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# PART 30 MEASUREMENT REPORT

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

**Date of Testing:**
10/18/2022 – 11/14/2022
**Test Report Issue Date:**
11/22/2022
**Test Site/Locaation:**
Element Lab. Yongin-Si, Gyeonggi-do, South Korea
**Test Report Serial No.:**
1M2209010096-08.A3L

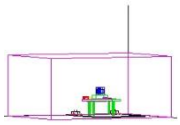
| | |
|---|---|
| **FCC ID:** | **A3LSMS911U** |
| **APPLICANT:** | **Samsung Electronics Co., Ltd.** |

| | |
|---|---|
| **Application Type:** | Certification |
| **Model:** | SM-S911U |
| **Additional Model(s):** | SM-S911U1 |
| **EUT Type:** | Portable Handset |
| **FCC Classification:** | Part 30 Mobile Transmitter (5GM) |
| **FCC Rule Part(s):** | 30 |
| **Test Procedure(s):** | ANSI C63.26-2015, KDB 842590 D01 v01r02, KDB 971168 D01 v03r01 |

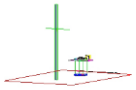
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

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.

# TABLE OF CONTENTS



# MEASUREMENT REPORT
## FCC Part 30



| Antenna | Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Max Power [W] | Max Power [dBm] | |
| M patch | NR-n258-R1 | 50 | 24275 - 24425 | 1 | QPSK | SISO | 0.723 | 28.59 | 46M1G7D |
| | | | | | QPSK | 2Tx | 0.796 | 29.01 | 46M1G7D |
| | | | | | π/2 BPSK | 2Tx | 0.780 | 28.92 | 46M0G7D |
| | | | | | 16QAM | 2Tx | 0.470 | 26.72 | 46M2W7D |
| | | | | | 64QAM | 2Tx | 0.232 | 23.66 | 46M0W7D |
| | | 100 | 24300 - 24400 | 1 | QPSK | SISO | 0.635 | 28.03 | 94M8G7D |
| | | | | | QPSK | 2Tx | 0.826 | 29.17 | 94M8G7D |
| | | | | | π/2 BPSK | 2Tx | 0.841 | 29.25 | 92M5G7D |
| | | | | | 16QAM | 2Tx | 0.498 | 26.97 | 94M6W7D |
| | | | | | 64QAM | 2Tx | 0.252 | 24.01 | 95M9W7D |
| | | | | 2 | QPSK | 2Tx | 0.232 | 23.65 | 194MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.234 | 23.70 | 194MG7D |
| | | | | | 16QAM | 2Tx | 0.166 | 22.21 | 194MW7D |
| | | | | | 64QAM | 2Tx | 0.128 | 21.06 | 194MW7D |
| N patch | NR-n258-R1 | 50 | 24275 - 24425 | 1 | QPSK | SISO | 0.453 | 26.56 | - |
| | | | | | QPSK | 2Tx | 0.785 | 28.95 | - |
| | | | | | π/2 BPSK | 2Tx | 0.807 | 29.07 | - |
| | | | | | 16QAM | 2Tx | 0.482 | 26.83 | - |
| | | | | | 64QAM | 2Tx | 0.262 | 24.19 | - |
| | | 100 | 24300 - 24400 | 1 | QPSK | 2Tx | 0.887 | 29.48 | - |
| | | | | | π/2 BPSK | 2Tx | 0.885 | 29.47 | - |
| | | | | | 16QAM | 2Tx | 0.550 | 27.40 | - |
| | | | | | 64QAM | 2Tx | 0.272 | 24.34 | - |
| | | | | 2 | QPSK | 2Tx | 0.165 | 22.17 | - |
| | | | | | π/2 BPSK | 2Tx | 0.190 | 22.79 | - |
| | | | | | 16QAM | 2Tx | 0.126 | 21.01 | - |
| | | | | | 64QAM | 2Tx | 0.096 | 19.81 | - |

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

| Antenna | Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Max Power [W] | Max Power [dBm] | |
| M patch | NR-n258-R2 | 50 | 24775 - 25225 | 1 | QPSK | SISO | 0.867 | 29.38 | 46M0G7D |
| | | | | | QPSK | 2Tx | 1.079 | 30.33 | 46M0G7D |
| | | | | | π/2 BPSK | 2Tx | 1.062 | 30.26 | 46M0G7D |
| | | | | | 16QAM | 2Tx | 0.703 | 28.47 | 46M0W7D |
| | | | | | 64QAM | 2Tx | 0.334 | 25.24 | 45M8W7D |
| | | 100 | 24800 - 25200 | 1 | QPSK | SISO | 0.991 | 29.96 | 94M4G7D |
| | | | | | QPSK | 2Tx | 1.016 | 30.07 | 94M4G7D |
| | | | | | π/2 BPSK | 2Tx | 1.062 | 30.26 | 91M4G7D |
| | | | | | 16QAM | 2Tx | 0.979 | 29.91 | 94M5W7D |
| | | | | | 64QAM | 2Tx | 0.601 | 27.79 | 94M4W7D |
| | | | | 2 | QPSK | 2Tx | 0.262 | 24.18 | 194MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.266 | 24.25 | 193MG7D |
| | | | | | 16QAM | 2Tx | 0.207 | 23.15 | 194MW7D |
| | | | | | 64QAM | 2Tx | 0.148 | 21.71 | 194MW7D |
| | | | | 3 | QPSK | 2Tx | 0.282 | 24.50 | 294MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.281 | 24.48 | 295MG7D |
| | | | | | 16QAM | 2Tx | 0.174 | 22.41 | 294MW7D |
| | | | | | 64QAM | 2Tx | 0.110 | 20.42 | 294MW7D |
| N patch | NR-n258-R2 | 50 | 24775 - 25225 | 1 | QPSK | SISO | 0.728 | 28.62 | - |
| | | | | | QPSK | 2Tx | 1.309 | 31.17 | - |
| | | | | | π/2 BPSK | 2Tx | 1.303 | 31.15 | - |
| | | | | | 16QAM | 2Tx | 0.800 | 29.03 | - |
| | | | | | 64QAM | 2Tx | 0.378 | 25.77 | - |
| | | 100 | 24800 - 25200 | 1 | QPSK | SISO | 0.618 | 27.91 | - |
| | | | | | QPSK | 2Tx | 1.245 | 30.95 | - |
| | | | | | π/2 BPSK | 2Tx | 1.225 | 30.88 | - |
| | | | | | 16QAM | 2Tx | 0.826 | 29.17 | - |
| | | | | | 64QAM | 2Tx | 0.337 | 25.27 | - |
| | | | | 2 | QPSK | 2Tx | 0.299 | 24.76 | - |
| | | | | | π/2 BPSK | 2Tx | 0.297 | 24.73 | - |
| | | | | | 16QAM | 2Tx | 0.187 | 22.73 | - |
| | | | | | 64QAM | 2Tx | 0.113 | 20.53 | - |
| | | | | 3 | QPSK | 2Tx | 0.329 | 25.17 | - |
| | | | | | π/2 BPSK | 2Tx | 0.327 | 25.14 | - |
| | | | | | 16QAM | 2Tx | 0.207 | 23.15 | - |
| | | | | | 64QAM | 2Tx | 0.127 | 21.03 | - |

**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] | |
| M patch | NR-n261 | 50 | 27525 - 28325 | 1 | QPSK | SISO | 0.834 | 29.21 | 46M2G7D |
| | | | | | QPSK | 2Tx | 1.845 | 32.66 | 46M2G7D |
| | | | | | π/2 BPSK | 2Tx | 1.901 | 32.79 | 46M0G7D |
| | | | | | 16QAM | 2Tx | 1.148 | 30.60 | 46M2W7D |
| | | | | | 64QAM | 2Tx | 0.564 | 27.51 | 45M9W7D |
| | | 100 | 27550 - 28300 | 1 | QPSK | SISO | 0.847 | 29.28 | 94M4G7D |
| | | | | | QPSK | 2Tx | 1.726 | 32.37 | 94M4G7D |
| | | | | | π/2 BPSK | 2Tx | 1.750 | 32.43 | 91M6G7D |
| | | | | | 16QAM | 2Tx | 1.549 | 31.90 | 94M4W7D |
| | | | | | 64QAM | 2Tx | 0.830 | 29.19 | 94M1W7D |
| | | | | 2 | QPSK | 2Tx | 0.778 | 28.91 | 194MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.774 | 28.89 | 191MG7D |
| | | | | | 16QAM | 2Tx | 0.515 | 27.12 | 194MW7D |
| | | | | | 64QAM | 2Tx | 0.371 | 25.69 | 194MW7D |
| | | | | 3 | QPSK | 2Tx | 0.838 | 29.23 | 293MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.830 | 29.19 | 291MG7D |
| | | | | | 16QAM | 2Tx | 0.525 | 27.20 | 293MW7D |
| | | | | | 64QAM | 2Tx | 0.327 | 25.14 | 294MW7D |
| | | | | 4 | QPSK | 2Tx | 0.605 | 27.82 | 396MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.628 | 27.98 | 395MG7D |
| | | | | | 16QAM | 2Tx | 0.370 | 25.68 | 395MW7D |
| | | | | | 64QAM | 2Tx | 0.233 | 23.67 | 399MW7D |
| N patch | NR-n261 | 50 | 27525 - 28325 | 1 | QPSK | SISO | 1.432 | 31.56 | - |
| | | | | | QPSK | 2Tx | 1.611 | 32.07 | - |
| | | | | | π/2 BPSK | 2Tx | 1.574 | 31.97 | - |
| | | | | | 16QAM | 2Tx | 1.050 | 30.21 | - |
| | | | | | 64QAM | 2Tx | 0.461 | 26.64 | - |
| | | 100 | 27550 - 28300 | 1 | QPSK | SISO | 1.189 | 30.75 | - |
| | | | | | QPSK | 2Tx | 1.462 | 31.65 | - |
| | | | | | π/2 BPSK | 2Tx | 1.469 | 31.67 | - |
| | | | | | 16QAM | 2Tx | 0.887 | 29.48 | - |
| | | | | | 64QAM | 2Tx | 0.445 | 26.48 | - |
| | | | | 2 | QPSK | 2Tx | 0.596 | 27.75 | - |
| | | | | | π/2 BPSK | 2Tx | 0.577 | 27.61 | - |
| | | | | | 16QAM | 2Tx | 0.412 | 26.15 | - |
| | | | | | 64QAM | 2Tx | 0.213 | 23.29 | - |
| | | | | 3 | QPSK | 2Tx | 0.509 | 27.07 | - |
| | | | | | π/2 BPSK | 2Tx | 0.509 | 27.07 | - |
| | | | | | 16QAM | 2Tx | 0.316 | 24.99 | - |
| | | | | | 64QAM | 2Tx | 0.198 | 22.96 | - |
| | | | | 4 | QPSK | 2Tx | 0.409 | 26.12 | - |
| | | | | | π/2 BPSK | 2Tx | 0.406 | 26.08 | - |
| | | | | | 16QAM | 2Tx | 0.244 | 23.87 | - |
| | | | | | 64QAM | 2Tx | 0.152 | 21.81 | - |

**EUT Overview (Band n261)**

| Antenna | Band | Bandwidth [MHz] | Tx Frequency [MHz] | CCs Active | Modulation | Mode | EIRP | | Emission Designator |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Max Power [W] | Max Power [dBm] | |
| M patch | NR-n260 | 50 | 37025 - 39975 | 1 | QPSK | SISO | 0.910 | 29.59 | 46M1G7D |
| | | | | | QPSK | 2Tx | 1.021 | 30.09 | 46M1G7D |
| | | | | | π/2 BPSK | 2Tx | 1.057 | 30.24 | 45M8G7D |
| | | | | | 16QAM | 2Tx | 0.630 | 27.99 | 46M0W7D |
| | | | | | 64QAM | 2Tx | 0.344 | 25.37 | 45M9W7D |
| | | 100 | 37050 - 39950 | 1 | QPSK | SISO | 0.836 | 29.22 | 95M0G7D |
| | | | | | QPSK | 2Tx | 0.923 | 29.65 | 95M0G7D |
| | | | | | π/2 BPSK | 2Tx | 0.935 | 29.71 | 91M7G7D |
| | | | | | 16QAM | 2Tx | 0.570 | 27.56 | 94M4W7D |
| | | | | | 64QAM | 2Tx | 0.280 | 24.47 | 94M6W7D |
| | | | | 2 | QPSK | 2Tx | 0.365 | 25.62 | 193MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.370 | 25.68 | 193MG7D |
| | | | | | 16QAM | 2Tx | 0.259 | 24.14 | 194MW7D |
| | | | | | 64QAM | 2Tx | 0.171 | 22.33 | 193MW7D |
| | | | | 3 | QPSK | 2Tx | 0.387 | 25.88 | 295MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.387 | 25.88 | 295MG7D |
| | | | | | 16QAM | 2Tx | 0.275 | 24.39 | 295MW7D |
| | | | | | 64QAM | 2Tx | 0.180 | 22.56 | 294MW7D |
| | | | | 4 | QPSK | 2Tx | 0.340 | 25.32 | 397MG7D |
| | | | | | π/2 BPSK | 2Tx | 0.339 | 25.30 | 398MG7D |
| | | | | | 16QAM | 2Tx | 0.240 | 23.80 | 398MW7D |
| | | | | | 64QAM | 2Tx | 0.160 | 22.05 | 392MW7D |
| N patch | NR-n260 | 50 | 37025 - 39975 | 1 | QPSK | SISO | 1.687 | 32.27 | - |
| | | | | | QPSK | 2Tx | 2.133 | 33.29 | - |
| | | | | | π/2 BPSK | 2Tx | 2.070 | 33.16 | - |
| | | | | | 16QAM | 2Tx | 1.524 | 31.83 | - |
| | | | | | 64QAM | 2Tx | 0.822 | 29.15 | - |
| | | 100 | 37050 - 39950 | 1 | QPSK | SISO | 1.718 | 32.35 | - |
| | | | | | QPSK | 2Tx | 2.208 | 33.44 | - |
| | | | | | π/2 BPSK | 2Tx | 2.296 | 33.61 | - |
| | | | | | 16QAM | 2Tx | 1.390 | 31.43 | - |
| | | | | | 64QAM | 2Tx | 0.678 | 28.31 | - |
| | | | | 2 | QPSK | 2Tx | 0.692 | 28.40 | - |
| | | | | | π/2 BPSK | 2Tx | 0.698 | 28.44 | - |
| | | | | | 16QAM | 2Tx | 0.493 | 26.93 | - |
| | | | | | 64QAM | 2Tx | 0.319 | 25.04 | - |
| | | | | 3 | QPSK | 2Tx | 0.690 | 28.39 | - |
| | | | | | π/2 BPSK | 2Tx | 0.689 | 28.38 | - |
| | | | | | 16QAM | 2Tx | 0.471 | 26.73 | - |
| | | | | | 64QAM | 2Tx | 0.310 | 24.91 | - |
| | | | | 4 | QPSK | 2Tx | 0.653 | 28.15 | - |
| | | | | | π/2 BPSK | 2Tx | 0.649 | 28.12 | - |
| | | | | | 16QAM | 2Tx | 0.455 | 26.58 | - |
| | | | | | 64QAM | 2Tx | 0.304 | 24.83 | - |

**EUT Overview (Band n260)**

**Note:** Due to similar antenna performance from the antennas after thorough investigation, the Occupied Bandwidth was only measured on one antenna for each band.

# 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 Suwon Laboratory located at 13, Heungdeok 1-ro, Giheung-gu, Yongin-si, Gyeonggi-do, 16954, South Korea. 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 Materials Technology Suwon, Ltd. located in Yongin-si, Gyeonggi-do, 16954, South Korea.**

- Element Materials Technology Suwon, Ltd. is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation(A2LA) with Certificate number 2041.04 for Specific Absorption Rate (SAR), and Electromagnetic Compatibility (EMC) & Telecommunications testing for FCC and Innovation, Science, and Economic Development Canada rules.

- Element Materials Technology Suwon, Ltd. facility is accredited, designated, and recognized in accordance with the provision of Radio Wave Act and International Standard ISO/IEC 17025:2017 under the National Radio Research Agency.

  - Designation Number / CABID: KR0169
  - Test Firm Registration Number of FCC: 417945
  - Test Firm Registration Number of ISED: 26168

# 2.0 PRODUCT INFORMATION

## 2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS911U**. 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. 2Tx and 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.:** 0284M, 0275M

## 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/ax WLAN, 802.11a/n/ac/ax UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer

## 2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 842590 D01. 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 and NR-DC mode.

While operating in the FR2 band, this device supports anchor band operation with an LTE or NR carrier via main antenna (default configuration) or diversity antenna (Tx hopping configuration). This was investigated during FR2 measurements.

## 2.4 Software and Firmware

The test was conducted with firmware version S911USQU0AVJM 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 were used in the measurement of the EUT.

## 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 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.

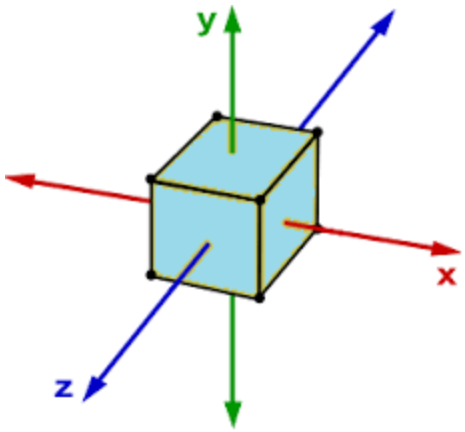



**Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes**

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 at least 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 ANSI C63.26-2015.

**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 |
|---|---|---|---|---|---|---|
| N/A | CL_NW_40G_06 | FAC mmWave cable 40GHz | 2022-09-01 | Annual | 2023-08-31 | CL_NW_40G_06 |
| ERAVANT | SAR-2309-19-S2 | WR-19 Rectangular Gain Horn | 2022-03-09 | Annual | 2023-03-09 | 17314-01 |
| ERAVANT | SAR-2309-12-S2 | WR-12 Rectangular Gain Horn | 2022-03-09 | Annual | 2023-03-09 | 17315-01 |
| ERAVANT | SAR-2309-08-S2 | WR-08 Rectangular Gain Horn | 2022-03-09 | Annual | 2023-03-09 | 01719-07 |
| ERAVANT | SAR-2309-05-S2 | WR-05 Rectangular Gain Horn | 2022-03-09 | Annual | 2023-03-09 | 01672-15 |
| Espec | SH-242 | Environmental Chamber | 2022-08-26 | Annual | 2023-08-25 | 93011064 |
| Keysight Technologies | N9030B | MXA Signal Analyzer | 2022-05-10 | Annual | 2023-05-19 | MY57142018 |
| NARDA | 180-442A-KF | Horn Antenna (Small) | 2020-11-20 | Biennial | 2022-11-19 | T058701-03 |
| Rohde & Schwarz | SFUNIT-Rx | Shielded Filter Unit | 2022-02-18 | Annual | 2023-02-17 | 102131 |
| Rohde & Schwarz | ESW | EMI Test Receiver | 2022-07-04 | Annual | 2023-07-03 | 101761 |
| Rohde & Schwarz | TS-PR18 | Preamplifier | 2022-07-06 | Annual | 2023-07-05 | 102141 |
| Schwarzbeck | VULB9162 | Broadband TRILOG Antenna | 2021-07-13 | Biennial | 2023-07-12 | 9162-217 |
| Sunol | DRH-118 | Horn Antenna | 2021-07-14 | Biennial | 2023-07-13 | A102416-1 |
| Virginia Diodes, Inc. | VDIWR19.0SAX | SAX Module (40 - 60GHz) | 2021-01-12 | Biennial | 2023-01-12 | SAX782 |
| Virginia Diodes, Inc. | VDIWR8.0SAX | SAX 90GHz - 140GHz | 2020-12-02 | Biennial | 2022-12-02 | SAX 784 |
| Virginia Diodes, Inc. | WR12.0SAX | SAX 60GHz - 90GHz | 2020-11-25 | Biennial | 2022-11-25 | SAX 783 |
| Virginia Diodes, Inc. | WR5.1SAX | SAX 140 - 220GHz | 2021-02-03 | Biennial | 2023-02-03 | SAX 785 |

**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: A3LSMS911U

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. Per 2.1057(a)(3), spurious emissions were investigated up to 200GHz for n260.
4) The radiated RF output power and all out-of-band emissions in the spurious domain are evaluated to the limits first as EIRP measurements to determine if the "early-exit" condition of KDB 842590 D01 applies. If not, then additional TRP measurements are performed.
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

**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, KDB842590 D01 v02r03 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

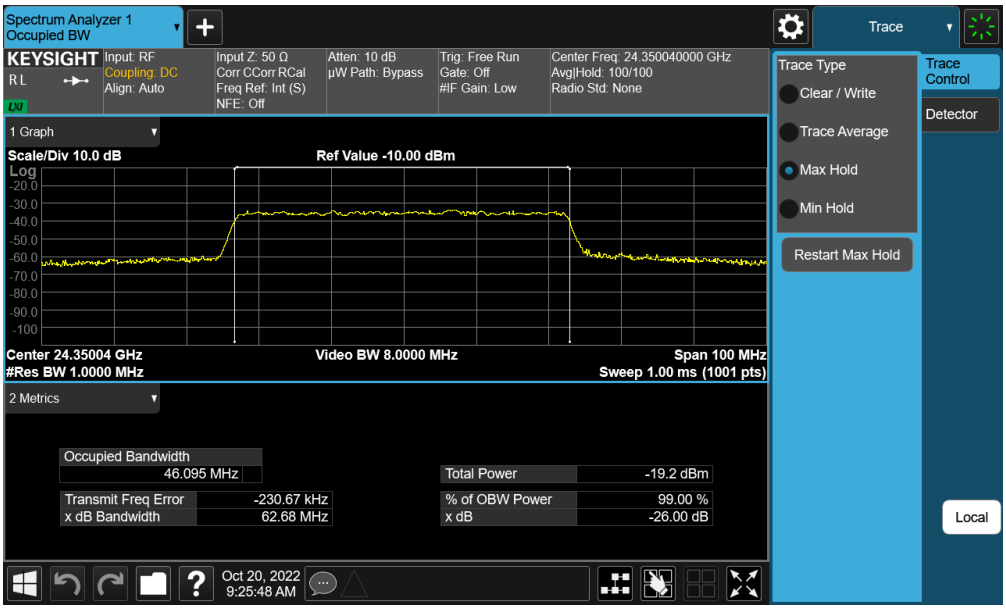
**Test Notes**

1. 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.
2. Due to similar antenna performance from both patch antennas, the Occupied Bandwidth was only measured on one antenna (M patch) for each band.

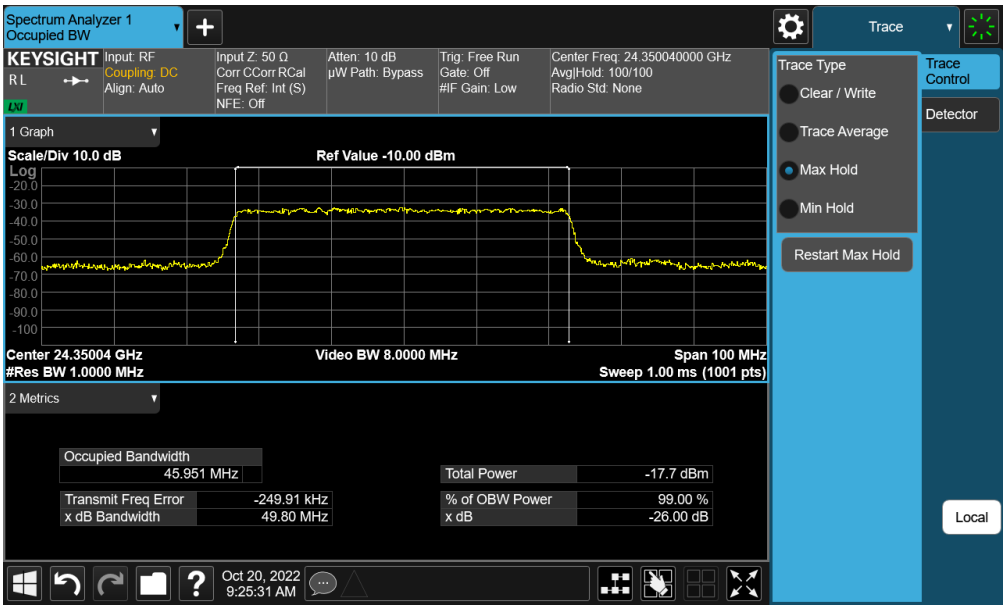
## Band n258-R1

| Antenna | Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|---|
| M patch | 50 | 1 | CP-OFDM | QPSK | 46.09 |
| | | | DFT-s-OFDM | π/2 BPSK | 45.95 |
| | | | CP-OFDM | 16QAM | 46.15 |
| | | | CP-OFDM | 64QAM | 46.01 |
| | 100 | 1 | CP-OFDM | QPSK | 94.79 |
| | | | DFT-s-OFDM | π/2 BPSK | 92.50 |
| | | | CP-OFDM | 16QAM | 94.59 |
| | | | CP-OFDM | 64QAM | 95.87 |
| | | 2 | DFT-s-OFDM | QPSK | 194.28 |
| | | | DFT-s-OFDM | π/2 BPSK | 193.85 |
| | | | CP-OFDM | 16QAM | 193.68 |
| | | | DFT-s-OFDM | 64QAM | 194.00 |

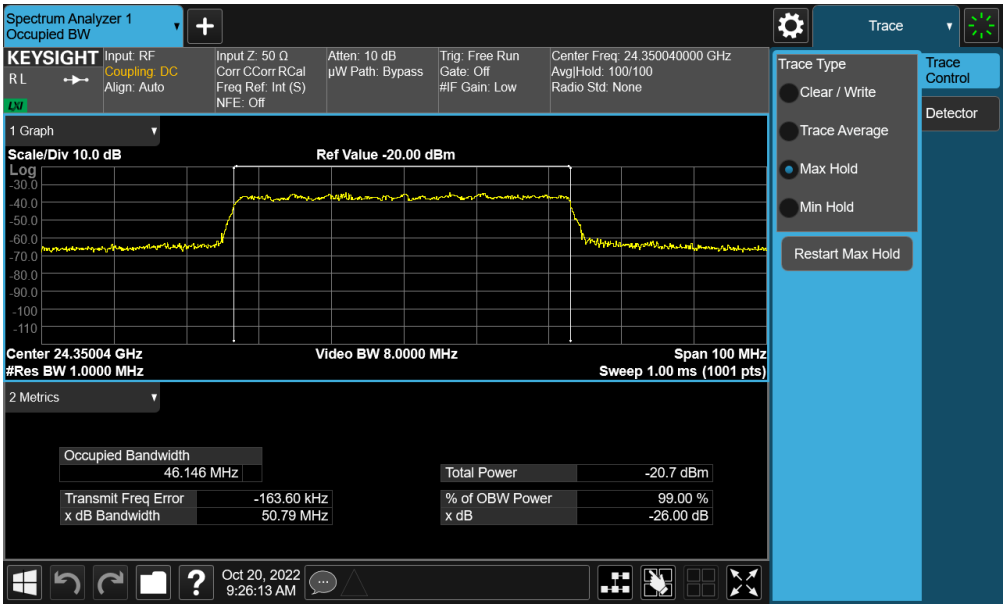
**Table 7-2. Summary of M patch Occupied Bandwidths (n258-R1)**



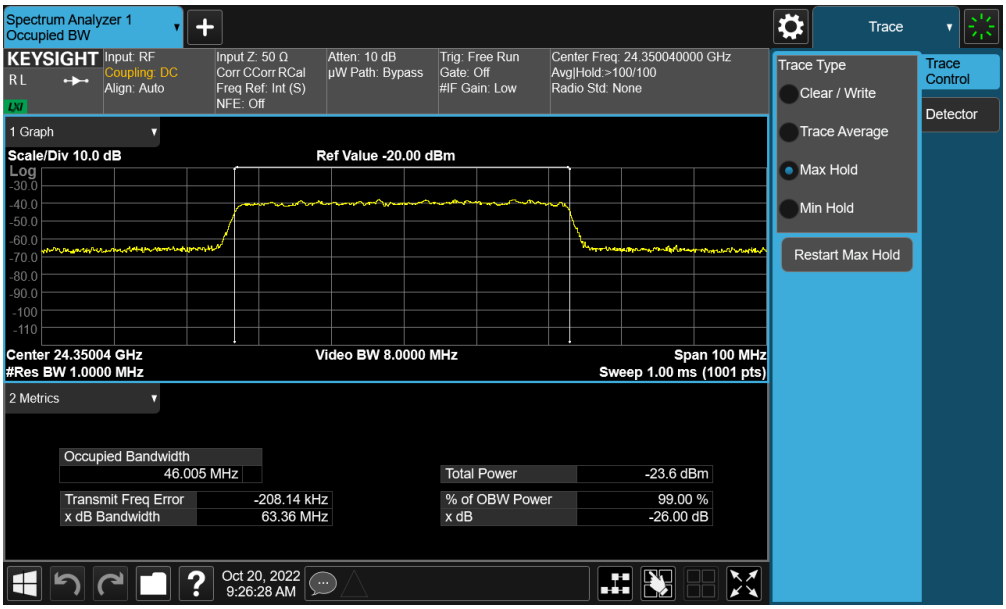

**Plot 7-1. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



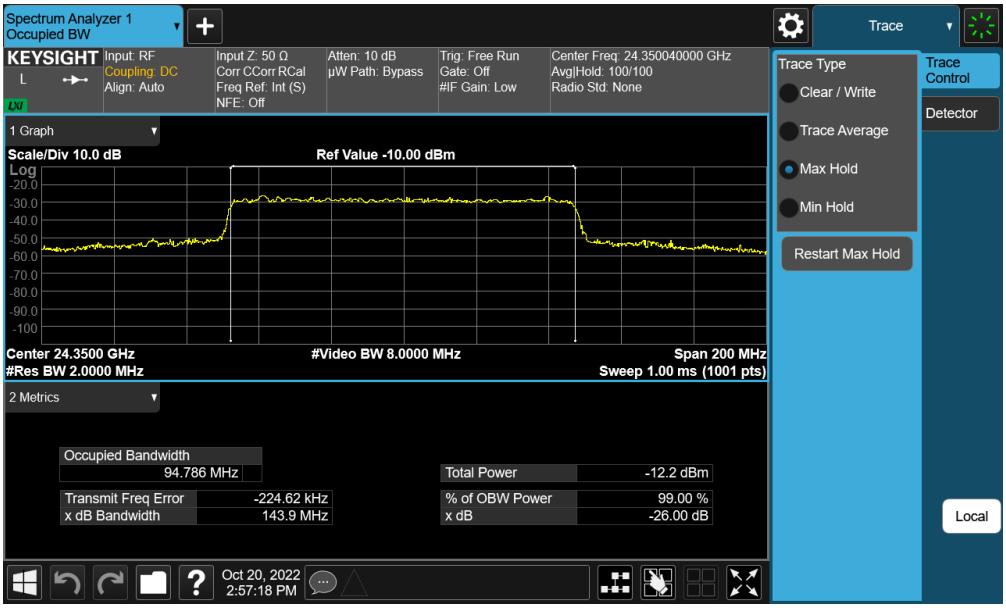

**Plot 7-2. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



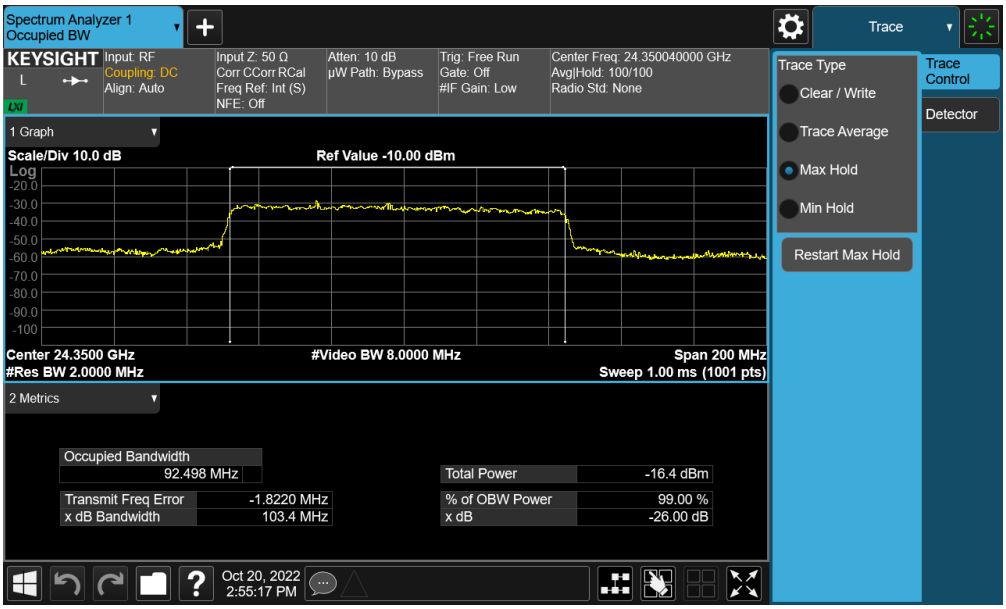

**Plot 7-3. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



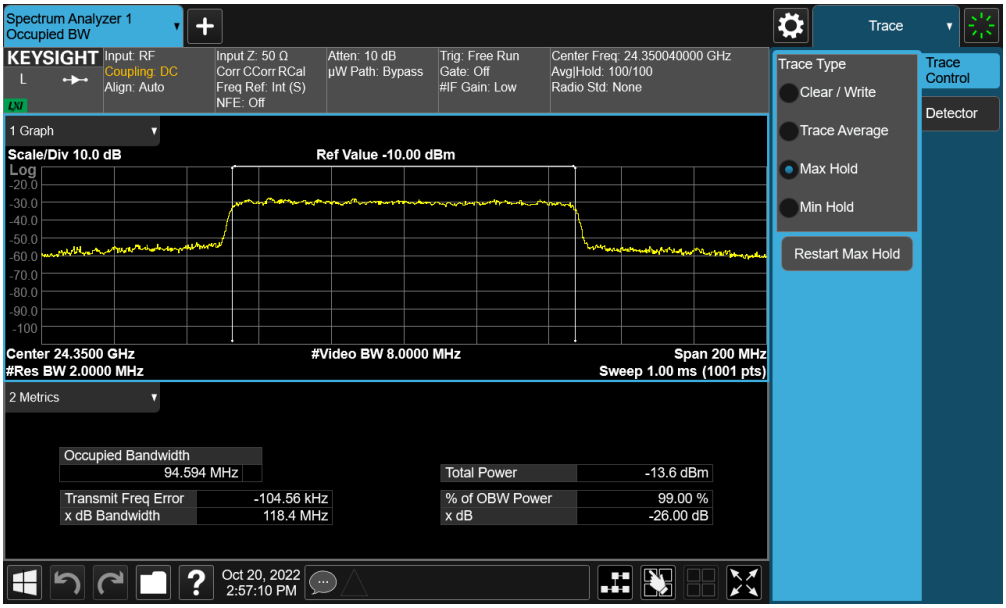

**Plot 7-4. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



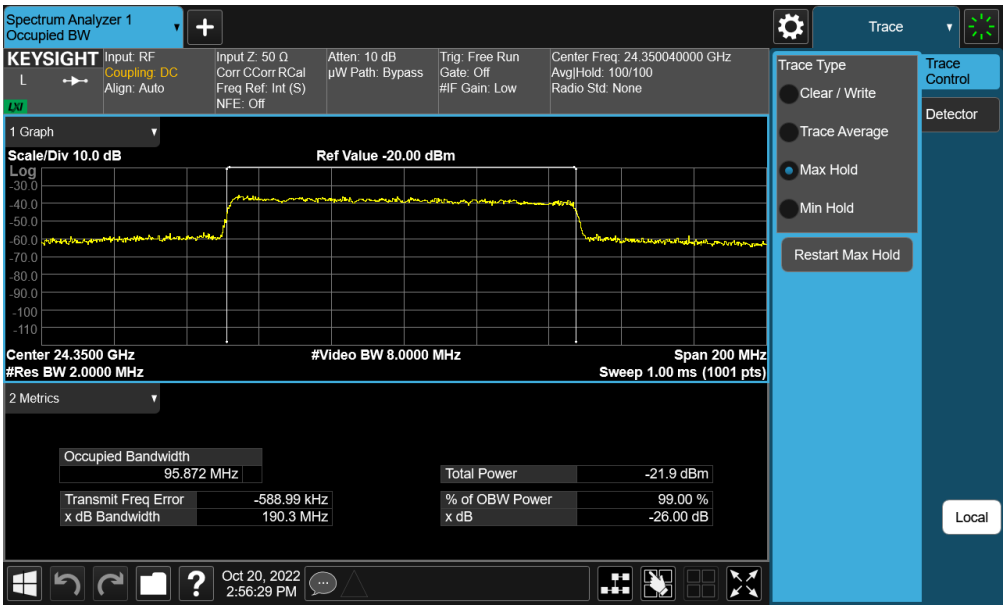

**Plot 7-5. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



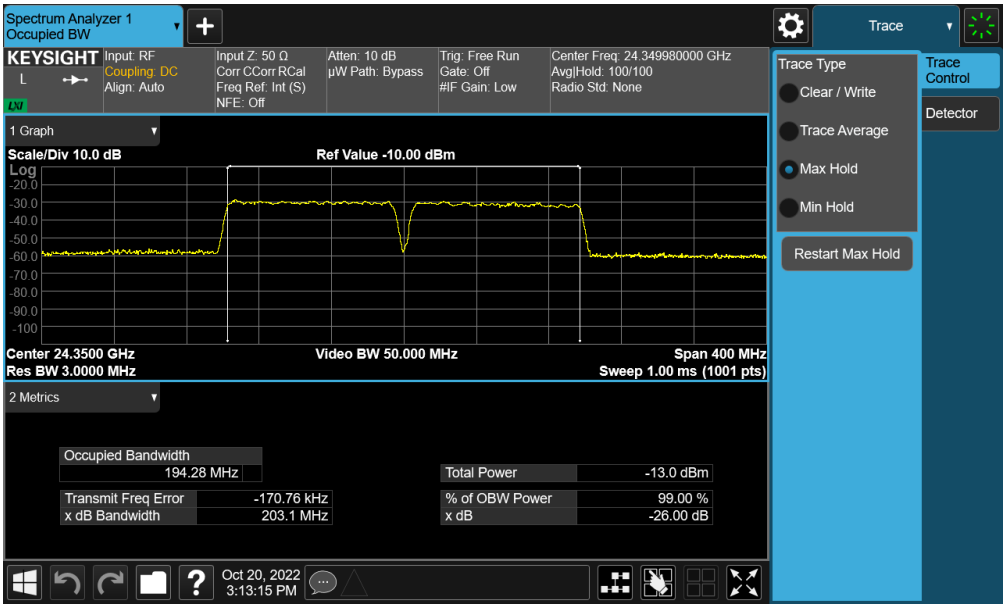

**Plot 7-6. M patch Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



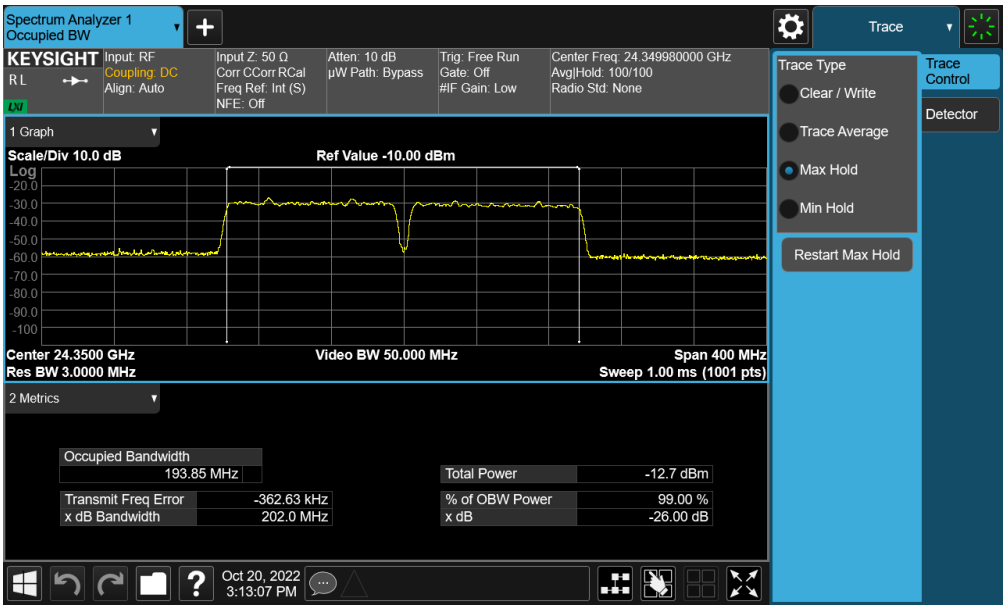

**Plot 7-7. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



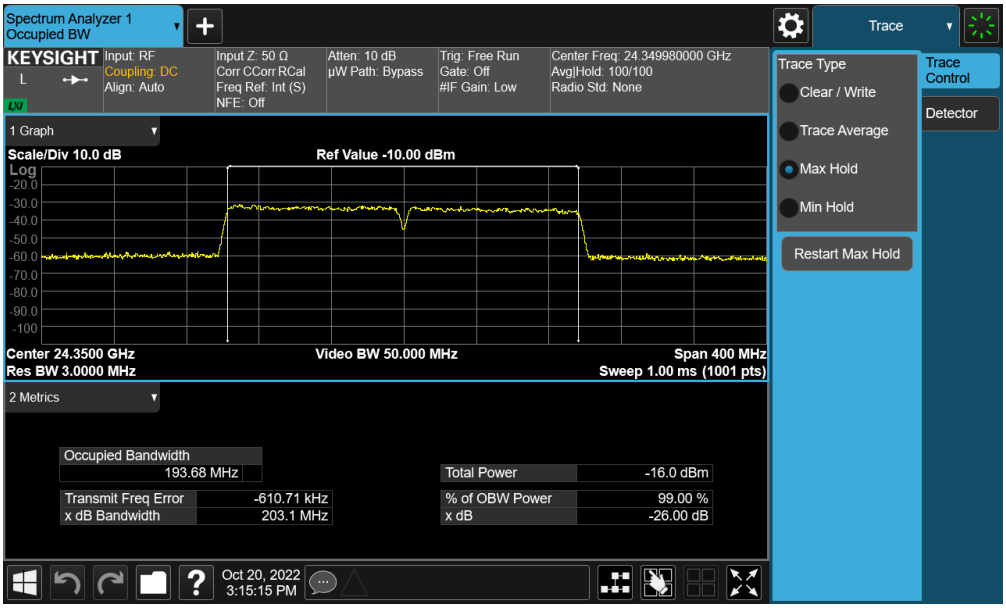

**Plot 7-8. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



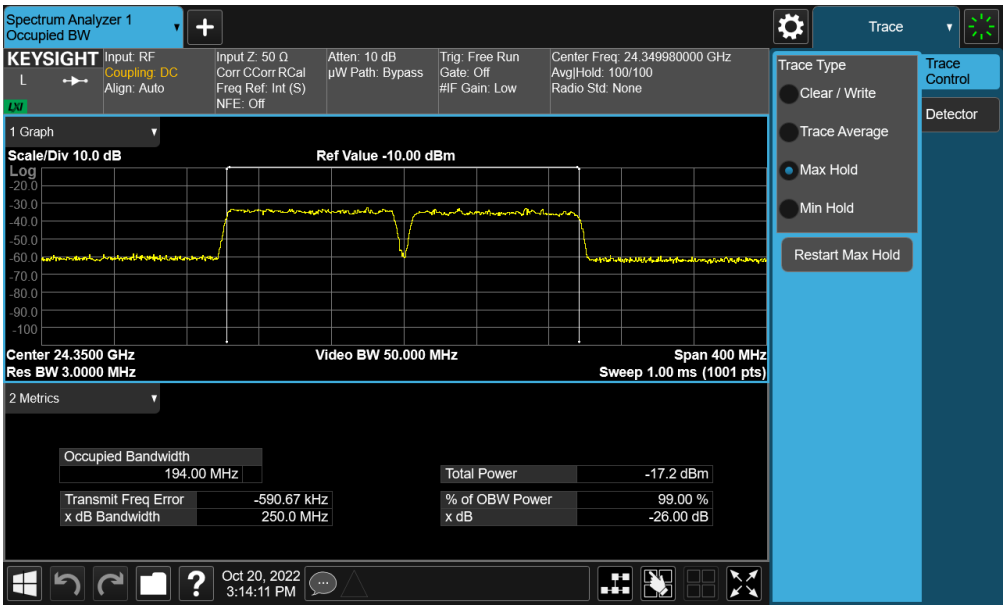

**Plot 7-9. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM QPSK – Mid Channel)**




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




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

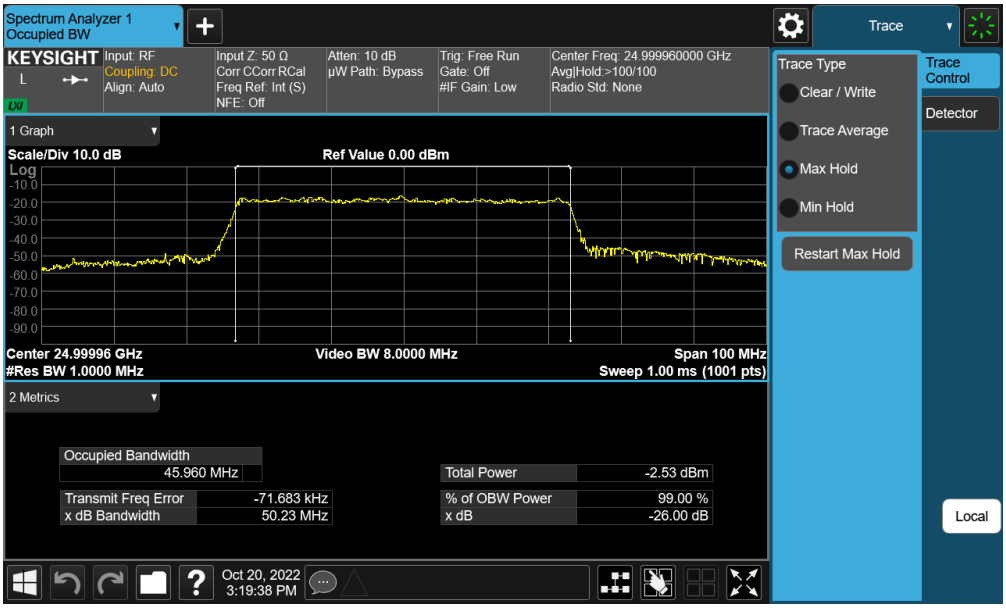



**Plot 7-12. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM 64QAM – Mid Channel)**

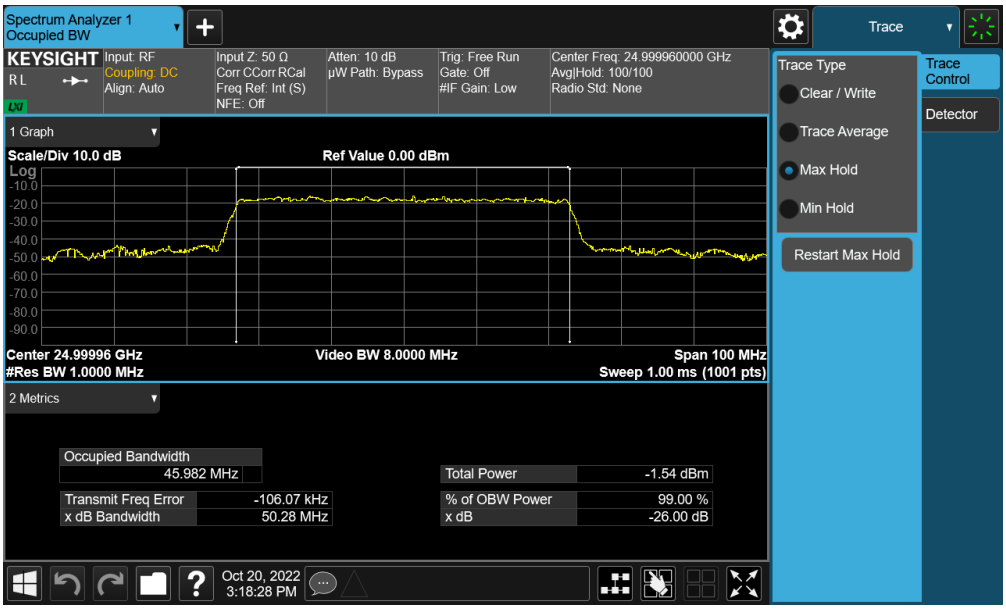
## Band n258-R2

| Antenna | Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|---|
| M patch | 50 | 1 | CP-OFDM | QPSK | 45.96 |
| | | | DFT-s-OFDM | π/2 BPSK | 45.98 |
| | | | CP-OFDM | 16QAM | 45.98 |
| | | | DFT-s-OFDM | 64QAM | 45.83 |
| | 100 | 1 | CP-OFDM | QPSK | 94.36 |
| | | | DFT-s-OFDM | π/2 BPSK | 91.42 |
| | | | CP-OFDM | 16QAM | 94.51 |
| | | | CP-OFDM | 64QAM | 94.42 |
| | | 2 | DFT-s-OFDM | QPSK | 193.69 |
| | | | DFT-s-OFDM | π/2 BPSK | 193.10 |
| | | | CP-OFDM | 16QAM | 193.77 |
| | | | DFT-s-OFDM | 64QAM | 193.53 |
| | | 3 | DFT-s-OFDM | QPSK | 294.47 |
| | | | DFT-s-OFDM | π/2 BPSK | 295.00 |
| | | | DFT-s-OFDM | 16QAM | 293.84 |
| | | | DFT-s-OFDM | 64QAM | 293.94 |

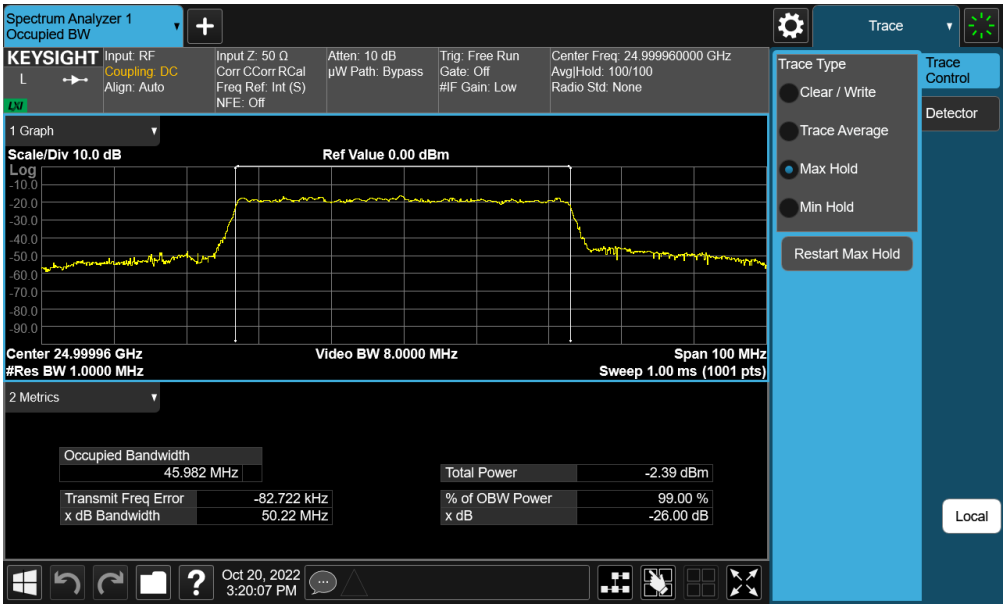
**Table 7-3. Summary of M patch Occupied Bandwidths (n258-R2)**



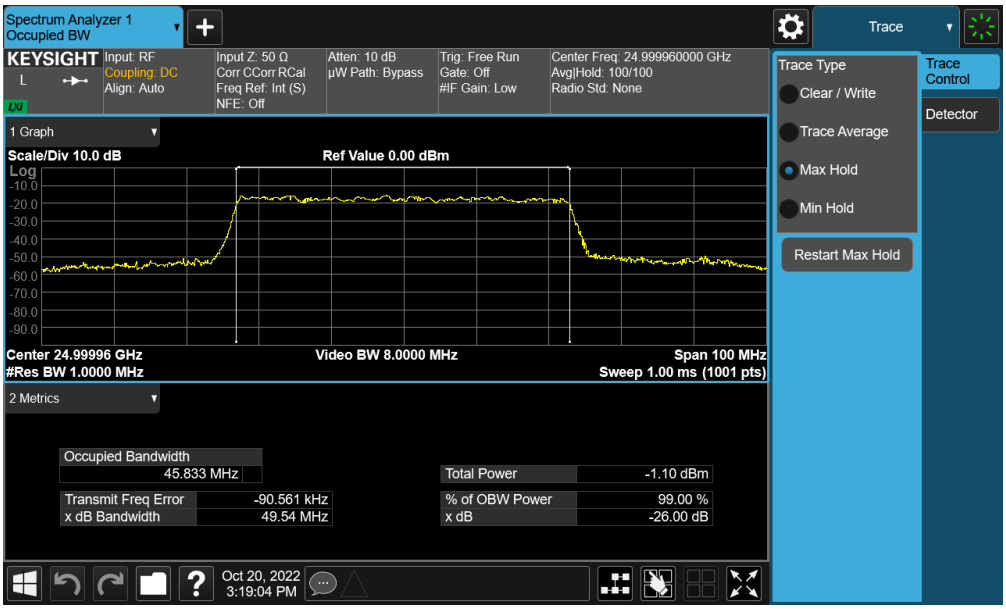

**Plot 7-13. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



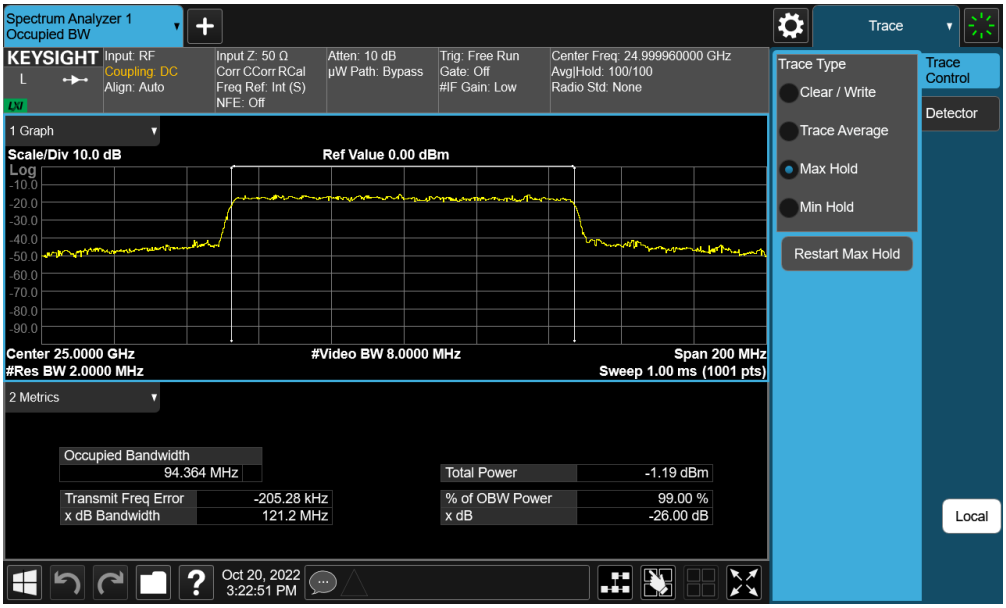

**Plot 7-14. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



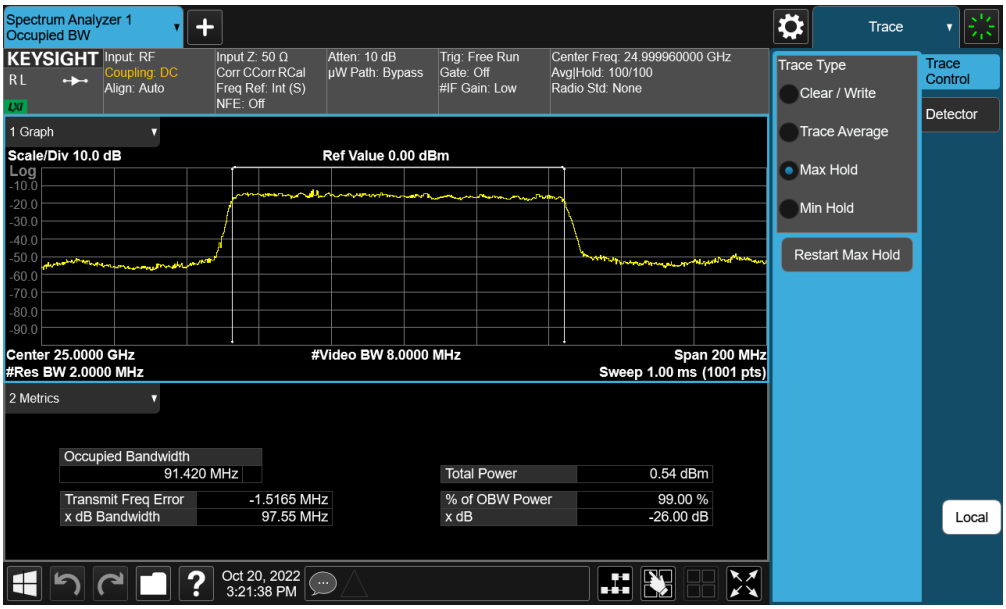

**Plot 7-15. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



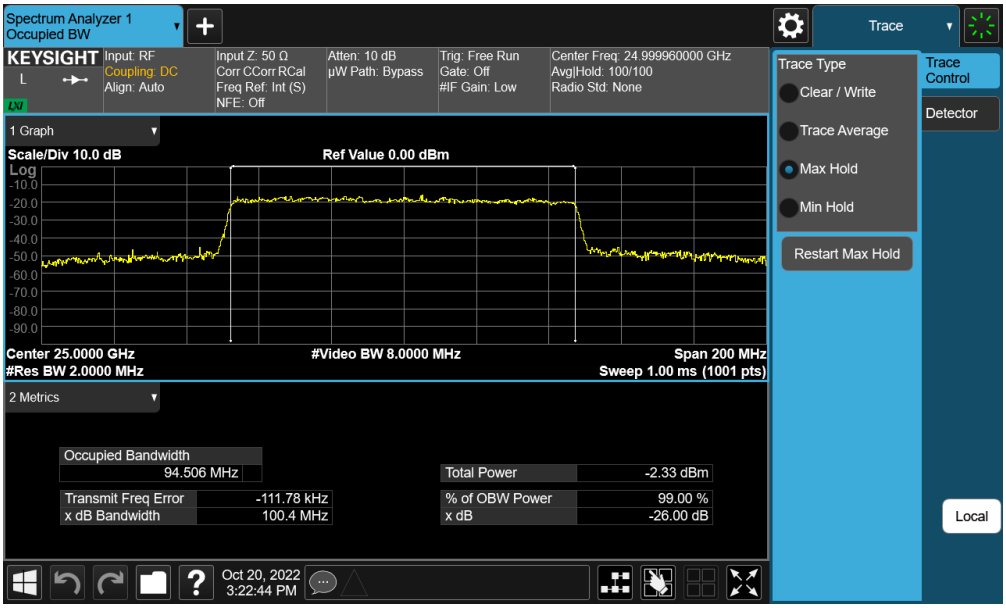

**Plot 7-16. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM 64QAM – Mid Channel)**




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

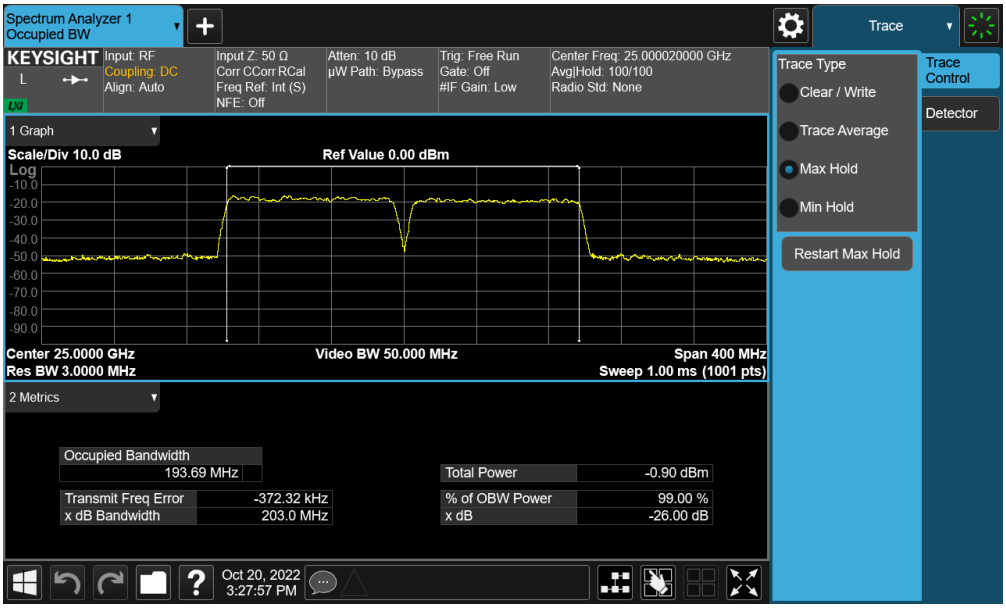



**Plot 7-18. M patch Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**

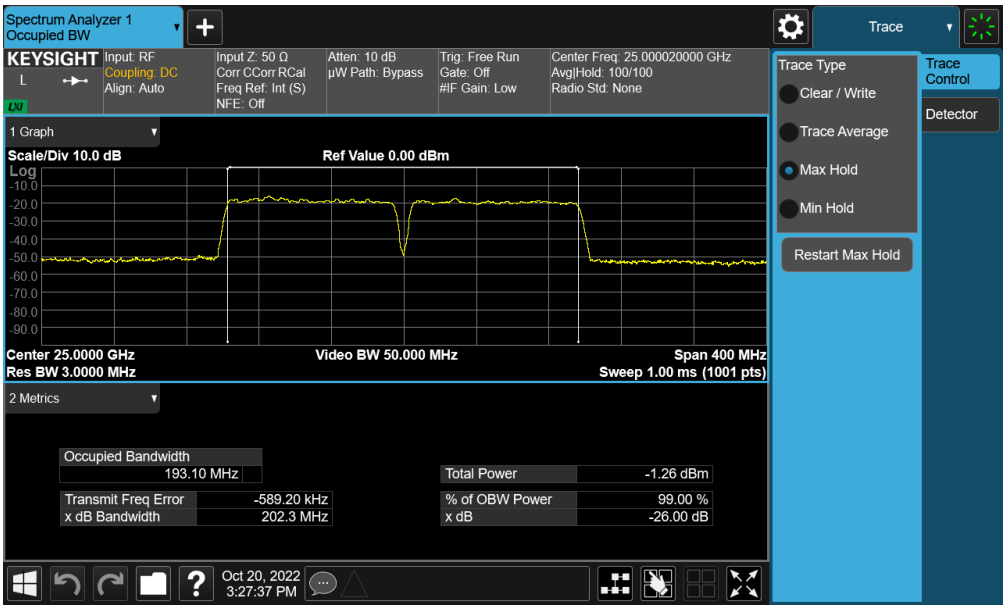



**Plot 7-19. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**

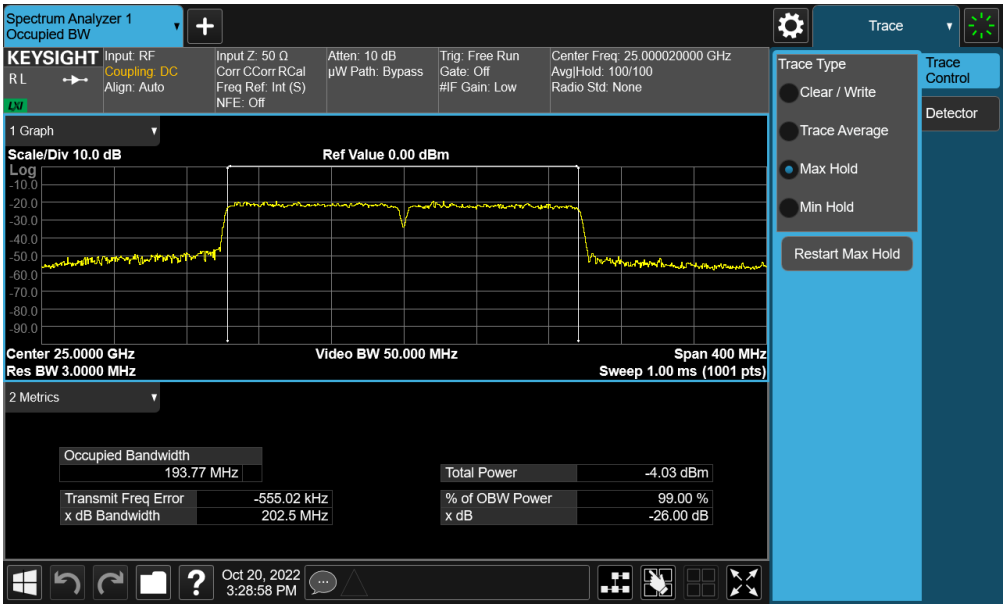

**Plot 7-20. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



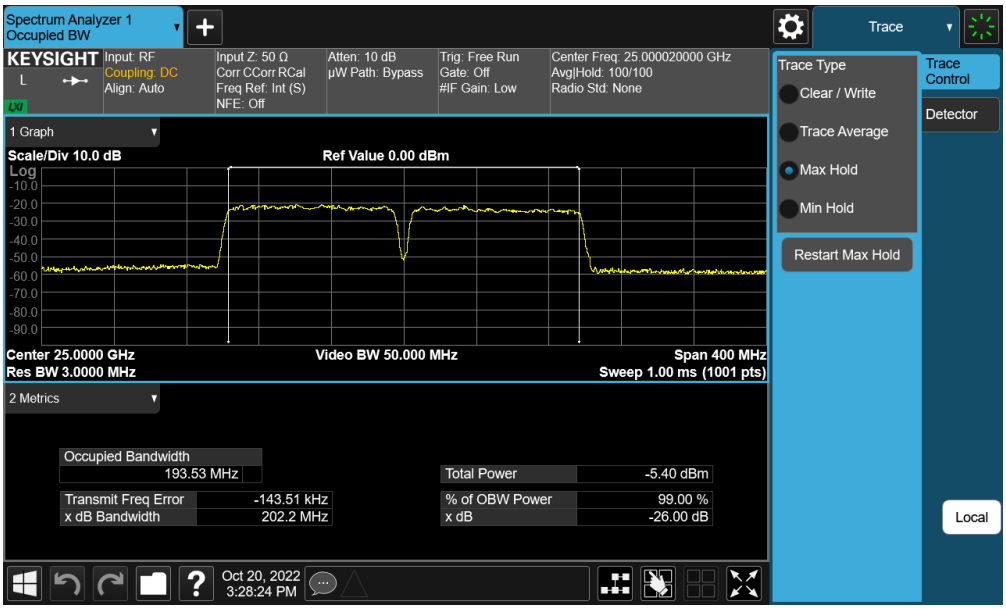

**Plot 7-21. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM QPSK – Mid Channel)**



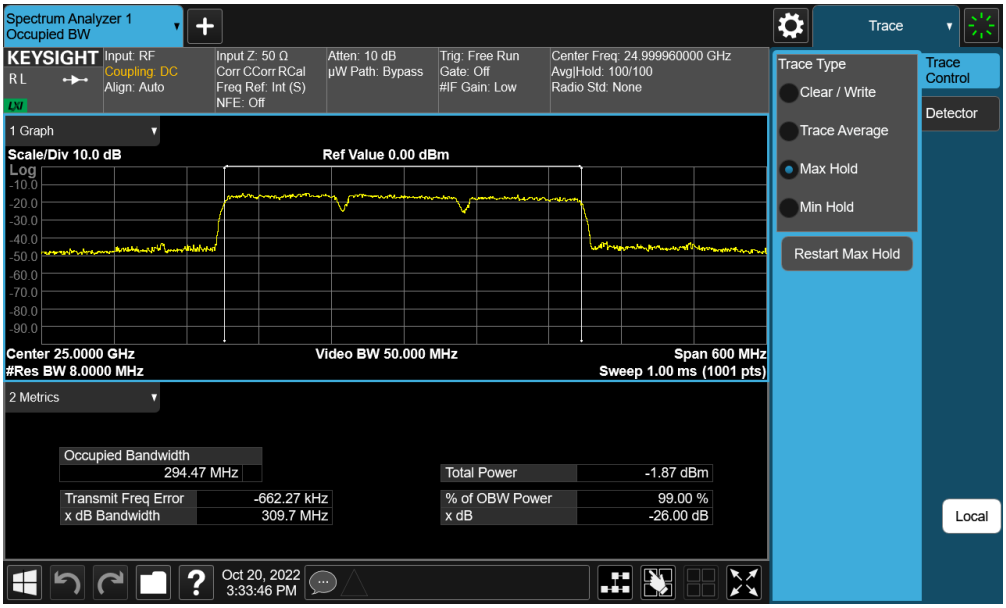

**Plot 7-22. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



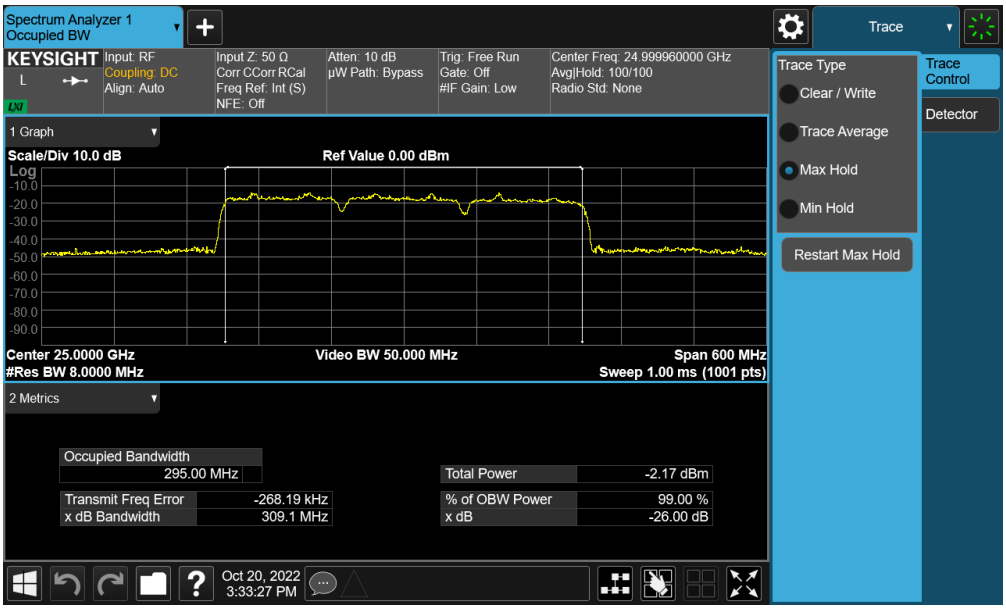

**Plot 7-23. M patch Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**



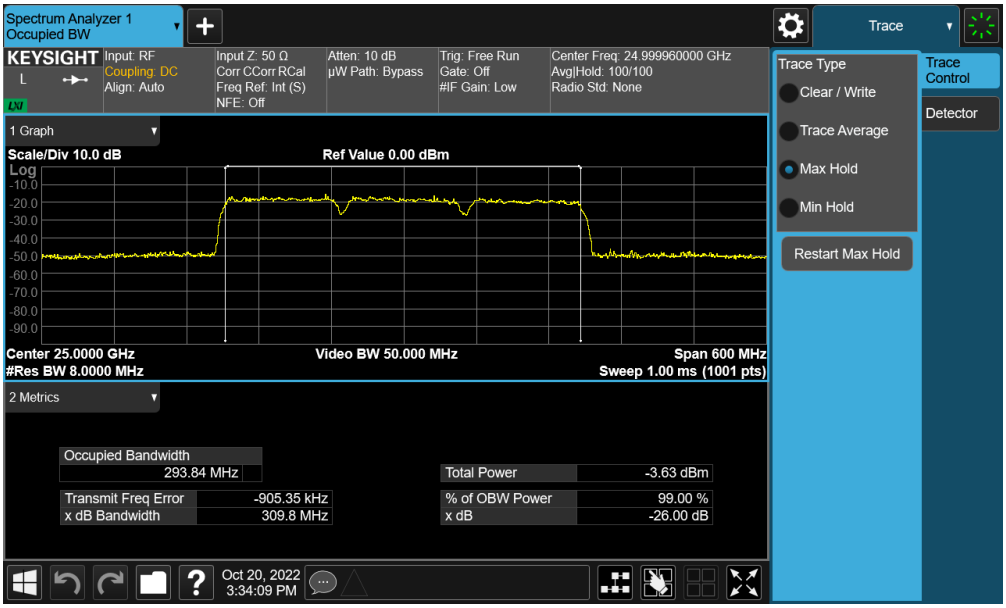

**Plot 7-24. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM 64QAM – Mid Channel)**



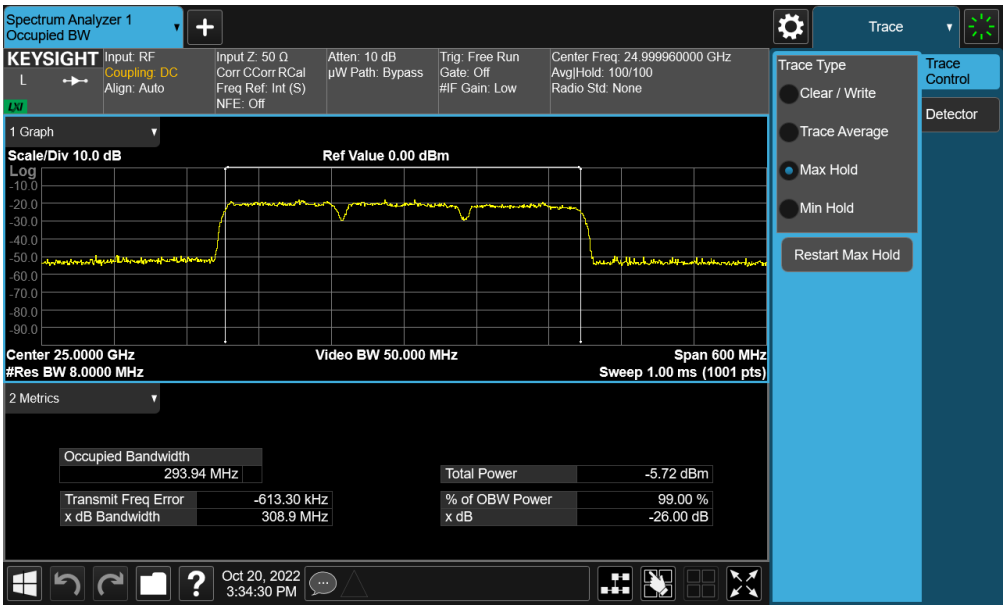

**Plot 7-25. M patch Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM QPSK – Mid Channel)**




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




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

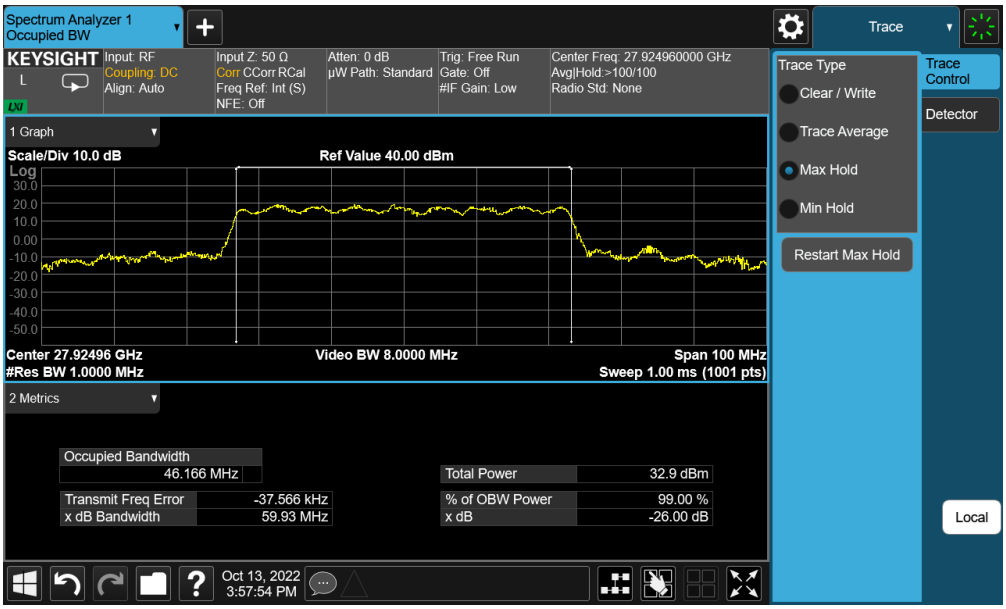



**Plot 7-28. M patch Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM 64QAM – Mid Channel)**

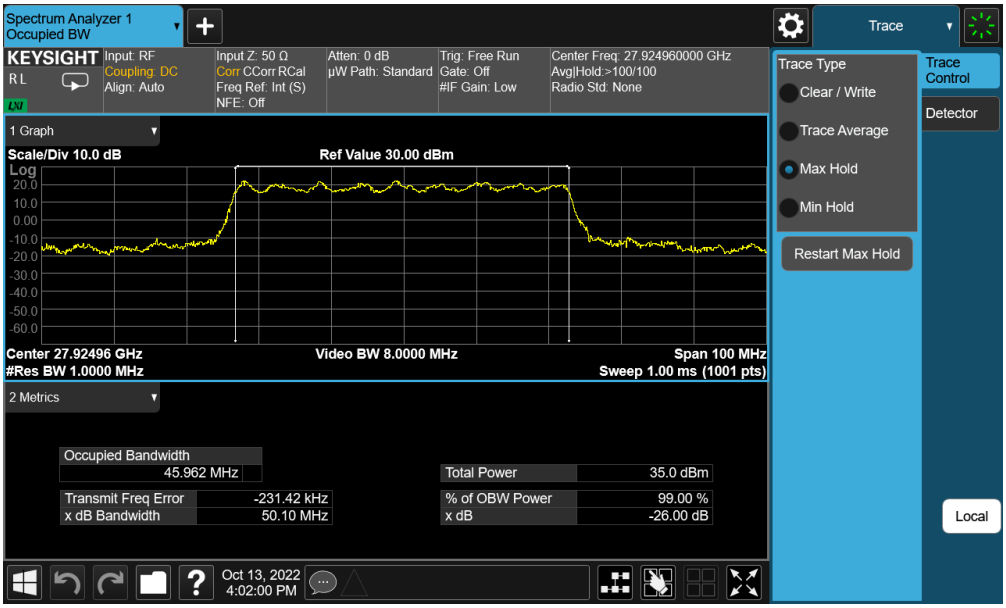
## Band n261

| Antenna | Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|---|
| M patch | 50 | 1 | CP-OFDM | QPSK | 46.17 |
| | | | DFT-s-OFDM | π/2 BPSK | 45.96 |
| | | | CP-OFDM | 16QAM | 46.16 |
| | | | CP-OFDM | 64QAM | 45.91 |
| | 100 | 1 | CP-OFDM | QPSK | 94.40 |
| | | | DFT-s-OFDM | π/2 BPSK | 91.56 |
| | | | CP-OFDM | 16QAM | 94.37 |
| | | | CP-OFDM | 64QAM | 94.07 |
| | | 2 | CP-OFDM | QPSK | 193.71 |
| | | | DFT-s-OFDM | π/2 BPSK | 191.04 |
| | | | CP-OFDM | 16QAM | 194.29 |
| | | | CP-OFDM | 64QAM | 193.90 |
| | | 3 | CP-OFDM | QPSK | 292.70 |
| | | | DFT-s-OFDM | π/2 BPSK | 290.94 |
| | | | CP-OFDM | 16QAM | 292.71 |
| | | | CP-OFDM | 64QAM | 293.75 |
| | | 4 | CP-OFDM | QPSK | 395.99 |
| | | | DFT-s-OFDM | π/2 BPSK | 394.56 |
| | | | CP-OFDM | 16QAM | 395.23 |
| | | | CP-OFDM | 64QAM | 399.31 |

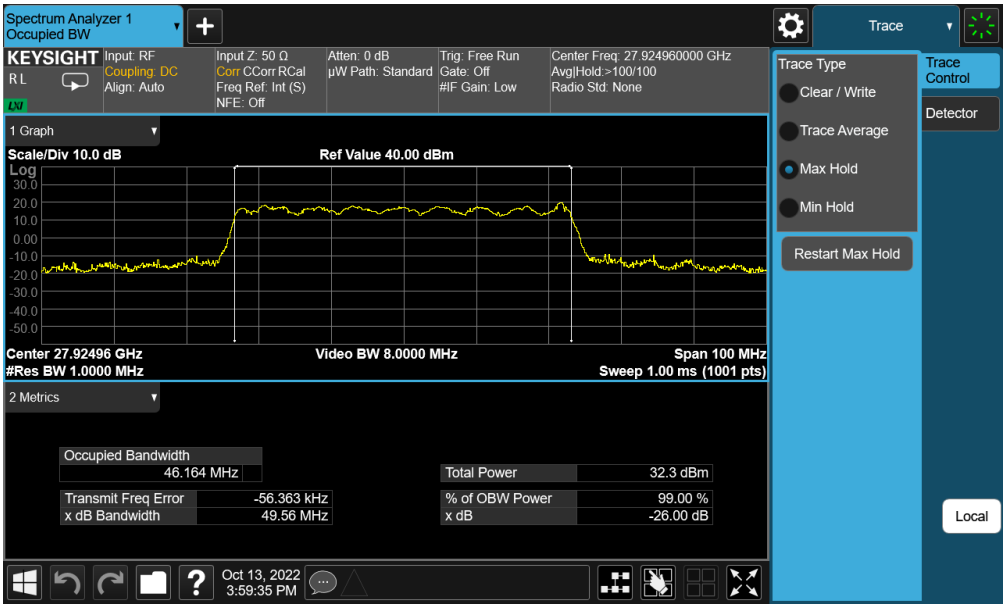
**Table 7-4. Summary of M patch Occupied Bandwidths (n261)**



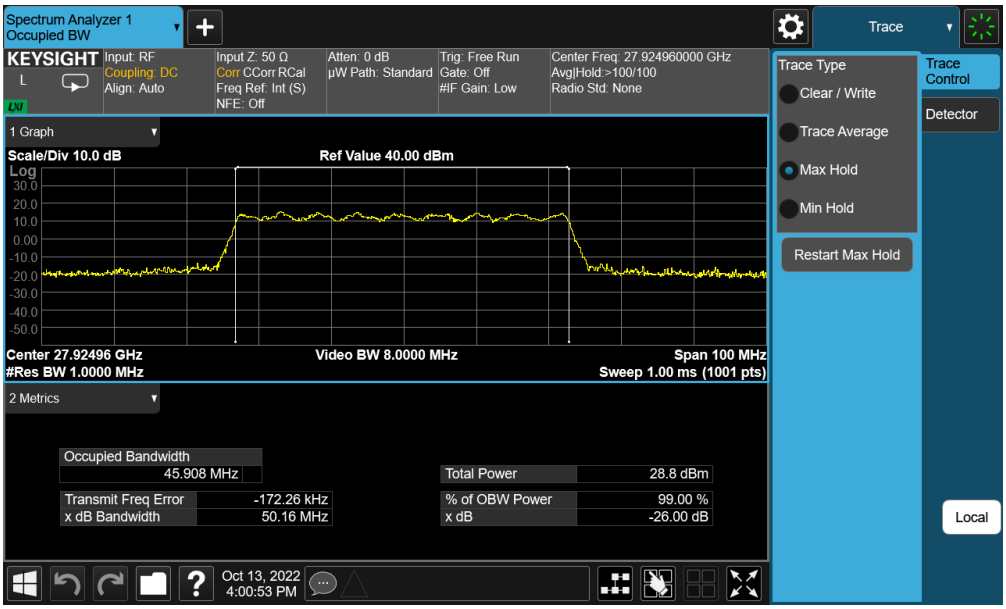

**Plot 7-29. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



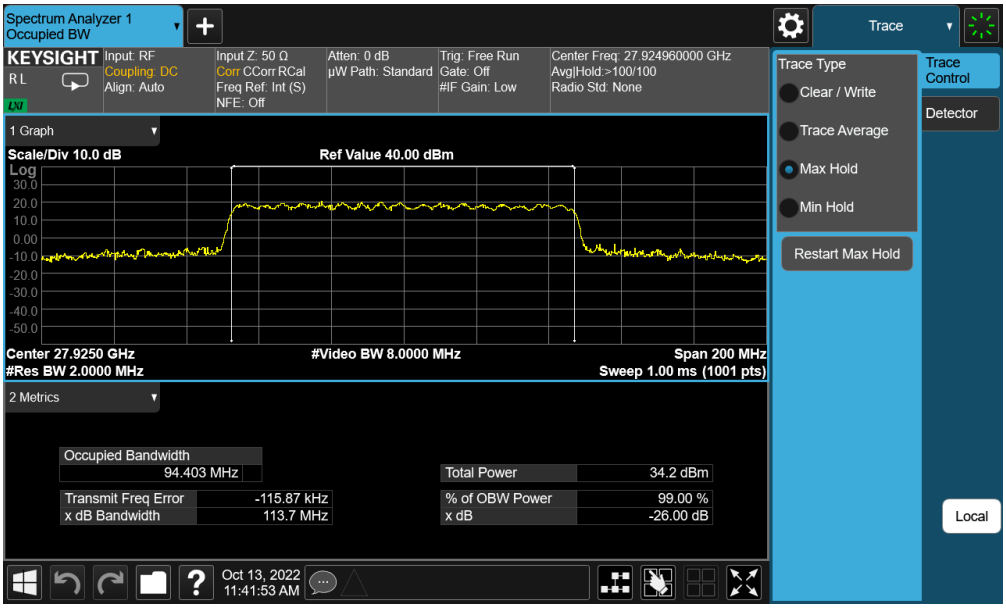

**Plot 7-30. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK– Mid Channel)**



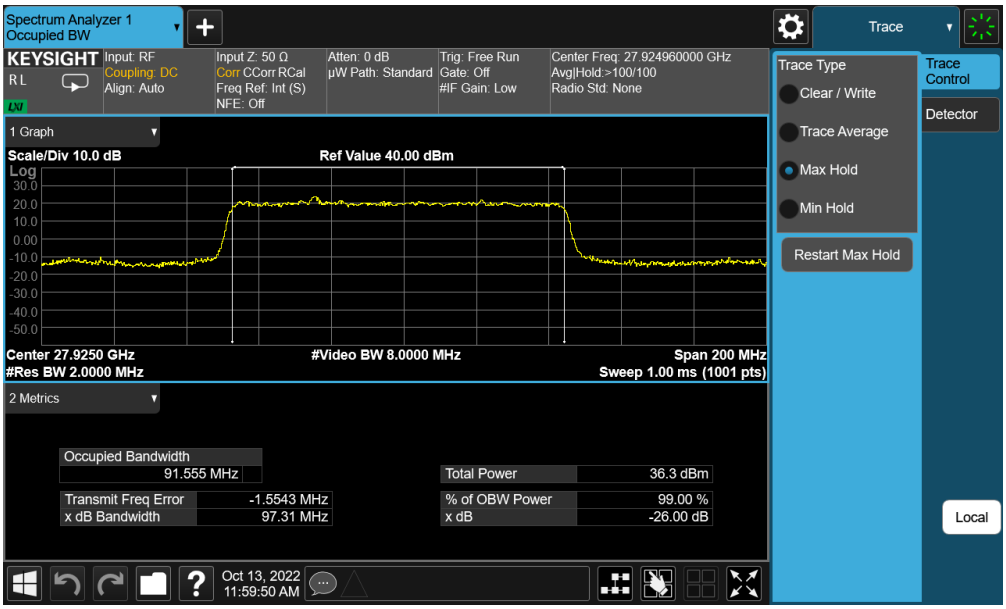

**Plot 7-31. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



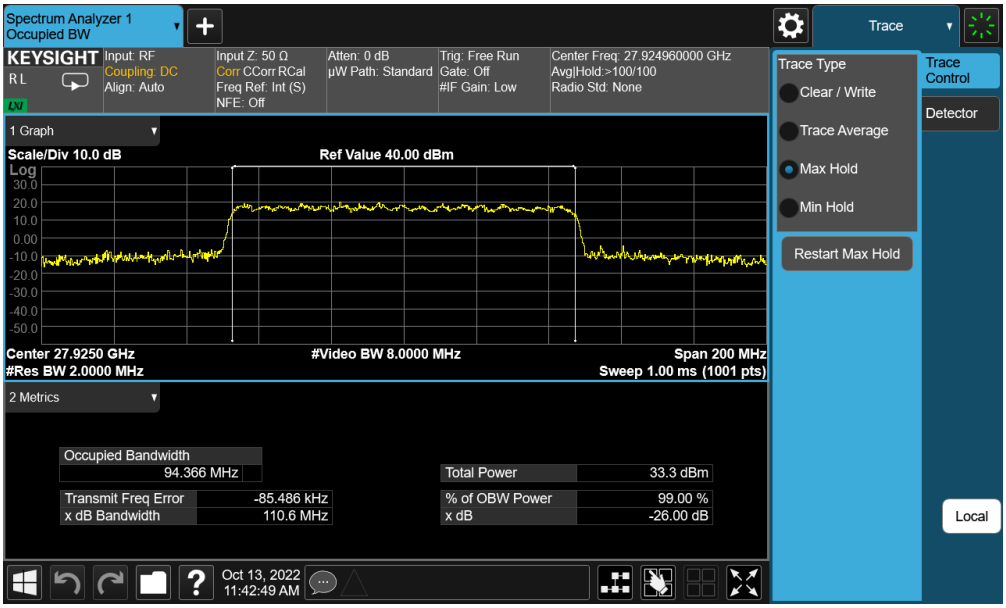

**Plot 7-32. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



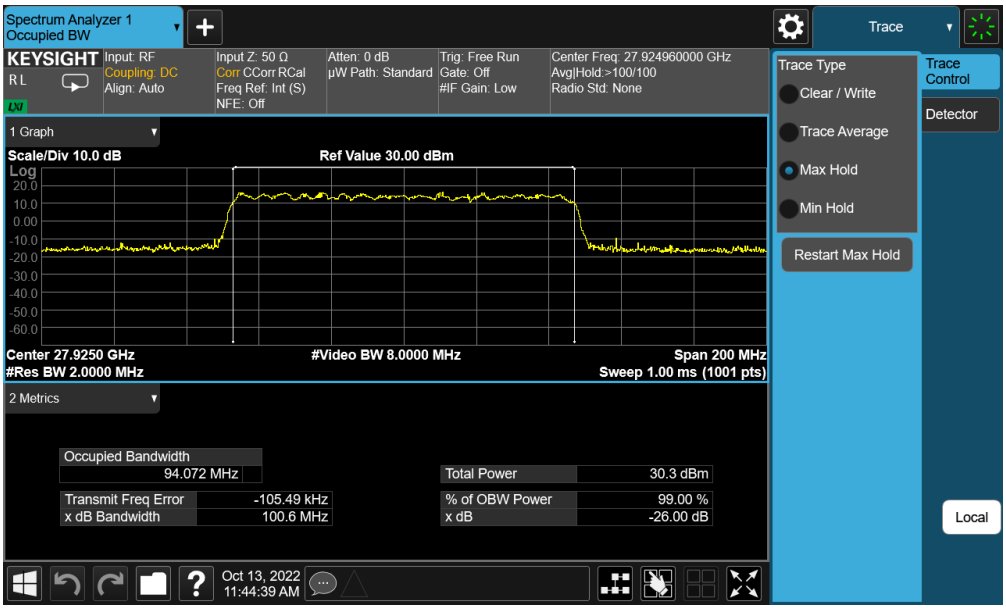

**Plot 7-33. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



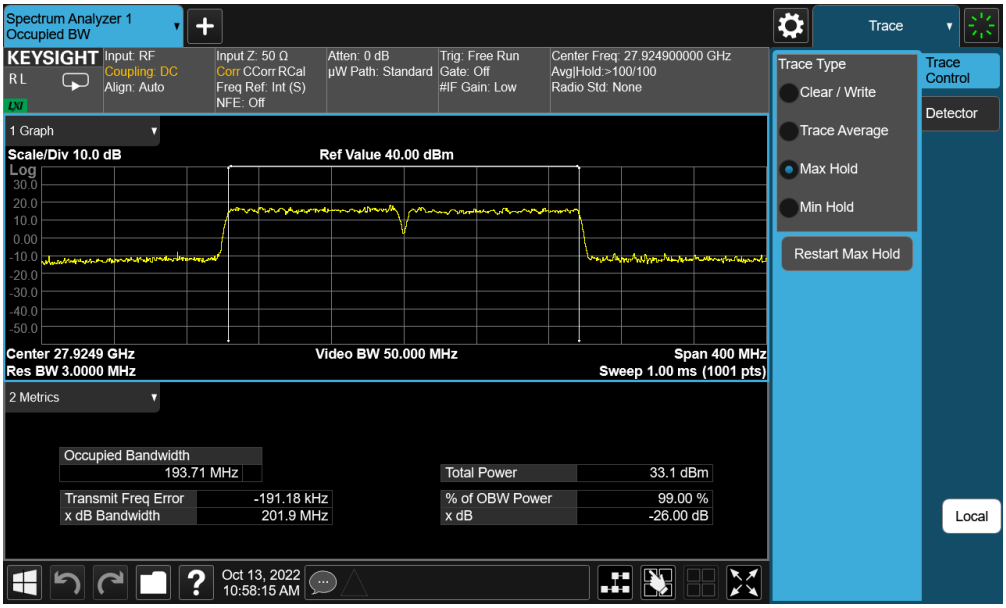

**Plot 7-34. M patch Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK– Mid Channel)**



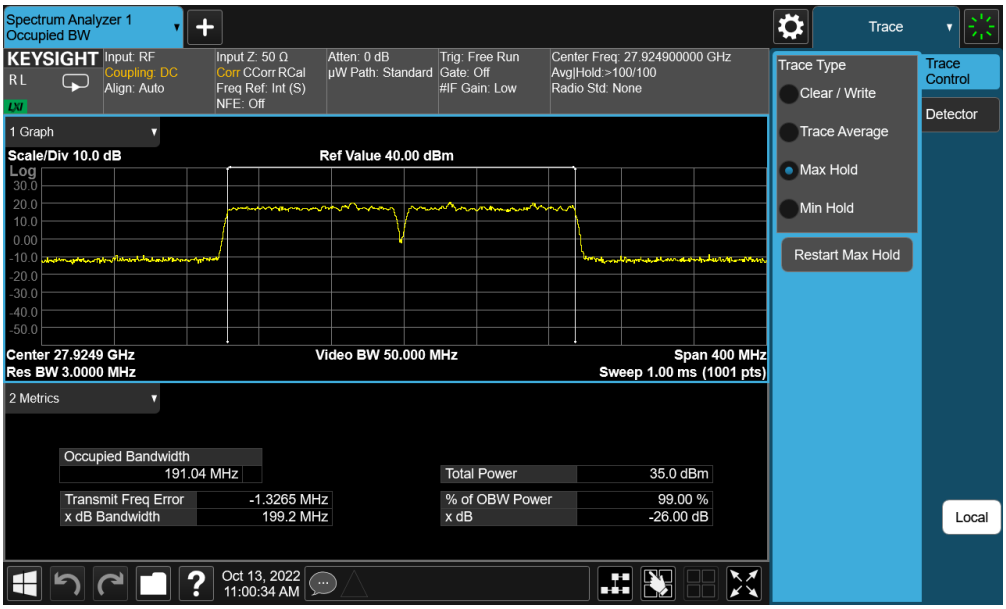

**Plot 7-35. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 16QAM – Mid Channel)**



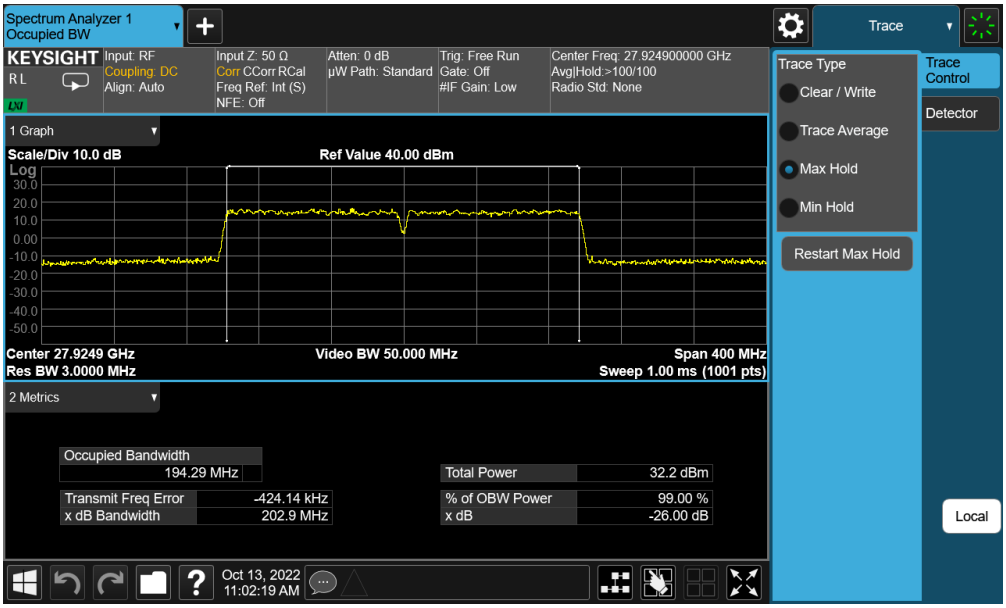

**Plot 7-36. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM 64QAM – Mid Channel)**



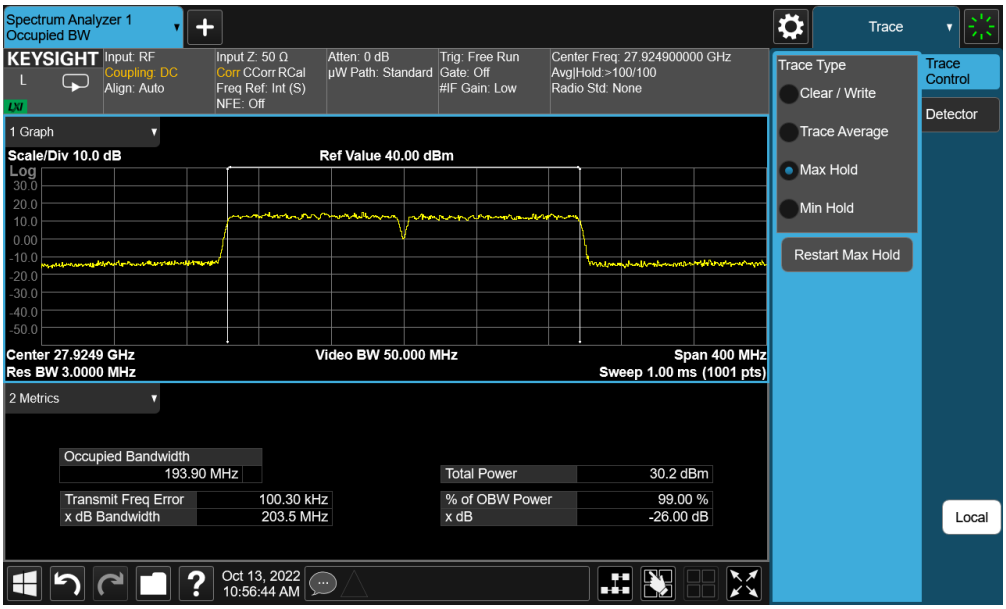

**Plot 7-37. M patch Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM QPSK – Mid Channel)**



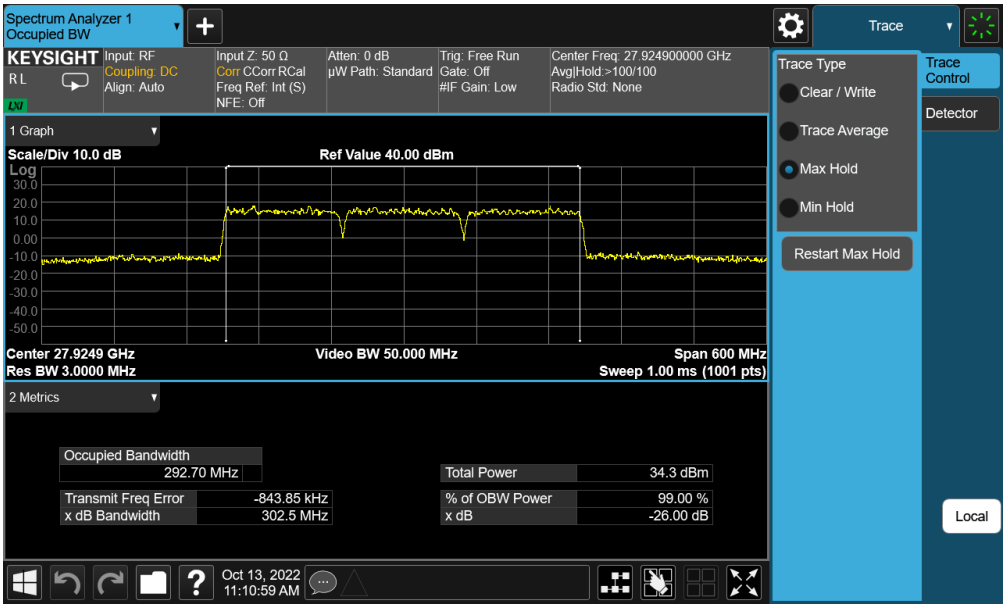

**Plot 7-38. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM π/2 BPSK– Mid Channel)**



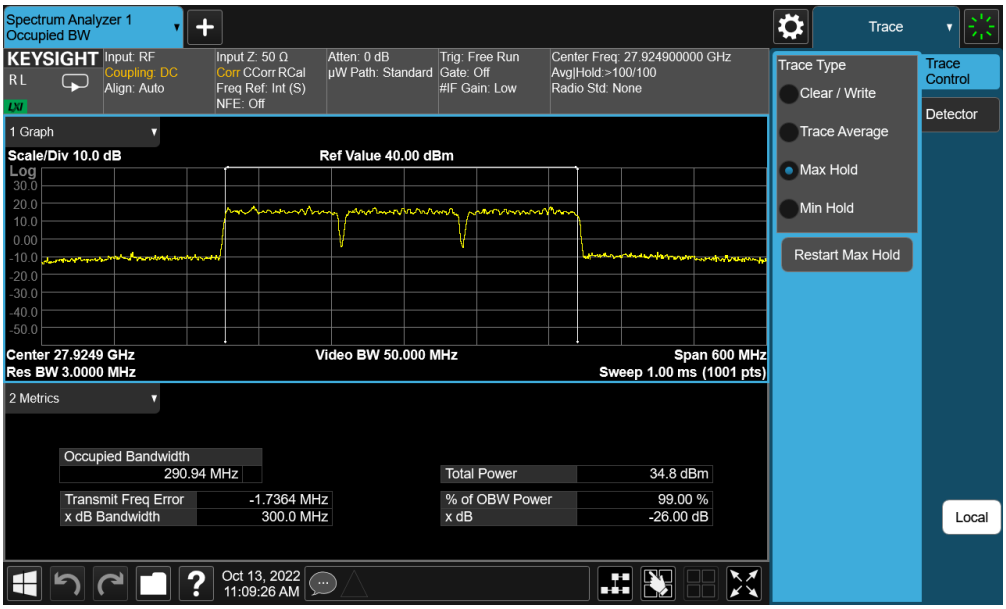

**Plot 7-39. M patch Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 16QAM – Mid Channel)**



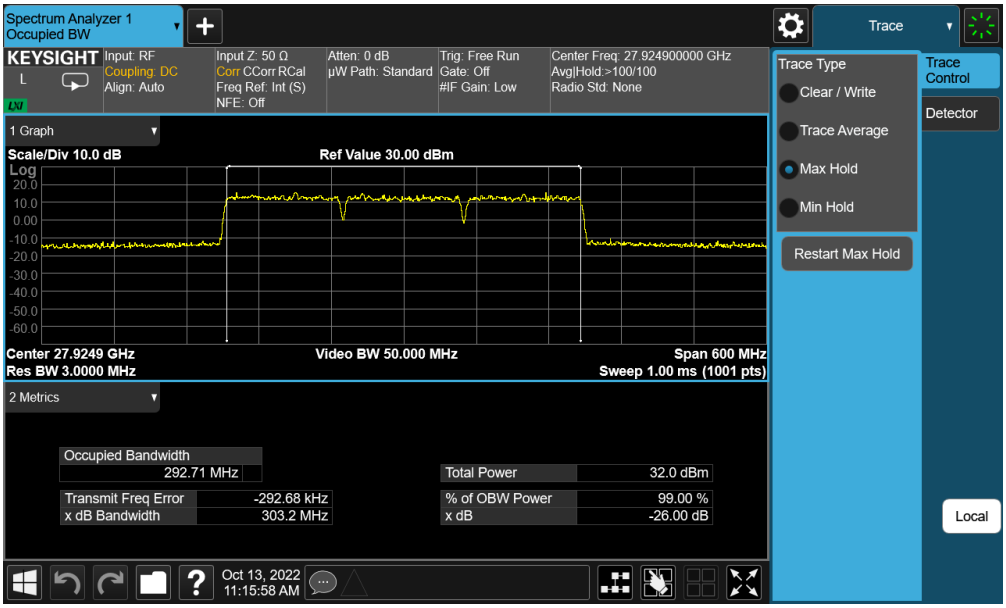

**Plot 7-40. M patch Occupied Bandwidth Plot (100MHz-2CC – CP-OFDM 64QAM – Mid Channel)**



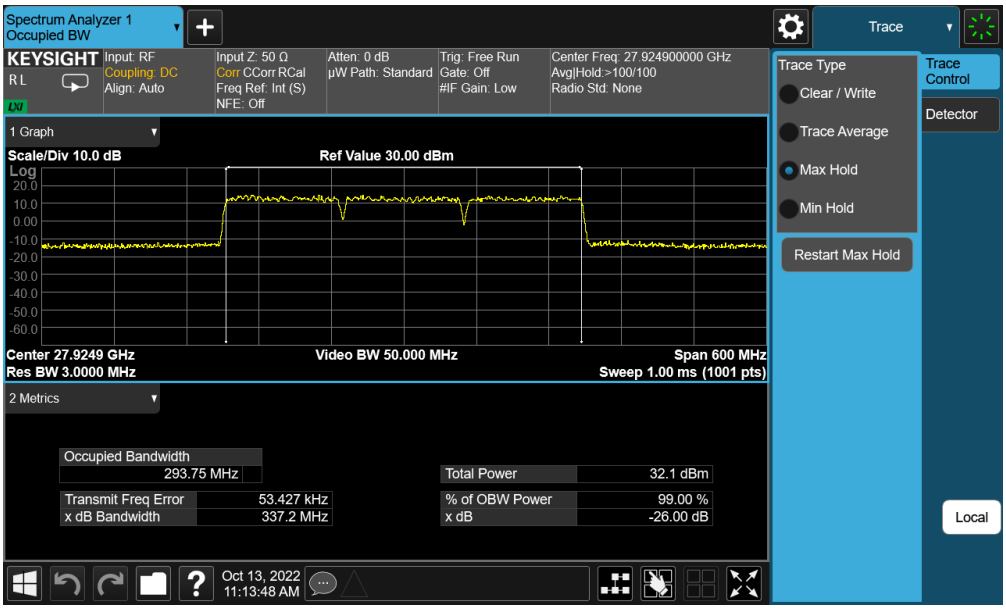

**Plot 7-41. M patch Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM QPSK – Mid Channel)**



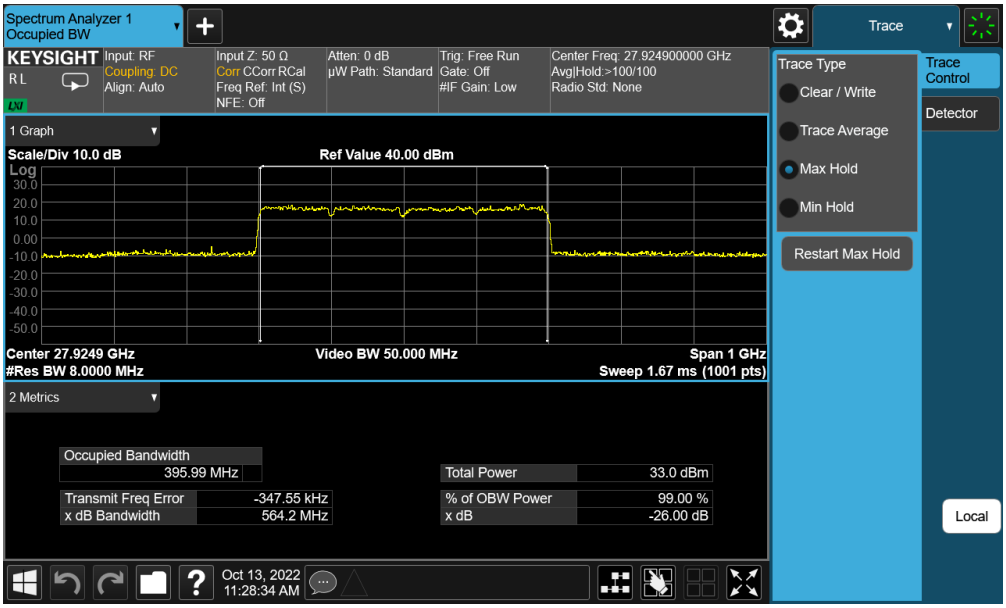

**Plot 7-42. M patch Occupied Bandwidth Plot (100MHz-3CC – DFT-s-OFDM π/2 BPSK– Mid Channel)**



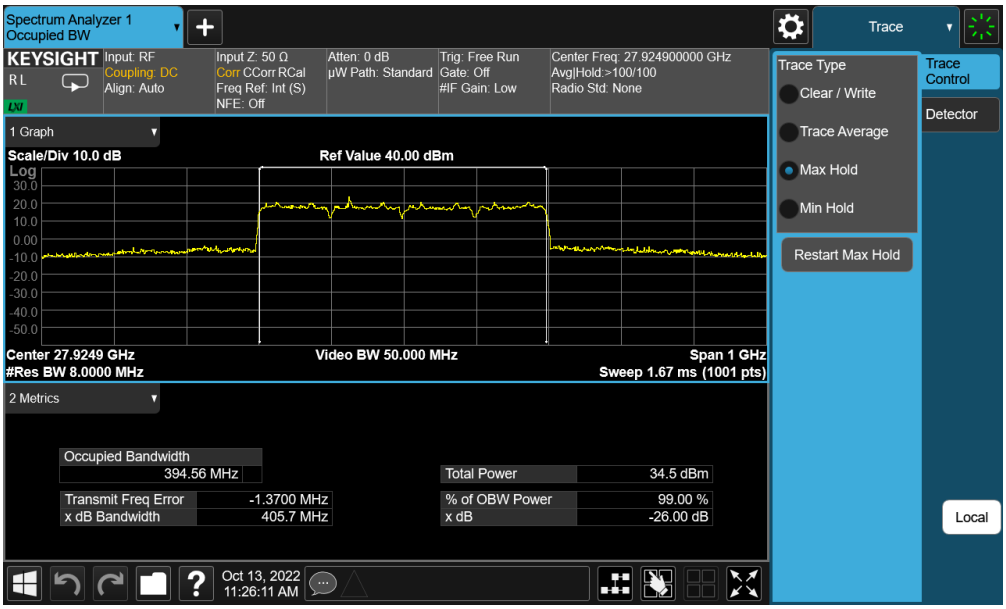

**Plot 7-43. M patch Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 16QAM – Mid Channel)**



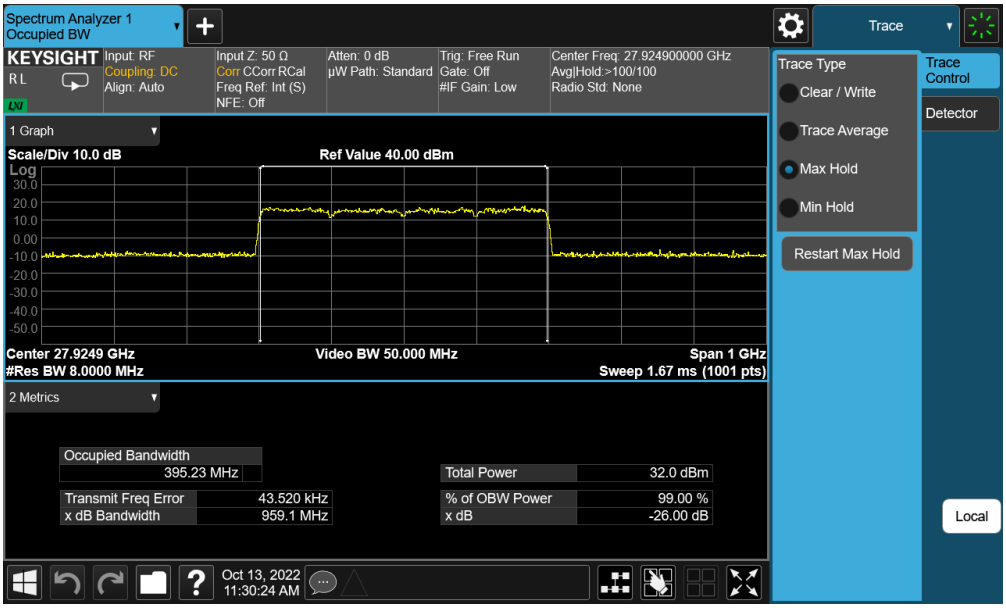

**Plot 7-44. M patch Occupied Bandwidth Plot (100MHz-3CC – CP-OFDM 64QAM – Mid Channel)**



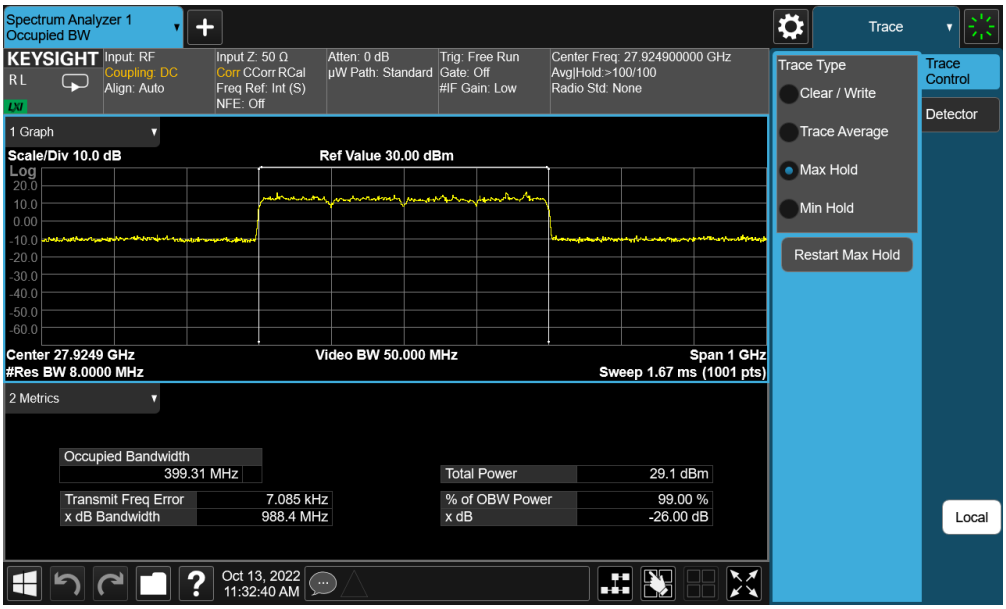

**Plot 7-45. M patch Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM QPSK – Mid Channel)**




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




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

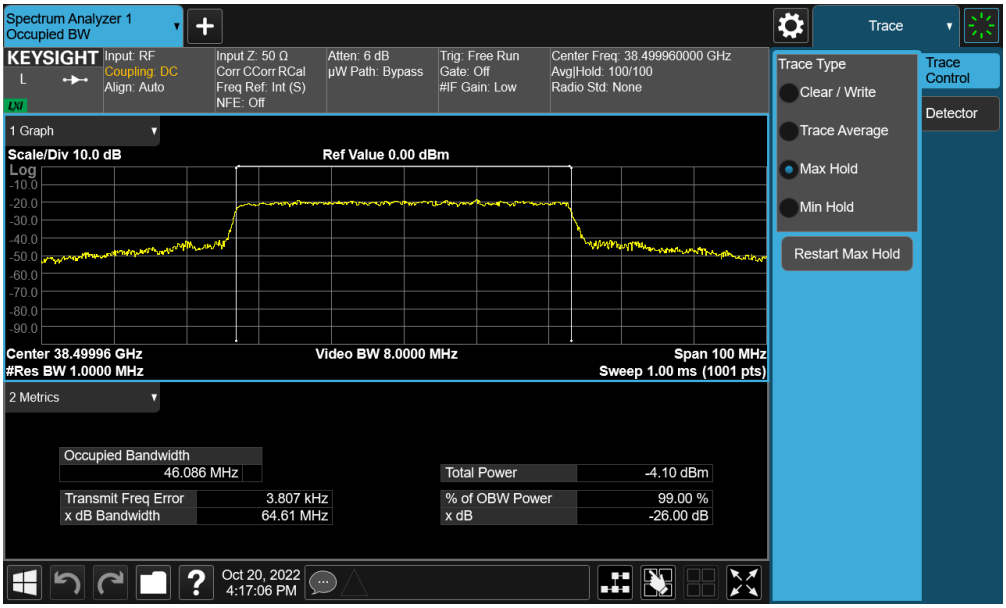



**Plot 7-48. M patch Occupied Bandwidth Plot (100MHz-4CC – CP-OFDM 64QAM – Mid Channel)**

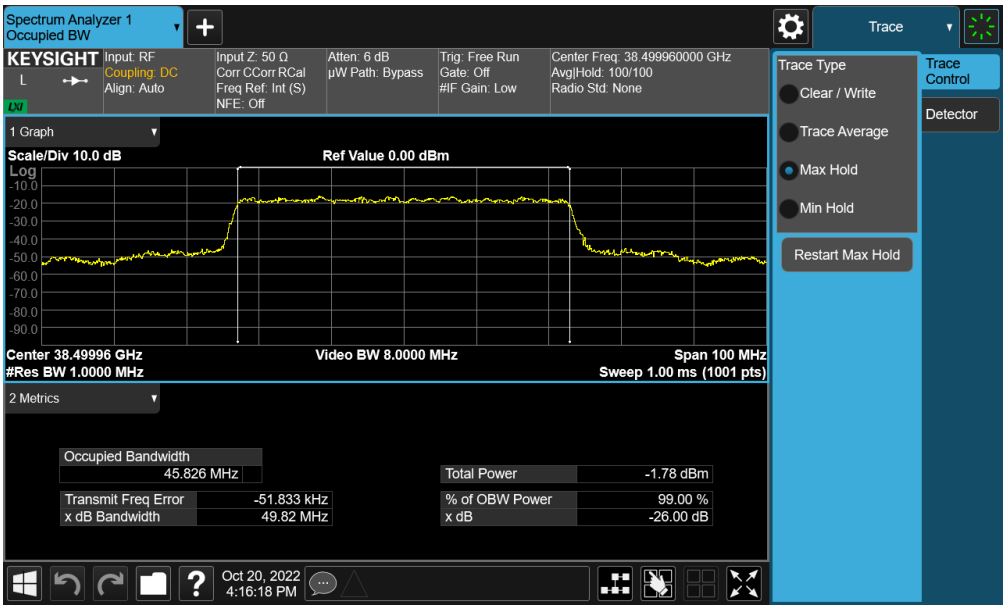
## Band n260

| Antenna | Bandwidth [MHz] | CCs Active | Transmition Scheme | Modulation | OBW [MHz] |
|---|---|---|---|---|---|
| M patch | 50 | 1 | CP-OFDM | QPSK | 46.09 |
| | | | DFT-s-OFDM | π/2 BPSK | 45.83 |
| | | | DFT-s-OFDM | 16QAM | 46.03 |
| | | | DFT-s-OFDM | 64QAM | 45.90 |
| | 100 | 1 | CP-OFDM | QPSK | 94.97 |
| | | | DFT-s-OFDM | π/2 BPSK | 91.71 |
| | | | CP-OFDM | 16QAM | 94.36 |
| | | | CP-OFDM | 64QAM | 94.59 |
| | | 2 | DFT-s-OFDM | QPSK | 193.11 |
| | | | DFT-s-OFDM | π/2 BPSK | 192.71 |
| | | | CP-OFDM | 16QAM | 193.59 |
| | | | CP-OFDM | 64QAM | 193.32 |
| | | 3 | DFT-s-OFDM | QPSK | 295.45 |
| | | | DFT-s-OFDM | π/2 BPSK | 295.13 |
| | | | DFT-s-OFDM | 16QAM | 294.72 |
| | | | DFT-s-OFDM | 64QAM | 294.43 |
| | | 4 | DFT-s-OFDM | QPSK | 397.32 |
| | | | DFT-s-OFDM | π/2 BPSK | 397.83 |
| | | | DFT-s-OFDM | 16QAM | 397.89 |
| | | | DFT-s-OFDM | 64QAM | 392.32 |

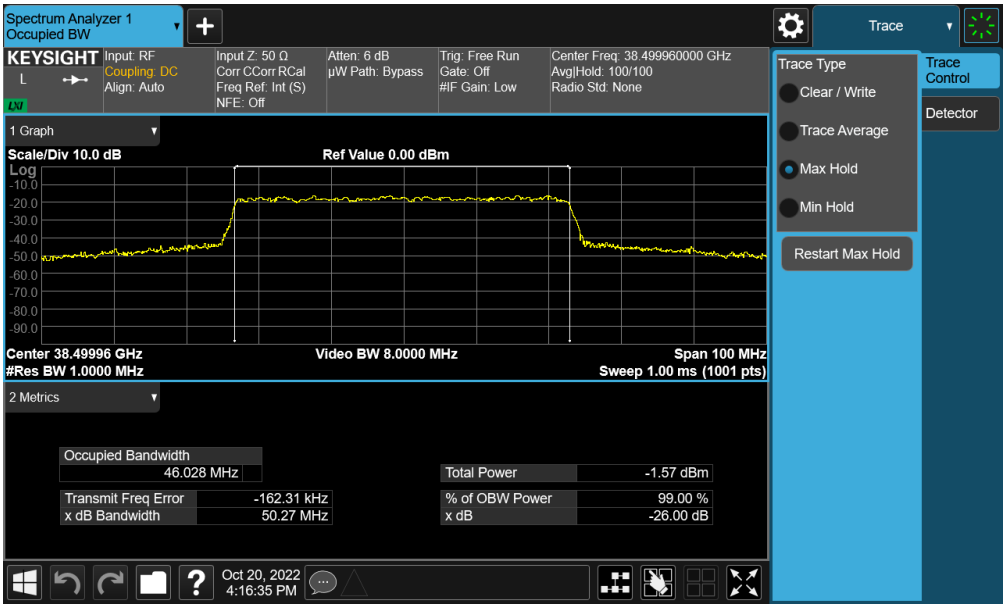
**Table 7-5. Summary of M patch Occupied Bandwidths (n260)**



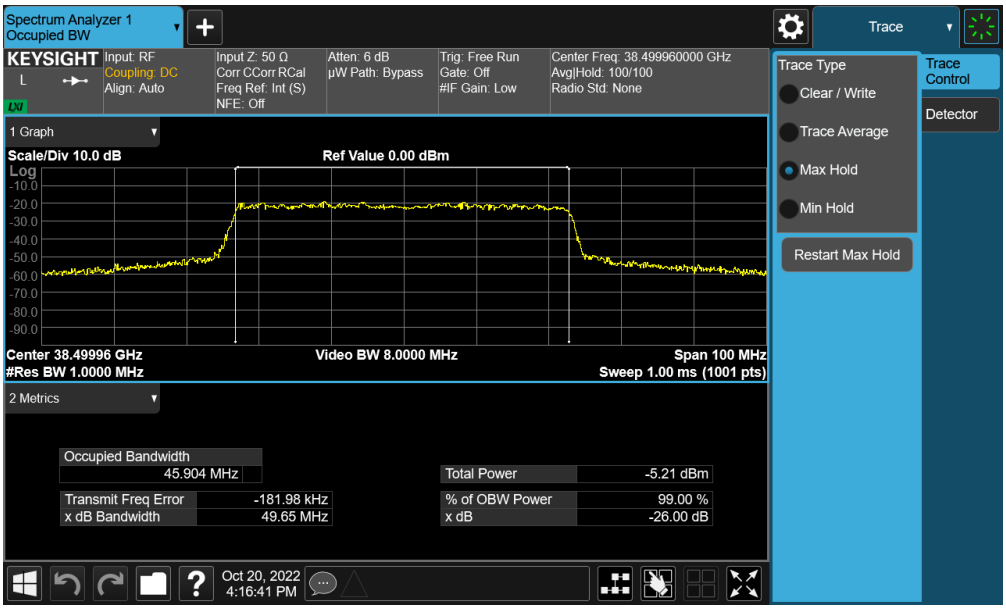

**Plot 7-49. M patch Occupied Bandwidth Plot (50MHz-1CC – CP-OFDM QPSK – Mid Channel)**



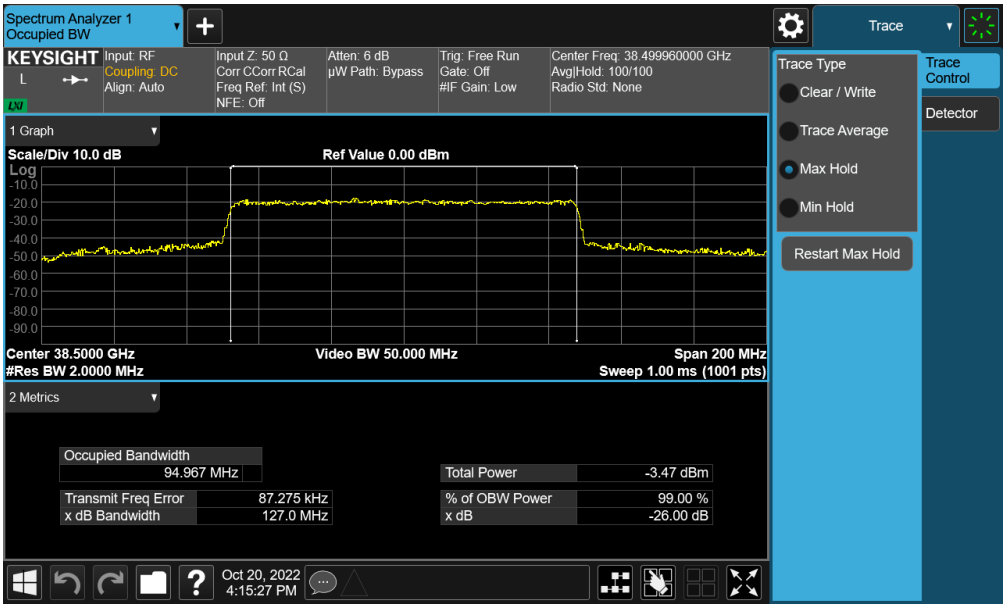

**Plot 7-50. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**



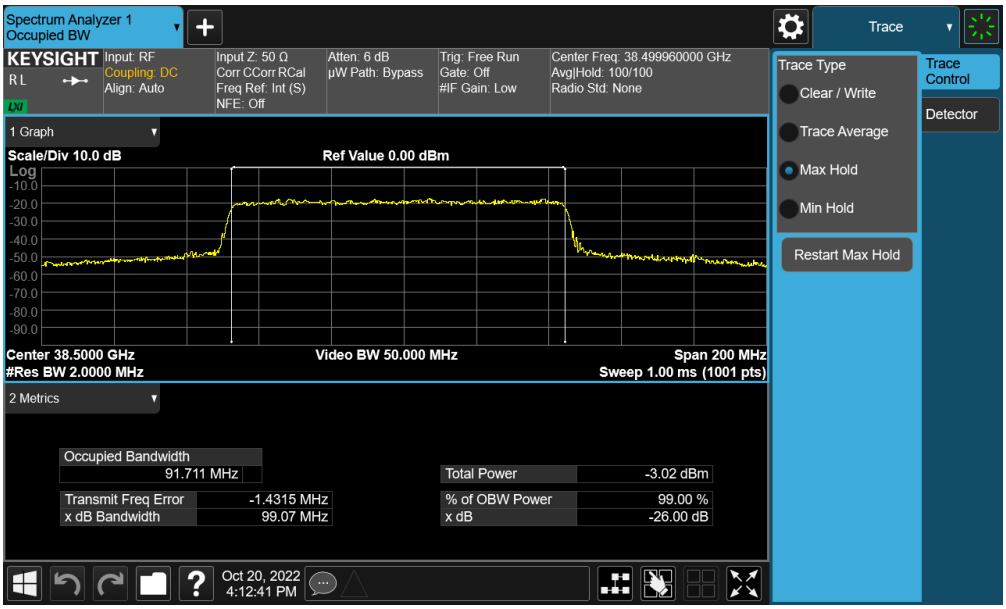

**Plot 7-51. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM 16QAM – Mid Channel)**



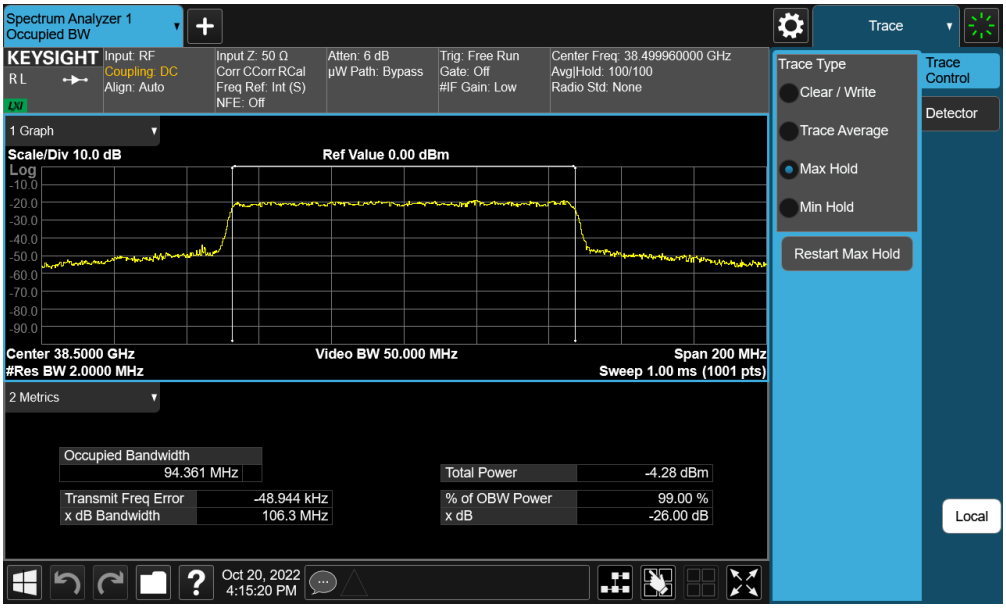

**Plot 7-52. M patch Occupied Bandwidth Plot (50MHz-1CC – DFT-s-OFDM 64QAM – Mid Channel)**



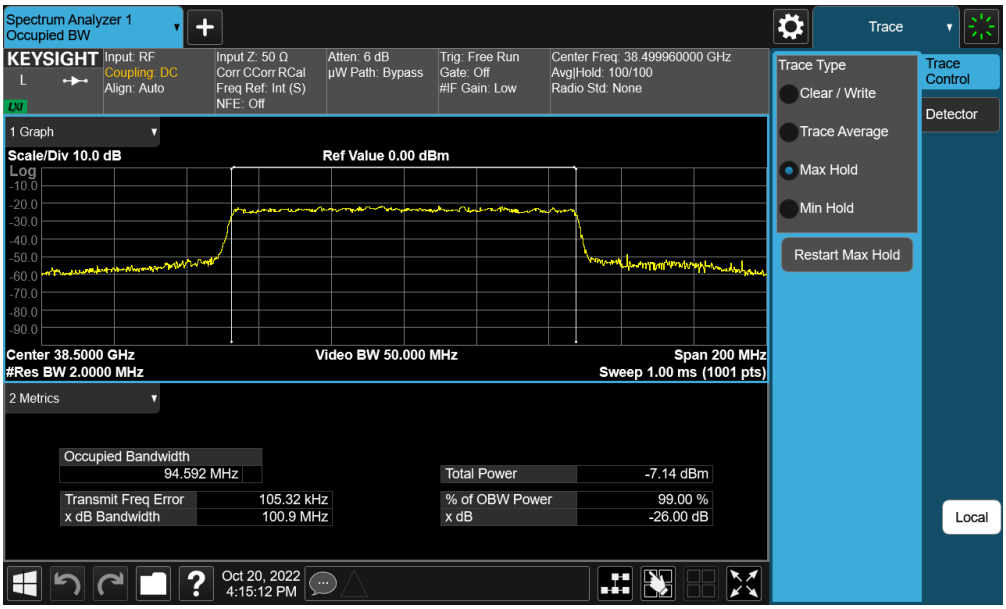

**Plot 7-53. M patch Occupied Bandwidth Plot (100MHz-1CC – CP-OFDM QPSK – Mid Channel)**



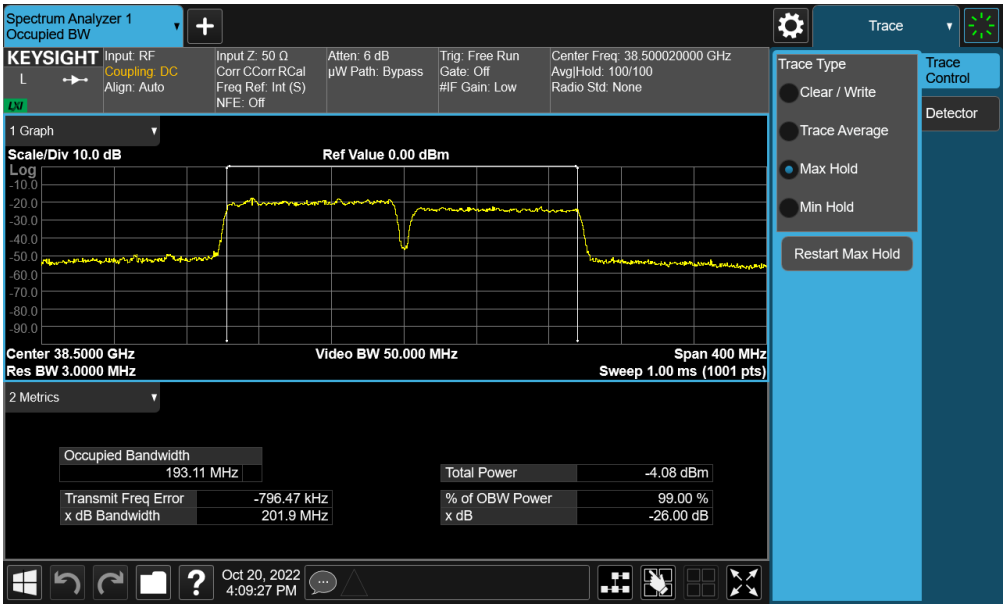

**Plot 7-54. M patch Occupied Bandwidth Plot (100MHz-1CC – DFT-s-OFDM π/2 BPSK – Mid Channel)**




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




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




**Plot 7-57. M patch Occupied Bandwidth Plot (100MHz-2CC – DFT-s-OFDM QPSK – Mid Channel)**