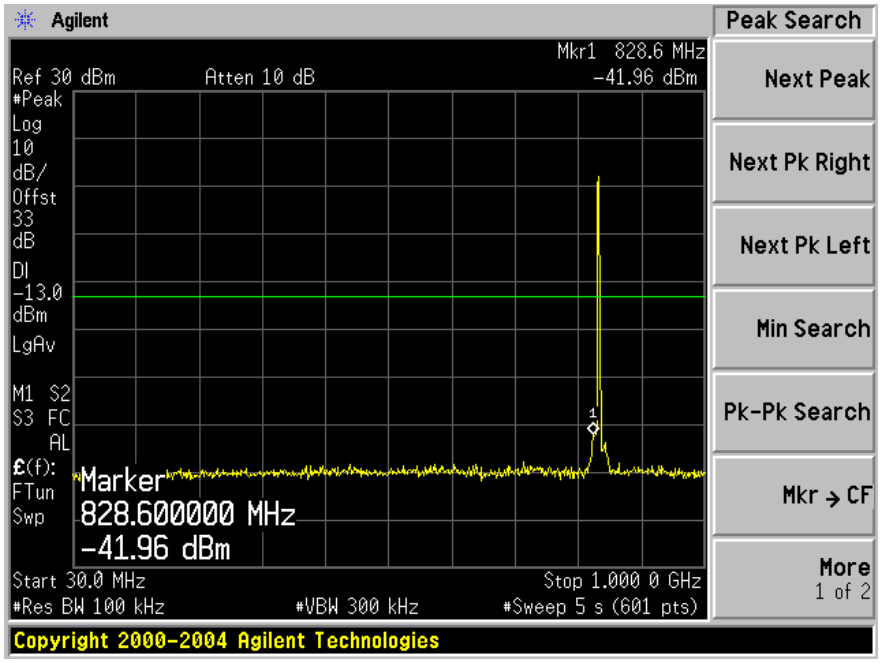


30 MHz to 1 GHz

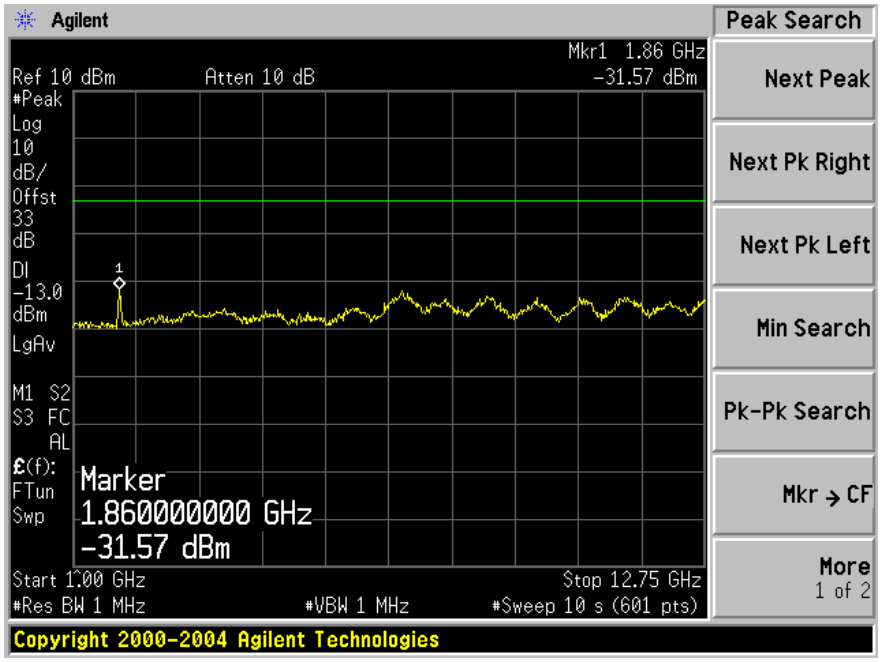


1 GHz to 12.75 GHz

CDMA 850 MHz band Uplink: Middle Channel (836.4 MHz)

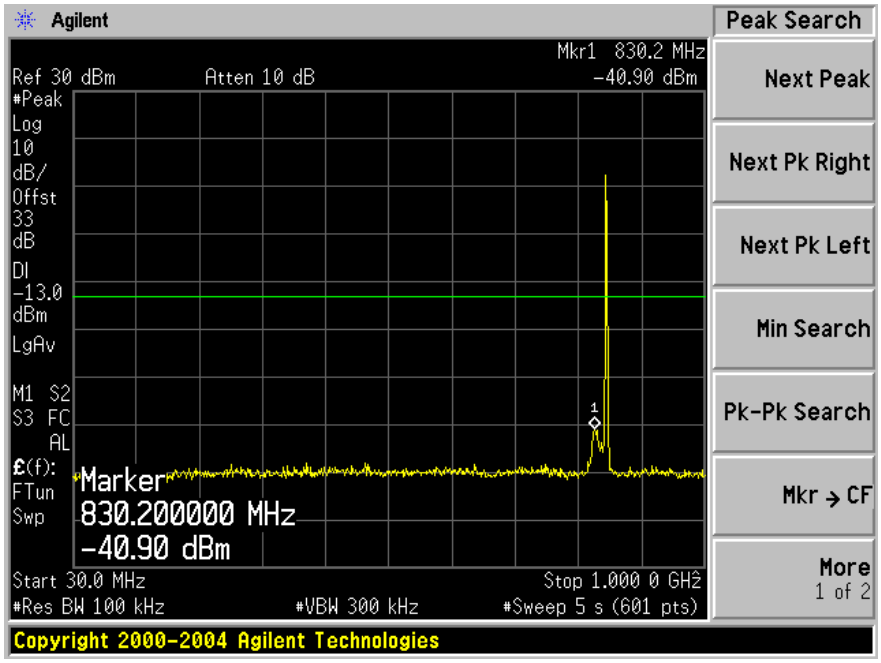


30 MHz to 1 GHz

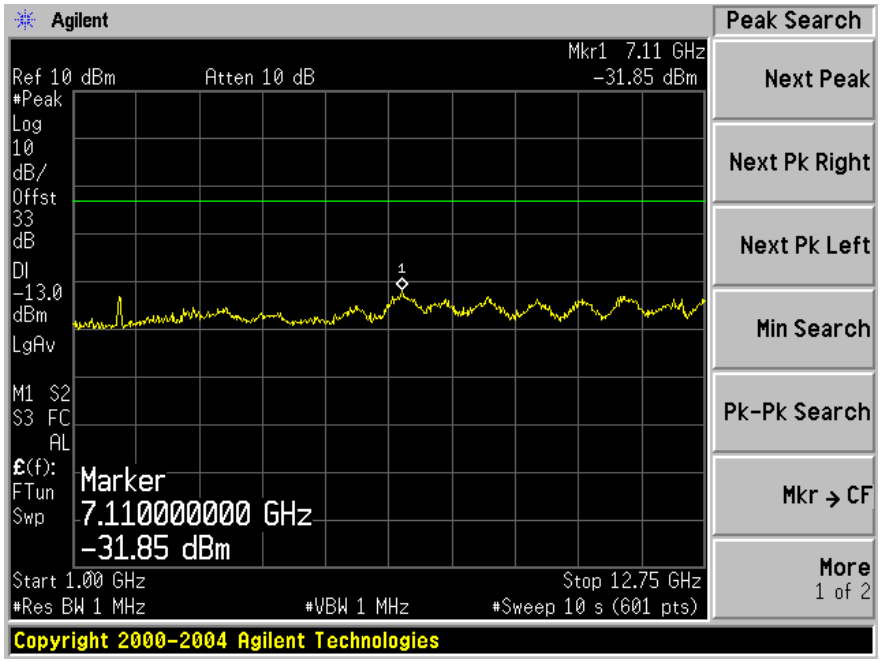


1 GHz to 12.75 GHz

CDMA 850 MHz band Uplink: High Channel (848.19 MHz)

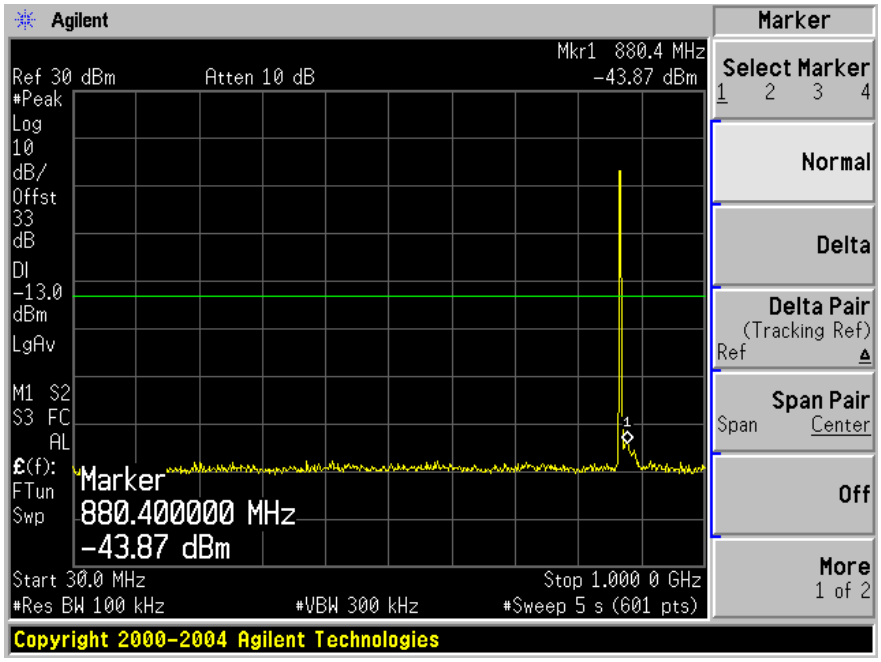


30 MHz to 1 GHz

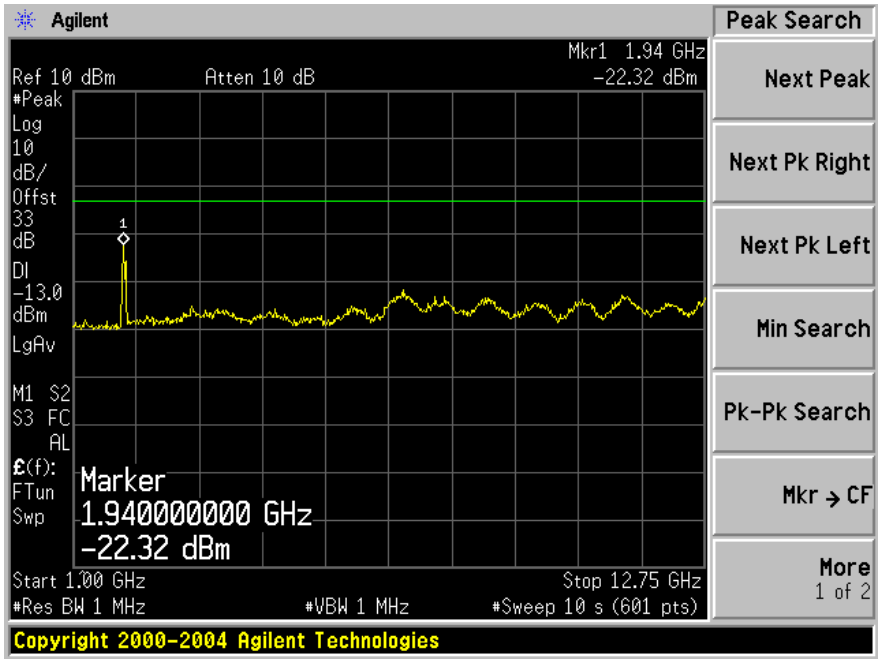


1 GHz to 12.75 GHz

CDMA 850 MHz band Downlink: Low Channel (869.73 MHz)

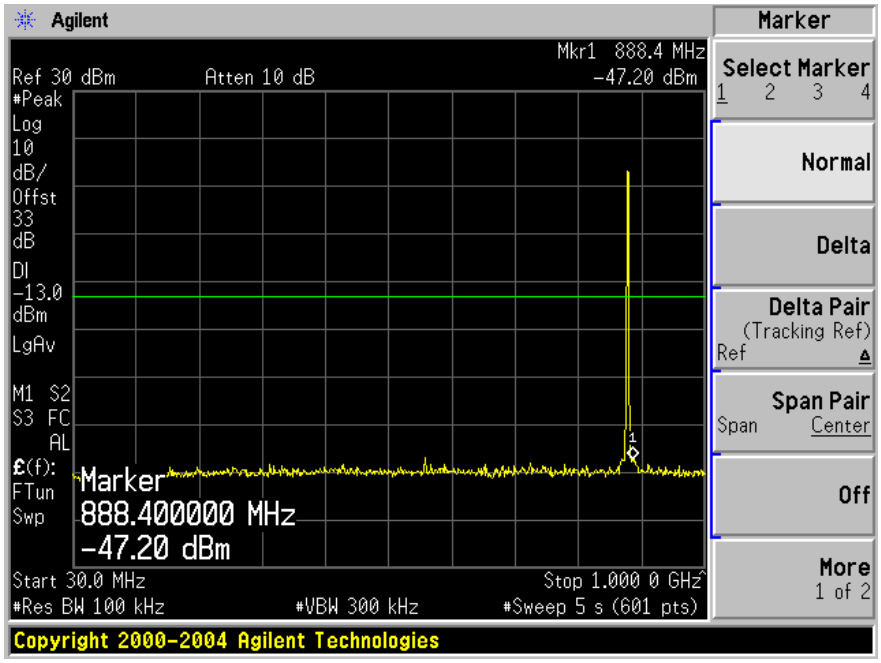


30 MHz to 1 GHz

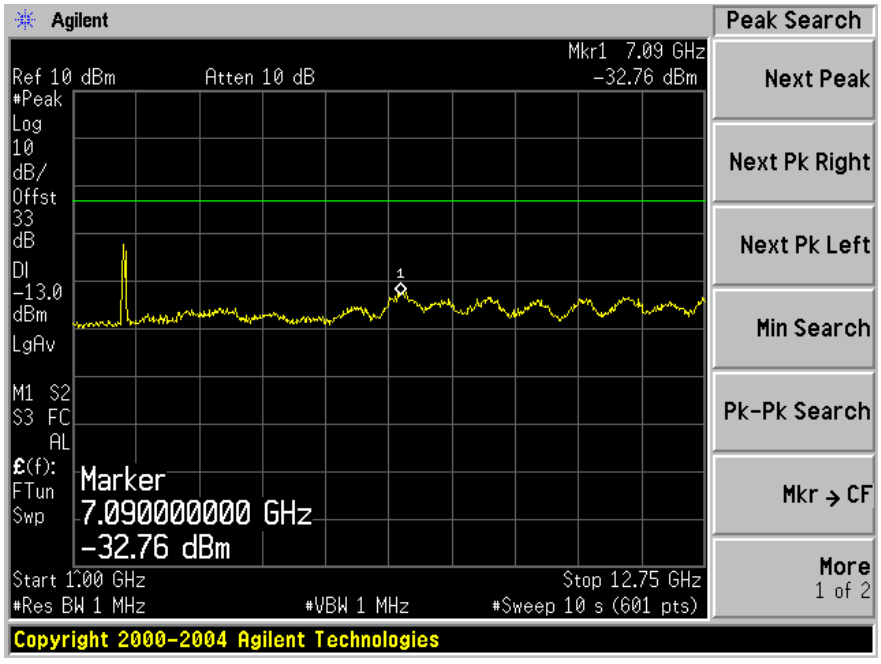


1 GHz to 12.75 GHz

CDMA 850 MHz band Downlink: Middle Channel (881.4 MHz)

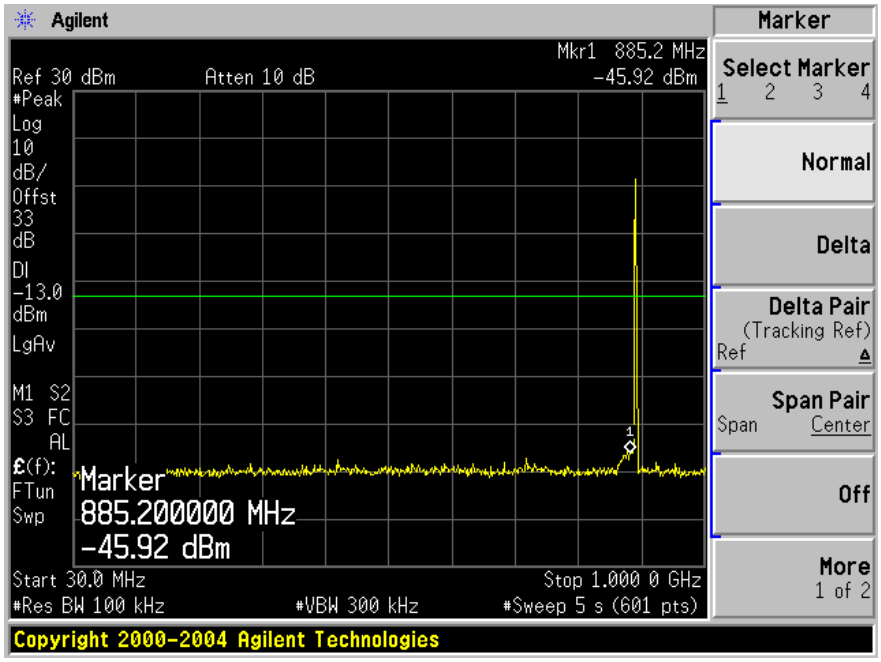


30 MHz to 1 GHz

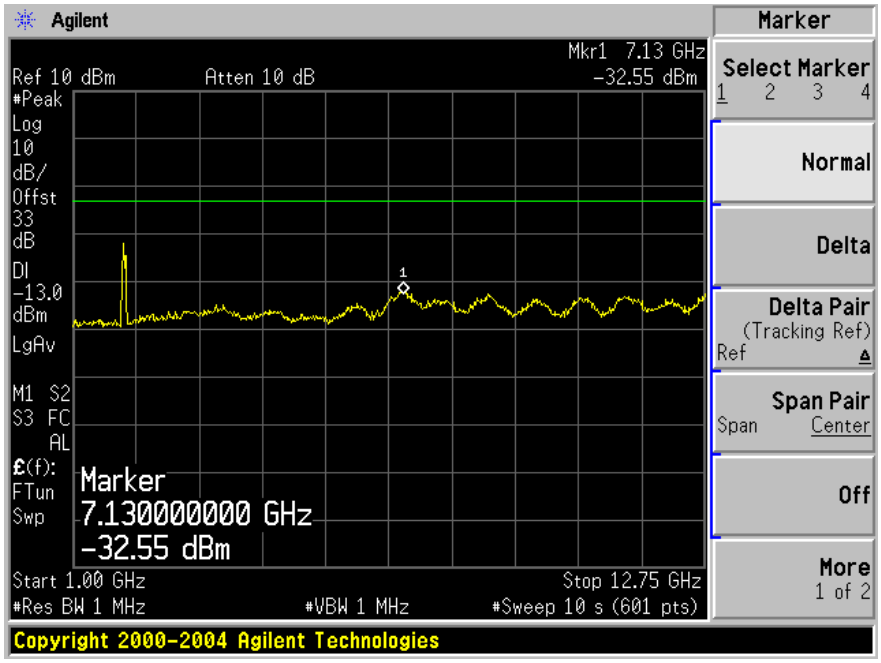


1 GHz to 12.75 GHz

CDMA850 MHz band Downlink: High Channel (893.19 MHz)

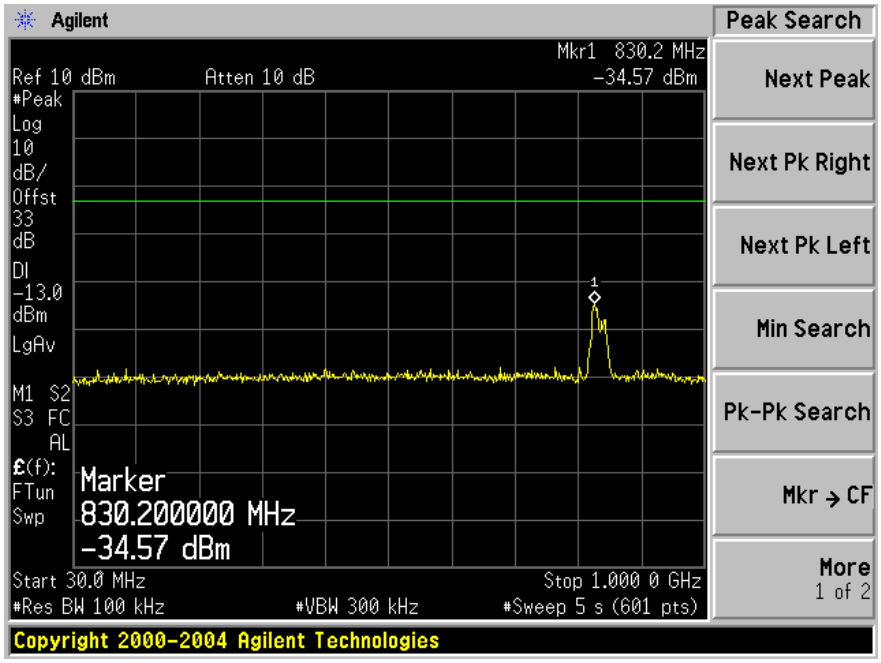


30 MHz to 1 GHz

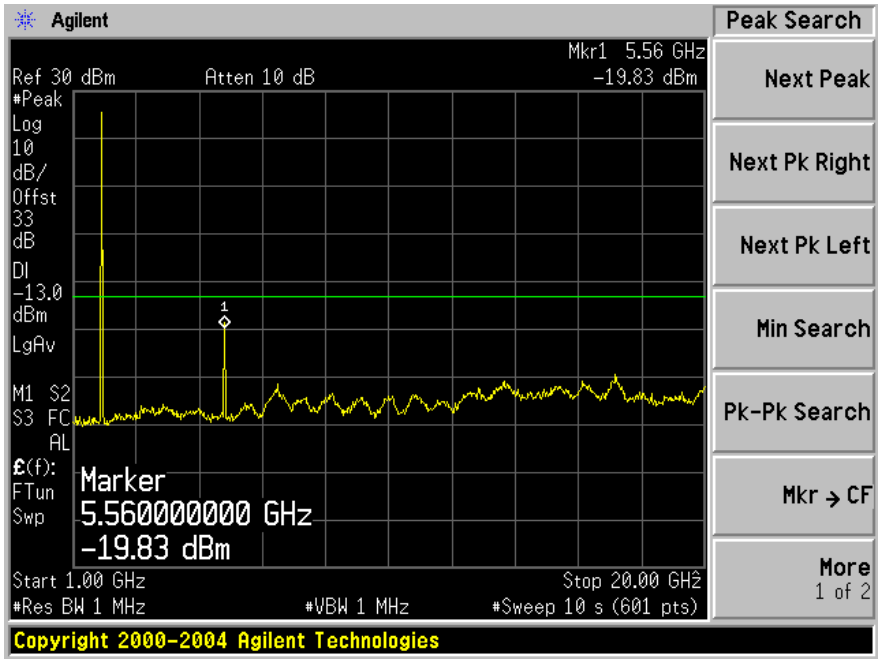


1 GHz to 12.75 GHz

CDMA 1900 MHz band Uplink: Low Channel (1851.25 MHz)

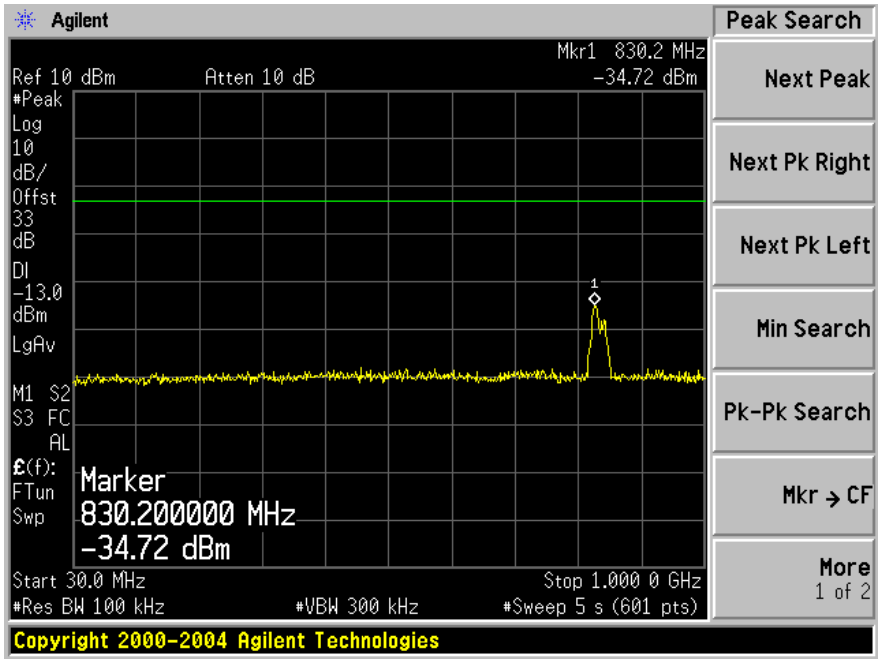


30 MHz to 1 GHz

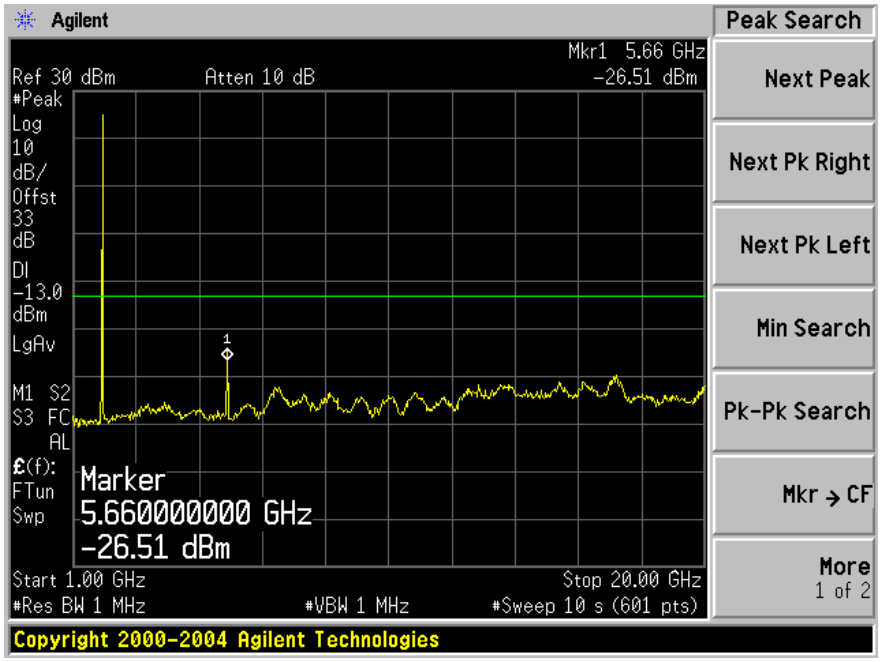


1 GHz to 20 GHz

CDMA 1900 MHz band Uplink: Middle Channel (1880 MHz)

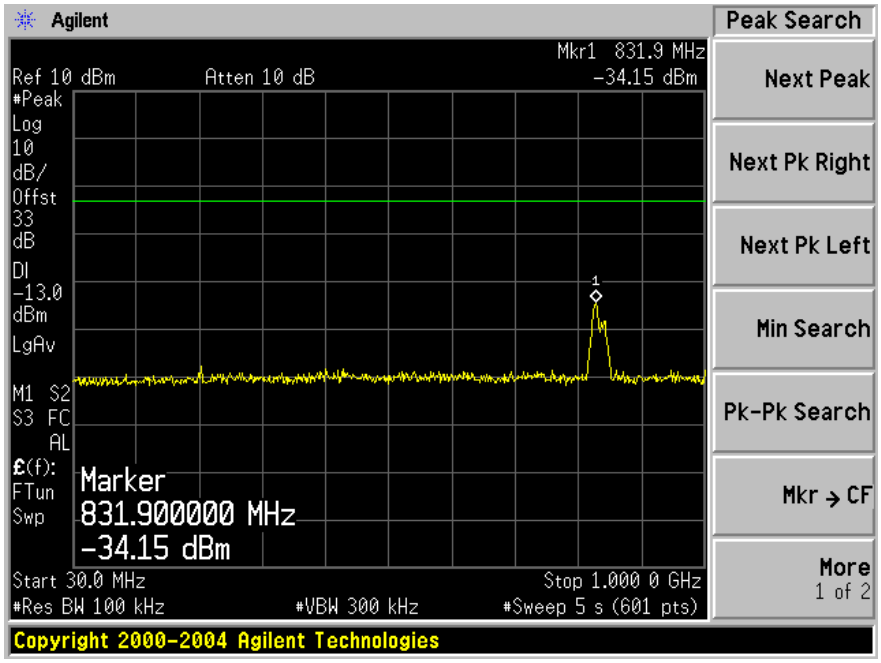


30 MHz to 1 GHz

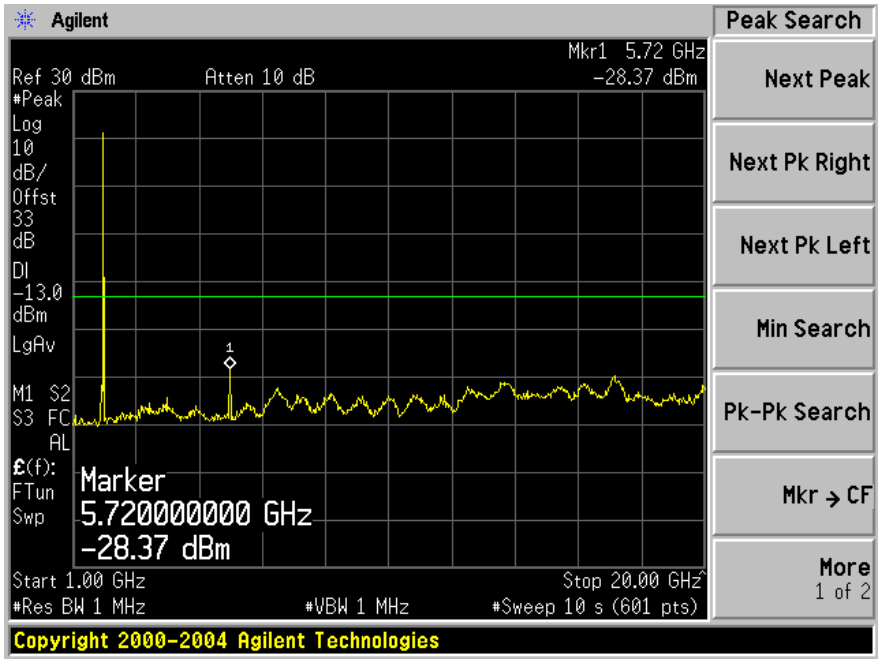


1 GHz to 20 GHz

CDMA 1900 MHz band Uplink: High Channel (1908.75 MHz)

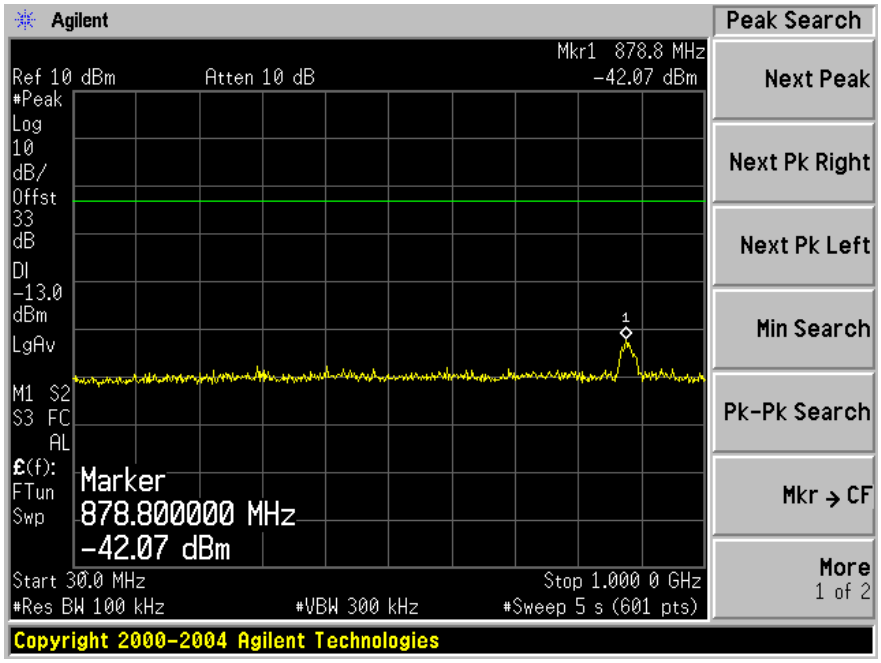


30 MHz to 1 GHz

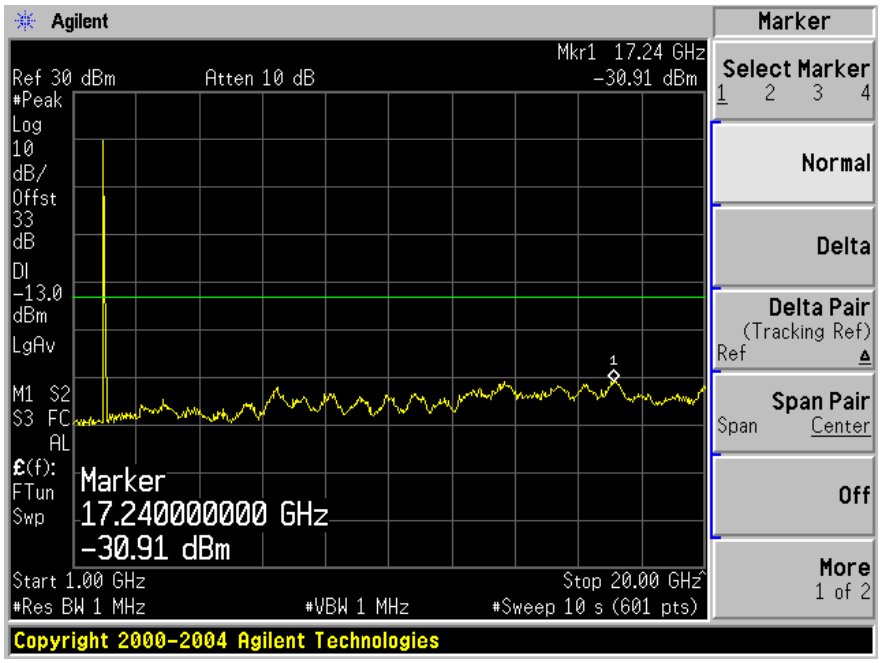


1 GHz to 20 GHz

CDMA 1900 MHz band Downlink: Low Channel (1931.25 MHz)

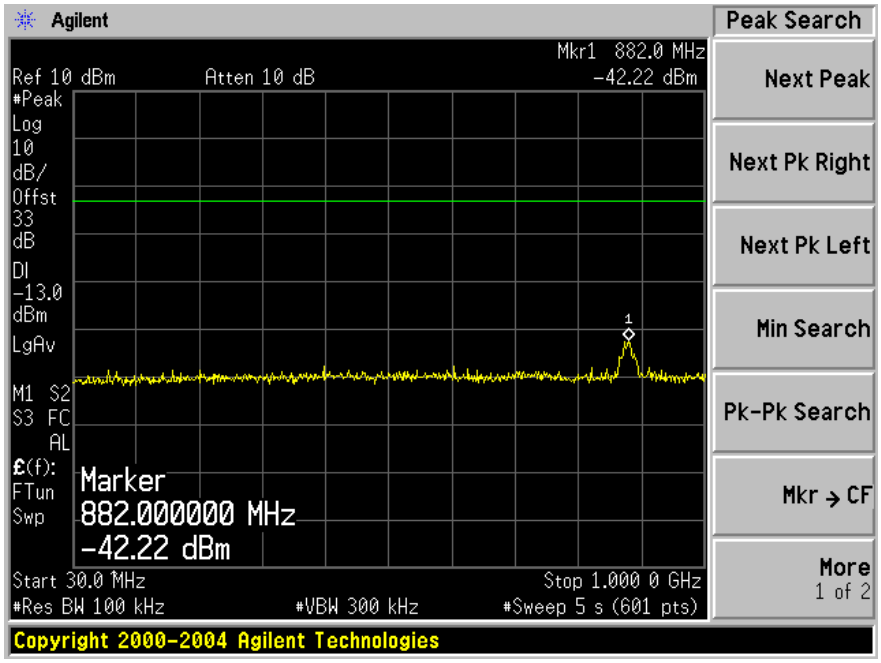


30 MHz to 1 GHz

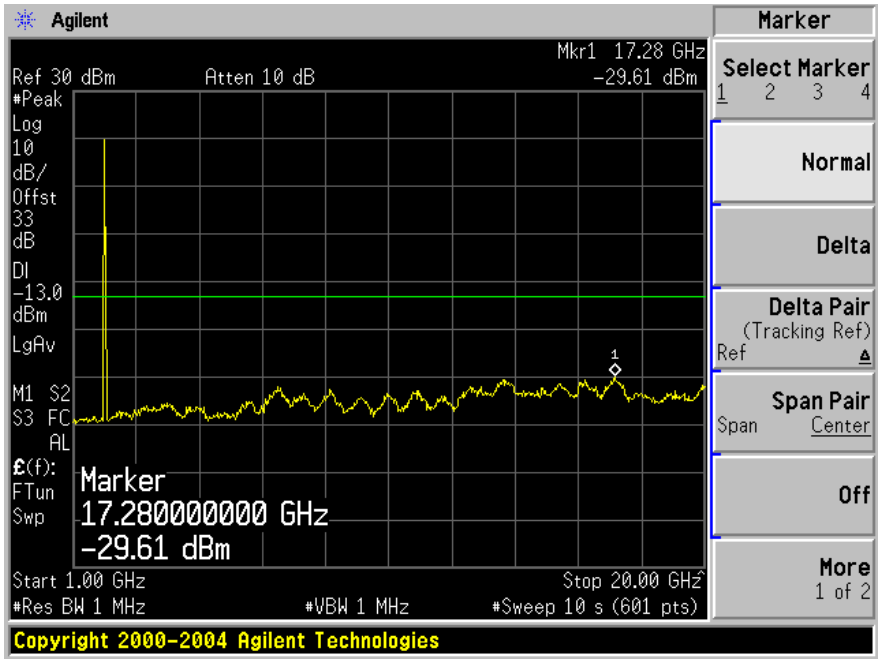


1 GHz to 20 GHz

CDMA 1900 MHz band Downlink: Middle Channel (1960 MHz)

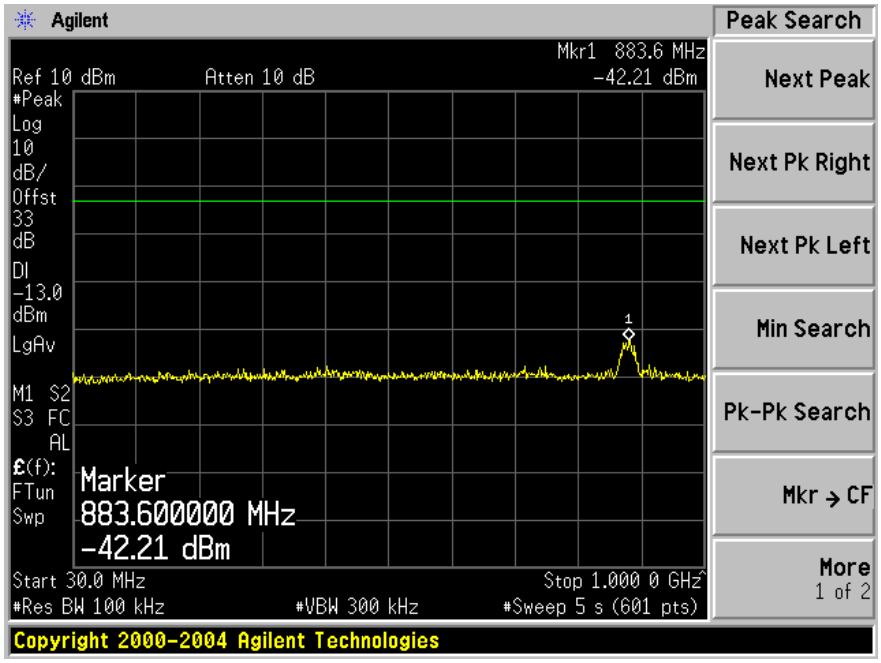


30 MHz to 1 GHz

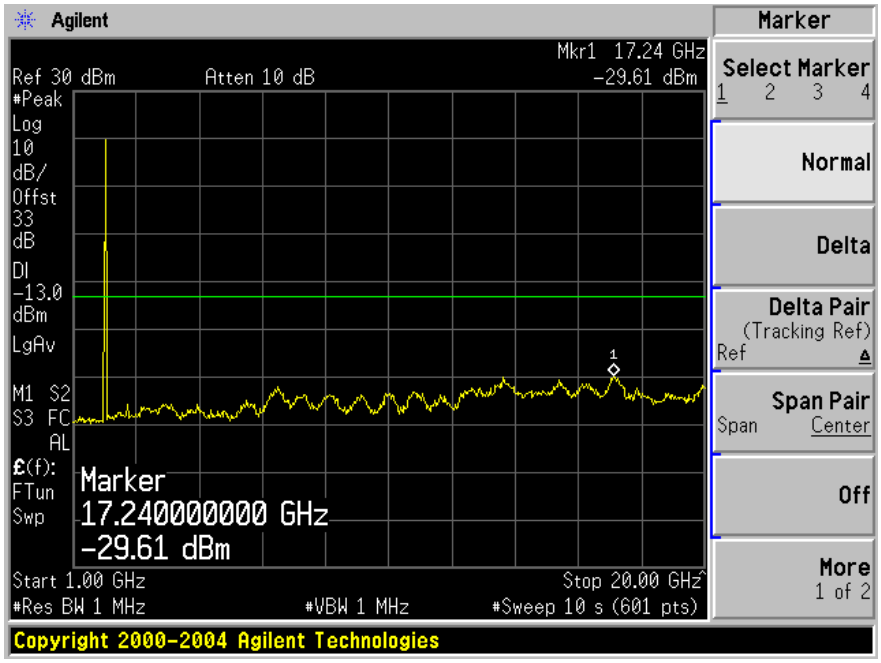


1 GHz to 20 GHz

CDMA 1900 MHz band Downlink: High Channel (1988.75 MHz)



30 MHz to 1 GHz



1 GHz to 20 GHz

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 Environmental Conditions

Temperature:	21 °C
Relative Humidity:	372 %
ATM Pressure:	101.7 kPa

The testing was performed by Victor Zhang on 2010-01-28in RF site.

9.4 Test Equipment List and Details

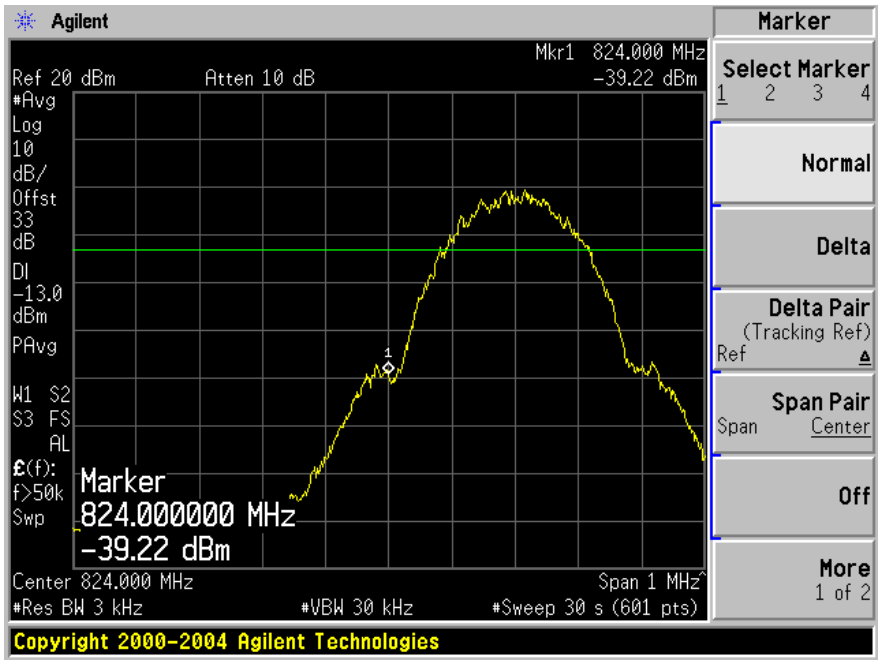
Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2009-03-31
Agilent	Analyzer, Spectrum	E4440A	US45303156	2009-07-23

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

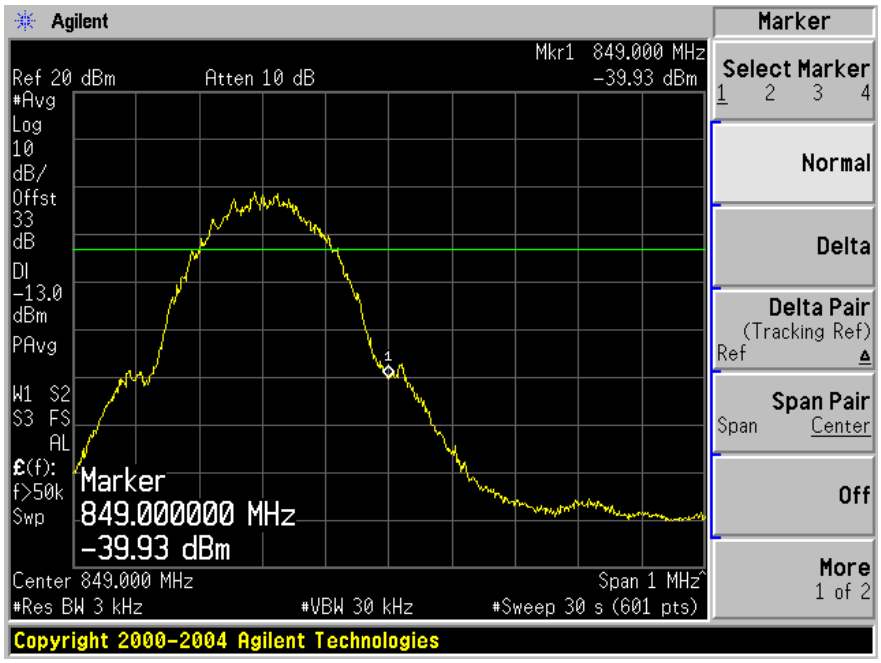
9.5 Test Results

Please refer to the following plots.

GSM 850 MHz band Uplink Band Edge

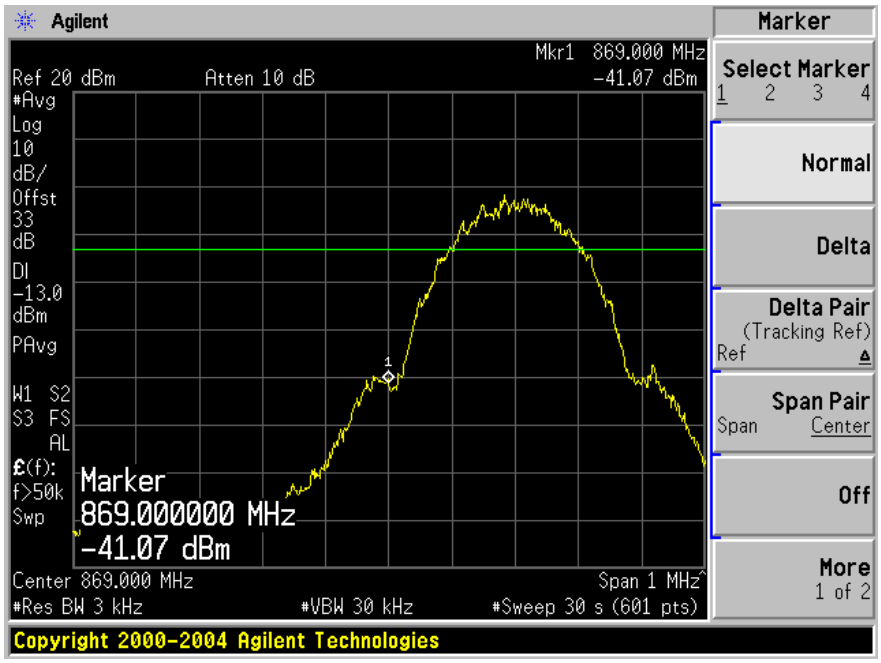


Low Channel

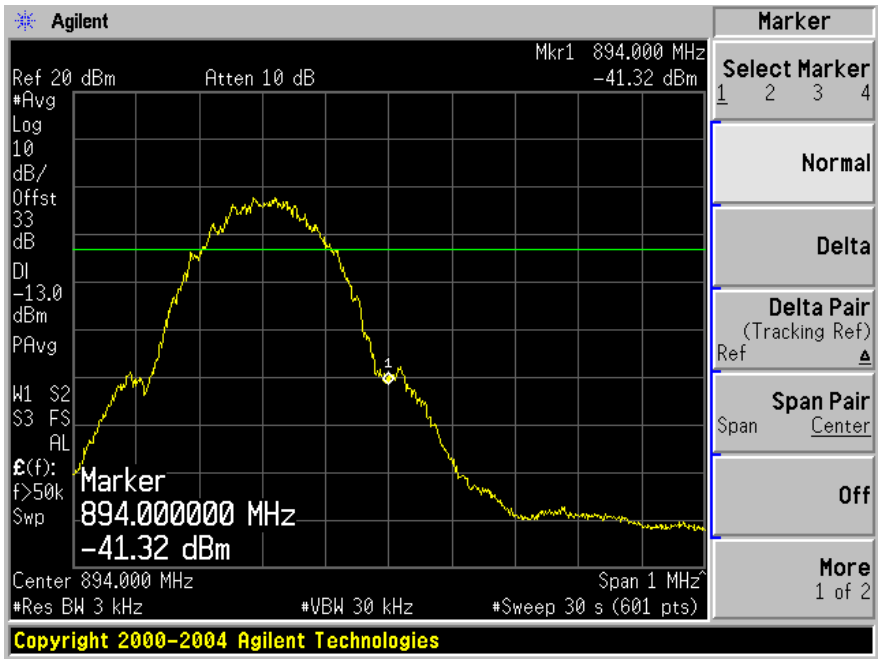


High Channel

GSM 850 MHz band Downlink Band Edge

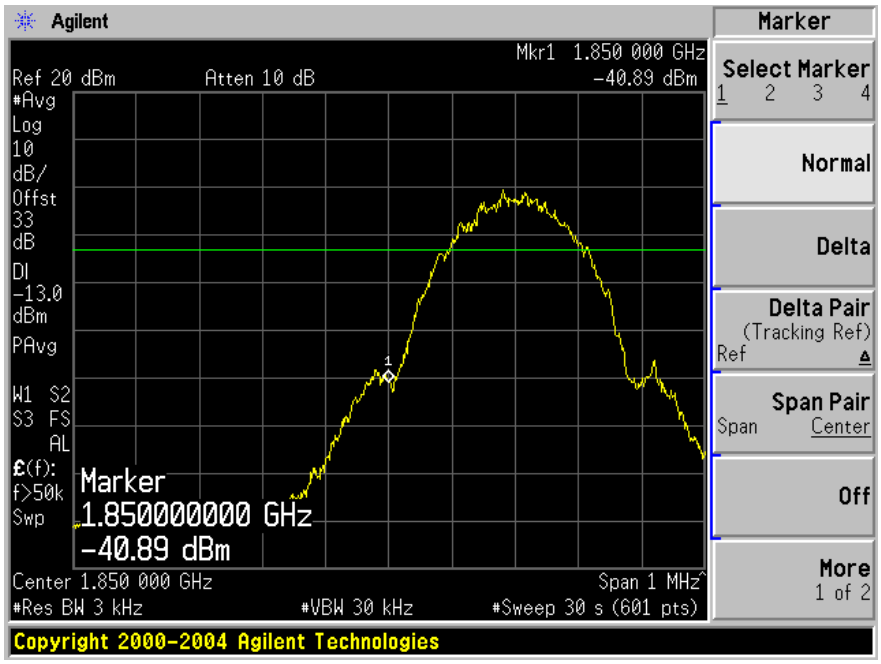


Low Channel

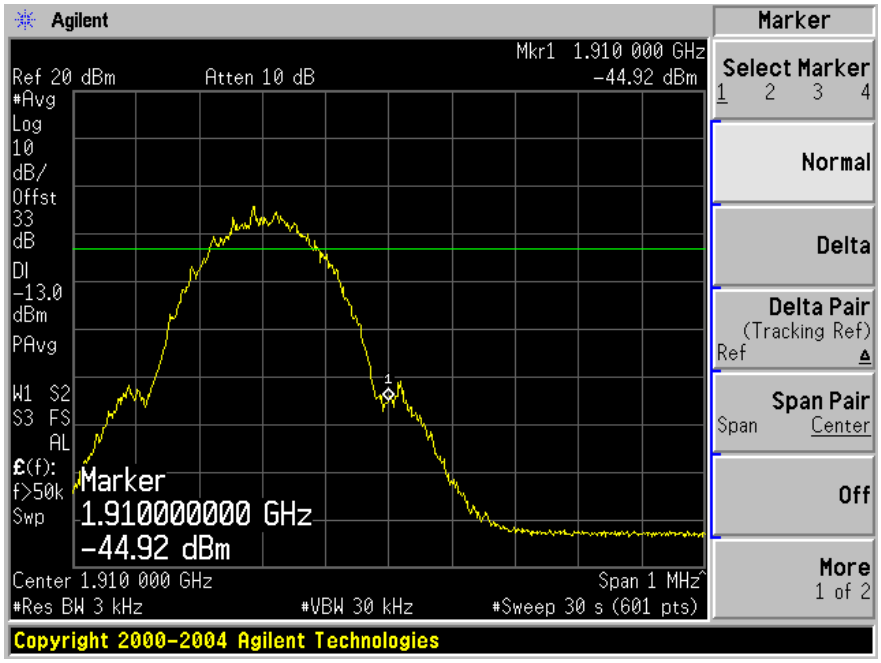


High Channel

GSM 1900 MHz band Uplink Band Edge

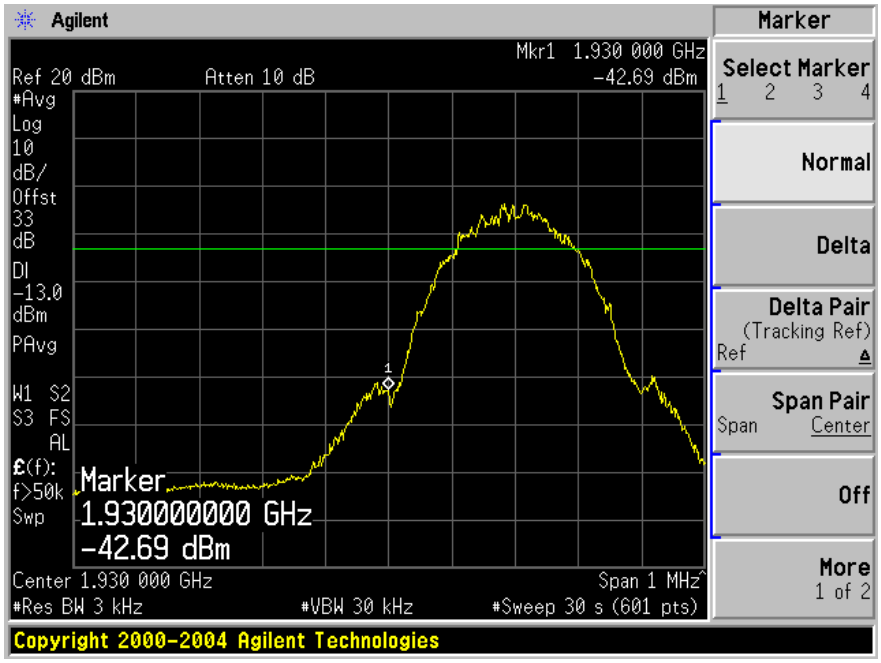


Low Channel

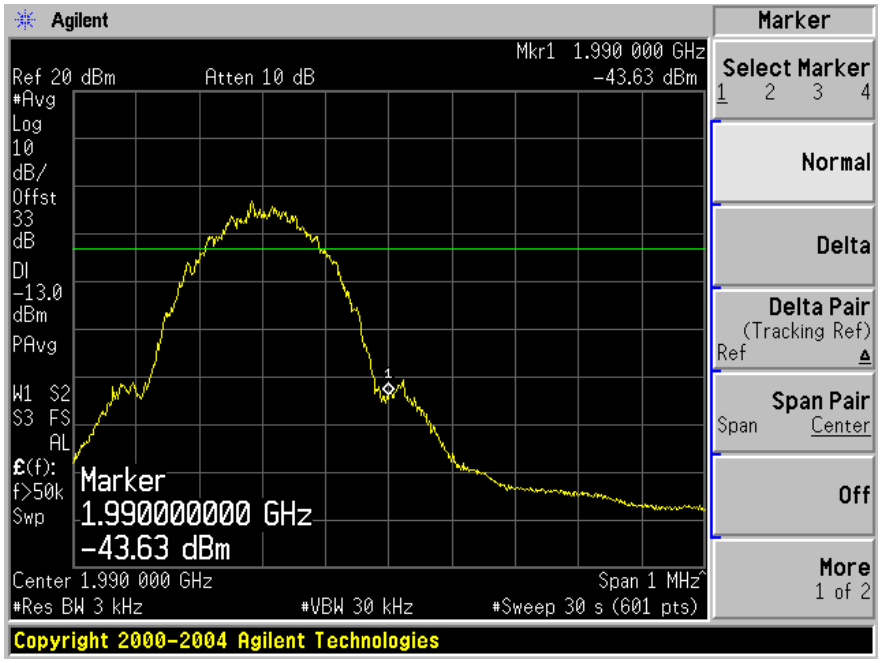


High Channel

GSM 1900 MHz band Downlink Band Edge

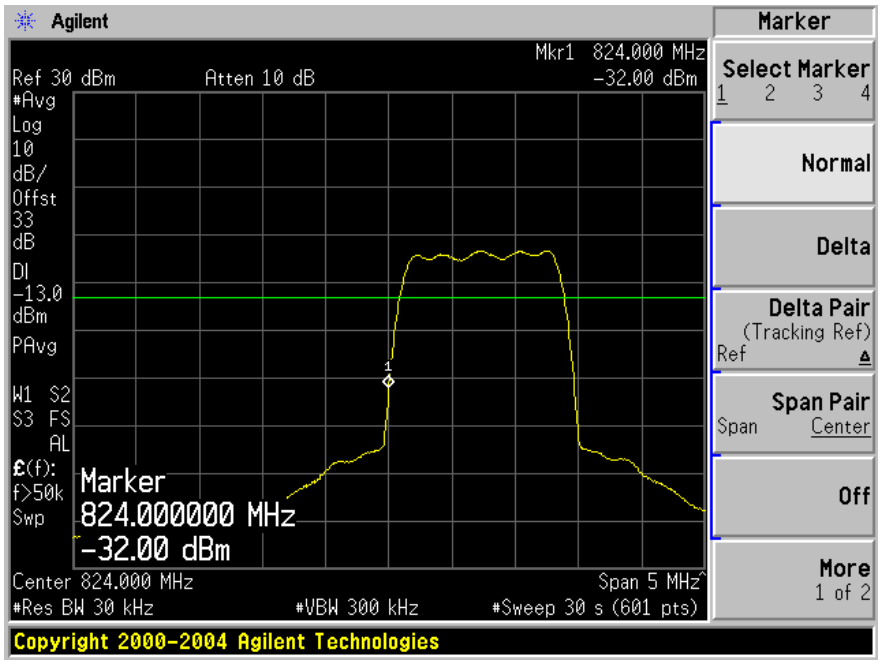


Low Channel

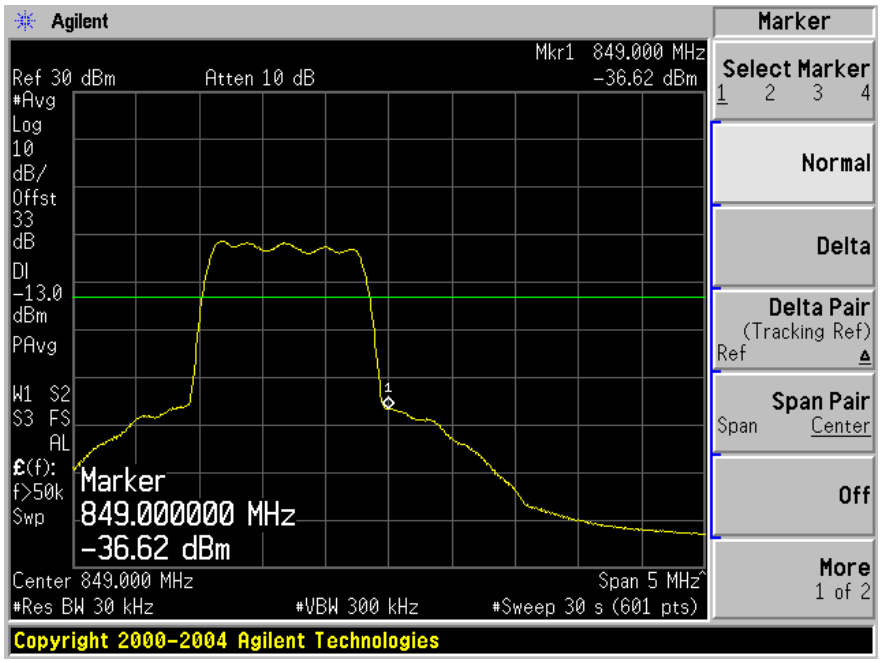


High Channel

CDMA 850 MHz band Uplink Band Edge

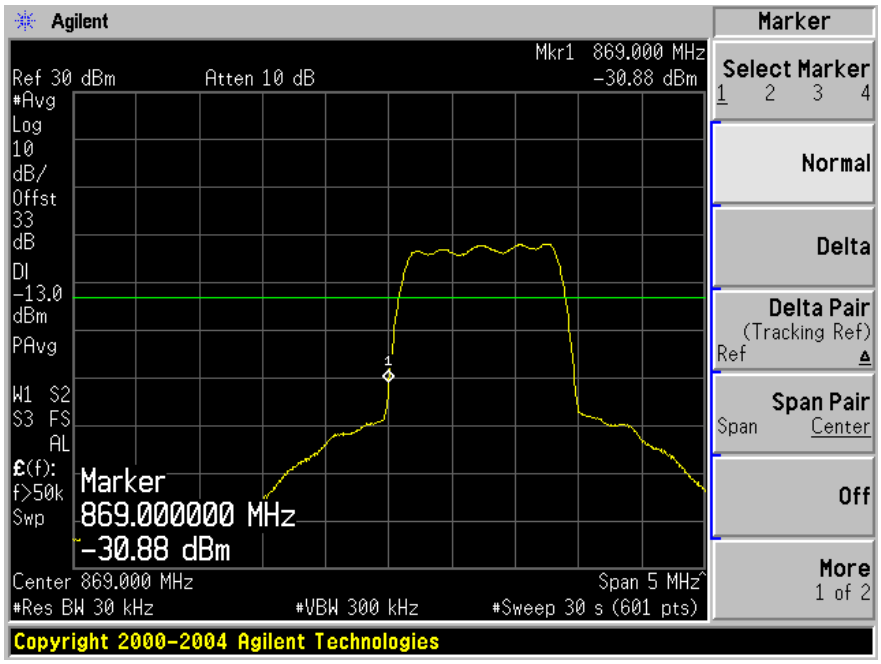


Low Channel

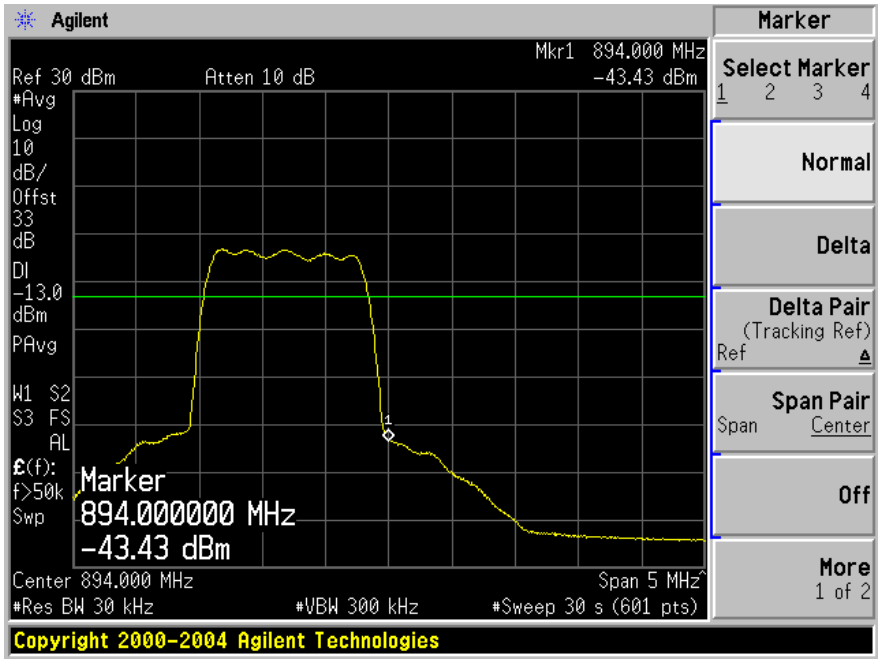


High Channel

CDMA 850 MHz band Downlink Band Edge

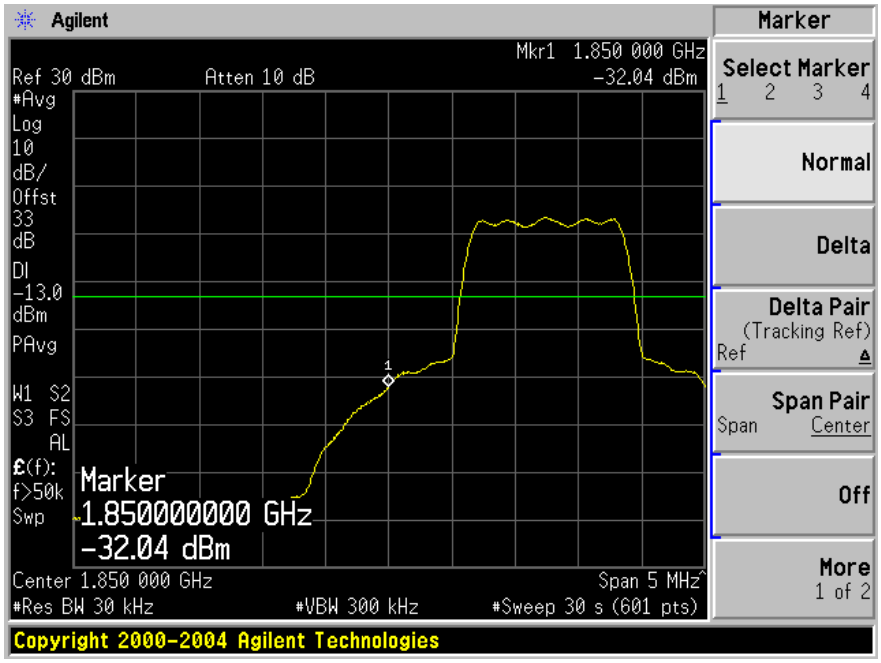


Low Channel

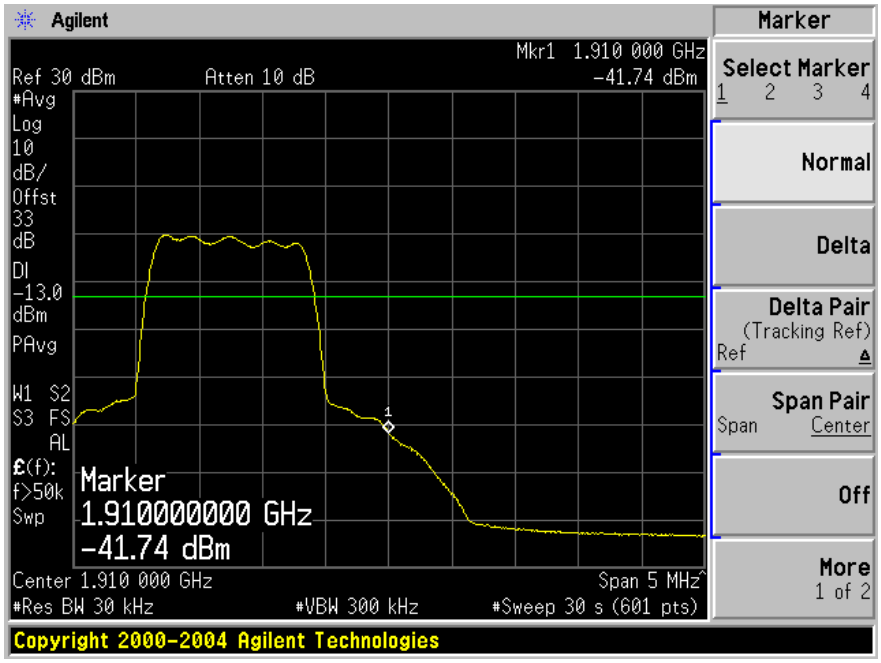


High Channel

CDMA 1900 MHz band Uplink Band Edge

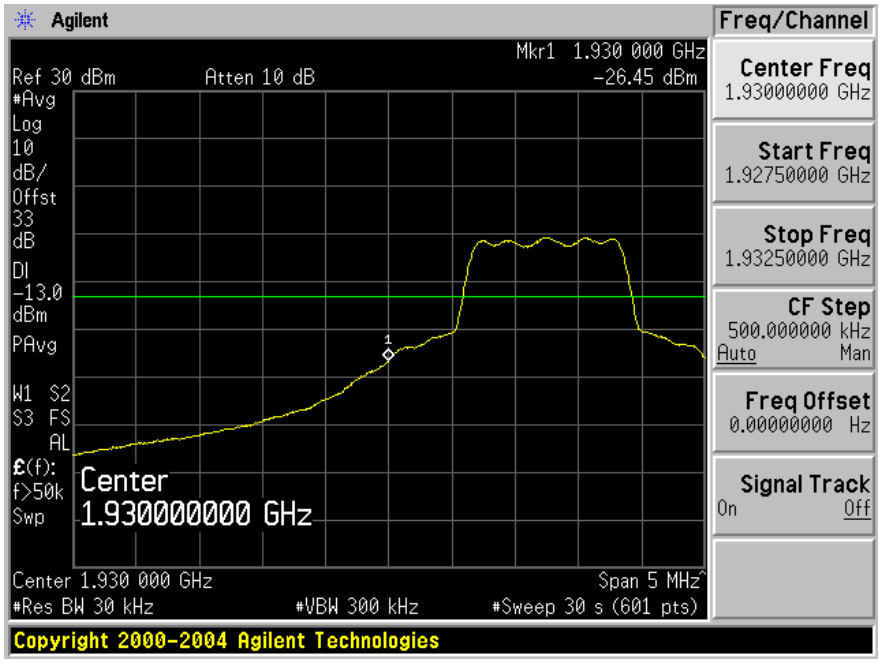


Low Channel

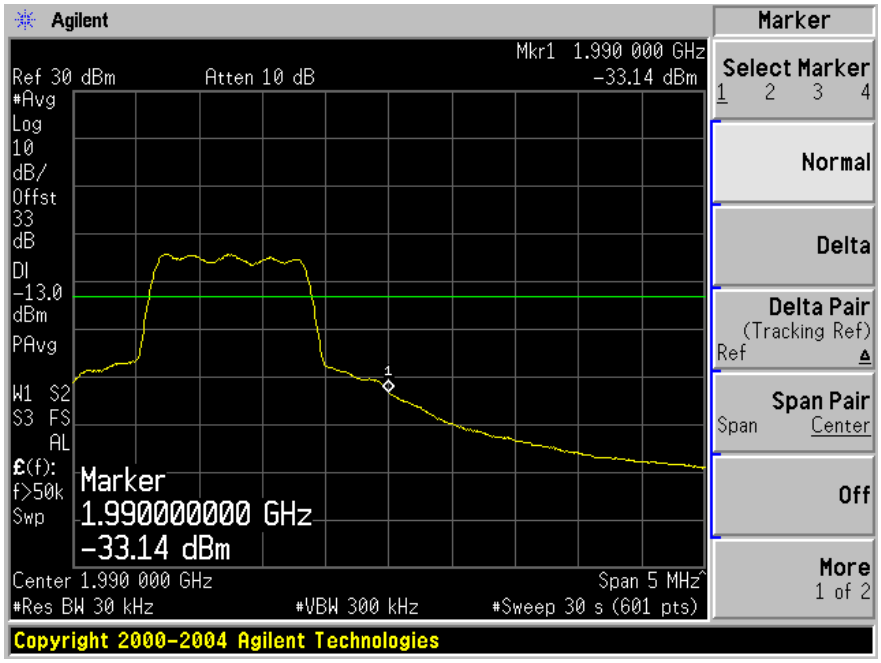


High Channel

CDMA 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, 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

850 MHz Cellular Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	19.14
Maximum peak output power at antenna input terminal (mW):	82.04
Prediction distance (cm):	25
Prediction frequency (MHz):	836.6
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.2624
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.558

850 MHz Cellular Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	19.41
Maximum peak output power at antenna input terminal (mW):	87.30
Prediction distance (cm):	25
Prediction frequency (MHz):	881.6
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.2792
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.588

1900 MHz PCS Band Uplink:

Maximum peak output power at antenna input terminal (dBm):	23.76
Maximum peak output power at antenna input terminal (mW):	237.68
Prediction distance (cm):	25
Prediction frequency (MHz):	1880
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.7299
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

PCS 1900 MHz Band Downlink:

Maximum peak output power at antenna input terminal (dBm):	20.73
Maximum peak output power at antenna input terminal (mW):	118.30
Prediction distance (cm):	25
Prediction frequency (MHz):	1960
Antenna Gain, typical (dBi):	14
Maximum Antenna Gain (numeric):	25.12
Power density at predication frequency and distance (mW/cm^2):	0.3784
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

Test Result

For Uplink, the highest power density level at 25 cm is 0.7299 mW/cm^2, which is below the uncontrolled exposure limit of 1 mW/cm^2 at 1880 MHz.
For Downlink, the highest power density level at 25 cm is 0.3784 mW/cm^2, which is below the uncontrolled exposure limit of 1mW/cm^2 at 1960 MHz.

So the indoor antenna prediction distance should be greater then 25 cm, and outdoor antenna prediction distance should be greater then 25 cm.

Note: Professional installer can set the conducted output power base on the antenna type so that the EIRP limit is not exceeded.