



FCC PART 22 TYPE APPROVAL EMI MEASUREMENT AND TEST REPORT

For

OPISYS Incorporated

9201 Irvine Blvd.
Irvine, CA 92618

FCC ID: Q4EUSHR-800H

This Report Concerns: <input checked="" type="checkbox"/> Original Report	Equipment Type: 800MHz GSM CDMA Bi-direction Amplifier
Test Engineer: Daniel Deng / 	
Report No.: R0506221	
Report Date: 2005-07-12	
Reviewed By: Richard Lee / 	
Prepared By: Bay Area Compliance Laboratory Corporation (BACL) 230 Commercial Street Sunnyvale, CA 94085 Tel: (408) 732-9162 Fax: (408) 732 9164	

Note: The test report is specially limited to the above company and this particular sample only. It may not be duplicated without prior written consent of Bay Area Compliance Laboratory Corporation. This report **must not** be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the US Government.

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GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

The *OPISYS Incorporated* 's product, FCC ID: *Q4EUSHR-800H* or the "EUT" as referred to in this report is a 800MHz GSM CDMA Bi-direction Amplifier, which measures approximately 4.7' L x 5.3' mm W x 2.3' mm H.

** The test data gathered are from typical production sample, serial number: 05-03-003 provided by the manufacturer.*

Objective

This type approval report is prepared on behalf of *OPISYS Incorporated* in accordance with Part 2, Subpart J, Part 22 Subpart H of the Federal Communication Commissions rules.

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

Related Submittal(s)/Grant(s)

No Related Submittals

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 15 Subpart B – Unintentional Radiators

Part 22 Subpart H - Public Mobile Services

Applicable Standards: TIA EIA 137-A, TIA EIA 603-B, ANSI 63.4-2003, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.

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.

Test Facility

The Open Area Test site used by Bay Area Compliance Laboratory Corporation to collect radiated and conducted emission measurement data is located in the back parking lot of the building at 230 Commercial Street, Sunnyvale, California, USA.

Test site at Bay Area Compliance Laboratory Corporation has been fully described in reports submitted to the Federal Communication Commission (FCC) and Voluntary Control Council for Interference (VCCI). The details of these reports 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 and Voluntary Control Council for Interference has the reports on file and is listed under FCC file 31040/SIT 1300F2 and VCCI Registration No.: C-1298 and R-1234. The test site has been approved by the FCC and VCCI for public use and is listed in the FCC Public Access Link (PAL) database.

Additionally, BACL 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>

SYSTEM TEST CONFIGURATION

Justification

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

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

Block Diagram

Please refer to Exhibit D.

Equipment Modifications

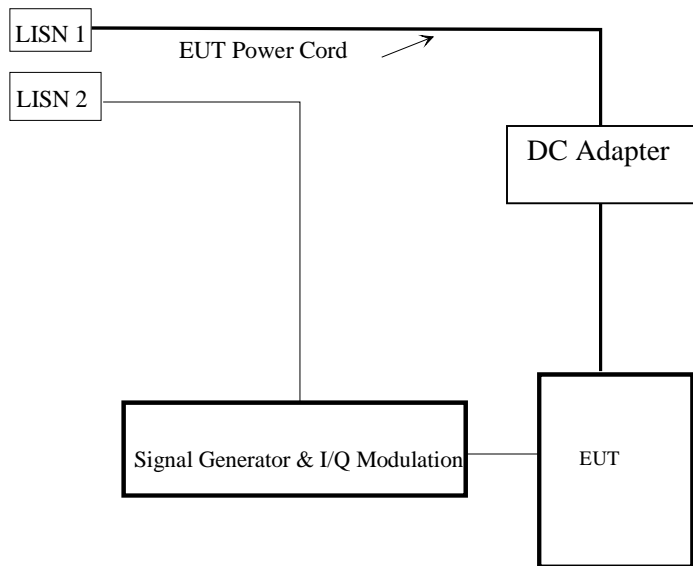
No modifications were made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number	FCC ID
Rohde & Schwarz	Signal Generator	SMIQ 03	DE23746	N/A
Rohde & Schwarz	I/O Modulation Generator	AMIQ	DE30565	N/A

Interface Ports and Cabling

Cable Description	Length (M)	From	To
RF Cable	1.5	EUT Uplink or Downlink port	Signal generator
Power cable	6	EUT Power port	DC Power Adapter
RF Cable	1.5 x 2	SMIQ 03	AMIQ

Test Setup Block Diagram

SUMMARY OF TEST RESULTS

Results reported relate only to the product tested, serial number: 05-03-003

FCC RULE	DESCRIPTION OF TEST	RESULT
§ 2.1047	Modulation Characteristics	N/A
§ 2.1051	Two-Tone Test	Compliant
§ 2.1053	Field Strength of Spurious Radiation	Compliant
§2.1091	RF Exposure	Compliant
§ 2.1046, § 22.913 (a)	RF Output Power	Compliant
§ 2.1046, § 22.913 (a)	Conducted Output Power	Compliant
§ 2.1049 § 22.917 § 22.905	Out of Band Emission, Occupied Bandwidth	Compliant
§ 2.1051, § 22.917	Spurious Emissions at Antenna Terminals	Compliant
§ 2.1055 (a) § 2.1055 (d) § 22.355	Frequency stability vs. temperature Frequency stability vs. voltage	N/A
§ 22.917	Band Edge	Compliant

§ 2.1051 - TWO-TONE TEST

Applicable Standards

According to IS-138A (3.4.4), Intermodulation products must be attenuated below the rated power of the EUT by at least $43 + 10\log(P)$, equivalent to -13 dBm.

Test Procedure

The RF output of the EUT was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1 MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic. Two input signals are equal in level (and can be raised equally), were sent to the EUT.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

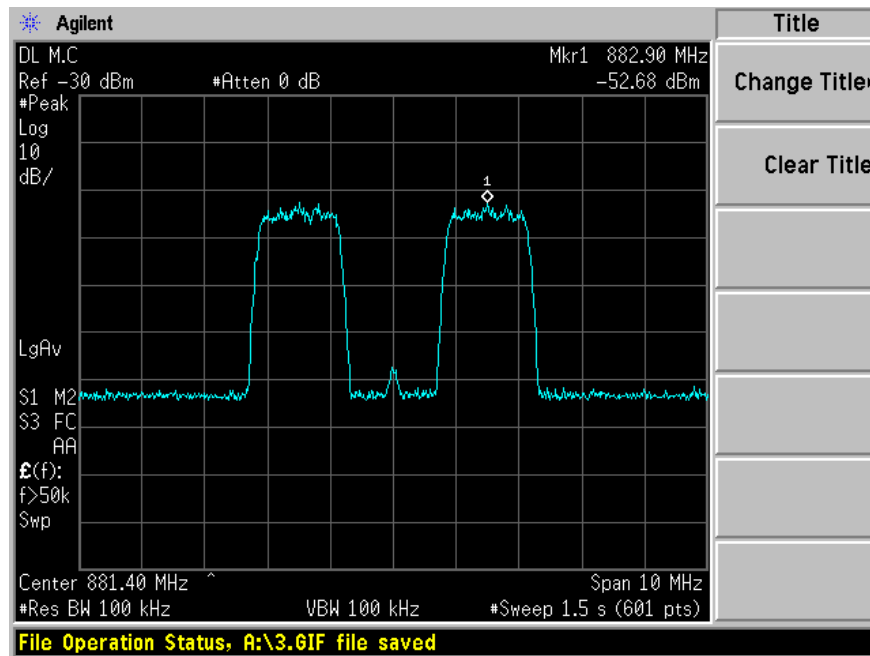
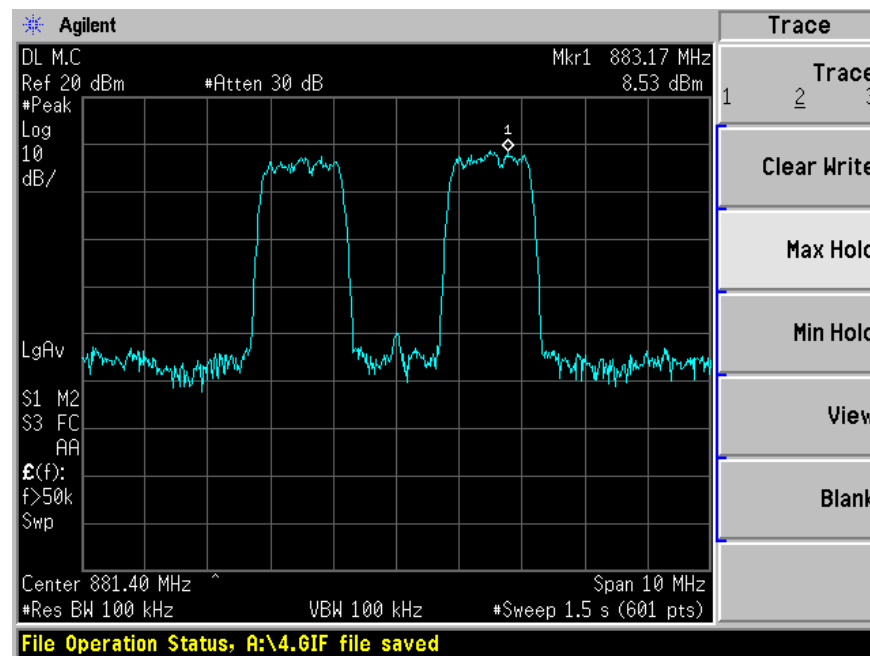
Environmental Conditions

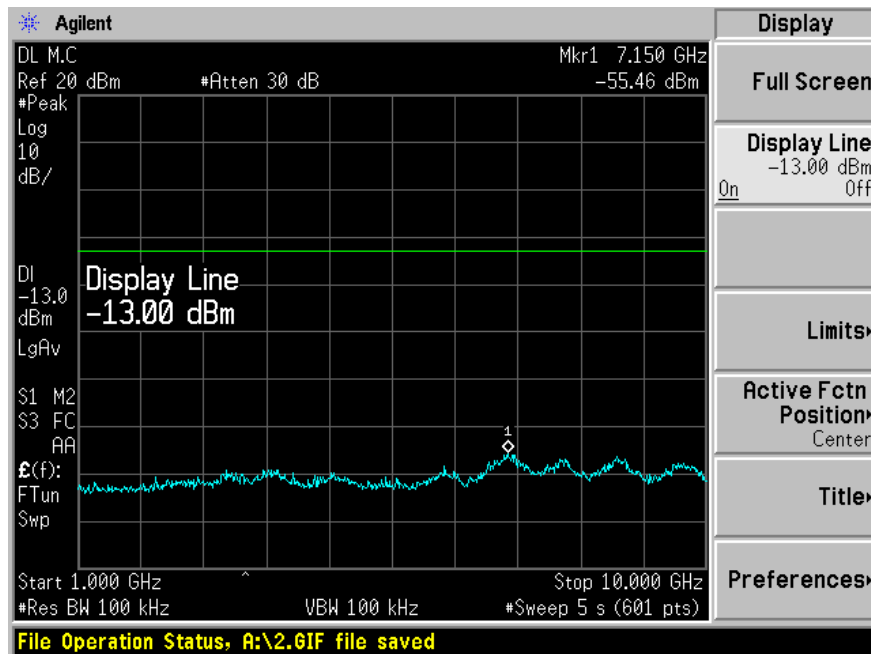
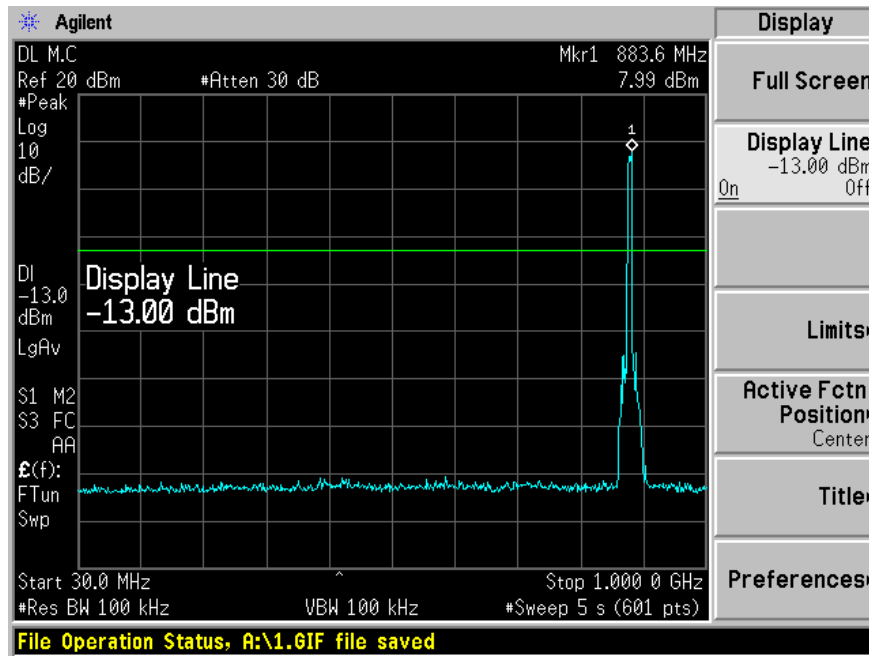
Temperature:	24° C
Relative Humidity:	42%
ATM Pressure:	1021 mbar

The testing was performed by Daniel Deng on 2005-06-29.

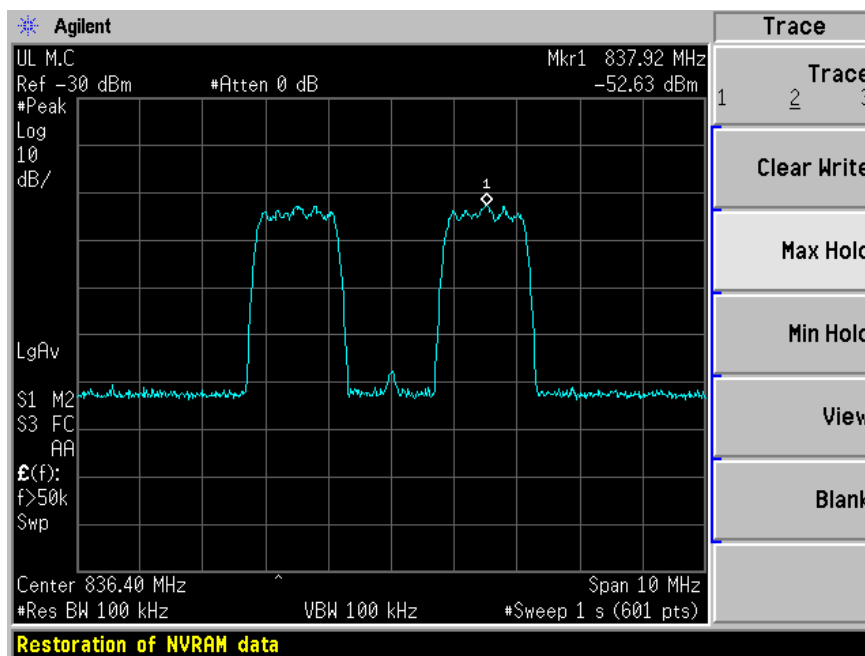
Plots of Two-Tone Test Result

Please refer to plots hereinafter.

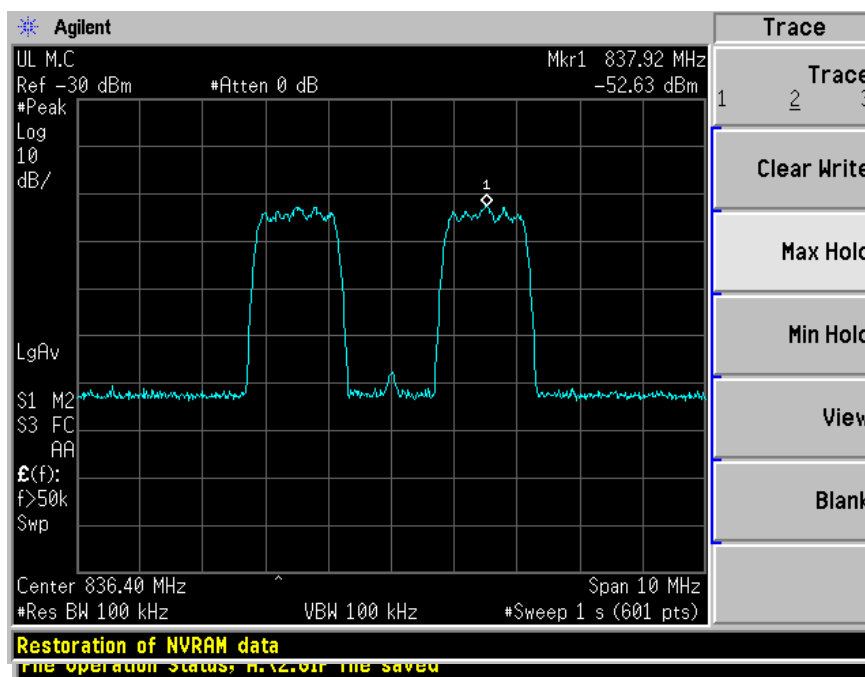
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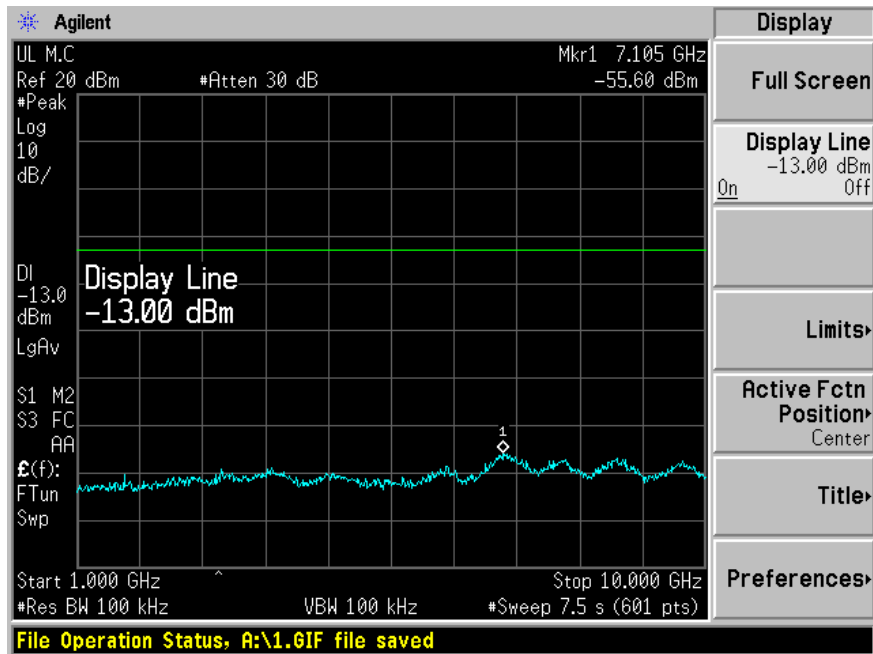
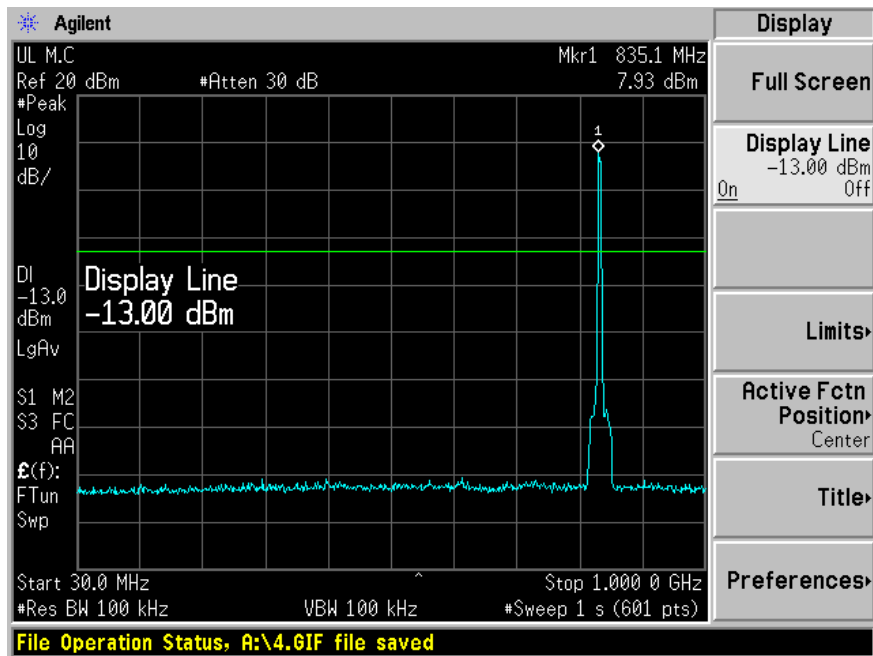


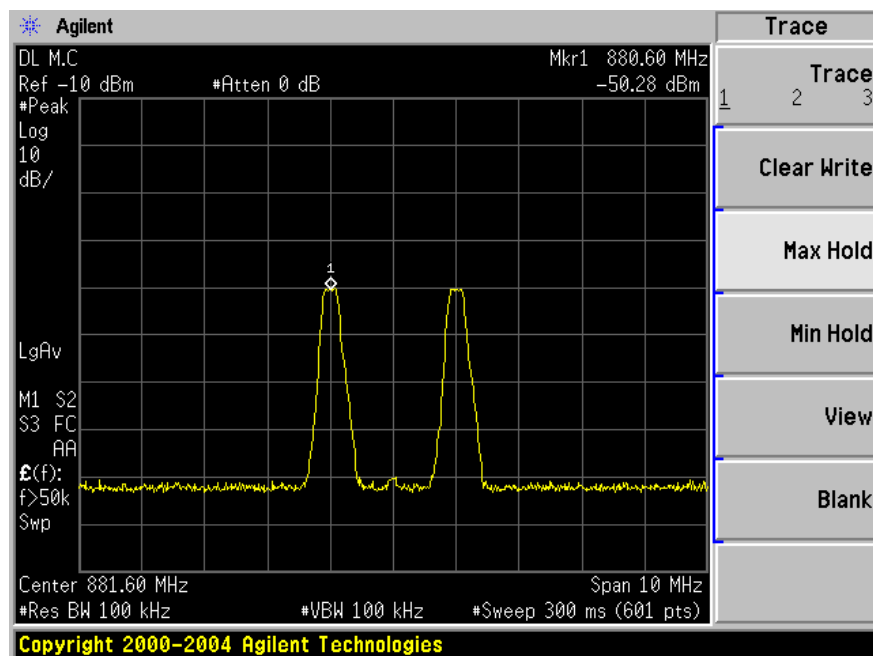
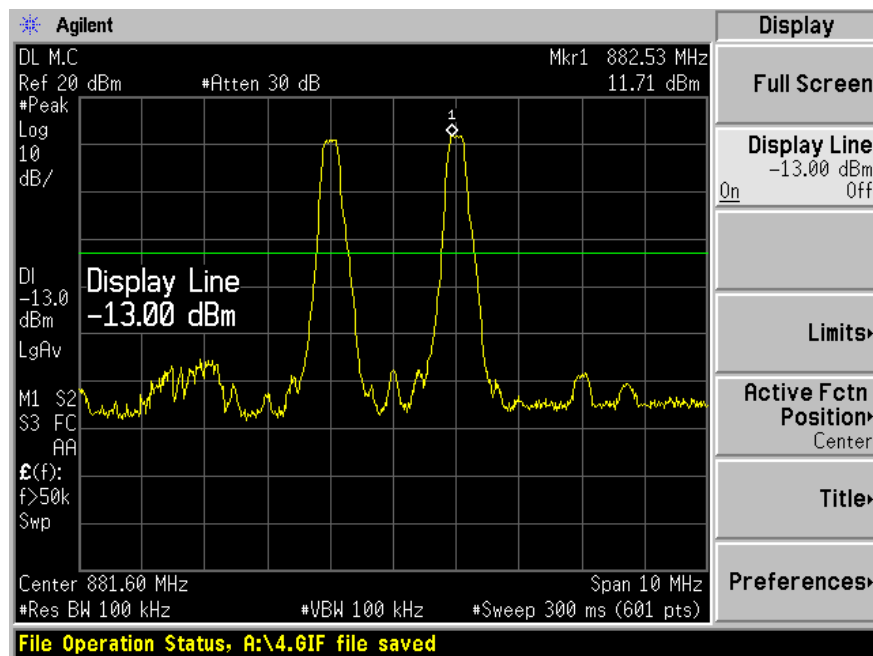
CDMA Uplink, IN:

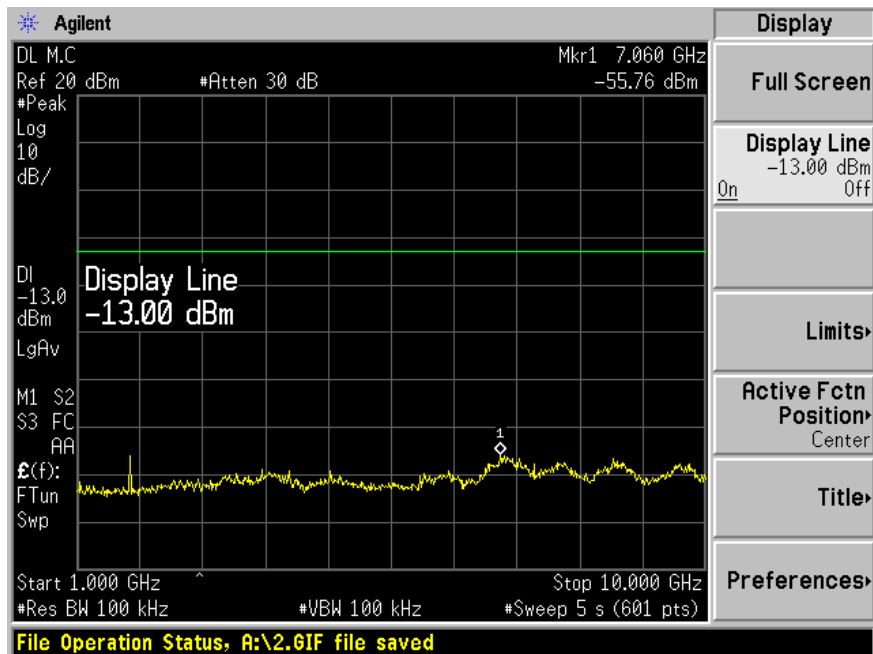
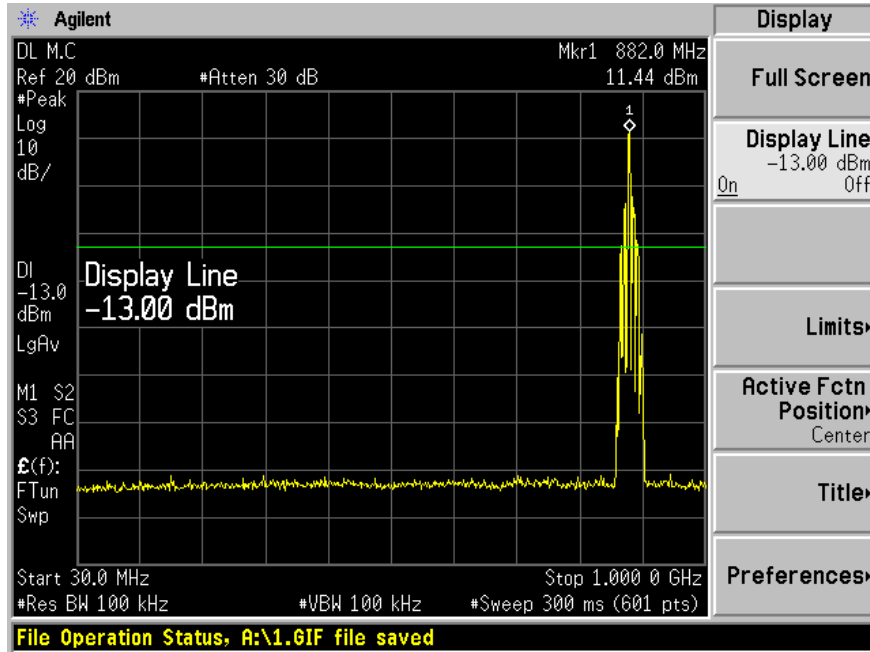


CDMA Uplink, OUT:

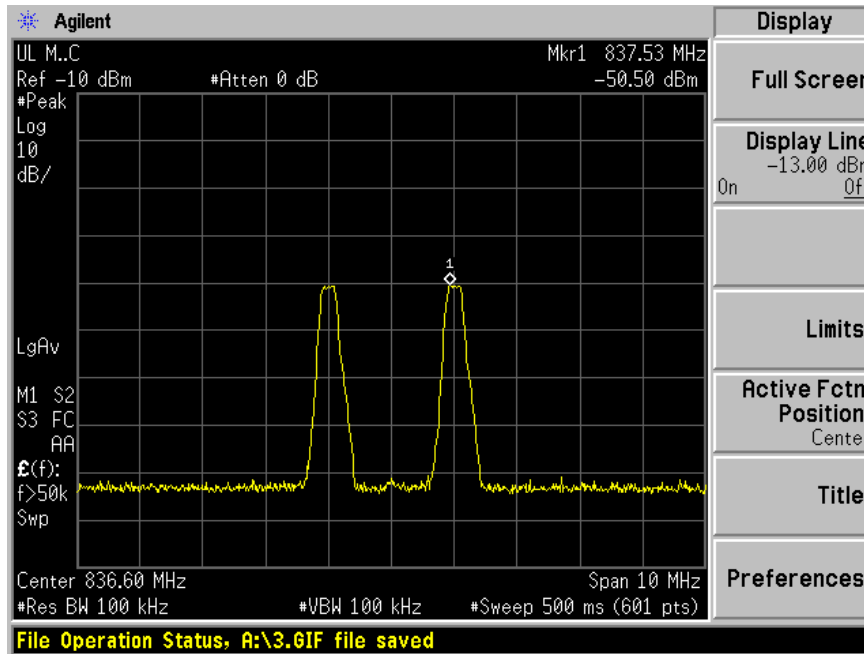




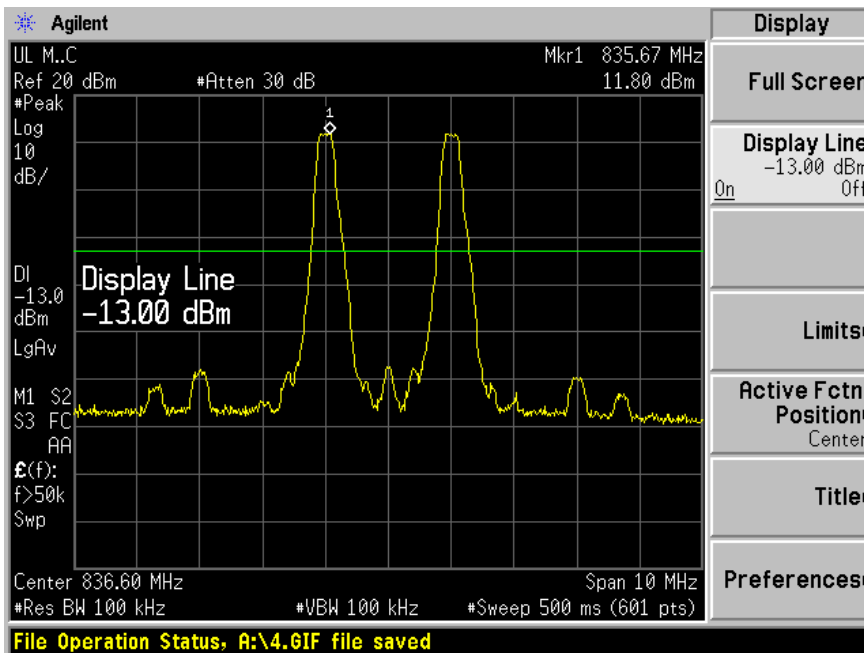
GSM Downlink, IN:*GSM Downlink, OUT:*

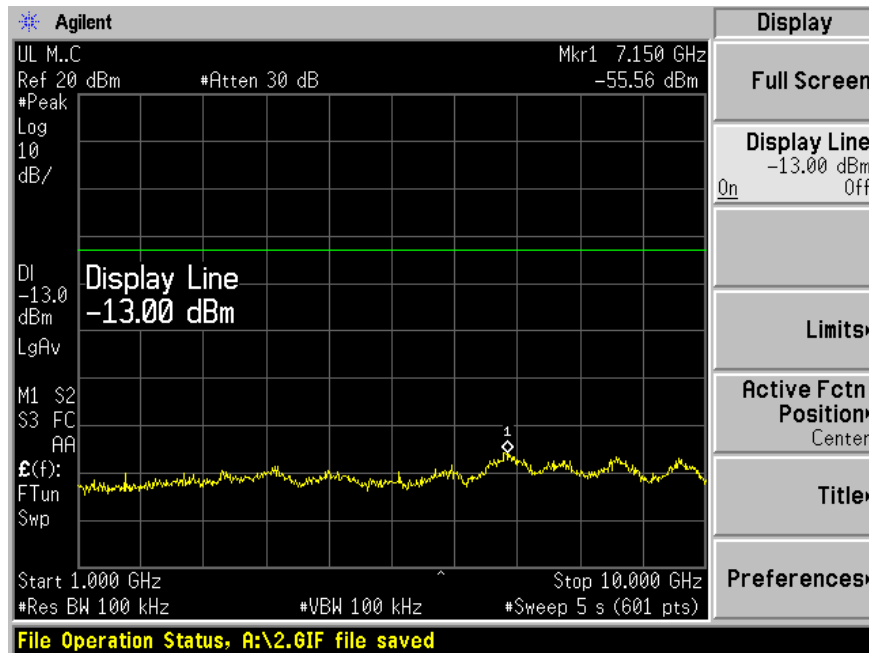
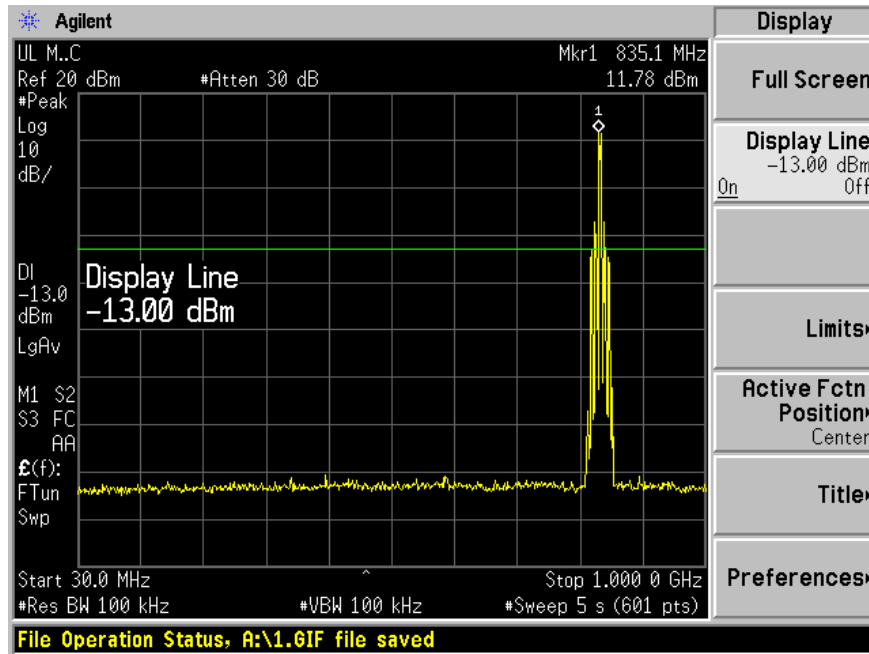


GSM Uplink, IN:



GSM Uplink, OUT:





§2.1053 – SPURIOUS RADIATED EMISSIONS

Applicable Standard

Requirements: CFR 47, § 2.1053.

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 = $10 \lg (\text{TXpwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \text{ Log}_{10} (\text{power out in Watts})$

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
ETS	Antenna, Log-Periodic	3148	4-1155	12/14/2004
ETS	Antenna, Biconical	3110B	9603-2315	12/14/2004
HP	Amplifier, Pre	8447D	2944A10198	8/20/2004
HP	Amplifier, Pre, Microwave	8449B	3147A00400	6/14/2004
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	4/20/2005
HP	Generator, Signal	83650B	3614A00276	5/10/2005
A.R.A.	Antenna, Horn	DRG-118/A	1132	9/30/2003
Wainwright	Filter, Band Reject	WRCG823/850-813/860-40/8SS	2	8/11/2004
Wainwright	Filter, Band Reject	WRCG1850/1910-1835/1925-40/8SS	5	8/11/2004

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	42%
ATM Pressure:	1021mbar

The testing was performed by Daniel Deng on 2005-06-29.

Test Result

The worse case readings are

- 50.6 dB at 1673.2 MHz in Vertical Polarization, uplink
- 50.1 dB at 1763.2 MHz in Vertical Polarization, downlink

Spurious Emission : Uplink 30 MHz - 10GHZ (TX) Mid Channel (836.6MHz)

Indicated		Table	Test Antenna		Substituted		Antenna	Cable	Absolute	Limit	Margin
Frequency	Ampl.	Angle	Height	Polar	Frequency	Level	Gain	Loss	Level		
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
1673.2	45.6	0	1.5	v	1673.2	-71.6	9.3	1.3	-63.6	-13	-50.6
2509.8	42.3	90	1.5	v	2509.8	-72.1	9.3	1.6	-64.4	-13	-51.4
2509.8	42.1	330	1.4	h	2509.8	-72.4	9.3	1.6	-64.7	-13	-51.7
1673.2	43.9	0	1.5	h	1673.2	-73.4	9.3	1.3	-65.4	-13	-52.4

Spurious Emission : Downlink 30 MHz - 10GHZ (TX) Mid Channel (881.6MHz)

Indicated		Table	Test Antenna		Substituted		Antenna	Cable	Absolute	Limit	Margin
Frequency	Ampl.	Angle	Height	Polar	Frequency	Level	Gain	Loss	Level		
MHz	dBuV/m	Degree	Meter	H/V	MHz	dBm	Correction	dB	dBm	dBm	dB
1763.2	46.2	0	1.5	v	1763.2	-71.1	9.3	1.3	-63.1	-13	-50.1
2644.8	42.6	300	1.5	h	2644.8	-71	9.3	1.6	-63.3	-13	-50.3
2644.8	42.7	90	1.5	v	2644.8	-71.6	9.3	1.6	-63.9	-13	-50.9
1763.2	44.3	0	1.5	h	1763.2	-72.9	9.3	1.3	-64.9	-13	-51.9

§2.1046, §22.913(a) – RF OUTPUT POWER

Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

Test Procedure

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

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004
ETS	Antenna, Log-Periodic	3148	4-1155	12/14/2004
ETS	Antenna, Biconical	3110B	9603-2315	12/14/2004
HP	Amplifier, Pre	8447D	2944A10198	8/20/2004
HP	Amplifier, Pre, Microwave	8449B	3147A00400	6/14/2004
A. H. Systems	Antenna, Horn, DRG	SAS-200/571	261	4/20/2005
HP	Generator, Signal	83650B	3614A00276	5/10/2005
A.R.A.	Antenna, Horn	DRG-118/A	1132	9/30/2003
Wainwright	Filter, Band Reject	WRCG823/850-813/860-40/8SS	2	8/11/2004
Wainwright	Filter, Band Reject	WRCG1850/1910-1835/1925-40/8SS	5	8/11/2004

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	42%
ATM Pressure:	1021mbar

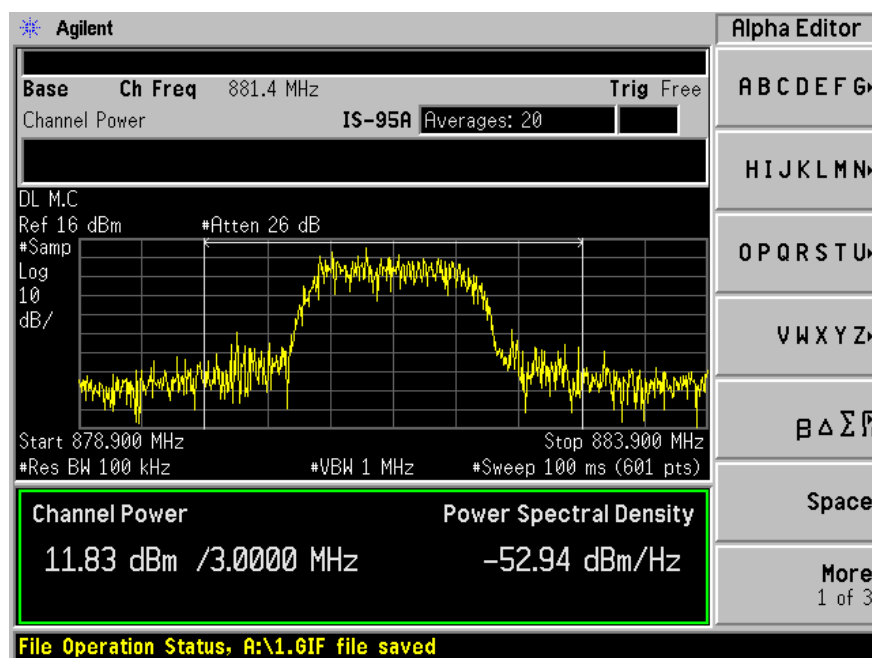
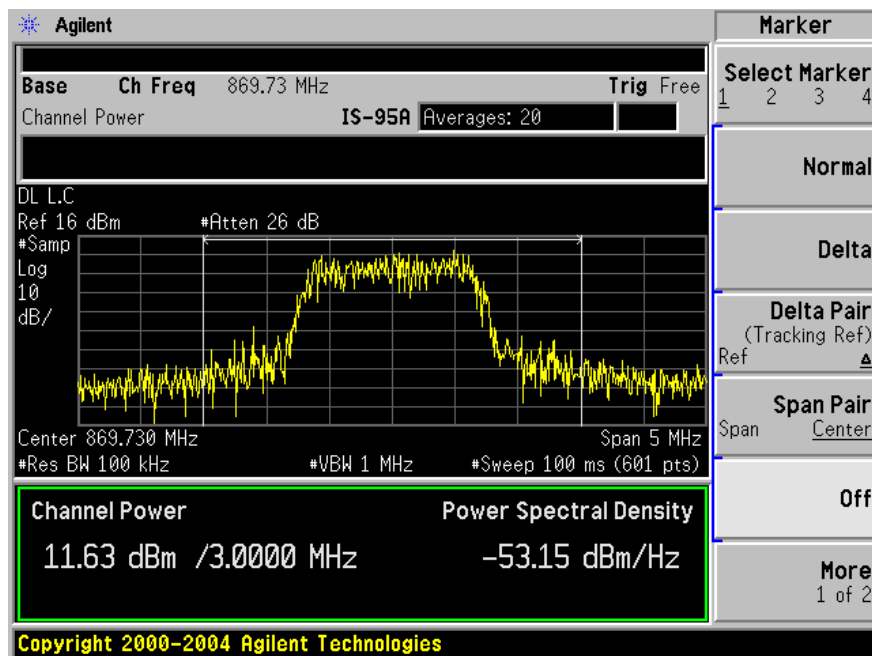
The testing was performed by Daniel Deng on 2005-06-29.

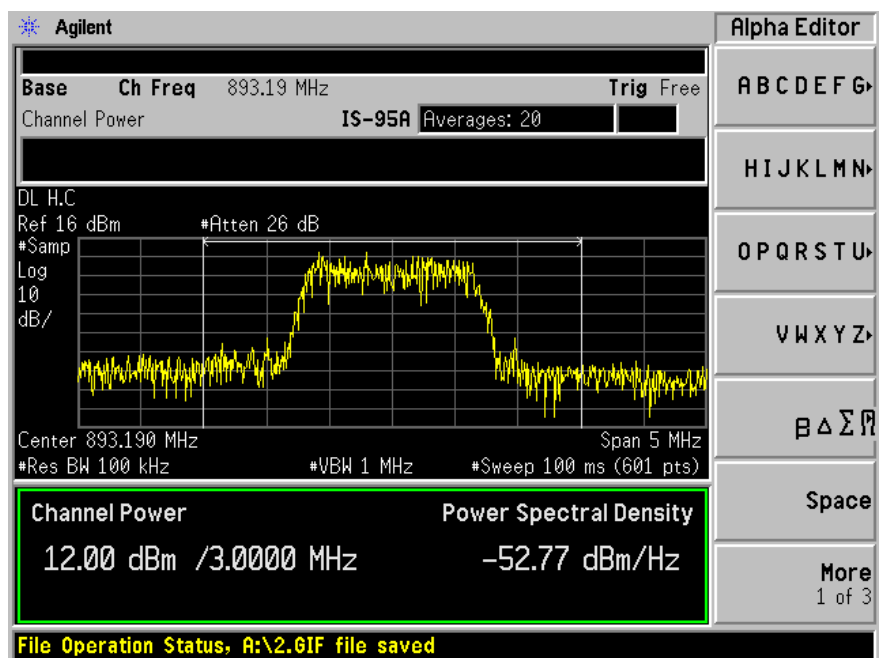
Test Results

(conducted)

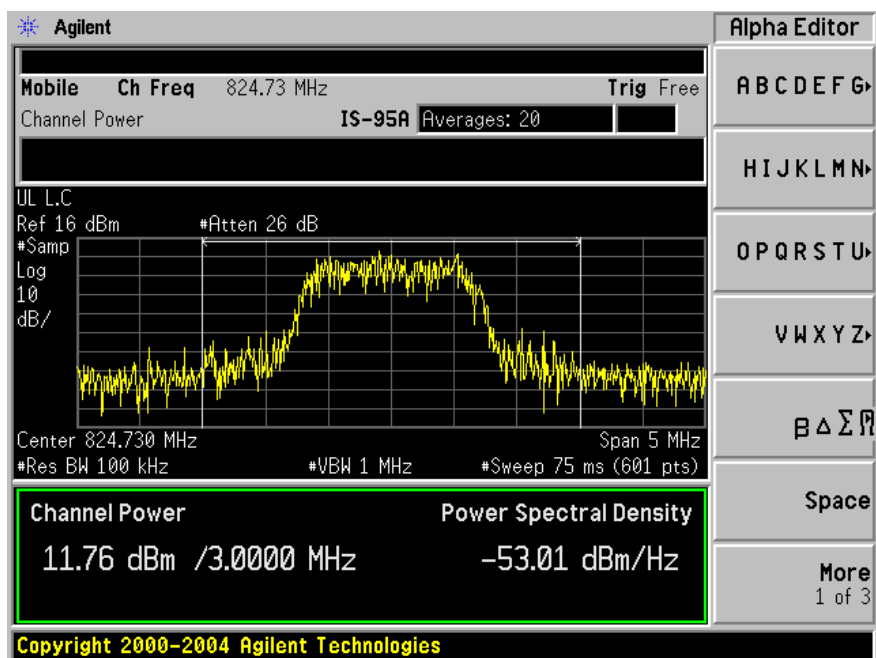
MODE		Channel	Frequency (MHz)	Output Power in dBm	Output Power in W	Limit in W
CDMA	Downlink	Low	869.73	11.63	0.015	7
		Middle	881.40	11.83	0.015	7
		High	893.19	12.00	0.016	7
	Uplink	Low	824.73	11.76	0.014	7
		Middle	836.40	11.87	0.015	7
		High	848.19	11.63	0.015	7
GSM	Downlink	Low	869.20	11.81	0.015	7
		Middle	881.60	11.89	0.015	7
		High	893.80	11.70	0.015	7
	Uplink	Low	824.20	11.98	0.016	7
		Middle	836.60	12.51	0.018	7
		High	848.80	11.82	0.015	7

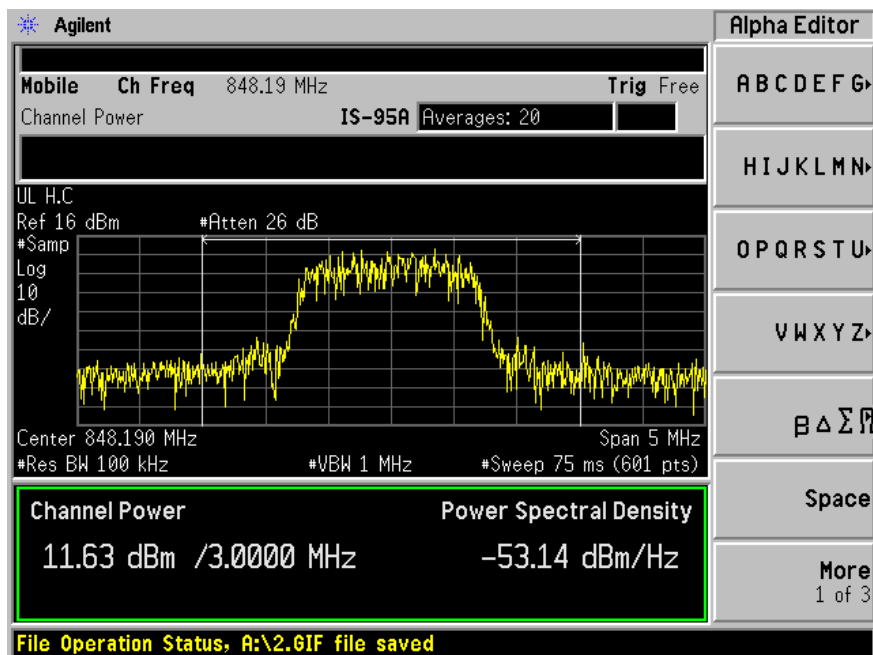
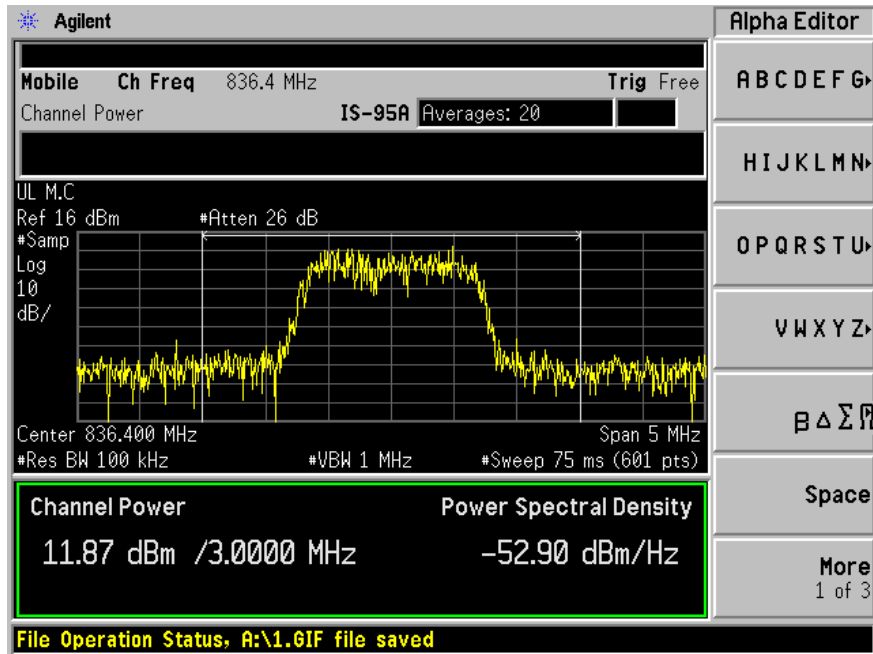
CDMA Downlink:



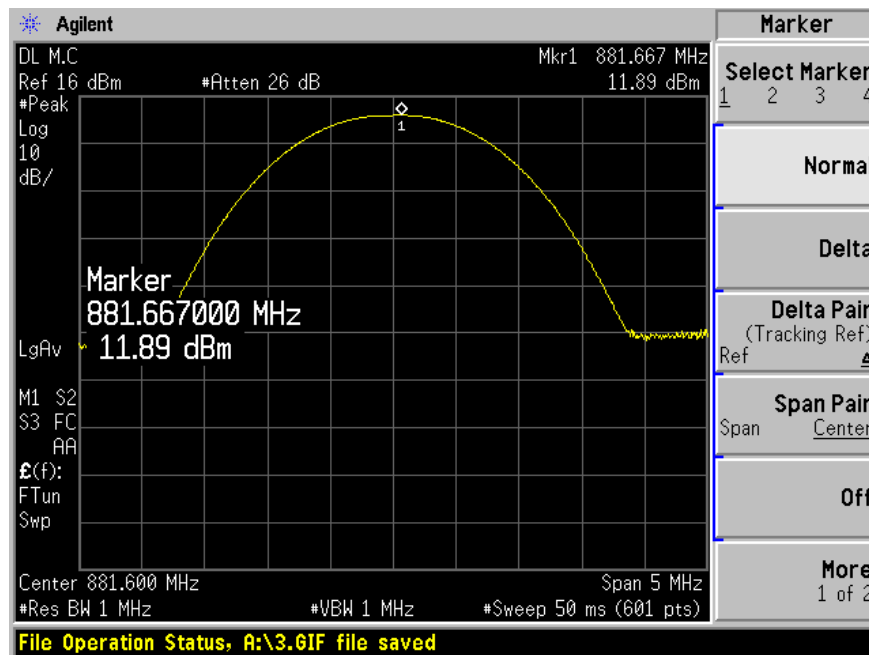
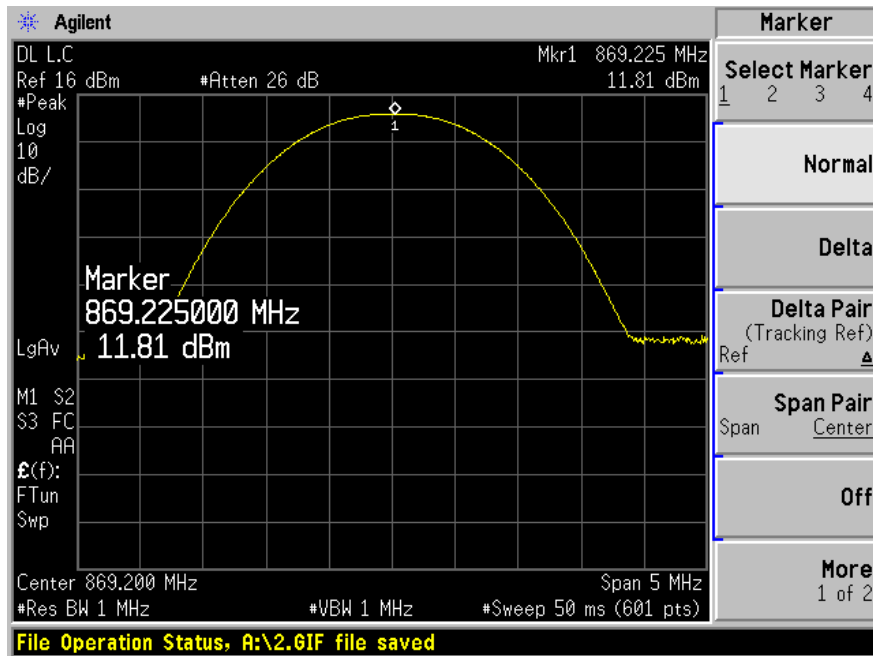


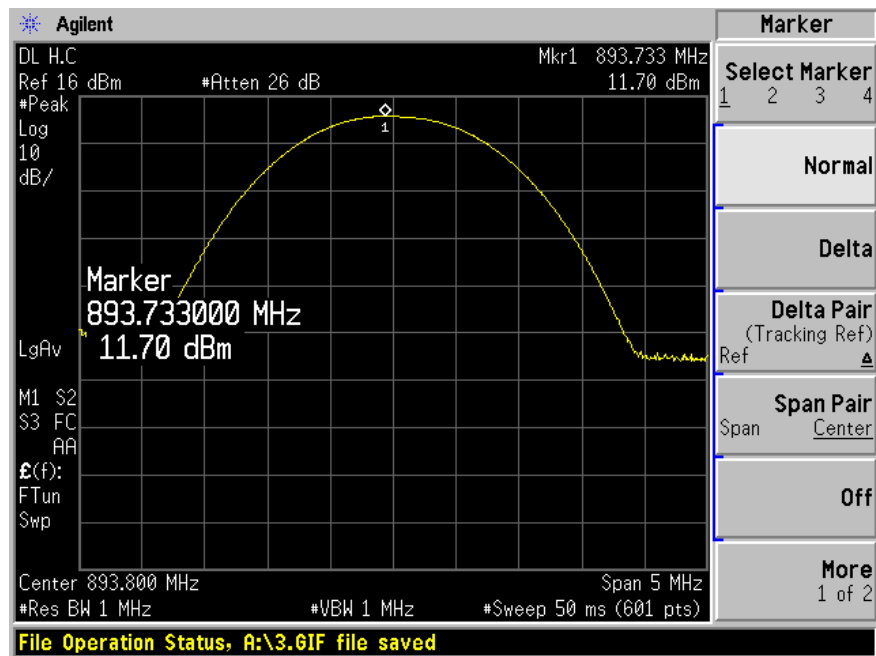
CDMA Uplink:



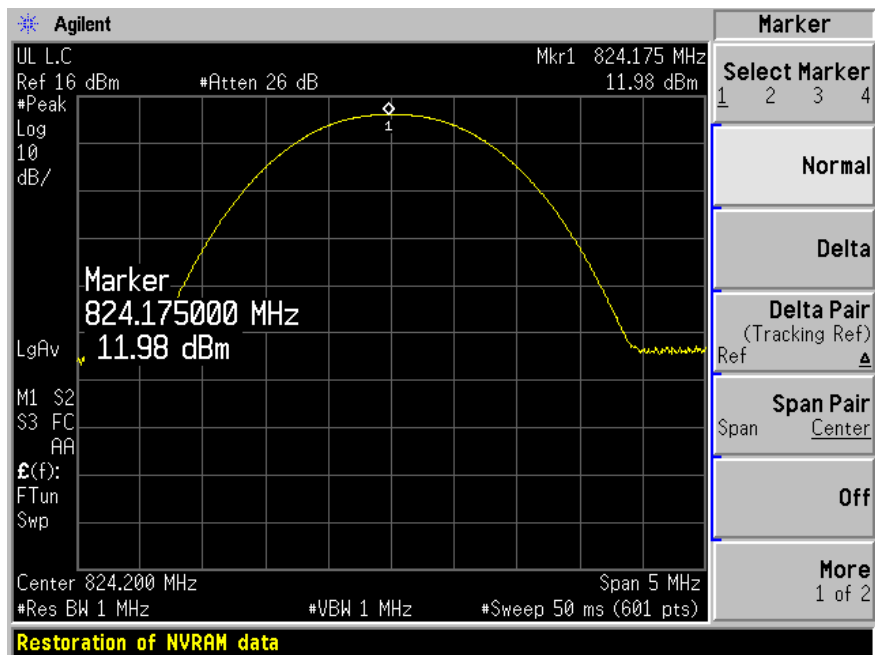


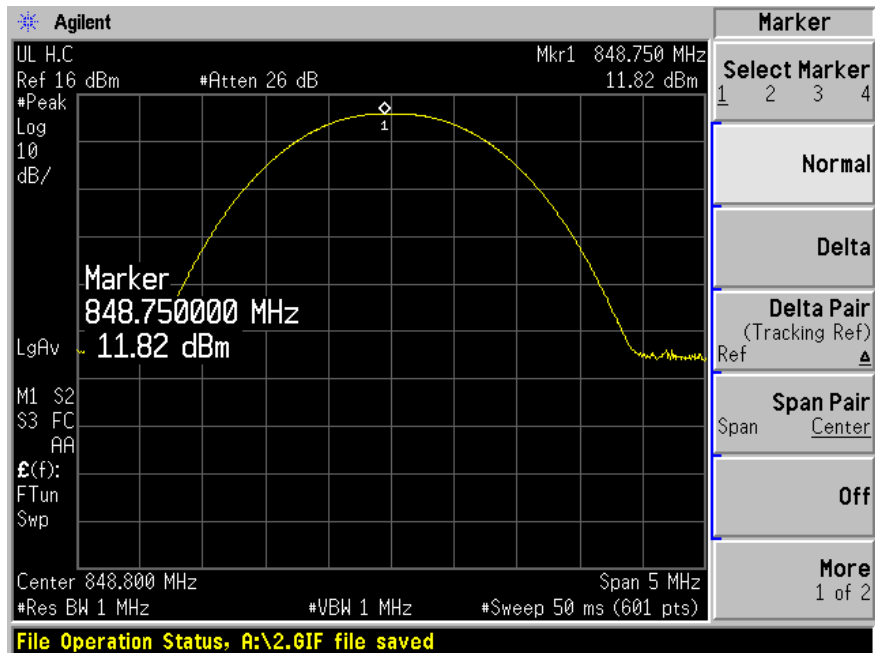
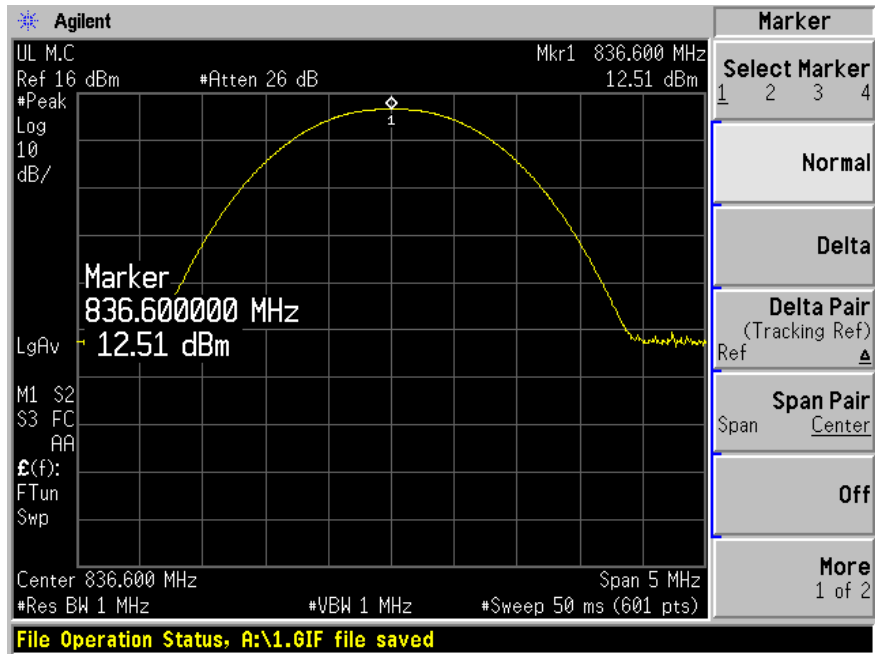
GSM Downlink:





GSM Uplink:





§2.1049, §22.917(b) - OCCUPIED BANDWIDTH

Applicable Standard

Requirements: CFR 47, Section 2.1049 and 22.917(b).

Test Procedure

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

The resolution bandwidth of the spectrum analyzer was set at 30 KHz and the 26 dB bandwidth was recorded.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

Environmental Conditions

Temperature:	24° C
Relative Humidity:	42%
ATM Pressure:	1021 mbar

The testing was performed by Daniel Deng on 2005-06-29.

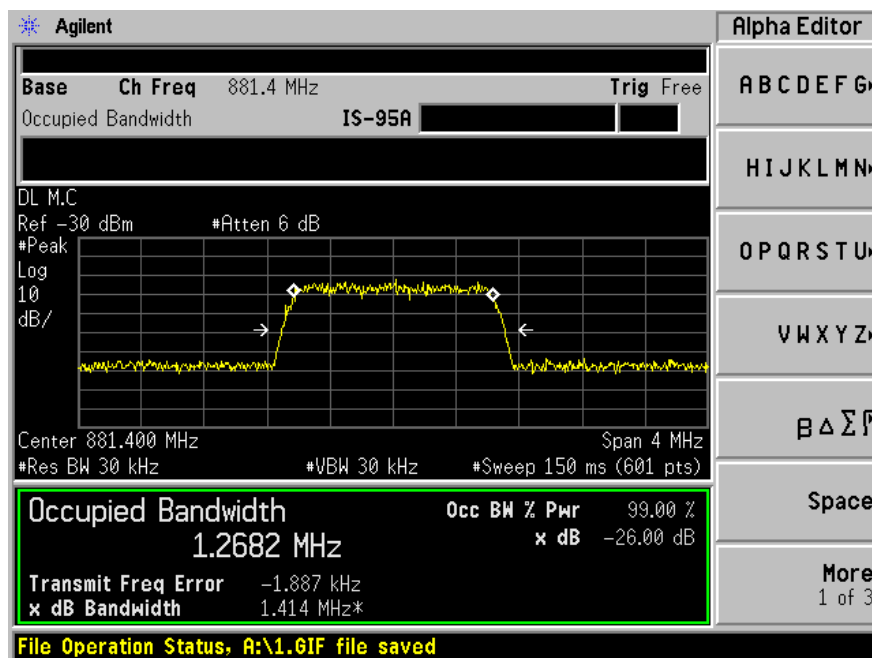
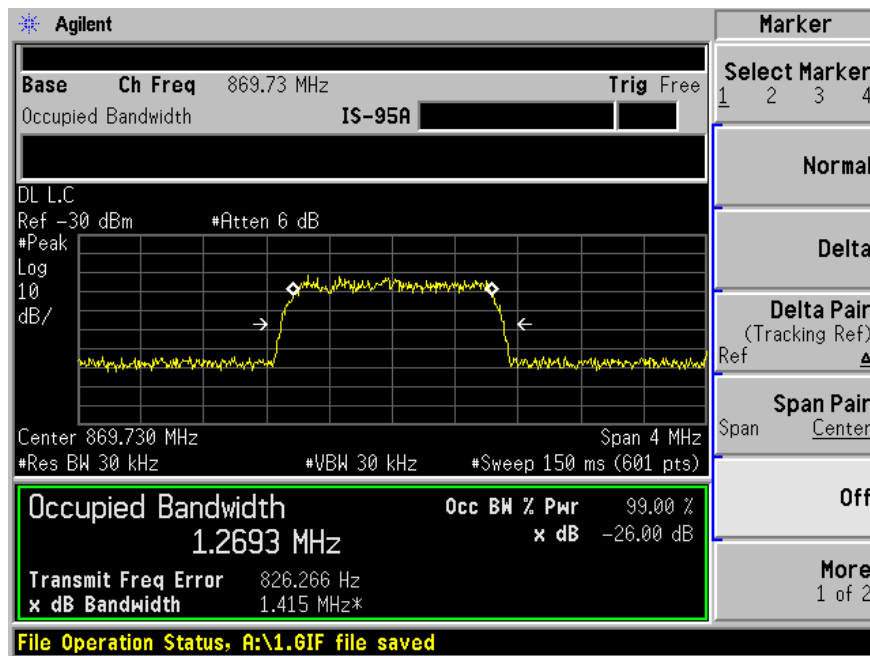
Test Results

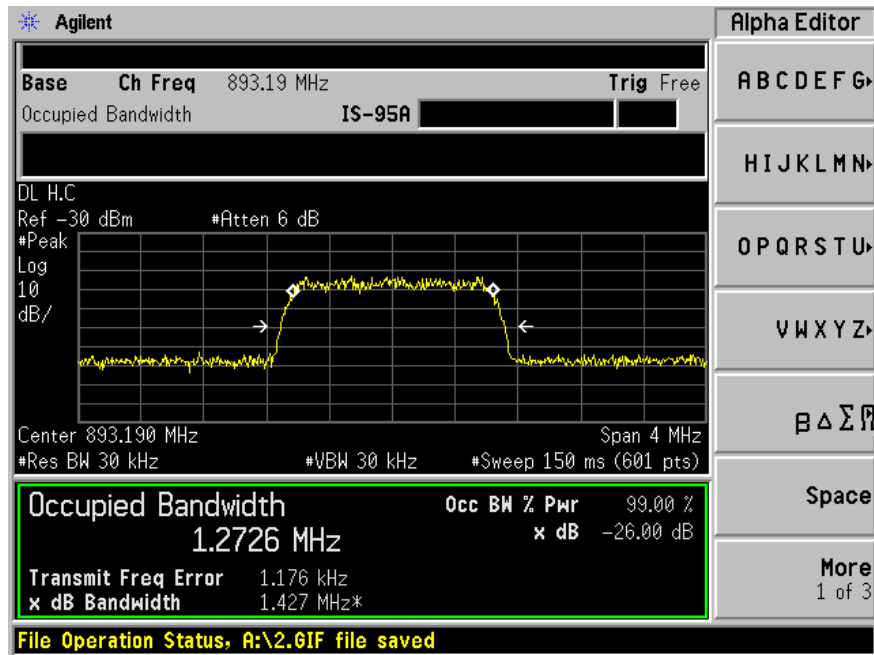
Input Signal Level = -50dBm

Modulation	Mode	Channel	Frequency in MHz	Emission Bandwidth in KHz
CDMA	Down-link	Low	869.73	1262.5
		Mid	881.40	1268.2
		High	893.19	1271.8
	Up-link	Low	824.73	1272.1
		Mid	836.40	1270.8
		High	848.19	1269.6
GSM	Down-link	Low	869.20	250.96
		Mid	881.60	250.11
		High	893.80	249.63
	Up-link	Low	824.20	250.87
		Mid	836.60	250.00
		High	848.80	250.91

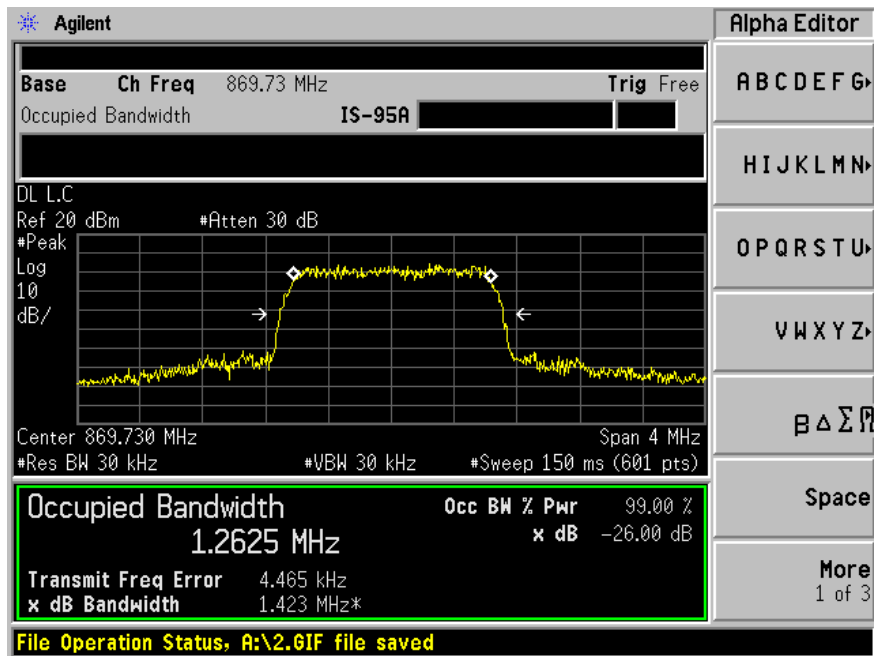
Please refer to the following plots.

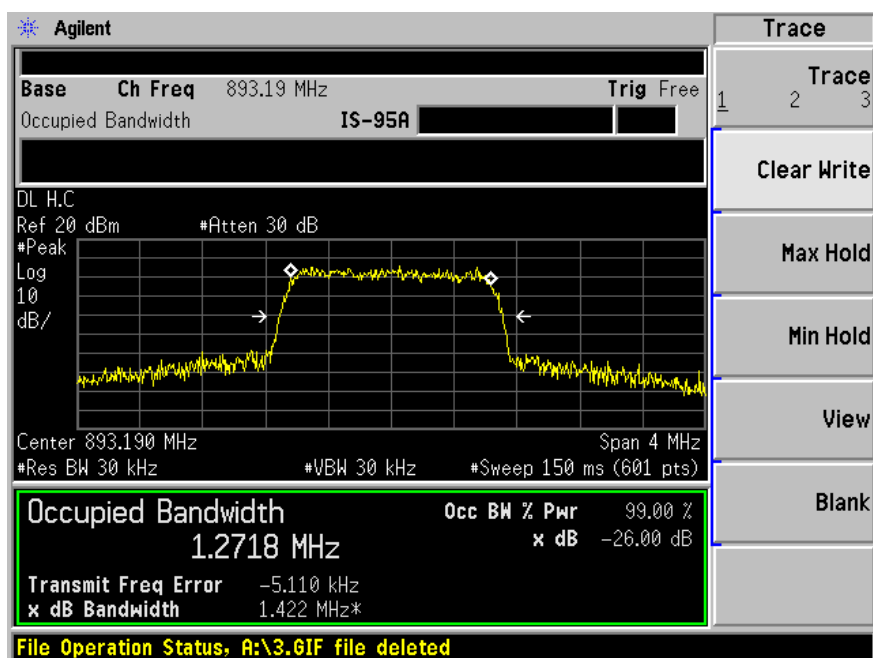
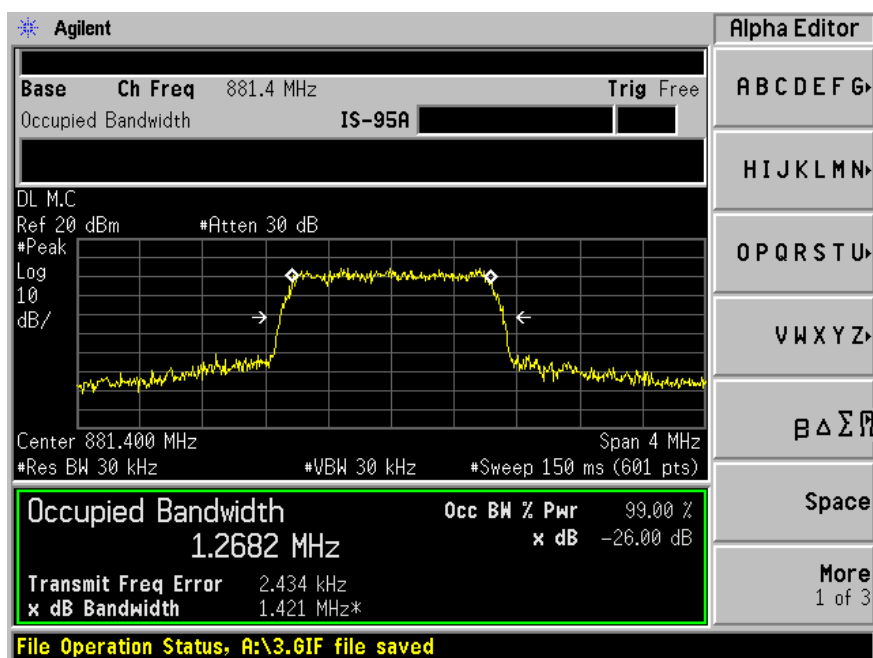
CDMA Downlink, IN



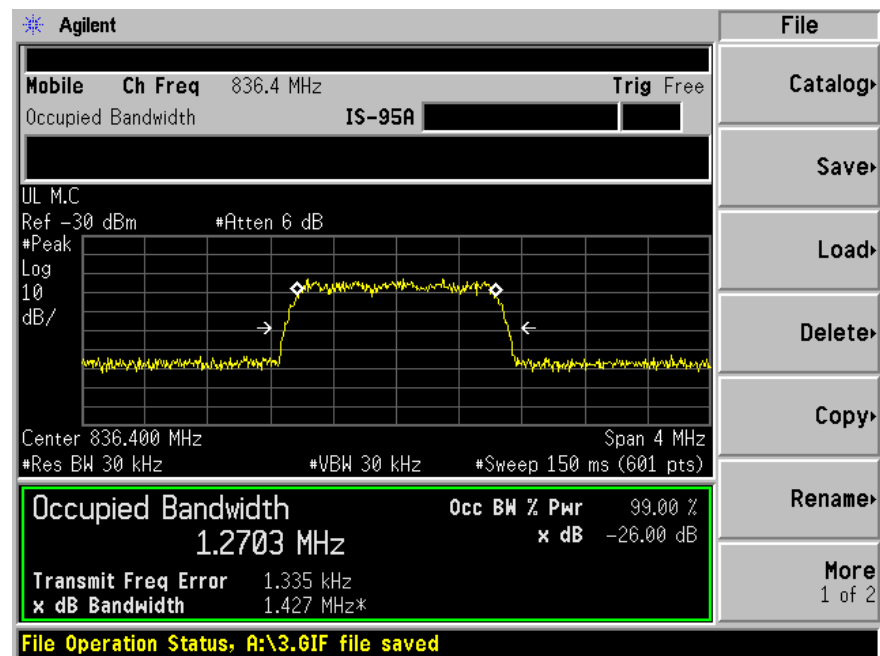
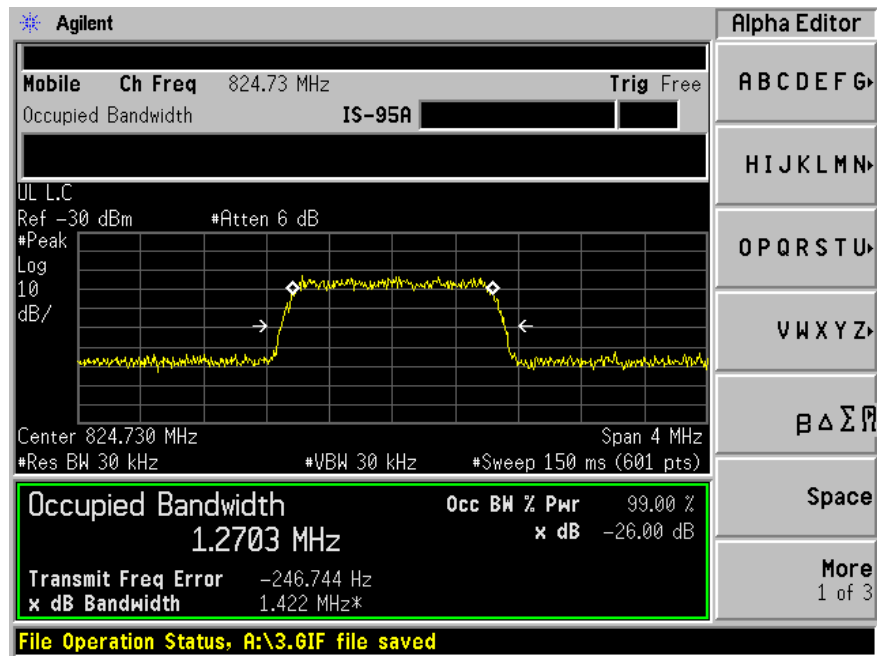


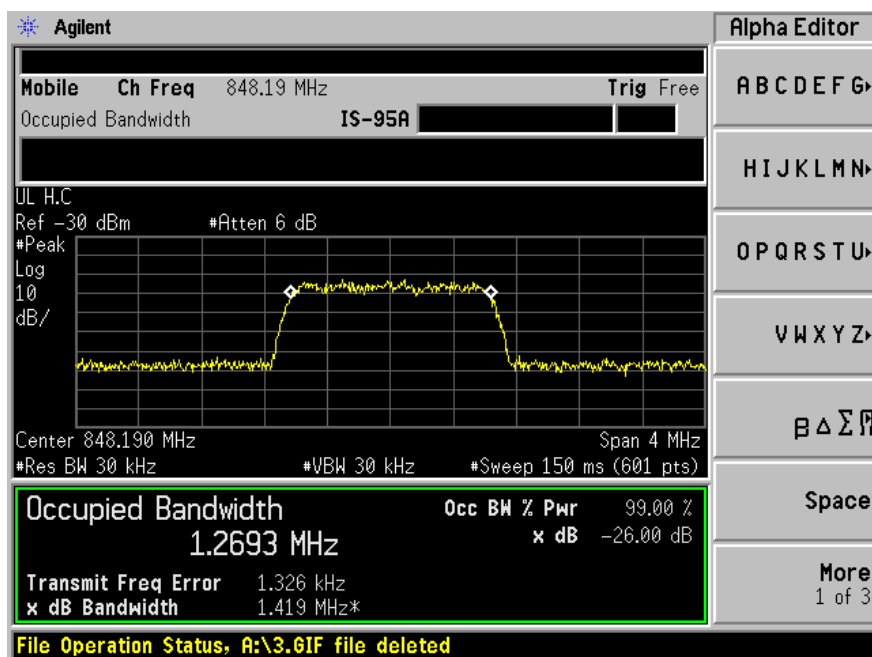
CDMA Downlink, OUT



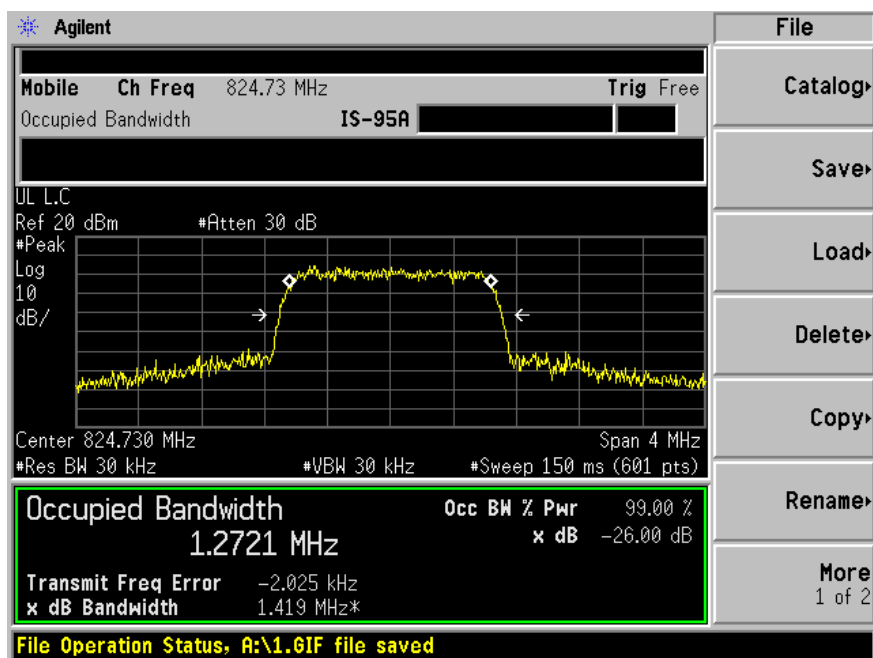


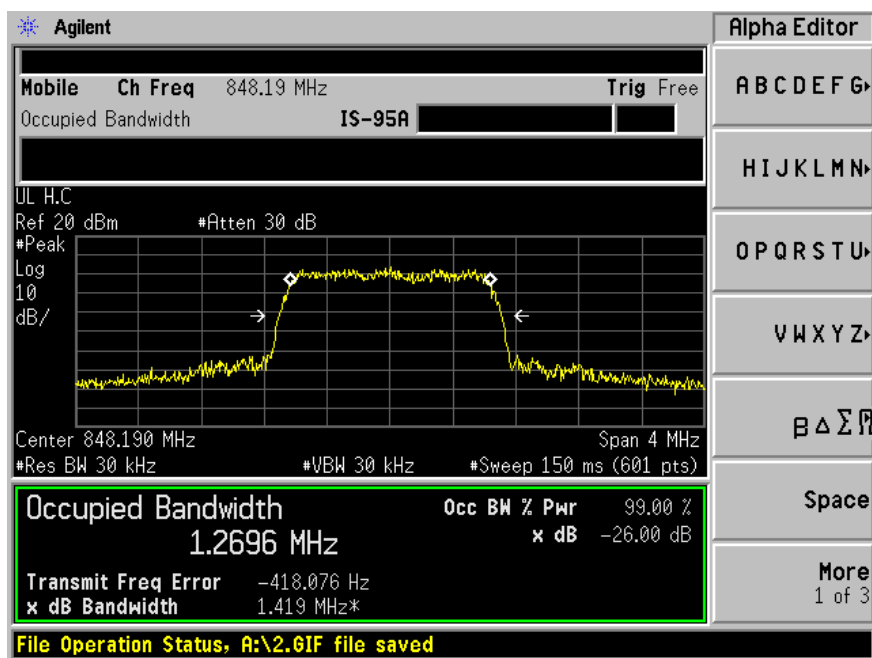
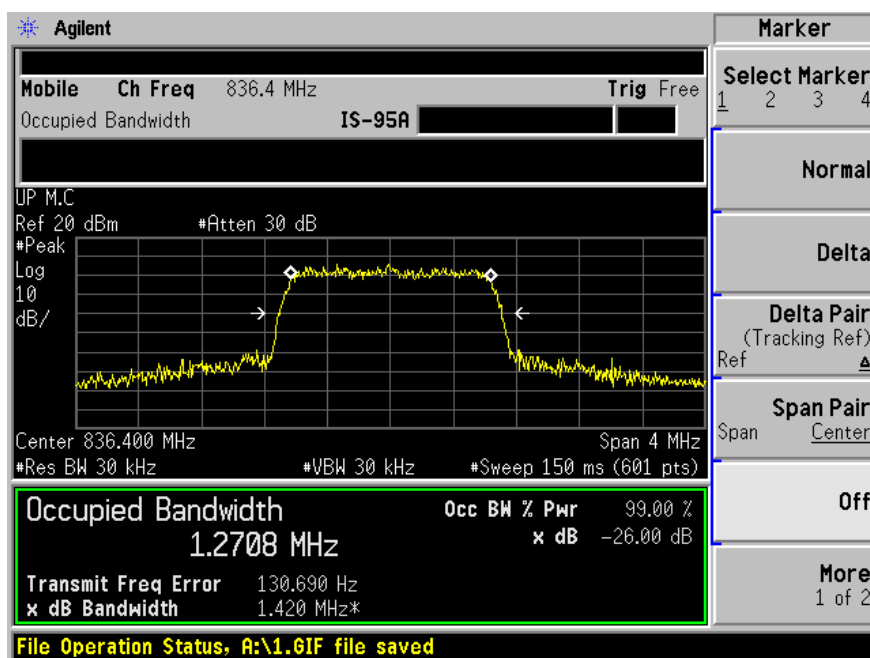
CDMA Uplink, IN



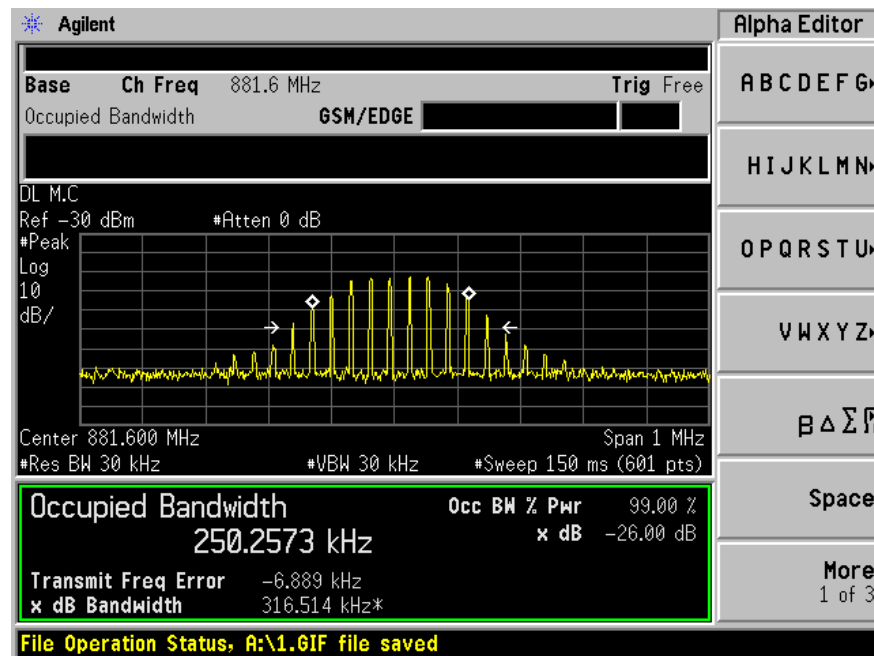
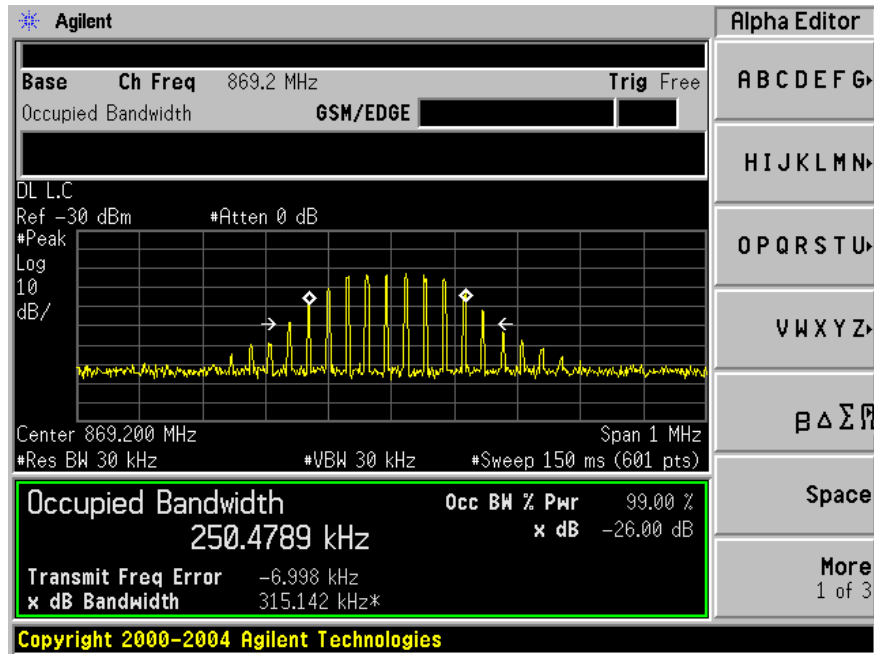


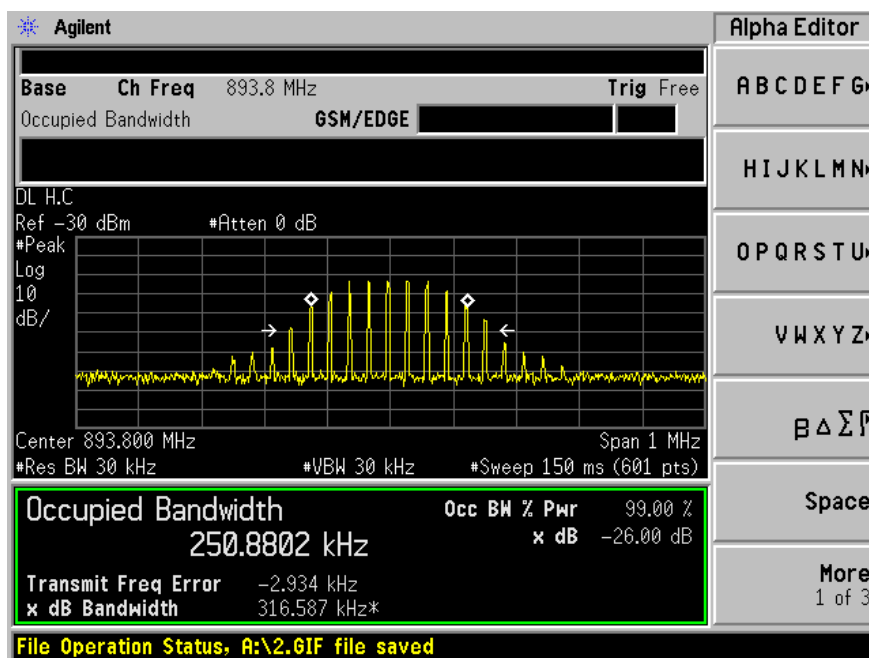
CDMA Uplink, OUT



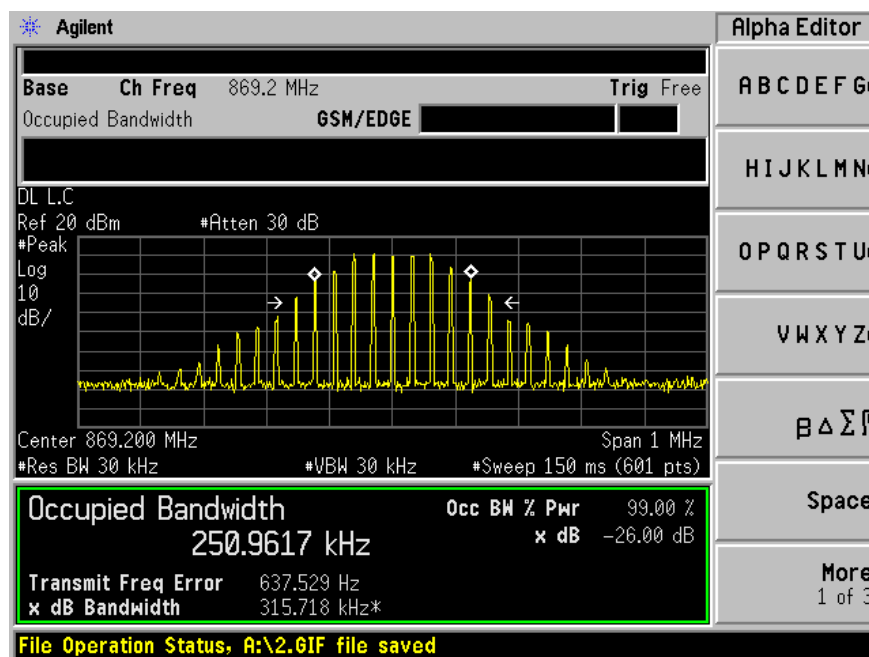


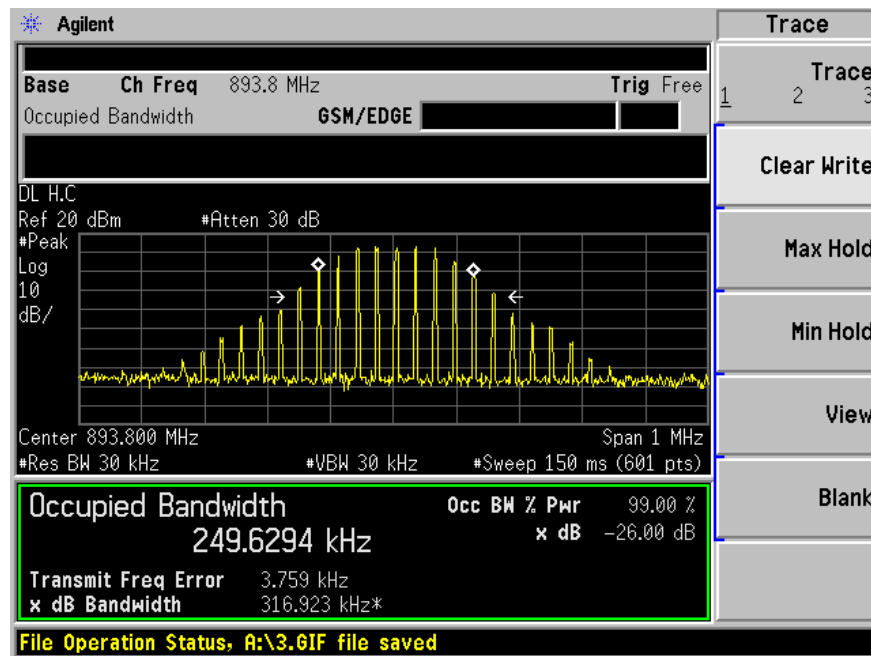
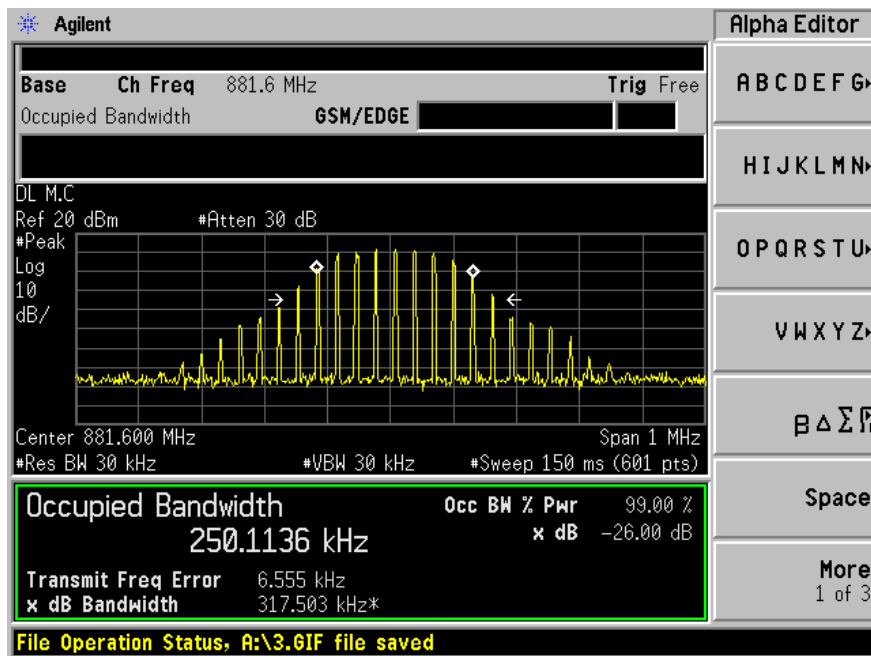
GSM Downlink, IN



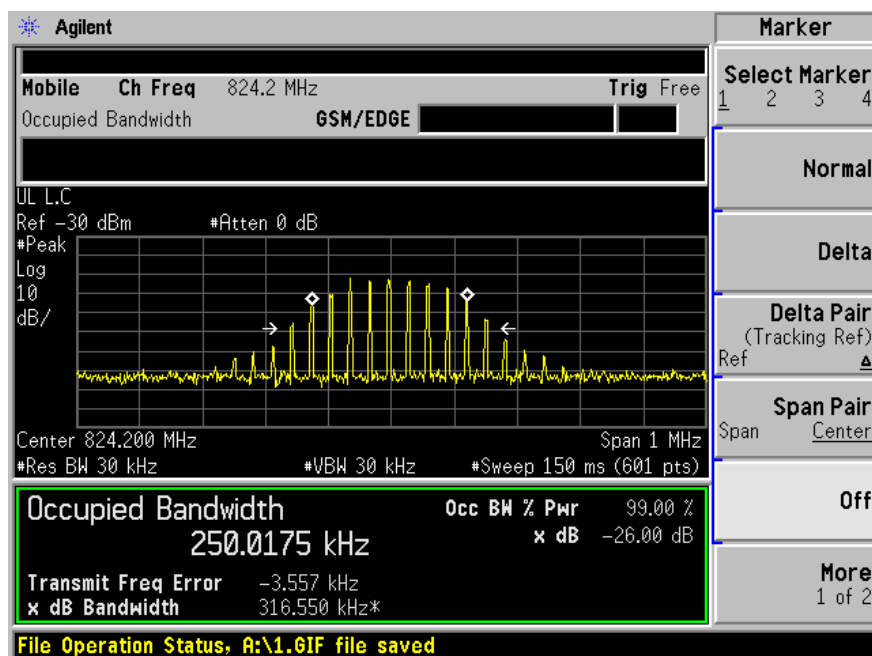
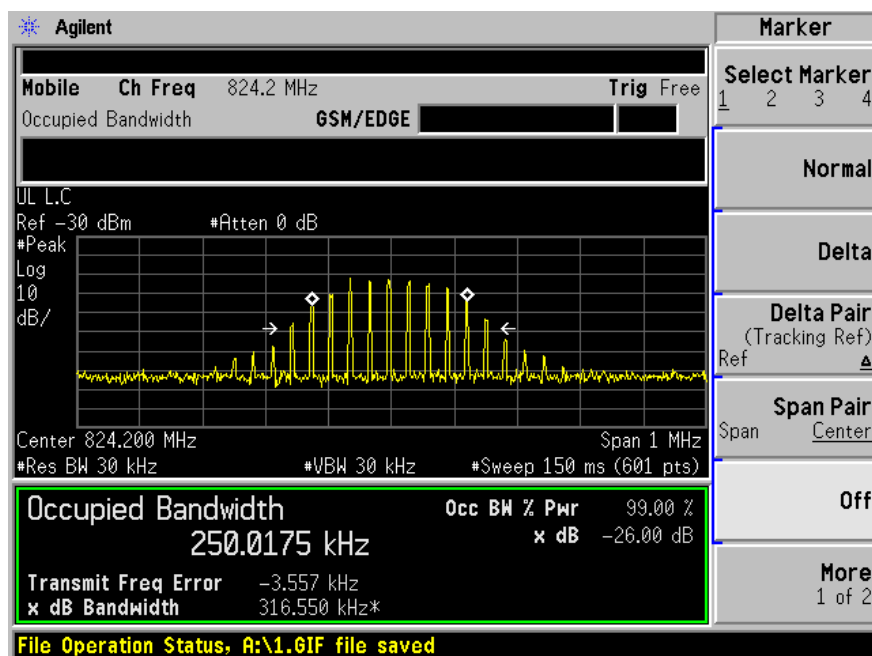


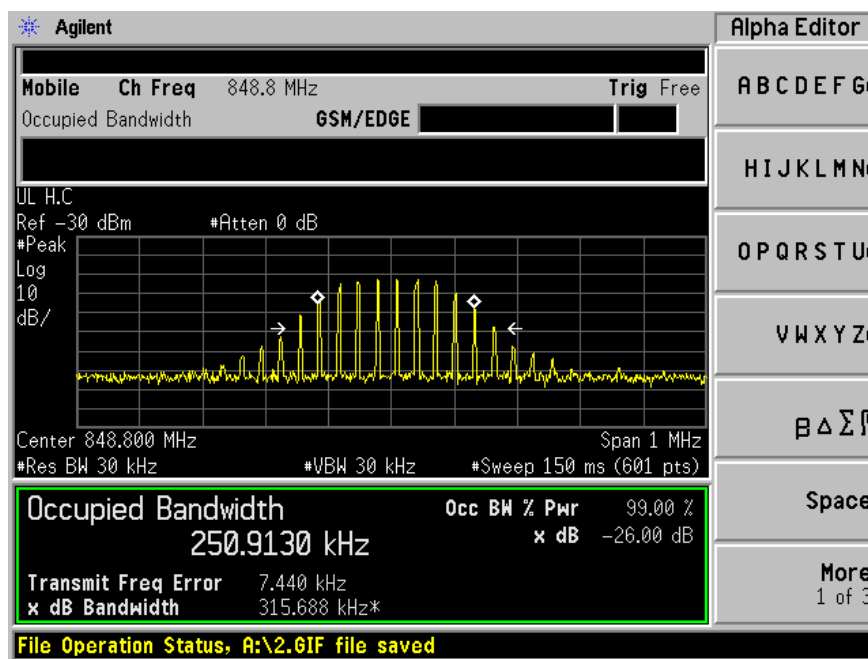
GSM Downlink, OUT



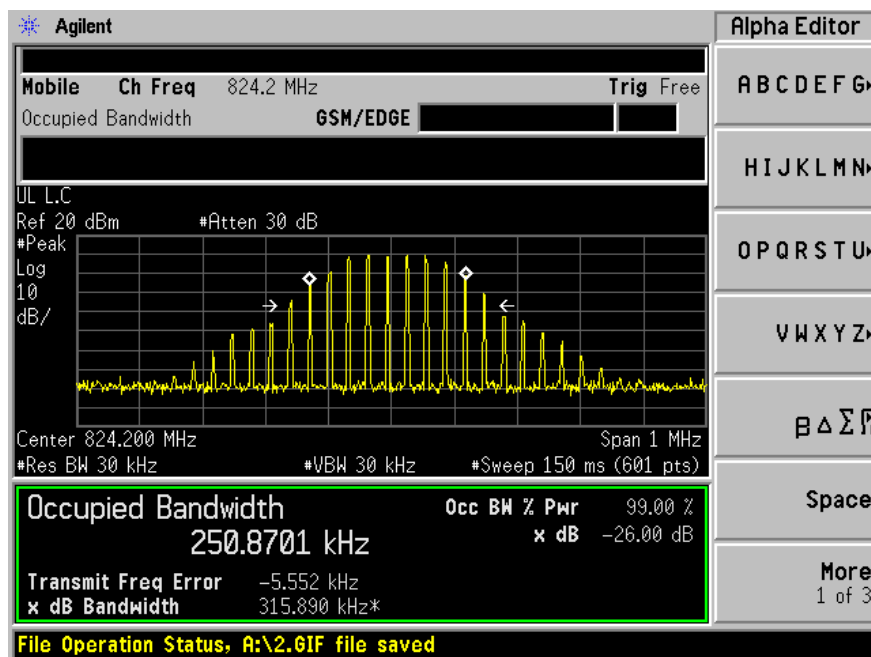


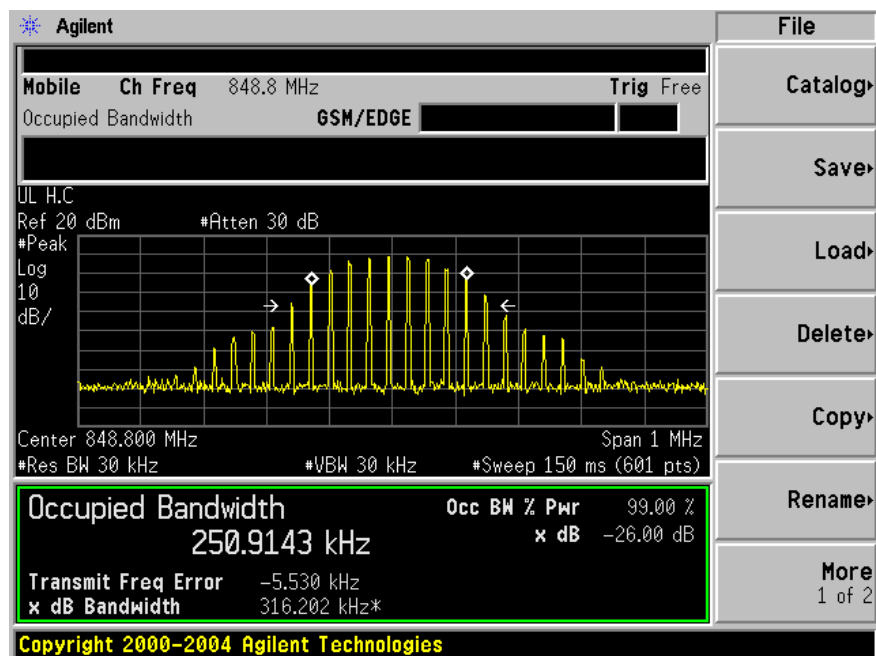
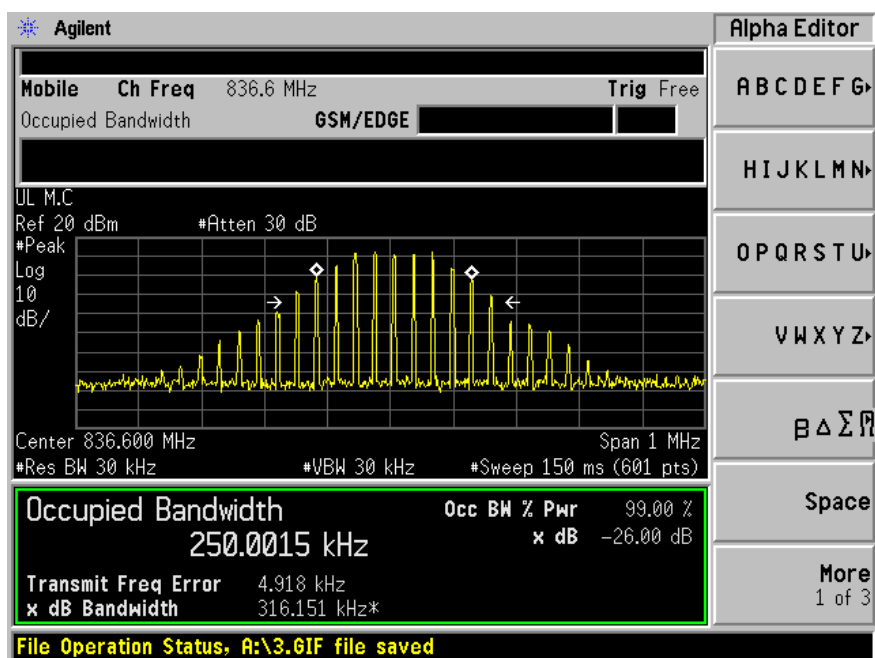
GSM Uplink, IN





GSM Uplink, OUT





§2.1051, §22.917 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

Requirements: CFR 47, § 2.1051, § 22.917.

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

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer 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.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

Environmental Conditions

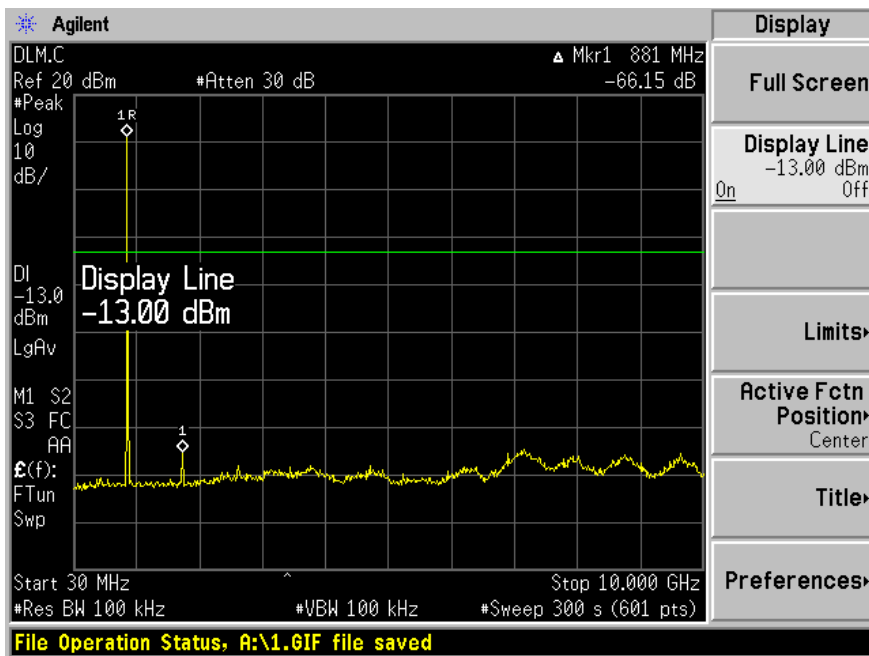
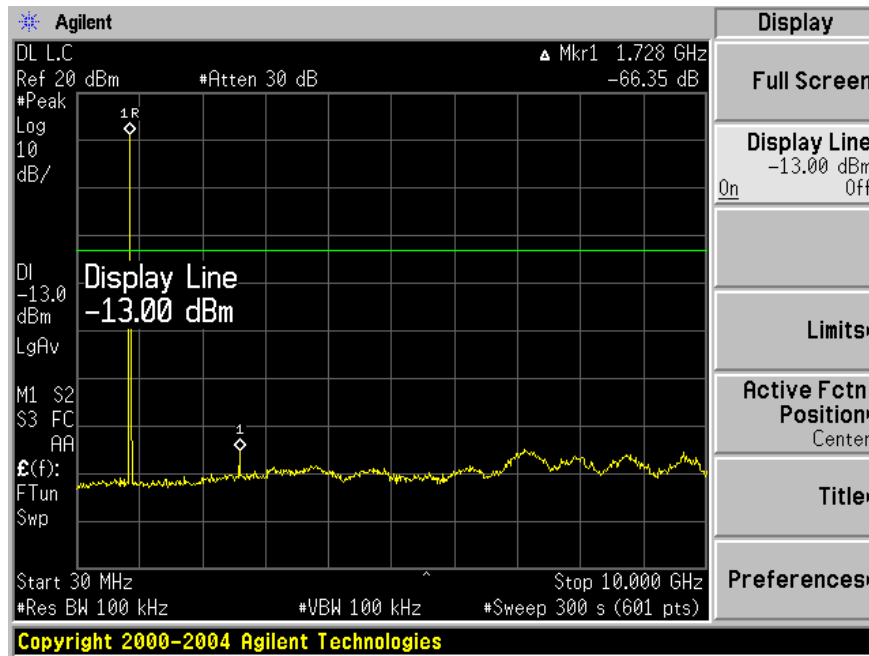
Temperature:	23° C
Relative Humidity:	40%
ATM Pressure:	1018 mbar

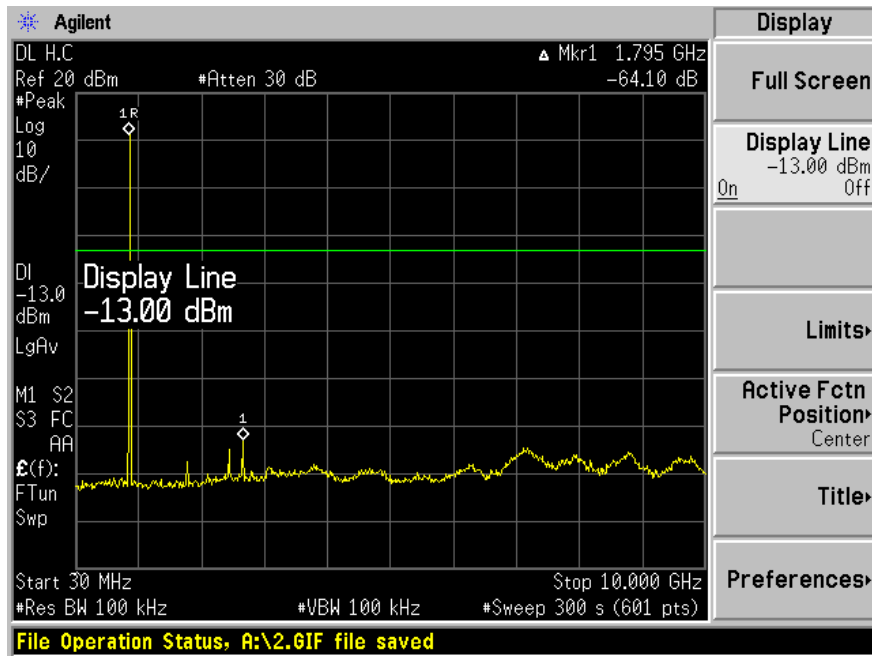
The testing was performed by Daniel Deng on 2005-06-28.

Test Results

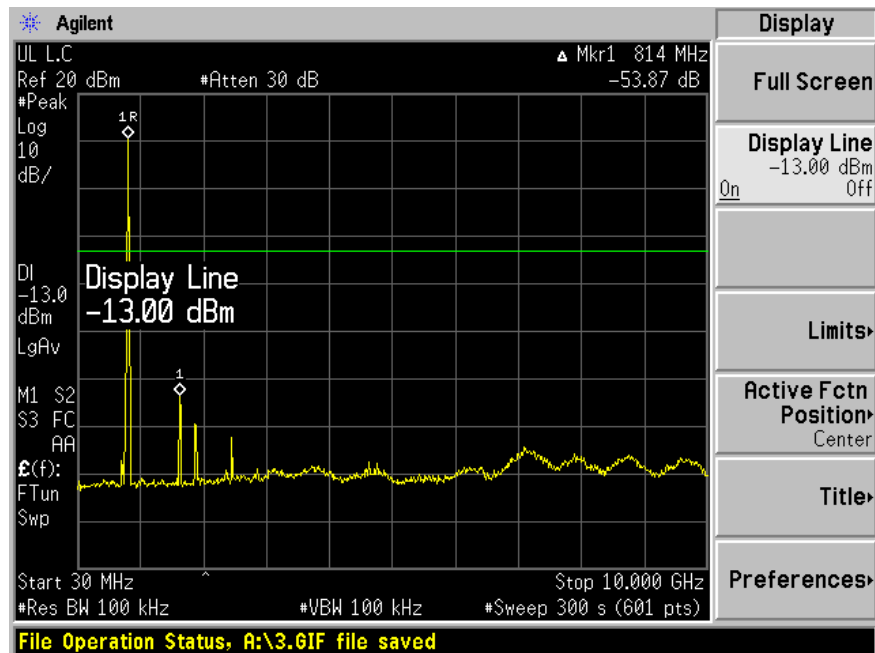
Please refer to the hereinafter plots.

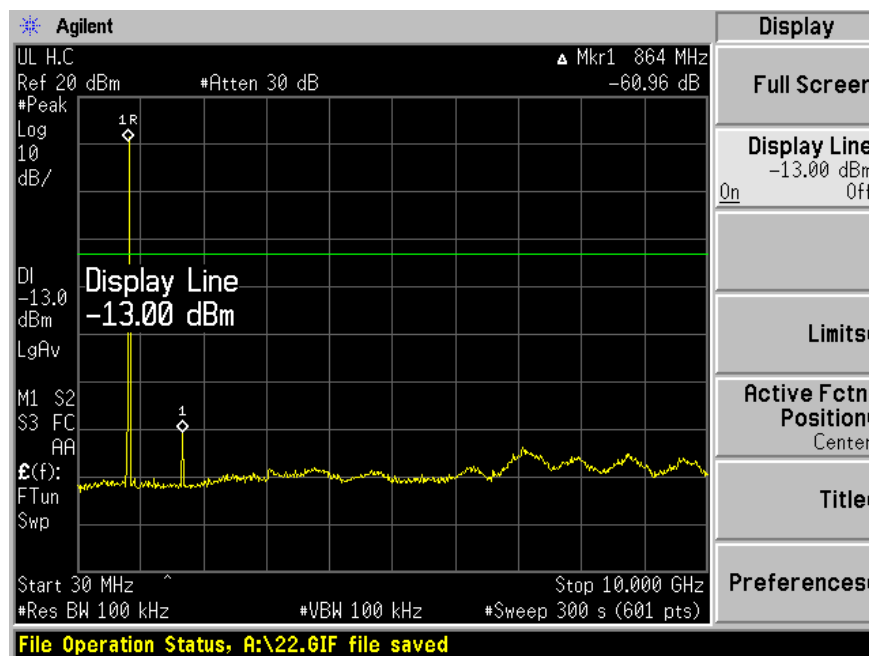
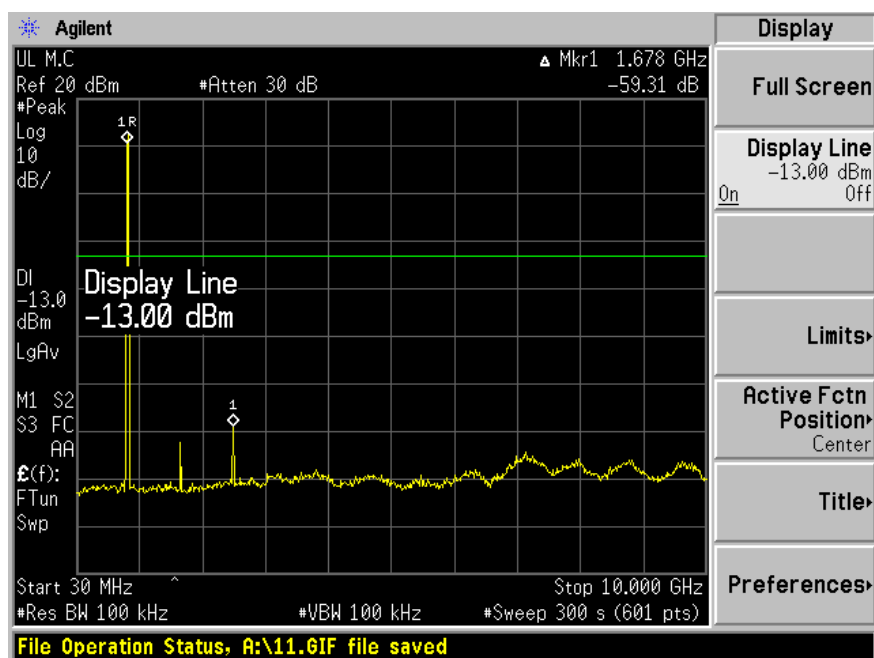
CDMA Downlink



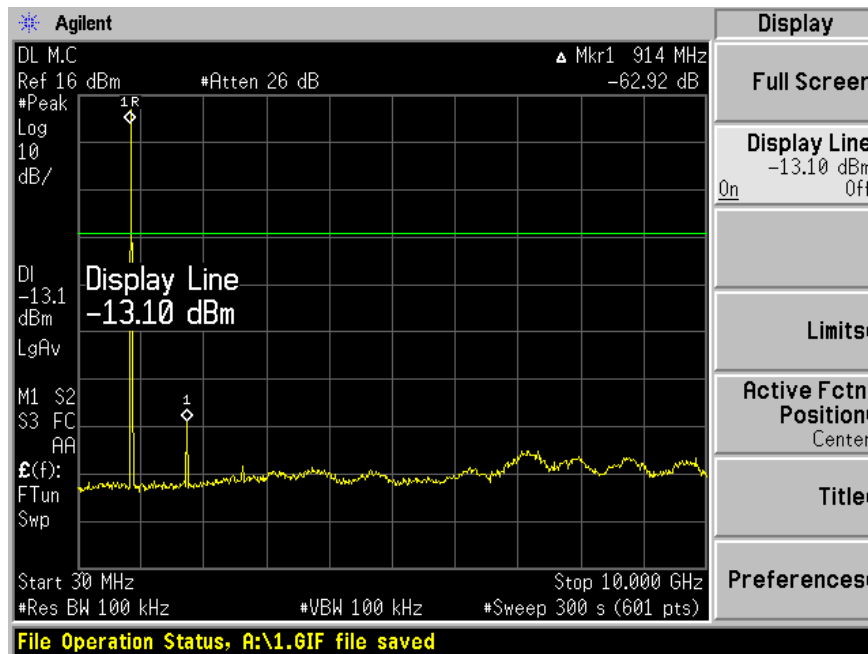
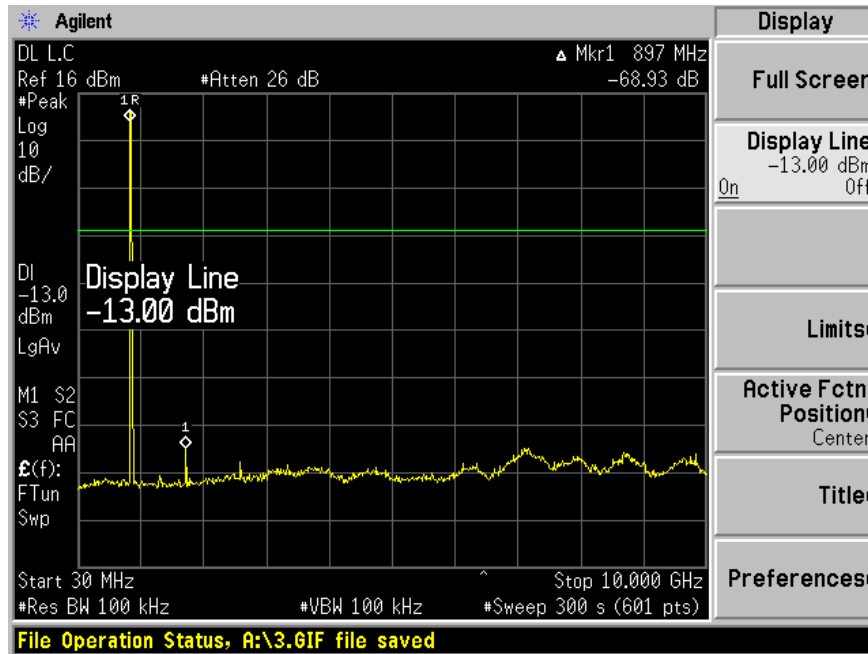


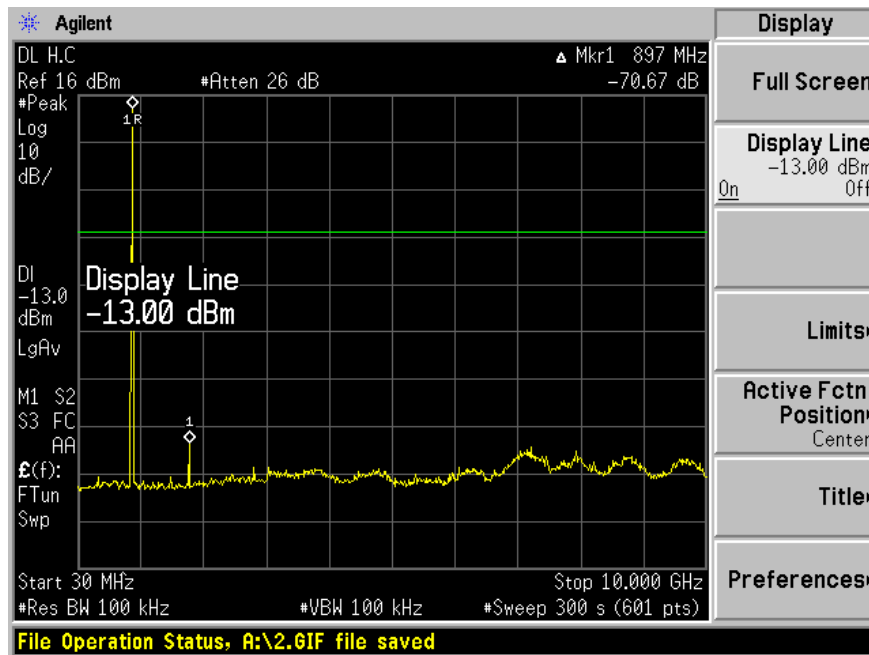
CDMA Uplink



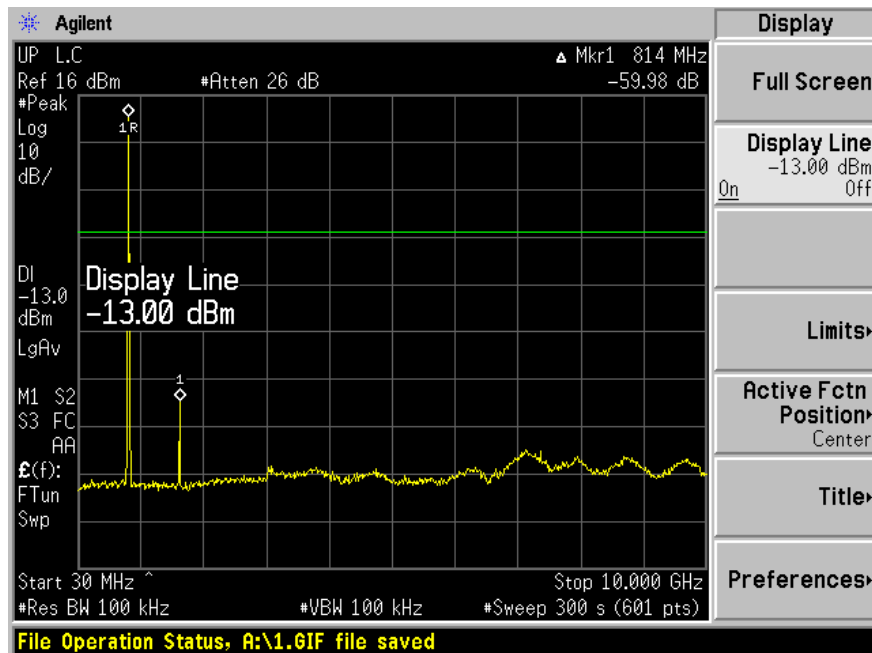


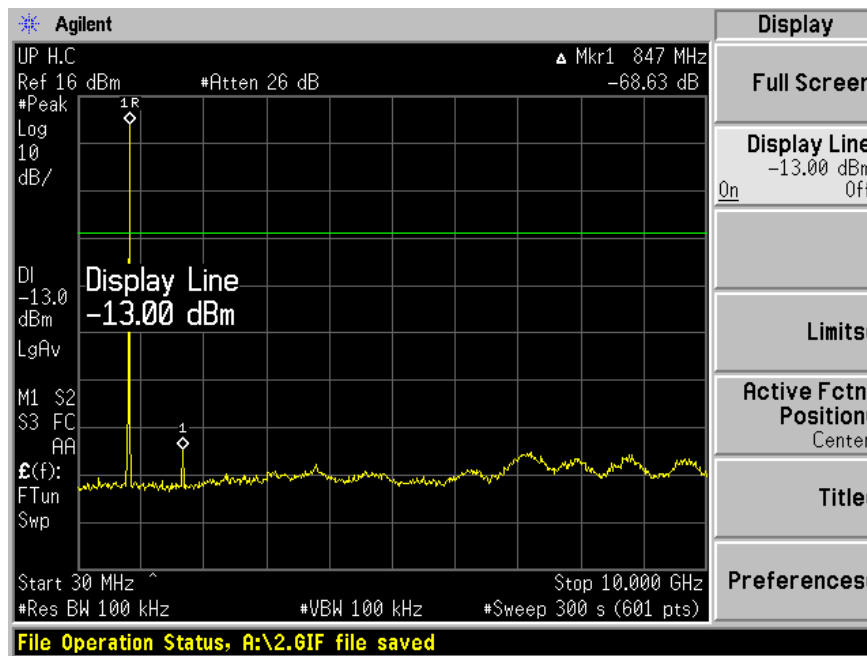
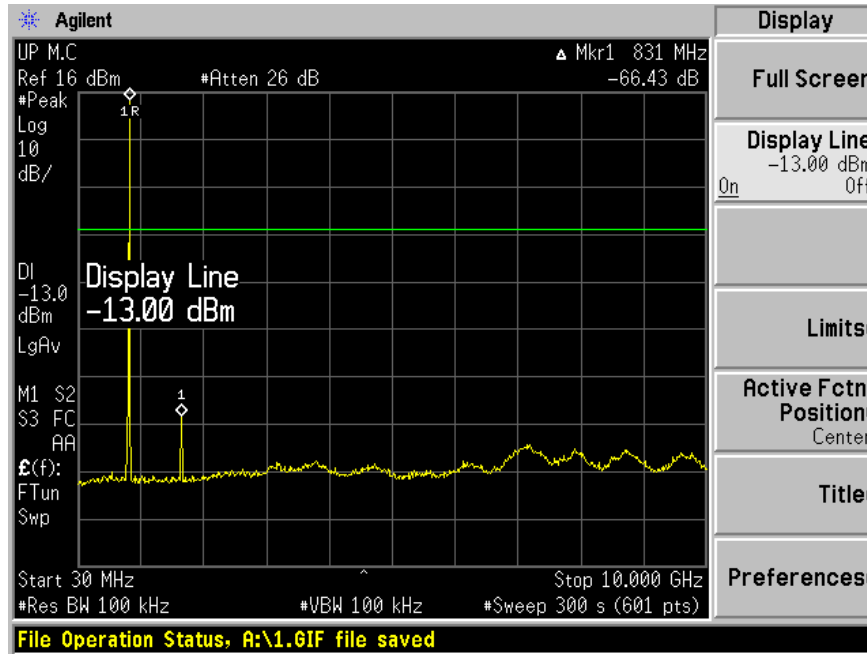
GSM Downlink





GSM Uplink





§22.917 – BAND EDGE

Applicable Standard

According to § 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.

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, RBW set to 30KHz.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Cal. Date
Rohde & Schwarz	Generator, Signal	SMIQ03	849192/0085	5/2/2005
Rohde & Schwarz	I/O Modulation	AMIQ-K11	831038/0023	5/3/2005
Agilent	Analyzer, Spectrum	E4446A	US44300386	11/10/2004

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

Environmental Conditions

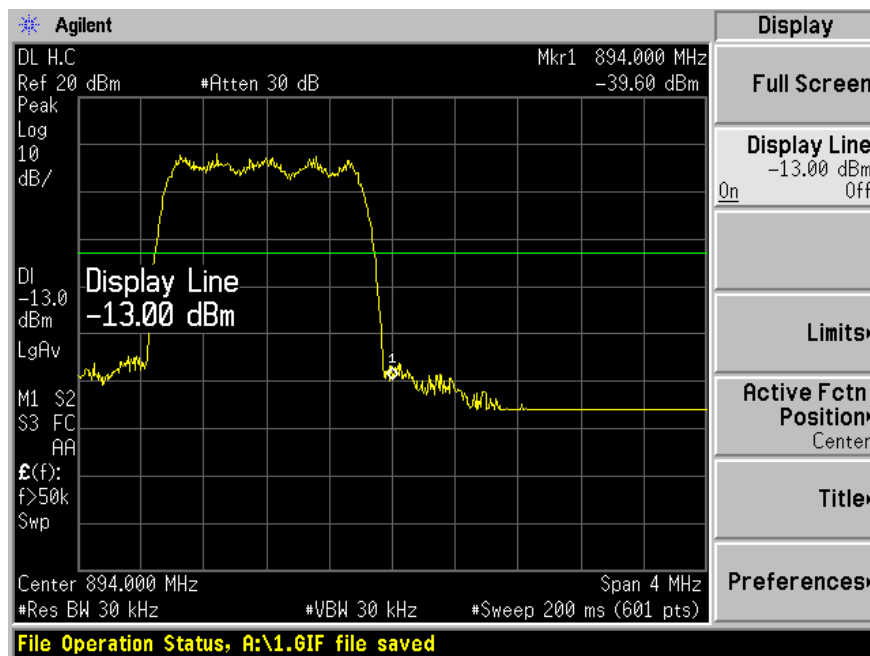
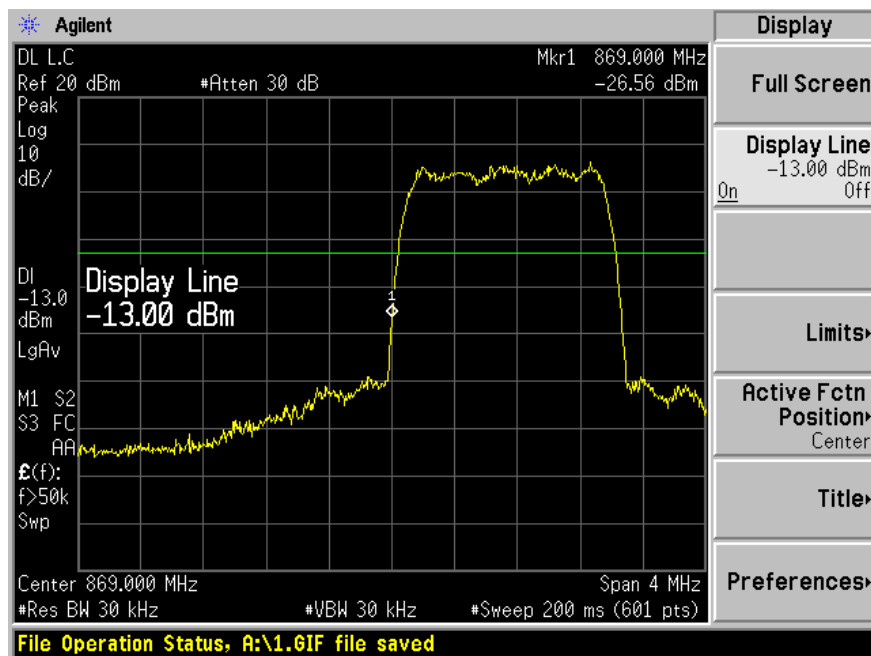
Temperature:	23° C
Relative Humidity:	40%
ATM Pressure:	1018 mbar

The testing was performed by Daniel Deng on 2005-06-28.

Test Results

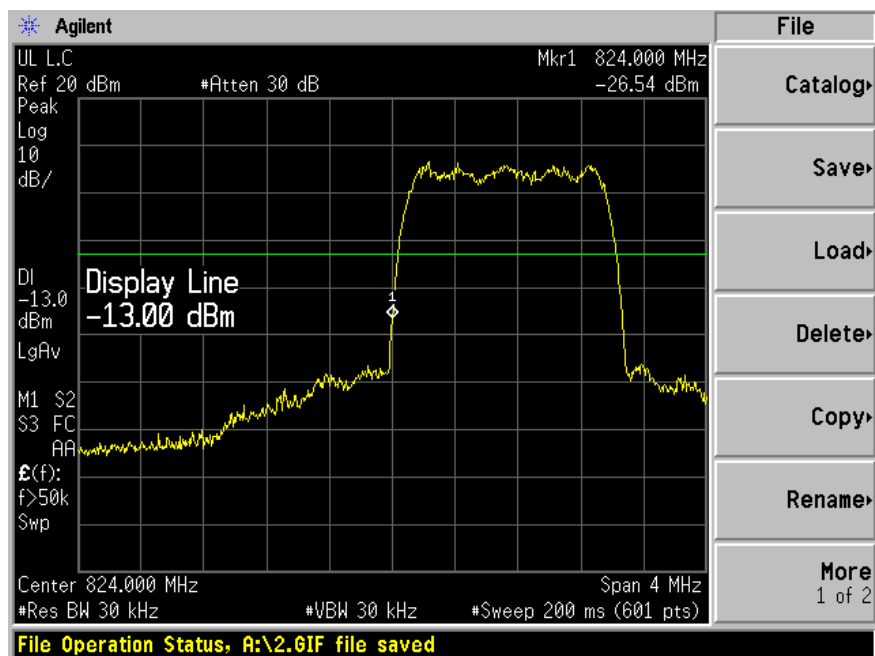
Please refer to the following plots.

Low channel

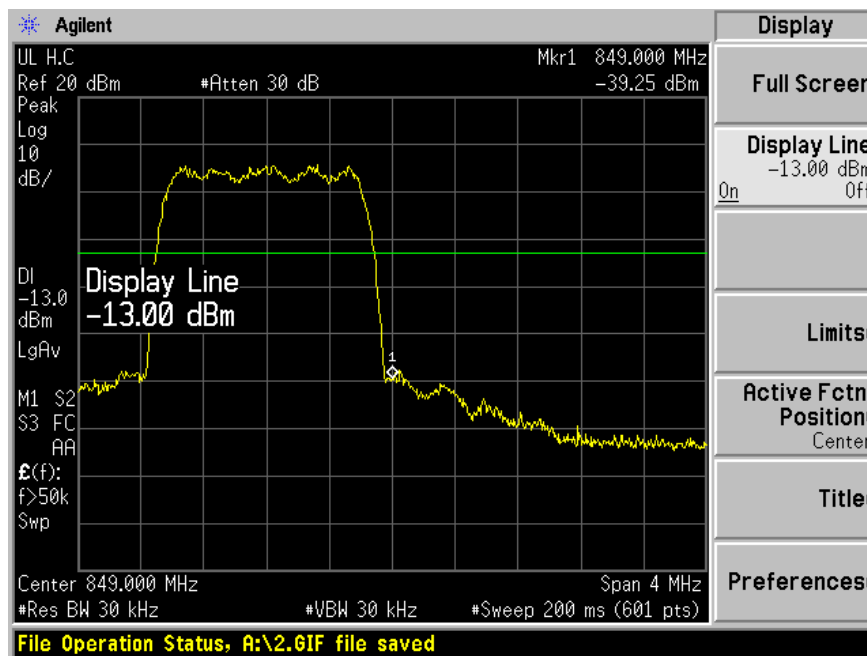


CDMA Uplink

Low channel

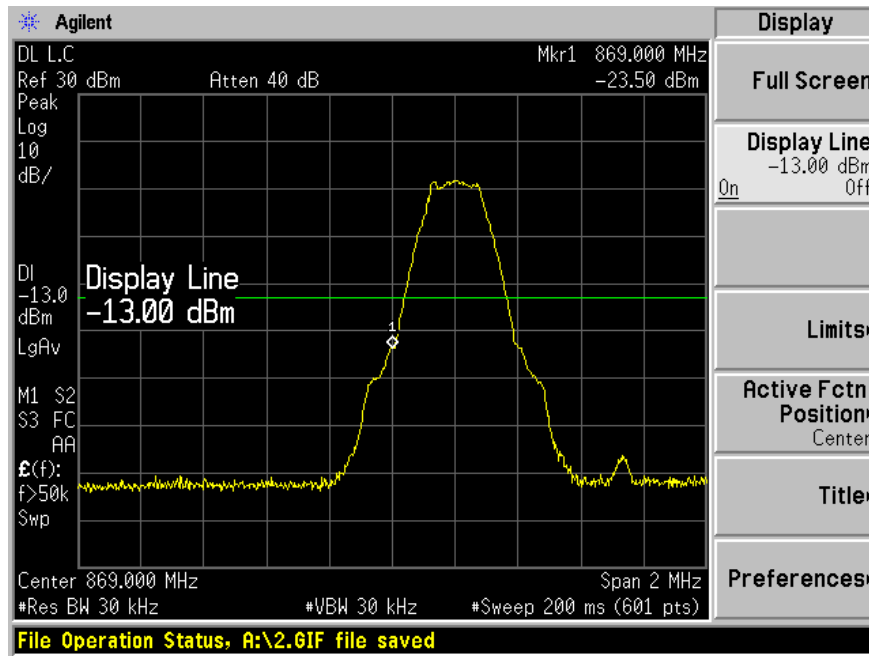


High Channel

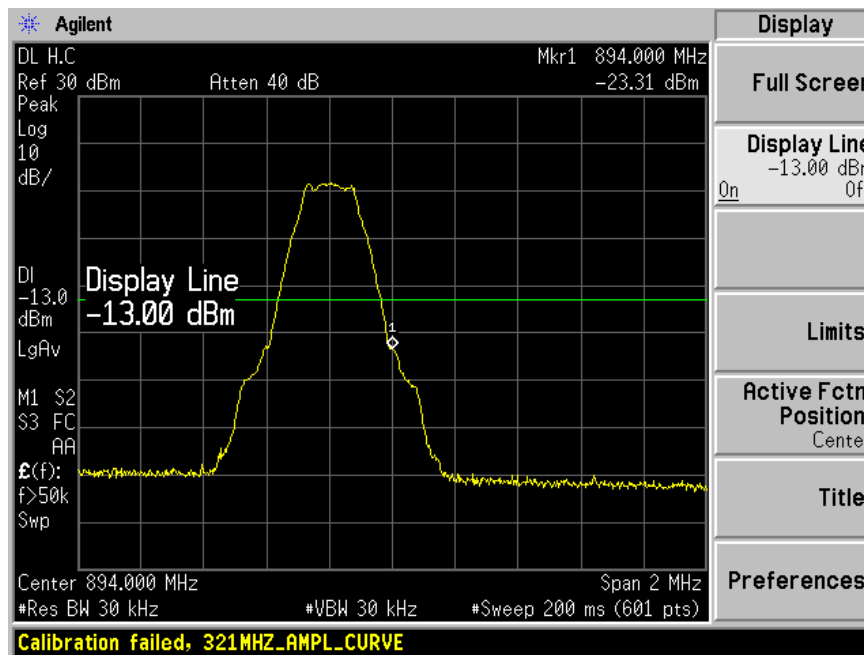


GSM Downlink

Low Channel

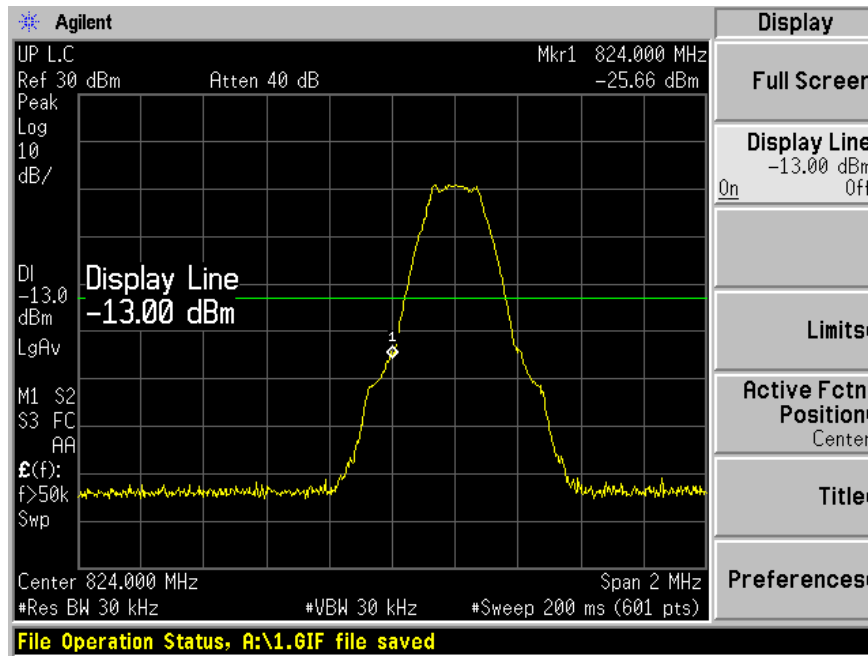


High Channel



GSM Uplink

Low channel



High Channel

