SL9090

Test Report

FOR

FCC and IC Certifications

IC: 2417C-SL9090
FCC ID: N7NSL9090

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1 Introduction and Purpose

This document provides test data for the SL9090 modem intended for FCC and Industry Canada certifications. The tests included in this report are limited to all conducted tests required. The radiated tests were performed at an external test facility.

2 Test Summary

FCC Rule	IC Standards	DESCRIPTION OF TEST	RESULT	PAGE
2.1046	RSS-132, 4.4 Issue 2 RSS-133, 6.4 Issue 5	RF Power Output	Complies	5
2.1049	RSS-Gen, 4.6 Issue 2	Occupied Bandwidth	Complies	6
2.1051, 22.901(d) 22.917, 24.238(a)	RSS-132, 4.5 Issue 2 RSS-133, 6.5 Issue 5	Out of Band Emissions at Antenna Terminals and Block Edge Compliance	Complies	26
2.1053	RSS-132, 4.5 Issue 2 RSS-133, 6.5 Issue 5	Field Strength of Spurious Radiation	Complies	See SGS Report
2.1055	RSS-132, 4.3 Issue 2 RSS-133, 6.3 Issue 5	Frequency Stability versus Temperature	Complies	7128
2.1055	RSS-132, 4.3 Issue 2 RSS-133, 6.3 Issue 5	Frequency Stability versus Voltage	Complies	73

3 Description of Equipment under Test

The SL9090 modem, referred to as “EUT” hereafter, is a multi-band wireless modem operating on the CDMA2000/ EVDO networks. EUT support 850MHz and 1900MHz, so this test report only contains data for these two bands (850MHz and 1900MHz).

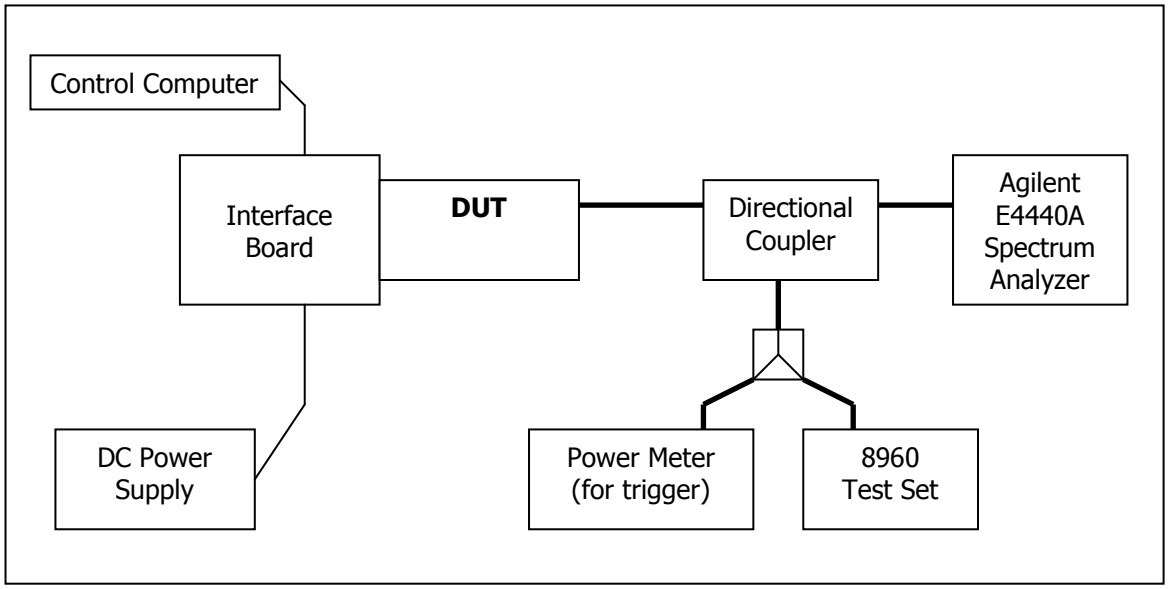
4 RF Power Output

FCC 2.1046

4.1 Test Procedure

The transmitter output was connected to an Agilent 8960 Test Set and configured to operate at maximum power in a call. The power was measured using the spectrum analyzer at three equally spaced operating frequencies for each band. The RBW was set to 1230 KHz for the CDMA2000 and EVDO measurements. The spectrum analyzer was set to measure the RF output power with the cable and coupler losses accounted for.

Test Setup



4.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
Control Computer	TC	Generic PC	100488	N/A
Wireless Test Set	Agilent	8960	MY50260409	2011-09-05
Spectrum Analyzer	Agilent	E4440A	MY48250234	2011-09-22
DC Power Supply	HP	66311B	MY43006721	2011-10-13
Interface Board	Shop built		N/A	N/A
Directional Coupler	Krytar	152010	111269	N/A

4.3 Test Results Cellular band

EUT Mode	Frequency (MHz)	CH	RMS Power (dBm)	Peak Power (dBm)
CDMA 2000	824.70	1013	23.98	24.19
	836.52	384	23.89	24.02
	848.31	777	23.82	23.96
EVDO	824.70	1013	24.24	24.34
	836.52	384	24.05	24.20
	848.31	777	24.09	24.23

4.4 Test Results PCS band

EUT Mode	Frequency (MHz)	CH	RMS Power (dBm)	Peak Power (dBm)
CDMA 2000	1851.25	25	24.13	24.37
	1880	600	24.04	24.28
	1908.75	1175	24.09	24.42
EVDO	1851.25	25	24.33	24.49
	1880	600	24.35	24.51
	19.8.75	1175	24.30	24.47

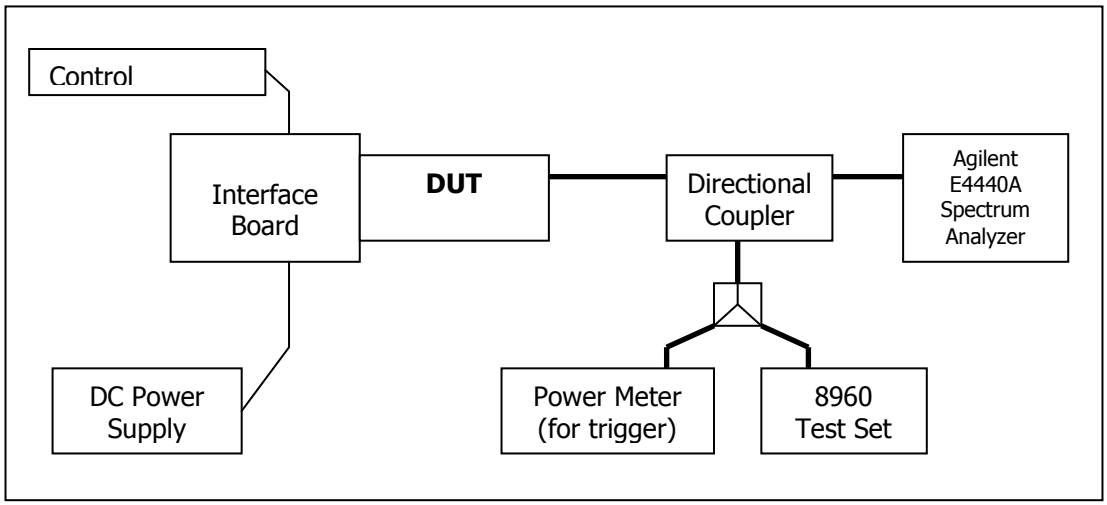
5 Occupied Bandwidth

FCC 2.1049

5.1 Test Procedure

The transmitter output was connected to a spectrum analyzer through a calibrated coaxial cable and a coupler. The occupied bandwidth (defined as the 99% Power Bandwidth) was measured with the spectrum analyzer at low, middle, and high frequencies in each band. The –26dB display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

Test Setup



5.2 Test Equipment

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE
Control Computer	TC	Generic PC	100488	N/A
Wireless Test Set	Agilent	8960	MY50260409	2011-09-05
Spectrum Analyzer	Agilent	E4440A	MY48250234	2011-09-22
DC Power Supply	HP	66311B	MY43006721	2011-10-13
Interface Board	Shop built		N/A	N/A
Directional Coupler	Krytar	152010	111269	N/A

5.3 Test Results

The performance of the CDMA2000 850 MHz Cellular band is shown in plots 5.3.1 to 5.3.3.
Performance of the CDMA2000 1900 MHz PCS band is shown in plots 5.3.4 to 5.3.6.
Performance of the EVDO 850 Cellular band is shown in plots 5.3.7 to 5.3.9.
Performance of the EVDO 1900 PCS band is shown in plots 5.3.10 to 5.3.12.

5.3.1 CDMA Results

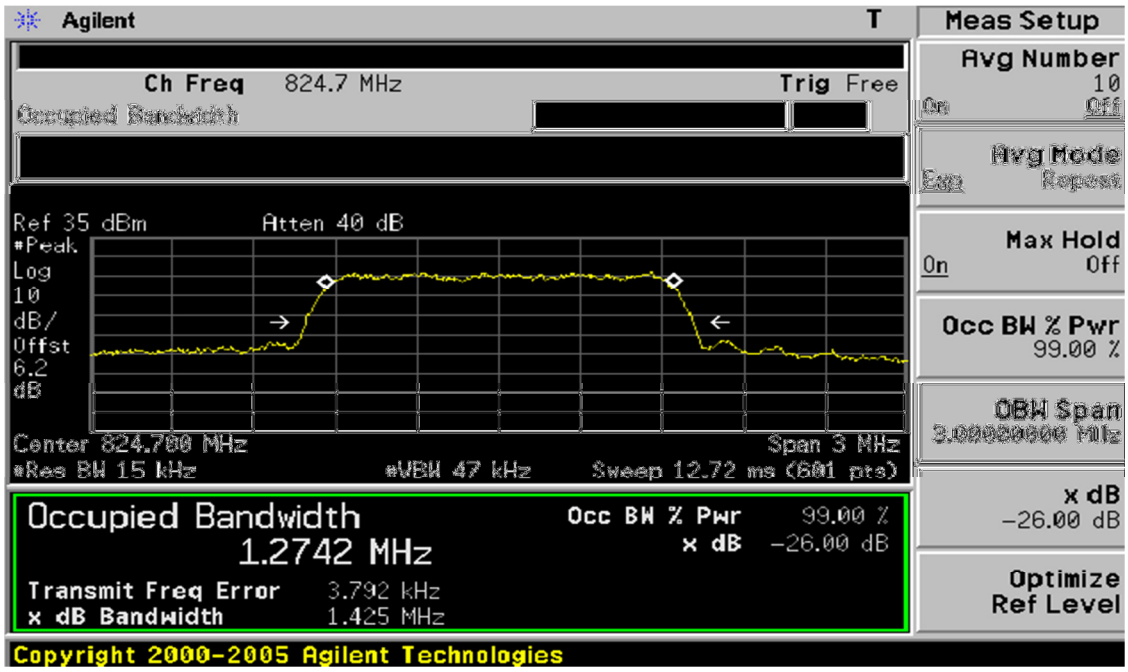
Frequency (MHz)	Channel	99% Occupied Bandwidth (kHz)
824.70	1013	1.2742
836.52	384	1.2781
848.31	777	1.2755
1851.25	25	1.2829
1880.0	600	1.2810
1908.75	1175	1.2817

5.3.2 EVDO Results

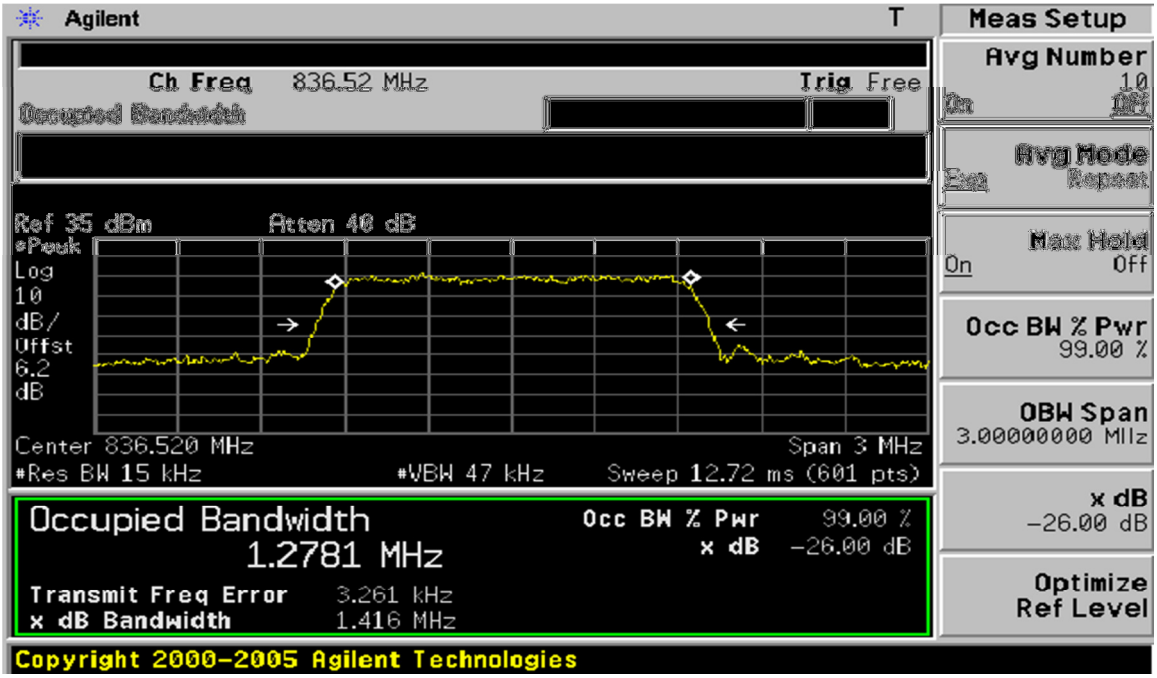
Frequency (MHz)	Channel	99% Occupied Bandwidth (MHz)
824.70	1013	1.2732
836.52	384	1.2729
848.31	777	1.2744
1851.25	25	1.2894
1880.0	600	1.2815
1908.75	1175	1.2860

5.4 Test Plots

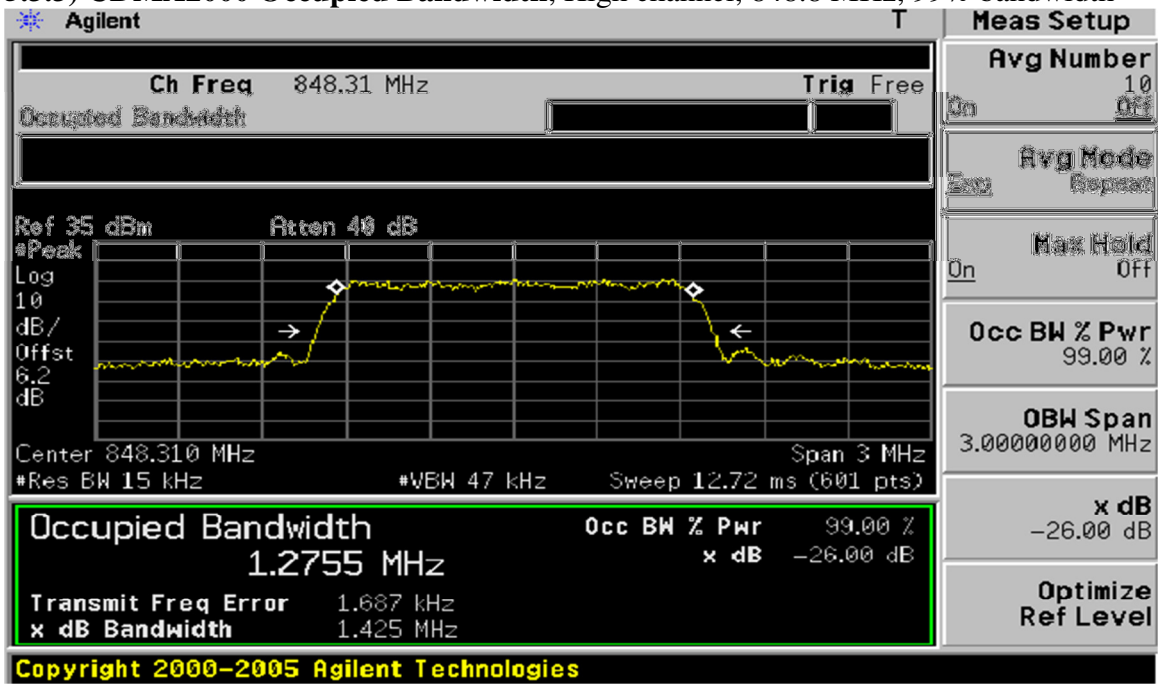
5.3.1) CDMA2000 Occupied Bandwidth, Cellular Low channel, 824.2 MHz, 99% BW



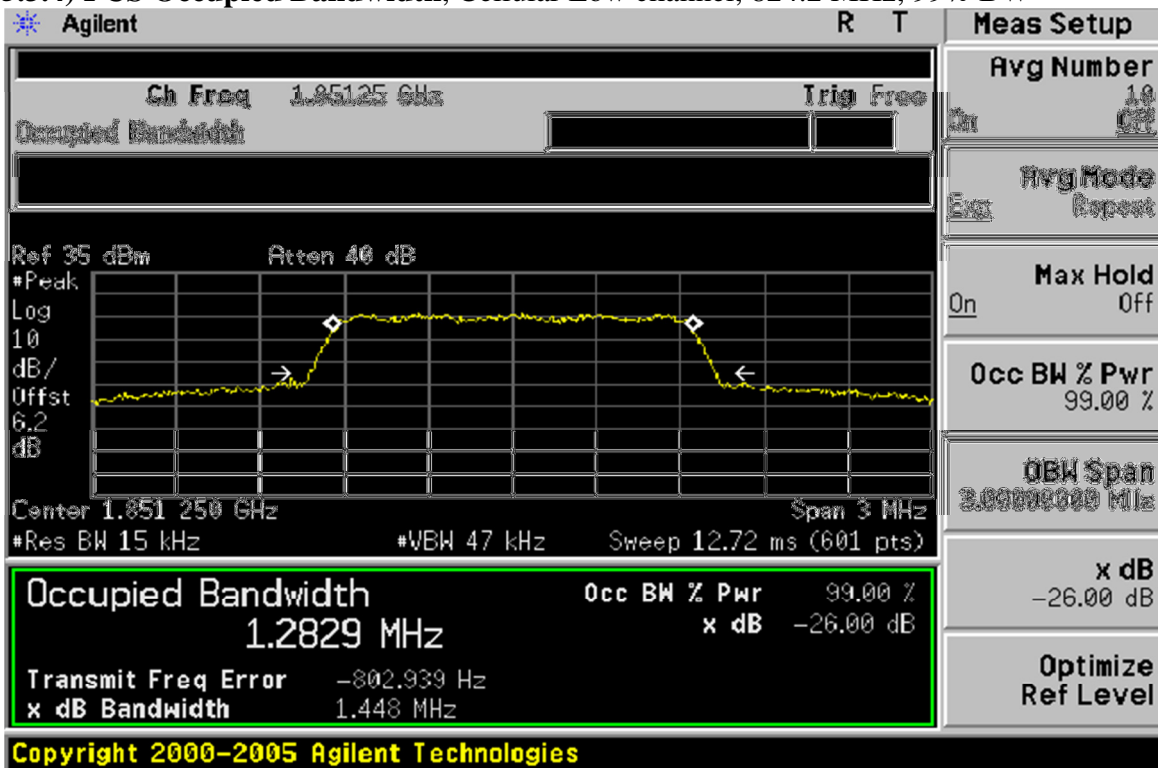
5.3.2) CDMA2000 Occupied Bandwidth, Middle channel, 836.6 MHz, 99% bandwidth



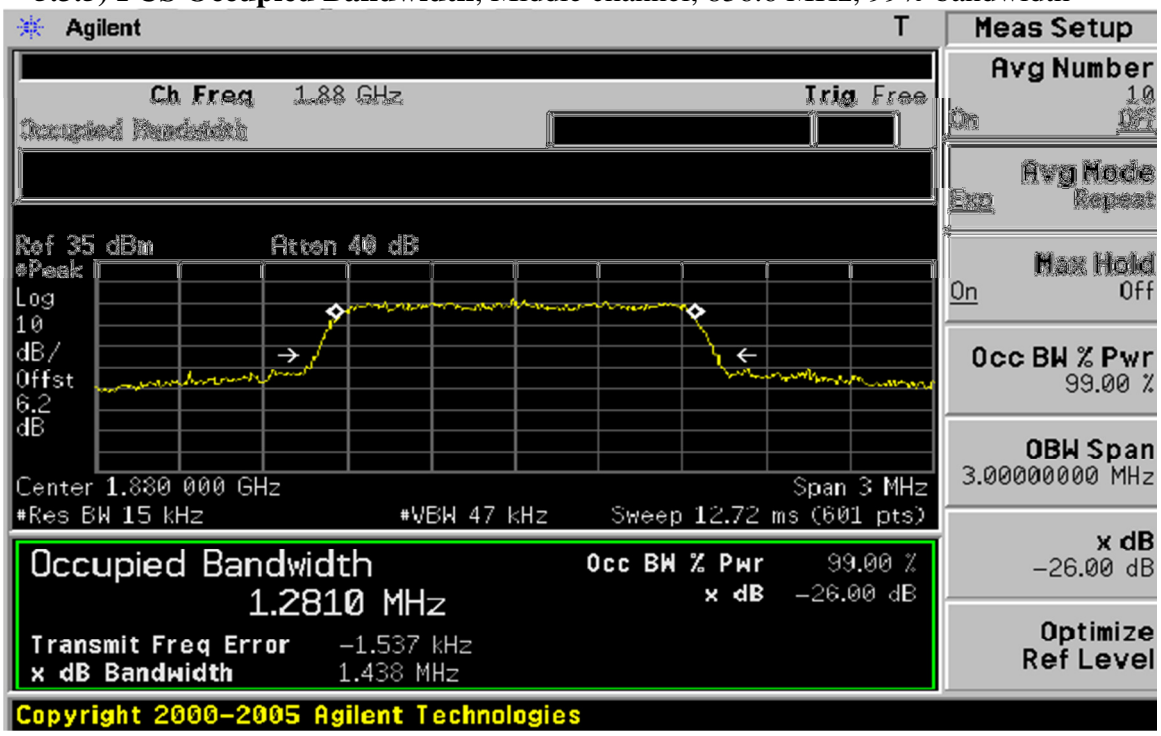
5.3.3) CDMA2000 Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth



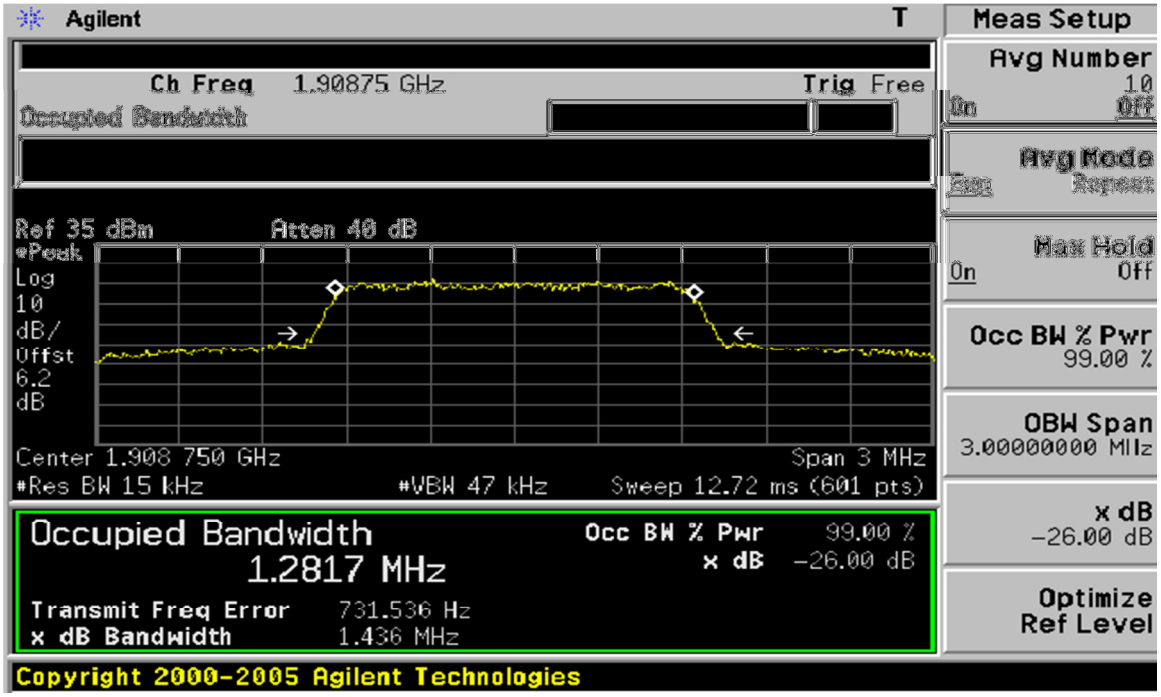
5.3.4) PCS Occupied Bandwidth, Cellular Low channel, 824.2 MHz, 99% BW



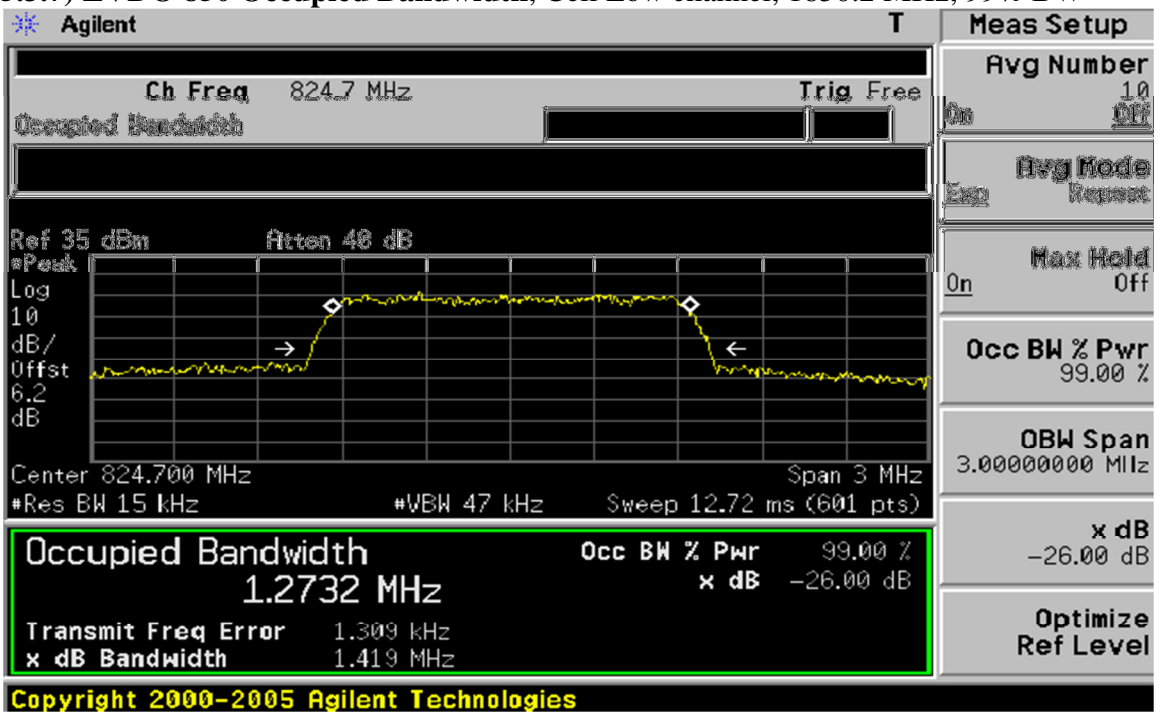
5.3.5) PCS Occupied Bandwidth, Middle channel, 836.6 MHz, 99% bandwidth



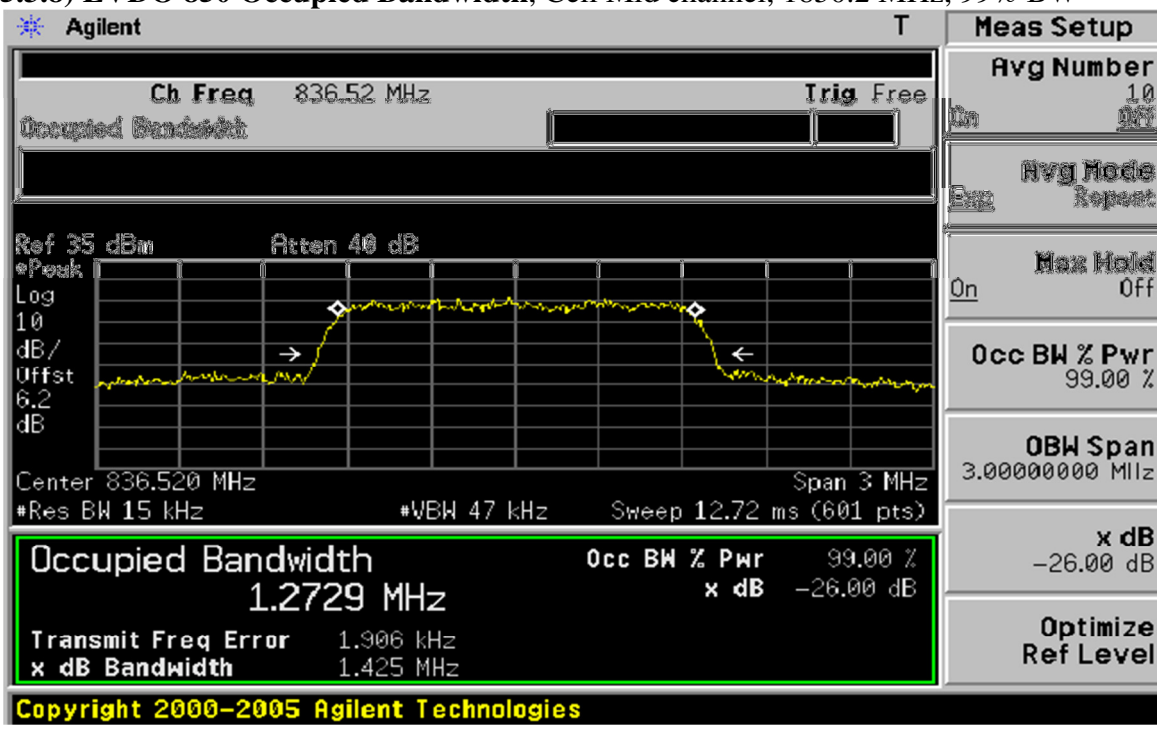
5.3.6) PCS Occupied Bandwidth, High channel, 848.8 MHz, 99% bandwidth



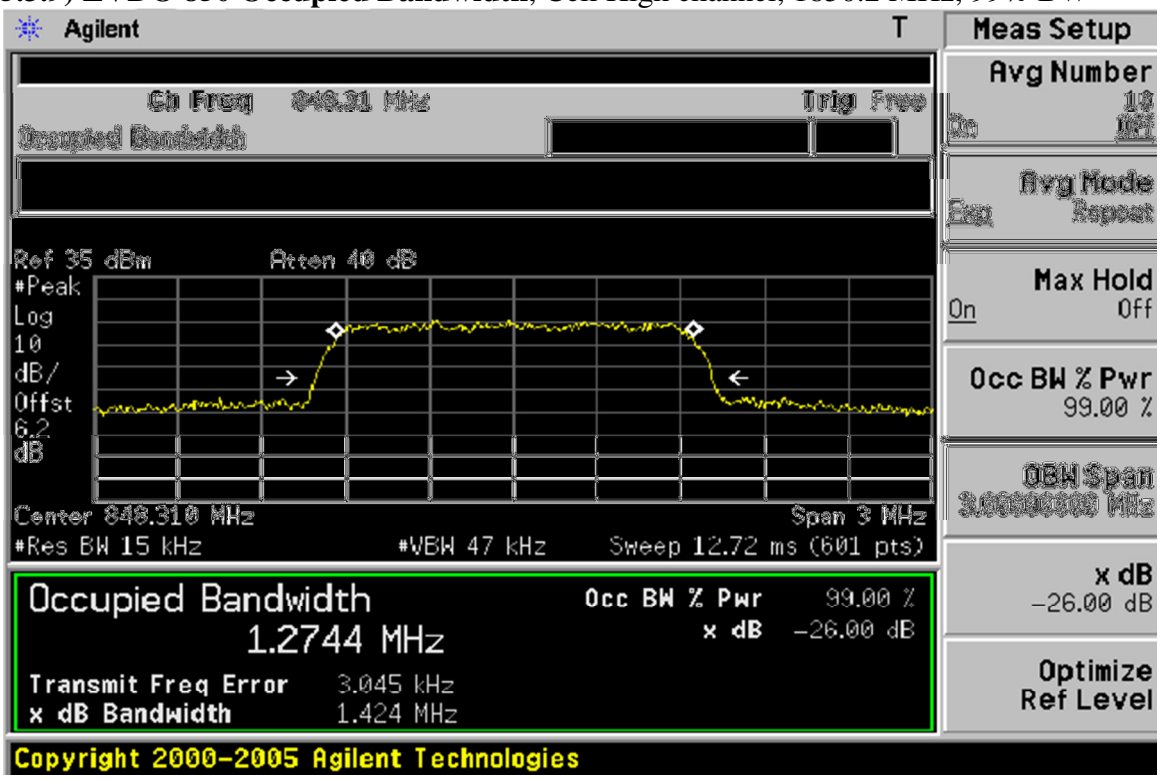
5.3.7) EVDO 850 Occupied Bandwidth, Cell Low channel, 1850.2 MHz, 99% BW



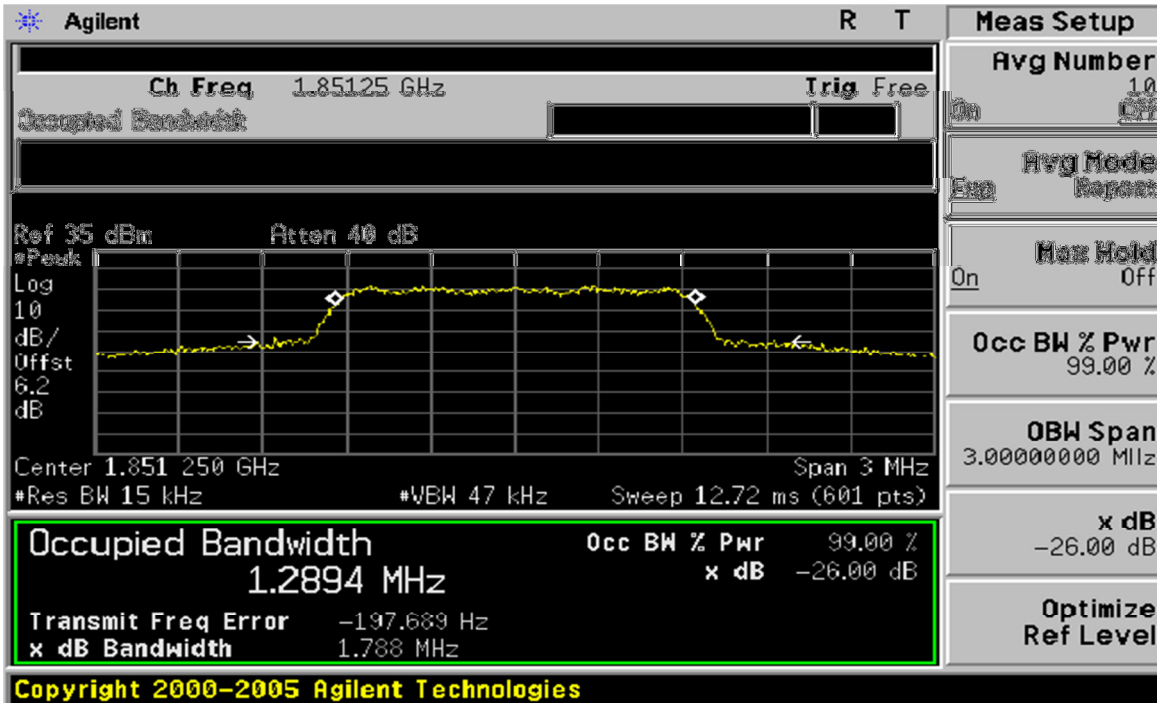
5.3.8) EVDO 850 Occupied Bandwidth, Cell Mid channel, 1850.2 MHz, 99% BW



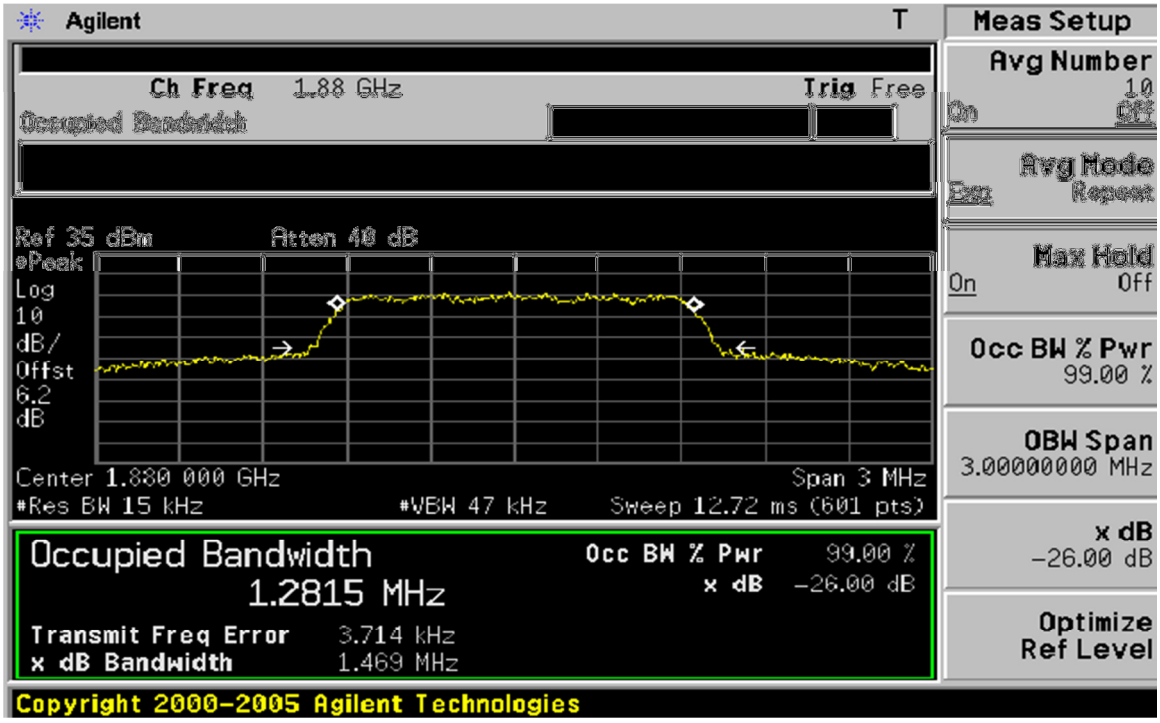
5.3.9) EVDO 850 Occupied Bandwidth, Cell High channel, 1850.2 MHz, 99% BW



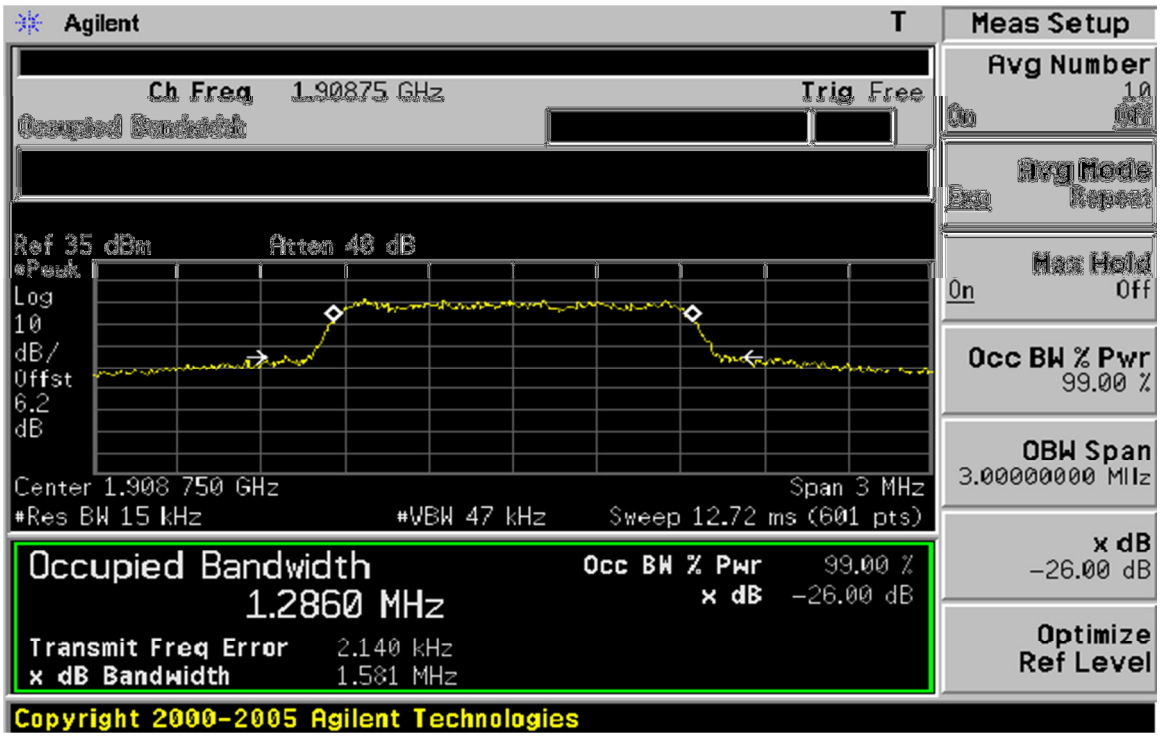
5.3.10)EVDO PCS Occupied Bandwidth, PCS Low channel, 1850.2 MHz, 99% BW



5.3.11) EVDO PCS Occupied Bandwidth, PCS Mid channel, 1850.2 MHz, 99% BW



5.3.12) 8 EVDO PCS Occupied Bandwidth, PCS Hig channel, 1850.2 MHz, 99% BW



6 Out of Band Emissions at Antenna Terminals

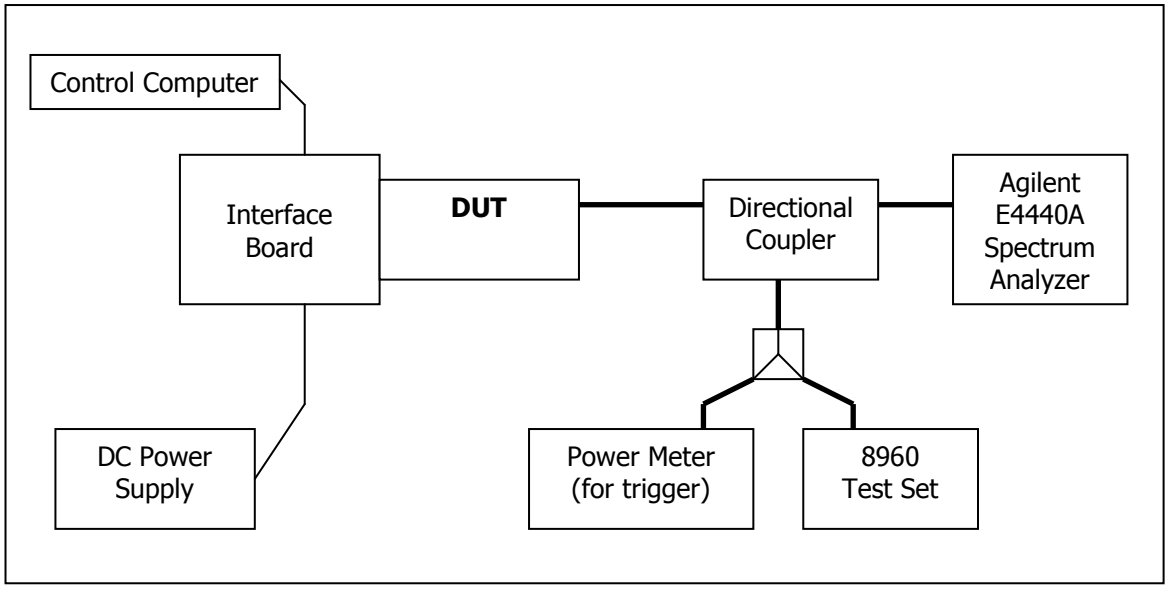
FCC 22.901(d), 22.917, 24.238(a)

Out of Band Emissions:
The mean power of emissions must be attenuated below the mean power of the unmodulated carrier (P) on any frequency outside the frequency band by at least (43 + 10 log P) dB. The out of band emission limit translates to a worst case absolute limit of -13dBm in this case.

6.1 Test Procedure

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band emissions, if any, up to 10th harmonic. The EUT was scanned for spurious emissions from 30MHz to 20GHz with sufficient bandwidth and video resolution. Data plots are included. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were captured.

Test Setup



6.2 Test Equipment

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Interface Board	Shop built		N/A	N/A
Directional Coupler	Krytar	152010	111269	N/A
Control Computer	TC	Generic PC	100488	N/A

6.3 Test Results

Refer to the following plots.

- **CDMA Cellular Band**

Plot Number	Description
6.4.1	CDMA2000 Mode, Low channel, 824.70 MHz
6.4.2	CDMA2000 Mode, Middle Channel, 836.52 MHz
6.4.3	CDMA2000 Mode, High Channel, 848.31 MHz

- **CDMA PCS Band**

Plot Number	Description
6.4.4	CDMA2000 Mode, Low Channel, 1851.25 MHz
6.4.5	CDMA2000 Mode, Middle Channel, 1880.0 MHz
6.4.6	CDMA2000 Mode, High Channel, 1908.75MHz

- **EVDO Cellular Band**

Plot Number	Description
6.4.7	EVDO Mode, Low Channel, 824.70 MHz
6.4.8	EVDO Mode, Middle Channel, 836.52 MHz
6.4.9	EVDO Mode, High Channel, 846.31 MHz

- **EVDO PCS Band**

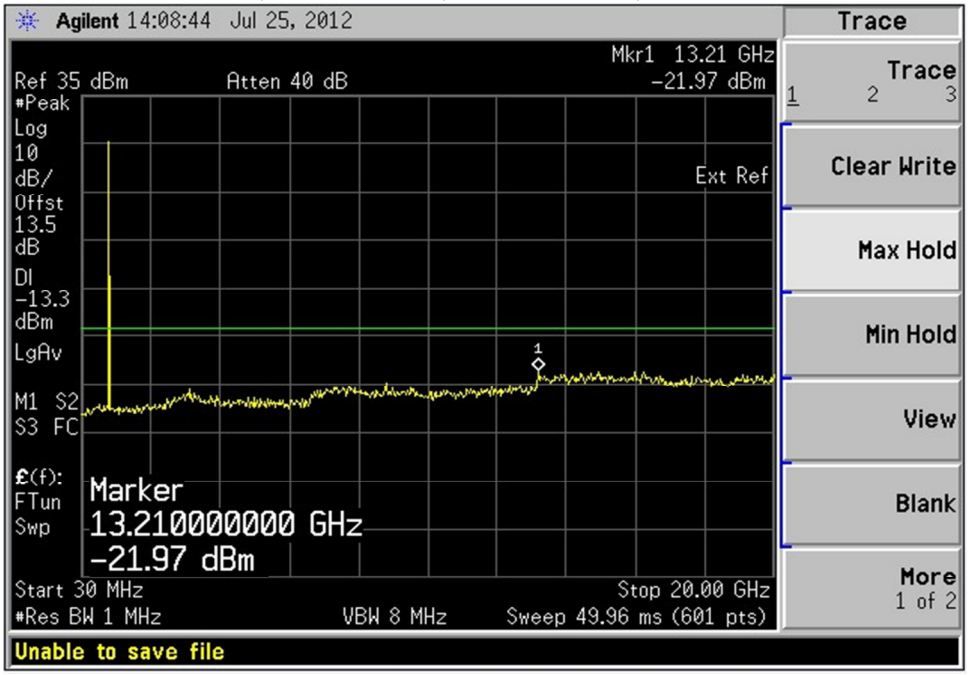
Plot Number	Description
6.4.10	EVDO Mode, Low Channel, 1851.25MHz
6.4.11	EVDO Mode, Middle Channel, 1880.0 MHz
6.4.12	EVDO Mode, High Channel, 1908.75 MHz

The plots below show that the conducted emission limits requirements are met.

6.4 Test Plots

Plot 6.4.1) Out of Band Emissions at Antenna Terminals

CDMA2000, Low channel, 824.700 MHz, 30 MHz to 20 GHz



Plot 6.4.2) Out of Band Emissions at Antenna Terminals

CDMA2000, Mid Channel, 836.52 MHz, 30 MHz to 20 GHz