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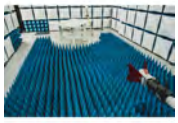

MEASUREMENT REPORT
FCC Part 22, 24, & 27 LTE

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

Date of Testing:
09/08/2017-10/04/2017
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M1709080250-03.A3L

FCC ID :	**A3LSMG892U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v02r02, KDB 648474 D03 v01r04

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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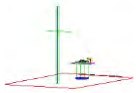
MEASUREMENT REPORT
FCC Part 22, 24, & 27



Mode	FCC Rule Part	Tx Frequency (MHz)	ERP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 71	27	665.5 - 695.5	0.130	21.14	4M52G7D	QPSK
LTE Band 71	27	665.5 - 695.5	0.112	20.50	4M52W7D	16QAM
LTE Band 71	27	665.5 - 695.5	0.082	19.15	4M54W7D	64QAM
LTE Band 71	27	668 - 693	0.140	21.46	9M04G7D	QPSK
LTE Band 71	27	668 - 693	0.098	19.90	9M02W7D	16QAM
LTE Band 71	27	668 - 693	0.080	19.05	9M02W7D	64QAM
LTE Band 71	27	670.5 - 690.5	0.148	21.69	13M5G7D	QPSK
LTE Band 71	27	670.5 - 690.5	0.119	20.77	13M5W7D	16QAM
LTE Band 71	27	670.5 - 690.5	0.085	19.30	13M6W7D	64QAM
LTE Band 71	27	673 - 688	0.145	21.62	18M0G7D	QPSK
LTE Band 71	27	673 - 688	0.127	21.04	18M0W7D	16QAM
LTE Band 71	27	673 - 688	0.089	19.50	18M1W7D	64QAM
LTE Band 12	27	699.7 - 715.3	0.093	19.67	1M09G7D	QPSK
LTE Band 12	27	699.7 - 715.3	0.075	18.74	1M10W7D	16QAM
LTE Band 12	27	699.7 - 715.3	0.062	17.93	1M10W7D	64QAM
LTE Band 12	27	700.5 - 714.5	0.093	19.69	2M70G7D	QPSK
LTE Band 12	27	700.5 - 714.5	0.077	18.84	2M70W7D	16QAM
LTE Band 12	27	700.5 - 714.5	0.059	17.71	2M70W7D	64QAM
LTE Band 12/17	27	701.5 - 713.5	0.087	19.38	4M50G7D	QPSK
LTE Band 12/17	27	701.5 - 713.5	0.071	18.53	4M51W7D	16QAM
LTE Band 12/17	27	701.5 - 713.5	0.057	17.55	4M51W7D	64QAM
LTE Band 12/17	27	704 - 711	0.094	19.72	9M04G7D	QPSK
LTE Band 12/17	27	704 - 711	0.074	18.71	8M99W7D	16QAM
LTE Band 12/17	27	704 - 711	0.060	17.81	9M00W7D	64QAM
LTE Band 13	27	779.5 - 784.5	0.159	22.00	4M50G7D	QPSK
LTE Band 13	27	779.5 - 784.5	0.133	21.25	4M50W7D	16QAM
LTE Band 13	27	779.5 - 784.5	0.105	20.22	4M53W7D	64QAM
LTE Band 13	27	782	0.153	21.85	8M98G7D	QPSK
LTE Band 13	27	782	0.128	21.07	8M98W7D	16QAM
LTE Band 13	27	782	0.101	20.02	8M96W7D	64QAM
LTE Band 5/26	22H	824.7 - 848.3	0.127	21.05	1M09G7D	QPSK
LTE Band 5/26	22H	824.7 - 848.3	0.105	20.20	1M10W7D	16QAM
LTE Band 5/26	22H	824.7 - 848.3	0.086	19.34	1M10W7D	64QAM
LTE Band 5/26	22H	825.5 - 847.5	0.127	21.04	2M70G7D	QPSK
LTE Band 5/26	22H	825.5 - 847.5	0.104	20.15	2M70W7D	16QAM
LTE Band 5/26	22H	825.5 - 847.5	0.085	19.31	2M70W7D	64QAM
LTE Band 5/26	22H	826.5 - 846.5	0.125	20.98	4M52G7D	QPSK
LTE Band 5/26	22H	826.5 - 846.5	0.103	20.12	4M50W7D	16QAM
LTE Band 5/26	22H	826.5 - 846.5	0.080	19.05	4M52W7D	64QAM
LTE Band 5/26	22H	829 - 844	0.136	21.33	8M98G7D	QPSK
LTE Band 5/26	22H	829 - 844	0.106	20.24	9M05W7D	16QAM
LTE Band 5/26	22H	829 - 844	0.085	19.29	9M00W7D	64QAM
LTE Band 26	22H	831.5 - 841.5	0.131	21.18	13M5G7D	QPSK
LTE Band 26	22H	831.5 - 841.5	0.111	20.46	13M5W7D	16QAM
LTE Band 26	22H	831.5 - 841.5	0.090	19.56	13M5W7D	64QAM

EUT Overview

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Mode	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (W)	Max. Power (dBm)		
LTE Band 4/66	27	1710.7 - 1779.3	0.336	25.26	1M10G7D	QPSK
LTE Band 4/66	27	1710.7 - 1779.3	0.282	24.50	1M10W7D	16QAM
LTE Band 4/66	27	1710.7 - 1779.3	0.221	23.45	1M10W7D	64QAM
LTE Band 4/66	27	1711.5 - 1778.5	0.323	25.10	2M71G7D	QPSK
LTE Band 4/66	27	1711.5 - 1778.5	0.271	24.33	2M70W7D	16QAM
LTE Band 4/66	27	1711.5 - 1778.5	0.213	23.29	2M71W7D	64QAM
LTE Band 4/66	27	1712.5 - 1777.5	0.357	25.53	4M51G7D	QPSK
LTE Band 4/66	27	1712.5 - 1777.5	0.301	24.79	4M51W7D	16QAM
LTE Band 4/66	27	1712.5 - 1777.5	0.231	23.64	4M51W7D	64QAM
LTE Band 4/66	27	1715 - 1775	0.367	25.65	9M02G7D	QPSK
LTE Band 4/66	27	1715 - 1775	0.310	24.92	8M98W7D	16QAM
LTE Band 4/66	27	1715 - 1775	0.240	23.81	9M01W7D	64QAM
LTE Band 4/66	27	1717.5 - 1772.5	0.360	25.56	13M5G7D	QPSK
LTE Band 4/66	27	1717.5 - 1772.5	0.302	24.80	13M5W7D	16QAM
LTE Band 4/66	27	1717.5 - 1772.5	0.237	23.74	13M5W7D	64QAM
LTE Band 4/66	27	1720 - 1770	0.364	25.61	18M0G7D	QPSK
LTE Band 4/66	27	1720 - 1770	0.304	24.83	18M0W7D	16QAM
LTE Band 4/66	27	1720 - 1770	0.240	23.80	18M0W7D	64QAM
LTE Band 2/25	24E	1850.7 - 1914.3	0.203	23.08	1M10G7D	QPSK
LTE Band 2/25	24E	1850.7 - 1914.3	0.167	22.23	1M10W7D	16QAM
LTE Band 2/25	24E	1850.7 - 1914.3	0.141	21.48	1M10W7D	64QAM
LTE Band 2/25	24E	1851.5 - 1913.5	0.193	22.85	2M71G7D	QPSK
LTE Band 2/25	24E	1851.5 - 1913.5	0.159	22.02	2M71W7D	16QAM
LTE Band 2/25	24E	1851.5 - 1913.5	0.126	20.99	2M71W7D	64QAM
LTE Band 2/25	24E	1852.5 - 1912.5	0.238	23.77	4M52G7D	QPSK
LTE Band 2/25	24E	1852.5 - 1912.5	0.197	22.94	4M51W7D	16QAM
LTE Band 2/25	24E	1852.5 - 1912.5	0.163	22.13	4M53W7D	64QAM
LTE Band 2/25	24E	1855 - 1910	0.224	23.51	9M04G7D	QPSK
LTE Band 2/25	24E	1855 - 1910	0.184	22.66	8M99W7D	16QAM
LTE Band 2/25	24E	1855 - 1910	0.147	21.69	8M99W7D	64QAM
LTE Band 2/25	24E	1857.5 - 1907.5	0.225	23.51	13M5G7D	QPSK
LTE Band 2/25	24E	1857.5 - 1907.5	0.189	22.76	13M5W7D	16QAM
LTE Band 2/25	24E	1857.5 - 1907.5	0.147	21.66	13M5W7D	64QAM
LTE Band 2/25	24E	1860 - 1905	0.217	23.37	18M0G7D	QPSK
LTE Band 2/25	24E	1860 - 1905	0.182	22.59	18M0W7D	16QAM
LTE Band 2/25	24E	1860 - 1905	0.159	22.02	18M0W7D	64QAM
LTE Band 7	27	2502.5 - 2567.5	0.185	22.66	4M51G7D	QPSK
LTE Band 7	27	2502.5 - 2567.5	0.157	21.96	4M51W7D	16QAM
LTE Band 7	27	2502.5 - 2567.5	0.120	20.79	4M53W7D	64QAM
LTE Band 7	27	2505 - 2565	0.190	22.79	9M04G7D	QPSK
LTE Band 7	27	2505 - 2565	0.149	21.72	8M98W7D	16QAM
LTE Band 7	27	2505 - 2565	0.113	20.53	8M99W7D	64QAM
LTE Band 7	27	2507.5 - 2562.5	0.176	22.45	13M5G7D	QPSK
LTE Band 7	27	2507.5 - 2562.5	0.143	21.56	13M5W7D	16QAM
LTE Band 7	27	2507.5 - 2562.5	0.109	20.36	13M5W7D	64QAM
LTE Band 7	27	2510 - 2560	0.173	22.38	17M9G7D	QPSK
LTE Band 7	27	2510 - 2560	0.150	21.77	18M0W7D	16QAM
LTE Band 7	27	2510 - 2560	0.115	20.61	18M0W7D	64QAM
LTE Band 38/41	27	2498.5 - 2687.5	0.357	25.53	4M51G7D	QPSK
LTE Band 38/41	27	2498.5 - 2687.5	0.281	24.49	4M52W7D	16QAM
LTE Band 38/41	27	2498.5 - 2687.5	0.244	23.87	4M52W7D	64QAM
LTE Band 38/41	27	2501 - 2685	0.355	25.50	9M05G7D	QPSK
LTE Band 38/41	27	2501 - 2685	0.263	24.20	9M03W7D	16QAM
LTE Band 38/41	27	2501 - 2685	0.226	23.54	8M97W7D	64QAM
LTE Band 38/41	27	2503.5 - 2682.5	0.352	25.47	13M5G7D	QPSK
LTE Band 38/41	27	2503.5 - 2682.5	0.266	24.24	13M5W7D	16QAM
LTE Band 38/41	27	2503.5 - 2682.5	0.229	23.59	13M5W7D	64QAM
LTE Band 38/41	27	2506 - 2680	0.352	25.47	18M0G7D	QPSK
LTE Band 38/41	27	2506 - 2680	0.257	24.10	18M0W7D	16QAM
LTE Band 38/41	27	2506 - 2680	0.225	23.53	17M9W7D	64QAM

EUT Overview

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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 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 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 (22831) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMG892U**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: 20209, 20514, 20084, 20951, 18831, 18476

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/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+

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.

LTE Band 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.

LTE Band 41 (2498.5 – 2687.5 MHz) overlaps the entire frequency range of LTE Band 38 (2572.5 – 2617.5 MHz). Therefore, test data provided in this report covers Band 38 as well as Band 41.

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v02r02. See Section 7.0 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 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) FCC ID: A3LEPNG930 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 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 v02r02) were used in the measurement of the EUT**.**

3.1 Block C Frequency Range

§27.5(b)(3)

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.

3.2 Block A Frequency Range

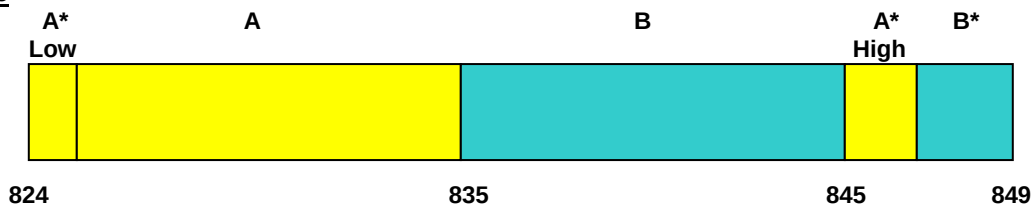
§27.5(c)

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 - 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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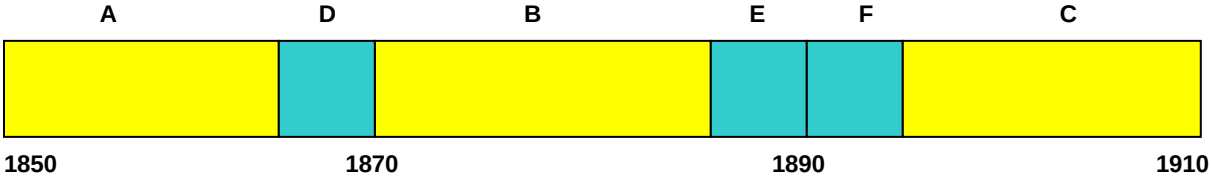
3.4 PCS - Mobile Frequency Blocks

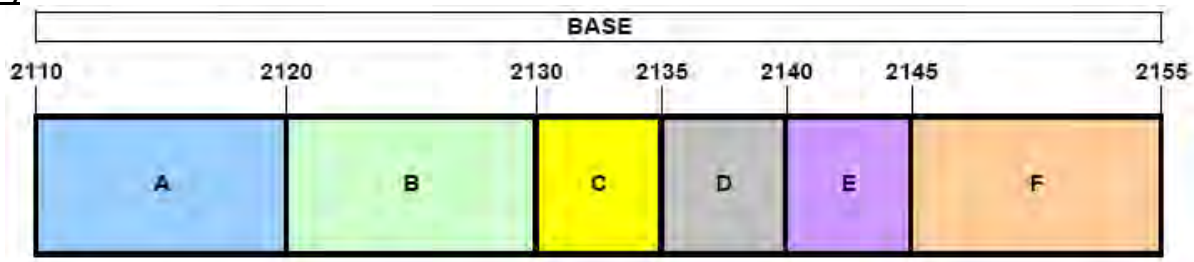
§24.229



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)

3.5 AWS - Base Frequency Blocks

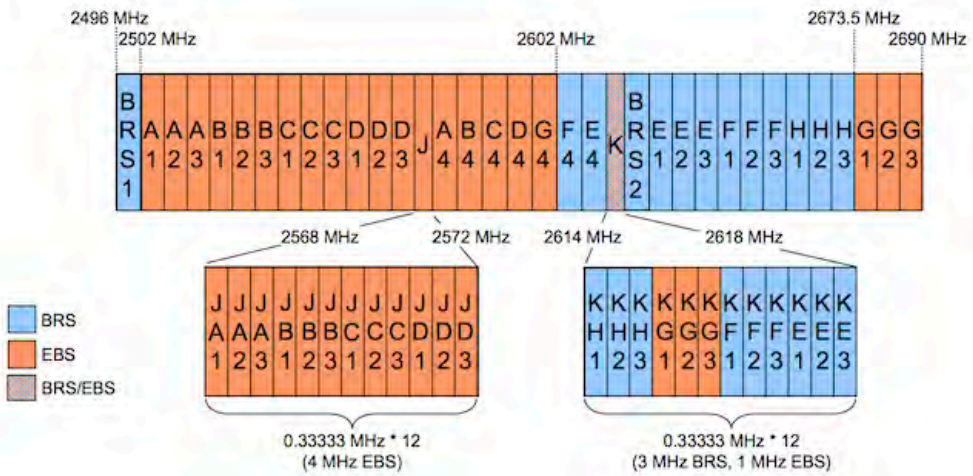
§27.5(h)



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)

3.6 BRS/EBS Frequency Block

§27.5



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3.7 Radiated Power and Radiated Spurious Emissions

§2.1053 §22.913(a.2) §22.917(a) §24.232(c) §24.238(a) §27.50(b.10) §27.50(c.10) §27.50(d.4) §27.53(f) §27.53(g) §27.53(h) §27.53(m)

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.

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 v02r02.

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 7, 38 and 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 $_{[Watts]}$).

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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

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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	8/10/2017	Annual	8/10/2018	LTx3
-	RE1	Radiated Emissions Cable Set (UHF/EHF)	6/21/2017	Annual	6/21/2018	RE1
Agilent	N9020A	MXA Signal Analyzer	10/28/2016	Annual	10/28/2017	US46470561
Emco	6502	Active Loop Antenna (10k - 30 MHz)	8/9/2016	Biennial	8/9/2018	2936
Emco	3115	Horn Antenna (1-18GHz)	3/10/2016	Biennial	3/10/2018	9704-5182
Espec	ESX-2CA	Environmental Chamber	4/11/2017	Annual	4/11/2018	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/26/2016	Biennial	4/26/2018	125518
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	4/26/2016	Biennial	4/26/2018	128337
ETS Lindgren	3160-09	18-26.5 GHz Standard Gain Horn	8/23/2016	Biennial	8/23/2018	135427
Mini Circuits	PWR-SEN-4GHS	USB Power Sensor	3/24/2017	Annual	3/24/2018	11401010036
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
PCTEST	-	EMC Switch System	6/21/2017	Annual	6/21/2018	NM1
PCTEST	-	EMC Switch System	6/21/2017	Annual	6/21/2018	NM2
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/11/2017	Annual	8/11/2018	103200
Rohde & Schwarz	CMW500	Radio Communication Tester	10/20/2016	Annual	10/20/2017	100976
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	7/31/2017	Annual	7/31/2018	100348
Rohde & Schwarz	TS-PR26	18-26.5 GHz Pre-Amplifier	5/11/2017	Annual	5/11/2018	100040
Schwarzbeck	UHA 9105	Dipole Antenna (400 - 1GHz) Rx	11/18/2015	Biennial	11/18/2017	91052523RX
Seekonk	NC-100	Torque Wrench 5/16", 8" lbs	3/2/2016	Biennial	3/2/2018	N/A
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	3/14/2016	Biennial	3/14/2018	A051107

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.

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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

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 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).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMG892U

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

Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Out of Band Emissions (Band 71, 12/17, 13, 5/26, 4/66, 2/25)	> 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 (Band 7, 38/41)	> 43 + 10log$_{10}$ (P[Watts]) at channel edges and > 55 + 10log$_{10}$ (P[Watts]) at 5.5MHz away and beyond channel edges		PASS	Section 7.3, 7.4
24.232(d)	Peak-Average Ratio	< 13 dB		PASS	Section 7.6
2.1046	Transmitter Conducted Output Power	N/A		PASS	See RF Exposure Report
2.1055. 22.355 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)		PASS	Section 7.10
22.913(a.2)	Effective Radiated Power (Band 5/26)	< 7 Watts max. ERP	RADIATED	PASS	Section 7.7
27.50(b.10) 27.50(c.10)	Effective Radiated Power (Band 71, 12/17, 13)	< 3 Watts max. ERP		PASS	Section 7.7
24.232(c) 27.50(h.2)	Equivalent Isotropic Radiated Power (Band 2/25, 7, 38/41)	< 2 Watts max. EIRP		PASS	Section 7.7
27.50(d.4)	Equivalent Isotropic Radiated Power (Band 4/66)	< 1 Watts max. EIRP		PASS	Section 7.7
2.1053 22.917(a) 24.238(a) 27.53(c) 27.53(g) 27.53(h)	Undesirable Emissions (Band 71, 12/17, 5/26, 4/66, 2/25)	> 43 + 10log$_{10}$ (P[Watts]) for all out-of-band emissions		PASS	Section 7.8
27.53(f)	Undesirable Emissions (Band 13)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 – 1610 MHz		PASS	Section 7.8
27.53(m)	Undesirable Emissions (Band 7, 38/41)	> 43 + 10log$_{10}$ (P[Watts]) at channel edges > 55 + 10log$_{10}$ (P[Watts]) at 5.5MHz away and beyond channel edges		PASS	Section 7.8

Table 7-1. 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, 7.6) 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.

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7.2 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 D01 v02r02 – 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.

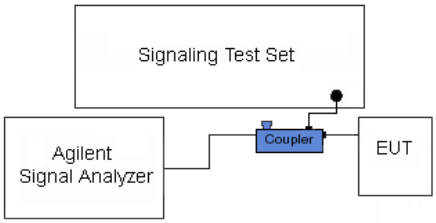

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None.

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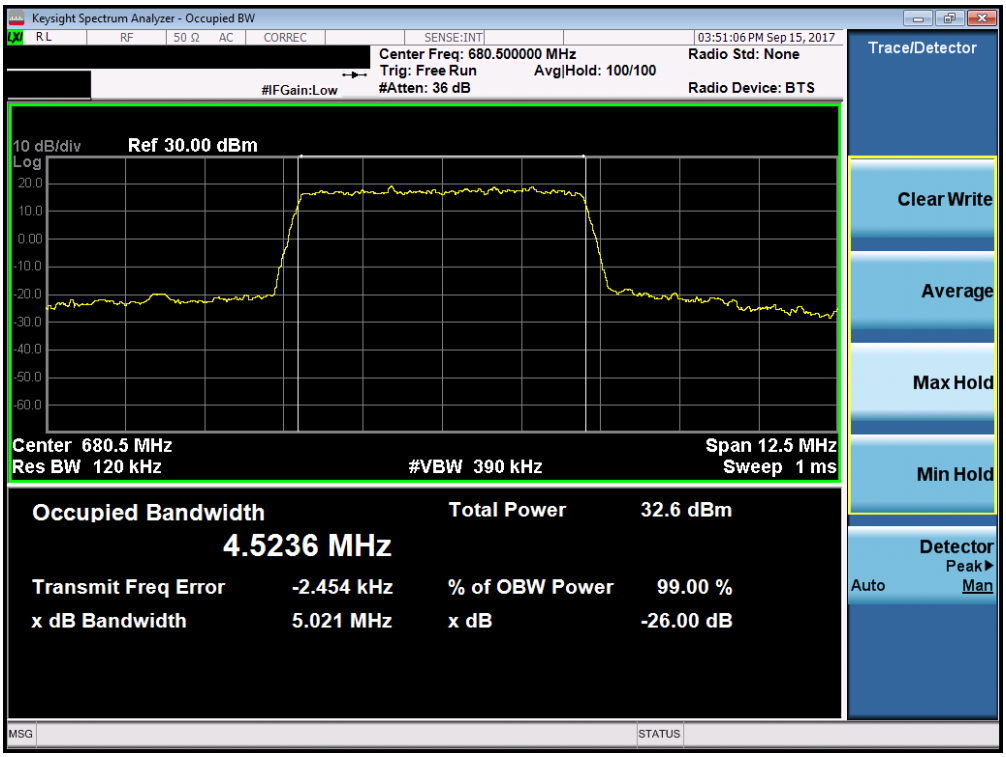
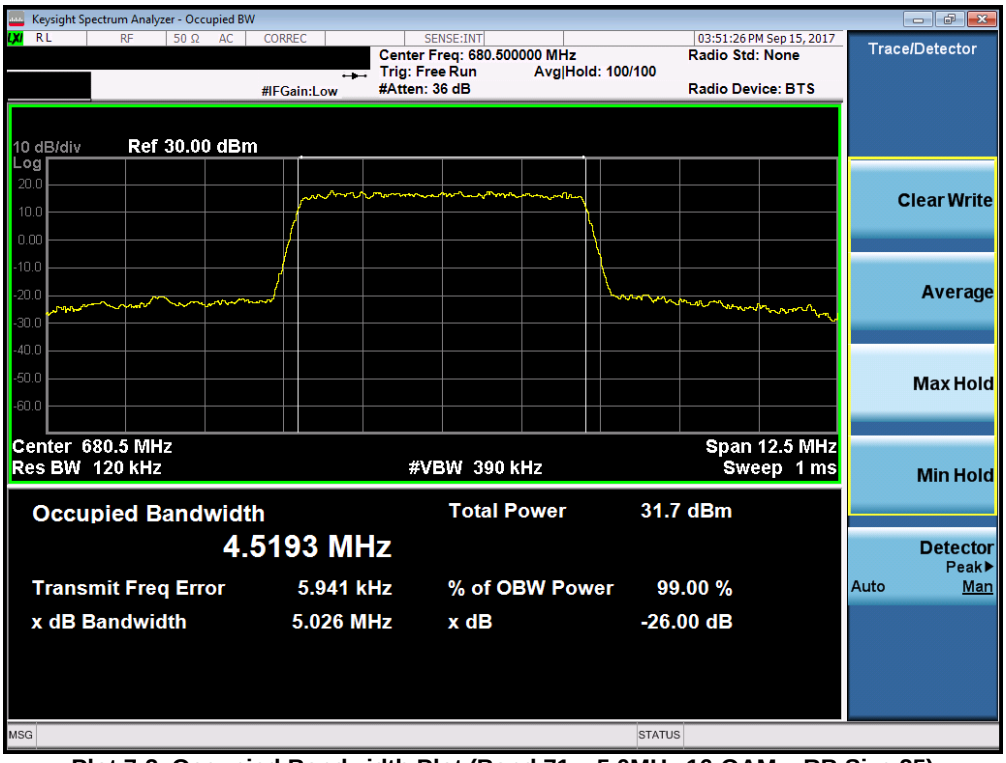


Plot 7-1. Occupied Bandwidth Plot (Band 71 – 5.0MHz QPSK – RB Size 25)



Plot 7-2. Occupied Bandwidth Plot (Band 71 – 5.0MHz 16-QAM – RB Size 25)

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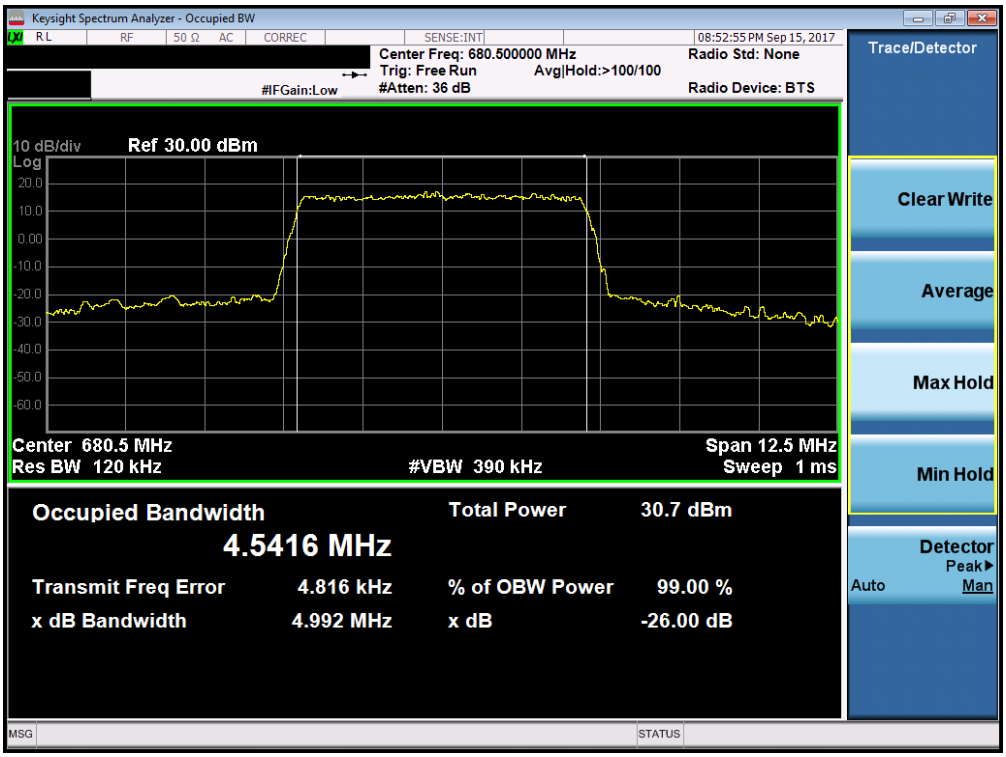
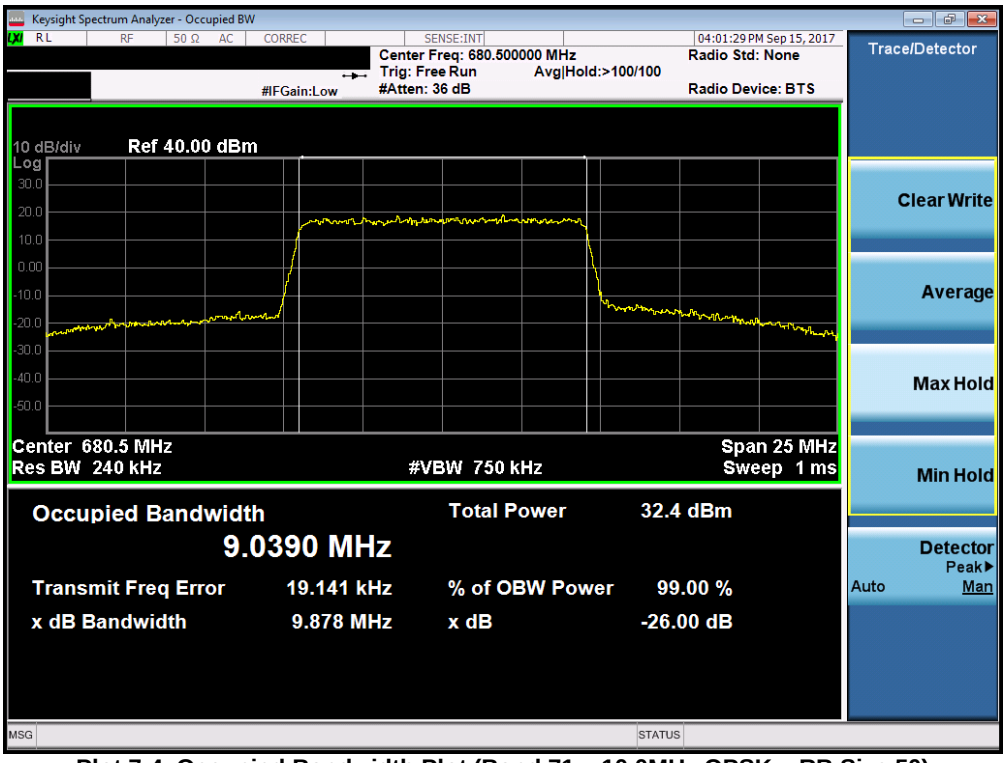


Plot 7-3. Occupied Bandwidth Plot (Band 71 – 5.0MHz 64-QAM – RB Size 25)



Plot 7-4. Occupied Bandwidth Plot (Band 71 – 10.0MHz QPSK – RB Size 50)

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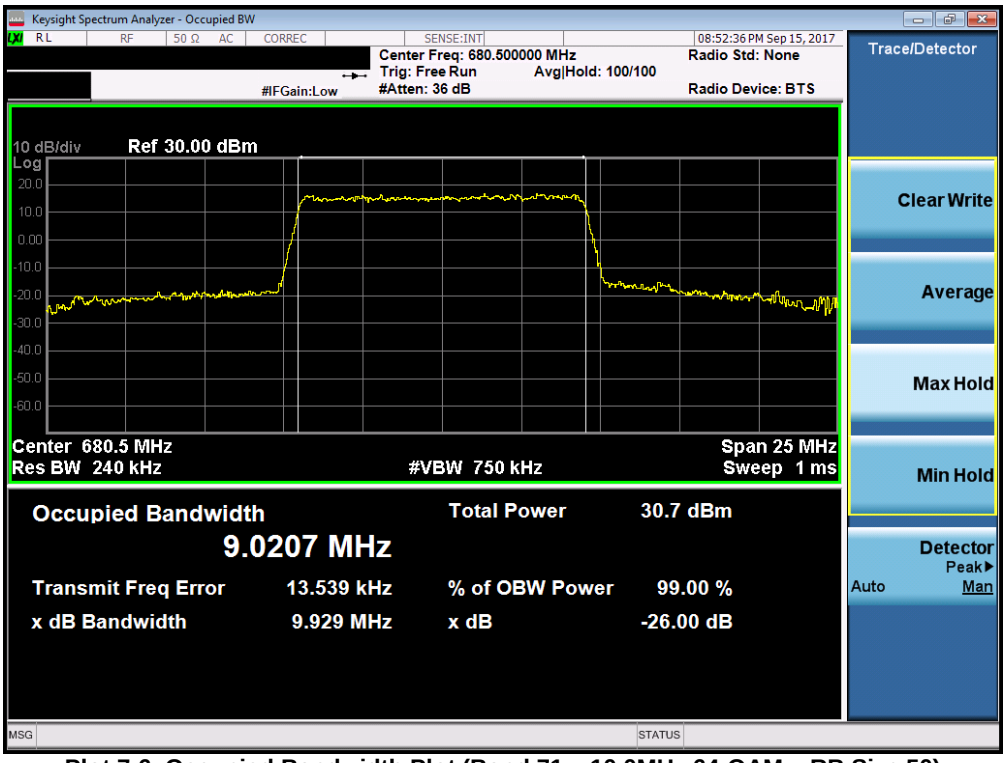
Plot 7-5. Occupied Bandwidth Plot (Band 71 – 10.0MHz 16-QAM – RB Size 50)



Plot 7-6. Occupied Bandwidth Plot (Band 71 – 10.0MHz 64-QAM – RB Size 50)

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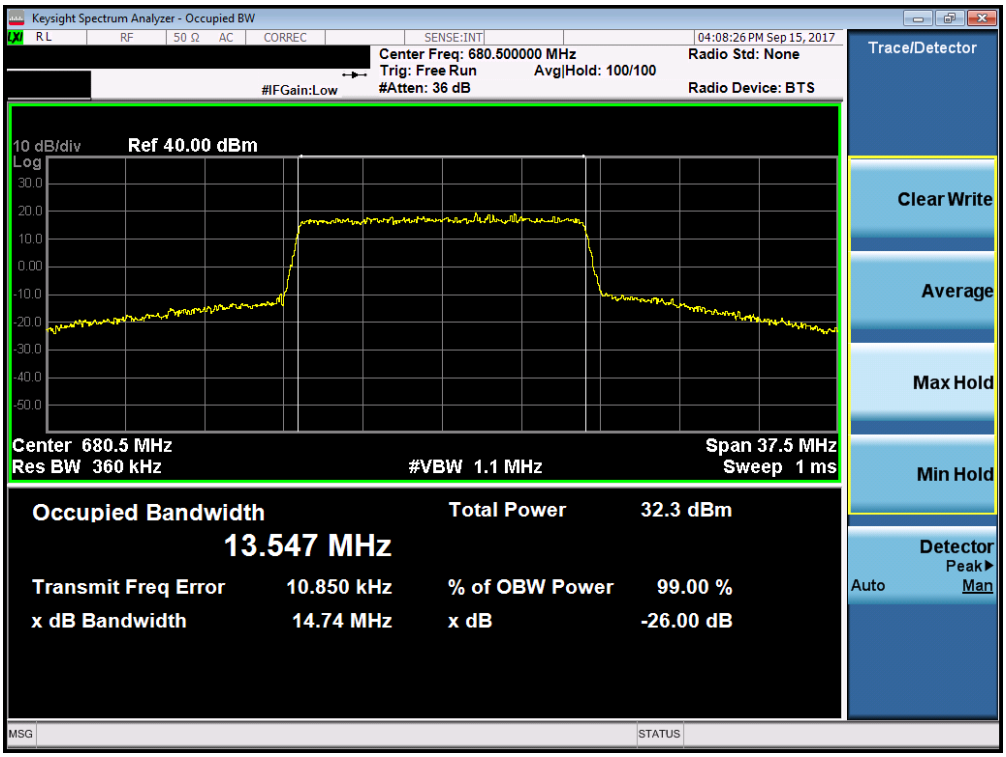
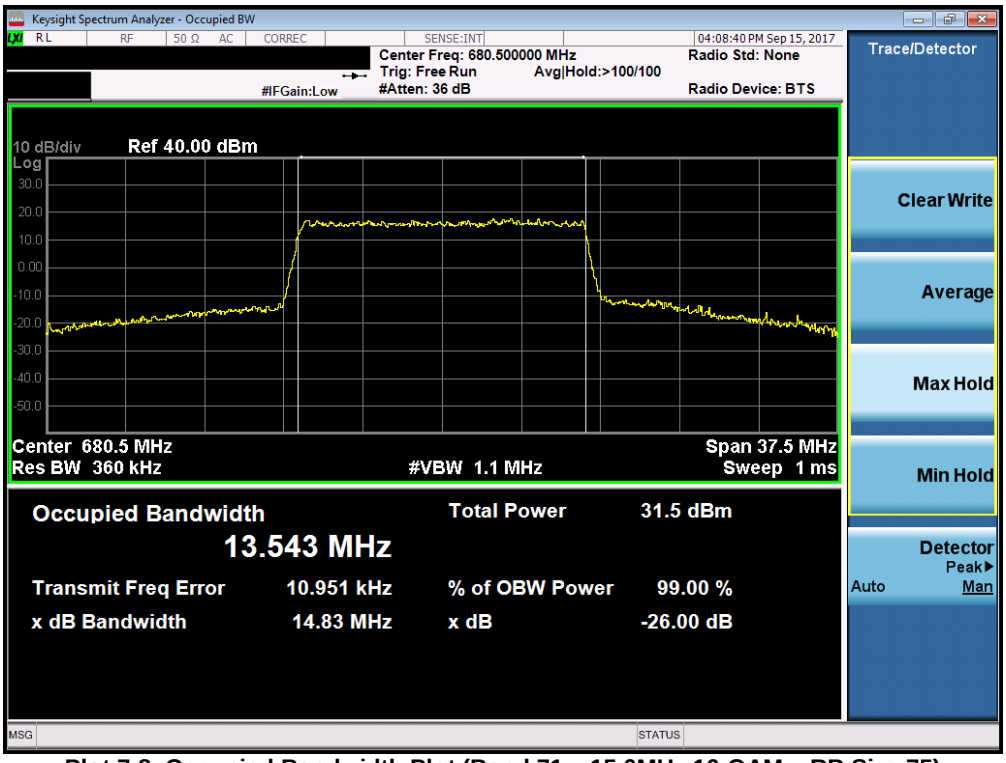


Plot 7-7. Occupied Bandwidth Plot (Band 71 – 15.0MHz QPSK – RB Size 75)



Plot 7-8. Occupied Bandwidth Plot (Band 71 – 15.0MHz 16-QAM – RB Size 75)

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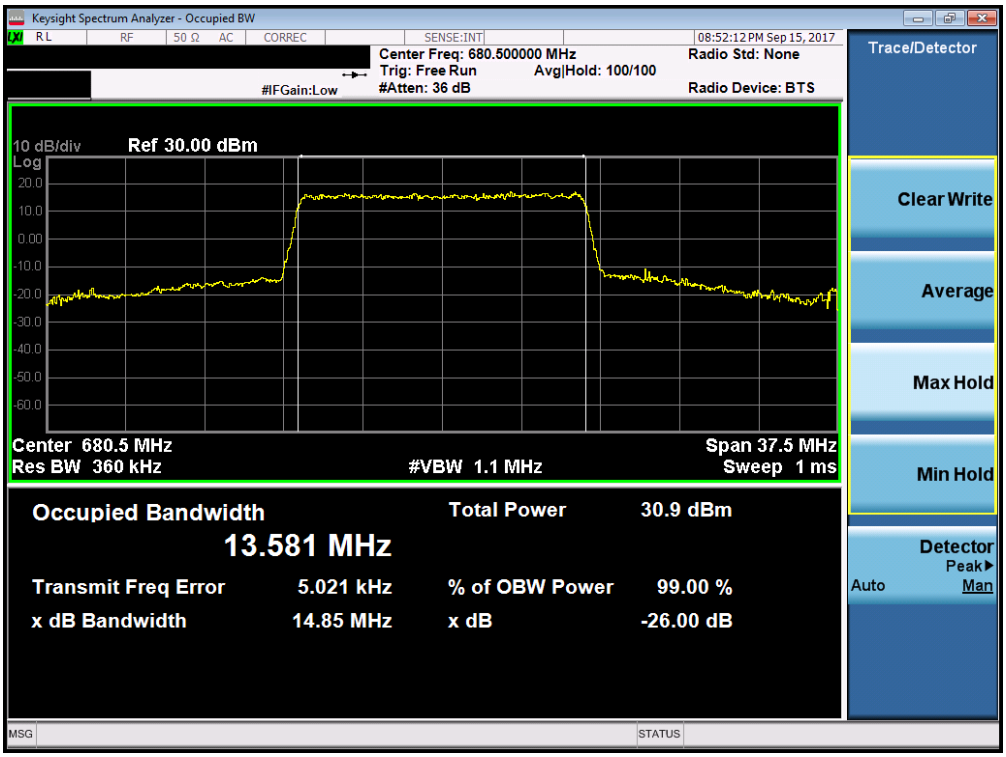
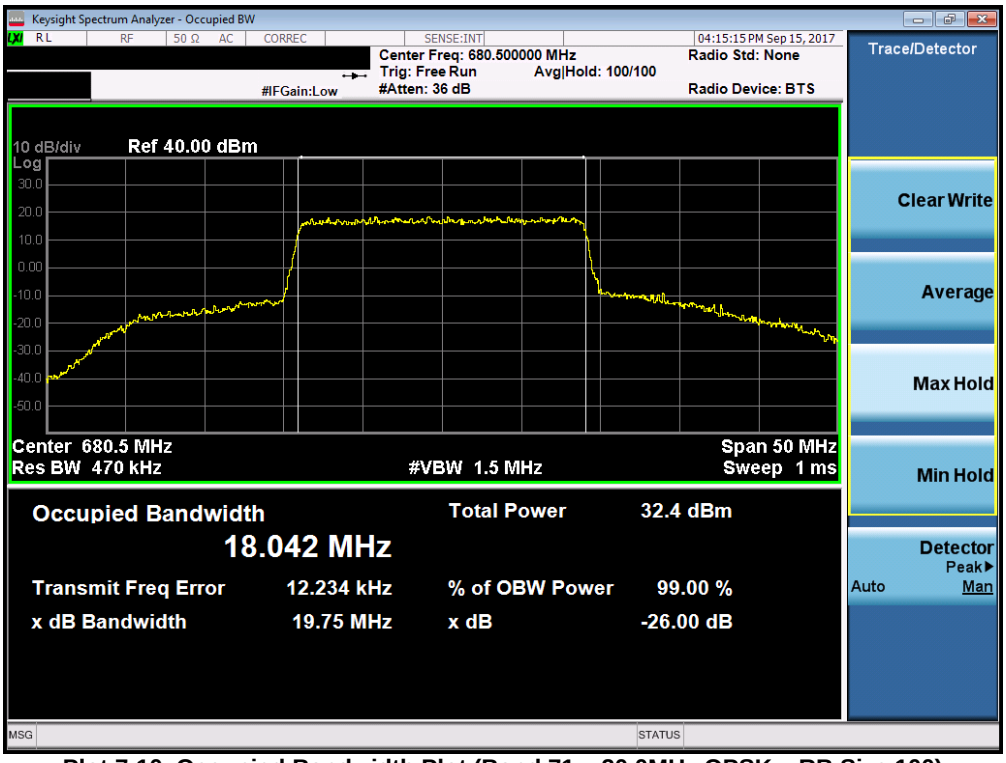


Plot 7-9. Occupied Bandwidth Plot (Band 71 – 15.0MHz 64-QAM – RB Size 75)



Plot 7-10. Occupied Bandwidth Plot (Band 71 – 20.0MHz QPSK – RB Size 100)

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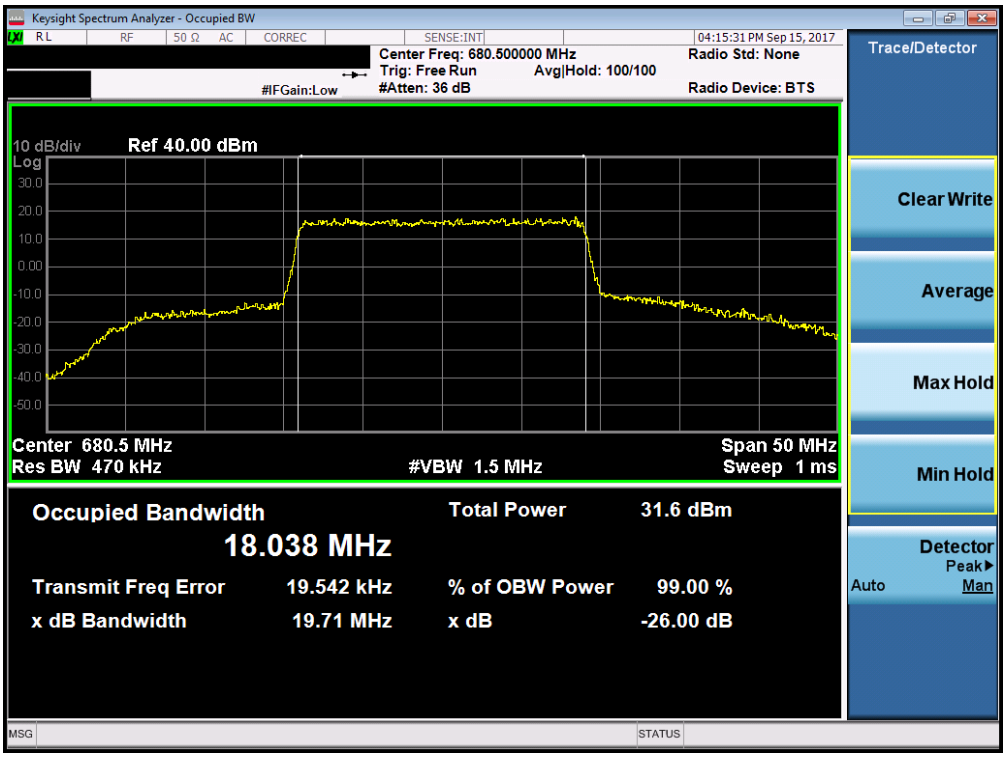

Plot 7-11. Occupied Bandwidth Plot (Band 71 – 20.0MHz 16-QAM – RB Size 100)

Plot 7-12. Occupied Bandwidth Plot (Band 71 – 20.0MHz 64-QAM – RB Size 100)

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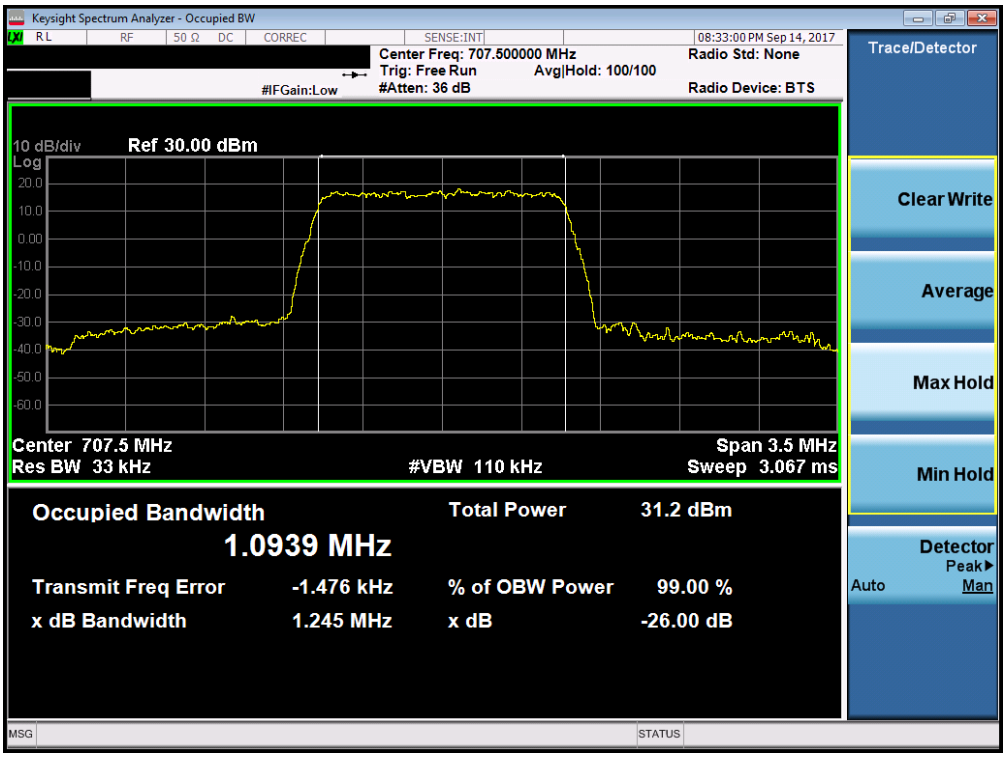
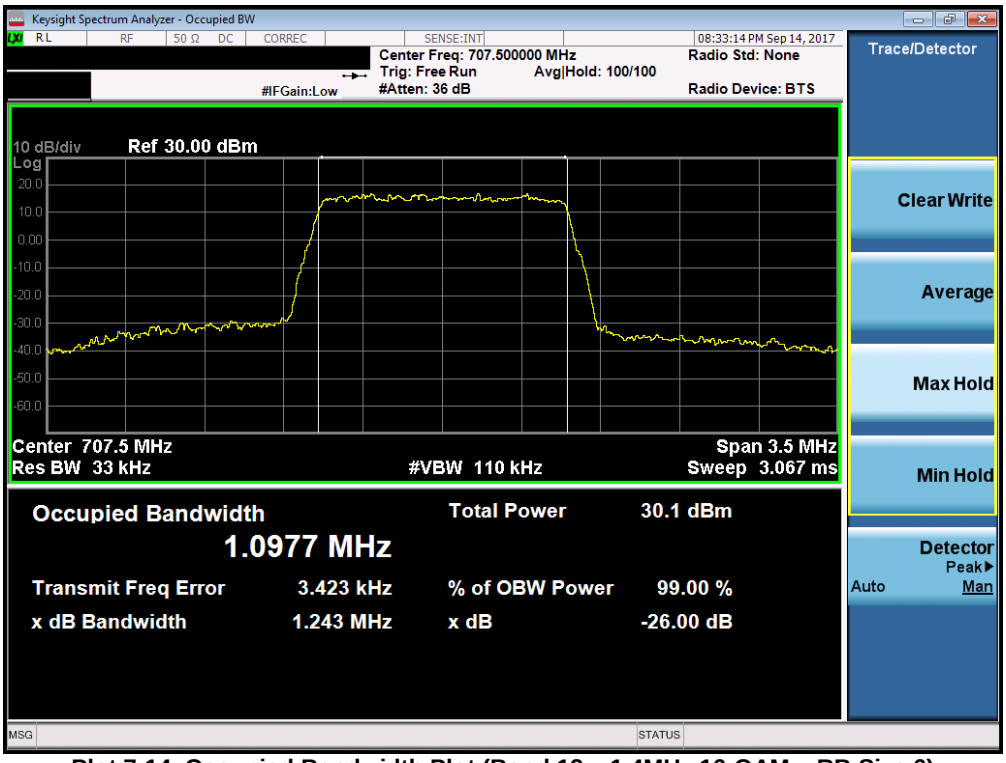


Plot 7-13. Occupied Bandwidth Plot (Band 12 – 1.4MHz QPSK – RB Size 6)



Plot 7-14. Occupied Bandwidth Plot (Band 12 – 1.4MHz 16-QAM – RB Size 6)

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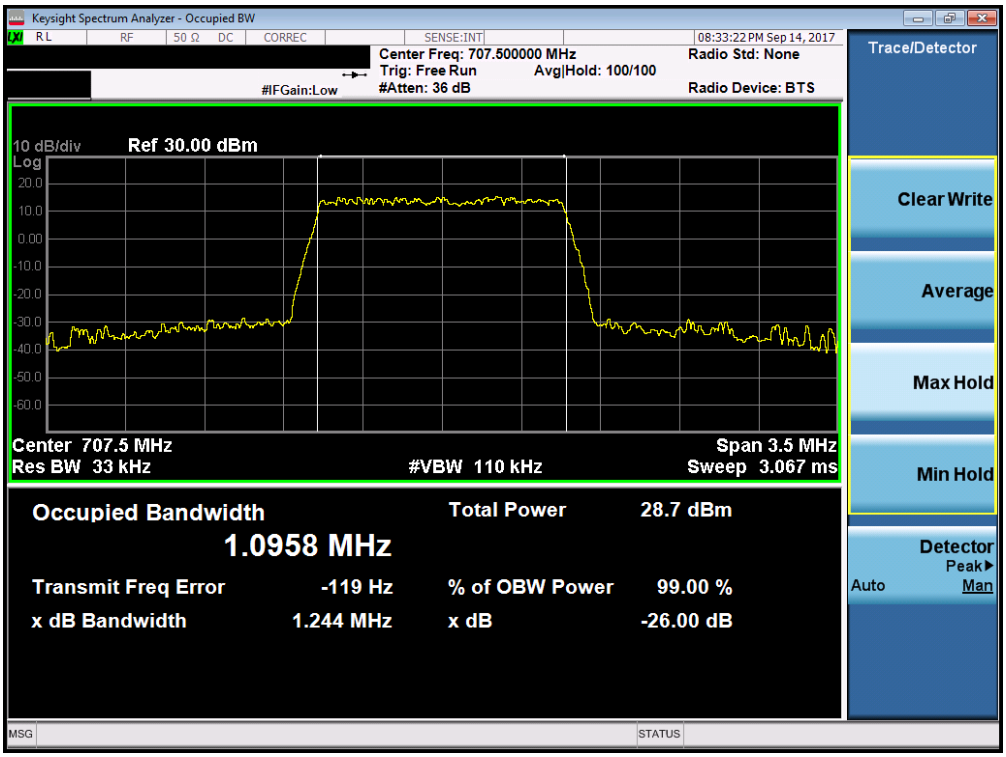

Plot 7-15. Occupied Bandwidth Plot (Band 12 – 1.4MHz 64-QAM – RB Size 6)

Plot 7-16. Occupied Bandwidth Plot (Band 12 – 3.0MHz QPSK – RB Size 15)

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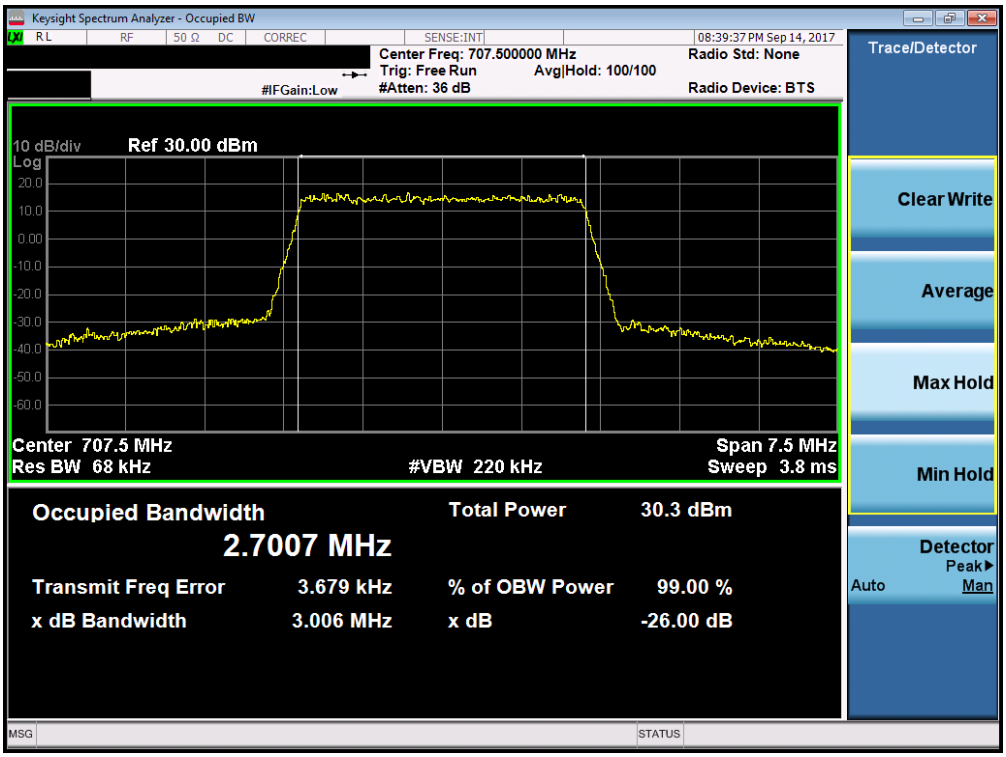
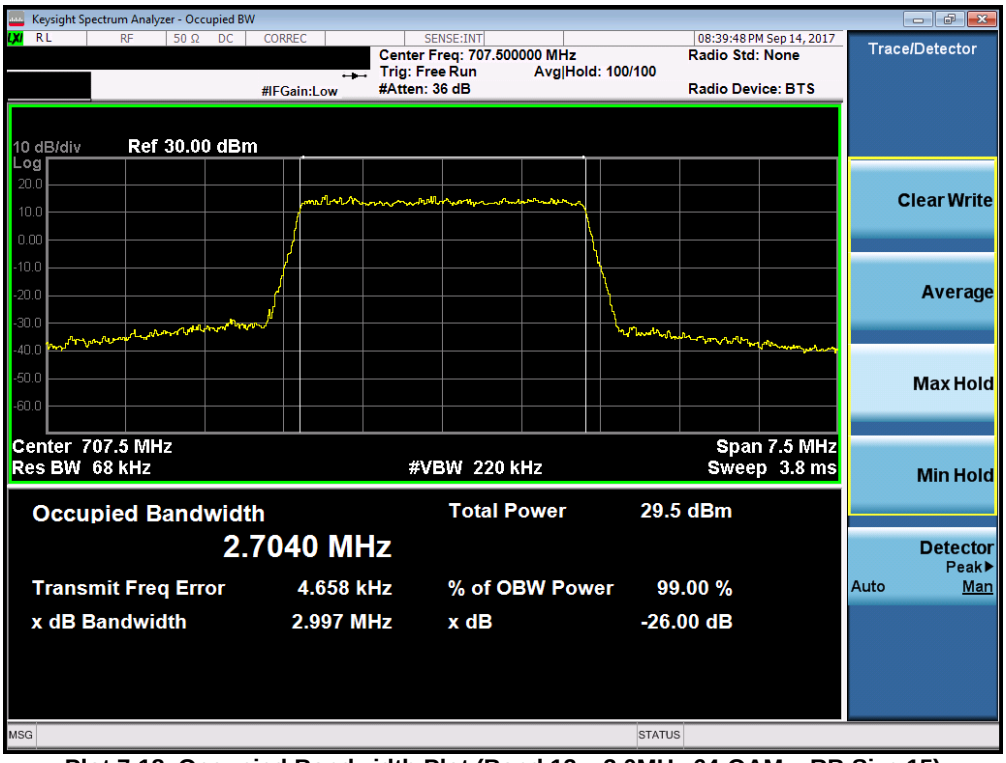


Plot 7-17. Occupied Bandwidth Plot (Band 12 – 3.0MHz 16-QAM – RB Size 15)



Plot 7-18. Occupied Bandwidth Plot (Band 12 – 3.0MHz 64-QAM – RB Size 15)

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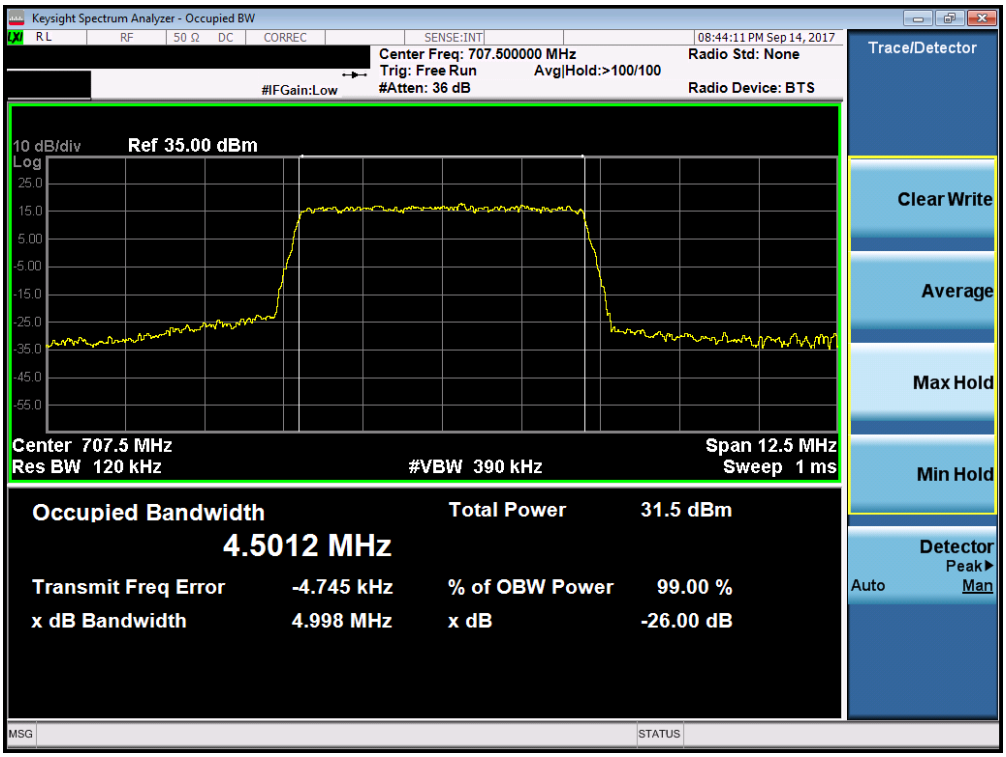

Plot 7-19. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz QPSK – RB Size 25)

Plot 7-20. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz 16-QAM – RB Size 25)

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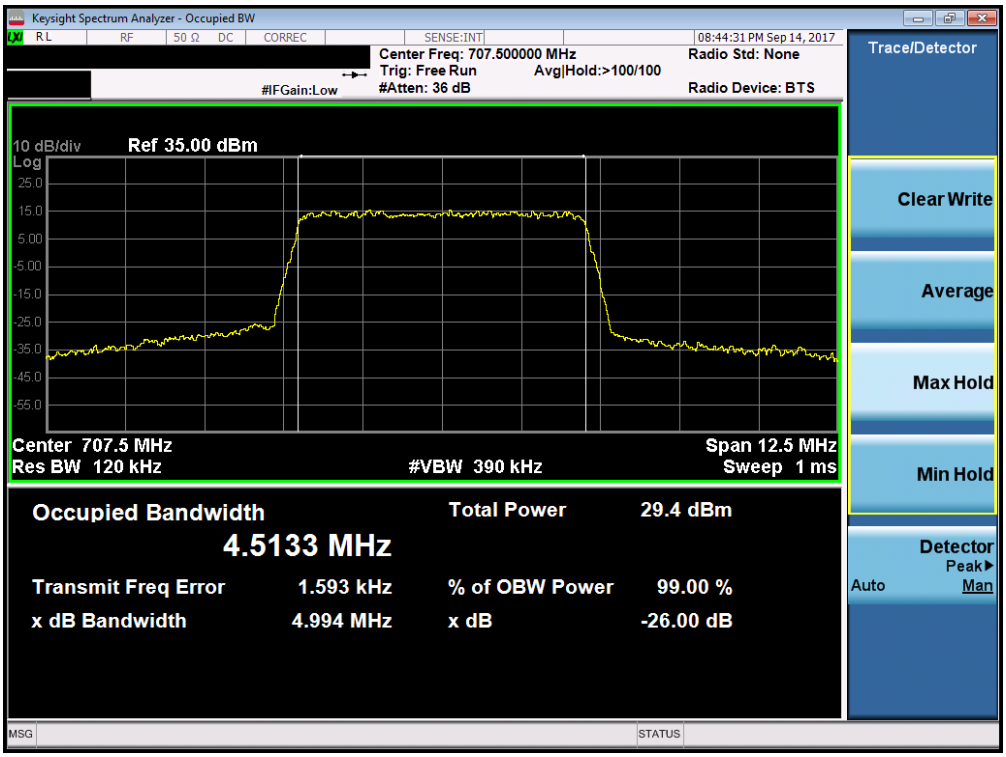
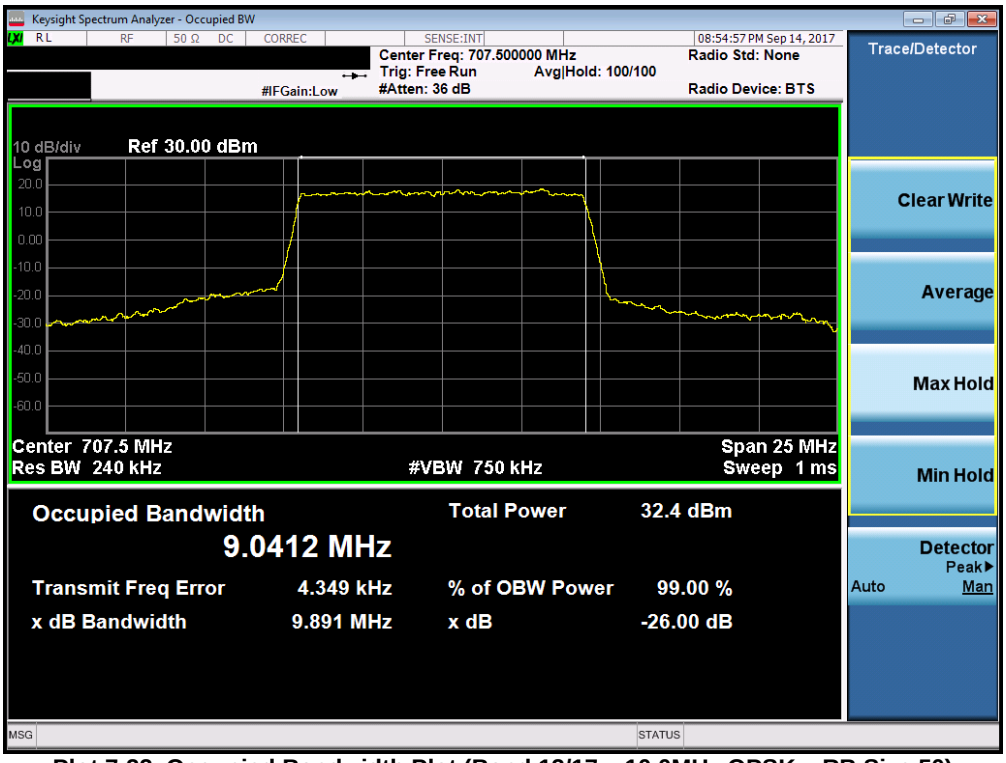


Plot 7-21. Occupied Bandwidth Plot (Band 12/17 – 5.0MHz 64-QAM – RB Size 25)



Plot 7-22. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz QPSK – RB Size 50)

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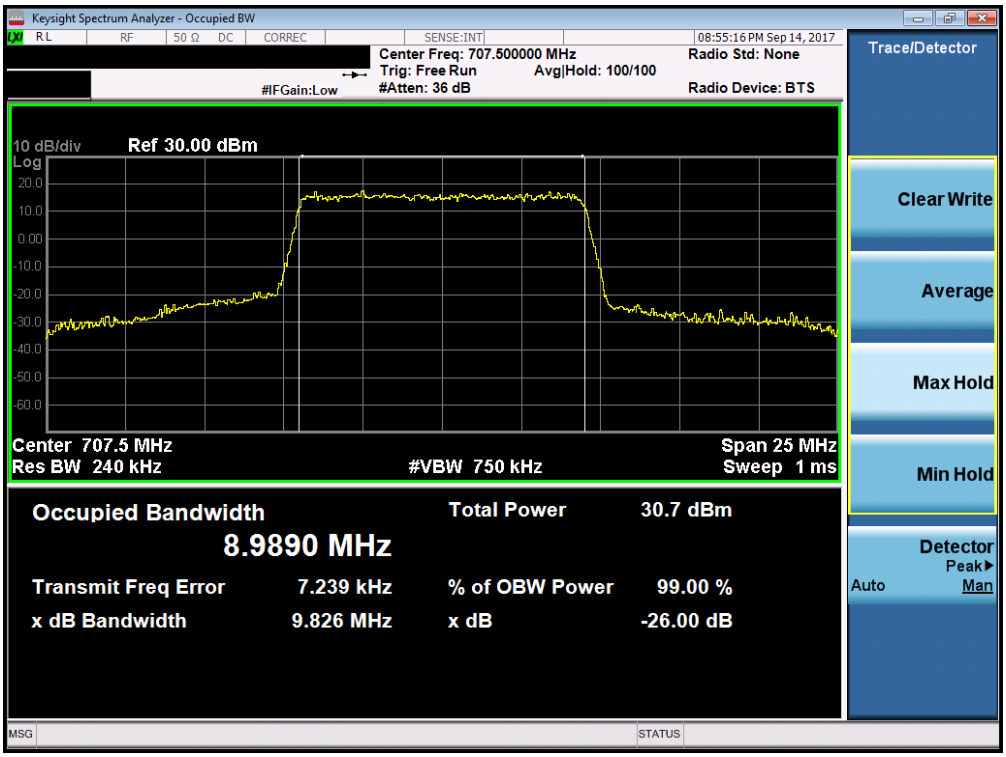

Plot 7-23. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz 16-QAM – RB Size 50)

Plot 7-24. Occupied Bandwidth Plot (Band 12/17 – 10.0MHz 64-QAM – RB Size 50)

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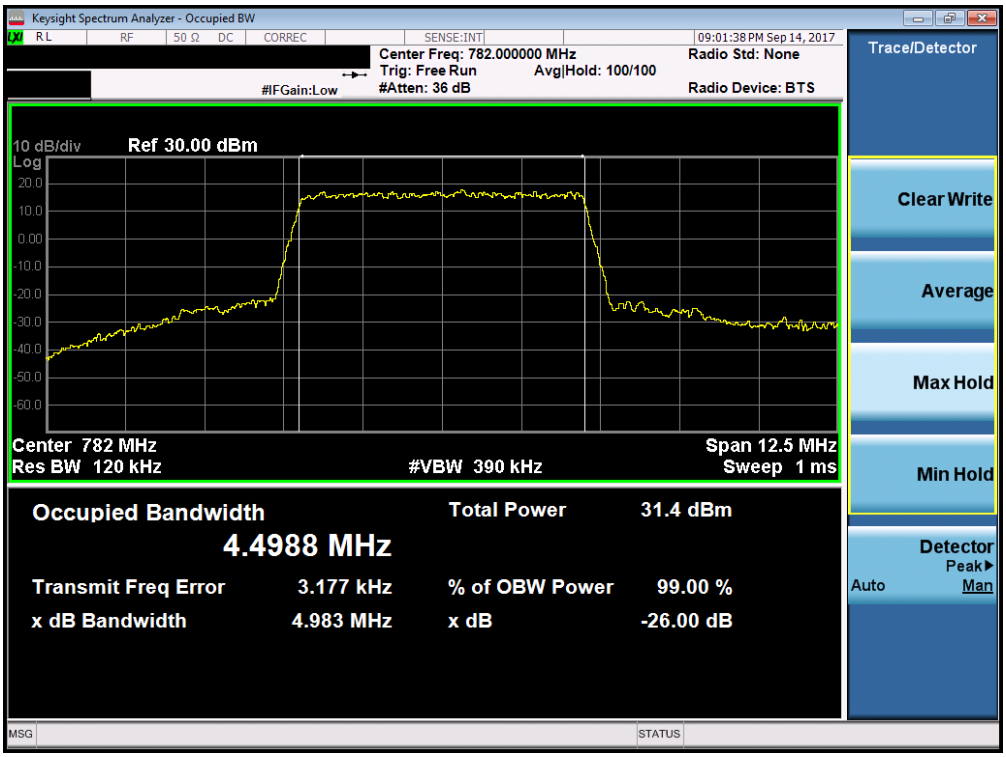

Plot 7-25. Occupied Bandwidth Plot (Band 13 – 5.0MHz QPSK – RB Size 25)

Plot 7-26. Occupied Bandwidth Plot (Band 13 – 5.0MHz 16-QAM – RB Size 25)

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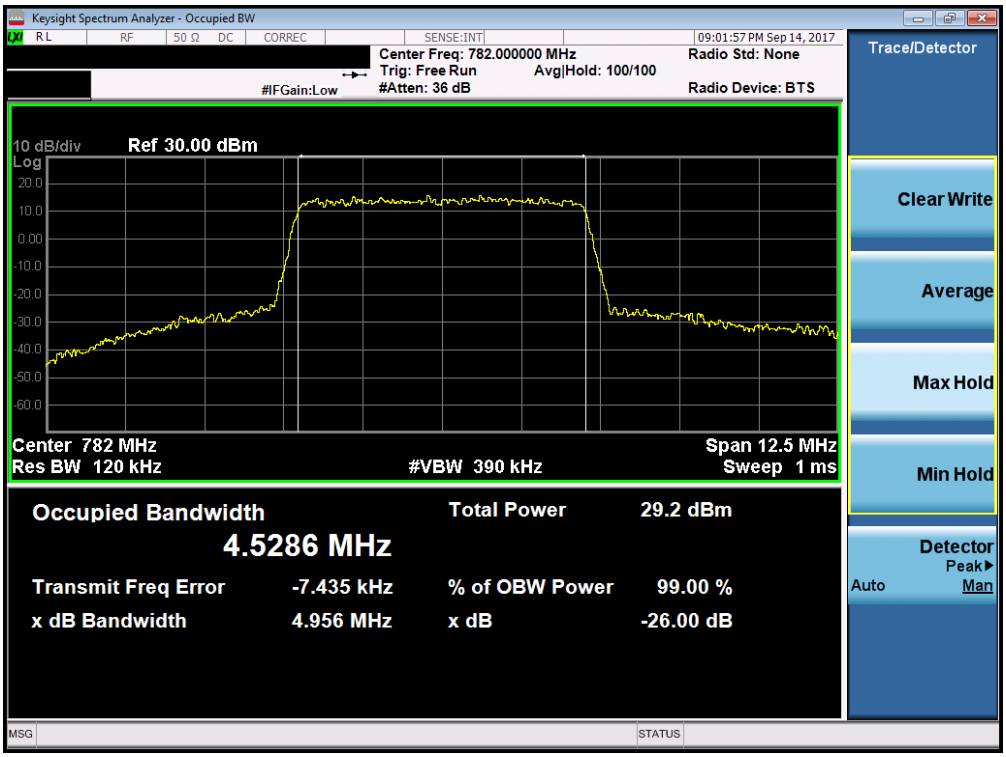

Plot 7-27. Occupied Bandwidth Plot (Band 13 – 5.0MHz 64-QAM – RB Size 25)

Plot 7-28. Occupied Bandwidth Plot (Band 13 – 10.0MHz QPSK – RB Size 50)

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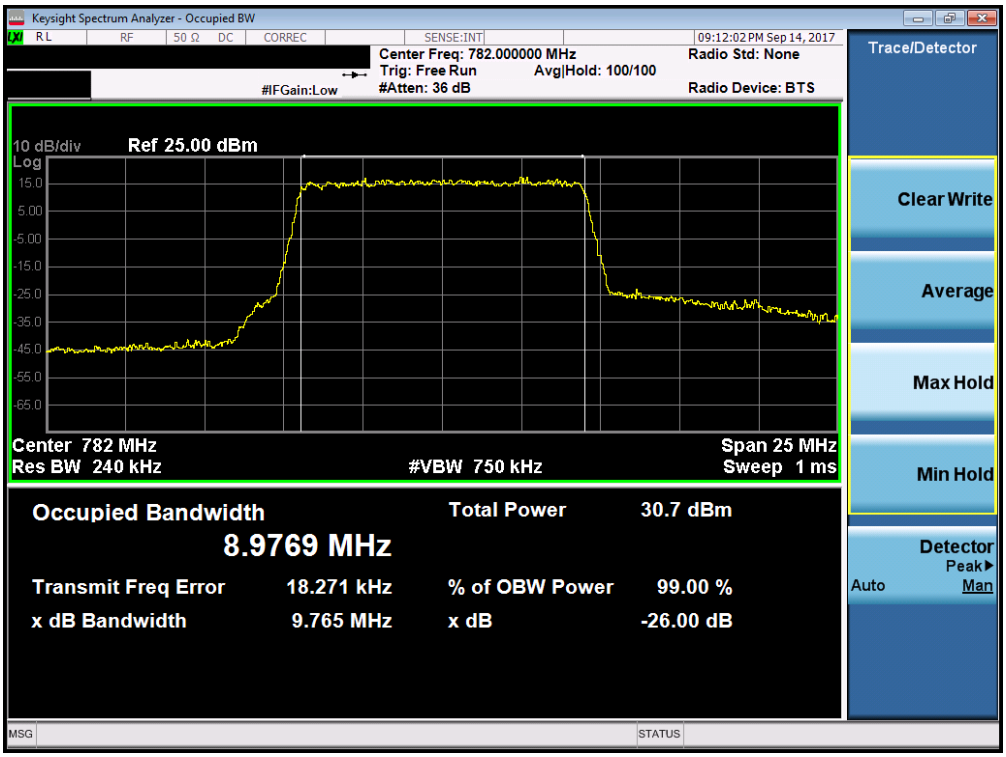
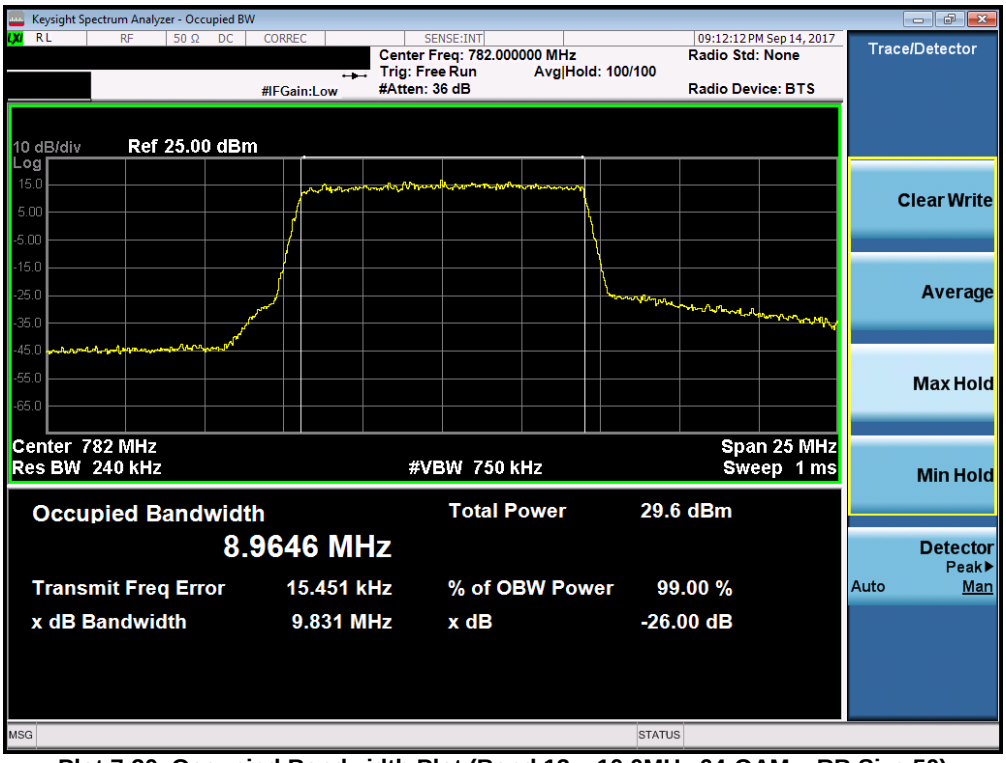


Plot 7-29. Occupied Bandwidth Plot (Band 13 – 10.0MHz 16-QAM – RB Size 50)



Plot 7-30. Occupied Bandwidth Plot (Band 13 – 10.0MHz 64-QAM – RB Size 50)

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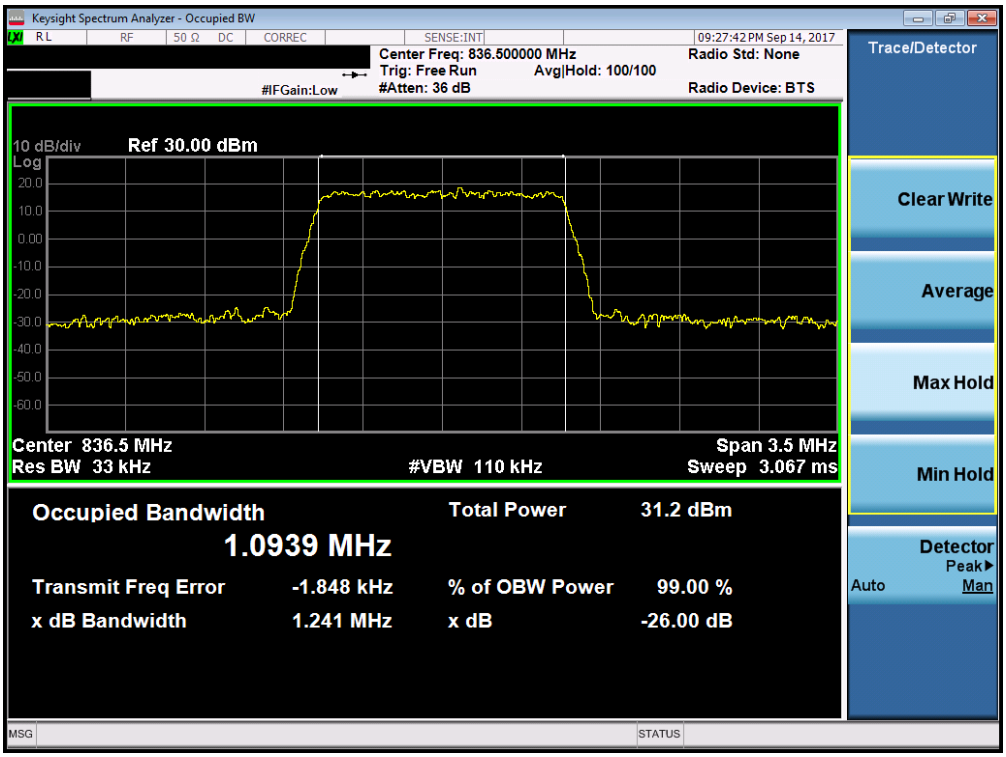
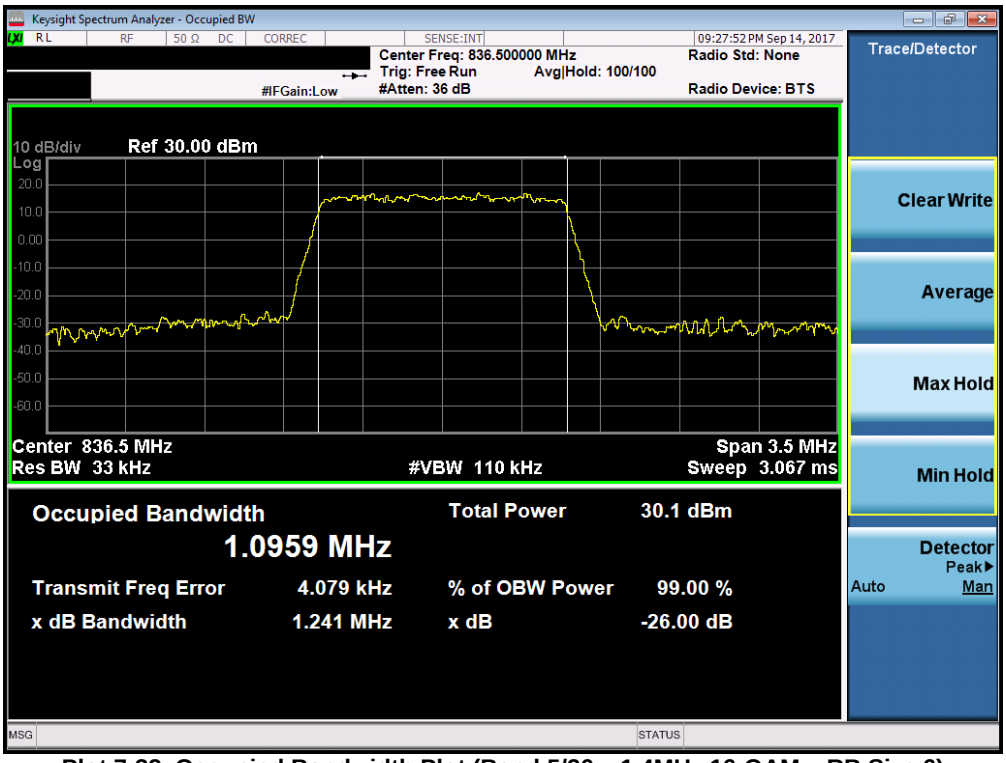


Plot 7-31. Occupied Bandwidth Plot (Band 5/26 – 1.4MHz QPSK – RB Size 6)



Plot 7-32. Occupied Bandwidth Plot (Band 5/26 – 1.4MHz 16-QAM – RB Size 6)

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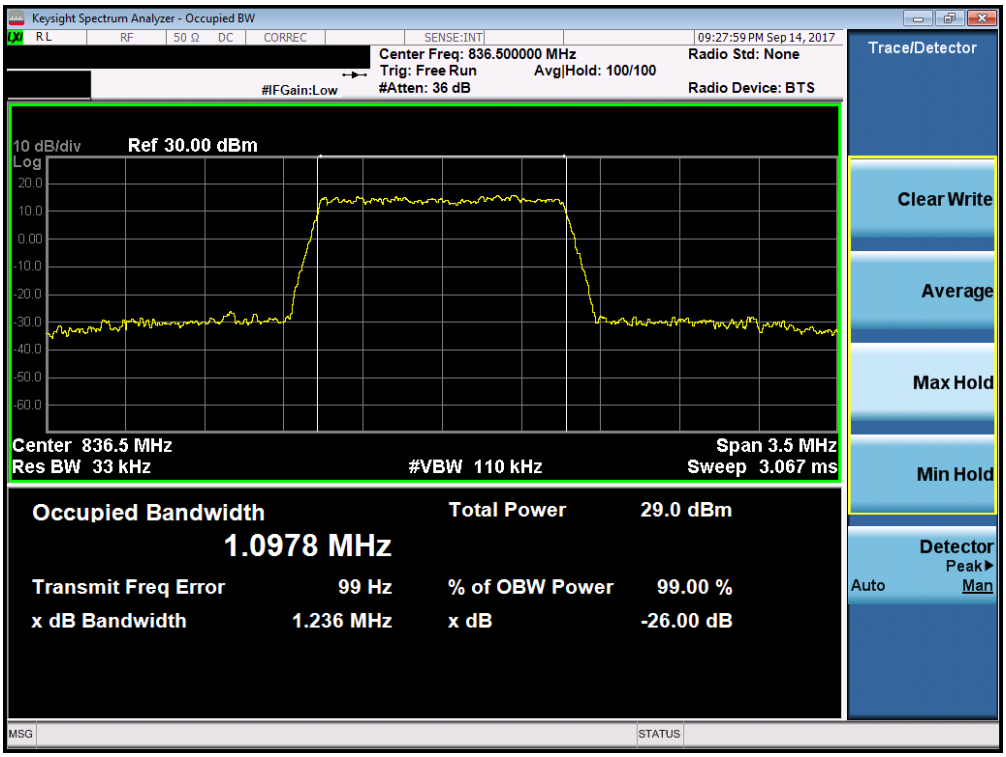

Plot 7-33. Occupied Bandwidth Plot (Band 5/26 – 1.4MHz 64-QAM – RB Size 6)

Plot 7-34. Occupied Bandwidth Plot (Band 5/26 – 3.0MHz QPSK – RB Size 15)

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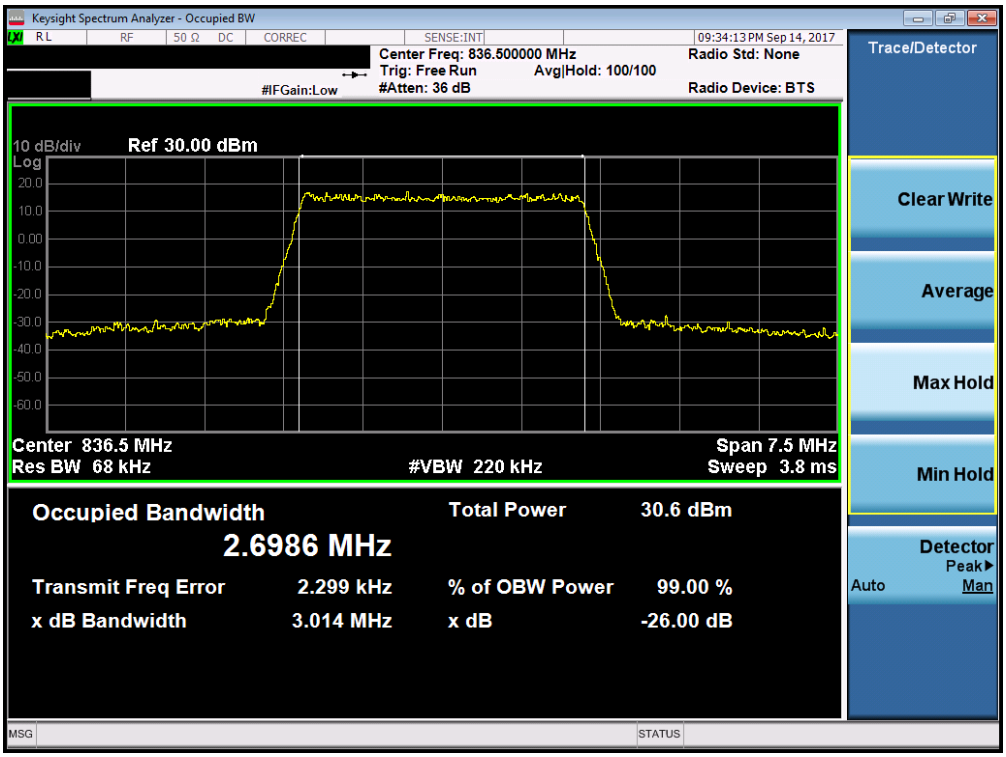

Plot 7-35. Occupied Bandwidth Plot (Band 5/26 – 3.0MHz 16-QAM – RB Size 15)

Plot 7-36. Occupied Bandwidth Plot (Band 5/26 – 3.0MHz 64-QAM – RB Size 15)

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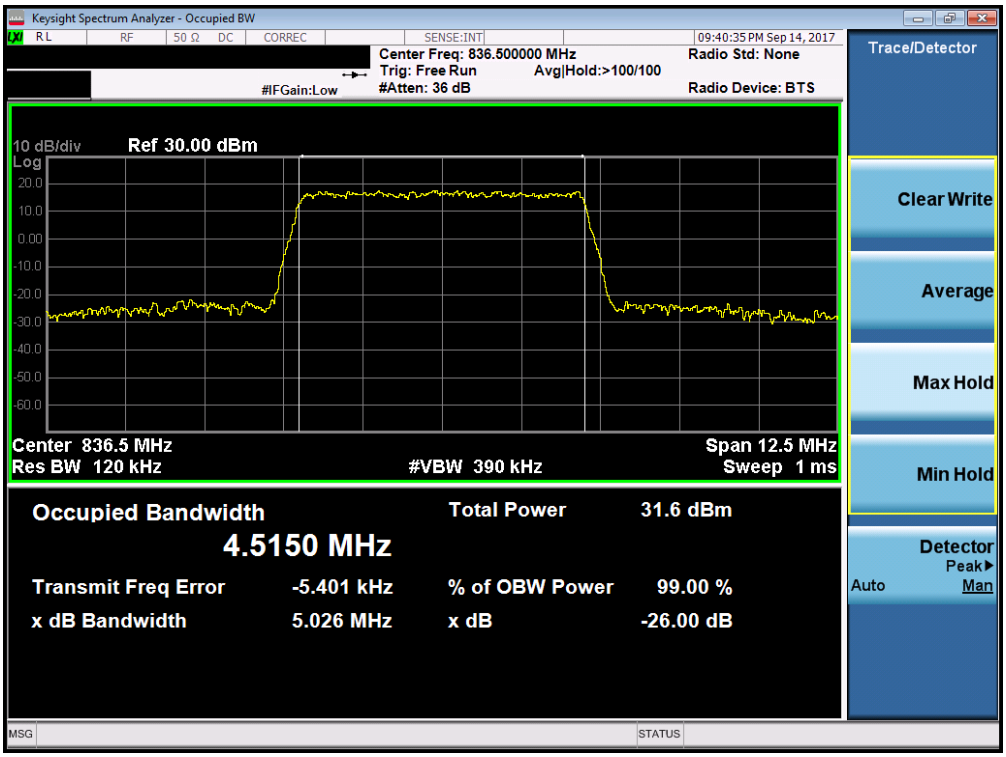

Plot 7-37. Occupied Bandwidth Plot (Band 5/26 – 5.0MHz QPSK – RB Size 25)

Plot 7-38. Occupied Bandwidth Plot (Band 5/26 – 5.0MHz 16-QAM – RB Size 25)

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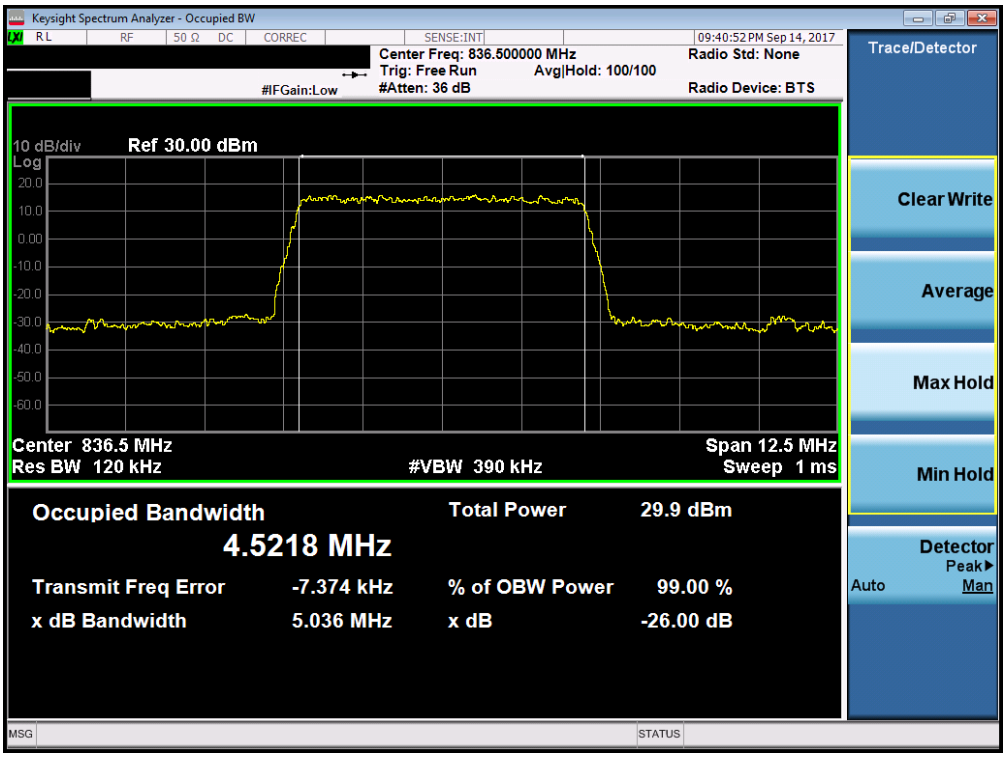

Plot 7-39. Occupied Bandwidth Plot (Band 5/26 – 5.0MHz 64-QAM – RB Size 25)

Plot 7-40. Occupied Bandwidth Plot (Band 5/26 – 10.0MHz QPSK – RB Size 50)

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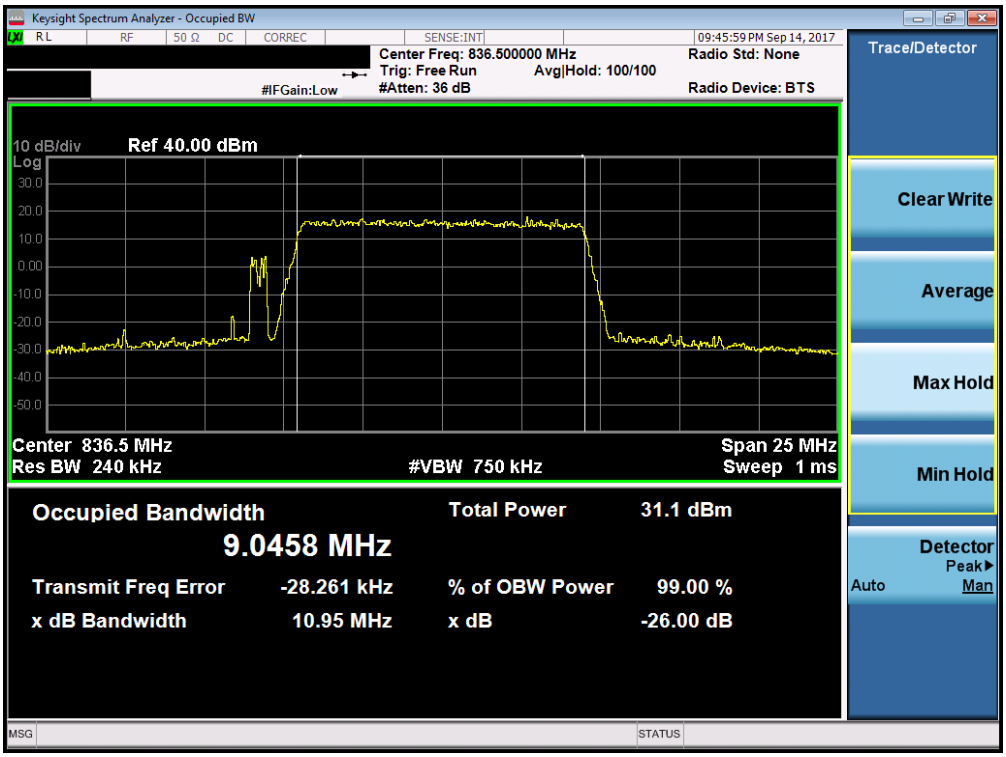
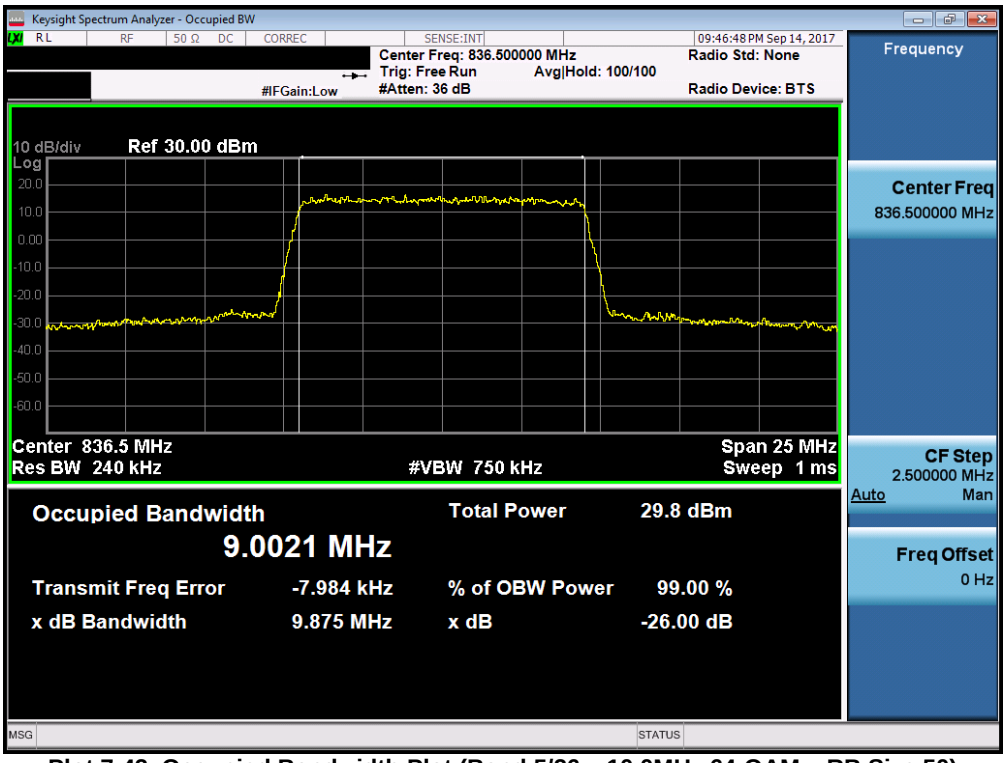


Plot 7-41. Occupied Bandwidth Plot (Band 5/26 – 10.0MHz 16-QAM – RB Size 50)



Plot 7-42. Occupied Bandwidth Plot (Band 5/26 – 10.0MHz 64-QAM – RB Size 50)

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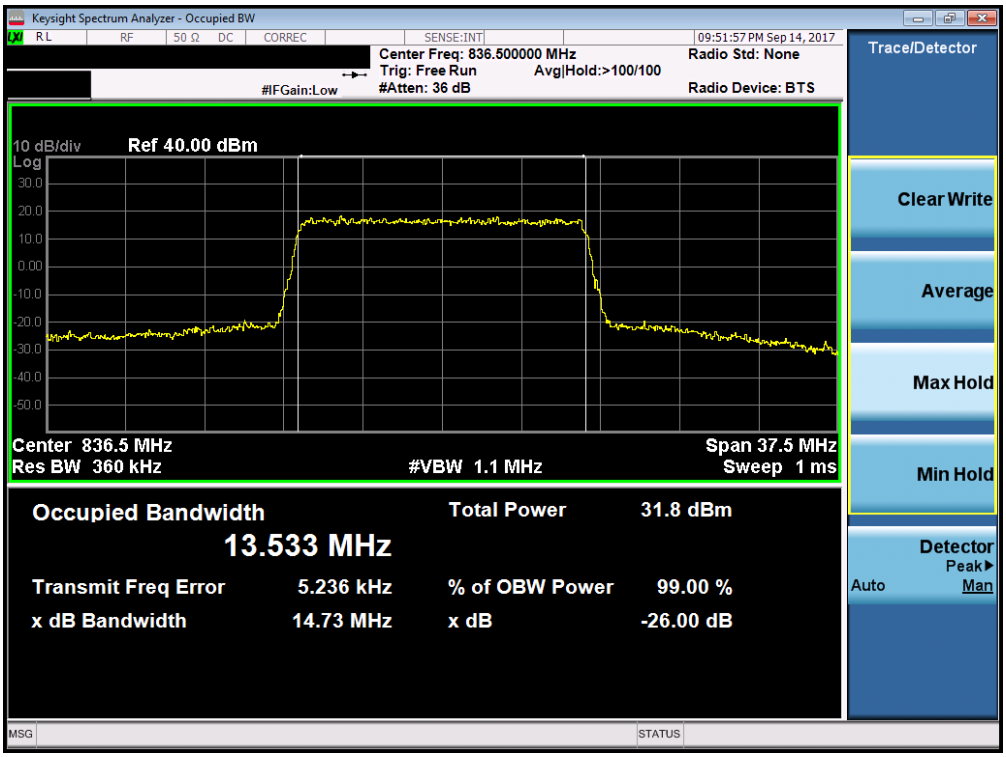
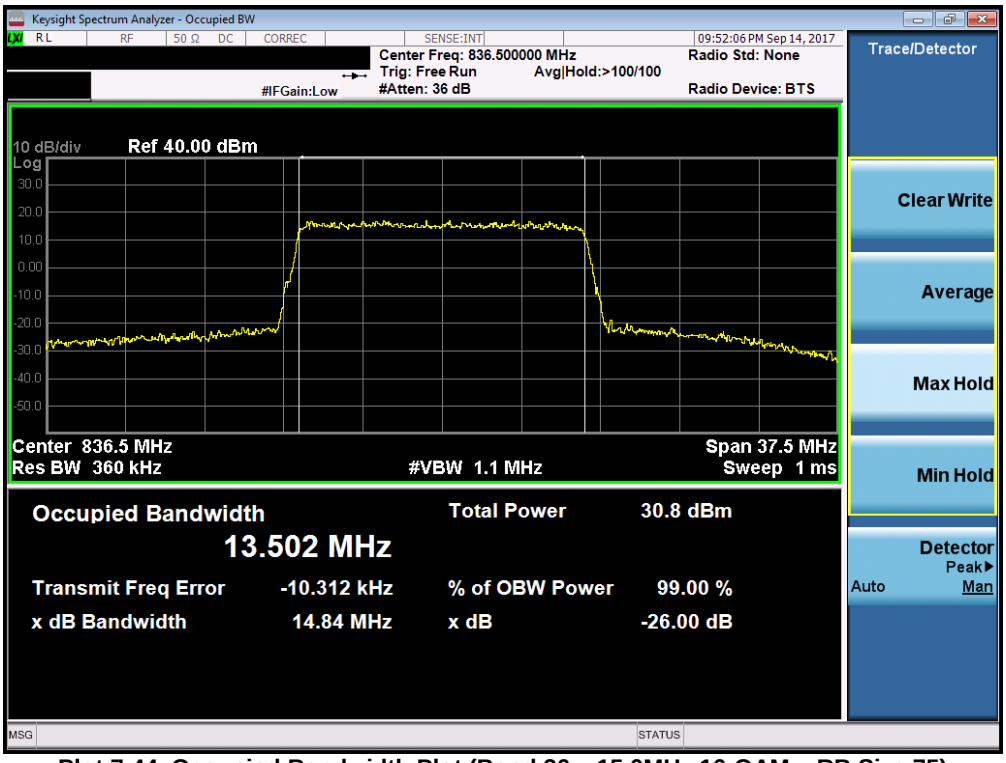


Plot 7-43. Occupied Bandwidth Plot (Band 26 – 15.0MHz QPSK – RB Size 75)



Plot 7-44. Occupied Bandwidth Plot (Band 26 – 15.0MHz 16-QAM – RB Size 75)

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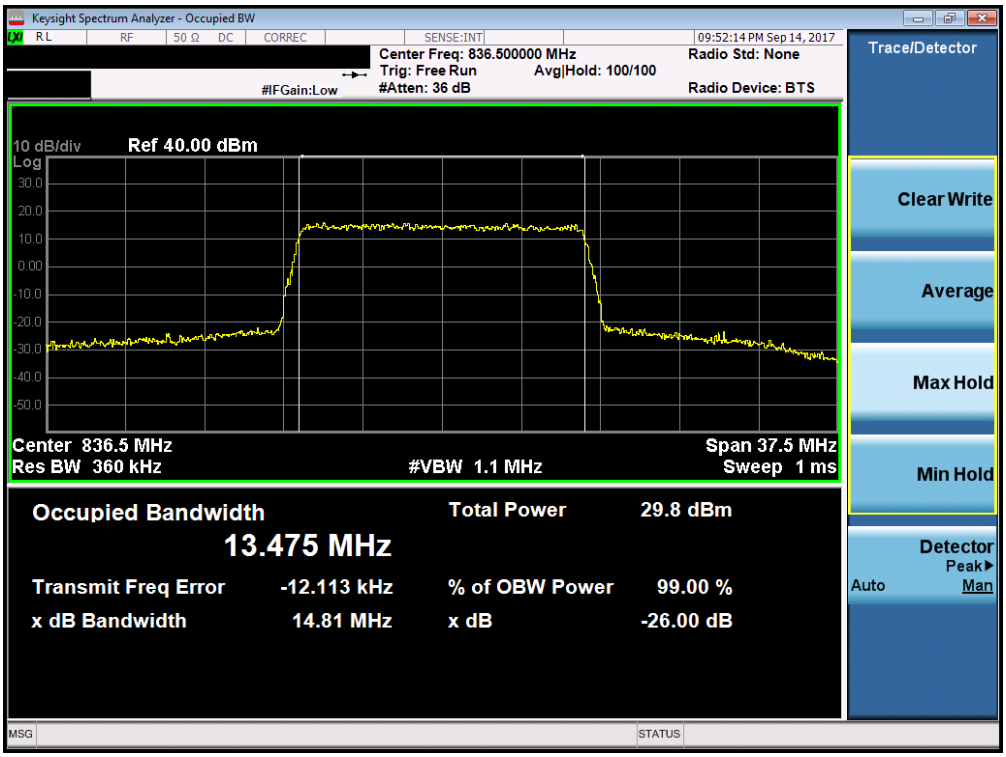
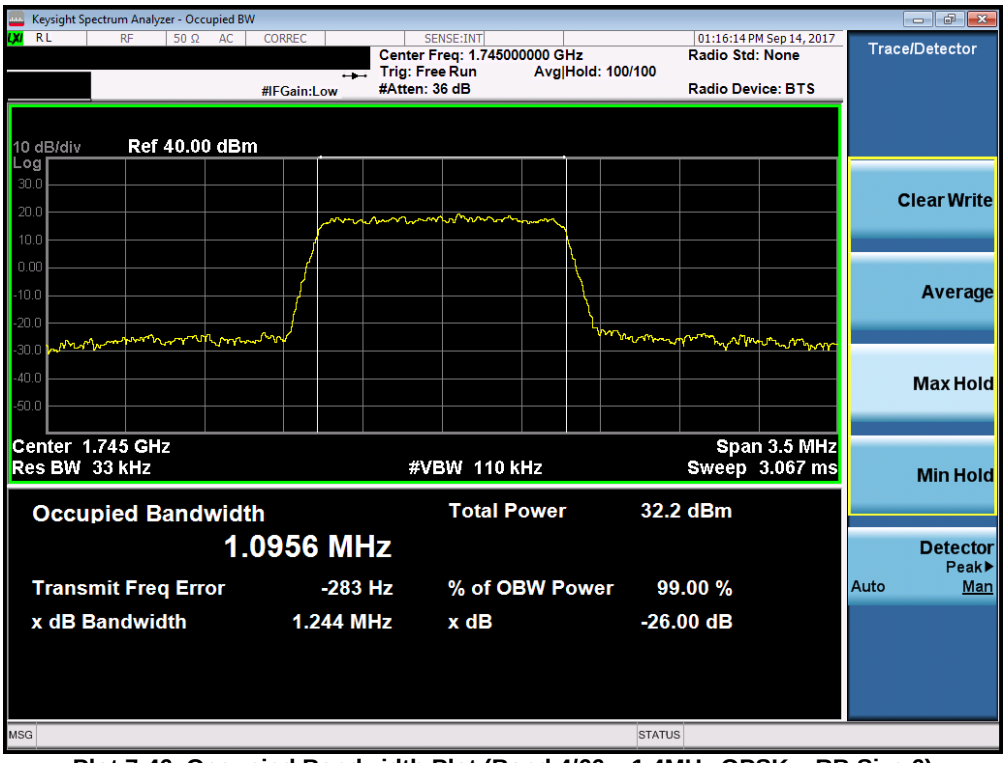


Plot 7-45. Occupied Bandwidth Plot (Band 26 – 15.0MHz 64-QAM – RB Size 75)



Plot 7-46. Occupied Bandwidth Plot (Band 4/66 – 1.4MHz QPSK – RB Size 6)

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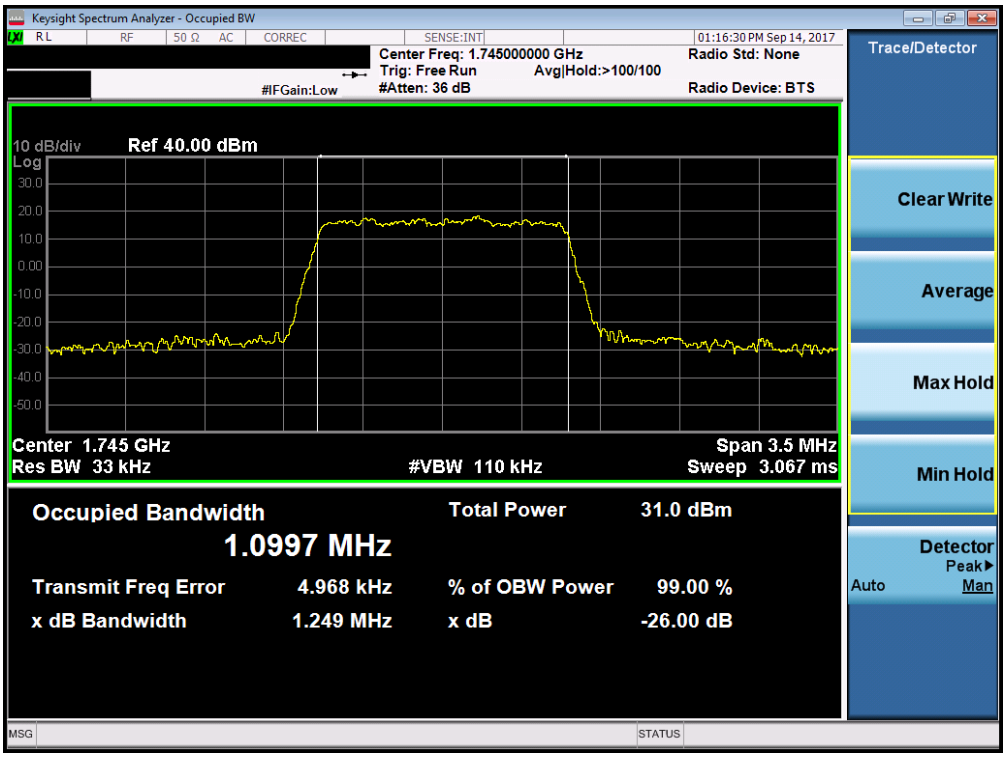
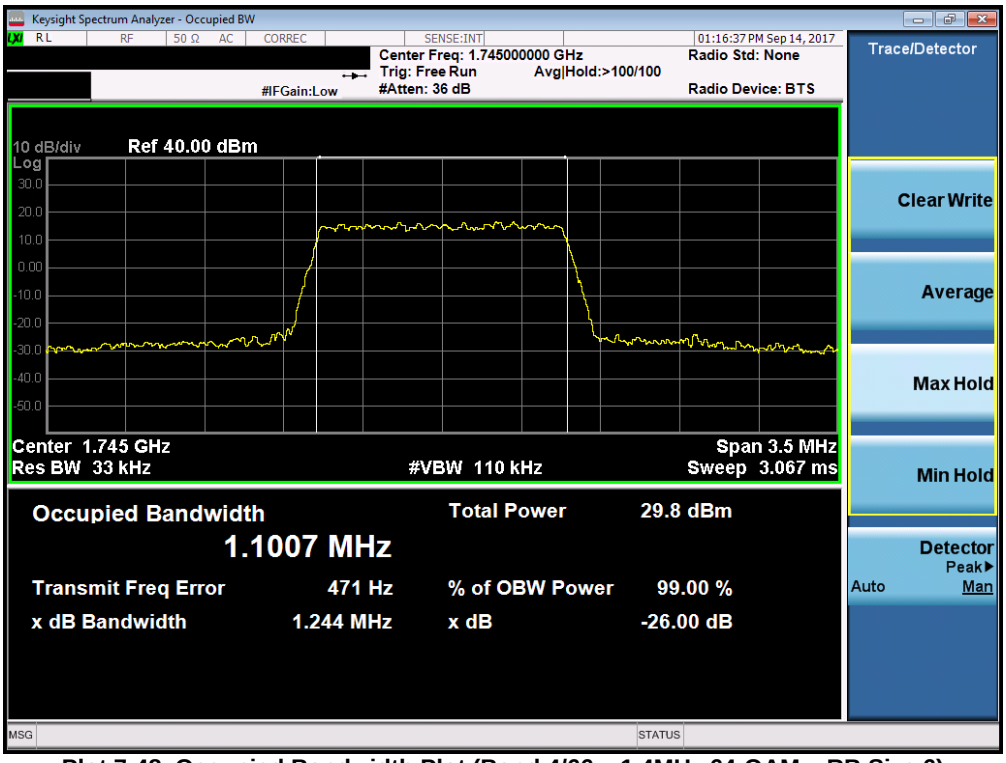


Plot 7-47. Occupied Bandwidth Plot (Band 4/66 – 1.4MHz 16-QAM – RB Size 6)



Plot 7-48. Occupied Bandwidth Plot (Band 4/66 – 1.4MHz 64-QAM – RB Size 6)

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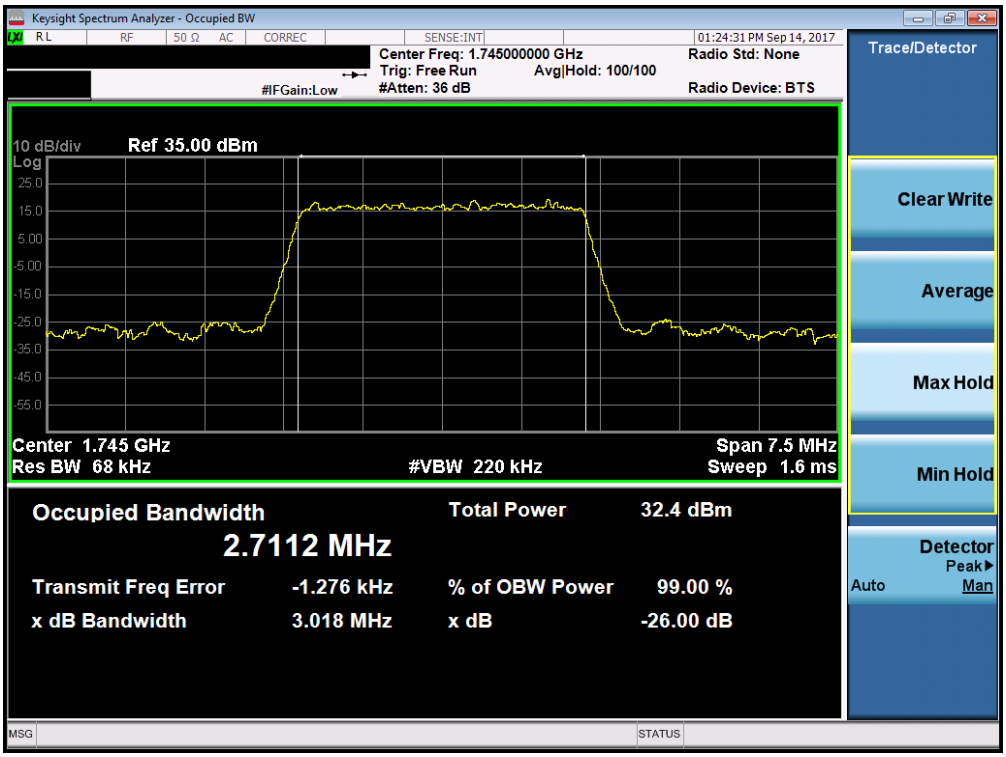
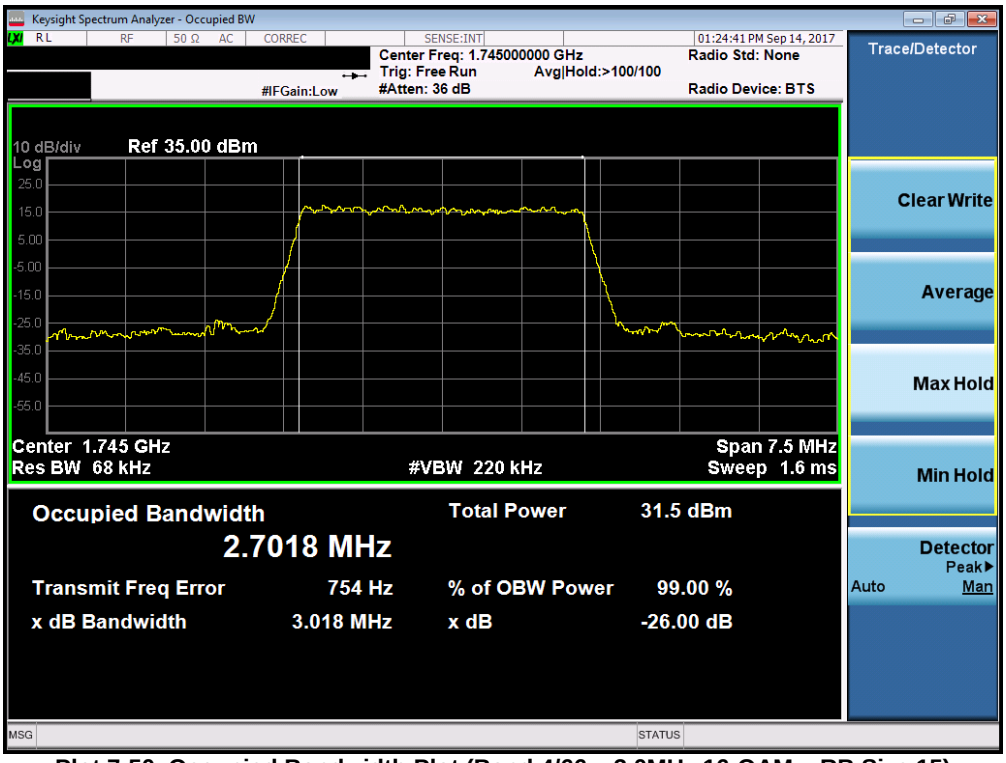


Plot 7-49. Occupied Bandwidth Plot (Band 4/66 – 3.0MHz QPSK – RB Size 15)



Plot 7-50. Occupied Bandwidth Plot (Band 4/66 – 3.0MHz 16-QAM – RB Size 15)

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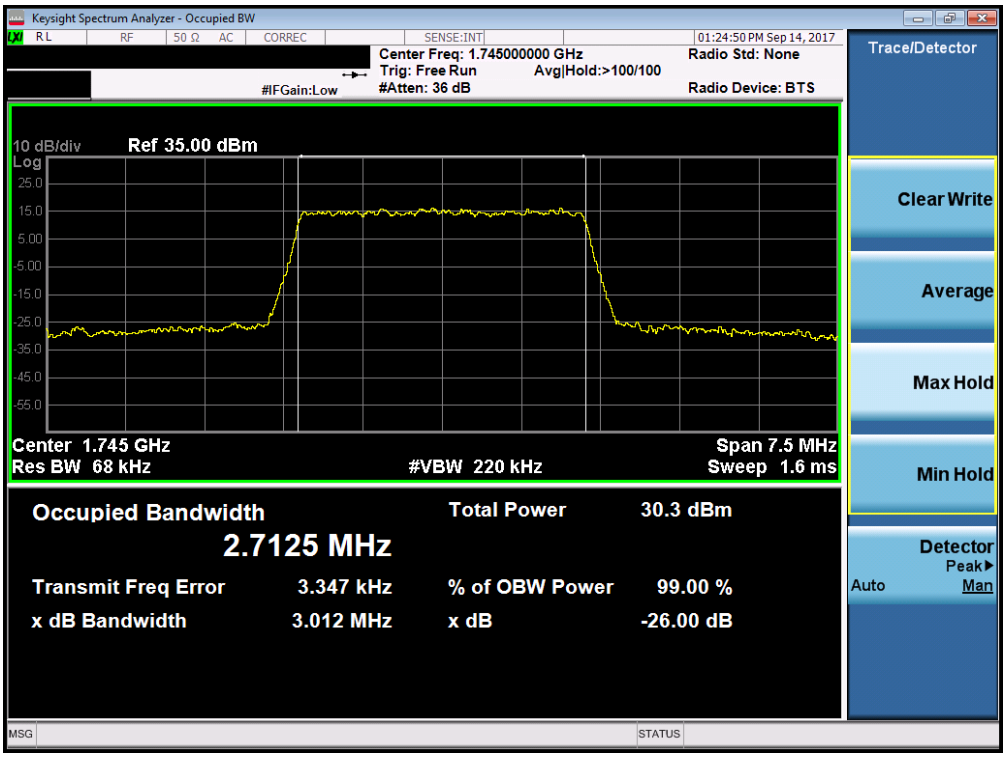
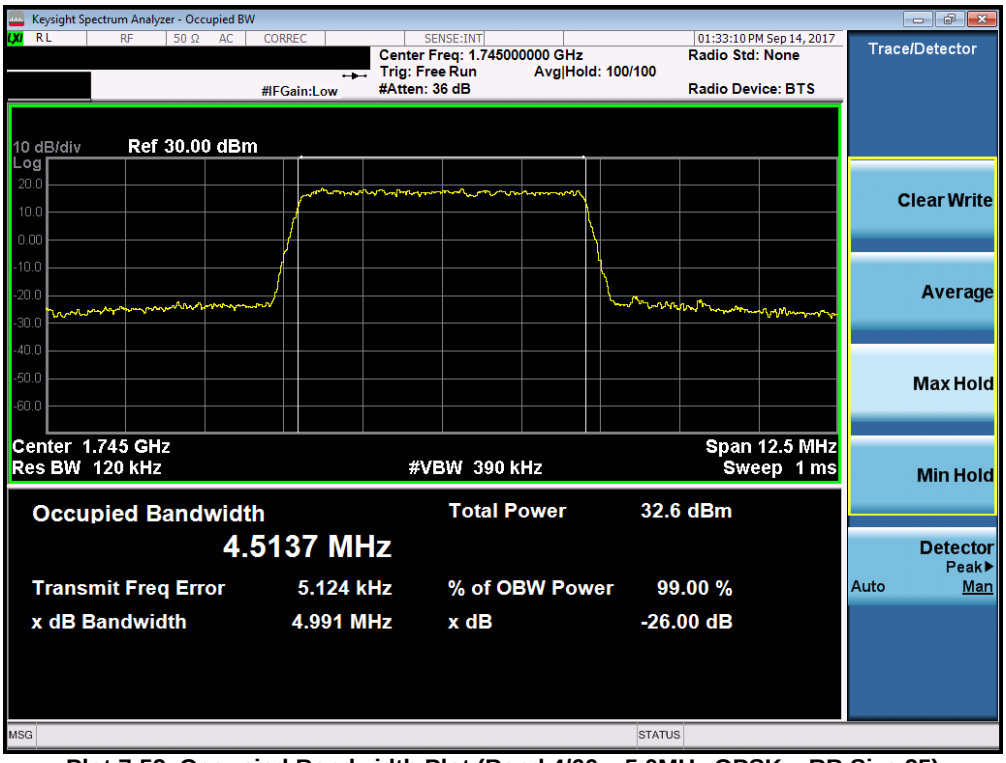


Plot 7-51. Occupied Bandwidth Plot (Band 4/66 – 3.0MHz 64-QAM – RB Size 15)



Plot 7-52. Occupied Bandwidth Plot (Band 4/66 – 5.0MHz QPSK – RB Size 25)

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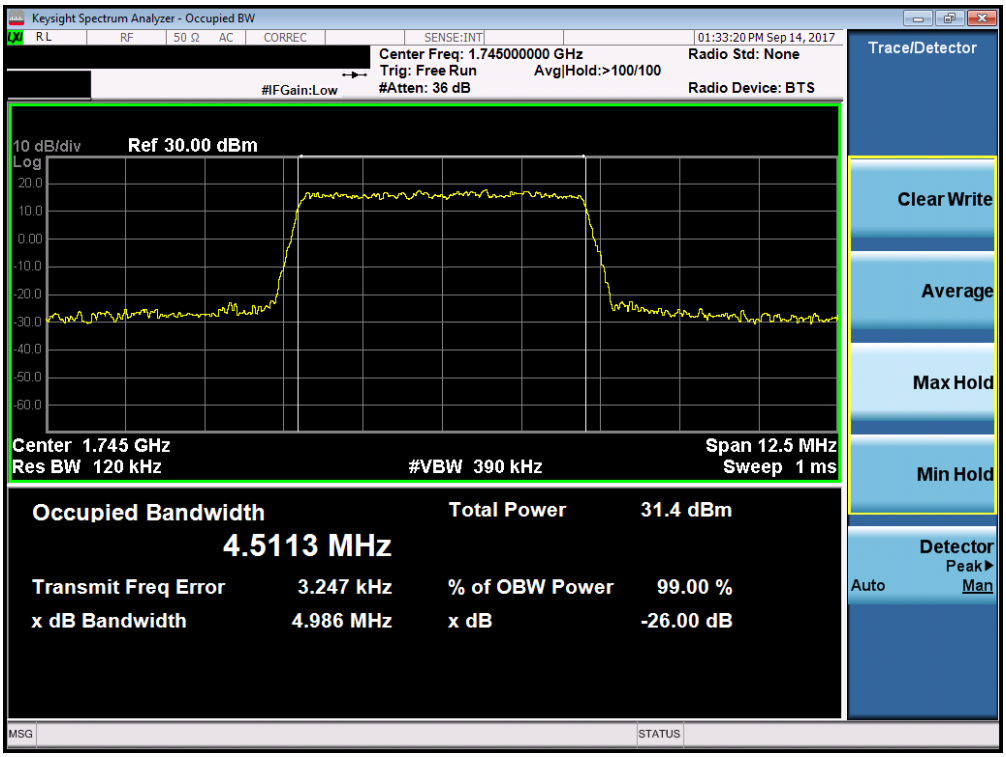

Plot 7-53. Occupied Bandwidth Plot (Band 4/66 – 5.0MHz 16-QAM – RB Size 25)

Plot 7-54. Occupied Bandwidth Plot (Band 4/66 – 5.0MHz 64-QAM – RB Size 25)

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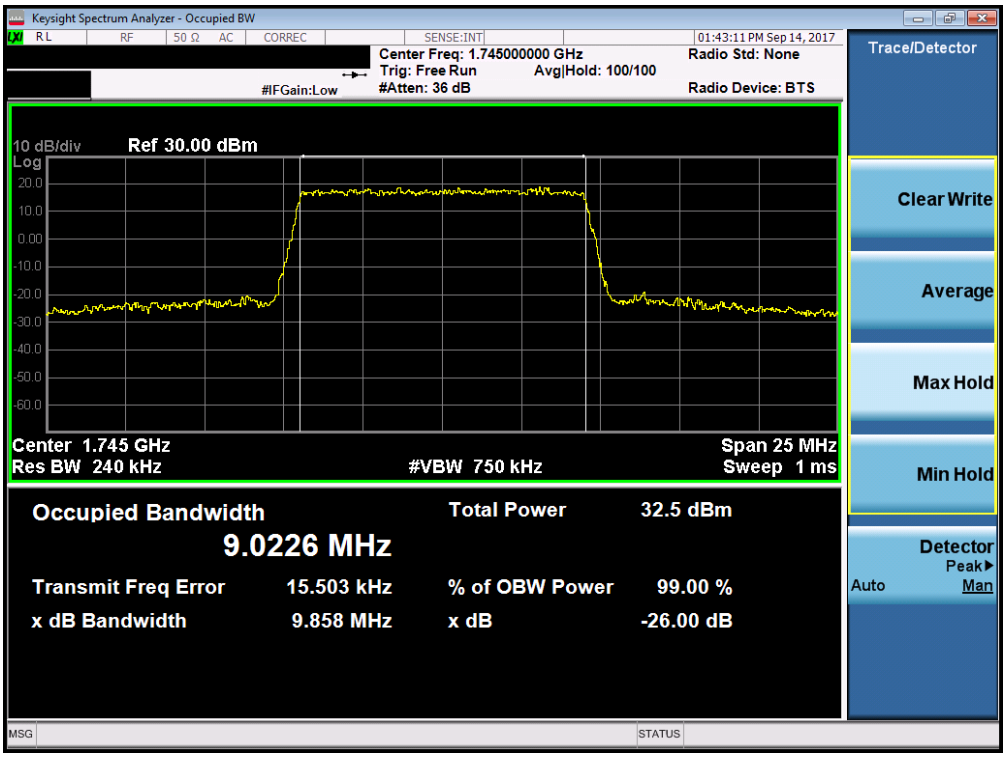

Plot 7-55. Occupied Bandwidth Plot (Band 4/66 – 10.0MHz QPSK – RB Size 50)

Plot 7-56. Occupied Bandwidth Plot (Band 4/66 – 10.0MHz 16-QAM – RB Size 50)

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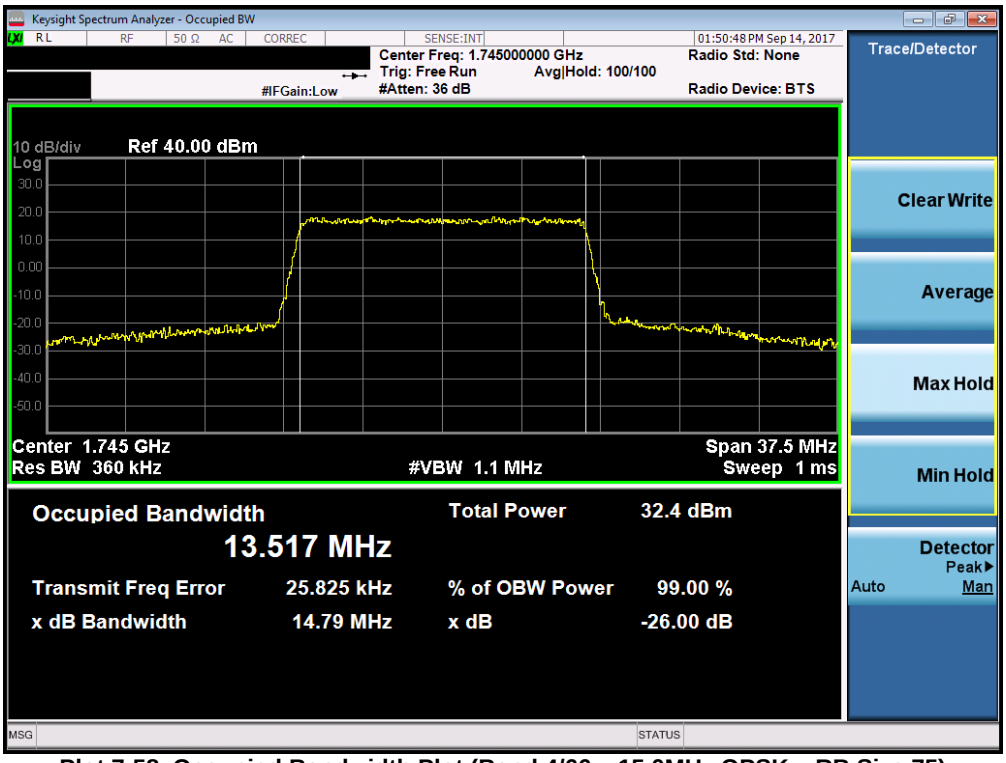
Plot 7-57. Occupied Bandwidth Plot (Band 4/66 – 10.0MHz 64-QAM – RB Size 50)



Plot 7-58. Occupied Bandwidth Plot (Band 4/66 – 15.0MHz QPSK – RB Size 75)

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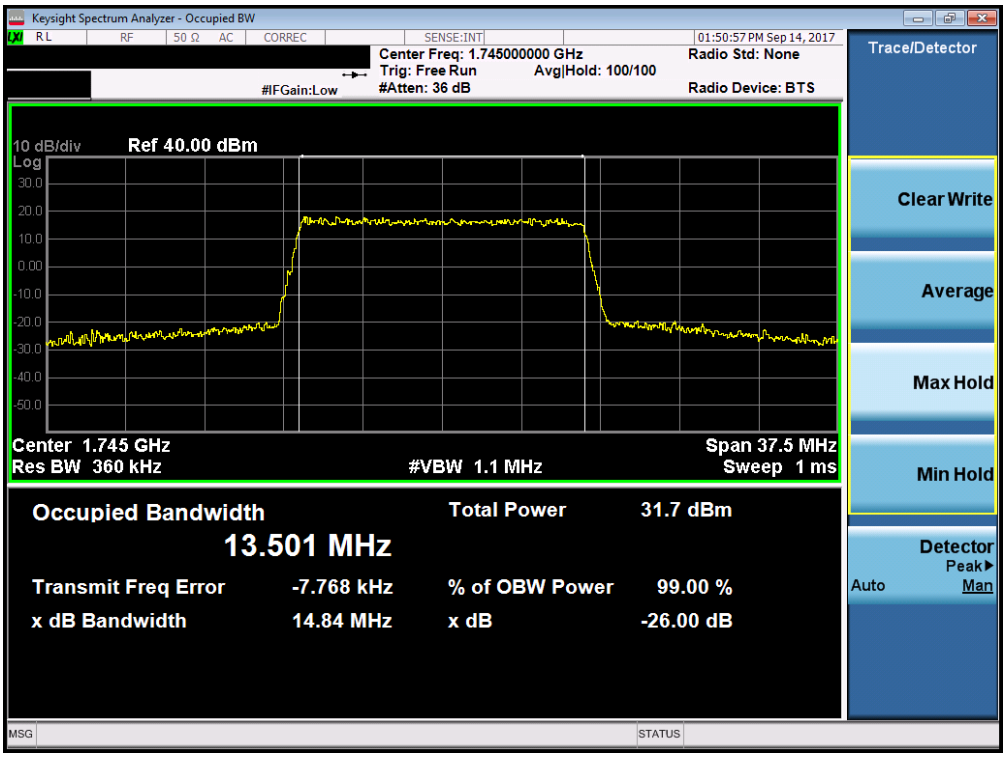
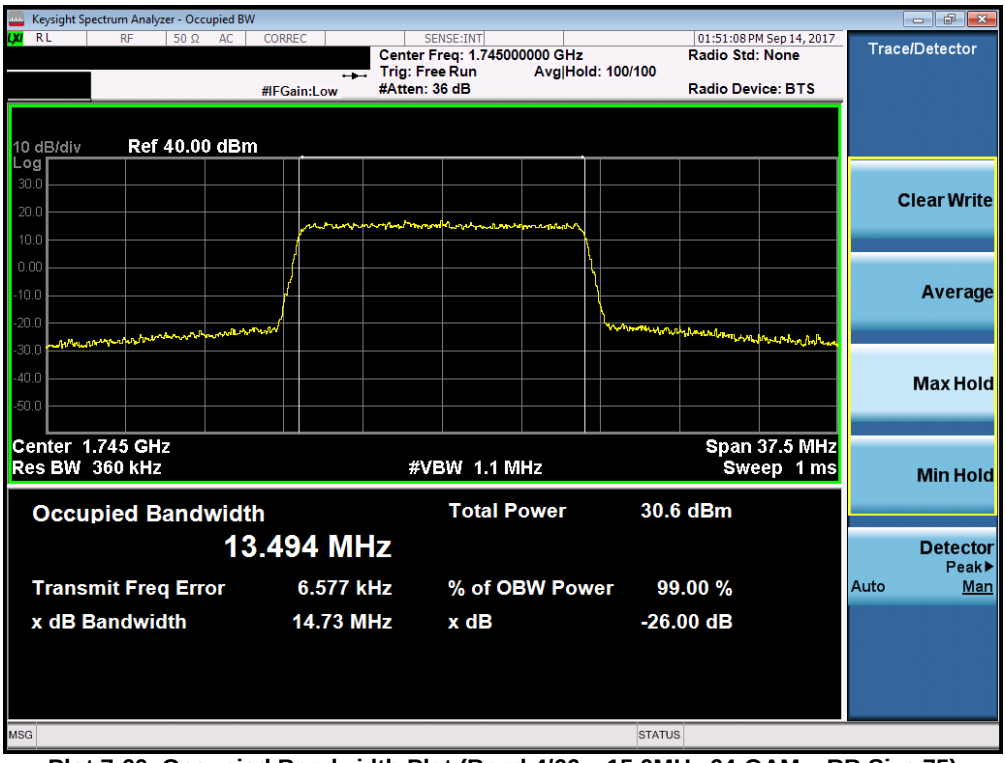


Plot 7-59. Occupied Bandwidth Plot (Band 4/66 – 15.0MHz 16-QAM – RB Size 75)



Plot 7-60. Occupied Bandwidth Plot (Band 4/66 – 15.0MHz 64-QAM – RB Size 75)

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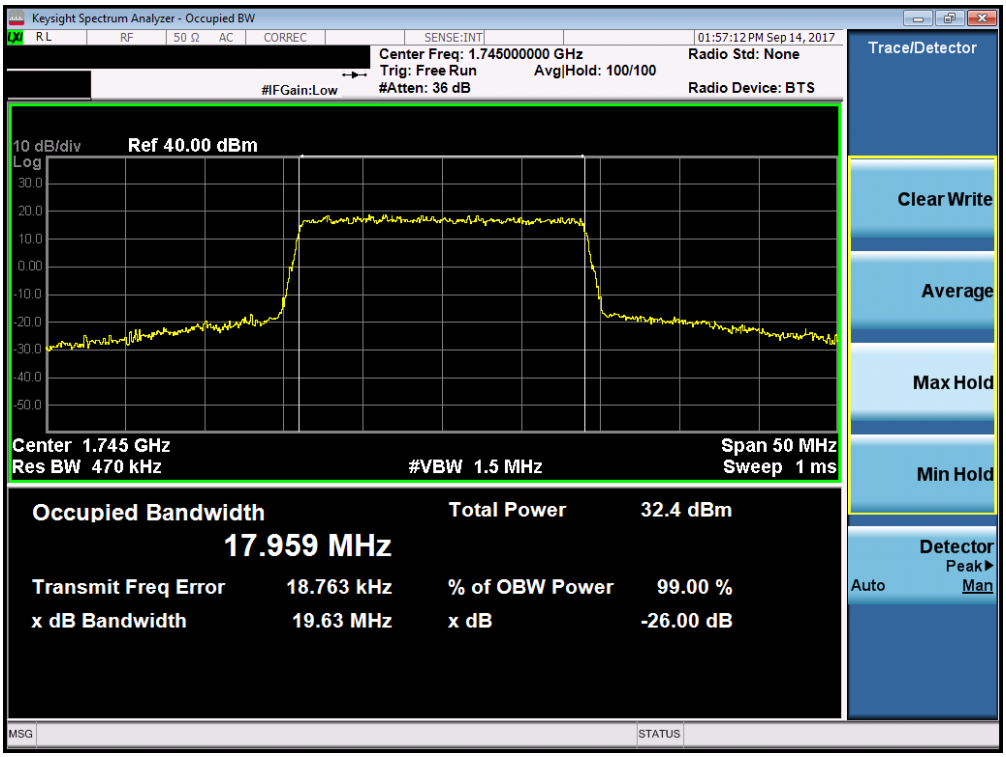
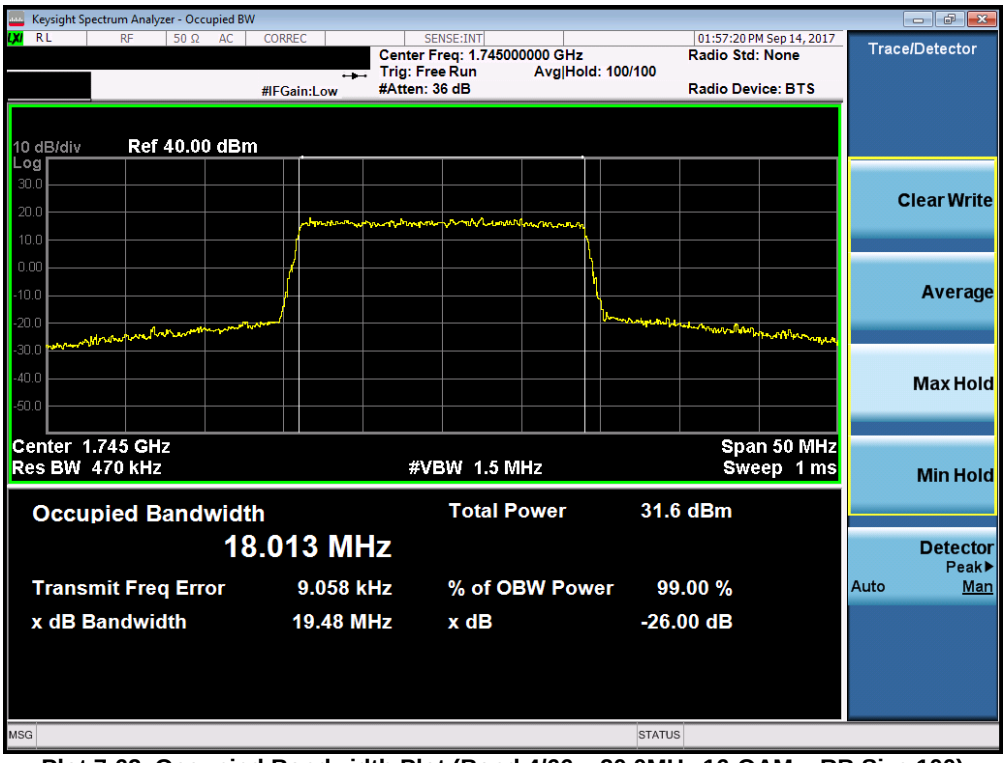


Plot 7-61. Occupied Bandwidth Plot (Band 4/66 – 20.0MHz QPSK – RB Size 100)



Plot 7-62. Occupied Bandwidth Plot (Band 4/66 – 20.0MHz 16-QAM – RB Size 100)

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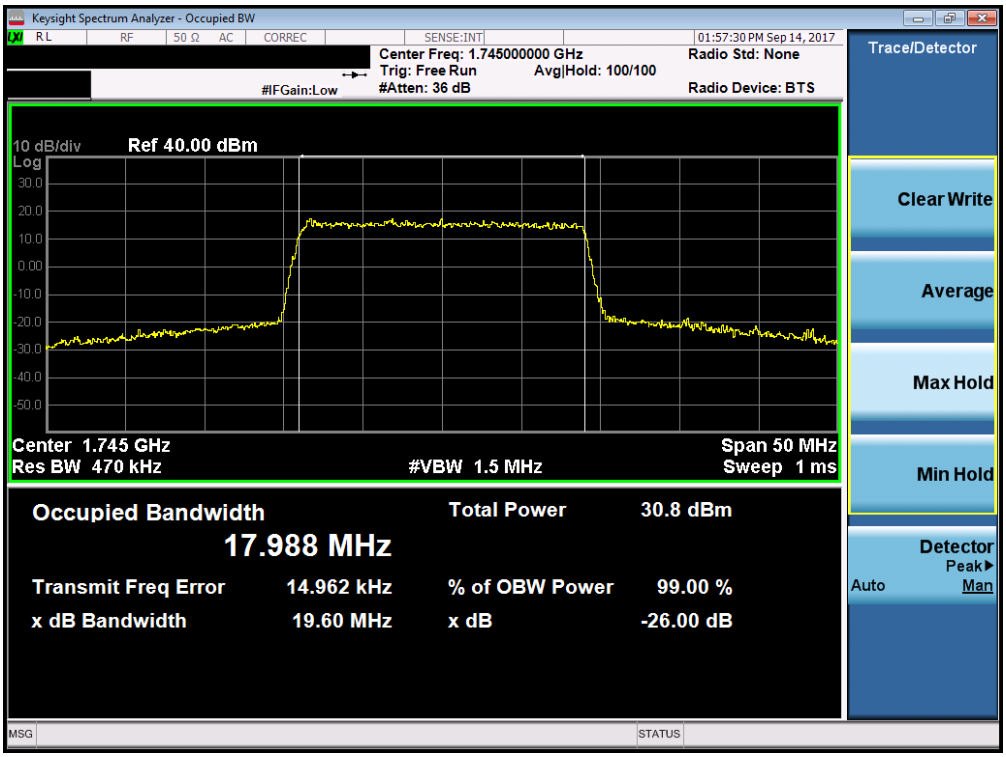
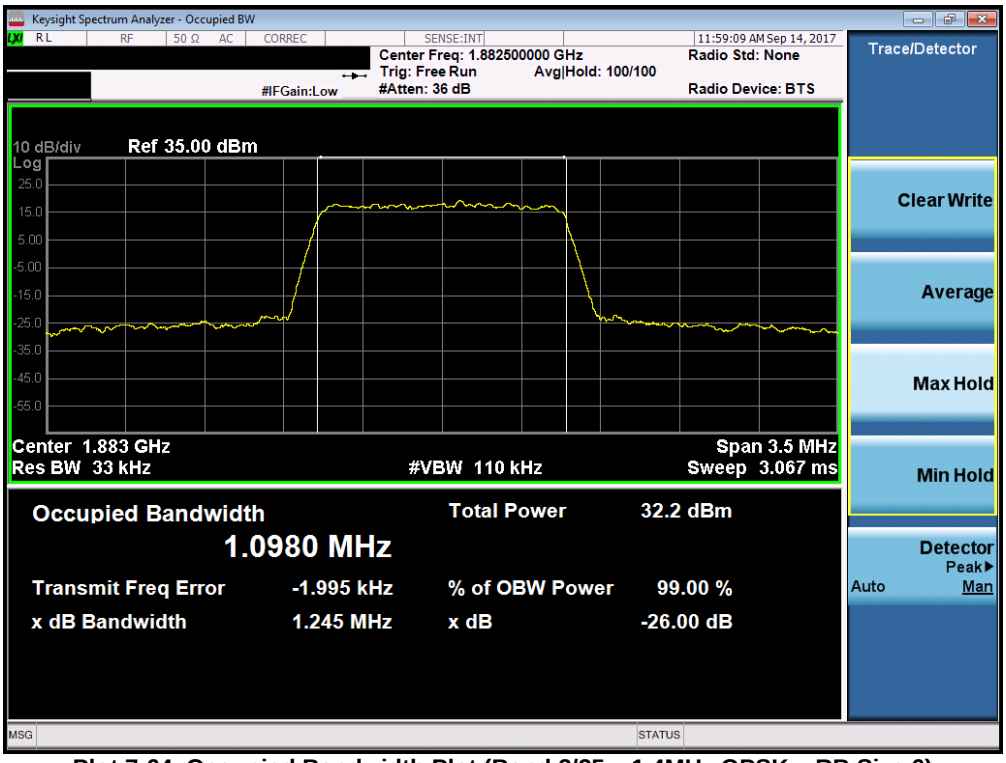


Plot 7-63. Occupied Bandwidth Plot (Band 4/66 – 20.0MHz 64-QAM – RB Size 100)



Plot 7-64. Occupied Bandwidth Plot (Band 2/25 – 1.4MHz QPSK – RB Size 6)

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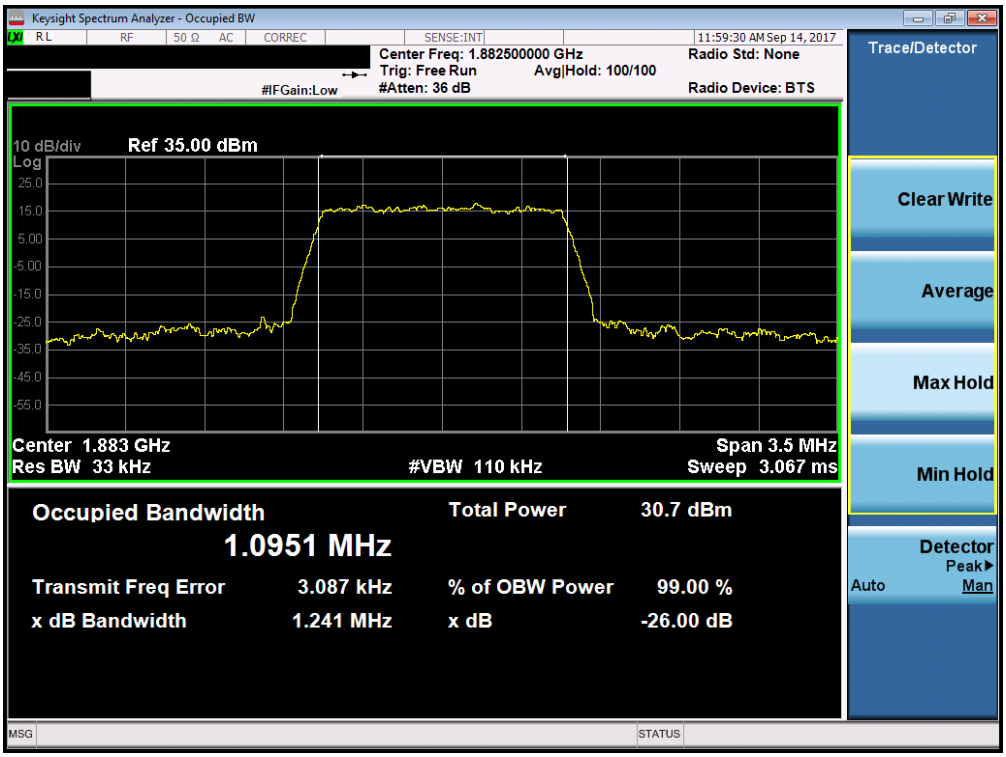
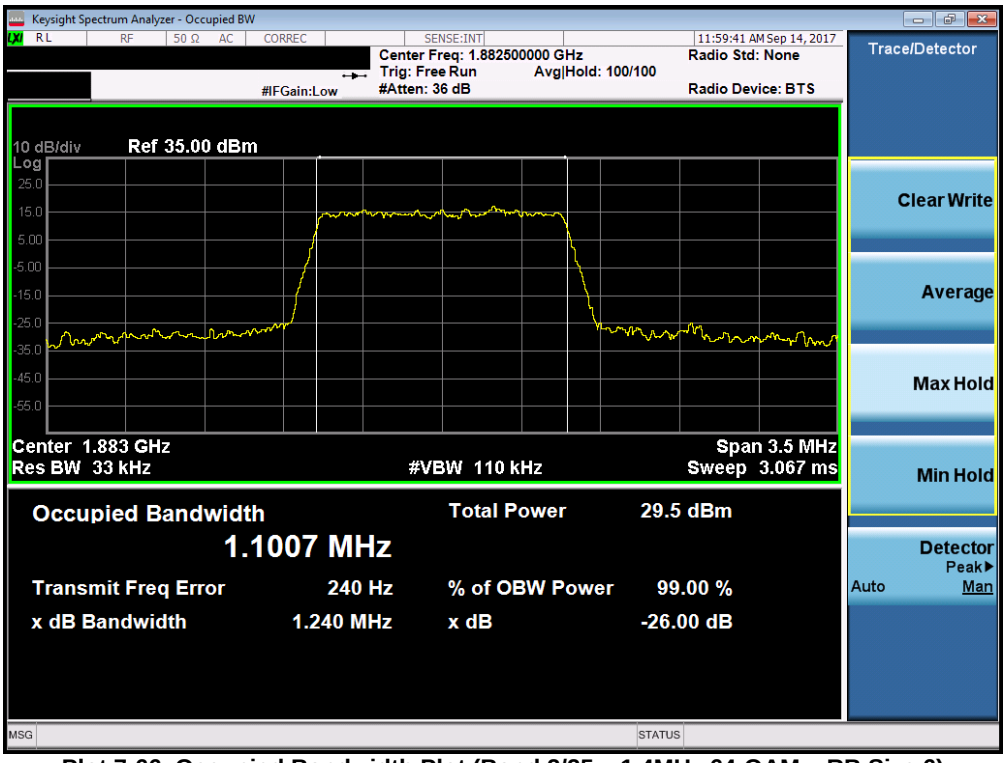


Plot 7-65. Occupied Bandwidth Plot (Band 2/25 – 1.4MHz 16-QAM – RB Size 6)



Plot 7-66. Occupied Bandwidth Plot (Band 2/25 – 1.4MHz 64-QAM – RB Size 6)

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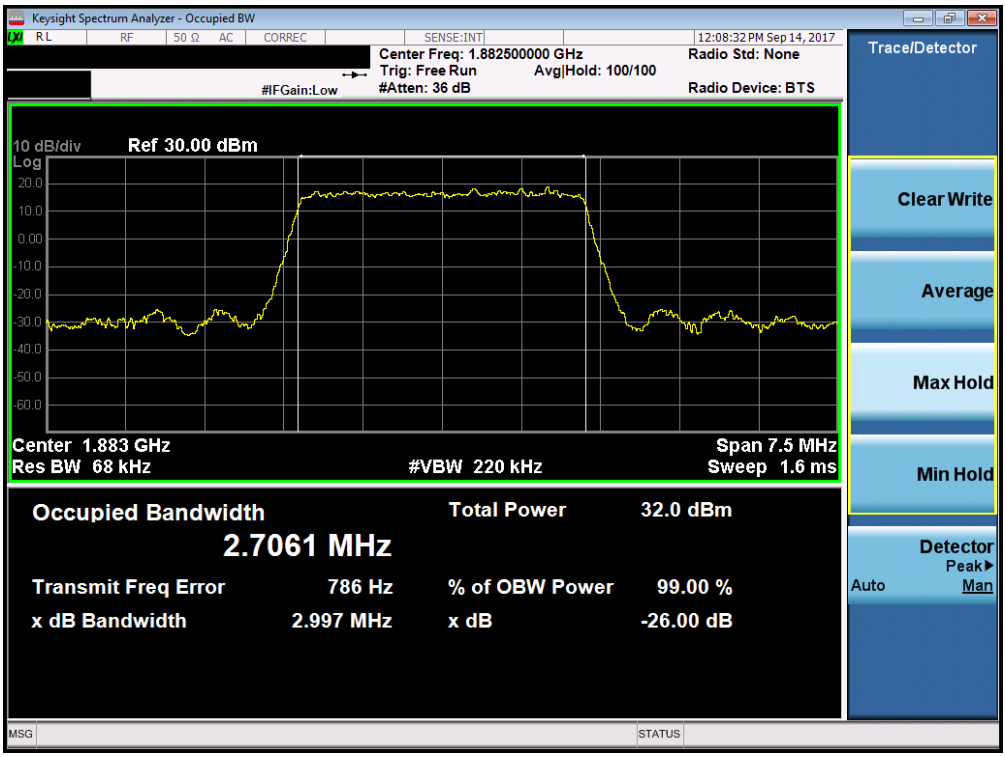
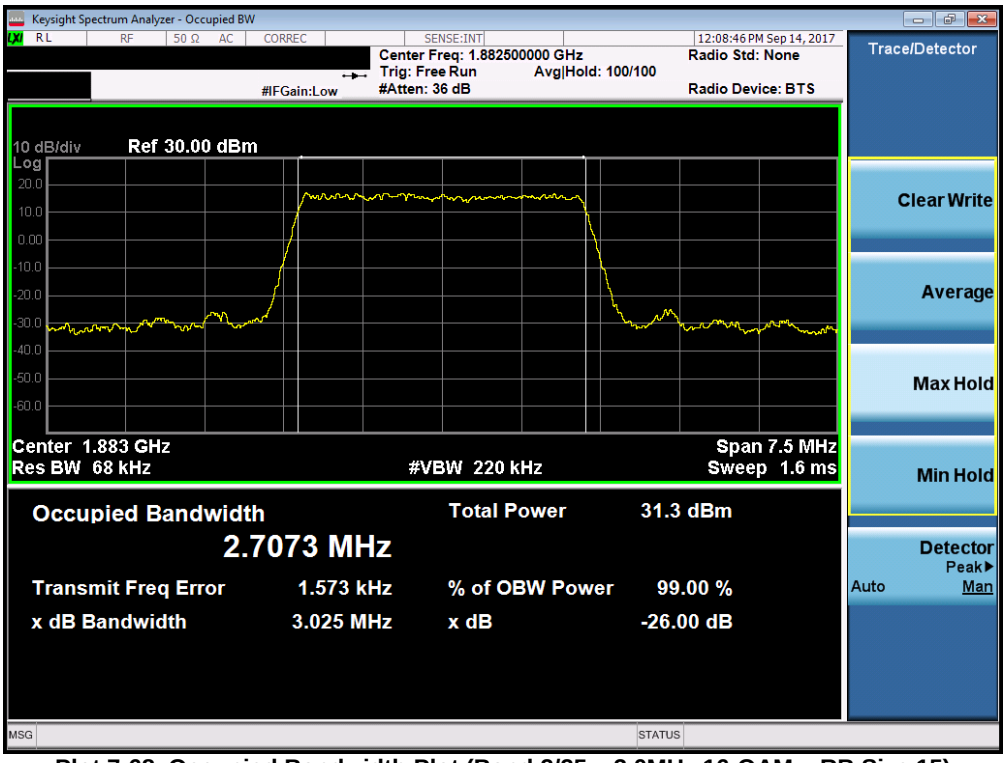


Plot 7-67. Occupied Bandwidth Plot (Band 2/25 – 3.0MHz QPSK – RB Size 15)



Plot 7-68. Occupied Bandwidth Plot (Band 2/25 – 3.0MHz 16-QAM – RB Size 15)

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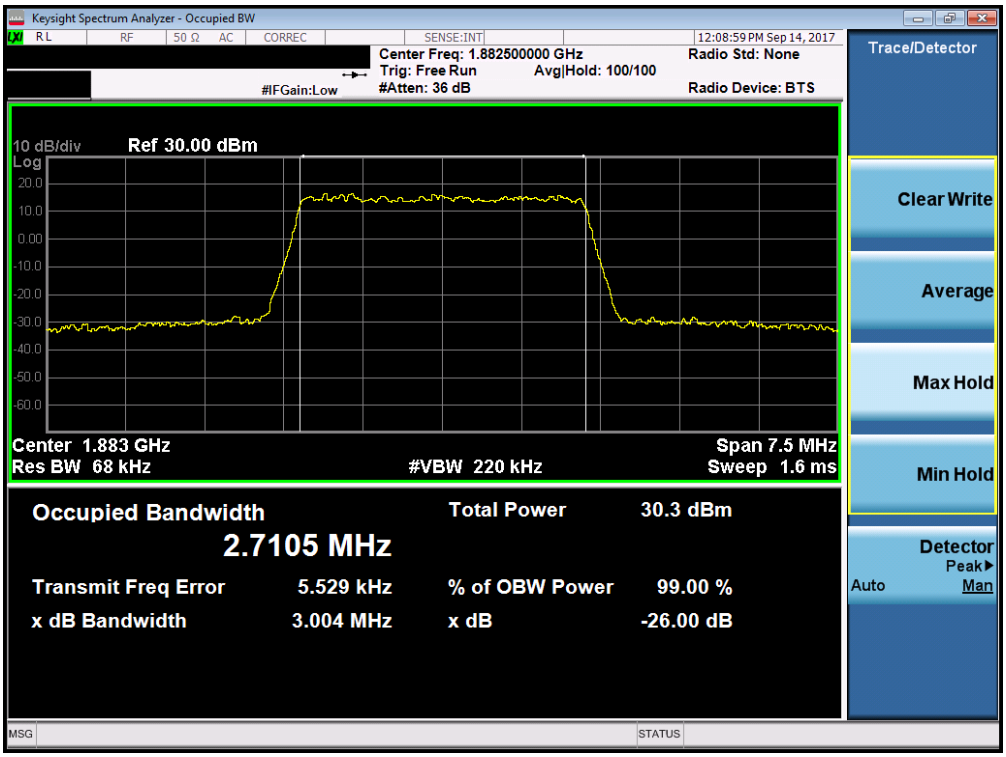

Plot 7-69. Occupied Bandwidth Plot (Band 2/25 – 3.0MHz 64-QAM – RB Size 15)

Plot 7-70. Occupied Bandwidth Plot (Band 2/25 – 5.0MHz QPSK – RB Size 25)

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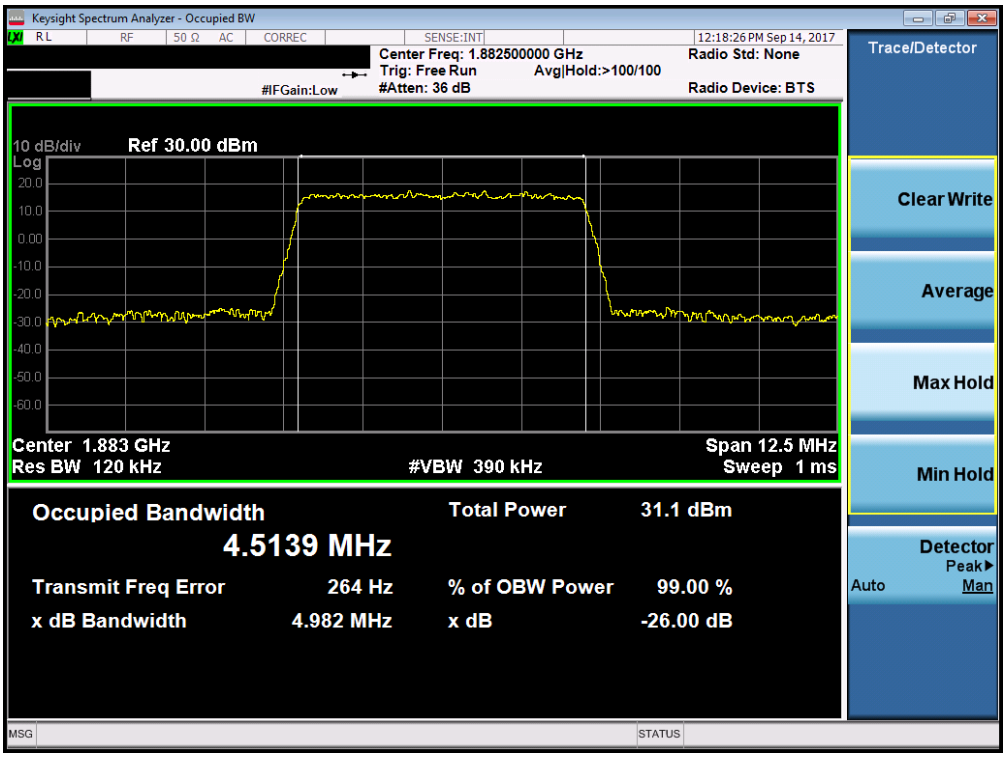
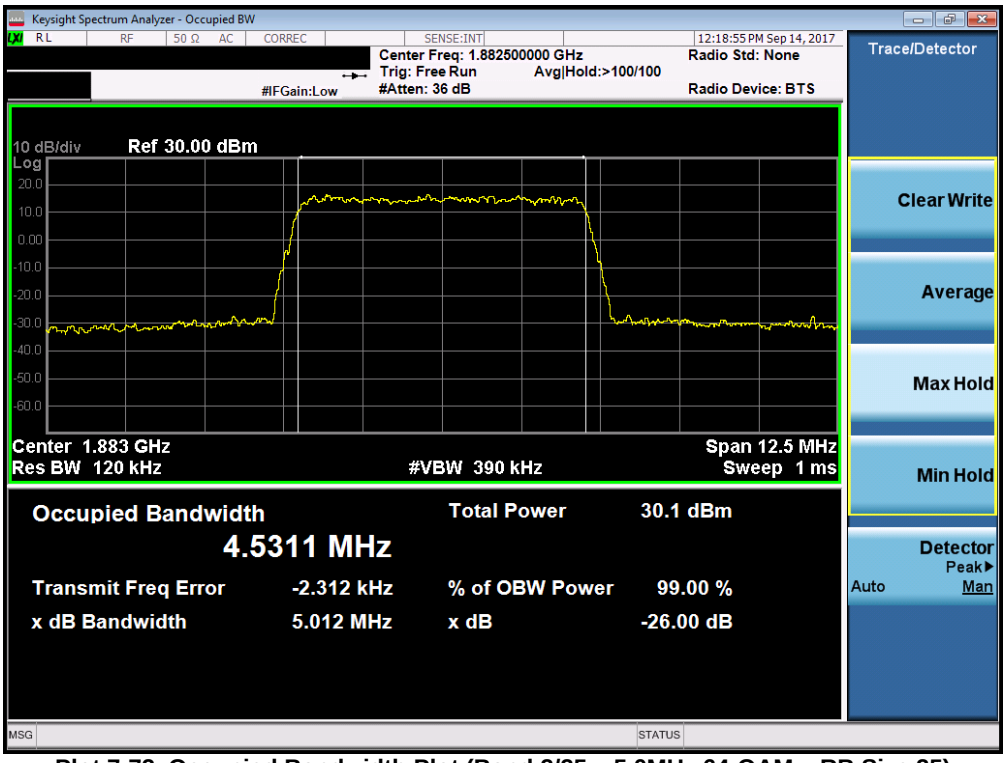


Plot 7-71. Occupied Bandwidth Plot (Band 2/25 – 5.0MHz 16-QAM – RB Size 25)



Plot 7-72. Occupied Bandwidth Plot (Band 2/25 – 5.0MHz 64-QAM – RB Size 25)

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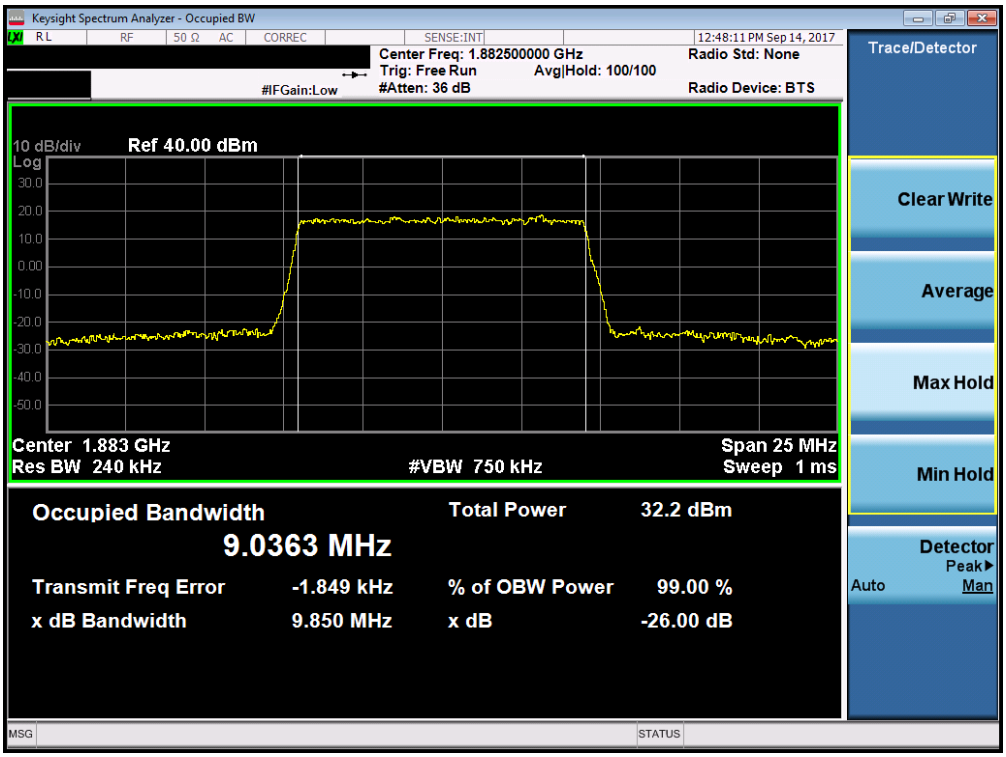
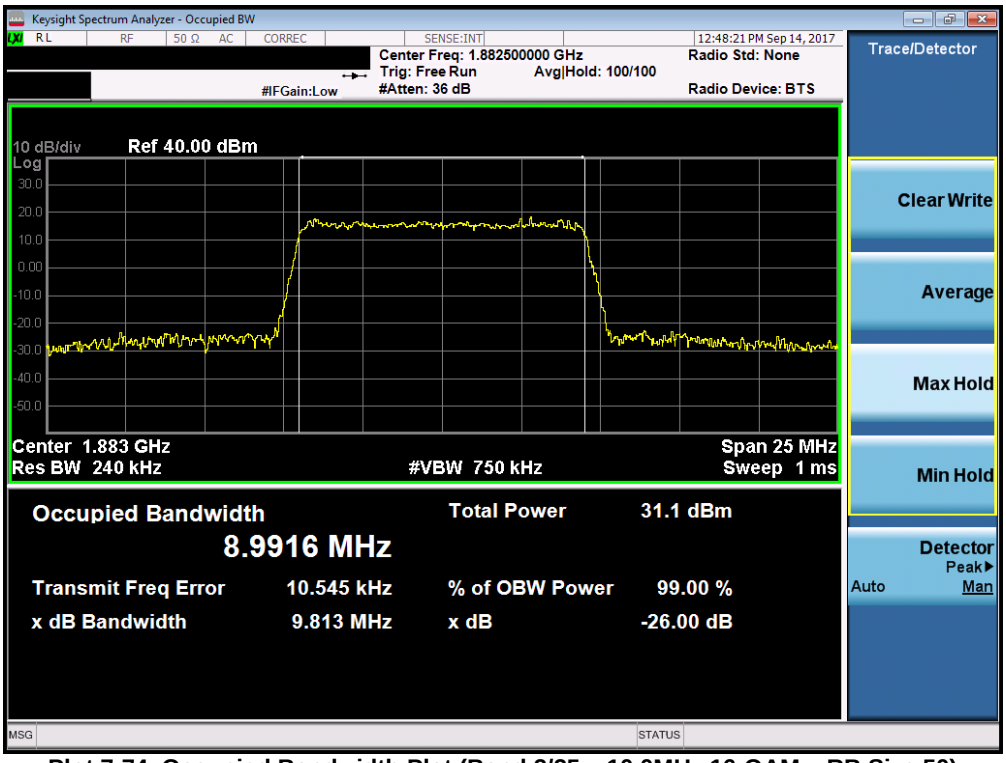


Plot 7-73. Occupied Bandwidth Plot (Band 2/25 – 10.0MHz QPSK – RB Size 50)



Plot 7-74. Occupied Bandwidth Plot (Band 2/25 – 10.0MHz 16-QAM – RB Size 50)

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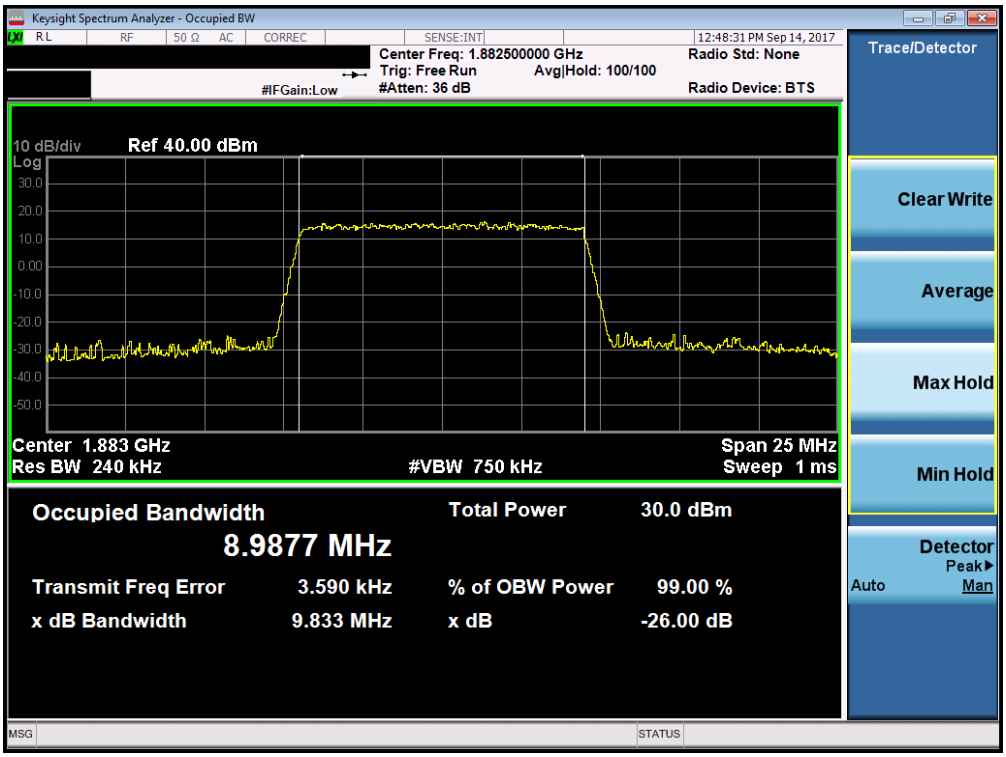
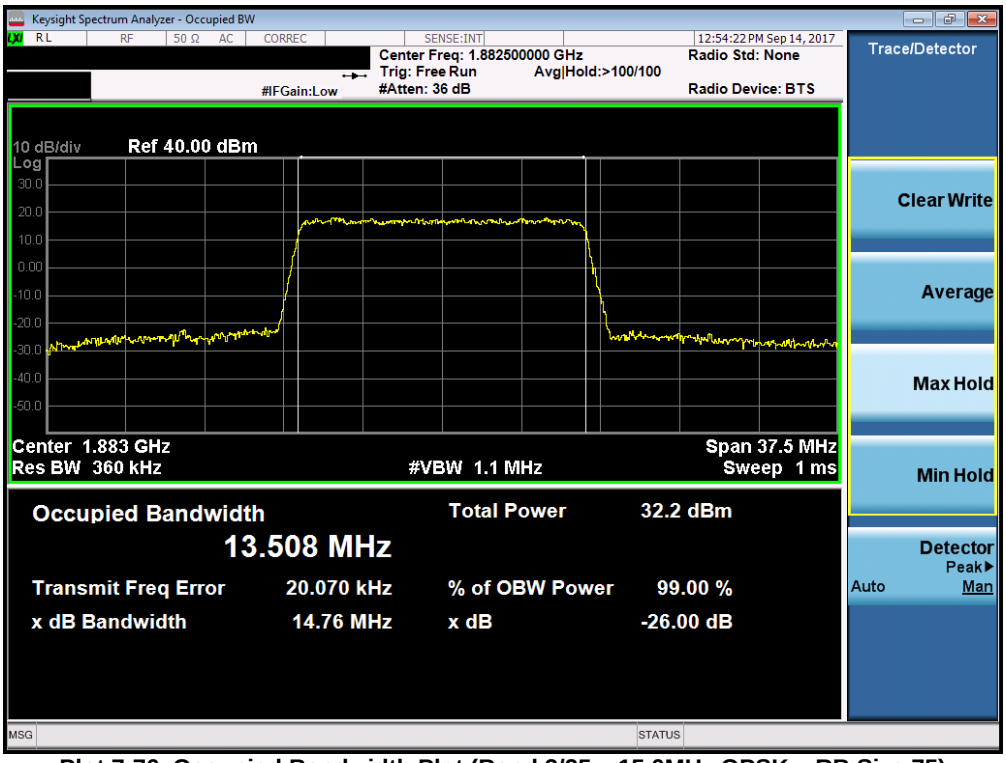


Plot 7-75. Occupied Bandwidth Plot (Band 2/25 – 10.0MHz 64-QAM – RB Size 50)



Plot 7-76. Occupied Bandwidth Plot (Band 2/25 – 15.0MHz QPSK – RB Size 75)

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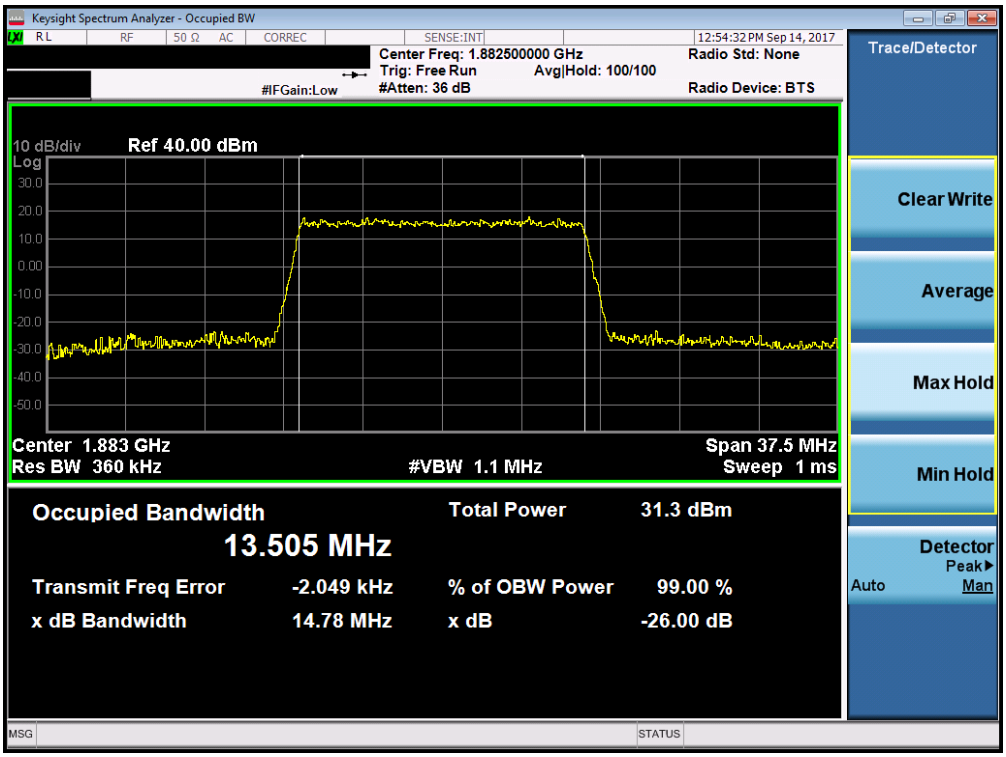
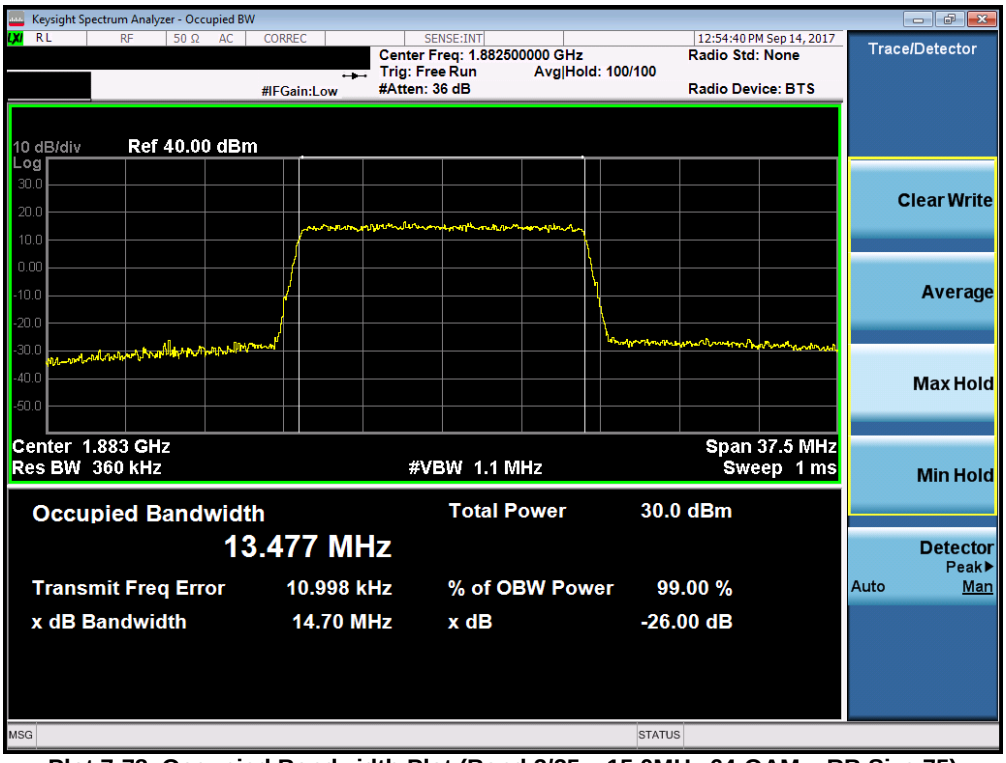


Plot 7-77. Occupied Bandwidth Plot (Band 2/25 – 15.0MHz 16-QAM – RB Size 75)



Plot 7-78. Occupied Bandwidth Plot (Band 2/25 – 15.0MHz 64-QAM – RB Size 75)

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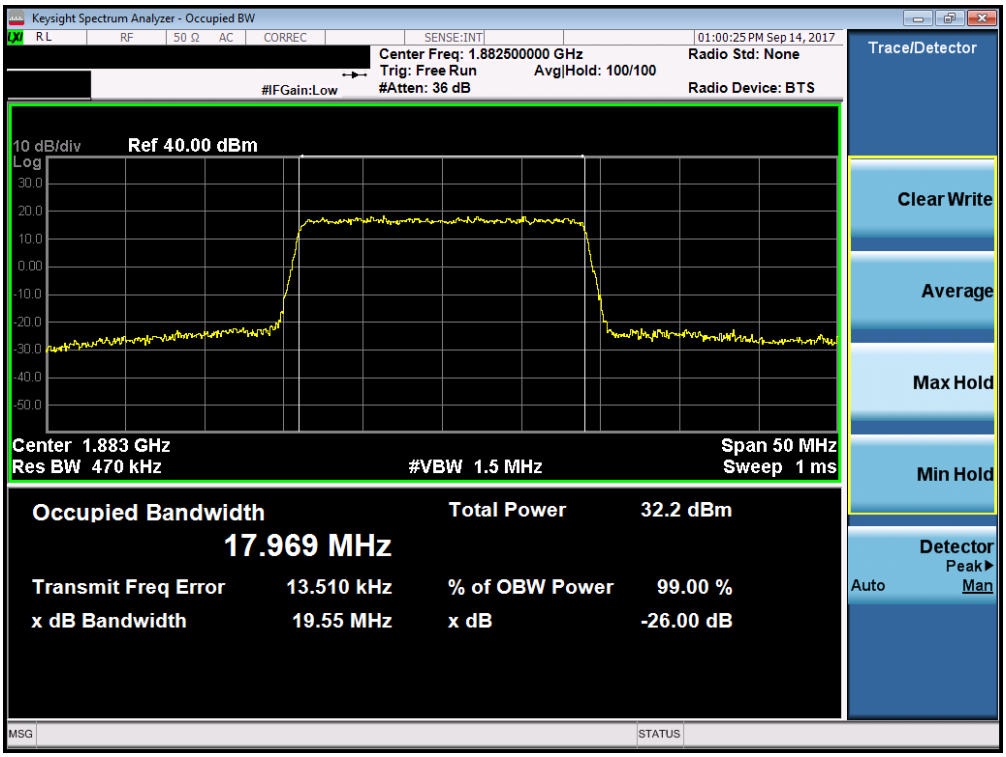
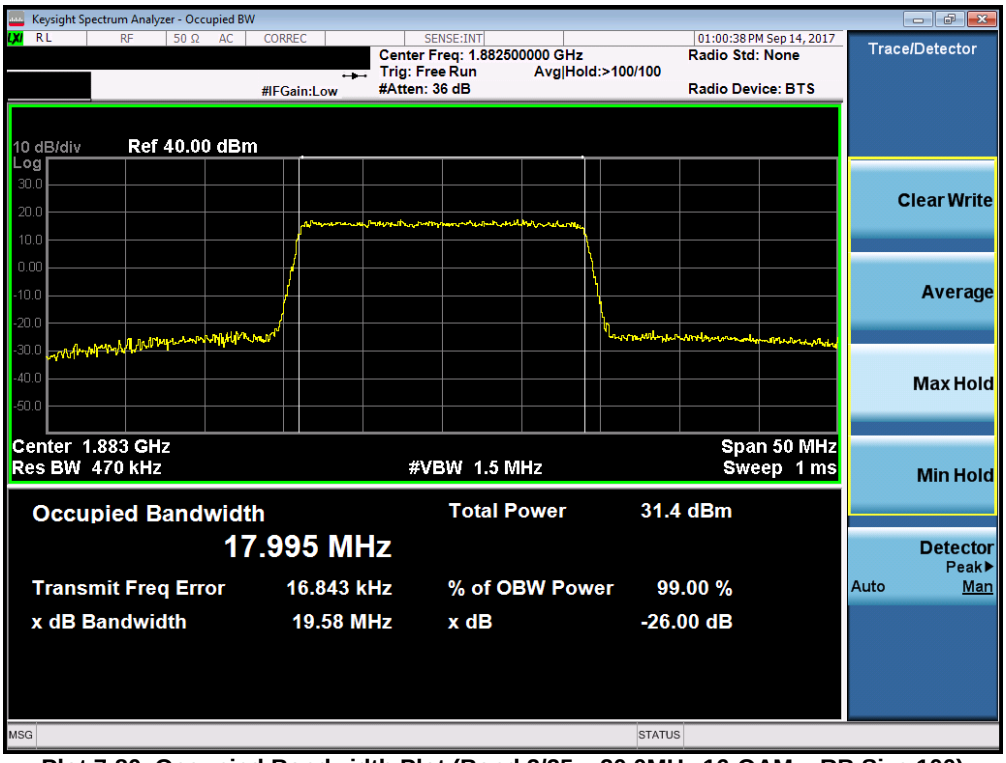


Plot 7-79. Occupied Bandwidth Plot (Band 2/25 – 20.0MHz QPSK – RB Size 100)



Plot 7-80. Occupied Bandwidth Plot (Band 2/25 – 20.0MHz 16-QAM – RB Size 100)

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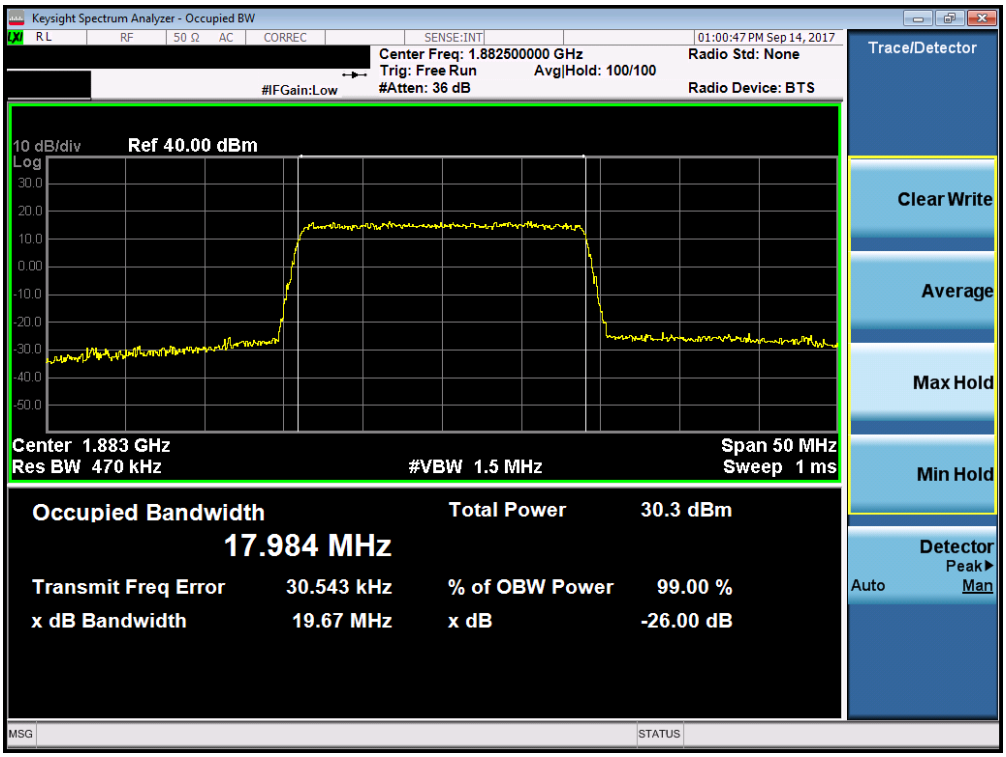
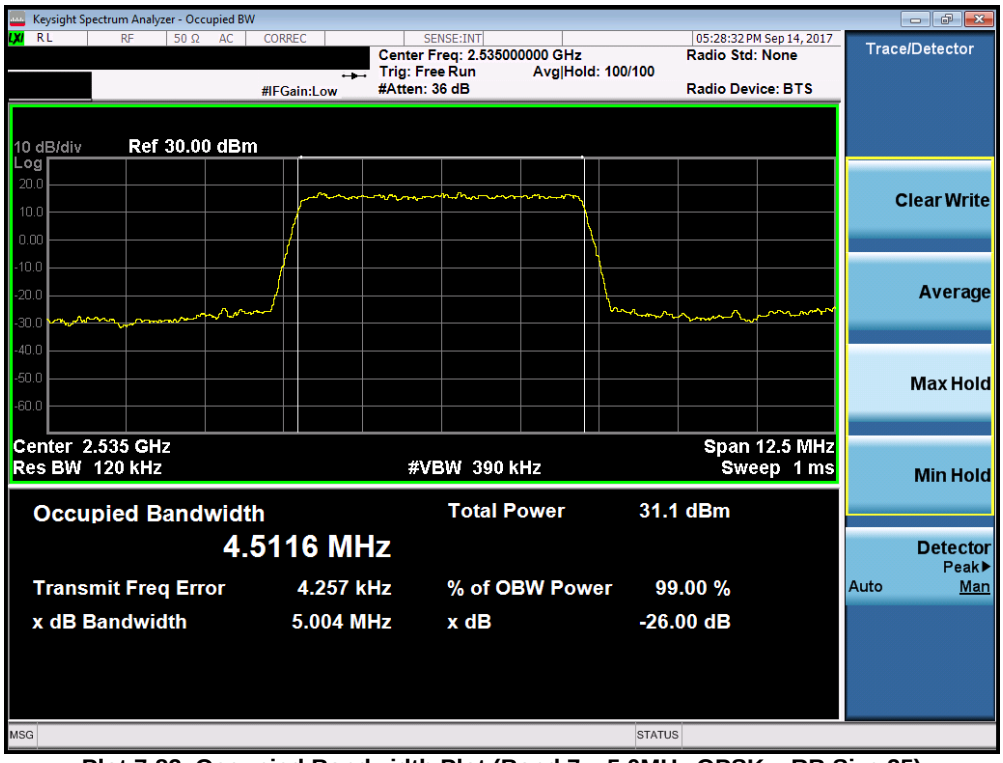


Plot 7-81. Occupied Bandwidth Plot (Band 2/25 – 20.0MHz 64-QAM – RB Size 100)



Plot 7-82. Occupied Bandwidth Plot (Band 7 – 5.0MHz QPSK – RB Size 25)

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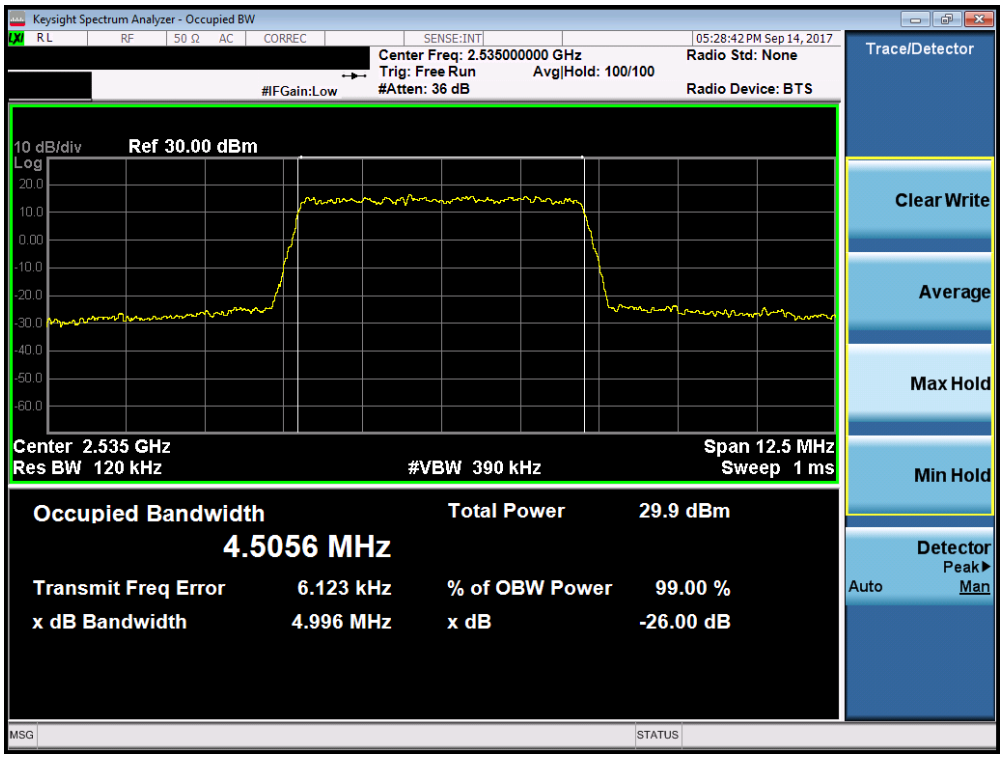
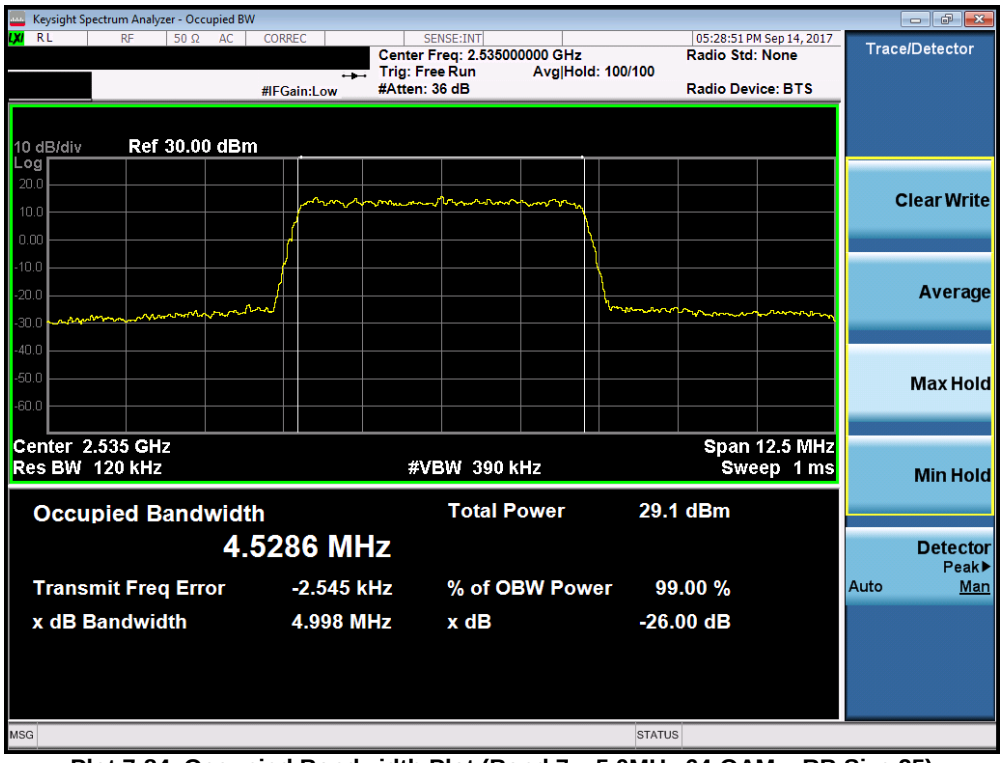


Plot 7-83. Occupied Bandwidth Plot (Band 7 – 5.0MHz 16-QAM – RB Size 25)



Plot 7-84. Occupied Bandwidth Plot (Band 7 – 5.0MHz 64-QAM – RB Size 25)

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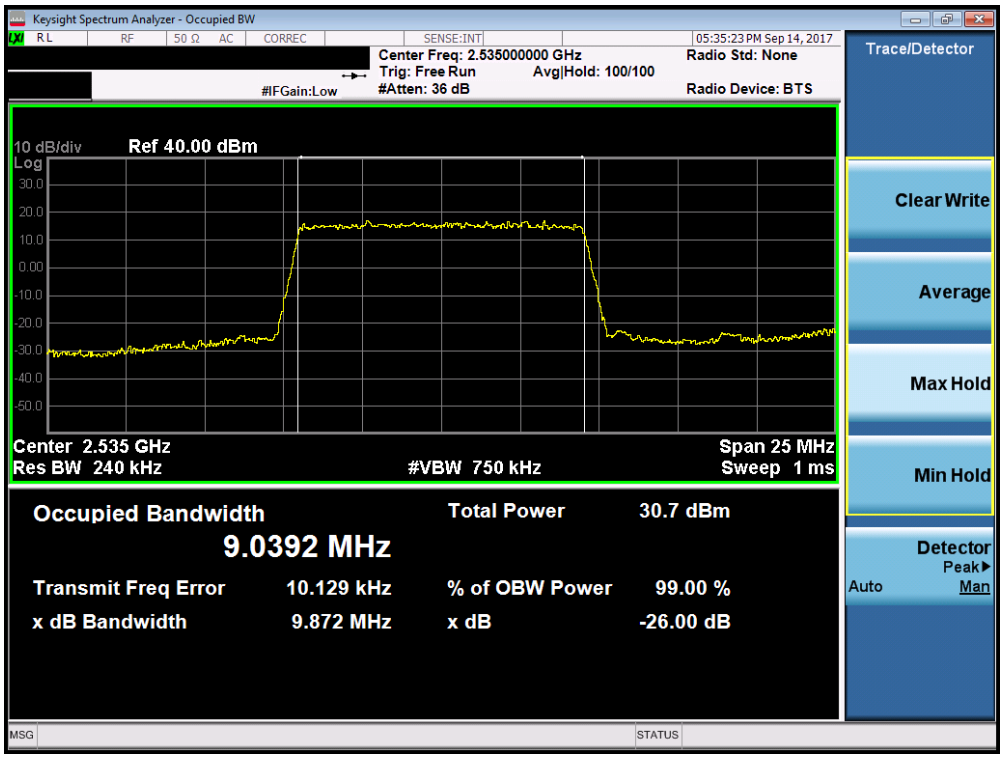
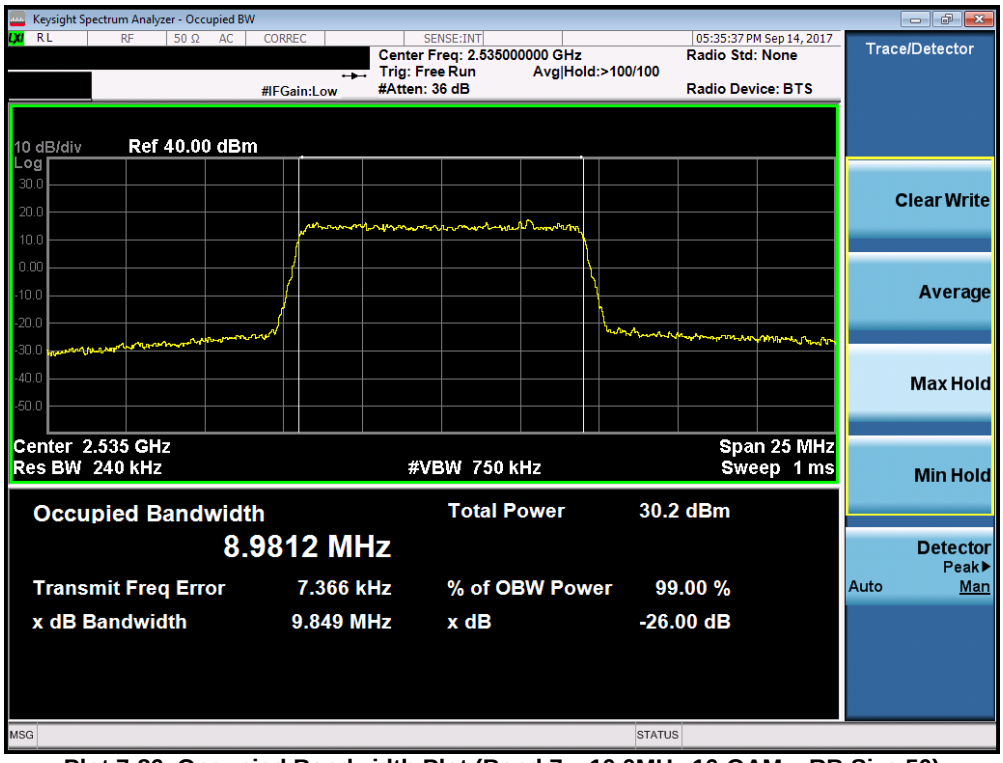


Plot 7-85. Occupied Bandwidth Plot (Band 7 – 10.0MHz QPSK – RB Size 50)



Plot 7-86. Occupied Bandwidth Plot (Band 7 – 10.0MHz 16-QAM – RB Size 50)

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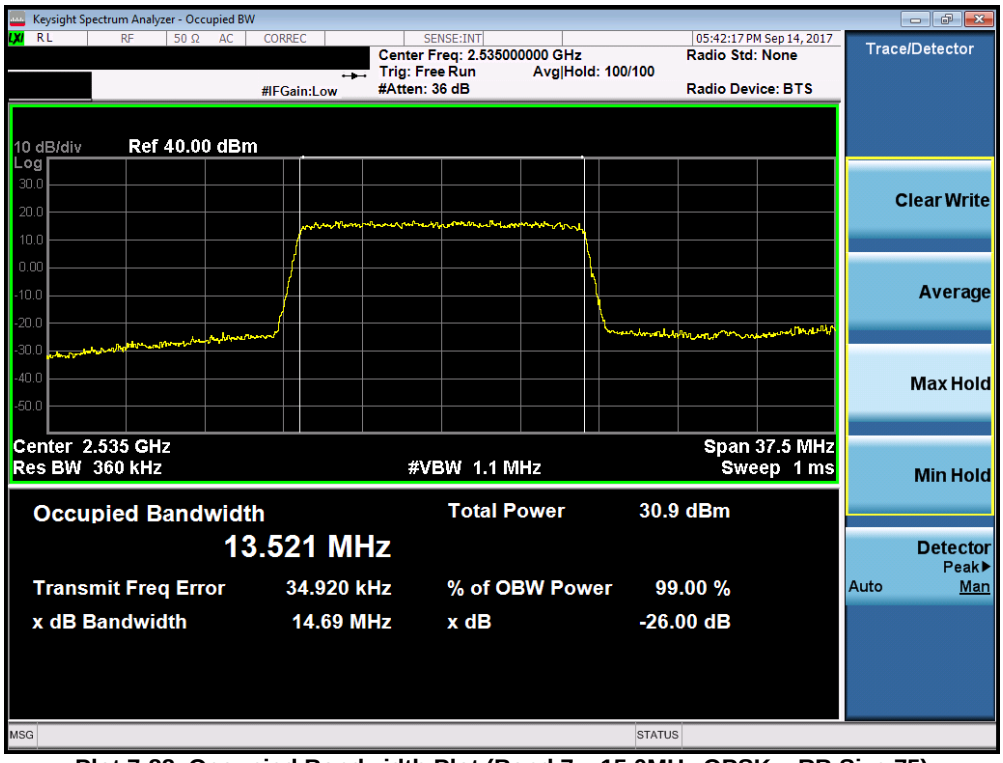
Plot 7-87. Occupied Bandwidth Plot (Band 7 – 10.0MHz 64-QAM – RB Size 50)



Plot 7-88. Occupied Bandwidth Plot (Band 7 – 15.0MHz QPSK – RB Size 75)

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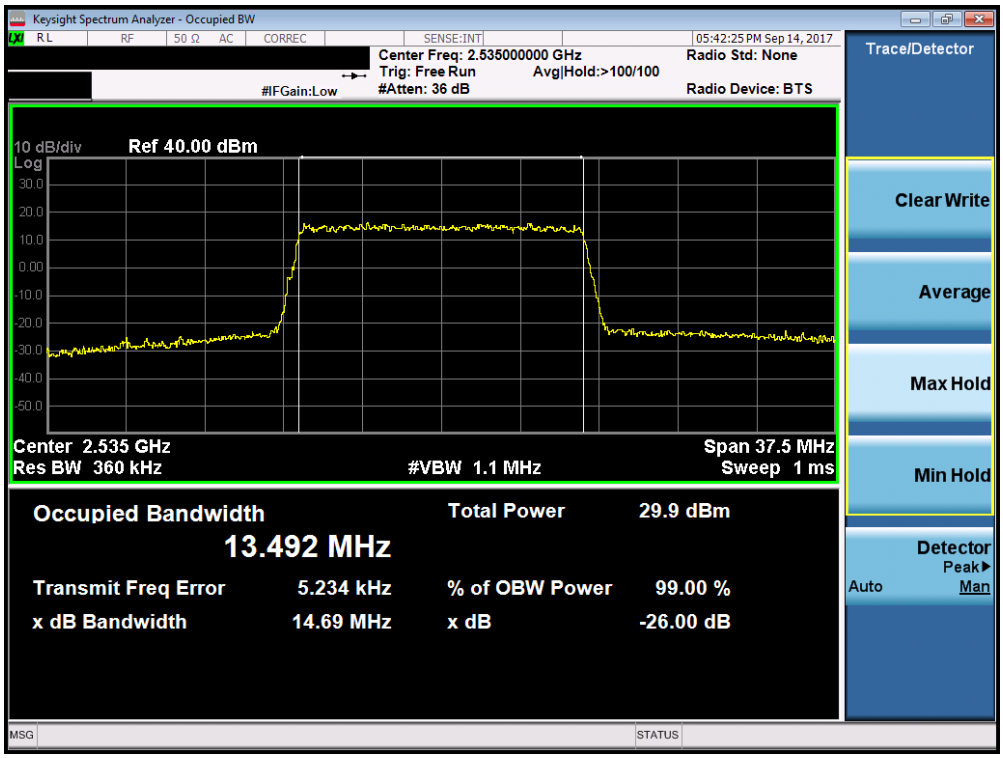
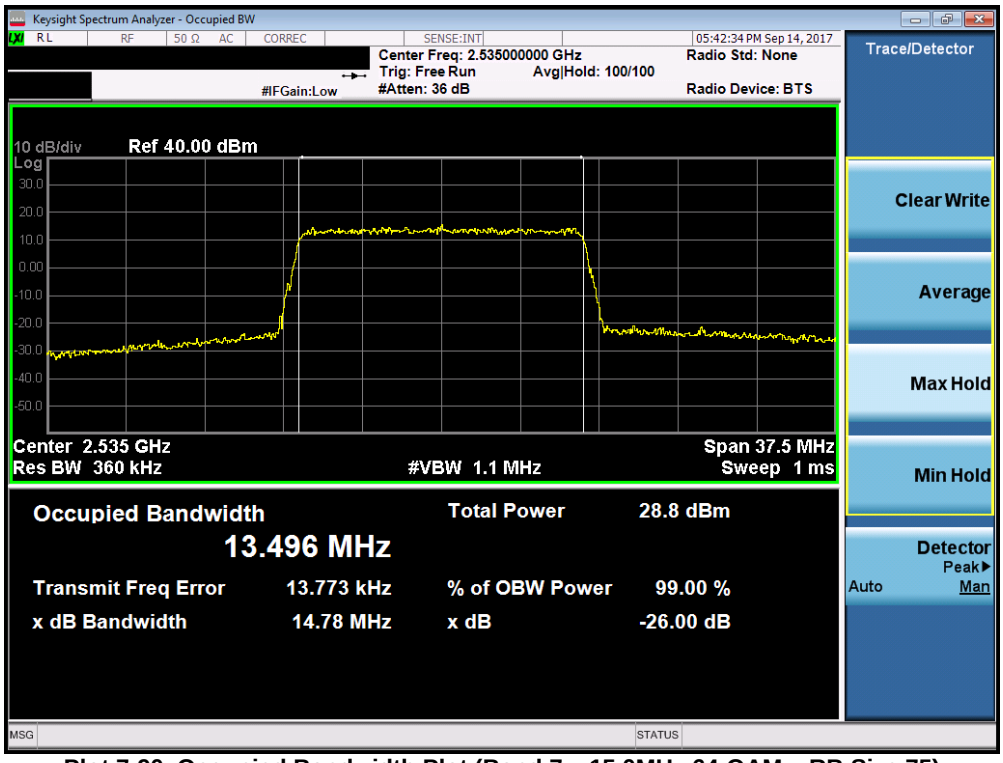


Plot 7-89. Occupied Bandwidth Plot (Band 7 – 15.0MHz 16-QAM – RB Size 75)



Plot 7-90. Occupied Bandwidth Plot (Band 7 – 15.0MHz 64-QAM – RB Size 75)

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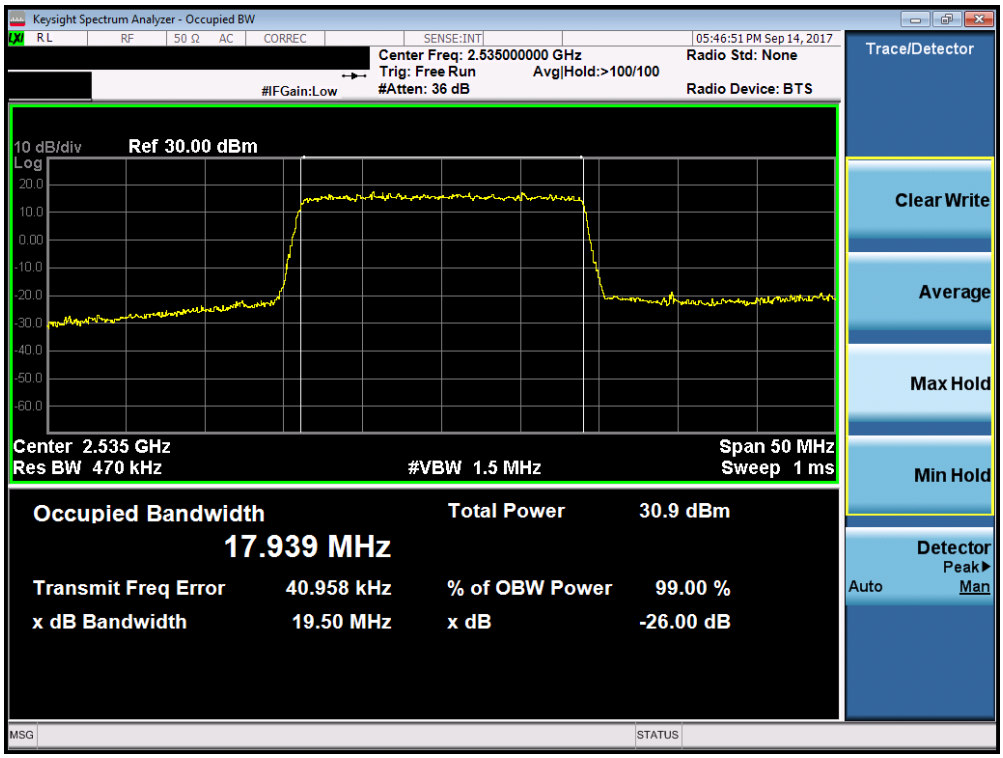
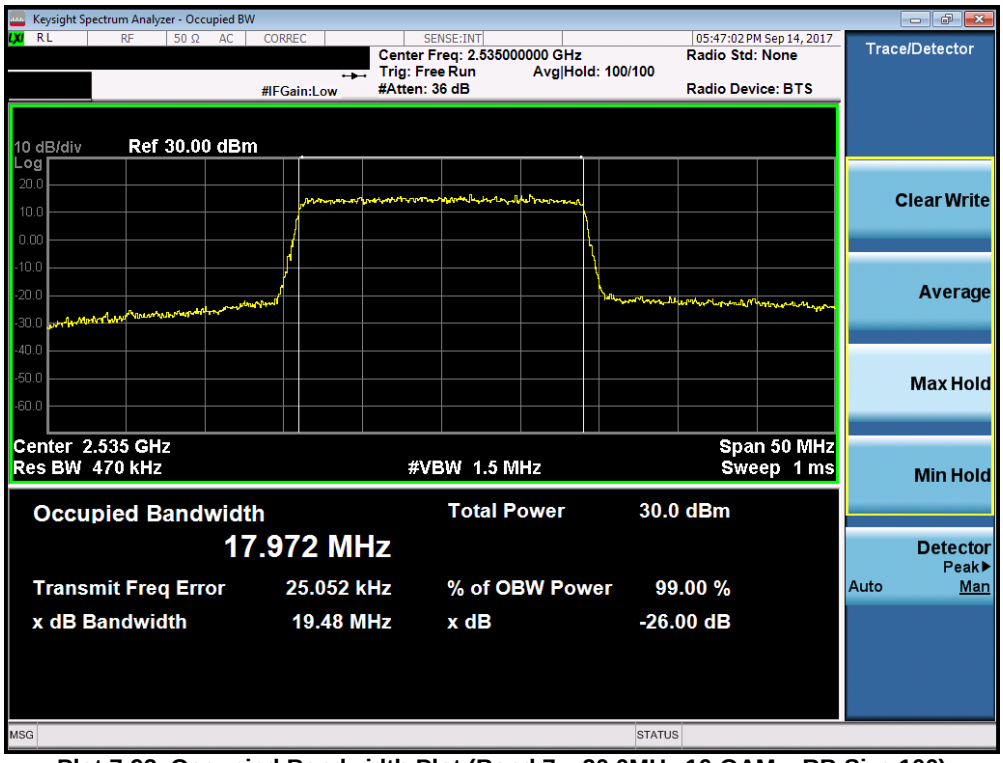


Plot 7-91. Occupied Bandwidth Plot (Band 7 – 20.0MHz QPSK – RB Size 100)



Plot 7-92. Occupied Bandwidth Plot (Band 7 – 20.0MHz 16-QAM – RB Size 100)

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