



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC Part 22, 24

**Applicant Name:**  
Continental Automotive Systems Inc.  
21440 West Lake Cook Rd.  
Deer Park, IL 60010  
USA

**Date of Testing:**  
April 24 - 30, 2013  
**Test Site/Location:**  
PCTEST Lab., Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1304190674.LHJ


<b>FCC ID:</b>	<b>LHJ-LNAD</b>
<b>APPLICANT:</b>	<b>CONTINENTAL AUTOMOTIVE SYSTEMS INC.</b>

**Application Type:** Certification  
**Model(s):** LNAD  
**EUT Type:** Wireless Modem Module  
**FCC Classification:** PCS Licensed Transmitter (PCB)  
**FCC Rule Part(s):** §2 §22(H) §24(E)  
**Mode:** WCDMA  
**Test Procedure(s):** ANSI/TIA-603-C-2004, KDB 971168  
**Test Device Serial No.:** *identical prototype [S/N: N/A]*



Mode	Tx Frequency (MHz)	Emission Designator	Conducted Powers	
			Max. Power (W)	Max. Power (dBm)
WCDMA850	826.4 - 846.6	4M17F9W	0.270	24.32
WCDMA1900	1852.4 - 1907.6	4M16F9W	0.261	24.16

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 Ortañez  
 President

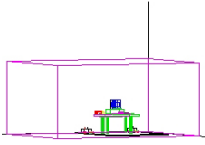


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# T A B L E O F C O N T E N T S

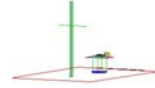
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# MEASUREMENT REPORT

## FCC Part 22, 24



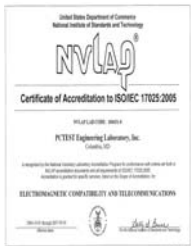
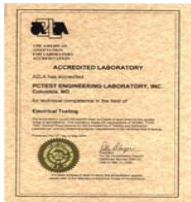
### §2.1033 General Information



**APPLICANT:** Continental Automotive Systems Inc.  
**APPLICANT ADDRESS:** 21440 West Lake Cook Rd.  
 Deer Park, IL 60010, USA  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 7185 Oakland Mills Road, Columbia, MD 21046 USA  
**FCC RULE PART(S):** §2 §22(H) §24(E)  
**MODE:** WCDMA  
**BASE MODEL:** LNAD  
**FCC ID:** LHJ-LNAD  
**FCC CLASSIFICATION:** PCS Licensed Transmitter (PCB)  
**FREQUENCY TOLERANCE:** ±0.00025 % (2.5 ppm)  
**Test Device Serial No.:** N/A       Production     Pre-Production     Engineering  
**DATE(S) OF TEST:** April 24 - 30, 2013  
**TEST REPORT S/N:** 0Y1304190674.LHJ

### Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, 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 and Industry Canada (2451B-1).
- 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 and Industry Canada Rules.
- 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 and Industry Canada Standards (RSS).
- PCTEST facility is an IC registered (2451B-1) test laboratory with the site description on file at Industry Canada.
- 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 C63.4-2009 on February 15, 2012.

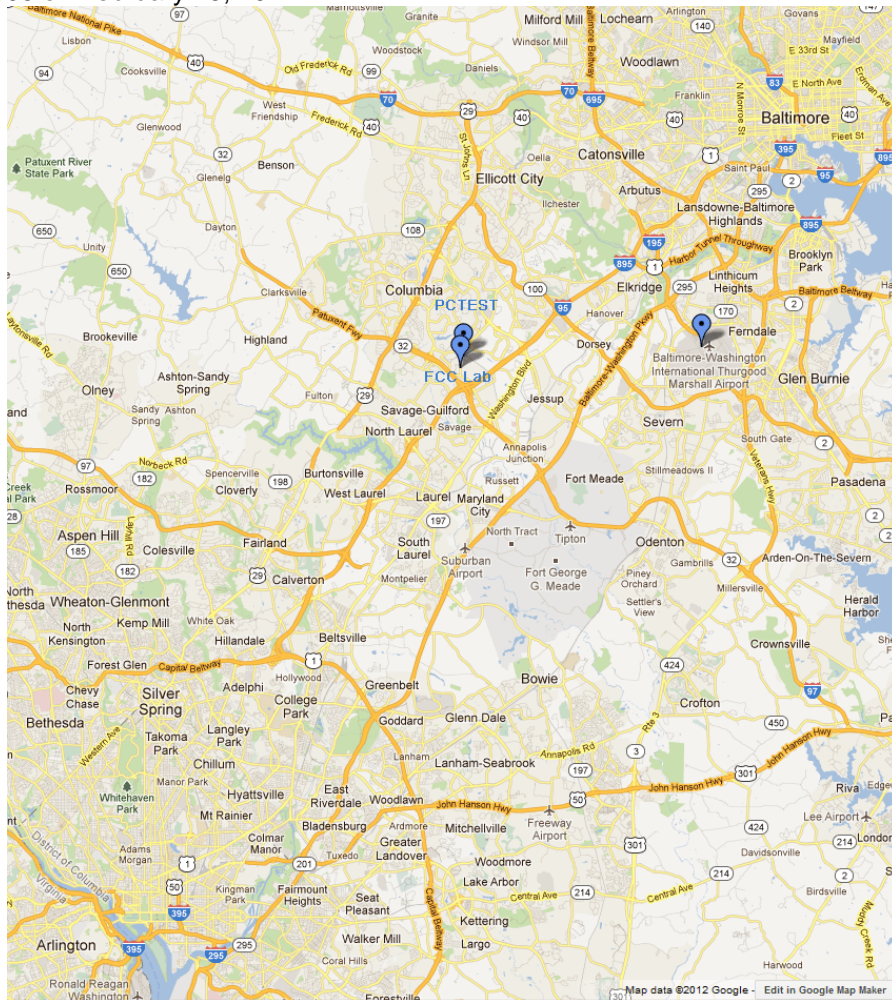




Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Continental Wireless Modem Module FCC ID: LHJ-LNAD**. The test data contained in this report pertains only to the emissions due to the EUT's 2G/3G licensed transmitters.

During testing, power was provided via DC Power Supply. The EUT was set to continuous transmission at max power through connection to a CMU200 WCDMA Call Box.

### 2.2 Device Capabilities

This device contains the following capabilities:



850/1900 WCDMA, Band 2, 4, 5, 17 LTE

### 2.3 Test Configuration

The Continental Wireless Modem Module FCC ID: LHJ-LNAD was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168. See Section 3.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

### 2.4 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

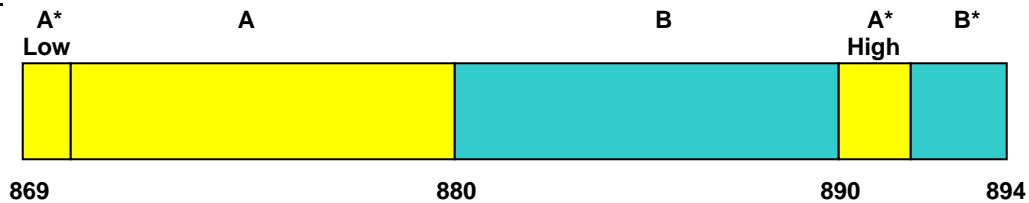
#### 3.1 Evaluation Procedure

The measurement procedures described in the “Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards” (ANSI/TIA-603-C-2004) and “Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems” (KDB 971168) were used in the measurement of the **Continental Wireless Modem Module FCC ID: LHJ-LNAD**.

Deviation from Measurement Procedure.....None

#### 3.2 Cellular - Base Frequency Blocks

§22.905



BLOCK 1: 869 – 880 MHz (A\* Low + A)

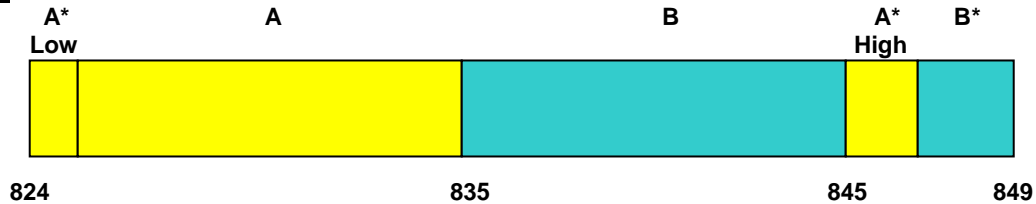
BLOCK 3: 890 – 891.5 MHz (A\* High)

BLOCK 2: 880 – 890 MHz (B)

BLOCK 4: 891.5 – 894 MHz (B\*)

#### 3.3 Cellular - Mobile Frequency Blocks

§22.905



BLOCK 1: 824 – 835 MHz (A\* Low + A)

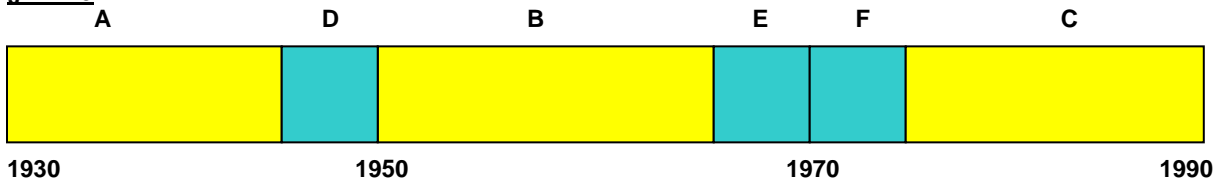
BLOCK 3: 845 – 846.5 MHz (A\* High)

BLOCK 2: 835 – 845 MHz (B)

BLOCK 4: 846.5 – 849 MHz (B\*)

#### 3.4 PCS - Base Frequency Blocks

§24.229



BLOCK 1: 1930 – 1945 MHz (A)



BLOCK 4: 1965 – 1970 MHz (E)

BLOCK 2: 1945 – 1950 MHz (D)

BLOCK 5: 1970 – 1975 MHz (F)

BLOCK 3: 1950 – 1965 MHz (B)

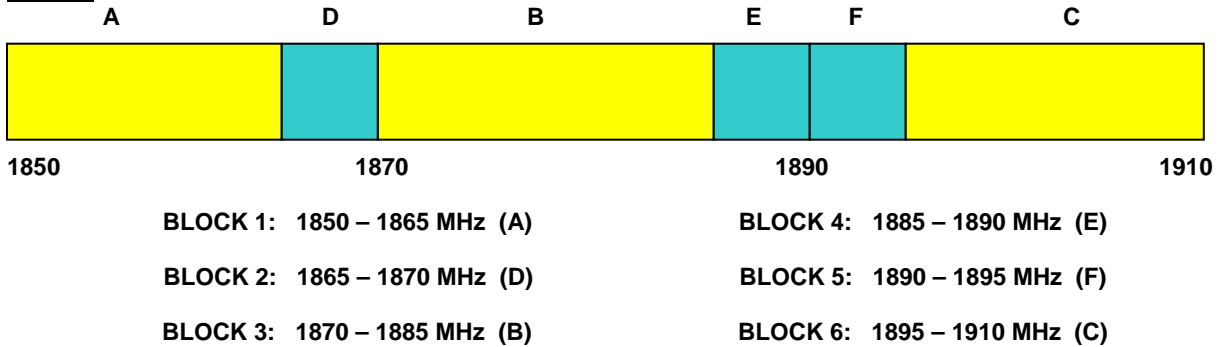
BLOCK 6: 1975 – 1990 MHz (C)

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### 3.5 PCS - Mobile Frequency Blocks

§24.229



### 3.6 Occupied Bandwidth



§2.1049 RSS-Gen(4.6.1) RSS-133(2.3)

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.

### 3.7 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) RSS-132(4.5.1) RSS-133(6.5.1)

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. 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. Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for Part 22 and 1 MHz or greater for Part 24. However, 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 emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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### 3.8 Radiated Spurious Emissions

**§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) RSS-132(4.4) RSS-132(4.5.1) RSS-133(6.4) RSS-133(6.5.1)**

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 ¾" (~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:

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

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  $P_g [dBm] - \text{cable loss} [dB]$ .

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  $43 + 10\log_{10}(\text{Power} [Watts])$  specified in 22.917(a) and 24.238(a).

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### 3.9 Peak-Average Ratio

§24.232(d) RSS-132(5.4) RSS-133(6.4)

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

### 3.10 Frequency Stability / Temperature Variation

§2.1055 §22.355 §22.863 §22.905 §24.229 §24.235 RSS-132(4.3) RSS-133(6.3)



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 22, the frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency. For Part 24, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.*

**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 period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.



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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	5/8/2012	Annual	5/8/2013	2443A01900
Agilent	N9030A	PXA Signal Analyzer (26.5GHz)	4/18/2013	Annual	4/18/2014	MY49432391
Agilent	N5183A	MXG Analog Signal Generator	1/6/2013	Annual	1/6/2014	MY50141900
Agilent	N9030A	PXA Signal Analyzer (44GHz)	1/11/2013	Annual	1/11/2014	MY52350166
Agilent	87405C	Pre-amplifier (0.1 - 18 GHz)	3/11/2013	Annual	3/11/2014	MY53010007
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	3160-09	18-26.5 GHz Standard Gain Horn	5/30/2012	Biennial	5/30/2014	135427
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	VHF-3100+	High Pass Filter	1/17/2013	Annual	1/17/2014	30841
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2013	Annual	4/17/2014	11210140001
Rohde & Schwarz	CMU200	Base Station Simulator	5/22/2012	Annual	5/22/2013	109892
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	6/26/2012	Annual	6/26/2013	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/30/2012	Annual	5/30/2013	100040
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

### WCDMA Emission Designator



**Emission Designator = 4M16F9W**

WCDMA BW = 4.16 MHz

F = Frequency Modulation

9 = Composite Digital Info

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

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## 6.0 TEST RESULTS

### 6.1 Summary



Company Name: Atheros Communications, Inc.  
 FCC ID: LHJ-LNAD  
 FCC Classification: PCS Licensed Transmitter (PCB)  
 Mode(s): WCDMA

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
<b>TRANSMITTER MODE (TX)</b>					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.0
2.1051 22.917(a) 24.238(a)	Band Edge / Conducted Spurious Emissions	> 43 + log <sub>10</sub> (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Section 7.0
24.232(d)	Peak-Average Ratio	< 13 dB		PASS	Section 7.0
2.1046	Transmitter Conducted Output Power	N/A		PASS	Section 6.2, 6.3
2.1053 22.917(a) 24.238(a)	Undesirable Emissions	> 43 + log <sub>10</sub> (P[Watts]) for all out-of-band emissions	RADIATED	PASS	Sections, 6.3, 6.4
2.1055 22.355 24.235	Frequency Stability	< 2.5 ppm (Part 22) Emission must remain in band (Part 24)		PASS	Sections, 6.5, 6.6

**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 all 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

**§22.913(a)(2) RSS-132(4.4) [SRSP-503(5.1.3)]**

The **Continental Wireless Modem Module FCC ID: LHJ-LNAD** was connected to the CMU200 WCDMA Callbox via RF Cable. Transmit power readings were taken from the CMU200. This unit was tested while being powered by a 12V DC Power Supply. This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1." Results are reported below.

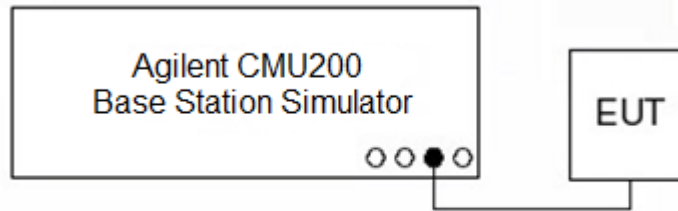




Figure 6-1. Conducted Output Power Test Setup Diagram

Frequency [MHz]	Mode	Conducted Power [dBm]	Conducted Power [Watts]
826.40	WCDMA850	24.32	0.270
836.60	WCDMA850	23.96	0.249
846.60	WCDMA850	23.84	0.242

Table 6-2. Conducted Power Data (Cellular WCDMA)

Frequency [MHz]	Mode	Conducted Power [dBm]	Conducted Power [Watts]
1852.40	WCDMA1900	23.29	0.213
1880.00	WCDMA1900	23.52	0.225
1907.60	WCDMA1900	24.16	0.261

Table 6-3. Conducted Power Data (PCS WCDMA)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 13 of 35	

### 6.3 Cellular WCDMA Radiated Measurements

§2.1053 §22.917(a) RSS-132(4.5.1)

#### Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 826.40 MHz  
 CHANNEL: 4132  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1652.80	-50.83	2.55	-48.28	H	-35.3
2479.20	-79.80	2.86	-76.93	H	-63.9
3305.60	-49.10	5.48	-43.62	H	-30.6
4132.00	-49.07	7.06	-42.01	H	-29.0
4958.40	-81.00	7.88	-73.12	H	-60.1

**Table 6-2. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4132)**

**NOTES:**

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 14 of 35	



**Cellular WCDMA Radiated Measurements (Cont'd)**  
**§2.1053 §22.917(a) RSS-132(4.5.1)**

**Field Strength of SPURIOUS Radiation**



OPERATING FREQUENCY: 836.60 MHz  
 CHANNEL: 4183  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1673.20	-48.41	2.37	-46.04	H	-33.0
2509.80	-79.73	2.80	-76.93	H	-63.9
3346.40	-48.48	5.62	-42.86	H	-29.9
4183.00	-48.41	7.13	-41.28	H	-28.3
5019.60	-81.07	7.96	-73.12	H	-60.1

**Table 6-3. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4183)**

**NOTES:**

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 15 of 35	

**Cellular WCDMA Radiated Measurements (Cont'd)**  
**§2.1053 §22.917(a) RSS-132(4.5.1)**

**Field Strength of SPURIOUS Radiation**



OPERATING FREQUENCY: 846.60 MHz  
 CHANNEL: 4233  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
1693.20	-50.38	2.13	-48.25	H	-35.2
2539.80	-80.05	3.11	-76.93	H	-63.9
3386.40	-50.66	5.80	-44.85	H	-31.9
4233.00	-49.55	7.22	-42.33	H	-29.3
5079.60	-81.13	8.01	-73.12	H	-60.1

**Table 6-4. Radiated Spurious Data (Cellular WCDMA Mode – Ch. 4233)**

**NOTES:**

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.4 PCS WCDMA Radiated Measurements

### §2.1053 §24.238(a) RSS-133(6.5.2)

#### Field Strength of SPURIOUS Radiation



OPERATING FREQUENCY: 1852.40 MHz  
 CHANNEL: 9262  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
3704.80	-45.89	8.40	-37.49	H	-24.5
5557.20	-46.57	10.62	-35.94	H	-22.9
7409.60	-80.01	11.83	-68.19	H	-55.2
9262.00	-79.40	13.30	-66.10	H	-53.1
11114.40	-76.02	13.50	-62.52	H	-49.5

**Table 6-5. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9262)**

#### NOTES:

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 17 of 35	

**PCS WCDMA Radiated Measurements (Cont'd)**  
§2.1053 §24.238(a) RSS-133(6.5.2)

**Field Strength of SPURIOUS Radiation**



OPERATING FREQUENCY: 1880.00 MHz  
 CHANNEL: 9400  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
3760.00	-46.08	8.42	-37.66	H	-24.7
5640.00	-46.95	10.66	-36.29	H	-23.3
7520.00	-80.11	11.92	-68.19	H	-55.2
9400.00	-79.34	13.24	-66.10	H	-53.1
11280.00	-76.01	13.49	-62.52	H	-49.5

**Table 6-6. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9400)**

**NOTES:**

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 18 of 35	

**PCS WCDMA Radiated Measurements (Cont'd)**  
**§2.1053 §24.238(a) RSS-133(6.5.2)**

**Field Strength of SPURIOUS Radiation**



OPERATING FREQUENCY: 1907.60 MHz  
 CHANNEL: 9538  
 MODULATION SIGNAL: WCDMA  
 DISTANCE: 3 meters  
 LIMIT: -13 dBm

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBi)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	Margin (dB)
3815.20	-45.92	8.56	-37.36	H	-24.4
5722.80	-47.25	10.69	-36.56	H	-23.6
7630.40	-80.24	12.06	-68.19	H	-55.2
9538.00	-79.30	13.20	-66.10	H	-53.1
11445.60	-75.94	13.42	-62.52	H	-49.5

**Table 6-7. Radiated Spurious Data (PCS WCDMA Mode – Ch. 9538)**

**NOTES:**

- 1) This device was tested under all configurations and the highest power is reported in WCDMA mode with HSDPA Inactive at 12.2 kbps RMC and TPC bits all set to "1."
- 2) This unit was tested with a 12V DC Power Supply.
- 3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The "H" positioning is defined with the EUT lying flat on the test surface, the "H2" positioning is defined with the EUT standing up on its side, and the "V" positioning is defined with the EUT standing upright. The worst case test configuration was found in the EUT in the horizontal positioning. The data reported in the table above was measured in this test setup.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.5 Cellular WCDMA Frequency Stability Measurements

§2.1055 §22.355 RSS-132(4.3)

OPERATING FREQUENCY: 836,600,000 Hz



CHANNEL: 4183

REFERENCE VOLTAGE: 12 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

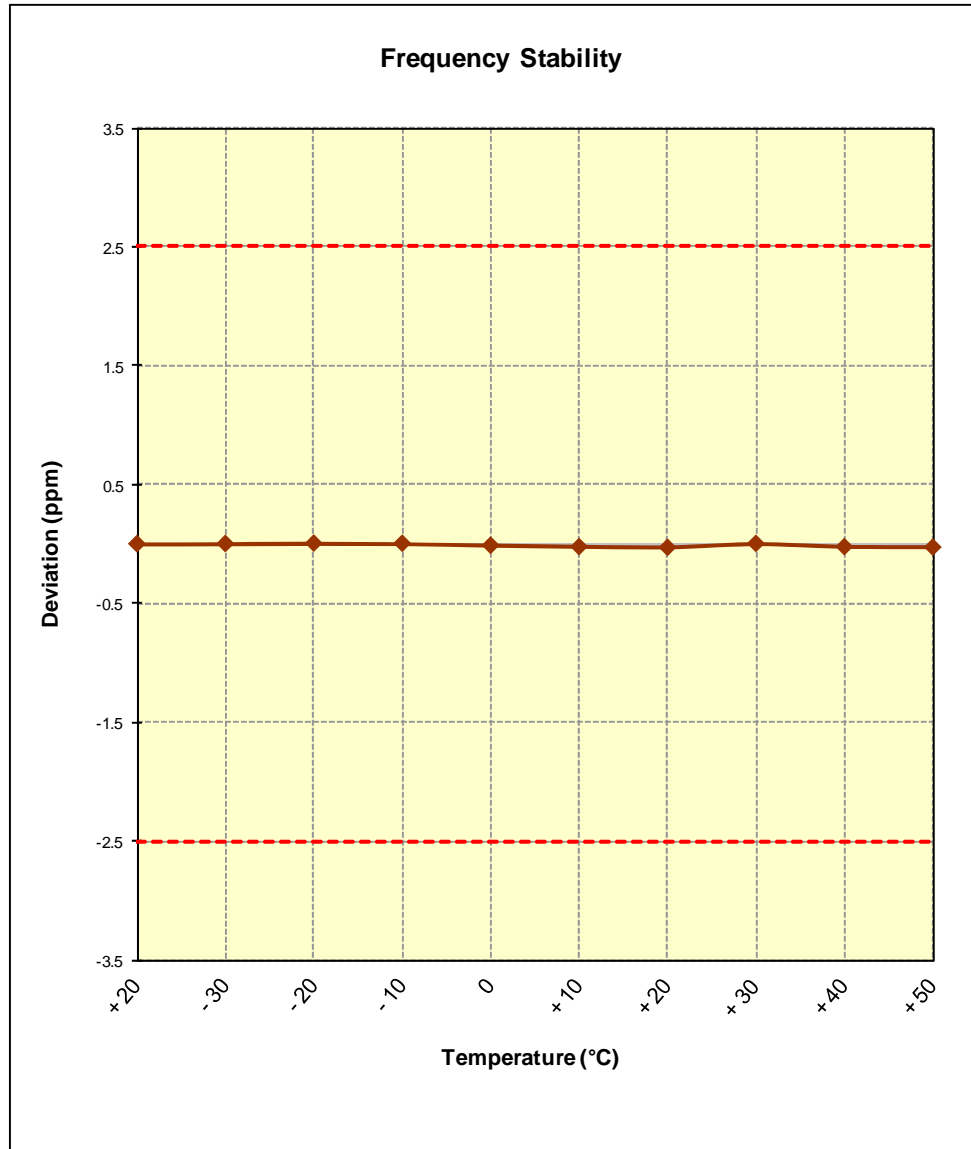
VOLTAGE (%)	POWER (VDC)	TEMP (° C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	+ 20 (Ref)	836,600,001	1	0.0000001
100 %		- 30	836,600,002	2	0.0000002
100 %		- 20	836,600,005	5	0.0000006
100 %		- 10	836,600,004	4	0.0000005
100 %		0	836,599,990	-10	-0.0000012
100 %		+ 10	836,599,980	-20	-0.0000024
100 %		+ 20	836,599,975	-25	-0.0000030
100 %		+ 30	836,600,003	3	0.0000004
100 %		+ 40	836,599,980	-20	-0.0000024
100 %		+ 50	836,599,977	-23	-0.0000027
115 %		13.80	+ 20	836,600,013	13
BATT. ENDPOINT	10.20	+ 20	836,600,012	12	0.0000014

**Table 6-8. Frequency Stability Data (Cellular WCDMA Mode – Ch. 4183)**



FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module	Page 20 of 35	



**Cellular WCDMA Frequency Stability Measurements (Cont'd)**  
§2.1055 §22.355 RSS-132(4.3)



**Figure 6-1. Frequency Stability Graph (Cellular WCDMA Mode – Ch. 4183)**

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.6 PCS WCDMA Frequency Stability Measurements

§2.1055 §24.235 RSS-139(6.3)

OPERATING FREQUENCY: 1,880,000,000 Hz

CHANNEL: 9400



REFERENCE VOLTAGE: 12 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (° C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	+ 20 (Ref)	1,880,000,004	4	0.0000002
100 %		- 30	1,880,000,024	24	0.0000013
100 %		- 20	1,880,000,022	22	0.0000012
100 %		- 10	1,879,999,948	-52	-0.0000028
100 %		0	1,880,000,031	31	0.0000016
100 %		+ 10	1,879,999,970	-30	-0.0000016
100 %		+ 20	1,880,000,021	21	0.0000011
100 %		+ 30	1,879,999,935	-65	-0.0000035
100 %		+ 40	1,880,000,007	7	0.0000004
100 %		+ 50	1,879,999,940	-60	-0.0000032
115 %	13.80	+ 20	1,879,999,983	-17	-0.0000009
BATT. ENDPOINT	10.20	+ 20	1,880,000,046	46	0.0000024

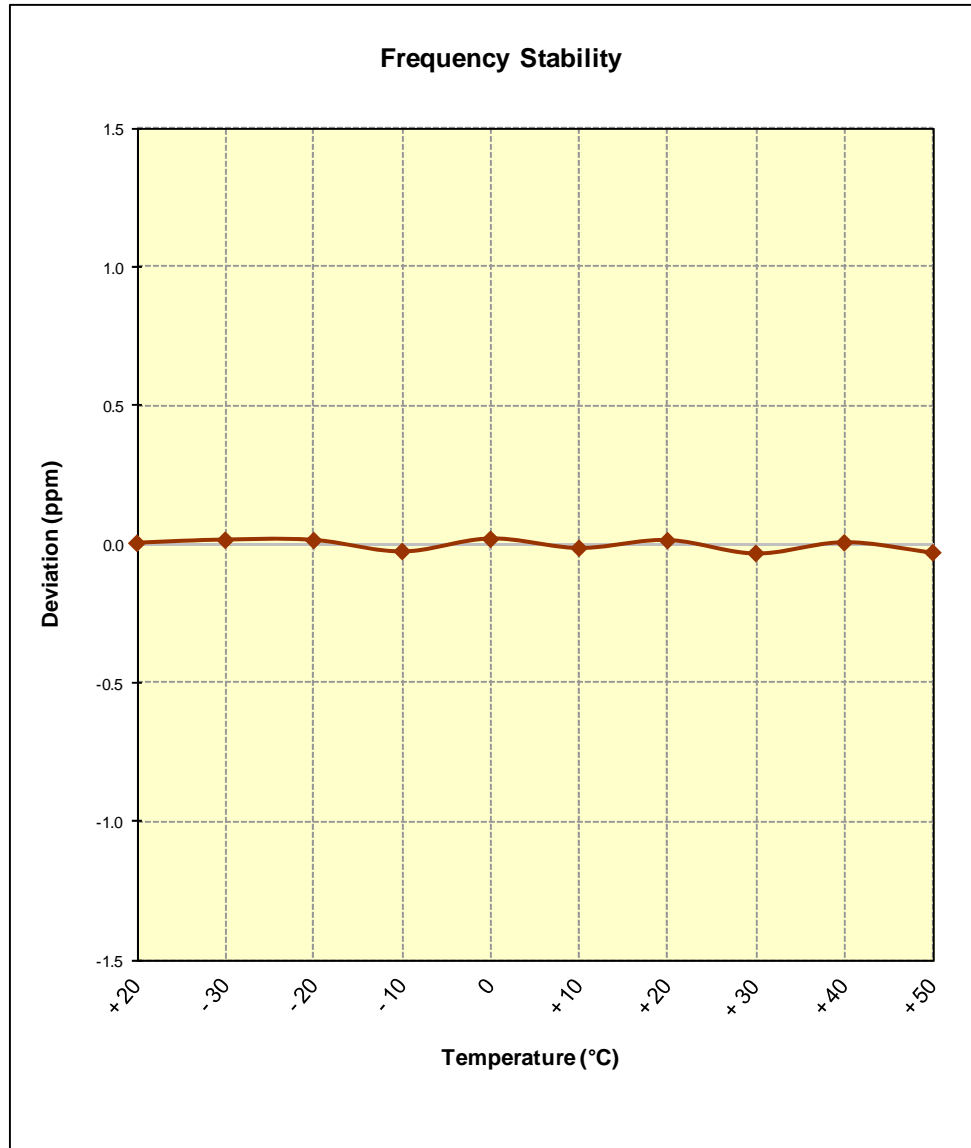
**Table 6-9. Frequency Stability Data (PCS WCDMA Mode – Ch. 9400)**

**Note:**



Based on the results of the frequency stability test at the center channel the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency deviation noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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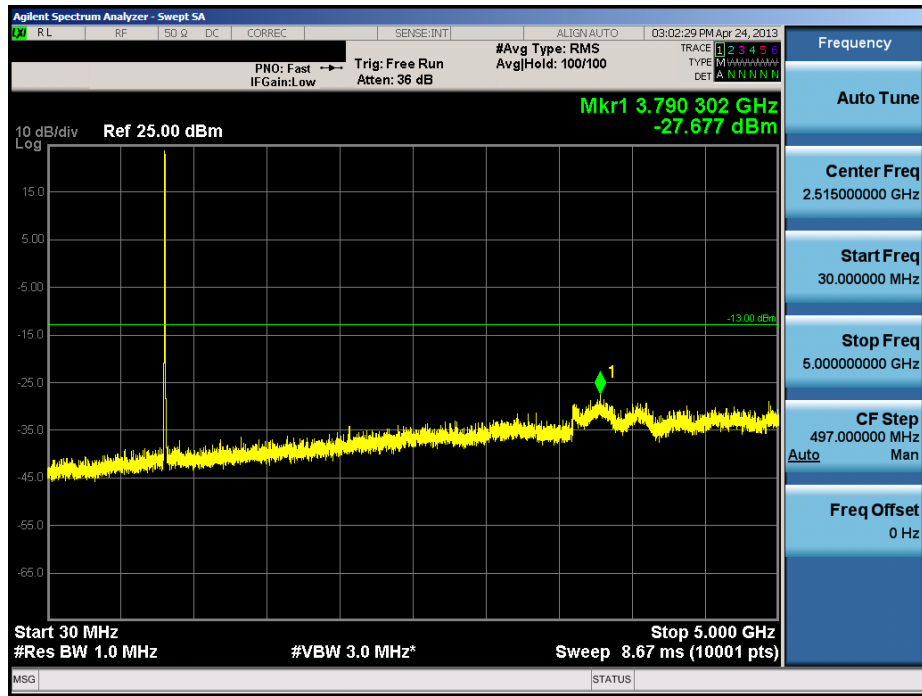
**PCS WCDMA Frequency Stability Measurements (Cont'd)**  
§2.1055 §24.235 RSS-139(6.3)



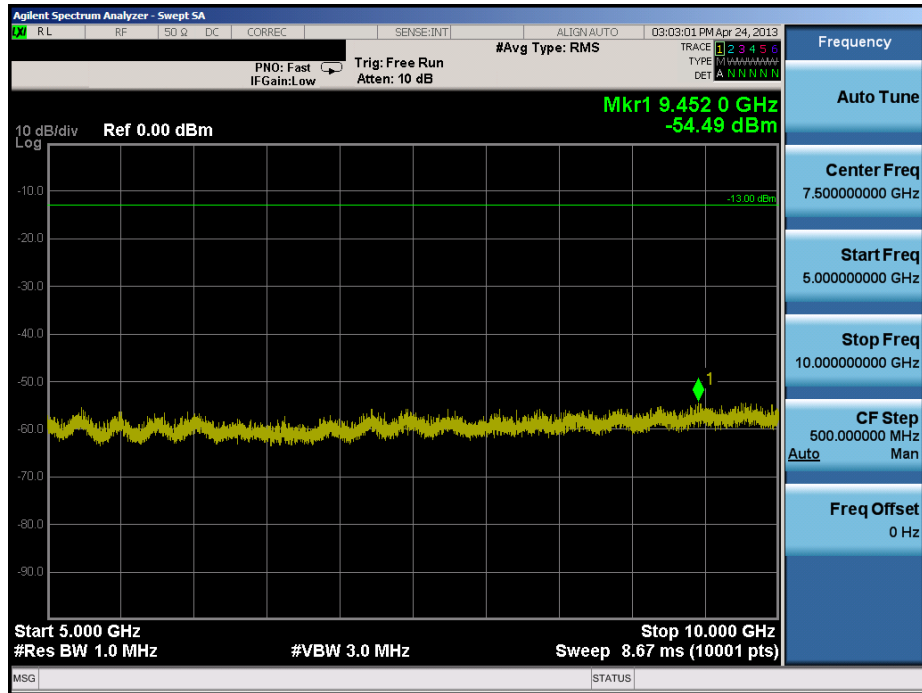
**Figure 6-2. Frequency Stability Graph (PCS WCDMA Mode – Ch. 9400)**

<b>FCC ID:</b> LHJ-LNAD		<b>FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)</b>		<b>Reviewed by:</b> Quality Manager
<b>Test Report S/N:</b> 0Y1304190674.LHJ	<b>Test Dates:</b> April 24 - 30, 2013	<b>EUT Type:</b> Wireless Modem Module	Page 23 of 35	

## 7.0 PLOTS OF EMISSIONS

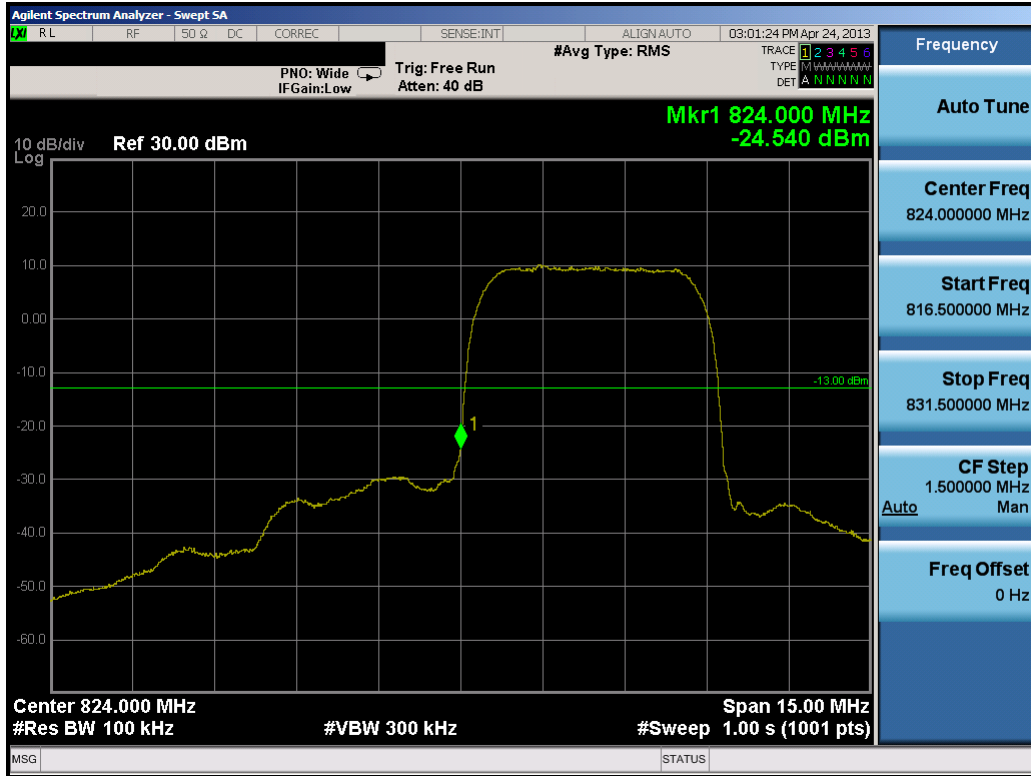


**Plot 7-1. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4132)**

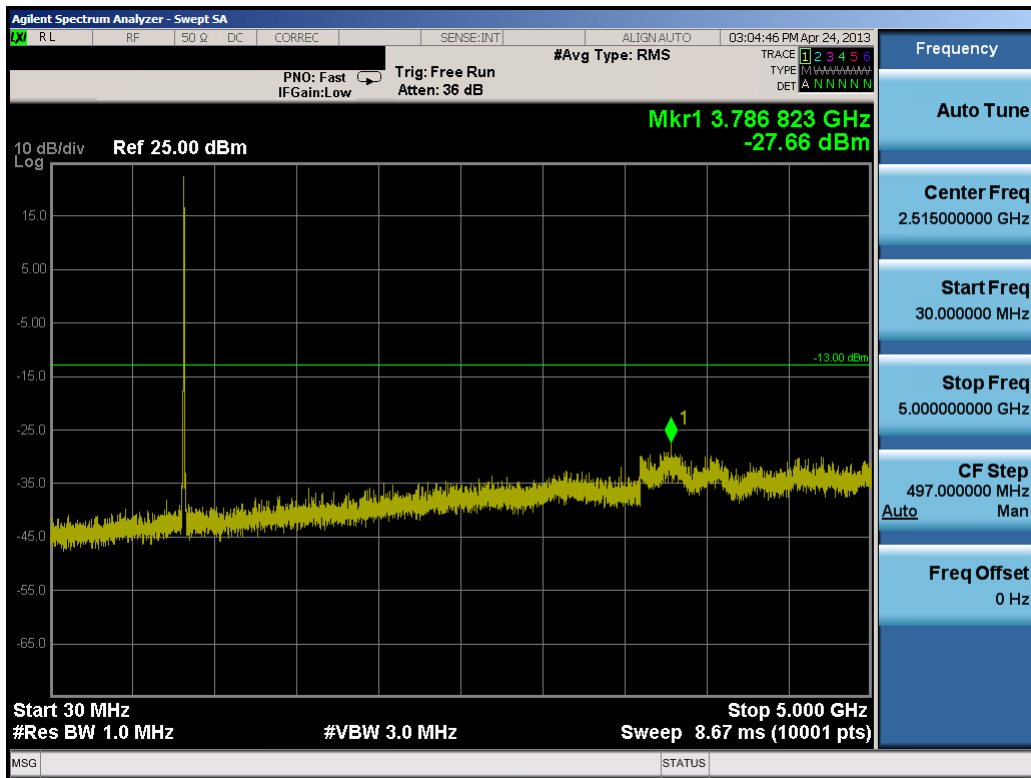


**Plot 7-2. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4132)**

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 24 of 35

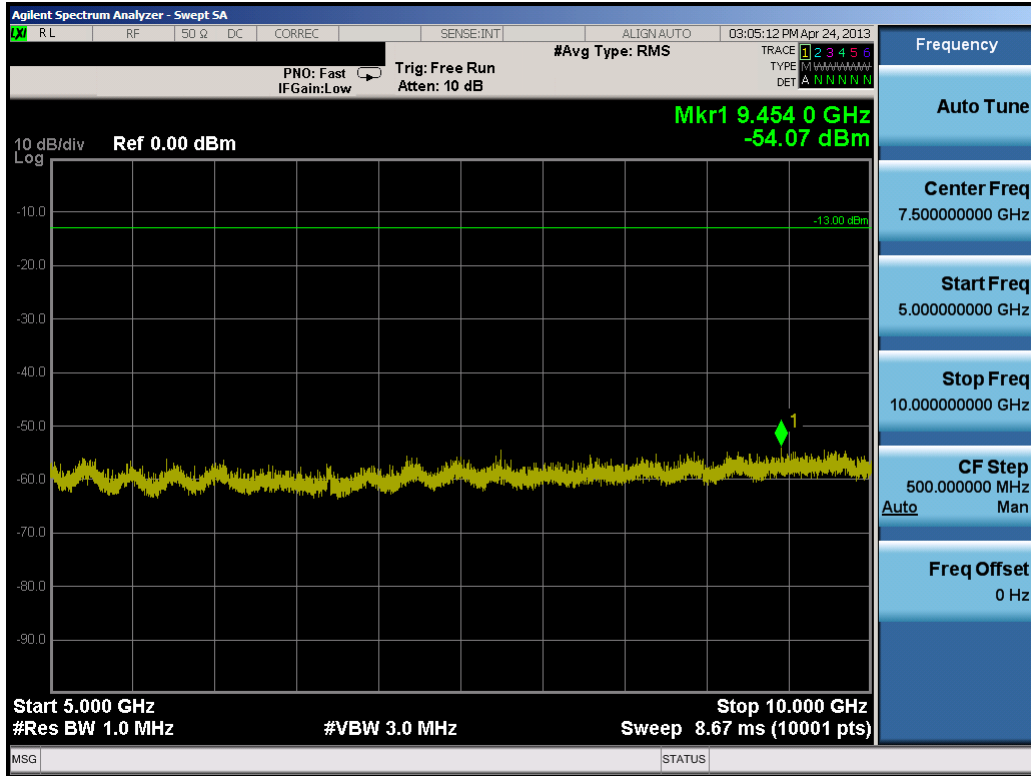


Plot 7-3. Band Edge Plot (Cellular WCDMA Mode – Ch. 4132)

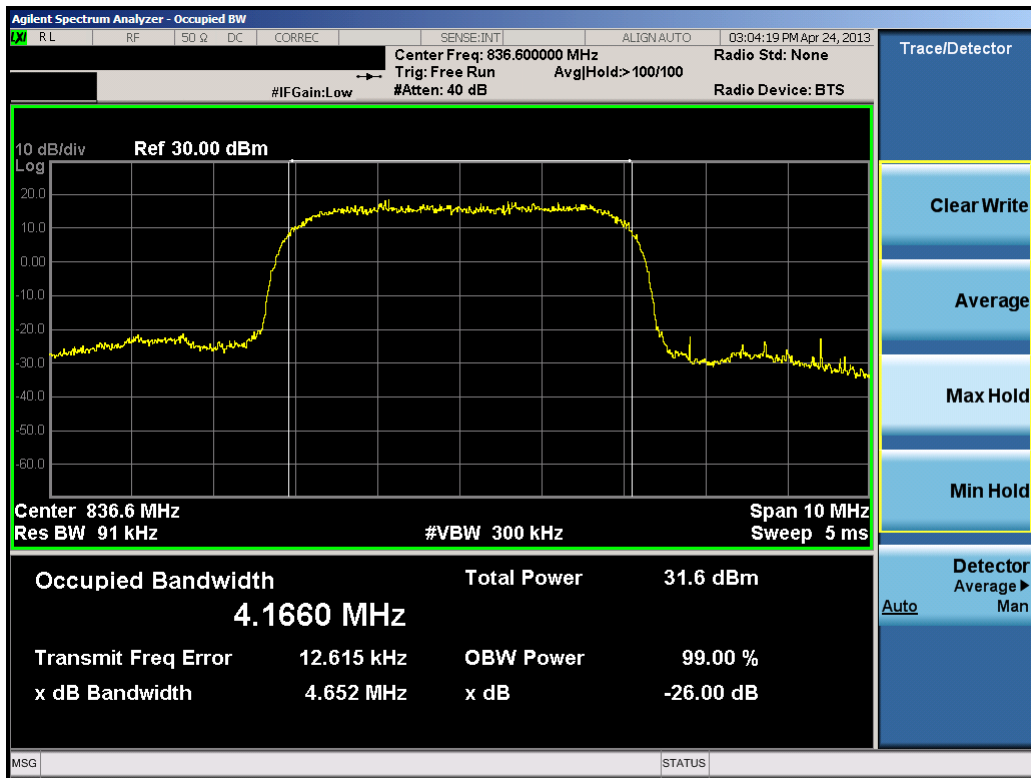


Plot 7-4. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4183)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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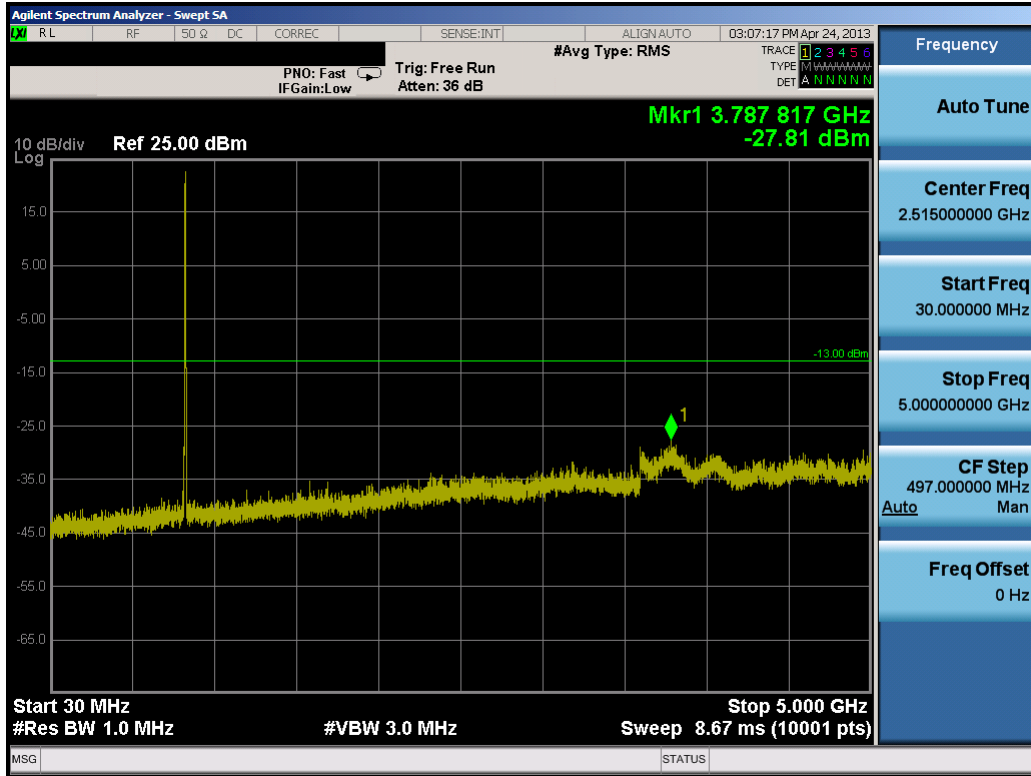
Plot 7-5. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4183)



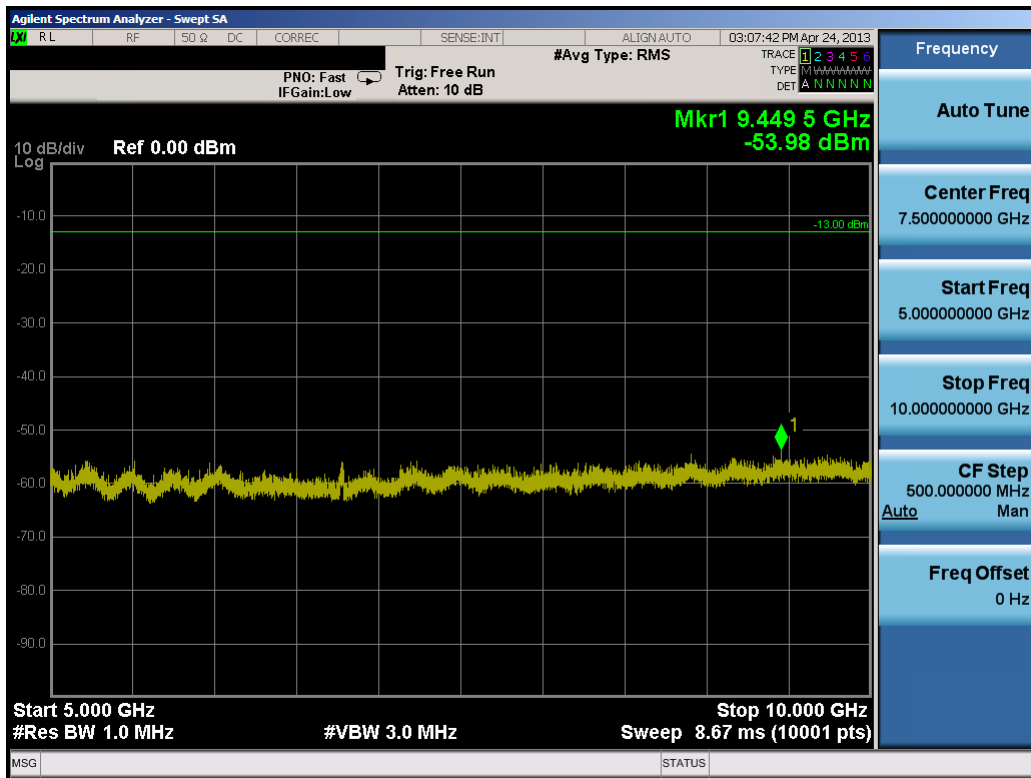
Plot 7-6. Occupied Bandwidth Plot (Cellular WCDMA Mode – Ch. 4183)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 26 of 35





Plot 7-7. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4233)

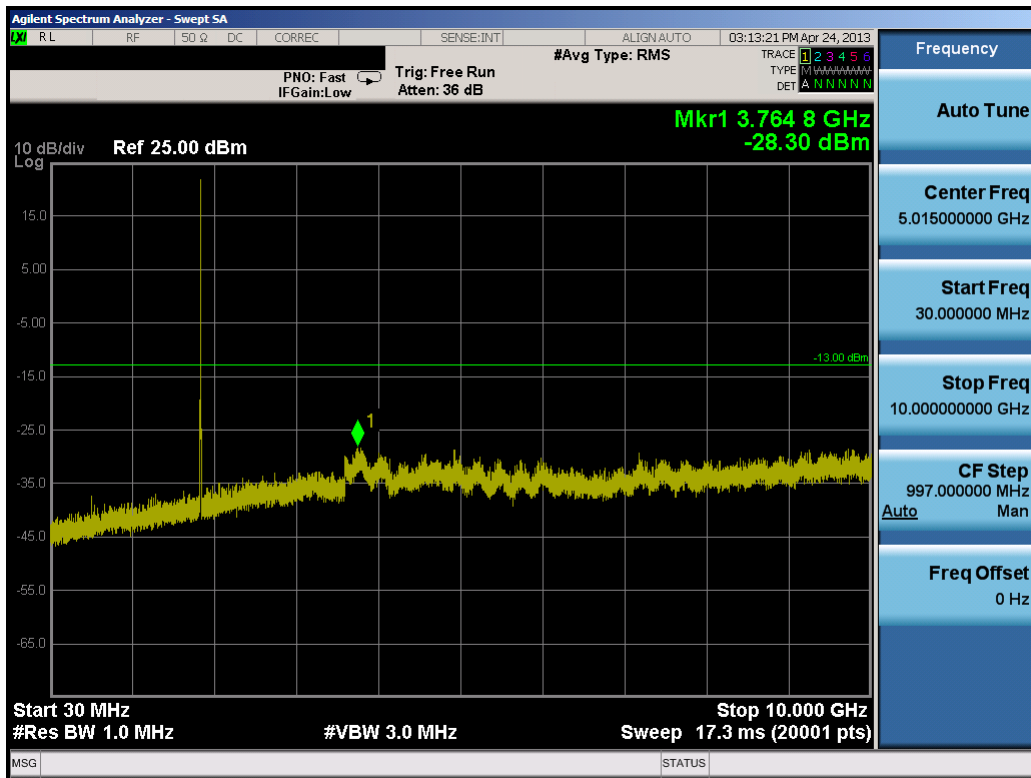


Plot 7-8. Conducted Spurious Plot (Cellular WCDMA Mode – Ch. 4233)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 27 of 35

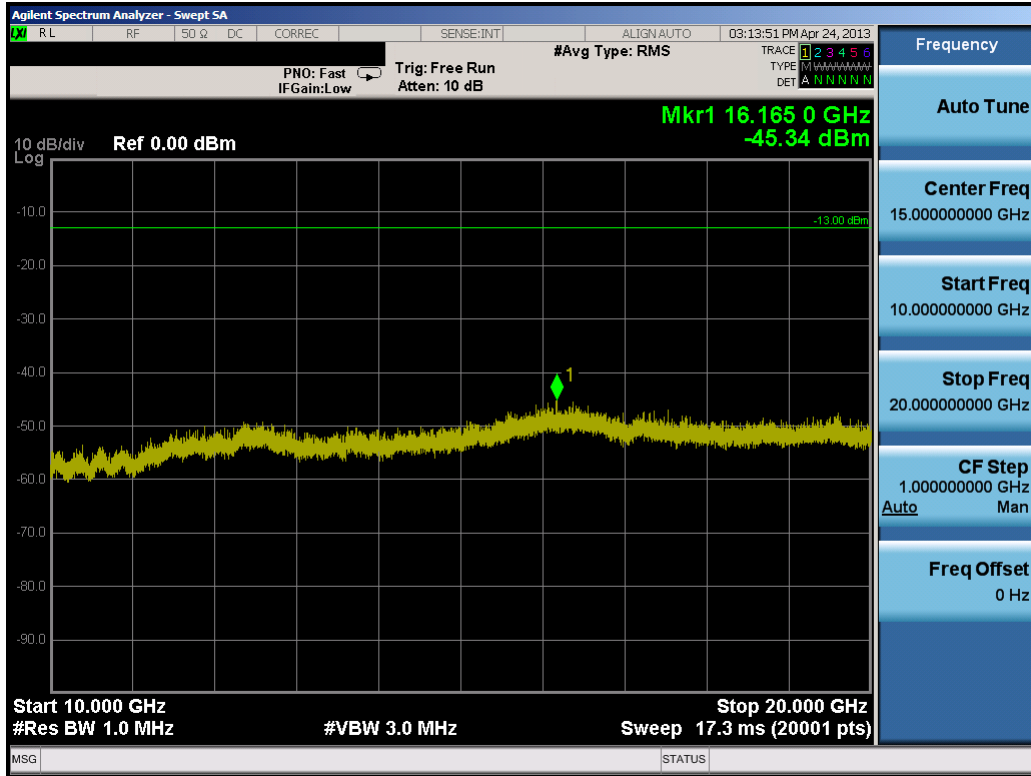


Plot 7-9. Band Edge Plot (Cellular WCDMA Mode – Ch. 4233)



Plot 7-10. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9262)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 28 of 35

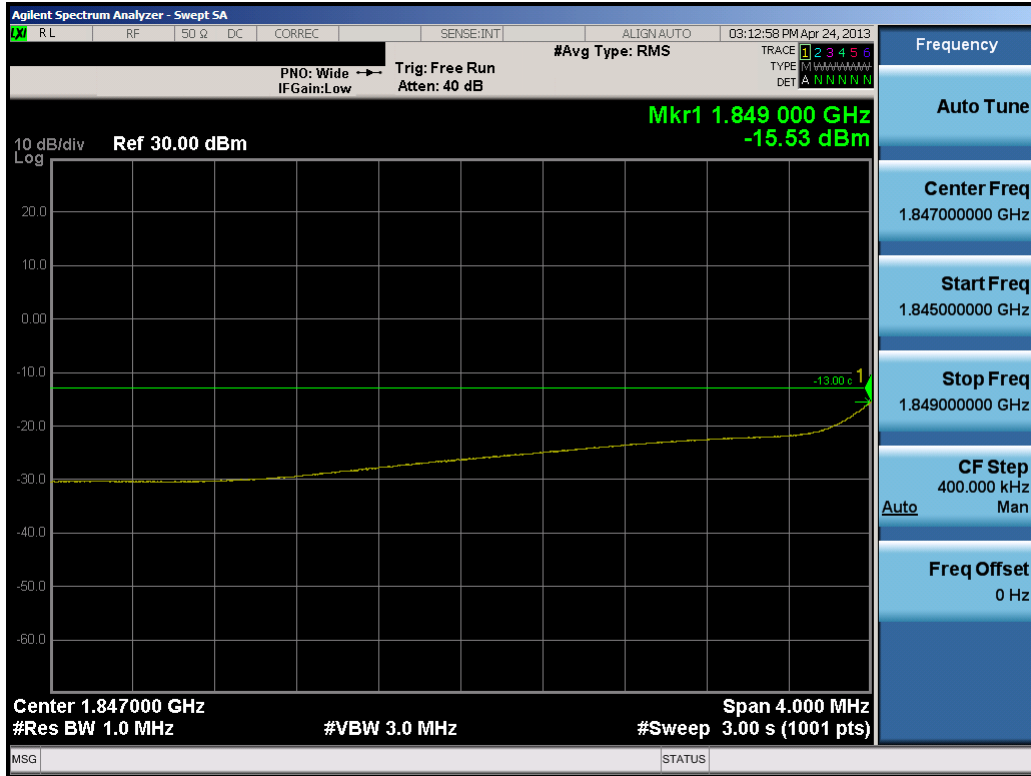


Plot 7-11. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9262)

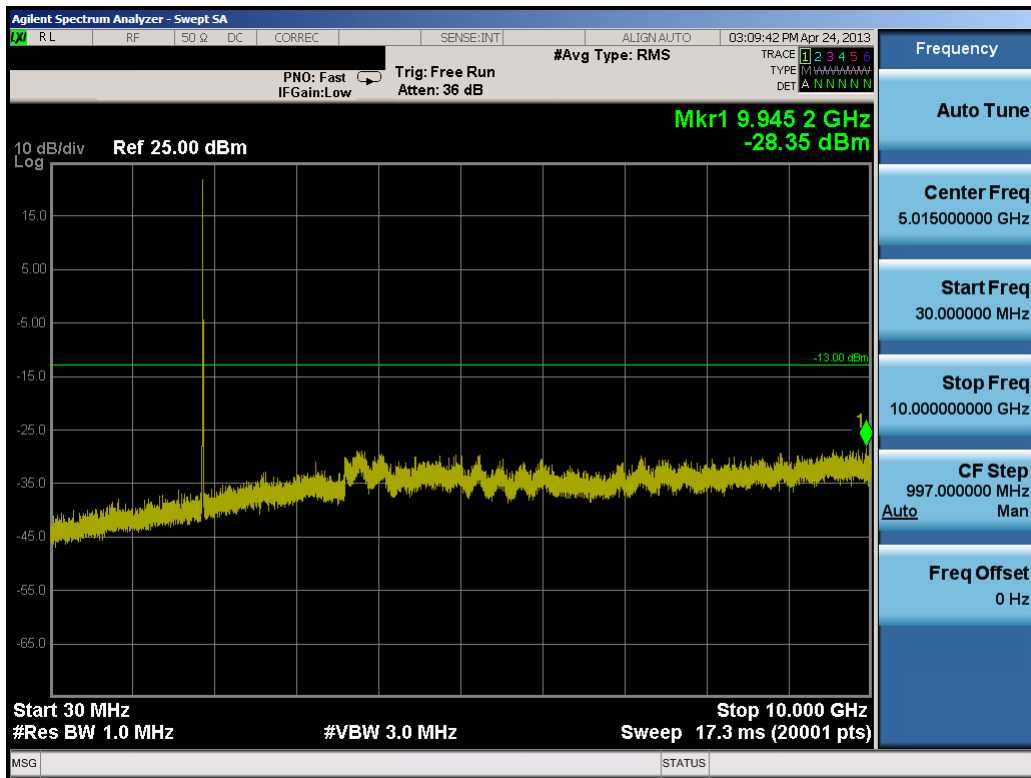


Plot 7-12. Band Edge Plot (PCS WCDMA Mode – Ch. 9262)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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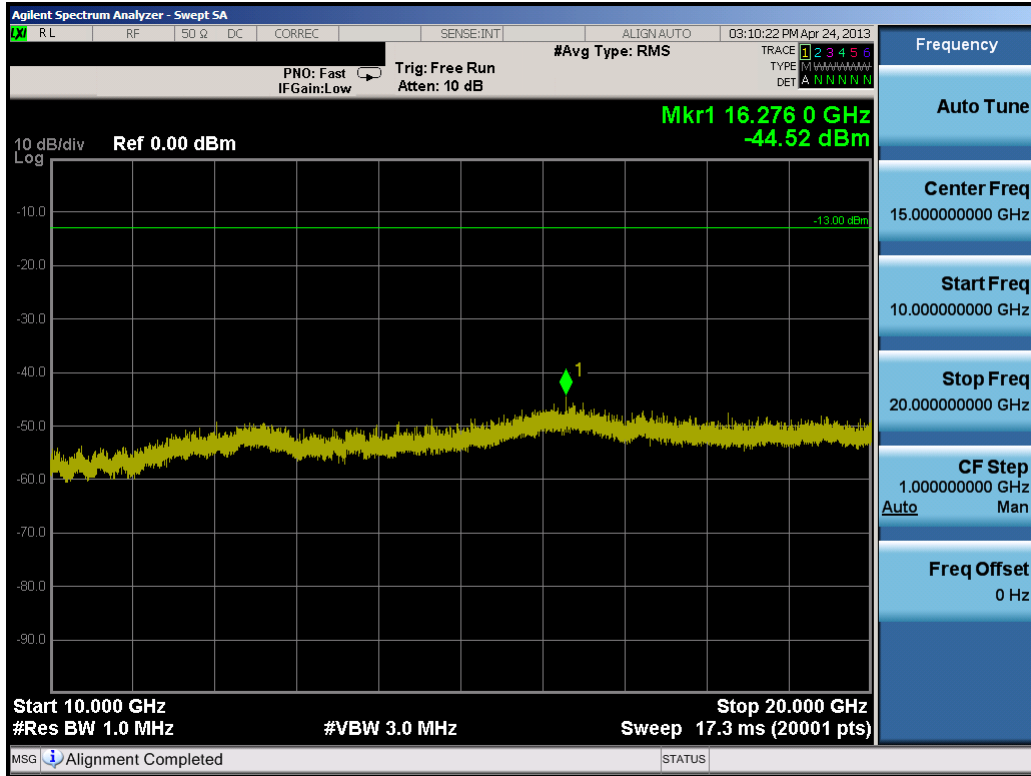


Plot 7-13. 4MHz Span Plot (PCS WCDMA Mode – Ch. 9262)

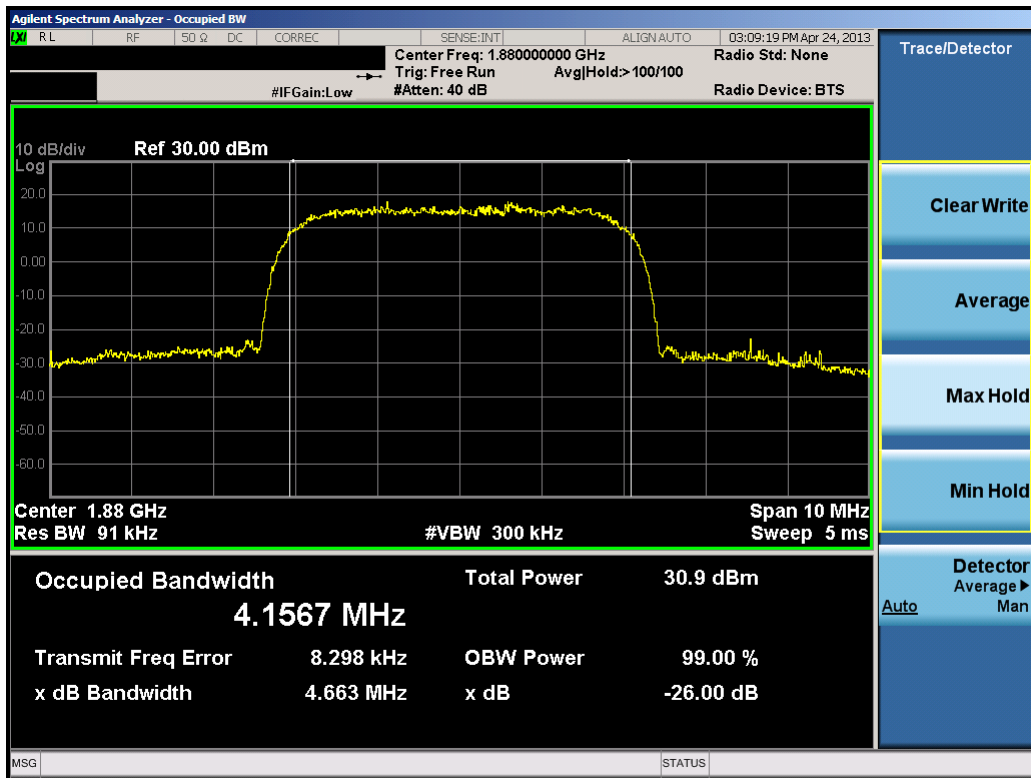


Plot 7-14. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9400)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 30 of 35

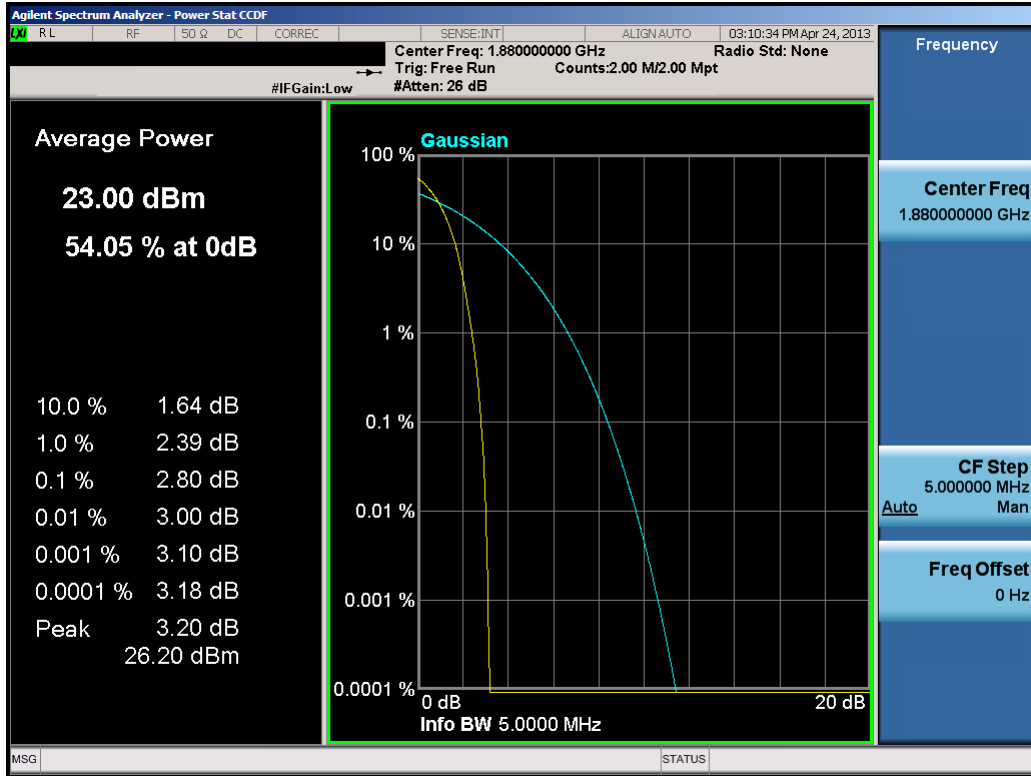


Plot 7-15. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9400)

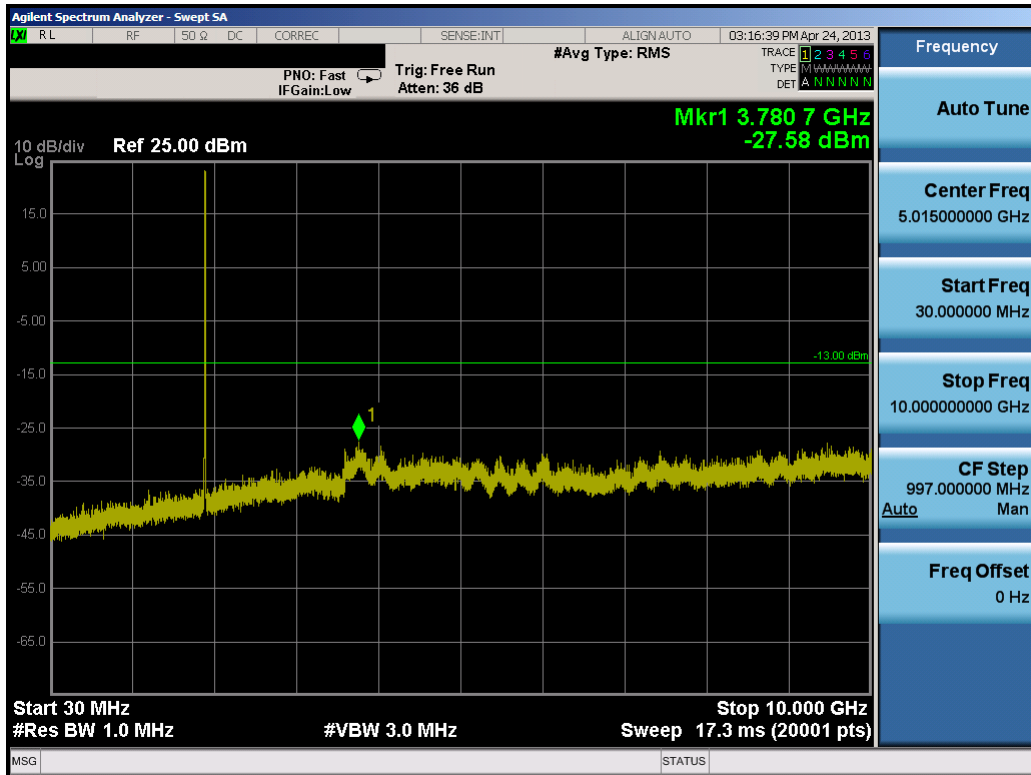


Plot 7-16. Occupied Bandwidth Plot (PCS WCDMA Mode – Ch. 9400)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 31 of 35



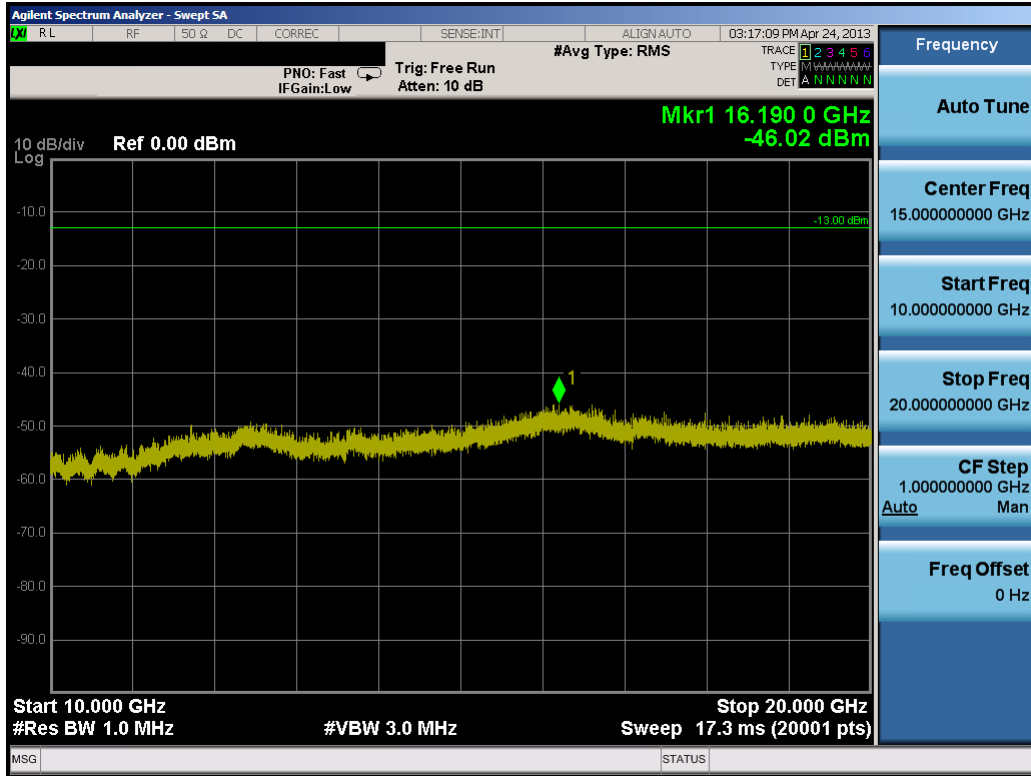
Plot 7-17. Peak-Average Ratio Plot (PCS WCDMA Mode – Ch. 9400)



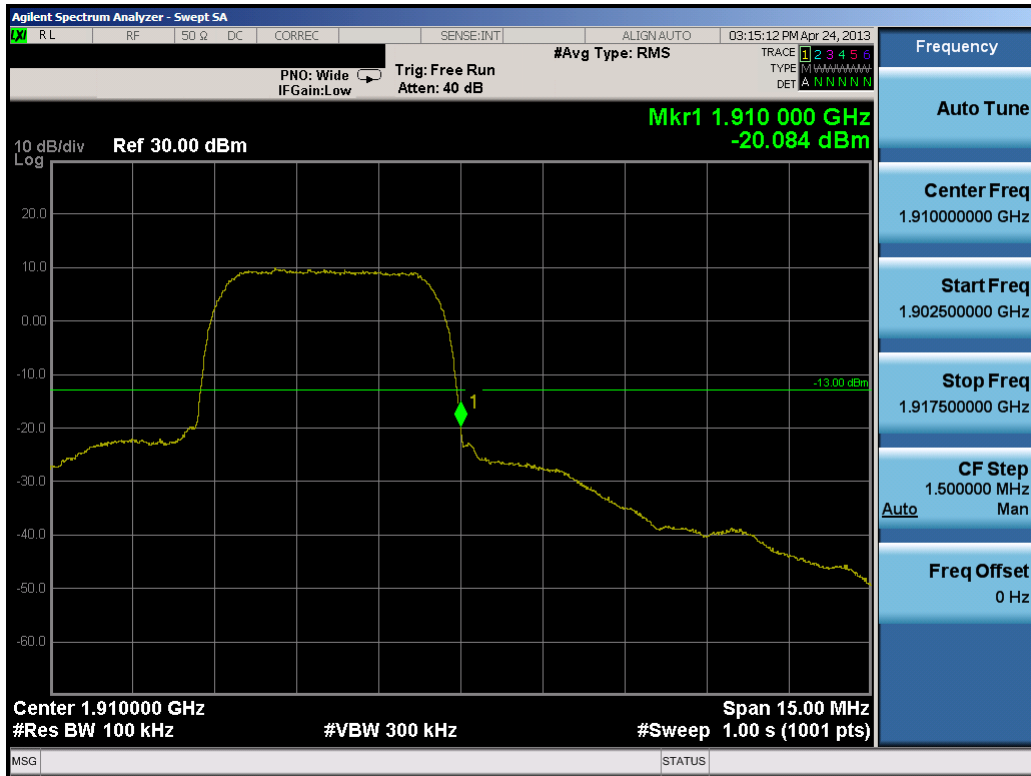
Plot 7-18. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9538)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 32 of 35





Plot 7-19. Conducted Spurious Plot (PCS WCDMA Mode – Ch. 9538)



Plot 7-20. Band Edge Plot (PCS WCDMA Mode – Ch. 9538)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 33 of 35





Plot 7-21. 4MHz Span Plot (PCS WCDMA Mode – Ch. 9538)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 34 of 35

## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Continental Wireless Modem Module FCC ID: LHJ-LNAD** complies with all the requirements of Parts 2, 22, 24 of the FCC rules.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24 MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1304190674.LHJ	Test Dates: April 24 - 30, 2013	EUT Type: Wireless Modem Module		Page 35 of 35