

Part 96 MEASUREMENT REPORT

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

Date of Testing:
 12/1/2023 - 03/13/2024
Test Report Issue Date:
 03/18/2024
Test Site/Location:
 Element lab., Columbia, MD, USA
Test Report Serial No.:
 1M2312040120-14.C3K

| | |
|-------------------|------------------------------|
| FCC ID: | C3K2077 |
| APPLICANT: | Microsoft Corporation |

Application Type: Certification
Model: 2077
EUT Type: Portable Computing Device
FCC Classification: Citizens Band End User Devices (CBE)
FCC Rule Part(s): 96
Test Procedure(s): ANSI C63.26-2015, KDB 940660 D01 v03, WINNF-TS-0122 v1.0.2

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



| | | | |
|--|--|---|--|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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FCC Part 96

| Mode | Bandwidth | Modulation | Tx Frequency Range [MHz] | EIRP | | Emission Designator |
|-------------|-----------|-----------------|--------------------------|----------------|------------------|---------------------|
| | | | | Max. Power [W] | Max. Power [dBm] | |
| LTE Band 48 | 40 MHz | QPSK | 3570.0 - 3680.0 | 0.158 | 22.00 | 37M8G7D |
| | | 16QAM | 3570.0 - 3680.0 | 0.150 | 21.77 | 37M7W7D |
| | 35 MHz | QPSK | 3567.5 - 3682.5 | 0.158 | 21.98 | 32M7G7D |
| | | 16QAM | 3567.5 - 3682.5 | 0.150 | 21.76 | 32M7W7D |
| | 30 MHz | QPSK | 3565.0 - 3685.0 | 0.159 | 22.03 | 27M8G7D |
| | | 16QAM | 3565.0 - 3685.0 | 0.151 | 21.79 | 27M9W7D |
| | 25 MHz | QPSK | 3562.5 - 3687.5 | 0.156 | 21.93 | 23M0G7D |
| | | 16QAM | 3562.5 - 3687.5 | 0.150 | 21.77 | 23M0W7D |
| | 20 MHz | QPSK | 3560.0 - 3690.0 | 0.155 | 21.91 | 18M0G7D |
| | | 16QAM | 3560.0 - 3690.0 | 0.146 | 21.65 | 18M0W7D |
| | 15 MHz | QPSK | 3557.5 - 3692.5 | 0.153 | 21.84 | 13M5G7D |
| | | 16QAM | 3557.5 - 3692.5 | 0.148 | 21.69 | 13M4W7D |
| | 10 MHz | QPSK | 3555.0 - 3695.0 | 0.158 | 22.00 | 9M02G7D |
| | | 16QAM | 3555.0 - 3695.0 | 0.158 | 21.99 | 8M97W7D |
| | 5 MHz | QPSK | 3552.5 - 3697.5 | 0.172 | 22.37 | 4M51G7D |
| | | 16QAM | 3552.5 - 3697.5 | 0.147 | 21.69 | 4M50W7D |
| NR Band n48 | 40 MHz | TT/2 BPSK | 3570.0 - 3680.0 | 0.170 | 22.29 | 35M9G7D |
| | | QPSK | 3570.0 - 3680.0 | 0.164 | 22.14 | 38M0G7D |
| | | 16QAM | 3570.0 - 3680.0 | 0.152 | 21.81 | 38M0W7D |
| | 30 MHz | TT/2 BPSK | 3565.0 - 3685.0 | 0.170 | 22.29 | 27M0G7D |
| | | QPSK | 3565.0 - 3685.0 | 0.167 | 22.22 | 28M0G7D |
| | | 16QAM | 3565.0 - 3685.0 | 0.155 | 21.89 | 28M0W7D |
| | 20 MHz | TT/2 BPSK | 3560.0 - 3690.0 | 0.171 | 22.32 | 18M0G7D |
| | | QPSK | 3560.0 - 3690.0 | 0.165 | 22.17 | 18M3G7D |
| | | 16QAM | 3560.0 - 3690.0 | 0.151 | 21.78 | 18M3W7D |
| | 15 MHz | TT/2 BPSK | 3557.5 - 3692.5 | 0.171 | 22.32 | 13M0G7D |
| | | QPSK | 3557.5 - 3692.5 | 0.165 | 22.18 | 13M7G7D |
| | | 16QAM | 3557.5 - 3692.5 | 0.151 | 21.79 | 13M6W7D |
| 10 MHz | TT/2 BPSK | 3555.0 - 3695.0 | 0.166 | 22.20 | 8M65G7D | |
| | QPSK | 3555.0 - 3695.0 | 0.157 | 21.96 | 8M63G7D | |
| | 16QAM | 3555.0 - 3695.0 | 0.148 | 21.70 | 8M68W7D | |

EUT Overview – Ant 2

| | | | |
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| Mode | Bandwidth | Modulation | Tx Frequency Range [MHz] | EIRP | | Emission Designator |
|-------------|--------------|-----------------|--------------------------|----------------|------------------|---------------------|
| | | | | Max. Power [W] | Max. Power [dBm] | |
| LTE Band 48 | 20 MHz | QPSK | 3560.0 - 3690.0 | 0.097 | 19.87 | 17M9G7D |
| | | 16QAM | 3560.0 - 3690.0 | 0.084 | 19.25 | 18M0W7D |
| | 15 MHz | QPSK | 3557.5 - 3692.5 | 0.097 | 19.88 | 13M5G7D |
| | | 16QAM | 3557.5 - 3692.5 | 0.082 | 19.16 | 13M5W7D |
| | 10 MHz | QPSK | 3555.0 - 3695.0 | 0.099 | 19.97 | 9M03G7D |
| | | 16QAM | 3555.0 - 3695.0 | 0.083 | 19.18 | 9M00W7D |
| 5 MHz | QPSK | 3552.5 - 3697.5 | 0.102 | 20.08 | 4M53G7D | |
| | 16QAM | 3552.5 - 3697.5 | 0.088 | 19.43 | 4M51W7D | |
| NR Band n48 | 40 MHz | $\pi/2$ BPSK | 3570.0 - 3680.0 | 0.089 | 19.47 | 35M9G7D |
| | | QPSK | 3570.0 - 3680.0 | 0.091 | 19.58 | 38M0G7D |
| | | 16QAM | 3570.0 - 3680.0 | 0.077 | 18.86 | 38M0W7D |
| | 30 MHz | $\pi/2$ BPSK | 3565.0 - 3685.0 | 0.101 | 20.03 | 27M0G7D |
| | | QPSK | 3565.0 - 3685.0 | 0.099 | 19.96 | 28M0G7D |
| | | 16QAM | 3565.0 - 3685.0 | 0.086 | 19.33 | 28M0W7D |
| | 20 MHz | $\pi/2$ BPSK | 3560.0 - 3690.0 | 0.094 | 19.72 | 18M0G7D |
| | | QPSK | 3560.0 - 3690.0 | 0.087 | 19.39 | 18M4G7D |
| | | 16QAM | 3560.0 - 3690.0 | 0.075 | 18.76 | 18M4W7D |
| | 15 MHz | $\pi/2$ BPSK | 3557.5 - 3692.5 | 0.093 | 19.71 | 13M0G7D |
| | | QPSK | 3557.5 - 3692.5 | 0.091 | 19.58 | 13M7G7D |
| | | 16QAM | 3557.5 - 3692.5 | 0.081 | 19.07 | 13M6W7D |
| 10 MHz | $\pi/2$ BPSK | 3555.0 - 3695.0 | 0.091 | 19.58 | 8M66G7D | |
| | QPSK | 3555.0 - 3695.0 | 0.084 | 19.25 | 8M70G7D | |
| | 16QAM | 3555.0 - 3695.0 | 0.068 | 18.34 | 8M70W7D | |

EUT Overview – Ant 3

| Mode | Bandwidth | Modulation | Tx Frequency Range [MHz] | EIRP | |
|-------------|-----------|--------------|--------------------------|----------------|------------------|
| | | | | Max. Power [W] | Max. Power [dBm] |
| NR Band n48 | 40MHz | $\pi/2$ BPSK | 3600.0 - 3650.0 | 0.052 | 17.17 |
| | | 16QAM | 3600.0 - 3650.0 | 0.060 | 17.81 |
| | | 16QAM | 3600.0 - 3650.0 | 0.049 | 16.89 |

EUT Overview – Ant 5

| Mode | Bandwidth | Modulation | Tx Frequency Range [MHz] | EIRP | |
|-------------|-----------|--------------|--------------------------|----------------|------------------|
| | | | | Max. Power [W] | Max. Power [dBm] |
| NR Band n48 | 40MHz | $\pi/2$ BPSK | 3600.0 - 3650.0 | 0.065 | 18.12 |
| | | 16QAM | 3600.0 - 3650.0 | 0.068 | 18.31 |
| | | 16QAM | 3600.0 - 3650.0 | 0.054 | 17.32 |

EUT Overview – Ant 8

Note: EIRP levels shown in the table above are measured over the full channel bandwidth. These values will appear on the Grant of Authorization.

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1.0 INTRODUCTION

1.1 Scope

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

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 a OnGo Alliance Approved Test Lab (ATL)
- Element Washington DC LLC is a WinnForum Approved Test Lab
- 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.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Microsoft Corporation Portable Computing Device FCC ID: C3K2077**. The test data contained in this report pertains only to the emissions due to the EUT's LTE Band 48 operation in the CBRS band. Per FCC Part 96, this device is evaluated as a Citizens Band End User Devices (CBE).

Test Device Serial No.: 7CDR2, B44T2, B44F2, 7CBC2

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.

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3.0 DESCRIPTION OF TESTS

3.1 Measurement 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:

$$P_d \text{ [dBm]} = P_g \text{ [dBm]} - \text{cable loss [dB]} + \text{antenna gain [dBd/dBi]};$$

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

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:

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

And

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

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.

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4.0 MEASUREMENT UNCERTAINTY

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

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

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5.0 TEST EQUIPMENT CALIBRATION DATA

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

| Manufacturer | Model | Description | Cal Date | Cal Interval | Cal Due | Serial Number |
|-----------------------|----------|----------------------------------|------------|--------------|------------|---------------|
| - | 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 | 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 |

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.
2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data transmission, telemetry, telecommand

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 (7250 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.

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7.0 TEST RESULTS

7.1 Summary

Company Name: Microsoft Corporation
 FCC ID: C3K2077
 FCC Classification: Citizens Band End User Devices (CBE)
 Mode(s): LTE/NR/ULCA

| Test Condition | Test Description | FCC Part Section(s) | Test Limit | Test Result | Reference |
|------------------|---|----------------------|---|-------------|-------------------|
| CONDUCTED | Conducted Power | 2.1046(a), 2.1046(c) | N/A | PASS | Section 7.2 |
| | Additional Maximum Power Reduction (A-MPR) | 2.1046 | N/A | PASS | Section 7.2 |
| | Occupied Bandwidth | 2.1049(h) | N/A | PASS | Section 7.3 |
| | Conducted Band Edge / Spurious Emissions (EUD) | 2.1051, 96.41(e)(ii) | -13 dBm/MHz at frequencies within 0-B MHz of channel edge (where B is the bandwidth of the assigned channel) -25 dBm/MHz at frequencies greater than B MHz above and below channel edge -40 dBm/MHz at frequencies below 3530 MHz and above 3720 MHz | PASS | Sections 7.4, 7.5 |
| | Frequency Stability | 2.1055 | Fundamental emissions stay within authorized frequency block | PASS | Section 7.8 |
| | End User Device Additional Requirements (CBSD Protocol) | 96.47 | End User Devices may operate only if they can positively receive and decode an authorization signal transmitted by a CBSD, including the frequencies and power limits for their operation. An End User Device must discontinue operations, change frequencies, or change its operational power level within 10 seconds of receiving instructions from its associated CBSD. | PASS | Section 7.9 |
| RADIATED | Equivalent Isotropic Radiated Power (EIRP) (EUD) | 96.41(b) | 23 dBm/10MHz | PASS | Section 7.6 |
| | Uplink Carrier Aggregation | 96.41(e) | > 43 + 10log(P[Watts]) at Band Edge and for all out-of-band emissions | PASS | Section 7.7 |
| | Radiated Spurious Emissions | 2.1053, 96.41(e) | -40 dBm/MHz | PASS | Section 7.7 |

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 were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
- 3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
- 4) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v1.2.2.

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 11 of 136 |

7.2 Conducted Output Power Data

Test Overview

The EUT is set up to transmit at maximum power for LTE. All power levels 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.

A-MPR is implemented in this device per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep $\geq 2 \times \text{span} / \text{RBW}$
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

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

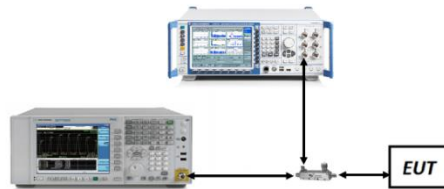


Figure 7-1. Test Instrument & Measurement Setup

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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Test Notes

1. A-MPR was only applied for test purposes to the 2CC case since the 1CC case was compliant for all testing at max power.
2. A-MPR was verified to comply with the "CA_NS_10" specification in the 3GPP TS 36.101 standard by setting the MCC to a U.S. code and the MNC to a U.S. carrier supporting LTE B48 operation.
3. 256QAM operations does not employ A-MPR.
4. 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.
5. All other conducted power measurements are contained in the RF exposure report for this filing.
6. 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.

| | | | |
|--|--|---|--|
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| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 20 MHz | QPSK | 55340 | 3560.0 | 1 / 99 | 19.59 |
| | | 55990 | 3625.0 | 1 / 99 | 20.07 |
| | | 56640 | 3690.0 | 1 / 50 | 19.79 |
| | 16-QAM | 56640 | 3690.0 | 1 / 50 | 18.77 |
| 15 MHz | QPSK | 55315 | 3557.5 | 1 / 74 | 19.44 |
| | | 55990 | 3625.0 | 1 / 0 | 20.06 |
| | | 56665 | 3692.5 | 1 / 37 | 19.72 |
| | 16-QAM | 55990 | 3625.0 | 1 / 0 | 19.14 |
| 10 MHz | QPSK | 55290 | 3555.0 | 1 / 49 | 19.82 |
| | | 55990 | 3625.0 | 1 / 25 | 20.25 |
| | | 56690 | 3695.0 | 1 / 25 | 19.88 |
| | 16-QAM | 55990 | 3625.0 | 1 / 25 | 19.44 |
| 5 MHz | QPSK | 55265 | 3552.5 | 1 / 12 | 19.65 |
| | | 55990 | 3625.0 | 1 / 12 | 20.28 |
| | | 56715 | 3697.5 | 1 / 12 | 20.25 |
| | 16-QAM | 56715 | 3697.5 | 1 / 12 | 18.81 |

Table 7-2. Conducted Power Output Data (LTE Band 48 – Ant2)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 40 MHz | π/2 BPSK | 638000 | 3570.0 | 1 / 104 | 20.43 |
| | | 641666 | 3625.0 | 1 / 104 | 20.59 |
| | | 645332 | 3680.0 | 1 / 1 | 20.53 |
| | QPSK | 638000 | 3570.0 | 1 / 104 | 20.36 |
| | | 641666 | 3625.0 | 1 / 104 | 20.59 |
| | | 645332 | 3680.0 | 1 / 1 | 20.47 |
| 16-QAM | 645332 | 3680.0 | 1 / 1 | 19.45 | |
| 30 MHz | π/2 BPSK | 637666 | 3565.0 | 1 / 76 | 20.38 |
| | | 641666 | 3625.0 | 1 / 76 | 20.50 |
| | | 645666 | 3685.0 | 1 / 39 | 20.53 |
| | QPSK | 637666 | 3565.0 | 1 / 76 | 20.32 |
| | | 641666 | 3625.0 | 1 / 76 | 20.54 |
| | | 645666 | 3685.0 | 1 / 39 | 20.55 |
| 16-QAM | 645666 | 3685.0 | 1 / 39 | 19.53 | |
| 20 MHz | π/2 BPSK | 637334 | 3560.0 | 1 / 49 | 20.27 |
| | | 641666 | 3625.0 | 1 / 49 | 20.42 |
| | | 646000 | 3690.0 | 1 / 49 | 20.56 |
| | QPSK | 637334 | 3560.0 | 1 / 49 | 20.23 |
| | | 641666 | 3625.0 | 1 / 49 | 20.45 |
| | | 646000 | 3690.0 | 1 / 49 | 20.50 |
| 16-QAM | 646000 | 3690.0 | 1 / 49 | 19.42 | |
| 15 MHz | π/2 BPSK | 637166 | 3557.5 | 1 / 1 | 20.29 |
| | | 641666 | 3625.0 | 1 / 36 | 20.47 |
| | | 646166 | 3692.5 | 1 / 36 | 20.56 |
| | QPSK | 637166 | 3557.5 | 1 / 1 | 20.22 |
| | | 641666 | 3625.0 | 1 / 36 | 20.44 |
| | | 646166 | 3692.5 | 1 / 36 | 20.51 |
| 16-QAM | 646166 | 3692.5 | 1 / 36 | 19.43 | |
| 10 MHz | π/2 BPSK | 637000 | 3555.0 | 1 / 1 | 20.15 |
| | | 641666 | 3625.0 | 1 / 22 | 20.39 |
| | | 646332 | 3695.0 | 1 / 1 | 20.44 |
| | QPSK | 637000 | 3555.0 | 1 / 1 | 20.10 |
| | | 641666 | 3625.0 | 1 / 22 | 20.41 |
| | | 646332 | 3695.0 | 1 / 1 | 20.29 |
| 16-QAM | 646332 | 3695.0 | 1 / 1 | 19.34 | |

Table 7-3. Conducted Power Output Data (NR n48 – Ant2)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 15 of 136 |

| Bandwidth | Modulation | PCC | | | SCC | | | Conducted Power [dBm] |
|-----------|------------|-----------------|-----------------|-------------|-----------------|-----------------|-------------|-----------------------|
| | | Bandwidth [MHz] | Frequency [MHz] | RB / Offset | Bandwidth [MHz] | Frequency [MHz] | RB / Offset | |
| 40 MHz | QPSK | 20 | 3560.0 | 1 / 99 | 20 | 3579.8 | 1 / 0 | 19.08 |
| | | 20 | 3625.0 | 1 / 99 | 20 | 3644.8 | 1 / 0 | 19.30 |
| | | 20 | 3690.0 | 1 / 0 | 20 | 3670.2 | 1 / 99 | 19.31 |
| | 16-QAM | 20 | 3690.0 | 1 / 0 | 20 | 3670.2 | 1 / 99 | 18.28 |
| 35 MHz | QPSK | 20 | 3560.0 | 1 / 99 | 15 | 3577.1 | 1 / 0 | 19.05 |
| | | 20 | 3625.0 | 1 / 99 | 15 | 3642.1 | 1 / 0 | 19.34 |
| | | 20 | 3690.0 | 1 / 0 | 15 | 3672.9 | 1 / 74 | 19.29 |
| | 16-QAM | 20 | 3690.0 | 1 / 0 | 15 | 3672.9 | 1 / 74 | 18.27 |
| 30 MHz | QPSK | 20 | 3560.0 | 1 / 99 | 10 | 3574.4 | 1 / 0 | 19.04 |
| | | 20 | 3625.0 | 1 / 99 | 10 | 3639.4 | 1 / 0 | 19.25 |
| | | 20 | 3690.0 | 1 / 0 | 10 | 3675.6 | 1 / 49 | 19.34 |
| | 16-QAM | 20 | 3690.0 | 1 / 0 | 10 | 3675.6 | 1 / 49 | 18.30 |
| 25 MHz | QPSK | 20 | 3560.0 | 1 / 99 | 5 | 3571.7 | 1 / 0 | 19.05 |
| | | 20 | 3625.0 | 1 / 99 | 5 | 3636.7 | 1 / 0 | 19.22 |
| | | 20 | 3690.0 | 1 / 0 | 5 | 3678.3 | 1 / 24 | 19.24 |
| | 16-QAM | 20 | 3690.0 | 1 / 0 | 5 | 3678.3 | 1 / 24 | 18.28 |

Table 7-4. Conducted Power Output Data (ULCA LTE Band 48 – Ant2)

| Test Case | NS | MCC | MNC | Channel BW [MHz] | PCC | | | SCC | | | A-MPR [dB] | Modulation | MPR [dB] | Maximum Target Output Power [dBm] | A-MPR Measured Power [dBm] |
|-----------|----------|--------|-----|------------------|-------------------------|---------|-----------|-------------------------|---------|-----------|------------|------------|----------|-----------------------------------|----------------------------|
| | | | | | Channel Frequency [MHz] | RB Size | RB Offset | Channel Frequency [MHz] | RB Size | RB Offset | | | | | |
| 1 | NS_CA_10 | 310 | 910 | 20 + 20 | 3560 | 100 | 0 | 3579.8 | 100 | 0 | ≤ 11 | QPSK | 0 | 19.60 | 8.23 |
| 16-QAM | | | | | | | | | | | | 1 | 18.60 | 8.22 | |
| 2 | | | | 20 + 20 | 3560 | 1 | 99 | 3579.8 | 1 | 0 | ≤ 11 | QPSK | 0 | 19.60 | 14.47 |
| 16-QAM | | | | | | | | | | | | 1 | 18.60 | 14.51 | |
| 3 | | | | 20 + 20 | 3605.1 | 100 | 0 | 3624.9 | 100 | 0 | ≤ 4.5 | QPSK | 0 | 19.60 | 16.15 |
| 16-QAM | | | | | | | | | | | | 1 | 18.60 | 16.18 | |
| 4 | 20 + 20 | 3605.1 | 1 | 99 | 3624.9 | 1 | 0 | ≤ 4.5 | QPSK | 0 | 19.60 | 19.55 | | | |
| 16-QAM | | | | | | | | | 1 | 18.60 | 19.52 | | | | |
| 5 | 20 + 20 | 3670.1 | 100 | 0 | 3689.9 | 100 | 0 | ≤ 11 | QPSK | 0 | 19.60 | 9.81 | | | |
| 16-QAM | | | | | | | | | 1 | 18.60 | 9.79 | | | | |
| 6 | 20 + 20 | 3670.1 | 1 | 99 | 3689.9 | 1 | 0 | ≤ 11 | QPSK | 0 | 19.60 | 16.13 | | | |
| 16-QAM | | | | | | | | | 1 | 18.60 | 16.08 | | | | |

Table 7-5. Conducted Power Output Data (ULCA LTE Band 48 – A-MPR -Ant2)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 20 MHz | QPSK | 55340 | 3560.0 | 1 / 0 | 19.87 |
| | | 55990 | 3625.0 | 1 / 0 | 20.12 |
| | | 56640 | 3690.0 | 1 / 99 | 19.55 |
| | 16-QAM | 55990 | 3625.0 | 1 / 0 | 19.74 |
| 15 MHz | QPSK | 55315 | 3557.5 | 1 / 0 | 19.84 |
| | | 55990 | 3625.0 | 1 / 37 | 19.92 |
| | | 56665 | 3692.5 | 1 / 74 | 19.57 |
| | 16-QAM | 56665 | 3692.5 | 1 / 74 | 18.70 |
| 10 MHz | QPSK | 55290 | 3555.0 | 1 / 25 | 20.14 |
| | | 55990 | 3625.0 | 1 / 0 | 19.27 |
| | | 56690 | 3695.0 | 1 / 0 | 19.30 |
| | 16-QAM | 55290 | 3555.0 | 1 / 25 | 19.46 |
| 5 MHz | QPSK | 55265 | 3552.5 | 1 / 12 | 20.25 |
| | | 55990 | 3625.0 | 1 / 12 | 18.73 |
| | | 56715 | 3697.5 | 1 / 12 | 19.19 |
| | 16-QAM | 55265 | 3552.5 | 1 / 12 | 19.71 |

Table 7-6. Conducted Power Output Data (LTE Band 48 – Ant3)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 40 MHz | π/2 BPSK | 638000 | 3570.0 | 1 / 53 | 19.93 |
| | | 641666 | 3625.0 | 1 / 1 | 19.90 |
| | | 645332 | 3680.0 | 1 / 1 | 19.81 |
| | QPSK | 638000 | 3570.0 | 1 / 53 | 20.11 |
| | | 641666 | 3625.0 | 1 / 1 | 19.90 |
| | | 645332 | 3680.0 | 1 / 1 | 19.98 |
| 16-QAM | 645332 | 3680.0 | 1 / 1 | 19.63 | |
| 30 MHz | π/2 BPSK | 637666 | 3565.0 | 1 / 39 | 20.59 |
| | | 641666 | 3625.0 | 1 / 1 | 20.12 |
| | | 645666 | 3685.0 | 1 / 76 | 19.80 |
| | QPSK | 637666 | 3565.0 | 1 / 39 | 20.49 |
| | | 641666 | 3625.0 | 1 / 1 | 20.28 |
| | | 645666 | 3685.0 | 1 / 76 | 19.85 |
| 16-QAM | 641666 | 3625.0 | 1 / 1 | 20.06 | |
| 20 MHz | π/2 BPSK | 637334 | 3560.0 | 1 / 1 | 20.19 |
| | | 641666 | 3625.0 | 50 / 0 | 20.15 |
| | | 646000 | 3690.0 | 50 / 0 | 20.02 |
| | QPSK | 637334 | 3560.0 | 1 / 1 | 20.09 |
| | | 641666 | 3625.0 | 50 / 0 | 19.71 |
| | | 646000 | 3690.0 | 50 / 0 | 19.42 |
| 16-QAM | 637334 | 3560.0 | 1 / 1 | 19.79 | |
| 15 MHz | π/2 BPSK | 637166 | 3557.5 | 1 / 1 | 20.27 |
| | | 641666 | 3625.0 | 1 / 1 | 19.86 |
| | | 646166 | 3692.5 | 1 / 36 | 19.70 |
| | QPSK | 637166 | 3557.5 | 1 / 1 | 20.21 |
| | | 641666 | 3625.0 | 1 / 1 | 19.90 |
| | | 646166 | 3692.5 | 1 / 36 | 19.76 |
| 16-QAM | 641666 | 3625.0 | 1 / 1 | 19.80 | |
| 10 MHz | π/2 BPSK | 637000 | 3555.0 | 1 / 19 | 20.14 |
| | | 641666 | 3625.0 | 1 / 36 | 19.39 |
| | | 646332 | 3695.0 | 1 / 19 | 19.40 |
| | QPSK | 637000 | 3555.0 | 1 / 1 | 19.99 |
| | | 641666 | 3625.0 | 1 / 1 | 19.26 |
| | | 646332 | 3695.0 | 1 / 19 | 19.29 |
| 16-QAM | 637000 | 3555.0 | 1 / 1 | 19.37 | |

Table 7-7. Conducted Power Output Data (NR n48 – Ant3)

| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 40 MHz | π/2 BPSK | 638000 | 3570.0 | 1 / 1 | 20.04 |
| | | 641666 | 3625.0 | 1 / 1 | 20.19 |
| | | 645332 | 3680.0 | 1 / 104 | 19.48 |
| | QPSK | 638000 | 3570.0 | 1 / 1 | 19.99 |
| | | 641666 | 3625.0 | 1 / 1 | 20.19 |
| | | 645332 | 3680.0 | 1 / 104 | 19.65 |
| 16-QAM | 638000 | 3570.0 | 1 / 1 | 18.85 | |

Table 7-8. Conducted Power Output Data (NR n48 – Ant5)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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| Bandwidth | Modulation | Channel | Frequency [MHz] | RB Size/Offset | Conducted Power [dBm] |
|-----------|------------|---------|-----------------|----------------|-----------------------|
| 40 MHz | π/2 BPSK | 638000 | 3570.0 | 1 / 1 | 19.72 |
| | | 641666 | 3625.0 | 1 / 1 | 19.53 |
| | | 645332 | 3680.0 | 1 / 104 | 19.12 |
| | QPSK | 638000 | 3570.0 | 1 / 1 | 19.70 |
| | | 641666 | 3625.0 | 1 / 1 | 19.45 |
| | | 645332 | 3680.0 | 1 / 104 | 19.14 |
| | 16-QAM | 638000 | 3570.0 | 1 / 1 | 18.52 |

Table 7-9. Conducted Power Output Data (NR n48 – Ant8)

| Bandwidth | Modulation | Channel | Frequency [MHz] | Ant 2 RB Size/Offset | Ant 2 Conducted Power [dBm] | Ant 3 RB Size/Offset | Ant 3 Conducted Power [dBm] | UL-MIMO Conducted Powers [dBm] |
|-----------|------------|---------|-----------------|----------------------|-----------------------------|----------------------|-----------------------------|--------------------------------|
| 40 MHz | QPSK | 638000 | 3570.0 | 1/1 | 16.21 | 1/1 | 15.97 | 19.10 |
| | | 641666 | 3625.0 | 1/104 | 16.31 | 1/53 | 15.66 | 19.01 |
| | | 645332 | 3680.0 | 1/1 | 16.36 | 1/104 | 15.73 | 19.07 |
| | 16-QAM | 645332 | 3680.0 | 1/1 | 15.90 | 1/104 | 14.99 | 18.48 |
| | 64-QAM | 645332 | 3680.0 | 1/1 | 14.00 | 1/104 | 14.20 | 17.11 |
| | 256-QAM | 645332 | 3680.0 | 1/1 | 11.87 | 1/104 | 10.67 | 14.32 |

Table 7-10. Conducted Power Output Data (UL-MIMO NR n48 – Ant2 and Ant3)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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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 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.

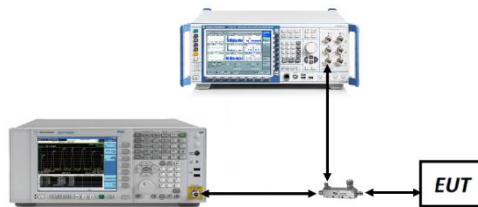


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None

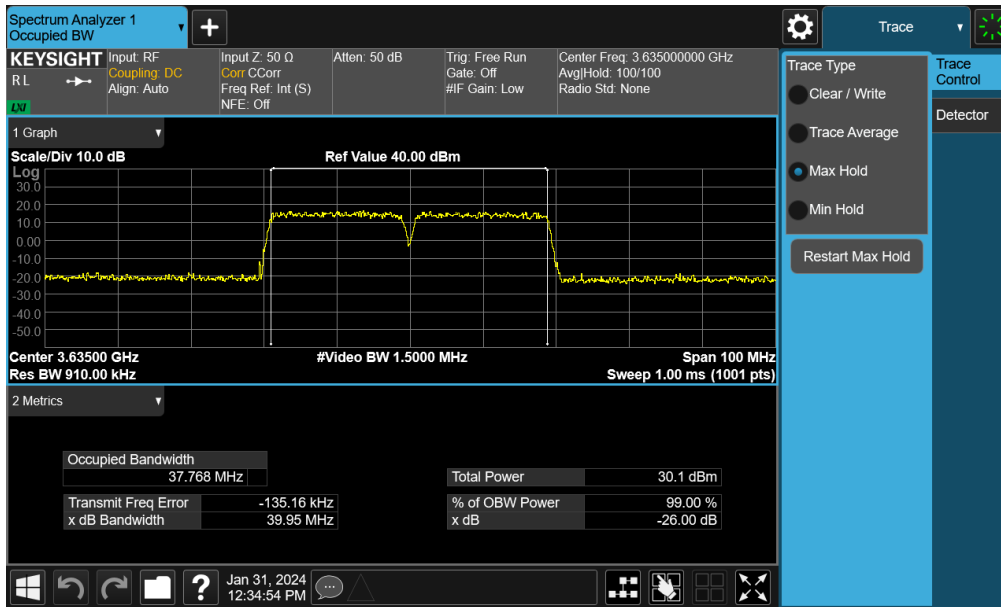
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 20 of 136 |

| Mode | Bandwidth | Modulation | OBW [MHz] |
|-----------------------|-----------|------------|-----------|
| LTE B48 (2CC ULCA) | 40MHz | QPSK | 37.77 |
| | | 16QAM | 37.71 |
| | 35MHz | QPSK | 32.74 |
| | | 16QAM | 32.72 |
| | 30MHz | QPSK | 27.76 |
| | | 16QAM | 27.89 |
| | 25MHz | QPSK | 23.02 |
| | | 16QAM | 23.00 |
| LTE B48 | 20MHz | QPSK | 18.01 |
| | | 16QAM | 17.96 |
| | 15MHz | QPSK | 13.54 |
| | | 16QAM | 13.45 |
| | 10MHz | QPSK | 9.02 |
| | | 16QAM | 8.97 |
| | 5MHz | QPSK | 4.51 |
| | | 16QAM | 4.50 |

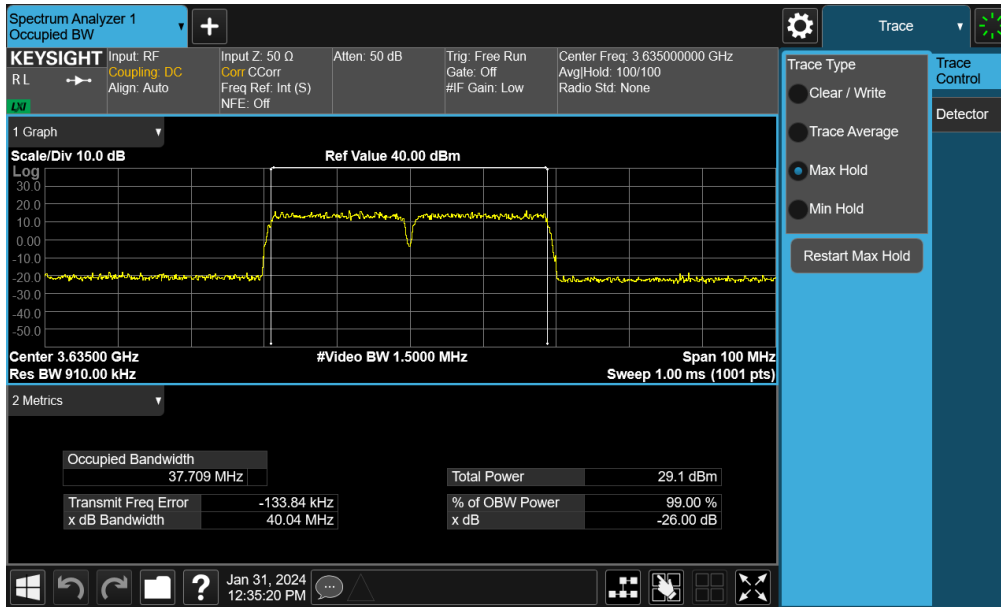
Table 7-11. Occupied Bandwidth Test Results (LTE – Ant 2)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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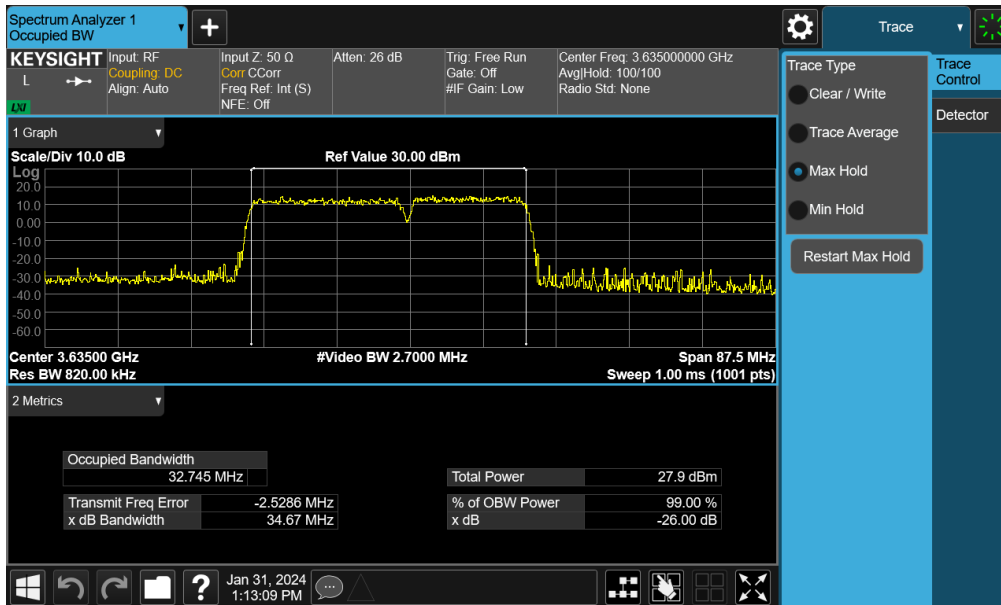


Plot 7-1. Occupied Bandwidth Plot (ULCA LB48 - 20+20MHz QPSK - Full RB Configuration)

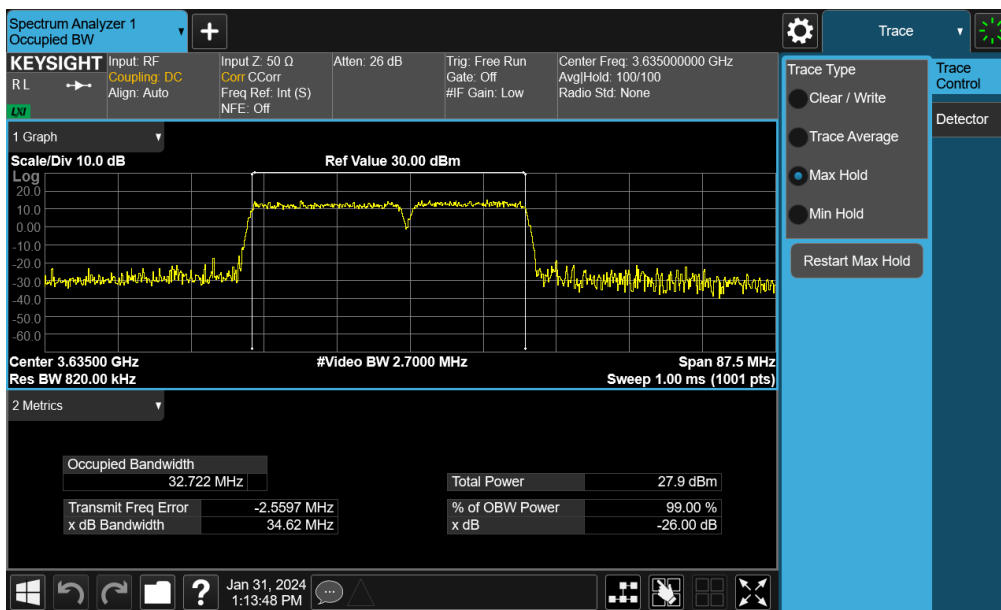


Plot 7-2. Occupied Bandwidth Plot (ULCA LB48 - 20+20MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 22 of 136 |

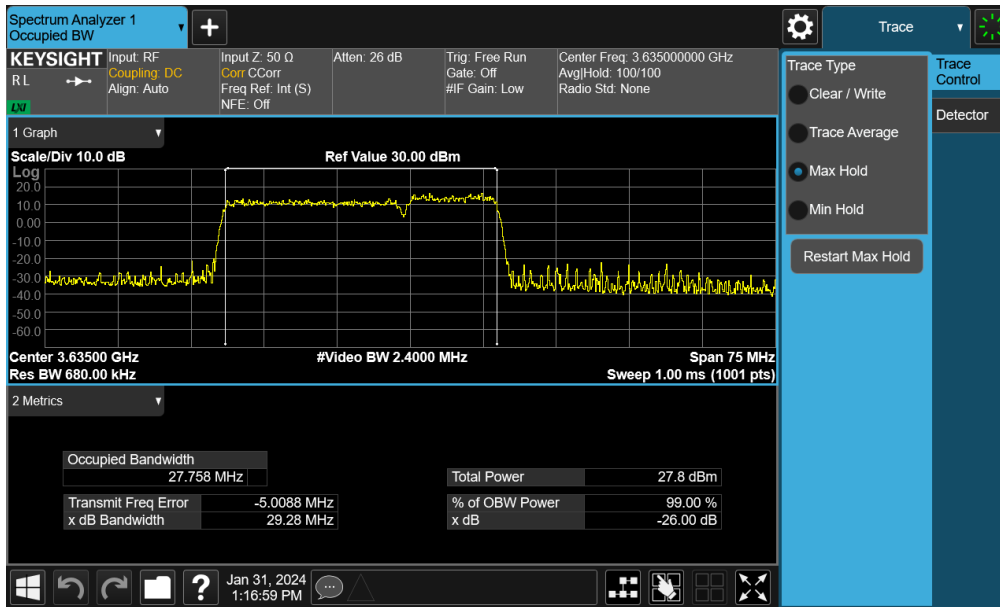


Plot 7-3. Occupied Bandwidth Plot (ULCA LB48 - 20+15MHz QPSK - Full RB Configuration)

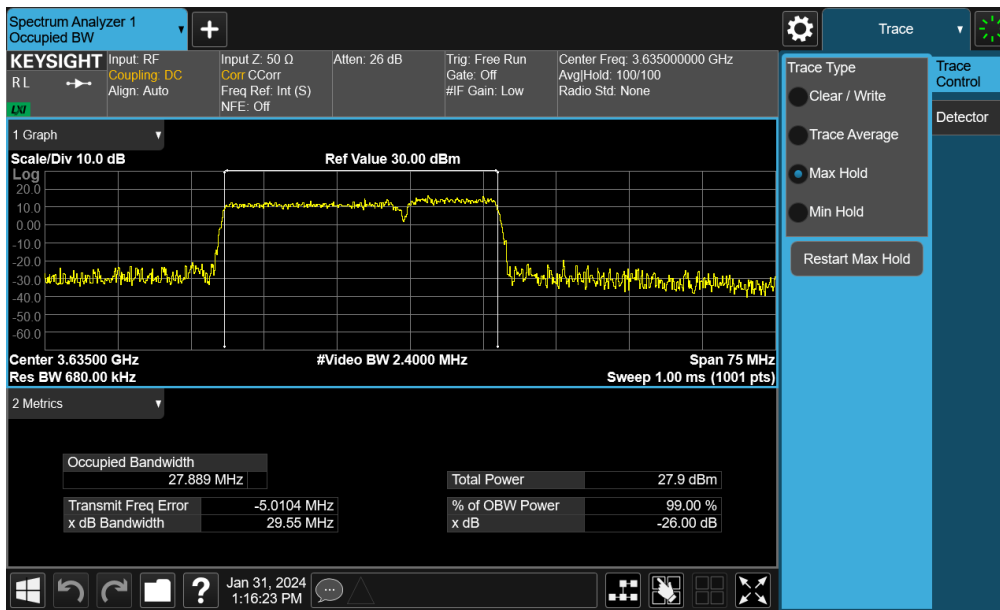


Plot 7-4. Occupied Bandwidth Plot (ULCA LB48 - 20+15MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 23 of 136 |

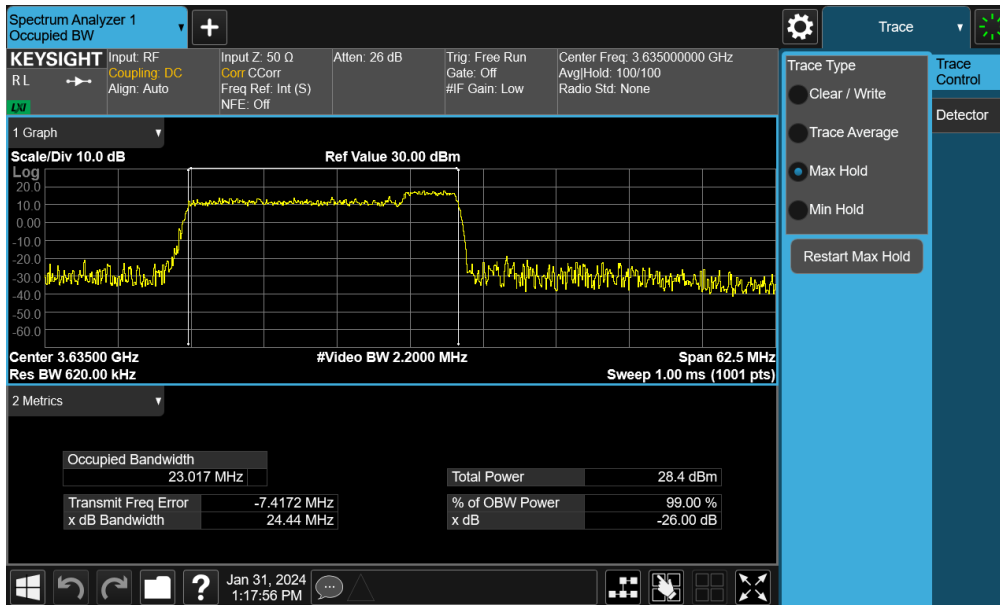


Plot 7-5. Occupied Bandwidth Plot (ULCA LB48 - 20+10MHz QPSK - Full RB Configuration)

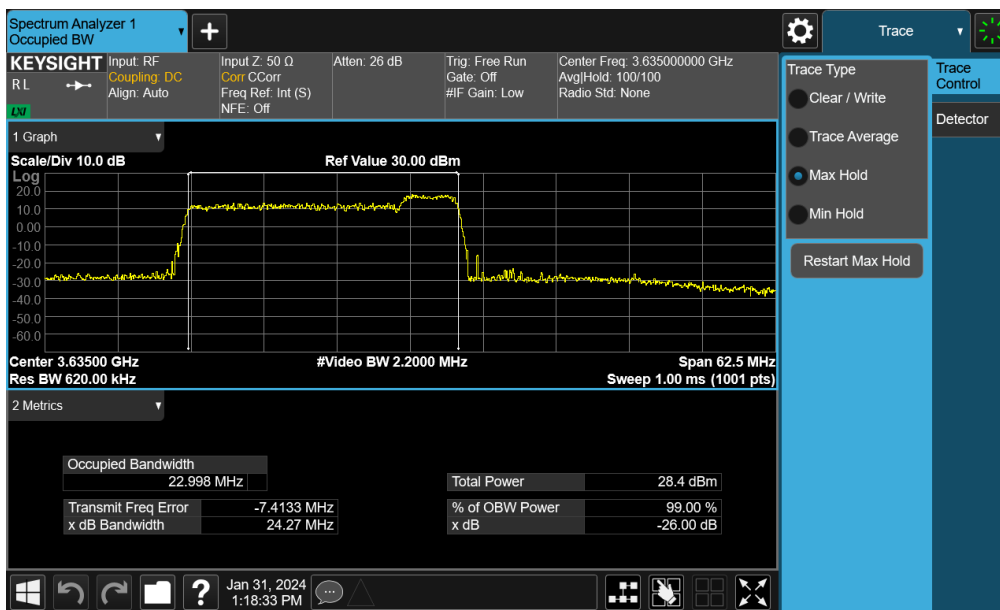


Plot 7-6. Occupied Bandwidth Plot (ULCA LB48 - 20+10MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 24 of 136 |



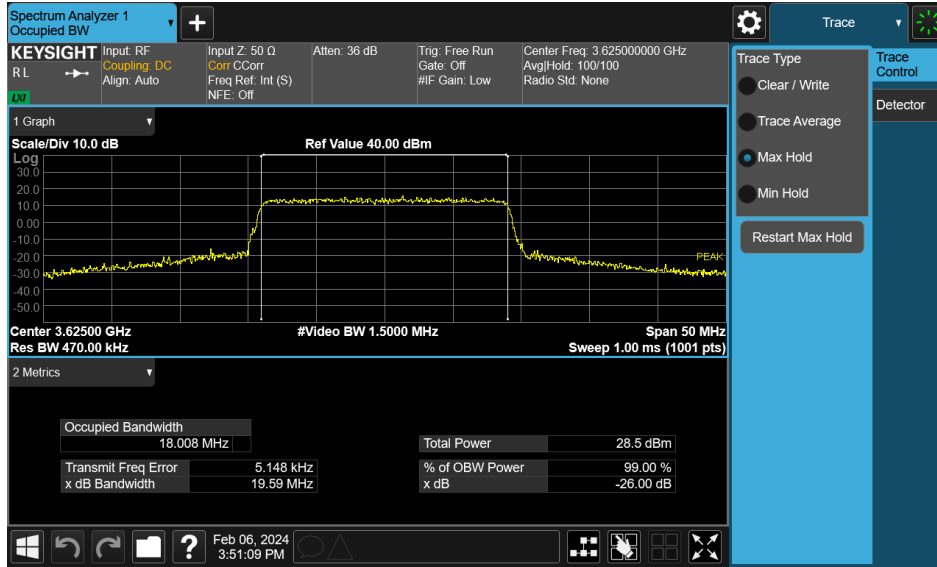
Plot 7-7. Occupied Bandwidth Plot (ULCA LB48 - 20+5MHz QPSK - Full RB Configuration)



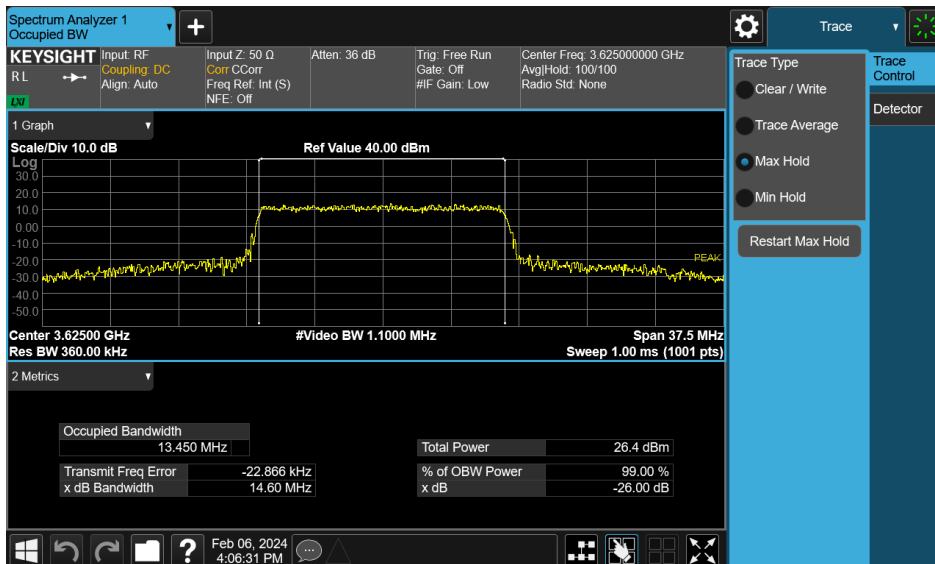
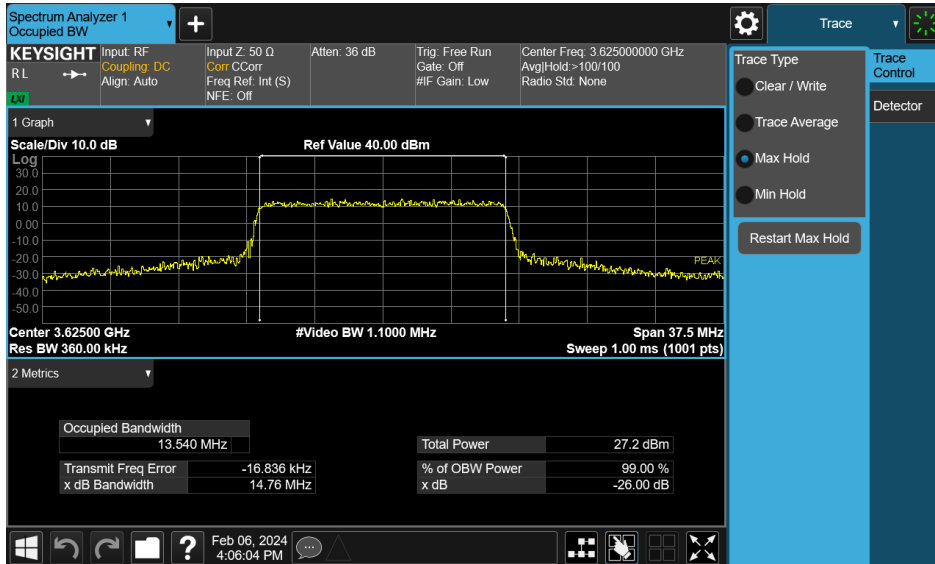
Plot 7-8. Occupied Bandwidth Plot (ULCA LB48 - 20+5MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 25 of 136 |

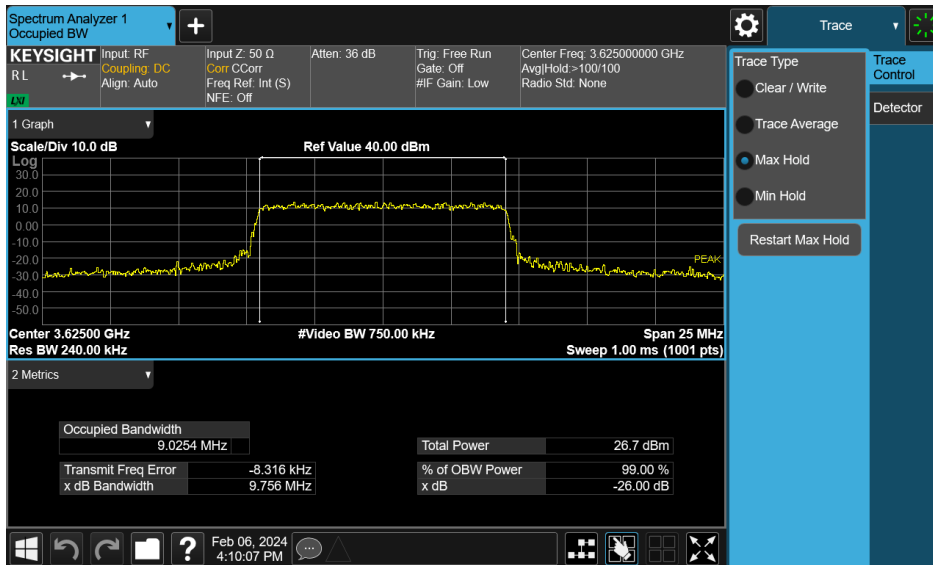
LTE Band 48 -Ant 2



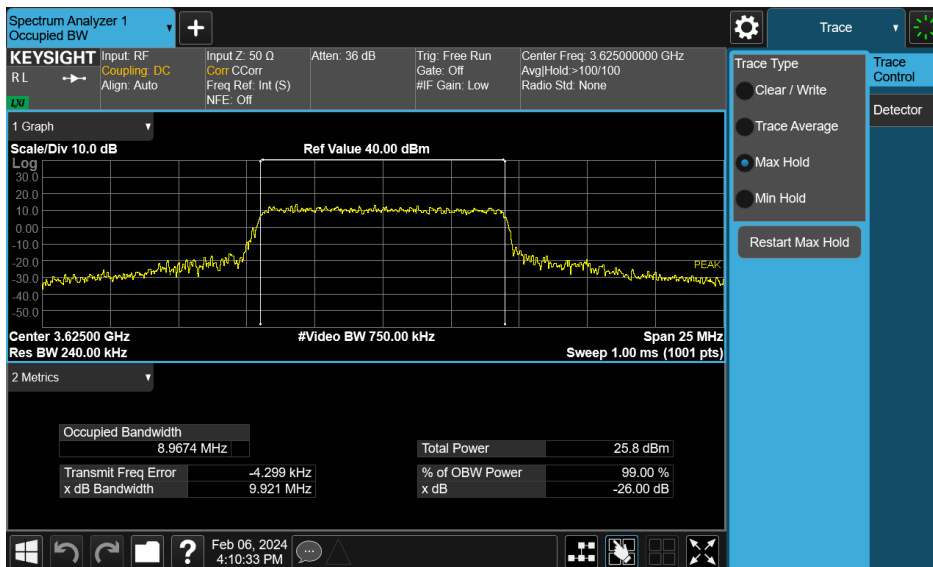
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 26 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 27 of 136 |

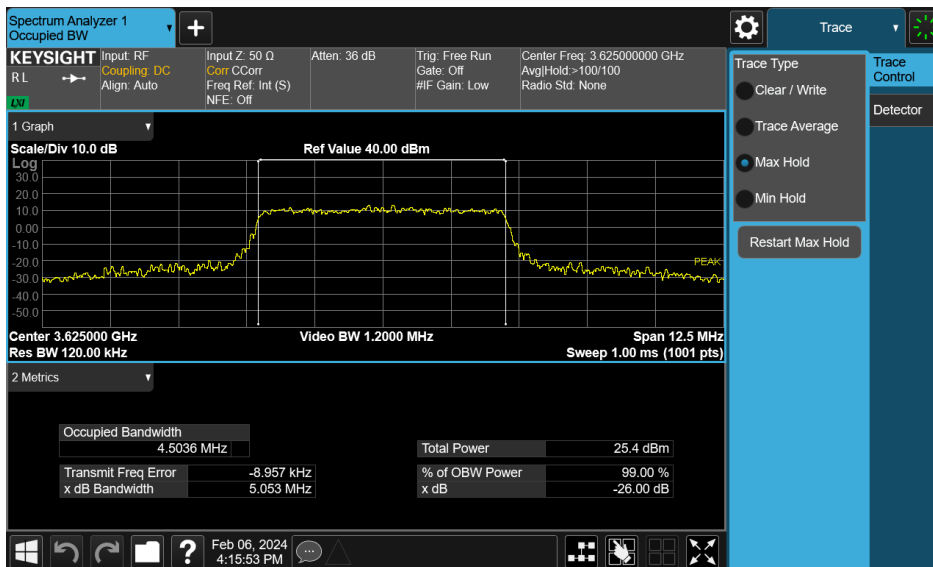
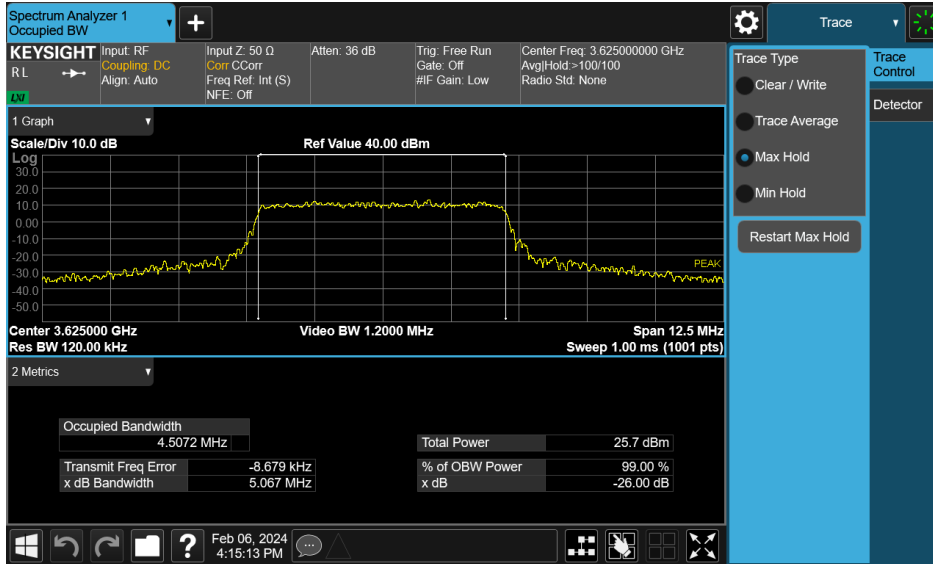


Plot 7-13. Occupied Bandwidth Plot (LTE Band 48 - 10MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (LTE Band 48 - 10MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 28 of 136 |



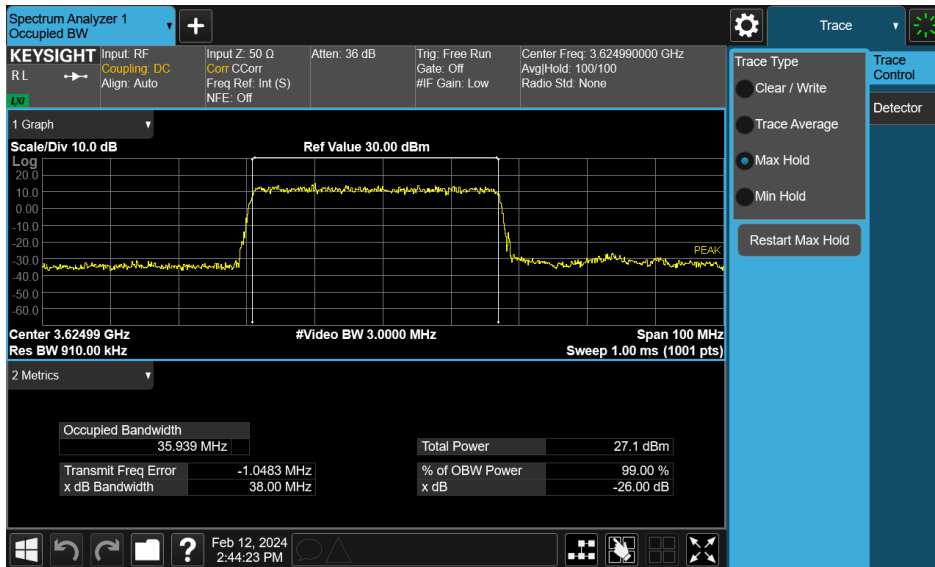
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 29 of 136 |

| Mode | Bandwidth | Modulation | OBW [MHz] |
|--------|--------------|--------------|-----------|
| NR n48 | 40MHz | $\pi/2$ BPSK | 35.94 |
| | | QPSK | 38.00 |
| | | 16QAM | 38.02 |
| | 30MHz | $\pi/2$ BPSK | 27.00 |
| | | QPSK | 27.99 |
| | | 16QAM | 27.99 |
| | 20MHz | $\pi/2$ BPSK | 17.96 |
| | | QPSK | 18.30 |
| | | 16QAM | 18.32 |
| | 15MHz | $\pi/2$ BPSK | 13.01 |
| | | QPSK | 13.65 |
| | | 16QAM | 13.63 |
| 10MHz | $\pi/2$ BPSK | 8.65 | |
| | QPSK | 8.63 | |
| | 16QAM | 8.68 | |

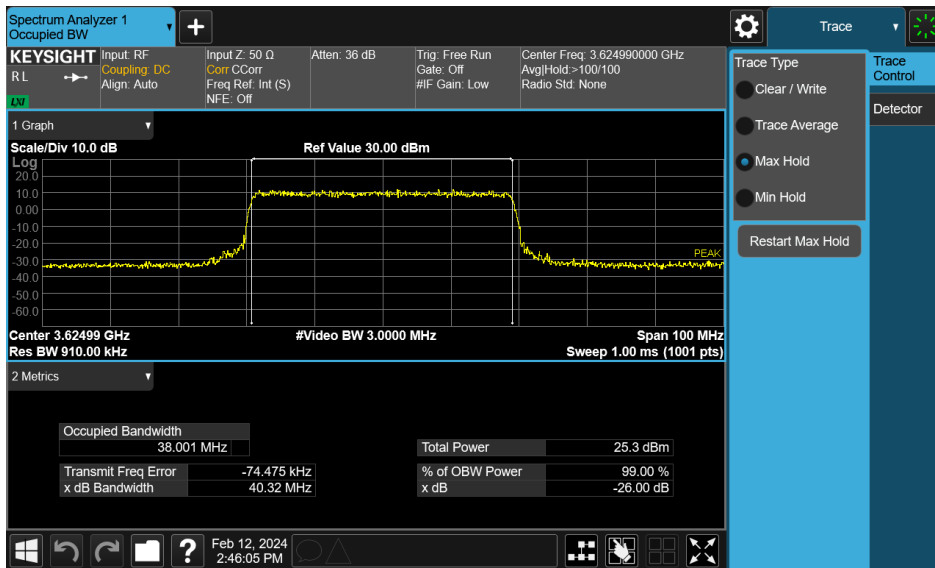
Table 7-12. Occupied Bandwidth Test Results (NR – Ant 2)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 30 of 136 |

NR Band n48- Ant 2

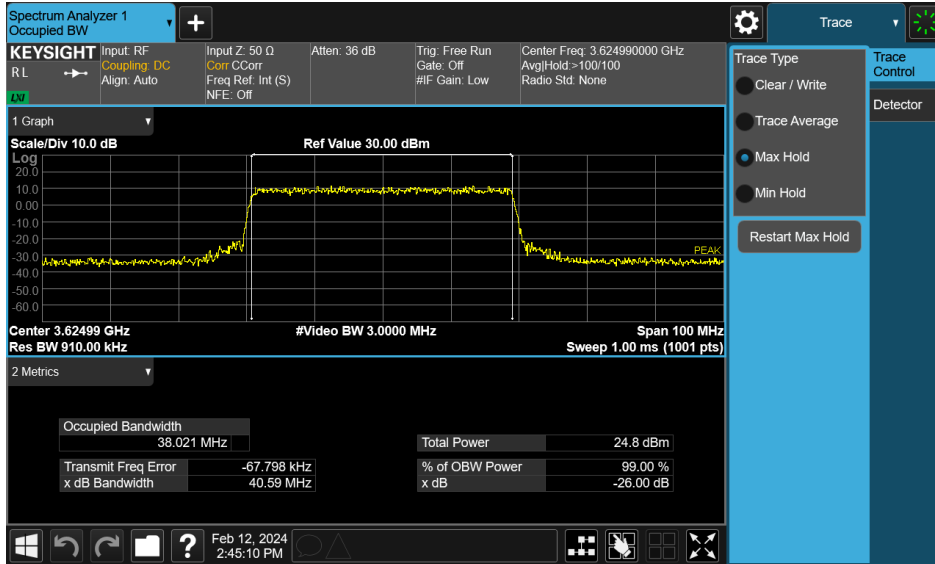


Plot 7-17. Occupied Bandwidth Plot (NR Band n48 - 40MHz $\pi/2$ BPSK - Full RB Configuration)

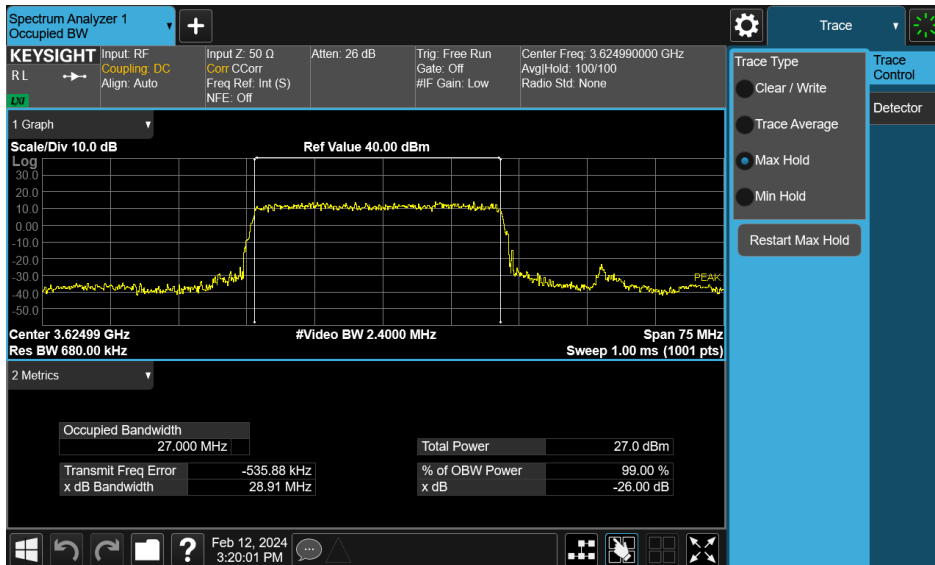


Plot 7-18. Occupied Bandwidth Plot (NR Band n48 - 40MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 31 of 136 |

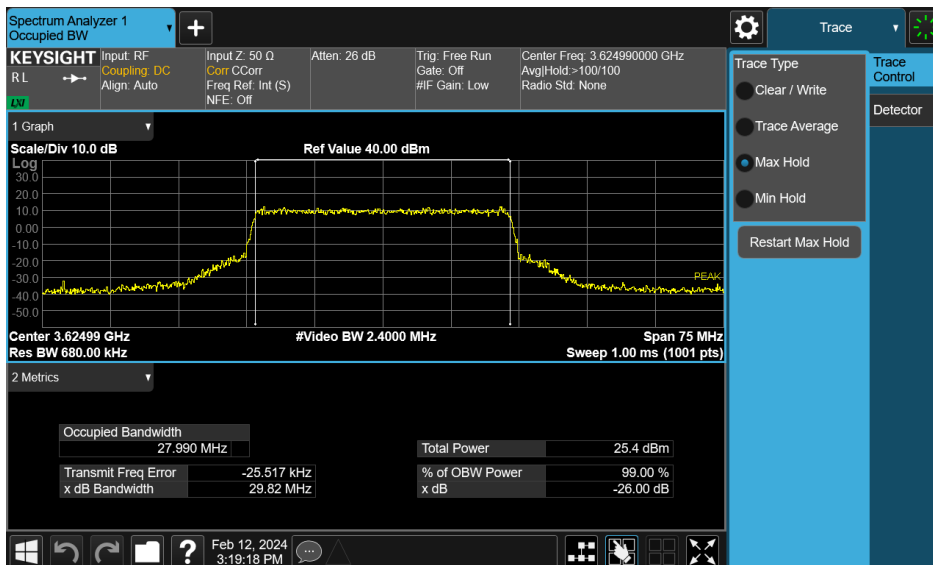
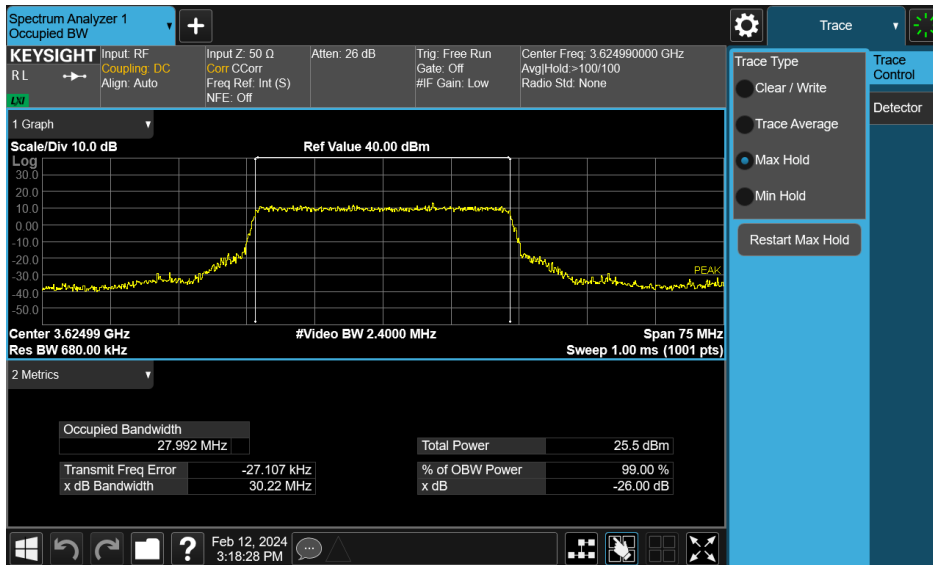


Plot 7-19. Occupied Bandwidth Plot (NR Band n48 - 40MHz 16-QAM - Full RB Configuration)

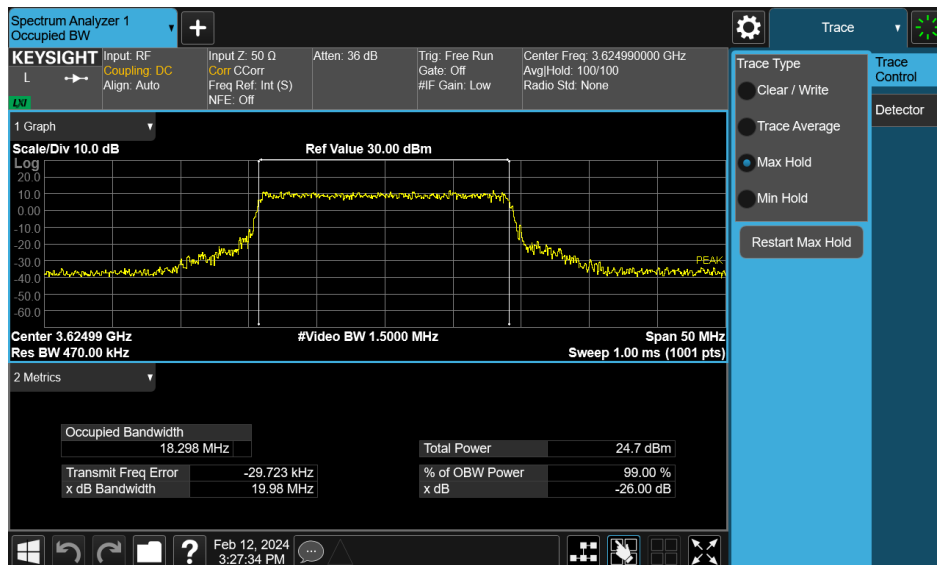
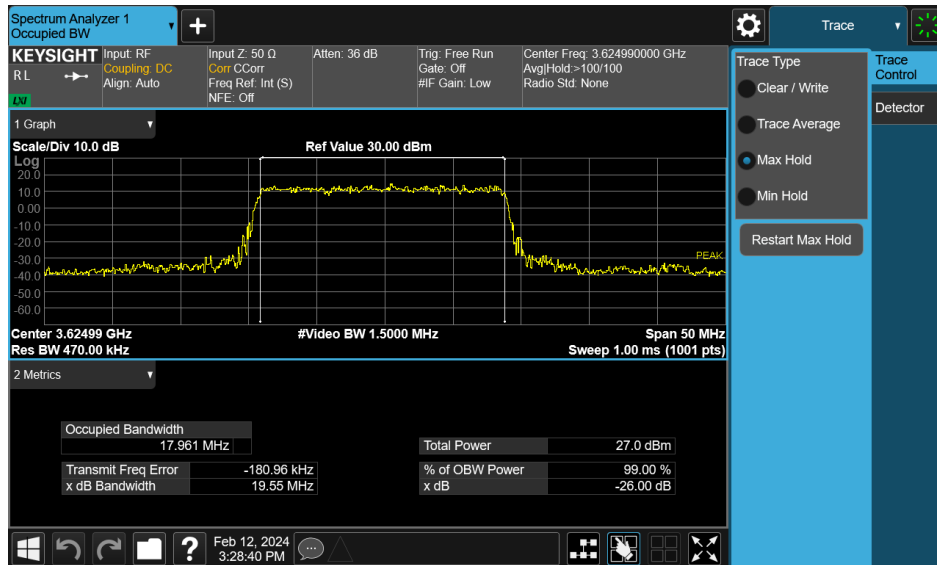


Plot 7-20. Occupied Bandwidth Plot (NR Band n48 - 30MHz $\pi/2$ BPSK - Full RB Configuration)

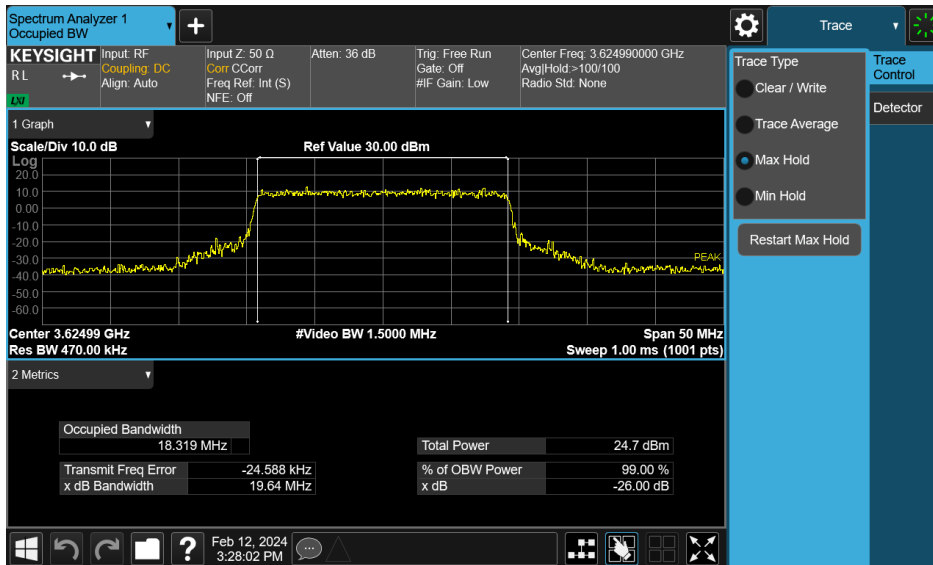
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 32 of 136 |



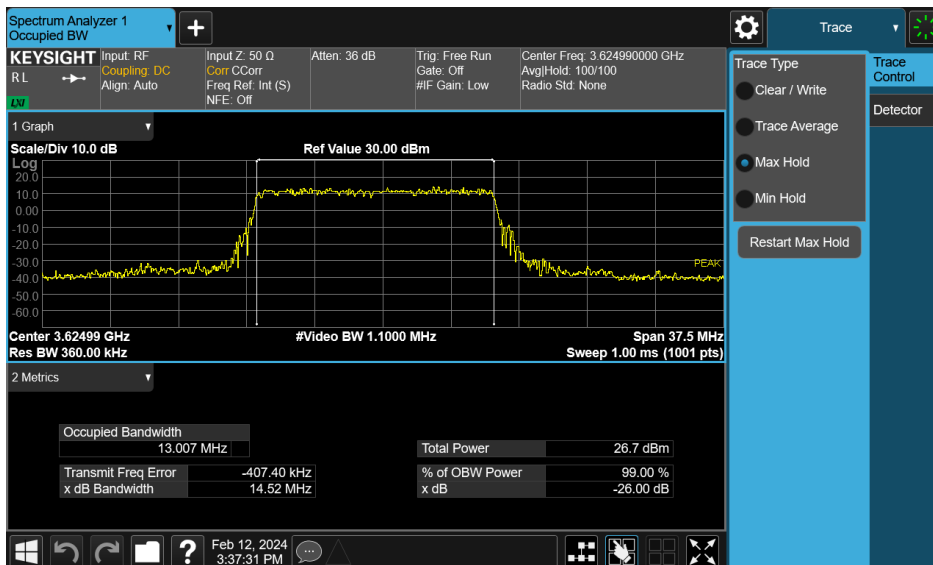
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 33 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 34 of 136 |

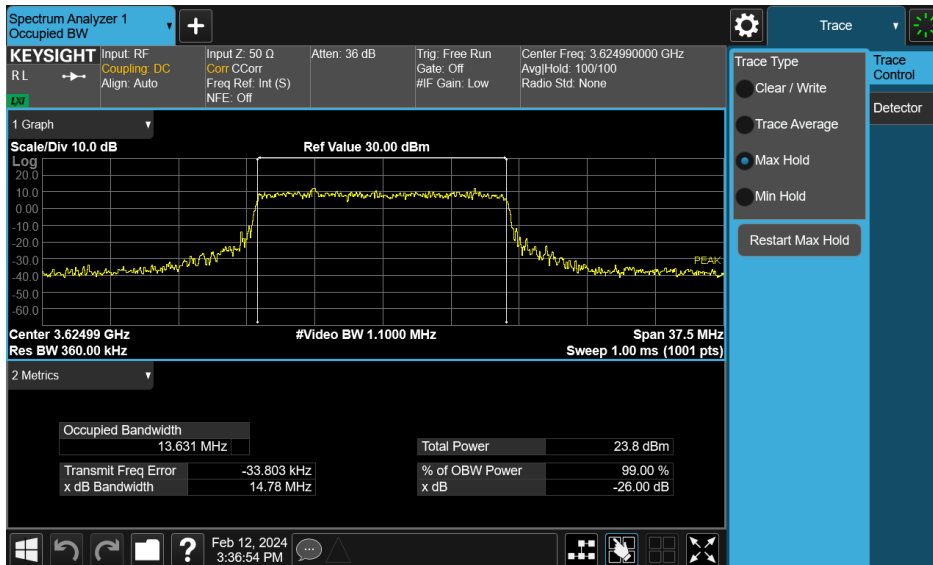
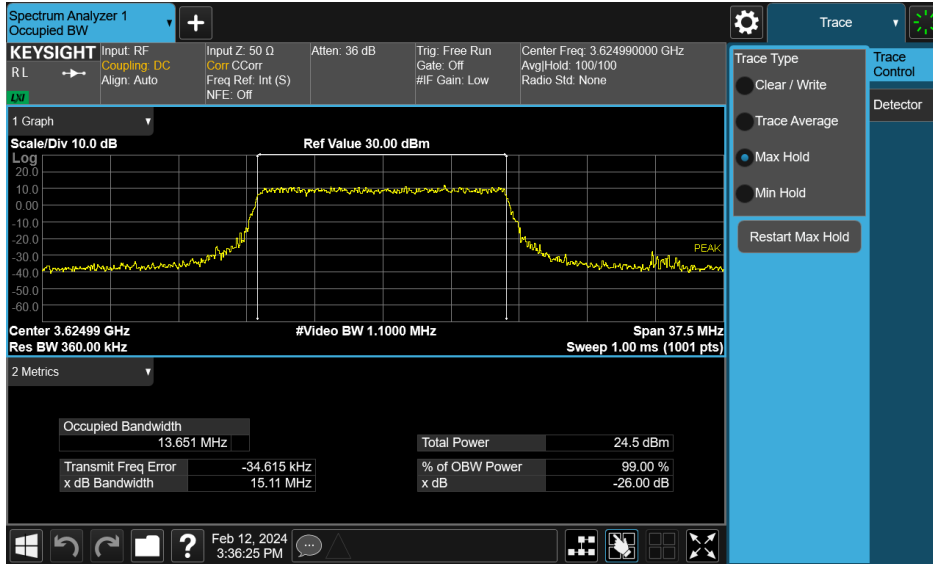


Plot 7-25. Occupied Bandwidth Plot (NR Band n48 - 20MHz 16-QAM - Full RB Configuration)

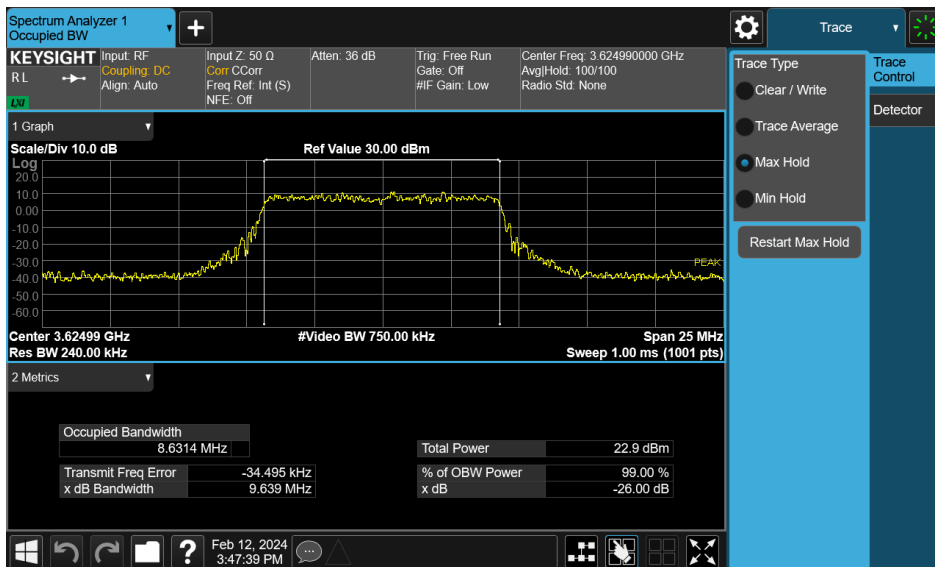
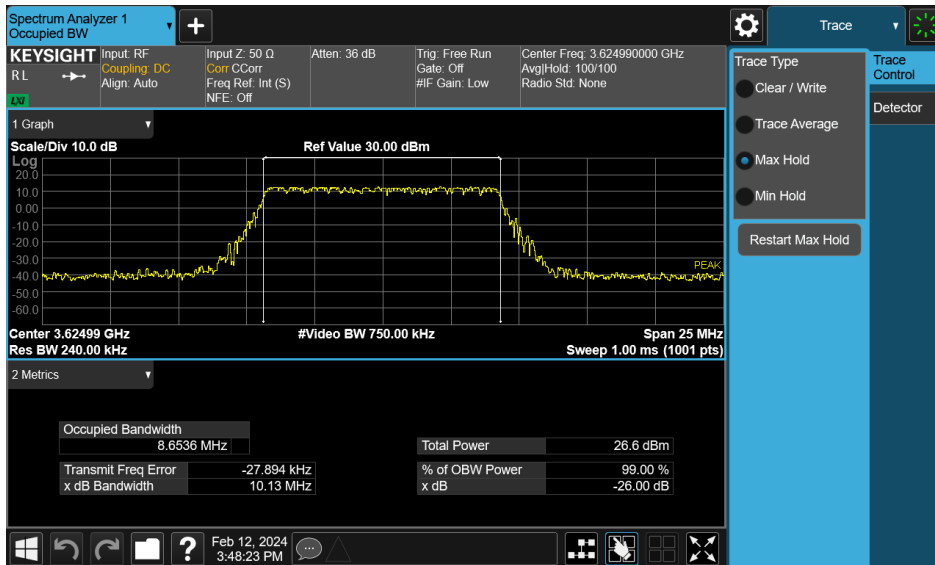


Plot 7-26. Occupied Bandwidth Plot (NR Band n48 - 15MHz $\pi/2$ BPSK - Full RB Configuration)

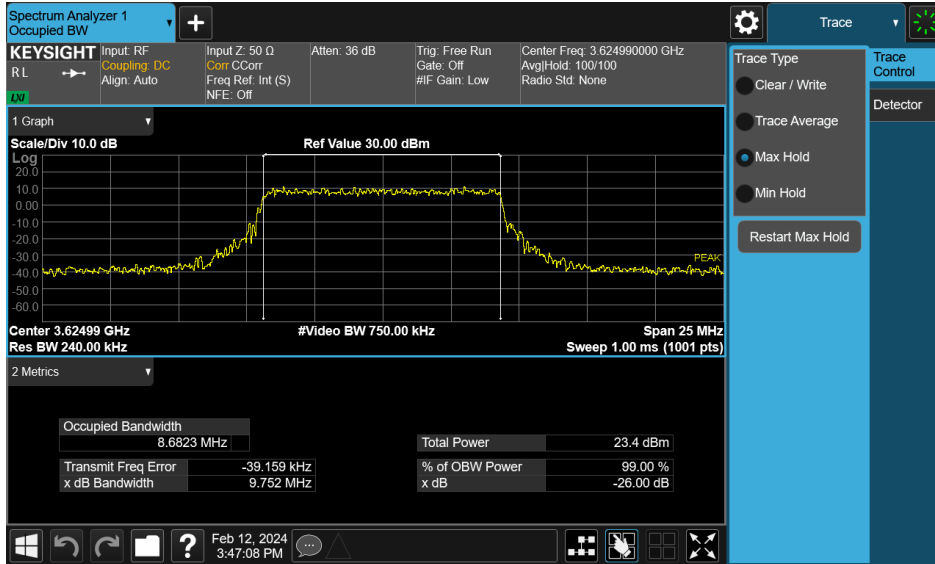
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 35 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 36 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 37 of 136 |



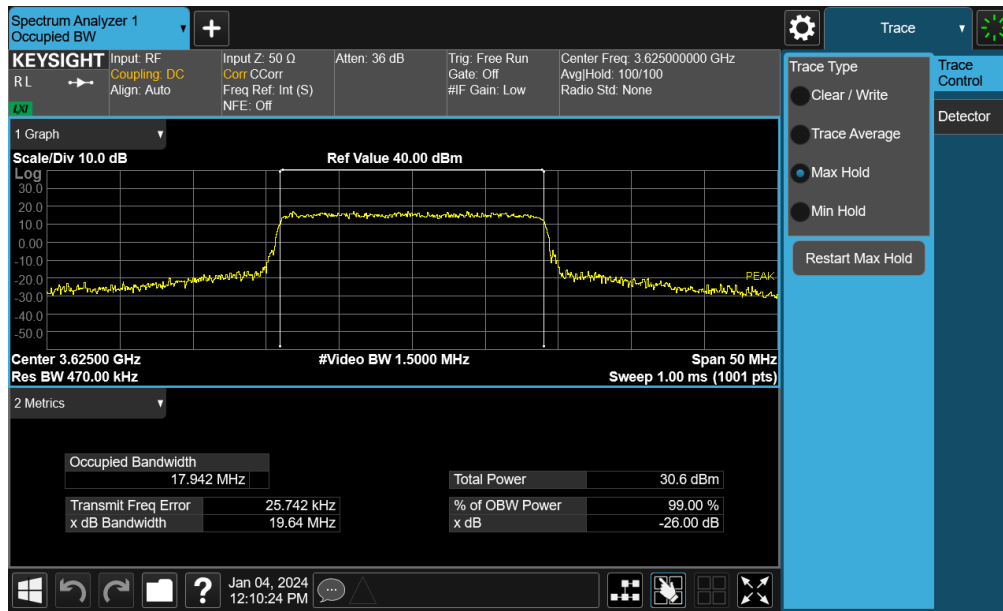
Plot 7-31. Occupied Bandwidth Plot (NR Band n48 - 10MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 38 of 136 |

LTE Band 48 – Ant 3

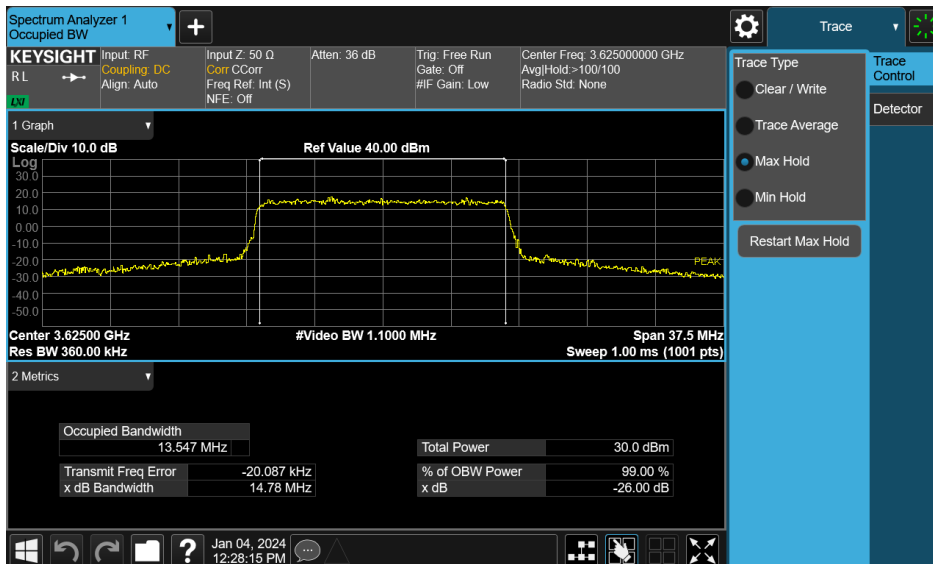
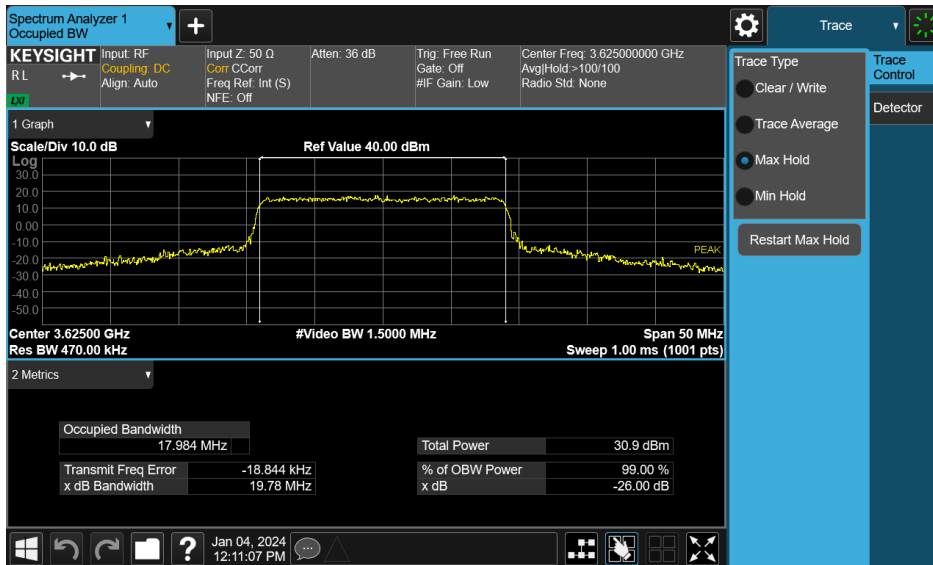
| Mode | Bandwidth | Modulation | OBW [MHz] |
|---------|-----------|------------|-----------|
| LTE B48 | 20MHz | QPSK | 17.94 |
| | | 16QAM | 17.98 |
| | 15MHz | QPSK | 13.55 |
| | | 16QAM | 13.48 |
| | 10MHz | QPSK | 9.03 |
| | | 16QAM | 9.00 |
| | 5MHz | QPSK | 4.53 |
| | | 16QAM | 4.51 |

Table 7-13. Occupied Bandwidth Test Results (LTE – Ant 3)



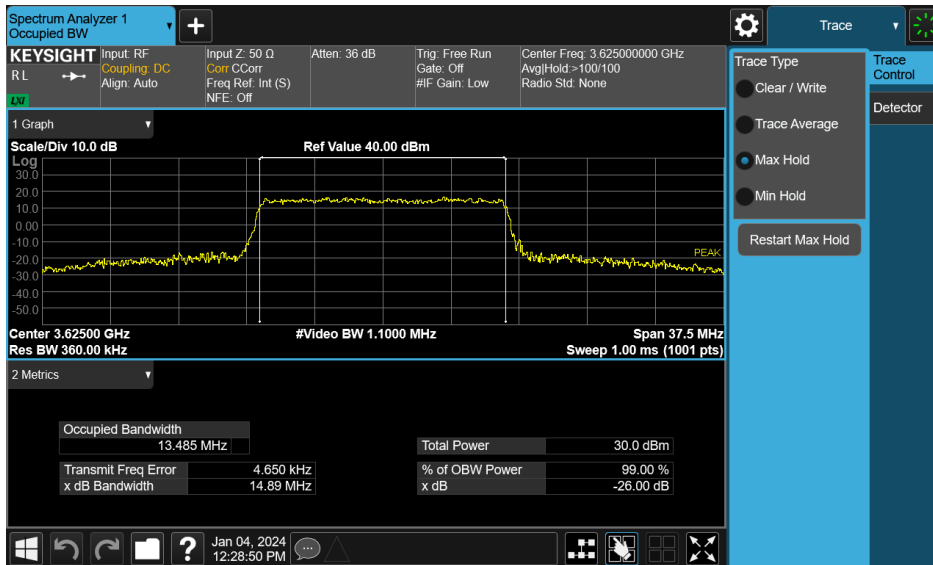
Plot 7-32. Occupied Bandwidth Plot (LTE Band 48 - 20MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 39 of 136 |

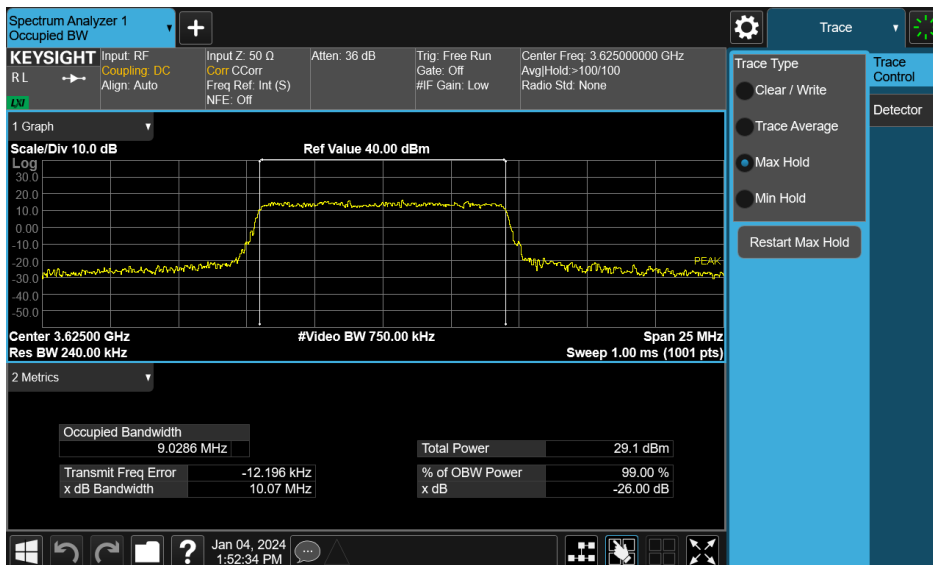


Plot 7-34. Occupied Bandwidth Plot (LTE Band 48 - 15MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 40 of 136 |

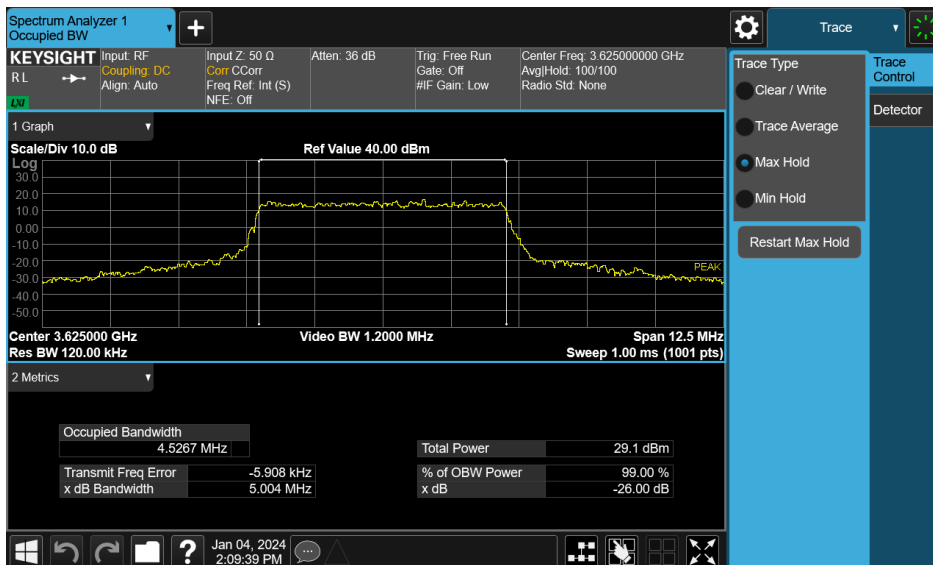
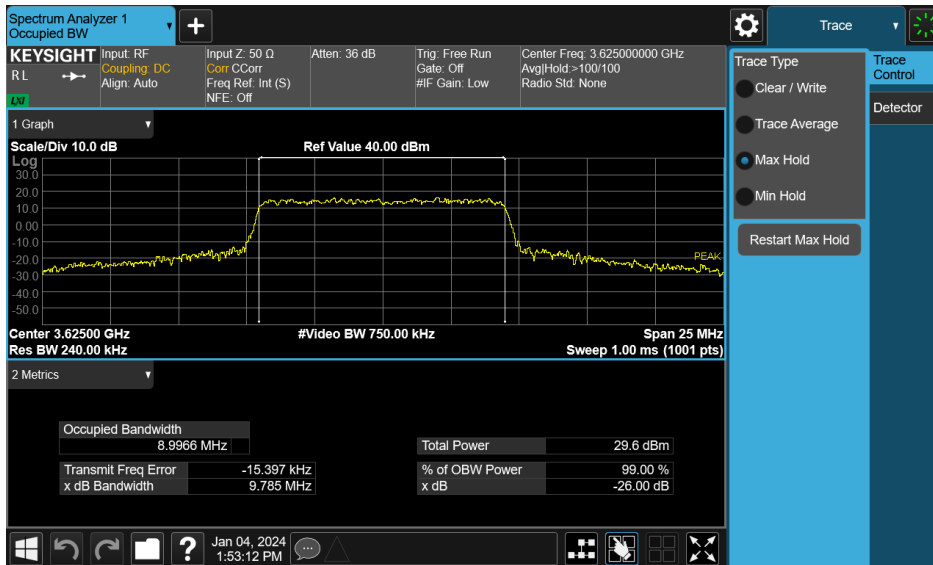


Plot 7-35. Occupied Bandwidth Plot (LTE Band 48 - 15MHz 16-QAM - Full RB Configuration)

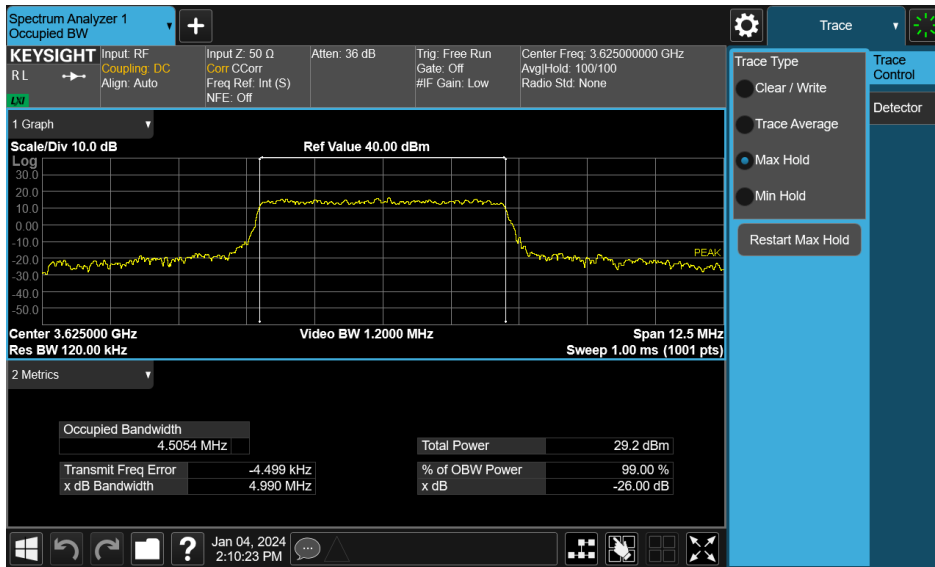


Plot 7-36. Occupied Bandwidth Plot (LTE Band 48 - 10MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 41 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 42 of 136 |



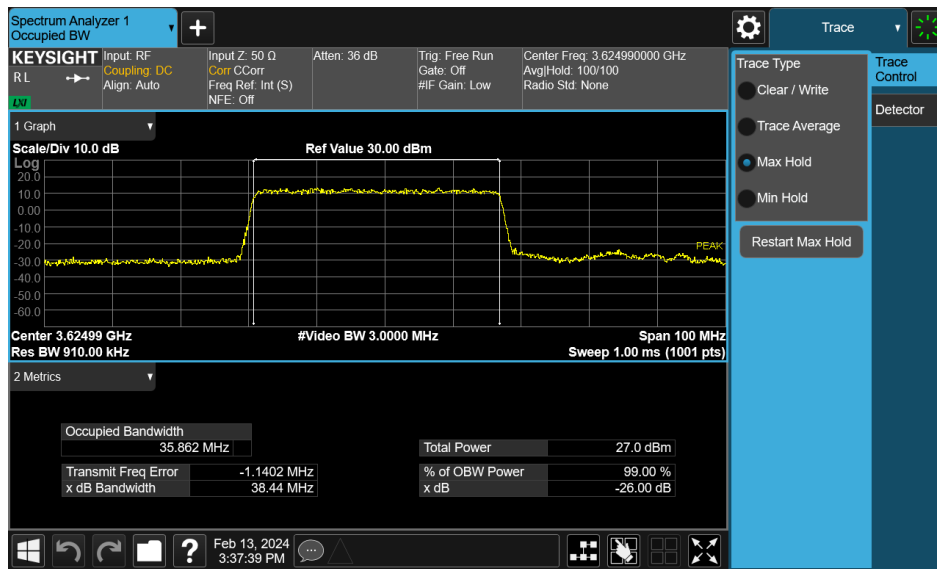
Plot 7-39. Occupied Bandwidth Plot (LTE Band 48 - 5MHz 16-QAM - Full RB Configuration)

| | | | |
|--|--|---|--|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 43 of 136 |

NR Band n48 - Ant 3

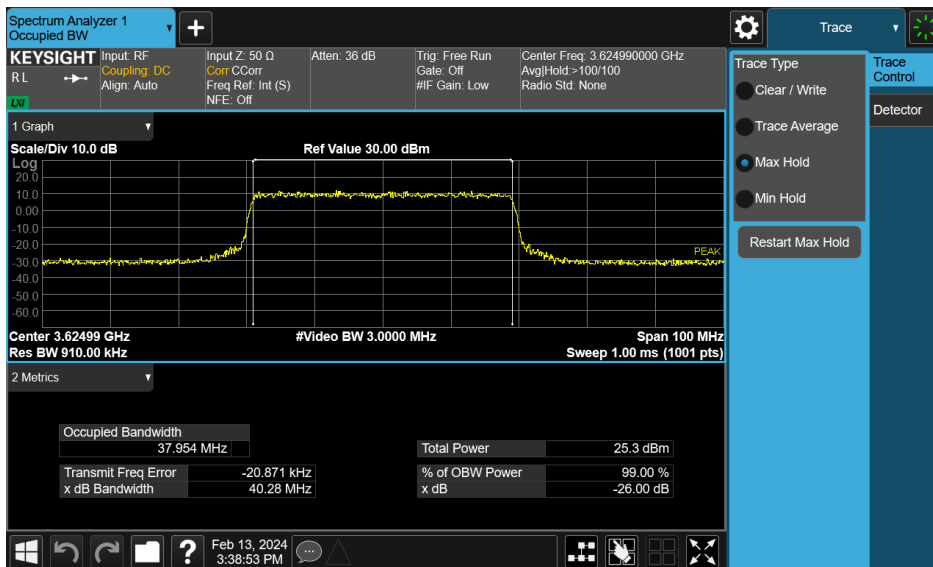
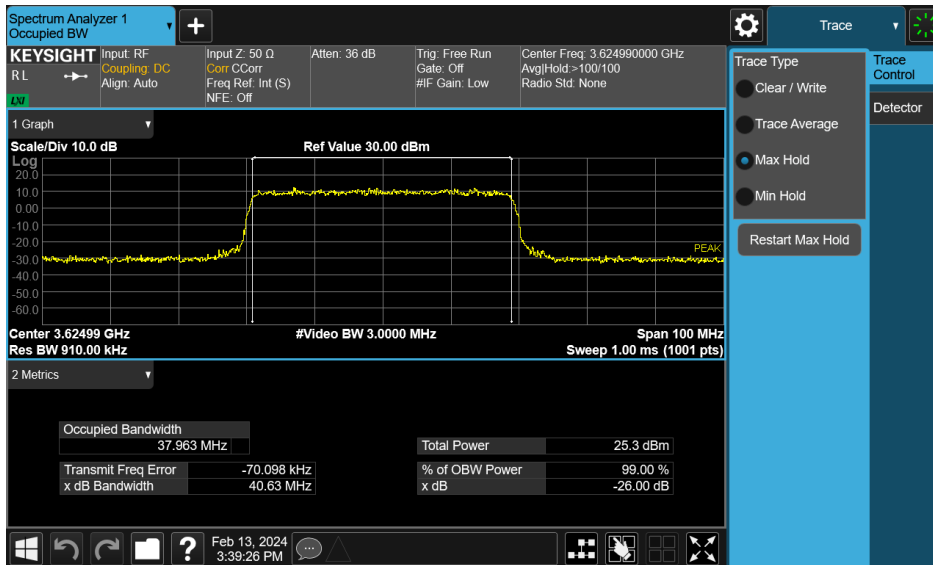
| Mode | Bandwidth | Modulation | OBW [MHz] |
|--------|--------------|--------------|-----------|
| NR n48 | 40MHz | $\pi/2$ BPSK | 35.86 |
| | | QPSK | 37.96 |
| | | 16QAM | 37.95 |
| | 30MHz | $\pi/2$ BPSK | 26.98 |
| | | QPSK | 28.00 |
| | | 16QAM | 27.98 |
| | 20MHz | $\pi/2$ BPSK | 18.01 |
| | | QPSK | 18.36 |
| | | 16QAM | 18.39 |
| | 15MHz | $\pi/2$ BPSK | 13.02 |
| | | QPSK | 13.68 |
| | | 16QAM | 13.65 |
| 10MHz | $\pi/2$ BPSK | 8.66 | |
| | QPSK | 8.70 | |
| | 16QAM | 8.70 | |

Table 7-14. Occupied Bandwidth Test Results (NR – Ant 3)

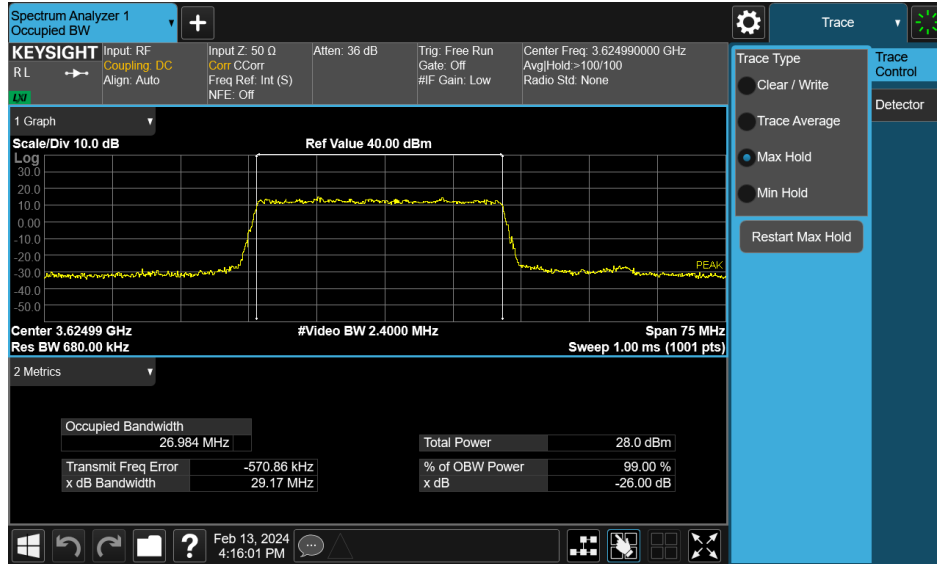


Plot 7-40. Occupied Bandwidth Plot (NR Band n48 - 40MHz $\pi/2$ BPSK - Full RB Configuration)

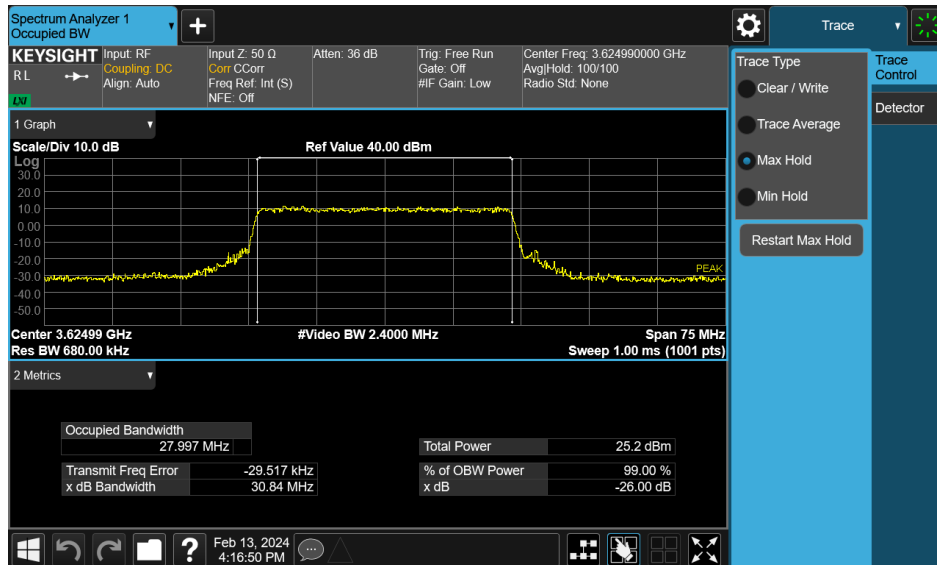
| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 44 of 136 |



| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 45 of 136 |

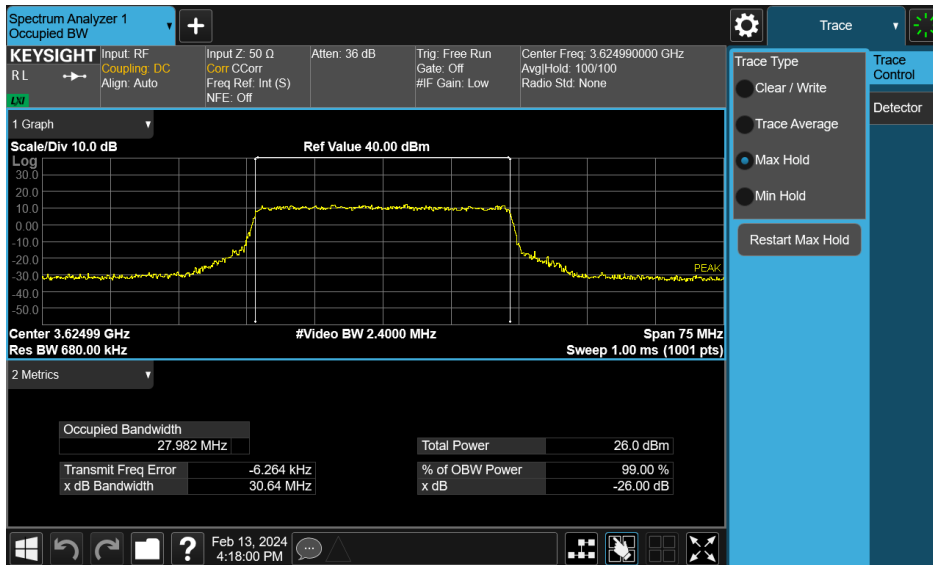


Plot 7-43. Occupied Bandwidth Plot (NR Band n48 - 30MHz $\pi/2$ BPSK - Full RB Configuration)

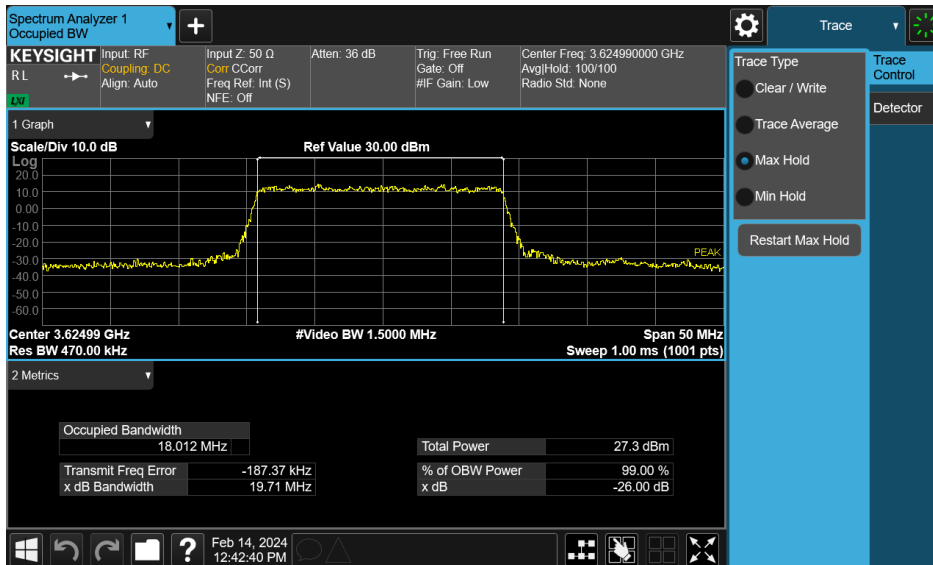


Plot 7-44. Occupied Bandwidth Plot (NR Band n48 - 30MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 46 of 136 |

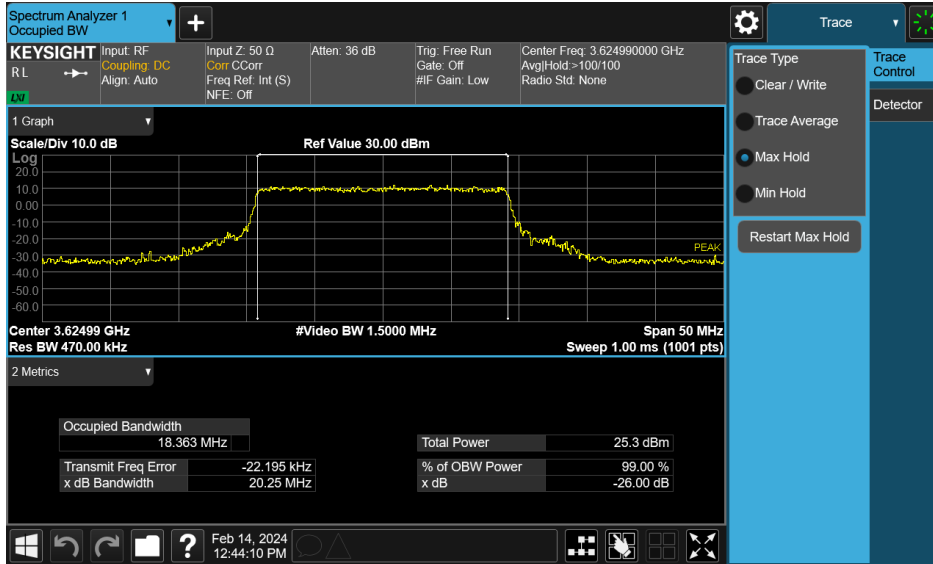


Plot 7-45. Occupied Bandwidth Plot (NR Band n48 - 30MHz 16-QAM - Full RB Configuration)

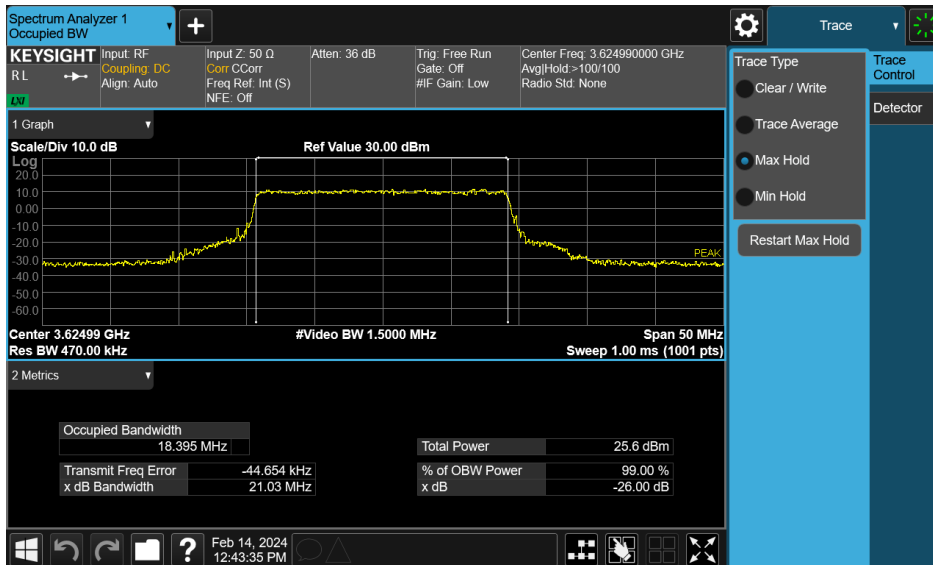


Plot 7-46. Occupied Bandwidth Plot (NR Band n48 - 20MHz $\pi/2$ BPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 47 of 136 |

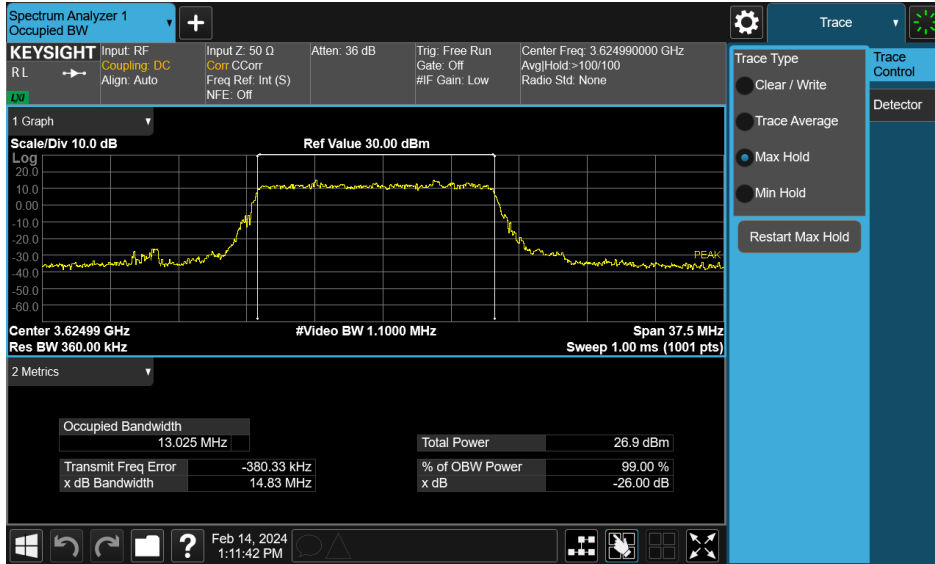


Plot 7-47. Occupied Bandwidth Plot (NR Band n48 - 20MHz QPSK - Full RB Configuration)

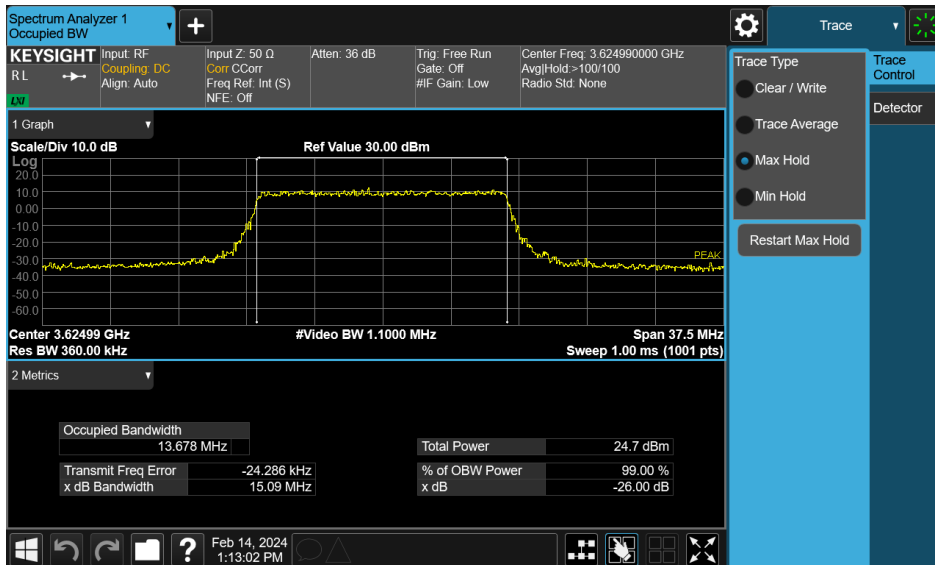


Plot 7-48. Occupied Bandwidth Plot (NR Band n48 - 20MHz 16-QAM - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
| Test Report S/N: 1M2312040120-14.C3K | Test Dates: 12/1/2023 - 03/13/2024 | EUT Type: Portable Computing Device | Page 48 of 136 |

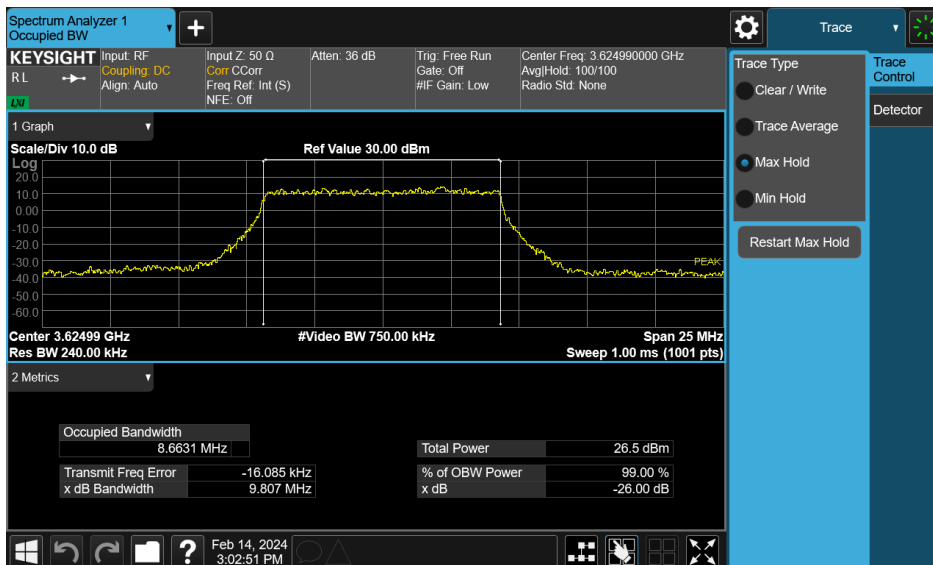
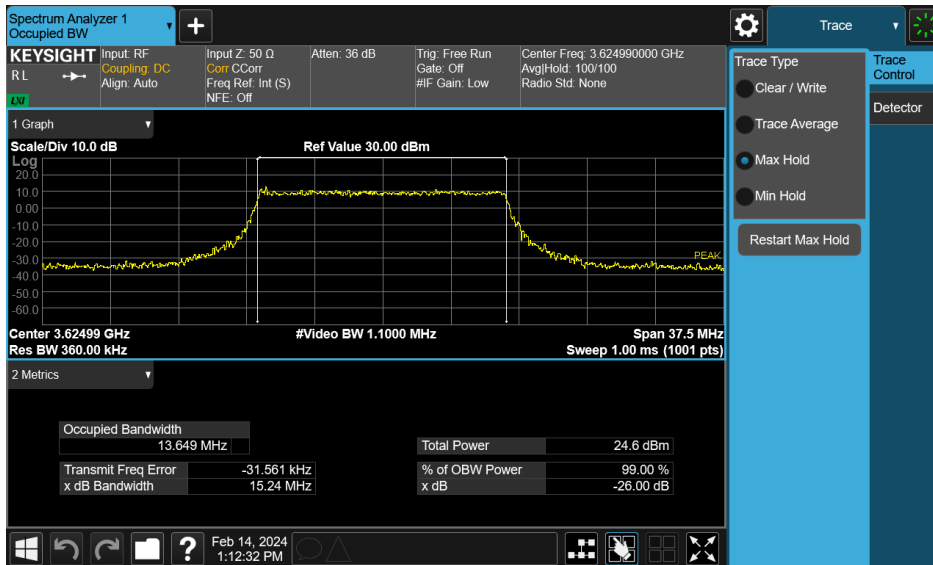


Plot 7-49. Occupied Bandwidth Plot (NR Band n48 - 15MHz $\pi/2$ BPSK - Full RB Configuration)

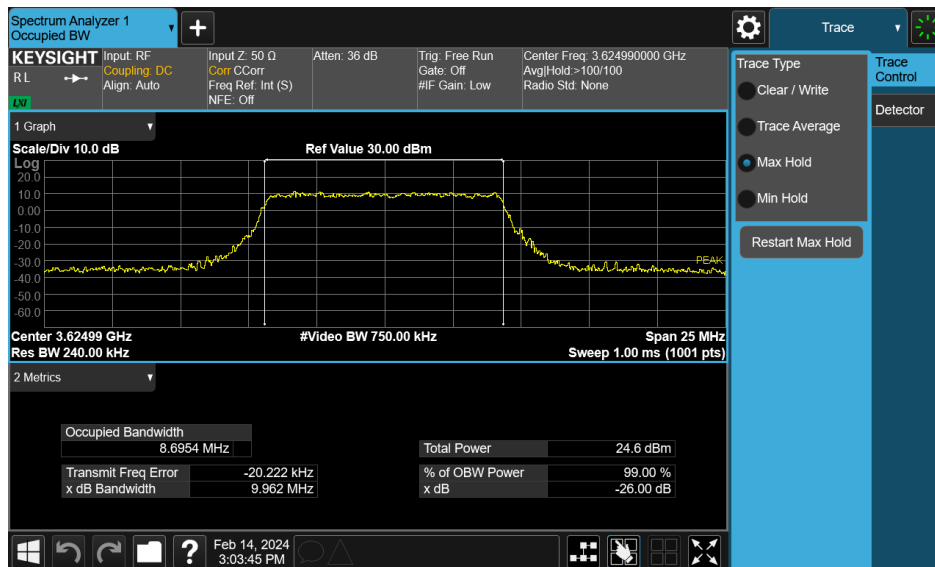
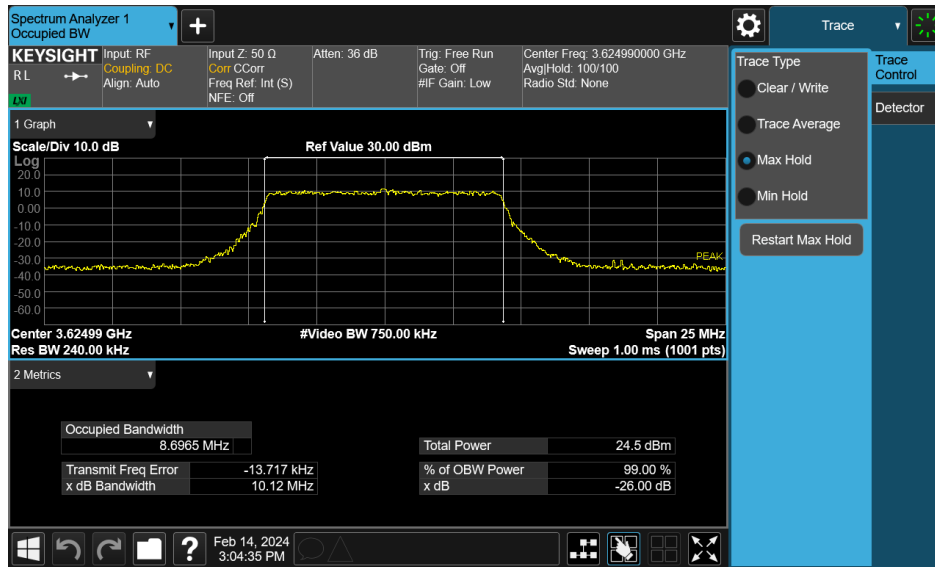


Plot 7-50. Occupied Bandwidth Plot (NR Band n48 - 15MHz QPSK - Full RB Configuration)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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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 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.

The conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.

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 at least 10 * the fundamental frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = Max Hold
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. 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.

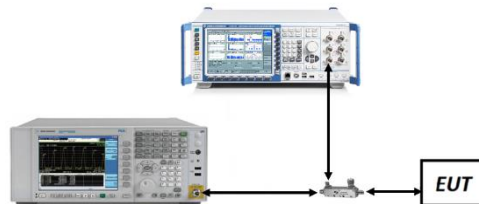


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

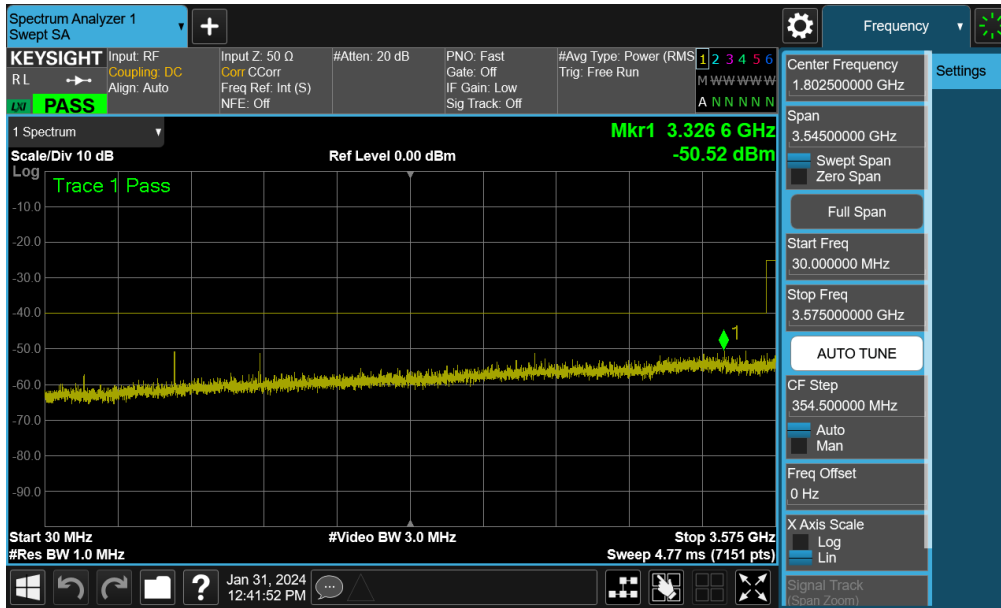
1. Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst-case configuration results are reported in this section.
3. Since standalone targets of Ant 2 and Ant 3 have higher targets than UL-MIMO n48 data is not included in the report. Also, UL-MIMO n48 conducted spurious emissions has been checked and was found not to be the worst case.

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ULCA LTE LB48

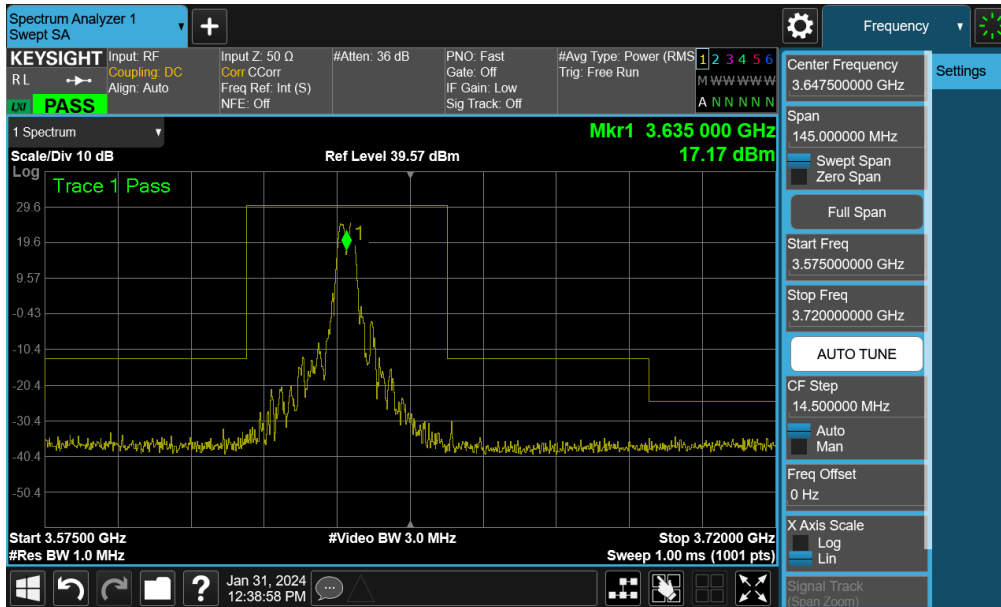
| Mode | Bandwidth | Channel | Range [MHz] | Level [dBm] | Limit [dBm] | Margin [dB] |
|------------------------|-----------------|---------|-----------------|-------------|-------------|-------------|
| LTE Band 48 (2CC ULCA) | 40MHz | Low | 30.0 - 3510.0 | -49.38 | -40 | -9.38 |
| | | Low | 3510.0-3630.0 | 17.39 | - | - |
| | | Low | 3610.0-15000.0 | -46.82 | -40 | -6.82 |
| | | Low | 15000.0-27000.0 | -50.96 | -40 | -10.96 |
| | | Low | 27000.0-37000.0 | -46.19 | -40 | -6.19 |
| | | Mid | 30.0 - 3575.0 | -50.52 | -40 | -10.52 |
| | | Mid | 3575.0-3695.0 | 17.17 | - | - |
| | | Mid | 3675.0-15000.0 | -44.70 | -40 | -4.70 |
| | | Mid | 15000.0-27000.0 | -51.15 | -40 | -11.15 |
| | | Mid | 27000.0-39000.0 | -46.08 | -40 | -6.08 |
| | | High | 30.0 - 3640.0 | -51.22 | -40 | -11.22 |
| | | High | 3620.0-3740.0 | 17.11 | - | - |
| | | High | 3740.0-15000.0 | -44.73 | -40 | -4.73 |
| | | High | 15000.0-27000.0 | -52.00 | -40 | -12.00 |
| High | 27000.0-39000.0 | -46.32 | -40 | -6.32 | | |

Table 7-15. Conducted Spurious Emission Results (ULCA LB48 – Ant 2)

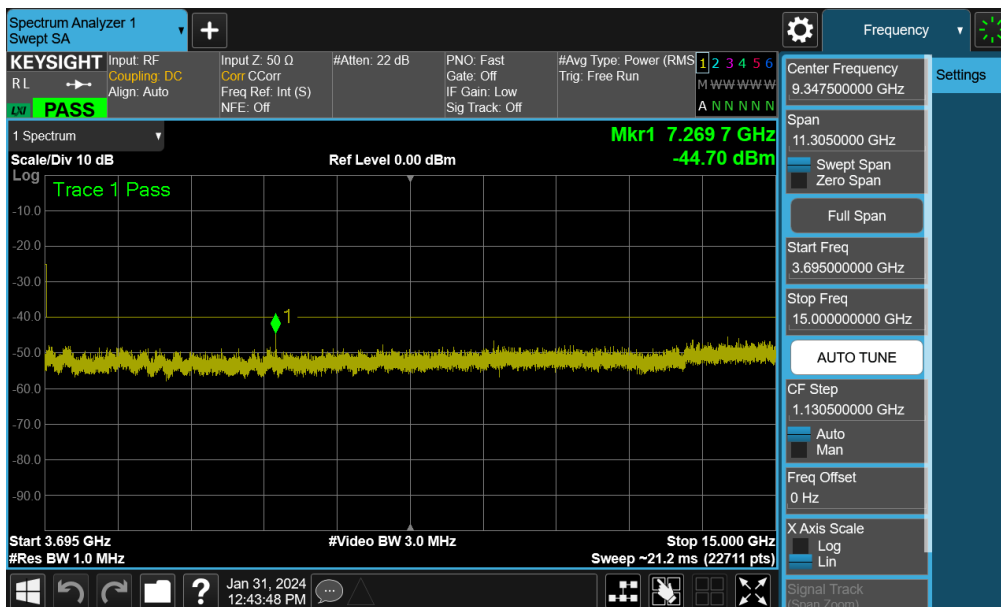


Plot 7-55. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Mid Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
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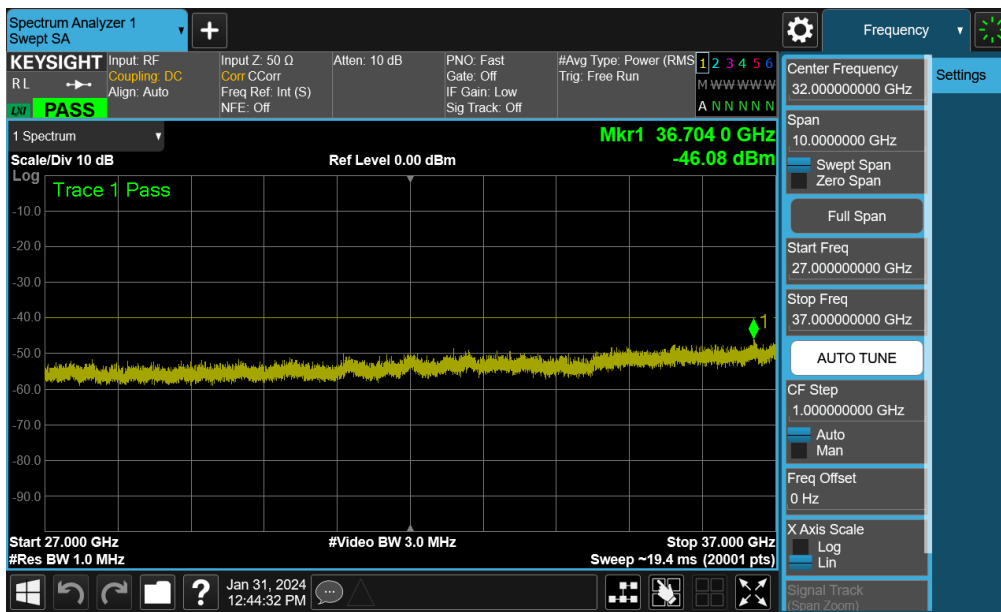
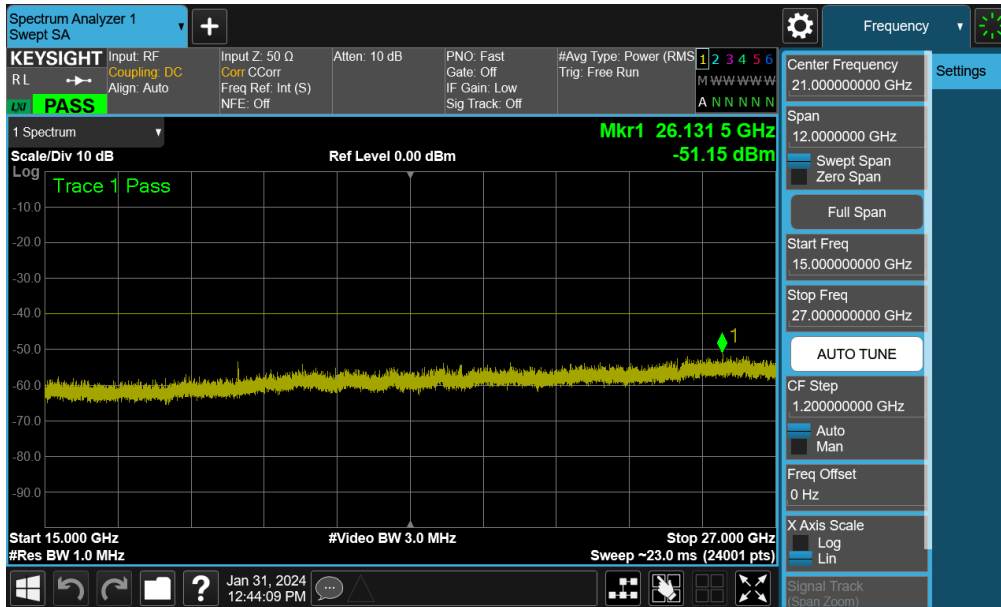


Plot 7-56. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Mid Channel)



Plot 7-57. Conducted Spurious Plot (ULCA LB48 - 20+20MHz QPSK - Mid Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
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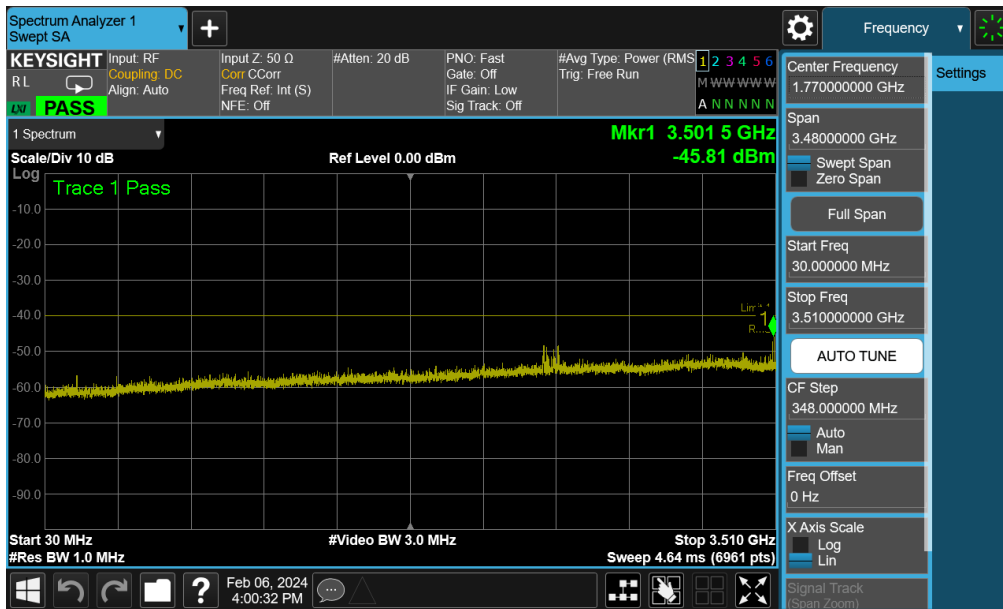


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LTE B48 – Ant 2

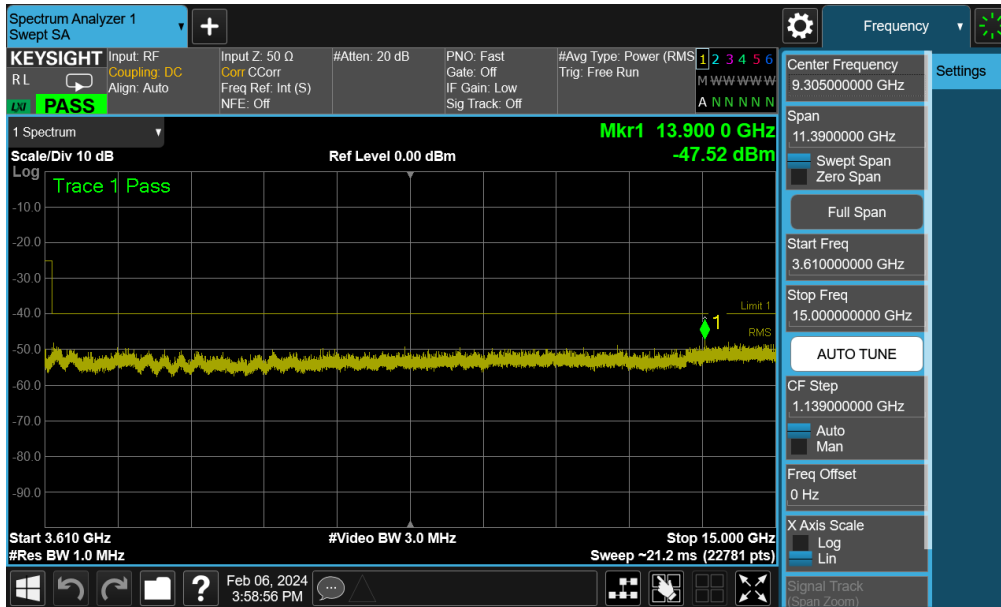
| Mode | Bandwidth | Channel | Range [MHz] | Level [dBm] | Limit [dBm] | Margin [dB] |
|-------------|-----------|---------|-----------------|-------------|-------------|-------------|
| LTE Band 48 | 20MHz | Low | 30.0 - 3510.0 | -45.81 | -40 | -5.81 |
| | | Low | 3610.0-15000.0 | -47.52 | -40 | -7.52 |
| | | Low | 15000.0-27000.0 | -51.78 | -40 | -11.78 |
| | | Low | 27000.0-37000.0 | -50.52 | -40 | -10.52 |
| | | Mid | 30.0 - 3575.0 | -46.07 | -40 | -6.07 |
| | | Mid | 3675.0-15000.0 | -46.94 | -40 | -6.94 |
| | | Mid | 15000.0-27000.0 | -51.61 | -40 | -11.61 |
| | | Mid | 27000.0-39000.0 | -47.03 | -40 | -7.03 |
| | | High | 30.0 - 3640.0 | -48.15 | -40 | -8.15 |
| | | High | 3740.0-15000.0 | -46.12 | -40 | -6.12 |
| | | High | 15000.0-27000.0 | -50.91 | -40 | -10.91 |
| | | High | 27000.0-39000.0 | -46.32 | -40 | -6.32 |

Table 7-16. Conducted Spurious Emission Results (LTE B48 – Ant 2)

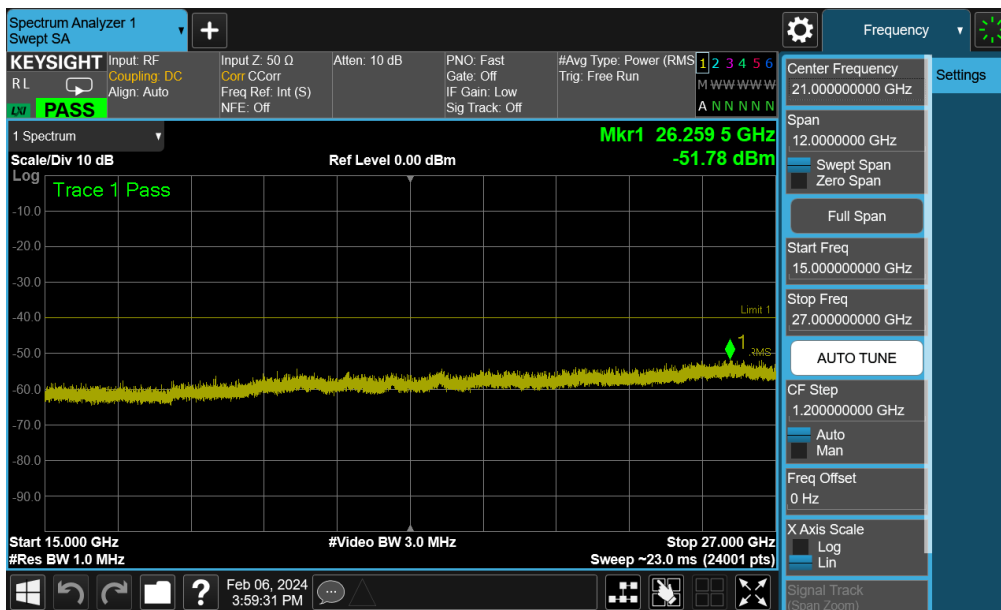


Plot 7-60. Conducted Spurious Plot (LTE Band 48 – 20MHz QPSK – Low Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
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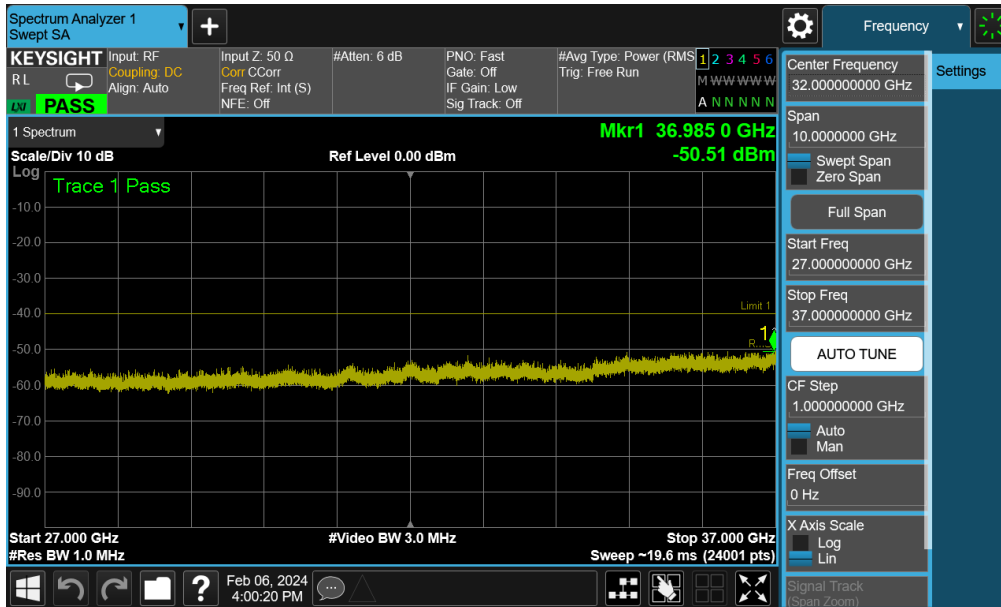


Plot 7-61. Conducted Spurious Plot (LTE Band 48 – 20MHz QPSK – Low Channel)



Plot 7-62. Conducted Spurious Plot (LTE Band 48 – 20MHz QPSK – Low Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
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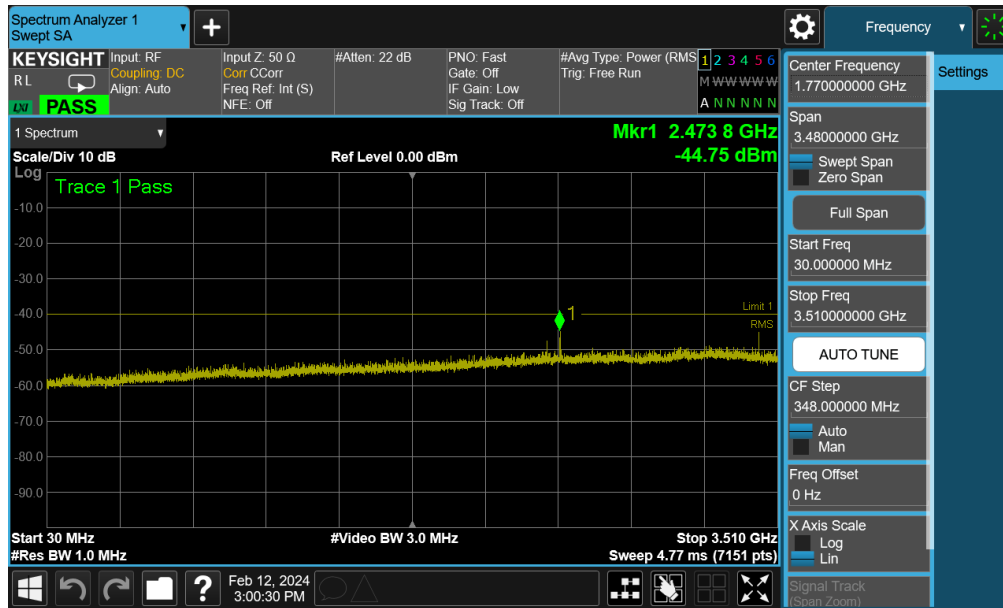
Plot 7-63. Conducted Spurious Plot (LTE Band 48 – 20MHz QPSK – Low Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
| FCC ID: C3K2077 | PART 96 MEASUREMENT REPORT | | Approved by: Technical Manager |
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NR Band n48 – Ant 2

| Mode | Bandwidth | Channel | Range [MHz] | Level [dBm] | Limit [dBm] | Margin [dB] |
|-------------|-----------|---------|-----------------|-------------|-------------|-------------|
| NR Band n48 | 40MHz | Low | 30.0 - 3510.0 | -49.20 | -40 | -9.20 |
| | | Low | 3610.0-15000.0 | -45.82 | -40 | -5.82 |
| | | Low | 15000.0-27000.0 | -50.19 | -40 | -10.19 |
| | | Low | 27000.0-37000.0 | -49.94 | -40 | -9.94 |
| | | Mid | 30.0 - 3575.0 | -44.75 | -40 | -4.75 |
| | | Mid | 3675.0-15000.0 | -45.14 | -40 | -5.14 |
| | | Mid | 15000.0-27000.0 | -51.47 | -40 | -11.47 |
| | | Mid | 27000.0-39000.0 | -46.36 | -40 | -6.36 |
| | | High | 30.0 - 3640.0 | -46.28 | -40 | -6.28 |
| | | High | 3740.0-15000.0 | -45.71 | -40 | -5.71 |
| | | High | 15000.0-27000.0 | -51.76 | -40 | -11.76 |
| | | High | 27000.0-39000.0 | -46.69 | -40 | -6.69 |

Table 7-17. Conducted Spurious Emission Results (NR Band n48 – Ant 2)



Plot 7-64. Conducted Spurious Plot (NR Band n48 - 40MHz QPSK - Mid Channel)

| | | | |
|---|---------------------------------------|--|-----------------------------------|
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