



MEASUREMENT REPORT FCC Part 22, 24, & 27 LTE

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

Date of Testing:
 08/07 - 08/14/2014
Test Site/Location:
 PCTEST Lab., Columbia, MD, USA
Test Report Serial No.:
 0Y1408211762.LHJ

FCC ID :	LHJ-LNAD
APPLICANT:	CONTINENTAL AUTOMOTIVE SYSTEMS, INC.

Application Type: Class II Permissive Change
FCC Classification: PCS Licensed Transmitter (PCB)
FCC Rule Part(s): §2; §22; §24; §27
Test Procedure(s): ANSI/TIA-603-C-2004, KDB 971168 v02r01
EUT Type: Wireless Modem Module
Model(s): LNAD
Test Device Serial No.: *identical prototype* [S/N: PJ662 (334)]
Class II Perm. Change: *Adding bandwidths to LTE Bands 2, 4, and 5*
Original Grant Date: *05/23/2013*



Mode	Tx Frequency (MHz)	Emission Designator	Modulation	Conducted Power	
				Max. Power (W)	Max. Power (dBm)
LTE Band 5	824.7 - 848.3	1M12G7D	QPSK	0.208	23.19
LTE Band 5	824.7 - 848.3	1M13W7D	16QAM	0.153	21.86
LTE Band 5	825.5 - 847.5	2M72G7D	QPSK	0.207	23.17
LTE Band 5	825.5 - 847.5	2M72W7D	16QAM	0.147	21.68
LTE Band 4	1710.7 - 1754.3	1M12G7D	QPSK	0.168	22.25
LTE Band 4	1710.7 - 1754.3	1M13W7D	16QAM	0.135	21.31
LTE Band 4	1711.5 - 1753.5	2M72G7D	QPSK	0.167	22.23
LTE Band 4	1711.5 - 1753.5	2M72W7D	16QAM	0.132	21.21
LTE Band 4	1717.5 - 1747.5	13M5G7D	QPSK	0.166	22.21
LTE Band 4	1717.5 - 1747.5	13M4W7D	16QAM	0.136	21.33
LTE Band 4	1720 - 1745	17M9G7D	QPSK	0.167	22.22
LTE Band 4	1720 - 1745	17M9W7D	16QAM	0.132	21.21
LTE Band 2	1850.7 - 1909.3	1M12G7D	QPSK	0.191	22.81
LTE Band 2	1850.7 - 1909.3	1M13W7D	16QAM	0.148	21.70
LTE Band 2	1851.5 - 1908.5	2M74G7D	QPSK	0.200	23.00
LTE Band 2	1851.5 - 1908.5	2M73W7D	16QAM	0.145	21.60
LTE Band 2	1857.5 - 1902.5	13M4G7D	QPSK	0.212	23.27
LTE Band 2	1857.5 - 1902.5	13M4W7D	16QAM	0.154	21.88
LTE Band 2	1860 - 1900	17M9G7D	QPSK	0.214	23.31
LTE Band 2	1860 - 1900	17M9W7D	16QAM	0.152	21.81

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

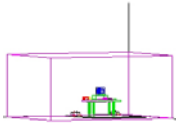


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MEASUREMENT REPORT

FCC Part 22, 24, & 27



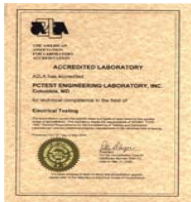
§2.1033 General Information



APPLICANT: Continental Automotive Systems, Inc.
APPLICANT ADDRESS: 21440 West Lake Cook Road
 Deer Park, IL 60010, USA
TEST SITE: PCTEST ENGINEERING LABORATORY, INC.
TEST SITE ADDRESS: 7185 Oakland Mills Road, Columbia, MD 21045 USA
FCC RULE PART(S): §2; §22; §24; §27
BASE MODEL: LNAD
FCC ID: LHJ-LNAD
FCC CLASSIFICATION: PCS Licensed Transmitter (PCB)
FREQUENCY TOLERANCE: ±0.00025 % (2.5 ppm)
Test Device Serial No.: PJ662 (334) Production Pre-Production Engineering
DATE(S) OF TEST: 08/07 - 08/14/2014
TEST REPORT S/N: 0Y1408211762.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 Intern't'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.

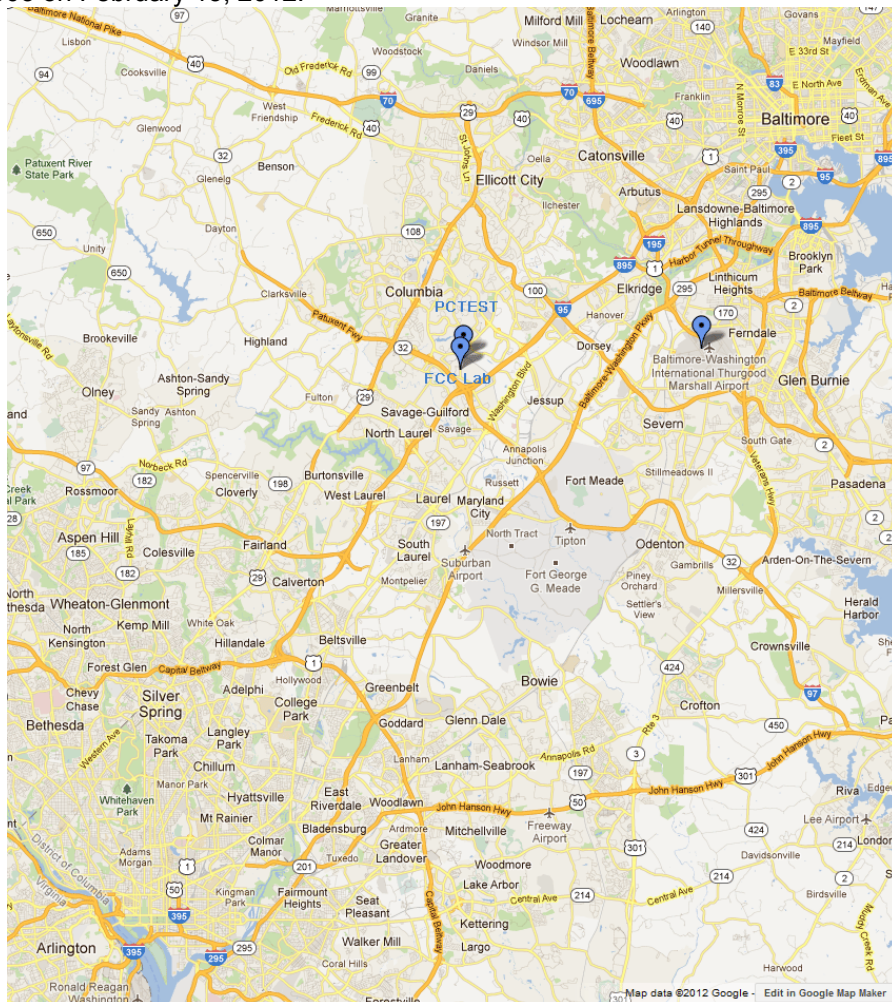


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **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 LTE function.

The EUT was powered with a 12VDC source while performing all testing. The unit was set to transmit continuously at maximum power through connection to an Anritus test set. There was no antenna supplied with the unit so all testing was performed with the device connected to the test set. The use of any antenna with this device is subject to the guidelines specified in the grant of authorization.

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 WCDMA, Multi-band LTE



2.3 EMI Suppression Device(s)/Modifications

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

2.4 Labeling Requirements

Per 2.925

The FCC identifier shall be permanently affixed to the equipment and shall be readily visible to the purchaser at the time of purchase.

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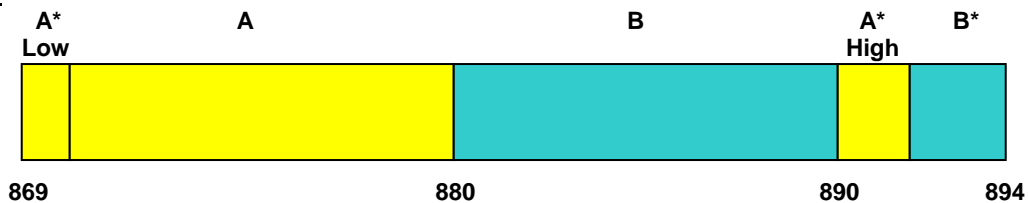
3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled “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**.

3.2 Cellular - Base Frequency Blocks

§22.905



BLOCK 1: 869 – 880 MHz (A* Low + A)

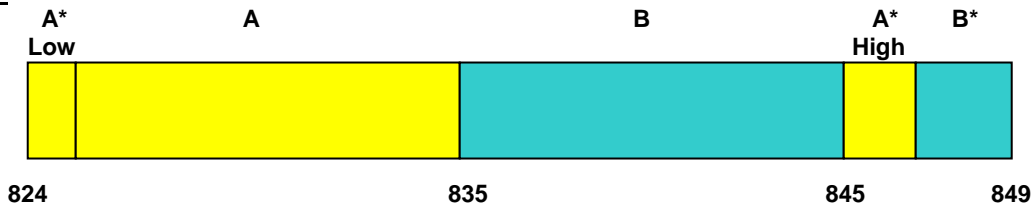
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A* High)

BLOCK 4: 891.5 – 894 MHz (B*)

3.3 Cellular - Mobile Frequency Blocks

§22.905



BLOCK 1: 824 – 835 MHz (A* Low + A)

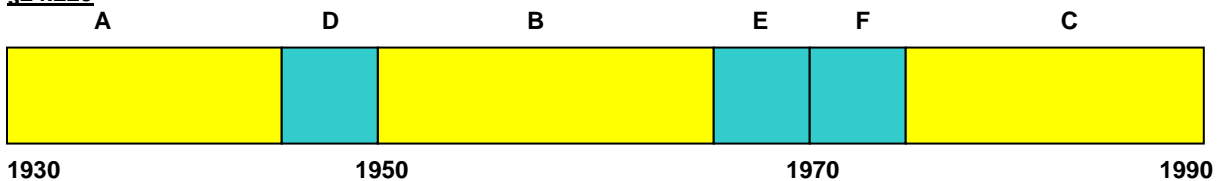
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A* High)

BLOCK 4: 846.5 – 849 MHz (B*)

3.4 PCS - Base Frequency Blocks

§24.229



BLOCK 1: 1930 – 1945 MHz (A)

BLOCK 2: 1945 – 1950 MHz (D)

BLOCK 3: 1950 – 1965 MHz (B)

BLOCK 4: 1965 – 1970 MHz (E)

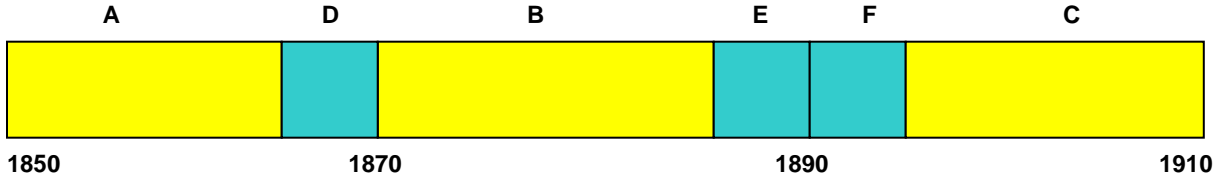
BLOCK 5: 1970 – 1975 MHz (F)

BLOCK 6: 1975 – 1990 MHz (C)

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3.5 PCS - Mobile Frequency Blocks

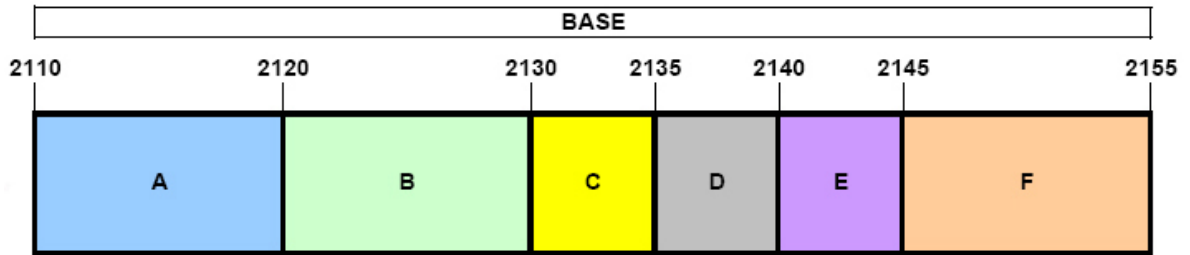
§24.229



- BLOCK 1: 1850 – 1865 MHz (A)
- BLOCK 2: 1865 – 1870 MHz (D)
- BLOCK 3: 1870 – 1885 MHz (B)
- BLOCK 4: 1885 – 1890 MHz (E)
- BLOCK 5: 1890 – 1895 MHz (F)
- BLOCK 6: 1895 – 1910 MHz (C)

3.6 AWS - Base Frequency Blocks

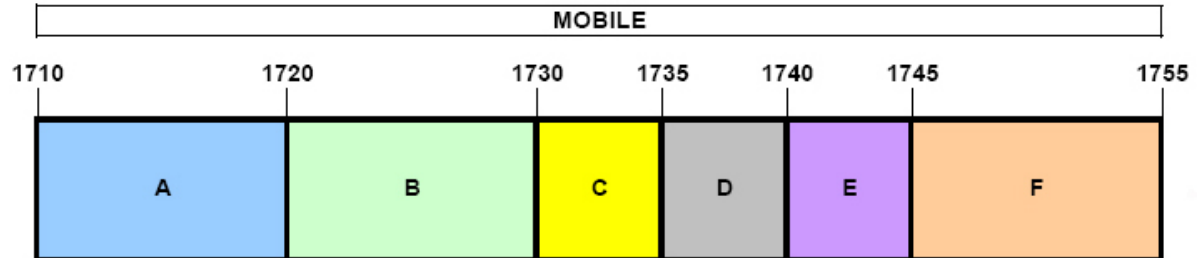
§27.5(h)





- BLOCK 1: 2110 – 2120 MHz (A)
- BLOCK 2: 2120 – 2130 MHz (B)
- BLOCK 3: 2130 – 2135 MHz (C)
- BLOCK 4: 2135 – 2140 MHz (D)
- BLOCK 5: 2140 – 2145 MHz (E)
- BLOCK 6: 2145 – 2155 MHz (F)

3.7 AWS - Mobile Frequency Blocks

§27.5(h)



- BLOCK 1: 1710 – 1720 MHz (A)
- BLOCK 2: 1720 – 1730 MHz (B)
- BLOCK 3: 1730 – 1735 MHz (C)
- BLOCK 4: 1735 – 1740 MHz (D)
- BLOCK 5: 1740 – 1745 MHz (E)
- BLOCK 6: 1745 – 1755 MHz (F)

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3.8 Radiated Spurious Emissions

§2.1053, §22.917(a), §24.238(a), §27.53(h)

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. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Clause 5, Figure 5.7 of ANSI C63.4-2009. 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 supplied with a 12VDC power source and was transmitting while connected to a base station simulator. The EUT 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 emission levels are investigated with the receive antenna horizontally and vertically polarized.

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:

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

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

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 $43 + 10\log_{10}(\text{Power [Watts]})$.

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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
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	5/29/2014	Annual	5/29/2015	N/A
-	LTx3	Licensed Transmitter Cable Set	1/30/2014	Annual	1/30/2015	N/A
Agilent	8447D	Broadband Amplifier	5/30/2014	Annual	5/30/2015	2443A01900
Agilent	E8267C	Vector Signal Generator	10/31/2013	Biennial	10/31/2015	US42340152
Agilent	N9020A	MXA Signal Analyzer	10/29/2013	Annual	10/29/2014	US46470561
Agilent	87405C	Pre-amplifier (0.1 - 18 GHz)	3/19/2014	Annual	3/19/2015	MY53010007
Anritsu	MT8820C	Radio Communication Analyzer	12/12/2013	Annual	12/12/2014	6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	6/26/2013	Biennial	6/26/2015	121034
Emco	3115	Horn Antenna (1-18GHz)	1/30/2014	Biennial	1/30/2016	9704-5182
Espec	ESX-2CA	Environmental Chamber	4/16/2014	Annual	4/16/2015	17620
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	6/17/2014	Biennial	6/17/2016	135427
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	11/7/2012	Biennial	11/7/2014	128338
K & L	13SH10-1000/U1000	N Type High Pass Filter	5/22/2014	Annual	5/22/2015	1
K & L	11SH10-3075/U18000	High Pass Filter	5/2/2014	Annual	5/2/2015	2
Mini-Circuits	SSG-4000HP	USB Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2014	Annual	4/17/2015	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	3/12/2014	Annual	3/12/2015	100040
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	1/27/2014	Annual	1/27/2015	100342
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/21/2013	Biennial	11/21/2015	9105-2404
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/18/2014	Biennial	3/18/2016	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/28/2014	Biennial	1/28/2016	A051107
Sunol	DRH-118	Horn Antenna (1-18 GHz)	6/19/2013	Biennial	6/19/2015	A042511
VWR	62344-734	Thermometer with Clock	2/20/2014	Biennial	2/20/2016	140140420

Table 4-1. Test Equipment

Notes:

Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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5.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
 G = Phase Modulation
 7 = Quantized/Digital Info
 D = Amplitude/Angle Modulated

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 – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

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 1564 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).

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6.0 TEST RESULTS

6.1 Summary



Company Name: Continental Automotive Systems, Inc.
 FCC ID: LHJ-LNAD
 FCC Classification: PCS Licensed Transmitter (PCB)
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
TRANSMITTER MODE (TX)					
2.1046	Conducted Output Power	N/A	CONDUCTED	PASS	Section 6.2
2.1049	Occupied Bandwidth	N/A		PASS	Section 6.3
2.1051, 22.917(a), 24.238(a), 27.53(h)	Band Edge / Conducted Spurious Emissions	> 43 + 10log ₁₀ (P[Watts]) at Band Edge and for all out-of-band emissions		PASS	Section 6.4, 6.5
24.232(d)	Peak-Average Ratio	< 13 dB		PASS	Section 6.6
2.1055, 22.355, 24.235, 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)		PASS	Section 6.8
2.1053, 22.917(a), 24.238(a), 27.53(h)	Undesirable Emissions	> 43 + 10log ₁₀ (P[Watts]) for all out-of-band emissions	RADIATED	PASS	Section 6.7

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 (Sections 6.3, 6.4, 6.5, and 6.6) 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.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation", Version 2.5.

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6.2 Conducted Output Power

§2.1046

Test Overview

The RF power is measured at the output of the transmitter board. All modes of operation were measured and the results are included in this section.

Test Procedure Used

KDB 971168 v02r01 – Section 5.2.1

Test Settings

1. The signal analyzer's channel power function was used to perform the conducted output power measurements with the integration window set to the channel OBW
2. Span is set to at least 1.5 times the OBW
3. RBW = 1 – 5% of the expected OBW
4. VBW $\geq 3 \times$ RBW
5. Number of points in sweep = 1001
6. Detector = RMS (power averaging)
7. Trace mode = trace averaging over 100 sweeps
8. Sweep = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

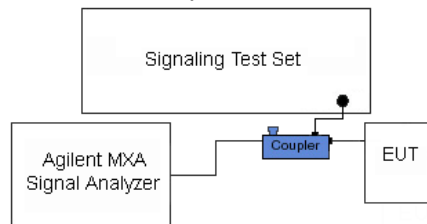




Figure 6-1. Test Instrument & Measurement Setup

Test Notes

The conducted powers of the LTE bandwidths in the original filing (granted on 05/23/2013) were investigated on the new permissive change sample. All measurements of the original bandwidths were found to be within 0.5dB of the power measurements submitted with the original filing.



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Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1850.7	18607	1.4	QPSK	1	0	22.70
1850.7	18607	1.4	QPSK	1	5	22.80
1850.7	18607	1.4	QPSK	3	2	22.56
1850.7	18607	1.4	QPSK	6	0	21.44
1850.7	18607	1.4	16-QAM	1	0	21.20
1850.7	18607	1.4	16-QAM	1	5	21.30
1850.7	18607	1.4	16-QAM	3	2	21.36
1850.7	18607	1.4	16-QAM	6	0	20.07
1880.0	18900	1.4	QPSK	1	0	22.73
1880.0	18900	1.4	QPSK	1	5	22.81
1880.0	18900	1.4	QPSK	3	2	22.78
1880.0	18900	1.4	QPSK	6	0	21.67
1880.0	18900	1.4	16-QAM	1	0	21.47
1880.0	18900	1.4	16-QAM	1	5	21.55
1880.0	18900	1.4	16-QAM	3	2	21.70
1880.0	18900	1.4	16-QAM	6	0	20.11
1909.3	19193	1.4	QPSK	1	0	22.30
1909.3	19193	1.4	QPSK	1	5	22.23
1909.3	19193	1.4	QPSK	3	2	22.17
1909.3	19193	1.4	QPSK	6	0	20.79
1909.3	19193	1.4	16-QAM	1	0	20.78
1909.3	19193	1.4	16-QAM	1	5	20.51
1909.3	19193	1.4	16-QAM	3	2	20.61
1909.3	19193	1.4	16-QAM	6	0	19.87

Table 6-1. LTE Band 2 Conducted Power (1.4MHz BW)

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1851.5	18615	3	QPSK	1	0	22.84
1851.5	18615	3	QPSK	1	14	22.75
1851.5	18615	3	QPSK	8	4	21.36
1851.5	18615	3	QPSK	15	0	21.33
1851.5	18615	3	16-QAM	1	0	21.47
1851.5	18615	3	16-QAM	1	14	21.15
1851.5	18615	3	16-QAM	8	4	19.91
1851.5	18615	3	16-QAM	15	0	19.91
1880.0	18900	3	QPSK	1	0	22.99
1880.0	18900	3	QPSK	1	14	23.00
1880.0	18900	3	QPSK	8	4	21.77
1880.0	18900	3	QPSK	15	0	21.61
1880.0	18900	3	16-QAM	1	0	21.60
1880.0	18900	3	16-QAM	1	14	21.40
1880.0	18900	3	16-QAM	8	4	21.40
1880.0	18900	3	16-QAM	15	0	20.06
1908.5	19185	3	QPSK	1	0	22.60
1908.5	19185	3	QPSK	1	14	22.15
1908.5	19185	3	QPSK	8	4	20.75
1908.5	19185	3	QPSK	15	0	20.85
1908.5	19185	3	16-QAM	1	0	20.89
1908.5	19185	3	16-QAM	1	14	20.67
1908.5	19185	3	16-QAM	8	4	19.88
1908.5	19185	3	16-QAM	15	0	19.94

Table 6-2. LTE Band 2 Conducted Power (3MHz BW)



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Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1857.5	18675	15	QPSK	1	0	22.74
1857.5	18675	15	QPSK	1	74	23.03
1857.5	18675	15	QPSK	36	18	21.57
1857.5	18675	15	QPSK	75	0	21.69
1857.5	18675	15	16QAM	1	0	21.57
1857.5	18675	15	16QAM	1	74	21.83
1857.5	18675	15	16QAM	36	18	20.15
1857.5	18675	15	16QAM	75	0	20.12
1880.0	18900	15	QPSK	1	0	23.08
1880.0	18900	15	QPSK	1	74	23.27
1880.0	18900	15	QPSK	36	18	21.65
1880.0	18900	15	QPSK	75	0	21.65
1880.0	18900	15	16QAM	1	0	21.62
1880.0	18900	15	16QAM	1	74	21.88
1880.0	18900	15	16QAM	36	18	20.05
1880.0	18900	15	16QAM	75	0	20.31
1902.5	19125	15	QPSK	1	0	23.19
1902.5	19125	15	QPSK	1	74	22.08
1902.5	19125	15	QPSK	36	18	21.07
1902.5	19125	15	QPSK	75	0	21.06
1902.5	19125	15	16QAM	1	0	21.73
1902.5	19125	15	16QAM	1	74	20.51
1902.5	19125	15	16QAM	36	18	20.18
1902.5	19125	15	16QAM	75	0	20.22

Table 6-3. LTE Band 2 Conducted Power (15MHz BW)

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1860	18700	20	QPSK	1	0	22.75
1860	18700	20	QPSK	1	99	22.80
1860	18700	20	QPSK	50	25	21.82
1860	18700	20	QPSK	100	0	21.76
1860	18700	20	16QAM	1	0	21.43
1860	18700	20	16QAM	1	99	21.76
1860	18700	20	16QAM	50	25	20.36
1860	18700	20	16QAM	100	0	20.25
1880.0	18900	20	QPSK	1	0	22.89
1880.0	18900	20	QPSK	1	99	23.31
1880.0	18900	20	QPSK	50	25	21.62
1880.0	18900	20	QPSK	100	0	21.71
1880.0	18900	20	16QAM	1	0	21.69
1880.0	18900	20	16QAM	1	99	21.81
1880.0	18900	20	16QAM	50	25	20.16
1880.0	18900	20	16QAM	100	0	20.33
1900	19100	20	QPSK	1	0	23.27
1900	19100	20	QPSK	1	99	22.20
1900	19100	20	QPSK	50	25	21.27
1900	19100	20	QPSK	100	0	21.35
1900	19100	20	16QAM	1	0	21.71
1900	19100	20	16QAM	1	99	20.76
1900	19100	20	16QAM	50	25	20.63
1900	19100	20	16QAM	100	0	20.47

Table 6-4. LTE Band 2 Conducted Power (20MHz BW)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1710.7	19957	1.4	QPSK	1	0	21.93
1710.7	19957	1.4	QPSK	1	5	21.87
1710.7	19957	1.4	QPSK	3	2	21.80
1710.7	19957	1.4	QPSK	6	0	20.86
1710.7	19957	1.4	16-QAM	1	0	20.85
1710.7	19957	1.4	16-QAM	1	5	20.86
1710.7	19957	1.4	16-QAM	3	2	20.89
1710.7	19957	1.4	16-QAM	6	0	19.89
1732.5	20175	1.4	QPSK	1	0	22.11
1732.5	20175	1.4	QPSK	1	5	22.10
1732.5	20175	1.4	QPSK	3	2	22.04
1732.5	20175	1.4	QPSK	6	0	21.23
1732.5	20175	1.4	16-QAM	1	0	21.14
1732.5	20175	1.4	16-QAM	1	5	21.08
1732.5	20175	1.4	16-QAM	3	2	21.11
1732.5	20175	1.4	16-QAM	6	0	20.13
1754.3	20393	1.4	QPSK	1	0	22.25
1754.3	20393	1.4	QPSK	1	5	22.23
1754.3	20393	1.4	QPSK	3	2	22.24
1754.3	20393	1.4	QPSK	6	0	21.32
1754.3	20393	1.4	16-QAM	1	0	21.31
1754.3	20393	1.4	16-QAM	1	5	21.29
1754.3	20393	1.4	16-QAM	3	2	21.30
1754.3	20393	1.4	16-QAM	6	0	20.34

Table 6-5. LTE Band 4 Conducted Power (1.4MHz BW)

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1711.5	19965	3	QPSK	1	0	21.85
1711.5	19965	3	QPSK	1	14	21.86
1711.5	19965	3	QPSK	8	4	20.80
1711.5	19965	3	QPSK	15	0	20.78
1711.5	19965	3	16-QAM	1	0	21.02
1711.5	19965	3	16-QAM	1	14	20.61
1711.5	19965	3	16-QAM	8	4	19.77
1711.5	19965	3	16-QAM	15	0	19.82
1732.5	20175	3	QPSK	1	0	22.16
1732.5	20175	3	QPSK	1	14	21.98
1732.5	20175	3	QPSK	8	4	21.21
1732.5	20175	3	QPSK	15	0	21.06
1732.5	20175	3	16-QAM	1	0	21.01
1732.5	20175	3	16-QAM	1	14	20.98
1732.5	20175	3	16-QAM	8	4	20.00
1732.5	20175	3	16-QAM	15	0	20.14
1753.5	20385	3	QPSK	1	0	22.22
1753.5	20385	3	QPSK	1	14	22.23
1753.5	20385	3	QPSK	8	4	21.21
1753.5	20385	3	QPSK	15	0	21.23
1753.5	20385	3	16-QAM	1	0	21.10
1753.5	20385	3	16-QAM	1	14	21.21
1753.5	20385	3	16-QAM	8	4	20.15
1753.5	20385	3	16-QAM	15	0	20.20

Table 6-6. LTE Band 4 Conducted Power (3MHz BW)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1717.5	20025	15	QPSK	1	0	22.11
1717.5	20025	15	QPSK	1	74	21.58
1717.5	20025	15	QPSK	36	18	20.82
1717.5	20025	15	QPSK	75	0	20.74
1717.5	20025	15	16QAM	1	0	21.18
1717.5	20025	15	16QAM	1	74	20.74
1717.5	20025	15	16QAM	36	18	19.86
1717.5	20025	15	16QAM	75	0	19.62
1732.5	20175	15	QPSK	1	0	21.84
1732.5	20175	15	QPSK	1	74	21.96
1732.5	20175	15	QPSK	36	18	20.97
1732.5	20175	15	QPSK	75	0	21.01
1732.5	20175	15	16QAM	1	0	21.02
1732.5	20175	15	16QAM	1	74	21.28
1732.5	20175	15	16QAM	36	18	20.08
1732.5	20175	15	16QAM	75	0	19.97
1747.5	20325	15	QPSK	1	0	22.14
1747.5	20325	15	QPSK	1	74	22.21
1747.5	20325	15	QPSK	36	18	21.19
1747.5	20325	15	QPSK	75	0	21.06
1747.5	20325	15	16QAM	1	0	21.22
1747.5	20325	15	16QAM	1	74	21.33
1747.5	20325	15	16QAM	36	18	20.12
1747.5	20325	15	16QAM	75	0	20.18

Table 6-7. LTE Band 4 Conducted Power (15MHz BW)

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
1720	20050	20	QPSK	1	0	21.99
1720	20050	20	QPSK	1	99	22.07
1720	20050	20	QPSK	50	25	20.73
1720	20050	20	QPSK	100	0	20.76
1720	20050	20	16QAM	1	0	20.95
1720	20050	20	16QAM	1	99	21.17
1720	20050	20	16QAM	50	25	19.80
1720	20050	20	16QAM	100	0	19.87
1732.5	20175	20	QPSK	1	0	21.82
1732.5	20175	20	QPSK	1	99	22.12
1732.5	20175	20	QPSK	50	25	21.10
1732.5	20175	20	QPSK	100	0	21.13
1732.5	20175	20	16QAM	1	0	20.82
1732.5	20175	20	16QAM	1	99	21.12
1732.5	20175	20	16QAM	50	25	19.97
1732.5	20175	20	16QAM	100	0	20.04
1745	20300	20	QPSK	1	0	21.96
1745	20300	20	QPSK	1	99	22.22
1745	20300	20	QPSK	50	25	21.14
1745	20300	20	QPSK	100	0	21.15
1745	20300	20	16QAM	1	0	21.07
1745	20300	20	16QAM	1	99	21.21
1745	20300	20	16QAM	50	25	20.16
1745	20300	20	16QAM	100	0	20.07

Table 6-8. LTE Band 4 Conducted Power (20MHz BW)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
824.7	20407	1.4	QPSK	1	0	22.64
824.7	20407	1.4	QPSK	1	5	23.19
824.7	20407	1.4	QPSK	3	2	22.90
824.7	20407	1.4	QPSK	6	0	21.73
824.7	20407	1.4	16-QAM	1	0	21.53
824.7	20407	1.4	16-QAM	1	5	21.86
824.7	20407	1.4	16-QAM	3	2	21.59
824.7	20407	1.4	16-QAM	6	0	20.78
836.5	20525	1.4	QPSK	1	0	21.75
836.5	20525	1.4	QPSK	1	5	21.87
836.5	20525	1.4	QPSK	3	2	21.87
836.5	20525	1.4	QPSK	6	0	20.81
836.5	20525	1.4	16-QAM	1	0	20.74
836.5	20525	1.4	16-QAM	1	5	20.80
836.5	20525	1.4	16-QAM	3	2	20.87
836.5	20525	1.4	16-QAM	6	0	19.80
848.3	20643	1.4	QPSK	1	0	22.17
848.3	20643	1.4	QPSK	1	5	22.21
848.3	20643	1.4	QPSK	3	2	22.18
848.3	20643	1.4	QPSK	6	0	21.05
848.3	20643	1.4	16-QAM	1	0	20.90
848.3	20643	1.4	16-QAM	1	5	20.95
848.3	20643	1.4	16-QAM	3	2	20.86
848.3	20643	1.4	16-QAM	6	0	19.94

Table 6-9. LTE Band 5 Conducted Power (1.4MHz BW)

Frequency [MHz]	Channel	Bandwidth [MHz]	Modulation	RB Size	RB Offset	Conducted Power [dBm]
825.5	20415	3	QPSK	1	0	22.69
825.5	20415	3	QPSK	1	14	23.17
825.5	20415	3	QPSK	8	4	22.10
825.5	20415	3	QPSK	15	0	21.88
825.5	20415	3	16-QAM	1	0	21.65
825.5	20415	3	16-QAM	1	14	21.68
825.5	20415	3	16-QAM	8	4	21.06
825.5	20415	3	16-QAM	15	0	21.01
836.5	20525	3	QPSK	1	0	21.73
836.5	20525	3	QPSK	1	14	22.03
836.5	20525	3	QPSK	8	4	21.21
836.5	20525	3	QPSK	15	0	20.81
836.5	20525	3	16-QAM	1	0	20.72
836.5	20525	3	16-QAM	1	14	20.63
836.5	20525	3	16-QAM	8	4	20.16
836.5	20525	3	16-QAM	15	0	19.80
847.5	20635	3	QPSK	1	0	21.91
847.5	20635	3	QPSK	1	14	21.97
847.5	20635	3	QPSK	8	4	21.00
847.5	20635	3	QPSK	15	0	20.79
847.5	20635	3	16-QAM	1	0	20.79
847.5	20635	3	16-QAM	1	14	20.80
847.5	20635	3	16-QAM	8	4	19.86
847.5	20635	3	16-QAM	15	0	19.91

Table 6-10. LTE Band 5 Conducted Power (3MHz BW)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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6.3 Occupied Bandwidth

§2.1049

Test Overview

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. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Procedure Used

KDB 971168 v02r01 – Section 4.2

Test Settings

1. The signal analyzer’s automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW \geq 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

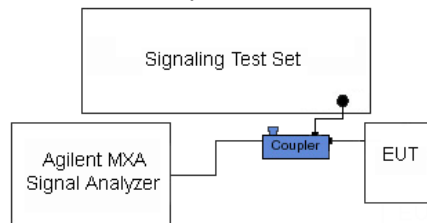


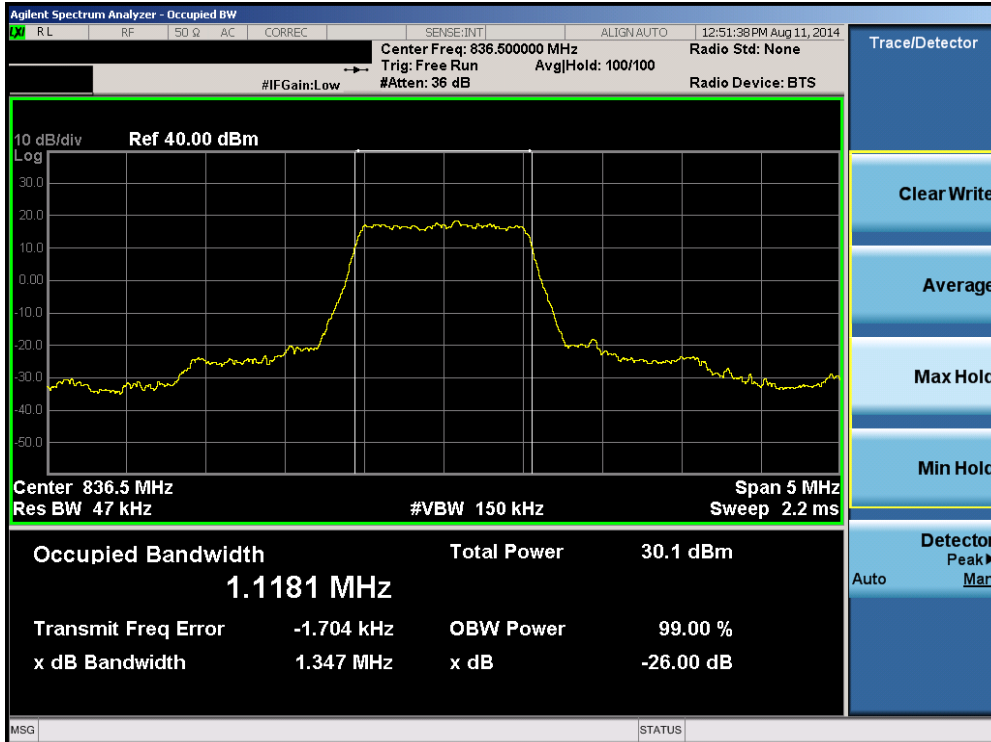


Figure 6-2. Test Instrument & Measurement Setup

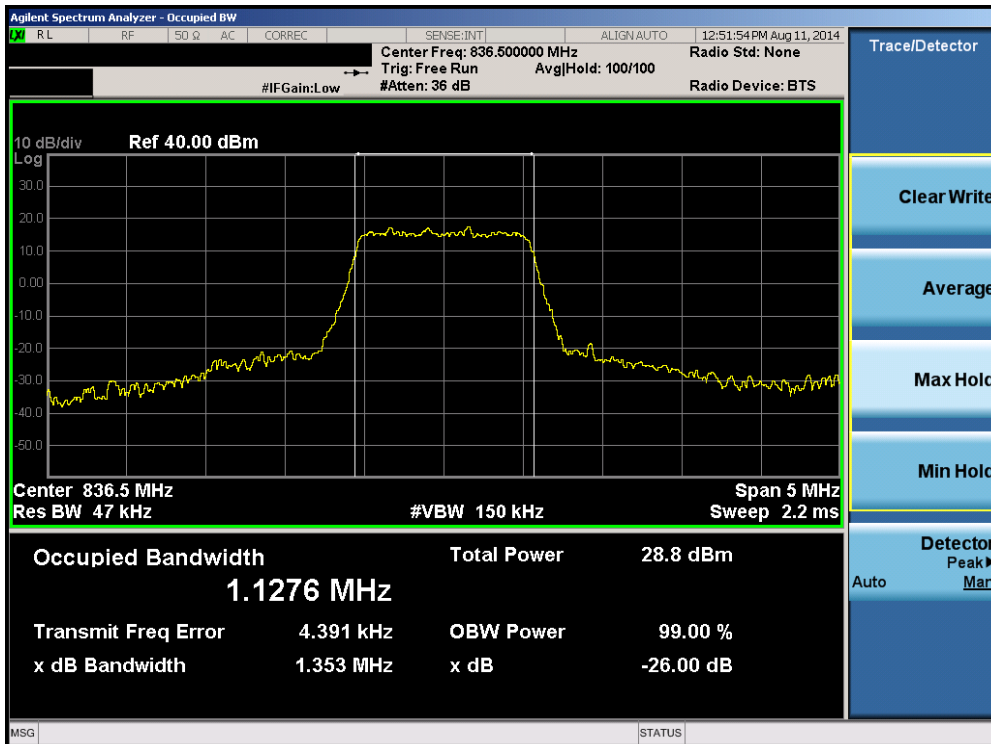
Test Notes

None.

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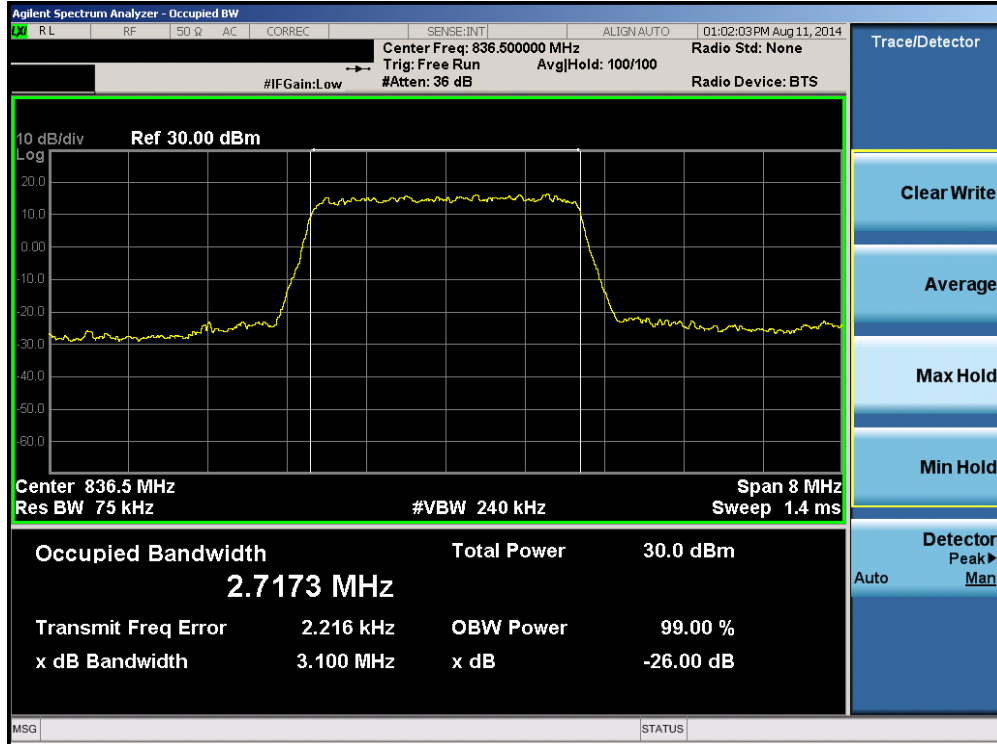


Plot 6-11. Occupied Bandwidth Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

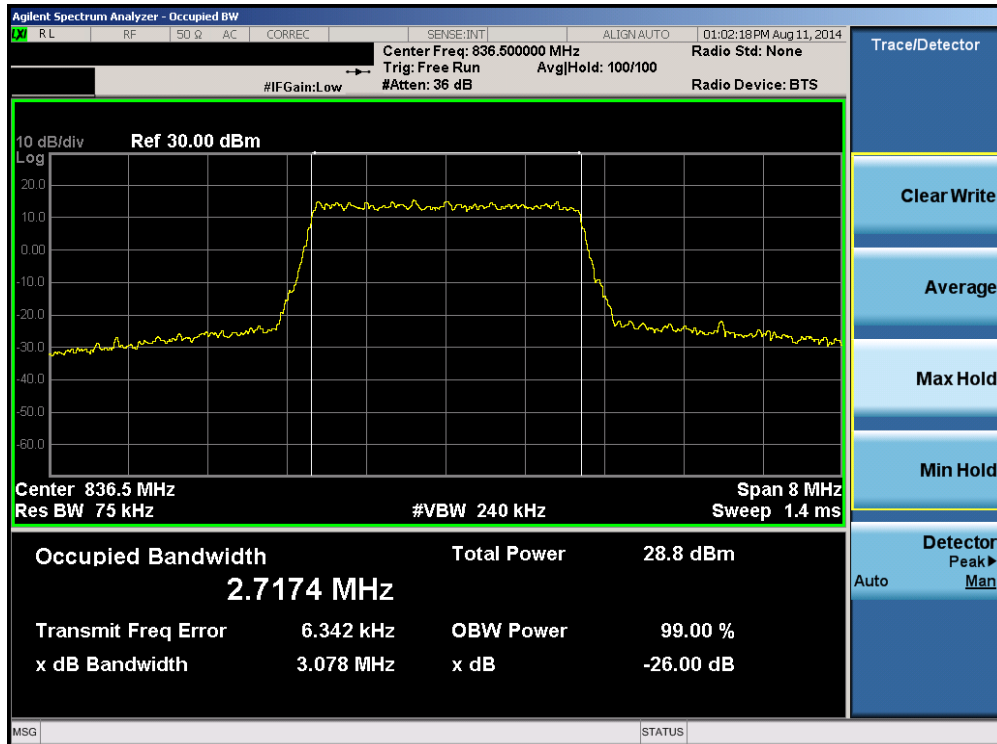


Plot 6-12. Occupied Bandwidth Plot (Band 5 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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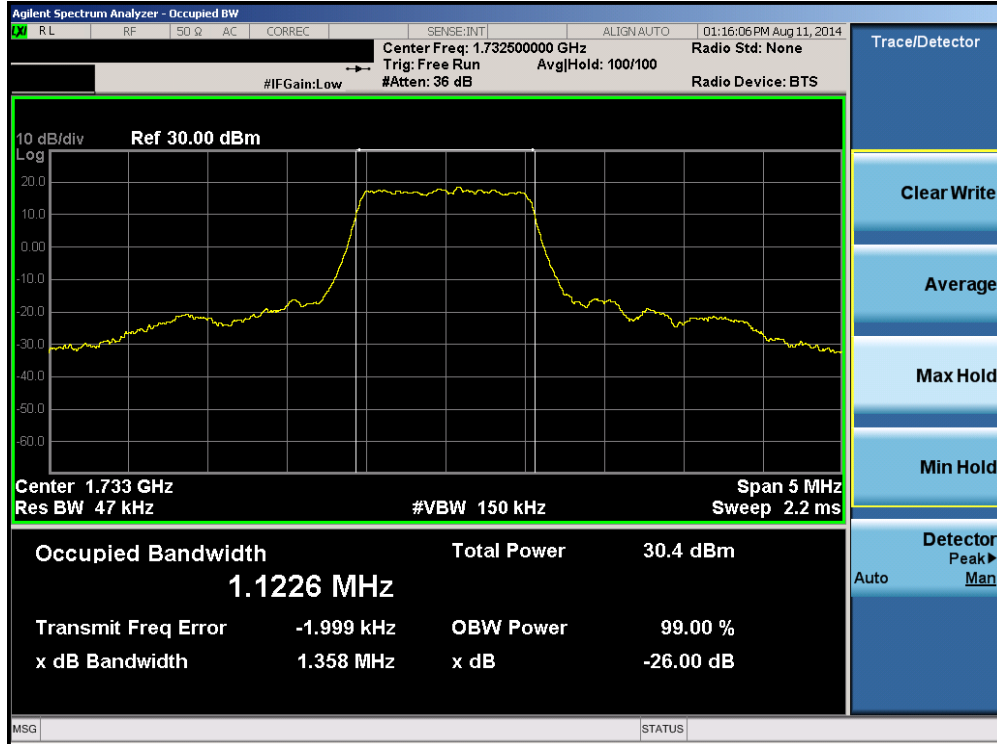


Plot 6-13. Occupied Bandwidth Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

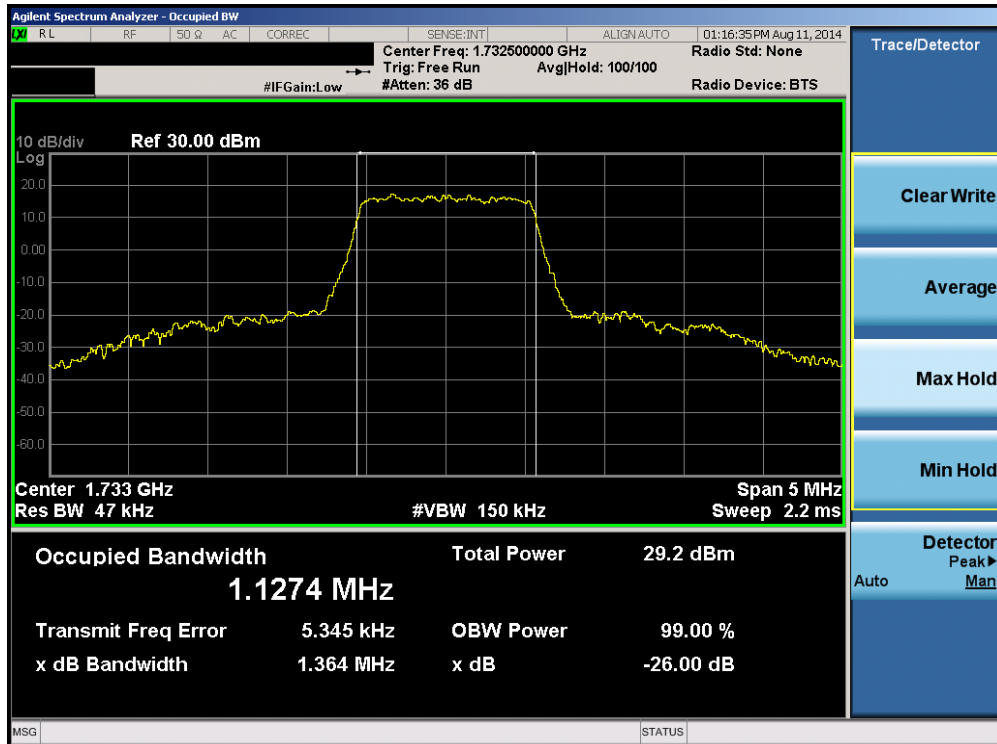


Plot 6-14. Occupied Bandwidth Plot (Band 5 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 20 of 78

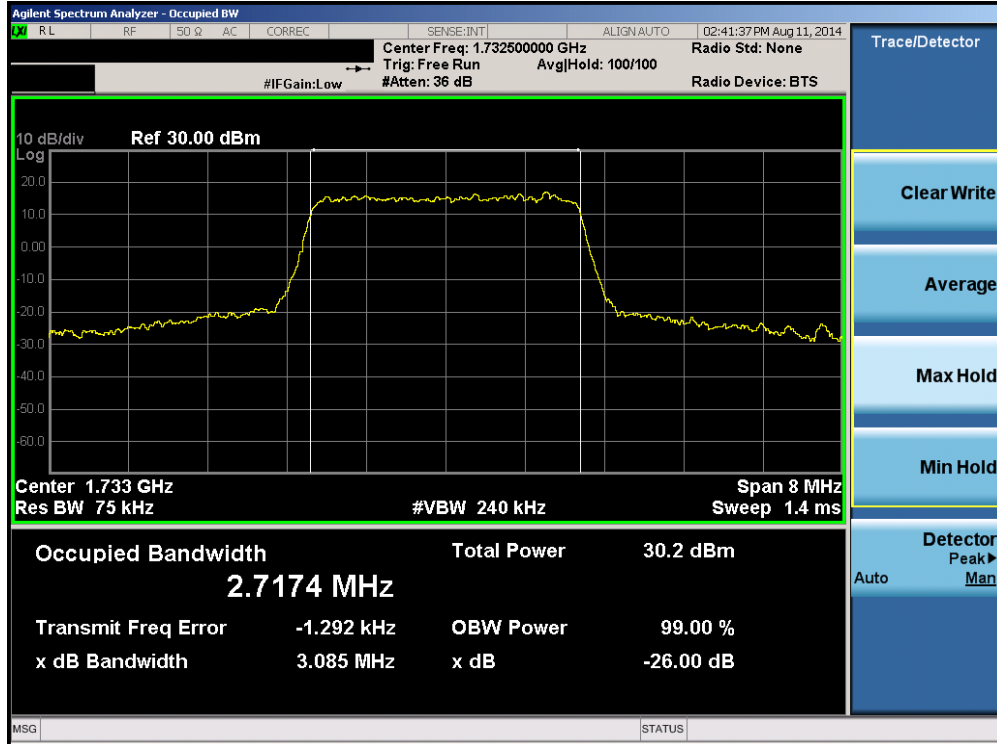


Plot 6-15. Occupied Bandwidth Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

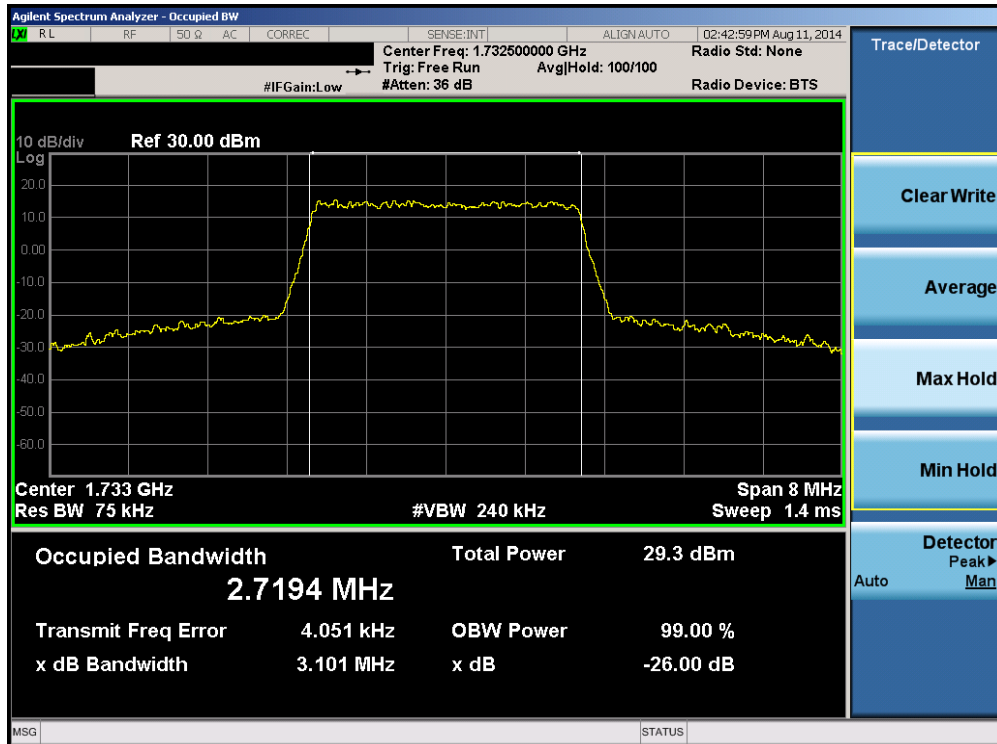


Plot 6-16. Occupied Bandwidth Plot (Band 4 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 21 of 78

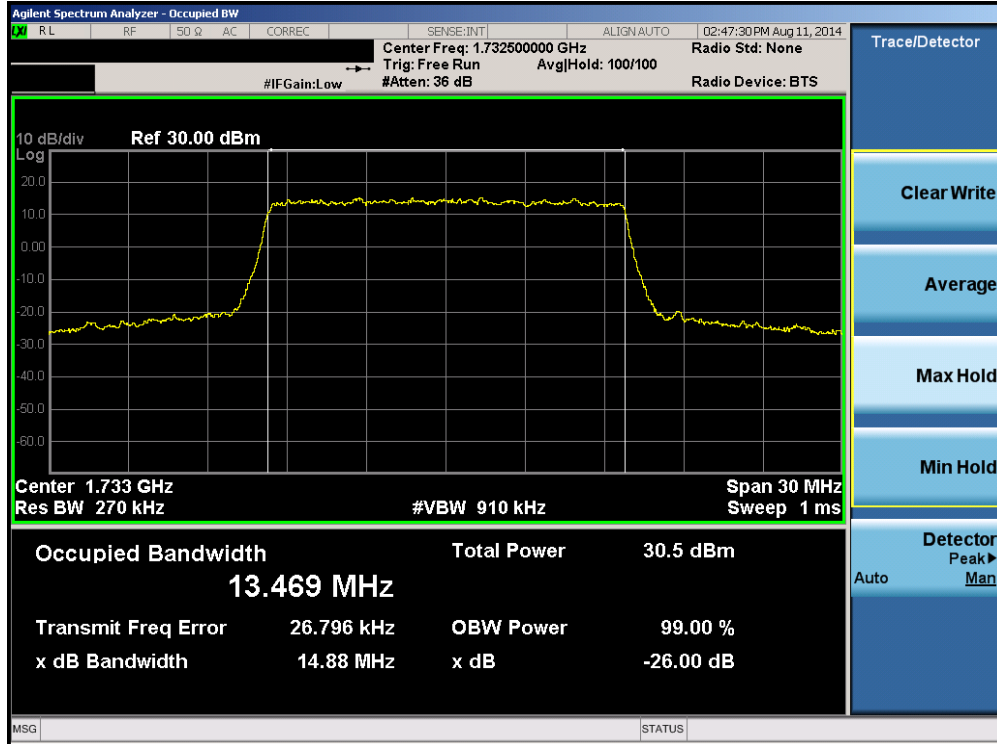


Plot 6-17. Occupied Bandwidth Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

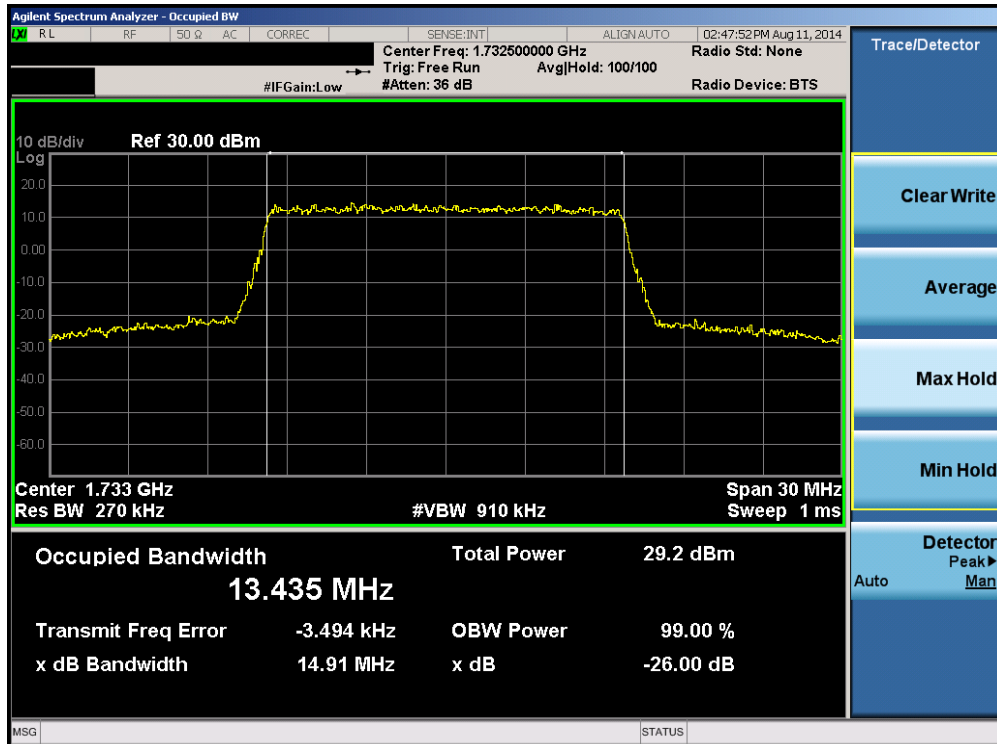


Plot 6-18. Occupied Bandwidth Plot (Band 4 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 22 of 78

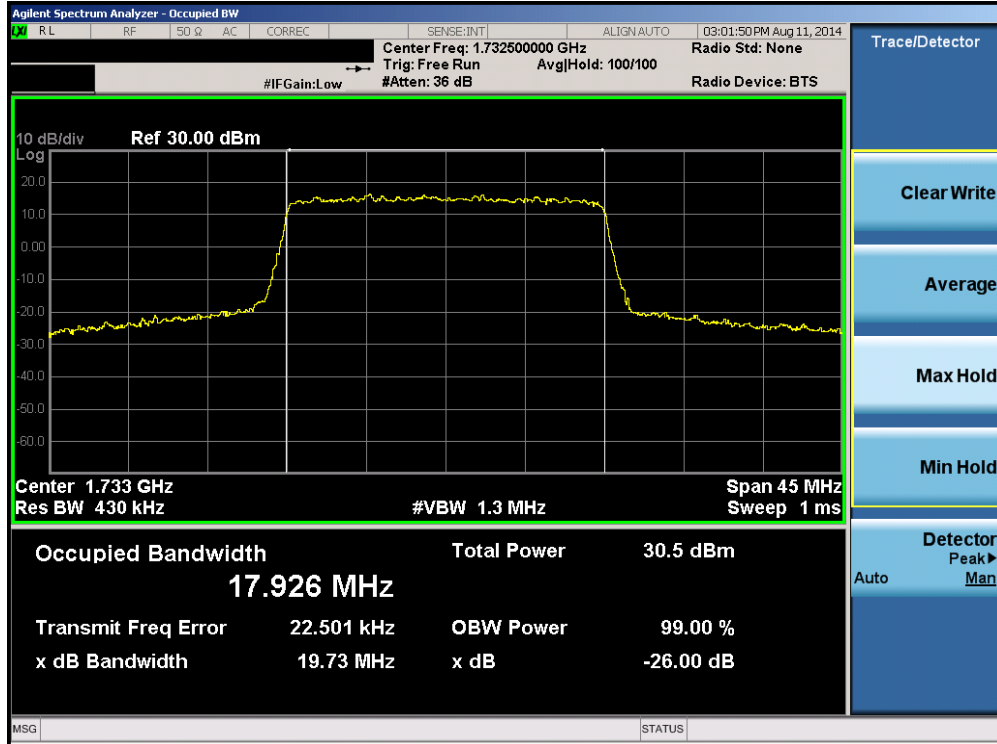


Plot 6-19. Occupied Bandwidth Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

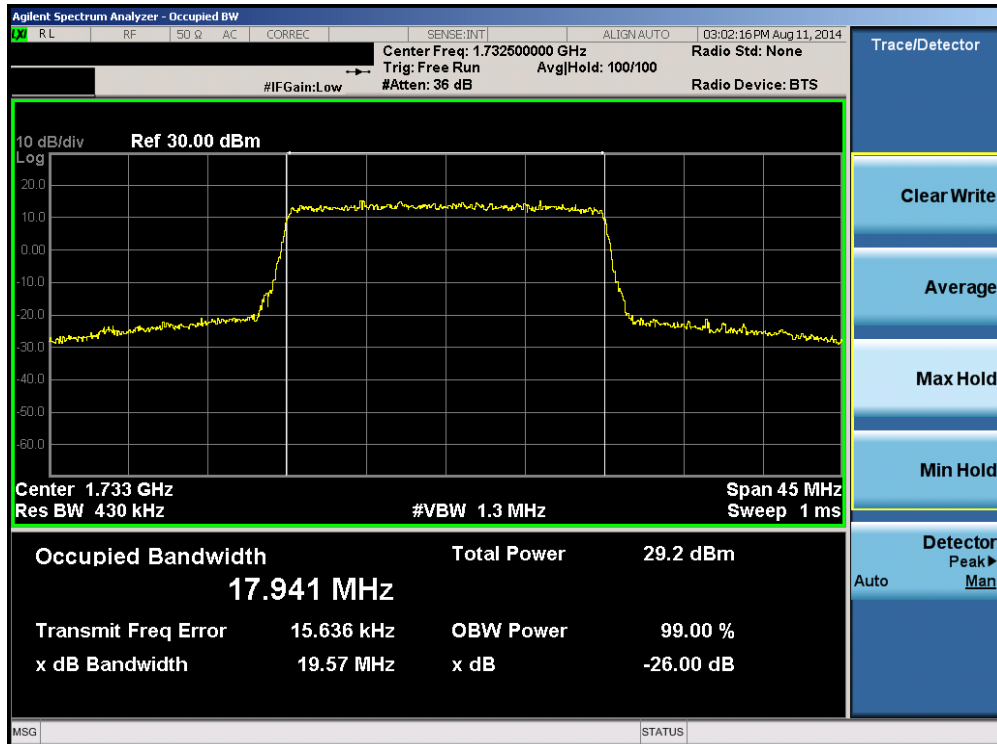


Plot 6-20. Occupied Bandwidth Plot (Band 4 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 23 of 78

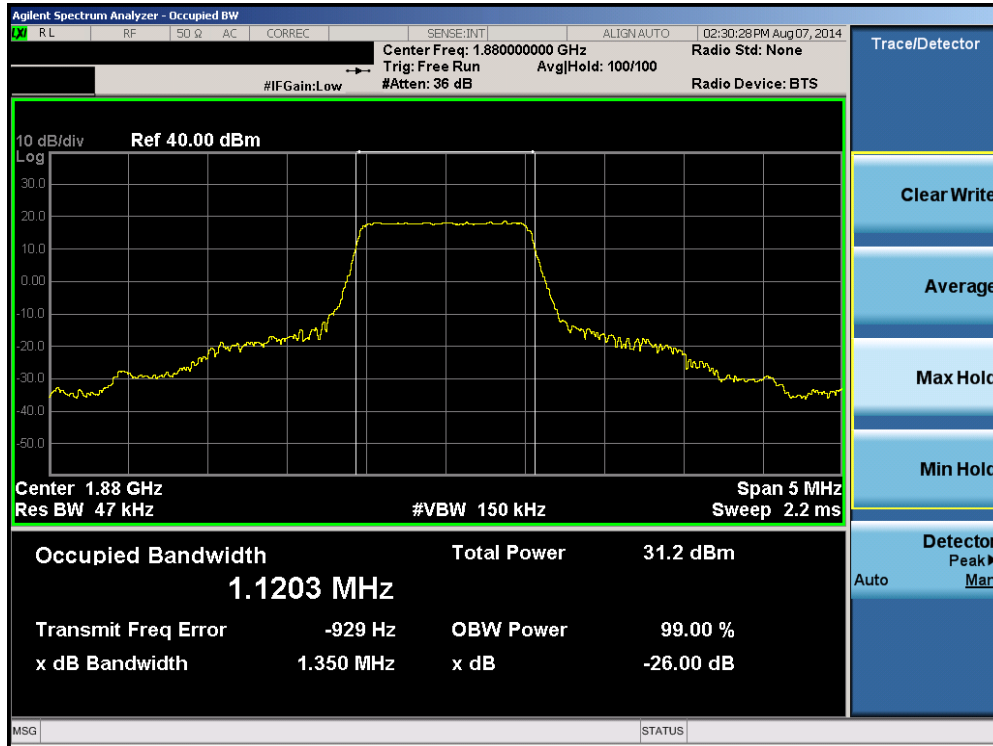


Plot 6-21. Occupied Bandwidth Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

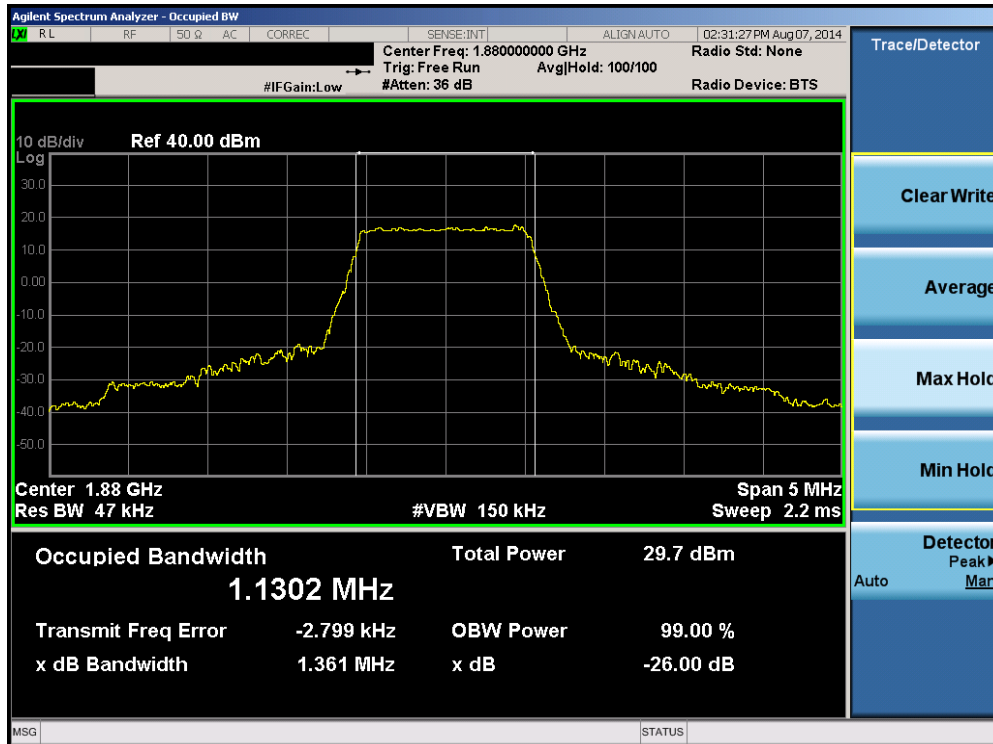


Plot 6-22. Occupied Bandwidth Plot (Band 4 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 24 of 78

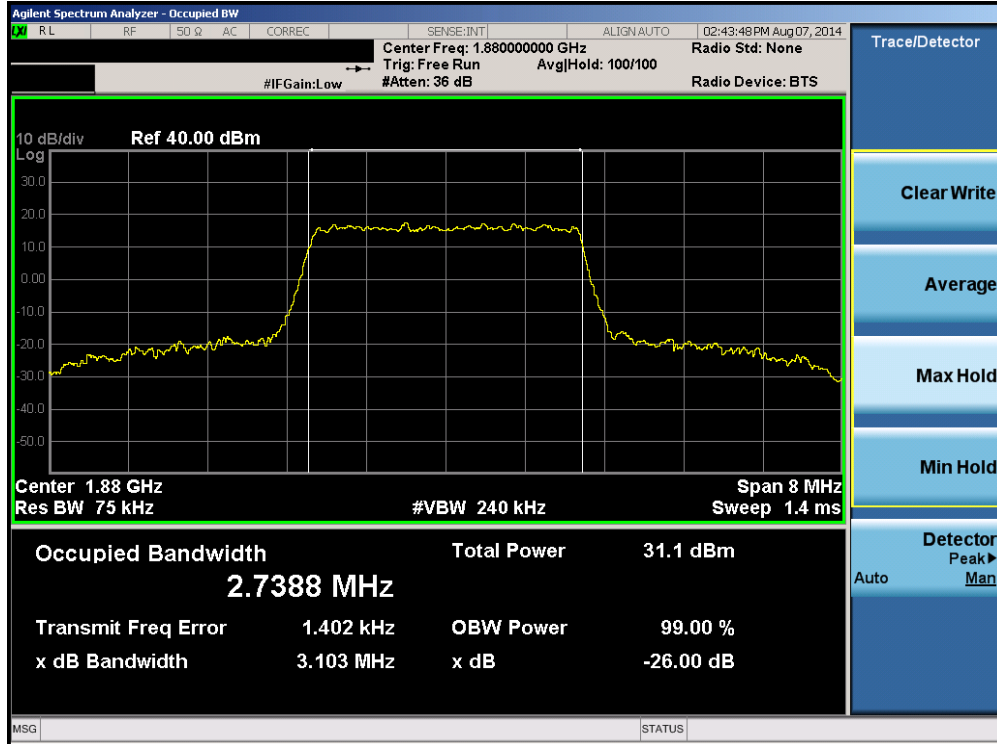


Plot 6-23. Occupied Bandwidth Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

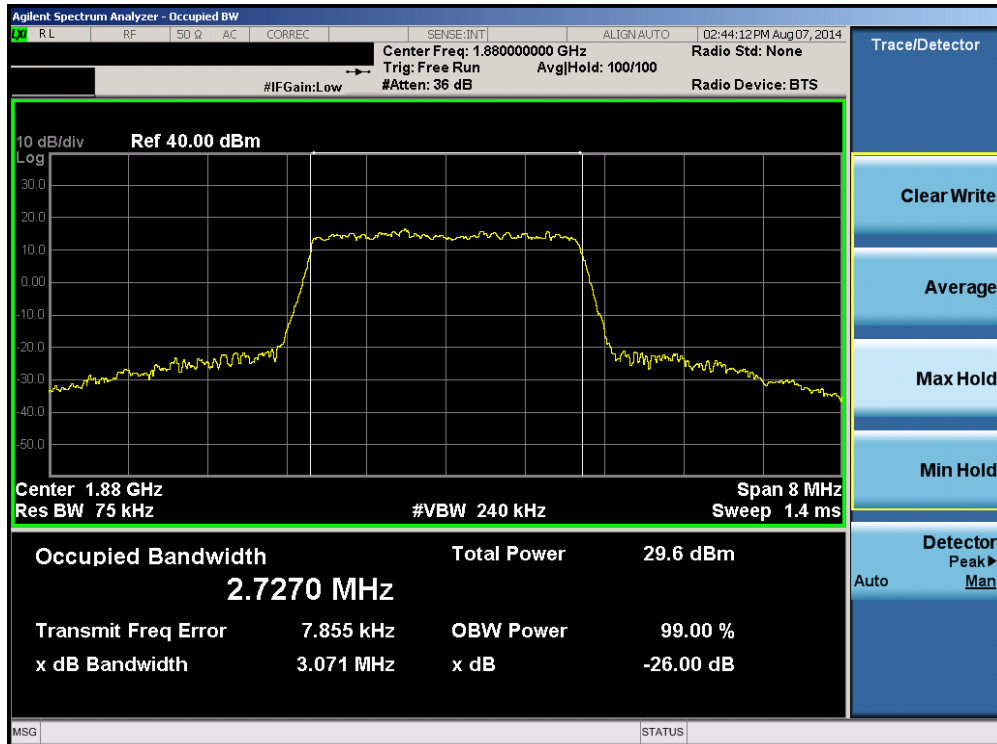


Plot 6-24. Occupied Bandwidth Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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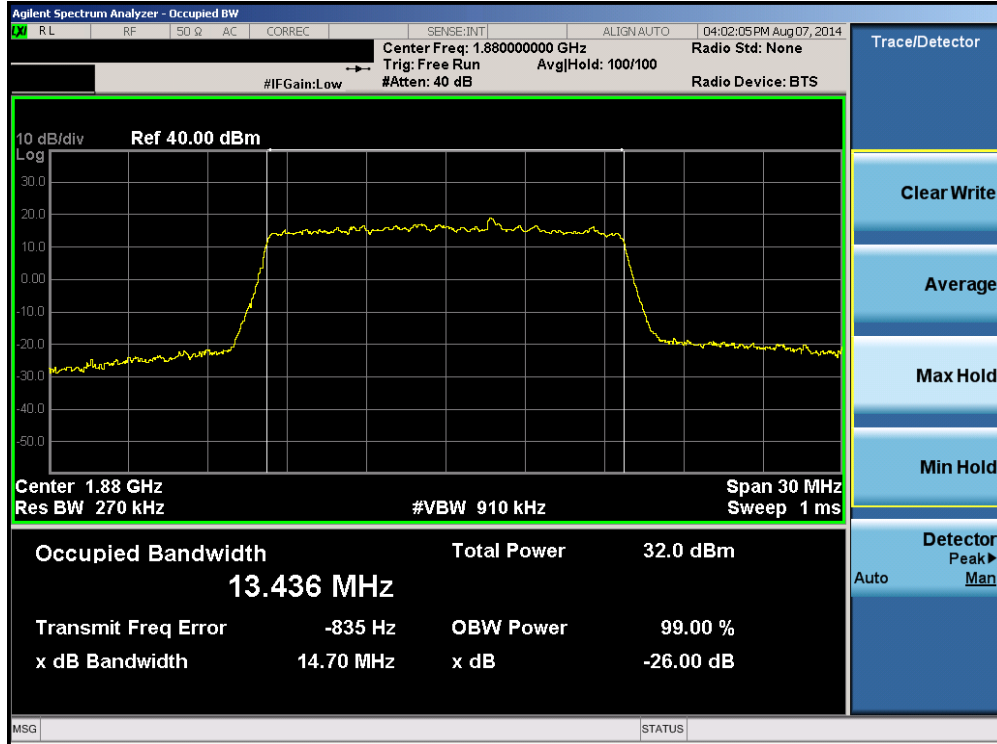


Plot 6-25. Occupied Bandwidth Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

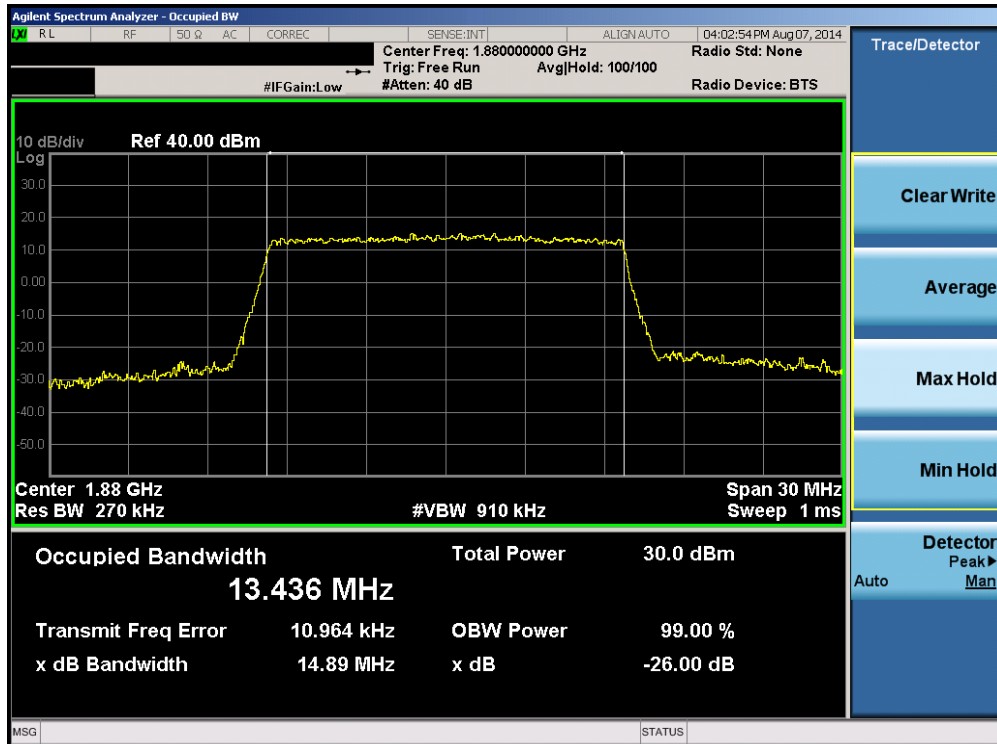


Plot 6-26. Occupied Bandwidth Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 26 of 78

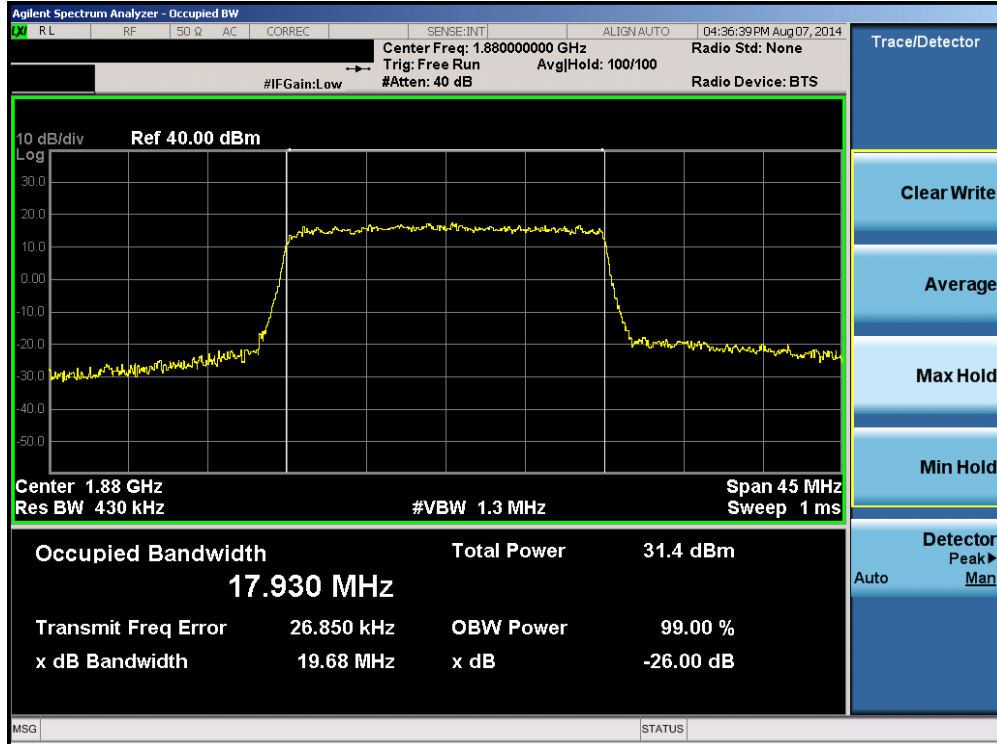


Plot 6-27. Occupied Bandwidth Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

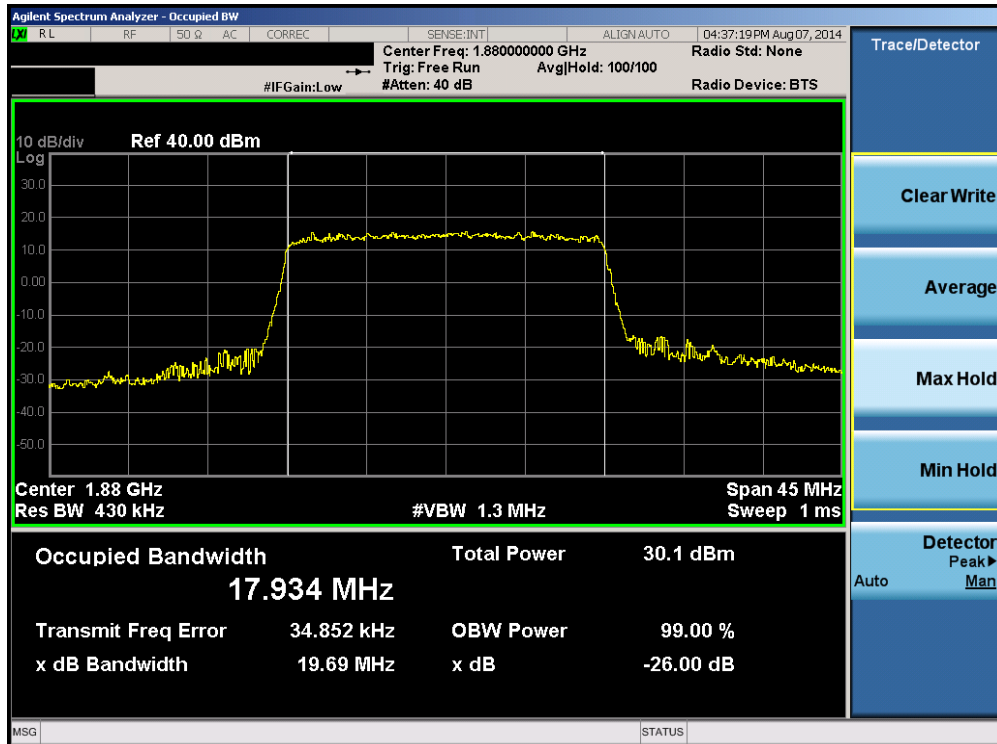


Plot 6-28. Occupied Bandwidth Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Plot 6-29. Occupied Bandwidth Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-30. Occupied Bandwidth Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 28 of 78

6.4 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051, §22.917(a), §24.238(a), §27.53(h)

Test Overview

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 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 v02r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = max hold
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

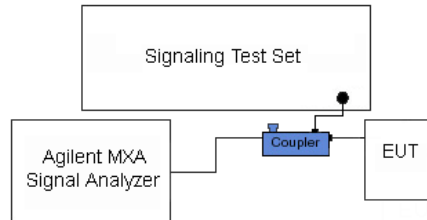


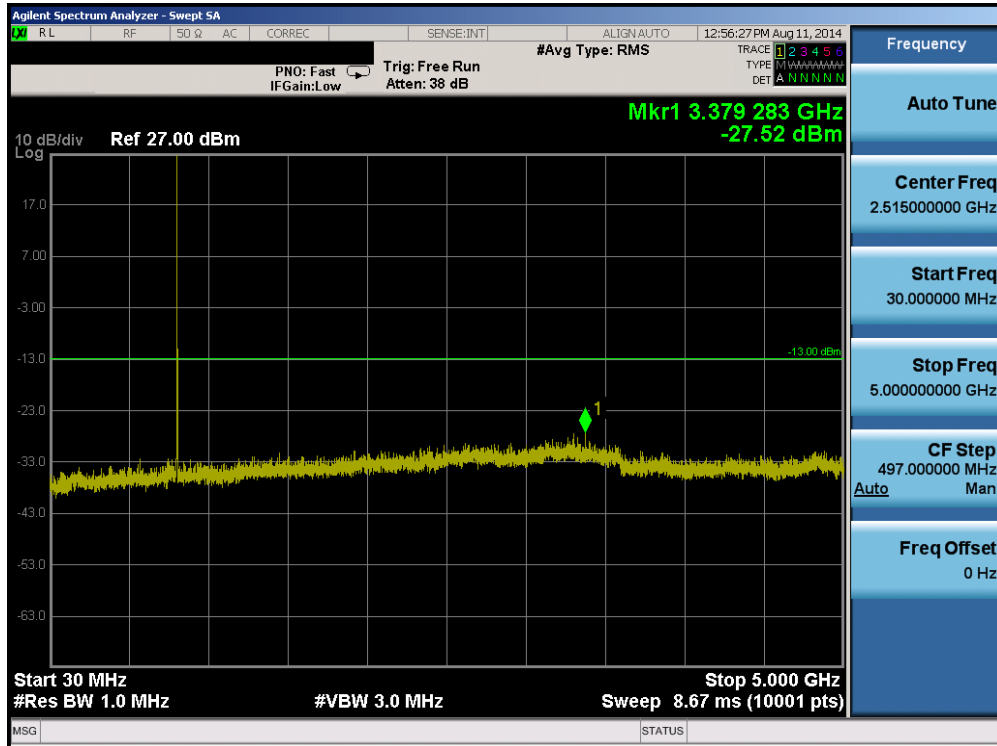


Figure 6-3. Test Instrument & Measurement Setup

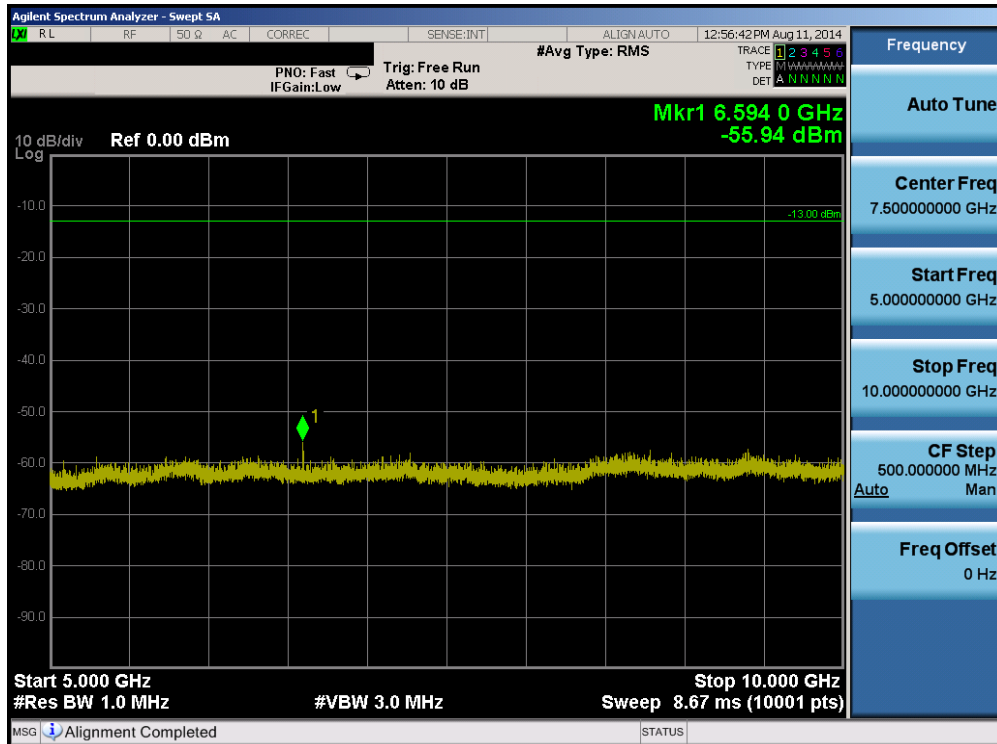
Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module	Page 29 of 78	

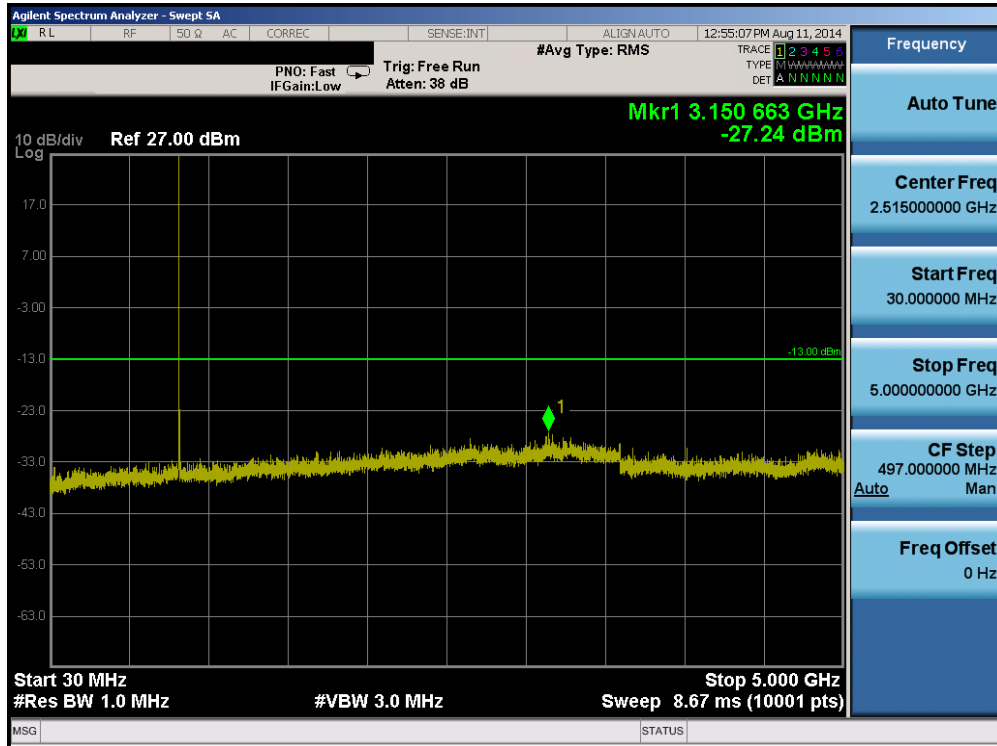


Plot 6-31. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – Low Channel)

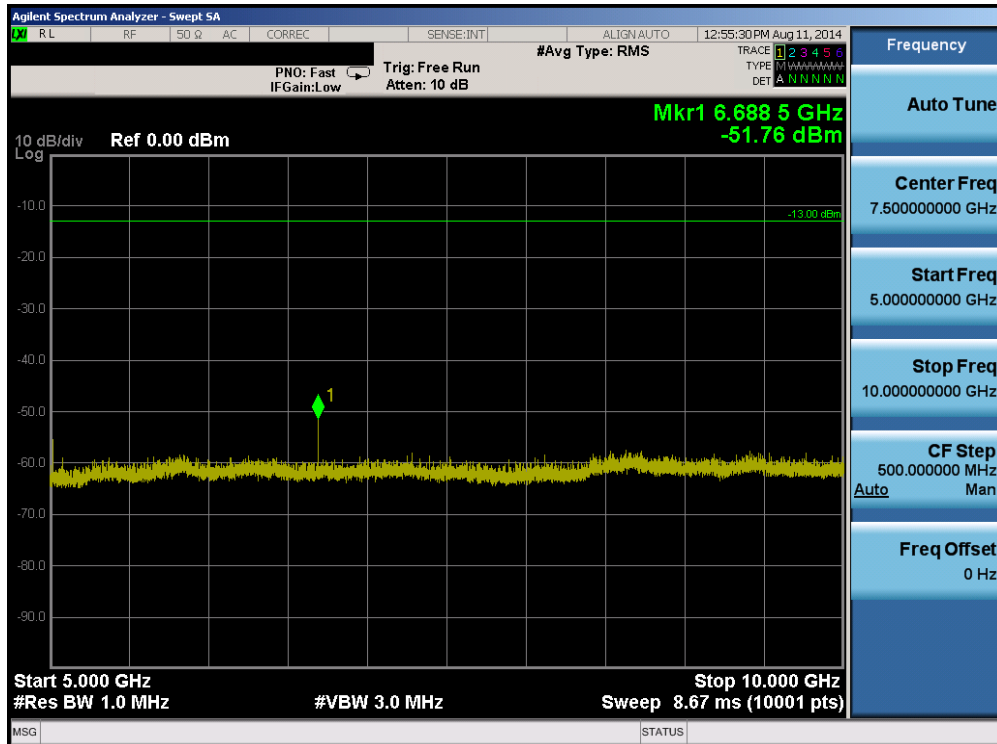


Plot 6-32. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – Low Channel)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 30 of 78

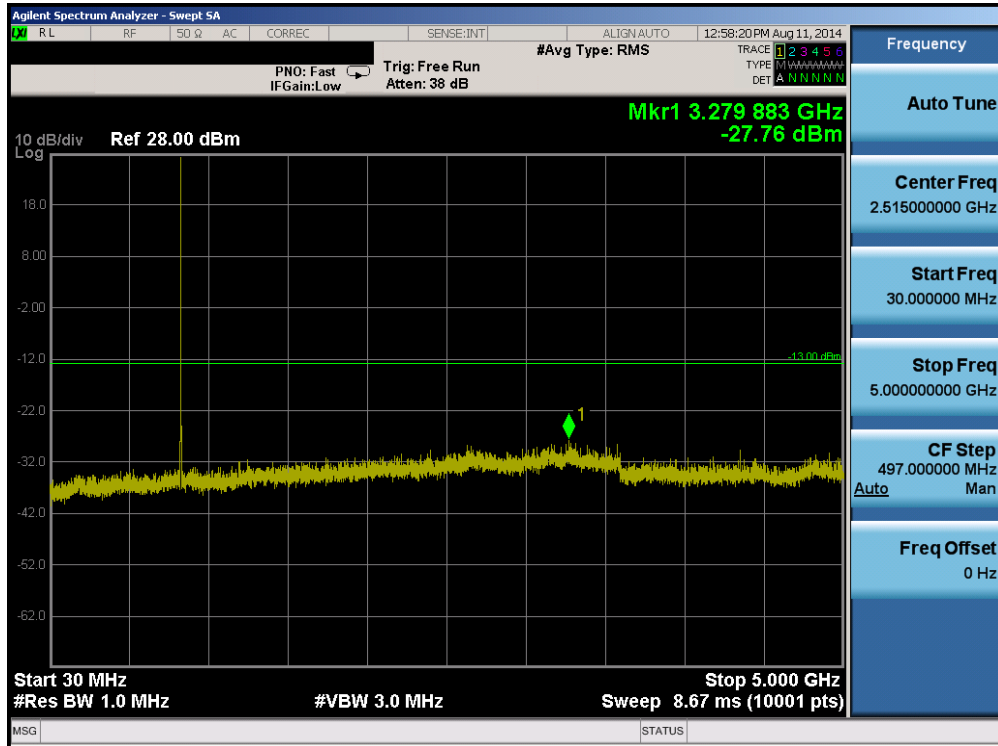


Plot 6-33. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – Mid Channel)

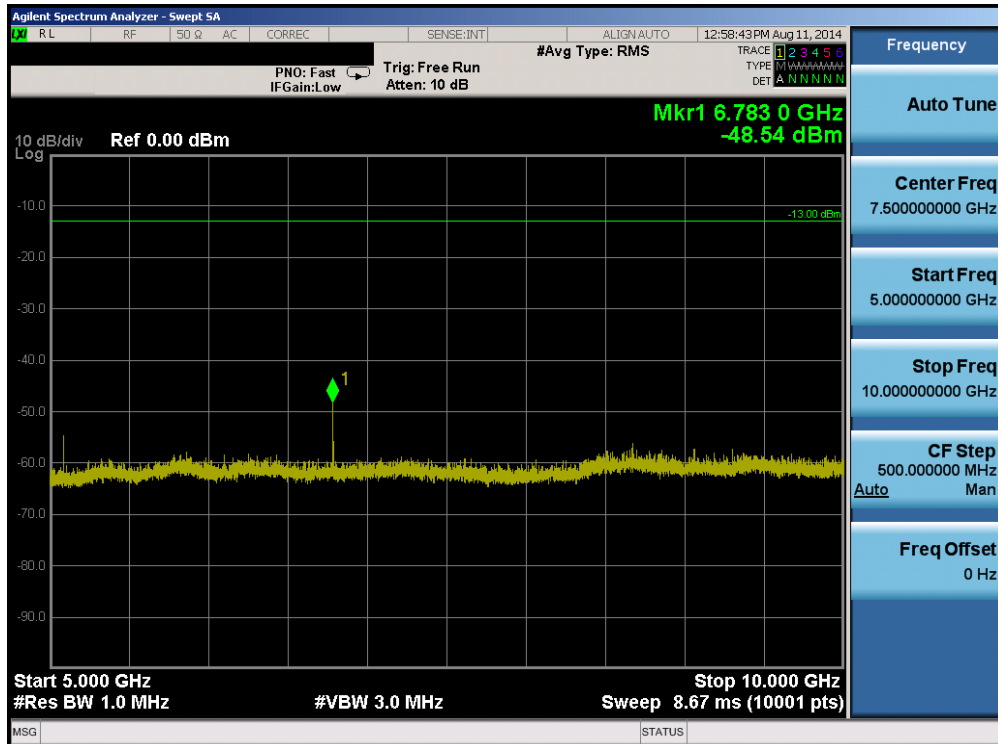


Plot 6-34. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – Mid Channel)



FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 31 of 78

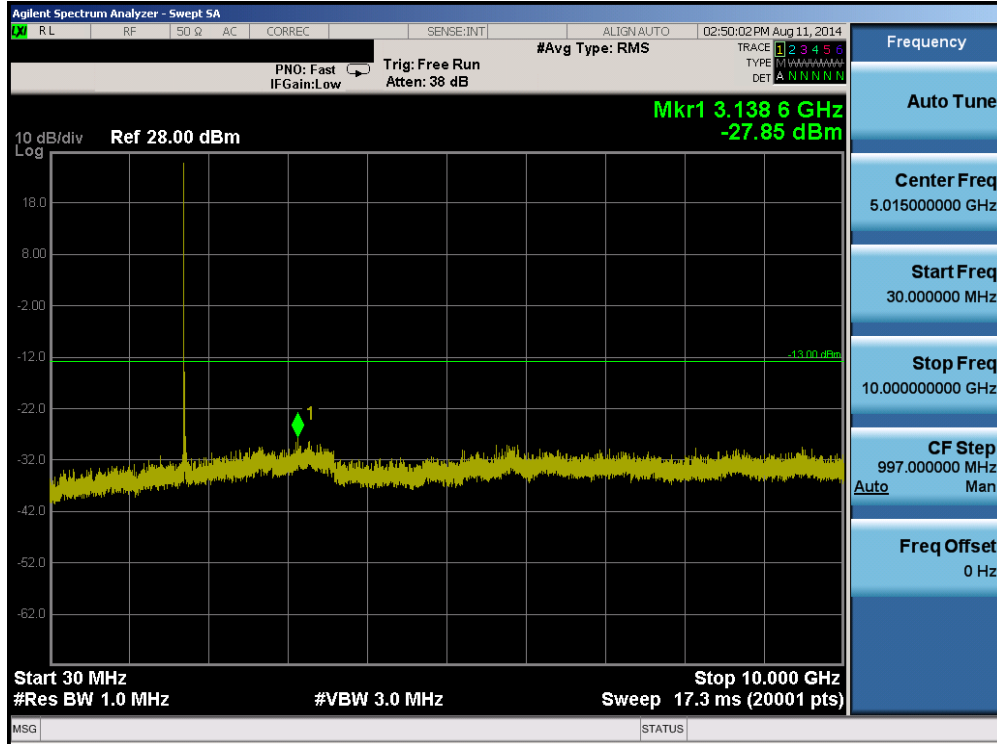


Plot 6-35. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – High Channel)

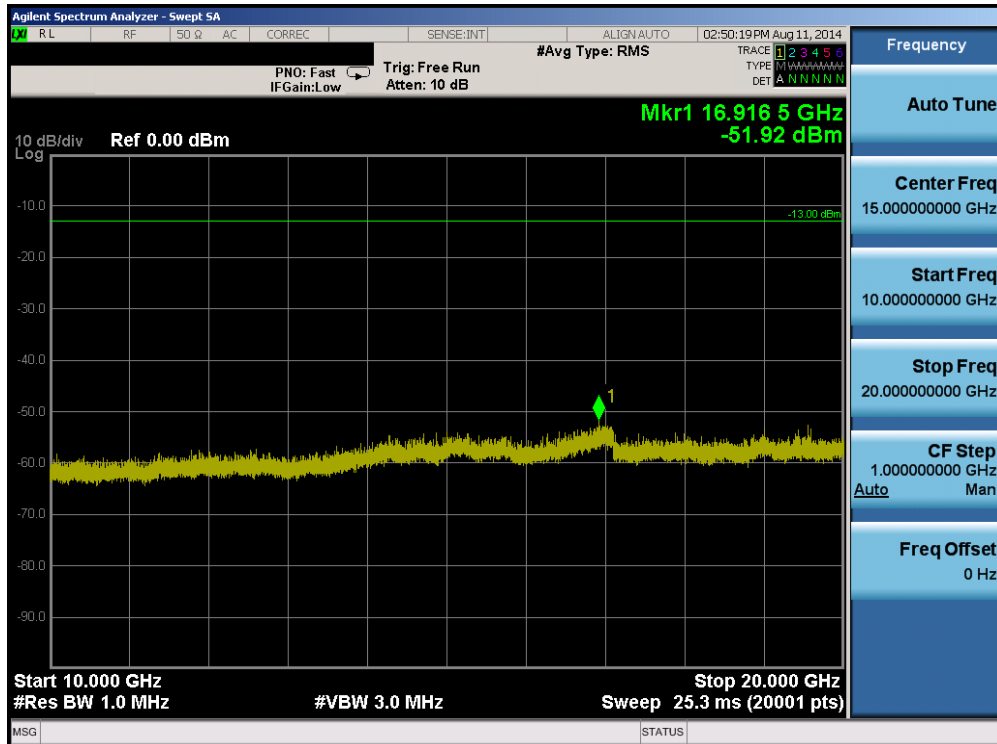


Plot 6-36. Conducted Spurious Plot (Band 5 – 1.4MHz QPSK – RB Size 1, RB Offset 5 – High Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 32 of 78

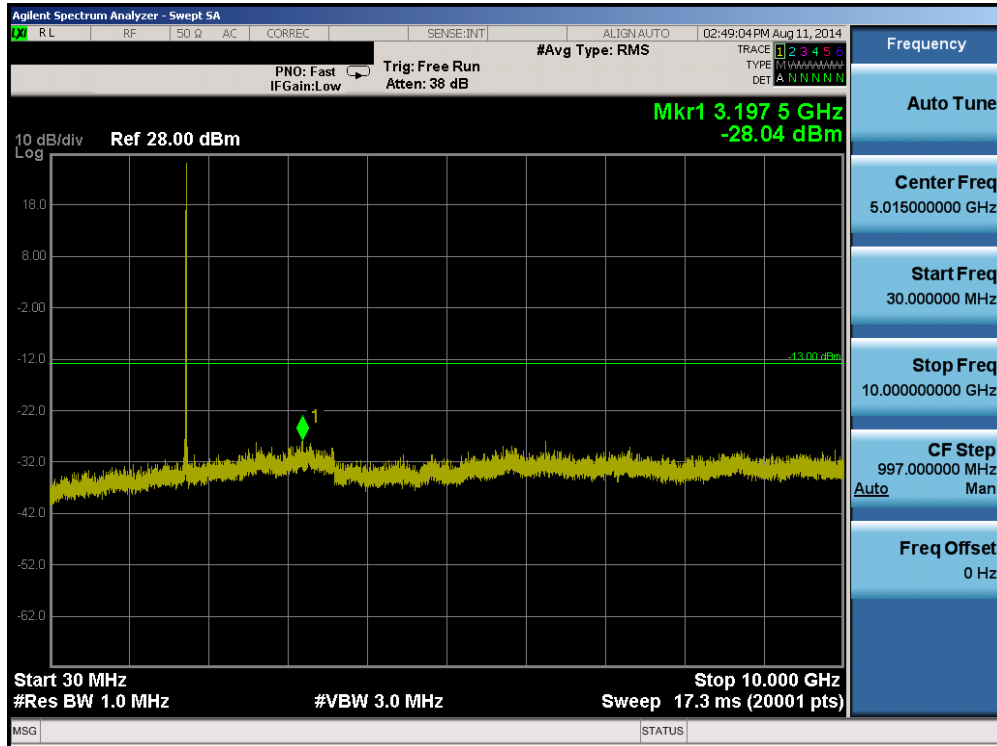


Plot 6-37. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Low Channel)

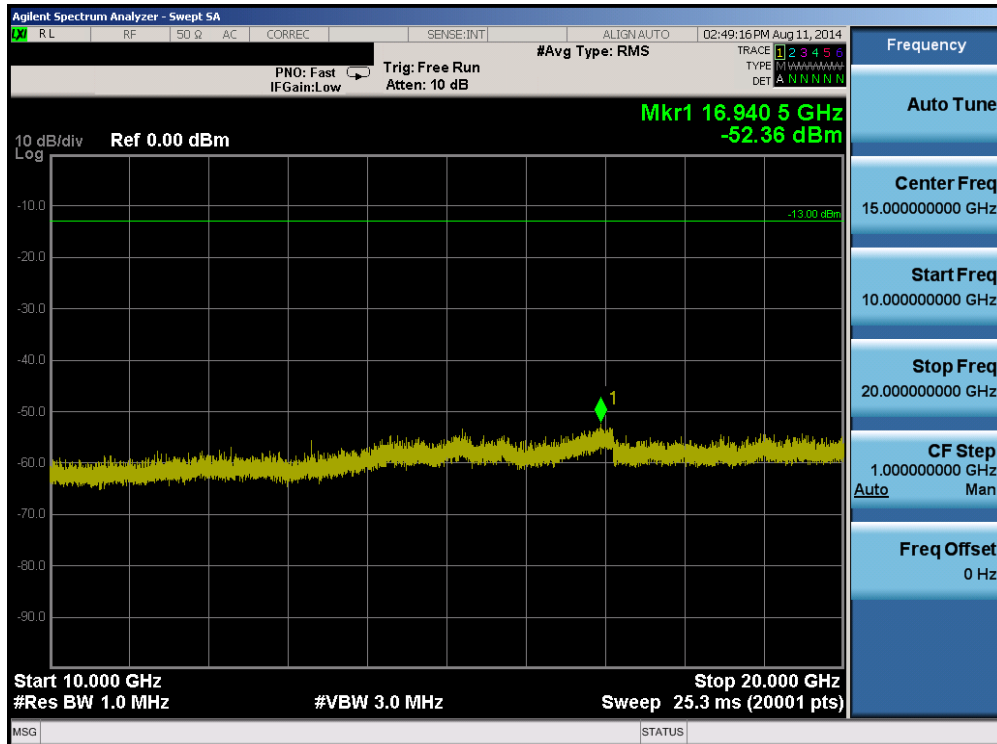


Plot 6-38. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Low Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 33 of 78

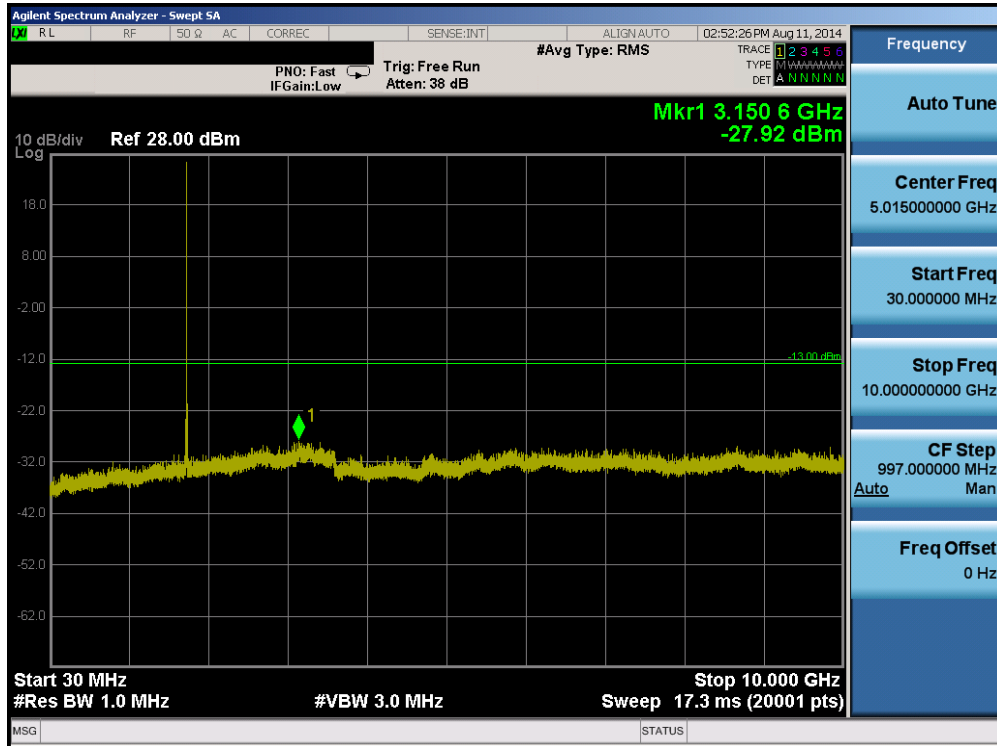


Plot 6-39. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Mid Channel)

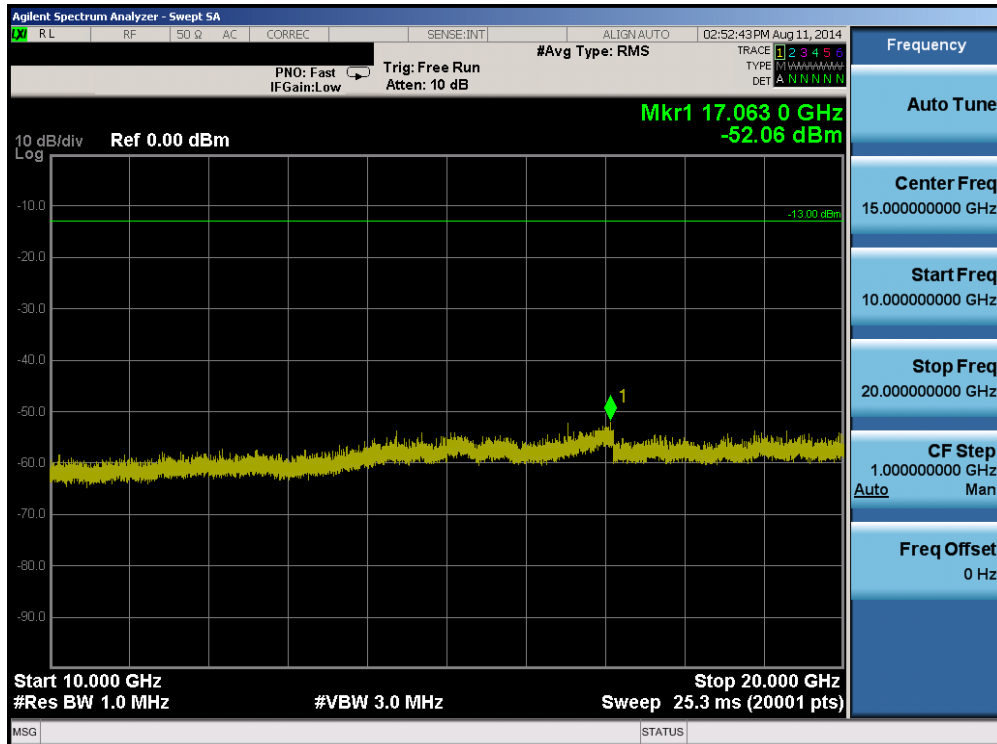


Plot 6-40. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Mid Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 34 of 78

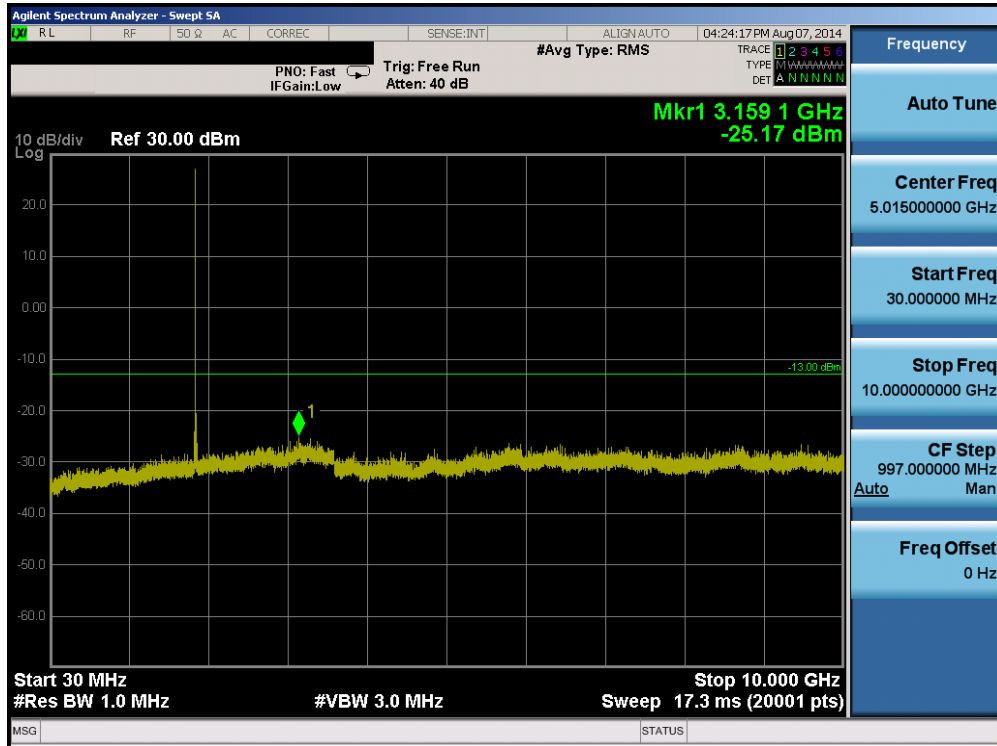


Plot 6-41. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – High Channel)

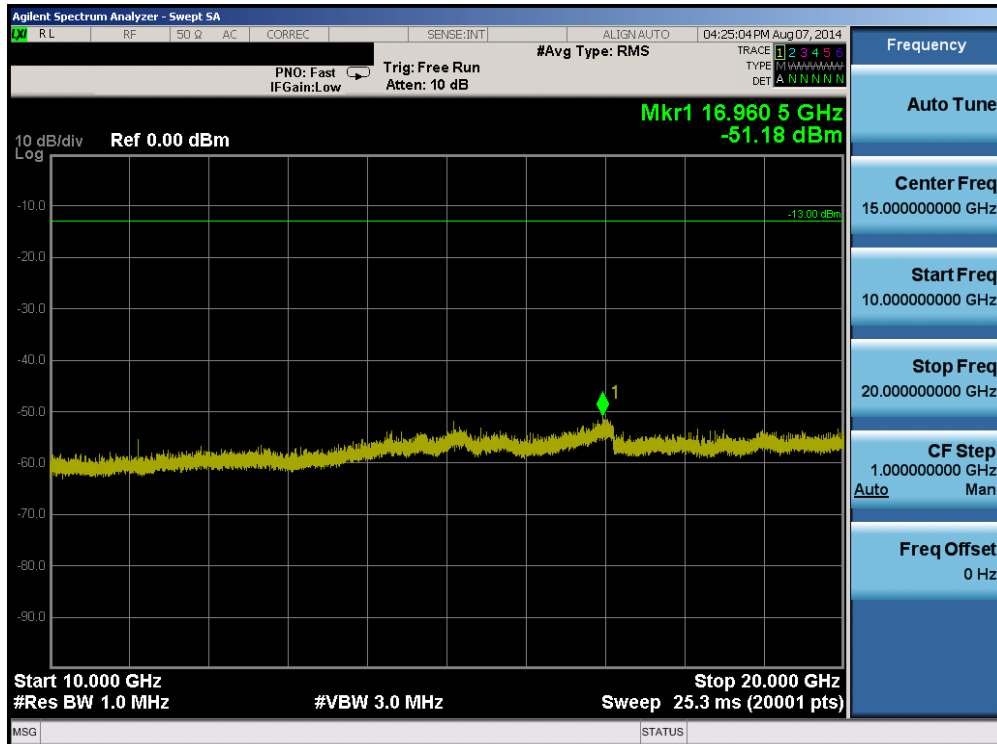


Plot 6-42. Conducted Spurious Plot (Band 4 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – High Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 35 of 78

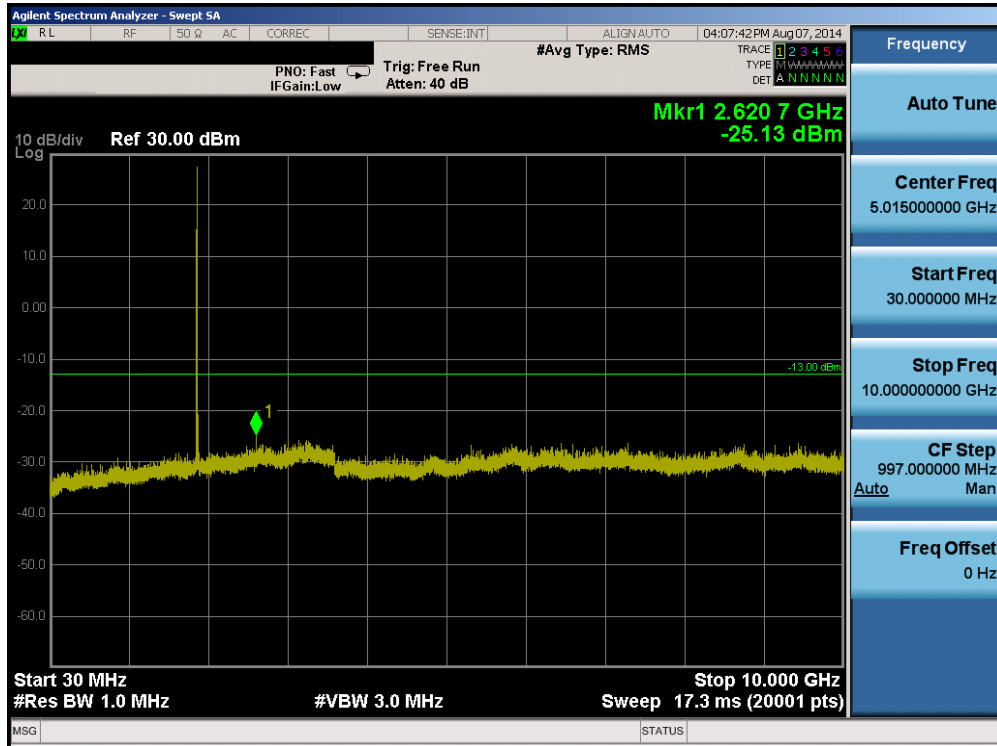


Plot 6-43. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Low Channel)

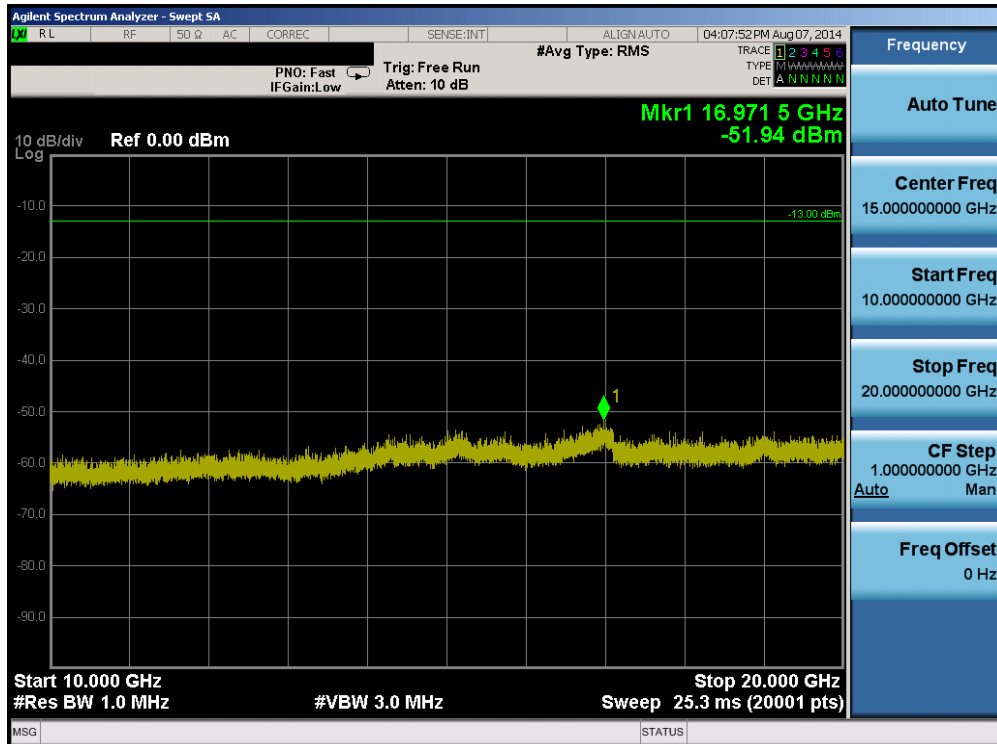


Plot 6-44. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Low Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 36 of 78

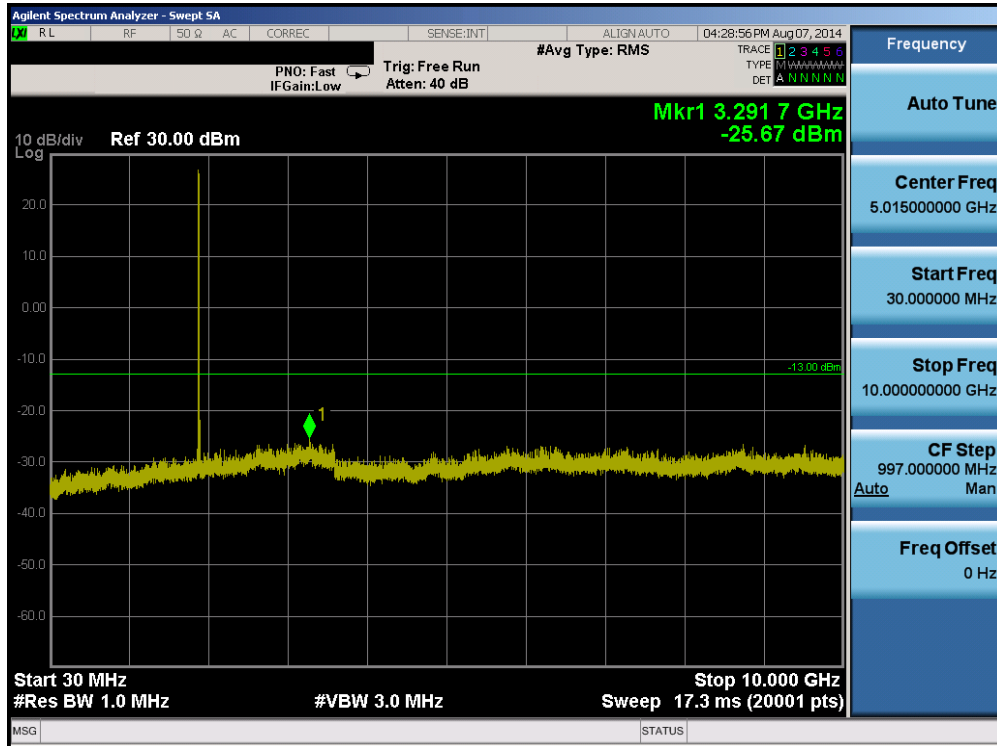


Plot 6-45. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Mid Channel)

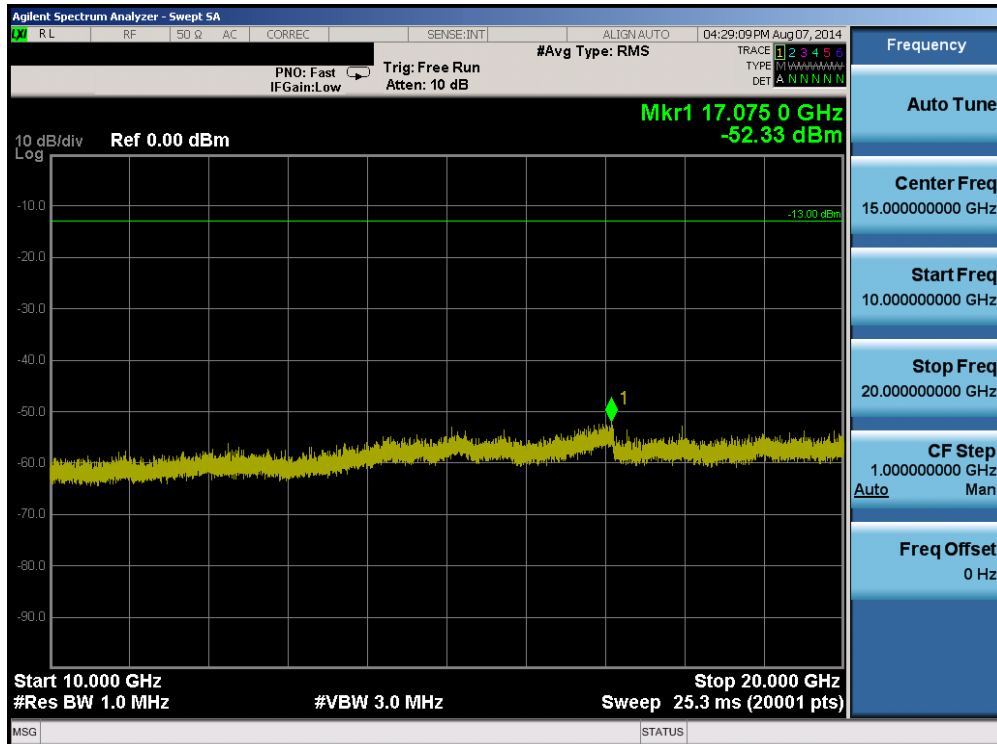


Plot 6-46. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – Mid Channel)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 37 of 78



Plot 6-47. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – High Channel)



Plot 6-48. Conducted Spurious Plot (Band 2 – 15.0MHz QPSK – RB Size 1, RB Offset 74 – High Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 38 of 78

6.5 Band Edge Emissions at Antenna Terminal

§2.1051, §22.917(a), §24.238(a), §27.53(h)

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is $43 + \log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

KDB 971168 v02r01 – Section 6.0

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW \geq 1% of the emission bandwidth
4. VBW \geq 3 x RBW
5. Detector = RMS
6. Number of sweep points \geq 2 x Span/RBW
7. Trace mode = max hold
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

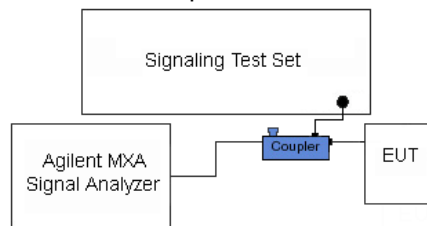


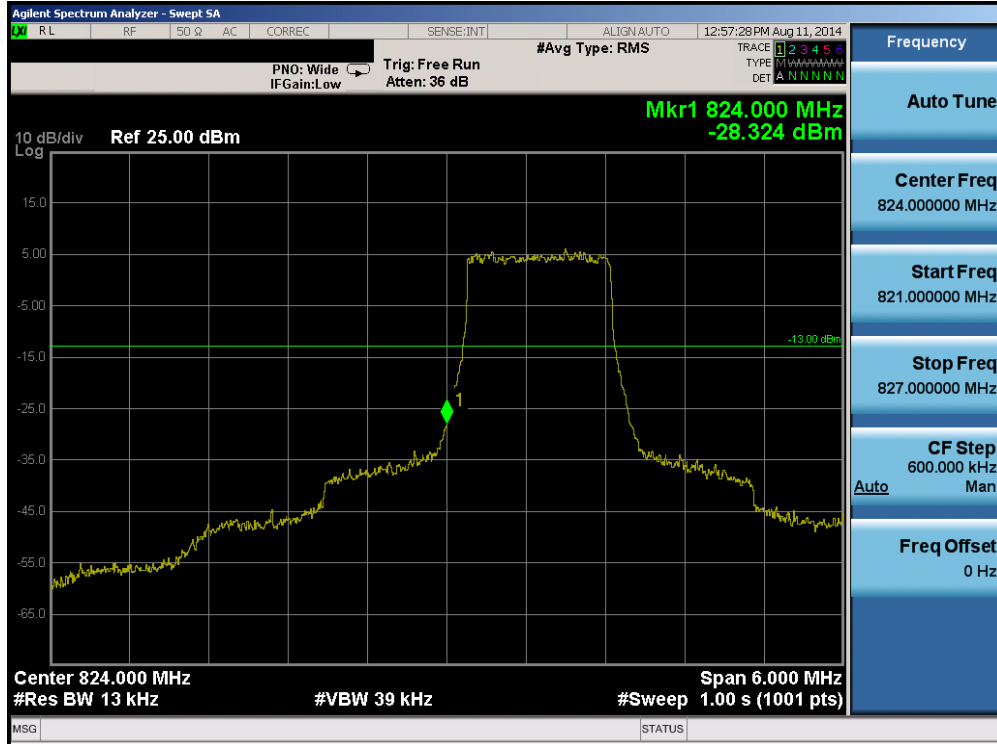


Figure 6-4. Test Instrument & Measurement Setup

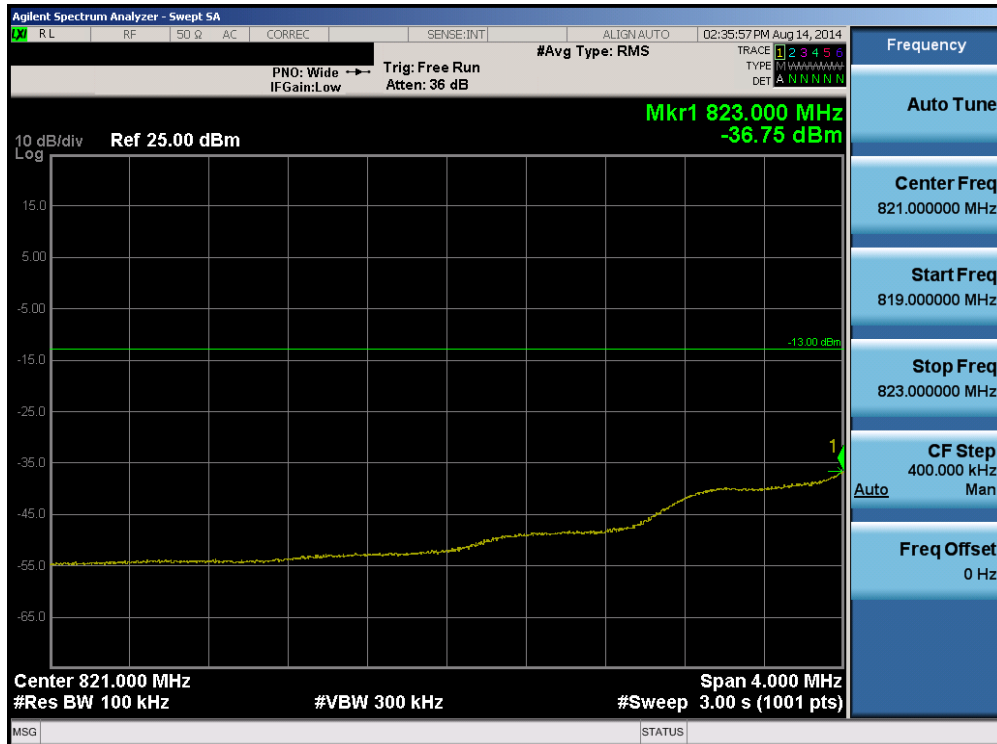
Test Notes

Per 22.917(b), 24.238(a), and 27.53(h) 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 to demonstrate compliance with the out-of-band emissions limit. 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.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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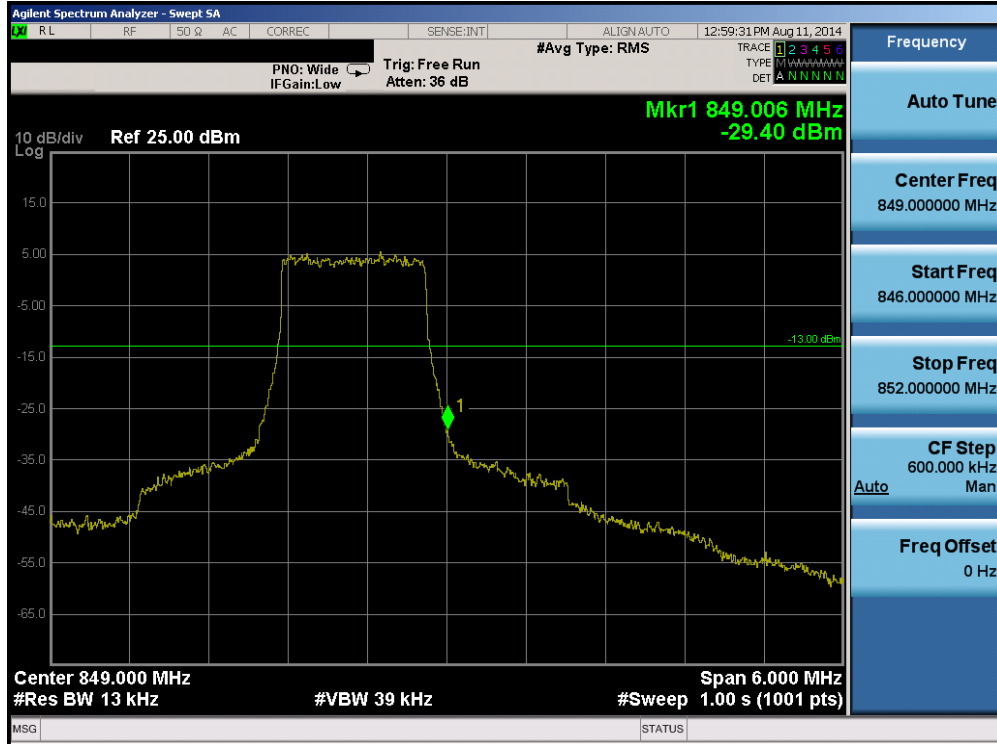


Plot 6-49. Lower Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

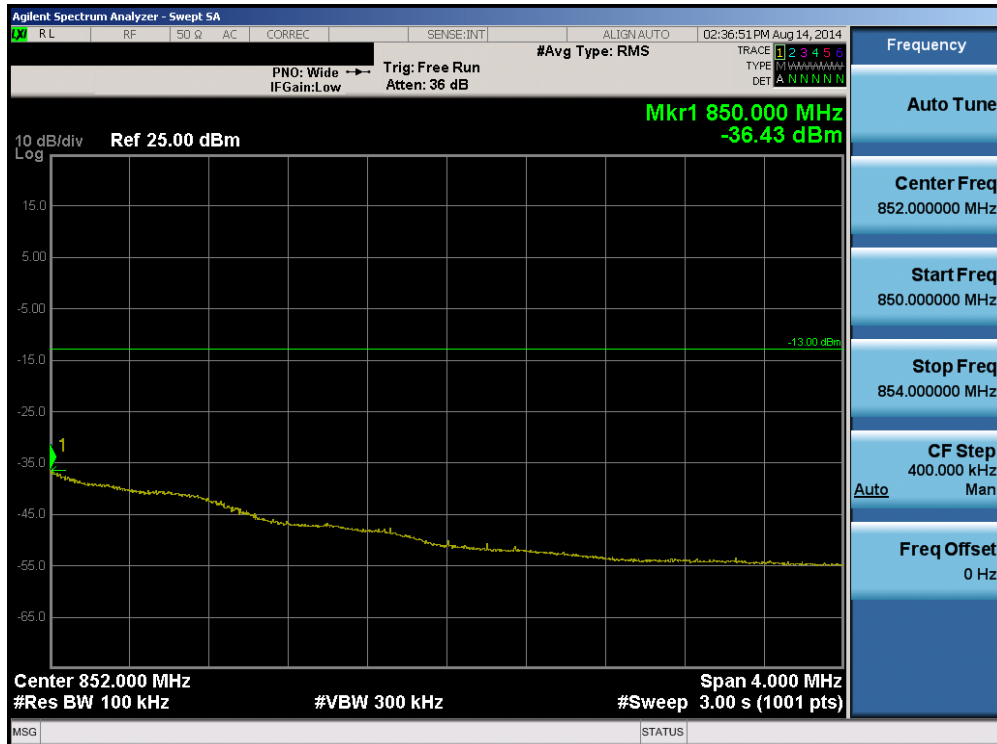


Plot 6-50. Lower Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 40 of 78

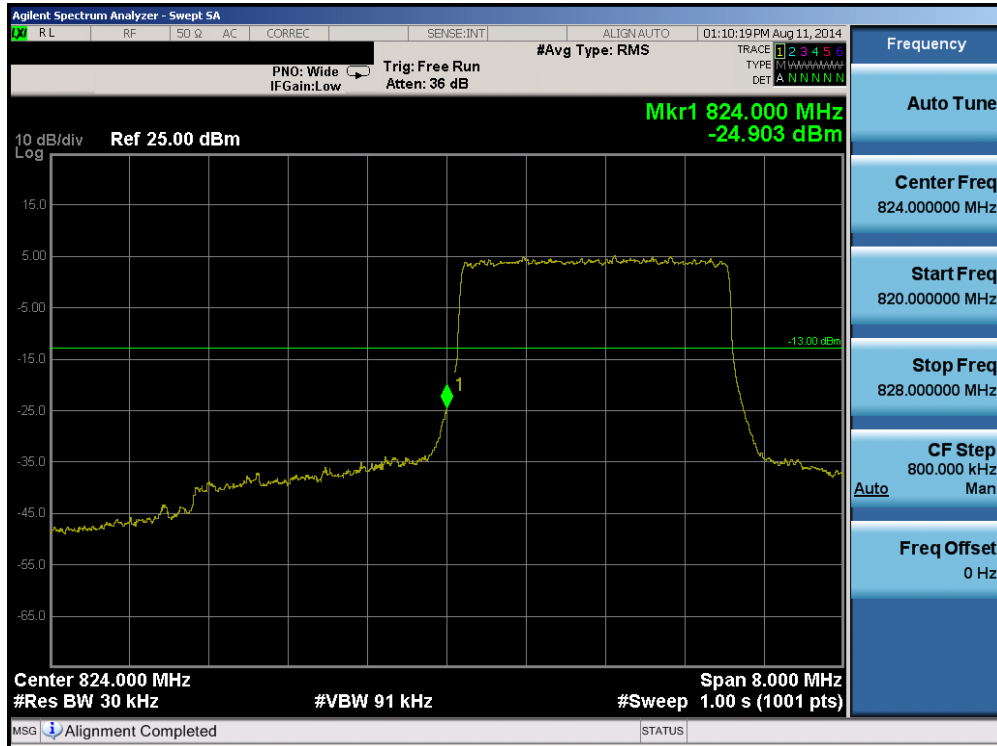


Plot 6-51. Upper Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)



Plot 6-52. Upper Extended Band Edge Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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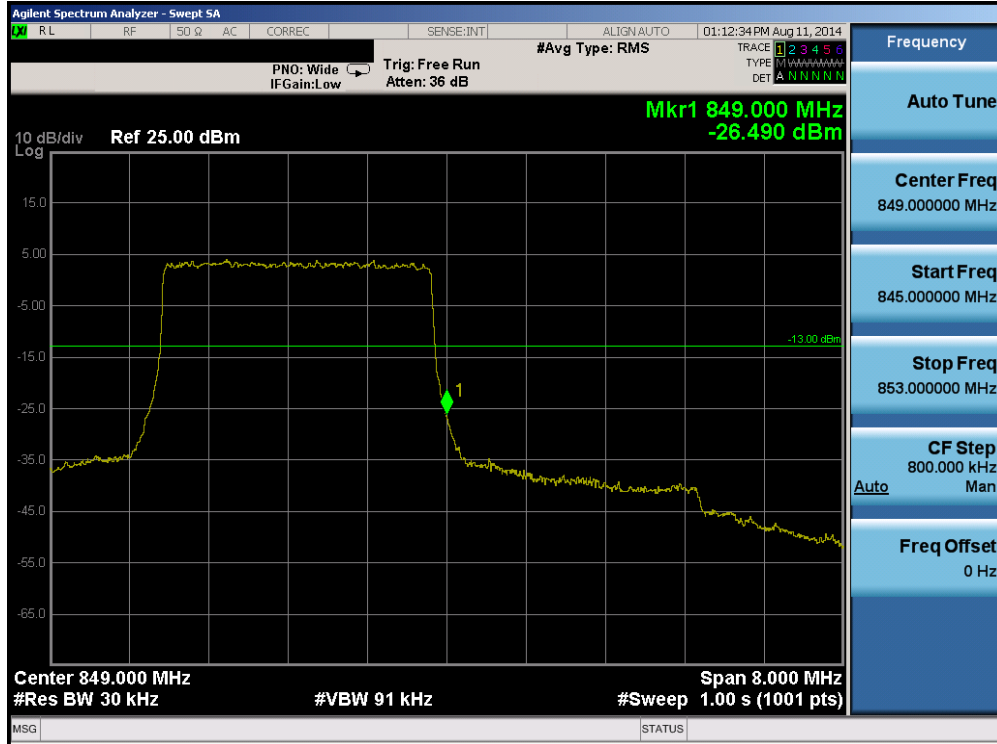


Plot 6-53. Lower Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

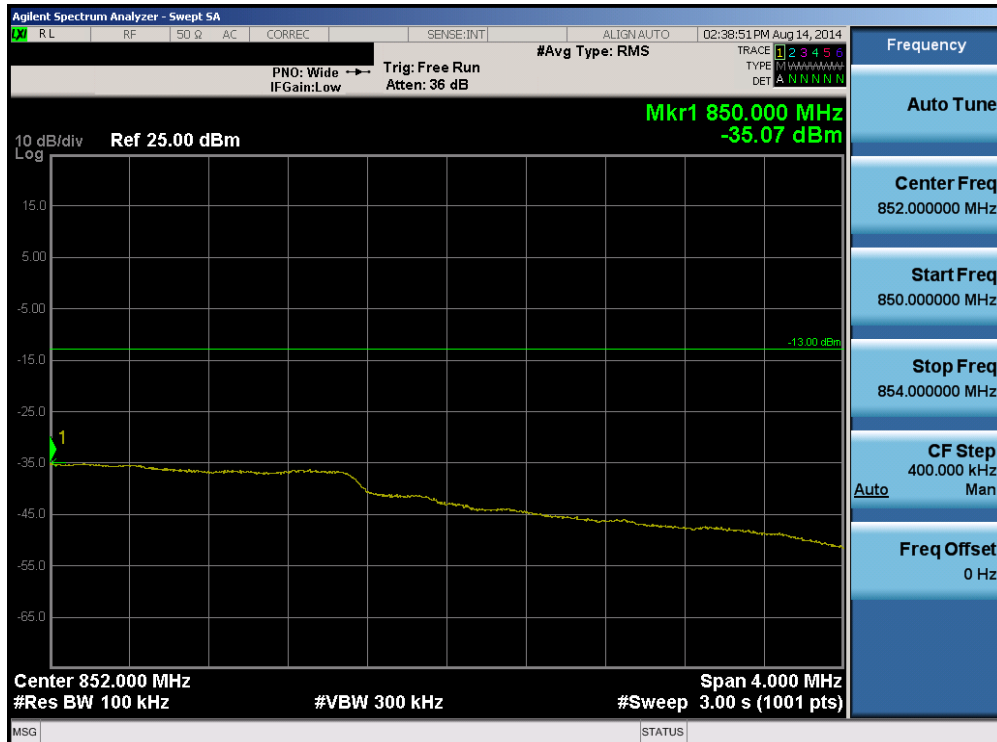


Plot 6-54. Lower Extended Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 42 of 78

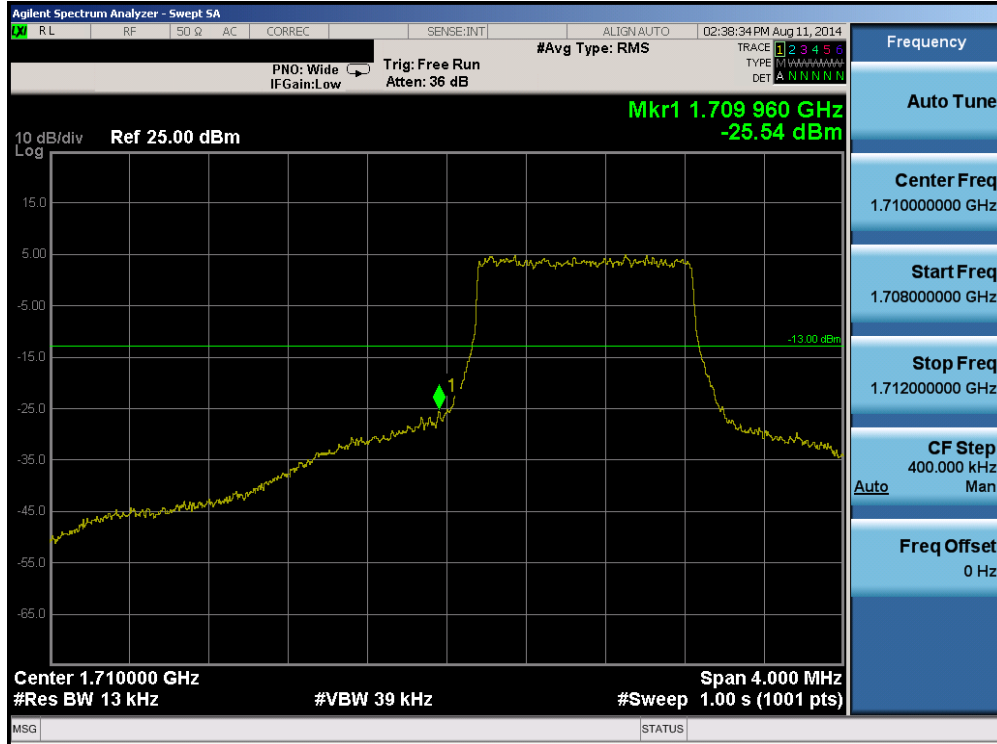


Plot 6-55. Upper Band Edge Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

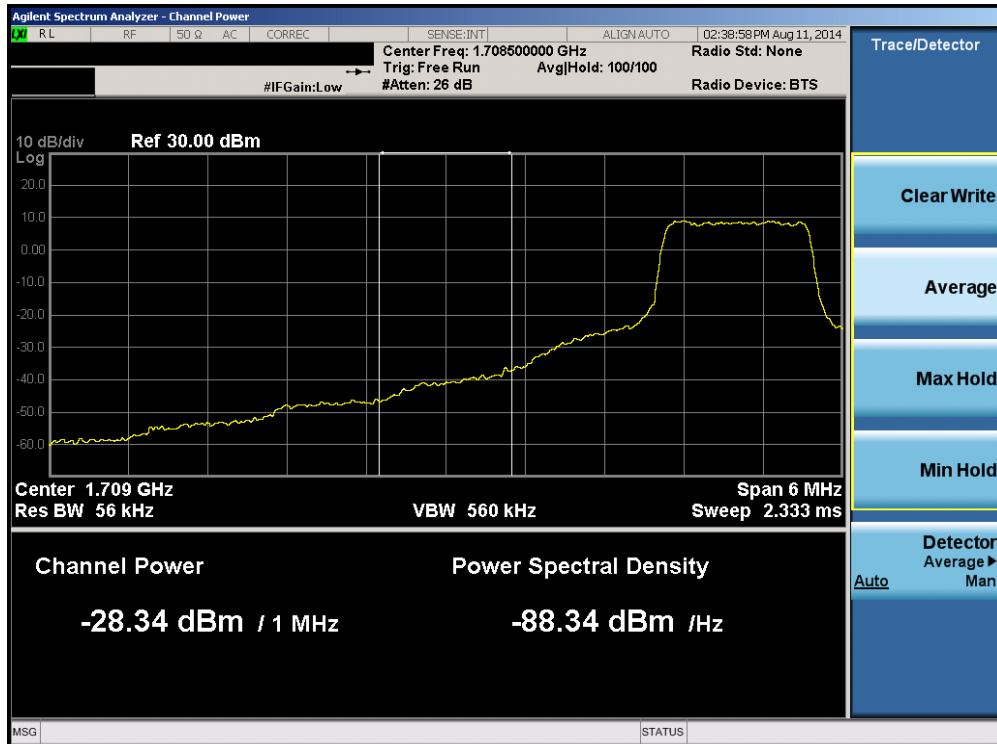


Plot 6-56. Upper Extended Band Edge Plot (Band 5 – Band 5 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 43 of 78

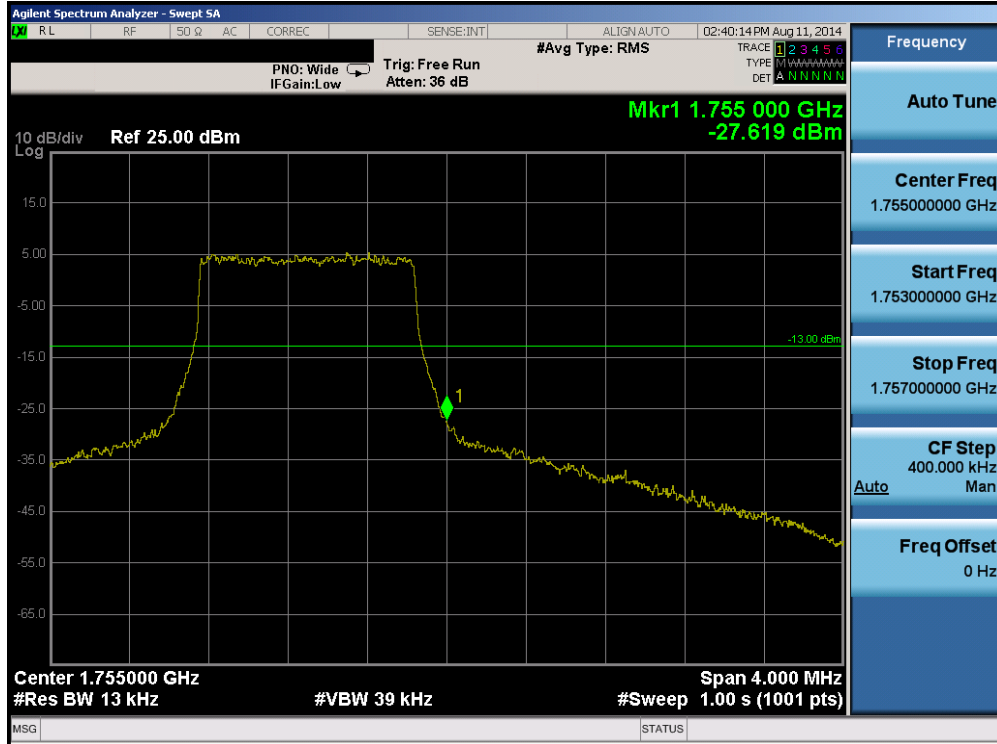


Plot 6-57. Lower Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

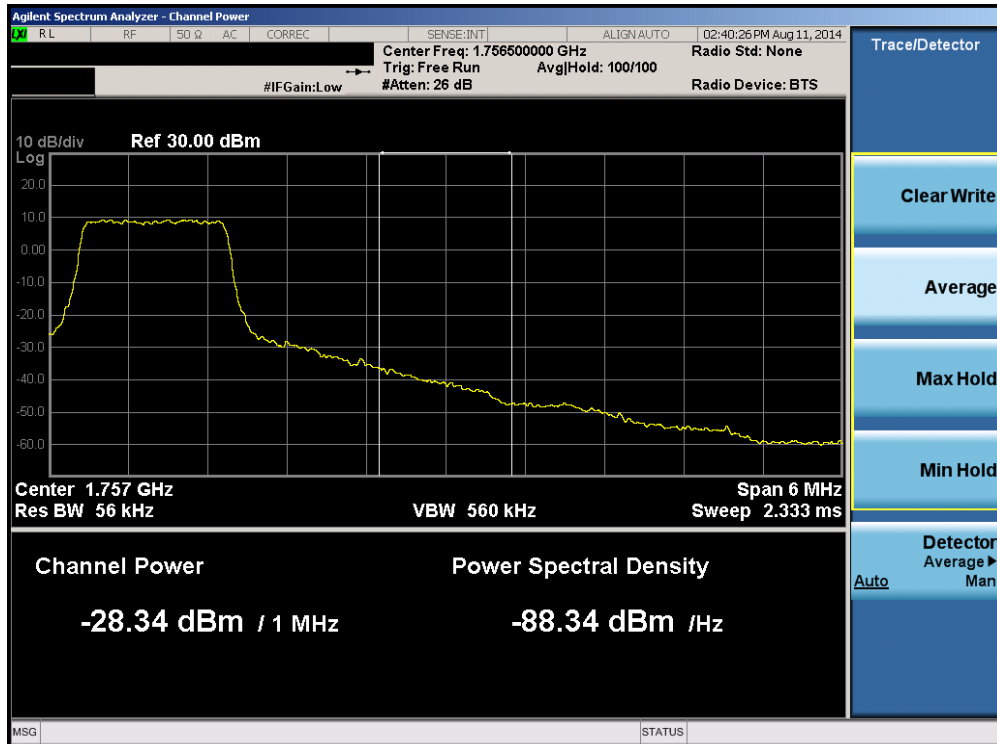


Plot 6-58. Lower Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 44 of 78

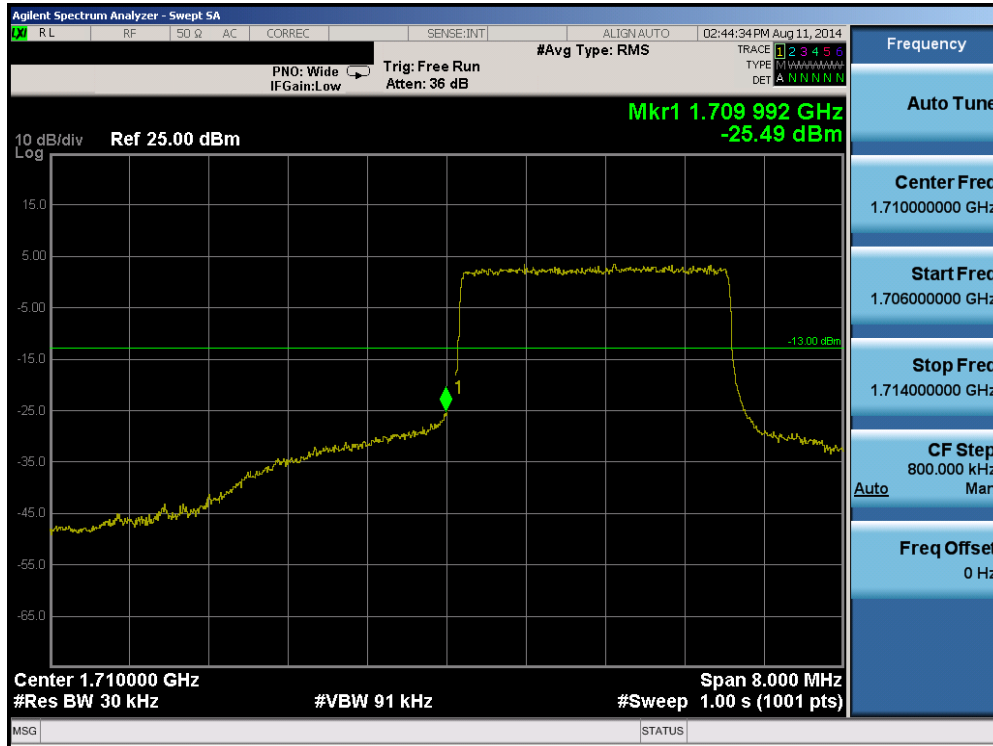


Plot 6-59. Upper Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

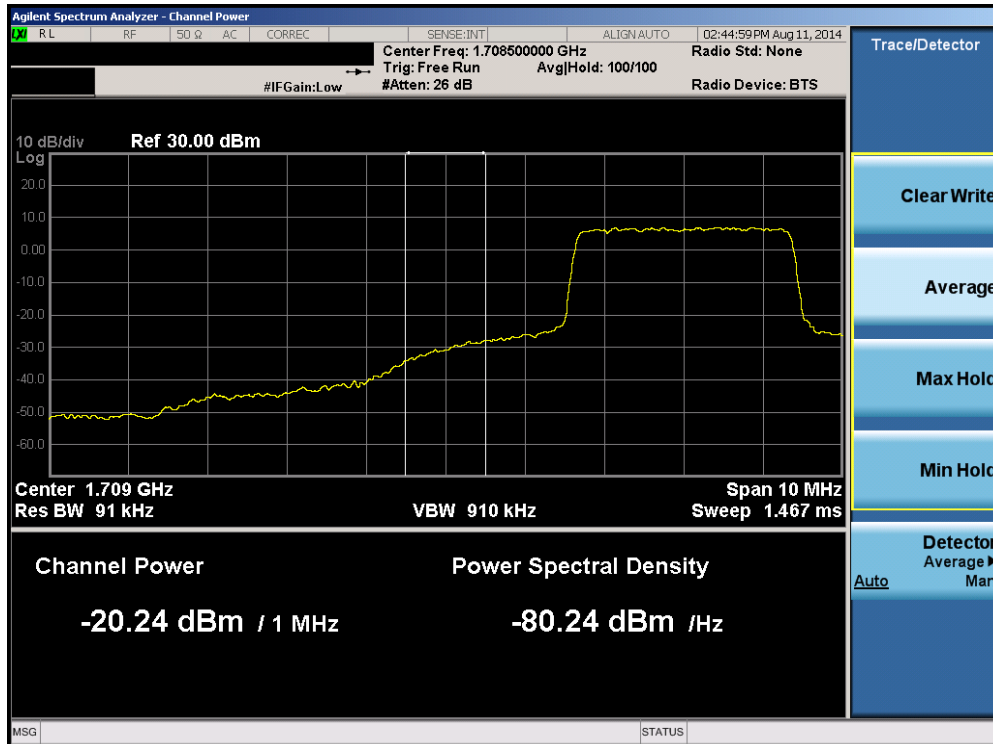


Plot 6-60. Upper Extended Band Edge Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 45 of 78

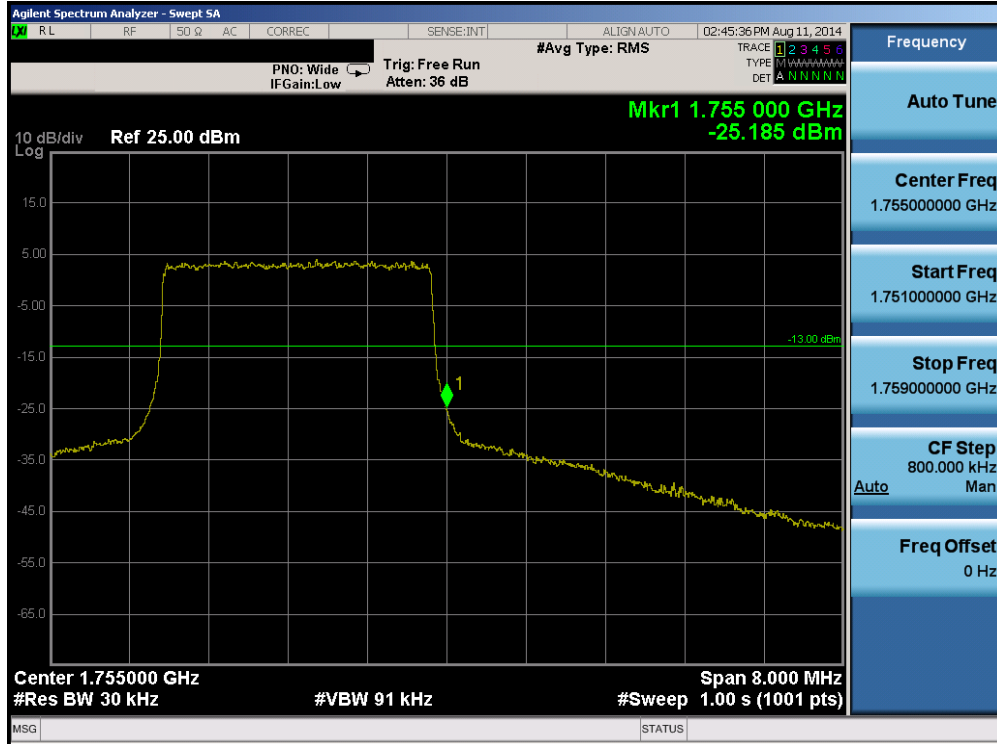


Plot 6-61. Lower Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

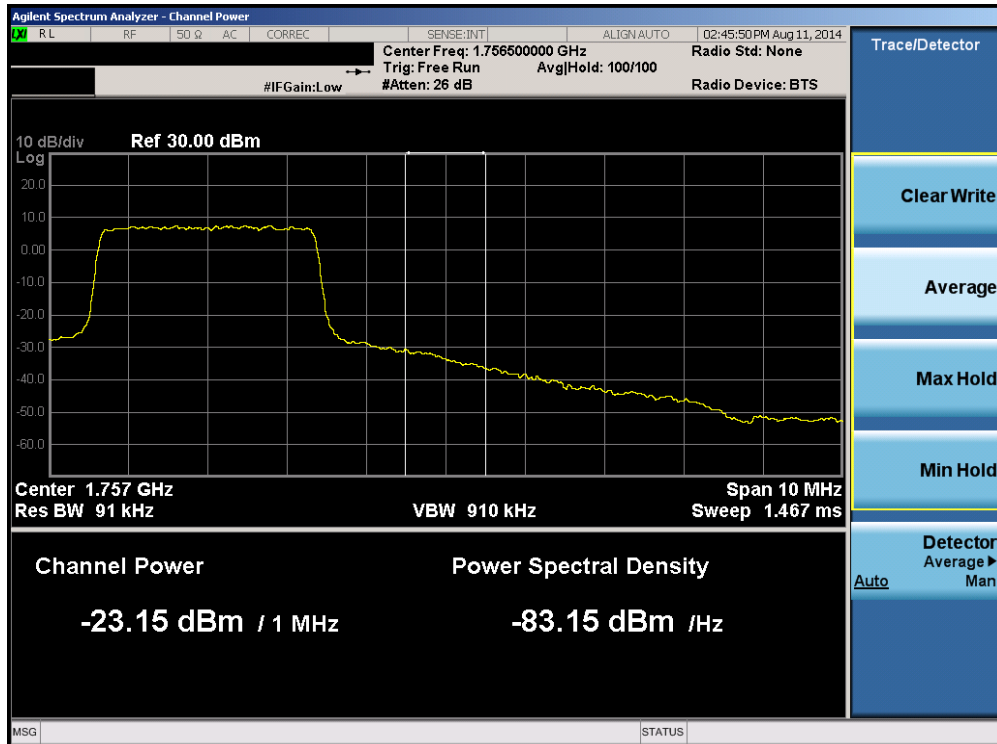


Plot 6-62. Lower Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 46 of 78

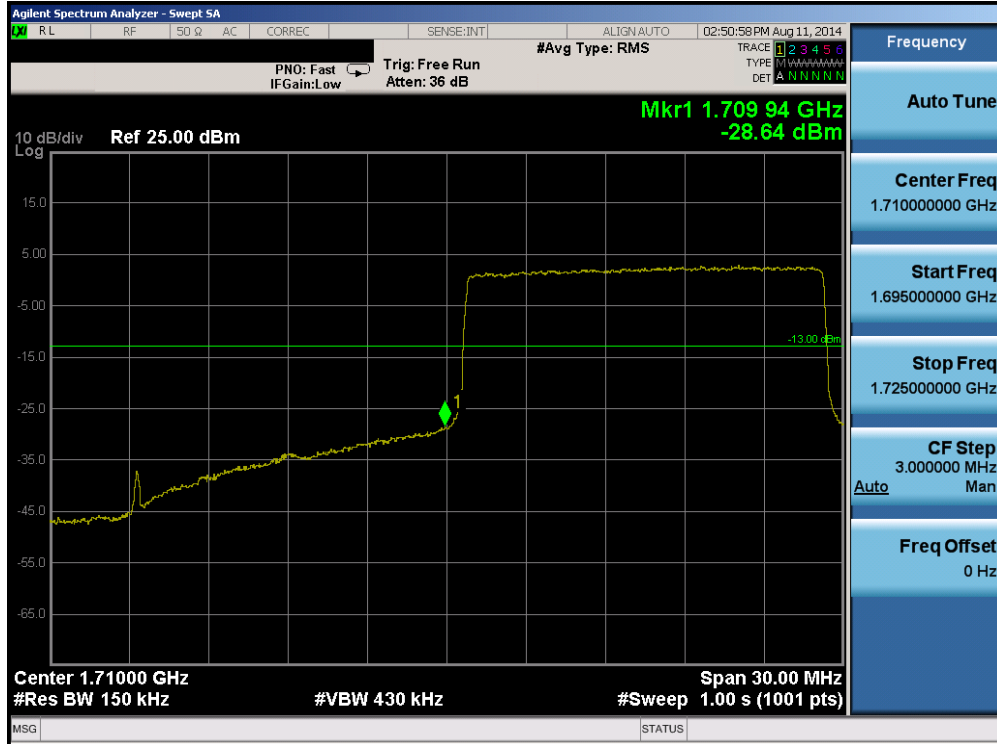


Plot 6-63. Upper Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

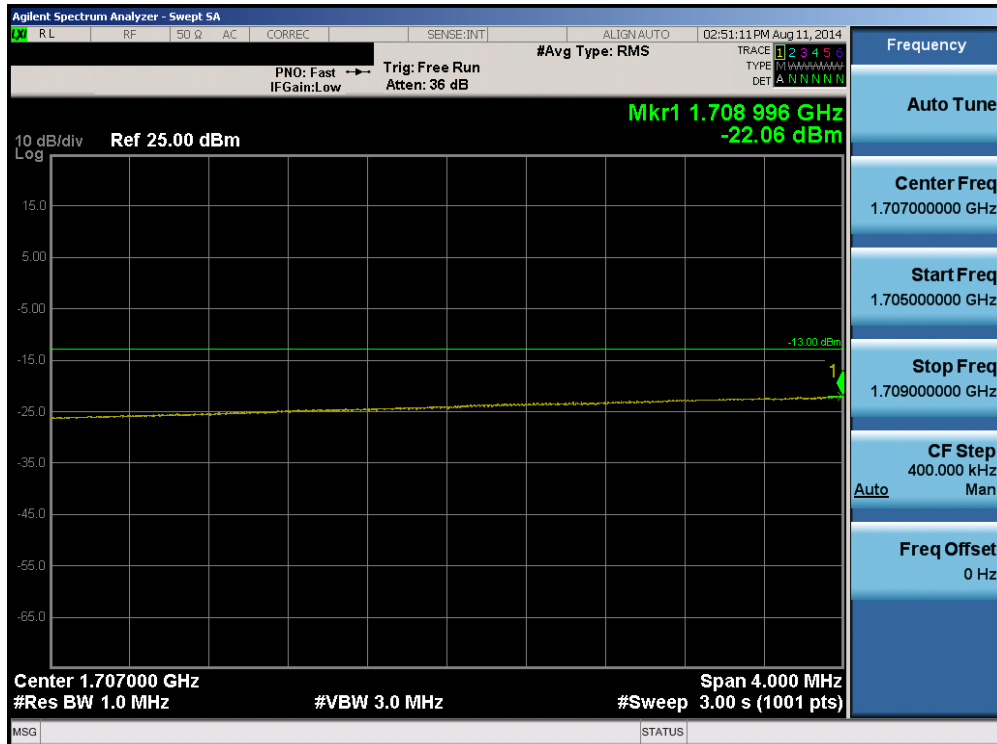


Plot 6-64. Upper Extended Band Edge Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
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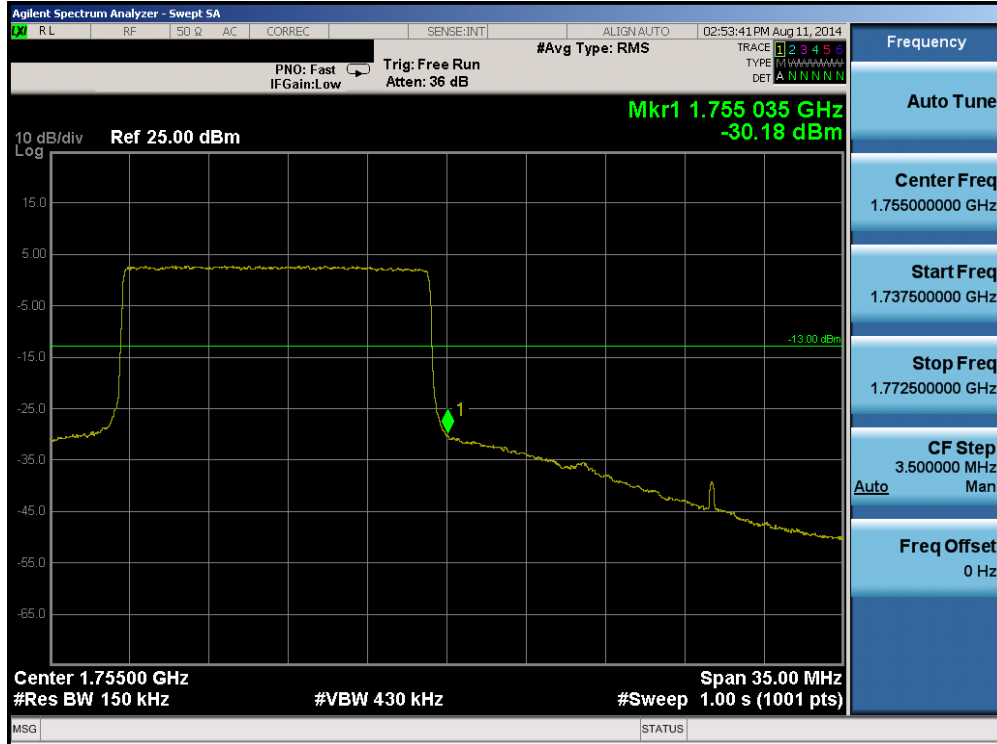


Plot 6-65. Lower Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

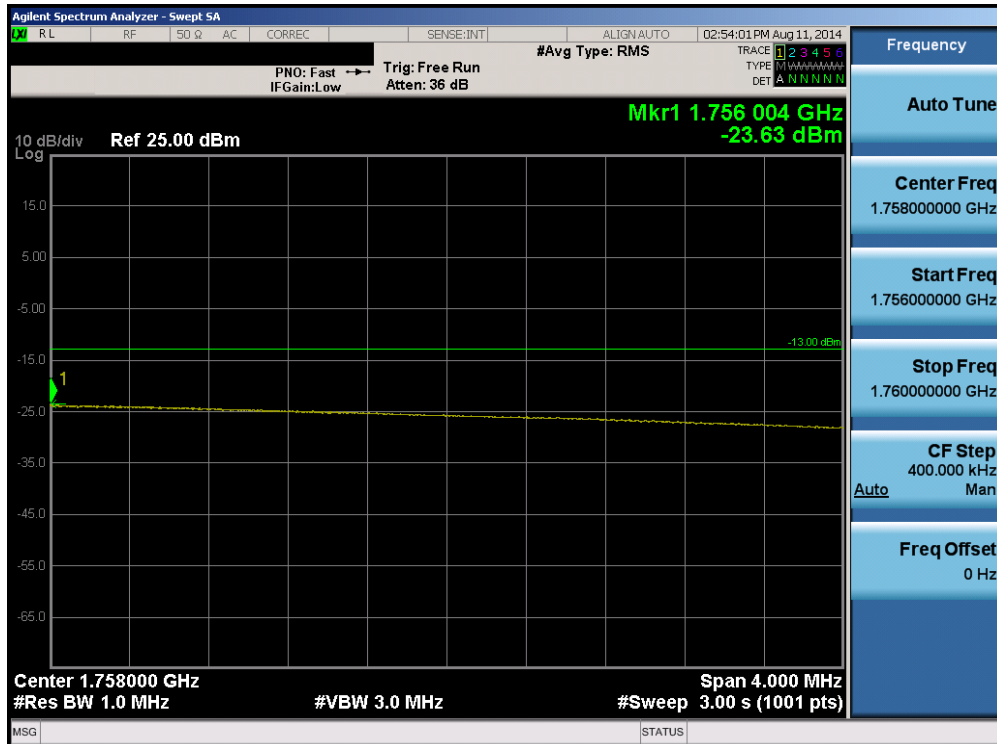


Plot 6-66. Lower Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Confidential	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 48 of 78

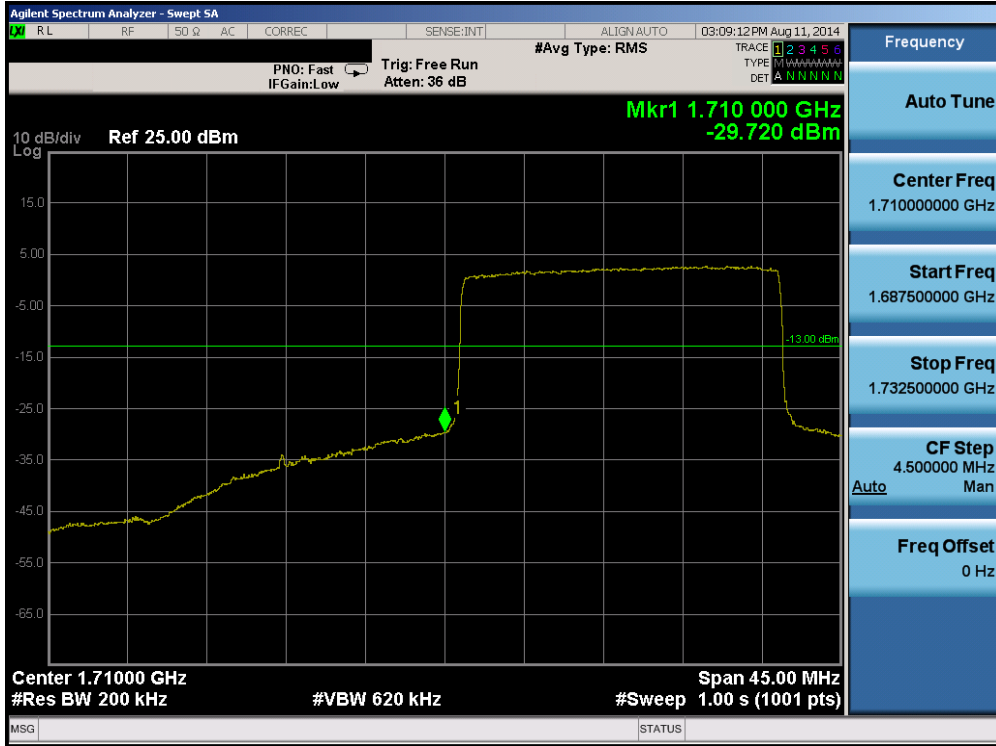


Plot 6-67. Upper Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

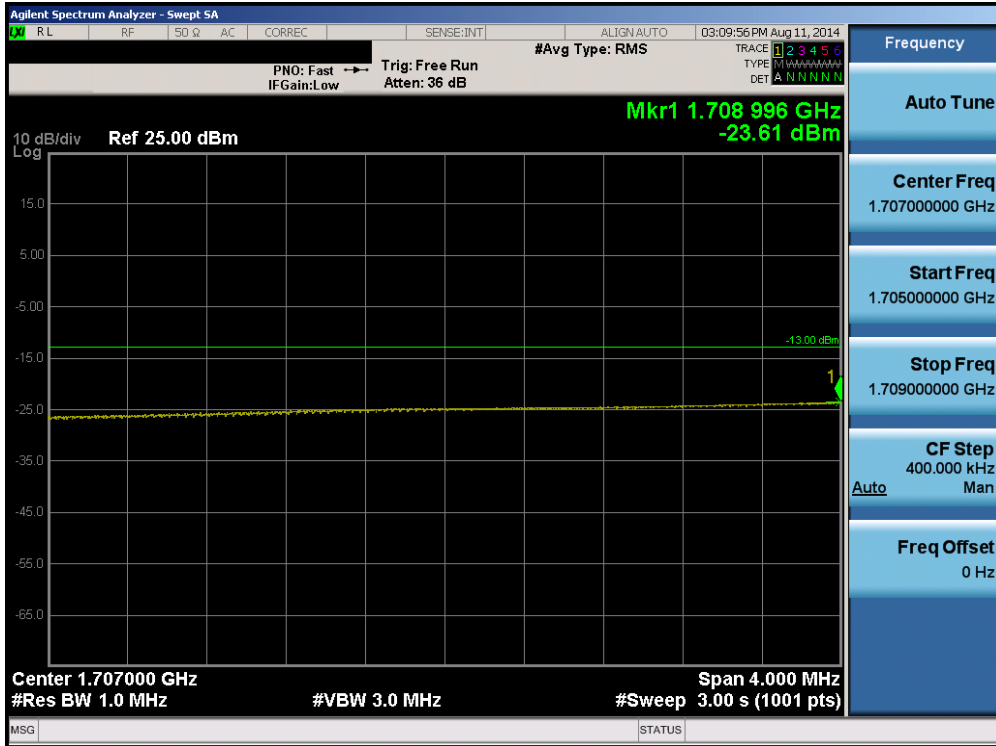


Plot 6-68. Upper Extended Band Edge Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 49 of 78

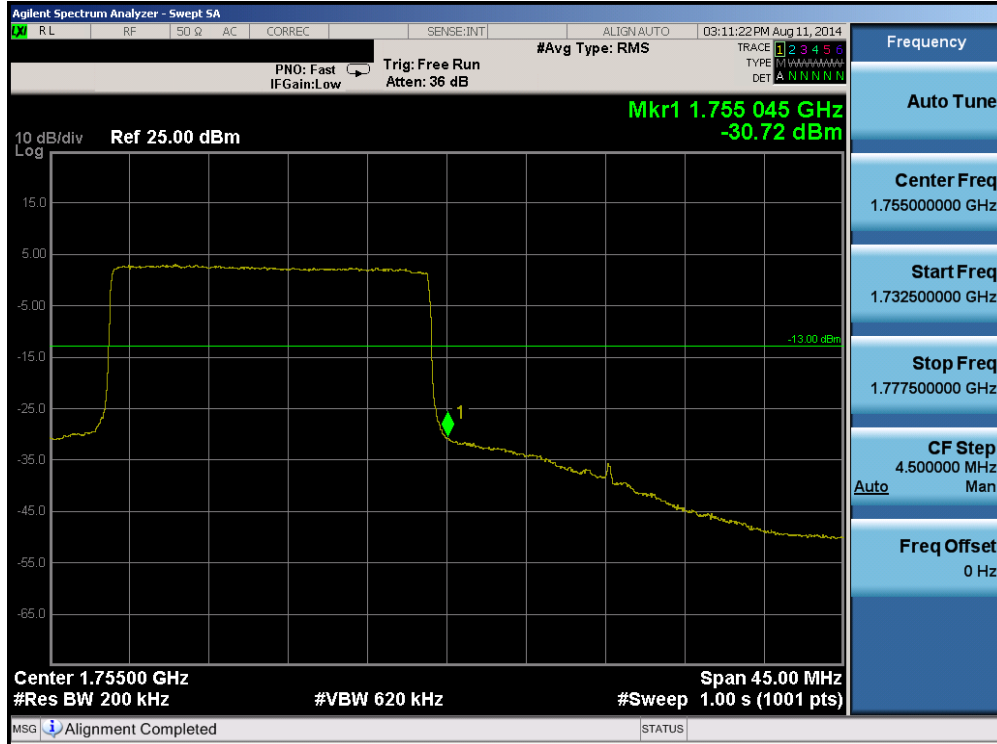


Plot 6-69. Lower Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

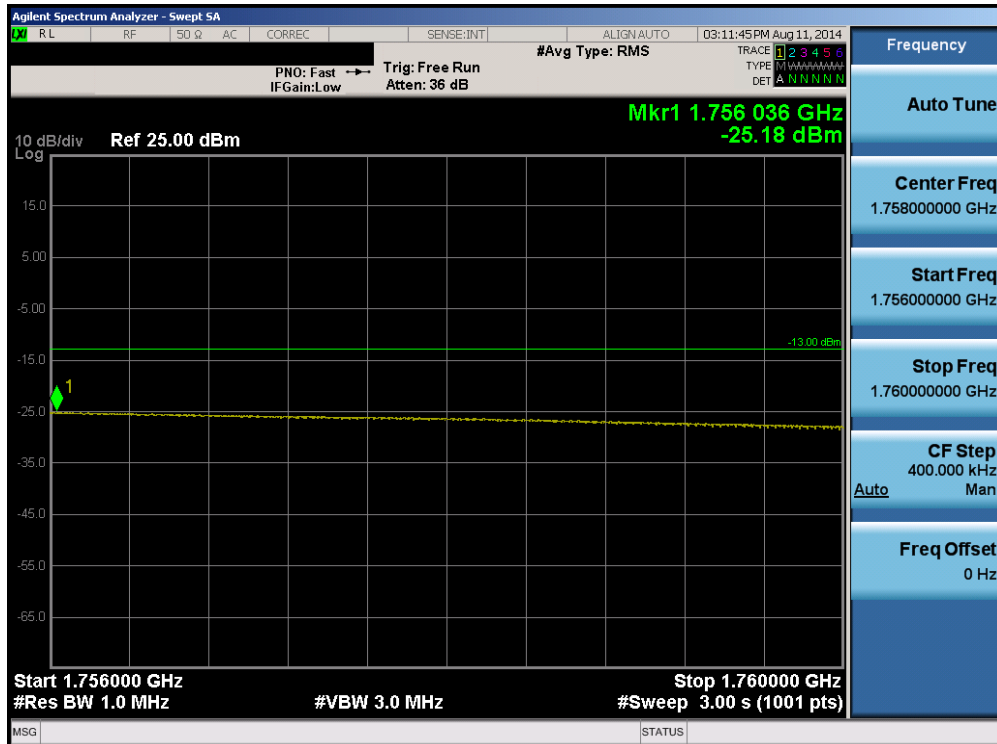


Plot 6-70. Lower Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 50 of 78

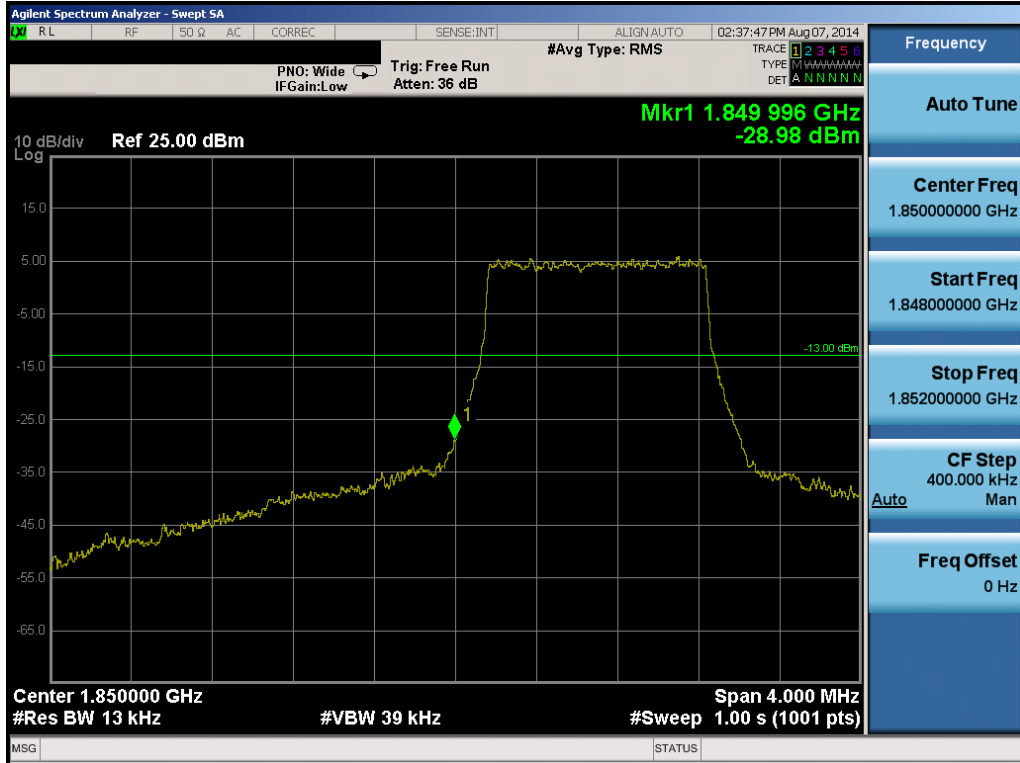


Plot 6-71. Upper Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

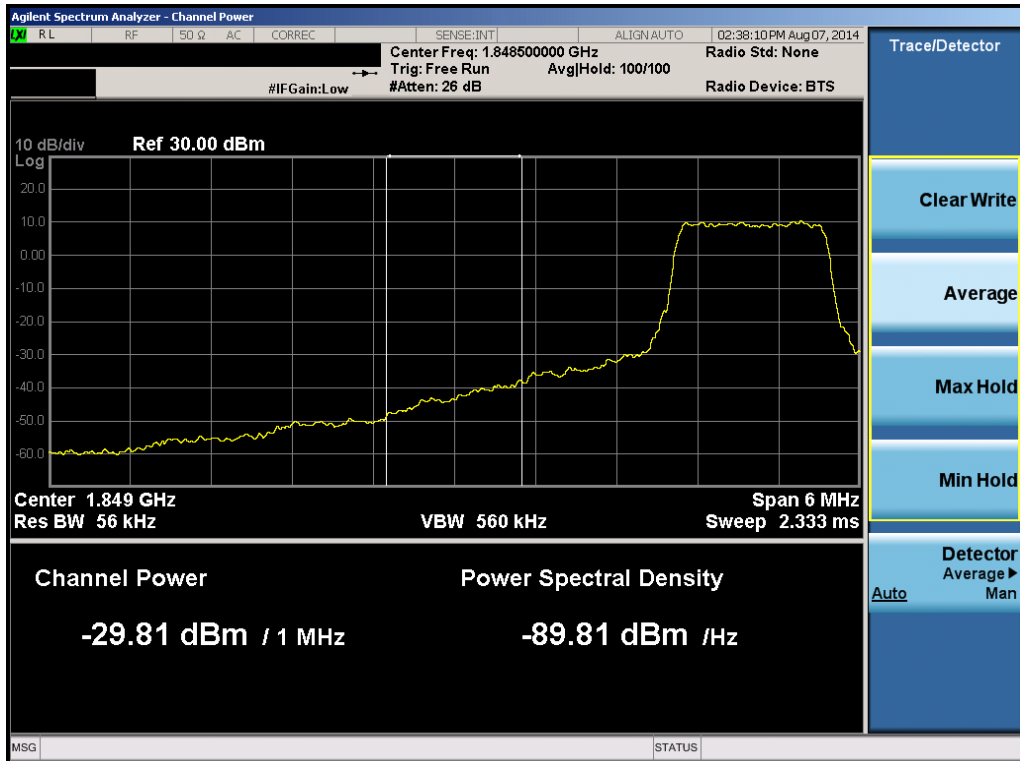


Plot 6-72. Upper Extended Band Edge Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Confidential	Reviewed by: Quality Manager
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Plot 6-73. Lower Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

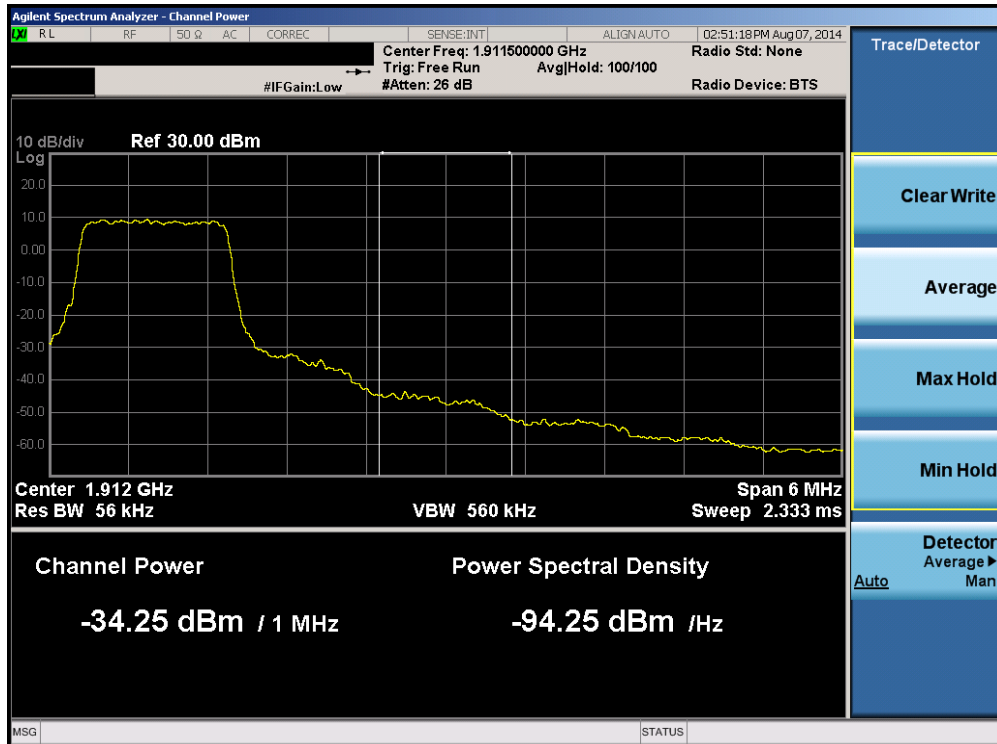


Plot 6-74. Lower Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 52 of 78

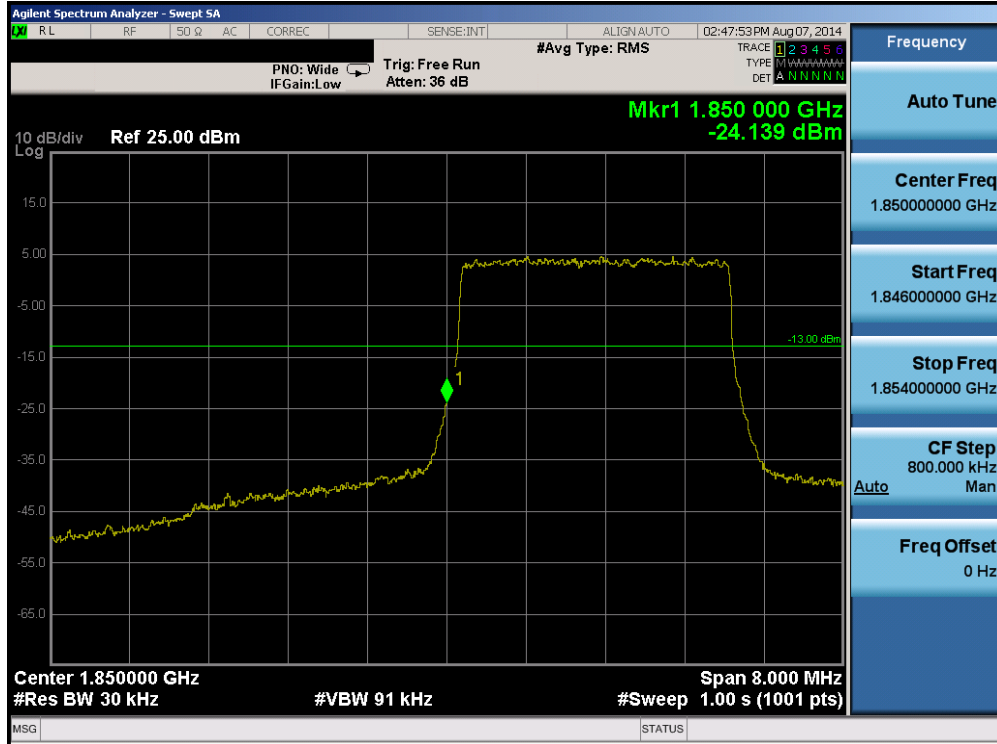


Plot 6-75. Upper Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

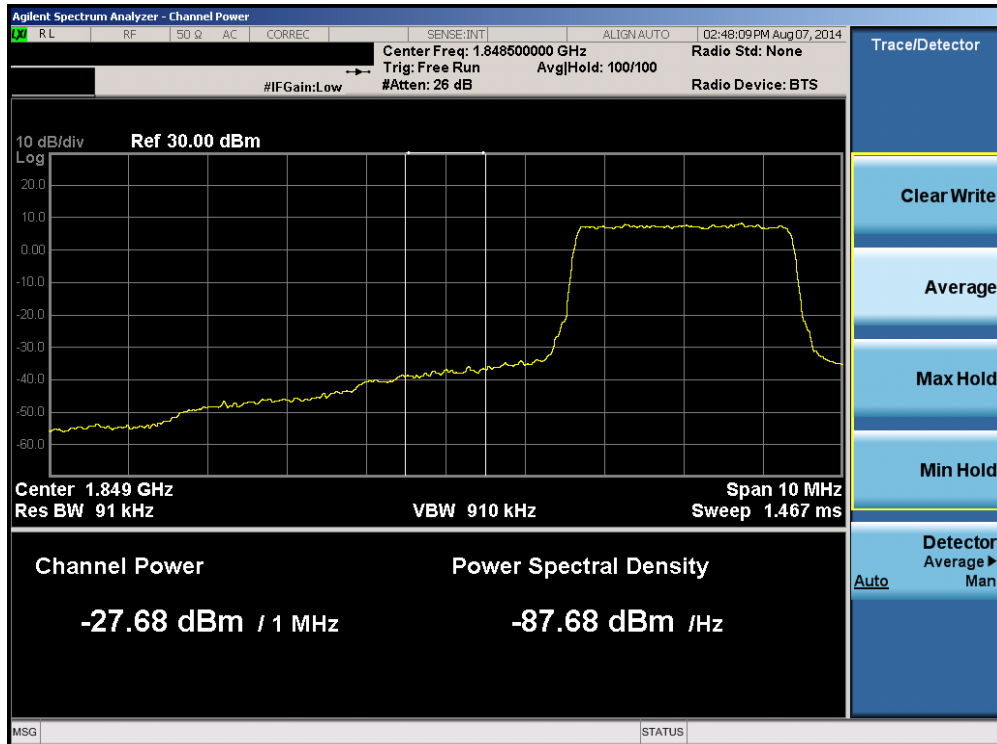


Plot 6-76. Upper Extended Band Edge Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 53 of 78



Plot 6-77. Lower Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

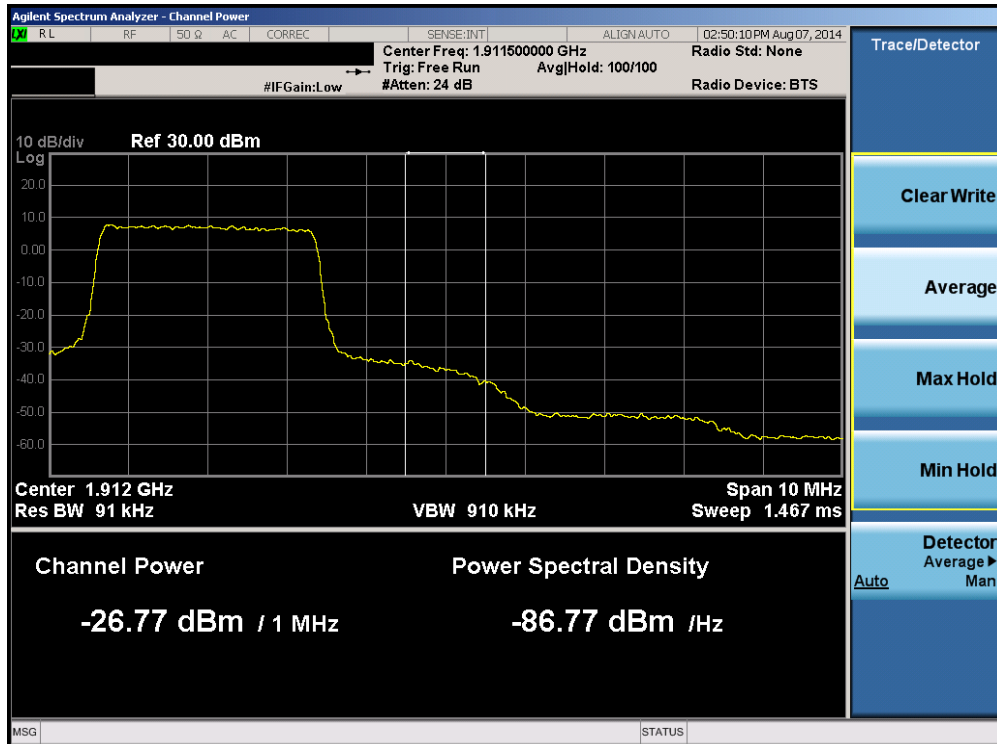


Plot 6-78. Lower Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 54 of 78

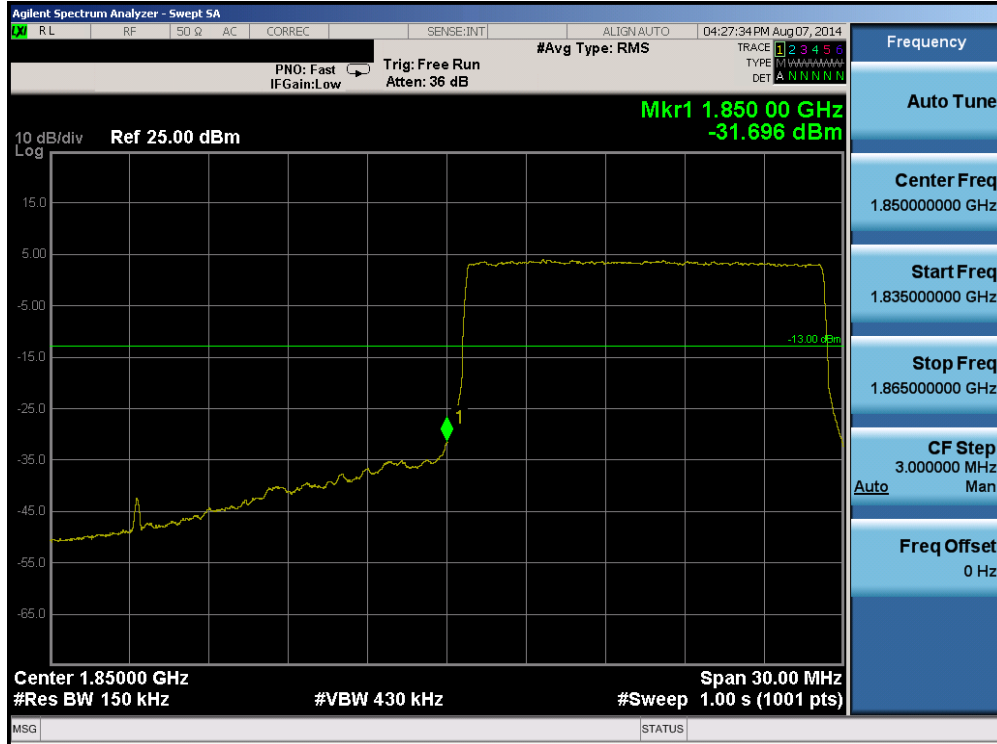


Plot 6-79. Upper Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

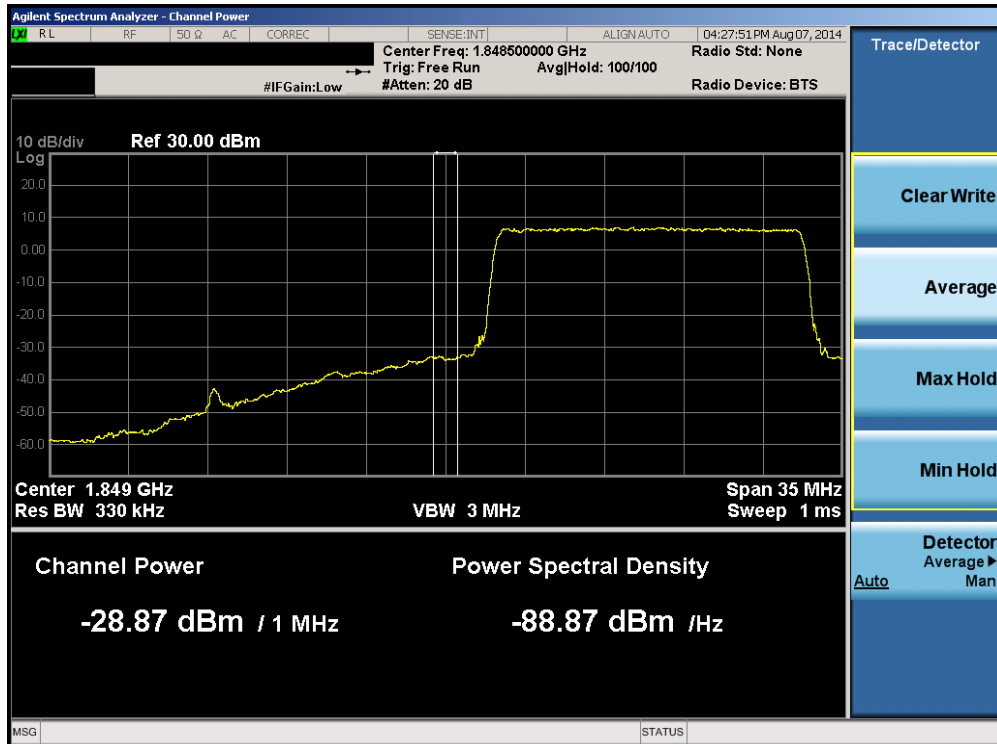


Plot 6-80. Upper Extended Band Edge Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 55 of 78



Plot 6-81. Lower Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

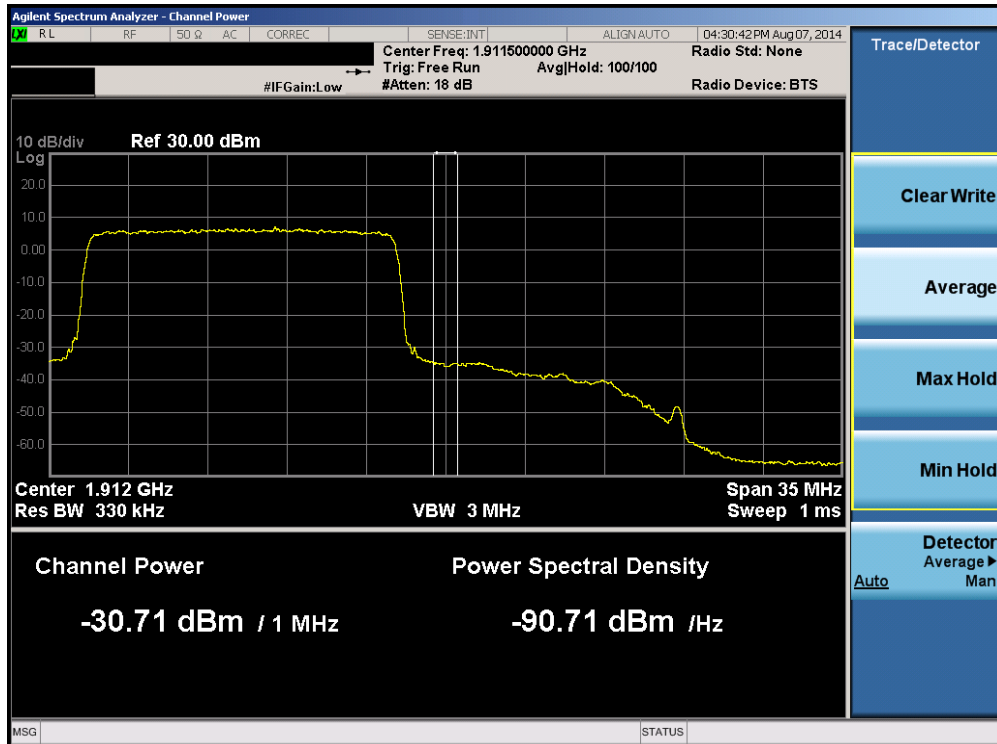


Plot 6-82. Lower Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 56 of 78

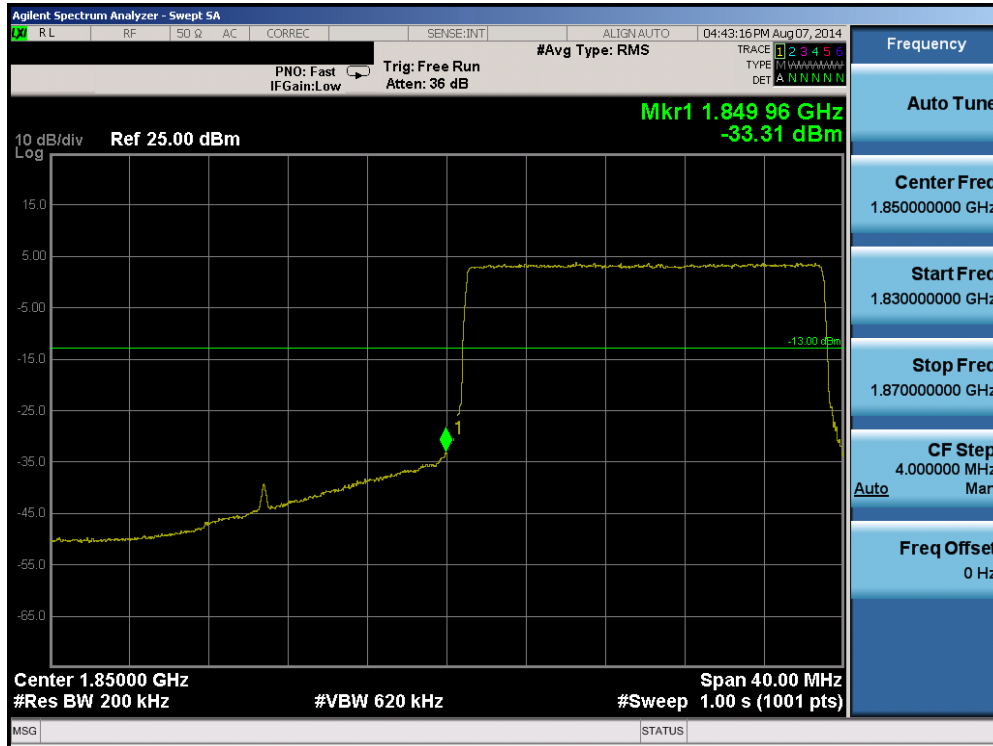


Plot 6-83. Upper Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

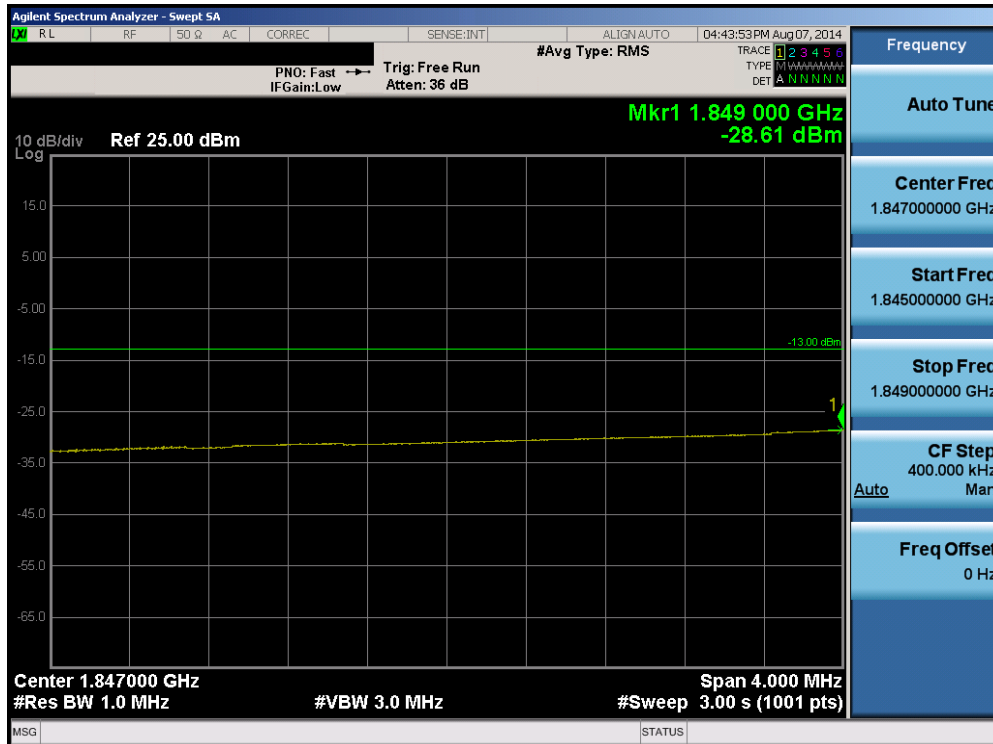


Plot 6-84. Upper Extended Band Edge Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 57 of 78



Plot 6-85. Lower Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

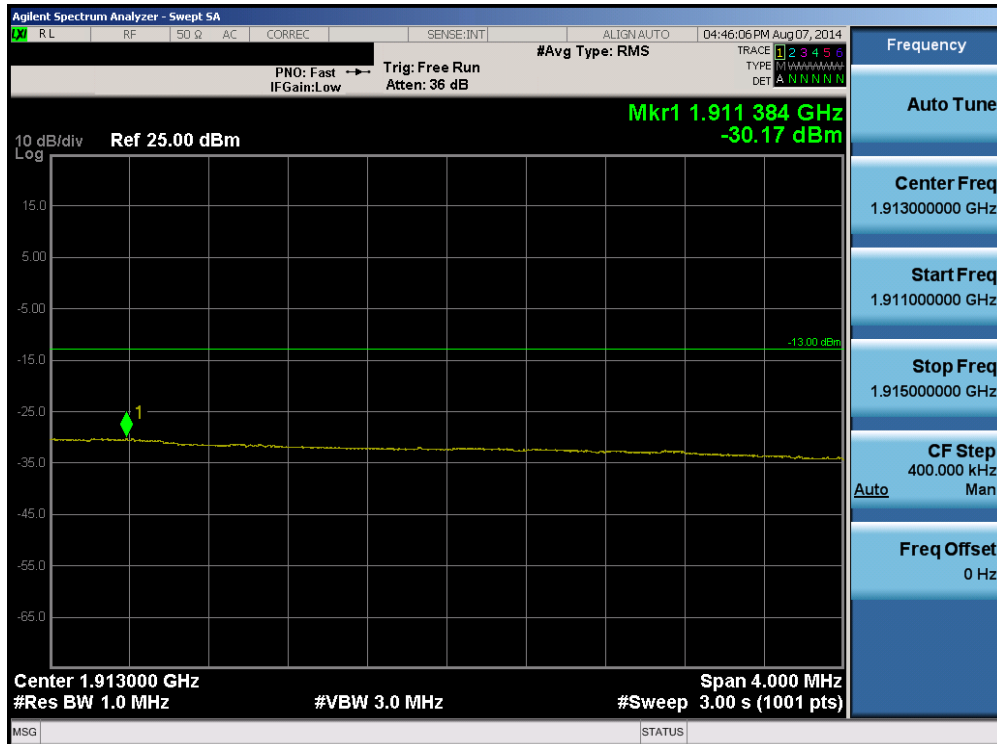


Plot 6-86. Lower Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 58 of 78



Plot 6-87. Upper Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-88. Upper Extended Band Edge Plot (Band 2 – 20.0MHz QPSK – RB Size 100)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 59 of 78

6.6 Peak-Average Ratio

§24.232(d)

Test Overview

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.

Test Procedure Used

KDB 971168 v02r01 – Section 5.7.1

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW > Emission bandwidth of signal
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

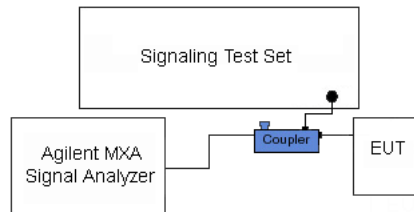


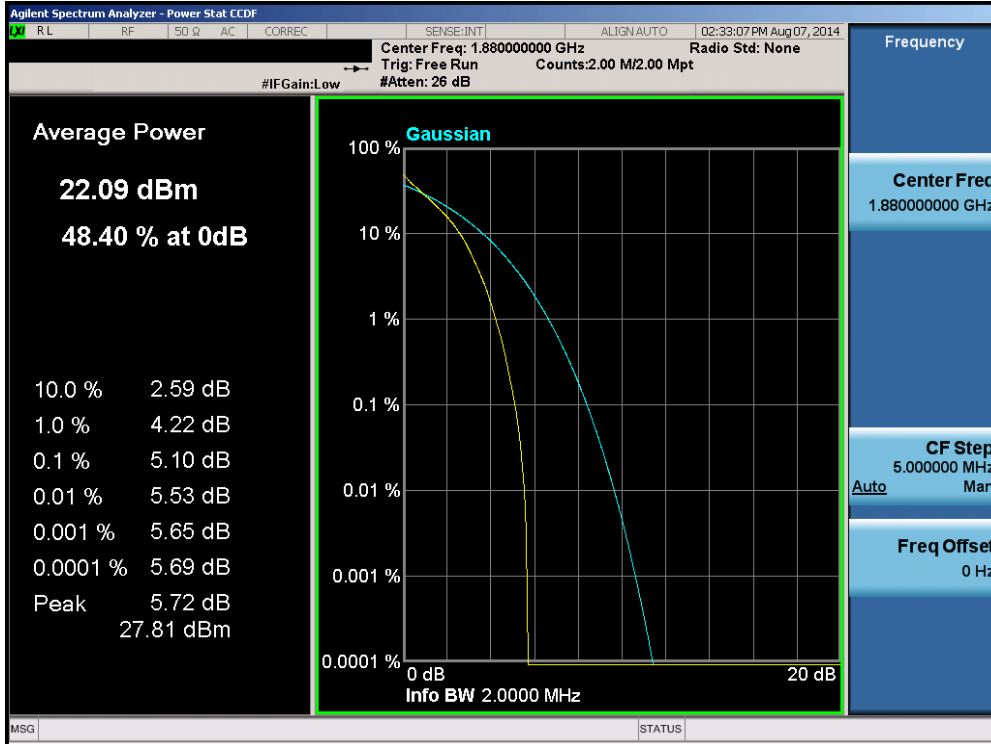


Figure 6-5. Test Instrument & Measurement Setup

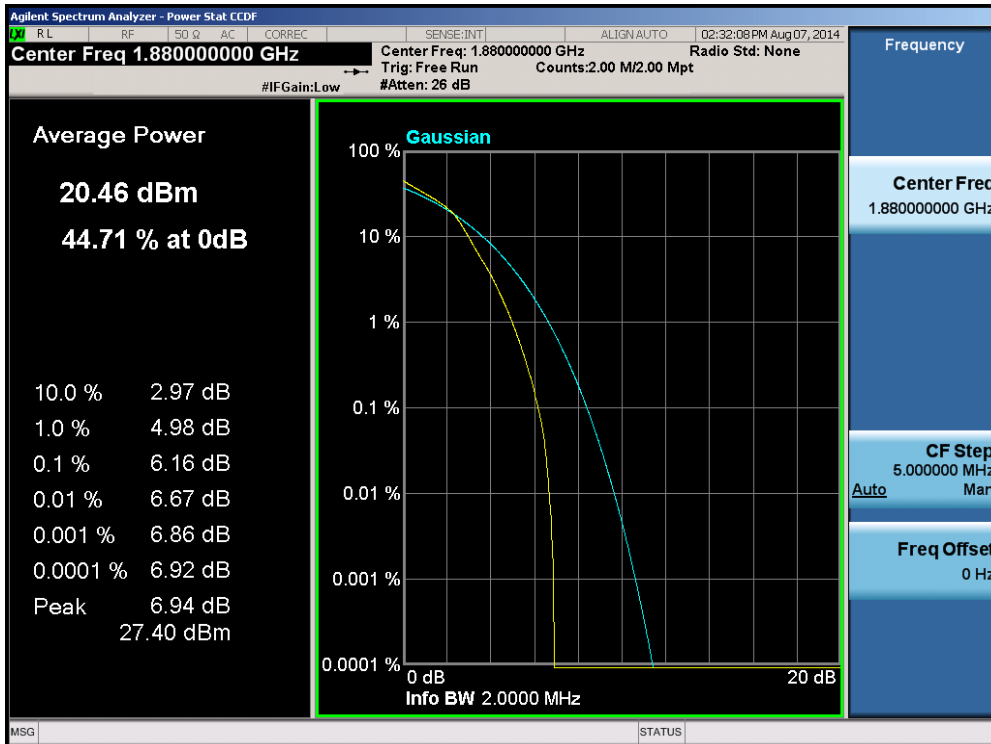
Test Notes

None.

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 60 of 78

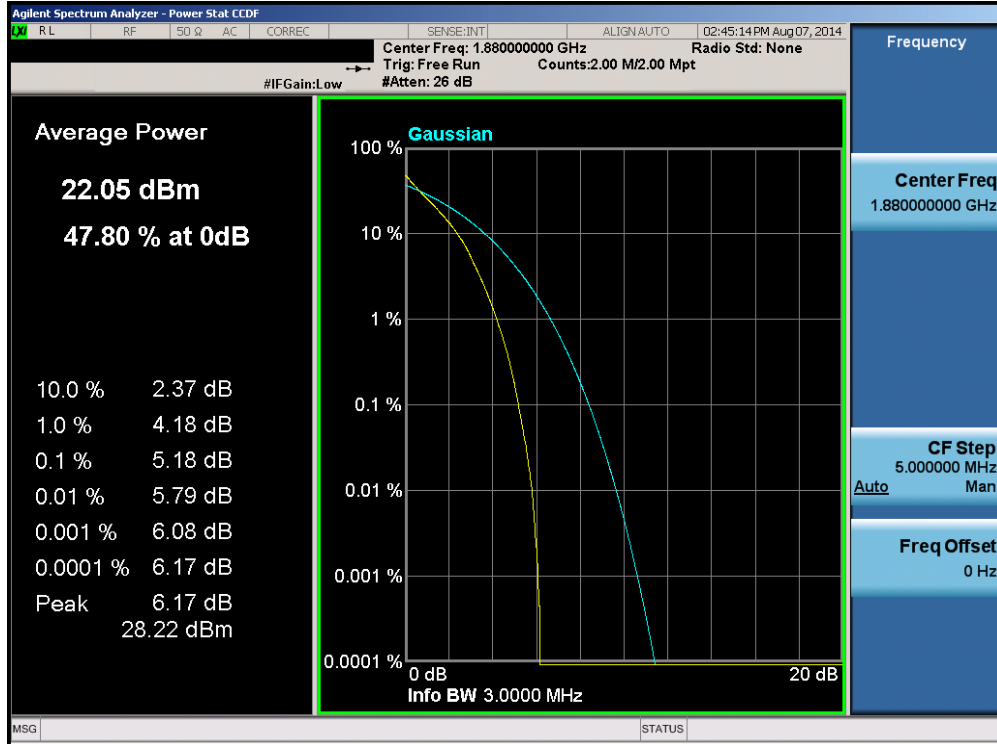


Plot 6-89. PAR Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

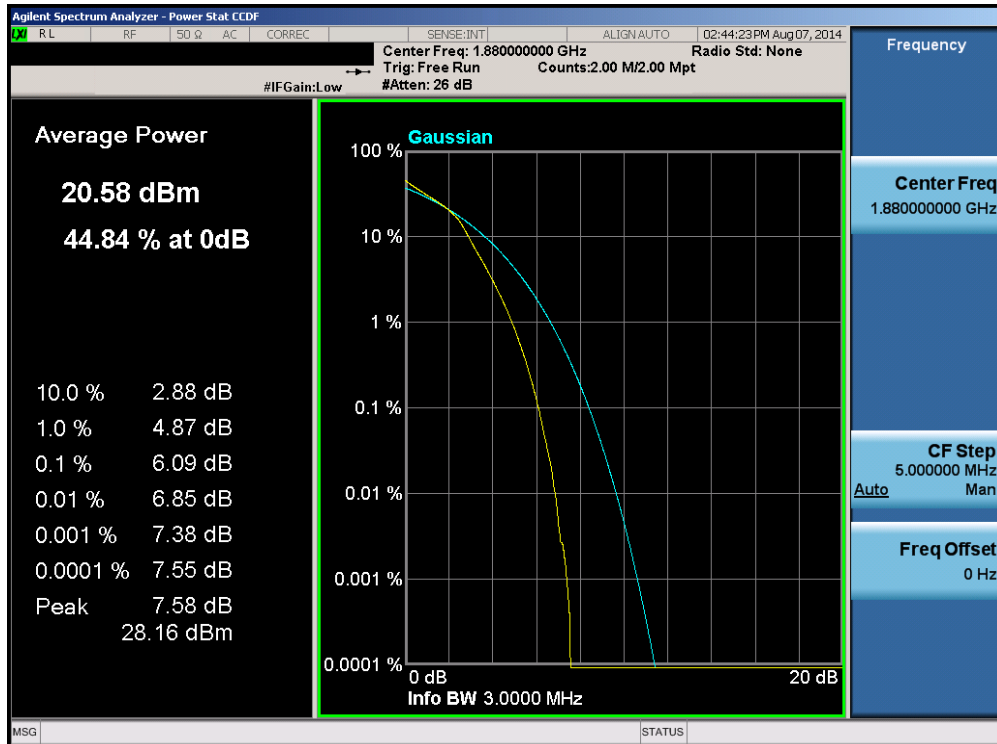


Plot 6-90. PAR Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 61 of 78

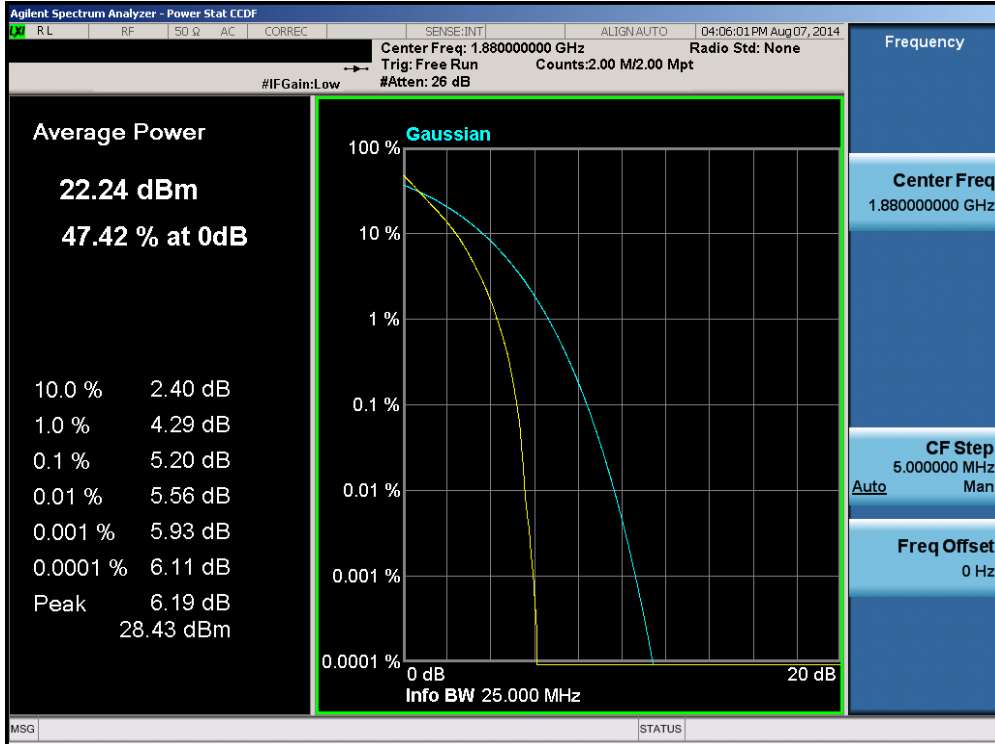


Plot 6-91. PAR Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

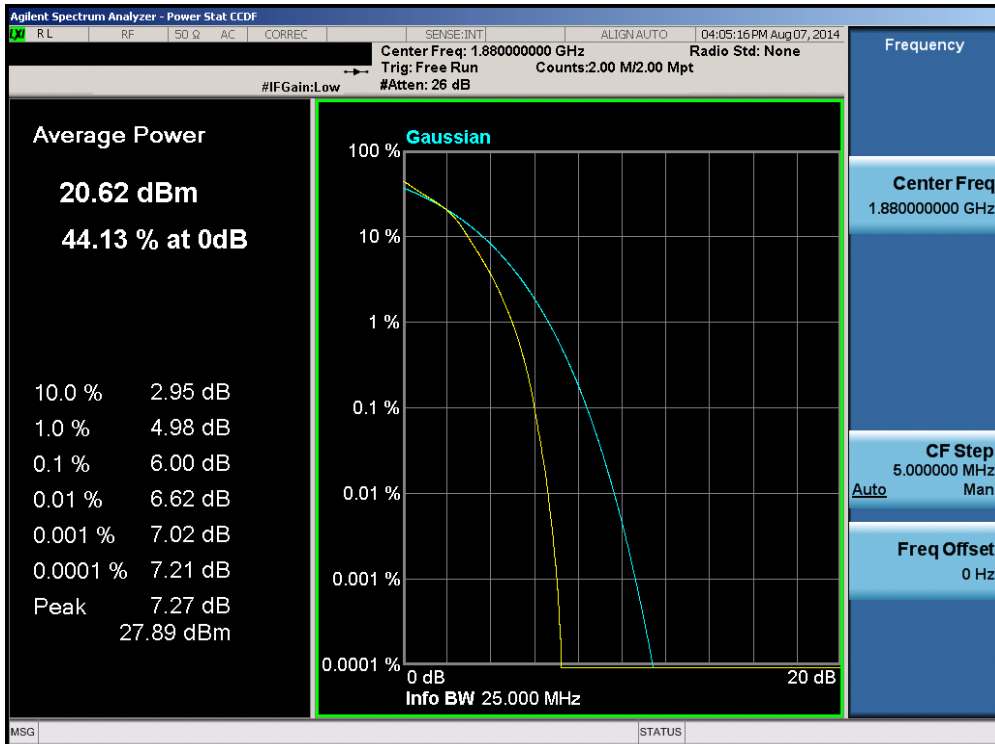


Plot 6-92. PAR Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 62 of 78

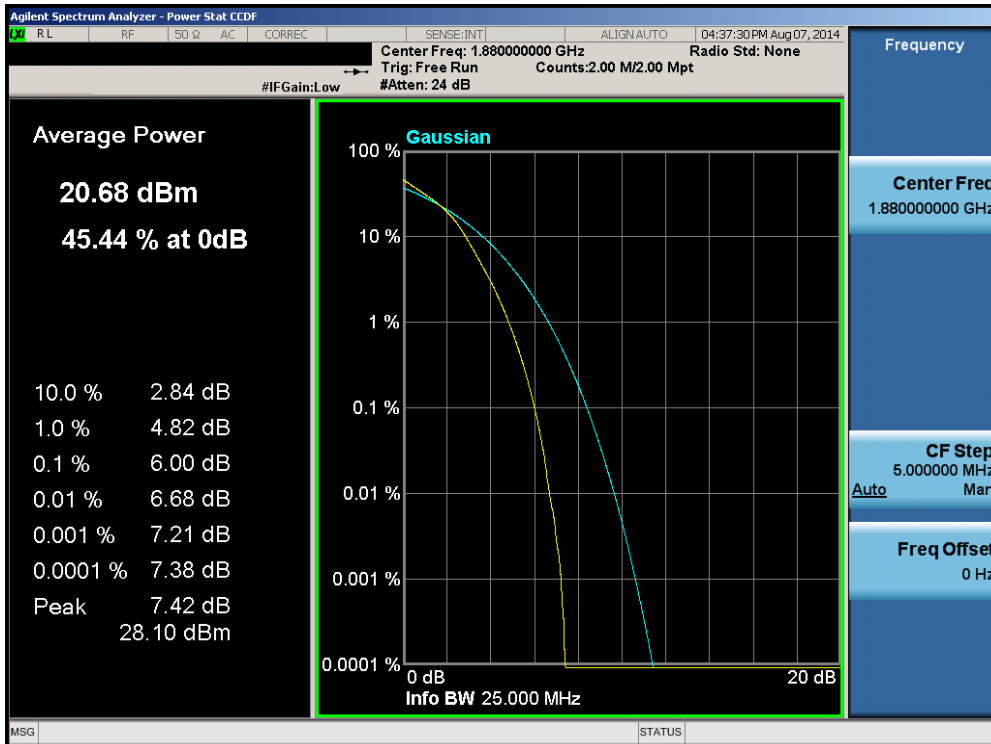
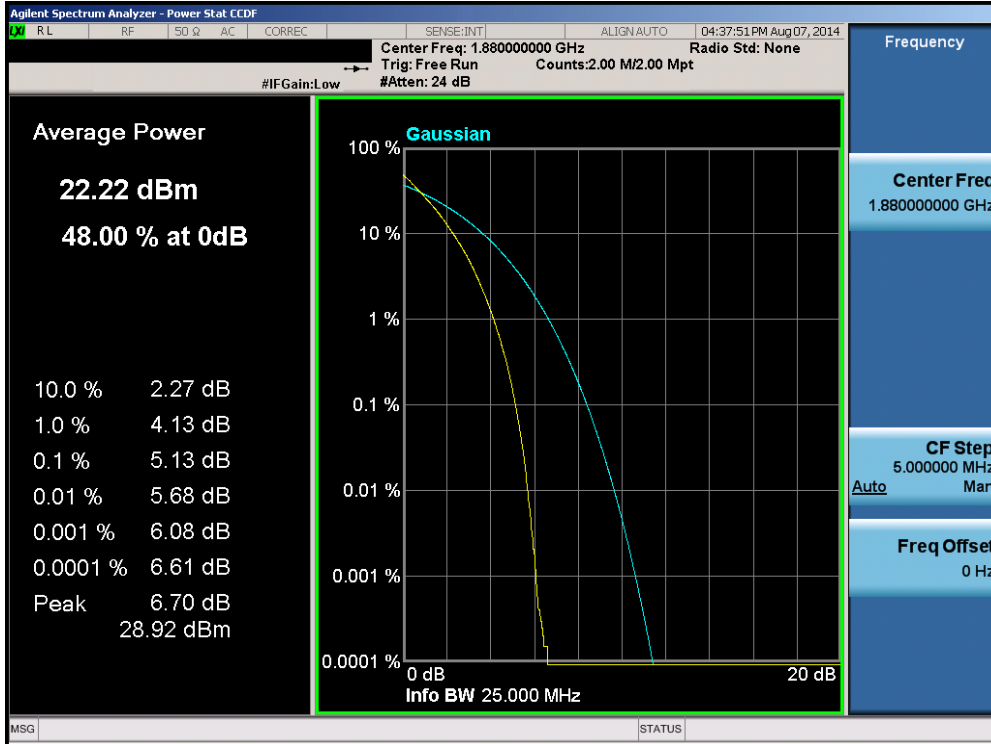


Plot 6-93. PAR Plot (Band 2 – 15.0MHz QPSK – RB Size 75)



Plot 6-94. PAR Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
Test Report S/N: 0Y1408211762.LHJ	Test Dates: 08/07 - 08/14/2014	EUT Type: Wireless Modem Module		Page 64 of 78

6.7 Radiated Spurious Emissions Measurements

§2.1053, §22.917(a), §24.238(a), §27.53(h)

Test Overview

Radiated spurious emissions measurements are performed using the substitution method described in ANSI/TIA-603-C-2004 with the EUT transmitting at maximum power while connected to a call box. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 v02r01 – Section 5.8

ANSI/TIA-603-C-2004 – Section 2.2.12

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW $\geq 3 \times$ RBW
3. Span = 1.5 times the OBW
4. No. of sweep points $\geq 2 \times$ span / RBW
5. Detector = Peak
6. Trace mode = max hold
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

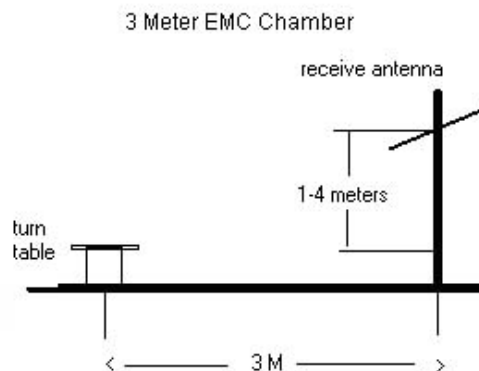




Figure 6-6. Test Instrument & Measurement Setup

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Test Notes

- 1) 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 emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.
- 2) This unit was tested while powered by an DC power supply set to 12VDC.
- 3) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.
- 4) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

OPERATING FREQUENCY: 824.70 MHz
 CHANNEL: 20407
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
1649.40	-55.01	6.56	-48.45	H	H	-35.5
2474.10	-60.50	7.30	-53.20	H	H	-40.2
3298.80	-58.10	7.37	-50.73	H	H	-37.7
4123.50	-57.00	8.02	-48.98	H	H	-36.0

Table 6-2. Radiated Spurious Data (Band 5 – Low Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 836.50 MHz
 CHANNEL: 20525
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
1673.00	-57.21	6.55	-50.66	H	H	-37.7
2509.50	-60.15	7.34	-52.81	H	H	-39.8
3346.00	-56.53	7.44	-49.10	H	H	-36.1

Table 6-3. Radiated Spurious Data (Band 5 – Mid Channel)

OPERATING FREQUENCY: 848.30 MHz
 CHANNEL: 20643
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 1.4 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBd]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
1696.60	-55.55	6.55	-49.00	H	H	-36.0
2544.90	-59.55	7.36	-52.19	H	H	-39.2
3393.20	-56.46	7.51	-48.95	H	H	-36.0

Table 6-4. Radiated Spurious Data (Band 5 – High Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1717.50 MHz
 CHANNEL: 20025
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3435.00	-50.99	9.69	-41.30	H	H	-28.3
5152.50	-48.45	10.65	-37.80	H	H	-24.8
6870.00	-63.69	11.74	-51.94	H	H	-38.9

Table 6-5. Radiated Spurious Data (Band 4 – Low Channel)

OPERATING FREQUENCY: 1732.50 MHz
 CHANNEL: 20175
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3465.00	-50.76	9.71	-41.05	H	H	-28.1
5197.50	-48.09	10.59	-37.51	H	H	-24.5
6930.00	-62.53	11.75	-50.77	H	H	-37.8

Table 6-6. Radiated Spurious Data (Band 4 – Mid Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1747.50 MHz
 CHANNEL: 20325
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13 dBm



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3495.00	-51.24	9.72	-41.52	H	H	-28.5
5242.50	-44.27	10.62	-33.64	H	H	-20.6
6990.00	-61.39	11.76	-49.63	H	H	-36.6

Table 6-7. Radiated Spurious Data (Band 4 – High Channel)

OPERATING FREQUENCY: 1857.50 MHz
 CHANNEL: 18675
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3715.00	-43.79	9.40	-34.39	H	H	-21.4
5572.50	-43.93	10.83	-33.10	H	H	-20.1
7430.00	-54.27	10.76	-43.51	H	H	-30.5

Table 6-8. Radiated Spurious Data (Band 2 – Low Channel)

FCC ID: LHJ-LNAD	 FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)			Reviewed by: Quality Manager
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OPERATING FREQUENCY: 1880.00 MHz
 CHANNEL: 18900
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13.00 dBm



Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3760.00	-44.83	9.28	-35.55	H	H	-22.5
5640.00	-42.83	11.03	-31.80	H	H	-18.8
7520.00	-53.46	10.97	-42.49	H	H	-29.5

Table 6-9. Radiated Spurious Data (Band 2 – Mid Channel)

OPERATING FREQUENCY: 1902.50 MHz
 CHANNEL: 19125
 MODULATION SIGNAL: QPSK
 BANDWIDTH: 15.0 MHz
 DISTANCE: 3 meters
 LIMIT: -13.00 dBm

Frequency [MHz]	Level at Antenna Terminals [dBm]	Substitute Antenna Gain [dBi]	Spurious Emission Level [dBm]	Ant. Pol. [H/V]	EUT Pol. [H/H2/V]	Margin (dB)
3805.00	-46.30	9.18	-37.12	H	H	-24.1
5707.50	-43.92	11.25	-32.67	H	H	-19.7
7610.00	-54.24	11.15	-43.09	H	H	-30.1

Table 6-10. Radiated Spurious Data (Band 2 – High Channel)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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6.8 Frequency Stability / Temperature Variation

§2.1055, §22.355, §24.235, §27.54

Test Overview and Limit

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.

For Part 22, the frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ (± 2.5 ppm) of the center frequency. For Part 24 and Part 27, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

Test Procedure Used

ANSI/TIA-603-C-2004

Test Settings



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.

Test Setup

The EUT was connected via an RF cable to a spectrum analyzer with the EUT placed inside an environmental chamber.

Test Notes

None

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Band 5 Frequency Stability Measurements

§2.1055 §22.355

OPERATING FREQUENCY: 836,500,000 Hz
 CHANNEL: 20525
 REFERENCE VOLTAGE: 12.00 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)	836,499,985	-15	-0.0000018
100 %		- 30	836,500,030	30	0.0000036
100 %		- 20	836,499,976	-24	-0.0000029
100 %		- 10	836,500,018	18	0.0000022
100 %		0	836,499,981	-19	-0.0000023
100 %		+ 10	836,500,039	39	0.0000047
100 %		+ 20	836,500,043	43	0.0000051
100 %		+ 30	836,500,021	21	0.0000025
100 %		+ 40	836,500,033	33	0.0000039
100 %		+ 50	836,500,040	40	0.0000048
85 %		10.20	+ 20	836,500,032	32
115 %	13.80	+ 20	836,499,995	-5	-0.0000006

Table 6-11. Frequency Stability Data (Band 5)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Band 5 Frequency Stability Measurements
§2.1055 §22.355

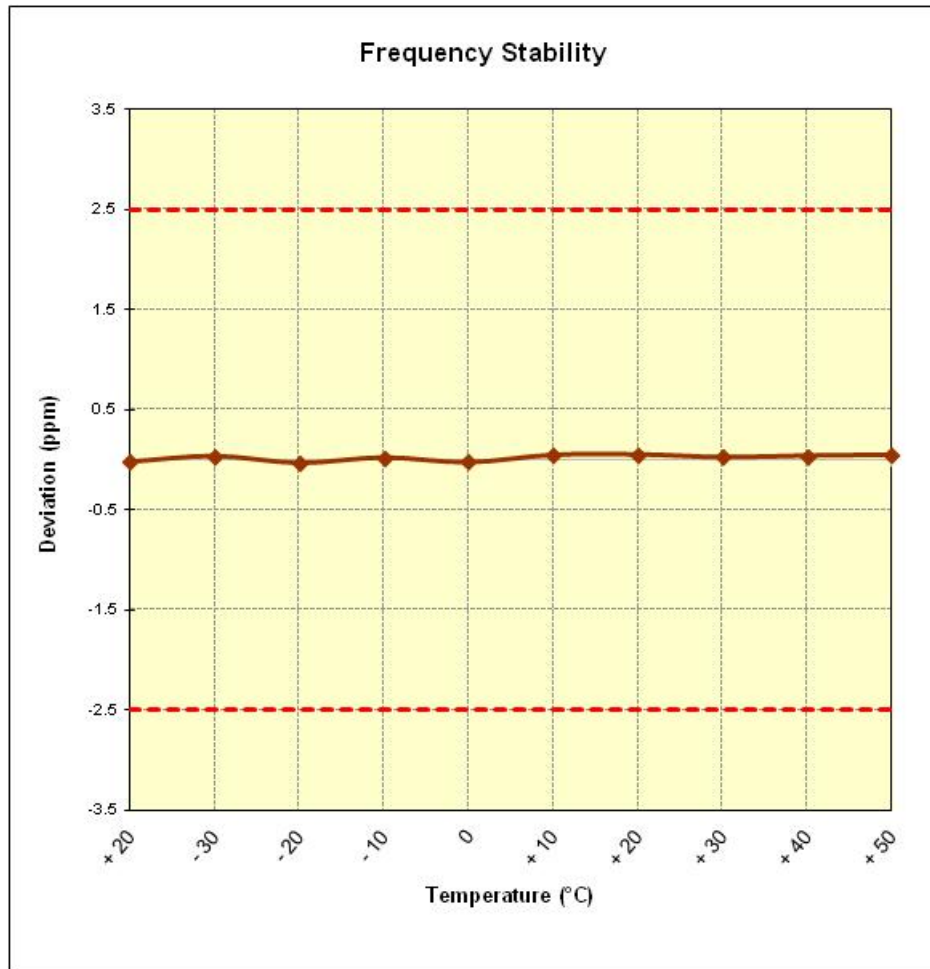


Figure 6-7. Frequency Stability Graph (Band 5)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
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Band 4 Frequency Stability Measurements

§2.1055 §§27.54



OPERATING FREQUENCY: 1,732,500,000 Hz
 CHANNEL: 20175
 REFERENCE VOLTAGE: 12.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	+ 20 (Ref)	1,732,500,035	35	0.000020
100 %		- 30	1,732,500,029	29	0.000017
100 %		- 20	1,732,500,018	18	0.000010
100 %		- 10	1,732,500,011	11	0.000006
100 %		0	1,732,500,026	26	0.000015
100 %		+ 10	1,732,499,988	-12	-0.000007
100 %		+ 20	1,732,499,984	-16	-0.000009
100 %		+ 30	1,732,499,969	-31	-0.000018
100 %		+ 40	1,732,500,010	10	0.000006
100 %		+ 50	1,732,499,985	-15	-0.000009
85 %	10.20	+ 20	1,732,500,039	39	0.000023
115 %	13.80	+ 20	1,732,500,017	17	0.000010

Table 6-12. Frequency Stability Data (Band 4)

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.

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Band 4 Frequency Stability Measurements
§2.1055 §§27.54

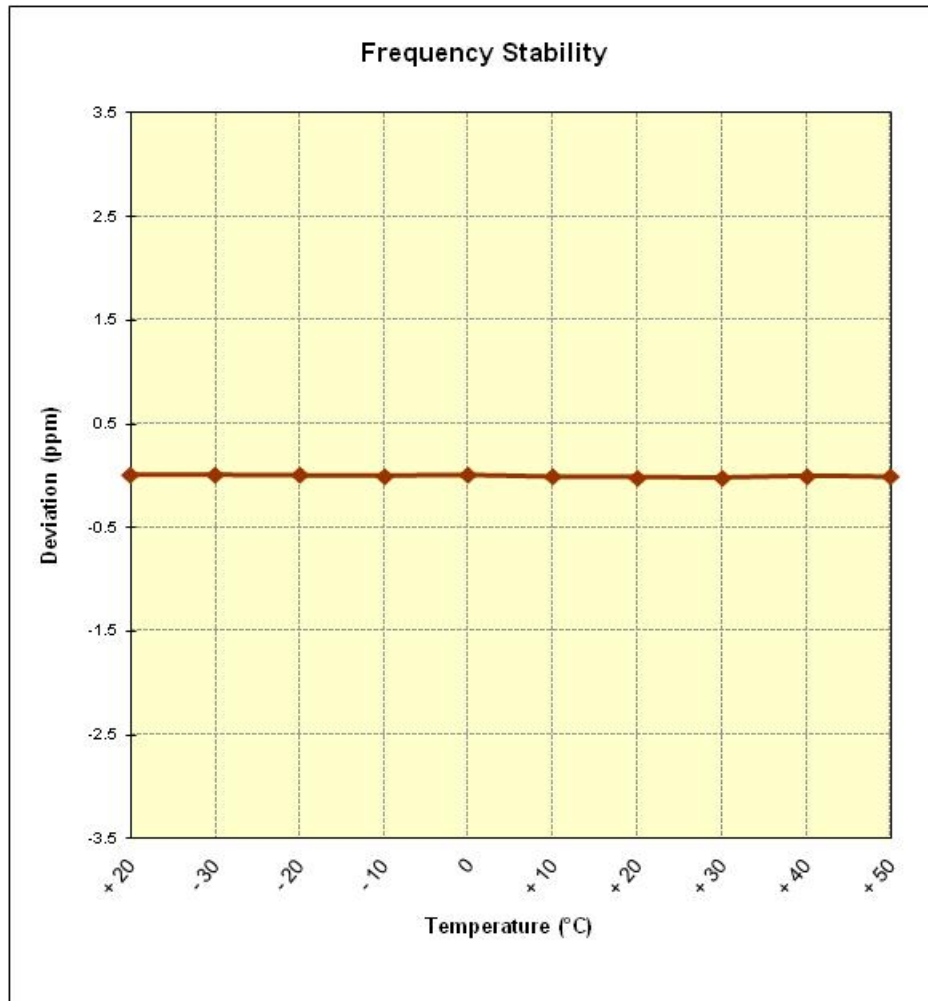




Figure 6-8. Frequency Stability Graph (Band 4)

FCC ID: LHJ-LNAD		FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Band 2 Frequency Stability Measurements

§2.1055 §24.235



OPERATING FREQUENCY: 1,880,000,000 Hz
 CHANNEL: 18900
 REFERENCE VOLTAGE: 12.00 VDC

VOLTAGE (%)	POWER (VDC)	TEMP (°C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	12.00	+ 20 (Ref)	1,880,000,041	41	0.0000022
100 %		- 30	1,880,000,035	35	0.0000019
100 %		- 20	1,879,999,993	-7	-0.0000004
100 %		- 10	1,880,000,004	4	0.0000002
100 %		0	1,879,999,980	-20	-0.0000011
100 %		+ 10	1,879,999,989	-11	-0.0000006
100 %		+ 20	1,879,999,979	-21	-0.0000011
100 %		+ 30	1,880,000,036	36	0.0000019
100 %		+ 40	1,879,999,981	-19	-0.0000010
100 %		+ 50	1,880,000,010	10	0.0000005
85 %	10.20	+ 20	1,879,999,977	-23	-0.0000012
115 %	13.80	+ 20	1,879,999,982	-18	-0.0000010

Table 6-13. Frequency Stability Data (Band 2)

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, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)		Reviewed by: Quality Manager
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Band 2 Frequency Stability Measurements
§2.1055 §24.235

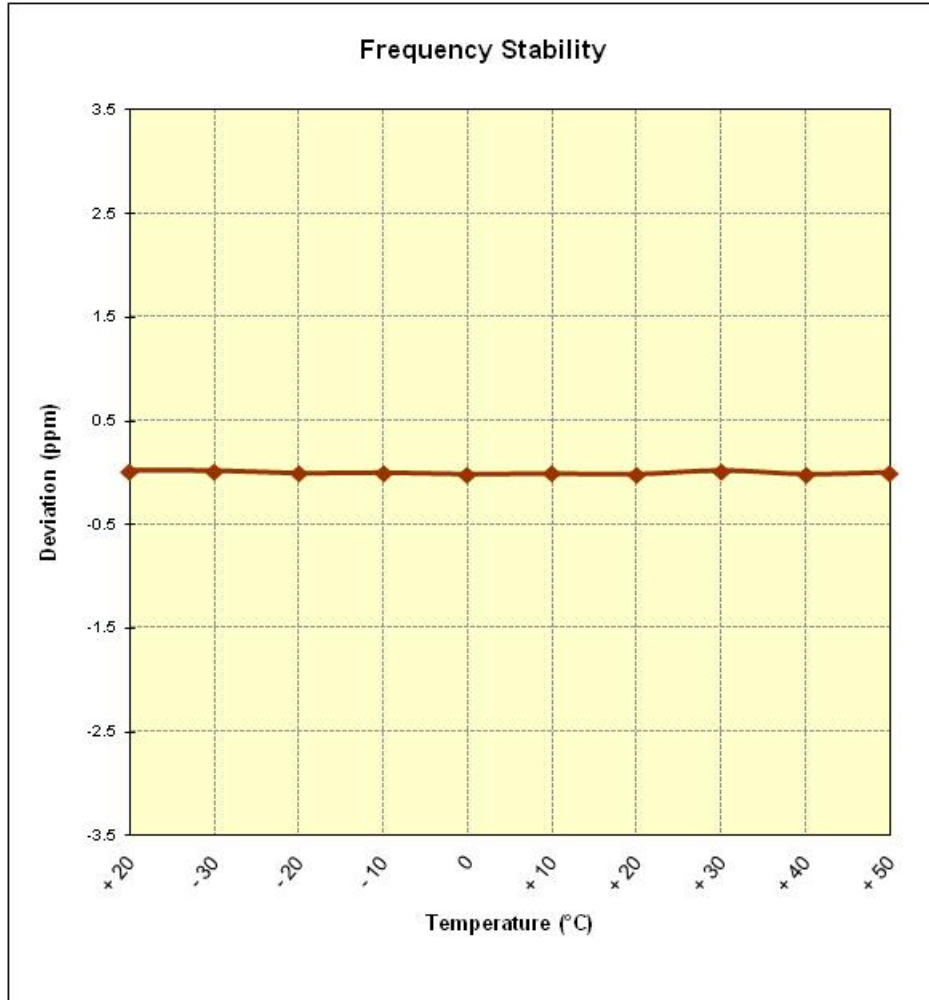




Figure 6-9. Frequency Stability Graph (Band 2)

FCC ID: LHJ-LNAD	PCTEST ENGINEERING LABORATORY, INC.	FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT (CLASS II PERMISSIVE CHANGE)	Continental	Reviewed by: Quality Manager
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7.0 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 22, 24, & 27 of the FCC rules for LTE operation only.

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