HCT CO., LTD.

CERTIFICATE OF COMPLIANCE

FCC Certification

Applicant Name:
Telit Communications S.p.A.

Address:

Viale Stazione di Prosecco 5/b Trieste, 34010 Italy

Date of Issue:
March 24, 2014
Location:
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, Korea
Test Report No.: HCT-R-1403-F055
HCT FRN: 0005866421
IC Recognition No.: 5944A-3

FCC ID	**: RI7CL865-DUAL**
IC	**: 5131A-CL865DUAL**
APPLICANT	**: Telit Communications S.p.A.**

FCC Model(s):	CL865-DUAL
IC Model(s):	CL865-DUAL
EUT Type:	CDMA 1x Module
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§22, §24, §2
IC Rule(s):	RSS-GEN, RSS-132, RSS-133
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)
Max. RF Conducted Output Power:	0.284 W CDMA (24.54 dBm)/ 0.277 W PCS CDMA (24.42 dBm)
Emission Designator(s):	1M28F9W (CDMA), 1M28F9W (PCS CDMA)

The measurements shown in this report were made in accordance with the procedures specified in §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
: Jong Seok Lee
Test Engineer of RF Team

Approved by
: Chang Seok Choi
Manager of RF Team

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-R-1403-F055	March 24, 2014	- First Approval Report

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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	Telit Communications S.p.A.
Address:	Viale Stazione di Prosecco 5/b Trieste, 34010 Italy
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Emission Designator(s):	1M28F9W (CDMA), 1M28F9W (PCS CDMA)
Date(s) of Tests:	February 27, 2014 ~ March 21, 2014
Antenna Specification	Manufacturer: Wilson Electronics Antenna type: Magnet Mount Antenna Peak Gain: CDMA : 5.12 dBi PCS CDMA : 6.12 dBi

2. INTRODUCTION

2.1. EUT DESCRIPTION

The CL865-DUAL CDMA 1x Module consists of Cellular CDMA, PCS CDMA and CDMA Secondary800.

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 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-C-2004 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 a positive peak 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

Frequency Range : 30 MHz ~ 10^{th} Harmonics of highest channel fundamental frequency.

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with RC1/SO55(CDMA) and RC1/SO55(PCS) with 'All Up' power control bits.

3.2 PEAK- TO- AVERAGE RATIO

Test Procedure

Peak to Average Power Ratio is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r01, June 7, 2013, 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.

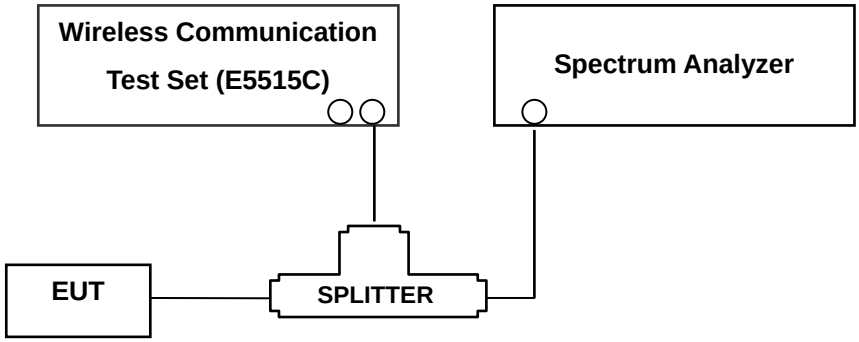
i) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the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

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with RC1/SO55(CDMA) and RC1/SO55(PCS) with ‘All Up’ power control bits.

3.3 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 v02r01, June 7, 2013, 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 RC1/SO55(CDMA) and RC1/SO55(PCS) with 'All Up' power control bits.

3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL.

Test Procedure

Spurious and harmonic emissions at antenna terminal is tested in accordance with KDB971168 D01 Power Meas License Digital Systems v02r01, June 7, 2013, Section 6.0.

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.

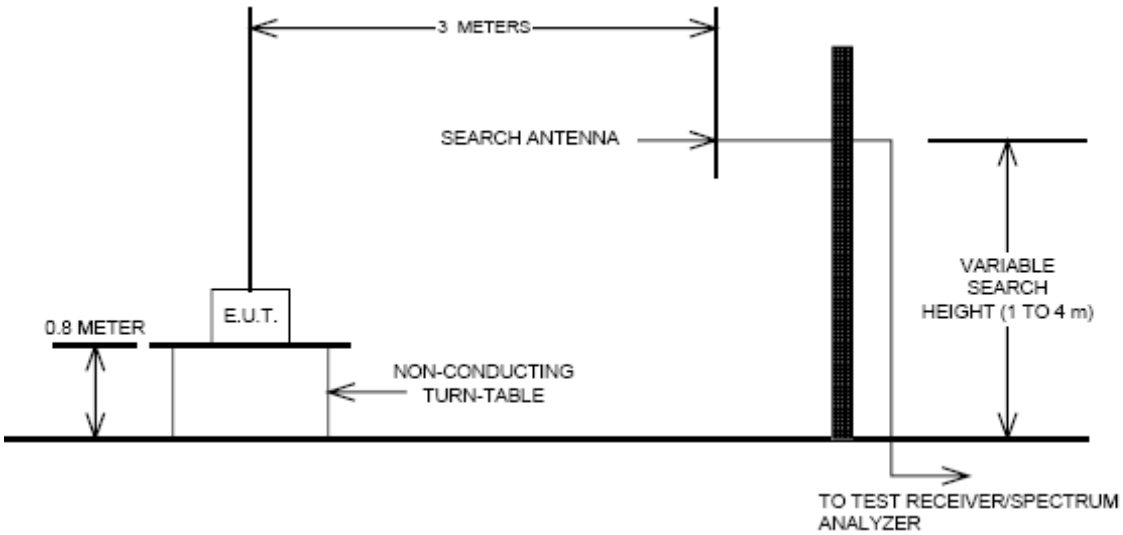
Note : This device was tested under all R.C.s and S.O.s and worst case is reported with RC1/SO55(CDMA) and RC1/SO55(PCS) with 'All Up' power control bits.

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

- For CDMA, total offset 27.1 dBm = 20 dBm attenuator + 6 dBm Splitter + 1.1 dBm RF cables,
- For PCS, total offset 27.9 dBm = 20 dBm attenuator + 6 dBm Splitter + 1.9 dBm RF cables,

3.5 RADIATED SPURIOUS AND HARMOMIC EMISSIONS

Test Set-up



The measurement facilities used for this test have been documented in previous filings with the commission pursuant to section § 2.948. The Fully-anechoic chamber meets requirements in ANSI C63.4 –2003. A mast capable of lifting the receiving antenna from a height of one to four meters is used together with a rotatable platform mounted at three from the antenna mast.

1) The unit mounted on a turntable 1.5 m × 1.0 m × 0.80 m is 0.8 meter above test site ground level.
2) During the emission test, the turntable is rotated and the EUT is manipulated to find the configuration resulting in maximum emission under normal condition of installation and operation.
3) The antenna height and polarization are also varied from 1 to 4 meters until the maximum signal is found.
4) The spectrum shall be scanned up to the 10th harmonic of the fundamental frequency.

Test Procedure

Frequency stability is tested in accordance with ANSI/TIA-603-C-2004 section 2.2.2.

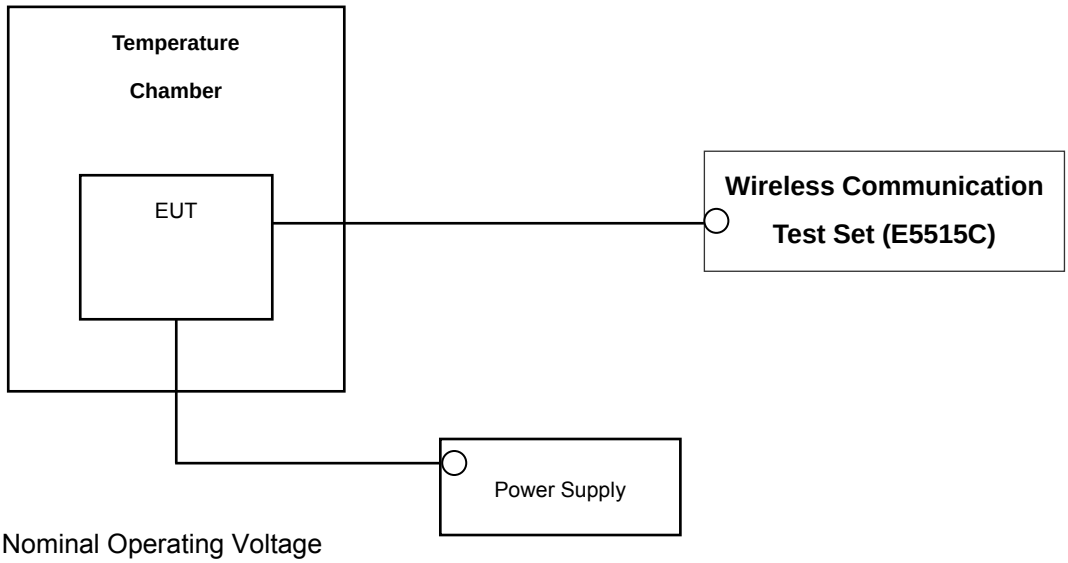
The equipment under test is placed on a non-conductive table 3-meters from the receive antenna. A turntable was rotated 360° and the receiving antenna scanned from 1-4m in order to capture the maximum emission. A half wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the previously recorded signal was duplicated.

The maximum EIRP was calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps were carried out with the receiving antenna in both vertical and horizontal polarization. For readings above 1GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn and an isotropic antenna are taken into consideration.

Note : This device was tested under all R.C.s and S.O.s and worst case is reported with RC1/SO55(CDMA) and RC1/SO55(PCS) with 'All Up' power control bits.

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-C-2004 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 115 % 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. The frequency stability of the transmitter shall be maintained within ± 0.000 25 %(± 2.5 ppm) of the center frequency.

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 : This device was tested under all R.C.s and S.O.s and worst case is reported with RC1/SO55(CDMA) and RC1/SO55(PCS) with ‘All Up’ power control bits.

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Interval	Calibration Due
Agilent	E9327A/ Power Sensor	MY4442009	Annual	04/16/2014
MITEQ	AMF-6D-001180-35-20P/AMP	1081666	Annual	09/12/2014
Wainwright	WHK1.2/15G-10EF/H.P.F	2	Annual	04/25/2014
Wainwright	WHK3.3/18G-10EF/H.P.F	1	Annual	04/25/2014
Hewlett Packard	11667B / Power Splitter	11275	Annual	05/13/2014
Digital	EP-3010/ Power Supply	3110117	Annual	10/29/2014
Schwarzbeck	UHAP/ Dipole Antenna	557	Biennial	03/05/2015
Schwarzbeck	UHAP/ Dipole Antenna	558	Biennial	05/03/2015
Korea Engineering	KR-1005L / Chamber	KRAB05063-3CH	Annual	10/30/2014
Schwarzbeck	BBHA 9120D/ Horn Antenna	147	Biennial	05/15/2014
Schwarzbeck	BBHA 9120D/ Horn Antenna	1151	Biennial	10/05/2015
Agilent	E4440A/Spectrum Analyzer	US45303008	Annual	04/25/2014
WEINSCHEL	ATTENUATOR	BR0592	Annual	10/28/2014
REOHDE&SCHWARZ	FSV40/Spectrum Analyzer	1307.9002K40-100931-NK	Annual	06/10/2014
Agilent	8960 (E5515C)/ Base Station	GB45070669	Annual	08/31/2014

5. SUMMARY OF TEST RESULTS

FCC Part Section(s)	RSS Section(s)	Test Description	Test Limit	Test Condition	Test Result
2.1049, 22.917(a), 24.238(a)	RSS-Gen(4.6.1)	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	N/A		PASS
24.232(d)	RSS-133(6.4)	Peak- to- Average Ratio	< 13 dB		
2.1055, 22.355, 24.235	RSS-132(5.3) RSS-133(6.3)	Frequency stability / variation of ambient temperature	< 2.5 ppm		PASS
22.913(a)(2) 24.232(c)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP	RADIATED	PASS
	RSS-133(6.4)	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
N/A	RSS-Gen(6)	Receiver Spurious Emissions	Cf.)Section 7.8		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 tuntable is 0.8 meter above test site ground level.
2) During the test , the turn table 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

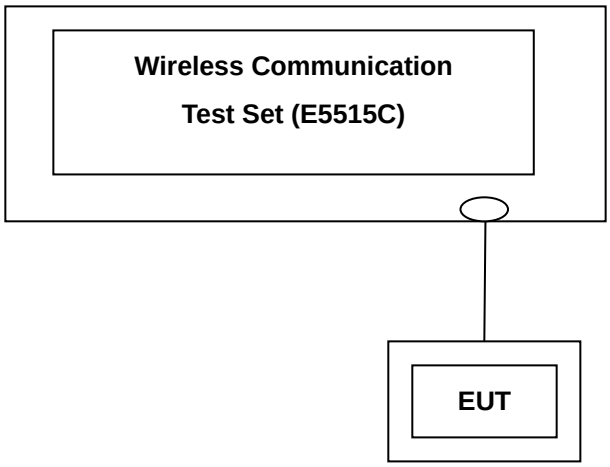
Emission Designator = 1M27F9W

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

7. TEST DATA

7.1 CONDUCTED OUTPUT POWER

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 SO32
		RC1/1 (dBm)	RC3/3 (dBm)	RC1/1 (dBm)	RC3/3 (dBm)	RC3/3 (dBm)
CDMA	1013	24.29	23.92	24.35	24.05	23.95
	384	24.50	24.08	24.54	24.09	24.04
	777	24.39	24.02	24.39	24.09	24.03
PCS	25	24.40	23.97	24.42	24.00	23.95
	600	24.35	23.91	24.37	24.02	23.79
	1175	23.92	23.58	23.92	23.57	23.54

(Maximum Conducted Output Powers)

Note : Detecting mode is average.

7.2 EFFECTIVE RADIATED POWER OUTPUT-EON

(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	824.20	-27.54	35.01	-10.59	0.84	V	0.228	23.58
	384	836.60	-30.09	32.28	-10.53	0.88	V	0.122	20.87
	777	848.80	-30.34	32.02	-10.48	0.86	V	0.117	20.68

Note: A peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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 planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of detecting Antenna is in vertical polarization in CDMA mode.

7.3 EQUIVALENT ISOTROPIC RADIATED POWER-EON

(PCS CDMA Mode)

Mode	Ch./ Freq.		Measured Level (dBm)	Substitude LEVEL (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
PCS	25	1,851.25	-18.09	13.50	10.04	1.19	V	0.172	22.35
	600	1,880.00	-17.10	14.63	10.04	1.23	V	0.221	23.44
	1175	1,908.75	-17.97	14.01	10.05	1.22	V	0.192	22.84

Note: A peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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 planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of detecting Antenna is in vertical polarization in PCS mode.

7.4 EFFECTIVE RADIATED POWER OUTPUT-SPANSION

(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	824.20	-29.13	33.42	-10.59	0.84	V	0.158	21.99
	384	836.60	-29.33	33.04	-10.53	0.88	V	0.146	21.63
	777	848.80	-30.61	31.75	-10.48	0.86	V	0.110	20.41

Note: A peak detector is used.

NOTES:

Effective Radiated Power Output Measurements by Substitution Method

according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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 planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of detecting Antenna is in vertical polarization in CDMA mode.

7.5 EQUIVALENT ISOTROPIC RADIATED POWER-SPANSION

(PCS CDMA Mode)

Mode	Ch./ Freq.		Measured Level (dBm)	Substitude LEVEL (dBm)	Ant. Gain (dBd)	C.L	Pol.	ERP	
	channel	Freq.(MHz)						W	dBm
PCS	25	1,851.25	-15.06	16.53	10.04	1.19	V	0.345	25.38
	600	1,880.00	-14.81	16.92	10.04	1.23	V	0.374	25.73
	1175	1,908.75	-15.41	16.57	10.05	1.22	V	0.347	25.40

Note: A peak detector is used.

NOTES:

Equivalent Isotropic Radiated Power Measurements by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

The EUT was placed on a non-conductive styrofoam resin table 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 planes in EUT and horizontal and vertical polarization in detecting antenna. The worst case of detecting Antenna is in vertical polarization in PCS mode.

7.6 RADIATED SPURIOUS EMISSIONS

7.6.1 RADIATED SPURIOUS EMISSIONS (CDMA Mode)-EON

▣ MEASURED OUTPUT POWER: 23.58 dBm = 0.228 W

▣ MODULATION SIGNAL: CDMA

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.58 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
1013	1,649.40	-48.87	9.71	-57.96	1.13	H	-49.38	72.96
	2,474.10	-54.40	10.54	-61.07	1.35	V	-51.88	75.46
	3,298.80	-54.90	12.23	-61.97	1.58	H	-51.32	74.90
384	1,673.04	-47.75	9.77	-56.99	1.12	V	-48.34	71.92
	2,509.56	-51.47	10.65	-58.05	1.35	V	-48.75	72.33
	3,346.08	-54.11	12.41	-61.32	1.61	V	-50.52	74.10
777	1,696.62	-52.72	9.84	-62.06	1.16	H	-53.38	76.96
	2,544.93	-55.91	10.72	-62.81	1.37	V	-53.46	77.04
	3,393.24	-54.93	12.40	-62.06	1.61	V	-51.27	74.85

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

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 planes in EUT and horizontal and vertical polarization in detecting antenna.

7.6.2 RADIATED SPURIOUS EMISSIONS (PCS Mode)-EON

▣ MEASURED OUTPUT POWER: 23.44 dBm = 0.221 W

▣ MODULATION SIGNAL: PCS

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 36.44 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
25	1,649.40	-43.11	12.32	-48.25	1.72	H	-37.65	61.09
	2,474.10	-46.57	13.02	-47.03	2.13	V	-36.14	59.58
	3,298.80	-53.61	11.06	-43.88	2.41	H	-35.23	58.67
600	1,673.04	-45.87	12.29	-51.00	1.79	V	-40.50	63.94
	2,509.56	-44.61	13.12	-44.89	2.11	V	-33.88	57.32
	3,346.08	-53.85	11.09	-44.84	2.35	V	-36.10	59.54
1175	1,696.62	-46.82	12.28	-51.96	1.77	H	-41.45	64.89
	2,544.93	-49.85	13.07	-49.93	2.13	V	-38.99	62.43
	3,393.24	-53.62	11.37	-43.52	2.47	V	-34.62	58.06

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

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 planes in EUT and horizontal and vertical polarization in detecting antenna.

7.6.3 RADIATED SPURIOUS EMISSIONS (CDMA Mode)-SPANSION

▣ MEASURED OUTPUT POWER: 21.99 dBm = 0.158 W

▣ MODULATION SIGNAL: CDMA

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 34.99 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
1013	1,649.40	-52.03	9.71	-61.12	1.13	V	-52.54	74.53
	2,474.10	-56.62	10.54	-63.29	1.35	H	-54.10	76.09
	3,298.80	-56.66	12.23	-63.73	1.58	V	-53.08	75.07
384	1,673.04	-49.41	9.77	-58.65	1.12	V	-50.00	71.99
	2,509.56	-51.80	10.65	-58.38	1.35	V	-49.08	71.07
	3,346.08	-57.23	12.41	-64.44	1.61	H	-53.64	75.63
777	1,696.62	-51.24	9.84	-60.58	1.16	V	-51.90	73.89
	2,544.93	-56.07	10.72	-62.97	1.37	V	-53.62	75.61
	3,393.24	-56.64	12.40	-63.77	1.61	H	-52.98	74.97

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

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 planes in EUT and horizontal and vertical polarization in detecting antenna.

7.6.4 RADIATED SPURIOUS EMISSIONS (PCS Mode) -SPANSION

▣ MEASURED OUTPUT POWER: 25.73 dBm = 0.374 W

▣ MODULATION SIGNAL: PCS

▣ DISTANCE: 3 meters

▣ LIMIT: 43 + 10 log10 (W) = 38.73 dBc

Ch.	Freq.(MHz)	Measured Level [dBm]	Ant. Gain (dBd)	Substitute Level [dBm]	C.L	Pol.	ERP (dBm)	dBc
25	1,649.40	-43.78	12.32	-48.92	1.72	V	-38.32	64.05
	2,474.10	-49.32	13.02	-49.78	2.13	H	-38.89	64.62
	3,298.80	-	-	-	-	-	-	-
600	1,673.04	-46.28	12.29	-51.41	1.79	V	-40.91	66.64
	2,509.56	-49.91	13.12	-50.19	2.11	H	-39.18	64.91
	3,346.08	-	-	-	-	-	-	-
1175	1,696.62	-46.38	12.28	-51.52	1.77	V	-41.01	66.74
	2,544.93	-52.44	13.07	-52.52	2.13	V	-41.58	67.31
	3,393.24	-	-	-	-	-	-	-

NOTES: 1. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA/EIA-603-C-2004, Aug. 17, 2004:

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 planes in EUT and horizontal and vertical polarization in detecting antenna.

7.7 PEAK-TO-AVERAGE RATIO

- Plots of the EUT's Peak- to- Average Ratio are shown Page 33.

7.8 OCCUPIED BANDWIDTH

Band	Channel	Frequency(MHz)	Data (MHz)
CDMA	1013	824.70	1.2770
	384	836.52	1.2807
	777	848.31	1.2722
PCS	25	1851.25	1.2782
	600	1880.00	1.2695
	1175	1908.75	1.2834

- Plots of the EUT's Occupied Bandwidth are shown Page 30 ~ 32.

7.9 CONDUCTED SPURIOUS EMISSIONS

Band	Channel	Frequency of Maximum Harmonic (GHz)	Maximum Data (dBm)
CDMA	1013	1.649900	-45.60
	384	1.674100	-43.63
	777	1.697420	-42.45
PCS	25	3.701830	-38.29
	600	3.761130	-42.11
	1175	3.817740	-37.57

- Plots of the EUT's Conducted Spurious Emissions are shown Page 37 ~ 44.

7.9.1 Band Edge

- Plots of the EUT's Band Edge are shown Page 33 ~ 37.

7.10 RECEIVER SPURIOUS EMISSIONS

FCC Rule(s)	**RSS-Gen**
Test Requirements:	**Emission Level shall not exceed RSS-Gen 6(a) limits**
Operating conditions:	**Under normal test conditions**
Method of testing:	**Radiated**
S/A. Settings:	**F < 1 GHz: RBW: 100 kHz, VBW: 300 kHz (Peak)** **F > 1 GHz: RBW: 1 MHz, VBW: 1 MHz (Peak)**
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:

30 MHz ~ 1 GHz

Frequency MHz	Reading dBuV	Factor (dB)	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
No Critical peaks found						

Above 1 GHz

Frequency MHz	Reading dBuV	Factor (dB)	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
No Critical peaks found						

7.11 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

7.11.1 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE (CDMA Mode)

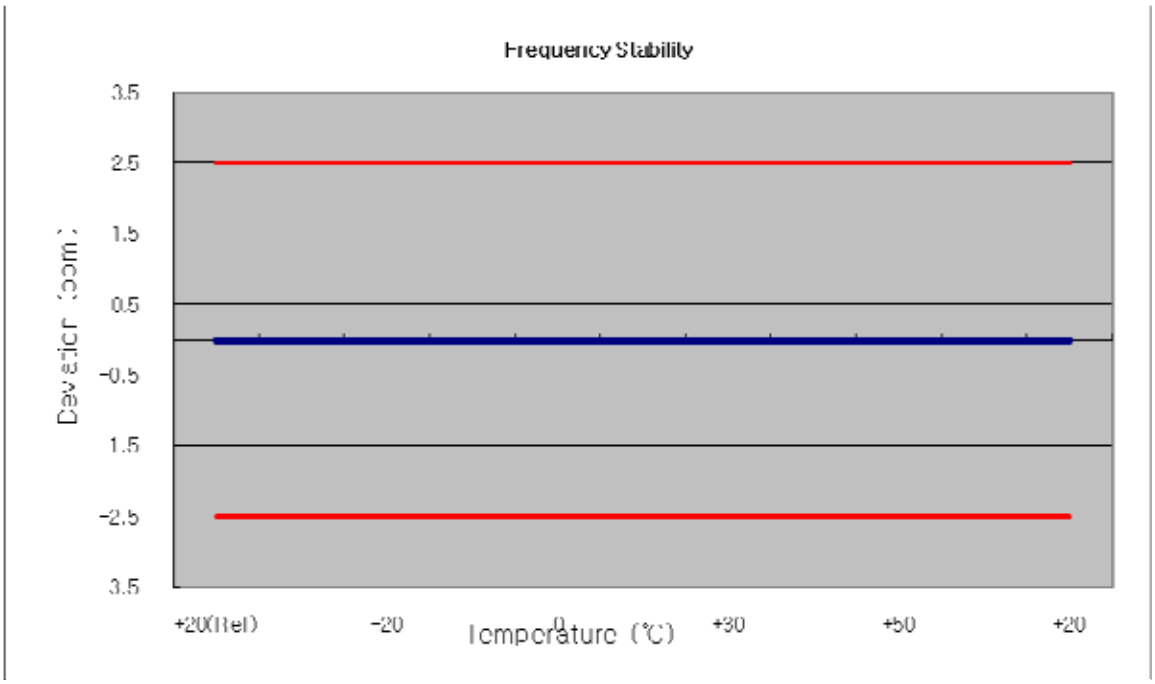
▣ OPERATING FREQUENCY: 836,520,000 Hz

▣ CHANNEL: 384

▣ REFERENCE VOLTAGE: 3.8 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)	836 520 010	0	0.000 000	0.000
100%		-30	836 520 003	-6.65	-0.000 001	-0.008
100%		-20	836 520 001	-8.99	-0.000 001	-0.011
100%		-10	836 520 003	-7.06	-0.000 001	-0.008
100%		0	836 520 002	-7.55	-0.000 001	-0.009
100%		+10	836 520 003	-6.32	-0.000 001	-0.008
100%		+30	836 520 000	-10.22	-0.000 001	-0.012
100%		+40	836 520 002	-7.60	-0.000 001	-0.009
100%		+50	836 520 004	-5.98	-0.000 001	-0.007
115%	4.37	+20	836 520 001	-8.52	-0.000 001	-0.010
85%	3.23	+20	836 520 003	-7.21	-0.000 001	-0.009



7.11.2 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE (PCS Mode)

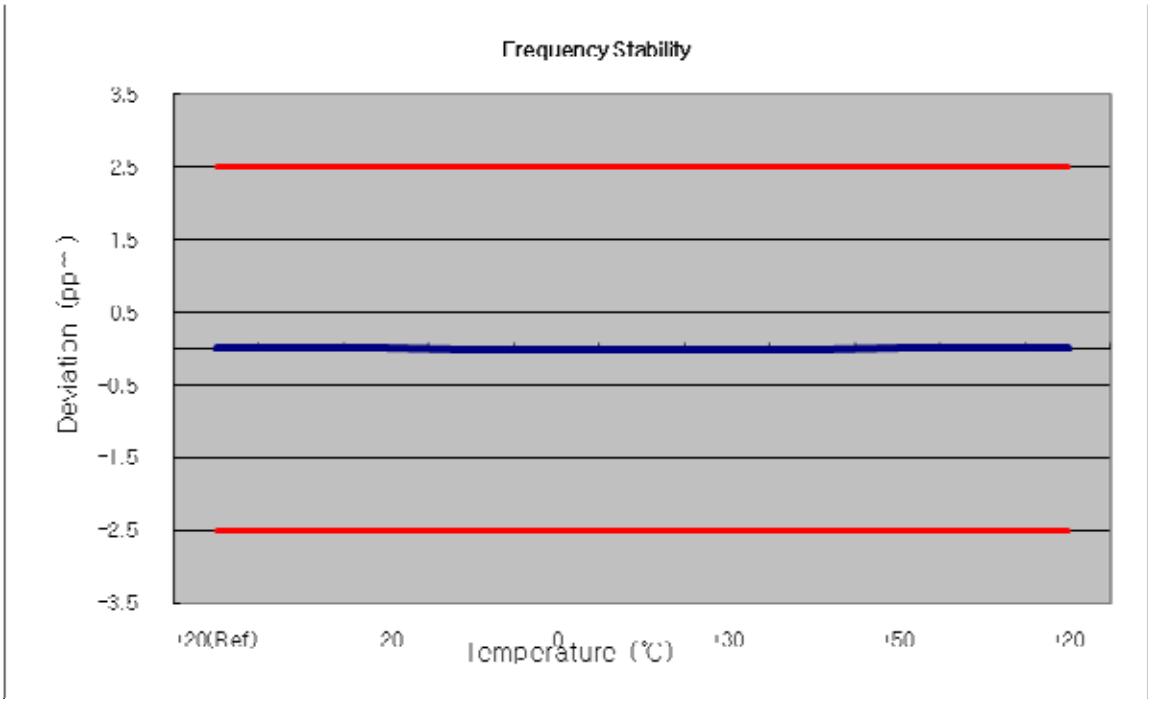
▣ OPERATING FREQUENCY: 1880,000,000 Hz

▣ CHANNEL: 600

▣ REFERENCE VOLTAGE: 3.8 VDC

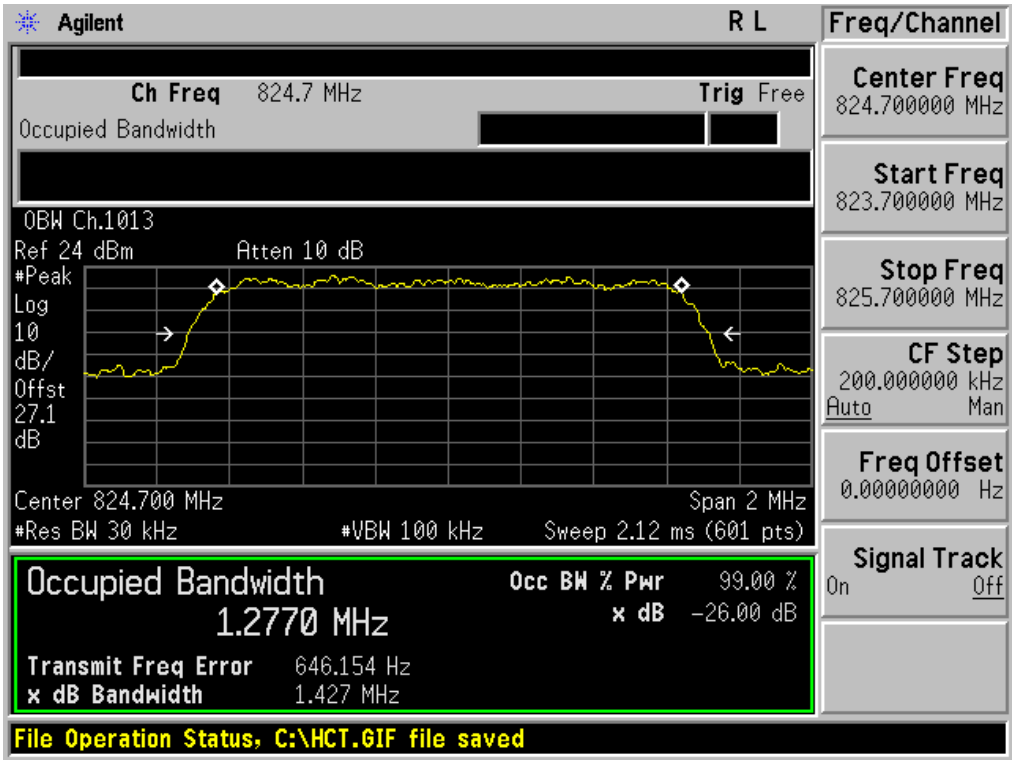
▣ DEVIATION LIM IT: ± 0.000 25 % or 2.5 ppm

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (Hz)	Frequency Error (Hz)	Deviation (%)	ppm
100%	3.80	+20(Ref)	1879 999 992	0	0.000 000	0.000
100%		-30	1880 000 006	5.70	0.000 000	0.003
100%		-20	1880 000 009	8.92	0.000 000	0.005
100%		-10	1879 999 978	-21.60	-0.000 001	-0.011
100%		0	1879 999 988	-12.13	-0.000 001	-0.006
100%		+10	1879 999 975	-24.71	-0.000 001	-0.013
100%		+30	1879 999 978	-22.11	-0.000 001	-0.012
100%		+40	1879 999 990	-10.50	-0.000 001	-0.006
100%		+50	1880 000 010	9.78	0.000 001	0.005
115%	4.37	+20	1880 000 008	8.32	0.000 000	0.004
85%	3.23	+20	1880 000 016	15.50	0.000 001	0.008

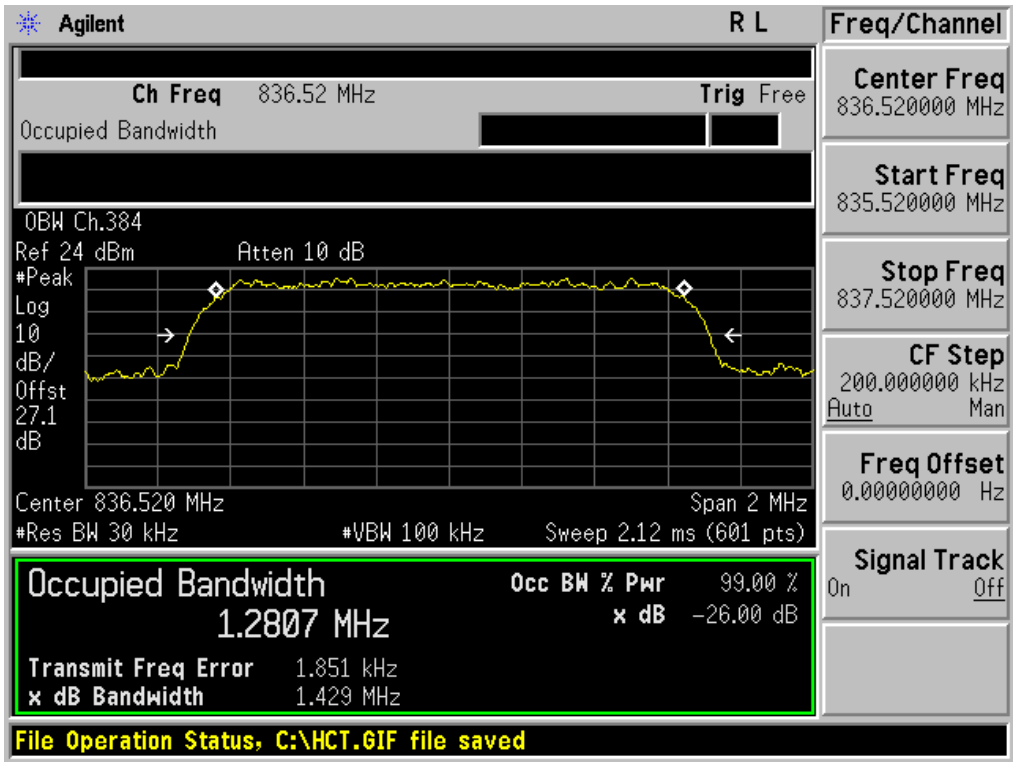


8. TEST PLOTS

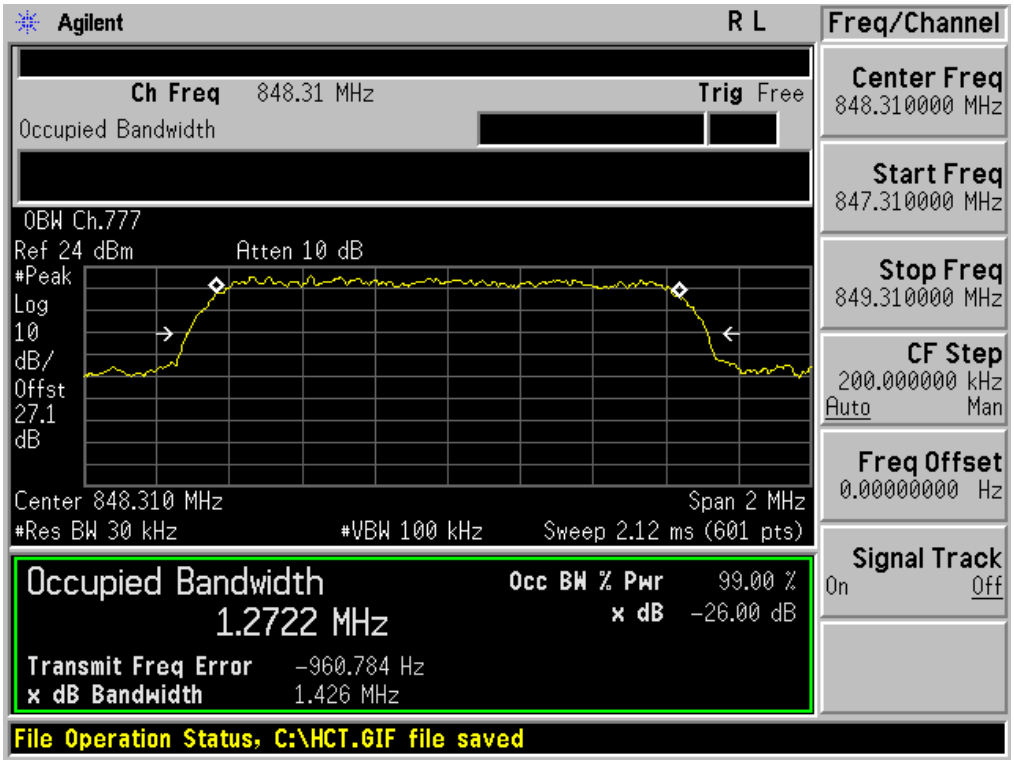
‘■ CDMA MODE (1013 CH.) Occupied Bandwidth



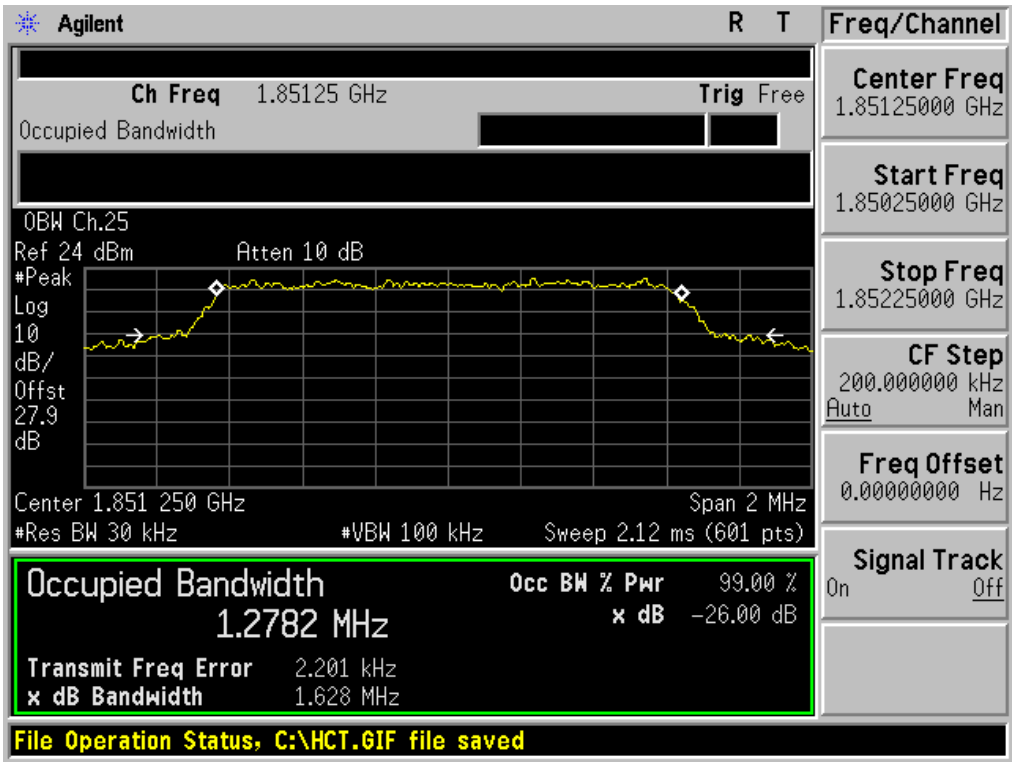
■ CDMA MODE (384 CH.) Occupied Bandwidth



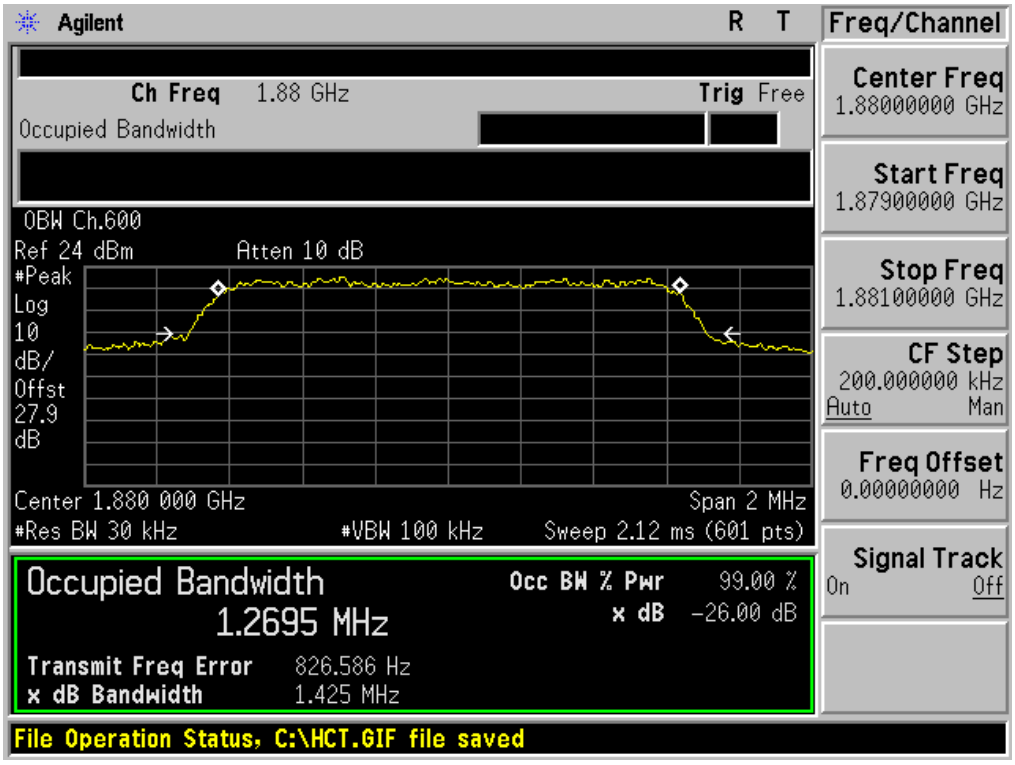
■ CDMA MODE (777 CH.) Occupied Bandwidth



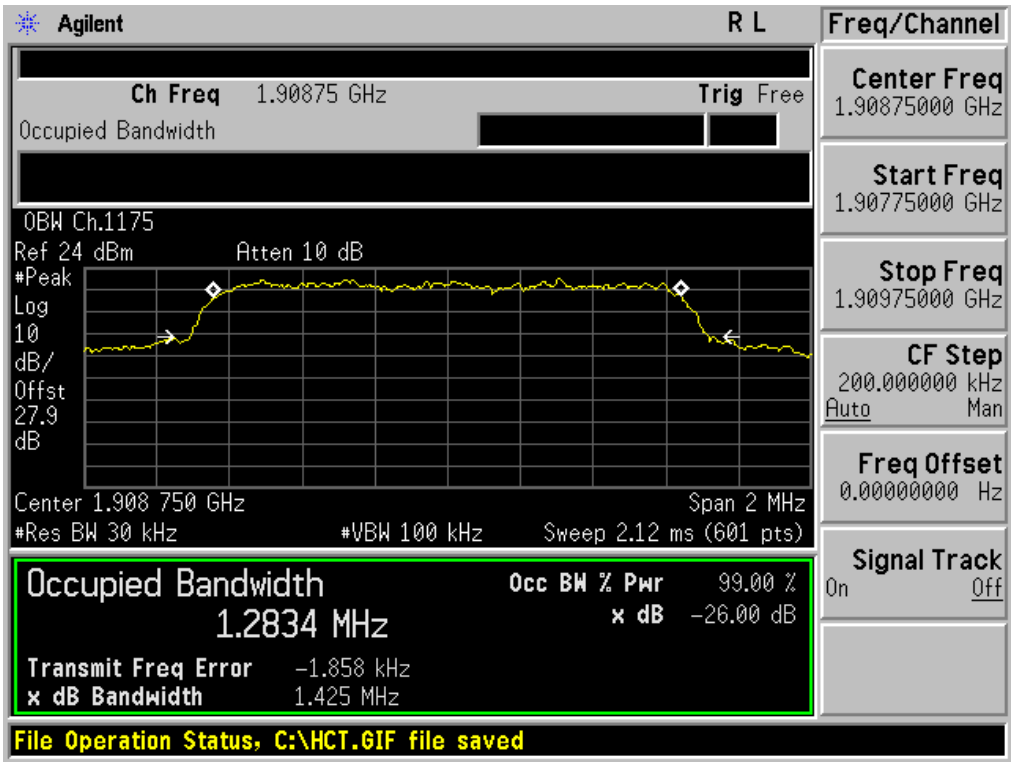
■ PCS MODE (25 CH.) Occupied Bandwidth



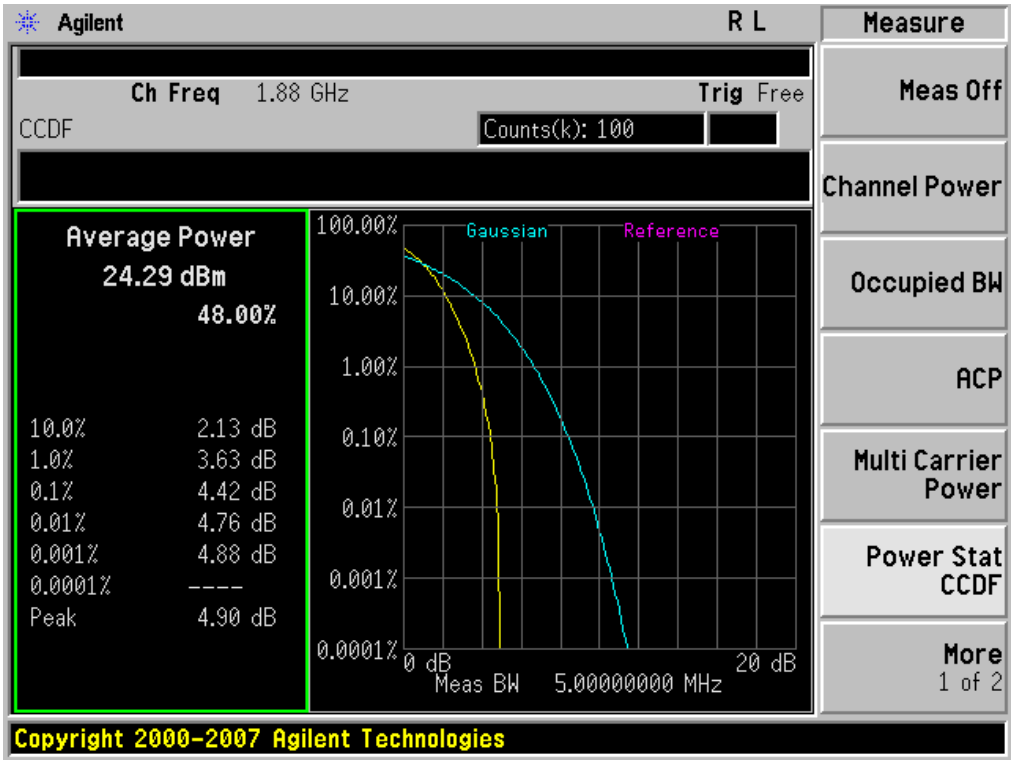
■ PCS MODE (600 CH.) Occupied Bandwidth



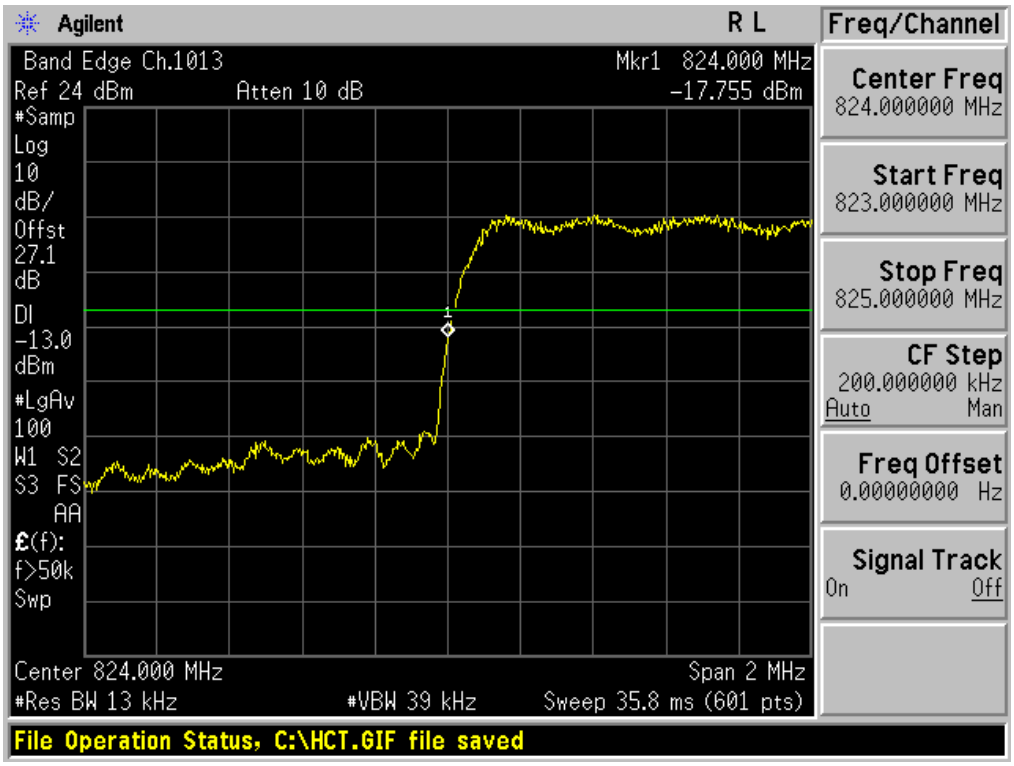
■ PCS MODE (1175 CH.) Occupied Bandwidth



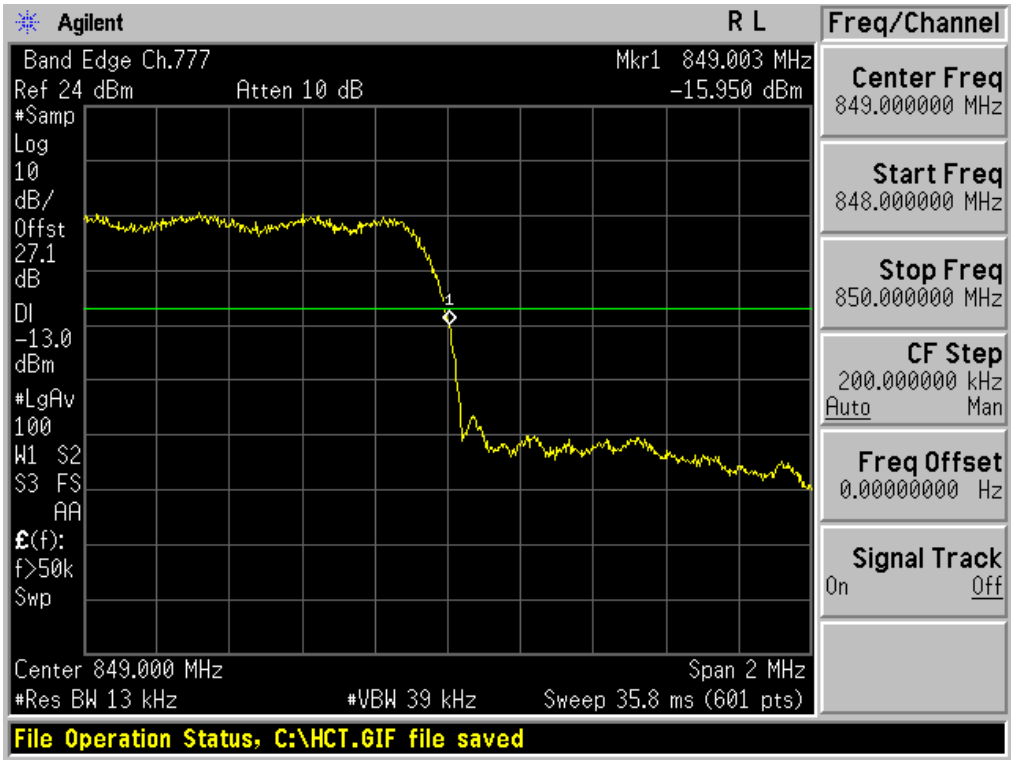
■ PCS CDMA MODE (600 CH.) Peak-to-Average Ratio



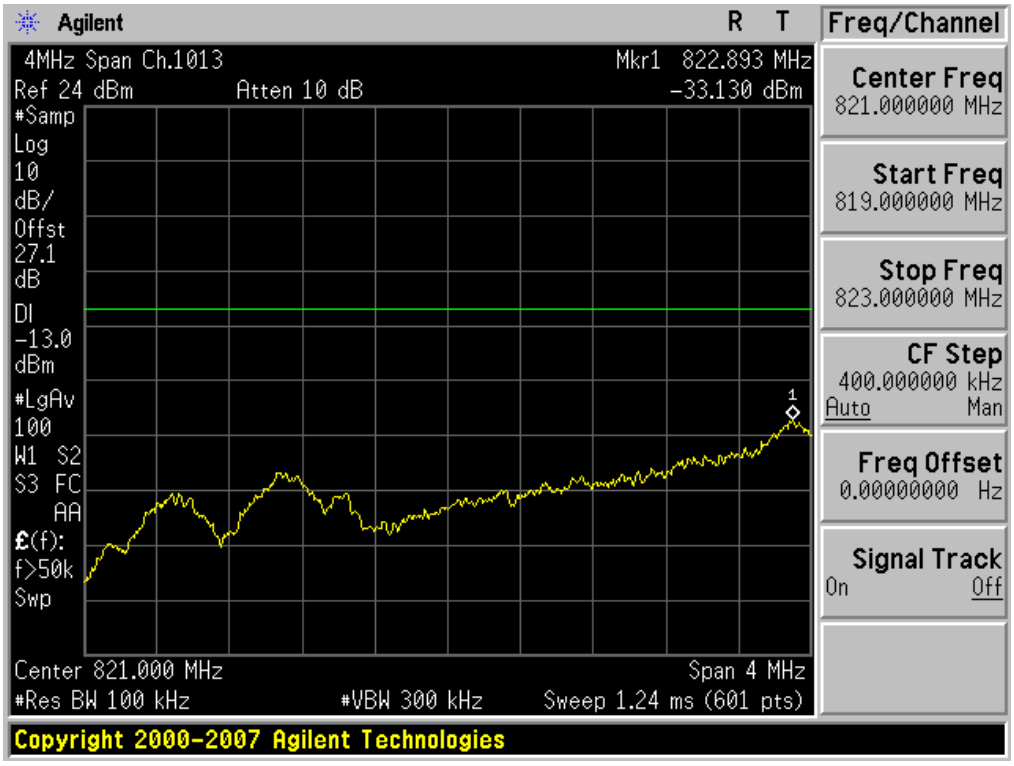
■ CDMA MODE (1013 CH.) Block Edge



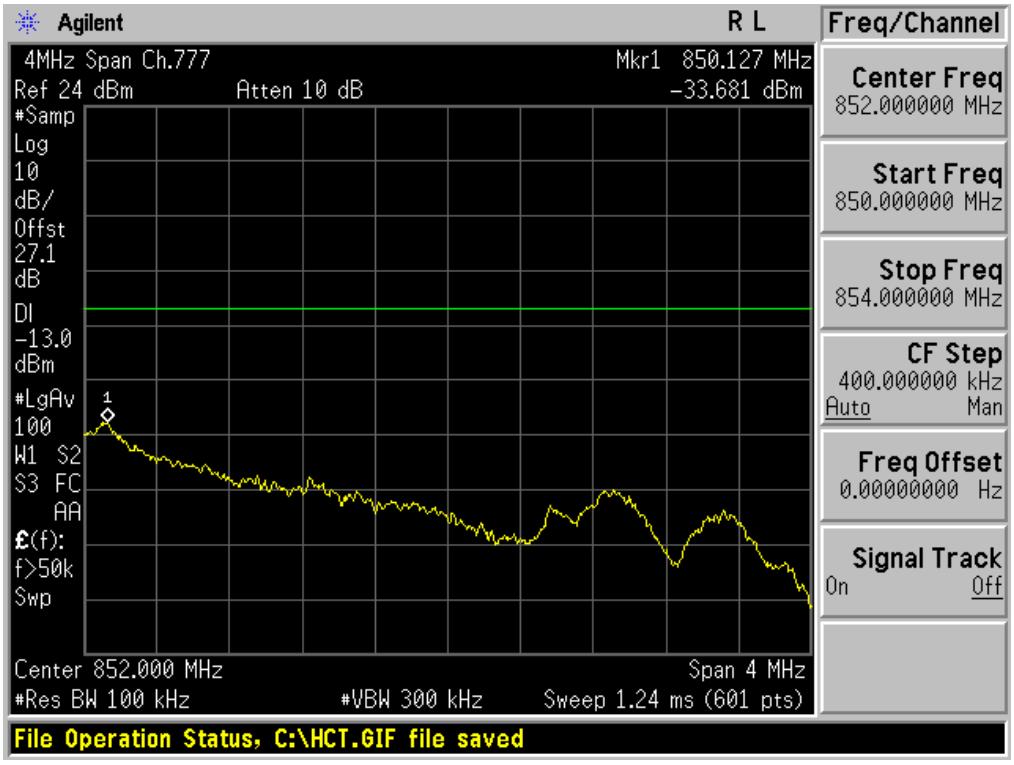
■ CDMA MODE (777 CH.) Block Edge



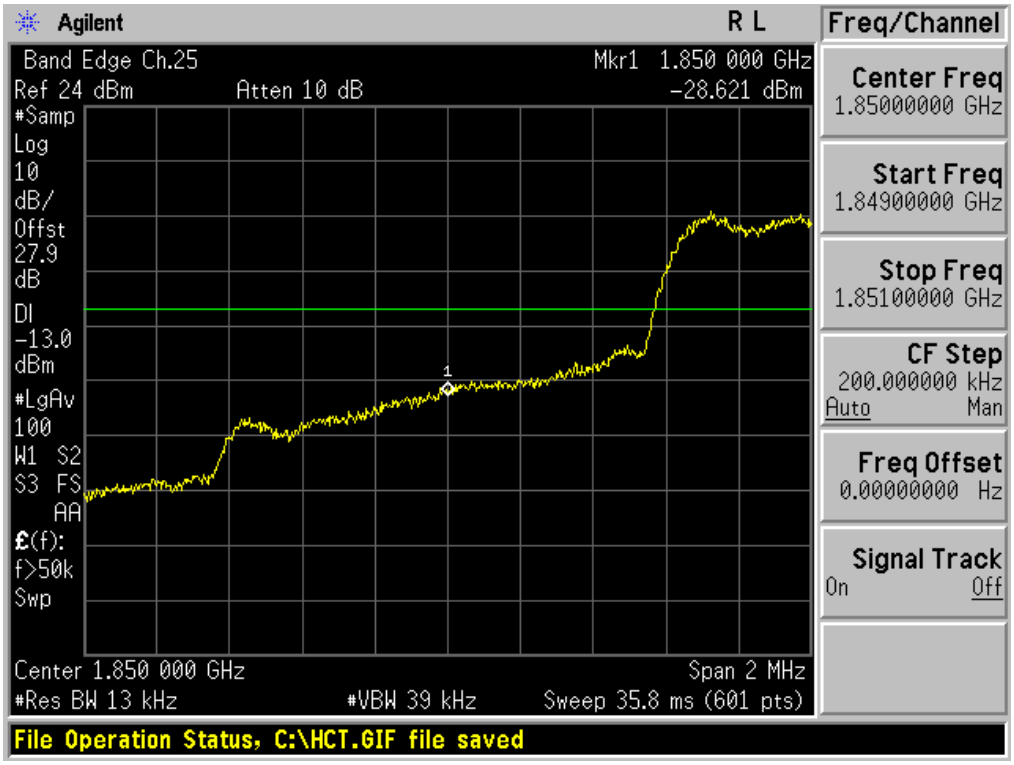
■ CDMA EVDO MODE (1013 CH.) Block Edge



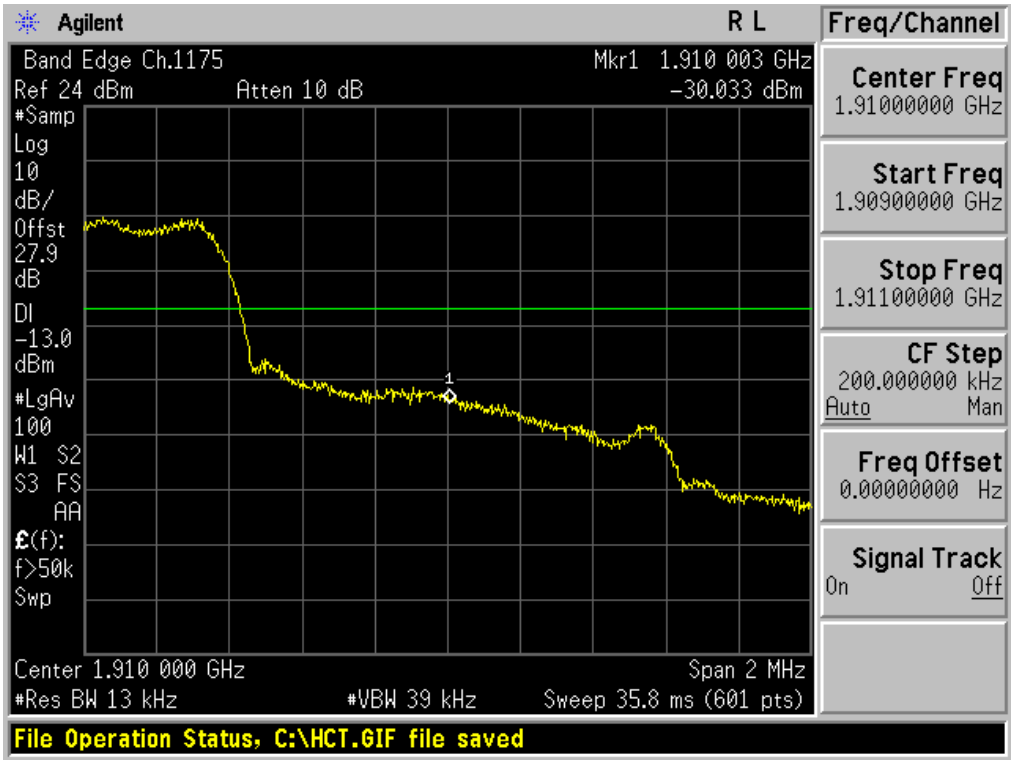
■ CDMA EVDO MODE (777 CH.) Block Edge



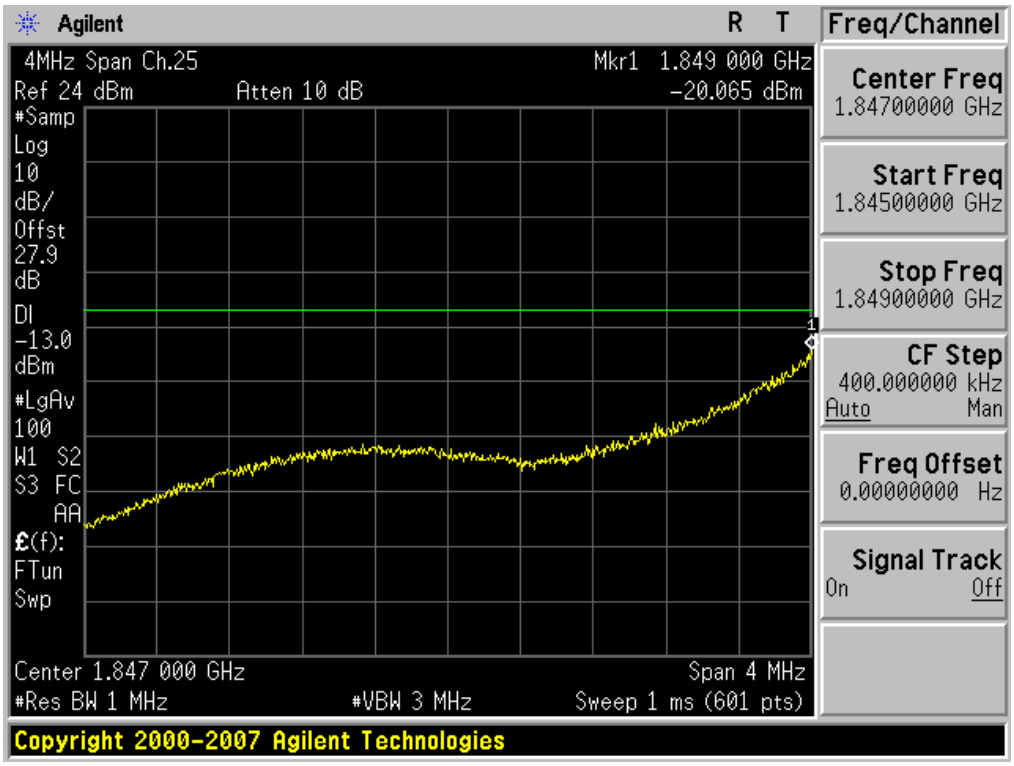
■ PCS MODE (25 CH.) Block Edge



■ PCS MODE (1175 CH.) Block Edge

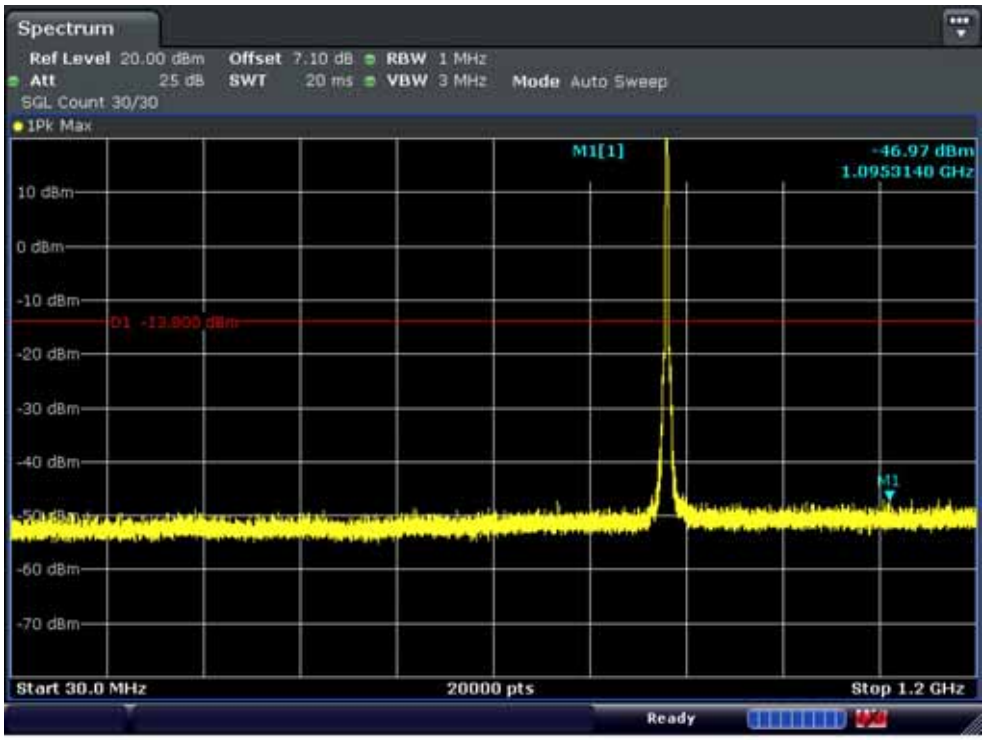


■ PCS EVDO MODE (25 CH.) Block Edge



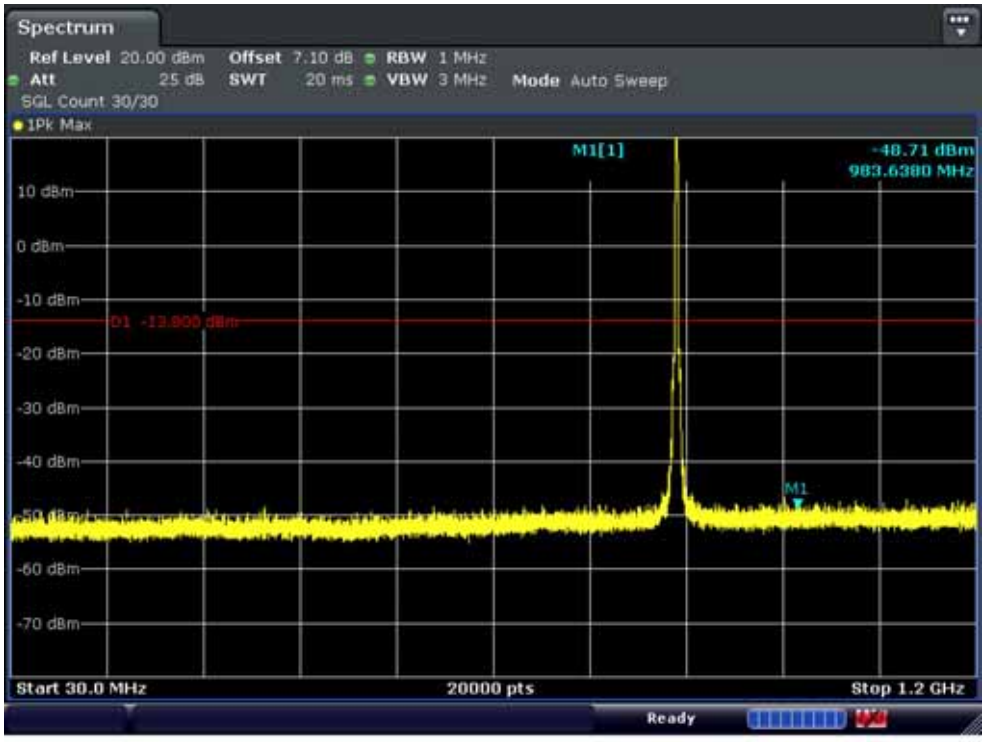
■ PCS EVDO MODE (1175 CH.) Block Edge

■ CDMA850 MODE (1013 CH.) 30 MHz ~ 1.2 GHz Conducted Spurious Emissions - 1

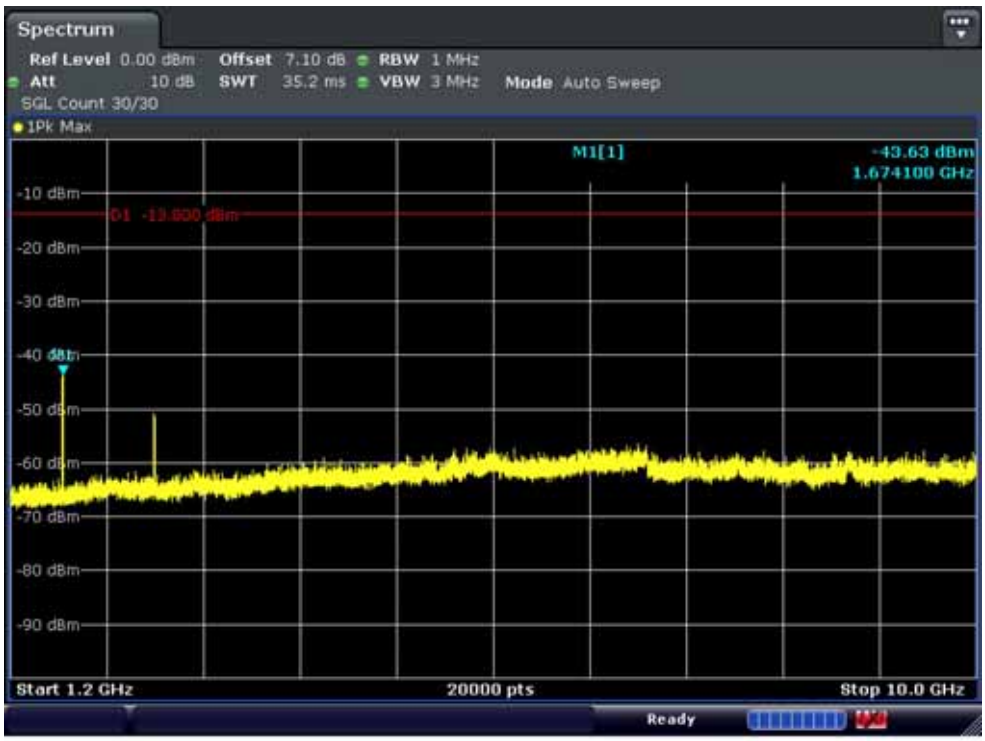


■ CDMA850 MODE (1013 CH.) 1.2 GHz ~ 10 GHz Conducted Spurious Emissions - 2

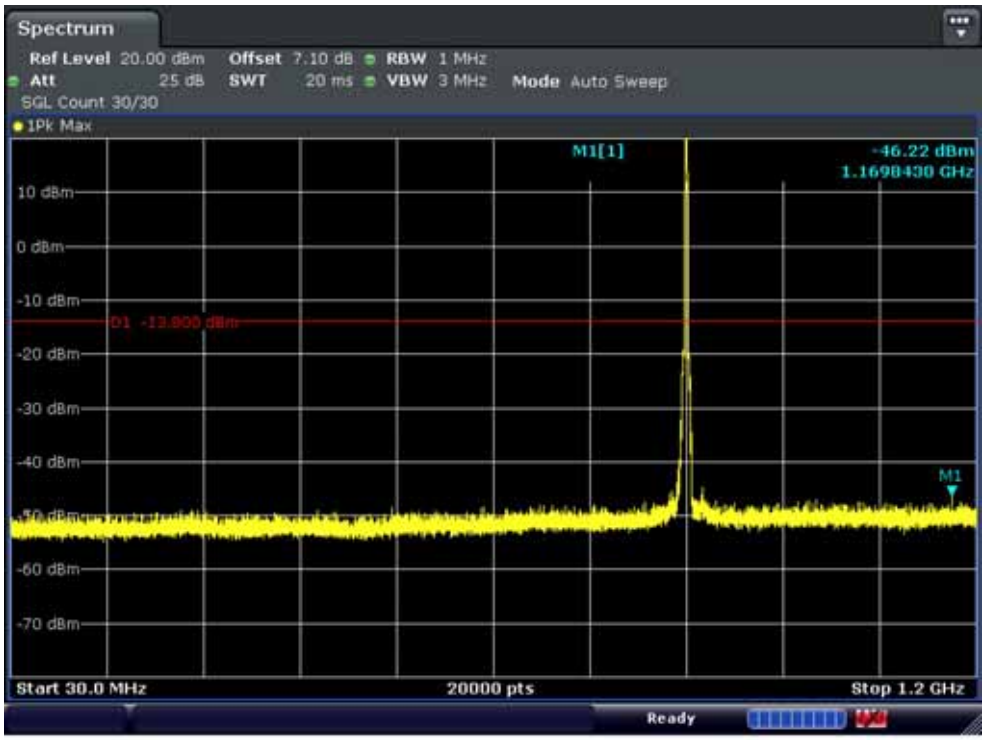
■ CDMA850 MODE (384 CH.) 30 MHz ~ 1.2 GHz Conducted Spurious Emissions - 1



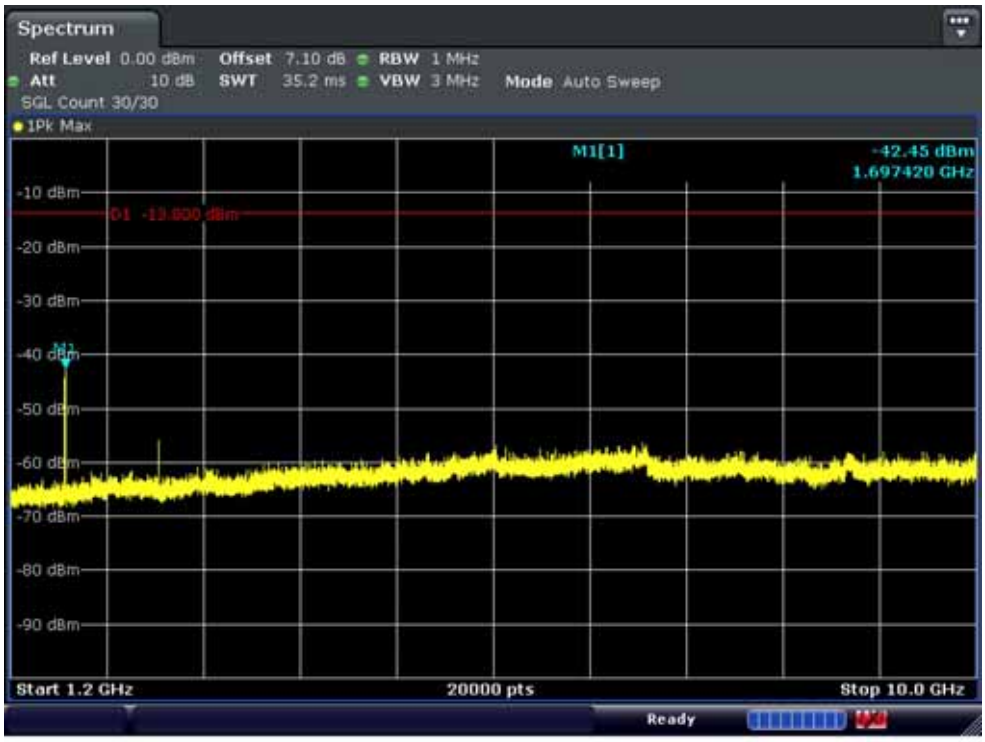
■ CDMA850 MODE (384 CH.)1.2 GHz ~ 10 GHz Conducted Spurious Emissions - 2



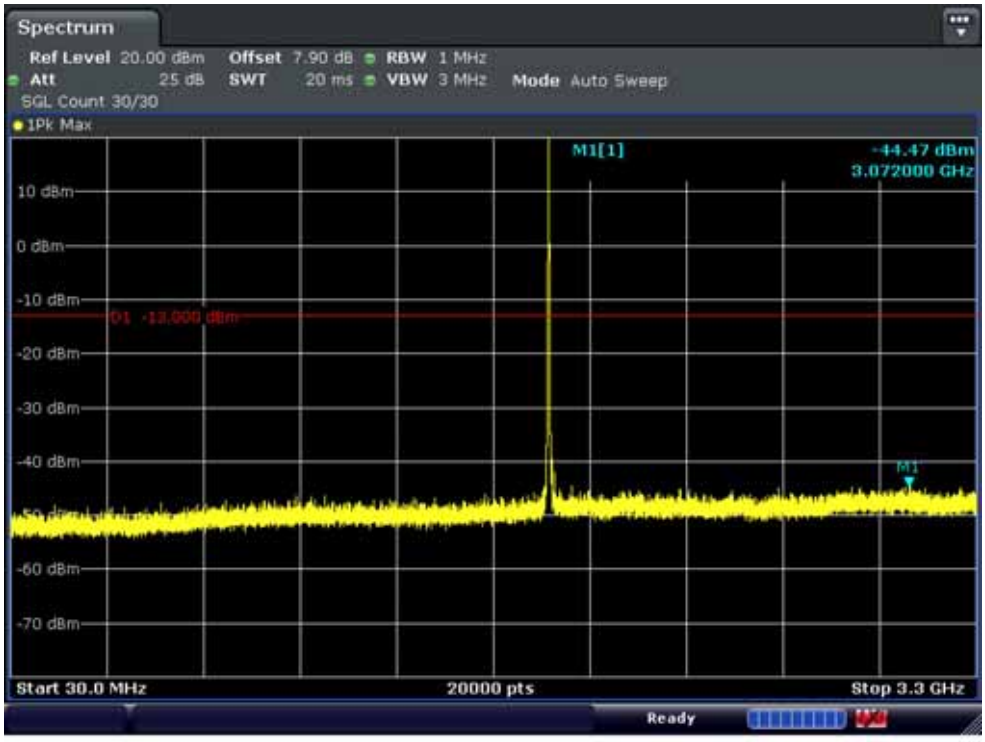
■ CDMA850 MODE (777 CH.) 30 MHz ~ 1.2 GHz Conducted Spurious Emissions - 1



■ CDMA850 MODE (777 CH.) 1.2 GHz ~ 10 GHz Conducted Spurious Emissions - 2



■ PCS MODE (25 CH.) 30 MHz ~ 3.3 GHz Conducted Spurious Emissions - 1



■ PCS MODE (25 CH.) 3.3 GHz ~ 10 GHz Conducted Spurious Emissions - 2

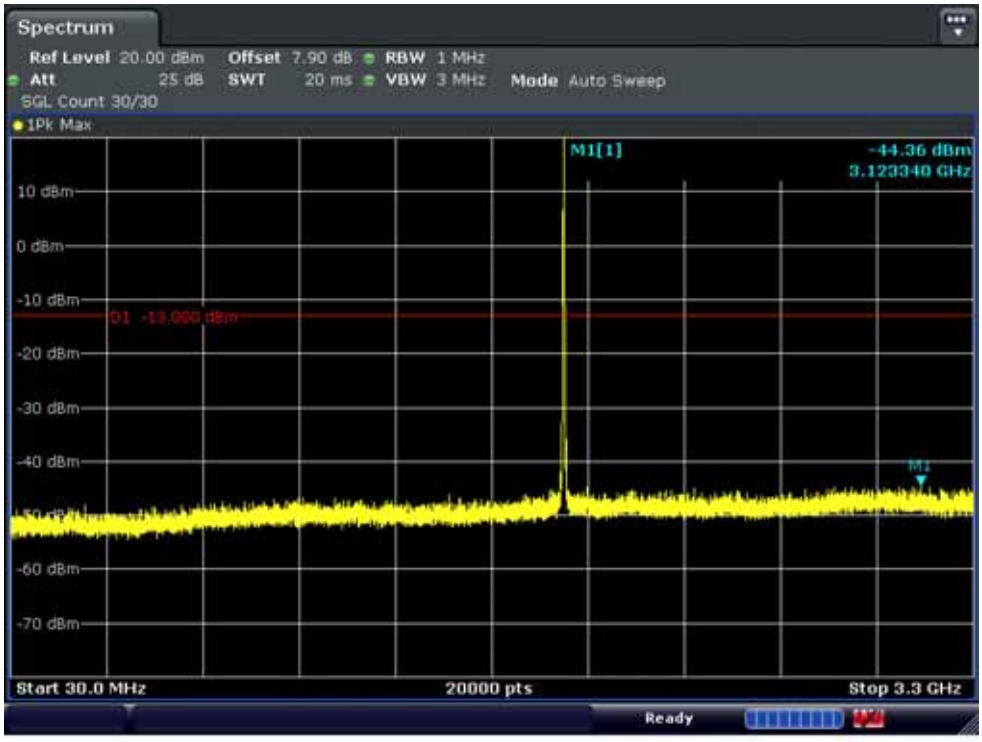
■ PCS MODE (25 CH.) 10 GHz ~ 20 GHz Conducted Spurious Emissions - 3

■ PCS MODE (600 CH.) 30 MHz ~ 3.3 GHz Conducted Spurious Emissions - 1

■ PCS MODE (600 CH.) 3.3 GHz ~ 10 GHz Conducted Spurious Emissions - 2

■ PCS MODE (600 CH.) 10 GHz ~ 20 GHz Conducted Spurious Emissions - 3

■ PCS MODE (1175 CH.) 30 MHz ~ 3.3 GHz Conducted Spurious Emissions - 1



■ PCS MODE (1175 CH.) 3.3 GHz ~ 10 GHz Conducted Spurious Emissions - 2

■ PCS MODE (1175 CH.) 10 GHz ~ 20 GHz Conducted Spurious Emissions - 3