Lab Code: 200167-0

FCC PART 22H, 24E

TEST AND MEASUREMENT REPORT

For

Shireen Inc.

7636A Standish Place,

Rockville, MD 20855, USA

FCC ID: YEF18850-8001900
Model: 18-850

Report Type:	**Product Type:**
Original Report	Cellular Amplifier Repeater

Test Engineer:	Jack Liu
Report Number:	R1009011-2224
Report Date:	2010-10-07
Reviewed By:	Victor Zhang RF Lead
Prepared By: (66)	Bay Area Compliance Laboratories Corp. 1274 Anvilwood Avenue, Sunnyvale, CA 94089, USA Tel: (408) 732-9162 Fax: (408) 732 9164

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DOCUMENT REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	R1009011-2224	Original Report	2010-10-07

1 GENERAL INFORMATION

1.1 Product Description for Equipment under Test (EUT)

This test and measurement report has been prepared on behalf of *Shireen Inc.* and their product *model:* 18-850, *FCC ID: YEF18850-8001900* or the "EUT" as referred to in this report is a 50 dB amplifier with N –Type female connector.

Technical Specification:

- Operating Frequency: *Downlink:* 869-894 MHz and 1930-1990MHz
  Uplink: 824-849 MHz and 1850-1910MHz
- Emission Designator: F9W, GXW
- Modulation: CDMA, GSM
- Power Source: 110V AC Power Adapter; Output: 5V DC

1.2 Mechanical Description

The EUT Approximate measurement is: 16 cm (L) x 12.5 cm (W) x 2.5 cm (H). Weight 657.5g.

The test data gathered are from typical production sample, serial number: R1009011-1, provided by BACL

1.3 Objective

This type approval report is prepared on behalf of *Shireen 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/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

A 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
Actiontec	Power Adapter	ADS6818-1505WDB	91421404

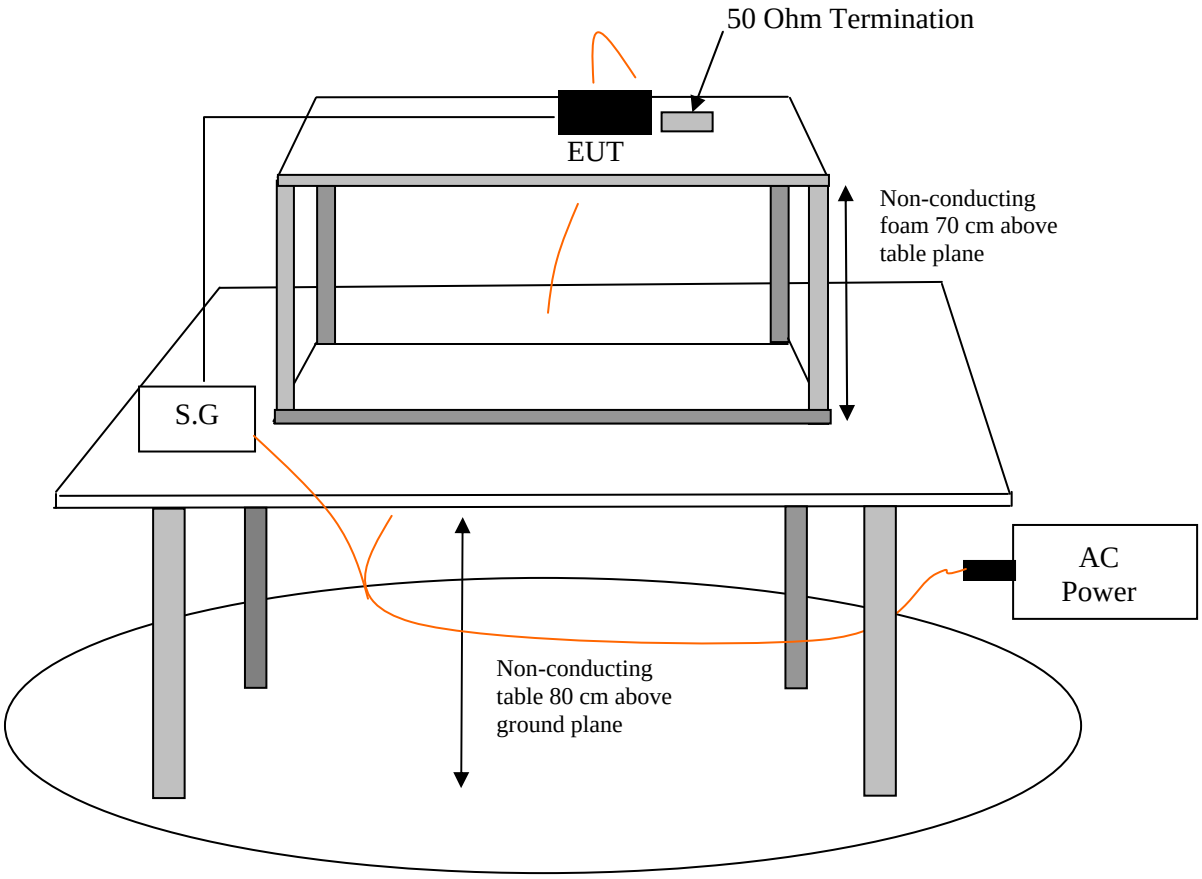
2.5 Local Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
-	-	-	-

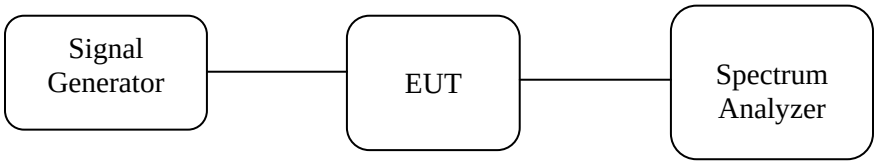
2.6 Interface Ports and Cabling

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

2.7 Radiated Test Block Diagram



2.8 Conducted Test Block Diagram



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, §22.905, § 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 [1]
§2.1091	RF Exposure	Compliant

Note [1]: Not Applicable

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

4.1 Applicable Standard

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

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

4.2 Test Procedure

Conducted:

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

4.3 Test Environmental Conditions

Temperature:	22~27 °C
Relative Humidity:	35~40 %
ATM Pressure:	101.1~102.2kPa

The testing was performed by Jack Liu on 2010-9-22 ~ 2010-9-28

4.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-21
Agilent	Analyzer, Spectrum	E4440A	US45303156	2010-08-09

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

4.5 Summary of Test Results

Maximum Output Power – Modulated Signal

Mode		Channel	Frequency (MHz)	Output Power (dBm)
GSM	850 MHz Uplink	Low	824.2	31.13
		Middle	836.6	34.12
		High	848.8	30.51
	850 MHz Downlink	Low	869.2	29.53
		Middle	881.6	31.58
		High	893.8	30.30
	1900 MHz Uplink	Low	1850.2	29.37
		Middle	1880	29.77
		High	1909.8	23.16
	1900 MHz Downlink	Low	1930.2	24.16
		Middle	1960	30.83
		High	1989.8	31.39

Mode		Channel	Frequency (MHz)	Output Power (dBm)
CDMA	850 MHz Uplink	Low	824.73	25.58
		Middle	836.4	27.13
		High	848.19	23.56
	850 MHz Downlink	Low	869.73	20.48
		Middle	881.4	23.53
		High	893.19	21.63
	1900 MHz Uplink	Low	1851.25	22.99
		Middle	1880	23.08
		High	1908.75	21.27
	1900 MHz Downlink	Low	1931.25	20.60
		Middle	1960	22.60
		High	1988.75	21.58

5 FCC §2.1047 - MODULATION CHARACTERISTIC

5.1 Applicable Standard

According to FCC §2.1047(d) and Part 22H, 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 at 30 kHz (Cellular/PCS) and the 26 dB & 99% bandwidth was recorded.

6.3 Test Environmental Conditions

Temperature:	22~27 °C
Relative Humidity:	35~40 %
ATM Pressure:	101.1~102.2kPa

The testing was performed by Jack Liu on 2010-9-22 ~ 2010-9-28

6.4 Test Equipment List and Details

Manufacturers	Descriptions	Models	Serial Numbers	Calibration Dates
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-21
HP	Generator, Signal	83650B	3641A00276	2010-06-21
Agilent	Analyzer, Spectrum	E4440A	US45303156	2010-08-09

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

6.5 Summary of Test Results

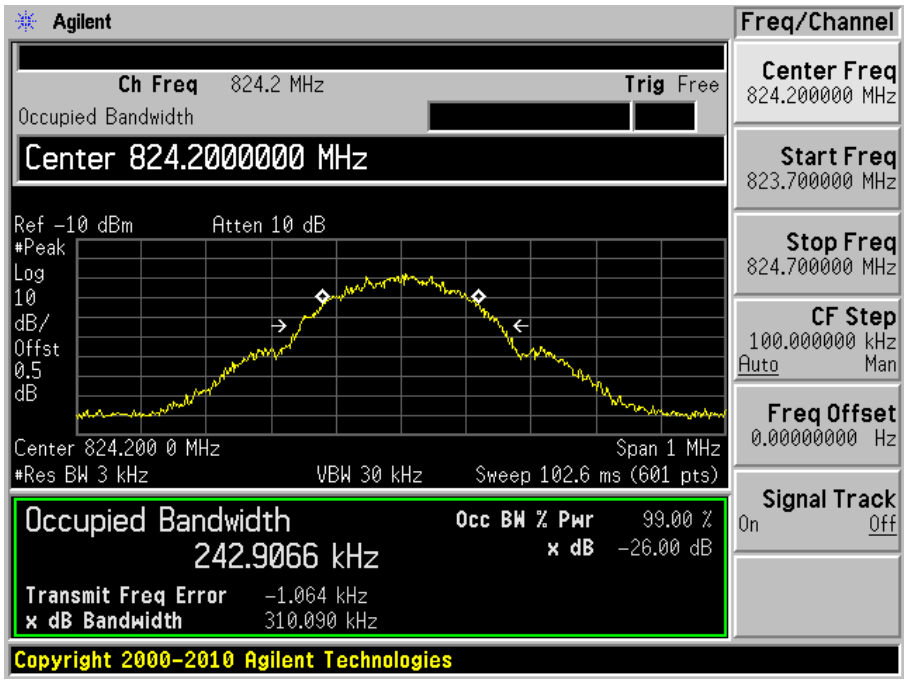
Mode		Channel	Frequency (MHz)	Emission Bandwidth Input (kHz)	Emission Bandwidth Output (kHz)
GSM	850 MHz Uplink	Low	824.2	242.9066	244.8264
		Middle	836.6	243.7471	244.9444
		High	848.8	244.2995	242.3194
	850 MHz Downlink	Low	869.2	247.4763	249.2715
		Middle	881.6	245.2788	243.9956
		High	893.8	243.4210	248.4373
	1900 MHz Uplink	Low	1850.2	245.5671	245.7827
		Middle	1880	245.6050	240.7830
		High	1909.8	244.9667	246.5547
	1900 MHz Downlink	Low	1930.2	246.1543	242.2933
		Middle	1960	242.9657	244.5316
		High	1989.8	247.4512	241.0402

Mode		Channel	Frequency (MHz)	Emission Bandwidth Input (MHz)	Emission Bandwidth Output (MHz)
CDMA	850 MHz Uplink	Low	824.73	1.2680	1.2729
		Middle	836.4	1.2650	1.2757
		High	848.19	1.2650	1.2734
	850 MHz Downlink	Low	869.73	1.2693	1.2703
		Middle	881.4	1.2661	1.2731
		High	893.19	1.2671	1.2702
	1900 MHz Uplink	Low	1851.25	1.2658	1.2696
		Middle	1880	1.2663	1.2716
		High	1908.75	1.2663	1.2732
	1900 MHz Downlink	Low	1931.25	1.2657	1.2783
		Middle	1960	1.2660	1.2750
		High	1988.75	1.2658	1.2808

Please refer to the following plots.

GSM 850 MHz band Uplink, Low Channel: 824.2 MHz

Input



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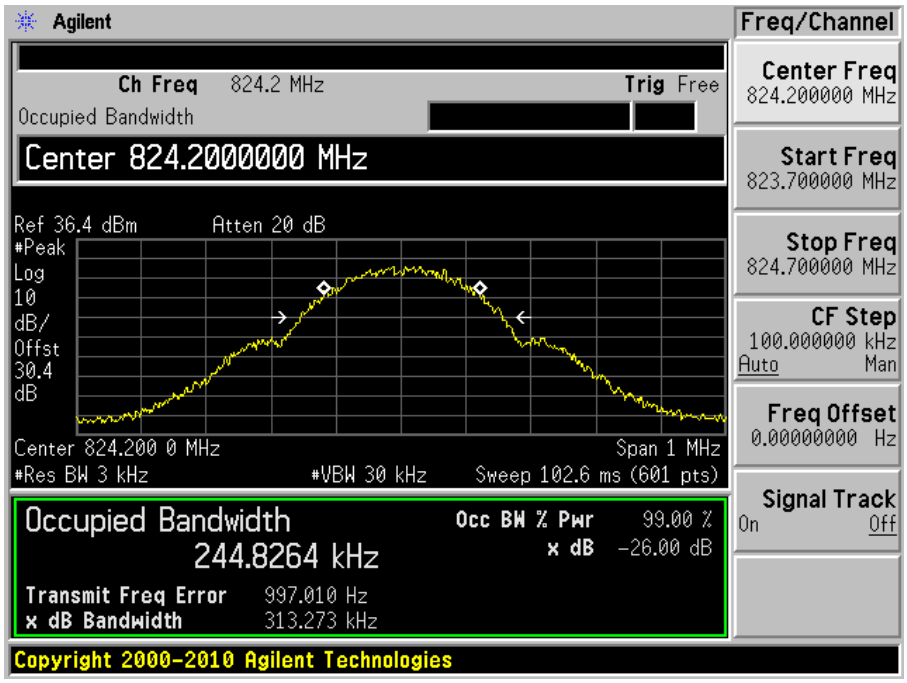
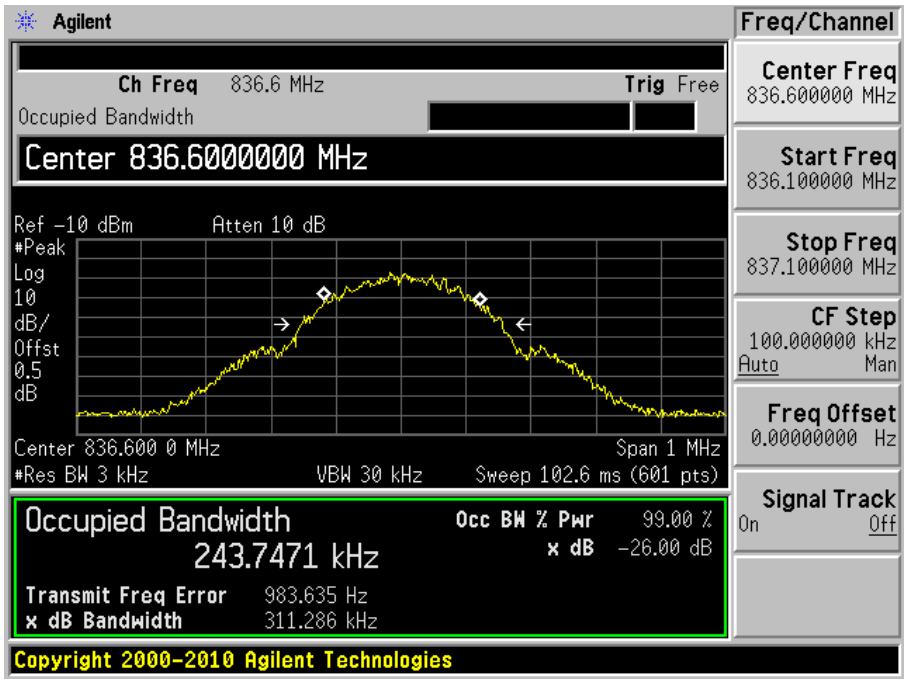


GSM 850MHz band Uplink, Middle Channel: 836.6 MHz

Input



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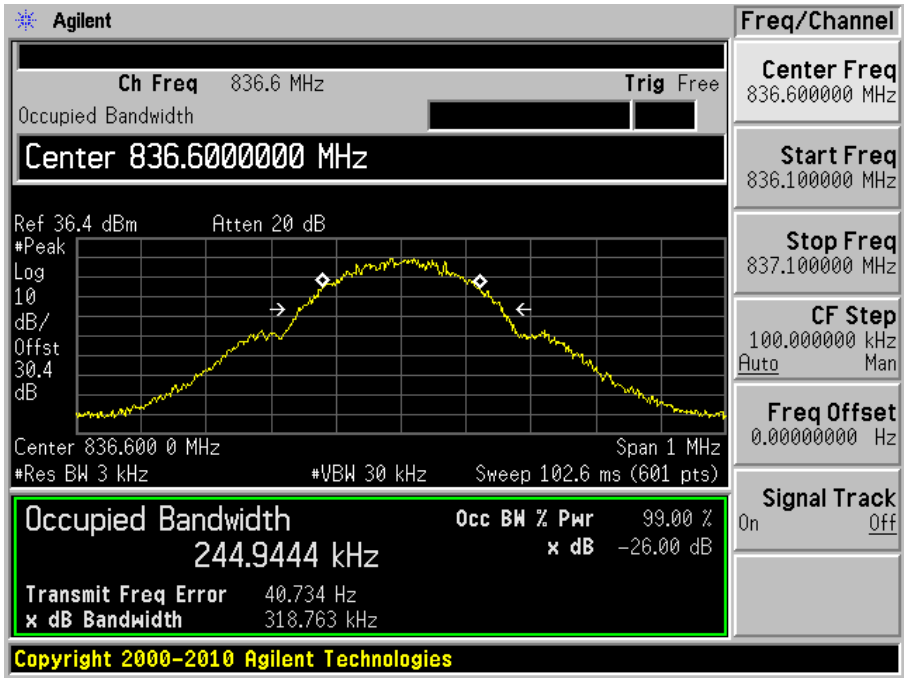
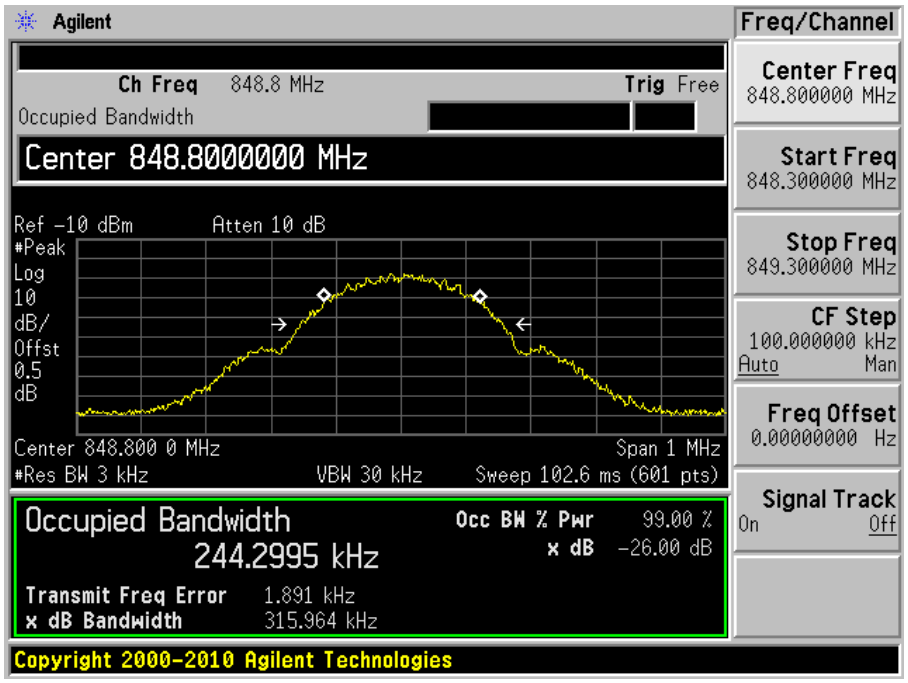


GSM 850 MHz band Uplink, High Channel: 848.8 MHz

Input



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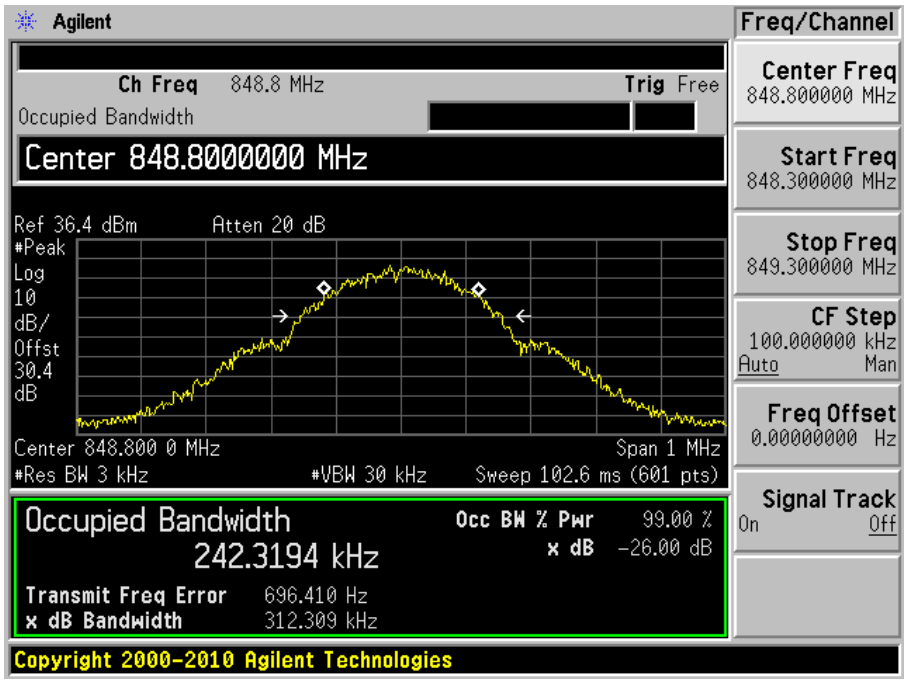
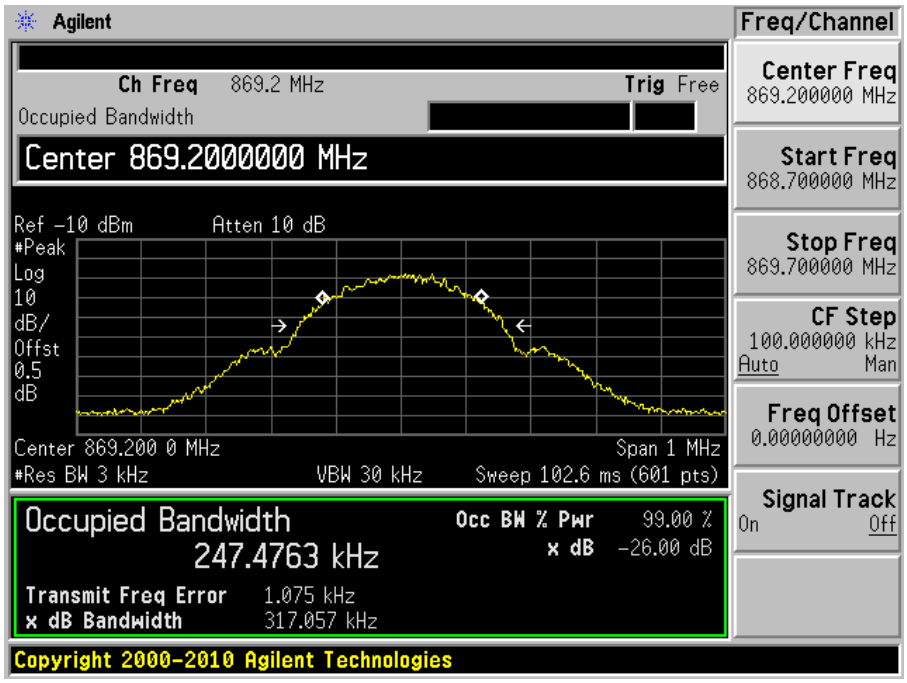
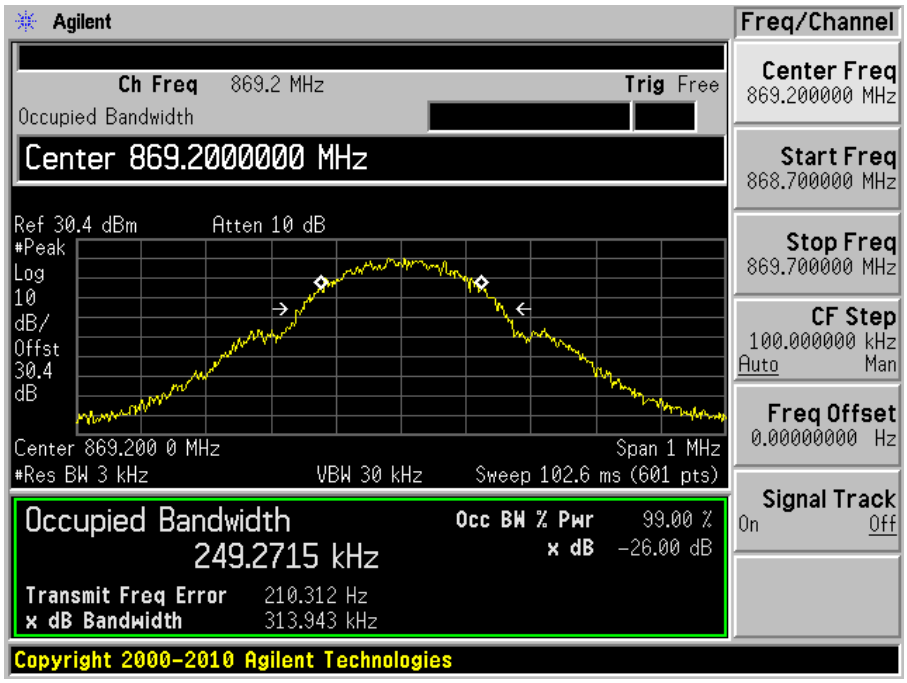


GSM 850 MHz band Downlink, Low Channel: 869.2 MHz

Input

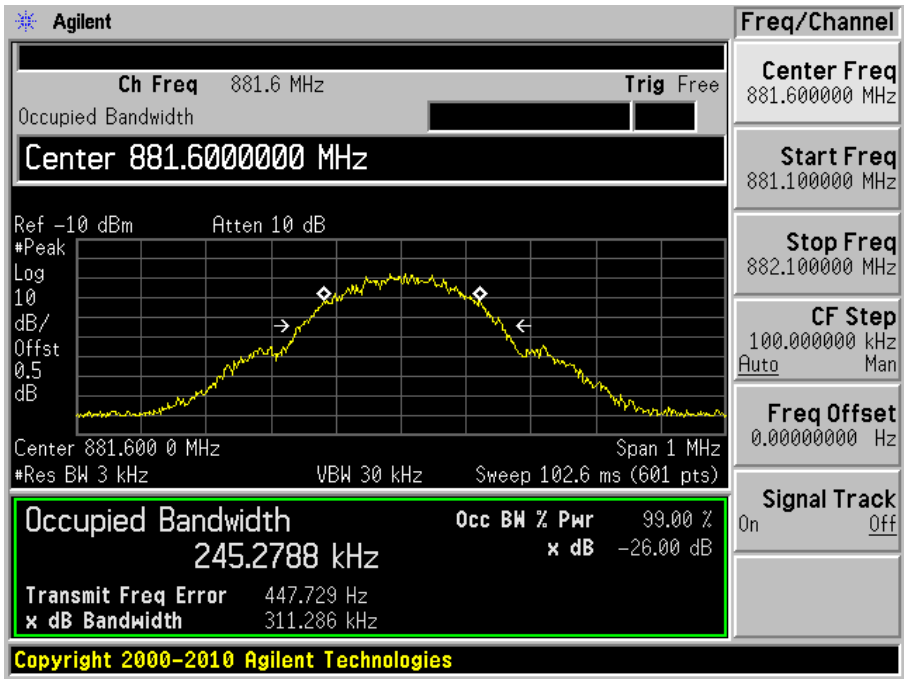


Output



GSM 850 MHz band Downlink, Middle Channel: 881.6 MHz

Input



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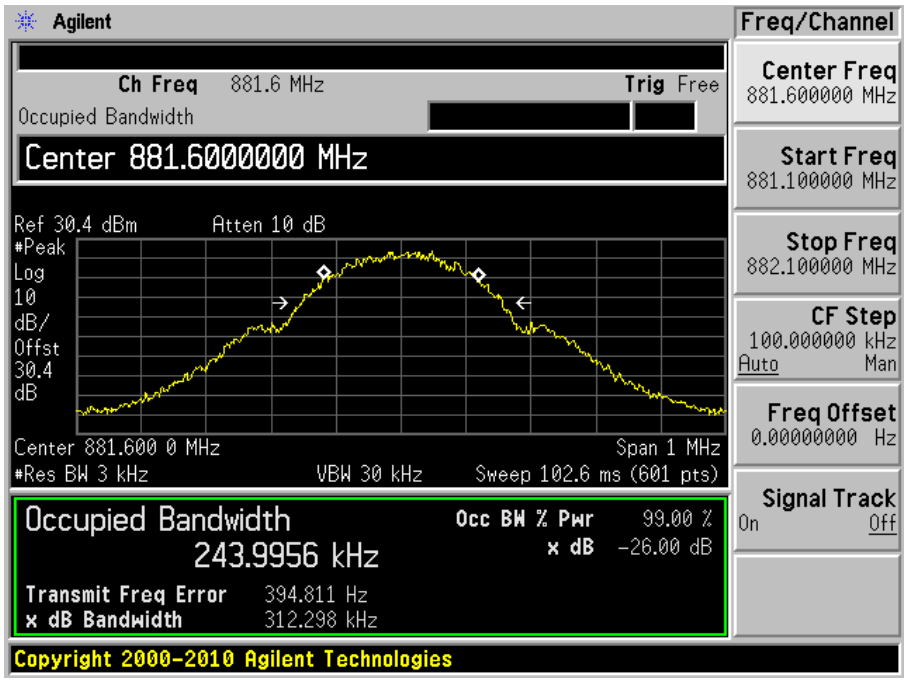
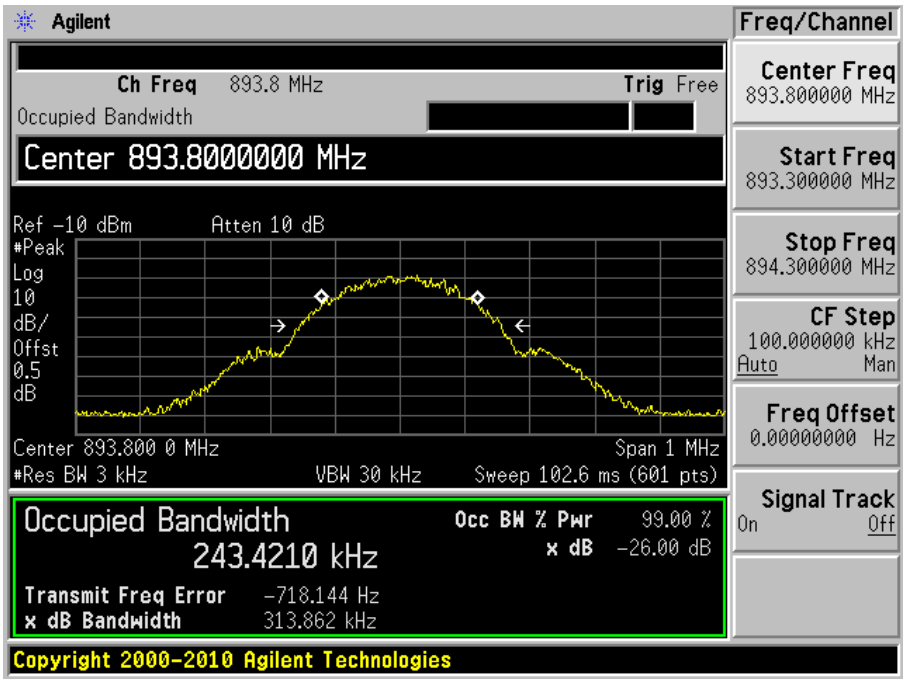


GSM 850 MHz band Downlink, High Channel: 893.8 MHz

Input



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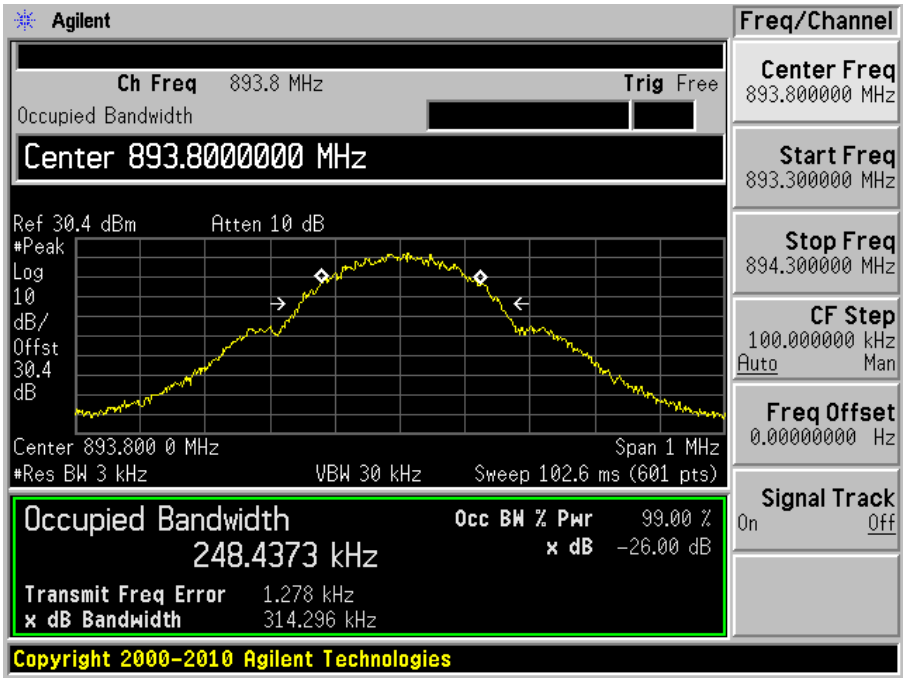
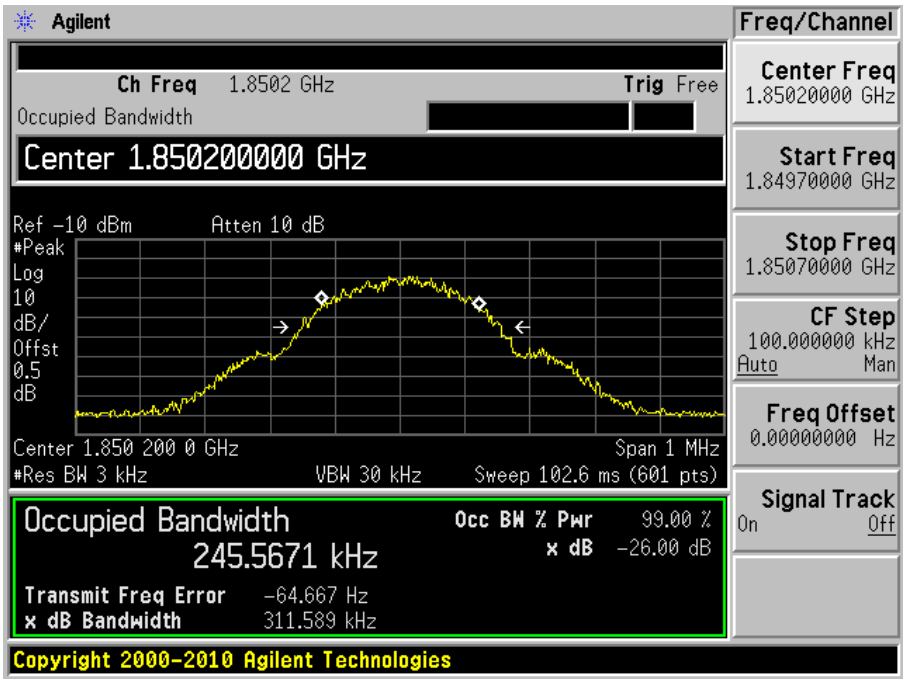


GSM 1900 MHz band Uplink, Low Channel: 1850.2 MHz

Input



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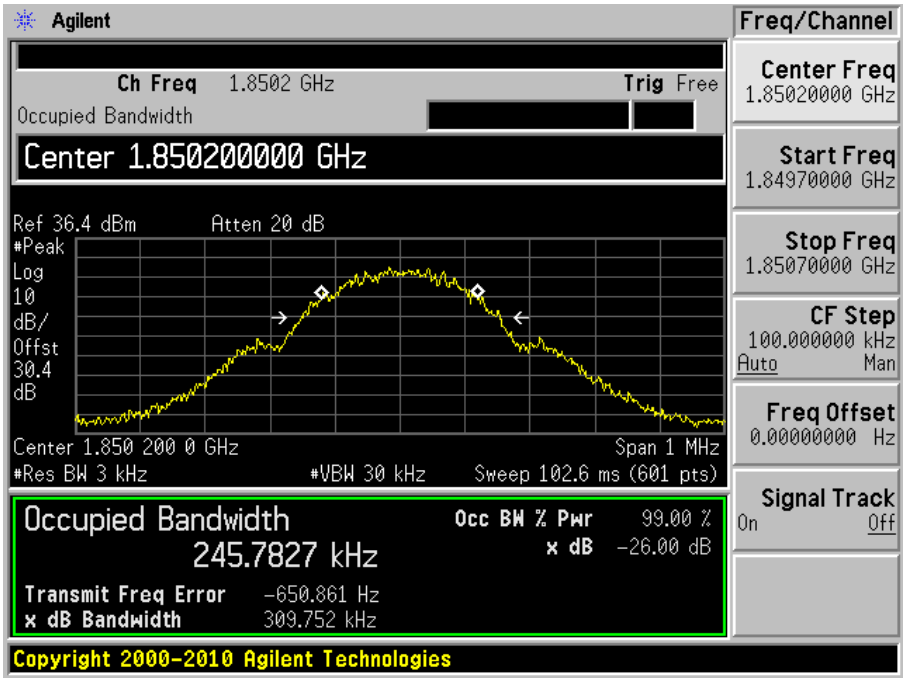
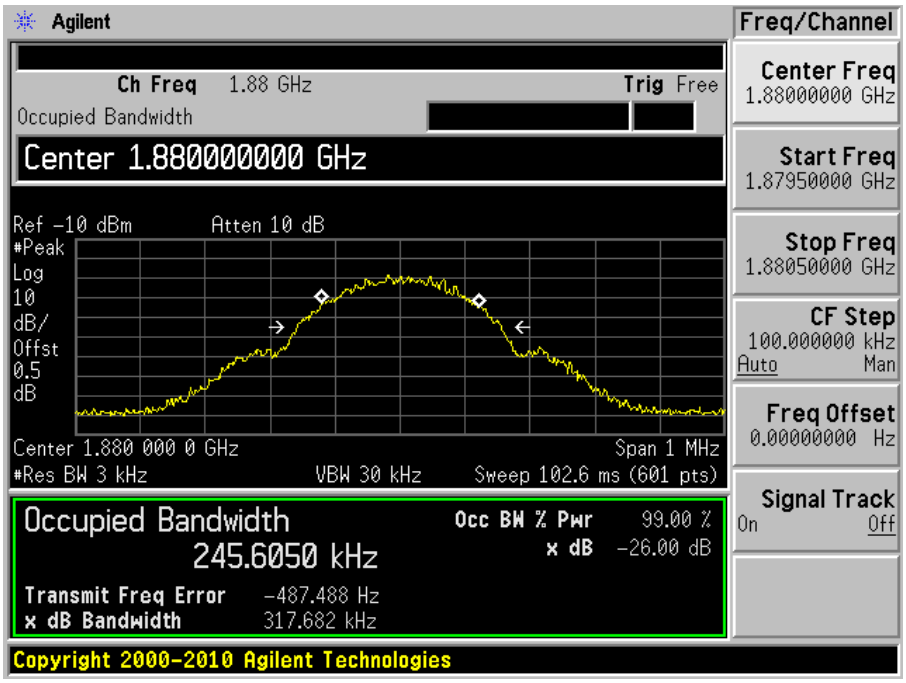


GSM 1900 MHz band Uplink, Middle Channel: 1880 MHz

Input



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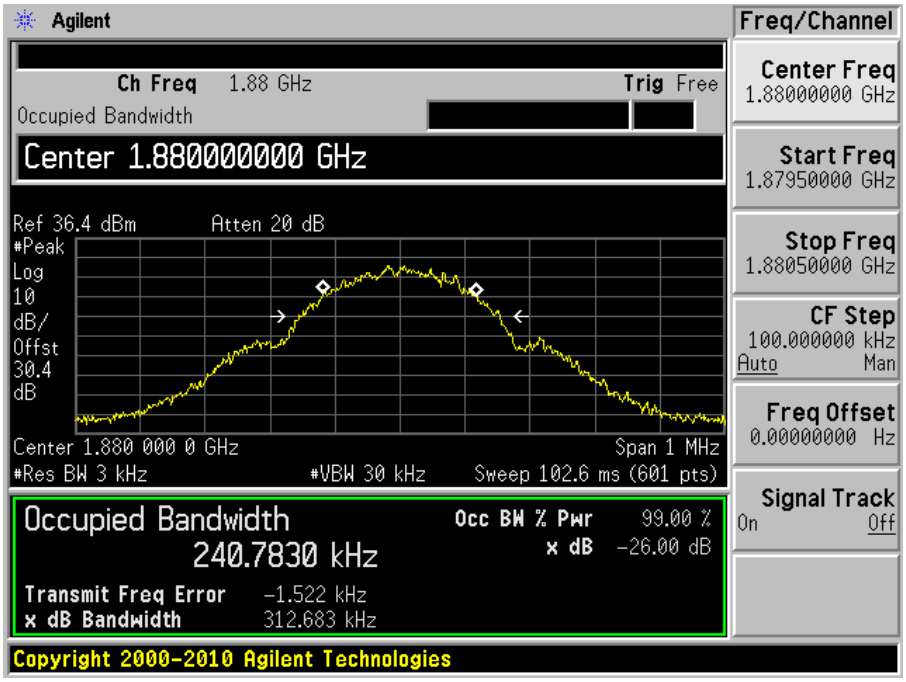
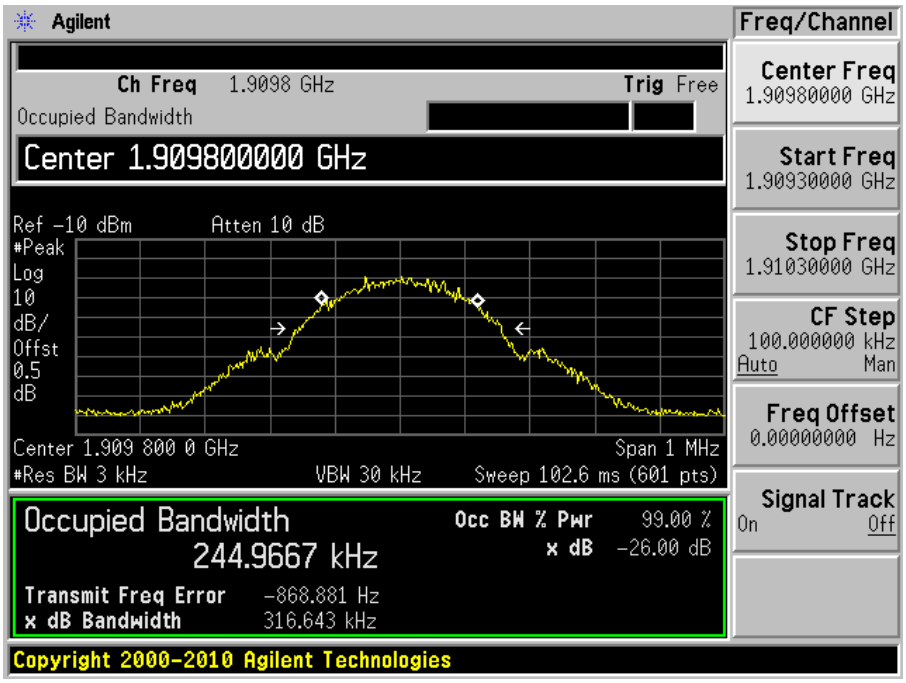


GSM 1900 MHz band Uplink, High Channel: 1909.8 MHz

Input



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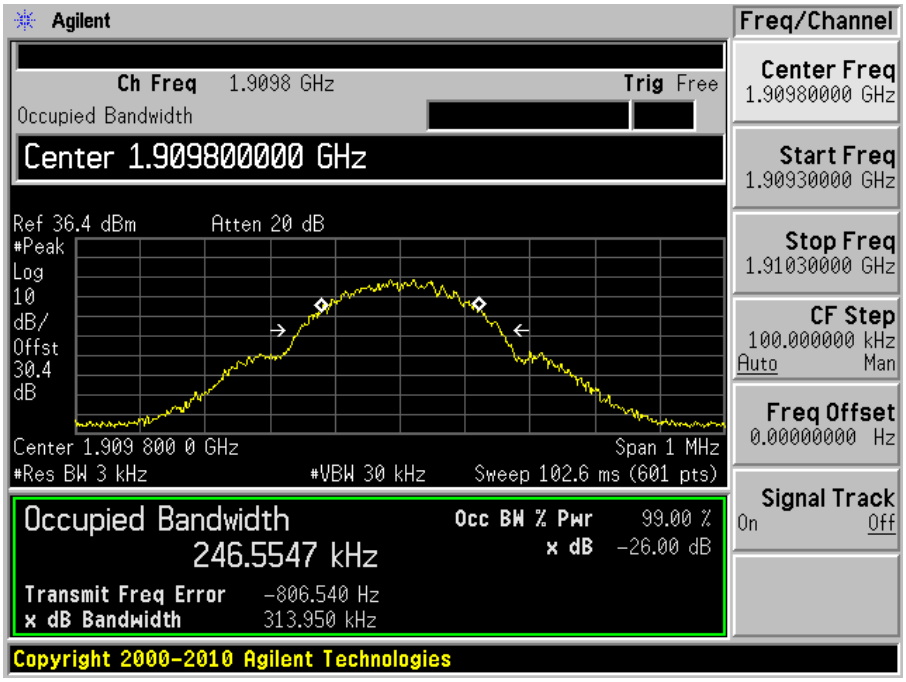
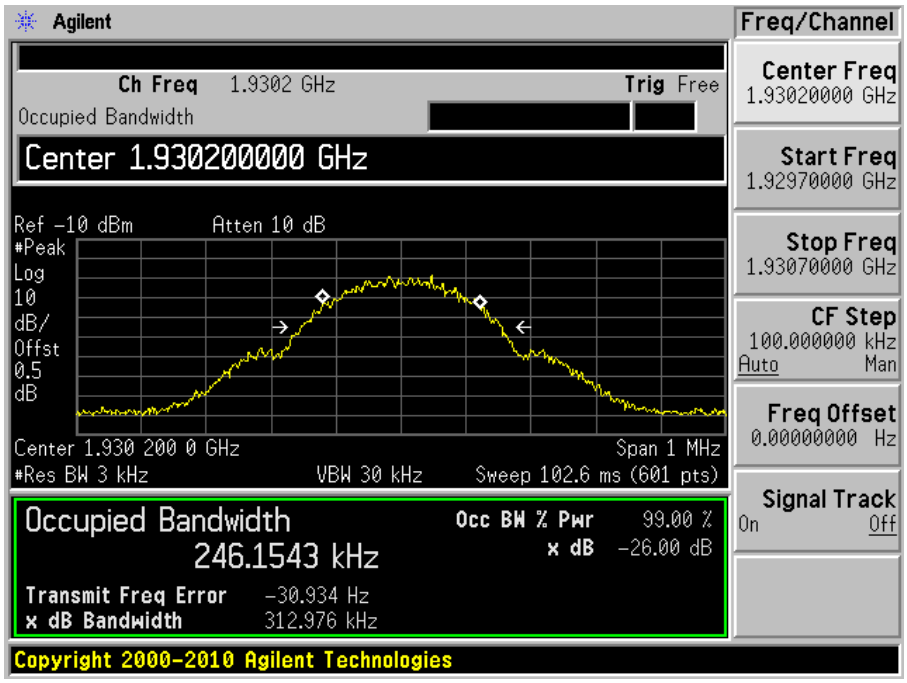


GSM 1900 MHz band Downlink, Low Channel: 1930.2 MHz

Input



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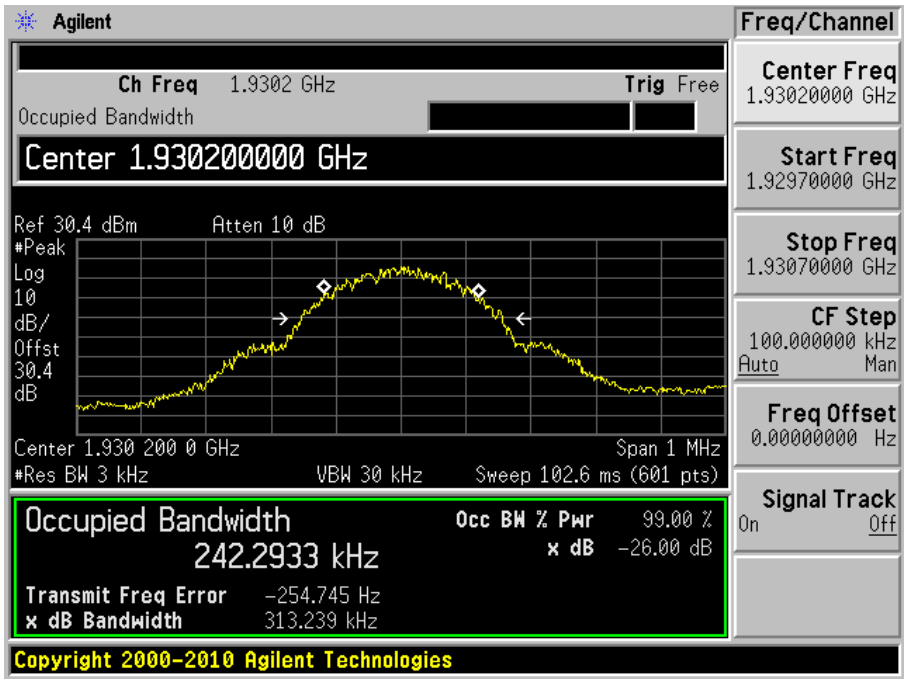
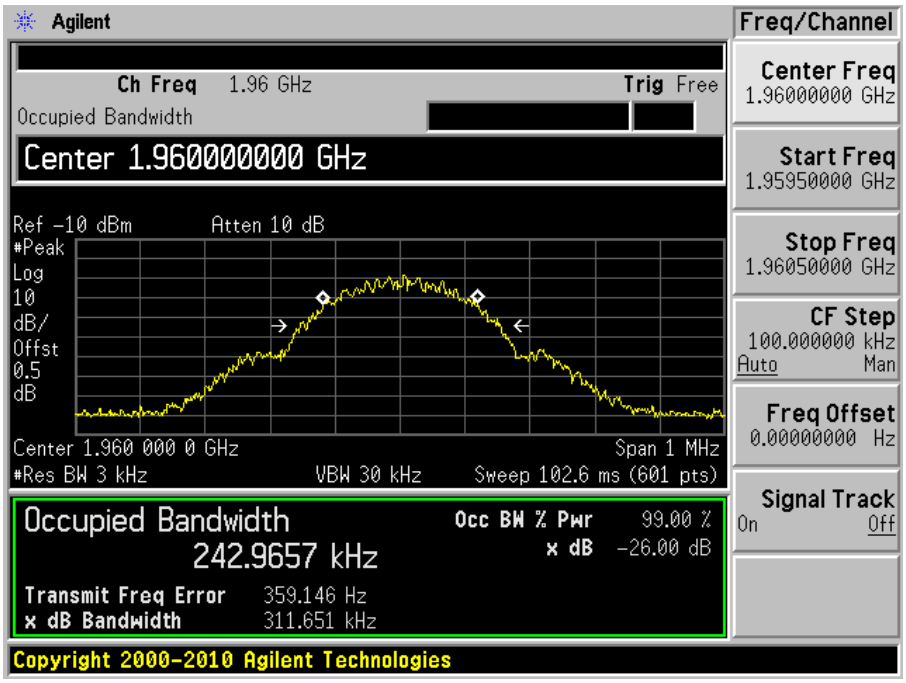


GSM 1900 MHz band Downlink, Middle Channel: 1960 MHz

Input



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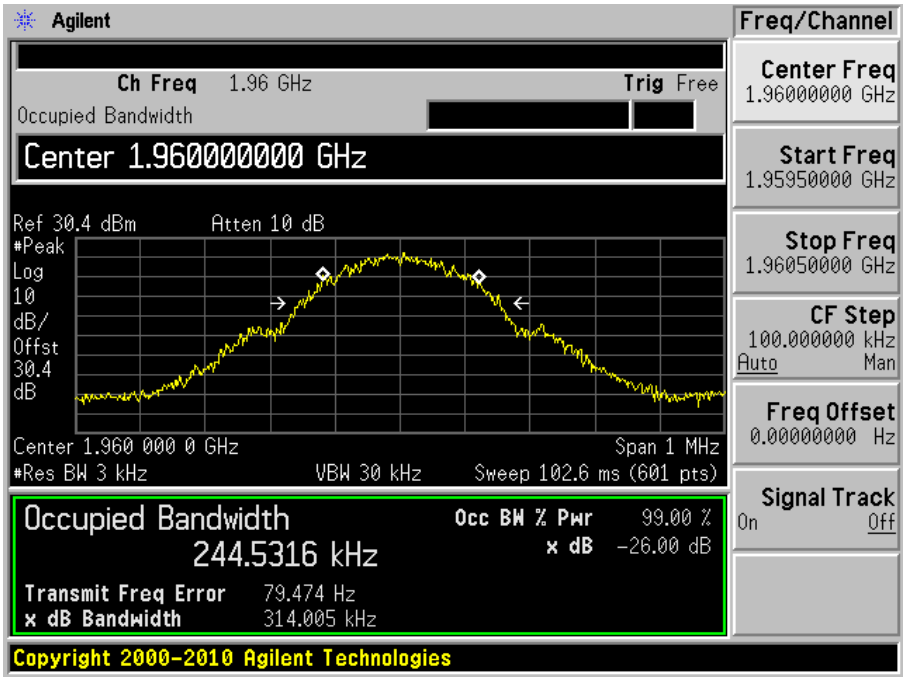
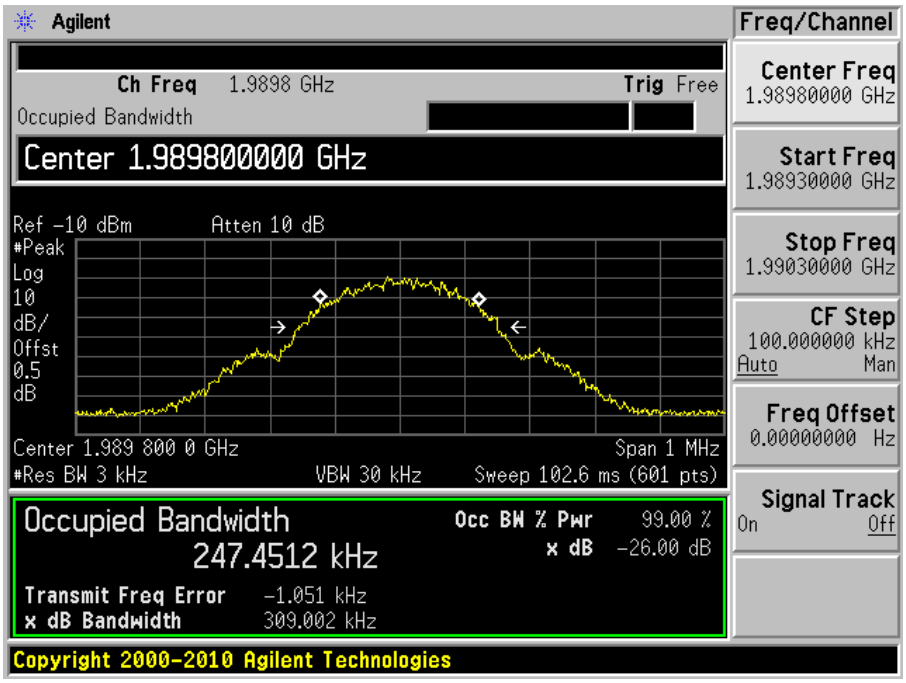


GSM 1900 MHz band Downlink, High Channel: 1989.8 MHz

Input



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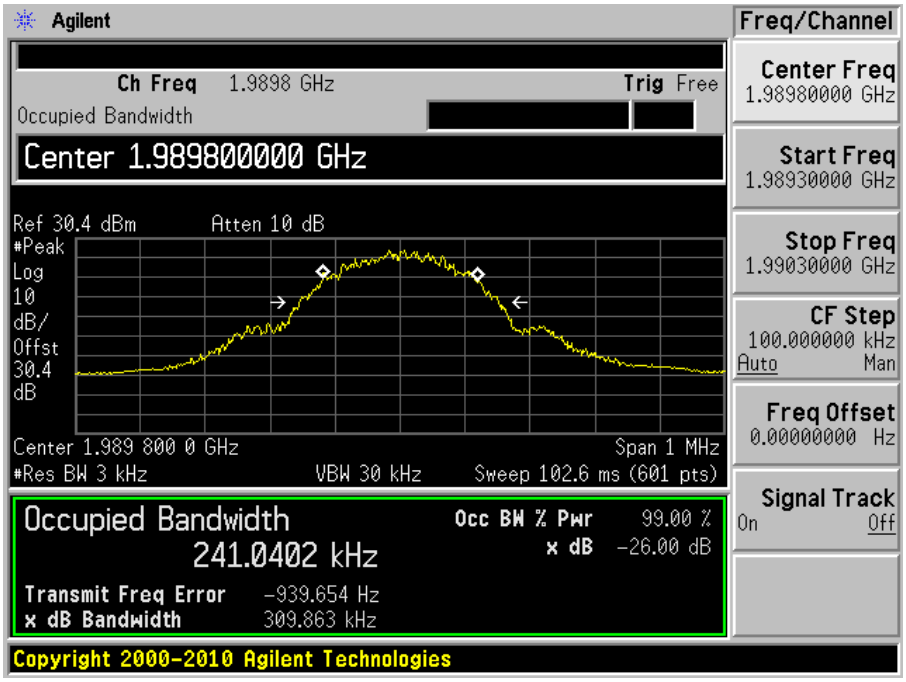
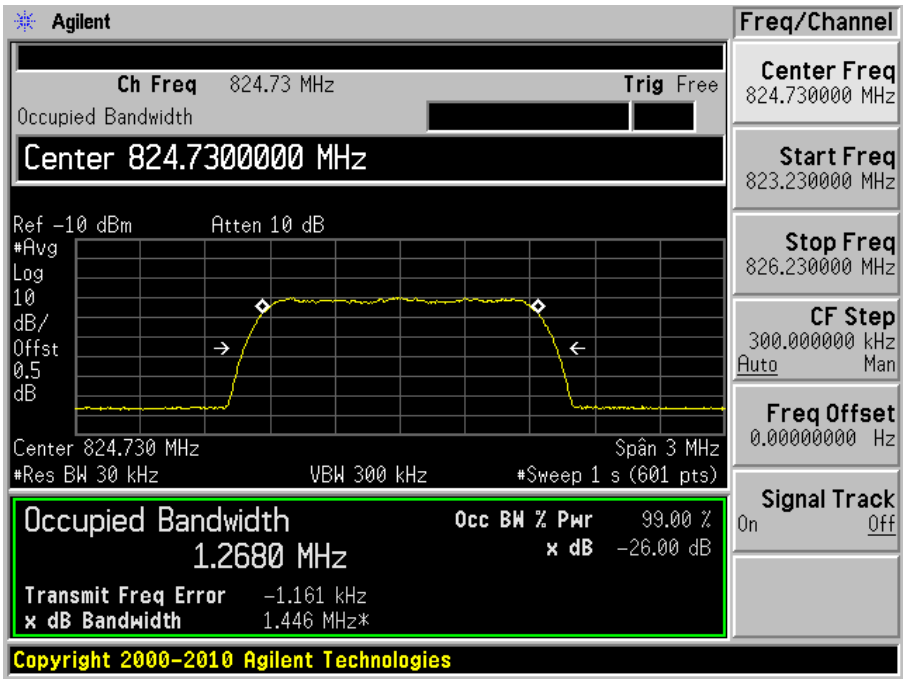
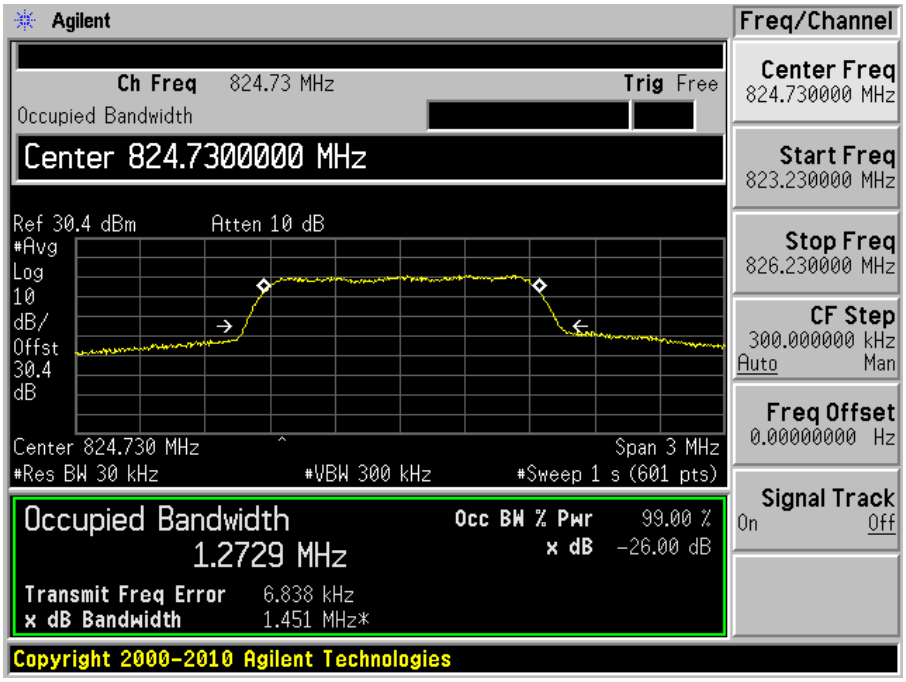


CDMA 850 MHz band Uplink, Low Channel: 824.73 MHz

Input

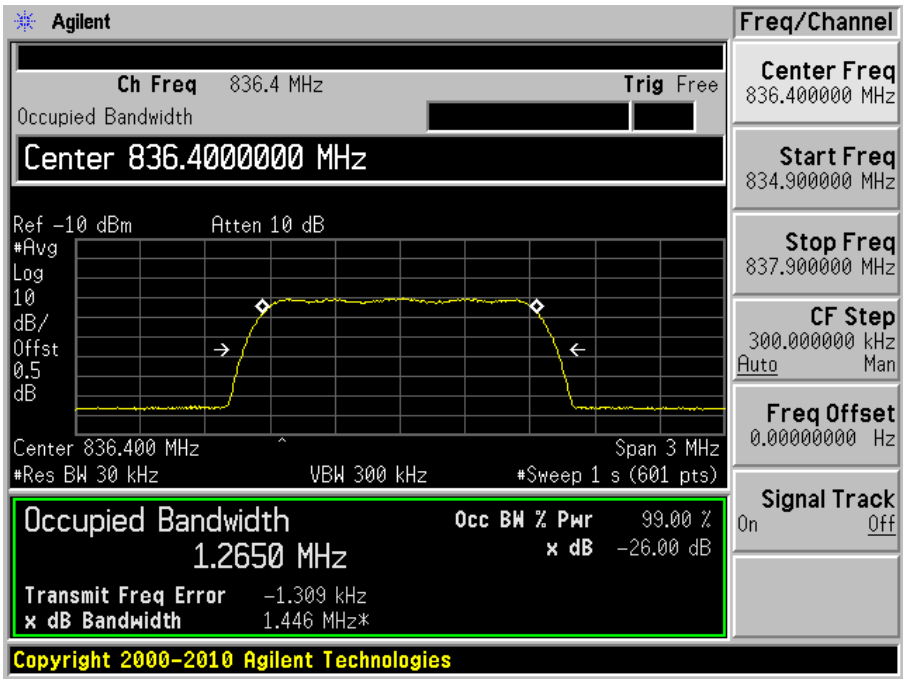


Output



CDMA 850 MHz band Uplink, Middle Channel: 836.4 MHz

Input



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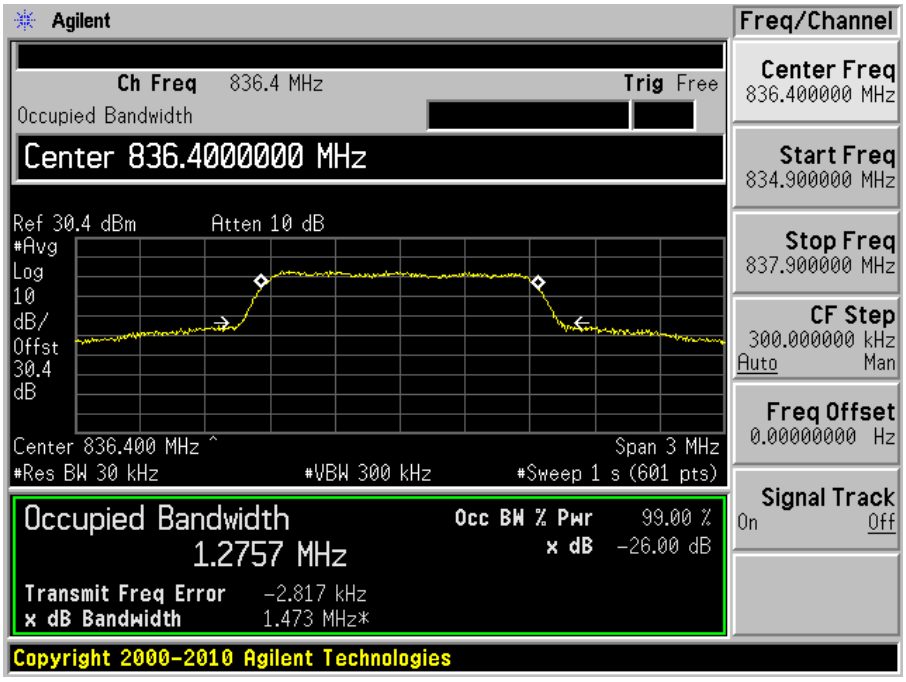
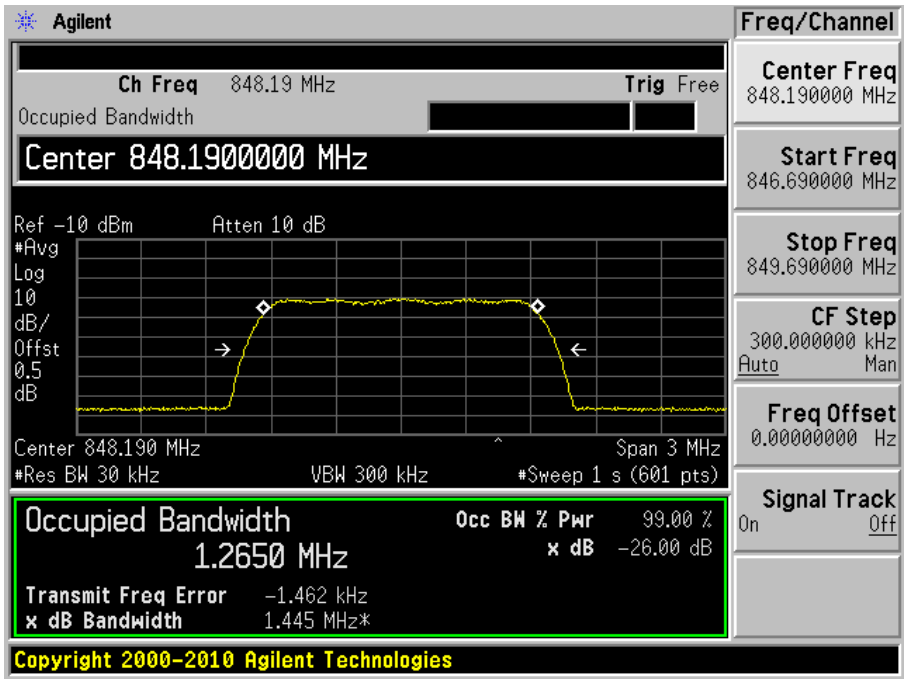
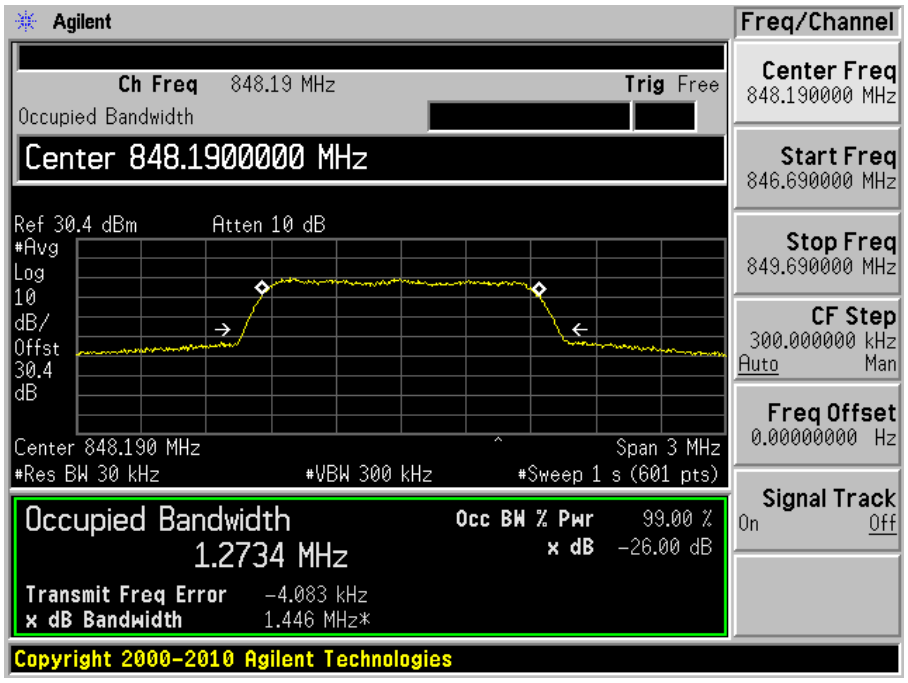


CDMA 850 MHz band Uplink, High Channel: 848.19 MHz

Input

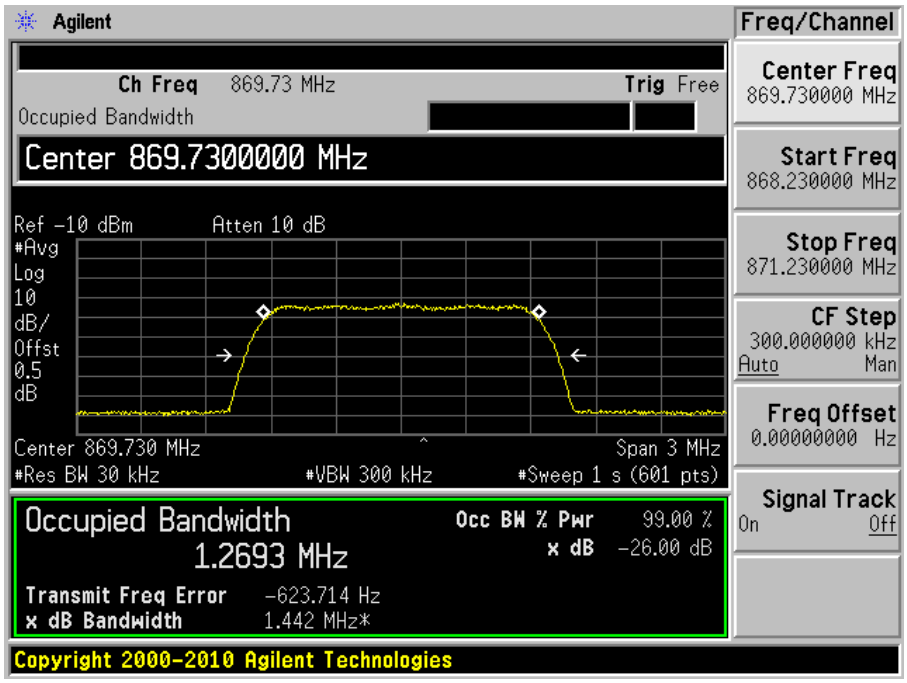


Output

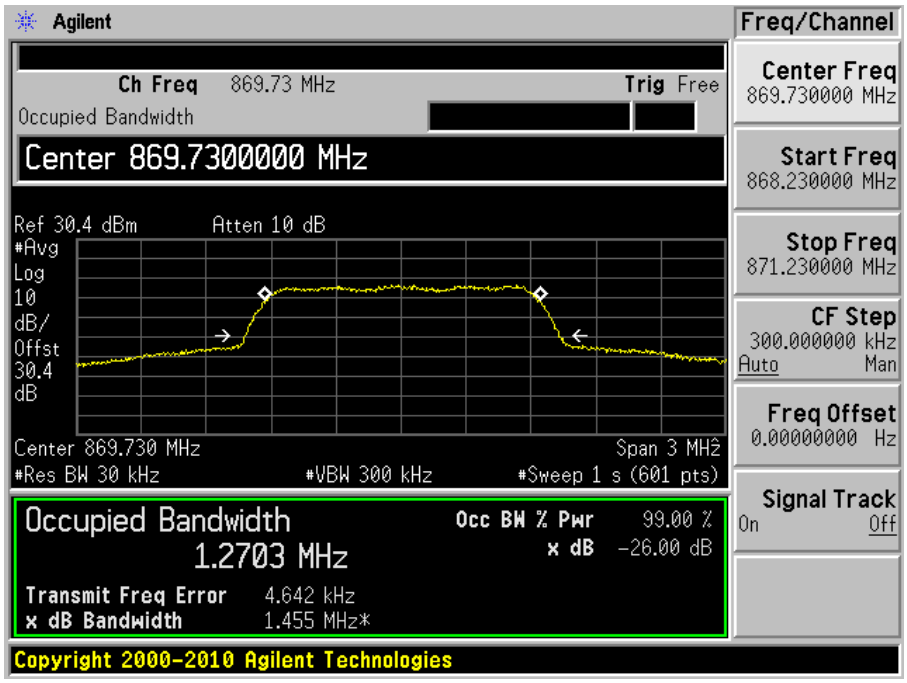


CDMA 850 MHz band Downlink, Low Channel: 869.73 MHz

Input

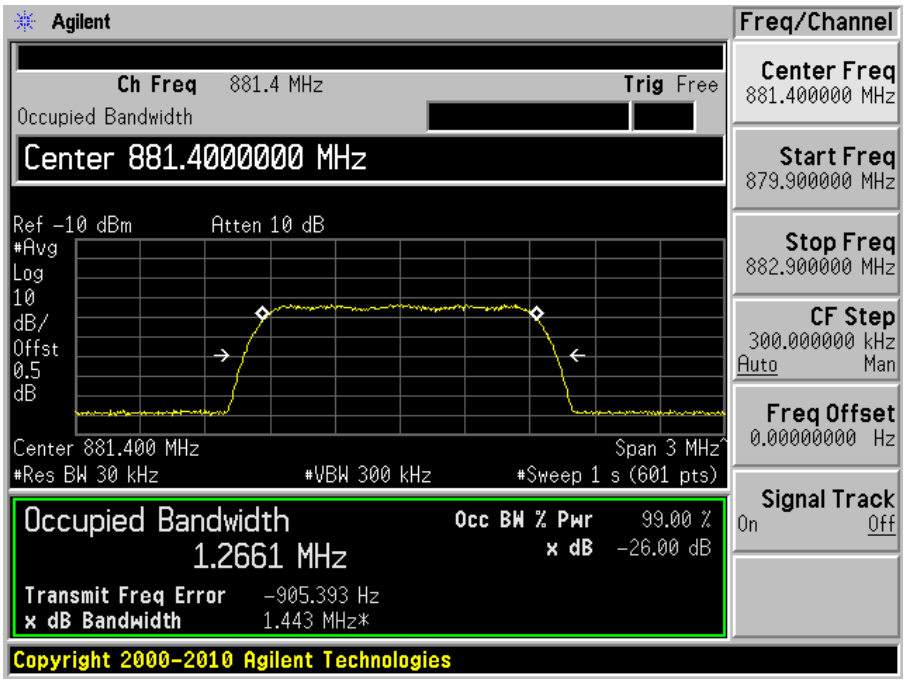


Output

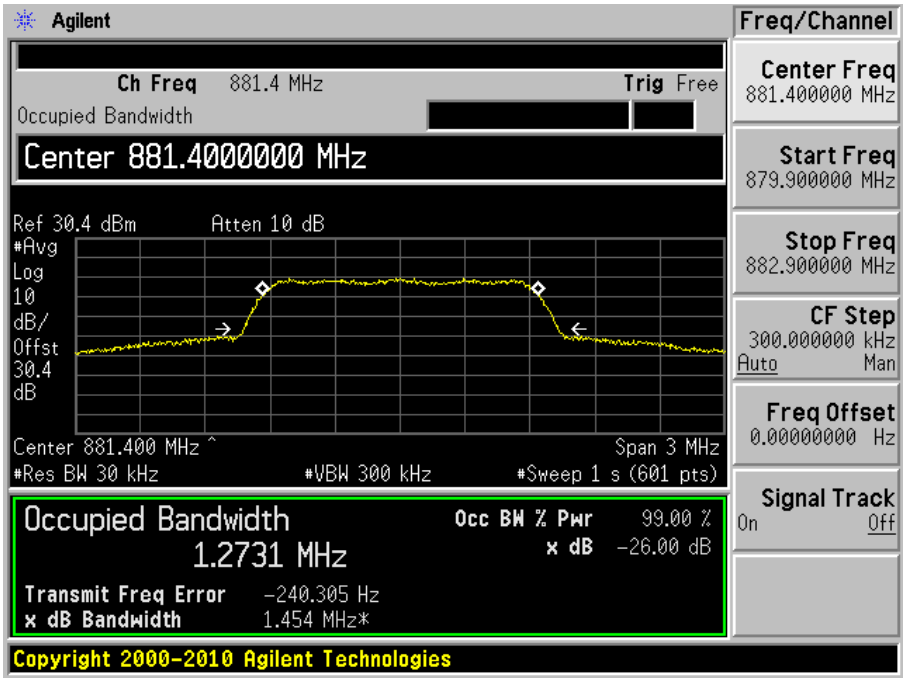


CDMA 850 MHz band Downlink, Middle Channel: 881.4 MHz

Input

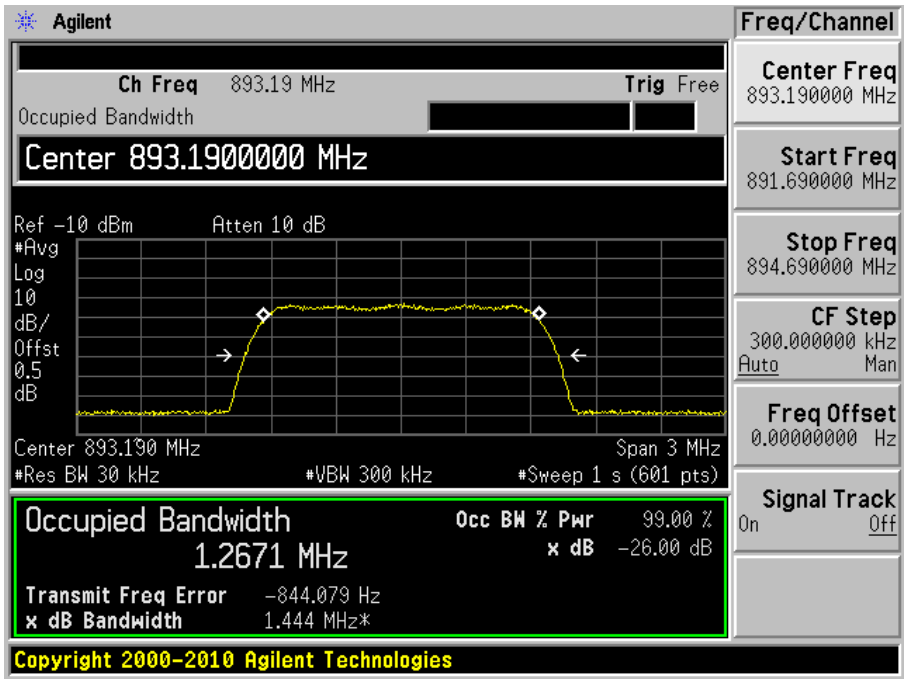


Output

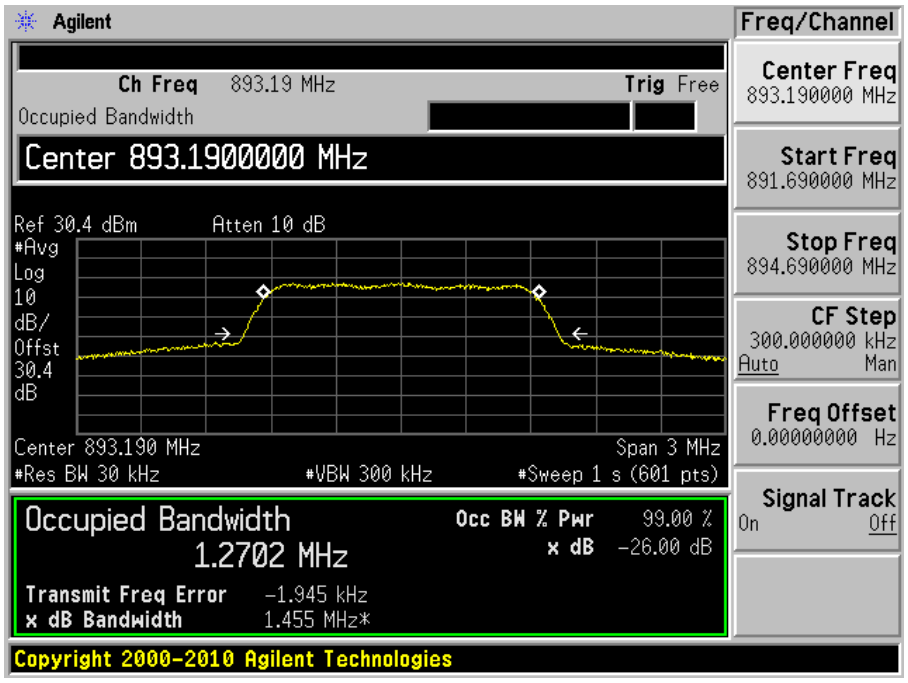


CDMA 850 MHz band Downlink, High Channel: 893.19 MHz

Input

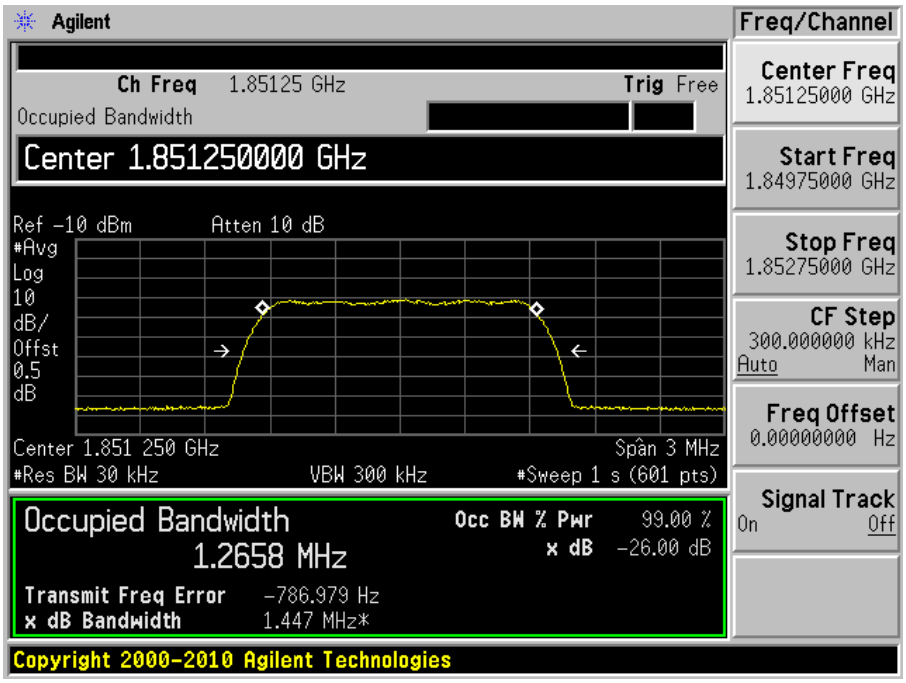


Output

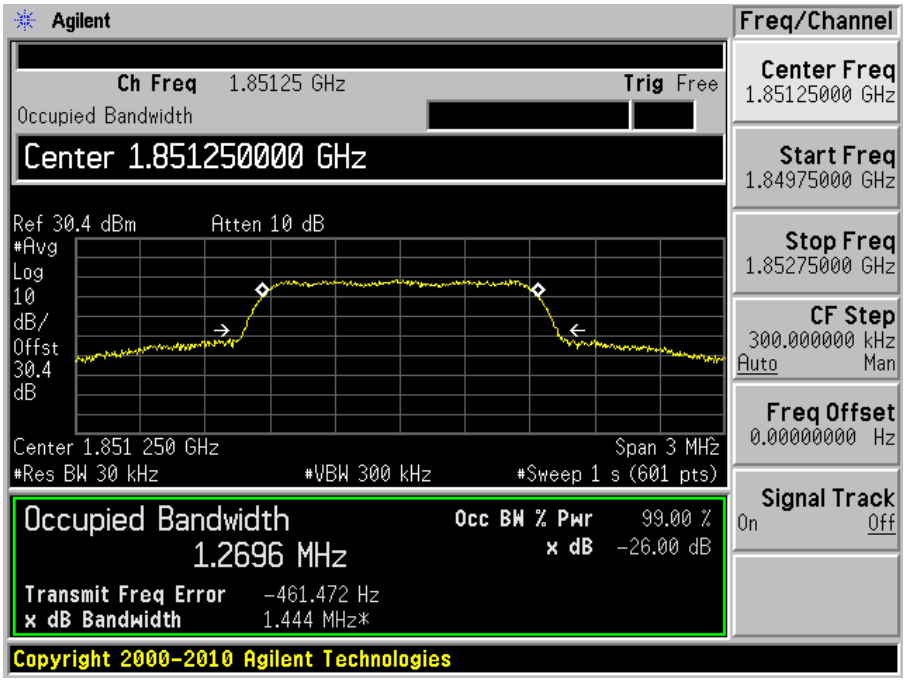


CDMA 1900 MHz band Uplink, Low Channel: 1851.25 MHz

Input

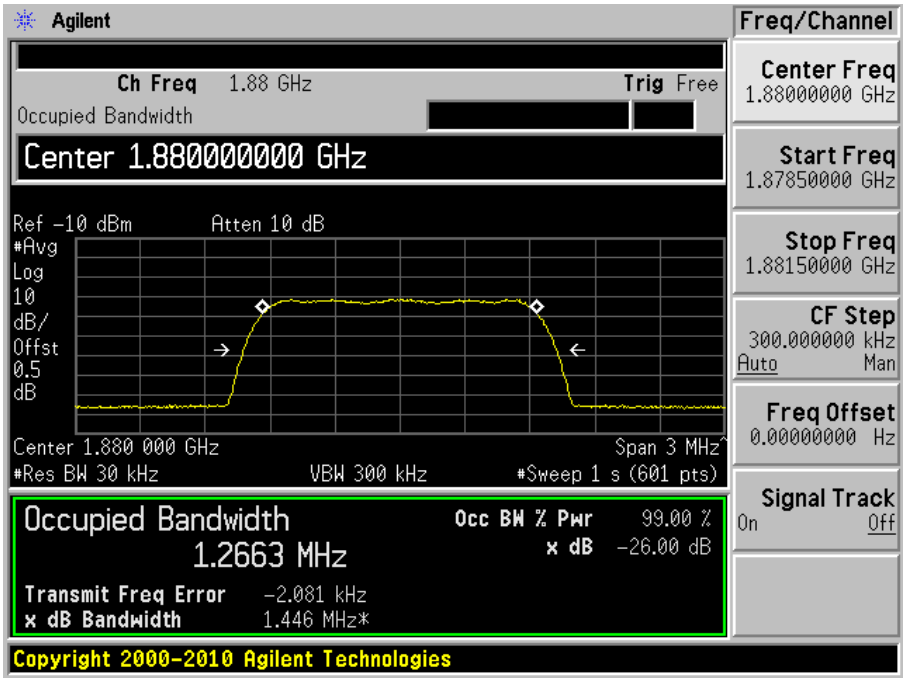


Output

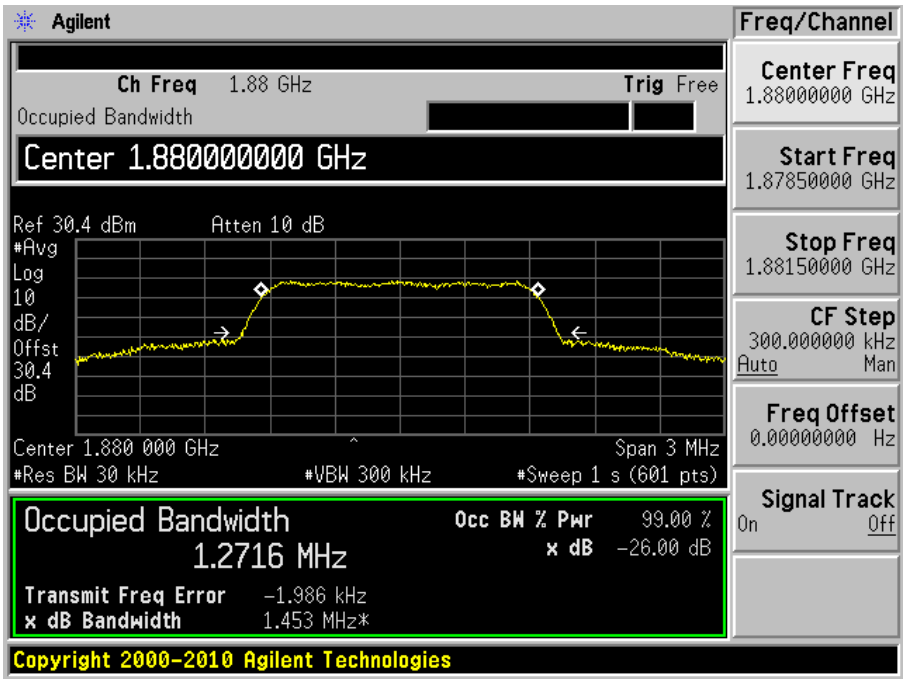


CDMA 1900 MHz band Uplink, Middle Channel: 1880 MHz

Input

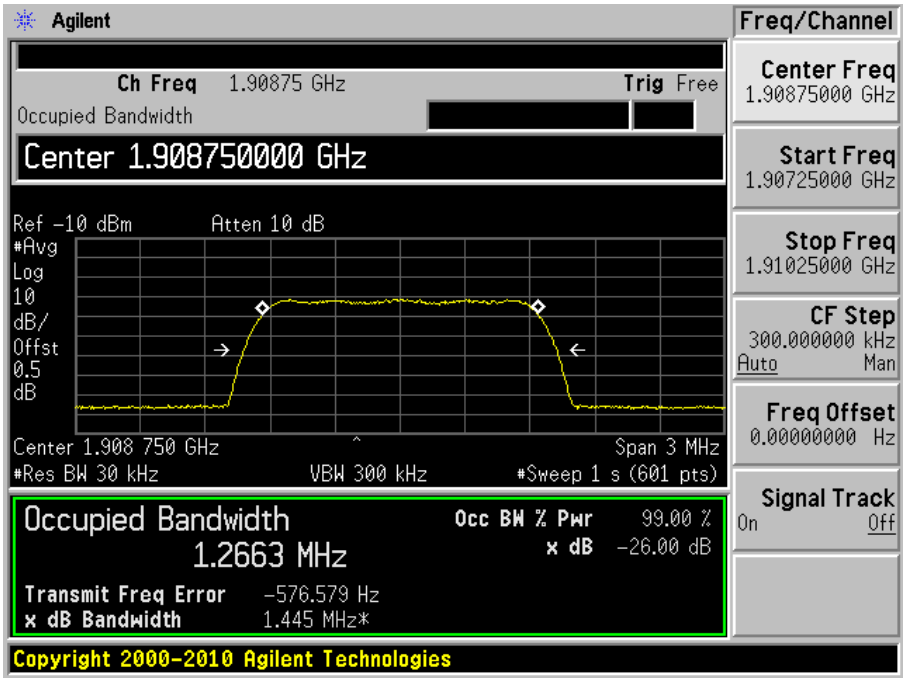


Output

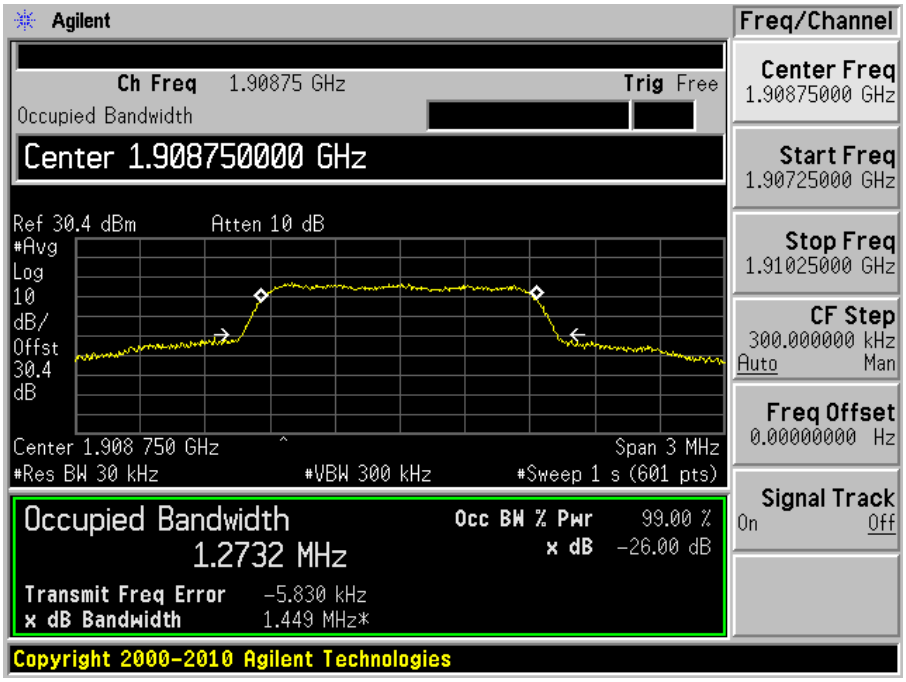


CDMA 1900 MHz band Uplink, High Channel: 1908.75MHz

Input

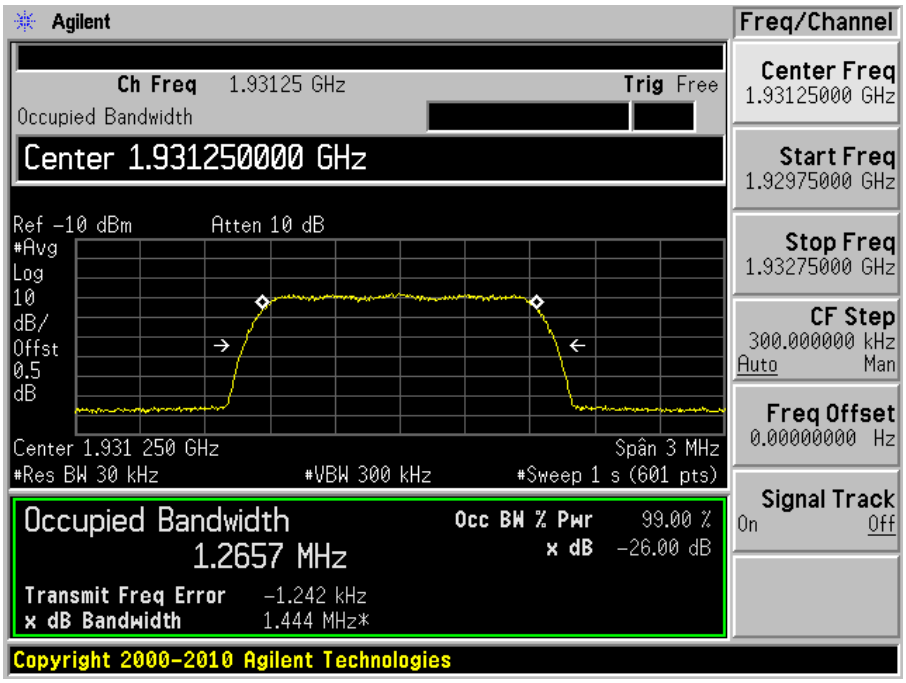


Output

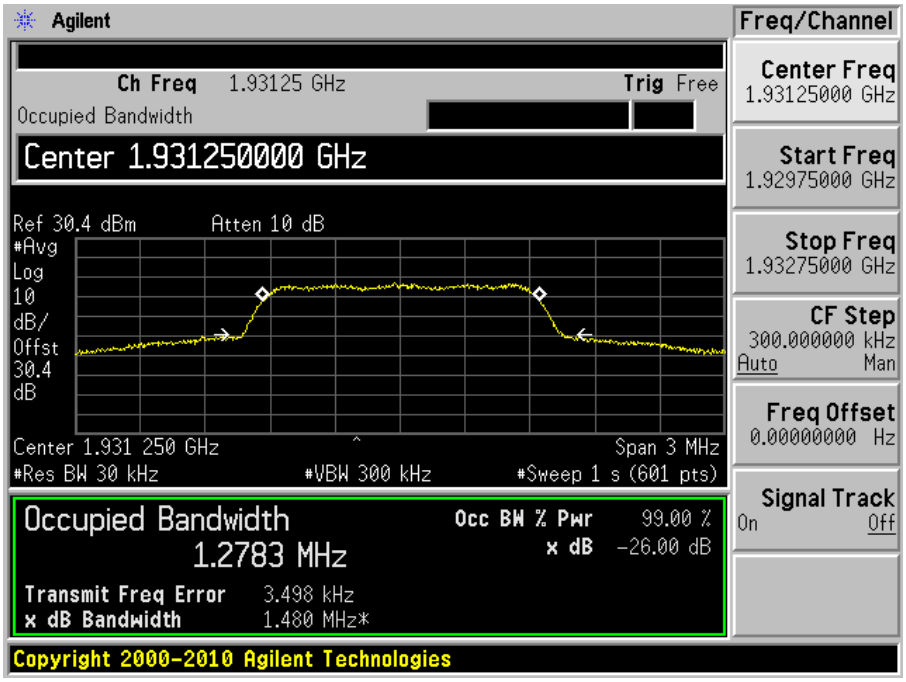


CDMA 1900MHz band Downlink, Low Channel: 1931.25 MHz

Input

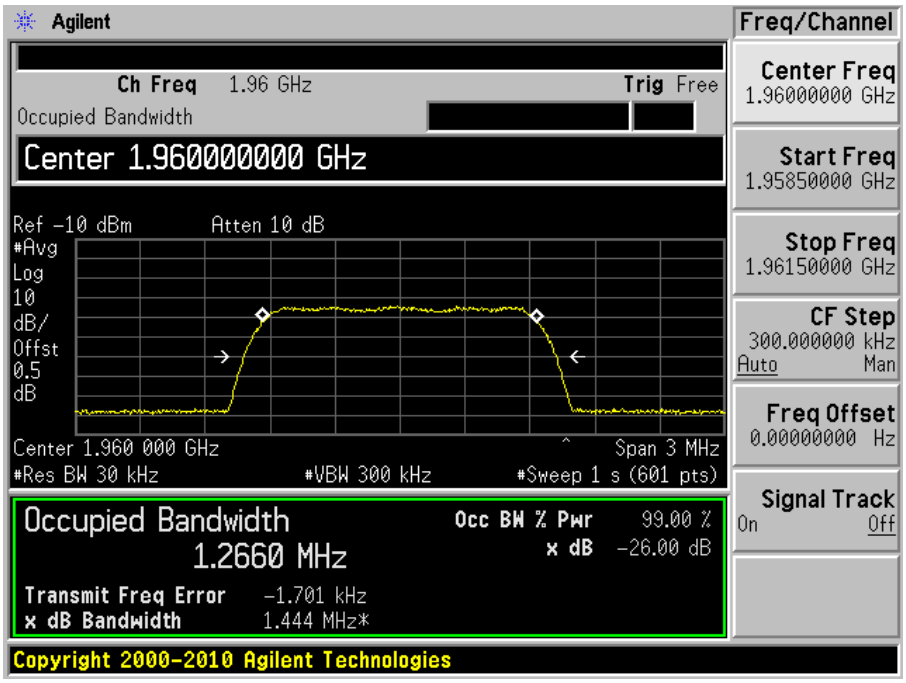


Output

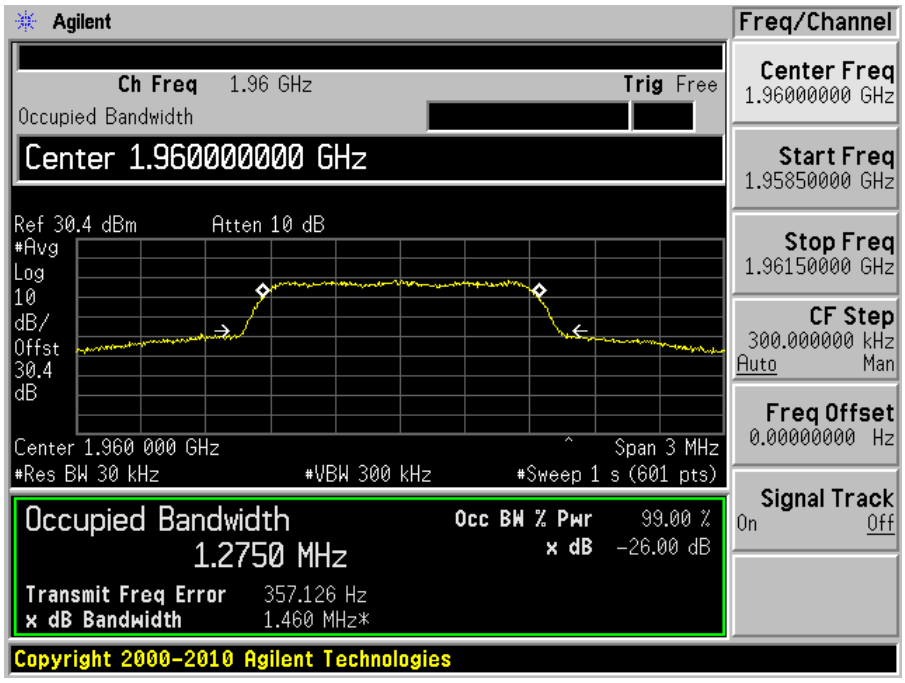


CDMA 1900 MHz band Downlink, Middle Channel: 1960 MHz

Input

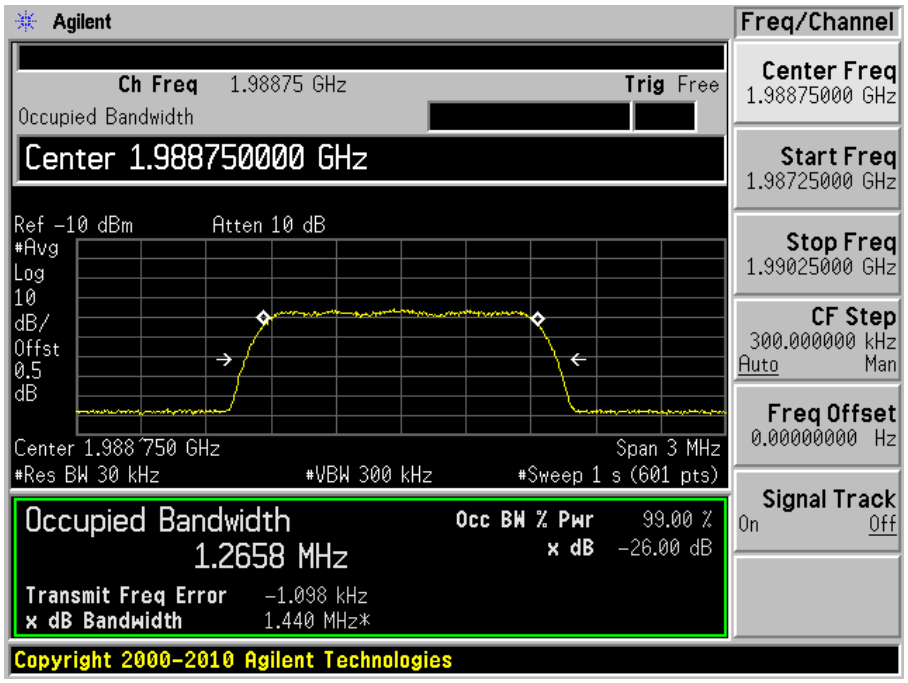


Output

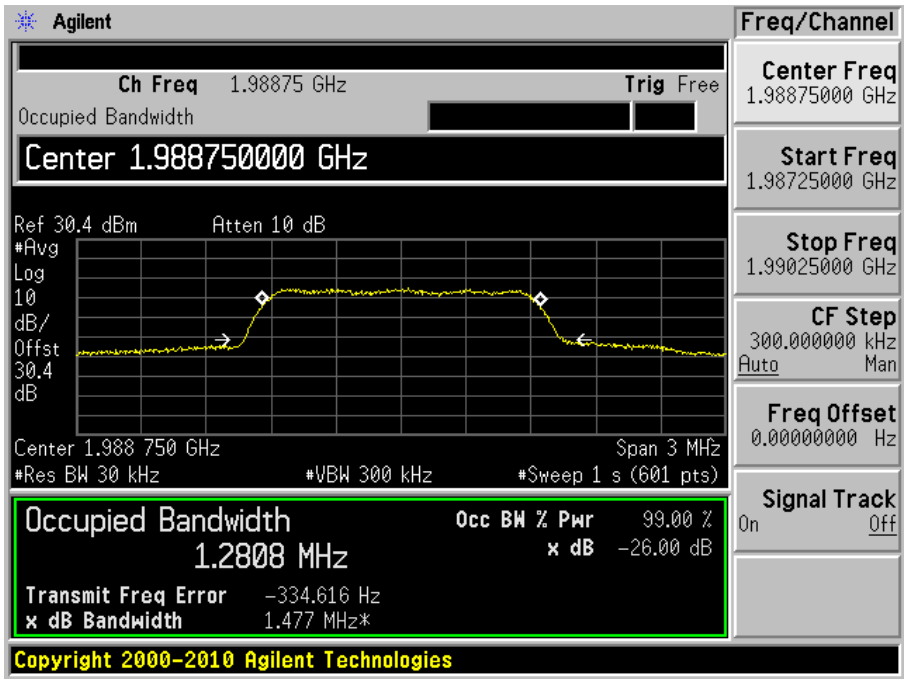


CDMA 1900 MHz band Downlink, High Channel: 1988.75 MHz

Input



Output



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

7.1 Applicable Standard

Requirements: FCC §2.1053, §22.917 & §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 Log_{10} (power out in Watts)

7.3 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Agilent	Analyzer, Spectrum	E4440A	US45303156	2010-08-09
A.H Systems	Antenna, Horn	SAS-200/571	261	2009-09-23
A.R.A Inc	Horn antenna	DRG-1181A	1132	2009-10-27
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-21
HP	Generator, Signal	83650B	3641A00276	2010-06-21
Sunol Science Corp	System Controller	SC99V	122303-1	N/R
Sunol Science Corp	Combination Antenna	JB3	A0020106-3	2010-06-16
Hewlett Packard	Pre amplifier	8447D	2944A06639	2010-06-18
Mini-Circuit	Pre-Amp. 1GHz to 18GHz	ZVA-183-S	570400946	2010-05-10

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

7.4 Test Environmental Conditions

Temperature:	18~22 °C
Relative Humidity:	35~42 %
ATM Pressure:	101.1~101.7kPa

The testing was performed by Jack Liu on 2009-4-29 ~ 2009-5-1

7.5 Summary of Test Results

Worst case reading as follows:

Mode: 850 MHz ,Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency (MHz)**
-27.6	1673.2	Horizontal	881.6
Mode: 850 MHz, Uplink			
-18.09	3526.4	Horizontal	836.6

Mode: 1900 MHz ,Downlink			
Margin (dB)	**Frequency (MHz)**	**Polarization (Horizontal/Vertical)**	**Input Frequency (MHz)**
-	-	-	1960
Mode: 1900 MHz, Uplink			
-	-	-	1880

7.6 Test Results

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Antenna Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
850 MHz, Downlink, Input frequency = 881.6 MHz											
1673.2	50.27	63	1.00	V	1673.2	-52.41	9.4	1.3	-44.31	-13	-31.31
1673.2	53.98	153	1.00	H	1673.2	-48.7	9.4	1.3	-40.6	-13	-27.6
2509.8	45.33	12	1.30	V	2509.8	-50.56	9.5	1.66	-42.72	-13	-29.72
2509.8	37.13	327	1.00	H	2509.8	-58.76	9.5	1.66	-50.92	-13	-37.92
850 MHz, Uplink, Input frequency = 836.6 MHz											
1763.2	56.8	157	1.00	V	1763.2	-44.64	9.6	1.3	-36.34	-13	-23.34
1763.2	59.53	257	1.00	H	1763.2	-41.91	9.6	1.3	-33.61	-13	-20.61
3526.4	51.48	200	1.15	V	3526.4	-42.37	10	1.68	-34.05	-13	-21.05
3526.4	54.44	170	1.00	H	3526.4	-39.41	10	1.68	-31.09	-13	-18.09

Indicated		Azimuth (degree)	Test Antenna		Substituted					Limit (dBm)	Margin (dB)
Frequency (MHz)	Amplitude (dBuV)		Height (m)	Polarity (H/V)	Frequency (MHz)	Level (dBm)	Antenna Cord. (dB)	Cable Loss (dB)	Absolute Level (dBm)		
1900 MHz, Downlink, Input frequency = 1960 MHz											
-	-	-	-	-	-	-	-	-	-	-	-[1]
-	-	-	-	-	-	-	-	-	-	-	-[1]
1900 MHz, Uplink, Input frequency = 880 MHz											
-	-	-	-	-	-	-	-	-	-	-	-[1]
-	-	-	-	-	-	-	-	-	-	-	-[1]

Note[1]: All emissions were20 dB below the limit and/or on the noise floor level.

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

8.1 Applicable Standard

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

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

§ 22.917**:** 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

Temperature:	22~27 °C
Relative Humidity:	35~40 %
ATM Pressure:	101.1~102.2kPa

The testing was performed by Jack Liu on 2010-9-22 ~ 2010-9-28

8.4 Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-21
HP	Generator, Signal	83650B	3641A00276	2010-06-21
Agilent	Analyzer, Spectrum	E4440A	US45303156	2010-08-09

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

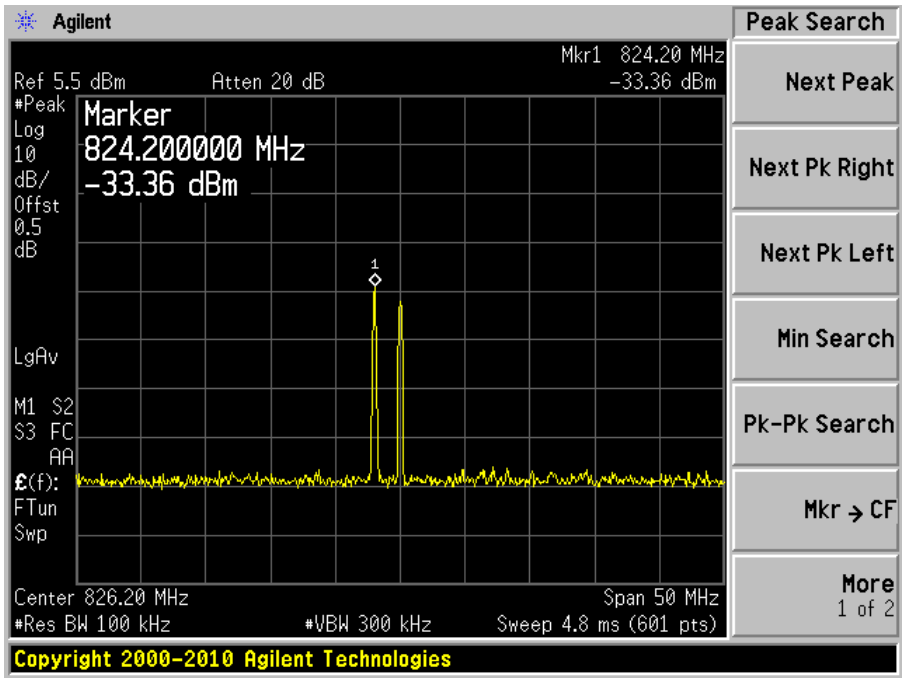
8.5 Test Results

Please refer to the hereinafter plots.

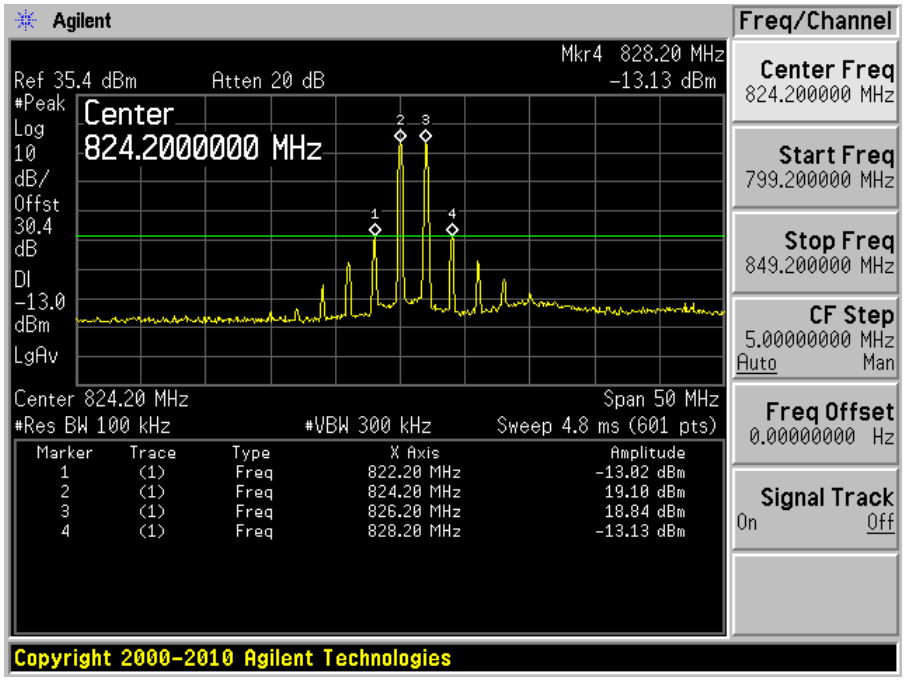
Inter-Modulation

GSM 850 MHz band Low channel Uplink:

Input

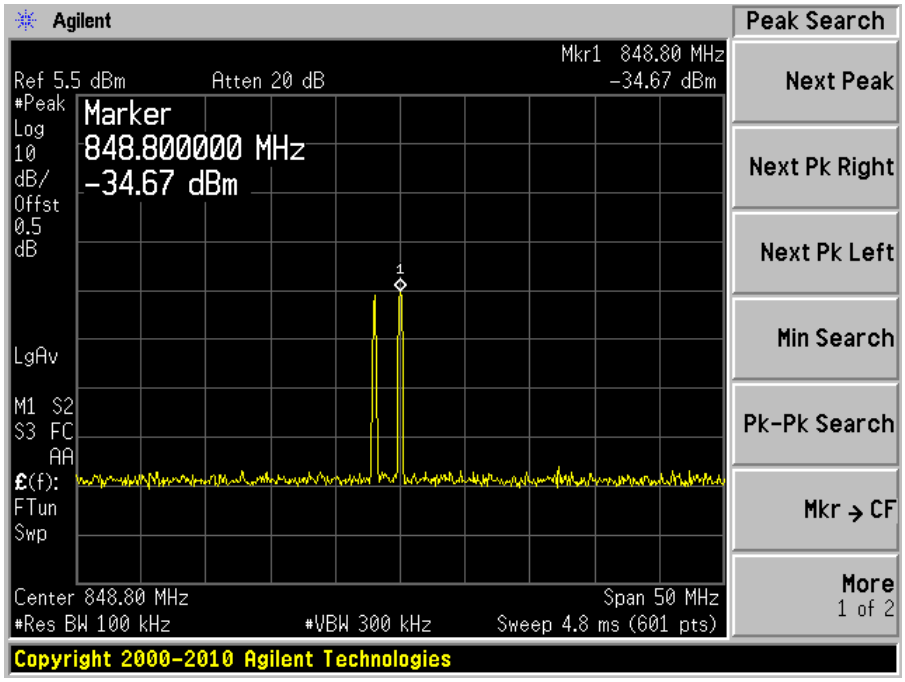


Output

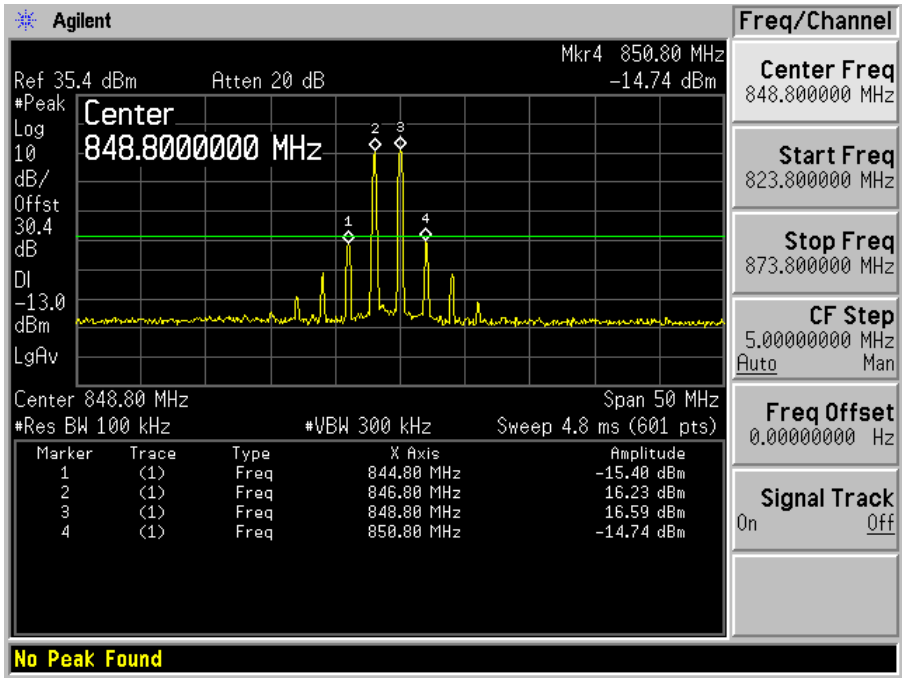


GSM 850 MHz band High channel Uplink:

Input

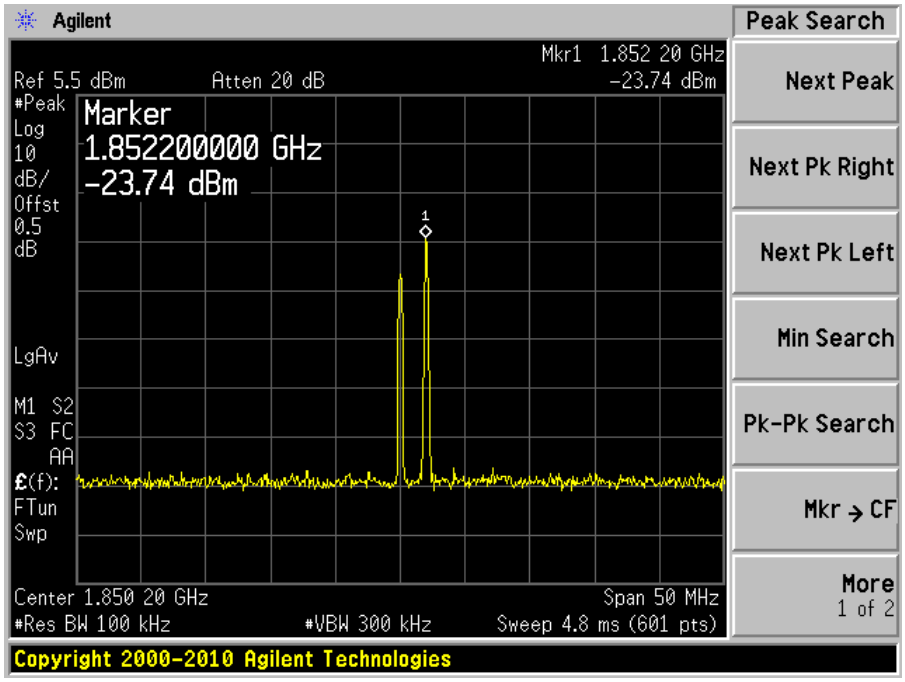


Output

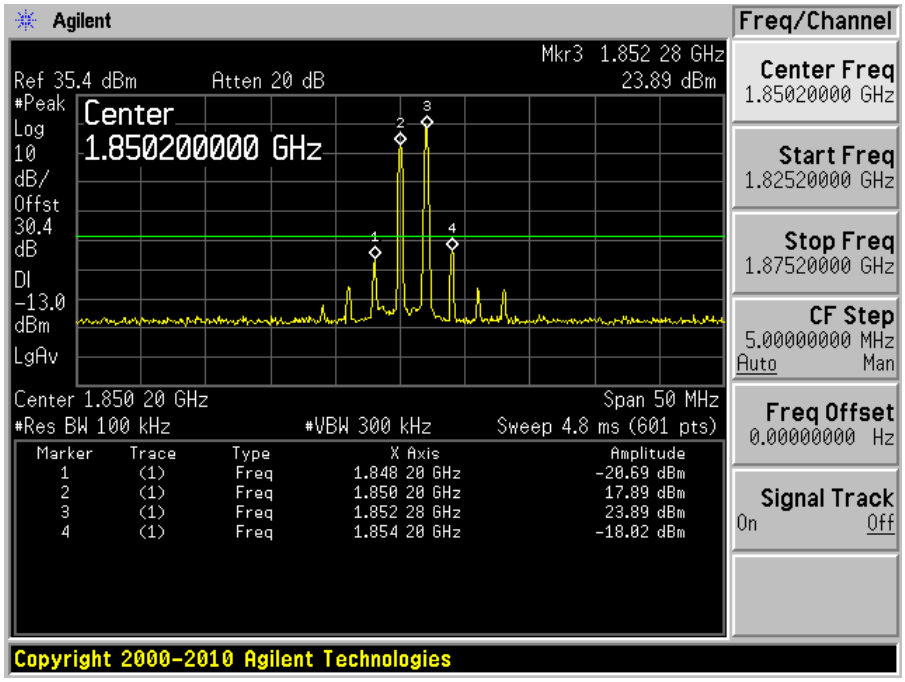


GSM 1900 MHz band Low channel Uplink:

Input

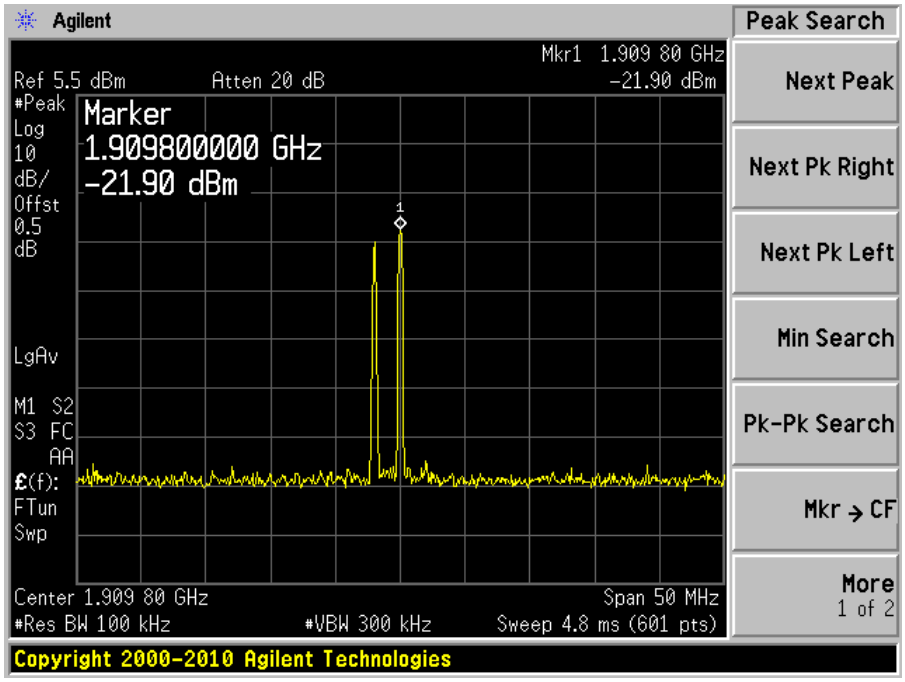


Output

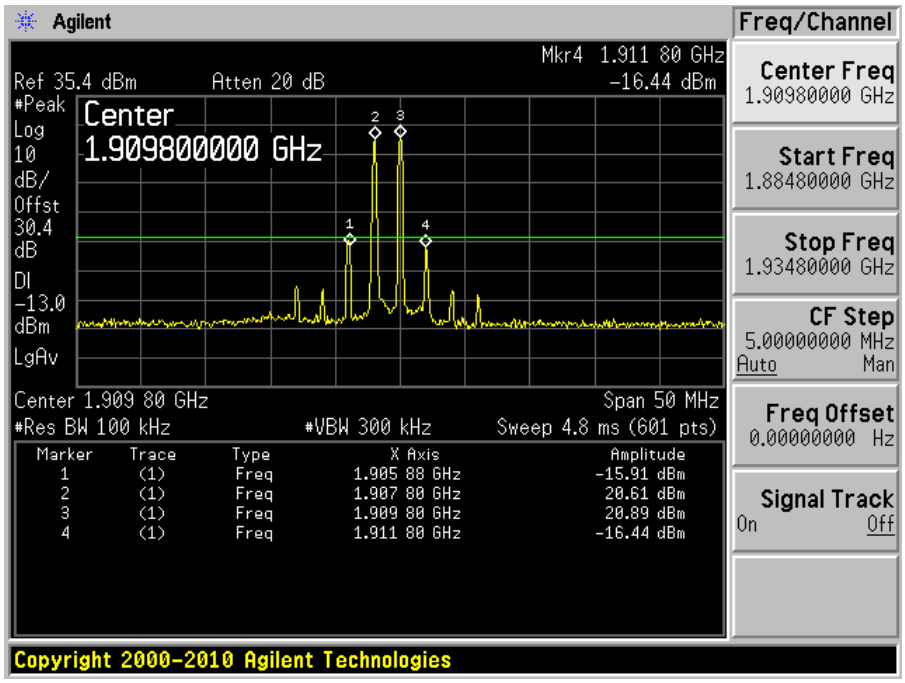


GSM 1900 MHz band High channel Uplink:

Input

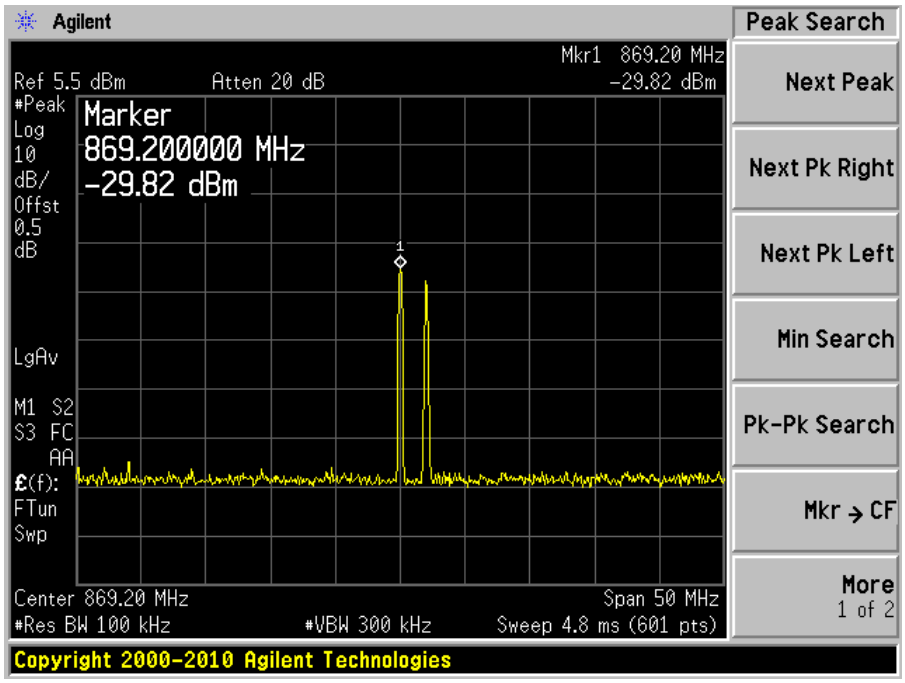


Output

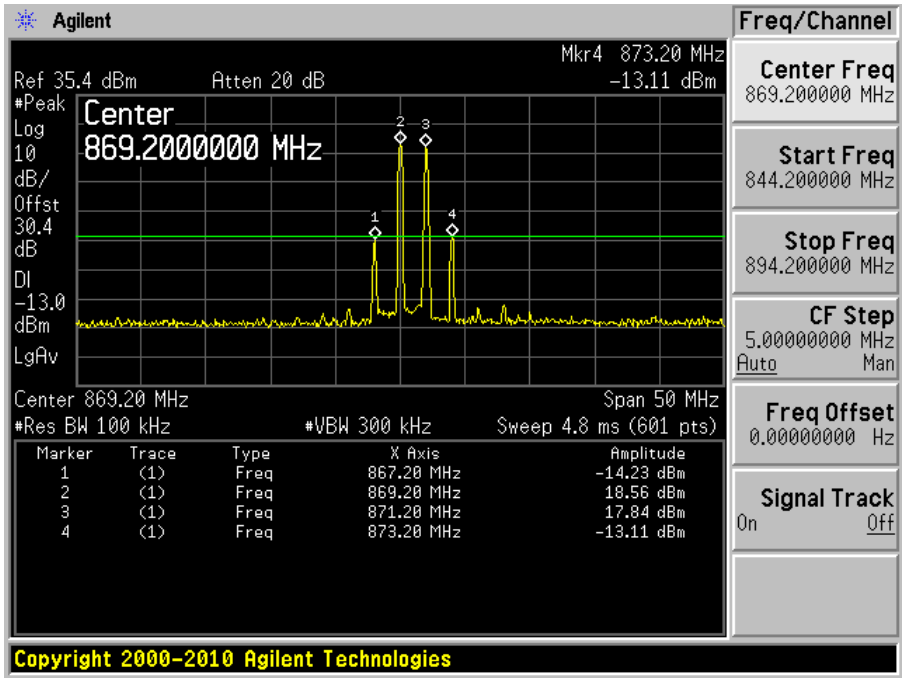


GSM 850 MHz band Low channel Downlink:

Input

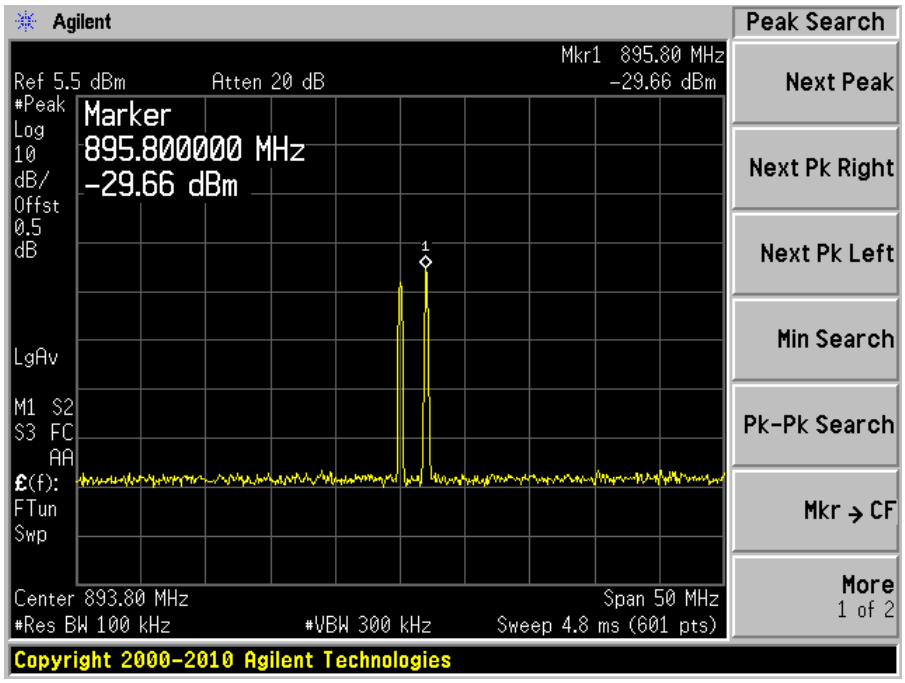


Output

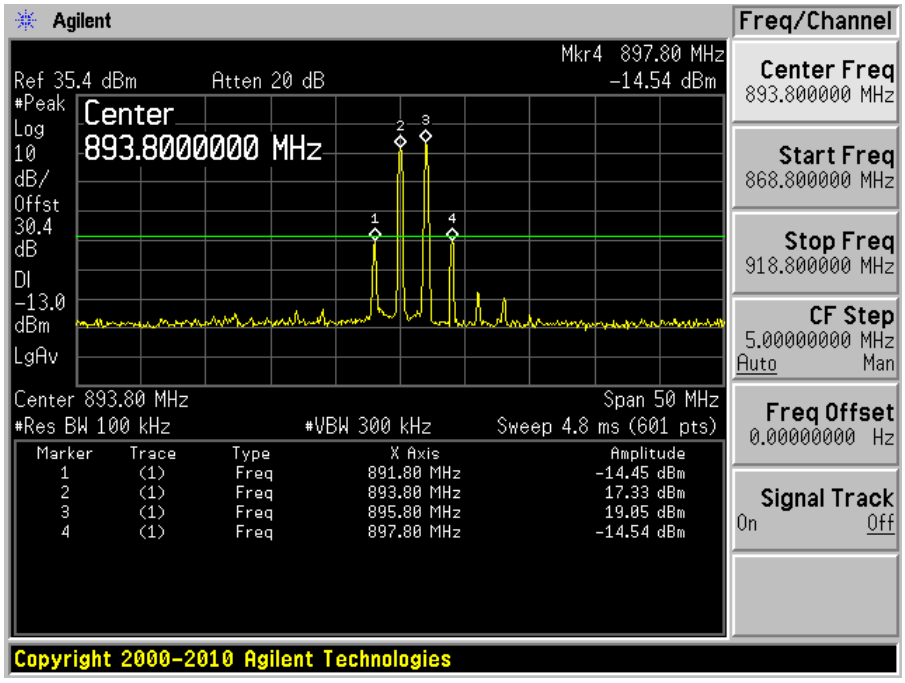


GSM 850 MHz band High channel Downlink:

Input

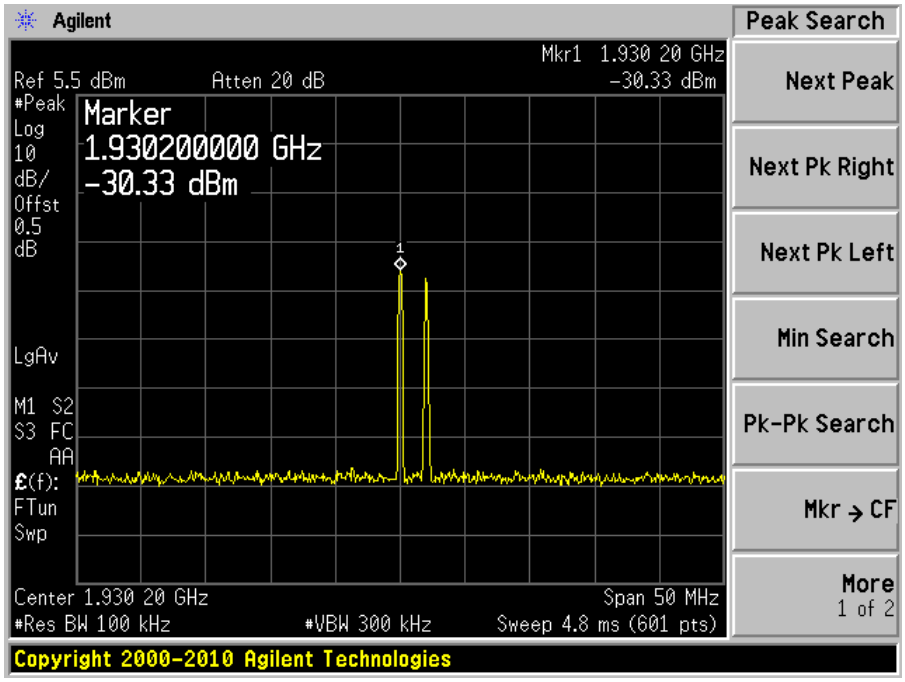


Output

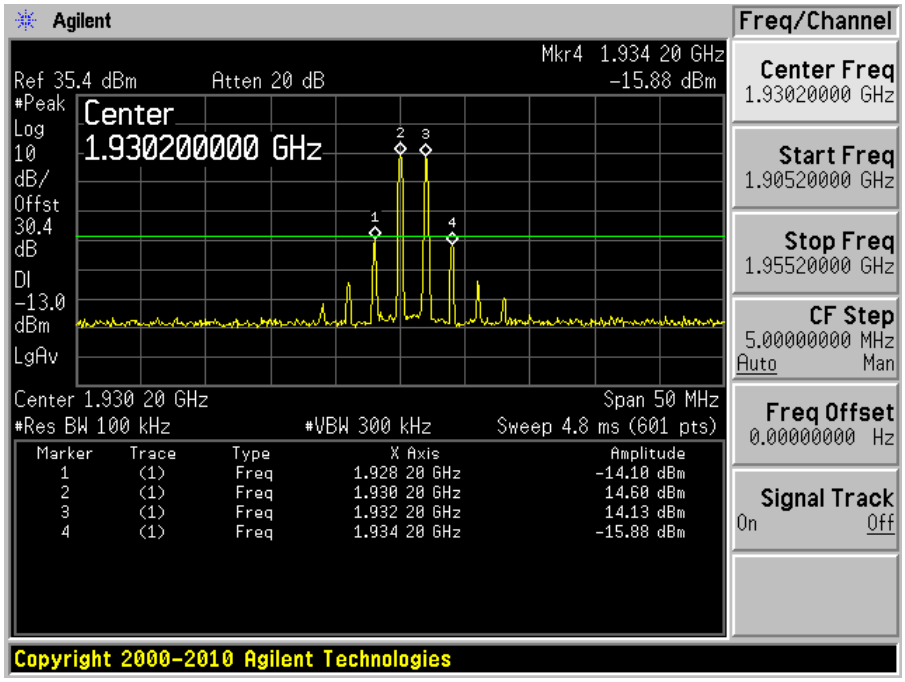


GSM 1900 MHz band Low channel Downlink:

Input

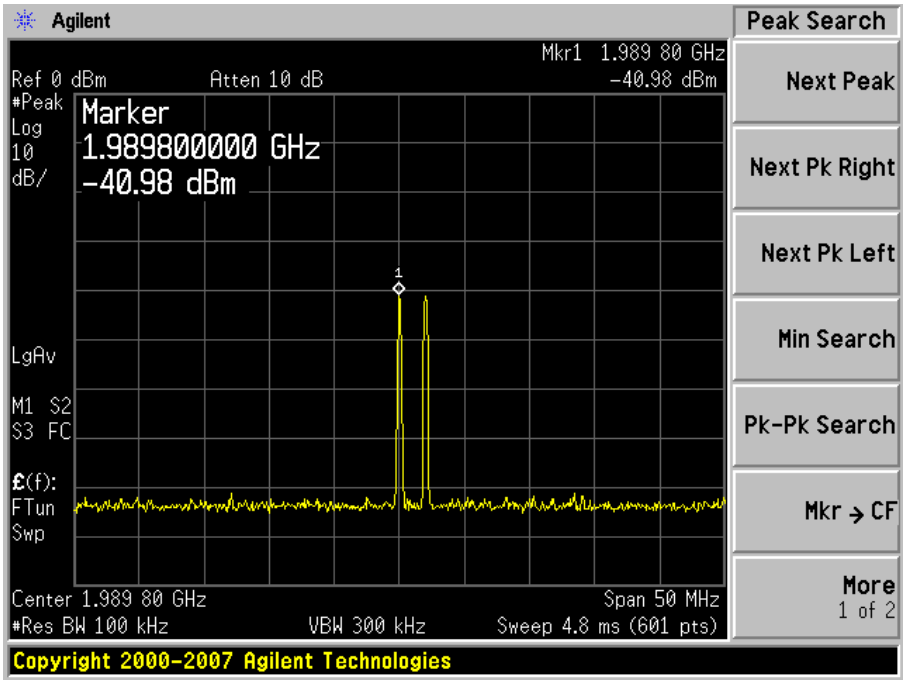


Output

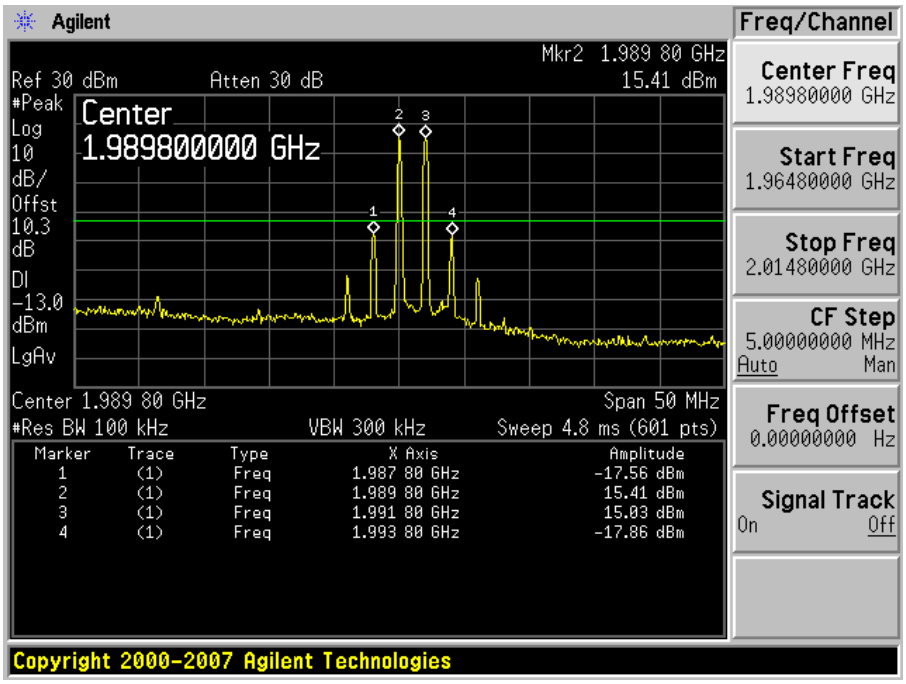


GSM 1900 MHz band High channel Downlink:

Input

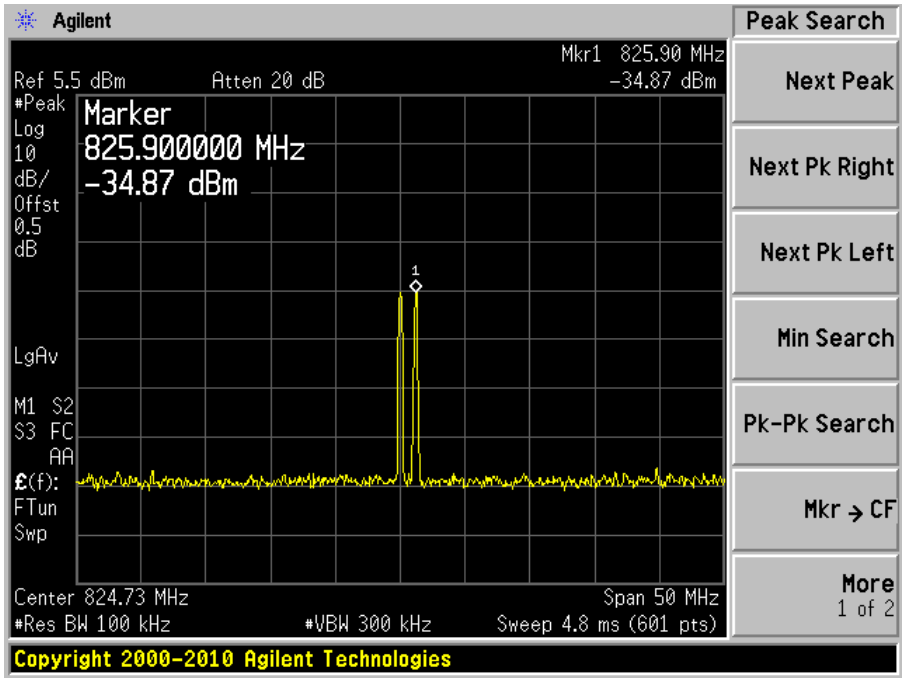


Output

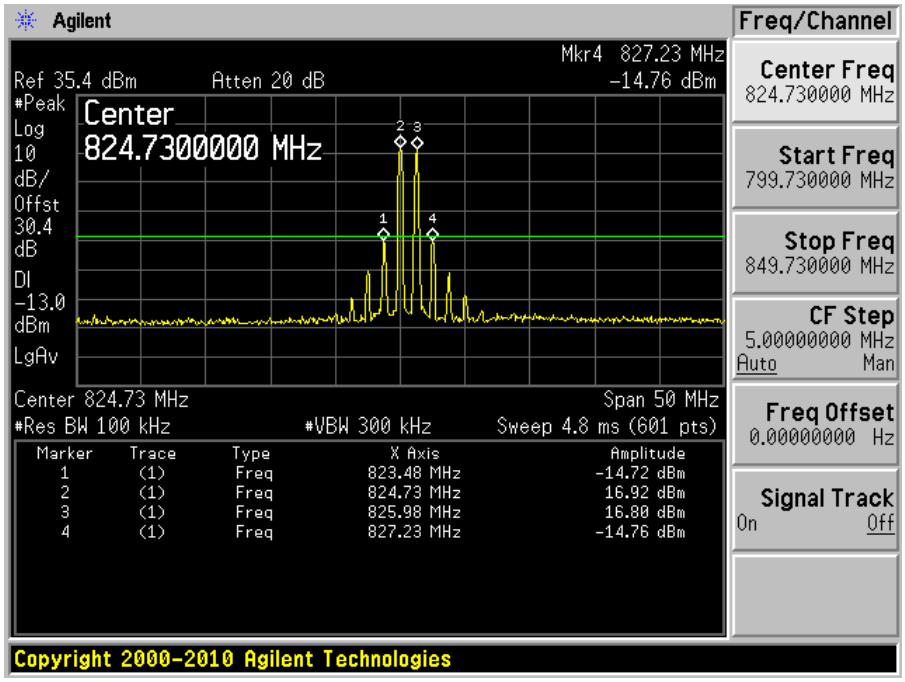


CDMA 850 MHz band Low channel Uplink:

Input

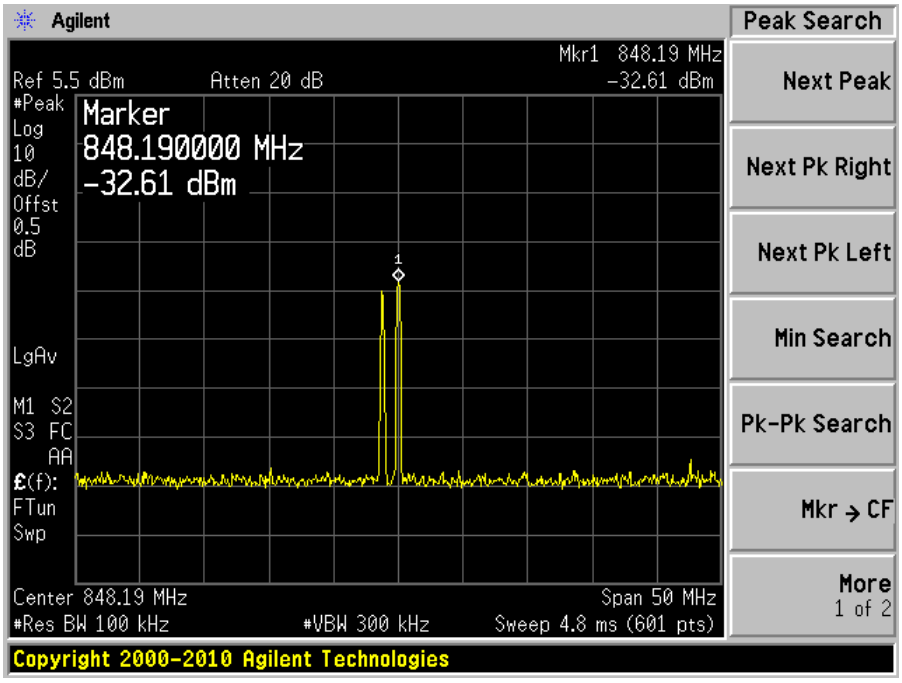


Output

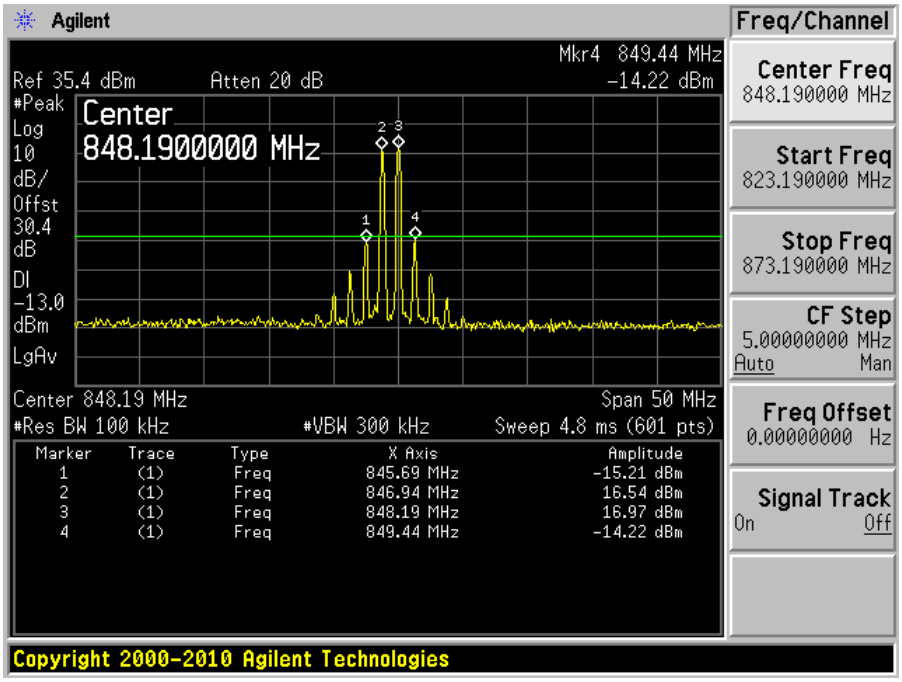


CDMA 850 MHz band High channel Uplink:

Input

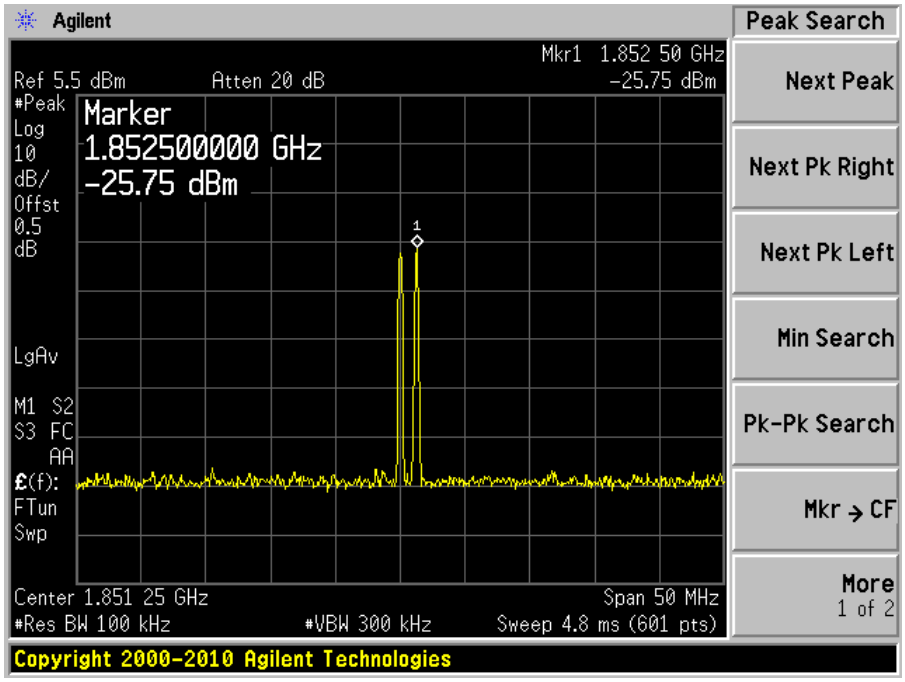


Output

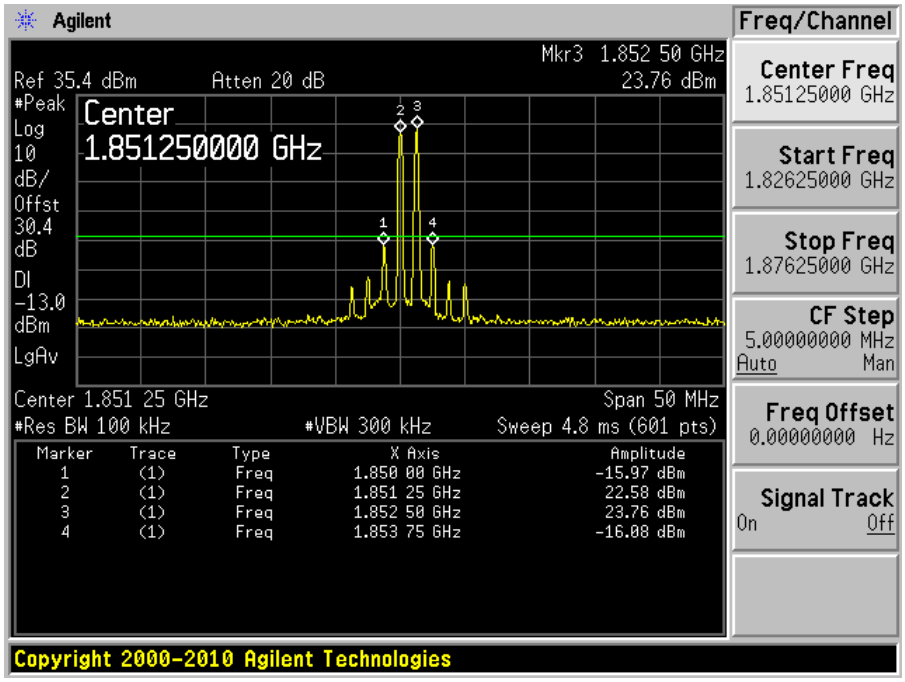


CDMA 1900 MHz band Low channel Uplink:

Input

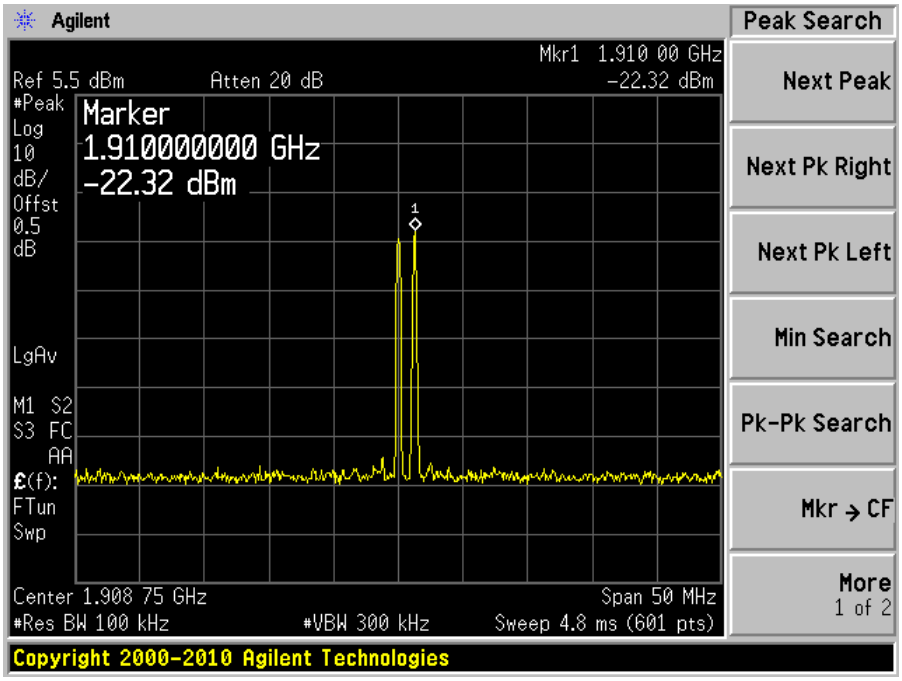


Output

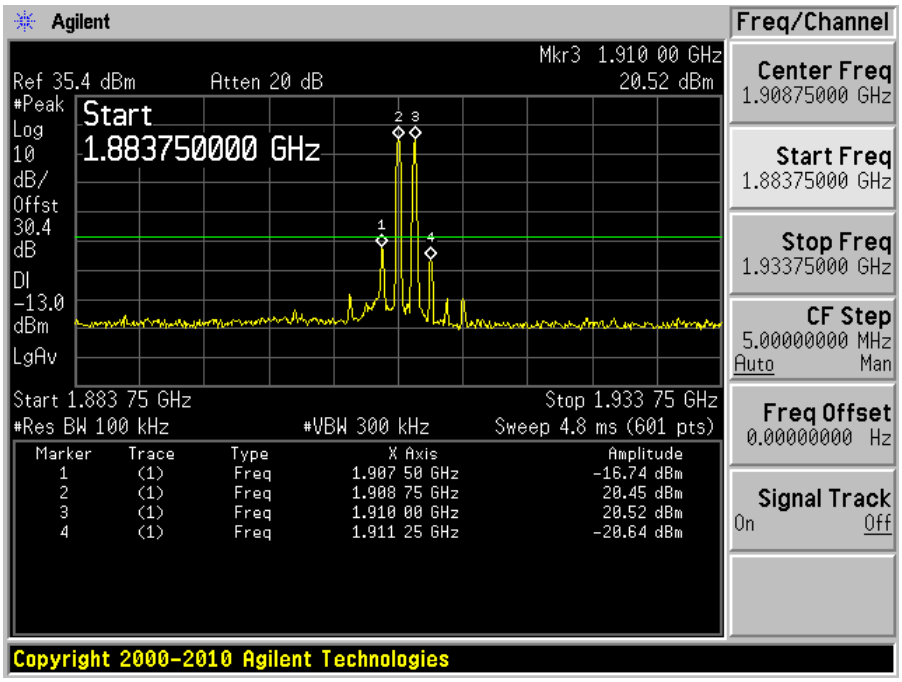


CDMA 1900 MHz band High channel Uplink:

Input

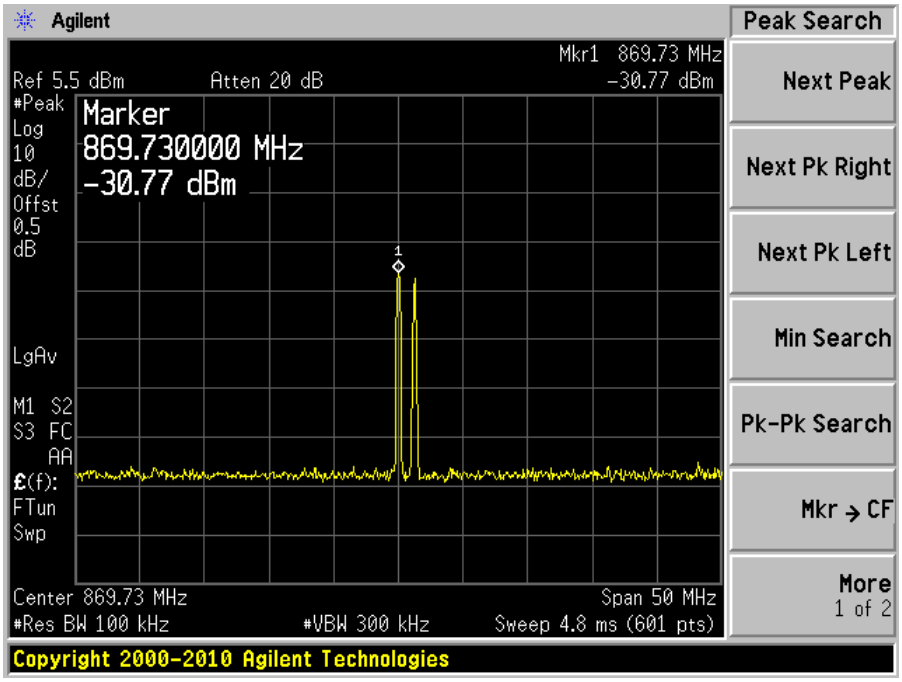


Output

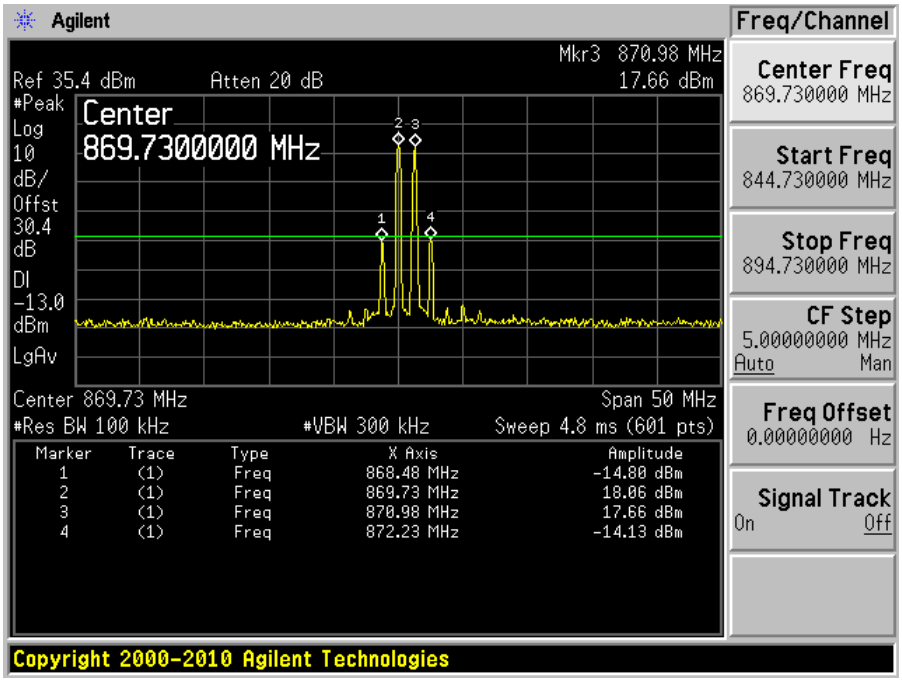


CDMA 850 MHz band Low channel Downlink:

Input

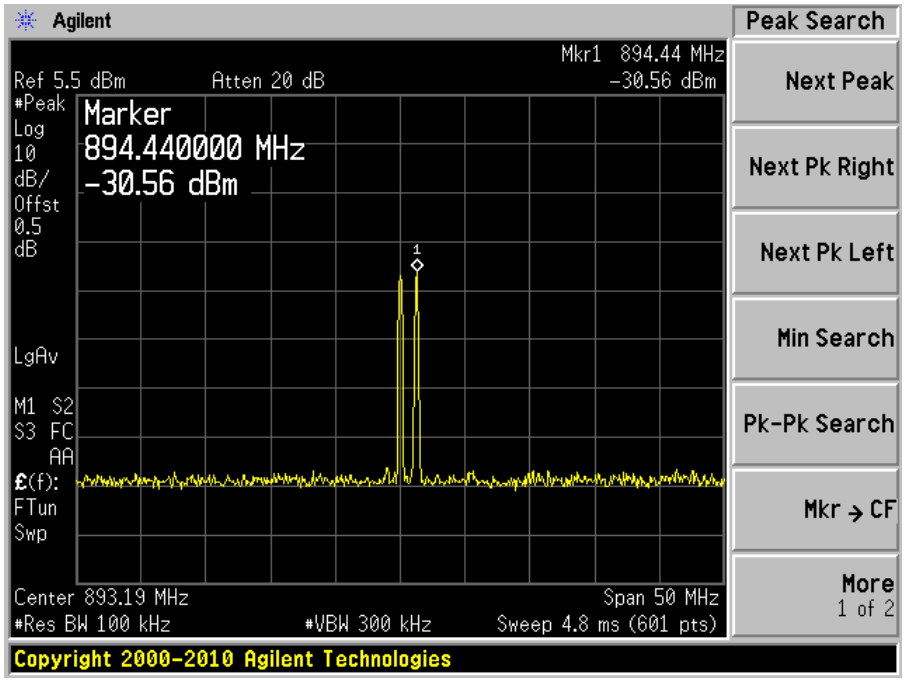


Output

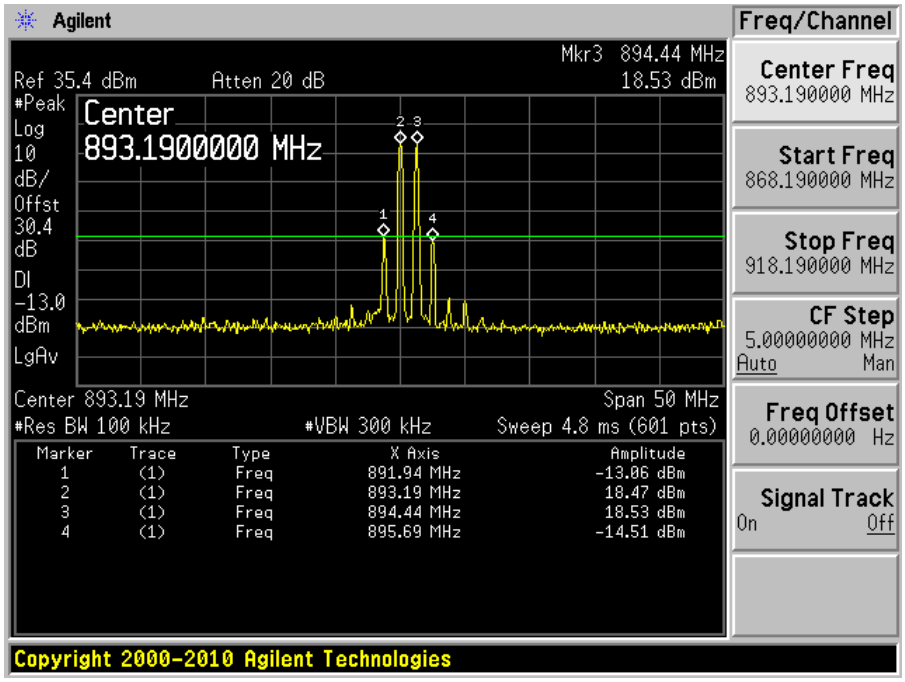


CDMA 850 MHz band High channel Downlink:

Input

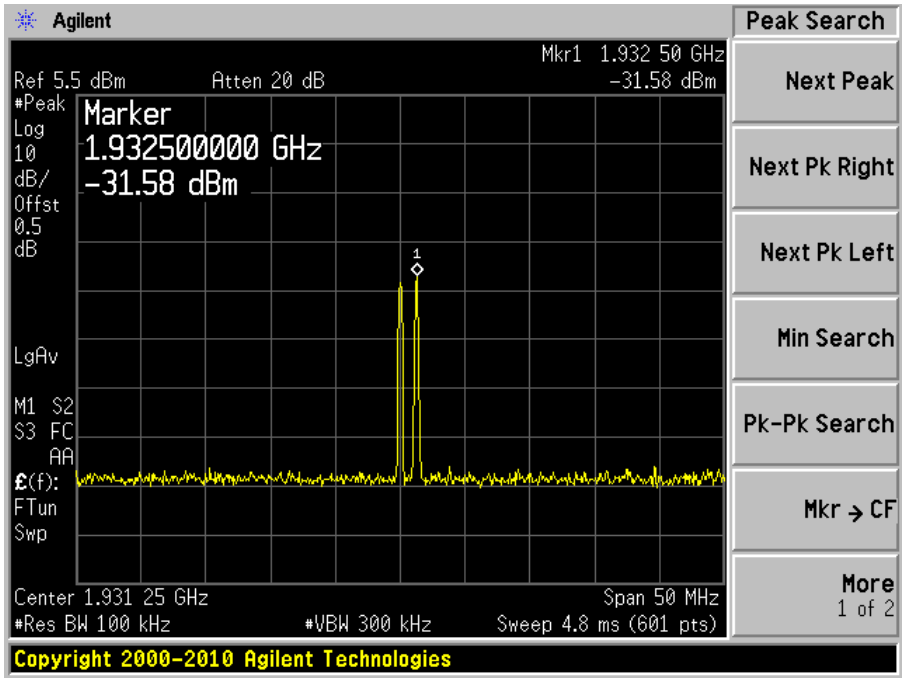


Output

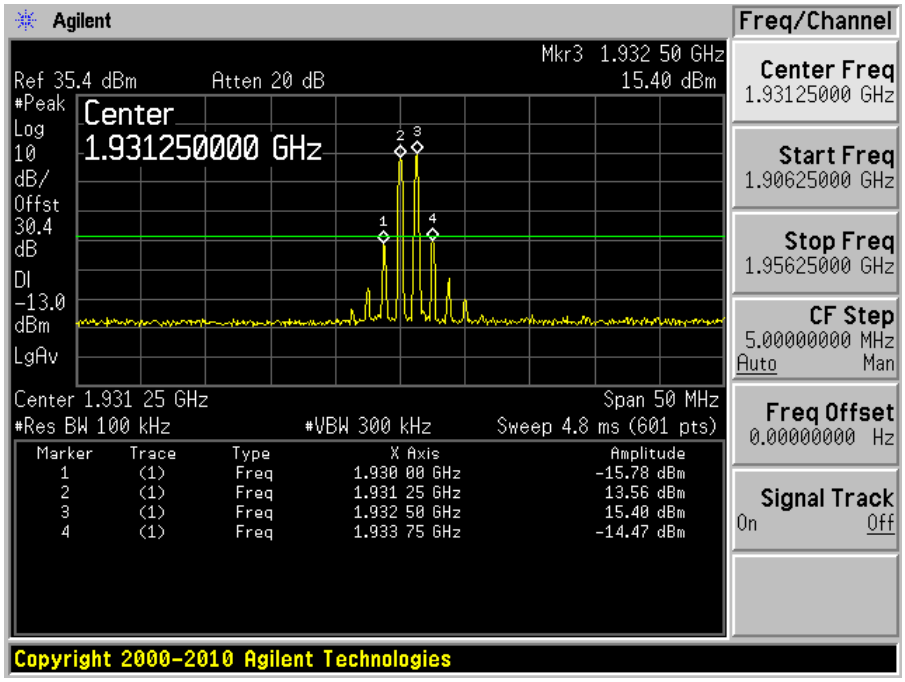


CDMA 1900 MHz band Low channel Downlink:

Input

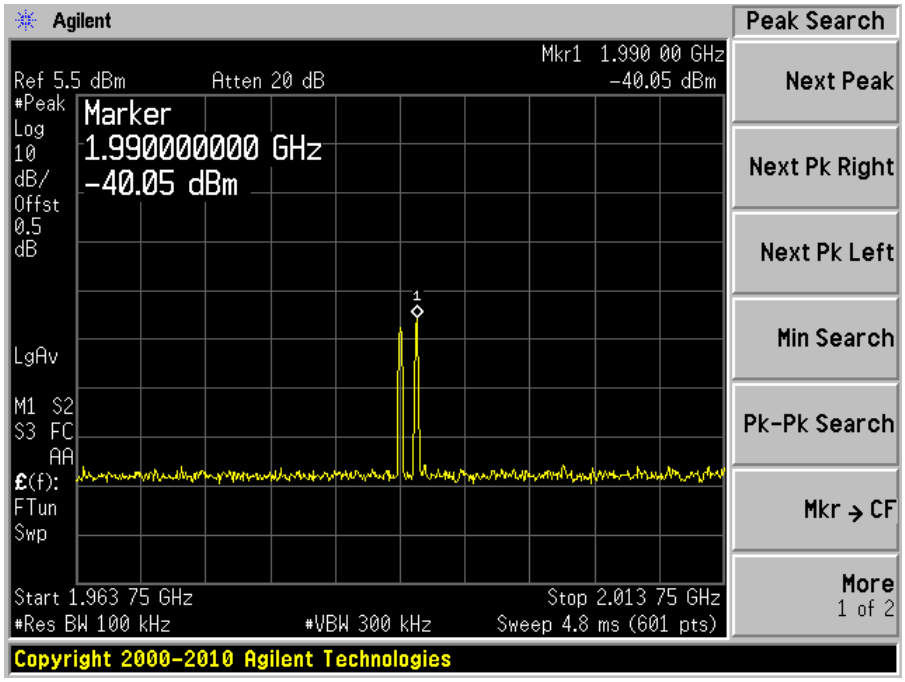


Output

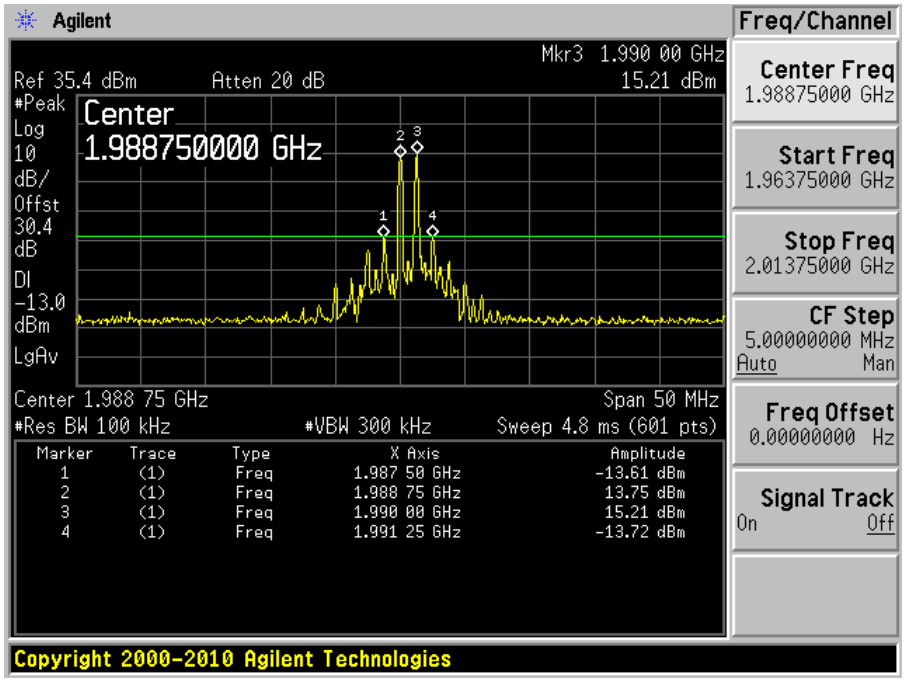


CDMA 1900 MHz band High channel Downlink:

Input

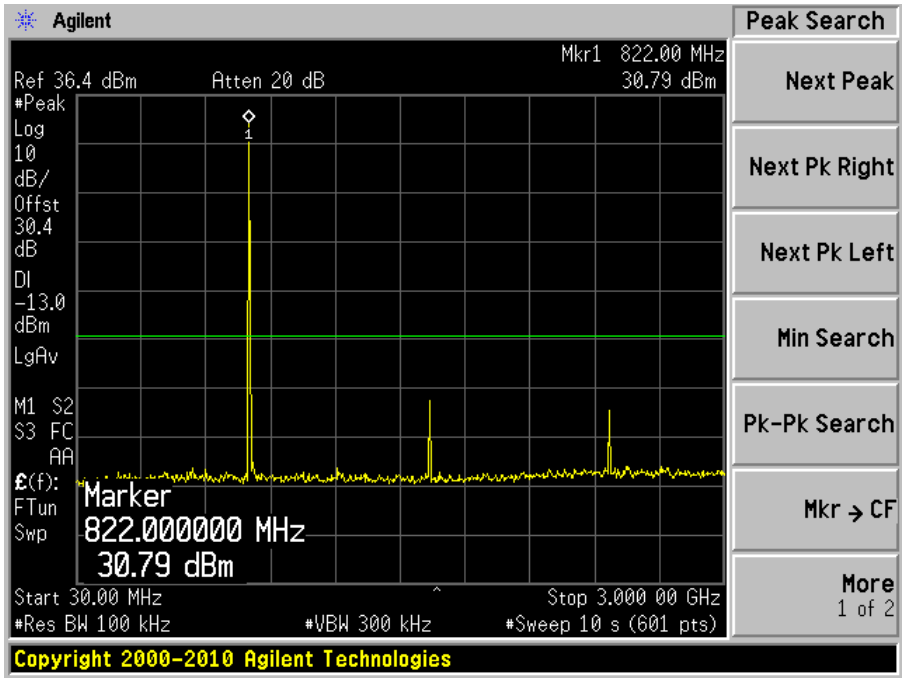


Output

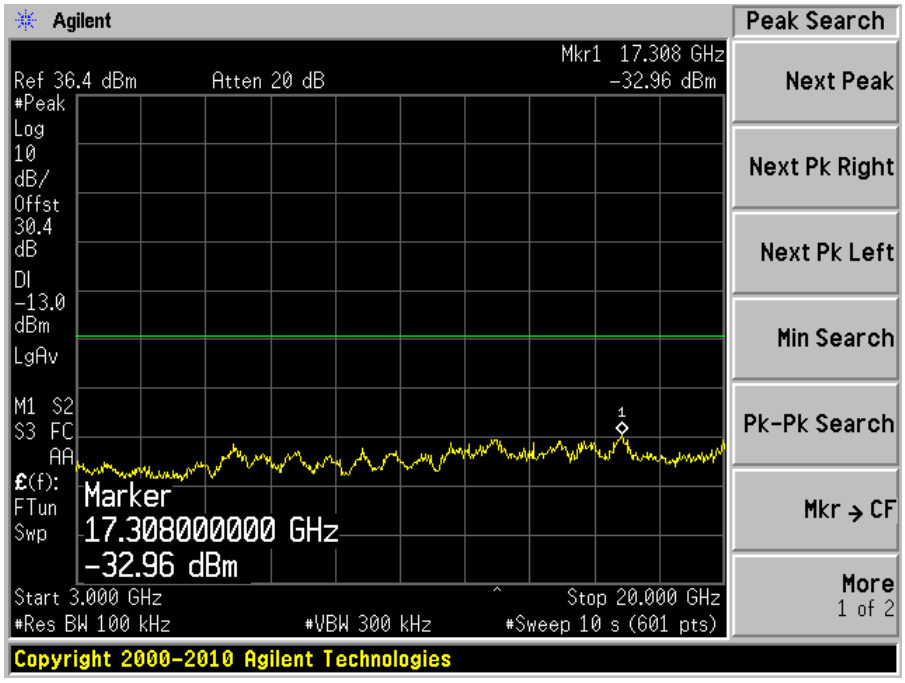


Antenna Port Conducted Spurious Emissions

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

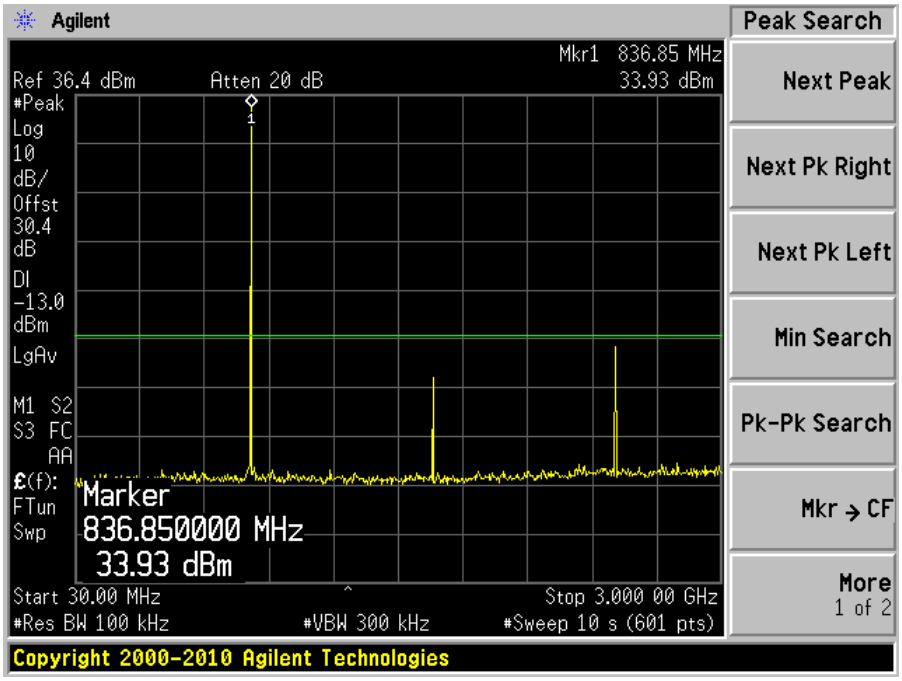


30 MHz to 3 GHz

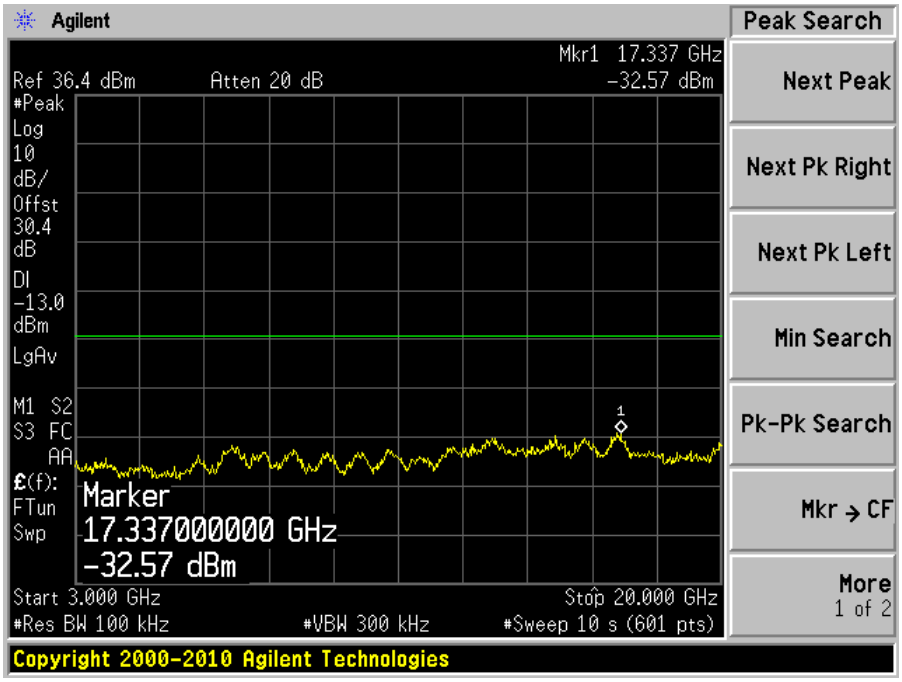


3 to 20 GHz

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

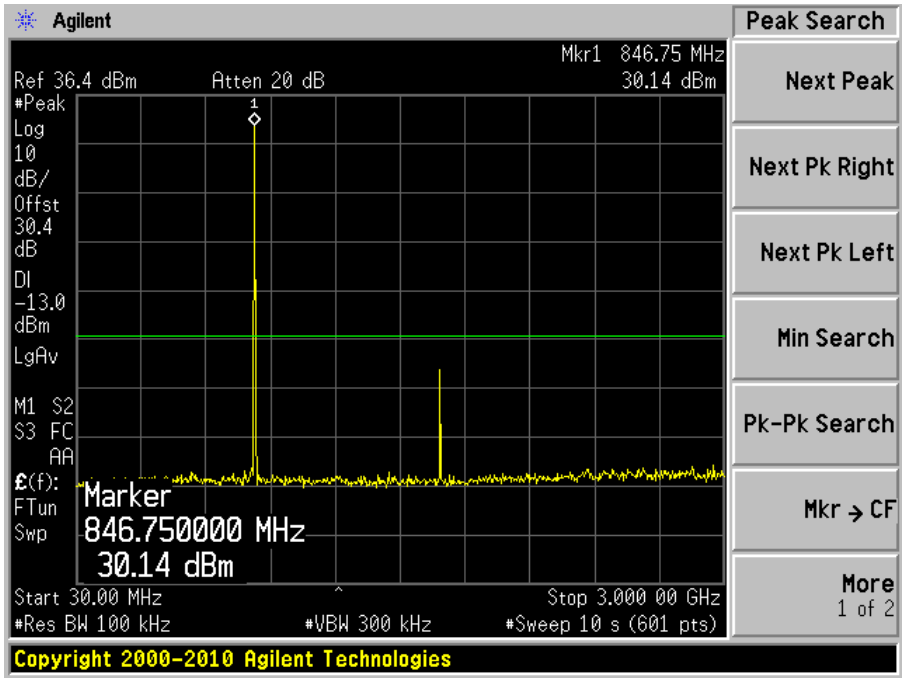


30 MHz to 3 GHz

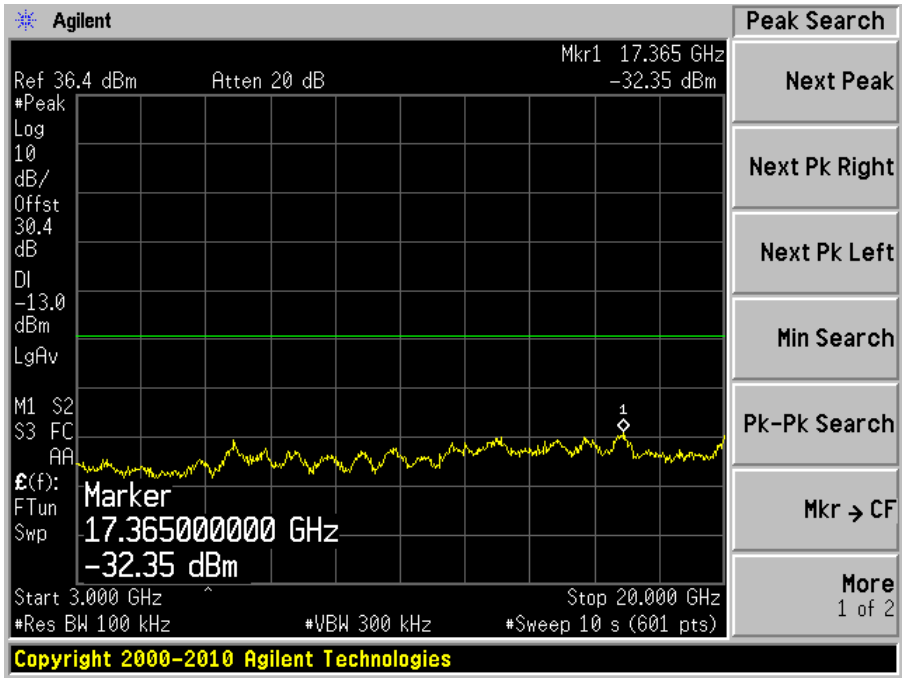


3 to 20 GHz

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

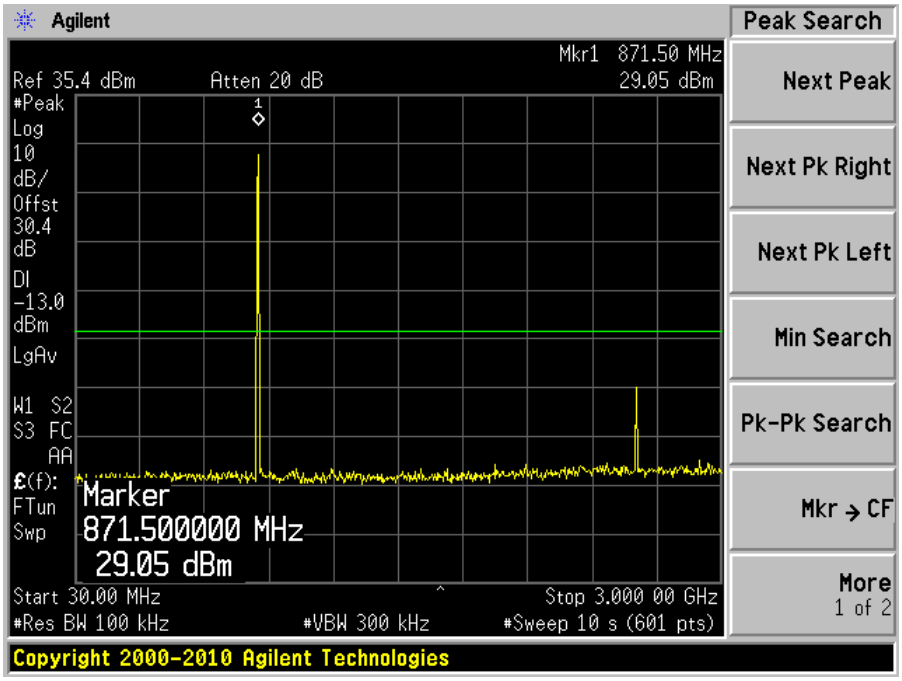


30 MHz to 3 GHz

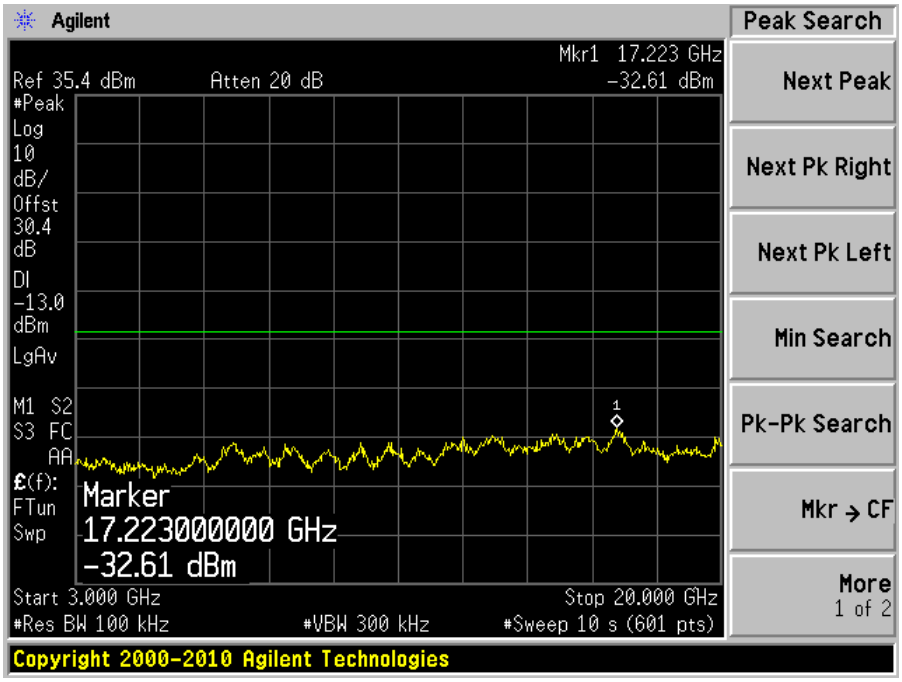


3 to 20 GHz

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

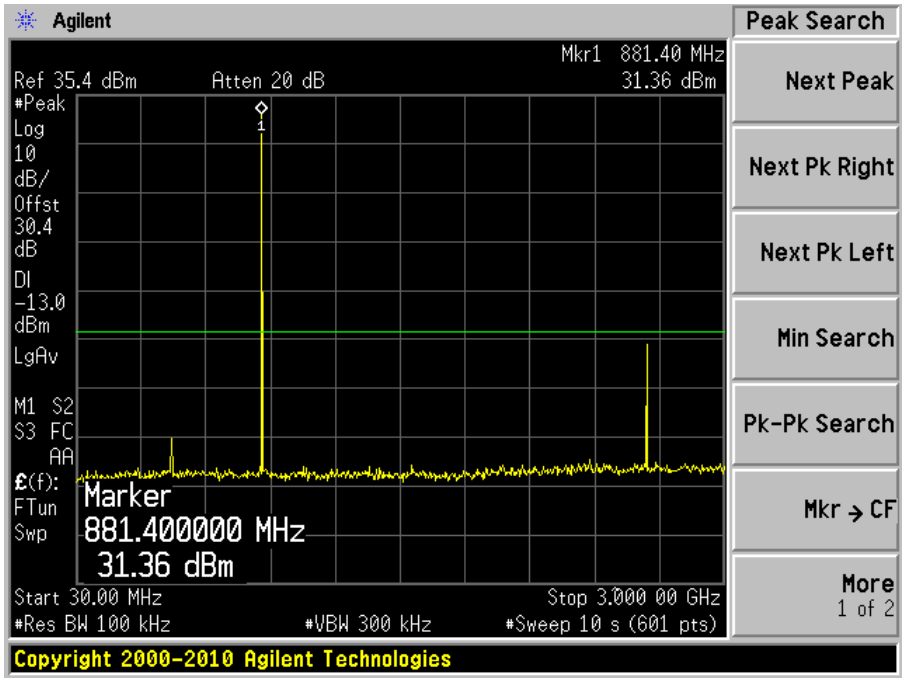


30 to 3 GHz

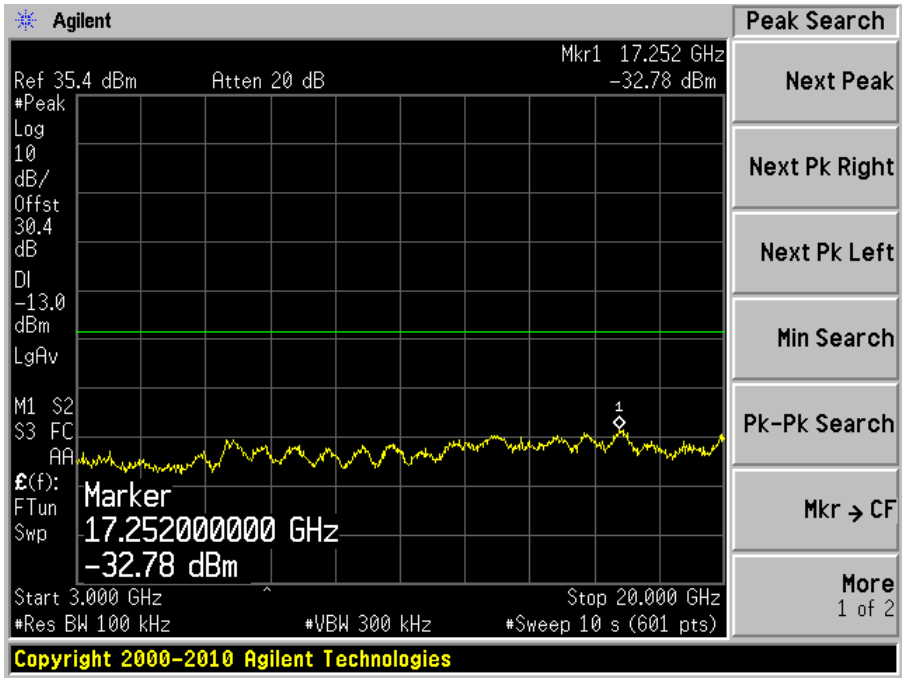


3 to 20 GHz

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

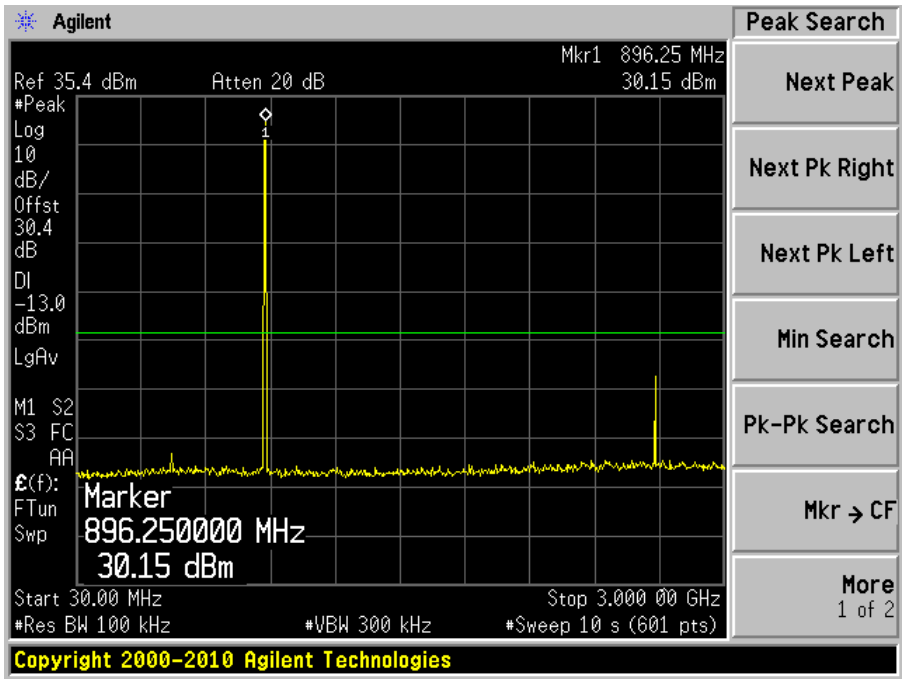


30 MHz to 3 GHz

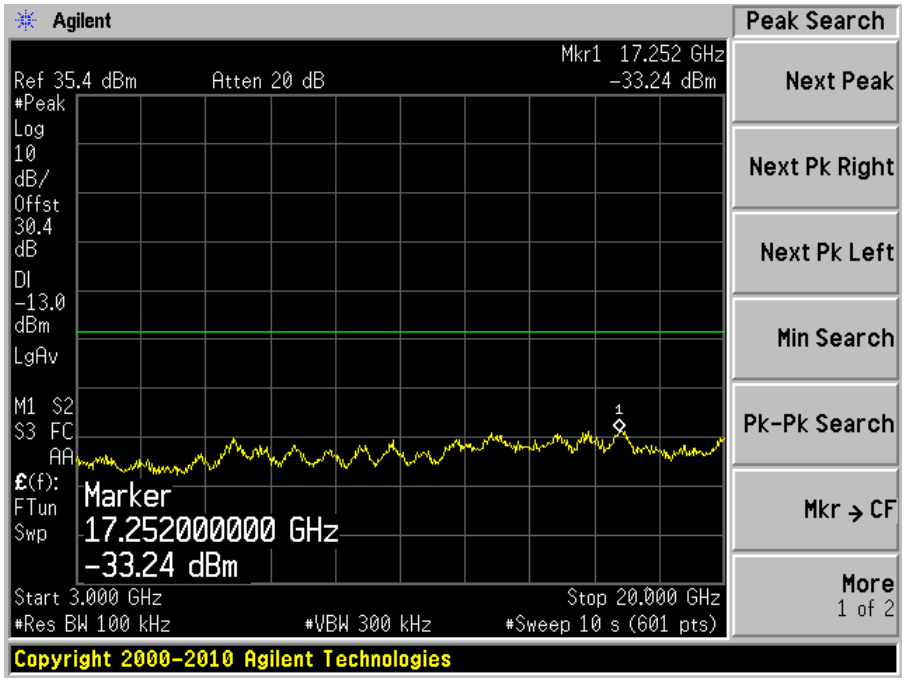


3 to 20 GHz

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

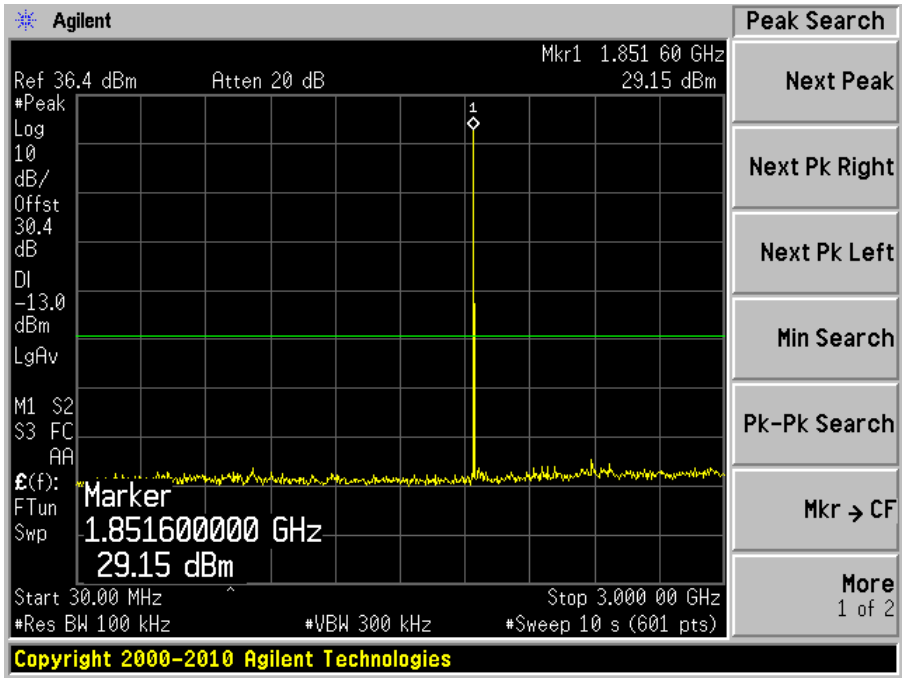


30 to 3 GHz

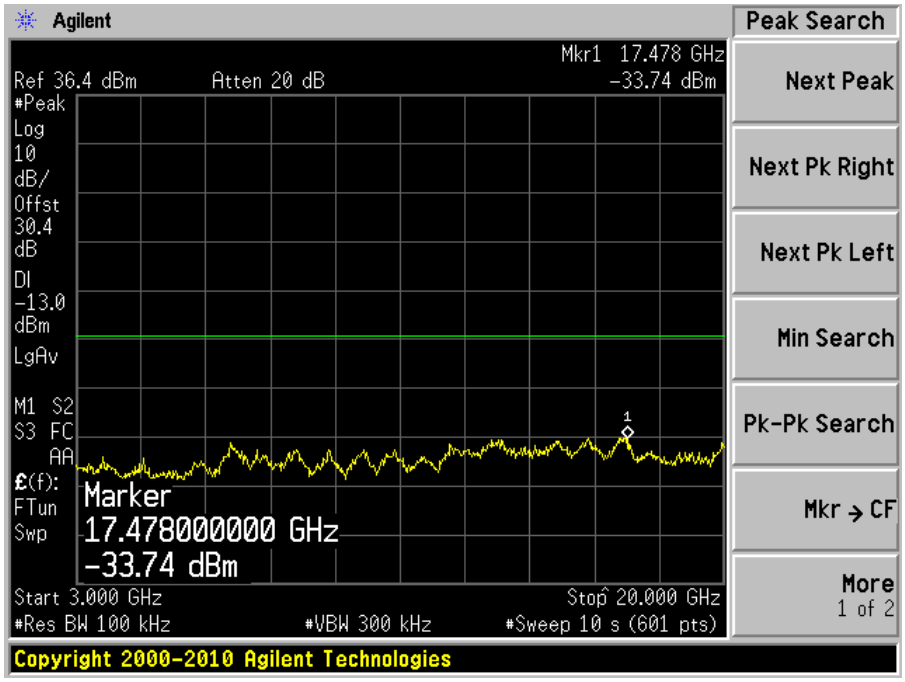


3 to 20 GHz

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

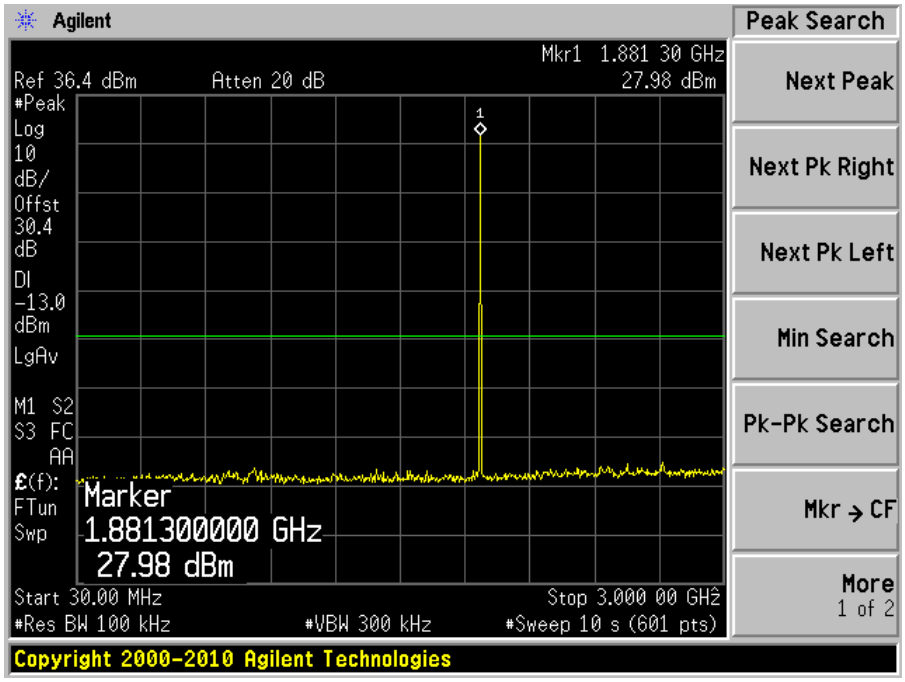


30 MHz to 3 GHz

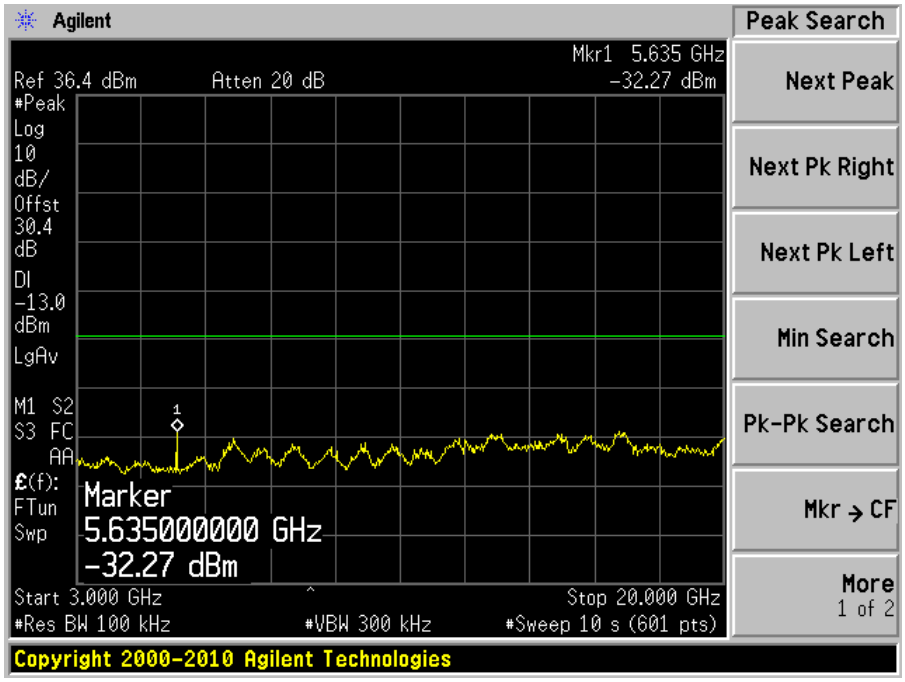


3 to 20 GHz

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

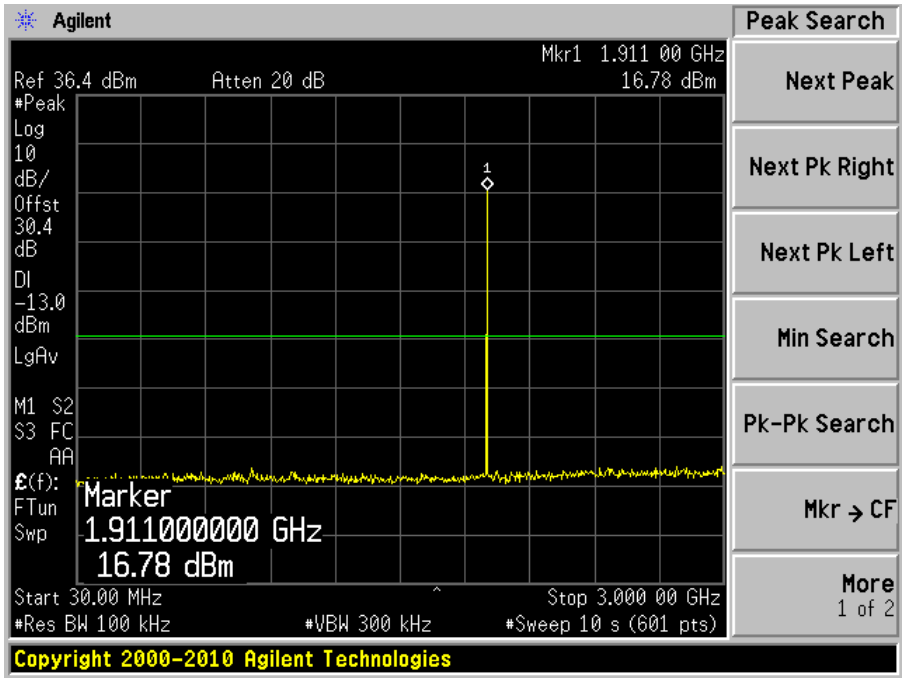


30 MHz to 3 GHz

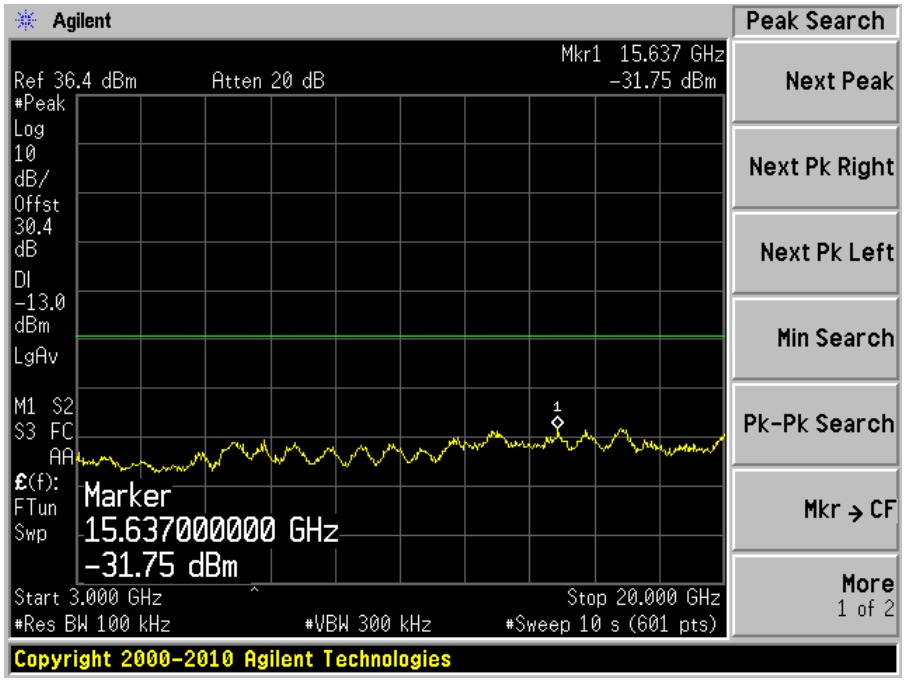


3 to 20 GHz

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

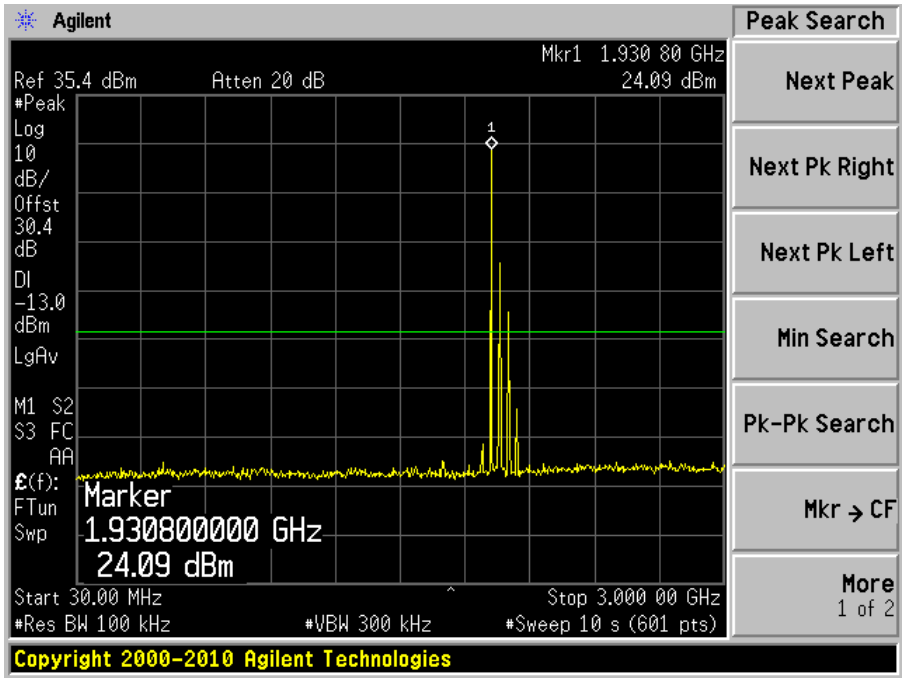


30 MHz to 3 GHz

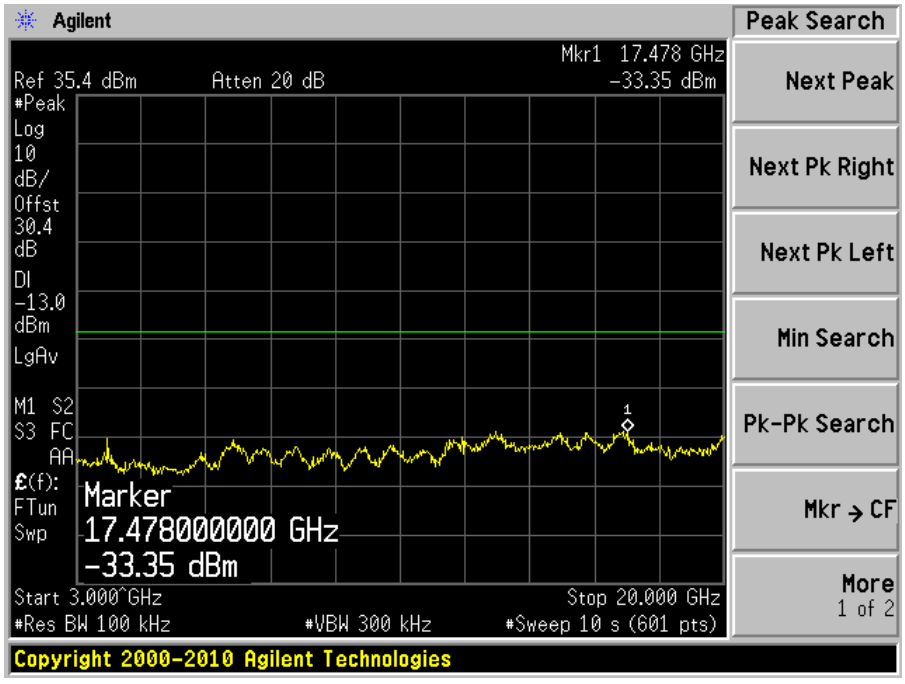


3 to 20 GHz

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

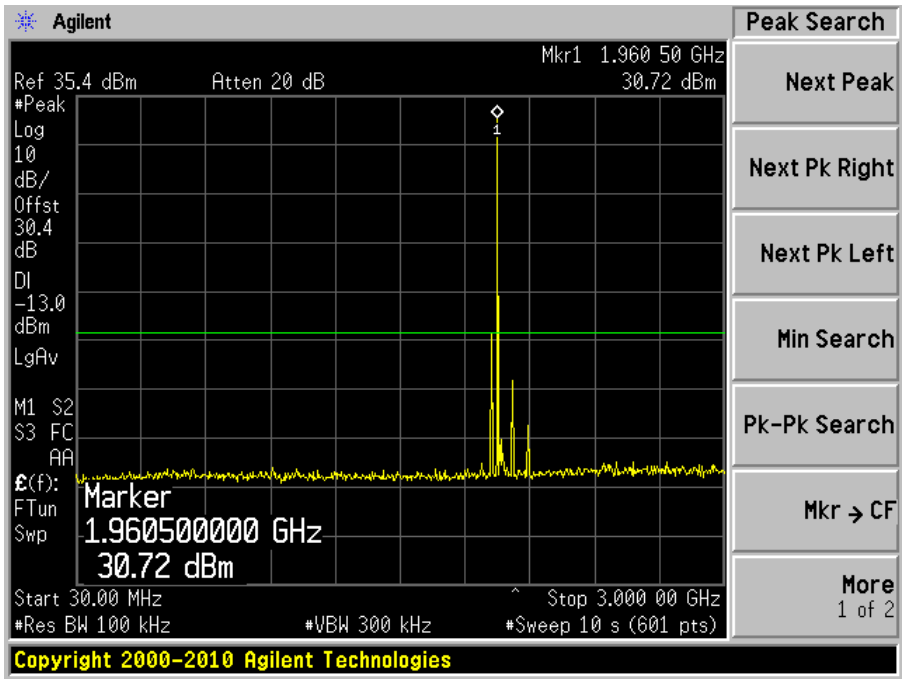


30 MHz to 3 GHz

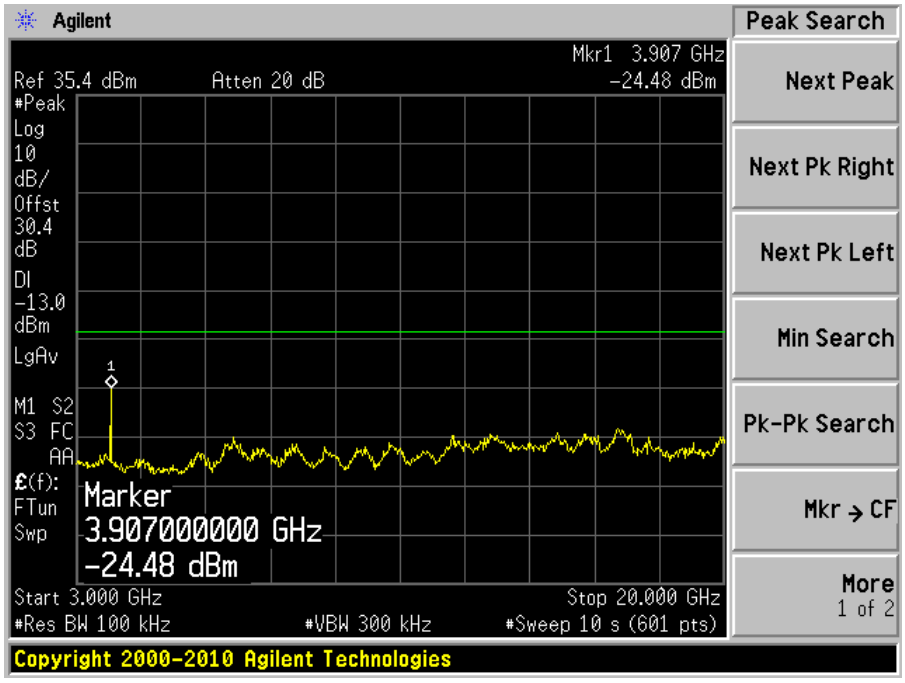


3 to 20 GHz

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

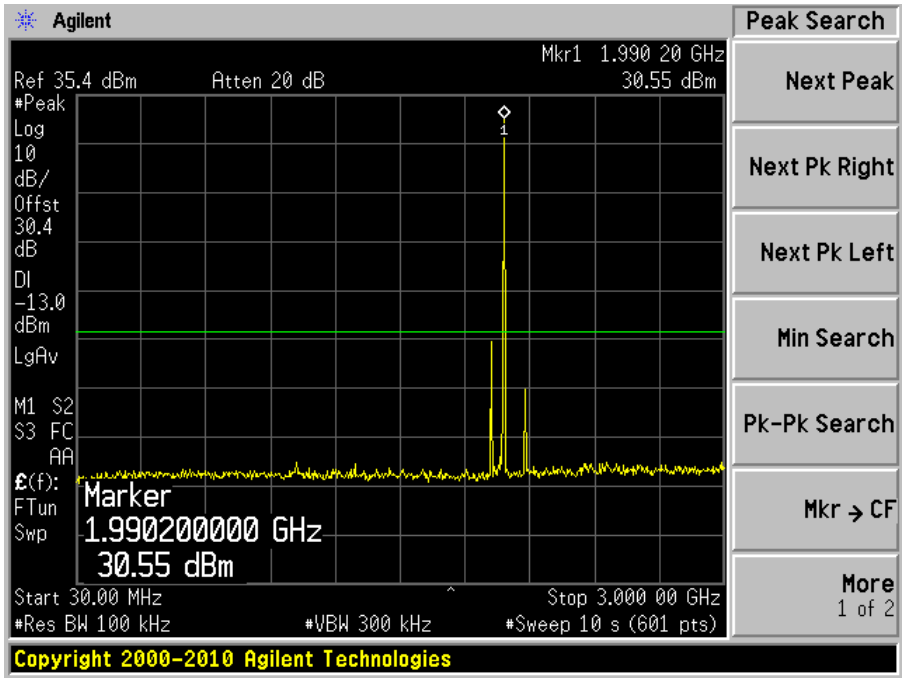


30 MHz to 3 GHz

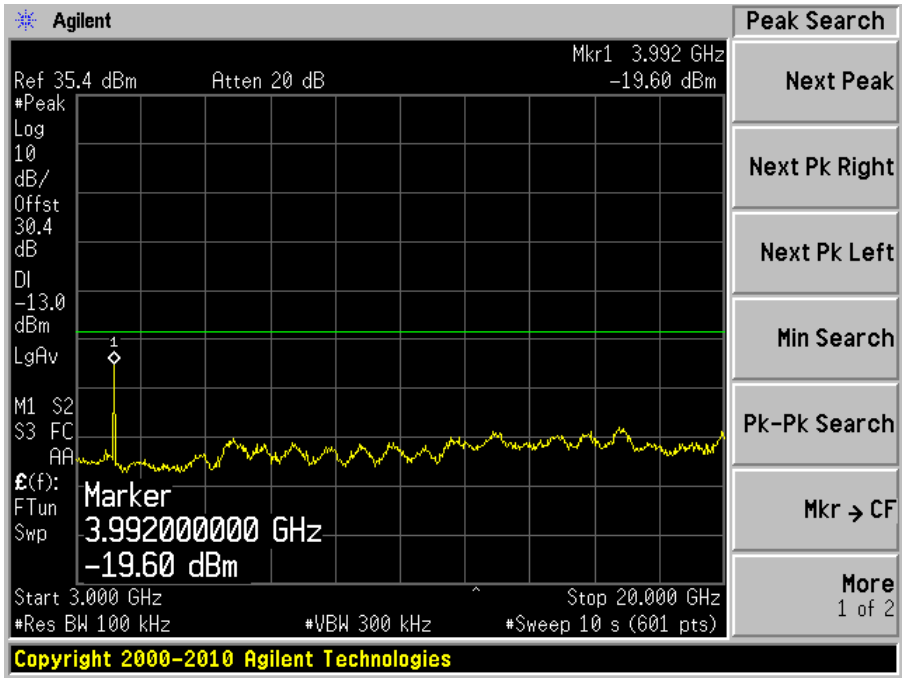


3 to 20 GHz

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

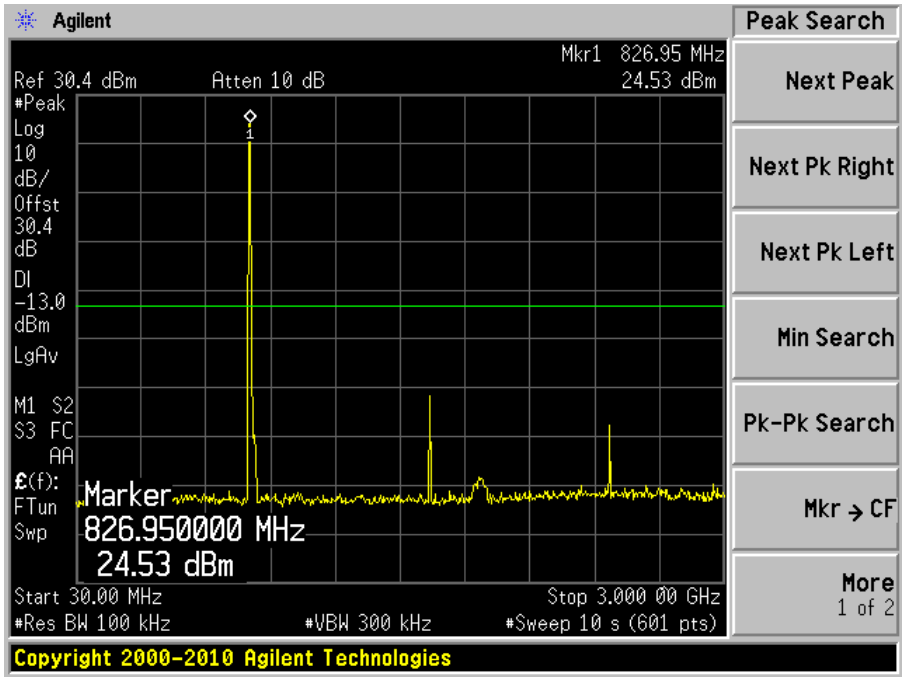


30 MHz to 3 GHz

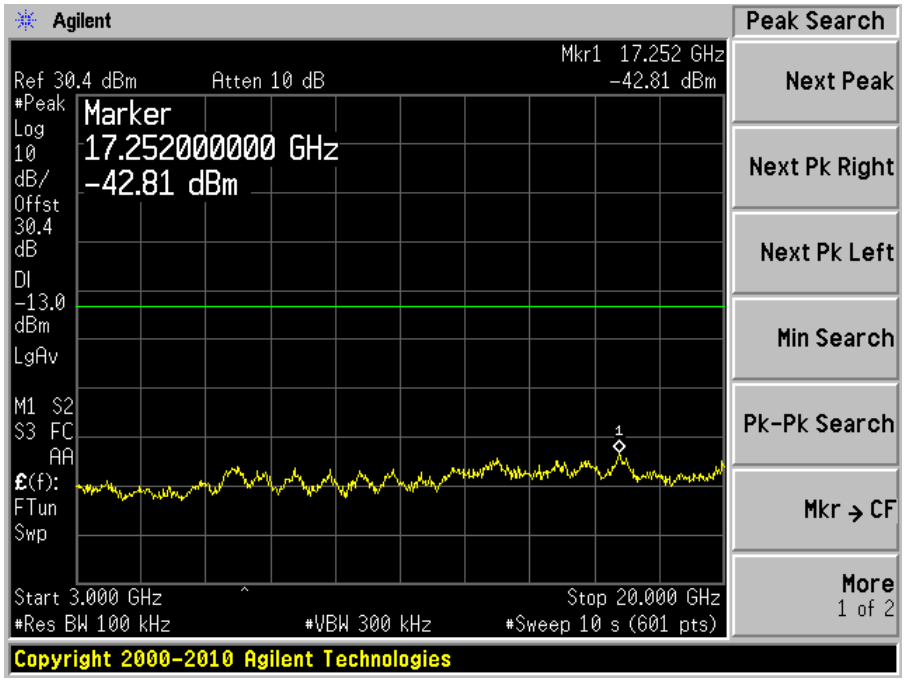


3 to 20 GHz

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

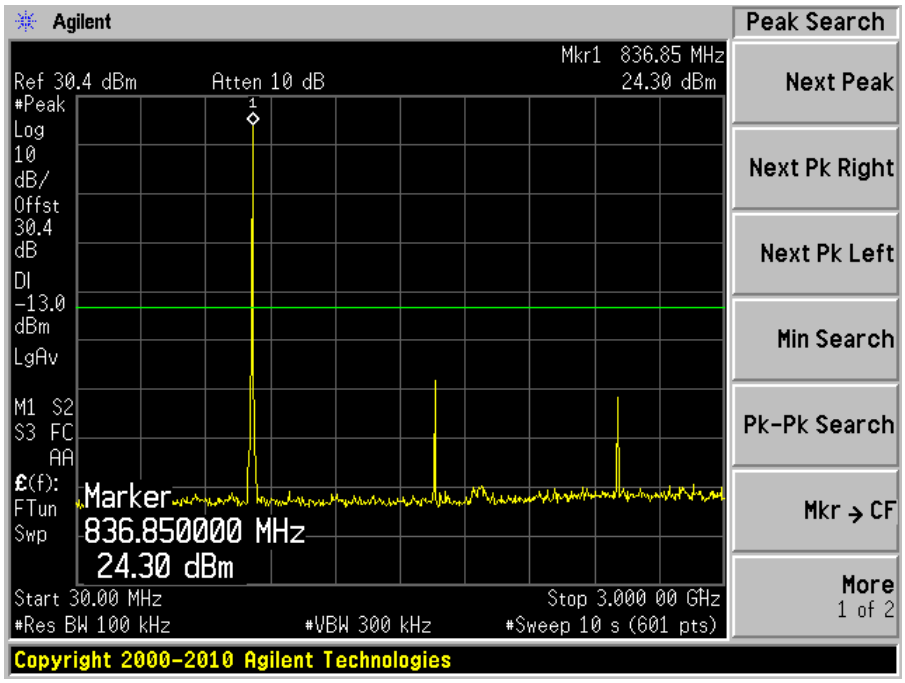


30 MHz to 3 GHz

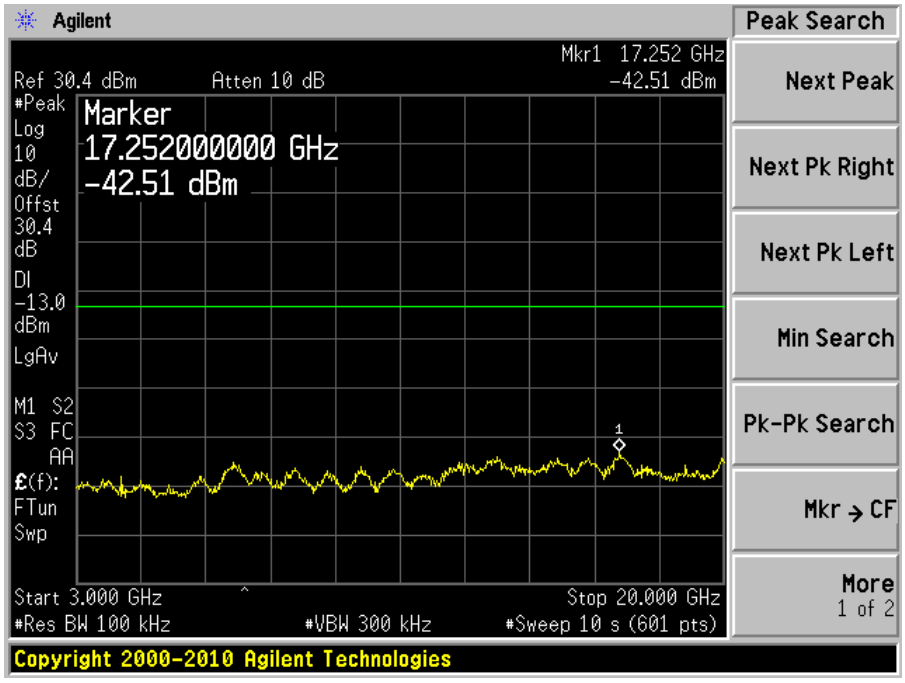


3 to 20 GHz

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

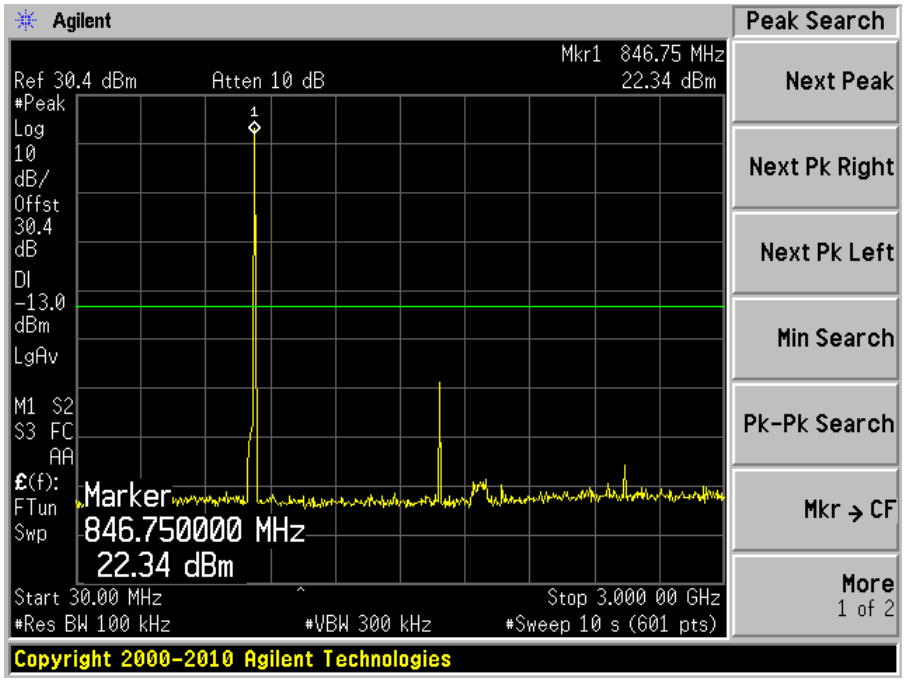


30 MHz to 3 GHz

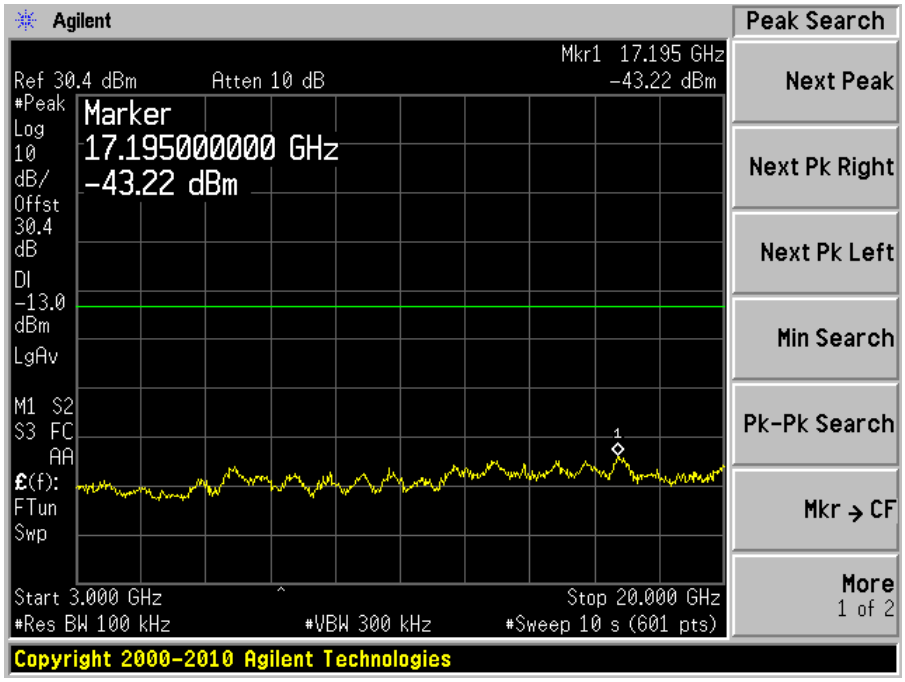


3 to 20 GHz

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

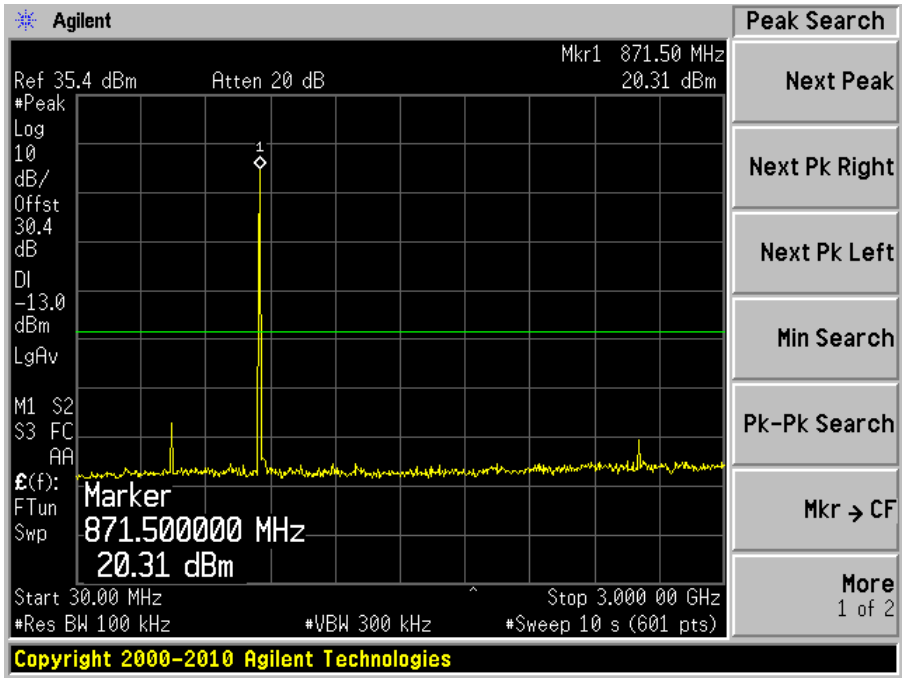


30 MHz to 3 GHz

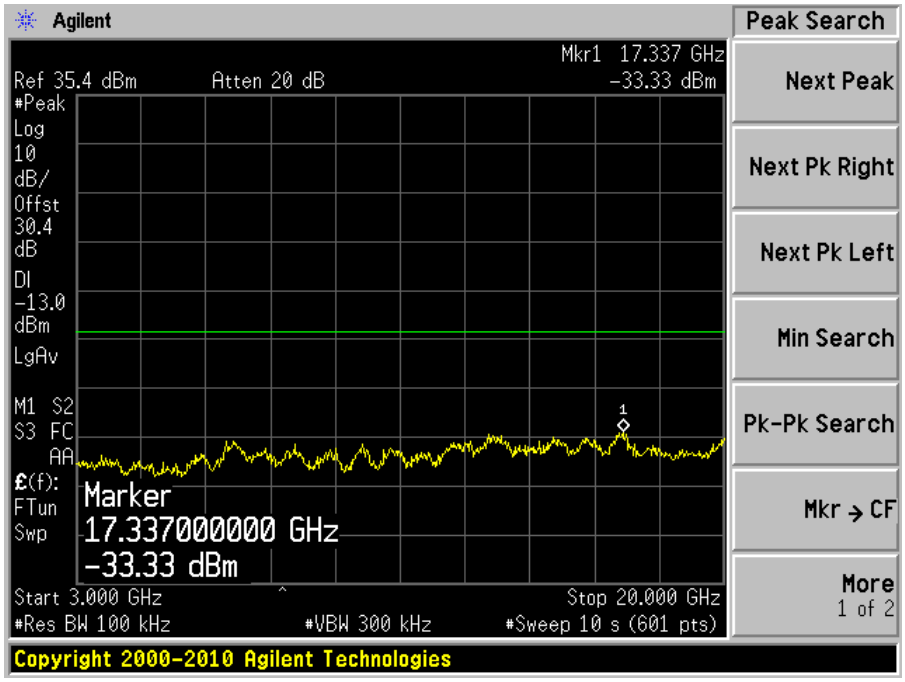


3 to 20 GHz

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

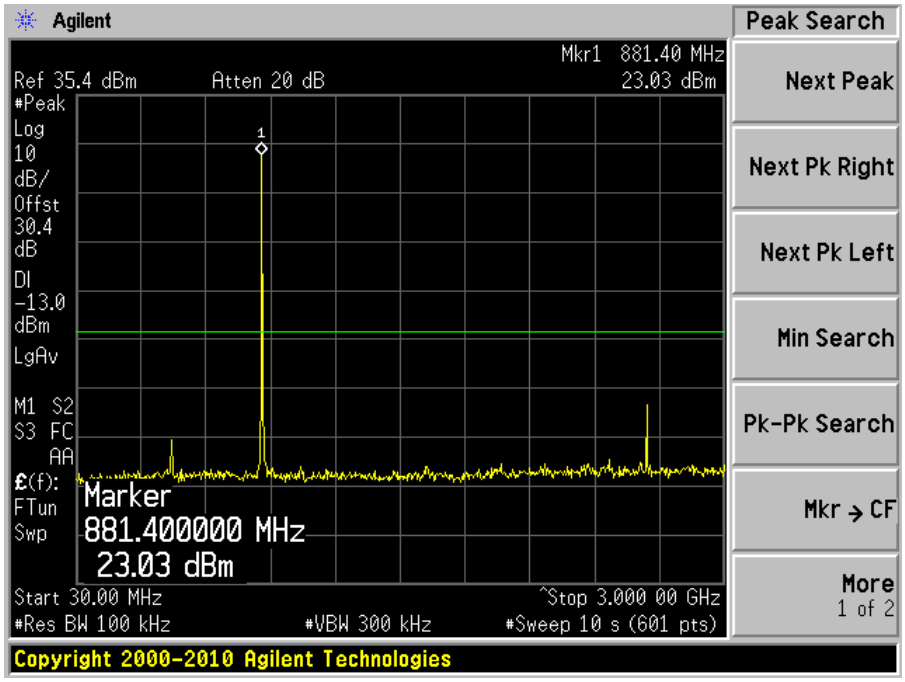


30 MHz to 3 GHz

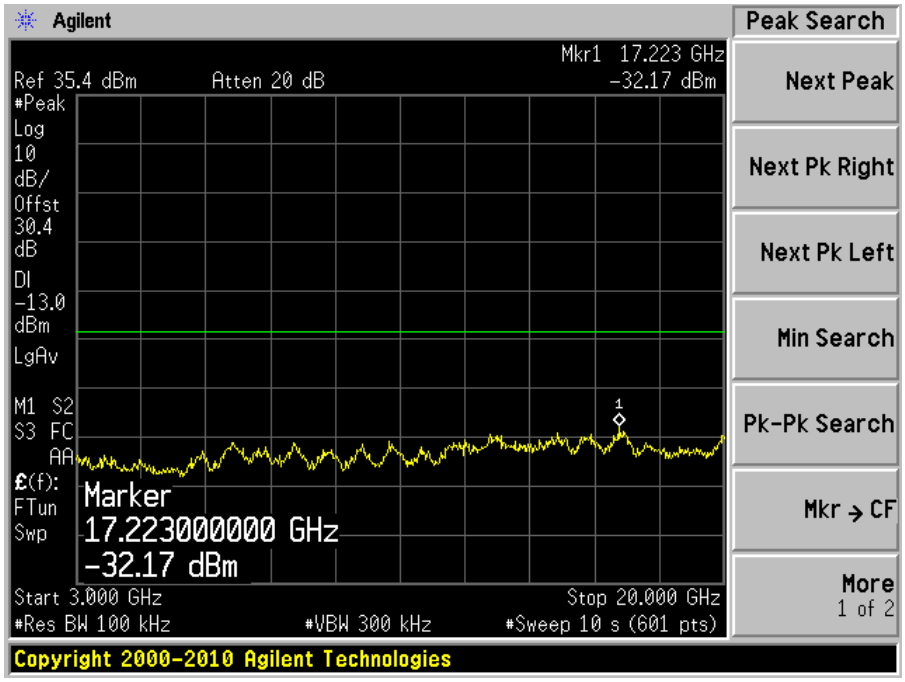


3 to 20 GHz

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

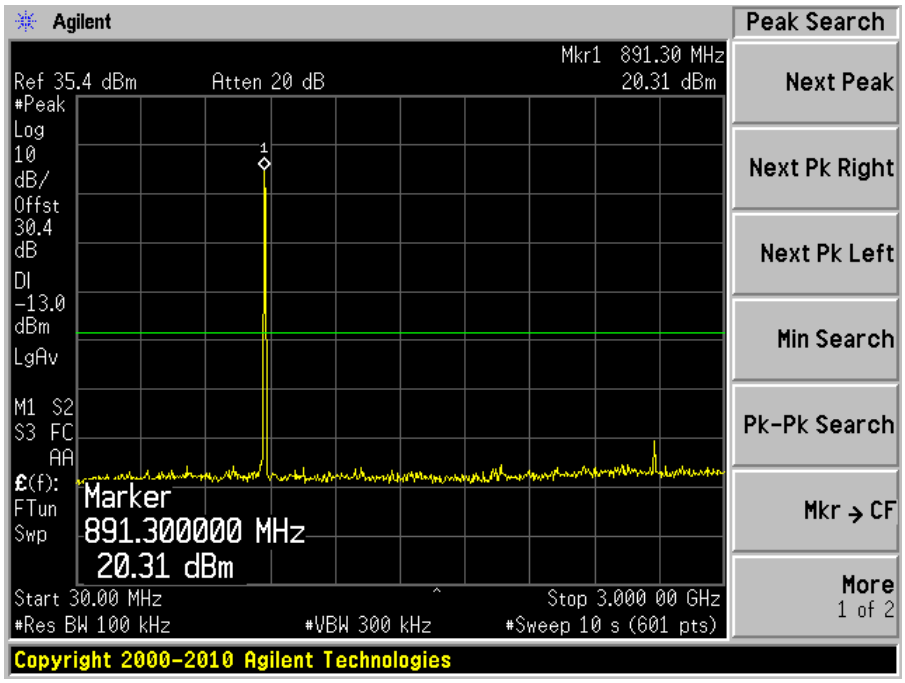


30 MHz to 3 GHz

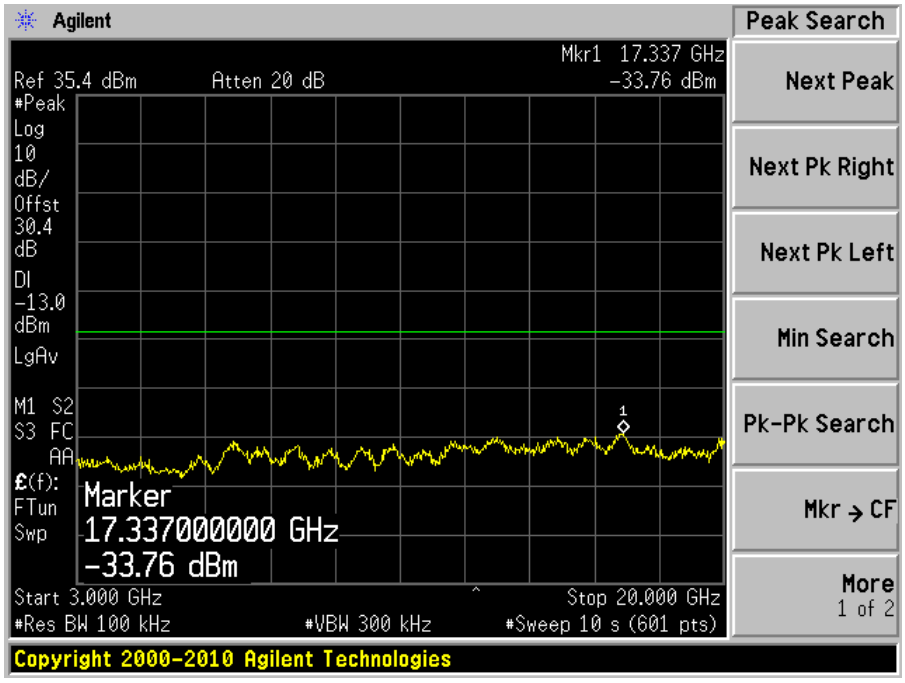


3 to 20 GHz

CDMA 850 MHz band Downlink: High Channel (893.19 MHz)

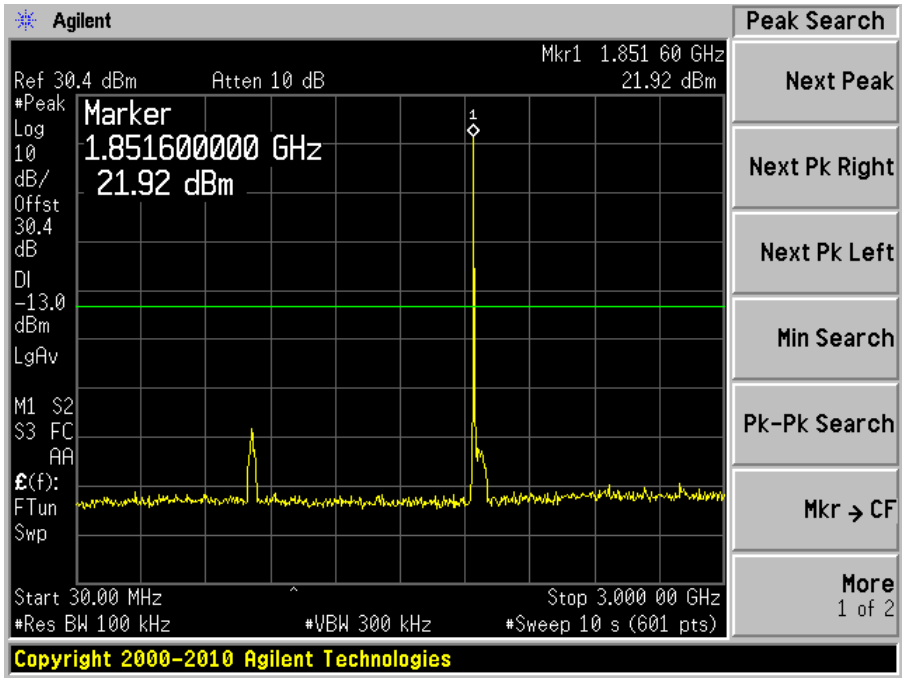


30 MHz to 3 GHz

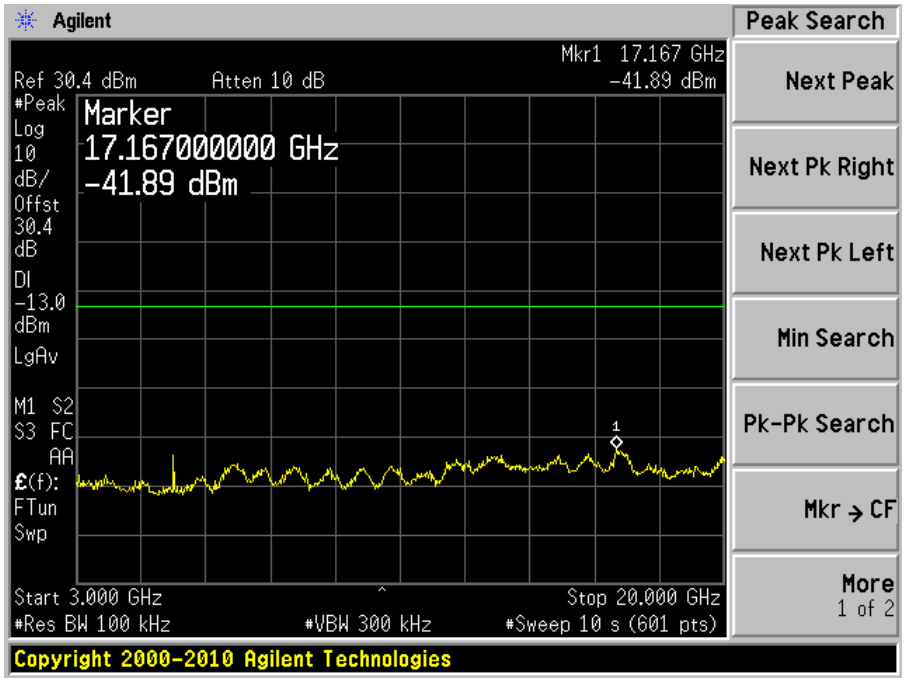


3 to 20 GHz

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

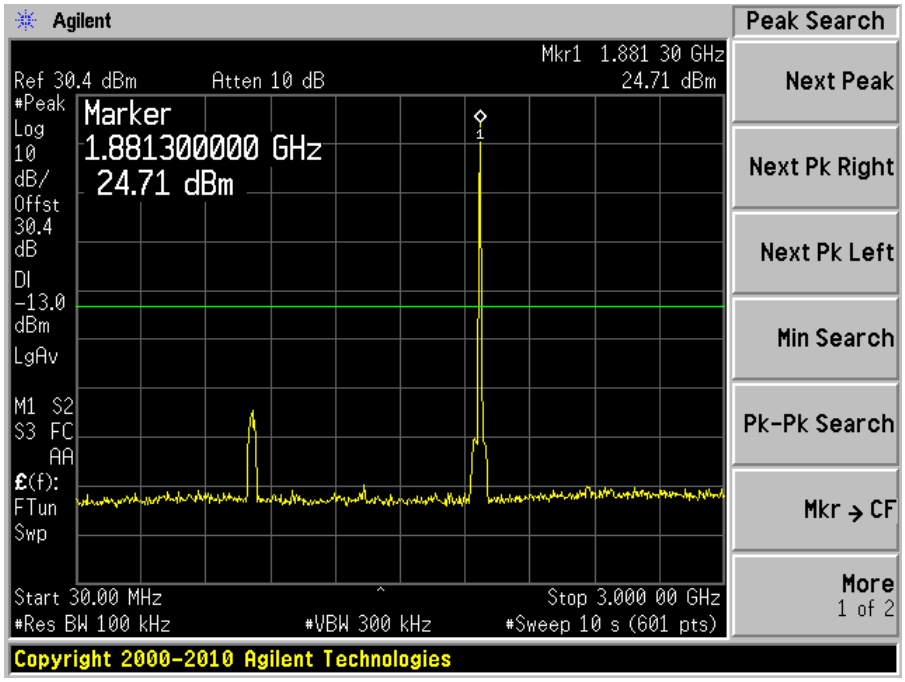


30 MHz to 3 GHz

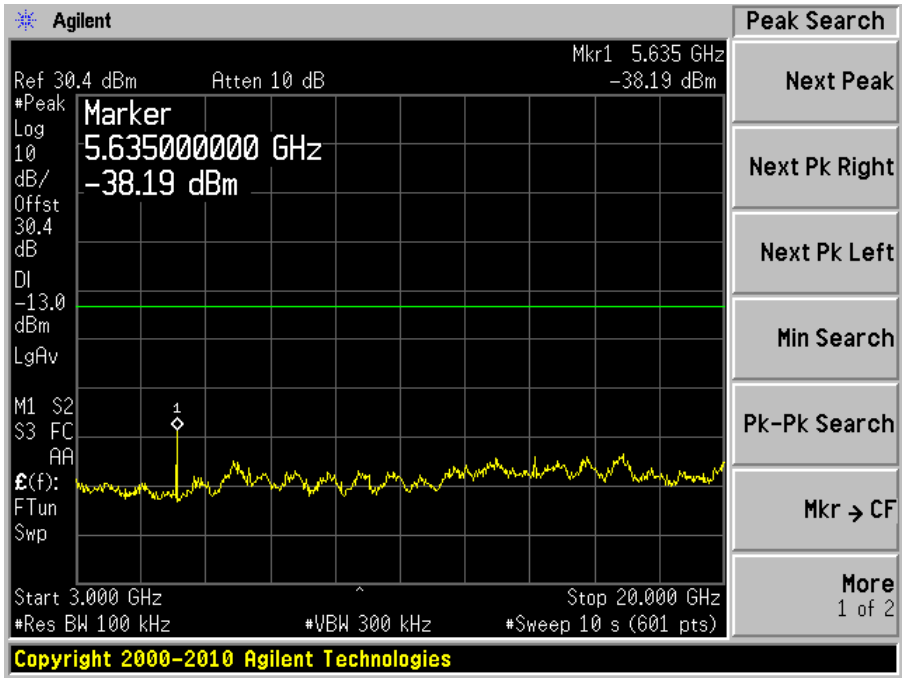


3 to 20 GHz

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

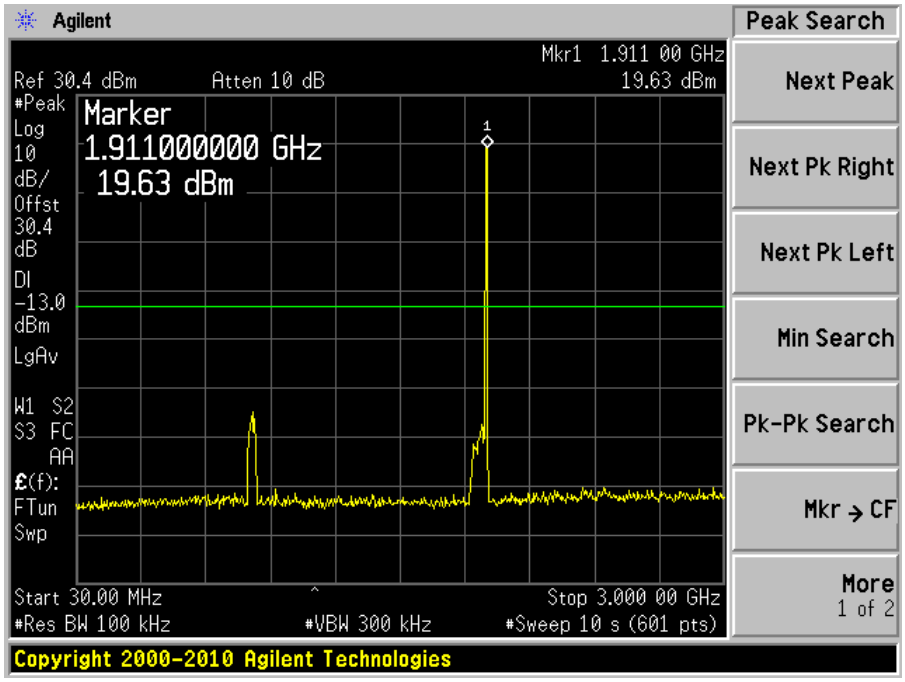


30 MHz to 3 GHz

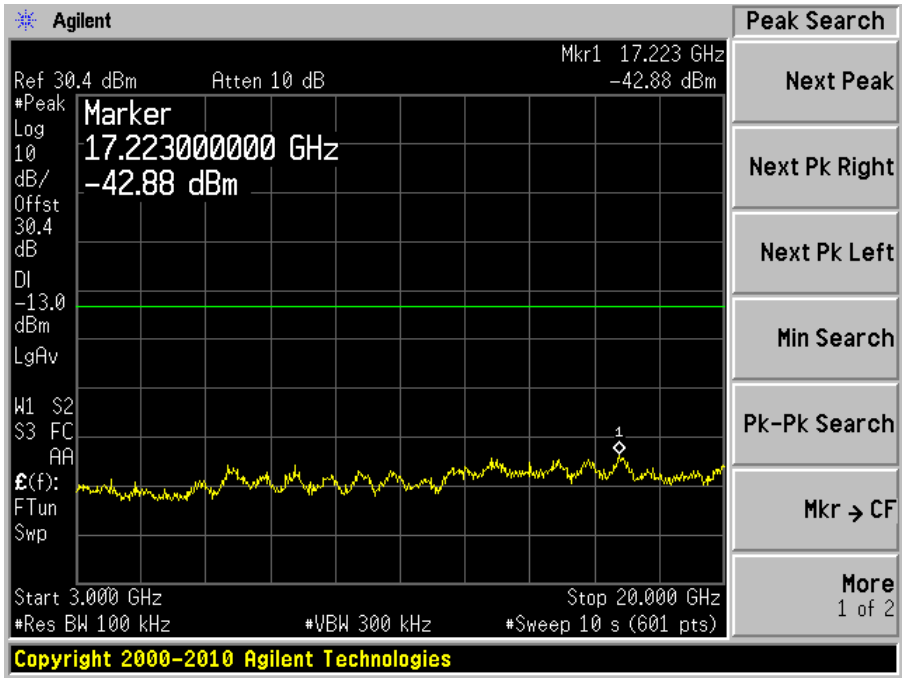


3 to 20 GHz

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

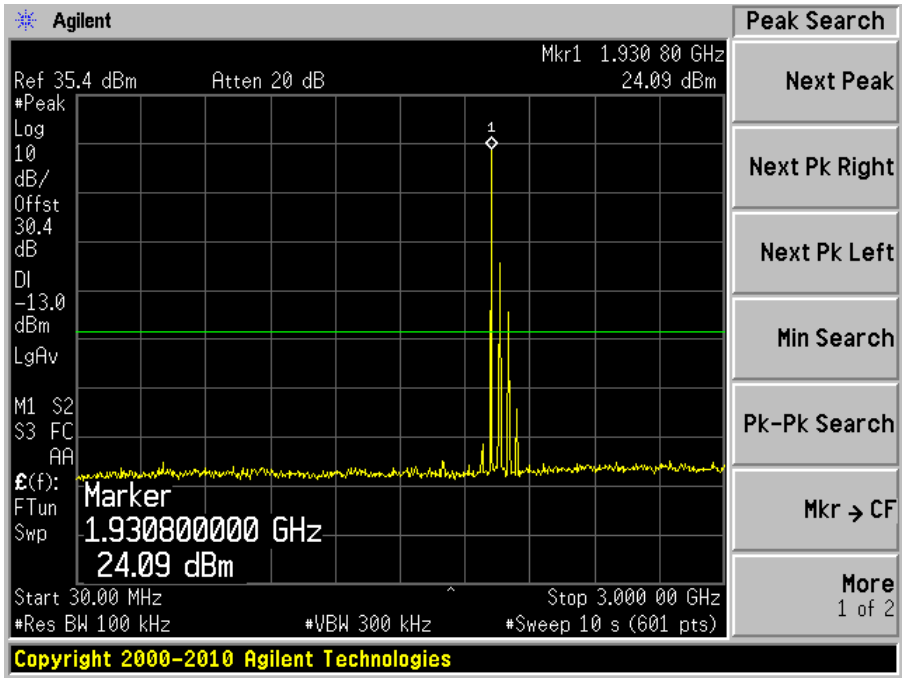


30 MHz to 3 GHz

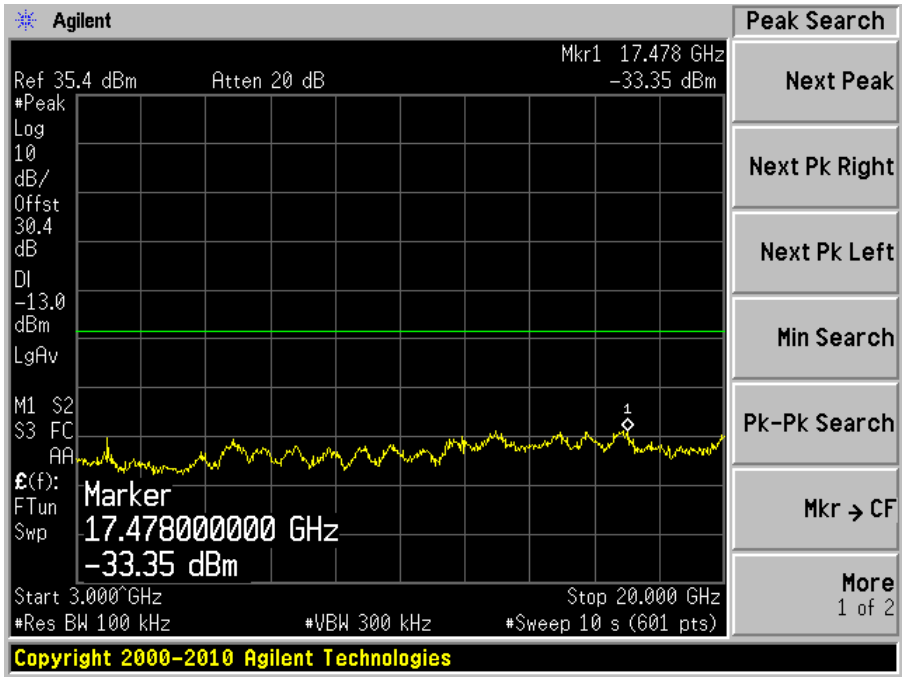


3 to 20 GHz

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

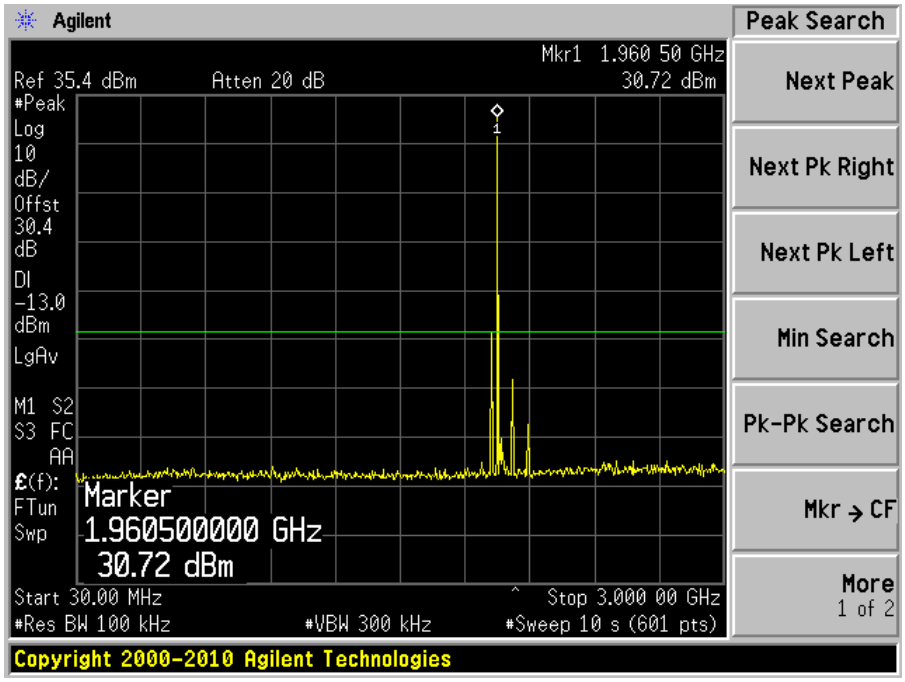


30 MHz to 3 GHz

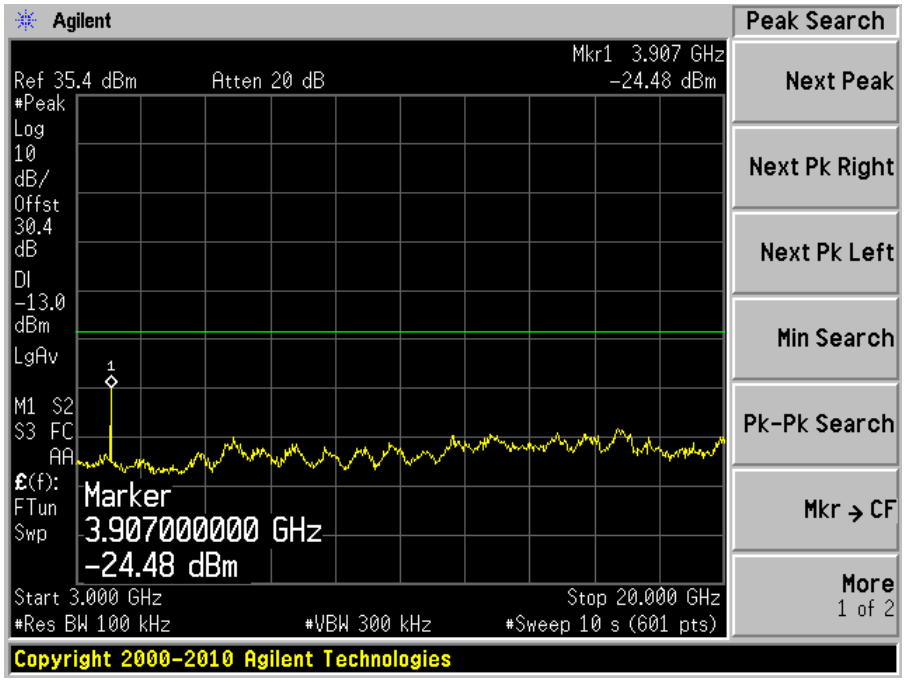


3 to 20 GHz

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

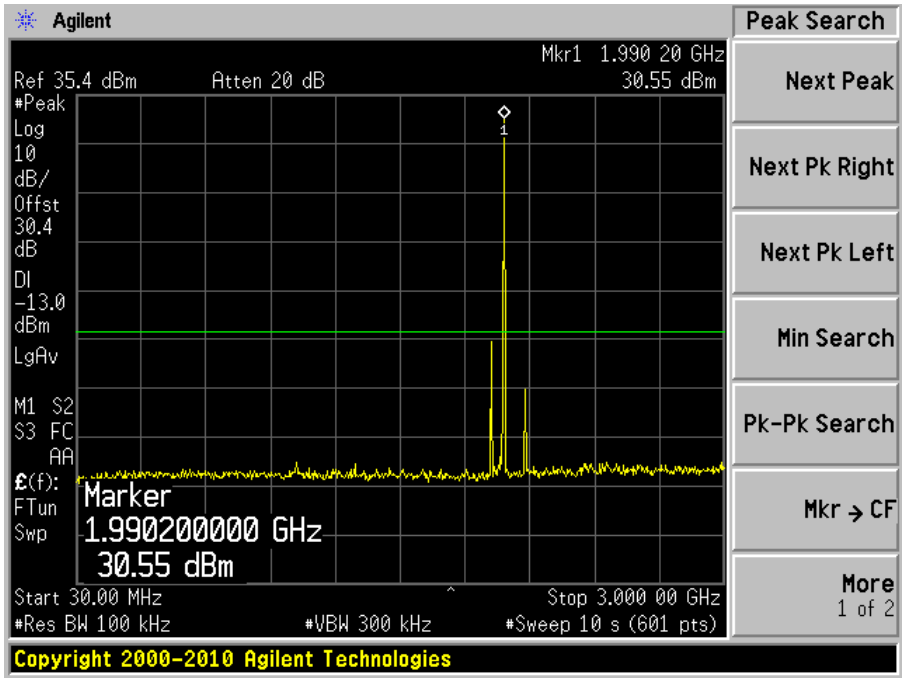


30 MHz to 3 GHz

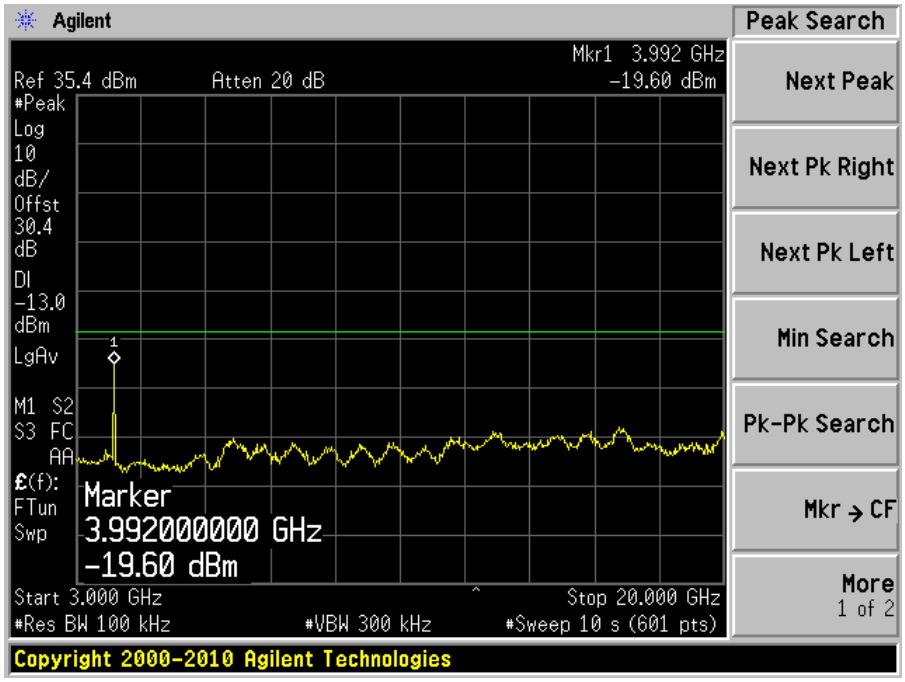


3 to 20 GHz

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



30 MHz to 3 GHz



3 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:	22~27 °C
Relative Humidity:	35~40 %
ATM Pressure:	101.1~102.2kPa

The testing was performed by Jack Liu on 2010-9-22 ~ 2010-9-28

9.4 Test Equipment List and Details

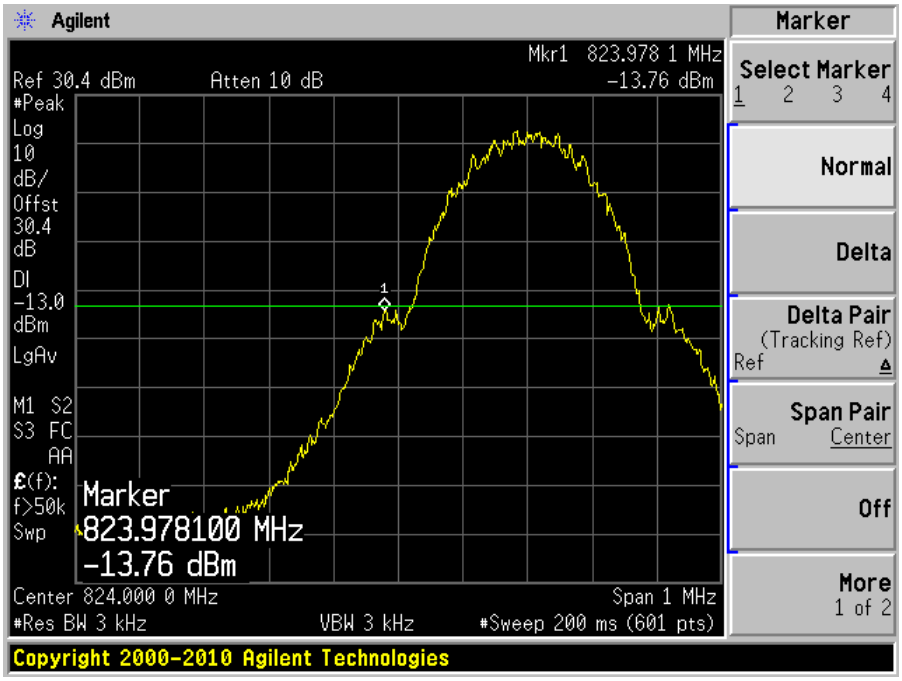
Manufacturer	Description	Model	Serial Number	Calibration Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	2010-03-21
Agilent	Analyzer, Spectrum	E4440A	US45303156	2010-08-09

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

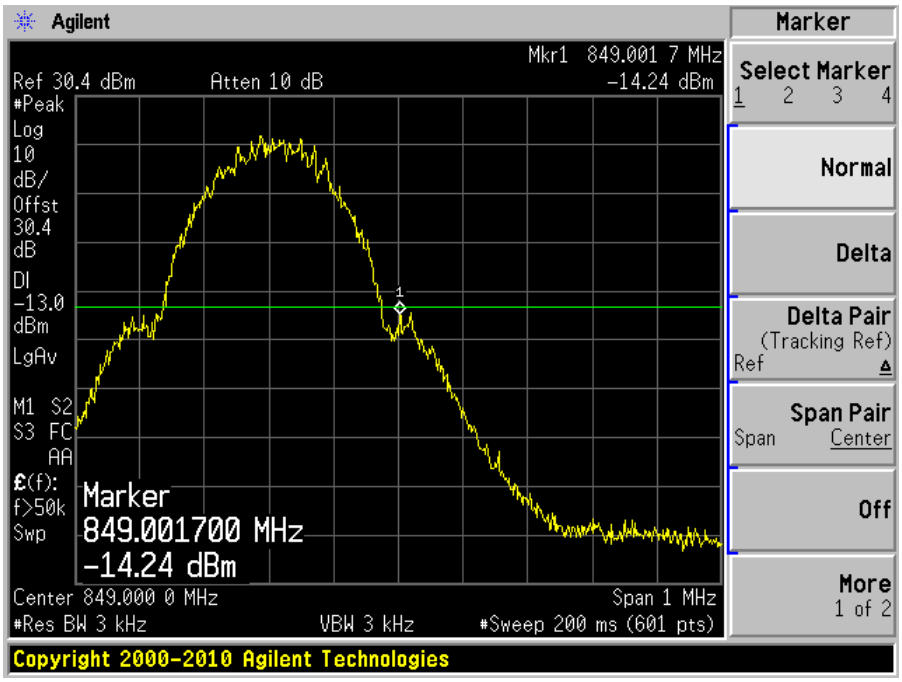
9.5 Test Results

Please refer to the following plots.

GSM 850 MHz band, Uplink Band Edge

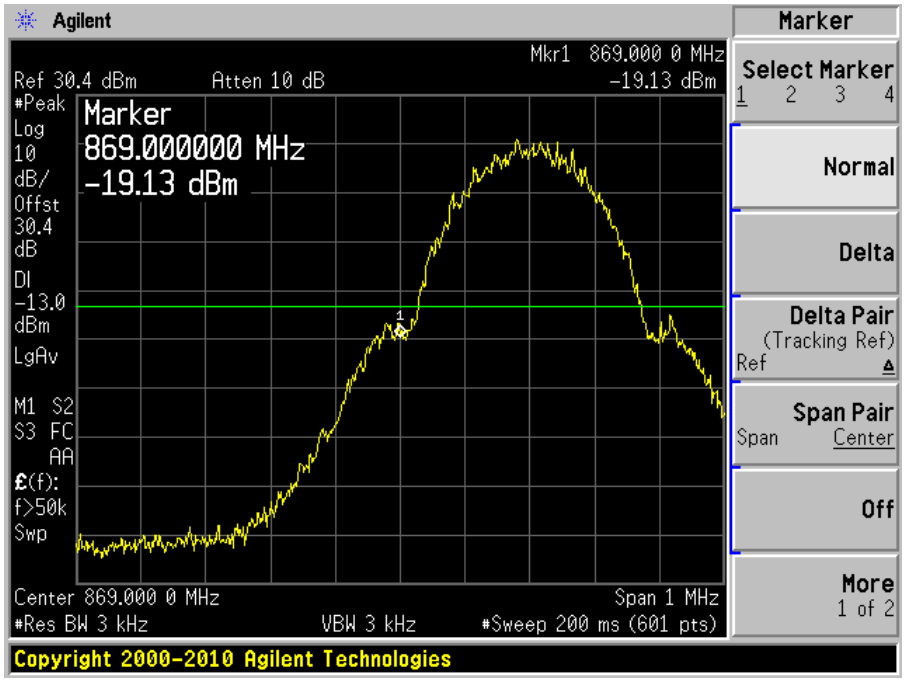


Low Channel

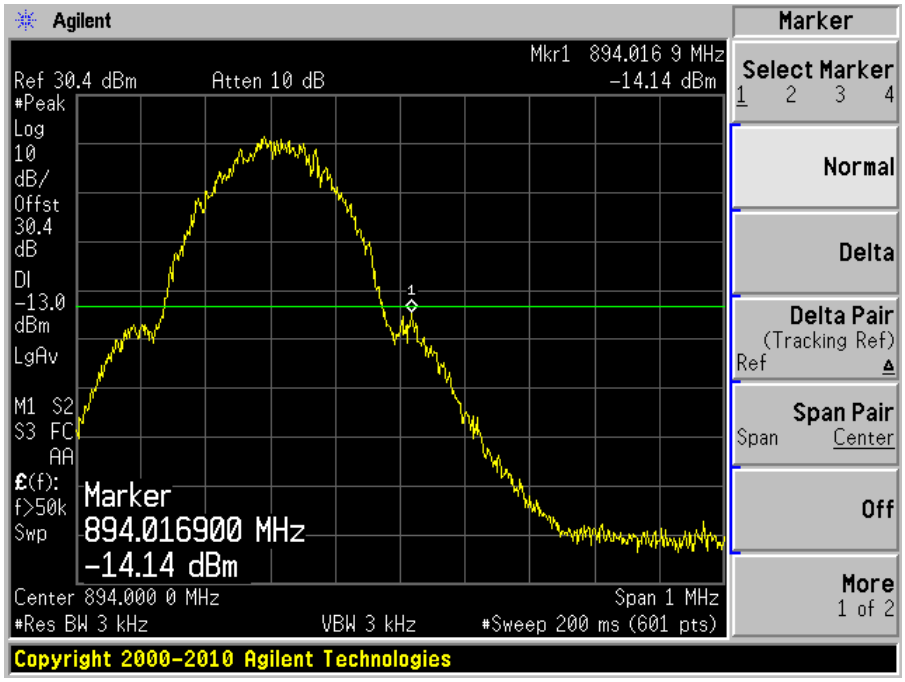


High Channel

GSM 850 MHz band, Downlink Band Edge

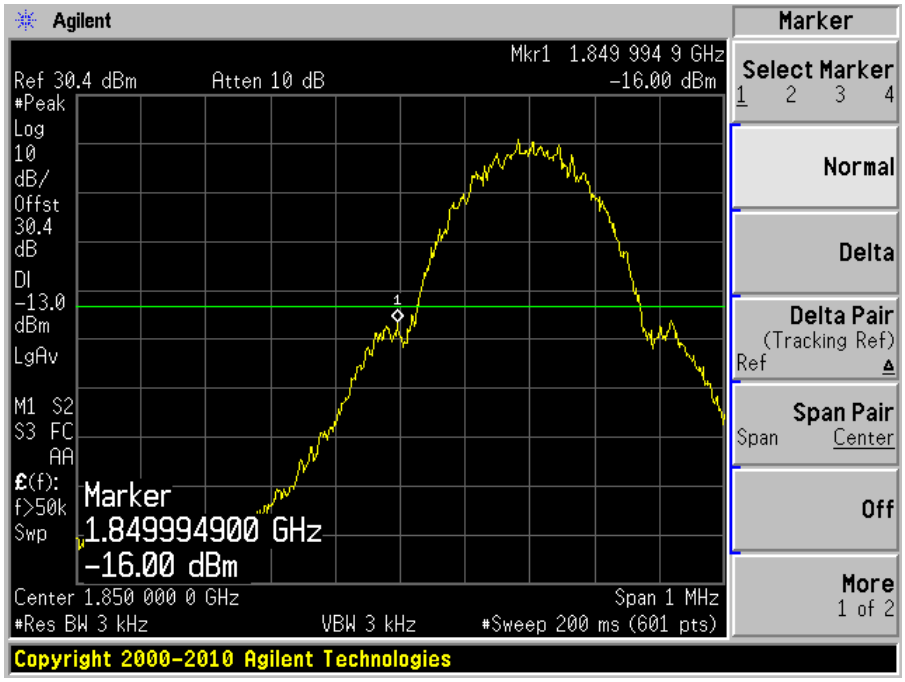


Low Channel

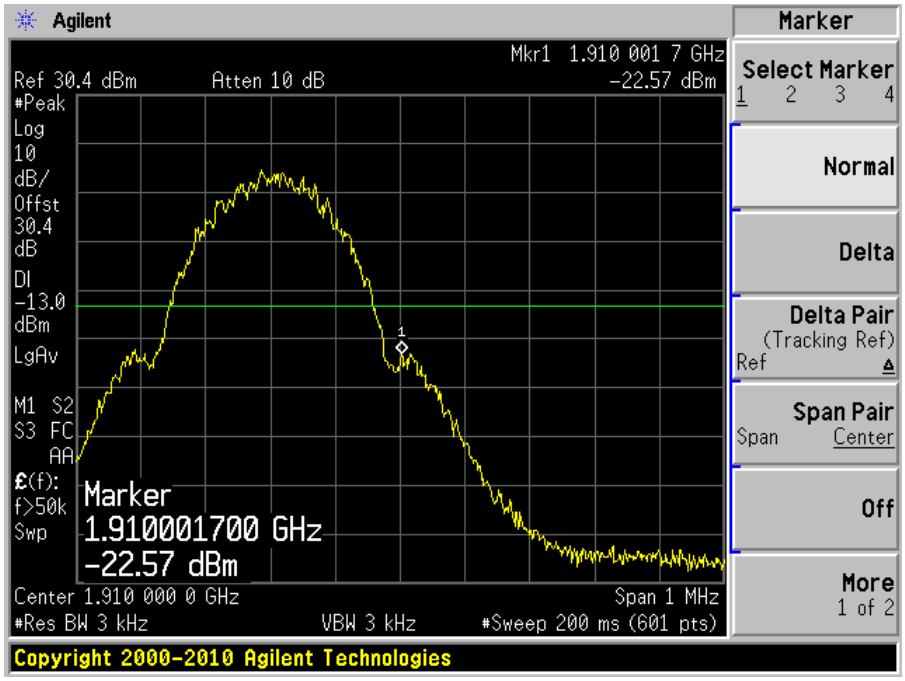


High Channel

GSM 1900 MHz band, Uplink Band Edge

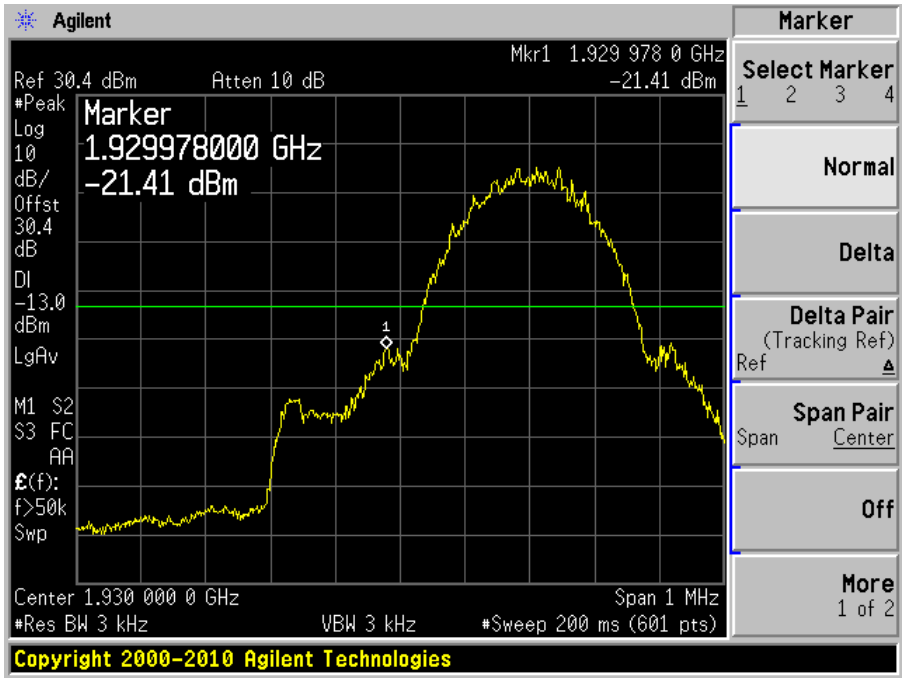


Low Channel

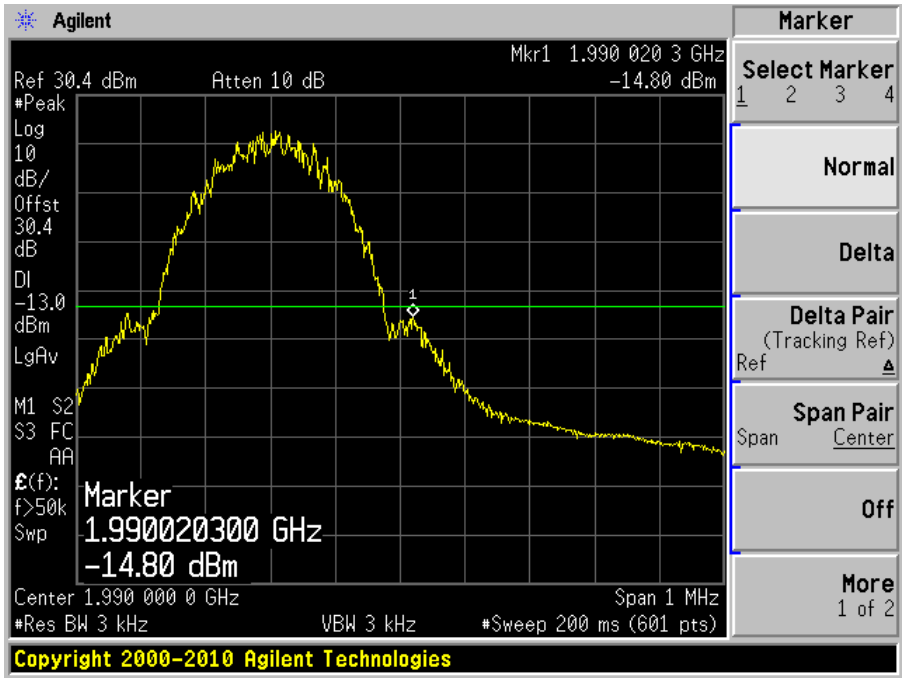


High Channel

GSM 1900 MHz band, Downlink Band Edge

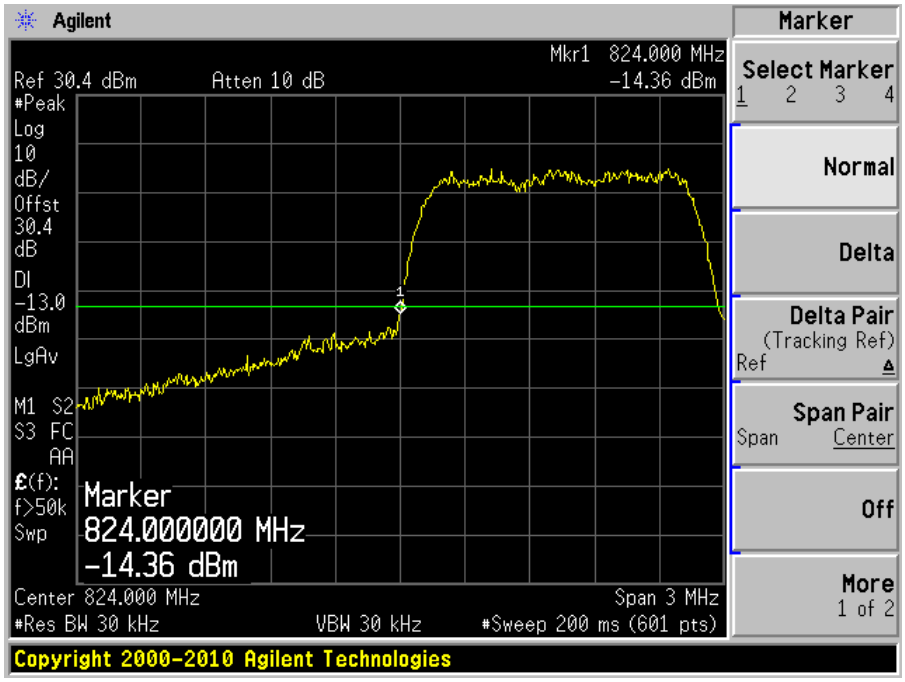


Low Channel

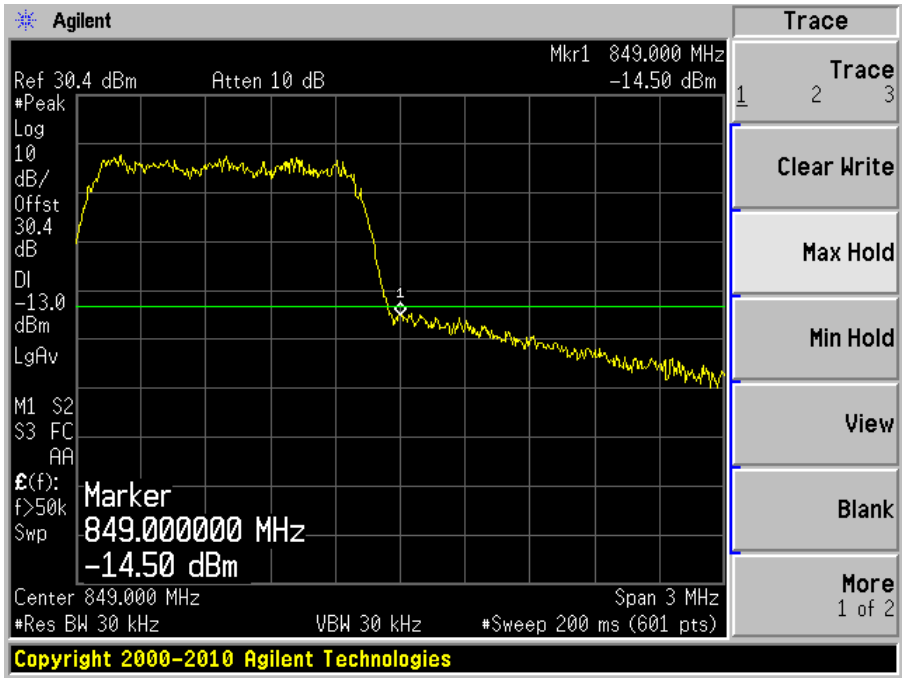


High Channel

CDMA 850 MHz band, Uplink Band Edge

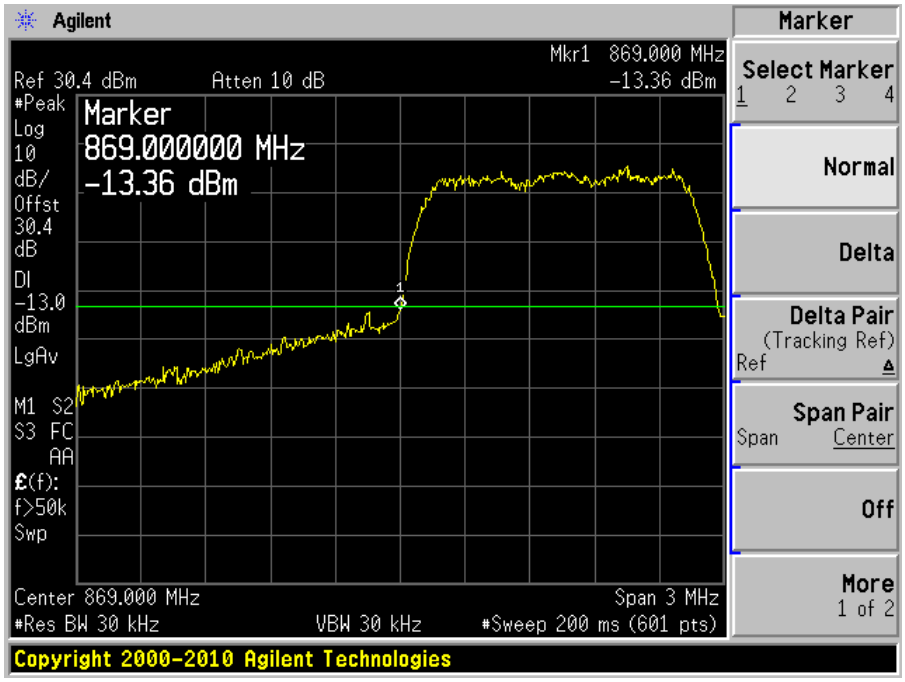


Low Channel

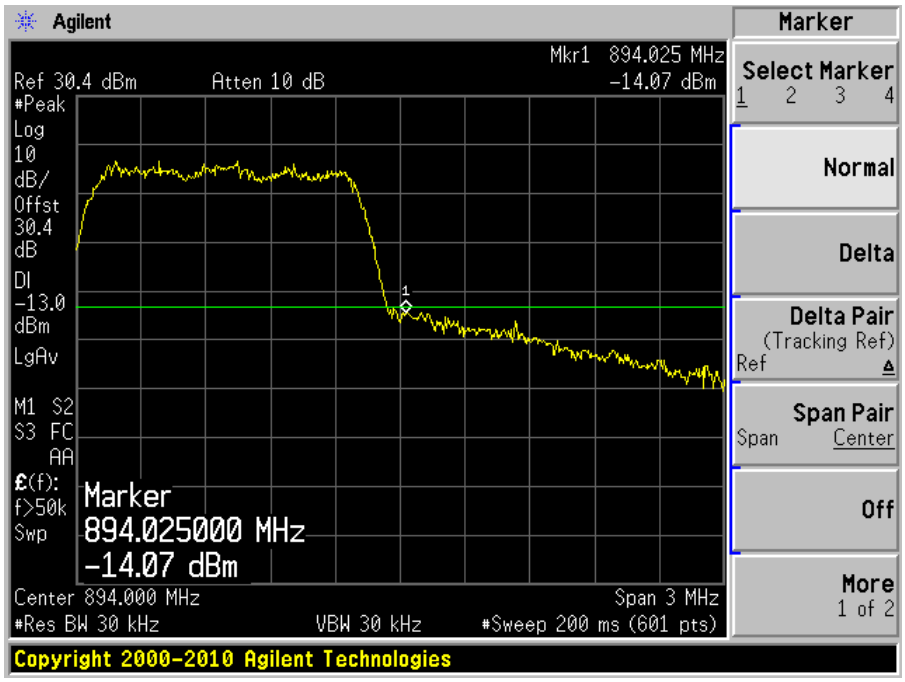


High Channel

CDMA 850 MHz band, Downlink Band Edge

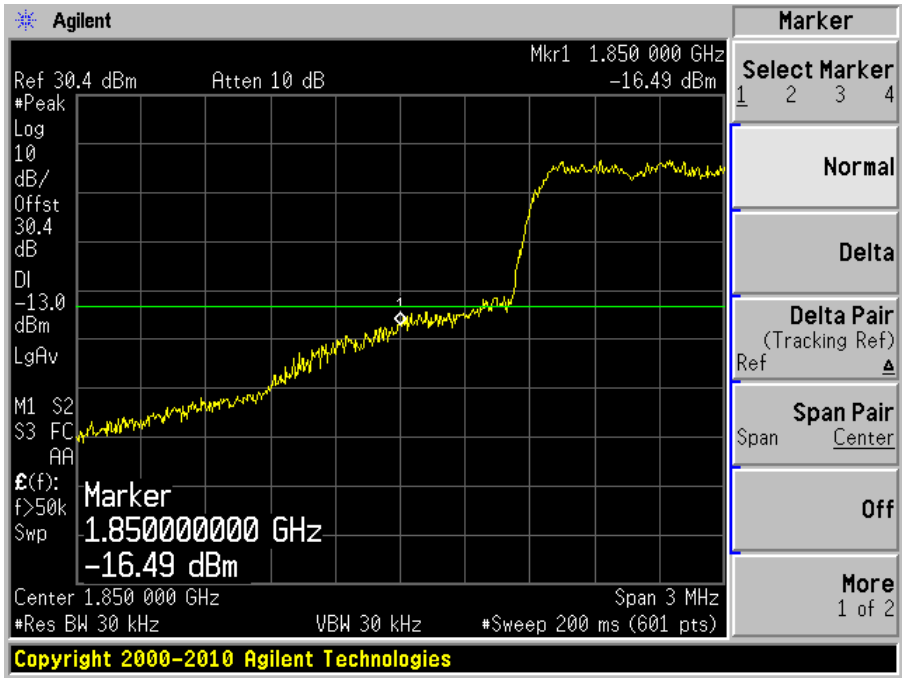


Low Channel

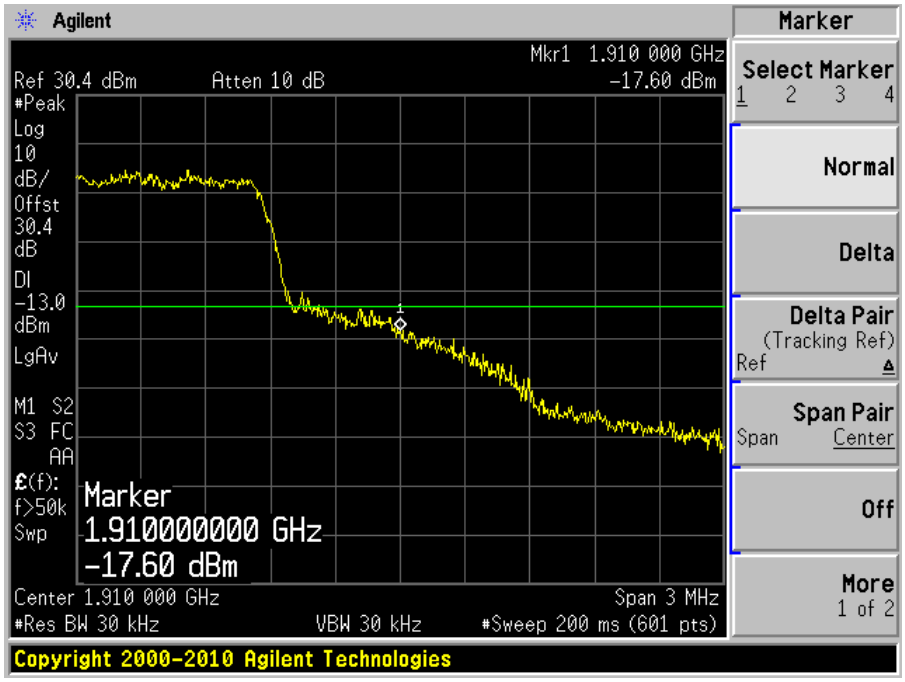


High Channel

CDMA 1900 MHz band Uplink Band Edge

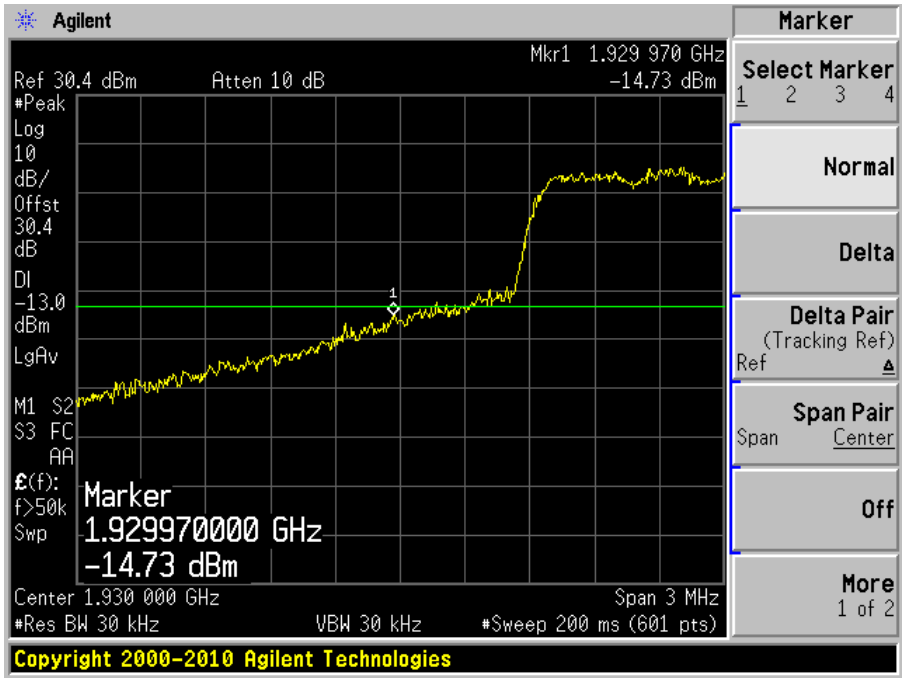


Low Channel

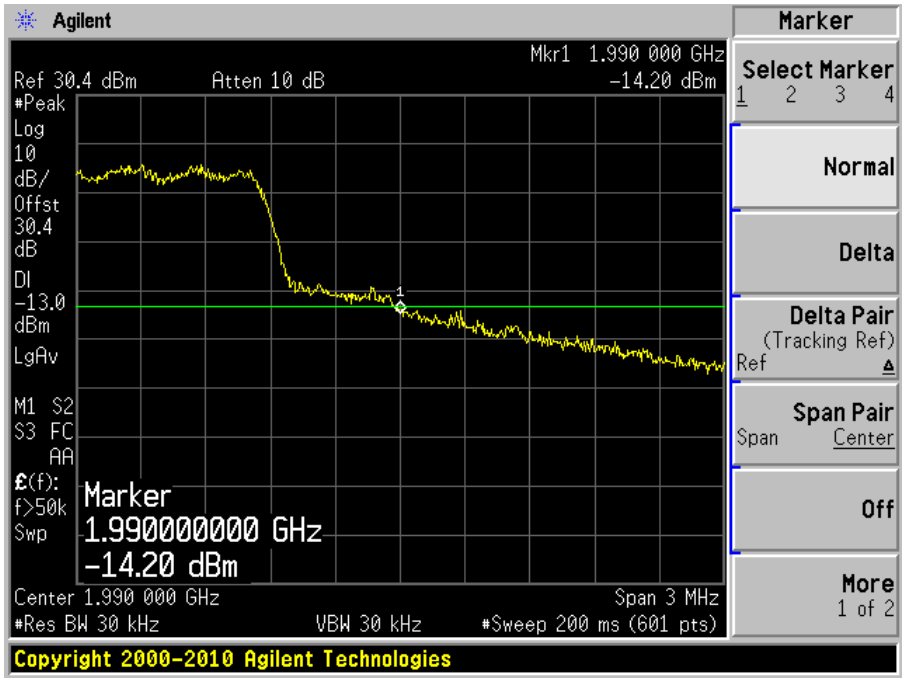


High Channel

CDMA 1900 MHz band Downlink Band Edge



Low Channel



High Channel

10 FCC §2.1055 – 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 FCC §1.1310 and §2.1091 (Mobile Devices) RF exposure is calculated.

Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minute)
Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	[1] (100)	30
1.34-30	824/f	2.19/f	[1] ($180/f^2$)	30
30-300	27.5	0.073	0.2	30
300-1500	/	/	f/1500	30
1500-100,000	/	/	1.0	30

f = frequency in MHz
[1] = 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 band, Uplink:

Maximum peak output power at antenna input terminal (dBm):	34.12
Maximum peak output power at antenna input terminal (mW):	2582.26
Prediction distance (cm):	30
Prediction frequency (MHz):	836.6
Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	2
Power density at predication frequency and distance (mW/cm^2):	0.457
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.558

850 MHz band, Downlink:

Maximum peak output power at antenna input terminal (dBm):	31.58
Maximum peak output power at antenna input terminal (mW):	1438.80
Prediction distance (cm):	30
Prediction frequency (MHz):	881.6
Antenna Gain, typical (dBi):	6
Maximum Antenna Gain (numeric):	3.98
Power density at predication frequency and distance (mW/cm^2):	0.506
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	0.588

1900 MHz band, Uplink:

Maximum peak output power at antenna input terminal (dBm):	29.77
Maximum peak output power at antenna input terminal (mW):	948.42
Prediction distance (cm):	30
Prediction frequency (MHz):	1880
Antenna Gain, typical (dBi):	3
Maximum Antenna Gain (numeric):	2
Power density at predication frequency and distance (mW/cm^2):	0.334
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

1900 MHz band, Downlink:

Maximum peak output power at antenna input terminal (dBm):	31.39
Maximum peak output power at antenna input terminal (mW):	1377.21
Prediction distance (cm):	30
Prediction frequency (MHz):	1960
Antenna Gain, typical (dBi):	6
Maximum Antenna Gain (numeric):	3.98
Power density at predication frequency and distance (mW/cm^2):	0.485
MPE limit for uncontrolled exposure at predication frequency (mW/cm^2):	1.0

Test Result

For Uplink, the highest power density level at 30 cm is 0.457mW/cm², which is below the uncontrolled exposure limit of 0.588 mW/cm² at 836.6 MHz.

For Downlink, the highest power density level at 30 cm is 0.506mW/cm², which is below the uncontrolled exposure limit of 0.588mW/cm² at 881.6 MHz.

Thus, the indoor and outdoor antenna prediction distance should be greater than 30 cm.