



# 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 / RSS-130 & RSS-139 MEASUREMENT REPORT

**Applicant Name:**  
Microsoft Corporation  
One Microsoft Way  
Redmond, WA 98052  
United States

**Date of Testing:**  
1/4/2024 - 3/14/2024  
**Test Report Issue Date:**  
3/15/2023  
**Test Site/Location:**  
Element lab., Columbia, MD, USA  
**Test Report Serial No.:**  
1M2312040120-10.C3K

<b>FCC ID:</b>	<b>C3K2077</b>
<b>IC:</b>	<b>3048A-2077</b>
<b>APPLICANT:</b>	<b>Microsoft Corporation</b>

**Application Type:** Certification  
**Model/HVIN:** 2077  
**EUT Type:** Portable Computing Device  
**FCC Classification:** PCS Licensed Transmitter (PCB)  
**FCC Rule Part:** 27  
**ISED Specification:** RSS-130 Issue 2, RSS-139 Issue 4  
**Test Procedure(s):** ANSI C63.26-2015

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



<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 1 of 174

## TABLE OF CONTENTS

1.0	INTRODUCTION .....	5
1.1	Scope .....	5
1.2	Element Test Location.....	5
1.3	Test Facility / Accreditations.....	5
2.0	PRODUCT INFORMATION.....	6
2.1	Equipment Description .....	6
2.2	Device Capabilities.....	6
2.3	Test Configuration .....	6
2.4	Software and Firmware .....	6
2.5	EMI Suppression Device(s)/Modifications .....	6
3.0	DESCRIPTION OF TESTS .....	7
3.1	Evaluation Procedure .....	7
3.2	Radiated Power and Radiated Spurious Emissions .....	7
4.0	MEASUREMENT UNCERTAINTY .....	8
5.0	TEST EQUIPMENT CALIBRATION DATA .....	9
6.0	SAMPLE CALCULATIONS .....	10
7.0	TEST RESULTS .....	11
7.1	Summary.....	11
7.2	Conducted Output Power Data .....	13
7.3	Occupied Bandwidth .....	15
7.4	Spurious and Harmonic Emissions at Antenna Terminal .....	69
7.5	Band Edge Emissions at Antenna Terminal .....	93
7.6	Peak-Average Ratio .....	116
7.7	Radiated Power (ERP/EIRP).....	133
7.8	Radiated Spurious Emissions Measurements.....	141
7.9	Frequency Stability / Temperature Variation .....	165
8.0	CONCLUSION.....	174

<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 2 of 174

## MEASUREMENT REPORT

### FCC Part 27

Antenna-4						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 71	20 MHz	QPSK	673.0 - 688.0	0.118	20.73	18M0G7D
		16QAM	673.0 - 688.0	0.104	20.15	18M0W7D
	15 MHz	QPSK	670.5 - 690.5	0.126	20.99	13M5G7D
		16QAM	670.5 - 690.5	0.103	20.11	13M5W7D
	10 MHz	QPSK	668.0 - 693.0	0.124	20.93	9M00G7D
		16QAM	668.0 - 693.0	0.112	20.48	9M01W7D
	5 MHz	QPSK	665.5 - 695.5	0.123	20.91	4M66G7D
		16QAM	665.5 - 695.5	0.109	20.37	4M67W7D
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.096	19.81	9M07G7D
		16QAM	704.0 - 711.0	0.076	18.83	9M03W7D
	5 MHz	QPSK	701.5 - 713.5	0.090	19.52	4M53G7D
		16QAM	701.5 - 713.5	0.074	18.67	4M54W7D
	3 MHz	QPSK	700.5 - 714.5	0.087	19.40	2M72G7D
		16QAM	700.5 - 714.5	0.078	18.94	2M73W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.091	19.58	1M11G7D
		16QAM	699.7 - 715.3	0.073	18.65	1M10W7D
LTE Band 13	10 MHz	QPSK	782.0	0.129	21.12	9M01G7D
		16QAM	782.0	0.104	20.16	9M01W7D
	5 MHz	QPSK	779.5 - 784.5	0.134	21.27	4M55G7D
		16QAM	779.5 - 784.5	0.109	20.37	4M54W7D
NR Band n71	20 MHz	$\pi/2$ BPSK	673.0 - 688.0	0.134	21.27	18M0G7D
		QPSK	673.0 - 688.0	0.127	21.03	19M0G7D
		16QAM	673.0 - 688.0	0.101	20.05	19M0W7D
	15 MHz	$\pi/2$ BPSK	670.5 - 690.5	0.135	21.30	13M5G7D
		QPSK	670.5 - 690.5	0.125	20.96	14M0G7D
		16QAM	670.5 - 690.5	0.099	19.96	14M0W7D
	10 MHz	$\pi/2$ BPSK	668.0 - 693.0	0.130	21.16	8M97G7D
		QPSK	668.0 - 693.0	0.122	20.88	9M35G7D
	5 MHz	16QAM	668.0 - 693.0	0.101	20.05	9M34W7D
		$\pi/2$ BPSK	665.5 - 695.5	0.135	21.32	4M54G7D
		QPSK	665.5 - 695.5	0.125	20.96	4M53G7D
		16QAM	665.5 - 695.5	0.100	19.99	4M53W7D
NR Band n12	15 MHz	$\pi/2$ BPSK	706.5 - 708.5	0.166	22.20	13M5G7D
		QPSK	706.5 - 708.5	0.165	22.18	14M0G7D
		16QAM	706.5 - 708.5	0.128	21.07	14M0W7D
	10 MHz	$\pi/2$ BPSK	704.0 - 711.0	0.165	22.17	9M00G7D
		QPSK	704.0 - 711.0	0.164	22.15	9M36G7D
		16QAM	704.0 - 711.0	0.128	21.08	9M36W7D
	5 MHz	$\pi/2$ BPSK	701.5 - 713.5	0.166	22.20	4M51G7D
		QPSK	701.5 - 713.5	0.163	22.11	4M54G7D
16QAM	701.5 - 713.5	0.127	21.04	4M53W7D		

**Overview Table (<1GHz Bands)**

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 3 of 174

Antenna-1						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
WCDMA1700	N/A	Spread Spectrum	1712.4 - 1752.6	0.305	24.84	4M18F9W
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.215	23.33	18M1G7D
		16QAM	1720.0 - 1770.0	0.185	22.66	18M0W7D
	15 MHz	QPSK	1717.5 - 1772.5	0.209	23.20	13M5G7D
		16QAM	1717.5 - 1772.5	0.188	22.73	13M5W7D
	10 MHz	QPSK	1715.0 - 1775.0	0.222	23.47	9M02G7D
		16QAM	1715.0 - 1775.0	0.195	22.89	9M02W7D
	5 MHz	QPSK	1712.5 - 1777.5	0.231	23.63	4M55G7D
		16QAM	1712.5 - 1777.5	0.196	22.93	4M56W7D
	3 MHz	QPSK	1711.5 - 1778.5	0.218	23.38	2M72G7D
		16QAM	1711.5 - 1778.5	0.199	22.98	2M72W7D
1.4 MHz	QPSK	1710.7 - 1779.3	0.221	23.45	1M11G7D	
	16QAM	1710.7 - 1779.3	0.201	23.02	1M11W7D	
NR Band n66	40 MHz	$\pi/2$ BPSK	1730.0 - 1760.0	0.233	23.68	38M8G7D
		QPSK	1730.0 - 1760.0	0.247	23.93	38M8G7D
		16QAM	1730.0 - 1760.0	0.195	22.91	38M9W7D
	30 MHz	$\pi/2$ BPSK	1725.0 - 1765.0	0.238	23.77	28M8G7D
		QPSK	1725.0 - 1765.0	0.248	23.94	28M8G7D
		16QAM	1725.0 - 1765.0	0.196	22.93	28M8W7D
	25 MHz	$\pi/2$ BPSK	1722.5 - 1767.5	0.237	23.75	23M2G7D
		QPSK	1722.5 - 1767.5	0.252	24.02	24M0G7D
		16QAM	1722.5 - 1767.5	0.197	22.95	24M0W7D
	20 MHz	$\pi/2$ BPSK	1720.0 - 1770.0	0.238	23.76	18M0G7D
		QPSK	1720.0 - 1770.0	0.249	23.96	19M1G7D
		16QAM	1720.0 - 1770.0	0.192	22.82	19M1W7D
	15 MHz	$\pi/2$ BPSK	1717.5 - 1772.5	0.235	23.71	13M6G7D
		QPSK	1717.5 - 1772.5	0.249	23.96	14M0G7D
		16QAM	1717.5 - 1772.5	0.196	22.92	14M0W7D
	10 MHz	$\pi/2$ BPSK	1715.0 - 1775.0	0.223	23.49	9M05G7D
		QPSK	1715.0 - 1775.0	0.236	23.74	9M40G7D
		16QAM	1715.0 - 1775.0	0.183	22.63	9M35W7D
	5 MHz	$\pi/2$ BPSK	1712.5 - 1777.5	0.232	23.66	4M52G7D
		QPSK	1712.5 - 1777.5	0.243	23.86	4M51G7D
16QAM		1712.5 - 1777.5	0.188	22.73	4M53W7D	

Overview Table (>1GHz Bands)

Antenna-4						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n66	40 MHz	$\pi/2$ BPSK	1730.0 - 1760.0	0.095	19.77	38M8G7D
		QPSK	1730.0 - 1760.0	0.096	19.84	38M8G7D
		16QAM	1730.0 - 1760.0	0.078	18.91	38M9W7D
	30 MHz	$\pi/2$ BPSK	1725.0 - 1765.0	0.099	19.95	28M7G7D
		QPSK	1725.0 - 1765.0	0.101	20.05	28M8G7D
		16QAM	1725.0 - 1765.0	0.081	19.10	28M8W7D
	25 MHz	$\pi/2$ BPSK	1722.5 - 1767.5	0.100	20.00	23M0G7D
		QPSK	1722.5 - 1767.5	0.103	20.12	23M9G7D
		16QAM	1722.5 - 1767.5	0.084	19.26	23M9W7D
	20 MHz	$\pi/2$ BPSK	1720.0 - 1770.0	0.100	19.98	18M1G7D
		QPSK	1720.0 - 1770.0	0.099	19.94	19M0G7D
		16QAM	1720.0 - 1770.0	0.085	19.30	19M0W7D
	15 MHz	$\pi/2$ BPSK	1717.5 - 1772.5	0.099	19.97	13M5G7D
		QPSK	1717.5 - 1772.5	0.099	19.96	14M2G7D
		16QAM	1717.5 - 1772.5	0.085	19.31	14M2W7D
	10 MHz	$\pi/2$ BPSK	1715.0 - 1775.0	0.096	19.83	9M03G7D
		QPSK	1715.0 - 1775.0	0.096	19.81	9M35G7D
		16QAM	1715.0 - 1775.0	0.081	19.06	9M35W7D
	5 MHz	$\pi/2$ BPSK	1712.5 - 1777.5	0.096	19.83	4M52G7D
		QPSK	1712.5 - 1777.5	0.099	19.97	4M52G7D
16QAM		1712.5 - 1777.5	0.080	19.01	4M53W7D	

Overview Table (>1GHz Bands)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 4 of 174

# 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.

<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 5 of 174

## 2.0 PRODUCT INFORMATION

### 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Microsoft Corporation Portable Computing Device FCC ID: C3K2077 / IC: 3048A-2077**. 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, RSS-130, and RSS139.

**Test Device Serial No.:** B44F2, 7CBR2, B44T2, B44D2, 7CBC2, B44G2, 7CDR2

### 2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1), 802.11b/g/n/ac/ax/be WLAN, 802.11a/n/ac/ax/be UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE)

### 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.

### 2.4 Software and Firmware

Testing was performed on device(s) using software/firmware version 2024.111.46 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.

<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 6 of 174

## 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  $P_g [dBm] - \text{cable loss} [dB]$ .

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

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

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.

<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 7 of 174

## 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 ( $\pm$ dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 8 of 174



## 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	11/15/2023	Annual	11/15/2024	AP2-001
-	AP2-002	EMC Cable and Switch System	11/15/2023	Annual	11/15/2024	AP2-002
-	AP1-002	EMC Cable and Switch System	11/15/2023	Annual	11/15/2024	AP1-002
-	ETS-001	EMC Cable and Switch System	11/15/2023	Annual	11/15/2024	ETS-001
-	ETS-002	EMC Cable and Switch System	11/15/2023	Annual	11/15/2024	ETS-002
-	LTx3	Licensed Transmitter Cable Set	11/15/2023	Annual	11/15/2024	LTx3
-	LTx4	Licensed Transmitter Cable Set	11/15/2023	Annual	11/15/2024	LTx4
-	LTx5	Licensed Transmitter Cable Set	11/15/2023	Annual	11/15/2024	LTx5
Anritsu	MT8821C	Radio Communication Analyzer	7/5/2023	Annual	7/5/2024	6262150000
Espec	SCP-220	Environmental Chamber	5/25/2022	Annual	5/25/2024	OCP55H0612K05
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Keysight Technologies	N9020A	MXA Signal Analyzer	3/15/2023	Annual	3/15/2024	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	2/29/2024	Annual	3/1/2025	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/7/2023	Annual	9/7/2024	MY57141001
Keysight Technologies	N9038A	MXE EMI Receiver	8/30/2023	Annual	8/30/2024	MY51210133
Rohde & Schwarz	CMW500	Radio Communication Tester		N/A		100976
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/11/2020	Annual	9/11/2024	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	2/15/2024	Annual	2/15/2025	103200
Schwarzbeck	VULB9162	Bilog Antenna	2/21/2023	Biennial	2/21/2025	83706
Rohde & Schwarz	TC-TA18	Vivaldi Antenna	2/23/2023	Biennial	2/23/2025	101072
ETS-Lindgren	3115	Double Ridged Horn 750MHz - 18GHz	4/12/2022	Biennial	4/12/2024	150693
Sunol Sciences	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.

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 9 of 174

## 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 2<sup>nd</sup> Harmonic (1564 MHz)**

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was  $-81.0$  dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of  $-81.0$  dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of  $-30.9$  dBm yielding  $-24.80$  dBm. The fundamental EIRP was 25.501 dBm so this harmonic was  $25.501$  dBm  $- (-24.80) = 50.3$  dBc.

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 10 of 174

## 7.0 TEST RESULTS

### 7.1 Summary

Company Name: Microsoft Corporation  
 FCC ID: C3K2077  
 FCC Classification: PCS Licensed Transmitter (PCB)  
 Mode(s): WCDMA/LTE/NR/UL-CA

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
<b>CONDUCTED</b>	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	RSS-Gen(6.12)	N/A	<b>PASS</b>	Section 7.2
	Occupied Bandwidth	2.1049(h)	RSS-Gen(6.7)	N/A	<b>PASS</b>	Section 7.3
	Conducted Band Edge / Spurious Emissions (LTE Band 13)	2.1051, 27.53(c), 27.53(f)	RSS-Gen(6.13), RSS-130(4.7)	Undesirable emissions must meet the limits detailed in sections 27.53(c) and 27.53(f)	<b>PASS</b>	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (LTE Band 12, 17, 71; NR Band n12, n71)	2.1051, 27.53(g)	RSS-Gen(6.13), RSS-130(4.7)	$\geq 43 + 10 \log (P[\text{Watts}])$ dB of attenuation below transmitter power	<b>PASS</b>	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (WCDMA AWS; LTE Band 4, 66; NR Band n66)	2.1051, 27.53(h)	RSS-Gen(6.13), RSS-139(5.6)	$\geq 43 + 10 \log (P[\text{Watts}])$ dB of attenuation below transmitter power	<b>PASS</b>	Sections 7.4, 7.5
	Peak-to-Average Ratio (LTE Band 12, 13, 17, 71; NR Band n12, n71)	N/A	RSS-130(4.6.1)	$\leq 13$ dB	<b>PASS</b>	Section 7.6
	Peak-to-Average Ratio (WCDMA AWS; LTE Band 4, 66; NR Band n66)	27.50(d)(5)	RSS-139(5.5)	$\leq 13$ dB	<b>PASS</b>	Section 7.6
	Frequency Stability	2.1055, 27.54	RSS-Gen(6.11), RSS-130(4.5), RSS-139(5.4)	Fundamental emissions stay within authorized frequency block	<b>PASS</b>	Section 7.9
<b>RADIATED</b>	Effective Radiated Power (LTE Band 13)	27.50(b)(10)	RSS-Gen(6.12), RSS-130(4.6)	$\leq 3$ Watts max. ERP	<b>PASS</b>	Section 7.7
	Effective Radiated Power (LTE Band 12, 17, 71; NR Band n12, n71)	27.50(c)(10)	RSS-Gen(6.12), RSS-130(4.6)	$\leq 3$ Watts max. ERP	<b>PASS</b>	Section 7.7
	Equivalent Isotropic Radiated Power (WCDMA AWS; LTE Band 4, 66; NR Band n66)	27.50(d)(4)	RSS-Gen(6.12), RSS-139(5.5)	$\leq 1$ Watt max. EIRP	<b>PASS</b>	Section 7.7
	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(c), 27.53(f)	RSS-Gen(6.13), RSS-130(4.7)	Undesirable emissions must meet the limits detailed in sections 27.53(c) and 27.53(f)	<b>PASS</b>	Section 7.8
	Radiated Spurious Emissions (LTE Band 12, 17, 71; NR Band n12, n71)	2.1053, 27.53(g)	RSS-Gen(6.13), RSS-130(4.7)	$\geq 43 + 10 \log (P[\text{Watts}])$ dB of attenuation below transmitter power	<b>PASS</b>	Section 7.8
	Radiated Spurious Emissions (WCDMA AWS; LTE Band 4, 66; NR Band n66)	2.1053, 27.53(h)(1)	RSS-Gen(6.13), RSS-139(5.6)	$\geq 43 + 10 \log (P[\text{Watts}])$ dB of attenuation below transmitter power	<b>PASS</b>	Section 7.8

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

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 11 of 174



**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 v1.2.2.
- 5) LTE Band B71 data in this report is for FCC filing only.

<b>FCC ID:</b> C3K2077 <b>IC:</b> 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		<b>Approved by:</b> Technical Manager
<b>Test Report S/N:</b> 1M2312040120-10.C3K	<b>Test Dates:</b> 1/4/2024 - 3/14/2024	<b>EUT Type:</b> Portable Computing Device	Page 12 of 174

## 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

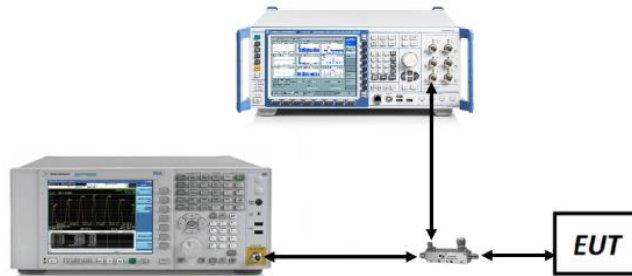
ANSI C63.26-2015 – Section 5.2

### 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. Uplink carrier aggregation is only supported in this EUT while operating in Power Class 3.
2. 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.
3. All other conducted power measurements are contained in the RF exposure report for this filing.
4. 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.

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 13 of 174



Power State	Band	Bandwidth (PCC + SCC)	PCC				SCC				ULCA Tx. Power [dBm]		
			Modulation	UL Channel	UL Frequency	UL # RB	UL RB Offset	Modulation	UL Channel	UL Frequency		UL # RB	UL RB Offset
Max	LTE B66	20MHz + 20MHz	QPSK	132072	1720.0	1	99	QPSK	132270	1739.8	1	0	24.99
				132322	1745.0	1	99		132520	1764.8	1	0	24.93
				132572	1770.0	1	0		132374	1750.2	1	99	24.96
			QPSK	132072	1720	100	0	QPSK	132270	1739.8	100	0	23.44
			16-QAM	132072	1720	100	0	16-QAM	132270	1739.8	100	0	22.41
			64-QAM	132072	1720	100	0	64-QAM	132270	1739.8	100	0	22.38
			256-QAM	132072	1720	100	0	256-QAM	132270	1739.8	100	0	20.42

**Table 7-2. Conducted Power Output Data (ULCA LTE Band B66) – Ant1**

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 14 of 174

## 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

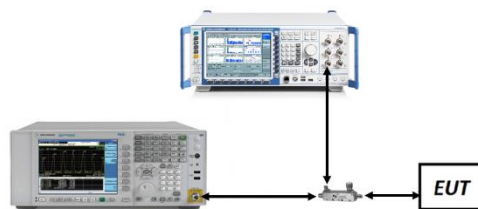
ANSI C63.26-2015 – Section 5.4.4

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

### Test Setup

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



**Figure 7-2. Test Instrument & Measurement Setup**

### Test Notes

None.

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 15 of 174

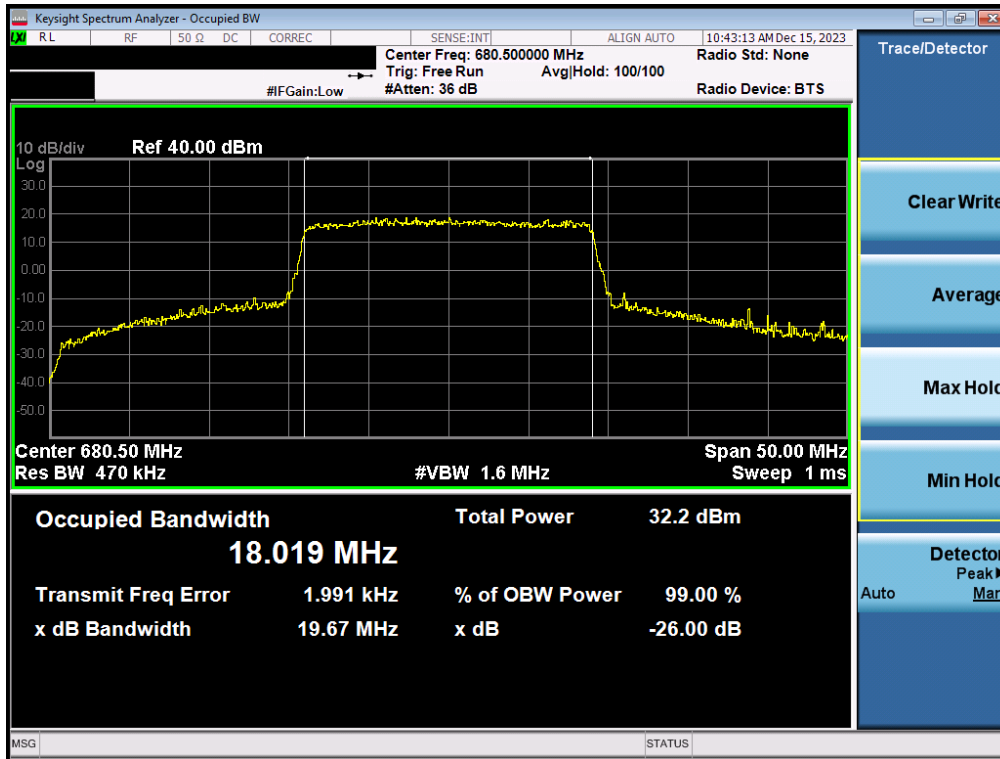
Mode	Bandwidth	Modulation	OBW [MHz]
LTE-B71	20MHz	QPSK	18.02
		16QAM	17.99
	15MHz	QPSK	13.53
		16QAM	13.52
	10MHz	QPSK	9.00
		16QAM	9.01
	5MHz	QPSK	4.54
		16QAM	4.54
LTE-B12	10MHz	QPSK	9.07
		16QAM	9.03
	5MHz	QPSK	4.53
		16QAM	4.54
	3MHz	QPSK	2.72
		16QAM	2.73
	1.4MHz	QPSK	1.11
		16QAM	1.10
LTE-B13	10MHz	QPSK	9.01
		16QAM	9.01
	5MHz	QPSK	4.55
		16QAM	4.54
NR-n71	20MHz	$\pi/2$ BPSK	18.01
		QPSK	19.01
		16QAM	19.04
	15MHz	$\pi/2$ BPSK	13.48
		QPSK	14.03
		16QAM	14.01
	10MHz	$\pi/2$ BPSK	8.97
		QPSK	9.35
		16QAM	9.34
	5MHz	$\pi/2$ BPSK	4.54
		QPSK	4.53
		16QAM	4.53
NR-n12	15MHz	$\pi/2$ BPSK	13.49
		QPSK	14.03
		16QAM	14.01
	10MHz	$\pi/2$ BPSK	9.00
		QPSK	9.36
		16QAM	9.36
	5MHz	$\pi/2$ BPSK	4.51
		QPSK	4.54
		16QAM	4.53

**Table 7-3. Occupied Bandwidth Test Results – Ant4**

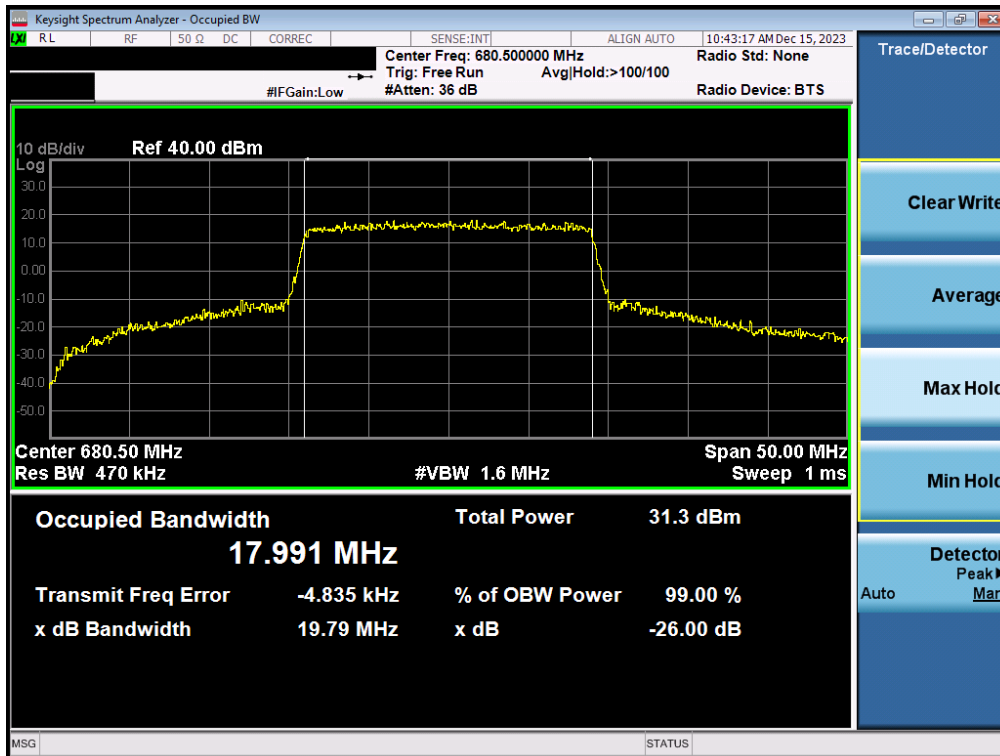
FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 16 of 174



# LTE Band 71 – Ant4

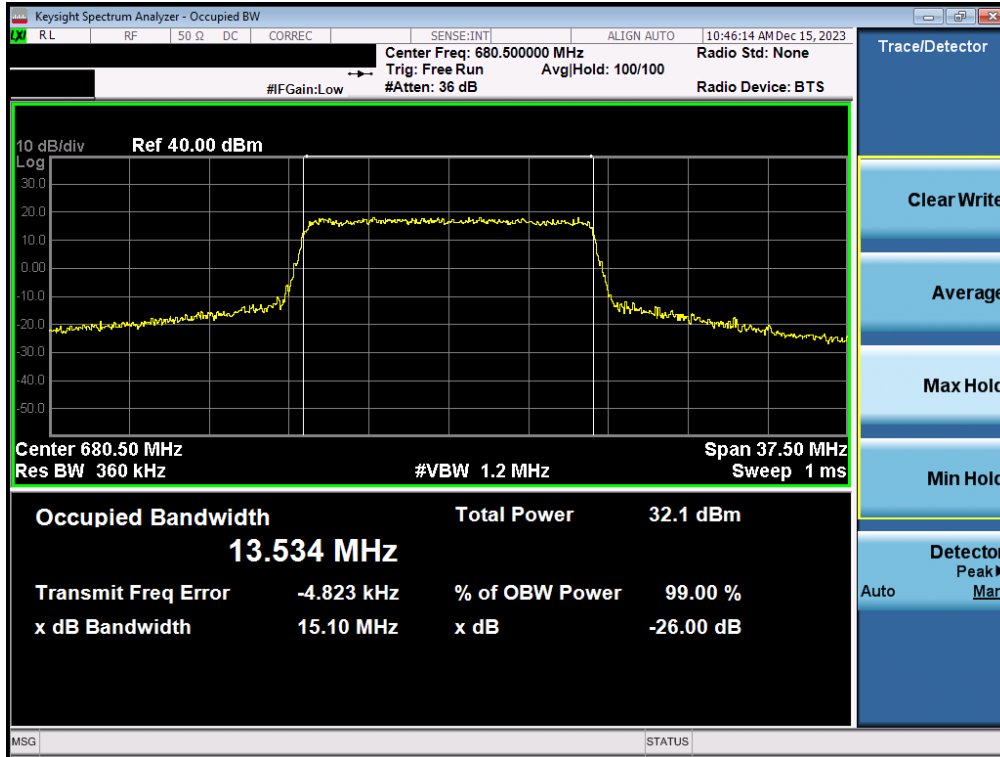


Plot 7-1. Occupied Bandwidth Plot (LTE Band 71 - 20MHz QPSK - Full RB – Ant4)

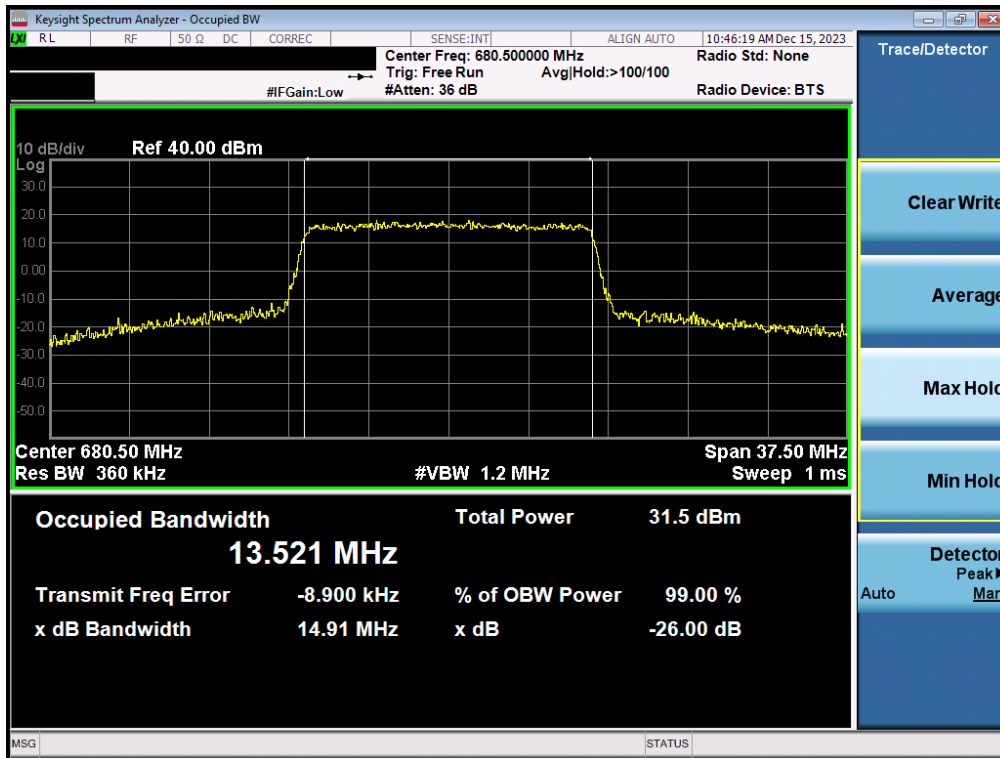


Plot 7-2. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 17 of 174

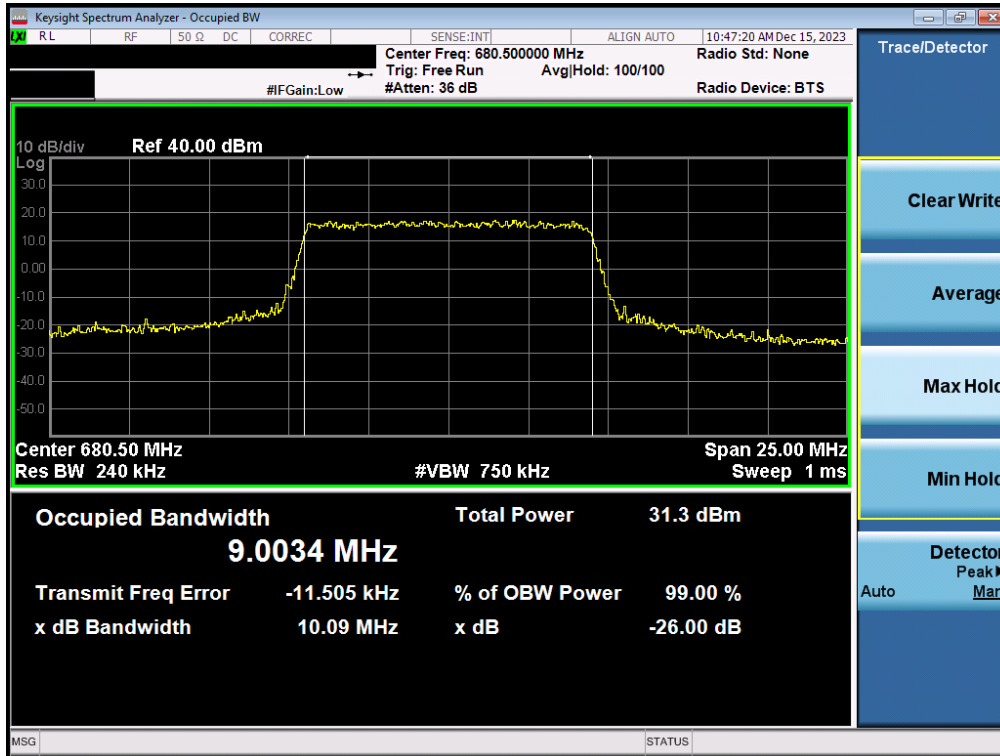


Plot 7-3. Occupied Bandwidth Plot (LTE Band 71 - 15MHz QPSK - Full RB - Ant4)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 16-QAM - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 18 of 174

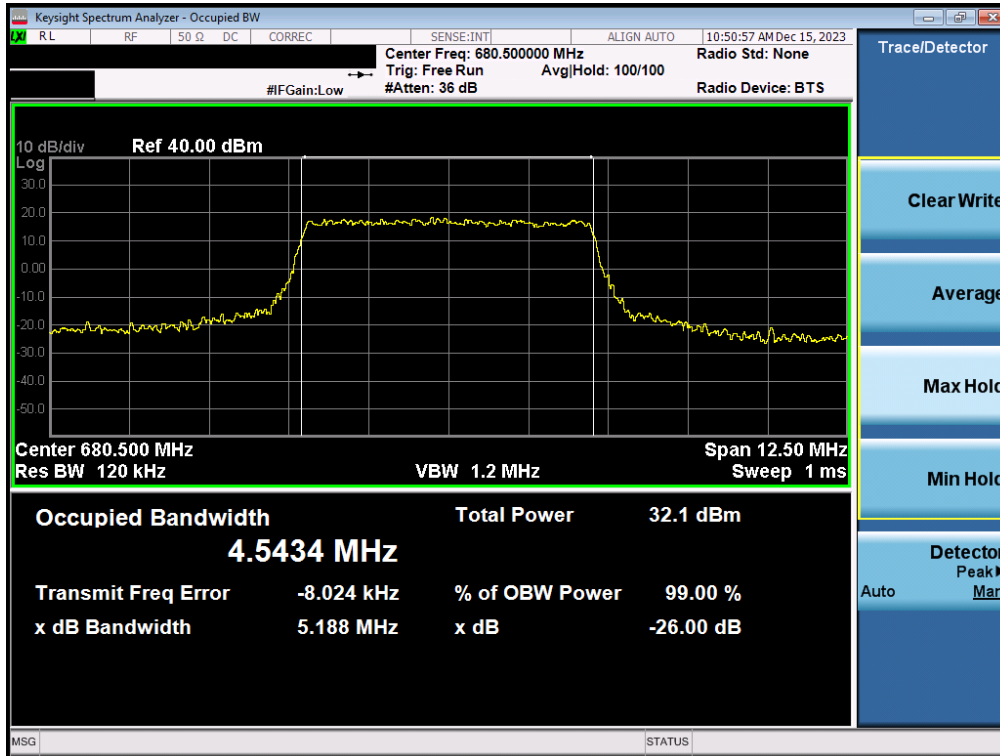


Plot 7-5. Occupied Bandwidth Plot (LTE Band 71 - 10MHz QPSK - Full RB – Ant4)

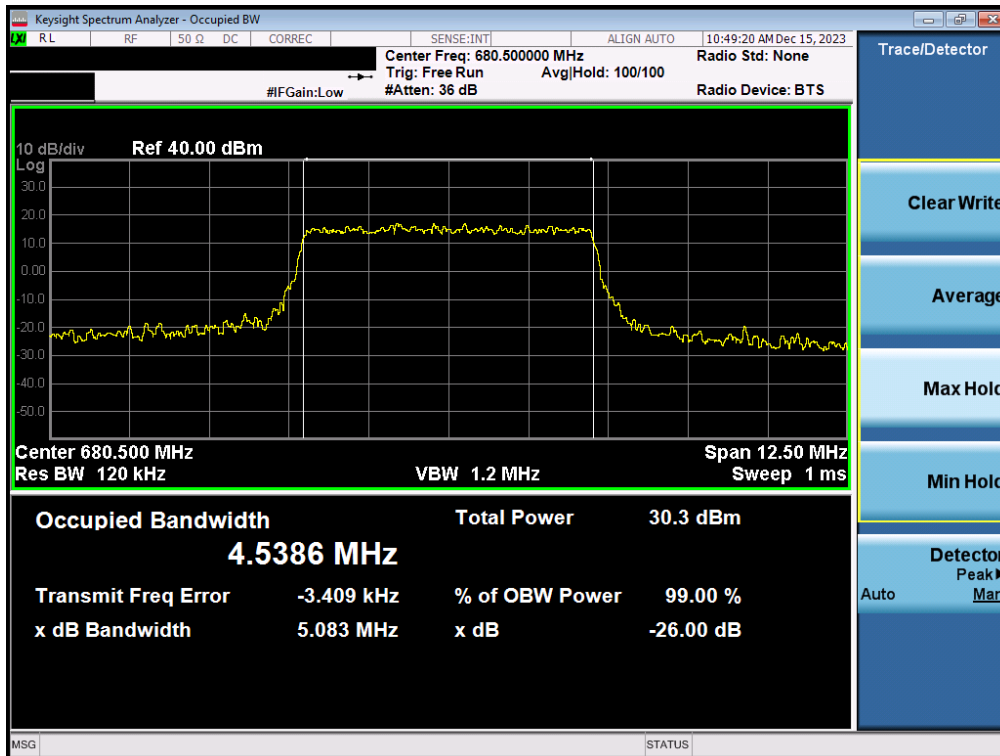


Plot 7-6. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 19 of 174



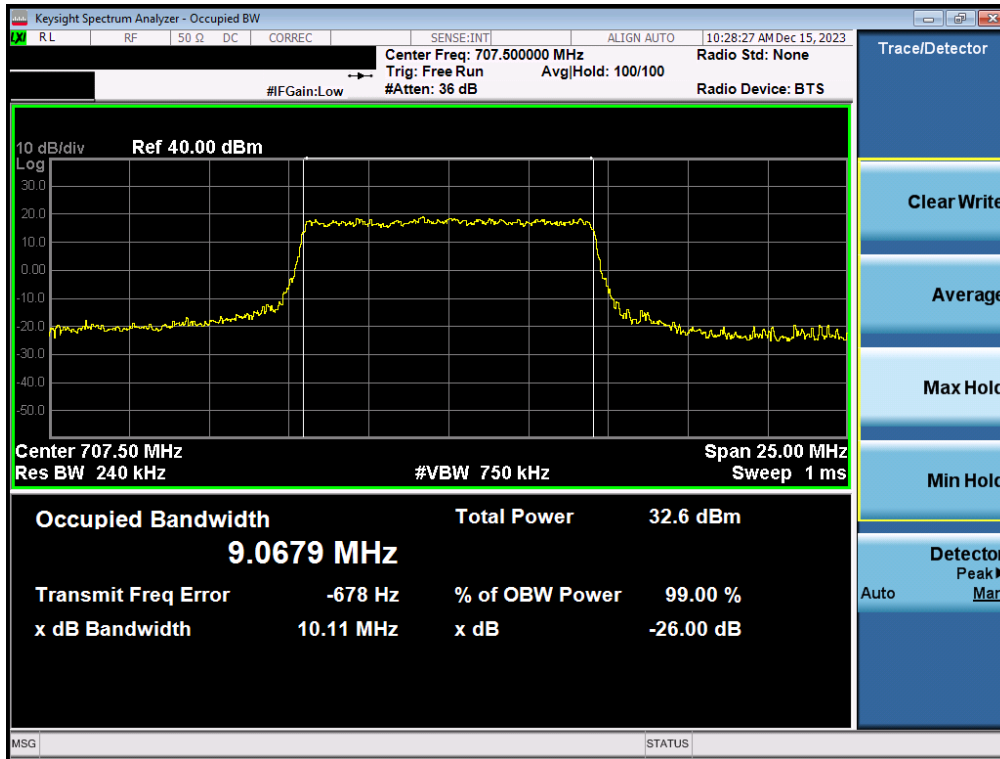
Plot 7-7. Occupied Bandwidth Plot (LTE Band 71 - 5MHz QPSK - Full RB – Ant4)



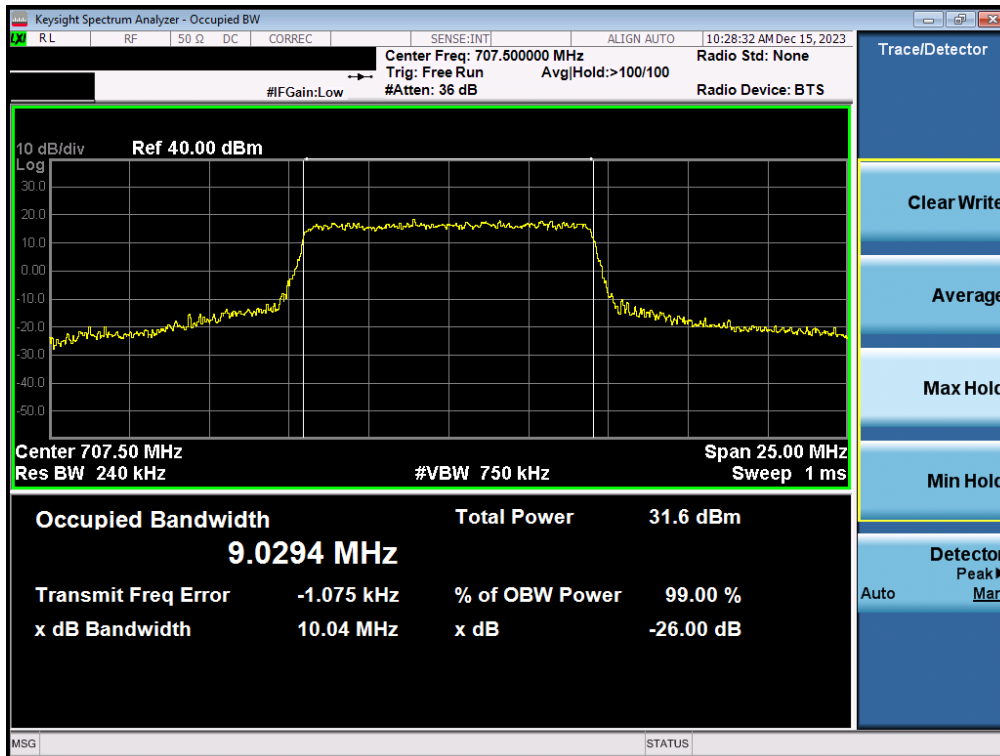
Plot 7-8. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 20 of 174

# LTE Band 12 – Ant4

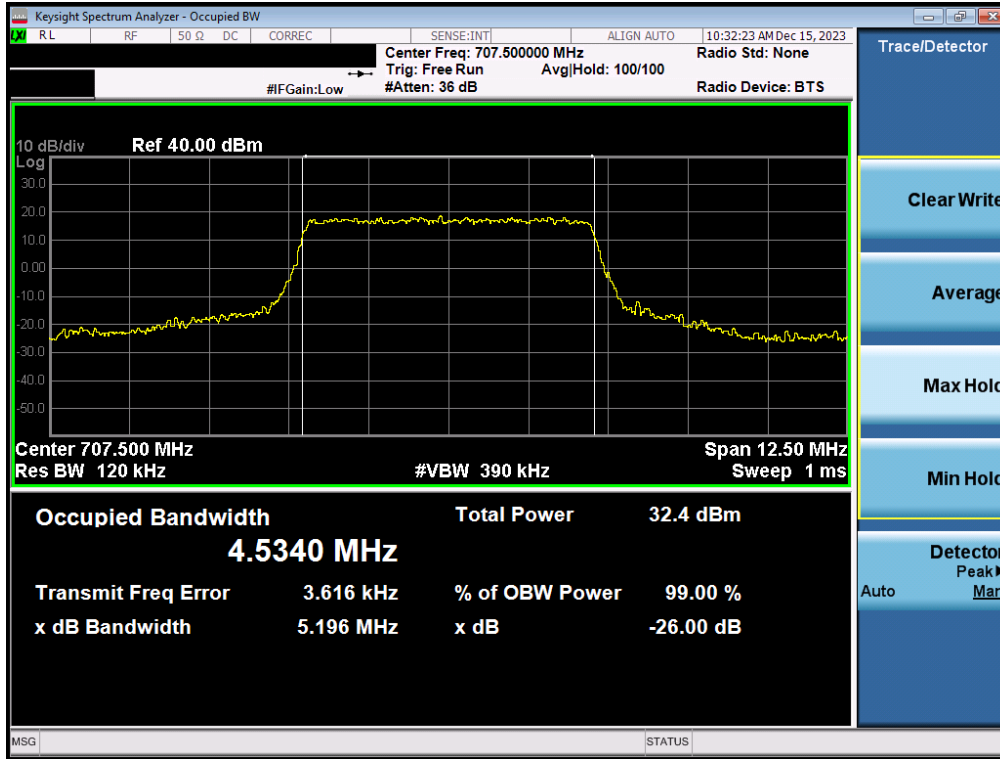


Plot 7-9. Occupied Bandwidth Plot (LTE Band 12 - 10MHz QPSK - Full RB – Ant4)



Plot 7-10. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 21 of 174

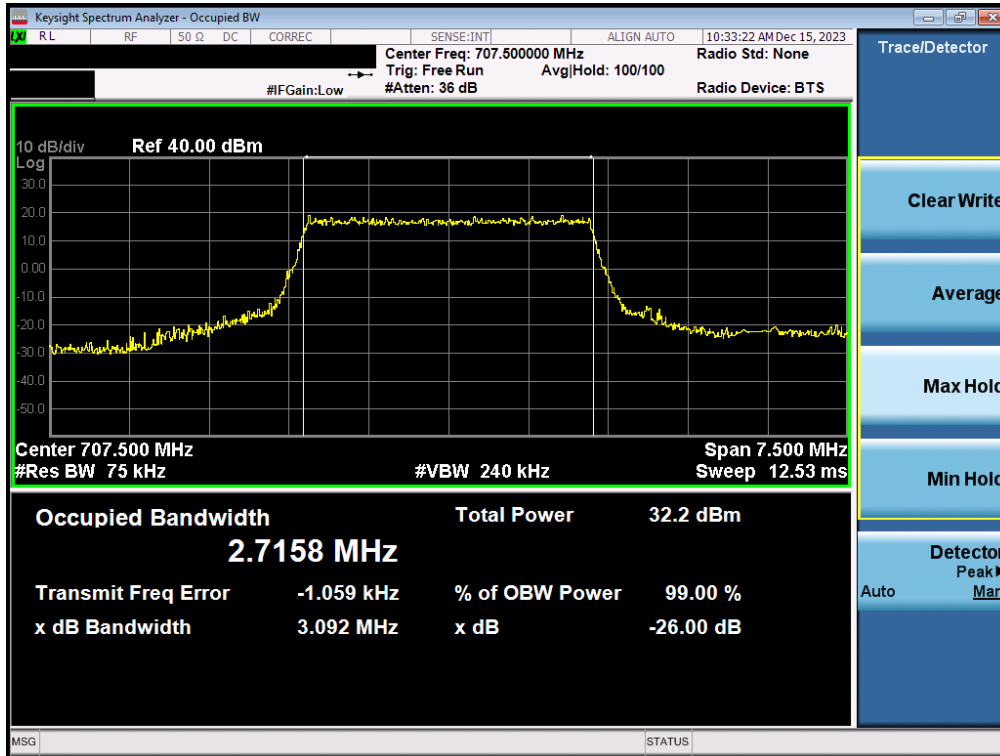


Plot 7-11. Occupied Bandwidth Plot (LTE Band 12 - 5MHz QPSK - Full RB – Ant4)

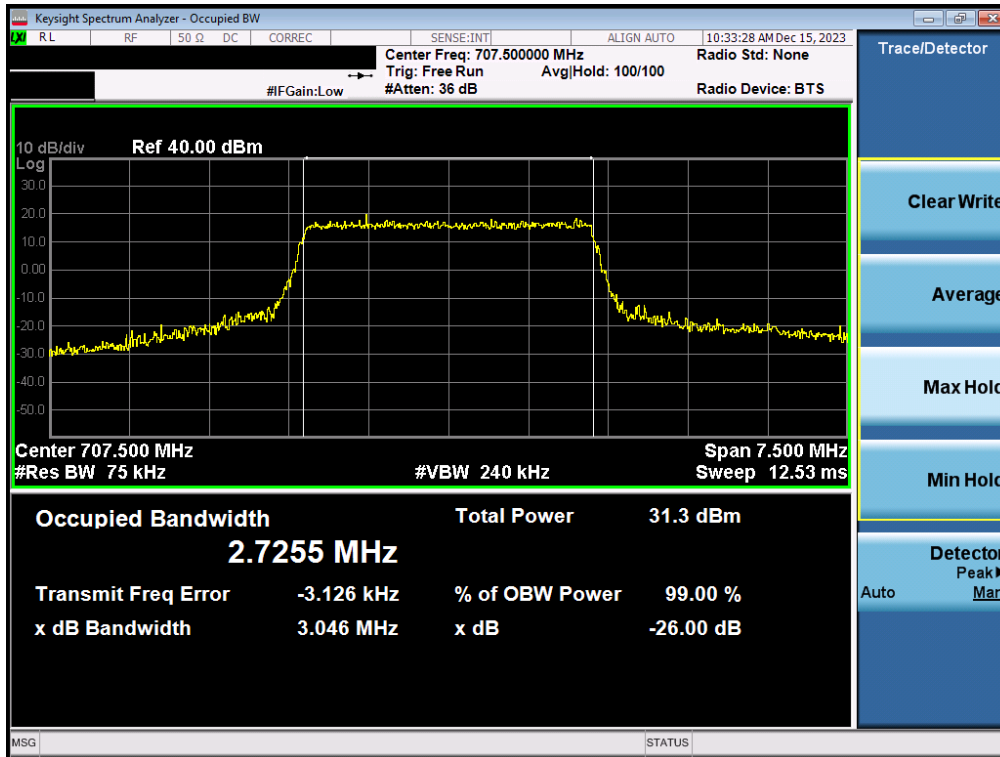


Plot 7-12. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 22 of 174

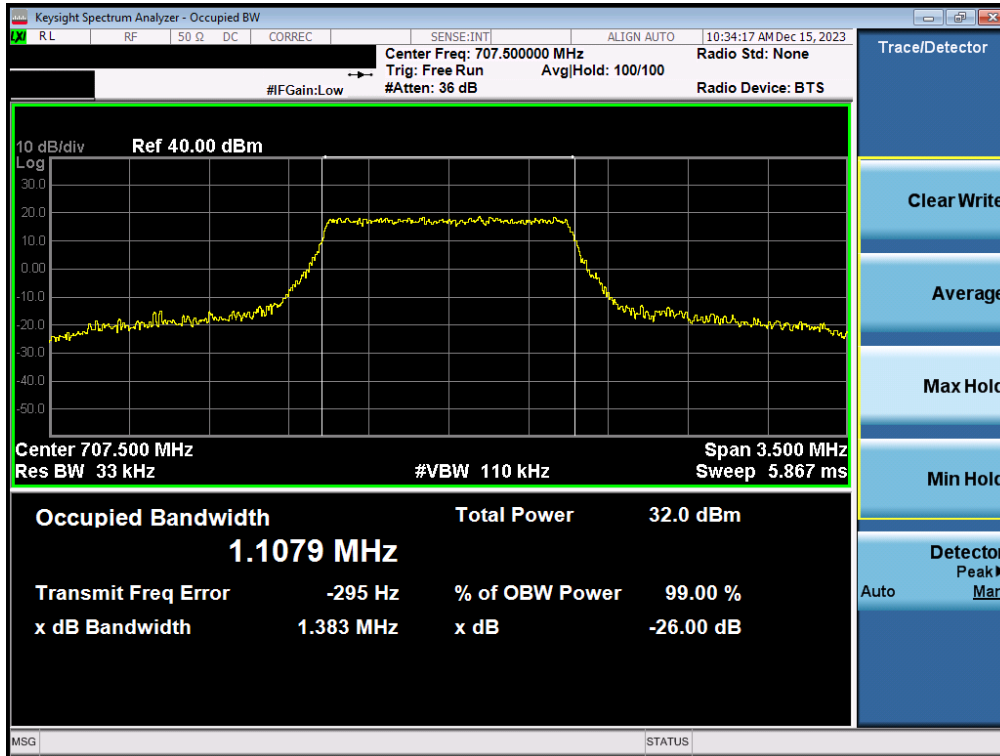


Plot 7-13. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB – Ant4)

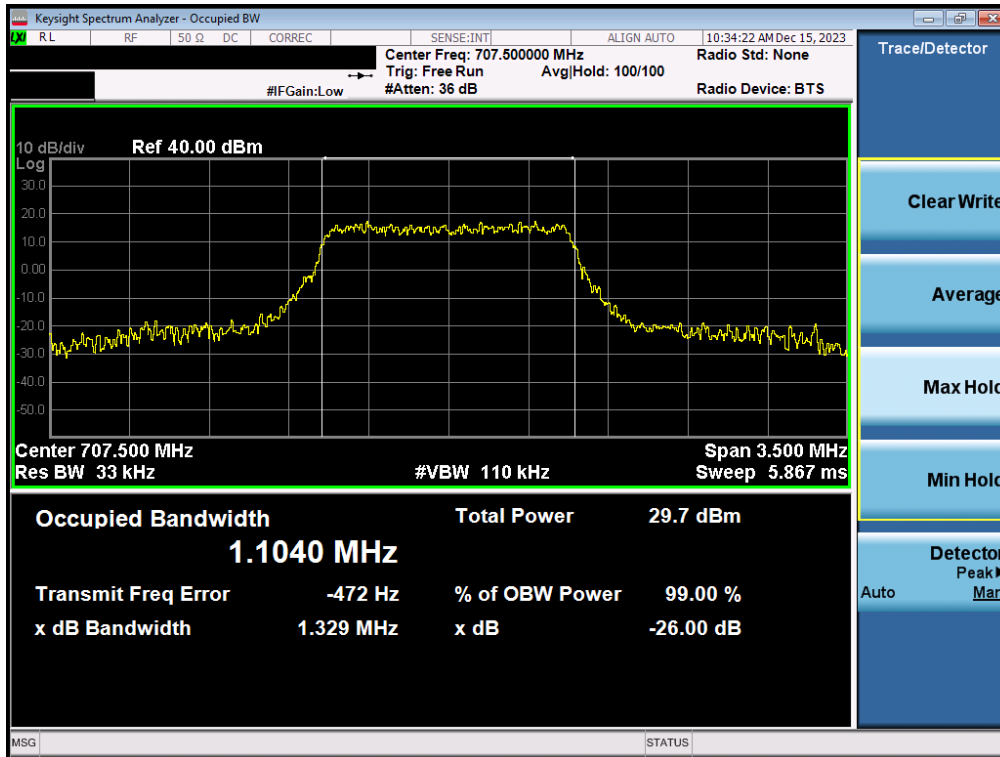


Plot 7-14. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 23 of 174



Plot 7-15. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz QPSK - Full RB – Ant4)

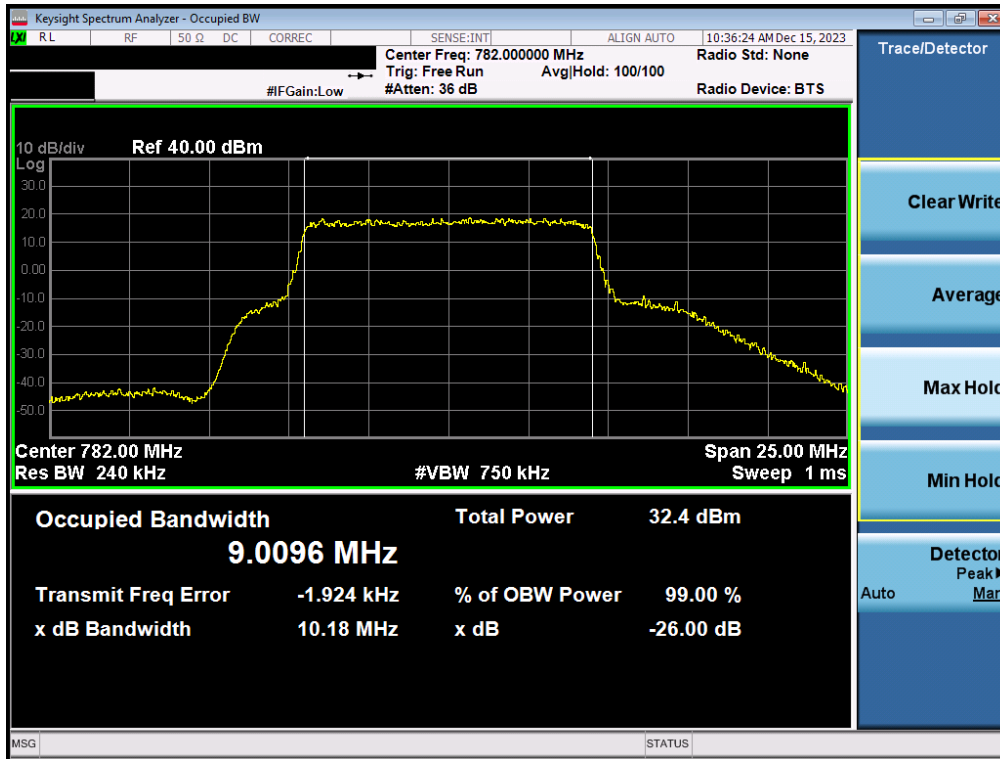


Plot 7-16. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB – Ant4)

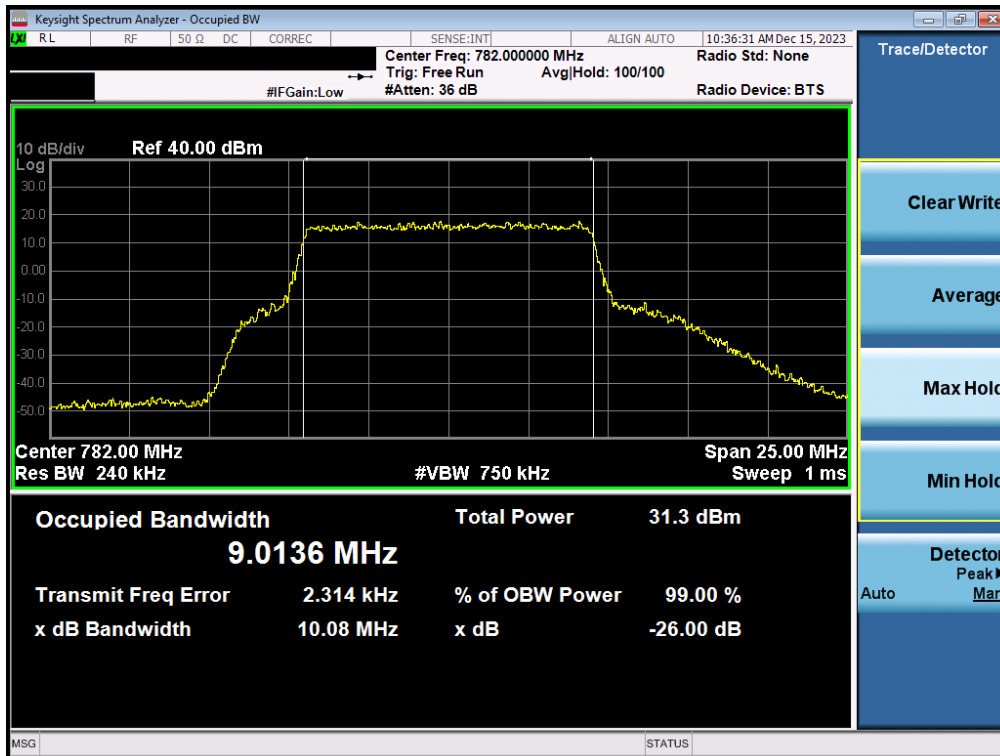
FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 24 of 174



### LTE Band 13 – Ant4



Plot 7-17. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB – Ant4)

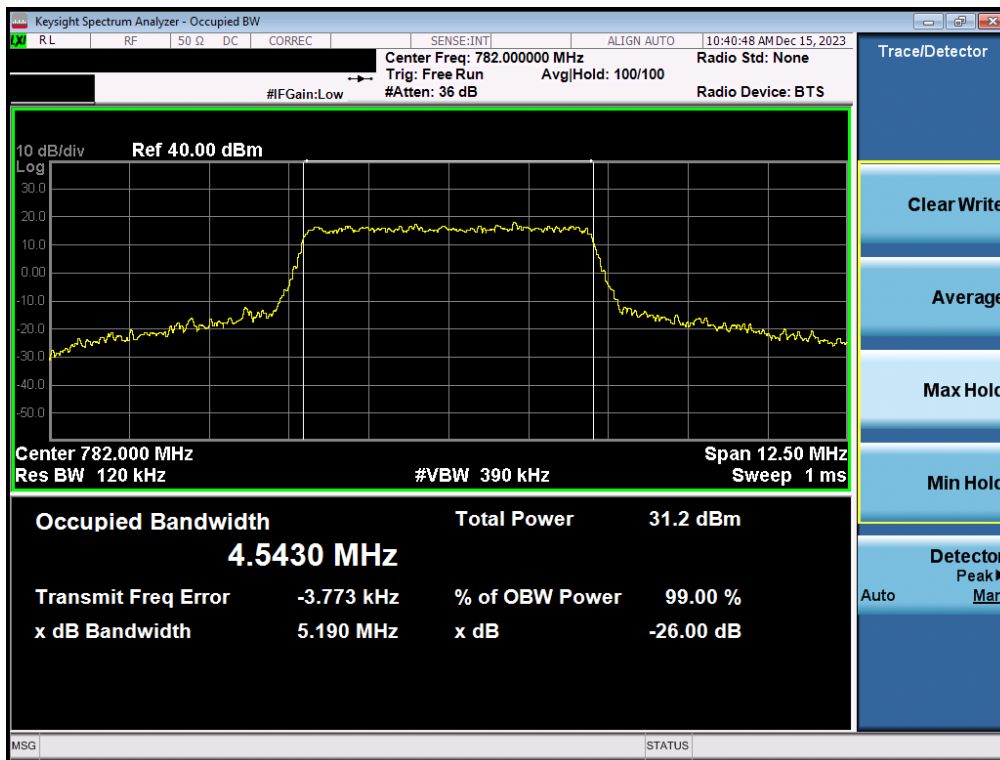


Plot 7-18. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 25 of 174



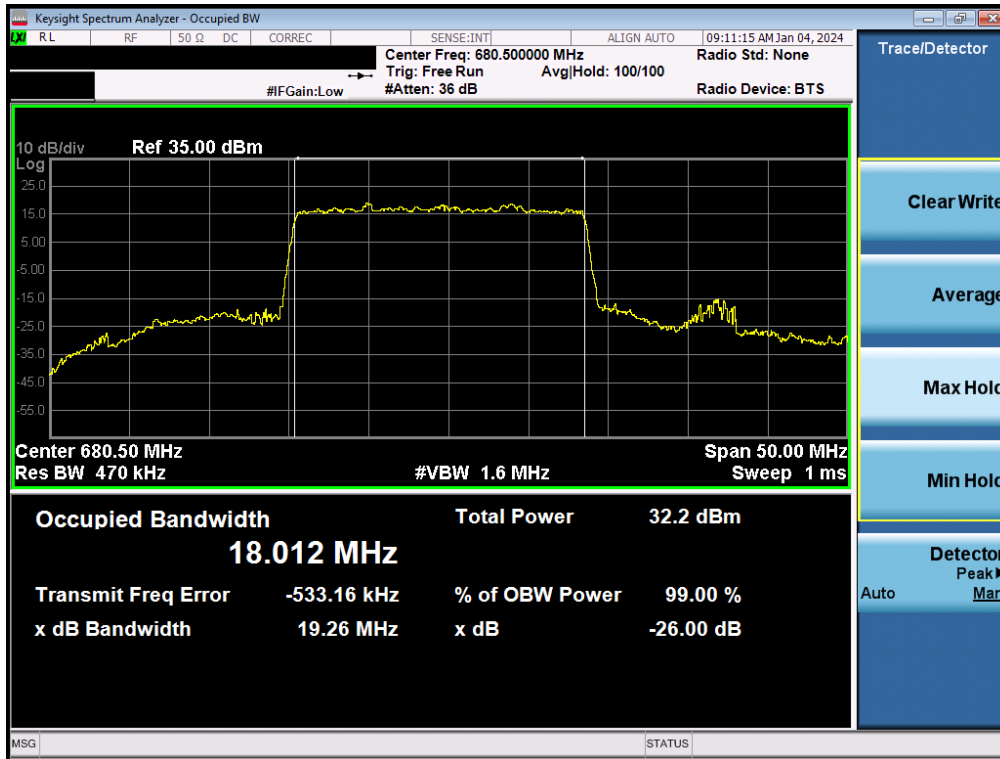
Plot 7-19. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB – Ant4)



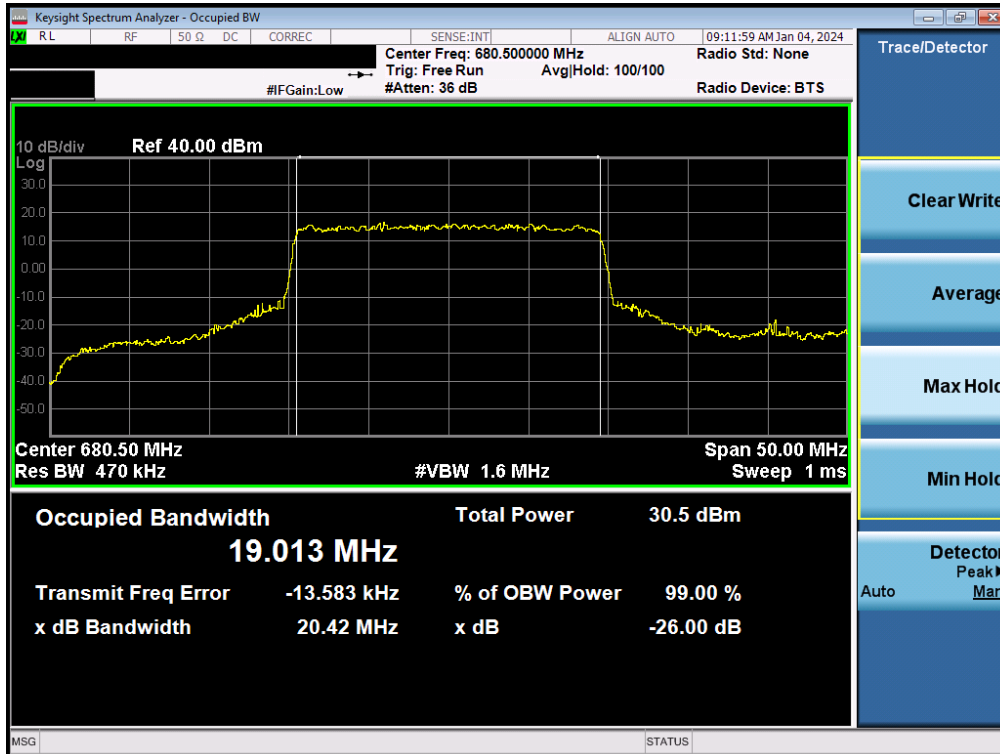
Plot 7-20. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 26 of 174

### NR Band n71 – Ant4

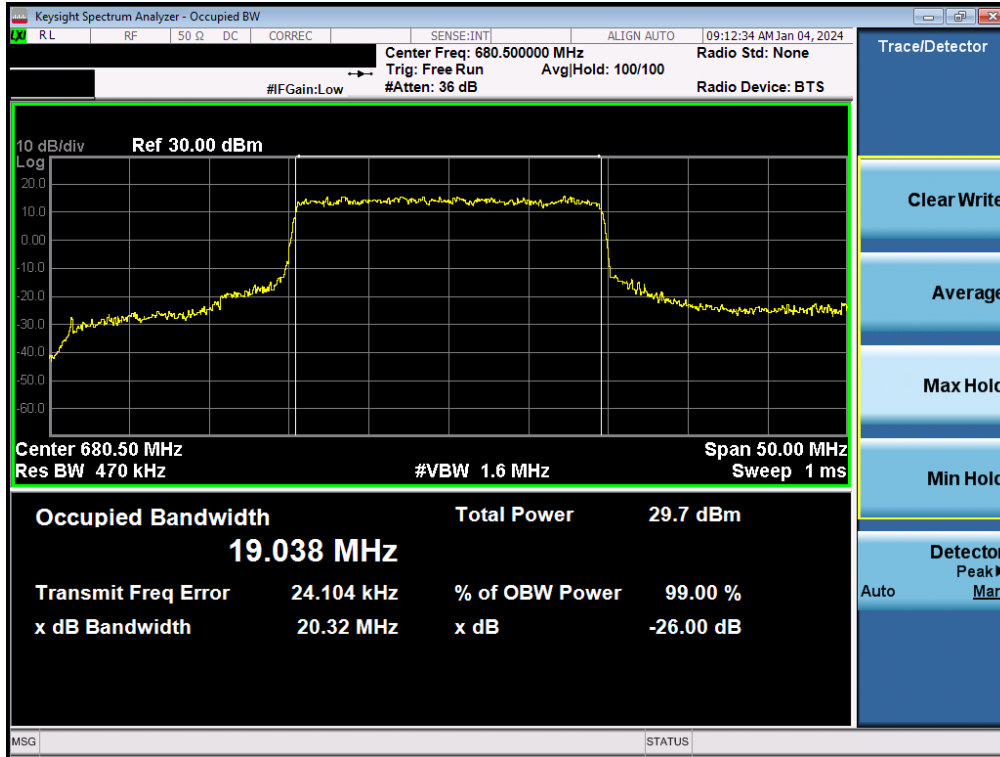


Plot 7-21. Occupied Bandwidth Plot (NR Band n71 - 20MHz DFT-s-OFDM BPSK - Full RB – Ant4)

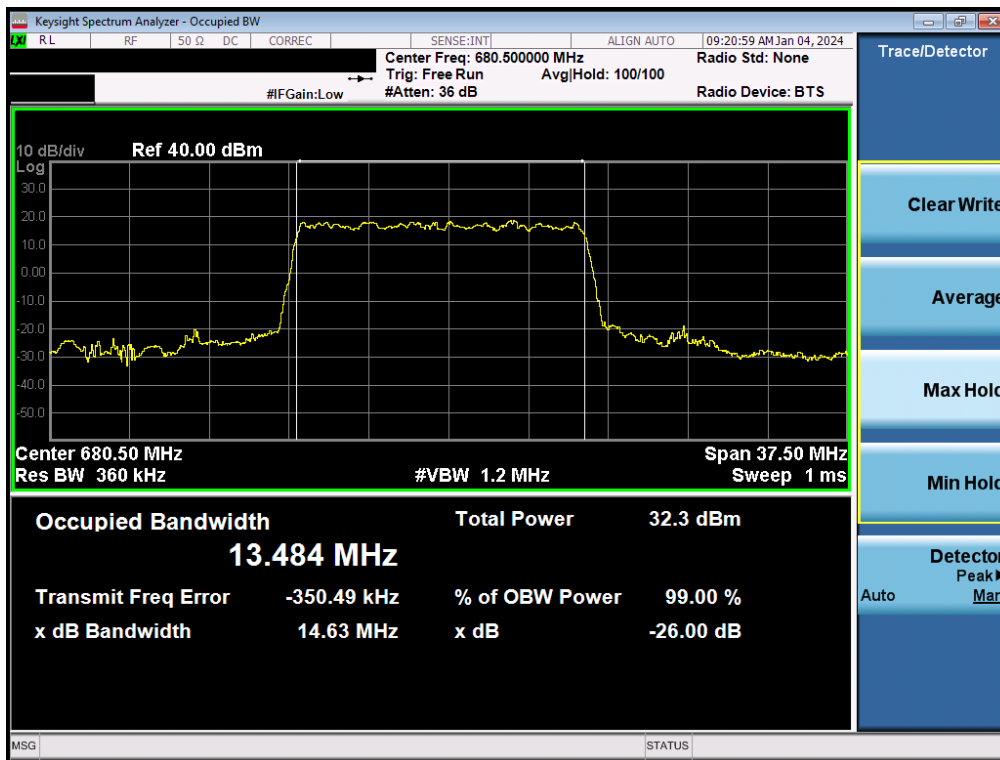


Plot 7-22. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM QPSK - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 27 of 174

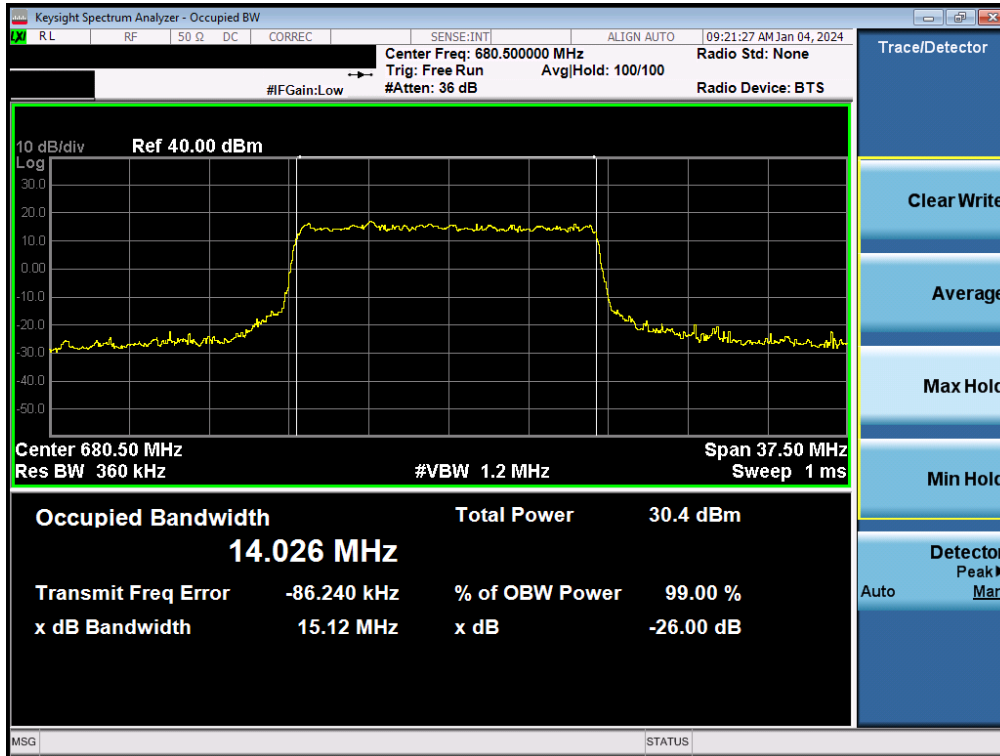


Plot 7-23. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM 16-QAM - Full RB - Ant4)

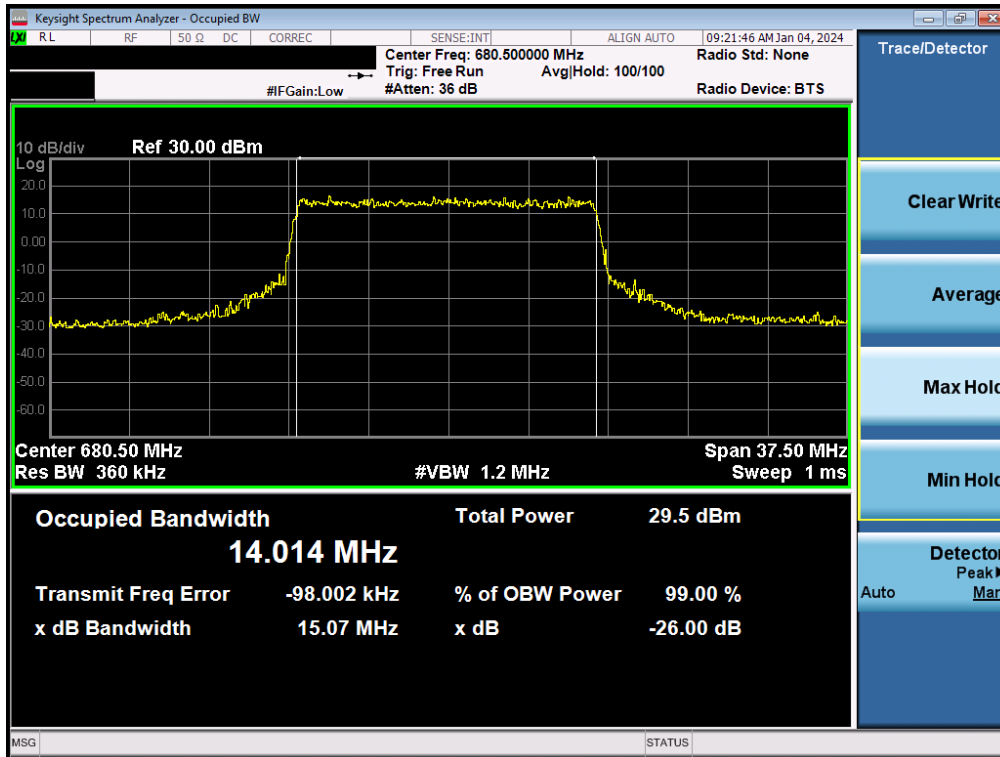


Plot 7-24. Occupied Bandwidth Plot (NR Band n71 - 15MHz DFT-s-OFDM BPSK - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 28 of 174

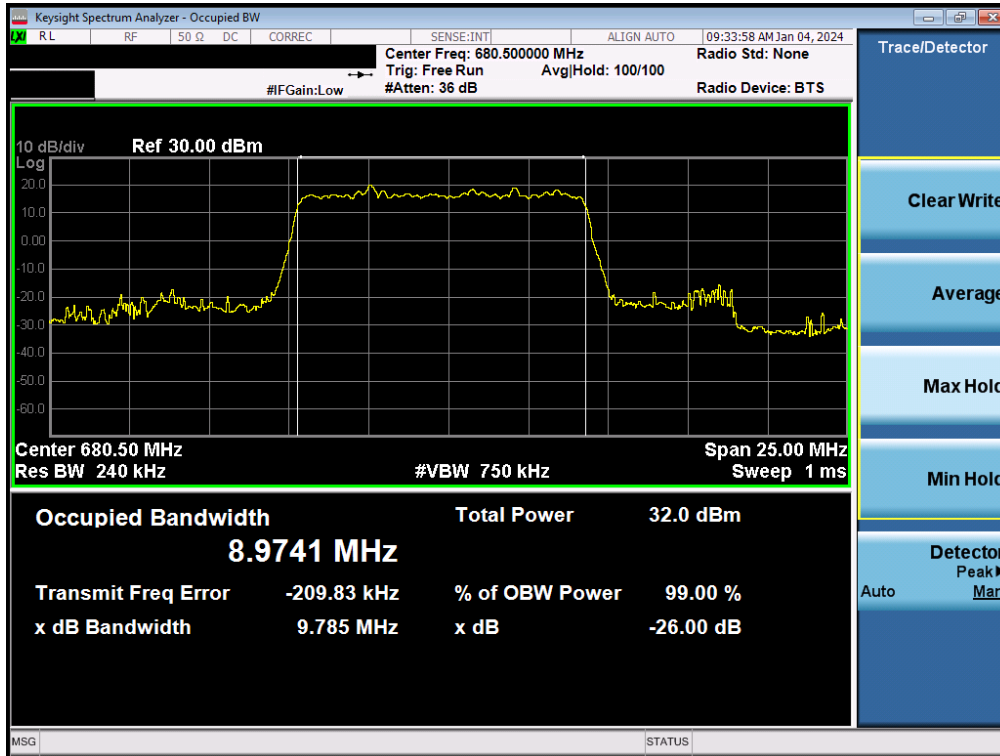


Plot 7-25. Occupied Bandwidth Plot (NR Band n71 - 15MHz CP-OFDM QPSK - Full RB - Ant4)

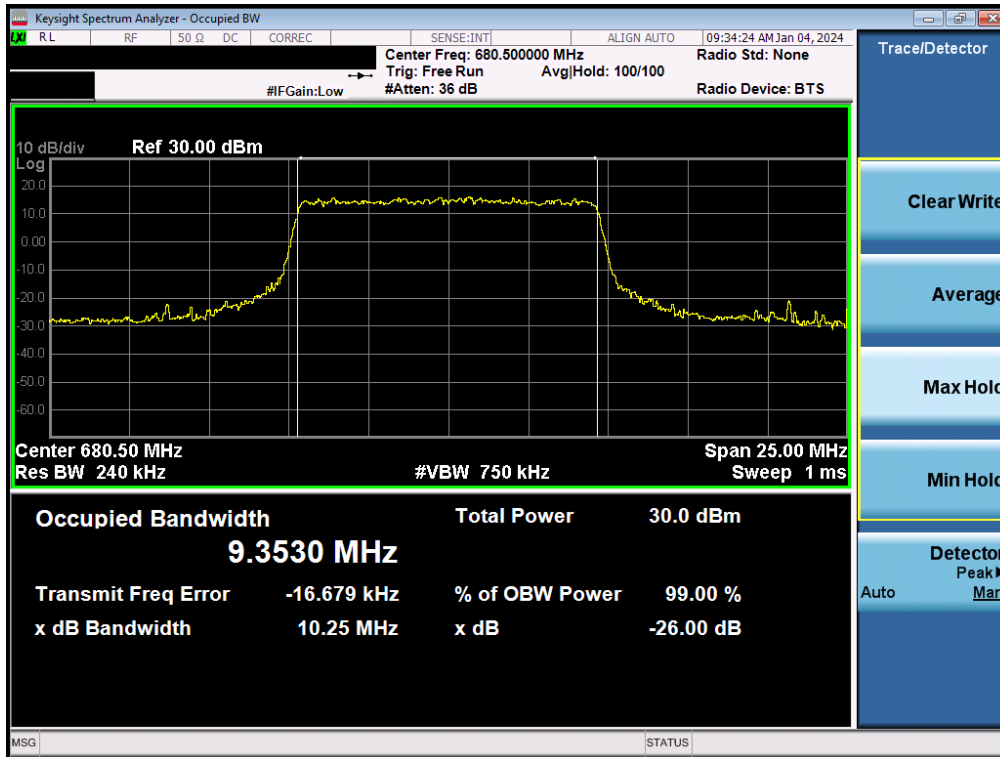


Plot 7-26. Occupied Bandwidth Plot (NR Band n71 - 15MHz CP-OFDM 16-QAM - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 29 of 174

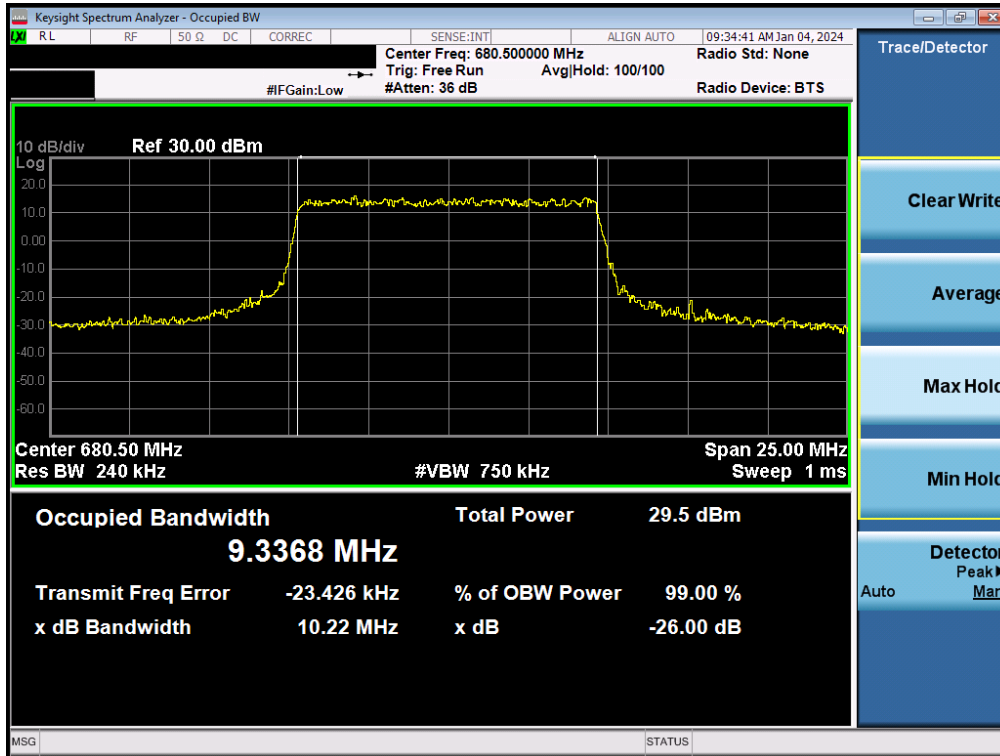


Plot 7-27. Occupied Bandwidth Plot (NR Band n71 - 10MHz DFT-s-OFDM BPSK - Full RB - Ant4)

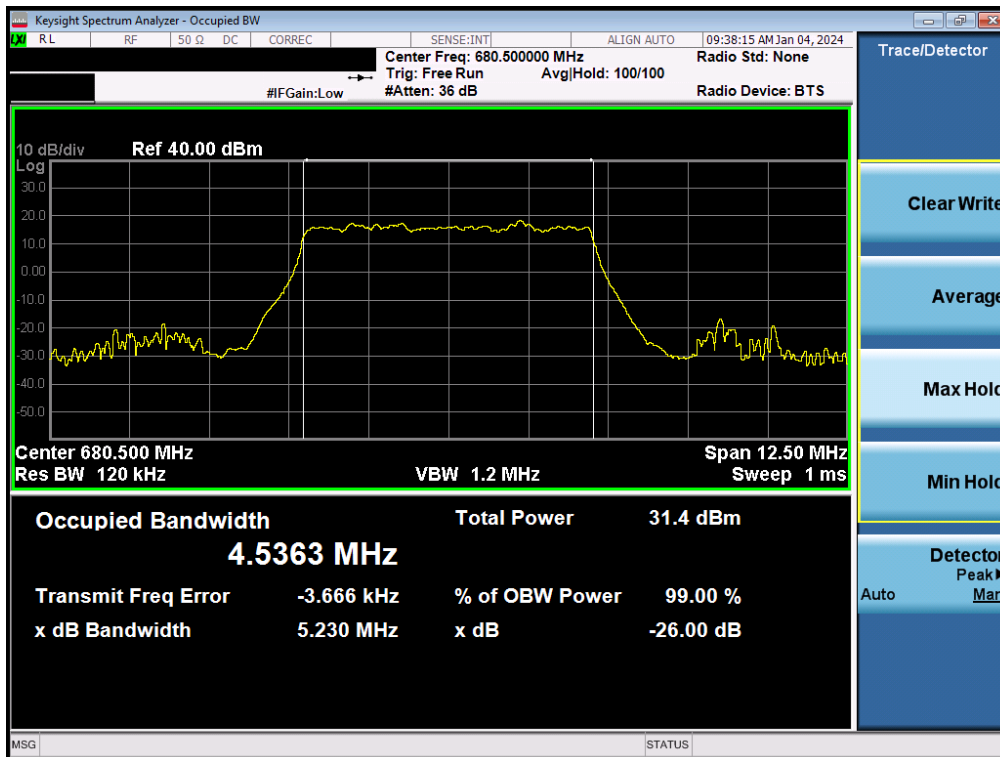


Plot 7-28. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM QPSK - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 30 of 174

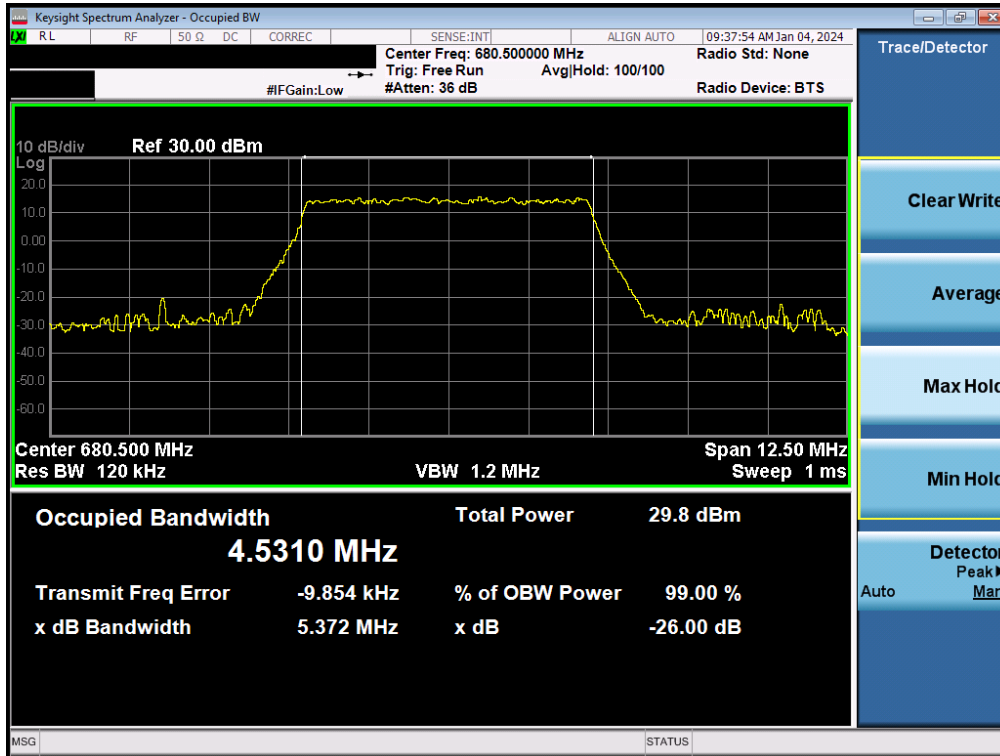


Plot 7-29. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM 16-QAM - Full RB - Ant4)

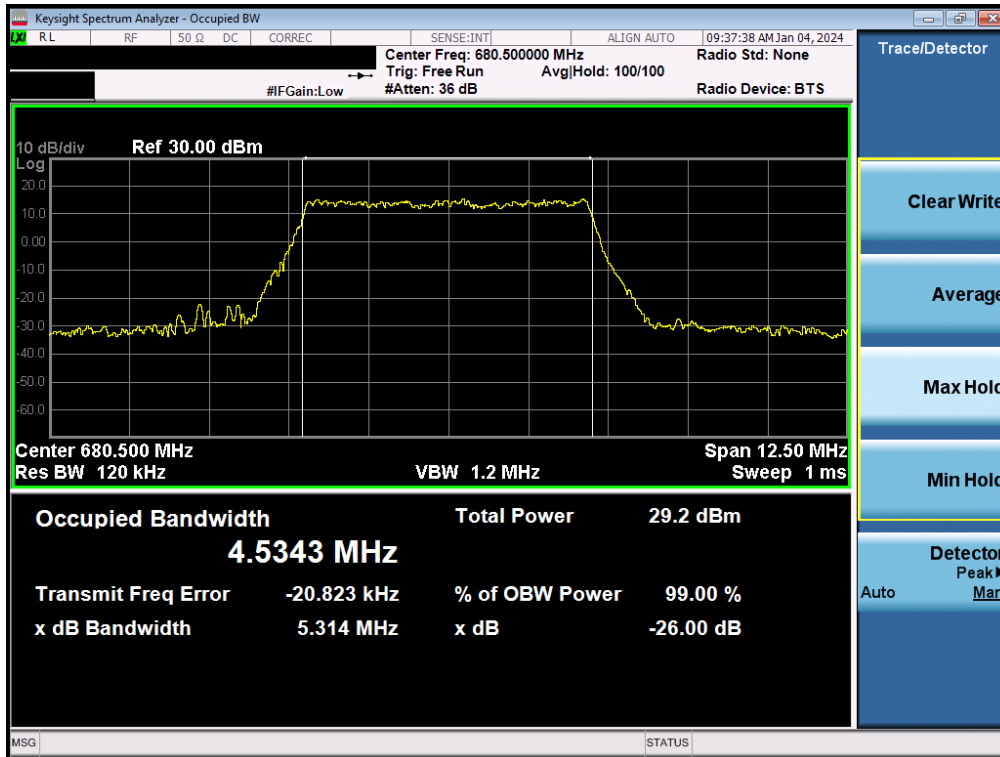


Plot 7-30. Occupied Bandwidth Plot (NR Band n71 - 5MHz DFT-s-OFDM BPSK - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 31 of 174



Plot 7-31. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM QPSK - Full RB – Ant4)

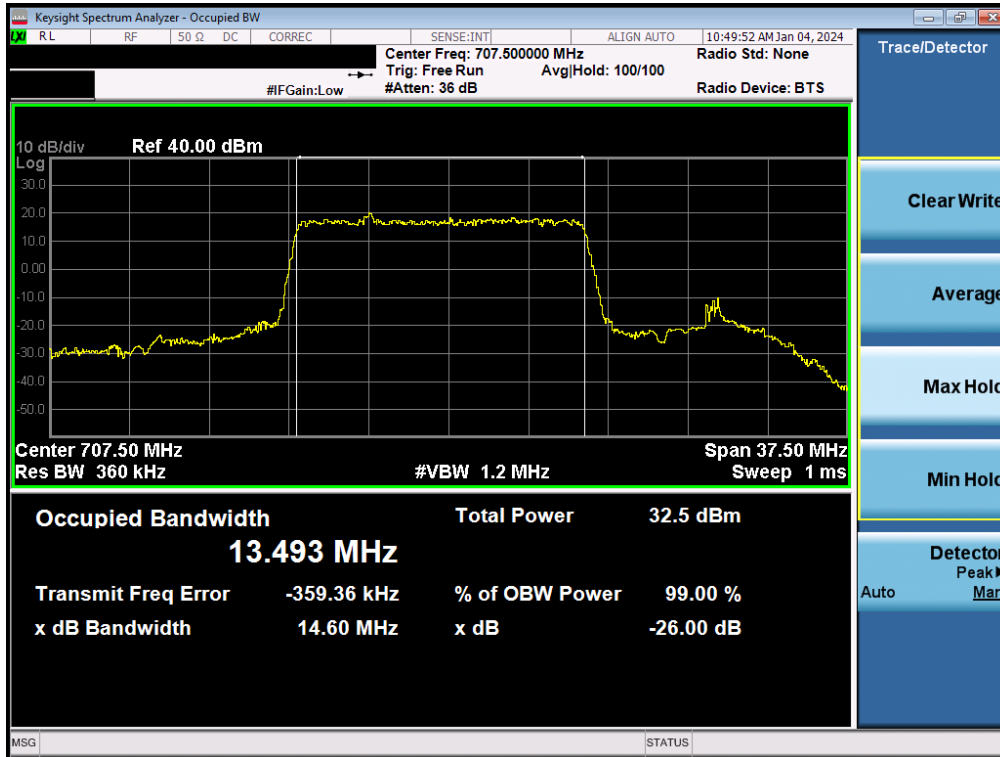


Plot 7-32. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM 16-QAM - Full RB – Ant4)

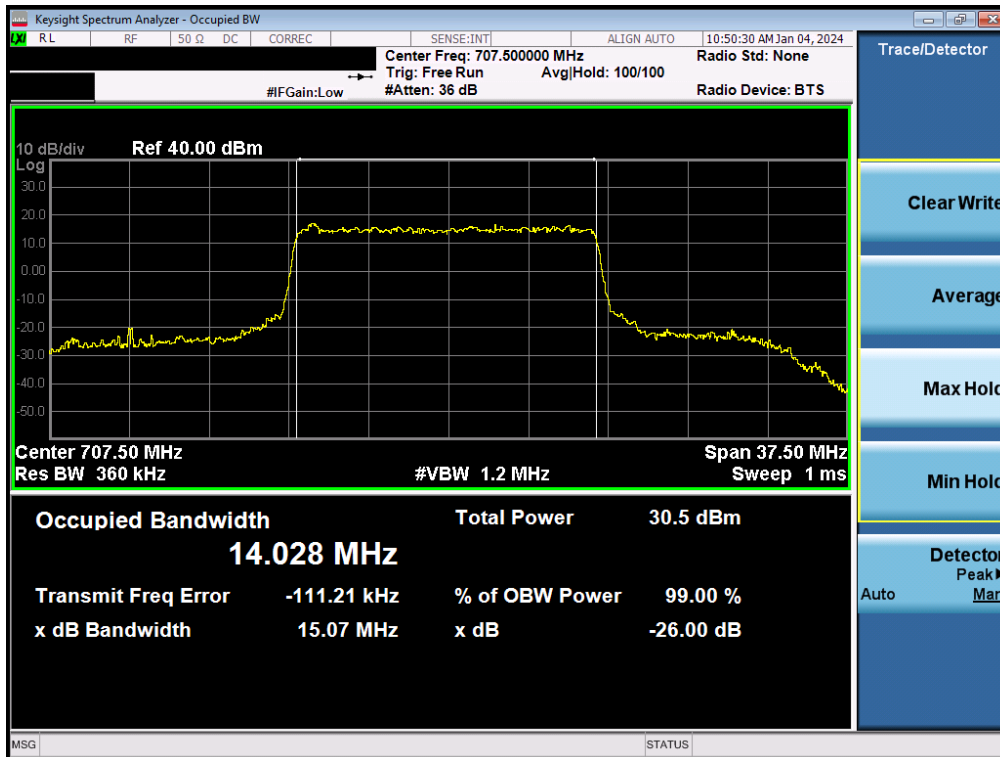
FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 32 of 174



# NR Band n12 – Ant4

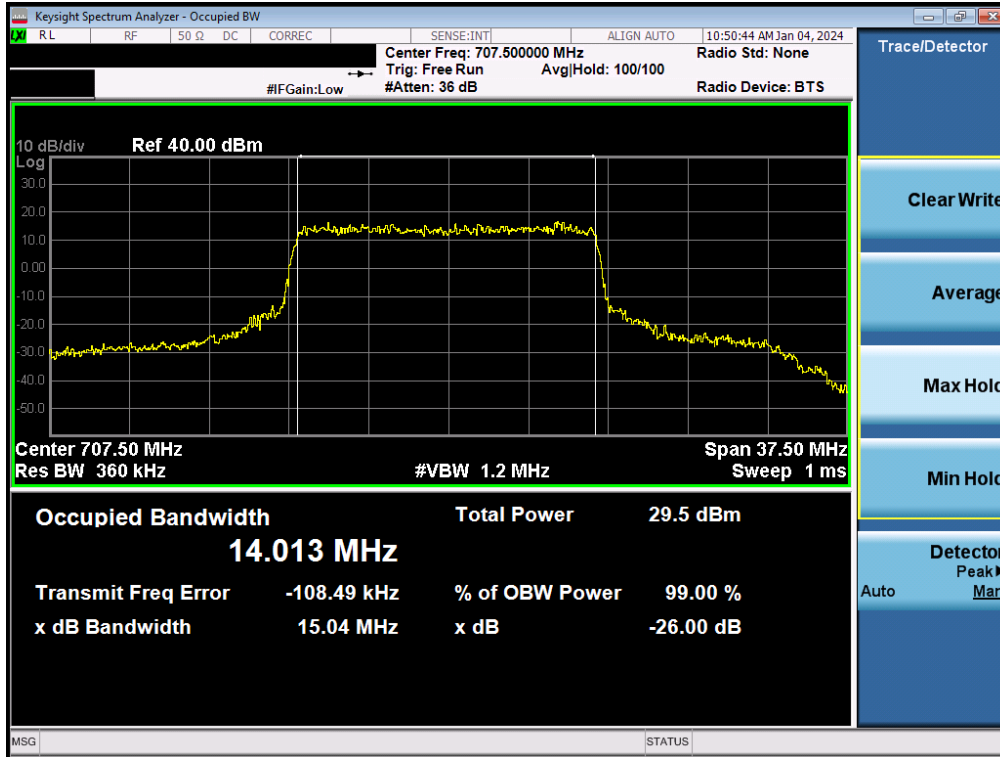


Plot 7-33. Occupied Bandwidth Plot (NR Band n12 - 15MHz DFT-s-OFDM BPSK - Full RB – Ant4)

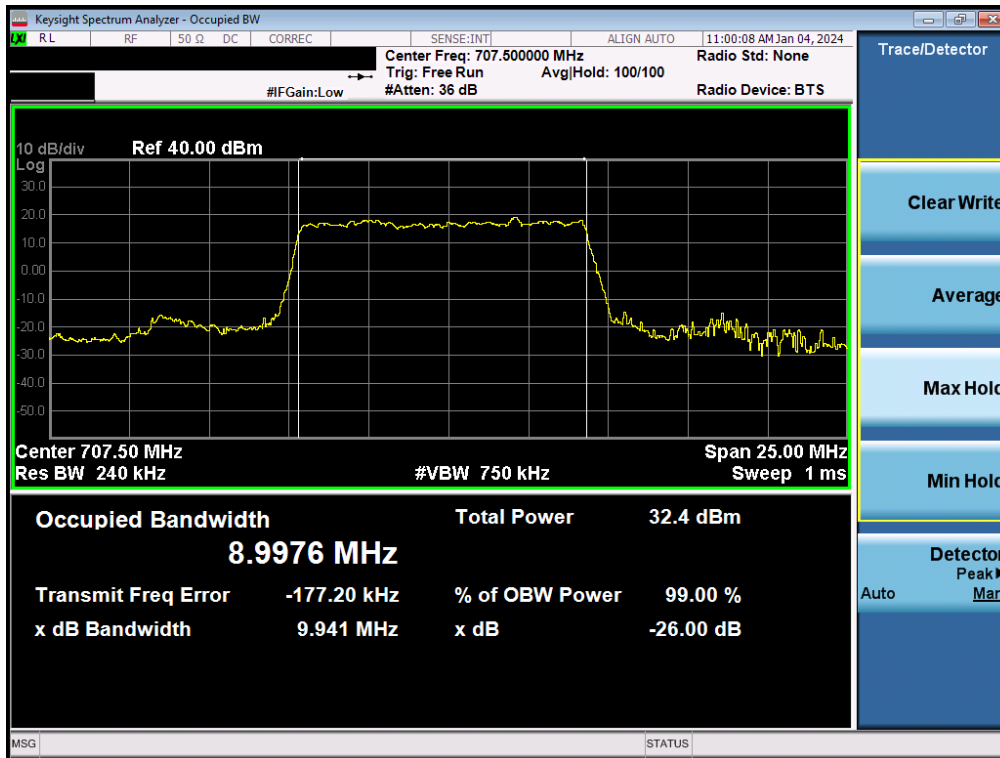


Plot 7-34. Occupied Bandwidth Plot (NR Band n12 - 15MHz CP-OFDM QPSK - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 33 of 174



Plot 7-35. Occupied Bandwidth Plot (NR Band n12 - 15MHz CP-OFDM 16-QAM - Full RB – Ant4)

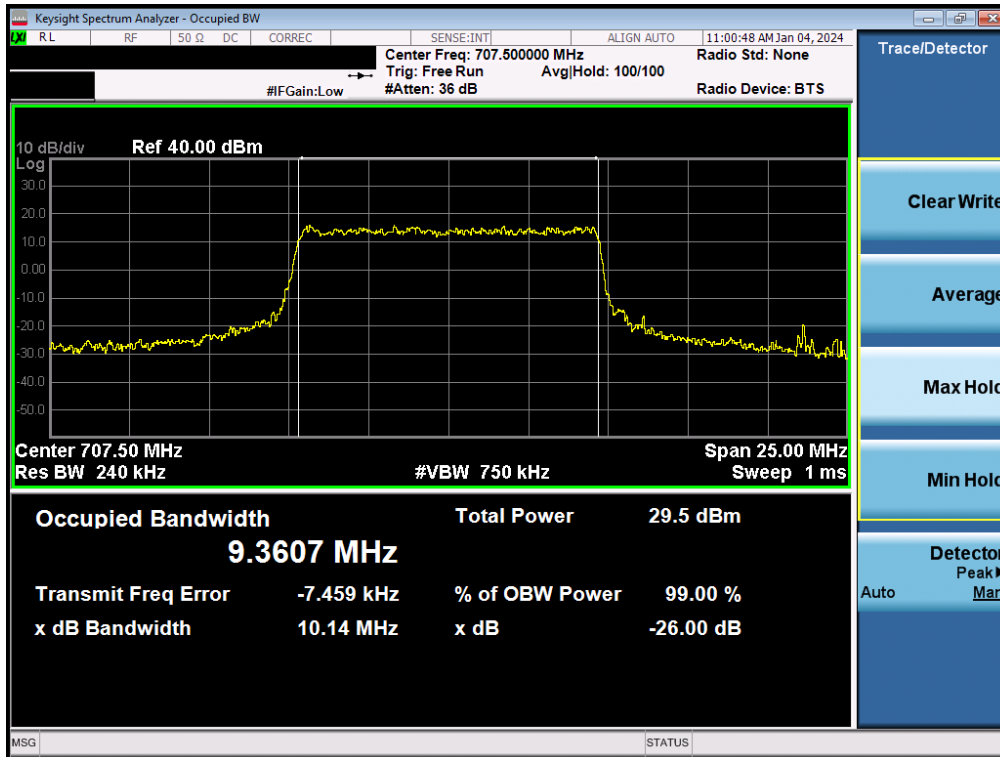


Plot 7-36. Occupied Bandwidth Plot (NR Band n12 - 10MHz DFT-s-OFDM BPSK - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 34 of 174

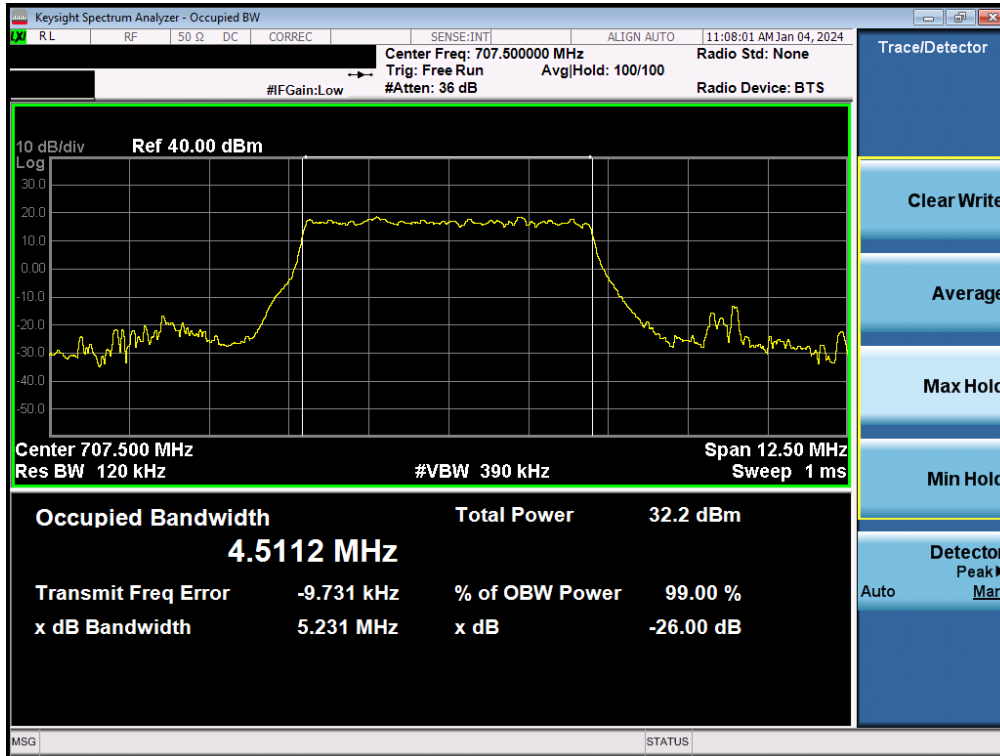


Plot 7-37. Occupied Bandwidth Plot (NR Band n12 - 10MHz CP-OFDM QPSK - Full RB - Ant4)

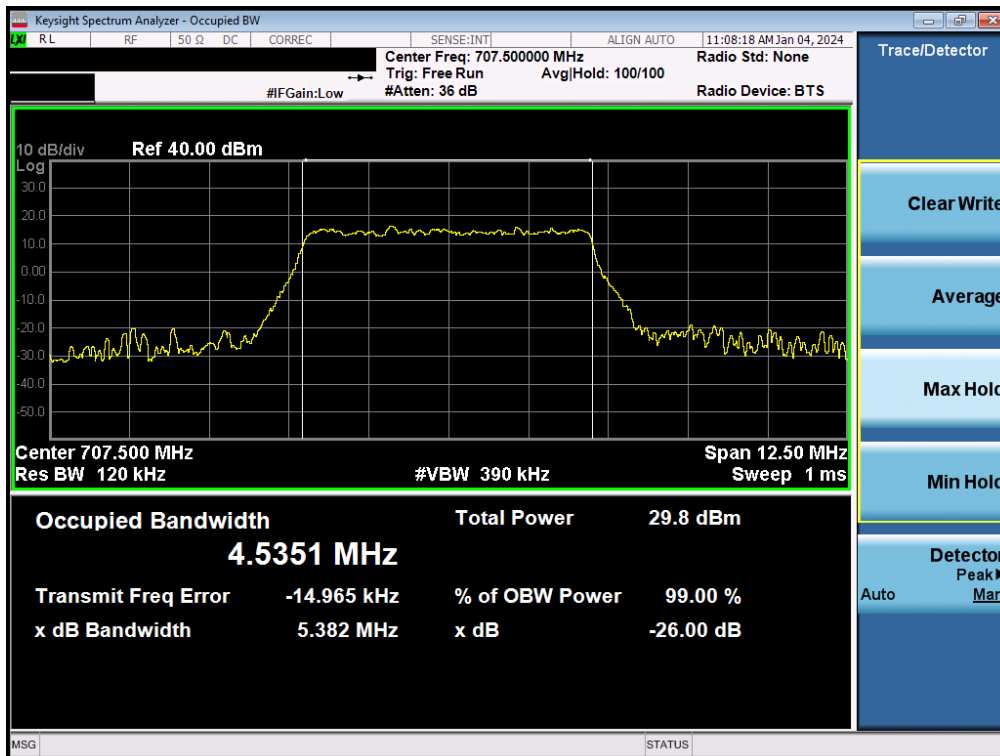


Plot 7-38. Occupied Bandwidth Plot (NR Band n12 - 10MHz CP-OFDM 16-QAM - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 35 of 174

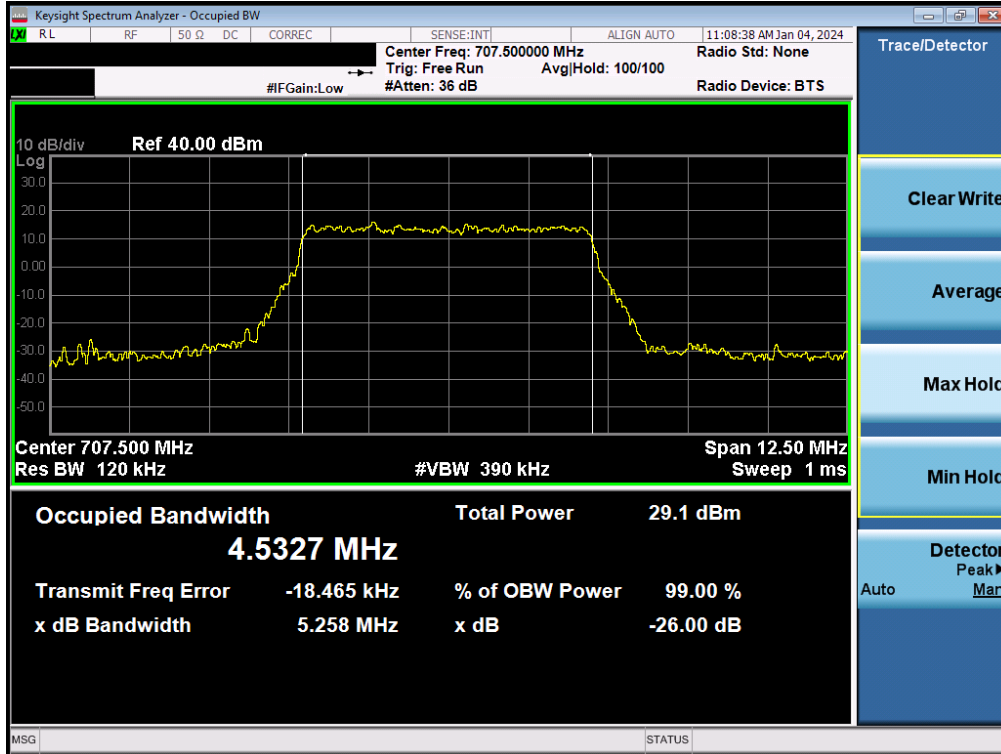


Plot 7-39. Occupied Bandwidth Plot (NR Band n12 - 5MHz DFT-s -OFDM BPSK - Full RB - Ant4)



Plot 7-40. Occupied Bandwidth Plot (NR Band n12 - 5MHz CP-OFDM QPSK - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 36 of 174



Plot 7-41. Occupied Bandwidth Plot (NR Band n12 - 5MHz CP-OFDM 16-QAM - Full RB – Ant4)

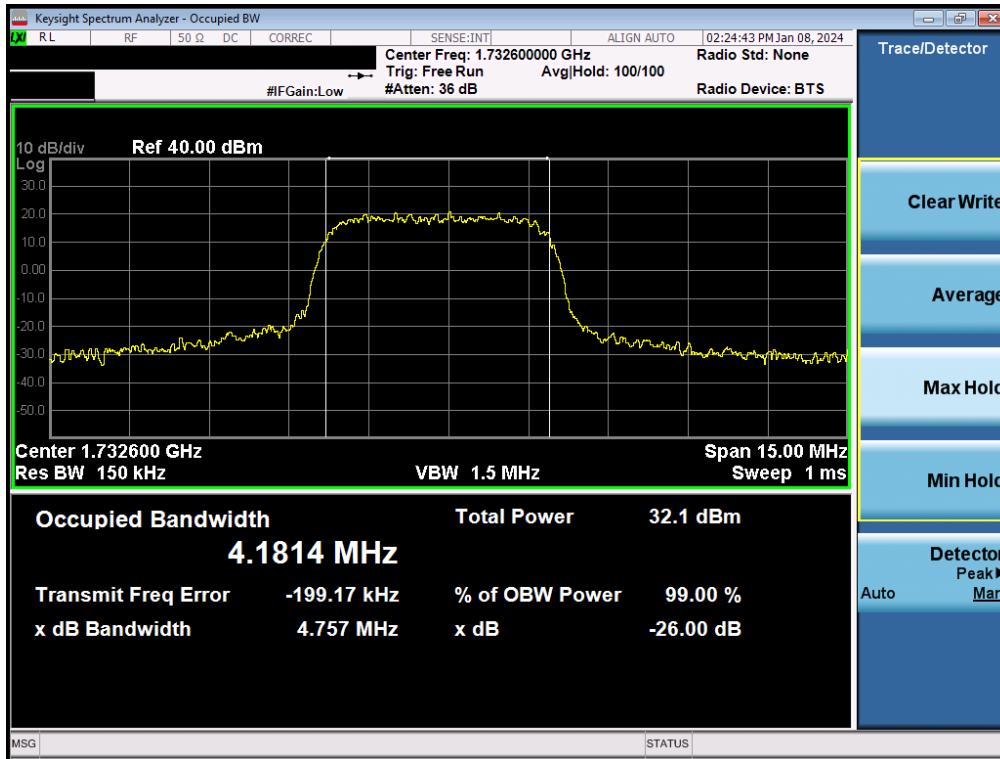
FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 37 of 174

Mode	Bandwidth	Modulation	OBW [MHz]
WCDMA-AWS	5MHz	GMSK	4.18
LTE-B66-4	20MHz	QPSK	18.06
		16QAM	18.04
	15MHz	QPSK	13.54
		16QAM	13.52
	10MHz	QPSK	9.02
		16QAM	9.02
	5MHz	QPSK	4.55
		16QAM	4.56
	3MHz	QPSK	2.72
		16QAM	2.72
1.4MHz	QPSK	1.11	
	16QAM	1.11	
NR-n66	40MHz	$\pi/2$ BPSK	38.76
		QPSK	38.80
		16QAM	38.91
	30MHz	$\pi/2$ BPSK	28.79
		QPSK	28.80
		16QAM	28.79
	25MHz	$\pi/2$ BPSK	23.16
		QPSK	23.97
		16QAM	24.04
	20MHz	$\pi/2$ BPSK	18.03
		QPSK	19.07
		16QAM	19.06
	15MHz	$\pi/2$ BPSK	13.60
		QPSK	14.03
		16QAM	14.03
	10MHz	$\pi/2$ BPSK	9.05
		QPSK	9.40
		16QAM	9.35
5MHz	$\pi/2$ BPSK	4.52	
	QPSK	4.51	
	16QAM	4.53	

**Table 7-4. Occupied Bandwidth Test Results – Ant1**

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 38 of 174

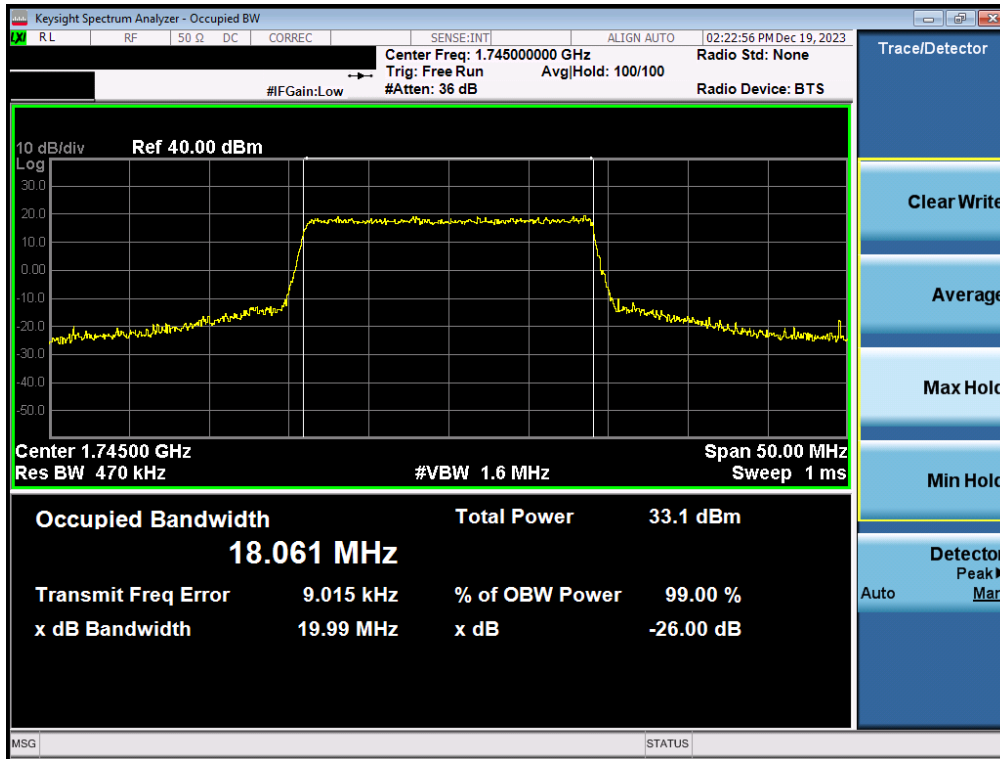
# WCDMA AWS – Ant1



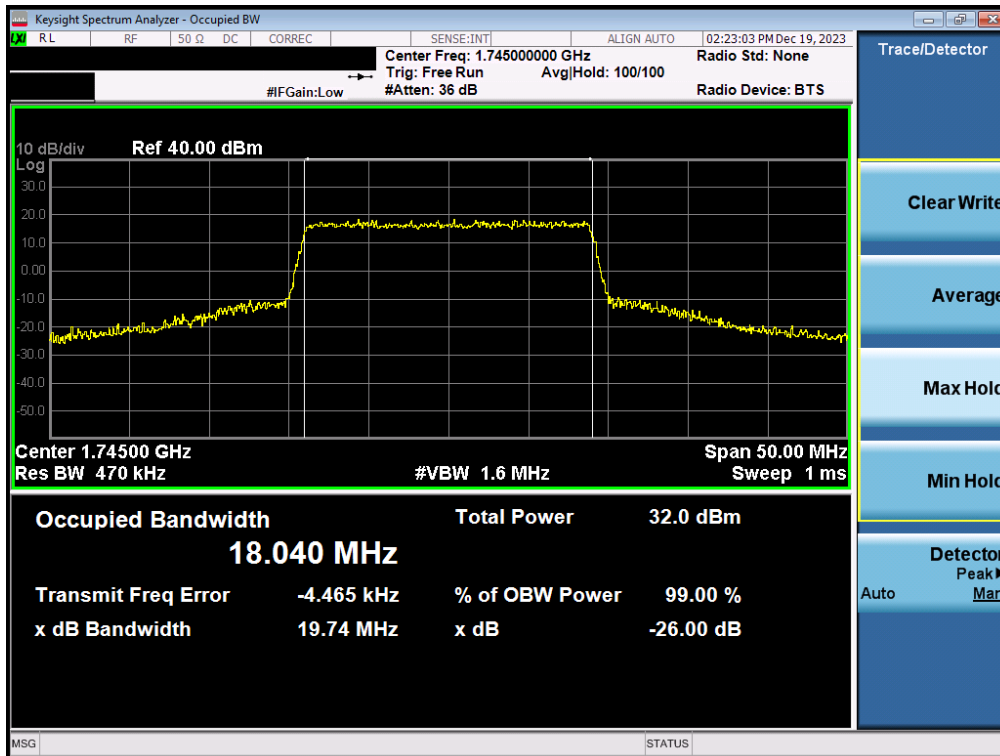
Plot 7-42. Occupied Bandwidth Plot (WCDMA, Ch. 1413 – Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 39 of 174

### LTE Band 66/4 - Ant1



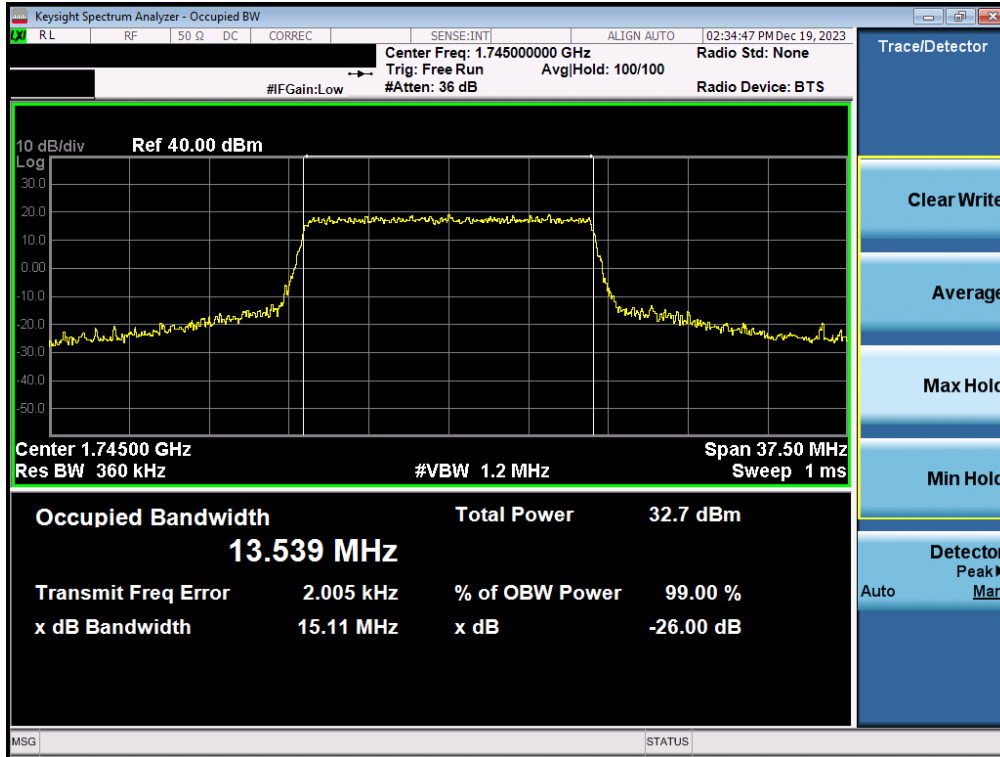
Plot 7-43. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB - Ant1)



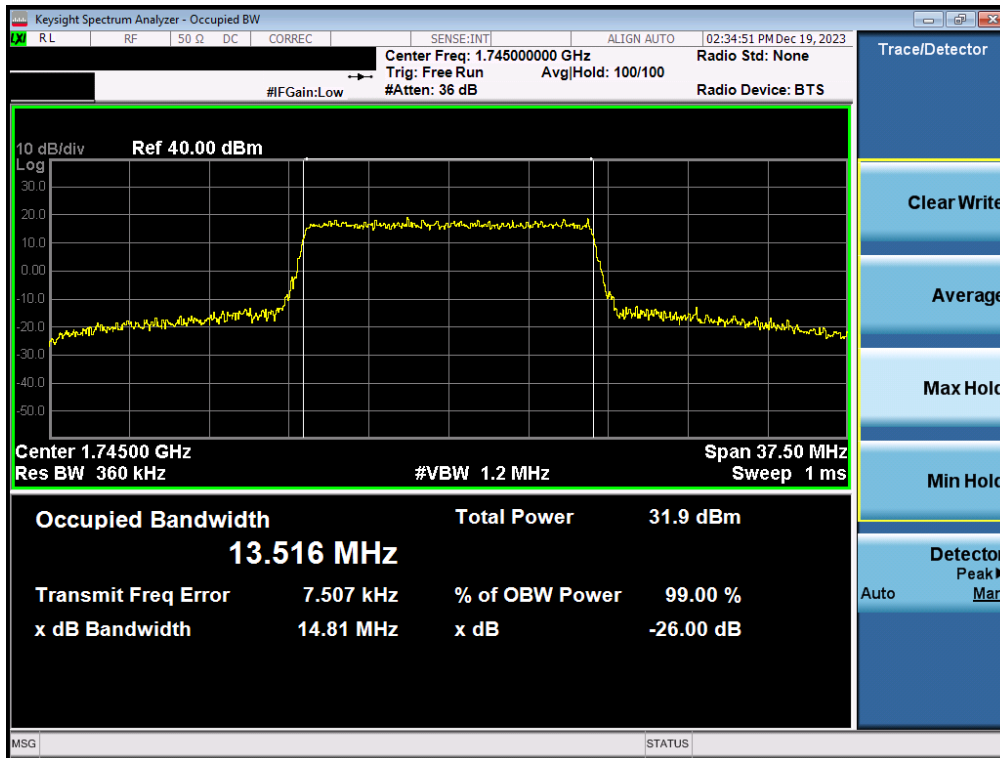
Plot 7-44. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 40 of 174



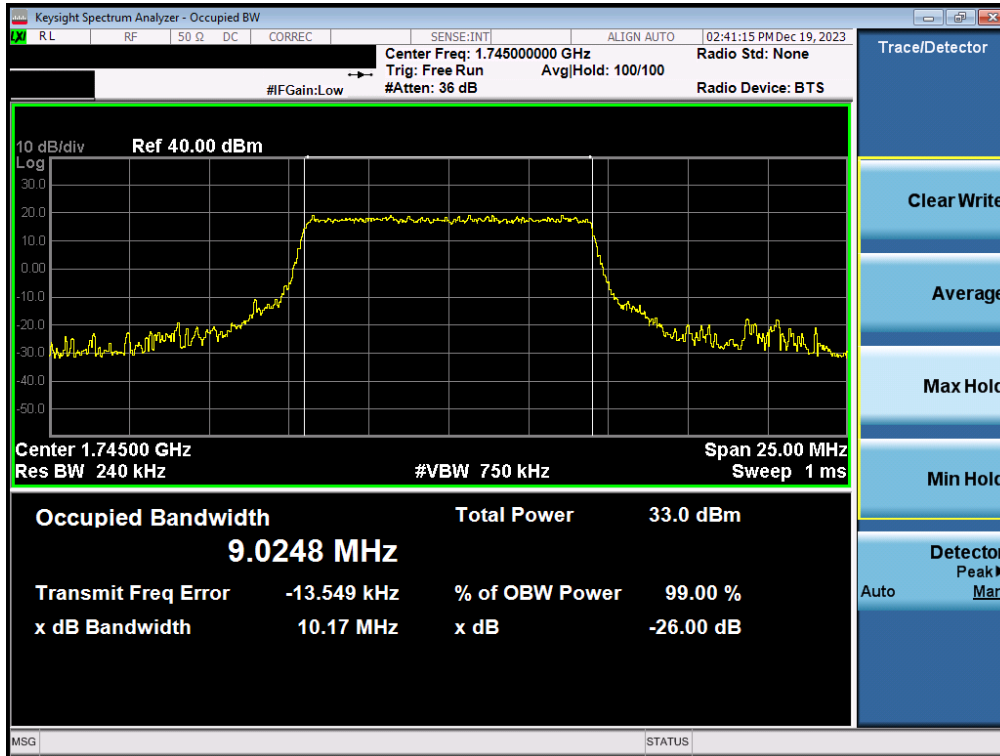


Plot 7-45. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB - Ant1)

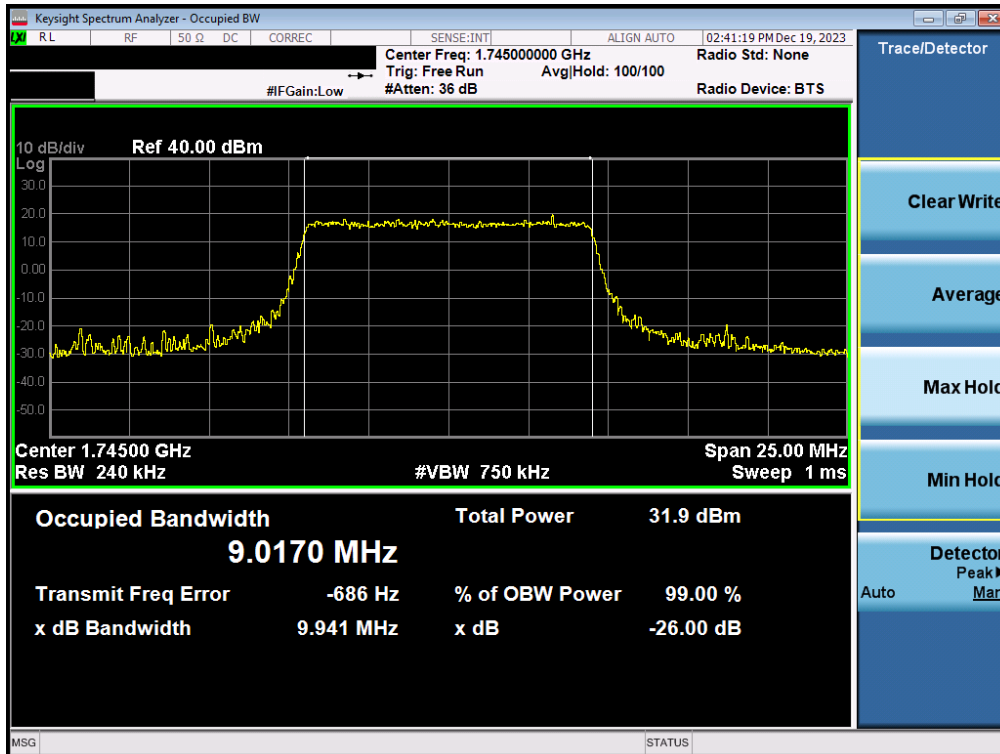


Plot 7-46. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 41 of 174



Plot 7-47. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB - Ant1)

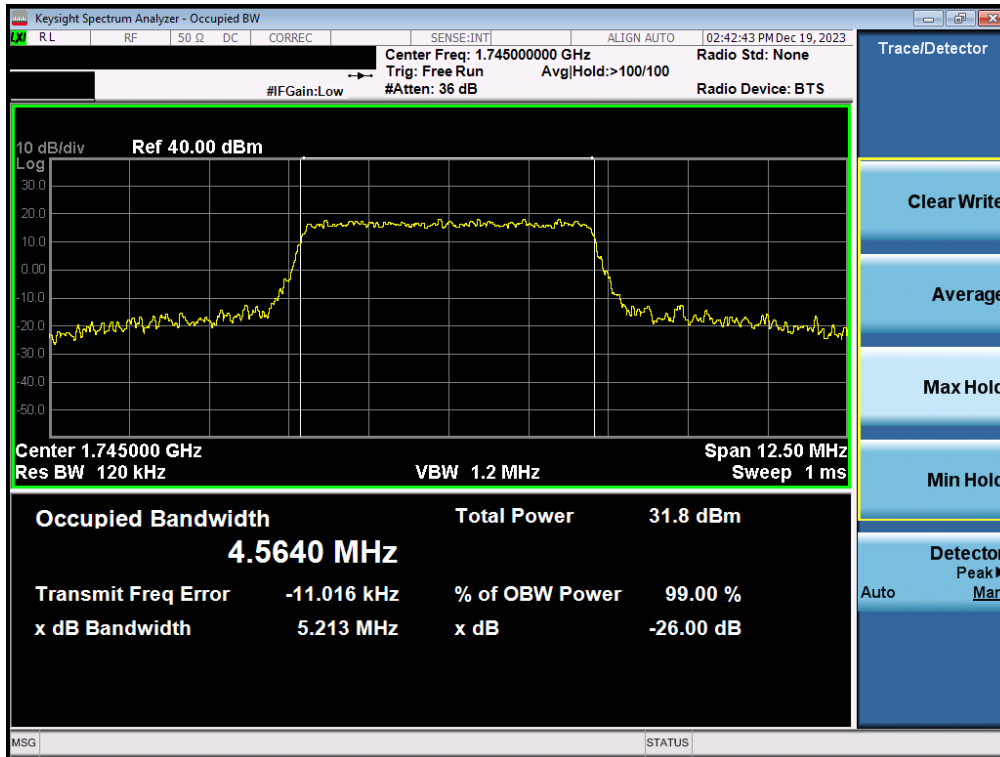


Plot 7-48. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 42 of 174

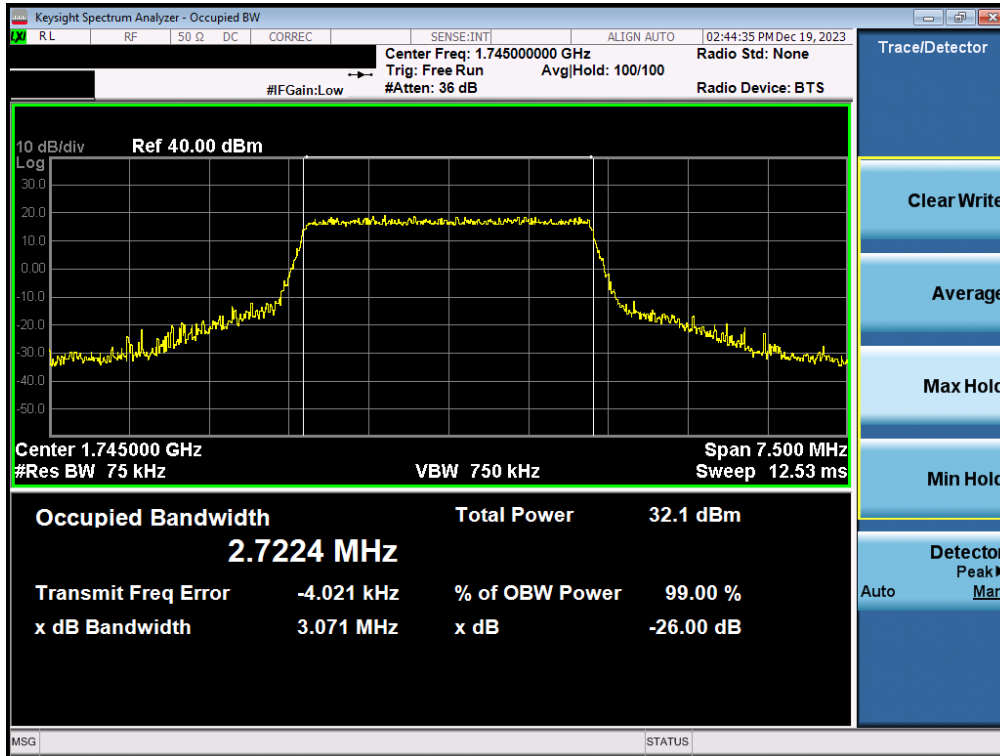


Plot 7-49. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB - Ant1)

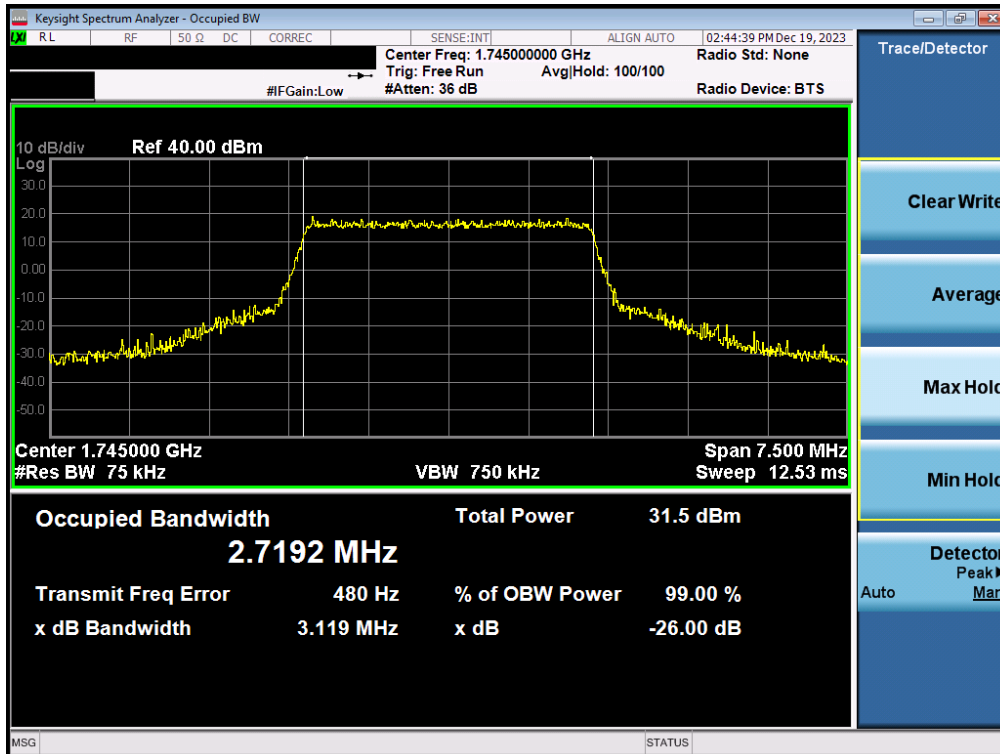


Plot 7-50. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 43 of 174

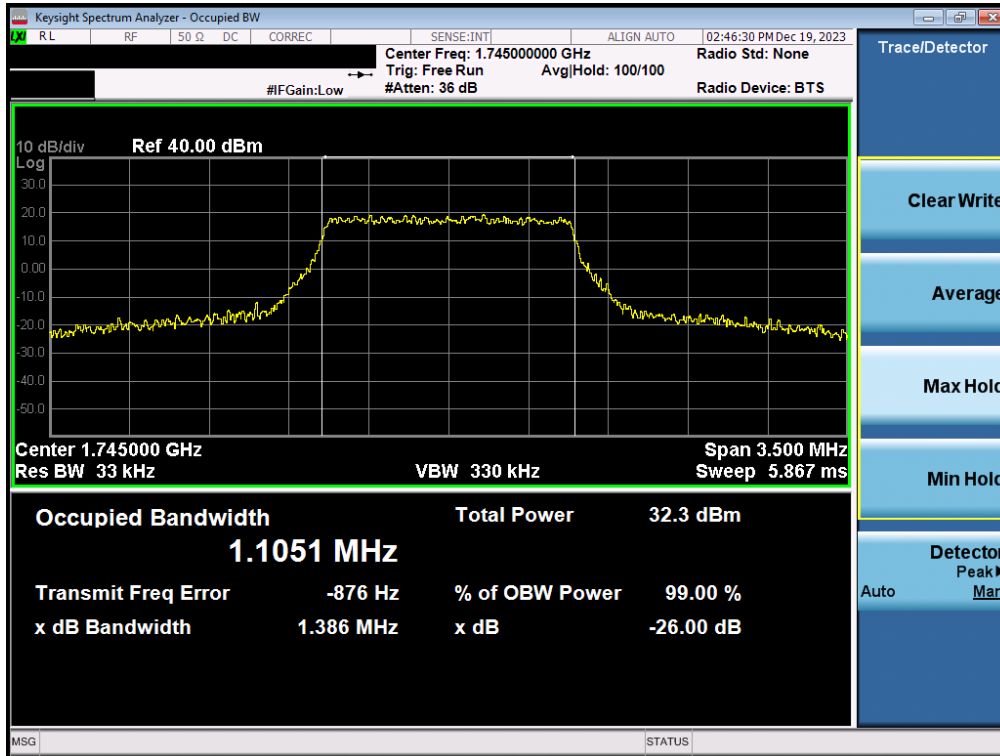


Plot 7-51. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB - Ant1)

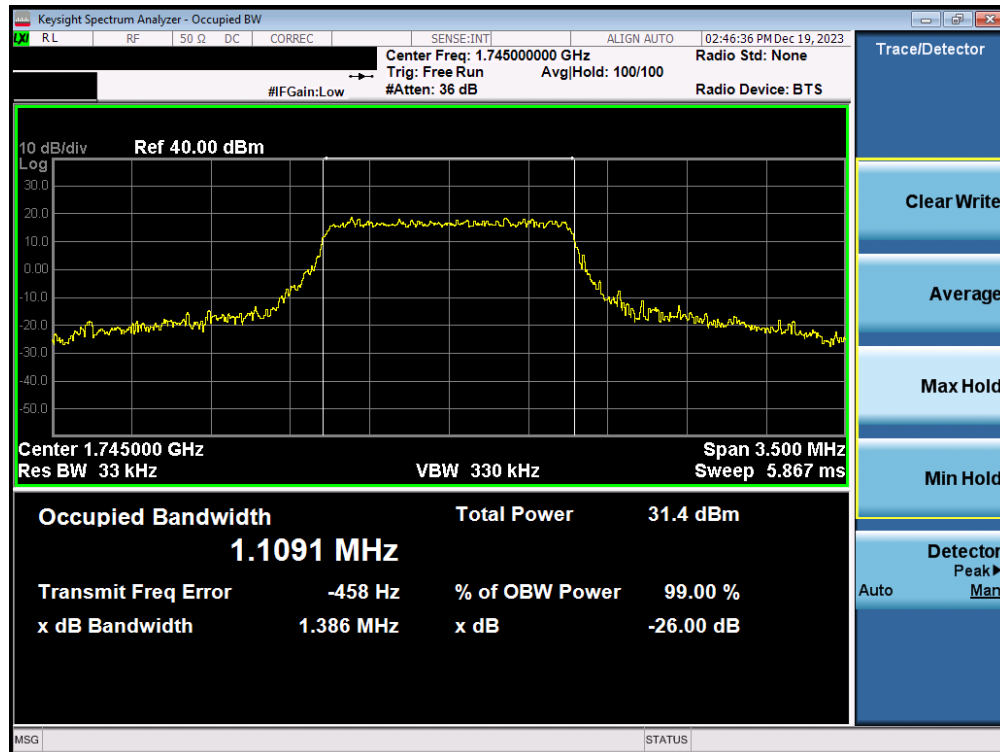


Plot 7-52. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 44 of 174



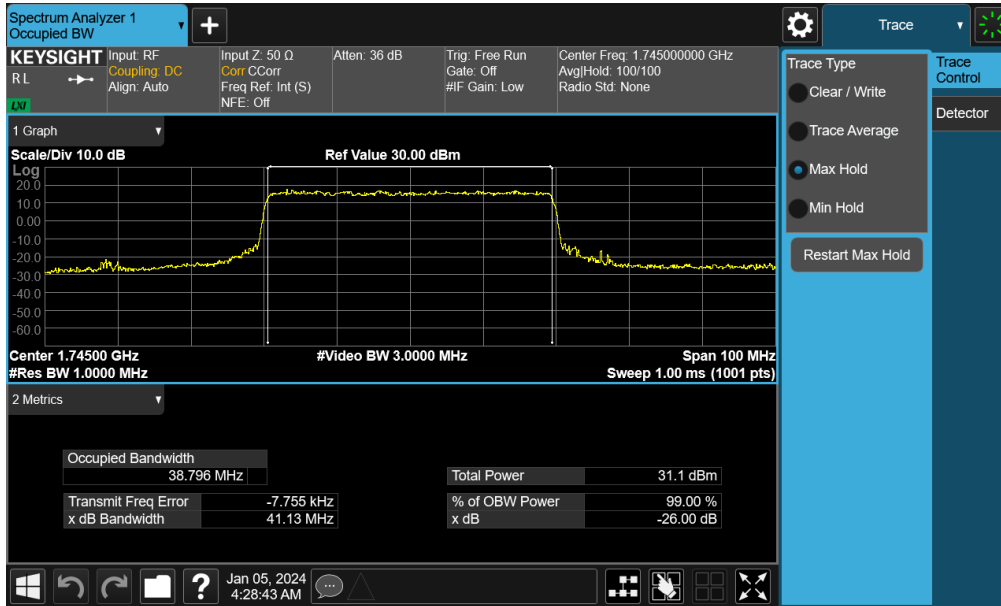
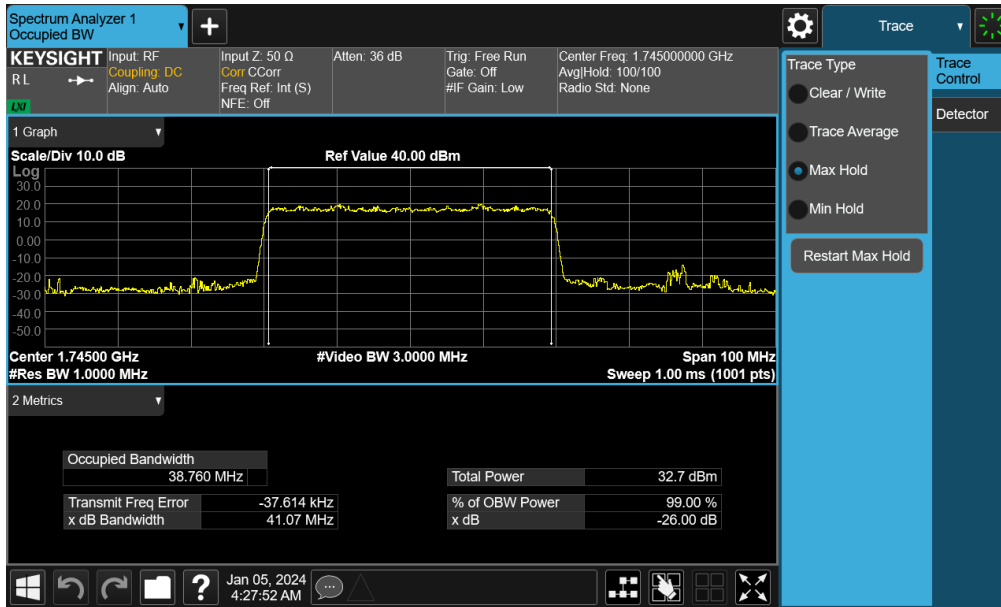
Plot 7-53. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB - Ant1)



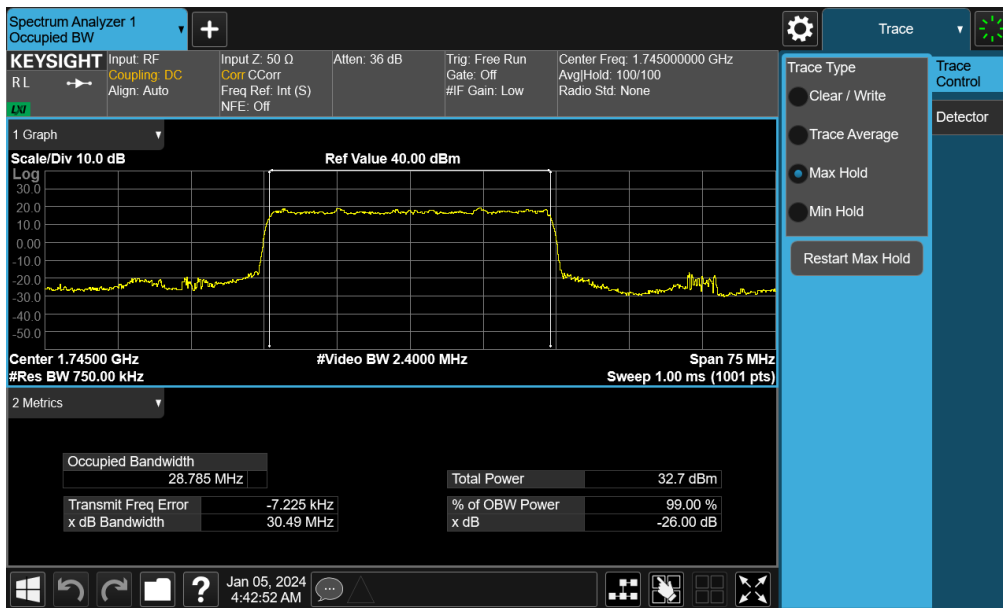
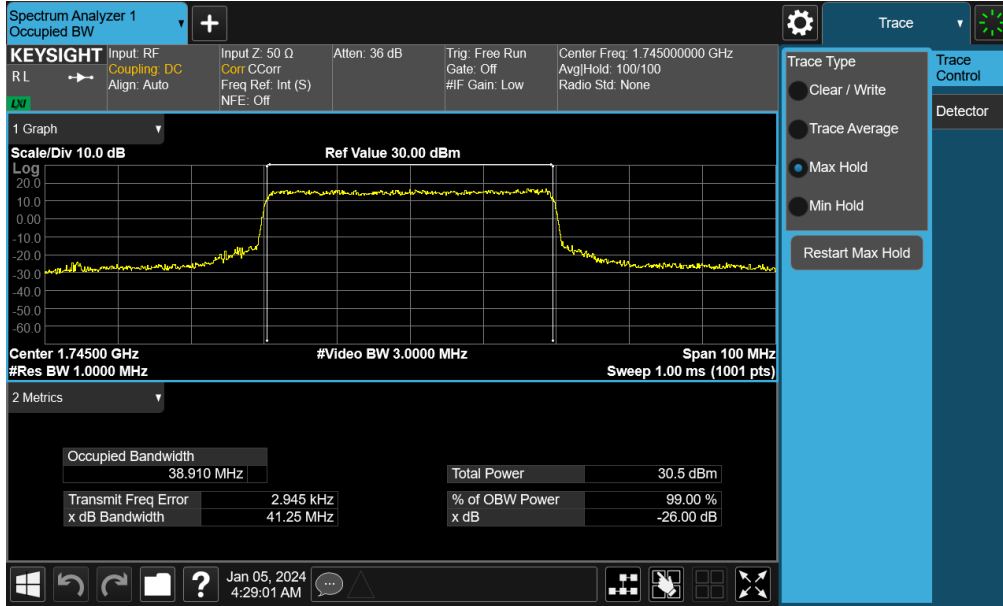
Plot 7-54. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 45 of 174

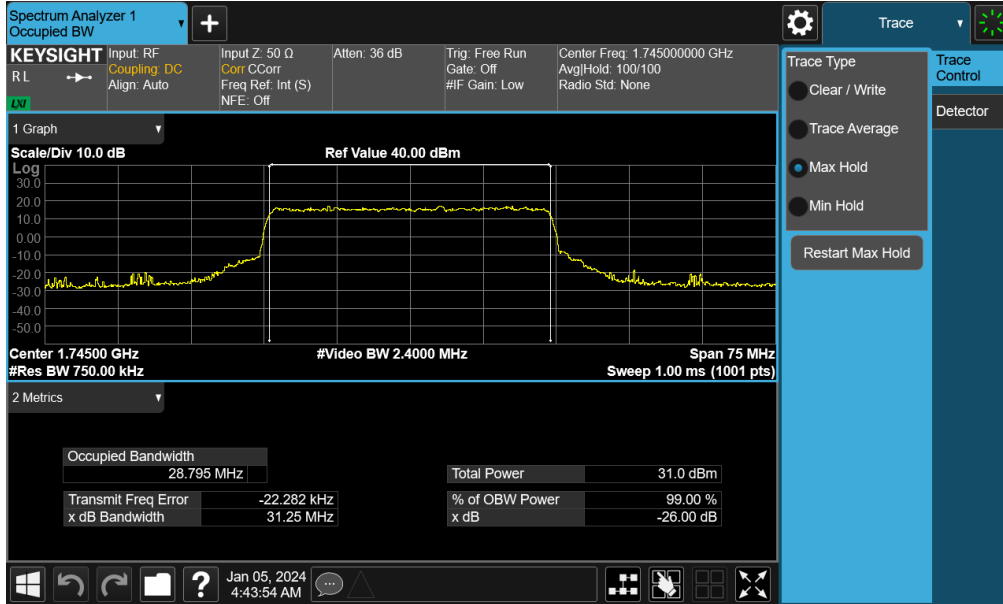
# NR Band n66 – Ant1



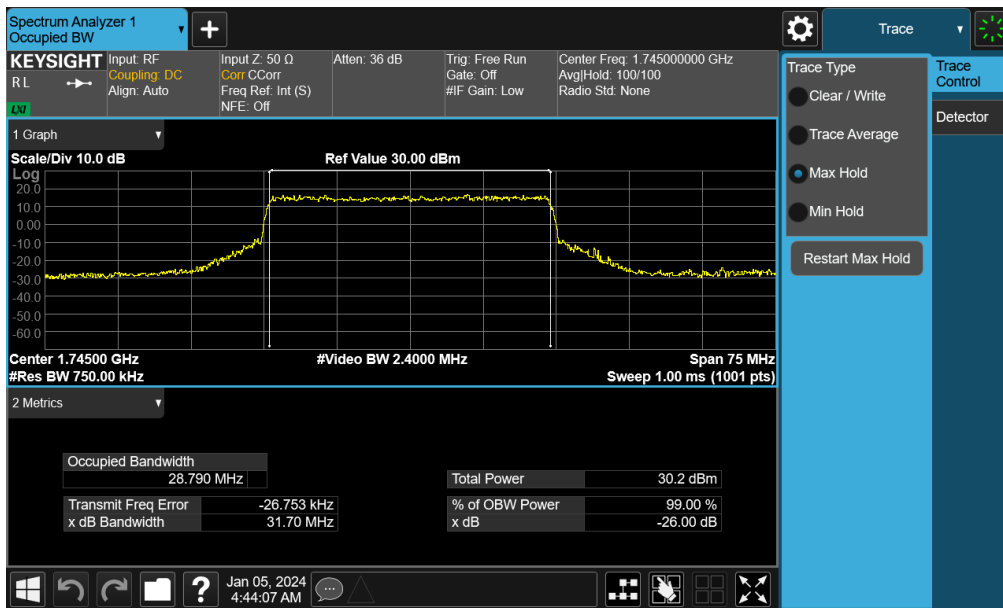
FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 46 of 174



FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 47 of 174



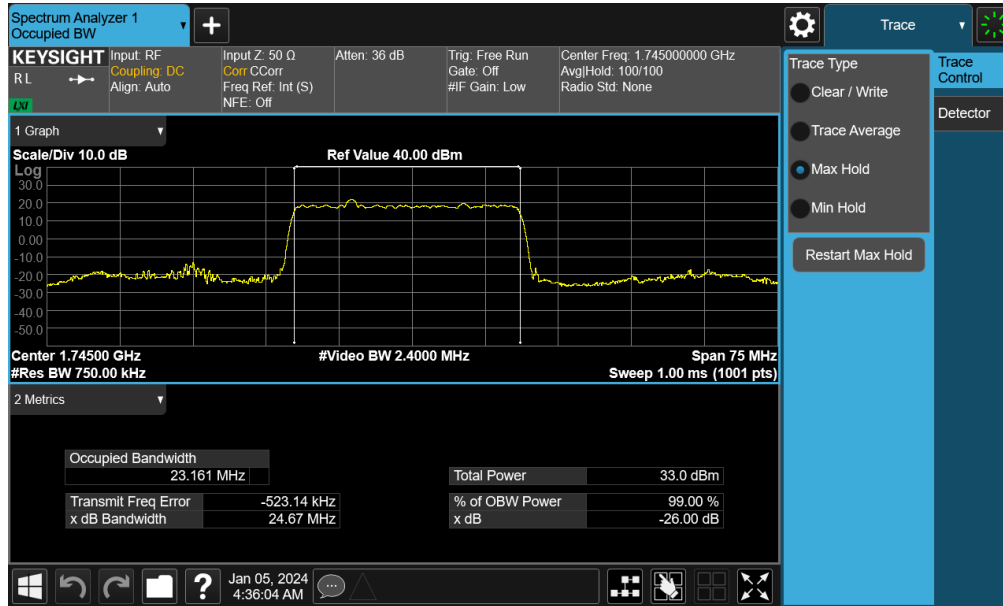
Plot 7-59. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM QPSK - Full RB - Ant1)



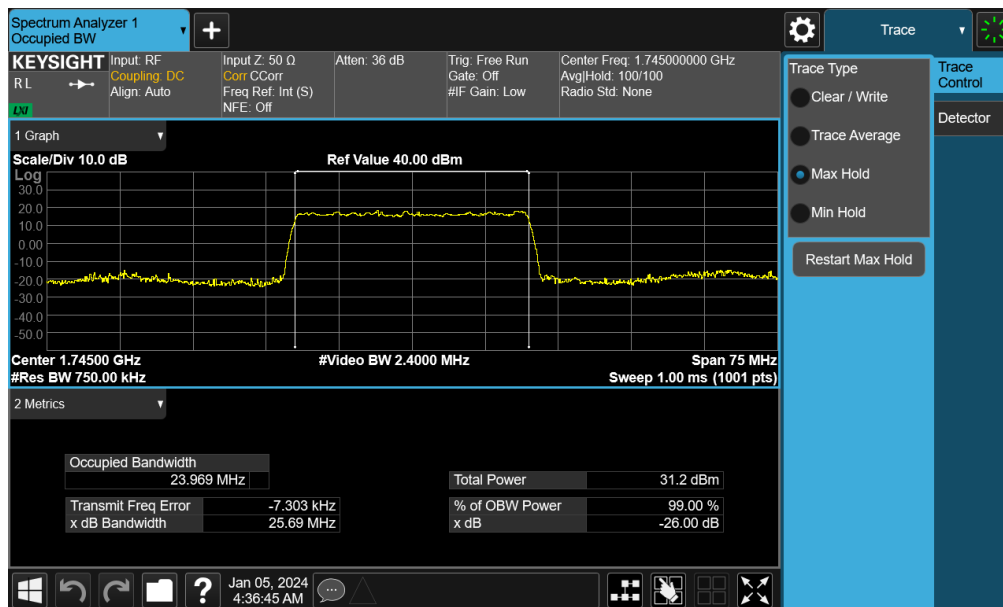
Plot 7-60. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM 16QAM - Full RB - Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 48 of 174



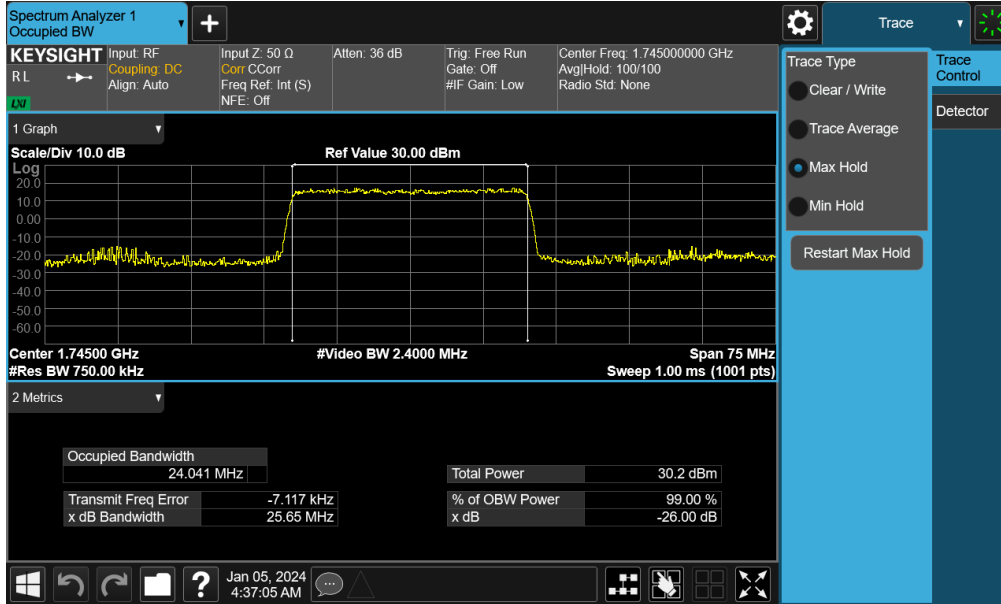


Plot 7-61. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz DFT-s-OFDM BPSK - Full RB – Ant1)

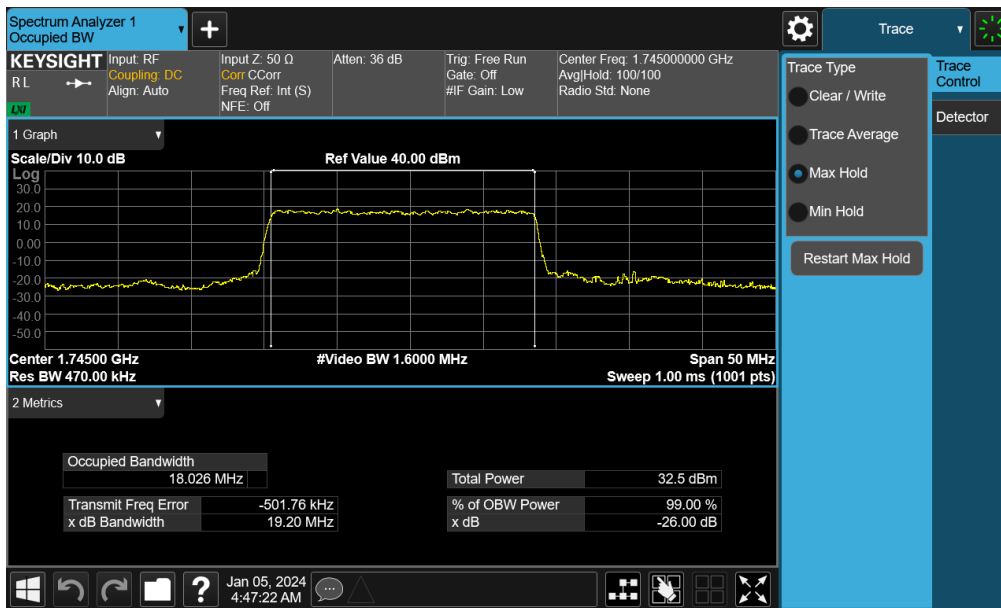


Plot 7-62. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM QPSK - Full RB – Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 49 of 174

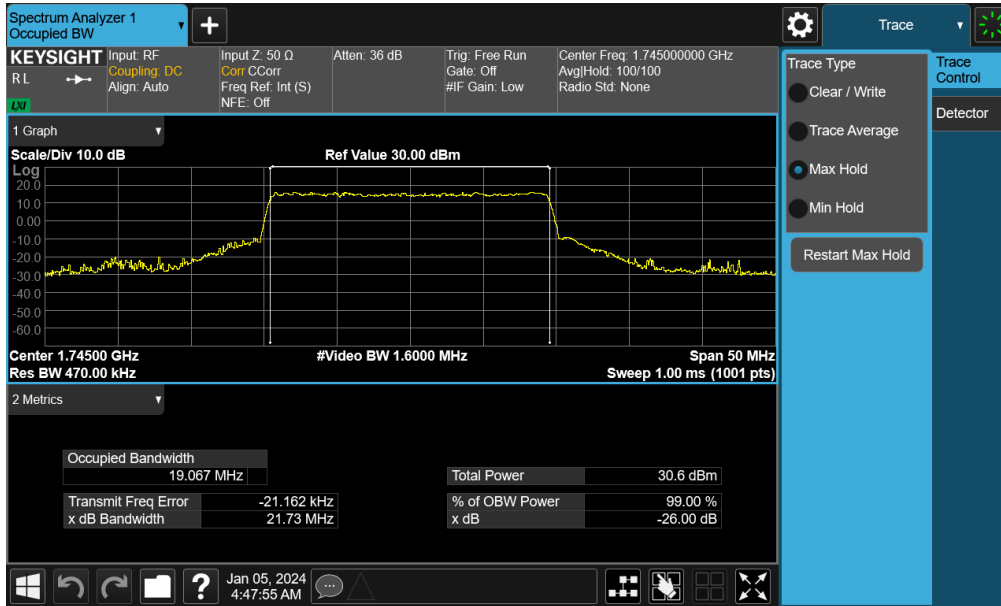


**Plot 7-63. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM 16QAM - Full RB – Ant1)**

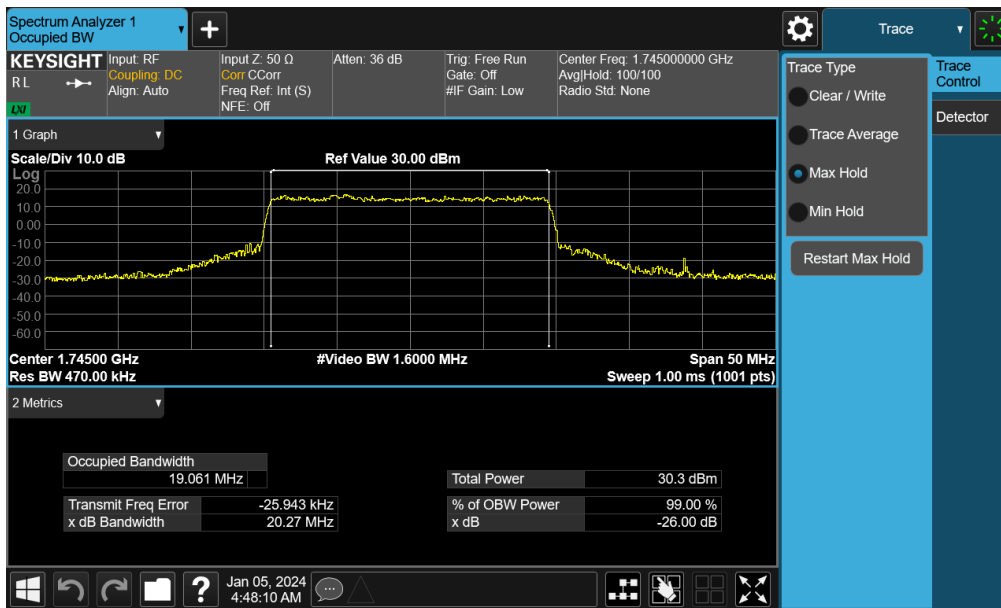


**Plot 7-64. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB – Ant1)**

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 50 of 174

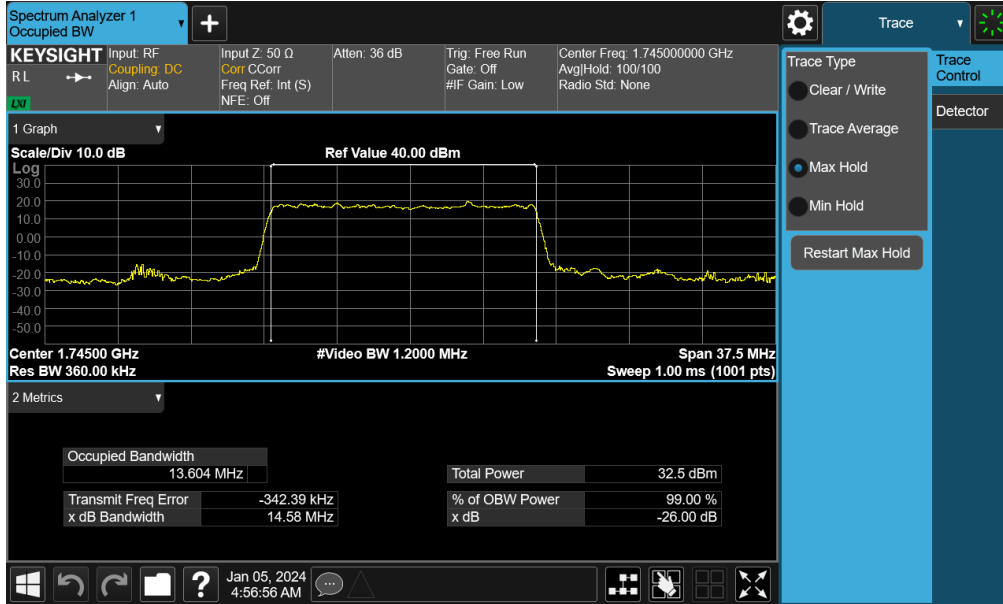


Plot 7-65. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB – Ant1)

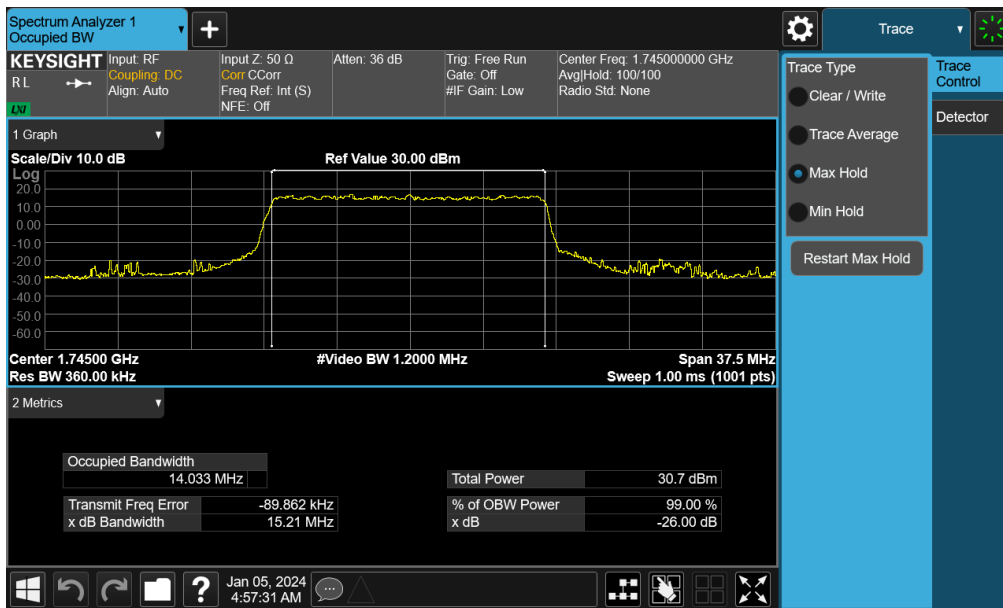


Plot 7-66. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 51 of 174

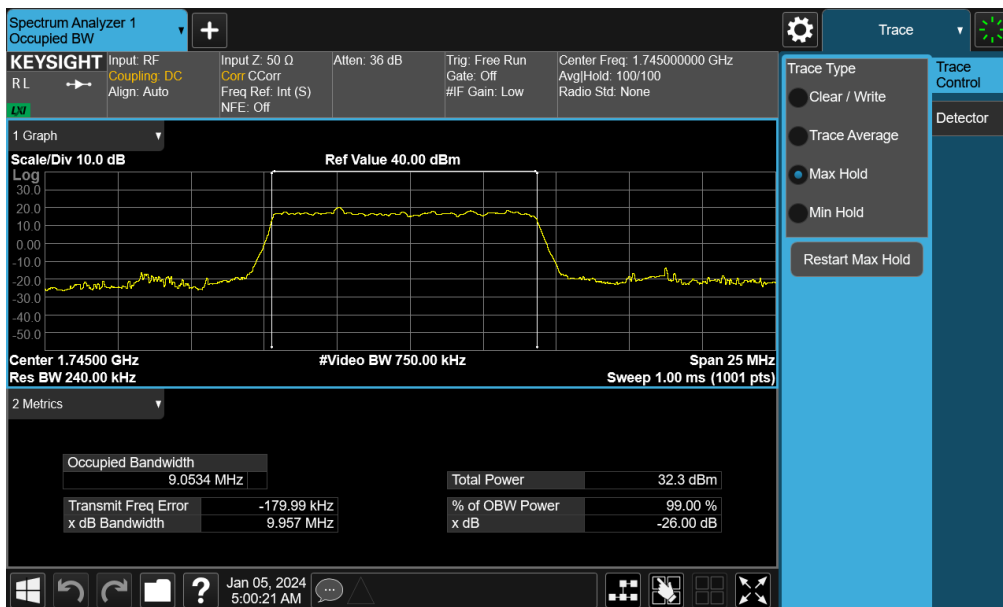


Plot 7-67. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB – Ant1)

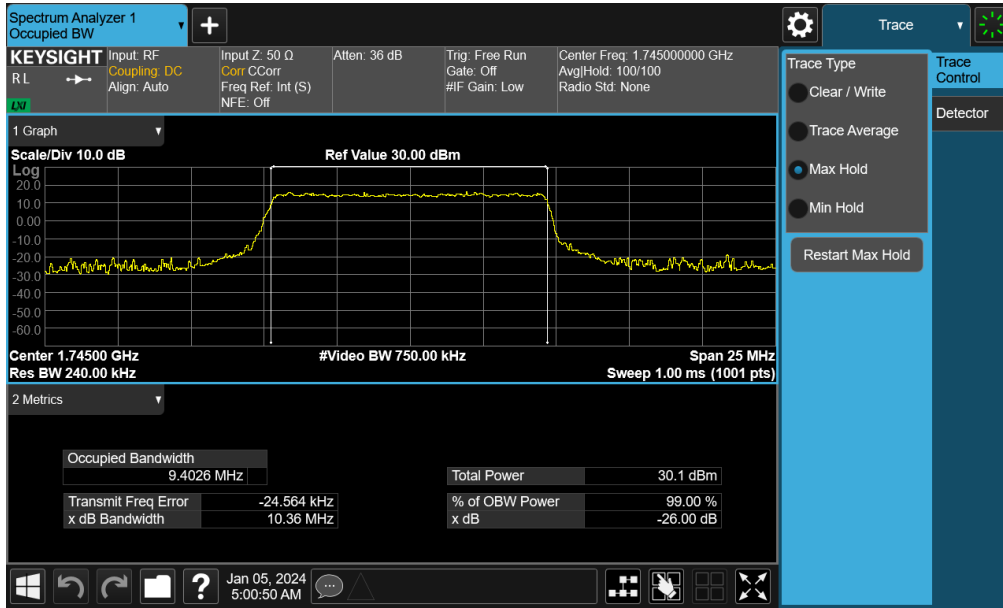


Plot 7-68. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB – Ant1)

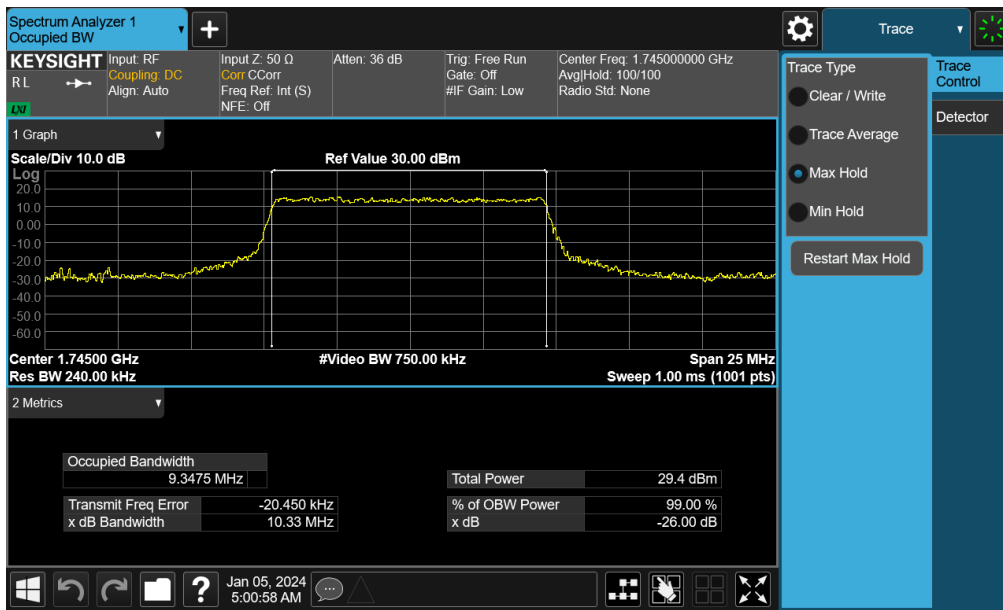
FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 52 of 174



FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 53 of 174

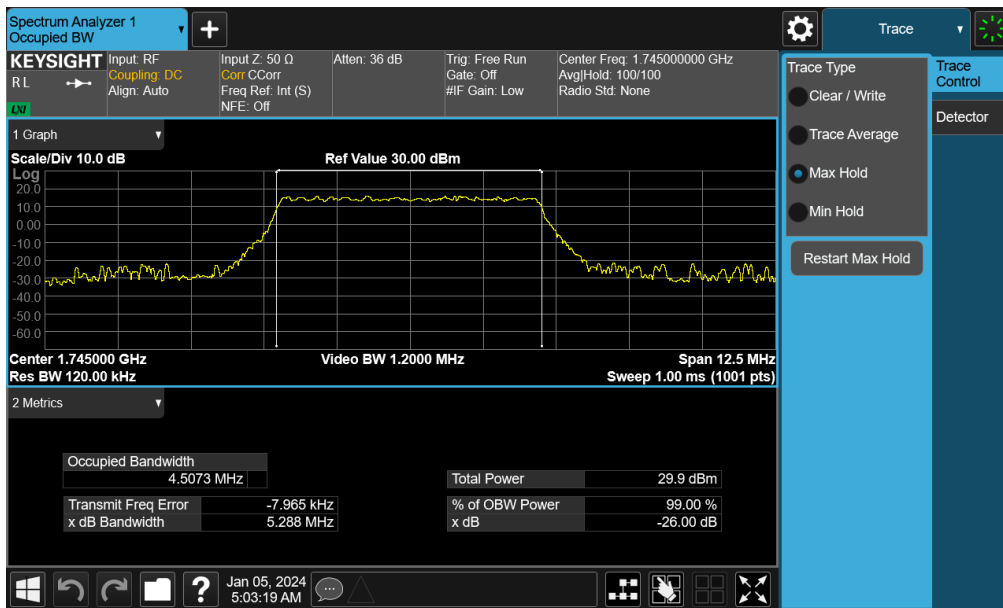
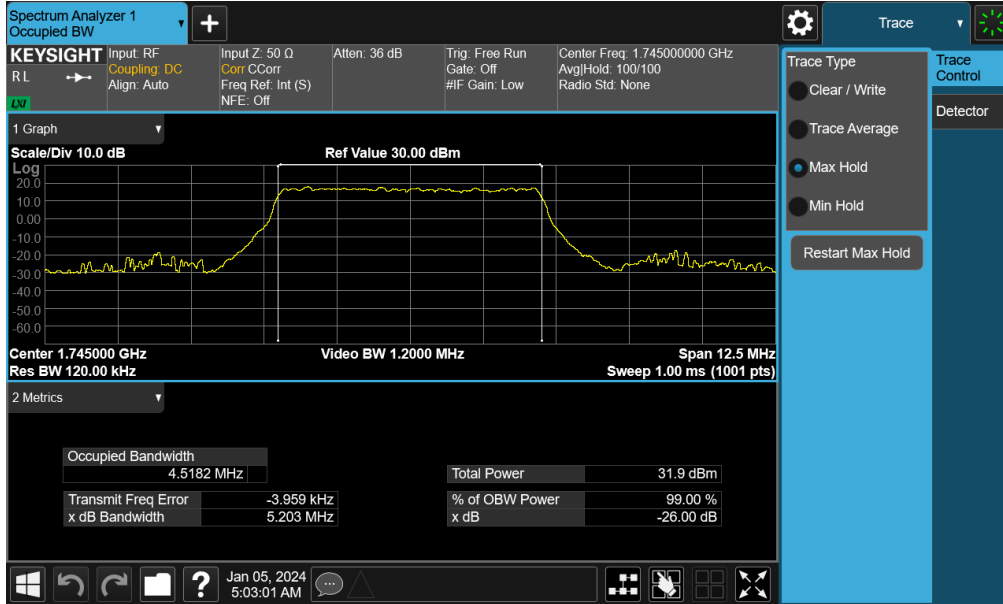


Plot 7-71. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB – Ant1)

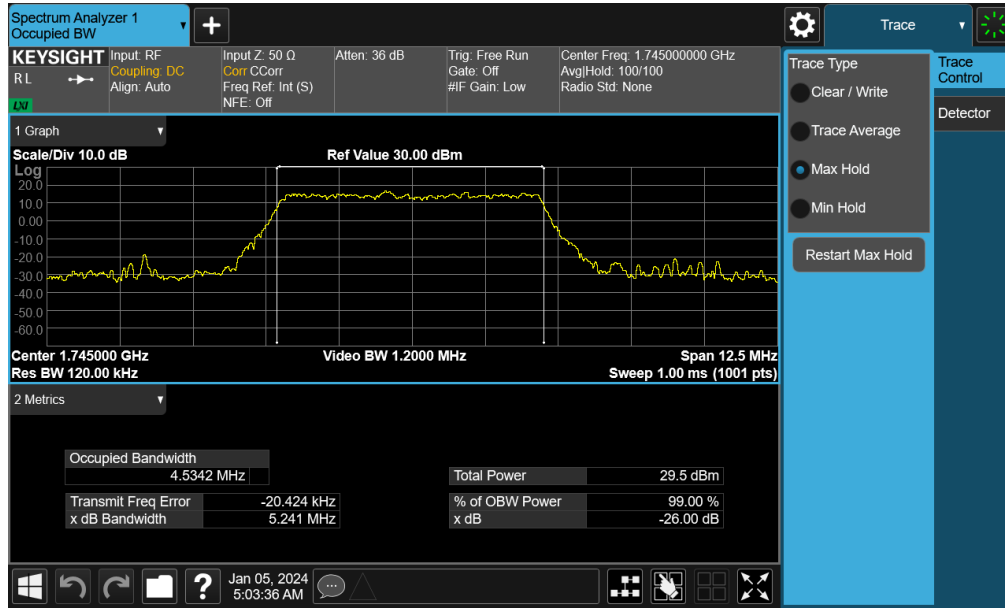


Plot 7-72. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB – Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 54 of 174



FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 55 of 174



Plot 7-75. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB – Ant1)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 56 of 174

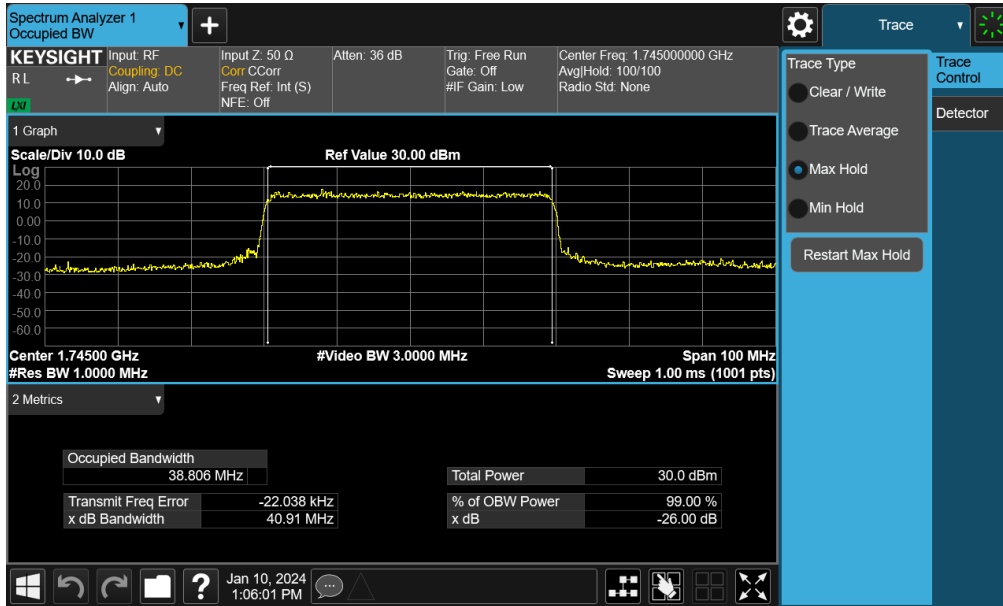
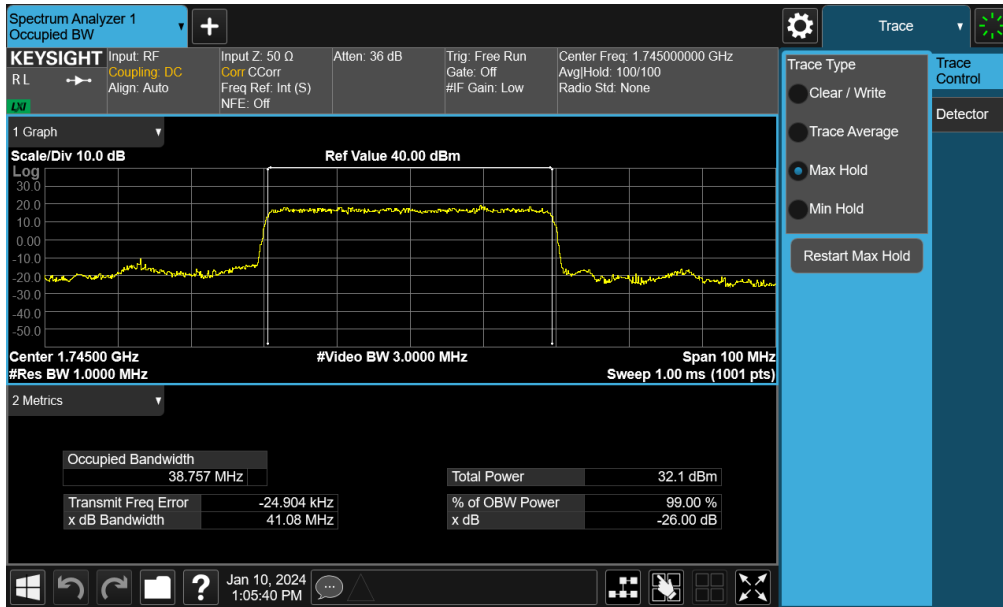


Mode	Bandwidth	Modulation	OBW [MHz]
NR-n66	40MHz	$\pi/2$ BPSK	38.76
		QPSK	38.81
		16QAM	38.86
	30MHz	$\pi/2$ BPSK	28.73
		QPSK	28.80
		16QAM	28.78
	25MHz	$\pi/2$ BPSK	22.99
		QPSK	23.86
		16QAM	23.89
	20MHz	$\pi/2$ BPSK	18.05
		QPSK	19.00
		16QAM	19.00
	15MHz	$\pi/2$ BPSK	13.55
		QPSK	14.16
		16QAM	14.17
	10MHz	$\pi/2$ BPSK	9.03
		QPSK	9.35
		16QAM	9.35
	5MHz	$\pi/2$ BPSK	4.52
		QPSK	4.52
		16QAM	4.53

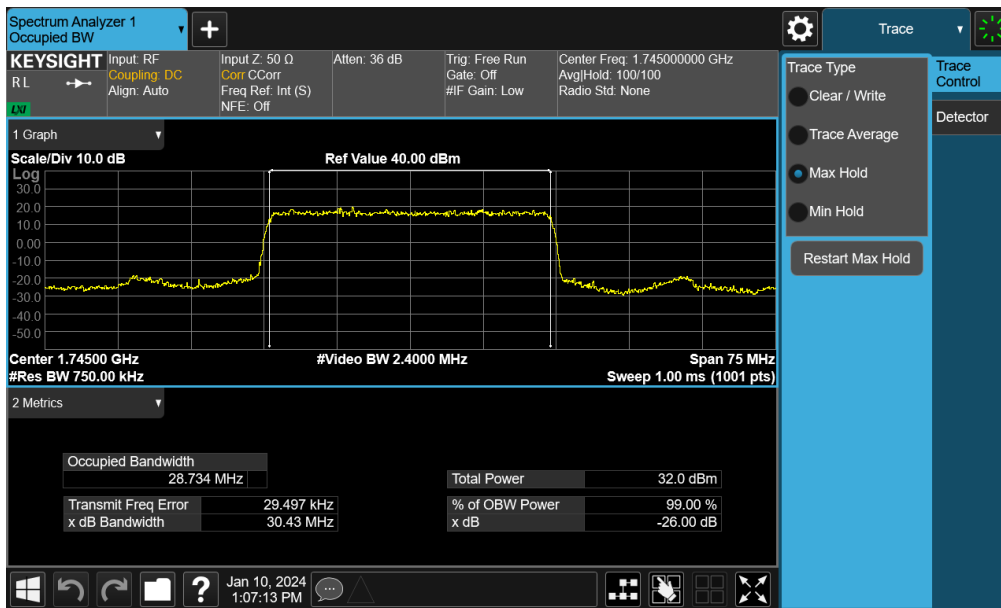
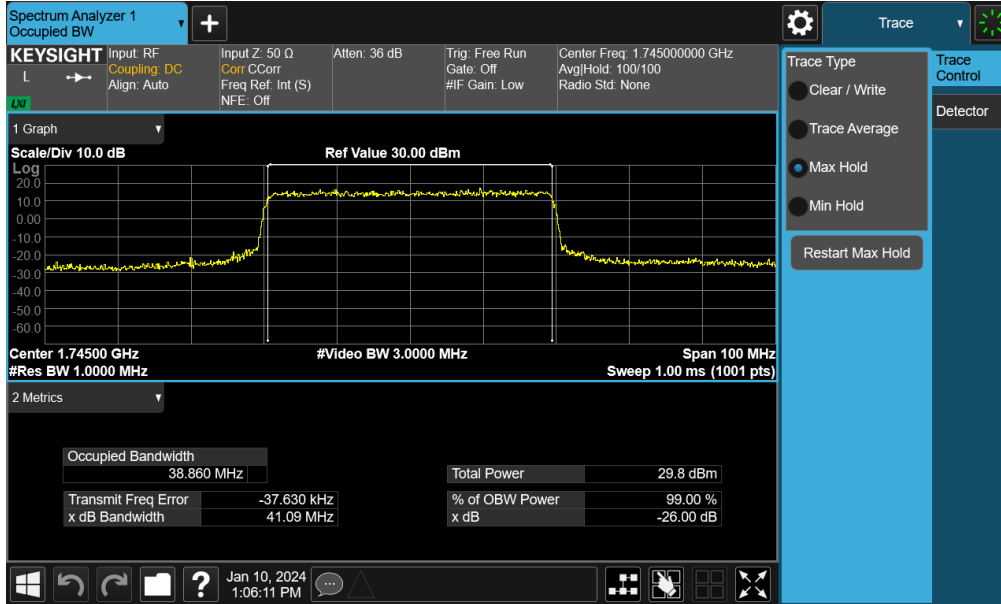
**Table 7-5. Occupied Bandwidth Test Results – Ant4**

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 57 of 174

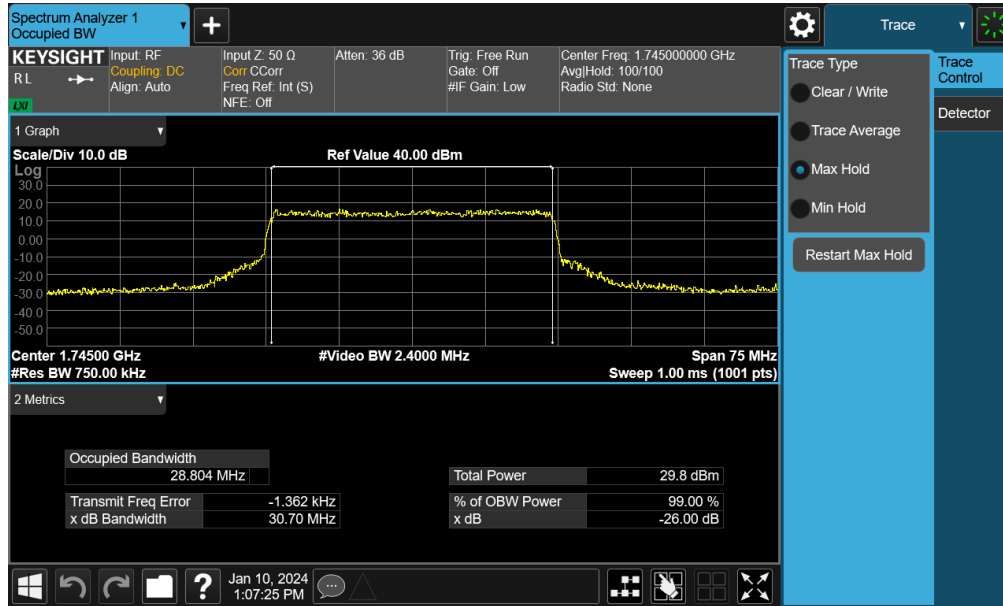
# NR Band n66 – Ant4



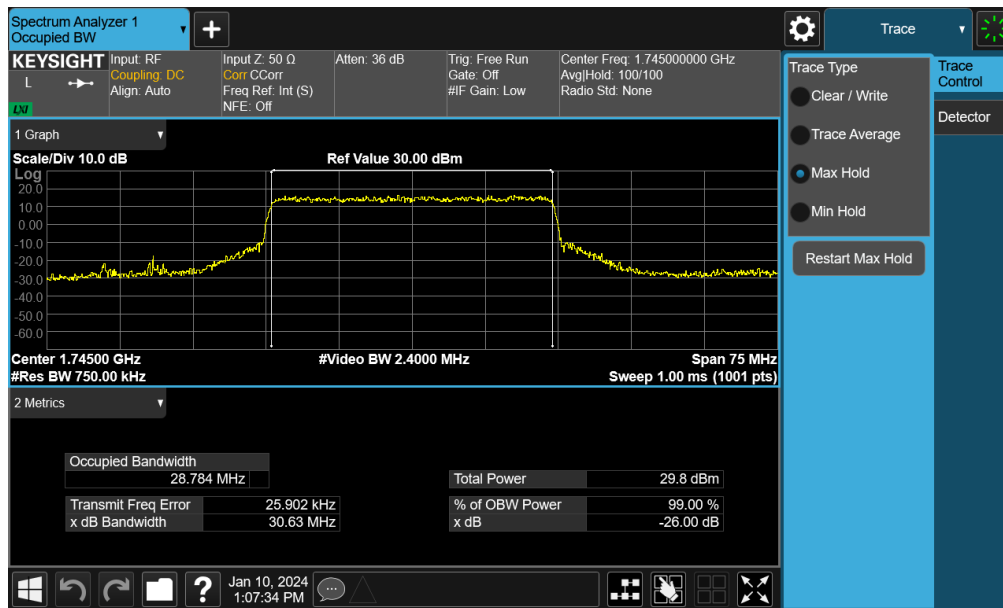
FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 58 of 174



FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 59 of 174

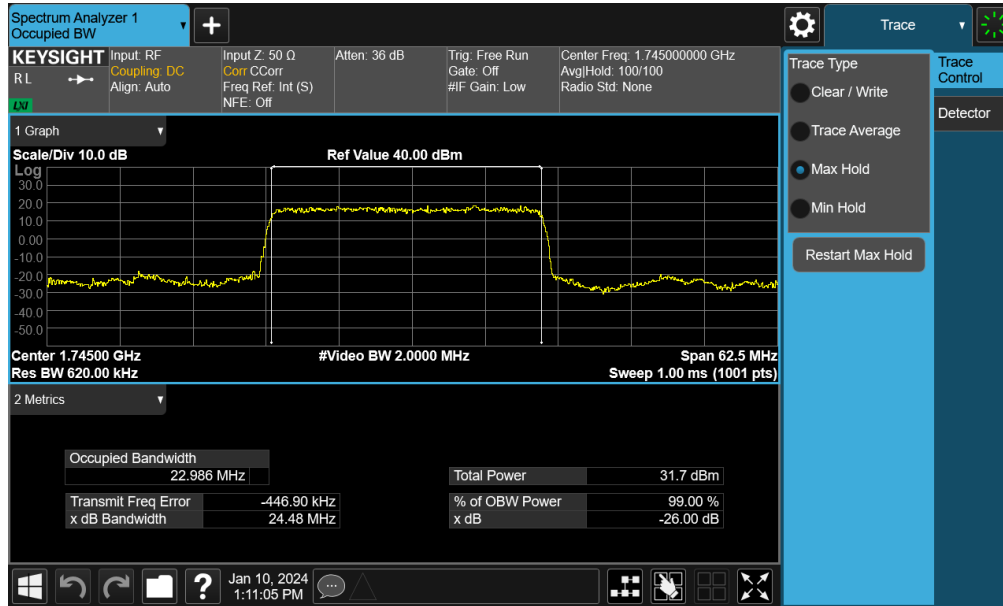


Plot 7-80. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM QPSK - Full RB - Ant4)

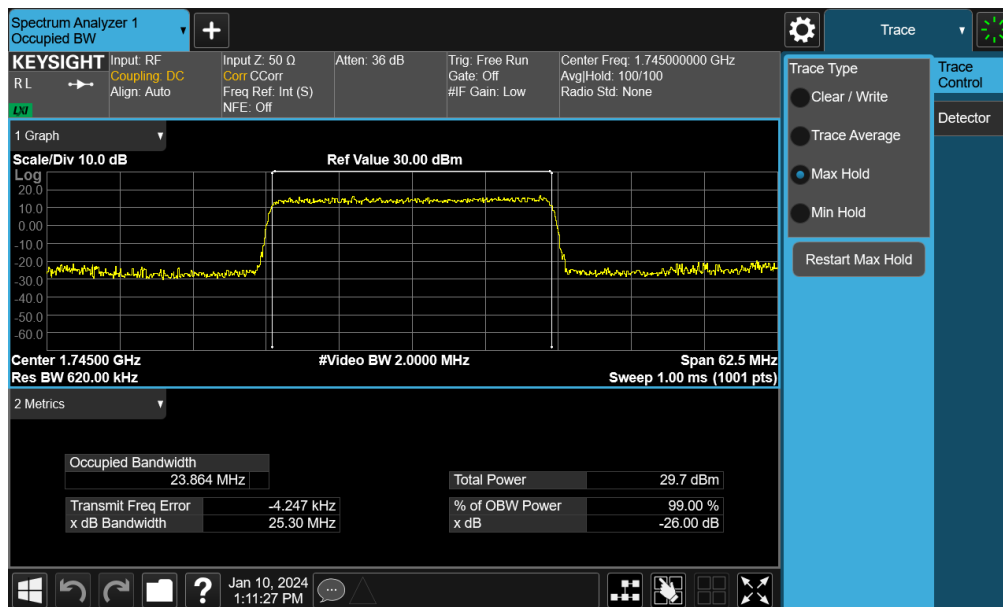


Plot 7-81. Occupied Bandwidth Plot (NR Band n66 - 30.0MHz CP-OFDM 16QAM - Full RB - Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 60 of 174

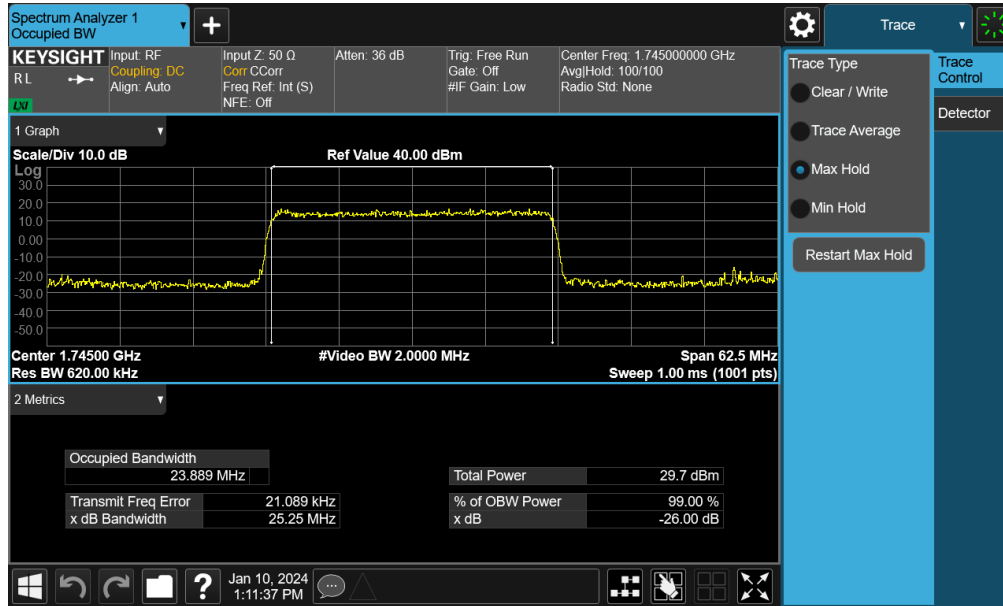


Plot 7-82. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz DFT-s-OFDM BPSK - Full RB – Ant4)

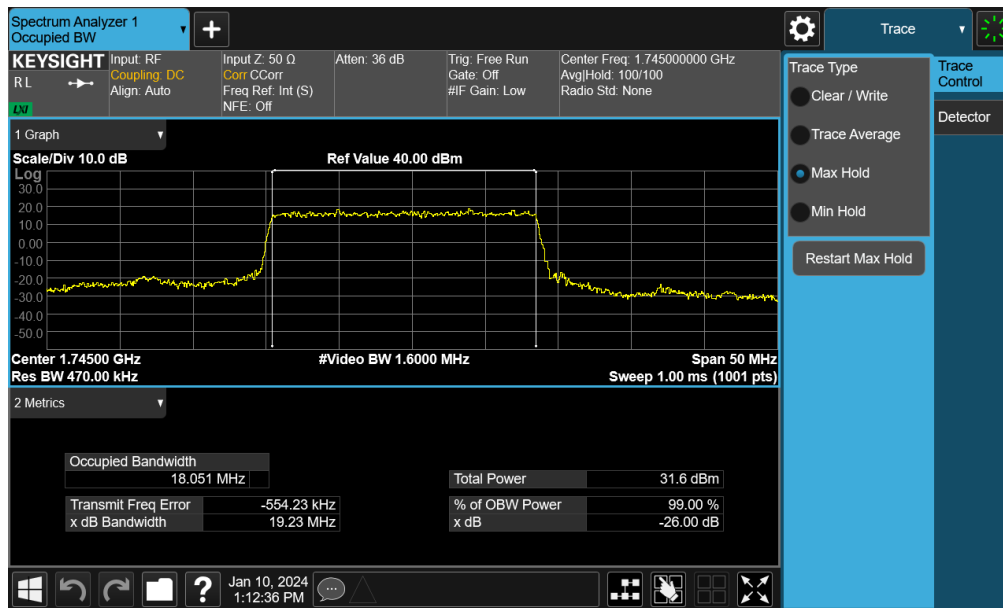


Plot 7-83. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM QPSK - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	PART 27 MEASUREMENT REPORT		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 61 of 174

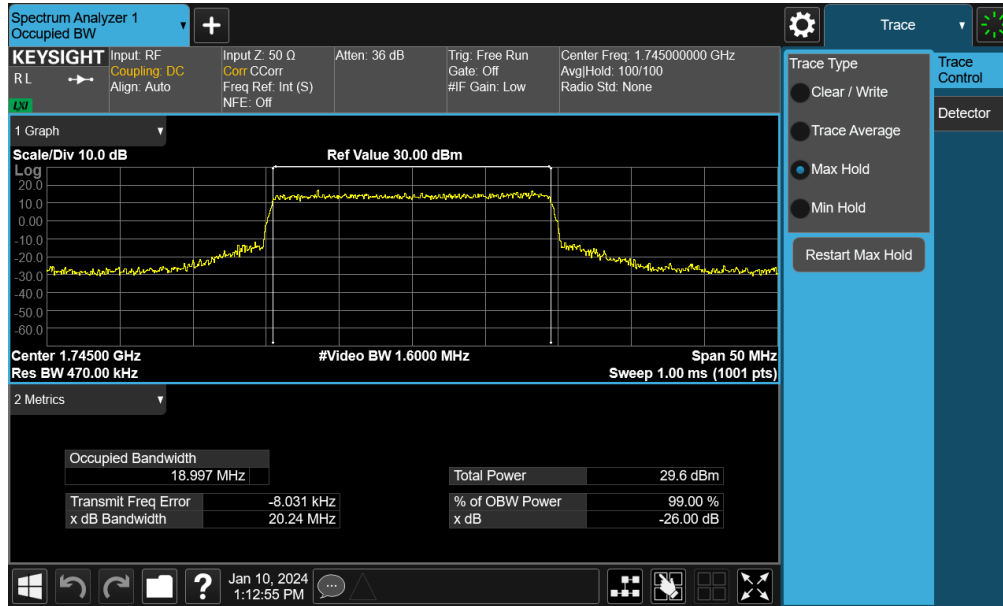


Plot 7-84. Occupied Bandwidth Plot (NR Band n66 - 25.0MHz CP-OFDM 16QAM - Full RB – Ant4)

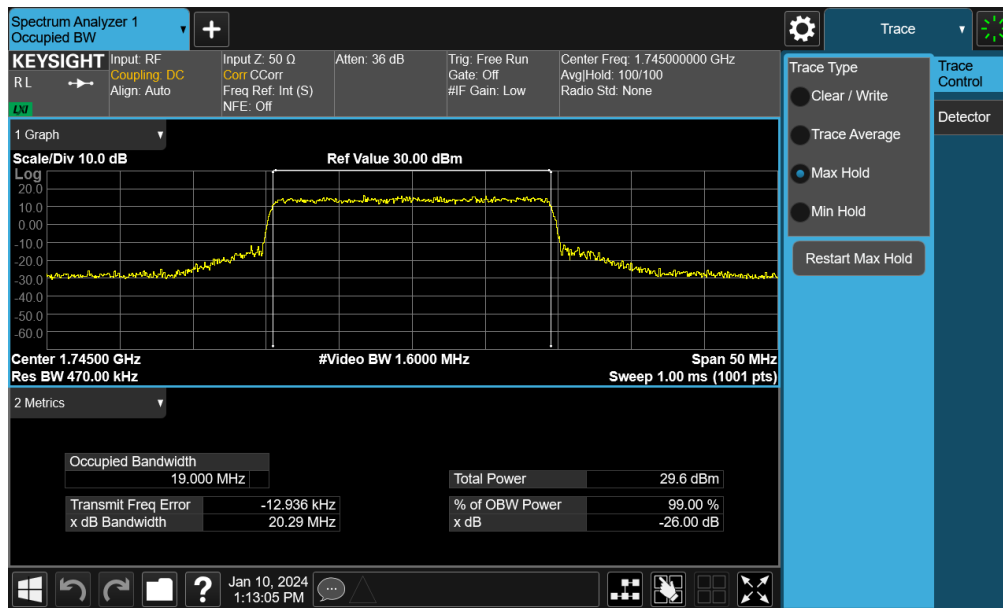


Plot 7-85. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 62 of 174



Plot 7-86. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB – Ant4)



Plot 7-87. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB – Ant4)

FCC ID: C3K2077 IC: 3048A-2077	<b>PART 27 MEASUREMENT REPORT</b>		Approved by: Technical Manager
Test Report S/N: 1M2312040120-10.C3K	Test Dates: 1/4/2024 - 3/14/2024	EUT Type: Portable Computing Device	Page 63 of 174