



## MEASUREMENT REPORT FCC Part 22, 24, & 27 LTE

**Applicant Name:**

Samsung Electronics, Co. Ltd.  
129, Samsung-ro, Maetan dong,  
Yeongtong-gu, Suwon-si  
Gyeonggi-do 443-742, Korea

**Date of Testing:**

7/29-8/25/2014, 9/2-9/12/2014

**Test Site/Location:**

PCTEST Lab., Columbia, MD, USA

**Test Report Serial No.:**

0Y1408051618.A3L-R1

**FCC ID :**

**A3LSMN910R4**

**APPLICANT:**

**SAMSUNG ELECTRONICS, CO. LTD.**

**Application Type:**

Certification

**FCC Classification:**

PCS Licensed Transmitter Held to Ear (PCE)

**FCC Rule Part(s):**

§2; §22; §24; §27

**Test Procedure(s):**

ANSI/TIA-603-C-2004, KDB 971168 v02r01

**EUT Type:**

Portable Handset

**Model(s):**

SM-N910R4

**Test Device Serial No.:**

identical prototype [S/N: 329DA, 329E0, 329E9, 329E6, 33EDD, 33EE3]

| Mode           | Tx Frequency (MHz) | Emission Designator | Modulation | ERP/EIRP       |                  |
|----------------|--------------------|---------------------|------------|----------------|------------------|
|                |                    |                     |            | Max. Power (W) | Max. Power (dBm) |
| LTE Band 12/17 | 699.7 - 715.3      | 1M12G7W             | QPSK       | 0.065          | 18.16            |
| LTE Band 12/17 | 699.7 - 715.3      | 1M12W7W             | 16QAM      | 0.051          | 17.04            |
| LTE Band 12/17 | 700.5 - 714.5      | 2M71G7W             | QPSK       | 0.065          | 18.13            |
| LTE Band 12/17 | 700.5 - 714.5      | 2M71W7W             | 16QAM      | 0.052          | 17.16            |
| LTE Band 12/17 | 701.5 - 713.5      | 4M49G7W             | QPSK       | 0.085          | 19.28            |
| LTE Band 12/17 | 701.5 - 713.5      | 4M49W7W             | 16QAM      | 0.063          | 18.01            |
| LTE Band 12/17 | 704 - 711          | 8M99G7W             | QPSK       | 0.076          | 18.79            |
| LTE Band 12/17 | 704 - 711          | 8M95W7W             | 16QAM      | 0.058          | 17.63            |
| LTE Band 5     | 824.7 - 848.3      | 1M12G7W             | QPSK       | 0.043          | 16.29            |
| LTE Band 5     | 824.7 - 848.3      | 1M12W7W             | 16QAM      | 0.032          | 15.09            |
| LTE Band 5     | 825.5 - 847.5      | 2M71G7W             | QPSK       | 0.046          | 16.61            |
| LTE Band 5     | 825.5 - 847.5      | 2M70W7W             | 16QAM      | 0.034          | 15.36            |
| LTE Band 5     | 826.5 - 846.5      | 4M50G7W             | QPSK       | 0.056          | 17.48            |
| LTE Band 5     | 826.5 - 846.5      | 4M50W7W             | 16QAM      | 0.042          | 16.24            |
| LTE Band 5     | 829 - 844          | 8M99G7W             | QPSK       | 0.049          | 16.92            |
| LTE Band 5     | 829 - 844          | 9M01W7W             | 16QAM      | 0.037          | 15.74            |
| LTE Band 4     | 1710.7 - 1754.3    | 1M11G7W             | QPSK       | 0.044          | 16.44            |
| LTE Band 4     | 1710.7 - 1754.3    | 1M11W7W             | 16QAM      | 0.033          | 15.22            |
| LTE Band 4     | 1711.5 - 1753.5    | 2M71G7W             | QPSK       | 0.048          | 16.79            |
| LTE Band 4     | 1711.5 - 1753.5    | 2M71W7W             | 16QAM      | 0.036          | 15.52            |
| LTE Band 4     | 1712.5 - 1752.5    | 4M49G7W             | QPSK       | 0.070          | 18.43            |
| LTE Band 4     | 1712.5 - 1752.5    | 4M49W7W             | 16QAM      | 0.052          | 17.20            |
| LTE Band 4     | 1715 - 1750        | 8M97G7W             | QPSK       | 0.069          | 18.38            |
| LTE Band 4     | 1715 - 1750        | 8M97W7W             | 16QAM      | 0.051          | 17.04            |
| LTE Band 4     | 1717.5 - 1747.5    | 13M5G7W             | QPSK       | 0.073          | 18.64            |
| LTE Band 4     | 1717.5 - 1747.5    | 13M4W7W             | 16QAM      | 0.056          | 17.48            |
| LTE Band 4     | 1720 - 1745        | 17M9G7W             | QPSK       | 0.103          | 20.14            |
| LTE Band 4     | 1720 - 1745        | 17M9W7W             | 16QAM      | 0.065          | 18.16            |
| LTE Band 2     | 1850.7 - 1909.3    | 1M12G7W             | QPSK       | 0.130          | 21.14            |
| LTE Band 2     | 1850.7 - 1909.3    | 1M12W7W             | 16QAM      | 0.107          | 20.31            |
| LTE Band 2     | 1851.5 - 1908.5    | 2M71G7W             | QPSK       | 0.121          | 20.82            |
| LTE Band 2     | 1851.5 - 1908.5    | 2M71W7W             | 16QAM      | 0.109          | 20.36            |
| LTE Band 2     | 1852.5 - 1907.5    | 4M49G7W             | QPSK       | 0.142          | 21.53            |
| LTE Band 2     | 1852.5 - 1907.5    | 4M48W7W             | 16QAM      | 0.120          | 20.79            |
| LTE Band 2     | 1855 - 1905        | 9M01G7W             | QPSK       | 0.126          | 20.99            |
| LTE Band 2     | 1855 - 1905        | 8M95W7W             | 16QAM      | 0.105          | 20.21            |
| LTE Band 2     | 1857.5 - 1902.5    | 13M5G7W             | QPSK       | 0.107          | 20.28            |
| LTE Band 2     | 1857.5 - 1902.5    | 13M5W7W             | 16QAM      | 0.092          | 19.62            |
| LTE Band 2     | 1860 - 1900        | 17M9G7W             | QPSK       | 0.101          | 20.06            |
| LTE Band 2     | 1860 - 1900        | 17M9W7W             | 16QAM      | 0.086          | 19.34            |

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

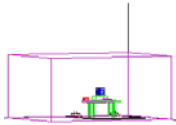


|                                         |                                                                                     |                                                                |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  |                                                                                       | Page 1 of 114                   |

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## MEASUREMENT REPORT

### FCC Part 22, 24, & 27

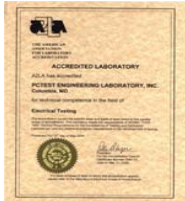


#### §2.1033 General Information

**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; §24; §27  
**BASE MODEL:** SM-N910R4  
**FCC ID:** A3LSMN910R4  
**FCC CLASSIFICATION:** PCS Licensed Transmitter Held to Ear (PCE)  
**FREQUENCY TOLERANCE:**  $\pm 0.00025\%$  (2.5 ppm)  
**Test Device Serial No.:** 329DA, 329E0, 329E9, 329E6, 33EDD, 33EE3 ☐ Production ☒ Pre-Production ☐ Engineering  
**DATE(S) OF TEST:** 07/29-08/14/2014  
**TEST REPORT S/N:** 0Y1408051618.A3L-R1

#### 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.

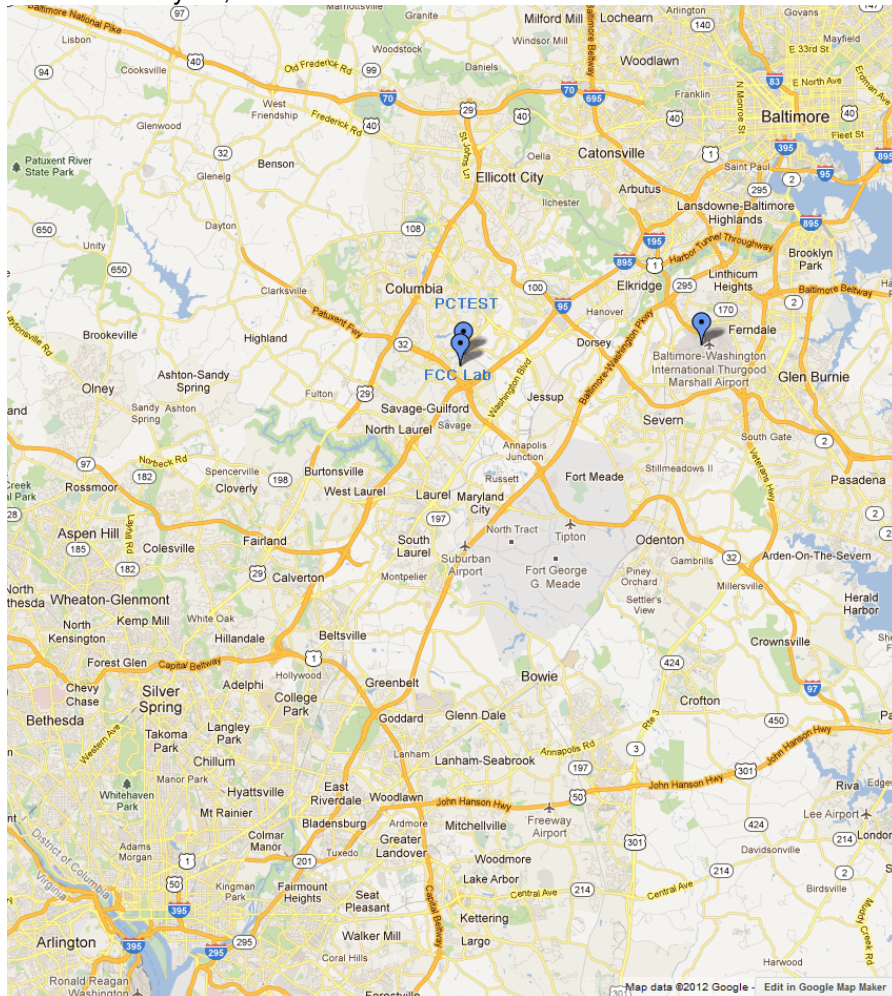


Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area

|                                         |                                                                                     |                                                                |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMN910R4**. 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 CDMA/EvDO RevA, 1x Advanced (BC0, BC1), Multi-band LTE, 802.11a/b/g/n/ac WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

### 2.3 Test Configuration

The Samsung Portable Handset FCC ID: A3LSMN910R4 was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r01. See Section 6.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports a wireless charging cover. Per KDB 648474 D03, spurious emissions measurement data was also investigated with the wireless charging battery cover. The handset was placed on the representative charging pad under normal conditions and in a simulated call configuration. Only worst case emissions are shown in this report and identified as WCC.

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

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

### 2.5 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 **Samsung Portable Handset FCC ID: A3LSMN910R4**.

### 3.2 Block A Frequency Range

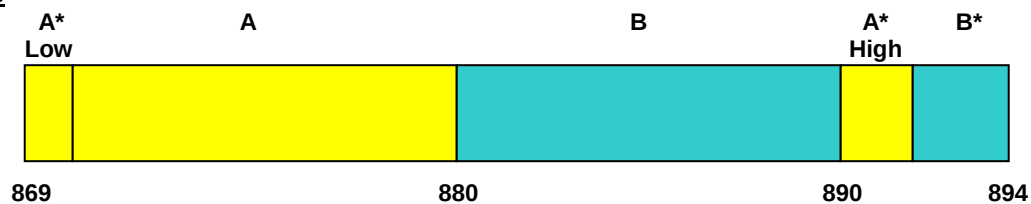
#### §27.5(c)

698-746 MHz band. The following frequencies are available for licensing pursuant to this part in the 698-746 MHz band: (1) Three paired channel blocks of 12 megahertz each are available for assignment as follows:

Block A: 698-704 MHz and 728-734 MHz;  
Block B: 704-710 MHz and 734-740 MHz; and  
Block C: 710-716 MHz and 740-746 MHz.

### 3.3 Cellular - Base Frequency Blocks

#### §22.905

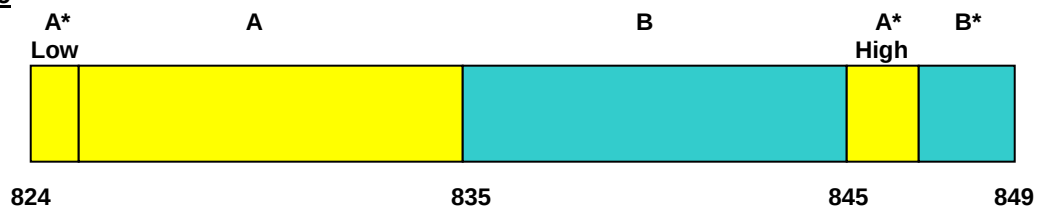


BLOCK 1: 869 – 880 MHz (A\* Low + A)  
BLOCK 2: 880 – 890 MHz (B)

BLOCK 3: 890 – 891.5 MHz (A\* High)  
BLOCK 4: 891.5 – 894 MHz (B\*)

### 3.4 Cellular - Mobile Frequency Blocks

#### §22.905



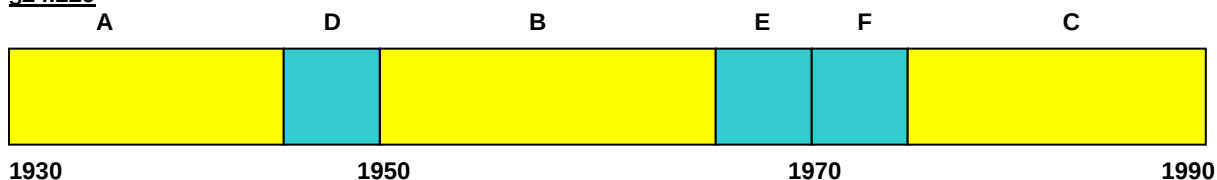
BLOCK 1: 824 – 835 MHz (A\* Low + A)  
BLOCK 2: 835 – 845 MHz (B)

BLOCK 3: 845 – 846.5 MHz (A\* High)  
BLOCK 4: 846.5 – 849 MHz (B\*)

|                                         |                                                                                     |                                                                |                                                                                       |                                 |
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### 3.5 PCS - Base Frequency Blocks

§24.229

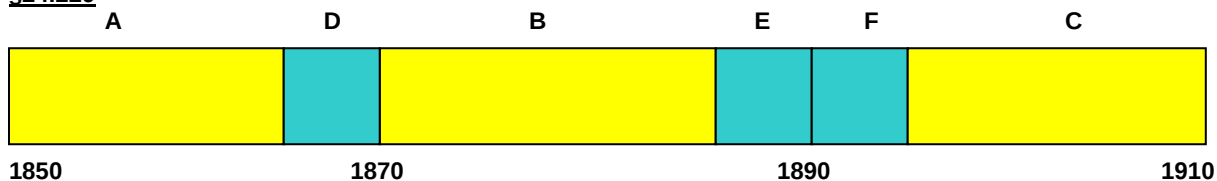


BLOCK 1: 1930 – 1945 MHz (A)  
BLOCK 2: 1945 – 1950 MHz (D)  
BLOCK 3: 1950 – 1965 MHz (B)

BLOCK 4: 1965 – 1970 MHz (E)  
BLOCK 5: 1970 – 1975 MHz (F)  
BLOCK 6: 1975 – 1990 MHz (C)

### 3.6 PCS - Mobile Frequency Blocks

§24.229

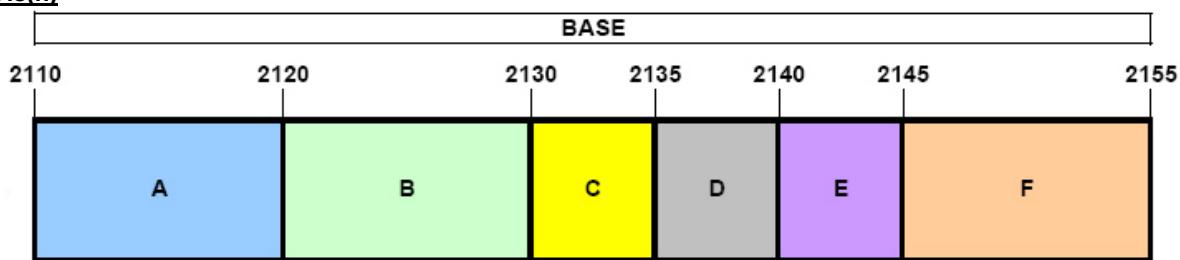


BLOCK 1: 1850 – 1865 MHz (A)  
BLOCK 2: 1865 – 1870 MHz (D)  
BLOCK 3: 1870 – 1885 MHz (B)

BLOCK 4: 1885 – 1890 MHz (E)  
BLOCK 5: 1890 – 1895 MHz (F)  
BLOCK 6: 1895 – 1910 MHz (C)

### 3.7 AWS - Base Frequency Blocks

§27.5(h)

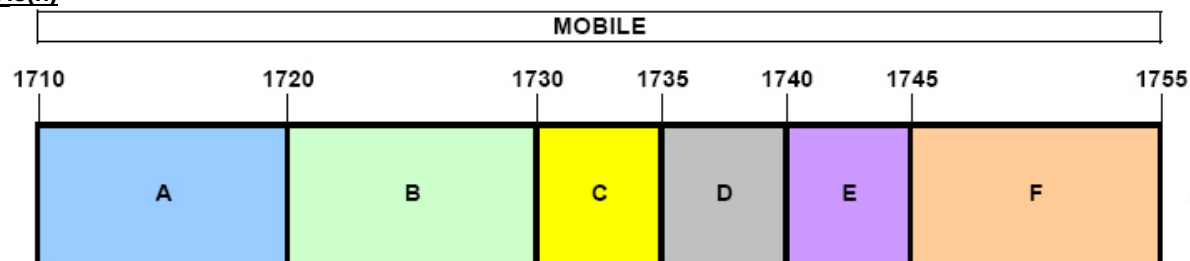


BLOCK 1: 2110 – 2120 MHz (A)  
BLOCK 2: 2120 – 2130 MHz (B)  
BLOCK 3: 2130 – 2135 MHz (C)

BLOCK 4: 2135 – 2140 MHz (D)  
BLOCK 5: 2140 – 2145 MHz (E)  
BLOCK 6: 2145 – 2155 MHz (F)

### 3.8 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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### 3.9 SVLTE

**§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)**

This device is capable of operating in SVLTE mode in the following cases:

| No. | Capable Transmit Configurations        | Power Reduction | Head              | Body-Worn Accessory | Hot Spot                       | Note  |
|-----|----------------------------------------|-----------------|-------------------|---------------------|--------------------------------|-------|
|     |                                        |                 | IEEE 1528, Supp C | Supplement C        | FCC KDB 941225 D06 edges/sides |       |
| 1   | 1X CDMA 850 Voice + LTE 700 MHz Data   | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 2   | 1X CDMA 1900 Voice + LTE 700 MHz Data  | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 3   | 1X CDMA 850 Voice + LTE 800 MHz Data   | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 4   | 1X CDMA 1900 Voice + LTE 800 MHz Data  | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 5   | 1X CDMA 850 Voice + LTE 1700 MHz Data  | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 6   | 1X CDMA 1900 Voice + LTE 1700 MHz Data | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 7   | 1X CDMA 850 Voice + LTE 1900 MHz Data  | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |
| 8   | 1X CDMA 1900 Voice + LTE 1900 MHz Data | LTE             | ✓                 | ✓                   | N/A                            | SVLTE |

**Table 3-1. SVLTE Transmit Configurations**

All modes of SVLTE operation were investigated. It was determined that this device did not produce any intermodulation products that were within 25dB of the spurious emission limit so the emissions are not reported herein.

### 3.10 Radiated Power and Radiated Spurious Emissions

**§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) §27.50(c.10) §27.50(d.4) §27.53(g) §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 ¾" (~1.9cm) sheet of high density polyethylene is used as the table top and is placed on top of the PVC supports to bring the total height of the table to 80cm.

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

Per the guidance of ANSI/TIA-603-C-2004, a half-wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

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

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

|                                         |                                                                                     |                                                                |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  |                                                                                       | Page 8 of 114                   |

## 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         | 1/29/2014  | Annual       | 1/29/2015  | N/A           |
| -               | RE1                | Radiated Emissions Cable Set (UHF/EHF) | 5/29/2014  | Annual       | 5/29/2015  | N/A           |
| Agilent         | 8447D              | Broadband Amplifier                    | 5/30/2014  | Annual       | 5/30/2015  | 2443A01900    |
| Agilent         | N9020A             | MXA Signal Analyzer                    | 10/29/2013 | Annual       | 10/29/2014 | US46470561    |
| Agilent         | N9030A             | PXA Signal Analyzer (26.5GHz)          | 5/8/2014   | Annual       | 5/8/2015   | MY49432391    |
| Espec           | ESX-2CA            | Environmental Chamber                  | 4/16/2014  | Annual       | 4/16/2015  | 17620         |
| ETS Lindgren    | 3117               | 1-18 GHz DRG Horn (Medium)             | 4/8/2014   | Biennial     | 4/8/2016   | 125518        |
| 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                | 3/12/2014  | Biennial     | 3/12/2016  | 128337        |
| K & L           | 11SH10-3075/U18000 | High Pass Filter                       | 5/2/2014   | Annual       | 5/2/2015   | 2             |
| K & L           | 13SH10-1000/U1000  | N Type High Pass Filter                | 5/22/2014  | Annual       | 5/22/2015  | 1             |
| Mini-Circuits   | PWR-SENS-4RMS      | USB Power Sensor                       | 4/17/2014  | Annual       | 4/17/2015  | 11210140001   |
| Mini-Circuits   | SSG-4000HP         | USB Synthesized Signal Generator       | N/A        |              |            | 11208010032   |
| Mini-Circuits   | TVA-11-422         | RF Power Amp                           | N/A        |              |            | QA1303002     |
| Rohde & Schwarz | CMW500             | Radio Communication Tester             | N/A        |              |            | 102060        |
| Rohde & Schwarz | ESU26              | EMI Test Receiver (26.5GHz)            | 1/27/2014  | Annual       | 1/27/2015  | 100342        |
| Rohde & Schwarz | TS-PR18            | 1-18 GHz Pre-Amplifier                 | 3/5/2014   | Annual       | 3/5/2015   | 100071        |
| Rohde & Schwarz | TS-PR26            | 18-26.5 GHz Pre-Amplifier              | 3/12/2014  | Annual       | 3/12/2015  | 100040        |
| Schwarzbeck     | UHA 9105           | Dipole Antenna (400 - 1GHz) Rx         | 11/21/2013 | Biennial     | 11/21/2015 | 9105-2404     |
| Seekonk         | NC-100             | Torque Wrench (8" lb)                  | 4/16/2014  | Biennial     | 4/16/2015  | N/A           |
| VWR             | 62344-734          | Thermometer with Clock                 | 2/20/2014  | Biennial     | 2/20/2016  | 140140336     |

**Table 4-1. Test Equipment**

### Note

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

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
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| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 9 of 114                   |

## 5.0 SAMPLE CALCULATIONS

### Emission Designator

#### QPSK Modulation

**Emission Designator = 8M62G7W**

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

W = Combination of 2 or more types of information to be transmitted

#### 16QAM Modulation

**Emission Designator = 8M45W7W**

LTE BW = 8.45 MHz

W = Amplitude/angle modulated

7 = Quantized/Digital Info

W = Combination of 2 or more types of information to be transmitted

### 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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| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  |                                                                                       | Page 10 of 114                  |

## 6.0 TEST RESULTS

### 6.1 Summary

Company Name: Samsung Electronics, Co. Ltd.  
 FCC ID: A3LSMN910R4  
 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 6.2                  |
| 2.1051 22.917(a)<br>24.238(a) 27.53(g)<br>27.53(h) | Band Edge /<br>Conducted Spurious<br>Emissions     | > 43 + 10log <sub>10</sub> (P[Watts]) at<br>Band Edge and for all out-of-<br>band emissions                 |                | PASS   | Section 6.3,<br>6.4          |
| 24.232(d)                                          | Peak-Average Ratio                                 | < 13 dB                                                                                                     |                | PASS   | Section 6.5                  |
| 2.1046                                             | Transmitter Conducted<br>Output Power              | N/A                                                                                                         |                | PASS   | See RF<br>Exposure<br>Report |
| 2.1055. 22.355<br>24.235 27.54                     | Frequency Stability                                | < 2.5 ppm (Part 22) and<br>fundamental emissions stay<br>within authorized frequency<br>block (Part 24, 27) |                | PASS   | Section 6.8                  |
| 22.913(a.2)                                        | Effective Radiated<br>Power (Band 5.)              | < 7 Watts max. ERP                                                                                          | RADIATED       | PASS   | Section 6.6                  |
| 27.50(c.10)                                        | Effective Radiated<br>Power (Band 12/17)           | < 3 Watts max. ERP                                                                                          |                | PASS   | Section 6.6                  |
| 24.232(c)                                          | Equivalent Isotropic<br>Radiated Power (Band<br>2) | < 2 Watts max. EIRP                                                                                         |                | PASS   | Section 6.6                  |
| 27.50(d.4)                                         | Equivalent Isotropic<br>Radiated Power (Band<br>4) | < 1 Watts max. EIRP                                                                                         |                | PASS   | Section 6.6                  |
| 2.1053 22.917(a)<br>24.238(a) 27.53(g)<br>27.53(h) | Undesirable Emissions                              | > 43 + 10log <sub>10</sub> (P[Watts]) for<br>all out-of-band emissions                                      |                | 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 6.2, 6.3, 6.4, 6.5) 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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| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  | Page 11 of 114                                                                        |                                 |

## 6.2 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

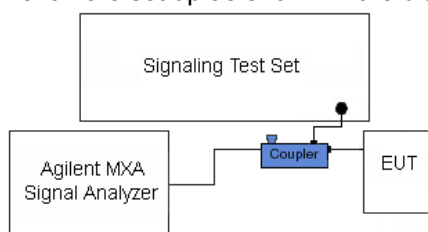
KDB 971168 v02r01 – Section 4.2

#### 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  $\geq 3 \times$  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.

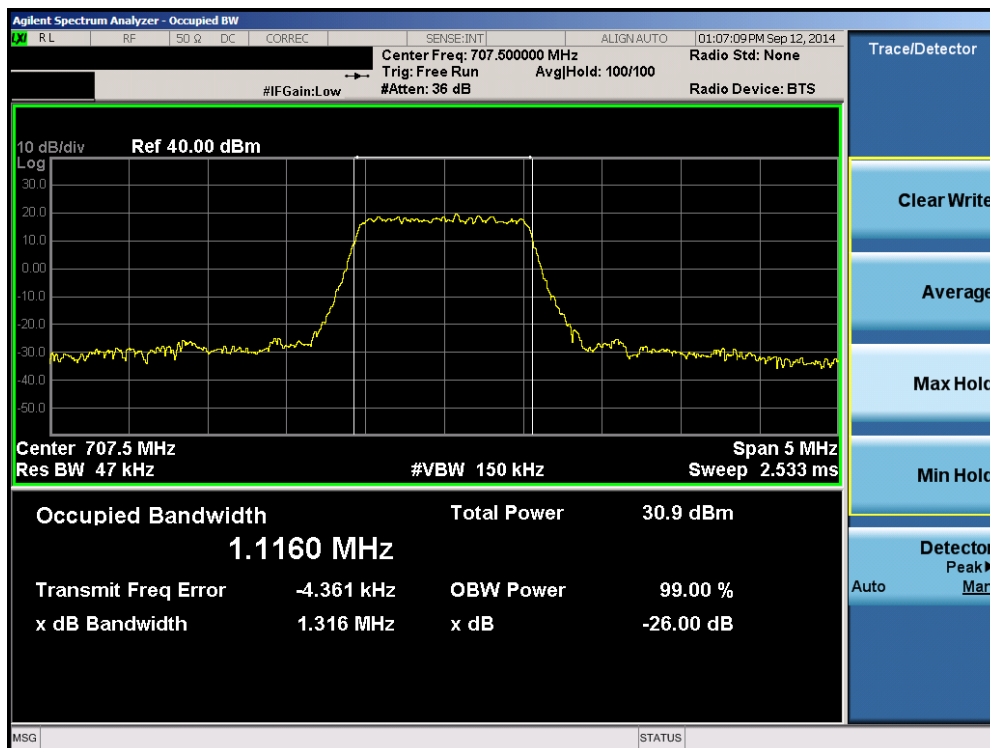


**Figure 6-1. Test Instrument & Measurement Setup**

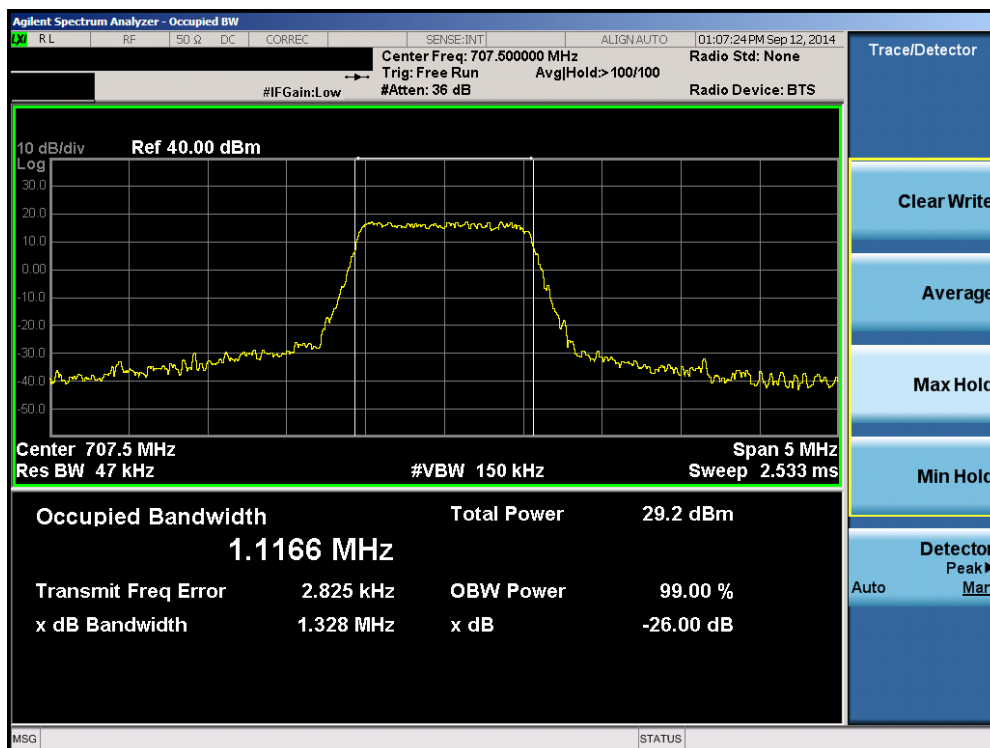
#### Test Notes

None.

|                                         |                                                                                     |                                                                |                                                                                       |                                 |
|-----------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------|---------------------------------|
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| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  |                                                                                       | Page 12 of 114                  |

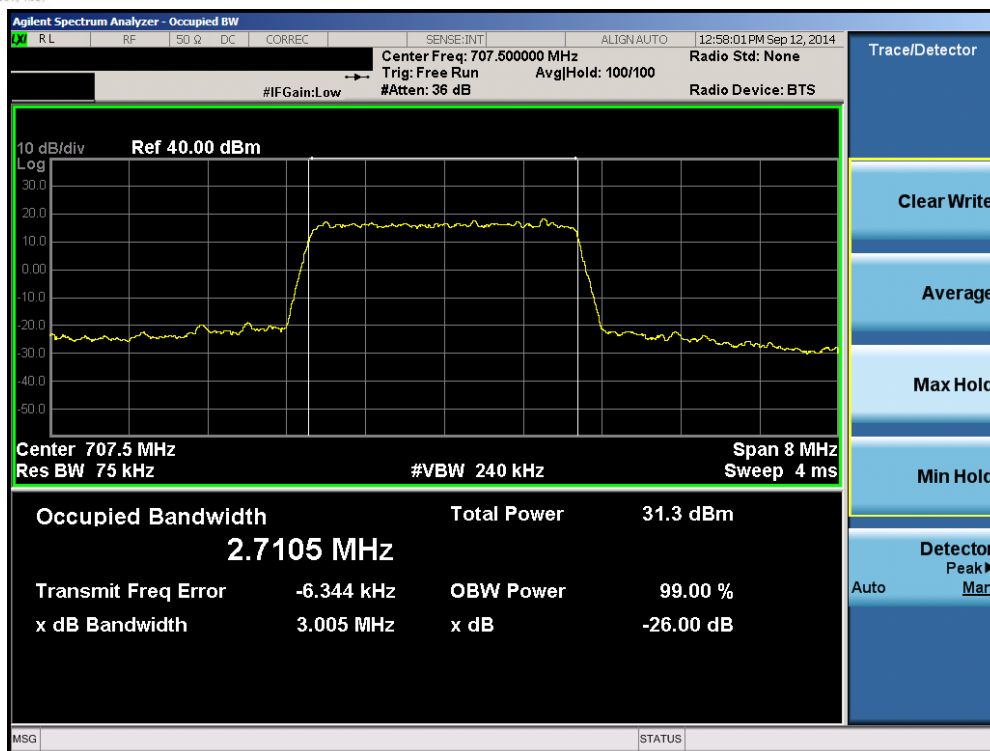


Plot 6-1. Occupied Bandwidth Plot (Band 12 – 1.4MHz QPSK – RB Size 6)

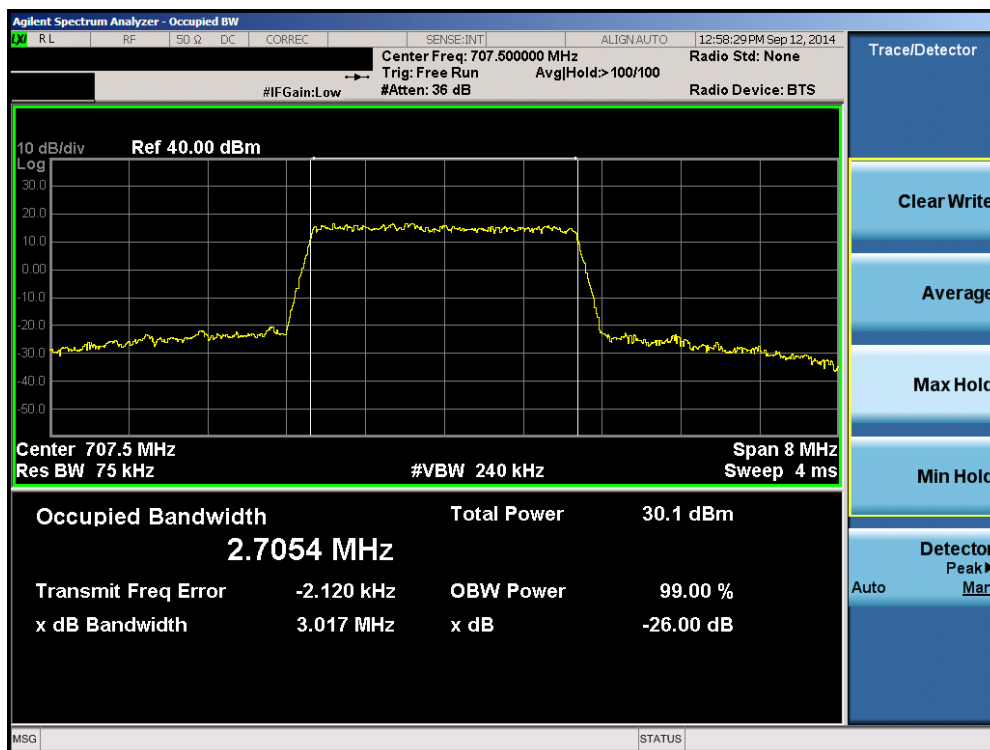


Plot 6-2. Occupied Bandwidth Plot (Band 12 – 1.4MHz 16-QAM – RB Size 6)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 13 of 114                  |

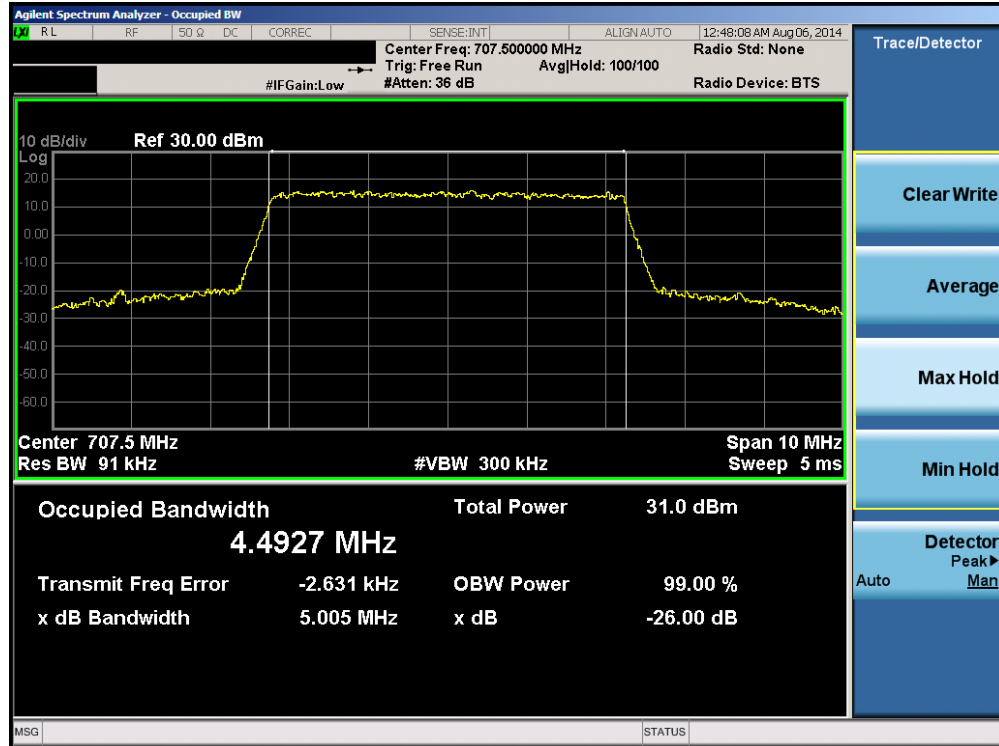


Plot 6-3. Occupied Bandwidth Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

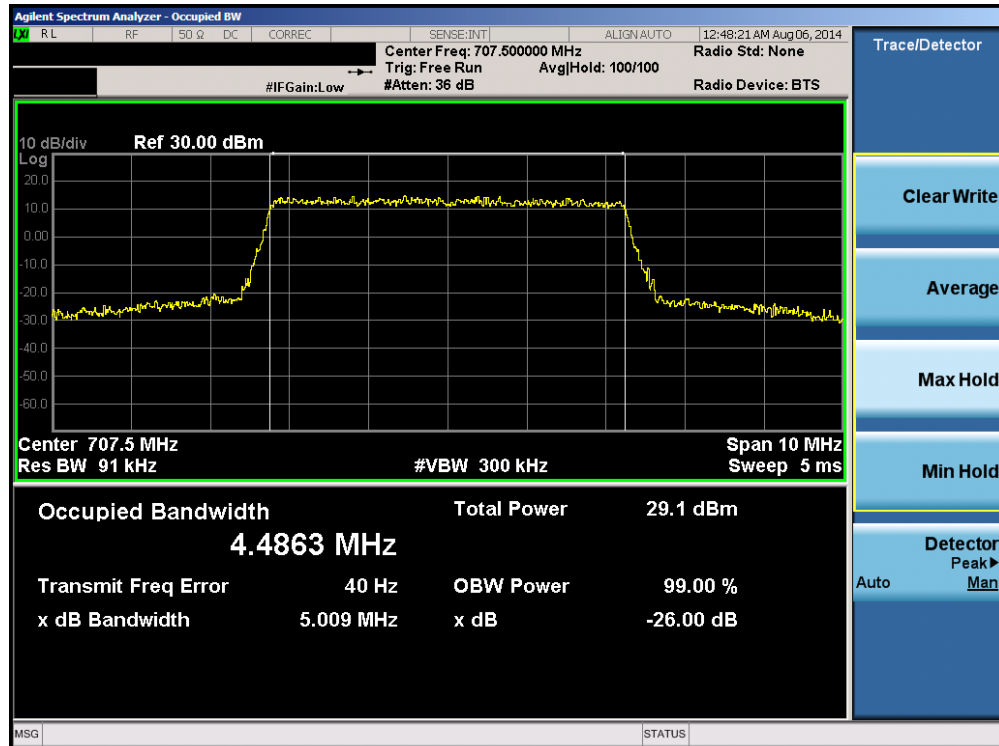


Plot 6-4. Occupied Bandwidth Plot (Band 12 – 3.0MHz 16-QAM – RB Size 15)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 14 of 114                  |

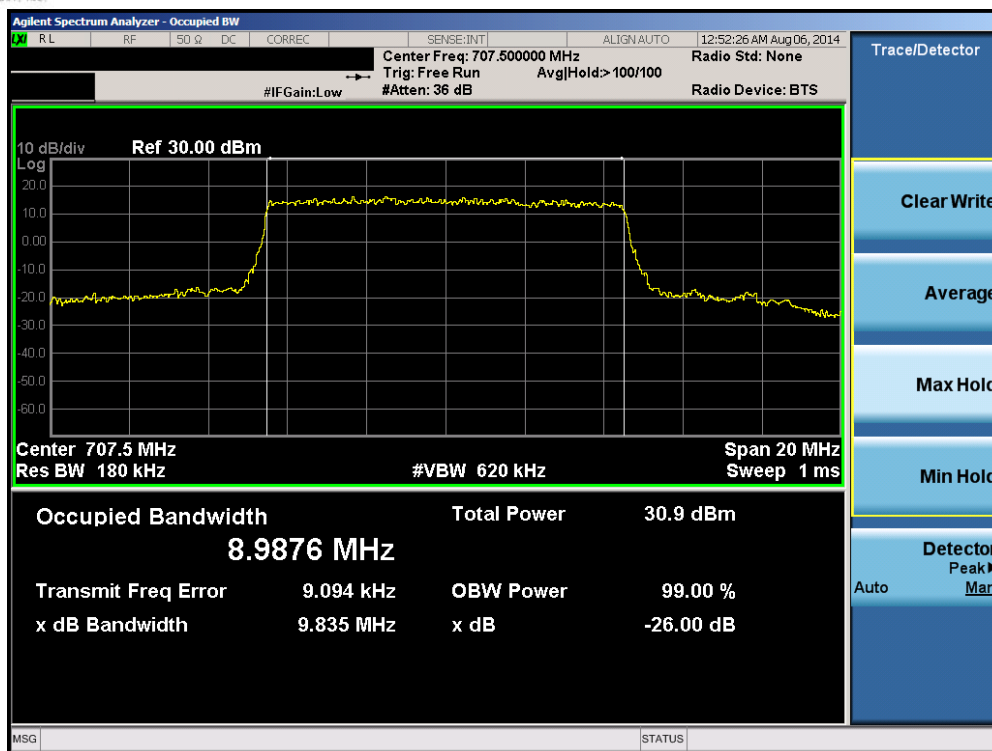


Plot 6-5. Occupied Bandwidth Plot (Band 12 – 5.0MHz QPSK – RB Size 25)

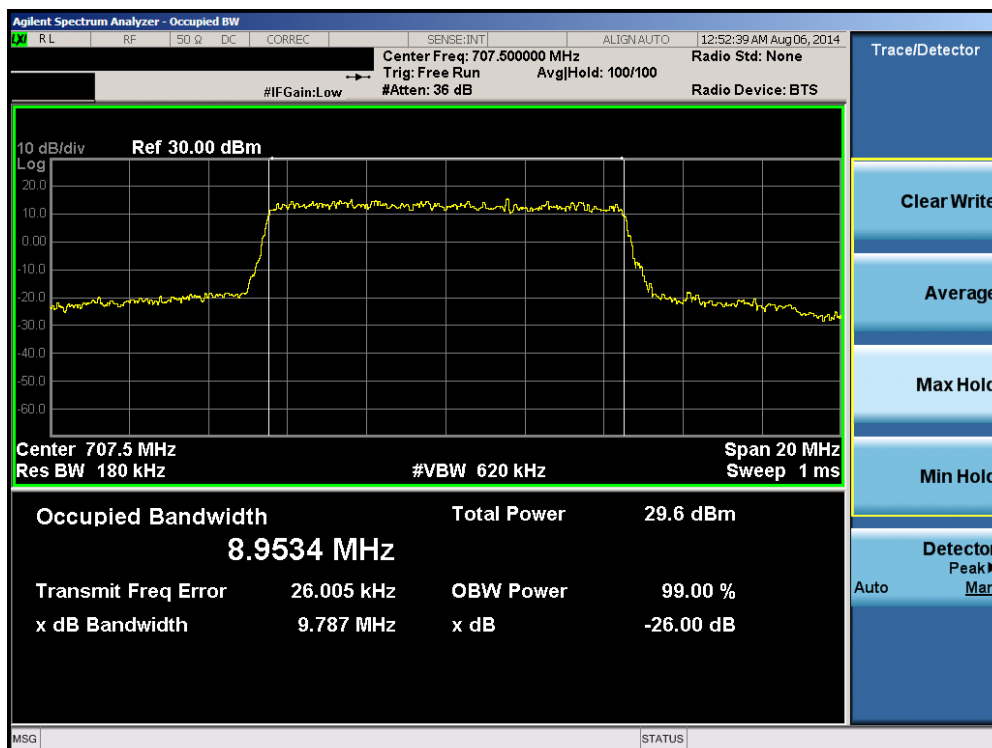


Plot 6-6. Occupied Bandwidth Plot (Band 12 – 5.0MHz 16-QAM – RB Size 25)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 15 of 114                  |

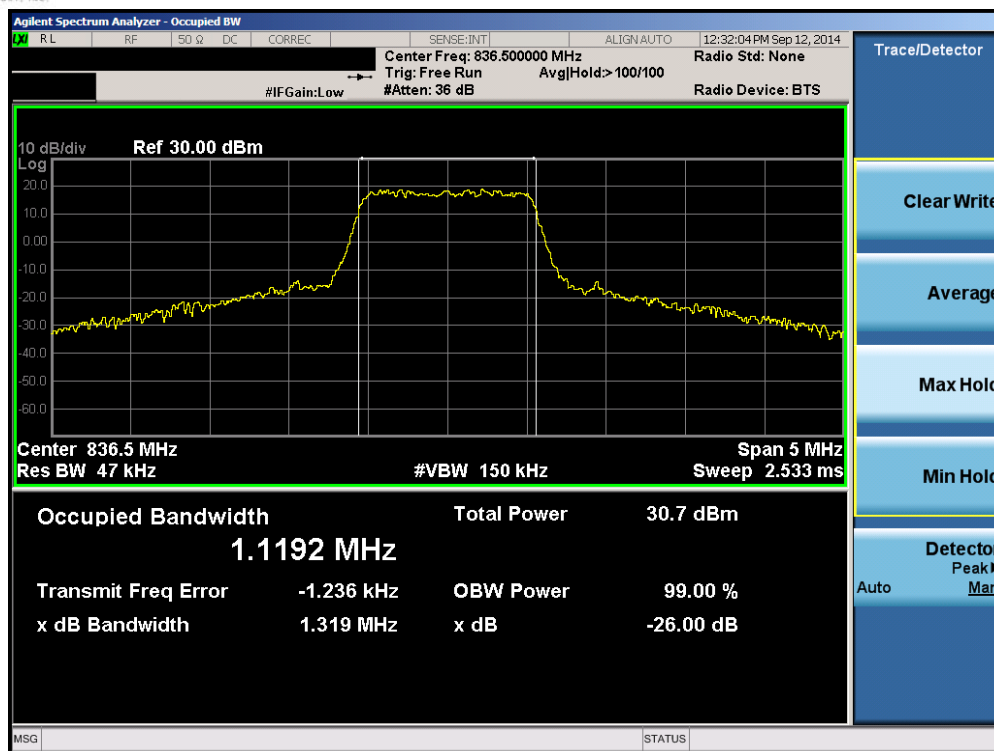


Plot 6-7. Occupied Bandwidth Plot (Band 12 – 10.0MHz QPSK – RB Size 50)

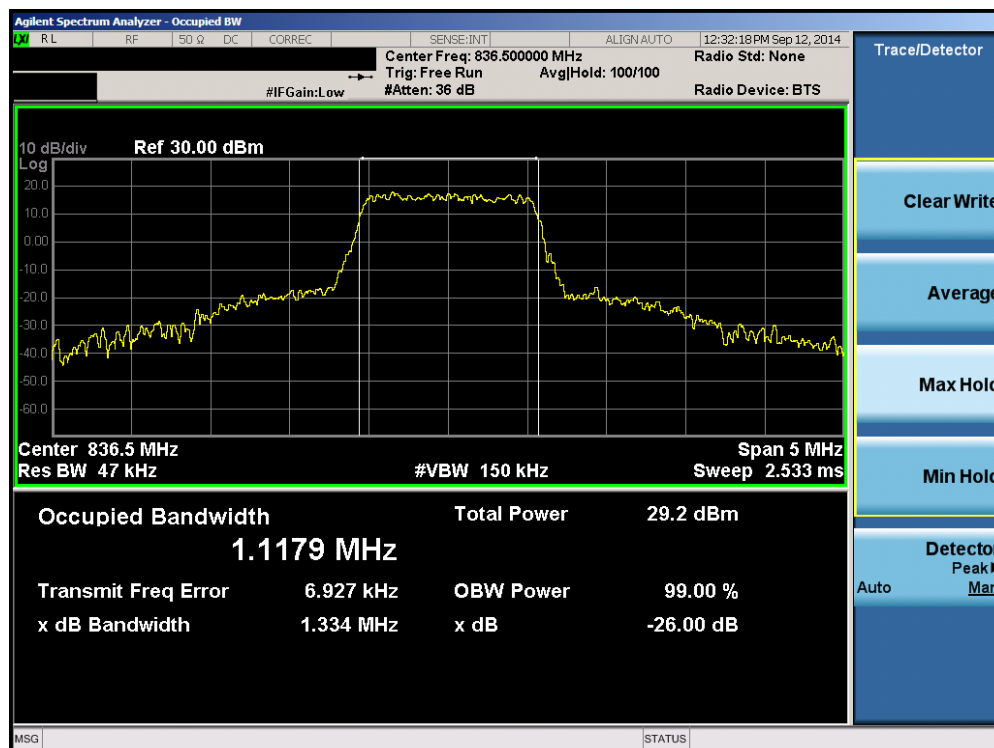


Plot 6-8. Occupied Bandwidth Plot (Band 12 – 10.0MHz 16-QAM – RB Size 50)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 16 of 114                  |

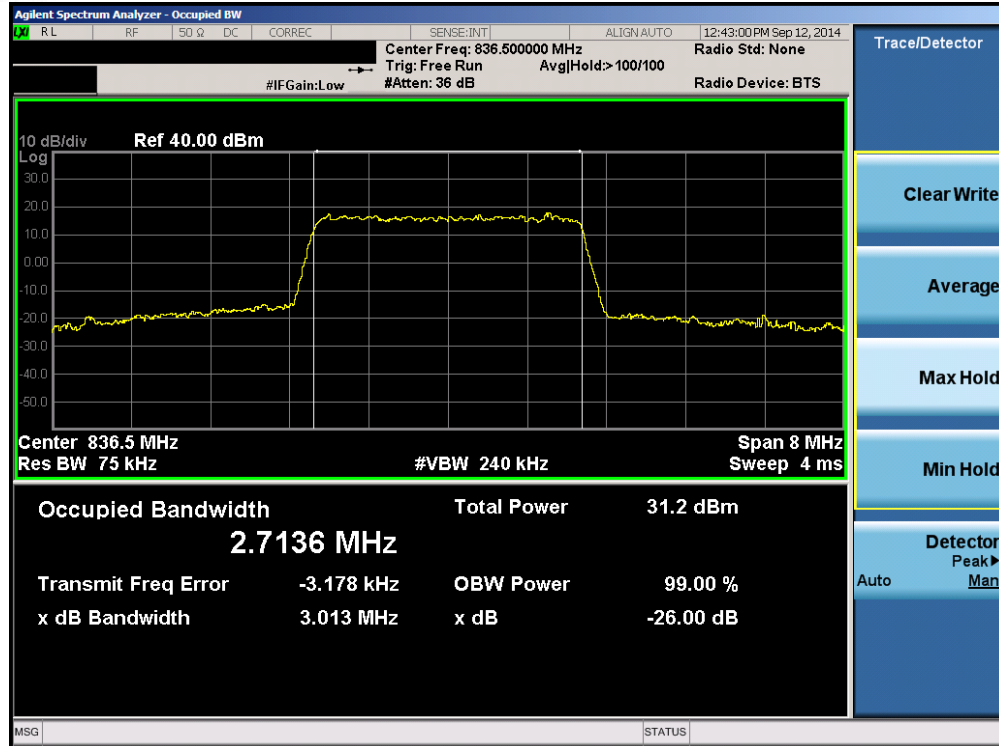


Plot 6-9. Occupied Bandwidth Plot (Band 5 – 1.4MHz QPSK – RB Size 6)

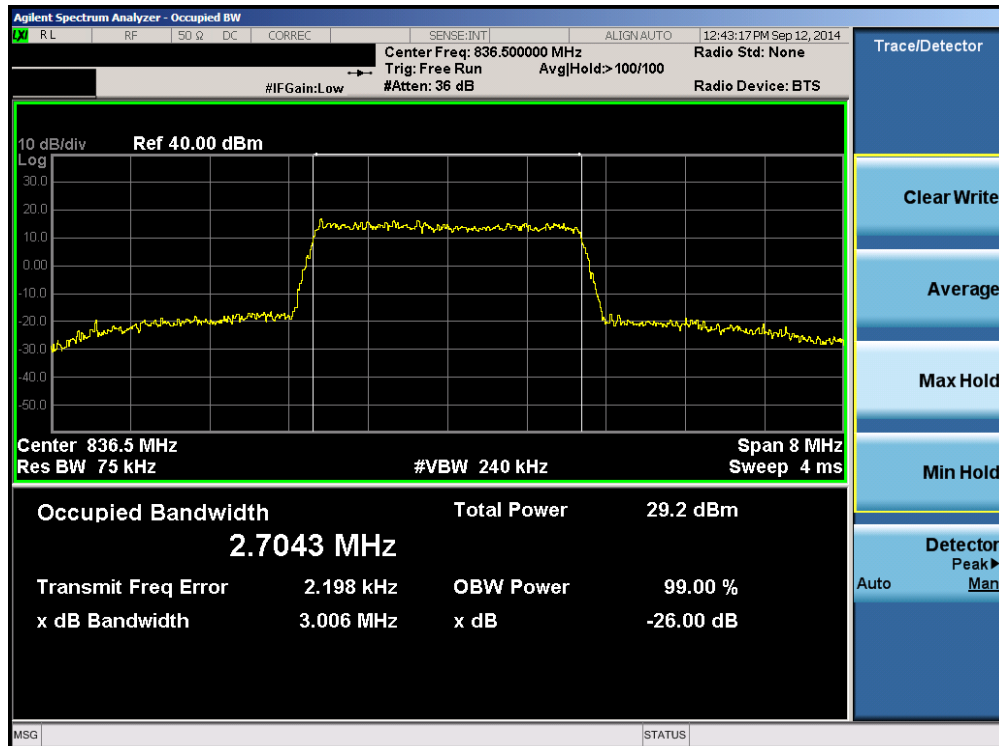


Plot 6-10. Occupied Bandwidth Plot (Band 5 – 1.4MHz 16-QAM – RB Size 6)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 17 of 114                  |

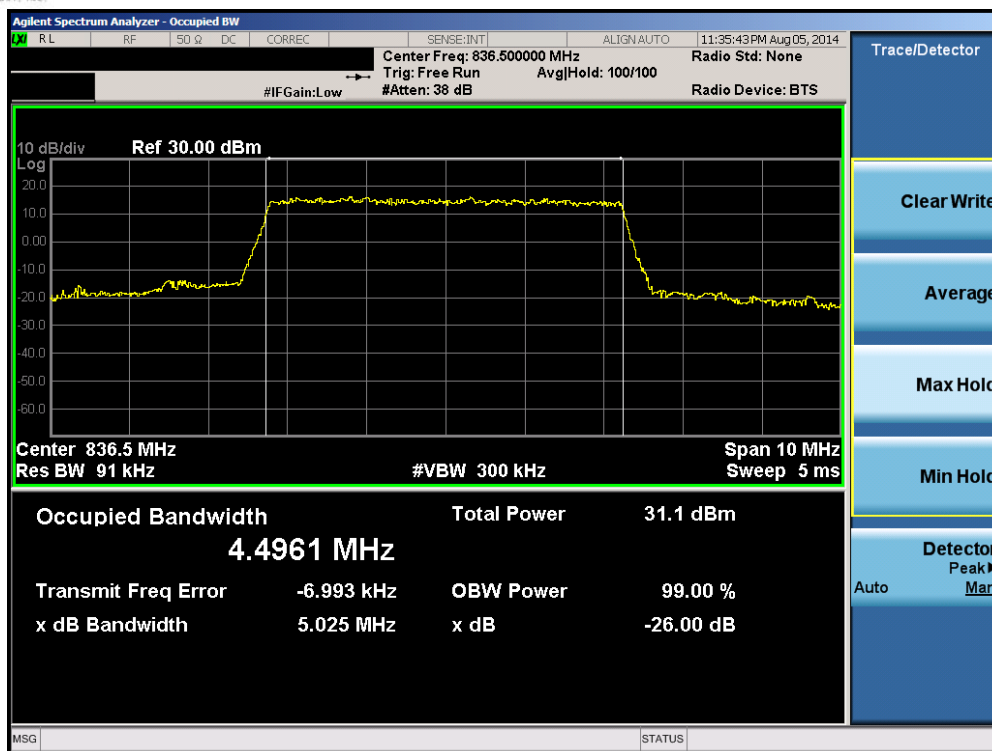


Plot 6-11. Occupied Bandwidth Plot (Band 5 – 3.0MHz QPSK – RB Size 15)

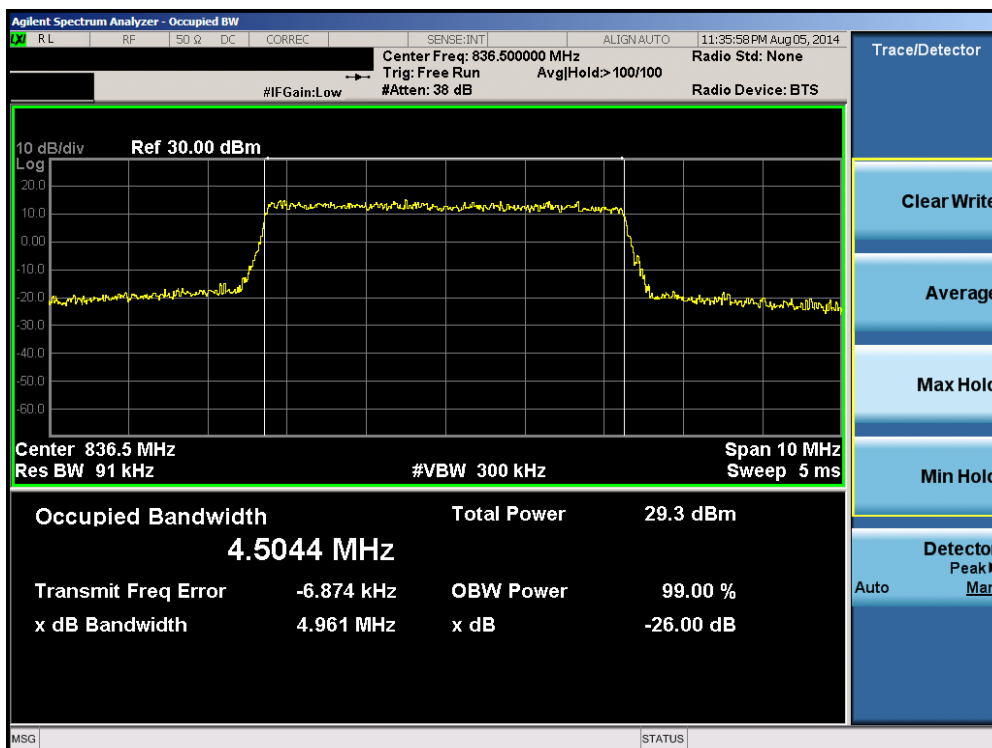


Plot 6-12. Occupied Bandwidth Plot (Band 5 – 3.0MHz 16-QAM – RB Size 15)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 18 of 114                  |

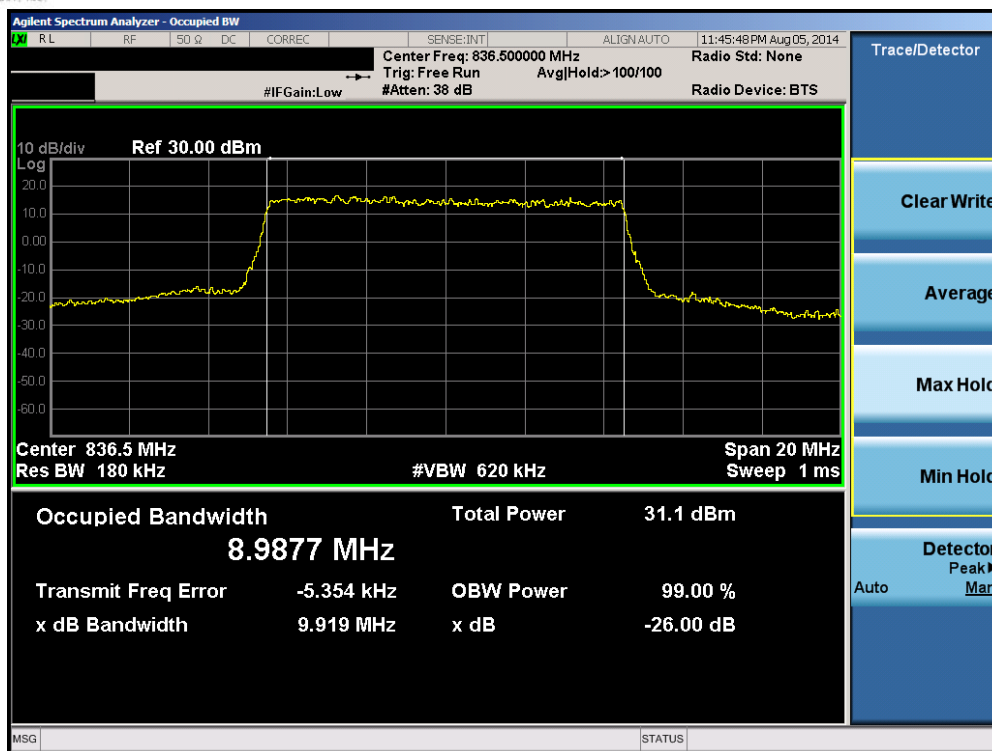


Plot 6-13. Occupied Bandwidth Plot (Band 5 – 5.0MHz QPSK – RB Size 25)

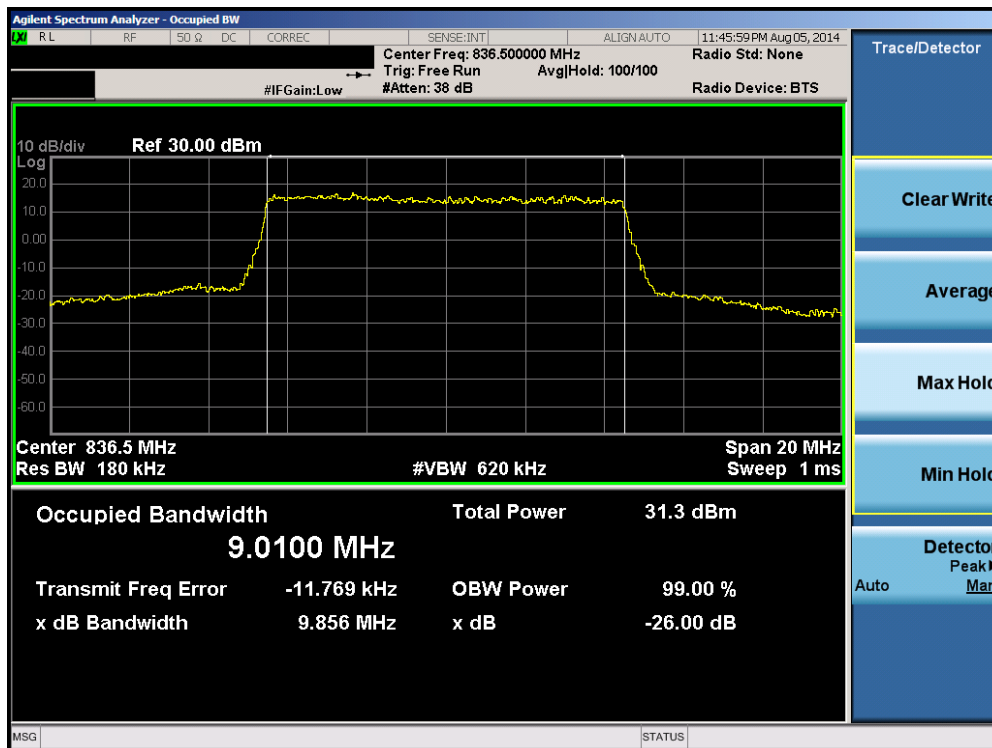


Plot 6-14. Occupied Bandwidth Plot (Band 5 – 5.0MHz 16-QAM – RB Size 25)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 19 of 114                  |

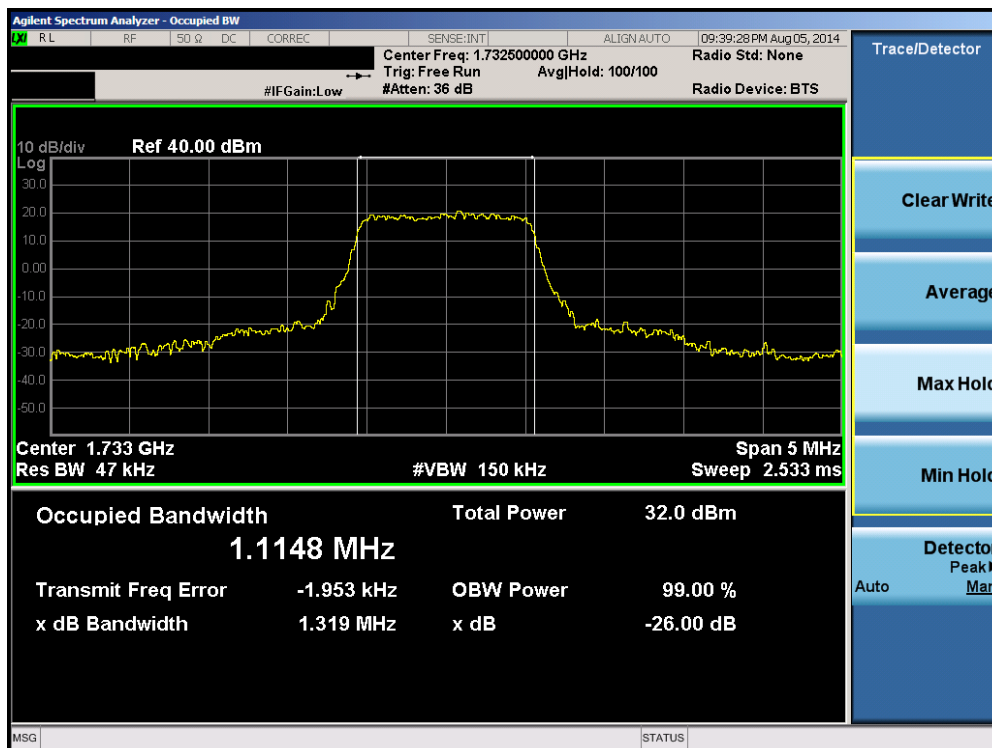


Plot 6-15. Occupied Bandwidth Plot (Band 5 – 10.0MHz QPSK – RB Size 50)

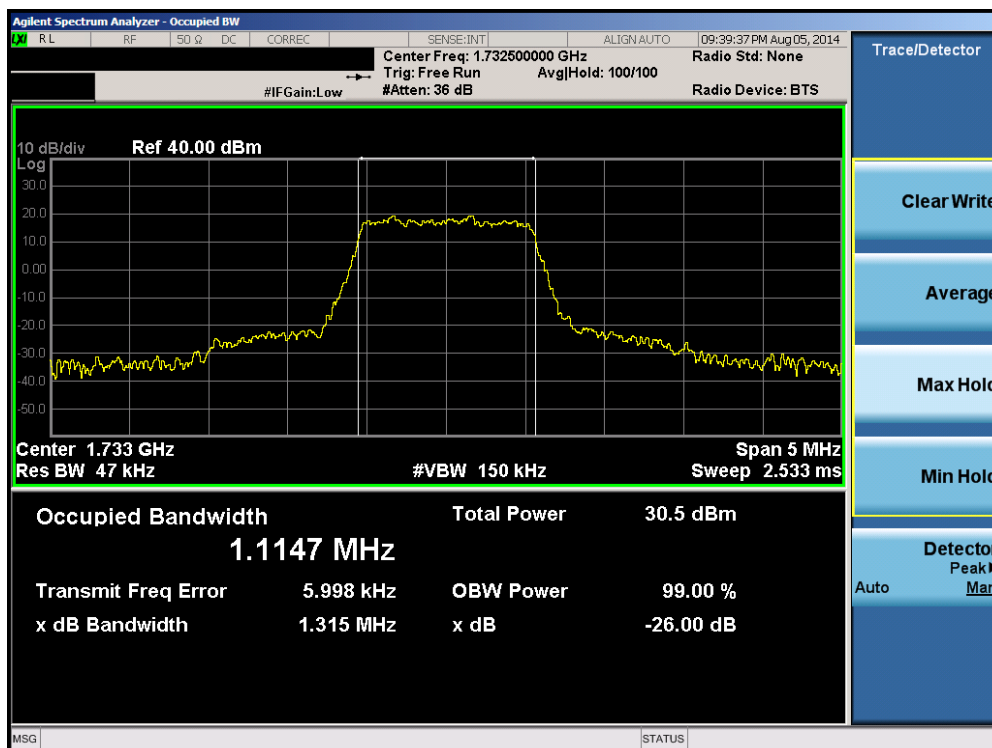


Plot 6-16. Occupied Bandwidth Plot (Band 5 – 10.0MHz 16-QAM – RB Size 50)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 20 of 114                  |

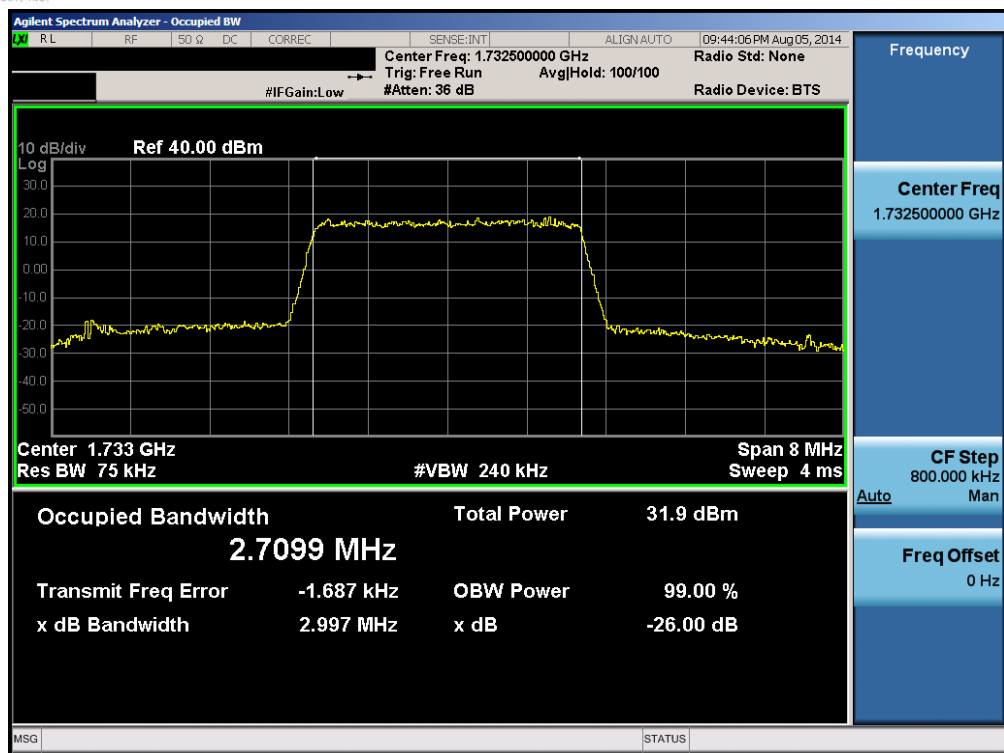


Plot 6-17. Occupied Bandwidth Plot (Band 4 – 1.4MHz QPSK – RB Size 6)

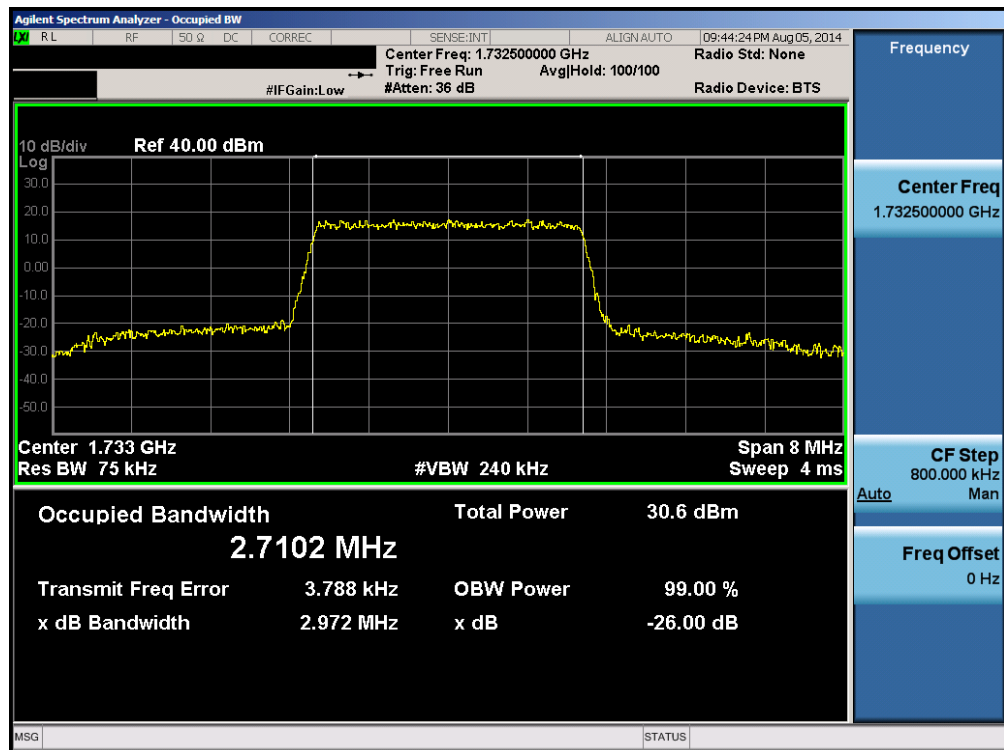


Plot 6-18. Occupied Bandwidth Plot (Band 4 – 1.4MHz 16-QAM – RB Size 6)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 21 of 114                  |

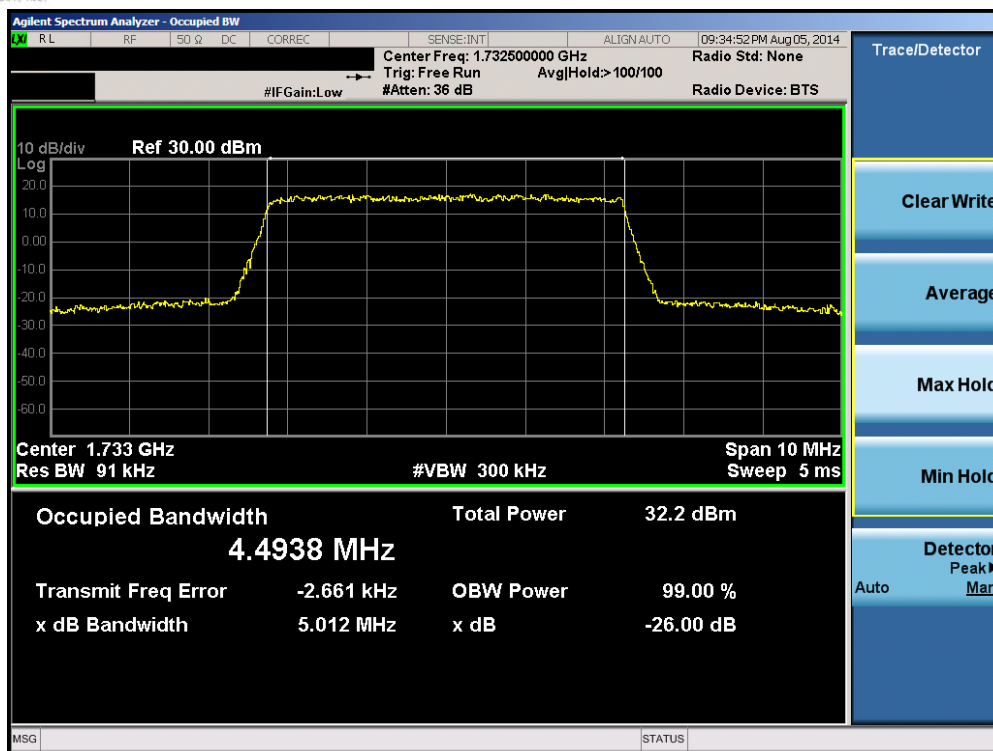


Plot 6-19. Occupied Bandwidth Plot (Band 4 – 3.0MHz QPSK – RB Size 15)

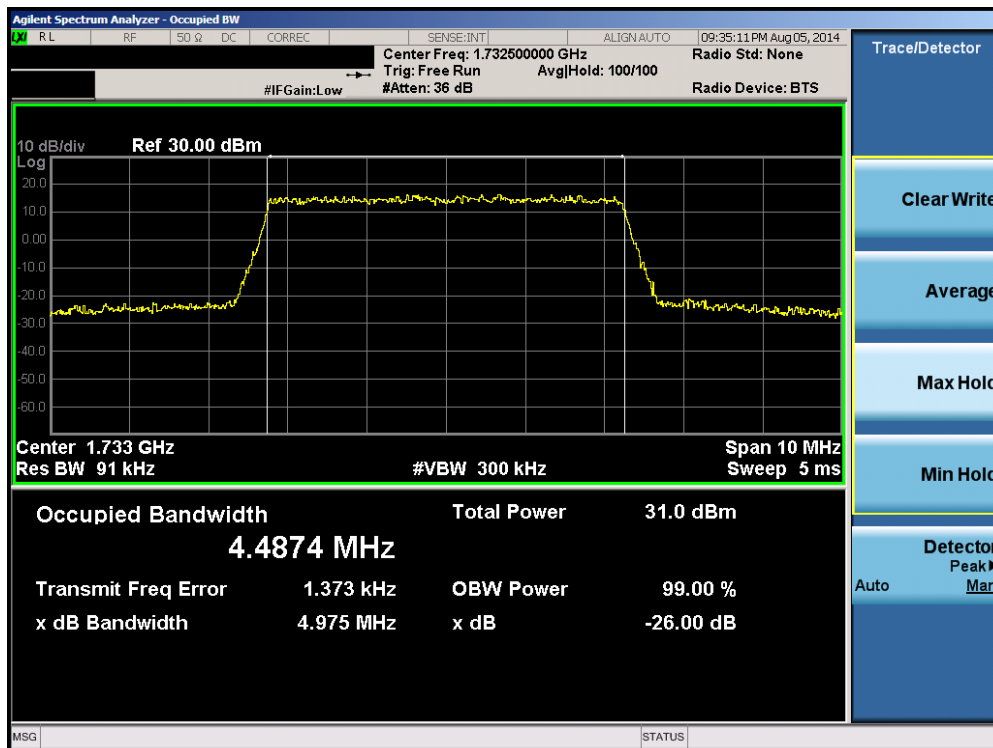


Plot 6-20. Occupied Bandwidth Plot (Band 4 – 3.0MHz 16-QAM – RB Size 15)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 22 of 114                  |

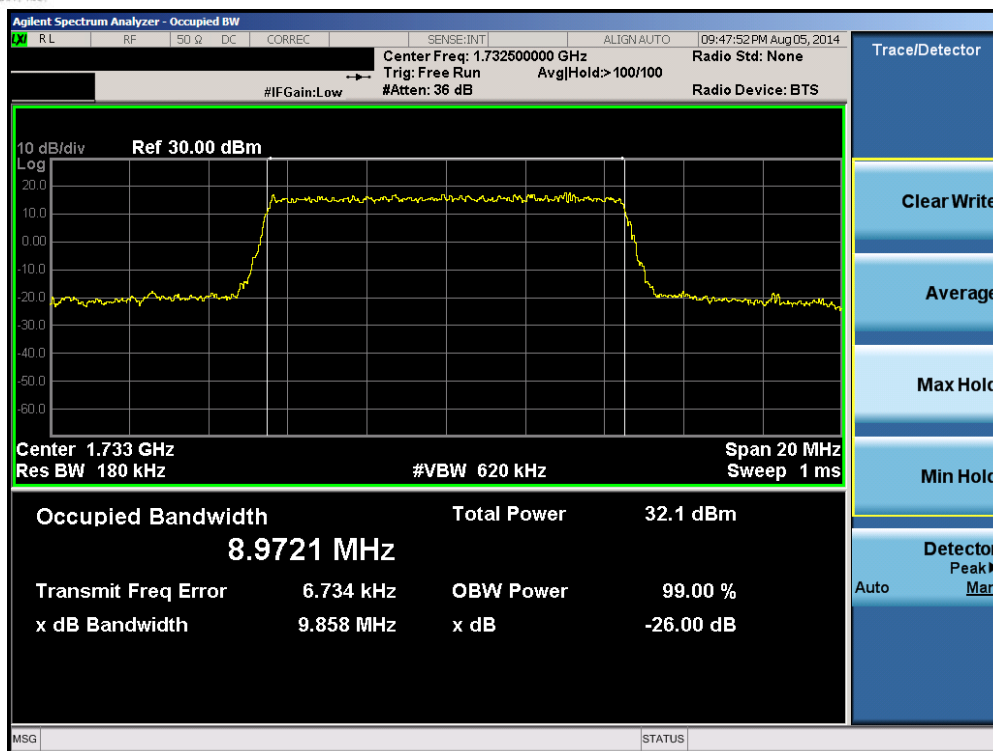


Plot 6-21. Occupied Bandwidth Plot (Band 4 – 5.0MHz QPSK – RB Size 25)

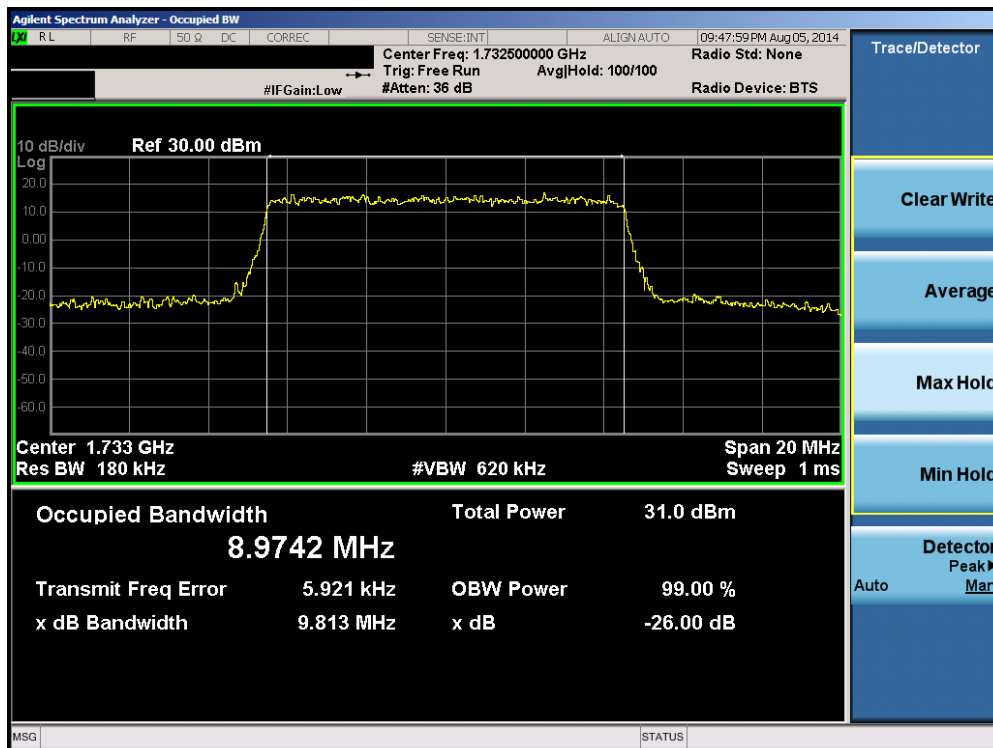


Plot 6-22. Occupied Bandwidth Plot (Band 4 – 5.0MHz 16-QAM – RB Size 25)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 23 of 114                  |

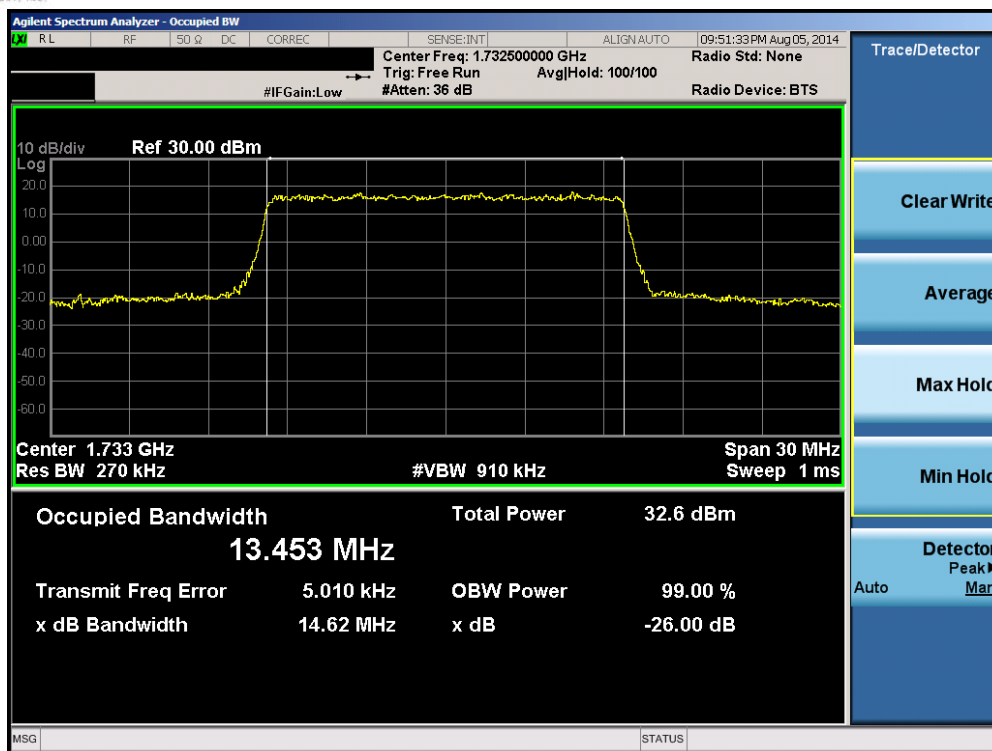


Plot 6-23. Occupied Bandwidth Plot (Band 4 – 10.0MHz QPSK – RB Size 50)

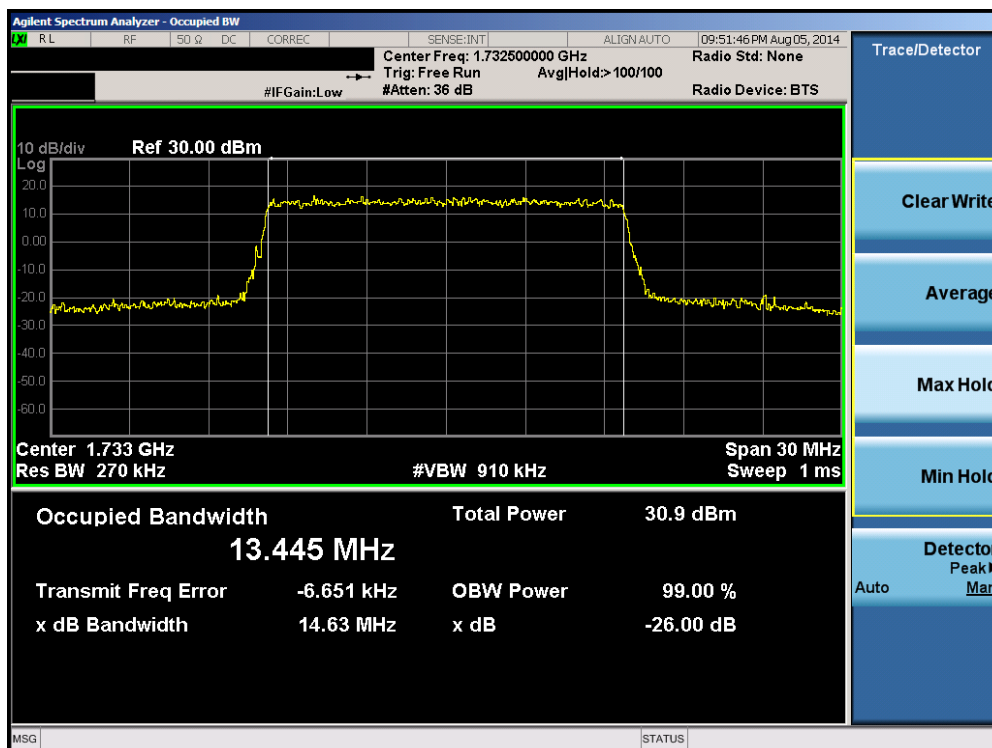


Plot 6-24. Occupied Bandwidth Plot (Band 4 – 10.0MHz 16-QAM – RB Size 50)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 24 of 114                  |

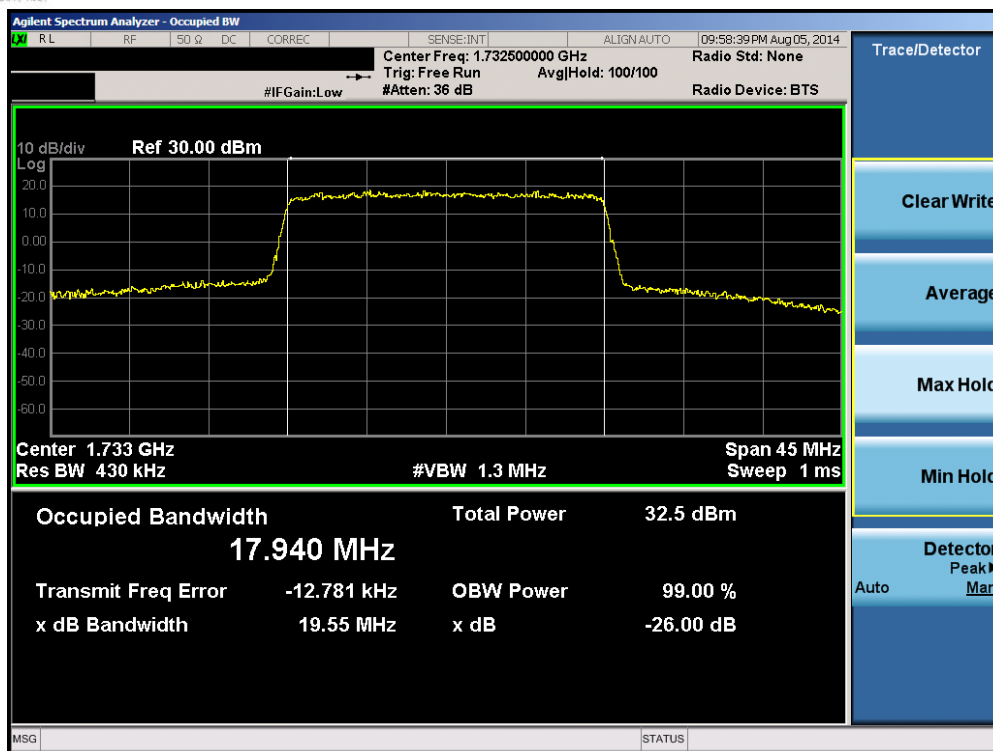


Plot 6-25. Occupied Bandwidth Plot (Band 4 – 15.0MHz QPSK – RB Size 75)

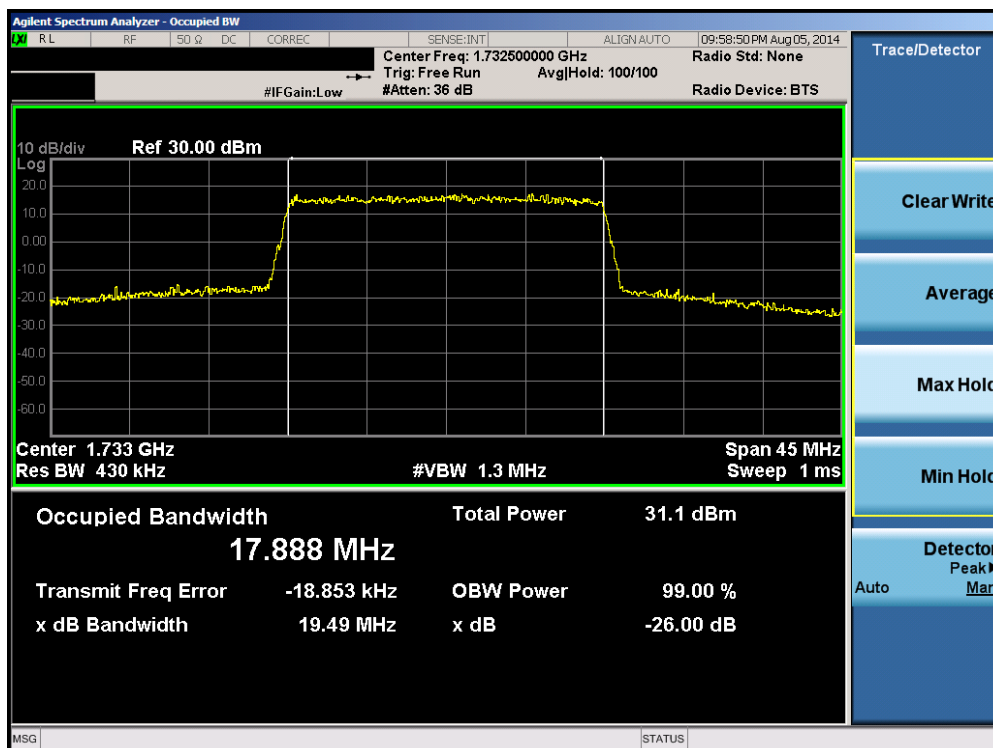


Plot 6-26. Occupied Bandwidth Plot (Band 4 – 15.0MHz 16-QAM – RB Size 75)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 25 of 114                  |

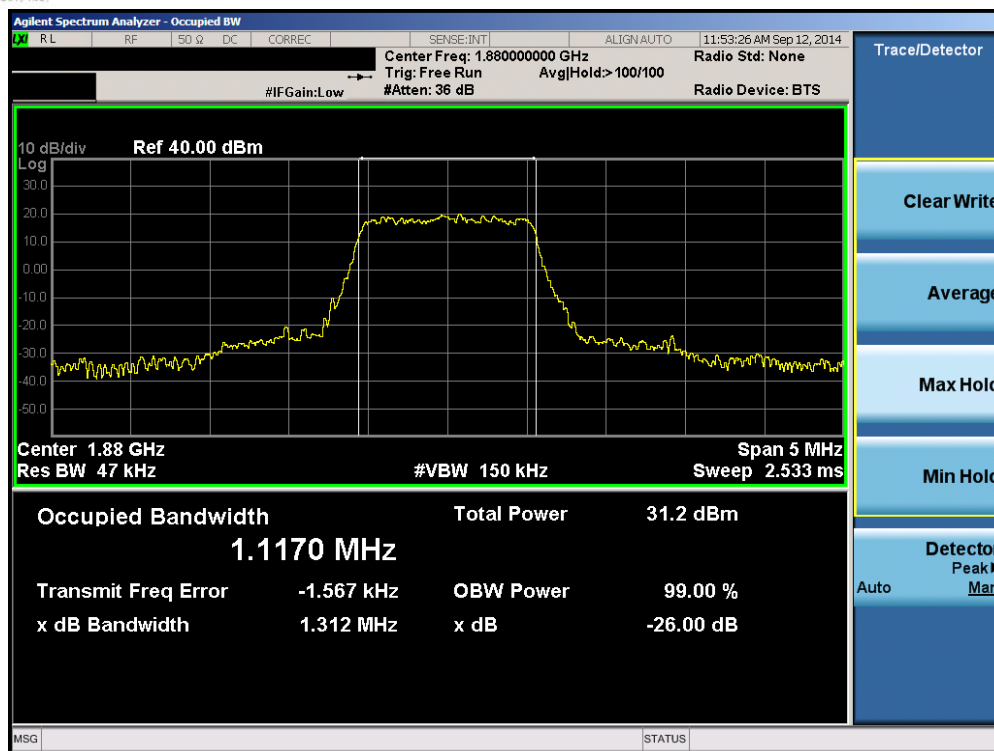


Plot 6-27. Occupied Bandwidth Plot (Band 4 – 20.0MHz QPSK – RB Size 100)

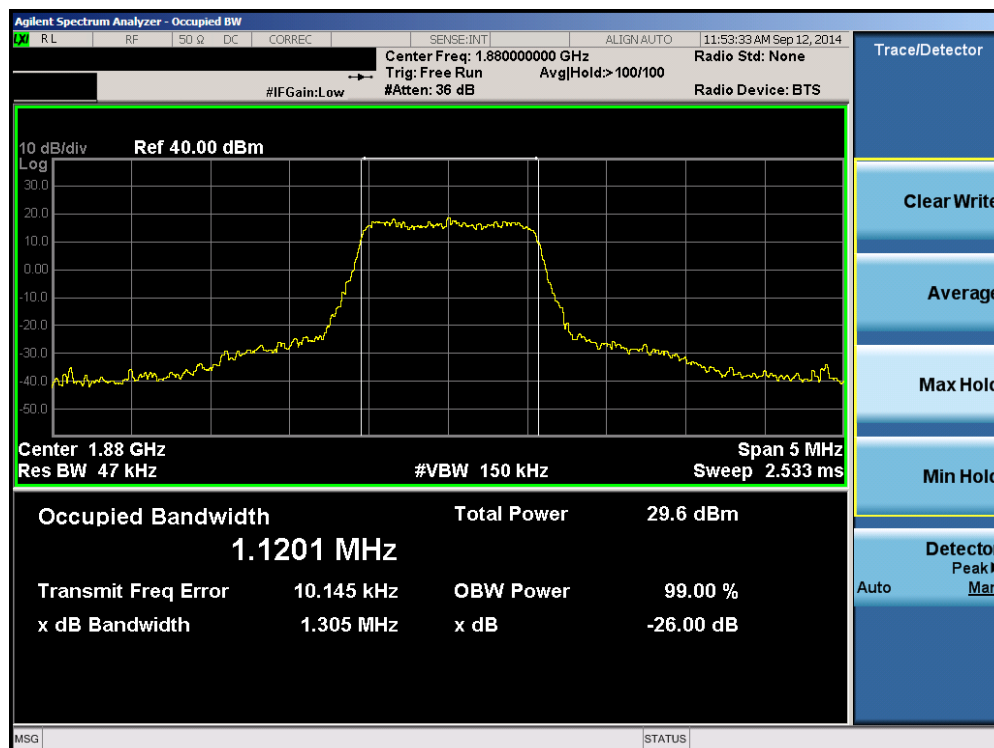


Plot 6-28. Occupied Bandwidth Plot (Band 4 – 20.0MHz 16-QAM – RB Size 100)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 26 of 114                  |

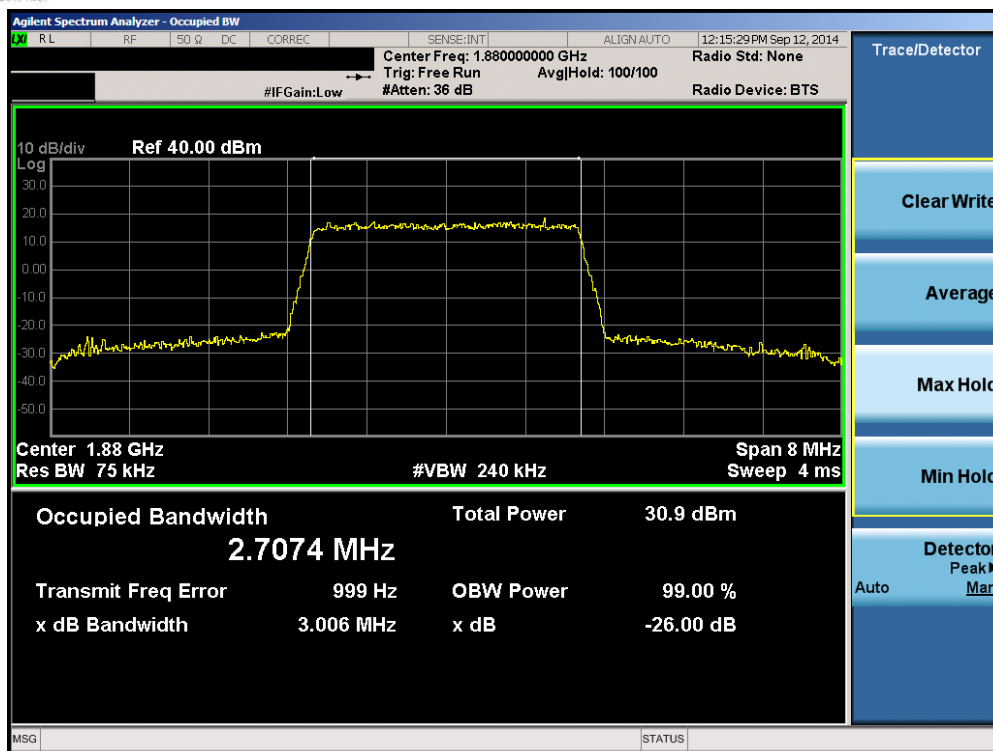


Plot 6-29. Occupied Bandwidth Plot (Band 2 – 1.4MHz QPSK – RB Size 6)

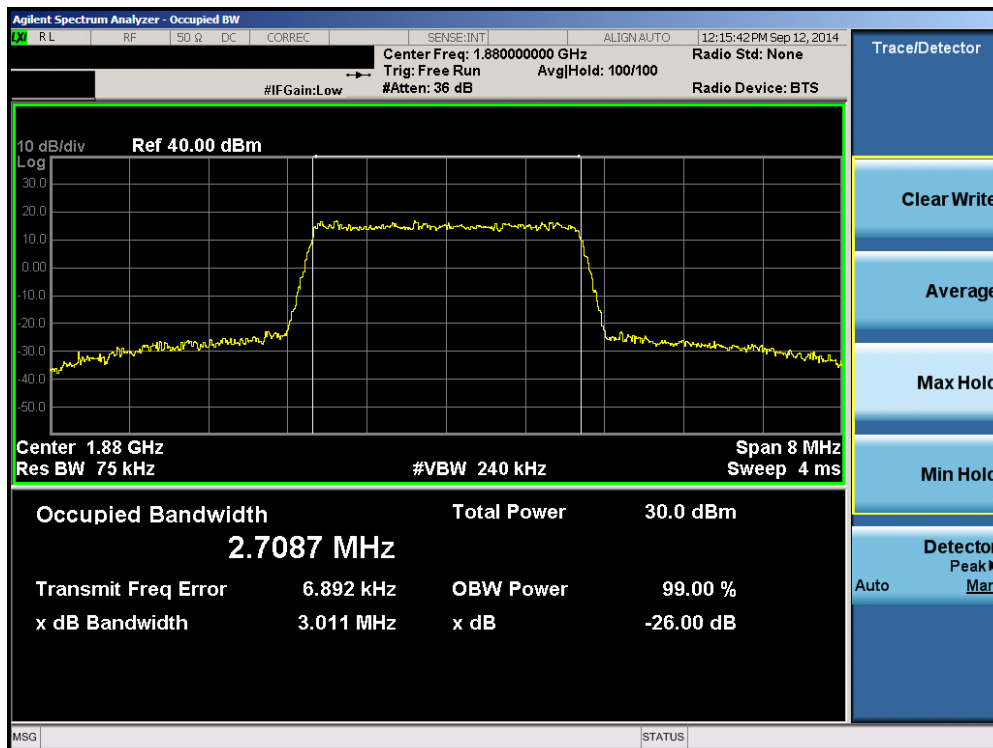


Plot 6-30. Occupied Bandwidth Plot (Band 2 – 1.4MHz 16-QAM – RB Size 6)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 27 of 114                  |

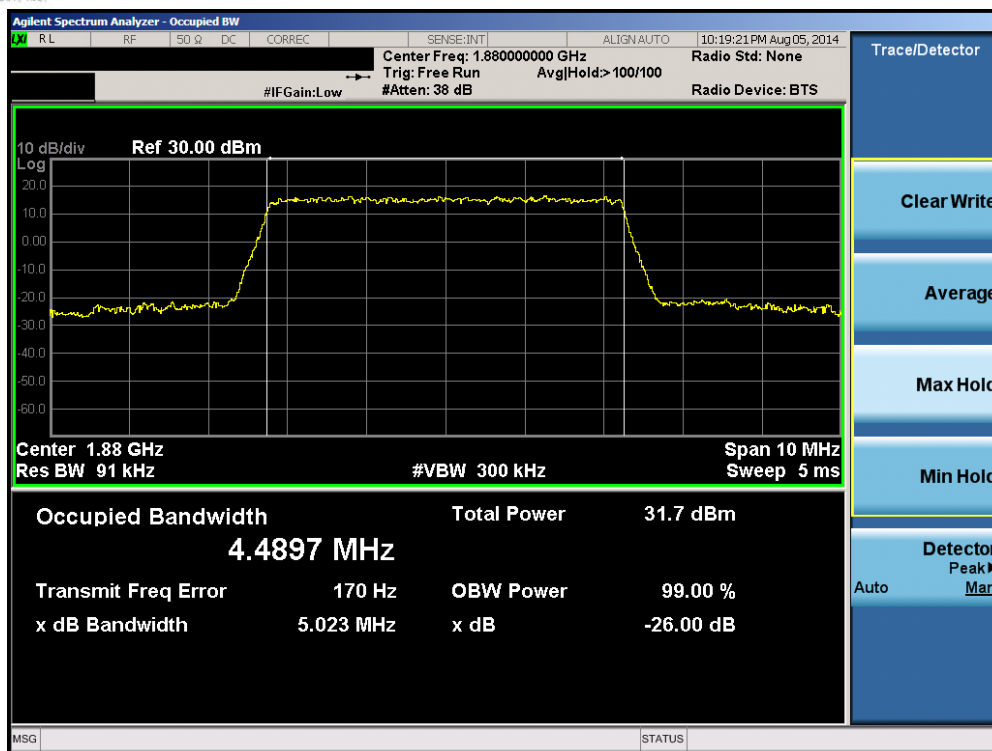


Plot 6-31. Occupied Bandwidth Plot (Band 2 – 3.0MHz QPSK – RB Size 15)

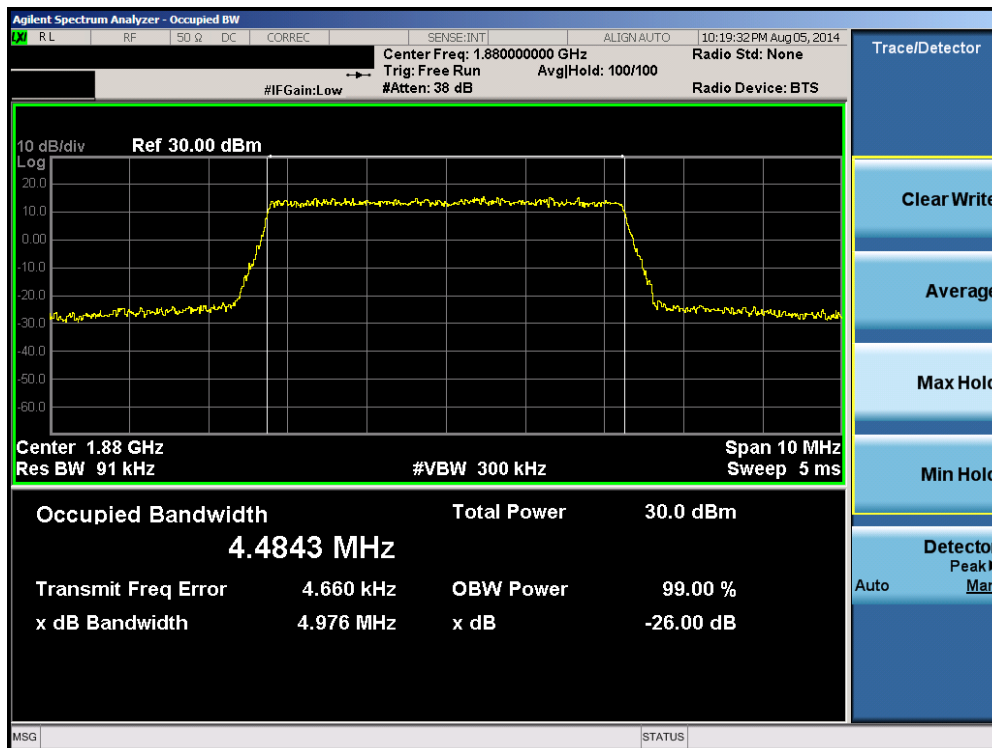


Plot 6-32. Occupied Bandwidth Plot (Band 2 – 3.0MHz 16-QAM – RB Size 15)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 28 of 114                  |

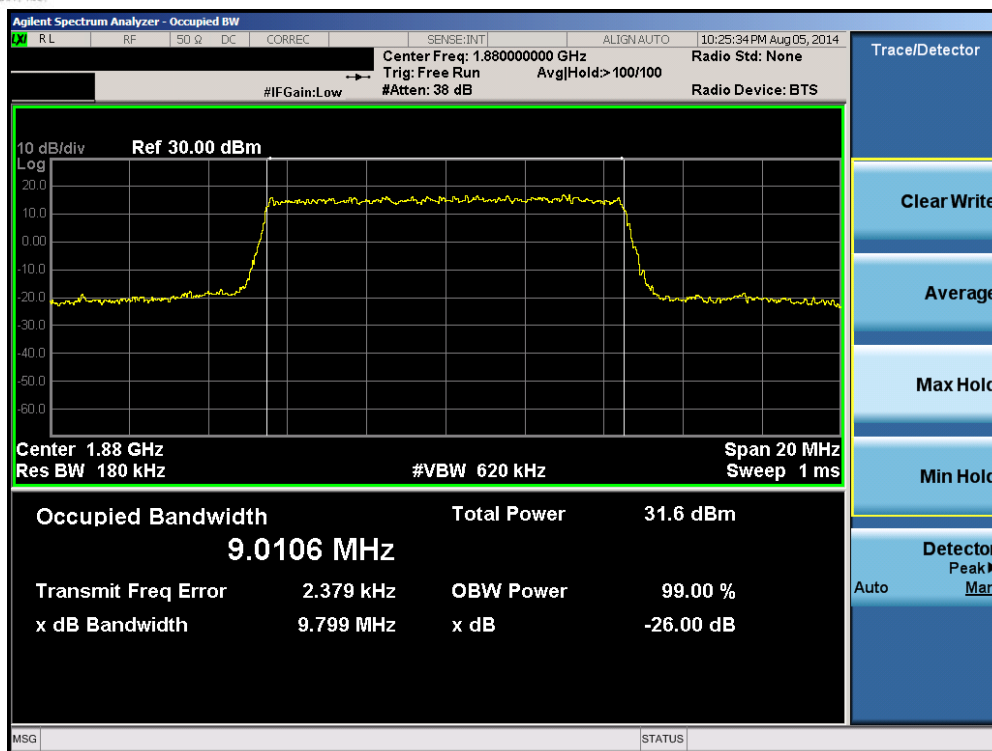


Plot 6-33. Occupied Bandwidth Plot (Band 2 – 5.0MHz QPSK – RB Size 25)

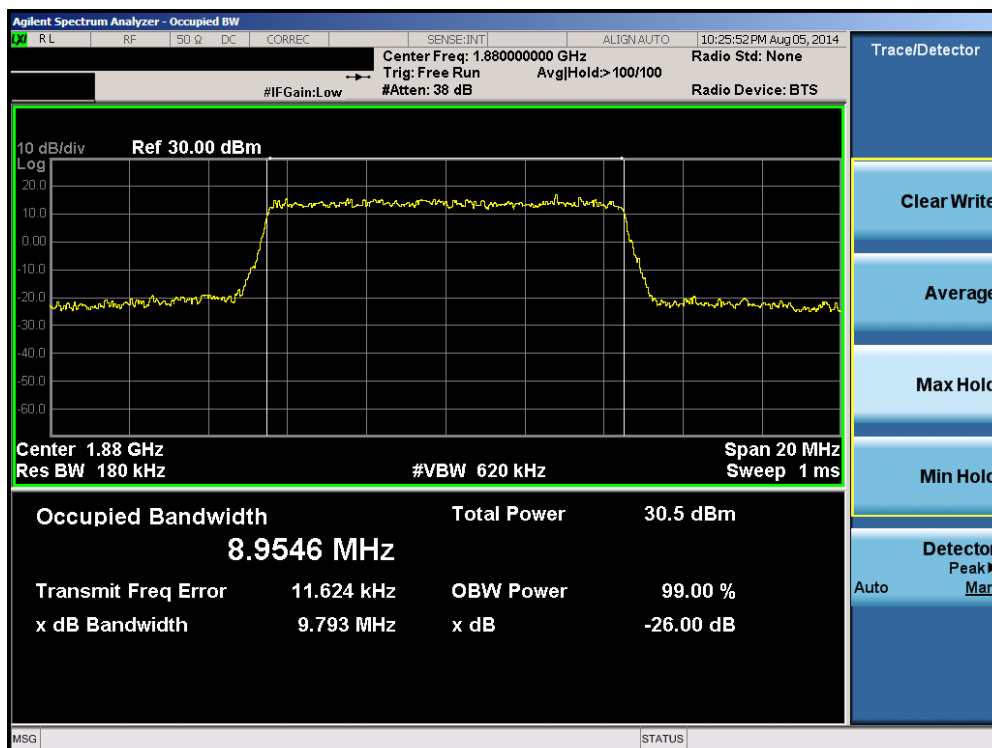


Plot 6-34. Occupied Bandwidth Plot (Band 2 – 5.0MHz 16-QAM – RB Size 25)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 29 of 114                  |

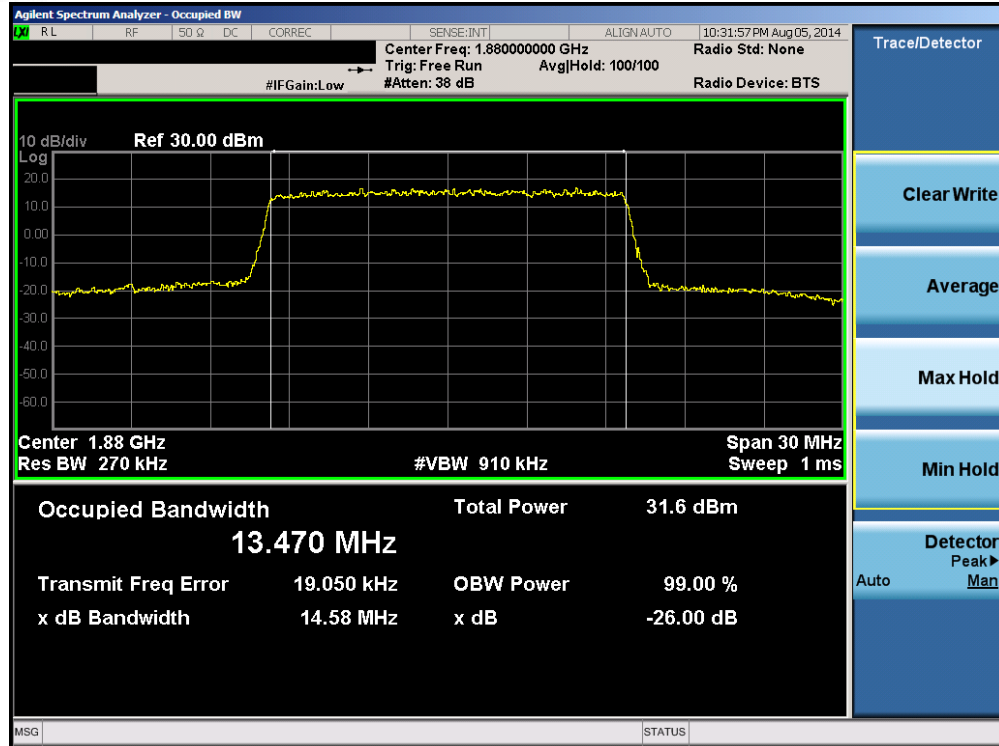


Plot 6-35. Occupied Bandwidth Plot (Band 2 – 10.0MHz QPSK – RB Size 50)

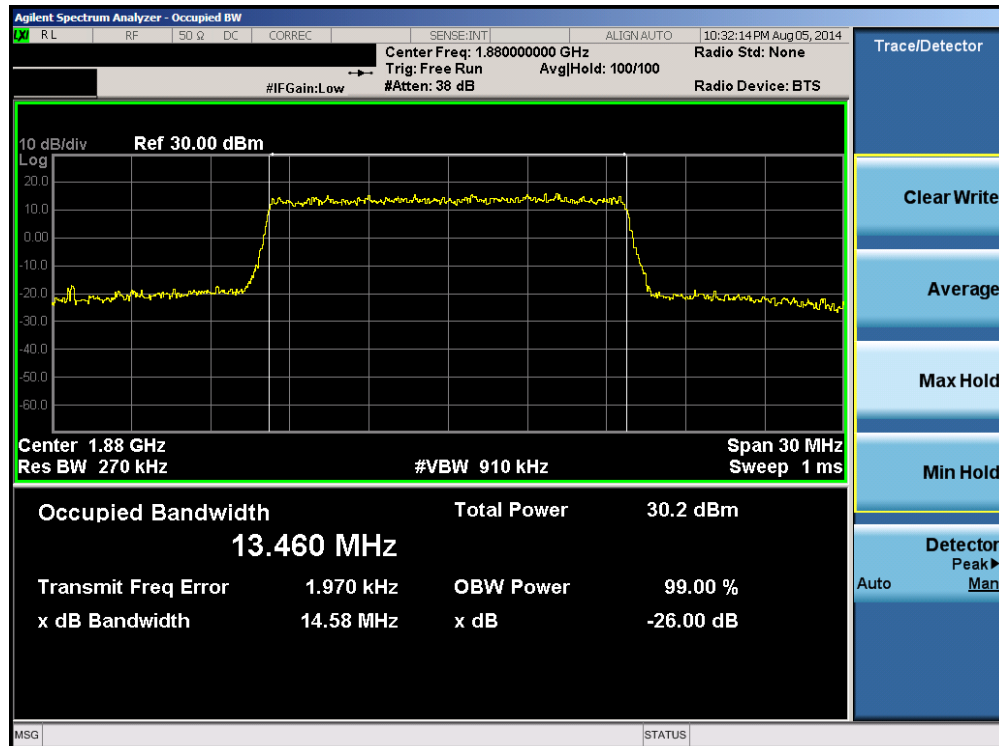


Plot 6-36. Occupied Bandwidth Plot (Band 2 – 10.0MHz 16-QAM – RB Size 50)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 30 of 114                  |

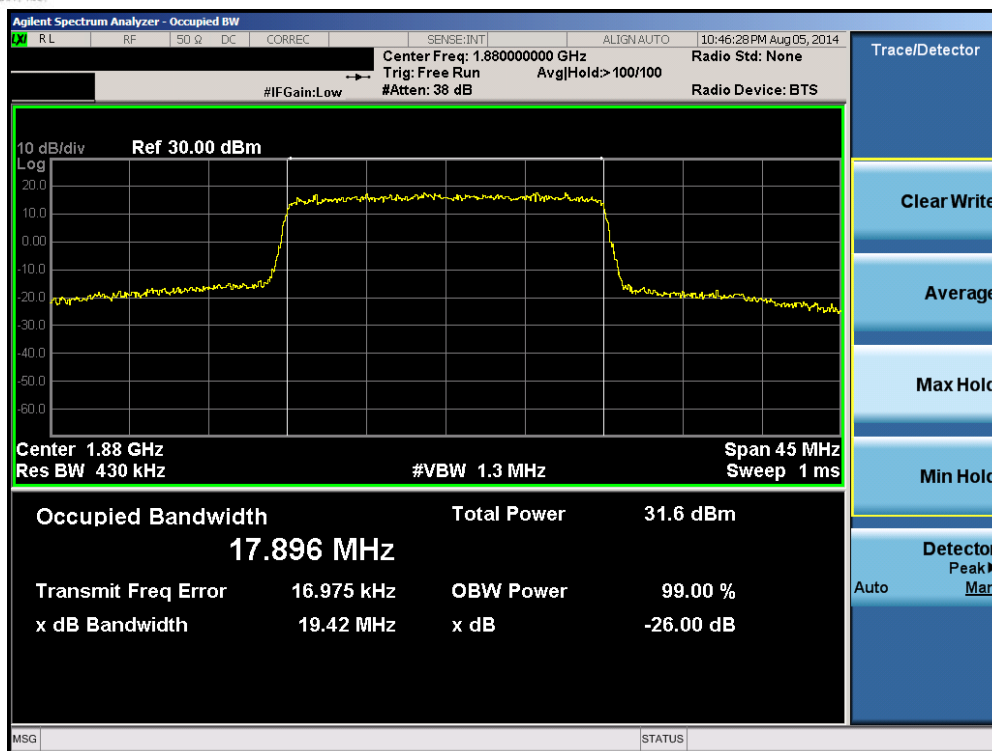


Plot 6-37. Occupied Bandwidth Plot (Band 2 – 15.0MHz QPSK – RB Size 75)

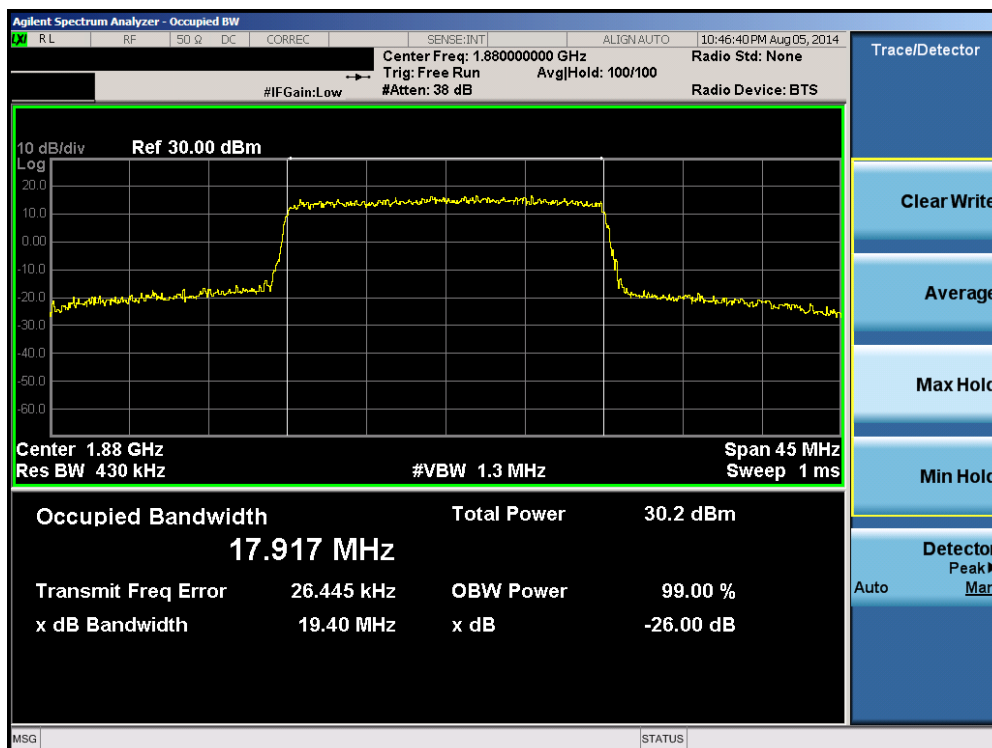


Plot 6-38. Occupied Bandwidth Plot (Band 2 – 15.0MHz 16-QAM – RB Size 75)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 31 of 114                  |



Plot 6-39. Occupied Bandwidth Plot (Band 2 – 20.0MHz QPSK – RB Size 100)



Plot 6-40. Occupied Bandwidth Plot (Band 2 – 20.0MHz 16-QAM – RB Size 100)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 32 of 114                  |

### 6.3 Spurious and Harmonic Emissions at Antenna Terminal

§2.1051 §22.917(a) §24.238(a) §27.53(g) §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 10<sup>th</sup> 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

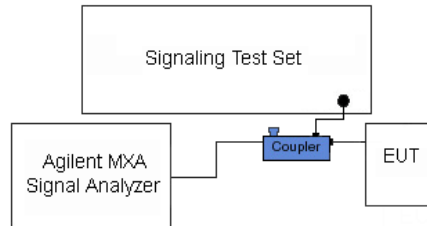
KDB 971168 v02r01 – Section 6.0

#### 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.

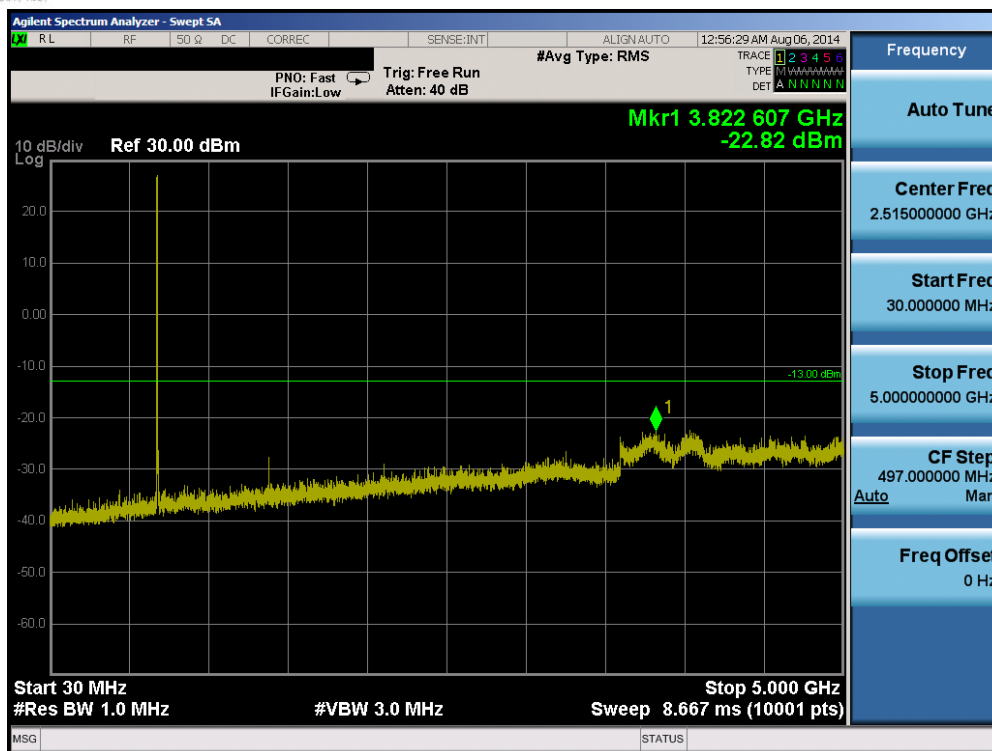


**Figure 6-2. Test Instrument & Measurement Setup**

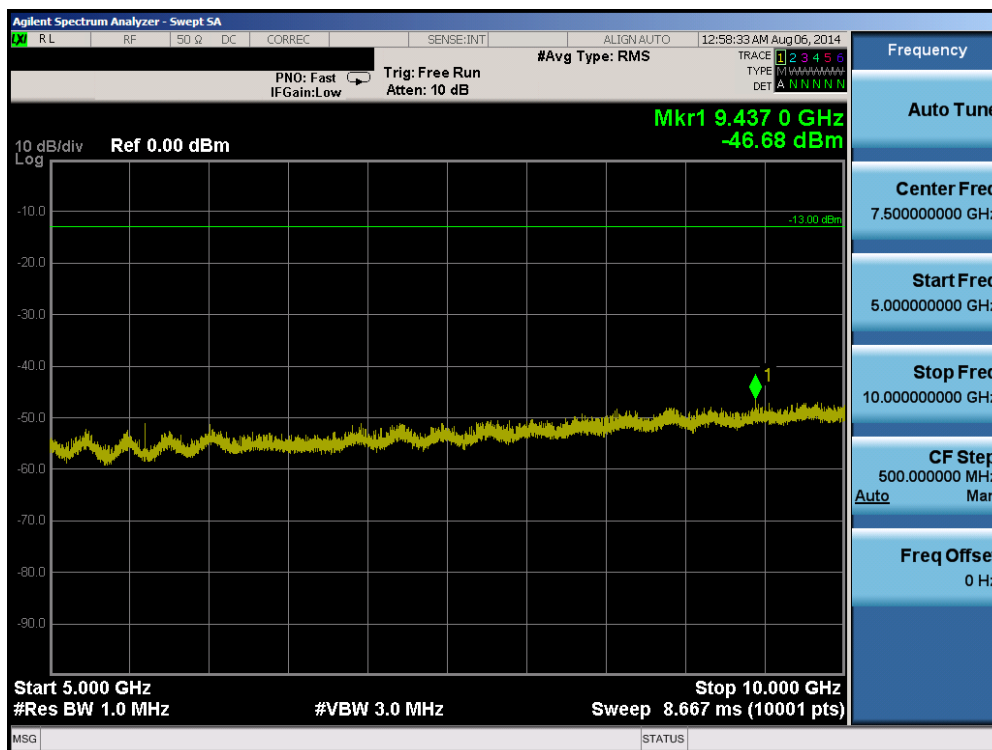
#### Test Notes

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: A3LSMN910R4                     |  | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) |  | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                        | EUT Type:<br>Portable Handset                                  |                                                                                       | Page 33 of 114                  |

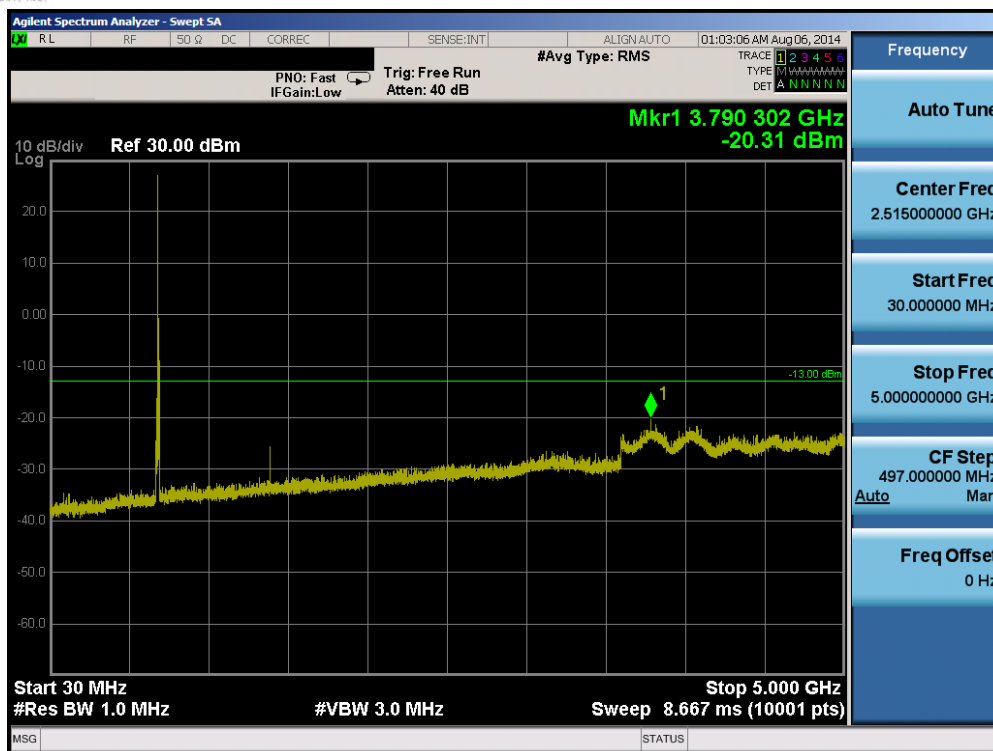


Plot 6-41. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

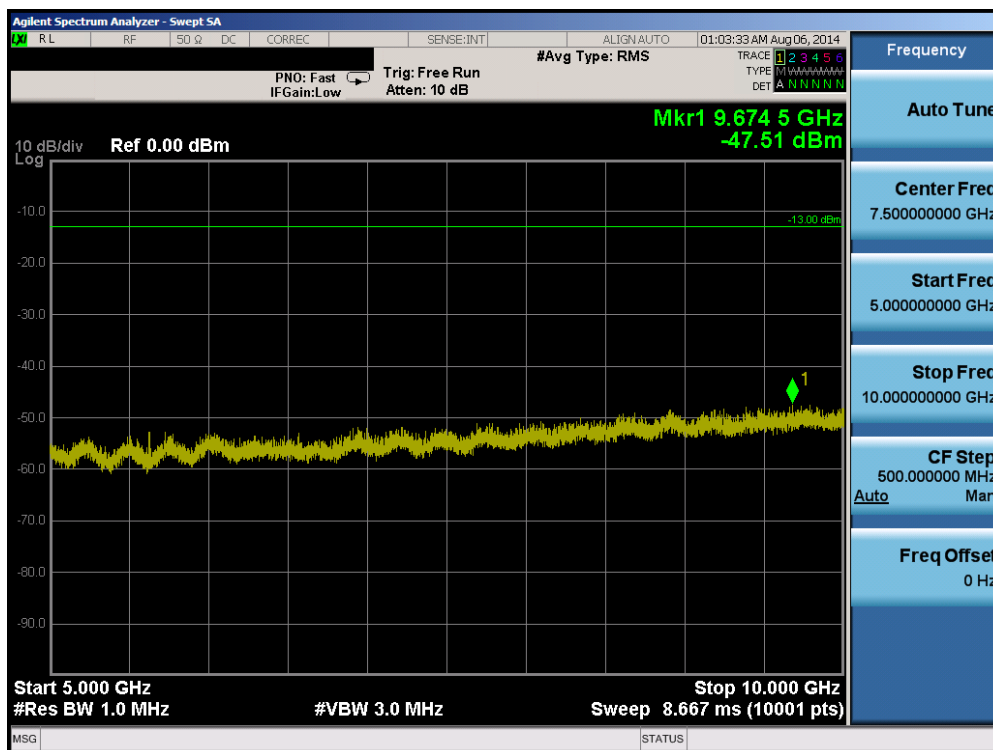


Plot 6-42. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 34 of 114                  |

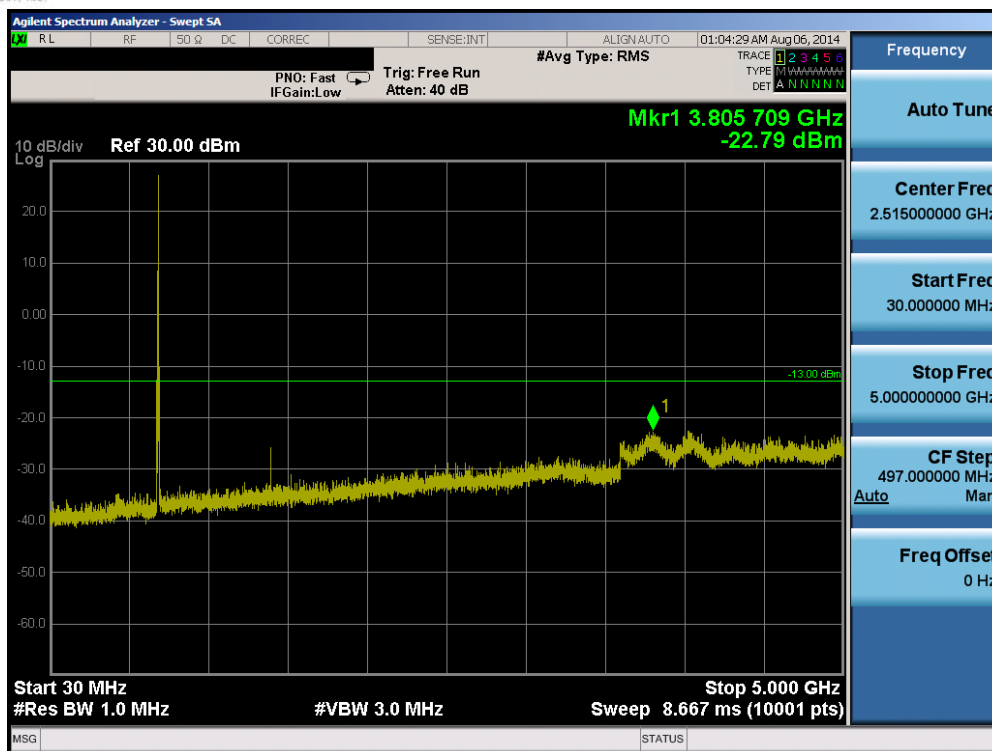


Plot 6-43. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

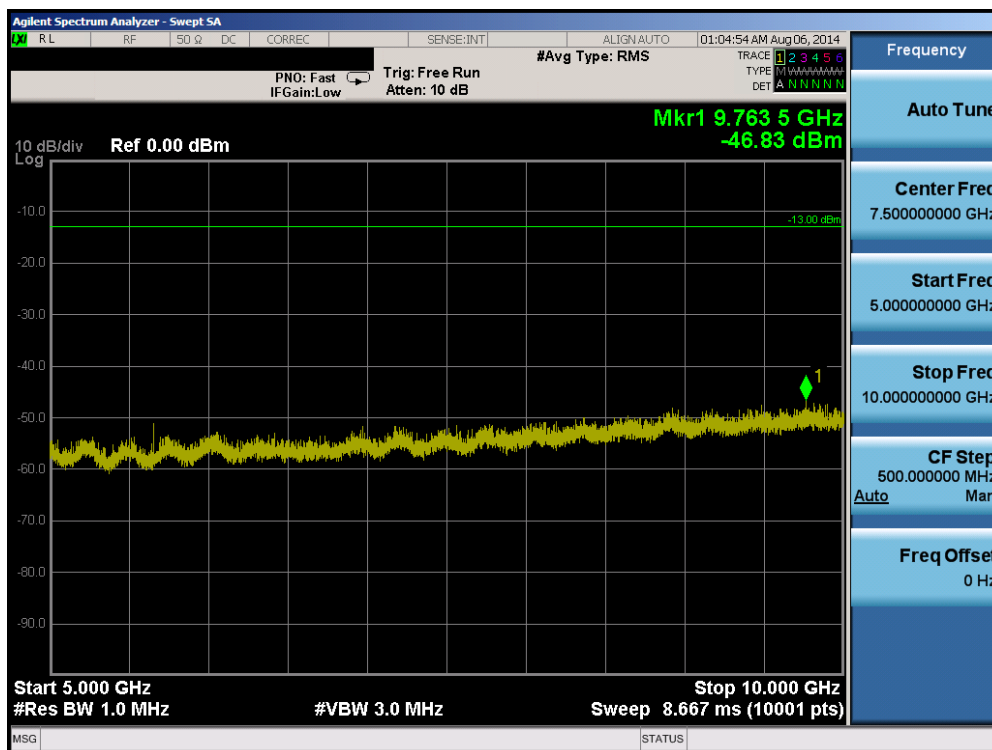


Plot 6-44. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 35 of 114                  |

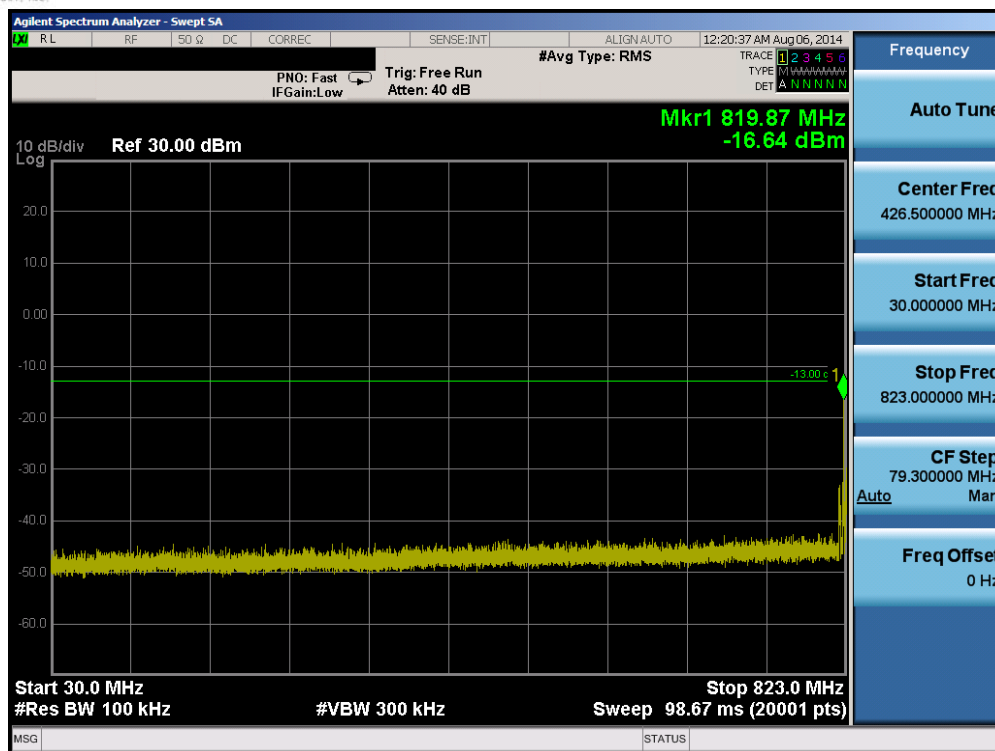


Plot 6-45. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

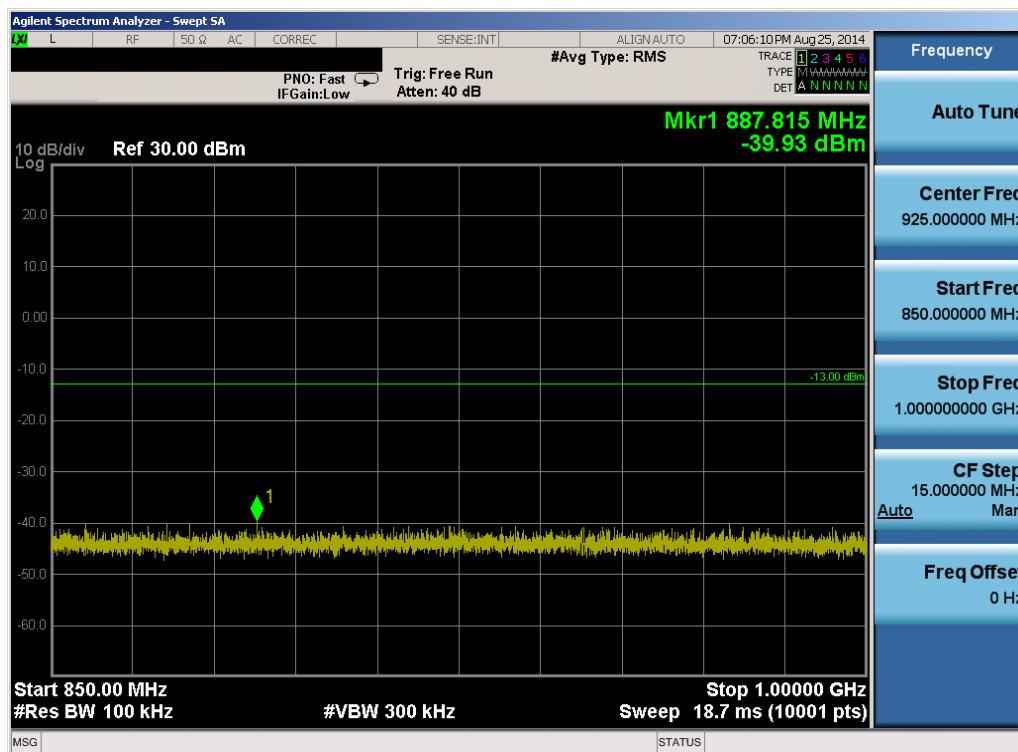


Plot 6-46. Conducted Spurious Plot (Band 12 – 10.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 36 of 114                  |

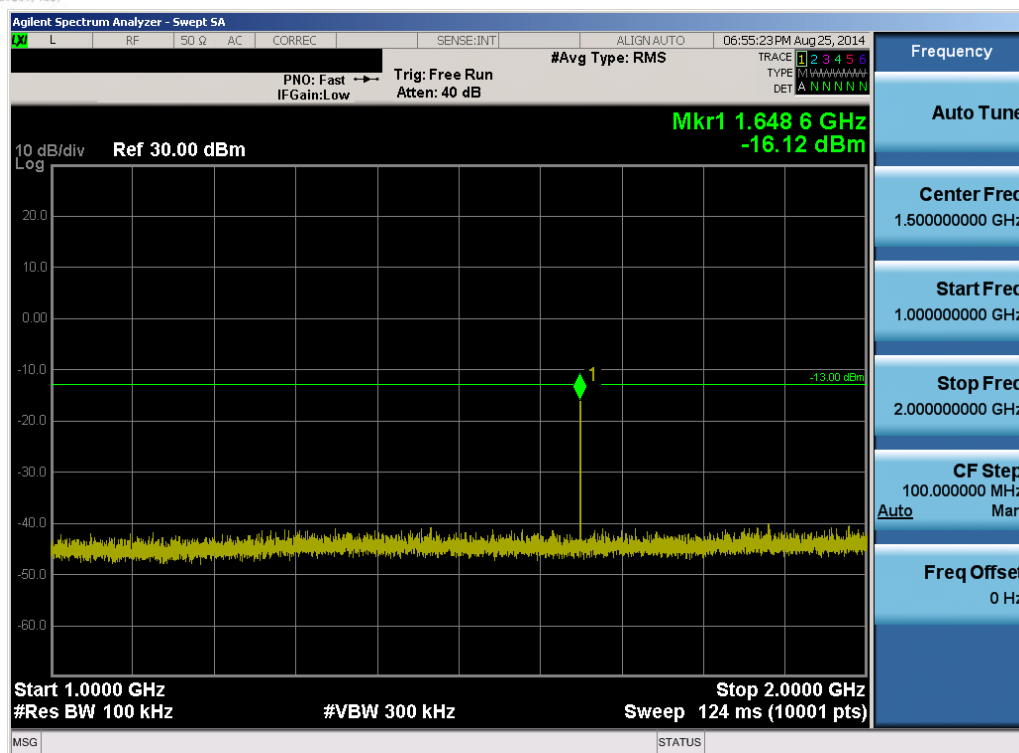


Plot 6-47. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

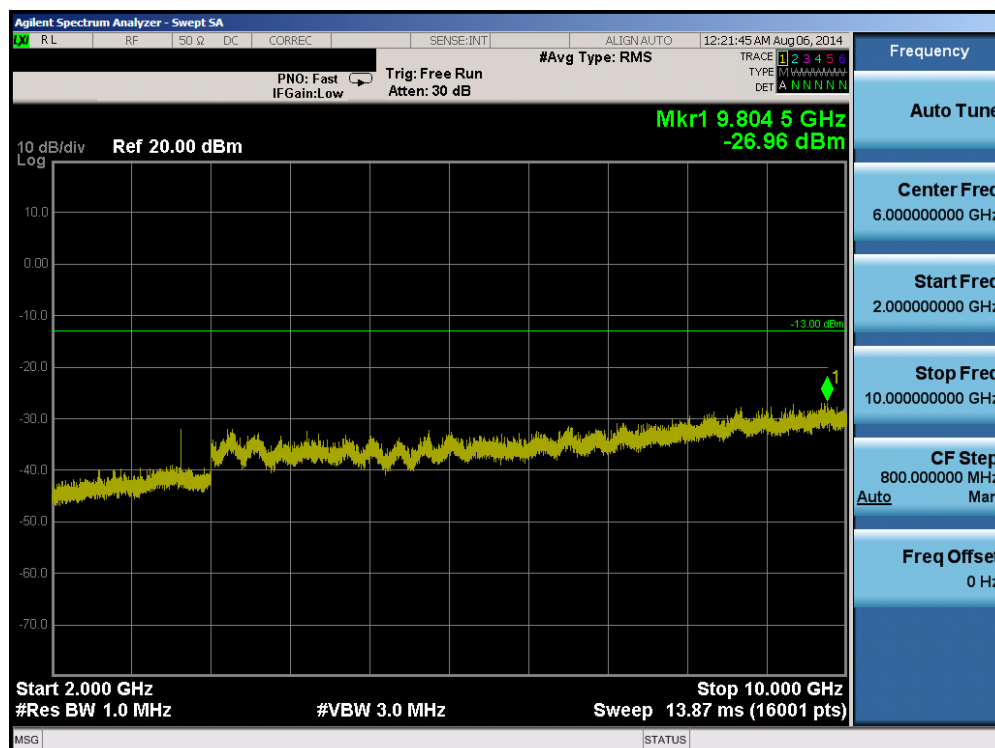


Plot 6-48. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 37 of 114                  |

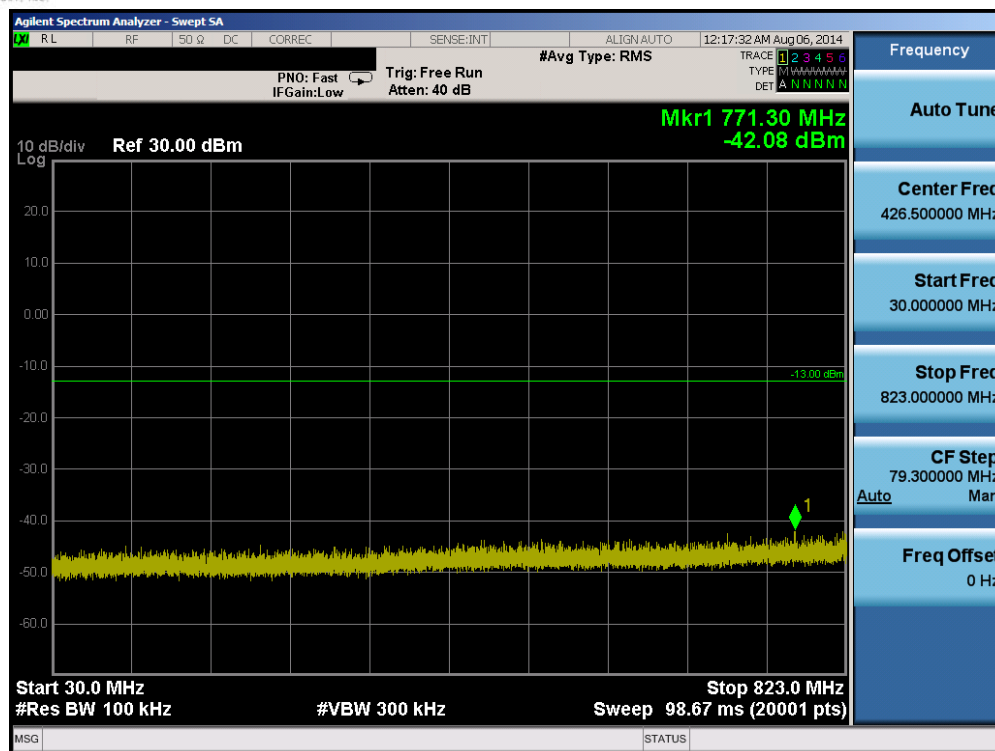


**Plot 6-49. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)**

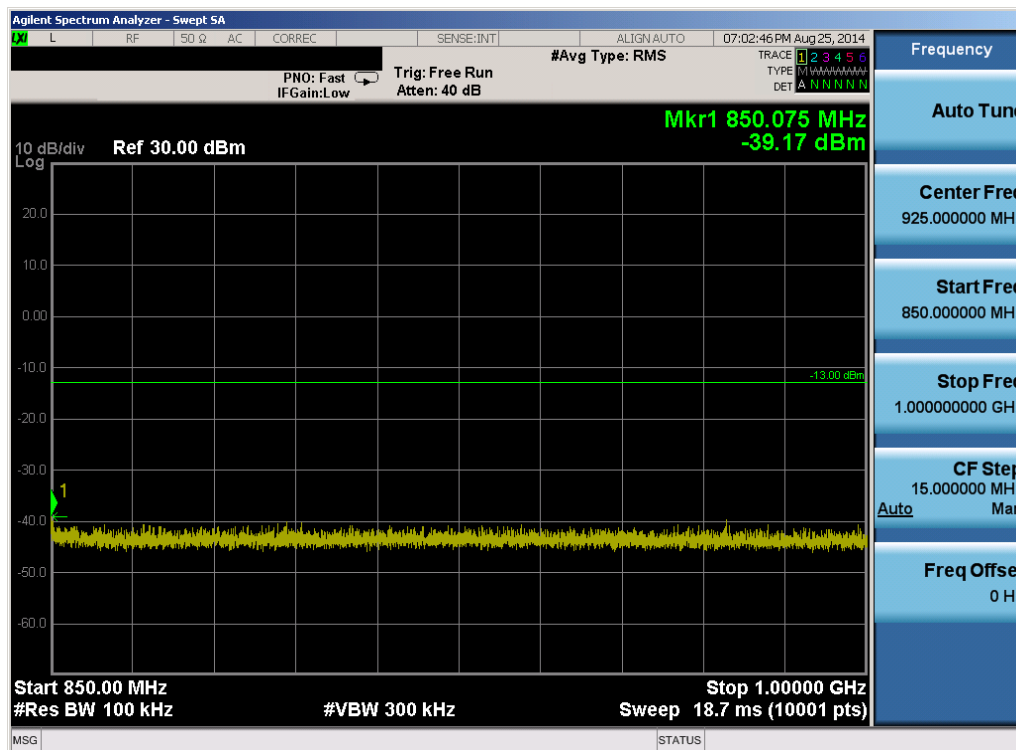


**Plot 6-50. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 38 of 114                  |

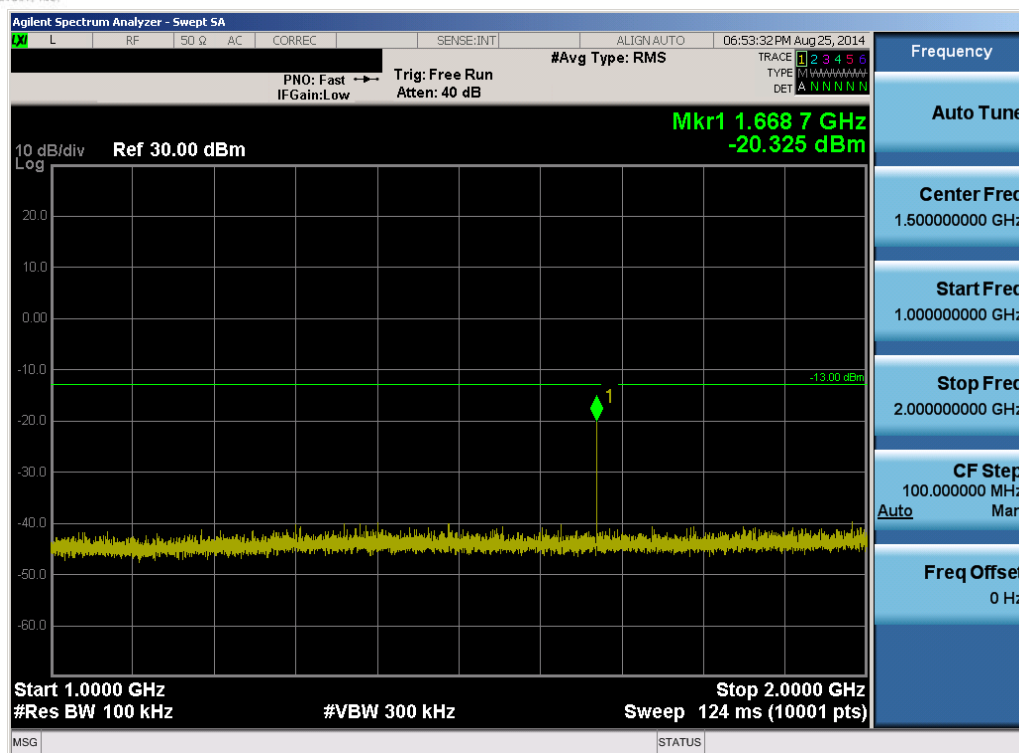


**Plot 6-51. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

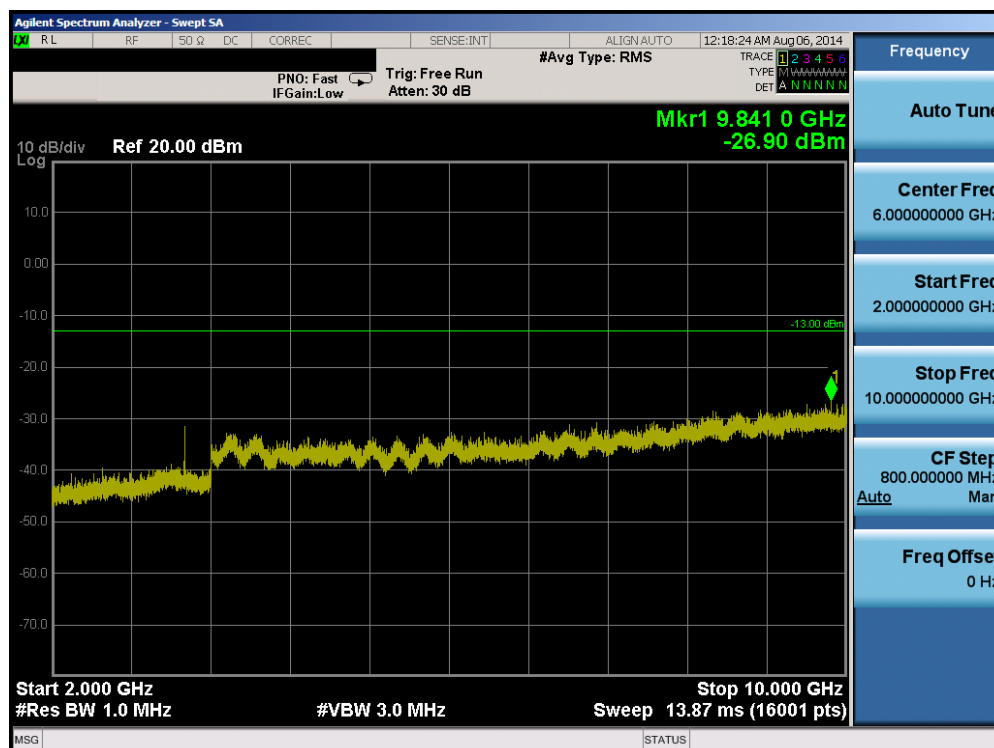


**Plot 6-52. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

|                                                |                                                                                                                                                    |                                      |                                                                            |                                                                                       |                                        |
|------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|----------------------------------------|
| FCC ID: A3LSMN910R4                            |  <b>PCTEST</b><br><small>ENGINEERING TECHNOLOGIES, INC.</small> |                                      | <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b> |  | <b>Reviewed by:</b><br>Quality Manager |
| <b>Test Report S/N:</b><br>0Y1408051618.A3L-R1 | <b>Test Dates:</b><br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                | <b>EUT Type:</b><br>Portable Handset |                                                                            |                                                                                       | Page 39 of 114                         |

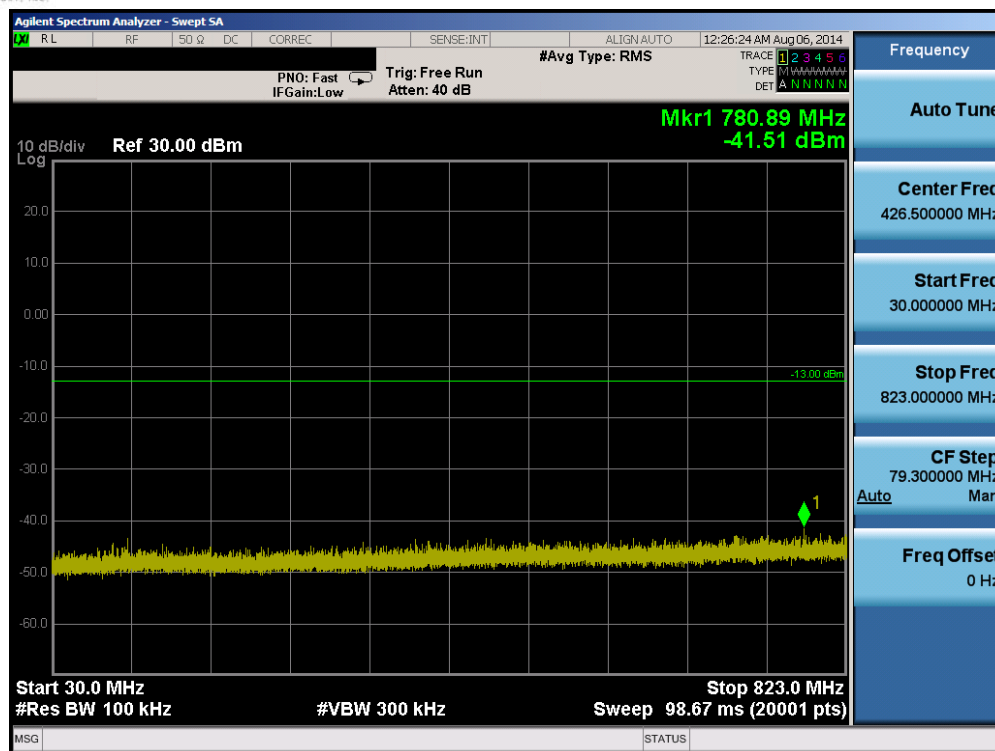


**Plot 6-53. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

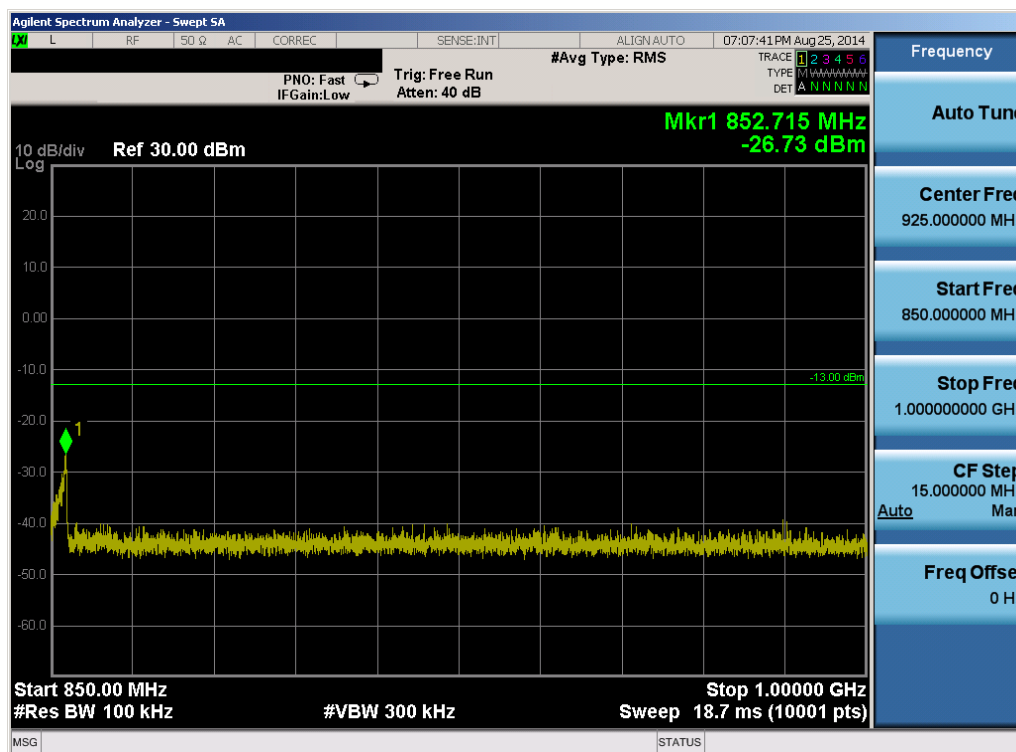


**Plot 6-54. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 40 of 114                  |

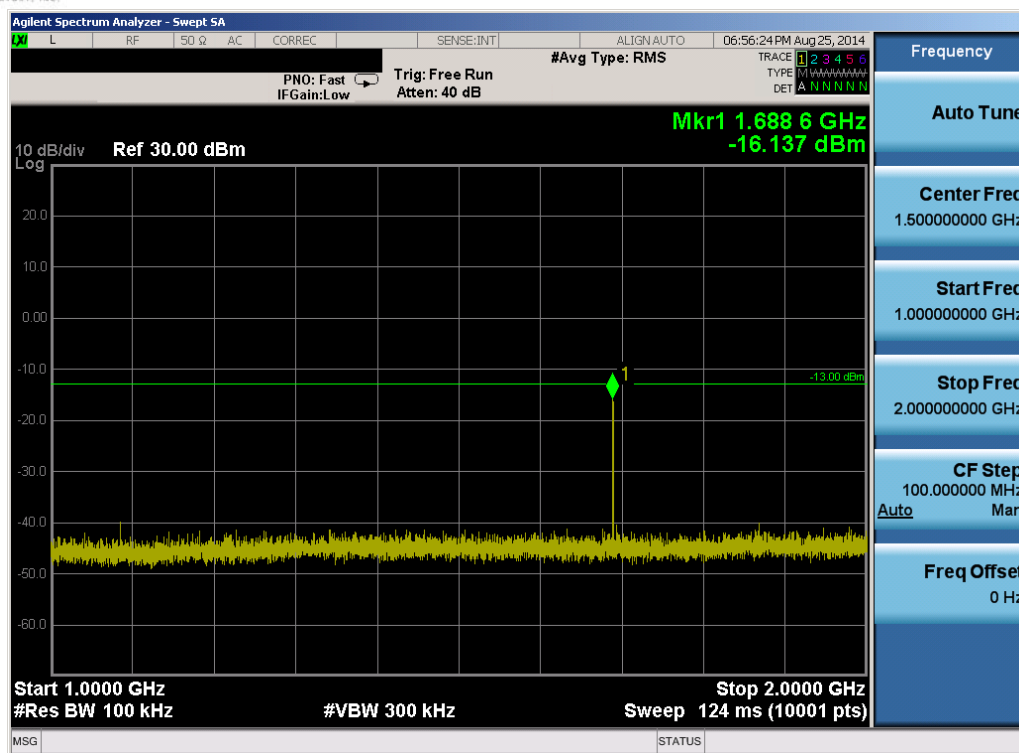


**Plot 6-55. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

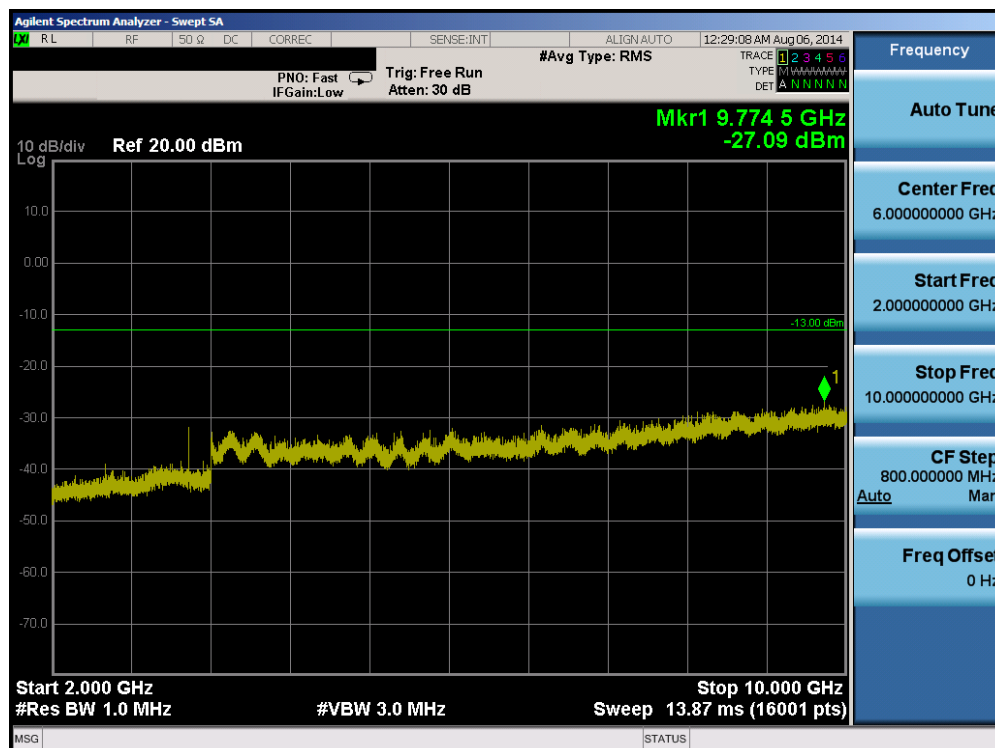


**Plot 6-56. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 41 of 114                  |

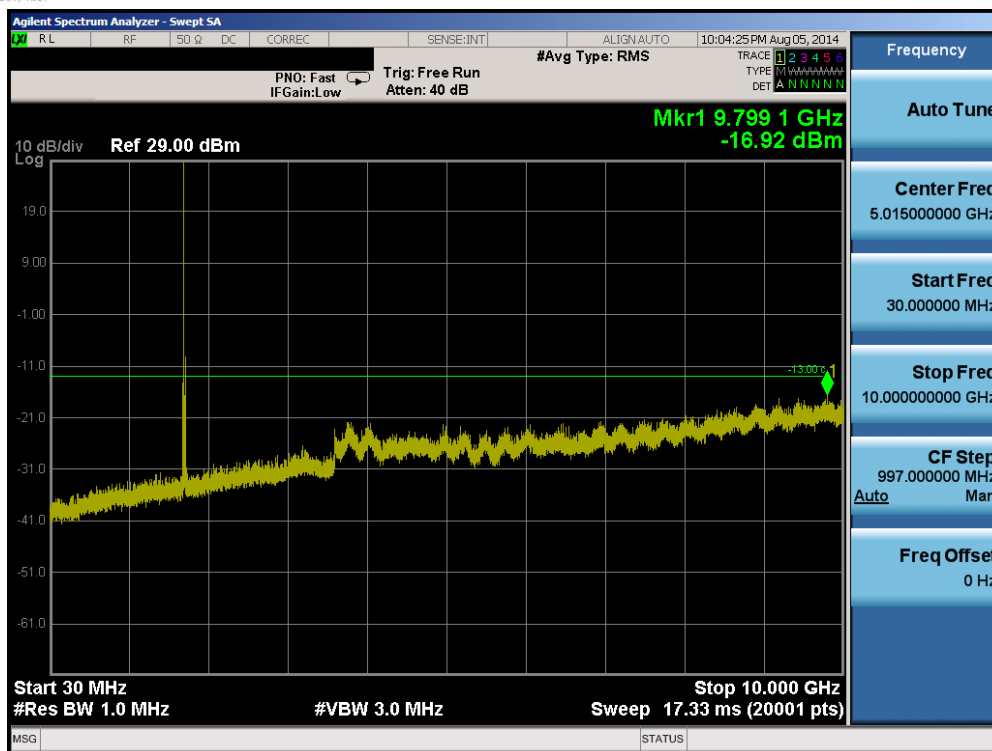


**Plot 6-57. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

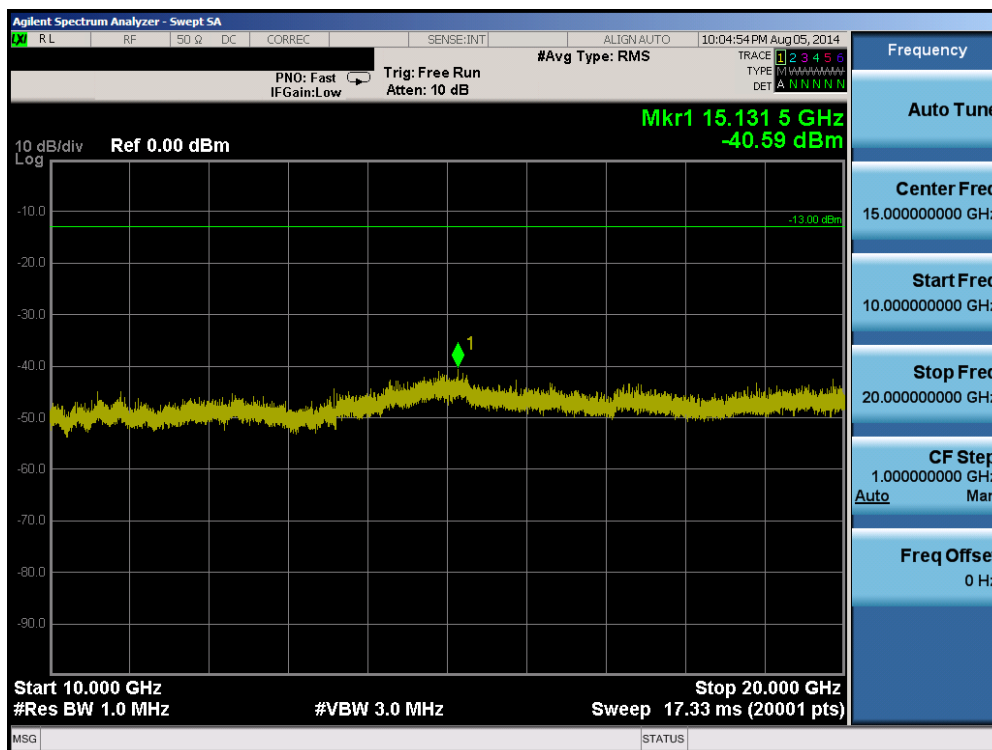


**Plot 6-58. Conducted Spurious Plot (Band 5 – 5.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 42 of 114                  |

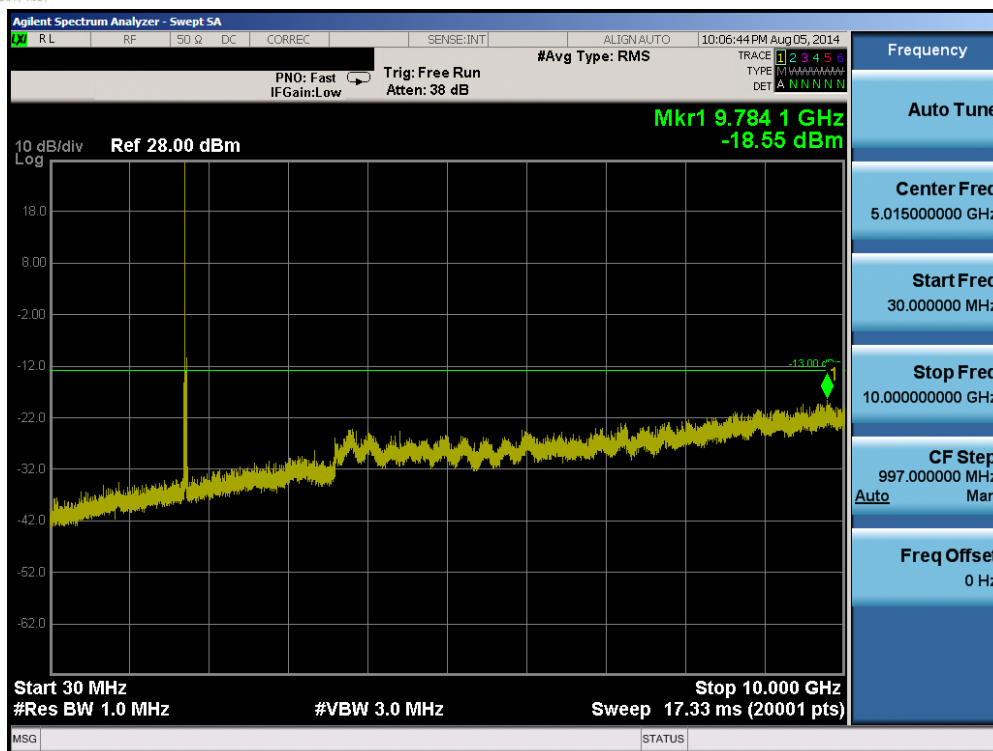


Plot 6-59. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

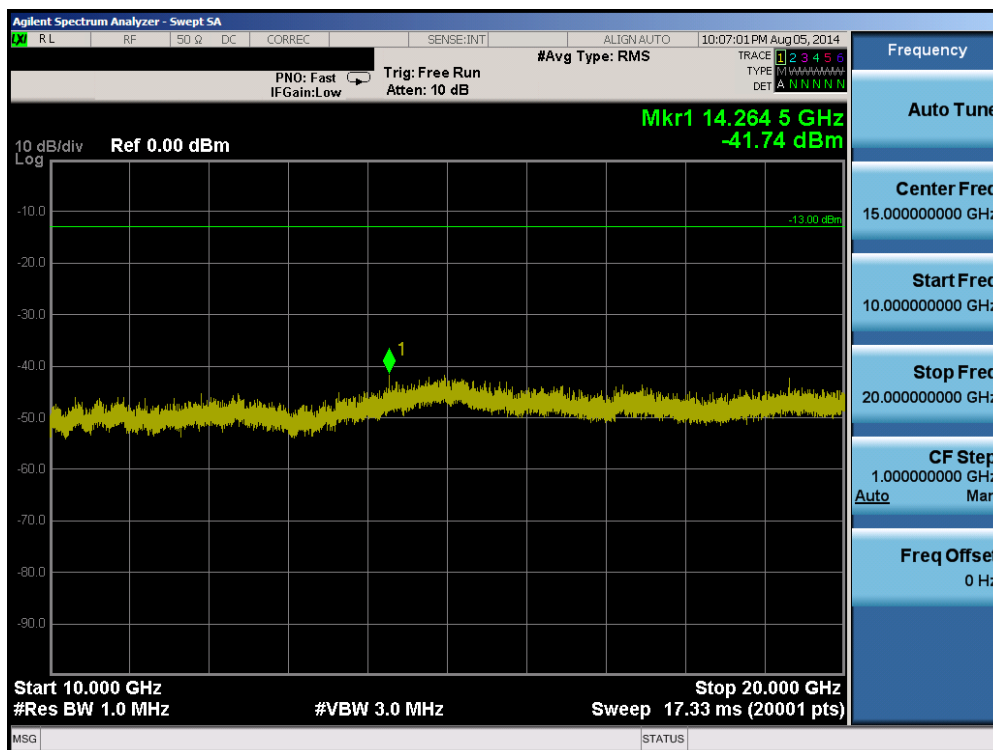


Plot 6-60. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

|                                         |                                                       |                               |                                                                |                       |                                 |
|-----------------------------------------|-------------------------------------------------------|-------------------------------|----------------------------------------------------------------|-----------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <p><b>PCTEST</b><br/>ENGINEERING LABORATORY, INC.</p> |                               | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <p><b>SAMSUNG</b></p> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014          | EUT Type:<br>Portable Handset |                                                                | Page 43 of 114        |                                 |

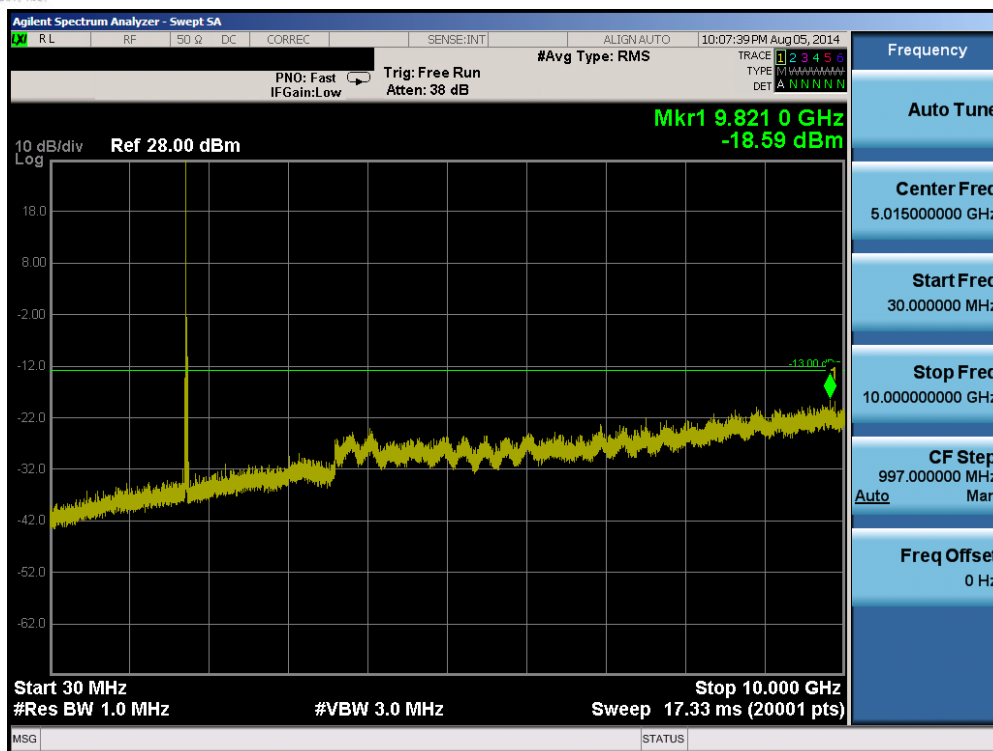


**Plot 6-61. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

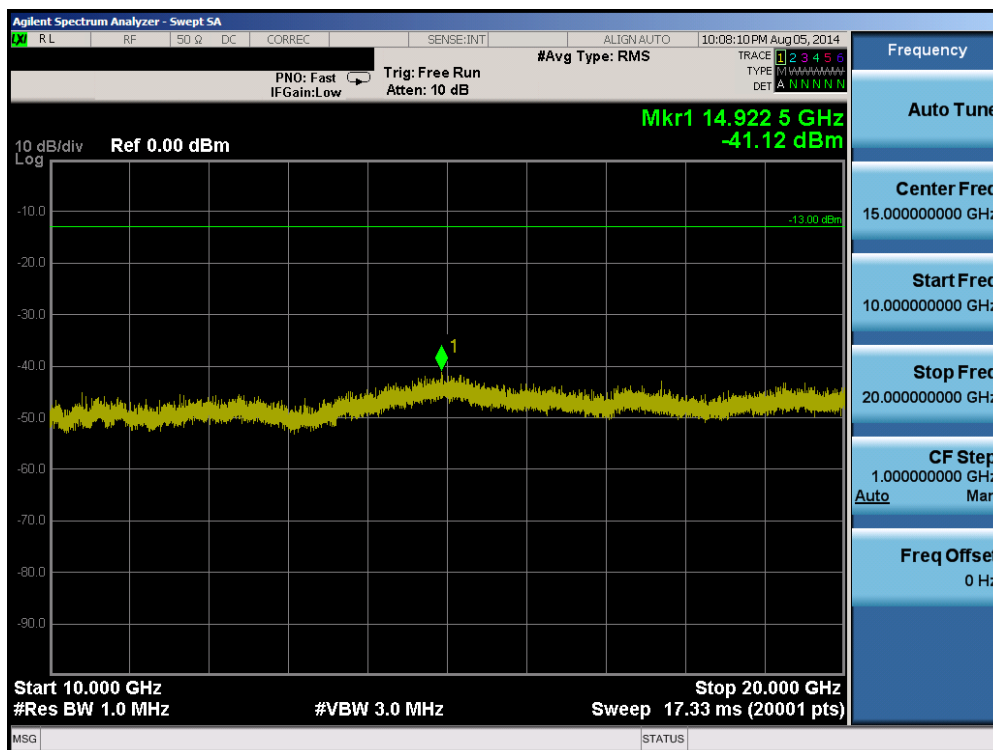


**Plot 6-62. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 44 of 114                  |

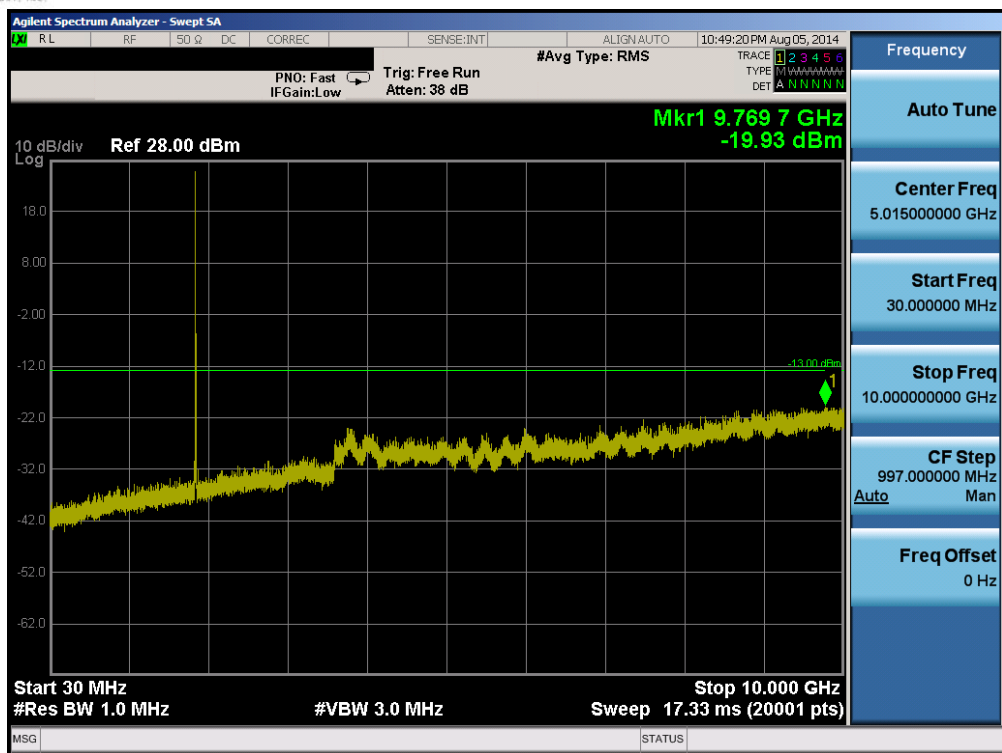


**Plot 6-63. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

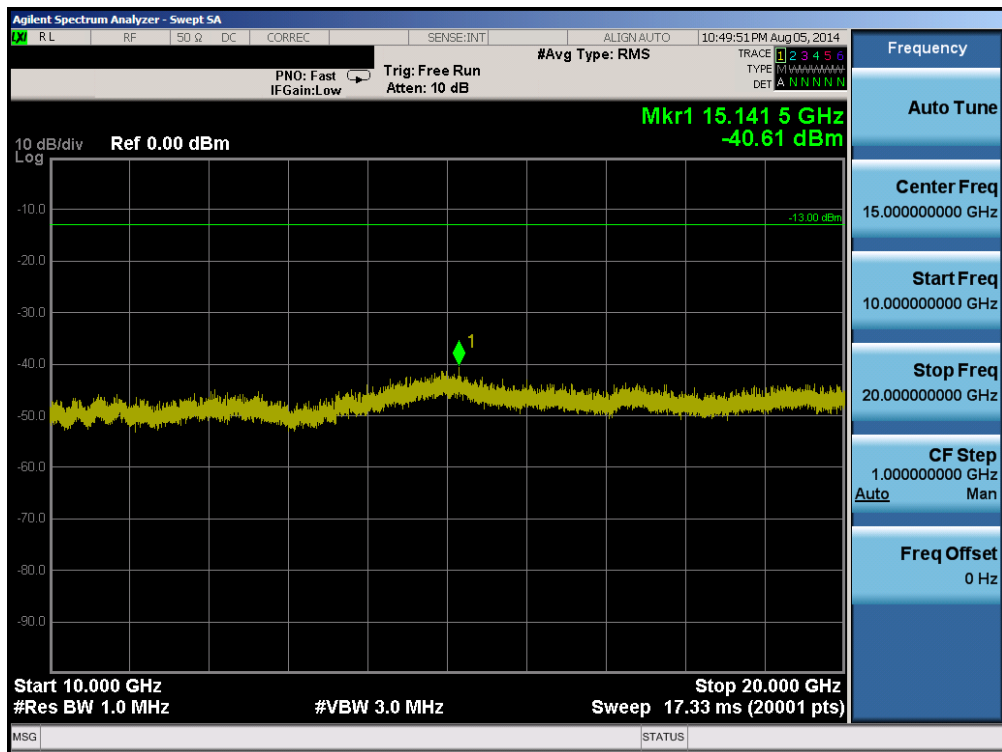


**Plot 6-64. Conducted Spurious Plot (Band 4 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 45 of 114                  |

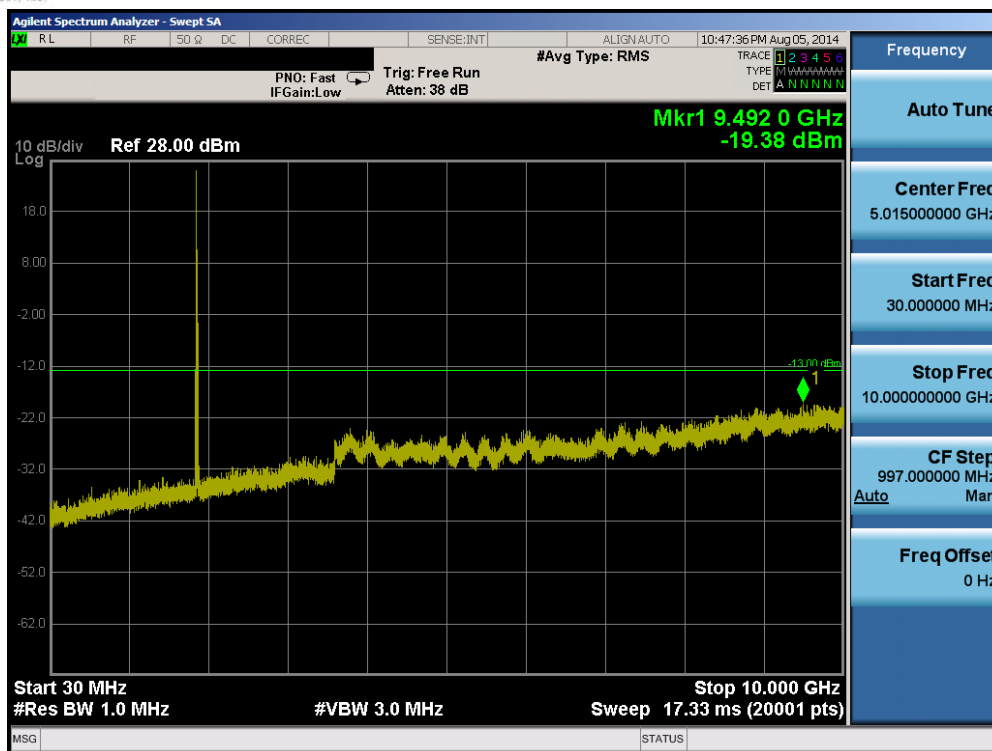


Plot 6-65. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0– Low Channel)

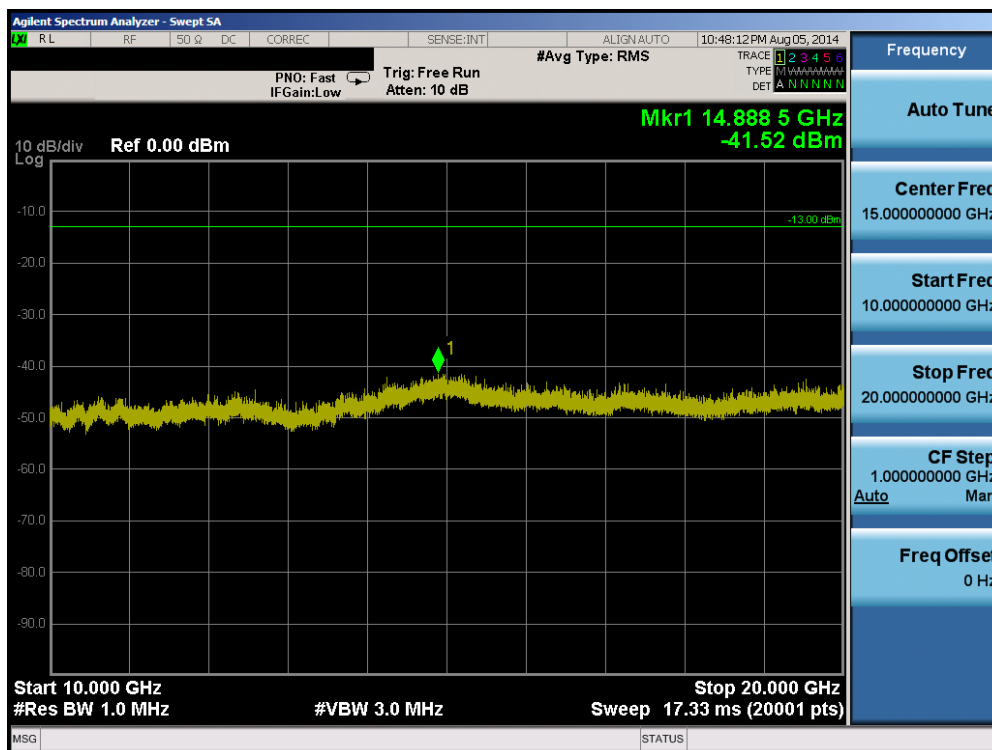


Plot 6-66. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 46 of 114                  |

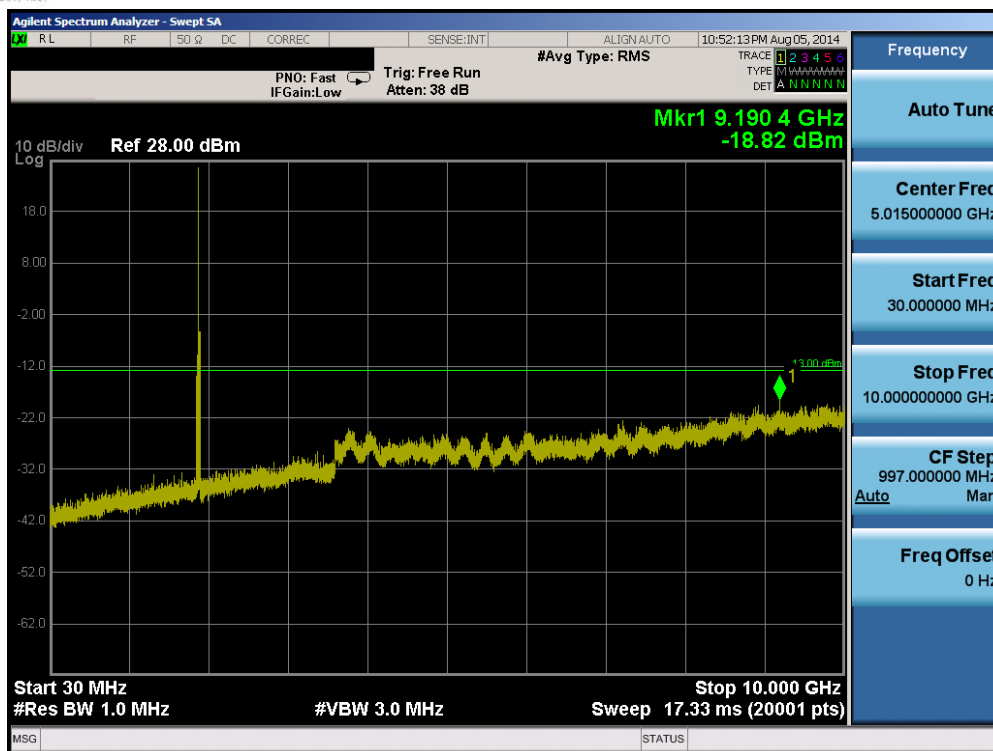


Plot 6-67. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

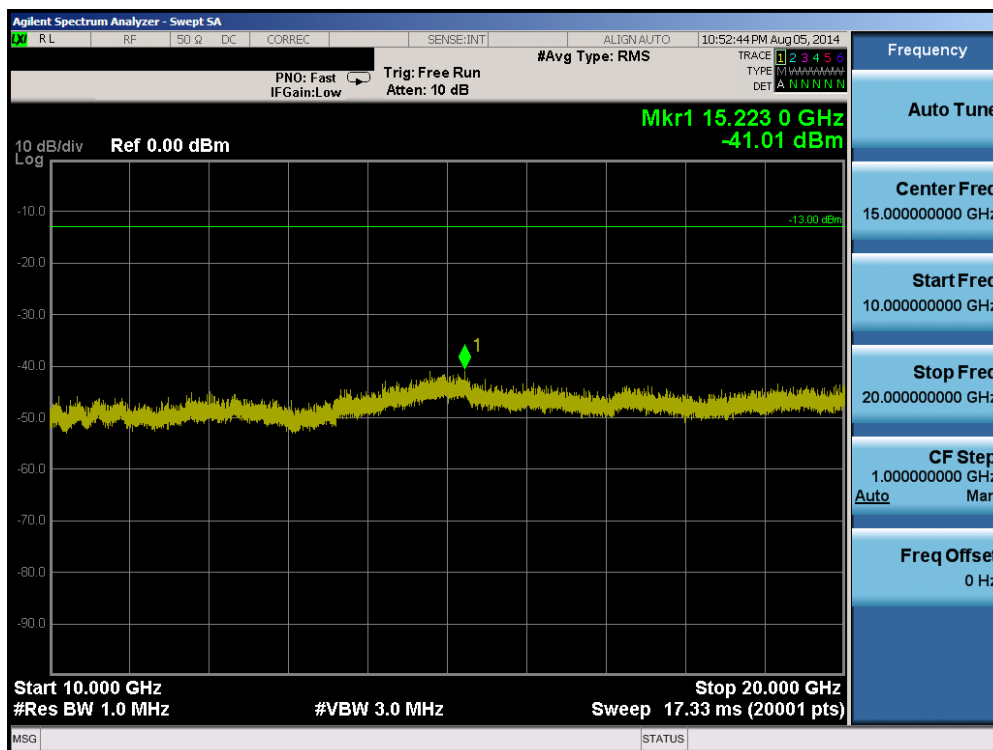


Plot 6-68. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – Mid Channel)

|                                         |                                               |                                                                |                |                                 |
|-----------------------------------------|-----------------------------------------------|----------------------------------------------------------------|----------------|---------------------------------|
| FCC ID: A3LSMN910R4                     | <b>PCTEST</b><br>ENGINEERING LABORATORY, INC. | FCC Pt. 22, 24, & 27 LTE MEASUREMENT REPORT<br>(CERTIFICATION) | <b>SAMSUNG</b> | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014  | EUT Type:<br>Portable Handset                                  |                | Page 47 of 114                  |



**Plot 6-69. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**



**Plot 6-70. Conducted Spurious Plot (Band 2 – 20.0MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**

|                                         |                                                                                                                                                                                                                                                      |                               |                                 |
|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------------|
| FCC ID: A3LSMN910R4                     |  <b>FCC Pt. 22, 24, &amp; 27 LTE MEASUREMENT REPORT<br/>(CERTIFICATION)</b>  |                               | Reviewed by:<br>Quality Manager |
| Test Report S/N:<br>0Y1408051618.A3L-R1 | Test Dates:<br>7/29-8/25/2014, 9/2-9/12/2014                                                                                                                                                                                                         | EUT Type:<br>Portable Handset | Page 48 of 114                  |