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# MEASUREMENT REPORT
## FCC Part 30 5G mmWave

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

**Date of Testing (Orignal):**
4/17/2023 – 5/10/2023
**Test Report Issue Date:**
6/29/2023
**Test Site/Location:**
Element Lab., Columbia, MD, USA
**Test Report Serial No.:**
1M2303100026-09A.A3L

| | |
|---|---|
| **FCC ID:** | **A3LSMF731U** |
| **APPLICANT:** | **Samsung Electronics Co., Ltd.** |

| | |
|---|---|
| **Application Type:** | Class II Permissive Change* |
| **Model:** | SM-F731U |
| **Additional Model(s):** | SM-F731U1 |
| **EUT Type:** | Portable Handset |
| **FCC Classification:** | Part 30 Mobile Transmitter (5GM) |
| **FCC Rule Part(s):** | 30 |
| **Test Procedure(s):** | ANSI C63.26-2015, KDB 971168 D01 v03r01, KDB 842590 D01 v01r02 |

*Note: The change, as described in the change description document for this device, has no impact on the Part 30 RF testing for this device and therefore the original test report remains applicable for this C2PC.

The test results included herein are from the original filing and are included here as the submitted exhibit for Part 30 RF compliance for the C2PC.

**RJ Ortanez**
**Executive Vice President**

ACCREDITED
CERT #2041.01

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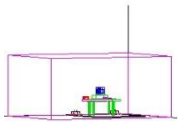
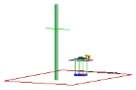


# MEASUREMENT REPORT
## FCC Part 30



| Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Max Power [W] | Max Power [dBm] | |
| NR-n258-R1 | 50 | 24275 - 24425 | 1 | QPSK | SISO | 0.581 | 27.64 | 46M2G7D |
| | | | | QPSK | 2Tx | 0.703 | 28.47 | 46M2G7D |
| | | | | π/2 BPSK | 2Tx | 0.733 | 28.65 | 46M1G7D |
| | | | | 16QAM | 2Tx | 0.416 | 26.19 | 46M2W7D |
| | | | | 64QAM | 2Tx | 0.229 | 23.59 | 46M3W7D |
| | 100 | 24300 - 24400 | 1 | QPSK | SISO | 0.628 | 27.98 | 95M5G7D |
| | | | | QPSK | 2Tx | 0.711 | 28.52 | 95M5G7D |
| | | | | π/2 BPSK | 2Tx | 0.714 | 28.54 | 92M1G7D |
| | | | | 16QAM | 2Tx | 0.489 | 26.89 | 95M2W7D |
| | | | | 64QAM | 2Tx | 0.224 | 23.50 | 95M5W7D |
| | | | 2 | QPSK | 2Tx | 0.212 | 23.27 | 195MG7D |
| | | | | π/2 BPSK | 2Tx | 0.212 | 23.27 | 194MG7D |
| | | | | 16QAM | 2Tx | 0.134 | 21.28 | 195MW7D |
| | | | | 64QAM | 2Tx | 0.087 | 19.38 | 196MW7D |

**EUT Overview (Band n258-R1)**

| Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Max Power [W] | Max Power [dBm] | |
| NR-n258-R2 | 50 | 24775 - 25225 | 1 | QPSK | SISO | 0.676 | 28.30 | 46M0G7D |
| | | | | QPSK | 2Tx | 0.849 | 29.29 | 46M0G7D |
| | | | | π/2 BPSK | 2Tx | 0.857 | 29.33 | 45M7G7D |
| | | | | 16QAM | 2Tx | 0.582 | 27.65 | 45M9W7D |
| | | | | 64QAM | 2Tx | 0.270 | 24.31 | 46M0W7D |
| | 100 | 24800 - 25200 | 1 | QPSK | SISO | 0.661 | 28.20 | 95M4G7D |
| | | | | QPSK | 2Tx | 0.764 | 28.83 | 95M4G7D |
| | | | | π/2 BPSK | 2Tx | 0.753 | 28.77 | 91M9G7D |
| | | | | 16QAM | 2Tx | 0.470 | 26.72 | 95M4W7D |
| | | | | 64QAM | 2Tx | 0.233 | 23.68 | 96M0W7D |
| | | | 2 | QPSK | 2Tx | 0.213 | 23.29 | 194MG7D |
| | | | | π/2 BPSK | 2Tx | 0.209 | 23.20 | 194MG7D |
| | | | | 16QAM | 2Tx | 0.167 | 22.23 | 194MW7D |
| | | | | 64QAM | 2Tx | 0.128 | 21.06 | 194MW7D |
| | | | 3 | QPSK | 2Tx | 0.204 | 23.10 | 293MG7D |
| | | | | π/2 BPSK | 2Tx | 0.202 | 23.05 | 291MG7D |
| | | | | 16QAM | 2Tx | 0.159 | 22.01 | 293MW7D |
| | | | | 64QAM | 2Tx | 0.125 | 20.98 | 294MW7D |

**EUT Overview (Band n258-R2)**

| Antenna | Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Max Power [W] | Max Power [dBm] | |
| | NR-n261 | 50 | 27525 - 28325 | 1 | QPSK | SISO | 0.714 | 28.54 | 45M7G7D |
| | | | | | QPSK | 2Tx | 1.718 | 32.35 | 45M7G7D |
| | | | | | π/2 BPSK | 2Tx | 1.718 | 32.35 | 45M6G7D |
| | | | | | 16QAM | 2Tx | 1.067 | 30.28 | 45M4W7D |
| | | | | | 64QAM | 2Tx | 0.693 | 28.41 | 45M8W7D |
| | | 100 | 27550 - 28300 | 1 | QPSK | 2Tx | 1.811 | 32.58 | 95M1G7D |
| | | | | | π/2 BPSK | 2Tx | 1.786 | 32.52 | 91M9G7D |
| | | | | | 16QAM | 2Tx | 1.191 | 30.76 | 95M0W7D |
| | | | | | 64QAM | 2Tx | 0.610 | 27.85 | 95M4W7D |
| | | | | 2 | QPSK | 2Tx | 0.389 | 25.90 | 195MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.470 | 26.72 | 190MG7D |
| | | | | | 16QAM | 2Tx | 0.303 | 24.82 | 195MW7D |
| | | | | | 64QAM | 2Tx | 0.167 | 22.24 | 196MW7D |
| | | | | 3 | QPSK | 2Tx | 0.275 | 24.39 | 294MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.276 | 24.41 | 292MG7D |
| | | | | | 16QAM | 2Tx | 0.205 | 23.12 | 294MW7D |
| | | | | | 64QAM | 2Tx | 0.136 | 21.33 | 294MW7D |
| | | | | 4 | QPSK | 2Tx | 0.254 | 24.05 | 396MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.276 | 24.41 | 394MG7D |
| | | | | | 16QAM | 2Tx | 0.199 | 22.98 | 395MW7D |
| | | | | | 64QAM | 2Tx | 0.155 | 21.91 | 395MW7D |

**EUT Overview (Band n261)**

| Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Max Power [W] | Max Power [dBm] | |
| NR-n260 | 50 | 37025 - 39975 | 1 | QPSK | SISO | 0.483 | 26.84 | 49M8G7D |
| | | | | QPSK | 2Tx | 0.873 | 29.41 | 49M8G7D |
| | | | | π/2 BPSK | 2Tx | 0.867 | 29.38 | 46M0G7D |
| | | | | 16QAM | 2Tx | 0.565 | 27.52 | 46M0W7D |
| | | | | 64QAM | 2Tx | 0.256 | 24.09 | 45M7W7D |
| | 100 | 37050 - 39950 | 1 | QPSK | SISO | 0.485 | 26.86 | 95M2G7D |
| | | | | QPSK | 2Tx | 0.769 | 28.86 | 95M2G7D |
| | | | | π/2 BPSK | 2Tx | 0.793 | 28.99 | 92M7G7D |
| | | | | 16QAM | 2Tx | 0.495 | 26.95 | 95M2W7D |
| | | | | 64QAM | 2Tx | 0.244 | 23.88 | 95M5W7D |
| | | | 2 | QPSK | 2Tx | 0.218 | 23.39 | 195MG7D |
| | | | | π/2 BPSK | 2Tx | 0.221 | 23.44 | 193MG7D |
| | | | | 16QAM | 2Tx | 0.161 | 22.06 | 195MW7D |
| | | | | 64QAM | 2Tx | 0.125 | 20.98 | 197MW7D |
| | | | 3 | QPSK | 2Tx | 0.207 | 23.17 | 299MG7D |
| | | | | π/2 BPSK | 2Tx | 0.203 | 23.07 | 298MG7D |
| | | | | 16QAM | 2Tx | 0.159 | 22.01 | 299MW7D |
| | | | | 64QAM | 2Tx | 0.116 | 20.63 | 298MW7D |
| | | | 4 | QPSK | 2Tx | 0.202 | 23.06 | 398MG7D |
| | | | | π/2 BPSK | 2Tx | 0.203 | 23.07 | 398MG7D |
| | | | | 16QAM | 2Tx | 0.159 | 22.02 | 398MW7D |
| | | | | 64QAM | 2Tx | 0.125 | 20.98 | 399MW7D |

**EUT Overview (Band n260)**

# 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 an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

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

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

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

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMF731U**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT supports both 50MHz bandwidth and 100MHz bandwidth. The EUT supports 1CC for 50MHz bandwidth and upto 4CC for 100MHz bandwidth. The table below indicates the supported bandwidths and component carriers for the Frequency ranges tested.

| # CC's | BW (MHz) | Total CC BW (MHz) | Channel | 24.25 - 24.45GHz (n258-R1) | 24.75 - 25.25GHz (n258-R2) | 27.5 - 28.35GHz (n261) | 37 - 40GHz (n260) |
|---|---|---|---|---|---|---|---|
| 1CC | 50 | 50 | Low | x | x | x | x |
| | | | Mid | x | x | x | x |
| | | | High | x | x | x | x |
| | 100 | 100 | Low | x | x | x | x |
| | | | Mid | x | x | x | x |
| | | | High | x | x | x | x |
| 2CC | 50 | 100 | Low | - | - | - | - |
| | | | Mid | - | - | - | - |
| | | | High | - | - | - | - |
| | 100 | 200 | Low | - | x | x | x |
| | | | Mid | x | x | x | x |
| | | | High | - | x | x | x |
| 3CC | 50 | 150 | Low | - | - | - | - |
| | | | Mid | - | - | - | - |
| | | | High | - | - | - | - |
| | 100 | 300 | Low | - | x | x | x |
| | | | Mid | - | x | x | x |
| | | | High | - | x | x | x |
| 4CC | 50 | 200 | Low | - | - | - | - |
| | | | Mid | - | - | - | - |
| | | | High | - | - | - | - |
| | 100 | 400 | Low | - | - | x | x |
| | | | Mid | - | - | x | x |
| | | | High | - | - | x | x |

The EUT supports a subcarrier spacing (SCS) of 120kHz with two transmission schemes, CP-OFDM and DFT-s-OFDM, with π/2-BPSK, QPSK, 16-QAM, and 64-QAM modulations. Different Beam IDs are supported, each corresponding to a different position in space for each antenna. During testing, FTM (Factory Test Mode) was used to operate the transmitter. MIMO operation was achieved by enabling two Beam IDs at the same time: one is from the list of H Beam IDs and other is from the list of V Beam IDs.

**Test Device Serial No.:** 0061M, 0106M

## 2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, Multi-band 5G NR (FR1 and FR2), 802.11b/g/n/ac/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC

## 2.3 Test Configuration

The EUT was tested per the guidance of KDB 842590 D01 v01r02 and ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated tests.

EIRP Simulation data for all Beam IDs was used to help determine the worst case Beam ID for SISO operation and Beam ID pair for 2Tx (DFT-s-OFDM) and MIMO (CP-OFDM) operation. Several additional Beam ID's were also investigated to determine the Beam ID's producing the highest measured EIRP.

All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation. When implemented out in the field, the EUT will operate with a maximum uplink configuration as allowed by the 5G network/carrier. The FTM software was also used for the EUT operation in the EN-DC mode.

This device supports three configurations: one is with screen open; one is where the screen is half open (90 degrees), and one is with the screen closed. All configurations are tested, and the worst case radiated emissions data is shown in this report.

## 2.4 Software and Firmware

The test was conducted with firmware version F731USQU0AWD1 installed on the EUT.

## 2.5 EMI Suppression Device(s)/Modifications

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

# 3.0 DESCRIPTION OF TESTS

## 3.1 Measurement Procedure

The measurement procedures described in the document titled "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26-2015) and the guidance provided in KDB 842590 D01 v01r02 were used in the measurement of the EUT.

## 3.2 Radiated Power and Radiated Spurious Emissions

**§30.202, §30.203**

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary for radiated emissions measurements in the spurious domain. 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 for measurements above 1GHz.

Radiated power (EIRP) measurements were performed in a full anechoic chamber (FAC) conforming to the site validation requirements of CISPR 16-1-4. Radiated spurious emission measurements from 30MHz - 18GHz were performed in a semi anechoic chamber (SAC) conforming to the site validation requirements of CISPR 16-1-4. A positioner was used to manipulate the EUT through several positions in space by rotating about the roll axis as shown in the figure below. The positioner was mounted on top of a turntable bringing the total EUT height to 1.5m.

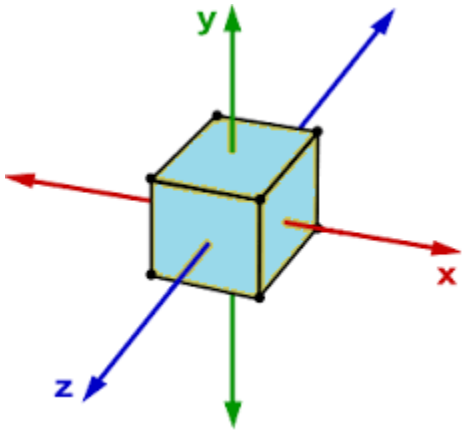



**Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes**

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable. The measurement antenna is in the far field of the EUT per formula $2D^2/\lambda$ where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, "D" is the largest dimension of the measurement antenna. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

| Frequency Range (GHz) | Wavelength(cm) | Far Field Distance (m) | Measurement Distance (m) |
|---|---|---|---|
| 18-40 | 0.749 | 0.54 | 1.00 |
| 40-60 | 0.500 | 1.39 | 1.50 |
| 60-90 | 0.333 | 0.91 | 1.00 |
| 90-140 | 0.214 | 0.58 | 1.00 |
| 140-200 | 0.150 | 0.39 | 1.00 |

**Table 3-1. Far-Field Distance & Measurement Distance per Frequency Range**

Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning. It was determined that H=0 degree and V=90 degree are the worst case positions when the EUT was transmitting horizontally and vertically polarized beams, respectively.

The maximized power level is recorded using the spectrum analyzer “Channel Power” function with the integration bandwidth set to the emissions’ occupied bandwidth. The EIRP is calculated from the raw power level measured with the spectrum analyzer using the formulas shown below.

## Effective Isotropic Radiated Power Sample Calculation

The measured e.i.r.p is converted to E-field in V/m. Then, the distance correction is applied before converting back to calculated e.i.r.p, as explained in KDB 971168 D01.

**Field Strength [dBμV/m]** = Measured Value [dBm] + AFCL [dB/m] + 107

= - 32.74 dBm + (40.7dB/m + 8.78dB) + 107 = 123.74dBuV/m

= 10^(123.74/20)/1000000 = 1.54 V/m

**e.i.r.p. [dBm]** = 10 * log((E-Field*$D_m$)^2/30) + 30dB

= 10 * log((1.54V/m * 1.00m)^2/30) + 30dB

= 18.98 dBm e.i.r.p.

# 4.0 MEASUREMENT UNCERTAINTY

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

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

# 5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to an accredited ISO/IEC 17025 calibration facility. 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 |
|---|---|---|---|---|---|---|
| Agilent | N9030A | 50GHz PXA Signal Analyzer | 9/9/2022 | Annual | 9/9/2023 | US51350301 |
| Carlisle IT | UTiFlex | FAC mmWave UTiFlex 40GHz | 1/12/2023 | Annual | 1/12/2024 | 234142-001 |
| Carlisle IT | UTiFlex | FAC mmWave UTiFlex 40GHz | 1/12/2023 | Annual | 1/12/2024 | 232062-001 |
| EMCO | 3116 | Horn Antenna (18-40GHz) | 7/20/2021 | Biennial | 7/20/2023 | 9203-2178 |
| Fairview Microwave | NC-100 | Torque Wrench | 12/5/2022 | Biennial | 12/5/2024 | N/A |
| N/A | AP2-001 | EMC Cable and Switch System | 1/11/2023 | Annual | 1/11/2024 | AP2-001 |
| N/A | AP2-002 | EMC Cable and Switch System | 1/11/2023 | Annual | 1/11/2024 | AP2-002 |
| N/A | MD 1M 18-40 | EMC Cable and Switch System | 1/11/2023 | Annual | 1/11/2024 | MD 1M 18-40 |
| Narda | 180-422-KF | Horn (Small) | 8/30/2022 | Biennial | 8/30/2024 | U157403-01 |
| OML, Inc. | M05RH | WR-05 Horn Antenna, 24dBi, 140 to 220 GHz | 9/27/2022 | Biennial | 9/27/2024 | 18073001 |
| OML, Inc. | M08RH | Horn Antenna (90 - 140GHz) | 10/6/2021 | Biennial | 10/6/2023 | 17111701 |
| OML, Inc. | M12RH | Horn Antenna (60 - 90GHz) | 11/16/2021 | Biennial | 11/16/2023 | 17111701 |
| OML, Inc. | M19RH | Horn Antenna (40 - 60GHz) | 10/12/2021 | Biennial | 10/12/2023 | 17111701 |
| Pasternack | NC-100 | Torque Wrench | 12/5/2022 | Biennial | 12/5/2024 | 1240 |
| Rohde & Schwarz | ESW44 | EMI Test Receiver 2Hz to 44 GHz | 3/1/2023 | Annual | 3/1/2024 | 101716 |
| Rohde & Schwarz | FSW67 | Signal / Spectrum Analyzer | 1/13/2023 | Annual | 1/13/2024 | ID: 1312.8000K67-103200-iQ |
| Virginia Diodes, Inc. | SAX679 | SAX Module (40 - 60GHz) | 11/21/2022 | Biennial | 11/21/2024 | SAX679 |
| Virginia Diodes, Inc. | SAX680 | SAX Module (60 - 90GHz) | 11/21/2022 | Biennial | 11/21/2024 | SAX680 |
| Virginia Diodes, Inc. | SAX681 | SAX Module (90 - 140GHz) | 1/5/2023 | Biennial | 1/5/2025 | SAX681 |
| Virginia Diodes, Inc. | SAX682 | SAX Module (140 - 220GHz) | 3/1/2023 | Biennial | 3/1/2025 | SAX682 |

**Table 5-1. Test Equipment**

**Notes:**

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.

# 6.0 SAMPLE CALCULATIONS

## Emission Designator

### π/2 BPSK/ QPSK Modulation

**Emission Designator = 800MG7D**

BW = 800 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

### QAM Modulation

**Emission Designator = 802MW7D**

BW = 802 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

# 7.0 TEST RESULTS

## 7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMF731U

FCC Classification: Part 30 Mobile Transmitter (5GM)

Mode(s): TDD

| FCC Part Section(s) | Test Description | Test Limit | Test Condition | Test Result | Reference |
|---|---|---|---|---|---|
| 2.1049 | Occupied Bandwidth | N/A | RADIATED | PASS | Section 7.2 |
| 2.1046, 30.202 | Equivalent Isotropic Radiated Power | 43dBm | | PASS | Section 7.3 |
| 2.1051, 30.203 | Spurious Emissions | -13dBm/MHz for all out-of-band emissions | | PASS | Section 7.4 |
| 2.1051, 30.203 | Out-of-Band Emissions at the Band Edge | -13dBm/MHz for all out-of-band emissions, -5dBm/MHz from the band edge up to 10% of the channel BW | | PASS | Section 7.5 |
| 2.1055 | Frequency Stability | Fundamental emissions stay within authorized frequency block | | PASS | Section 7.6 |

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

**Notes:**

1) All modes of operation and modulations were investigated. The test results shown in the following sections represent the worst case emissions.
2) This report contains references to "n258-R1" and "n258-R2". These correspond to n258 Range 1, operating from 24.25 - 24.45GHz, and n258 Range 2, operating from 24.75 - 25.25GHz, respectively, as defined in Part 30.4(a).
3) Per 2.1057(a)(2), spurious emissions were investigated up to 100GHz for n258-R1, n258-R2 and n261. For n260, spurious emissions were investigated up to 200GHz.
4) The radiated RF output power and all out-of-band emissions in the spurious domain are evaluated to the EIRP limits.
5) “CC” refers to “Component Carriers”.
6) Beam IDs were chosen based on which Beam ID produces the highest EIRP during EIRP simulation.
7) All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation (100% duty cycle).
8) The CP-OFDM and DFT-s-OFDM transmission schemes were investigated fully for each test type and only the worst case data is included.

## 7.2 Occupied Bandwidth

**§2.1049**

### Test Overview

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured. All modes of operation were investigated and the worst case configuration results are reported in this section.

### Test Procedure Used

ANSI C63.26-2015 Section 5.4.3
KDB 842590 D01 v01r02 Section 4.3

### Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. RBW = 1 – 5% of the expected OBW
3. VBW ≥ 3 x RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. The trace was allowed to stabilize
8. If necessary, steps 2 – 7 were repeated after changing the RBW such that it would be within 1 – 5% of the 99% occupied bandwidth observed in Step 7

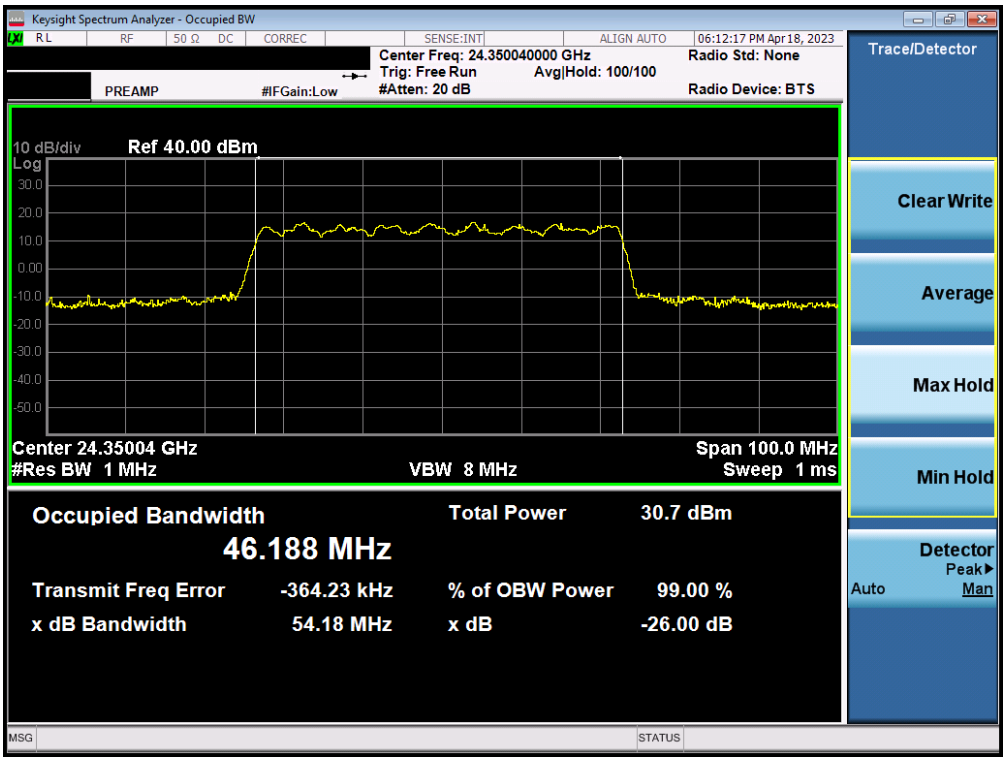
### Test Notes

The EUT supports CP-OFDM and DFT-s-OFDM. OBW was measured for both waveforms and the worst case has been included in the report.

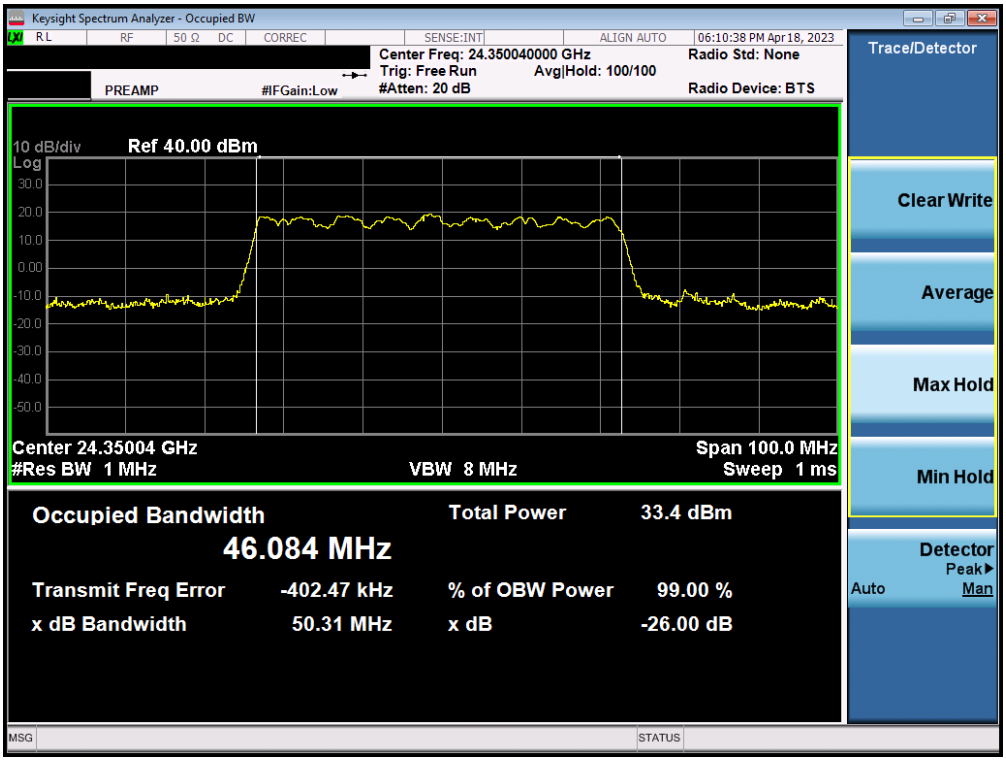
## Band n258-R1

| Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|
| 50 | 1 | CP-OFDM | QPSK | 46.19 |
| | | DFT-s-OFDM | π/2 BPSK | 46.08 |
| | | CP-OFDM | 16QAM | 46.20 |
| | | CP-OFDM | 64QAM | 46.33 |
| 100 | 1 | CP-OFDM | QPSK | 95.46 |
| | | DFT-s-OFDM | π/2 BPSK | 92.10 |
| | | CP-OFDM | 16QAM | 95.16 |
| | | CP-OFDM | 64QAM | 95.47 |
| | 2 | CP-OFDM | QPSK | 194.79 |
| | | DFT-s-OFDM | π/2 BPSK | 194.41 |
| | | CP-OFDM | 16QAM | 195.10 |
| | | DFT-s-OFDM | 64QAM | 195.70 |

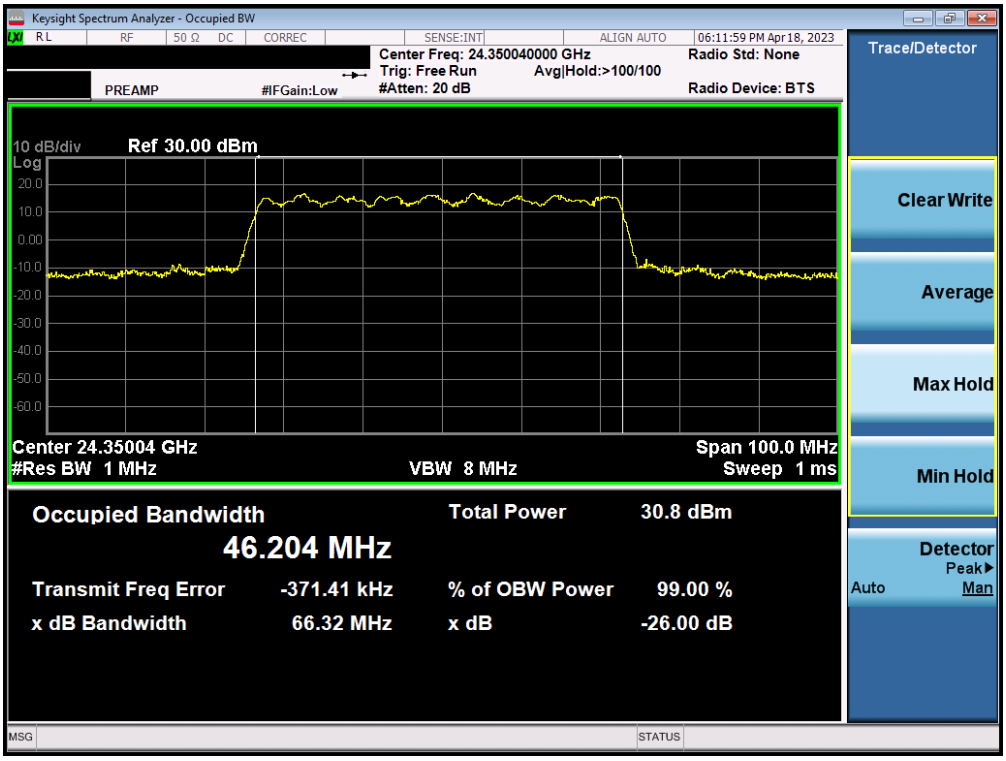
**Table 7-2. Summary of Occupied Bandwidths (n258-R1)**



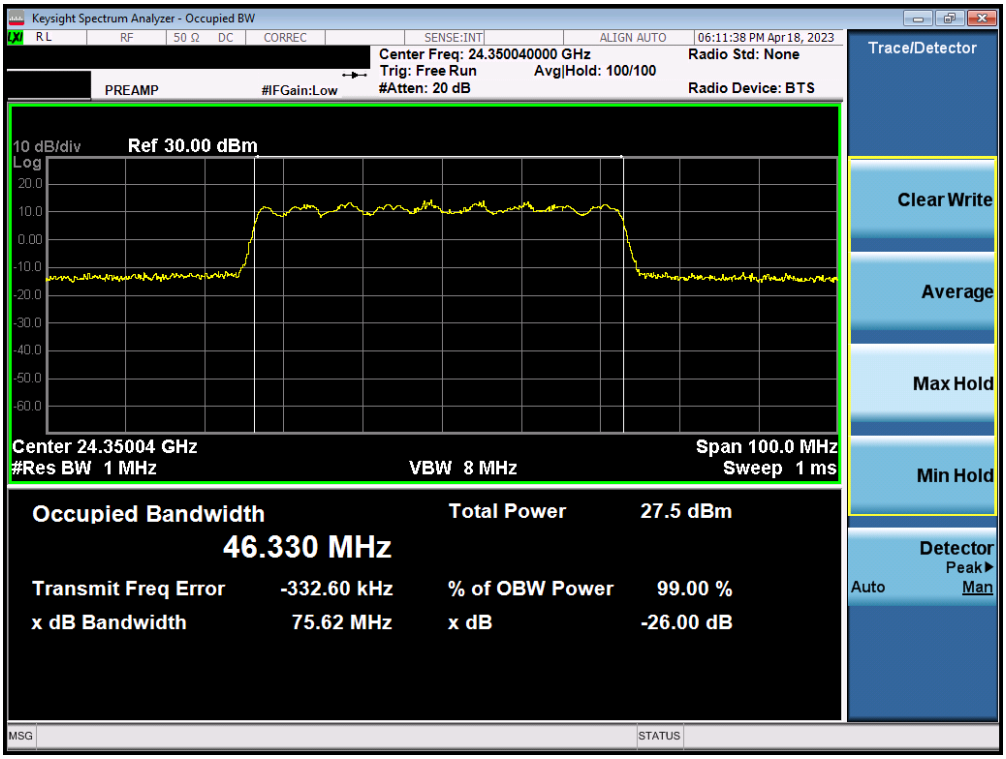

**Plot 7-1. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



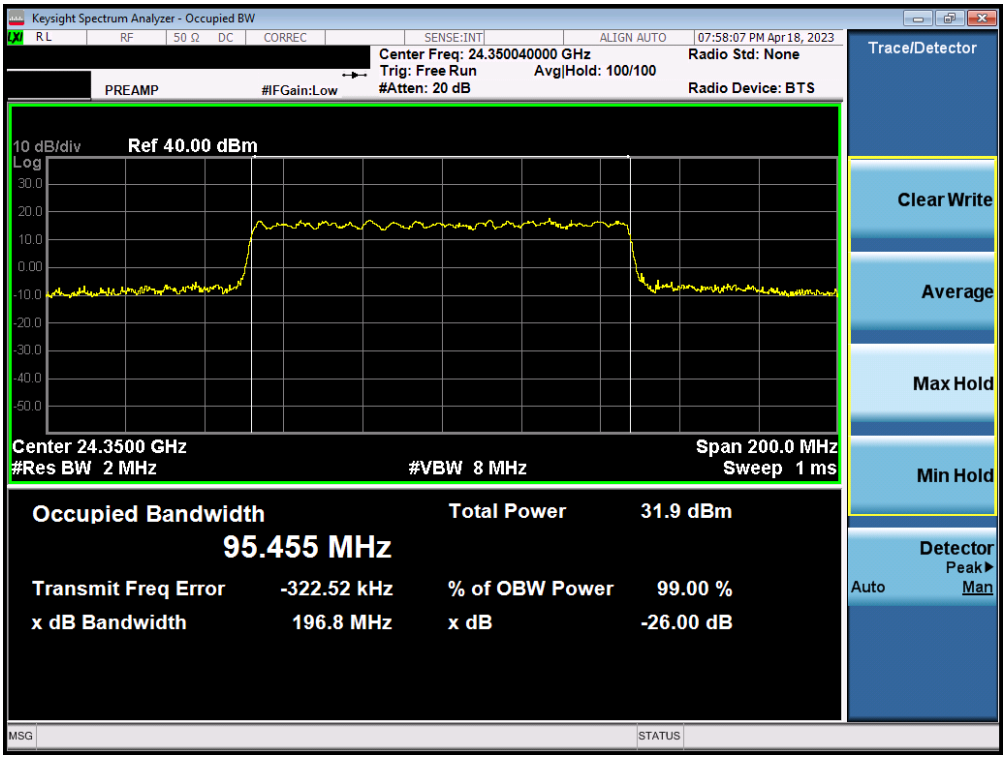

**Plot 7-2. Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



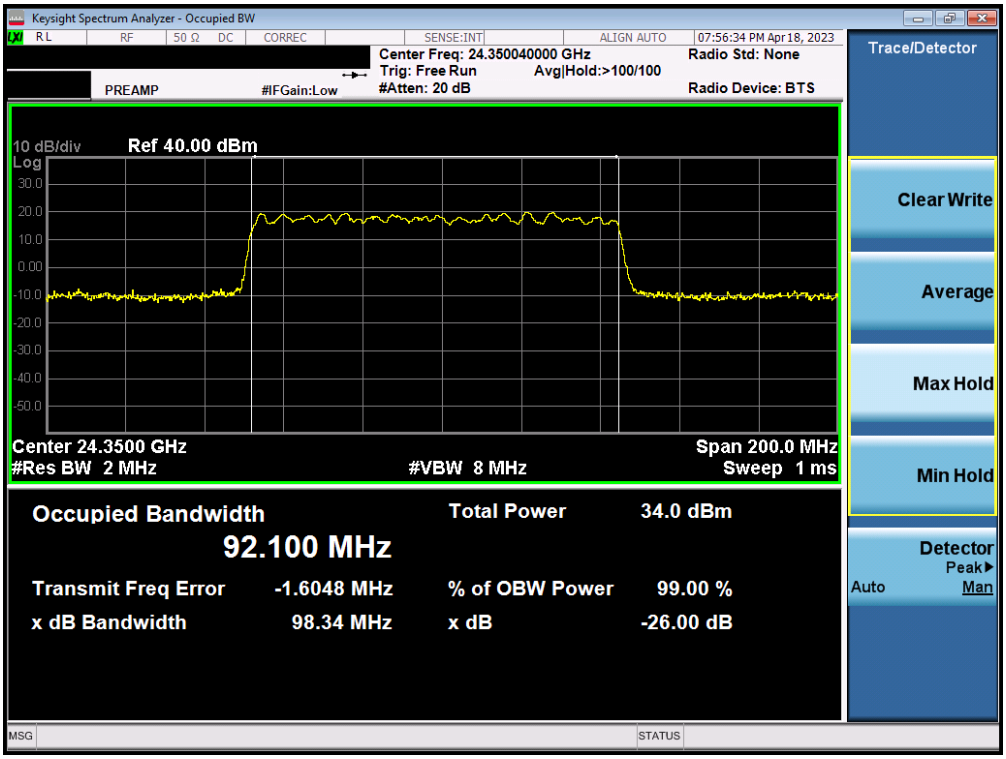

**Plot 7-3. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



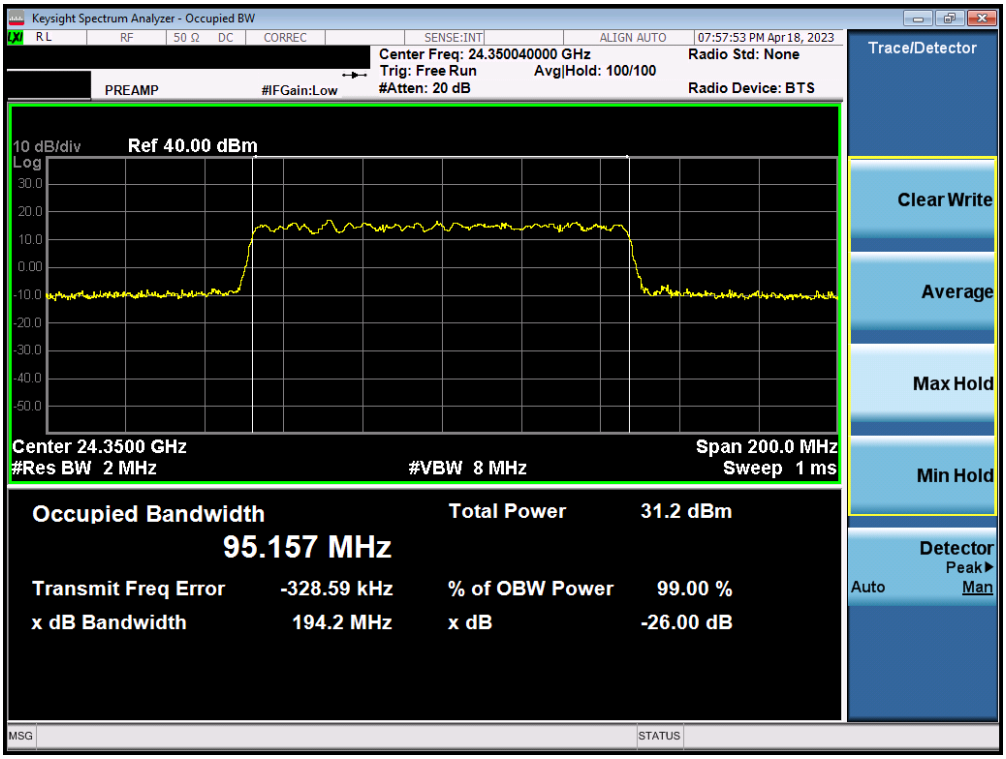

**Plot 7-4. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



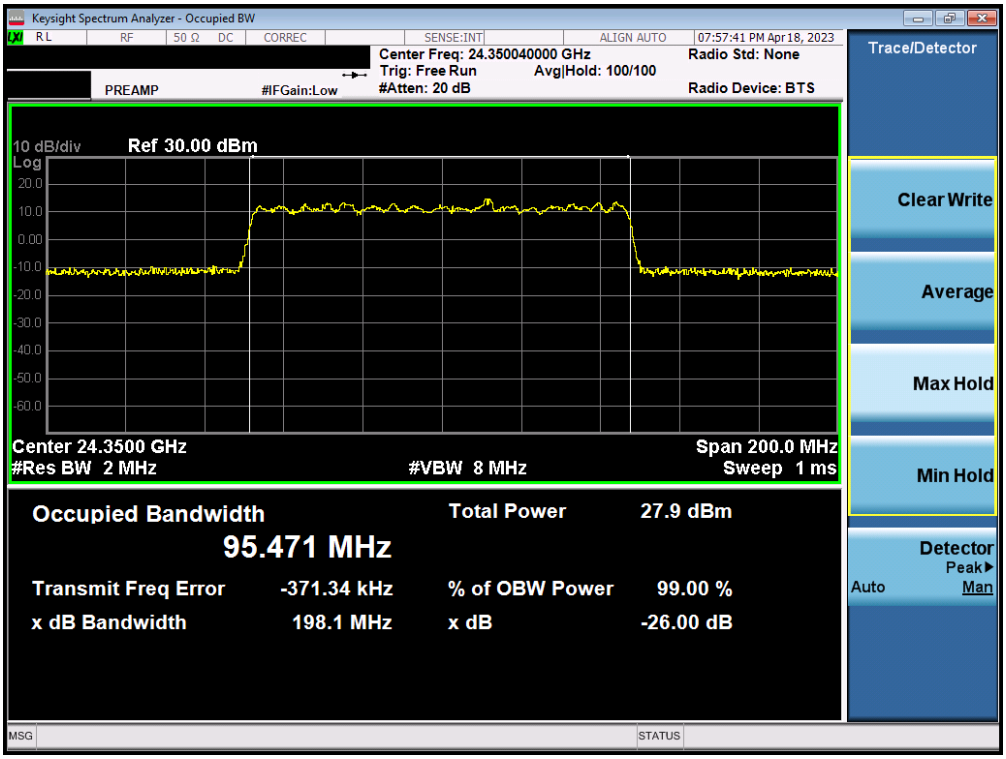

**Plot 7-5. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



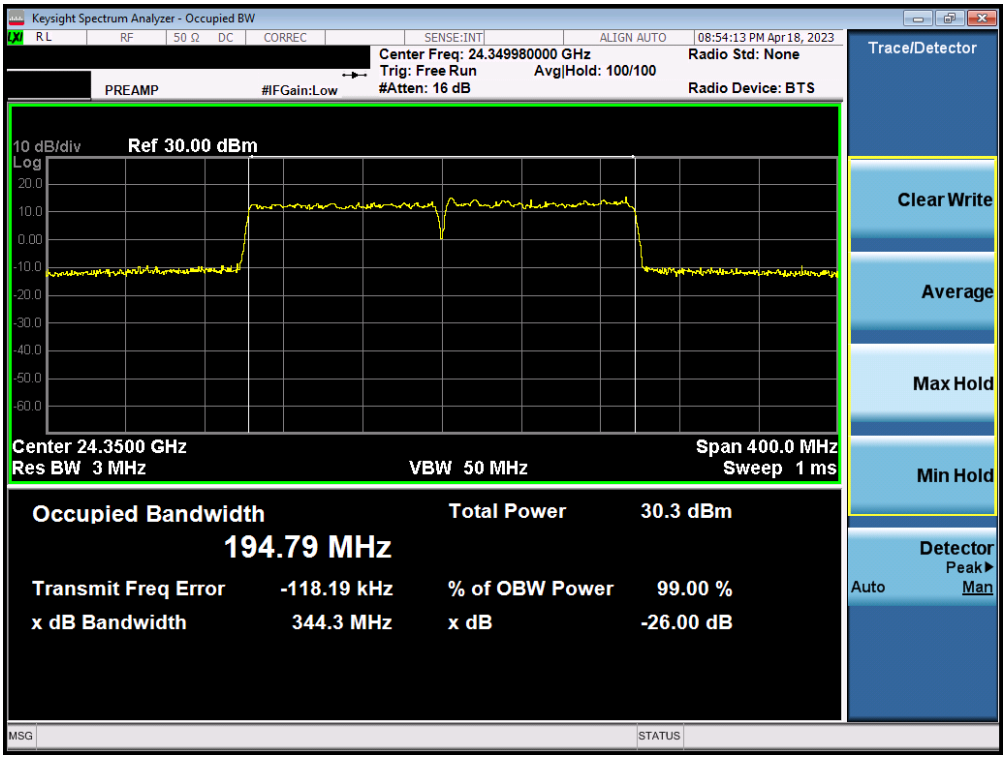

**Plot 7-6. Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



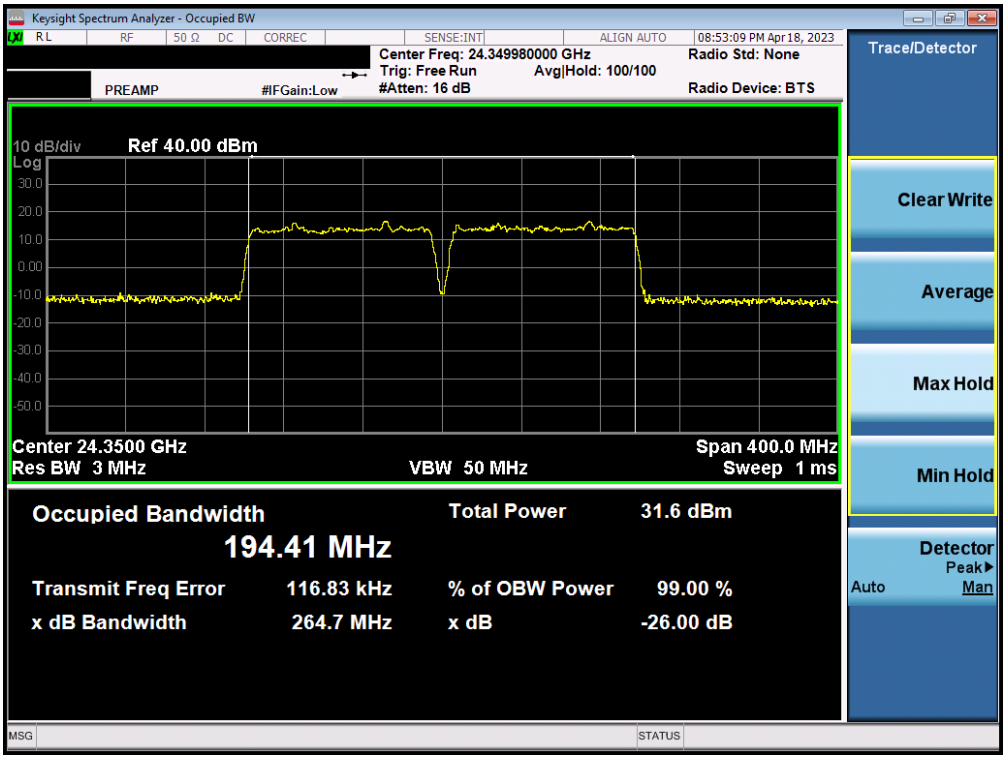

**Plot 7-7. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



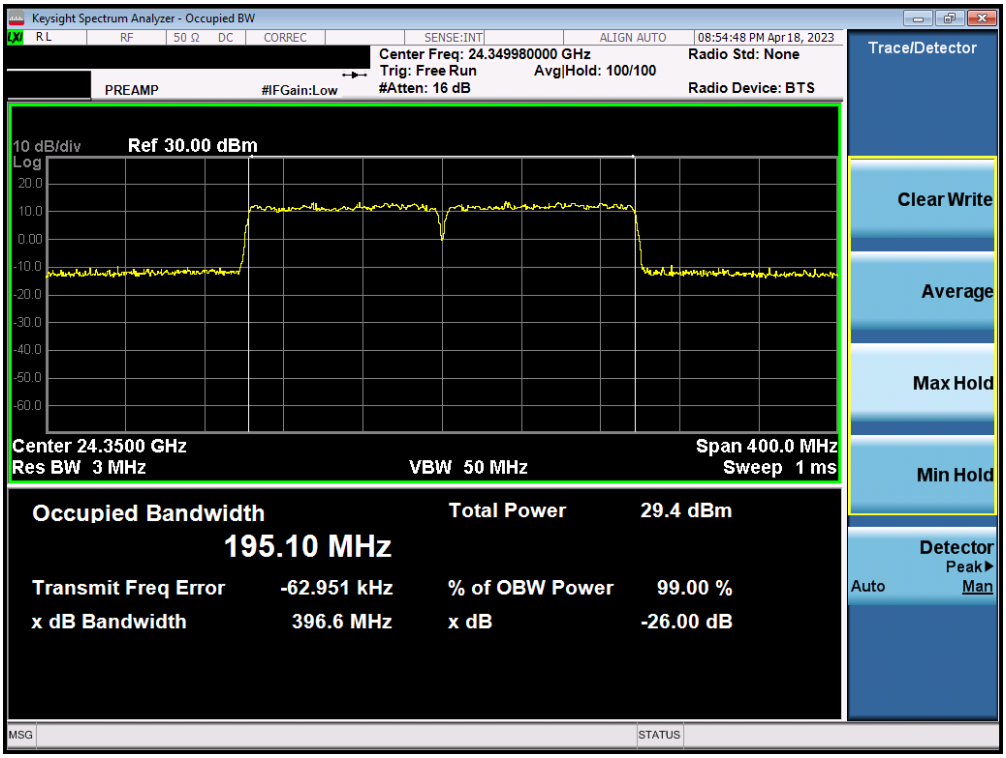

**Plot 7-8. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



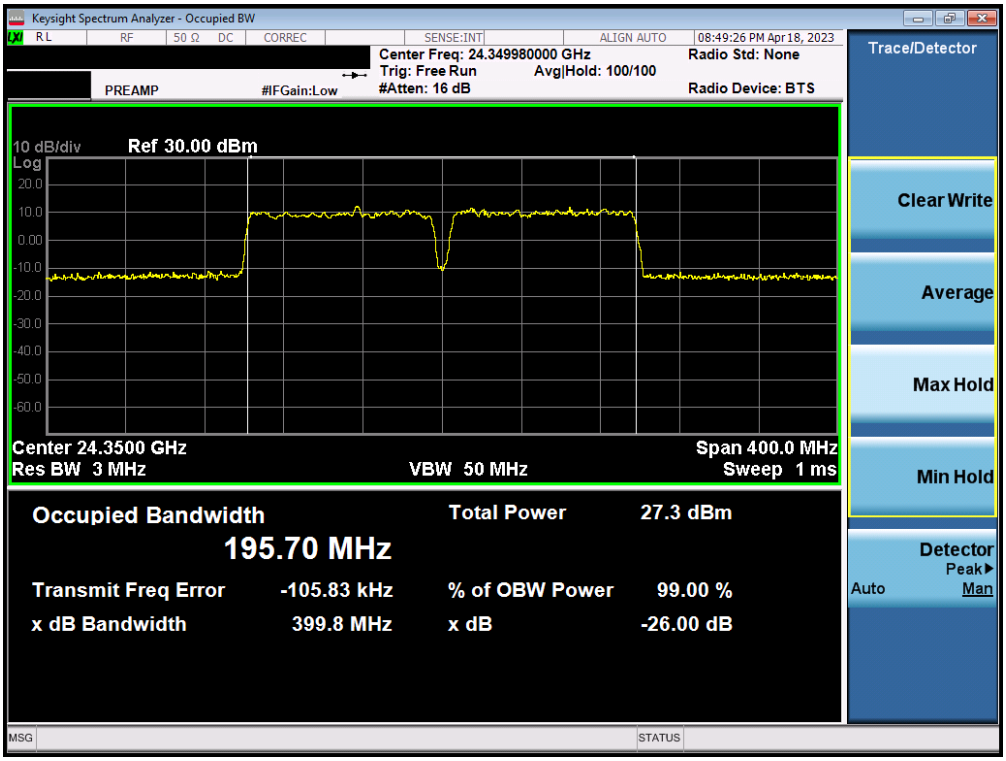

**Plot 7-9. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM QPSK – Mid Channel)**




**Plot 7-10. Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**




**Plot 7-11. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**

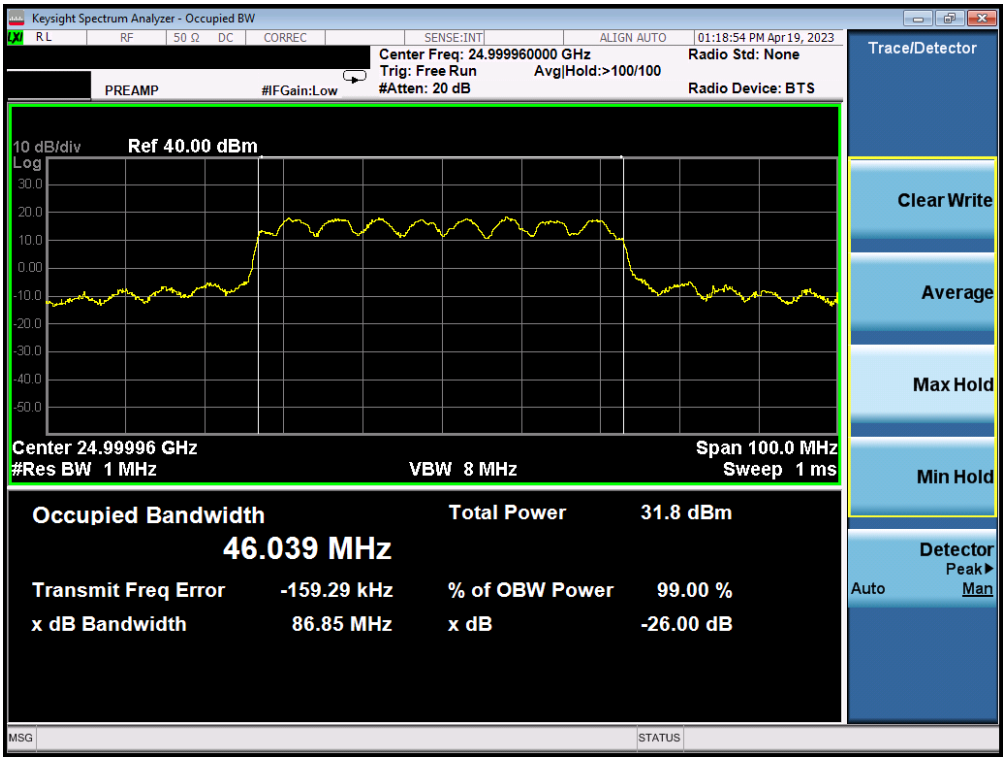



**Plot 7-12. Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM 64QAM – Mid Channel)**

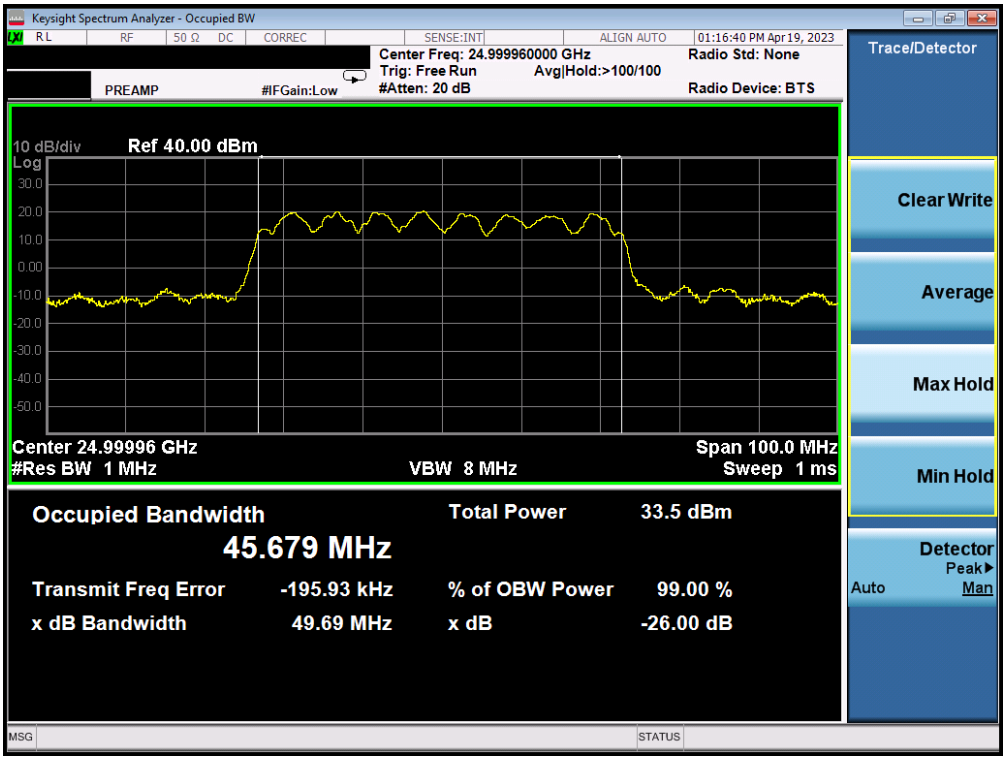
## Band n258-R2

| Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|
| 50 | 1 | CP-OFDM | QPSK | 46.04 |
| | | DFT-s-OFDM | π/2 BPSK | 45.68 |
| | | CP-OFDM | 16QAM | 45.87 |
| | | CP-OFDM | 64QAM | 45.95 |
| 100 | 1 | CP-OFDM | QPSK | 95.39 |
| | | DFT-s-OFDM | π/2 BPSK | 91.88 |
| | | CP-OFDM | 16QAM | 95.37 |
| | | CP-OFDM | 64QAM | 95.95 |
| | 2 | CP-OFDM | QPSK | 193.98 |
| | | DFT-s-OFDM | π/2 BPSK | 193.62 |
| | | CP-OFDM | 16QAM | 193.80 |
| | | CP-OFDM | 64QAM | 194.49 |
| | 3 | CP-OFDM | QPSK | 293.32 |
| | | DFT-s-OFDM | π/2 BPSK | 290.79 |
| | | CP-OFDM | 16QAM | 293.20 |
| | | CP-OFDM | 64QAM | 293.79 |

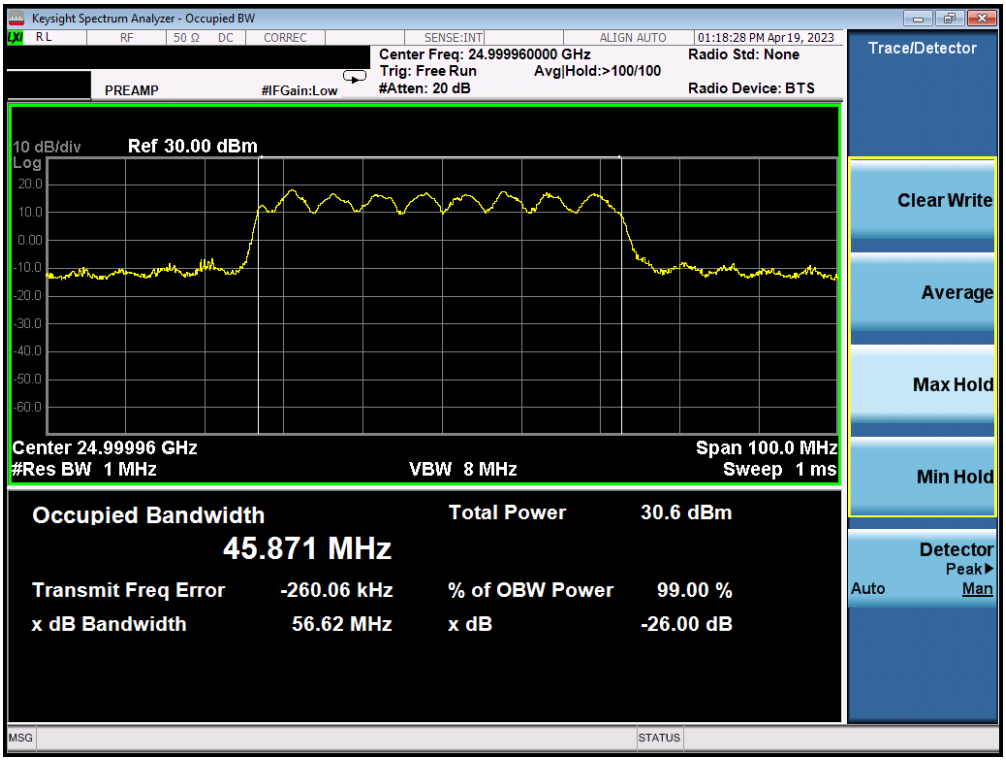
**Table 7-3. Summary of Occupied Bandwidths (n258-R2)**



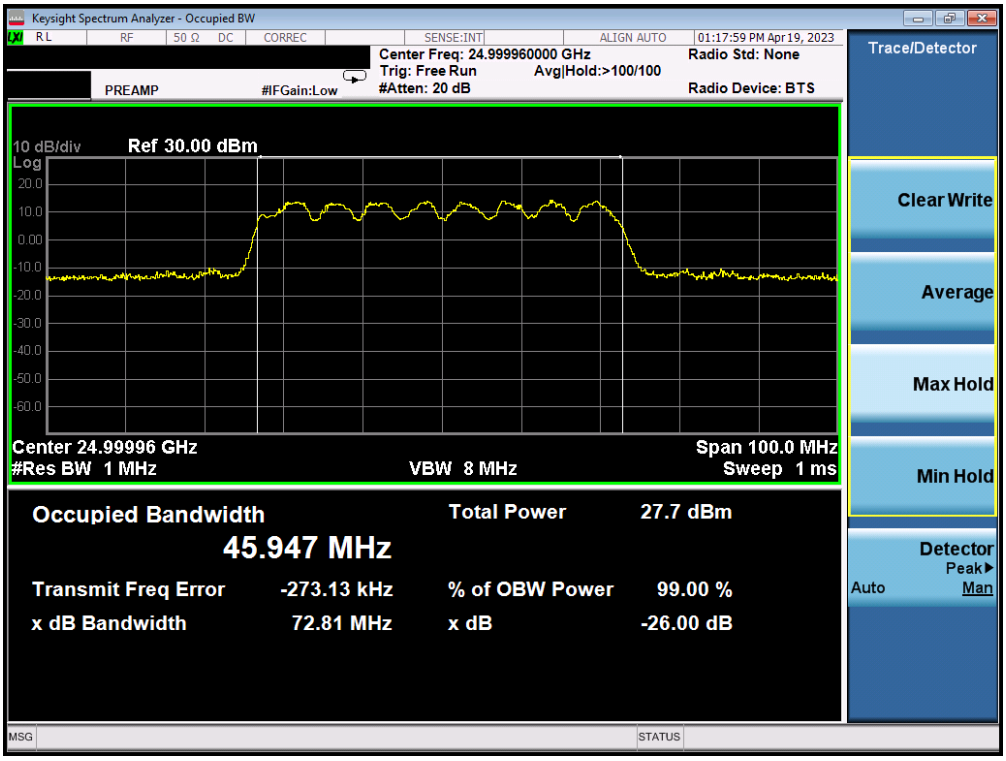

**Plot 7-13. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



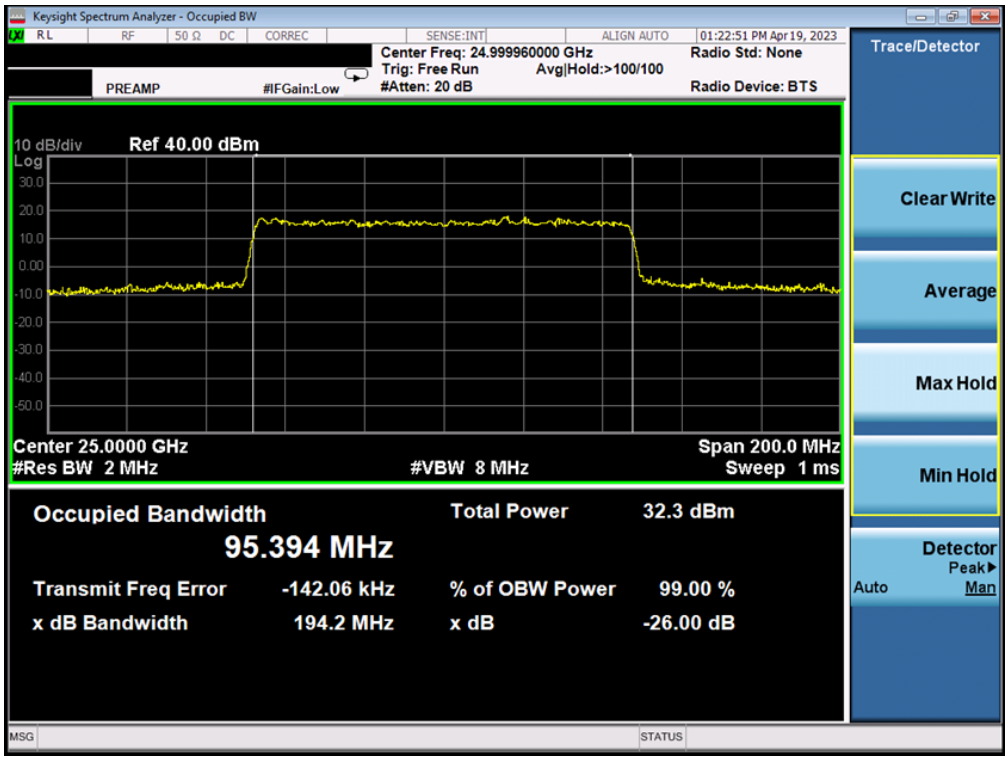

**Plot 7-14. Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



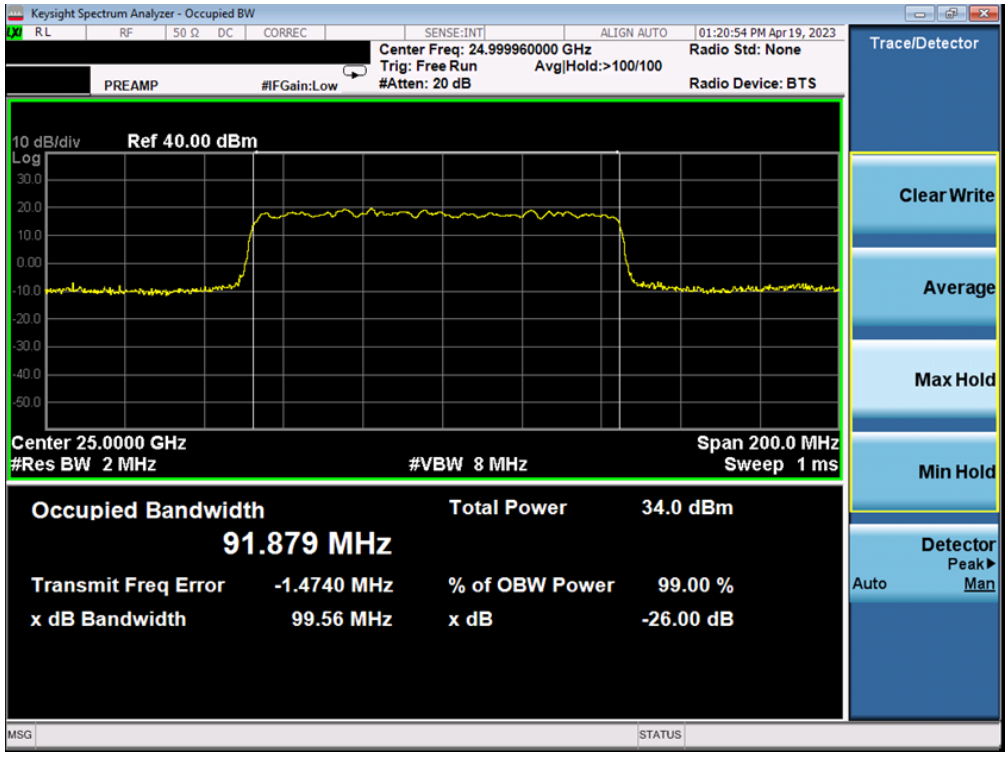

**Plot 7-15. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



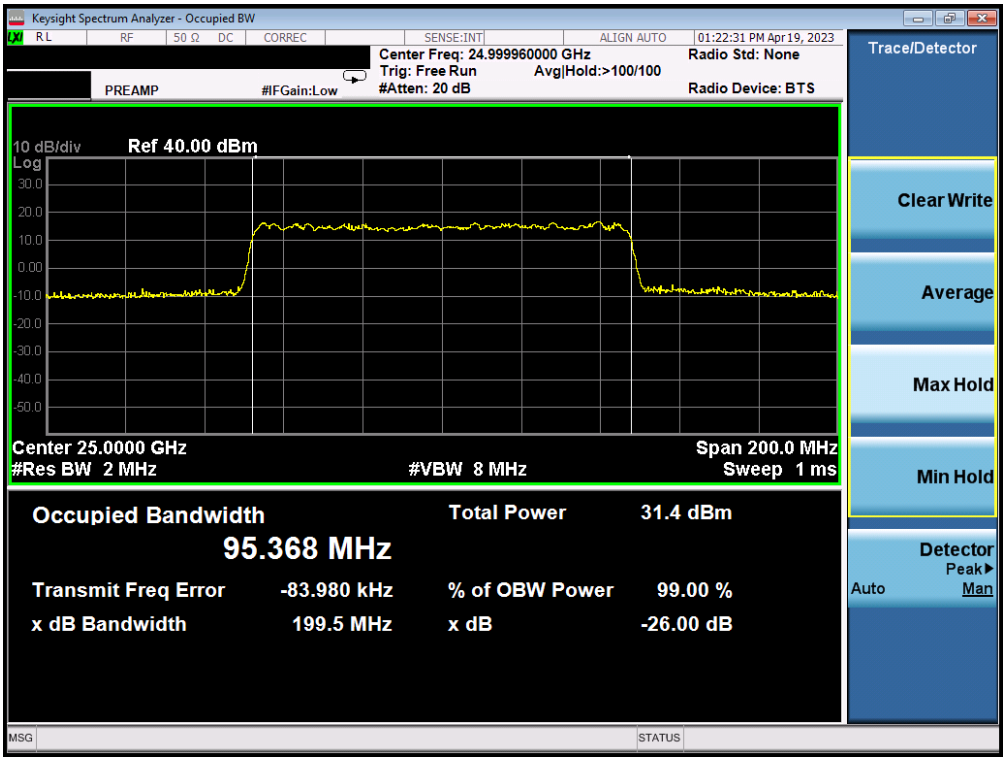

**Plot 7-16. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



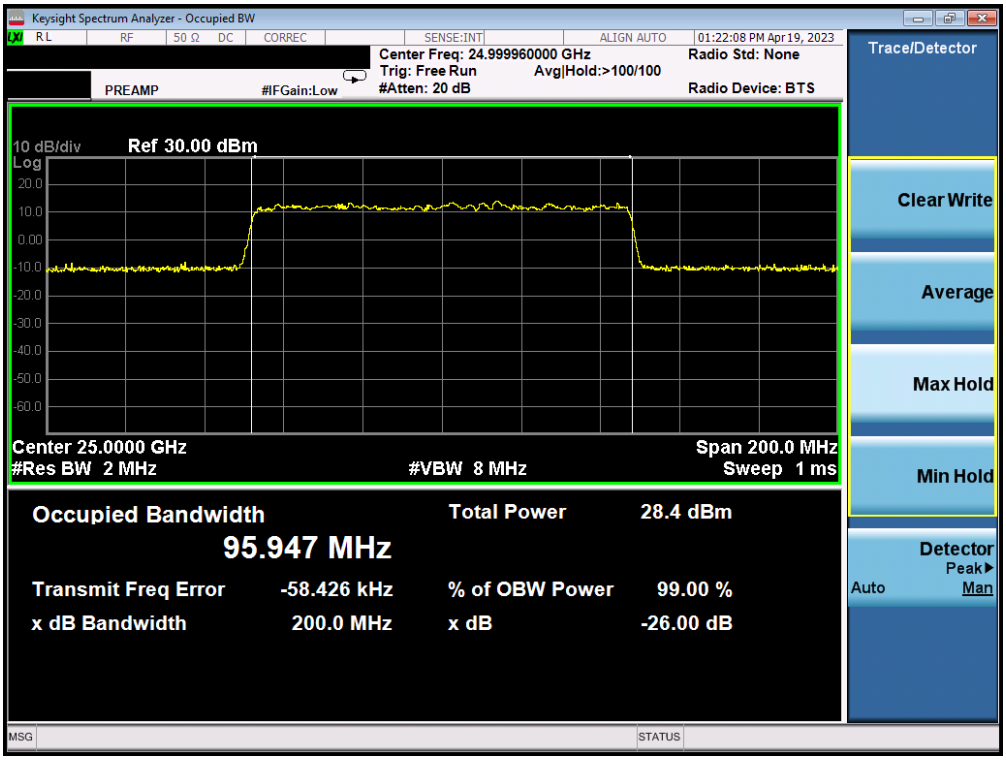

**Plot 7-17. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



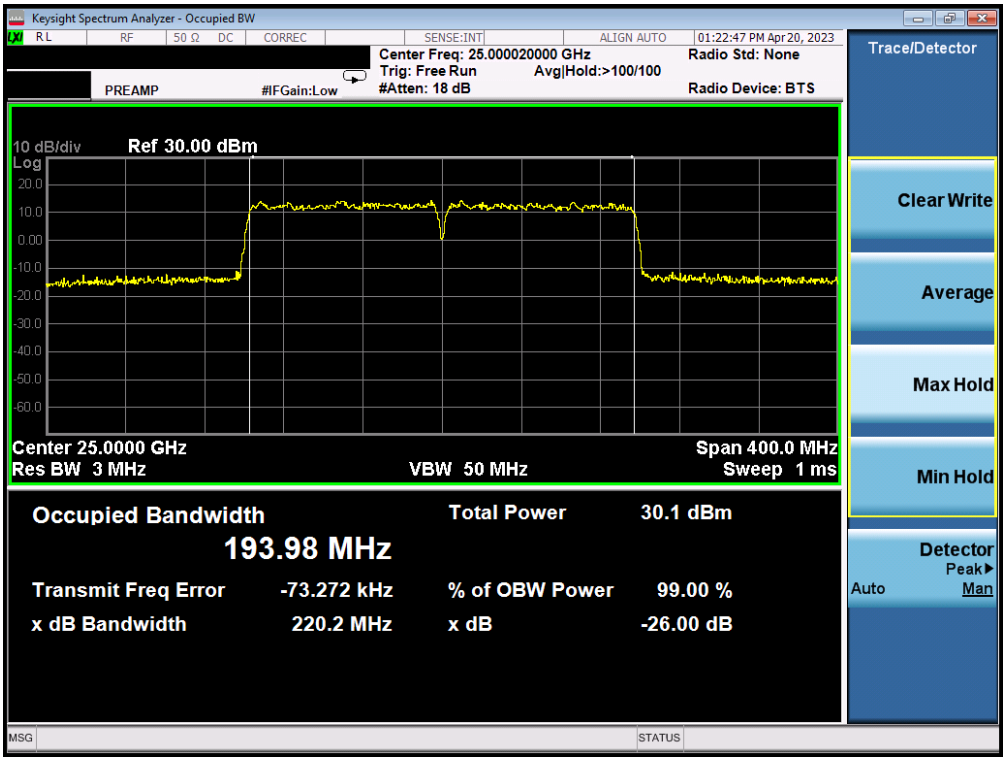

**Plot 7-18. Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



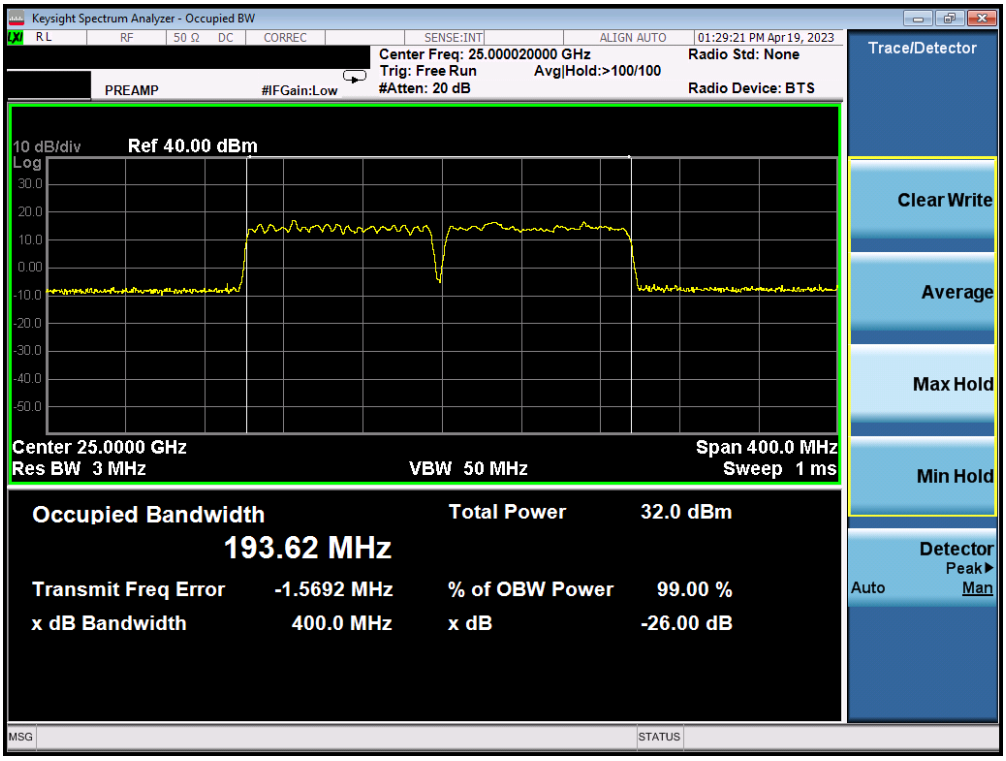

**Plot 7-19. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



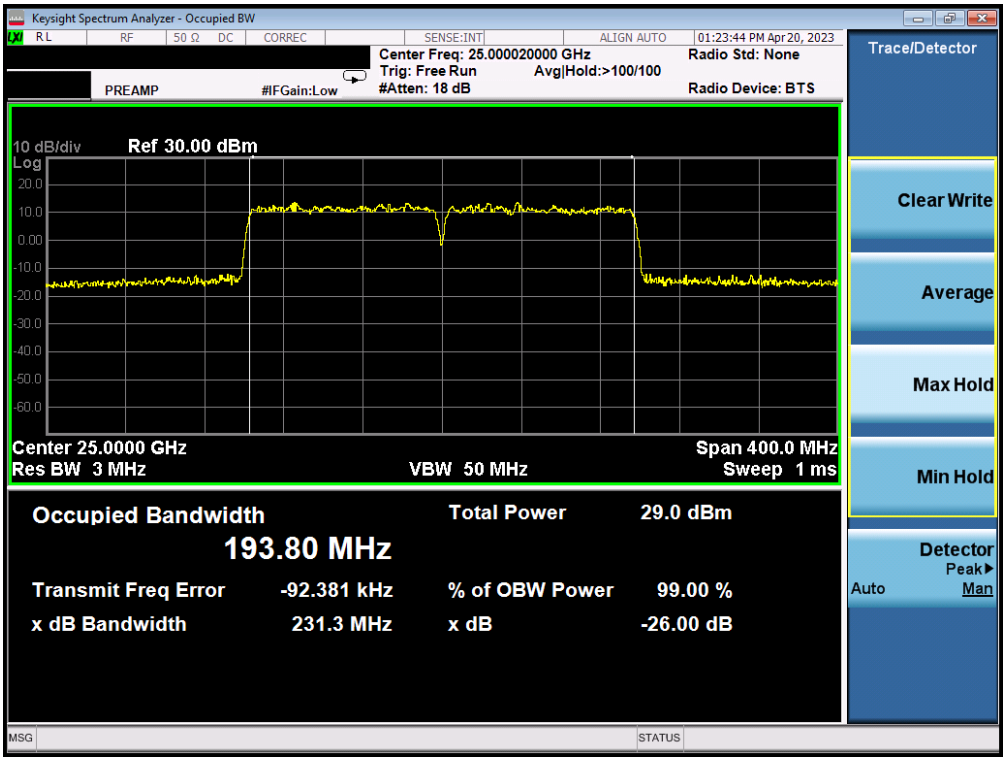

**Plot 7-20. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



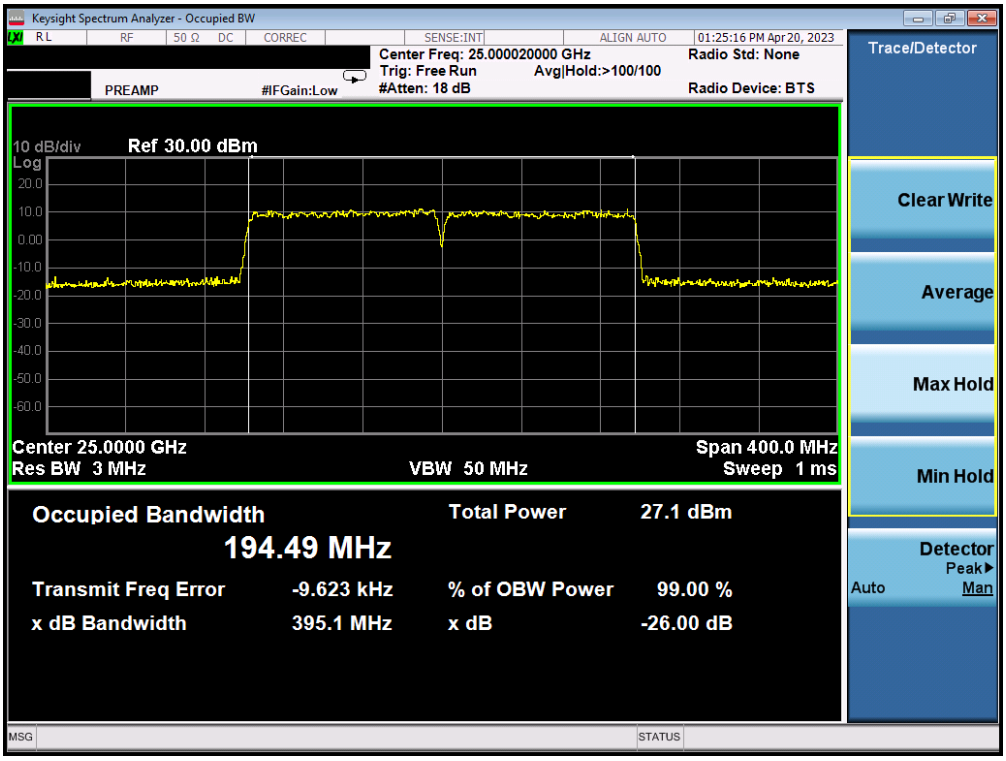

**Plot 7-21. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM QPSK – Mid Channel)**



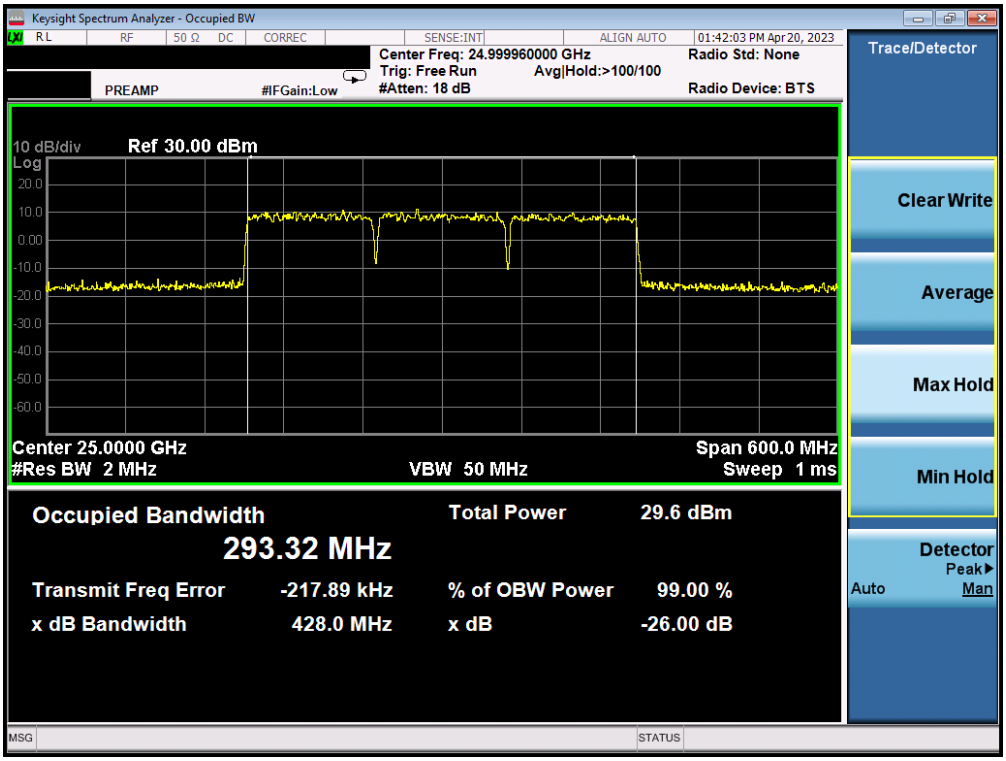

**Plot 7-22. Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



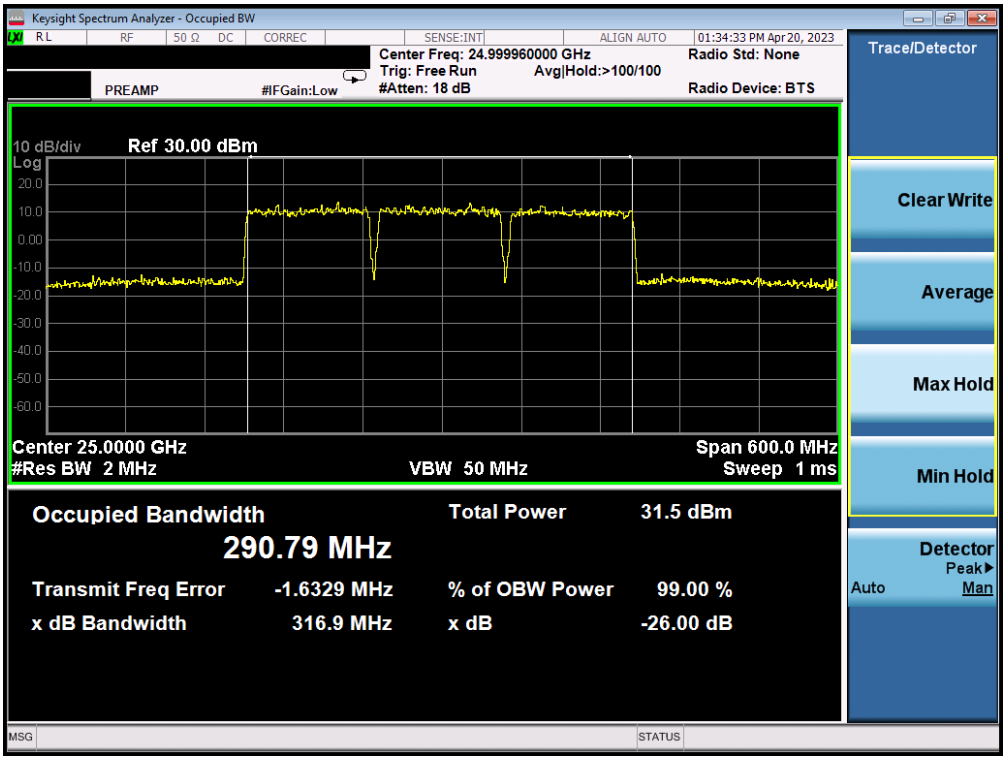

**Plot 7-23. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**



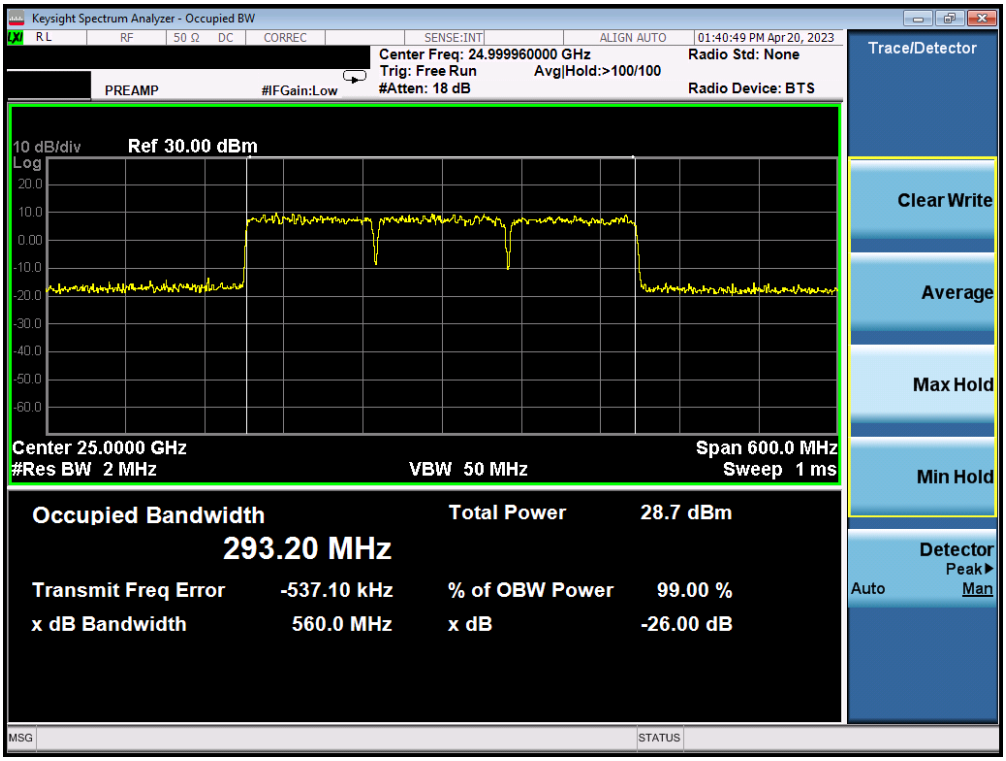

**Plot 7-24. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 64QAM – Mid Channel)**



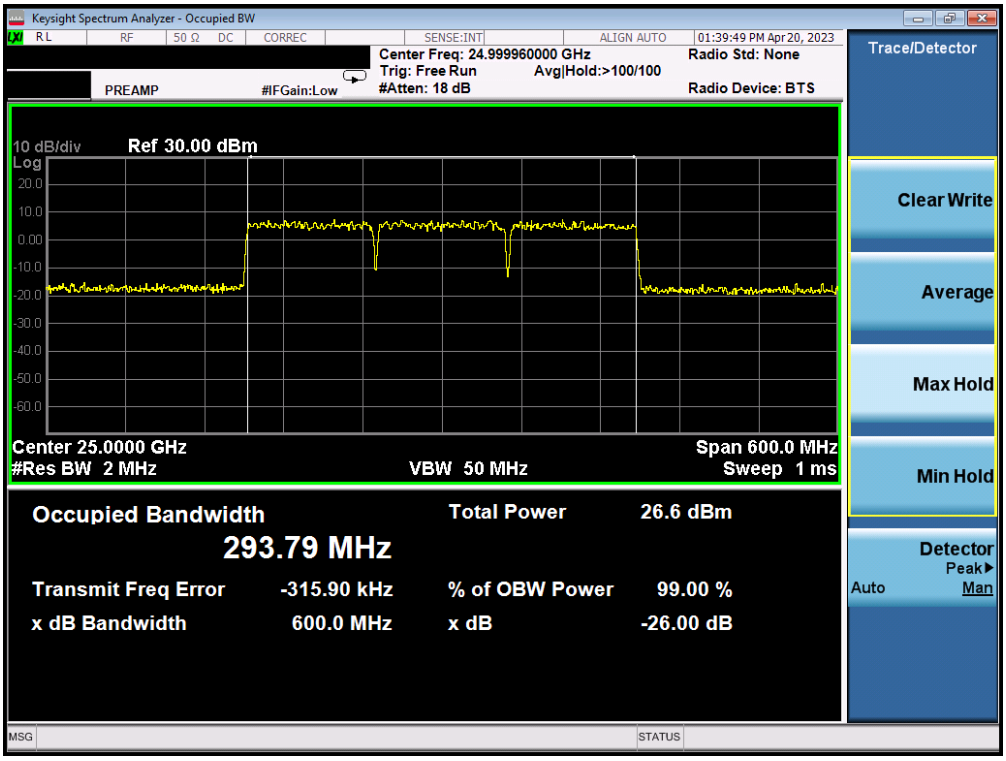

**Plot 7-25. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM QPSK – Mid Channel)**




**Plot 7-26. Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**




**Plot 7-27. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 16QAM – Mid Channel)**

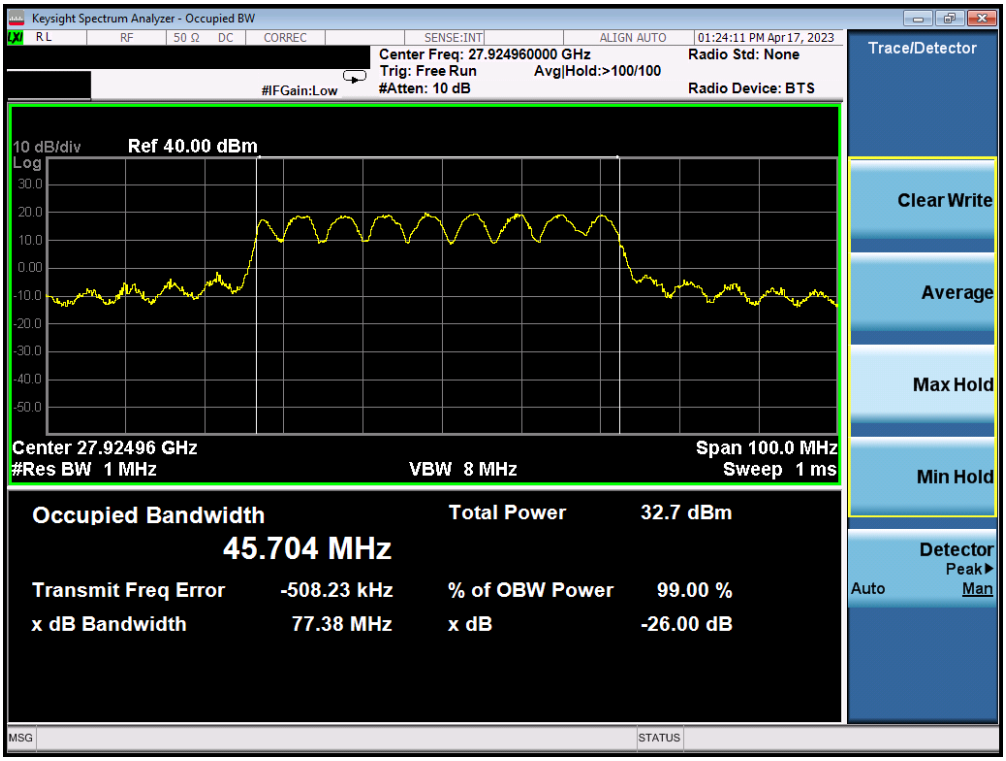



**Plot 7-28. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 64QAM – Mid Channel)**

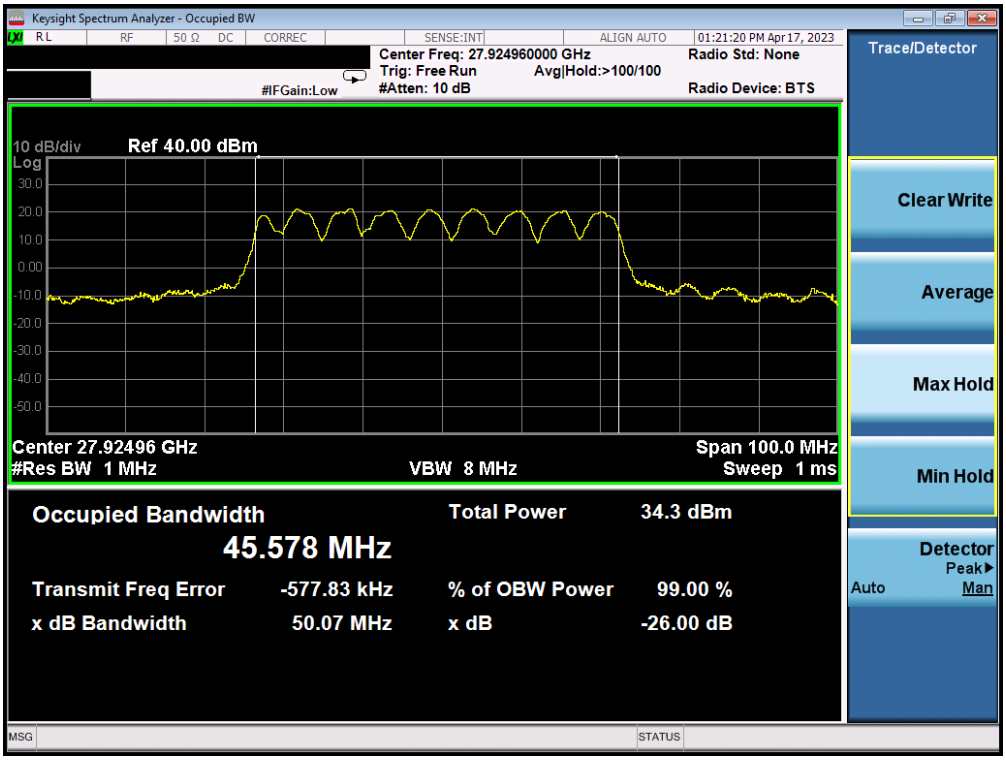
## Band n261

| Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|
| 50 | 1 | CP-OFDM | QPSK | 45.70 |
| | | DFT-s-OFDM | π/2 BPSK | 45.58 |
| | | CP-OFDM | 16QAM | 45.41 |
| | | CP-OFDM | 64QAM | 45.77 |
| 100 | 1 | CP-OFDM | QPSK | 95.13 |
| | | DFT-s-OFDM | π/2 BPSK | 91.89 |
| | | CP-OFDM | 16QAM | 95.02 |
| | | CP-OFDM | 64QAM | 95.37 |
| | 2 | CP-OFDM | QPSK | 194.60 |
| | | DFT-s-OFDM | π/2 BPSK | 189.87 |
| | | CP-OFDM | 16QAM | 194.59 |
| | | CP-OFDM | 64QAM | 196.29 |
| | 3 | CP-OFDM | QPSK | 294.02 |
| | | DFT-s-OFDM | π/2 BPSK | 291.55 |
| | | CP-OFDM | 16QAM | 294.04 |
| | | CP-OFDM | 64QAM | 294.17 |
| | 4 | CP-OFDM | QPSK | 395.89 |
| | | DFT-s-OFDM | π/2 BPSK | 394.04 |
| | | CP-OFDM | 16QAM | 395.04 |
| | | CP-OFDM | 64QAM | 395.09 |

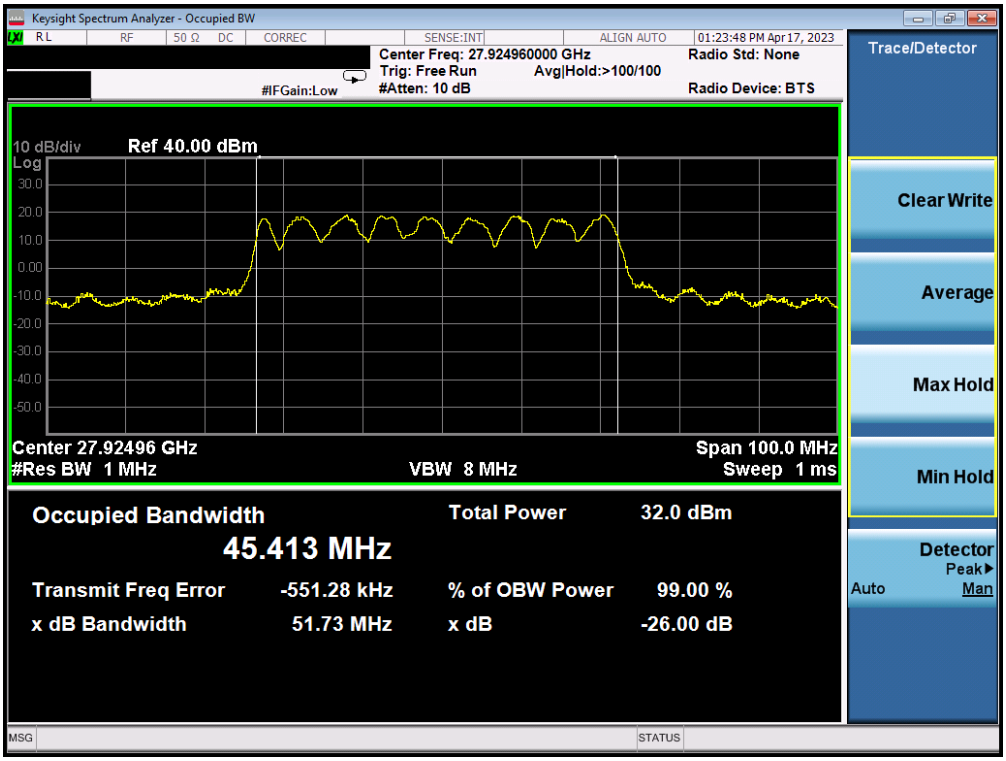
**Table 7-4. Summary of Occupied Bandwidths (n261)**



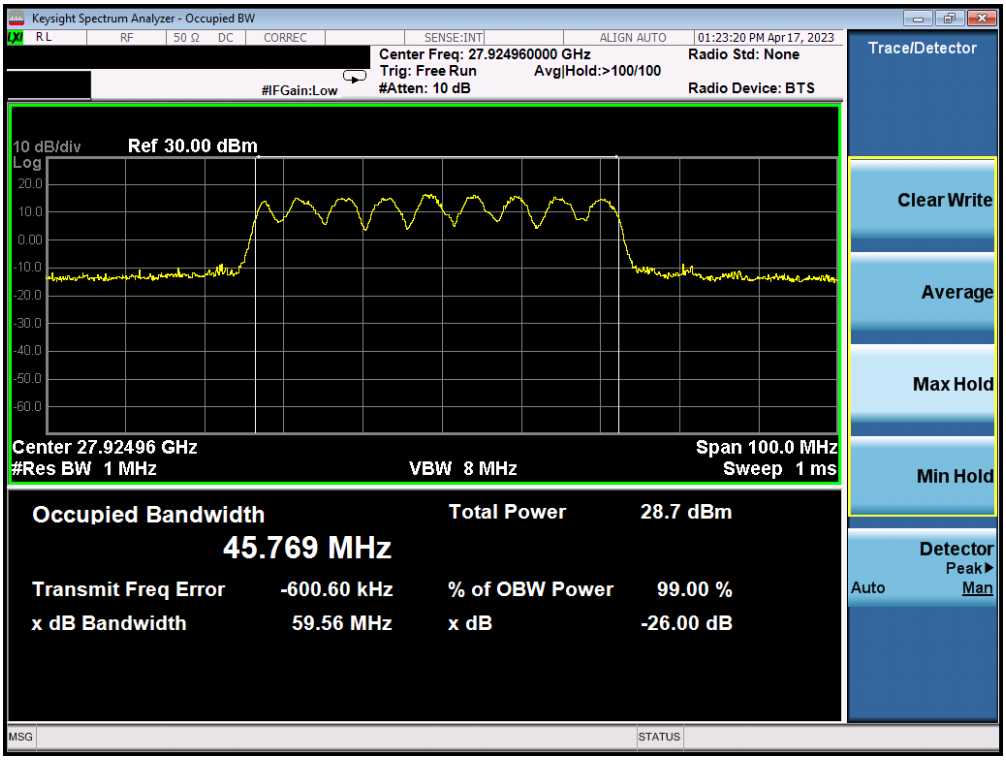

**Plot 7-29. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



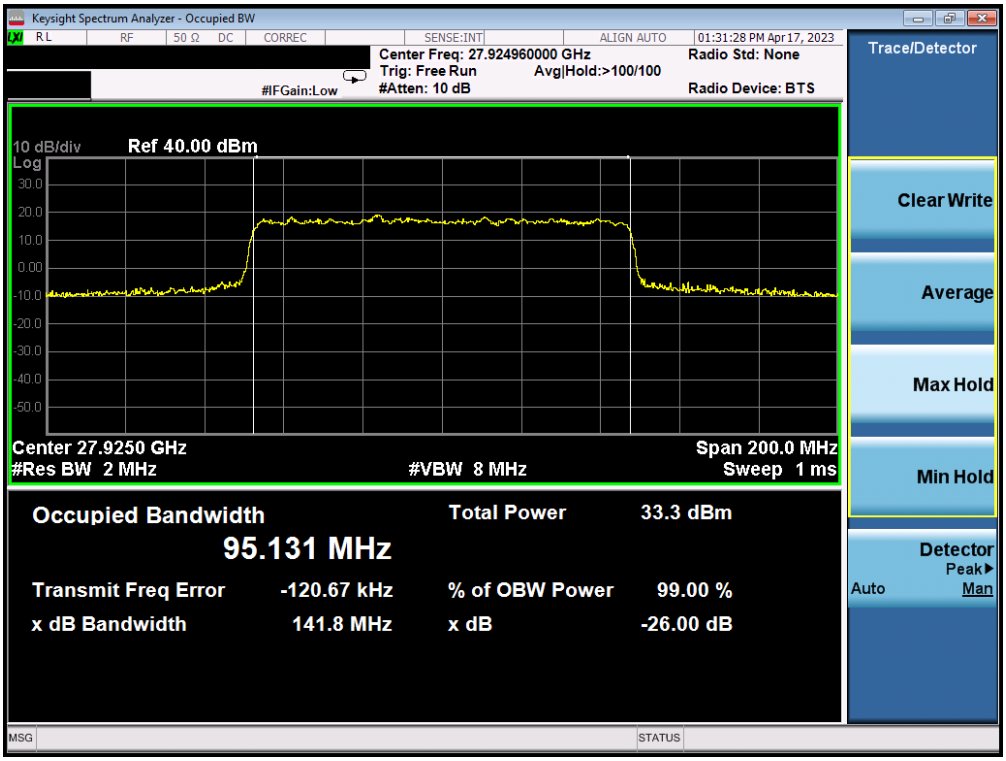

**Plot 7-30. Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



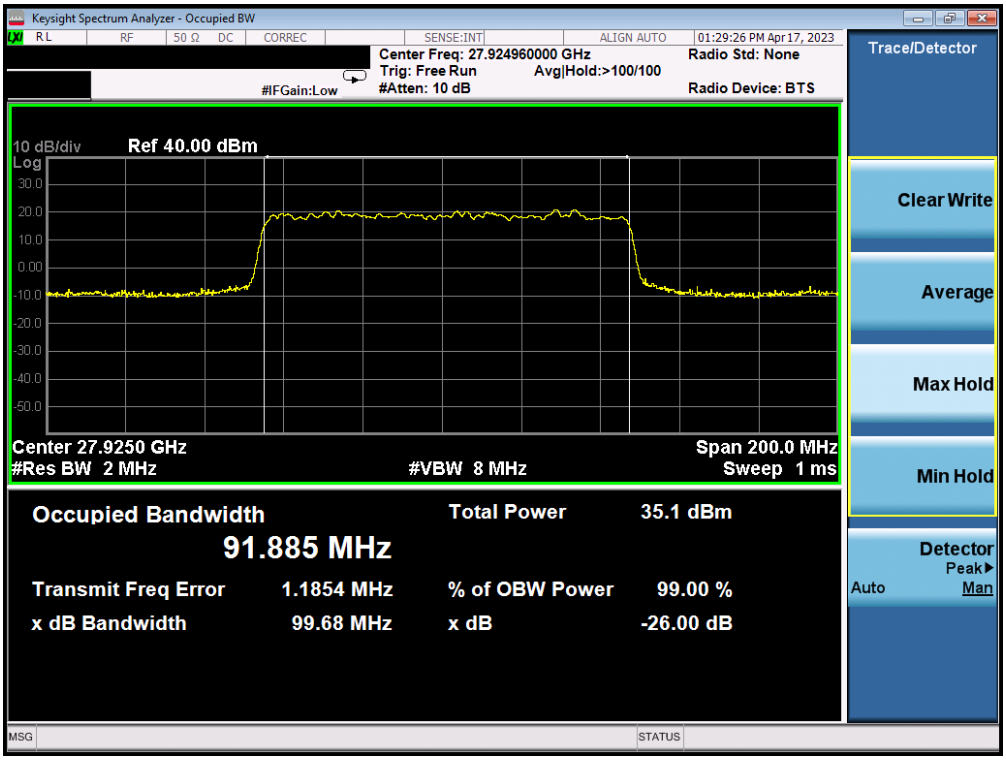

**Plot 7-31. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



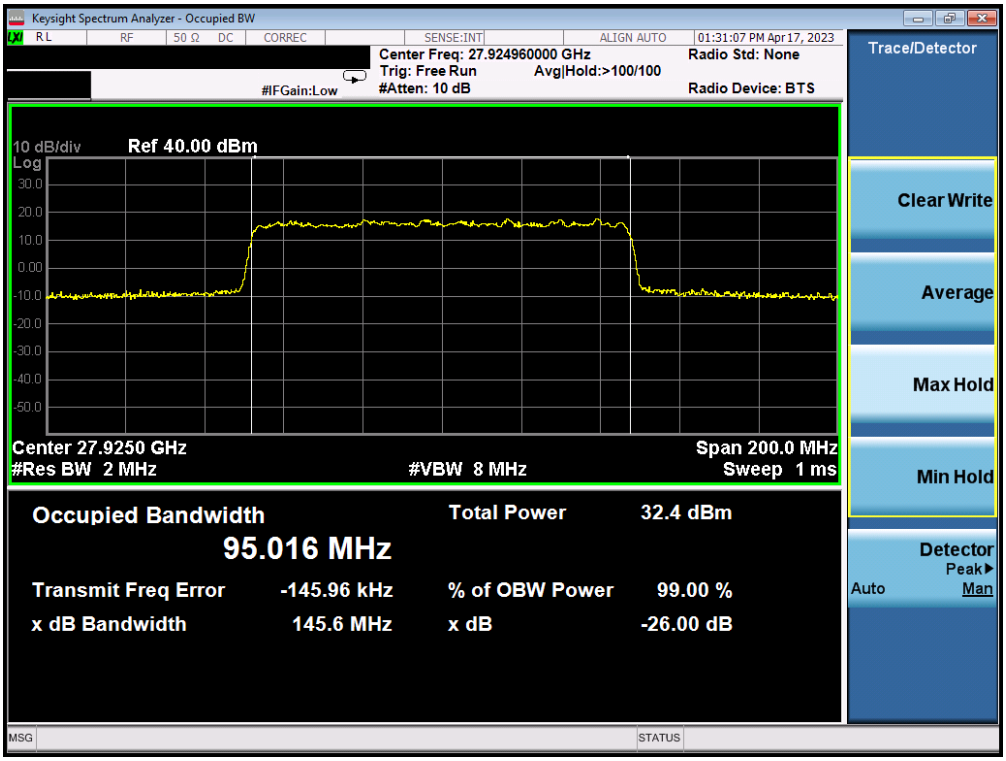

**Plot 7-32. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



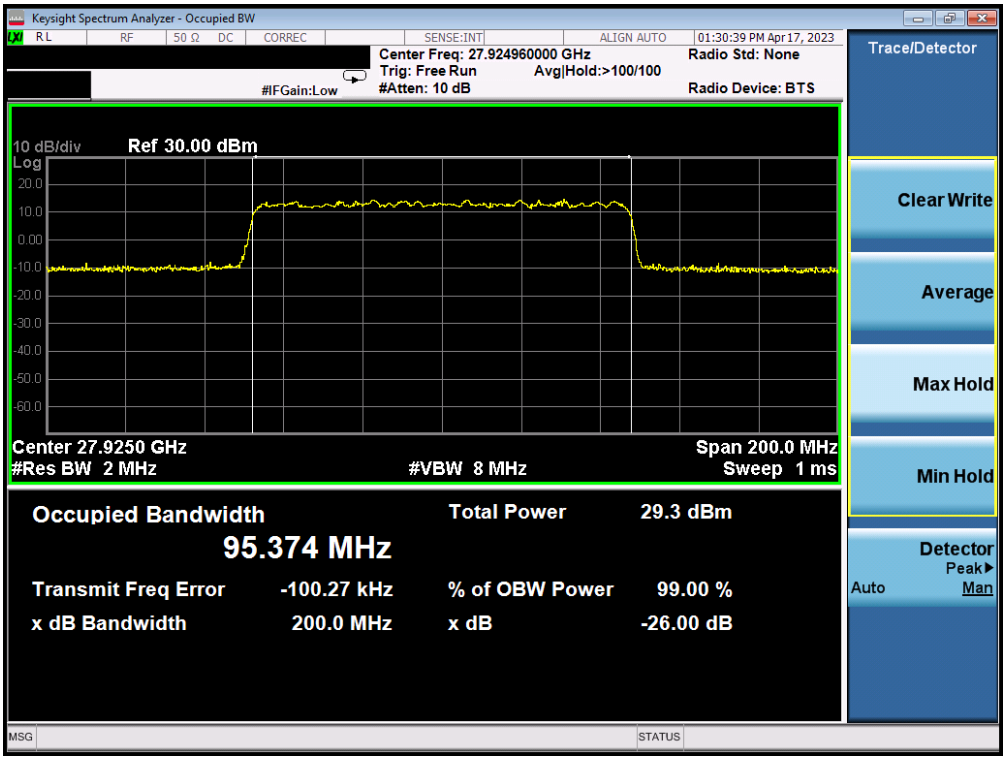

**Plot 7-33. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



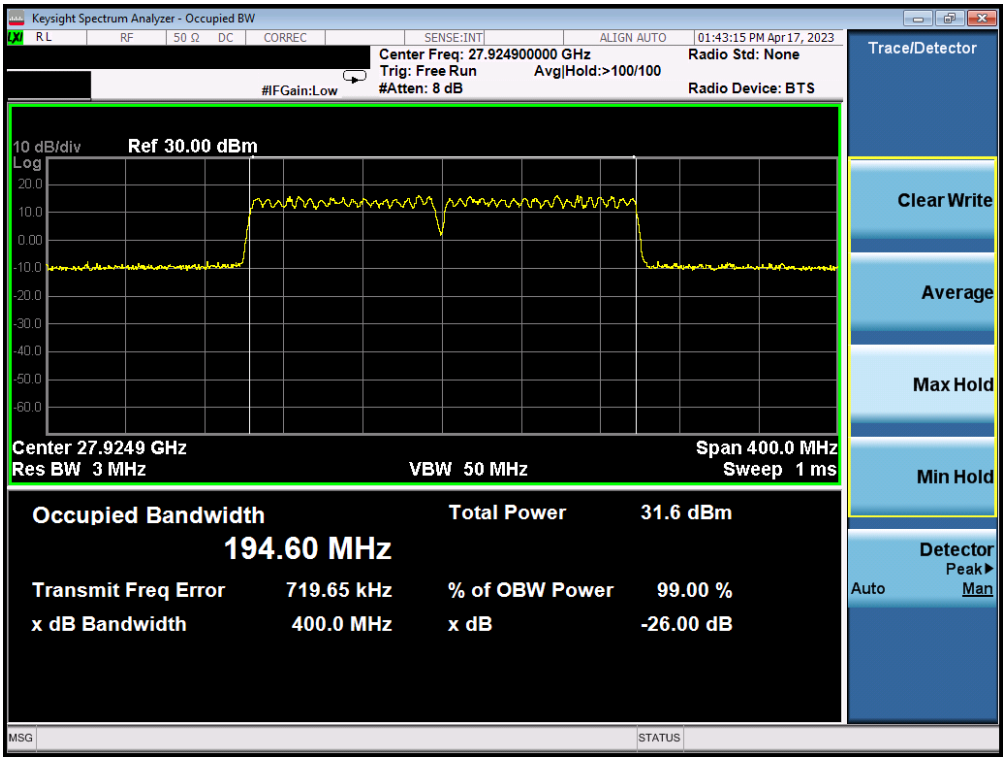

**Plot 7-34. Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



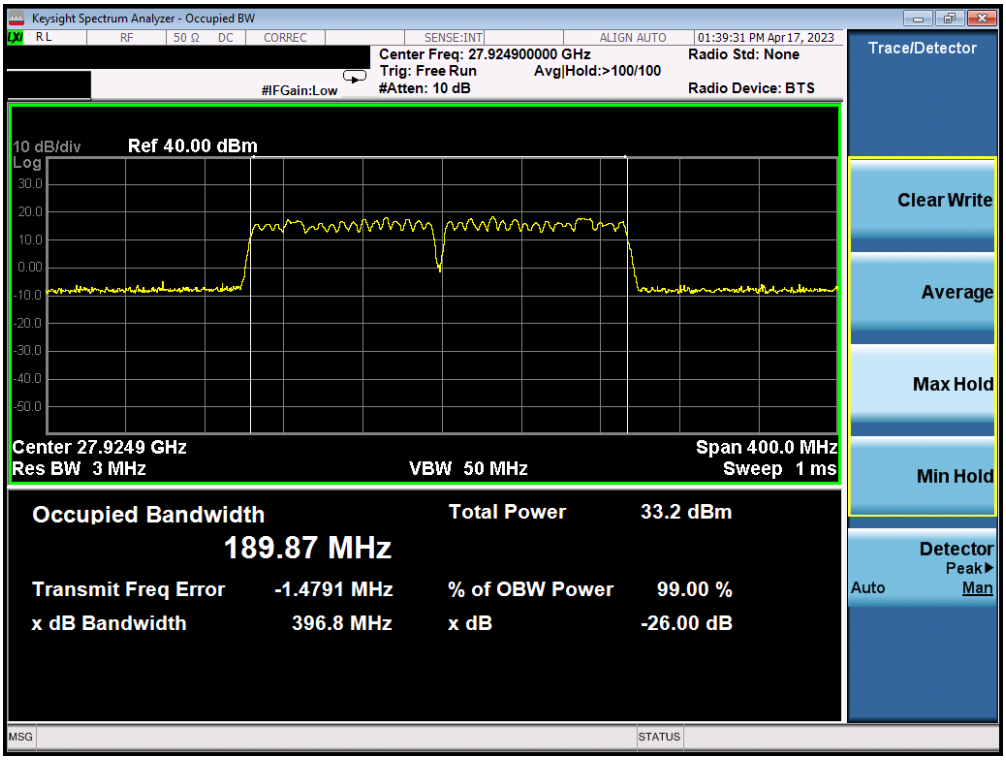

**Plot 7-35. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



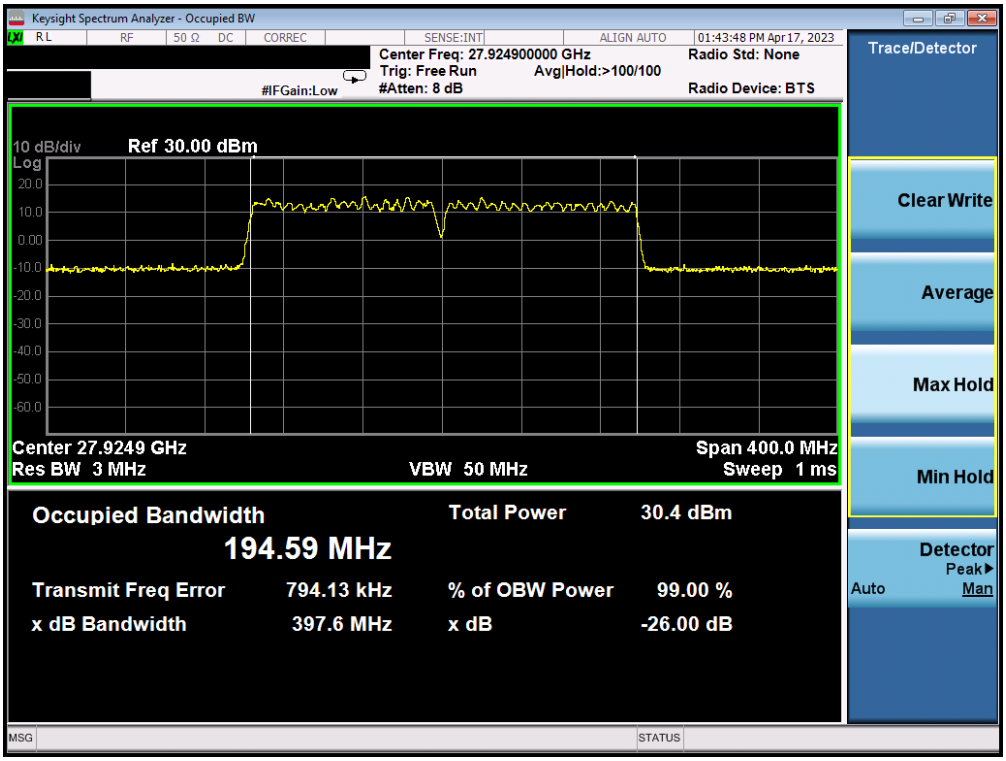

**Plot 7-36. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



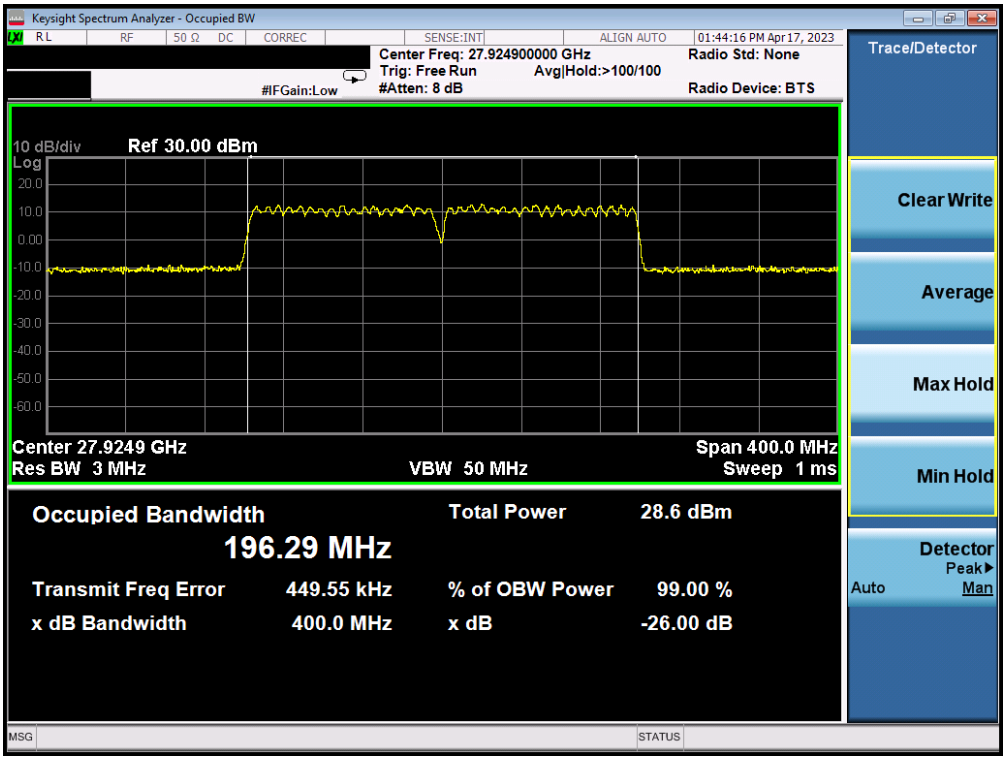

**Plot 7-37. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM QPSK – Mid Channel)**



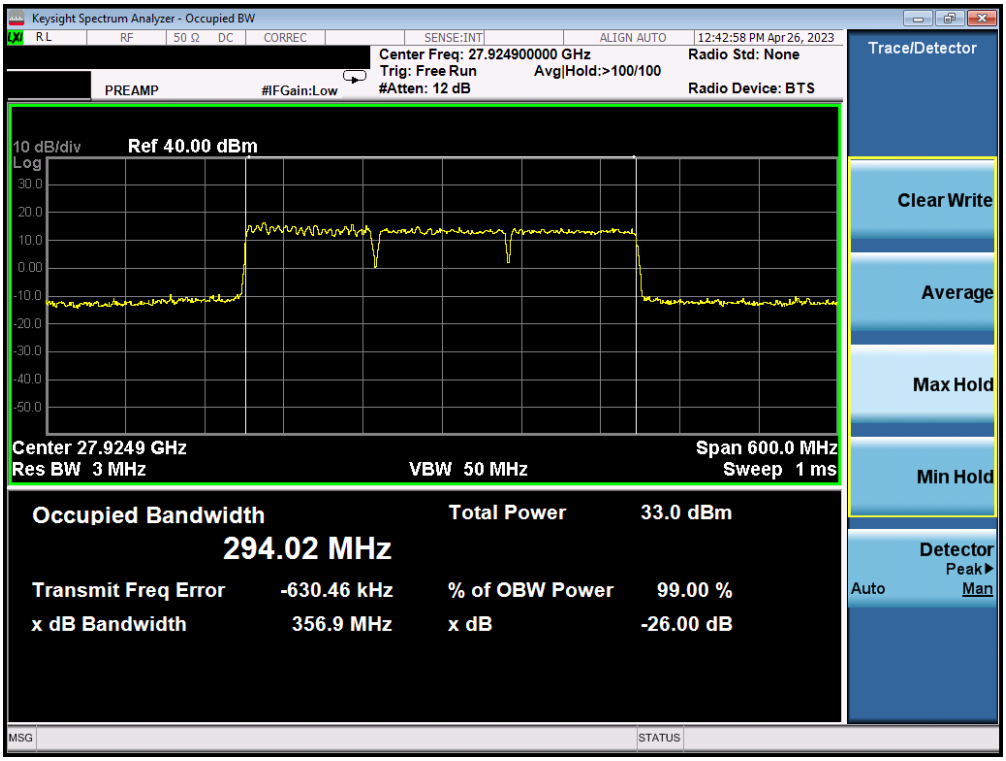

**Plot 7-38. Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



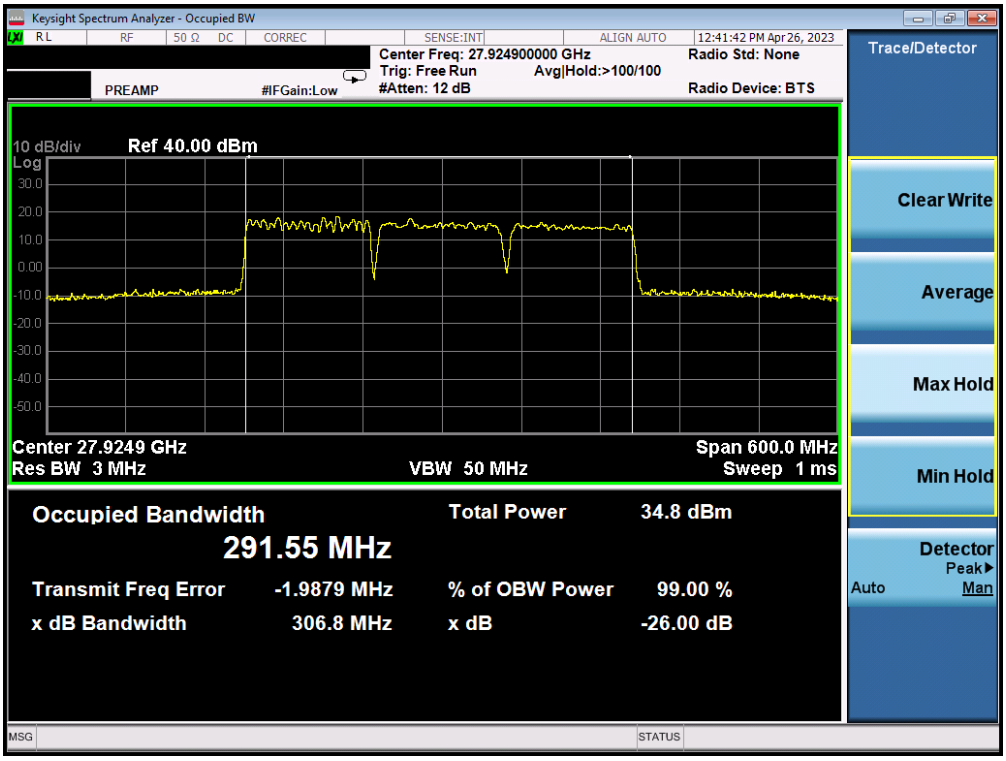

**Plot 7-39. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**



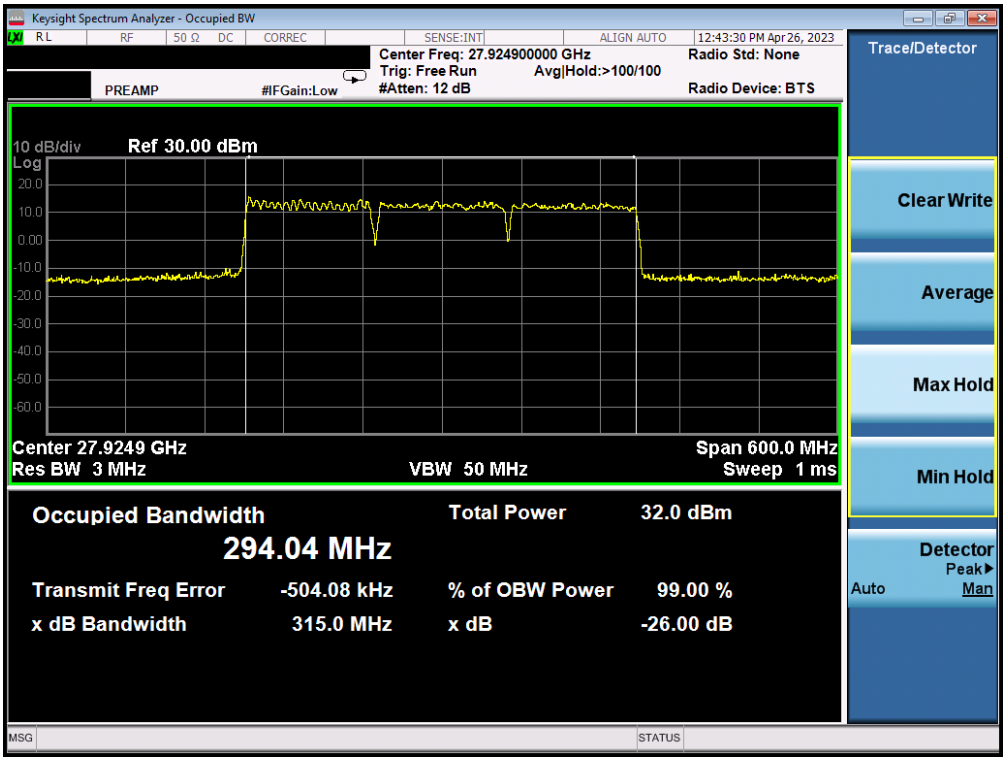

**Plot 7-40. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 64QAM – Mid Channel)**



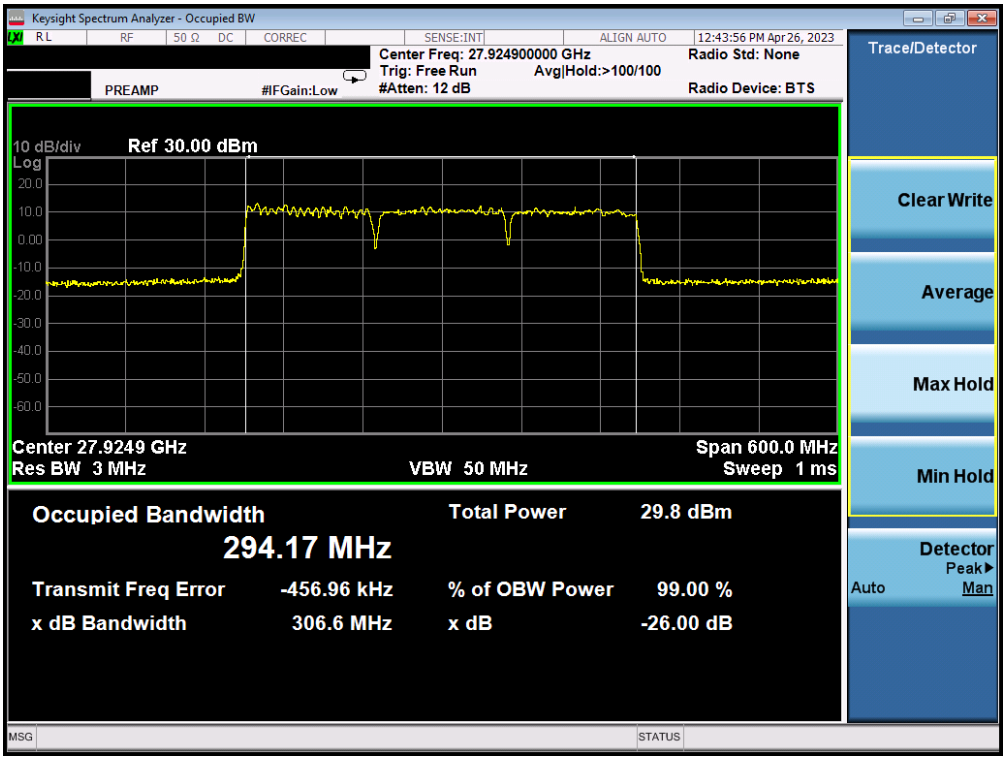

**Plot 7-41. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM QPSK – Mid Channel)**



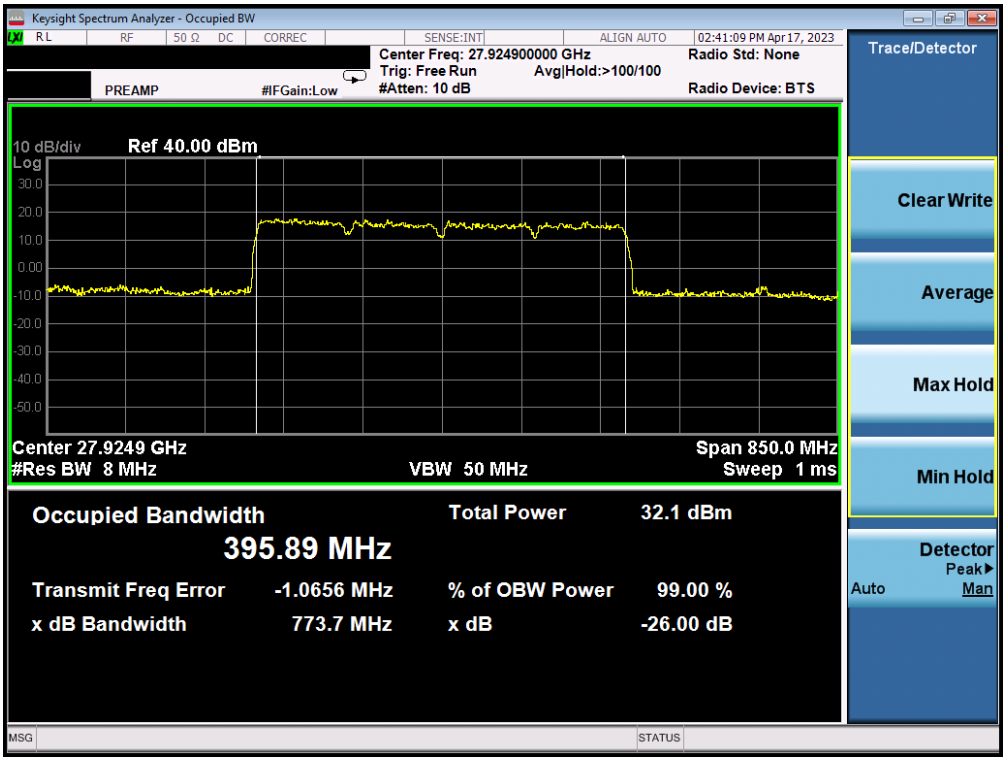

**Plot 7-42. Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



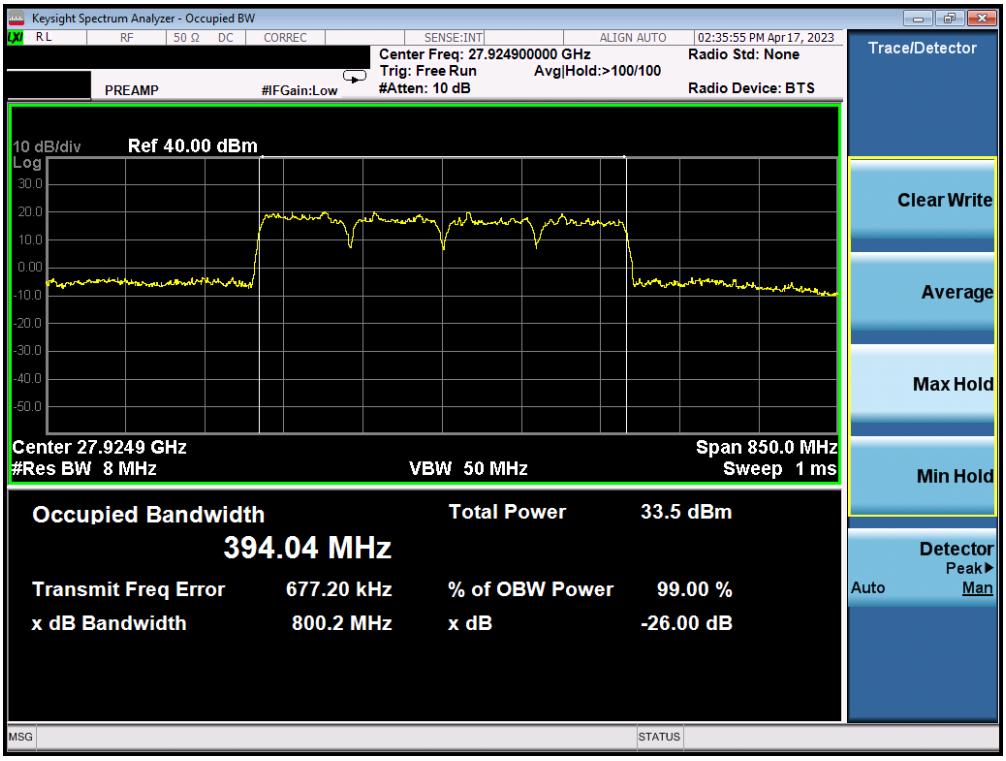

**Plot 7-43. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 16QAM – Mid Channel)**



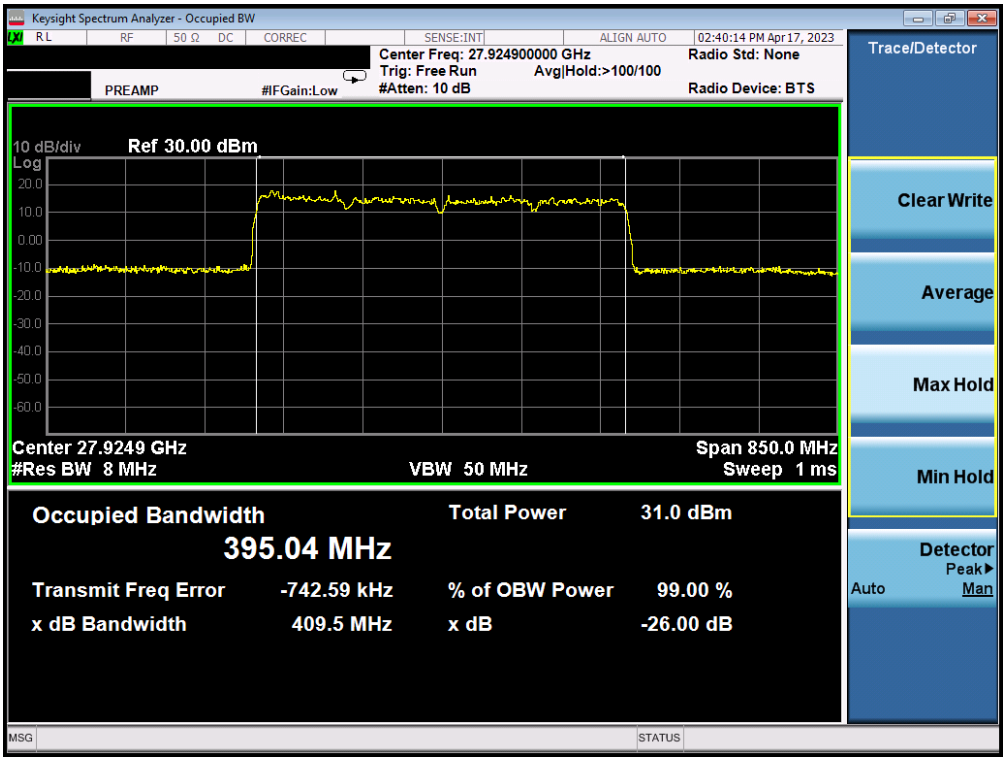

**Plot 7-44. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 64QAM – Mid Channel)**



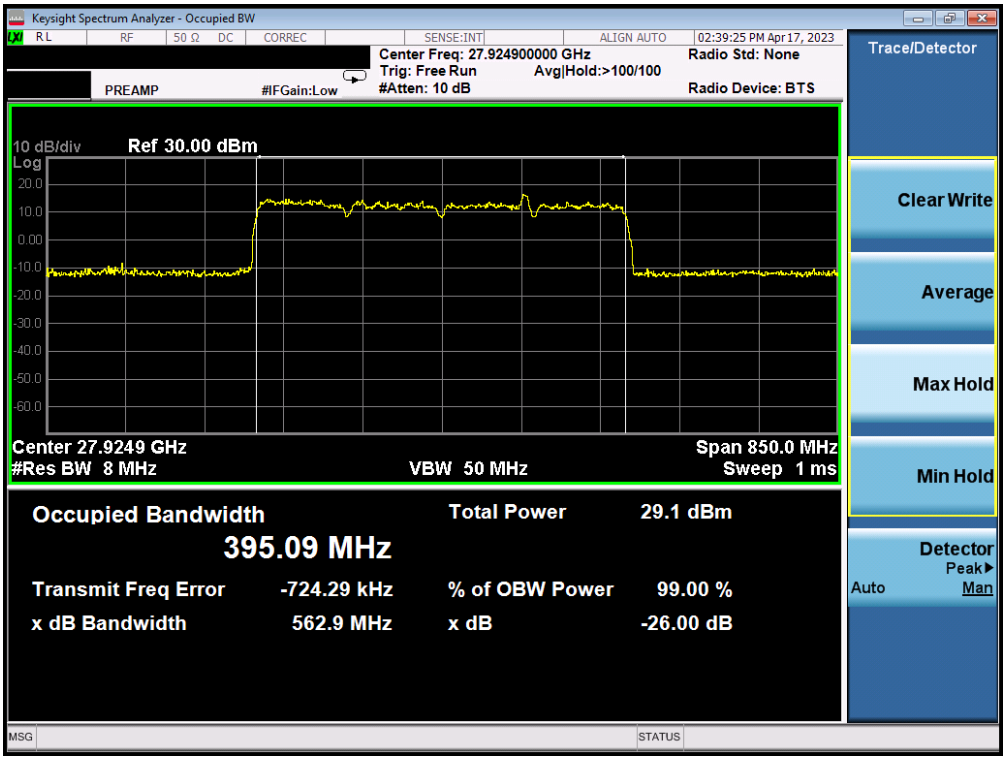

**Plot 7-45. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM QPSK – Mid Channel)**




**Plot 7-46. Occupied Bandwidth Plot (100MHz-4CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**




**Plot 7-47. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM 16QAM – Mid Channel)**

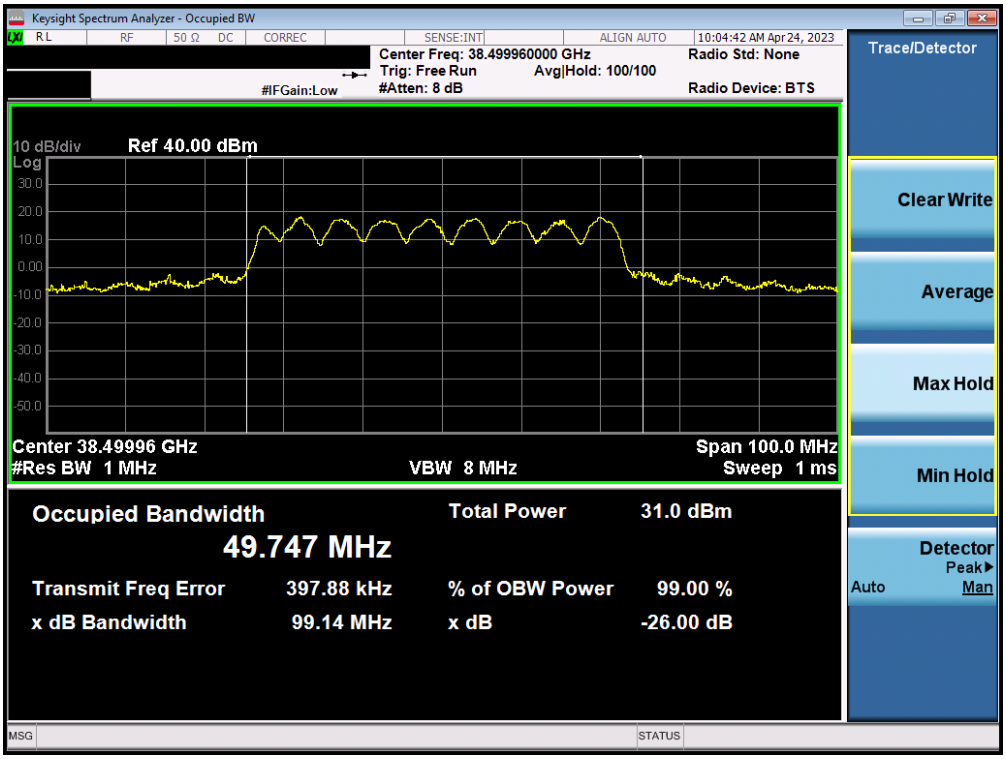



**Plot 7-48. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM 64QAM – Mid Channel)**

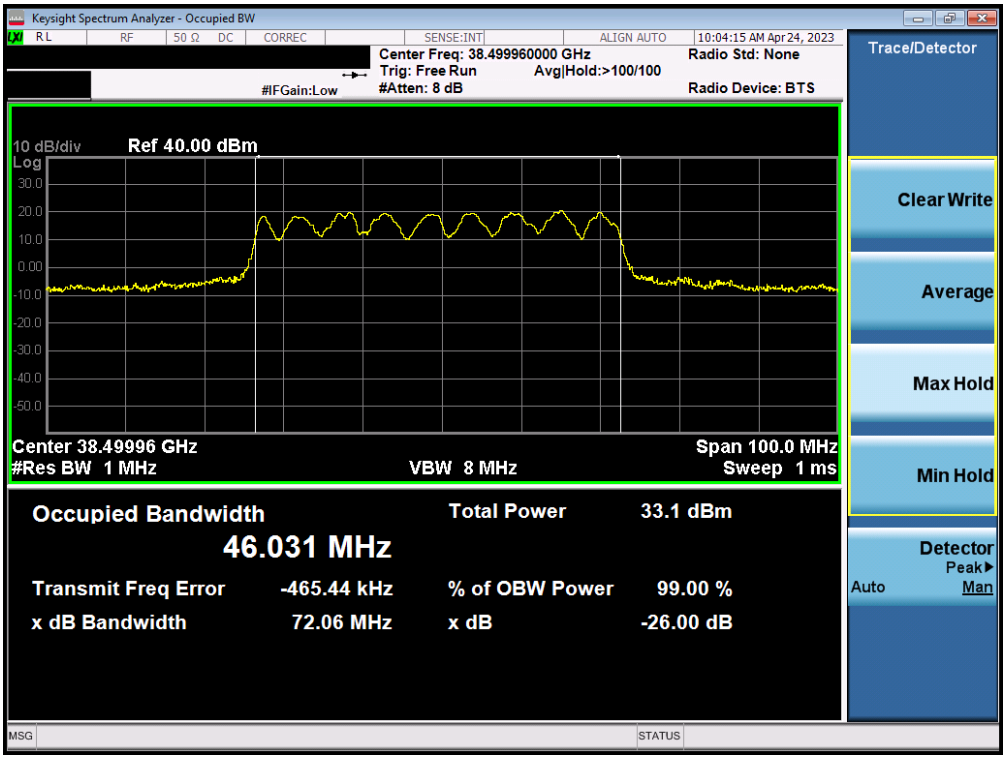
## Band n260

| Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|
| 50 | 1 | CP-OFDM | QPSK | 49.75 |
| | | DFT-s-OFDM | π/2 BPSK | 46.03 |
| | | CP-OFDM | 16QAM | 46.01 |
| | | CP-OFDM | 64QAM | 45.68 |
| 100 | 1 | CP-OFDM | QPSK | 95.17 |
| | | DFT-s-OFDM | π/2 BPSK | 92.72 |
| | | CP-OFDM | 16QAM | 95.18 |
| | | CP-OFDM | 64QAM | 95.51 |
| | 2 | CP-OFDM | QPSK | 195.16 |
| | | DFT-s-OFDM | π/2 BPSK | 193.04 |
| | | CP-OFDM | 16QAM | 195.28 |
| | | CP-OFDM | 64QAM | 197.45 |
| | 3 | CP-OFDM | QPSK | 298.60 |
| | | DFT-s-OFDM | π/2 BPSK | 298.33 |
| | | CP-OFDM | 16QAM | 298.93 |
| | | CP-OFDM | 64QAM | 298.43 |
| | 4 | CP-OFDM | QPSK | 398.05 |
| | | DFT-s-OFDM | π/2 BPSK | 398.36 |
| | | CP-OFDM | 16QAM | 397.84 |
| | | CP-OFDM | 64QAM | 398.90 |

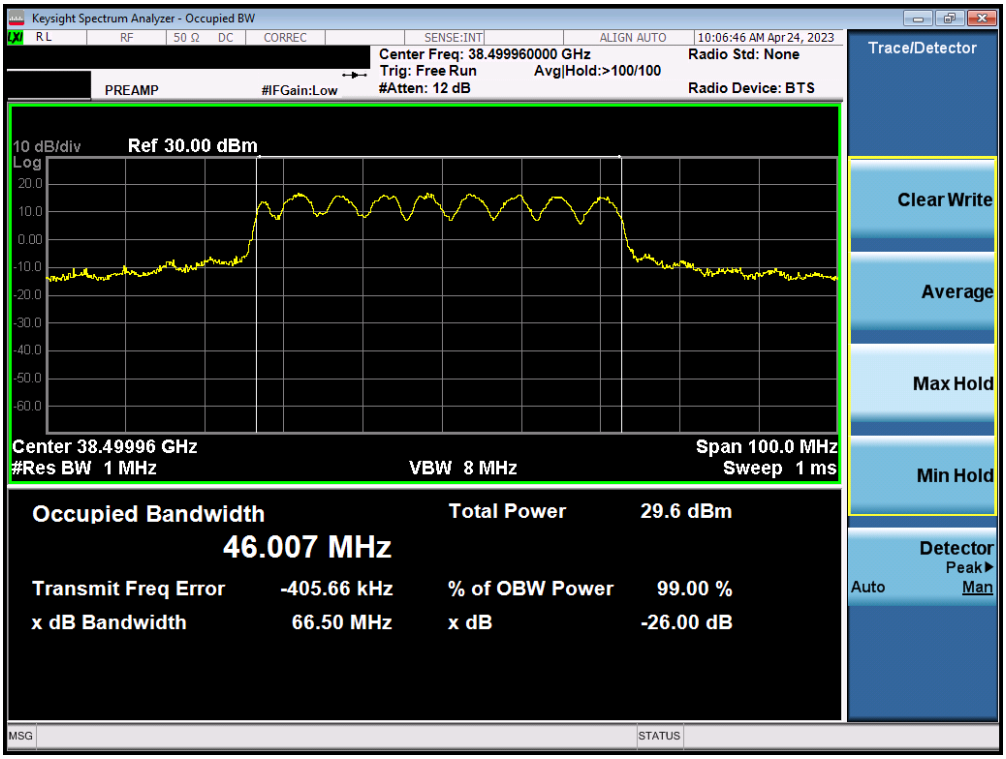
**Table 7-5. Summary of Occupied Bandwidths (n260)**



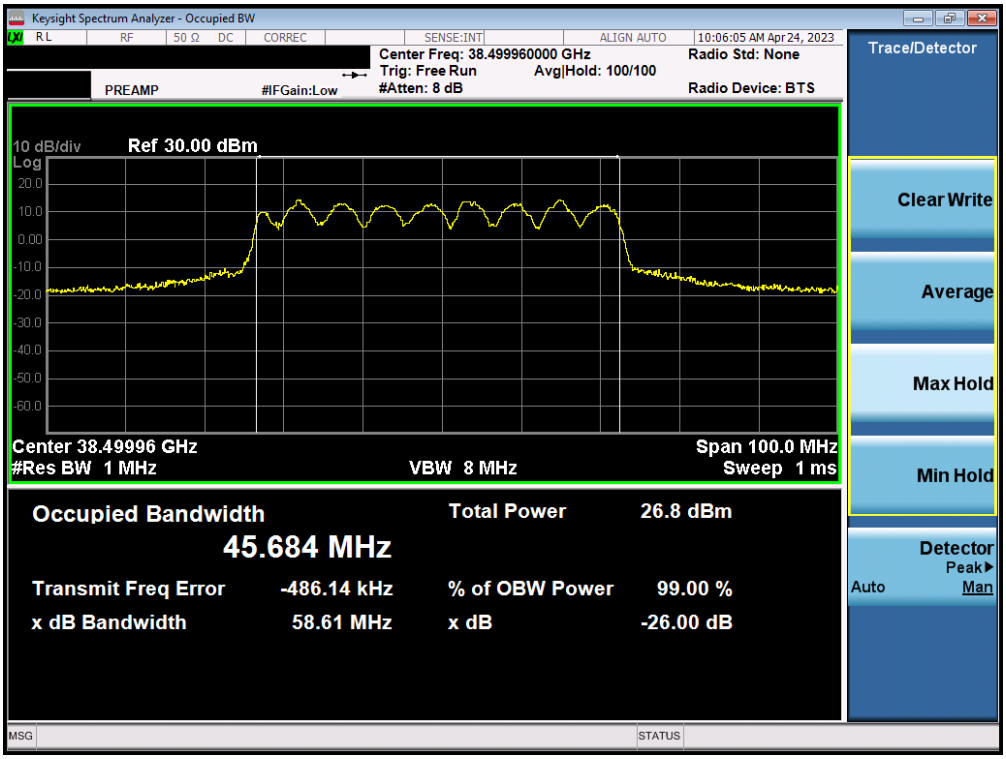

**Plot 7-49. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



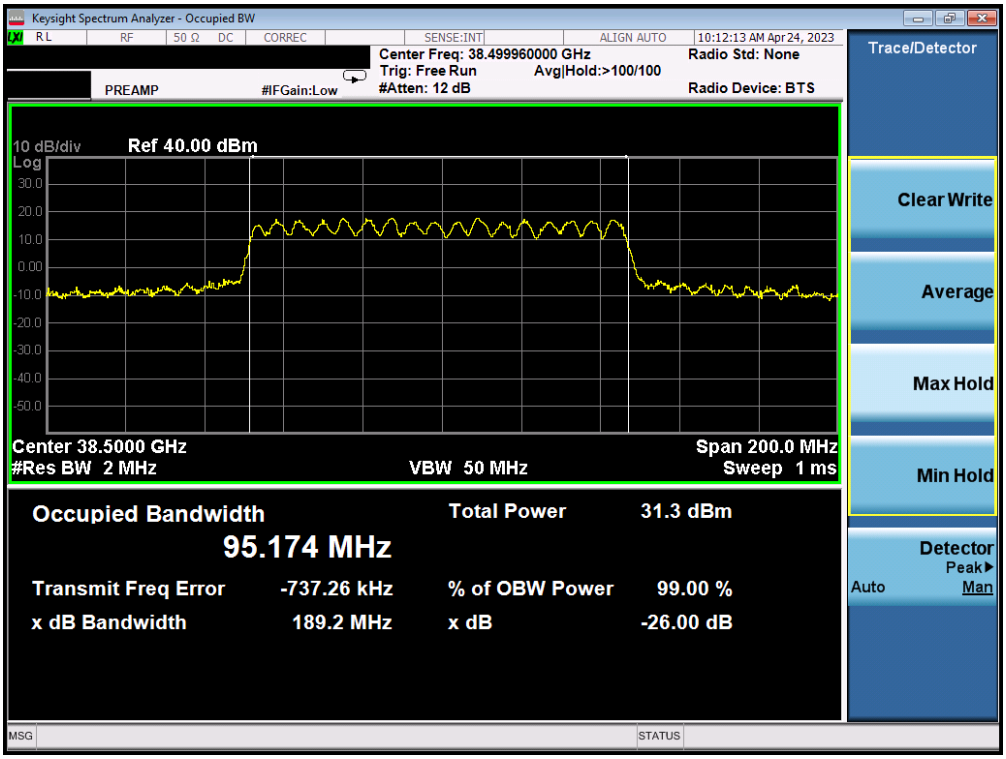

**Plot 7-50. Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



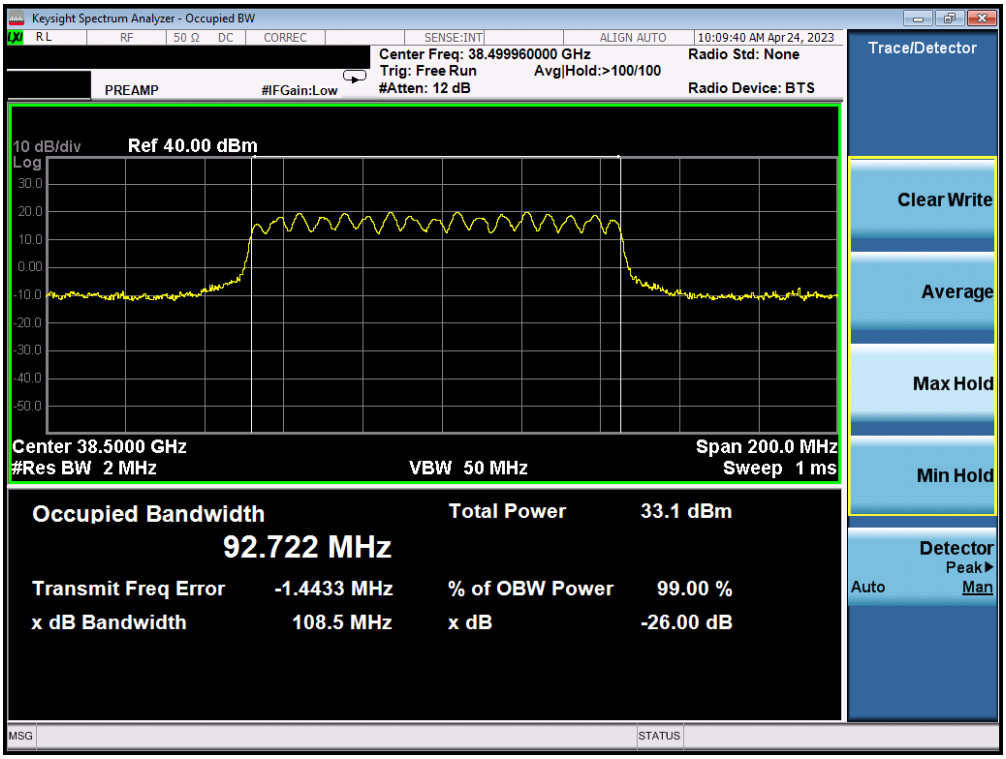

**Plot 7-51. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



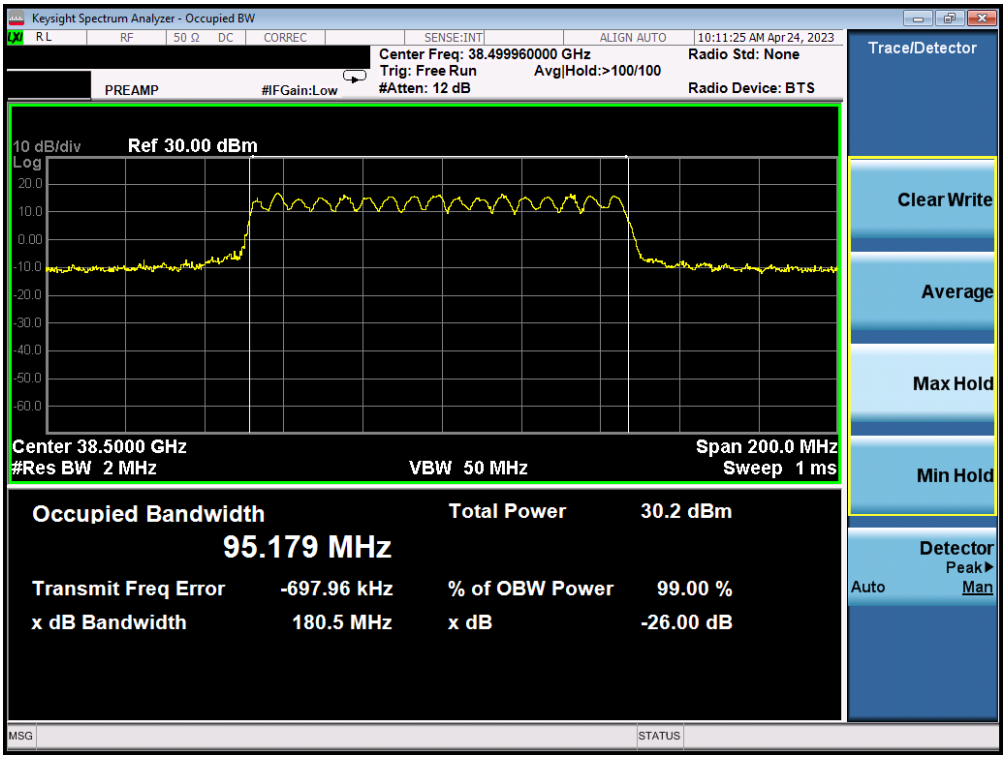

**Plot 7-52. Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



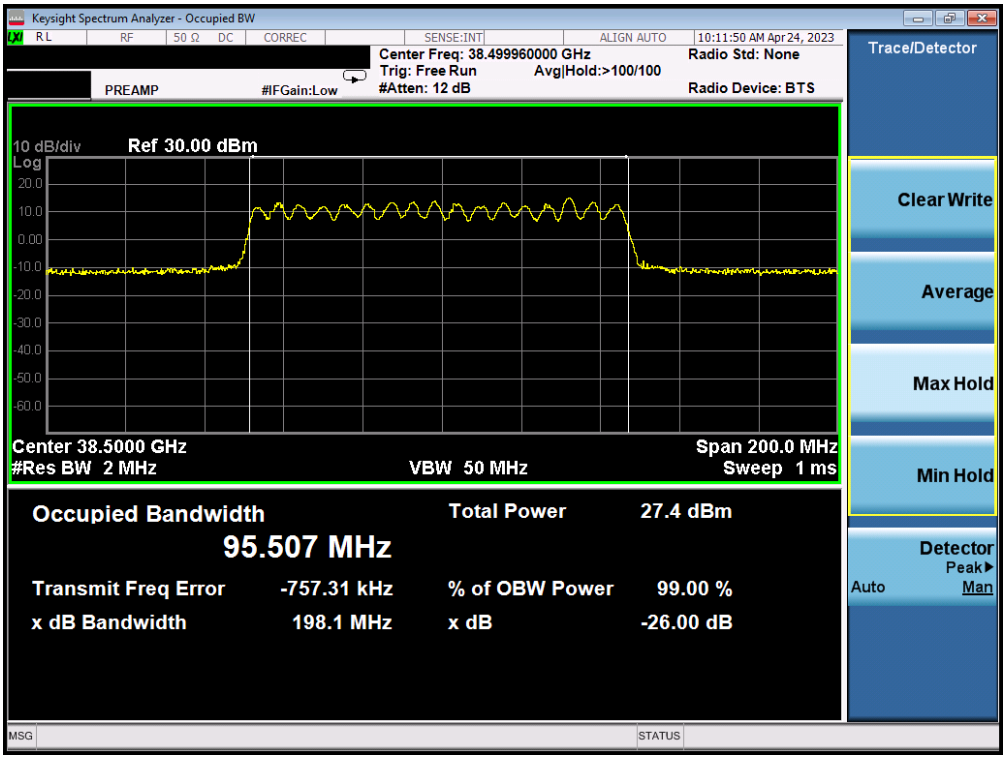

**Plot 7-53. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



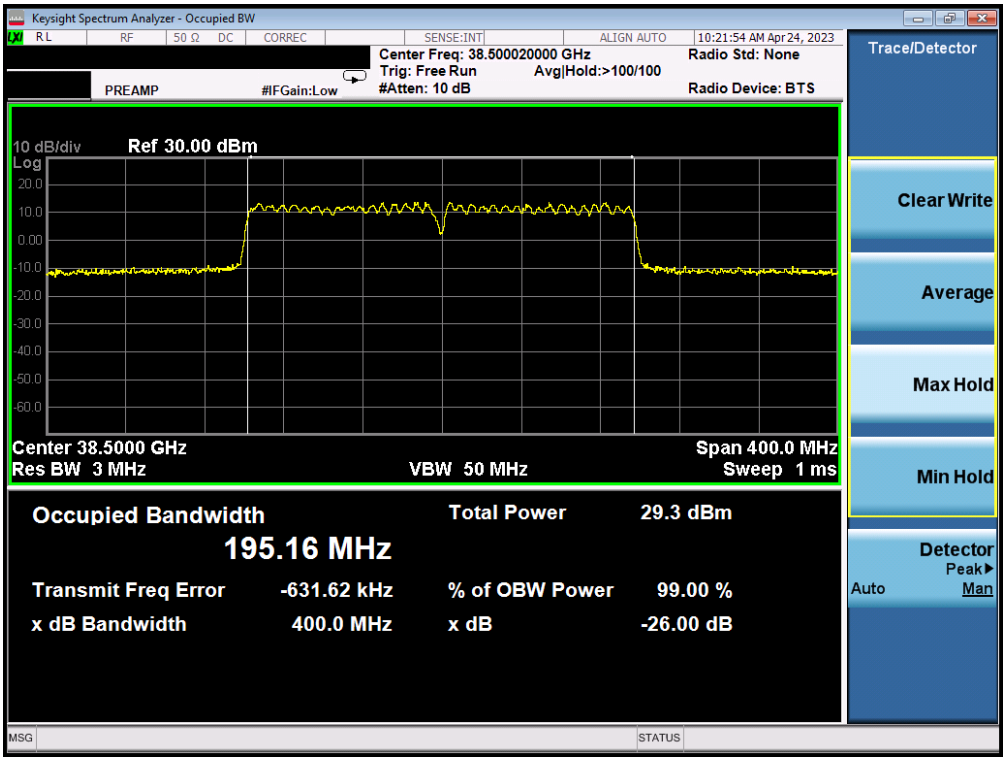

**Plot 7-54. Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



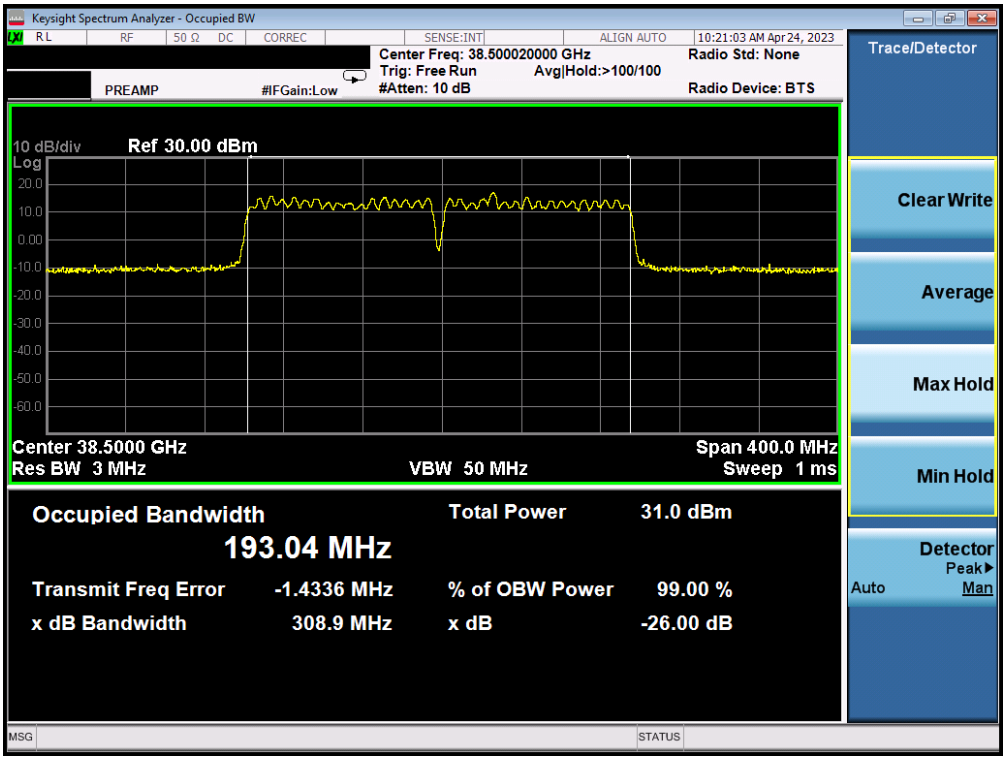

**Plot 7-55. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



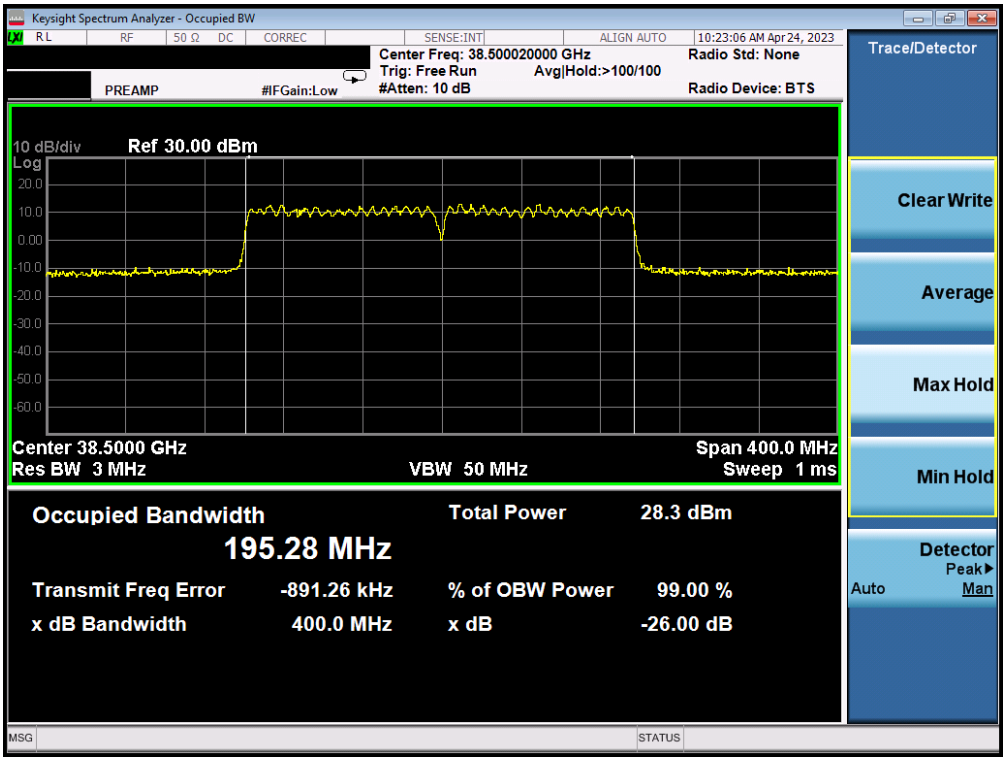

**Plot 7-56. Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



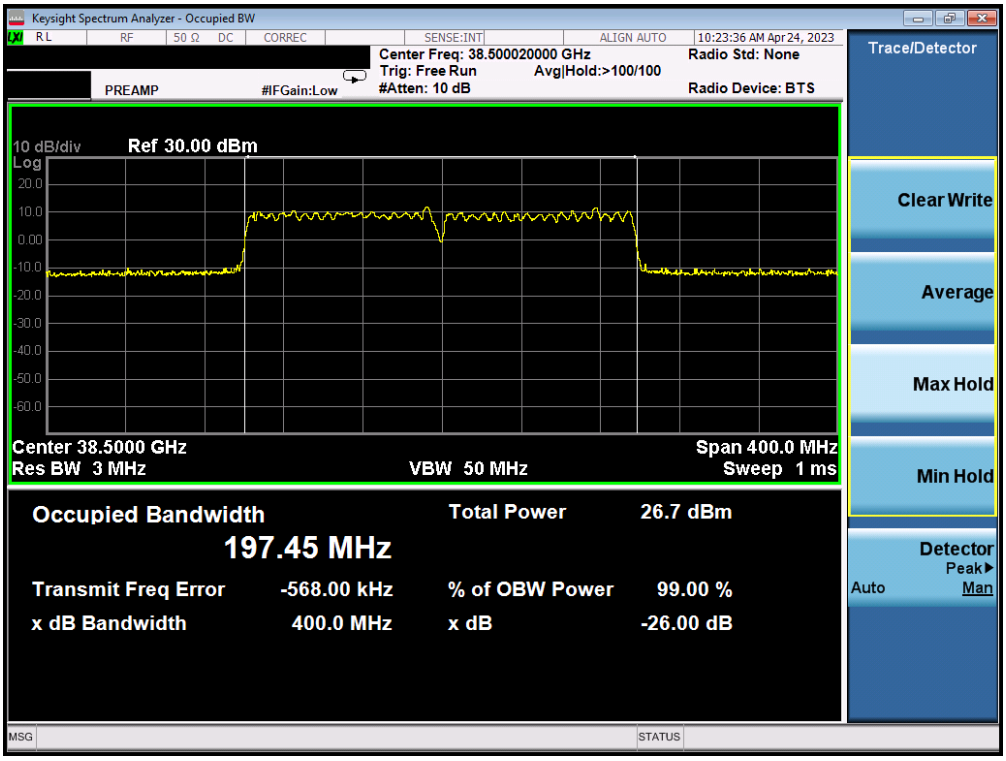

**Plot 7-57. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM QPSK – Mid Channel)**



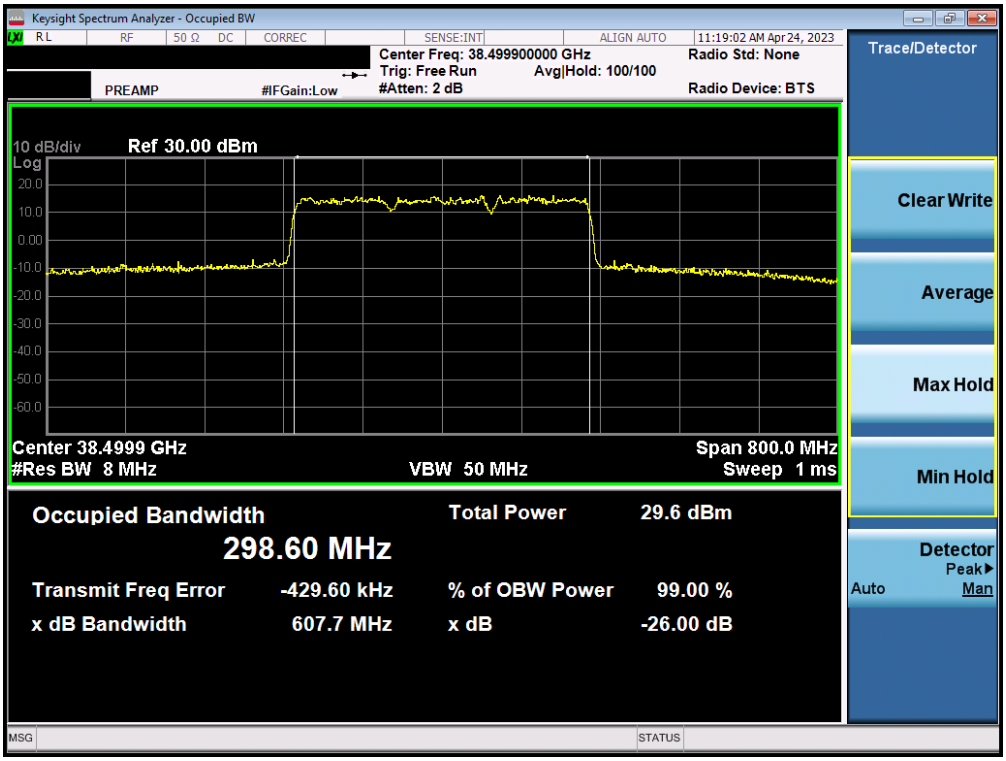

**Plot 7-58. Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



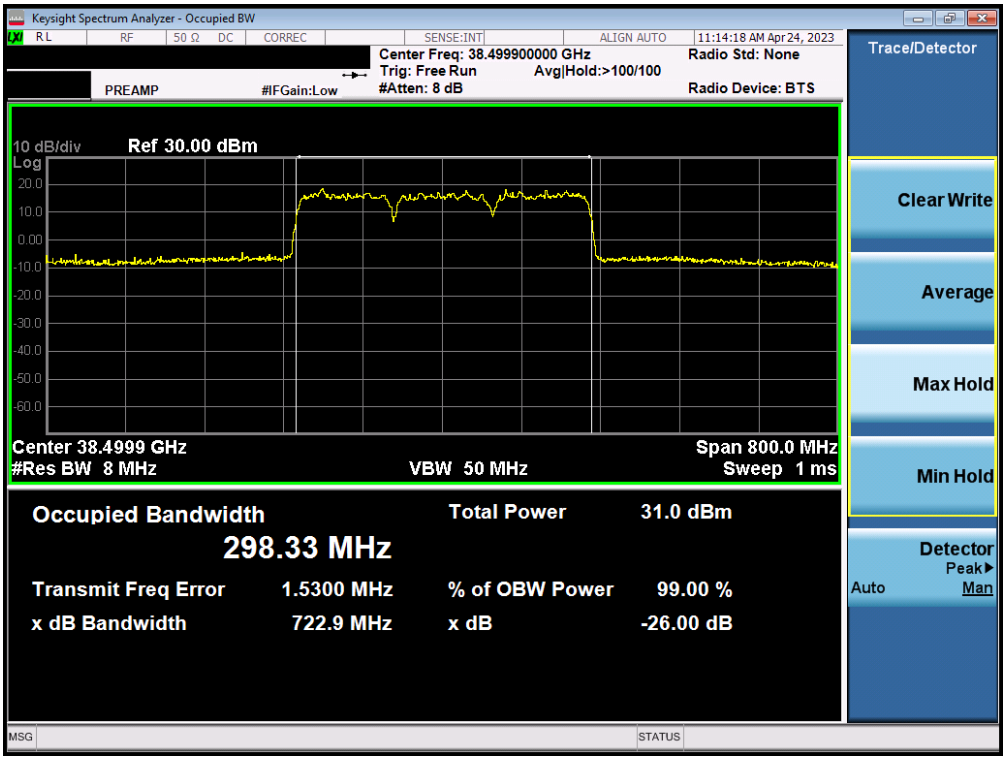

**Plot 7-59. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**



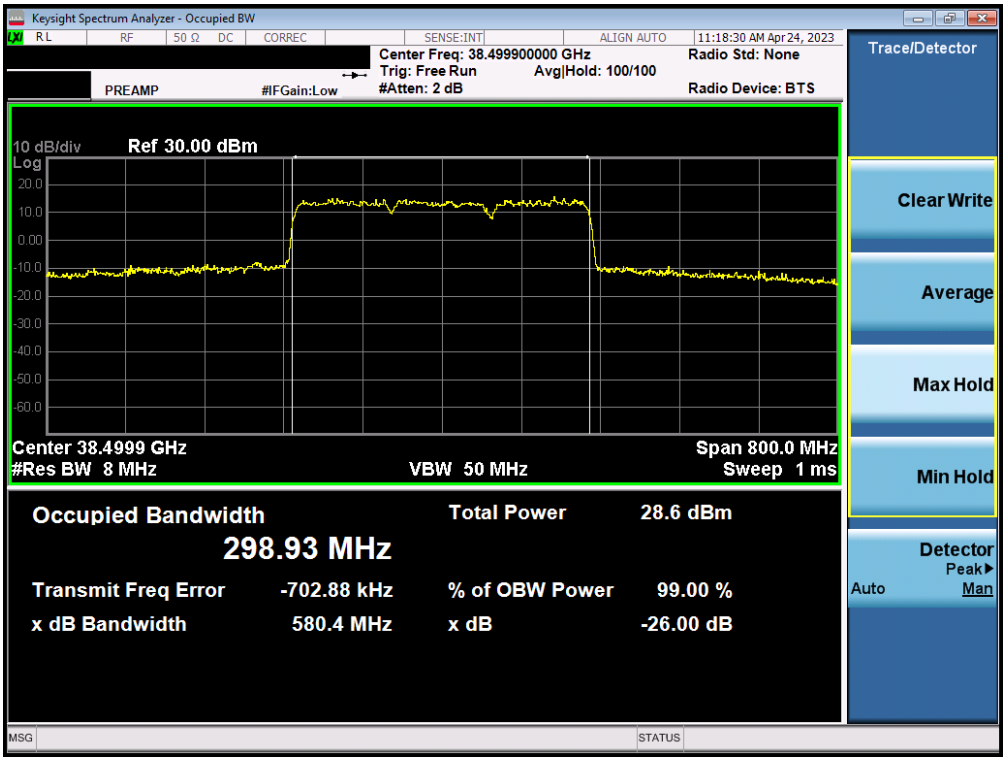

**Plot 7-60. Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 64QAM – Mid Channel)**



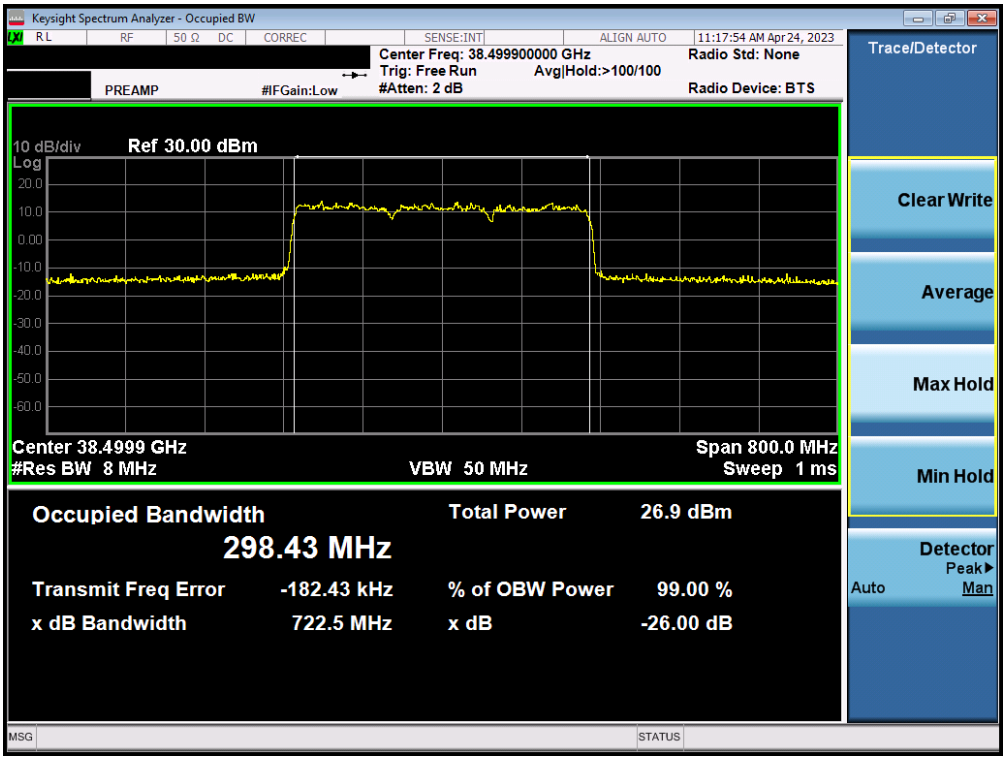

**Plot 7-61. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM QPSK – Mid Channel)**



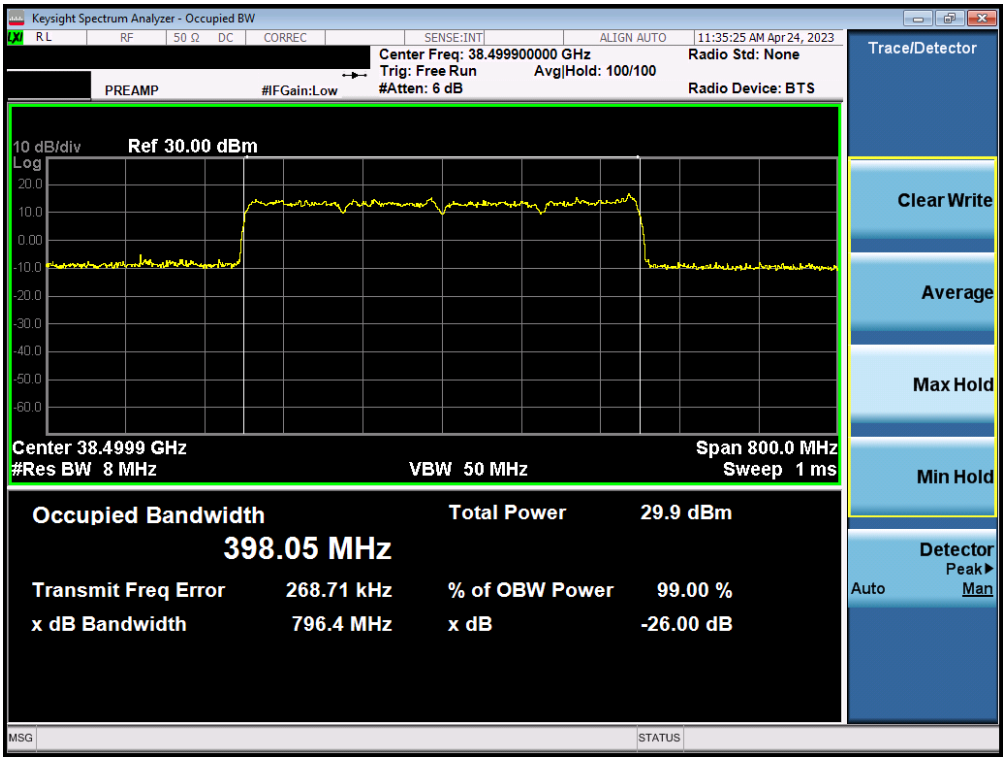

**Plot 7-62. Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



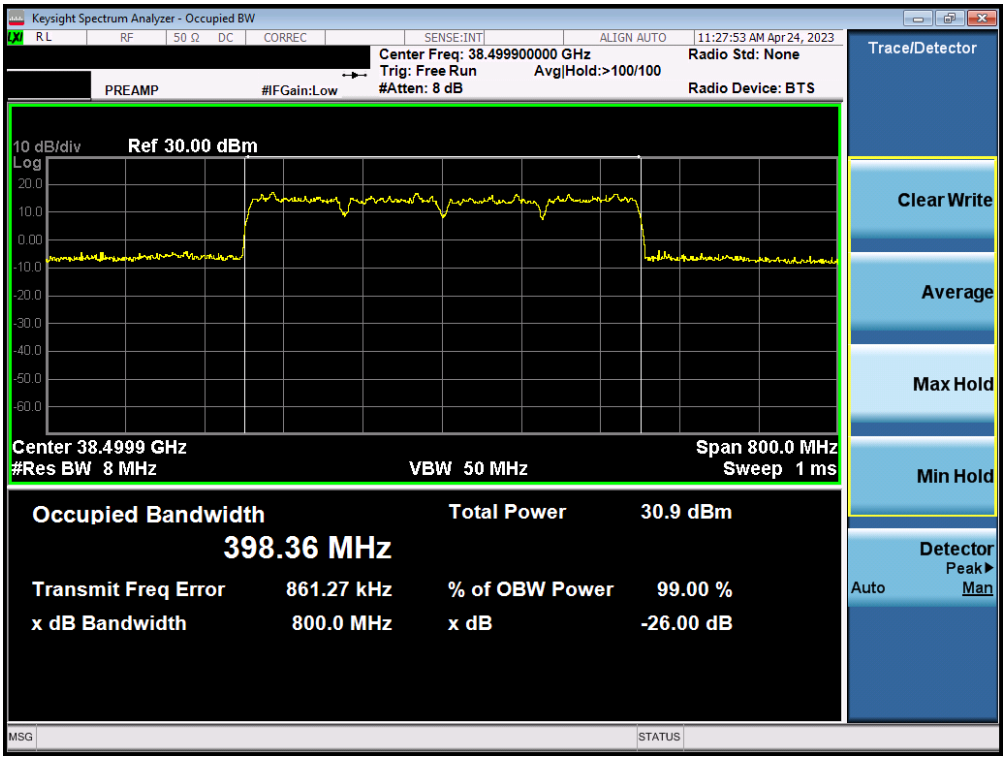

**Plot 7-63. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 16QAM – Mid Channel)**



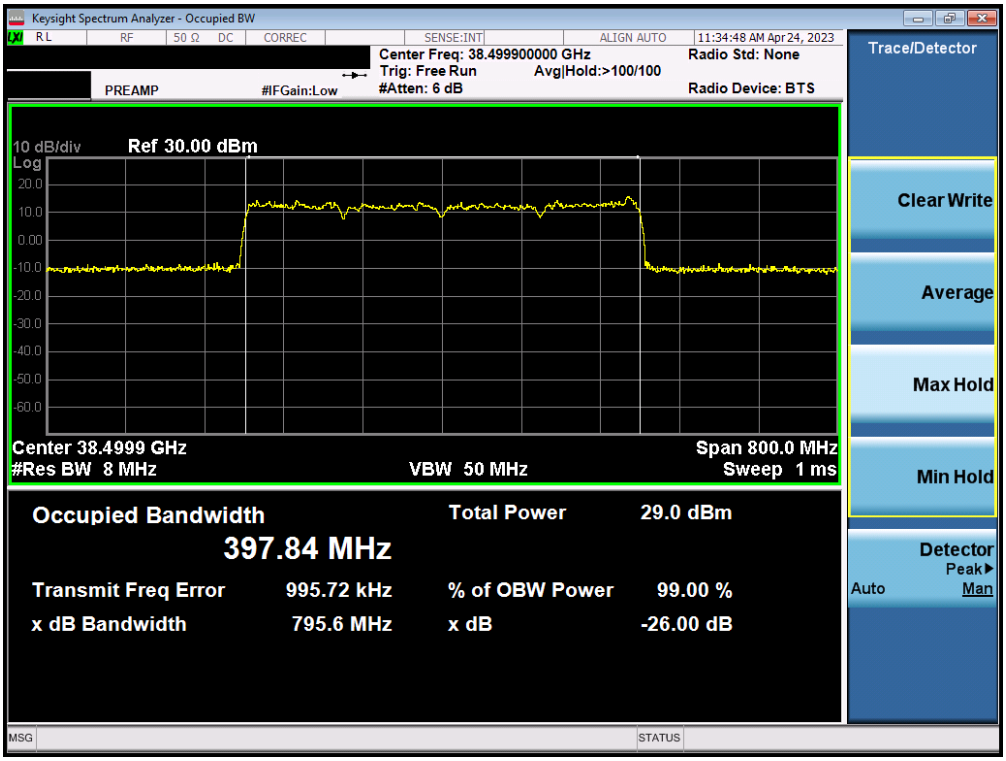

**Plot 7-64. Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 64QAM – Mid Channel)**



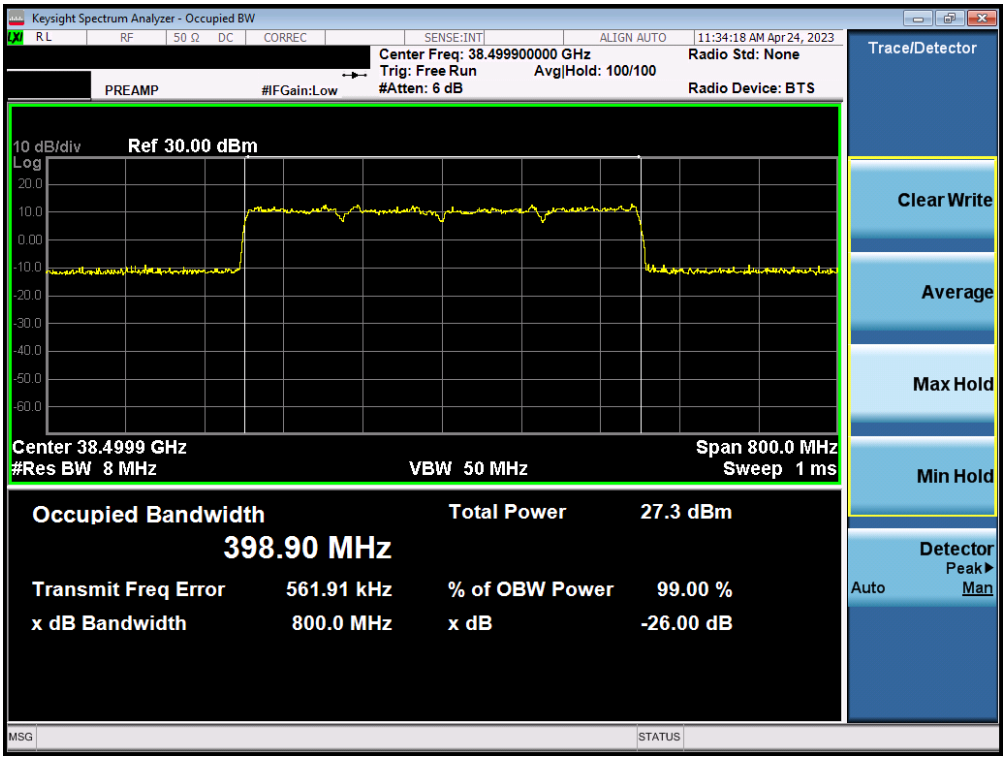

**Plot 7-65. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM QPSK – Mid Channel)**




**Plot 7-66. Occupied Bandwidth Plot (100MHz-4CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**




**Plot 7-67. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM 16QAM – Mid Channel)**




**Plot 7-68. Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM 64QAM – Mid Channel)**

## 7.3 Equivalent Isotropic Radiated Power

**§2.1046, §30.202**

### Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

***The average power of the sum of all antenna elements is limited to a maximum EIRP of +43 dBm.***

### Test Procedures Used

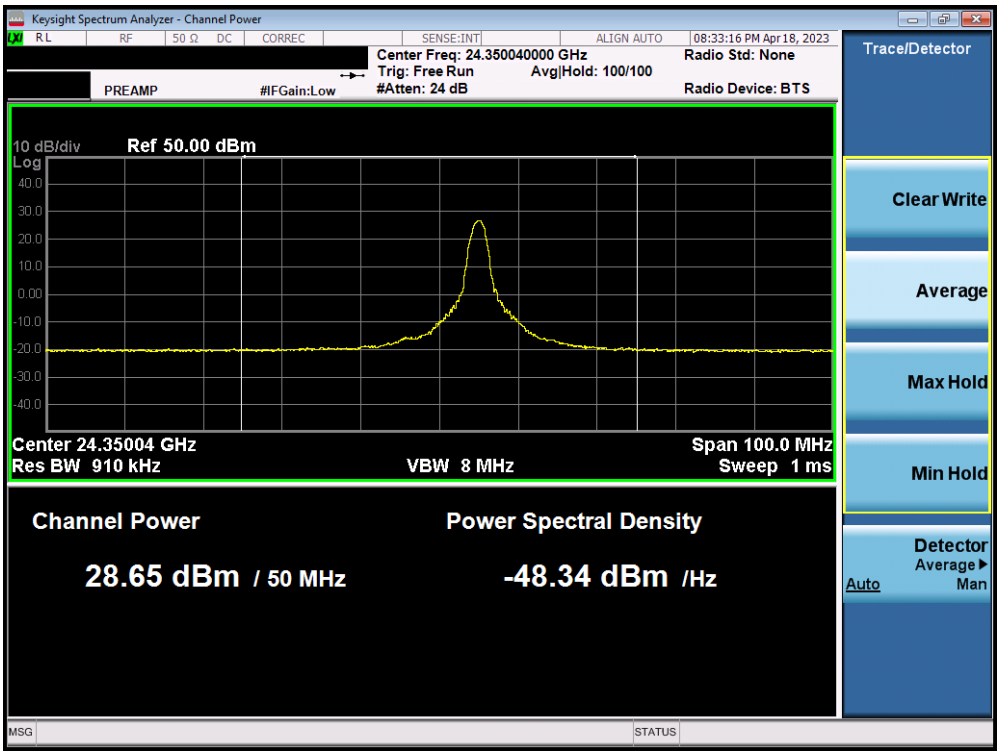
ANSI C63.26-2015 Section 5.2.4.4.1
KDB 842590 D01 v01r02 Section 4.2

### Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation.
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
8. Trace mode = trace averaging (RMS) over 100 sweeps
9. The trace was allowed to stabilize

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 1 | Low | 24275.04 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 332 | 119 | 1 / 19 | **27.76** |
| | | Mid | 24350.04 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 1 / 19 | 28.47 |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | H | 330 | 116 | 1 / 12 | 25.47 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 1 / 19 | **28.65** |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 1 / 19 | 26.19 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 1 / 19 | 23.59 |
| | | High | 24424.92 | DFT-s-OFDM | QPSK | 18 | V | SISO | H | 330 | 277 | 1 / 16 | 27.64 |
| | | | | DFT-s-OFDM | QPSK | 140 | H | SISO | V | 37 | 48 | 1 / 16 | 24.90 |
| | | | | CP-OFDM | QPSK | 18 | V | SISO | H | 330 | 277 | 1 / 11 | 25.38 |
| | | | | CP-OFDM | QPSK | 140 | H | SISO | V | 37 | 48 | 1 / 16 | 21.64 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 345 | 120 | 1 / 11 | **27.92** |

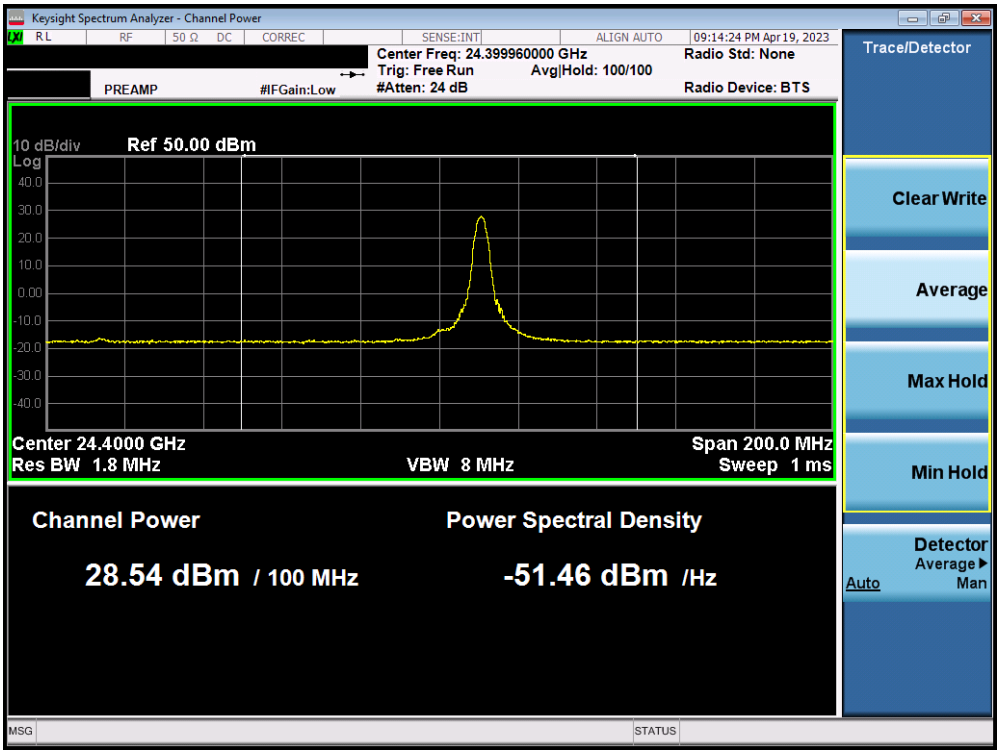
**Table 7-6. EIRP Data (Band n258-R1 - 50MHz)**



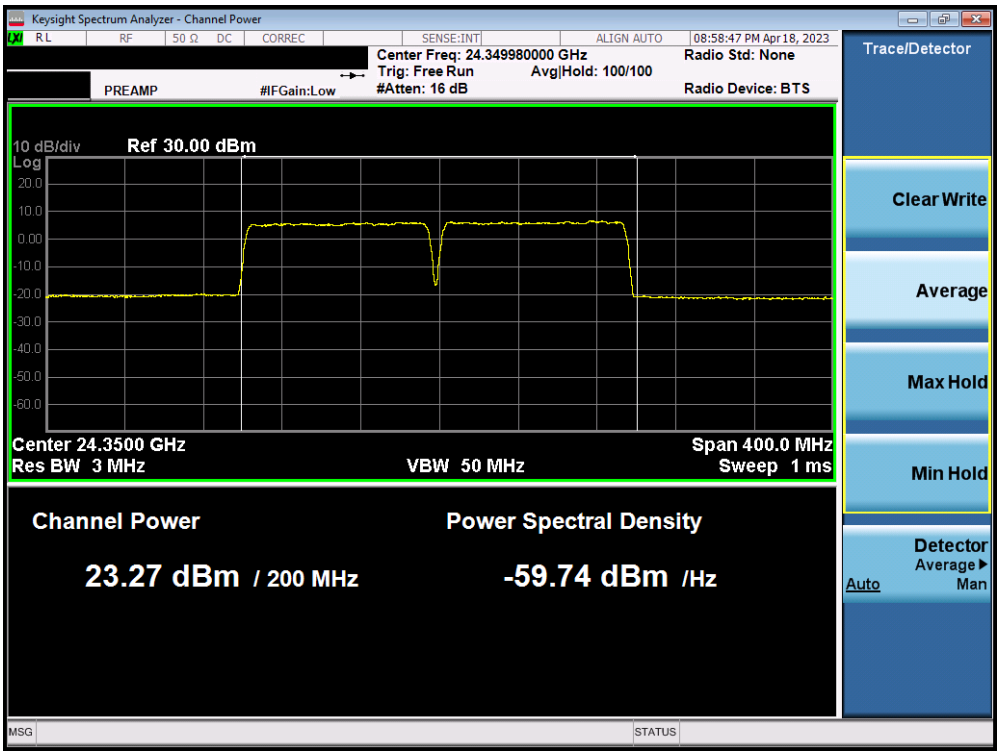

**Plot 7-69. EIRP Plot (Band n258-R1 − 50MHz-1CC Mid Channel DFT-s-OFDM π/2 BPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 1 | Low | 24300.00 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 342 | 122 | 1 / 24 | **27.60** |
| | | Mid | 24350.04 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 333 | 119 | 1 / 40 | **28.43** |
| | | High | 24399.96 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | H | 342 | 122 | 1 / 42 | 28.52 |
| | | | | DFT-s-OFDM | QPSK | 18 | V | SISO | H | 330 | 277 | 1 / 22 | 27.98 |
| | | | | DFT-s-OFDM | QPSK | 140 | H | SISO | V | 37 | 48 | 1 / 42 | 25.23 |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | H | 342 | 122 | 1 / 42 | 25.52 |
| | | | | CP-OFDM | QPSK | 18 | V | SISO | H | 330 | 277 | 1 / 22 | 24.68 |
| | | | | CP-OFDM | QPSK | 140 | H | SISO | V | 37 | 48 | 1 / 42 | 22.64 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 342 | 122 | 1 / 42 | **28.54** |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | H | 342 | 122 | 1 / 42 | 26.89 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | H | 342 | 122 | 1 / 42 | 23.50 |
| 100+100 | 2 | Mid | 24349.98 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 64 / 0 | 23.27 |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | H | 330 | 116 | 66 / 0 | 21.31 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 64 / 0 | **23.27** |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 64 / 0 | 21.28 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | H | 330 | 116 | 64 / 0 | 19.38 |

**Table 7-7. EIRP Data (Band n258-R1 - 100MHz)**



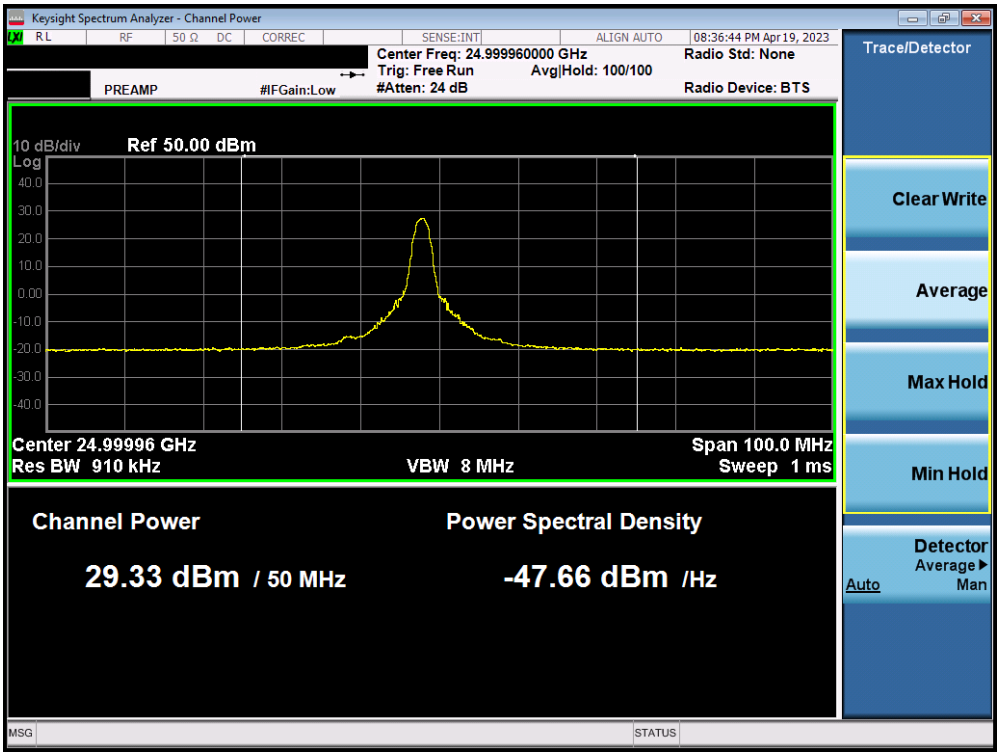

**Plot 7-70. EIRP Plot (Band n258-R1 − 100MHz-1CC High Channel DFT-s-OFDM π/2 BPSK)**




**Plot 7-71. EIRP Plot (Band n258-R1 − 100MHz-2CC Mid Channel DFT-s-OFDM π/2 BPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 1 | Low | 24775.08 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 36 | 121 | 1 / 18 | **29.19** |
| | | Mid | 24999.96 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 29 | 123 | 1 / 18 | 29.29 |
| | | | | DFT-s-OFDM | QPSK | 17 | V | SISO | H | 338 | 119 | 1 / 10 | 28.30 |
| | | | | DFT-s-OFDM | QPSK | 140 | H | SISO | V | 37 | 40 | 1 / 10 | 25.01 |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | V | 29 | 123 | 1 / 10 | 26.33 |
| | | | | CP-OFDM | QPSK | 17 | V | SISO | H | 338 | 119 | 1 / 10 | 26.18 |
| | | | | CP-OFDM | QPSK | 140 | H | SISO | V | 37 | 40 | 1 / 10 | 21.99 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 29 | 123 | 1 / 14 | **29.33** |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | V | 29 | 123 | 1 / 14 | 27.65 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | V | 29 | 123 | 1 / 18 | 24.31 |
| | | High | 25224.96 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 38 | 128 | 1 / 10 | **28.29** |

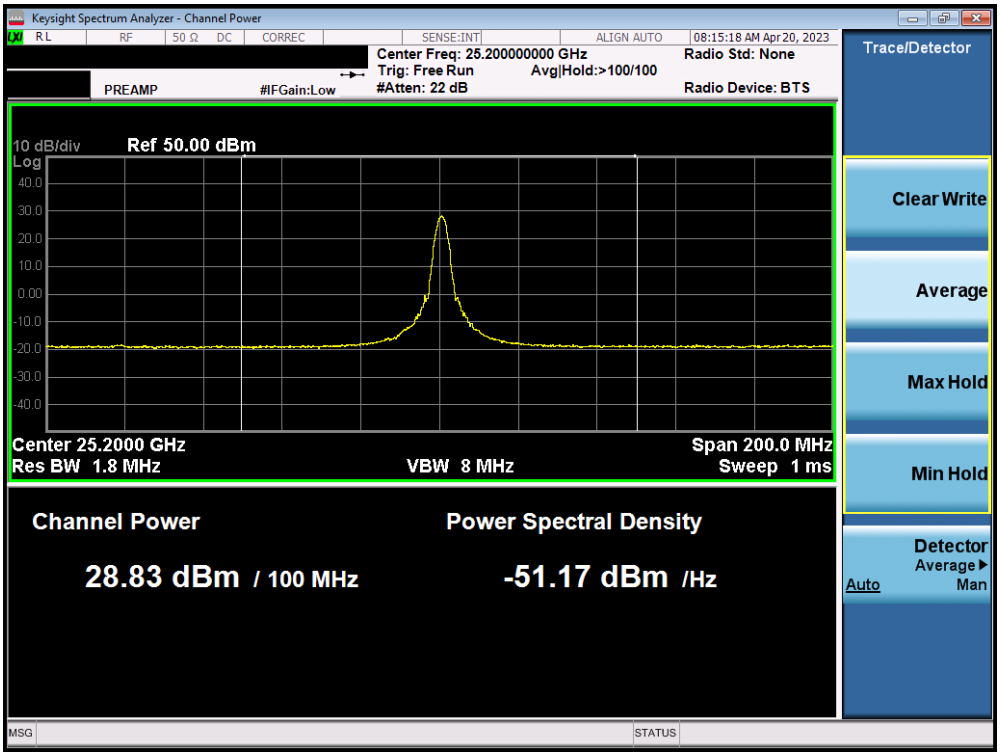
**Table 7-8. EIRP Data (Band n258-R2 - 50MHz)**



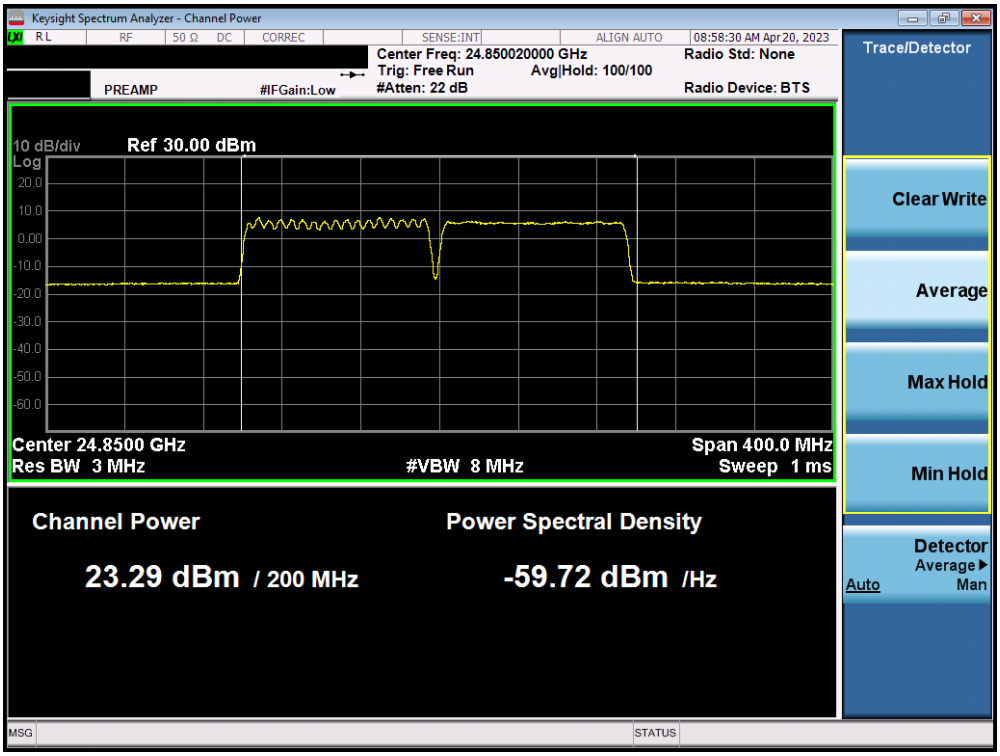

**Plot 7-72. EIRP Plot (Band n258-R2 − 50MHz-1CC Mid Channel DFT-s-OFDM π/2 BPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 1 | Low | 24800.04 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 26 | 120 | 1 / 42 | **28.77** |
| | | Mid | 24999.96 | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 334 | 126 | 1 / 33 | **28.63** |
| | | High | 25200.00 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 338 | 124 | 1 / 33 | **28.83** |
| | | | | DFT-s-OFDM | QPSK | 17 | V | SISO | H | 338 | 119 | 1 / 23 | 28.20 |
| | | | | DFT-s-OFDM | QPSK | 140 | H | SISO | V | 40 | 125 | 1 / 33 | 24.24 |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | V | 338 | 124 | 1 / 33 | 25.62 |
| | | | | CP-OFDM | QPSK | 17 | V | SISO | H | 338 | 119 | 1 / 23 | 25.02 |
| | | | | CP-OFDM | QPSK | 140 | H | SISO | V | 40 | 125 | 1 / 33 | 21.03 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 338 | 124 | 1 / 42 | 28.71 |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | V | 338 | 124 | 1 / 33 | 26.72 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | V | 338 | 124 | 1 / 33 | 23.68 |
| 100+100 | 2 | Low | 24850.02 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 25 | 121 | 64 / 0 | **23.29** |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | V | 25 | 121 | 66 / 0 | 21.10 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 25 | 121 | 64 / 0 | 23.20 |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | V | 25 | 121 | 1 / 42 | 22.23 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | V | 25 | 121 | 1 / 42 | 21.06 |
| | | Mid | 25000.02 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 28 | 120 | 64 / 0 | **22.96** |
| | | High | 25150.02 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 28 | 119 | 64 / 0 | **22.79** |
| 100+100+100 | 3 | Low | 24900.00 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 27 | 119 | 64 / 0 | **23.10** |
| | | | | CP-OFDM | QPSK | 145 + 17 | H + V | MIMO | | 27 | 119 | 66 / 0 | 21.08 |
| | | | | DFT-s-OFDM | π/2 BPSK | 145 + 17 | H + V | 2Tx | V | 27 | 119 | 64 / 0 | 23.05 |
| | | | | DFT-s-OFDM | 16QAM | 145 + 17 | H + V | 2Tx | V | 27 | 119 | 1 / 23 | 22.01 |
| | | | | DFT-s-OFDM | 64QAM | 145 + 17 | H + V | 2Tx | V | 27 | 119 | 1 / 42 | 20.98 |
| | | High | 25100.04 | DFT-s-OFDM | QPSK | 145 + 17 | H + V | 2Tx | V | 31 | 117 | 64 / 0 | **22.74** |

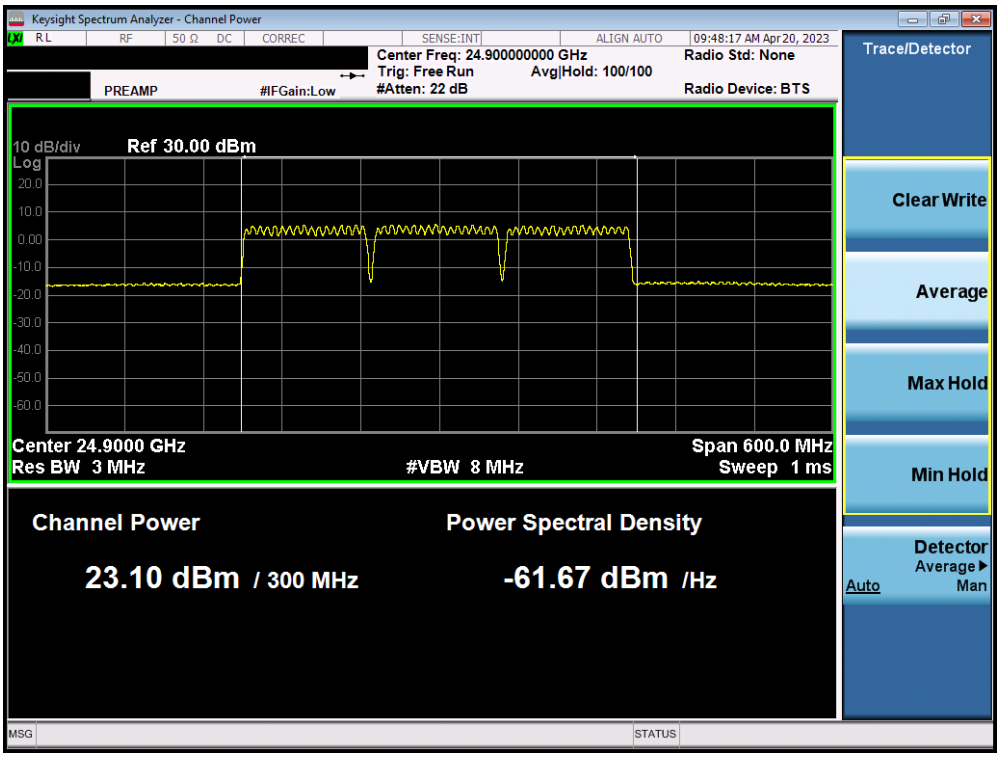
**Table 7-9. EIRP Data (Band n258-R2 - 100MHz)**




**Plot 7-73. EIRP Plot (Band n258-R2 − 100MHz-1CC High Channel DFT-s-OFDM QPSK)**



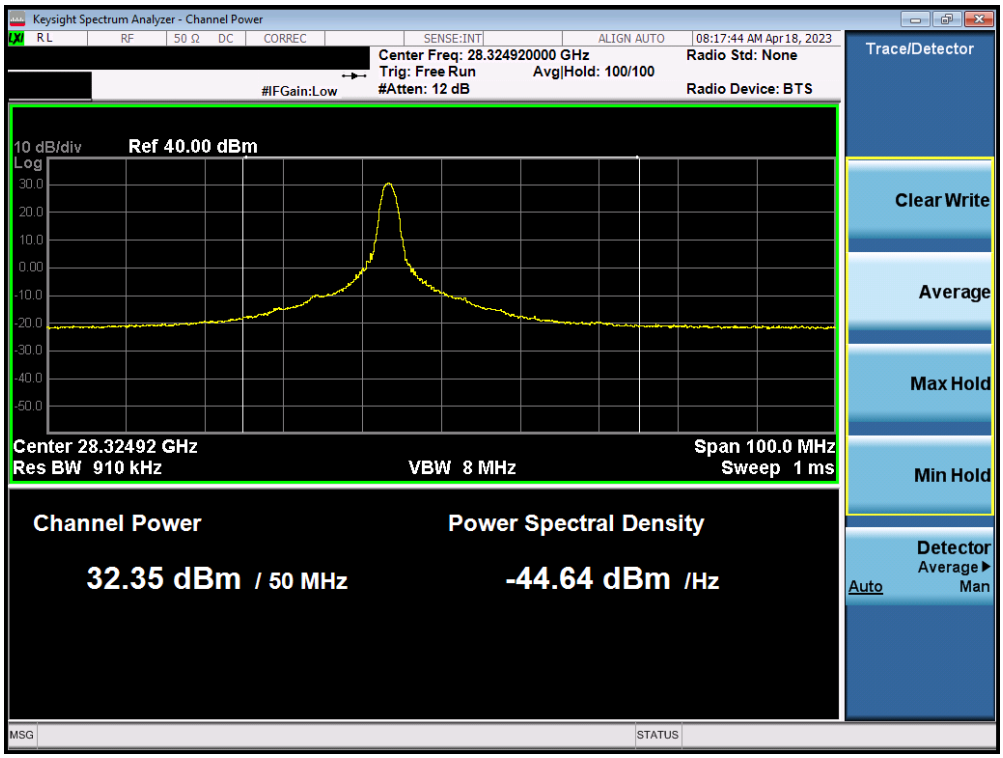

**Plot 7-74. EIRP Plot (Band n258-R2 − 100MHz-2CC Low Channel DFT-s-OFDM QPSK)**




**Plot 7-75. EIRP Plot (Band n258-R2 − 100MHz-3CC Low Channel DFT-s-OFDM QPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 1 | Low | 27525.00 | DFT-s-OFDM | QPSK | 14 | V | SISO | H | 332 | 76 | 1 / 12 | 28.54 |
| | | | | CP-OFDM | QPSK | 14 | V | SISO | H | 332 | 76 | 1 / 12 | 25.48 |
| | | | | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 29 | 217 | 1 / 12 | **30.90** |
| | | Mid | 27924.96 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 28 | 217 | 1 / 12 | **31.71** |
| | | High | 28324.92 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 1 / 12 | 32.35 |
| | | | | DFT-s-OFDM | QPSK | 146 | H | SISO | V | 8 | 200 | 1 / 12 | 27.96 |
| | | | | CP-OFDM | QPSK | 147 + 19 | H + V | MIMO | H | 30 | 217 | 1 / 12 | 29.26 |
| | | | | CP-OFDM | QPSK | 146 | H | SISO | V | 8 | 200 | 1 / 12 | 24.83 |
| | | | | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 1 / 12 | **32.35** |
| | | | | DFT-s-OFDM | 16QAM | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 1 / 12 | 30.28 |
| | | | | DFT-s-OFDM | 64QAM | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 1 / 12 | 28.41 |

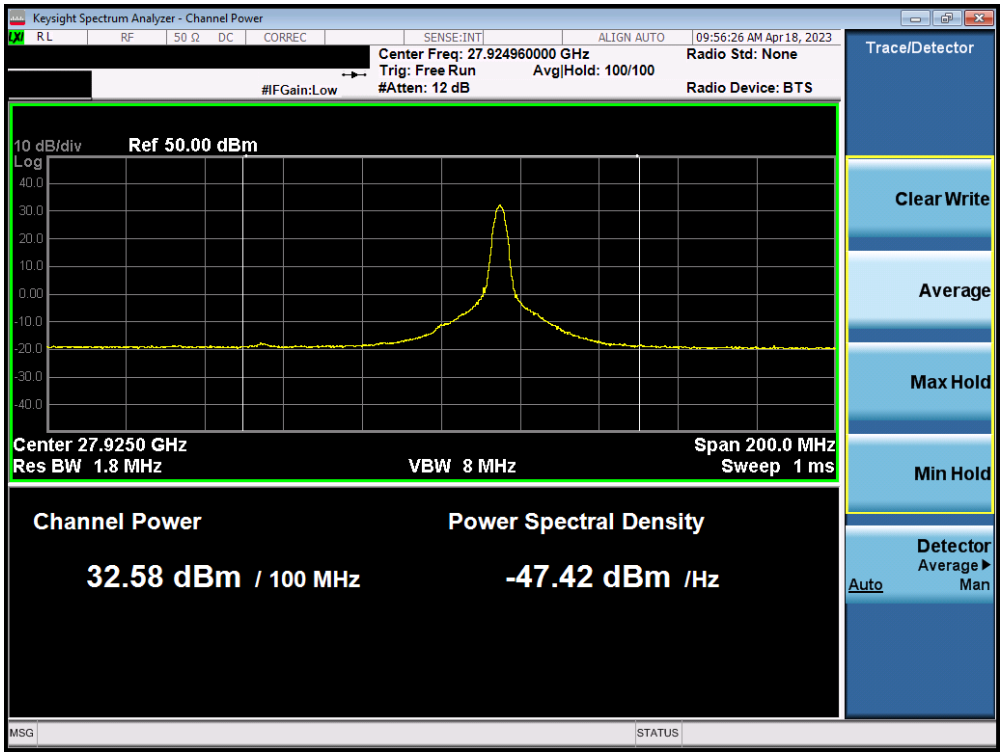
**Table 7-10. EIRP Data (Band n261 - 50MHz)**



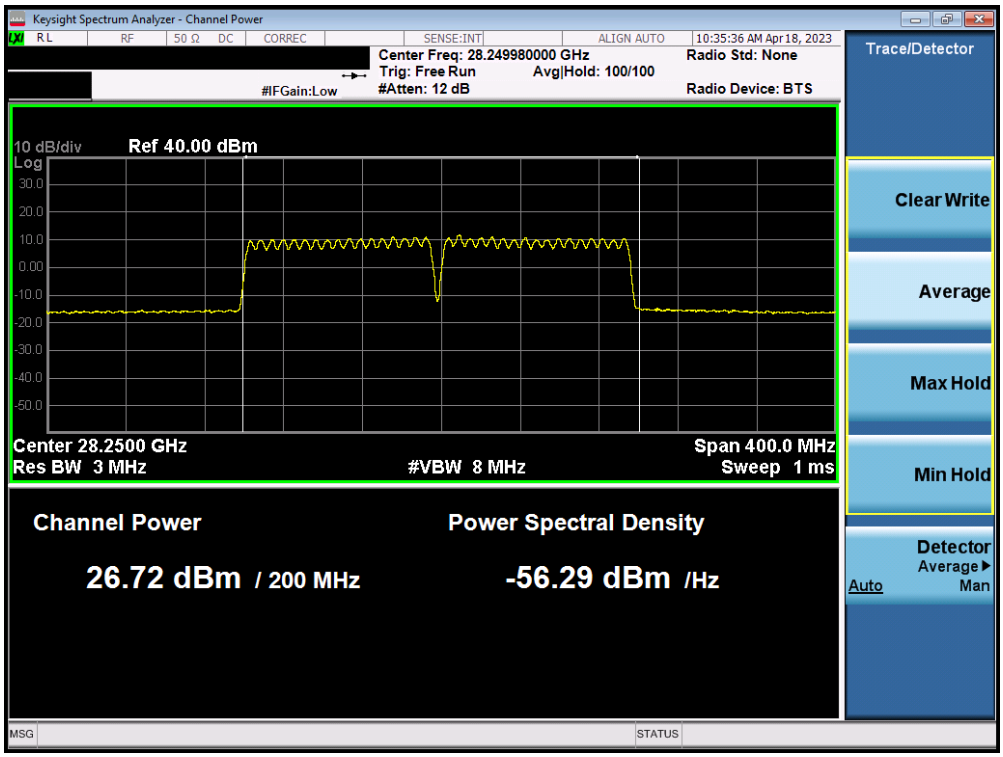

**Plot 7-76. EIRP Plot (Band n261 − 50MHz-1CC High Channel DFT-s-OFDM π/2 BPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 1 | Low | 27550.08 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 1 / 42 | **32.14** |
| | | | | DFT-s-OFDM | QPSK | 14 | V | SISO | H | 332 | 76 | 1 / 23 | **28.41** |
| | | | | CP-OFDM | QPSK | 14 | V | SISO | H | 332 | 76 | 1 / 23 | 25.35 |
| | | Mid | 27924.96 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 28 | 215 | 1 / 42 | **32.58** |
| | | | | CP-OFDM | QPSK | 147 + 19 | H + V | MIMO | H | 28 | 215 | 1 / 42 | 29.49 |
| | | | | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 28 | 215 | 1 / 42 | 32.52 |
| | | | | DFT-s-OFDM | 16QAM | 147 + 19 | H + V | 2Tx | H | 28 | 215 | 1 / 42 | 30.76 |
| | | | | DFT-s-OFDM | 64QAM | 147 + 19 | H + V | 2Tx | H | 28 | 215 | 1 / 42 | 27.85 |
| | | High | 28299.96 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 19 | 216 | 1 / 23 | **31.43** |
| | | | | DFT-s-OFDM | QPSK | 146 | H | SISO | V | 8 | 200 | 1 / 23 | 28.19 |
| | | | | CP-OFDM | QPSK | 146 | H | SISO | V | 8 | 200 | 1 / 23 | 24.99 |
| 100+100 | 2 | Low | 27600.06 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 30 | 217 | 64 / 0 | **25.90** |
| | | Mid | 27925.02 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 19 | 218 | 64 / 0 | **26.06** |
| | | High | 28249.98 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 20 | 227 | 64 / 0 | 25.77 |
| | | | | CP-OFDM | QPSK | 147 + 19 | H + V | MIMO | H | 20 | 227 | 66 / 0 | 25.89 |
| | | | | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 20 | 227 | 64 / 0 | **26.72** |
| | | | | DFT-s-OFDM | 16QAM | 147 + 19 | H + V | 2Tx | H | 20 | 227 | 1 / 23 | 24.82 |
| | | | | DFT-s-OFDM | 64QAM | 147 + 19 | H + V | 2Tx | H | 20 | 227 | 1 / 23 | 22.24 |
| 100+100+100 | 3 | Low | 27650.04 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 64 / 0 | **24.33** |
| | | Mid | 27924.96 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 18 | 216 | 64 / 0 | **24.39** |
| | | High | 28200.00 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 64 / 0 | **24.40** |
| | | | | DFT-s-OFDM | 16QAM | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 1 / 23 | 23.12 |
| | | | | DFT-s-OFDM | 64QAM | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 1 / 42 | 21.33 |
| 100+100+100+100 | 4 | Low | 27700.02 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 22 | 227 | 64 / 0 | **24.02** |
| | | Mid | 27925.02 | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 18 | 216 | 64 / 0 | **24.21** |
| | | High | 28150.02 | DFT-s-OFDM | QPSK | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 64 / 0 | 24.05 |
| | | | | CP-OFDM | QPSK | 147 + 19 | H + V | MIMO | H | 22 | 215 | 66 / 0 | 24.05 |
| | | | | DFT-s-OFDM | π/2 BPSK | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 64 / 0 | **24.41** |
| | | | | DFT-s-OFDM | 16QAM | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 1 / 33 | 22.98 |
| | | | | DFT-s-OFDM | 64QAM | 147 + 19 | H + V | 2Tx | H | 22 | 215 | 1 / 33 | 21.91 |

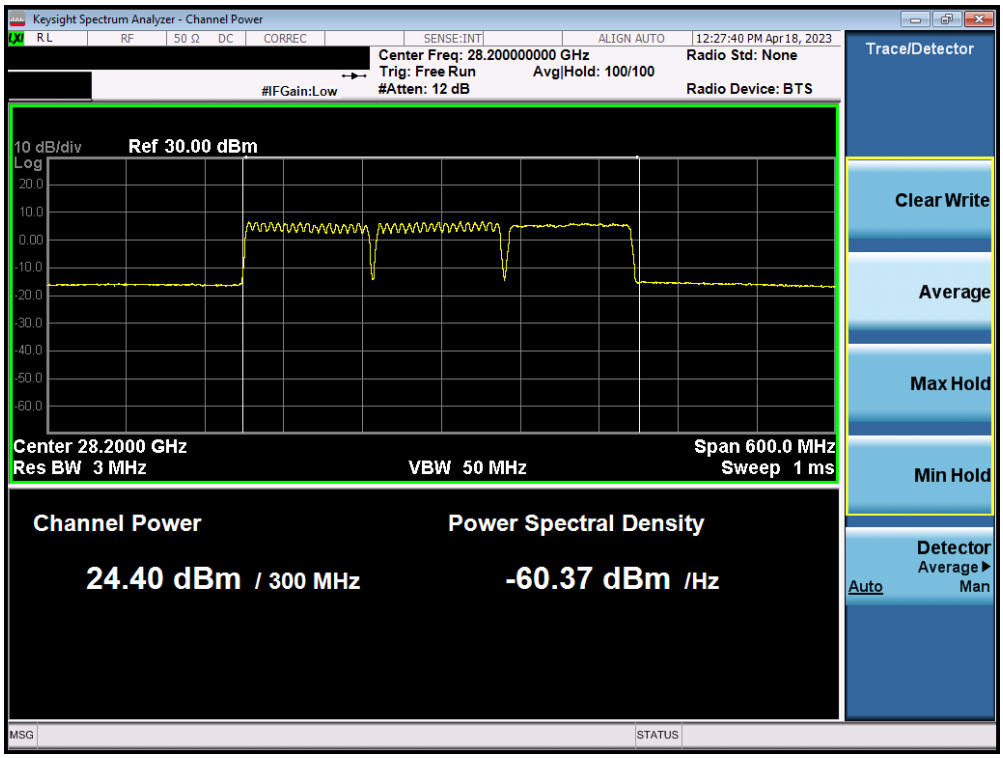
**Table 7-11. EIRP Data (Band n261 - 100MHz)**



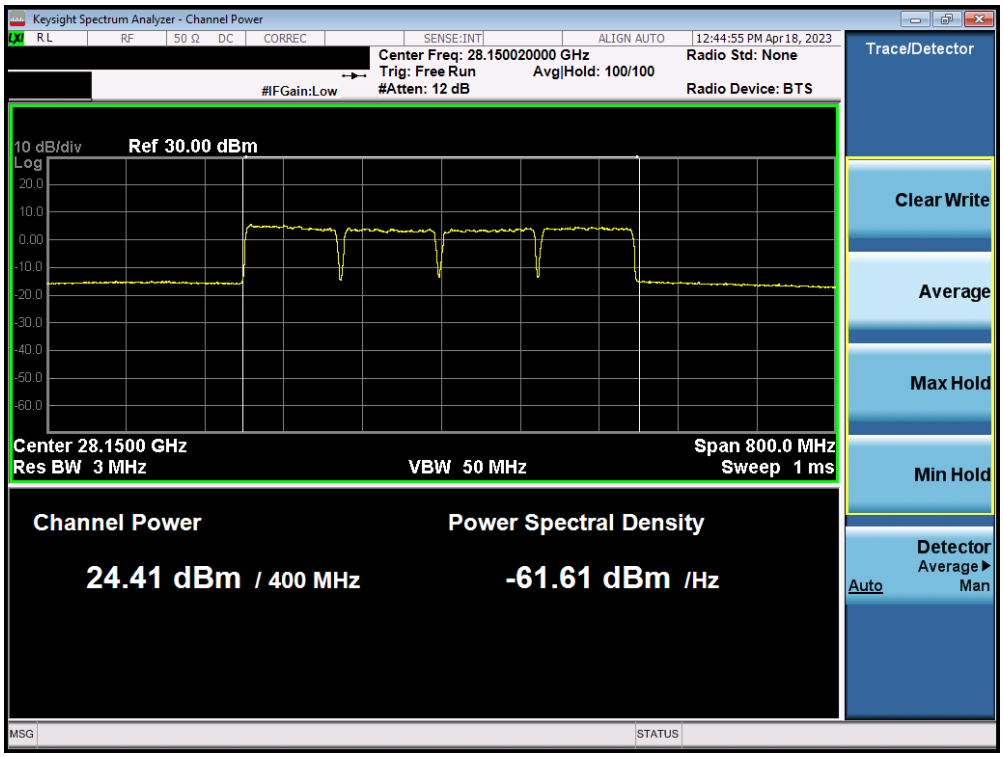

**Plot 7-77. EIRP Plot (Band n261 − 100MHz-1CC Mid Channel DFT-s-OFDM QPSK)**




**Plot 7-78. EIRP Plot (Band n261 − 100MHz-2CC High Channel DFT-s-OFDM π/2 BPSK)**



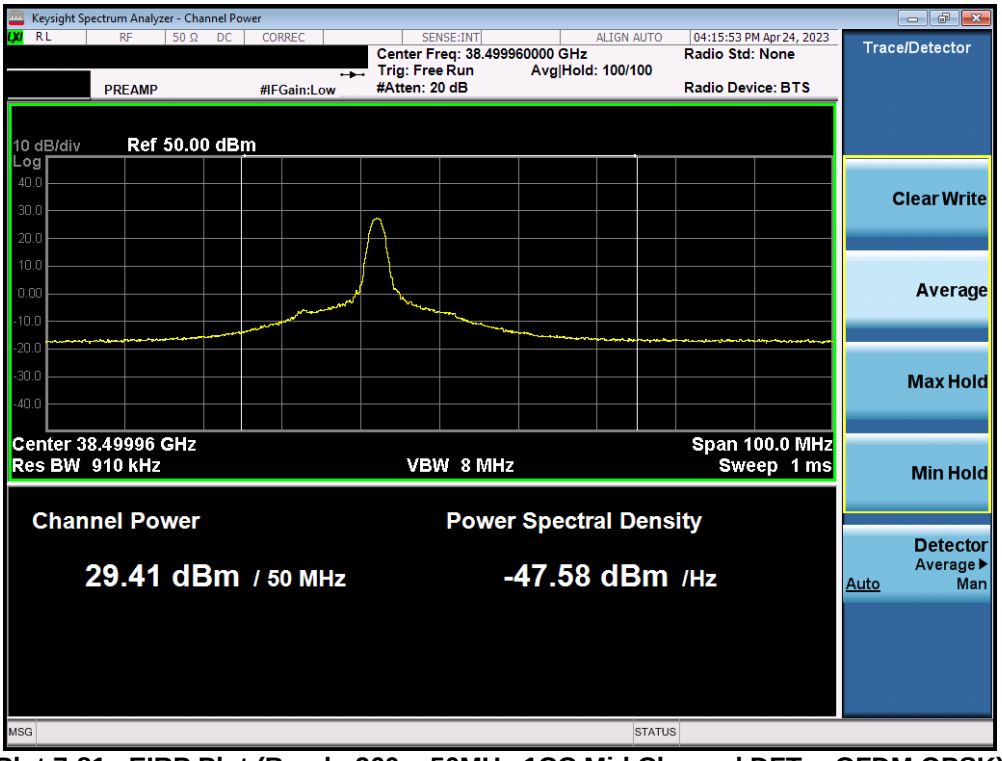

**Plot 7-79. EIRP Plot (Band n261 − 100MHz-3CC High Channel DFT-s-OFDM π/2 BPSK)**




**Plot 7-80. EIRP Plot (Band n261 − 100MHz-4CC High Channel DFT-s-OFDM π/2 BPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 1 | Low | 37025.04 | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | H | 309 | 143 | 1 / 11 | **29.38** |
| | | Mid | 38499.96 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 339 | 294 | 1 / 10 | **29.41** |
| | | | | DFT-s-OFDM | QPSK | 141 | H | SISO | V | 346 | 77 | 1 / 14 | 26.74 |
| | | | | DFT-s-OFDM | QPSK | 19 | V | SISO | V | 281 | 199 | 1 / 19 | 26.84 |
| | | | | CP-OFDM | QPSK | 141 + 13 | H + V | MIMO | V | 339 | 294 | 1 / 10 | 26.39 |
| | | | | CP-OFDM | QPSK | 141 | H | SISO | V | 346 | 77 | 1 / 14 | 23.59 |
| | | | | CP-OFDM | QPSK | 19 | V | SISO | V | 281 | 199 | 1 / 19 | 23.73 |
| | | | | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 339 | 294 | 1 / 10 | 29.32 |
| | | | | DFT-s-OFDM | 16QAM | 141 + 13 | H + V | 2Tx | V | 339 | 294 | 1 / 14 | 27.52 |
| | | | | DFT-s-OFDM | 64QAM | 141 + 13 | H + V | 2Tx | V | 339 | 294 | 1 / 10 | 24.09 |
| | | High | 39975.00 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | H | 309 | 143 | 1 / 18 | **28.53** |

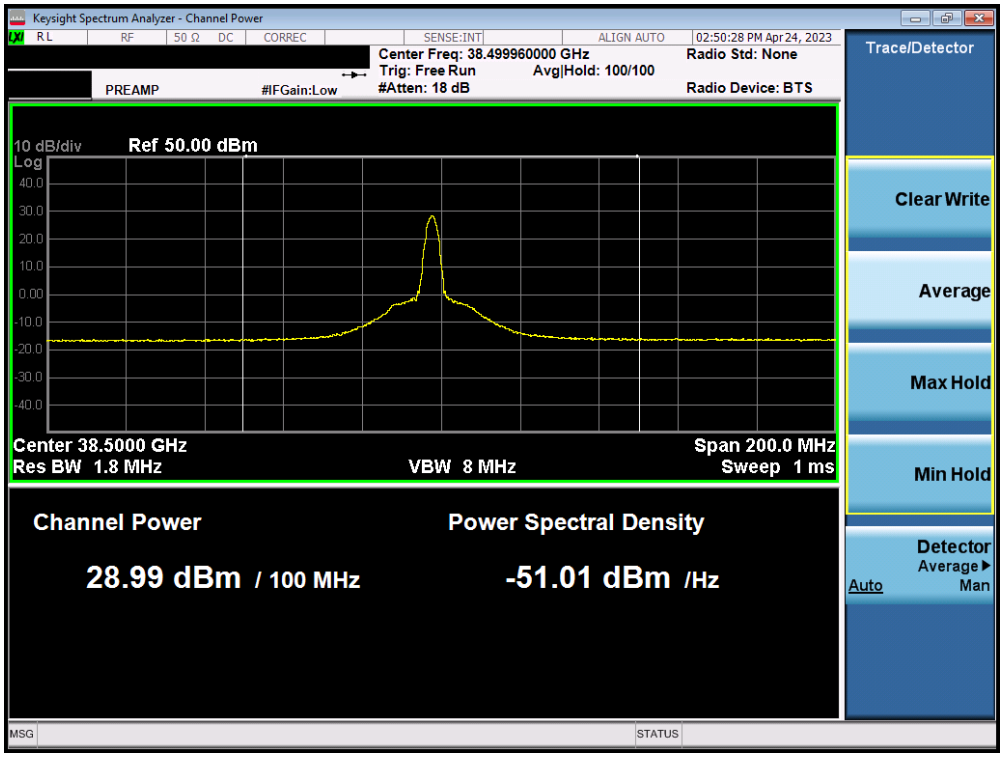
**Table 7-12. EIRP Data (Band n260 - 50MHz)**



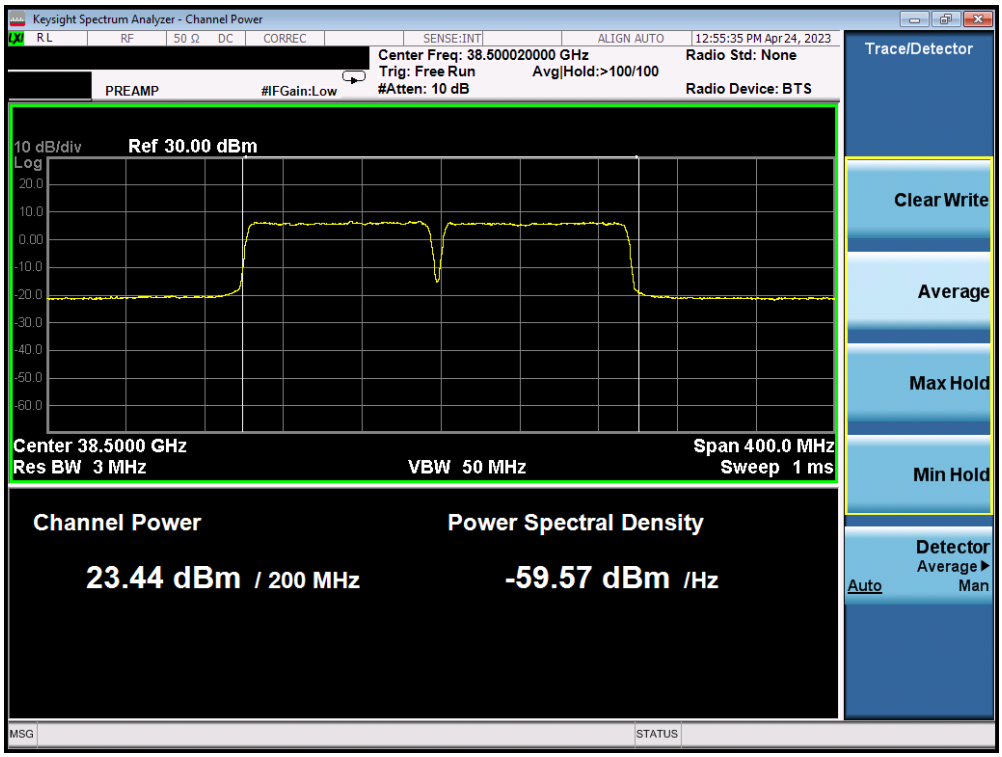

**Plot 7-81. EIRP Plot (Band n260 − 50MHz-1CC Mid Channel DFT-s-OFDM QPSK)**

| Bandwidth [MHz] | CCs Active | Channel | Frequency [MHz] | Transmission Scheme | Modulation | Beam ID | Beam Pol. | Ant. Div. | Ant. Pol. [H/V] | Positioner Roll [degrees] | Turntable Azimuth [degrees] | RB Size/Offsets | EIRP [dBm] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 100 | 1 | Low | 37050.00 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 328 | 295 | 1 / 43 | **28.69** |
| | | Mid | 38499.96 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 335 | 293 | 1 / 31 | 28.86 |
| | | | | DFT-s-OFDM | QPSK | 141 | H | SISO | V | 345 | 77 | 1 / 23 | 26.64 |
| | | | | DFT-s-OFDM | QPSK | 19 | V | SISO | V | 279 | 200 | 1 / 31 | 26.86 |
| | | | | CP-OFDM | QPSK | 141 + 13 | H + V | MIMO | V | 335 | 293 | 1 / 31 | 25.83 |
| | | | | CP-OFDM | QPSK | 141 | H | SISO | V | 345 | 77 | 1 / 31 | 23.54 |
| | | | | CP-OFDM | QPSK | 19 | V | SISO | V | 279 | 200 | 1 / 31 | 23.85 |
| | | | | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 335 | 293 | 1 / 31 | **28.99** |
| | | | | DFT-s-OFDM | 16QAM | 141 + 13 | H + V | 2Tx | V | 335 | 293 | 1 / 31 | 26.95 |
| | | | | DFT-s-OFDM | 64QAM | 141 + 13 | H + V | 2Tx | V | 335 | 293 | 1 / 31 | 23.88 |
| | | High | 39949.92 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 332 | 289 | 1 / 31 | **28.10** |
| 100+100 | 2 | Low | 37099.98 | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 351 | 293 | 64 / 0 | **22.60** |
| | | Mid | 38500.02 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 350 | 293 | 64 / 0 | 23.39 |
| | | | | CP-OFDM | QPSK | 141 + 13 | H + V | MIMO | V | 350 | 293 | 66 / 0 | 21.88 |
| | | | | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 350 | 293 | 64 / 0 | **23.44** |
| | | | | DFT-s-OFDM | 16QAM | 141 + 13 | H + V | 2Tx | V | 350 | 293 | 1 / 43 | 22.06 |
| | | | | DFT-s-OFDM | 64QAM | 141 + 13 | H + V | 2Tx | V | 350 | 293 | 1 / 43 | 20.98 |
| | | High | 39899.94 | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 336 | 290 | 64 / 0 | **21.95** |
| 100+100+100 | 3 | Low | 37149.96 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 335 | 290 | 64 / 0 | **22.75** |
| | | Mid | 38499.96 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 338 | 293 | 64 / 0 | **23.17** |
| | | | | CP-OFDM | QPSK | 141 + 13 | H + V | MIMO | V | 338 | 293 | 66 / 0 | 21.01 |
| | | | | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 338 | 293 | 64 / 0 | 23.07 |
| | | | | DFT-s-OFDM | 16QAM | 141 + 13 | H + V | 2Tx | V | 338 | 293 | 1 / 23 | 22.01 |
| | | | | DFT-s-OFDM | 64QAM | 141 + 13 | H + V | 2Tx | V | 338 | 293 | 1 / 23 | 20.63 |
| | | High | 39849.96 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 335 | 291 | 64 / 0 | **21.24** |
| 100+100+100+100 | 4 | Low | 37199.94 | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 341 | 294 | 64 / 0 | **22.76** |
| | | Mid | 38500.02 | DFT-s-OFDM | QPSK | 141 + 13 | H + V | 2Tx | V | 346 | 294 | 64 / 0 | 23.06 |
| | | | | CP-OFDM | QPSK | 141 + 13 | H + V | MIMO | V | 346 | 294 | 66 / 0 | 21.64 |
| | | | | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 346 | 294 | 64 / 0 | **24.07** |
| | | | | DFT-s-OFDM | 16QAM | 141 + 13 | H + V | 2Tx | V | 346 | 294 | 1 / 23 | 22.02 |
| | | | | DFT-s-OFDM | 64QAM | 141 + 13 | H + V | 2Tx | V | 346 | 294 | 1 / 23 | 20.98 |
| | | High | 39799.98 | DFT-s-OFDM | π/2 BPSK | 141 + 13 | H + V | 2Tx | V | 343 | 296 | 64 / 0 | **22.54** |

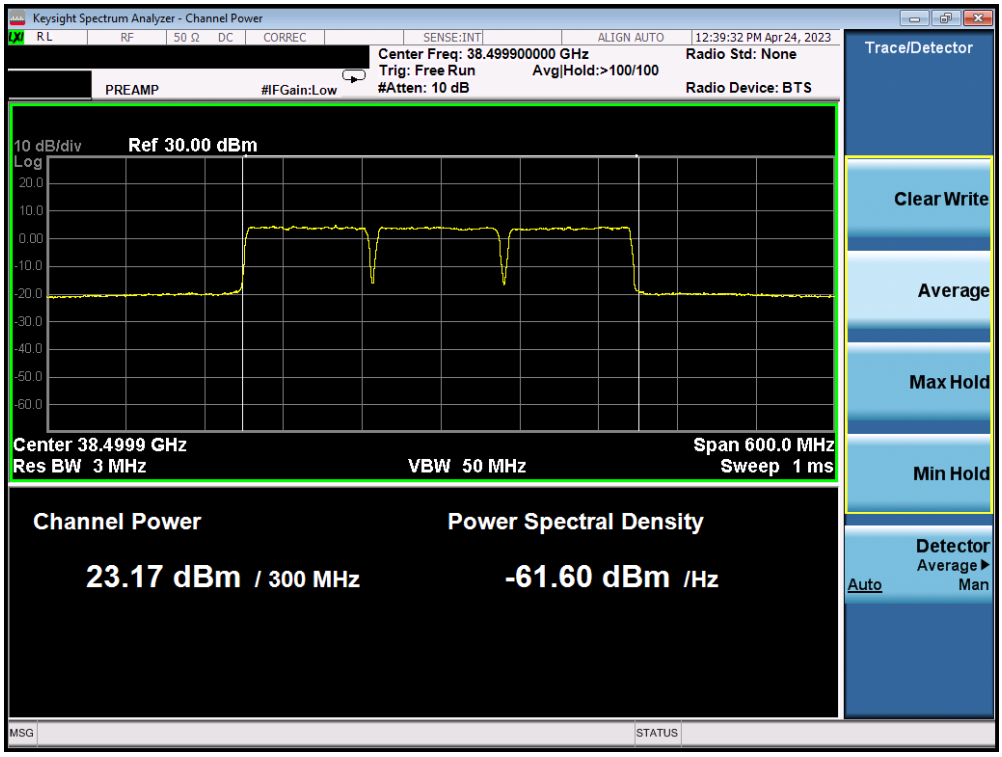
**Table 7-13. EIRP Data (Band n260 - 100MHz)**



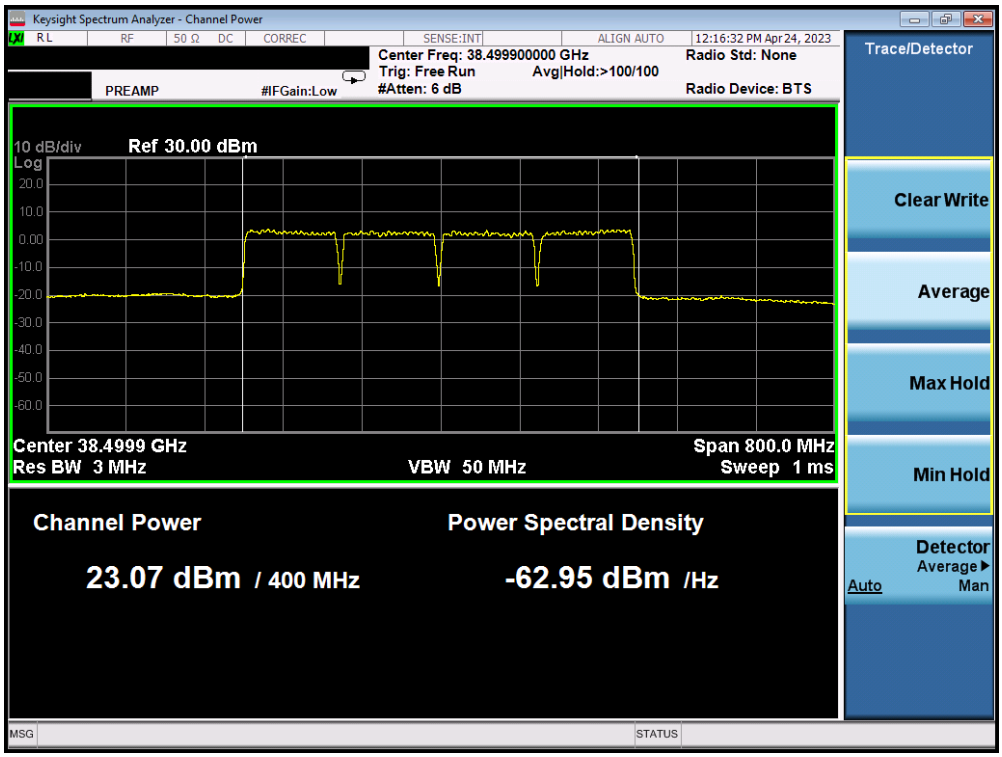

**Plot 7-82. EIRP Plot (Band n260 − 100MHz-1CC Mid Channel DFT-s-OFDM π/2 BPSK)**




**Plot 7-83. EIRP Plot (Band n260 − 100MHz-2CC Mid Channel DFT-s-OFDM π/2 BPSK)**




**Plot 7-84. EIRP Plot (Band n260 − 100MHz-3CC Mid Channel DFT-s-OFDM QPSK)**




**Plot 7-85. EIRP Plot (Band n260 − 100MHz-4CC Mid Channel DFT-s-OFDM π/2 BPSK)**

## Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below. Both H-Beam and V-Beam were investigated and the worst-case measurements were reported below.

2) Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.

3) EIRP measurements for all bands were taken at 1m test distance as was required for far-field conditions (see Table 3-1).

4) The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states: EIRP (dBm) = E (dBµV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m. The field strength at the antenna terminals E is calculated as: E (dBµV/m) = Spectrum Analyzer Channel Power Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + 107.

5) All EIRP measurements were made with the appropriate offset levels loaded into the spectrum analyzer as determined from the measurement distance, antenna factor, cable loss, and the equations in Note 4 above.

6) Radiated power levels are investigated while the receive antenna was rotated through all angles to determine the worst case polarization/positioning.

7) This device supports transmission of H-polarized and V-polarized beams from the antenna array in both CP-OFDM and DFT-s-OFDM transmission schemes. SISO and MIMO operation is also supported for some configurations. As part of the testing, all modes are investigated fully on the channel showing the highest simulated EIRP using QPSK modulation. The configuration that shows the highest measured EIRP was then used to determine the EIRP for the low and high channels and for the additional modulations.

8) Several BeamID's are investigated based on the provided simulated data to determine the worst-case BeamID.

## Sample Calculation

The offset level loaded into the spectrum analyzer allows for a direct conversion of the raw channel power level measured by the analyzer into an EIRP. This offset level is frequency dependent and is calculated as follows:

**Offset Level [dB]** = Antenna Factor [dB/m] + Cable Loss [dB] + 20 Log(Distance [m]) + 107 - 104.8 .

For example, to measure an EIRP at a frequency of 24400MHz with an antenna factor of 45.49dB/m, a cable loss of 8.53dB, and a measurement distance of 1 meter, an offset level of:

**Offset Level** = 45.49dB/m + 8.53dB + 20 Log(1 meter) + 107 - 104.8 = 56.22 dB

shall be loaded into the spectrum analyzer.

## 7.4 Radiated Spurious and Harmonic Emissions

**§2.1051, §30.203**

### Test Overview

The spectrum is scanned from 30MHz to 100GHz for n258-R1, n258-R2, and n261. For n260, the spectrum is scanned from 30MHz to 200GHz. All out of band emissions are measured in a radiated test setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations 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 conductive power or total radiated power of any emissions outside a licensee's frequency block shall be -13dBm/1MHz.***

### Test Procedure Used

ANSI C63.26-2015 Section 5.7.4
KDB 842590 D01 v01r02 Section 4.4.3

### Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 100 GHz for n258/n261 and 200GHz for n260. Several plots are used to show investigations in this entire span.
2. Detector = RMS
3. Trace mode = trace average
4. Sweep time = auto couple
5. Number of sweep points ≥ 2 x Span/RBW
6. The trace was allowed to stabilize
7. RBW = 1MHz, VBW = 3MHz

### Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

2) All radiated spurious emissions were measured as EIRP to compare with the §30.203 TRP limits. Emissions that were found to be non-compliant using the EIRP method were re-measured using the Spherical Grid TRP Method per KDB 842590.

3) The plots in this section were taken with the analyzer set to max hold. All final measurements shown in the tables that accompany the plots were taken with trace averaging performed over 100 sweeps while the analyzer was triggering on a specific emission of interest.

4) Elements within the same antenna array are correlated to produce beamforming array gain. Antenna arrays cannot be correlated with another antenna array. During testing, only one antenna array was active.

5) The plots from 1-200GHz show corrected average EIRP levels. The average EIRP reported below is calculated per section 5.2.7 of ANSI C63.26-2015 which states: EIRP (dBm) = E (dBµV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m. The field strength E is calculated E (dBµV/m) = Spectrum Analyzer Level (dBm) + Antenna Factor (dB/m) + Cable Loss (dB) + Harmonic Mixer Conversion Loss (dB) + 107. All appropriate Antenna Factor and Cable Loss have been applied in the spectrum analyzer for each measurement. For measurements > 40GHz, Harmonic Mixer Conversion Loss was also applied to the spectrum analyzer.

6) Emissions below 18GHz were measured at a 3 meter test distance, while emissions above 18GHz were measured at the appropriate far field distance. The far field of the mmWave signal is based on formula: R > 2D^2/wavelength, where D is the larger between the dimension of the measurement antenna and the transmitting antenna of the EUT. In this case, D is the largest dimension of the measurement antenna.

| Frequency Range (GHz) | Wavelength(cm) | Far Field Distance (m) | Measurement Distance (m) |
|---|---|---|---|
| 18-40 | 0.749 | 0.54 | 1.00 |
| 40-60 | 0.500 | 1.39 | 1.50 |
| 60-90 | 0.333 | 0.91 | 1.00 |
| 90-140 | 0.214 | 0.58 | 1.00 |
| 140-200 | 0.150 | 0.39 | 1.00 |

**Table 7-14. Far-Field Distance & Measurement Distance per Frequency Range**

7) All emissions from 30MHz - 40GHz were measured using a spectrum analyzer with an internal preamplifier. Emissions >40GHz were measured using a harmonic mixer with the spectrum analyzer.

8) All RSE's were measured with 1CC. It was determined that adding more CC's causes the overall amplitude of just 1CC to decrease, therefore, 1CC is the worst case for the purposes of spurious emissions measurements.

9) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

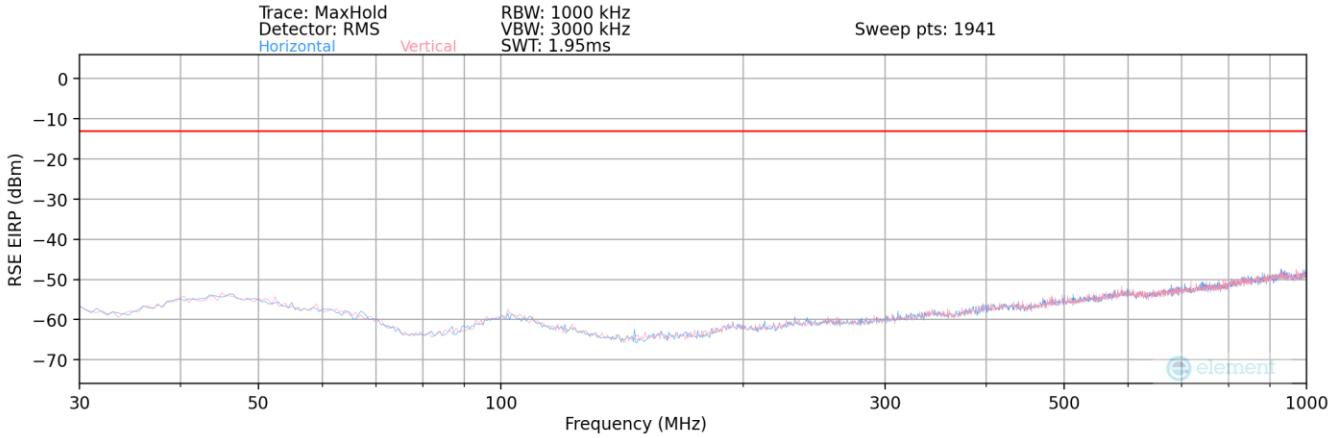
10) All RSE's were investigated in EN-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC mode, or the 802.11 chipset. For EN-DC mode, n261 uses LTE B2, B4, B5, B12, B13, B48 and B66, n260 uses LTE B2, B14, B5, B12, B13, B30, B48 and B66 and n258 uses LTE B2, B5, B12, B14, B30, and B66.

11) Additionally, this device supports anchor bands operating in FR1 spectrum. The n261 band uses NR Bands n2, n5, n25, n41, n48, n66 and n77. The n260 band uses NR Bands n2, n5, n12, n25, n30, n41, n48, n66 and n77. The n258 band uses NR Bands NR n2, n5, n12, n25, n30, n41, n66 and n77 as anchor bands.

12) LTE and FR1 anchor bands supports default configuration and Tx hopping configuration. Both configurations were investigated. There was no discernible difference in the spurious emission levels when using different LTE and NR FR1 anchor bands. Thus, LTE Band 2 was used as a representative anchor band for EN-DC and NR-DC investigations.

## Band n258-R1

## 30MHz - 1GHz




**Plot 7-86. n258-R1 Radiated Spurious Plot – EN-DC Anchor LTE Band 2**

## Spurious Emissions ERP Sample Calculation (n258-R1)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE ERP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

**RSE ERP (dBm)** = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 – 2.15 (dB)

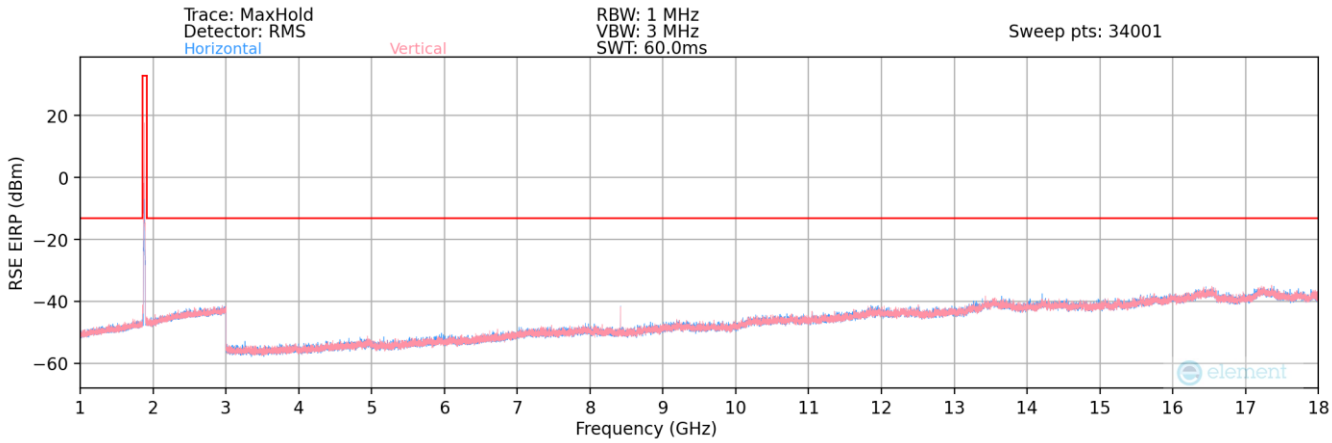
| Frequency [MHz] | Channnel | Bandwidth (MHz) | EUT Beam Pol. | Modulation | Antenna Polarization [H/V] | Antenna Height [cm] | Turntable Azimuth [degrees] | Spurious Emission Level [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 105.00 | Mid | 50 | 2Tx | QPSK | V | - | - | -56.86 | -13.00 | -43.86 |

**Table 7-15. n258-R1 Radiated Spurious Emissions Table (30MHz - 1GHz)**

**Notes**

The RSE ERP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a distance of 3 meter.

## 1GHz - 18GHz




**Plot 7-87. n258-R1 Radiated Spurious Plot – EN-DC Anchor LTE Band 2**

## Spurious Emissions EIRP Sample Calculation (n258-R1)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 3 meter.

**RSE EIRP (dBm)** = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

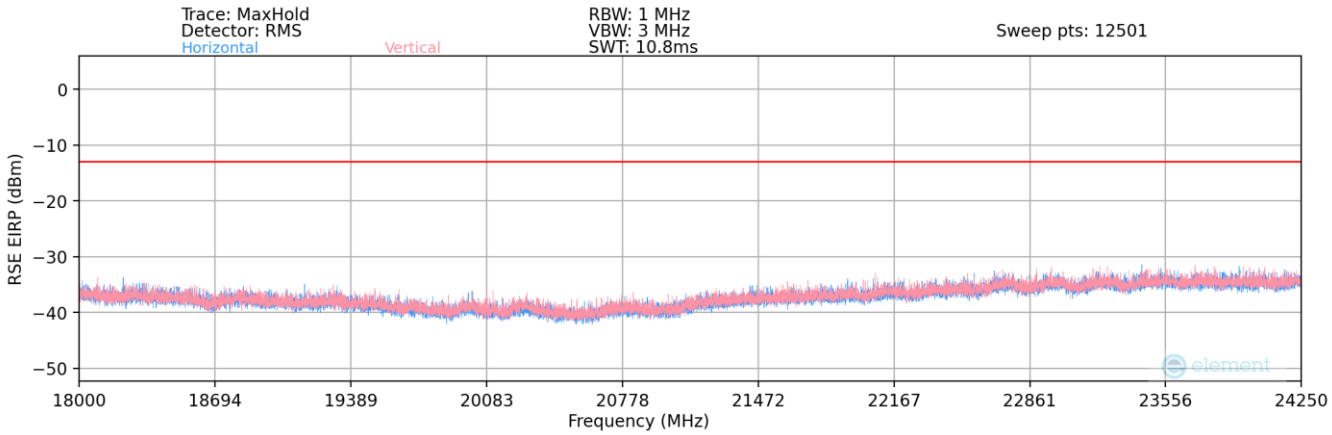
| Frequency [MHz] | Channnel | Bandwidth (MHz) | EUT Beam Pol. | Modulation | Antenna Polarization [H/V] | Antenna Height [cm] | Turntable Azimuth [degrees] | Spurious Emission Level [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 5600.00 | Low | 50 | 2Tx | QPSK | V | - | - | -59.70 | -13.00 | -46.70 |
| 8418.00 | Mid | 50 | 0.00 | QPSK | V | 254 | 128 | -45.31 | -13.00 | -32.31 |
| 10590.00 | Mid | 50 | 0.00 | QPSK | V | - | - | -51.65 | -13.00 | -38.65 |
| 17200.00 | High | 50 | 0.00 | QPSK | V | - | - | -45.00 | -13.00 | -32.00 |

**Table 7-16. n258-R1 Radiated Spurious Emissions Table (1GHz - 18GHz)**

**Notes**

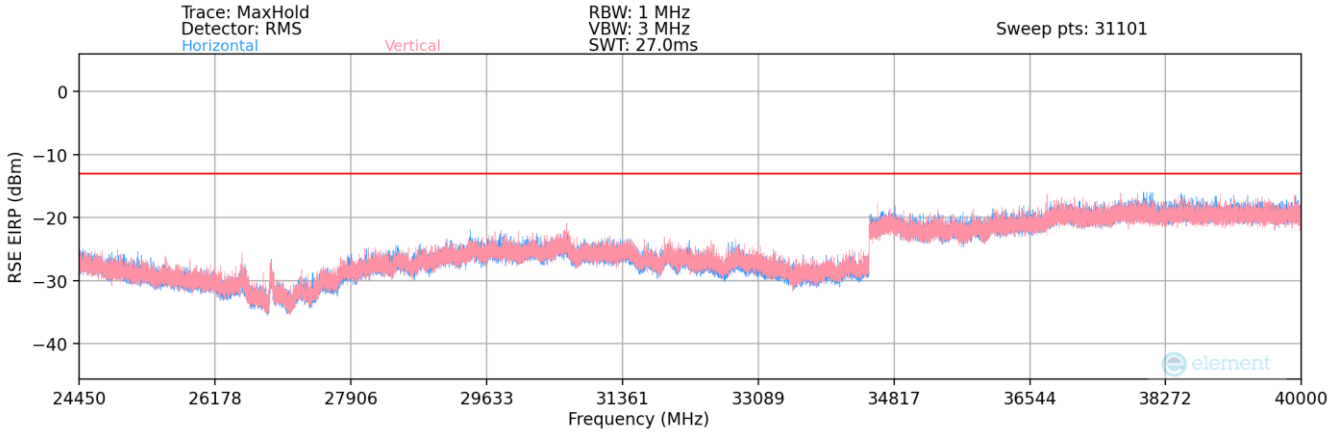
The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a test distance of 3 meter.

## 18GHz-24.25GHz




**Plot 7-88. n258-R1 Radiated Spurious Plot**

## 24.45GHz-40GHz




**Plot 7-89. n258-R1 Radiated Spurious Plot**

## Spurious Emissions EIRP Sample Calculation (n258-R1)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.

**RSE EIRP (dBm)** = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

| Frequency [MHz] | Channnel | Bandwidth (MHz) | EUT Beam Pol. | Modulation | Antenna Polarization [H/V] | Antenna Height [cm] | Turntable Azimuth [degrees] | Spurious Emission Level [dBm] | Limit [dBm] | Margin [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 23413.68 | Low | 50 | 2Tx | QPSK | V | - | - | -35.82 | -13.00 | -22.82 |
| 23567.42 | Mid | 50 | 2Tx | QPSK | V | - | - | -38.95 | -13.00 | -25.95 |
| 23836.66 | High | 50 | 2Tx | QPSK | V | - | - | -35.71 | -13.00 | -22.71 |
| 36992.65 | Low | 50 | 2Tx | QPSK | V | - | - | -22.37 | -13.00 | -9.37 |
| 36767.45 | Mid | 50 | 2Tx | QPSK | V | - | - | -23.50 | -13.00 | -10.50 |
| 37527.35 | High | 50 | 2Tx | QPSK | V | - | - | -23.34 | -13.00 | -10.34 |

**Table 7-17. n258-R1 Radiated Spurious Emissions Table (18GHz - 40GHz)**

**Notes**

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a test distance of 1 meter.