



# PCTEST ENGINEERING LABORATORY, INC.

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## MEASUREMENT REPORT FCC Part 22 LTE

**Applicant Name:**  
Samsung Electronics, Co. Ltd.  
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Yeongtong-gu, Suwon-si  
Gyeonggi-do 443-742, Korea

**Date of Testing:**  
07/24 - 08/02/2013  
**Test Site/Location:**  
PCTEST Lab., Columbia, MD, USA  
**Test Report Serial No.:**  
0Y1307221322.A3L

<b>FCC ID :</b>	<b>A3LSMN9005</b>
<b>APPLICANT:</b>	<b>SAMSUNG ELECTRONICS, CO. LTD.</b>

**Application Type:** Certification  
**Model(s):** SM-N9005  
**EUT Type:** Portable Handset  
**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)  
**FCC Rule Part(s):** §2; §22  
**Test Procedure(s):** ANSI/TIA-603-C-2004, KDB 971168 v02r01  
**Test Device Serial No.:** *identical prototype* [S/N: #23]

Mode	Tx Frequency (MHz)	Emission Designator	Modulation	ERP/EIRP	
				Max. Power (W)	Max. Power (dBm)
LTE Band 5	824.7 - 848.3	1M09G7D	QPSK	0.091	19.57
LTE Band 5	824.7 - 848.3	1M11W7D	16QAM	0.070	18.48
LTE Band 5	825.5 - 847.5	2M70G7D	QPSK	0.093	19.68
LTE Band 5	825.5 - 847.5	2M70W7D	16QAM	0.070	18.47
LTE Band 5	826.5 - 846.5	4M51G7D	QPSK	0.083	19.17
LTE Band 5	826.5 - 846.5	4M51W7D	16QAM	0.064	18.07
LTE Band 5	829 - 844	8M99G7D	QPSK	0.088	19.42
LTE Band 5	829 - 844	9M01W7D	16QAM	0.069	18.36

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

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

  
 Randy Ortanez  
 President

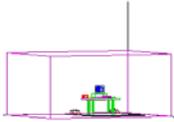


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# MEASUREMENT REPORT

## FCC Part 22



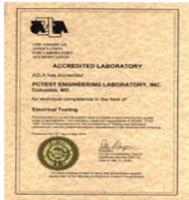
### §2.1033 General Information

**APPLICANT:** Samsung Electronics, Co. Ltd.  
**APPLICANT ADDRESS:** 129, Samsung-ro, Maetan dong,  
 Yeongtong-gu, Suwon-si, Gyeonggi-do 443-742, Korea  
**TEST SITE:** PCTEST ENGINEERING LABORATORY, INC.  
**TEST SITE ADDRESS:** 7185 Oakland Mills Road, Columbia, MD 21045 USA  
**FCC RULE PART(S):** §2; §22  
**BASE MODEL:** SM-N9005  
**FCC ID:** A3LSMN9005  
**FCC CLASSIFICATION:** PCS Licensed Transmitter Held to Ear (PCE)  
**FREQUENCY TOLERANCE:** ±0.00025 % (2.5 ppm)  
**Test Device Serial No.:** #23       Production     Pre-Production     Engineering  
**DATE(S) OF TEST:** 07/24 - 08/02/2013  
**TEST REPORT S/N:** 0Y1307221322.A3L

### 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

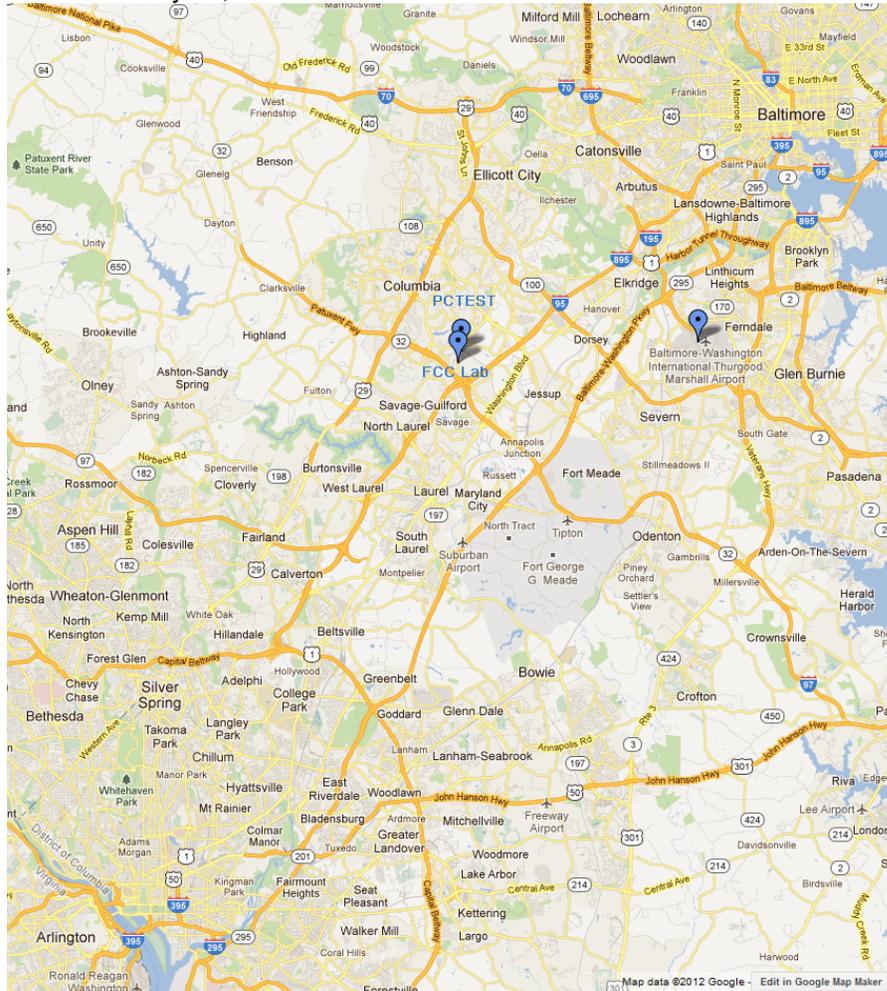
## 1.1 Scope

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 **Samsung Portable Handset FCC ID: A3LSMN9005**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1900 WCDMA/HSPA, Band 5 LTE (1.4MHz, 3MHz, 5MHz, 10MHz BWs), 802.11a/b/g/n/ac WLAN (DTS/NII), Bluetooth (1x,EDR, LE), NFC, ANT+

### 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.

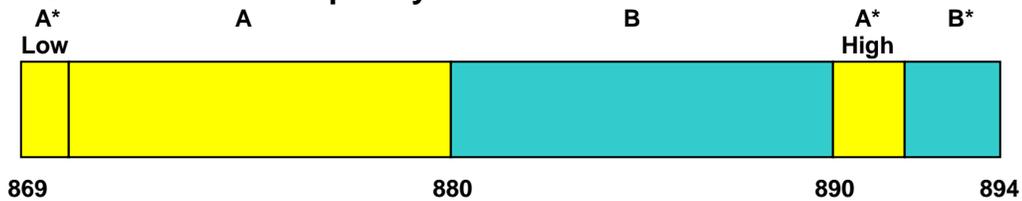
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## 3.0 DESCRIPTION OF TESTS

### 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 v02r01) were used in the measurement of the **Samsung Portable Handset FCC ID: A3LSMN9005**.

### 3.2 Cellular - Base Frequency Blocks



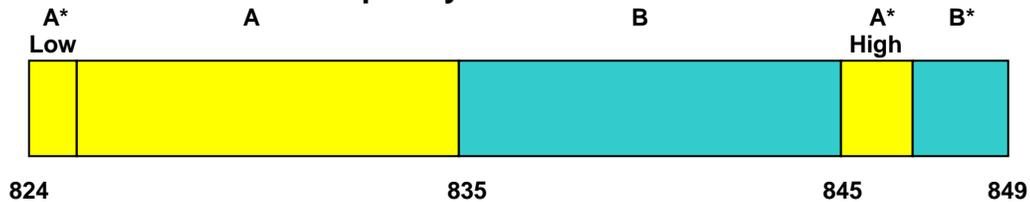
**BLOCK 1:** 869 – 880 MHz (A\* Low + A)

**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



**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 Occupied Bandwidth

§2.1049 RSS-Gen(4.6.1)

The implementation of this test is performed by the spectrum analyzer’s occupied bandwidth function. 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.

### 3.5 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a)(b) RSS-132(4.5.1)

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 Cell band operation. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one

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percent of the emission bandwidth of the fundamental emission of the transmitter may be employed for. 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.

### 3.6 Radiated Power and Radiated Spurious Emissions

**§2.1053 §22.913(a.2) §22.917(a) RSS-132(4.4) RSS-132(4.5.1)**

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 v02r01.

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).

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### 3.7 Frequency Stability / Temperature Variation

§2.1055 §22.863 §22.905 RSS-132(4.3)

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 – The frequency stability of the transmitter shall be maintained within ±0.00025% (±2.5 ppm) of the center frequency for Part 22.*

**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 one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A sufficient stabilization period at each temperature shall be used prior to each frequency requirement.

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## 4.0 TEST EQUIPMENT CALIBRATION DATA

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

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	LTx1	Licensed Transmitter Cable Set	1/17/2013	Annual	1/17/2014	N/A
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	3/29/2013	Annual	3/29/2014	N/A
-	RE2	Radiated Emissions Cable Set (VHF/UHF)	3/29/2013	Annual	3/29/2014	N/A
Agilent	8447D	Broadband Amplifier	5/31/2013	Annual	5/31/2014	2443A01900
Agilent	E8257D	(250kHz-20GHz) Signal Generator	4/16/2013	Annual	4/16/2014	MY45470194
Agilent	N9020A	MXA Signal Analyzer	10/9/2012	Annual	10/9/2013	US46470561
Emco	3115	Horn Antenna (1-18GHz)	1/12/2012	Biennial	1/12/2014	9704-5182
Espec	ESX-2CA	Environmental Chamber	4/16/2013	Annual	4/16/2014	17620
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	SSG-4000HP	USB Synthesized Signal Generator	N/A			11208010032
Mini-Circuits	PWR-SENS-4RMS	USB Power Sensor	4/17/2013	Annual	4/17/2014	11210140001
Mini-Circuits	TVA-11-422	RF Power Amp	N/A			QA1303002
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	CMW500	LTE Radio Communication Tester	10/7/2011	Biennial	10/7/2013	103962
Rohde & Schwarz	TS-PR18	1-18 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	100071
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/31/2013	Annual	5/31/2014	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
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	1/26/2012	Biennial	1/26/2014	A051107

**Table 4-1. Test Equipment**

**Notes:**

Equipment used for signaling with a calibration date of "N/A" shown in this list was only used for maintaining a link between the piece of equipment and the EUT. This equipment 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 2<sup>nd</sup> 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: Samsung Electronics, Co. Ltd.  
 FCC ID: A3LSMN9005  
 FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)  
 Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
<b>TRANSMITTER MODE (TX)</b>					
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section, 7.0
2.1051 22.917(a)	Band Edge / Conducted Spurious Emissions	$> 43 + 10\log_{10}(P[\text{Watts}])$ at Band Edge and for all out-of-band emissions		PASS	Section, 7.0
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
22.913(a.2)	Effective Radiated Power	$< 7$ Watts max. ERP	RADIATED	PASS	Section 6.2
2.1053 22.917(a)	Undesirable Emissions	$> 43 + 10\log_{10}(P[\text{Watts}])$ for all out-of-band emissions		PASS	Section, 6.3
2.1055. 22.355	Frequency Stability	$< 2.5$ ppm (Part 22)		PASS	Section, 6.4

**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.
- 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 "LTEauto", Version 1.2.

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## 6.2 Effective Radiated Power (ERP)

### §22.913(a.2) RSS-132(4.4)

Frequency [MHz]	Channel Bandwidth [MHz]	Mod.	Battery	RB Size/Offset	Substitute Level [dBm]	Antenna Gain [dBd]	Pol [H/V]	ERP [dBm]	ERP [Watts]	Margin [dB]
824.70	1.4	QPSK	Standard	1 / 5	13.16	4.68	V	17.84	0.061	-20.61
836.50	1.4	QPSK	Standard	3 / 2	14.38	4.82	V	19.20	0.083	-19.25
848.30	1.4	QPSK	Standard	1 / 0	14.61	4.96	V	<b>19.57</b>	<b>0.091</b>	-18.88
824.70	1.4	16-QAM	Standard	1 / 5	12.15	4.68	V	16.83	0.048	-21.62
836.50	1.4	16-QAM	Standard	3 / 2	13.41	4.82	V	18.23	0.067	-20.22
848.30	1.4	16-QAM	Standard	1 / 0	13.52	4.96	V	<b>18.48</b>	<b>0.070</b>	-19.97
825.50	3	QPSK	Standard	1 / 14	13.28	4.68	V	17.96	0.063	-20.49
836.50	3	QPSK	Standard	1 / 14	14.43	4.82	V	19.25	0.084	-19.20
847.50	3	QPSK	Standard	1 / 0	14.72	4.96	V	<b>19.68</b>	<b>0.093</b>	-18.77
825.50	3	16-QAM	Standard	1 / 14	12.00	4.68	V	16.68	0.047	-21.77
836.50	3	16-QAM	Standard	1 / 14	13.52	4.82	V	18.34	0.068	-20.11
847.50	3	16-QAM	Standard	1 / 0	13.51	4.96	V	<b>18.47</b>	<b>0.070</b>	-19.98
826.50	5	QPSK	Standard	1 / 24	13.19	4.68	V	17.87	0.061	-20.58
836.50	5	QPSK	Standard	1 / 24	13.60	4.82	V	18.42	0.070	-20.03
846.50	5	QPSK	Standard	1 / 24	14.21	4.96	V	<b>19.17</b>	<b>0.083</b>	-19.28
826.50	5	16-QAM	Standard	1 / 24	12.23	4.68	V	16.91	0.049	-21.54
836.50	5	16-QAM	Standard	1 / 24	12.68	4.82	V	17.50	0.056	-20.95
846.50	5	16-QAM	Standard	1 / 24	13.11	4.96	V	<b>18.07</b>	<b>0.064</b>	-20.38
829.00	10	QPSK	Standard	1 / 49	13.73	4.68	V	18.41	0.069	-20.04
836.50	10	QPSK	Standard	1 / 49	14.15	4.82	V	18.97	0.079	-19.48
844.00	10	QPSK	Standard	1 / 49	14.46	4.96	V	<b>19.42</b>	<b>0.088</b>	-19.03
829.00	10	16-QAM	Standard	1 / 49	12.57	4.68	V	17.25	0.053	-21.20
836.50	10	16-QAM	Standard	1 / 49	13.19	4.82	V	18.01	0.063	-20.44
844.00	10	16-QAM	Standard	1 / 49	13.40	4.96	V	<b>18.36</b>	<b>0.069</b>	-20.09

Table 6-2. ERP Data (Band 5)

#### NOTES:

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

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### 6.3 Band 5 Radiated Spurious Emissions §2.1053 §22.917(a) RSS-132(4.5.1)

#### Field Strength of SPURIOUS Radiation

OPERATING FREQUENCY: 825.50 MHz  
 MEASURED OUTPUT POWER: 17.96 dBm = 0.063 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  30.96 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1651.00	-45.99	3.72	-42.27	V	60.24
2476.50	-53.15	3.61	-49.53	V	67.49
3302.00	-79.94	5.64	-74.29	V	92.26
4127.50	-79.17	6.94	-72.23	V	90.19
4953.00	-78.76	7.84	-70.92	V	88.89

**Table 6-3. Radiated Spurious Data**

#### NOTES:

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

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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**Band 5 Radiated Spurious Measurements (continued)**  
**§2.1053 §22.917(a) RSS-132(4.5.1)**

**Field Strength of SPURIOUS Radiation**

OPERATING FREQUENCY: 836.50 MHz  
 MEASURED OUTPUT POWER: 19.25 dBm = 0.084 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10}(W) =$  32.25 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1673.00	-43.49	3.67	-39.82	V	59.08
2509.50	-51.42	3.65	-47.77	V	67.02
3346.00	-80.00	5.74	-74.26	V	93.52
4182.50	-79.33	7.04	-72.29	V	91.54
5019.00	-78.75	7.90	-70.85	V	90.10

**Table 6-4. Radiated Spurious Data**

**NOTES:**

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

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset	Page 14 of 39	

**Band 5 Radiated Spurious Measurements (continued)**  
**§2.1053 §22.917(a) RSS-132(4.5.1)**

**Field Strength of SPURIOUS Radiation**

OPERATING FREQUENCY: 847.50 MHz  
 MEASURED OUTPUT POWER: 19.68 dBm = 0.093 W  
 MODULATION SIGNAL: QPSK  
 BANDWIDTH: 3 MHz  
 DISTANCE: 3 meters  
 LIMIT:  $43 + 10 \log_{10} (W) =$  32.68 dBc

FREQUENCY (MHz)	LEVEL @ ANTENNA TERMINALS (dBm)	SUBSTITUTE ANTENNA GAIN (dBd)	SPURIOUS EMISSION LEVEL (dBm)	POL (H/V)	(dBc)
1695.00	-46.70	3.62	-43.09	V	62.77
2542.50	-53.67	3.72	-49.96	V	69.64
3390.00	-80.06	5.83	-74.23	V	93.91
4237.50	-79.45	7.11	-72.34	V	92.02
5085.00	-78.59	7.93	-70.66	V	90.34

**Table 6-5. Radiated Spurious Data**

**NOTES:**

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

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 6.4 Band 5 Frequency Stability Measurements

§2.1055 §22.355 RSS-132(4.3)

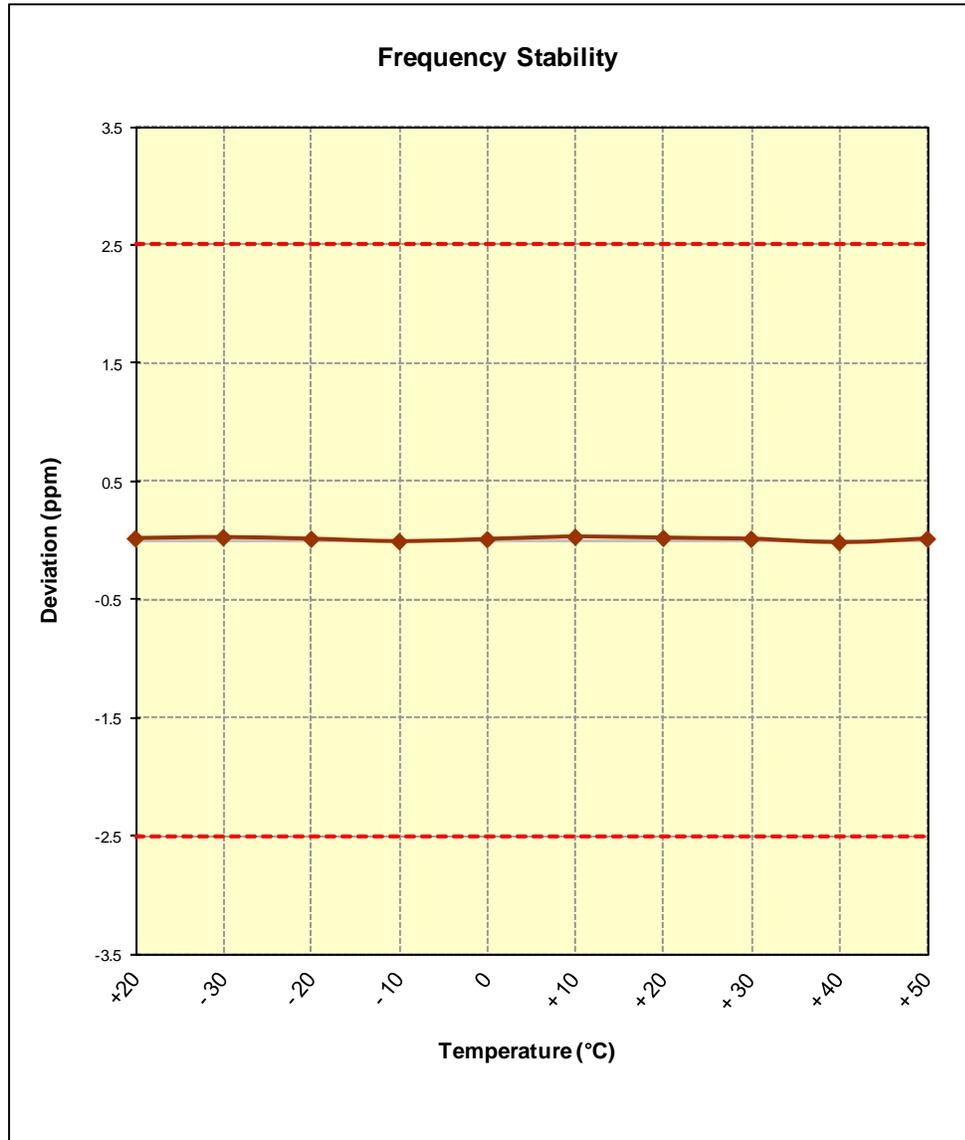
OPERATING FREQUENCY: 836,500,000 Hz  
 CHANNEL: 20525  
 REFERENCE VOLTAGE: 3.8 VDC  
 DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

VOLTAGE (%)	POWER (VDC)	TEMP (° C)	FREQUENCY (Hz)	Freq. Dev. (Hz)	Deviation (%)
100 %	3.80	+ 20 (Ref)	836,500,010	10	0.0000012
100 %		- 30	836,500,017	17	0.0000020
100 %		- 20	836,500,006	6	0.0000007
100 %		- 10	836,499,989	-11	-0.0000013
100 %		0	836,500,004	4	0.0000005
100 %		+ 10	836,500,021	21	0.0000025
100 %		+ 20	836,500,013	13	0.0000016
100 %		+ 30	836,500,006	6	0.0000007
100 %		+ 40	836,499,982	-18	-0.0000022
100 %		+ 50	836,500,007	7	0.0000008
115 %	4.37	+ 20	836,500,013	13	0.0000016
BATT. ENDPOINT	3.42	+ 20	836,500,005	5	0.0000006

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

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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**Band 5 Frequency Stability Measurements (Cont'd)**  
**§2.1055 §22.355 RSS-132(4.3)**

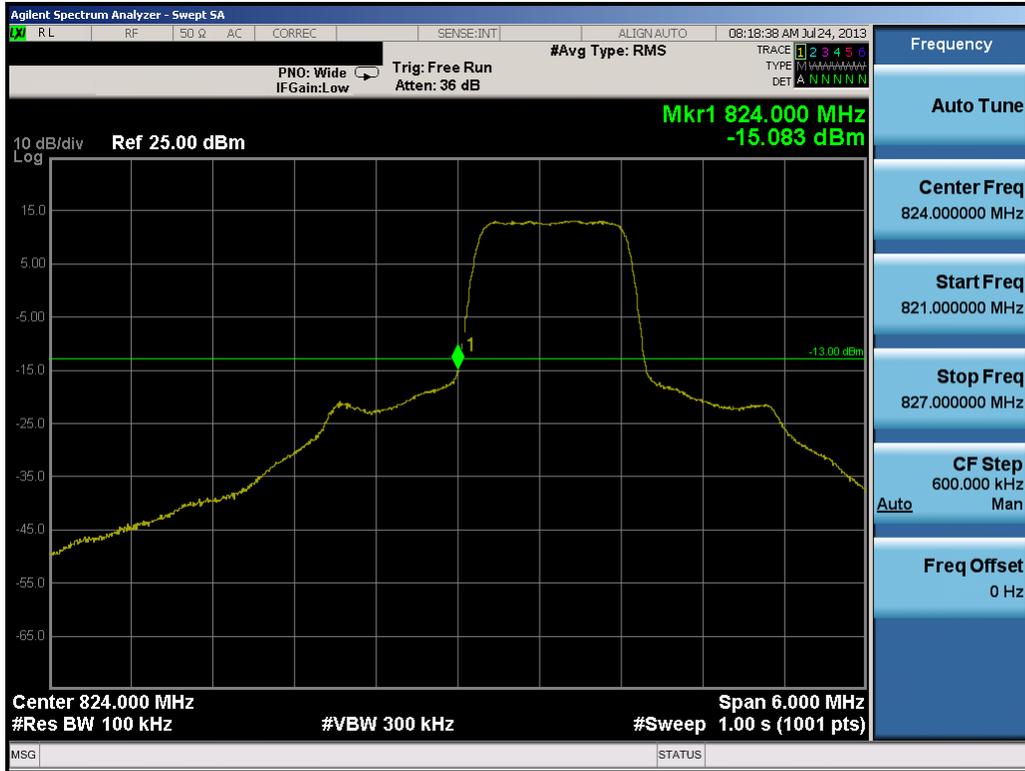


**Figure 6-1. Frequency Stability Graph (Band 5)**

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 7.0 BAND 5 PLOTS OF EMISSIONS

**Note:** All bandwidths, RB configurations, and modulations were investigated. The worst case test results are reported below.

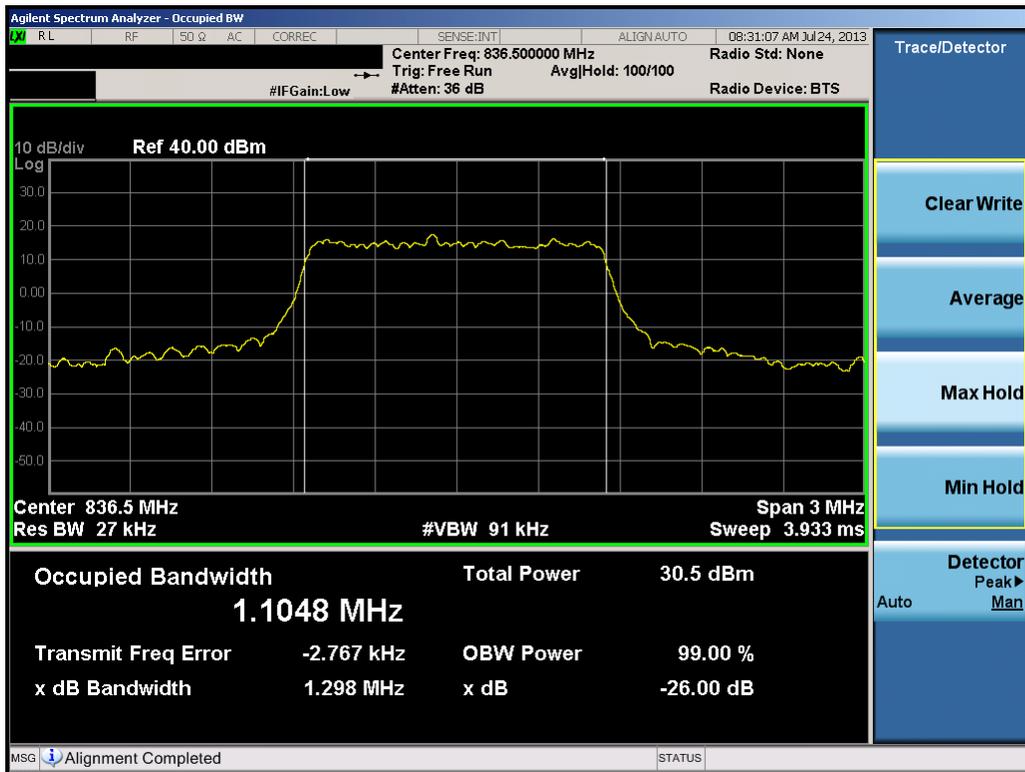


**Plot 7-1. Lower Band Edge Plot (1.4MHz QPSK – RB Size 6)**

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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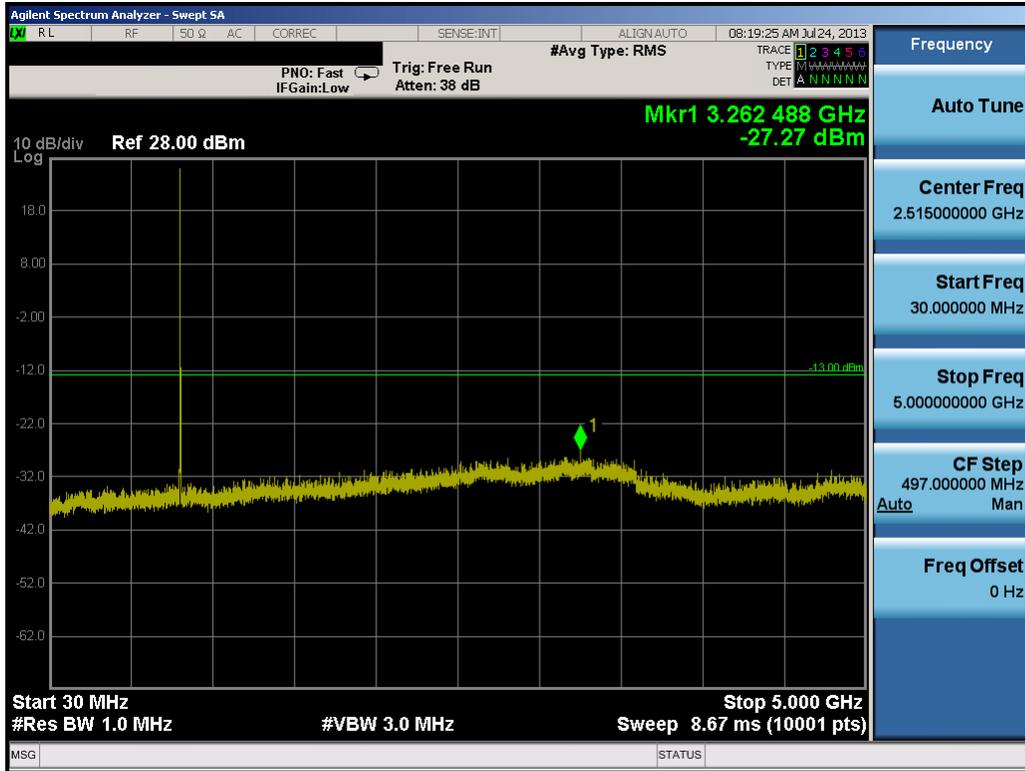


Plot 7-2. Occupied Bandwidth Plot (1.4MHz QPSK – RB Size 6)

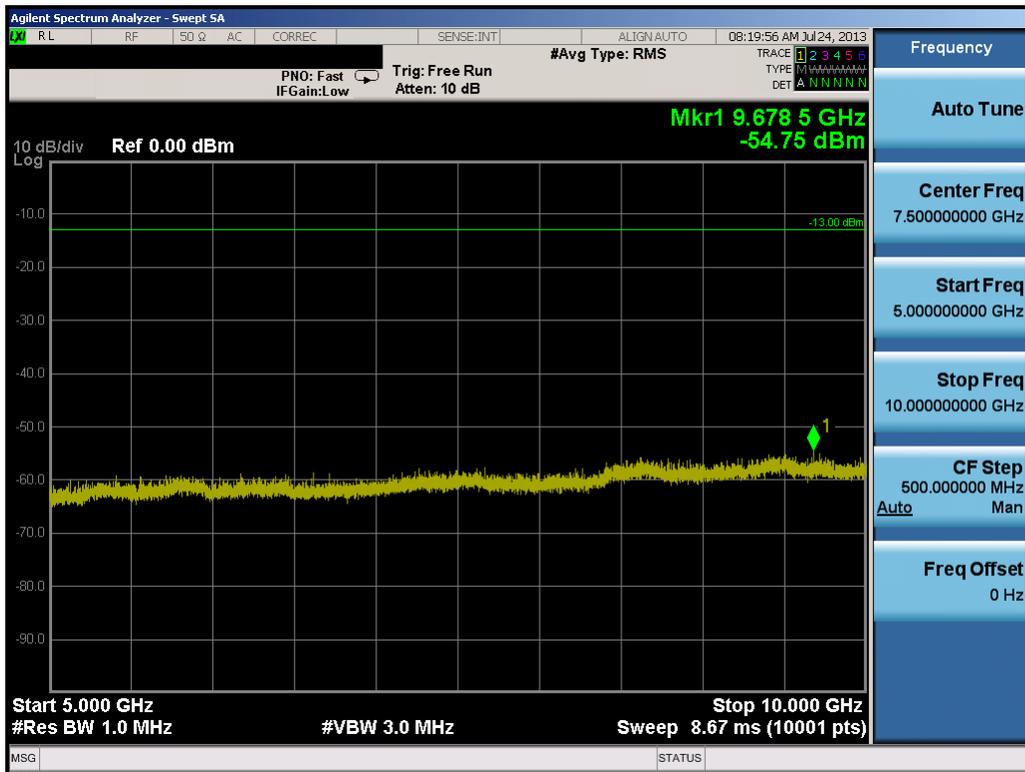


Plot 7-3. Occupied Bandwidth Plot (1.4MHz 16-QAM – RB Size 6)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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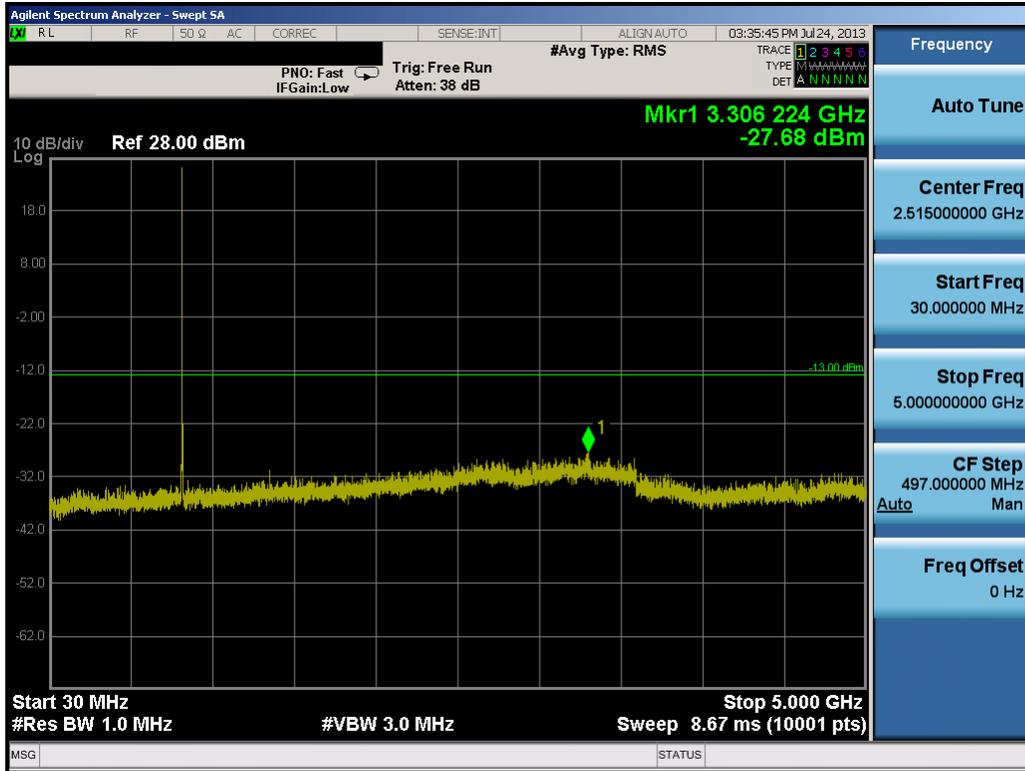


Plot 7-4. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

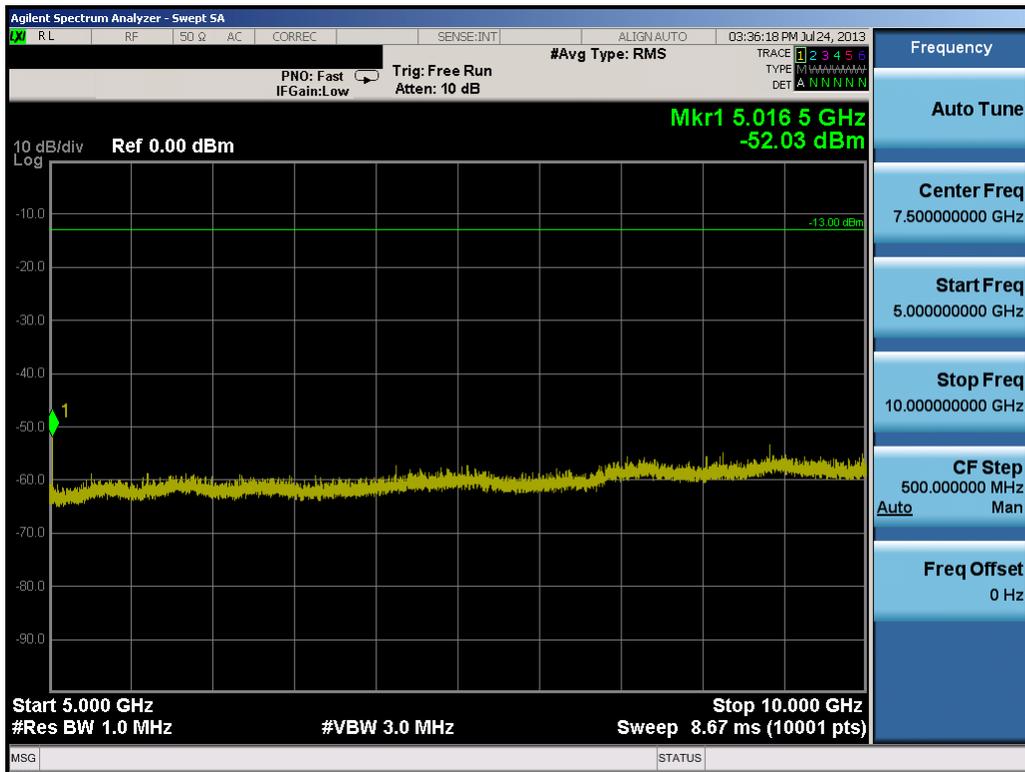


Plot 7-5. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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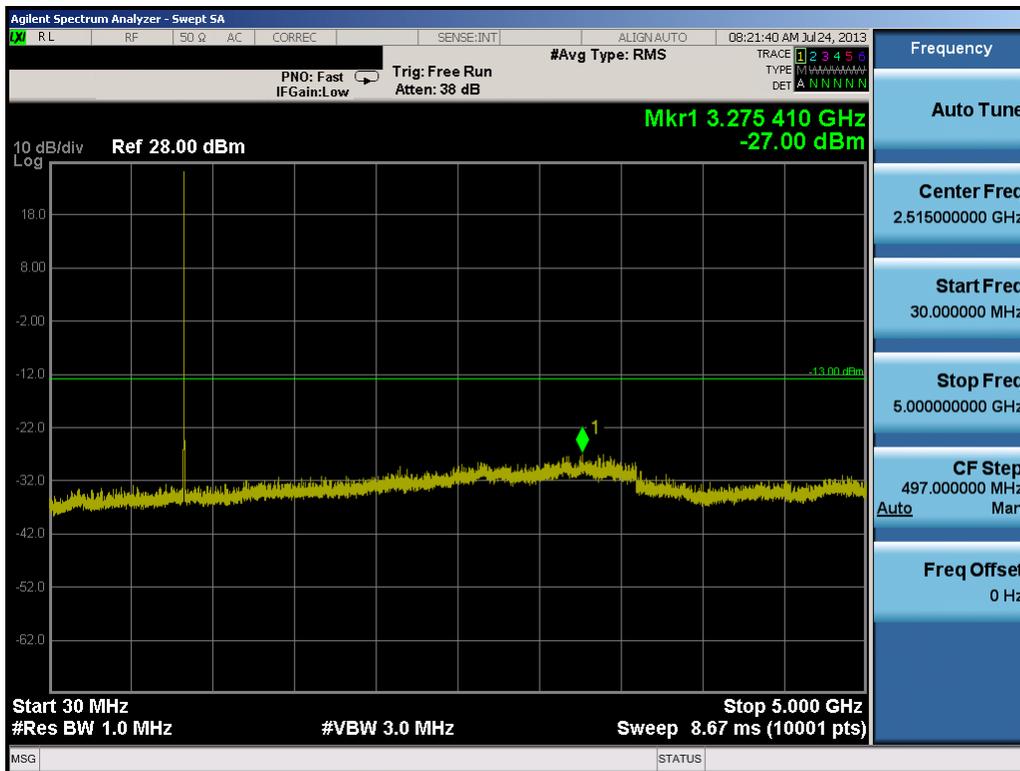


Plot 7-6. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

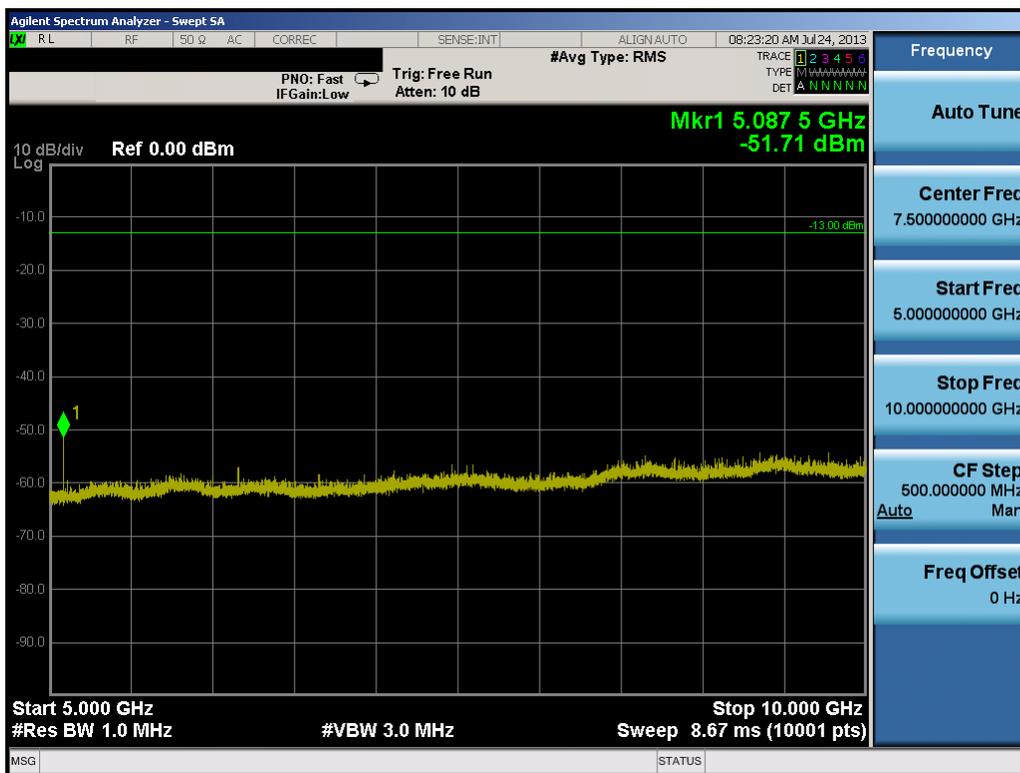


Plot 7-7. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-8. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

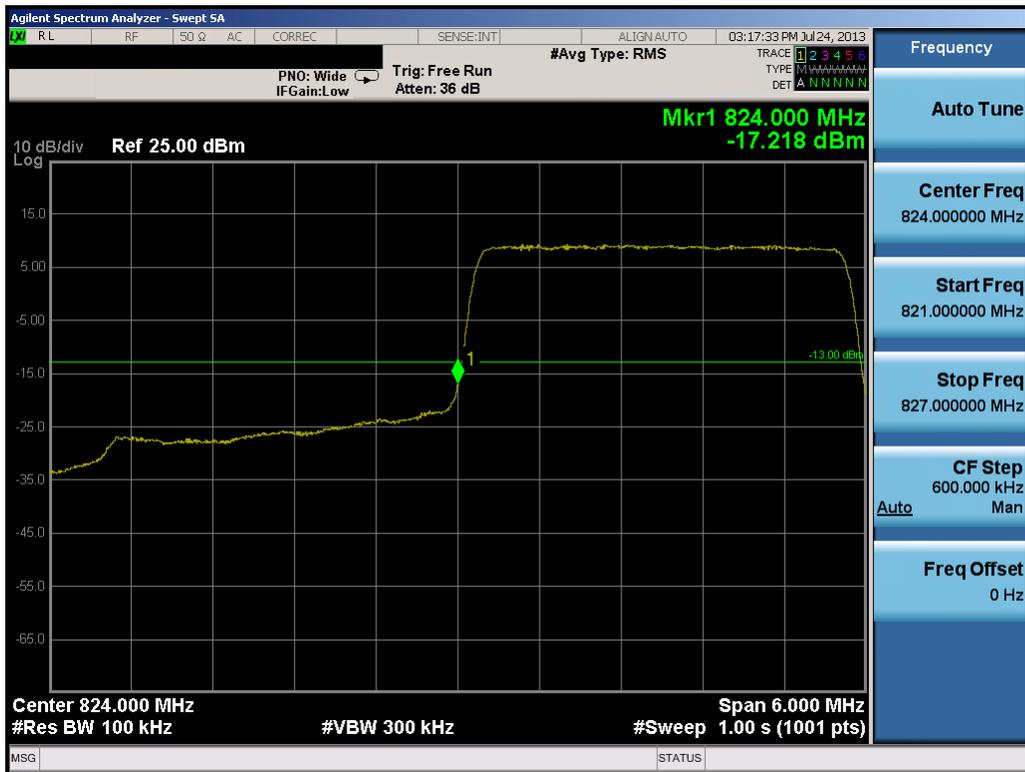


Plot 7-9. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-10. Upper Band Edge Plot (1.4MHz QPSK – RB Size 6)

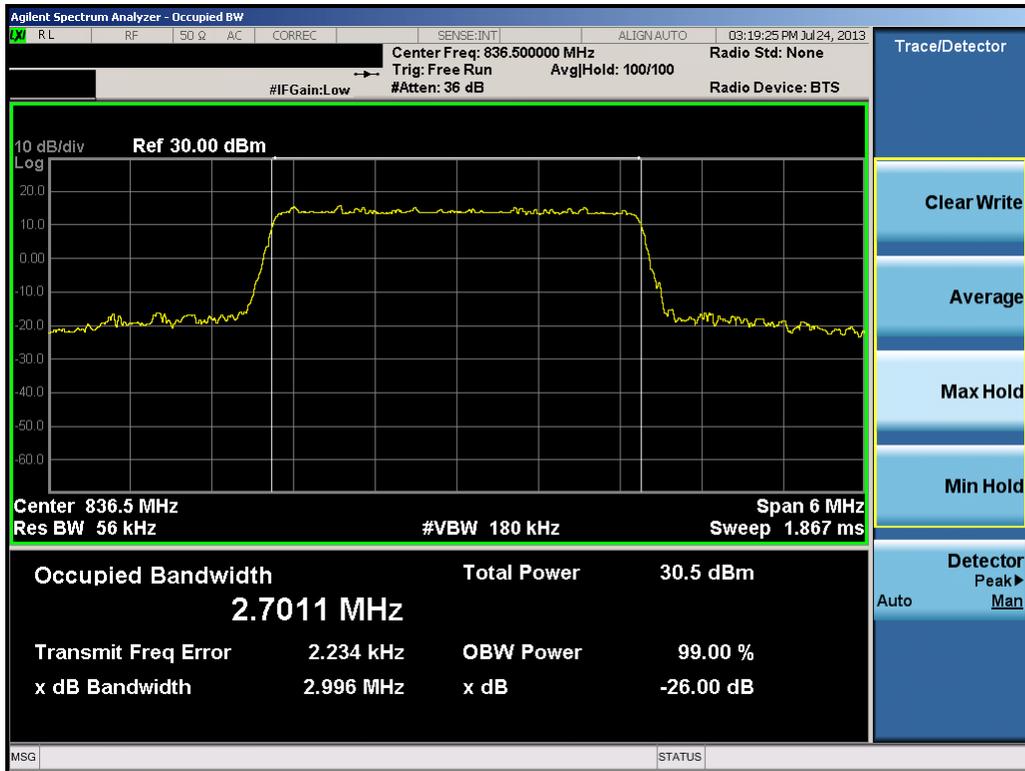


Plot 7-11. Lower Band Edge Plot (3.0MHz QPSK – RB Size 15)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 23 of 39

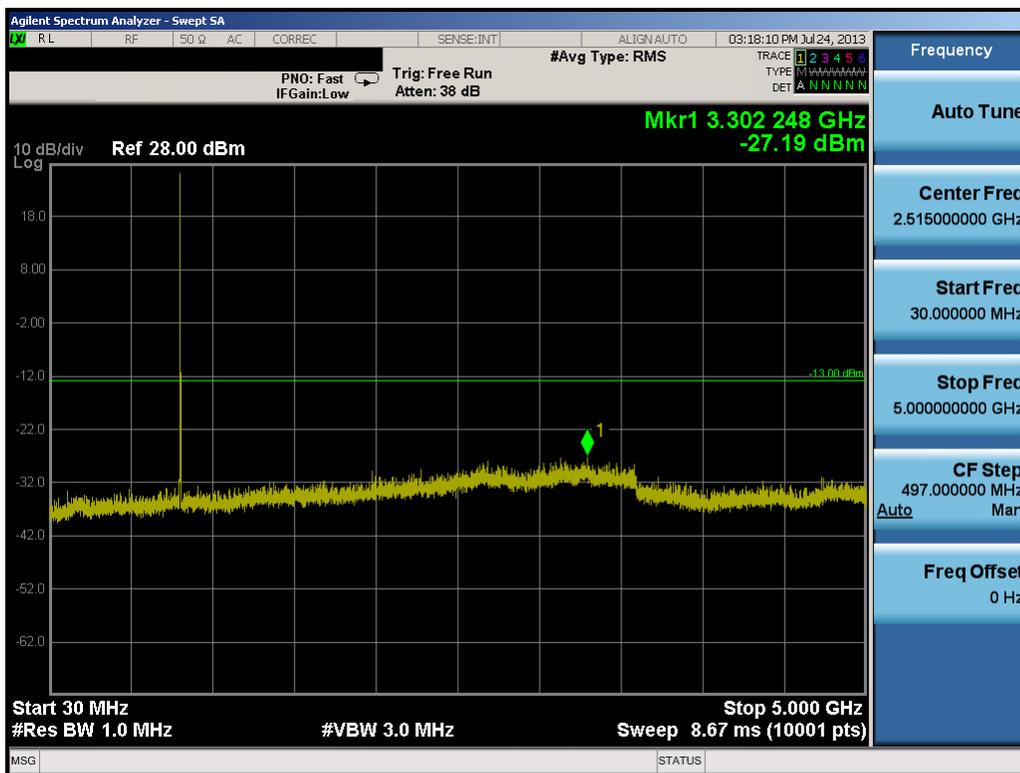


Plot 7-12. Occupied Bandwidth Plot (3.0MHz QPSK – RB Size 15)

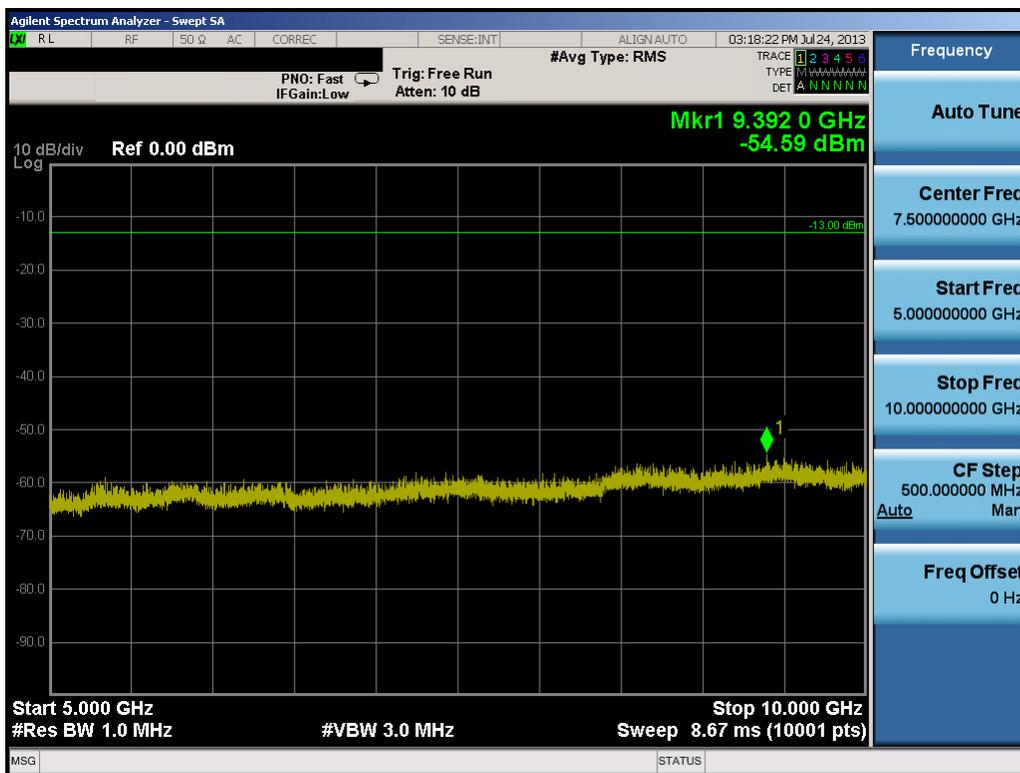


Plot 7-13. Occupied Bandwidth Plot (3.0MHz 16-QAM – RB Size 15)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 24 of 39

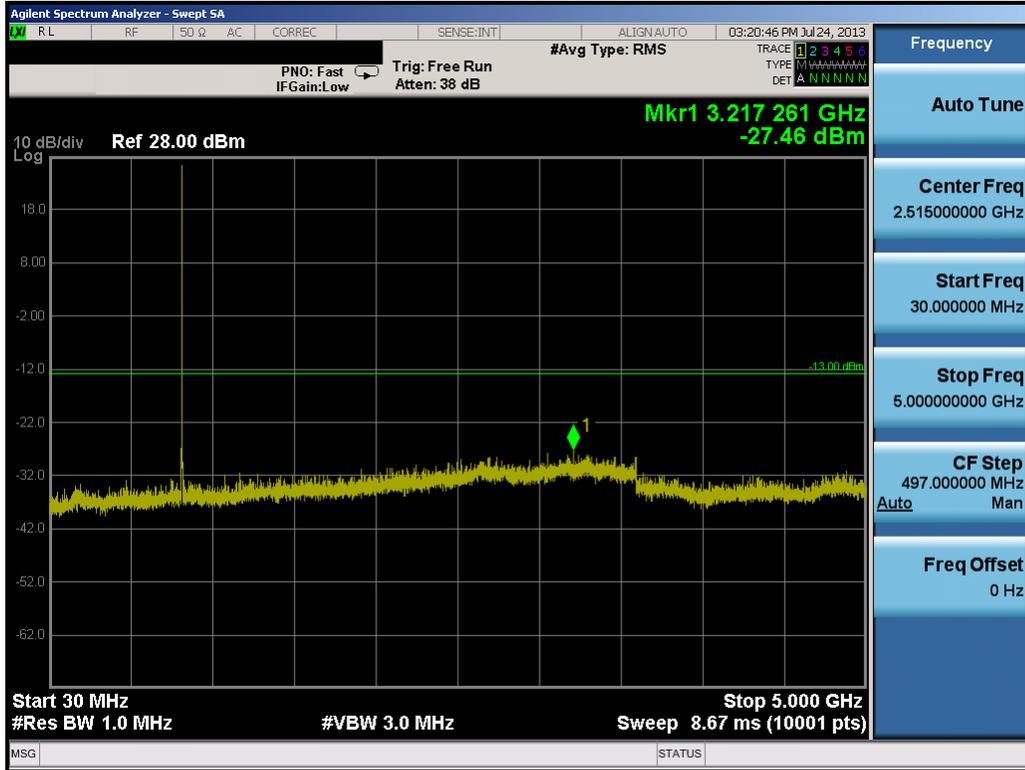


Plot 7-14. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

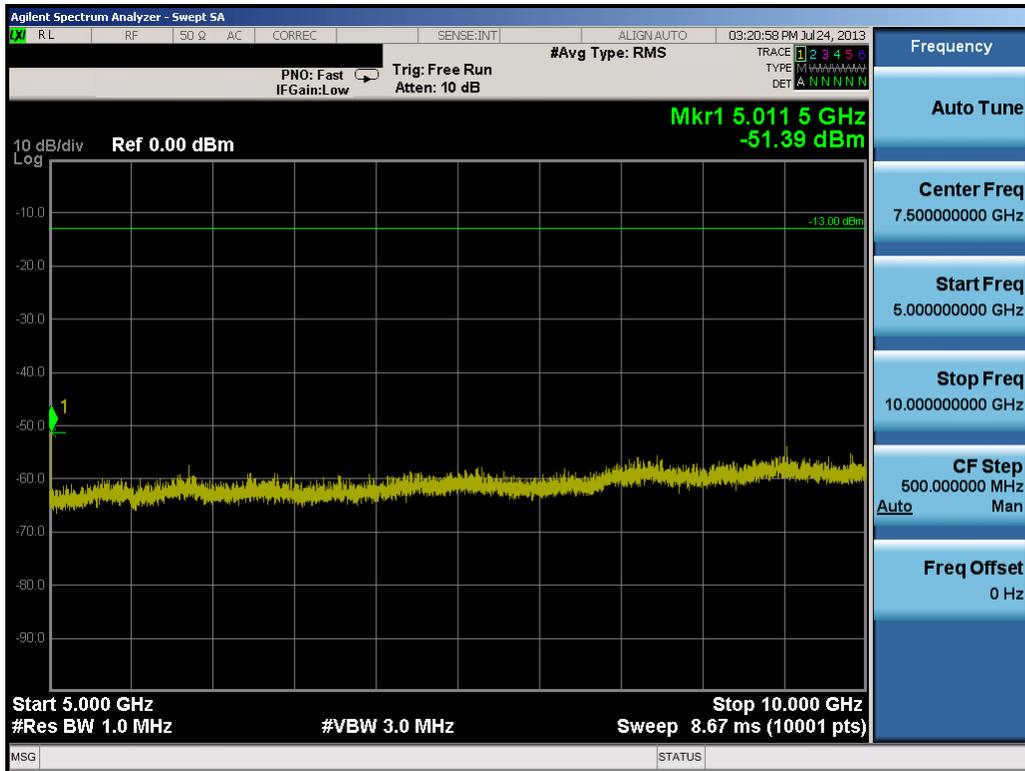


Plot 7-15. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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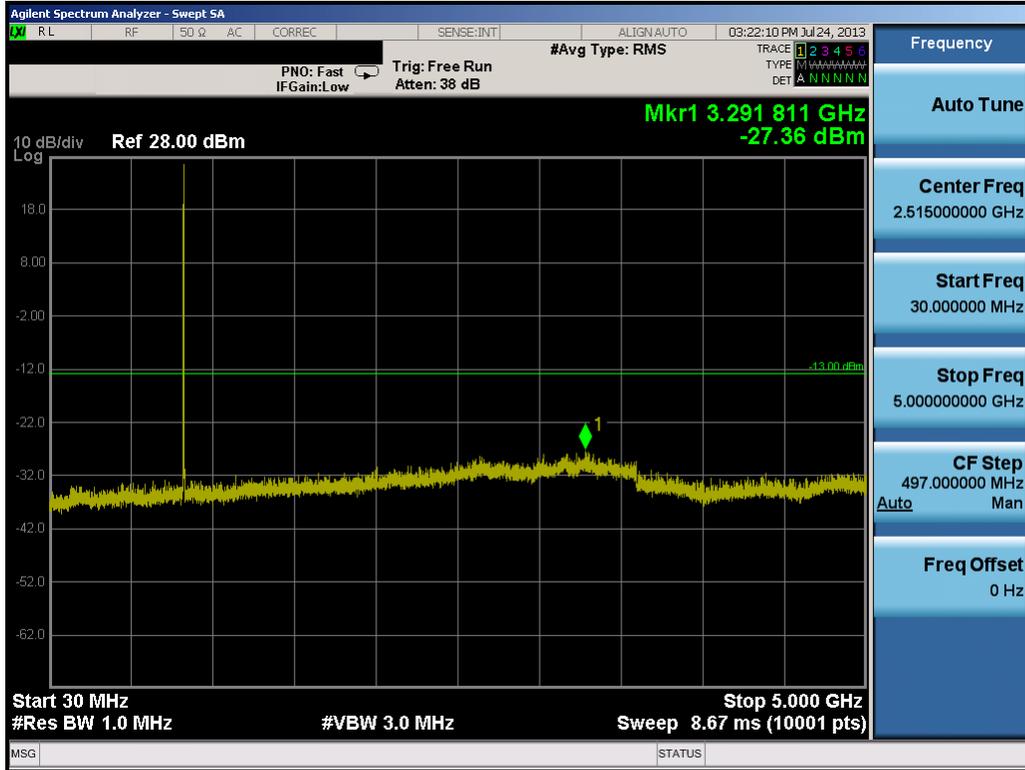


Plot 7-16. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

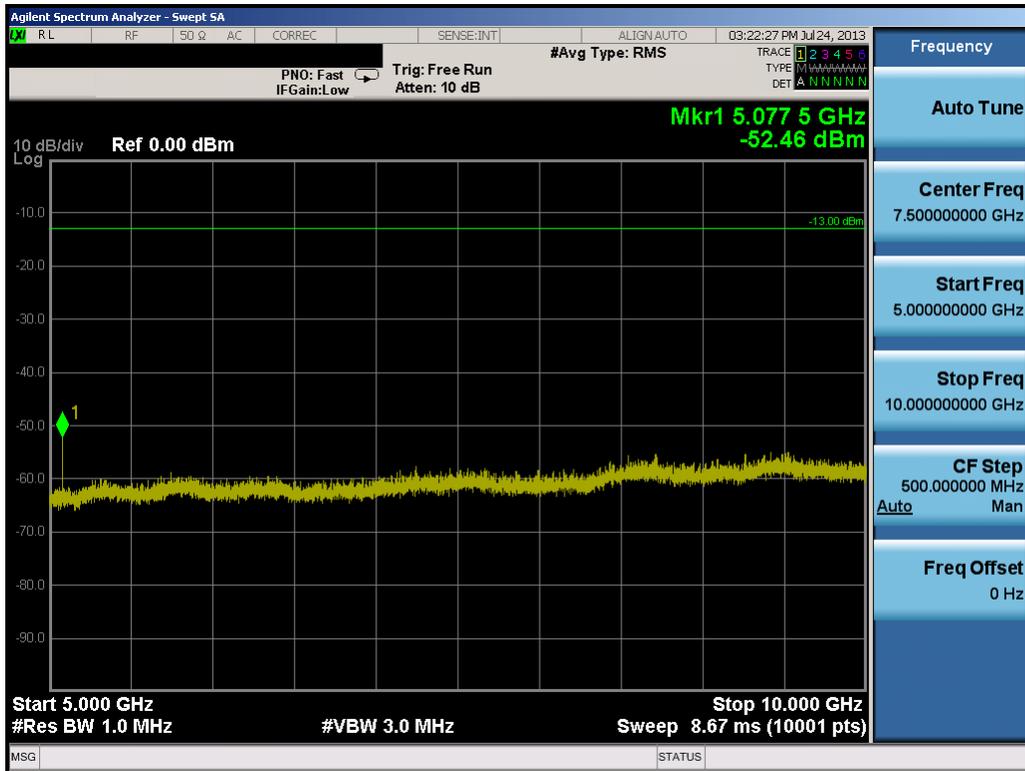


Plot 7-17. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-18. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

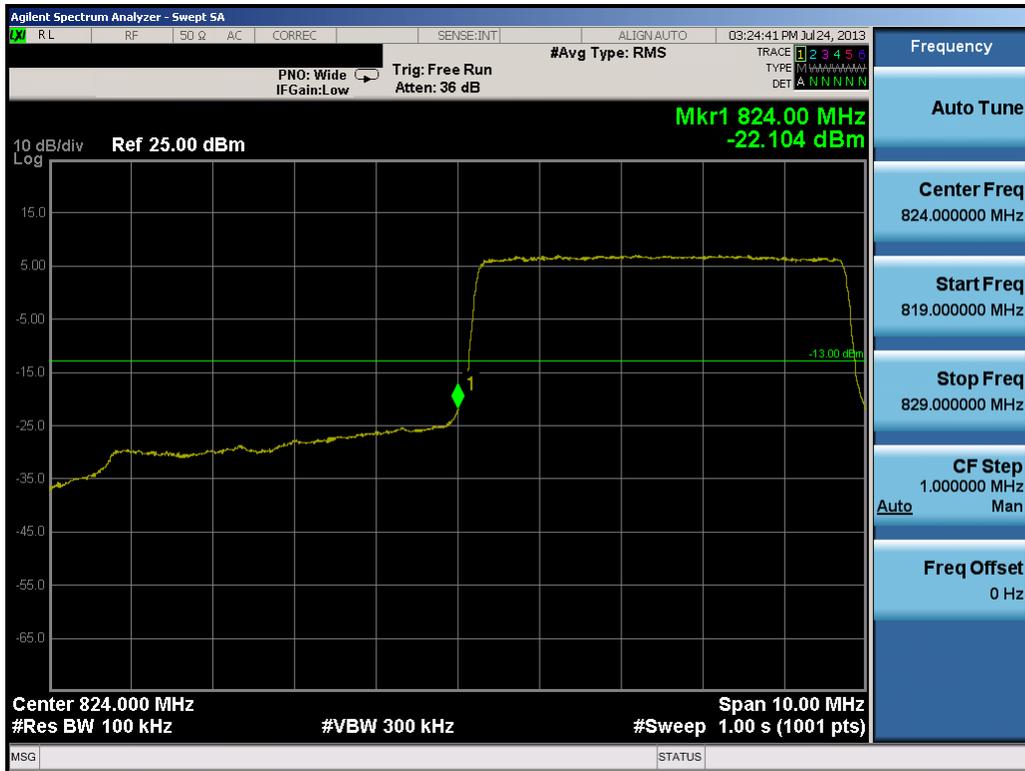


Plot 7-19. Conducted Spurious Plot (3.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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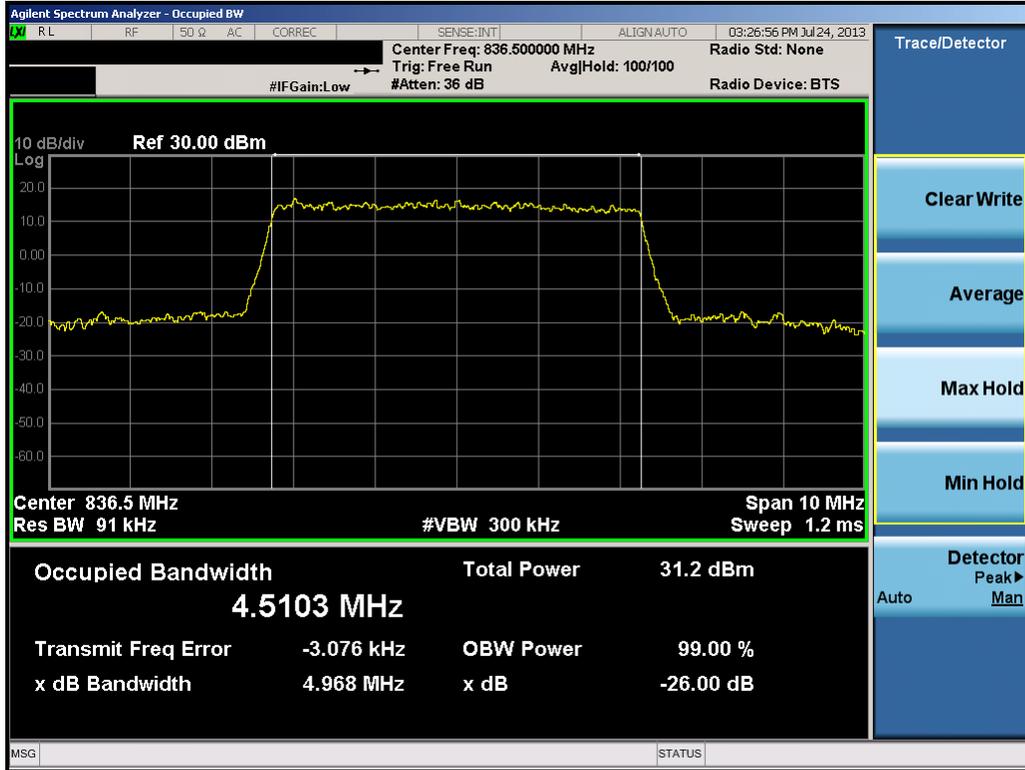


Plot 7-20. Upper Band Edge Plot (3.0MHz QPSK – RB Size 15)

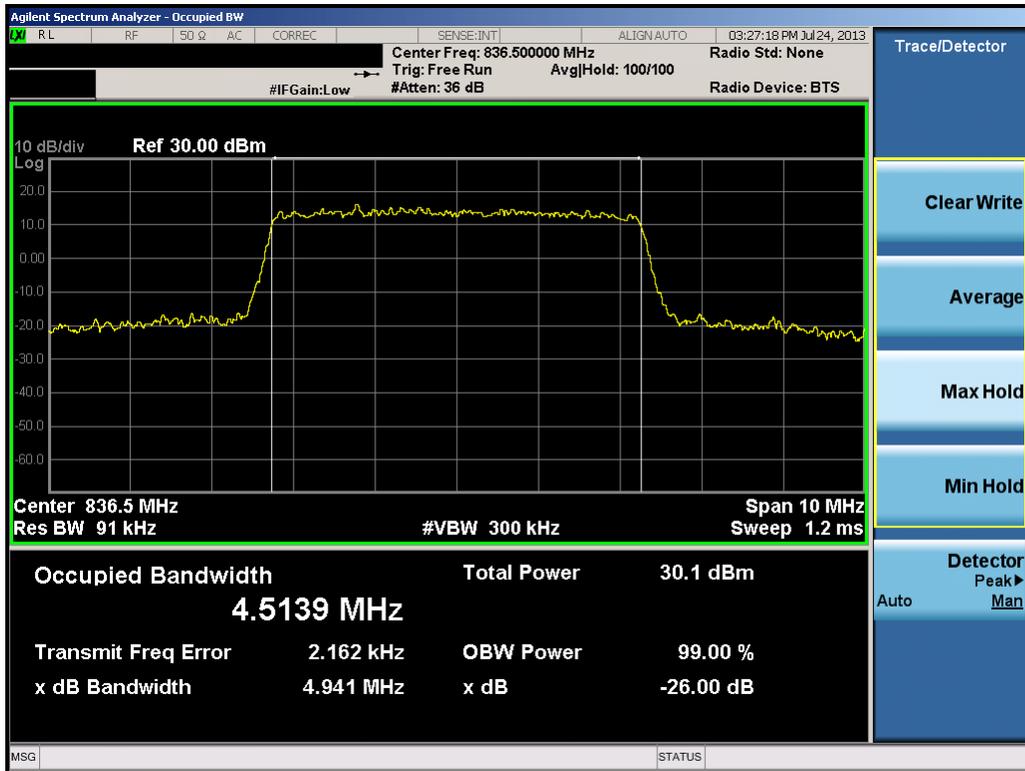


Plot 7-21. Lower Band Edge Plot (5.0MHz QPSK – RB Size 25)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 28 of 39

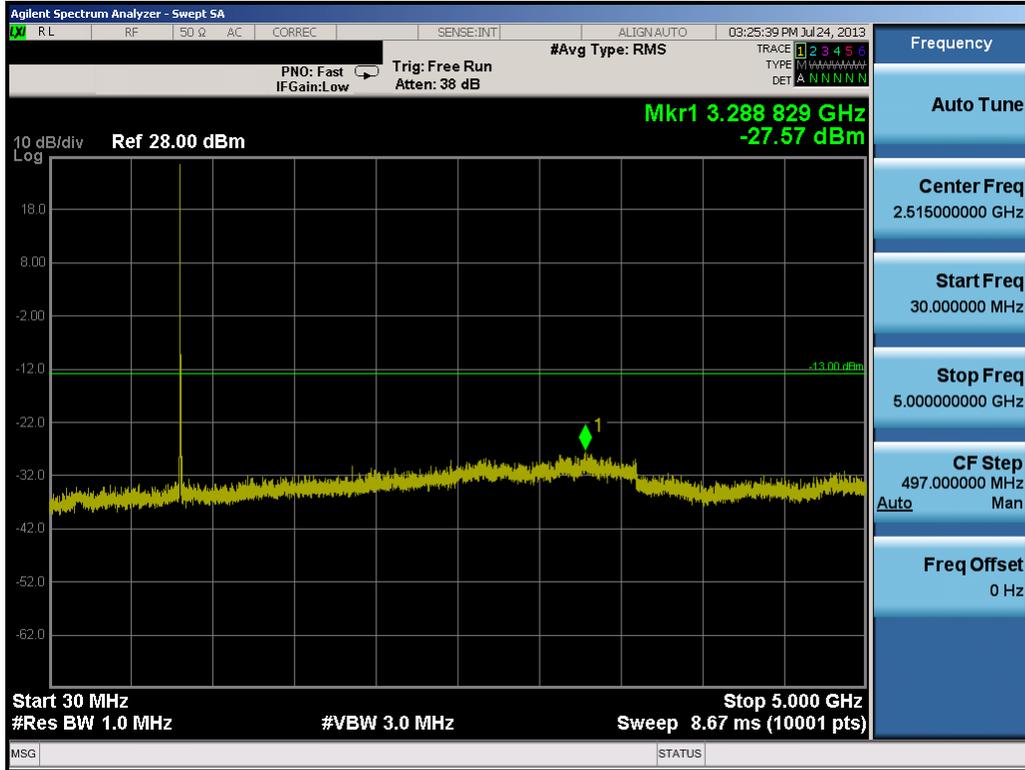


Plot 7-22. Occupied Bandwidth Plot (5.0MHz QPSK – RB Size 25)

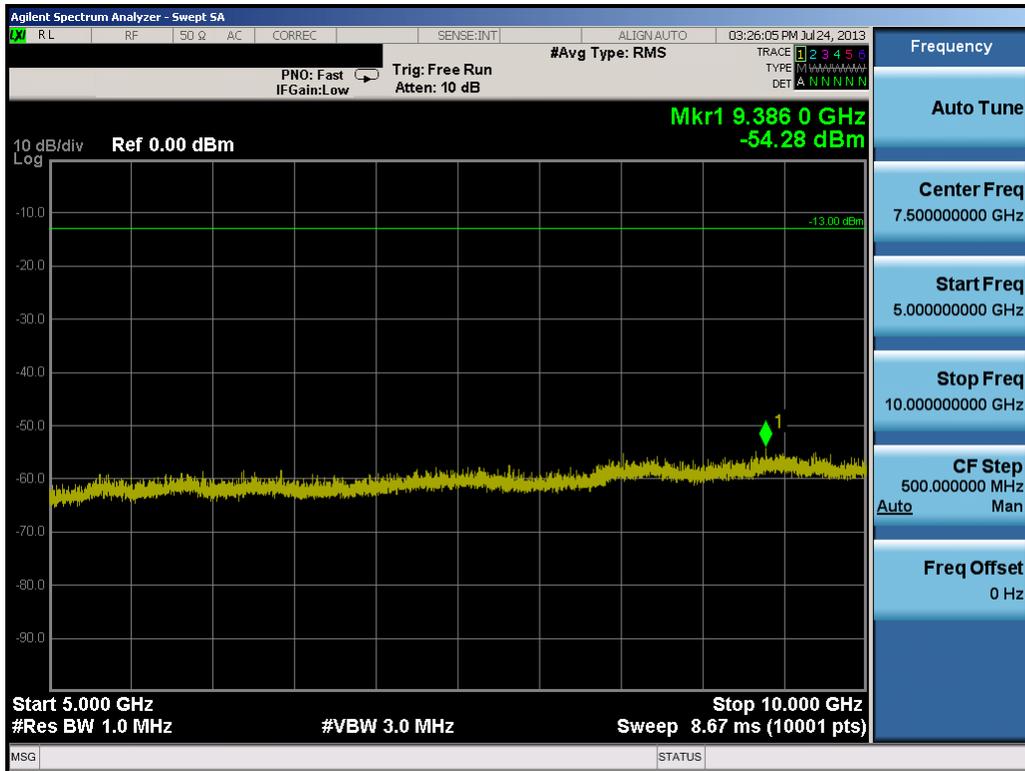


Plot 7-23. Occupied Bandwidth Plot (5.0MHz 16-QAM – RB Size 25)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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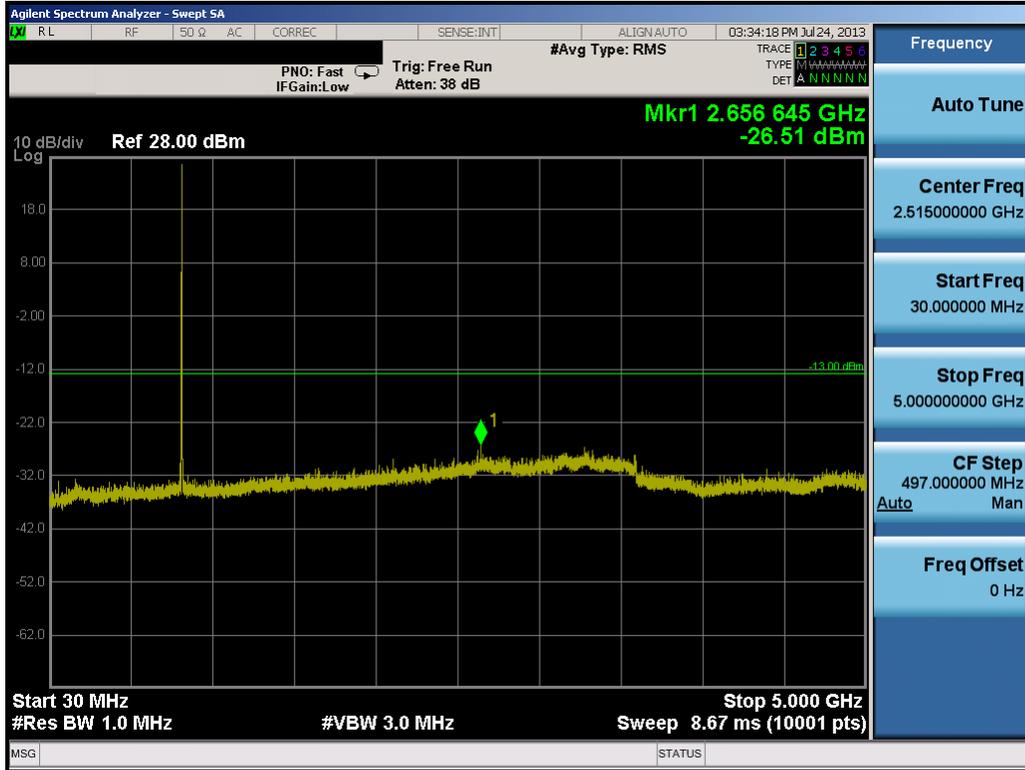


Plot 7-24. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

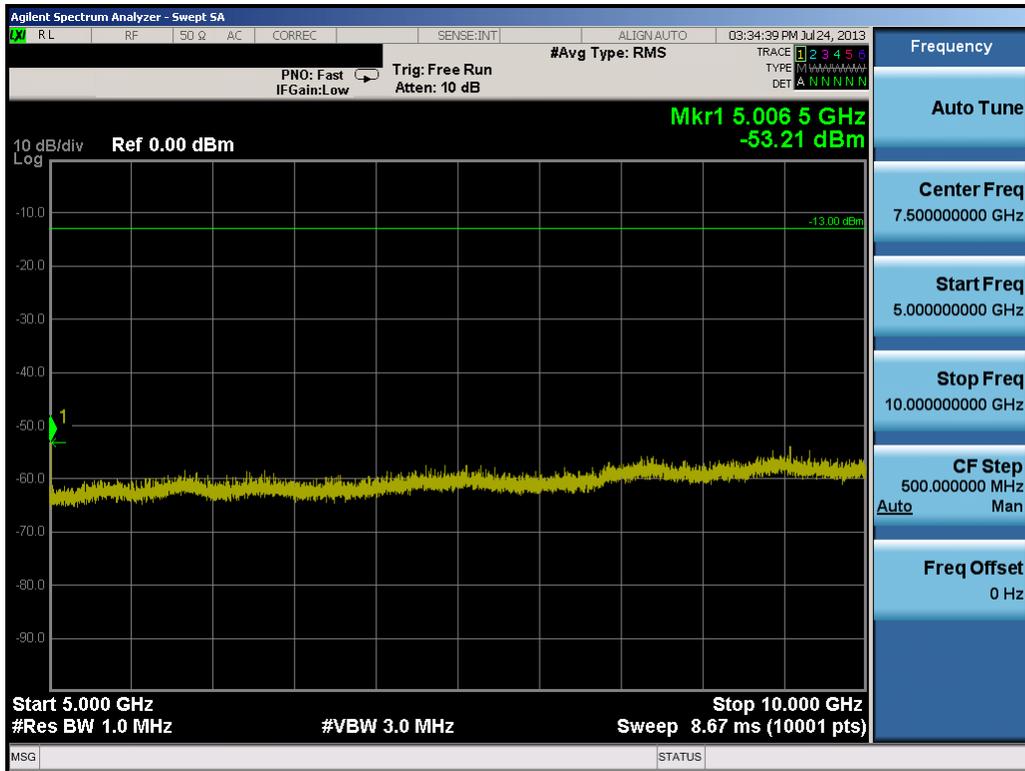


Plot 7-25. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 30 of 39

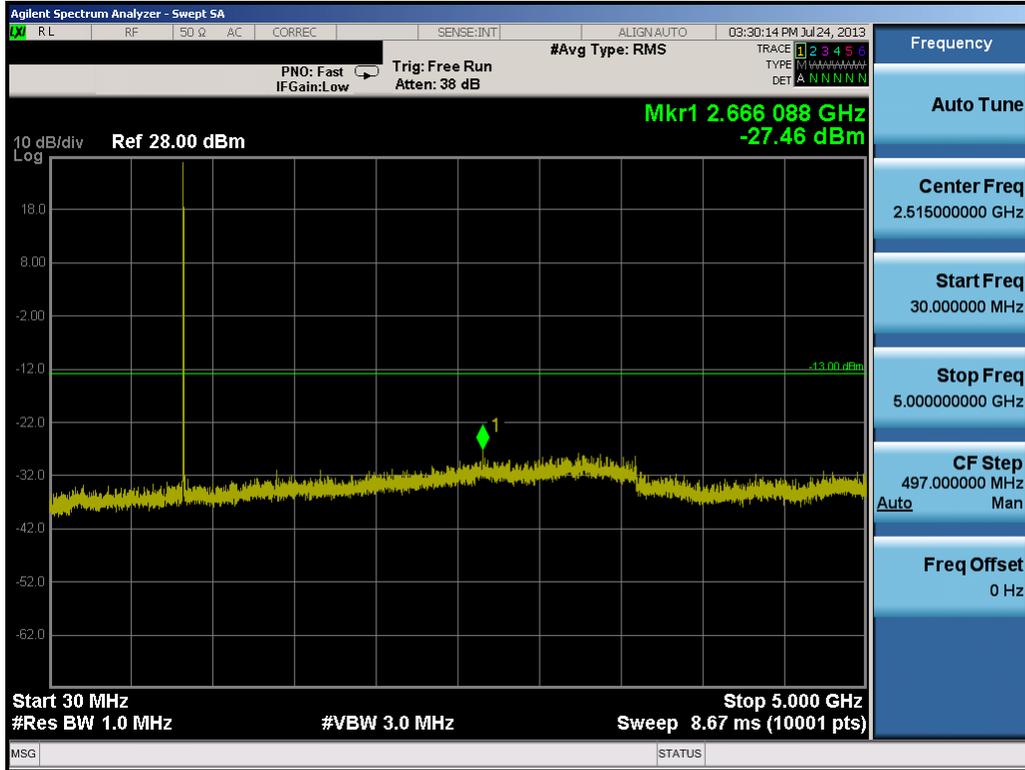


Plot 7-26. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

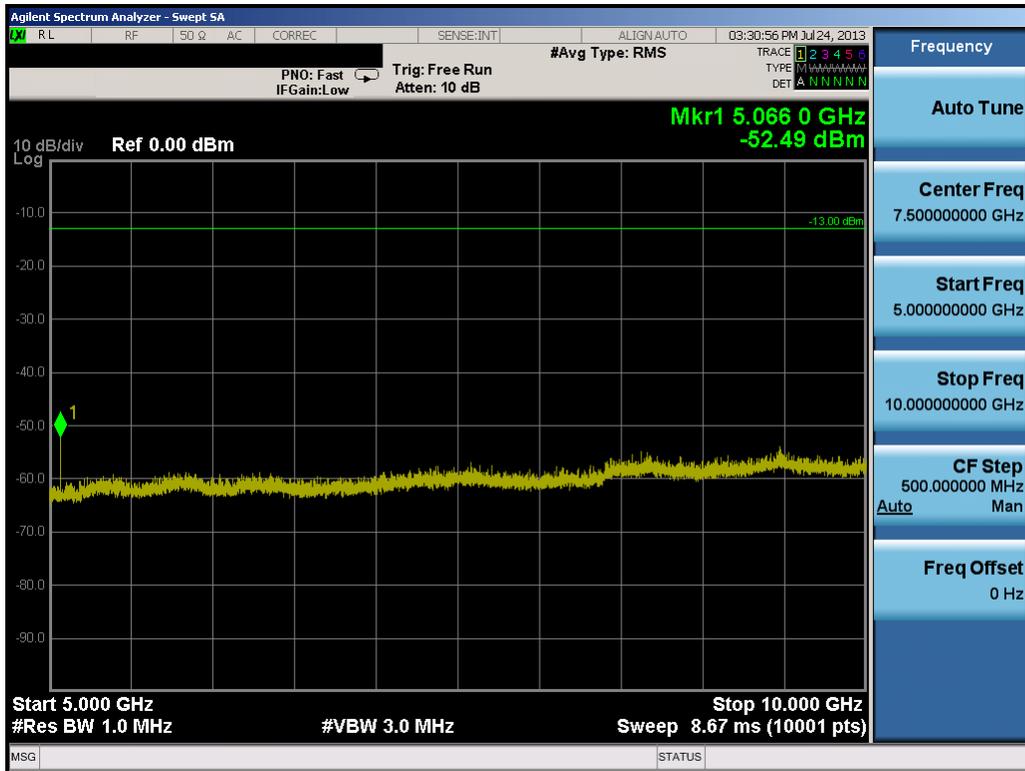


Plot 7-27. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-28. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

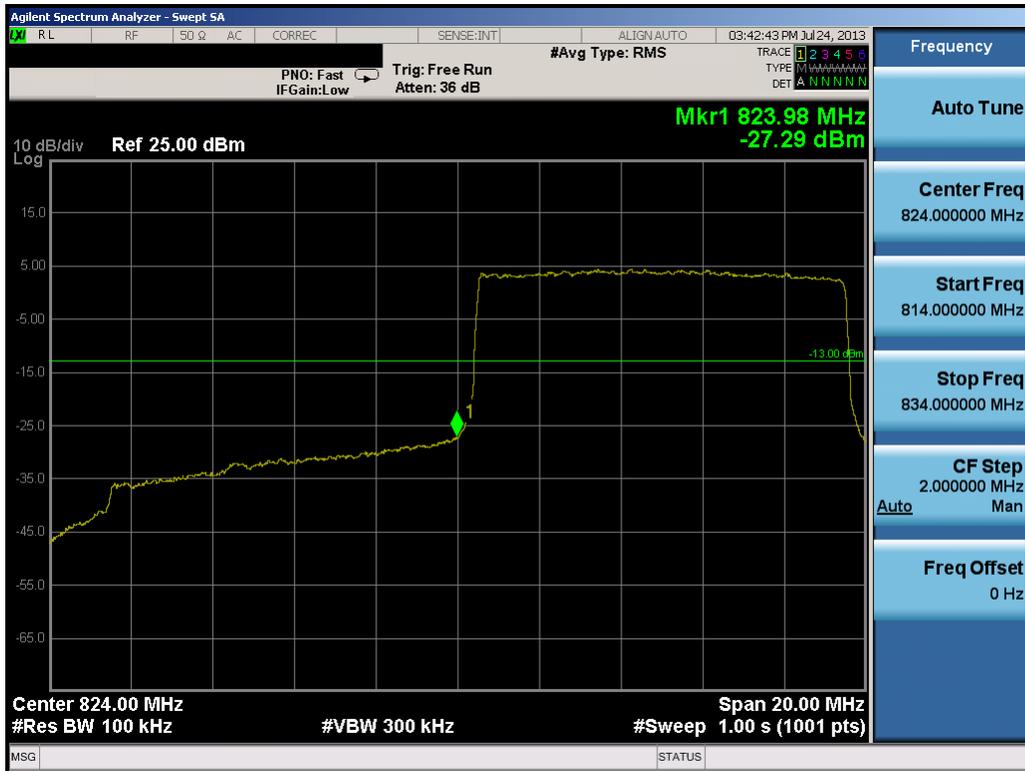


Plot 7-29. Conducted Spurious Plot (5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 32 of 39

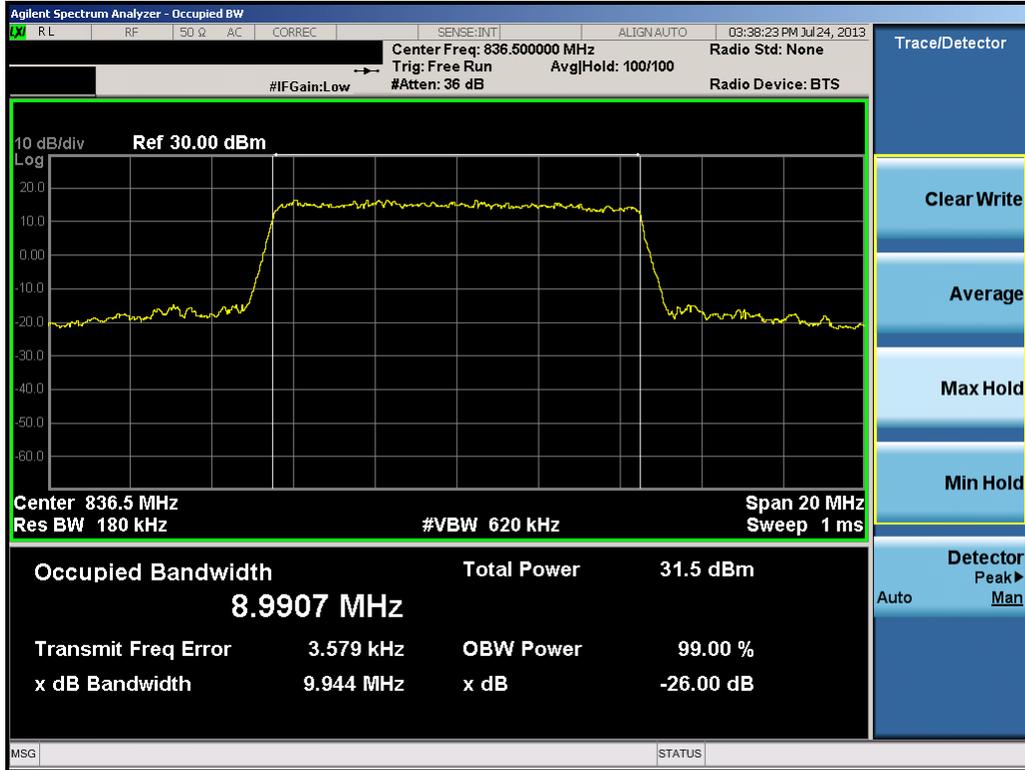


Plot 7-30. Upper Band Edge Plot (5.0MHz QPSK – RB Size 25)

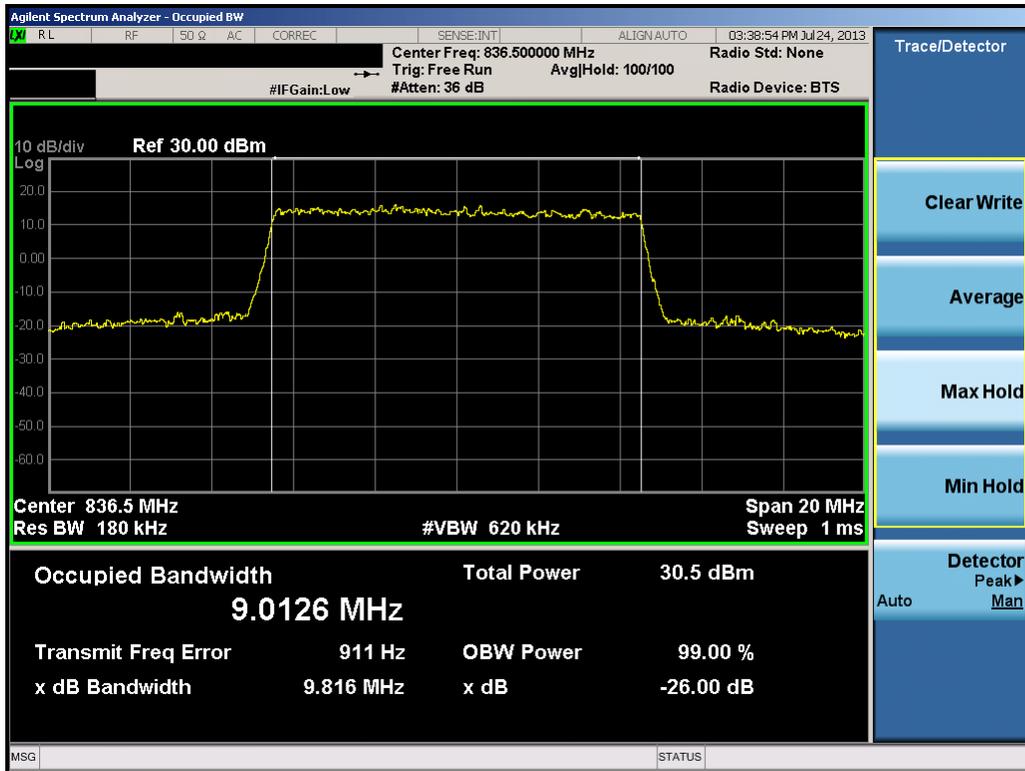


Plot 7-31. Lower Band Edge Plot (10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 33 of 39

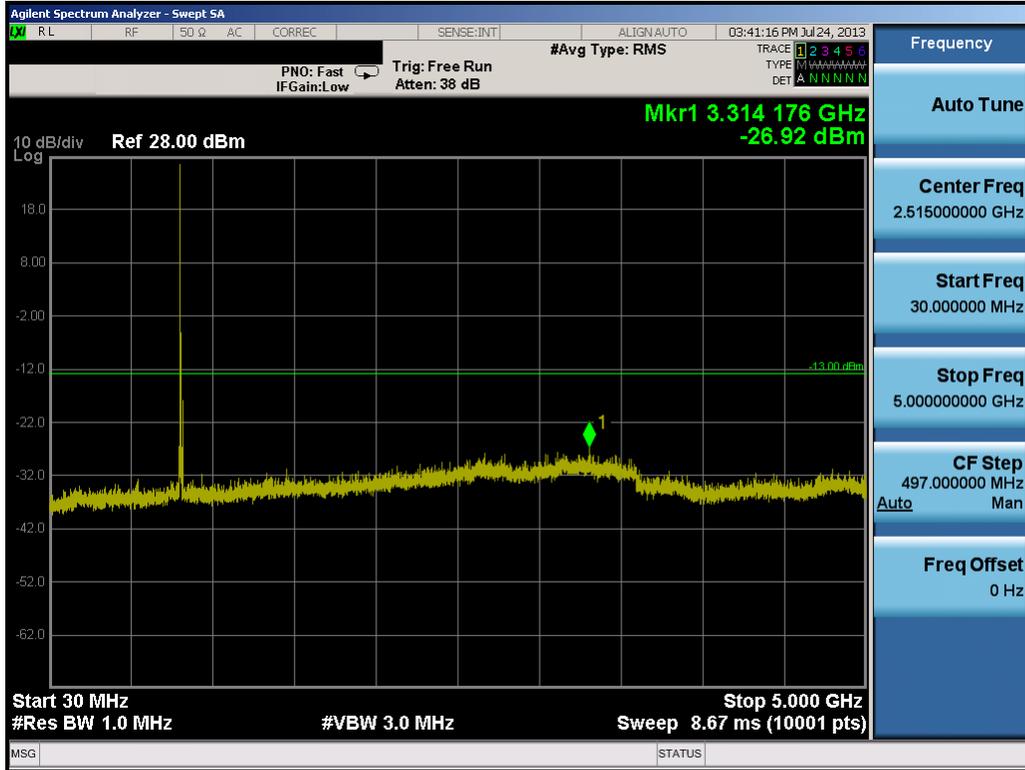


Plot 7-32. Occupied Bandwidth Plot (10.0MHz QPSK – RB Size 50)

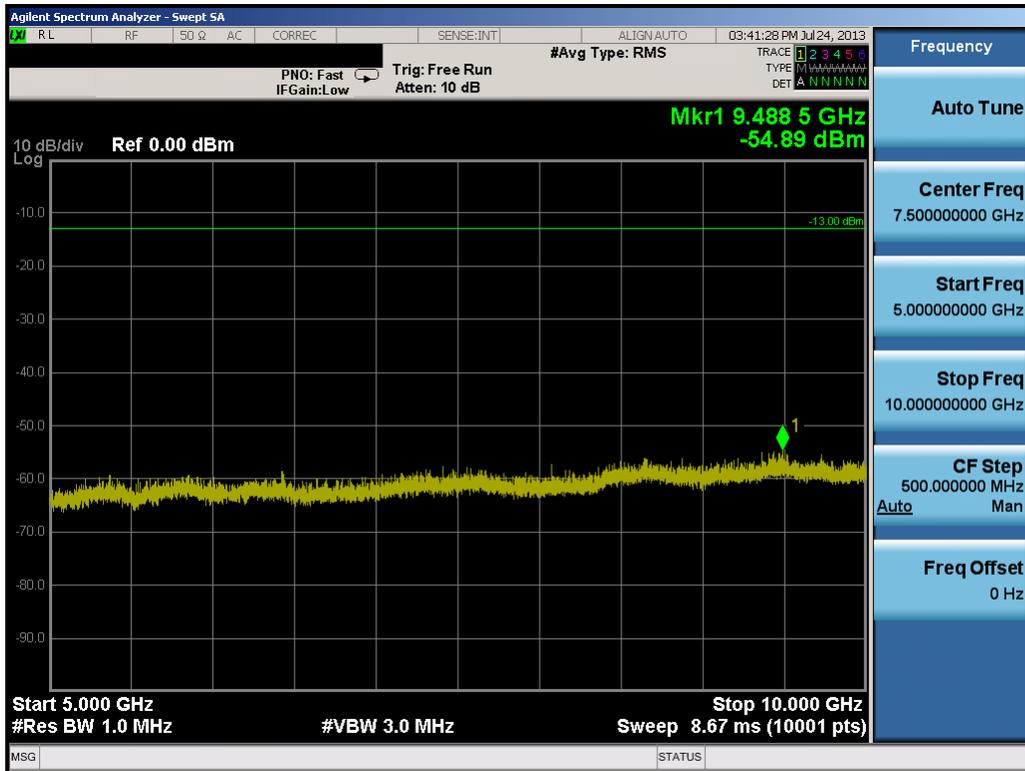


Plot 7-33. Occupied Bandwidth Plot (10.0MHz 16-QAM – RB Size 50)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 34 of 39

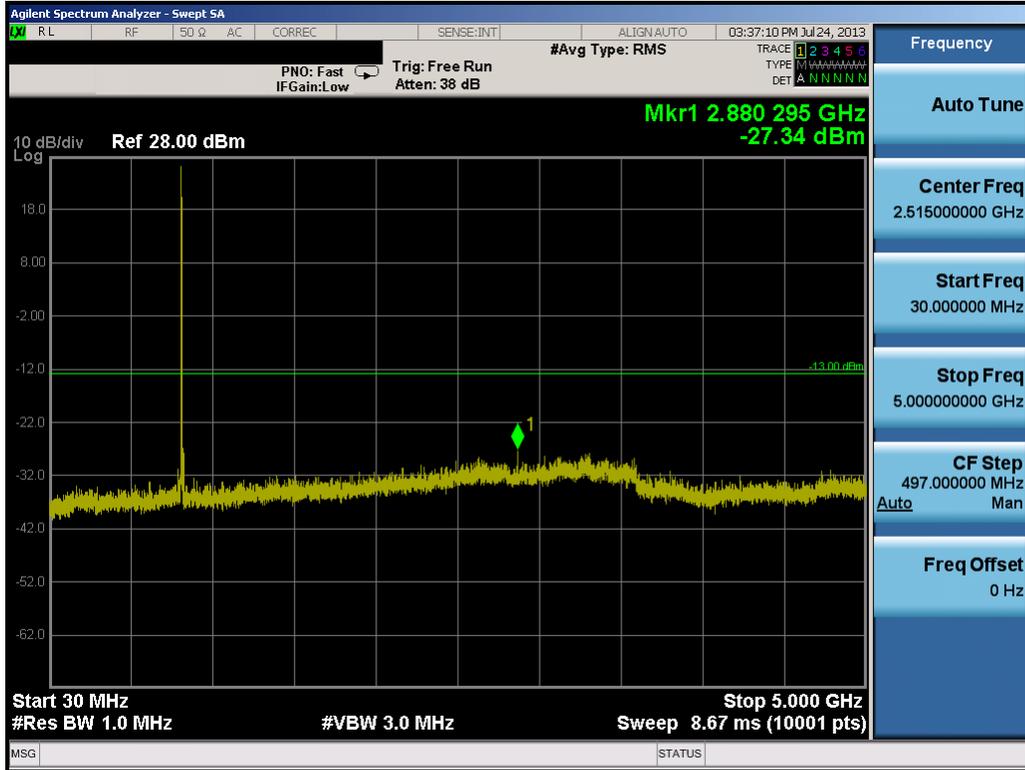


Plot 7-34. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

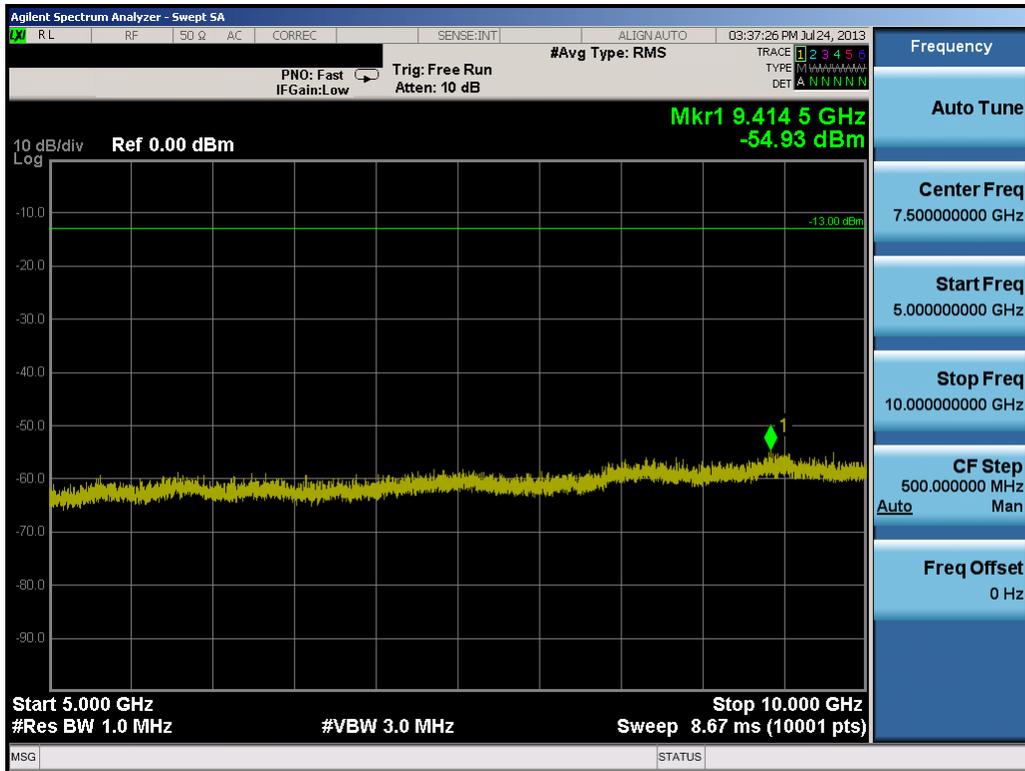


Plot 7-35. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 35 of 39

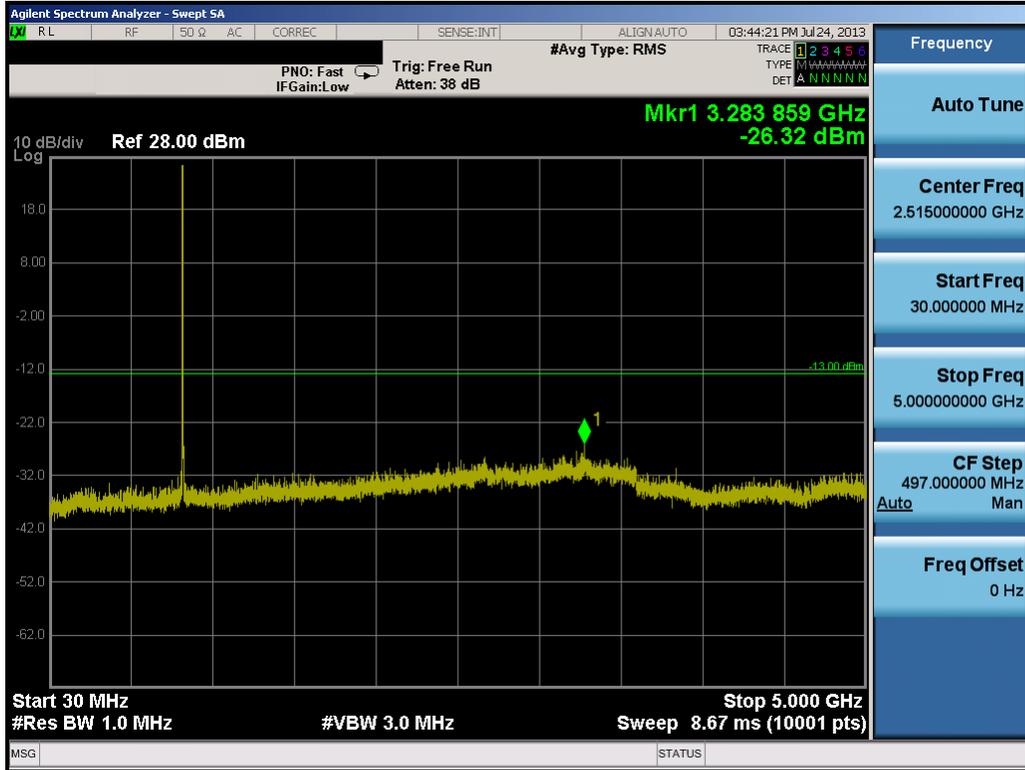


Plot 7-36. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

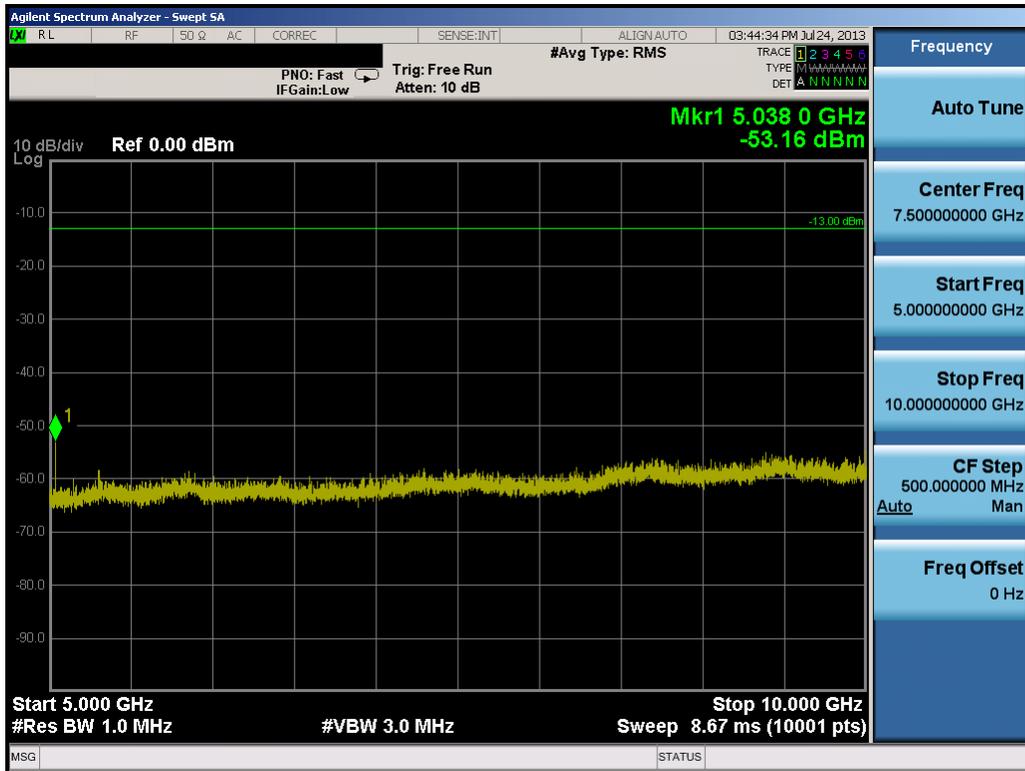


Plot 7-37. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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Plot 7-38. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)



Plot 7-39. Conducted Spurious Plot (10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset		Page 37 of 39



Plot 7-40. Upper Band Edge Plot (10.0MHz QPSK – RB Size 50)

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
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## 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMN9005** complies with all the requirements of Parts 2 and 22 of the FCC rules for LTE operation only.

FCC ID: A3LSMN9005		FCC Pt. 22 LTE MEASUREMENT REPORT (CERTIFICATION)		Reviewed by: Quality Manager
Test Report S/N: 0Y1307221322.A3L	Test Dates: 07/24 - 08/02/2013	EUT Type: Portable Handset	Page 39 of 39	