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# MEASUREMENT REPORT
## FCC Part 90

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

**Date of Testing:**
2/8-2/20/2015
**Test Site/Location:**
PCTEST Lab., Columbia, MD, USA
**Test Report Serial No.:**
0Y1502060406.A3L

| | |
|---|---|
| **FCC ID:** | **A3LSMG920I** |
| **APPLICANT:** | **SAMSUNG ELECTRONICS CO., LTD.** |

**Applicant Type:** Certification

**FCC Classification:** PCS Licensed Transmitter Held to Ear (PCE)

**FCC Rule Part:** §90.691

**EUT Type:** Portable Handset

**Model(s):** SM-G920I

**Test Device Serial No.:** *identical prototype* [S/N: 0873F]

| Mode | Tx Frequency (MHz) | Emission Designator | Cond. PWR | |
|---|---|---|---|---|
| | | | Max. Power (W) | Max. Power (dBm) |
| LTE Band 26 | 814.7 - 823.3 | 1M09G7D | 0.256 | 24.08 |
| LTE Band 26 | 814.7 - 823.3 | 1M08W7D | 0.180 | 22.56 |
| LTE Band 26 | 815.5 - 822.5 | 2M70G7D | 0.270 | 24.31 |
| LTE Band 26 | 815.5 - 822.5 | 2M70W7D | 0.184 | 22.64 |
| LTE Band 26 | 816.5 - 821.5 | 4M53G7D | 0.270 | 24.31 |
| LTE Band 26 | 816.5 - 821.5 | 4M53W7D | 0.186 | 22.70 |
| LTE Band 26 | 819 | 8M99G7D | 0.249 | 23.96 |
| LTE Band 26 | 819 | 8M99W7D | 0.169 | 22.28 |

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

ACCREDITED
TESTING CERT#2041.01



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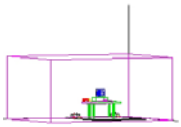
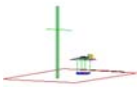


# MEASUREMENT REPORT
## LTE Band 26



## §2.1033 General Information

| | |
|---|---|
| **APPLICANT:** | Samsung Electronics Co., Ltd. |
| **APPLICANT ADDRESS:** | 129, Samsung-ro, Maetan dong,<br>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 |
| **BASE MODEL:** | SM-G920I |
| **FCC CLASSIFICATION:** | PCS Licensed Transmitter Held to Ear (PCE) |
| **MODE:** | LTE |
| **FREQUENCY TOLERANCE:** | ±0.00025 % (2.5 ppm) |
| **Test Device Serial No.:** | 0873F ☐ Production ☒ Pre-Production ☐ Engineering |
| **DATE(S) OF TEST:** | 2/8-2/20/2015 |
| **TEST REPORT S/N:** | 0Y1502060406.A3L |

## Test Facility / Accreditations

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

- PCTEST facility is an FCC registered (PCTEST Reg. No. 159966) test facility with the site description report on file and has met all the requirements specified in Section 2.948 of the FCC Rules.
- PCTEST Lab is accredited to ISO 17025 by U.S. National Institute of Standards and Technology (NIST) under the National Voluntary Laboratory Accreditation Program (NVLAP Lab code: 100431-0) in EMC, FCC and Telecommunications.
- PCTEST Lab is accredited to ISO 17025-2005 by the American Association for Laboratory Accreditation (A2LA) in Specific Absorption Rate (SAR) testing, Hearing Aid Compatibility (HAC) testing, CTIA Test Plans, and wireless testing for FCC.

- PCTEST Lab is a recognized U.S. Conformity Assessment Body (CAB) in EMC and R&TTE (n.b. 0982) under the U.S.-EU Mutual Recognition Agreement (MRA).
- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC Guide 65 by the American National Standards Institute (ANSI) in all scopes of FCC Rules.
- PCTEST is a CTIA Authorized Test Laboratory (CATL) for AMPS, CDMA, and EvDO wireless devices and for Over-the-Air (OTA) Antenna Performance testing for AMPS, CDMA, GSM, GPRS, EGPRS, UMTS (W-CDMA), CDMA 1xEVDO, and CDMA 1xRTT.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# 1.0 INTRODUCTION

## 1.1 Scope

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

## 1.2 Testing Facility

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

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The site coordinates are 39o 10'23" N latitude and 76o 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.

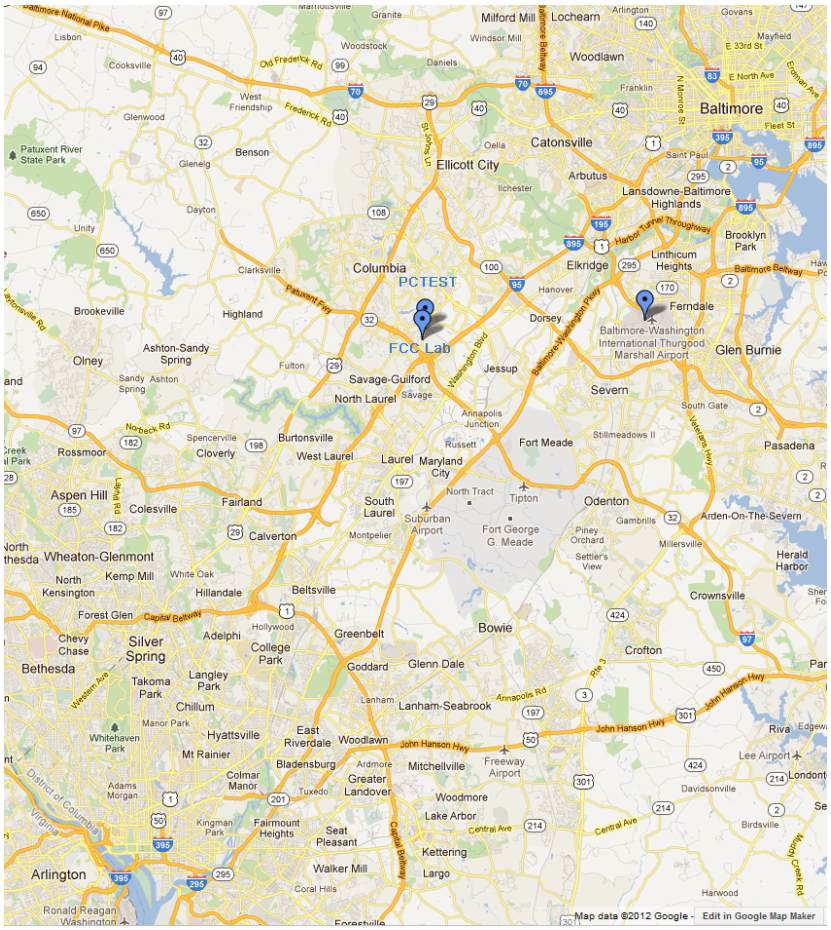


**Figure 1-1. Map of the Greater Baltimore and Metropolitan Washington, D.C. area**


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# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG920I**. The EUT consisted of the following component(s):

| Trade Name / Base Model | FCC ID | Description |
|---|---|---|
| Samsung / Model: SM-G920I | A3LSMG920I | Portable Handset |

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

**Note:** All data contained in this report is applicable for the device operation in the BC10 (817 – 824 MHz). Test data shown supports the devices compliance with §90.691 of the FCC Rules and Regulation.

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, 802.11a/n/ac UNII, Bluetooth (1x, EDR, LE), NFC, ANT+

## 2.3 Test Configuration

The Samsung Portable Handset FCC ID: A3LSMG920I was tested per the guidance of ANSI/TIA-603-C-2004 and KDB 971168 v02r02. See Section 6.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r02. Additional radiated spurious emission measurements were performed with the EUT lying flat on a certified wireless charging pad while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

## 2.4 EMI Suppression Device(s)/Modifications

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


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# 3.0 DESCRIPTION OF TESTS

## 3.1 Evaluation Procedure

The measurement procedures described in the "Land Mobile FM or PM – Communications Equipment Measurements and Performance Standards" (ANSI/TIA-603-C-2004) was used in the measurement of the measurement of the **Samsung Portable Handset FCC ID: A3LSMG920I.**

## 3.2 Occupied Bandwidth

**§2.1049**

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

## 3.3 Spurious and Harmonic Emissions at Antenna Terminal

**§2.1051, §90.691**

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

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

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

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


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## 3.4 Radiated Power and Radiated Spurious Emissions

**§2.1053, §90.635, §90.691**

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. 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:

$$P_{d\,[dBm]} = P_{g\,[dBm]} - \text{cable loss}_{\,[dB]} + \text{antenna gain}_{\,[dBd/dBi]}$$

Where, $P_d$ is the dipole equivalent power, $P_g$ is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g\,[dBm]}$ – 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 + $10\log_{10}$(Power $_{[Watts]}$) specified in 90.691.

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


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## 3.5 Frequency Stability / Temperature Variation

**§2.1055, 90.213(a)**

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

a.) **Temperature:** The temperature is varied from -30°C to +50°C in 10°C increments using an environmental chamber.

b.) **Primary Supply Voltage:** The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

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

**Time Period and Procedure:**

1. The carrier frequency of the transmitter is measured at room temperature (20°C to provide a reference).

2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.

3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A sufficient stabilization period at each temperature shall be used prior to each frequency requirement.


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# 4.0 TEST EQUIPMENT CALIBRATION DATA

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

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| - | LTx1 | Licensed Transmitter Cable Set | 10/16/2014 | Annual | 10/16/2015 | N/A |
| - | LTx3 | LIcensed Transmitter Cable Set | 10/15/2014 | Annual | 10/15/2015 | N/A |
| - | RE1 | Radiated Emissions Cable Set (UHF/EHF) | 10/24/2014 | Annual | 10/24/2015 | N/A |
| - | RE3 | Radiated Emissions Cable Set | 10/17/2014 | Annual | 10/17/2015 | N/A |
| Agilent | E5515C | Wireless Communications Test Set | 11/5/2013 | Biennial | 11/5/2015 | GB46310798 |
| Agilent | N9020A | MXA Signal Analyzer | 10/27/2014 | Annual | 10/27/2015 | US46470561 |
| Agilent | N9030A | PXA Signal Analyzer (44GHz) | 3/17/2014 | Annual | 3/17/2015 | MY52350166 |
| Agilent | N9038A | MXE EMI Receiver | 3/3/2014 | Annual | 3/3/2015 | MY51210133 |
| Emco | 3115 | Horn Antenna (1-18GHz) | 1/30/2014 | Biennial | 1/30/2016 | 9704-5182 |
| Espec | ESX-2CA | Environmental Chamber | 4/16/2014 | Annual | 4/16/2015 | 17620 |
| ETS Lindgren | 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 | 12/1/2014 | Annual | 12/1/2015 | 2 |
| K & L | 13SH10-1000/U1000 | N Type High Pass Filter | 12/1/2014 | Annual | 12/1/2015 | 1 |
| Mini Circuits | PWR-SEN-4GHS | USB Power Sensor | 4/9/2014 | Annual | 4/9/2015 | 11401010036 |
| Mini-Circuits | SSG-4000HP | USB Synthesized Signal Generator | N/A | | | 11208010032 |
| Mini-Circuits | TVA-11-422 | RF Power Amp | N/A | | | QA1303002 |
| Rhode & Schwarz | TS-PR18 | Pre-Amplifier | 6/12/2014 | Annual | 6/12/2015 | 101622 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 10/3/2014 | Annual | 10/3/2015 | 100976 |
| Rohde & Schwarz | ESU26 | EMI Test Receiver (26.5GHz) | 3/27/2014 | Annual | 3/27/2015 | 100342 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 5/21/2014 | Annual | 5/21/2015 | 100348 |
| 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 5/16", 8" lbs | 3/18/2014 | Biennial | 3/18/2016 | 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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# 5.0 SAMPLE CALCULATIONS

## Emission Designator

### QPSK Modulation

**Emission Designator = 8M62G7D**

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

### 16QAM Modulation

**Emission Designator = 8M45W7D**

LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

## Spurious Radiated Emission – LTE Band

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

The average spectrum analzyer 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 2453.70 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80) = 50.3 dBc.


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# 6.0 TEST RESULTS

## 6.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMG920I

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): LTE

Band: Band 26

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| helvet | Band Edge / Conducted Spurious Emissions | > 50 + 10log$_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge | CONDUCTED | PASS | Section 7.0 |
| §2.1046, §90.635 | Conducted Power | < 100 Watts | | PASS | Section 6.2 |
| §2.1055, §90.213 | Frequency Stability | < 2.5 ppm | | PASS | Section 6.4 |
| §2.1053, §90.691 | Undesirable Emissions | > 43 + 10log$_{10}$ (P[Watts]) for all out-of-band emissions | RADIATED | PASS | Sections 6.3 |

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

**Notes:**

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


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## 6.2 Conducted Power Output Data

**§90.635**

| Frequency [MHz] | Channel Bandwidth [MHz] | Mod. | Cond. PWR [dBm] | Cond. PWR Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|
| 814.70 | 1.4 | QPSK | 24.03 | 50.00 | -25.97 |
| 823.30 | 1.4 | QPSK | 24.08 | 50.00 | -25.92 |
| 814.70 | 1.4 | 16-QAM | 22.34 | 50.00 | -27.66 |
| 823.30 | 1.4 | 16-QAM | 22.56 | 50.00 | -27.44 |
| 815.50 | 3 | QPSK | 24.1 | 50.00 | -25.90 |
| 822.50 | 3 | QPSK | 24.31 | 50.00 | -25.69 |
| 815.50 | 3 | 16-QAM | 22.36 | 50.00 | -27.64 |
| 822.50 | 3 | 16-QAM | 22.64 | 50.00 | -27.36 |
| 816.50 | 5 | QPSK | 24.09 | 50.00 | -25.91 |
| 821.50 | 5 | QPSK | 24.31 | 50.00 | -25.69 |
| 816.50 | 5 | 16-QAM | 22.22 | 50.00 | -27.78 |
| 821.50 | 5 | 16-QAM | 22.70 | 50.00 | -27.30 |
| 819.00 | 10 | QPSK | 23.96 | 50.00 | -26.04 |
| 819.00 | 10 | 16-QAM | 22.28 | 50.00 | -27.72 |

**Table 6-2. LTE Band 26 Conducted Power Output Data**

**NOTES:**

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.

2. This unit was tested with its standard battery.


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## 6.3 Radiated Spurious Emissions Measurements

**§2.1053, §90.691**

### Field Strength of SPURIOUS Radiation for LTE Band 26

OPERATING FREQUENCY: 815.50 MHz

CHANNEL: 26705

MODULATION SIGNAL: QPSK

BANDWIDTH: 3.0 MHz

DISTANCE: 3 meters

LIMIT: -13.00 dBm

| Frequency [MHz] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | Ant. Pol. [H/V] | Margin [dB] |
|---|---|---|---|---|---|
| 1631.00 | -64.94 | 6.56 | -58.38 | H | -45.4 |
| 2446.50 | -64.43 | 7.25 | -57.18 | H | -44.2 |
| 3262.00 | -62.22 | 7.35 | -54.86 | H | -41.9 |
| 4077.50 | -61.19 | 7.86 | -53.33 | H | -40.3 |

**Table 6-3. Radiated Spurious Data (Ch. 26705)**

**NOTES:**

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.



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# Radiated Spurious Emissions Measurements

**§2.1053, §90.691**

## Field Strength of SPURIOUS Radiation for LTE Band 26

OPERATING FREQUENCY: 822.50 MHz

CHANNEL: 26775

MODULATION SIGNAL: QPSK

BANDWIDTH: 3.0 MHz

DISTANCE: 3 meters

LIMIT: -13.00 dBm

| Frequency [MHz] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | Ant. Pol. [H/V] | Margin [dB] |
|---|---|---|---|---|---|
| 1645.00 | -65.79 | 6.56 | -59.23 | H | -46.2 |
| 2467.50 | -63.64 | 7.29 | -56.36 | H | -43.4 |
| 3290.00 | -61.86 | 7.36 | -54.50 | H | -41.5 |
| 4112.50 | -60.54 | 7.99 | -52.55 | H | -39.5 |

**Table 6-4. Radiated Spurious Data (Ch. 26775)**

**NOTES:**

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.



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# Radiated Spurious Emissions Measurements

**§2.1053, §90.691**

## Field Strength of SPURIOUS Radiation for LTE Band 26

OPERATING FREQUENCY: 822.50 MHz

CHANNEL: 26775

MODULATION SIGNAL: QPSK

BANDWIDTH: 3.0 MHz

DISTANCE: 3 meters

LIMIT: -13.00 dBm

| Frequency [MHz] | Level at Antenna Terminals [dBm] | Substitute Antenna Gain [dBd] | Spurious Emission Level [dBm] | Ant. Pol. [H/V] | Margin [dB] |
|---|---|---|---|---|---|
| 1645.00 | -65.10 | 6.56 | -58.54 | H | -45.5 |
| 2467.50 | -62.67 | 7.29 | -55.39 | H | -42.4 |
| 3290.00 | -62.12 | 7.36 | -54.76 | H | -41.8 |
| 4112.50 | -61.21 | 7.99 | -53.22 | H | -40.2 |

**Table 6-5. Radiated Spurious Data with WCP (Ch. 26775)**

**NOTES:**

1. For LTE mode, the device was tested under all modulations, RB sizes and offsets, and channel bandwidth configurations and the worst case emissions are reported with 1 RB.
2. This unit was tested with its standard battery.
3. The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.



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## 6.4 Frequency Stability / Temperature Variation

**§2.1055, §90.213**

OPERATING FREQUENCY: 815,500,000 Hz

CHANNEL: 26705

REFERENCE VOLTAGE: 3.85 VDC

DEVIATION LIMIT: ± 0.00025 % or 2.5 ppm

| VOLTAGE (%) | POWER (VDC) | TEMP (°C) | FREQUENCY (Hz) | Freq. Dev. (Hz) | Deviation (%) |
|---|---|---|---|---|---|
| 100 % | 3.85 | + 20 (Ref) | 817,900,000 | -60 | -0.0000074 |
| 100 % | | - 30 | 817,900,000 | -25 | -0.0000031 |
| 100 % | | - 20 | 817,900,000 | -143 | -0.0000175 |
| 100 % | | - 10 | 817,900,000 | 165 | 0.0000202 |
| 100 % | | 0 | 817,900,000 | 86 | 0.0000105 |
| 100 % | | + 10 | 817,900,000 | 16 | 0.0000020 |
| 100 % | | + 20 | 817,900,000 | -61 | -0.0000075 |
| 100 % | | + 30 | 817,900,000 | -277 | -0.0000340 |
| 100 % | | + 40 | 817,900,000 | -265 | -0.0000325 |
| 100 % | | + 50 | 817,900,000 | 230 | 0.0000282 |
| BATT. ENDPOINT | 3.45 | + 20 | 817,900,000 | 3 | 0.0000004 |

**Table 6-6. LTE Band 26 Frequency Stability Data (Ch. 26697)**



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# Frequency Stability / Temperature Variation

**§2.1055, §90.213**

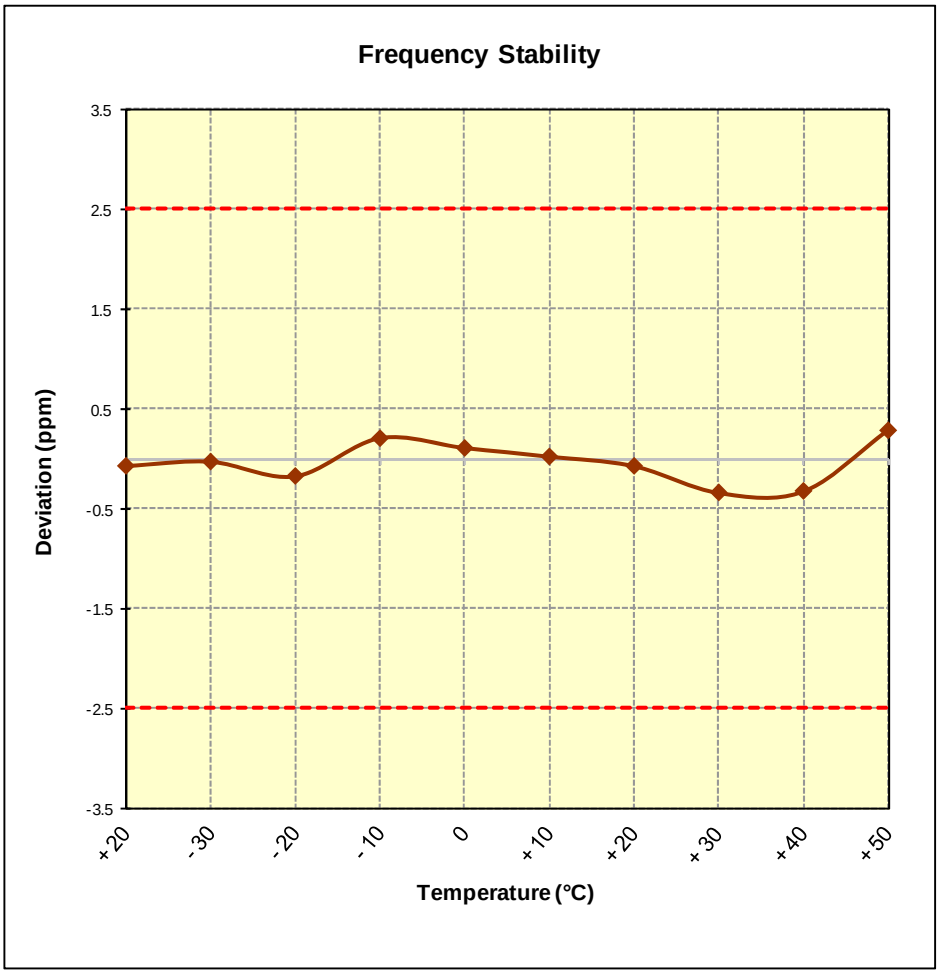


**Table 6-7. LTE Band 26 Frequency Stability Data (Ch. 26697)**



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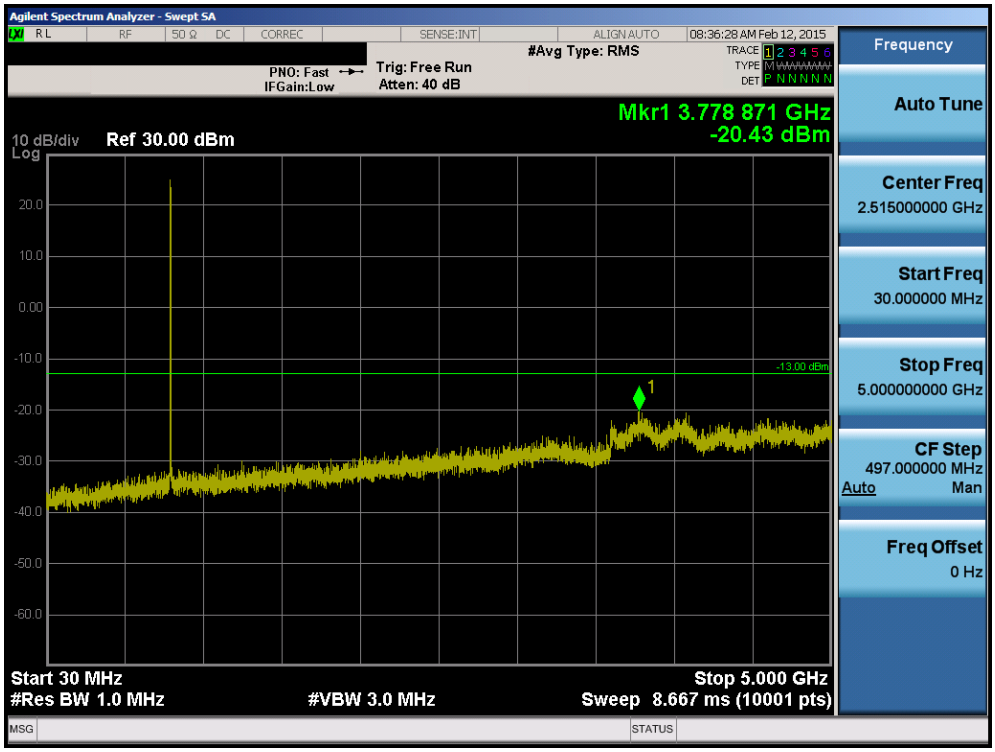
# 7.0 LTE PLOTS OF EMISSIONS




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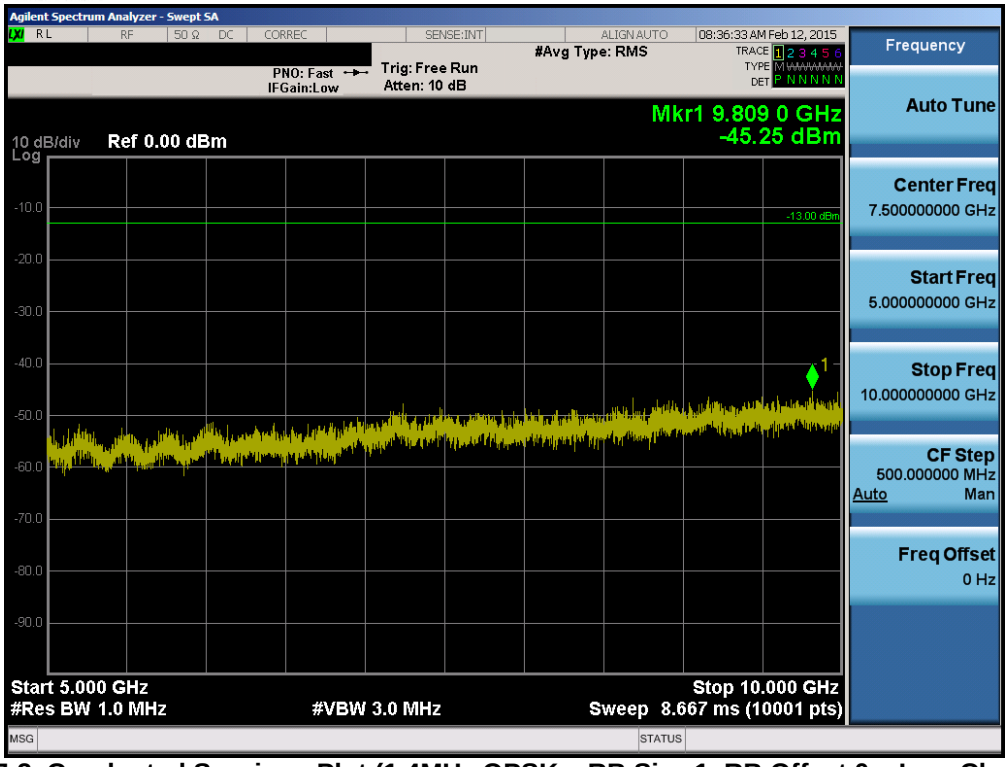
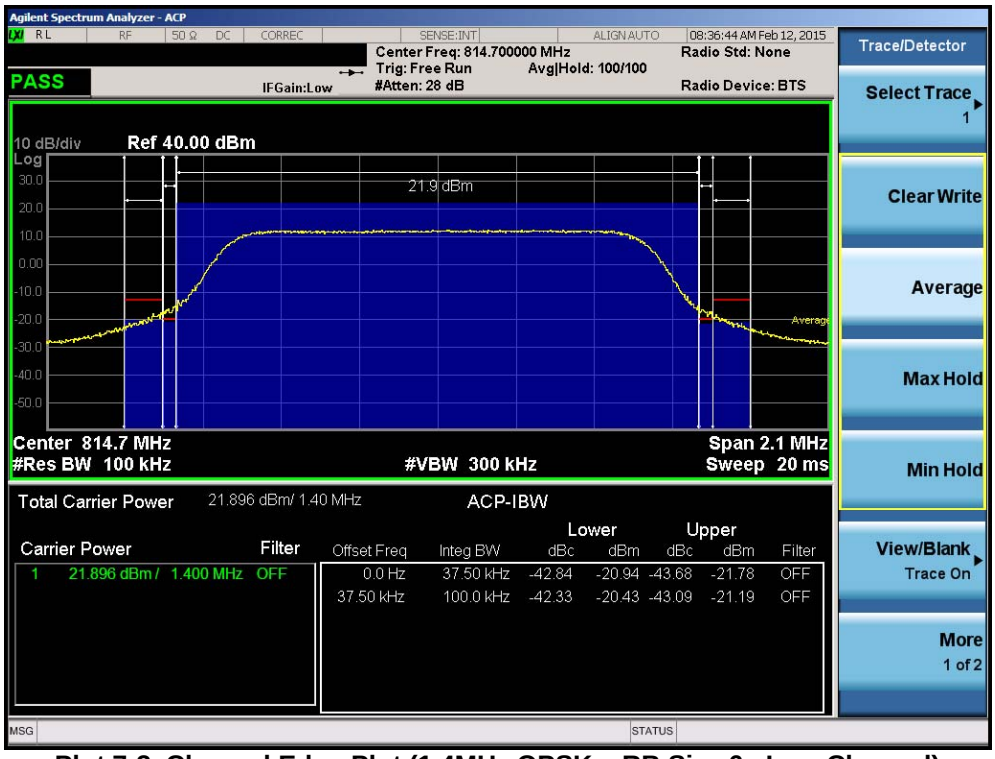



**Plot 7-2. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – Low Channel)**




**Plot 7-3. Channel Edge Plot (1.4MHz QPSK – RB Size 6– Low Channel)**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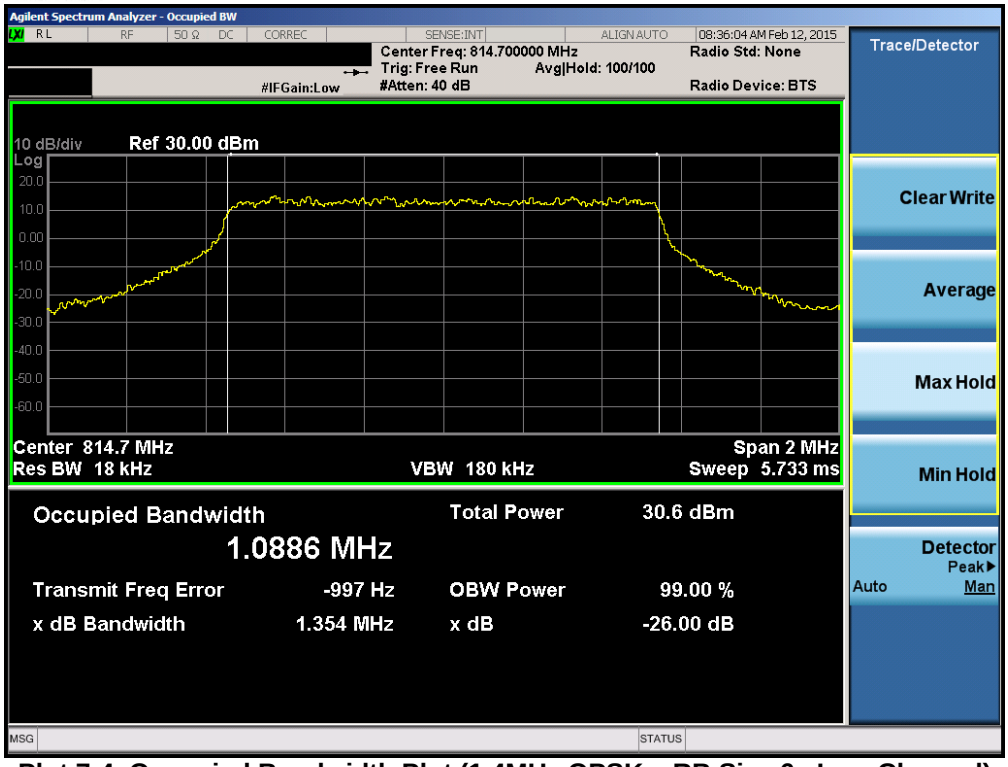
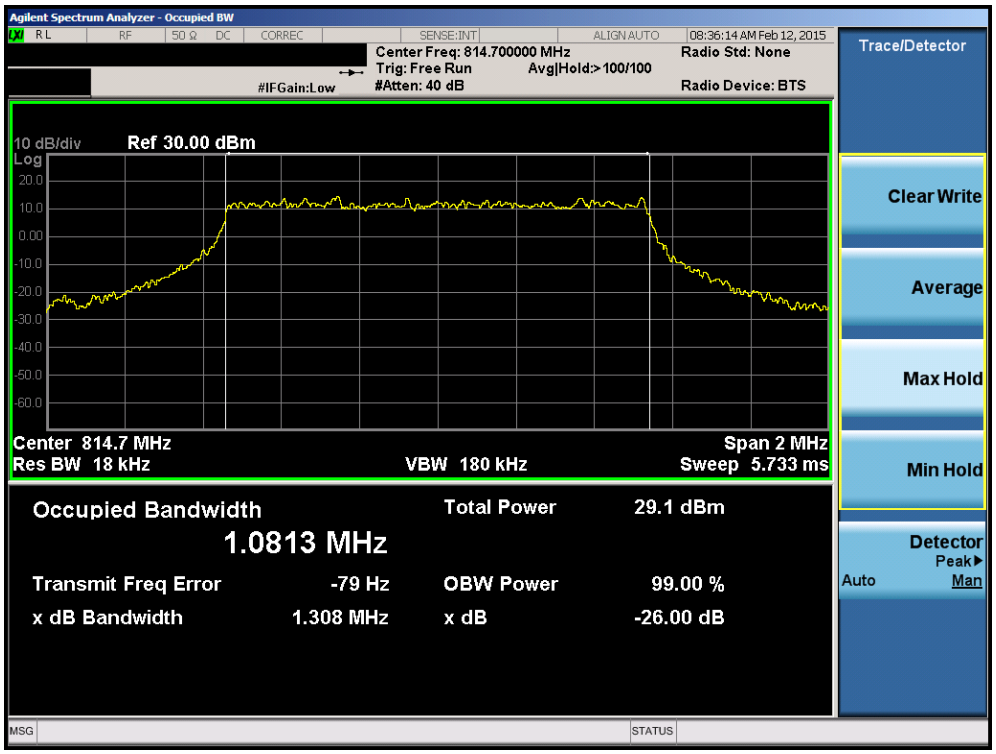



**Plot 7-4. Occupied Bandwidth Plot (1.4MHz QPSK – RB Size 6– Low Channel)**




**Plot 7-5. Occupied Bandwidth Plot (1.4MHz 16-QAM – RB Size 6– Low Channel)**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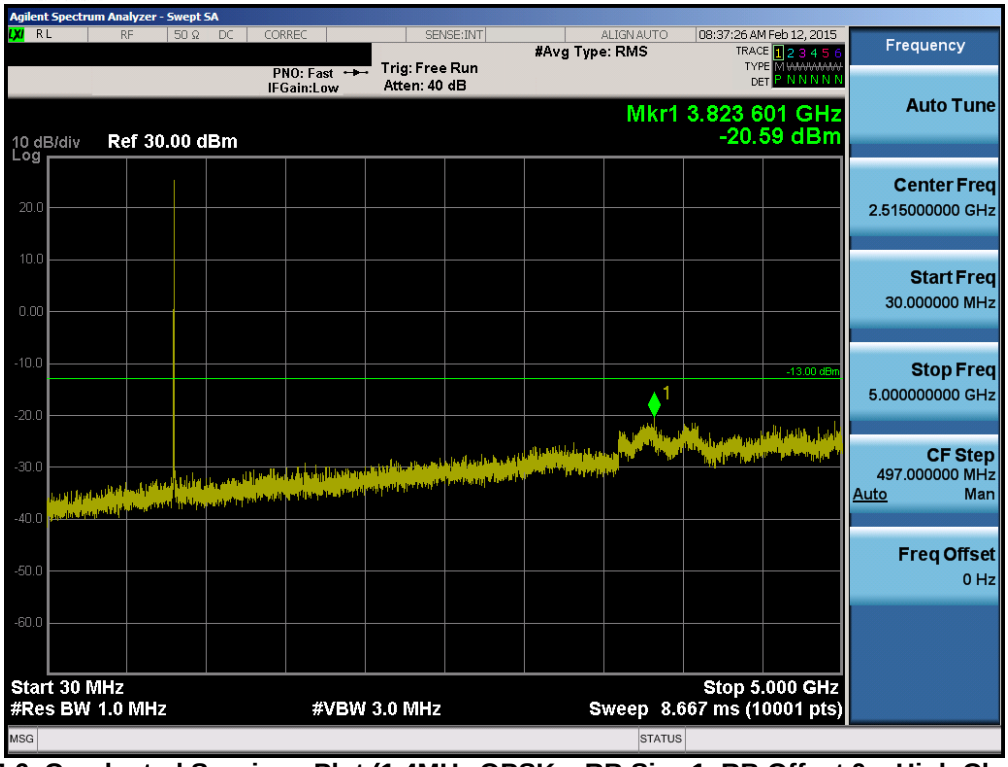
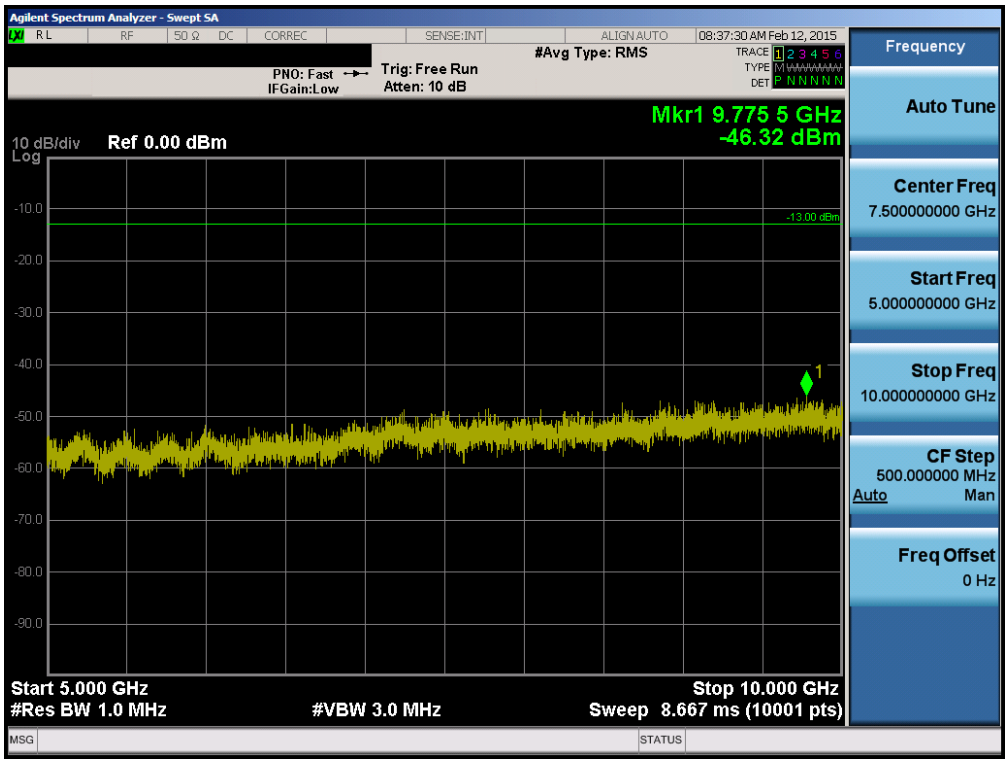



**Plot 7-6. Conducted Spurious Plot (1.4MHz QPSK – RB Size 1, RB Offset 0 – High Channel)**




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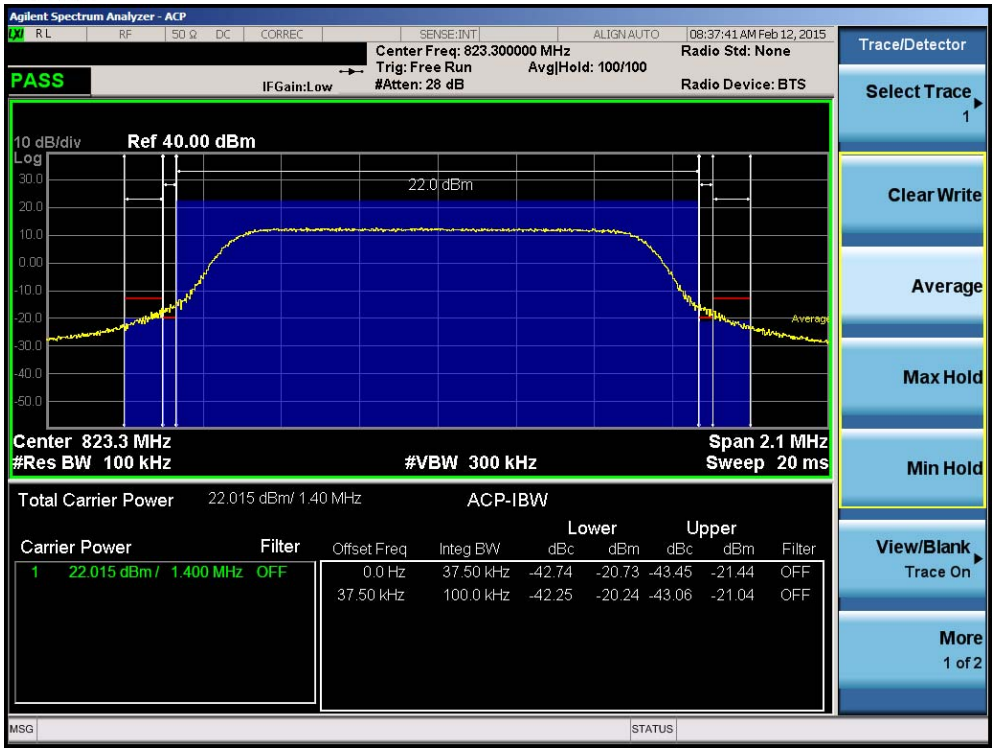
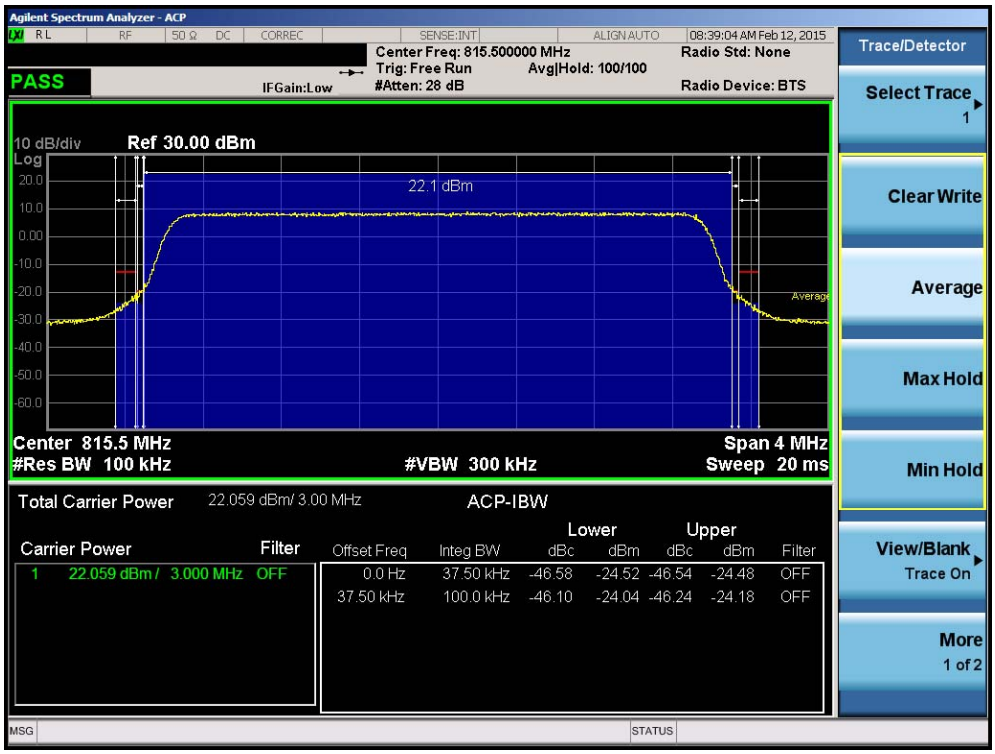



**Plot 7-8. Channel Edge Plot (1.4MHz QPSK – RB Size 6 – High Channel)**




**Plot 7-9. Channel Edge Plot (3MHz QPSK – RB Size 15– Low Channel)**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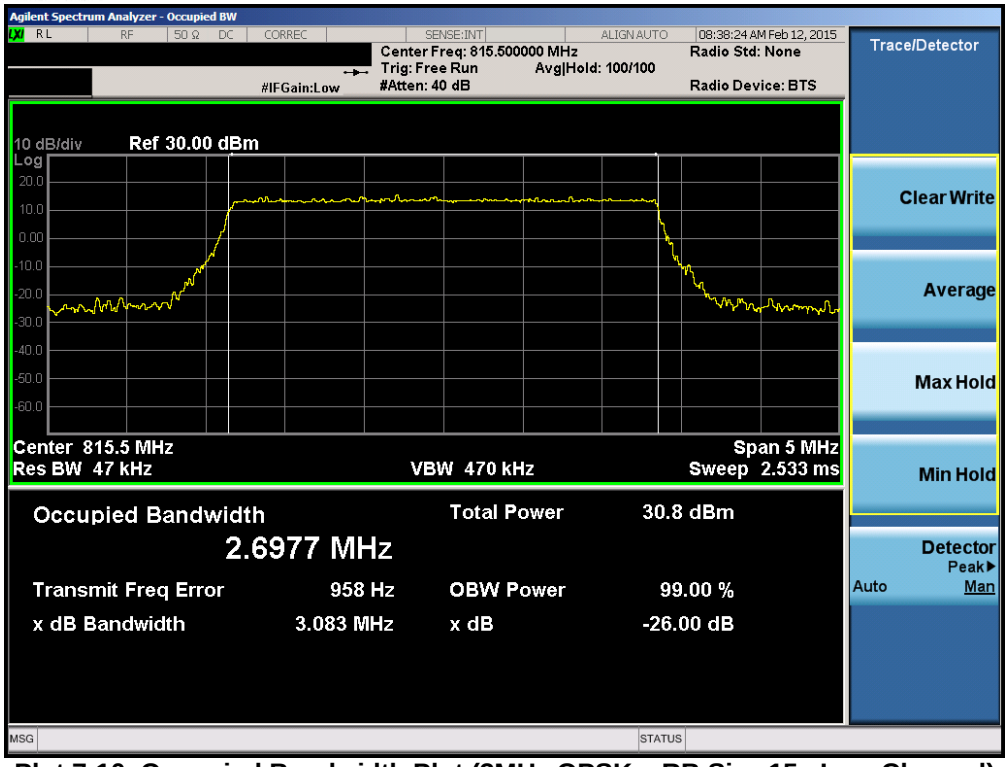
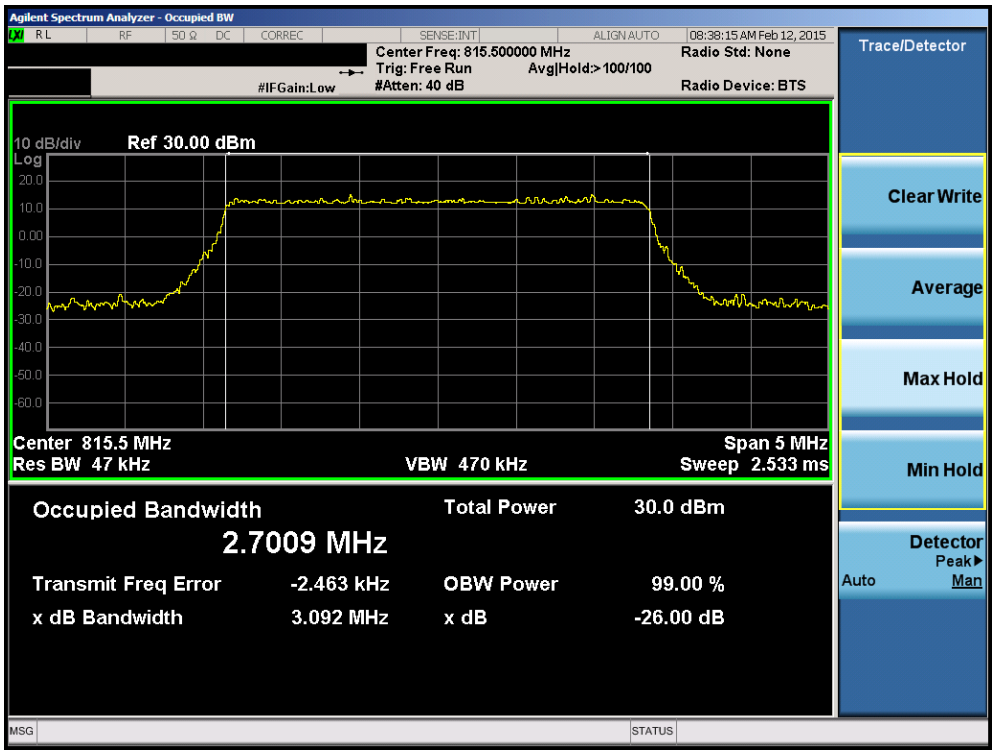



**Plot 7-10. Occupied Bandwidth Plot (3MHz QPSK – RB Size 15– Low Channel)**




**Plot 7-11. Occupied Bandwidth Plot (3MHz 16-QAM – RB Size 15– Low Channel))**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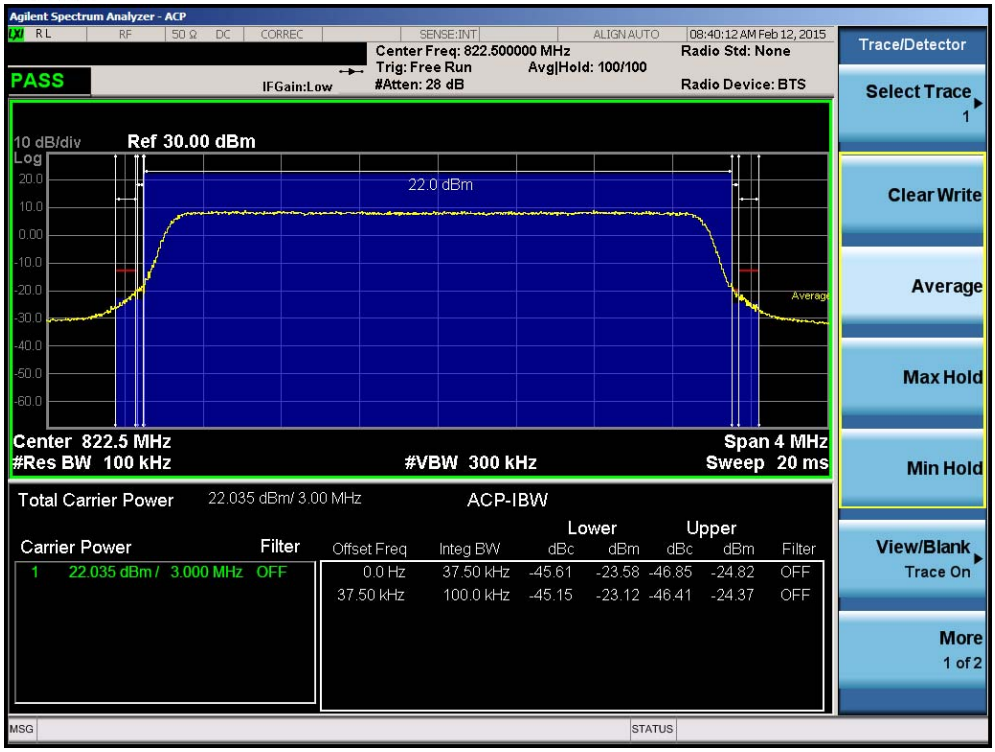
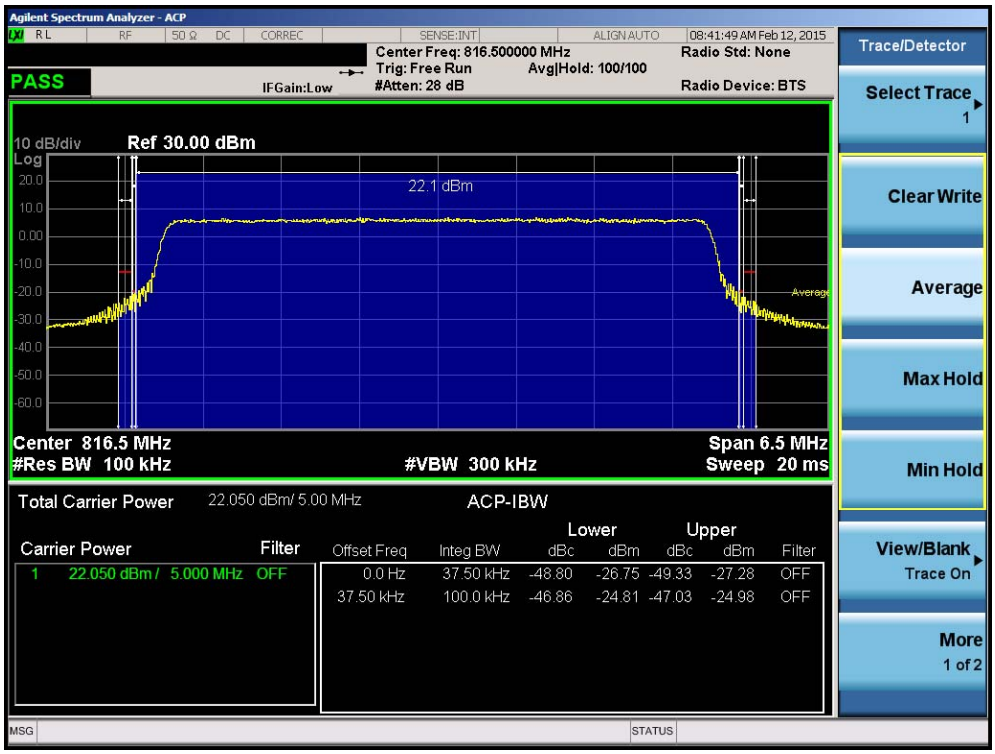



**Plot 7-12. Channel Edge Plot (3MHz QPSK – RB Size 15 – High Channel)**




**Plot 7-13. Channel Edge Plot (5MHz QPSK – RB Size 25– Low Channel)**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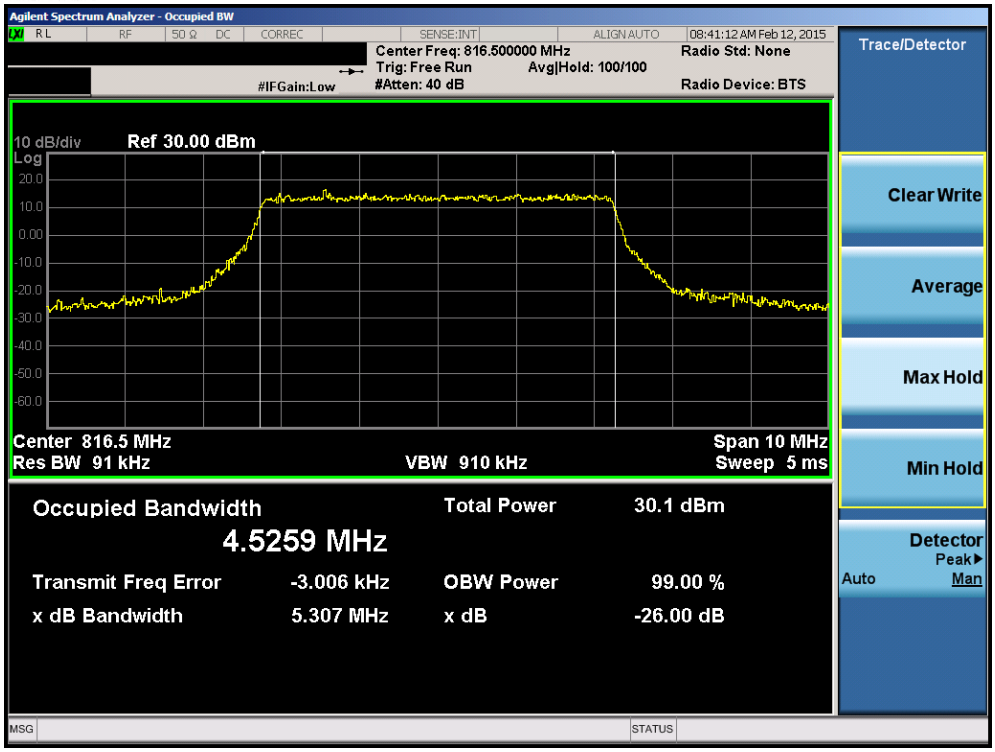
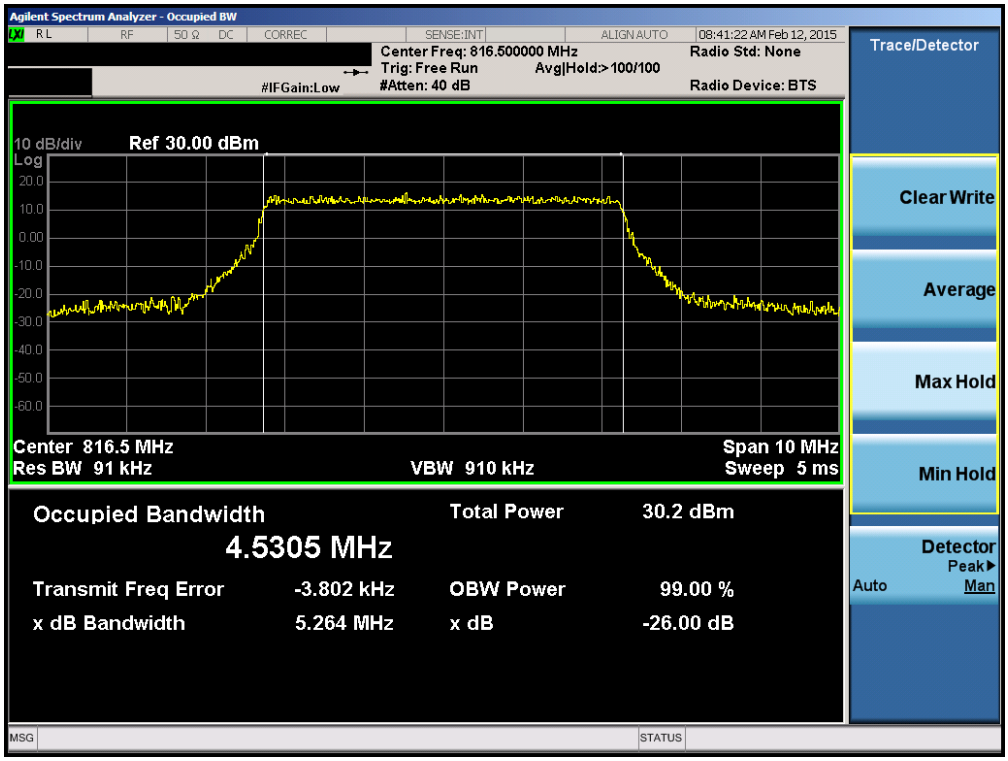



**Plot 7-14. Channel Edge Plot (5MHz 16-QAM – RB Size 25– Low Channel)**




**Plot 7-15. Occupied Bandwidth Plot (5MHz QPSK – RB Size 25– Low Channel)**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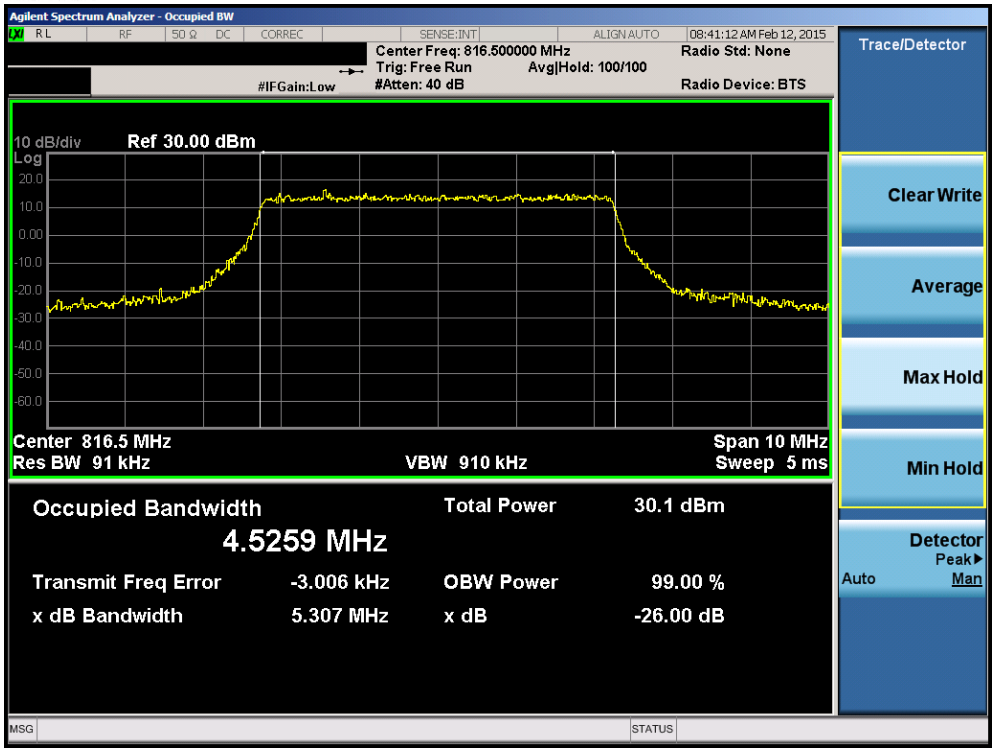
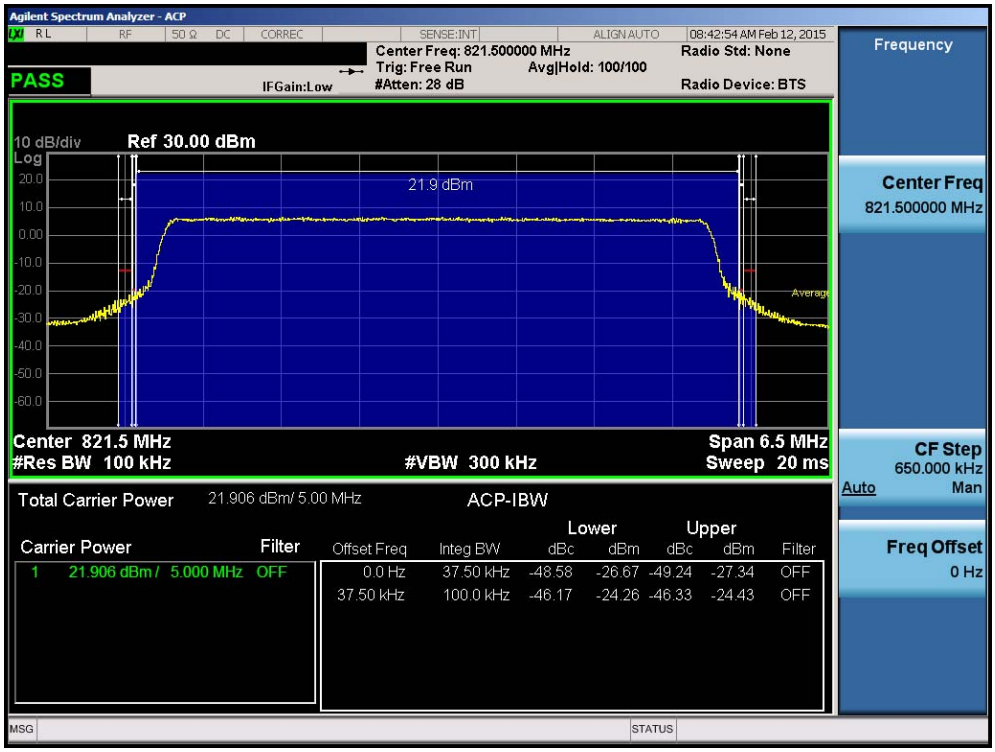



**Plot 7-16. Occupied Bandwidth Plot (5MHz 16-QAM – RB Size 25– Low Channel))**




**Plot 7-17. Channel Edge Plot (5MHz QPSK – RB Size 25 – High Channel)**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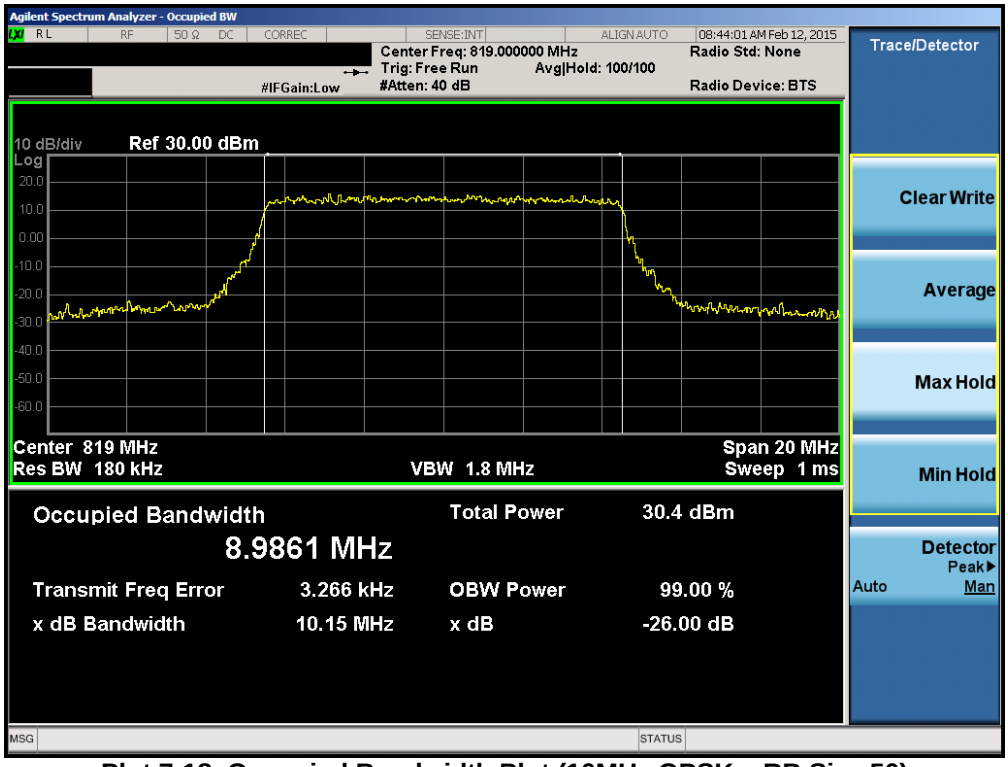
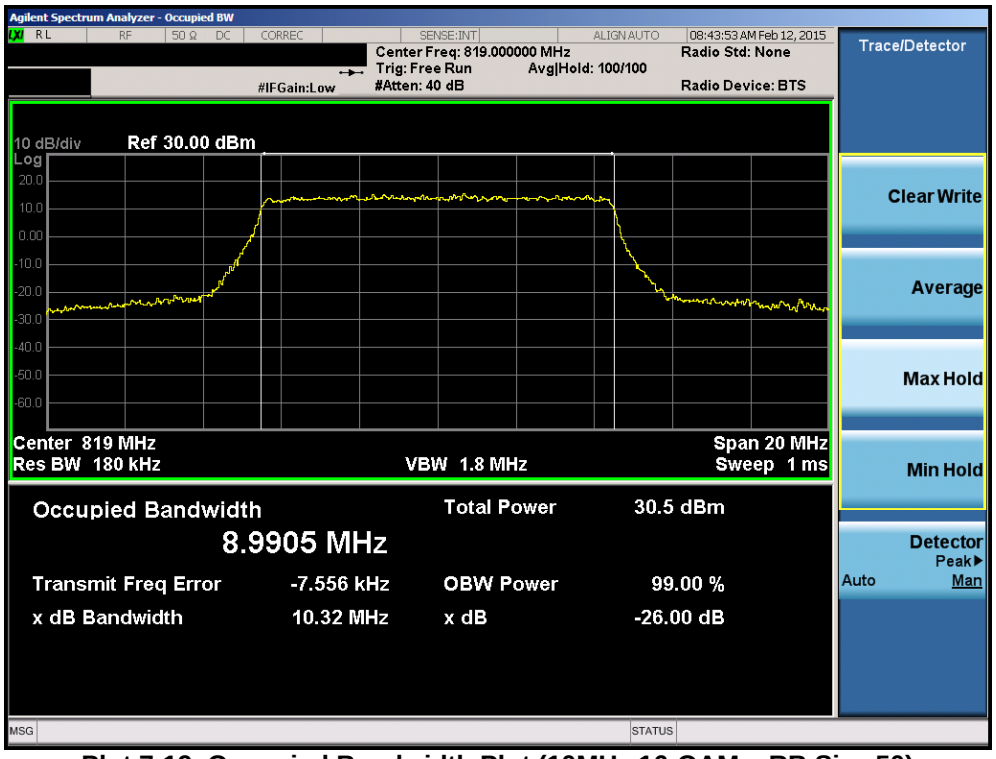



**Plot 7-18. Occupied Bandwidth Plot (10MHz QPSK – RB Size 50)**




**Plot 7-19. Occupied Bandwidth Plot (10MHz 16-QAM – RB Size 50)**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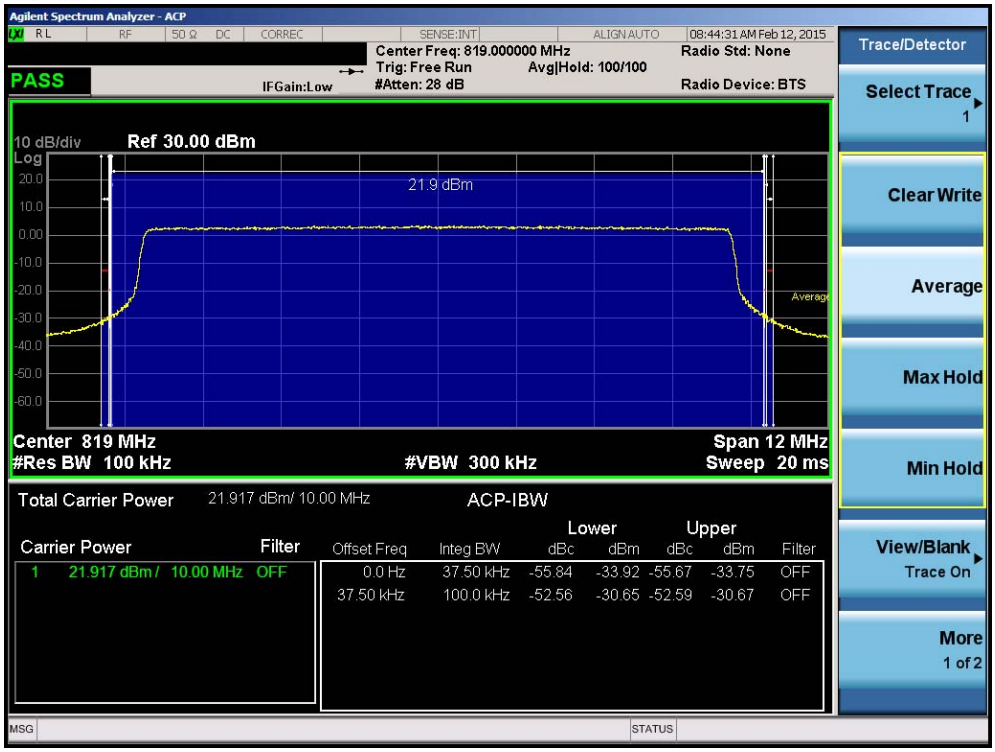


**Plot 7-20. Channel Edge Plot (10MHz QPSK – RB Size 50)**


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# 8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Samsung Portable Handset FCC ID: A3LSMG920I** complies with all the requirements of Parts 90 of the FCC rules.


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