74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
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FCC/IC CDMA REPORT

Certification

Applicant Name:
Telit Communications S.p.A.

Address:
VialeStazione di Prosecco 5/b Trieste 34010 Italy

Date of Issue:
July 21, 2015

Test Site/Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea

Report No.: HCT-R-1507-F019-1

HCT FRN: 0005866421

IC Recognition No.: 5944A-3

FCC ID:	**RI7DE921**
IC:	**5131A-DE921**
APPLICANT:	**Telit Communications S.p.A.**

FCC/ IC Model(s):	DE921
EUT Type:	CDMA Module
FCC Rule Part(s):	§22, §24, §2
IC Rule:	RSS-Gen (Issue 4), RSS-132 (Issue 3) , RSS-133 (Issue 6)
FCC Classification:	PCS Licensed Transmitter (PCB)

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	Conducted output power	
				Max. Power (W)	Max. Power (dBm)
CDMA	824.70– 848.31	869.70– 893.31	1M27F9W	0.272	24.35
CDMA EVDO_Rev.0			1M28F9W	0.254	24.04
CDMA EVDO_Rev.A			1M28F9W	0.250	23.98

Mode	Tx Frequency (MHz)	Rx Frequency (MHz)	Emission Designator	Conducted output power	
				Max. Power (W)	Max. Power (dBm)
PCS CDMA	1851.25– 1 908.75	1 931.25– 1 988.75	1M27F9W	0.257	24.10
PCS CDMA EVDO_Rev.0			1M28F9W	0.240	23.80
PCS CDMA EVDO_Rev.A			1M27F9W	0.236	23.73

The measurements shown in this report were made in accordance with the procedures specified inCFR47 section§2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

Report prepared by
:Jeong Ho Kim
Test engineer of RF Team

Approved by
: KyoungHounSeo
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1507-F019	July 15, 2015	- First Approval Report
HCT-R-1507-F019-1	July 21, 2015	- Revised the Conducted power table on Page.1 - Revised the Summary table Page.14

Table of Contents

MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Telit Communications S.p.A.
Address:	VialeStazione di Prosecco 5/b Trieste 34010 Italy
FCC ID:	RI7DE921
IC:	5131A-DE921
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§22, §24, §2
EUT Type:	CDMA Module
FCC/IC Model(s):	DE921
Tx Frequency:	824.70–848.31 MHz (CDMA) 1 851.25 – 1 908.75 MHz (PCS CDMA)
Rx Frequency:	869.70 – 893.31 MHz (CDMA) 1 931.25 – 1 988.75 MHz (PCS CDMA)
Conducted Output Power:	0.272 W ERP CDMA(24.35dBm)/ 0.254 W ERP CDMA EVDO_Rev.0 (24.04dBm) / 0.250 W ERP CDMA EVDO_Rev.A(23.98dBm) 0.257 W EIRP PCS CDMA(24.10dBm) / 0.240 W EIRP PCS CDMA EVDO_Rev.0 (23.80dBm) / 0.236 W EIRP PCS CDMA EVDO_Rev.A(23.73dBm)
Emission Designator(s):	1M27F9W (CDMA)/1M28F9W (CDMA EVDO_Rev.0) /1M28F9W (CDMA EVDO_Rev.A) 1M27F9W (PCS CDMA)/ 1M28F9W (PCS CDMA EVDO_Rev.0) / 1M27F9W (PCS CDMA EVDO_ Rev.A)
Date(s) of Tests:	June 08, 2015 ~ July 15, 2015
Antenna Specification	Manufacturer: Wilson Electronics Antenna type: General Vehicular External Antenna Peak Gain: CDMA: 5.12dBi PCS CDMA : 6.12dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The Telit Communications S.p.A.DE921CDMA Module consists ofCellular CDMA, PCS CDMA, EVDO, EVDO_Rev.0 and EVDO_Rev.A

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea**.

3. DESCRIPTION OF TESTS

3.1 CONDUCTED OUTPUT POWER

Test Procedure

Conducted Output Power is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.2.

5.2.1 Procedure for use with a spectrum/signal analyzer when EUT can be configured to transmit continuously or when sweep triggering/signal gating can be properly implemented

The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98% throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average output power of the EUT.

This procedure can also be used when the EUT cannot be configured to transmit continuously, provided that the measurement instrument can be configured to trigger a sweep at the beginning of each full-power transmission burst, and the sweep time is less than or equal to the minimum transmission time during each burst (*i.e.*, no burst off-time is to be included in the measurement).

a) Set span to at least 1.5 times the OBW.

b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.

c) Set VBW ≥ 3 x RBW.

d) Set number of points in sweep ≥ 2 × span / RBW.

e) Sweep time = auto-couple.

f) Detector = RMS (power averaging).

g) If the EUT can be configured to transmit continuously (*i.e.*, burst duty cycle ≥ 98%), then set the trigger tofree run.

h) If the EUT cannot be configured to transmit continuously (*i.e.*, burst duty cycle < 98 %), then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Ensure that the sweep time is less than or equal to the transmission burst duration.

i) Trace average at least 100 traces in power averaging (*i.e.*, RMS) mode.

j) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

3.2 ERP/EIRP RADIATED POWER AND RADIATED SPURIOUS EMISSIONS

Note: ERP(Effective Radiated Power), EIRP(Effective Isotropic Radiated Power)

Test Procedure

Radiated emission measurements are performed in the Fully-anechoic chamber. The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-D-2010 Clause 2.2.17.The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission. The level and position of the maximized emission is recorded with the spectrum analyzer using RMS detector.
A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.
The power is calculated by the following formula;

$$P_{d(dBm)} = Pg_{(dBm)} - \text{cable loss}_{(dB)} + \text{antenna gain}_{(dB)}$$

Where: $P_d$is the dipole equivalent power and $P_g$is the generator output power into the substitution antenna.

The maximum EIRP is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration

Radiated spurious emissions

1. Frequency Range : 30 MHz ~ 10th Harmonics of highest channel fundamental frequency.
2. The EUT was setup to maximum output power. The 100 kHz RBW was used to scan from 30 MHz to 1 GHz. Also, the 1 MHz RBW was used to scan from 1 GHz to 10 GHz(Cellular CDMA) or 20 GHz(PCS CDMA). The high, low and a middle channel were tested for out of band measurements.

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with 'All Up' power control bits.

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3.3 PEAK- TO- AVERAGE RATIO

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.7.

- Section 5.7.1 CCDF Procedure

a) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
b) Set the number of counts to a value that stabilizes the measured CCDF curve;
c) Set the measurement interval as follows:
   1) for continuous transmissions, set to 1 ms,
   2) for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.
d) Record the maximum PAPR level associated with a probability of 0.1%.

- Section 5.7.2 Alternate Procedure

Use one of the procedures presented in 5.1 to measure the total peak power and record as P_{Pk}. Use one of the applicable procedures presented 5.2 to measure the total average power and record as P_{Avg}. Determine the P.A.R. from: $P.A.R_{(dB)} = P_{Pk(dBm)} - P_{Avg(dBm)}$ (P_{Avg} = Average Power + Duty cycle Factor)

5.1.1 Peak power measurements with a spectrum/signal analyzer or EMI receiver

The following procedure can be used to determine the total peak output power.

a) Set the RBW ≥ OBW.
b) Set VBW ≥ 3 × RBW.
c) Set span ≥ 2 x RBW
d) Sweep time = auto couple.
e) Detector = peak.
f) Ensure that the number of measurement points ≥ span/RBW.
g) Trace mode = max hold.
h) Allow trace to fully stabilize.
i) Use the peak marker function to determine the peak amplitude level.

5.2.2 Procedures for use with a spectrum/signal analyzer when EUT cannot be configured to transmit continuously and sweep triggering/signal gating cannot be properly implemented

If the EUT cannot be configured to transmit continuously (burst duty cycle < 98%), then one of the following procedures can be used. The selection of the applicable procedure will depend on the characteristics of the measured burst duty cycle.

Measure the burst duty cycle with a spectrum/signal analyzer or EMC receiver can be used in zero-span mode if the response time and spacing between bins on the sweep are sufficient to permit accurate measurement of the burst on/off time of the transmitted signal.

5.2.2.2 Constant burst duty cycle

If the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent), then:

a) Set span to at least 1.5 times the OBW.

b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz.

c) Set VBW ≥ 3 x RBW.

d) Number of points in sweep ≥ 2 × span / RBW. (This gives bin-to-bin spacing ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

e) Sweep time = auto.

f) Detector = RMS (power averaging).

g) Set sweep trigger to “free run”.

h) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

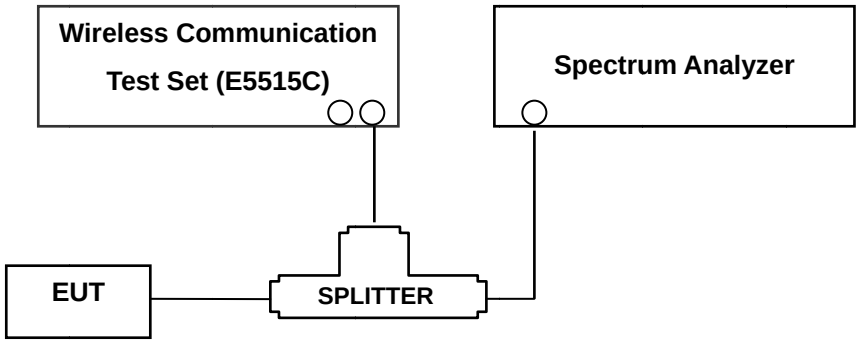
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

j) Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission).

For example, add 10 log (1/0.25) = 6 dB if the duty cycle is a constant 25%.

3.4 OCCUPIED BANDWIDTH.

Test set-up



(Configuration of conducted Emission measurement)

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

Test Procedure

OBW is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 4.2..

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels (low, middle and high operational range.)

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with ‘All Up’ power control bits.

3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer.

On any frequency outside a licensee's frequency block, the power of any emission shall be attenuated below the transmitter power (P) by at least 43 + 10 log(P) dB. The RBW settings used in the testing are greater than 1 % of the occupied bw. The 1 MHz RBW was used to scan from 10 MHz to 10 GHz. (GSM1900 Mode: 10 MHz to 20 GHz). A display line was placed at – 13 dBm to show compliance. The high, lowest and a middle channel were tested for out of band measurements.

Measurements of all out of band are made on RBW = 1MHz and VBW ≥ 3 MHz in the worst case despite RBW = 100 kHz and VBW ≥ 300 kHz upon 1 GHz.

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Trace Mode = max hold
- Sweep time = auto
- Number of points in sweep ≥ 2 * Span / RBW

- Band Edge Requirement : According to FCC 22.917, 24.238(a) specified that 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. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

The EUT makes a call to the communication simulator. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

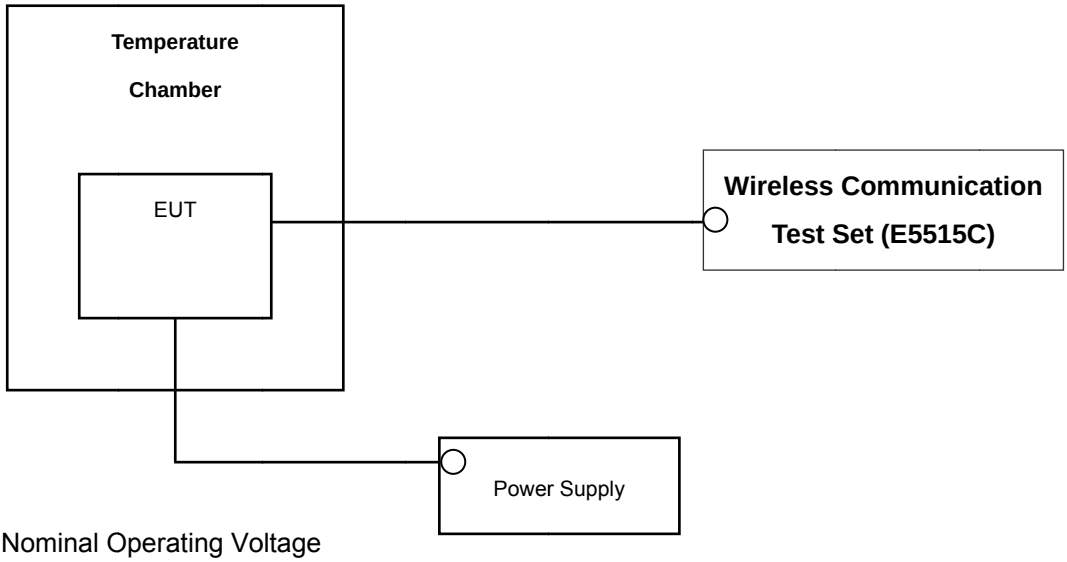
Note : This device was tested under all R.C.s and S.O.s and worst case is reported with 'All Up' power control bits.

NOTES: The analyzer plot offsets were determined by below conditions.

- For CDMA, total offset 26.7 dB = 20 dB attenuator + 6 dB Splitter + 0.7 dB RF cables,
- For PCS, total offset 27.3 dB = 20 dB attenuator + 6 dB Splitter + 1.3 dB RF cables,

3.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

Test Set-up



* Nominal Operating Voltage

Test Procedure

Frequency stability is tested in accordance with ANSI/TIA-603-D-2010 section 2.2.2.

The frequency stability of the transmitter is measured by:
a.) **Temperature:** The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from battery end point to 100 % of the voltage normally at the input to the device or at the power supply terminals if cables are not normally supplied.

Specification — the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block(PCS CDMA). The frequency stability of the transmitter shall be maintained within ± 0.000 25 %(± 2.5 ppm) of the center frequency(Cellular CDMA).

Time Period and Procedure:

The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
1. The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

2. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.
NOTE: The EUT is tested down to the battery endpoint.

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with ‘All Up’ power control bits.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	N1921A/ Power Sensor	MY45241059	Annual	07/09/2016
Agilent	N1911A/ Power Meter	MY45100523	Annual	07/09/2016
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/04/2015
Wainwright	WHK1.2/15G-10EF/H.P.F	4	Annual	04/27/2016
Wainwright	WHK3.3/18G-10EF/H.P.F	2	Annual	04/27/2016
Hewlett Packard	11667B / Power Splitter	10545	Annual	02/16/2016
Hewlett Packard	11667B / Power Splitter	11275	Annual	04/29/2016
Digital	EP-3010/ Power Supply	3110117	Annual	10/29/2015
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/23/2017
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	03/23/2017
Korea Engineering	KR-1005L / Chamber	KRAC05063-3CH	Annual	10/29/2015
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	09/01/2016
Schwarzbeck	BBHA 9120D/ Horn Antenna	1299	Biennial	05/15/2017
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	Biennial	04/30/2017
Schwarzbeck	BBHA 9170/ Horn Antenna(15~35GHz)	BBHA9170124	Biennial	3/23/2017
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	03/18/2016
WEINSCHEL	ATTENUATOR	BR0592	Annual	10/22/2015
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	Annual	06/04/2016
Agilent	8960 (E5515C)/ Base Station	MY48360222	Annual	08/26/2015
Agilent	N9020A/Spectrum Analyzer	MY51110085	Annual	06/30/2016

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049	RSS-Gen(6.6) RSS-133(2.3)	Occupied Bandwidth	N/A	CONDUCTED	PASS
2.1051, 22.917(a), 24.238(a)	RSS-132(5.5) RSS-133(6.5)	Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions		PASS
2.1046	RSS-132(5.4) RSS-133(4.1)	Conducted Output Power	-		PASS
24.232(d)	RSS-133(6.4)	Peak- to- Average Ratio	< 13 dB		PASS
2.1055, 22.355	RSS-132(5.3) RSS-133(6.3)	Frequency stability / variation of ambient temperature	< 2.5 ppm (Part22)		PASS
24.235			Emission must remain in band (Part24)		PASS
22.913(a)(2)	RSS-132(5.4) SRSP-503(5.1.3)	Effective Radiated Power	< 7 Watts max. ERP(FCC) <11.5 Watts max. ERP(IC)	RADIATED	PASS
24.232(c)	RSS-133(6.4) SRSP-510(5.1.2)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		PASS
2.1053, 22.917(a), 24.238(a)	RSS-132(5.5) RSS-133(6.5)	Radiated Spurious and Harmonic Emissions	< 43 + 10log10 (P[Watts]) for all out-of band emissions		PASS
	RSS-Gen(7.1.2)	Receiver Spurious Emissions	Cf.)RSS-Gen 7.1.2 Table 2		PASS

6. SAMPLE CALCULATION

A. ERP Sample Calculation

Mode	Ch./ Freq.		Measured Level(dBm)	Substitude LEVEL(dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
CDMA	384	836.52	-23.45	38.92	-10.53	0.88	V	0.564	27.51

ERP = SubstitudeLEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.
2) During the test , the turntable is rotated until the maximum signal is found.
3) Record the field strength meter's level.
4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power (**ERP**).

B. Emission Designator

CDMA Emission Designator

Emission Designator = 1M27F9W
CDMA BW = 1.27 MHz
(Measured at the 99% power bandwidth)
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

EVDO Emission Designator

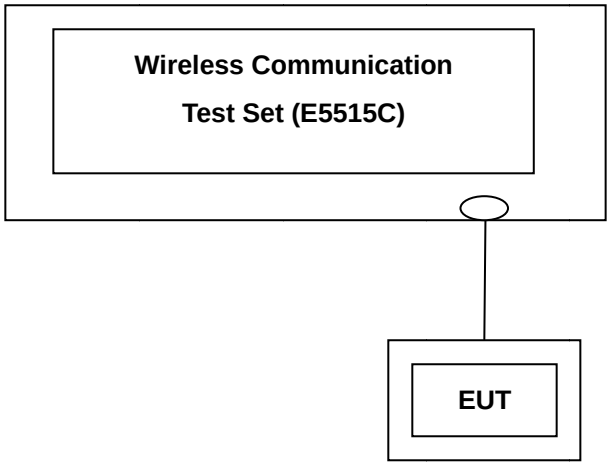
Emission Designator = 1M27F9W
CDMA BW = 1.27 MHz
(Measured at the 99% power bandwidth)
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

Conducted Output Power was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.2.

A base station simulator was used to establish communication with The EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Band	Channel	SO2	SO2	SO55	SO55	TDSO	1xEVDO Rev.0	1xEVDO Rev.0	1xEVDO Rev.A	1xEVDO Rev.A
		RC1 (dBm)	RC3 (dBm)	RC1 (dBm)	RC3 (dBm)	RC3 (dBm)	(FTAP) (dBm)	(RTAP) (dBm)	(FETAP) (dBm)	(RETAP) (dBm)
CDMA	1013	24.22	24.22	24.27	24.24	24.26	23.89	23.95	23.86	23.79
	384	24.34	24.34	24.35	24.34	24.34	23.95	24.04	23.92	23.98
	777	24.15	24.13	24.18	24.11	24.13	23.82	23.88	23.79	23.82
PCS	25	24.08	24.05	24.05	23.98	24.04	23.66	23.60	23.64	23.61
	600	24.10	24.10	24.07	24.06	24.07	23.80	23.73	23.70	23.73
	1175	24.07	24.07	24.04	24.04	24.07	23.68	23.63	23.67	23.68

(Maximum Conducted Output Powers)

Note : Detecting mode is average.

7.2EFFECTIVE RADIATED POWER

(CDMA Mode)

Mode	Ch./ Freq.		Measured Level (dBm)	Substitude LEVEL (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
CDMA	1013	824.70	-31.69	30.28	-10.59	0.88	V	0.076	18.81
	384	836.52	-30.24	31.53	-10.54	0.89	V	0.102	20.10
	777	848.31	-30.07	30.88	-10.49	0.89	V	0.089	19.50
EVDO Rev.0	1013	824.70	-32.15	29.82	-10.59	0.88	V	0.068	18.35
	384	836.52	-30.67	31.10	-10.54	0.89	V	0.093	19.67
	777	848.31	-30.30	30.65	-10.49	0.89	V	0.085	19.27
EVDO Rev.A	1013	824.70	-32.10	29.87	-10.59	0.88	V	0.069	18.40
	384	836.52	-30.62	31.15	-10.54	0.89	V	0.094	19.72
	777	848.31	-30.25	30.70	-10.49	0.89	V	0.086	19.32

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-D-2010June 24, 2010:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW ≥ OBW, VBW ≥ 3 x RBW. A half-wave dipole was substituted in place of the EUT.This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The ERP is recorded.

This device was tested under all configurations and the highest power is reported. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is in y plane in CDMA mode,CDMA EVDO_Rev.0mode and CDMA EVDO_Rev.A mode. Also worst case of detecting Antenna is in vertical polarization in CDMA mode, CDMA EVDO_Rev.0 mode and CDMA EVDO_Rev.A mode.

7.3EQUIVALENT ISOTROPIC RADIATED POWER

(PCS CDMA Mode)

Mode	Ch./ Freq.		Measured Level (dBm)	Substitude LEVEL (dBm)	Ant. Gain (dBi)	C.L	Pol.	EIRP	
	channel	Freq.(MHz)						W	dBm
PCS	25	1,851.25	-20.54	12.14	10.04	1.36	V	0.121	20.82
	600	1,880.00	-19.45	13.51	10.05	1.37	V	0.166	22.19
	1175	1,908.75	-20.02	13.21	10.06	1.38	V	0.154	21.89
EVDO Rev.0	25	1,851.25	-21.03	11.65	10.04	1.36	V	0.108	20.33
	600	1,880.00	-19.78	13.18	10.05	1.37	V	0.154	21.86
	1175	1,908.75	-20.36	12.87	10.06	1.38	V	0.143	21.55
EVDO Rev.A	25	1,851.25	-21.01	11.67	10.04	1.36	V	0.108	20.35
	600	1,880.00	-19.81	13.15	10.05	1.37	V	0.153	21.83
	1175	1,908.75	-20.39	12.84	10.06	1.38	V	0.142	21.52

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-D-2010June 24, 2010:

The EUT was placed on a non-conductive styrofoam resin table 3-meters from the receive antenna. The receive antenna height and turntable rotation was adjusted for the highest reading on the receive spectrum analyzer. For CDMA signals, a peak detector is used, with RBW ≥ OBW, VBW ≥ 3 x RBW. A half-wave dipole was substituted in place of the EUT.This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminals of the dipole is measured. The EIRP is recorded.

This device was tested under all configurations and the highest power is reported. Also, we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of the EUT is in y plane in PCS mode, PCSEVDO_Rev.0 mode and PCS EVDO_Rev.Amode. Also worst case of detecting Antenna is in vertical polarization in PCS mode, PCSEVDO_Rev.0 mode and PCS EVDO_Rev.A mode.

7.4 RADIATED SPURIOUS EMISSIONS

7.4.1 RADIATED SPURIOUS EMISSIONS (CDMA Mode)

▣ MEASURED OUTPUT POWER: 20.10dBm = 0.102 W

▣ MODULATION SIGNAL: CDMA

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 33.10dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
1013 (824.70)	1,649.40	-50.96	9.71	-59.00	1.29	H	-50.58	70.68
	2,474.10	-48.78	10.54	-53.88	1.60	V	-44.94	65.04
	3,298.80	-56.21	12.23	-61.29	1.85	H	-50.91	71.01
384 (836.52)	1,673.04	-50.14	9.77	-58.29	1.28	H	-49.80	69.90
	2,509.56	-51.25	10.65	-56.24	1.61	V	-47.20	67.30
	3,346.08	-57.98	12.41	-63.46	1.86	V	-52.91	73.01
777 (848.31)	1,696.62	-50.18	9.84	-58.41	1.30	H	-49.88	69.98
	2,544.93	-52.44	10.72	-57.32	1.64	V	-48.24	68.34
	3,393.24	-57.95	12.40	-63.24	1.86	H	-52.70	72.80

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010June 24, 2010:

2. We are performed all frequency to 10th harmonics from 30 MHz.Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

7.4.2 RADIATED SPURIOUS EMISSIONS (PCS Mode)

▣ MEASURED OUTPUT POWER: 22.19dBm = 0.166 W

▣ MODULATION SIGNAL: PCS

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 35.19dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBi)	Substitute Level [dBm]	C.L	Pol.	EIRP (dBm)	dBc
25 (1851.25)	3,702.50	-41.73	12.32	-45.38	2.02	V	-35.08	57.27
	5,553.75	-41.44	13.02	-40.32	2.52	V	-29.82	52.01
	7,405.00	-54.77	11.05	-45.90	2.29	V	-37.14	59.33
600 (1880.00)	3,760.00	-43.05	12.29	-46.65	1.93	V	-36.29	58.48
	5,640.00	-40.38	13.12	-39.45	2.57	V	-28.90	51.09
	7,520.00	-54.46	11.09	-45.62	3.03	V	-37.56	59.75
1175 (1908.75)	3,817.50	-45.42	12.28	-48.54	2.04	V	-38.30	60.49
	5,726.25	-40.61	13.07	-39.42	2.56	V	-28.91	51.10
	7,635.00	-56.39	11.37	-46.92	3.15	H	-38.70	60.89

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-D-2010June 24, 2010:

2. We are performed all frequency to 10^{th} harmonics from 30 MHz.Measurements above show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

3. we have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

7.5 PEAK-TO-AVERAGE RATIO

Band	Ch.	Measured P_{Pk} (dBm)	Measured P_{Avg} (dBm)	P_{Avg} (Duty Cycle)			P.A.R. = P_{Pk} - P_{Avg} (dB)	Limit (dB)	Pass / Fail
				Tx_{Total} (ms)	Tx_{On} (ms)	Factor (dB)			
PCS	600	CCDF Procedure					4.04	13	Pass
PCS_Rev.0							4.38		
PCS_Rev.A							5.08		

- Plots of the EUT's Peak- to- Average Ratio are shown Page 37 ~ 38.

NOTES:

Peak to Average Power Ratio was tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r02, October 17, 2014, Section 5.7

7.6OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (MHz)
CDMA	1013	824.70	1.2698
	384	836.52	1.2669
	777	848.31	1.2742
CDMA EVDO_Rev.0	1013	824.70	1.2683
	384	836.52	1.2759
	777	848.31	1.2770
CDMA EVDO_Rev.A	1013	824.70	1.2711
	384	836.52	1.2750
	777	848.31	1.2705
PCS	25	1851.25	1.2694
	600	1880.00	1.2710
	1175	1908.75	1.2731
PCS EVDO_Rev.0	25	1851.25	1.2759
	600	1880.00	1.2663
	1175	1908.75	1.2685
PCS EVDO_Rev.A	25	1851.25	1.2732
	600	1880.00	1.2723
	1175	1908.75	1.2679

- Plots of the EUT's Occupied Bandwidth are shown Page 28 ~ 36.

7.7CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
CDMA	1013	7.306500	-32.326
	384	7.510500	-32.761
	777	6.158000	-32.618
PCS	25	19.573500	-26.970
	600	16.534500	-27.085
	1175	15.915500	-27.120

- Plots of the EUT's Conducted Spurious Emissions are shown Page 50 ~ 56.

7.7.1 Band Edge

- Plots of the EUT's Band Edge are shown Page 38 ~ 50.

7.8RECEIVER SPURIOUS EMISSIONS

FCC Rule(s)	RSS-Gen
Test Requirements:	Emission Level shall not exceed RSS-Gen 7 limits
Operating conditions:	Under normal test conditions
Method of testing:	Radiated
S/A. Settings:	F < 1 GHz: RBW: 100 kHz, VBW: 300 kHz (Quasi Peak) F > 1 GHz: RBW: 1 MHz, VBW: 3 MHz (Average)
Mode of operation:	Receive

Frequency (MHz)	Field Strength (mV/m)	Measurement Distance (m)
30 – 88	100 (40 dBuV)	3
88 - 216	150 (43.5 dBuV))	3
216 – 960	200 (46 dBuV)	3
Above 960	500 (54 dBuV)	3

Operation Mode: Receive:

30MHz ~ 1 GHz

Frequency	Reading	Ant. factor+Cable loss-Amp Gain	Ant. POL	Total	Limit	Margin
MHz	dBμV	dB/m	(H/V)	dBμV/m	dBμV/m	dB
No Peak Found						

Above 1 GHz

Frequency	Reading	Ant. factor+Cable loss-Amp Gain	Ant. POL	Total	Limit	Margin
MHz	dBμV	dB/m	(H/V)	dBμV/m	dBμV/m	dB
1696.0	41.40	-12.54	H	28.86	54	25.14
1816.0	44.51	-13.92	H	30.59	54	23.41
1849.0	46.45	-13.68	V	32.77	54	21.23
1882.6	38.49	-13.40	V	25.09	54	28.91
2152.0	42.58	-10.78	H	31.81	54	22.20

7.9 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.9.1 RADIATED SPURIOUS EMISSIONS (CDMA Mode)

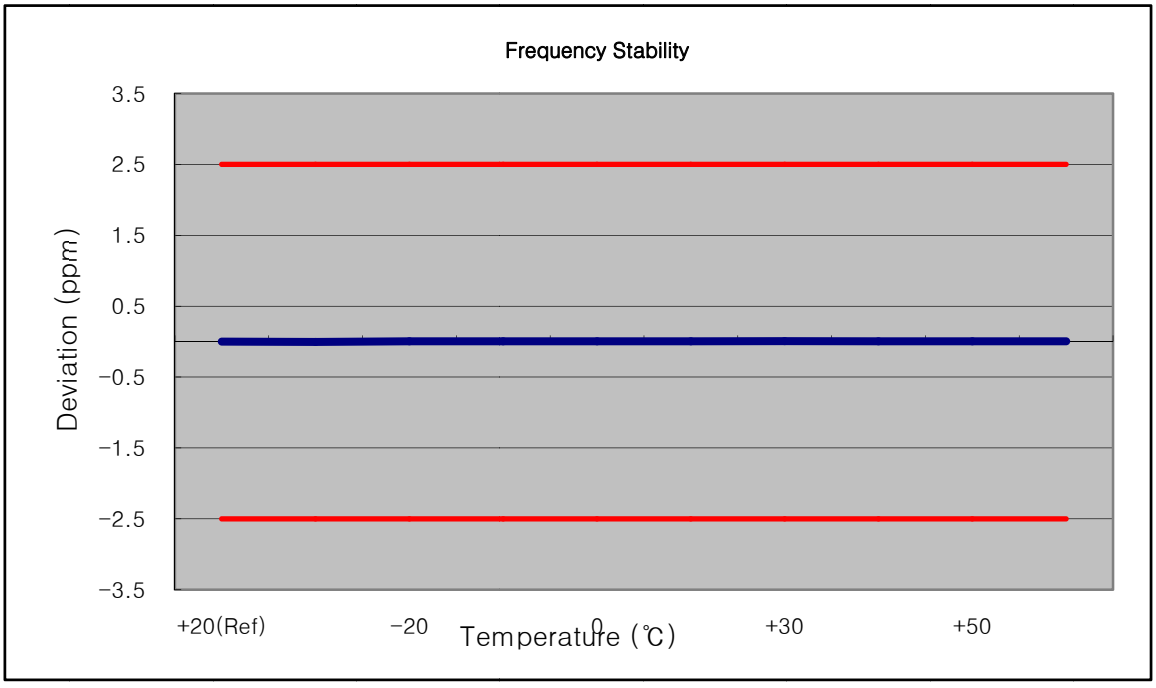
▣OPERATING FREQUENCY: 836,520,000 Hz

▣CHANNEL: 384

▣REFERENCE VOLTAGE: 3.80 VDC

▣DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	836 519 996	0	0.000 000	0.000
100%		-30	836 519 993	-3.49	0.000 000	-0.004
100%		-20	836 520 001	4.63	0.000 001	0.006
100%		-10	836 520 000	3.46	0.000 000	0.004
100%		0	836 520 000	4.18	0.000 000	0.005
100%		+10	836 520 001	4.59	0.000 001	0.005
100%		+30	836 520 002	5.72	0.000 001	0.007
100%		+40	836 520 000	4.09	0.000 000	0.005
100%		+50	836 520 001	4.61	0.000 001	0.006
Batt. Endpoint	3.23	+20	836 520 001	4.55	0.000 001	0.005



7.9.2 RADIATED SPURIOUS EMISSIONS (PCS Mode)

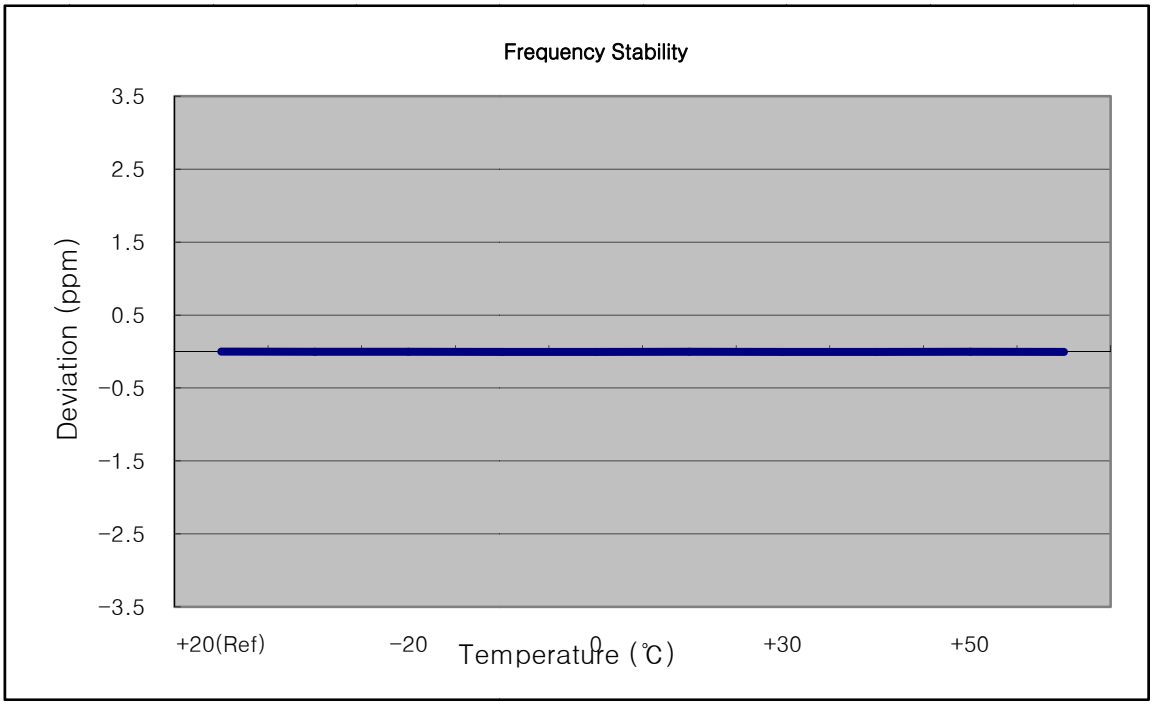
▣OPERATING FREQUENCY: 1880,000,000 Hz

▣CHANNEL: 600

▣REFERENCE VOLTAGE: 3.80 VDC

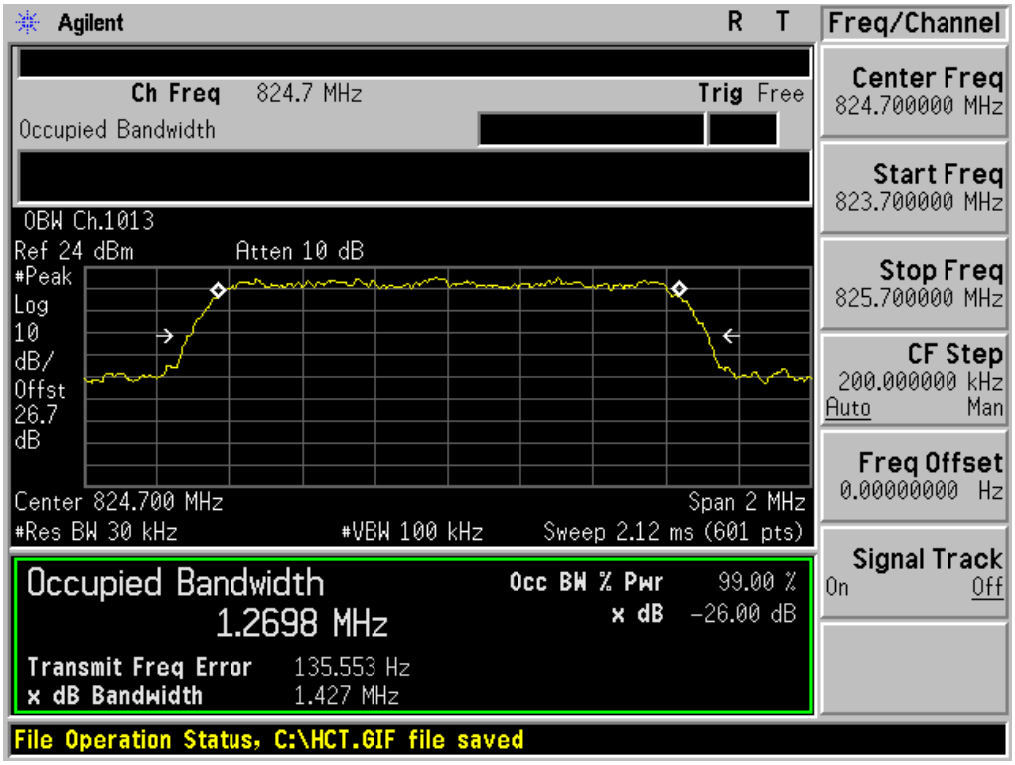
▣DEVIATION LIM IT: -

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1880 000 009	0	0.000 000	0.000
100%		-30	1879 999 992	-7.52	0.000 000	-0.004
100%		-20	1879 999 992	-7.83	0.000 000	-0.004
100%		-10	1879 999 992	-7.91	0.000 000	-0.004
100%		0	1879 999 992	-8.24	0.000 000	-0.004
100%		+10	1879 999 994	-6.21	0.000 000	-0.003
100%		+30	1879 999 991	-8.75	0.000 000	-0.005
100%		+40	1879 999 992	-8.05	0.000 000	-0.004
100%		+50	1879 999 993	-6.90	0.000 000	-0.004
Batt. Endpoint	3.23	+20	1879 999 991	-9.07	0.000 000	-0.005

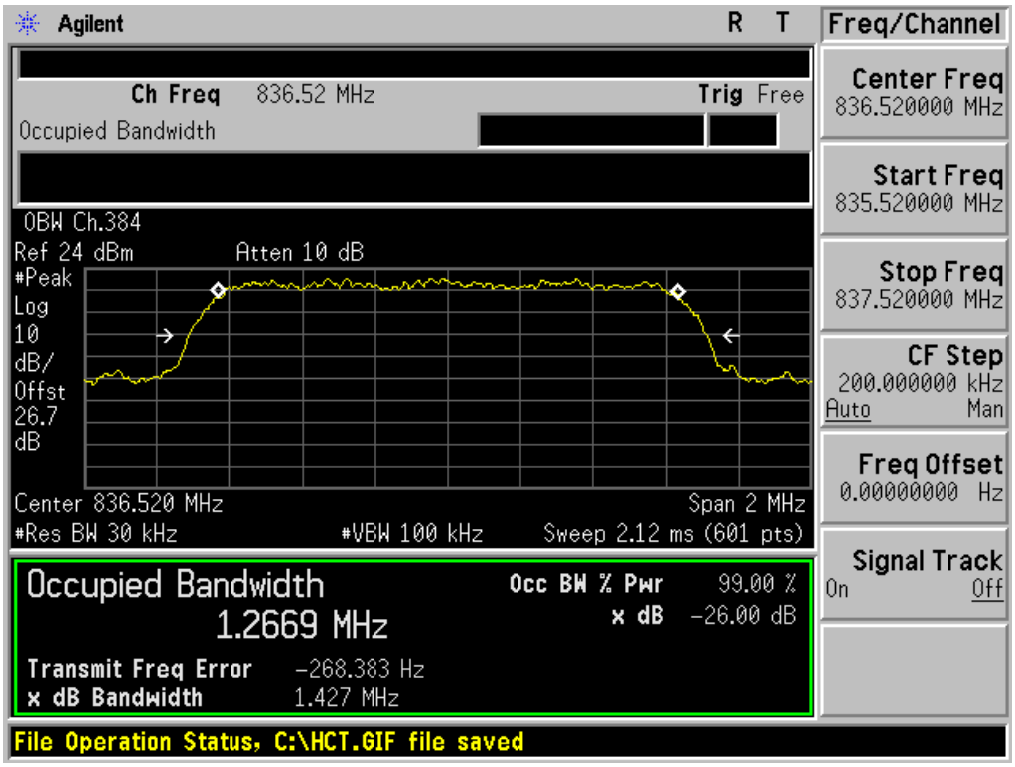


8. TEST PLOTS

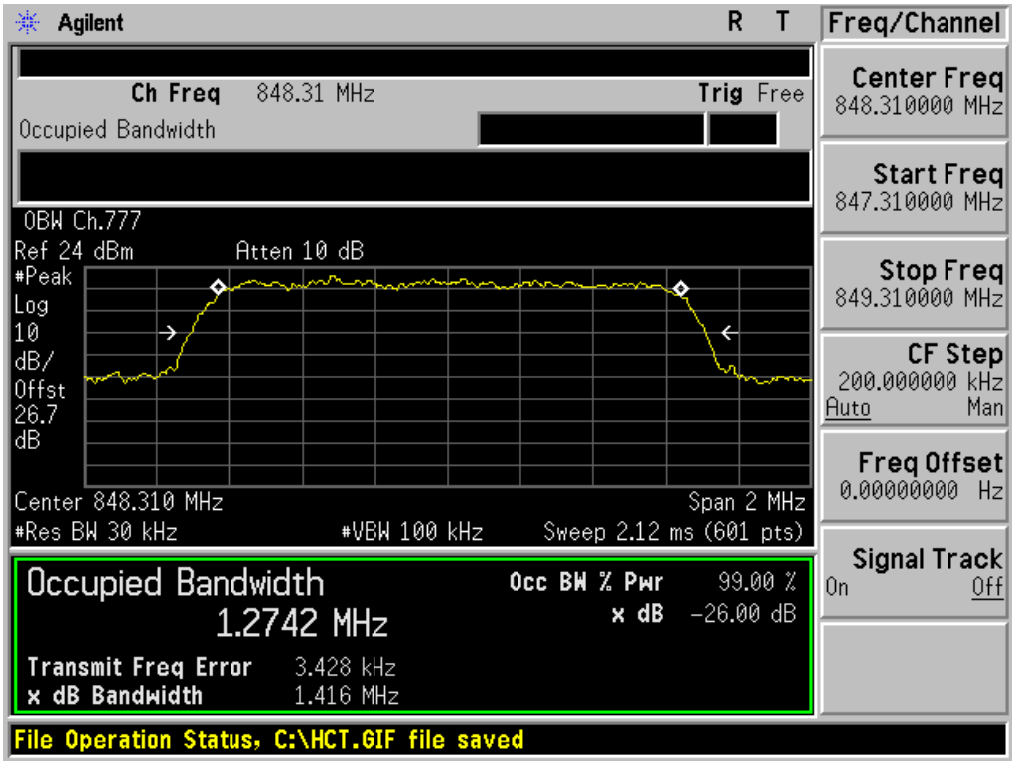
■ CDMA MODE (1013 CH.) Occupied Bandwidth



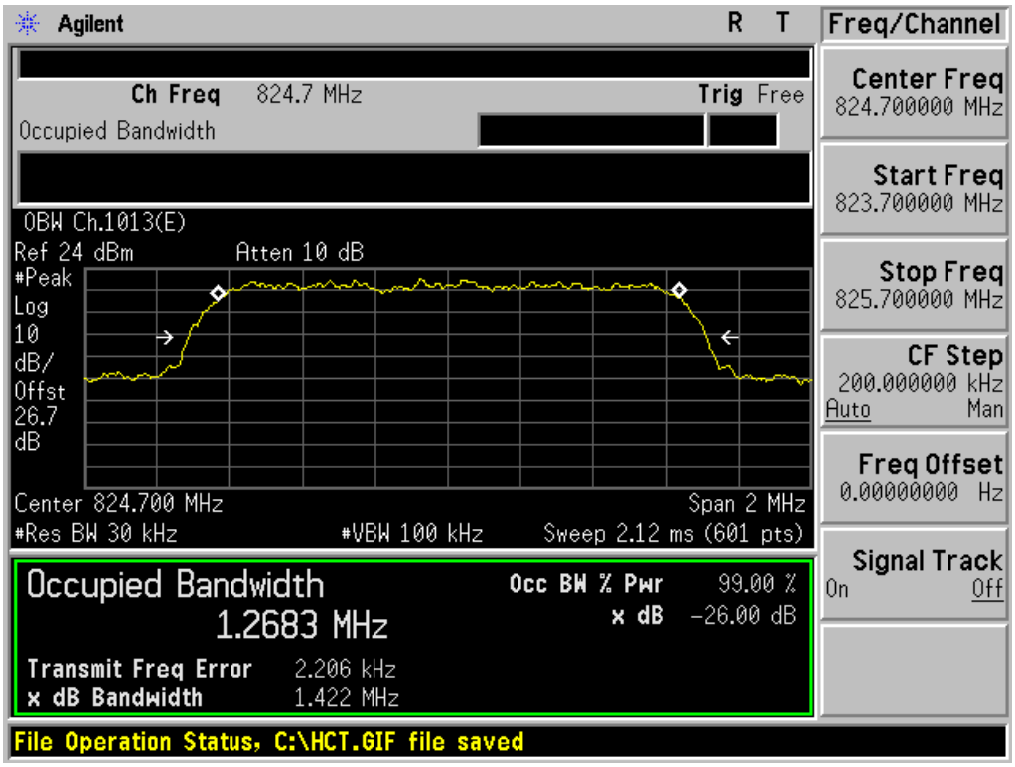
■ CDMA MODE (384 CH.) Occupied Bandwidth



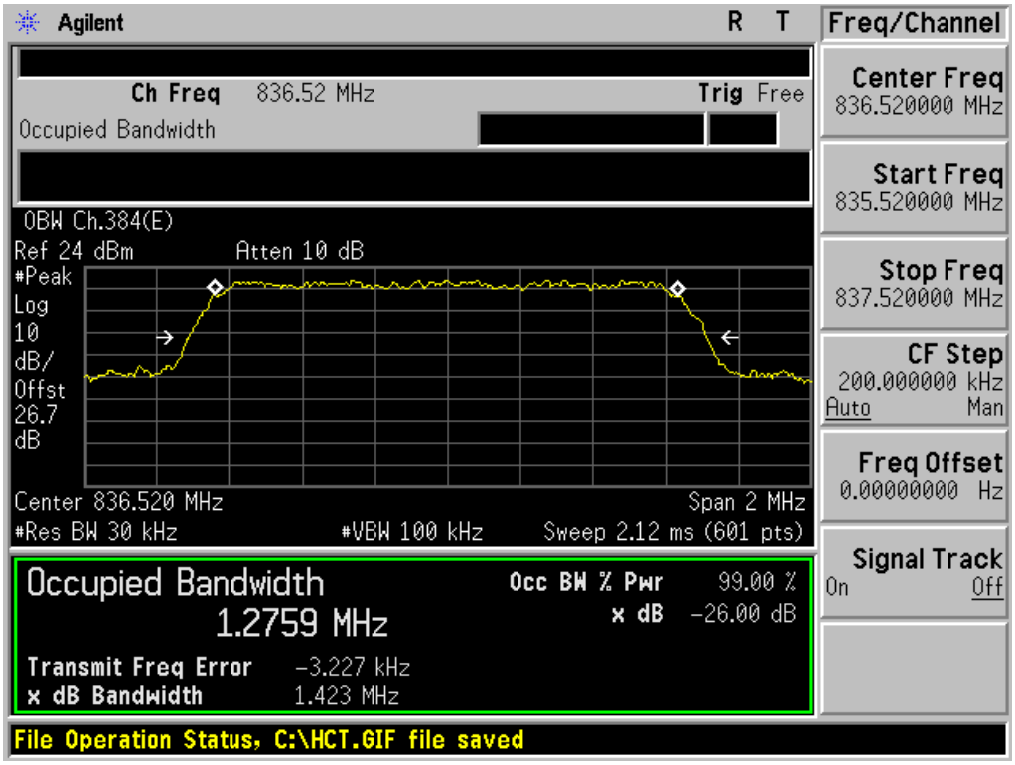
■ CDMA MODE (777 CH.) Occupied Bandwidth



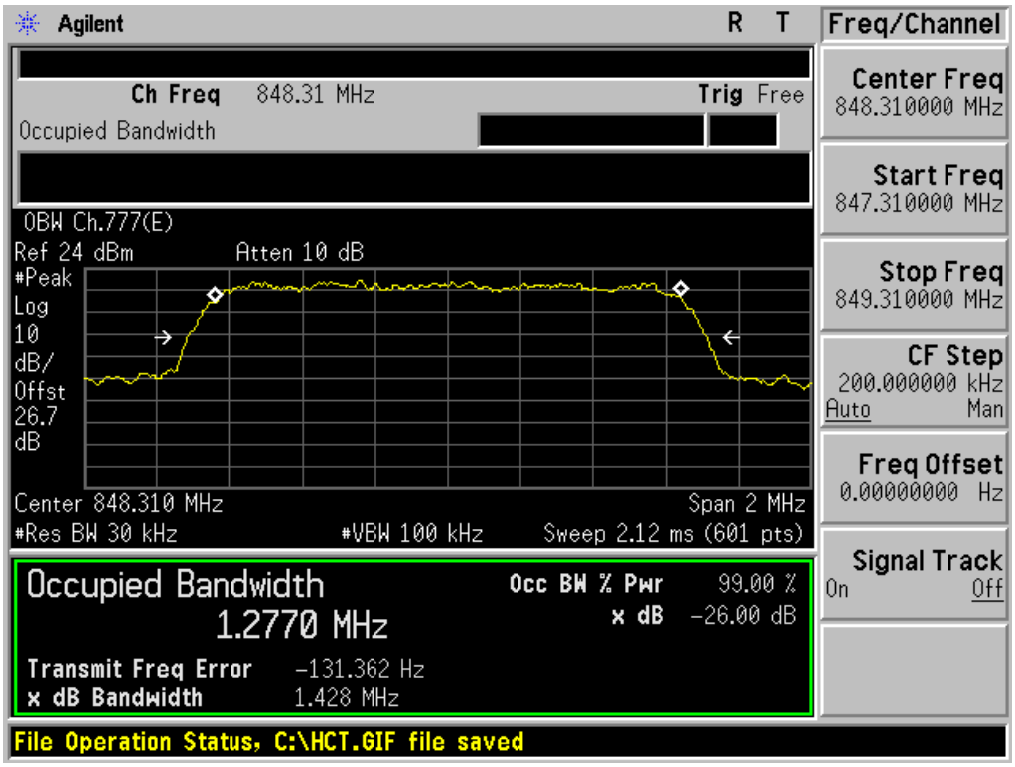
■ CDMA EVDO_Rev.0 MODE (1013 CH.) Occupied Bandwidth



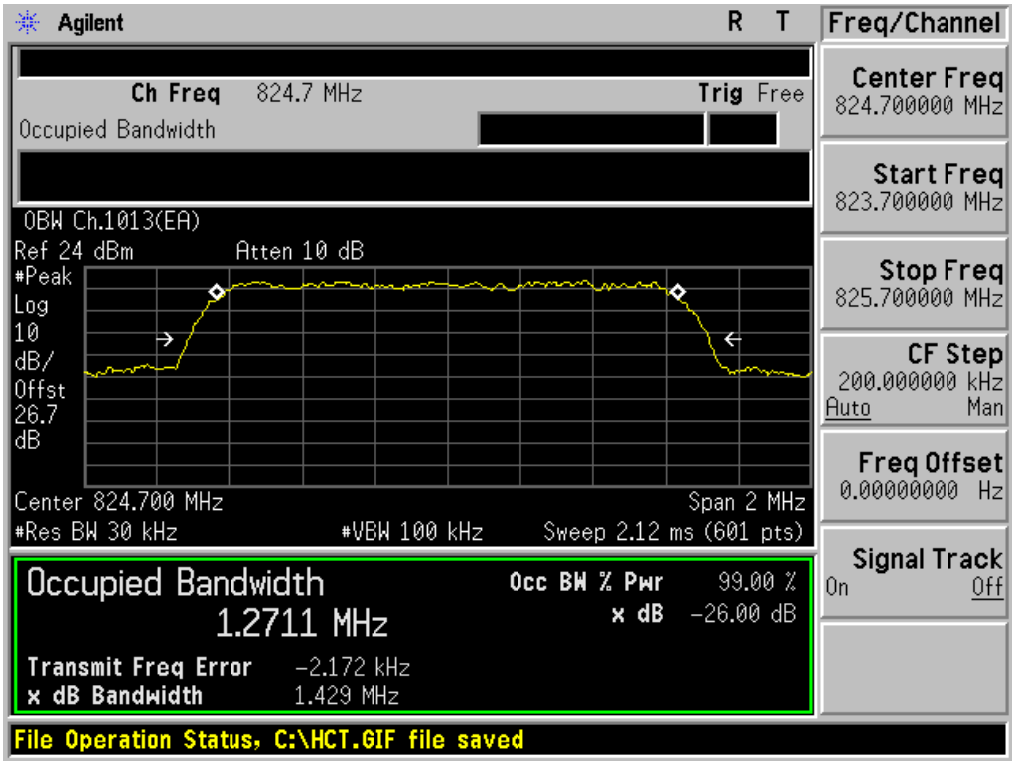
■ CDMA EVDO_Rev.0 MODE (384 CH.) Occupied Bandwidth



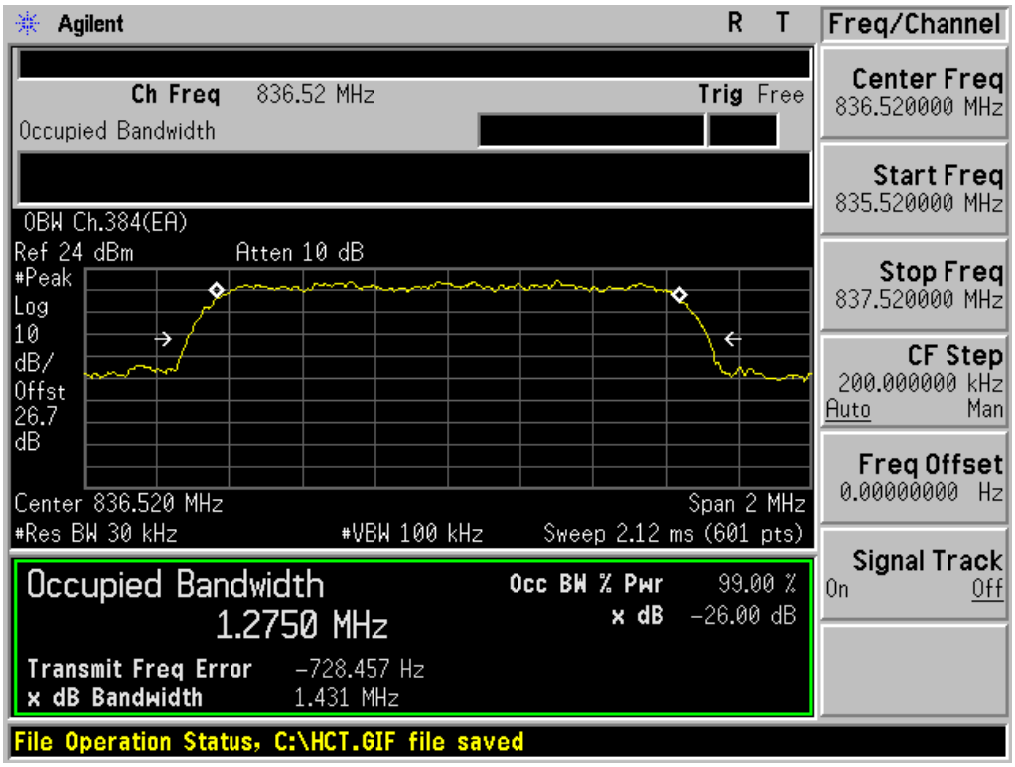
■ CDMA EVDO_Rev.0 MODE (777 CH.) Occupied Bandwidth



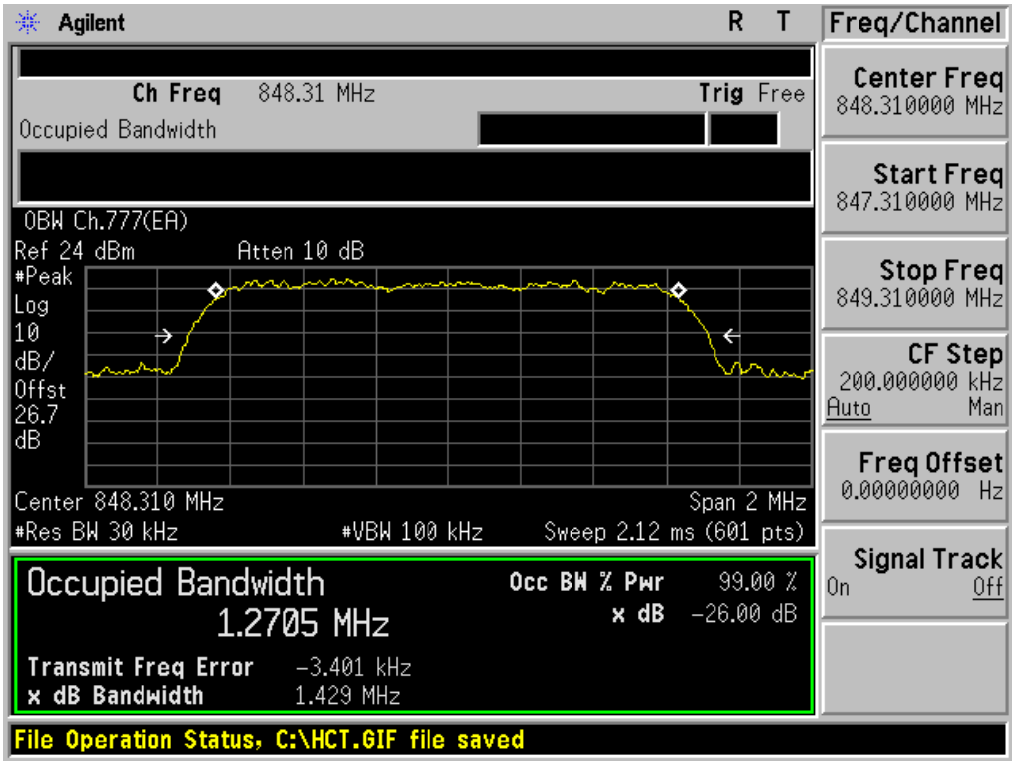
■ CDMA EVDO_Rev.A MODE (1013 CH.) Occupied Bandwidth



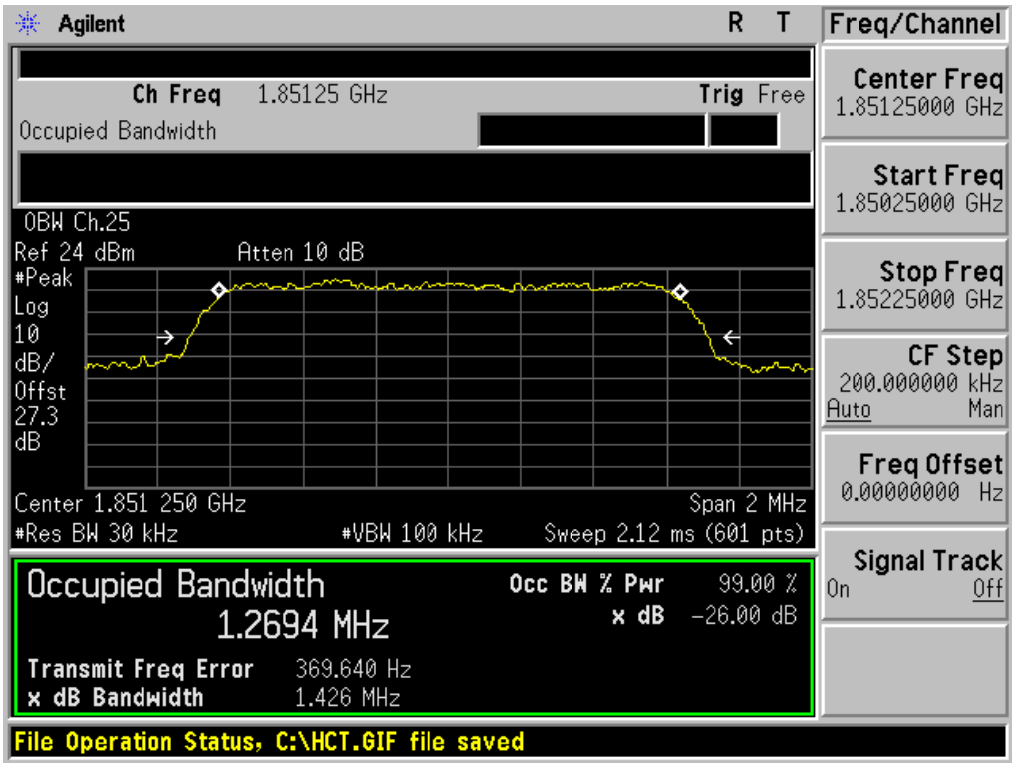
■ CDMA EVDO_Rev.A MODE (384 CH.) Occupied Bandwidth



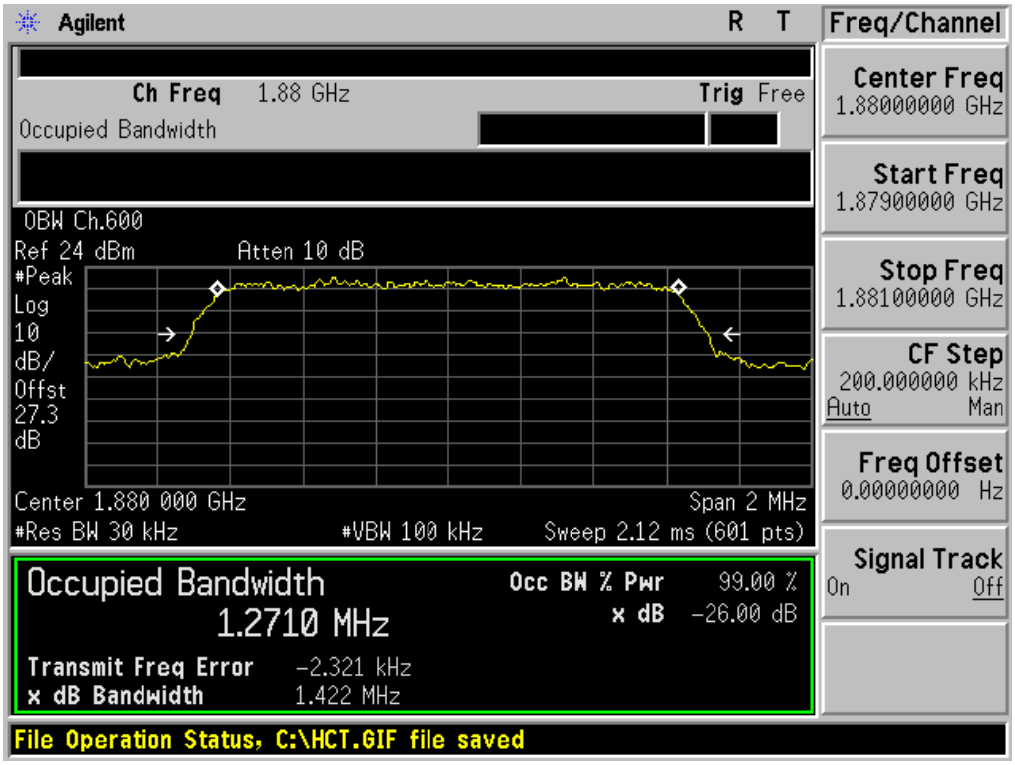
■ CDMA EVDO_Rev.A MODE (777 CH.) Occupied Bandwidth



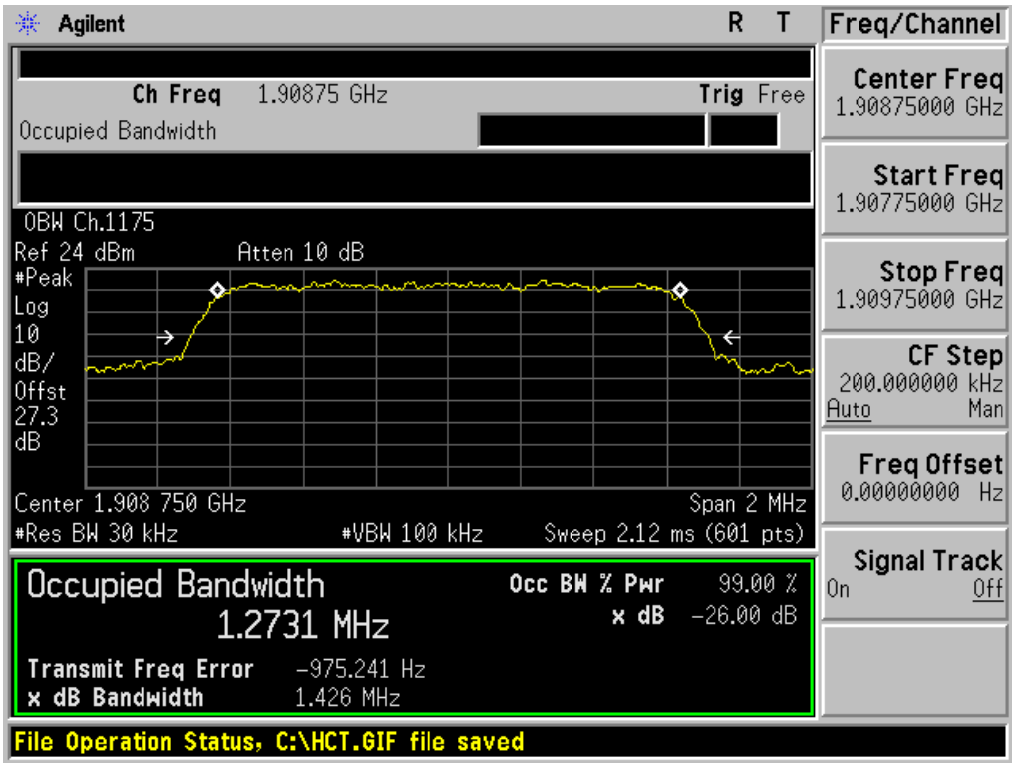
■ PCS MODE (25 CH.) Occupied Bandwidth



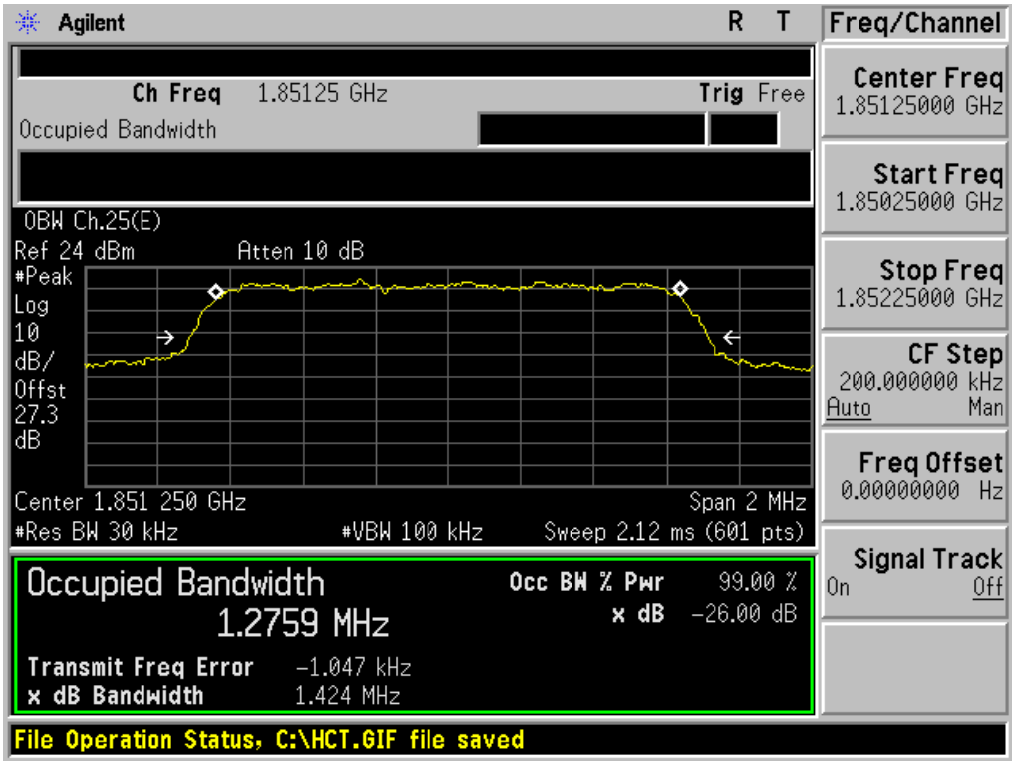
■ PCS MODE (600 CH.) Occupied Bandwidth



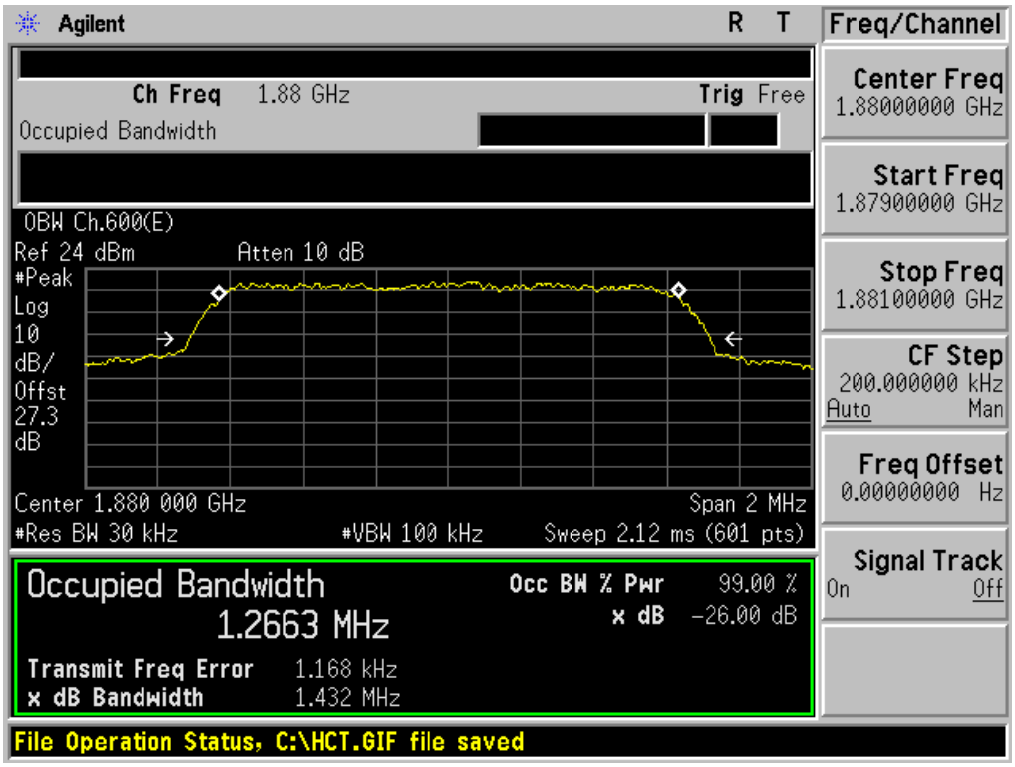
■ PCS MODE (1175 CH.) Occupied Bandwidth



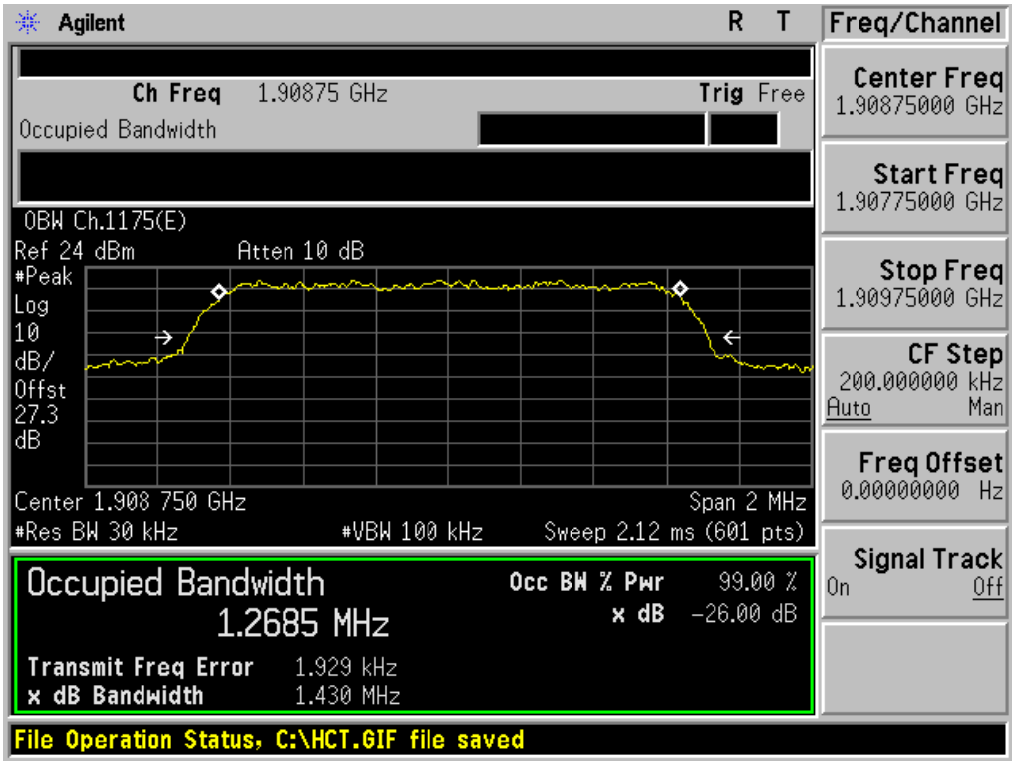
■ PCS EVDO_Rev.0 MODE (25 CH.) Occupied Bandwidth



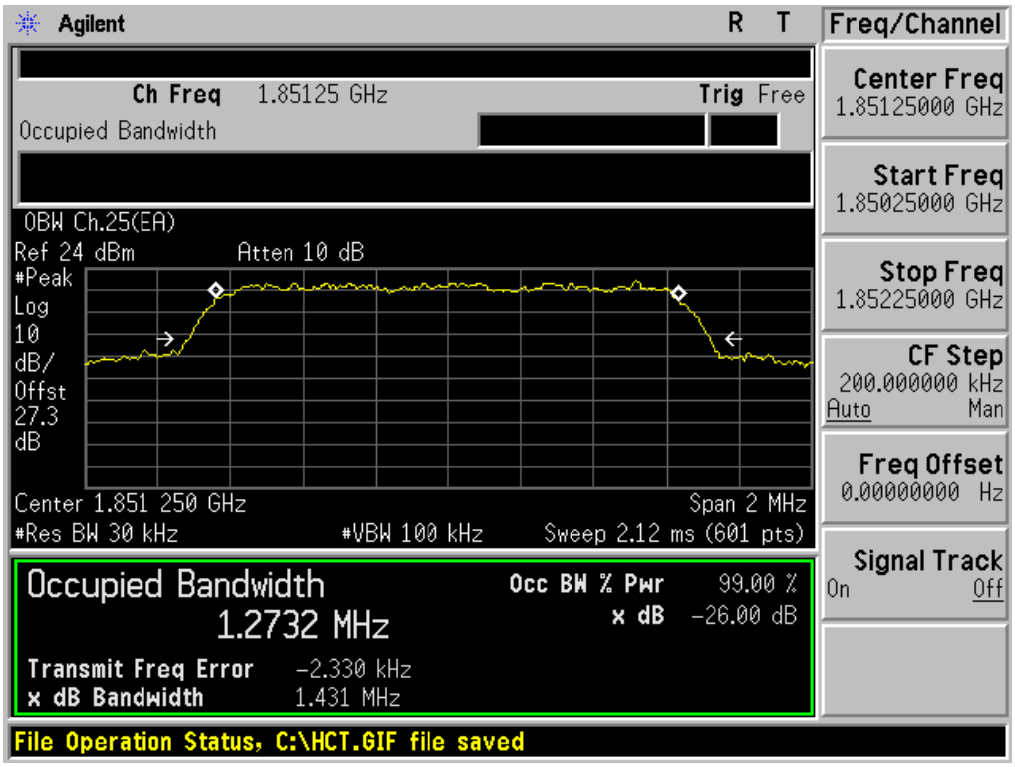
■ PCS EVDO_Rev.0 MODE (600 CH.) Occupied Bandwidth



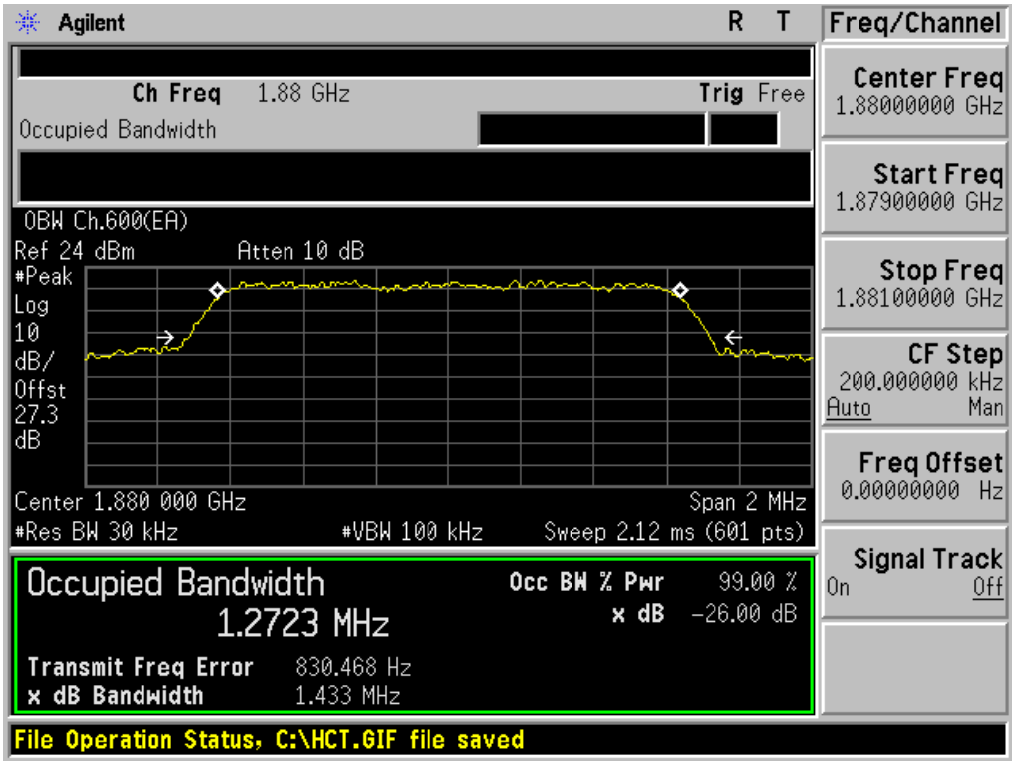
■ PCS EVDO_Rev.0 MODE (1175 CH.) Occupied Bandwidth



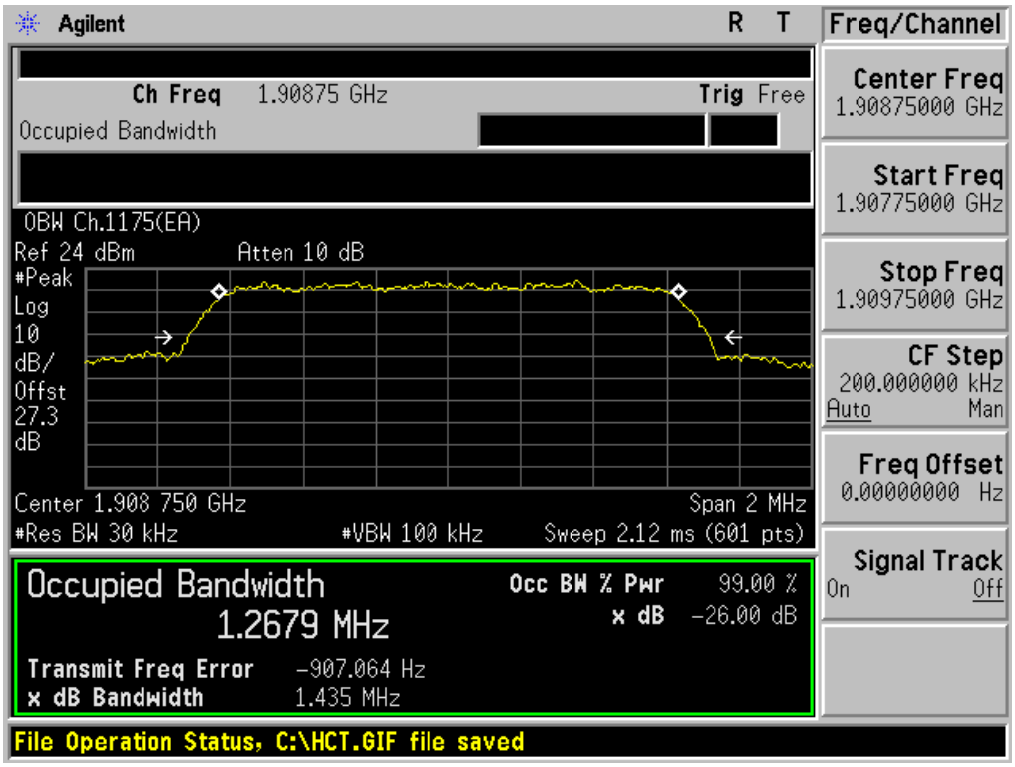
■ PCS EVDO_Rev.A MODE (25 CH.) Occupied Bandwidth



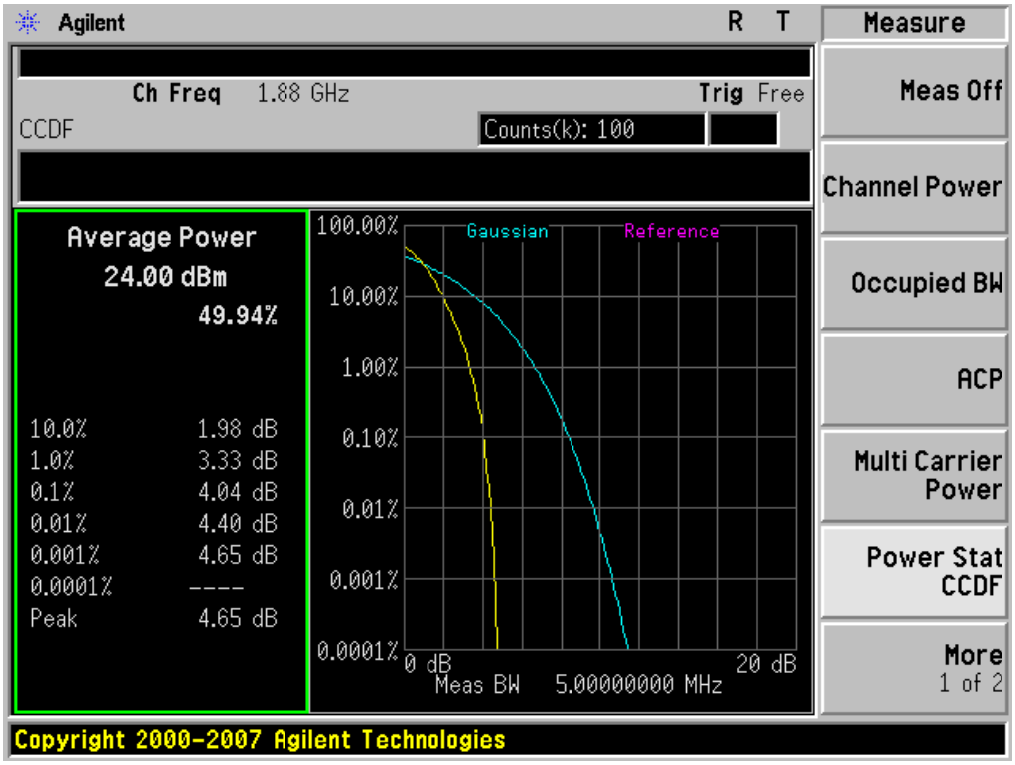
■ PCS EVDO_Rev.A MODE (600 CH.) Occupied Bandwidth



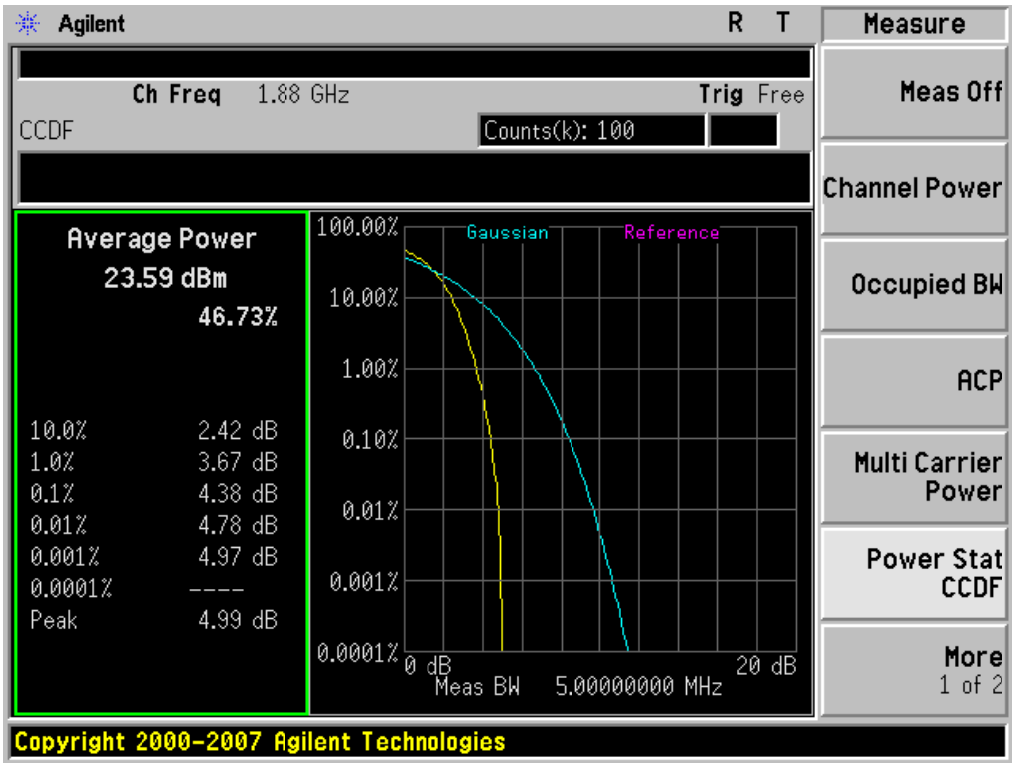
■ PCS EVDO_Rev.A MODE (1175 CH.) Occupied Bandwidth



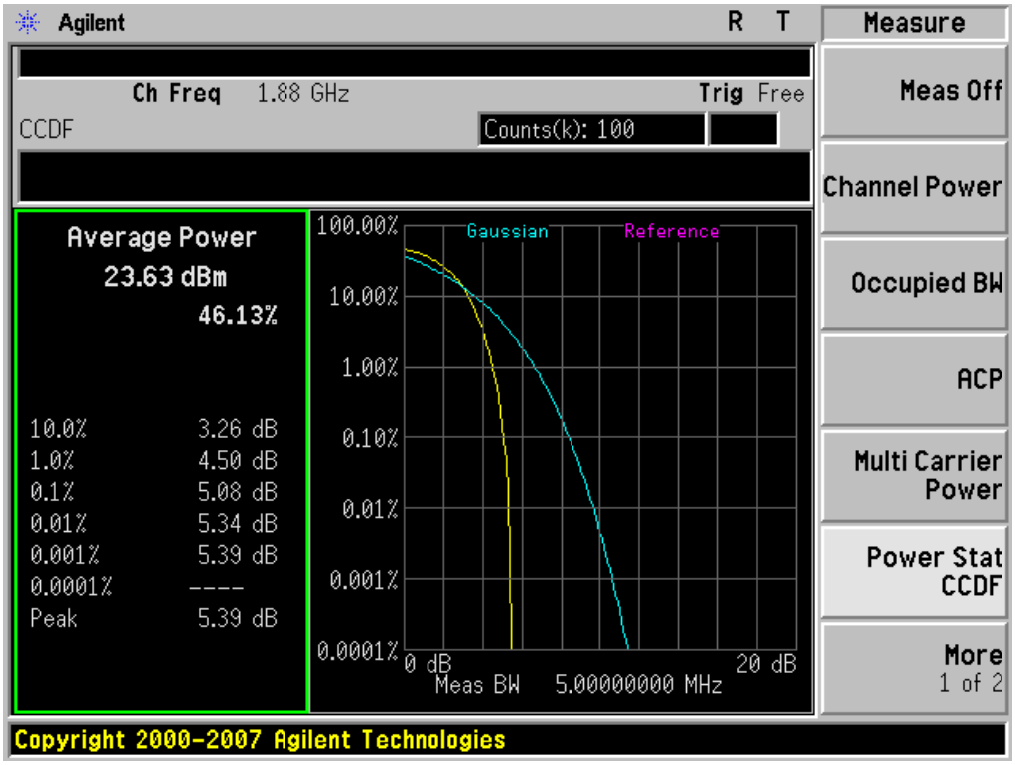
■ PCS CDMA MODE (600 CH.) Peak-to-Average Ratio



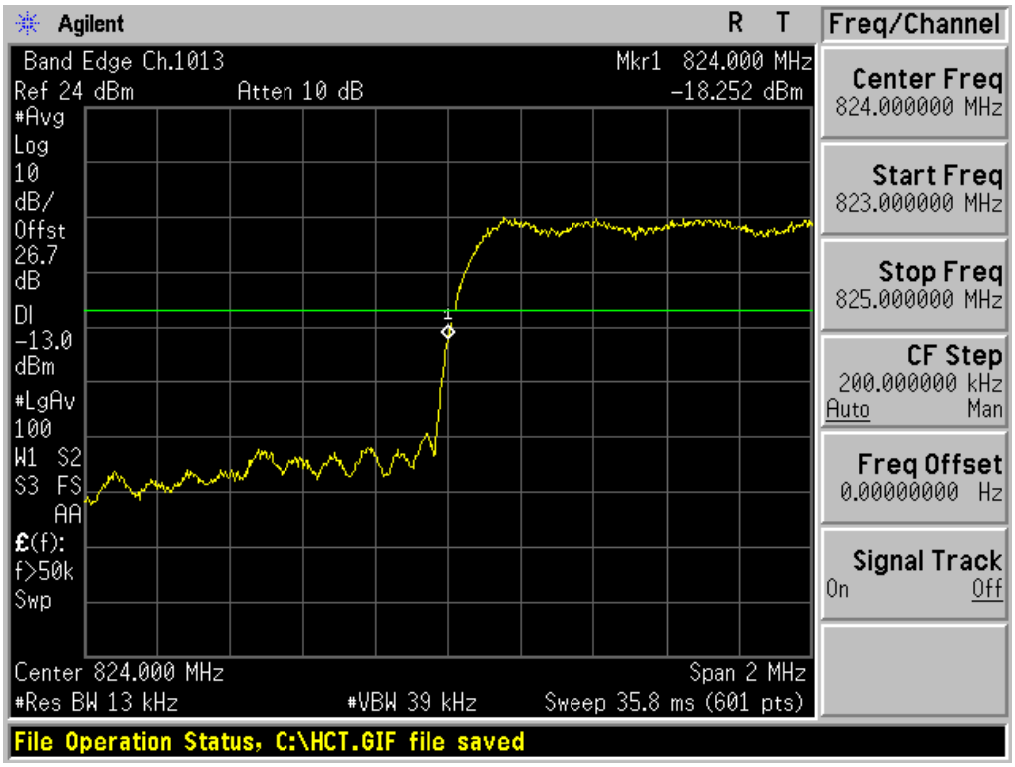
■ PCS CDMA EVDO_Rev.0 MODE (600 CH.) Peak-to-Average Ratio



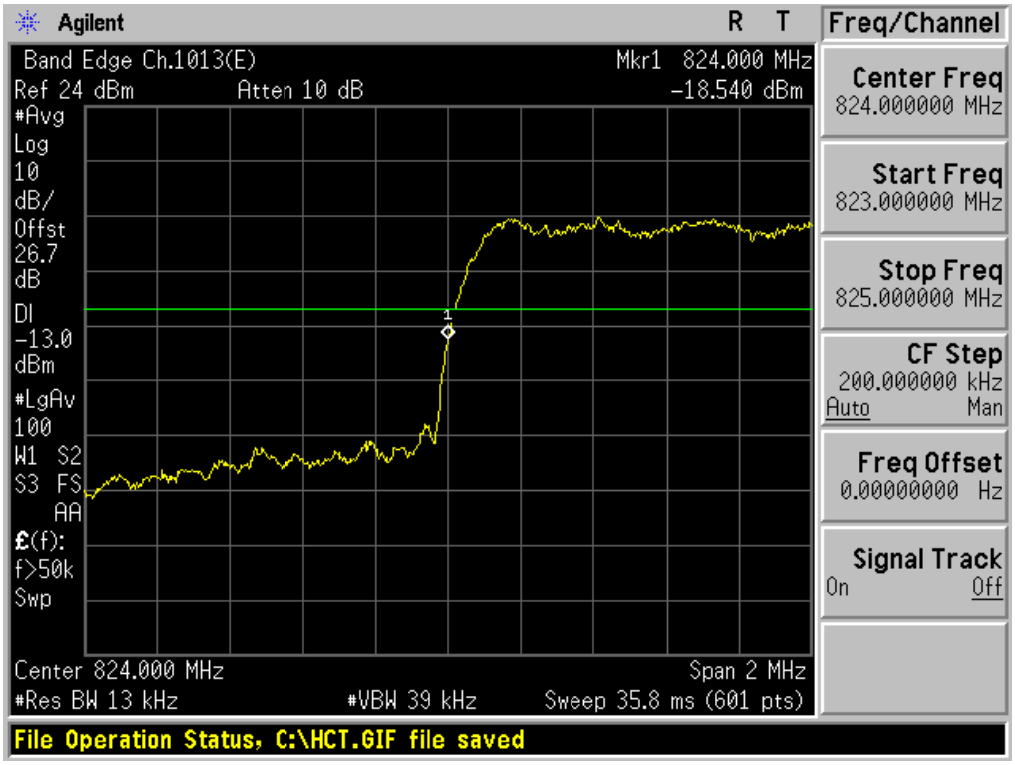
■ PCS CDMA EVDO_Rev.A MODE (600 CH.) Peak-to-Average Ratio



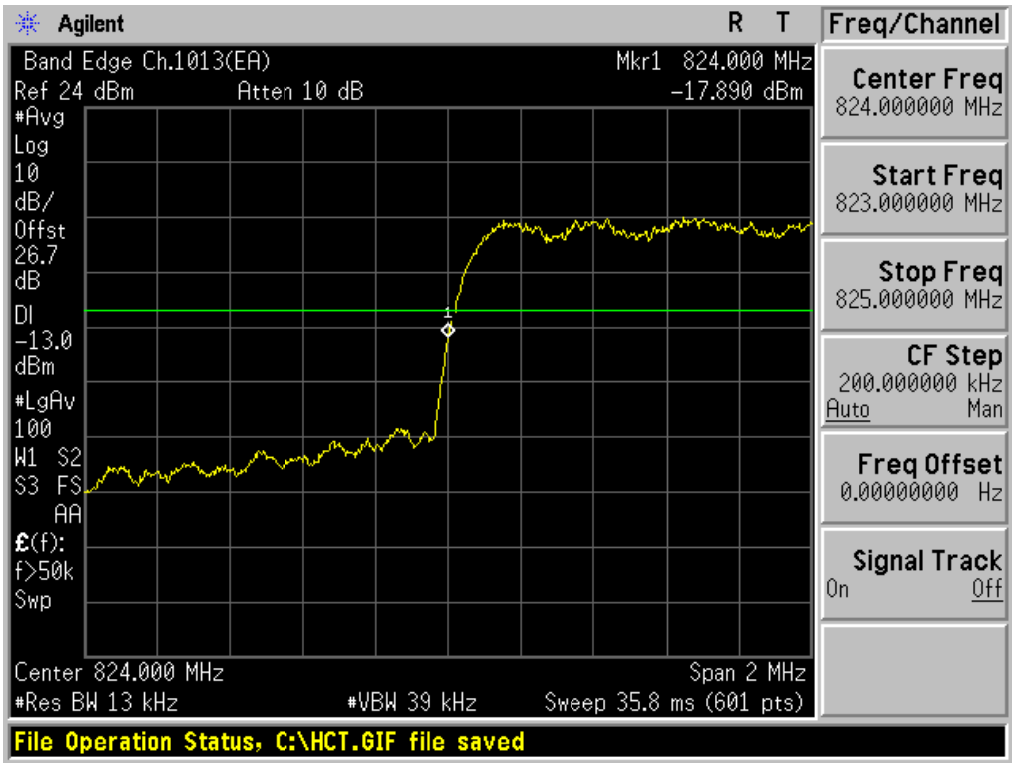
■ CDMA MODE (1013 CH.) Block Edge



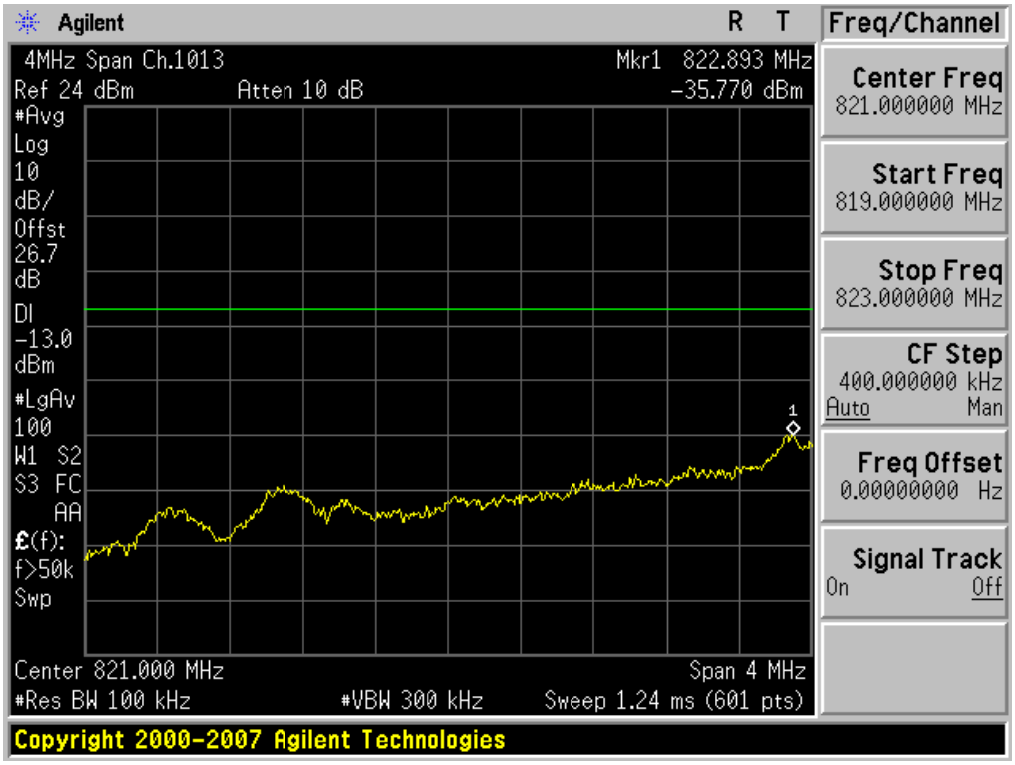
■ CDMA EVDO_Rev.0 MODE (1013 CH.) Block Edge



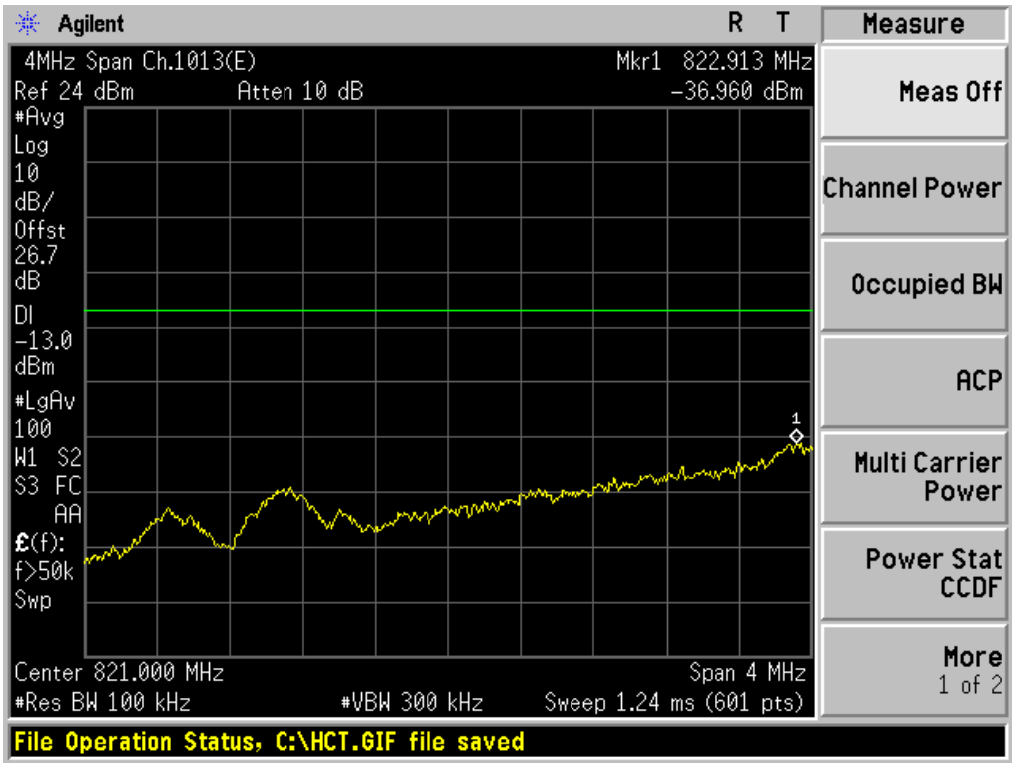
■ CDMA EVDO_Rev.A MODE (1013 CH.) Block Edge



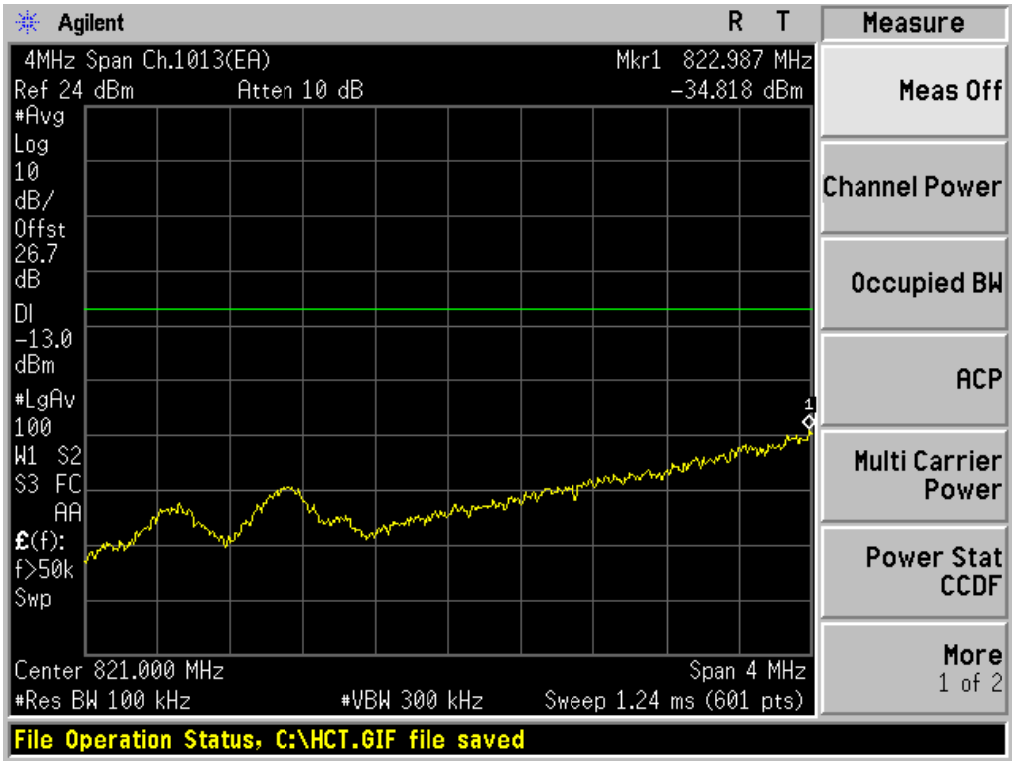
■ CDMA MODE (1013 CH.) 4 MHz Span



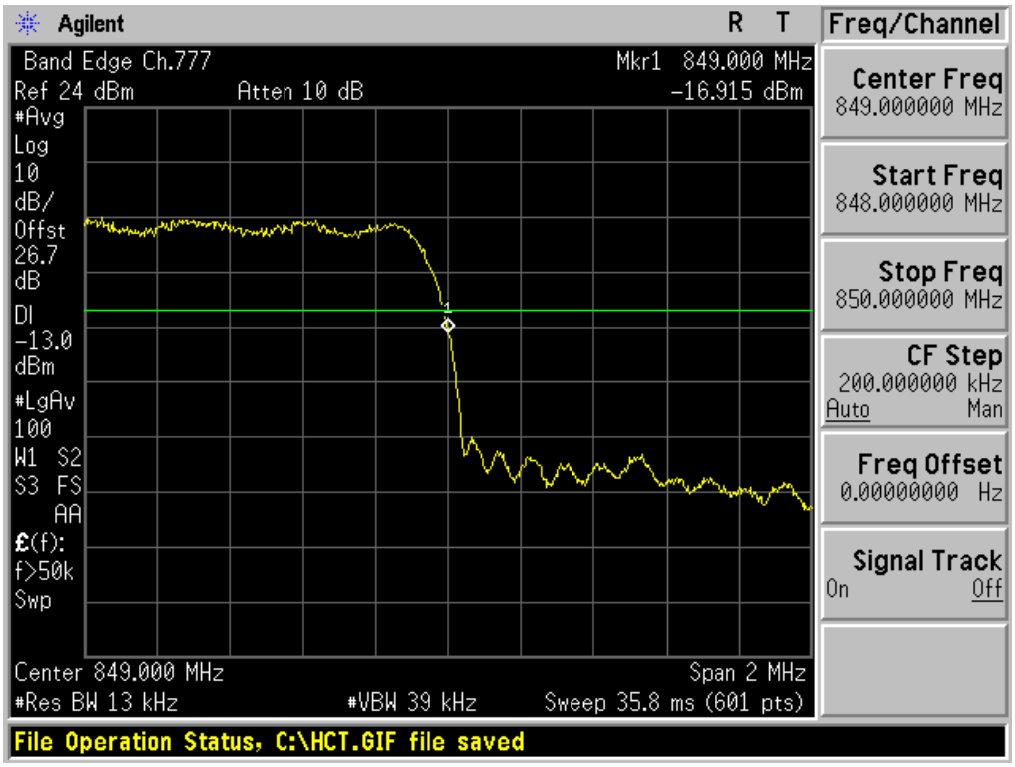
■ CDMA EVDO_Rev.0 MODE (1013 CH.) 4 MHz Span



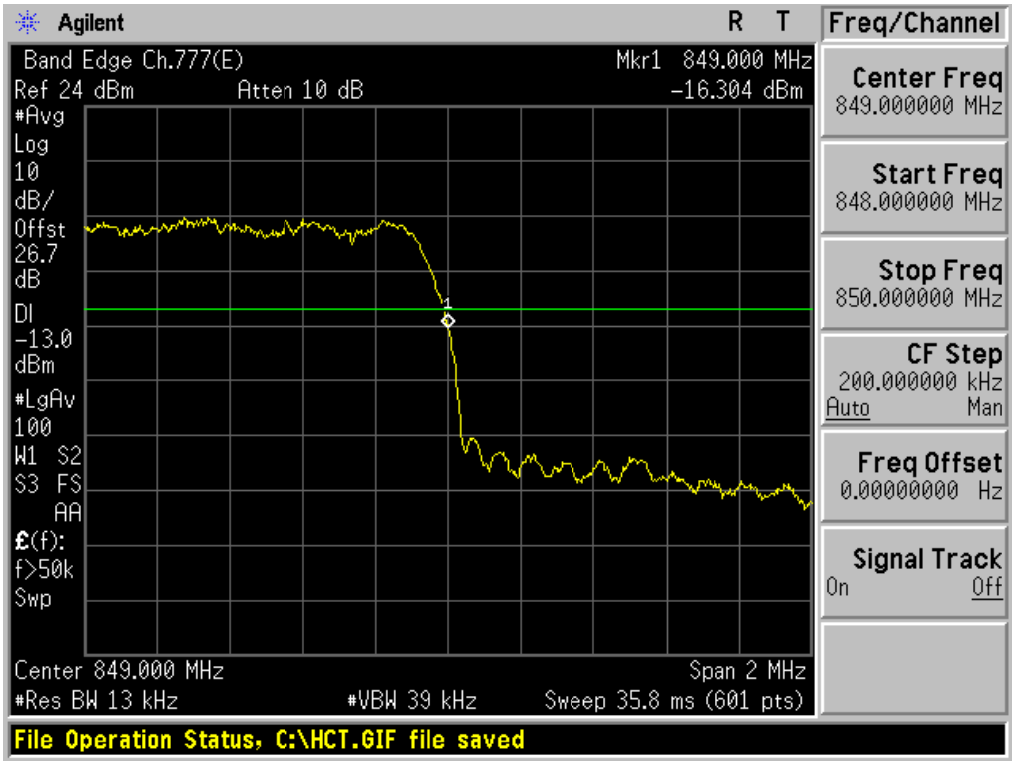
■ CDMA EVDO_Rev.A MODE (1013 CH.) 4 MHz Span



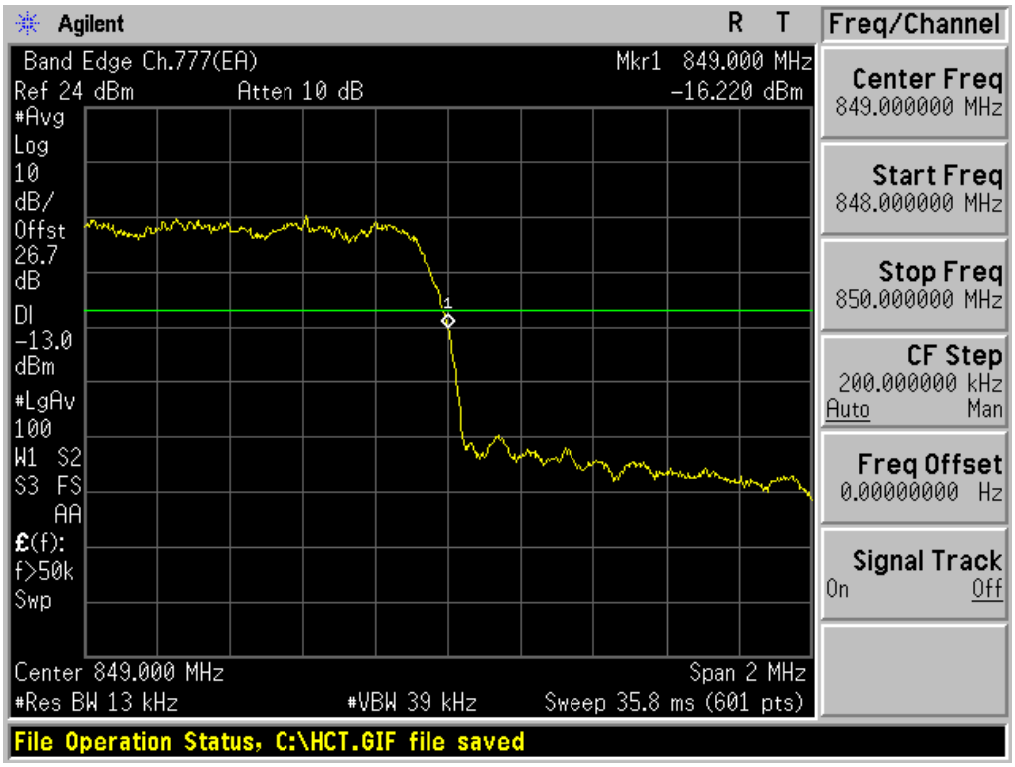
■ CDMA MODE (777 CH.) Block Edge



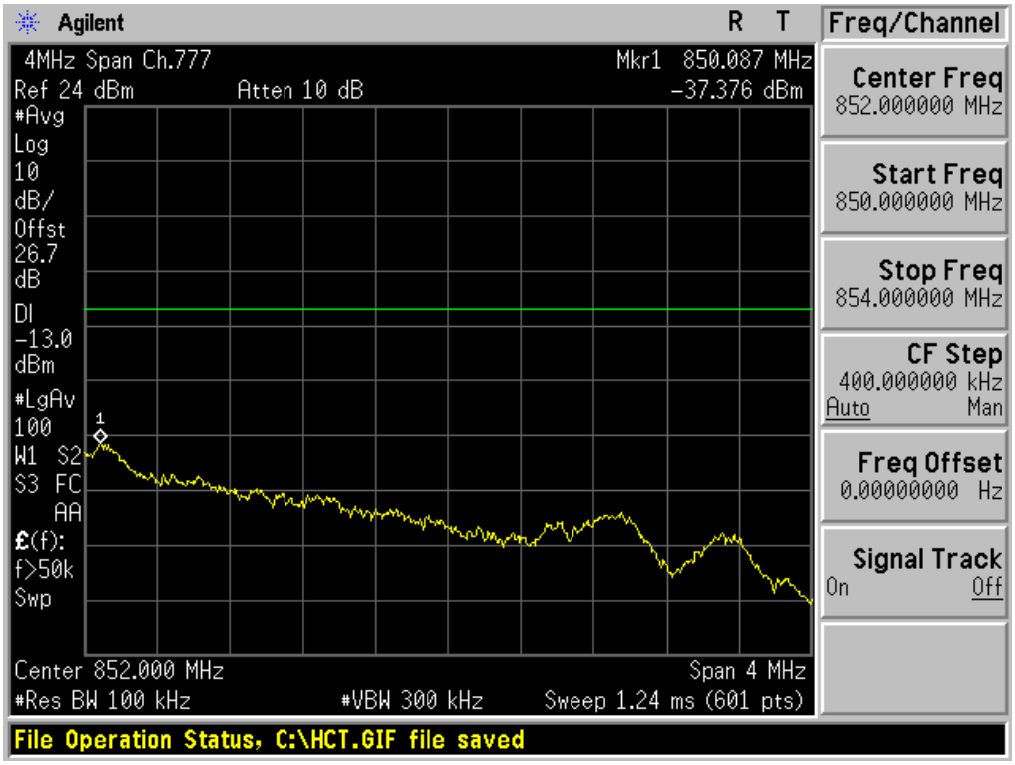
■ CDMA EVDO_Rev.0 MODE (777 CH.) Block Edge



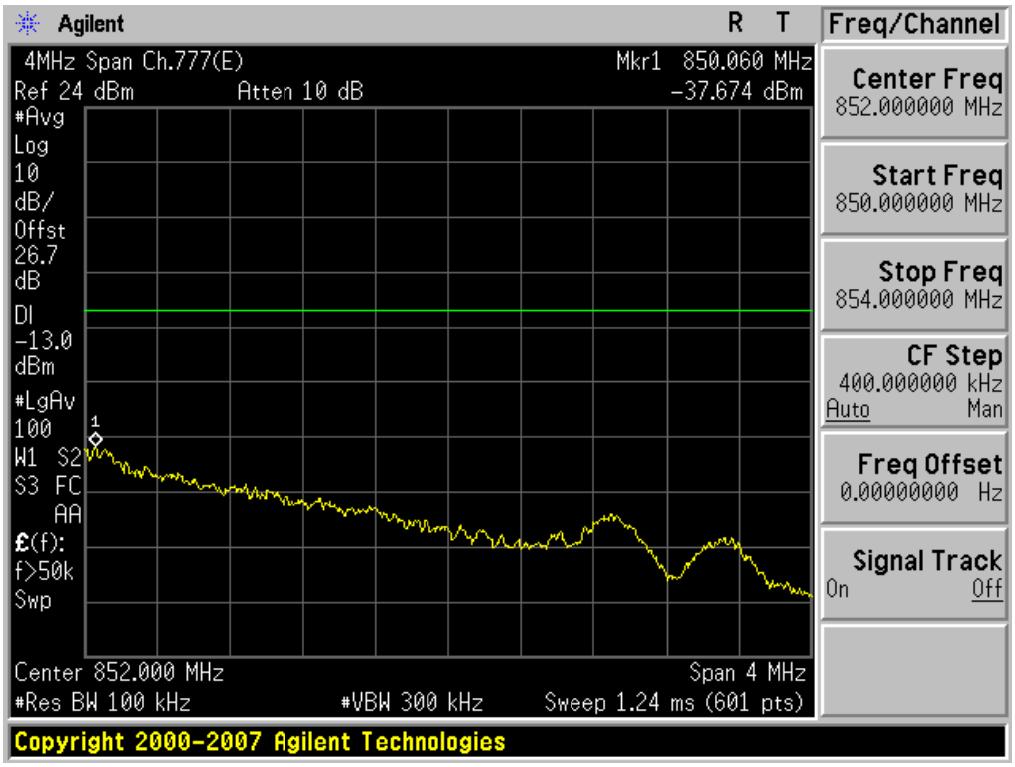
■ CDMA EVDO_Rev.A MODE (777 CH.) Block Edge



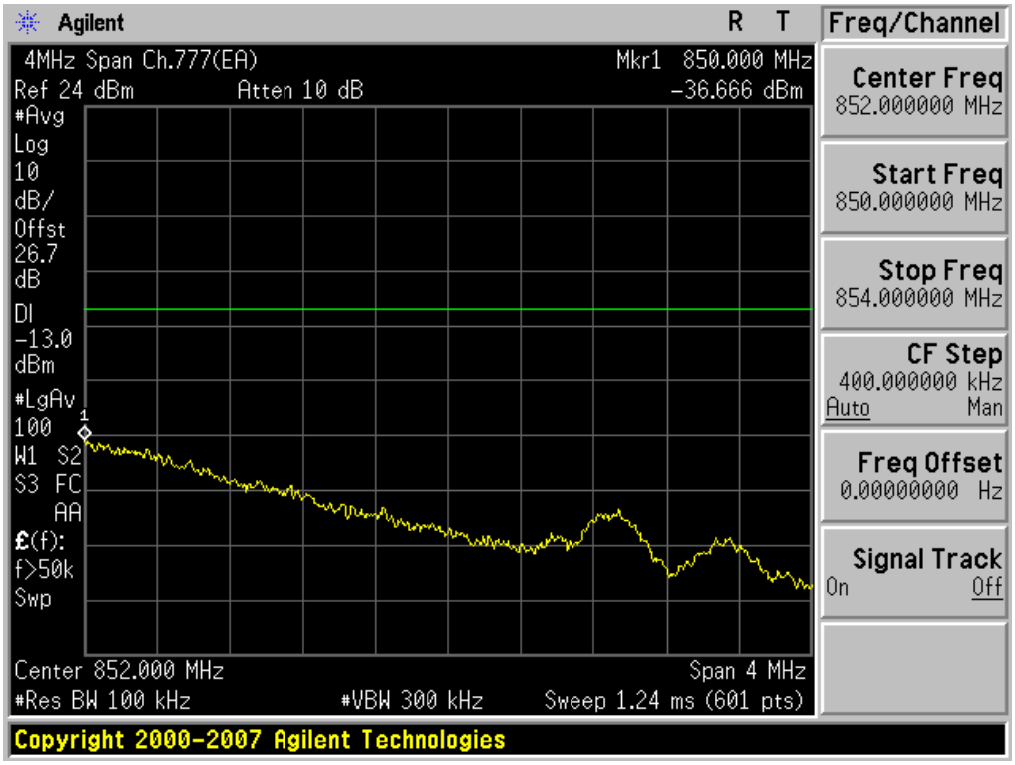
■ CDMA MODE (777 CH.) 4 MHz Span



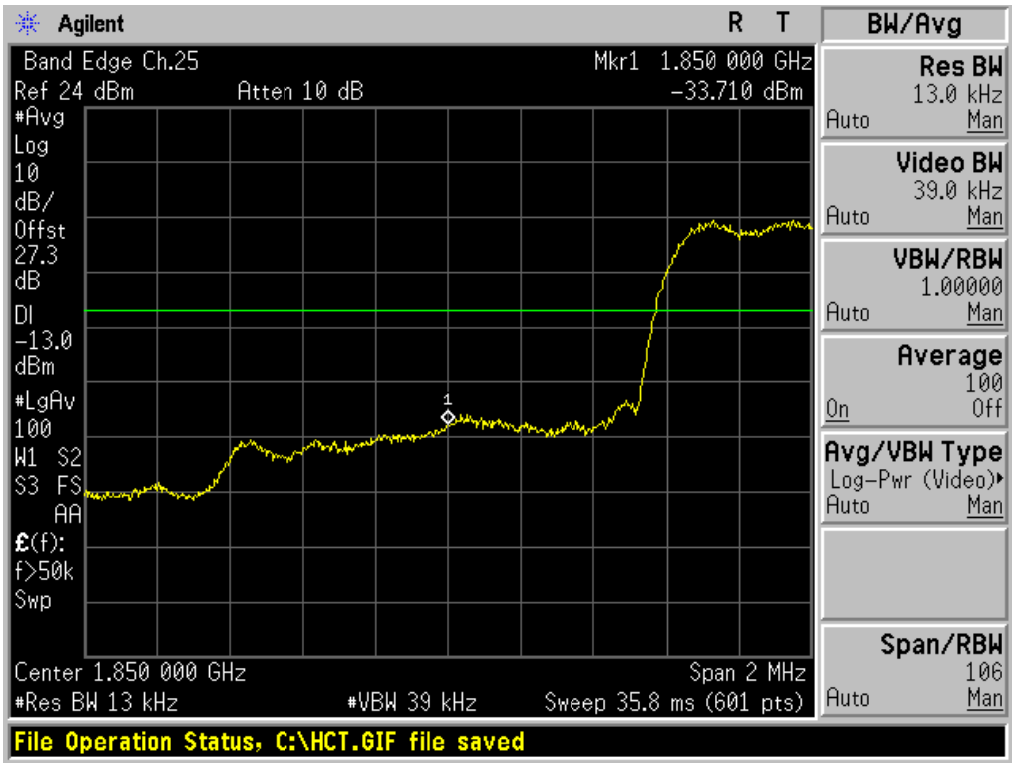
■ CDMA EVDO_Rev.0 MODE (777 CH.) 4 MHz Span



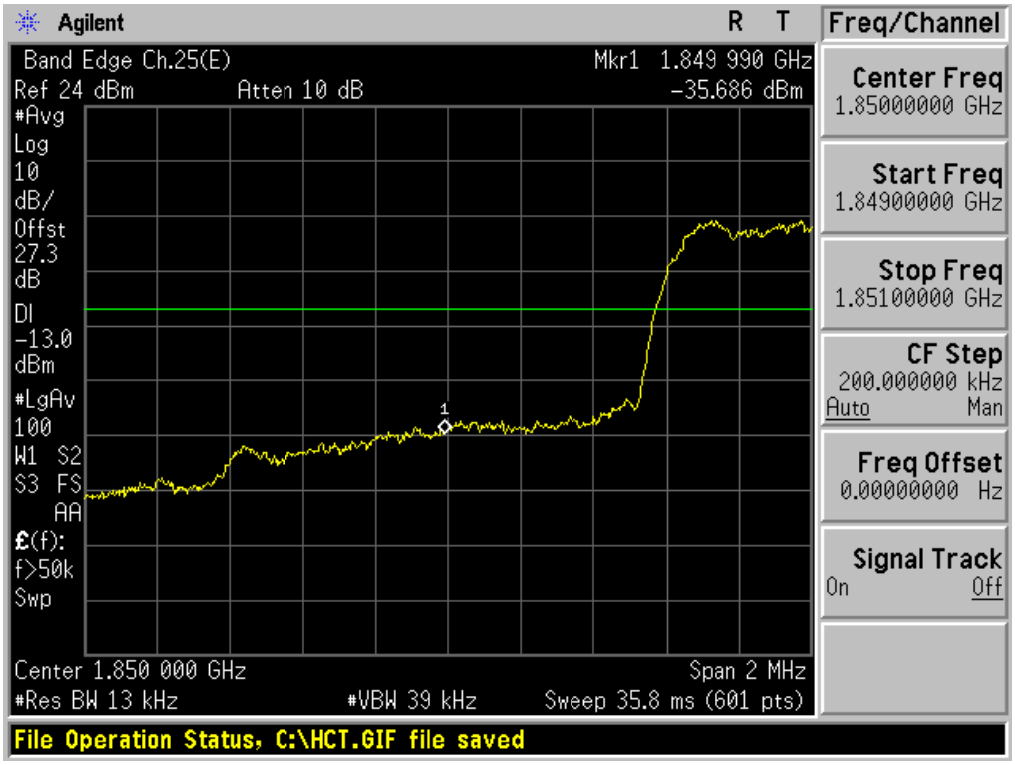
■ CDMA EVDO_Rev.A MODE (777 CH.) 4 MHz Span



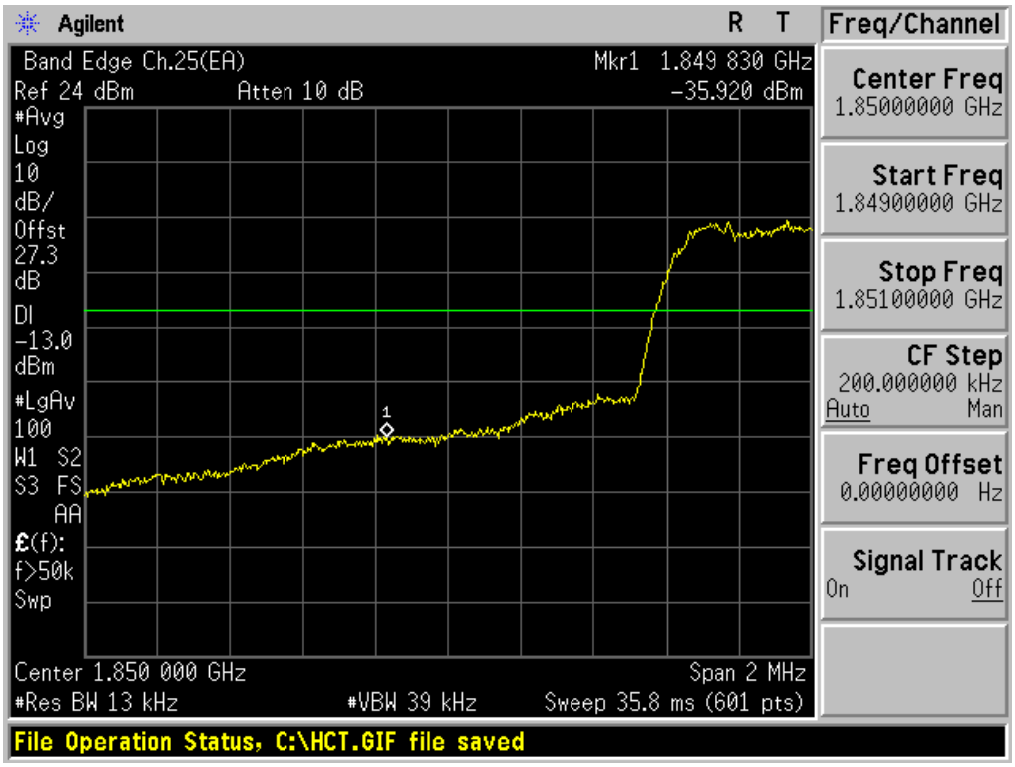
■ PCS MODE (25 CH.) Block Edge pan



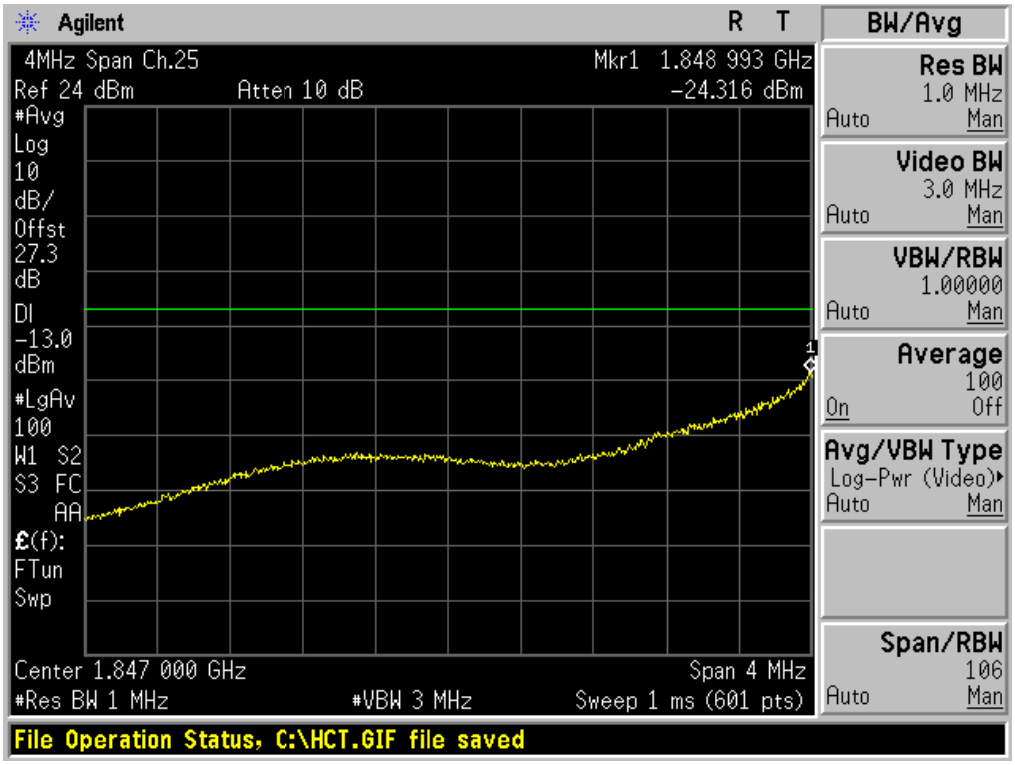
■ PCS EVDO_Rev.0 MODE (25 CH.) Block Edge



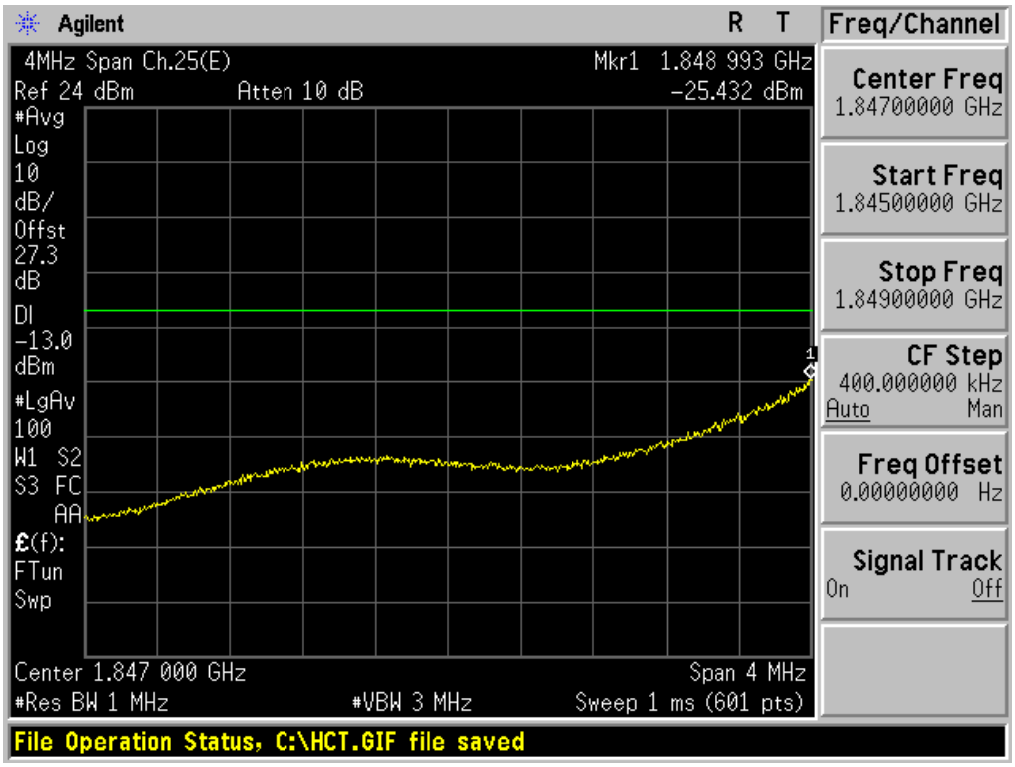
■ PCS EVDO_Rev.A MODE (25 CH.) Block Edge



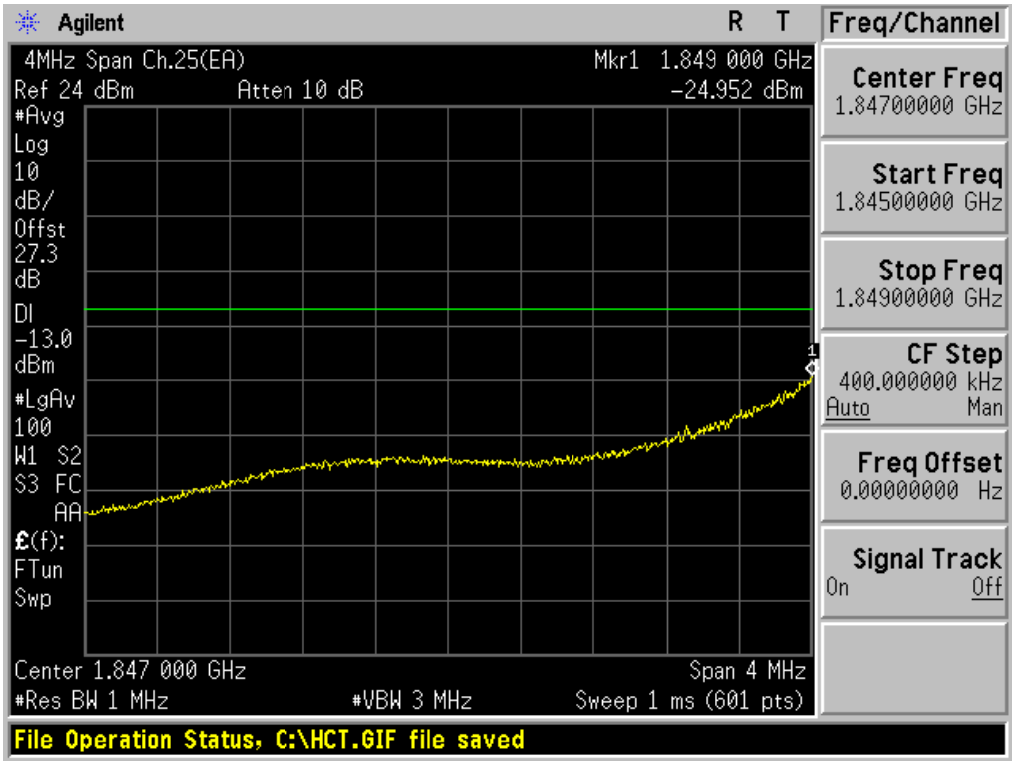
■ PCS MODE (25 CH.) 4 MHz Span



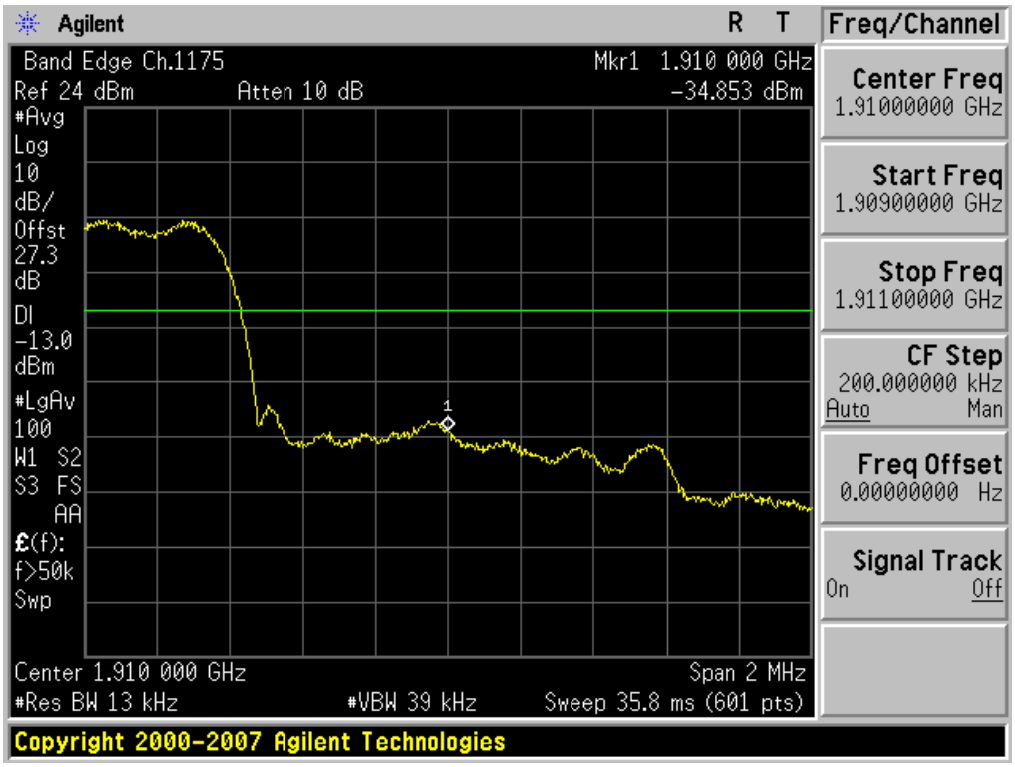
■ PCS EVDO_Rev.0 MODE (25 CH.) 4 MHz Span



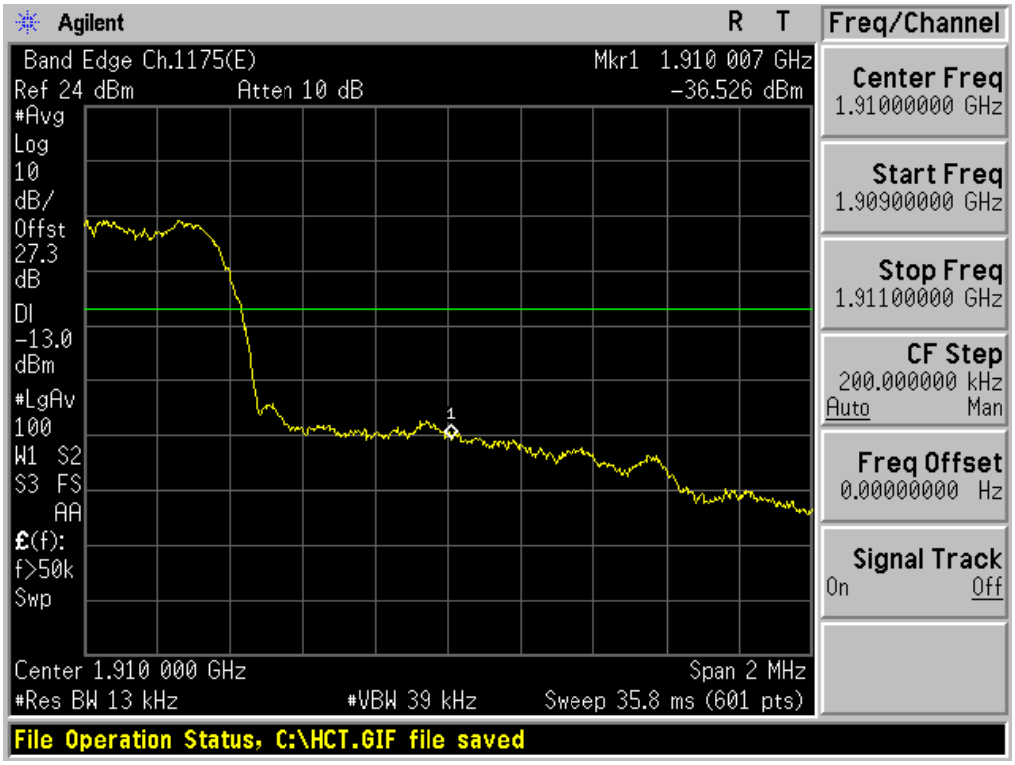
■ PCS EVDO_Rev.A MODE (25 CH.) 4 MHz Span



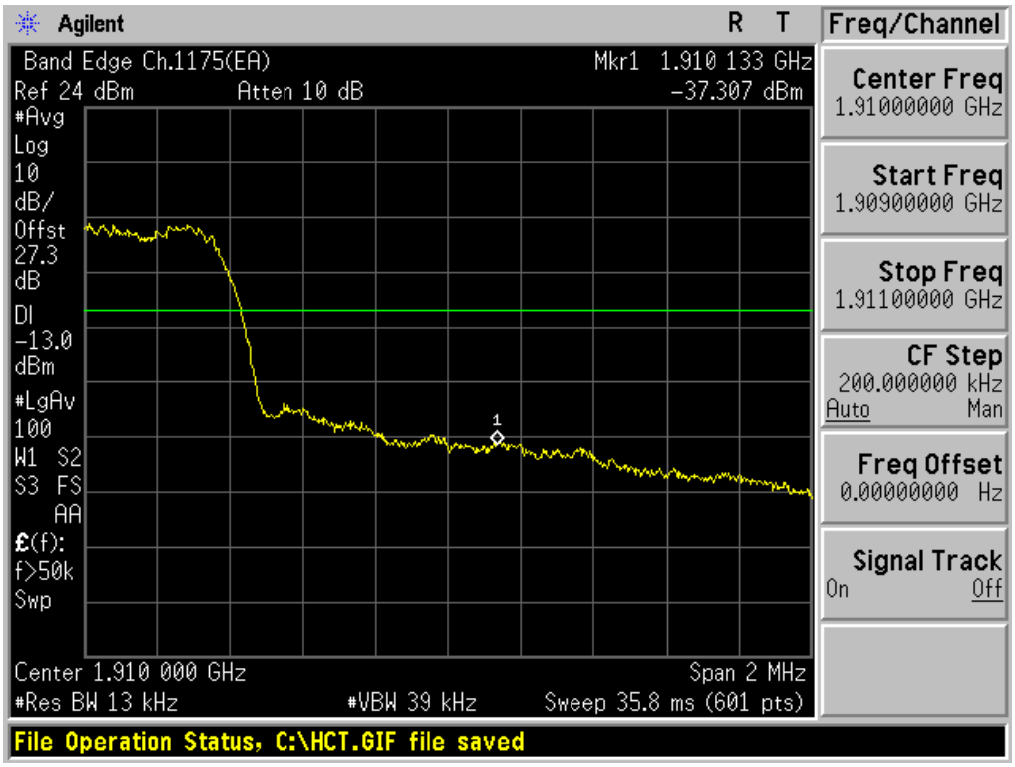
■ PCS MODE (1175 CH.) Block Edge



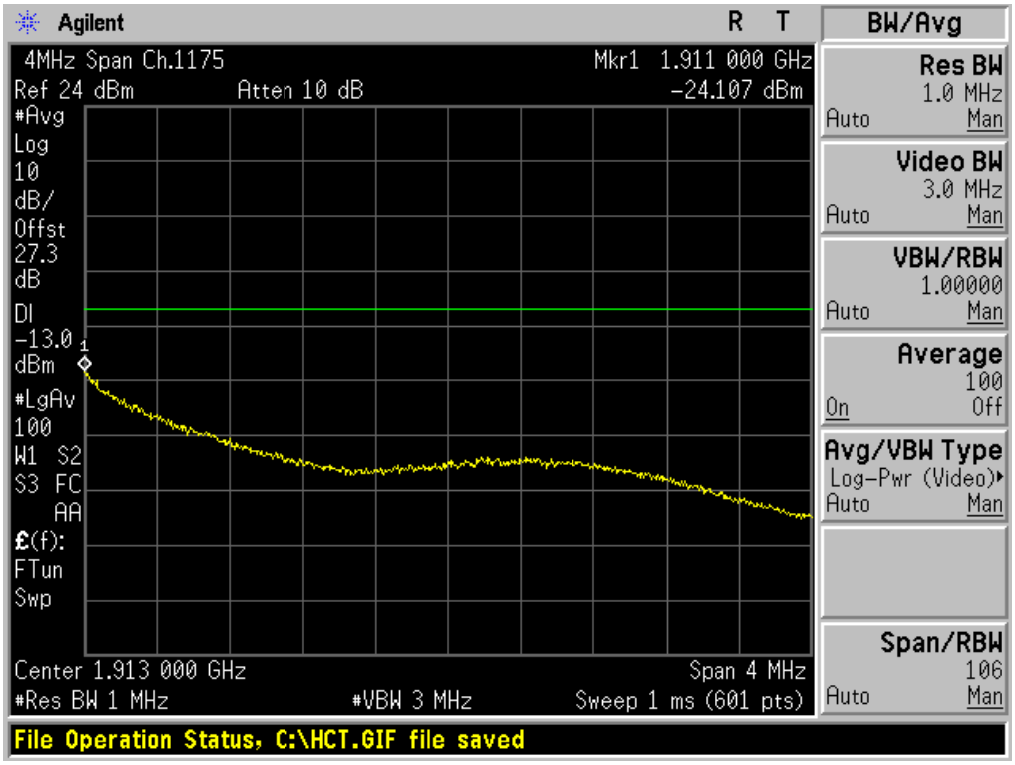
■ PCS EVDO_Rev.0 MODE (1175 CH.) Block Edge



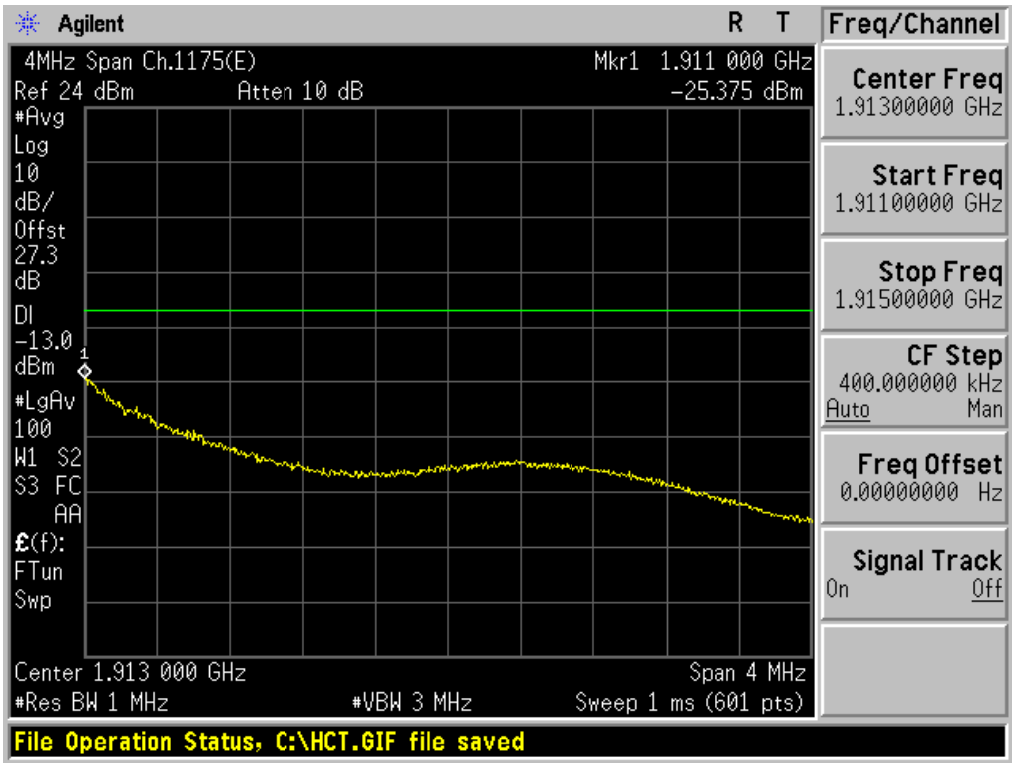
■ PCS EVDO_Rev.A MODE (1175 CH.) Block Edge



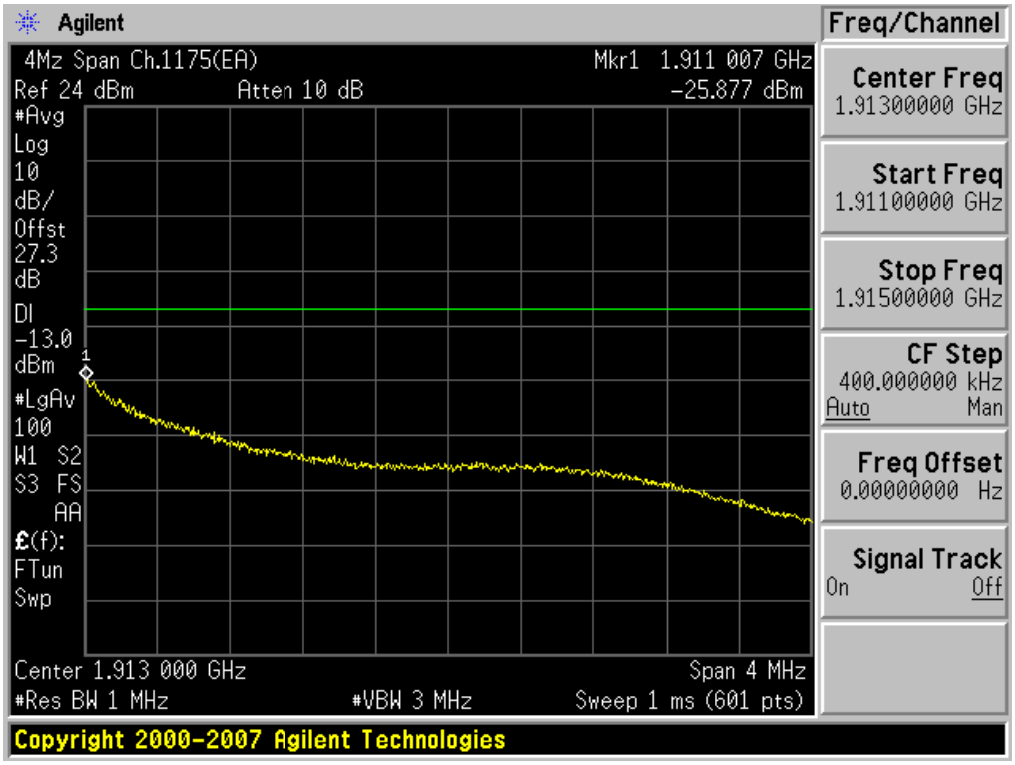
■ PCS MODE (1175 CH.) 4 MHz Span



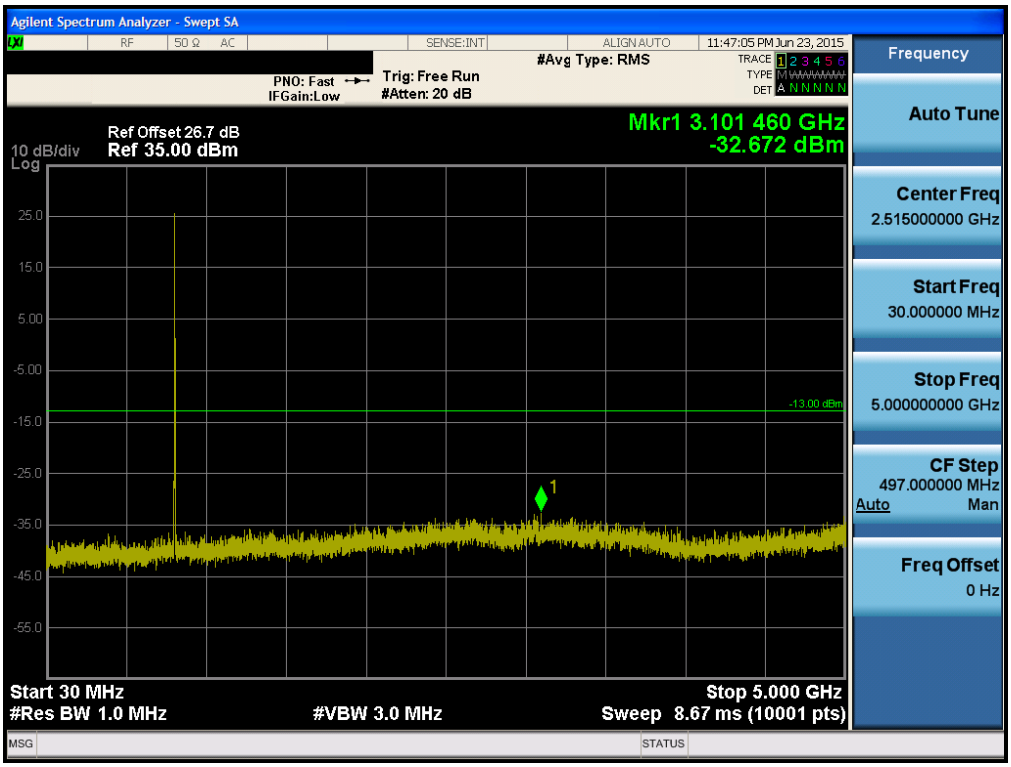
■ PCS EVDO_Rev.0 MODE (1175 CH.) 4 MHz Span



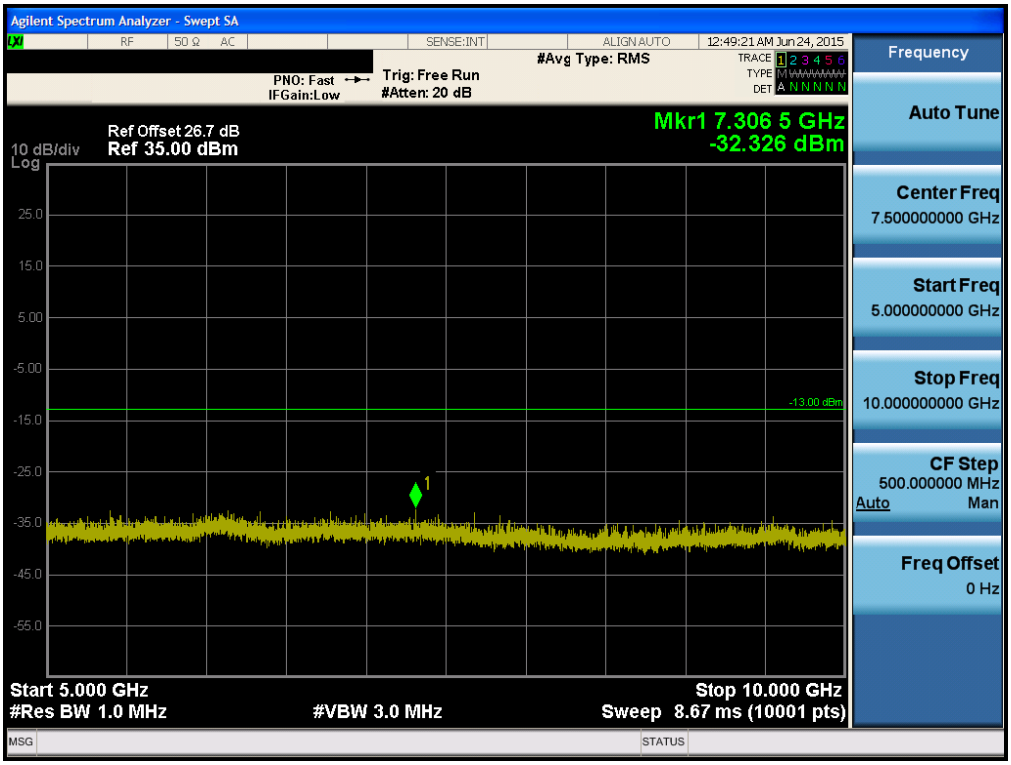
■ PCS EVDO_Rev.A MODE (1175 CH.) 4 MHz Span



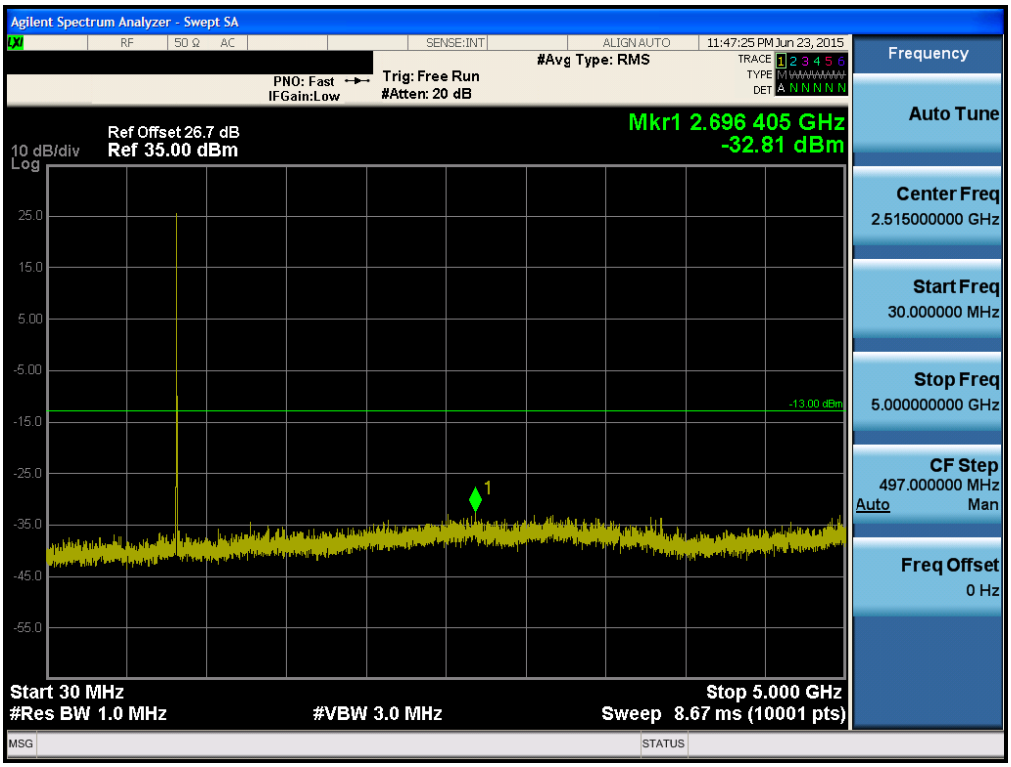
■ CDMA MODE (1013 CH.) Conducted Spurious Emissions – 1



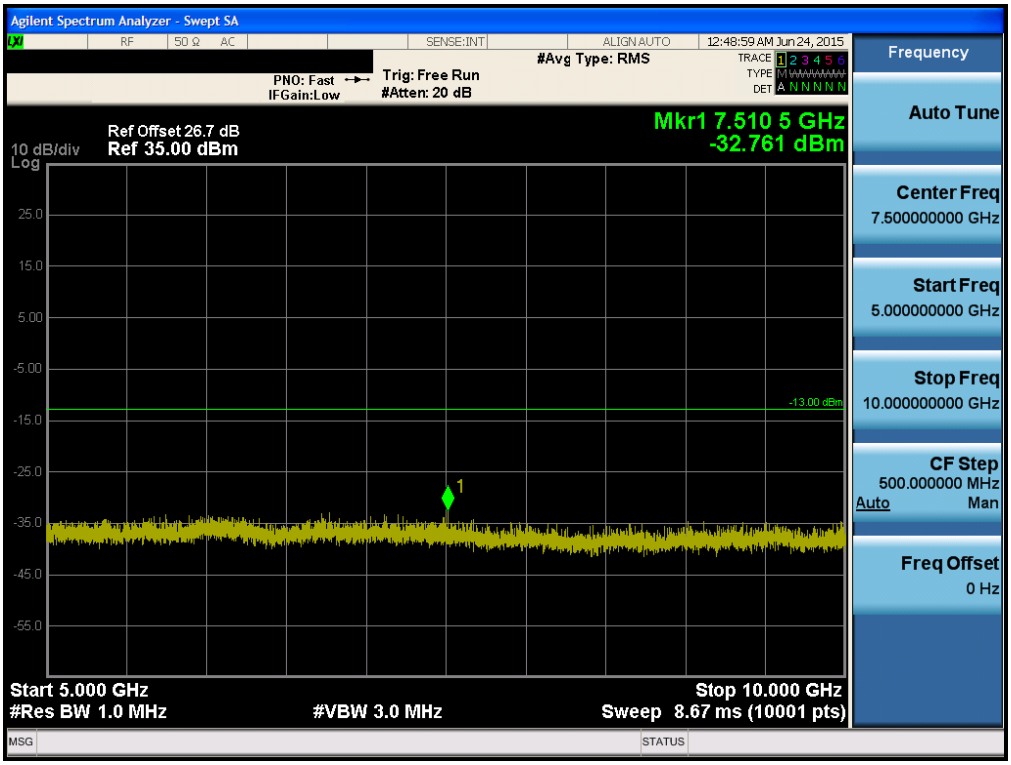
■ CDMA MODE (1013 CH.) Conducted Spurious Emissions – 2



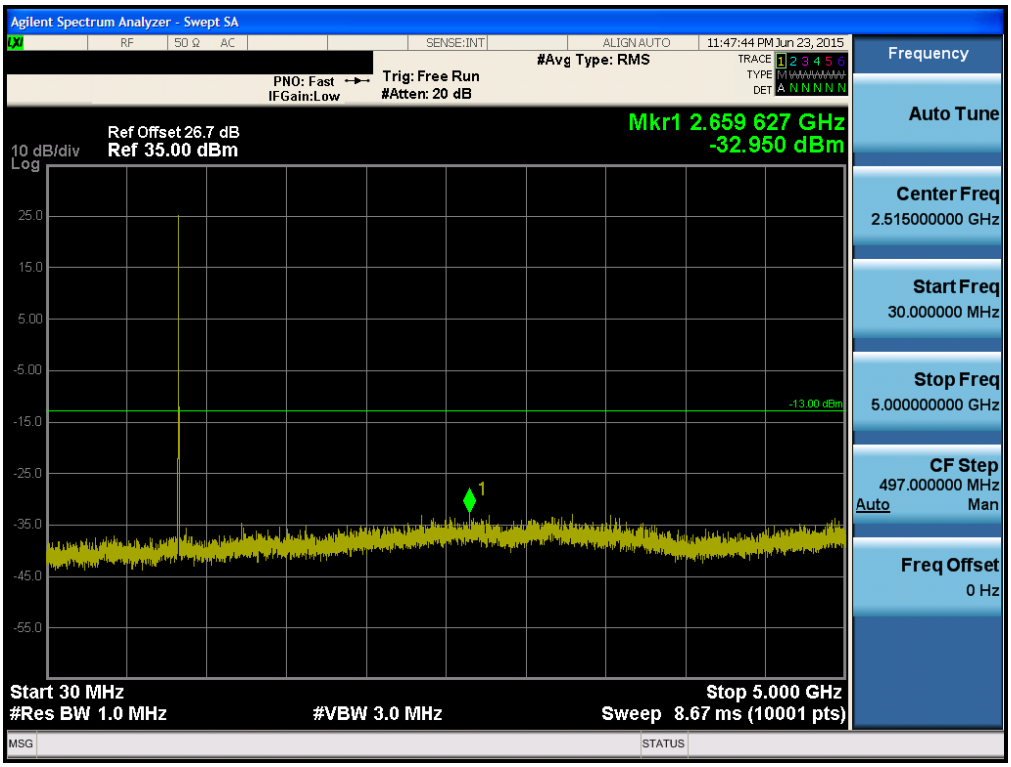
■ CDMA MODE (384 CH.) Conducted Spurious Emissions – 1



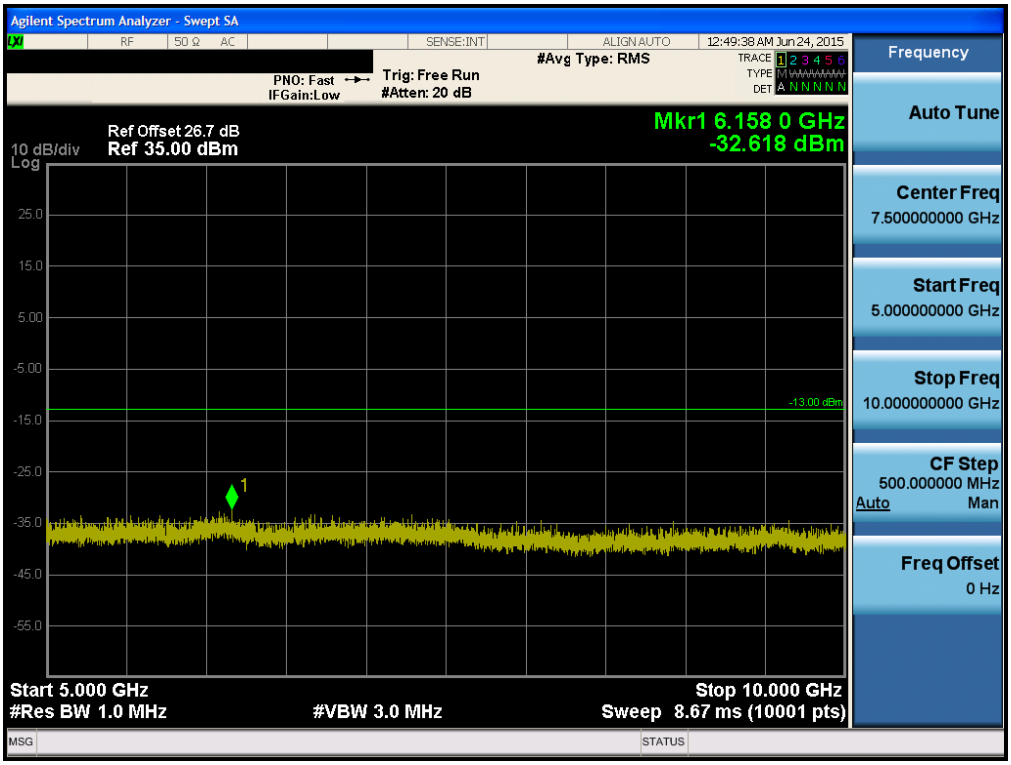
■ CDMA MODE (384 CH.) Conducted Spurious Emissions – 2



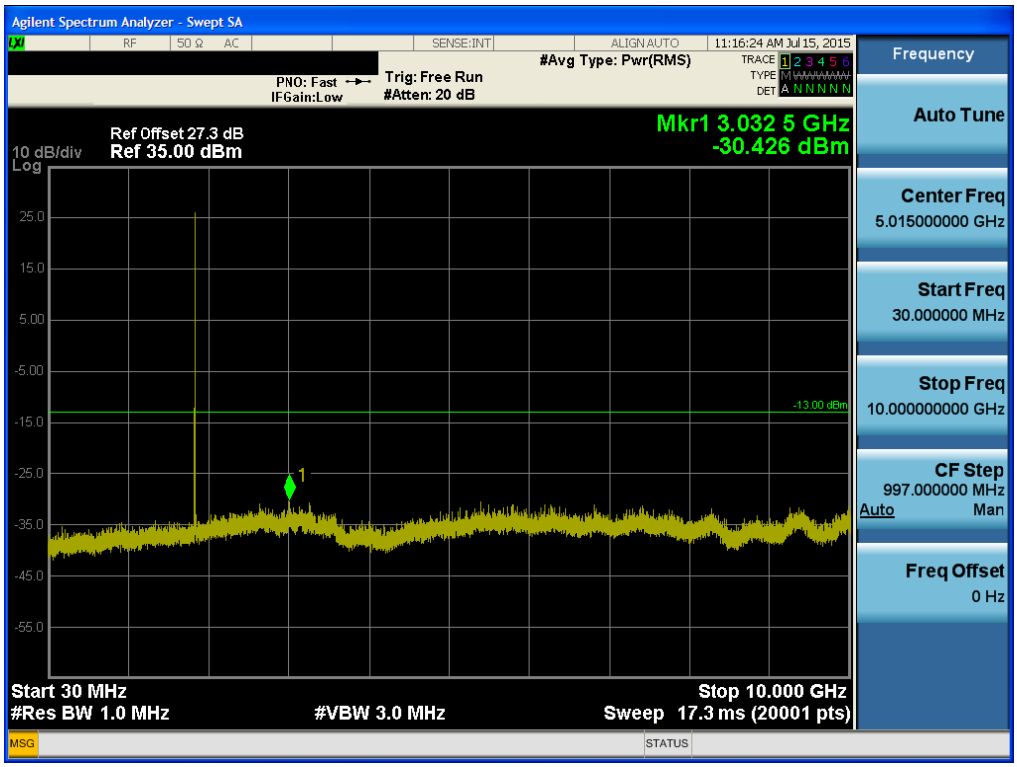
■ CDMA MODE (777 CH.) Conducted Spurious Emissions – 1



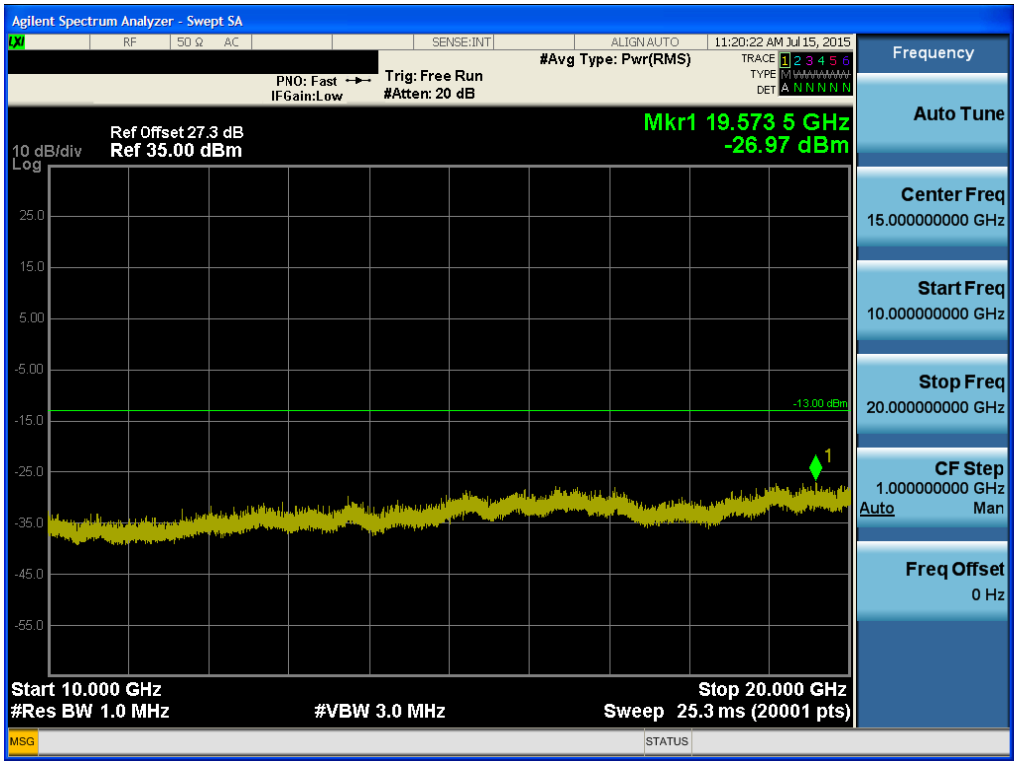
■ CDMA MODE (777 CH.) Conducted Spurious Emissions – 2



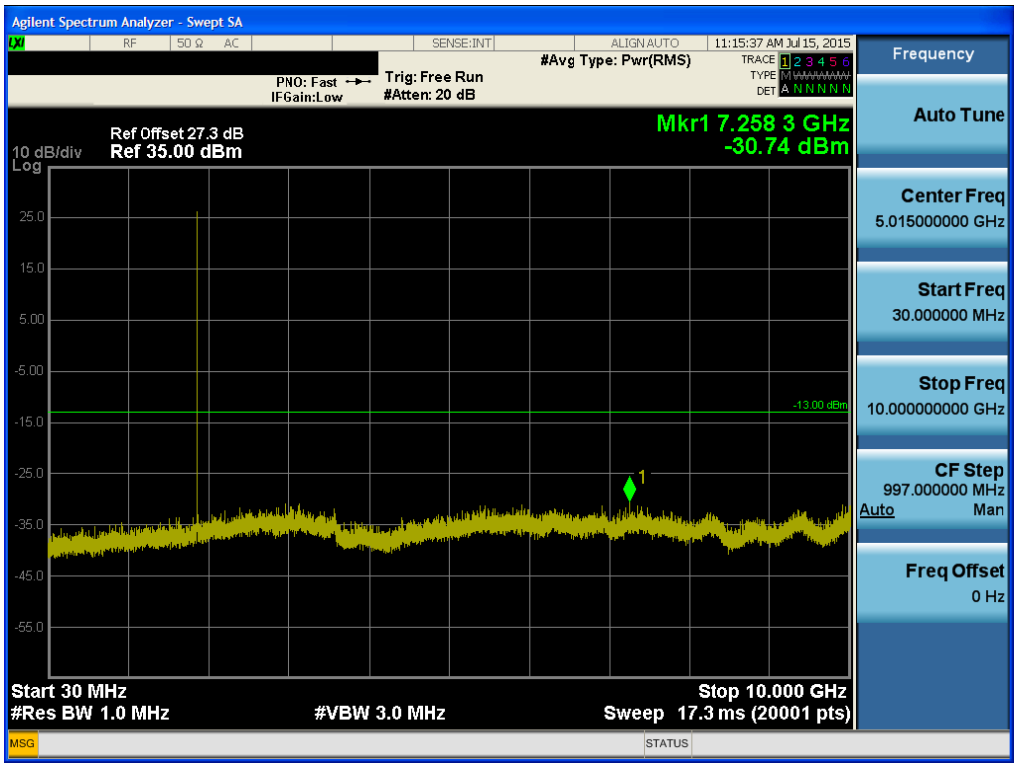
■ PCS MODE (25 CH.) Conducted Spurious Emissions – 1



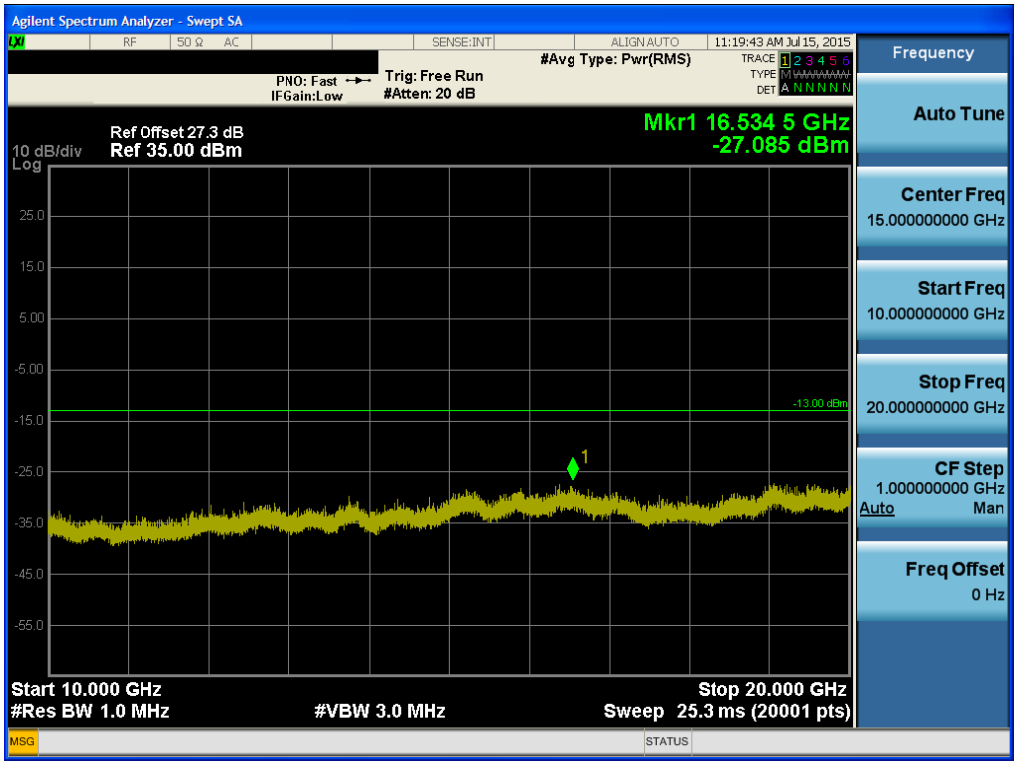
■ PCS MODE (25 CH.) Conducted Spurious Emissions – 2



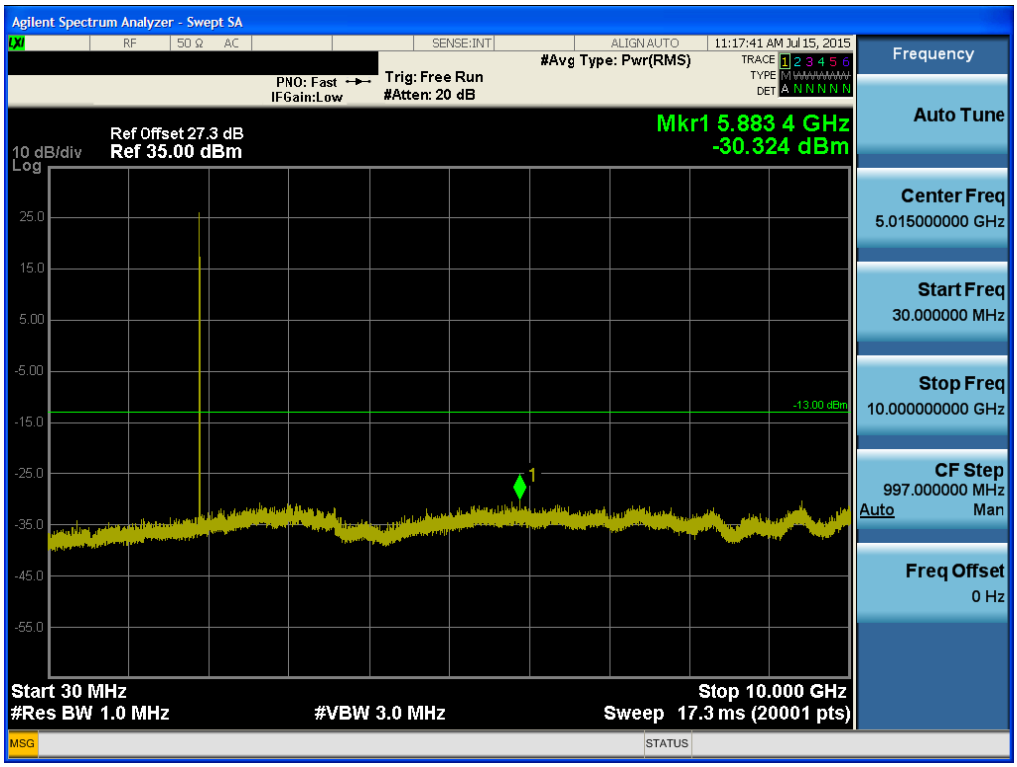
■ PCS MODE (600 CH.) Conducted Spurious Emissions – 1



■ PCS MODE (600 CH.) Conducted Spurious Emissions – 2



■ PCS MODE (1175 CH.) Conducted Spurious Emissions – 1



■ PCS MODE (1175 CH.) Conducted Spurious Emissions – 2