



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC Part 90 CDMA / LTE

**Applicant:**  
LG Electronics MobileComm U.S.A  
1000 Sylvan Avenue  
Englewood Cliffs, NJ 07632  
United States

**Date of Testing:**  
5/23 - 5/28/2013  
**Test Site/Location:**  
PCTEST Lab., Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1305140844.ZNF

<b>FCC ID:</b>	<b>ZNFLS980</b>
<b>APPLICANT:</b>	<b>LG ELECTRONICS MOBILECOMM U.S.A</b>

**Applicant Type:** Certification  
**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)  
**FCC Rule Part:** §90.691  
**EUT Type:** Portable Handset  
**Model(s):** LS-980, LGLS980  
**Test Device Serial No.:** *identical prototype [S/N: RF1]*

Mode	Tx Frequency (MHz)	Emission Designator	Cond. PWR	
			Max. Power (W)	Max. Power (dBm)
CDMA800 (BC10)	817.9 - 823.1	1M27F9W	0.355	25.50
LTE Band 26	814.7 - 823	1M09G7D	0.239	23.79
LTE Band 26	814.7 - 823	1M09W7D	0.195	22.90
LTE Band 26	815.5 - 822.5	2M68G7D	0.233	23.68
LTE Band 26	815.5 - 822.5	2M68W7D	0.185	22.67
LTE Band 26	816.5 - 821.5	4M47G7D	0.221	23.44
LTE Band 26	816.5 - 821.5	4M47W7D	0.182	22.59
LTE Band 26	819	8M94G7D	0.215	23.32
LTE Band 26	819	8M92W7D	0.173	22.39

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

  
 Randy Ortanez  
 President

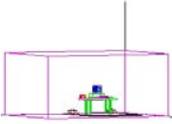


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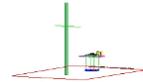
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# MEASUREMENT REPORT

## Part 90

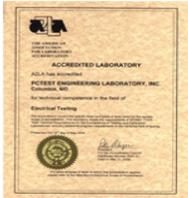


### §2.1033 General Information

**APPLICANT:** LG Electronics MobileComm U.S.A  
**APPLICANT ADDRESS:** 1000 Sylvan Avenue  
 Englewood Cliffs, NJ 07632, United States  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 7185 Oakland Mills Road, Columbia, MD 21045 USA  
**BASE MODEL:** LS-980  
**FCC CLASSIFICATION:** PCS Licensed Transmitter Held to Ear (PCE)  
**MODE:** LTE / CDMA / EvDO  
**FREQUENCY TOLERANCE:** ±0.00025 % (2.5 ppm)  
**Test Device Serial No.:** RF1  Production  Pre-Production  Engineering  
**DATE(S) OF TEST:** 5/23 - 5/28/2013  
**TEST REPORT S/N:** 0Y1305140844.ZNF

### Test Facility / Accreditations

Measurements were performed at **PCTEST Engineering Lab. located in Columbia, MD 21045, U.S.A.**



- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC.
- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.

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# 1.0 INTRODUCTION

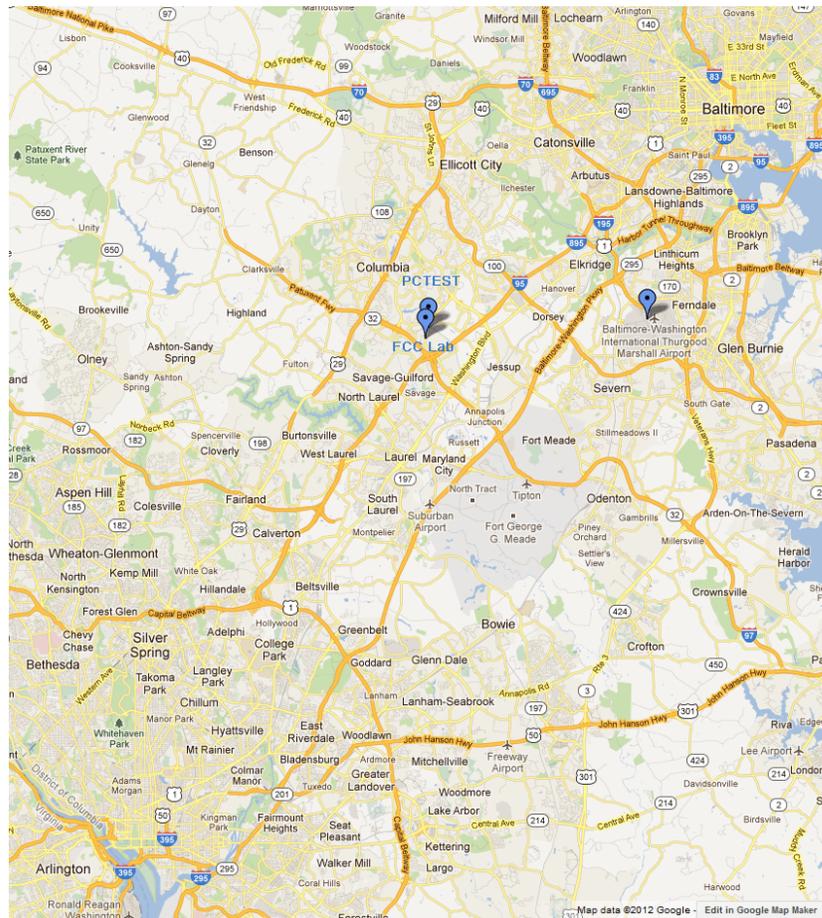
## 1.1 Scope

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

## 1.2 Testing Facility

The map below shows the location of the PCTEST LABORATORY, its proximity to the FCC Laboratory, the Columbia vicinity, the Baltimore-Washington Internt'l (BWI) airport, the city of Baltimore and the Washington, DC area. (See **Figure 1-1**).

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39° 10'23" N latitude and 76° 49'50" W longitude. The facility is 0.4 miles North of the FCC laboratory, and the ambient signal and ambient signal strength are approximately equal to those of the FCC laboratory. The detailed description of the measurement facility was found to be in compliance with the requirements of § 2.948 according to ANSI C63.4-2003 on February 15, 2012.



**Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **LG Portable Handset FCC ID: ZNFLS980**. The EUT consisted of the following component(s):

Trade Name / Base Model	FCC ID	Description
LG / Model: LS-980	ZNFLS980	Portable Handset

**Table 2-1. EUT Equipment Description**

**Note:** All data contained in this report is applicable for the device operation in the 814.7 – 824 MHz frequency range. Test data shown supports the devices compliance with §90.691 of the FCC Rules and Regulation.

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 2, 4, 5, 12 LTE, 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC

### 2.3 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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## 3.0 DESCRIPTION OF TESTS

### 3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment Measurements and Performance Standards” (ANSI/TIA-603-C-2004) was used in the measurement of the measurement of the **LG Portable Handset FCC ID: ZNFLS980**.

### 3.2 Occupied Bandwidth

#### §2.1049

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. The spectrum analyzers’ “occupied bandwidth” measurement function was used to record the occupied bandwidth in accordance with KDB 971168.

### 3.3 Spurious and Harmonic Emissions at Antenna Terminal

#### §2.1051, §90.691

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10<sup>th</sup> harmonic.

Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The emission limits are as follows:

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \text{ Log}_{10}(f/6.1)$  decibels or  $50 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \text{ Log}_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

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### 3.4 Radiated Power and Radiated Spurious Emissions

§2.1053, §90.635, §90.691

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. An ETS Lindgren Model 2188 raised turntable is used for radiated measurement. It is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. A 78cm high PVC support structure is placed on top of the turntable. A 3/4" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

The equipment under test was transmitting while connected to its integral antenna and is placed on a wooden turntable 80cm above the ground plane and 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168.

Per the guidance of ANSI/TIA-603-C-2004, 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 with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss} \text{ [dB]} + \text{antenna gain} \text{ [dBd/dBi]}$$

Where,  $P_d$  is the dipole equivalent power,  $P_g$  is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to  $P_g \text{ [dBm]} - \text{cable loss} \text{ [dB]}$ .

The calculated  $P_d$  levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of  $43 + 10\log_{10}(\text{Power} \text{ [Watts]})$  specified in 90.691.

For fundamental radiated power measurements, the guidance of KDB 971168 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-C-2004.

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### 3.5 Frequency Stability / Temperature Variation

#### §2.1055, 90.213(a)

Frequency stability testing is performed in accordance with the guidelines of ANSI/TIA-603-C-2004. The frequency stability of the transmitter is measured by:

- a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.
- b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

*Specification – For Part 90.213, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency.*

#### Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).
2. The equipment is turned on in a “standby” condition for fifteen minutes 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.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

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## 4.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST).

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTX1	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
Agilent	8447D	Broadband Amplifier	6/8/2012	Annual	6/8/2013	2443A01900
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/11/2013	Annual	1/11/2014	MY52350166
Anritsu	MA2411B	Pulse Sensor	9/19/2012	Annual	9/19/2013	1027293
Anritsu	ML2495A	Power Meter	10/11/2012	Annual	10/11/2013	1039008
Espec	ESX-2CA	Environmental Chamber	4/16/2013	Annual	4/16/2014	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	7/22/2011	Biennial	7/22/2013	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
Mini-Circuits	VHF-1200+	High Pass Filter	1/17/2013	Annual	1/17/2014	30923
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2013	Annual	4/17/2014	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	ESU26	EMI Test Receiver	2/25/2013	Annual	2/25/2014	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/14/2011	Biennial	11/14/2013	9105-2404
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Tx	11/14/2011	Biennial	11/14/2013	9105-2403
Seekonk	NC-100	Torque Wrench (8" lb)	3/5/2012	Triennial	3/5/2015	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

**Table 4-1. Test Equipment**

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## 5.0 SAMPLE CALCULATIONS

### Emission Designator

**CDMA Emission Designator = 1M25F9W**

CDMA BW = 1.25 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data) (Measured at the 99.75% power bandwidth)

### LTE QPSK Modulation

**Emission Designator = 8M62G7D**

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Amplitude/Angle Modulated

### LTE 16QAM Modulation

**Emission Designator = 8M45W7D**

LTE BW = 8.45 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Combination (Audio/Data)

### Spurious Radiated Emission – BC10

**Example: Channel 476 CDMA BC10 Mode 3<sup>rd</sup> Harmonic (2453.70MHz)**

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was -81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of -81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of -30.9 dBm yielding -24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm - (-24.80) = 50.3 dBc.

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## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: LG Electronics MobileComm U.S.A  
 FCC ID: ZNFLS980  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE / CDMA / EvDO  
 Band: Band Class 10

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
§2.1051, §90.691	Band Edge / Conducted Spurious Emissions	> 50 + 10log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge	CONDUCTED	PASS	Section 7.0
§2.1046, §90.635	Transmitter Conducted Output Power	< 100 Watts max.		PASS	Section 6.2
§2.1053, §90.691	Undesirable Emissions	> 43 + 10log <sub>10</sub> (P[Watts]) for all out-of-band emissions		PASS	Sections 6.3
§2.1055, §90.213	Frequency Stability	< 2.5 ppm		PASS	Section 6.5

**Table 6-1. Summary of Test Results**

**Notes:**

- 1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- 2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.

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## 6.2 Conducted Power Output Data

### §90.635

Frequency [MHz]	BC10 [Channel]	Battery Type	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
817.90	476	Standard	25.48	0.353	50.00	-24.52
823.10	684	Standard	25.50	0.355	50.00	-24.50

Table 6-2. CDMA BC10 Conducted Power Output Data

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	RB Size/Offset	Cond. PWR [dBm]	Cond. PWR [Watts]	Cond. PWR Limit [dBm]	Margin [dB]
814.70	1.4	QPSK	1/0	23.79	0.239	50.00	-26.21
823.30	1.4	QPSK	1/0	23.74	0.237	50.00	-26.26
814.70	1.4	16-QAM	1/0	22.69	0.186	50.00	-27.31
823.30	1.4	16-QAM	1/0	22.90	0.195	50.00	-27.10
815.50	3	QPSK	1/0	23.66	0.232	50.00	-26.34
822.50	3	QPSK	1/0	23.68	0.233	50.00	-26.32
815.50	3	16-QAM	1/0	22.67	0.185	50.00	-27.33
822.50	3	16-QAM	1/0	22.64	0.184	50.00	-27.36
816.50	5	QPSK	1/0	23.41	0.219	50.00	-26.59
821.50	5	QPSK	1/0	23.44	0.221	50.00	-26.56
816.50	5	16-QAM	1/0	22.59	0.182	50.00	-27.41
821.50	5	16-QAM	1/0	22.47	0.177	50.00	-27.53
819.00	10	QPSK	1/0	23.32	0.215	50.00	-26.68
819.00	10	16-QAM	1/0	22.39	0.173	50.00	-27.61

Table 6-3. LTE Band 26 Conducted Power Output Data

#### NOTES:

1. This device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

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### 6.3 BC10 CDMA Radiated Measurements §2.1053, §90.691

#### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 817.90 MHz  
 CHANNEL: 476  
 MEASURED OUTPUT POWER: 25.48 dBm = 0.353 W  
 MODULATION SIGNAL: CDMA  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin
1635.80	-55.30	4.88	-50.42	H	-37.42
2453.70	-49.77	5.15	-44.62	H	-31.62
3271.60	-118.00	7.49	-110.51	H	-97.51
4089.50	-117.61	9.15	-108.47	H	-95.47
4907.40	-116.97	9.95	-107.02	H	-94.02

**Table 6-4. Radiated Spurious Data (Ch. 476)**

#### NOTES:

1. This device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset	Page 13 of 47	

**BC10 CDMA Radiated Measurements (Cont'd)**  
§2.1053, §90.691

**Field Strength of SPURIOUS Radiation**

OPERATING FREQUENCY: 823.10 MHz  
 CHANNEL: 684  
 MEASURED OUTPUT POWER: 25.50 dBm = 0.355 W  
 MODULATION SIGNAL: CDMA  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin
<u>1646.20</u>	<u>-49.95</u>	<u>4.77</u>	<u>-45.18</u>	<u>H</u>	<u>-32.18</u>
<u>2469.30</u>	<u>-52.77</u>	<u>5.06</u>	<u>-47.71</u>	<u>H</u>	<u>-34.71</u>
<u>3292.40</u>	<u>-118.09</u>	<u>7.57</u>	<u>-110.52</u>	<u>H</u>	<u>-97.52</u>
<u>4115.50</u>	<u>-117.69</u>	<u>9.19</u>	<u>-108.50</u>	<u>H</u>	<u>-95.50</u>
<u>4938.60</u>	<u>-117.04</u>	<u>10.00</u>	<u>-107.03</u>	<u>H</u>	<u>-94.03</u>

**Table 6-5. Radiated Spurious Data (Ch. 684)**

**NOTES:**

1. This device was tested under all R.C.s and S.O.s and the worst case is reported with RC3/SO55 with "All Up" power control bits.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
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## 6.4 Band 26 LTE Radiated Measurements

\$2.1053, \$90.691

### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 814.70 MHz  
 CHANNEL: 26697  
 MEASURED OUTPUT POWER: 23.79 dBm = 0.239 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin
<u>1629.40</u>	<u>-47.06</u>	<u>4.95</u>	<u>-42.11</u>	<u>H</u>	<u>-29.11</u>
<u>2444.10</u>	<u>-51.07</u>	<u>5.20</u>	<u>-45.87</u>	<u>H</u>	<u>-32.87</u>
<u>3258.80</u>	<u>-117.95</u>	<u>7.44</u>	<u>-110.51</u>	<u>H</u>	<u>-97.51</u>
<u>4073.50</u>	<u>-117.56</u>	<u>9.12</u>	<u>-108.44</u>	<u>H</u>	<u>-95.44</u>
<u>4888.20</u>	<u>-116.93</u>	<u>9.92</u>	<u>-107.01</u>	<u>H</u>	<u>-94.01</u>

Table 6-6. Radiated Spurious Data

#### **NOTES:**

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1/0.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
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**Band 26 LTE Radiated Measurements (Cont'd)**  
§2.1053, §90.691

**Field Strength of SPURIOUS Radiation**

OPERATING FREQUENCY: 823.30 MHz  
 CHANNEL: 26783  
 MEASURED OUTPUT POWER: 23.74 dBm = 0.237 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 1.4MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  -13.00 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin
1646.60	-45.45	4.77	-40.69	H	-27.69
2469.90	-48.70	5.06	-43.64	H	-30.64
3293.20	-118.10	7.58	-110.52	H	-97.52
4116.50	-117.69	9.19	-108.50	H	-95.50
4939.80	-117.04	10.01	-107.03	H	-94.03

**Table 6-7. Radiated Spurious Data**

**NOTES:**

1. This device was tested under all bandwidths, and RB configurations, and modulations. This device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1/0.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case test configuration was found in the horizontal setup. The data reported in the table above was measured in this test setup.

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset	Page 16 of 47	

## 6.5 BC10 CDMA Frequency Stability Measurements

§2.1055, §90.213

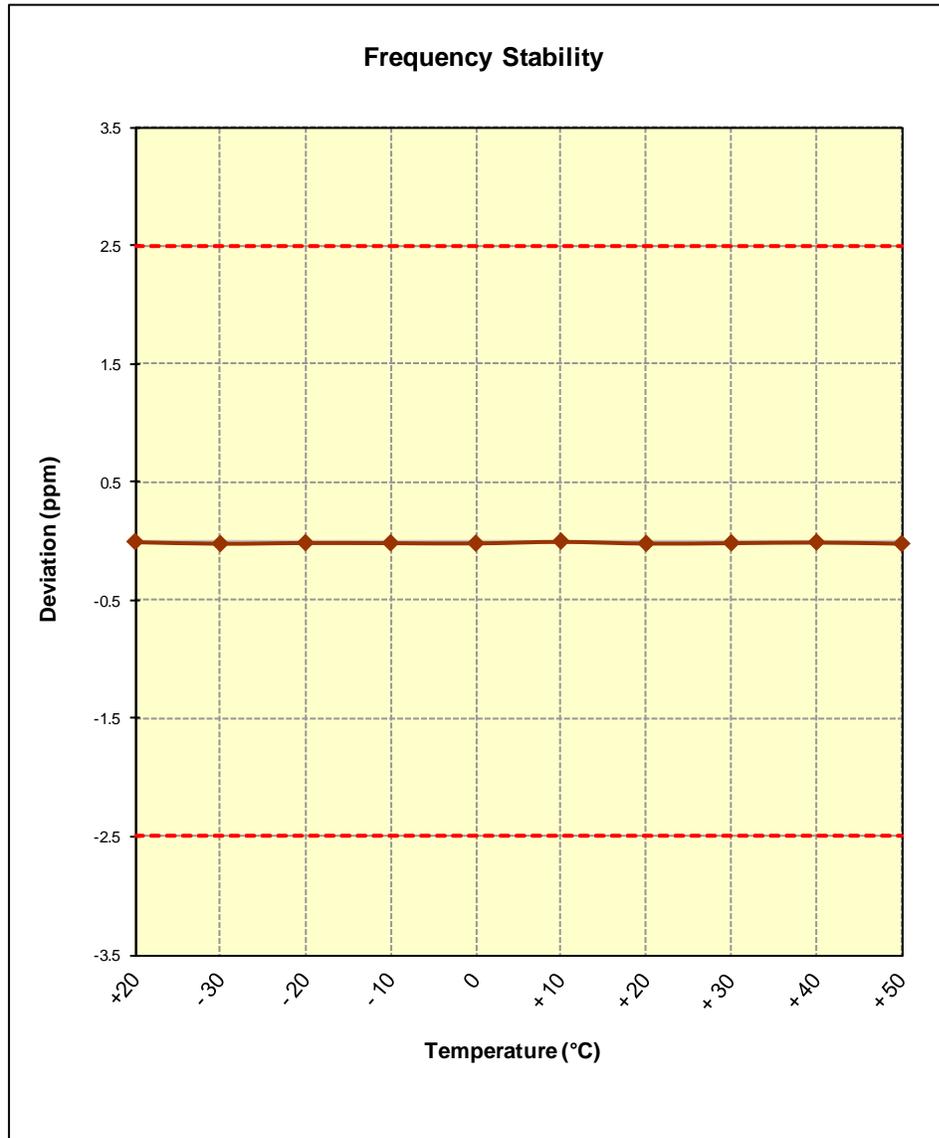
OPERATING FREQUENCY: 823,100,000 Hz  
 CHANNEL: 684  
 REFERENCE VOLTAGE: 3.8 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (° C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	823,099,996	-4	-0.000001
100 %		- 30	823,099,982	-18	-0.000002
100 %		- 20	823,099,988	-12	-0.000001
100 %		- 10	823,099,987	-13	-0.000002
100 %		0	823,099,984	-16	-0.000002
100 %		+ 10	823,099,999	-1	0.000000
100 %		+ 20	823,099,983	-17	-0.000002
100 %		+ 30	823,099,987	-13	-0.000002
100 %		+ 40	823,099,992	-8	-0.000001
100 %		+ 50	823,099,982	-18	-0.000002
115 %	4.37	+ 20	823,099,990	-10	-0.000001
BATT. ENDPOINT	3.40	+ 20	823,099,984	-16	-0.000002

**Table 6-8. Frequency Stability Data (Ch.684)**

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EVDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset	Page 17 of 47	

**BC10 CDMA Frequency Stability Measurements (Cont'd)**  
§2.1055, §90.213



**Figure 6-1. Frequency Stability Graph (Ch. 684)**

<b>FCC ID:</b> ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1305140844.ZNF	<b>Test Dates:</b> 5/23 - 5/28/2013	<b>EUT Type:</b> Portable Handset	Page 18 of 47	

## 6.6 Band 26 LTE Frequency Stability Measurements

§2.1055, §90.213

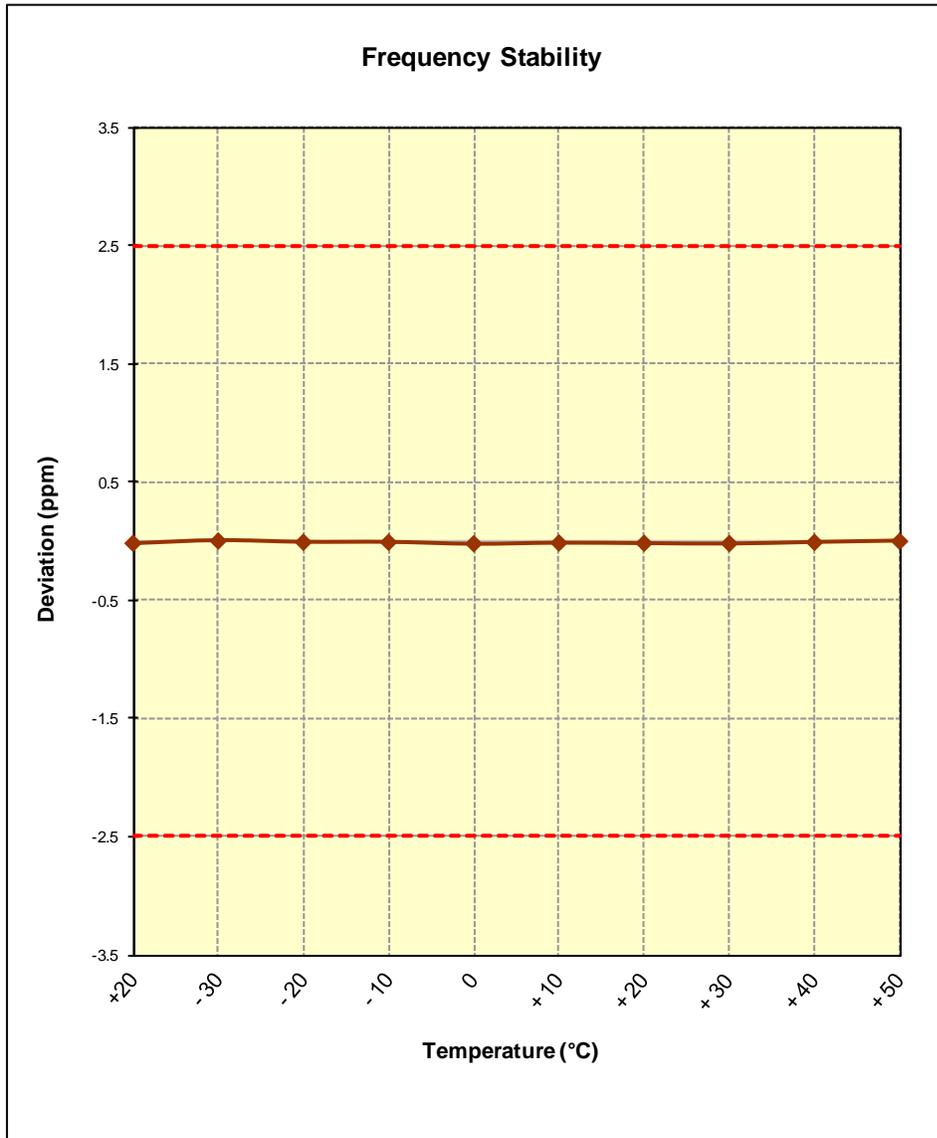
OPERATING FREQUENCY: 814,700,000 Hz  
 CHANNEL: 26697  
 REFERENCE VOLTAGE: 3.8 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (° C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	814,699,983	-17	-0.000002
100 %		- 30	814,699,999	-1	0.000000
100 %		- 20	814,699,991	-9	-0.000001
100 %		- 10	814,699,990	-10	-0.000001
100 %		0	814,699,981	-19	-0.000002
100 %		+ 10	814,699,986	-14	-0.000002
100 %		+ 20	814,699,984	-16	-0.000002
100 %		+ 30	814,699,982	-18	-0.000002
100 %		+ 40	814,699,990	-10	-0.000001
100 %		+ 50	814,699,997	-3	0.000000
115 %	4.37	+ 20	814,699,983	-17	-0.000002
BATT. ENDPOINT	3.40	+ 20	814,699,992	-8	-0.000001

Table 6-9. Frequency Stability Data (Ch. 26697)

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EVDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset	Page 19 of 47	

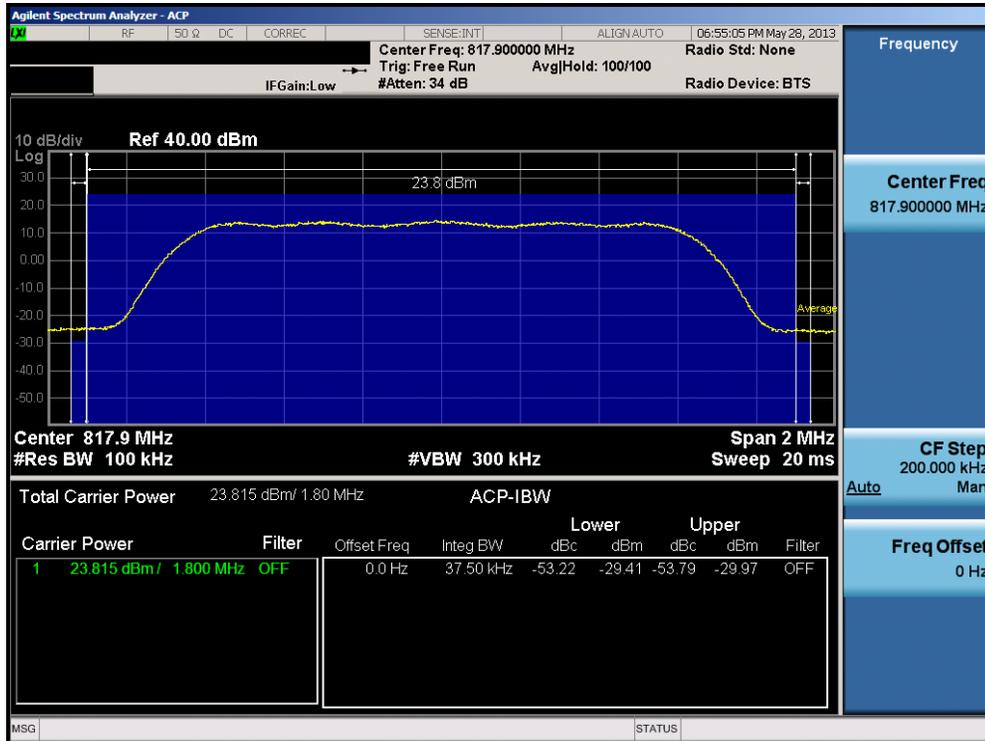
**Band 26 LTE Frequency Stability Measurements (Cont'd)**  
**§2.1055, §90.213**



**Figure 6-2. Frequency Stability Graph (Ch. 26697)**

<b>FCC ID:</b> ZNFLS980	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	<b>LG</b>	<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1305140844.ZNF	<b>Test Dates:</b> 5/23 - 5/28/2013	<b>EUT Type:</b> Portable Handset	Page 20 of 47	





Plot 7-3. Channel Edge Plot (Ch. 476)

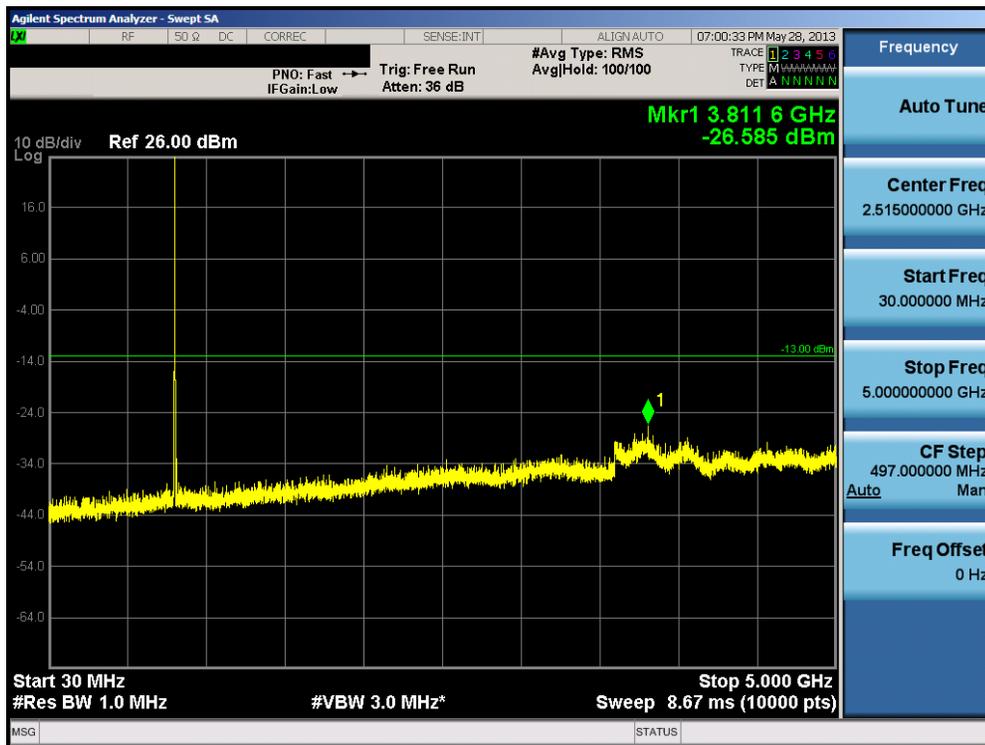


Plot 7-4. Extended Band Edge Plot (Ch. 476)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 22 of 47

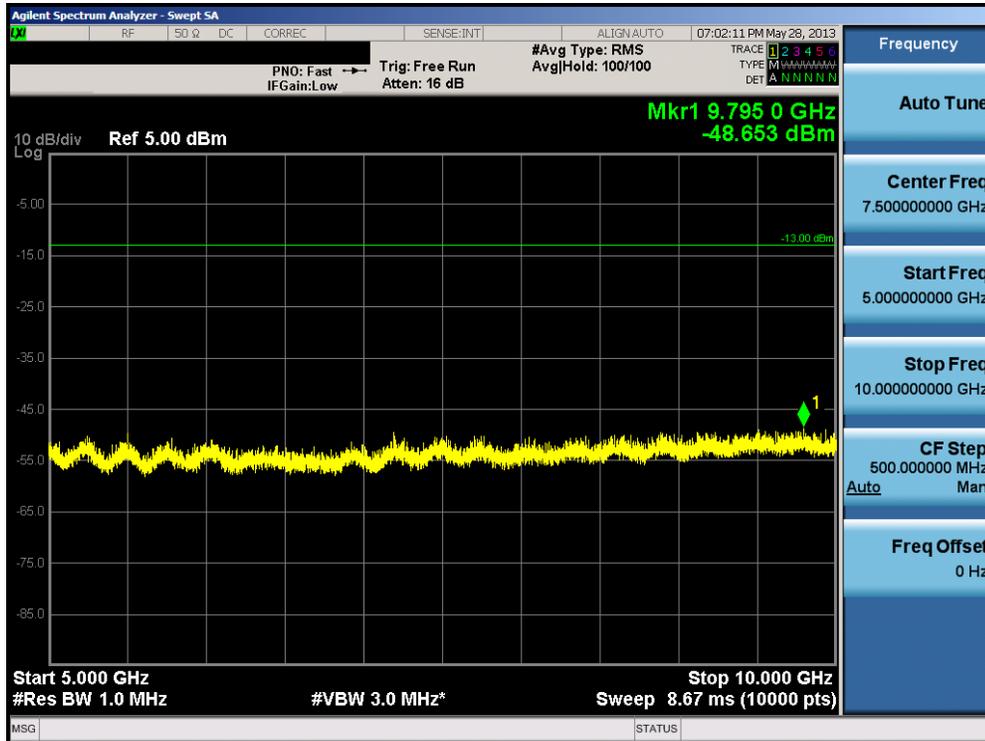


Plot 7-5. Extended Band Edge Plot - Interior (Ch. 476)

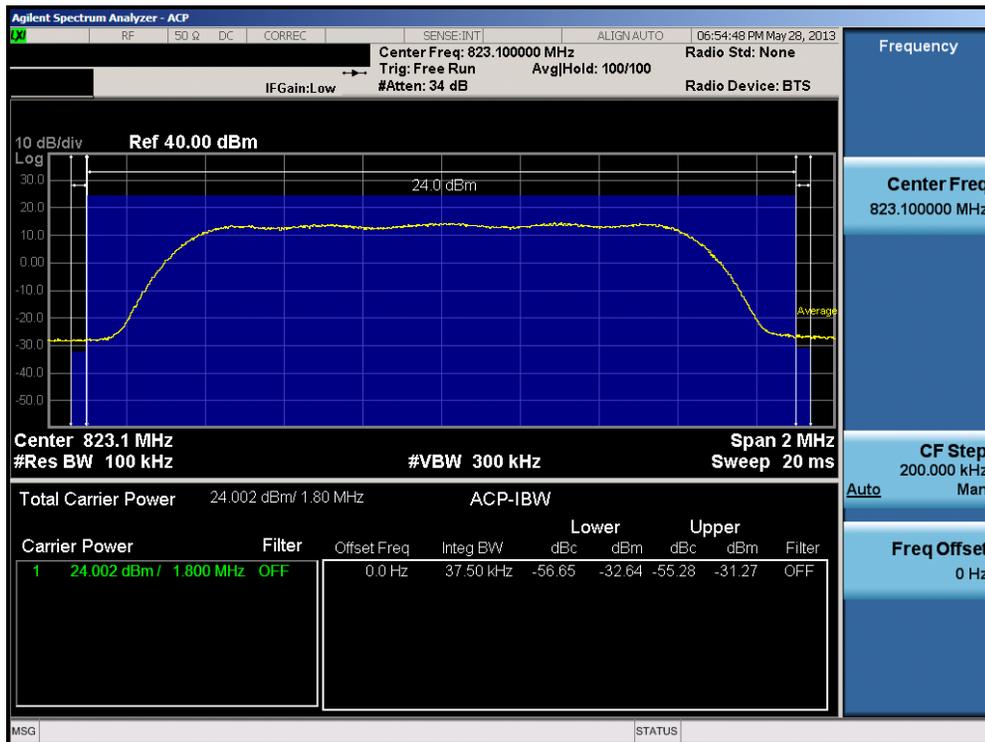


Plot 7-6. Conducted Spurious Plot (Ch. 684)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 23 of 47



Plot 7-7. Conducted Spurious Plot (Ch. 684)



Plot 7-8. Channel Edge Plot (Ch. 684)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 24 of 47

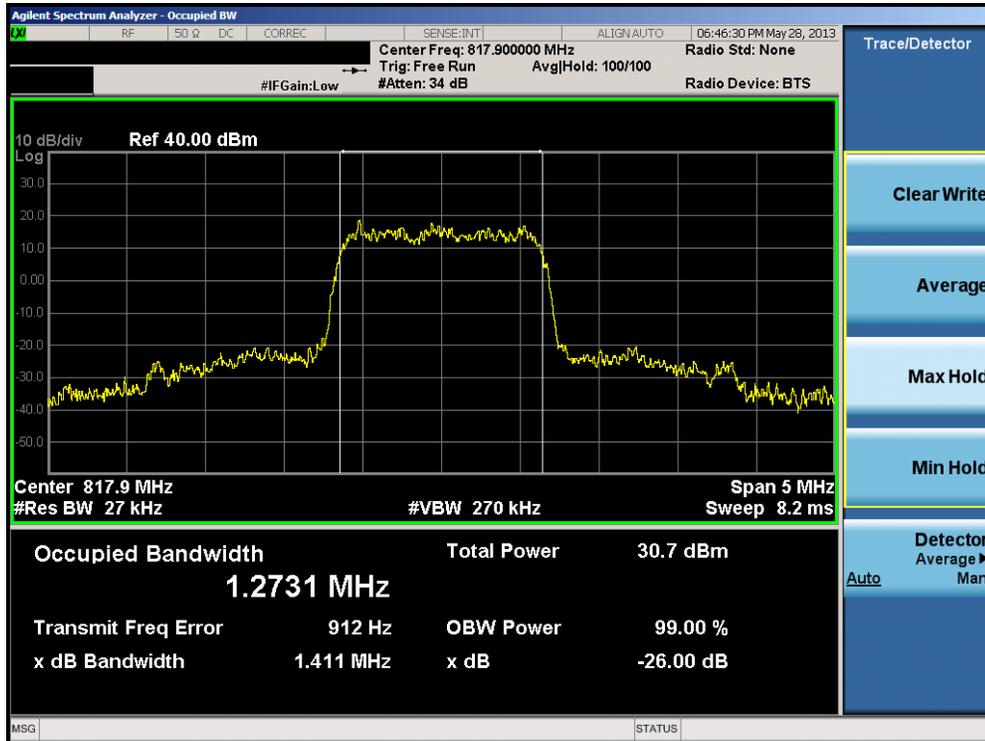


**Plot 7-9. Extended Band Edge Plot (Ch. 684)**

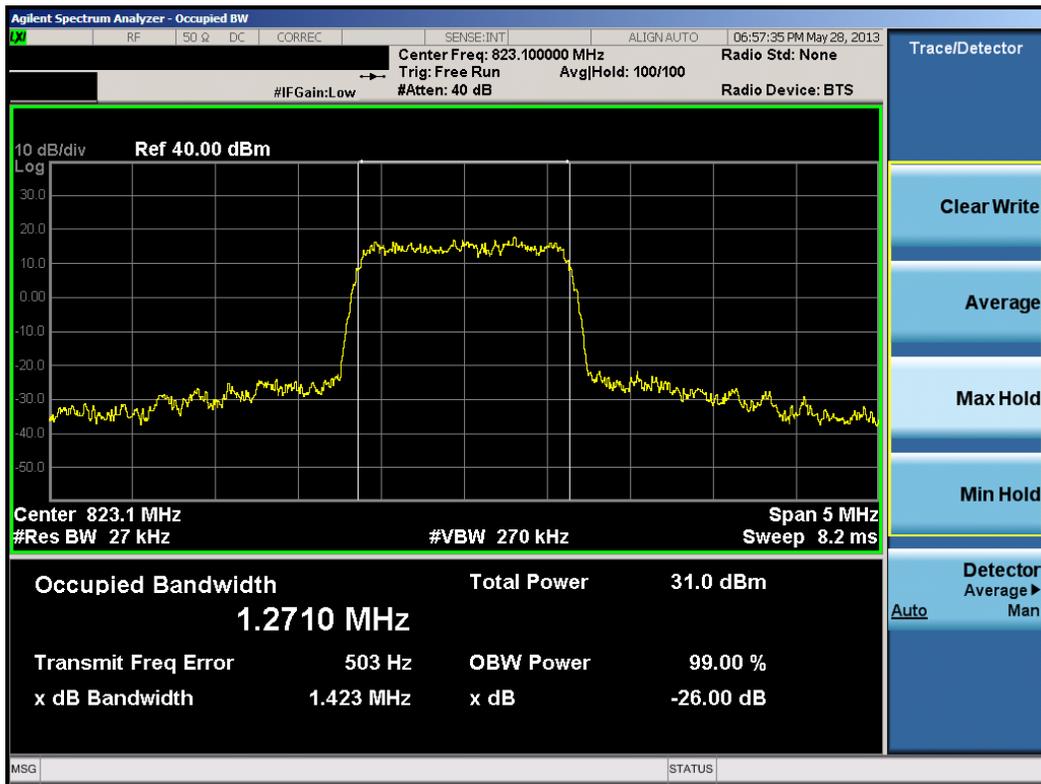


**Plot 7-10. Extended Band Edge Plot – Interior (Ch. 684)**

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
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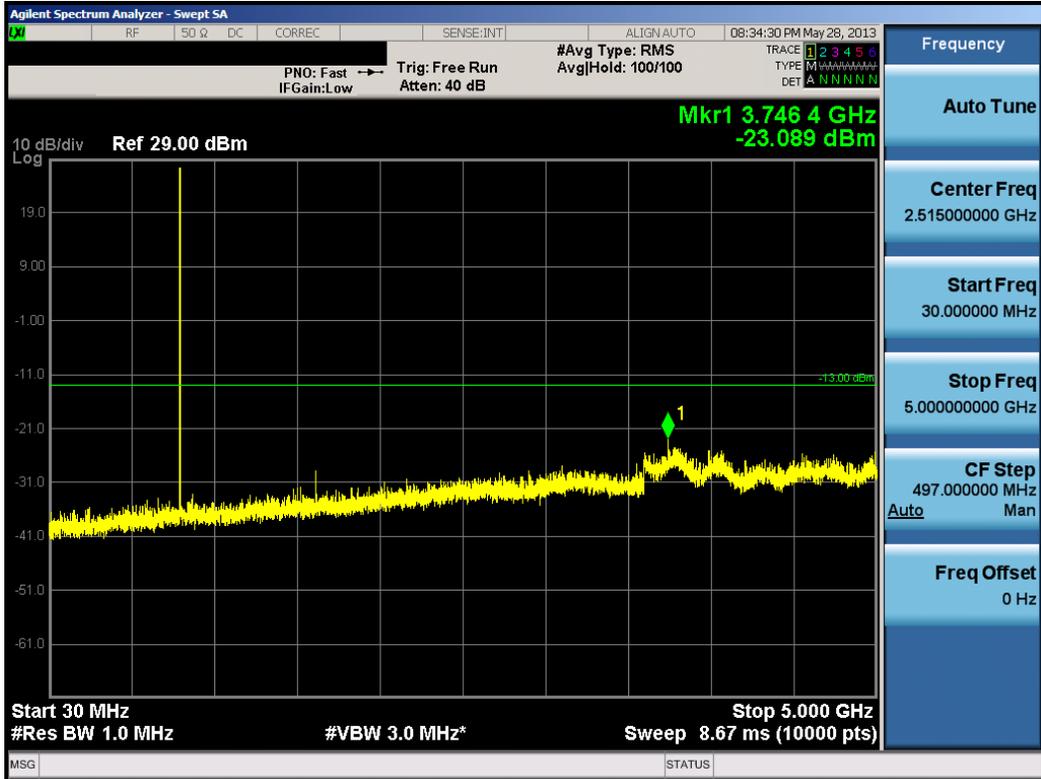


Plot 7-11. Occupied Bandwidth Plot (Ch. 476)

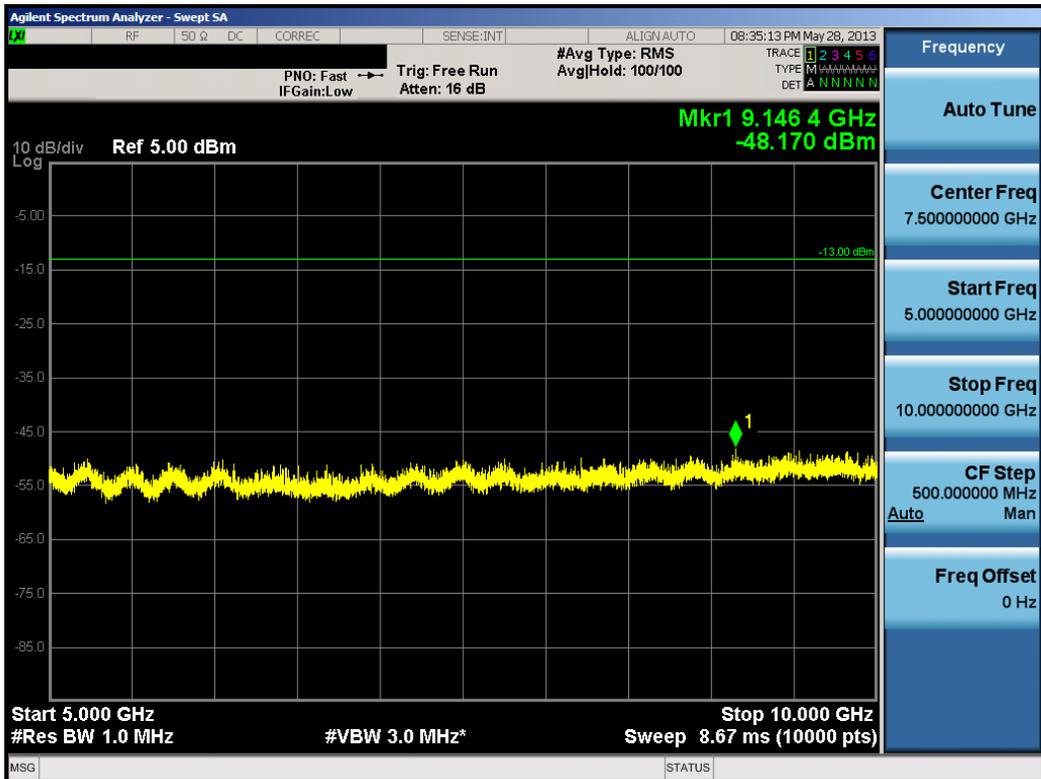


Plot 7-12. Occupied Bandwidth Plot (Ch. 684)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 26 of 47

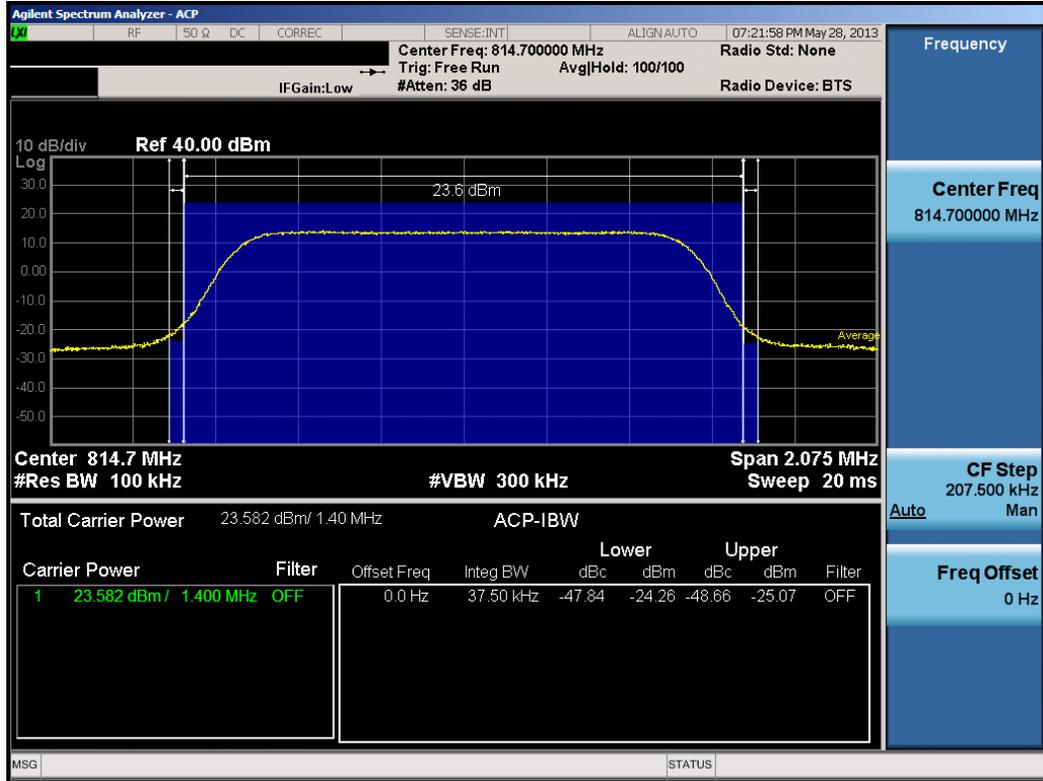


Plot 7-13. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)



Plot 7-14. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 27 of 47



Plot 7-15. Channel Edge Plot (1.4MHz QPSK – RB Size 6– Low Channel)



Plot 7-16. Extended Band Edge Plot (1.4MHz QPSK – RB Size 6– Low Channel)

FCC ID: ZNFLS980	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	<b>LG</b>	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 28 of 47



Plot 7-17. Extended Band Edge Plot (1.4MHz QPSK – RB Size 6– Low Channel)

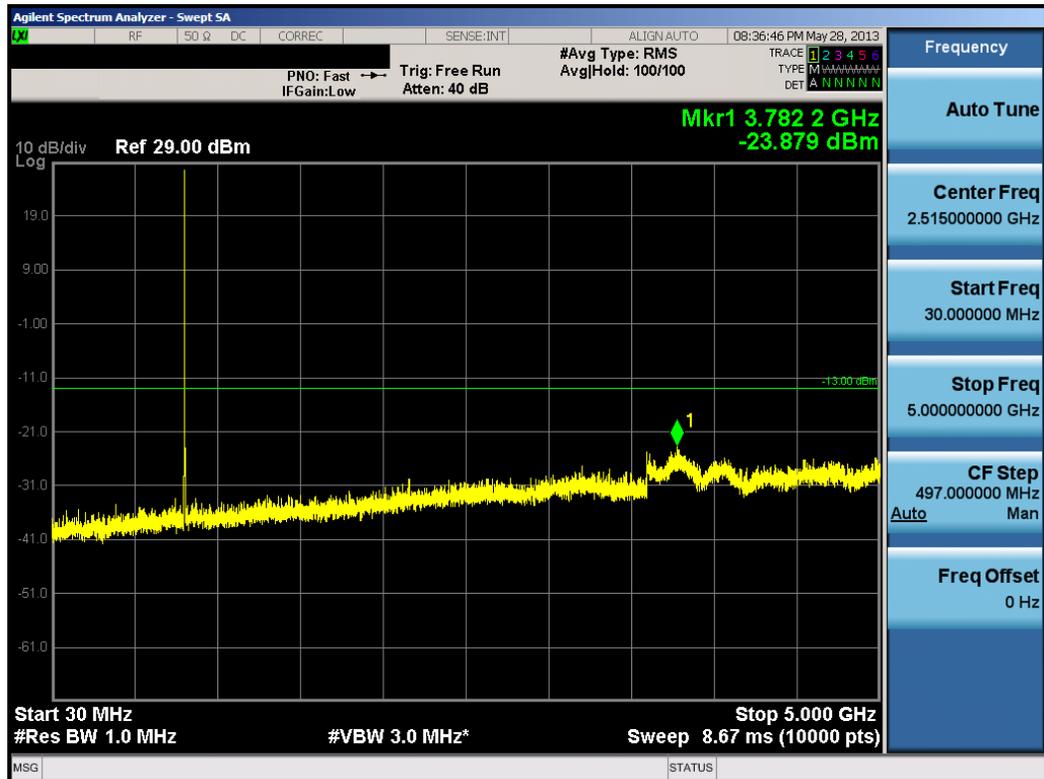


Plot 7-18. Occupied Bandwidth Plot (1.4MHz QPSK – RB Size 6– Low Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 29 of 47

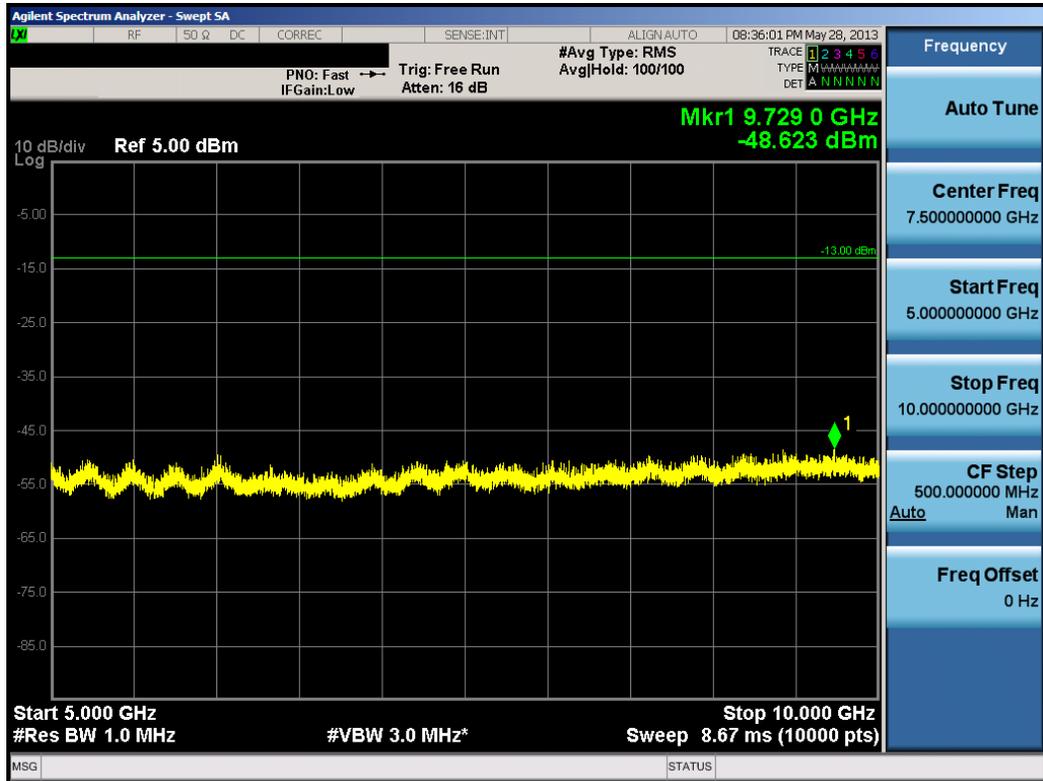


Plot 7-19. Occupied Bandwidth Plot (1.4MHz 16-QAM – RB Size 6– Low Channel)

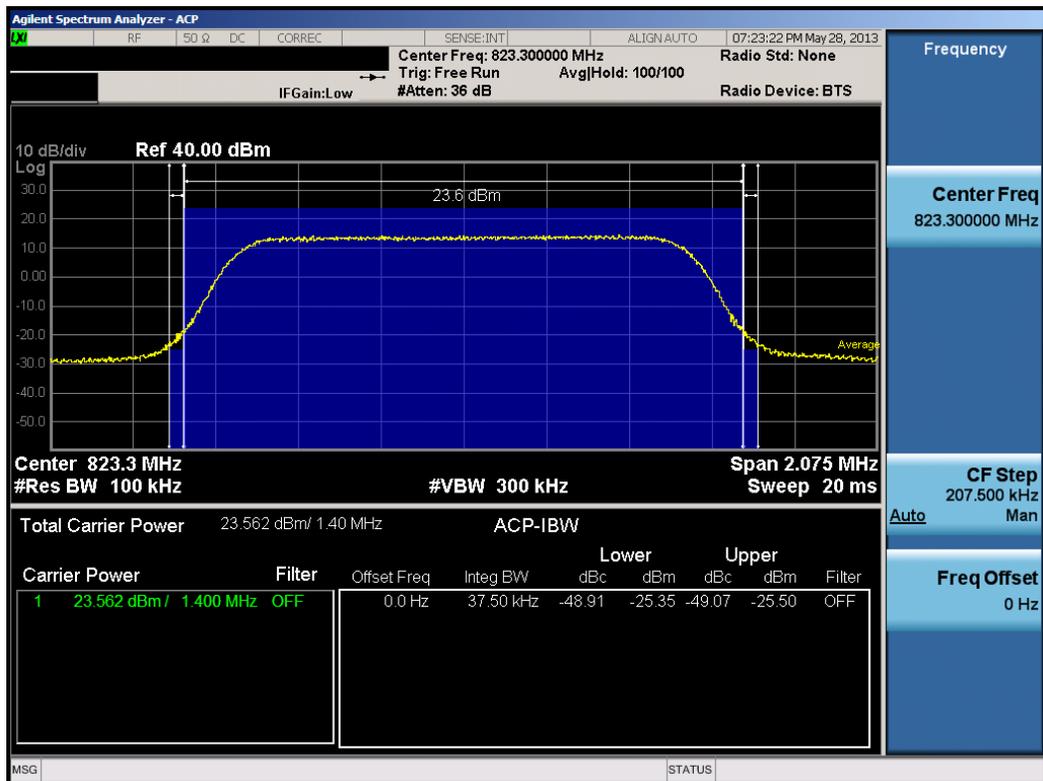


Plot 7-20. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 30 of 47



Plot 7-21. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-22. Channel Edge Plot (1.4MHz QPSK – RB Size 6 – High Channel)

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 31 of 47

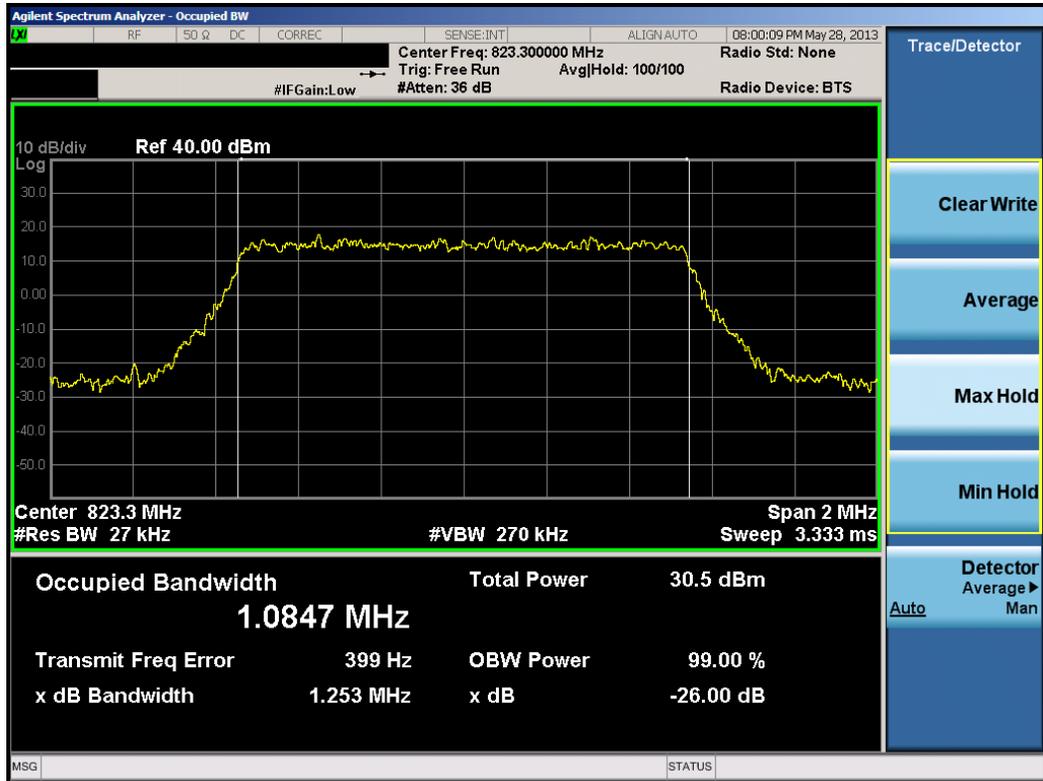


Plot 7-23. Extended Band Edge Plot (1.4MHz QPSK – RB Size 6 – High Channel)

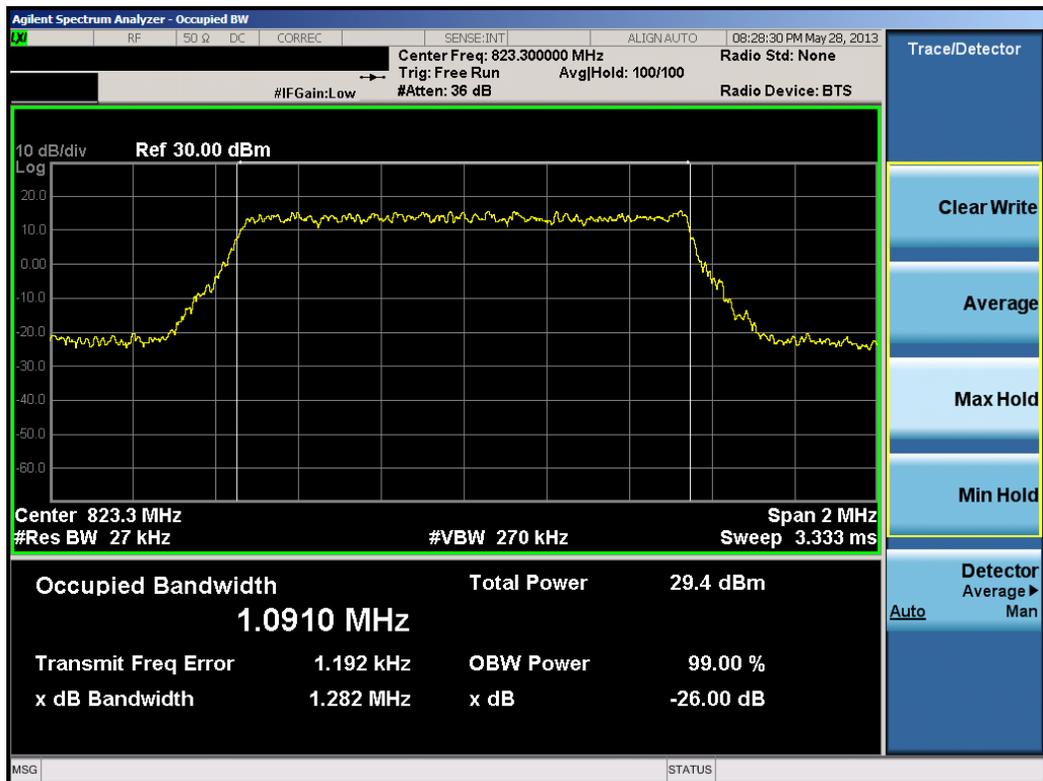


Plot 7-24. Extended Band Edge Plot (1.4MHz QPSK – RB Size 6 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 32 of 47



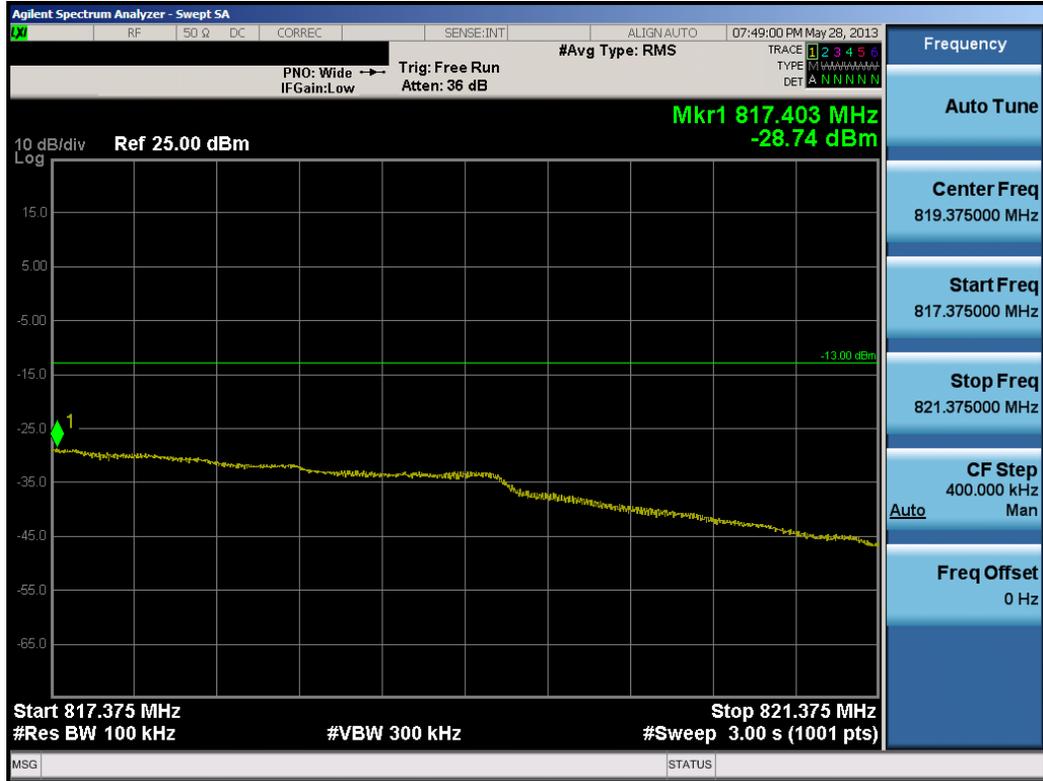
Plot 7-25. Occupied Bandwidth Plot (1.4MHz QPSK – RB Size 6 – High Channel)



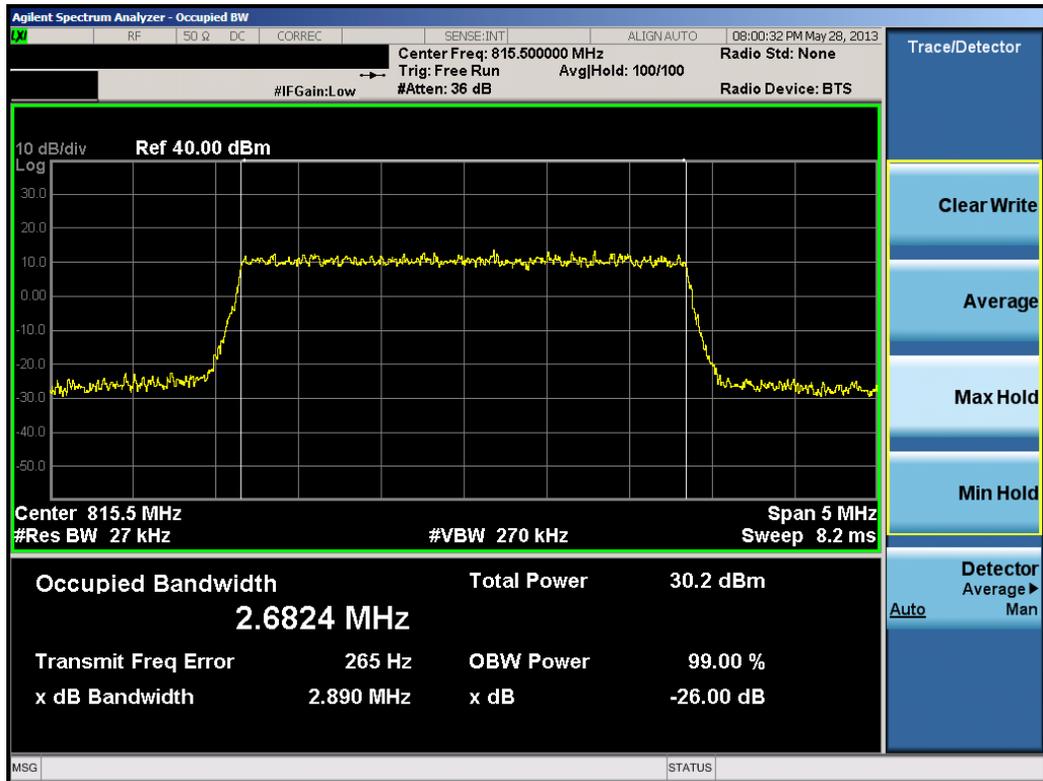
Plot 7-26. Occupied Bandwidth Plot (1.4MHz 16-QAM – RB Size 6 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 33 of 47



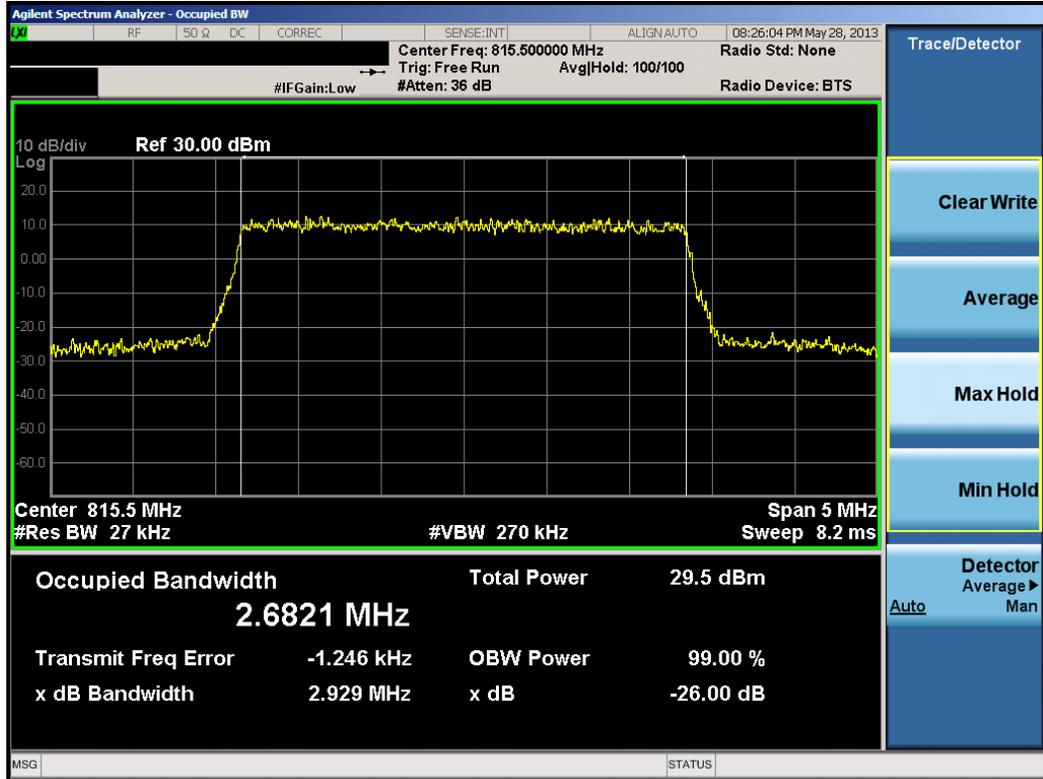


Plot 7-29. Extended Band Edge Plot (3MHz QPSK – RB Size 15– Low Channel)

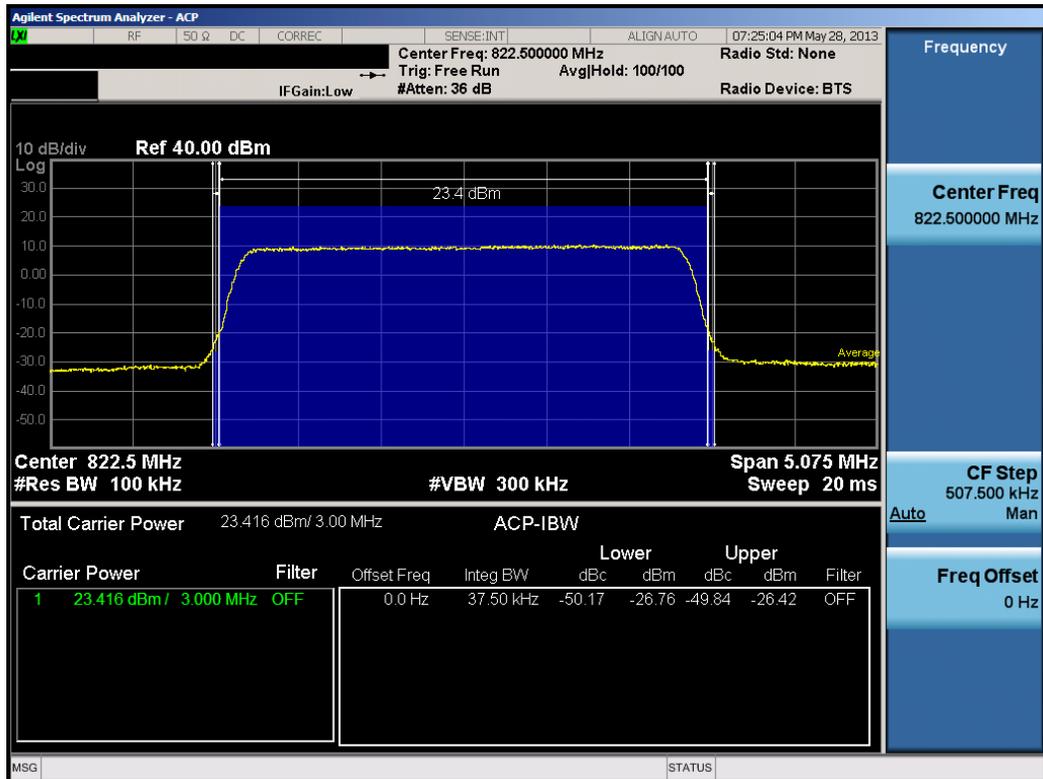


Plot 7-30. Occupied Bandwidth Plot (3MHz QPSK – RB Size 15– Low Channel)

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 35 of 47



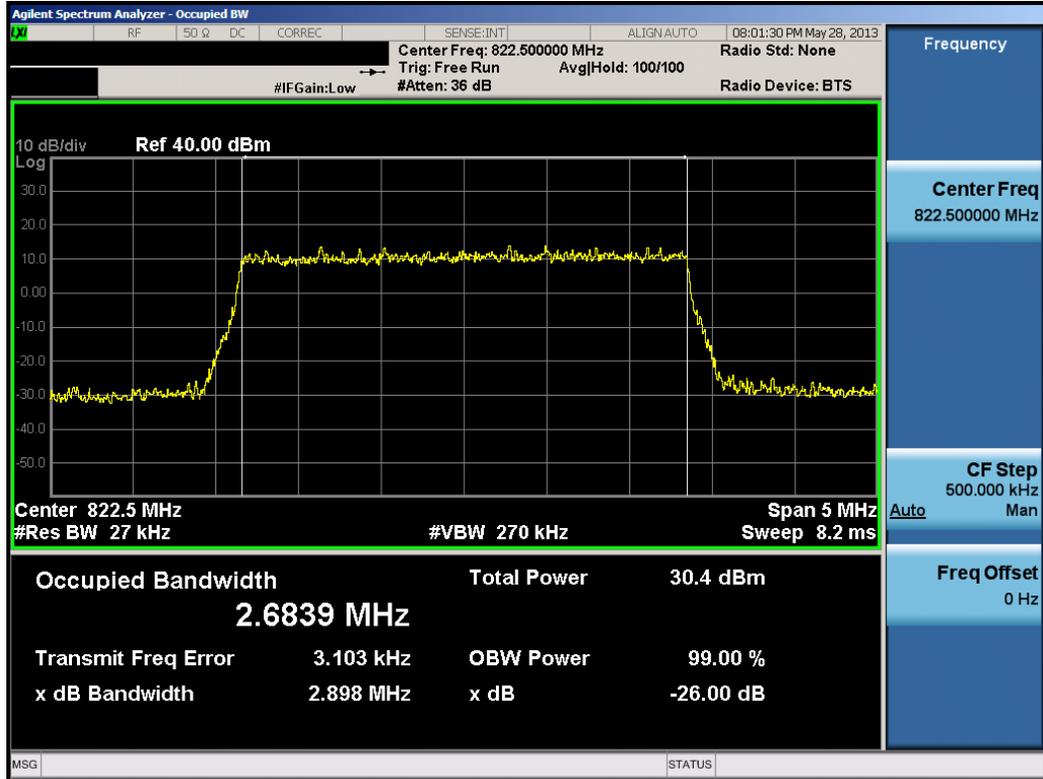
Plot 7-31. Occupied Bandwidth Plot (3MHz 16-QAM – RB Size 15– Low Channel))



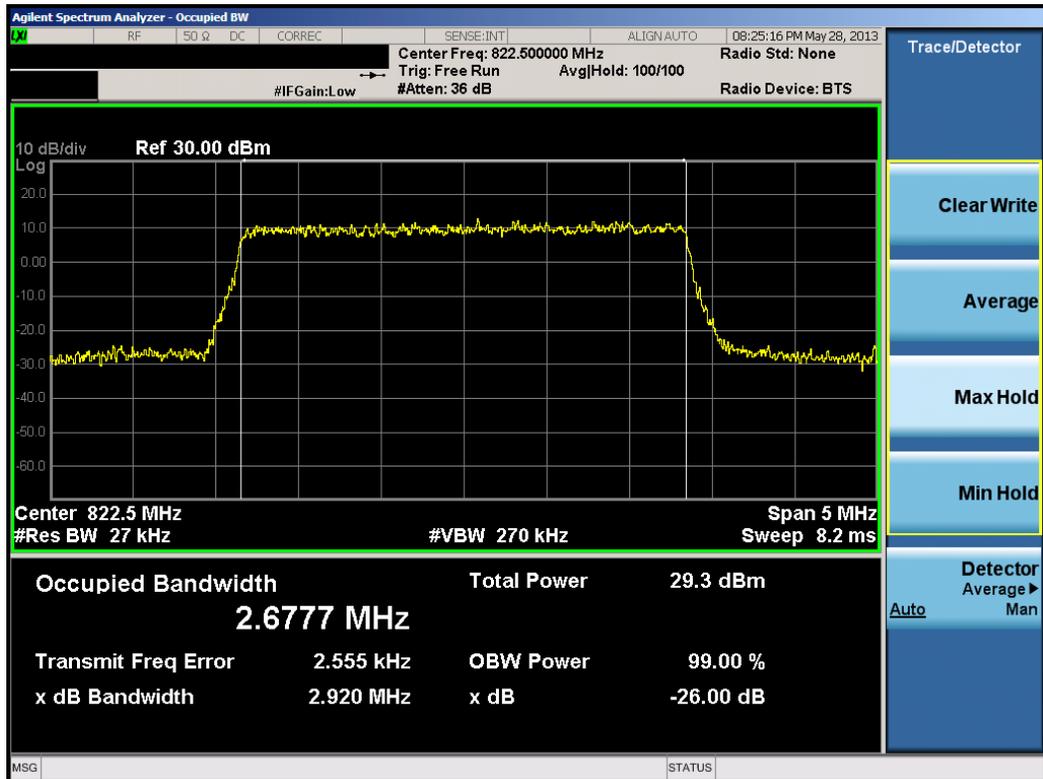
Plot 7-32. Channel Edge Plot (3MHz QPSK – RB Size 15 – High Channel)

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 36 of 47



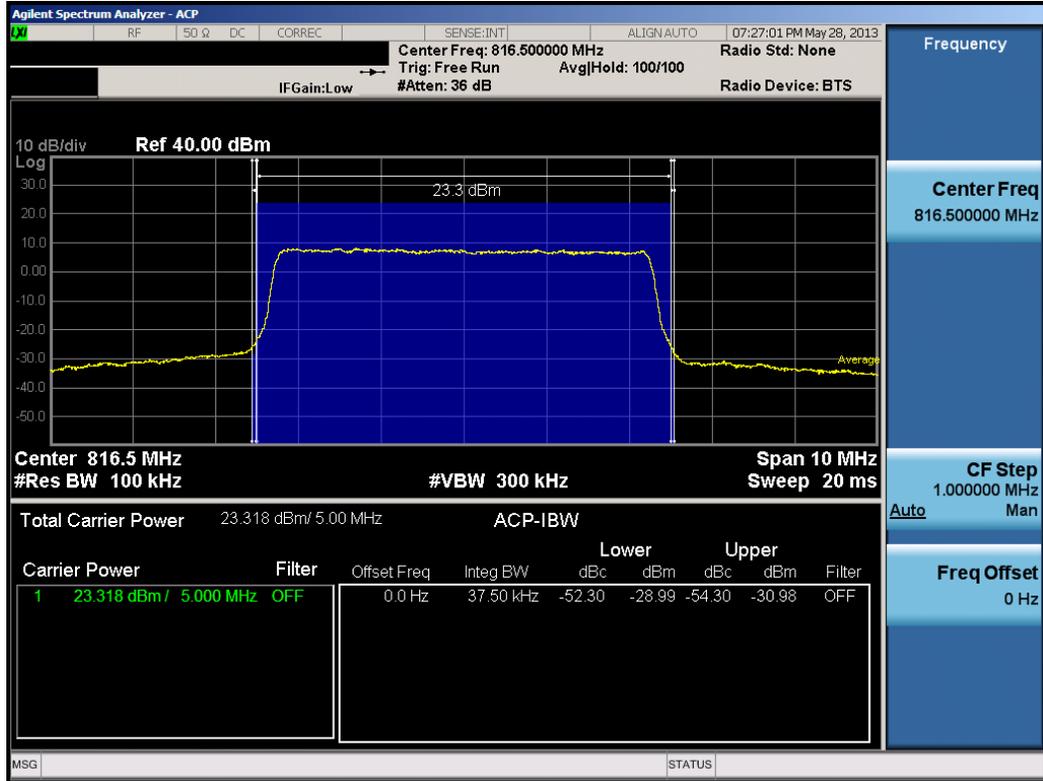


Plot 7-35. Occupied Bandwidth Plot (3MHz QPSK – RB Size 15 – High Channel)

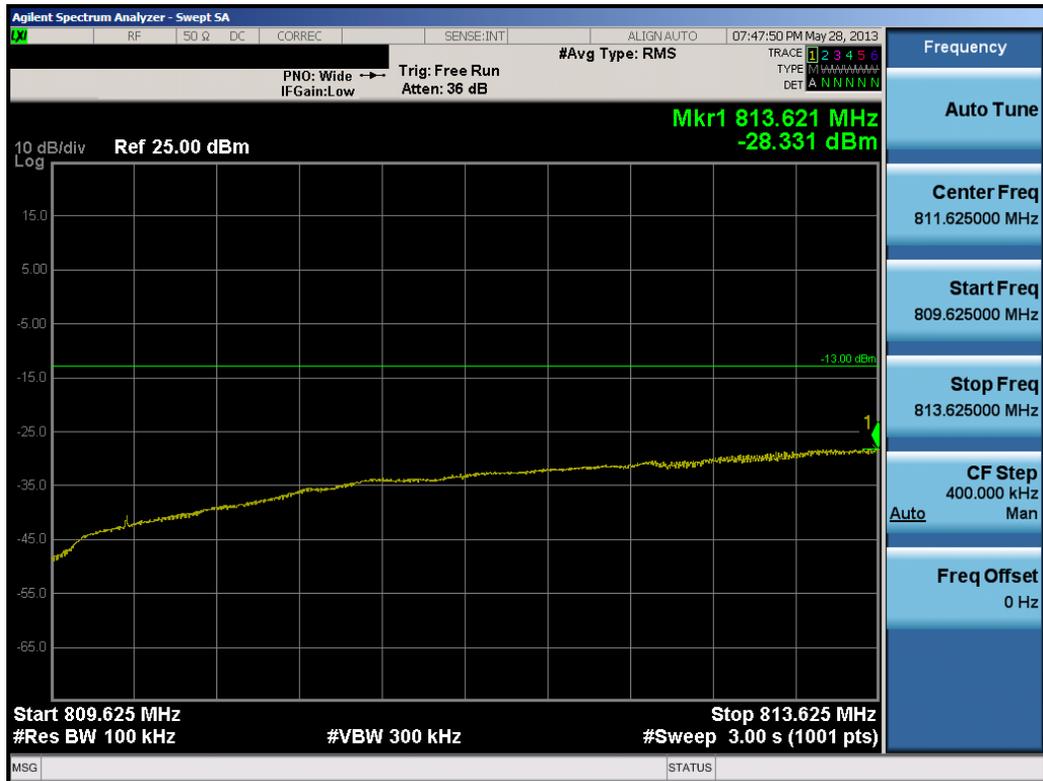


Plot 7-36. Occupied Bandwidth Plot (3MHz 16-QAM – RB Size 15 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EVD0 MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 38 of 47



Plot 7-37. Channel Edge Plot (5MHz QPSK – RB Size 25– Low Channel)

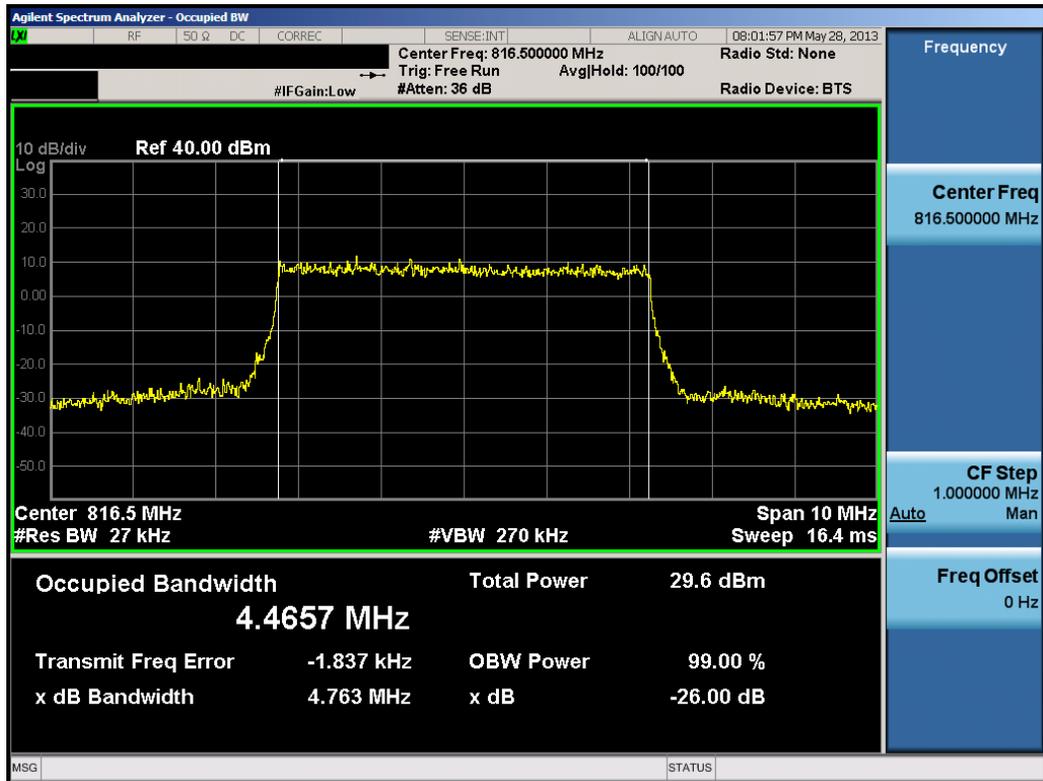


Plot 7-38. Extended Band Edge Plot (5MHz QPSK – RB Size 25– Low Channel)

FCC ID: ZNFLS980	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 39 of 47

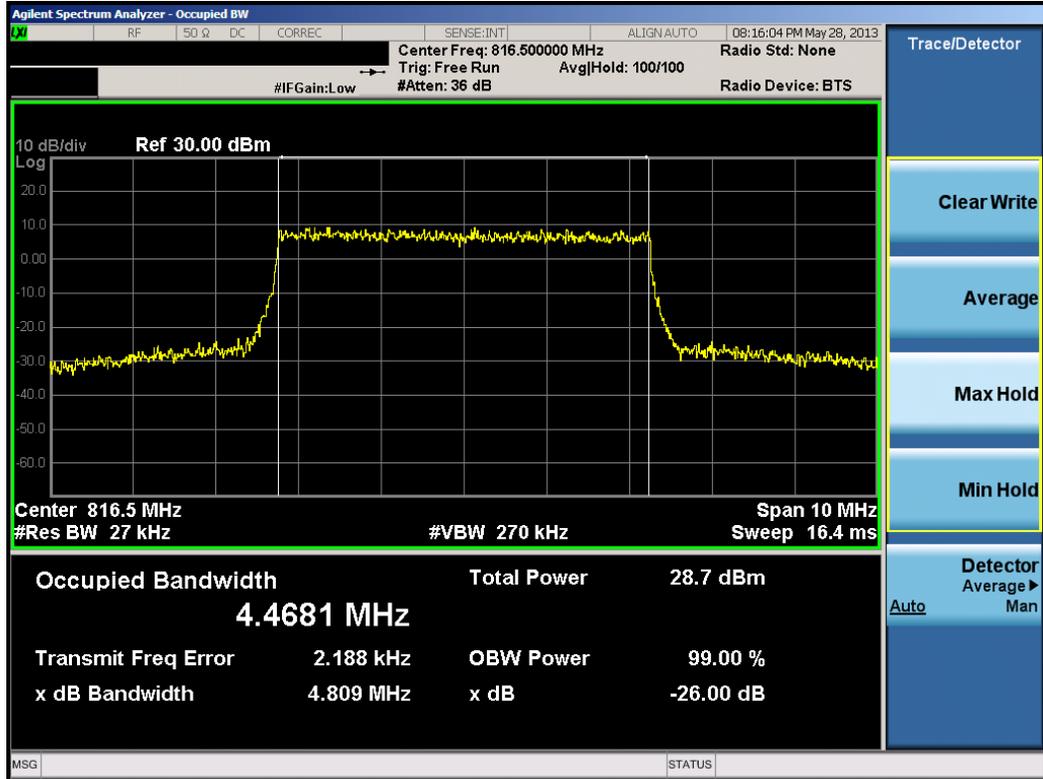


**Plot 7-39. Extended Band Edge Plot (5MHz QPSK – RB Size 25– Low Channel)**

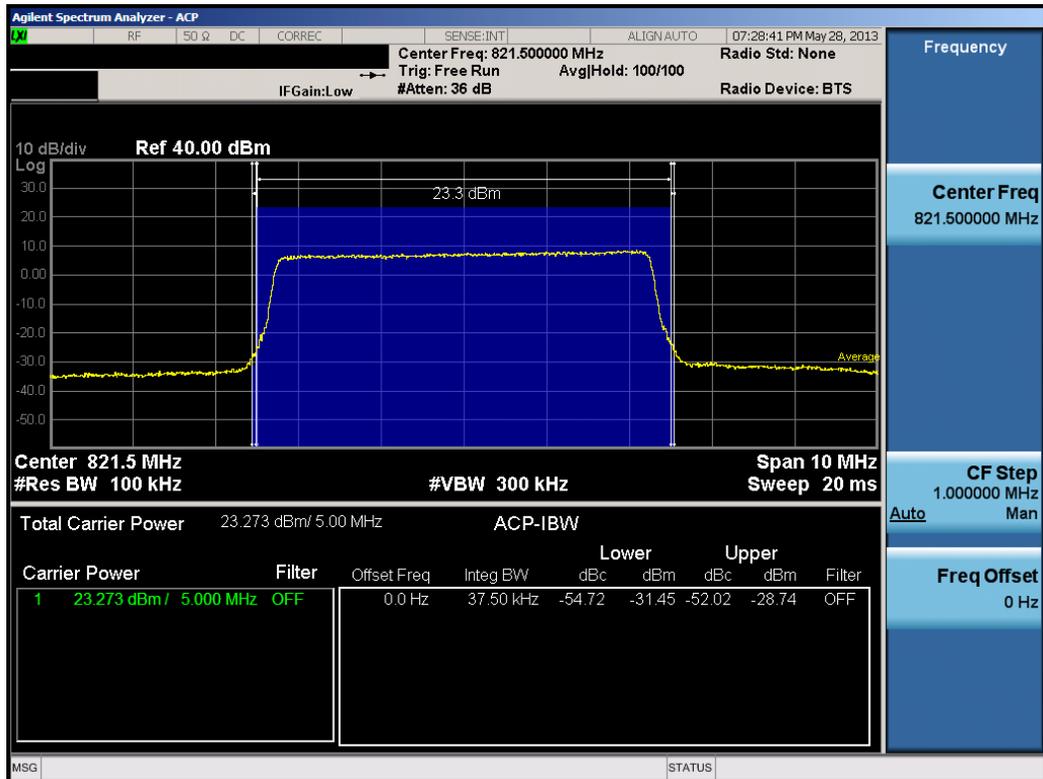


**Plot 7-40. Occupied Bandwidth Plot (5MHz QPSK – RB Size 25– Low Channel)**

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 40 of 47

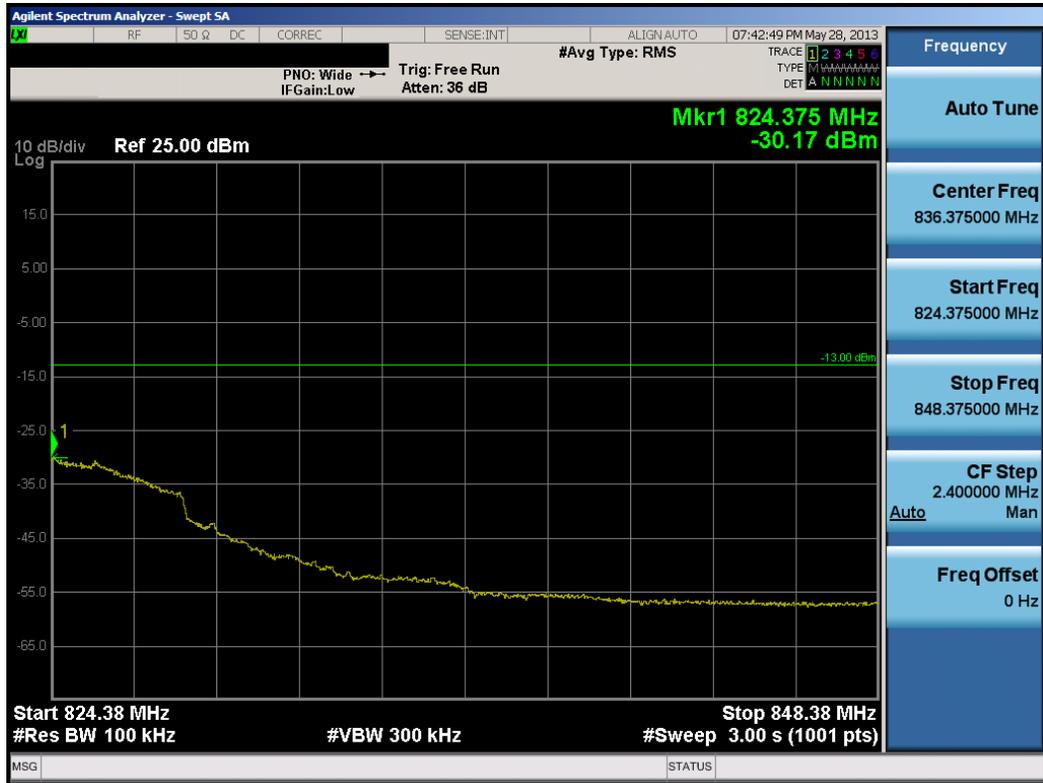


Plot 7-41. Occupied Bandwidth Plot (5MHz 16-QAM – RB Size 25– Low Channel))

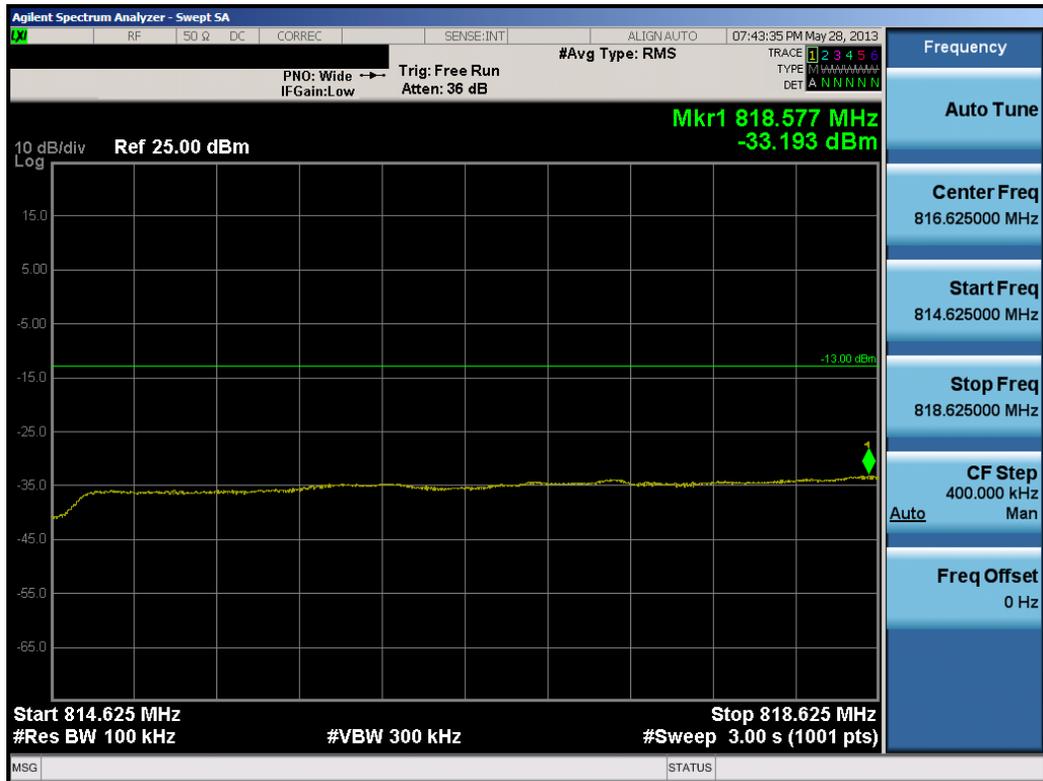


Plot 7-42. Channel Edge Plot (5MHz QPSK – RB Size 25 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 41 of 47

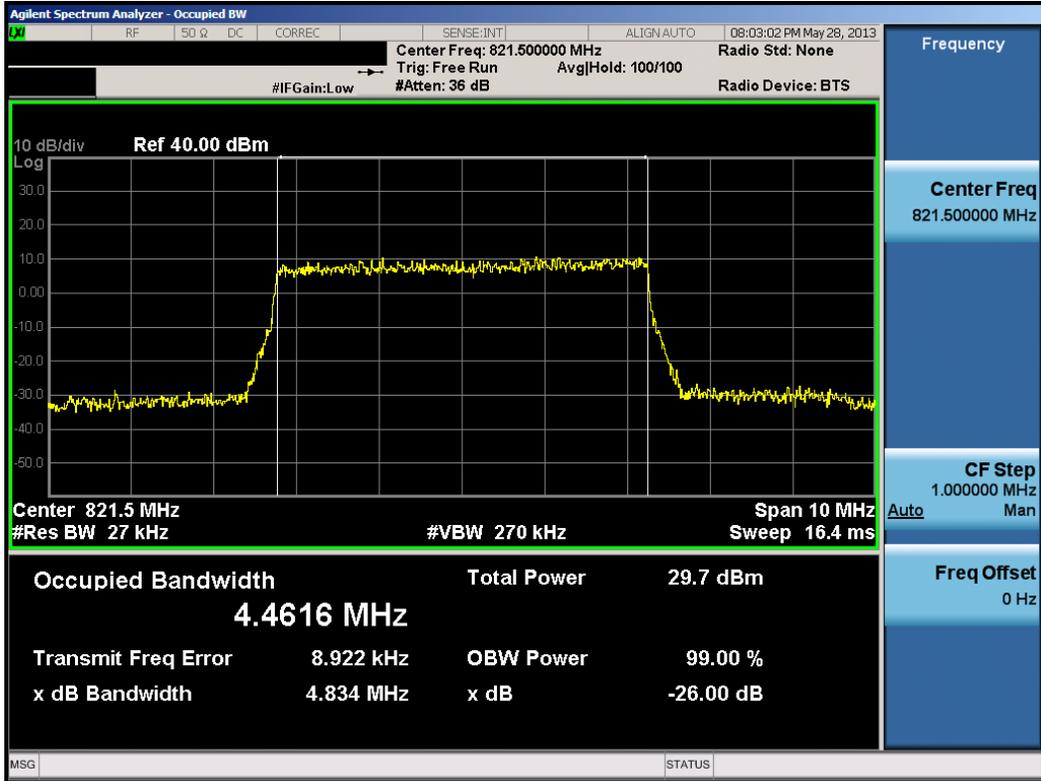


Plot 7-43. Extended Band Edge Plot (5MHz QPSK – RB Size 25 – High Channel)

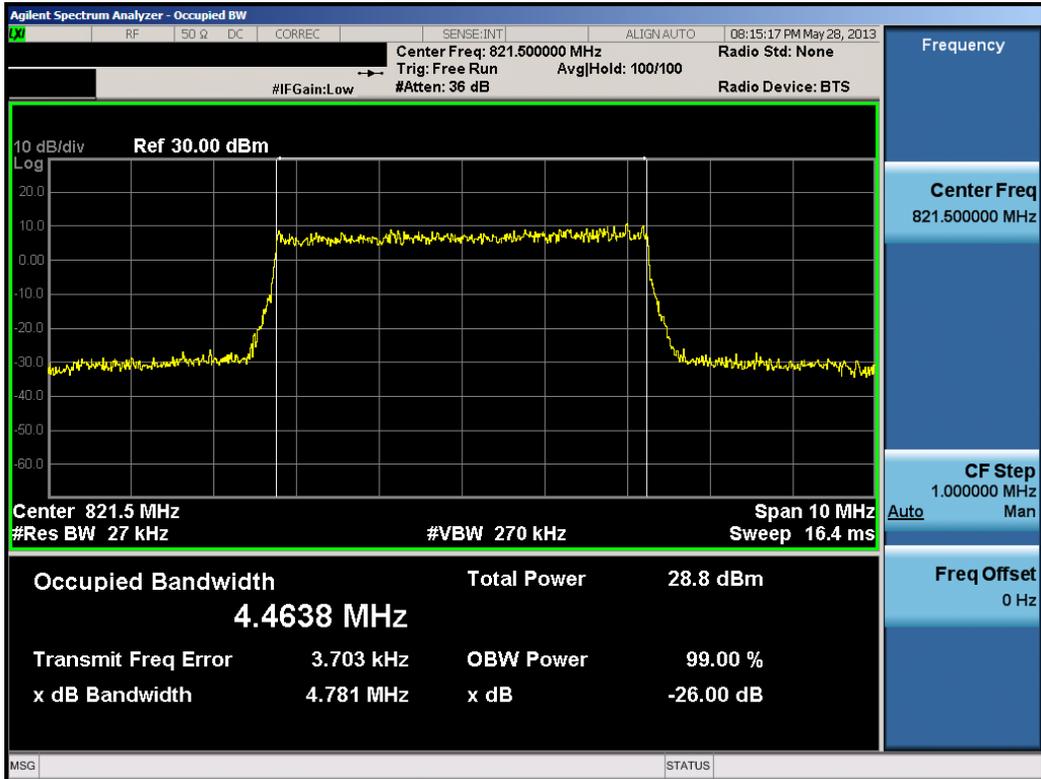


Plot 7-44. Extended Band Edge Plot (5MHz QPSK – RB Size 25 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
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Plot 7-45. Occupied Bandwidth Plot (5MHz QPSK – RB Size 25 – High Channel)



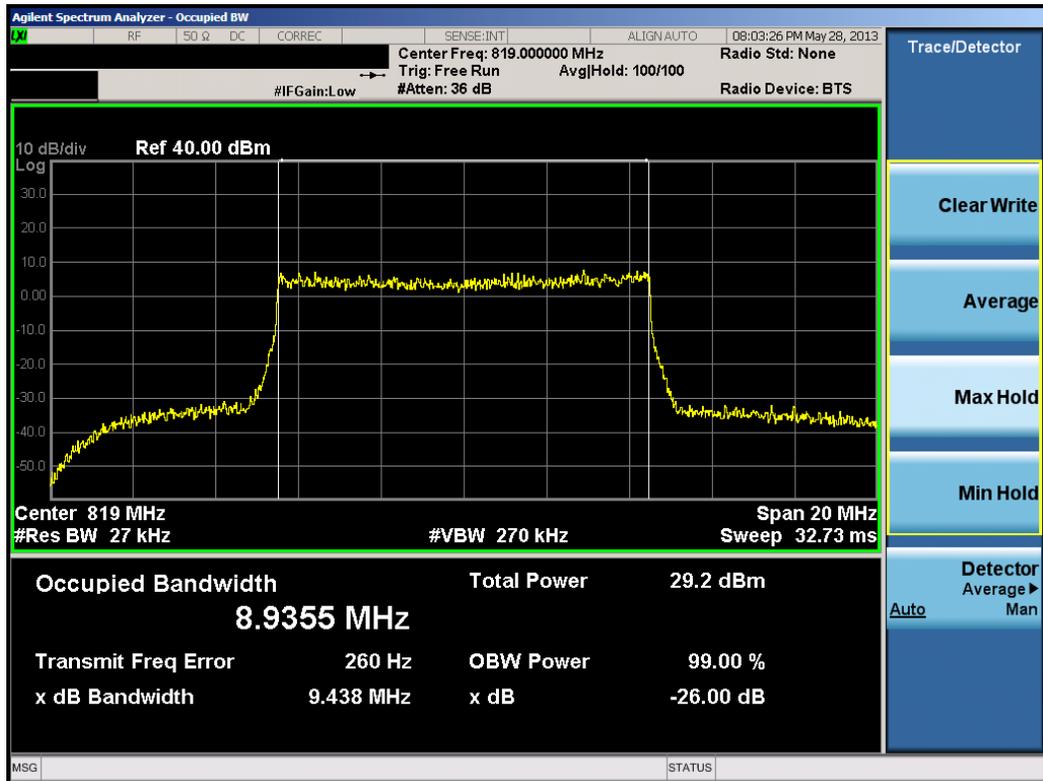
Plot 7-46. Occupied Bandwidth Plot (5MHz 16-QAM – RB Size 25 – High Channel)

FCC ID: ZNFLS980	PCTEST ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EVD0 MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 43 of 47



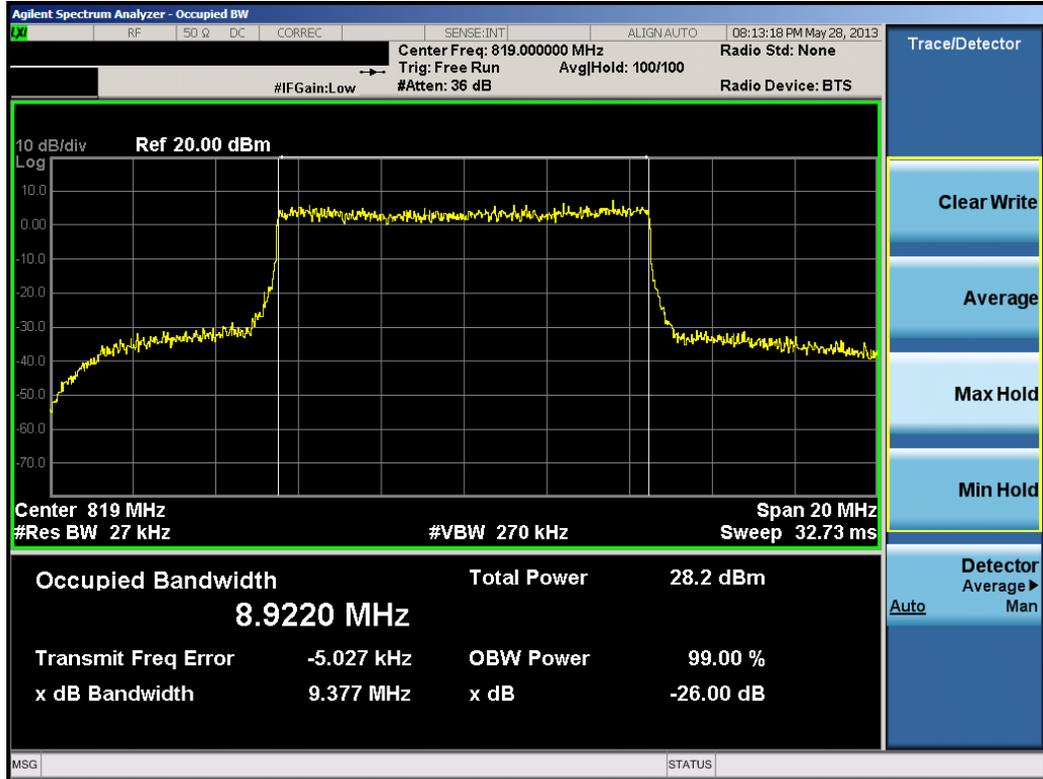


Plot 7-49. Extended Band Edge Plot (10MHz QPSK – RB Size 50)



Plot 7-50. Occupied Bandwidth Plot (10MHz QPSK – RB Size 50 – High Channel)

FCC ID: ZNFLS980	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 45 of 47



**Plot 7-51. Occupied Bandwidth Plot (10MHz 16-QAM – RB Size 50 – High Channel)**

FCC ID: ZNFLS980	<b>PCTEST</b> ENGINEERING LABORATORY, INC.	Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION	LG	Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 46 of 47

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **LG Portable Handset FCC ID: ZNFLS980** complies with all the requirements of Parts 90 of the FCC rules.

FCC ID: ZNFLS980		Part 90 LTE / CDMA / EvDO MEASUREMENT REPORT CERTIFICATION		Reviewed by: Quality Manager
Test Report S/N: 0Y1305140844.ZNF	Test Dates: 5/23 - 5/28/2013	EUT Type: Portable Handset		Page 47 of 47