ELEMENT WASHINGTON DC LLC
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.element.com

PART 27 MEASUREMENT REPORT

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

Date of Testing:
9/7 – 11/7/2023
Test Report Issue Date:
2/6/2024
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2312110124-04.A3L

FCC ID:	**A3LSMS928JPN**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SC-52E
Additional Model(s):	SCG26
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, KDB 648474 D03 v01r04, KDB 484596 D01 v02r02

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.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

MEASUREMENT REPORT
FCC Part 27

Antenna-1								
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.039	15.91	0.064	18.06	8M99G7D
		16QAM	704.0 - 711.0	0.034	15.31	0.056	17.46	9M03W7D
	5 MHz	QPSK	701.5 - 713.5	0.041	16.10	0.067	18.25	4M54G7D
		16QAM	701.5 - 713.5	0.035	15.44	0.057	17.59	4M54W7D
	3 MHz	QPSK	700.5 - 714.5	0.041	16.11	0.067	18.26	2M73G7D
		16QAM	700.5 - 714.5	0.034	15.32	0.056	17.47	2M72W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.039	15.94	0.064	18.09	1M11G7D
		16QAM	699.7 - 715.3	0.033	15.18	0.054	17.33	1M12W7D
LTE Band 13	10 MHz	QPSK	782.0	0.056	17.50	0.092	19.65	9M02G7D
		16QAM	782.0	0.045	16.54	0.074	18.69	9M03W7D
	5 MHz	QPSK	779.5 - 784.5	0.056	17.50	0.092	19.65	4M54G7D
		16QAM	779.5 - 784.5	0.047	16.69	0.077	18.84	4M53W7D

Antenna-1						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.311	24.93	18M0G7D
		16QAM	1720.0 - 1770.0	0.263	24.20	18M0W7D
	15 MHz	QPSK	1717.5 - 1772.5	0.304	24.83	13M5G7D
		16QAM	1717.5 - 1772.5	0.273	24.36	13M5W7D
	10 MHz	QPSK	1715.0 - 1775.0	0.308	24.88	9M04G7D
		16QAM	1715.0 - 1775.0	0.264	24.22	9M05W7D
	5 MHz	QPSK	1712.5 - 1777.5	0.313	24.96	4M54G7D
		16QAM	1712.5 - 1777.5	0.281	24.49	4M54W7D
	3 MHz	QPSK	1711.5 - 1778.5	0.309	24.90	2M74G7D
		16QAM	1711.5 - 1778.5	0.280	24.46	2M73W7D
	1.4 MHz	QPSK	1710.7 - 1779.3	0.316	25.00	1M11G7D
		16QAM	1710.7 - 1779.3	0.267	24.26	1M11W7D
NR Band n66	40 MHz	π/2 BPSK	1730.0 - 1760.0	0.392	25.93	38M9G7D
		QPSK	1730.0 - 1760.0	0.382	25.82	38M8G7D
		16QAM	1730.0 - 1760.0	0.333	25.22	38M8W7D
	30 MHz	π/2 BPSK	1725.0 - 1765.0	0.394	25.95	28M7G7D
		QPSK	1725.0 - 1765.0	0.398	26.00	28M7G7D
		16QAM	1725.0 - 1765.0	0.354	25.49	28M7W7D
	20 MHz	π/2 BPSK	1720.0 - 1770.0	0.380	25.80	0M00G7D
		QPSK	1720.0 - 1770.0	0.373	25.72	0M00G7D
		16QAM	1720.0 - 1770.0	0.326	25.14	0M00W7D
	15 MHz	π/2 BPSK	1717.5 - 1772.5	0.394	25.95	13M5G7D
		QPSK	1717.5 - 1772.5	0.375	25.74	14M2G7D
		16QAM	1717.5 - 1772.5	0.344	25.36	14M2W7D
	10 MHz	π/2 BPSK	1715.0 - 1775.0	0.390	25.91	9M02G7D
		QPSK	1715.0 - 1775.0	0.377	25.76	9M38G7D
		16QAM	1715.0 - 1775.0	0.325	25.12	9M38W7D
	5 MHz	π/2 BPSK	1712.5 - 1777.5	0.391	25.92	4M53G7D
		QPSK	1712.5 - 1777.5	0.389	25.90	4M53G7D
		16QAM	1712.5 - 1777.5	0.328	25.16	4M53W7D

Antenna-2								
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.070	18.46	0.115	20.61	9M02G7D
		16QAM	704.0 - 711.0	0.059	17.71	0.097	19.86	9M00W7D
	5 MHz	QPSK	701.5 - 713.5	0.072	18.58	0.118	20.73	4M54G7D
		16QAM	701.5 - 713.5	0.059	17.72	0.097	19.87	4M54W7D
	3 MHz	QPSK	700.5 - 714.5	0.070	18.46	0.115	20.61	2M73G7D
		16QAM	700.5 - 714.5	0.057	17.55	0.093	19.70	2M72W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.069	18.39	0.113	20.54	1M11G7D
		16QAM	699.7 - 715.3	0.057	17.55	0.093	19.70	1M11W7D
LTE Band 13	10 MHz	QPSK	782.0	0.061	17.82	0.099	19.97	9M01G7D
		16QAM	782.0	0.051	17.05	0.083	19.20	9M02W7D
	5 MHz	QPSK	779.5 - 784.5	0.061	17.84	0.100	19.99	4M54G7D
		16QAM	779.5 - 784.5	0.053	17.28	0.088	19.43	4M55W7D

Antenna-2						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.161	22.07	18M1G7D
		16QAM	1720.0 - 1770.0	0.126	21.01	18M1W7D
	15 MHz	QPSK	1717.5 - 1772.5	0.161	22.06	13M6G7D
		16QAM	1717.5 - 1772.5	0.123	20.90	13M5W7D
	10 MHz	QPSK	1715.0 - 1775.0	0.163	22.13	9M04G7D
		16QAM	1715.0 - 1775.0	0.126	21.01	9M04W7D
	5 MHz	QPSK	1712.5 - 1777.5	0.171	22.33	4M54G7D
		16QAM	1712.5 - 1777.5	0.123	20.90	4M55W7D
	3 MHz	QPSK	1711.5 - 1778.5	0.169	22.28	2M73G7D
		16QAM	1711.5 - 1778.5	0.127	21.04	2M73W7D
	1.4 MHz	QPSK	1710.7 - 1779.3	0.161	22.06	1M11G7D
		16QAM	1710.7 - 1779.3	0.124	20.94	1M11W7D
NR Band n66	40 MHz	π/2 BPSK	1730.0 - 1760.0	0.231	23.63	38M8G7D
		QPSK	1730.0 - 1760.0	0.221	23.44	38M8G7D
		16QAM	1730.0 - 1760.0	0.175	22.43	38M9W7D
	30 MHz	π/2 BPSK	1725.0 - 1765.0	0.247	23.93	28M9G7D
		QPSK	1725.0 - 1765.0	0.239	23.78	28M8G7D
		16QAM	1725.0 - 1765.0	0.176	22.45	28M8W7D
	20 MHz	π/2 BPSK	1720.0 - 1770.0	0.224	23.51	18M0G7D
		QPSK	1720.0 - 1770.0	0.218	23.38	19M0G7D
		16QAM	1720.0 - 1770.0	0.178	22.49	19M0W7D
	15 MHz	π/2 BPSK	1717.5 - 1772.5	0.223	23.49	13M5G7D
		QPSK	1717.5 - 1772.5	0.214	23.31	14M2G7D
		16QAM	1717.5 - 1772.5	0.175	22.44	14M2W7D
	10 MHz	π/2 BPSK	1715.0 - 1775.0	0.281	24.48	9M05G7D
		QPSK	1715.0 - 1775.0	0.273	24.36	9M36G7D
		16QAM	1715.0 - 1775.0	0.197	22.94	9M35W7D
	5 MHz	π/2 BPSK	1712.5 - 1777.5	0.287	24.57	4M55G7D
		QPSK	1712.5 - 1777.5	0.284	24.53	4M54G7D
		16QAM	1712.5 - 1777.5	0.194	22.88	4M52W7D

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 Element Test Location

These measurement tests were conducted at the Element laboratory 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 Element lab located in Columbia, MD 21046, U.S.A.

- Element Washington DC LLC is an ISO 17025-2017 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.

- Element Washington DC LLC 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).

- Element Washington DC LLC facility is a registered (2451B) test laboratory with the site description on file with ISED.

- Element Washington DC LLC is a Recognized U.S. Certification Assessment Body (CAB # US0110) for ISED Canada as designated by NIST under the U.S. and Canada Mutual Recognition Agreement.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS928JPN**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

Test Device Serial No.: 0109M, 0861M, 0220M, 0121M, 0110M

2.2 Device Capabilities

This device contains the following capabilities:

50/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, UWB

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.

Band	Ant1	Ant2
WCDMA	Ant B	N/A
B12	Ant A	N/A
B13	Ant A	N/A
B66/4/n66	Ant B	Ant F

Table 2-1. Antenna Naming Convention

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015. 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) Model: EP-N5100 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 Software and Firmware

Testing was performed on device(s) using software/firmware version S928USQU0AWIA installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure……..None

3.2 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.

For radiated power measurements, substitution method is used per the guidance of ANSI C63.26-2015. For emissions below 1GHz, a half-wave dipole is 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 $_{[dB]}$.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26-2015. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;\ \text{where D is the measurement distance in meters.}$$

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

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	1.77
Line Conducted Disturbance	2.70
Radiated Disturbance (<30MHz)	4.38
Radiated Disturbance (30MHz - 1GHz)	4.75
Radiated Disturbance (1 - 18GHz)	5.20
Radiated Disturbance (>18GHz)	4.72

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
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
-	LTX1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX1
-	LTX2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX2
-	LTX3	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX3
-	LTX4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX4
-	LTX5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX5
Anritsu	MT8821C	Radio Communication Analyzer	N/A			620152694
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	8/30/2023	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/6/2022	Annual	9/6/2023	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	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.

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) = 50.3 dBc.

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMS928JPN

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

Mode(s): LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power*	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (LTE Band 13)	2.1051, 27.53(c), 27.53(f)	Undesirable emissions must meet the limits detailed in sections 27.53(c) and 27.53(f)	PASS	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (LTE Band 12)	2.1051, 27.53(g)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (LTE Band 4, 66; NR Band n66)	2.1051, 27.53(h)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Sections 7.4, 7.5
	Peak-to-Average Ratio (LTE Band 4, 66; NR Band n66)	27.50(d)(5)	≤ 13 dB	PASS	Section 7.6
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.9
RADIATED	Effective Radiated Power (LTE Band 13)	27.50(b)(10)	≤ 3 Watts max. ERP	PASS	Section 7.7
	Effective Radiated Power (LTE Band 12)	27.50(c)(10)	≤ 3 Watts max. ERP	PASS	Section 7.7
	Equivalent Isotropic Radiated Power (LTE Band 4, 66; NR Band n66)	27.50(d)(4)	≤ 1 Watt max. EIRP	PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(c), 27.53(f)	Undesirable emissions must meet the limits detailed in sections 27.53(c) and 27.53(f)	PASS	Section 7.8
	Radiated Spurious Emissions (LTE Band 12)	2.1053, 27.53(g)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Section 7.8
	Radiated Spurious Emissions (LTE Band 4, 66; NR Band n66)	2.1053, 27.53(h)(1)	≥ 43 + 10 log (P[Watts]) dB of attenuation below transmitter power	PASS	Section 7.8

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
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 EMC Software Tool v1.1.
5) Data was leveraged from test report 1M2308210092-03, FCC ID: A3LSMS928JPN. See Table 7-2 and Table 7-3 for results.

FCC Rules	Test Item	Test Case	Units	Limit	Reference FCC ID: A3LSMS928U	Variant FCC ID: A3LSMS928JPN	Deviation	Max Deviation	Pass/Fail
27 (699-716)	Conducted Output Power	LTE B12, 3MHz, QPSK	dBm	-	24.26	23.57	0.69	N/A	PASS
	Occupied Bandwidth	LTE B12, 10MHz, 16QAM	MHz	N/A	9.04	9.01	0.03	N/A	PASS
	Conducted Spurious Emissions	LTE B12, 10MHz, QPSK	dBm	-13	-36.99	-38.42	1.43	3	PASS
	Conducted Out-of-Band Emissions (Band Edge)	LTE B12, 1.4MHz, High Channel	dBm	-13	-14.59	-17.13	2.54	3	PASS
	Frequency Stability	LTE B12	Hz	N/A	1229	255	974	N/A	PASS
	ERP/EIRP	LTE B12, 5MHz, High Channel, QPSK	dBm	34.77	18.58	17.99	0.59	3	PASS
	Radiated Spurious Emissions	LTE B12, 10MHz, Low Channel, QPSK	dBm	-20	-50.47	-50.18	0.29	3	PASS
27 (777-787)	Conducted Output Power	LTE B13, 10MHz, QPSK	dBm	-	24.18	23.7	0.48	-	-
	Occupied Bandwidth	LTE B13, 10MHz, 16QAM	MHz	N/A	9.03	18.07	9.04	N/A	PASS
	Conducted Spurious Emissions	LTE B13, 10MHz, QPSK	dBm	-13	-39.56	-39.49	0.071	3	PASS
	Conducted Out-of-Band Emissions (Band Edge)	LTE B13, 5MHz	dBm	-13	-20.14	-18.47	1.671	3	PASS
	Frequency Stability	LTE B13	Hz	N/A	-1790	1211	3001	N/A	PASS
	ERP/EIRP	LTE B13, 5MHz, Low Channel, QPSK	dBm	40.61	17.84	19.39	1.55	3	PASS
	Radiated Spurious Emissions	LTE B13, 5MHz, High Channel, QPSK	dBm	-13	-65.37	-67.24	1.87	3	PASS
27 (1710 - 1780)	Conducted Output Power	LTE B66/4, 20MHz, High Channel, QPSK	dBm	-	23.91	23.81	0.1	N/A	PASS
	Occupied Bandwidth	NR n66, 40MHz, 16QAM	MHz	N/A	38.91	39.01	0.1	N/A	PASS
	Conducted Spurious Emissions	LTE B6/46, 20MHz, QPSK	dBm	-13	-50.19	-51.23	1.04	3	PASS
	Conducted Out-of-Band Emissions (Band Edge)	NR n66, 10MHz, QPSK	dBm	-13	-17.83	-18.47	0.639	3	PASS
	Peak-to-Average Ratio	NR n66, 5MHz, 256Q	dB	13	8.58	8.49	0.09	3	PASS
	Frequency Stability	LTE B66/4	Hz	N/A	3839	2466	1373	N/A	PASS
	ERP/EIRP	NR n66, 30MHz, Low Channel, QPSK	dBm	40.61	26.00	24.85	1.15	3	PASS
	Radiated Spurious Emissions	NR n66, 40MHz, Mid Channel, BPSK	dBm	-47.42	-47.42	-49.53	2.11	3	PASS

Table 7-2. Summary of Spot-checks

7.2 Conducted Output Power Data

Test Overview

All emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2

Test Settings

1. Detector = RMS
2. Trace mode = trace average for continuous emissions, max hold for pulse emissions
3. Sweep time = auto couple
4. The trace was allowed to stabilize
5. Please see test notes below for RBW and VBW settings

Test Setup

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

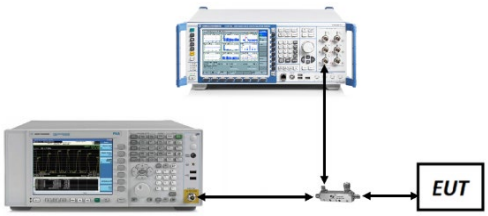


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

2. All other conducted power measurements are contained in the RF exposure report for this filing.

3. Conducted power was found to reduce for the higher order QAM modulations when compared to 16QAM. Due to this trend, only the worst-case QAM (16QAM) powers are included in this section.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	132072	1720.0	1 / 50	23.31
		132322	1745.0	1 / 0	23.26
		132572	1770.0	1 / 99	23.53
	16-QAM	132322	1745.0	1 / 99	22.55
15 MHz	QPSK	132047	1717.5	1 / 74	23.46
		132322	1745.0	1 / 37	23.24
		132597	1772.5	1 / 74	23.56
	16-QAM	132322	1745.0	1 / 37	22.44
10 MHz	QPSK	132022	1715.0	1 / 0	23.37
		132322	1745.0	1 / 25	23.32
		132622	1775.0	1 / 49	23.54
	16-QAM	132322	1745.0	1 / 25	22.55
5 MHz	QPSK	131997	1712.5	1 / 0	23.50
		132322	1745.0	1 / 24	23.51
		132647	1777.5	1 / 12	23.54
	16-QAM	132322	1745.0	1 / 0	22.45
3 MHz	QPSK	131987	1711.5	1 / 7	23.38
		132322	1745.0	1 / 0	23.47
		132657	1778.5	1 / 0	23.54
	16-QAM	132322	1745.0	1 / 14	22.58
1.4 MHz	QPSK	131979	1710.7	1 / 0	23.36
		132322	1745.0	1 / 5	23.24
		132665	1779.3	1 / 3	23.54
	16-QAM	132322	1745.0	1 / 5	22.48

Table 7-3. Conducted Power - LTE Band 66/4 - Ant2

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
40 MHz	π/2 BPSK	346000	1730.0	1 / 1	22.24
		349000	1745.0	1 / 214	22.13
		352000	1760.0	1 / 214	22.11
	QPSK	346000	1730.0	1 / 1	22.35
		349000	1745.0	1 / 214	22.13
		352000	1760.0	1 / 214	22.05
	16-QAM	352000	1760.0	1 / 214	22.02
35 MHz	π/2 BPSK	345500	1727.5	1 / 1	22.17
		349000	1745.0	1 / 1	22.34
		352500	1762.5	1 / 1	22.28
	QPSK	345500	1727.5	1 / 1	22.30
		349000	1745.0	1 / 1	22.38
		352500	1762.5	1 / 1	22.28
	16-QAM	349000	1745.0	1 / 1	21.82
30 MHz	π/2 BPSK	345000	1725.0	1 / 1	22.53
		349000	1745.0	1 / 1	22.43
		353000	1765.0	1 / 1	22.37
	QPSK	345000	1725.0	1 / 1	22.51
		349000	1745.0	1 / 1	22.47
		353000	1765.0	1 / 1	22.39
	16-QAM	345000	1725.0	1 / 1	22.09
25 MHz	π/2 BPSK	344500	1722.5	1 / 1	22.49
		349000	1745.0	1 / 1	22.32
		353500	1767.5	1 / 1	22.17
	QPSK	344500	1722.5	1 / 1	22.49
		349000	1745.0	1 / 1	22.38
		353500	1767.5	1 / 1	22.16
	16-QAM	349000	1745.0	1 / 1	22.04
20 MHz	π/2 BPSK	344000	1720.0	1 / 1	22.23
		349000	1745.0	1 / 53	22.01
		354000	1770.0	1 / 104	22.31
	QPSK	344000	1720.0	1 / 1	22.32
		349000	1745.0	1 / 53	22.06
		354000	1770.0	1 / 104	22.09
	16-QAM	349000	1745.0	1 / 1	21.93
15 MHz	π/2 BPSK	343500	1717.5	1 / 1	22.15
		349000	1745.0	1 / 1	21.99
		354500	1772.5	1 / 39	22.19
	QPSK	343500	1717.5	1 / 1	22.36
		349000	1745.0	1 / 1	21.98
		354500	1772.5	1 / 77	22.05
	16-QAM	349000	1745.0	1 / 1	21.88
10 MHz	π/2 BPSK	343000	1715.0	1 / 26	23.35
		349000	1745.0	1 / 50	22.98
		355000	1775.0	1 / 50	23.16
	QPSK	343000	1715.0	1 / 1	23.29
		349000	1745.0	1 / 1	22.98
		355000	1775.0	1 / 26	23.10
	16-QAM	349000	1745.0	1 / 50	22.37
5 MHz	π/2 BPSK	342500	1712.5	1 / 1	20.57
		349000	1745.0	1 / 1	23.07
		355500	1777.5	1 / 23	19.95
	QPSK	342500	1712.5	1 / 12	20.66
		349000	1745.0	1 / 12	23.22
		355500	1777.5	1 / 23	20.35
	16-QAM	349000	1745.0	1 / 23	22.32

Table 7-4. Conducted Power - NR Band n66 - Ant2

7.3 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

ANSI C63.26-2015 – Section 5.4.4

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.

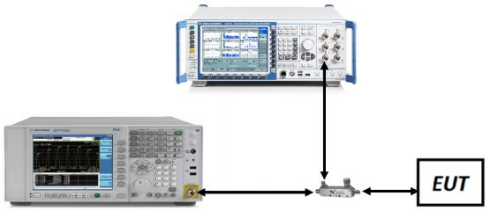


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None.

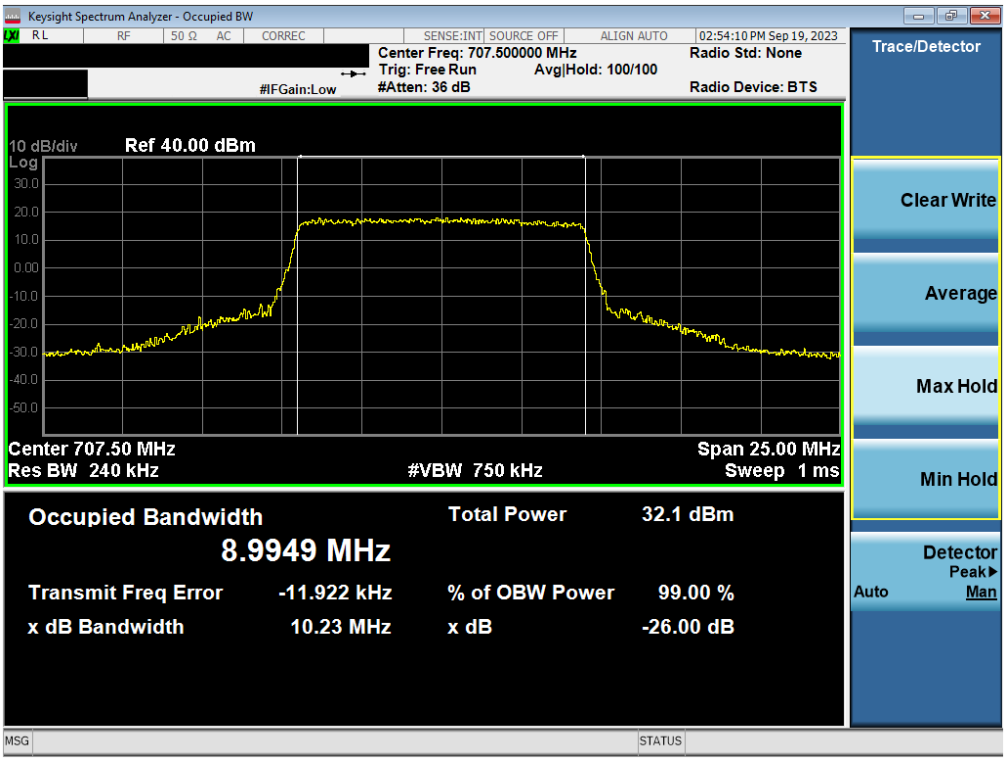
Mode	Bandwidth	Modulation	OBW [MHz]
LTE-B12	10MHz	QPSK	9.00
		16QAM	9.04
	5MHz	QPSK	4.54
		16QAM	4.54
	3MHz	QPSK	2.73
		16QAM	2.72
	1.4MHz	QPSK	1.11
		16QAM	1.12
LTE-B13	10MHz	QPSK	9.02
		16QAM	9.03
	5MHz	QPSK	4.54
		16QAM	4.53
LTE-B66-4	20MHz	QPSK	18.03
		16QAM	18.01
	15MHz	QPSK	13.53
		16QAM	13.54
	10MHz	QPSK	9.04
		16QAM	9.05
	5MHz	QPSK	4.54
		16QAM	4.54
	3MHz	QPSK	2.74
		16QAM	2.73
	1.4MHz	QPSK	1.11
		16QAM	1.11

Table 7-5. Occupied Bandwidth Results – Ant1

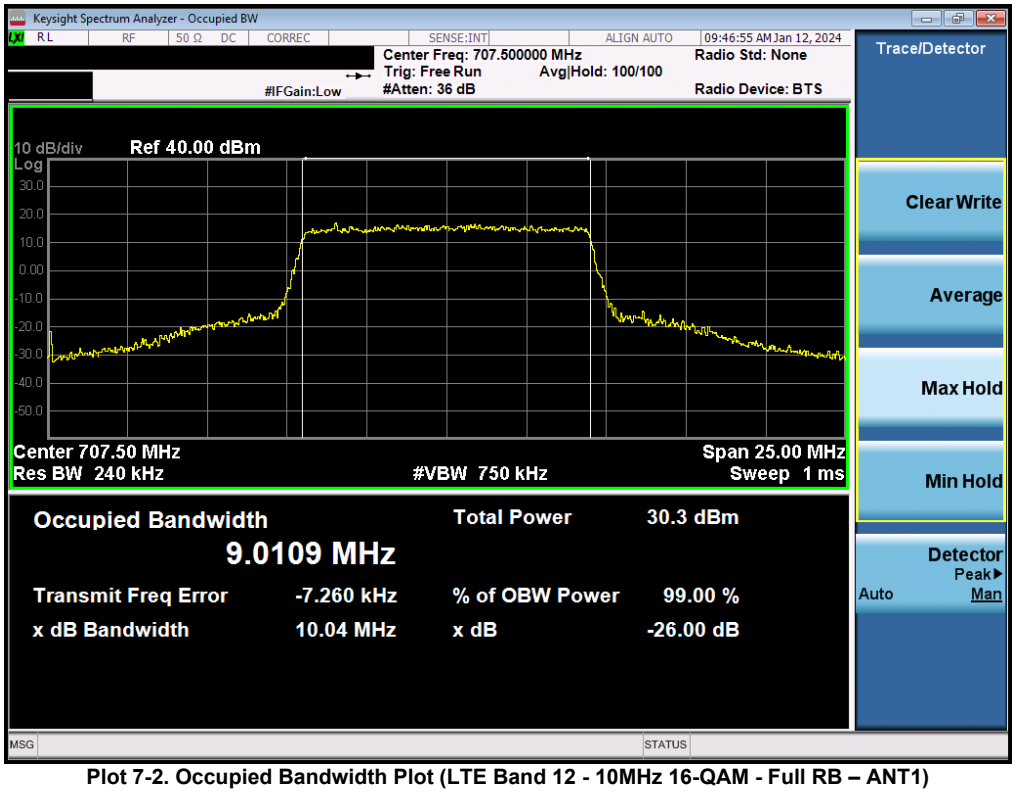
Mode	Bandwidth	Modulation	OBW [MHz]
NR-n66	40MHz	π/2 BPSK	38.86
		QPSK	38.76
		16QAM	38.78
	30MHz	π/2 BPSK	28.74
		QPSK	28.75
		16QAM	28.73
	20MHz	π/2 BPSK	18.02
		QPSK	9.06
		16QAM	19.06
	15MHz	π/2 BPSK	13.53
		QPSK	14.18
		16QAM	14.21
	10MHz	π/2 BPSK	9.02
		QPSK	9.38
		16QAM	9.38
	5MHz	π/2 BPSK	4.53
		QPSK	4.53
		16QAM	4.53

Table 7-6. Occupied Bandwidth Results – Ant1

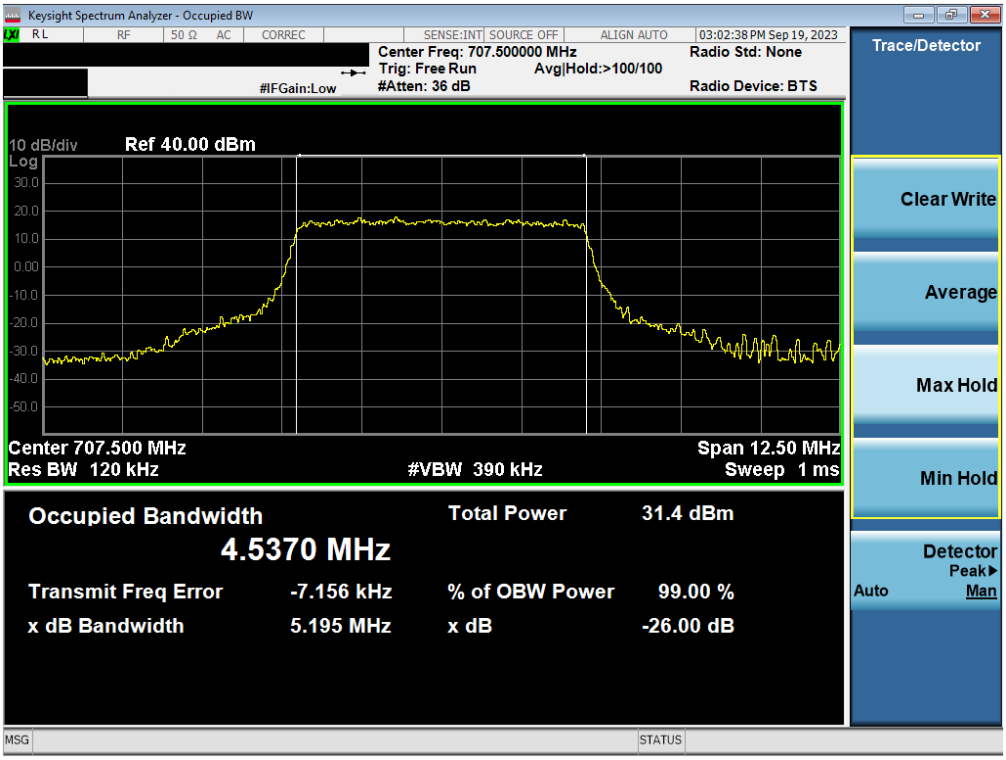
LTE Band 12 – ANT1



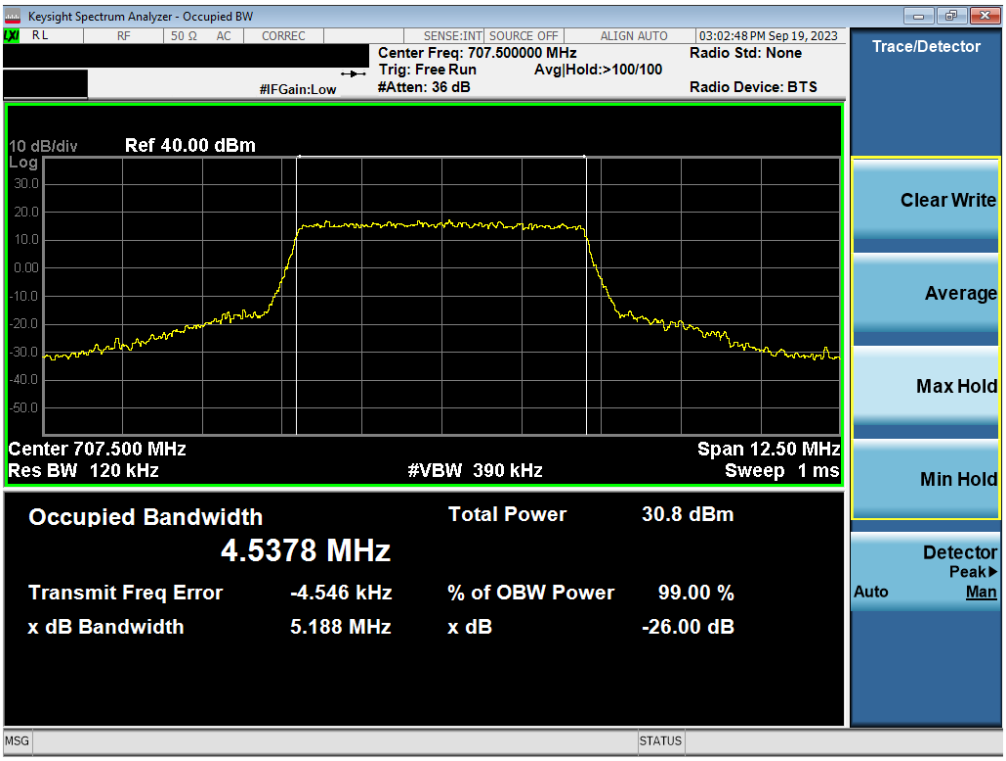
Plot 7-1. Occupied Bandwidth Plot (LTE Band 12 - 10MHz QPSK - Full RB – ANT1)



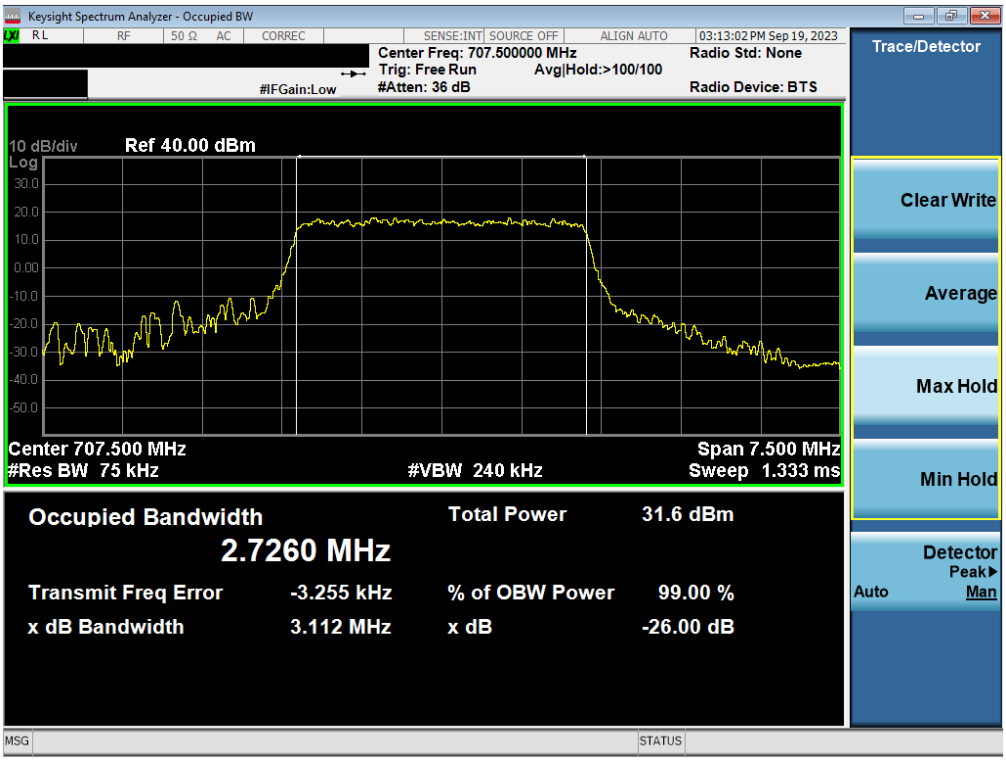
Plot 7-2. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 16-QAM - Full RB – ANT1)



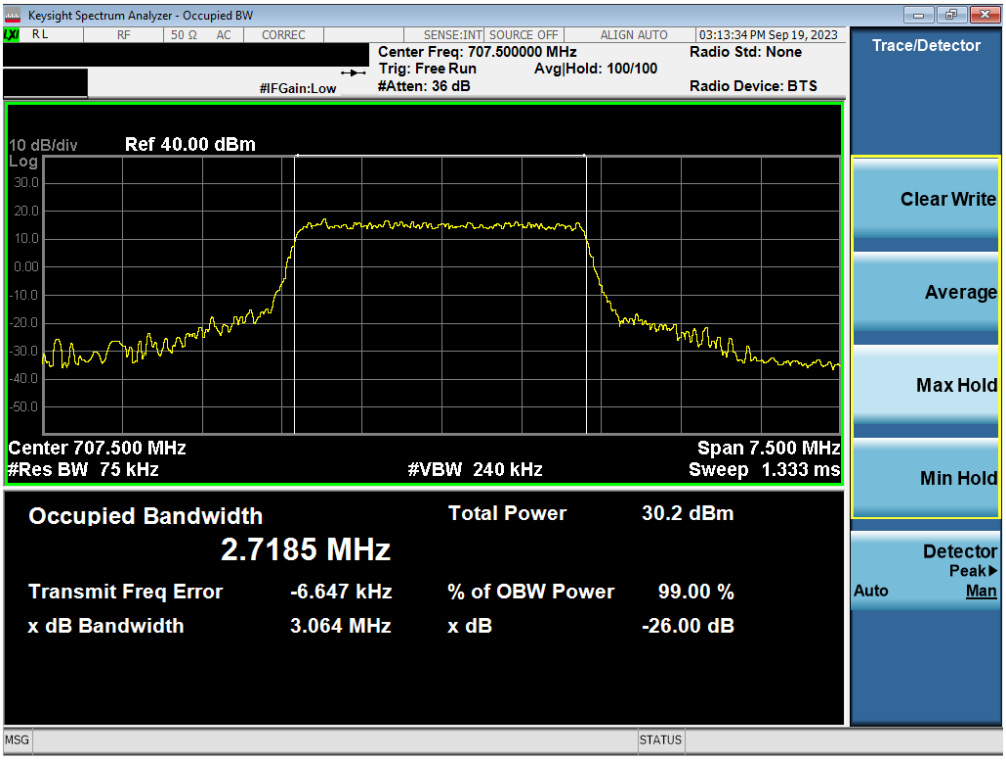
Plot 7-3. Occupied Bandwidth Plot (LTE Band 12 - 5MHz QPSK - Full RB – ANT1)



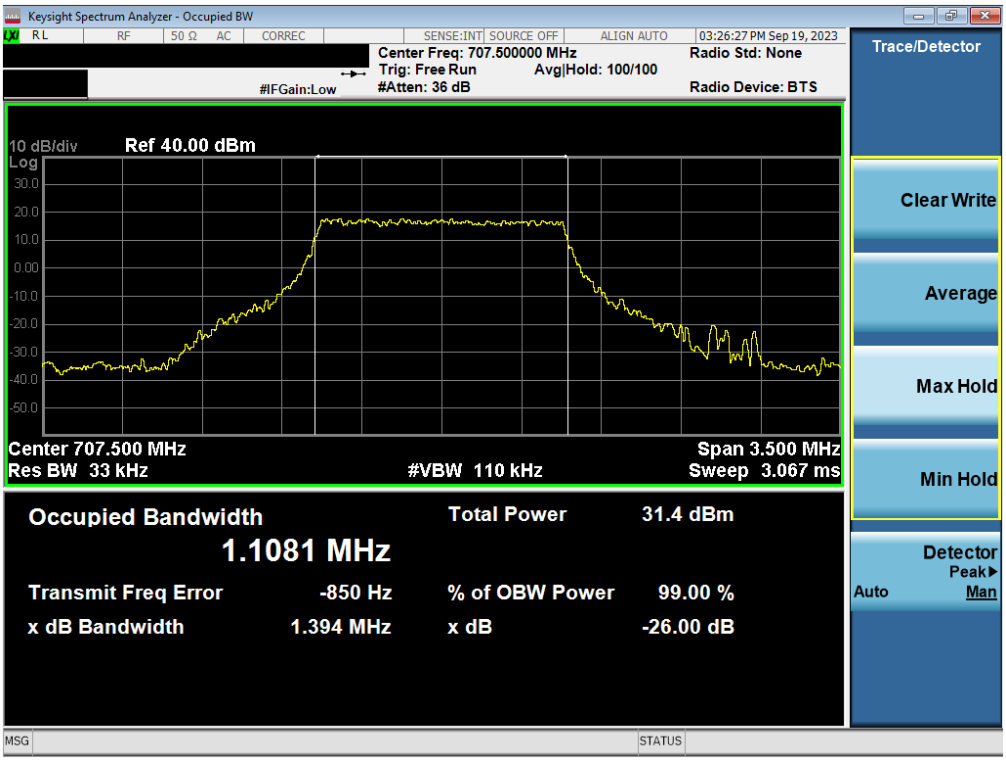
Plot 7-4. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 16-QAM - Full RB – ANT1)



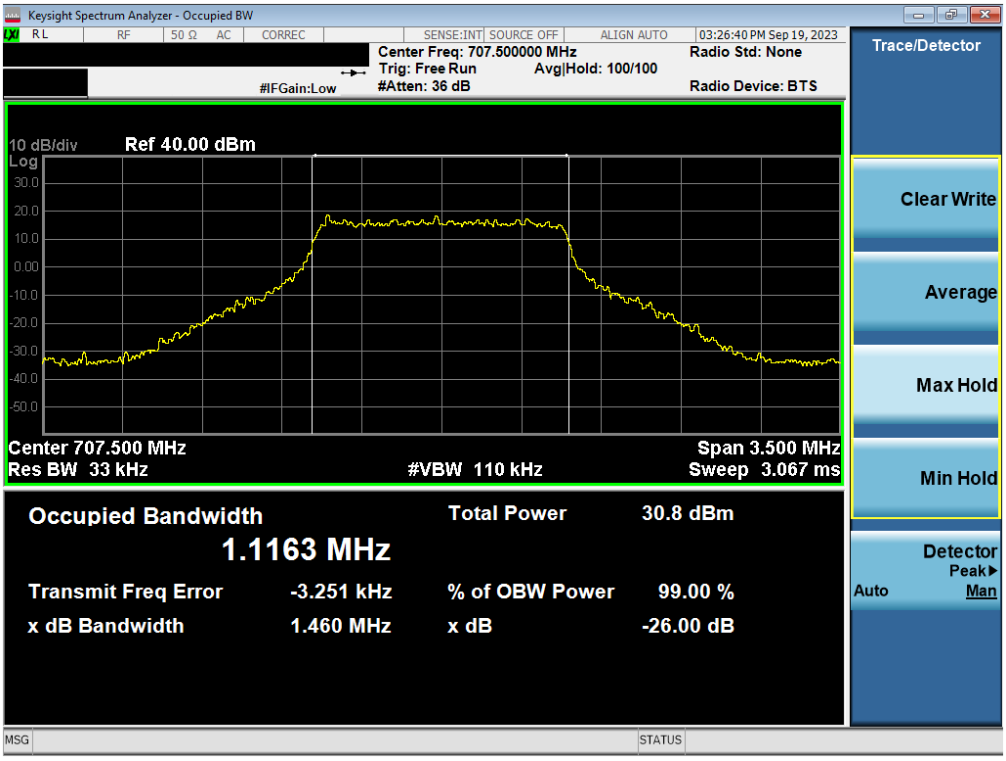
Plot 7-5. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB – ANT1)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB – ANT1)

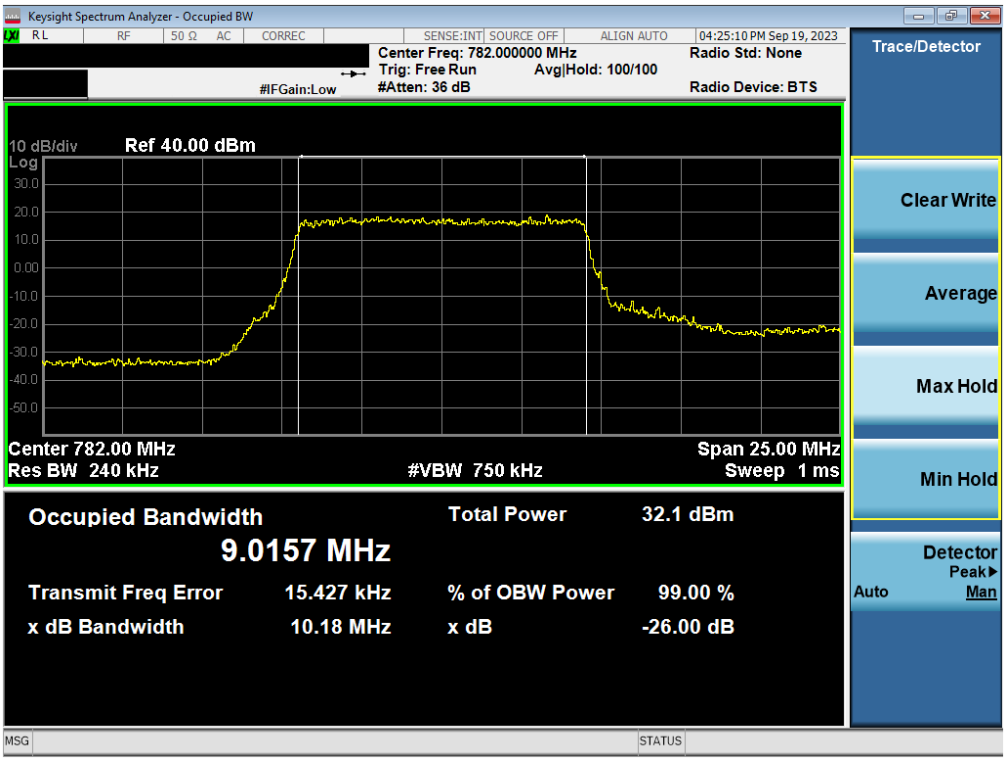


Plot 7-7. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz QPSK - Full RB – ANT1)

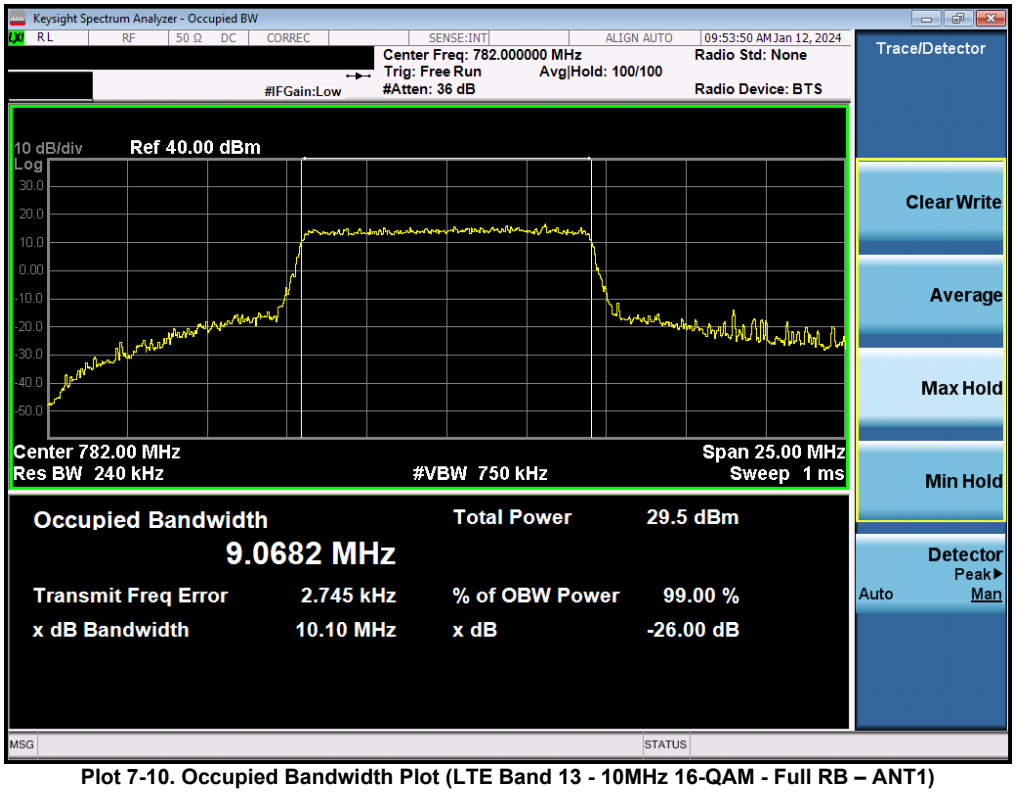


Plot 7-8. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB – ANT1)

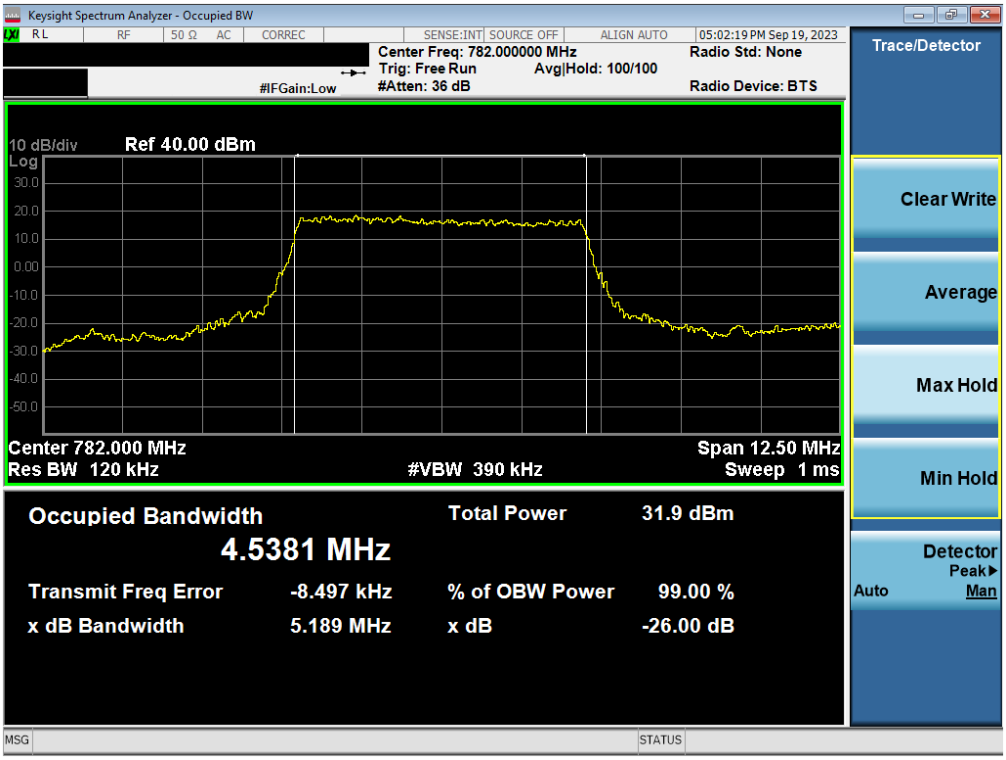
LTE Band 13 – ANT1



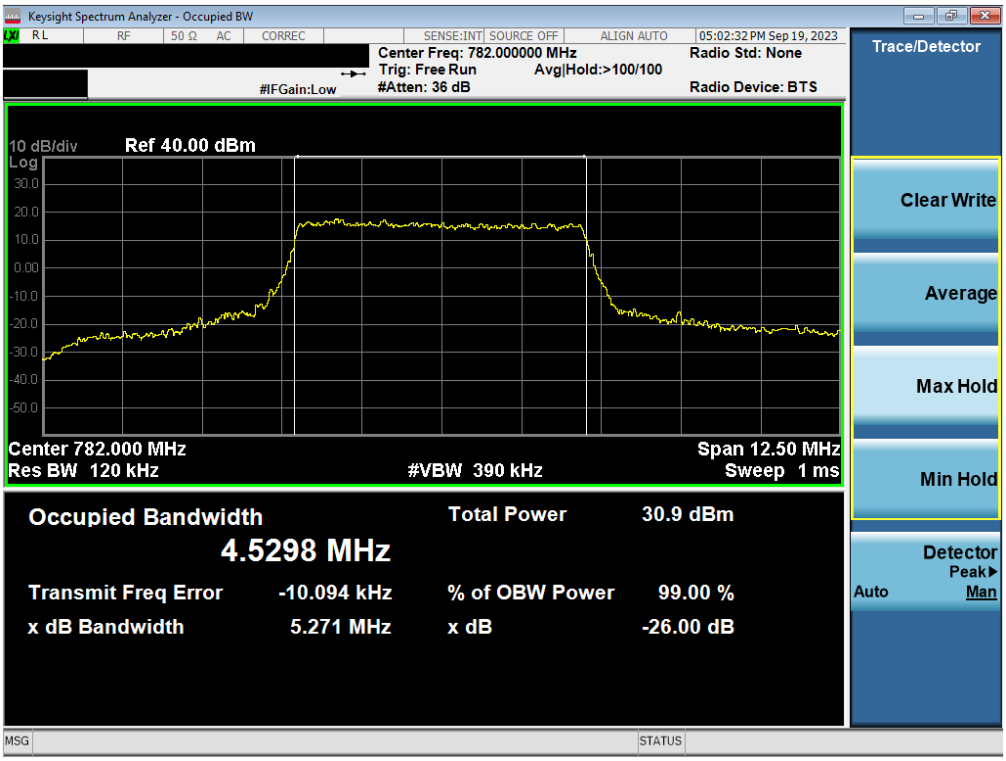
Plot 7-9. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB – ANT1)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB – ANT1)

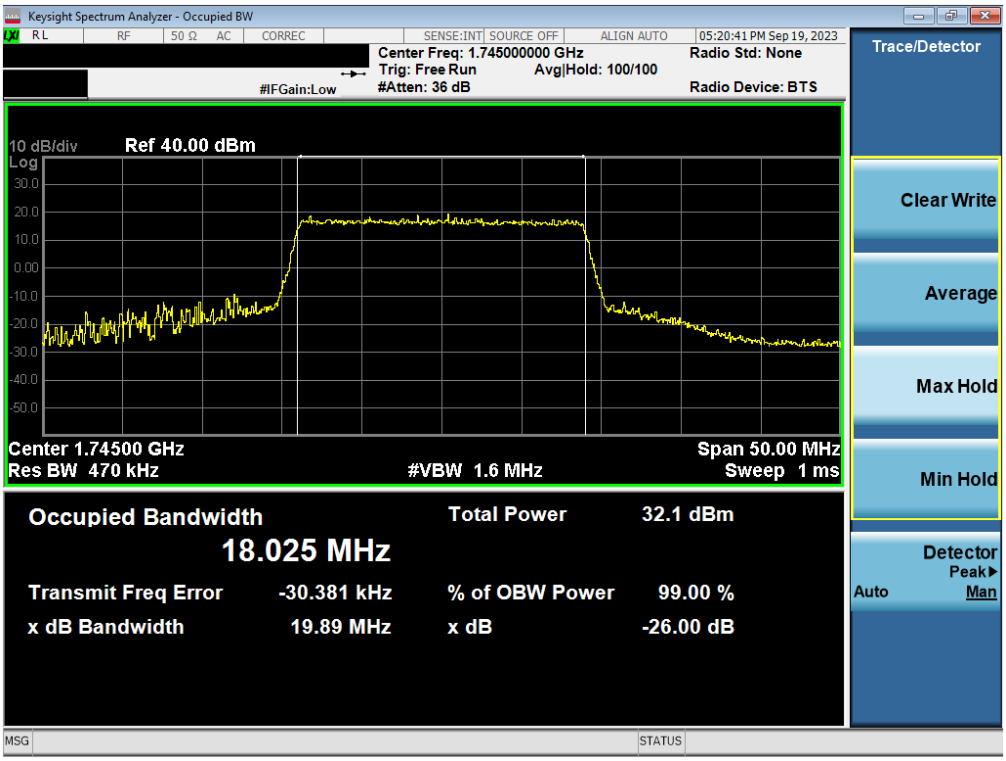


Plot 7-11. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB – ANT1)

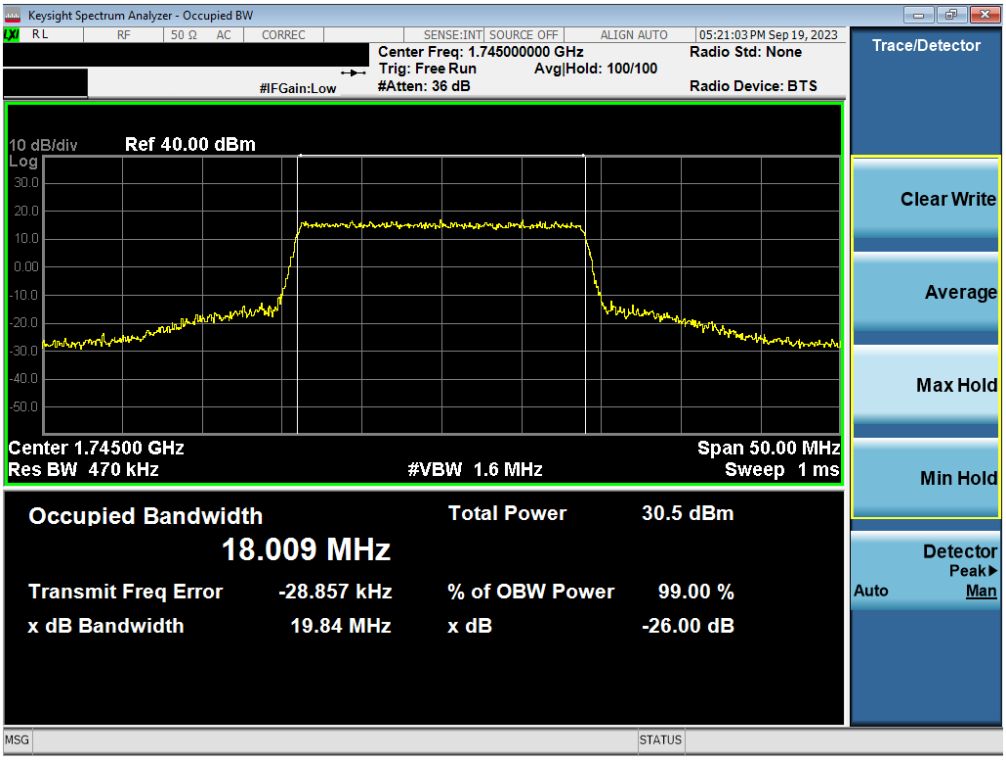


Plot 7-12. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB – ANT1)

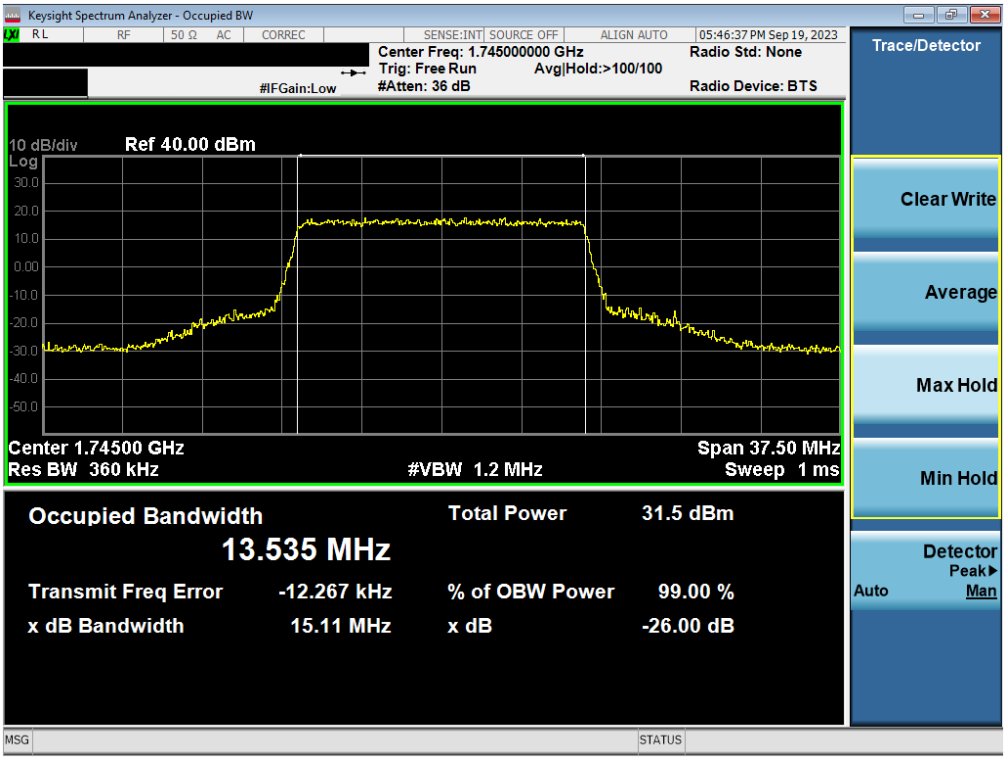
LTE Band 66/4 - ANT1



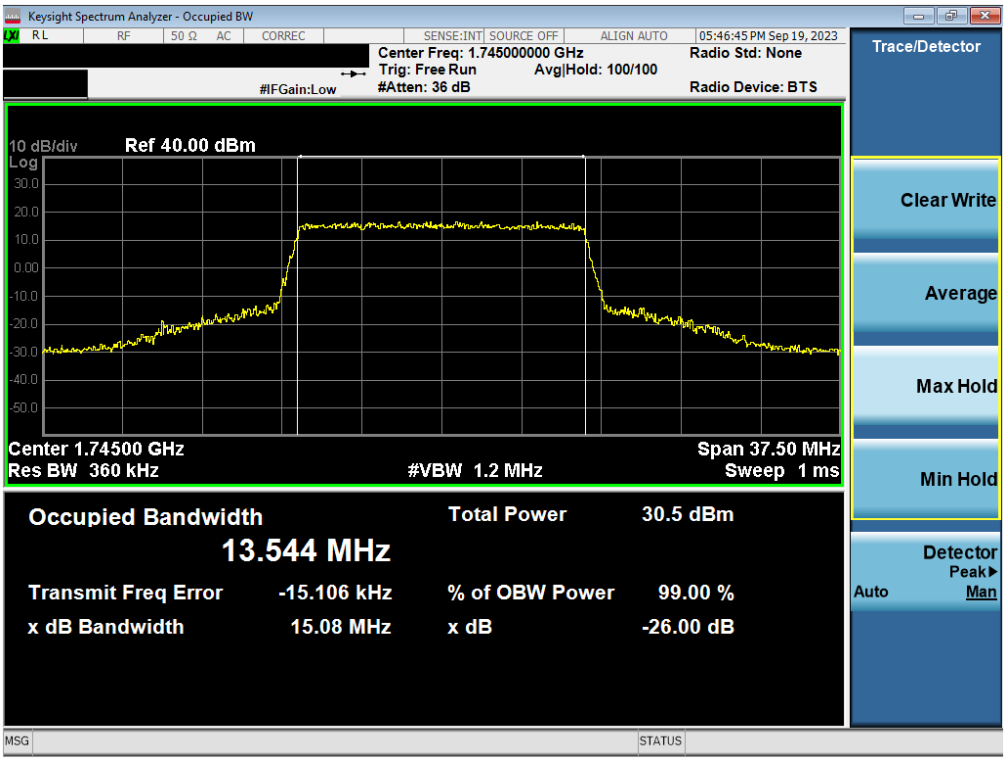
Plot 7-13. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB - ANT1)



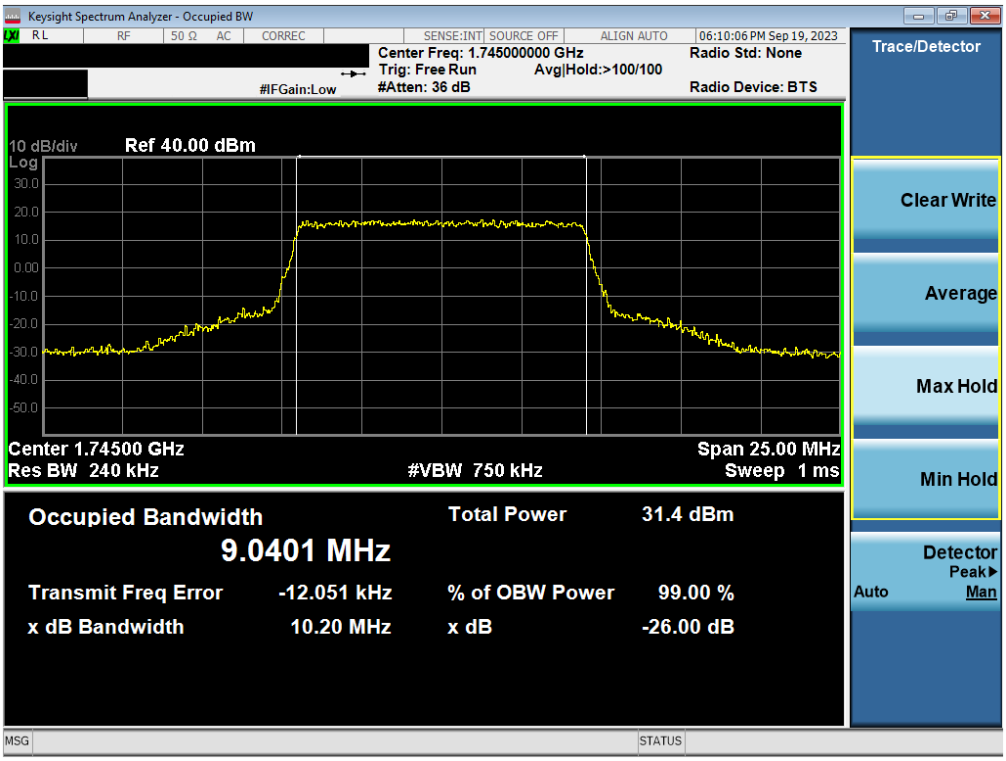
Plot 7-14. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB - ANT1)



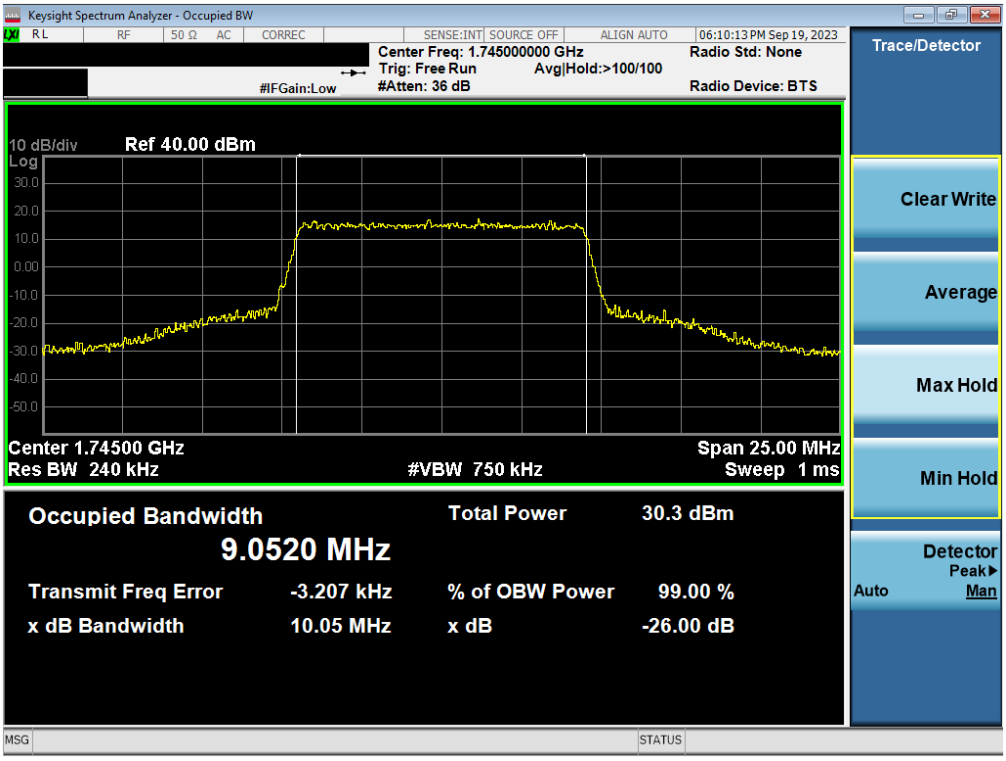
Plot 7-15. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB - ANT1)



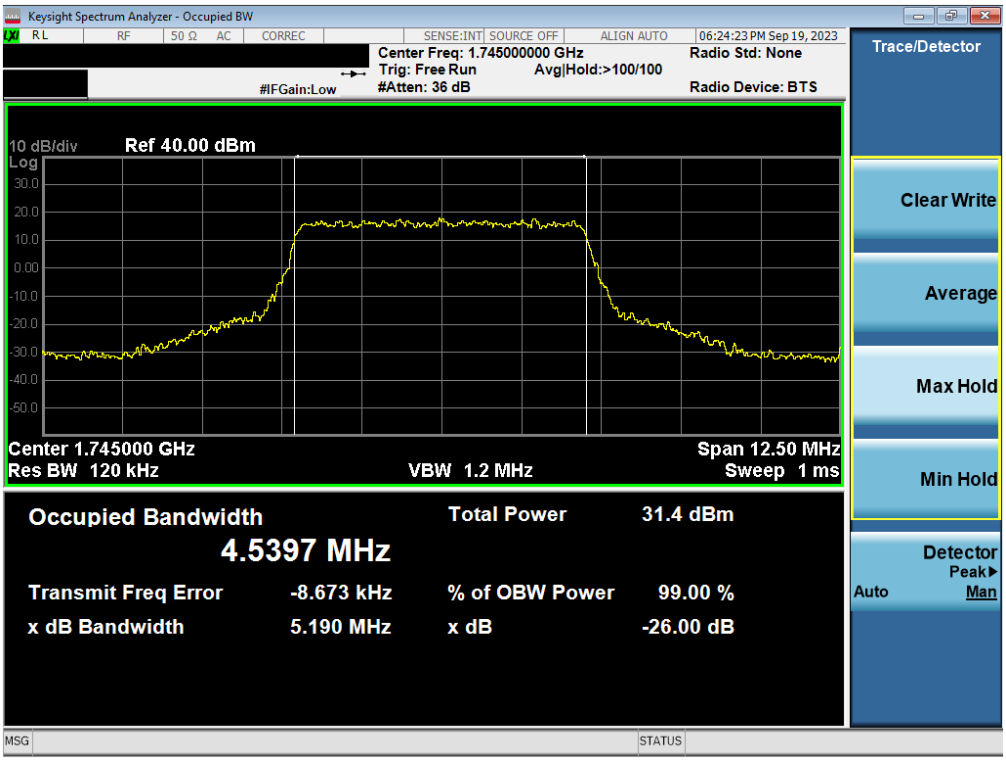
Plot 7-16. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB - ANT1)



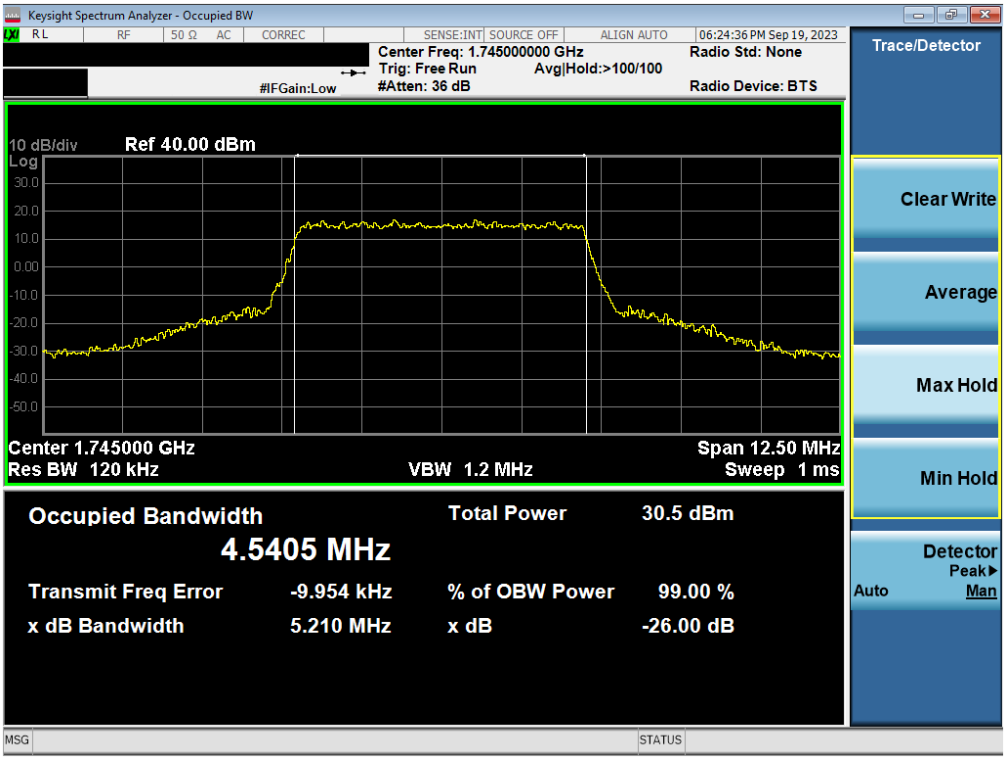
Plot 7-17. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB - ANT1)



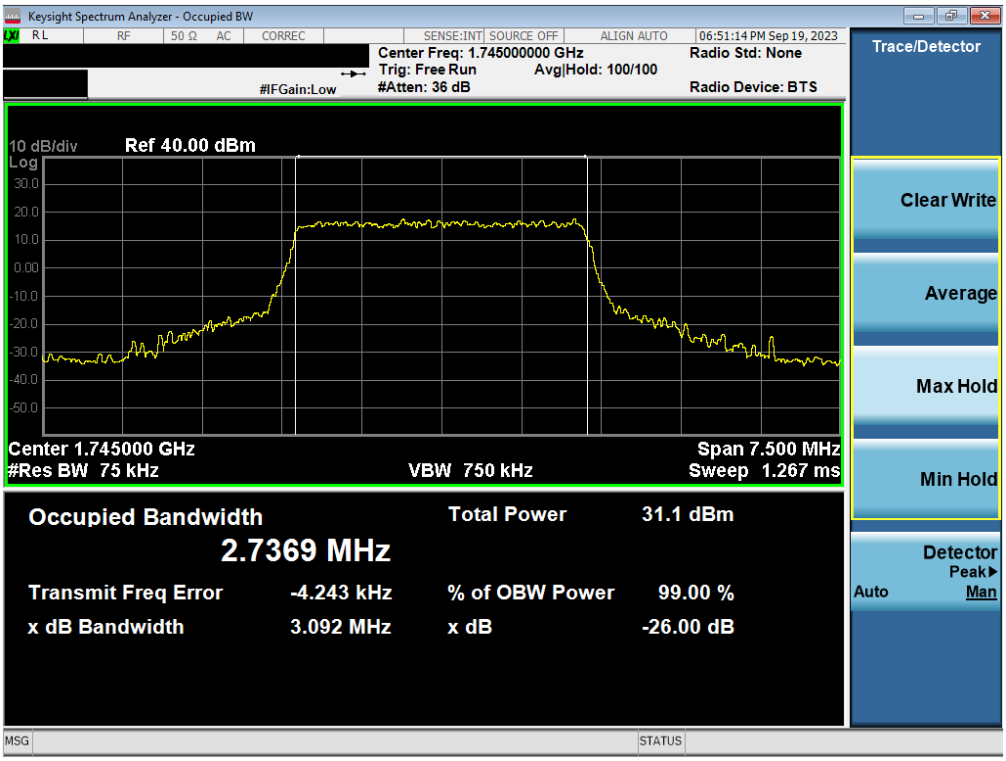
Plot 7-18. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB - ANT1)



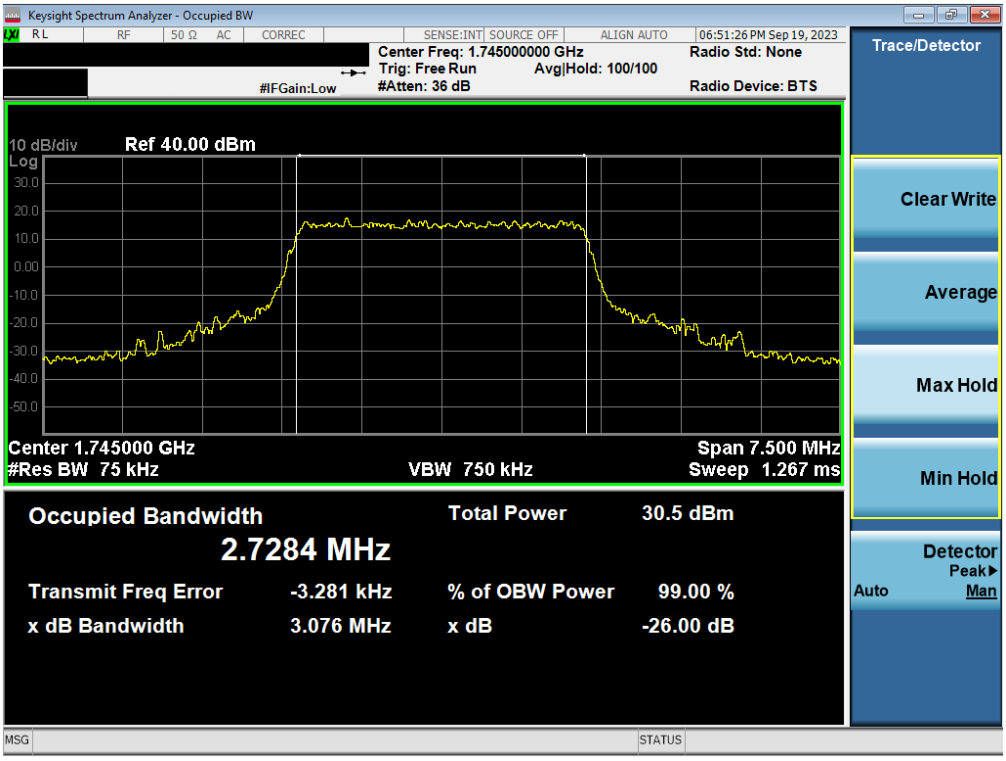
Plot 7-19. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB - ANT1)



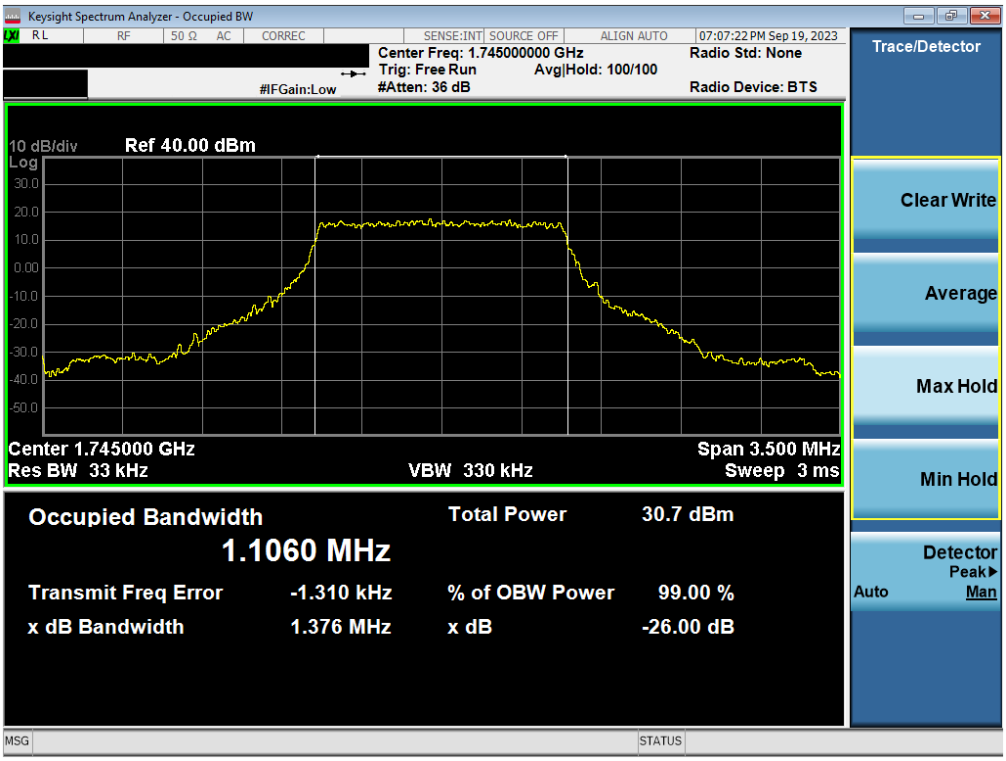
Plot 7-20. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB - ANT1)



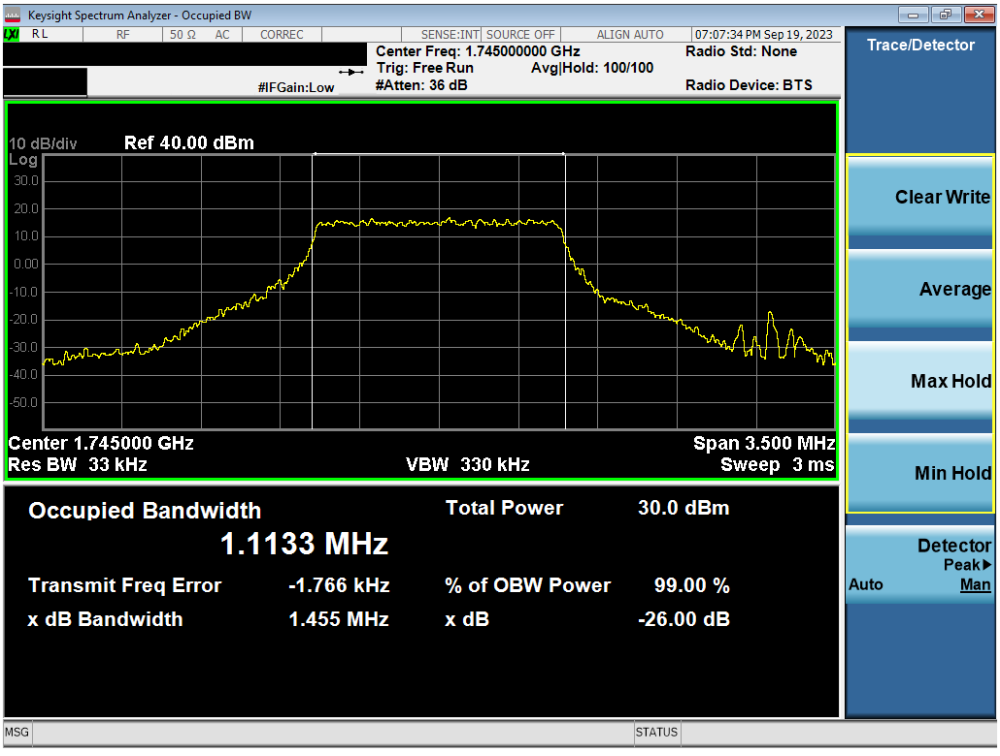
Plot 7-21. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB - ANT1)



Plot 7-22. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB - ANT1)

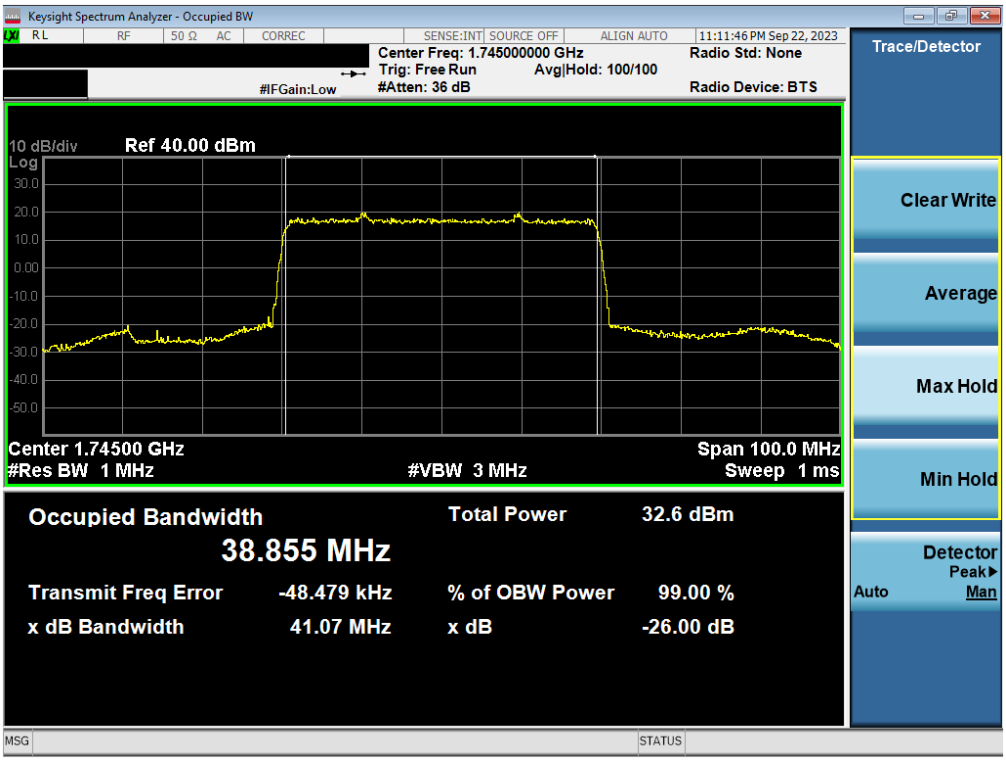


Plot 7-23. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB - ANT1)

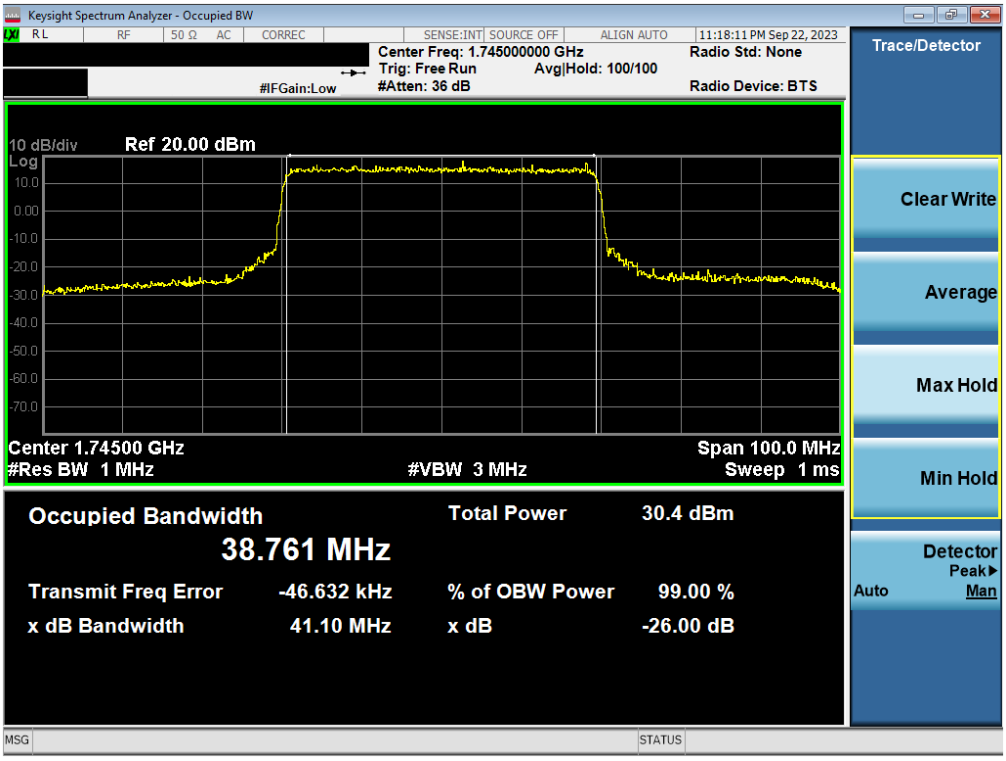


Plot 7-24. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB - ANT1)

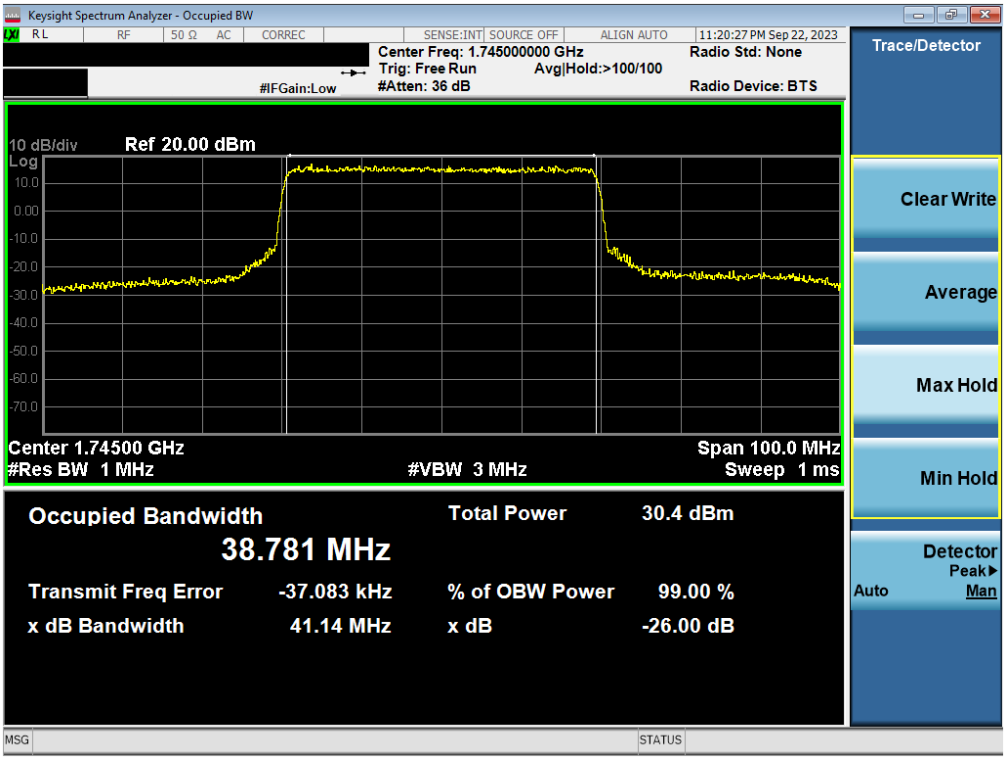
NR Band n66 – ANT1



Plot 7-25. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)

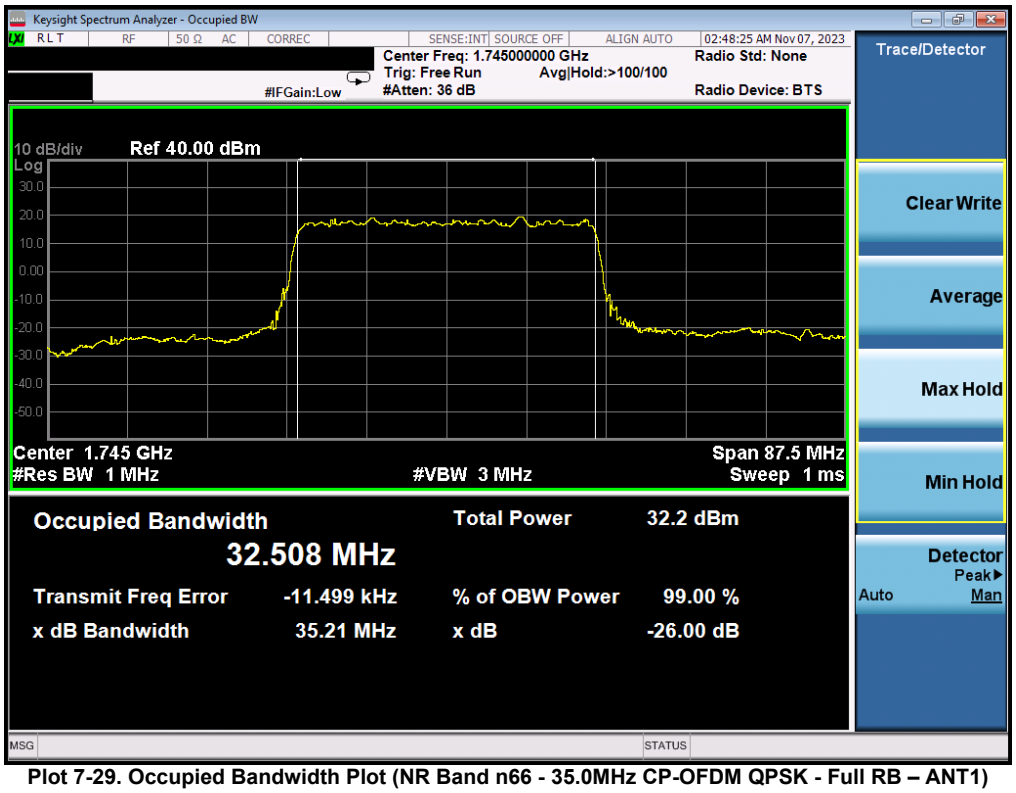


Plot 7-26. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz CP-OFDM QPSK - Full RB – ANT1)

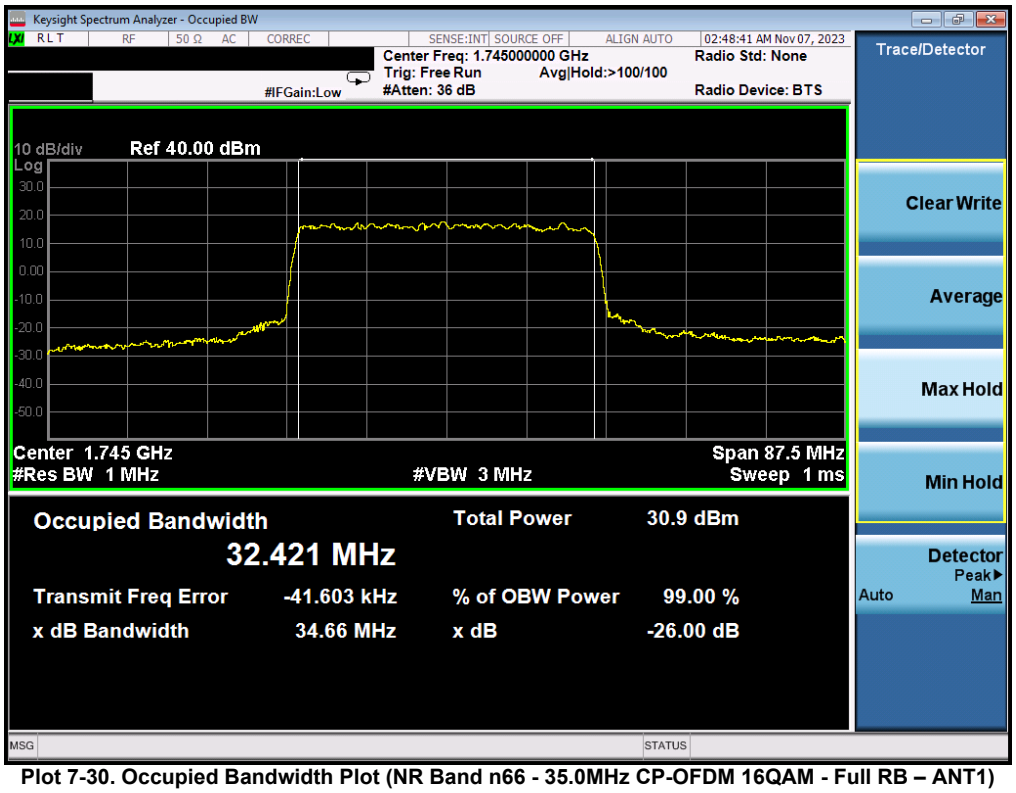


Plot 7-27. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz CP-OFDM 16QAM - Full RB – ANT1)

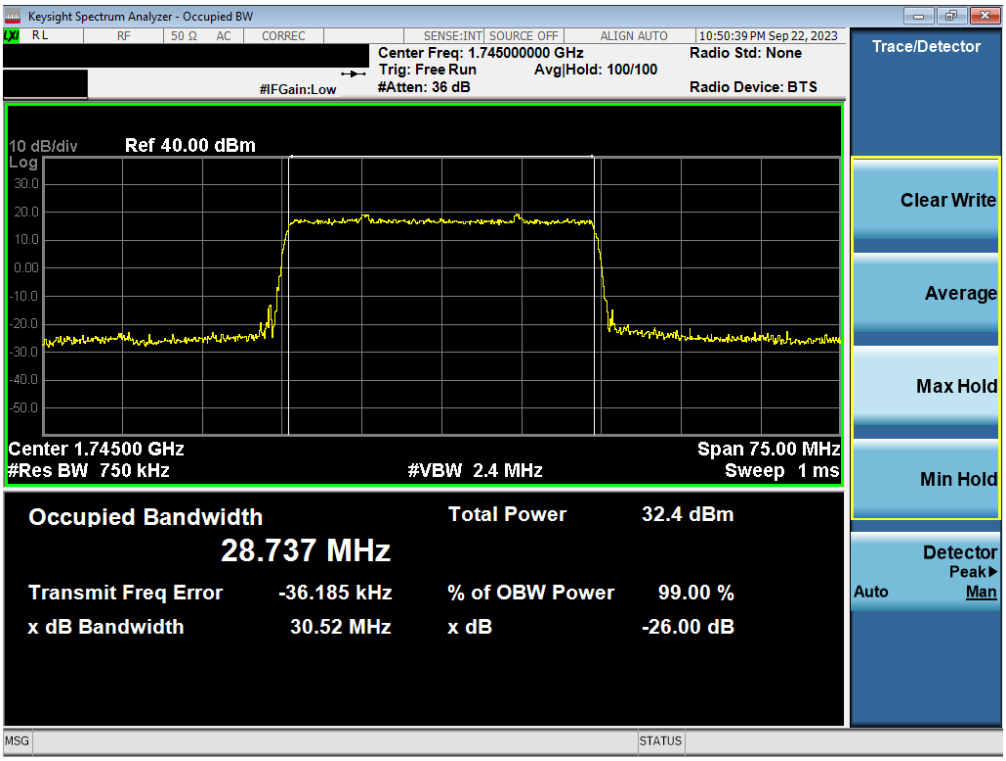
Plot 7-28. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



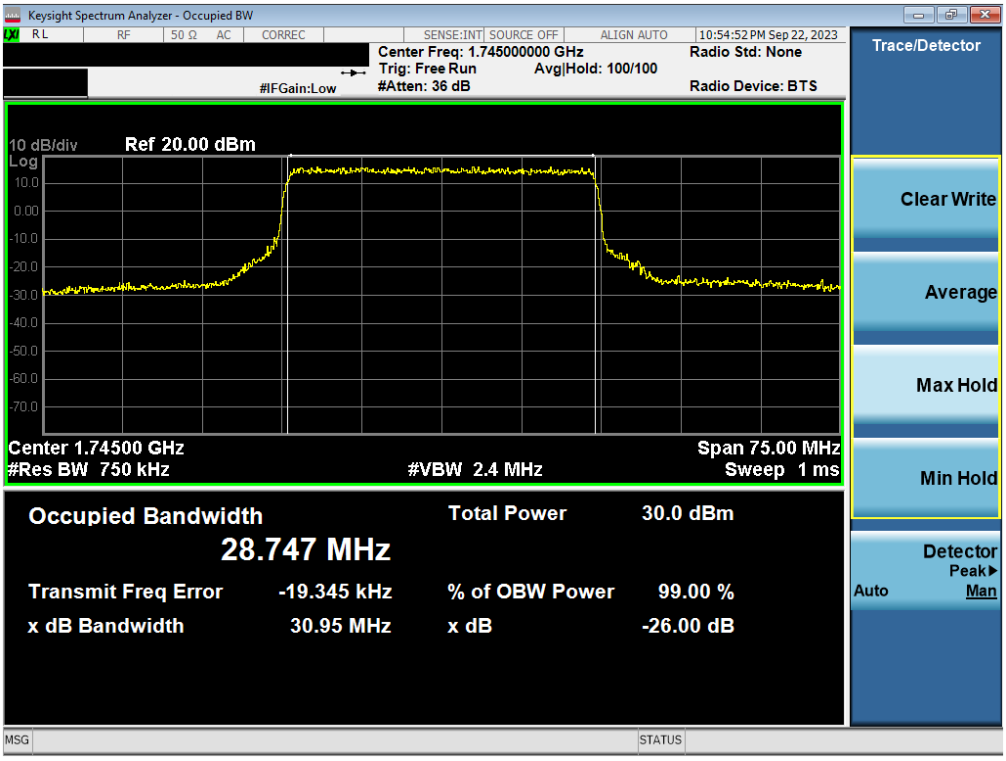
Plot 7-29. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz CP-OFDM QPSK - Full RB – ANT1)



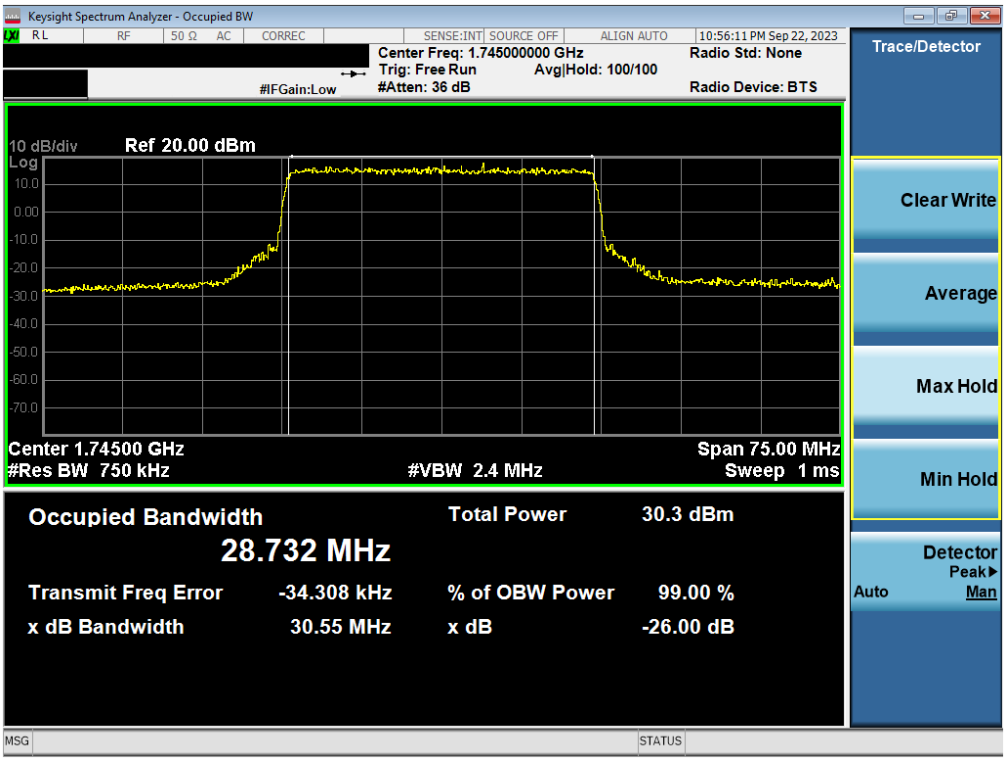
Plot 7-30. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz CP-OFDM 16QAM - Full RB – ANT1)



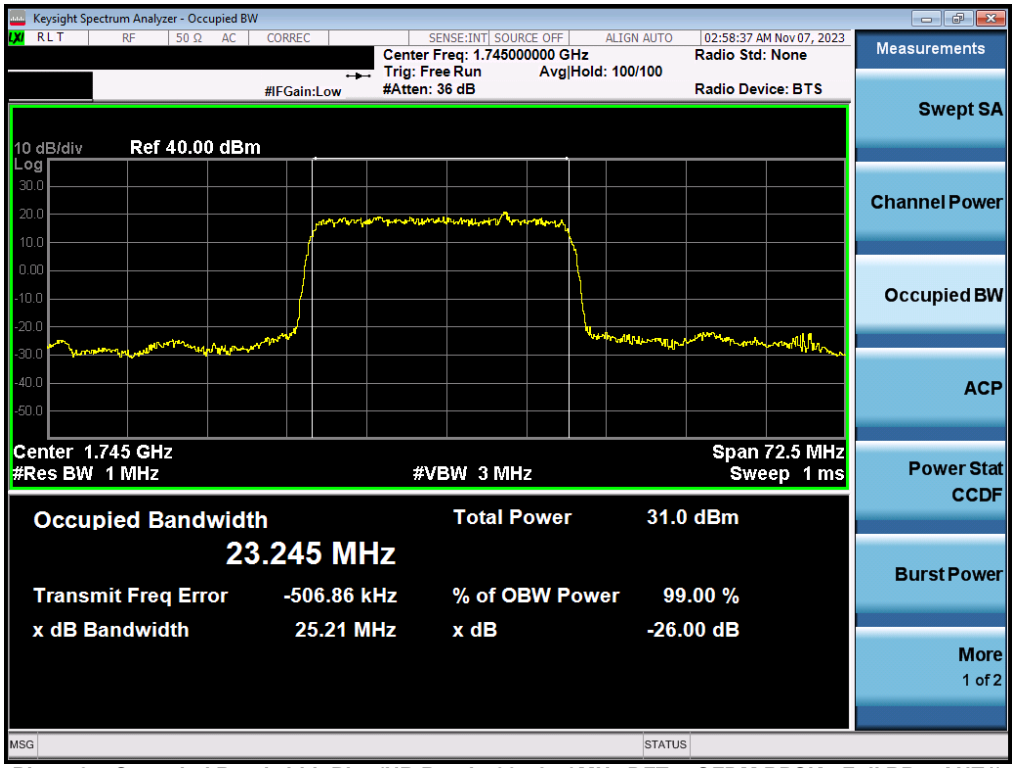
Plot 7-31. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



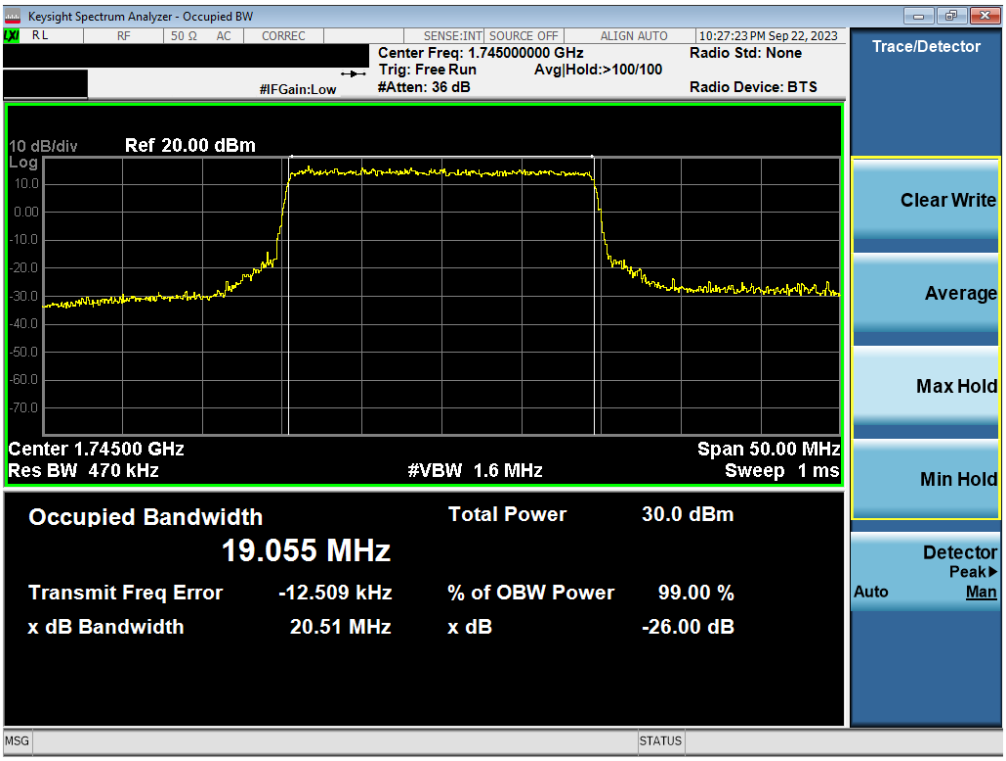
Plot 7-32. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM QPSK - Full RB – ANT1)



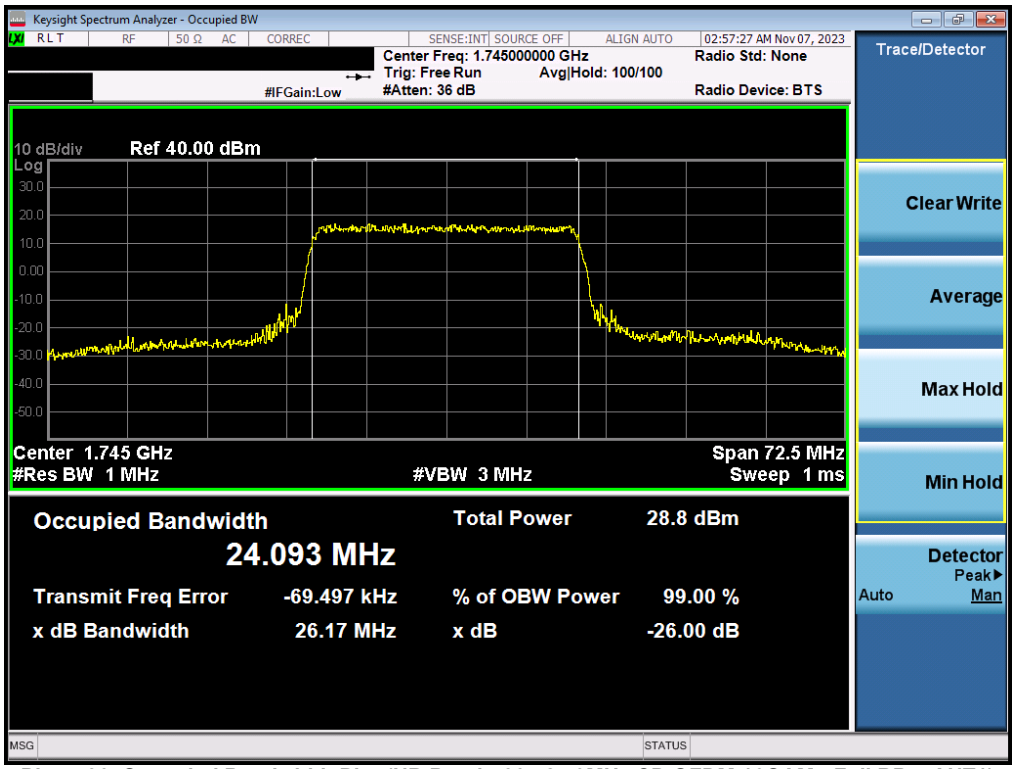
Plot 7-33. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM 16QAM - Full RB – ANT1)



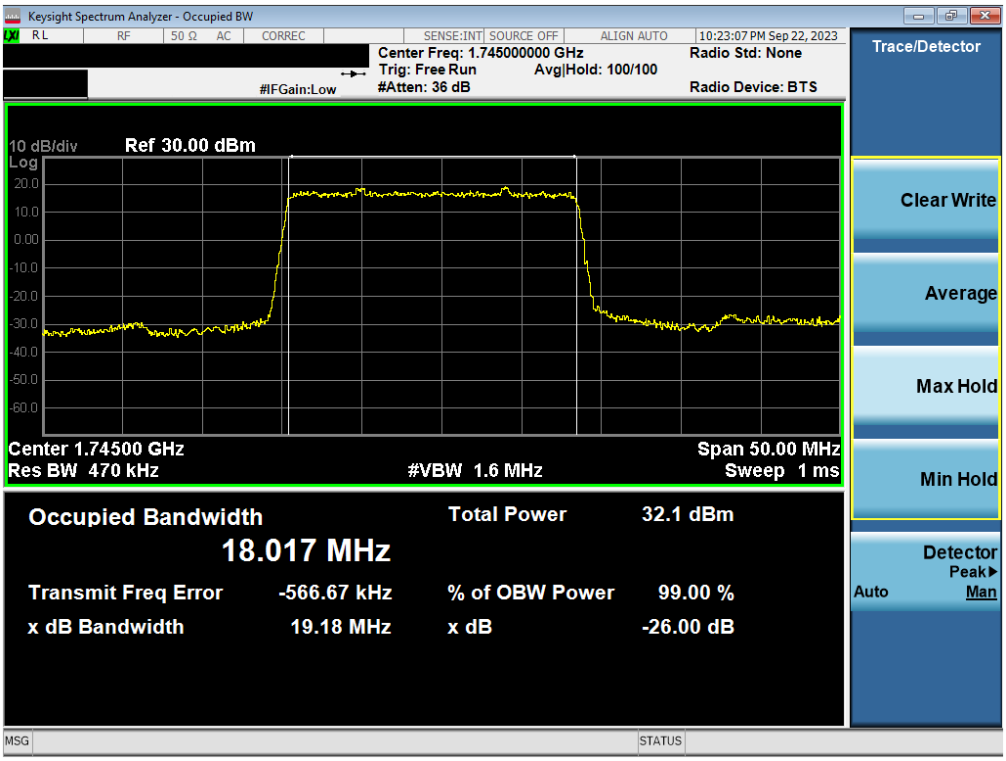
Plot 7-34. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



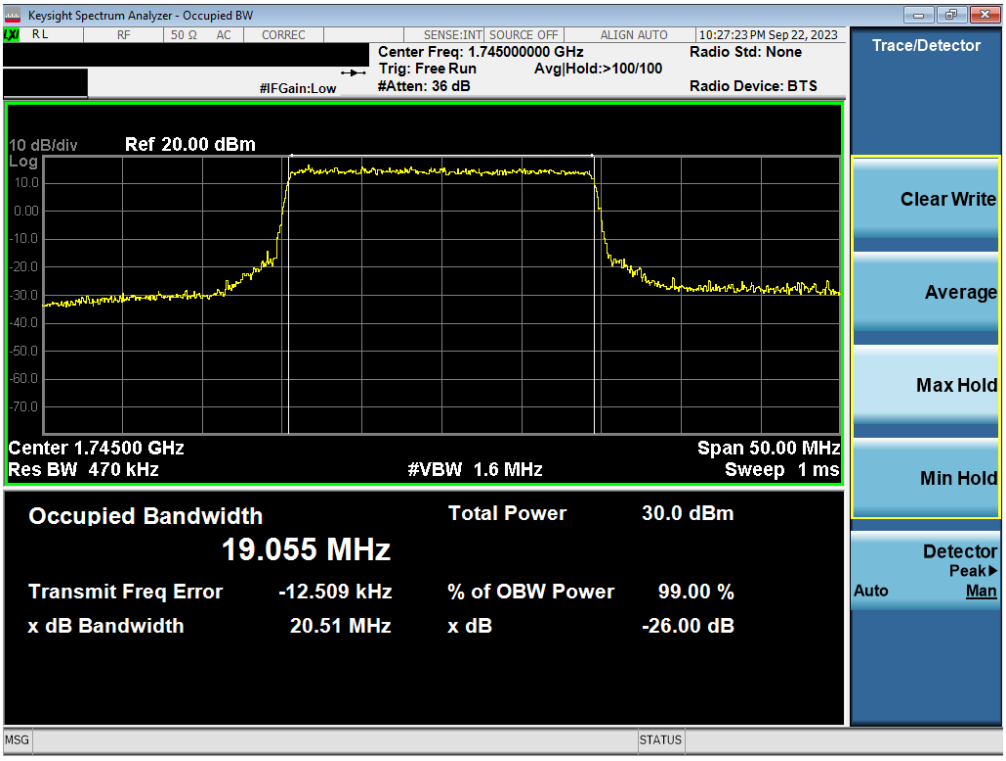
Plot 7-35. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM QPSK - Full RB – ANT1)



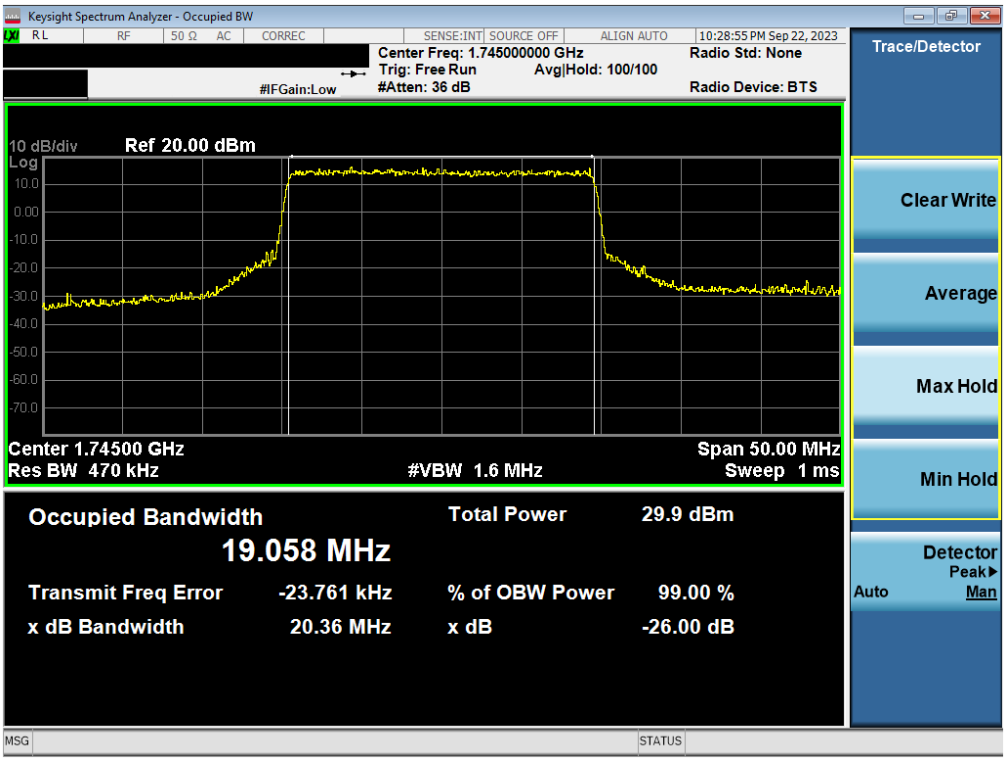
Plot 7-36. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM 16QAM - Full RB – ANT1)



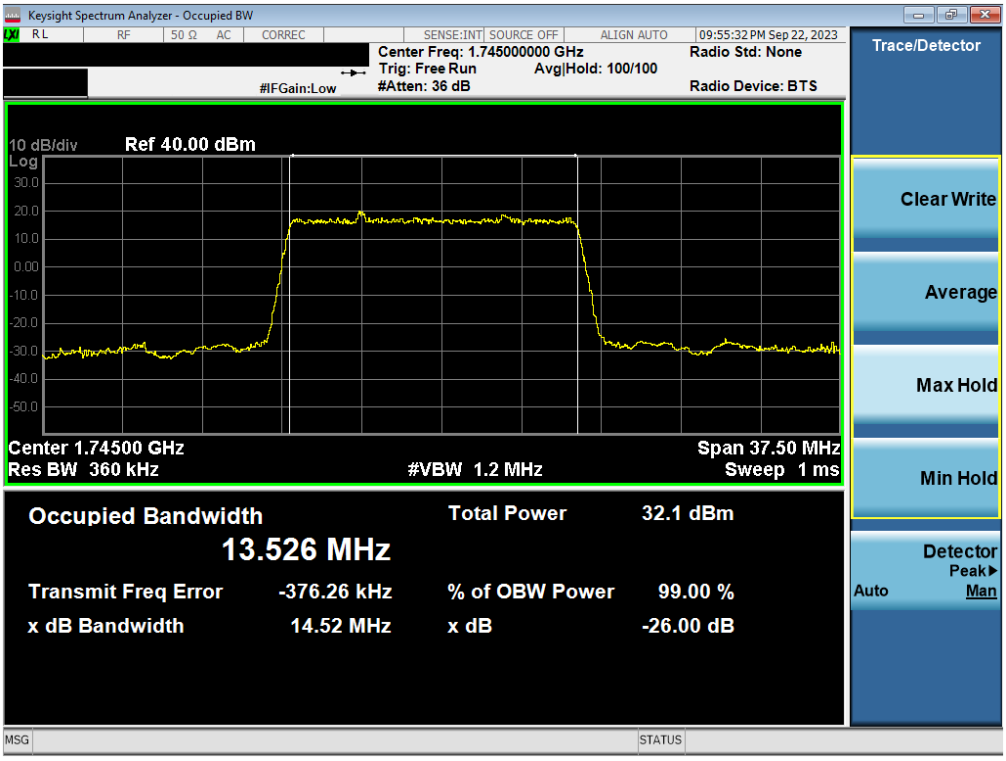
Plot 7-37. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



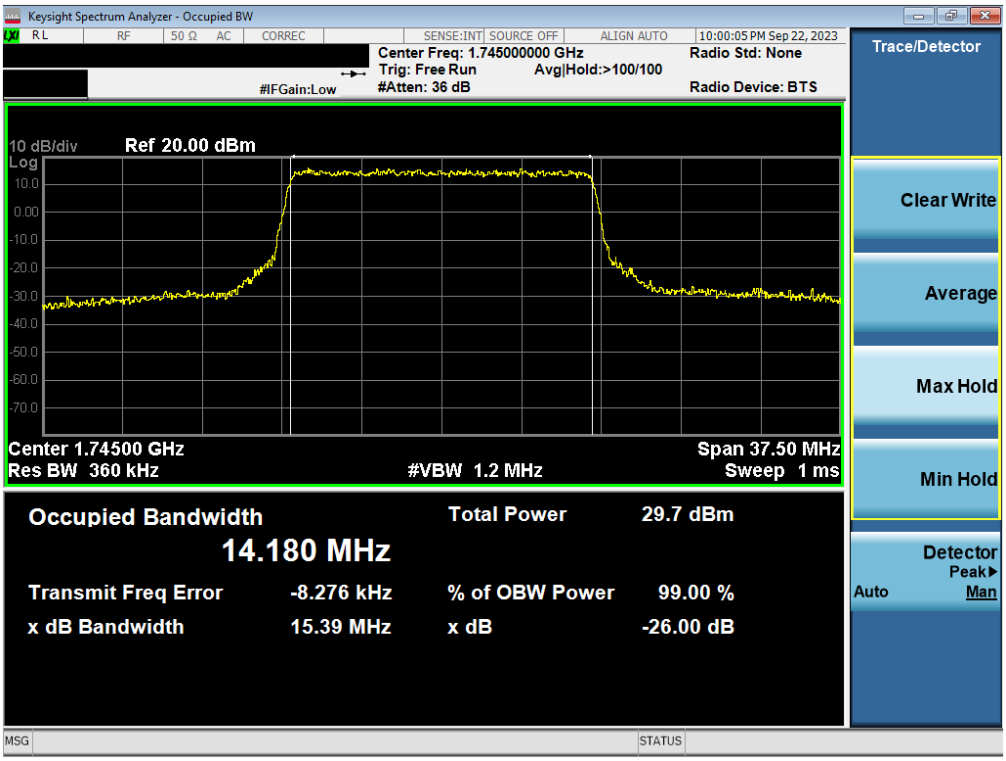
Plot 7-38. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB – ANT1)



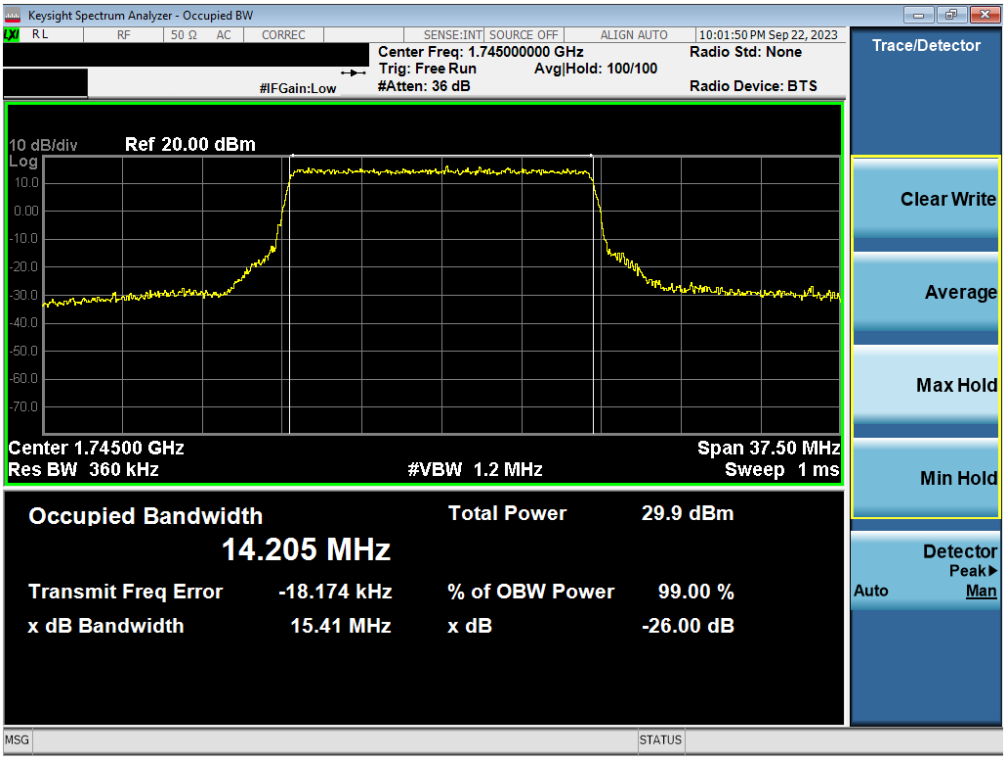
Plot 7-39. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – ANT1)



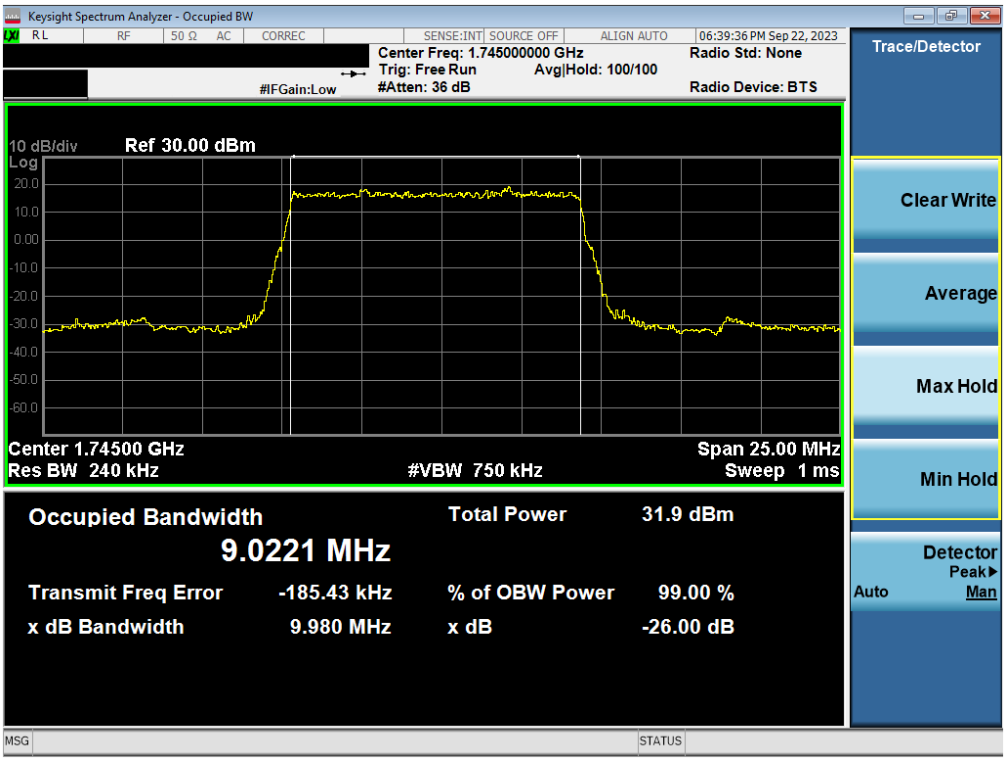
Plot 7-40. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



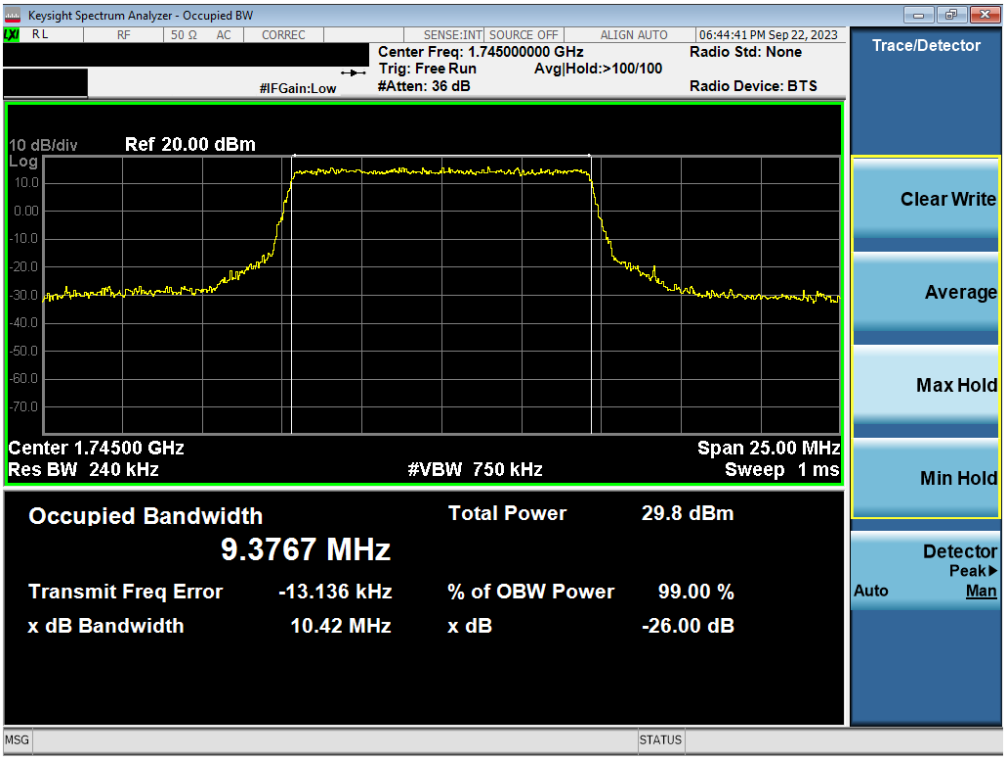
Plot 7-41. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB – ANT1)



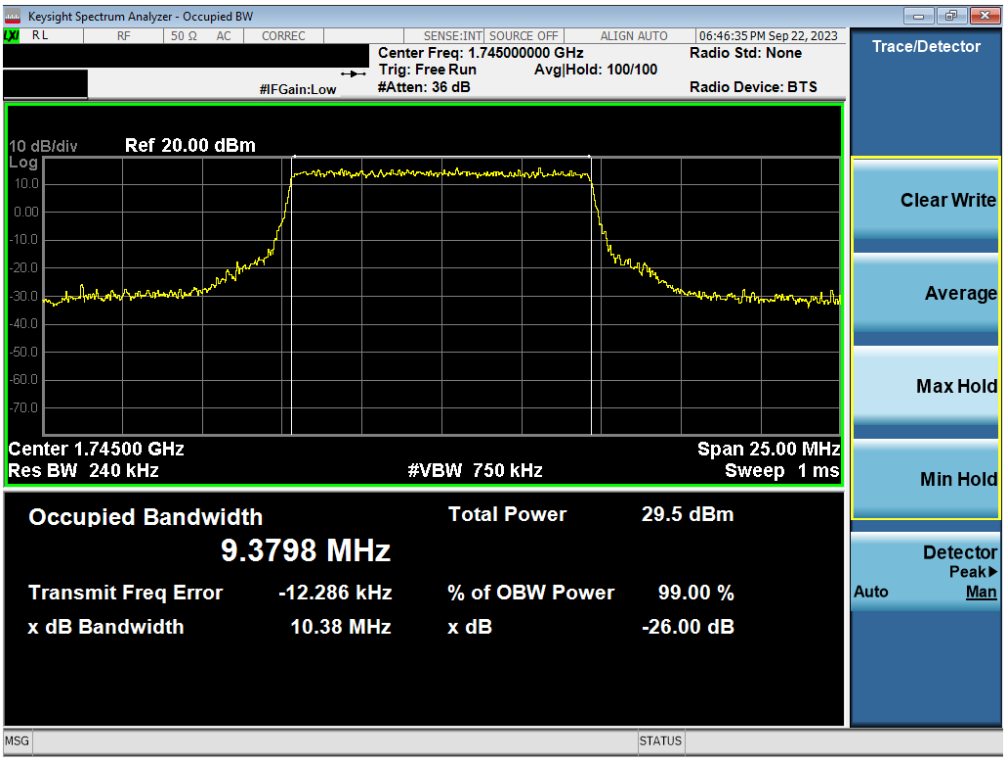
Plot 7-42. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB – ANT1)



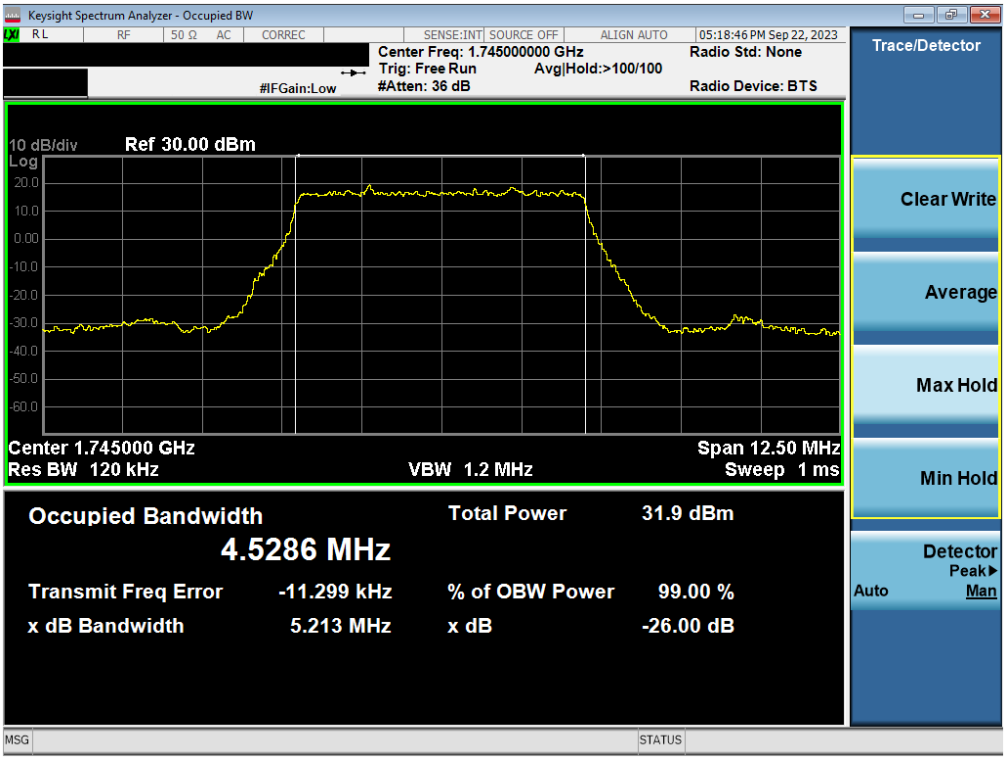
Plot 7-43. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



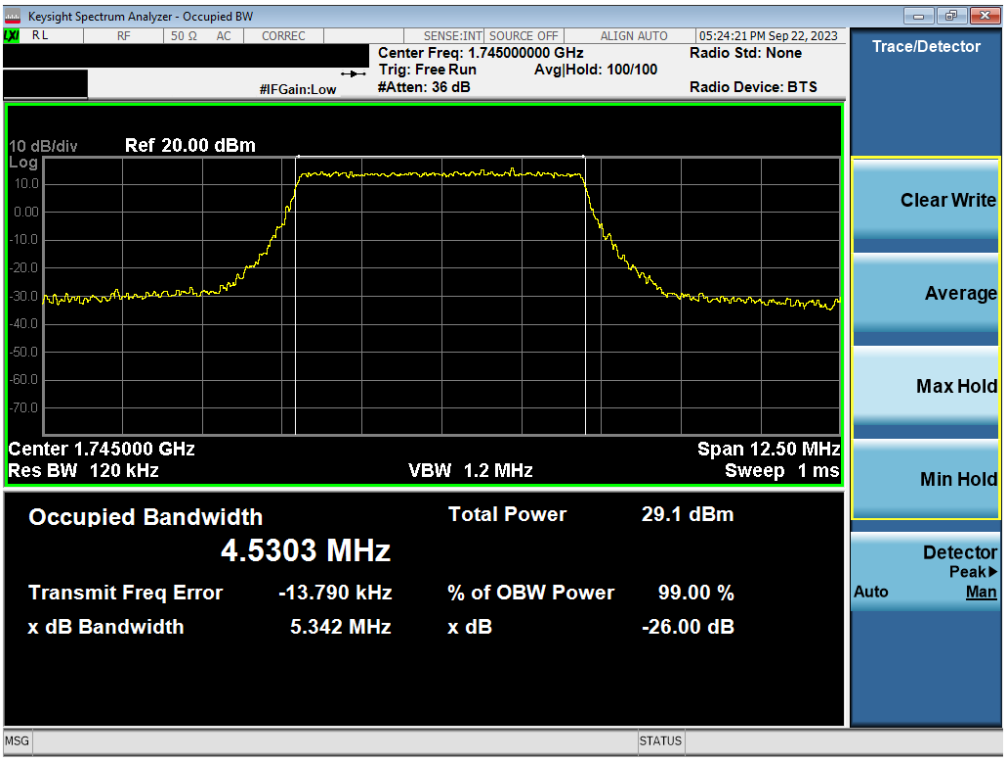
Plot 7-44. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB – ANT1)



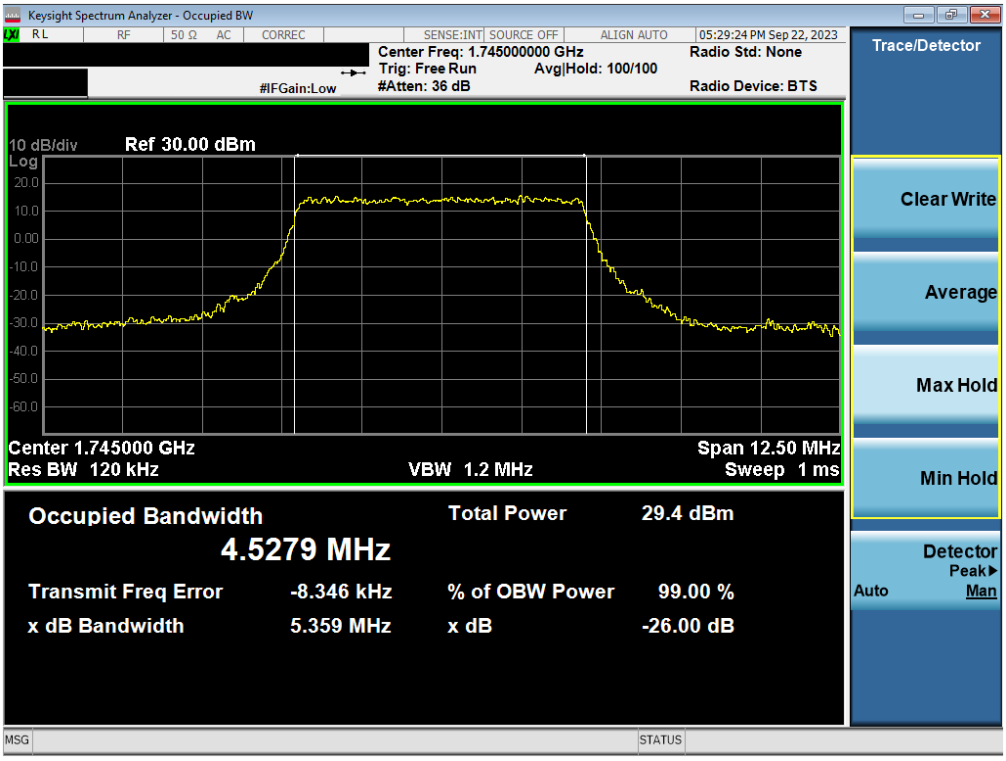
Plot 7-45. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB – ANT1)



Plot 7-46. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB – ANT1)



Plot 7-47. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB – ANT1)



Plot 7-48. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB – ANT1)

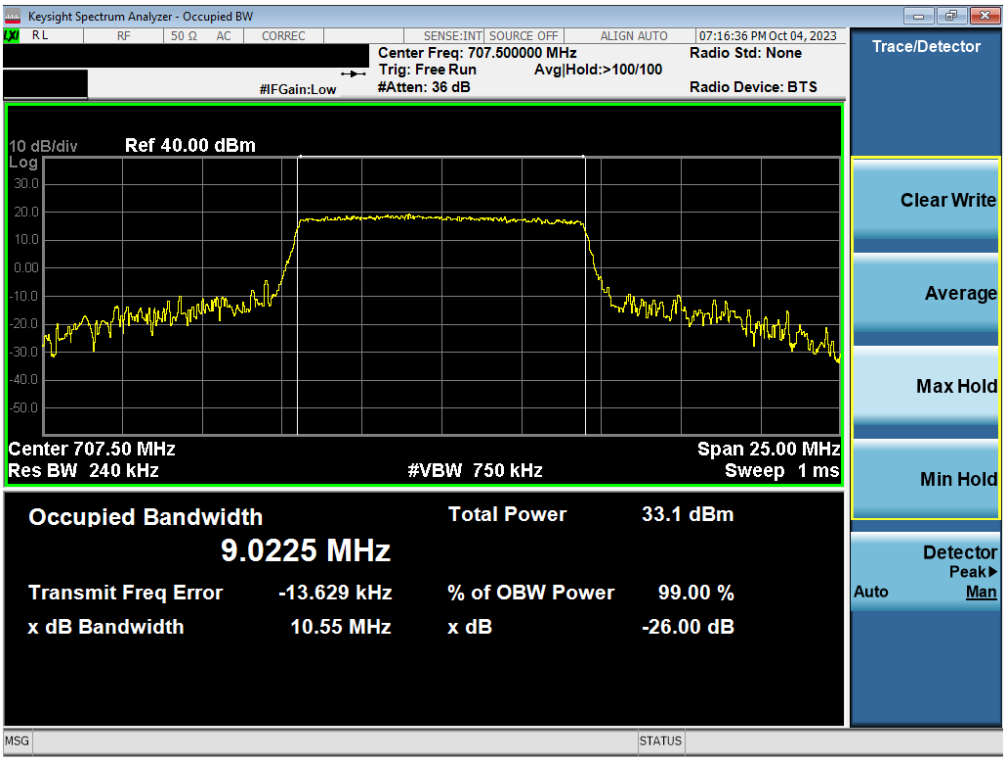
Mode	Bandwidth	Modulation	OBW [MHz]
LTE-B12	10MHz	QPSK	9.02
		16QAM	9.00
	5MHz	QPSK	4.54
		16QAM	4.54
	3MHz	QPSK	2.73
		16QAM	2.72
	1.4MHz	QPSK	1.11
		16QAM	1.11
LTE-B13	10MHz	QPSK	9.01
		16QAM	9.02
	5MHz	QPSK	4.54
		16QAM	4.55
LTE-B66-4	20MHz	QPSK	18.06
		16QAM	18.06
	15MHz	QPSK	13.60
		16QAM	13.54
	10MHz	QPSK	9.04
		16QAM	9.04
	5MHz	QPSK	4.54
		16QAM	4.55
	3MHz	QPSK	2.73
		16QAM	2.73
	1.4MHz	QPSK	1.11
		16QAM	1.11

Table 7-7. Occupied Bandwidth Test Result - Ant2

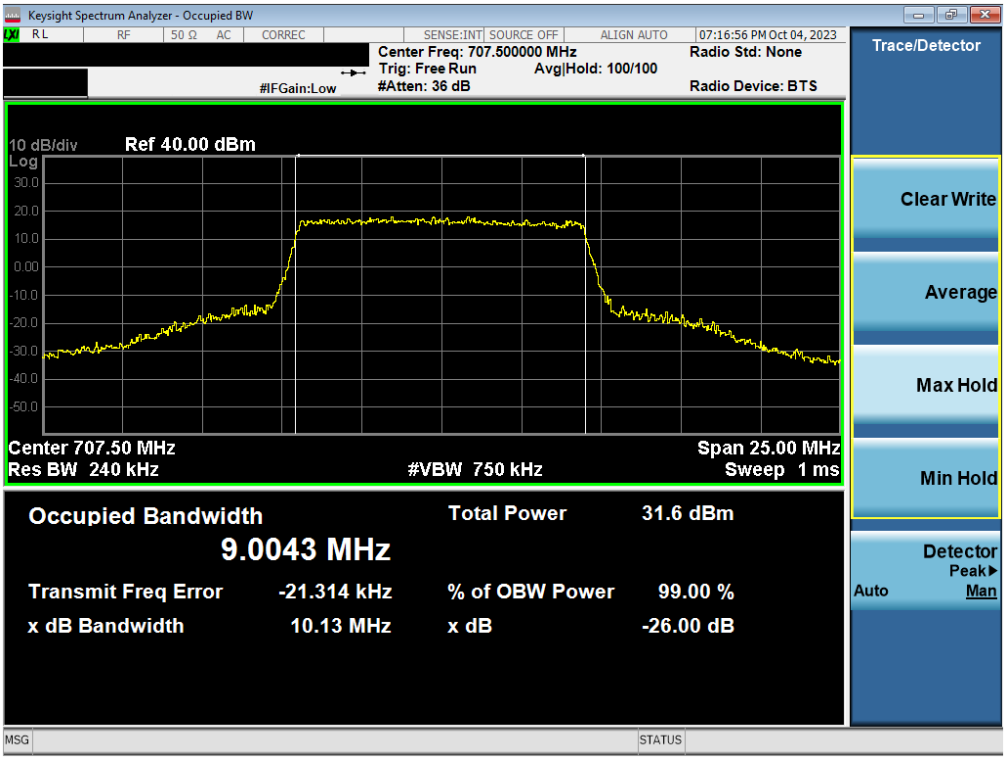
Mode	Bandwidth	Modulation	OBW [MHz]
NR-n66	40MHz	π/2 BPSK	38.84
		QPSK	38.82
		16QAM	38.91
	30MHz	π/2 BPSK	28.86
		QPSK	28.76
		16QAM	28.82
	20MHz	π/2 BPSK	18.00
		QPSK	19.04
		16QAM	19.04
	15MHz	π/2 BPSK	13.53
		QPSK	14.22
		16QAM	14.22
	10MHz	π/2 BPSK	9.05
		QPSK	9.36
		16QAM	9.35
	5MHz	π/2 BPSK	4.55
		QPSK	4.54
		16QAM	4.52

Table 7-8. Occupied Bandwidth Test Result - Ant2

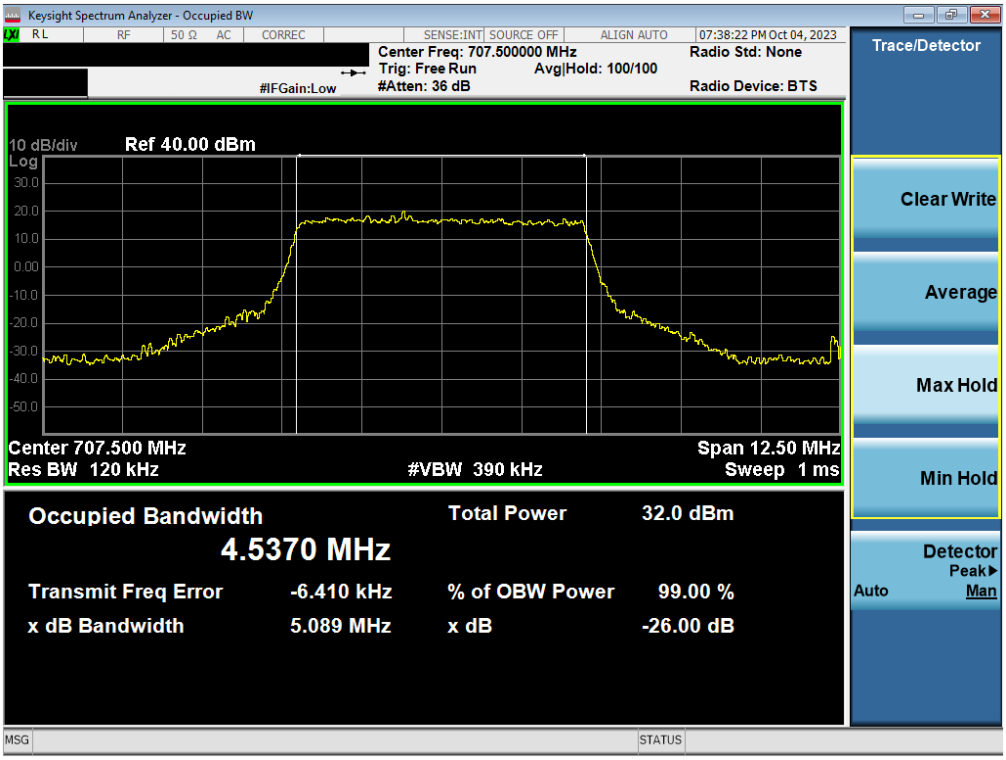
LTE Band 12 – ANT2



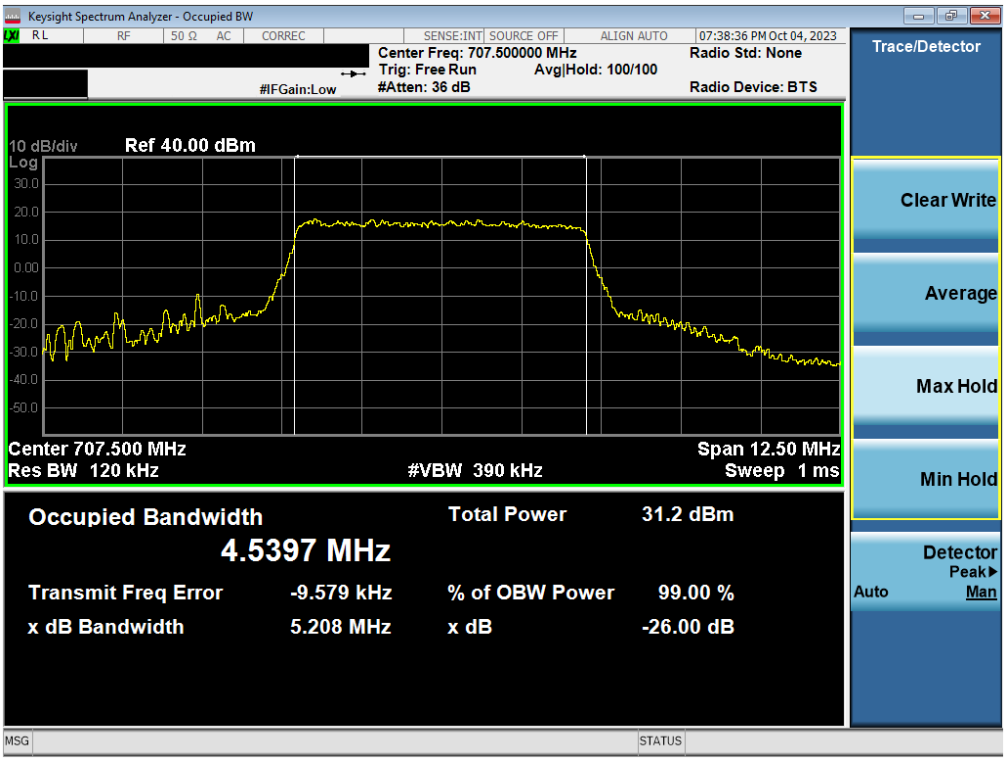
Plot 7-49. Occupied Bandwidth Plot (LTE Band 12 - 10MHz QPSK - Full RB – ANT2)



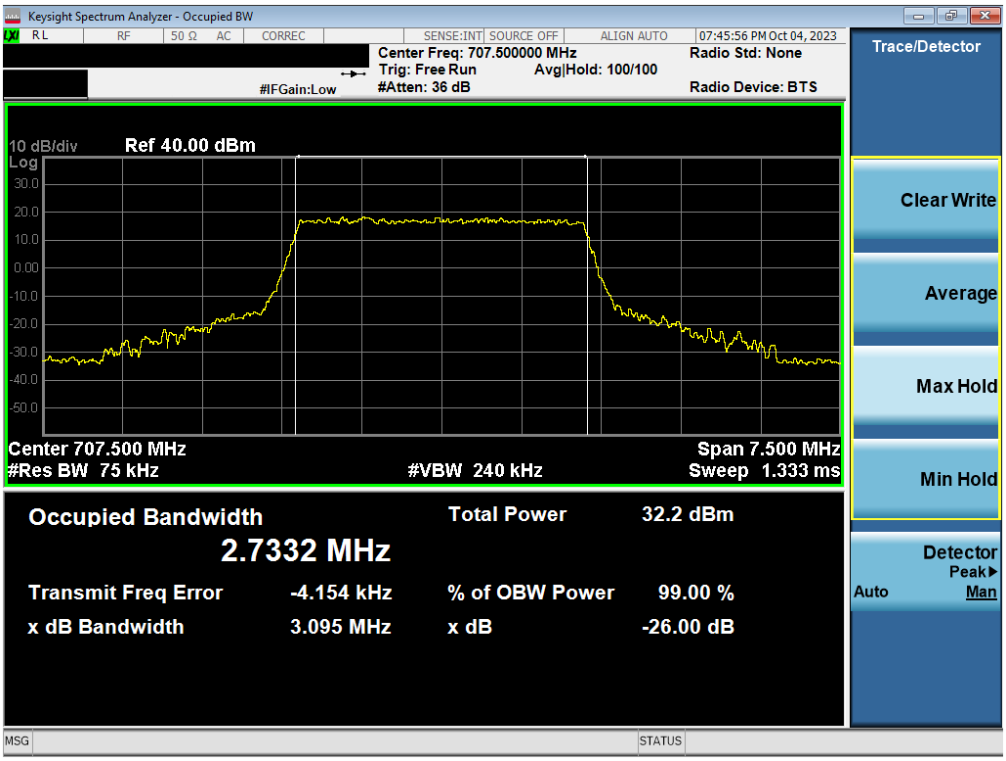
Plot 7-50. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 16-QAM - Full RB – ANT2)



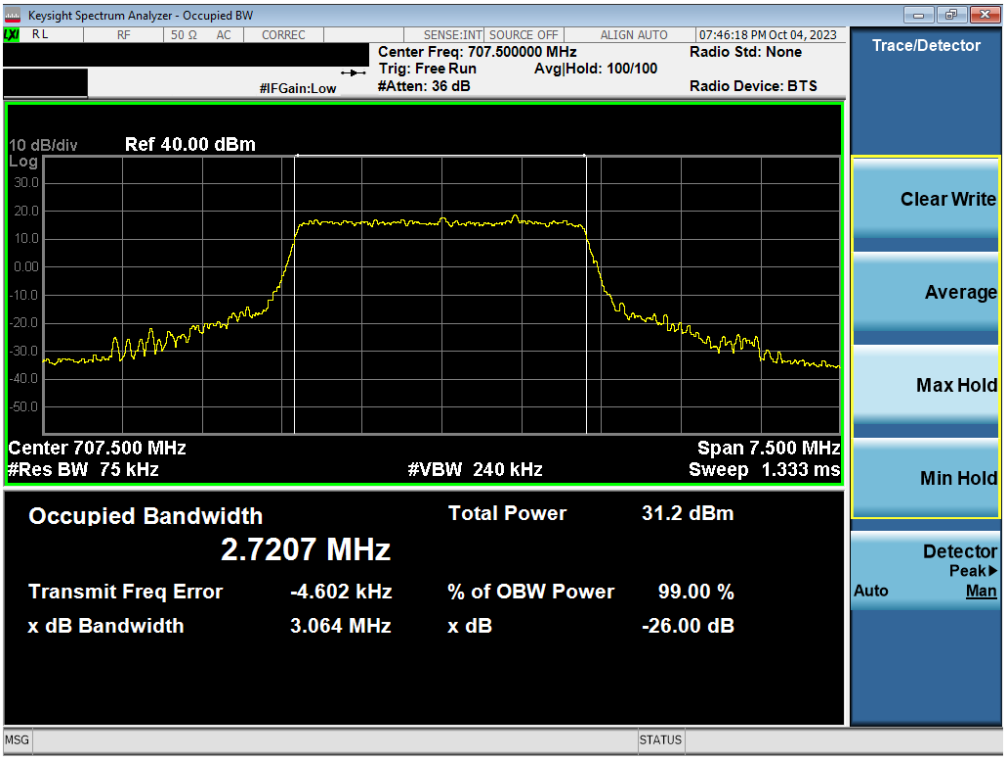
Plot 7-51. Occupied Bandwidth Plot (LTE Band 12 - 5MHz QPSK - Full RB – ANT2)



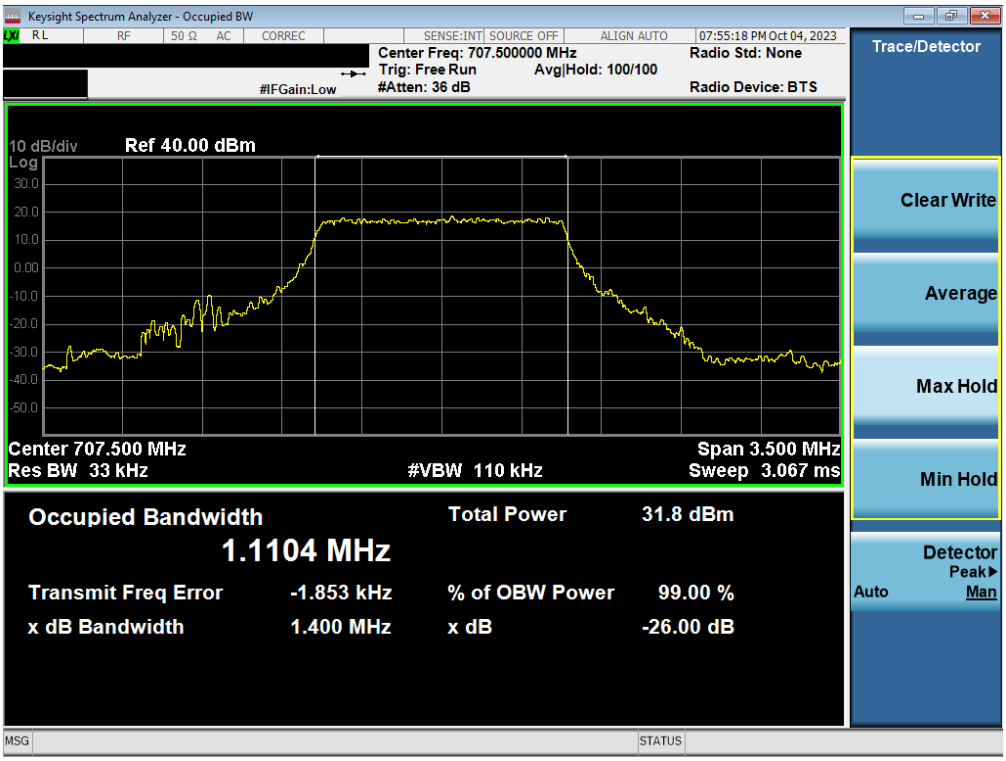
Plot 7-52. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 16-QAM - Full RB – ANT2)



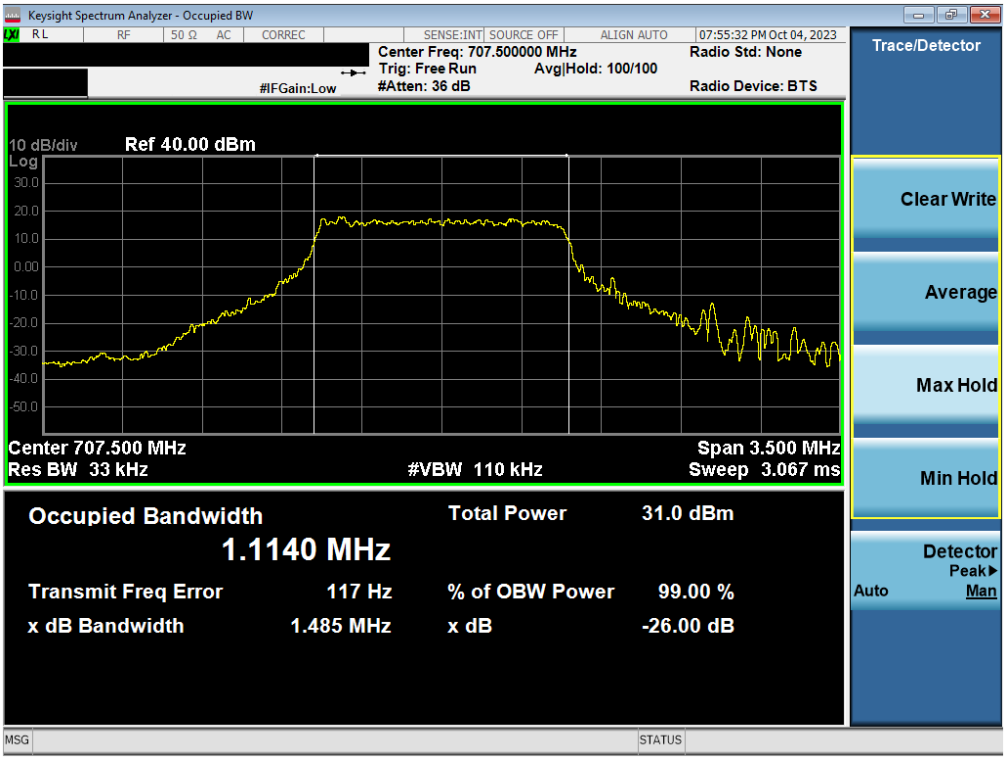
Plot 7-53. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB – ANT2)



Plot 7-54. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB – ANT2)

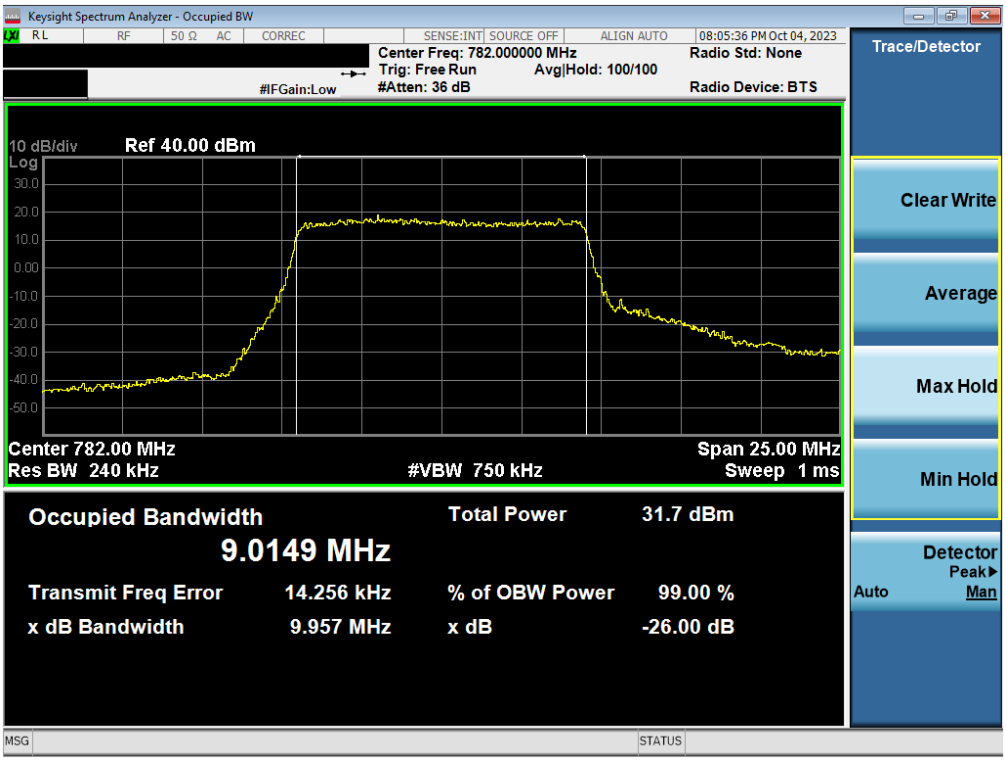


Plot 7-55. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz QPSK - Full RB – ANT2)

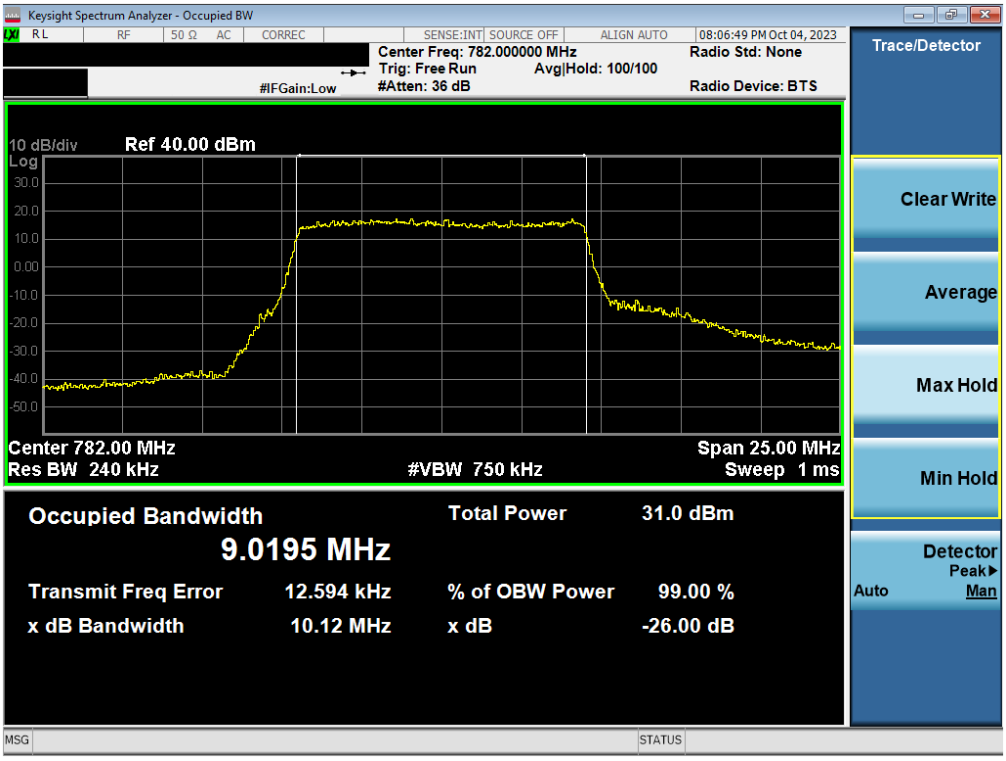


Plot 7-56. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB – ANT2)

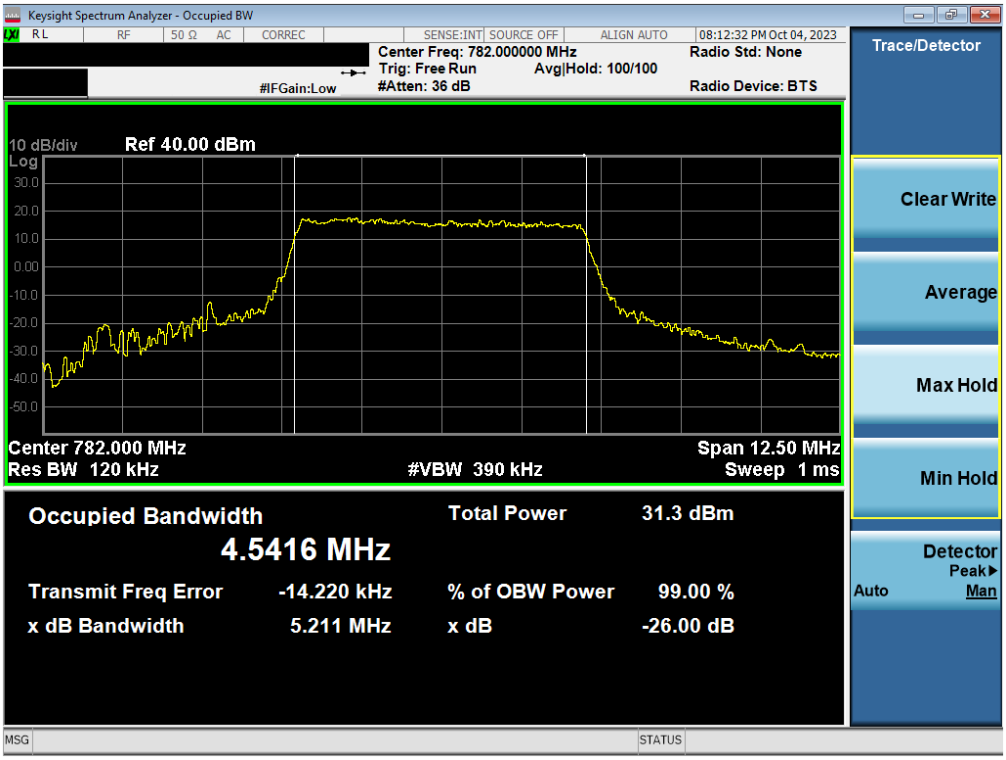
LTE Band 13 – ANT2



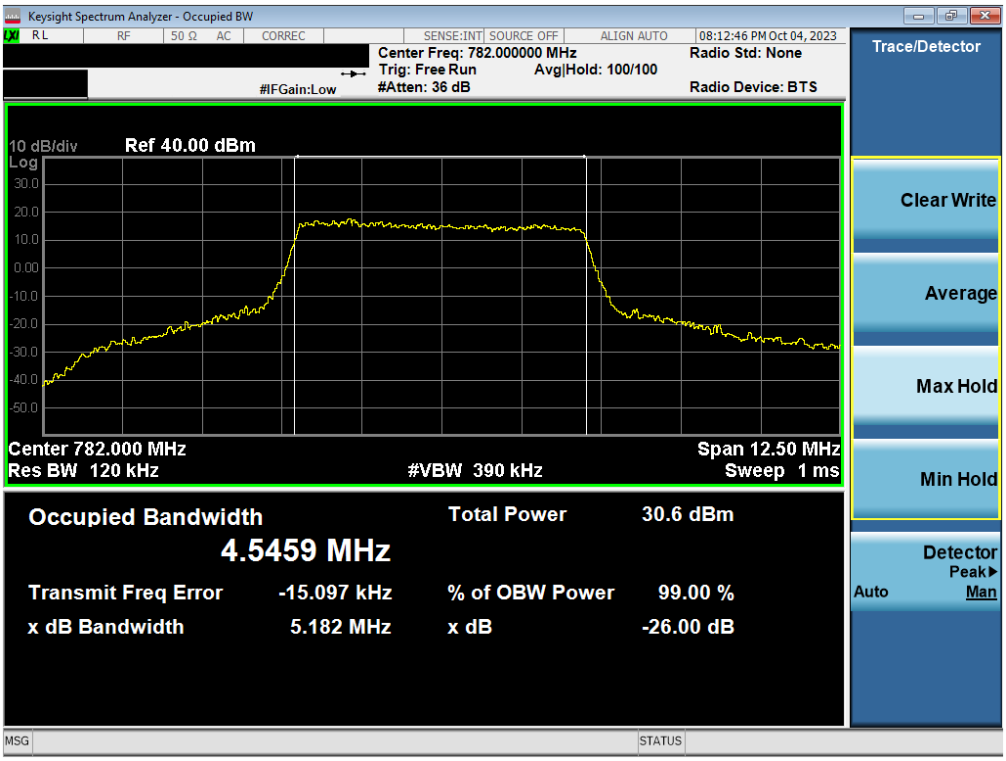
Plot 7-57. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB – ANT2)



Plot 7-58. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB – ANT2)

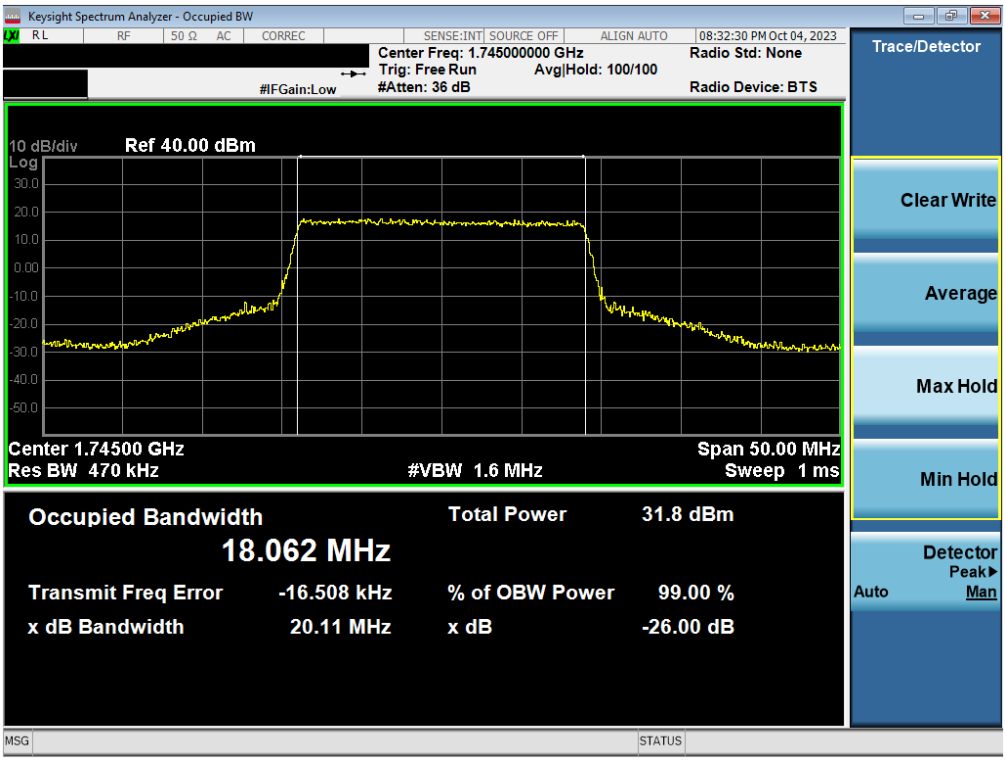


Plot 7-59. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB – ANT2)

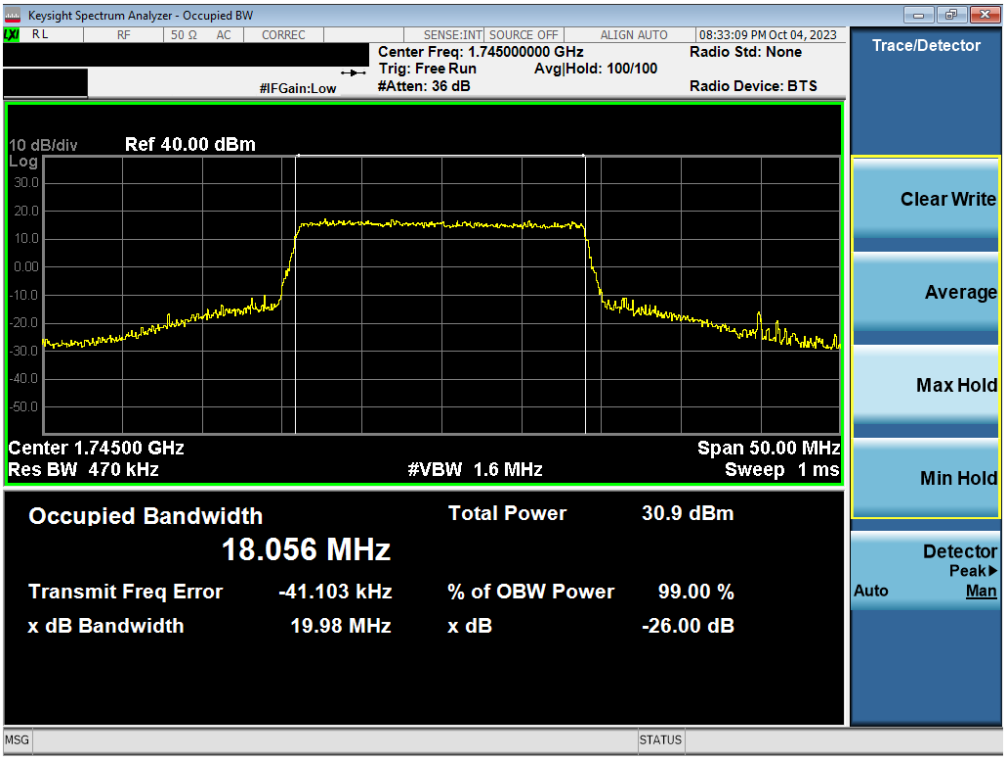


Plot 7-60. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB – ANT2)

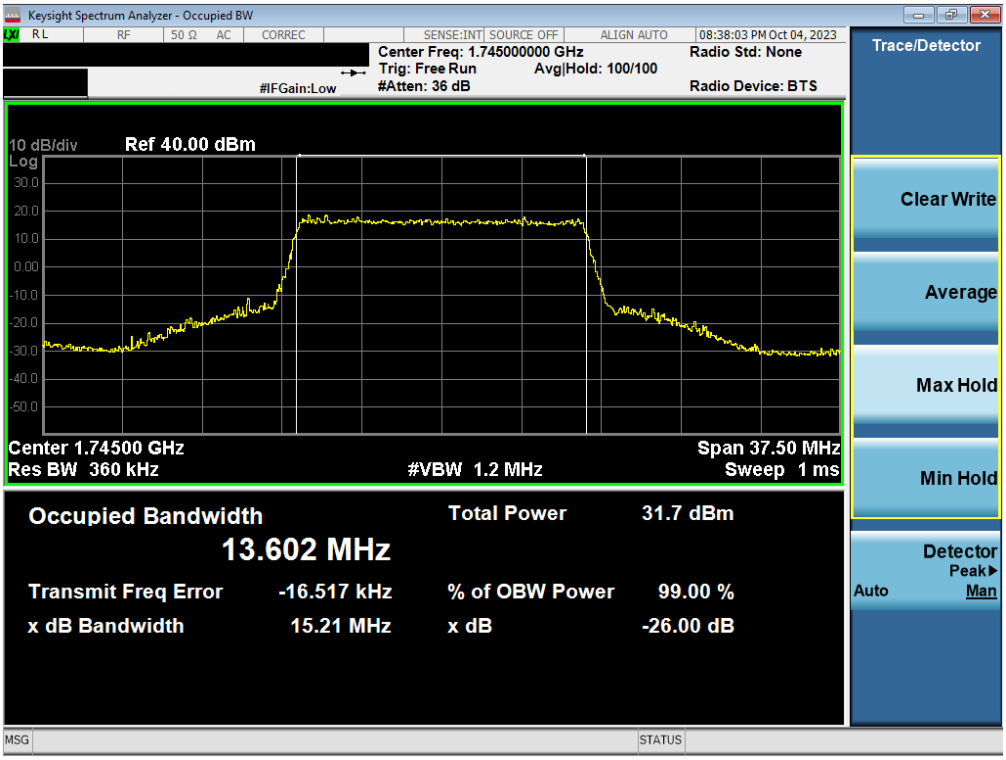
LTE Band 66/4 - ANT2



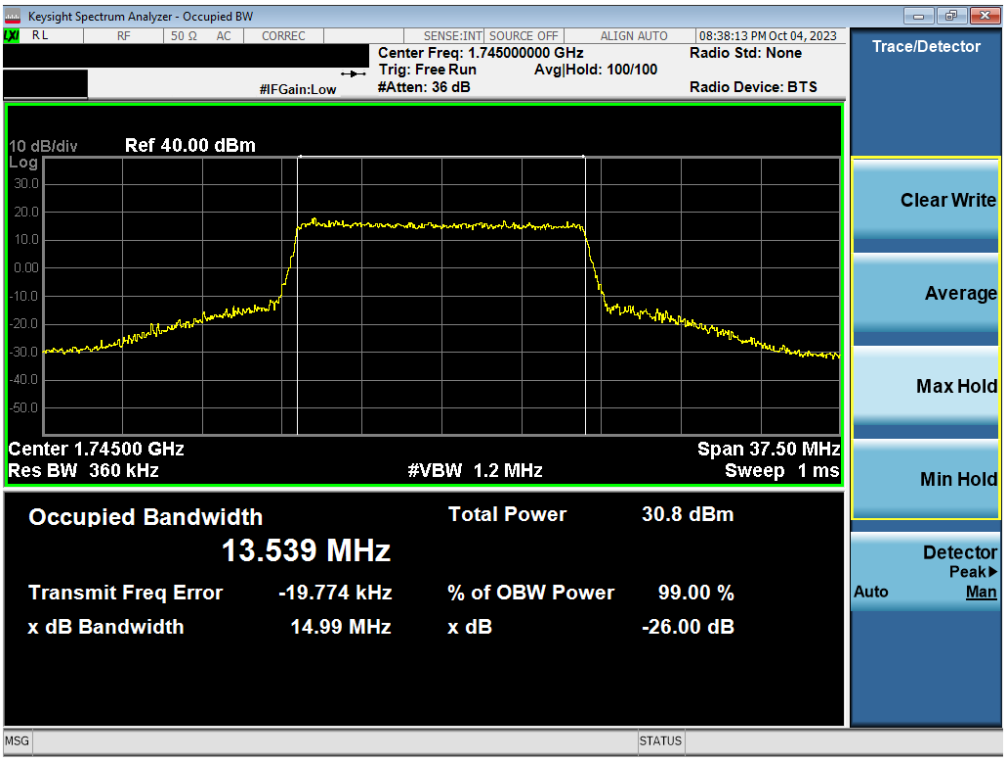
Plot 7-61. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB - ANT2)



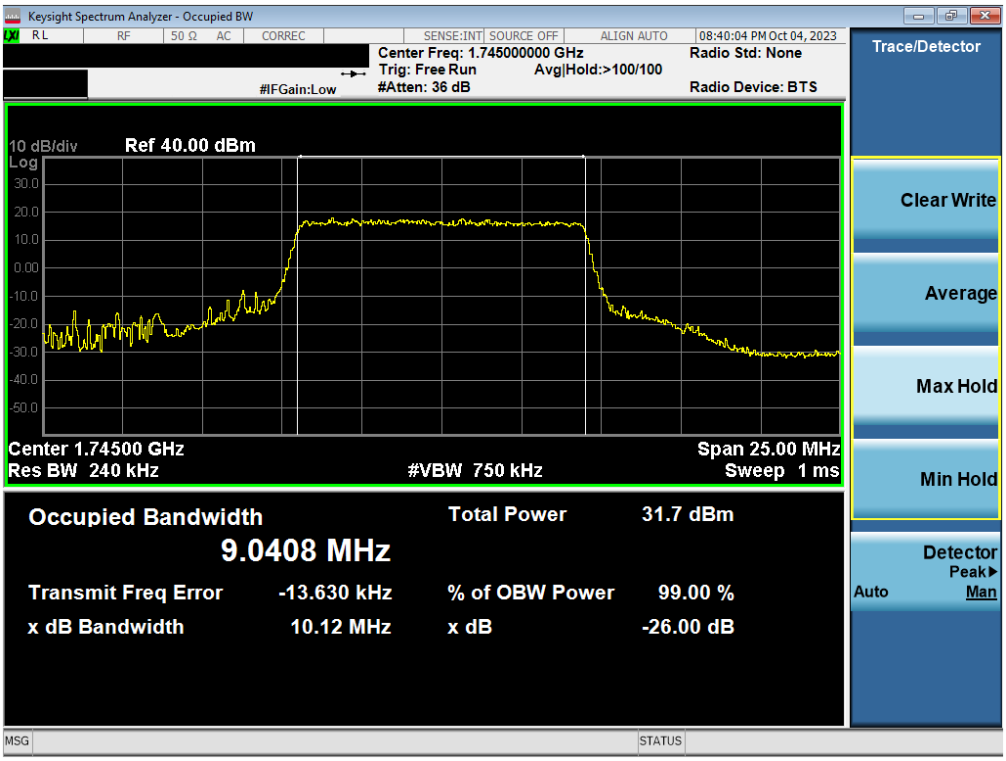
Plot 7-62. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB - ANT2)



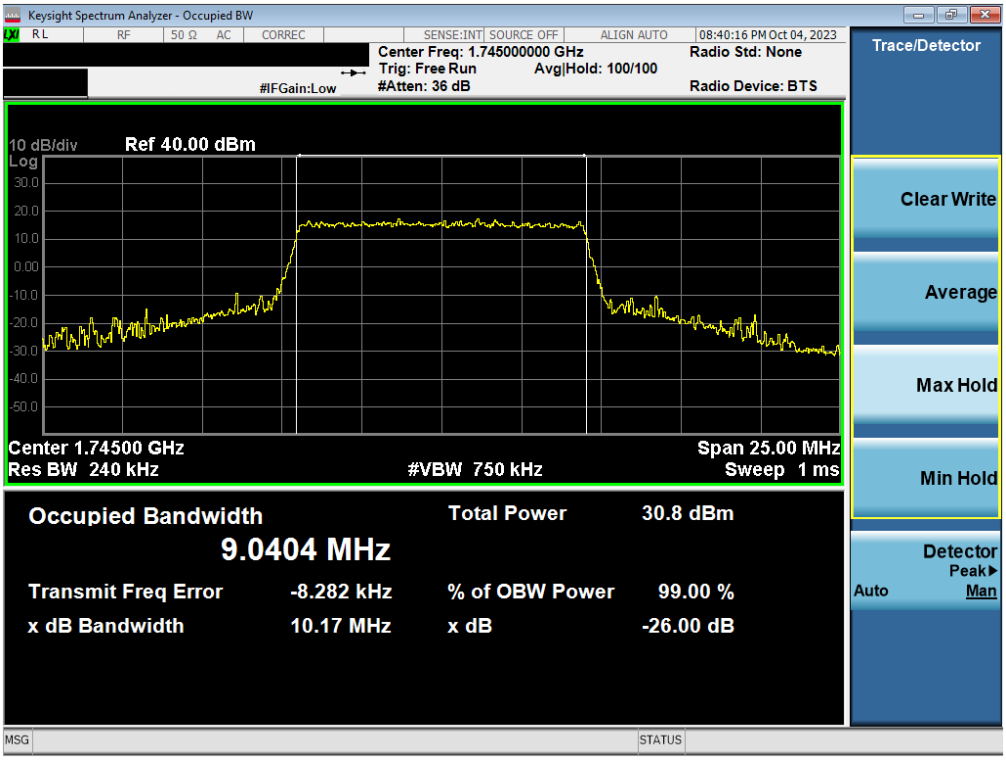
Plot 7-63. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB - ANT2)



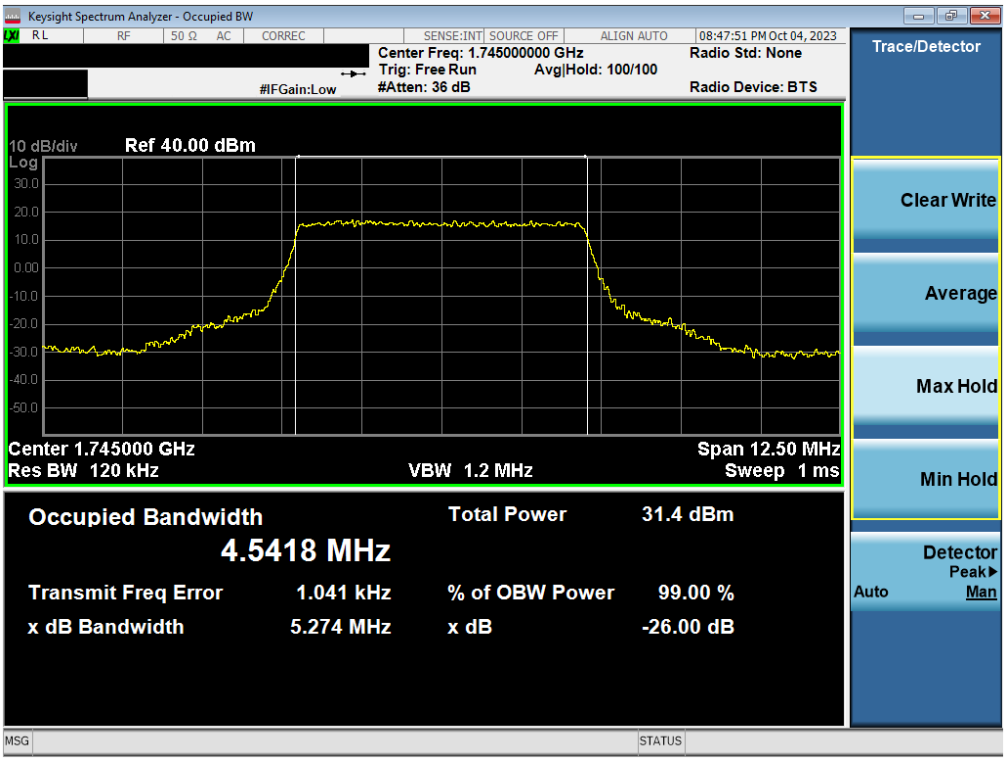
Plot 7-64. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB - ANT2)



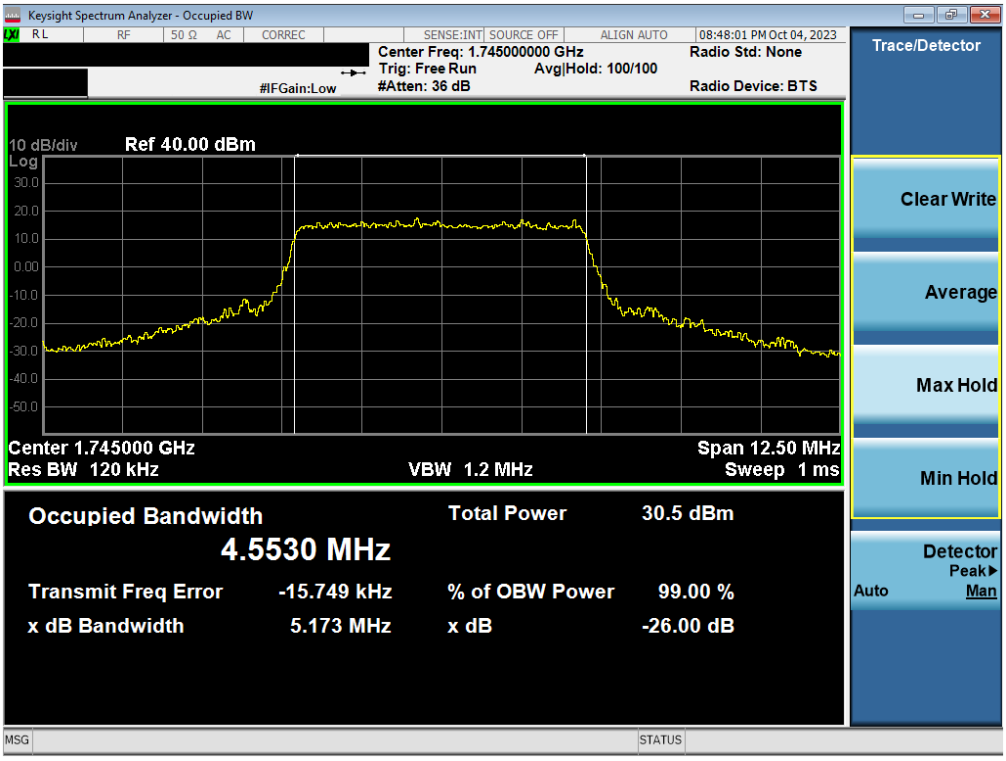
Plot 7-65. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB - ANT2)



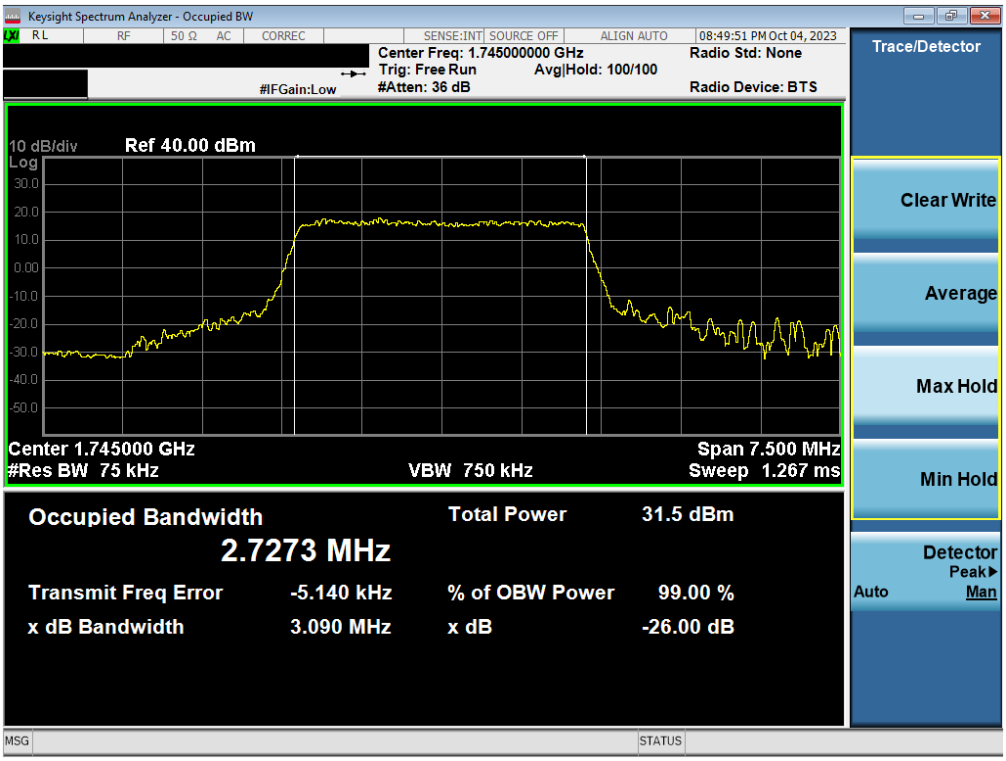
Plot 7-66. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB - ANT2)



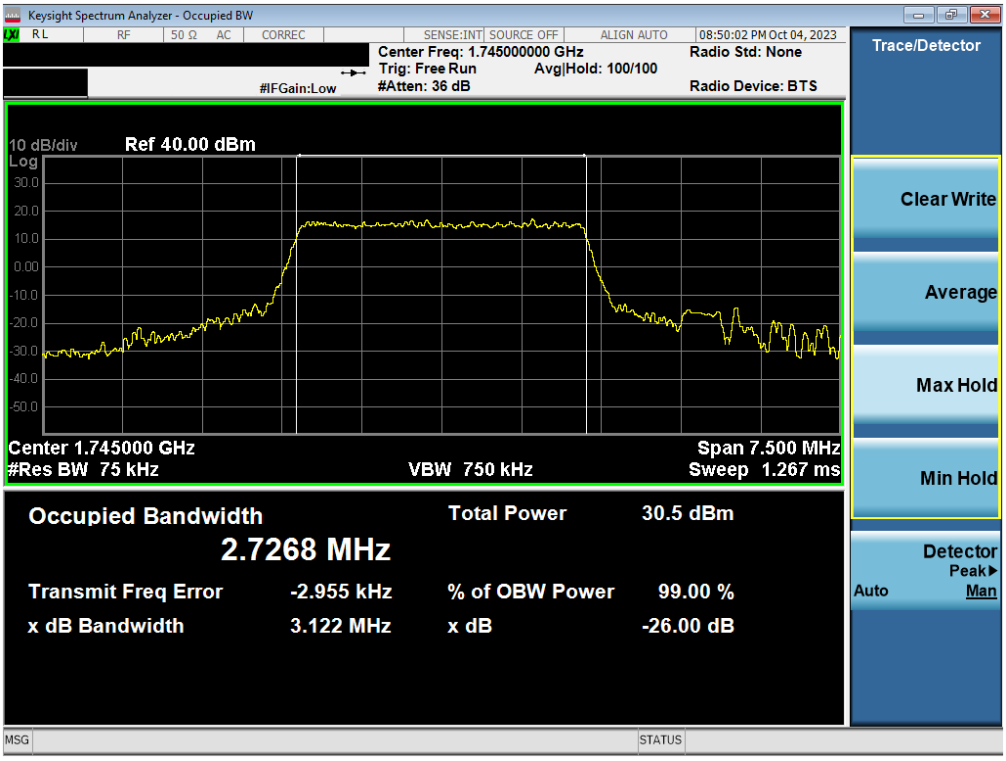
Plot 7-67. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB - ANT2)



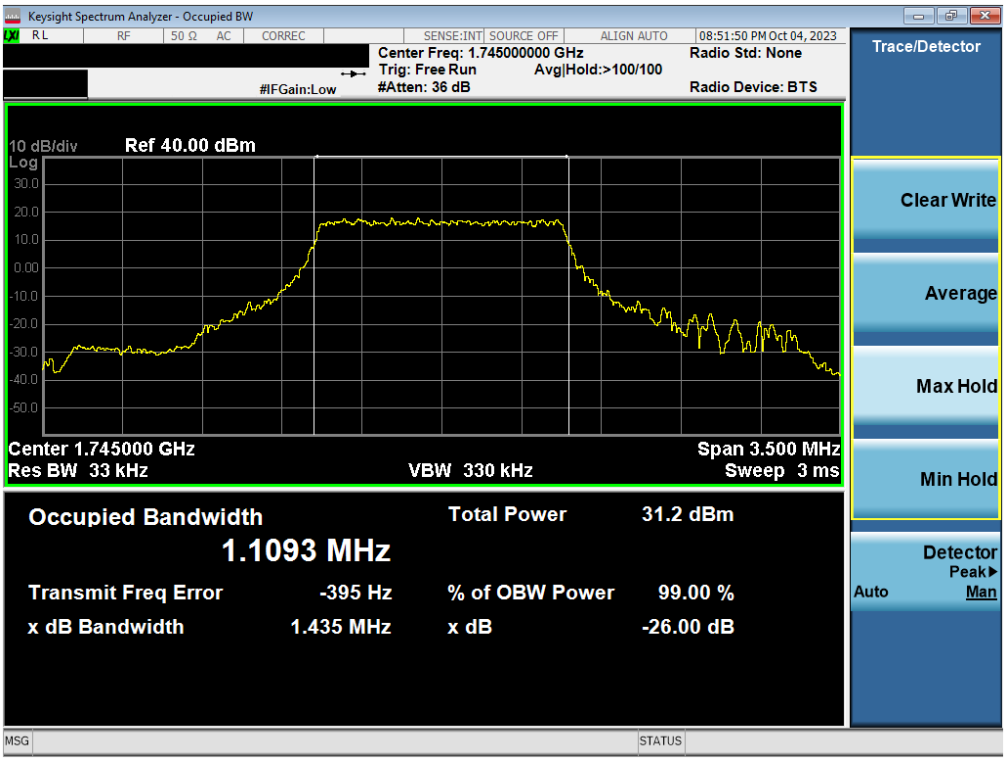
Plot 7-68. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB - ANT2)



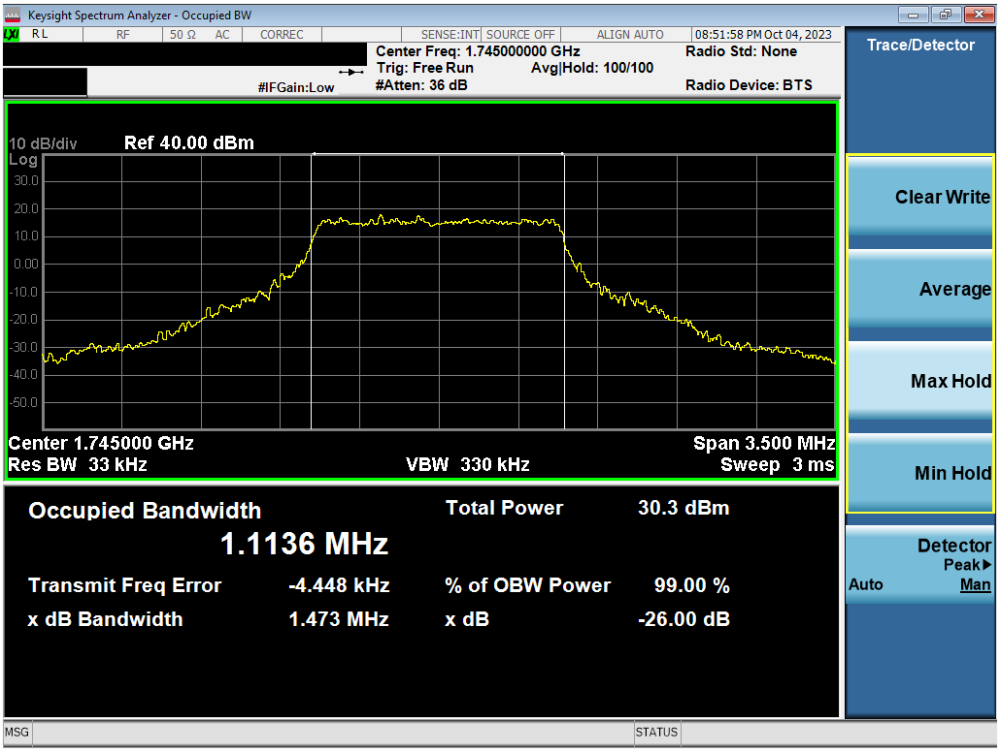
Plot 7-69. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB - ANT2)



Plot 7-70. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB - ANT2)

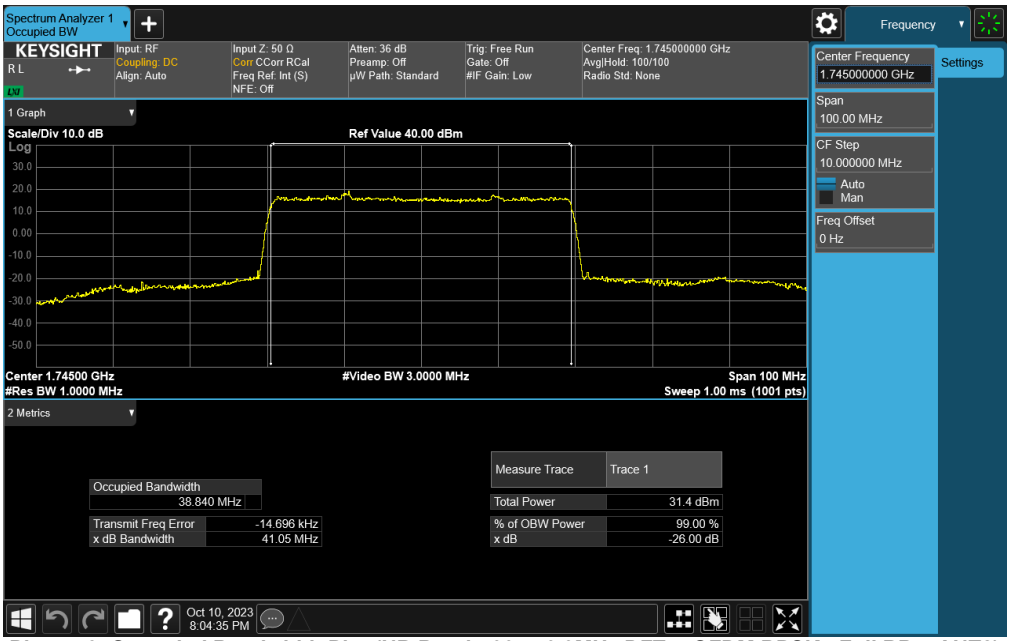


Plot 7-71. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB - ANT2)

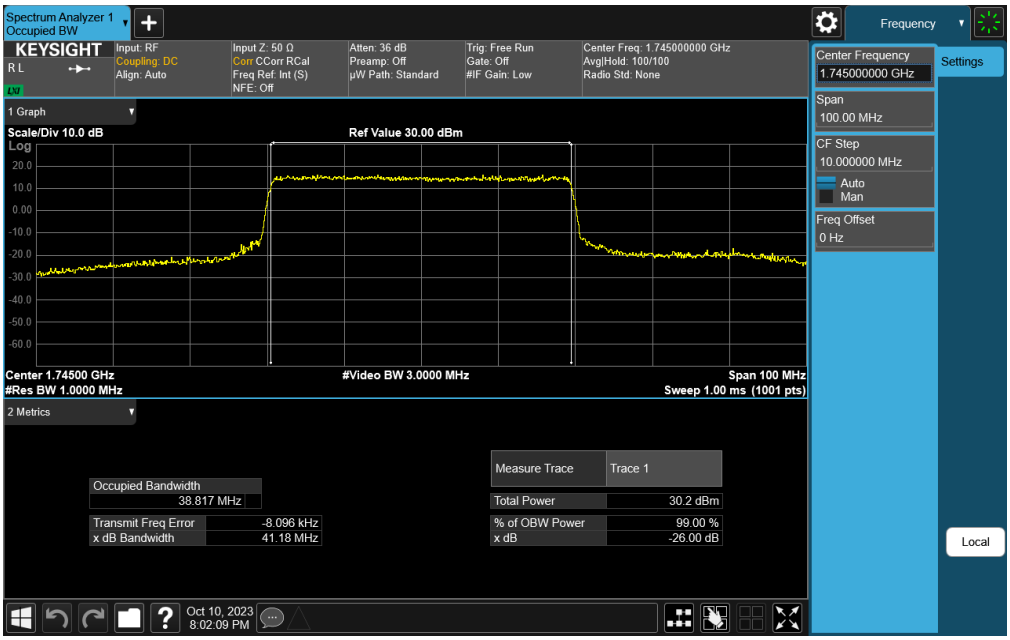


Plot 7-72. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB - ANT2)

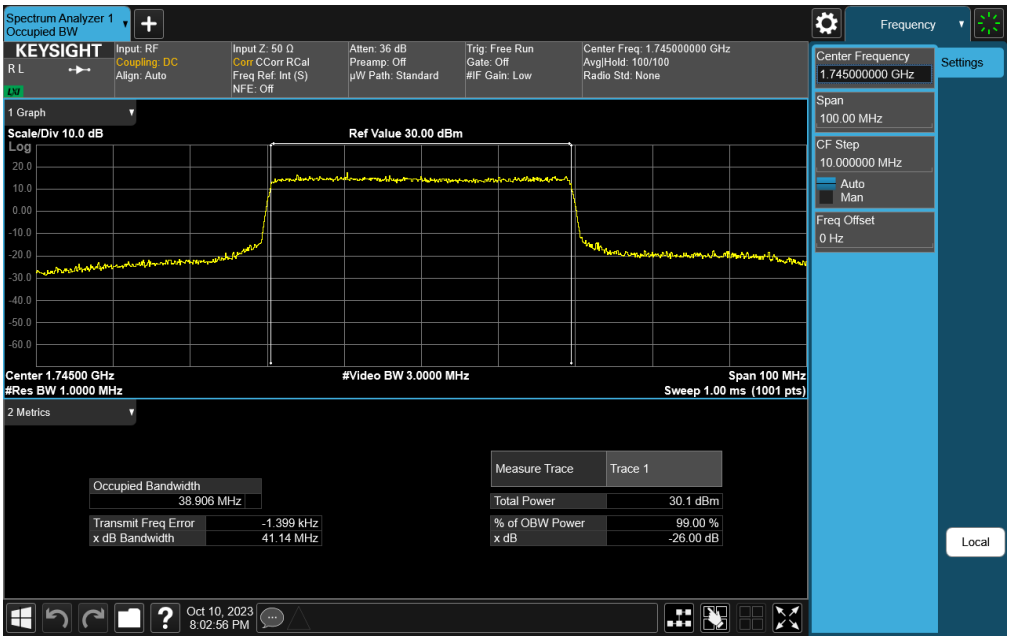
NR Band n66 – ANT2



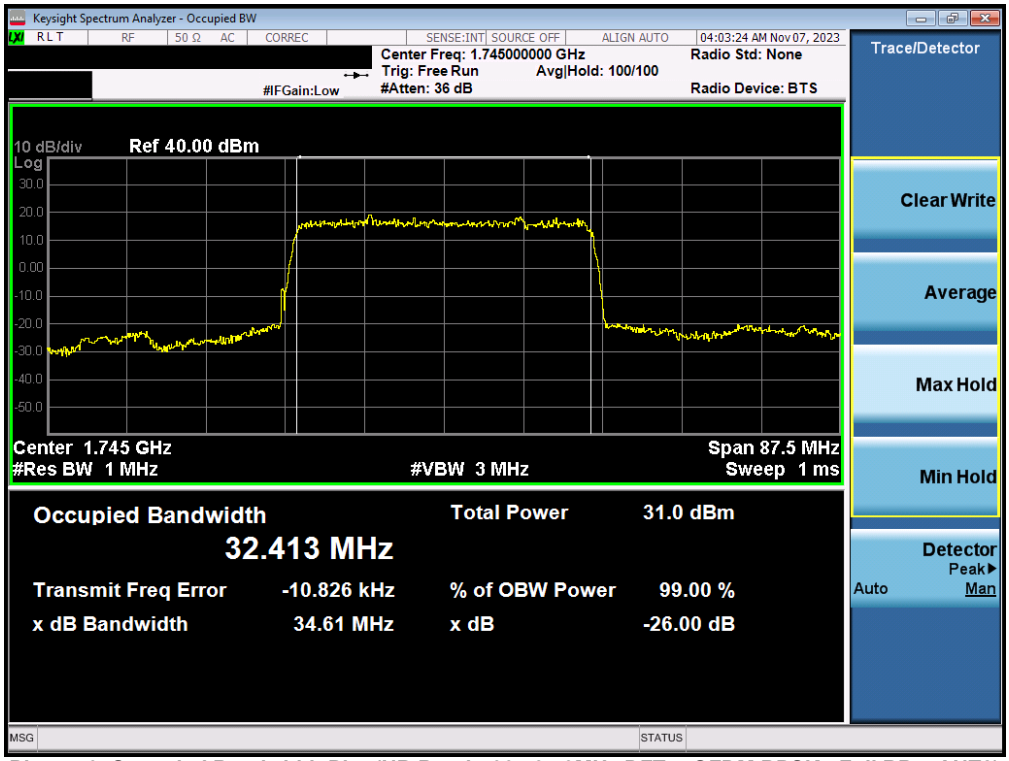
Plot 7-73. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



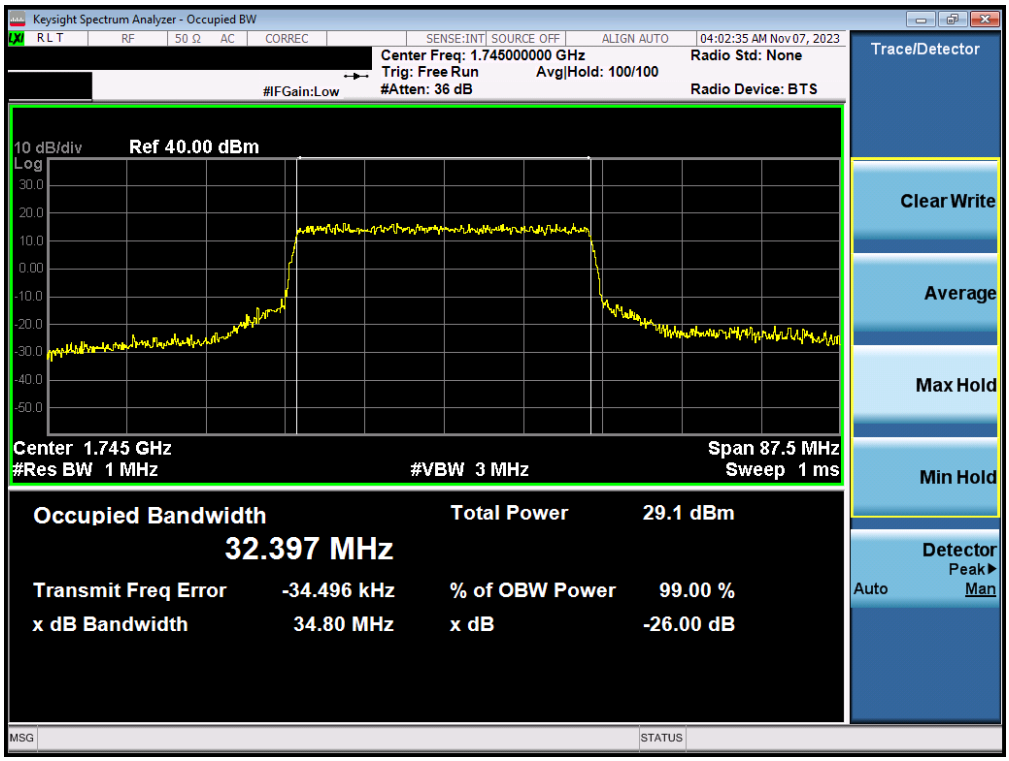
Plot 7-74. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz CP-OFDM QPSK - Full RB – ANT2)



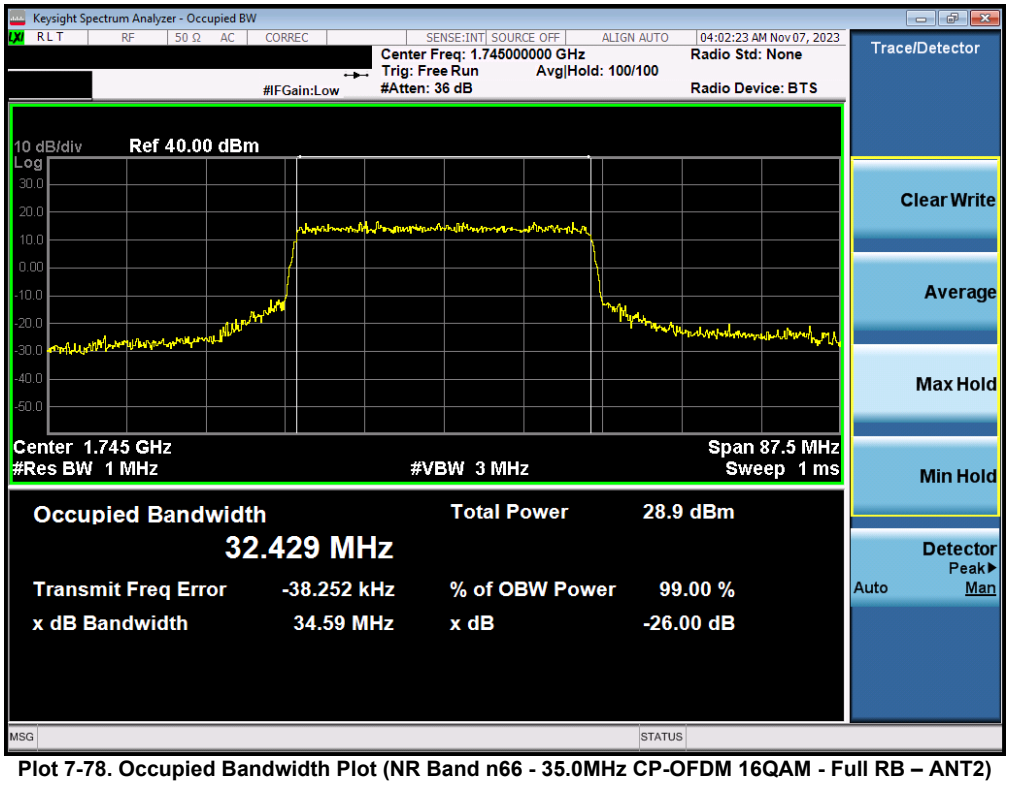
Plot 7-75. Occupied Bandwidth Plot (NR Band n66 - 40.0MHz CP-OFDM 16QAM - Full RB – ANT2)



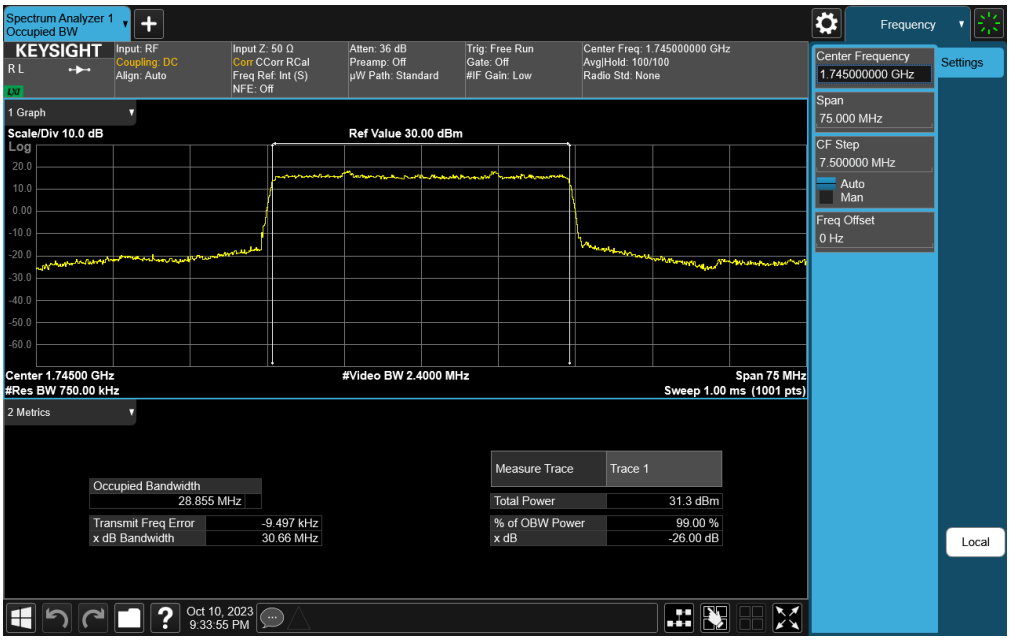
Plot 7-76. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



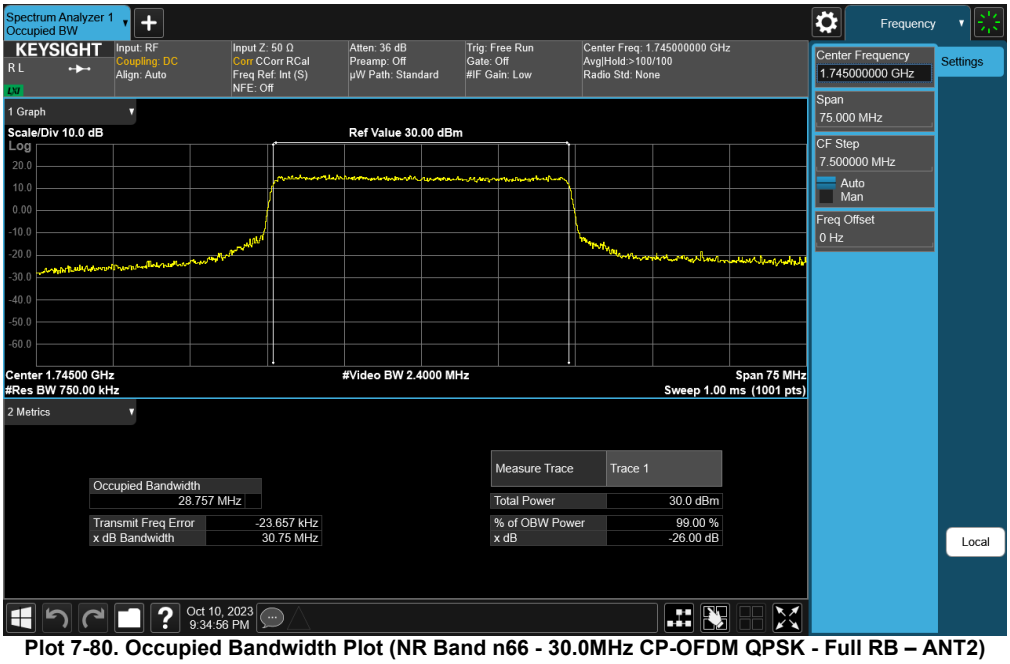
Plot 7-77. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz CP-OFDM QPSK - Full RB – ANT2)



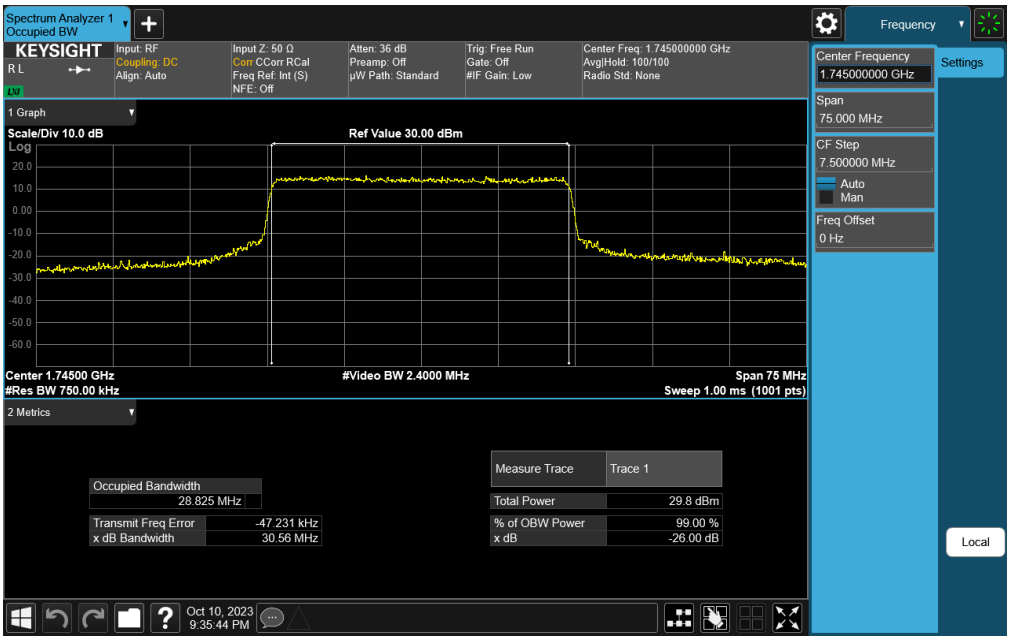
Plot 7-78. Occupied Bandwidth Plot (NR Band n66 - 35.0MHz CP-OFDM 16QAM - Full RB – ANT2)



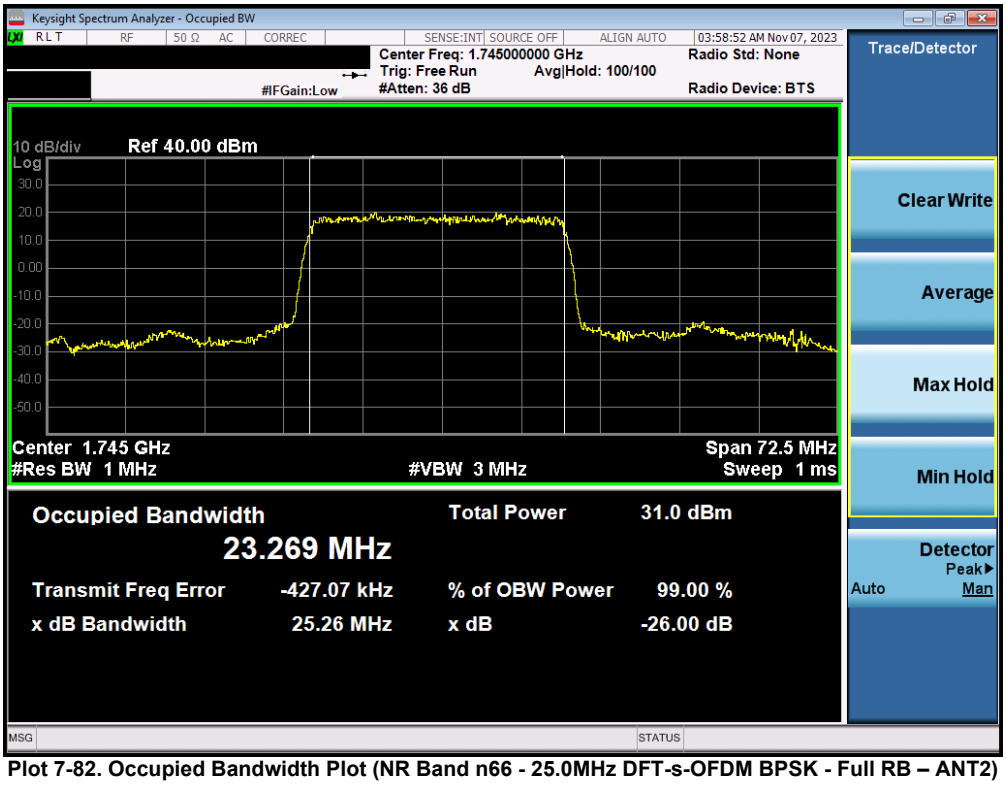
Plot 7-79. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



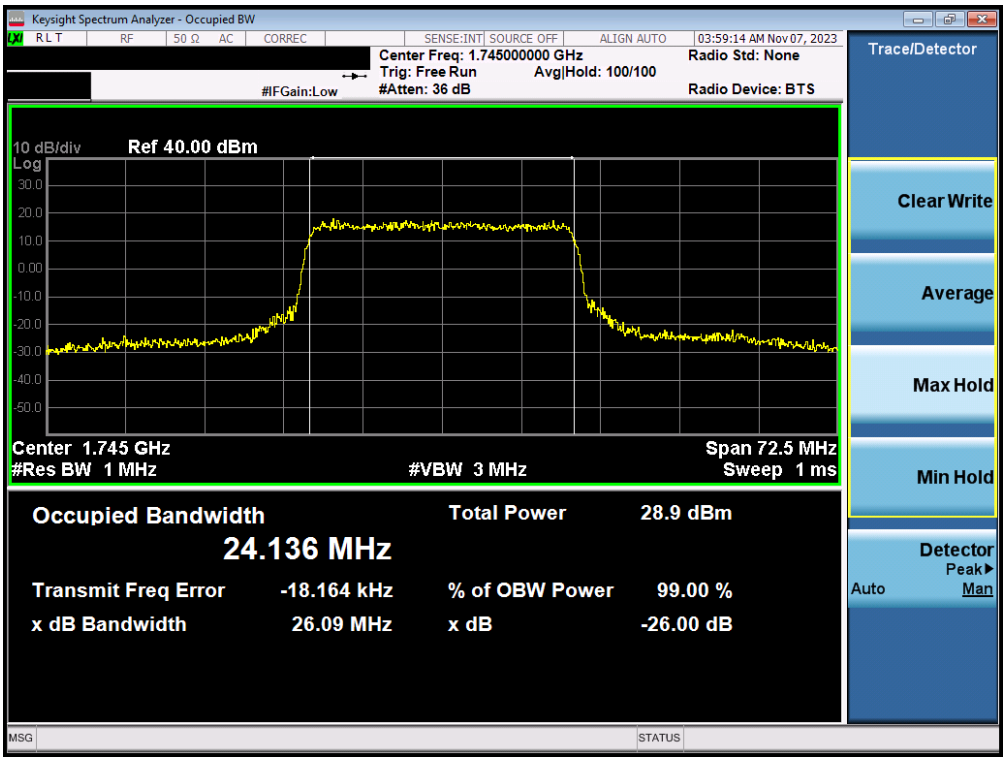
Plot 7-80. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM QPSK - Full RB – ANT2)



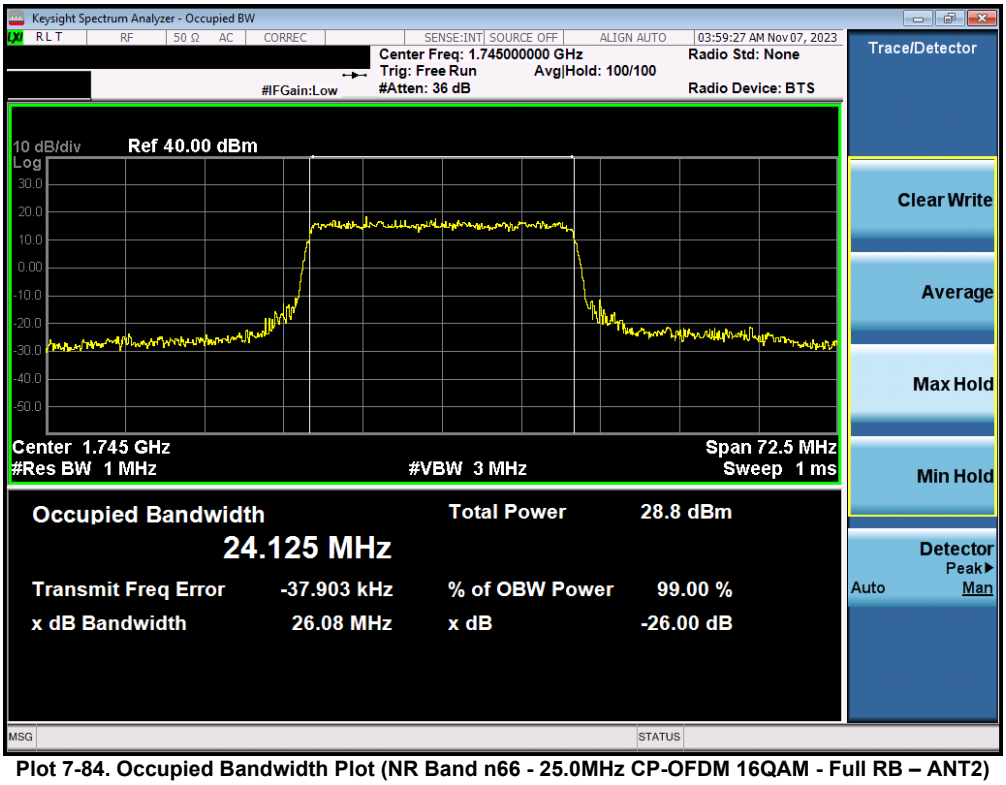
Plot 7-81. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM 16QAM - Full RB – ANT2)



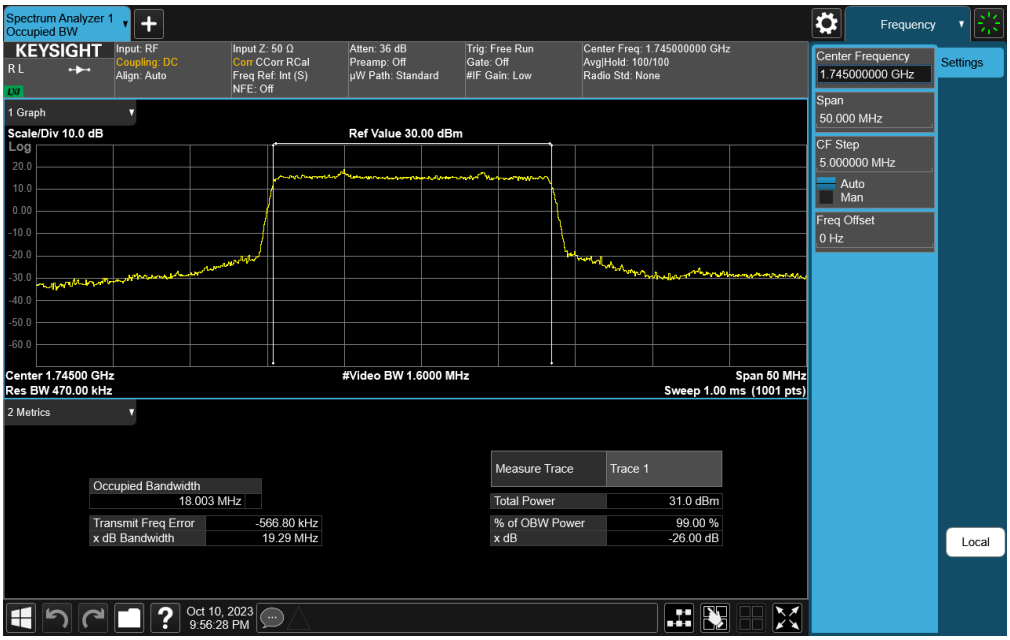
Plot 7-82. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



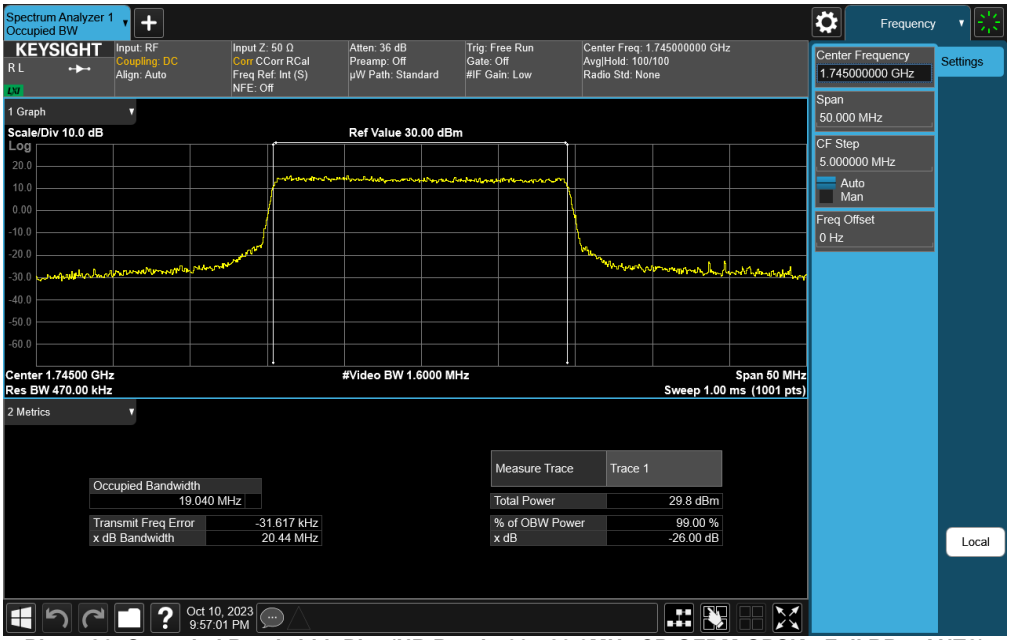
Plot 7-83. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM QPSK - Full RB – ANT2)



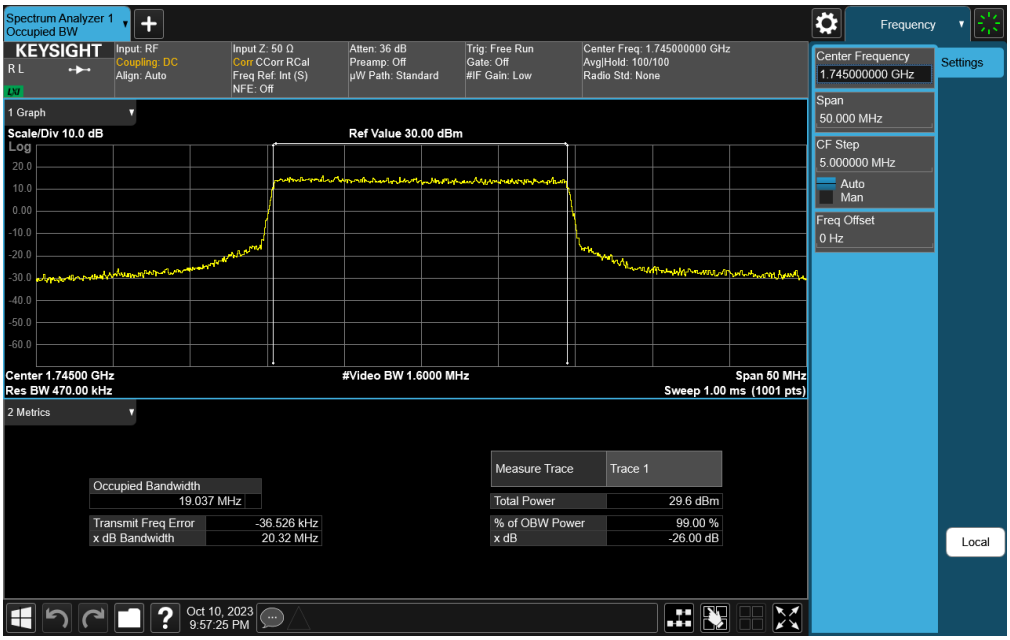
Plot 7-84. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM 16QAM - Full RB – ANT2)



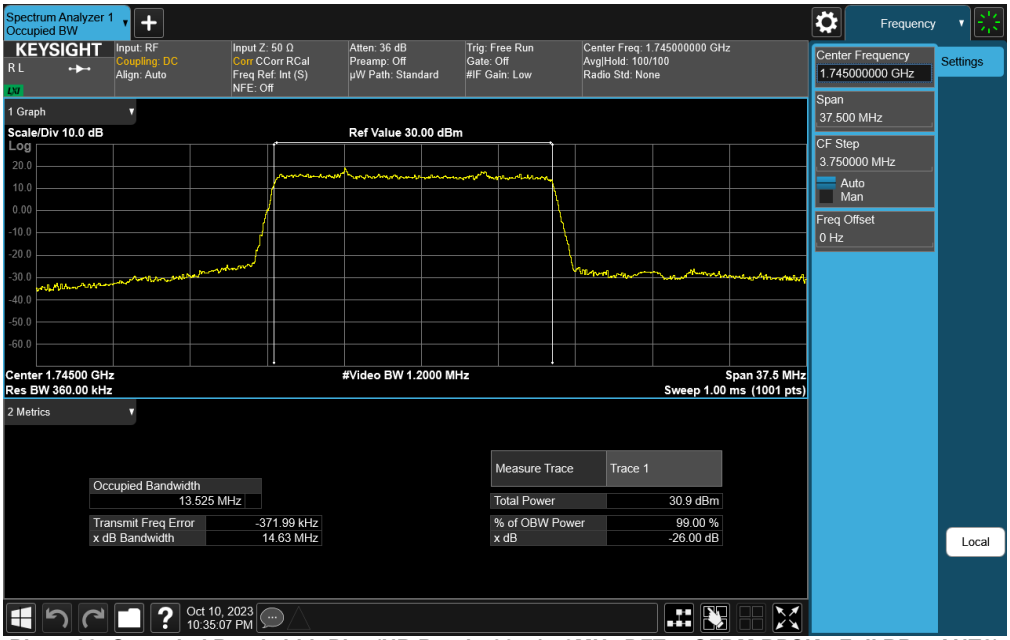
Plot 7-85. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



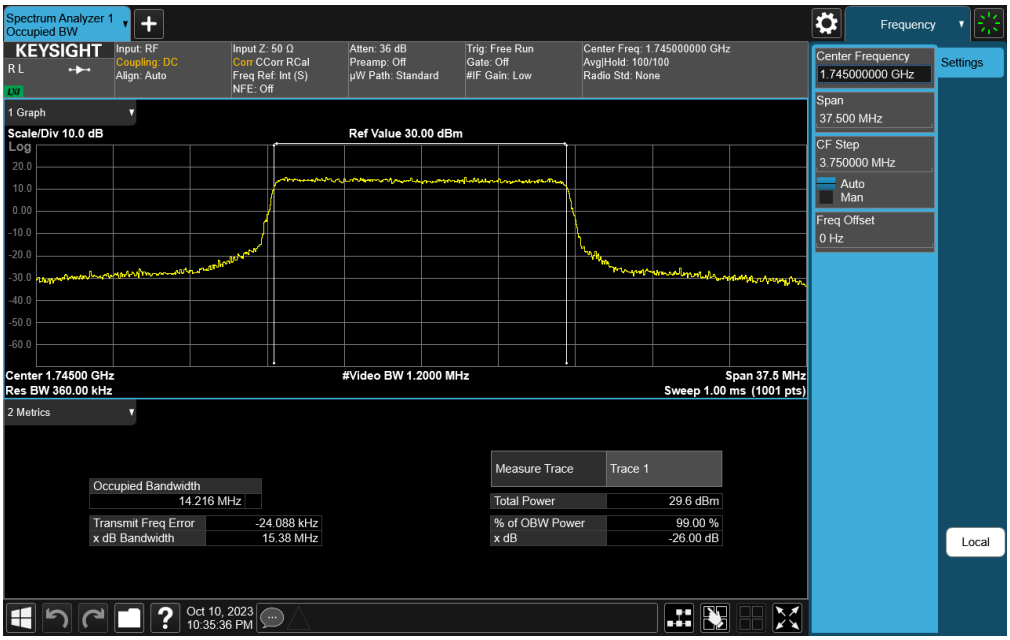
Plot 7-86. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB – ANT2)



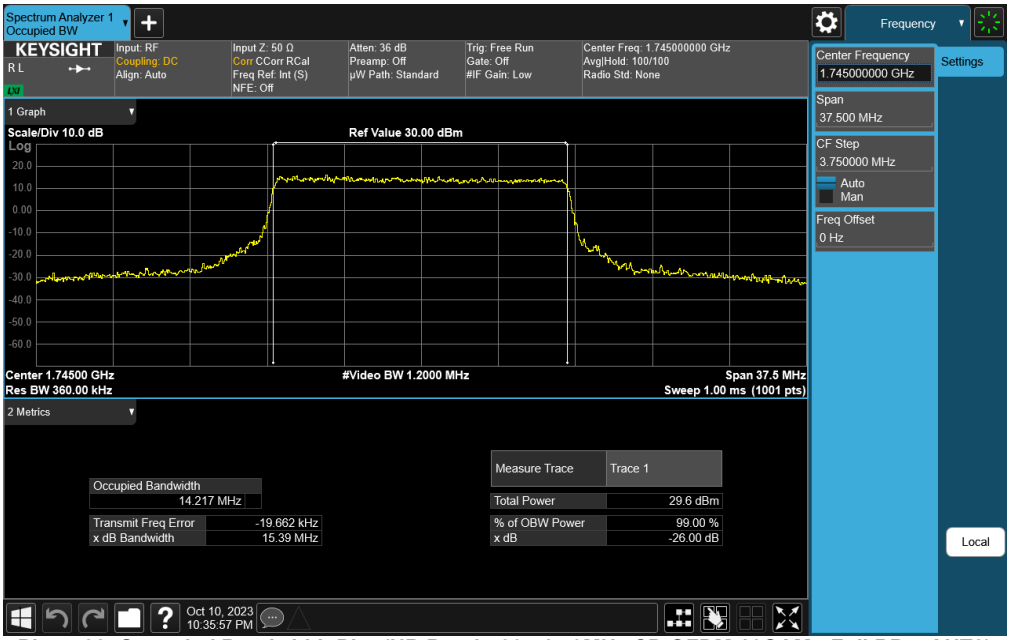
Plot 7-87. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – ANT2)



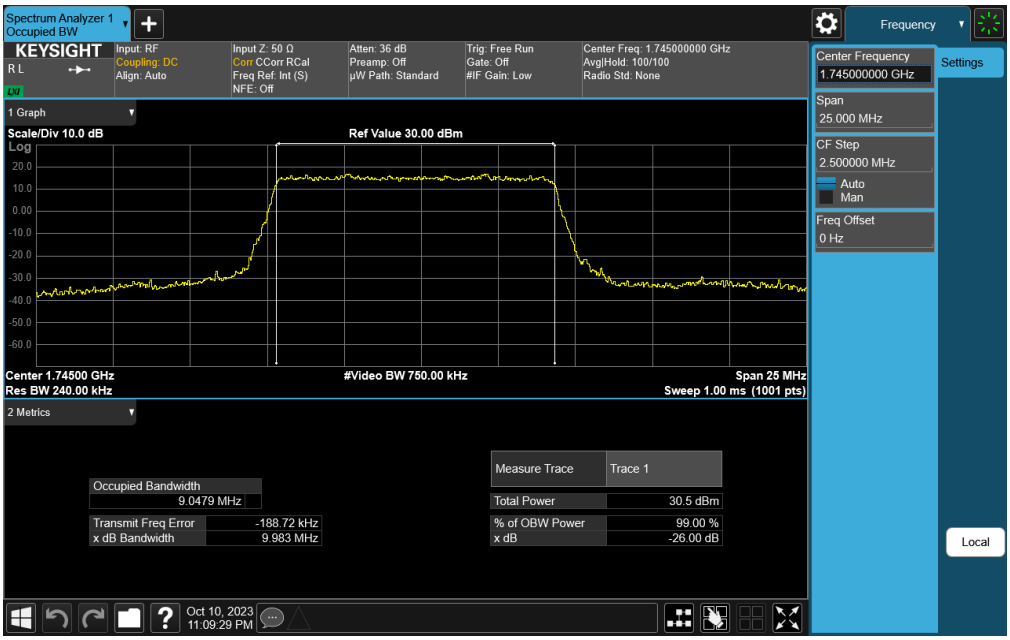
Plot 7-88. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



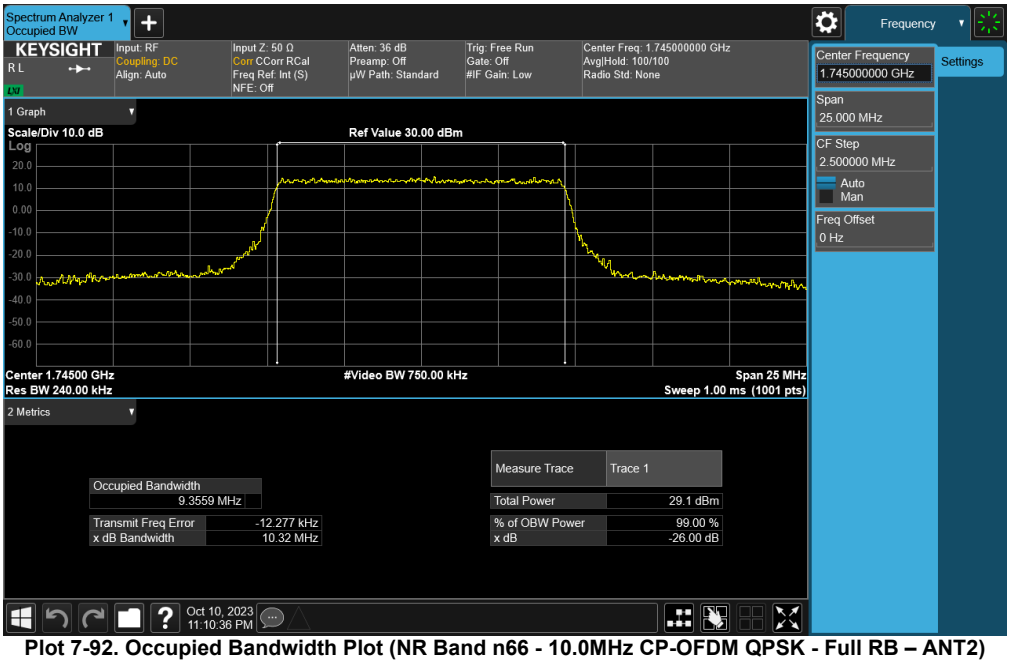
Plot 7-89. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB – ANT2)



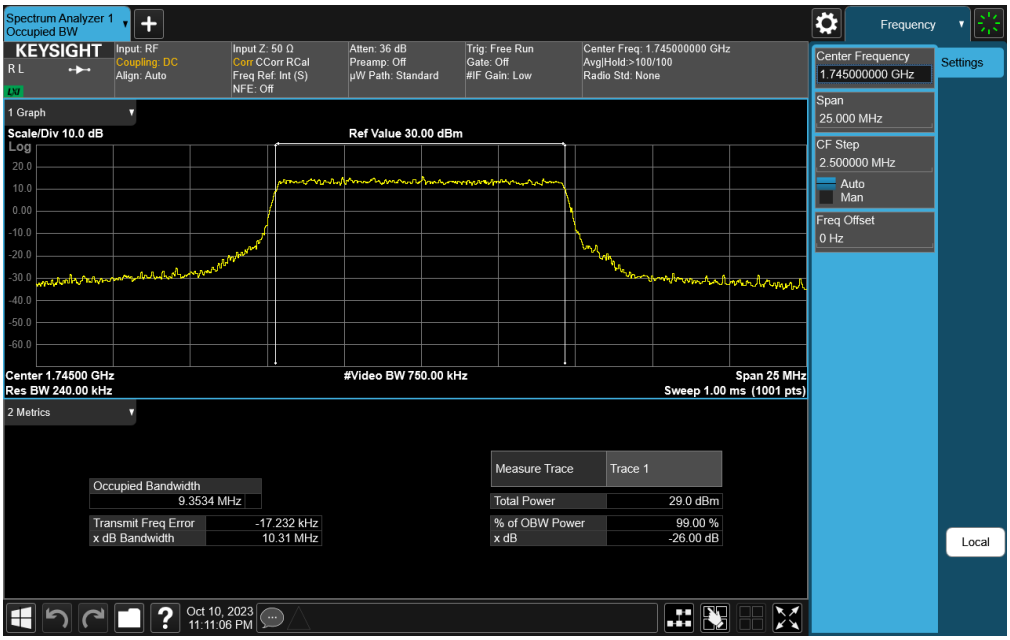
Plot 7-90. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB – ANT2)



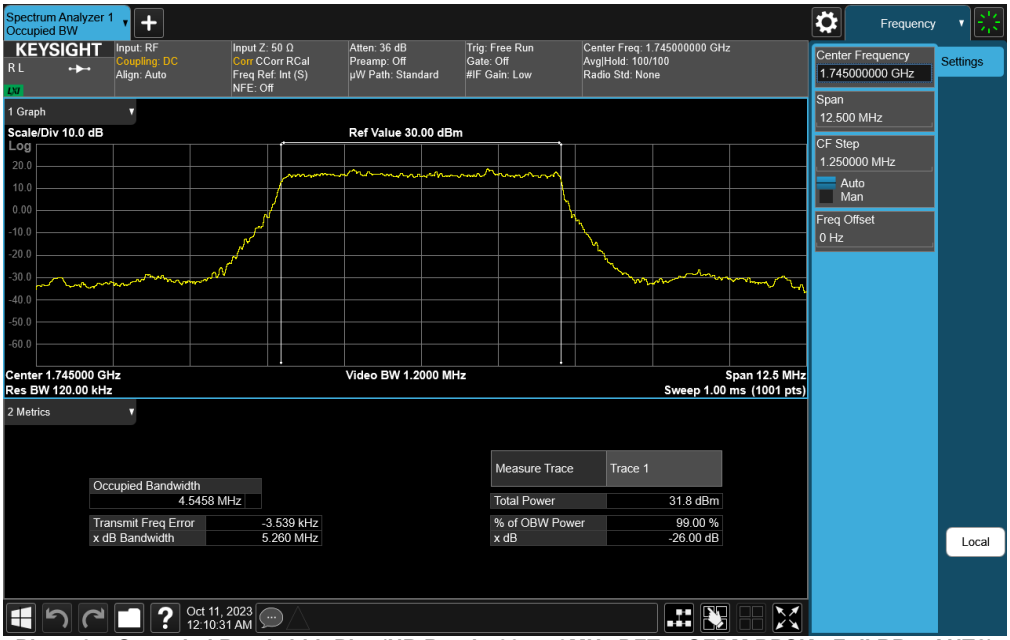
Plot 7-91. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



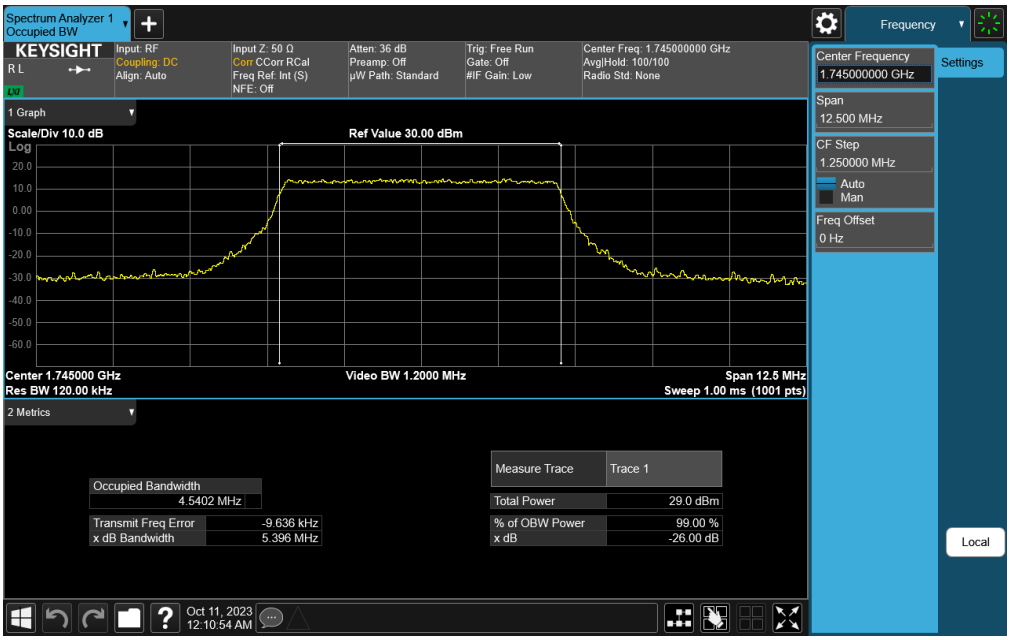
Plot 7-92. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB – ANT2)



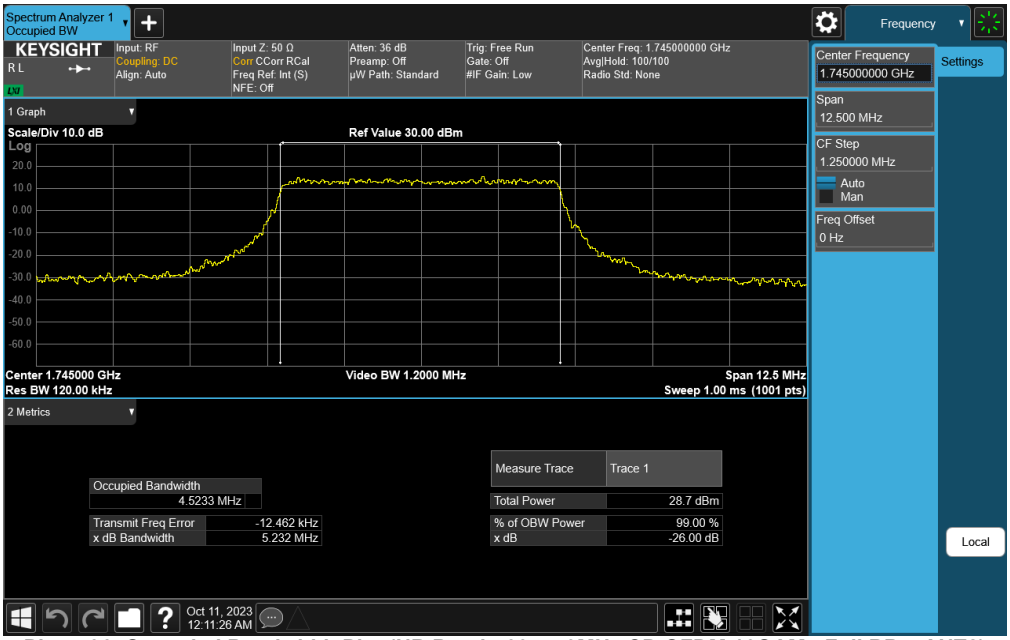
Plot 7-93. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB – ANT2)



Plot 7-94. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB – ANT2)



Plot 7-95. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB – ANT2)



Plot 7-96. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB – ANT2)

7.4 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $\log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

Test Procedure Used

ANSI C63.26-2015 – Section 5.7.4

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 18GHz (separated into at least two plots per channel)
2. RBW ≥ 100kHz
3. VBW ≥ 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

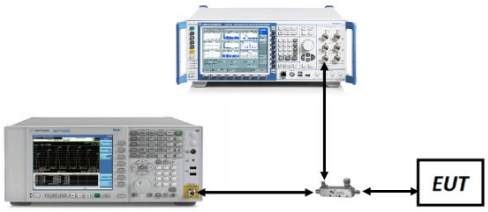


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per Part 27 and RSS-139, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

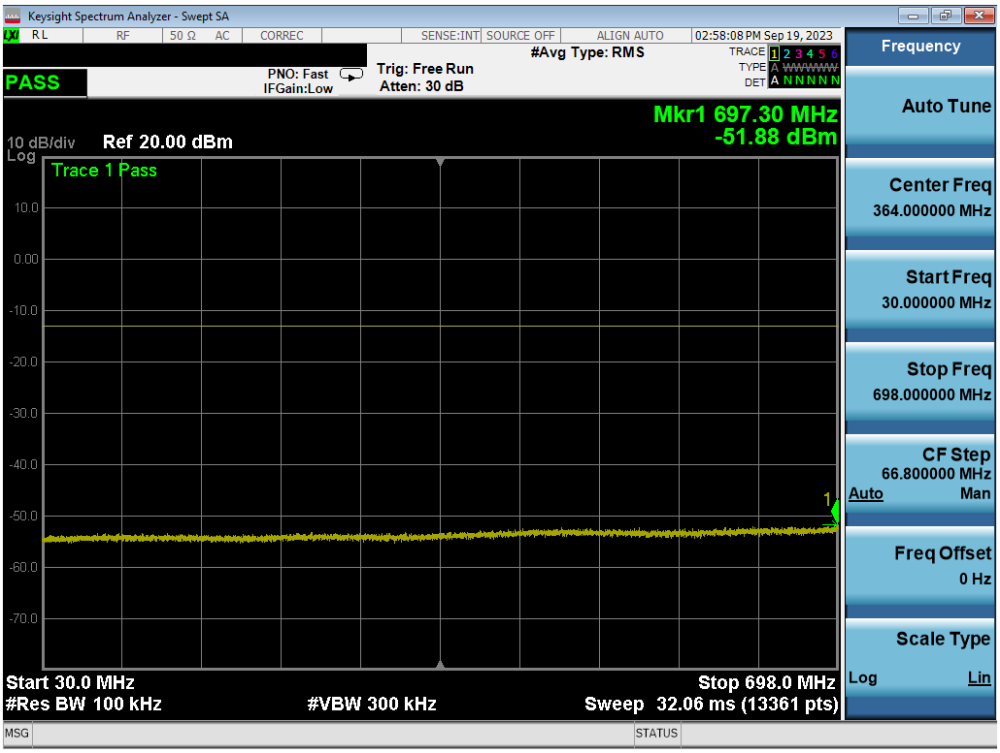
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 12	10 MHz	Low	30.0 - 697.9	-51.31	-13	-38.31
		Low	716.0 - 1000.0	-51.47	-13	-38.47
		Low	1000.0 - 10000.0	-37.49	-13	-24.49
		Mid	30.0 - 698.0	-51.88	-13	-38.88
		Mid	716.0 - 1000.0	-51.56	-13	-38.56
		Mid	1000.0 - 10000.0	-36.99	-13	-23.99
		High	30.0 - 697.9	-51.76	-13	-38.76
		High	716.1 - 1000.0	-51.47	-13	-38.47
		High	1000.0 - 10000.0	-37.66	-13	-24.66
LTE Band 13	10 MHz	Mid	30.0 - 777.0	-51.55	-35	-16.55
		Mid	787.0 - 1000.0	-51.18	-13	-38.18
		Mid	1000.0 - 20000.0	-36.62	-13	-23.62

Table 7-9. Conducted Spurious Emissions Results - Ant1

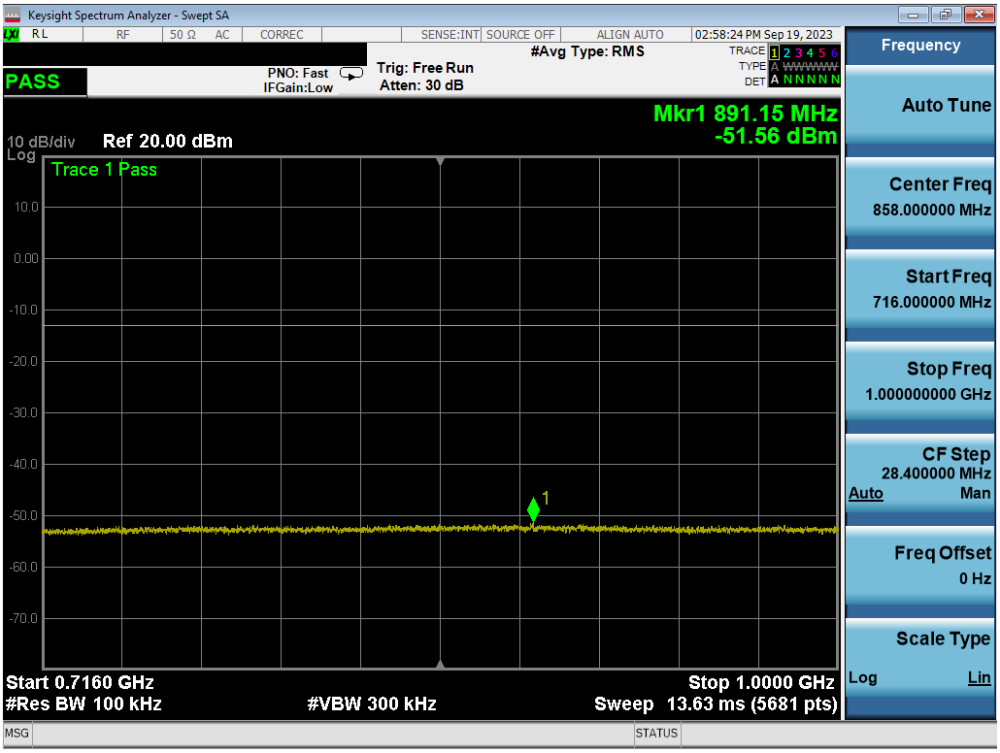
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 66/4	20 MHz	Low	30.0 - 1709.0	-40.03	-13	-27.03
		Low	1780.0 - 10000.0	-36.41	-13	-23.41
		Low	10000.0 - 20000.0	-50.32	-13	-37.32
		Mid	30.0 - 1710.0	-39.93	-13	-26.93
		Mid	1780.0 - 10000.0	-36.40	-13	-23.40
		Mid	10000.0 - 20000.0	-50.33	-13	-37.33
		High	30.0 - 1710.0	-40.05	-13	-27.05
		High	1781.0 - 10000.0	-36.39	-13	-23.39
		High	10000.0 - 20000.0	-50.19	-13	-37.19
NR Band n66	40 MHz	Low	30.0 - 1710.0	-49.11	-13	-36.11
		Low	1780.0 - 10000.0	-45.49	-13	-32.49
		Low	10000.0 - 20000.0	-59.35	-13	-46.35
		Mid	30.0 - 1710.0	-49.47	-13	-36.47
		Mid	1780.0 - 10000.0	-45.50	-13	-32.50
		Mid	10000.0 - 20000.0	-59.80	-13	-46.80
		High	30.0 - 1710.0	-49.48	-13	-36.48
		High	1780.0 - 10000.0	-45.47	-13	-32.47
		High	10000.0 - 20000.0	-59.40	-13	-46.40
LTE Band 66B/C ULCA	40 MHz	Low	30.0 - 1709.0	-44.41	-13	-31.41
		Low	1710.0 - 1780.0	12.51	-	-
		Low	1780.0 - 10000.0	-45.69	-13	-32.69
		Low	10000.0 - 20000.0	-59.46	-13	-46.46
		Mid	30.0 - 1710.0	-49.35	-13	-36.35
		Mid	1710.0 - 1780.0	12.58	-	-
		Mid	1780.0 - 10000.0	-45.75	-13	-32.75
		Mid	10000.0 - 20000.0	-59.56	-13	-46.56
		High	30.0 - 1710.0	-49.29	-13	-36.29
		High	1710.0 - 1780.0	12.18	-	-
		High	1781.0 - 10000.0	-42.33	-13	-29.33
		High	10000.0 - 20000.0	-59.58	-13	-46.58

Table 7-10. Conducted Spurious Emissions Results - Ant1

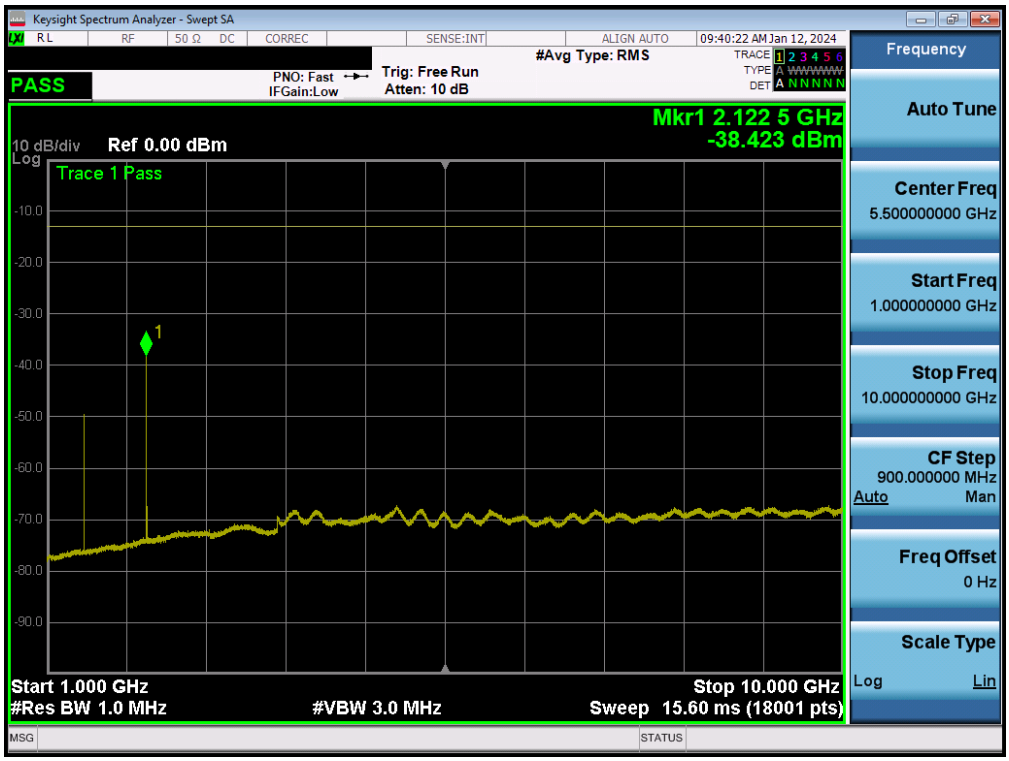
LTE Band 12 – ANT1



Plot 7-97. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - ANT1)



Plot 7-98. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - ANT1)



Plot 7-99. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - 1 RB - Mid Channel - ANT1)