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PART 30 MEASUREMENT REPORT

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

Date of Testing:
07/11/2022- 08/17/2022
Test Report Issue Date:
08/25/2022
Test Site/Location:
Element Lab., Columbia, MD, USA
Test Report Serial No.:
1M2203290039-01.A3L

FCC ID:	**A3LSMS901U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Class II Permissive Change
Model:	SM-S901U
Additional Model(s):	SM-S901U1
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:	12/07/2021

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

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Antenna	Band	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Modulation	Mode	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
M-Patch	n258-R1	50	24250 - 24450	3	QPSK	2Tx	0.158	21.98	147MG7D
					π/2 BPSK	2Tx	0.159	22.01	146MG7D
					16QAM	2Tx	0.101	20.06	147MW7D
					64QAM	2Tx	0.080	19.04	146MW7D
				4	QPSK	2Tx	0.150	21.76	196MG7D
					π/2 BPSK	2Tx	0.148	21.71	194MG7D
					16QAM	2Tx	0.096	19.84	196MW7D
					64QAM	2Tx	0.069	18.36	197MW7D
N-Patch	n258-R1	50		3	QPSK	2Tx	0.140	21.47	-
					π/2 BPSK	2Tx	0.106	20.25	-
					16QAM	2Tx	0.088	19.45	-
					64QAM	2Tx	0.064	18.07	-
				4	QPSK	2Tx	0.133	21.24	-
					π/2 BPSK	2Tx	0.132	21.20	-
					16QAM	2Tx	0.082	19.14	-
					64QAM	2Tx	0.065	18.12	-

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	n258-R2	50	24750 - 25250	3	QPSK	2Tx	0.240	23.81	150MG7D
					π/2 BPSK	2Tx	0.239	23.79	150MG7D
					16QAM	2Tx	0.152	21.83	150MW7D
					64QAM	2Tx	0.103	20.11	149MW7D
				4	QPSK	2Tx	0.227	23.57	194MG7D
					π/2 BPSK	2Tx	0.223	23.48	194MG7D
					16QAM	2Tx	0.150	21.76	194MW7D
					64QAM	2Tx	0.104	20.16	194MW7D
		100	24750 - 25250	3	QPSK	2Tx	0.256	24.09	292MG7D
					π/2 BPSK	2Tx	0.253	24.03	293MG7D
					16QAM	2Tx	0.158	22.00	292MW7D
					64QAM	2Tx	0.102	20.09	294MW7D
				4	QPSK	2Tx	0.163	22.11	393MG7D
					π/2 BPSK	2Tx	0.162	22.09	392MG7D
					16QAM	2Tx	0.123	20.91	395MW7D
					64QAM	2Tx	0.079	18.99	396MW7D
N-Patch	n258-R2	50	24750 - 25250	3	QPSK	2Tx	0.175	22.44	-
					π/2 BPSK	2Tx	0.175	22.43	-
					16QAM	2Tx	0.103	20.14	-
					64QAM	2Tx	0.081	19.09	-
				4	QPSK	2Tx	0.171	22.33	-
					π/2 BPSK	2Tx	0.170	22.31	-
					16QAM	2Tx	0.109	20.36	-
					64QAM	2Tx	0.070	18.42	-
		100	24750 - 25250	3	QPSK	2Tx	0.186	22.70	-
					π/2 BPSK	2Tx	0.185	22.68	-
					16QAM	2Tx	0.117	20.67	-
					64QAM	2Tx	0.088	19.44	-
				4	QPSK	2Tx	0.123	20.89	-
					π/2 BPSK	2Tx	0.122	20.85	-
					16QAM	2Tx	0.075	18.77	-
					64QAM	2Tx	0.051	17.04	-

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	n261	50	27525 - 28325	3	QPSK	2Tx	0.185	22.67	-
					π/2 BPSK	2Tx	0.186	22.70	-
					16QAM	2Tx	0.133	21.25	-
					64QAM	2Tx	0.091	19.60	-
				4	QPSK	2Tx	0.134	21.26	-
					π/2 BPSK	2Tx	0.153	21.85	-
					16QAM	2Tx	0.120	20.80	-
					64QAM	2Tx	0.085	19.32	-
		100	27525 - 28325	3	QPSK	2Tx	0.195	22.90	-
					π/2 BPSK	2Tx	0.195	22.91	-
					16QAM	2Tx	0.153	21.86	-
					64QAM	2Tx	0.123	20.91	-
				4	QPSK	2Tx	0.167	22.22	-
					π/2 BPSK	2Tx	0.165	22.18	-
					16QAM	2Tx	0.120	20.77	-
					64QAM	2Tx	0.095	19.79	-
N-Patch	n261	50	27525 - 28325	3	QPSK	2Tx	0.419	26.22	148MG7D
					π/2 BPSK	2Tx	0.425	26.28	148MG7D
					16QAM	2Tx	0.264	24.21	148MW7D
					64QAM	2Tx	0.187	22.71	148MW7D
				4	QPSK	2Tx	0.235	23.71	195MG7D
					π/2 BPSK	2Tx	0.234	23.68	197MG7D
					16QAM	2Tx	0.153	21.85	196MW7D
					64QAM	2Tx	0.095	19.77	197MW7D
		100	27525 - 28325	3	QPSK	2Tx	0.492	26.92	293MG7D
					π/2 BPSK	2Tx	0.499	26.98	292MG7D
					16QAM	2Tx	0.360	25.57	294MW7D
					64QAM	2Tx	0.281	24.49	293MW7D
				4	QPSK	2Tx	0.407	26.09	395MG7D
					π/2 BPSK	2Tx	0.402	26.05	395MG7D
					16QAM	2Tx	0.255	24.06	395MW7D
					64QAM	2Tx	0.174	22.41	397MW7D

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	n260	50	37050 - 39950	3	QPSK	2Tx	0.078	18.92	-
					π/2 BPSK	2Tx	0.079	18.98	-
					16QAM	2Tx	0.077	18.86	-
					64QAM	2Tx	0.055	17.41	-
				4	QPSK	2Tx	0.074	18.67	-
					π/2 BPSK	2Tx	0.073	18.62	-
					16QAM	2Tx	0.051	17.05	-
					64QAM	2Tx	0.036	15.58	-
		100	37050 - 39950	3	QPSK	2Tx	0.081	19.11	-
					π/2 BPSK	2Tx	0.083	19.17	-
					16QAM	2Tx	0.058	17.62	-
					64QAM	2Tx	0.042	16.22	-
				4	QPSK	2Tx	0.071	18.50	-
					π/2 BPSK	2Tx	0.071	18.52	-
					16QAM	2Tx	0.058	17.65	-
					64QAM	2Tx	0.040	16.03	-
N-Patch	n260	50	37050 - 39950	3	QPSK	2Tx	0.131	21.19	149MG7D
					π/2 BPSK	2Tx	0.129	21.10	148MG7D
					16QAM	2Tx	0.091	19.58	149MW7D
					64QAM	2Tx	0.071	18.49	149MW7D
				4	QPSK	MIMO	0.110	20.41	196MG7D
					π/2 BPSK	2Tx	0.105	20.20	198MG7D
					16QAM	2Tx	0.108	20.35	196MW7D
					64QAM	2Tx	0.078	18.92	198MW7D
		100	37050 - 39950	3	QPSK	2Tx	0.107	20.29	298MG7D
					π/2 BPSK	2Tx	0.108	20.32	295MG7D
					16QAM	2Tx	0.077	18.88	297MW7D
					64QAM	2Tx	0.055	17.38	299MW7D
				4	QPSK	2Tx	0.104	20.16	395MG7D
					π/2 BPSK	2Tx	0.102	20.08	394MG7D
					16QAM	2Tx	0.100	19.99	394MW7D
					64QAM	2Tx	0.074	18.72	395MW7D

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: A3LSMS901U C2PC**. 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 Ant1 and 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.: 0264M, 0267M, 1517M

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 S901USQU2AVDA 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.

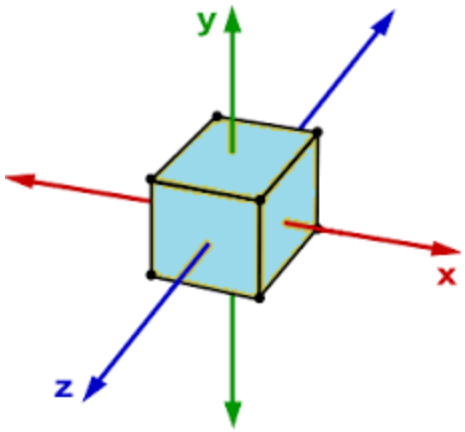


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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
	AP1	EMC Cable and Switch System	9/10/2021	Annual	9/10/2022	AP1
	AP2	EMC Cable and Switch System	9/3/2021	Annual	9/3/2022	AP2
ETS-Lindgren	3116C	DRG Horn Antenna	5/11/2021	Biennial	5/11/2023	218893
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	125518
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	8/12/2020	Triennial	8/12/2023	18073001
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and spectrum analyzer	2/2/2022	Annual	2/2/2023	103187
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/25/2021	Annual	8/25/2022	103200
Rohde & Schwarz	SMW200A	Signal Generator	N/A			190456
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
UTiFlex	UTiFlex	1m UTiFlex 40GHz	9/10/2021	Annual	9/10/2022	232063-001

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: A3LSMS901U

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

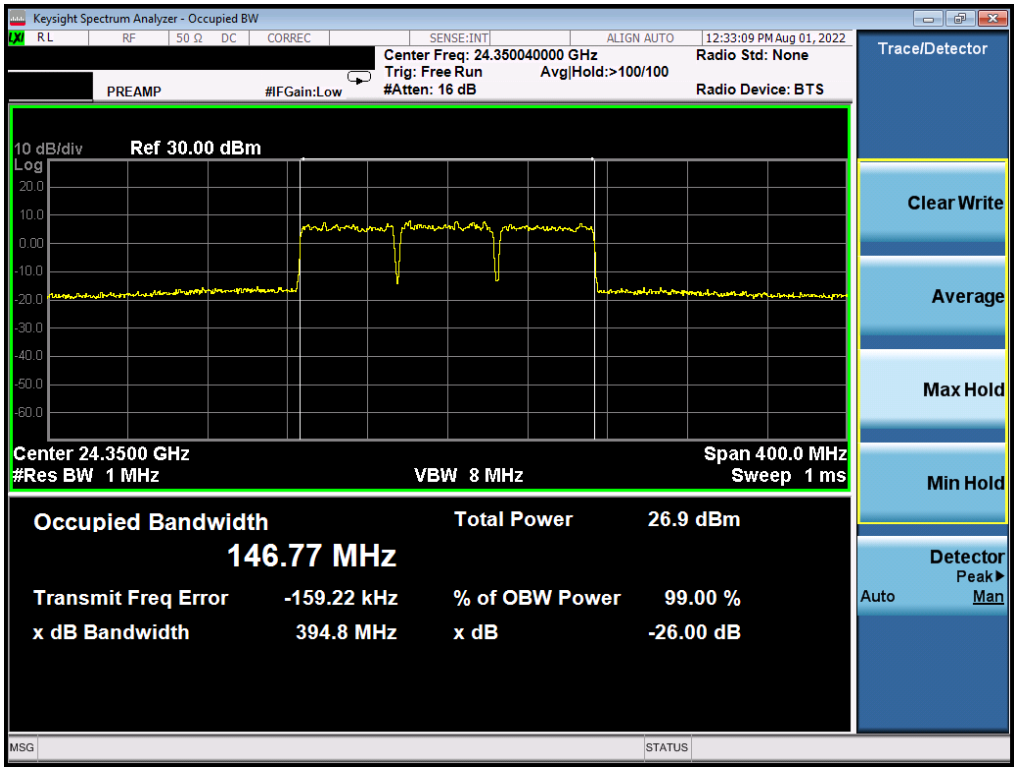
Test Notes

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.

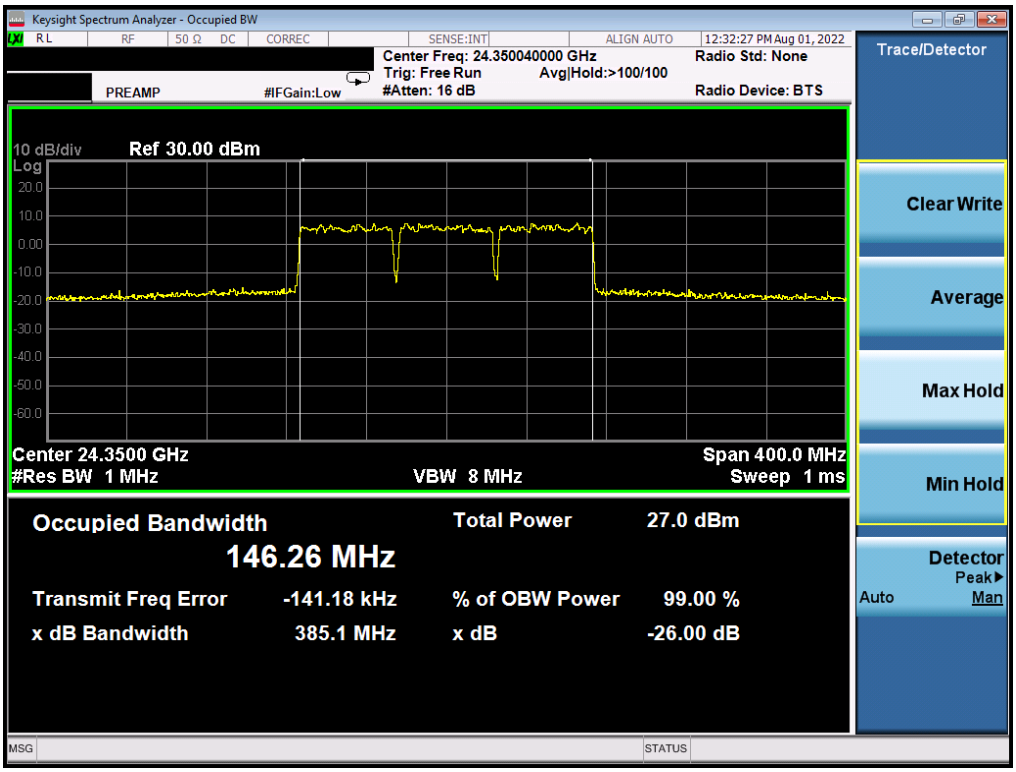
Band n258-R1 (M Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M-Patch	50MHz	3	DFTs OFDM	QPSK	146.77
			DFTs OFDM	π/2 BPSK	146.26
			CP OFDM	16QAM	146.85
			CP OFDM	64QAM	145.72
		4	CP OFDM	QPSK	195.90
			DFTs OFDM	π/2 BPSK	193.90
			DFTs OFDM	16QAM	196.19
			CP OFDM	64QAM	197.21

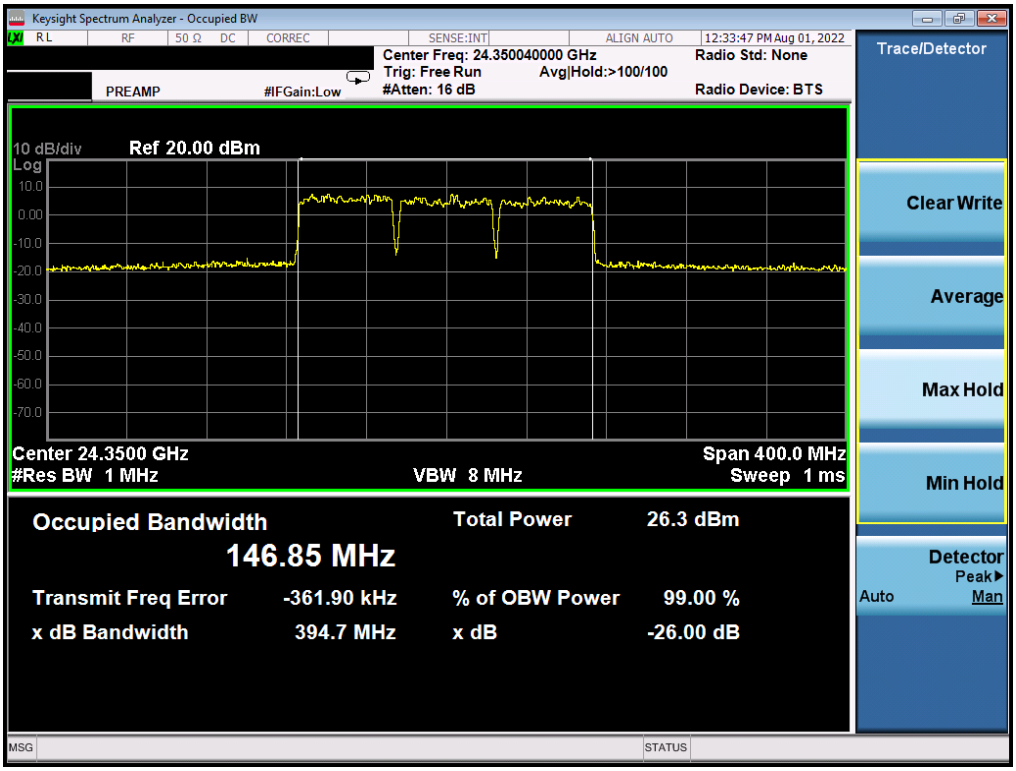
Table 7-2. Summary of Occupied Bandwidths (n258-R1)



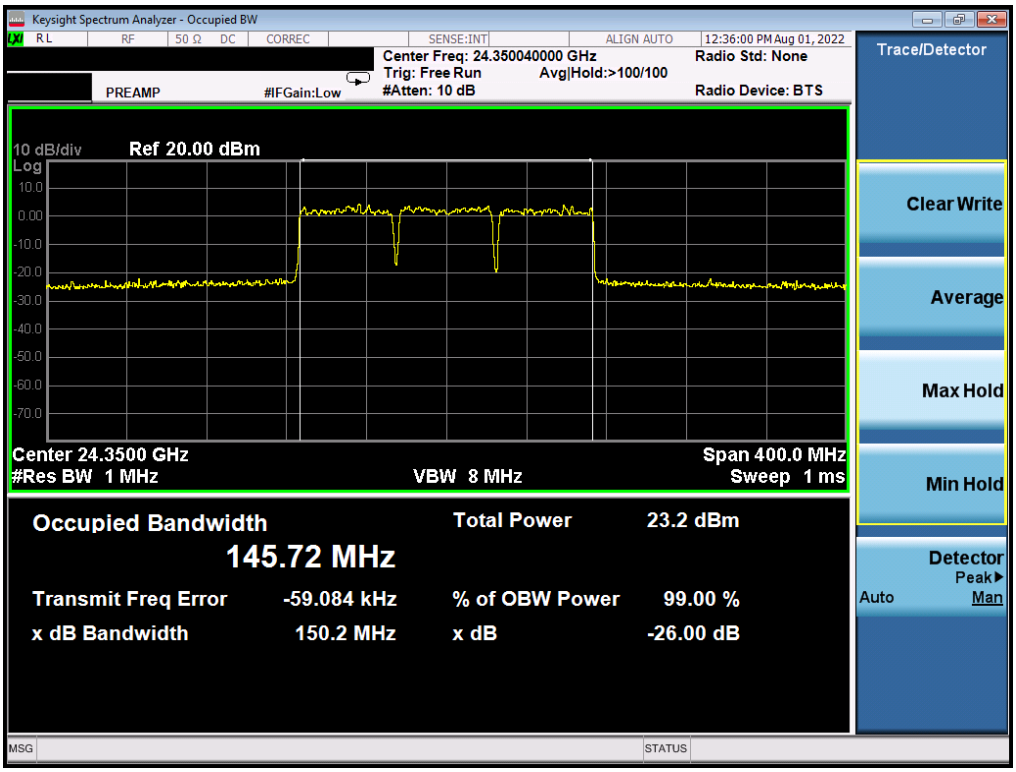
Plot 7-1. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



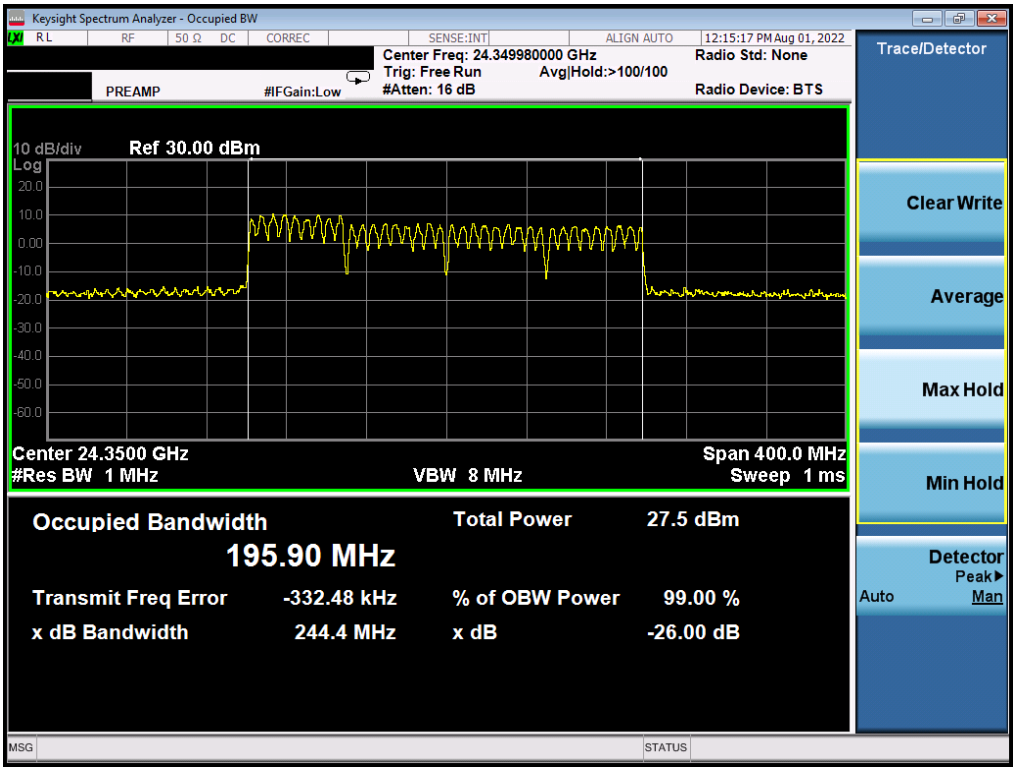
Plot 7-2. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



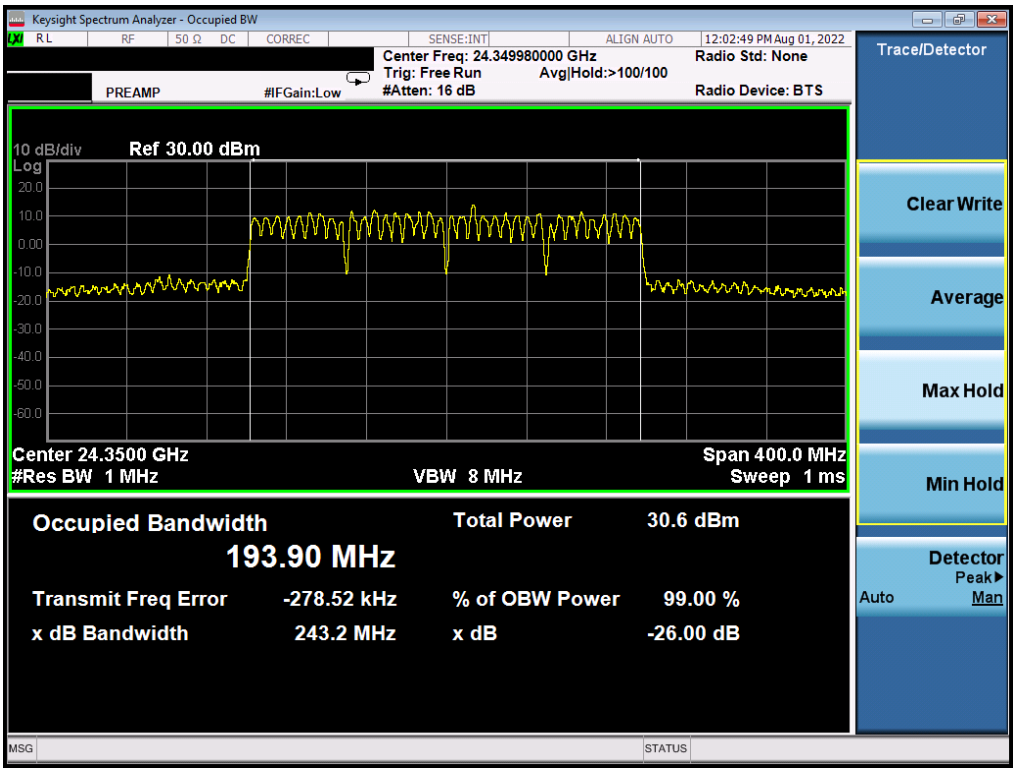
Plot 7-3. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



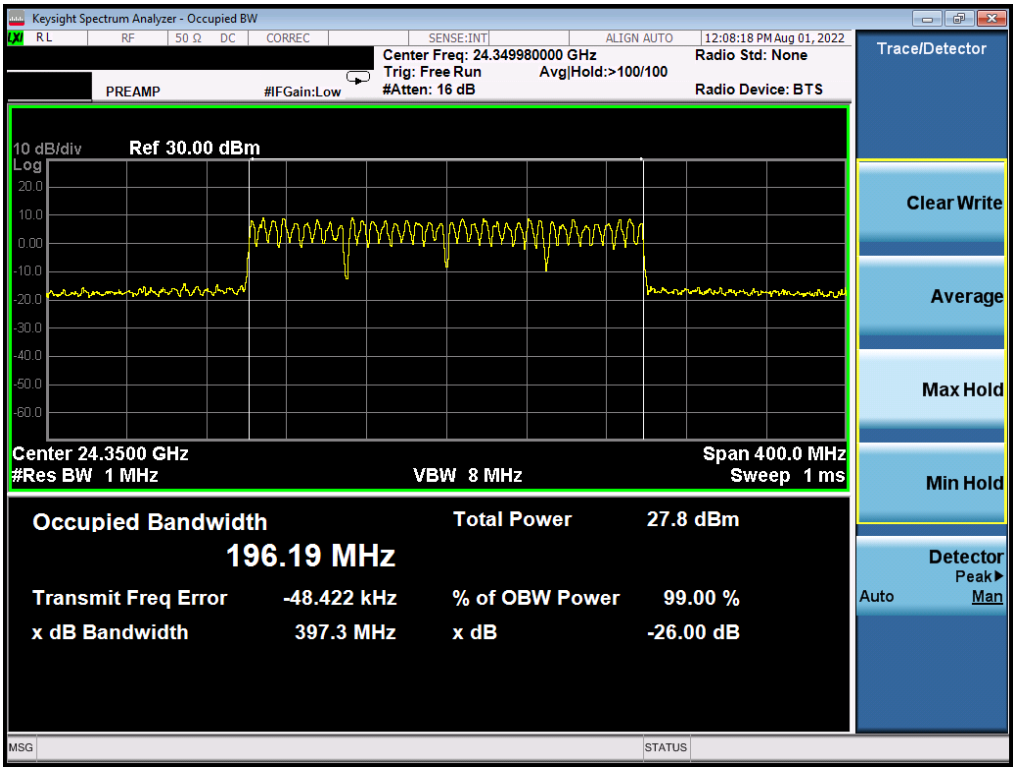
Plot 7-4. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



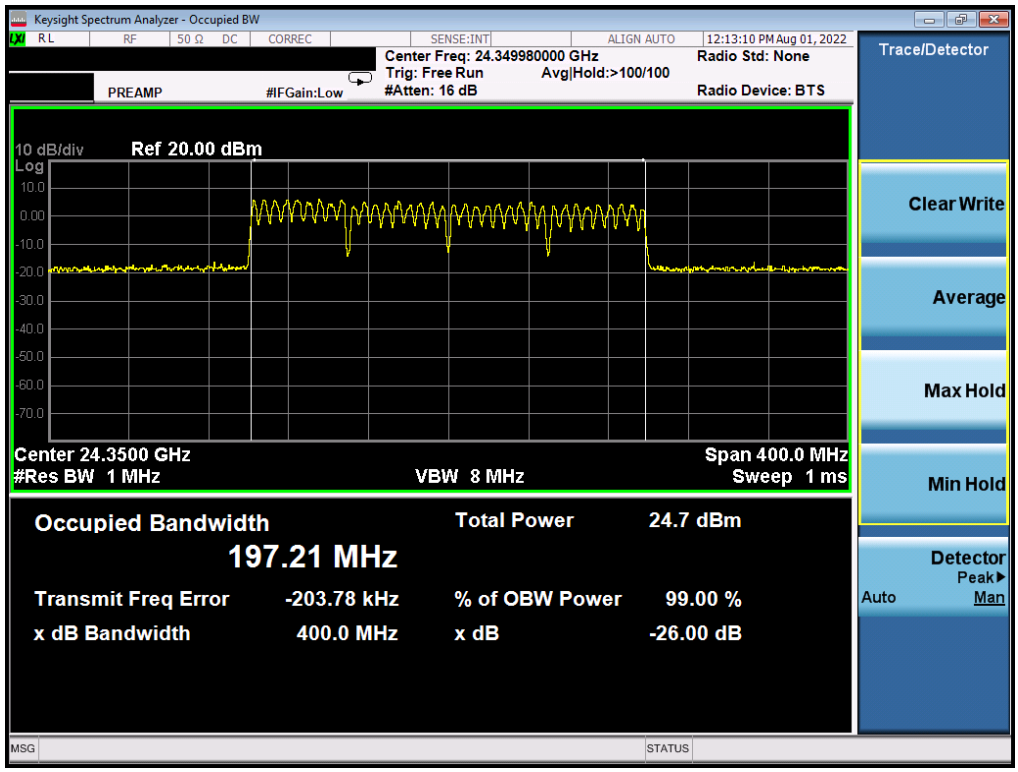
Plot 7-5. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



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



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

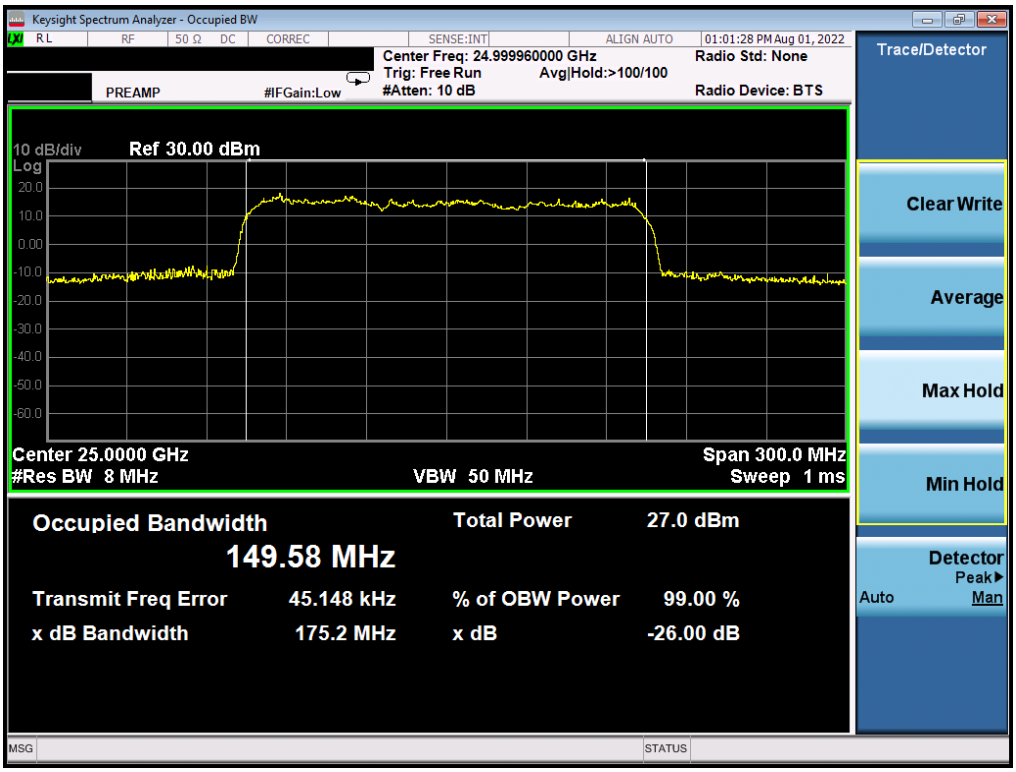


Plot 7-8. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)

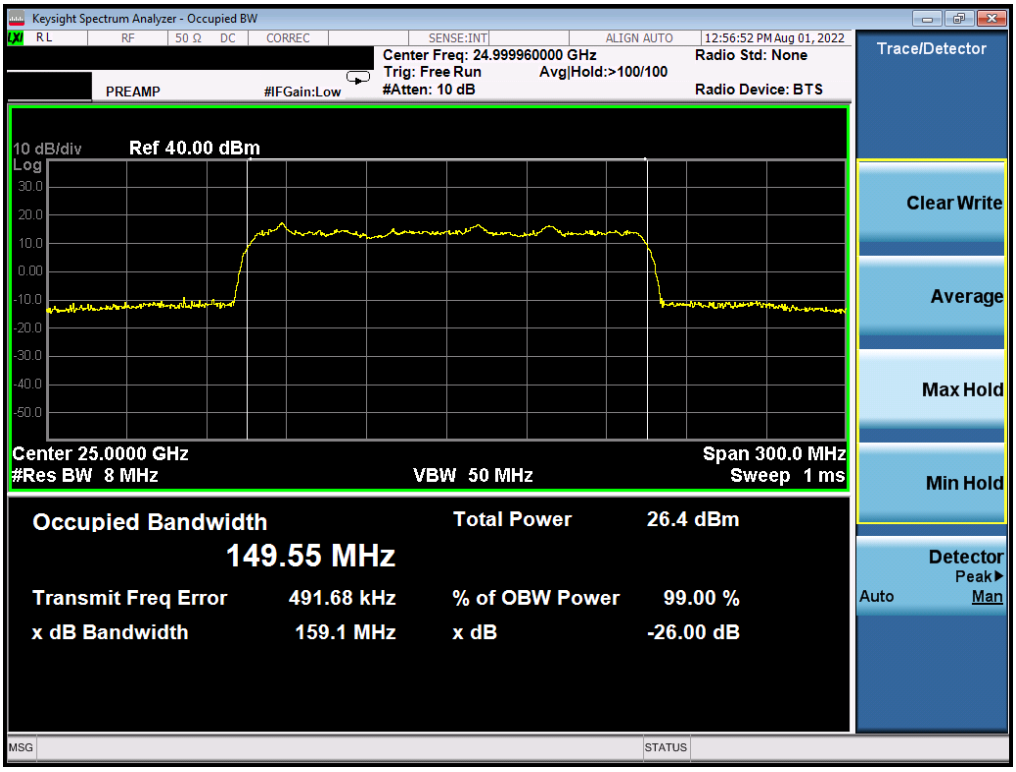
Band n258-R2 (M Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
M-Patch	50	3	CP OFDM	QPSK	149.58
			DFTs OFDM	π/2 BPSK	149.55
			CP OFDM	16QAM	149.77
			CP OFDM	64QAM	149.14
		4	DFTs OFDM	QPSK	193.77
			DFTs OFDM	π/2 BPSK	194.42
			CP OFDM	16QAM	193.80
			CP OFDM	64QAM	194.14
	100	3	CP OFDM	QPSK	292.15
			DFTs OFDM	π/2 BPSK	293.40
			CP OFDM	16QAM	292.43
			CP OFDM	64QAM	293.63
		4	CP OFDM	QPSK	393.18
			DFTs OFDM	π/2 BPSK	392.45
			CP OFDM	16QAM	394.95
			CP OFDM	64QAM	395.74

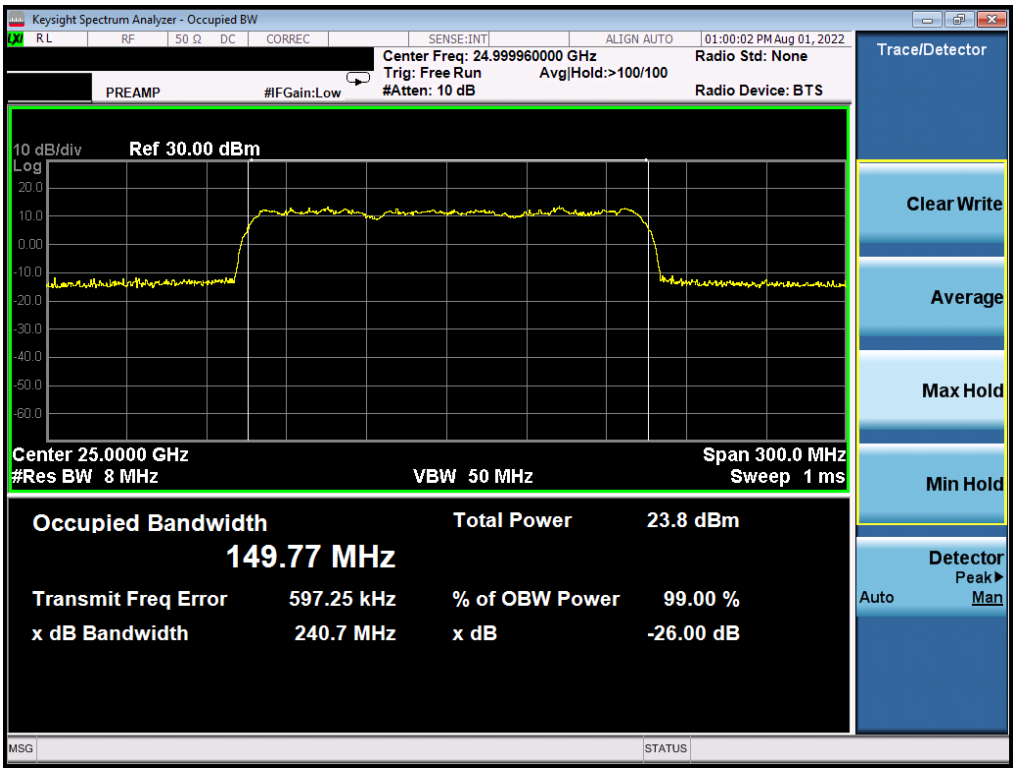
Table 7-3. Summary of Occupied Bandwidths (n258-R2)



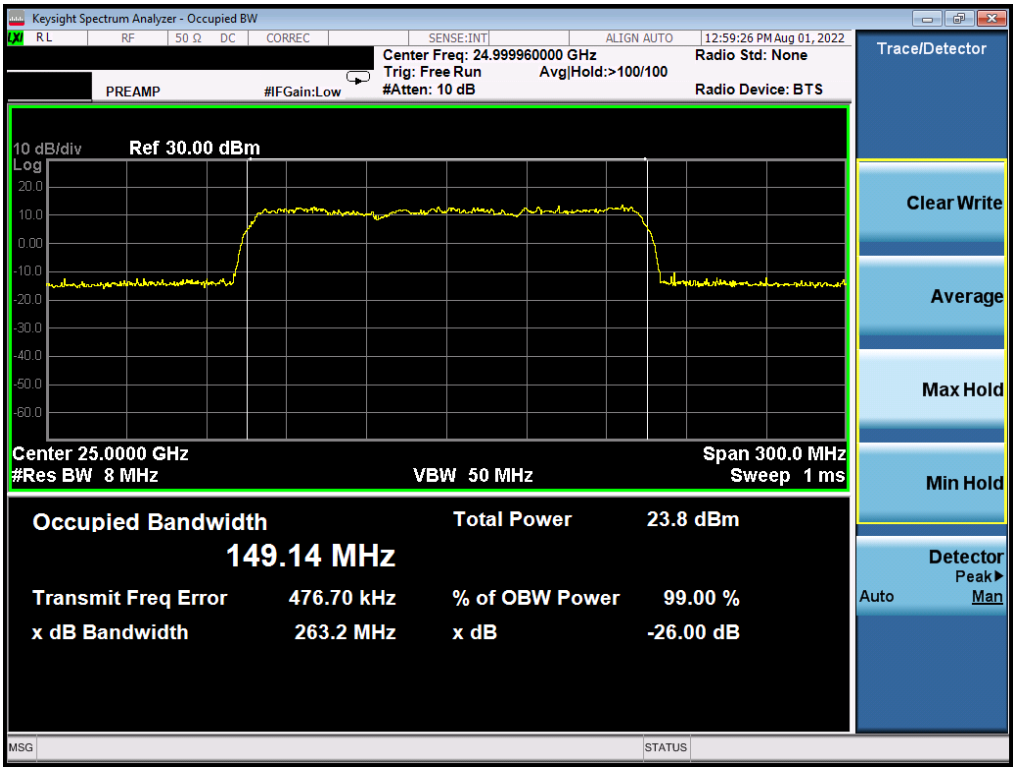
Plot 7-9. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



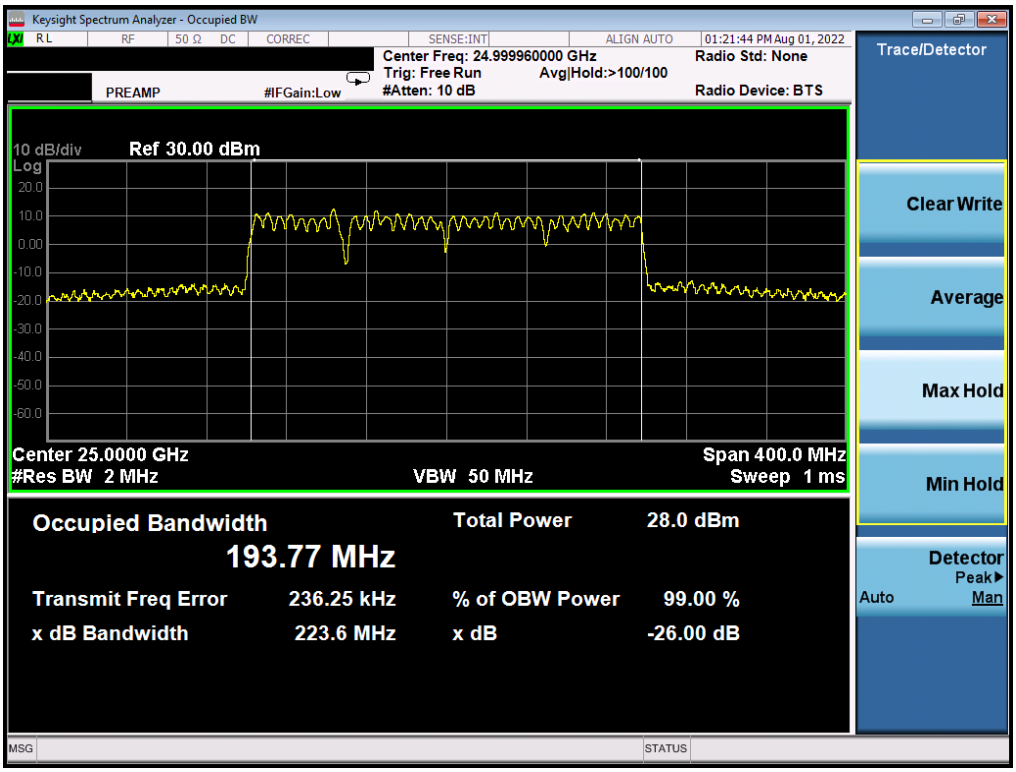
Plot 7-10. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



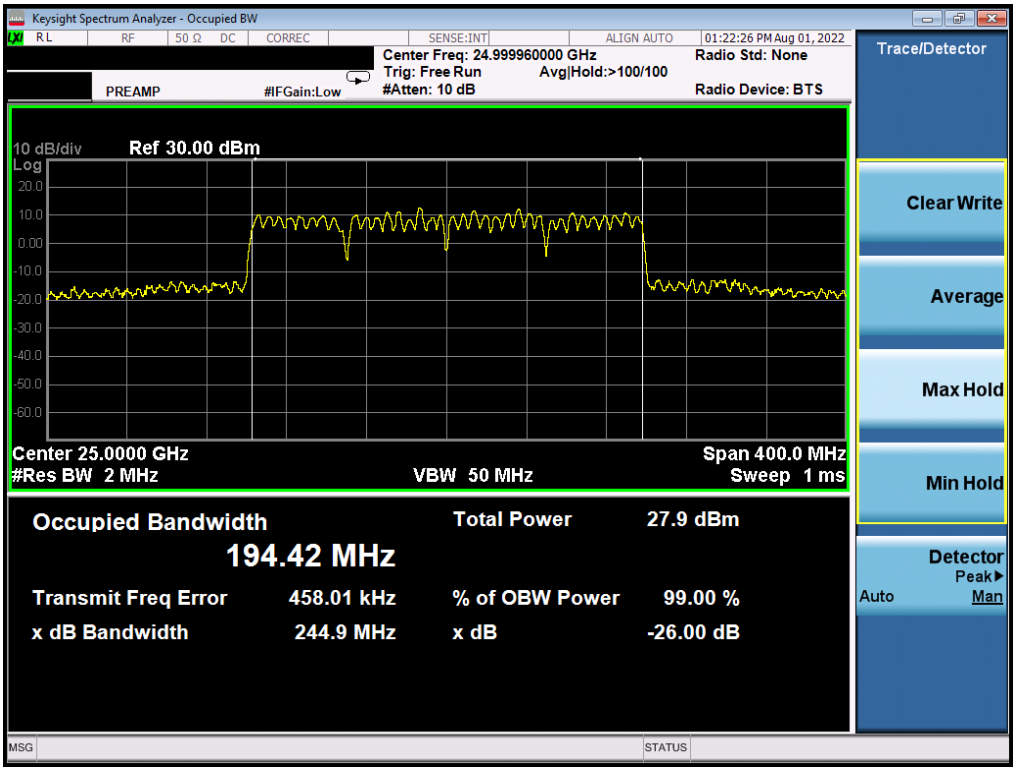
Plot 7-11. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



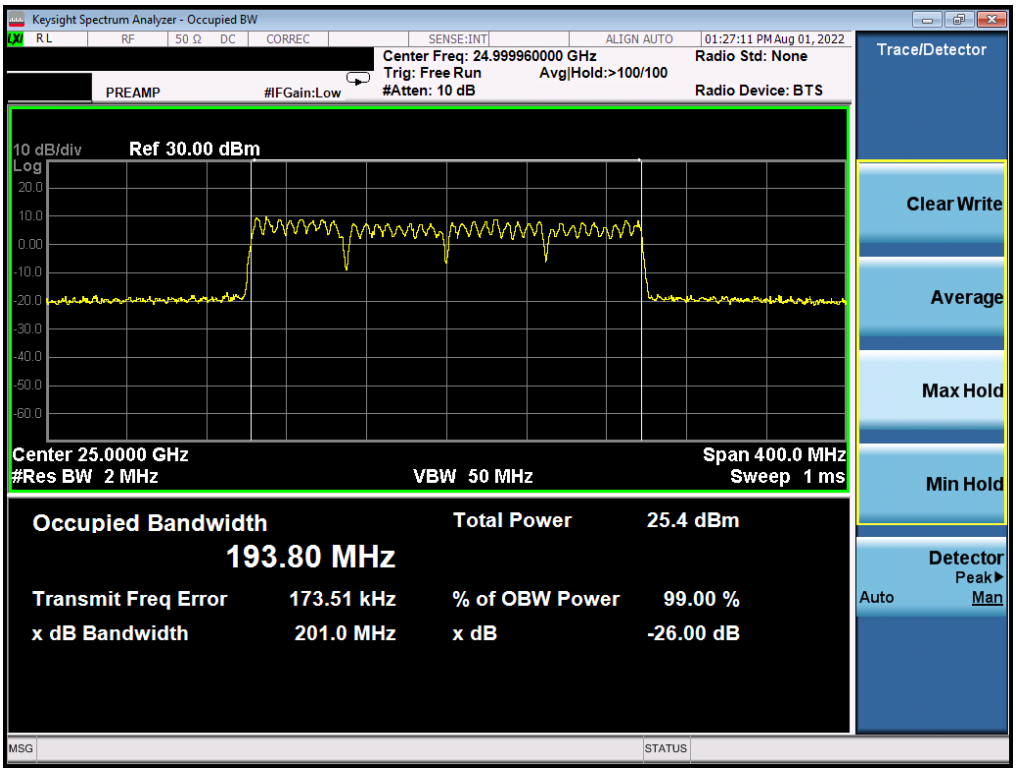
Plot 7-12. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



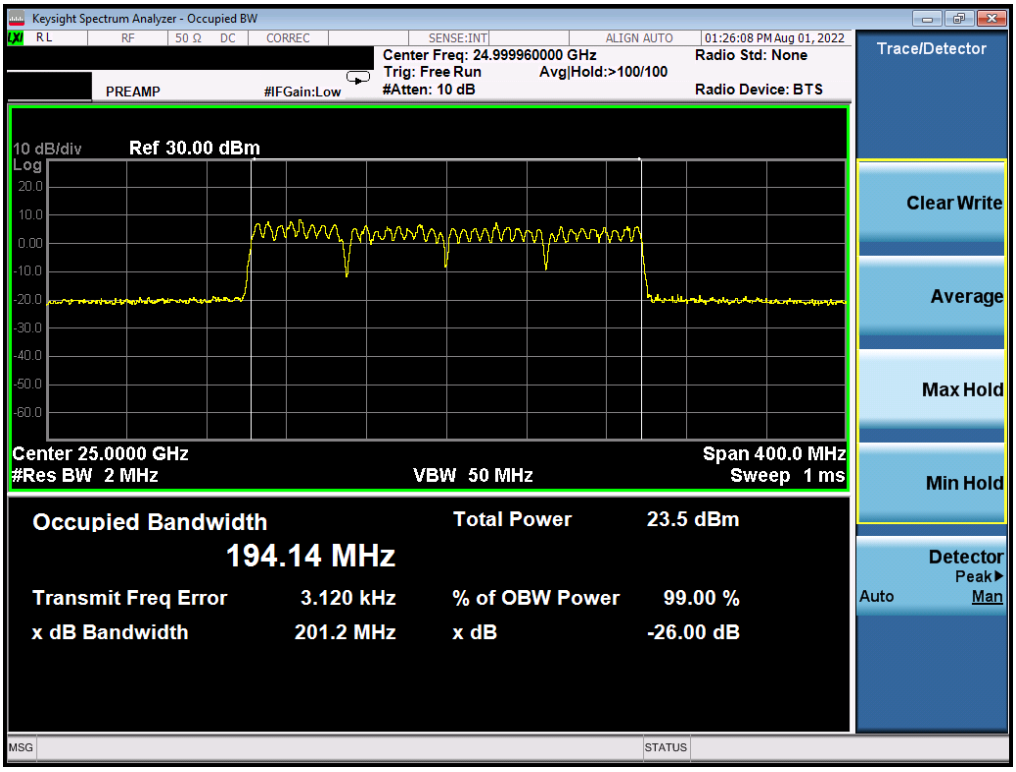
Plot 7-13. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



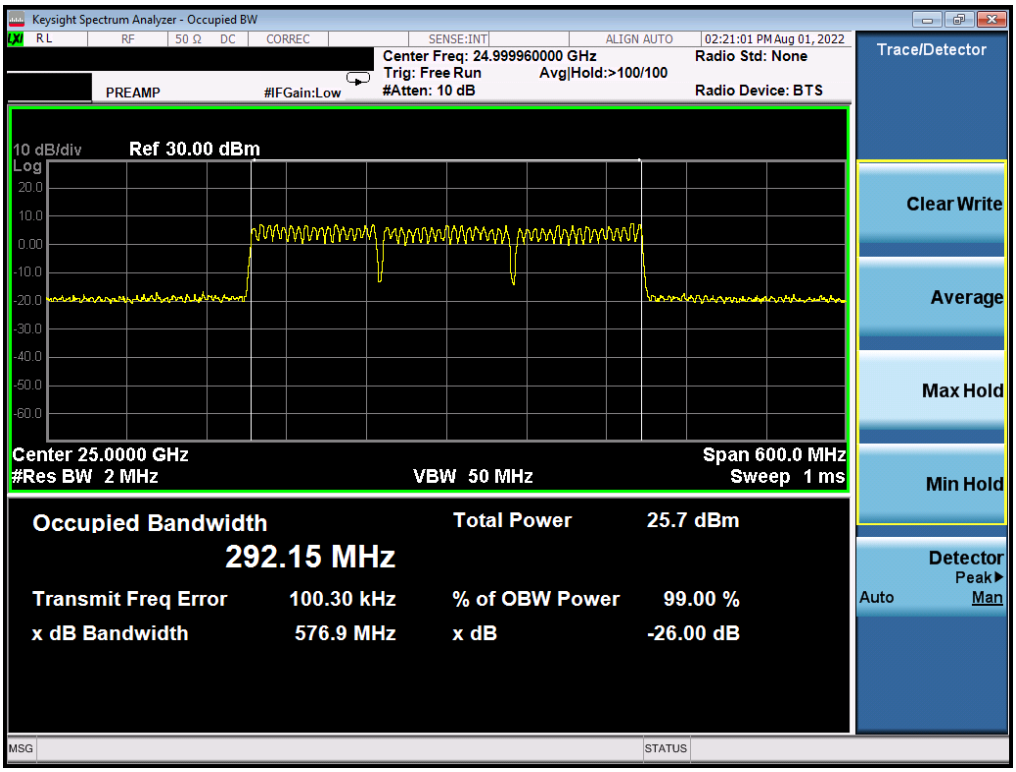
Plot 7-14. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



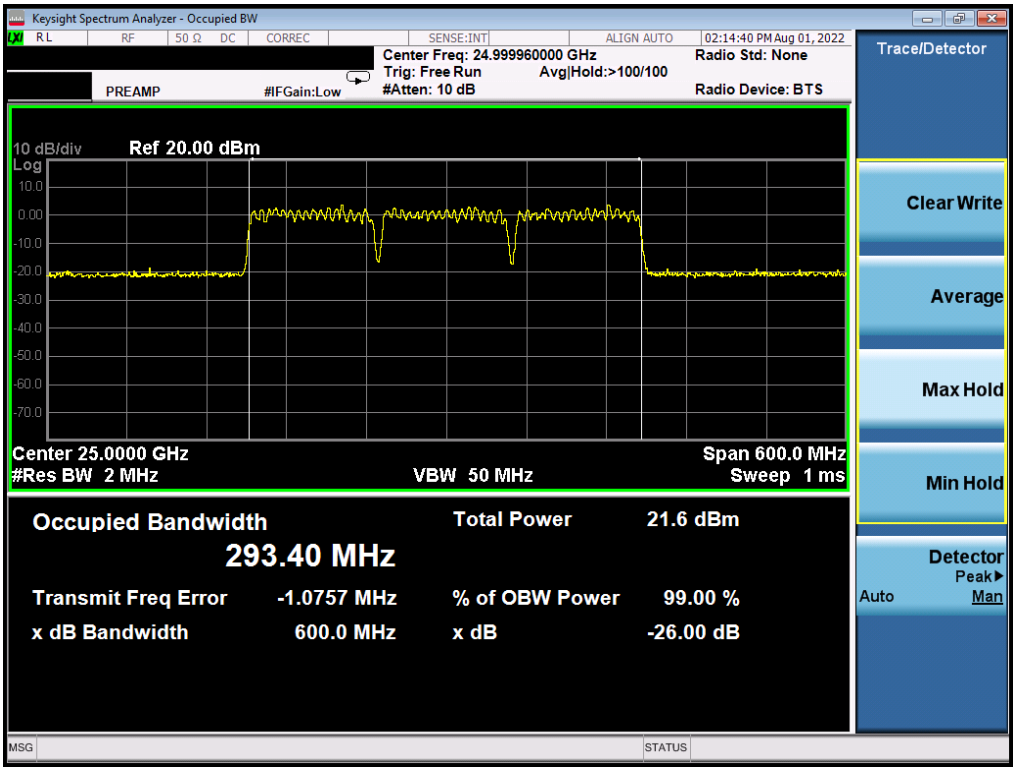
Plot 7-15. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



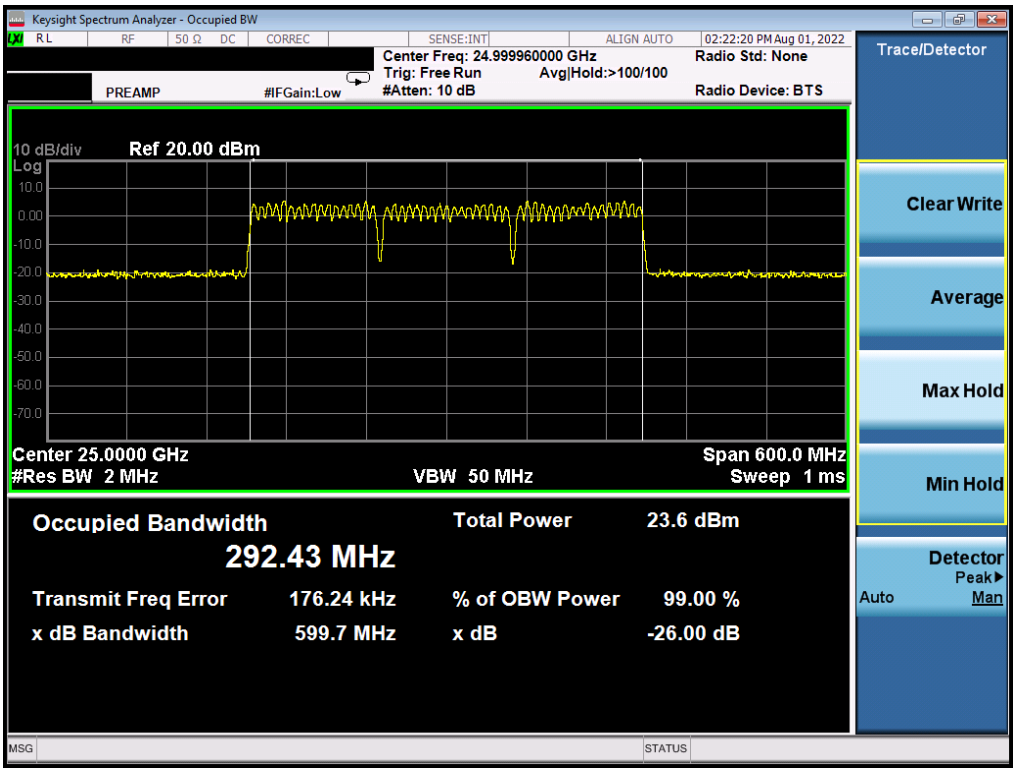
Plot 7-16. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



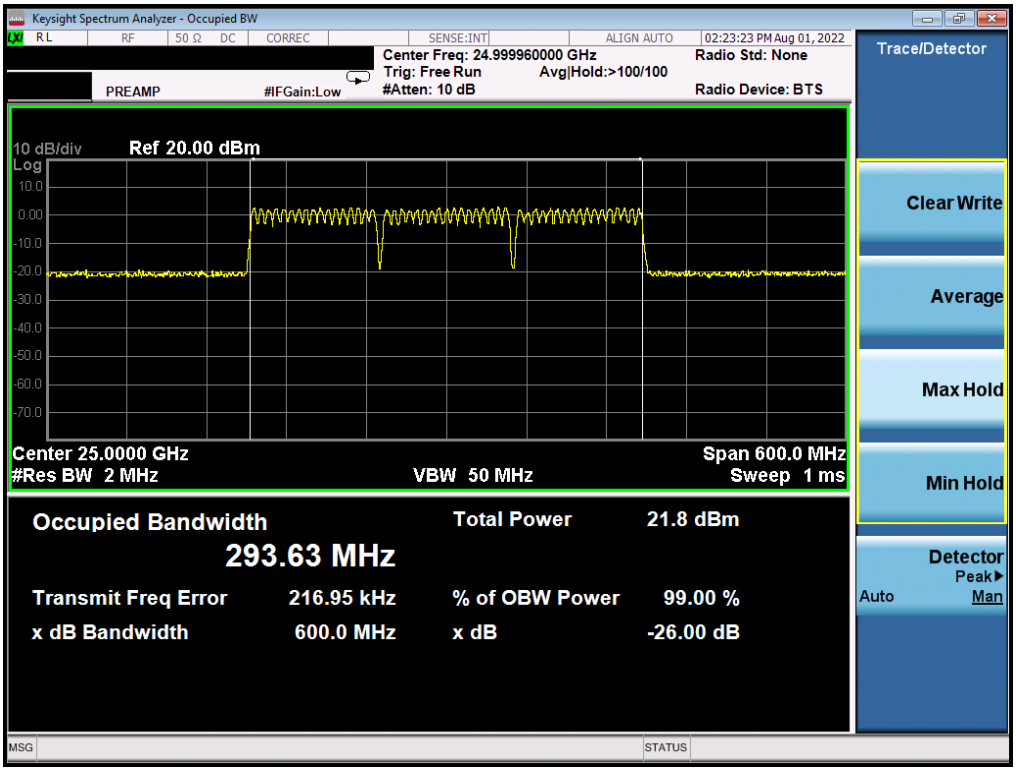
Plot 7-17. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



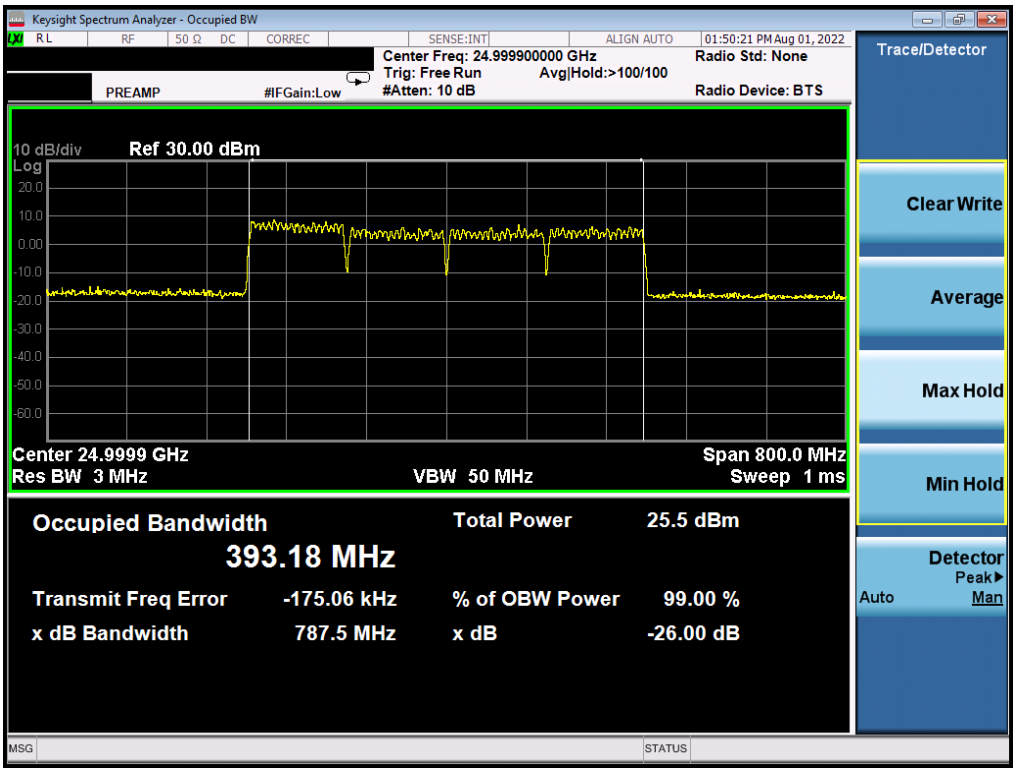
Plot 7-18. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



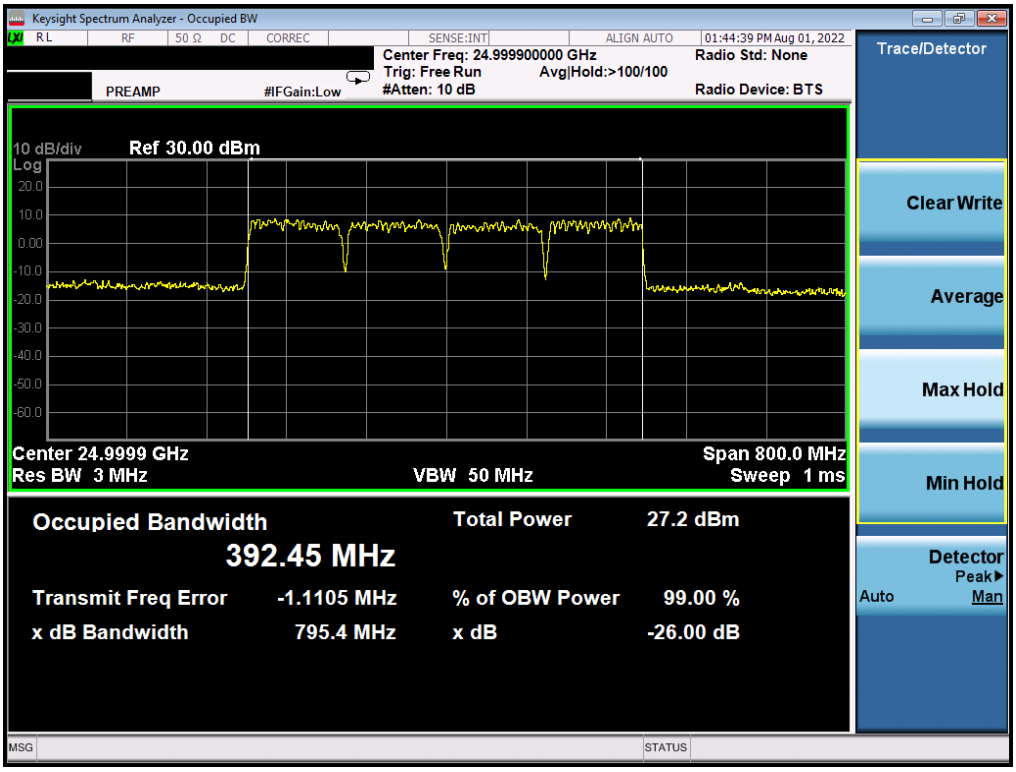
Plot 7-19. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



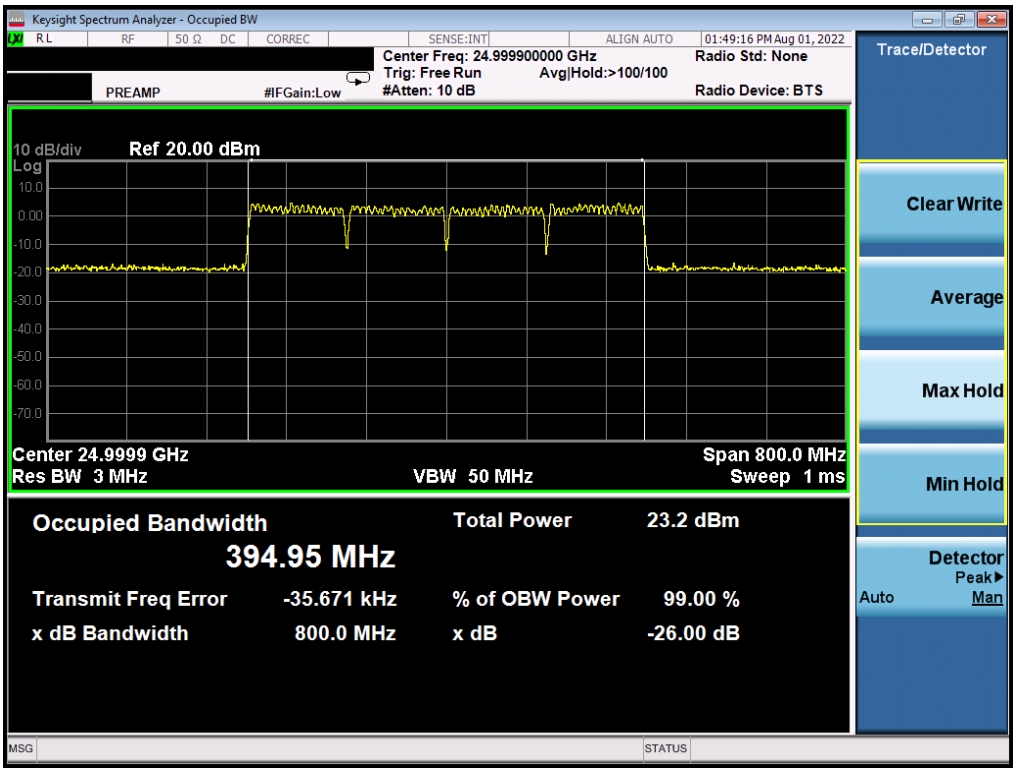
Plot 7-20. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



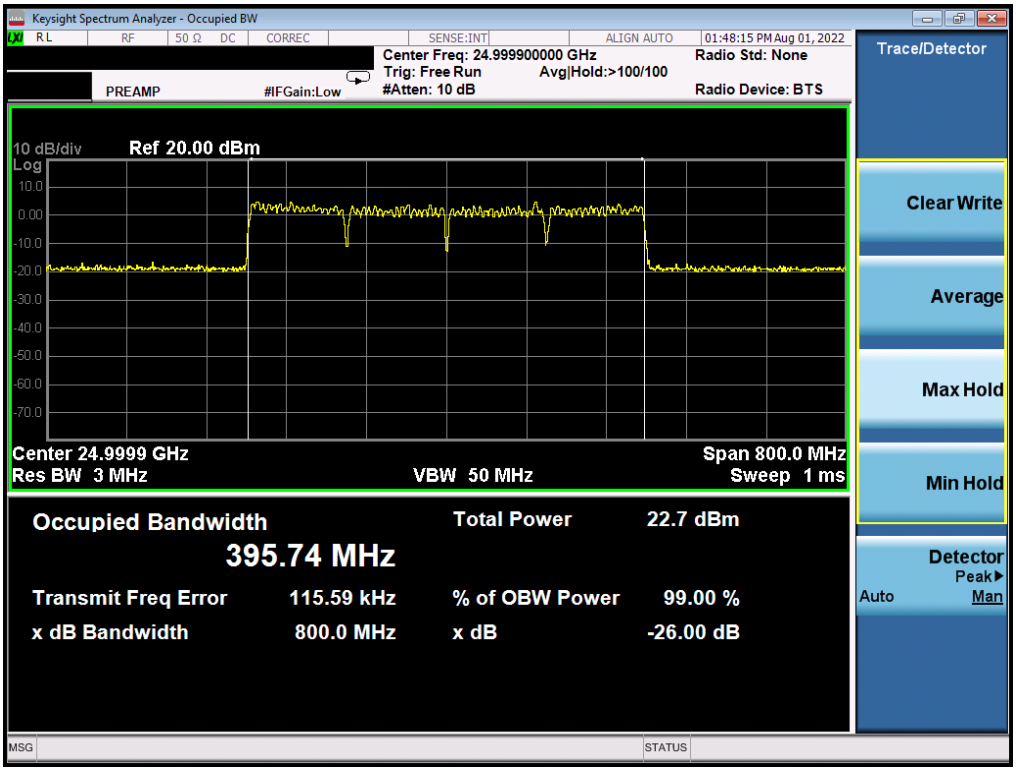
Plot 7-21. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



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



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

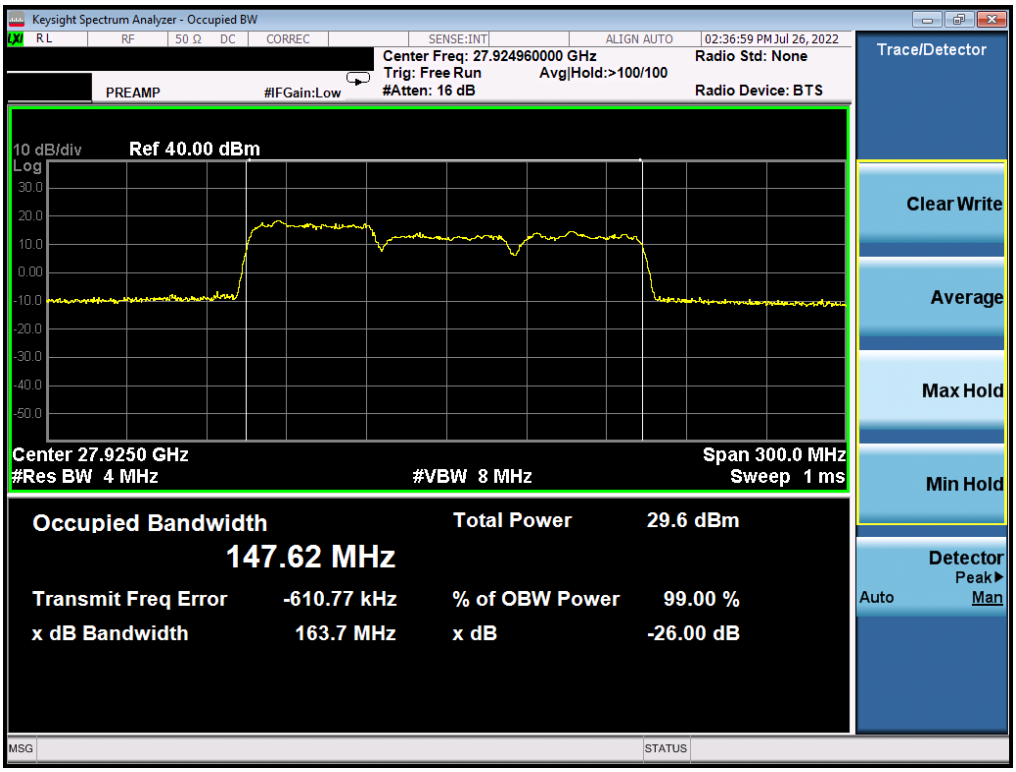


Plot 7-24. Occupied Bandwidth Plot (100MHz-4CC – 64QAM – Mid Channel)

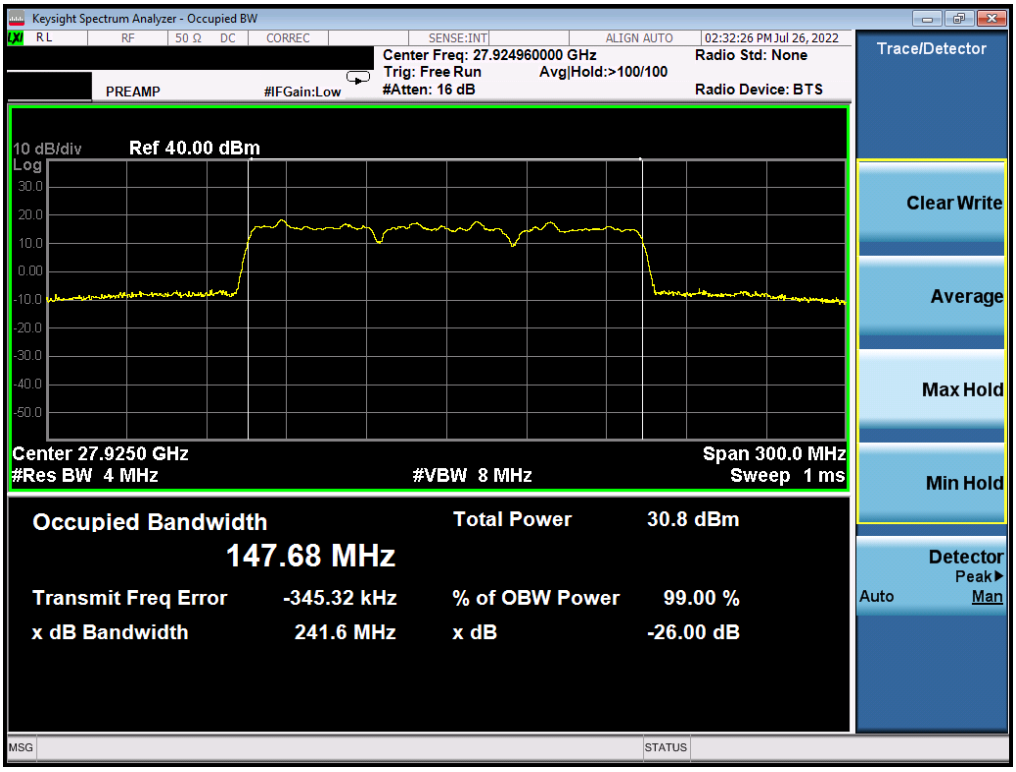
Band n261 (N Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
N-Patch	50	3	CP OFDM	QPSK	147.62
			DFTs OFDM	π/2 BPSK	147.68
			CP OFDM	16QAM	147.62
			CP OFDM	64QAM	148.40
		4	DFTs OFDM	QPSK	195.47
			DFTs OFDM	π/2 BPSK	196.50
			CP OFDM	16QAM	195.52
			CP OFDM	64QAM	196.60
	100	3	CP OFDM	QPSK	293.08
			DFTs OFDM	π/2 BPSK	291.70
			CP OFDM	16QAM	293.89
			CP OFDM	64QAM	293.31
		4	CP OFDM	QPSK	394.56
			DFTs OFDM	π/2 BPSK	395.04
			CP OFDM	16QAM	395.18
			DFTs OFDM	64QAM	396.88

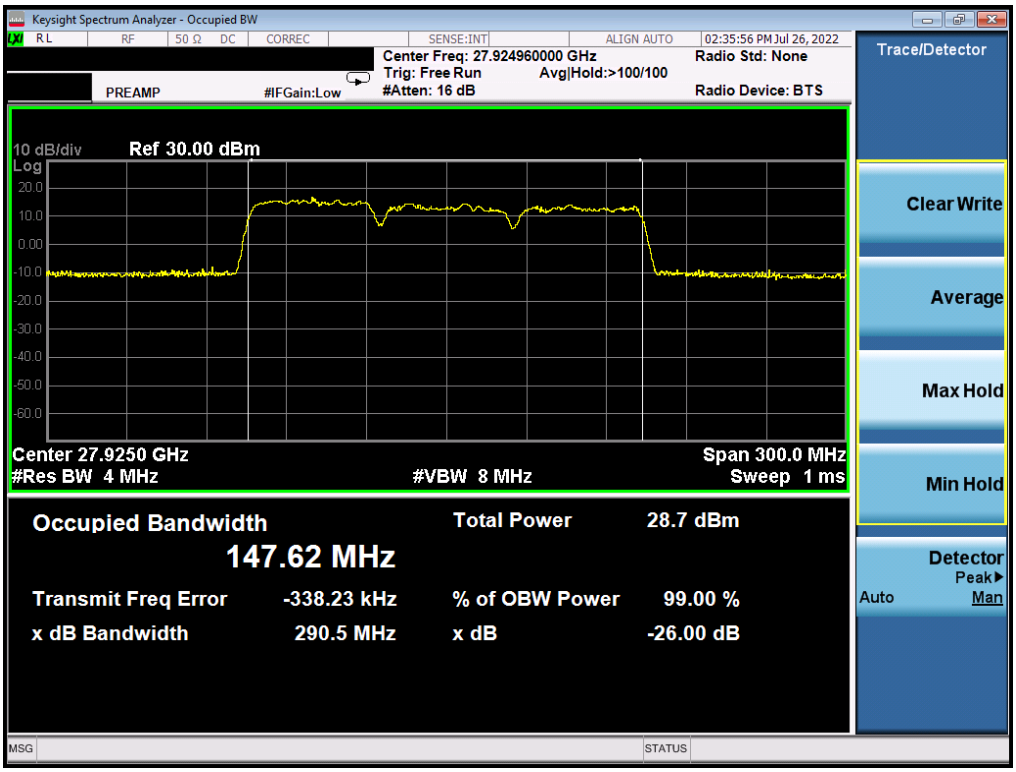
Table 7-4. Summary of Occupied Bandwidths (n261)



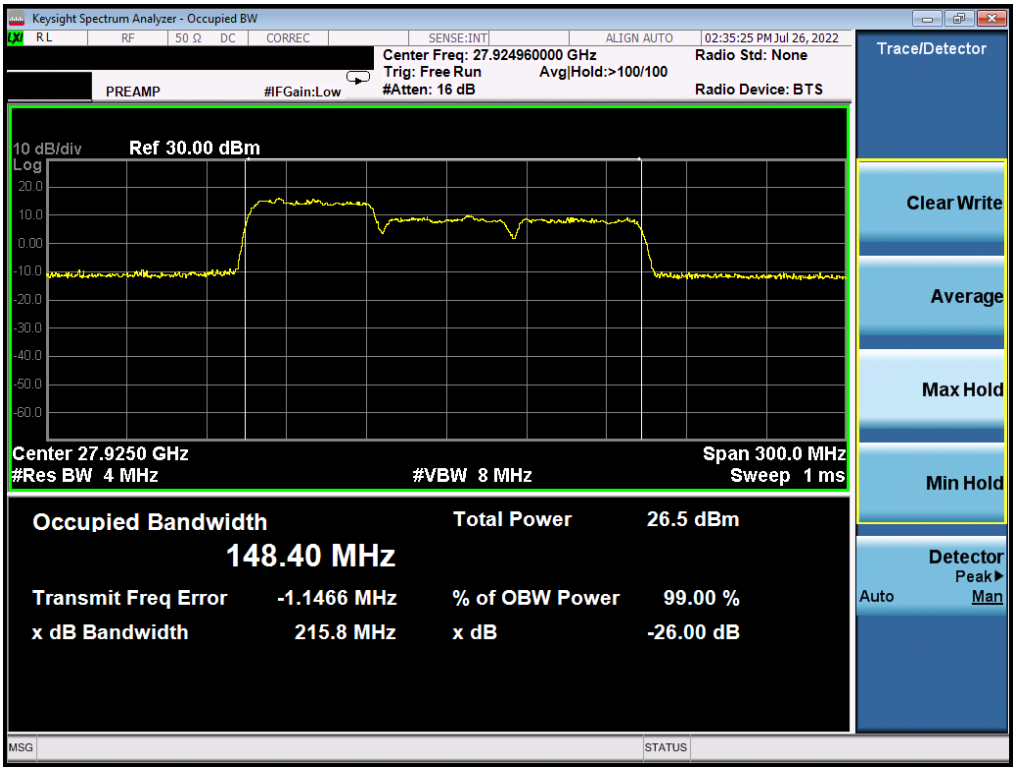
Plot 7-25. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



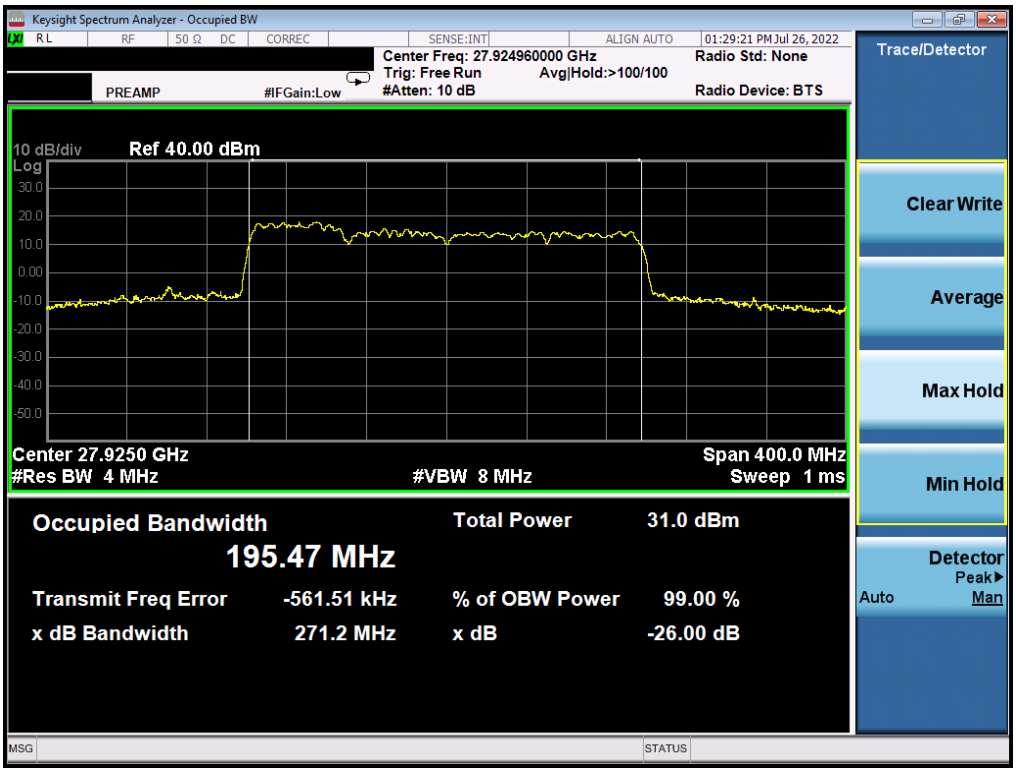
Plot 7-26. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



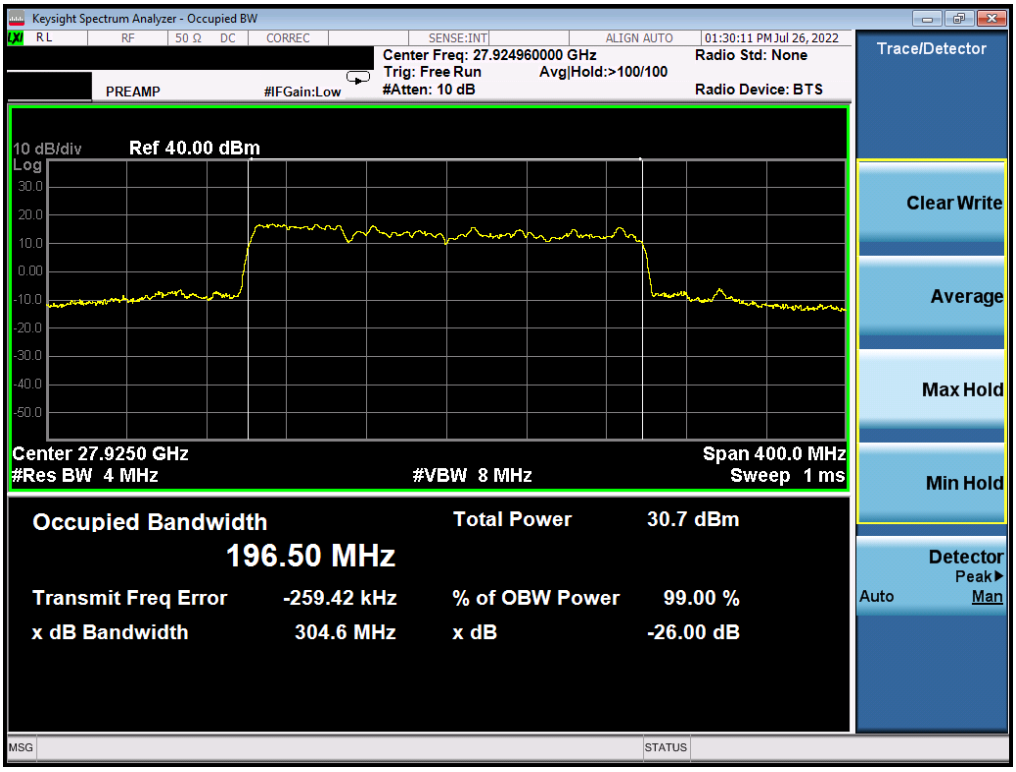
Plot 7-27. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



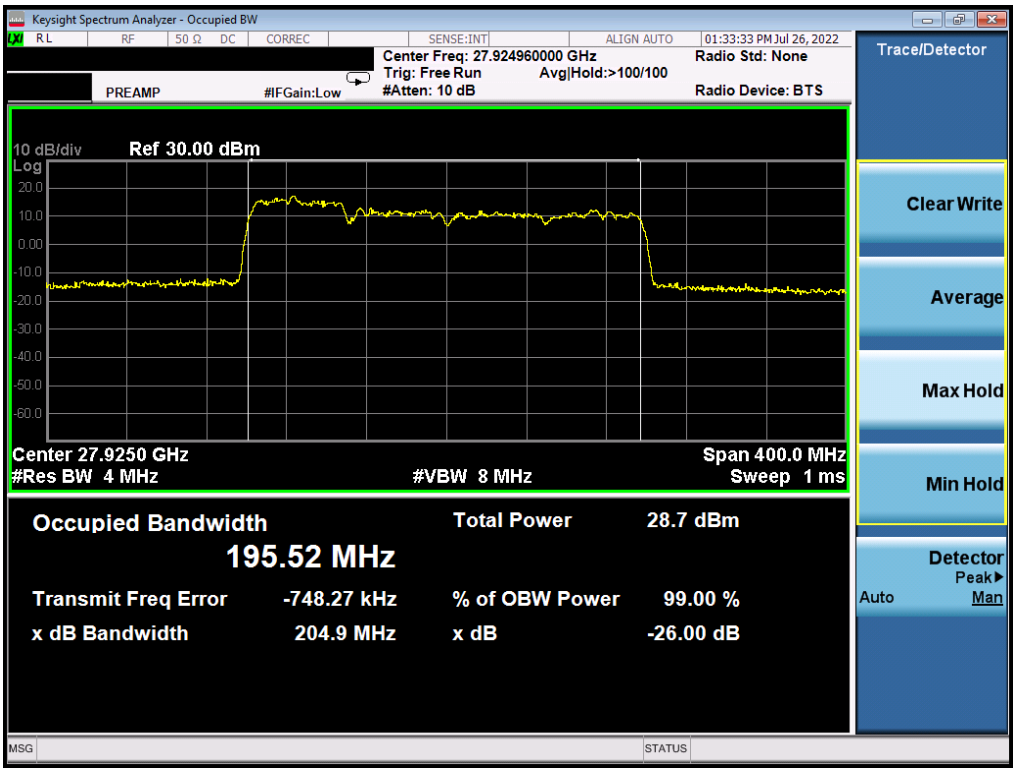
Plot 7-28. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



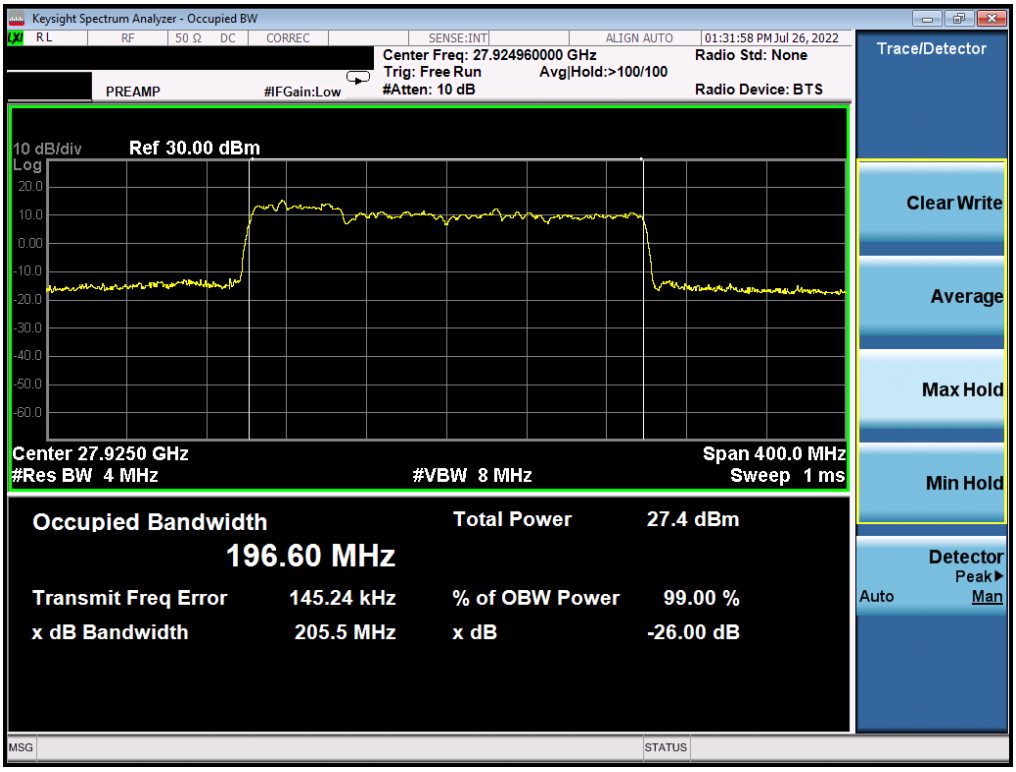
Plot 7-29. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



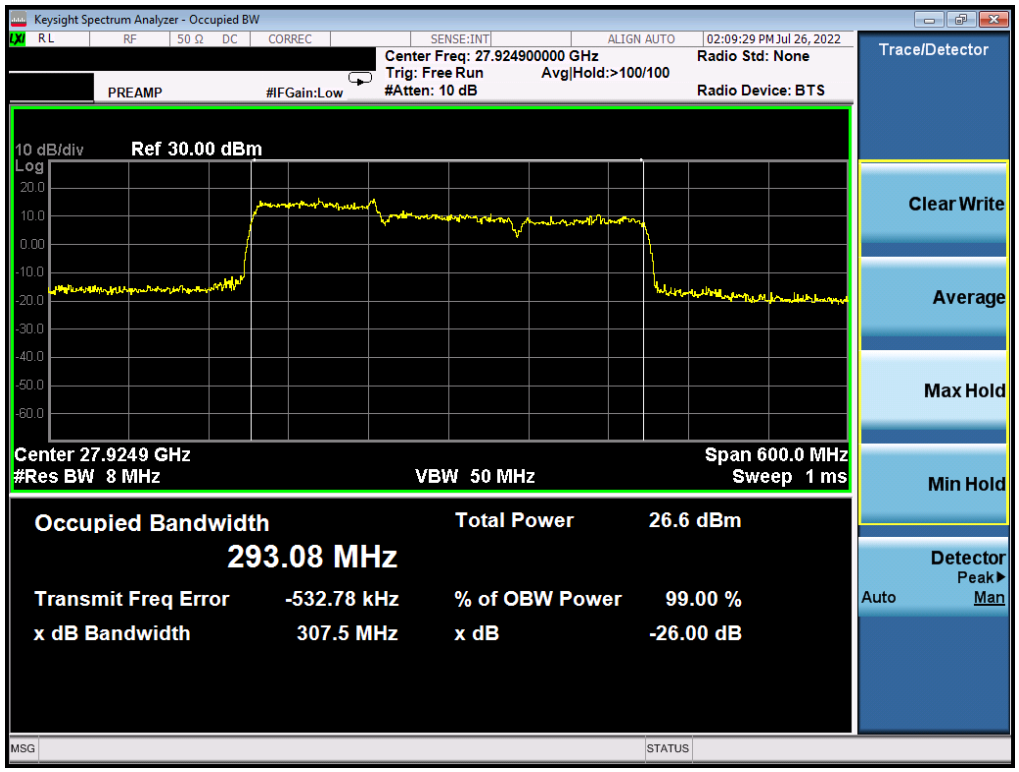
Plot 7-30. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



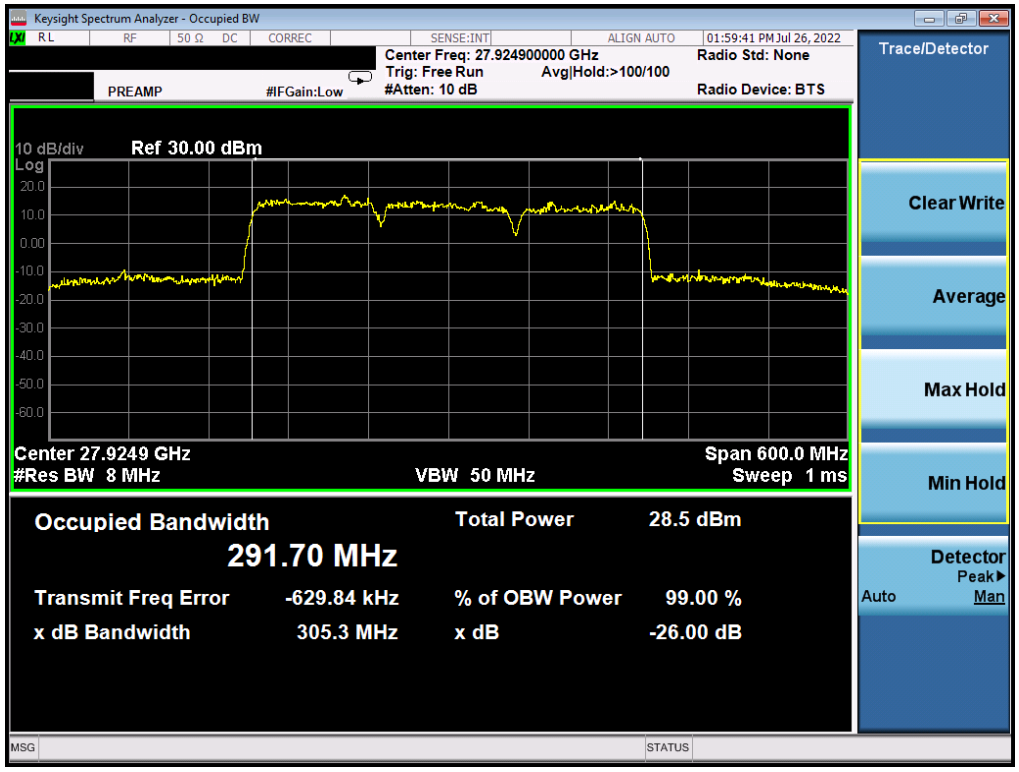
Plot 7-31. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



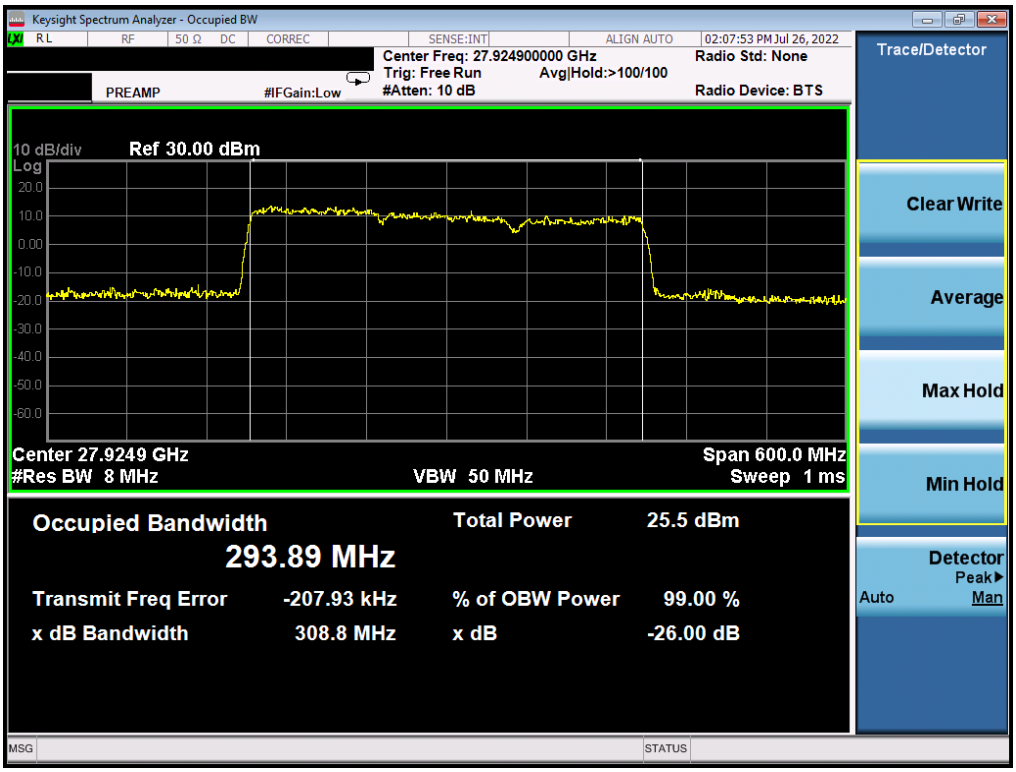
Plot 7-32. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



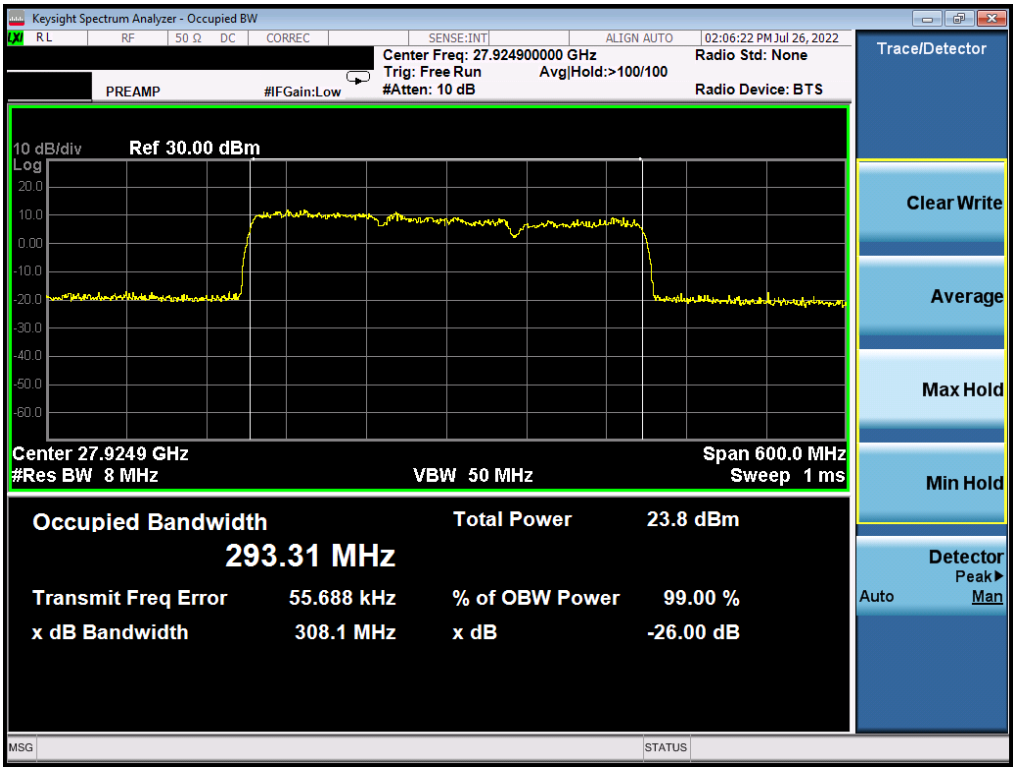
Plot 7-33. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



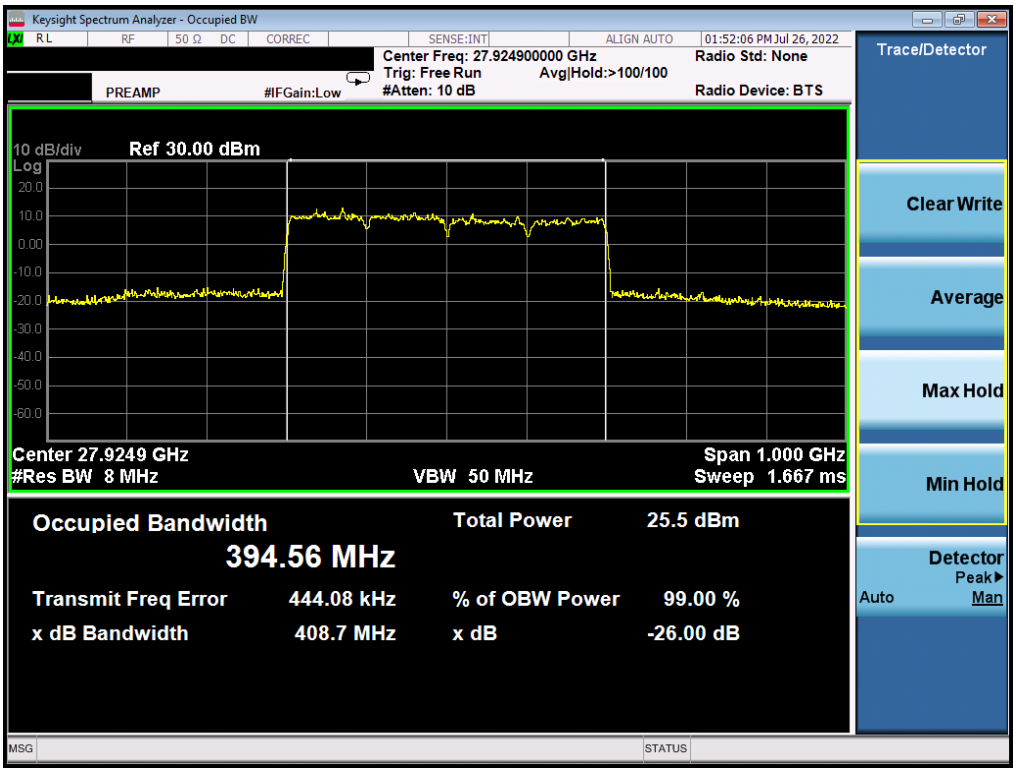
Plot 7-34. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



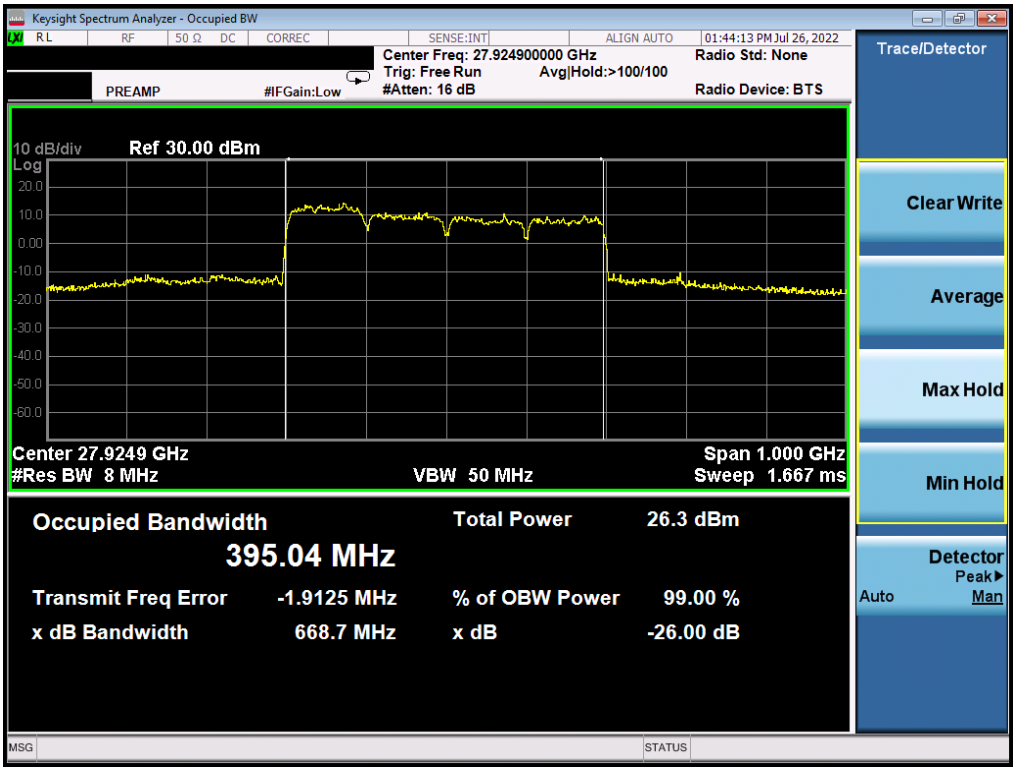
Plot 7-35. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



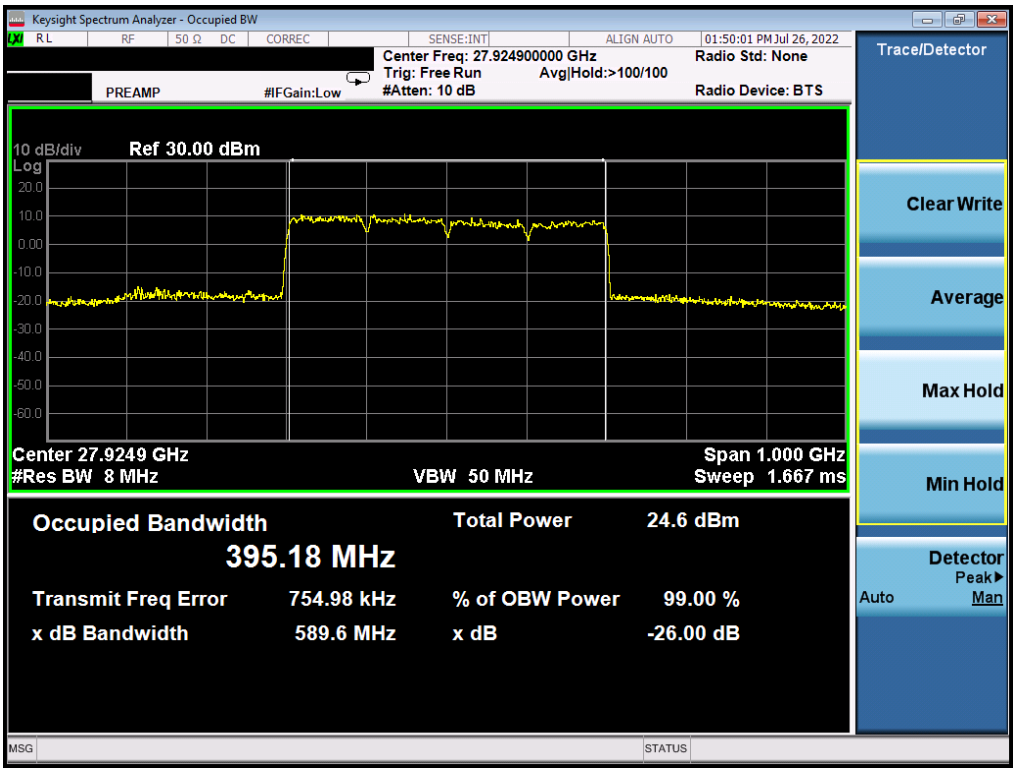
Plot 7-36. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



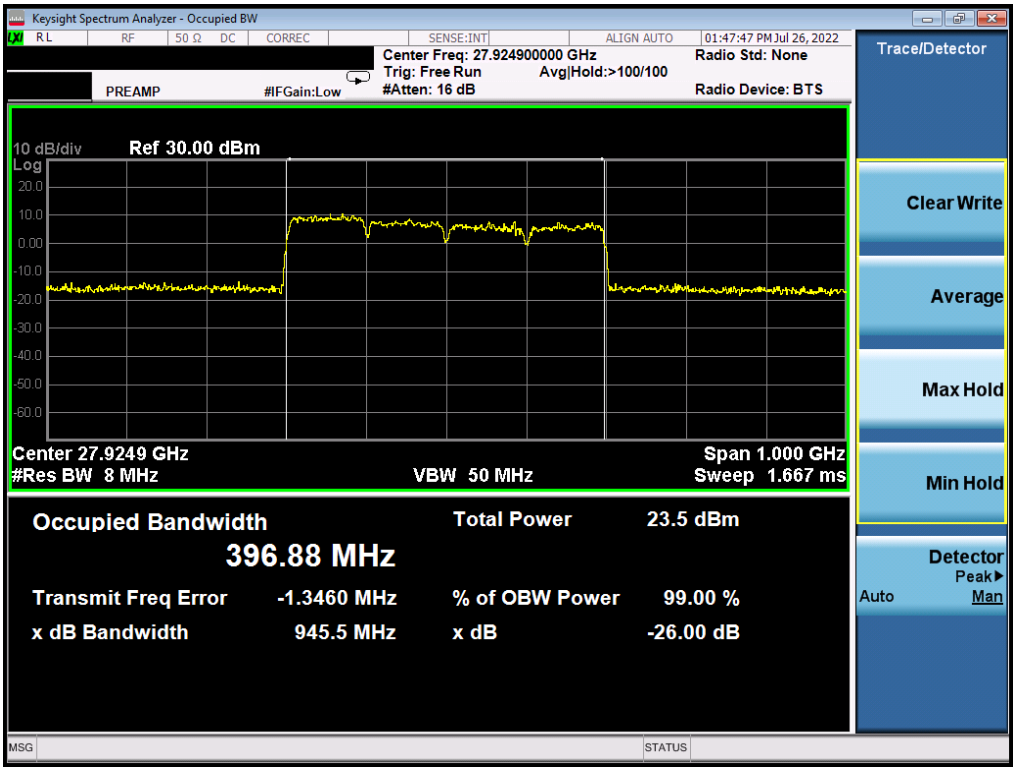
Plot 7-37. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



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



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

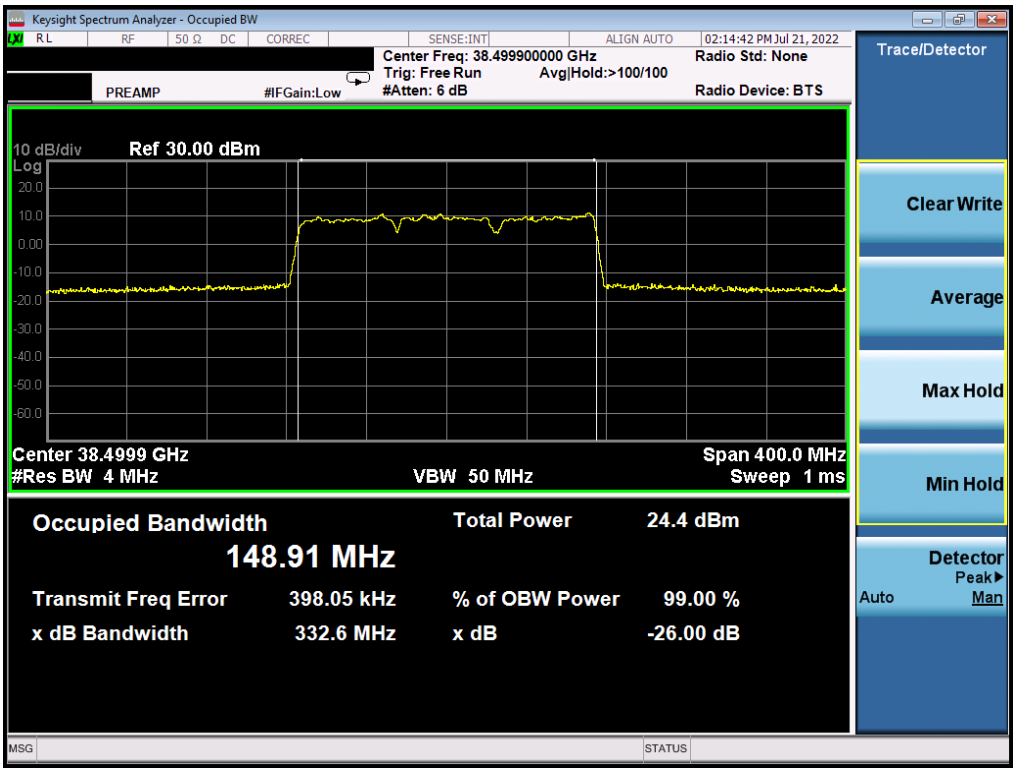


Plot 7-40. Occupied Bandwidth Plot (100MHz-4CC – 64QAM – Mid Channel)

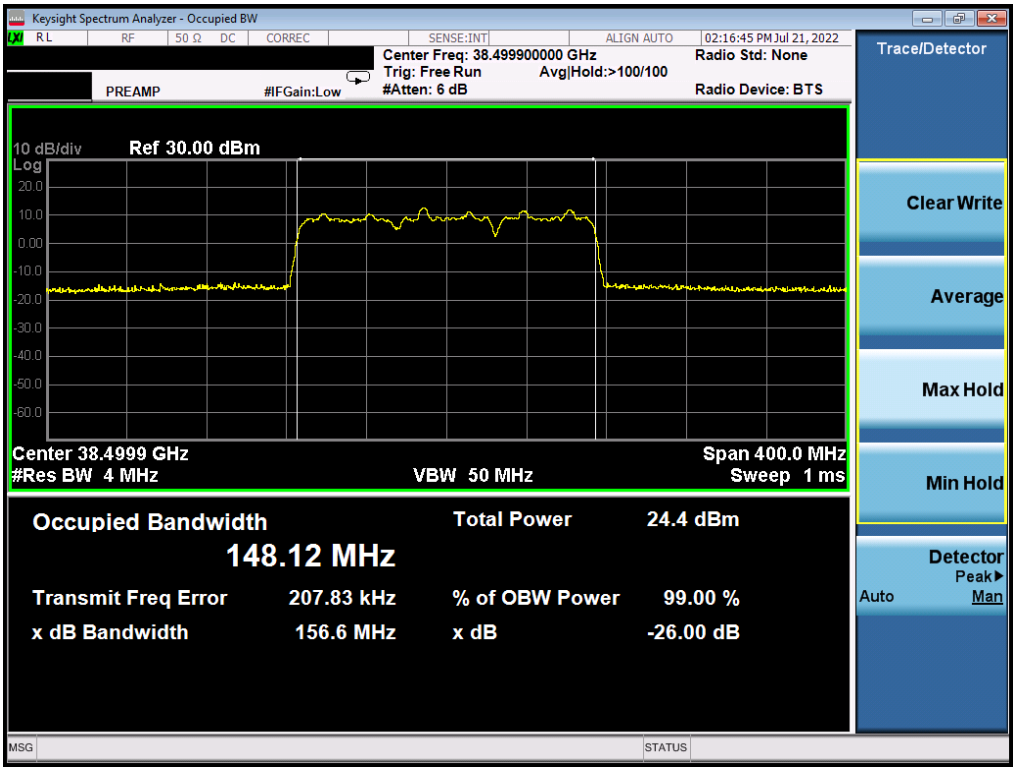
Band n260 (N Patch)

Antenna	Bandwidth [MHz]	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
N-Patch	50	3	DFTs OFDM	QPSK	148.91
			DFTs OFDM	π/2 BPSK	148.12
			DFTs OFDM	16QAM	148.69
			DFTs OFDM	64QAM	149.30
		4	DFTs OFDM	QPSK	195.81
			DFTs OFDM	π/2 BPSK	197.99
			DFTs OFDM	16QAM	196.36
			CP OFDM	64QAM	197.74
	100	3	CP OFDM	QPSK	297.50
			DFTs OFDM	π/2 BPSK	294.71
			CP OFDM	16QAM	297.06
			CP OFDM	64QAM	298.57
		4	CP OFDM	QPSK	394.88
			DFTs OFDM	π/2 BPSK	394.24
			CP OFDM	16QAM	394.45
			CP OFDM	64QAM	394.98

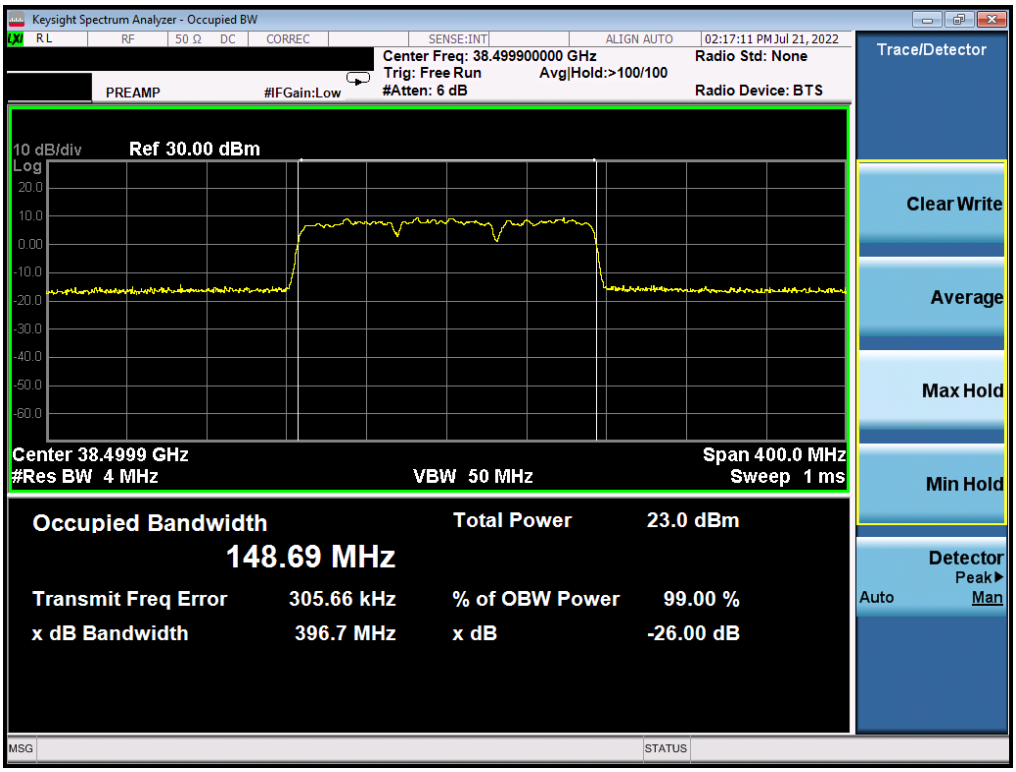
Table 7-5. Summary of Ant 1 Occupied Bandwidths (n260)



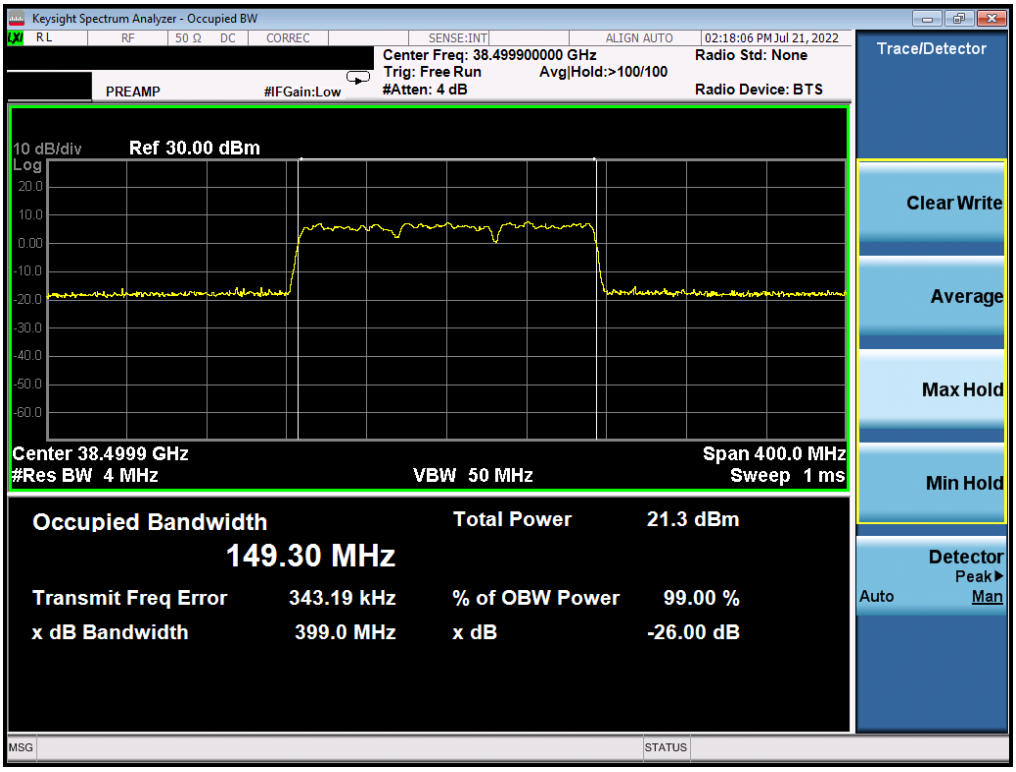
Plot 7-41. Occupied Bandwidth Plot (50MHz-3CC – QPSK – Mid Channel)



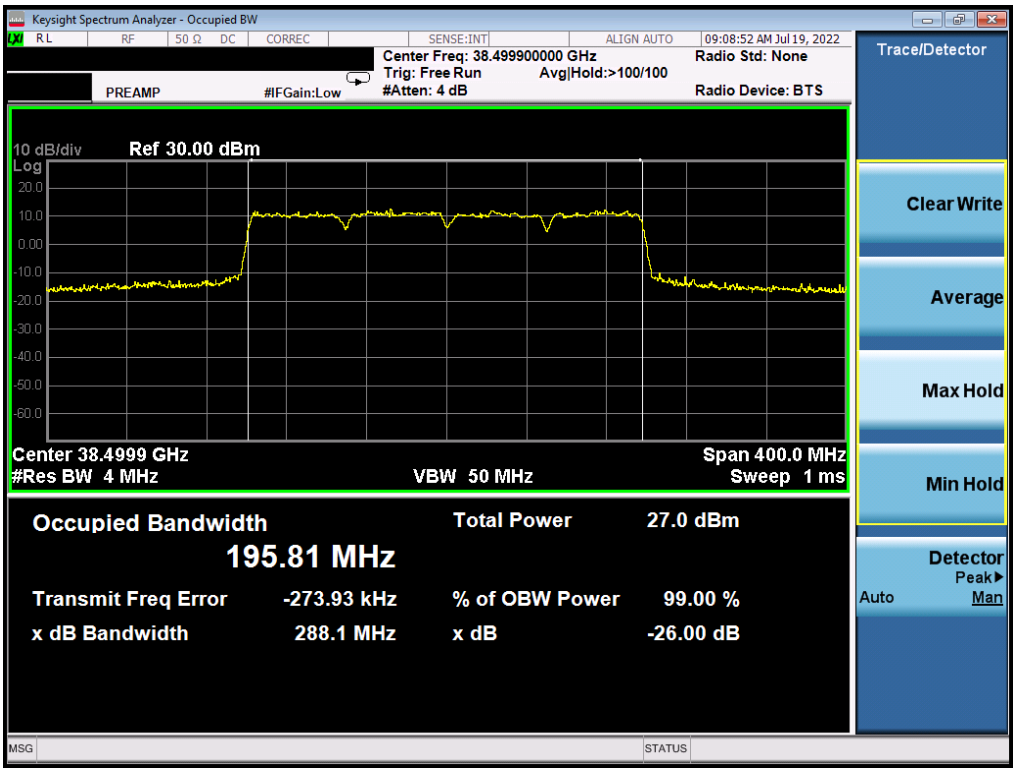
Plot 7-42. Occupied Bandwidth Plot (50MHz-3CC – π/2-BPSK – Mid Channel)



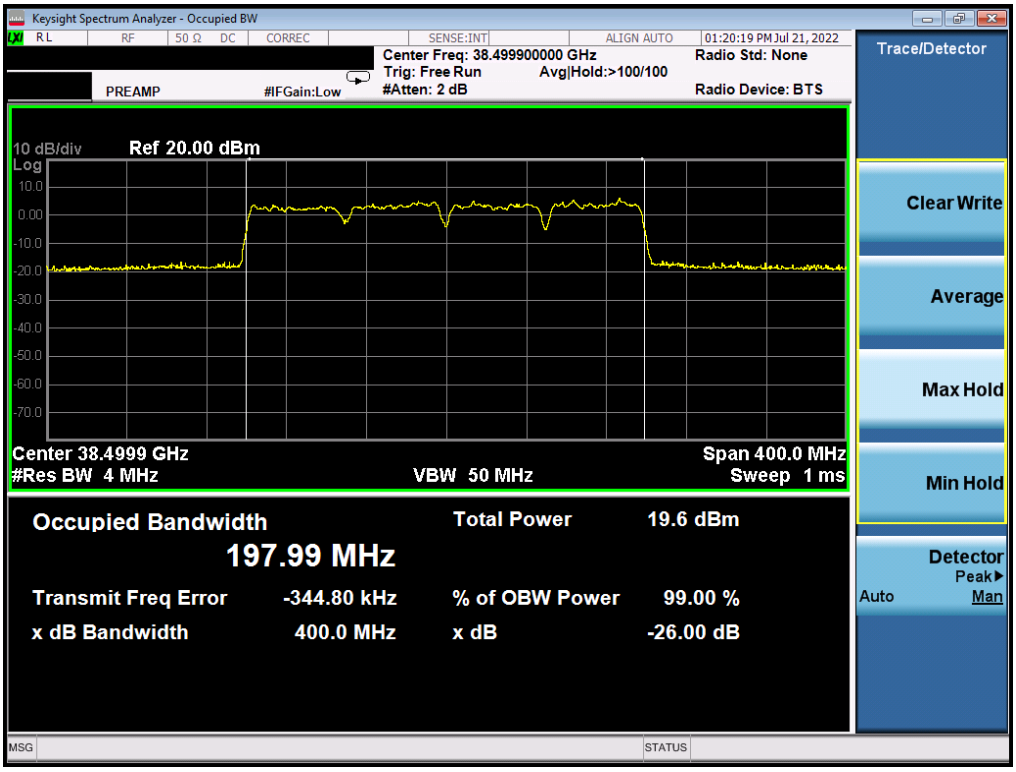
Plot 7-43. Occupied Bandwidth Plot (50MHz-3CC – 16QAM – Mid Channel)



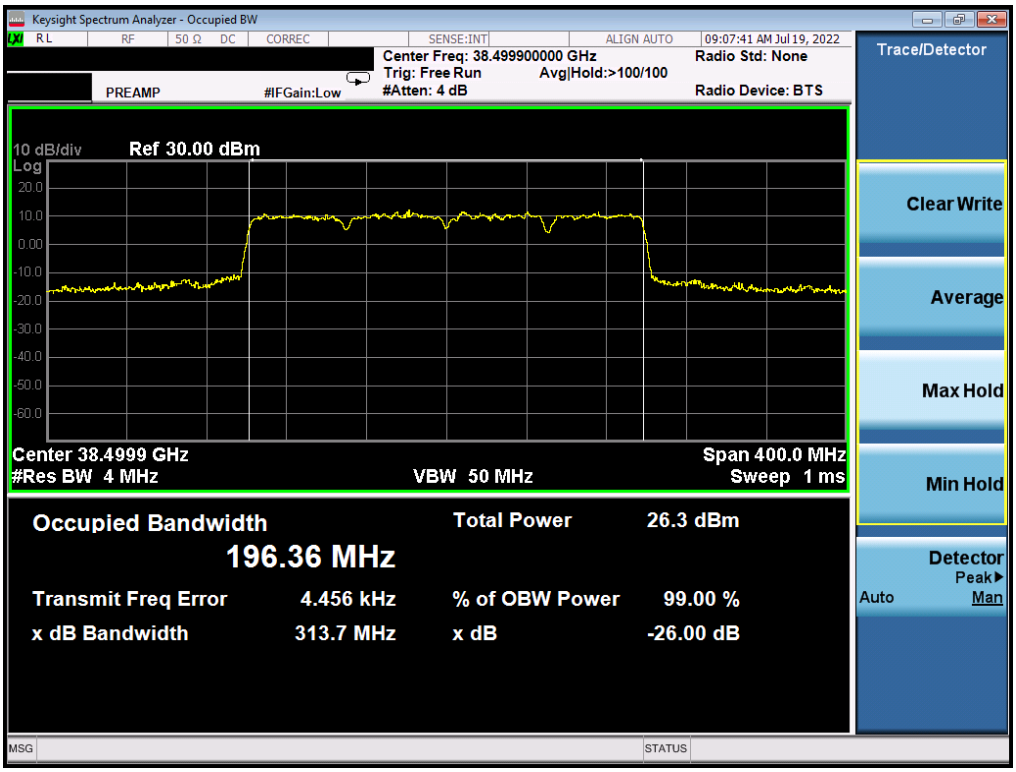
Plot 7-44. Occupied Bandwidth Plot (50MHz-3CC – 64QAM – Mid Channel)



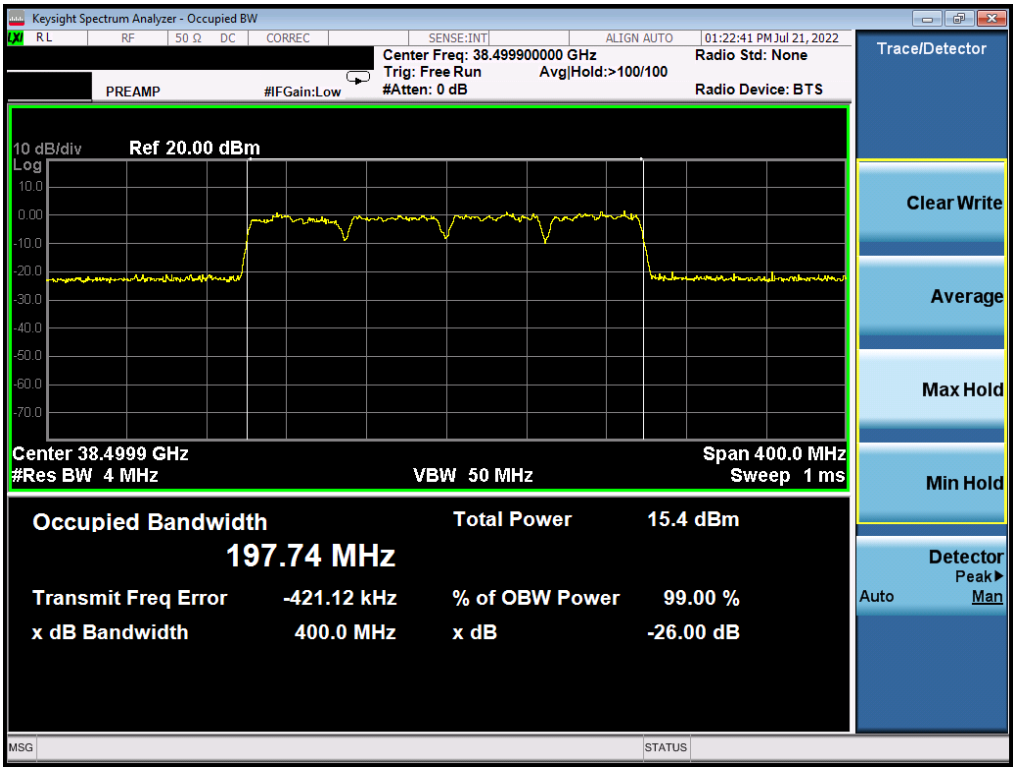
Plot 7-45. Occupied Bandwidth Plot (50MHz-4CC – QPSK – Mid Channel)



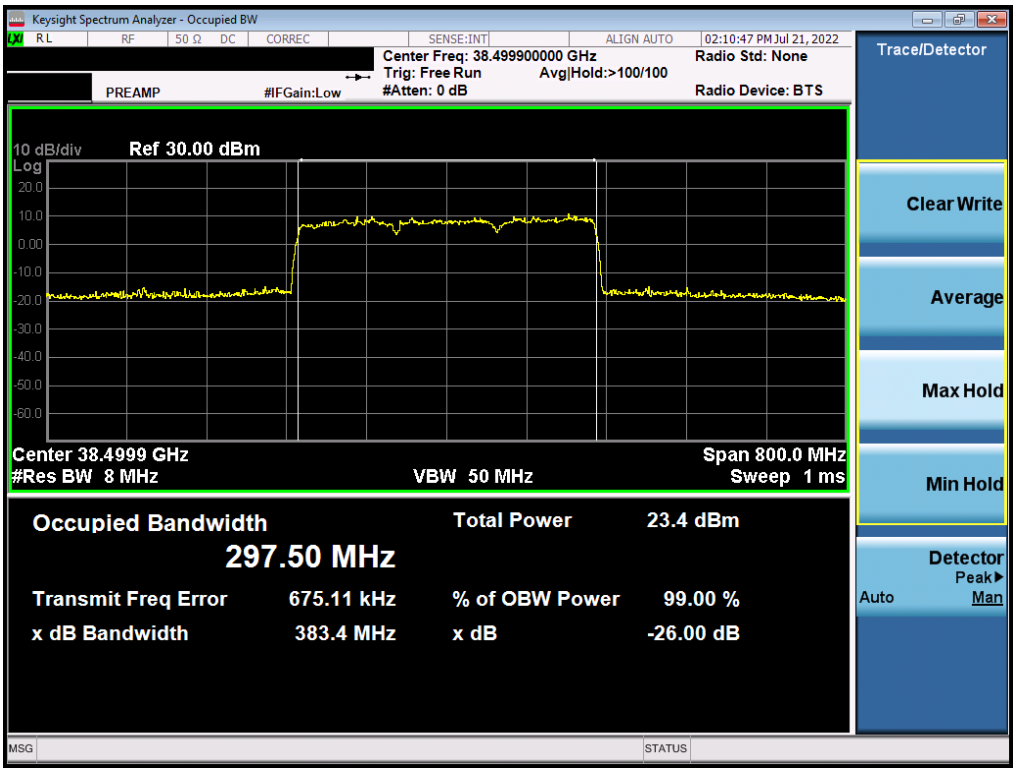
Plot 7-46. Occupied Bandwidth Plot (50MHz-4CC – π/2-BPSK – Mid Channel)



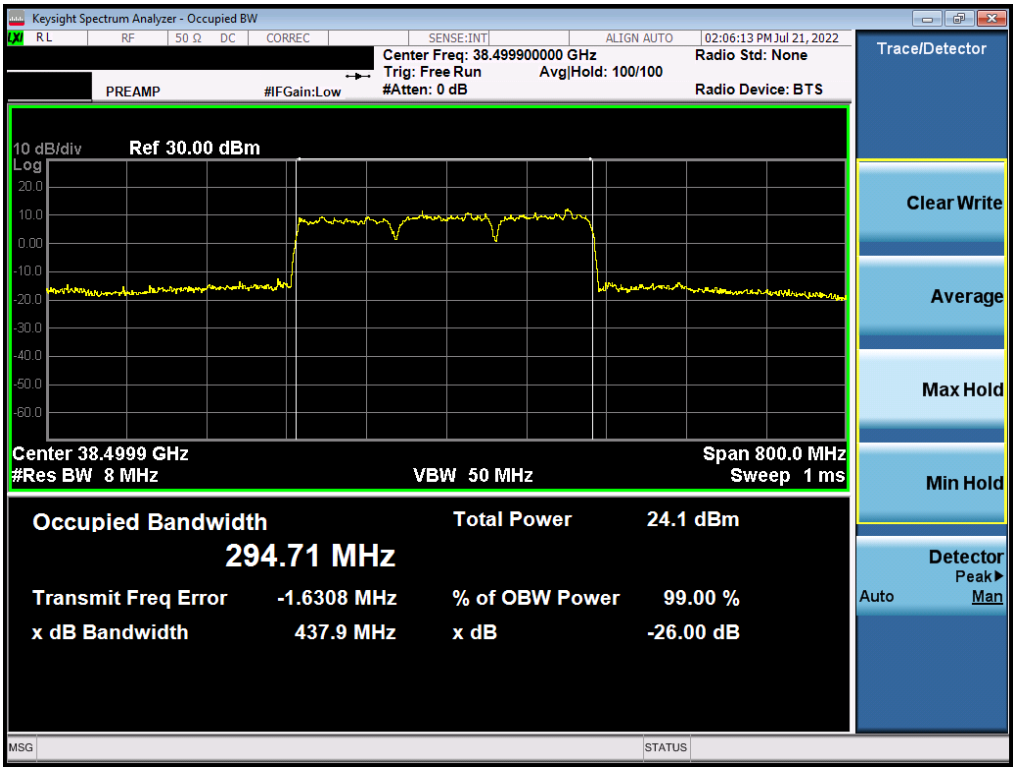
Plot 7-47. Occupied Bandwidth Plot (50MHz-4CC – 16QAM – Mid Channel)



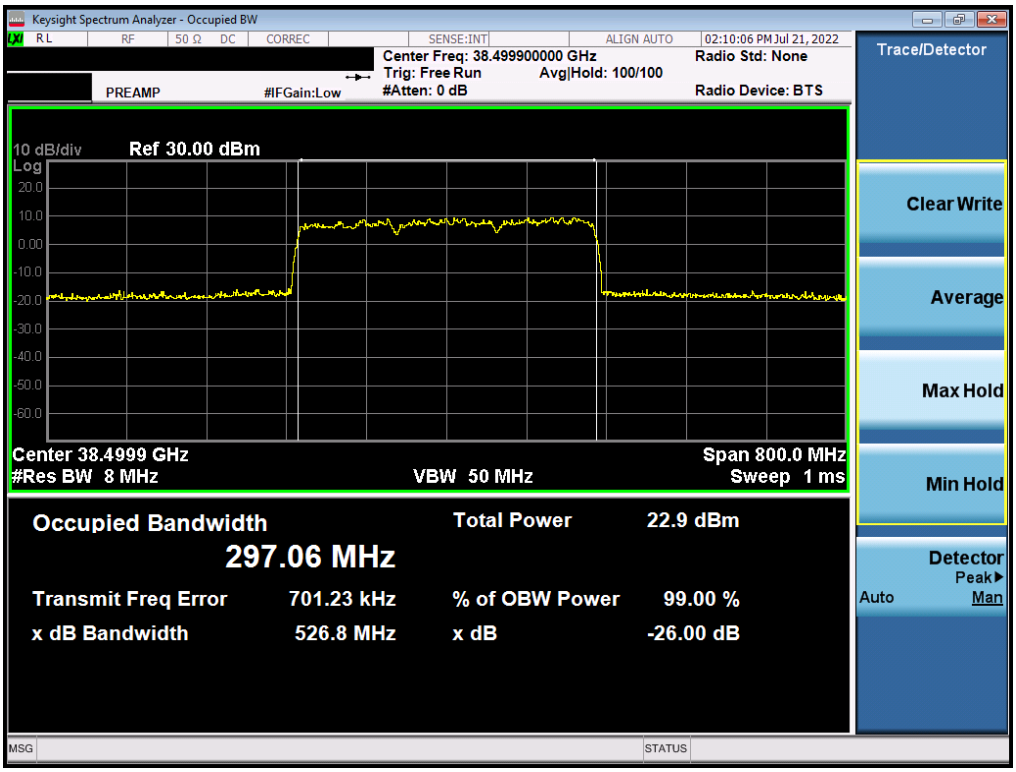
Plot 7-48. Occupied Bandwidth Plot (50MHz-4CC – 64QAM – Mid Channel)



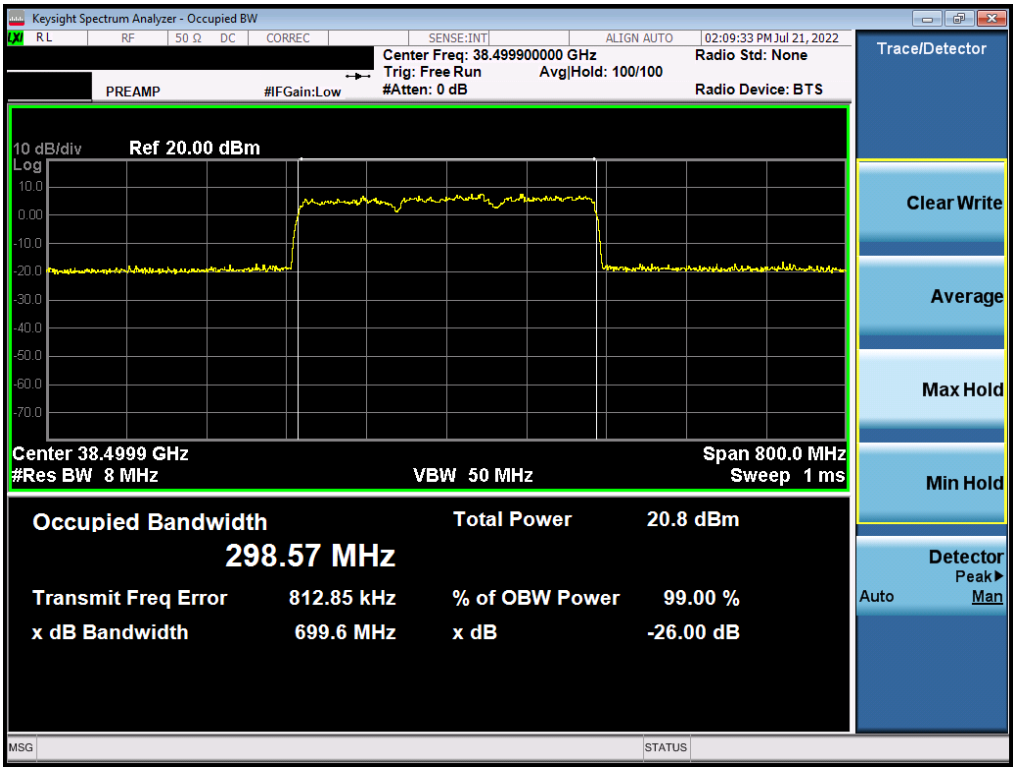
Plot 7-49. Occupied Bandwidth Plot (100MHz-3CC – QPSK – Mid Channel)



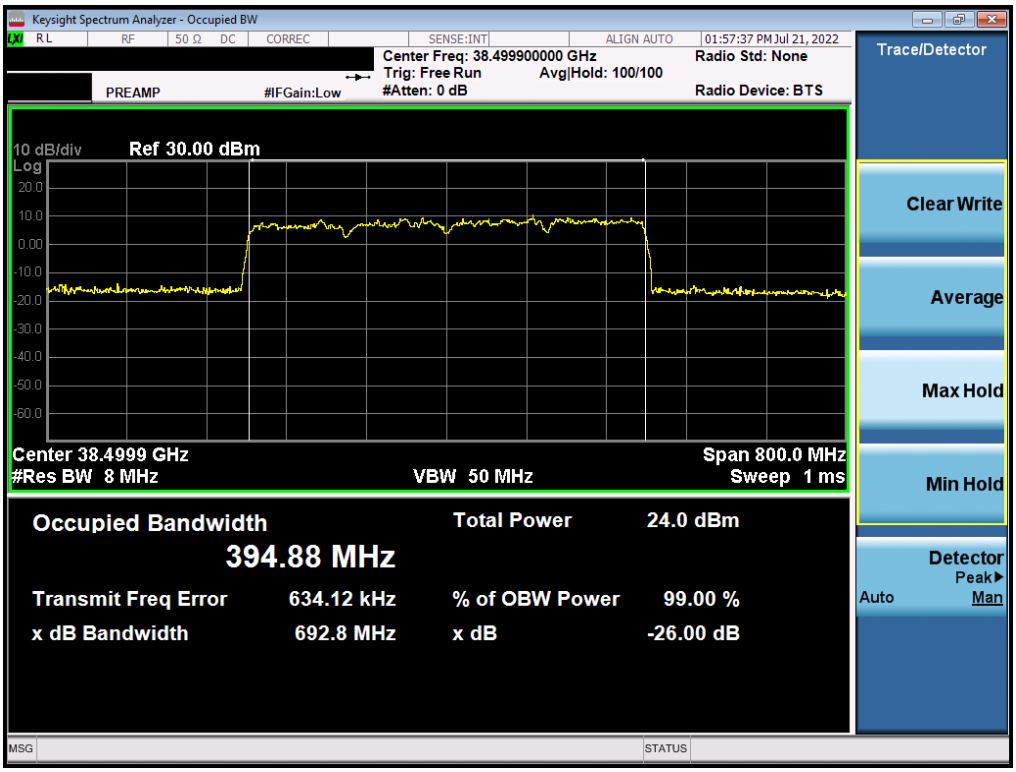
Plot 7-50. Occupied Bandwidth Plot (100MHz-3CC – π/2-BPSK – Mid Channel)



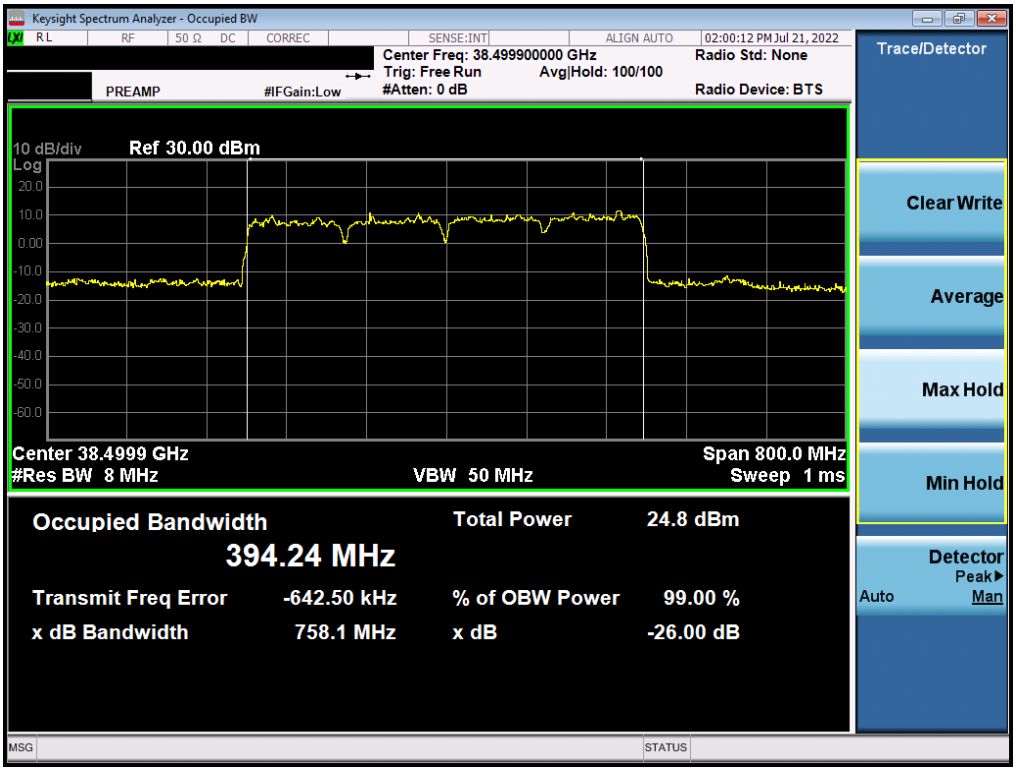
Plot 7-51. Occupied Bandwidth Plot (100MHz-3CC – 16QAM – Mid Channel)



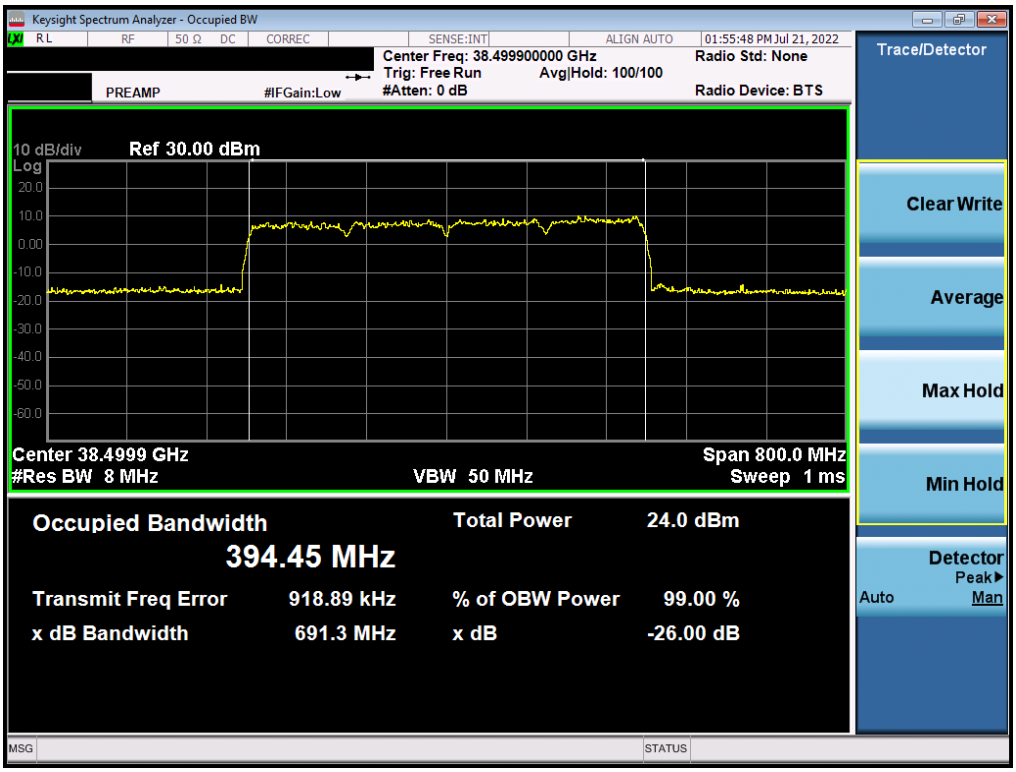
Plot 7-52. Occupied Bandwidth Plot (100MHz-3CC – 64QAM – Mid Channel)



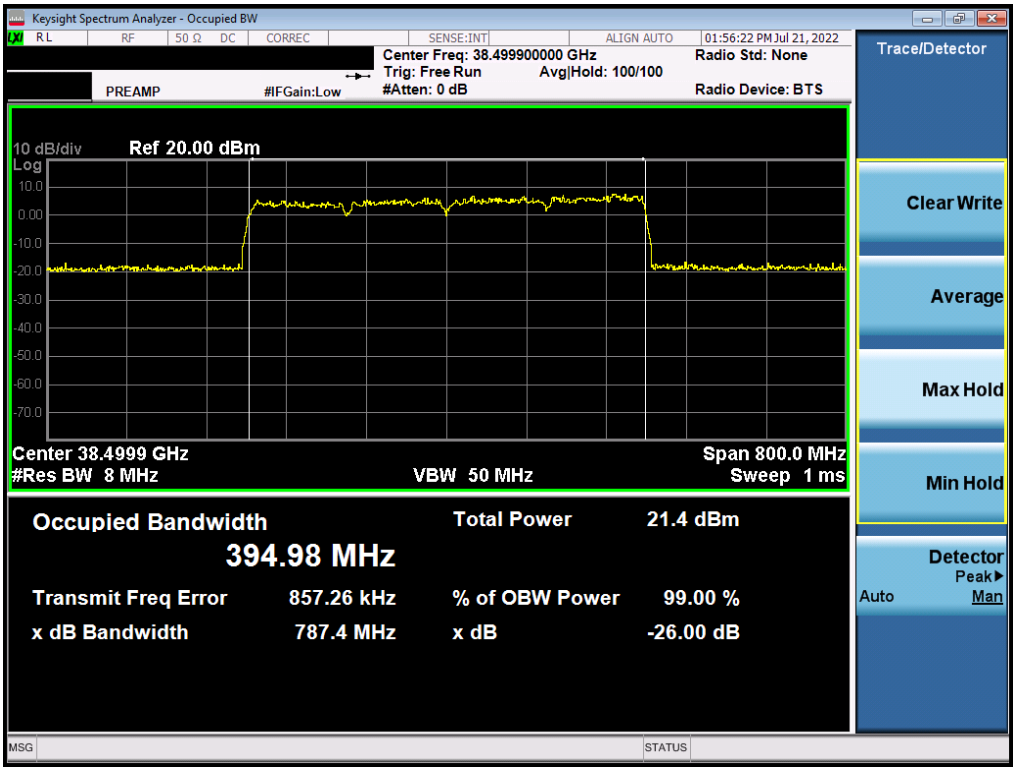
Plot 7-53. Occupied Bandwidth Plot (100MHz-4CC – QPSK – Mid Channel)



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	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	154	26
	Mid	2Tx/MIMO	154	26
	High	2Tx/MIMO	154	26

Table 7-6. Ant1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	168	40
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	159	31

Table 7-7. Ant2 Worst Case Beam ID

Band n258-R1

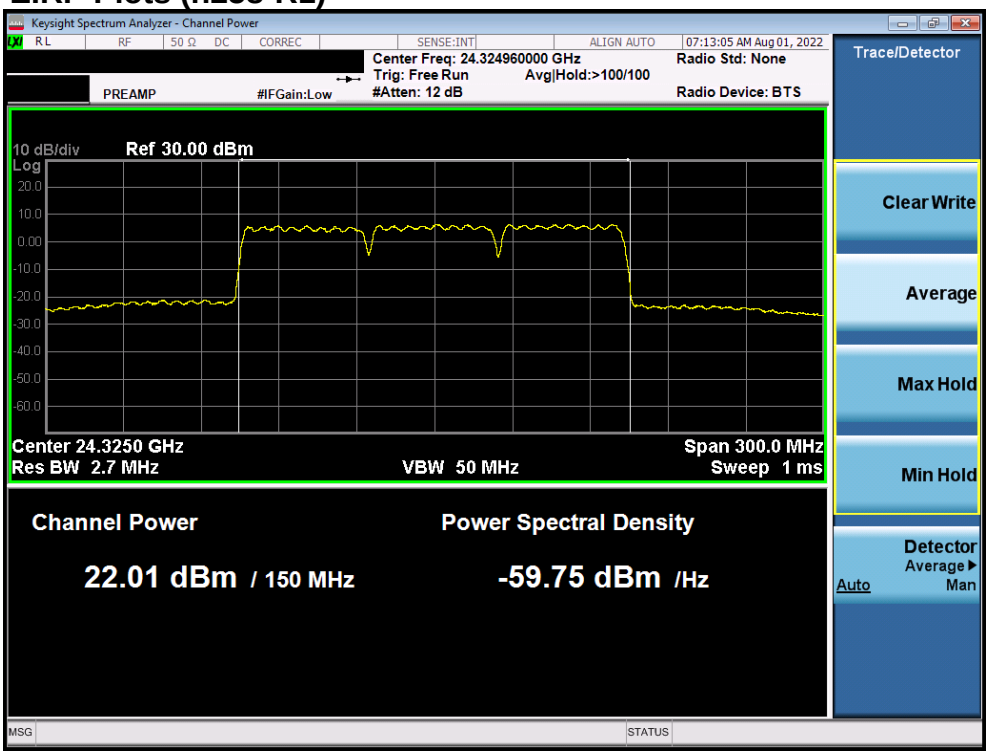
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50	3	Low	24324.96	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	270.0	266.7	32 / 0	21.98
		Low	24324.96	CP-OFDM	QPSK	26 + 154	H + V	MIMO	V	270.0	266.7	32 / 0	19.91
		Low	24324.96	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	270.0	266.7	32 / 0	**22.01**
		Low	24324.96	DFT-s-OFDM	16QAM	26 + 154	H + V	2Tx	V	270.0	266.7	1 / 16	20.06
		Low	24324.96	DFT-s-OFDM	64QAM	26 + 154	H + V	2Tx	V	270.0	266.7	1 / 16	19.04
		Mid	24350.04	DFT-s-OFDM	π/2 BPSK	28 + 156	H + V	2Tx	V	16.0	30.9	32 / 0	17.13
		High	24375.00	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	270.0	265.0	32 / 0	19.17

Table 7-8. Ant1 EIRP Data (Band n258-R1 − 50MHz-3CC)

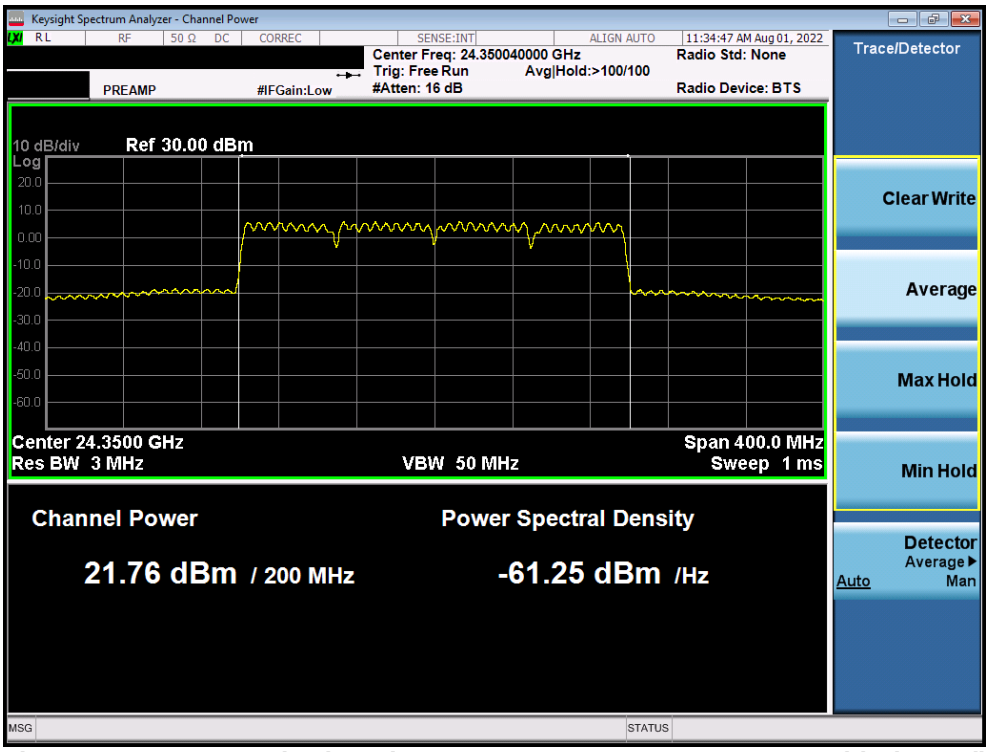
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
50+50+50+50	4	Mid	24349.98	DFT-s-OFDM	QPSK	28 + 156	H + V	2Tx	V	322.0	292.2	32 / 0	**21.76**
		Mid	24349.98	CP-OFDM	QPSK	28 + 156	H + V	MIMO	V	322.0	292.2	32 / 0	19.75
		Mid	24349.98	DFT-s-OFDM	π/2 BPSK	28 + 156	H + V	2Tx	V	322.0	292.2	32 / 0	21.71
		Mid	24349.98	DFT-s-OFDM	16QAM	28 + 156	H + V	2Tx	V	322.0	292.2	1 / 19	19.84
		Mid	24349.98	DFT-s-OFDM	64QAM	28 + 156	H + V	2Tx	V	322.0	292.2	1 / 19	18.36

Table 7-9. Ant1 EIRP Data (Band n258-R1 − 50MHz-4CC)

Worst-Case EIRP Plots (n258-R1)



Plot 7-57. Ant1 EIRP Plot (Band n258-R1 − 50MHz-3CC − π/2-BPSK – Low Channel)



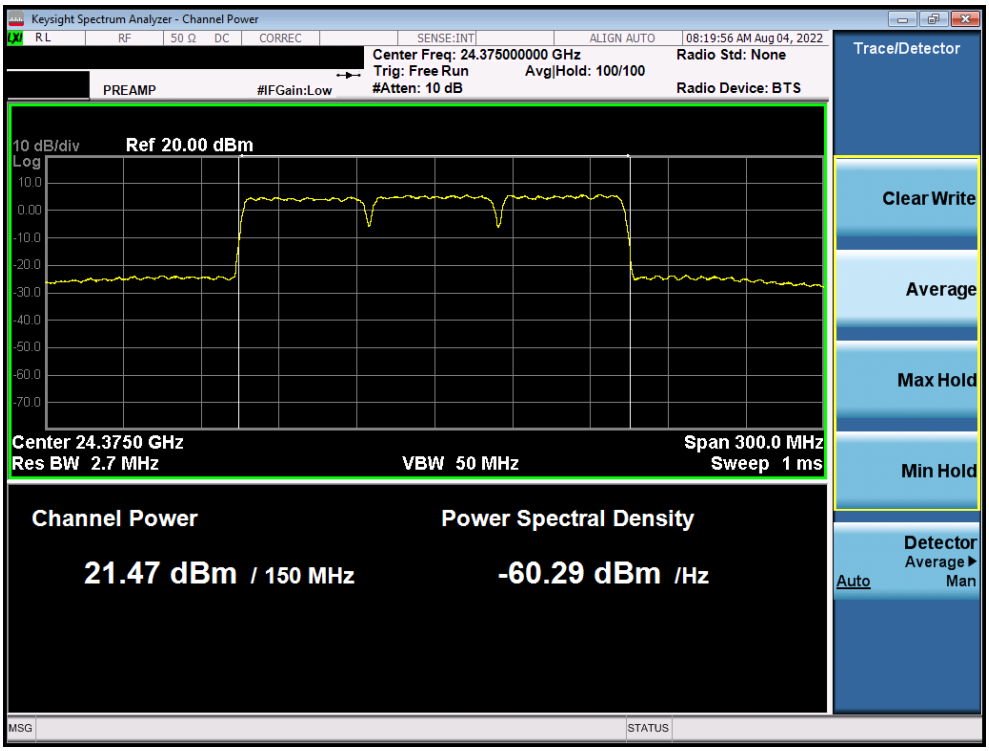
Plot 7-58. Ant1 EIRP Plot (Band n258-R1 − 50MHz-4CC − QPSK – Mid Channel)

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	40 + 168	H + V	2Tx	V	362.0	89.9	32 / 0	21.37
		Mid	24350.04	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	359.0	89.0	32 / 0	21.32
		High	24375.00	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	V	15.0	101.0	32 / 0	**21.47**
		High	24375.00	CP-OFDM	QPSK	31 + 159	H + V	MIMO	V	15.0	101.0	32 / 0	19.30
		High	24375.00	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	15.0	101.0	32 / 0	20.25
		High	24375.00	DFT-s-OFDM	16QAM	31 + 159	H + V	2Tx	V	15.0	101.0	1 / 16	19.45
		High	24375.00	DFT-s-OFDM	64QAM	31 + 159	H + V	2Tx	V	15.0	101.0	1 / 16	18.07

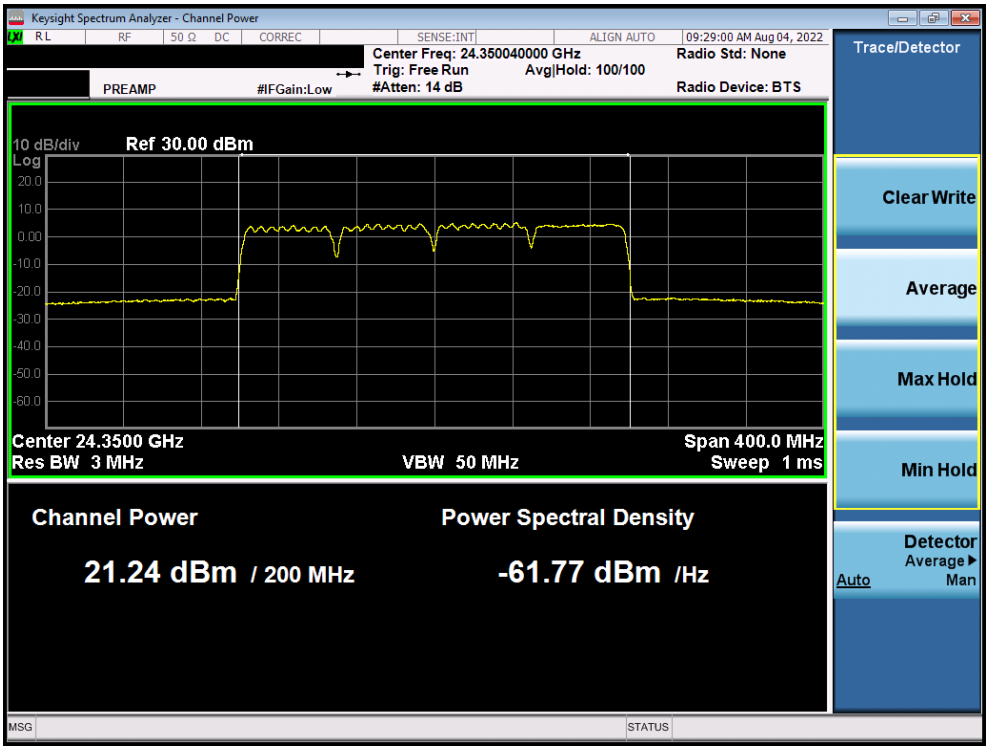
Table 7-10. Ant2 EIRP Data (Band n258-R1 − 50MHz-3CC)

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	24349.98	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	356.0	91.0	32 / 0	**21.24**
		Mid	24349.98	CP-OFDM	QPSK	40 + 168	H + V	MIMO	V	356.0	91.0	32 / 0	18.41
		Mid	24349.98	DFT-s-OFDM	π/2 BPSK	40 + 168	H + V	2Tx	V	356.0	91.0	32 / 0	21.20
		Mid	24349.98	DFT-s-OFDM	16QAM	40 + 168	H + V	2Tx	V	356.0	91.0	32 / 0	19.14
		Mid	24349.98	DFT-s-OFDM	64QAM	40 + 168	H + V	2Tx	V	356.0	91.0	1 / 16	18.12

Table 7-11. Ant2 EIRP Data (Band n258-R1 − 50MHz-4CC)



Plot 7-59. Ant2 EIRP Plot (Band n258-R1 − 50MHz-3CC − π/2-BPSK – Low Channel)



Plot 7-60. Ant2 EIRP Plot (Band n258-R1 − 50MHz-4CC − QPSK – Low Channel)

Band n258-R2 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	154	26
	Mid	2Tx/MIMO	154	26
	High	2Tx/MIMO	154	26

Table 7-12. Ant1 Worst Case Beam ID

Mode	Channel	Beam 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. Ant2 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	QPSK	26 + 154	H + V	2Tx	V	246.0	264.0	32 / 0	**23.81**
		Low	24825.00	CP-OFDM	QPSK	26 + 154	H + V	MIMO	V	246.0	264.0	32 / 0	21.75
		Low	24825.00	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	246.0	264.0	32 / 0	23.79
		Low	24825.00	DFT-s-OFDM	16QAM	26 + 154	H + V	2Tx	V	246.0	264.0	32 / 0	21.83
		Low	24825.00	DFT-s-OFDM	64QAM	26 + 154	H + V	2Tx	V	246.0	264.0	1 / 16	20.11
		Mid	24999.96	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	256.0	270.0	32 / 0	17.54
		High	25175.04	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	256.0	270.0	32 / 0	23.54

Table 7-14. Ant1 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	26 + 154	H + V	2Tx	V	267.0	262.6	32 / 0	**23.57**
		Low	24849.00	CP-OFDM	QPSK	26 + 154	H + V	MIMO	V	267.0	262.6	32 / 0	21.49
		Low	24849.96	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	267.0	262.6	32 / 0	23.48
		Low	24849.96	DFT-s-OFDM	16QAM	26 + 154	H + V	2Tx	V	267.0	262.6	1 / 16	21.76
		Low	24849.96	DFT-s-OFDM	64QAM	26 + 154	H + V	2Tx	V	267.0	262.6	1 / 16	20.16
		Mid	24999.96	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	256.0	266.4	32 / 0	22.78
		High	25150.08	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	253.0	262.1	32 / 0	22.19

Table 7-15. Ant1 EIRP Data (Band n258-R2 − 50MHz-4CC)

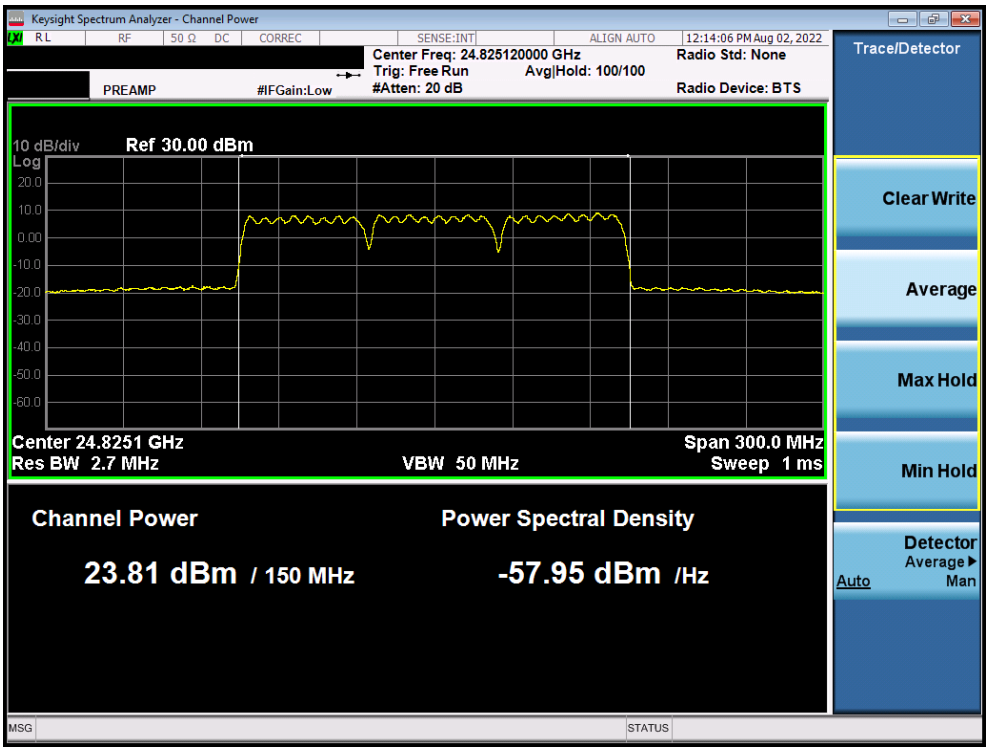
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	24900.00	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	256.0	270.2	32 / 0	**24.09**
		Low	24900.00	CP-OFDM	QPSK	26 + 154	H + V	MIMO	V	256.0	270.2	32 / 0	22.01
		Low	24900.00	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	256.0	270.2	32 / 0	24.03
		Low	24900.00	DFT-s-OFDM	16QAM	26 + 154	H + V	2Tx	V	256.0	270.2	32 / 0	22.00
		Low	24900.00	DFT-s-OFDM	64QAM	26 + 154	H + V	2Tx	V	256.0	270.2	32 / 0	20.09
		Mid	24999.96	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	255.0	270.9	32 / 0	23.96
		High	25100.04	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	254.0	269.1	32 / 0	23.98

Table 7-16. Ant1 EIRP Data (Band n258-R2 − 100MHz-3CC)

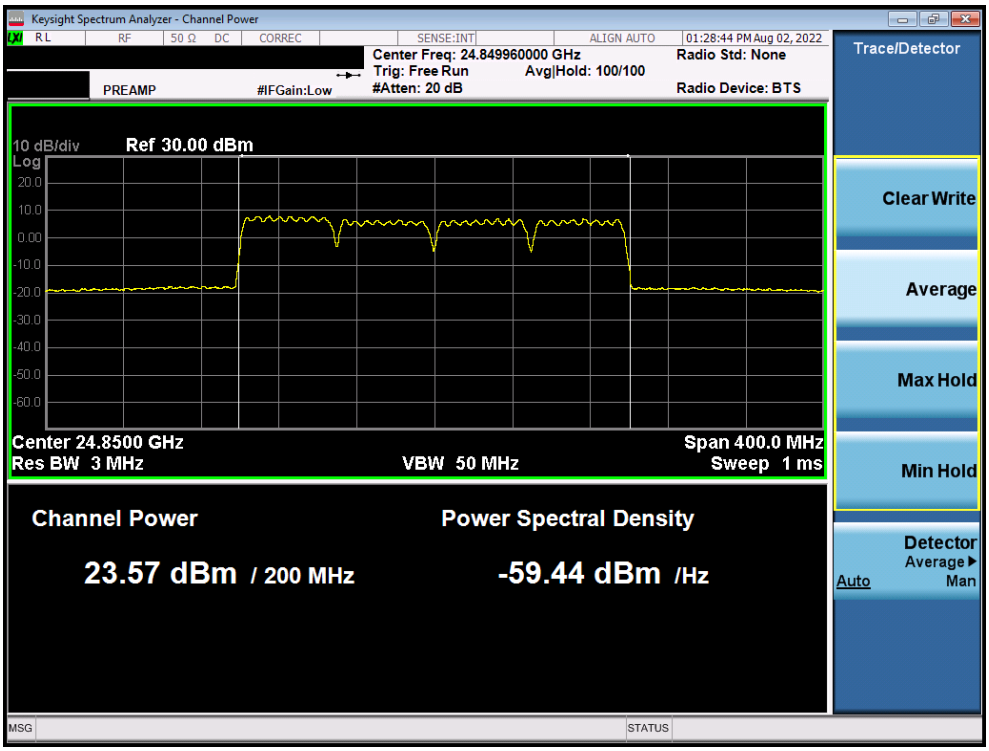
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	24949.98	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	255.0	269.2	32 / 0	**22.11**
		Low	24949.98	CP-OFDM	QPSK	26 + 154	H + V	MIMO	V	255.0	269.2	32 / 0	20.62
		Low	24949.98	DFT-s-OFDM	π/2 BPSK	26 + 154	H + V	2Tx	V	255.0	269.2	32 / 0	22.09
		Low	24949.98	DFT-s-OFDM	16QAM	26 + 154	H + V	2Tx	V	255.0	269.2	1 / 16	20.91
		Low	24949.98	DFT-s-OFDM	64QAM	26 + 154	H + V	2Tx	V	255.0	269.2	1 / 16	18.99
		Mid	25000.02	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	254.0	268.8	32 / 0	21.26
		High	25050.06	DFT-s-OFDM	QPSK	26 + 154	H + V	2Tx	V	253.0	268.5	32 / 0	21.23

Table 7-17. Ant1 EIRP Data (Band n258-R2 − 100MHz-4CC)

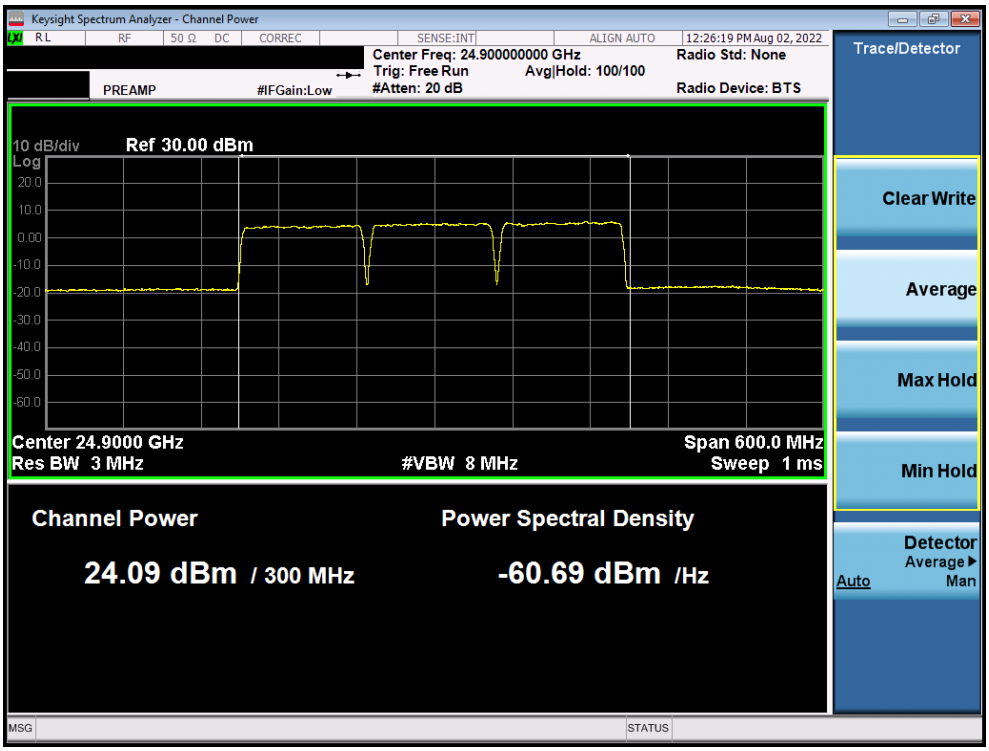
Worst-Case EIRP Plots (n258-R2)



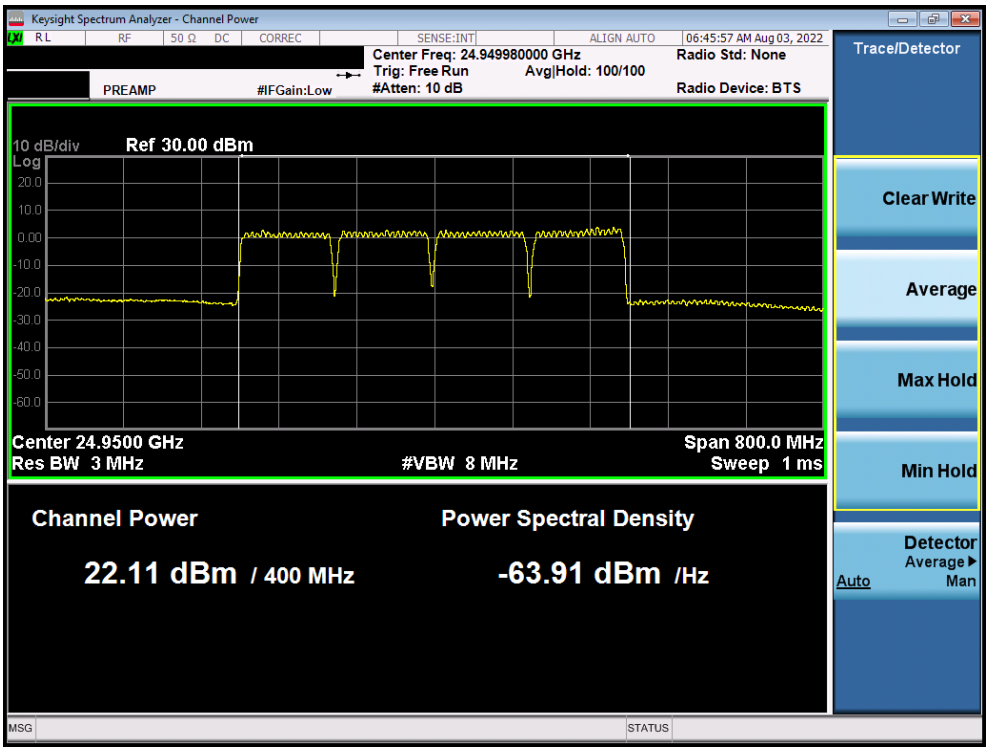
Plot 7-61. Ant1 EIRP Plot (Band n258-R2 − 50MHz-3CC − QPSK – Low Channel)



Plot 7-62. Ant1 EIRP Plot (Band n258-R2 − 50MHz-4CC − QPSK – Low Channel)



Plot 7-63. Ant1 EIRP Plot (Band n258-R2 − 100MHz-3CC − QPSK – Low Channel)



Plot 7-64. Ant1 EIRP Plot (Band n258-R2 − 100MHz-4CC − QPSK – 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	24825.00	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	4.0	89.6	32 / 0	22.37
		Mid	24999.96	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	5.0	95.2	32 / 0	22.09
		High	25175.04	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	8.0	97.7	32 / 0	**22.44**
		High	25175.04	CP-OFDM	QPSK	40 + 168	H + V	MIMO	V	8.0	97.7	32 / 0	20.32
		High	25175.04	DFT-s-OFDM	π/2 BPSK	40 + 168	H + V	2Tx	V	8.0	97.7	32 / 0	22.43
		High	25175.04	DFT-s-OFDM	16QAM	40 + 168	H + V	2Tx	V	8.0	97.7	1 / 16	20.14
		High	25175.04	DFT-s-OFDM	64QAM	40 + 168	H + V	2Tx	V	8.0	97.7	1 / 16	19.09

Table 7-18. Ant2 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	40 + 168	H + V	2Tx	V	7.0	101.4	32 / 0	20.17
		Mid	24999.96	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	9.0	105.0	32 / 0	20.54
		High	25150.08	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	7.0	98.9	32 / 0	**22.33**
		High	25150.08	CP-OFDM	QPSK	40 + 168	H + V	MIMO	V	7.0	98.9	32 / 0	20.17
		High	25150.08	DFT-s-OFDM	π/2 BPSK	40 + 168	H + V	2Tx	V	7.0	98.9	32 / 0	22.31
		High	25150.08	DFT-s-OFDM	16QAM	40 + 168	H + V	2Tx	V	7.0	98.9	32 / 0	20.36
		High	25150.08	DFT-s-OFDM	64QAM	40 + 168	H + V	2Tx	V	7.0	98.9	1 / 16	18.42

Table 7-19. Ant2 EIRP Data (Band n258-R2 − 50MHz-4CC)

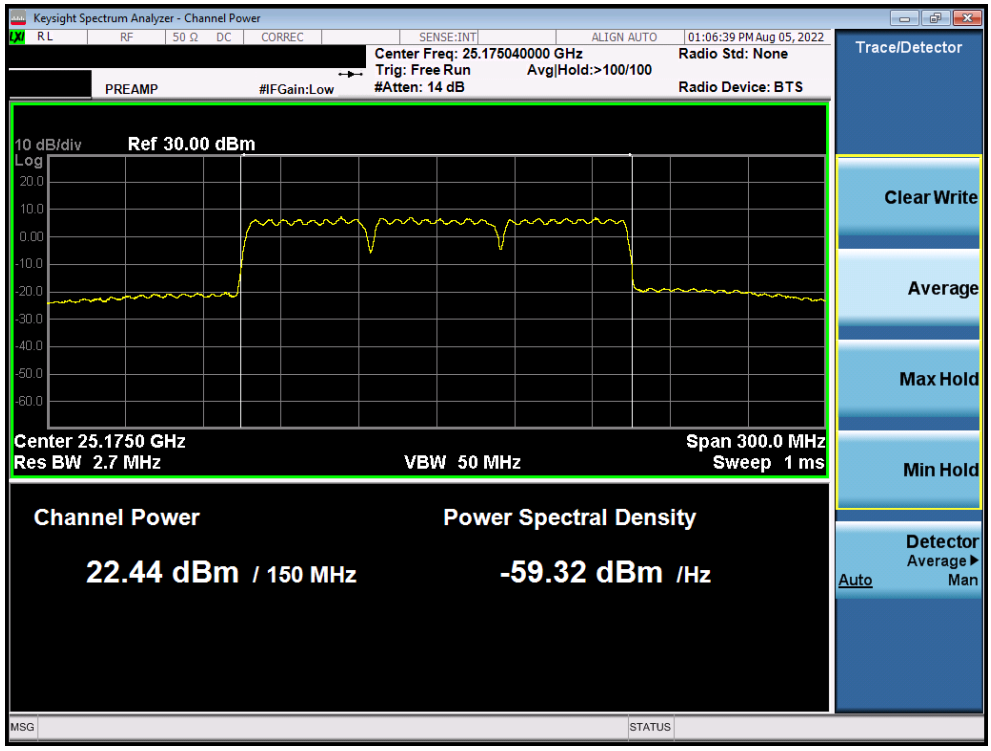
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	24900.00	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	4.0	264.0	32 / 0	22.38
		Mid	24999.96	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	350.0	255.0	32 / 0	22.54
		High	25175.04	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	358.0	254.9	32 / 0	**22.70**
		High	25175.04	CP-OFDM	QPSK	40 + 168	H + V	MIMO	V	358.0	254.9	32 / 0	20.67
		High	25175.04	DFT-s-OFDM	π/2 BPSK	40 + 168	H + V	2Tx	V	358.0	254.9	32 / 0	22.68
		High	25175.04	DFT-s-OFDM	16QAM	40 + 168	H + V	2Tx	V	358.0	254.9	32 / 0	20.67
		High	25175.04	DFT-s-OFDM	64QAM	40 + 168	H + V	2Tx	V	358.0	254.9	1 / 19	19.44

Table 7-20. Ant2 EIRP Data (Band n258-R2 − 100MHz-3CC)

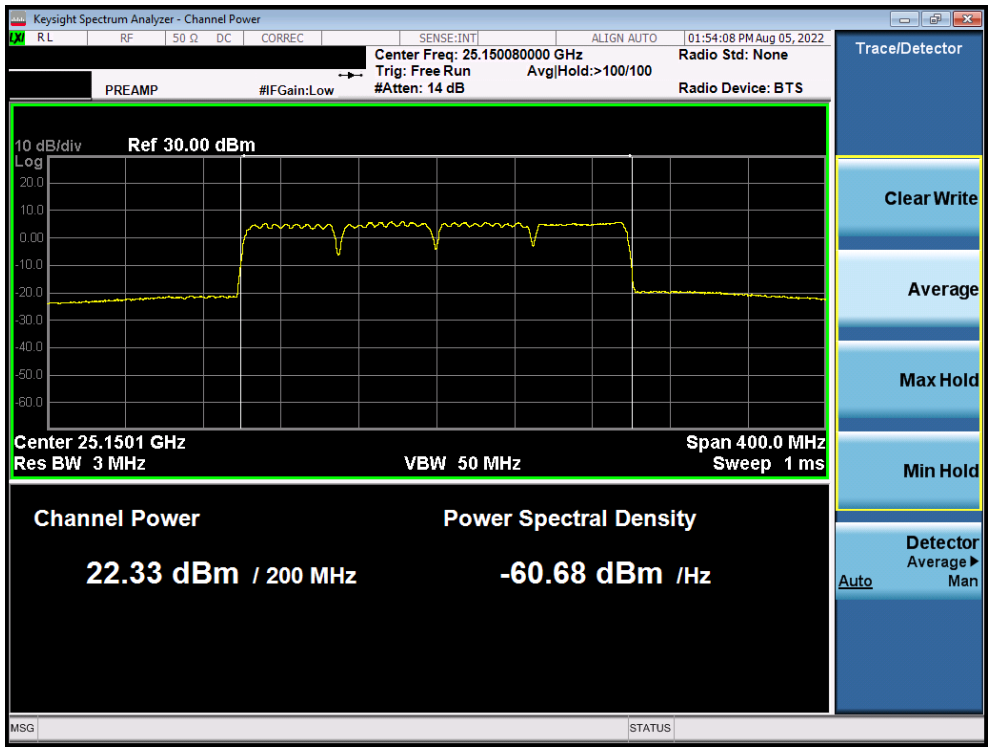
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	24949.98	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	354.0	261.0	32 / 0	20.54
		Mid	25000.02	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	3.0	268.8	32 / 0	20.62
		High	25050.06	DFT-s-OFDM	QPSK	40 + 168	H + V	2Tx	V	359.0	232.0	32 / 0	**20.89**
		High	25050.06	CP-OFDM	QPSK	40 + 168	H + V	MIMO	V	359.0	232.0	32 / 0	19.11
		High	25050.06	DFT-s-OFDM	π/2 BPSK	40 + 168	H + V	2Tx	V	359.0	232.0	32 / 0	20.85
		High	25050.06	DFT-s-OFDM	16QAM	40 + 168	H + V	2Tx	V	359.0	232.0	32 / 0	18.77
		High	25050.06	DFT-s-OFDM	64QAM	40 + 168	H + V	2Tx	V	359.0	232.0	1 / 16	17.04

Table 7-21. Ant2 EIRP Data (Band n258-R2 − 100MHz-4CC)

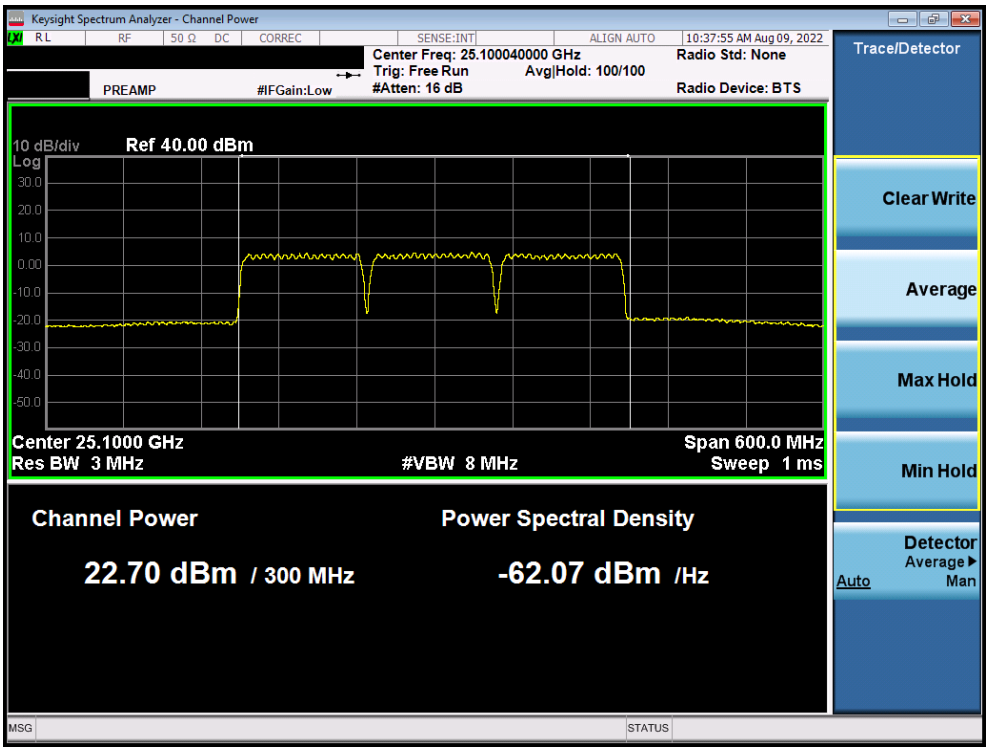
Worst-Case EIRP Plots (n258-R2)



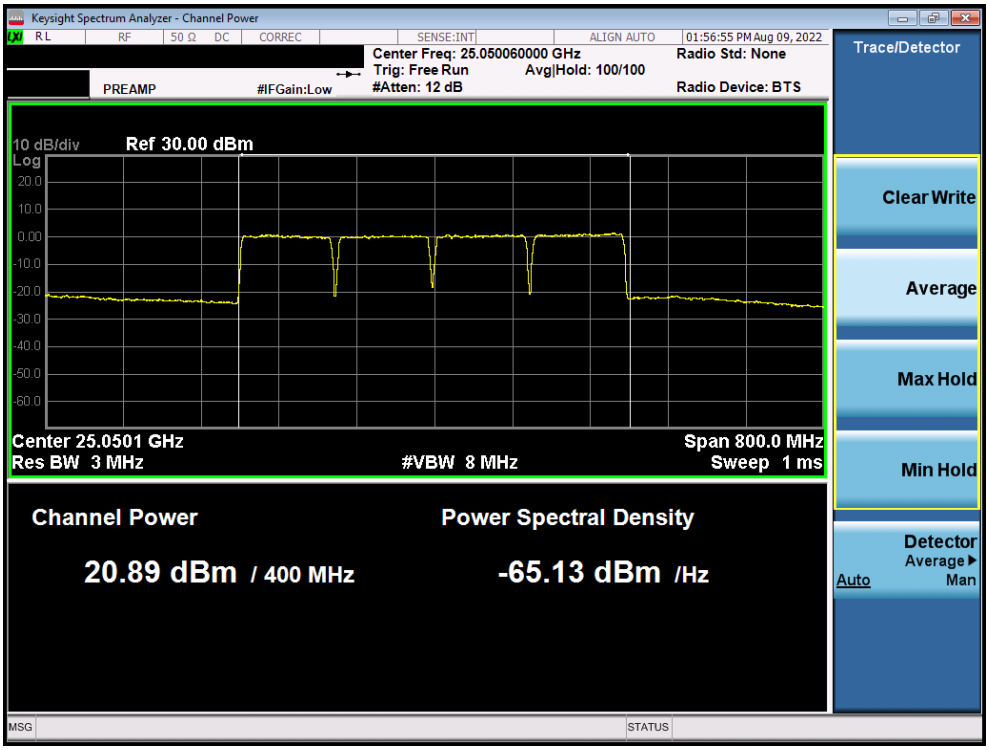
Plot 7-65. Ant2 EIRP Plot (Band n258-R2 − 50MHz-3CC − QPSK – High Channel)



Plot 7-66. Ant2 EIRP Plot (Band n258-R2 − 100MHz-4CC − QPSK – High Channel)



Plot 7-67. Ant2 EIRP Plot (Band n258-R2 − 100MHz-3CC − QPSK – High Channel)



Plot 7-68. Ant2 EIRP Plot (Band n258-R2 − 100MHz-4CC − QPSK – High Channel)

Band n261 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	155	27
	Mid	2Tx/MIMO	164	36
	High	2Tx/MIMO	165	37

Table 7-22. Ant1 Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	159	31
	Mid	2Tx/MIMO	159	31
	High	2Tx/MIMO	159	31

Table 7-23. Ant2 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	27 + 155	H + V	2Tx	V	115.0	120.2	32 / 0	22.67
		Low	27574.92	CP-OFDM	QPSK	27 + 155	H + V	MIMO	V	115.0	120.2	32 / 0	20.77
		Low	27574.92	DFT-s-OFDM	π/2 BPSK	27 + 155	H + V	2Tx	V	115.0	120.2	32 / 0	**22.70**
		Low	27574.92	DFT-s-OFDM	16QAM	27 + 155	H + V	2Tx	V	115.0	120.2	1 / 16	21.25
		Low	27574.92	DFT-s-OFDM	64QAM	27 + 155	H + V	2Tx	V	115.0	120.2	1 / 16	19.60
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	36 + 164	H + V	2Tx	V	121.0	120.0	32 / 0	22.39
		High	28275.00	DFT-s-OFDM	π/2 BPSK	37 + 165	H + V	2Tx	V	110.0	120.6	32 / 0	19.59

Table 7-24. Ant1 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	π/2 BPSK	27 + 155	H + V	2Tx	H	125.0	271.0	32 / 0	21.05
		Mid	27924.96	DFT-s-OFDM	QPSK	36 + 164	H + V	2Tx	H	118.0	272.3	32 / 0	21.26
		Mid	27924.96	CP-OFDM	QPSK	36 + 164	H + V	MIMO	H	118.0	272.3	32 / 0	20.39
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	36 + 164	H + V	2Tx	H	118.0	272.3	32 / 0	**21.85**
		Mid	27924.96	DFT-s-OFDM	16QAM	36 + 164	H + V	2Tx	H	118.0	272.3	1 / 16	20.80
		Mid	27924.96	DFT-s-OFDM	64QAM	36 + 164	H + V	2Tx	H	118.0	272.3	1 / 16	19.32
		High	28250.04	DFT-s-OFDM	π/2 BPSK	37 + 165	H + V	2Tx	H	259.0	57.0	32 / 0	21.80

Table 7-25. Ant1 EIRP Data (Band n261 − 50MHz-4CC)

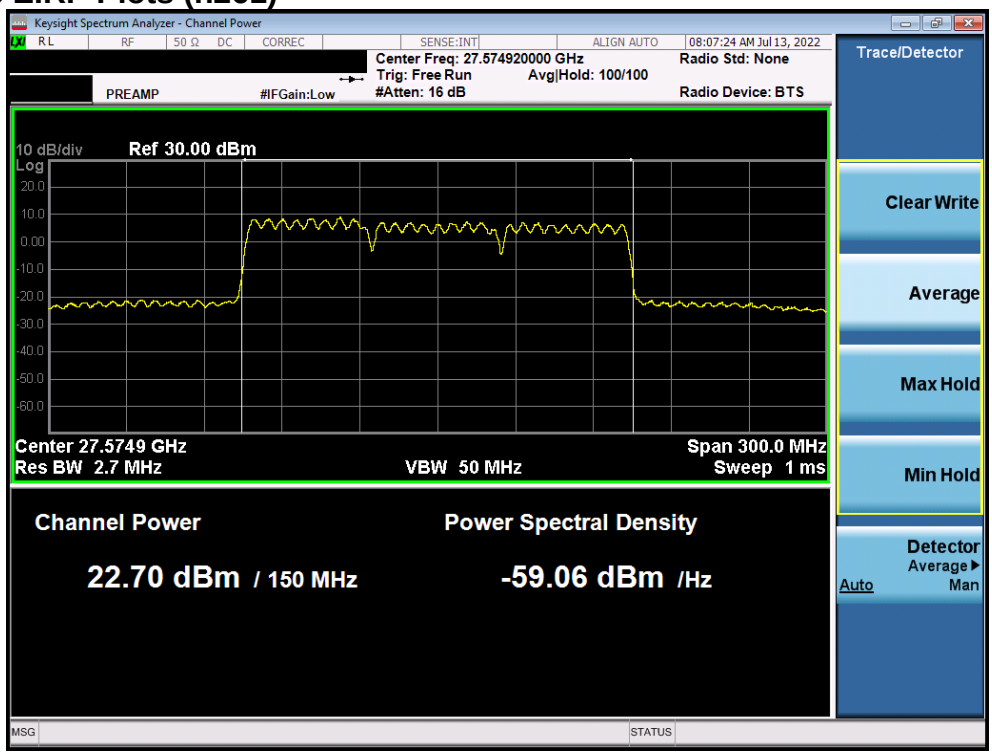
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	27650.04	DFT-s-OFDM	QPSK	27 + 155	H + V	2Tx	H	100.0	98.5	32 / 0	22.90
		Low	27650.04	CP-OFDM	QPSK	27 + 155	H + V	MIMO	H	100.0	98.5	32 / 0	20.96
		Low	27650.04	DFT-s-OFDM	π/2 BPSK	27 + 155	H + V	2Tx	H	100.0	98.5	32 / 0	**22.91**
		Low	27650.04	DFT-s-OFDM	16QAM	27 + 155	H + V	2Tx	H	100.0	98.5	1 / 16	21.86
		Low	27650.04	DFT-s-OFDM	64QAM	27 + 155	H + V	2Tx	H	100.0	98.5	1 / 16	20.91
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	36 + 164	H + V	2Tx	H	102.0	95.0	32 / 0	21.04
		High	28200.00	DFT-s-OFDM	π/2 BPSK	37 + 165	H + V	2Tx	H	108.0	121.0	32 / 0	22.27

Table 7-26. Ant1 EIRP Data (Band n261 − 100MHz-3CC)

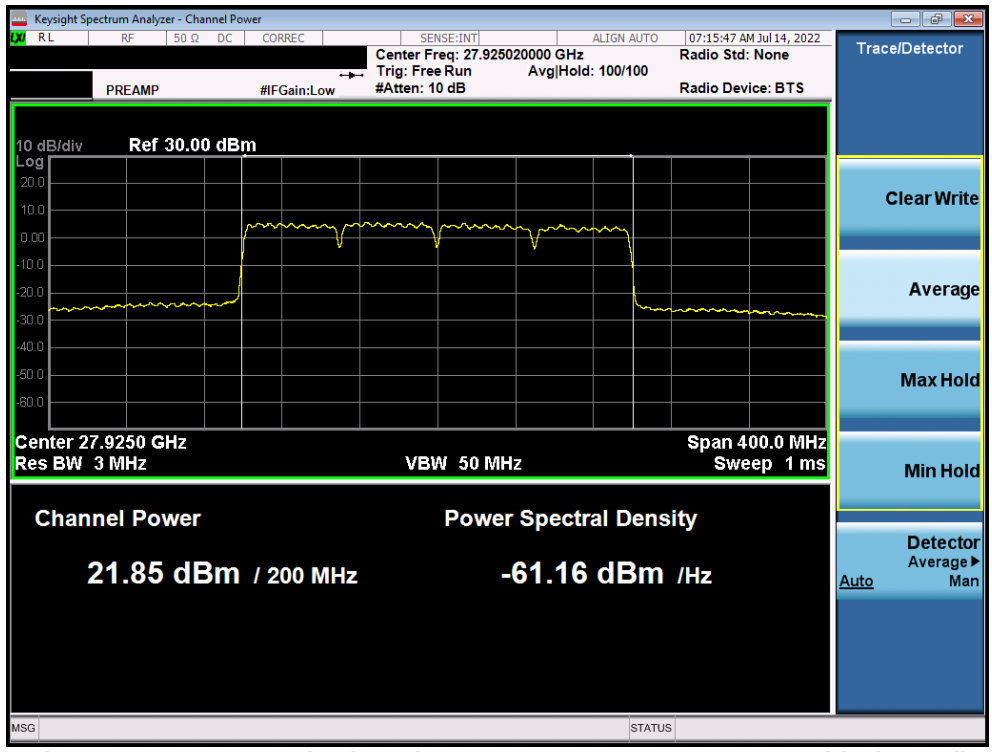
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	27700.02	DFT-s-OFDM	QPSK	27 + 155	H + V	2Tx	H	233.0	74.2	32 / 0	21.28
		Mid	27925.02	DFT-s-OFDM	QPSK	36 + 164	H + V	2Tx	H	252.0	97.7	32 / 0	**22.22**
		Mid	27925.02	CP-OFDM	QPSK	36 + 164	H + V	MIMO	H	252.0	97.7	32 / 0	20.73
		Mid	27925.02	DFT-s-OFDM	π/2 BPSK	36 + 164	H + V	2Tx	H	252.0	97.7	32 / 0	22.18
		Mid	27925.02	DFT-s-OFDM	16QAM	36 + 164	H + V	2Tx	H	252.0	97.7	1 / 12	20.77
		Mid	27925.02	DFT-s-OFDM	64QAM	36 + 164	H + V	2Tx	H	252.0	97.7	1 / 12	19.79
		High	28150.02	DFT-s-OFDM	QPSK	37 + 165	H + V	2Tx	H	239.0	87.8	32 / 0	21.41

Table 7-27. Ant1 EIRP Data (Band n261 − 100MHz-4CC)

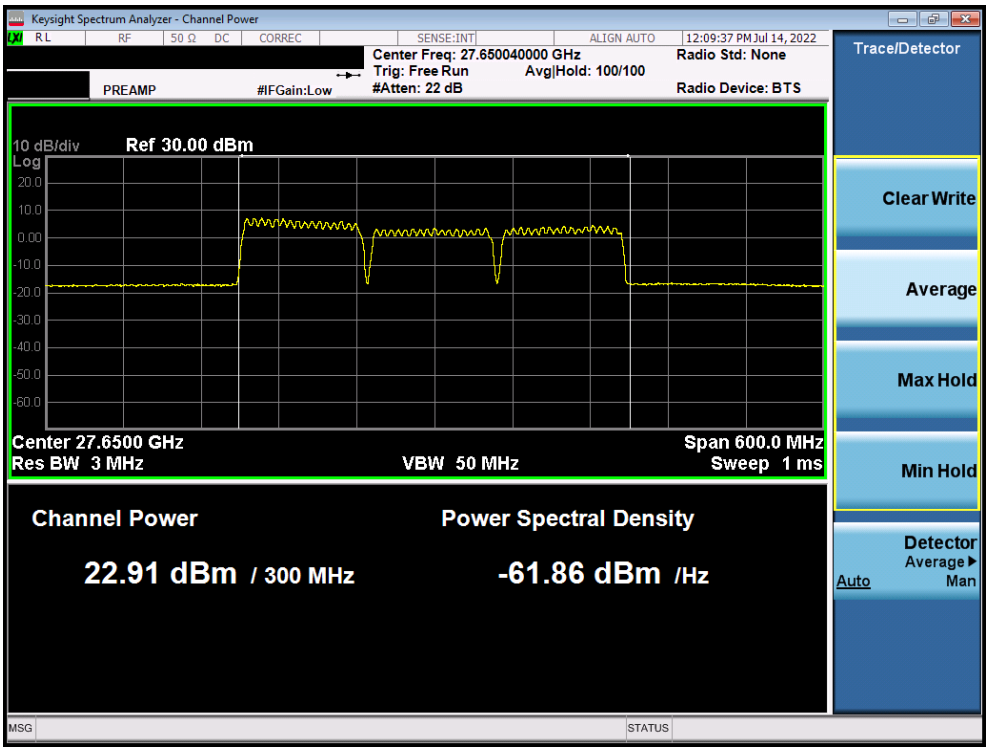
Worst-Case EIRP Plots (n261)



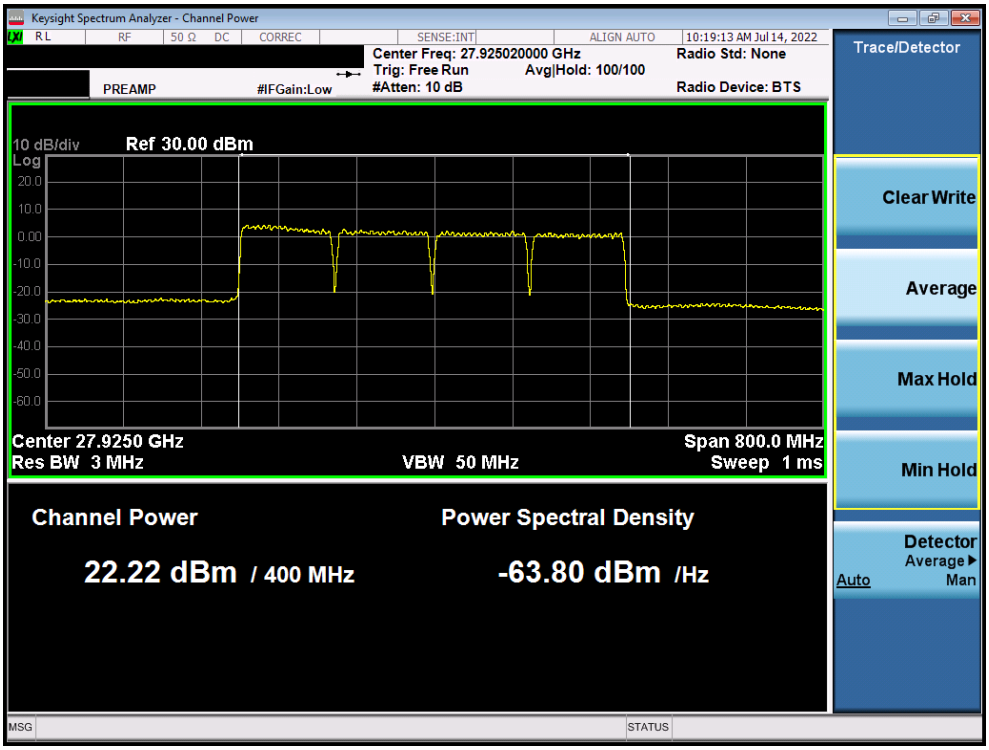
Plot 7-69. Ant1 EIRP Plot (Band n261 − 50MHz-3CC – π/2 BPSK – Low Channel)



Plot 7-70. Ant1 EIRP Plot (Band n261 − 50MHz-4CC – QPSK – Mid Channel)



Plot 7-71. Ant1 EIRP Plot (Band n261 − 100MHz-3CC − QPSK – Low Channel)



Plot 7-72. Ant1 EIRP Plot (Band n261 − 100MHz-4CC − π/2-BPSK – 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	27574.92	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	250.0	325.0	32 / 0	23.79
		Mid	27924.96	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	V	262.0	332.9	32 / 0	26.22
		Mid	27924.96	CP-OFDM	QPSK	31 + 159	H + V	MIMO	V	262.0	332.9	32 / 0	24.21
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	262.0	332.9	32 / 0	26.28
		Mid	27924.96	DFT-s-OFDM	16QAM	31 + 159	H + V	2Tx	V	262.0	332.9	32 / 0	24.21
		Mid	27924.96	DFT-s-OFDM	64QAM	31 + 159	H + V	2Tx	V	262.0	332.9	1 / 16	22.71
		High	28275.00	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	43.0	175.2	32 / 0	21.32

Table 7-28. Ant2 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	31 + 159	H + V	2Tx	H	311.0	177.9	32 / 0	22.05
		Mid	27924.96	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	V	111.0	344.8	32 / 0	**23.71**
		Mid	27924.96	CP-OFDM	QPSK	31 + 159	H + V	MIMO	V	111.0	344.8	32 / 0	21.64
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	111.0	344.8	32 / 0	23.68
		Mid	27924.96	DFT-s-OFDM	16QAM	31 + 159	H + V	2Tx	V	111.0	344.8	1 / 12	21.85
		Mid	27924.96	DFT-s-OFDM	64QAM	31 + 159	H + V	2Tx	V	111.0	344.8	32 / 0	19.77
		High	28250.04	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	H	308.0	178.9	32 / 0	21.88

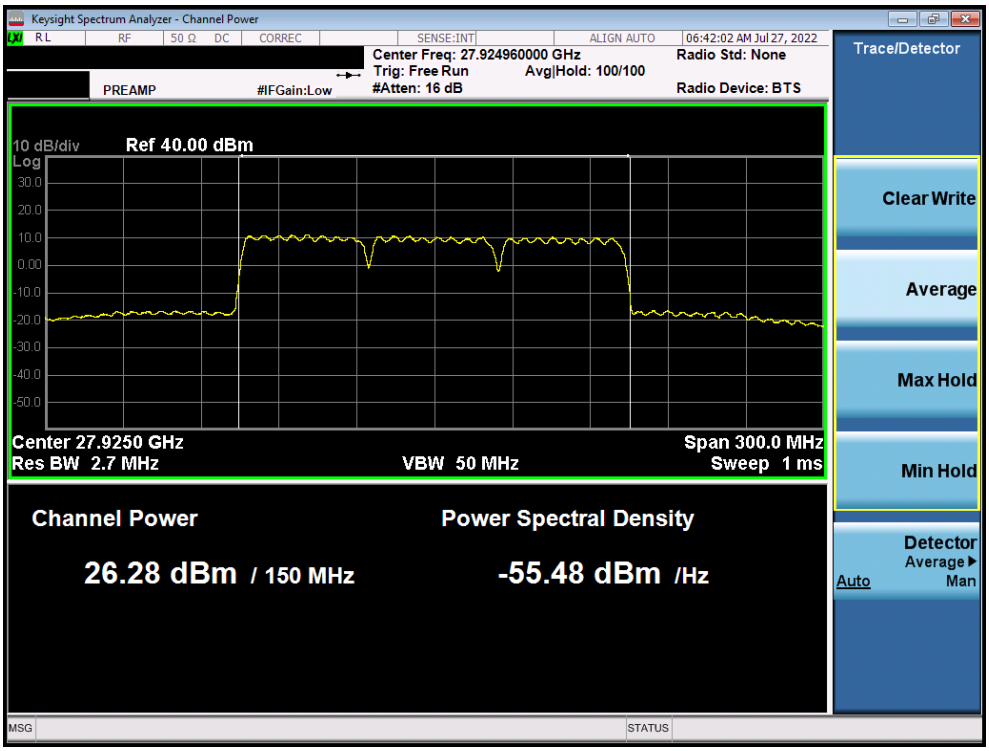
Table 7-29. Ant2 EIRP Data (Band n261 − 50MHz-4CC)

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	π/2 BPSK	31 + 159	H + V	2Tx	V	72.0	16.7	32 / 0	23.74
		Mid	27924.96	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	V	79.0	26.7	32 / 0	26.92
		Mid	27924.96	CP-OFDM	QPSK	31 + 159	H + V	MIMO	V	79.0	26.7	32 / 0	24.94
		Mid	27924.96	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	79.0	26.7	32 / 0	**26.98**
		Mid	27924.96	DFT-s-OFDM	16QAM	31 + 159	H + V	2Tx	V	79.0	26.7	1 / 19	25.57
		Mid	27924.96	DFT-s-OFDM	64QAM	31 + 159	H + V	2Tx	V	79.0	26.7	1 / 19	24.49
		High	28200.00	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	V	74.0	16.0	32 / 0	23.95

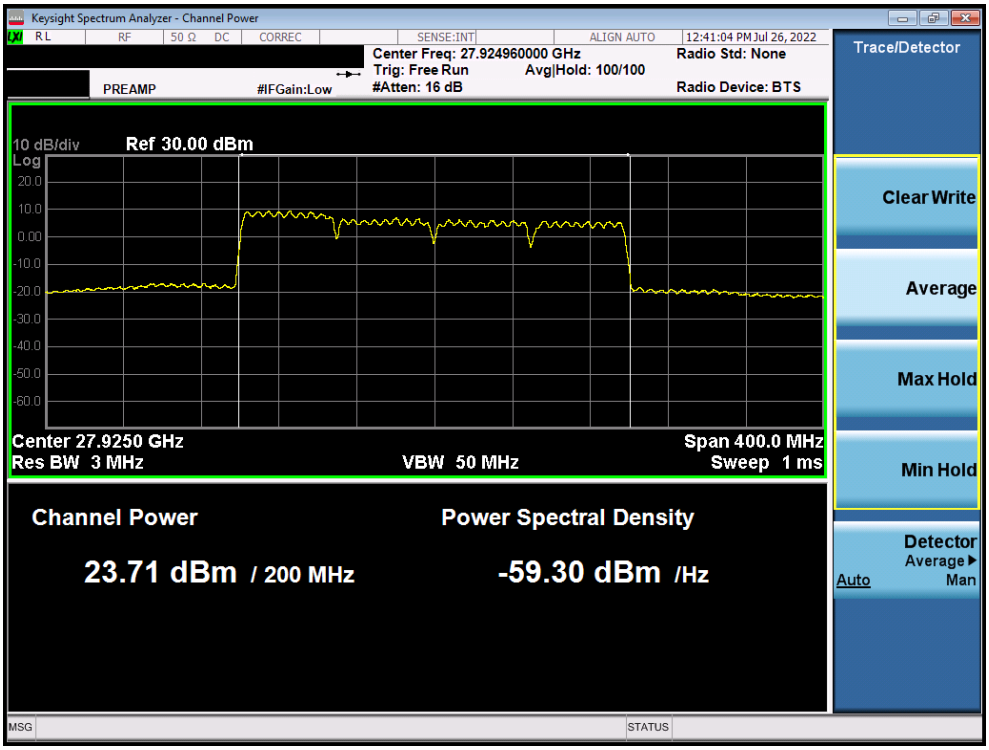
Table 7-30. Ant2 EIRP Data (Band n261 − 100MHz-3CC)

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	31 + 159	H + V	2Tx	V	43.0	348.2	32 / 0	22.75
		Mid	27925.02	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	H	71.0	27.1	32 / 0	**26.09**
		Mid	27925.02	CP-OFDM	QPSK	31 + 159	H + V	MIMO	H	71.0	27.1	32 / 0	23.47
		Mid	27925.02	DFT-s-OFDM	π/2 BPSK	31 + 159	H + V	2Tx	H	71.0	27.1	32 / 0	26.05
		Mid	27925.02	DFT-s-OFDM	16QAM	31 + 159	H + V	2Tx	H	71.0	27.1	1 / 12	24.06
		Mid	27925.02	DFT-s-OFDM	64QAM	31 + 159	H + V	2Tx	H	71.0	27.1	1 / 12	22.41
		High	28150.02	DFT-s-OFDM	QPSK	31 + 159	H + V	2Tx	H	53.0	347.8	32 / 0	23.02

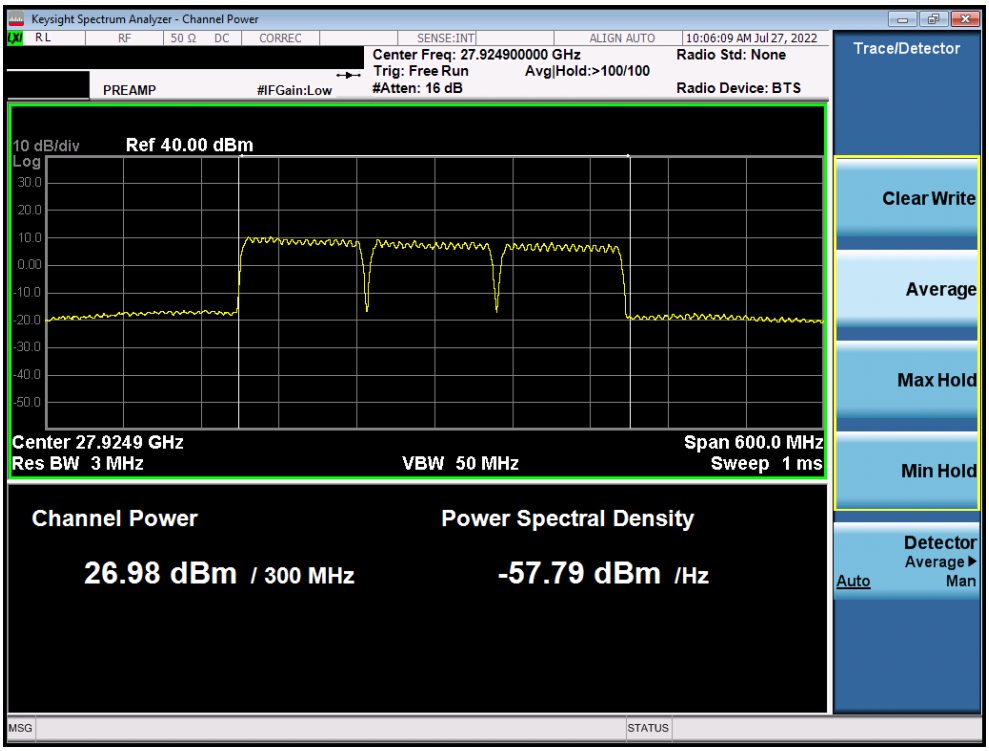
Table 7-31. Ant2 EIRP Data (Band n261 − 100MHz-4CC)



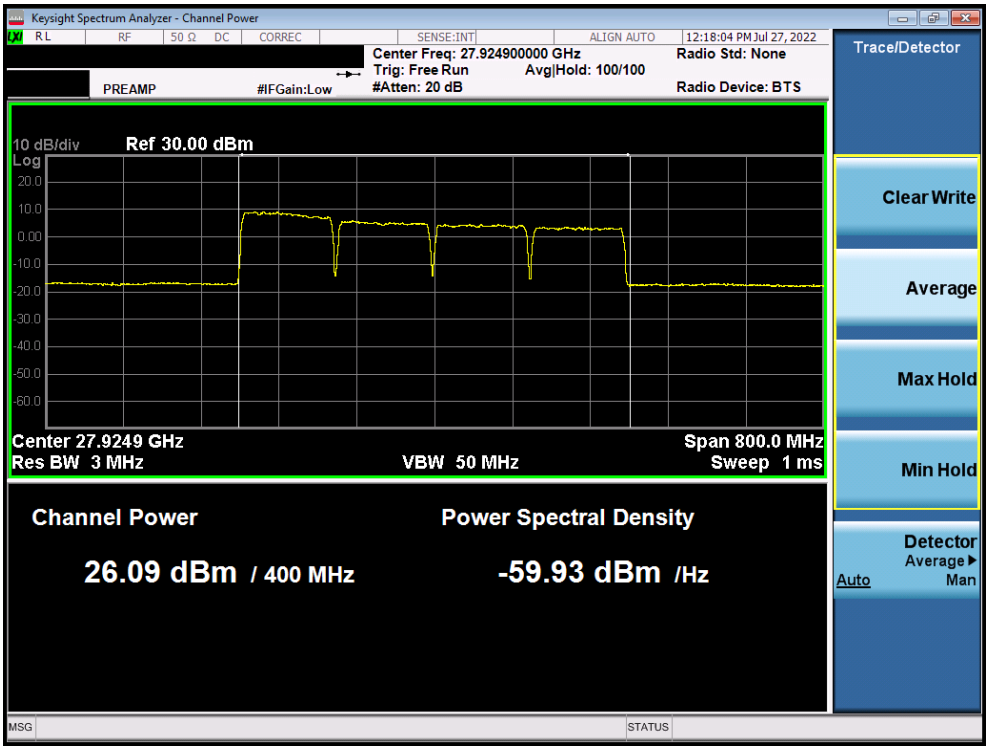
Plot 7-73. Ant2 EIRP Plot (Band n261 − 50MHz-3CC − QPSK – Mid Channel)



Plot 7-74. Ant2 EIRP Plot (Band n261 − 50MHz-4CC – QPSK – Mid Channel)



Plot 7-75. Ant2 EIRP Plot (Band n261 − 100MHz-3CC − QPSK – Mid Channel)



Plot 7-76. Ant2 EIRP Plot (Band n261 − 100MHz-4CC − π/2-BPSK – Mid Channel)

Band n260 Beam ID Configurations

de	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	163	35
	Mid	2Tx/MIMO	163	35
	High	2Tx/MIMO	162	34

Table 7-32. Ant1 Worst Case Beam ID

de	Channel	Beam Polarization	Beam ID	Beam ID Pair
MIMO	Low	2Tx/MIMO	167	39
	Mid	2Tx/MIMO	167	39
	High	2Tx/MIMO	158	30

Table 7-33. Ant2 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	π/2 BPSK	35 + 163	H + V	2Tx	V	234.0	260.7	32 / 0	16.51
		Mid	38499.96	DFT-s-OFDM	QPSK	35 + 163	H + V	2Tx	V	232.0	261.4	32 / 0	**18.92**
		Mid	38499.96	CP-OFDM	QPSK	35 + 163	H + V	MIMO	V	232.0	261.4	32 / 0	17.44
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	232.0	261.4	32 / 0	18.98
		Mid	38499.96	DFT-s-OFDM	16QAM	35 + 163	H + V	2Tx	V	232.0	261.4	1 / 19	18.86
		Mid	38499.96	DFT-s-OFDM	64QAM	35 + 163	H + V	2Tx	V	232.0	261.4	1 / 19	17.41
		High	39925.08	DFT-s-OFDM	π/2 BPSK	34 + 162	H + V	2Tx	V	240.0	266.4	32 / 0	17.36

Table 7-34. Ant1 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	35 + 163	H + V	2Tx	V	133.0	82.2	32 / 0	16.98
		Mid	38499.96	DFT-s-OFDM	QPSK	35 + 163	H + V	2Tx	V	132.0	86.0	32 / 0	**18.67**
		Mid	38499.96	CP-OFDM	QPSK	35 + 163	H + V	MIMO	V	132.0	86.0	32 / 0	17.21
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	132.0	86.0	32 / 0	18.62
		Mid	38499.96	DFT-s-OFDM	16QAM	35 + 163	H + V	2Tx	V	132.0	86.0	32 / 0	17.05
		Mid	38499.96	DFT-s-OFDM	64QAM	35 + 163	H + V	2Tx	V	132.0	86.0	1 / 19	15.58
		High	39900.12	DFT-s-OFDM	QPSK	34 + 162	H + V	2Tx	V	132.0	83.8	32 / 0	18.38

Table 7-35. Ant1 EIRP Data (Band n260 − 50MHz-4CC)

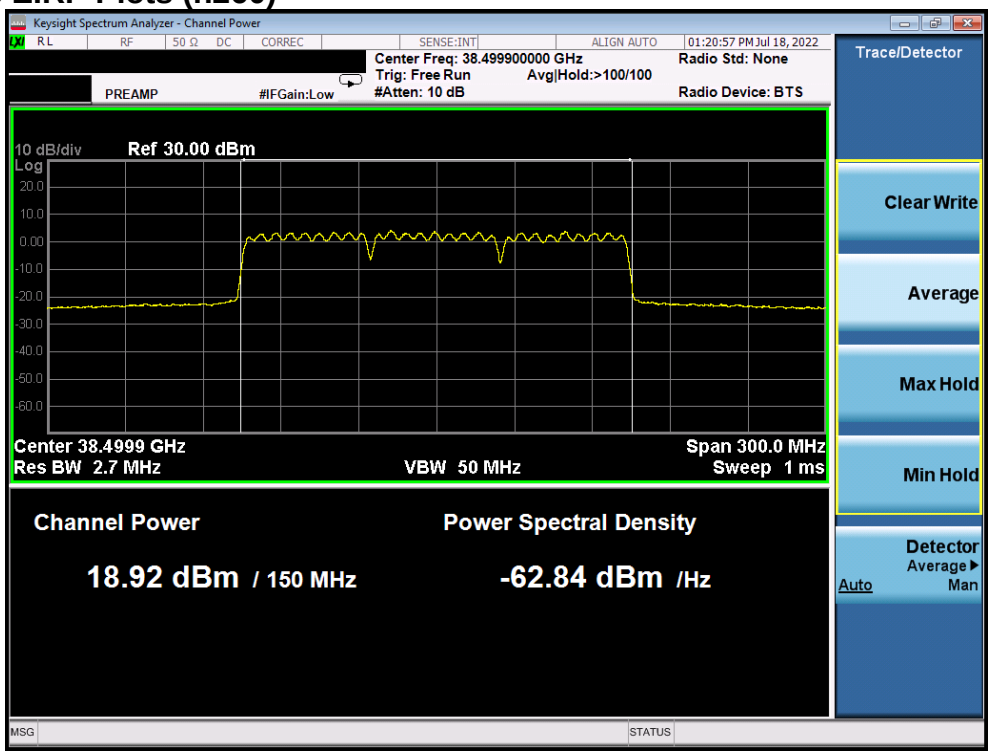
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100	3	Low	37149.96	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	231.0	260.5	32 / 0	17.04
		Mid	38499.96	DFT-s-OFDM	QPSK	35 + 163	H + V	2Tx	V	231.0	260.5	32 / 0	19.11
		Mid	38499.96	CP-OFDM	QPSK	35 + 163	H + V	MIMO	V	231.0	260.5	32 / 0	17.58
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	231.0	260.5	32 / 0	**19.17**
		Mid	38499.96	DFT-s-OFDM	16QAM	35 + 163	H + V	2Tx	V	231.0	260.5	32 / 0	17.62
		Mid	38499.96	DFT-s-OFDM	64QAM	35 + 163	H + V	2Tx	V	231.0	260.5	1 / 19	16.22
		High	39849.96	DFT-s-OFDM	π/2 BPSK	34 + 162	H + V	2Tx	V	229.0	261.1	32 / 0	17.47

Table 7-36. Ant1 EIRP Data (Band n260 − 100MHz-3CC)

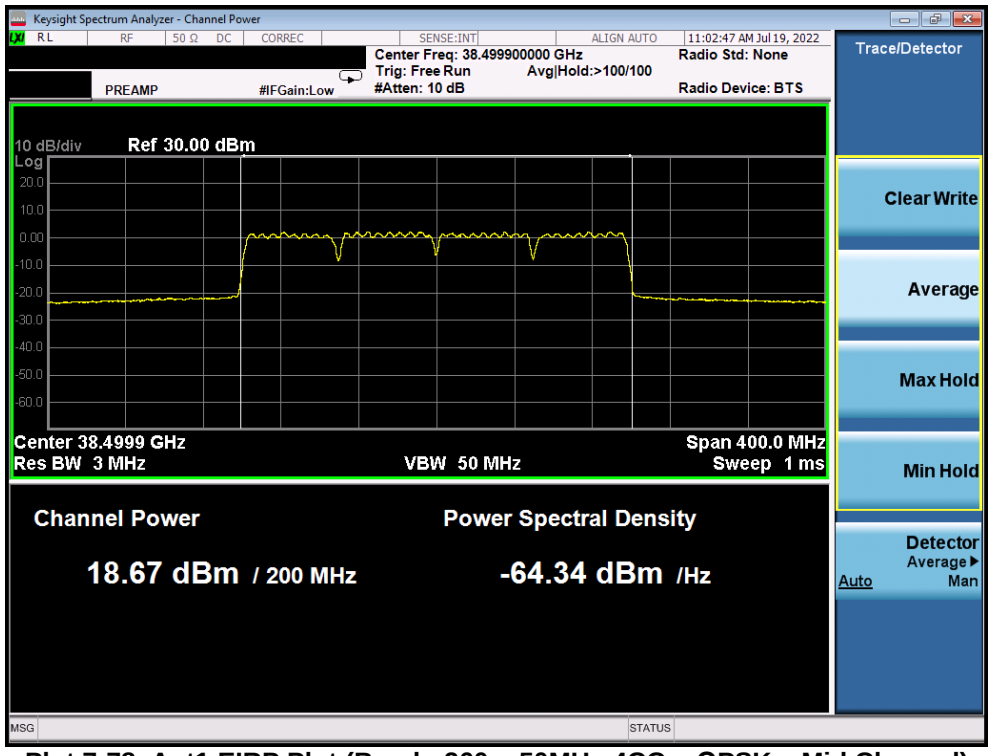
Bandwidth [MHz]	CCs Active	Channel	Frequency [MHz]	Transmission Scheme	Modulation	Beam ID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Positioner Azimuth [degrees]	Turntable Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
100+100+100+100	4	Low	37199.94	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	251.0	261.1	32 / 0	16.96
		Mid	38500.02	DFT-s-OFDM	QPSK	35 + 163	H + V	2Tx	V	105.0	84.1	32 / 0	18.50
		Mid	38500.02	CP-OFDM	QPSK	35 + 163	H + V	MIMO	V	105.0	84.1	32 / 0	17.73
		Mid	38500.02	DFT-s-OFDM	π/2 BPSK	35 + 163	H + V	2Tx	V	105.0	84.1	32 / 0	**18.52**
		Mid	38500.02	DFT-s-OFDM	16QAM	35 + 163	H + V	2Tx	V	105.0	84.1	1 / 16	17.65
		Mid	38500.02	DFT-s-OFDM	64QAM	35 + 163	H + V	2Tx	V	105.0	84.1	1 / 16	16.03
		High	39799.98	DFT-s-OFDM	π/2 BPSK	34 + 162	H + V	2Tx	V	249.0	262.5	32 / 0	17.40

Table 7-37. Ant1 EIRP Data (Band n260 − 100MHz-4CC)

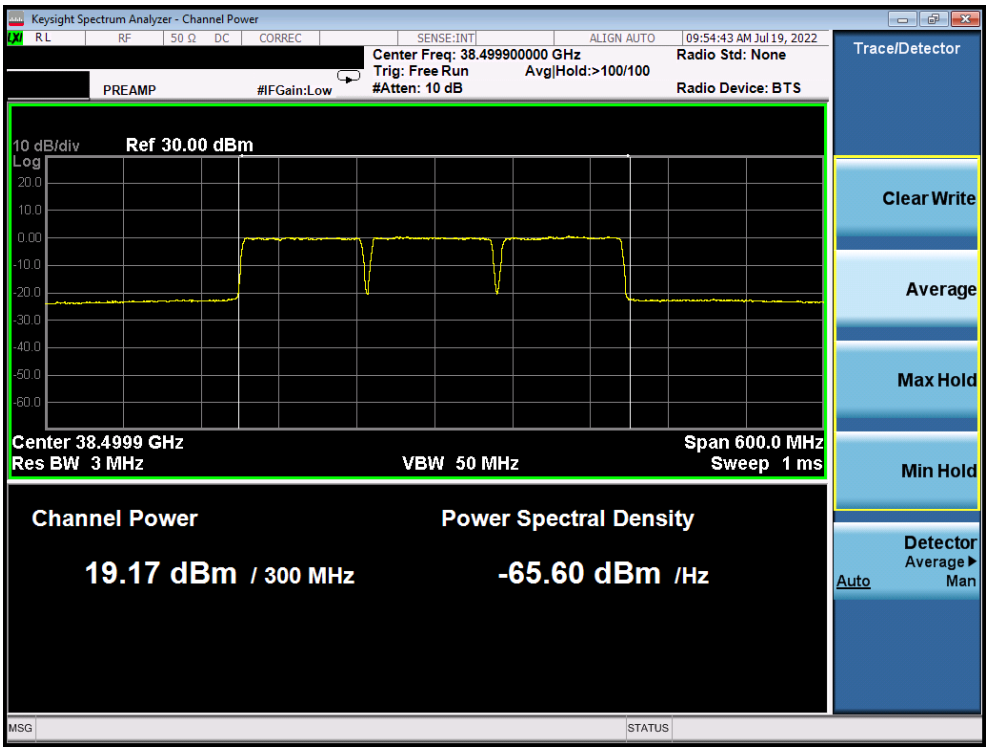
Worst-Case EIRP Plots (n260)



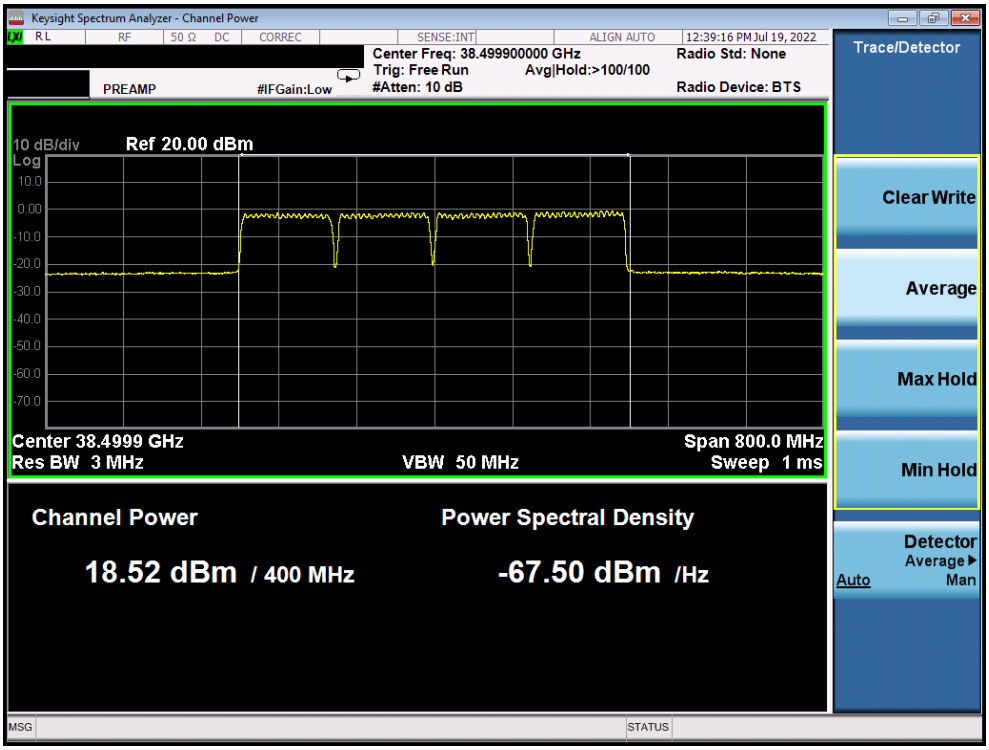
Plot 7-77. Ant1 EIRP Plot (Band n260 − 50MHz-3CC − QPSK – Mid Channel)



Plot 7-78. Ant1 EIRP Plot (Band n260 − 50MHz-4CC − QPSK – Mid Channel)



Plot 7-79. Ant1 EIRP Plot (Band n260 − 100MHz-3CC − QPSK – Mid Channel)



Plot 7-80. Ant1 EIRP Plot (Band n260 − 100MHz-4CC − BPSK – Mid Channel)

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	39 + 167	H + V	2Tx	H	36.0	189.7	32 / 0	**21.19**
		Low	37074.96	CP-OFDM	QPSK	39 + 167	H + V	MIMO	H	36.0	189.7	32 / 0	19.54
		Low	37074.96	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	36.0	189.7	32 / 0	21.10
		Low	37074.96	DFT-s-OFDM	16QAM	39 + 167	H + V	2Tx	H	36.0	189.7	1 / 19	19.58
		Low	37074.96	DFT-s-OFDM	64QAM	39 + 167	H + V	2Tx	H	36.0	189.7	1 / 19	18.49
		Mid	38499.96	DFT-s-OFDM	QPSK	39 + 167	H + V	2Tx	H	25.0	153.0	32 / 0	19.29
		High	39925.08	DFT-s-OFDM	QPSK	30 + 158	H + V	2Tx	H	32.0	199.6	32 / 0	19.09

Table 7-38. Ant2 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	39 + 167	H + V	2Tx	H	295.0	26.1	32 / 0	20.16
		Low	37099.92	CP-OFDM	QPSK	39 + 167	H + V	MIMO	H	295.0	26.1	32 / 0	**20.41**
		Low	37099.92	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	295.0	26.1	32 / 0	20.20
		Low	37099.92	DFT-s-OFDM	16QAM	39 + 167	H + V	2Tx	H	295.0	26.1	1 / 19	20.35
		Low	37099.92	DFT-s-OFDM	64QAM	39 + 167	H + V	2Tx	H	295.0	26.1	1 / 19	18.92
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	300.0	27.0	32 / 0	20.05
		High	39900.12	DFT-s-OFDM	π/2 BPSK	30 + 158	H + V	2Tx	H	230.0	35.0	32 / 0	17.86

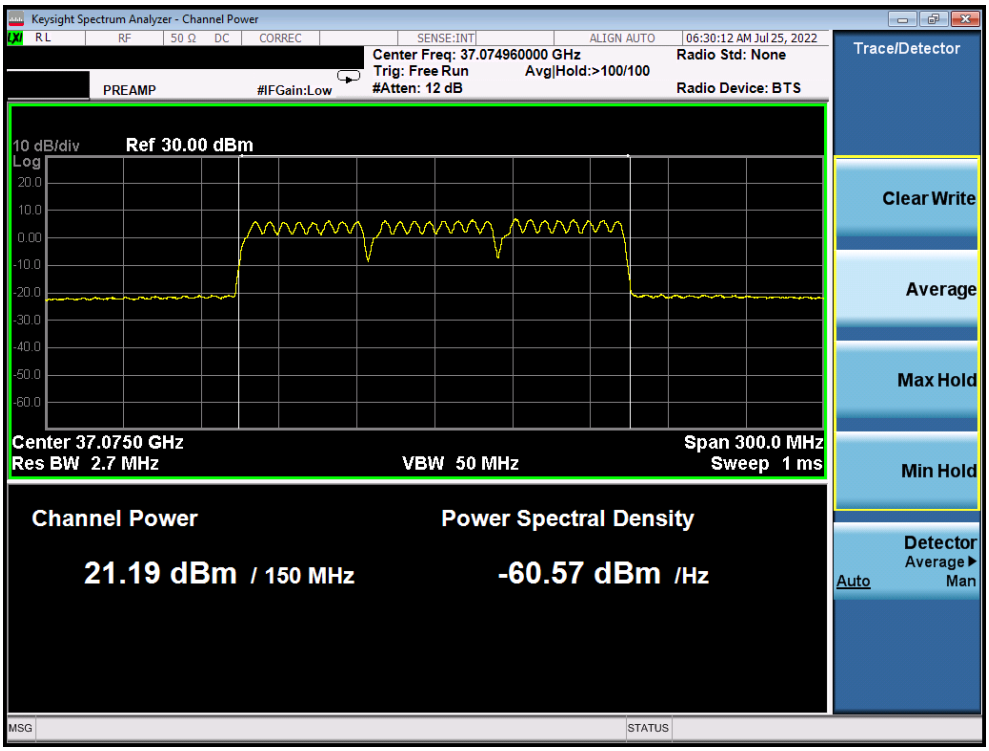
Table 7-39. Ant2 EIRP Data (Band n260 − 50MHz-4CC)

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	39 + 167	H + V	2Tx	H	29.0	195.2	1 / 12	20.29
		Low	37149.96	CP-OFDM	QPSK	39 + 167	H + V	MIMO	H	29.0	195.2	32 / 0	19.95
		Low	37149.96	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	29.0	195.2	1 / 12	**20.32**
		Low	37149.96	DFT-s-OFDM	16QAM	39 + 167	H + V	2Tx	H	28.0	192.0	32 / 0	18.88
		Low	37149.96	DFT-s-OFDM	64QAM	39 + 167	H + V	2Tx	H	29.0	195.2	1 / 16	17.38
		Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	361.0	255.0	32 / 0	14.74
		High	39849.96	DFT-s-OFDM	π/2 BPSK	30 + 158	H + V	2Tx	H	360.0	248.0	32 / 0	14.95

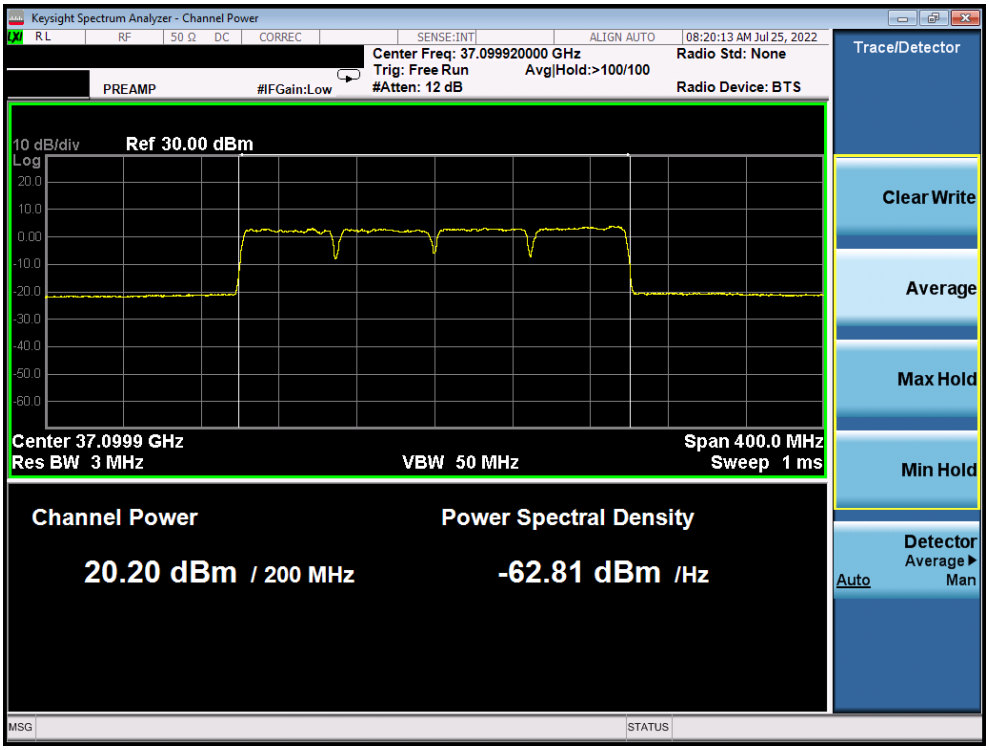
Table 7-40. Ant2 EIRP Data (Band n260 − 100MHz-3CC)

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	39 + 167	H + V	2Tx	H	36.0	191.5	32 / 0	**20.16**
		Low	37199.94	CP-OFDM	QPSK	39 + 167	H + V	MIMO	H	36.0	191.5	32 / 0	19.56
		Low	37199.94	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	36.0	191.5	32 / 0	20.08
		Low	37199.94	DFT-s-OFDM	16QAM	39 + 167	H + V	2Tx	H	36.0	191.5	1 / 12	19.99
		Low	37199.94	DFT-s-OFDM	64QAM	39 + 167	H + V	2Tx	H	36.0	191.5	1 / 12	18.72
		Mid	38500.02	DFT-s-OFDM	π/2 BPSK	39 + 167	H + V	2Tx	H	40.0	187.5	32 / 0	19.89
		High	39799.98	DFT-s-OFDM	π/2 BPSK	30 + 158	H + V	2Tx	H	36.0	191.5	32 / 0	20.02

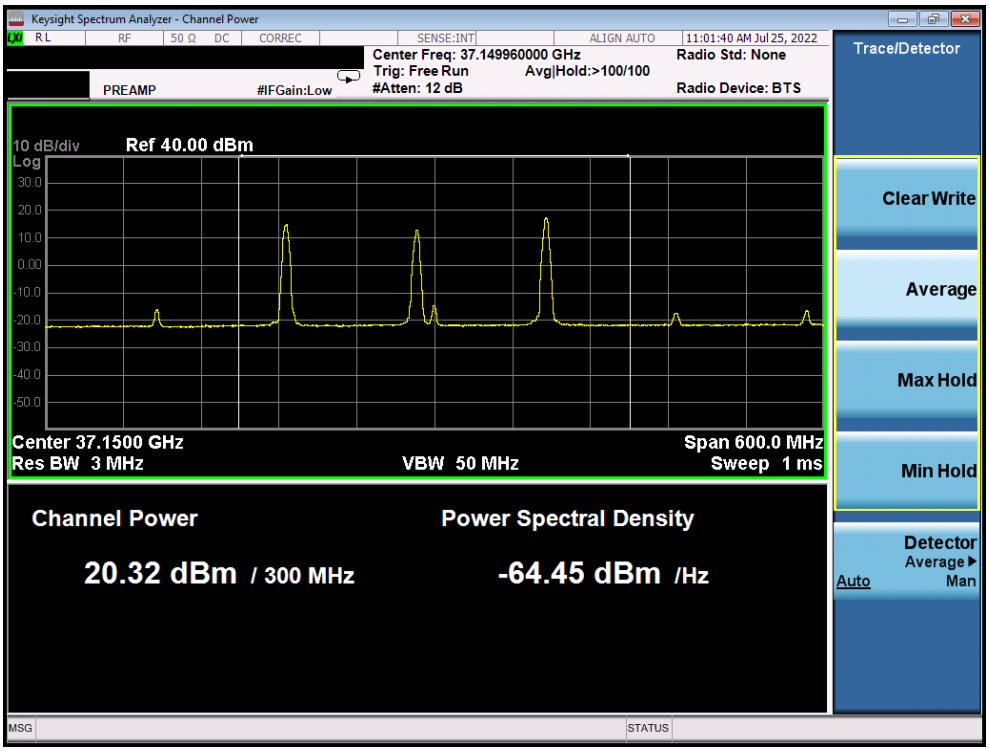
Table 7-41. Ant2 EIRP Data (Band n260 − 100MHz-4CC)



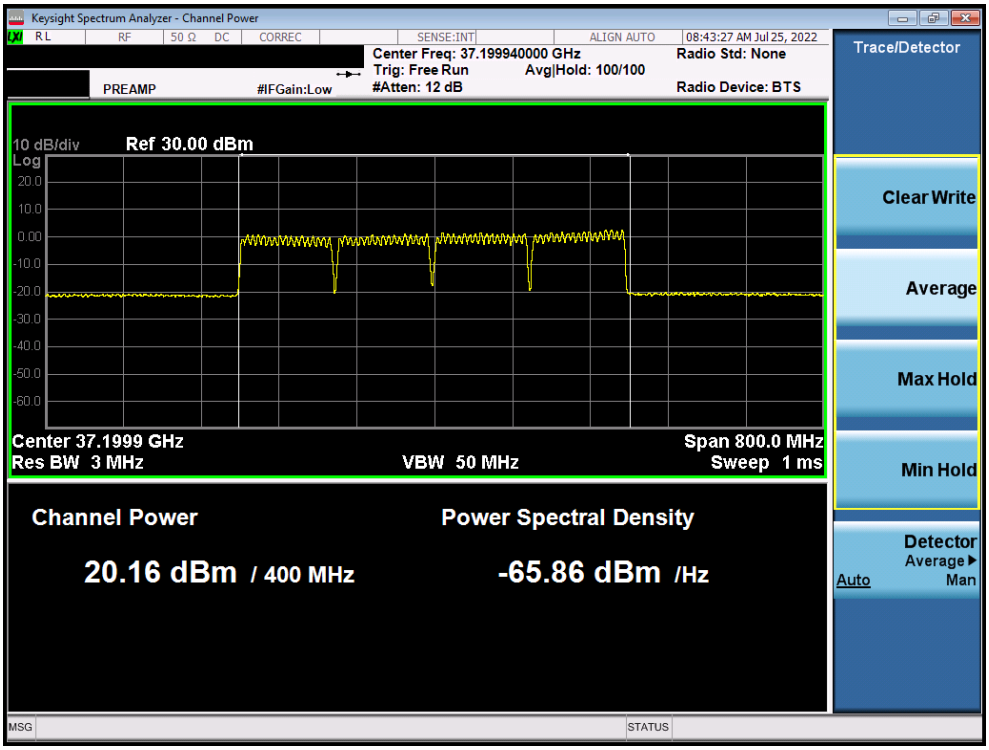
Plot 7-81. Ant2 EIRP Plot (Band n260 − 50MHz-3CC − QPSK – Low Channel)



Plot 7-82. Ant2 EIRP Plot (Band n260 − 50MHz-4CC – QPSK – Low Channel)



Plot 7-83. Ant2 EIRP Plot (Band n260 − 100MHz-3CC − QPSK – Low Channel)



Plot 7-84. Ant2 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) RSE's were measured with 3CC (60-90GHz) for all bands. It was determined that adding more CC's causes the overall amplitude of just 3CC to decrease, therefore, 1CC is the worst case for the purposes of spurious emissions measurements.

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

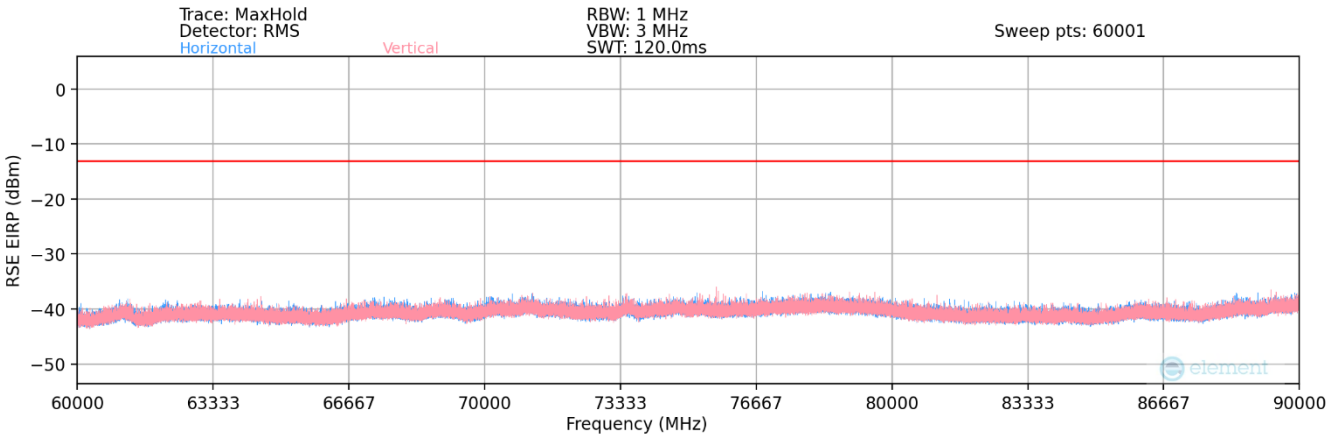
10) All RSE's were investigated in EN-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC mode, or the 802.11 chipset. For EN-DC mode, n261 uses LTE B2, B5, B12, B13, B48 and B66, n260 uses LTE B2, B5, B12, B13, B14,B30, B48 and B66 and n258 uses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

11) Additionally, this device supports anchor bands operating in FR1 spectrum. The n261 band uses NR Bands n2, n5, n66, and n77 as anchor bands. The n260 band uses NR Bands n2, n5, n12, n14, n30, n66, and n77 as anchor bands. The n258 band uses NR Bands n2, n5, n12, n14, n30, and n66 as anchor bands.

12) 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]
71105.90	Low	50	2Tx	QPSK	V	258	146	-41.26	-13.00	-28.26
73051.31	Mid	50	2Tx	QPSK	V	258	146	-39.20	-13.00	-26.20
75686.00	High	50	2Tx	QPSK	V	258	146	-37.54	-13.00	-24.54

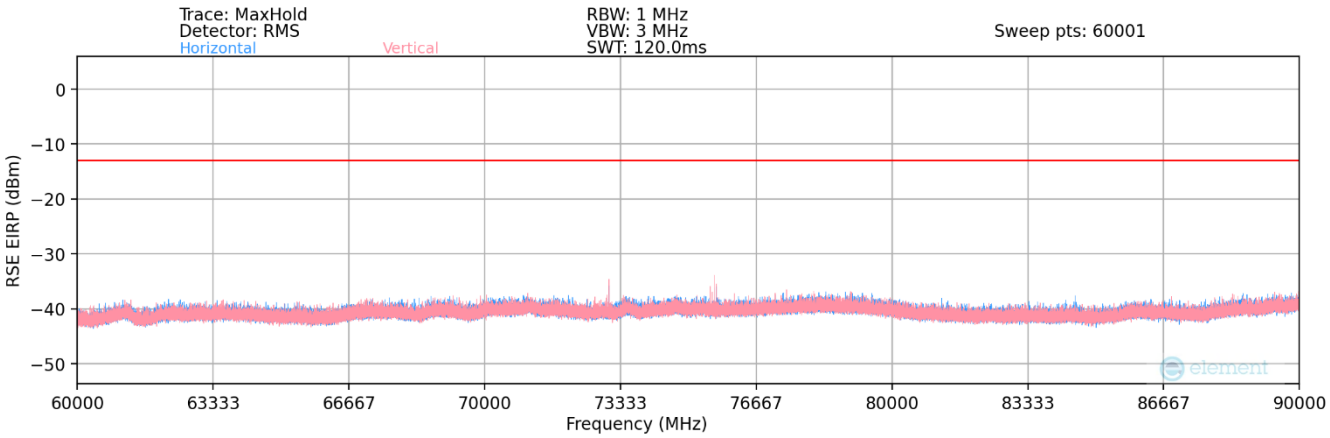
Table 7-51. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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]
72826.32	Low	50	2Tx	QPSK	V	91	84	-41.54	-13.00	-28.54
73051.00	Mid	50	2Tx	QPSK	V	89	80	-37.16	-13.00	-24.16
75686.00	High	50	2Tx	QPSK	V	89	80	-36.23	-13.00	-23.23
75675.00	High	50	2Tx	QPSK	V	89	80	-39.01	-13.00	-26.01

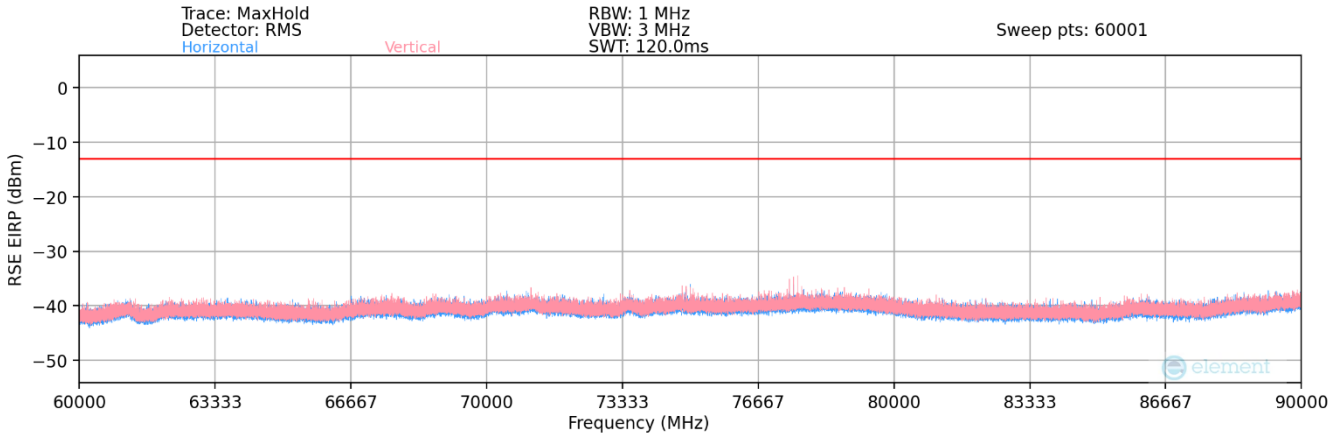
Table 7-57. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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]
74320.00	Low	100	2Tx	QPSK	V	85	193	-41.01	-13.00	-28.01
74997.50	Low	100	2Tx	QPSK	V	85	193	-40.82	-13.00	-27.82
75001.18	Mid	100	2Tx	QPSK	V	85	191	-41.34	-13.00	-28.34
75032.50	Mid	100	2Tx	QPSK	V	85	191	-40.56	-13.00	-27.56
75906.00	High	100	2Tx	QPSK	V	85	191	-38.42	-13.00	-25.42
75911.00	High	100	2Tx	QPSK	V	85	191	-39.53	-13.00	-26.53
75920.00	High	100	2Tx	QPSK	V	85	191	-38.99	-13.00	-25.99

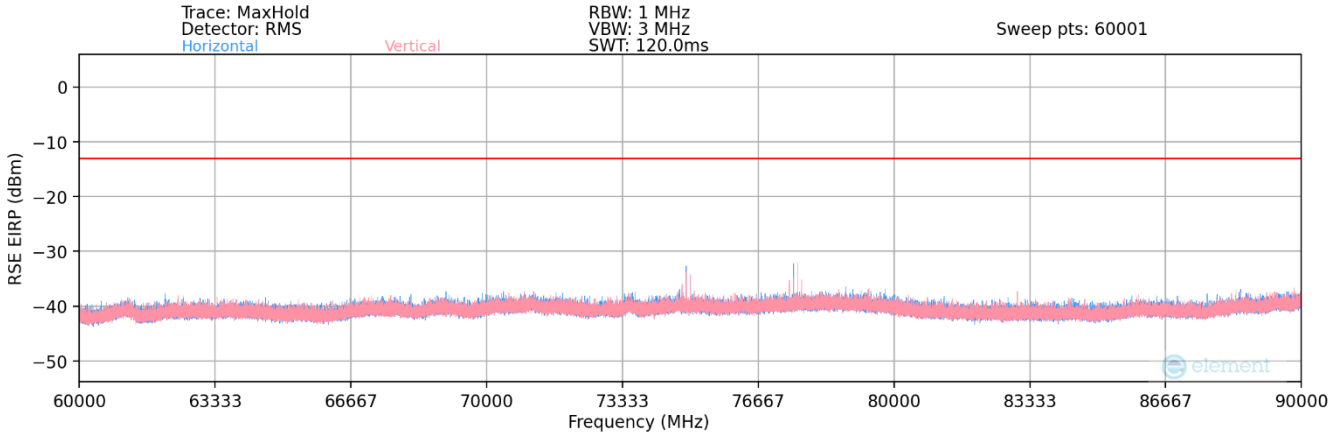
Table 7-63. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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]
74997.00	Mid	100	2Tx	QPSK	H	75	223	-36.21	-13.00	-23.21
75017.00	Mid	100	2Tx	QPSK	H	75	223	-38.42	-13.00	-25.42
77610.00	High	100	2Tx	QPSK	H	79	220	-39.64	-13.00	-26.64
77631.00	High	100	2Tx	QPSK	H	79	220	-35.22	-13.00	-22.22
77620.00	High	100	2Tx	QPSK	V	79	220	-35.88	-13.00	-22.88
77639.00	High	50	2Tx	QPSK	H	79	220	-38.41	-13.00	-25.41

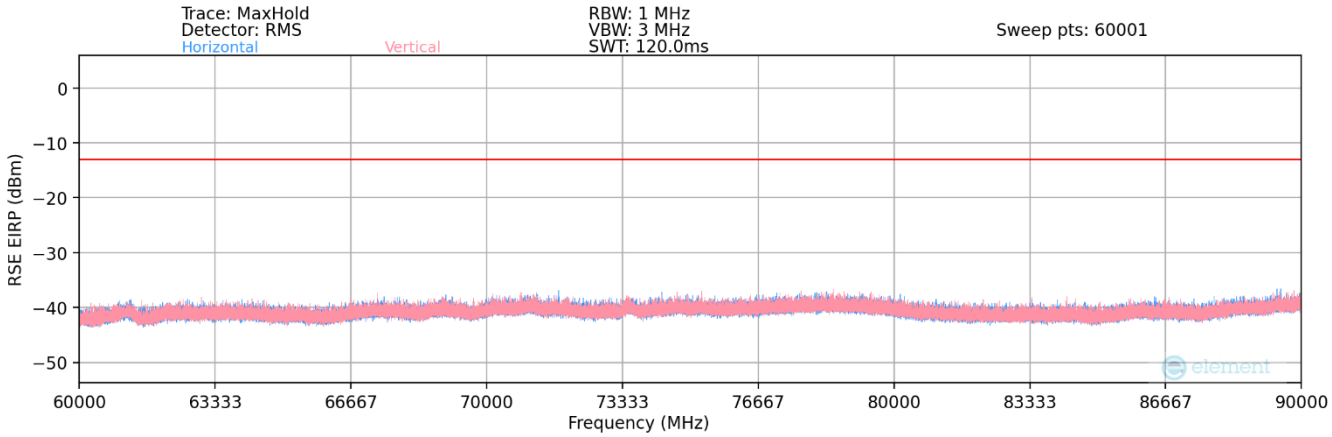
Table 7-69. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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]
83561.00	Low	100	2Tx	QPSK	V	315.00	51.00	-41.66	-13.00	-28.66
83776.03	Mid	100	2Tx	QPSK	V	315.00	51.00	-39.06	-13.00	-26.06
83912.78	High	100	2Tx	QPSK	V	315.00	51.00	-40.75	-13.00	-27.75

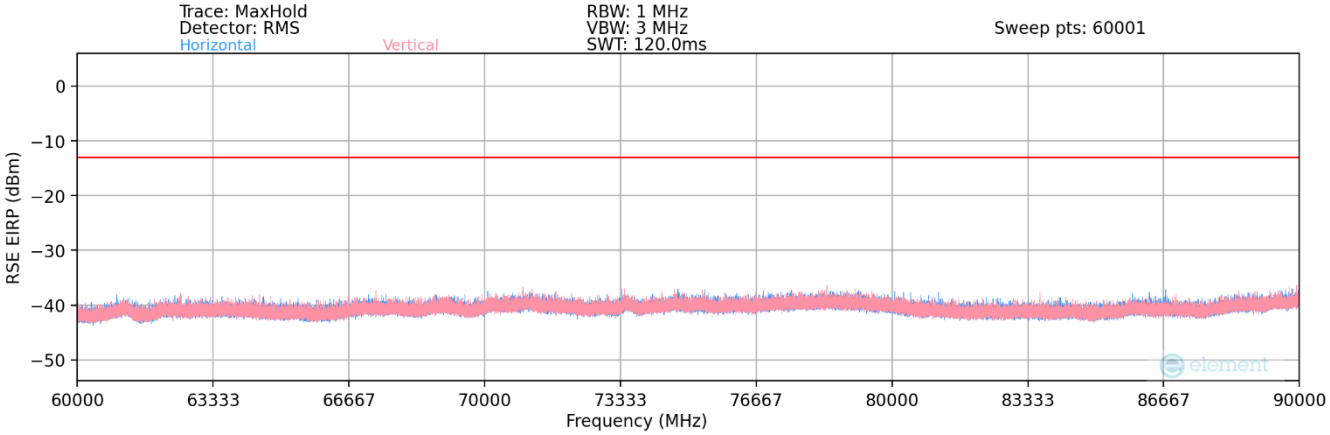
Table 7-76. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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]
83600.00	Low	100	2Tx	QPSK	H	251.00	234.00	-41.26	-13.00	-28.26
83776.00	Mid	100	2Tx	QPSK	H	251.00	234.00	-38.41	-13.00	-25.41
83912.00	High	100	2Tx	QPSK	H	251.00	234.00	-39.20	-13.00	-26.20

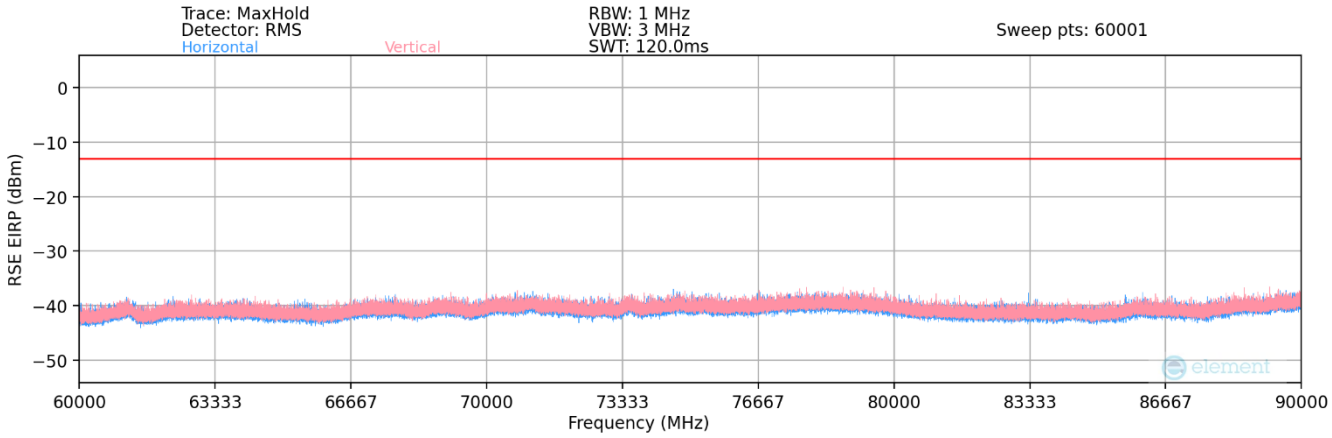
Table 7-83. Ant 2 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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)

60GHz - 90GHz



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 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]
76685.00	Low	100	2Tx	QPSK	H	-	-	-42.34	-13.00	-29.34
79950.80	Mid	100	2Tx	QPSK	H	-	-	-42.56	-13.00	-29.56
83100.50	High	100	2Tx	QPSK	H	-	-	-42.98	-13.00	-29.98

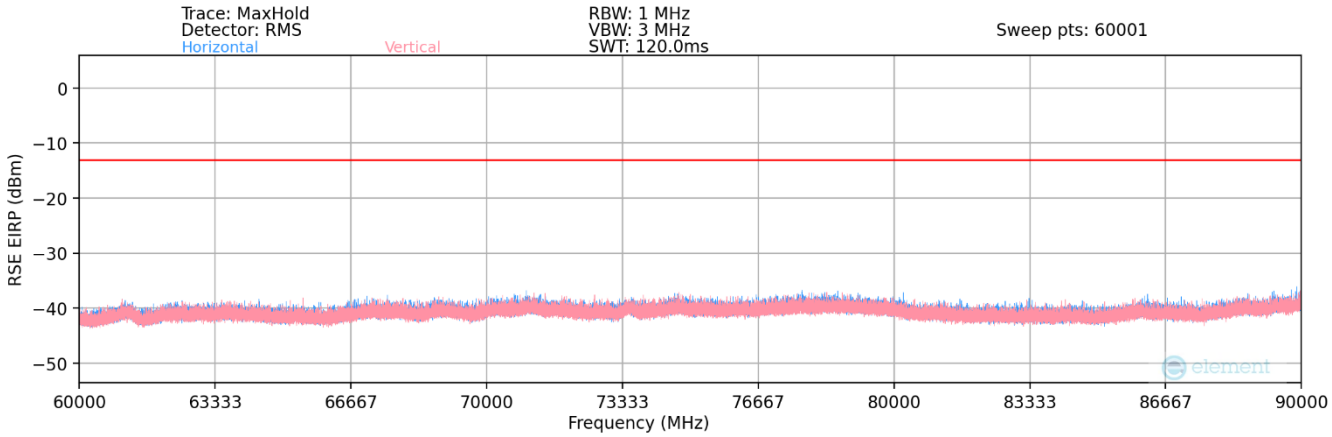
Table 7-89. Ant 1 - 2Tx - Spurious Emissions Table (60GHz - 90GHz)

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 n260 (N Patch)

60GHz - 90GHz



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 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]
77000.01	Low	100	2Tx	QPSK	H	-	-	-44.13	-13.00	-31.13
86998.88	Mid	100	2Tx	QPSK	H	-	-	-43.21	-13.00	-30.21
88250.00	High	100	2Tx	QPSK	H	-	-	-44.56	-13.00	-31.56

Table 7-96. 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.

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

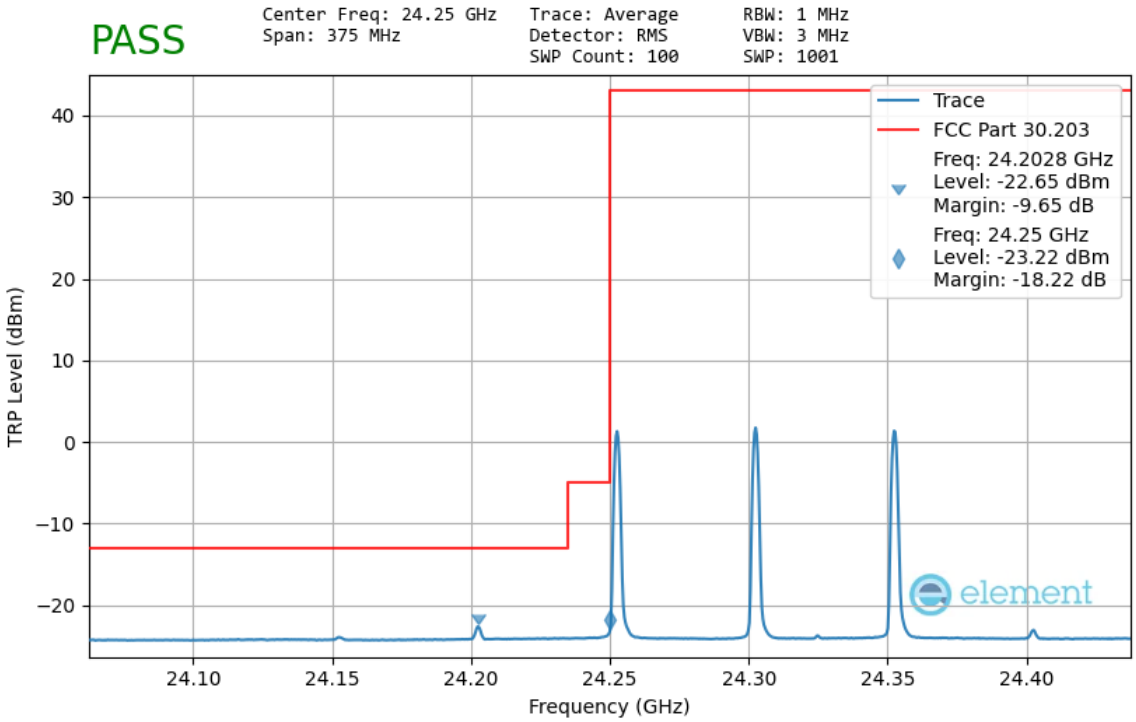
Cable Loss = 8.82dB

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

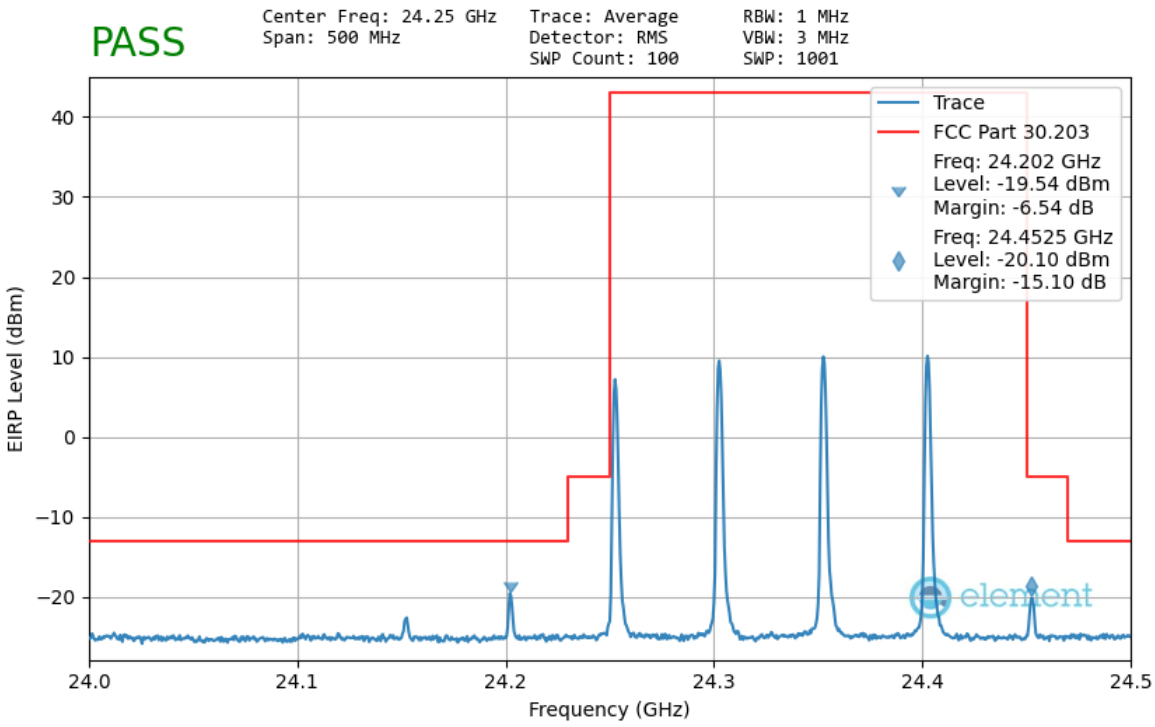
= 40.70dB/m + 8.82dB + 107 + $20\log_{10}$(1m) – 104.8dB

= 51.72dB

Band n258-R1 – Worst Case



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



Plot 7-94. Ant 1 Lower Band Edge (50MHz-4CC – pi/2-BPSK 1 RB)