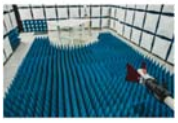
PCTEST ENGINEERING LABORATORY, INC.
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



# MEASUREMENT REPORT
## LTE

**Applicant Name:**
Samsung Electronics Co., Ltd.
129, Samsung-ro,
Yeongtong-gu, Suwon-si
Gyeonggi-do, 16677, Korea

**Date of Testing:**
8/30 - 10/18/2018
**Test Site/Location:**
PCTEST Lab. Columbia, MD, USA
**Test Report Serial No.:**
1M1809140179-03.A3L

| | |
|---|---|
| **FCC ID:** | **A3LSMA9200** |
| **APPLICANT:** | **Samsung Electronics Co., Ltd.** |

| | |
|---|---|
| **Application Type:** | Certification |
| **Model:** | SM-A9200 |
| **EUT Type:** | Portable Handset |
| **FCC Classification:** | PCS Licensed Transmitter Held to Ear (PCE) |
| **FCC Rule Part(s):** | 22 & 27 |
| **Test Procedure(s):** | ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01 |

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



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# TABLE OF CONTENTS


1.0 INTRODUCTION ..... 5
- 1.1 Scope ..... 5
- 1.2 PCTEST Test Location ..... 5
- 1.3 Test Facility / Accreditations ..... 5

2.0 PRODUCT INFORMATION ..... 6
- 2.1 Equipment Description ..... 6
- 2.2 Device Capabilities ..... 6
- 2.3 Test Configuration ..... 6
- 2.4 EMI Suppression Device(s)/Modifications ..... 6

3.0 DESCRIPTION OF TESTS ..... 7
- 3.1 Measurement Procedure ..... 7
- 3.2 Block C Frequency Range ..... 7
- 3.3 Block A Frequency Range ..... 7
- 3.4 Cellular - Base Frequency Blocks ..... 7
- 3.5 Cellular - Mobile Frequency Blocks ..... 7
- 3.6 AWS - Base Frequency Blocks ..... 8
- 3.7 AWS - Mobile Frequency Blocks ..... 8
- 3.8 BRS/EBS Frequency Block ..... 8
- 3.9 Radiated Power and Radiated Spurious Emissions ..... 9

4.0 MEASUREMENT UNCERTAINTY ..... 10

5.0 TEST EQUIPMENT CALIBRATION DATA ..... 11

6.0 SAMPLE CALCULATIONS ..... 12

7.0 TEST RESULTS ..... 13
- 7.1 Summary ..... 13
- 7.2 Occupied Bandwidth ..... 15
- 7.3 Spurious and Harmonic Emissions at Antenna Terminal ..... 43
- 7.4 Band Edge Emissions at Antenna Terminal ..... 64
- 7.5 Peak-Average Ratio ..... 91
- 7.6 Uplink Carrier Aggregation ..... 101
- 7.7 Radiated Power (ERP/EIRP) ..... 111
- 7.8 Radiated Spurious Emissions Measurements ..... 117
- 7.9 Uplink Carrier Aggregation Radiated Measurements ..... 128
- 7.10 Frequency Stability / Temperature Variation ..... 134

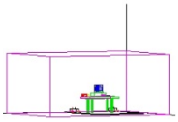
8.0 CONCLUSION ..... 143



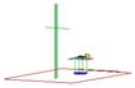


© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



# MEASUREMENT REPORT
## FCC Part 22 & 27



| Mode | FCC Rule Part | Tx Frequency (MHz) | ERP | | EIRP | | Emission Designator | Modulation |
|---|---|---|---|---|---|---|---|---|
| | | | Max. Power (W) | Max. Power (dBm) | Max. Power (W) | Max. Power (dBm) | | |
| LTE Band 12 | 27 | 699.7 - 715.3 | 0.082 | 19.14 | 0.135 | 21.29 | 1M09G7D | QPSK |
| LTE Band 12 | 27 | 699.7 - 715.3 | 0.072 | 18.58 | 0.118 | 20.73 | 1M10W7D | 16QAM |
| LTE Band 12 | 27 | 699.7 - 715.3 | 0.058 | 17.61 | 0.095 | 19.76 | 1M09W7D | 64QAM |
| LTE Band 12 | 27 | 700.5 - 714.5 | 0.084 | 19.26 | 0.138 | 21.41 | 2M72G7D | QPSK |
| LTE Band 12 | 27 | 700.5 - 714.5 | 0.079 | 18.97 | 0.129 | 21.12 | 2M71W7D | 16QAM |
| LTE Band 12 | 27 | 700.5 - 714.5 | 0.060 | 17.77 | 0.098 | 19.92 | 2M72W7D | 64QAM |
| LTE Band 12/17 | 27 | 701.5 - 713.5 | 0.080 | 19.04 | 0.132 | 21.19 | 4M55G7D | QPSK |
| LTE Band 12/17 | 27 | 701.5 - 713.5 | 0.071 | 18.53 | 0.117 | 20.68 | 4M53W7D | 16QAM |
| LTE Band 12/17 | 27 | 701.5 - 713.5 | 0.056 | 17.51 | 0.093 | 19.66 | 4M54W7D | 64QAM |
| LTE Band 12/17 | 27 | 704 - 711 | 0.088 | 19.44 | 0.144 | 21.59 | 8M99G7D | QPSK |
| LTE Band 12/17 | 27 | 704 - 711 | 0.071 | 18.54 | 0.117 | 20.69 | 8M96W7D | 16QAM |
| LTE Band 12/17 | 27 | 704 - 711 | 0.055 | 17.43 | 0.091 | 19.58 | 8M97W7D | 64QAM |
| LTE Band 5 | 22H | 824.7 - 848.3 | 0.136 | 21.34 | 0.223 | 23.49 | 1M09G7D | QPSK |
| LTE Band 5 | 22H | 824.7 - 848.3 | 0.104 | 20.18 | 0.171 | 22.33 | 1M10W7D | 16QAM |
| LTE Band 5 | 22H | 824.7 - 848.3 | 0.081 | 19.11 | 0.134 | 21.26 | 1M09W7D | 64QAM |
| LTE Band 5 | 22H | 825.5 - 847.5 | 0.139 | 21.43 | 0.228 | 23.58 | 2M71G7D | QPSK |
| LTE Band 5 | 22H | 825.5 - 847.5 | 0.109 | 20.37 | 0.179 | 22.52 | 2M72W7D | 16QAM |
| LTE Band 5 | 22H | 825.5 - 847.5 | 0.084 | 19.26 | 0.138 | 21.41 | 2M72W7D | 64QAM |
| LTE Band 5 | 22H | 826.5 - 846.5 | 0.144 | 21.57 | 0.236 | 23.72 | 4M53G7D | QPSK |
| LTE Band 5 | 22H | 826.5 - 846.5 | 0.110 | 20.40 | 0.180 | 22.55 | 4M53W7D | 16QAM |
| LTE Band 5 | 22H | 826.5 - 846.5 | 0.091 | 19.58 | 0.149 | 21.73 | 4M54W7D | 64QAM |
| LTE Band 5 | 22H | 829 - 844 | 0.131 | 21.18 | 0.215 | 23.33 | 9M01G7D | QPSK |
| LTE Band 5 | 22H | 829 - 844 | 0.107 | 20.29 | 0.175 | 22.44 | 9M02W7D | 16QAM |
| LTE Band 5 | 22H | 829 - 844 | 0.085 | 19.31 | 0.140 | 21.46 | 8M99W7D | 64QAM |

**EUT Overview (<1GHz)**



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

| Mode | FCC Rule Part | Tx Frequency (MHz) | EIRP | | Emission Designator | Modulation |
|---|---|---|---|---|---|---|
| | | | Max. Power (W) | Max. Power (dBm) | | |
| LTE Band 4 | 27 | 1710.7 - 1754.3 | 0.188 | 22.74 | 1M10G7D | QPSK |
| LTE Band 4 | 27 | 1710.7 - 1754.3 | 0.147 | 21.66 | 1M11W7D | 16QAM |
| LTE Band 4 | 27 | 1710.7 - 1754.3 | 0.108 | 20.32 | 1M09W7D | 64QAM |
| LTE Band 4 | 27 | 1711.5 - 1753.5 | 0.174 | 22.41 | 2M72G7D | QPSK |
| LTE Band 4 | 27 | 1711.5 - 1753.5 | 0.132 | 21.21 | 2M72W7D | 16QAM |
| LTE Band 4 | 27 | 1711.5 - 1753.5 | 0.103 | 20.12 | 2M71W7D | 64QAM |
| LTE Band 4 | 27 | 1712.5 - 1752.5 | 0.170 | 22.29 | 4M56G7D | QPSK |
| LTE Band 4 | 27 | 1712.5 - 1752.5 | 0.137 | 21.36 | 4M54W7D | 16QAM |
| LTE Band 4 | 27 | 1712.5 - 1752.5 | 0.112 | 20.49 | 4M54W7D | 64QAM |
| LTE Band 4 | 27 | 1715 - 1750 | 0.165 | 22.17 | 9M03G7D | QPSK |
| LTE Band 4 | 27 | 1715 - 1750 | 0.130 | 21.15 | 9M05W7D | 16QAM |
| LTE Band 4 | 27 | 1715 - 1750 | 0.102 | 20.08 | 9M04W7D | 64QAM |
| LTE Band 4 | 27 | 1717.5 - 1747.5 | 0.191 | 22.81 | 13M5G7D | QPSK |
| LTE Band 4 | 27 | 1717.5 - 1747.5 | 0.151 | 21.79 | 13M5W7D | 16QAM |
| LTE Band 4 | 27 | 1717.5 - 1747.5 | 0.117 | 20.68 | 13M5W7D | 64QAM |
| LTE Band 4 | 27 | 1720 - 1745 | 0.174 | 22.41 | 18M0G7D | QPSK |
| LTE Band 4 | 27 | 1720 - 1745 | 0.142 | 21.52 | 17M9W7D | 16QAM |
| LTE Band 4 | 27 | 1720 - 1745 | 0.119 | 20.77 | 17M9W7D | 64QAM |
| LTE Band 41 | 27 | 2557.5 - 2652.5 | 0.178 | 22.51 | 4M51G7D | QPSK |
| LTE Band 41 | 27 | 2557.5 - 2652.5 | 0.146 | 21.64 | 4M52W7D | 16QAM |
| LTE Band 41 | 27 | 2557.5 - 2652.5 | 0.114 | 20.57 | 4M52W7D | 64QAM |
| LTE Band 41 | 27 | 2560 - 2650 | 0.180 | 22.55 | 9M00G7D | QPSK |
| LTE Band 41 | 27 | 2560 - 2650 | 0.151 | 21.80 | 9M03W7D | 16QAM |
| LTE Band 41 | 27 | 2560 - 2650 | 0.120 | 20.79 | 9M01W7D | 64QAM |
| LTE Band 41 | 27 | 2562.5 - 2647.5 | 0.181 | 22.59 | 13M5G7D | QPSK |
| LTE Band 41 | 27 | 2562.5 - 2647.5 | 0.150 | 21.77 | 13M5W7D | 16QAM |
| LTE Band 41 | 27 | 2562.5 - 2647.5 | 0.115 | 20.61 | 13M5W7D | 64QAM |
| LTE Band 41 | 27 | 2565 - 2645 | 0.183 | 22.63 | 17M9G7D | QPSK |
| LTE Band 41 | 27 | 2565 - 2645 | 0.153 | 21.84 | 18M0W7D | 16QAM |
| LTE Band 41 | 27 | 2565 - 2645 | 0.123 | 20.91 | 17M9W7D | 64QAM |

**EUT Overview (>1GHz)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 1.0 INTRODUCTION

## 1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) 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 Innovation, Science and Economic Development Canada.

## 1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, Inc. facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

## 1.3 Test Facility / Accreditations

**Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.**

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMA9200**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

**Test Device Serial No.:** 17715, 01420, 39131, 10132, 10280, 10262, 39156, 01420, 16244, 02239, 02203, 02270

## 2.2 Device Capabilities

This device contains the following capabilities:

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

LTE Band 12 (698 - 716 MHz) overlaps the entire frequency range of LTE Band 17 (704 - 716 MHz). Therefore, test data provided in this report covers Band 17 as well as Band 12.

## 2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

## 2.4 EMI Suppression Device(s)/Modifications

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




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 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-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT.

## 3.2 Block C Frequency Range

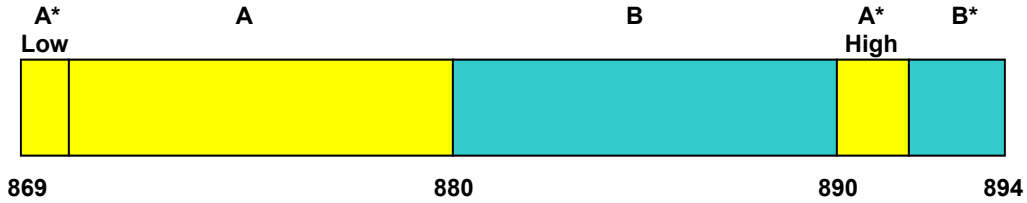
Two paired channels of 11 megahertz each are available for assignment in Block C in the 746-757 MHz and 776-787 MHz bands. In the event that no licenses for two channels in this Block C are assigned based on the results of the first auction in which such licenses were offered because the auction results do not satisfy the applicable reserve price, the spectrum in the 746-757 MHz and 776-787 MHz bands will instead be made available for assignment at a subsequent auction as follows: (i) Two paired channels of 6 megahertz each available for assignment in Block C1 in the 746-752 MHz and 776-782 MHz bands. (ii) Two paired channels of 5 megahertz each available for assignment in Block C2 in the 752-757 MHz and 782-787 MHz bands.

## 3.3 Block A Frequency Range

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:

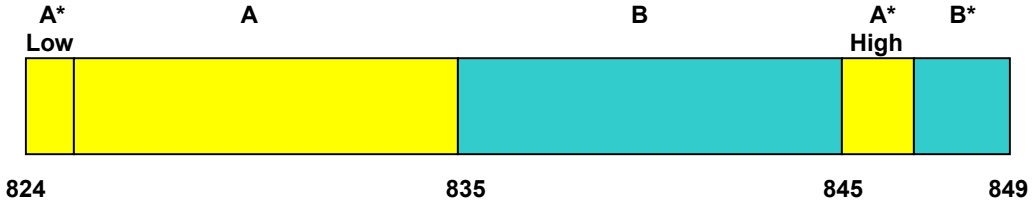
Block A: 698-704 MHz and 728-734 MHz;
Block B: 704-710 MHz and 734-740 MHz; and
Block C: 710-716 MHz and 740-746 MHz.

## 3.4 Cellular - Base Frequency Blocks




**BLOCK 1: 869 – 880 MHz (A* Low + A)**
**BLOCK 2: 880 – 890 MHz (B)**
**BLOCK 3: 890 – 891.5 MHz (A* High)**
**BLOCK 4: 891.5 – 894 MHz (B*)**

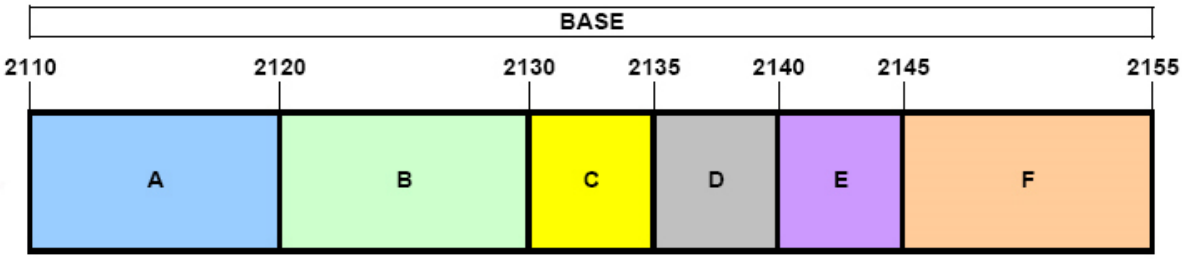
## 3.5 Cellular - Mobile Frequency Blocks




**BLOCK 1: 824 – 835 MHz (A* Low + A)**
**BLOCK 2: 835 – 845 MHz (B)**
**BLOCK 3: 845 – 846.5 MHz (A* High)**
**BLOCK 4: 846.5 – 849 MHz (B*)**

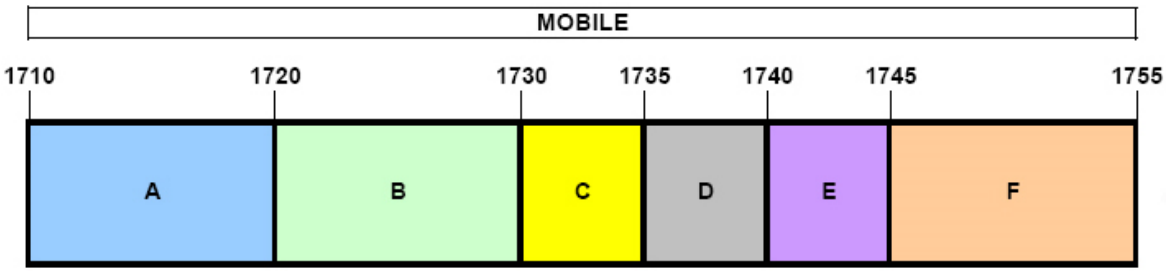

© 2018 PCTEST Engineering Laboratory, Inc.
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## 3.6 AWS - Base Frequency Blocks



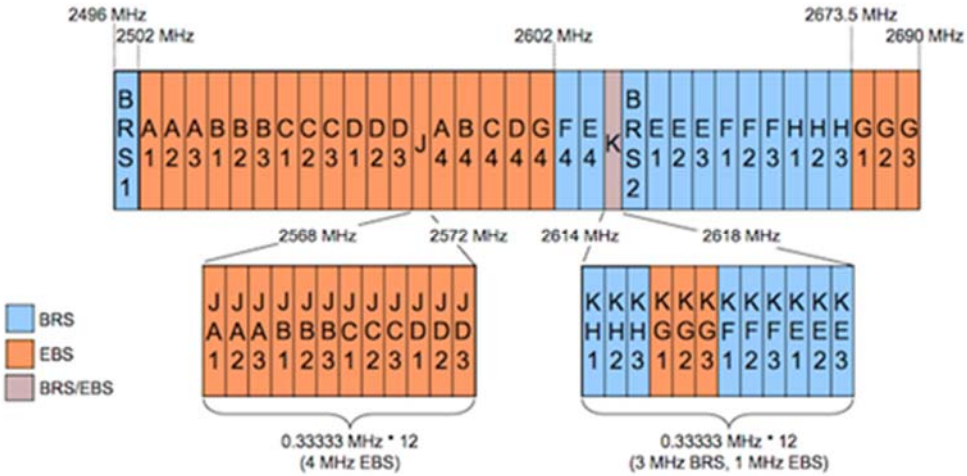

BLOCK 1: 2110 – 2120 MHz (A)
BLOCK 2: 2120 – 2130 MHz (B)
BLOCK 3: 2130 – 2135 MHz (C)
BLOCK 4: 2135 – 2140 MHz (D)
BLOCK 5: 2140 – 2145 MHz (E)
BLOCK 6: 2145 – 2155 MHz (F)

## 3.7 AWS - Mobile Frequency Blocks




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)

## 3.8 BRS/EBS Frequency Block







© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## 3.9 Radiated Power and Radiated Spurious Emissions

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 Figure 5.7 of Clause 5 in ANSI C63.4-2014. 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 above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 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 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, 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 $_{[Watts]}$). For Band 41, the calculated $P_d$ levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of 55 + $10\log_{10}$(Power $_{[Watts]}$).



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 4.0 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

| Contribution | Expanded Uncertainty (±dB) |
|---|---|
| Conducted Bench Top Measurements | 1.13 |
| Radiated Disturbance (<1GHz) | 4.98 |
| Radiated Disturbance (>1GHz) | 5.07 |
| Radiated Disturbance (>18GHz) | 5.09 |




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|---|---|---|---|---|---|---|
| - | LTx3 | LIcensed Transmitter Cable Set | 8/23/2018 | Annual | 8/23/2019 | LTx3 |
| Agilent | N9030A | PXA Signal Analyzer (44GHz) | 5/25/2018 | Annual | 5/25/2019 | MY52350166 |
| Anritsu | MT8820C | Radio Communication Analyzer | 1/30/2018 | Annual | 1/30/2019 | 6201300731 |
| Com-Power | AL-130 | 9kHz - 30MHz Loop Antenna | 10/10/2017 | Biennial | 10/10/2019 | 121034 |
| EMCO | 3160-09 | Small Horn (18 - 26.5GHz) | 8/9/2018 | Biennial | 8/9/2020 | 135427 |
| Espec | ESX-2CA | Environmental Chamber | 3/28/2018 | Annual | 3/28/2019 | 17620 |
| ETS Lindgren | 3164-08 | Quad Ridge Horn Antenna | 3/28/2018 | Biennial | 3/28/2020 | 128337 |
| ETS Lindgren | 3117 | 1-18 GHz DRG Horn (Medium) | 12/1/2016 | Biennial | 12/1/2018 | 125518 |
| Huber + Suhner | Sucoflex 102A | 40GHz Radiated Cable Set | 1/23/2018 | Annual | 1/23/2019 | 251425001 |
| Mini Circuits | TVA-11-422 | RF Power Amp | N/A | | | QA1317001 |
| Mini Circuits | PWR-SEN-4GHS | USB Power Sensor | 3/30/2018 | Annual | 3/30/2019 | 11401010036 |
| Mini-Circuits | SSG-4000HP | Synthesized Signal Generator | N/A | | | 11208010032 |
| Rohde & Schwarz | TS-PR26 | 18-26.5 GHz Pre-Amplifier | 1/24/2018 | Annual | 1/24/2019 | 100040 |
| Rohde & Schwarz | ESU40 | EMI Test Receiver (40GHz) | 8/9/2018 | Annual | 8/9/2019 | 100348 |
| Rohde & Schwarz | CMW500 | Radio Communication Tester | 11/3/2017 | Annual | 11/3/2018 | 100976 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 6/18/2018 | Annual | 6/18/2019 | 102134 |
| Sunol | DRH-118 | Horn Antenna (1-18GHz) | 8/11/2017 | Biennial | 8/11/2019 | A050307 |
| Sunol | JB6 | Bi-Log Antenna (30M - 6GHz) | 9/27/2016 | Biennial | 9/27/2018 | A082816 |

**Table 5-1. Test Equipment**

**Notes:**

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

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




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 6.0 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

### QAM 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 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 analzyer. 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).



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

# 7.0 TEST RESULTS

## 7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMA9200

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

Mode(s): LTE

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 2.1049 | Occupied Bandwidth | N/A | CONDUCTED | PASS | Section 7.2 |
| 2.1051<br>2.917(a)<br>27.53(c)<br>27.53(g)<br>27.53(h) | Out of Band Emissions | > 43 + 10log$_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions | | PASS | Section 7.3, 7.4 |
| 27.53(m) | Out of Band Emissions | Undesirable emissions must meet the limits detailed in 27.53(m) | | PASS | Section 7.3, 7.4 |
| 27.50(b) | Peak-Average Ratio | < 13 dB | | PASS | Section 7.5 |
| 2.1046 | Transmitter Conducted Output Power | N/A | | See RF Exposure Report | See RF Exposure Report |
| 27.53(m) | Uplink Carrier Aggregation | Undesirable emissions must meet the limits detailed in 27.53(m) | | PASS | Section 7.6 |
| 2.1055<br>22.355<br>27.54 | Frequency Stability | < 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 27) | | PASS | Section 7.10 |

**Table 7-1. Summary of Conducted Test Results**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Reference | Reference |
|---|---|---|---|---|---|
| 22.913(a)(5) | Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 5) | < 7 Watts max. ERP | RADIATED | PASS | Section 7.7 |
| 27.50(b)(10)<br>27.50(c)(10) | Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 12/17) | < 3 Watts max. ERP | | PASS | Section 7.7 |
| 27.50(h)(2) | Equivalent Isotropic Radiated Power (Band 41) | < 2 Watts max. EIRP | | PASS | Section 7.7 |
| 27.50(d)(4) | Equivalent Isotropic Radiated Power (Band 4) | < 1 Watts max. EIRP | | PASS | Section 7.7 |
| 2.1053<br>22.917(a)<br>27.53(c)<br>27.53(g)<br>27.53(h) | Undesirable Emissions (Band 12/17, 5, 4) | > 43 + $10\log_{10}$ (P[Watts]) for all out-of-band emissions | | PASS | Section 7.8 |
| 27.53(m) | Undesirable Emissions (Band 41) | Undesirable emissions must meet the limits detailed in 27.53(m) | | PASS | Section 7.8 |
| 27.53(m) | Uplink Carrier Aggregation | Undesirable emissions must meet the limits detailed in 27.53(m) | | PASS | Section 7.9 |

**Table 7-2. Summary of Radiated 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 7.2, 7.3, 7.4, 7.5, 7.6) were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST "LTE Automation," Version 4.8.
5) For operation <1GHz, the EIRP limits in the table above are referenced to the specifications written in the relevant Radio Standards Specifications for Innovation, Science, and Economic Development Canada.




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## 7.2 Occupied Bandwidth

**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 D01 v03r01 – 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 ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

**Test Setup**

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

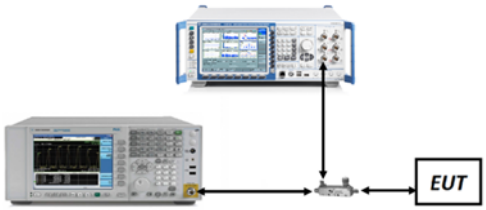



**Figure 7-1. Test Instrument & Measurement Setup**

**Test Notes**

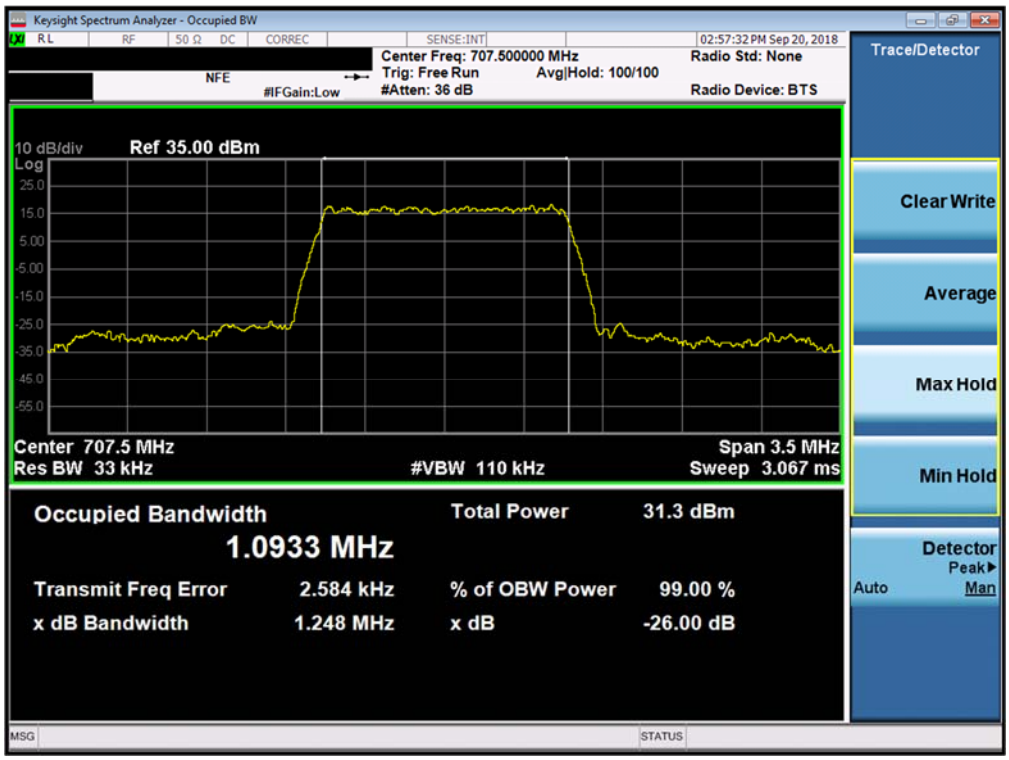
None.




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## Band 12/17



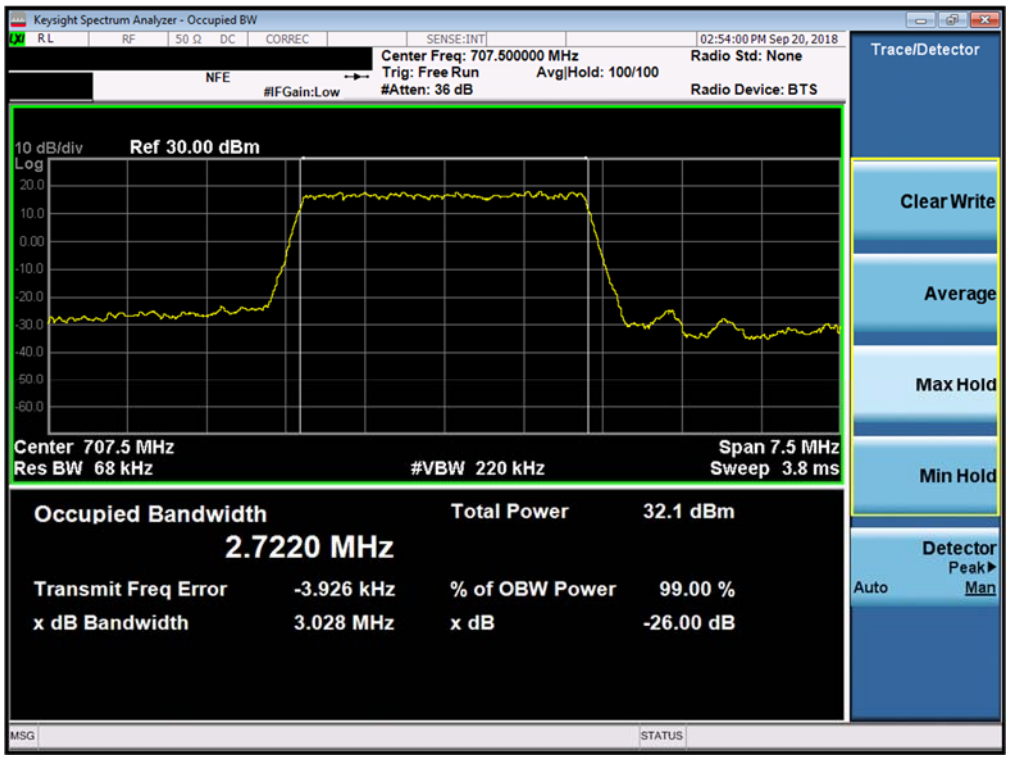

**Plot 7-1. Occupied Bandwidth Plot (Band 12 - 1.4MHz QPSK - Full RB Configuration)**

**Plot 7-2. Occupied Bandwidth Plot (Band 12 - 1.4MHz 16-QAM - Full RB Configuration)**



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-3. Occupied Bandwidth Plot (Band 12 - 1.4MHz 64-QAM - Full RB Configuration)**

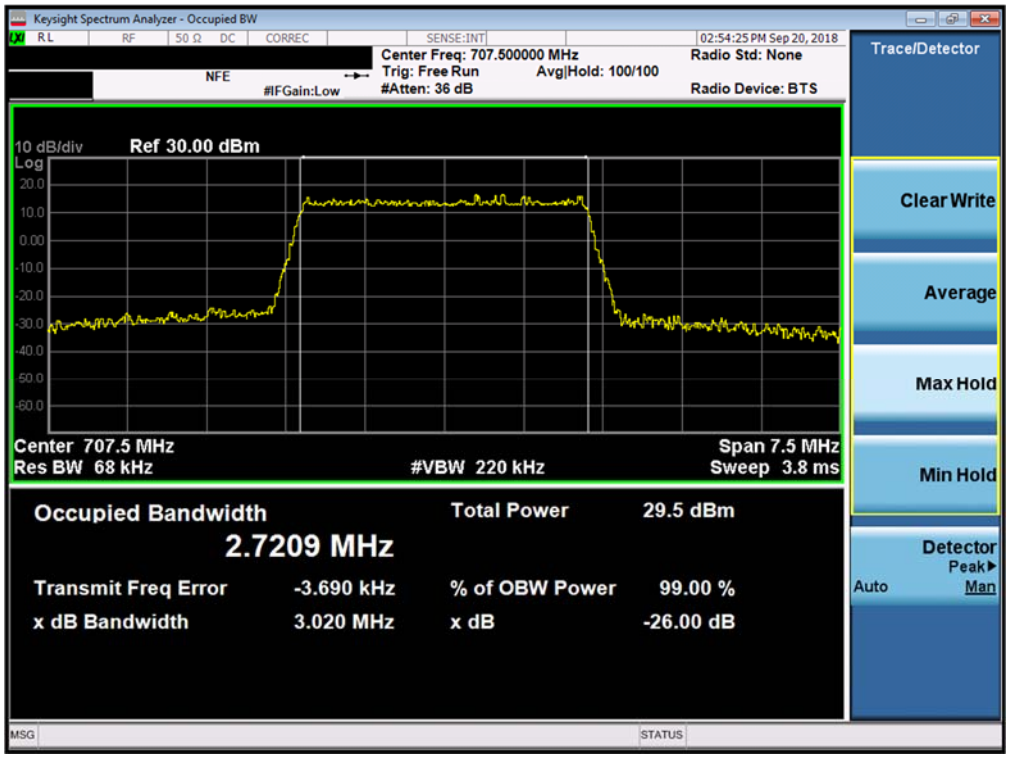



**Plot 7-4. Occupied Bandwidth Plot (Band 12 - 3.0MHz QPSK - Full RB Configuration)**



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

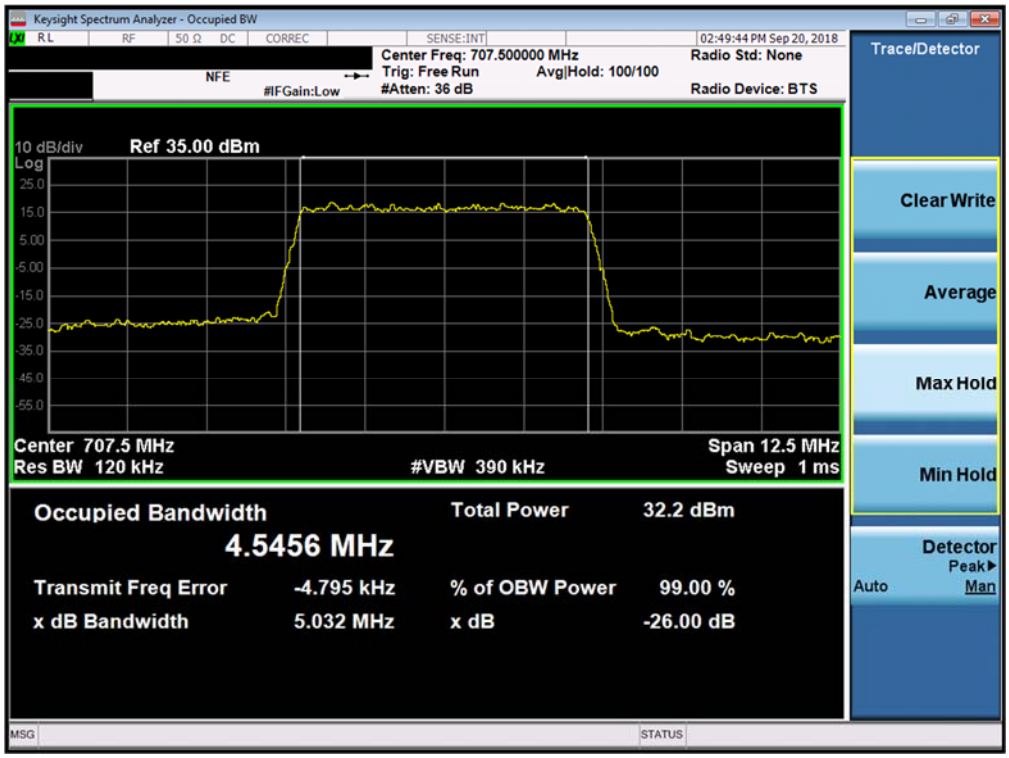
**Plot 7-5. Occupied Bandwidth Plot (Band 12 - 3.0MHz 16-QAM - Full RB Configuration)**



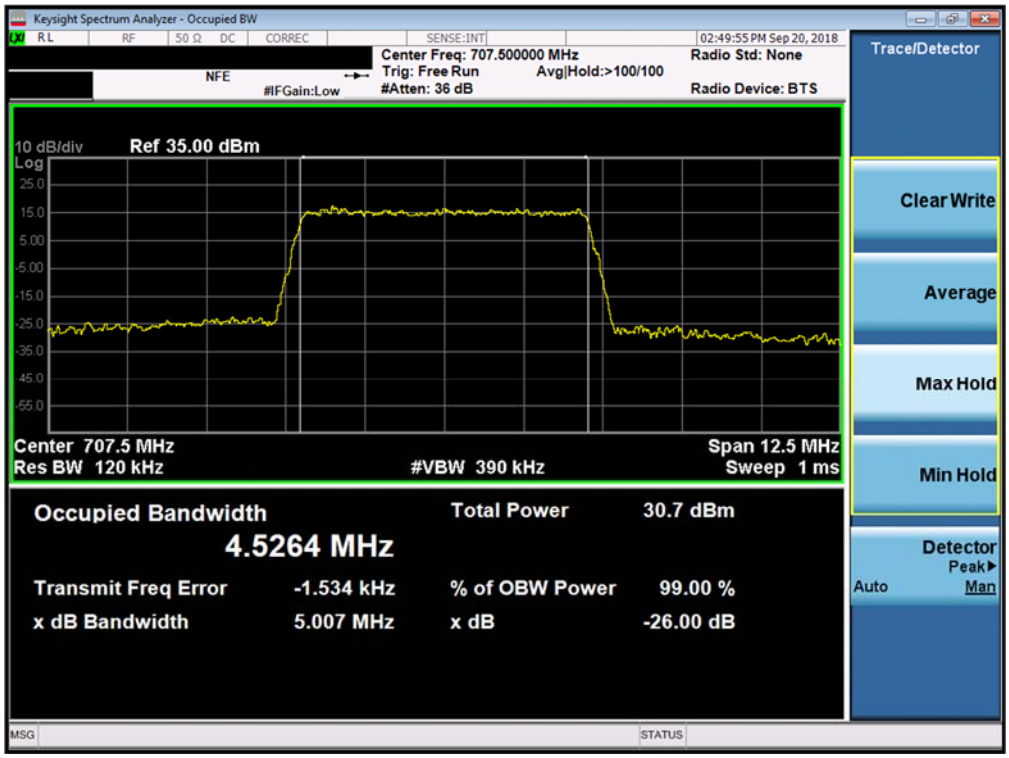

**Plot 7-6. Occupied Bandwidth Plot (Band 12 - 3.0MHz 64-QAM - Full RB Configuration)**



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



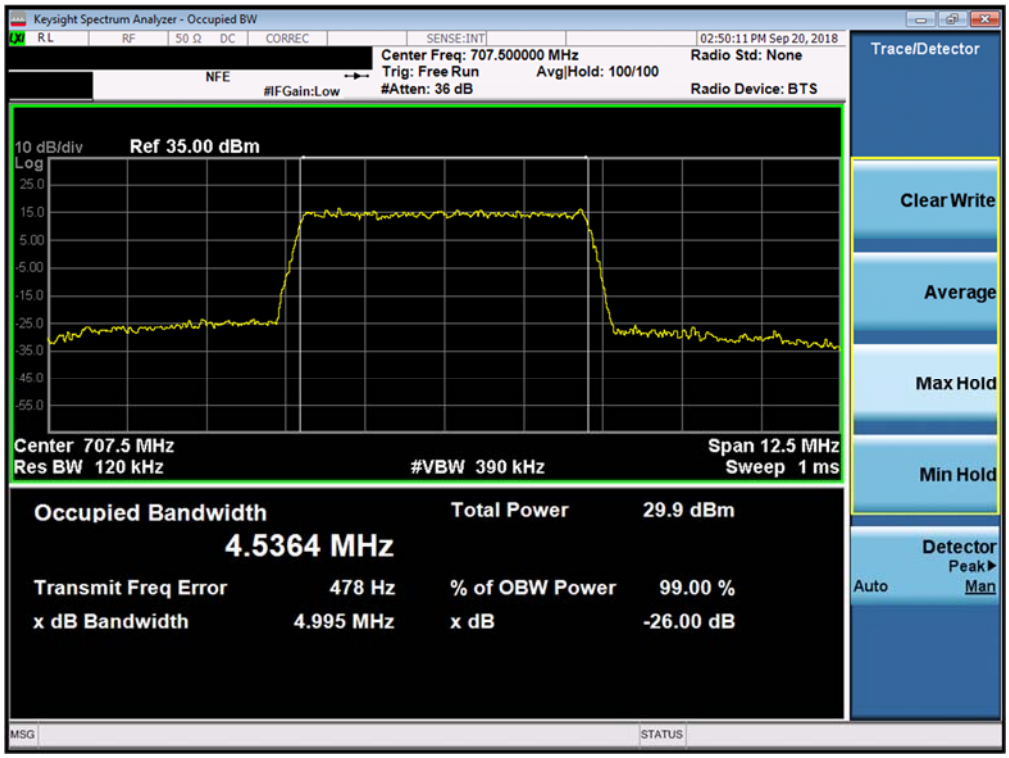

**Plot 7-7. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz QPSK - Full RB Configuration)**




**Plot 7-8. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz 16-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

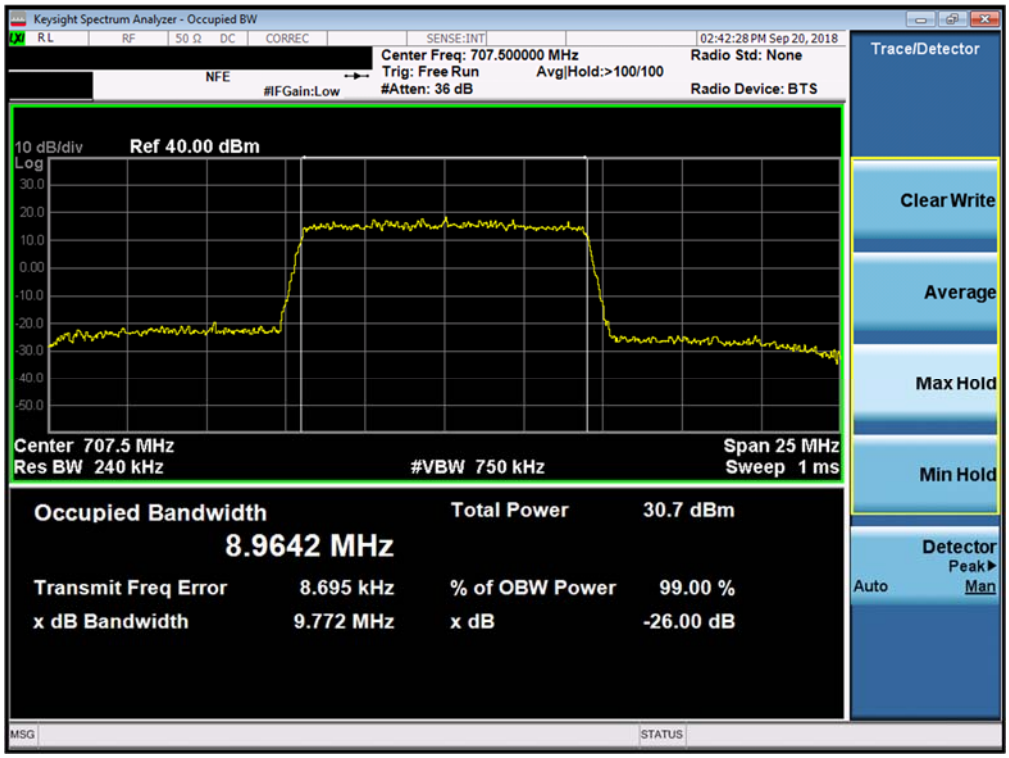



**Plot 7-9. Occupied Bandwidth Plot (Band 12/17 - 5.0MHz 64-QAM - Full RB Configuration)**

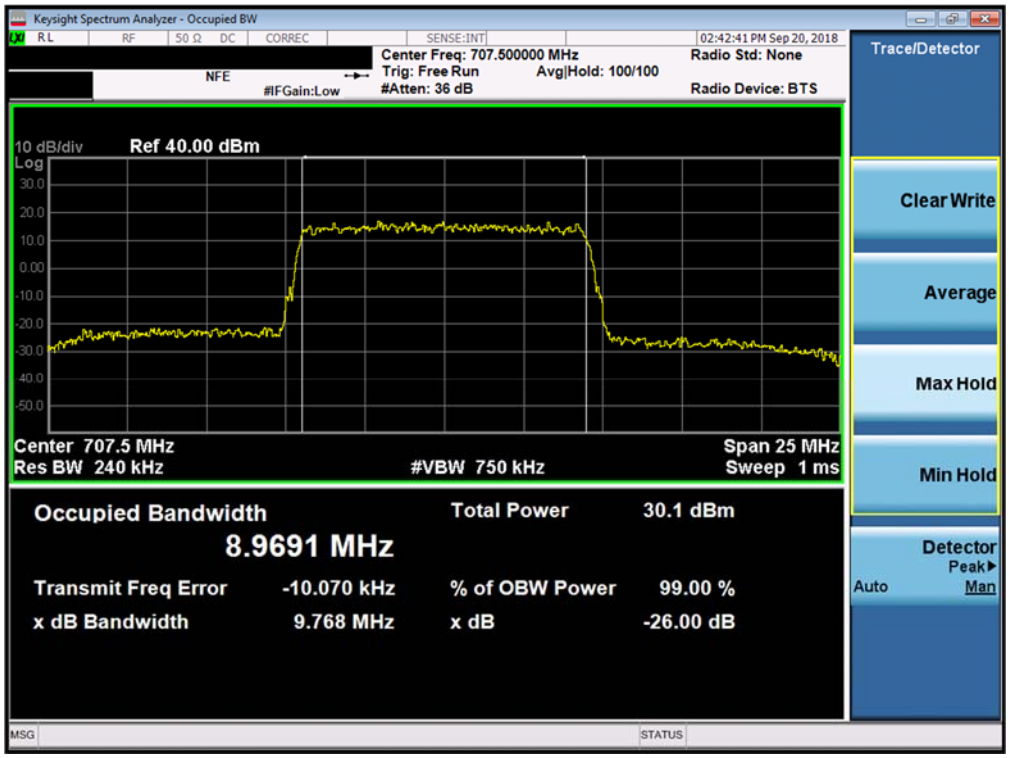
**Plot 7-10. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz QPSK - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.




**Plot 7-11. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz 16-QAM - Full RB Configuration)**



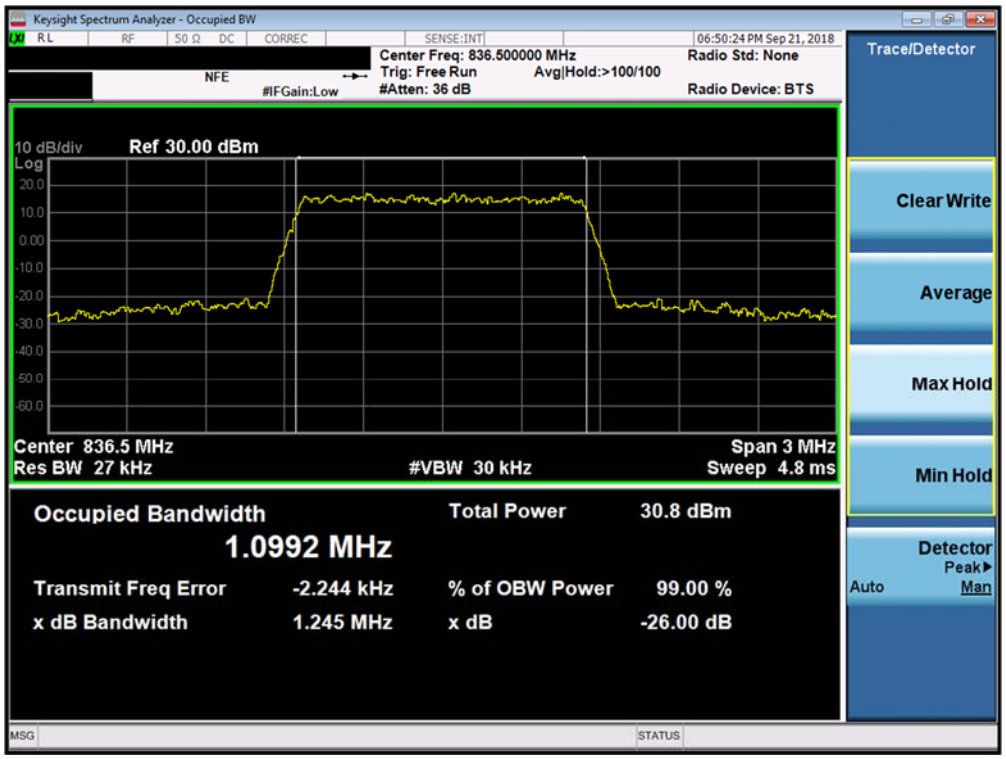

**Plot 7-12. Occupied Bandwidth Plot (Band 12/17 - 10.0MHz 64-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## Band 5

**Plot 7-13. Occupied Bandwidth Plot (Band 5 - 1.4MHz QPSK - Full RB Configuration)**




**Plot 7-14. Occupied Bandwidth Plot (Band 5 - 1.4MHz 16-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-15. Occupied Bandwidth Plot (Band 5 - 1.4MHz 64-QAM - Full RB Configuration)**

**Plot 7-16. Occupied Bandwidth Plot (Band 5 - 3.0MHz QPSK - Full RB Configuration)**



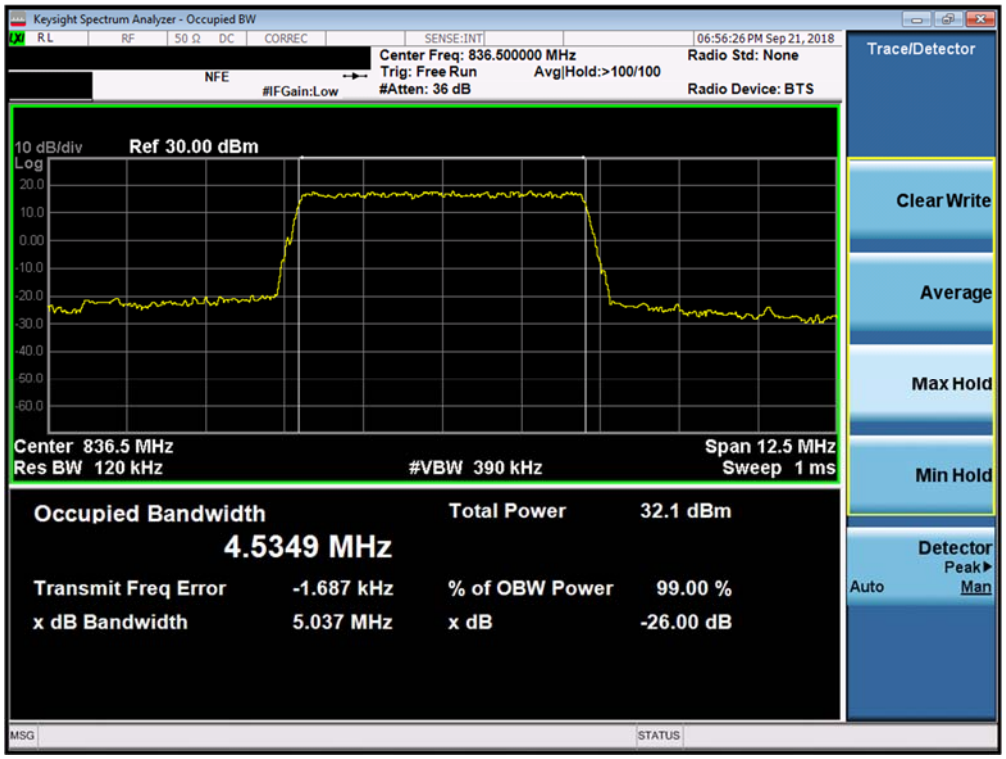
© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-17. Occupied Bandwidth Plot (Band 5 - 3.0MHz 16-QAM - Full RB Configuration)**

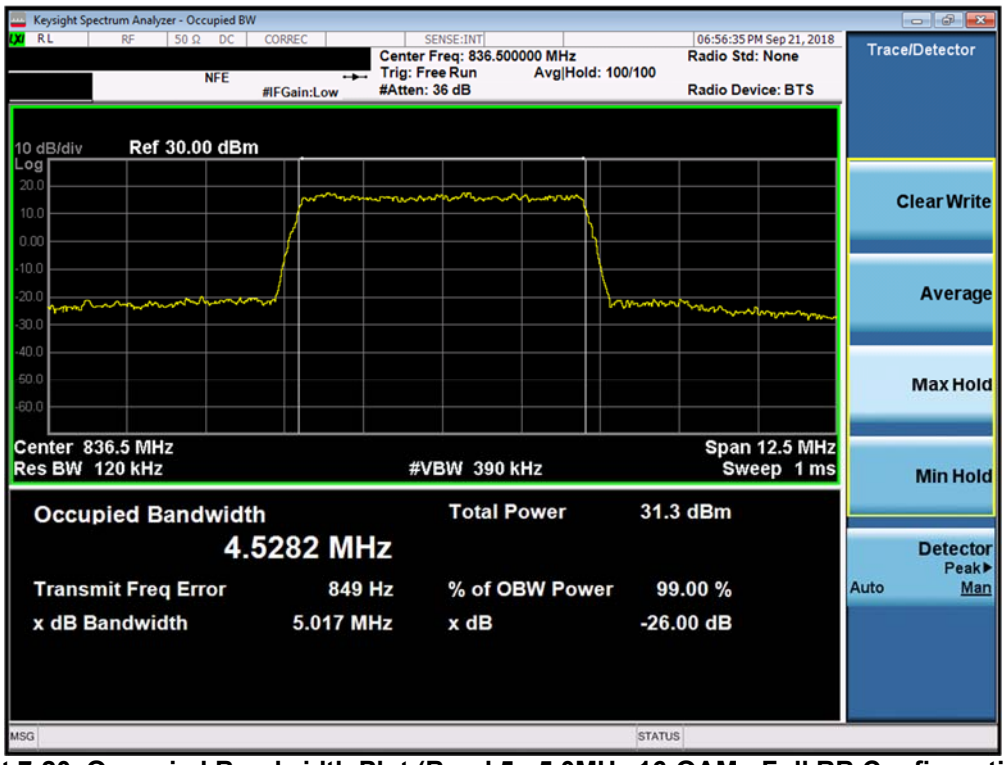
**Plot 7-18. Occupied Bandwidth Plot (Band 5 - 3.0MHz 64-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



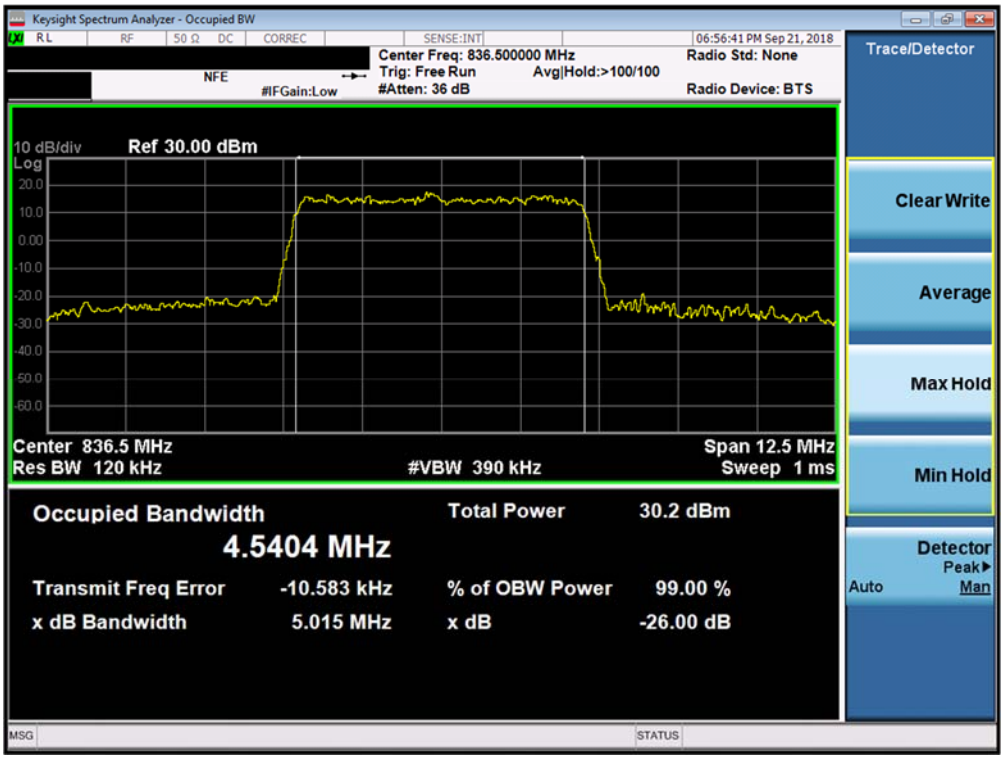

**Plot 7-19. Occupied Bandwidth Plot (Band 5 - 5.0MHz QPSK - Full RB Configuration)**




**Plot 7-20. Occupied Bandwidth Plot (Band 5 - 5.0MHz 16-QAM - Full RB Configuration)**



© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.




**Plot 7-21. Occupied Bandwidth Plot (Band 5 - 5.0MHz 64-QAM - Full RB Configuration)**

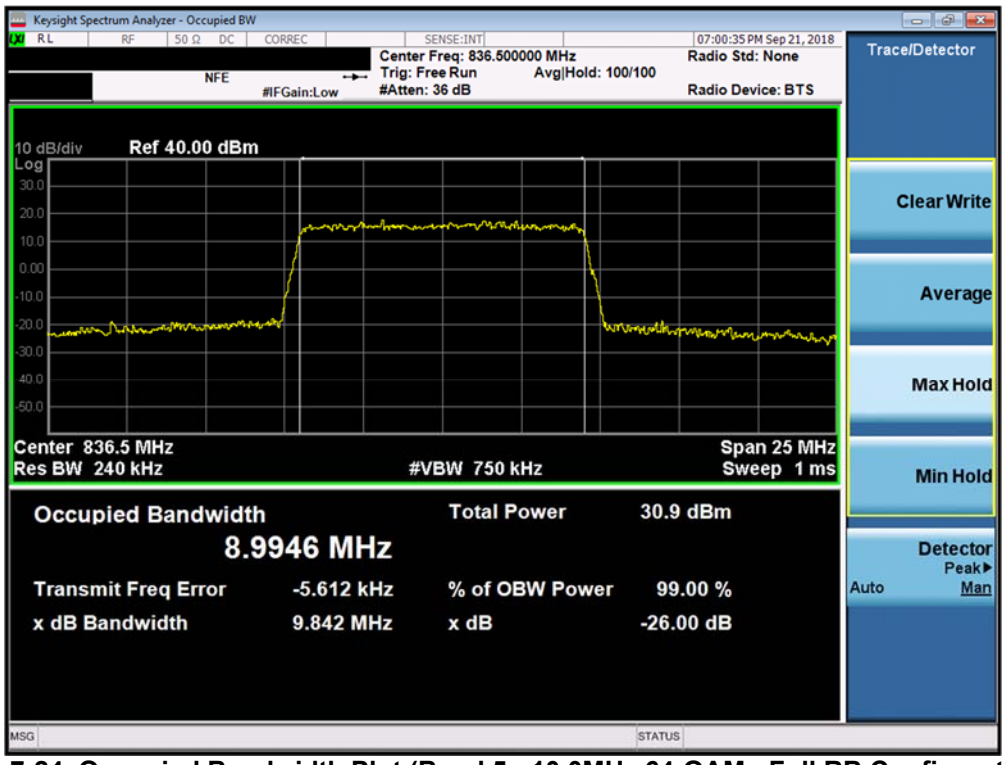
**Plot 7-22. Occupied Bandwidth Plot (Band 5 - 10.0MHz QPSK - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018

All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-23. Occupied Bandwidth Plot (Band 5 - 10.0MHz 16-QAM - Full RB Configuration)**




**Plot 7-24. Occupied Bandwidth Plot (Band 5 - 10.0MHz 64-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

## Band 4

**Plot 7-25. Occupied Bandwidth Plot (Band 4 - 1.4MHz QPSK - Full RB Configuration)**

**Plot 7-26. Occupied Bandwidth Plot (Band 4 - 1.4MHz 16-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

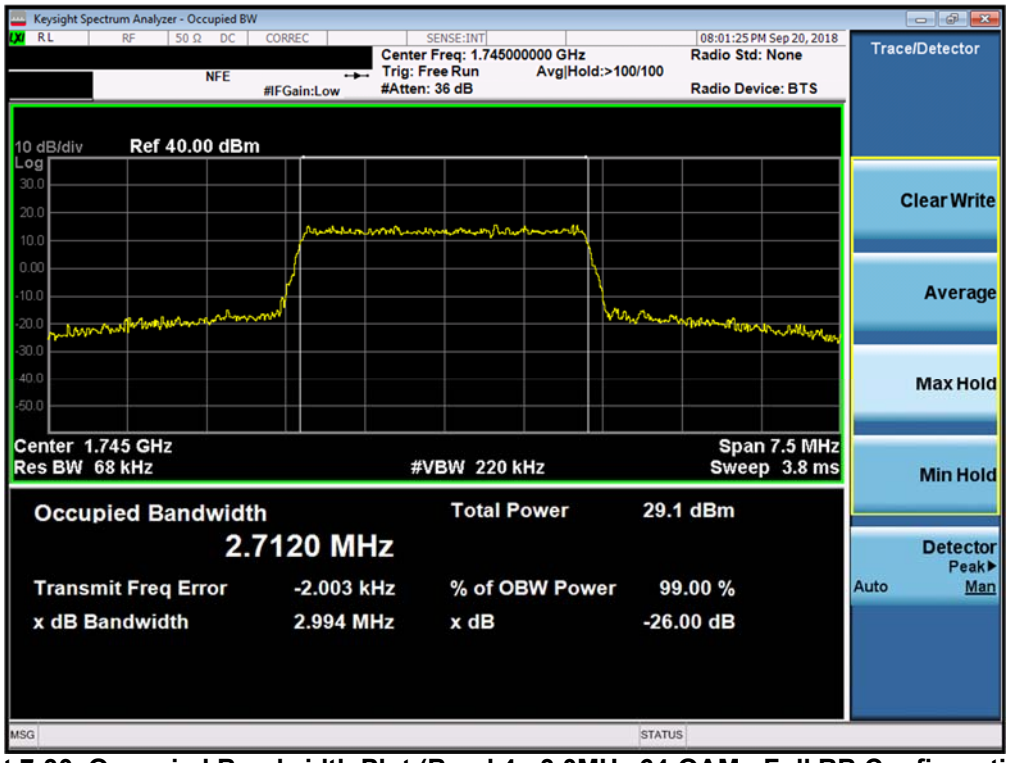
**Plot 7-27. Occupied Bandwidth Plot (Band 4 - 1.4MHz 64-QAM - Full RB Configuration)**

**Plot 7-28. Occupied Bandwidth Plot (Band 4 - 3.0MHz QPSK - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

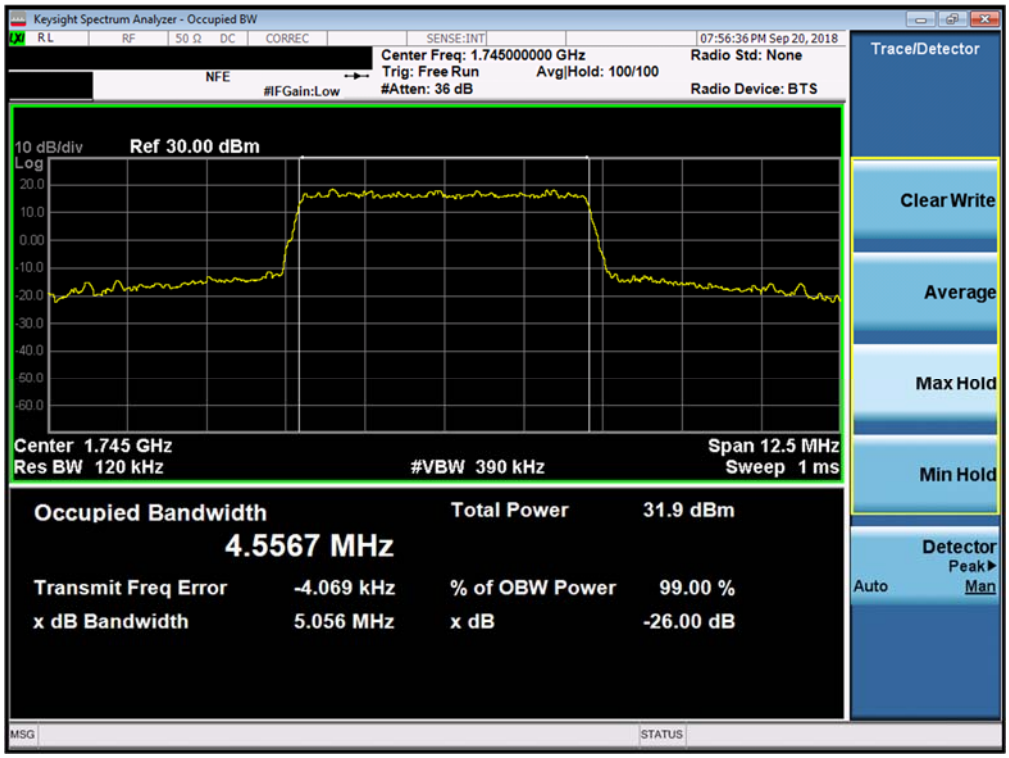
**Plot 7-29. Occupied Bandwidth Plot (Band 4 - 3.0MHz 16-QAM - Full RB Configuration)**



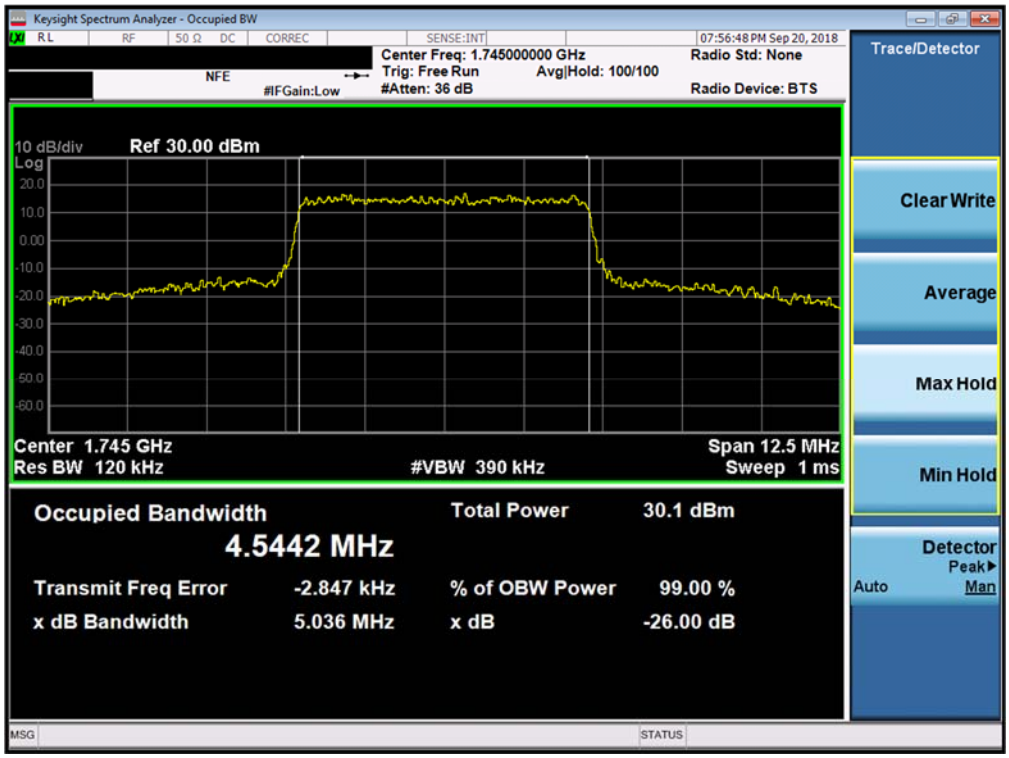

**Plot 7-30. Occupied Bandwidth Plot (Band 4 - 3.0MHz 64-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.



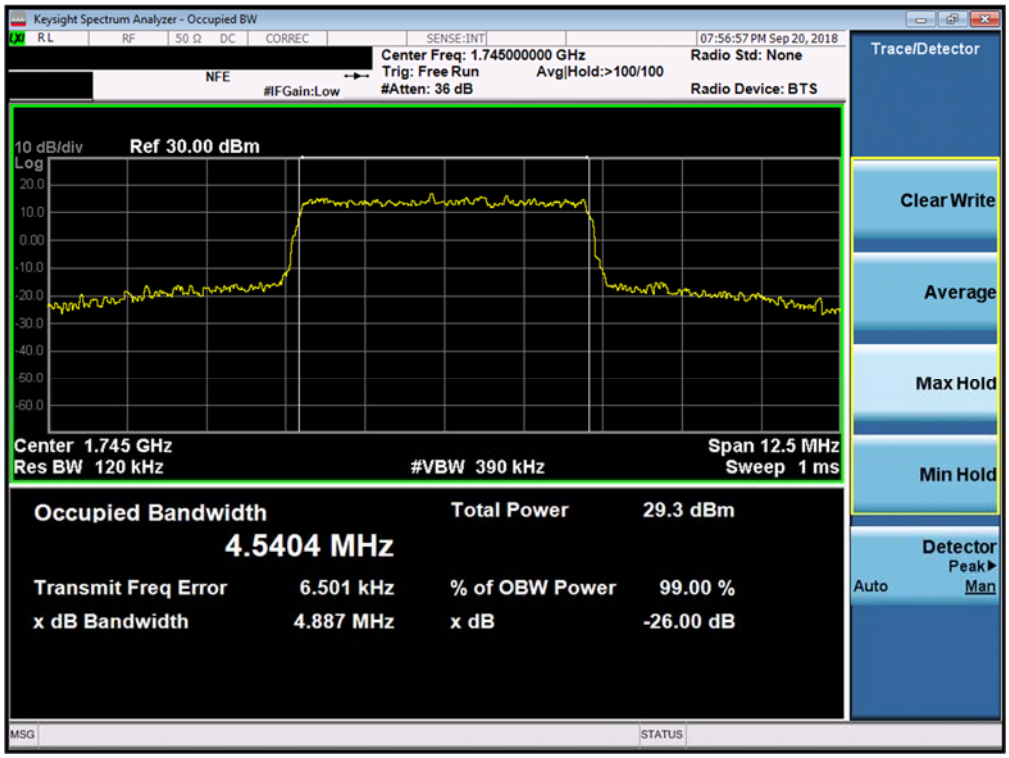

**Plot 7-31. Occupied Bandwidth Plot (Band 4 - 5.0MHz QPSK - Full RB Configuration)**



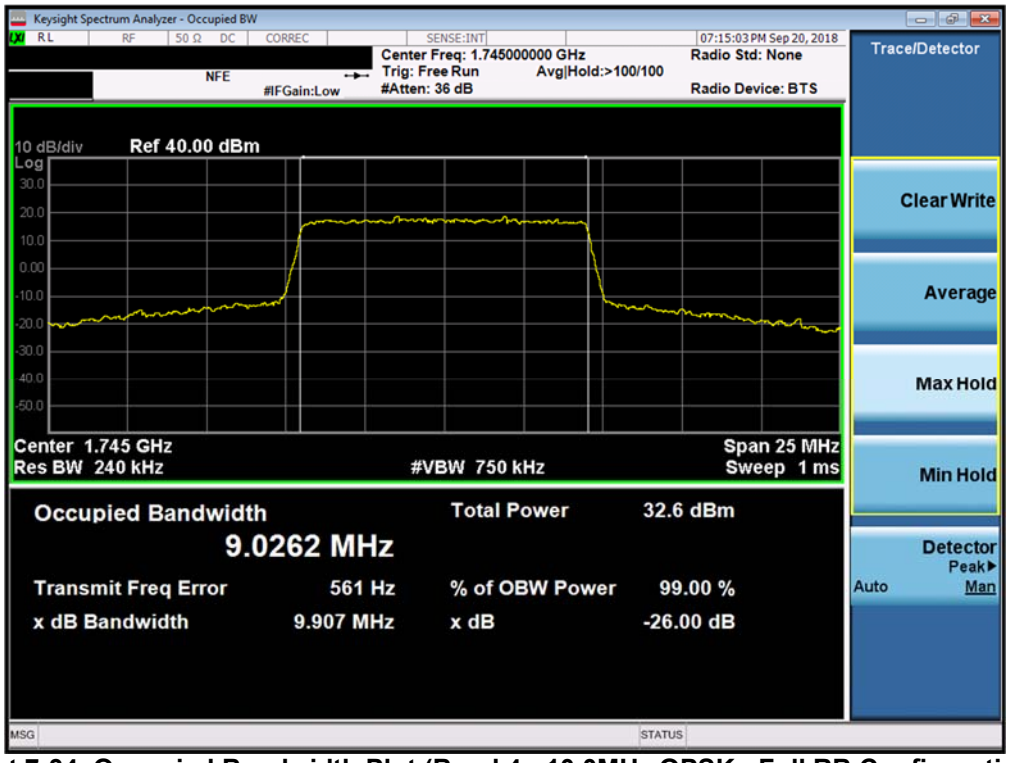

**Plot 7-32. Occupied Bandwidth Plot (Band 4 - 5.0MHz 16-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.




**Plot 7-33. Occupied Bandwidth Plot (Band 4 - 5.0MHz 64-QAM - Full RB Configuration)**




**Plot 7-34. Occupied Bandwidth Plot (Band 4 - 10.0MHz QPSK - Full RB Configuration)**



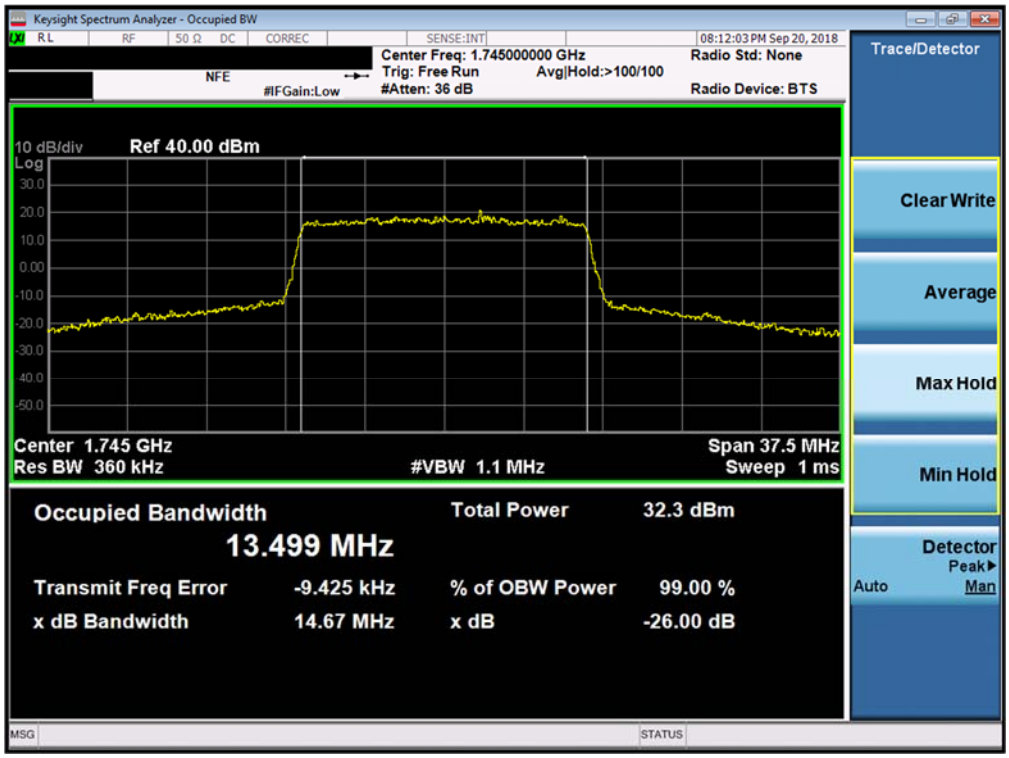

© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-35. Occupied Bandwidth Plot (Band 4 - 10.0MHz 16-QAM - Full RB Configuration)**

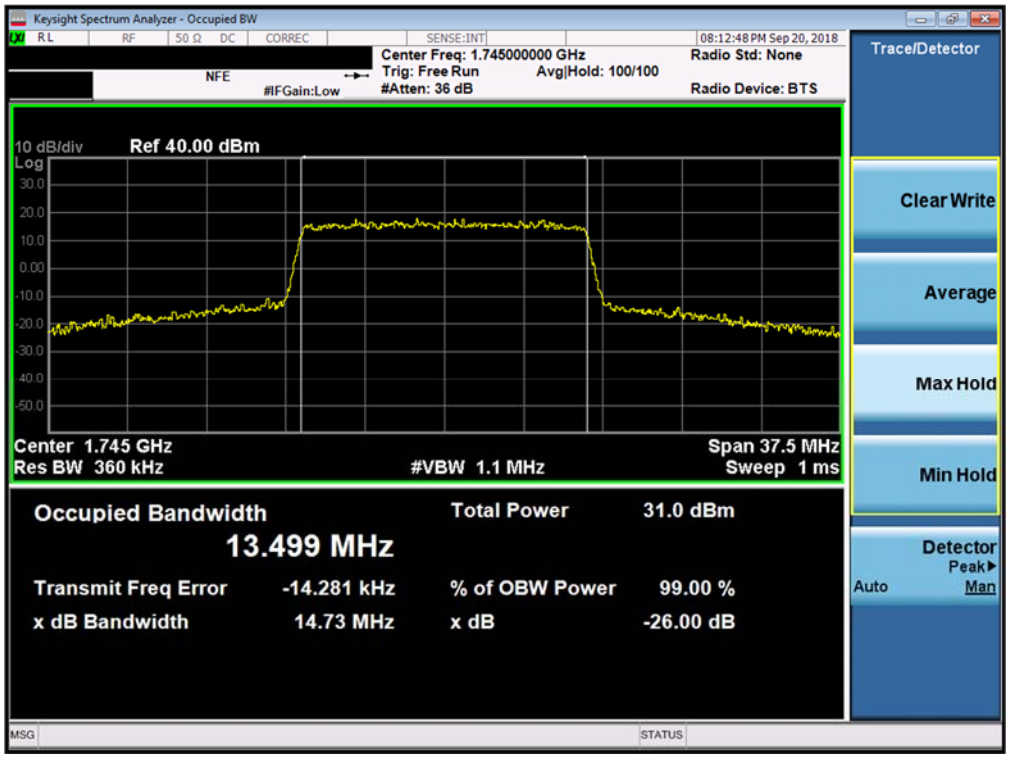
**Plot 7-36. Occupied Bandwidth Plot (Band 4 - 10.0MHz 64-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.




**Plot 7-37. Occupied Bandwidth Plot (Band 4 - 15.0MHz QPSK - Full RB Configuration)**

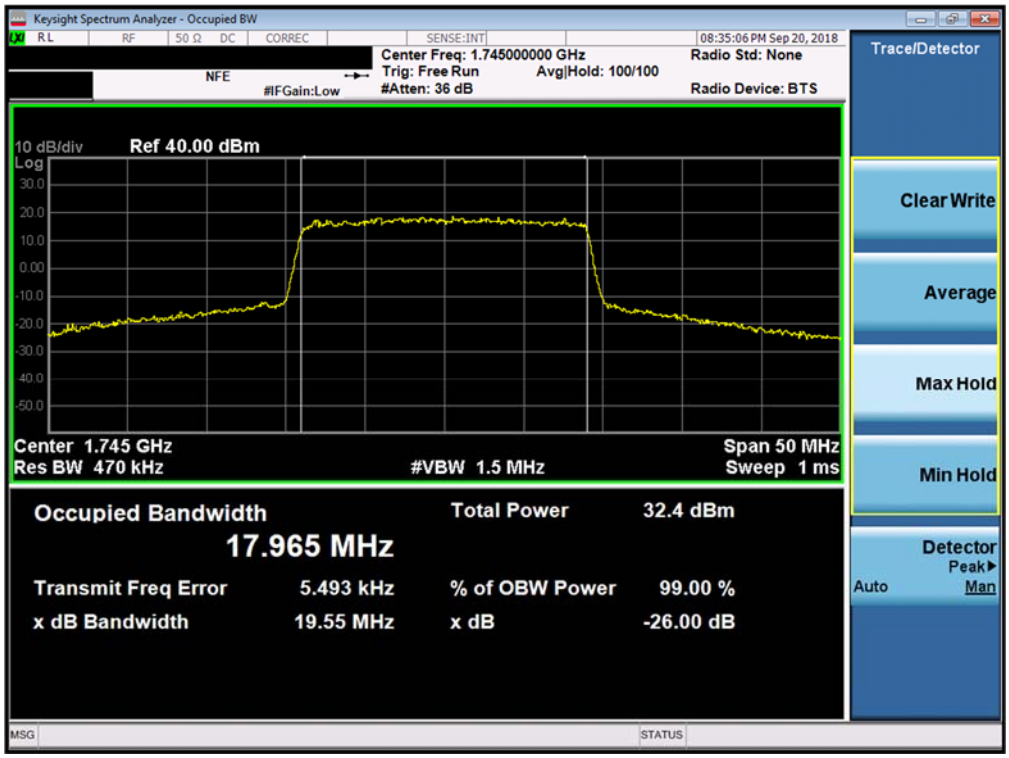



**Plot 7-38. Occupied Bandwidth Plot (Band 4 - 15.0MHz 16-QAM - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.

**Plot 7-39. Occupied Bandwidth Plot (Band 4 - 15.0MHz 64-QAM - Full RB Configuration)**




**Plot 7-40. Occupied Bandwidth Plot (Band 4 - 20.0MHz QPSK - Full RB Configuration)**




© 2018 PCTEST Engineering Laboratory, Inc. V 8.5 08/29/2018
All rights reserved. Unless otherwise specified, no part of this report may be reproduced or utilized in any part, form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from PCTEST Engineering Laboratory, Inc. If you have any questions about this international copyright or have an enquiry about obtaining additional rights to this report or assembly of contents thereof, please contact INFO@PCTEST.COM.