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

PART 30 MEASUREMENT REPORT

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

Date of Testing:
07/11/2022- 08/17/2022
Test Report Issue Date:
08/29/2022
Test Site/Location:
Element Lab. Columbia, MD, USA
Test Report Serial No.:
1M2203290041-01.A3L

FCC ID:	**A3LSMS908U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Class II Permissive Change
Model:	SM-S908U
Additional Model(s):	SM-S908U1
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
Class II Permissive Change:	Adding 3CC & 4CC capabilities
Original Grant Date:	12/10/2021

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

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS

PART 30 MEASUREMENT REPORT

Band	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Modulation	Mode	EIRP		Emission Designator
						Max Power [W]	Max Power [dBm]	
NR-n258-R1	50	24250 - 24450	3	QPSK	2Tx	0.371	25.69	145MG7D
				π/2 BPSK	2Tx	0.368	25.66	145MG7D
				16QAM	2Tx	0.236	23.73	145MW7D
				64QAM	2Tx	0.171	22.33	145MW7D
			4	QPSK	2Tx	0.359	25.55	195MG7D
				π/2 BPSK	2Tx	0.356	25.52	195MG7D
				16QAM	2Tx	0.265	24.24	195MW7D
				64QAM	2Tx	0.182	22.60	194MW7D
NR-n258-R1	50	24250 - 24450	3	QPSK	2Tx	0.156	21.94	-
				π/2 BPSK	2Tx	0.154	21.87	-
				16QAM	2Tx	0.097	19.86	-
				64QAM	2Tx	0.072	18.58	-
			4	QPSK	2Tx	0.146	21.65	-
				π/2 BPSK	2Tx	0.146	21.63	-
				16QAM	2Tx	0.092	19.66	-
				64QAM	2Tx	0.062	17.94	-

EUT Overview (Band n258, 24.25- 24.45GHz)

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	24750 - 25250	3	QPSK	2Tx	0.180	22.55	145MG7D
					π/2 BPSK	2Tx	0.180	22.54	145MG7D
					16QAM	2Tx	0.110	20.43	145MW7D
					64QAM	2Tx	0.080	19.01	145MW7D
				4	QPSK	2Tx	0.184	22.65	195MG7D
					π/2 BPSK	2Tx	0.186	22.69	195MG7D
					16QAM	2Tx	0.124	20.95	195MW7D
					64QAM	2Tx	0.095	19.79	195MW7D
		100	24750 - 25250	3	QPSK	2Tx	0.168	22.26	293MG7D
					π/2 BPSK	2Tx	0.167	22.22	294MG7D
					16QAM	2Tx	0.106	20.26	294MW7D
					64QAM	2Tx	0.090	19.53	294MW7D
				4	QPSK	2Tx	0.164	22.14	393MG7D
					π/2 BPSK	2Tx	0.161	22.08	394MG7D
					16QAM	2Tx	0.116	20.64	393MW7D
					64QAM	2Tx	0.084	19.26	394MW7D
N Patch	NR-n258-R2	50	24750 - 25250	3	QPSK	2Tx	0.161	22.08	-
					π/2 BPSK	2Tx	0.162	22.10	-
					16QAM	2Tx	0.102	20.07	-
					64QAM	2Tx	0.082	19.15	-
				4	QPSK	2Tx	0.170	22.30	-
					π/2 BPSK	2Tx	0.171	22.32	-
					16QAM	2Tx	0.109	20.37	-
					64QAM	2Tx	0.082	19.14	-
		100	24750 - 25250	3	QPSK	2Tx	0.166	22.21	-
					π/2 BPSK	2Tx	0.166	22.19	-
					16QAM	2Tx	0.103	20.14	-
					64QAM	2Tx	0.068	18.33	-
				4	QPSK	2Tx	0.148	21.71	-
					π/2 BPSK	2Tx	0.148	21.69	-
					16QAM	2Tx	0.093	19.67	-
					64QAM	2Tx	0.062	17.89	-

EUT Overview (Band n258, 24.75- 25.25GHz)

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	3	QPSK	2Tx	0.304	24.83	147MG7D
					π/2 BPSK	2Tx	0.306	24.85	147MG7D
					16QAM	2Tx	0.201	23.03	147MW7D
					64QAM	2Tx	0.150	21.77	147MW7D
				4	QPSK	2Tx	0.284	24.53	195MG7D
					π/2 BPSK	2Tx	0.284	24.53	196MG7D
					16QAM	2Tx	0.177	22.47	195MW7D
					64QAM	2Tx	0.138	21.41	195MW7D
		100	27525 - 28325	3	QPSK	2Tx	0.306	24.85	295MG7D
					π/2 BPSK	2Tx	0.302	24.80	297MG7D
					16QAM	2Tx	0.188	22.74	296MW7D
					64QAM	2Tx	0.125	20.97	297MW7D
				4	QPSK	2Tx	0.281	24.48	394MG7D
					π/2 BPSK	2Tx	0.286	24.57	394MG7D
					16QAM	2Tx	0.202	23.06	395MW7D
					64QAM	2Tx	0.151	21.78	396MW7D
N Patch	NR-n261	50	27525 - 28325	3	QPSK	2Tx	0.203	23.07	-
					π/2 BPSK	2Tx	0.204	23.09	-
					16QAM	2Tx	0.122	20.86	-
					64QAM	2Tx	0.086	19.32	-
				4	QPSK	2Tx	0.199	22.98	-
					π/2 BPSK	2Tx	0.199	22.98	-
					16QAM	2Tx	0.125	20.98	-
					64QAM	2Tx	0.085	19.27	-
		100	27525 - 28325	3	QPSK	2Tx	0.222	23.46	-
					π/2 BPSK	2Tx	0.221	23.44	-
					16QAM	2Tx	0.140	21.46	-
					64QAM	2Tx	0.101	20.02	-
				4	QPSK	2Tx	0.197	22.94	-
					π/2 BPSK	2Tx	0.194	22.89	-
					16QAM	2Tx	0.126	21.02	-
					64QAM	2Tx	0.091	19.58	-

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	37050 - 39950	3	QPSK	2Tx	0.141	21.49	148MG7D
					π/2 BPSK	2Tx	0.143	21.55	148MG7D
					16QAM	2Tx	0.097	19.89	148MW7D
					64QAM	2Tx	0.063	18.02	148MW7D
				4	QPSK	2Tx	0.124	20.93	195MG7D
					π/2 BPSK	2Tx	0.124	20.92	194MG7D
					16QAM	2Tx	0.087	19.40	195MW7D
					64QAM	2Tx	0.056	17.50	195MW7D
		100	37050 - 39950	3	QPSK	2Tx	0.139	21.43	298MG7D
					π/2 BPSK	2Tx	0.142	21.51	298MG7D
					16QAM	2Tx	0.099	19.95	297MW7D
					64QAM	2Tx	0.069	18.37	299MW7D
				4	QPSK	2Tx	0.129	21.11	395MG7D
					π/2 BPSK	2Tx	0.129	21.09	395MG7D
					16QAM	2Tx	0.091	19.59	394MW7D
					64QAM	2Tx	0.064	18.07	397MW7D
N Patch	NR-n260	50	37050 - 39950	3	QPSK	2Tx	0.142	21.53	-
					π/2 BPSK	2Tx	0.141	21.50	-
					16QAM	2Tx	0.123	20.91	-
					64QAM	2Tx	0.091	19.59	-
				4	QPSK	2Tx	0.158	21.98	-
					π/2 BPSK	2Tx	0.157	21.96	-
					16QAM	2Tx	0.117	20.67	-
					64QAM	2Tx	0.082	19.15	-
		100	37050 - 39950	3	QPSK	2Tx	0.149	21.72	-
					π/2 BPSK	2Tx	0.150	21.76	-
					16QAM	2Tx	0.104	20.16	-
					64QAM	2Tx	0.080	19.01	-
				4	QPSK	2Tx	0.139	21.44	-
					π/2 BPSK	2Tx	0.135	21.29	-
					16QAM	2Tx	0.113	20.53	-
					64QAM	2Tx	0.095	19.76	-

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 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 laboratory 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: A3LSMS908U**. The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT contains two patch antennas, referred to herein as M patch (Ant1) and N patch (Ant2). Each of the antennas is comprised of two separate antenna feeds - one for horizontal and one for vertical polarization. Only one array antenna can be active at a time.

The EUT supports up to 4CC for UL. Only contiguous carrier operation is supported. For each CC, the EUT supports both 50MHz bandwidth and 100MHz bandwidth. 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.: 1146M, 1125M

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 mode.

While operating in the FR2 band, this device supports anchor band operation with an LTE carrier. This was investigated during FR2 measurements.

The table below indicates the channel Plan for all the Frequency range tested for 3CC/4CC:

# 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)
3CC	50	150	Low	x	x	x	x
			Mid	-	x	x	x
			High	x	x	x	x
	100	300	Low	-	x	x	x
			Mid	-	-	x	x
			High	-	x	x	x
4CC	50	200	Low	-	x	x	x
			Mid	x	x	x	x
			High	-	x	x	x
	100	400	Low	-	x	x	x
			Mid	-	-	x	x
			High	-	x	x	x

2.4 Software and Firmware

The test was conducted with firmware version FAS0_S908UFAU0AUI3 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.

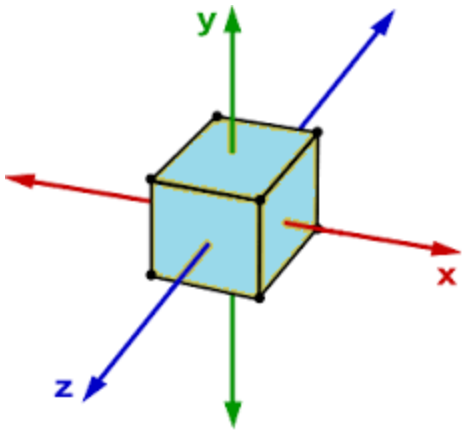


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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 & Measurment 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
Keysight Technologies	N9030A	PXA Signal Analyzer	2/14/2022	Annual	2/14/2023	MY54490576
Megaphase	FAC mmWave	AP FAC mmWave 18ft 40GHz	8/18/2021	Annual	8/18/2022	20033003
Narda	180-442-KF	Wide Band Horn Antenna 18.0 - 40.0 GHz	9/14/2020	Biennial	9/14/2022	2172481
Narda	180-442-KF	Wide Band Horn Antenna 18.0 - 40.0 GHz	11/5/2020	Biennial	11/5/2022	U157403-01
OML Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 to 90 GHz	11/16/2021	Biennial	11/16/2023	17111701
OML Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 to 60 GHz	10/12/2021	Biennial	10/12/2023	17111701
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	9/25/2021	Annual	9/25/2022	103200
Virginia Diodes Inc	SAX679	SAX Module (40 - 60GHz)	8/28/2020	Biennial	8/28/2022	SAX679
Virginia Diodes Inc	SAX680	SAX Module (60 - 90GHz)	8/14/2020	Biennial	8/14/2022	SAX680
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/9/2022	Annual	3/9/2023	234142-001
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/9/2022	Annual	3/9/2023	232062-001

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: A3LSMS908U

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) Per 2.1057(a)(2), spurious emissions were investigated up to 100GHz for n258-R1, n258-R2, n261. Per 2.1057(a)(3), spurious emissions were investigated up to 200GHz for n260.
3) 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.
4) “CC” refers to “Component Carriers”.
5) Beam IDs were chosen based on which Beam ID produces the highest EIRP during EIRP simulation.
6) All testing was performed using FTM (Factory Test Mode) software at continuous Tx operation (100% duty cycle).
7) The CP-OFDM and DFT-s-OFDM transmission schemes were investigated fully for each test type and only the worst case data is included.
8) 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)."

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

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

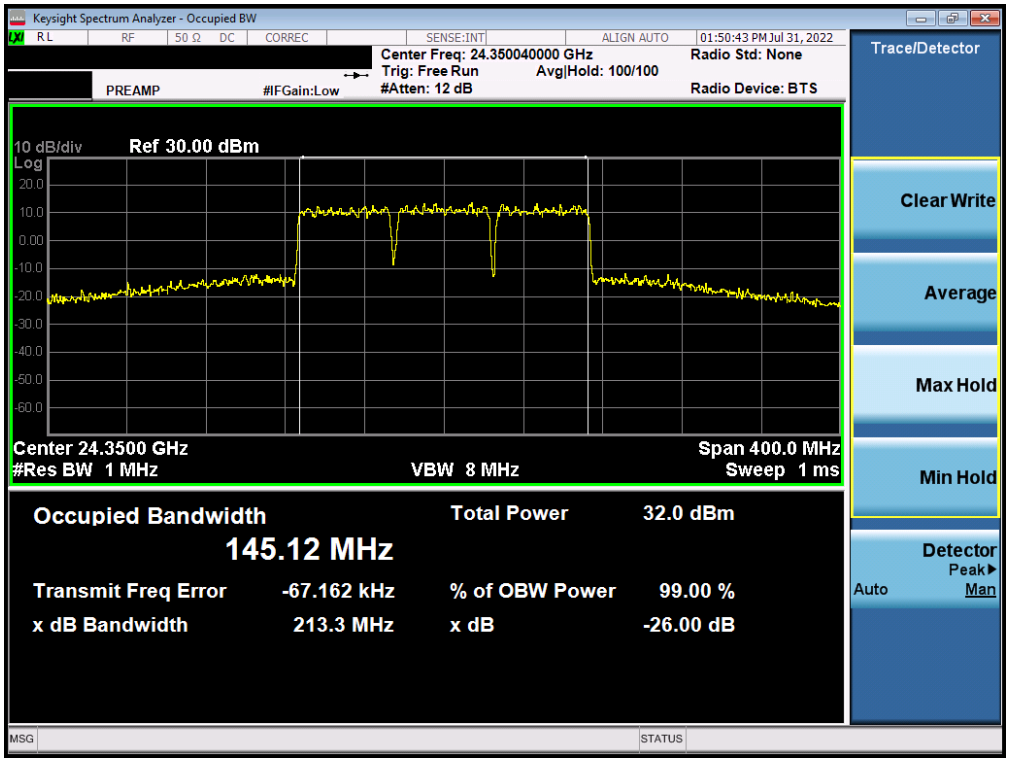
Test Notes

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 for each band.

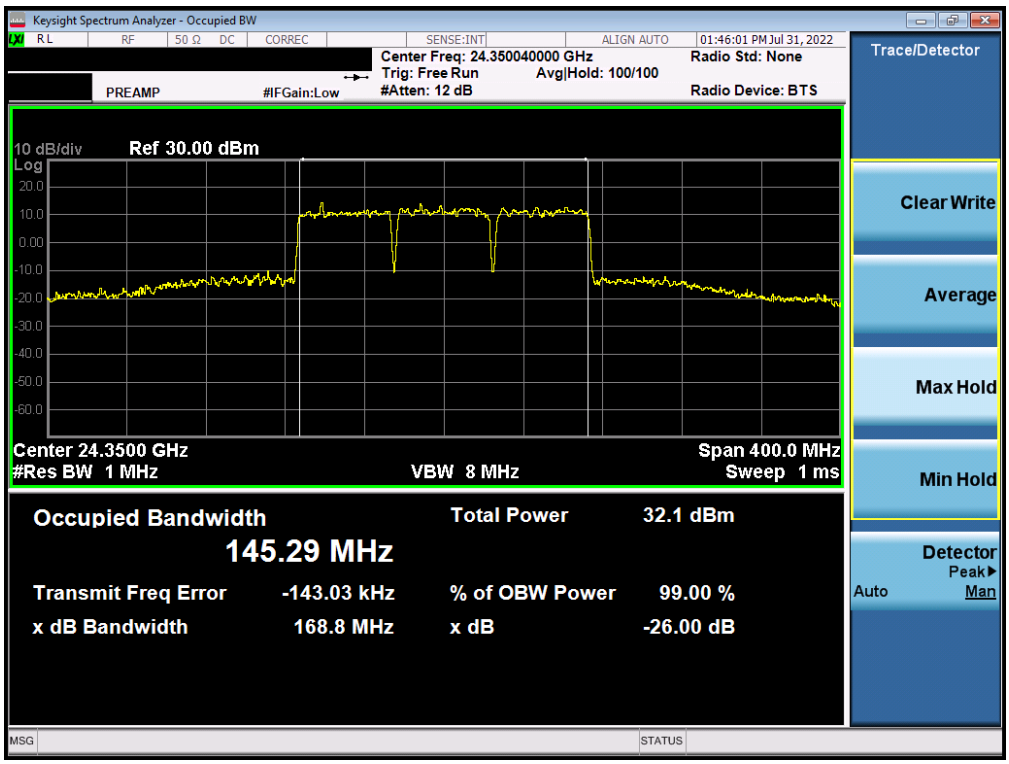
Band n258-R1 (M Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M Patch	50	3	DFT-s-OFDM	QPSK	145.12
			DFT-s-OFDM	π/2 BPSK	145.29
			DFT-s-OFDM	16QAM	145.12
			DFT-s-OFDM	64QAM	145.30
		4	DFT-s-OFDM	QPSK	195.11
			DFT-s-OFDM	π/2 BPSK	194.76
			DFT-s-OFDM	16QAM	194.63
			DFT-s-OFDM	64QAM	194.40

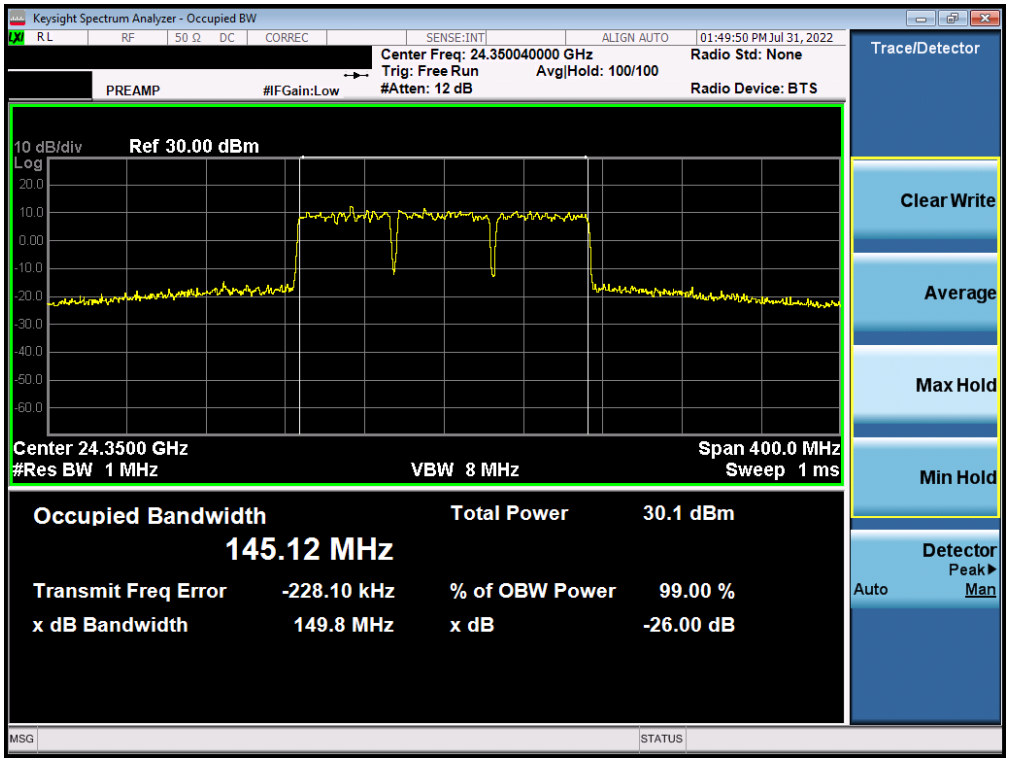
Table 7-2. Summary of Occupied Bandwidths (n258-R1)



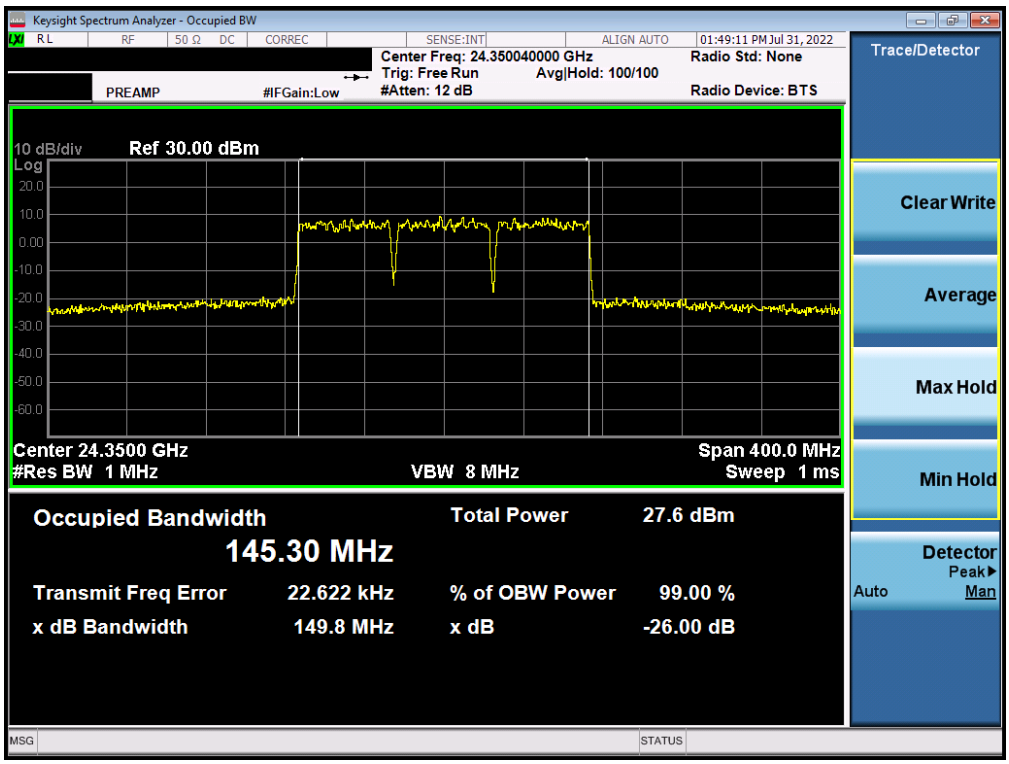
Plot 7-1. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



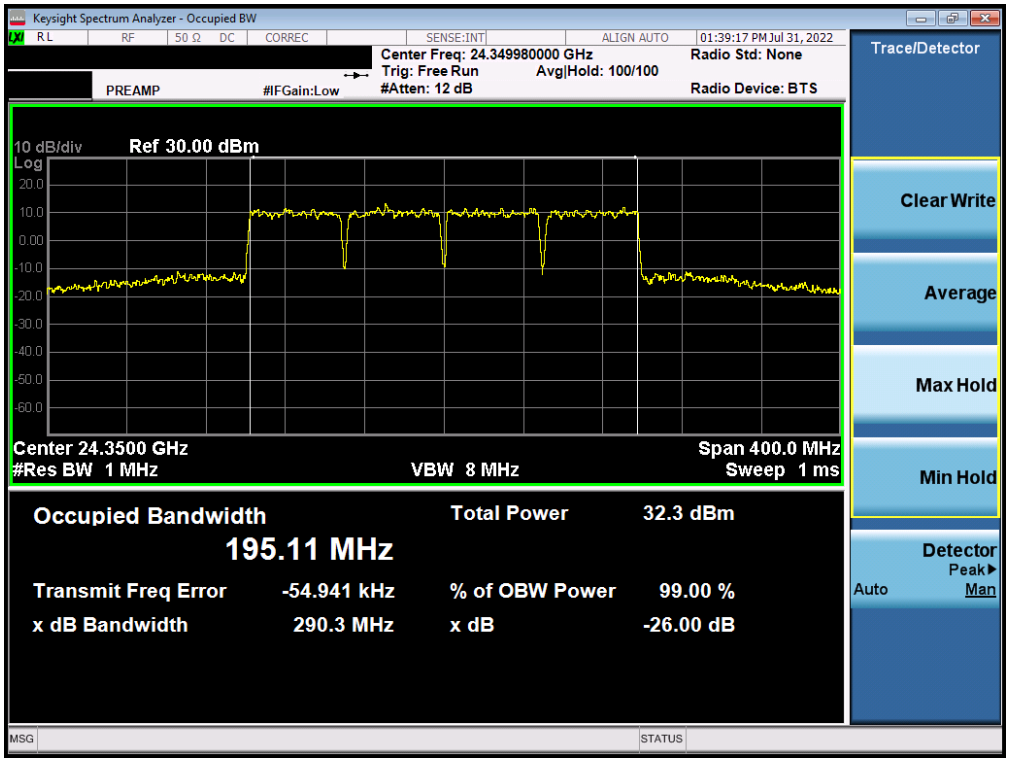
Plot 7-2. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



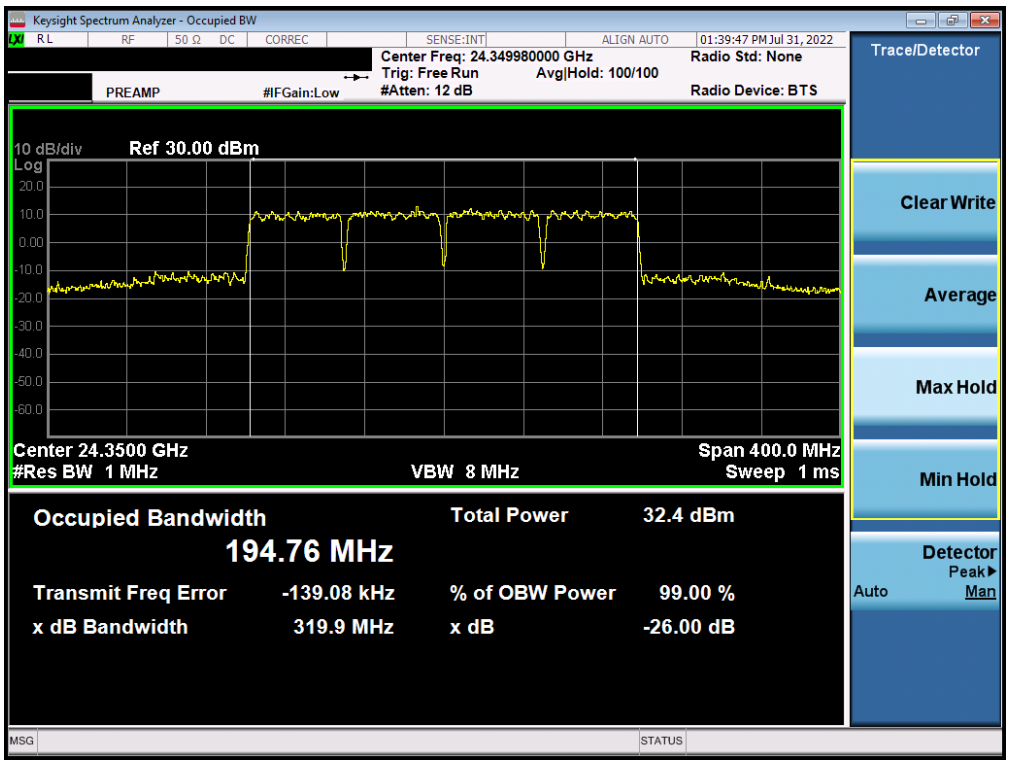
Plot 7-3. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



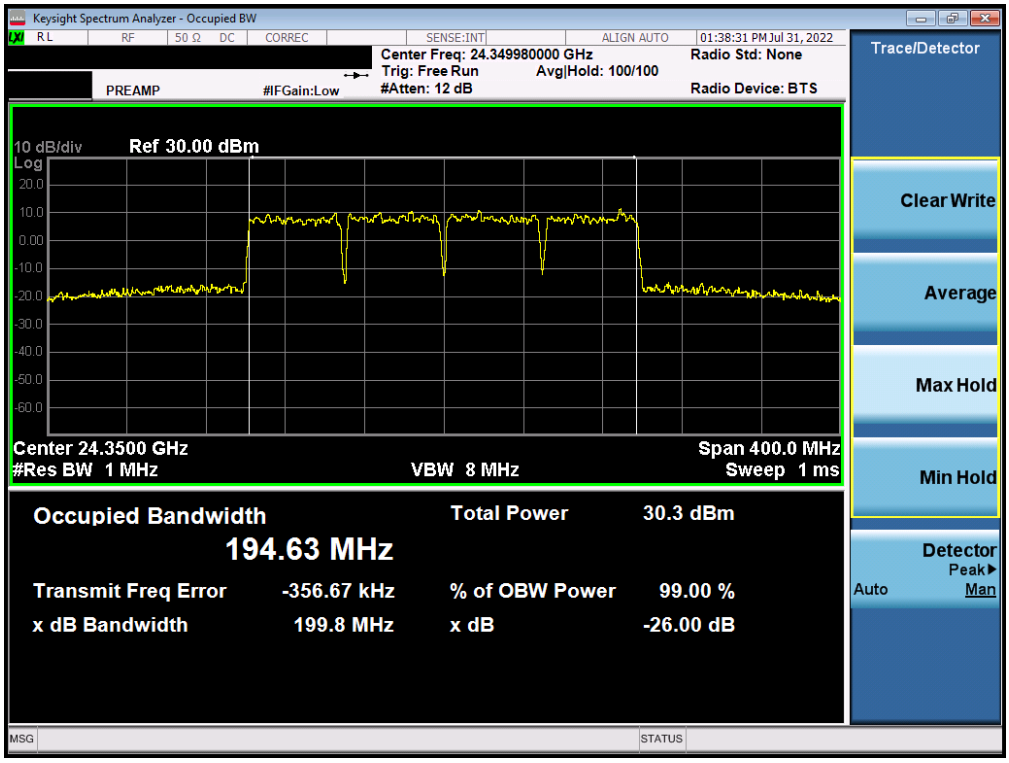
Plot 7-4. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



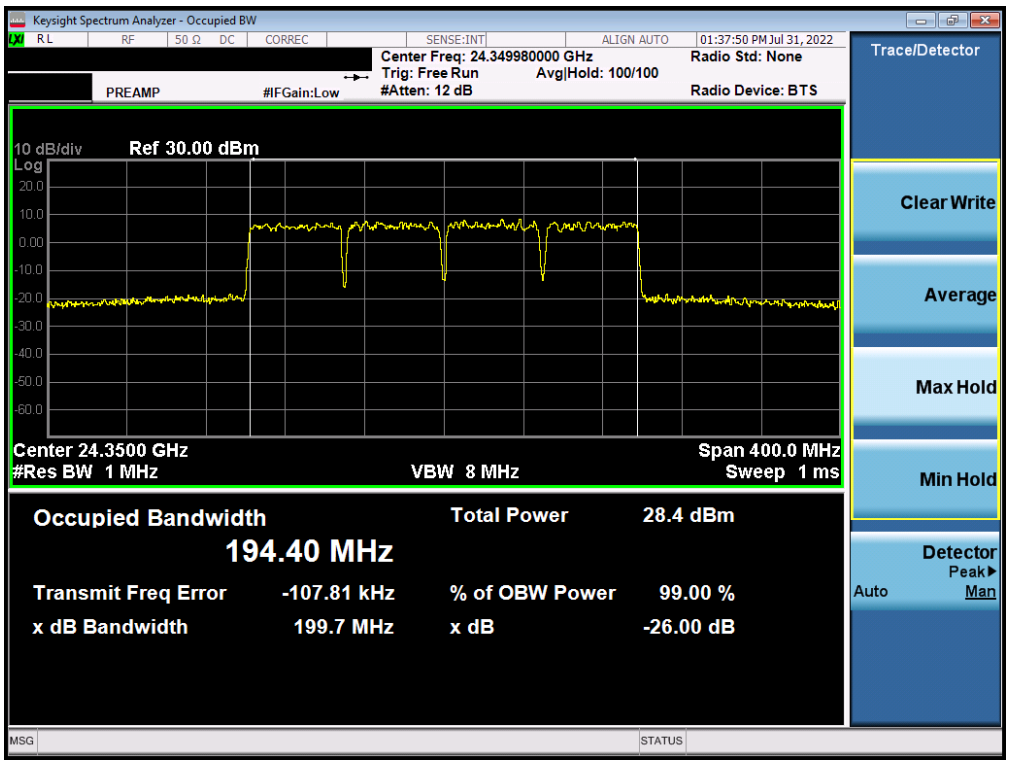
Plot 7-5. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



Plot 7-6. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



Plot 7-7. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)

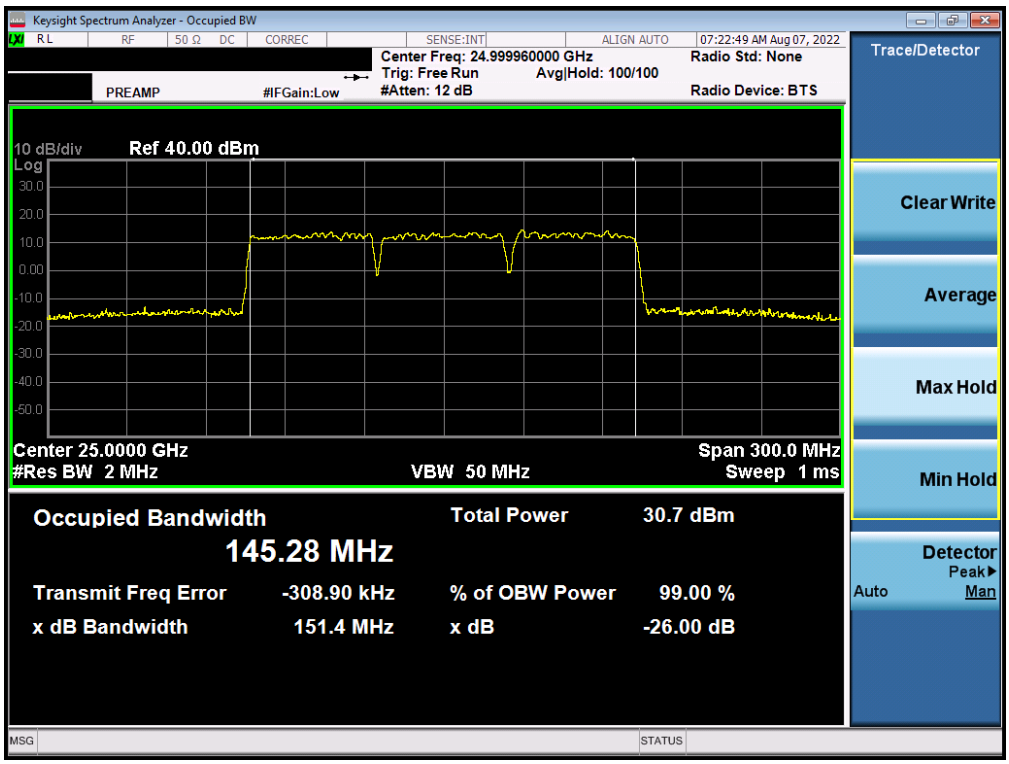


Plot 7-8. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)

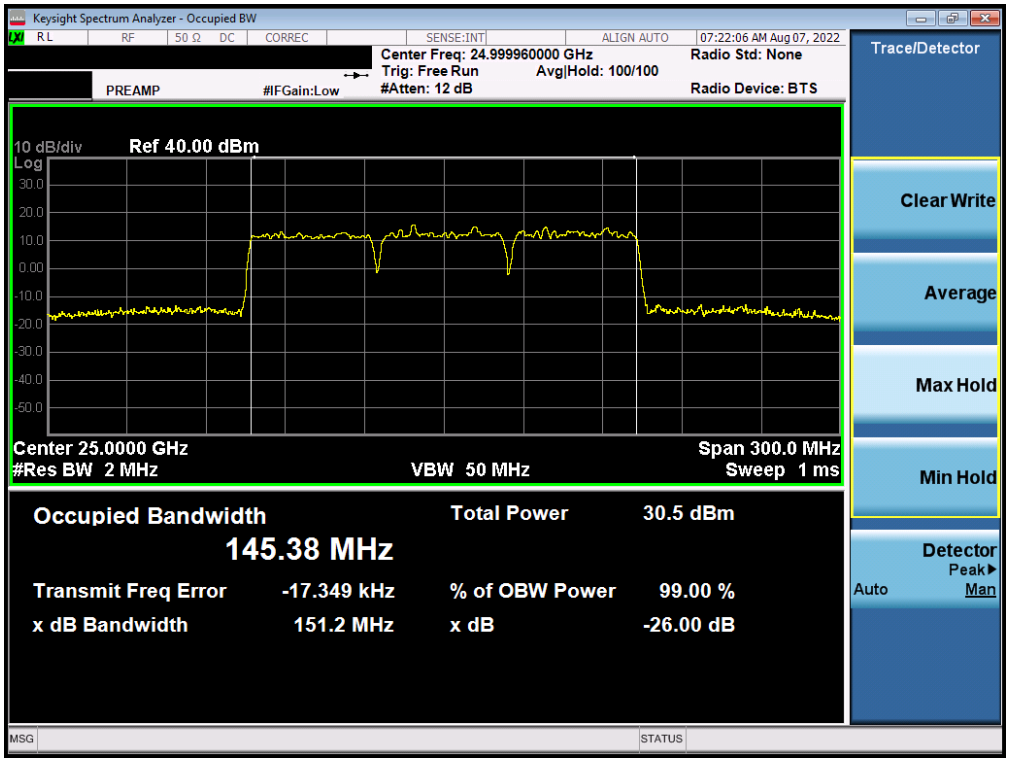
Band n258-R2 (M Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M Patch	50	3	DFT-s-OFDM	QPSK	145.28
			DFT-s-OFDM	π/2 BPSK	145.38
			DFT-s-OFDM	16QAM	145.35
			DFT-s-OFDM	64QAM	145.07
		4	DFT-s-OFDM	QPSK	194.72
			DFT-s-OFDM	π/2 BPSK	194.55
			DFT-s-OFDM	16QAM	194.72
			DFT-s-OFDM	64QAM	194.54
	100	3	CP-OFDM	QPSK	293.17
			DFT-s-OFDM	π/2 BPSK	293.71
			CP-OFDM	16QAM	293.53
			CP-OFDM	64QAM	293.60
		4	CP-OFDM	QPSK	392.87
			DFT-s-OFDM	π/2 BPSK	394.31
			CP-OFDM	16QAM	393.04
			CP-OFDM	64QAM	393.71

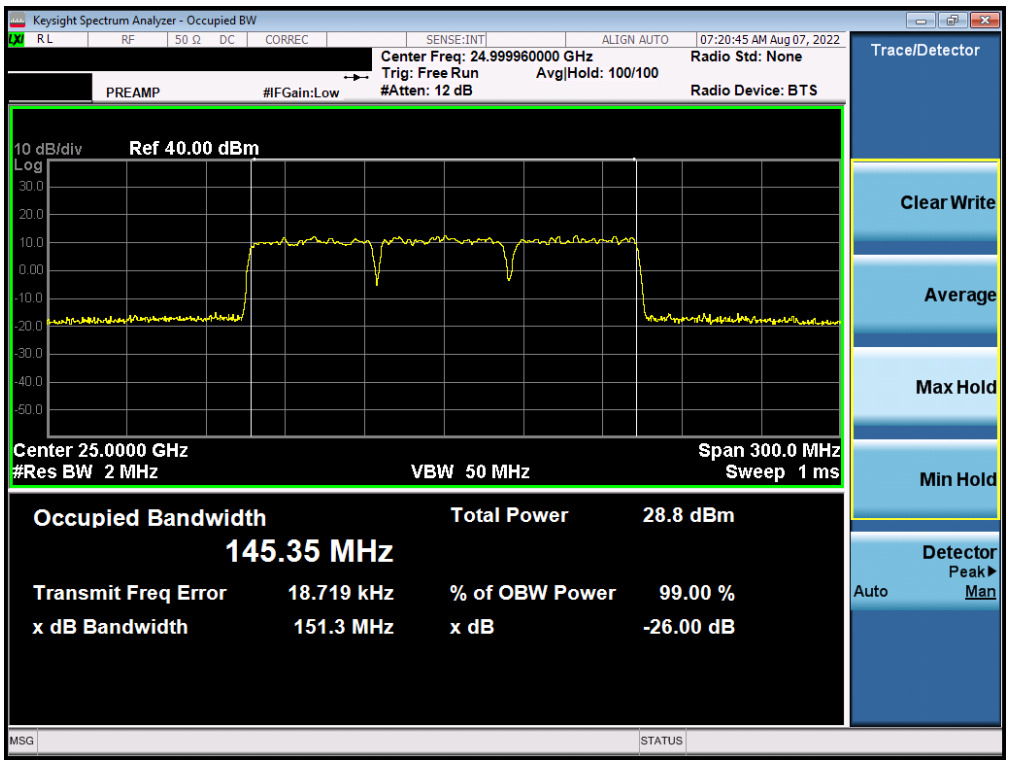
Table 7-3. Summary of Occupied Bandwidths (n258-R2)



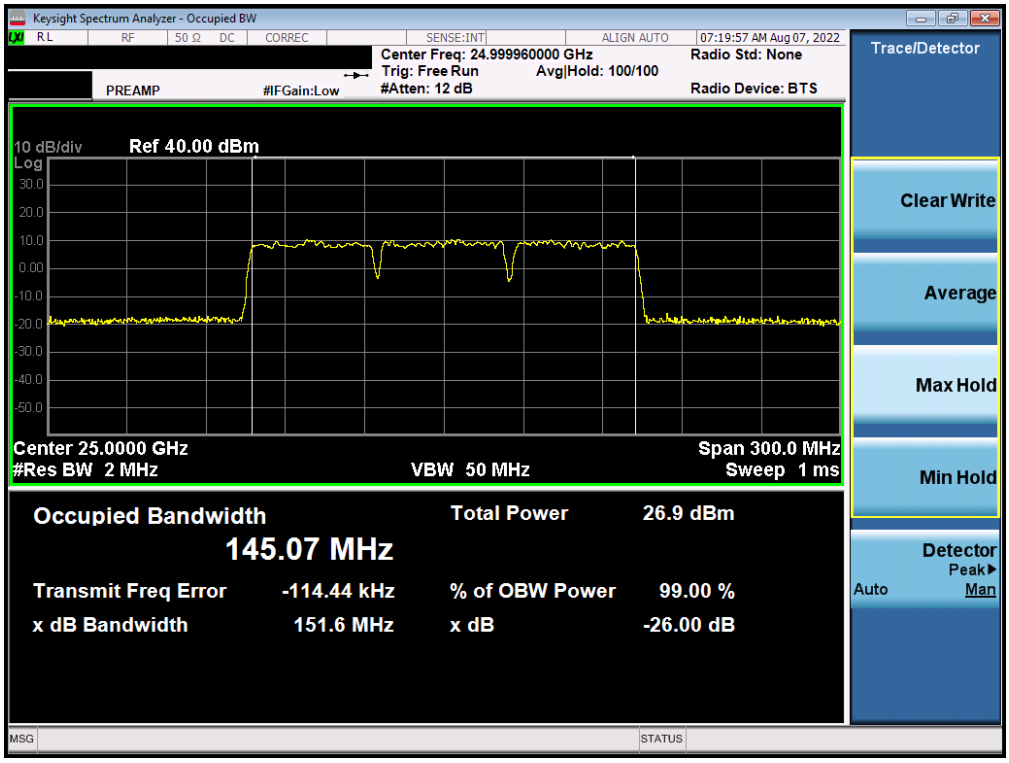
Plot 7-9. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



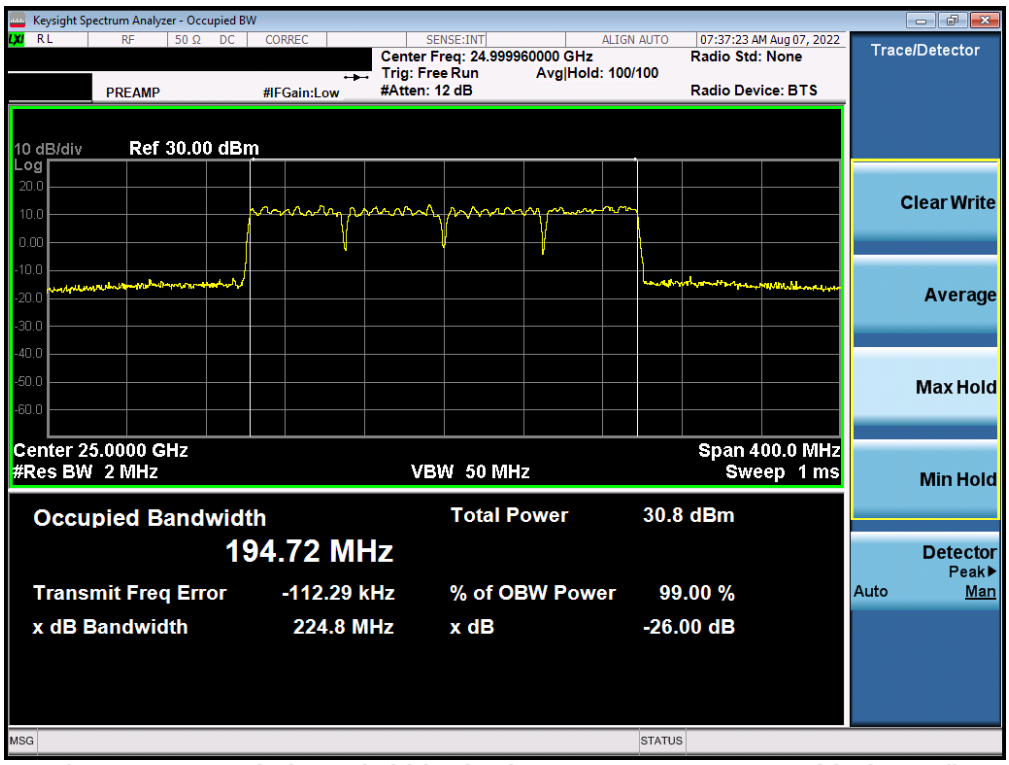
Plot 7-10. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



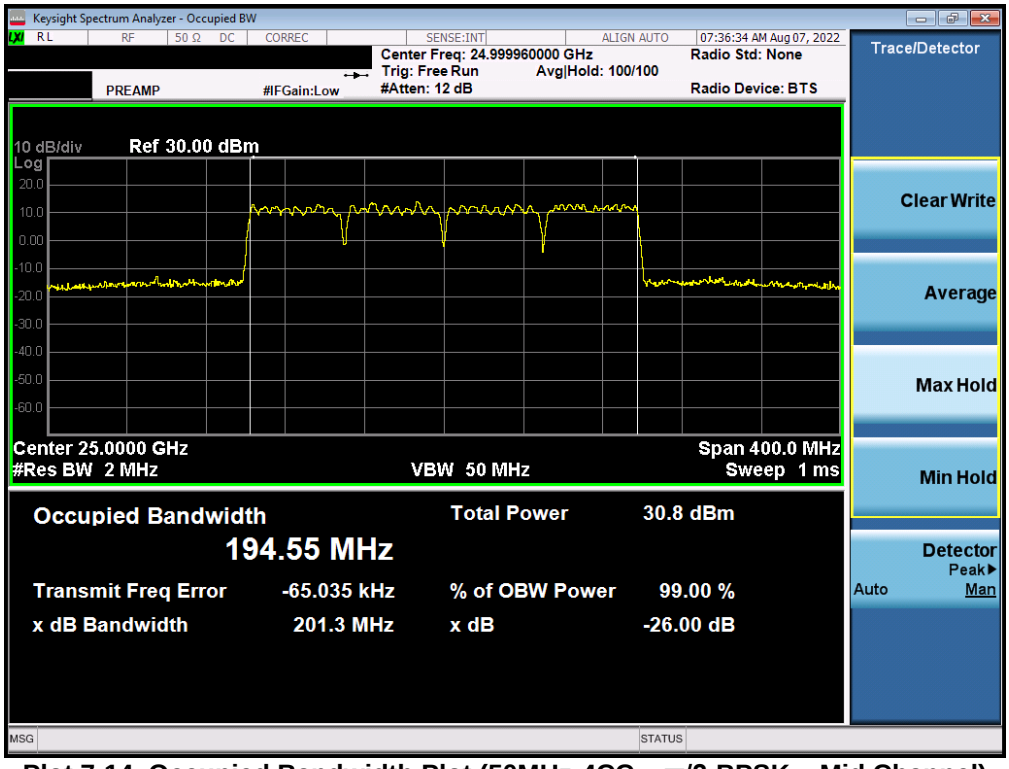
Plot 7-11. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



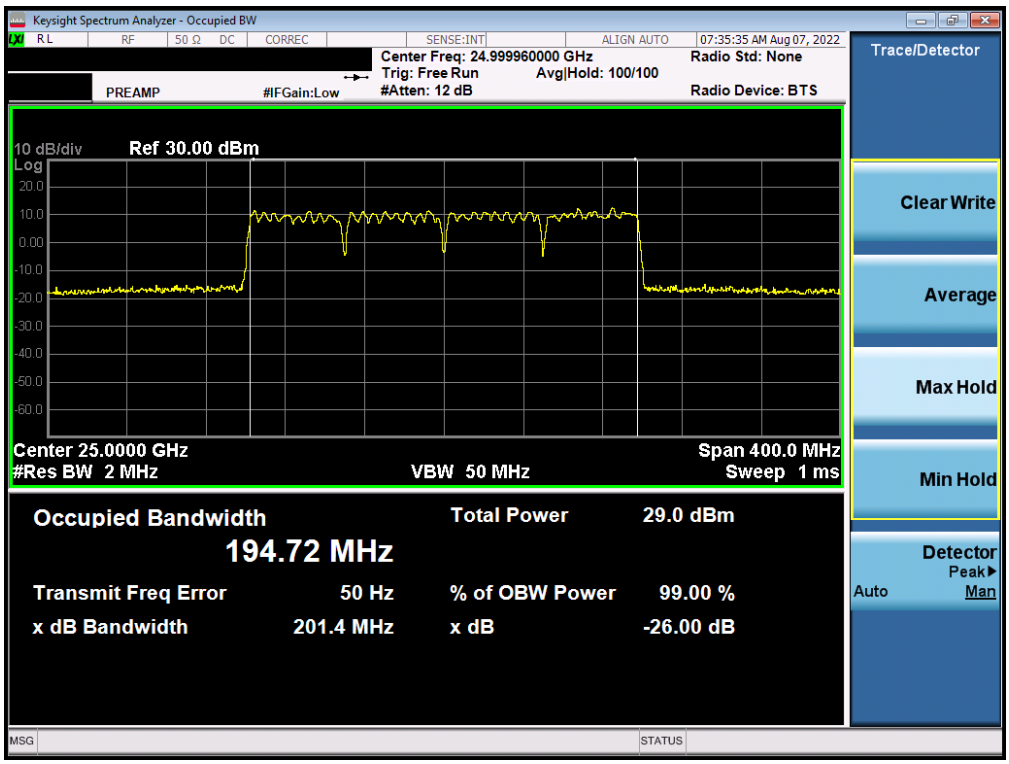
Plot 7-12. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



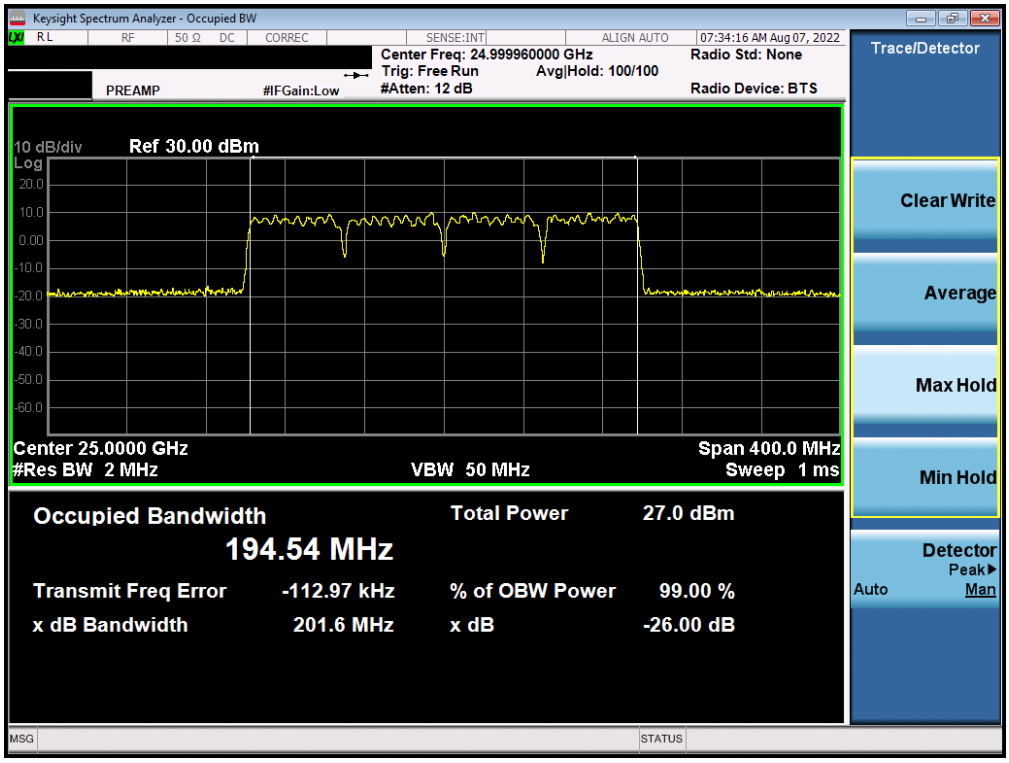
Plot 7-13. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



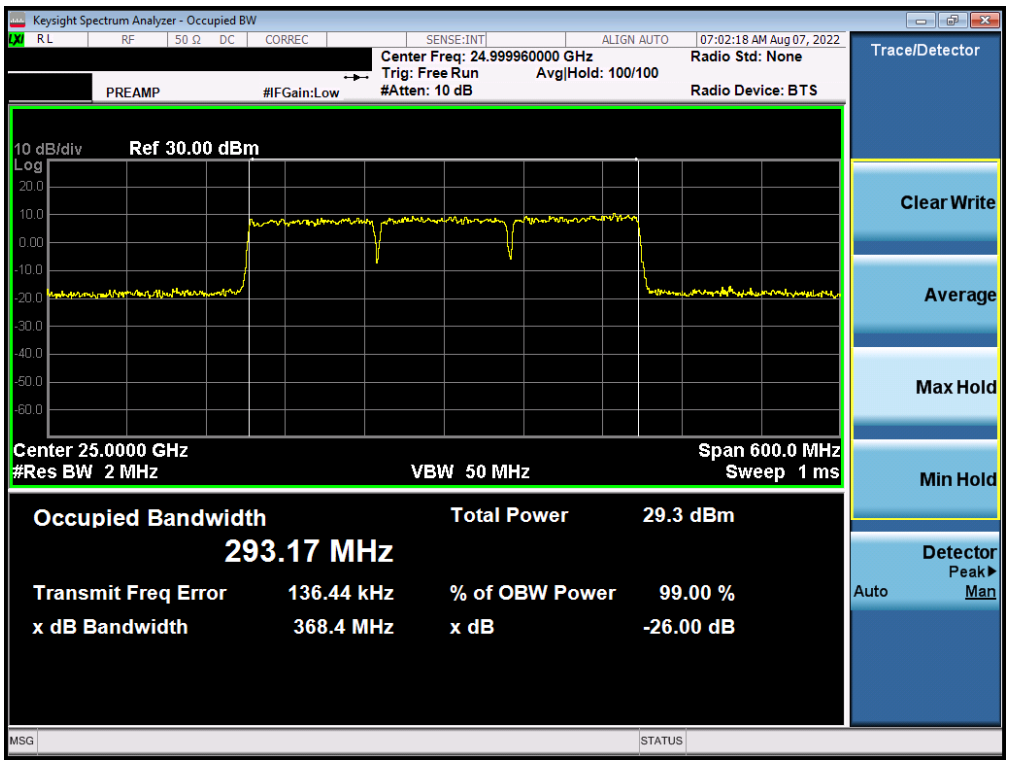
Plot 7-14. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



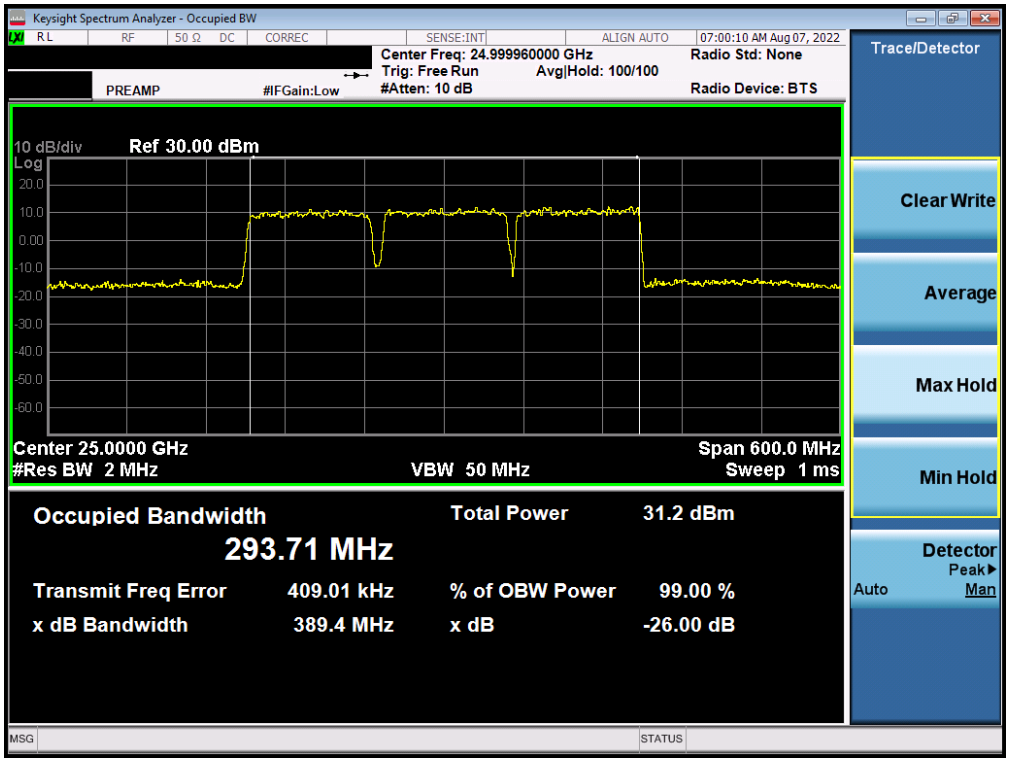
Plot 7-15. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



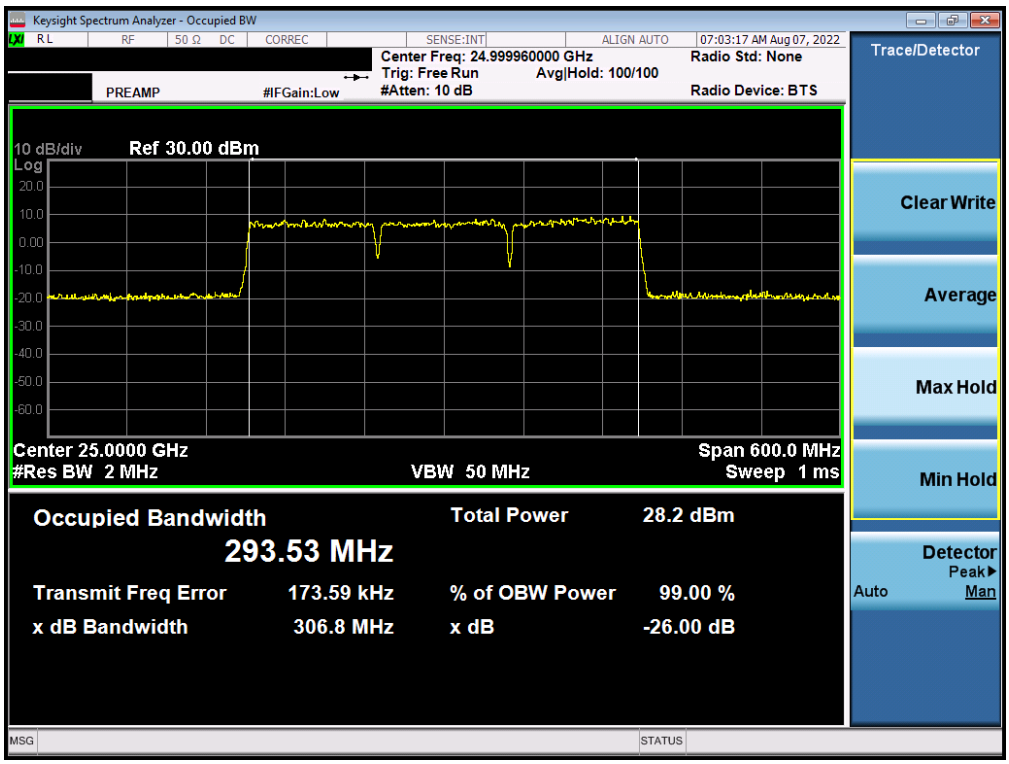
Plot 7-16. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



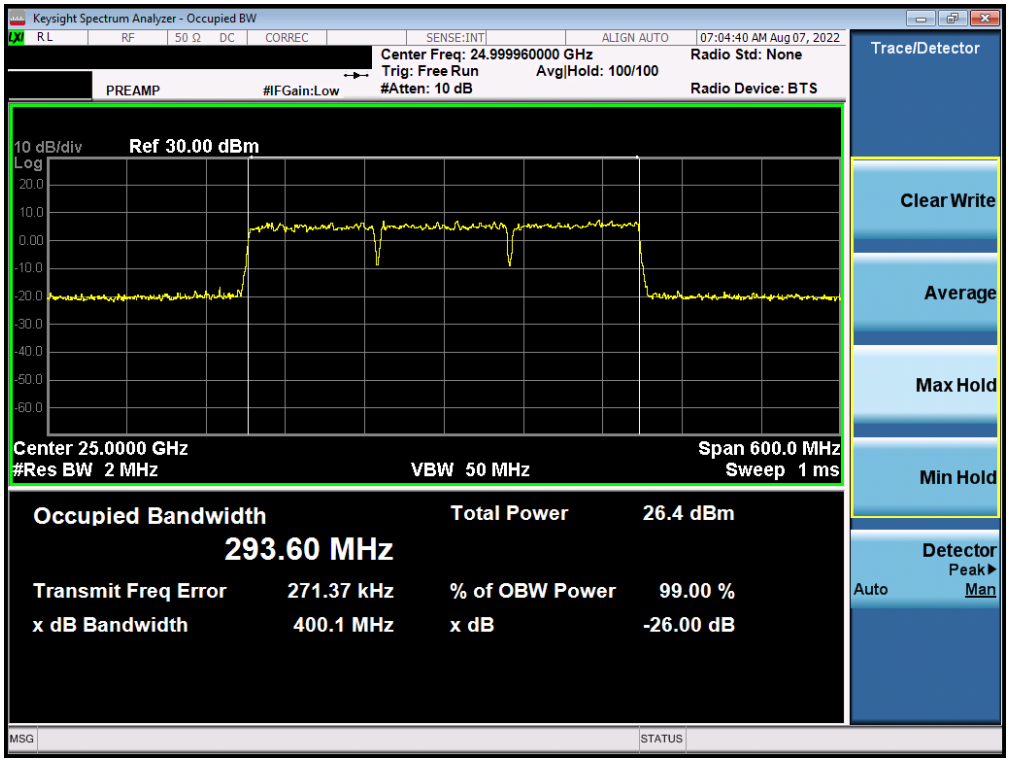
Plot 7-17. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



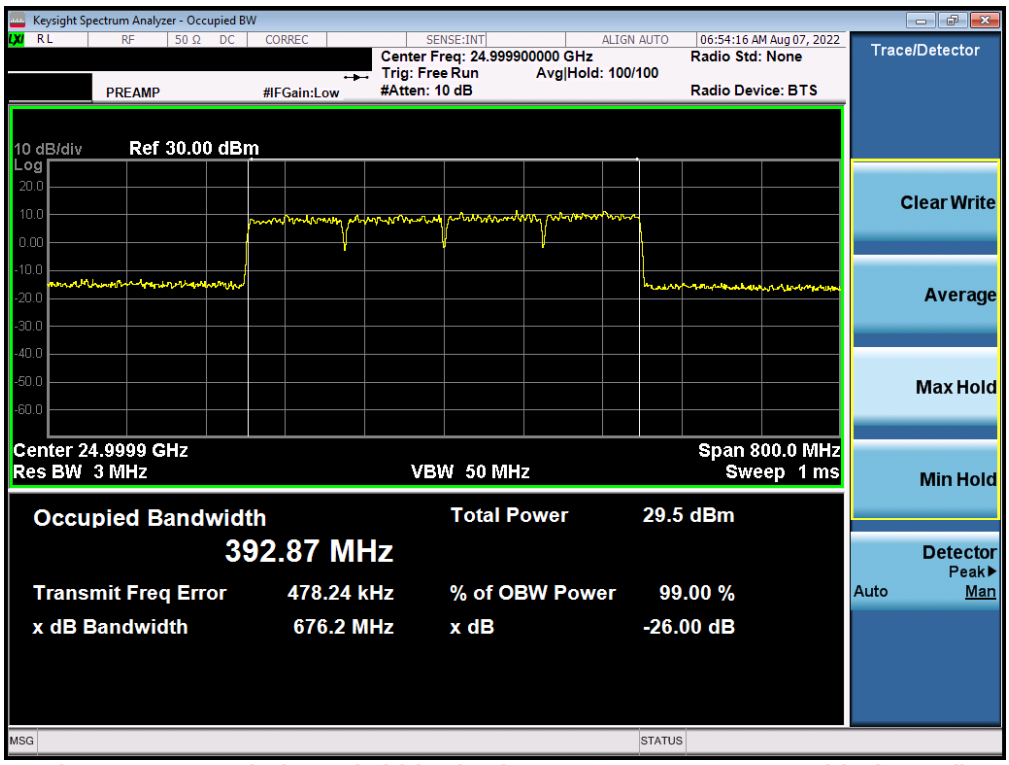
Plot 7-18. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



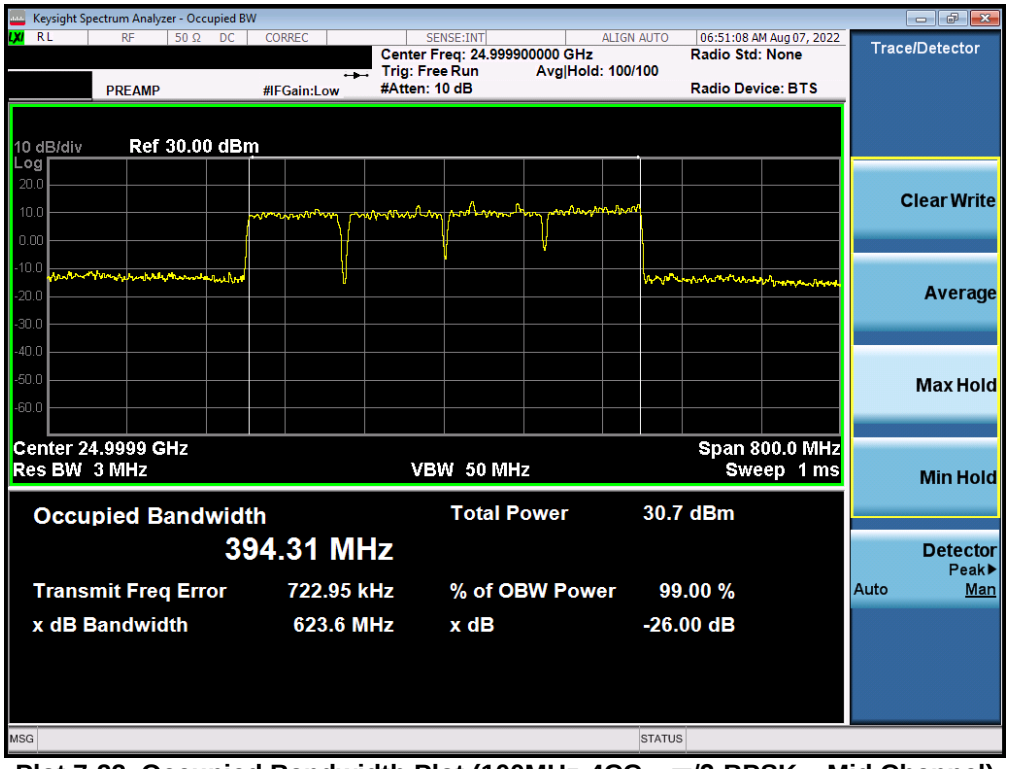
Plot 7-19. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



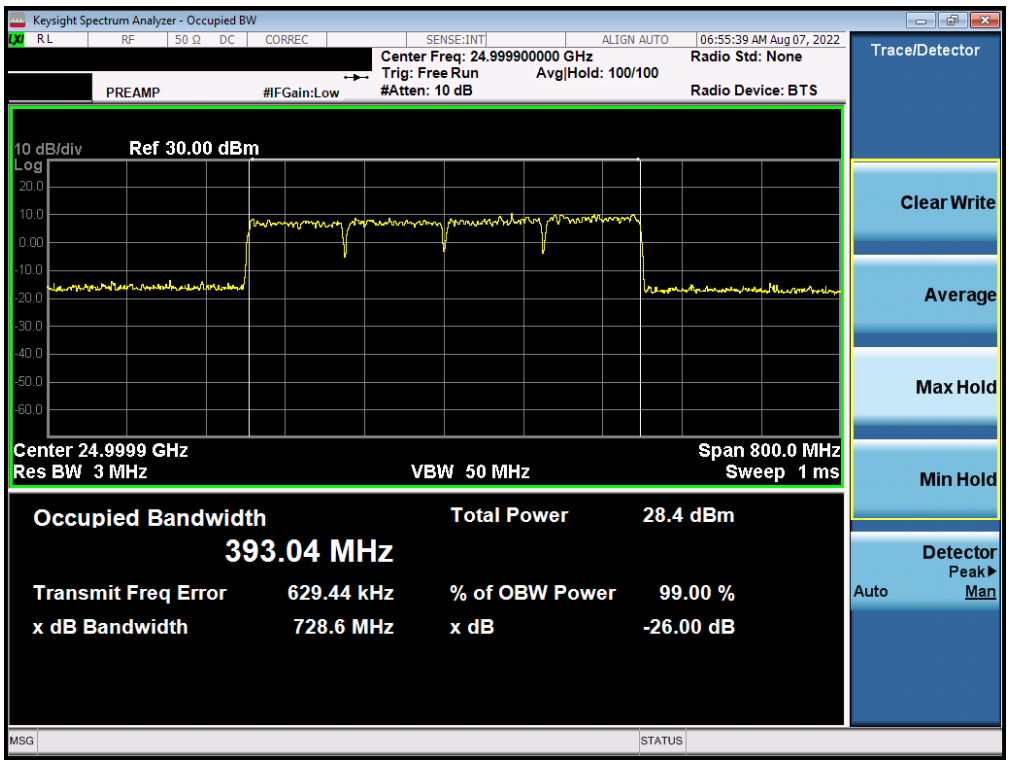
Plot 7-20. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



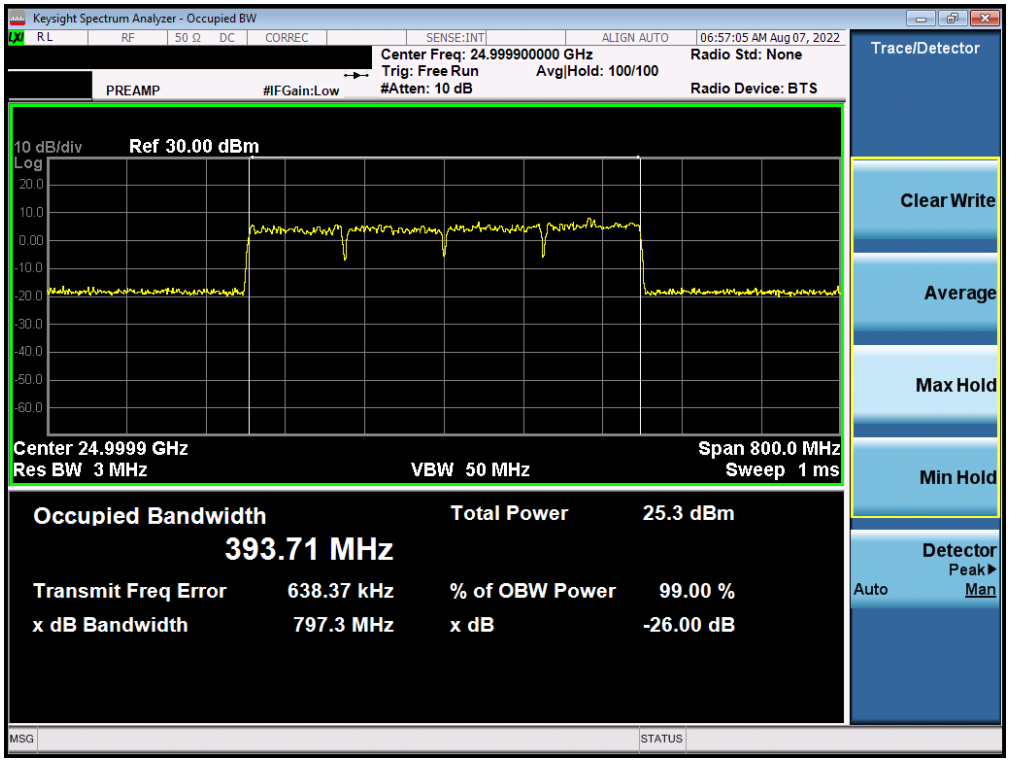
Plot 7-21. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



Plot 7-22. Occupied Bandwidth Plot (100MHz-4CC – π/2-BPSK – Mid Channel)



Plot 7-23. Occupied Bandwidth Plot (100MHz-4CC – 16QAM – Mid Channel)



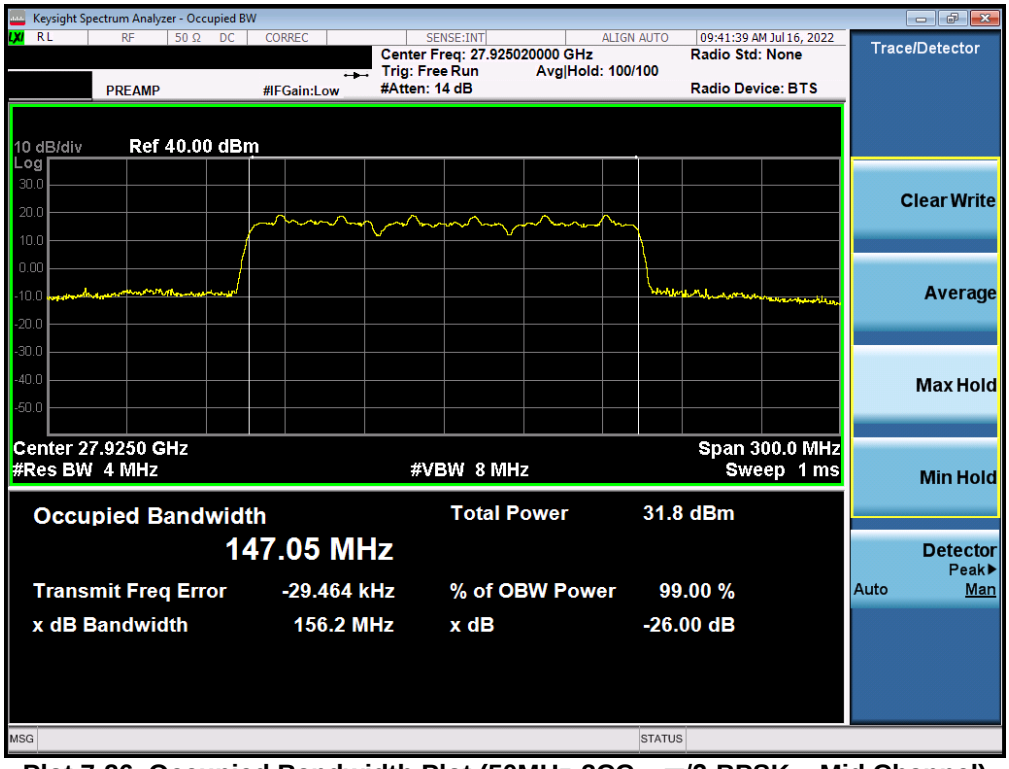
Plot 7-24. Occupied Bandwidth Plot (100MHz-4CC – 64QAM – Mid Channel)

Band n261 (M Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M Patch	50	3	DFT-s-OFDM	QPSK	146.62
			DFT-s-OFDM	π/2 BPSK	147.05
			DFT-s-OFDM	16QAM	146.96
			DFT-s-OFDM	64QAM	146.73
		4	DFT-s-OFDM	QPSK	195.44
			DFT-s-OFDM	π/2 BPSK	195.68
			DFT-s-OFDM	16QAM	195.22
			DFT-s-OFDM	64QAM	195.13
	100	3	CP-OFDM	QPSK	295.21
			DFT-s-OFDM	π/2 BPSK	296.85
			CP-OFDM	16QAM	296.34
			CP-OFDM	64QAM	296.98
		4	CP-OFDM	QPSK	394.06
			DFT-s-OFDM	π/2 BPSK	394.49
			CP-OFDM	16QAM	394.79
			CP-OFDM	64QAM	396.29

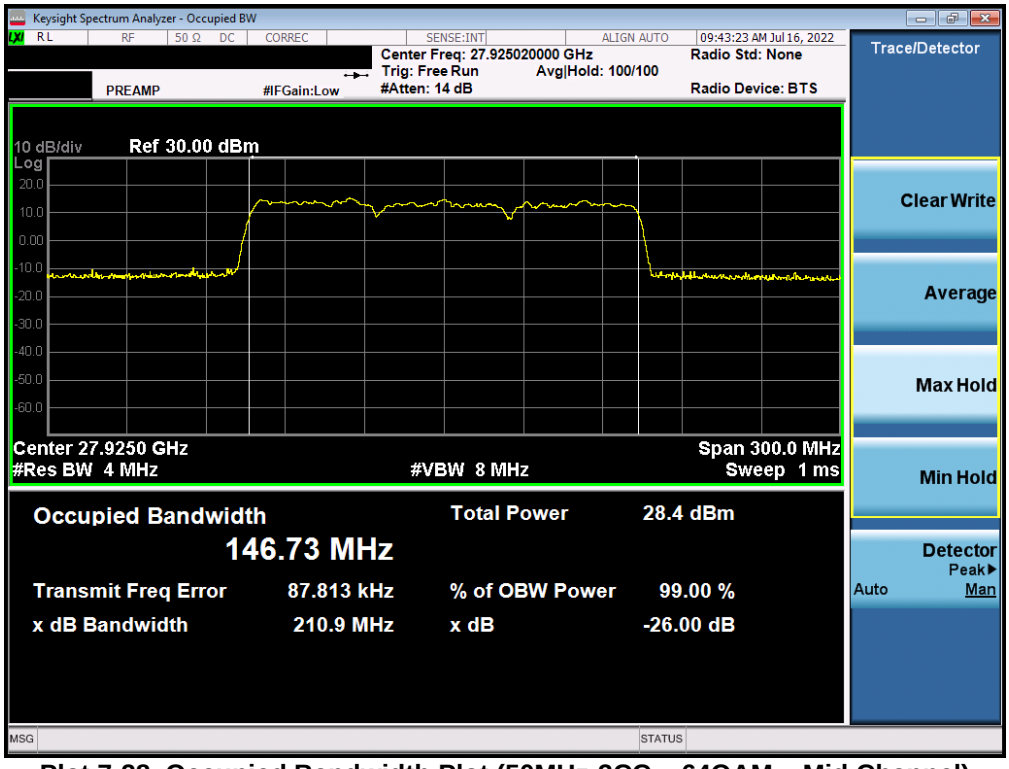
Table 7-4. Summary of Occupied Bandwidths (n261)

Plot 7-25. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)

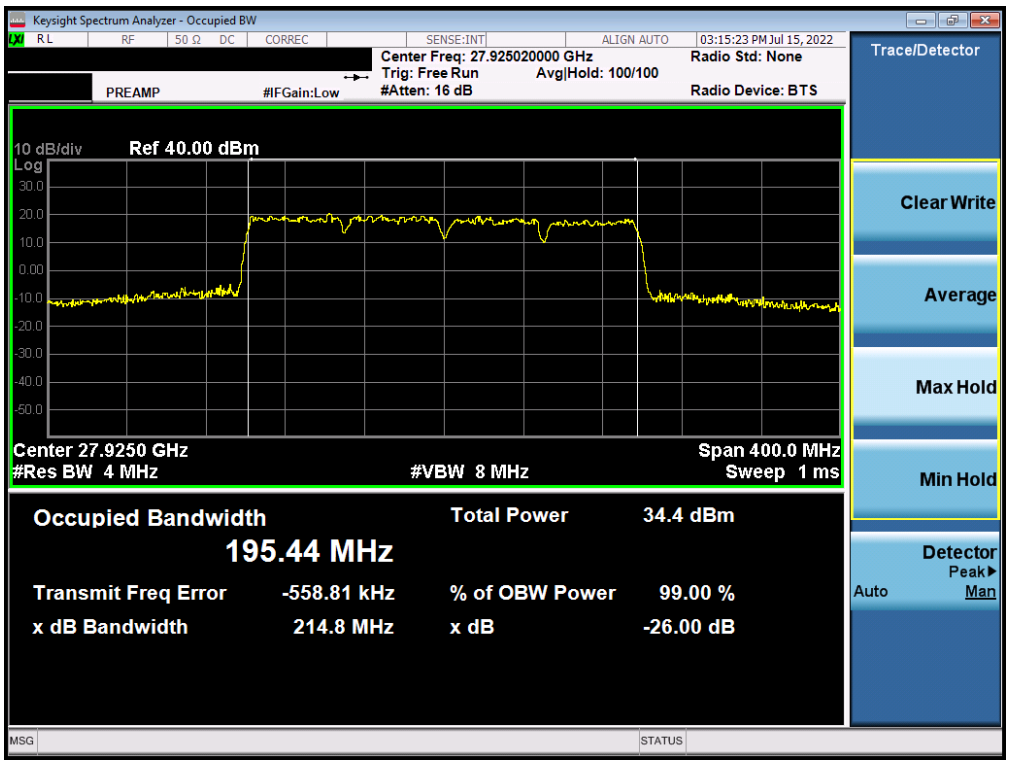


Plot 7-26. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)

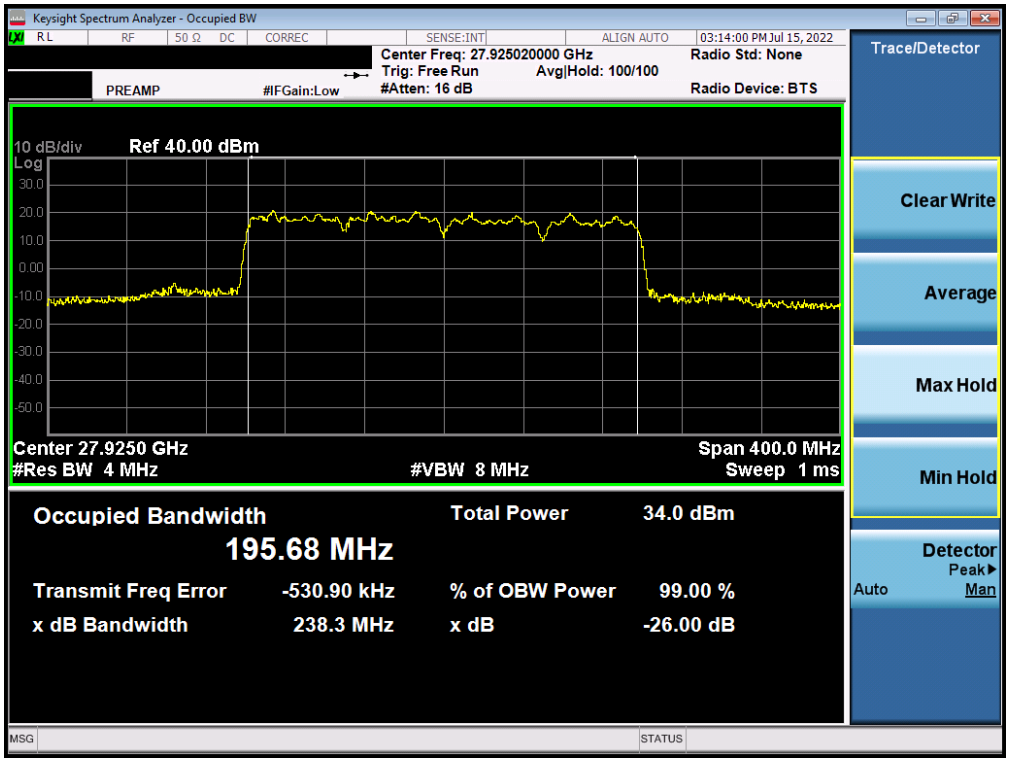
Plot 7-27. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



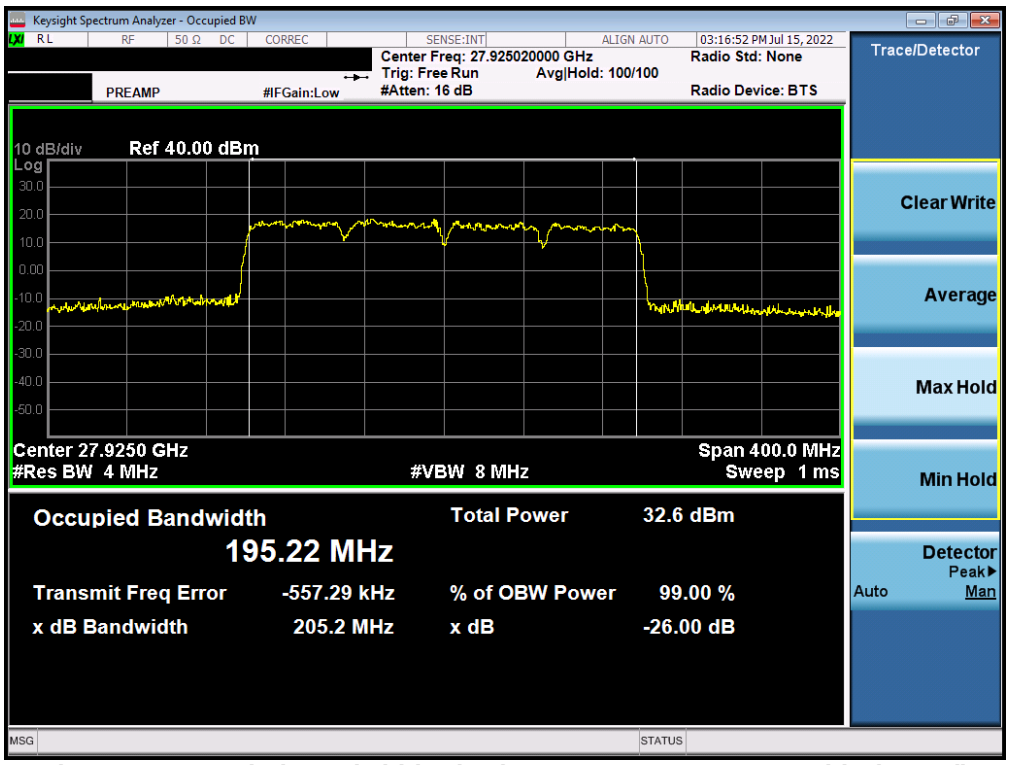
Plot 7-28. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



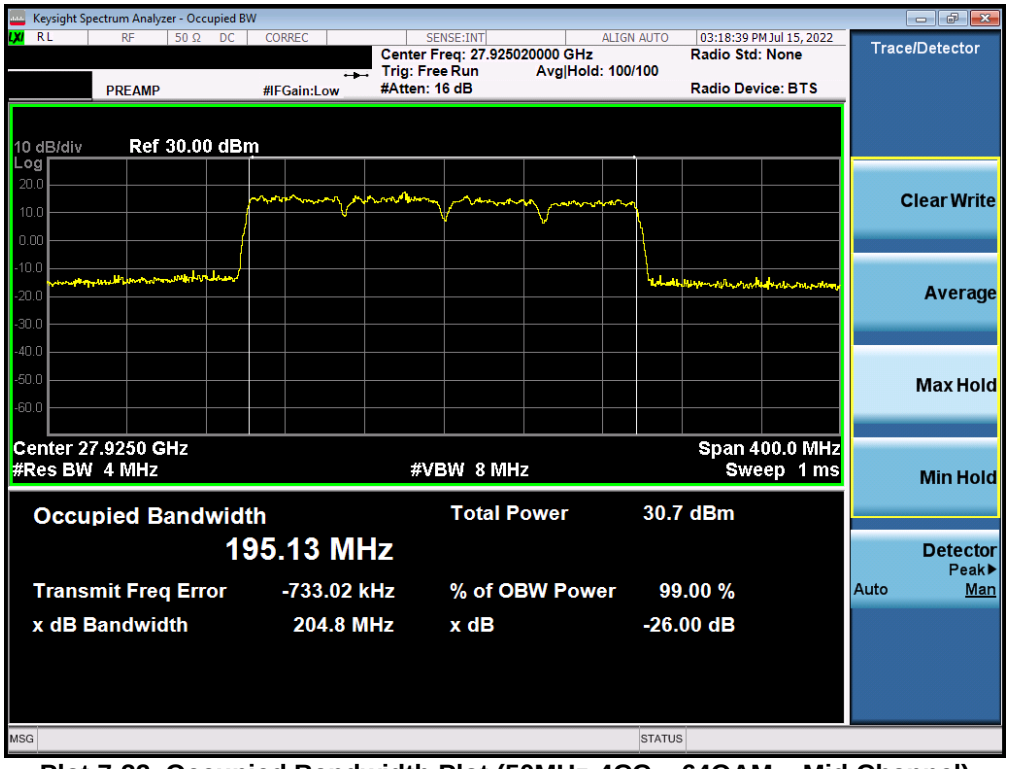
Plot 7-29. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



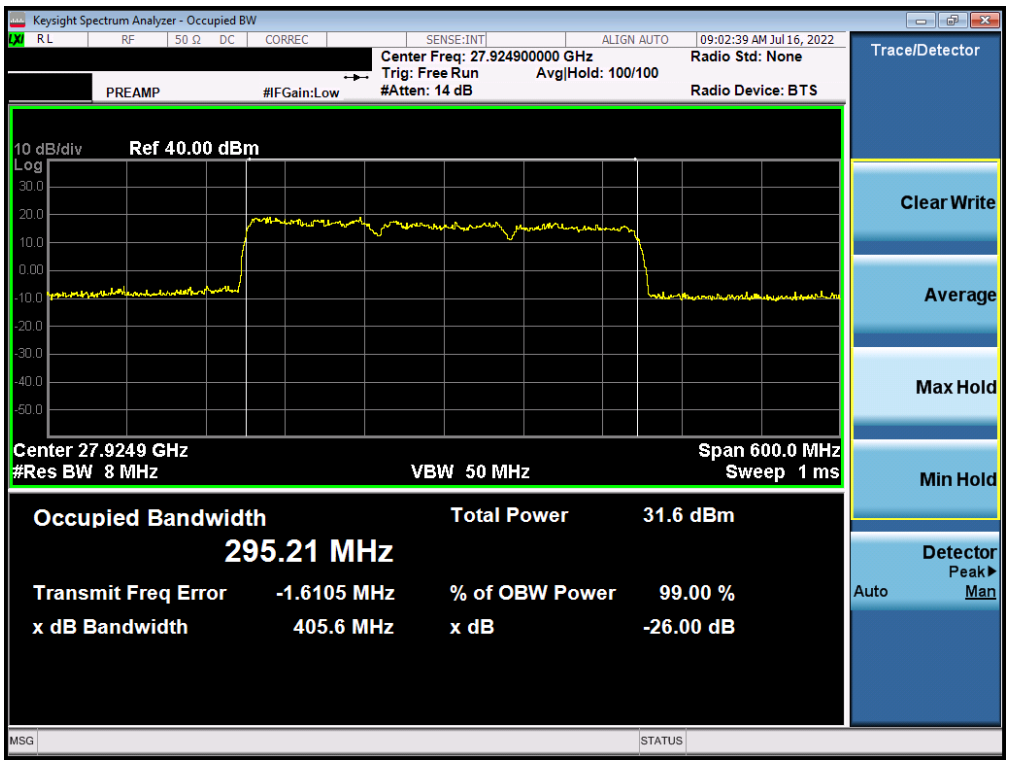
Plot 7-30. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



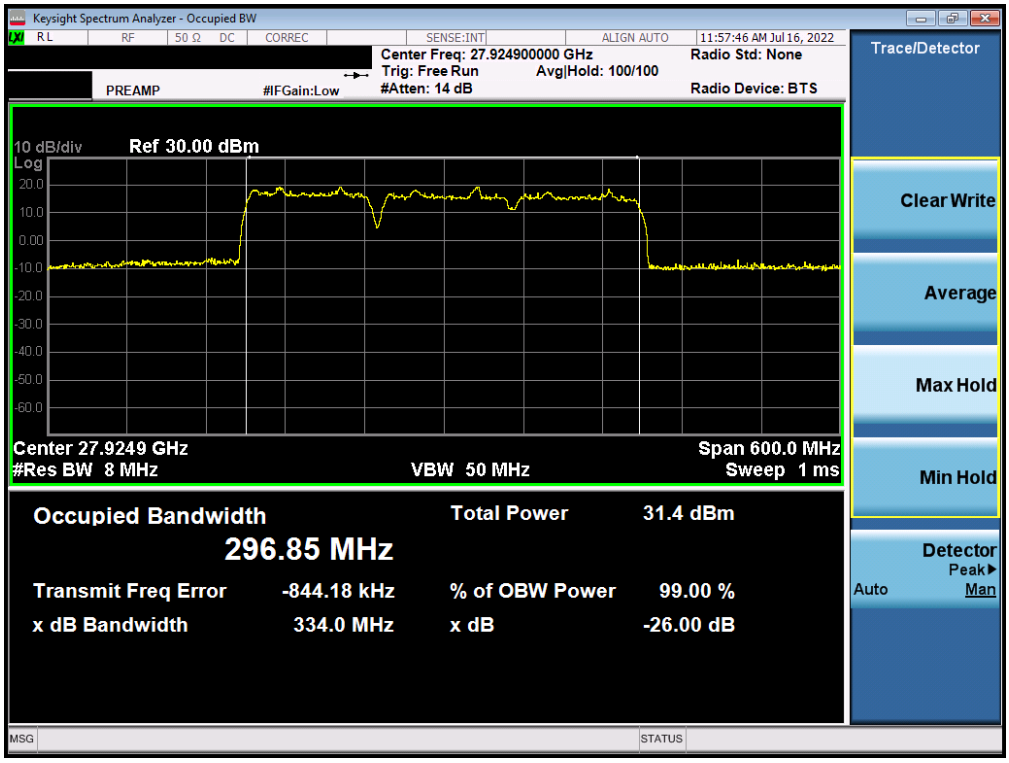
Plot 7-31. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



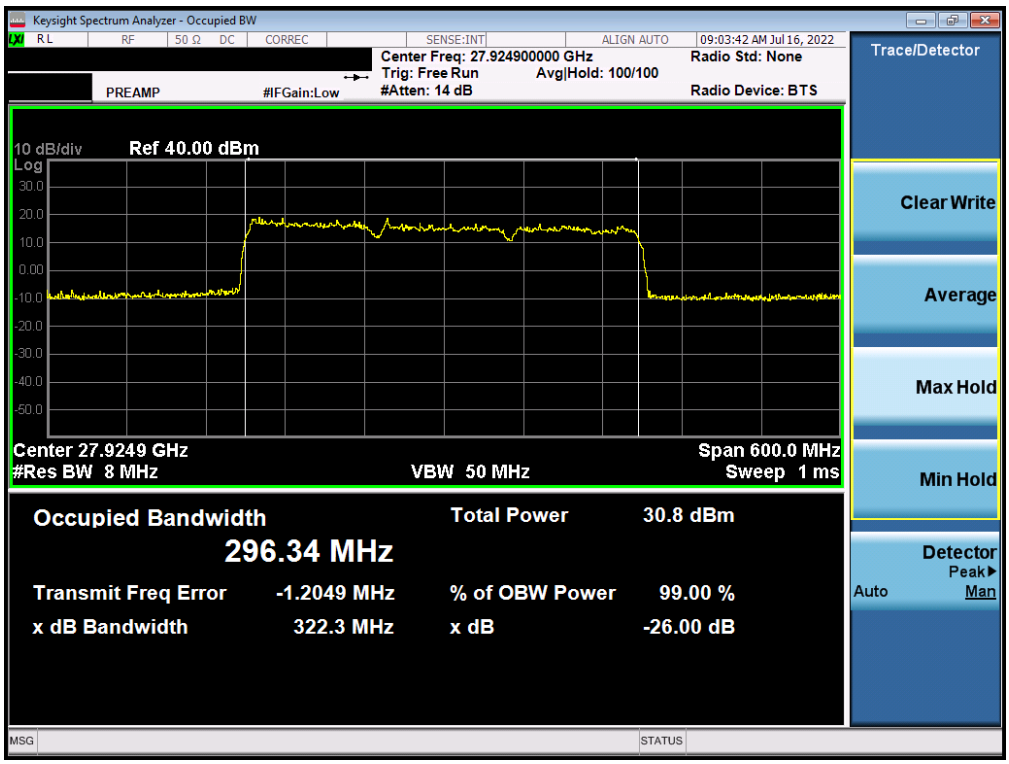
Plot 7-32. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



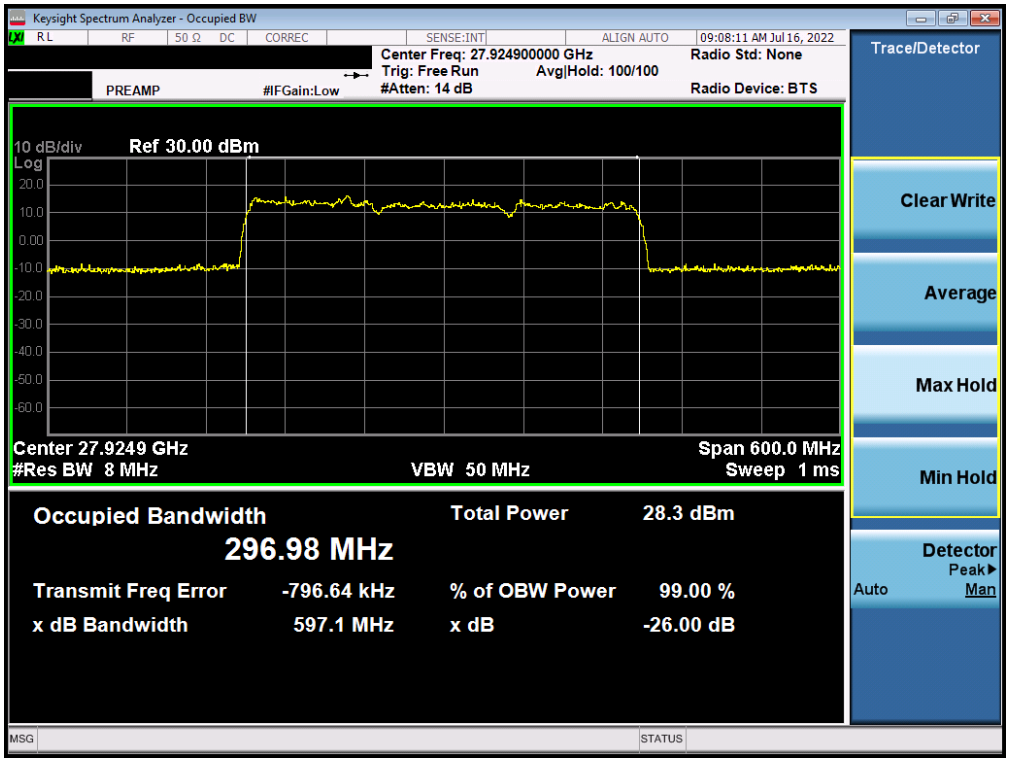
Plot 7-33. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



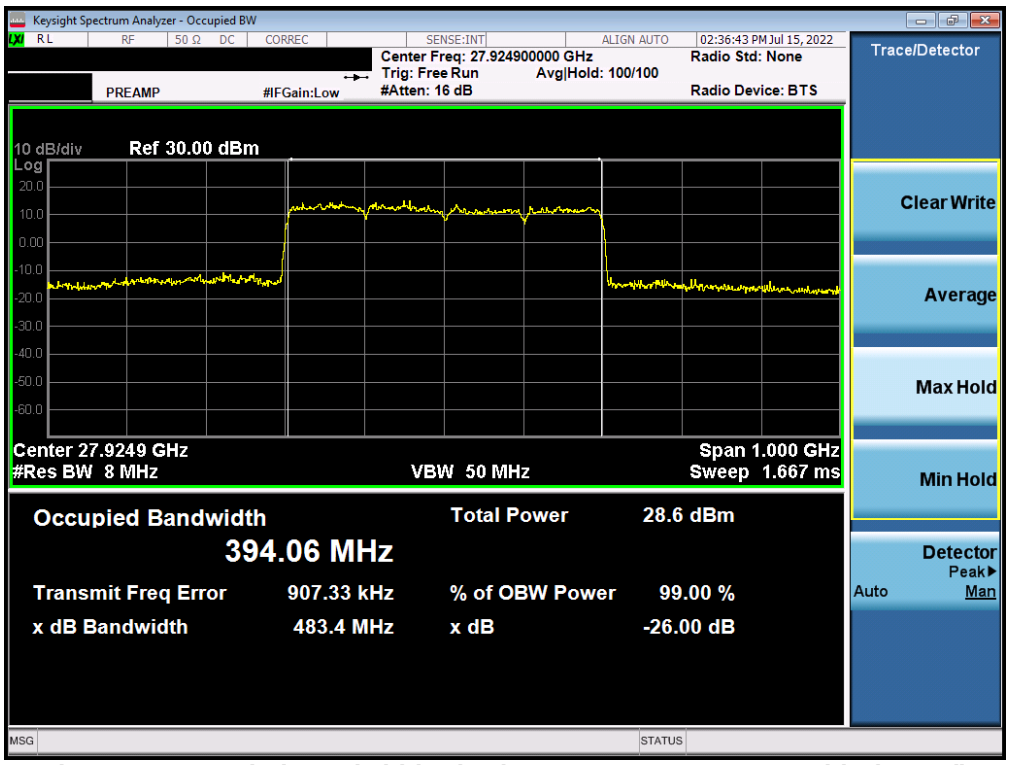
Plot 7-34. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



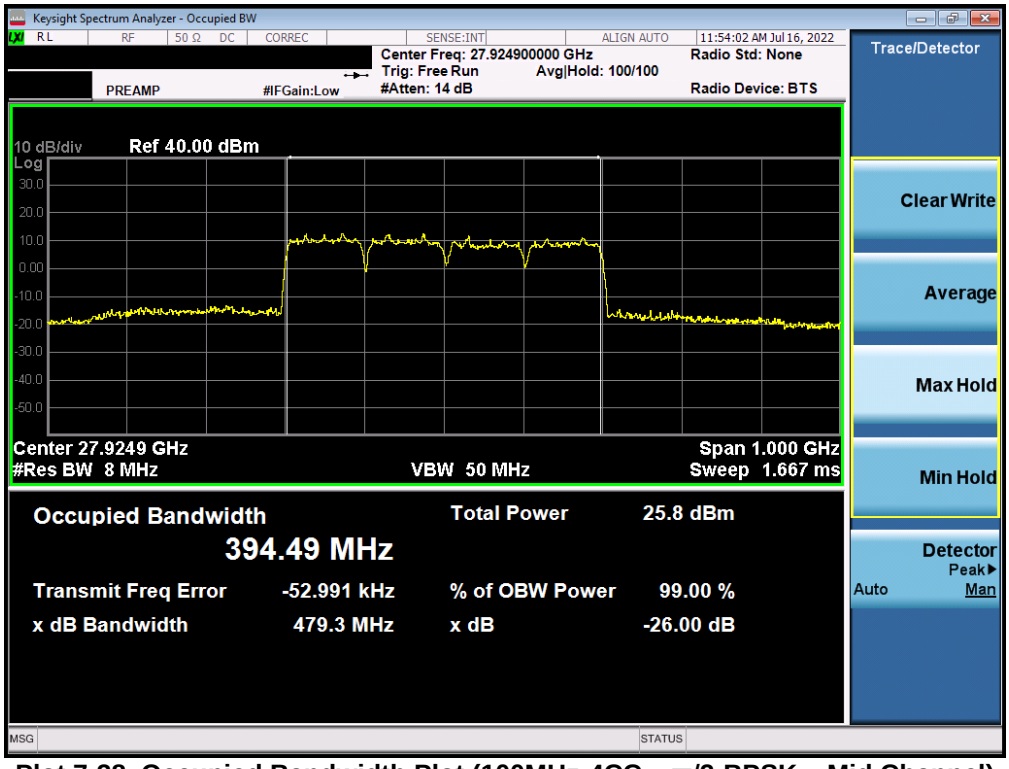
Plot 7-35. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



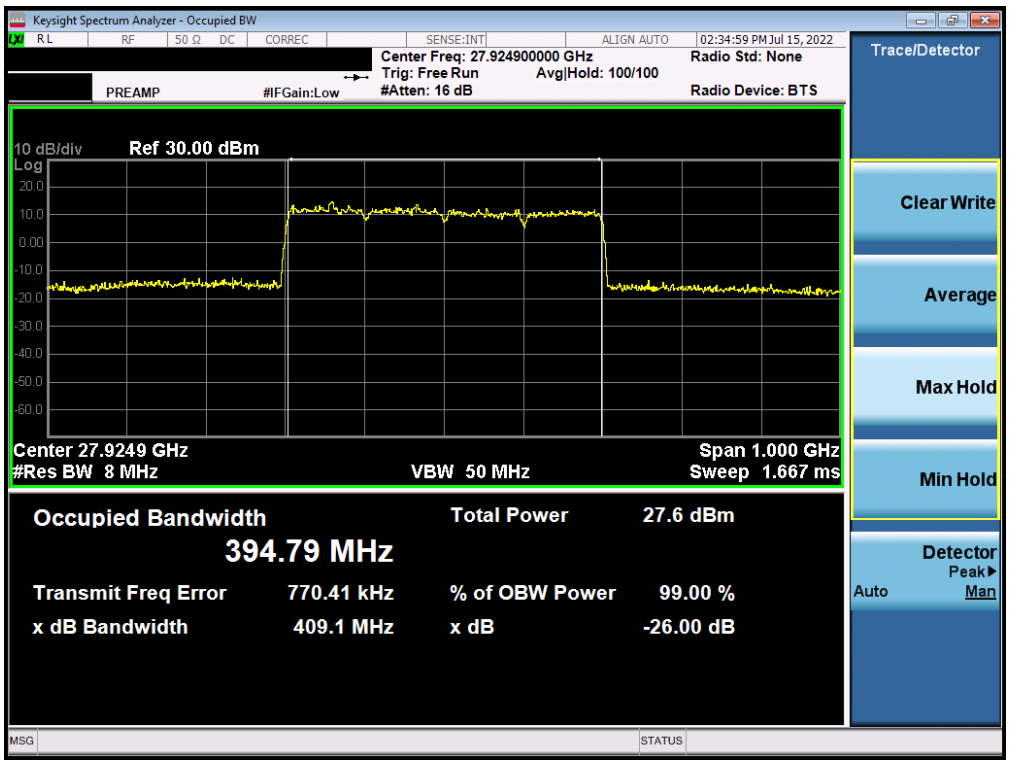
Plot 7-36. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



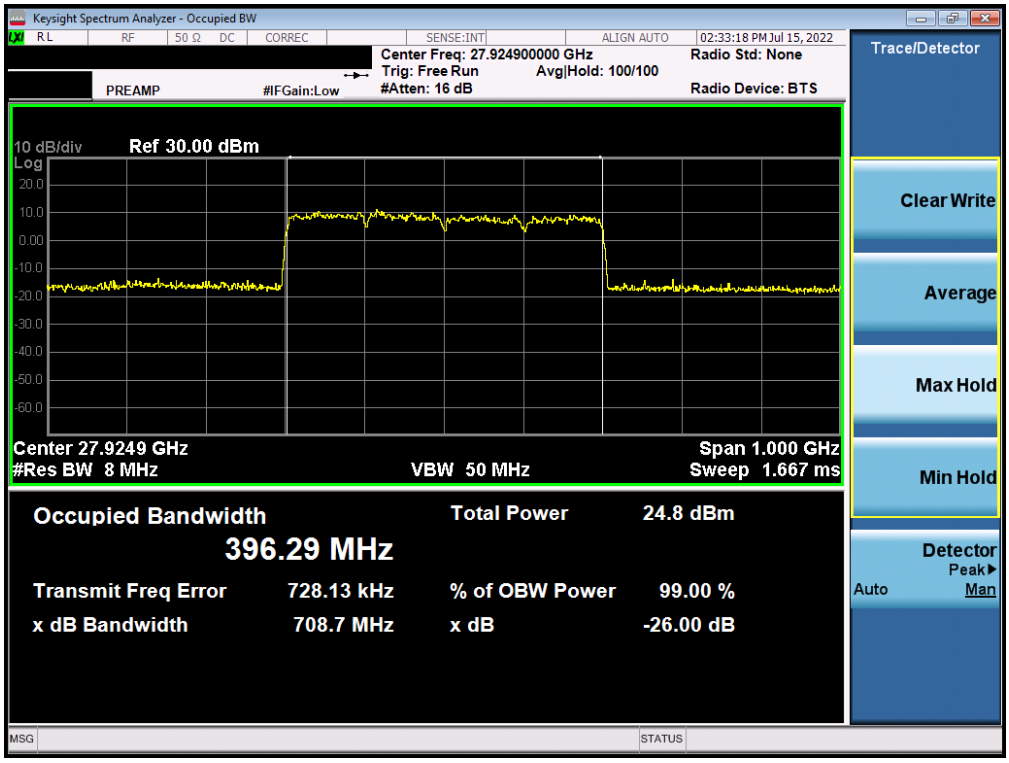
Plot 7-37. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



Plot 7-38. Occupied Bandwidth Plot (100MHz-4CC – π/2-BPSK – Mid Channel)



Plot 7-39. Occupied Bandwidth Plot (100MHz-4CC – 16QAM – Mid Channel)



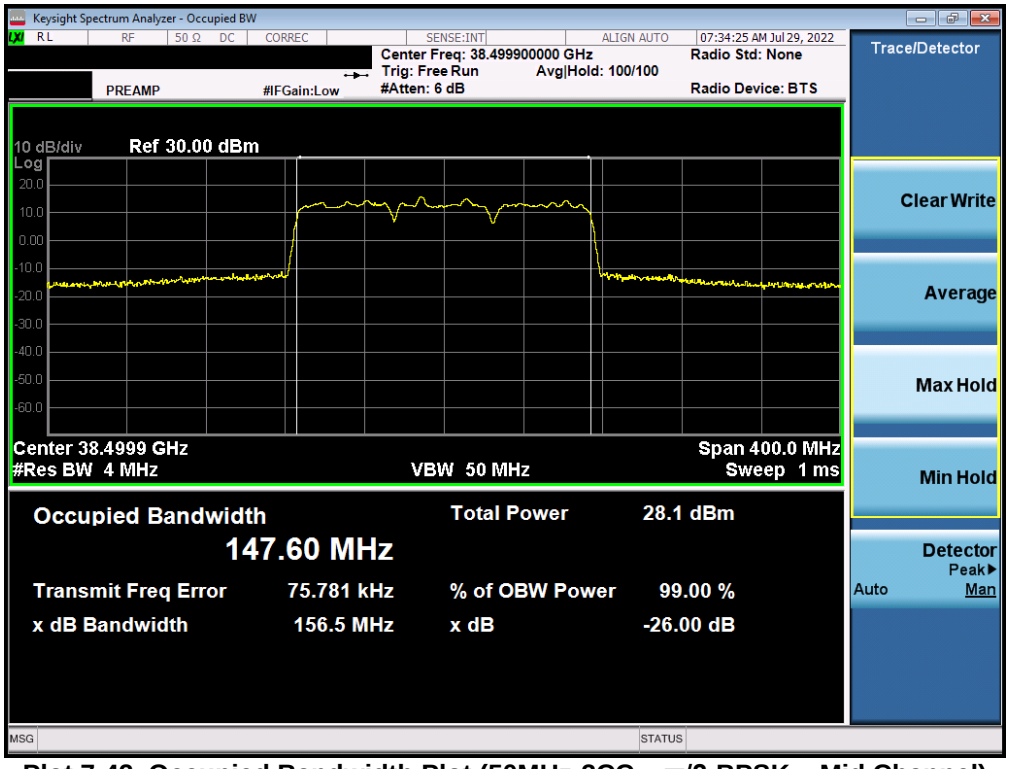
Plot 7-40. Occupied Bandwidth Plot (100MHz-4CC – 64QAM – Mid Channel)

Band n260 (M Patch)

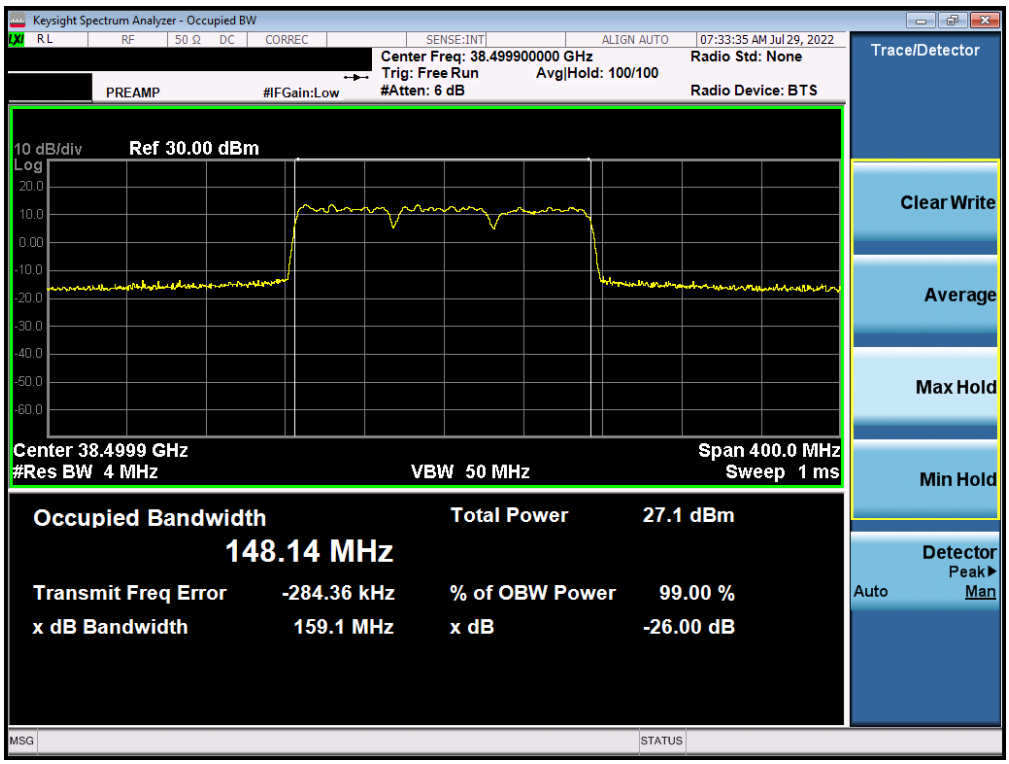
Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M Patch	50	3	DFT-s-OFDM	QPSK	147.51
			DFT-s-OFDM	π/2 BPSK	147.60
			DFT-s-OFDM	16QAM	148.14
			DFT-s-OFDM	64QAM	148.47
		4	DFT-s-OFDM	QPSK	195.15
			DFT-s-OFDM	π/2 BPSK	194.48
			DFT-s-OFDM	16QAM	195.11
			DFT-s-OFDM	64QAM	195.01
	100	3	CP-OFDM	QPSK	297.70
			DFT-s-OFDM	π/2 BPSK	298.12
			CP-OFDM	16QAM	297.19
			CP-OFDM	64QAM	298.79
		4	CP-OFDM	QPSK	394.83
			DFT-s-OFDM	π/2 BPSK	394.85
			CP-OFDM	16QAM	394.48
			CP-OFDM	64QAM	396.68

Table 7-5. Summary of Ant 1 Occupied Bandwidths (n260)

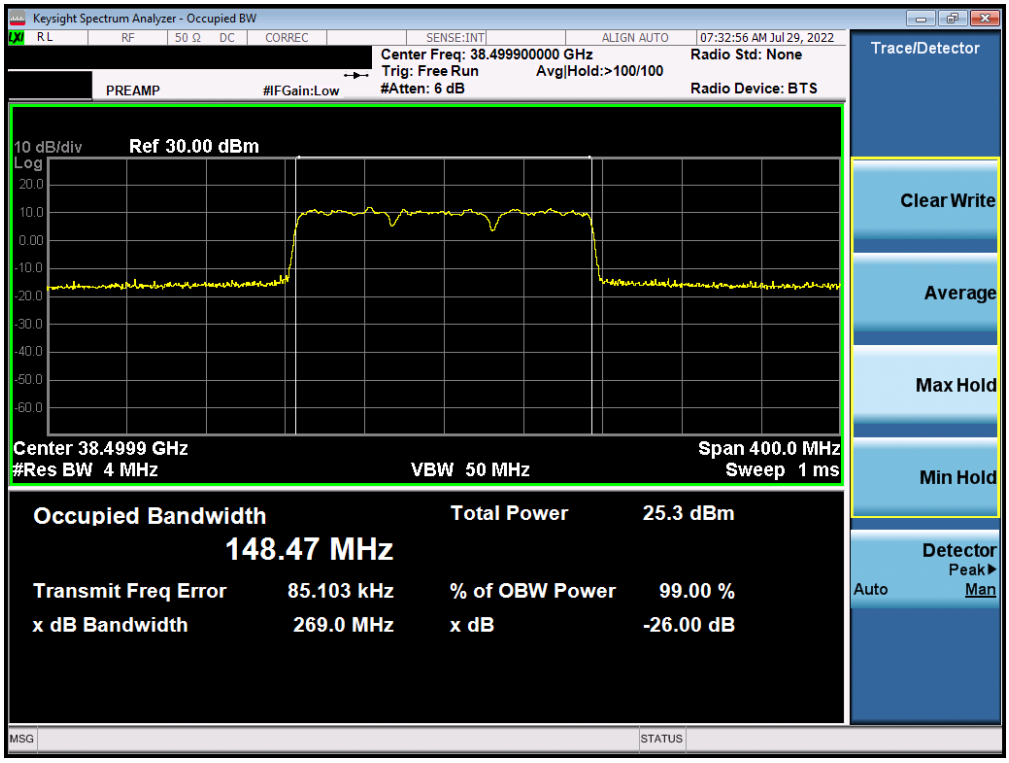
Plot 7-41. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



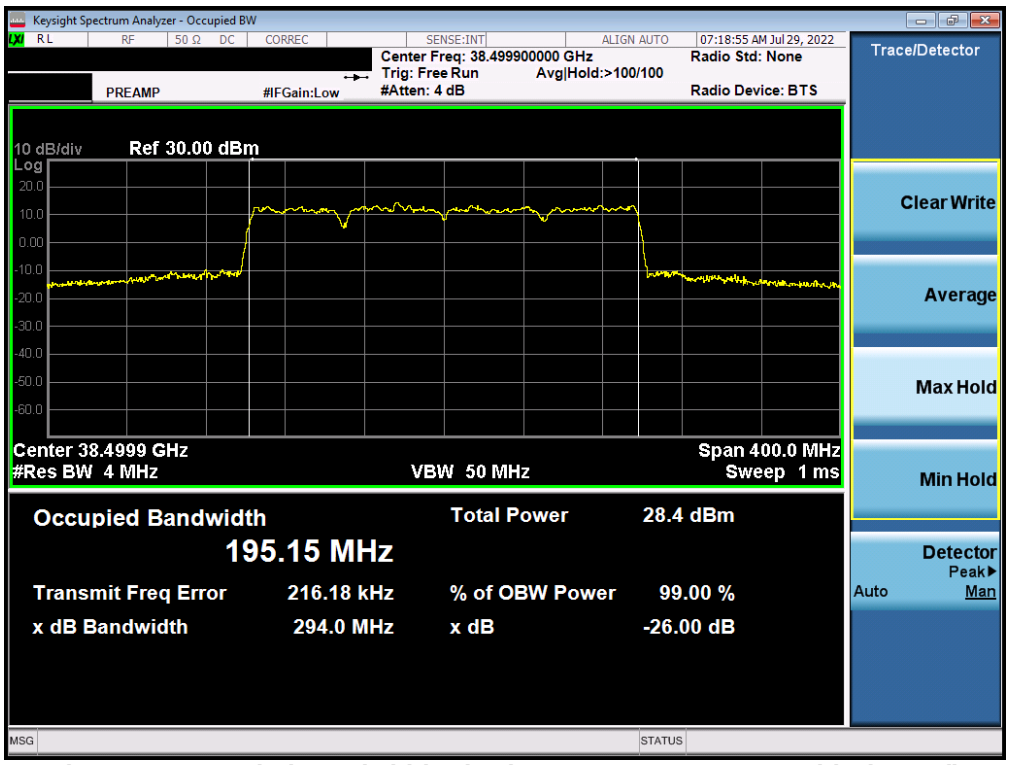
Plot 7-42. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



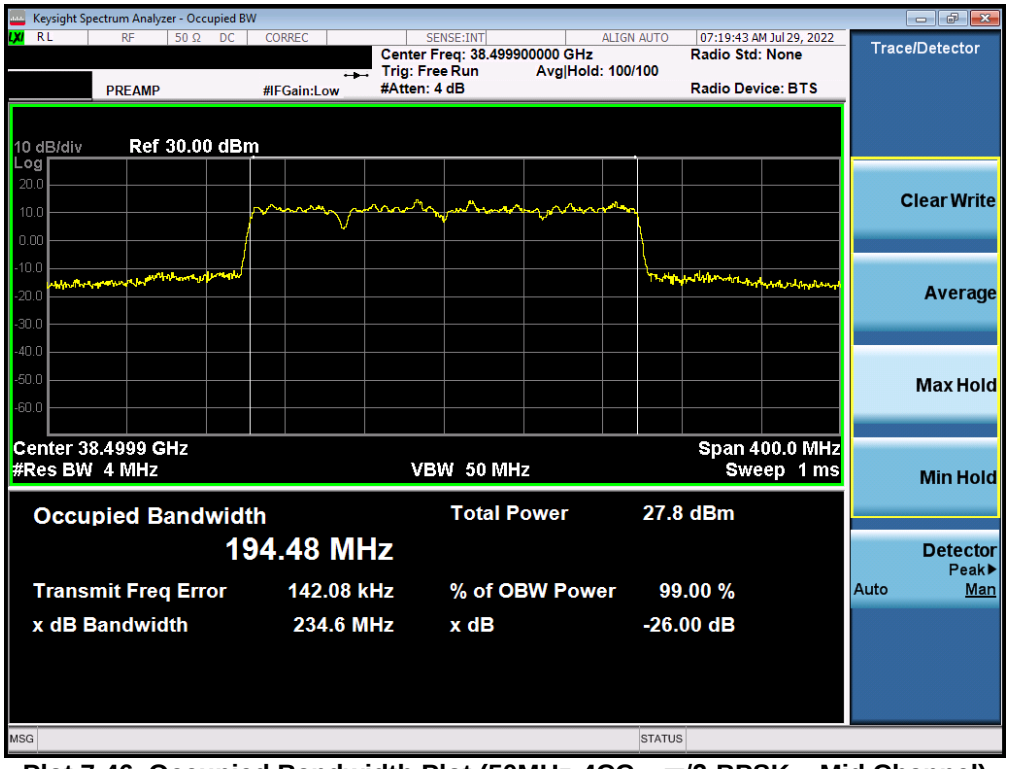
Plot 7-43. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



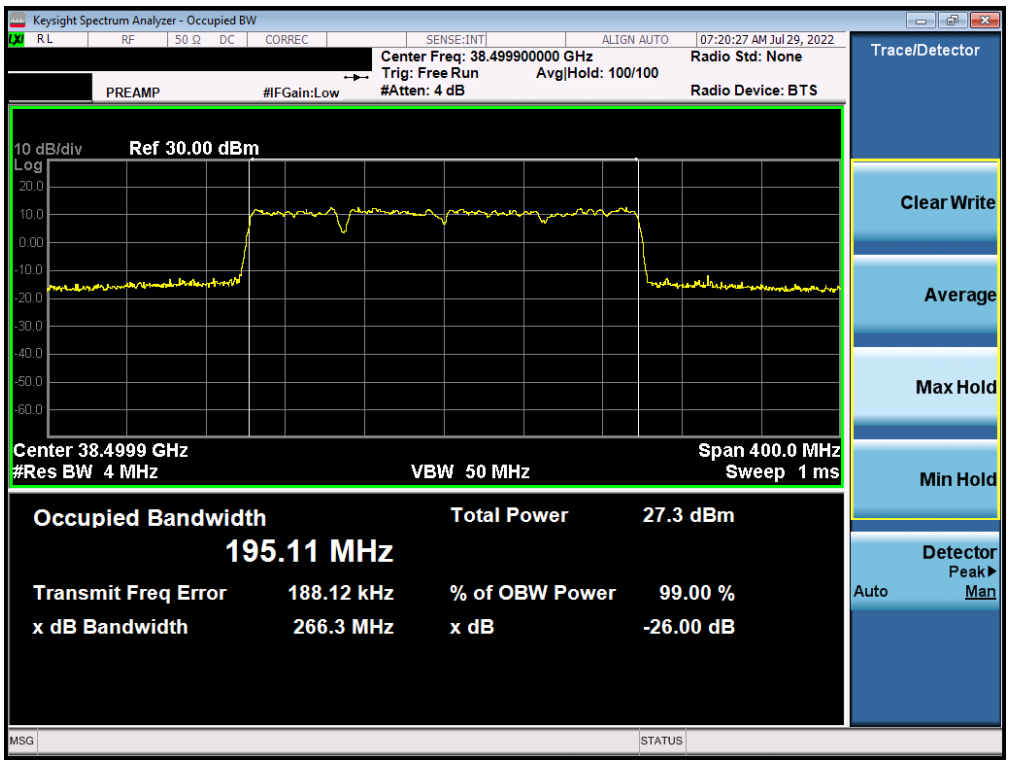
Plot 7-44. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



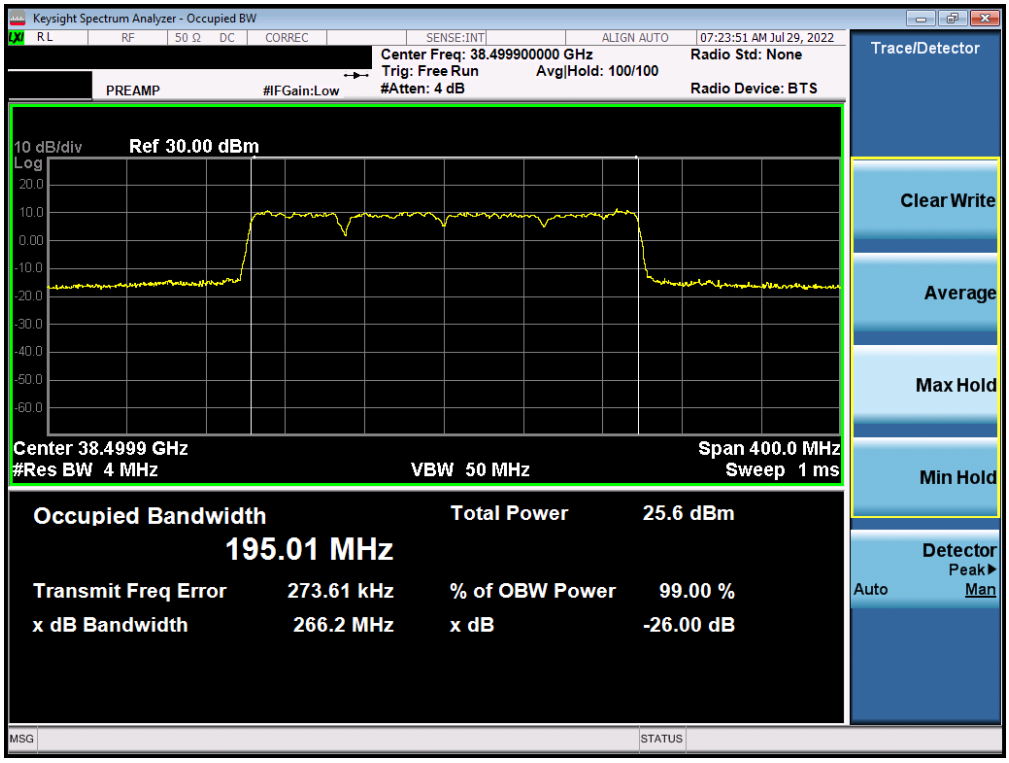
Plot 7-45. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



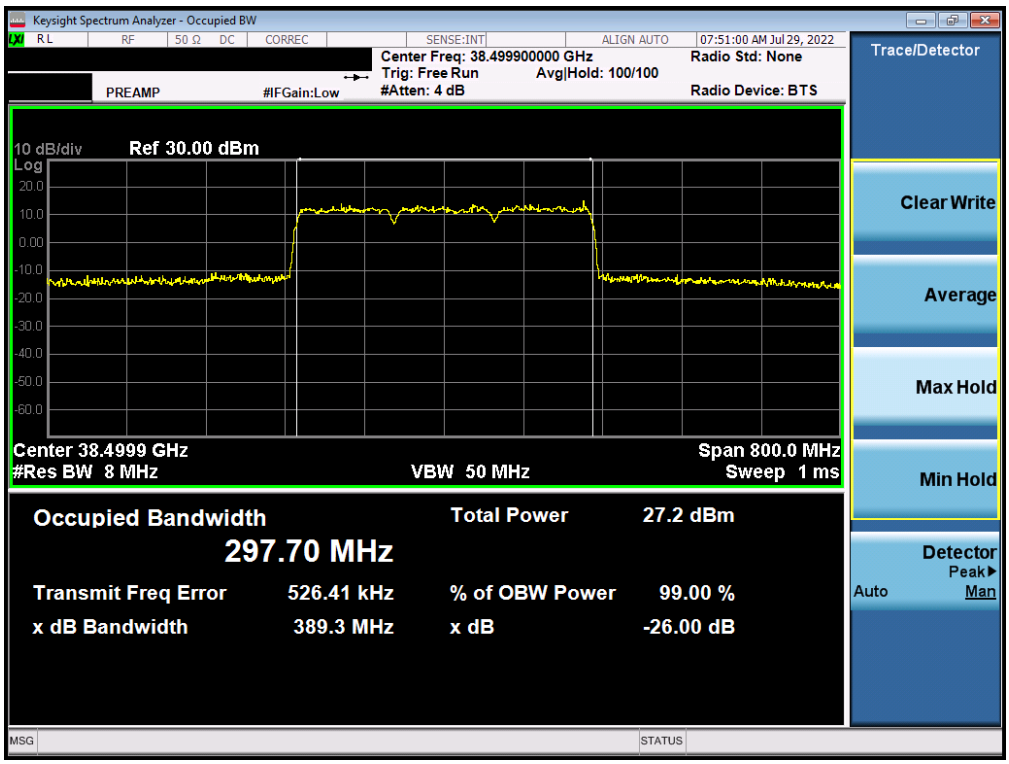
Plot 7-46. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



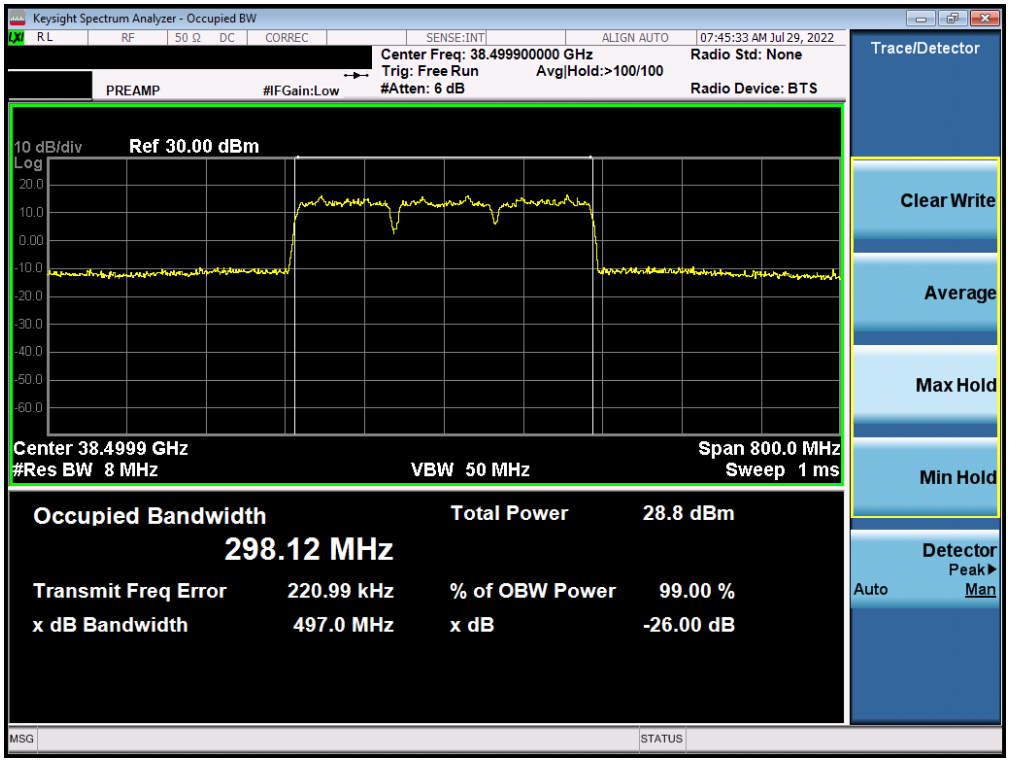
Plot 7-47. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



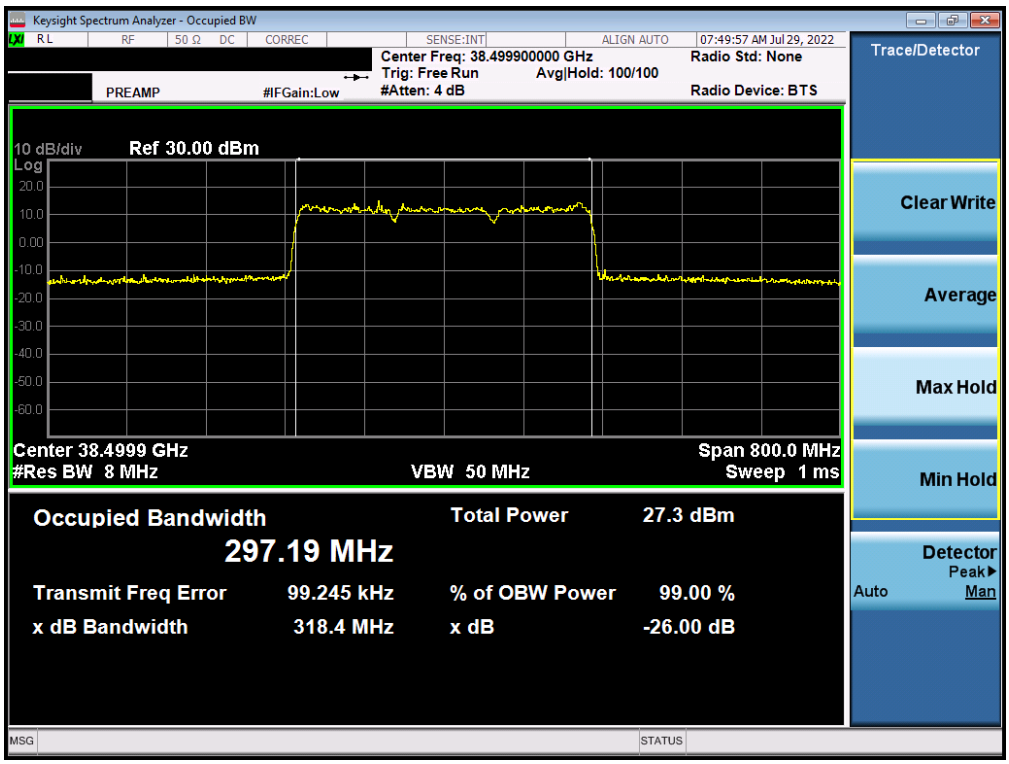
Plot 7-48. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



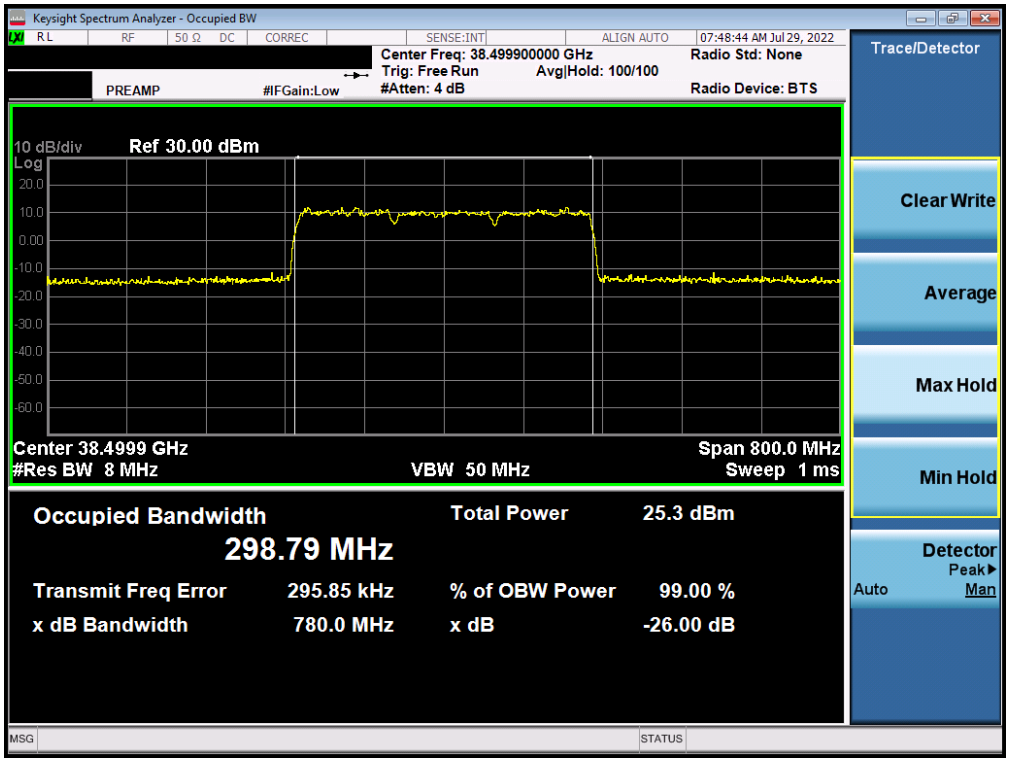
Plot 7-49. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



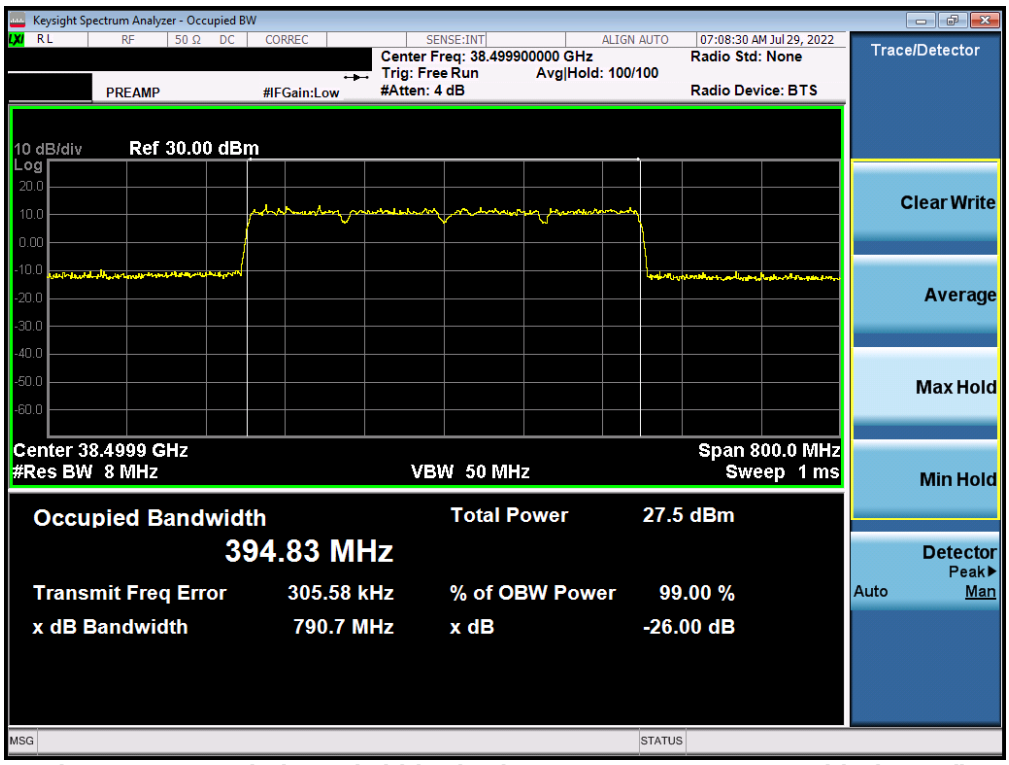
Plot 7-50. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



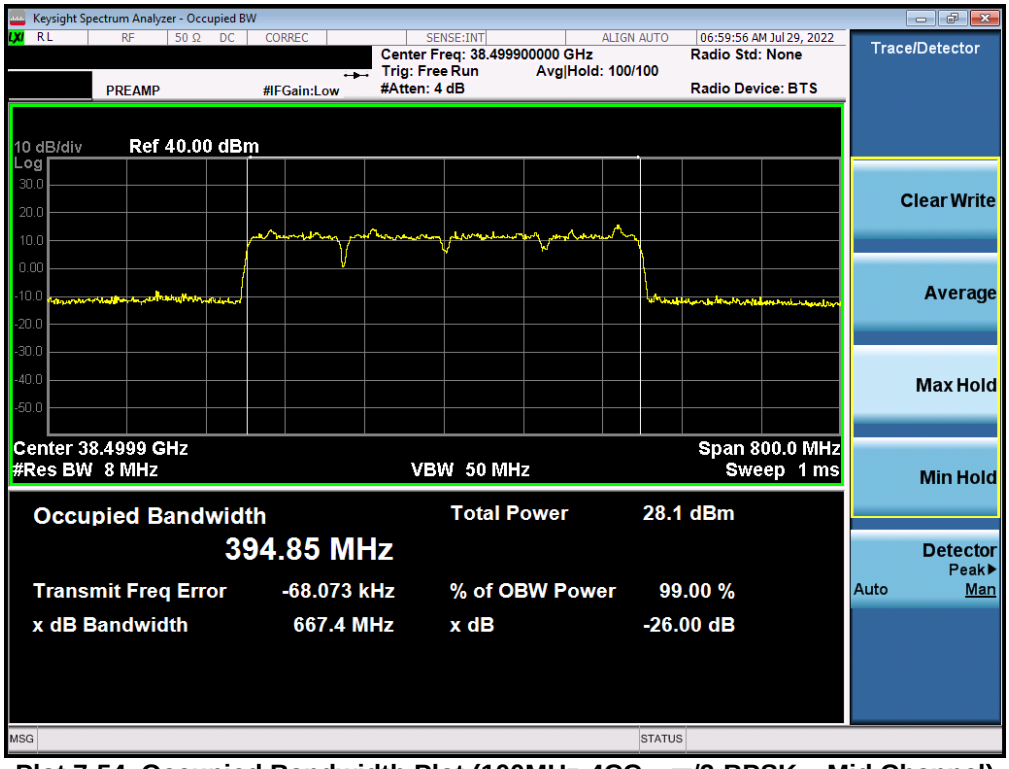
Plot 7-51. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



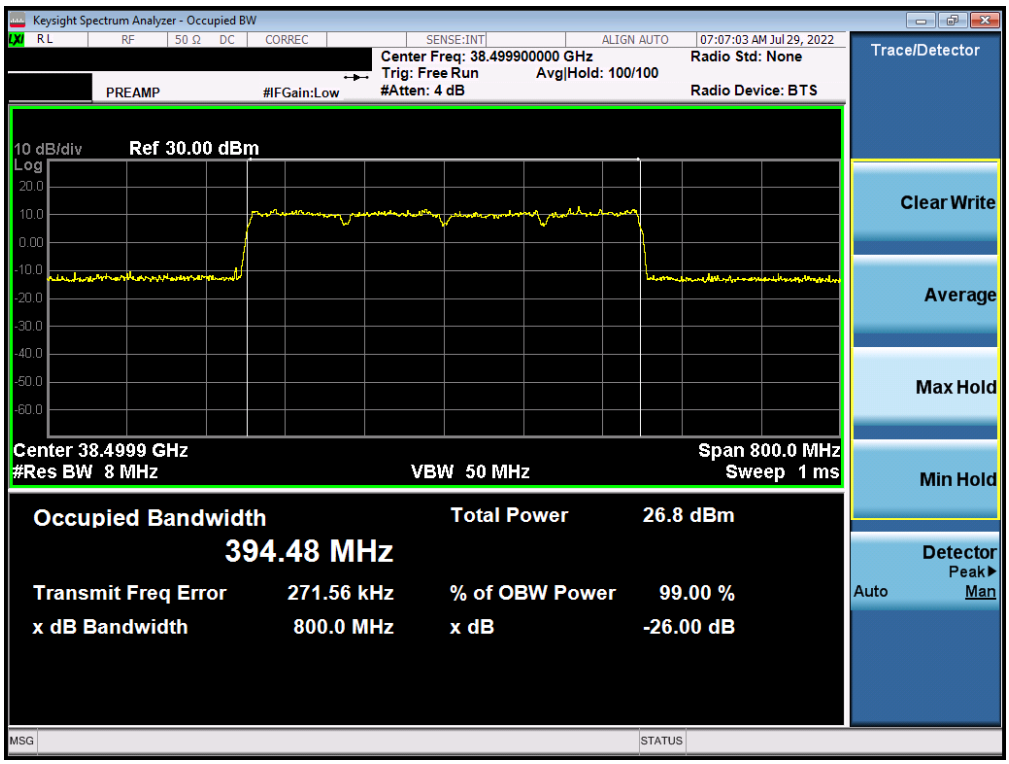
Plot 7-52. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



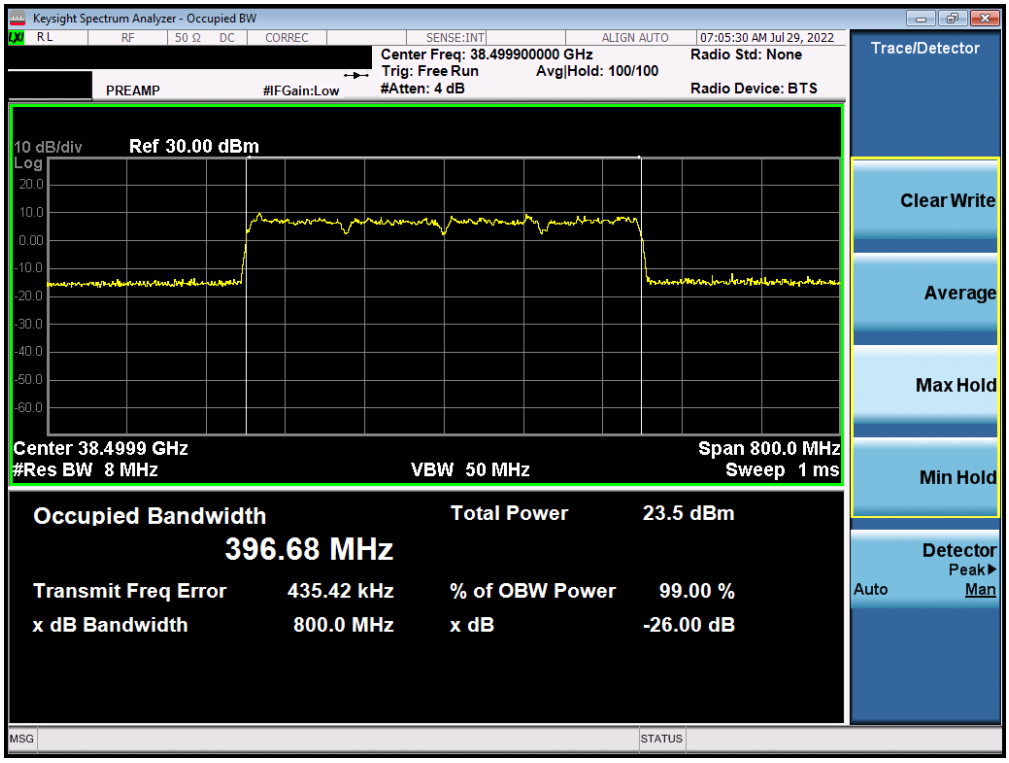
Plot 7-53. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



Plot 7-54. Occupied Bandwidth Plot (100MHz-4CC – π/2-BPSK – Mid Channel)



Plot 7-55. Occupied Bandwidth Plot (100MHz-4CC – 16QAM – Mid Channel)



Plot 7-56. Occupied Bandwidth Plot (100MHz-4CC – 64QAM – Mid Channel)

7.3 Equivalent Isotropic Radiated Power

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 – 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
3. VBW ≥ 3 x RBW
4. Span = 2x to 3x the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Sweep time = Auto
7. Detector = RMS
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize

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.

9) For each band and antenna array configuration tested, worst case EIRP plots are displayed for all total bandwidths tested (50MHz, 100MHz, 200MHz).

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 40.40dB/m, a cable loss of 7.68dB, and a measurement distance of 1 meter, an offset level of:

Offset Level = 40.40dB/m + 7.68dB + 20 Log(1 meter) + 107 - 104.8 = **50.28 dB**

shall be loaded into the spectrum analyzer.

Band n258-R1 Beam ID Configurations

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	156	28
	Mid	2Tx/MIMO	156	28
	High	2Tx/MIMO	156	28

Table 7-6. M Patch Worst Case Beam ID

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	168	40
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	168	40

Table 7-7. N Patch Worst Case Beam ID

Band n258-R1

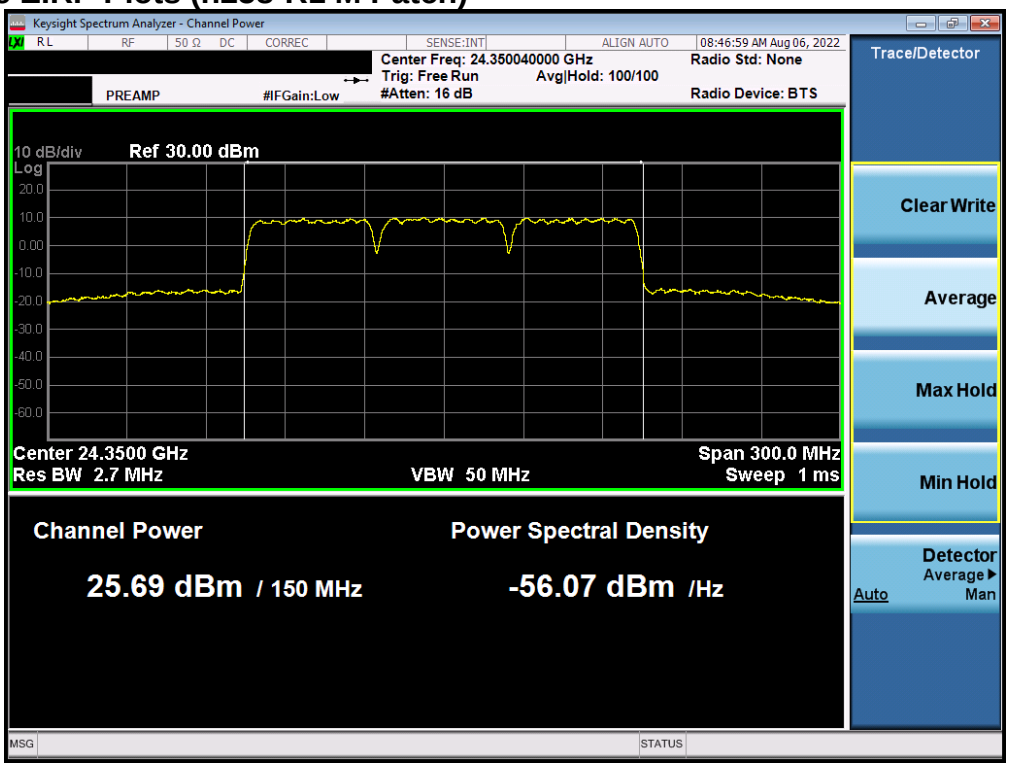
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	24324.96	DFT-s-OFDM	QPSK	156+28	H + V	2Tx	H	252.0	308.1	32 / 0	25.52
		Mid	24350.04	DFT-s-OFDM	QPSK	156+28	H + V	2Tx	H	255.0	299.5	32 / 0	**25.69**
		Mid	24350.04	CP-OFDM	QPSK	156+28	H + V	MIMO	H	255.0	299.5	1 / 21	23.64
		Mid	24350.04	DFT-s-OFDM	π/2 BPSK	156+28	H + V	2Tx	H	255.0	299.5	32 / 0	25.66
		Mid	24350.04	DFT-s-OFDM	16QAM	156+28	H + V	2Tx	H	255.0	299.5	1 / 21	23.73
		Mid	24350.04	DFT-s-OFDM	64QAM	156+28	H + V	2Tx	H	255.0	299.5	1 / 21	22.33
		High	24375.00	DFT-s-OFDM	QPSK	156+28	H + V	2Tx	H	255.0	308.0	32 / 0	25.54

Table 7-8. M Patch EIRP Data (Band n258-R1 − 50MHz-3CC)

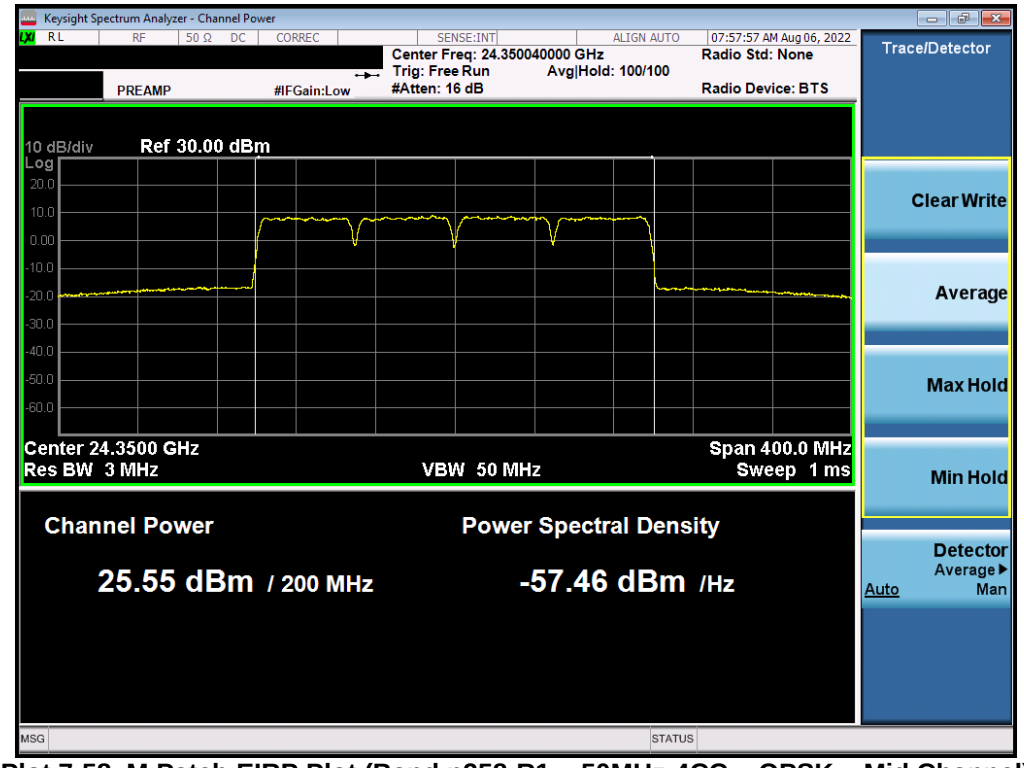
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Mid	24350.04	DFT-s-OFDM	QPSK	156+28	H + V	2Tx	H	253.0	307.7	32 / 0	**25.55**
		Mid	24350.04	CP-OFDM	QPSK	156+28	H + V	MIMO	H	253.0	307.7	1 / 21	24.18
		Mid	24350.04	DFT-s-OFDM	π/2 BPSK	156+28	H + V	2Tx	H	253.0	307.7	32 / 0	25.52
		Mid	24350.04	DFT-s-OFDM	16QAM	156+28	H + V	2Tx	H	253.0	307.7	1 / 21	24.24
		Mid	24350.04	DFT-s-OFDM	64QAM	156+28	H + V	2Tx	H	253.0	307.7	1 / 21	22.60

Table 7-9. M Patch EIRP Data (Band n258-R1 − 50MHz-4CC)

Worst-Case EIRP Plots (n258-R1 M Patch)



Plot 7-57. M Patch EIRP Plot (Band n258-R1 − 50MHz-3CC − QPSK – Mid Channel)



Plot 7-58. M Patch EIRP Plot (Band n258-R1 − 50MHz-4CC − QPSK – Mid Channel)

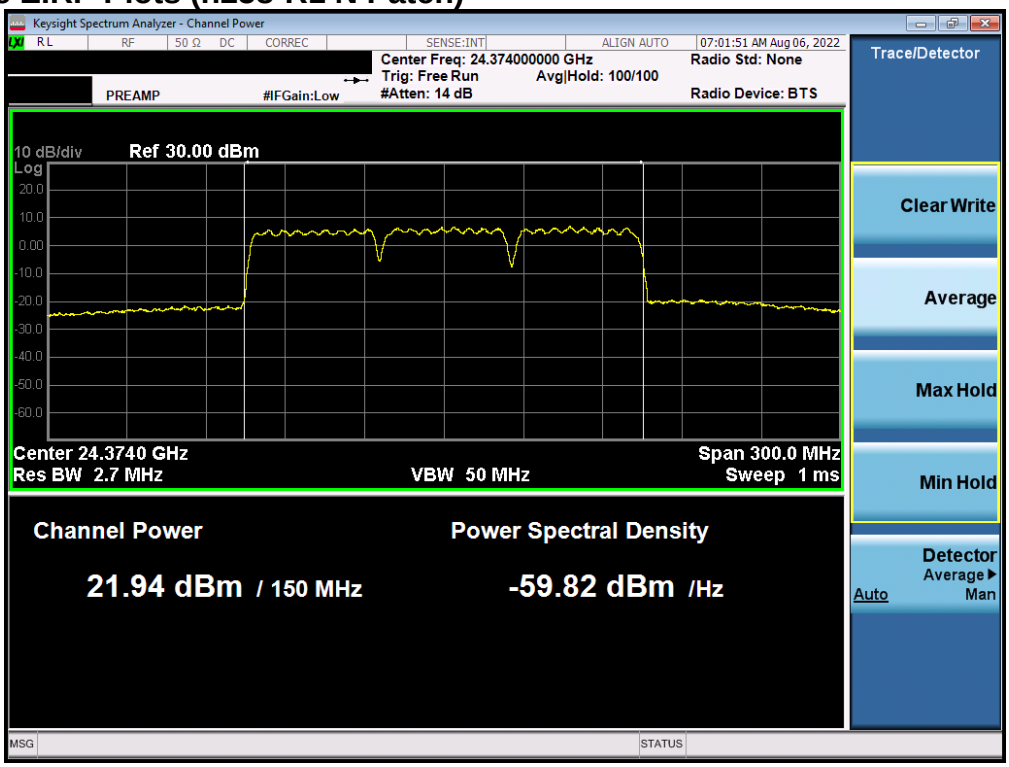
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	24324.96	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	73.0	63.7	32 / 0	21.91
		Mid	24350.04	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	73.0	66.1	32 / 0	21.55
		High	24374.00	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	73.0	62.8	32 / 0	**21.94**
		High	24374.00	CP-OFDM	QPSK	168+40	H + V	MIMO	H	73.0	62.8	32 / 0	19.88
		High	24374.00	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	73.0	62.8	32 / 0	21.87
		High	24374.00	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	H	73.0	62.8	32 / 0	19.86
		High	24374.00	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	H	73.0	62.8	1 / 21	18.58

Table 7-10. N Patch EIRP Data (Band n258-R1 − 50MHz-3CC)

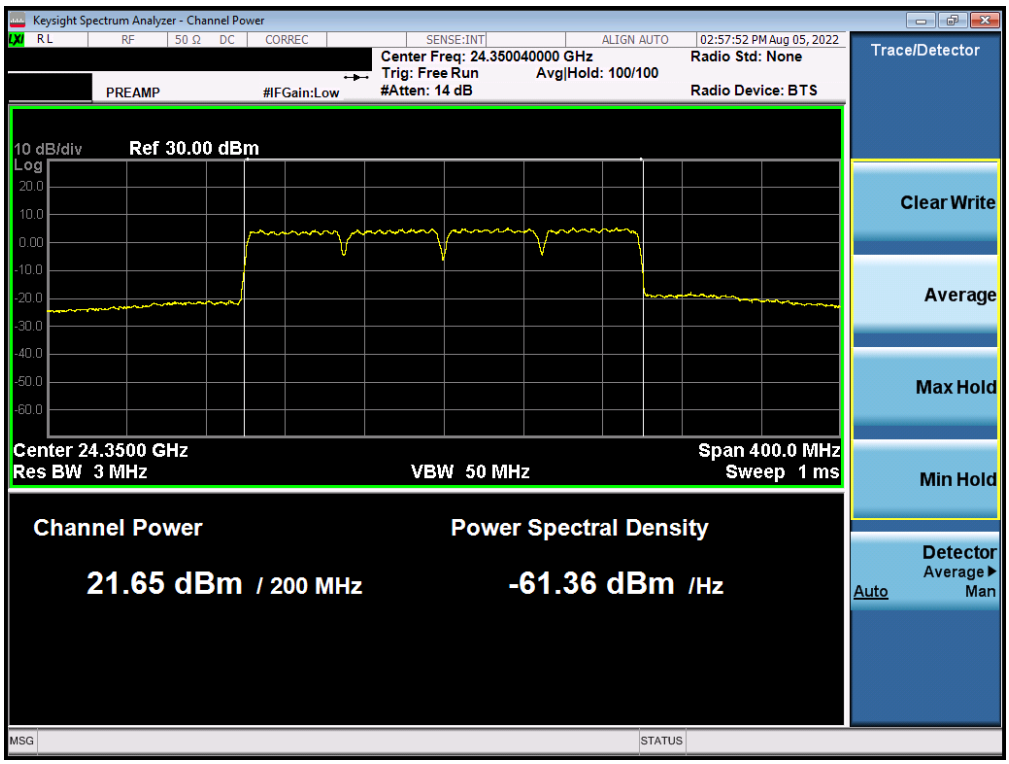
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Mid	24350.04	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	74.0	67.7	32 / 0	**21.65**
		Mid	24350.04	CP-OFDM	QPSK	168+40	H + V	MIMO	H	74.0	67.7	32 / 0	19.61
		Mid	24350.04	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	74.0	67.7	32 / 0	21.63
		Mid	24350.04	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	H	74.0	67.7	32 / 0	19.66
		Mid	24350.04	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	H	74.0	67.7	1 / 16	17.94

Table 7-11. N Patch EIRP Data (Band n258-R1 − 50MHz-4CC)

Worst-Case EIRP Plots (n258-R1 N Patch)



Plot 7-59. N Patch EIRP Plot (Band n258-R1 − 50MHz-3CC − QPSK – High Channel)



Plot 7-60. N Patch EIRP Plot (Band n258-R1 − 50MHz-4CC − QPSK – Mid Channel)

Band n258-R2 Beam ID Configurations

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	163	35
	Mid	2Tx/MIMO	163	35
	High	2Tx/MIMO	163	35

Table 7-12. M Patch Worst Case Beam ID

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	168	40
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	168	40

Table 7-13. N Patch Worst Case Beam ID

Band n258-R2

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	24825.00	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	269.0	114.2	32 / 0	21.95
		Mid	24999.96	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	269.0	110.3	32 / 0	22.28
		High	25175.04	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	113.5	32 / 0	**22.55**
		High	25175.04	CP-OFDM	QPSK	163+35	H + V	MIMO	V	268.0	113.5	32 / 0	20.48
		High	25175.04	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	268.0	113.5	32 / 0	22.54
		High	25175.04	DFT-s-OFDM	16QAM	163+35	H + V	2Tx	V	268.0	113.5	32 / 0	20.43
		High	25175.04	DFT-s-OFDM	64QAM	163+35	H + V	2Tx	V	268.0	113.5	1 / 11	19.01

Table 7-14. M Patch EIRP Data (Band n258-R2 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	24849.96	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	268.0	114.5	32 / 0	22.06
		Mid	24999.96	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	113.2	32 / 0	22.29
		High	25150.08	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	113.8	32 / 0	22.65
		High	25150.08	CP-OFDM	QPSK	163+35	H + V	MIMO	V	268.0	113.8	1 / 16	21.07
		High	25150.08	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	268.0	113.8	32 / 0	**22.69**
		High	25150.08	DFT-s-OFDM	16QAM	163+35	H + V	2Tx	V	268.0	113.8	1 / 16	20.95
		High	25150.08	DFT-s-OFDM	64QAM	163+35	H + V	2Tx	V	268.0	113.8	1 / 16	19.79

Table 7-15. M Patch EIRP Data (Band n258-R2 − 50MHz-4CC)

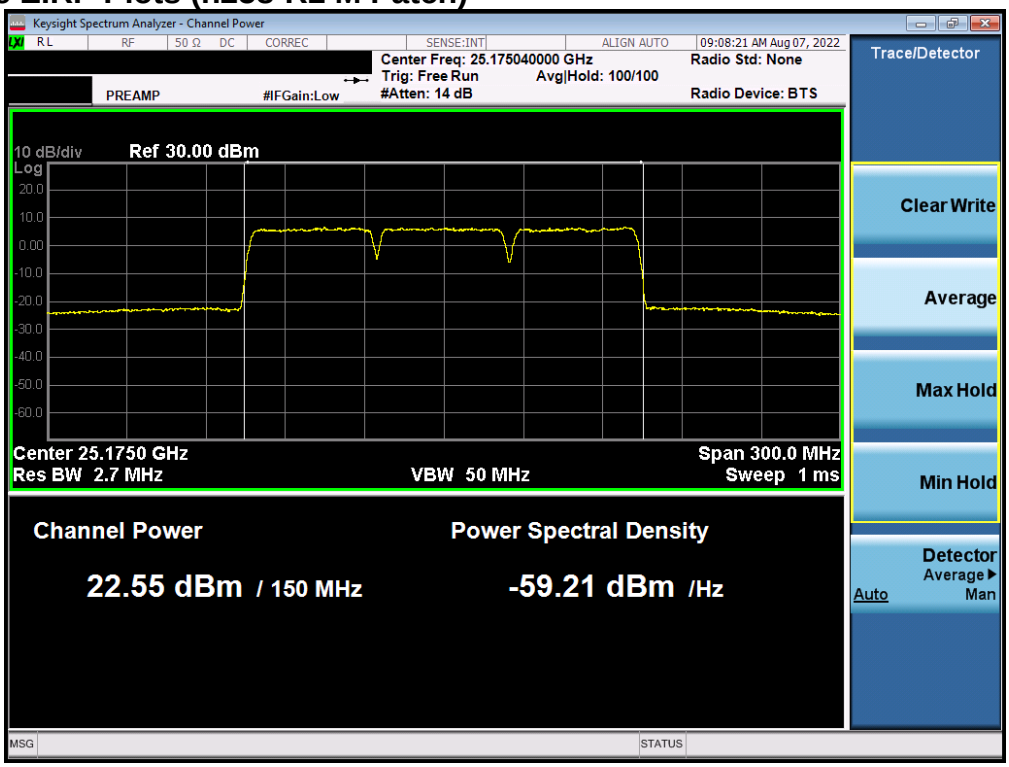
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	24900.00	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	270.0	115.9	64 / 0	21.83
		Mid	24999.96	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	269.0	113.8	64 / 0	22.08
		High	25100.04	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	114.0	64 / 0	**22.26**
		High	25100.04	CP-OFDM	QPSK	163+35	H + V	MIMO	V	268.0	114.0	1 / 33	20.20
		High	25100.04	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	268.0	114.0	64 / 0	22.22
		High	25100.04	DFT-s-OFDM	16QAM	163+35	H + V	2Tx	V	268.0	114.0	1 / 33	20.26
		High	25100.04	DFT-s-OFDM	64QAM	163+35	H + V	2Tx	V	268.0	114.0	1 / 33	19.53

Table 7-16. M Patch EIRP Data (Band n258-R2 − 100MHz-3CC)

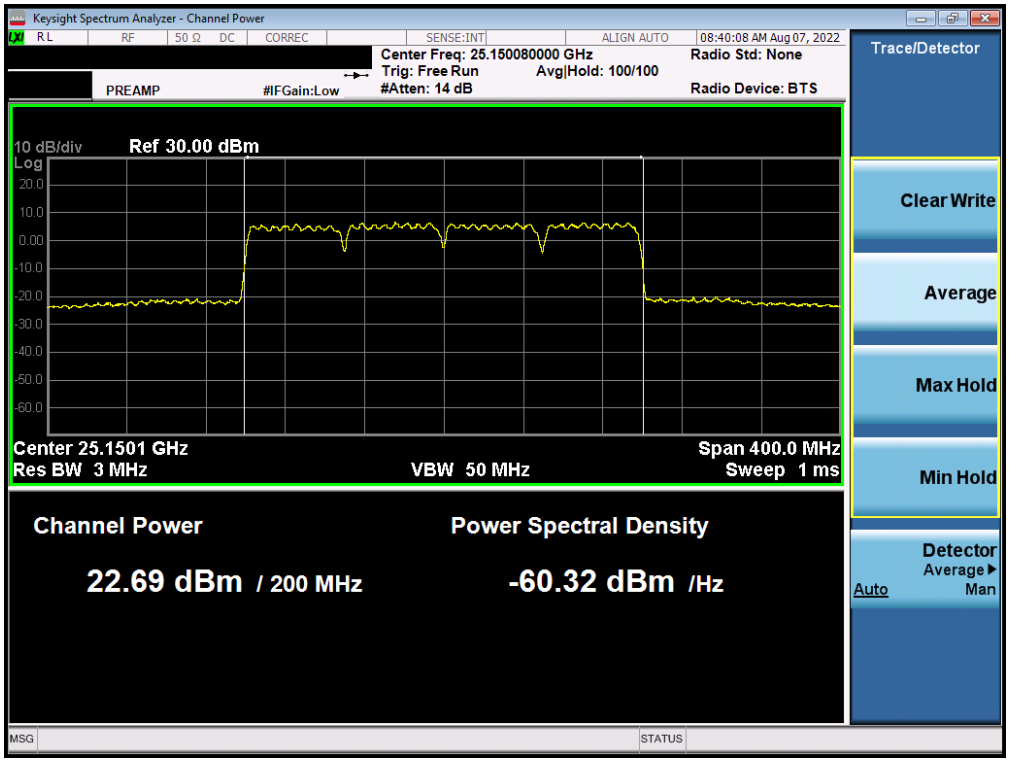
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	24949.98	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	114.8	64 / 0	21.77
		Mid	25000.02	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	113.5	64 / 0	21.83
		High	25050.06	DFT-s-OFDM	QPSK	163+35	H + V	2Tx	V	268.0	113.5	64 / 0	**22.14**
		High	25050.06	CP-OFDM	QPSK	163+35	H + V	MIMO	V	268.0	113.5	1 / 33	20.56
		High	25050.06	DFT-s-OFDM	π/2 BPSK	163+35	H + V	2Tx	V	268.0	113.5	64 / 0	22.08
		High	25050.06	DFT-s-OFDM	16QAM	163+35	H + V	2Tx	V	268.0	113.5	1 / 33	20.64
		High	25050.06	DFT-s-OFDM	64QAM	163+35	H + V	2Tx	V	268.0	113.5	1 / 33	19.26

Table 7-17. M Patch EIRP Data (Band n258-R2 − 100MHz-4CC)

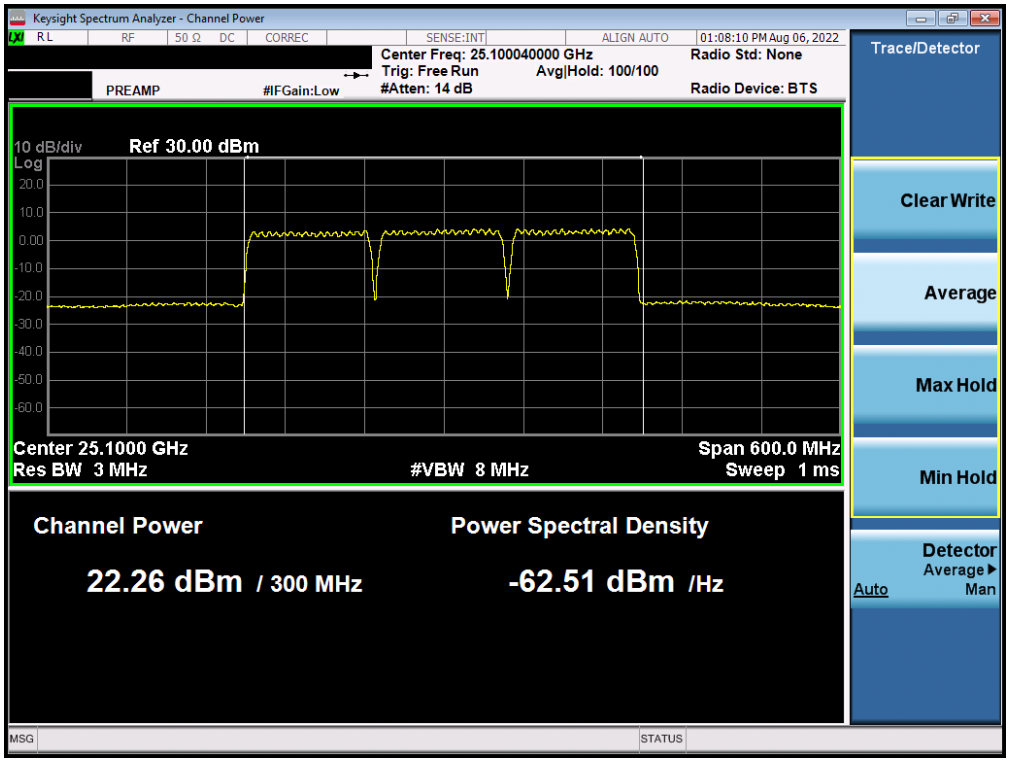
Worst-Case EIRP Plots (n258-R2 M Patch)



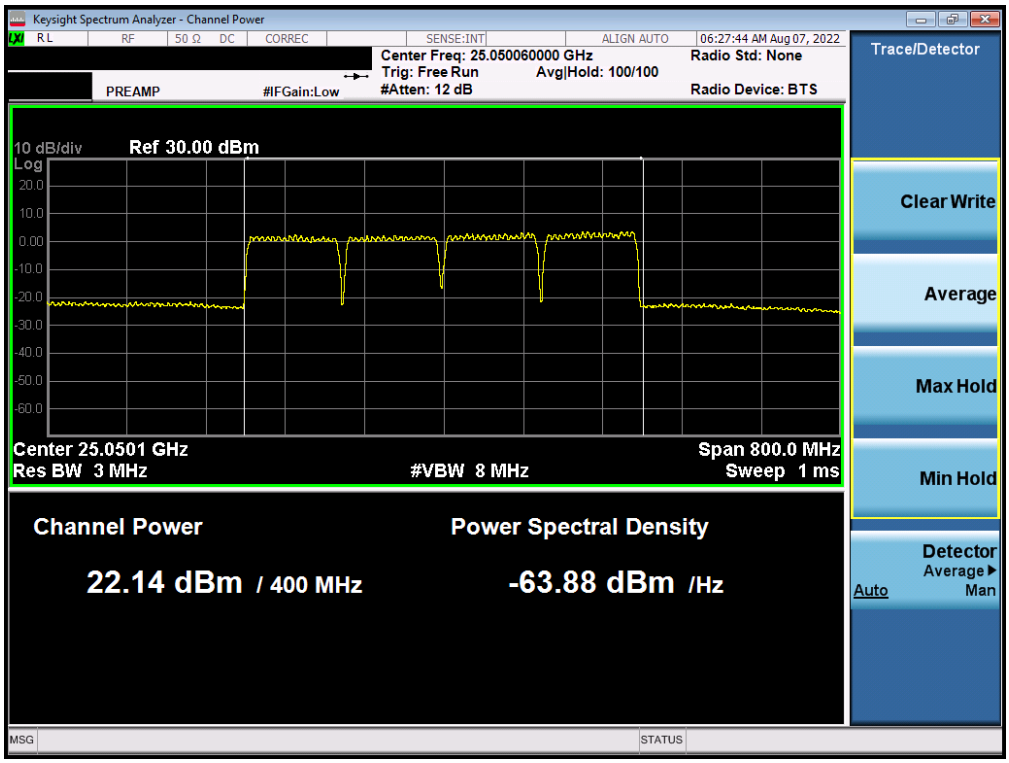
Plot 7-61. M Patch EIRP Plot (Band n258-R2 − 50MHz-3CC − QPSK – High Channel)



Plot 7-62. M Patch EIRP Plot (Band n258-R2 − 50MHz-4CC − π/2 BPSK – High Channel)



Plot 7-63. M Patch EIRP Plot (Band n258-R2 − 100MHz-3CC − QPSK – High Channel)



Plot 7-64. M Patch EIRP Plot (Band n258-R2 − 100MHz-4CC − QPSK – High Channel)

Worst-Case EIRP Plots (n258-R2 N Patch)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	24825.12	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	31.0	250.0	32 / 0	22.08
		Low	24825.12	CP-OFDM	QPSK	168+40	H + V	MIMO	V	31.0	250.0	32 / 0	20.09
		Low	24825.12	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	V	31.0	250.0	32 / 0	**22.10**
		Low	24825.12	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	V	31.0	250.0	32 / 0	20.07
		Low	24825.12	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	V	31.0	250.0	1 / 21	19.15
		Mid	24999.96	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	29.0	250.6	32 / 0	21.94
		High	25175.04	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	33.0	250.5	32 / 0	22.00

Table 7-18. N Patch EIRP Data (Band n258-R2 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	24849.96	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	32.0	250.2	32 / 0	22.30
		Low	24849.96	CP-OFDM	QPSK	168+40	H + V	MIMO	V	32.0	250.2	1 / 21	20.43
		Low	24849.96	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	V	32.0	250.2	32 / 0	**22.32**
		Low	24849.96	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	V	32.0	250.2	1 / 21	20.37
		Low	24849.96	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	V	32.0	250.2	1 / 21	19.14
		Mid	24999.96	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	29.0	249.8	32 / 0	22.19
		High	25150.08	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	33.0	250.7	32 / 0	22.19

Table 7-19. N Patch EIRP Data (Band n258-R2 − 50MHz-4CC)

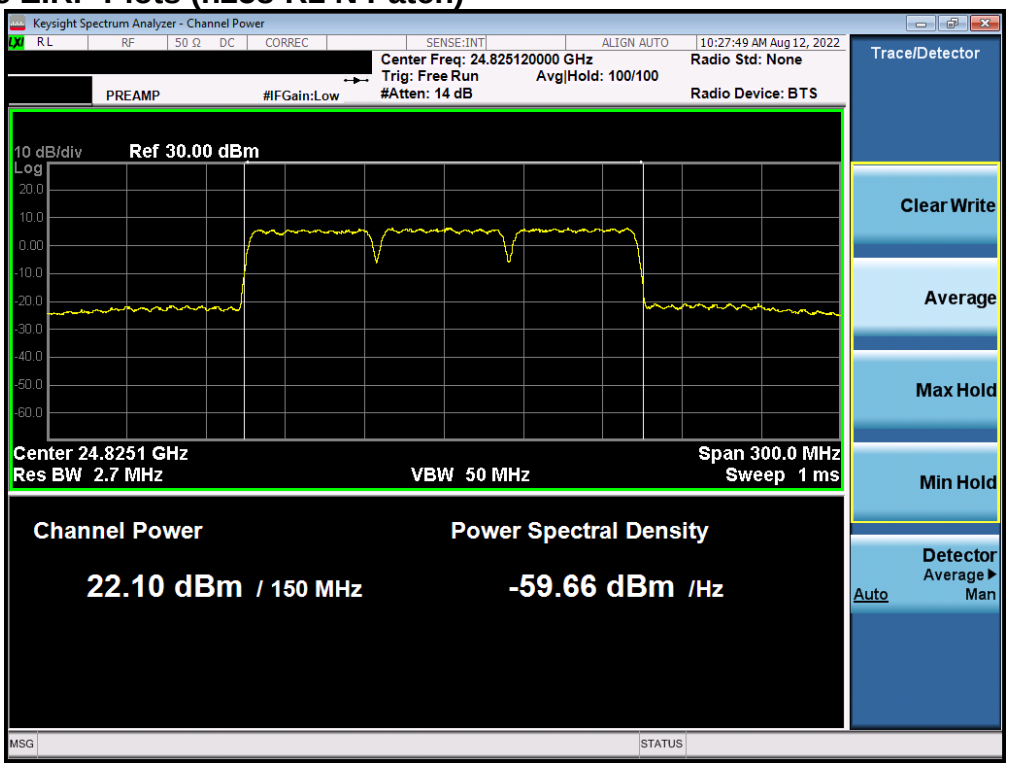
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	24900.00	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	32.0	251.4	64 / 0	22.01
		Mid	24999.96	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	31.0	250.5	64 / 0	**22.21**
		Mid	24999.96	CP-OFDM	QPSK	168+40	H + V	MIMO	V	31.0	250.5	64 / 0	20.10
		Mid	24999.96	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	V	31.0	250.5	64 / 0	22.19
		Mid	24999.96	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	V	31.0	250.5	64 / 0	20.14
		Mid	24999.96	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	V	31.0	250.5	1 / 33	18.33
		High	25100.04	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	32.0	250.8	64 / 0	22.07

Table 7-20. N Patch EIRP Data (Band n258-R2 − 100MHz-3CC)

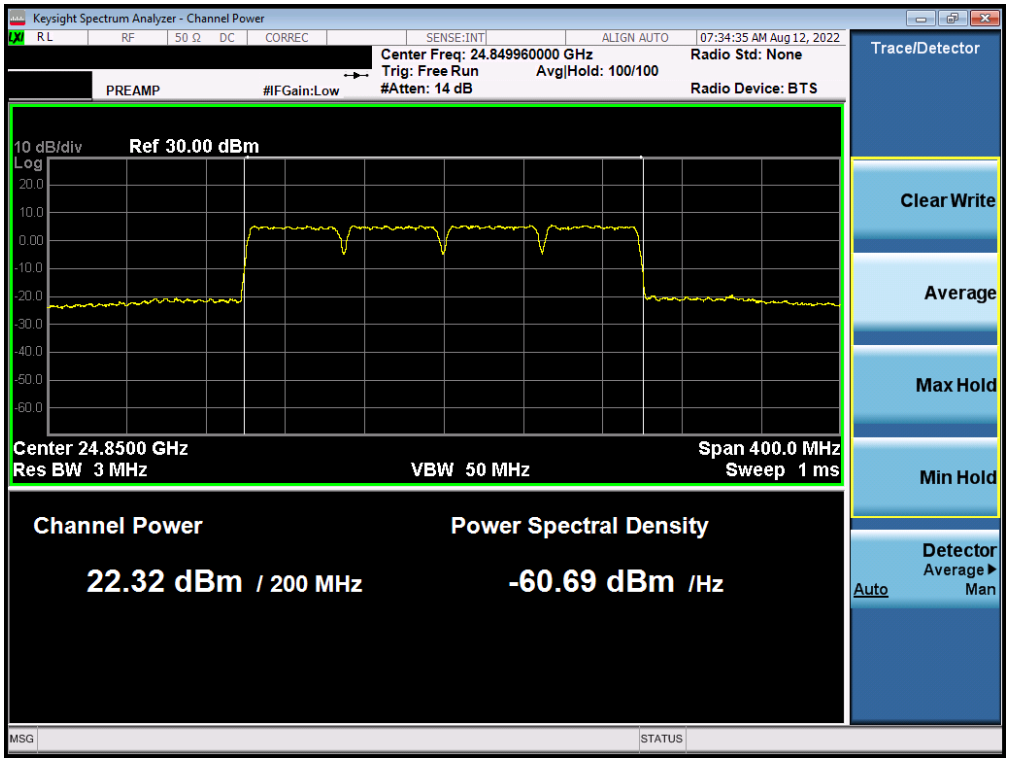
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	24949.98	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	V	32.0	251.5	64 / 0	21.60
		Mid	25000.02	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	34.0	250.9	64 / 0	**21.71**
		Mid	25000.02	CP-OFDM	QPSK	168+40	H + V	MIMO	V	34.0	250.9	64 / 0	19.65
		Mid	25000.02	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	V	34.0	250.9	64 / 0	21.69
		Mid	25000.02	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	V	34.0	250.9	64 / 0	19.67
		Mid	25000.02	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	V	34.0	250.9	1 / 21	17.89
		High	25050.06	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	V	30.0	250.6	64 / 0	21.65

Table 7-21. N Patch EIRP Data (Band n258-R2 − 100MHz-4CC)

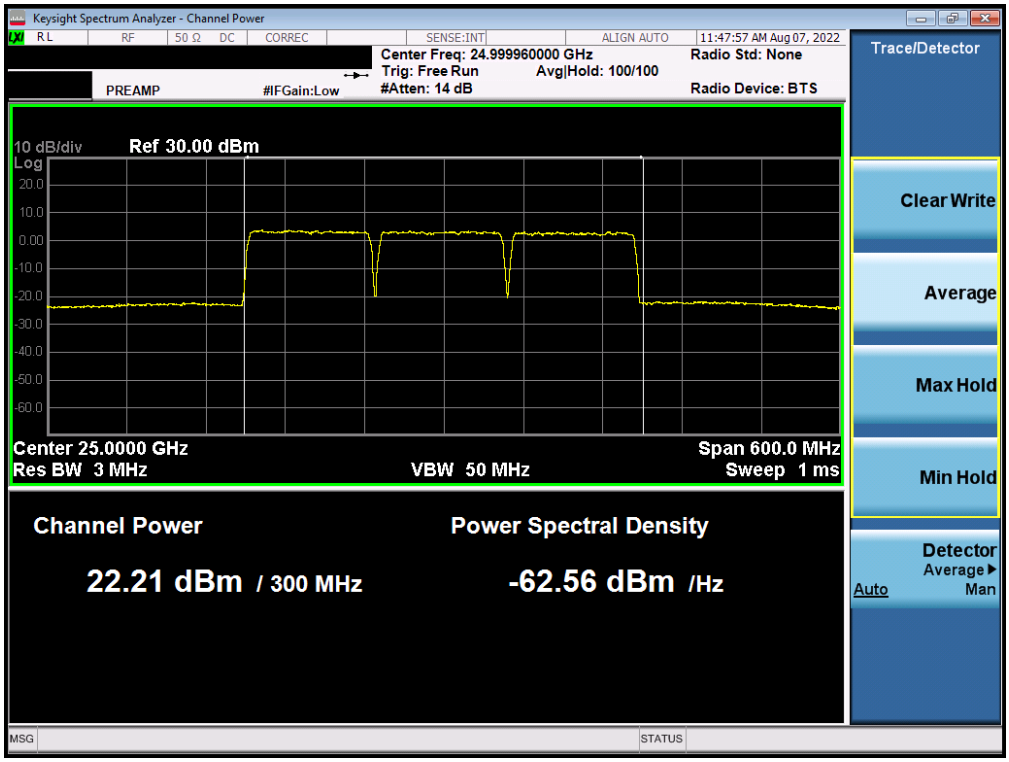
Worst-Case EIRP Plots (n258-R2 N Patch)



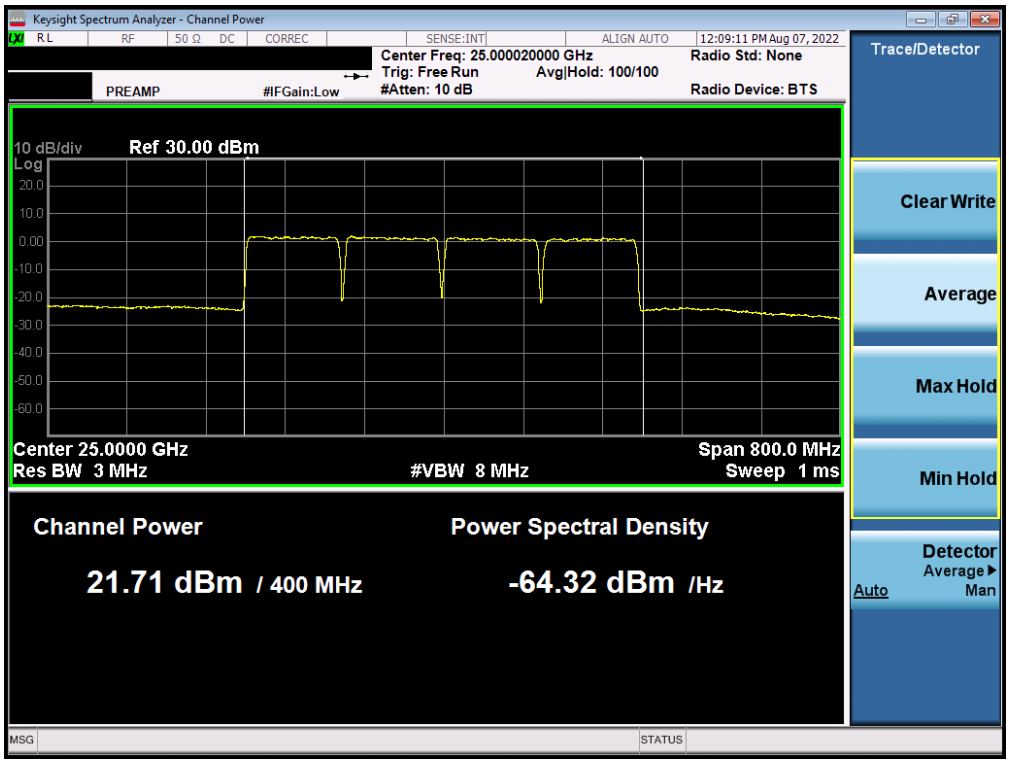
Plot 7-65. N Patch EIRP Plot (Band n258-R2 − 50MHz-3CC − π/2 BPSK – Low Channel)



Plot 7-66. N Patch EIRP Plot (Band n258-R2 − 50MHz-4CC − π/2 BPSK – Low Channel)



Plot 7-67. N Patch EIRP Plot (Band n258-R2 − 100MHz-3CC − QPSK – Mid Channel)



Plot 7-68. N Patch EIRP Plot (Band n258-R2 − 100MHz-4CC − QPSK – Mid Channel)

Band n261 Beam ID Configurations

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	164	36
	Mid	2Tx/MIMO	155	27
	High	2Tx/MIMO	155	27

Table 7-22. M Patch Worst Case Beam ID

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	158	30
	Mid	2Tx/MIMO	158	30
	High	2Tx/MIMO	158	30

Table 7-23. N Patch Worst Case Beam ID

Band n261

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	27574.92	DFT-s-OFDM	QPSK	164+36	H + V	2Tx	V	71.0	27.6	32 / 0	24.83
		Low	27574.92	CP-OFDM	QPSK	164+36	H + V	MIMO	V	71.0	27.6	1 / 0	22.82
		Low	27574.92	DFT-s-OFDM	π/2 BPSK	164+36	H + V	2Tx	V	71.0	27.6	32 / 0	**24.85**
		Low	27574.92	DFT-s-OFDM	16QAM	164+36	H + V	2Tx	V	71.0	27.6	1 / 0	23.03
		Low	27574.92	DFT-s-OFDM	64QAM	164+36	H + V	2Tx	V	71.0	27.6	1 / 0	21.77
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	155+27	H + V	2Tx	H	265.0	297.5	32 / 0	24.41
		High	28200.00	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	266.0	300.8	32 / 0	24.55

Table 7-24. M Patch EIRP Data (Band n261 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	27600.06	DFT-s-OFDM	QPSK	164+36	H + V	2Tx	V	73.0	27.3	32 / 0	24.53
		Low	27600.06	CP-OFDM	QPSK	164+36	H + V	MIMO	V	73.0	27.3	1 / 21	22.57
		Low	27600.06	DFT-s-OFDM	π/2 BPSK	164+36	H + V	2Tx	V	73.0	27.3	32 / 0	**24.53**
		Low	27600.06	DFT-s-OFDM	16QAM	164+36	H + V	2Tx	V	73.0	27.3	1 / 21	22.47
		Low	27600.06	DFT-s-OFDM	64QAM	164+36	H + V	2Tx	V	73.0	27.3	1 / 21	21.41
		Mid	27924.96	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	289.0	290.4	32 / 0	24.41
		High	28250.04	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	290.0	291.8	32 / 0	23.78

Table 7-25. M Patch EIRP Data (Band n261 − 50MHz-4CC)

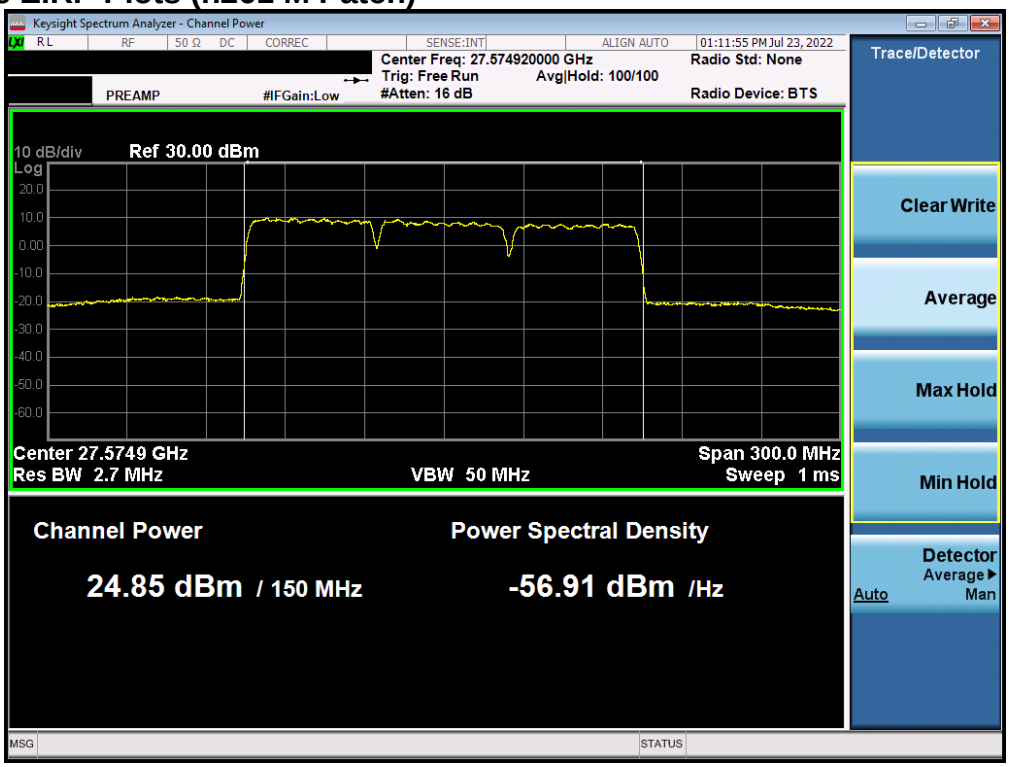
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	27650.04	DFT-s-OFDM	QPSK	164+36	H + V	2Tx	V	70.0	49.8	64 / 0	**24.85**
		Low	27550.08	CP-OFDM	QPSK	164+36	H + V	MIMO	V	70.0	49.8	66 / 0	22.81
		Low	27550.08	DFT-s-OFDM	π/2 BPSK	164+36	H + V	2Tx	V	70.0	49.8	64 / 0	24.80
		Low	27550.08	DFT-s-OFDM	16QAM	164+36	H + V	2Tx	V	70.0	49.8	64 / 0	22.74
		Low	27550.08	DFT-s-OFDM	64QAM	164+36	H + V	2Tx	V	70.0	49.8	1 / 43	20.97
		Mid	27924.96	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	266.0	300.8	64 / 0	24.56
		High	28200.00	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	266.0	299.5	64 / 0	24.13

Table 7-26. M Patch EIRP Data (Band n261 − 100MHz-3CC)

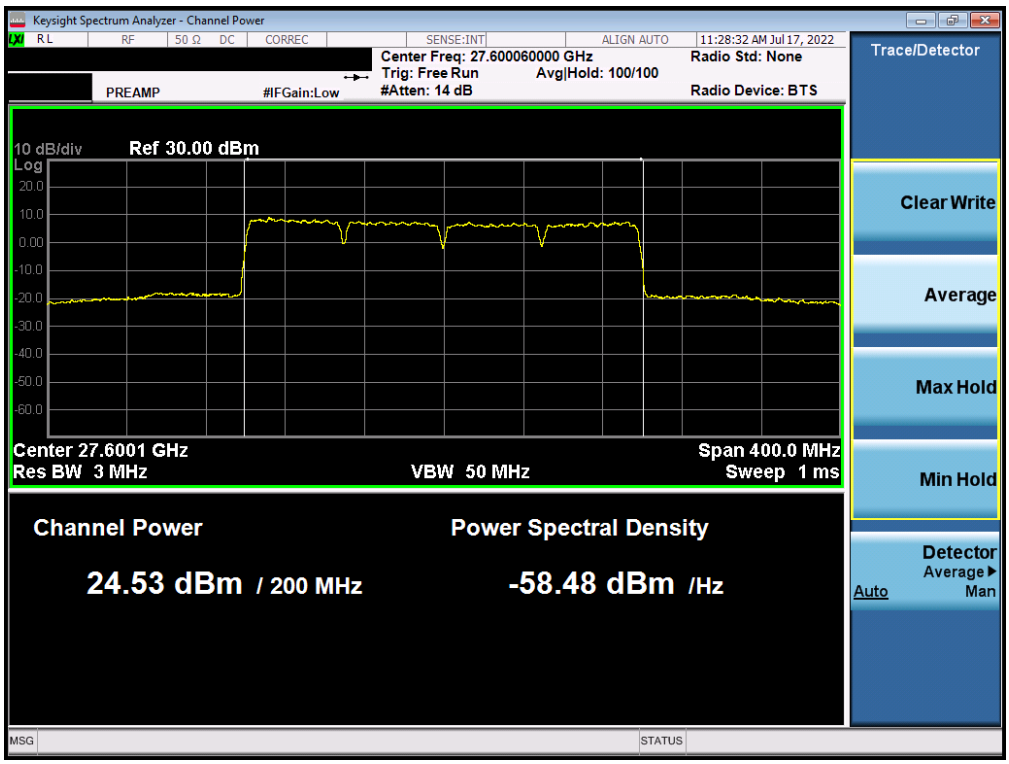
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	27700.02	DFT-s-OFDM	QPSK	164+36	H + V	2Tx	V	74.0	27.4	64 / 0	24.48
		Low	27700.02	CP-OFDM	QPSK	164+36	H + V	MIMO	V	74.0	27.4	1 / 21	23.06
		Low	27700.02	DFT-s-OFDM	π/2 BPSK	164+36	H + V	2Tx	V	74.0	27.4	64 / 0	**24.57**
		Low	27700.02	DFT-s-OFDM	16QAM	164+36	H + V	2Tx	V	74.0	27.4	1 / 21	23.06
		Low	27700.02	DFT-s-OFDM	64QAM	164+36	H + V	2Tx	V	74.0	27.4	1 / 21	21.78
		Mid	27924.96	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	304.0	292.2	64 / 0	23.96
		High	28150.02	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	304.0	290.8	64 / 0	23.28

Table 7-27. M Patch EIRP Data (Band n261 − 100MHz-4CC)

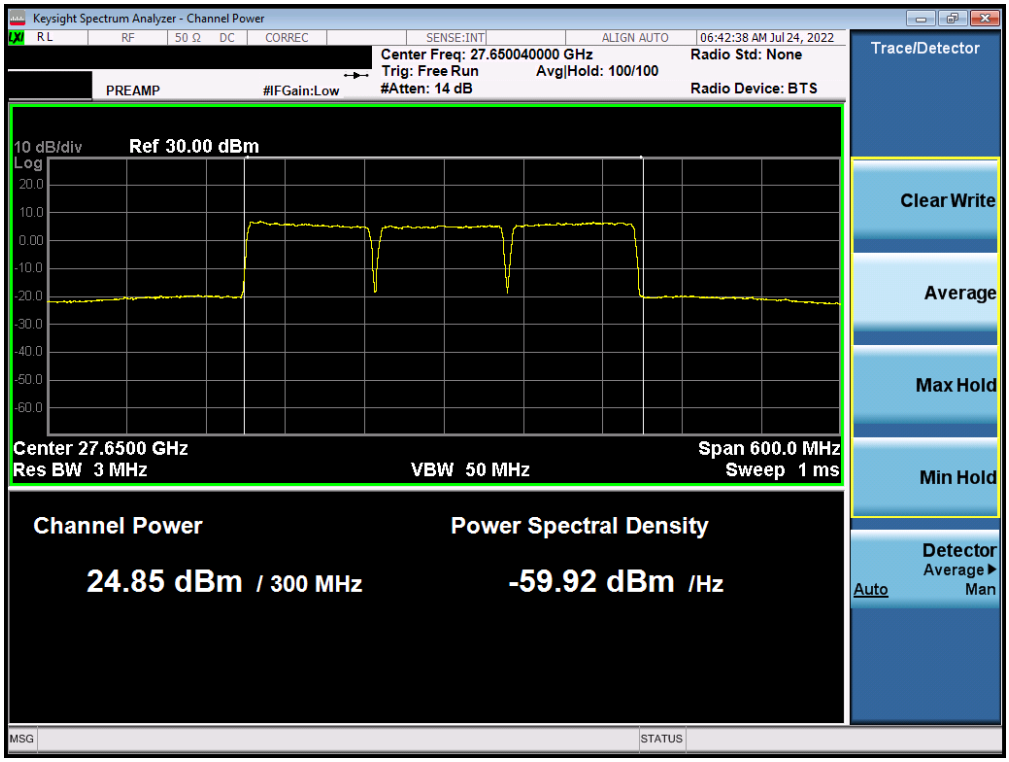
Worst-Case EIRP Plots (n261 M Patch)



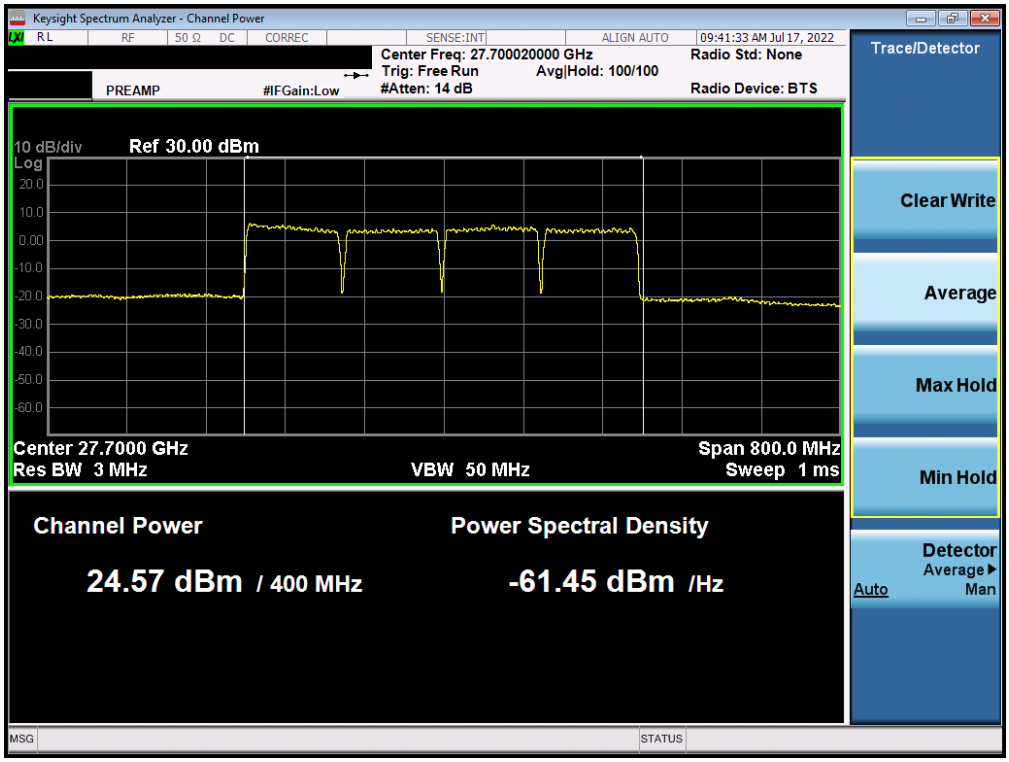
Plot 7-69. M Patch EIRP Plot (Band n261 − 50MHz-3CC – π/2 BPSK – Low Channel)



Plot 7-70. M Patch EIRP Plot (Band n261 − 50MHz-4CC – π/2 BPSK – Low Channel)



Plot 7-71. M Patch EIRP Plot (Band n261 − 100MHz-3CC − QPSK – Low Channel)



Plot 7-72. M Patch EIRP Plot (Band n261 − 100MHz-4CC − π/2-BPSK – Low Channel)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	27574.92	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	31.0	68.5	32 / 0	22.73
		Mid	27924.96	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	30.0	68.0	32 / 0	23.07
		Mid	27924.96	CP-OFDM	QPSK	158+30	H + V	MIMO	V	30.0	68.0	32 / 0	20.94
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	28.0	70.7	32 / 0	**23.09**
		Mid	27924.96	DFT-s-OFDM	16QAM	158+30	H + V	2Tx	V	28.0	70.7	32 / 0	20.86
		Mid	27924.96	DFT-s-OFDM	64QAM	158+30	H + V	2Tx	V	28.0	70.7	1 / 21	19.32
		High	28275.00	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	24.0	70.8	32 / 0	22.80

Table 7-28. N Patch EIRP Data (Band n261 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	27599.88	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	39.0	63.7	32 / 0	22.70
		Mid	27924.96	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	26.0	70.0	32 / 0	**22.98**
		Mid	27924.96	CP-OFDM	QPSK	158+30	H + V	MIMO	V	26.0	70.0	32 / 0	20.96
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	26.0	70.0	32 / 0	22.98
		Mid	27924.96	DFT-s-OFDM	16QAM	158+30	H + V	2Tx	V	26.0	70.0	32 / 0	20.98
		Mid	27924.96	DFT-s-OFDM	64QAM	158+30	H + V	2Tx	V	26.0	70.0	1 / 11	19.27
		High	28250.04	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	27.0	68.0	32 / 0	22.63

Table 7-29. N Patch EIRP Data (Band n261 − 50MHz-4CC)

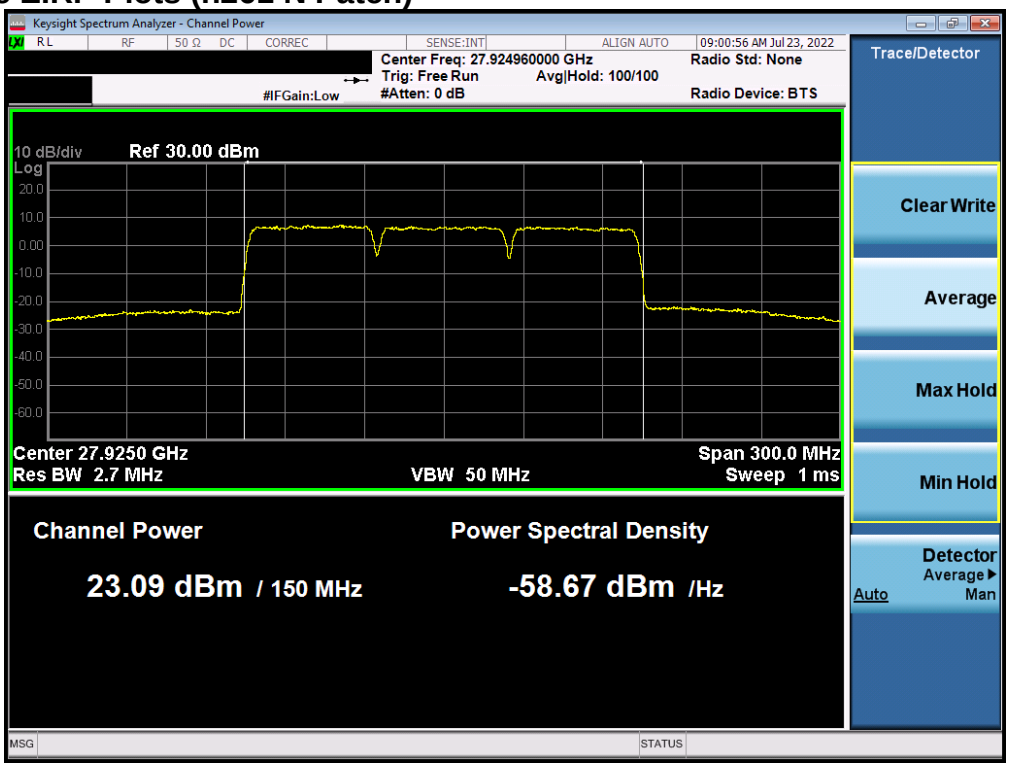
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	27650.04	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	28.0	68.0	64 / 0	**23.46**
		Low	27650.04	CP-OFDM	QPSK	158+30	H + V	MIMO	V	28.0	68.0	66 / 0	21.58
		Low	27650.04	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	28.0	68.0	64 / 0	23.44
		Low	27650.04	DFT-s-OFDM	16QAM	158+30	H + V	2Tx	V	28.0	68.0	64 / 0	21.46
		Low	27650.04	DFT-s-OFDM	64QAM	158+30	H + V	2Tx	V	28.0	68.0	1 / 0	20.02
		Mid	27924.96	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	35.0	68.0	64 / 0	23.11
		High	28200.00	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	23.0	70.7	64 / 0	22.56

Table 7-30. N Patch EIRP Data (Band n261 − 100MHz-3CC)

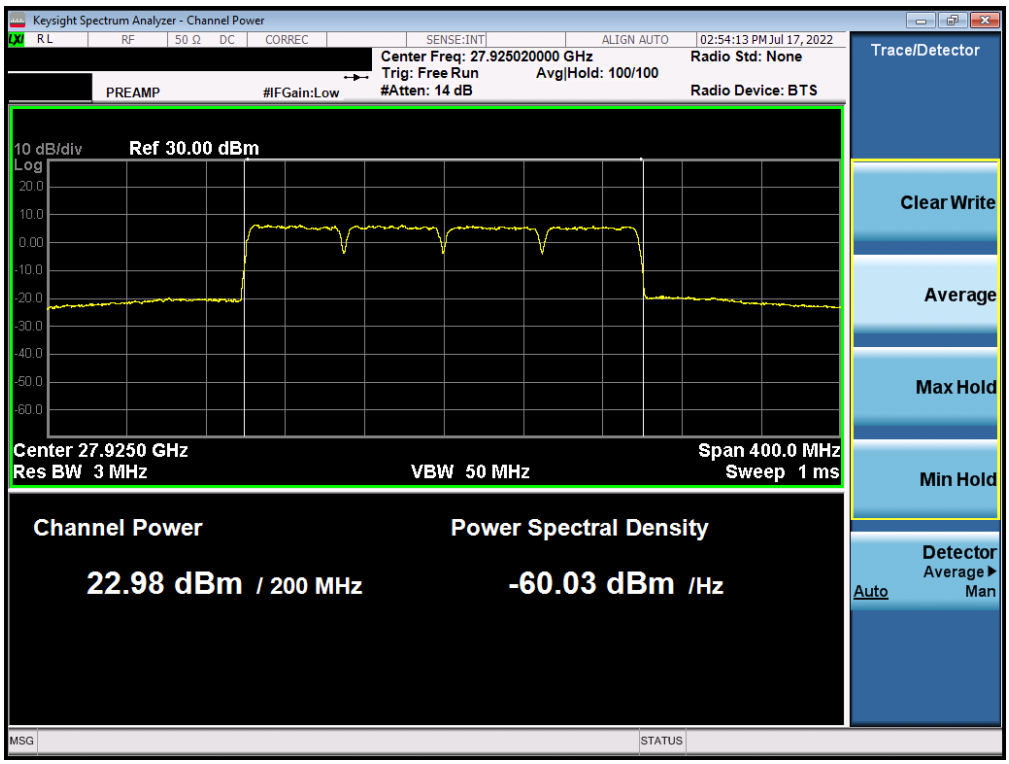
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	27700.02	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	V	31.0	67.4	64 / 0	**22.94**
		Low	27700.02	CP-OFDM	QPSK	158+30	H + V	MIMO	V	31.0	67.4	1 / 43	21.01
		Low	27700.02	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	31.0	67.4	64 / 0	22.89
		Low	27700.02	DFT-s-OFDM	16QAM	158+30	H + V	2Tx	V	31.0	67.4	1 / 43	21.02
		Low	27700.02	DFT-s-OFDM	64QAM	158+30	H + V	2Tx	V	31.0	67.4	1 / 43	19.58
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	27.0	69.0	64 / 0	22.65
		High	28150.02	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	V	29.0	66.4	64 / 0	22.52

Table 7-31. N Patch EIRP Data (Band n261 − 100MHz-4CC)

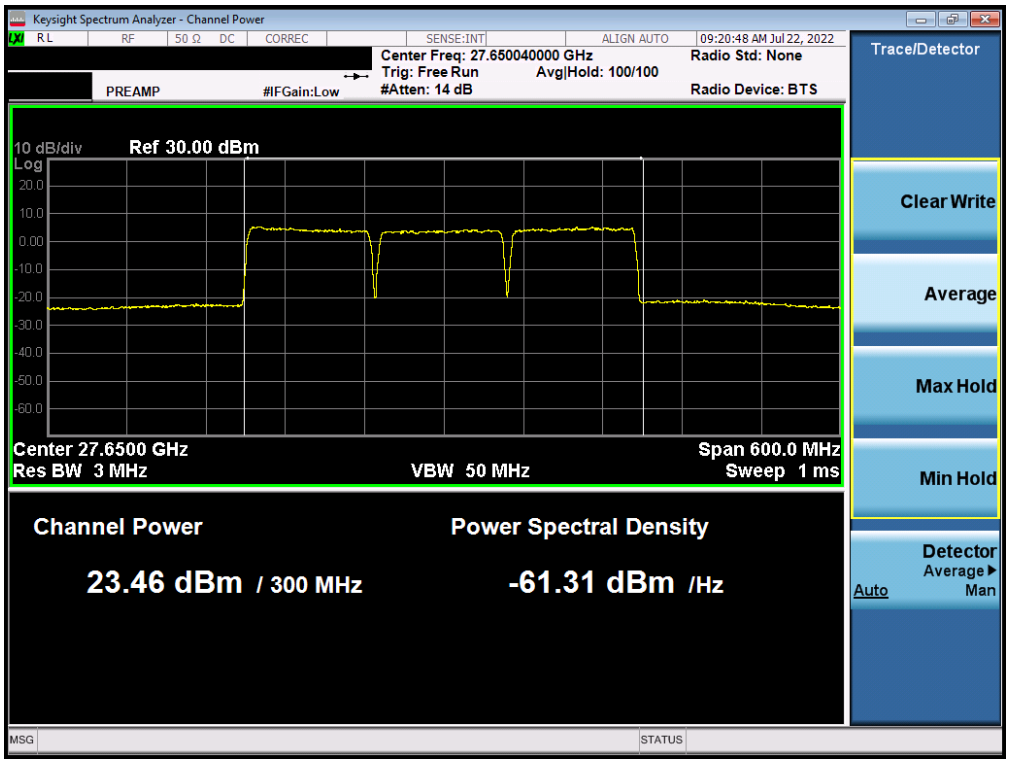
Worst-Case EIRP Plots (n261 N Patch)



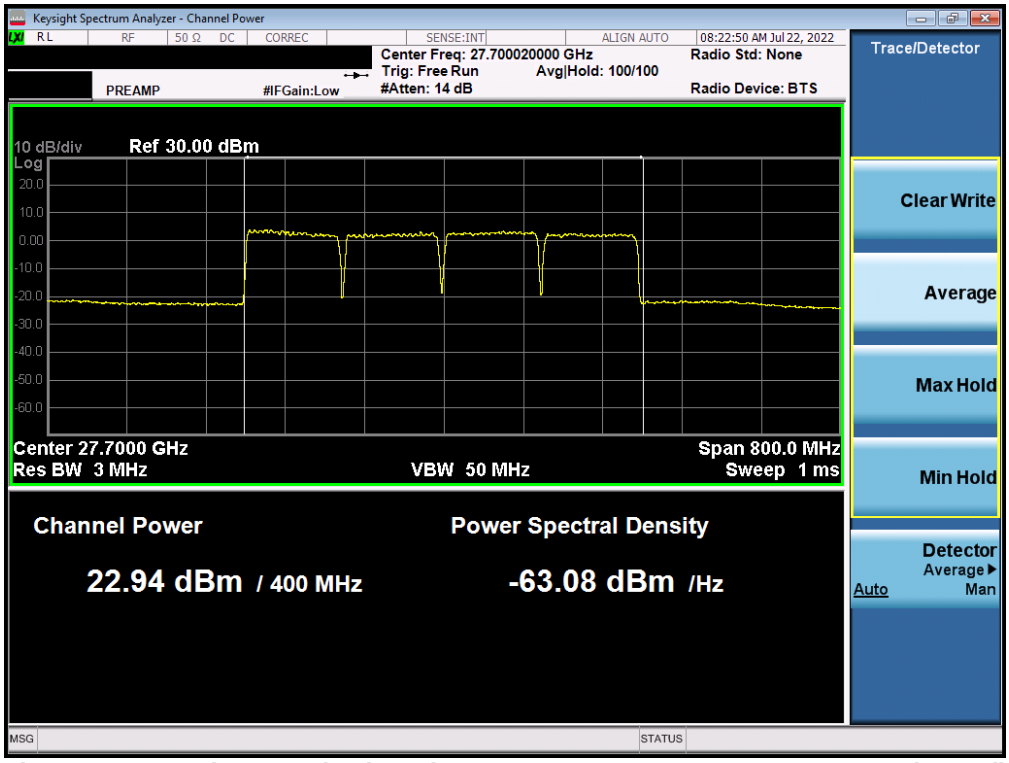
Plot 7-73. N Patch EIRP Plot (Band n261 − 50MHz-3CC − π/2-BPSK – Mid Channel)



Plot 7-74. N Patch EIRP Plot (Band n261 − 50MHz-4CC – QPSK – Mid Channel)



Plot 7-75. N Patch EIRP Plot (Band n261 − 100MHz-3CC − QPSK – Low Channel)



Plot 7-76. N Patch EIRP Plot (Band n261 − 100MHz-4CC − QPSK – Low Channel)

Band n260 Beam ID Configurations

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	153	25
	Mid	2Tx/MIMO	153	25
	High	2Tx/MIMO	155	27

Table 7-32. M Patch Worst Case Beam ID

Mode	Channel	Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	158	30
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	168	40

Table 7-33. N Patch Worst Case Beam ID

Band n260

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	37074.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	338.0	240.2	1 / 16	18.27
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	153+25	H + V	2Tx	V	323.0	245.5	32 / 0	19.83
		High	39925.08	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	285.0	298.2	32 / 0	21.49
		High	39925.08	CP-OFDM	QPSK	155+27	H + V	MIMO	H	285.0	298.2	32 / 0	19.91
		High	39925.08	DFT-s-OFDM	π/2 BPSK	155+27	H + V	2Tx	H	285.0	298.2	32 / 0	**21.55**
		High	39925.08	DFT-s-OFDM	16QAM	155+27	H + V	2Tx	H	285.0	298.2	32 / 0	19.89
		High	39925.08	DFT-s-OFDM	64QAM	155+27	H + V	2Tx	H	285.0	298.2	32 / 0	18.02

Table 7-34. M Patch EIRP Data (Band n260 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	37099.92	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	341.0	244.5	1 / 16	17.74
		Mid	38499.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	325.0	244.0	32 / 0	19.96
		High	39899.94	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	285.0	298.0	32 / 0	**20.93**
		High	39899.94	CP-OFDM	QPSK	155+27	H + V	MIMO	H	285.0	298.0	32 / 0	19.43
		High	39899.94	DFT-s-OFDM	π/2 BPSK	155+27	H + V	2Tx	H	285.0	298.0	32 / 0	20.92
		High	39899.94	DFT-s-OFDM	16QAM	155+27	H + V	2Tx	H	285.0	298.0	32 / 0	19.40
		High	39899.94	DFT-s-OFDM	64QAM	155+27	H + V	2Tx	H	285.0	298.0	32 / 0	17.50

Table 7-35. M Patch EIRP Data (Band n260 − 50MHz-4CC)

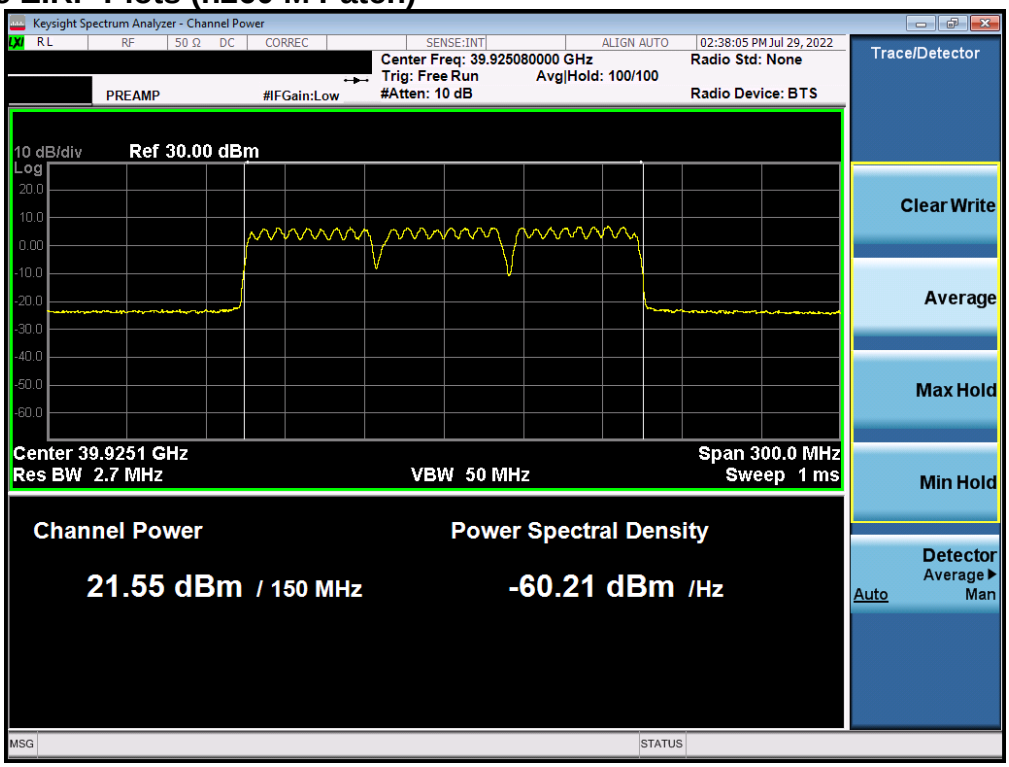
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	37149.96	DFT-s-OFDM	π/2 BPSK	153+25	H + V	2Tx	V	336.0	239.6	1 / 33	18.33
		Mid	38499.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	327.0	244.5	64 / 0	19.91
		High	39849.96	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	285.0	297.8	64 / 0	21.43
		High	39849.96	CP-OFDM	QPSK	155+27	H + V	MIMO	H	285.0	297.8	66 / 0	19.92
		High	39849.96	DFT-s-OFDM	π/2 BPSK	155+27	H + V	2Tx	H	285.0	297.8	64 / 0	**21.51**
		High	39849.96	DFT-s-OFDM	16QAM	155+27	H + V	2Tx	H	285.0	297.8	64 / 0	19.95
		High	39849.96	DFT-s-OFDM	64QAM	155+27	H + V	2Tx	H	285.0	297.8	1 / 33	18.37

Table 7-36. M Patch EIRP Data (Band n260 − 100MHz-3CC)

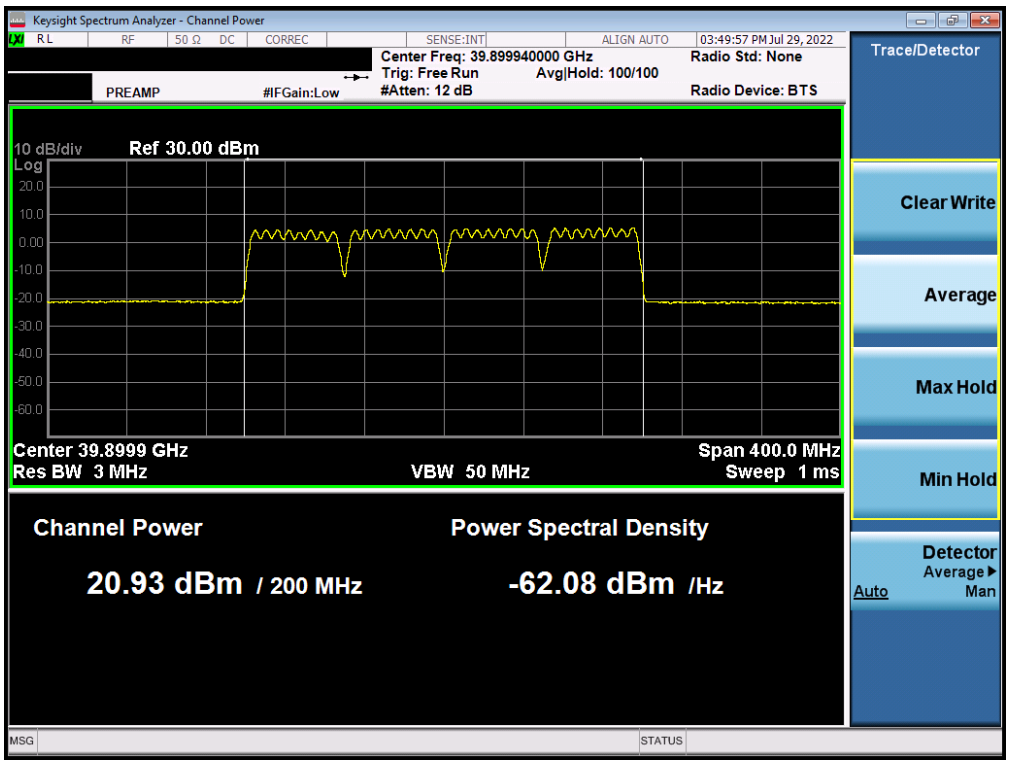
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	37199.94	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	344.0	244.6	1 / 21	18.14
		Mid	38499.96	DFT-s-OFDM	QPSK	153+25	H + V	2Tx	V	322.0	244.0	64 / 0	19.30
		High	39799.98	DFT-s-OFDM	QPSK	155+27	H + V	2Tx	H	285.0	298.0	64 / 0	**21.11**
		High	39799.98	CP-OFDM	QPSK	155+27	H + V	MIMO	H	285.0	298.0	1 / 33	19.74
		High	39799.98	DFT-s-OFDM	π/2 BPSK	155+27	H + V	2Tx	H	285.0	298.0	64 / 0	21.09
		High	39799.98	DFT-s-OFDM	16QAM	155+27	H + V	2Tx	H	285.0	298.0	64 / 0	19.59
		High	39799.98	DFT-s-OFDM	64QAM	155+27	H + V	2Tx	H	285.0	298.0	1 / 23	18.07

Table 7-37. M Patch EIRP Data (Band n260 − 100MHz-4CC)

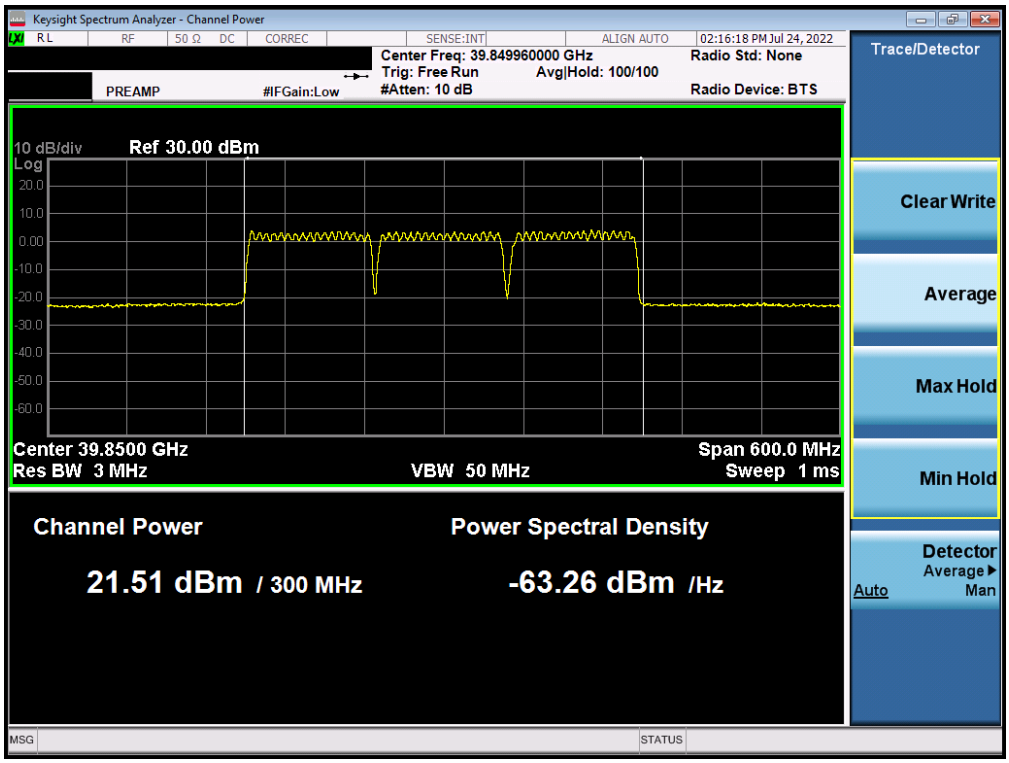
Worst-Case EIRP Plots (n260 M Patch)



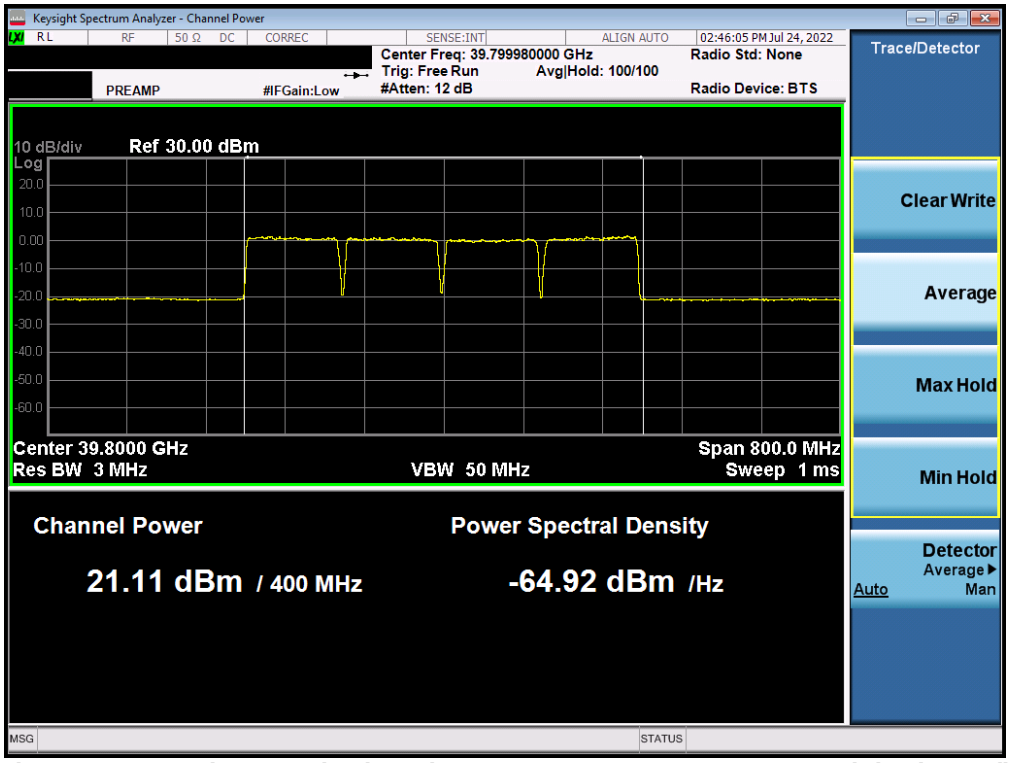
Plot 7-77. M Patch EIRP Plot (Band n260 − 50MHz-3CC − π/2-BPSK – High Channel)



Plot 7-78. M Patch EIRP Plot (Band n260 − 50MHz-4CC − QPSK – High Channel)



Plot 7-79. M Patch EIRP Plot (Band n260 − 100MHz-3CC − π/2-BPSK – High Channel)



Plot 7-80. M Patch EIRP Plot (Band n260 − 100MHz-4CC − QPSK – High Channel)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	37074.96	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	H	332.0	338.3	32 / 0	20.47
		Mid	38499.90	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	302.0	16.7	32 / 0	**21.53**
		Mid	38499.90	CP-OFDM	QPSK	168+40	H + V	MIMO	H	302.0	16.7	1 / 21	20.82
		Mid	38499.90	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	302.0	16.7	32 / 0	21.50
		Mid	38499.90	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	H	302.0	16.7	1 / 21	20.91
		Mid	38499.90	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	H	302.0	16.7	1 / 21	19.59
		High	39925.08	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	299.0	16.0	1 / 11	21.12

Table 7-38. N Patch EIRP Data (Band n260 − 50MHz-3CC)

Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Low	37099.92	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	H	332.0	338.5	32 / 0	20.76
		Mid	38499.90	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	297.0	16.6	32 / 0	**21.98**
		Mid	38499.90	CP-OFDM	QPSK	168+40	H + V	MIMO	H	297.0	16.6	1 / 11	20.57
		Mid	38499.90	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	297.0	16.6	32 / 0	21.96
		Mid	38499.90	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	H	297.0	16.6	1 / 11	20.67
		Mid	38499.90	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	H	297.0	16.6	1 / 11	19.15
		High	39799.98	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	301.0	16.0	1 / 11	21.23

Table 7-39. N Patch EIRP Data (Band n260 − 50MHz-4CC)

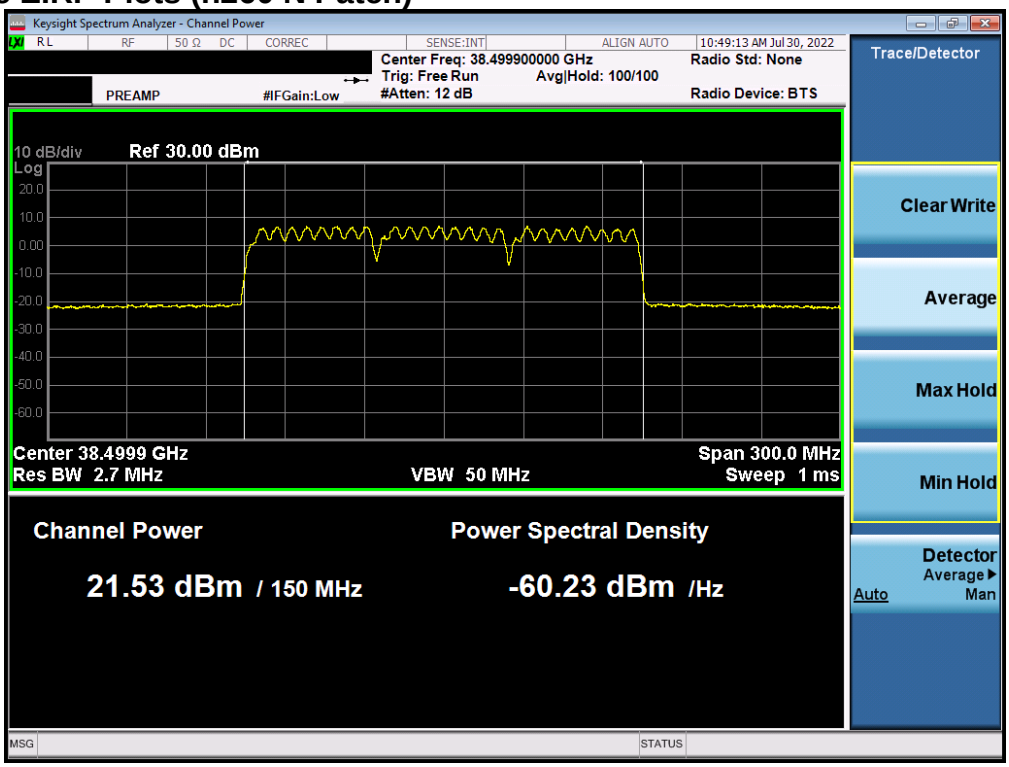
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	37149.96	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	H	332.0	339.0	64 / 0	20.77
		Mid	38499.90	DFT-s-OFDM	QPSK	168+40	H + V	2Tx	H	297.0	17.4	64 / 0	21.72
		Mid	38499.90	CP-OFDM	QPSK	168+40	H + V	MIMO	H	297.0	17.4	1 / 0	20.22
		Mid	38499.90	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	297.0	17.4	64 / 0	**21.76**
		Mid	38499.90	DFT-s-OFDM	16QAM	168+40	H + V	2Tx	H	297.0	17.4	64 / 0	20.16
		Mid	38499.90	DFT-s-OFDM	64QAM	168+40	H + V	2Tx	H	297.0	17.4	1 / 0	19.01
		High	39849.96	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	300.0	16.0	64 / 0	20.86

Table 7-40. N Patch EIRP Data (Band n260 − 100MHz-3CC)

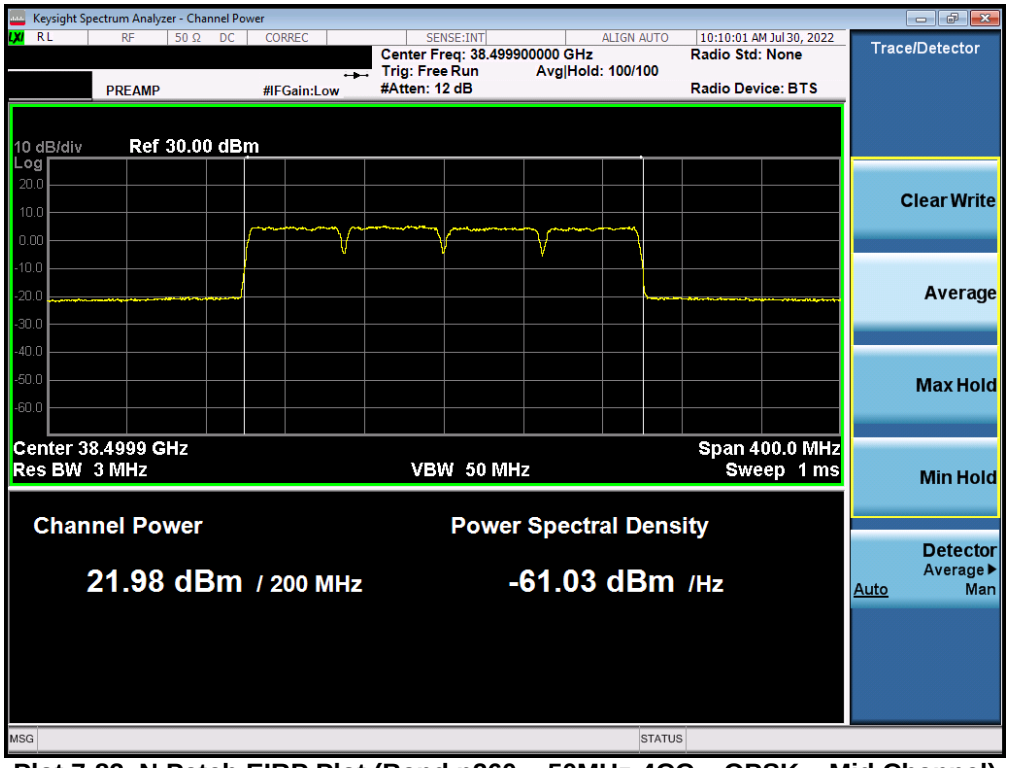
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	37199.94	DFT-s-OFDM	QPSK	158+30	H + V	2Tx	H	334.0	338.8	1 / 43	**21.44**
		Low	37199.94	CP-OFDM	QPSK	158+30	H + V	MIMO	H	334.0	338.8	1 / 21	20.57
		Low	37199.94	DFT-s-OFDM	π/2 BPSK	158+30	H + V	2Tx	H	334.0	338.8	1 / 43	21.29
		Low	37199.94	DFT-s-OFDM	16QAM	158+30	H + V	2Tx	H	334.0	338.8	1 / 43	20.53
		Low	37199.94	DFT-s-OFDM	64QAM	158+30	H + V	2Tx	H	334.0	338.8	1 / 43	19.76
		Mid	38499.90	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	307.0	16.2	64 / 0	21.05
		High	39799.98	DFT-s-OFDM	π/2 BPSK	168+40	H + V	2Tx	H	301.0	16.7	64 / 0	20.41

Table 7-41. N Patch EIRP Data (Band n260 − 100MHz-4CC)

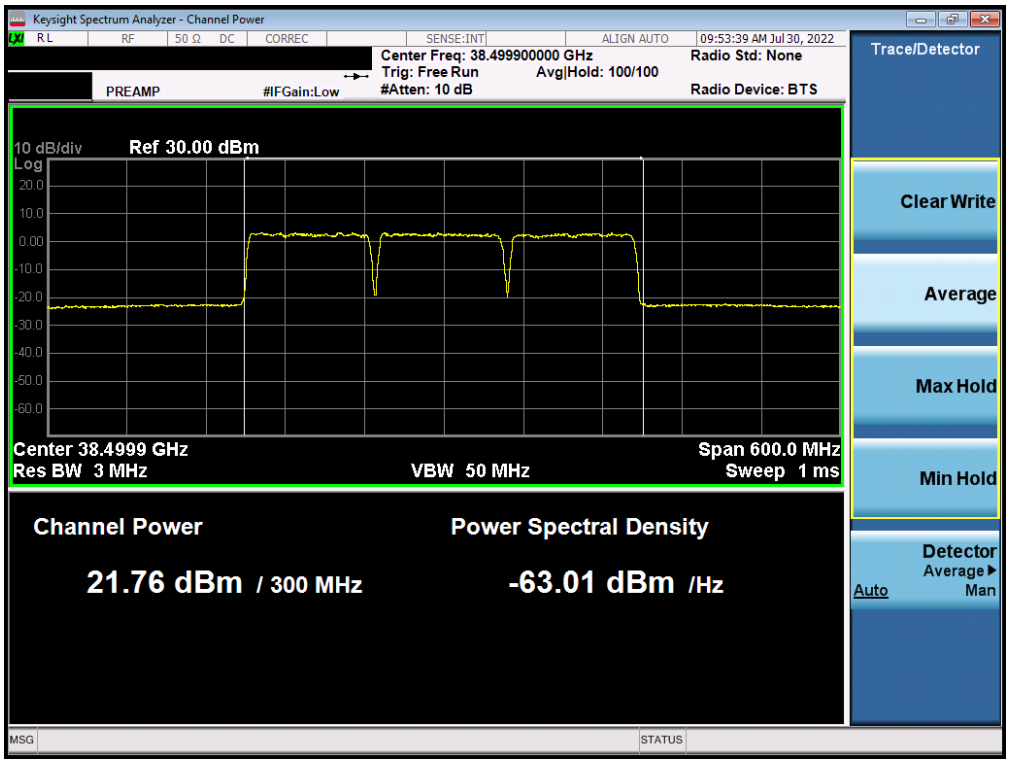
Worst-Case EIRP Plots (n260 N Patch)



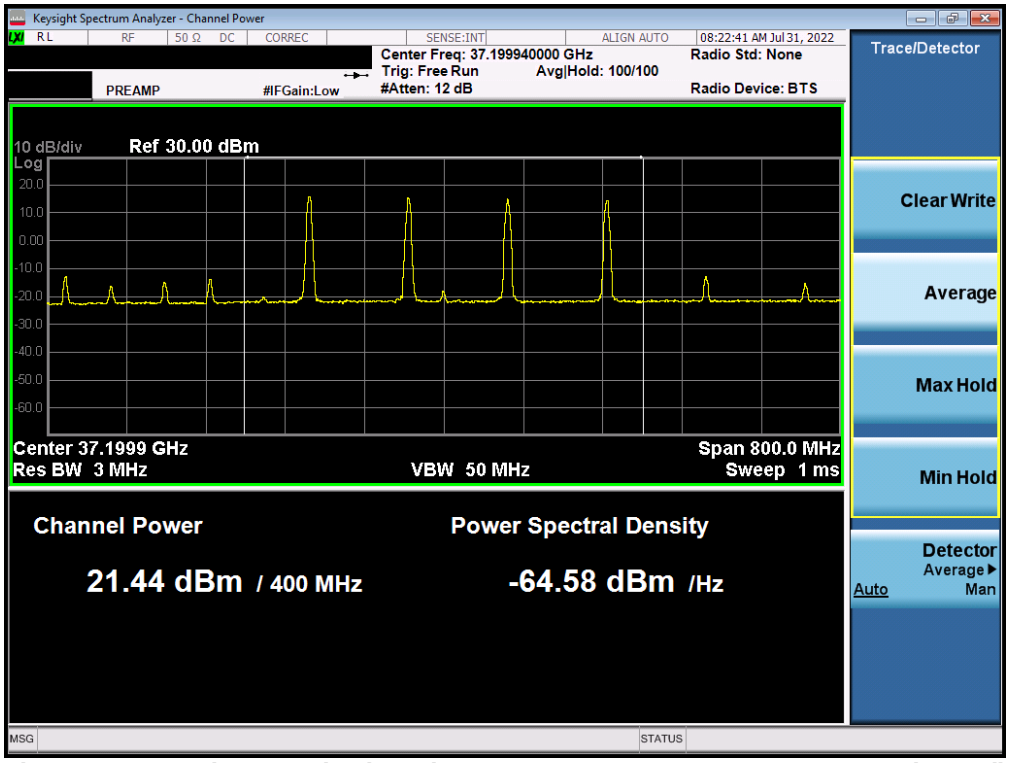
Plot 7-81. N Patch EIRP Plot (Band n260 − 50MHz-3CC − QPSK – Mid Channel)



Plot 7-82. N Patch EIRP Plot (Band n260 − 50MHz-4CC – QPSK – Mid Channel)



Plot 7-83. N Patch EIRP Plot (Band n260 − 100MHz-3CC − π/2-BPSK – Mid Channel)



Plot 7-84. N Patch EIRP Plot (Band n260 − 100MHz-4CC – QPSK – Low Channel)

7.4 Radiated Spurious and Harmonic Emissions

Test Overview

Radiated spurious emissions measurements are performed using the field strength conversion method described in ANSI C63.26-2015 with the EUT transmitting into an integral antenna. Measurements on signals operating below 1GHz are performed using hybrid (biconical/log) antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

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 5.5.4
KDB 842590 D01 – Section 4.4.3

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to 100 GHz for 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 D01 Section 4.4.3.3.4.

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 Factors and Cable Losses have been applied in the spectrum analyzer for each measurement. For measurements > 40GHz, a 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 7-42. Far-Field Distance & Measurement Distance per Frequency Range

7) All emissions from 18MHz - 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 3CC. It was determined that adding more CC's causes the overall amplitude of just 3CC to decrease, therefore, 3CC is the worst case for the purposes of spurious emissions measurements.

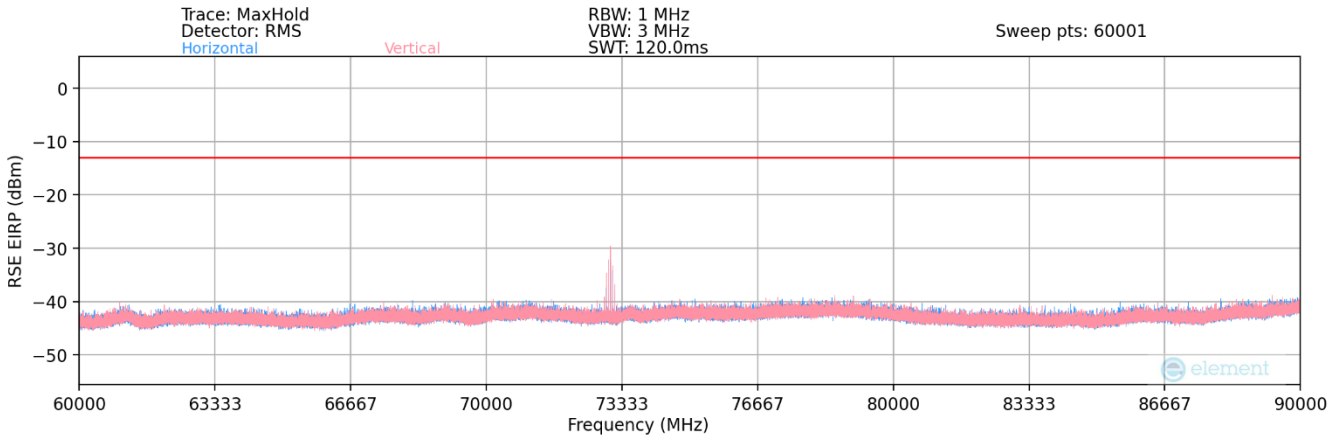
9) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

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, B5, B13, B66 and B48, n260 uses LTE B2, B14, B13 and B66.

11) There was no discernible difference in the spurious emission levels when using different LTE anchor bands. Thus, LTE Band 2 was used as a representative anchor band for EN-DC investigations.

Band n258-R1 (M Patch)

60GHz - 90GHz



Plot 7-85. Ant 1-n258-R1 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
72926.75	Low	50	2Tx	QPSK	V	275	159	-37.11	-13.00	-24.11
72977.15	Low	50	2Tx	QPSK	V	267	158	-36.25	-13.00	-23.25
73026.50	Low	50	2Tx	QPSK	V	255	53	-35.99	-13.00	-22.99
72951.65	Mid	50	2Tx	QPSK	V	260	47	-34.08	-13.00	-21.08
73001.65	Mid	50	2Tx	QPSK	V	267	49	-32.63	-13.00	-19.63
73051.75	Mid	50	2Tx	QPSK	V	262	45	-33.52	-13.00	-20.52
73076.00	High	50	2Tx	QPSK	V	262	45	-34.89	-13.00	-21.89
73126.55	High	50	2Tx	QPSK	V	272	47	-31.29	-13.00	-18.29
73176.25	High	50	2Tx	QPSK	V	270	47	-32.09	-13.00	-19.09
73226.14	High	50	2Tx	QPSK	V	272	48	-33.76	-13.00	-20.76

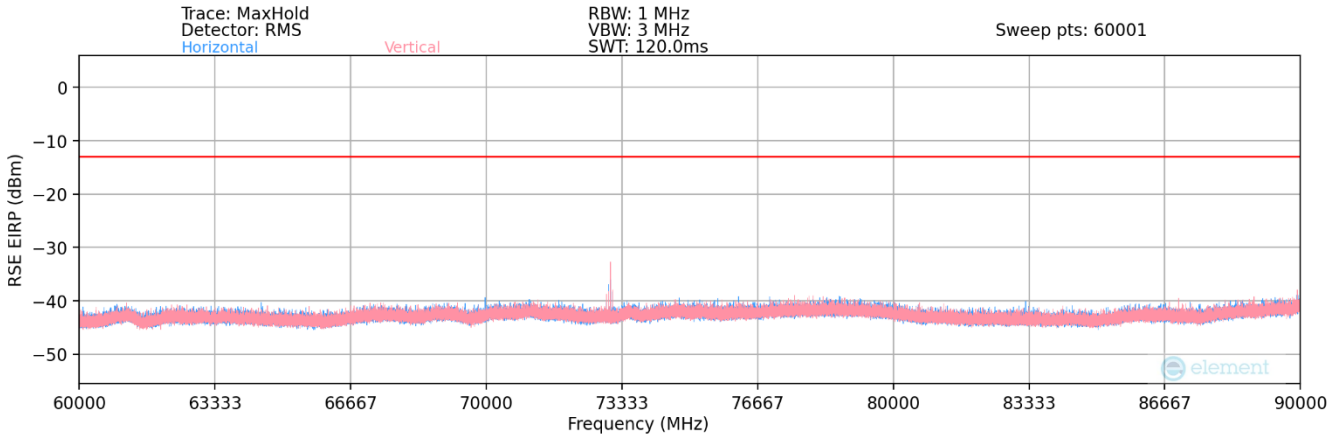
Table 7-51. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n258-R1 (N Patch)

60GHz - 90GHz



Plot 7-86. Ant 2-n258-R1 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
72926.80	Low	50	2Tx	QPSK	V	347	66	-38.28	-13.00	-25.28
72976.60	Low	50	2Tx	QPSK	V	354	68	-37.81	-13.00	-24.81
73027.00	Low	50	2Tx	QPSK	V	349	69	-41.32	-13.00	-28.32
72952.00	Mid	50	2Tx	QPSK	V	345	69	-40.31	-13.00	-27.31
73001.70	Mid	50	2Tx	QPSK	V	344	66	-39.58	-13.00	-26.58
73052.00	Mid	50	2Tx	QPSK	V	345	68	-37.84	-13.00	-24.84
73076.90	High	50	2Tx	QPSK	V	343	64	-42.44	-13.00	-29.44
73127.05	High	50	2Tx	QPSK	V	359	65	-37.93	-13.00	-24.93
73176.90	High	50	2Tx	QPSK	V	348	67	-40.31	-13.00	-27.31
73226.95	High	50	2Tx	QPSK	V	353	65	-40.84	-13.00	-27.84

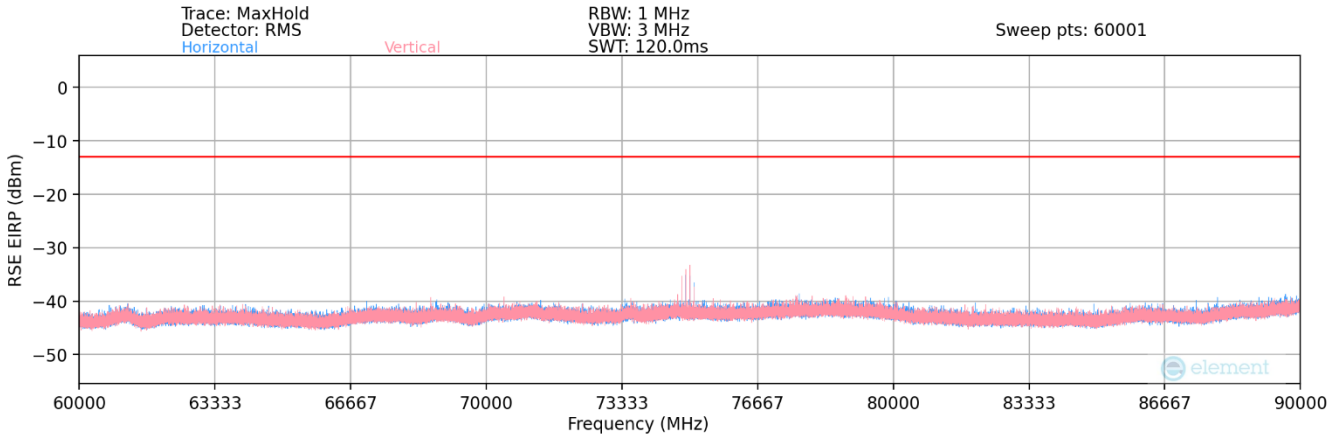
Table 7-57. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n258-R2 (M Patch)

60GHz - 90GHz



Plot 7-87. Ant 1-n258-R2 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n258-R2)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74501.35	Low	100	2Tx	QPSK	V	254	53	-35.39	-13.00	-22.39
74601.45	Low	100	2Tx	QPSK	V	258	52	-34.07	-13.00	-21.07
74701.50	Low	100	2Tx	QPSK	V	259	54	-34.00	-13.00	-21.00
74801.60	Mid	100	2Tx	QPSK	V	278	56	-36.18	-13.00	-23.18
74901.60	Mid	100	2Tx	QPSK	V	282	53	-34.96	-13.00	-21.96
75001.35	Mid	100	2Tx	QPSK	V	268	50	-35.48	-13.00	-22.48
75201.45	High	100	2Tx	QPSK	V	287	35	-38.26	-13.00	-25.26
75301.25	High	100	2Tx	QPSK	V	277	36	-36.91	-13.00	-23.91
75401.15	High	100	2Tx	QPSK	V	284	35	-37.99	-13.00	-24.99
75501.45	High	100	2Tx	QPSK	V	391	33	-39.48	-13.00	-26.48

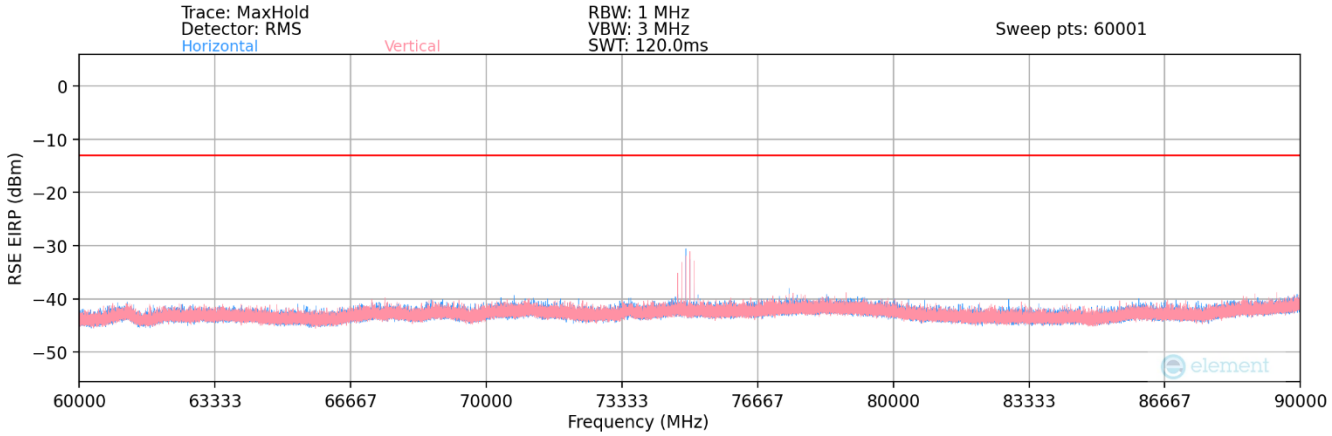
Table 7-63. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n258-R2 (N Patch)

60GHz - 90GHz



Plot 7-88. Ant 2-n258-R2 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n258-R2)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
74502.05	Low	100	2Tx	QPSK	V	305	179	-35.50	-13.00	-22.50
74602.05	Low	100	2Tx	QPSK	V	307	180	-33.85	-13.00	-20.85
74701.90	Low	100	2Tx	QPSK	V	305	181	-34.28	-13.00	-21.28
74801.55	Mid	100	2Tx	QPSK	V	305	181	-34.70	-13.00	-21.70
74901.55	Mid	100	2Tx	QPSK	V	301	180	-32.71	-13.00	-19.71
75001.65	Mid	100	2Tx	QPSK	V	306	181	-34.60	-13.00	-21.60
75101.85	High	100	2Tx	QPSK	V	329	169	-38.96	-13.00	-25.96
75202.05	High	100	2Tx	QPSK	V	92	163	-34.41	-13.00	-21.41
75302.40	High	100	2Tx	QPSK	V	140	195	-34.21	-13.00	-21.21
75401.65	High	100	2Tx	QPSK	V	340	170	-36.37	-13.00	-23.37
75502.30	High	100	2Tx	QPSK	V	339	167	-37.56	-13.00	-24.56

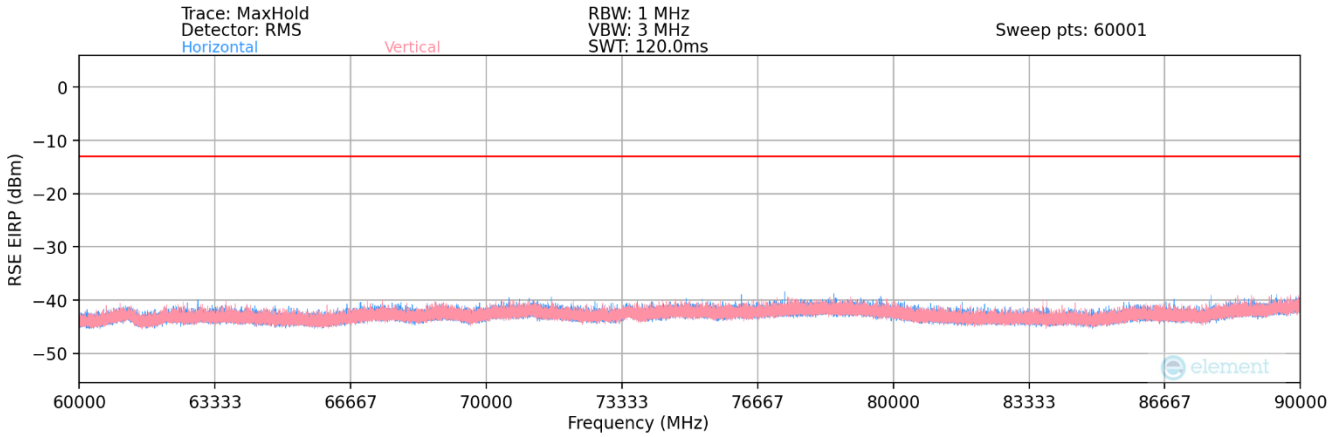
Table 7-69. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n261 (M Patch)

60GHz - 90GHz



Plot 7-89. Ant 1-n261 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n261)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82851.90	Low	100	2Tx	QPSK	H	347	167	-43.89	-13.00	-30.89
82952.00	Low	100	2Tx	QPSK	H	351	166	-43.17	-13.00	-30.17
83686.70	Mid	100	2Tx	QPSK	H	352	187	-42.96	-13.00	-29.96
83776.50	Mid	100	2Tx	QPSK	H	350	186	-42.75	-13.00	-29.75
84601.80	High	100	2Tx	QPSK	H	349	186	-42.86	-13.00	-29.86
84701.55	High	100	2Tx	QPSK	H	348	186	-43.43	-13.00	-30.43

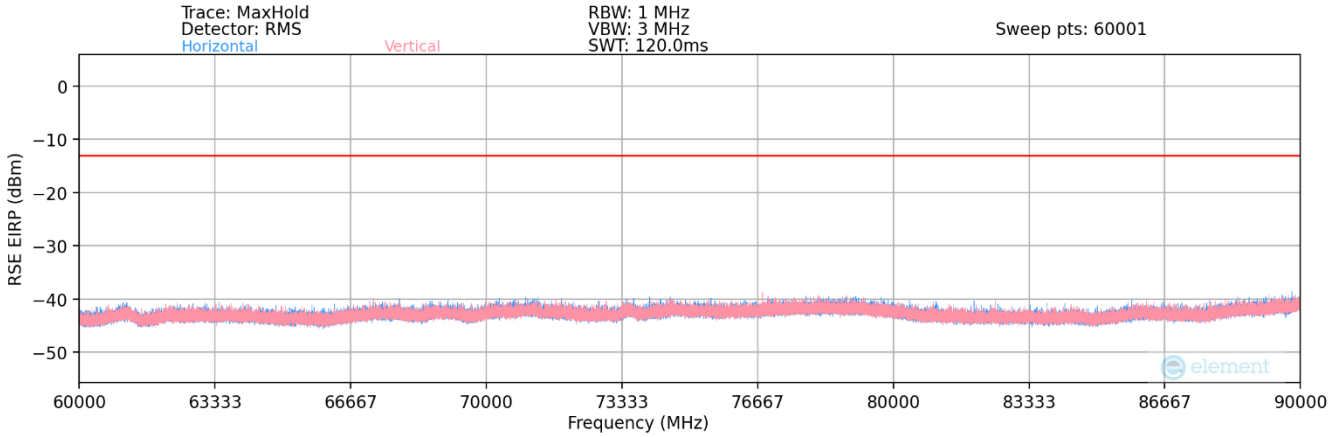
Table 7-76. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n261 (N Patch)

60GHz - 90GHz



Plot 7-90. Ant 2-n261 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n261)

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 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
82852.05	Low	100	2Tx	QPSK	V	33	336	-43.01	-13.00	-30.01
82951.99	Low	100	2Tx	QPSK	V	26	342	-42.62	-13.00	-29.62
83675.95	Mid	100	2Tx	QPSK	V	18	342	-41.75	-13.00	-28.75
83776.05	Mid	100	2Tx	QPSK	V	25	341	-42.39	-13.00	-29.39
84601.35	High	100	2Tx	QPSK	V	27	341	-40.94	-13.00	-27.94
84701.55	High	100	2Tx	QPSK	V	31	336	-41.89	-13.00	-28.89

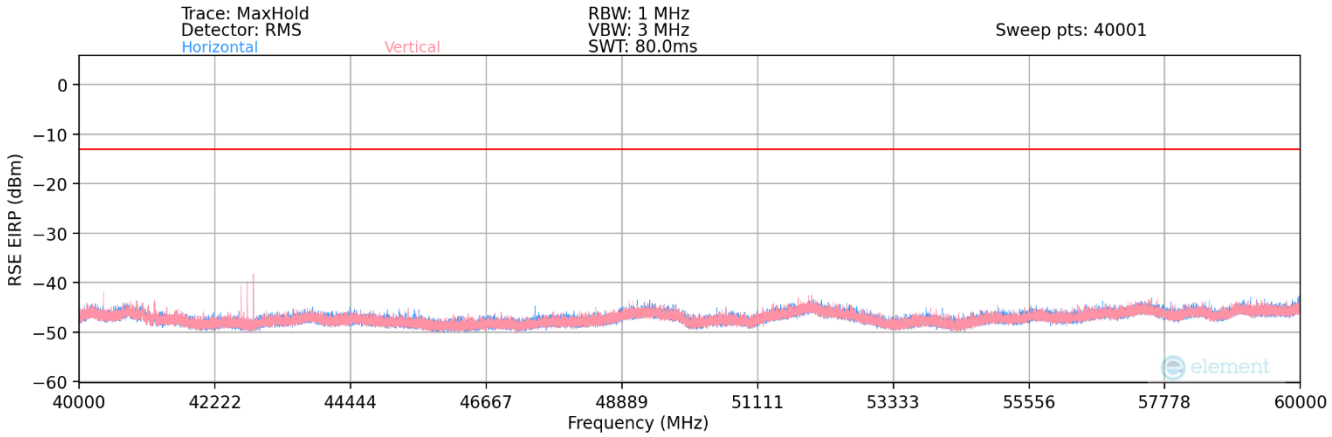
Table 7-83. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

Notes

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

Band n260 (M Patch)

40GHz - 60GHz



Plot 7-91. Ant 1-n260 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n260)

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 1.5 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
40163.65	Low	100	2Tx	QPSK	V	276	113	-37.02	-13.00	-24.02
40263.15	Low	100	2Tx	QPSK	V	277	112	-36.86	-13.00	-23.86
40363.35	Low	100	2Tx	QPSK	V	278	110	-33.57	-13.00	-20.57
42653.35	Mid	100	2Tx	QPSK	V	273	103	-35.49	-13.00	-22.49
42753.30	Mid	100	2Tx	QPSK	V	272	104	-36.75	-13.00	-23.75
42853.15	Mid	100	2Tx	QPSK	V	271	102	-33.37	-13.00	-20.37
44836.35	High	100	2Tx	QPSK	V	279	62	-33.17	-13.00	-20.17
44936.25	High	100	2Tx	QPSK	V	277	155	-36.57	-13.00	-23.57
45036.15	High	100	2Tx	QPSK	V	276	154	-36.59	-13.00	-23.59

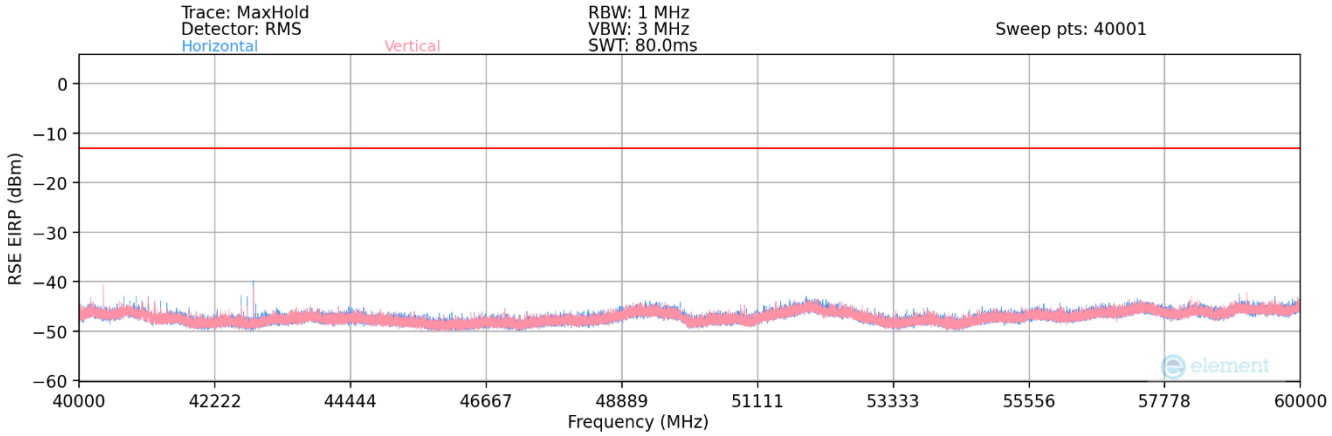
Table 7-89. Ant 1 - 2Tx - Spurious Emissions Table (40GHz - 60GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1.5 meter.

Band n260 (N Patch)

40GHz - 60GHz



Plot 7-92. Ant 2-n260 Radiated Spurious Plot (3CC QPSK Mid Channel 2Tx)

Spurious Emissions EIRP Sample Calculation (n260)

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 1.5 meter.

RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8 + Harmonic Mixer Conversion Loss [dB]

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
40163.35	Low	100	2Tx	QPSK	H	47	326	-40.08	-13.00	-27.08
40263.35	Low	100	2Tx	QPSK	H	42	332	-40.62	-13.00	-27.62
40363.40	Low	100	2Tx	QPSK	H	47	327	-36.12	-13.00	-23.12
42653.55	Mid	100	2Tx	QPSK	H	279	20	-38.55	-13.00	-25.55
42753.30	Mid	100	2Tx	QPSK	H	275	23	-40.29	-13.00	-27.29
42853.25	Mid	100	2Tx	QPSK	H	273	22	-37.19	-13.00	-24.19
44836.15	High	100	2Tx	QPSK	H	46	13	-36.47	-13.00	-23.47
44936.40	High	100	2Tx	QPSK	H	54	13	-40.46	-13.00	-27.46
45037.00	High	100	2Tx	QPSK	H	52	13	-40.85	-13.00	-27.85

Table 7-96. Ant 2 - 2Tx -Spurious Emissions Table (40GHz - 60GHz)

Notes

The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, cable losses, and harmonic mixer conversion losses. Measurements were performed at a distance of 1.5 meter.

7.5 Band Edge Emissions

Test Overview

All out of band emissions are measured in a radiated 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 minimum permissible attenuation level of any spurious emission is -13dBm/1MHz. However, in the bands immediately outside and adjacent to the licensee's frequency block, having a bandwidth equal to 10 percent of the channel bandwidth, the conductive power or the total radiated power of any emission shall be −5 dBm/MHz or lower.

Test Procedure Used

ANSI C63.26-2015 Section 5 and ANSI C63.26-2015 Section 6.4
KDB 842590 D01 – Section 4.4.2.4

Test Settings

1. Start and stop frequency were set such that both upper and lower band edges are measured.
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW = 1MHz
4. VBW $\geq$ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Notes

1) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning.

2) Band Edge emissions were measured at a 1 meter distance.

3) The spectrum analyzer for each measurement shows an offset value that was determined using the measurement antenna factor, cable loss, far field measurement distance. A sample calculation is shown on the following page.

4) 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 were fully investigated and only the worst case has been included in this report.

5) All combinations of 3CC and 4CC were fully investigated, and only the worst case has been included in this report.

6) All 4CC cases were investigated with PCC prioritization feature, which has the higher power PCC at the band edge for the worst case.

7) Unless otherwise specified, the radiated band edge plots in this section display the worst case EIRP measurements for the indicated bandwidth−component carrier configuration.

8) The plots in this section that display Total Radiated Power (TRP) were obtained from measurements that were performed in accordance with the guidance of Section 4.4.2.4 of KDB 842590 D01 for the Spherical Method.

Sample Analyzer Offset Calculation (at 27.5GHz)

Measurement Antenna Factor = 40.70dB/m

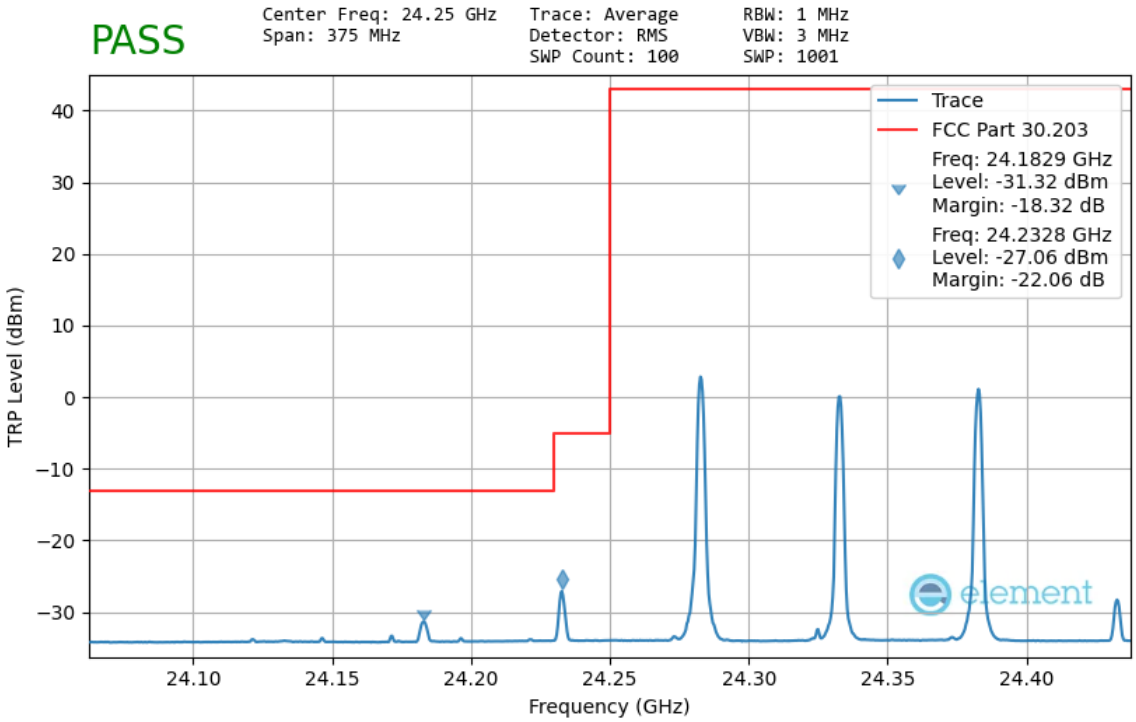
Cable Loss = 8.82dB

Analyzer Offset (dB) = AF (dB/m) + CL (dB) + 107 + $20\log_{10}$(D) – 104.8dB, where D = 1m

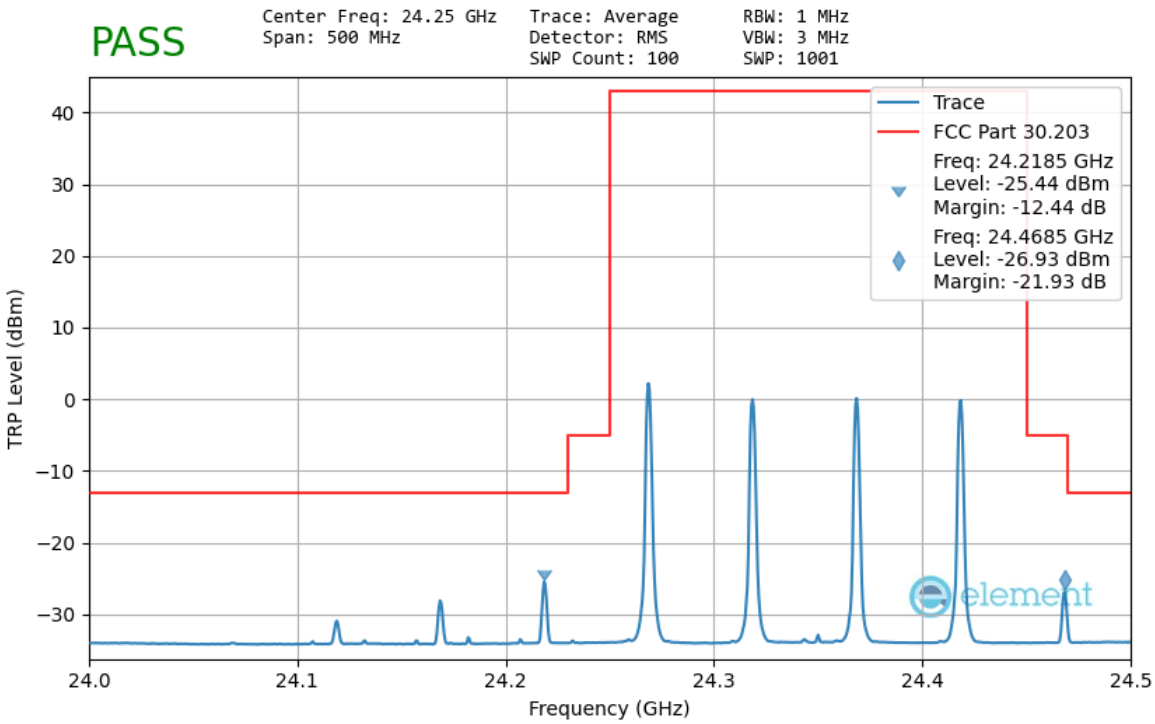
= 40.70dB/m + 8.82dB + 107 + $20\log_{10}$(1m) – 104.8dB

= 51.72dB

Band n258-R1 – Worst Case



Plot 7-93. M Patch Lower Band Edge (50MHz-3CC – π/2-BPSK 1 RB) – TRP



Plot 7-94. M Patch Lower Band Edge (50MHz-4CC – π/2-BPSK 1 RB) – TRP