PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
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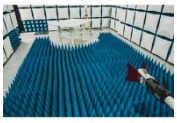

MEASUREMENT REPORT
FCC Part 30 5G mmWave

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

Date of Testing:
09/15/2021-01/06/2022
Test Report Issue Date:
01/06/2022
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2109080099-06-R1.A3L

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

Application Type:	Certification
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 971168 D01 v03r01, KDB 842590 D01 v01r02

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.

This revised Test Report (S/N: 1M2109080099-06-R1.A3L) supersedes and replaces the previously issued test report (S/N: 1M2109080099-06.A3L) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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.

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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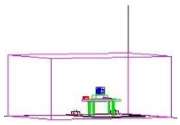
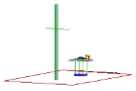


MEASUREMENT REPORT
FCC Part 30



Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n258 (24.25 - 24.45GHz)	M Patch	100	24300 - 24400	1	SISO	QPSK	0.490	26.90	-
					2Tx	QPSK	0.703	**28.47**	-
					2Tx	π/2 BPSK	0.673	28.28	-
					2Tx	16QAM	0.301	24.78	-
					2Tx	64QAM	0.193	22.86	-
				2	2Tx	QPSK	0.177	22.49	-
					2Tx	π/2 BPSK	0.188	22.74	-
					2Tx	16QAM	0.094	19.73	-
					2Tx	64QAM	0.067	18.27	-
		50	24275 - 24425	1	SISO	QPSK	0.341	25.33	-
					2Tx	QPSK	0.492	26.92	-
					2Tx	π/2 BPSK	0.520	**27.16**	-
					2Tx	16QAM	0.277	24.43	-
					2Tx	64QAM	0.162	22.10	-
				2	2Tx	QPSK	0.172	22.35	-
					2Tx	π/2 BPSK	0.212	23.27	-
					2Tx	16QAM	0.113	20.53	-
					2Tx	64QAM	0.064	18.08	-
n258 (24.25 - 24.45GHz)	N Patch	100	24300 - 24400	1	SISO	QPSK	0.385	25.85	94M8G7D
					2Tx	QPSK	1.274	**31.05**	94M8G7D
					2Tx	π/2 BPSK	0.914	29.61	91M6G7D
					2Tx	16QAM	0.794	29.00	94M5W7D
					2Tx	64QAM	0.472	26.74	94M7W7D
				2	2Tx	QPSK	0.428	26.31	195MG7D
					2Tx	π/2 BPSK	0.432	26.35	192MG7D
					2Tx	16QAM	0.270	24.32	195MW7D
					2Tx	64QAM	0.185	22.66	196MW7D
		50	24275 - 24425	1	SISO	QPSK	0.225	23.53	45M9G7D
					2Tx	QPSK	0.988	29.95	45M9G7D
					2Tx	π/2 BPSK	1.049	**30.21**	45M8G7D
					2Tx	16QAM	0.621	27.93	45M7W7D
					2Tx	64QAM	0.365	25.62	45M9W7D
				2	2Tx	QPSK	0.380	25.80	95M4G7D
					2Tx	π/2 BPSK	0.381	25.81	95M3G7D
					2Tx	16QAM	0.239	23.79	95M5W7D
					2Tx	64QAM	0.155	21.91	95M8W7D

EUT Overview (Band n258, 24.25 - 24.45GHz)

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n258 (24.75 - 25.25GHz)	M Patch	100	24800 - 25200	1	SISO	QPSK	0.458	26.61	-
					2Tx	QPSK	0.767	28.85	-
					2Tx	π/2 BPSK	0.771	**28.87**	-
					2Tx	16QAM	0.480	26.81	-
					2Tx	64QAM	0.294	24.68	-
				2	2Tx	QPSK	0.239	23.78	-
					2Tx	π/2 BPSK	0.233	23.67	-
					2Tx	16QAM	0.155	21.91	-
					2Tx	64QAM	0.100	19.99	-
		50	24775 - 25225	1	SISO	QPSK	0.356	25.51	-
					2Tx	QPSK	0.695	**28.42**	-
					2Tx	π/2 BPSK	0.667	28.24	-
					2Tx	16QAM	0.433	26.36	-
					2Tx	64QAM	0.244	23.87	-
				2	2Tx	QPSK	0.272	24.34	-
					2Tx	π/2 BPSK	0.277	24.43	-
					2Tx	16QAM	0.173	22.38	-
					2Tx	64QAM	0.111	20.44	-
n258 (24.75 - 25.25GHz)	N Patch	100	24800 - 25200	1	SISO	QPSK	0.583	27.65	94M7G7D
					2Tx	QPSK	1.539	31.87	94M7G7D
					2Tx	π/2 BPSK	1.568	**31.95**	91M3G7D
					2Tx	16QAM	0.967	29.85	94M2W7D
					2Tx	64QAM	0.616	27.89	94M0W7D
				2	2Tx	QPSK	0.266	24.25	195MG7D
					2Tx	π/2 BPSK	0.264	24.22	192MG7D
					2Tx	16QAM	0.175	22.43	195MW7D
					2Tx	64QAM	0.119	20.76	197MW7D
		50	24775 - 25225	1	SISO	QPSK	0.489	26.89	46M1G7D
					2Tx	QPSK	0.742	**28.70**	46M1G7D
					2Tx	π/2 BPSK	0.669	28.25	45M9G7D
					2Tx	16QAM	0.407	26.09	46M0W7D
					2Tx	64QAM	0.273	24.35	46M1W7D
				2	2Tx	QPSK	0.505	27.03	95M8G7D
					2Tx	π/2 BPSK	0.516	27.13	96M9G7D
					2Tx	16QAM	0.312	24.94	96M1W7D
					2Tx	64QAM	0.210	23.23	95M9W7D

EUT Overview (Band n258, 24.75 - 25.25GHz)

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n261	M Patch	100	27550 - 28300	1	SISO	QPSK	0.600	27.78	-
					2Tx	QPSK	0.780	28.92	-
					2Tx	π/2 BPSK	0.785	**28.95**	-
					2Tx	16QAM	0.537	27.30	-
					2Tx	64QAM	0.349	25.43	-
				2	2Tx	QPSK	0.212	23.26	-
					2Tx	π/2 BPSK	0.221	23.45	-
					2Tx	16QAM	0.136	21.32	-
					2Tx	64QAM	0.091	19.60	-
		50	27525 - 28325	1	SISO	QPSK	0.587	27.69	-
					2Tx	QPSK	0.792	28.99	-
					2Tx	π/2 BPSK	0.797	**29.02**	-
					2Tx	16QAM	0.471	26.73	-
					2Tx	64QAM	0.291	24.65	-
				2	2Tx	QPSK	0.284	24.54	-
					2Tx	π/2 BPSK	0.292	24.65	-
					2Tx	16QAM	0.184	22.65	-
					2Tx	64QAM	0.123	20.91	-
n261	N Patch	100	27550 - 28300	1	SISO	QPSK	1.055	30.23	94M9G7D
					2Tx	QPSK	2.067	33.15	94M9G7D
					2Tx	π/2 BPSK	2.133	**33.29**	91M3G7D
					2Tx	16QAM	1.291	31.11	94M8W7D
					2Tx	64QAM	0.806	29.06	94M4W7D
				2	2Tx	QPSK	0.549	27.39	194MG7D
					2Tx	π/2 BPSK	0.561	27.49	191MG7D
					2Tx	16QAM	0.257	24.09	194MW7D
					2Tx	64QAM	0.202	23.06	194MW7D
		50	27525 - 28325	1	SISO	QPSK	0.914	29.61	46M3G7D
					2Tx	QPSK	1.786	32.52	46M3G7D
					2Tx	π/2 BPSK	1.795	**32.54**	46M0G7D
					2Tx	16QAM	1.119	30.49	46M1W7D
					2Tx	64QAM	0.675	28.29	46M0W7D
				2	2Tx	QPSK	0.609	27.84	95M3G7D
					2Tx	π/2 BPSK	0.623	27.94	95M5G7D
					2Tx	16QAM	0.314	24.97	95M7W7D
					2Tx	64QAM	0.266	24.25	95M6W7D

EUT Overview (Band n261)

Band	Antenna	Bandwidth [MHz]	Tx Frequency [MHz]	CCs Active	Mode	Modulation	EIRP		Emission Designator
							Max Power [W]	Max Power [dBm]	
n260	M Patch	100	37050 - 39950	1	SISO	QPSK	0.212	23.26	95M4G7D
					2Tx	QPSK	1.493	31.74	95M4G7D
					2Tx	π/2 BPSK	1.503	**31.77**	92M0W7D
					2Tx	16QAM	0.861	29.35	95M0W7D
					2Tx	64QAM	0.590	27.71	95M4W7D
				2	2Tx	QPSK	0.284	24.54	195MG7D
					2Tx	π/2 BPSK	0.176	22.46	193MG7D
					2Tx	16QAM	0.199	22.98	196MW7D
					2Tx	64QAM	0.147	21.66	197MW7D
		50	37025 - 39975	1	SISO	QPSK	0.147	21.66	46M0G7D
					2Tx	QPSK	0.753	**28.77**	46M0G7D
					2Tx	π/2 BPSK	0.738	28.68	45M9G7D
					2Tx	16QAM	0.450	26.53	45M9W7D
					2Tx	64QAM	0.271	24.33	46M2W7D
				2	2Tx	QPSK	0.099	19.94	95M4G7D
					2Tx	π/2 BPSK	0.109	20.39	95M5G7D
					2Tx	16QAM	0.071	18.51	95M8W7D
					2Tx	64QAM	0.055	17.40	95M7W7D
n260	N Patch	100	37050 - 39950	1	SISO	QPSK	0.331	25.20	-
					2Tx	QPSK	0.415	**26.18**	-
					2Tx	π/2 BPSK	0.383	25.83	-
					2Tx	16QAM	0.244	23.87	-
					2Tx	64QAM	0.147	21.67	-
				2	2Tx	QPSK	0.132	21.19	-
					2Tx	π/2 BPSK	0.140	21.47	-
					2Tx	16QAM	0.096	19.81	-
					2Tx	64QAM	0.063	18.02	-
		50	37025 - 39975	1	SISO	QPSK	0.238	23.76	-
					2Tx	QPSK	0.378	**25.77**	-
					2Tx	π/2 BPSK	0.359	25.55	-
					2Tx	16QAM	0.227	23.56	-
					2Tx	64QAM	0.136	21.33	-
				2	2Tx	QPSK	0.152	21.81	-
					2Tx	π/2 BPSK	0.127	21.05	-
					2Tx	16QAM	0.088	19.43	-
					2Tx	64QAM	0.075	18.77	-

EUT Overview (Band n260)

Note: Due to similar antenna performance from both patch antennas, 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 and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST facility 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 PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO/IEC 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.

- PCTEST 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).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS901U.** The test data contained in this report pertains only to the emissions due to the EUT's 5G mmWave function.

The EUT contains two antennas, referred to herein as Ant1 (M Patch) and Ant2 (N Patch). Each of the patch 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 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 pi/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 KDB 842590 D01 v01r02 and ANSI C63.26-2015. See Section 7.0 of this test report for a description of the radiated tests.

EIRP simulation data for all Beam ID's 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. 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 either an LTE carrier or an NR FR1 carrier. Both were investigated during FR2 measurements.

2.4 Software and Firmware

The test was conducted with firmware version FAS0_S901UFAU0AUI3 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

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

3.2 Radiated Power and Radiated Spurious Emissions

§30.202, §30.203

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary for radiated emissions measurements in the spurious domain. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. Absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections for measurements above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m for measurements above 1GHz.

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

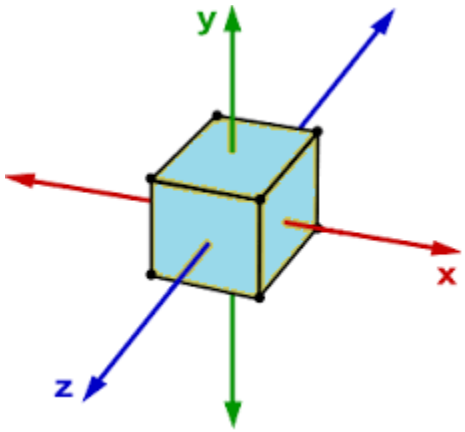


Figure 3-1. Rotation of the EUT Through Three Orthogonal Planes

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

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

Table 3-1. Far-Field Distance & 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 the emissions’ occupied bandwidth. The EIRP is calculated from the raw power level measured with the spectrum analyzer using the formulas shown below.

Effective Isotropic Radiated Power Sample Calculation

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

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

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

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

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

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

= 18.98 dBm e.i.r.p.

4.0 MEASUREMENT UNCERTAINTY

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

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

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to an accredited ISO/IEC 17025 calibration facility. Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
	AP1	EMC Cable and Switch System	9/10/2021	Annual	9/10/2022	AP1
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
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Biennial	8/27/2022	17620
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	7/21/2021	Annual	7/21/2022	MY49430494
Keysight Technologies	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Megaphase	FAC mmWave	AP FAC mmWave 18ft 40GHz	3/3/2021	Annual	3/3/2022	20033003
Narda	180-442-KF	Wide Band Horn Antenna 18.0 - 40.0 GHz	11/5/2020	Biennial	11/5/2022	U157403-01
OML Inc.	M05RH	WR-05 Horn Antenna, 24dBi, 140 to 220 GHz	10/31/2019	Biennial	1/31/2022	18073001
OML Inc.	M08RH	WR-08 Horn Antenna, 24dBi, 90 to 140 GHz	10/31/2019	Biennial	1/31/2022	18073001
OML Inc.	M12RH	WR-12 Horn Antenna, 24dBi, 60 to 90 GHz	10/31/2019	Biennial	1/31/2022	18073001
OML Inc.	M19RH	WR-19 Horn Antenna, 24dBi, 40 to 60 GHz	10/31/2019	Biennial	1/31/2022	18073001
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	5/25/2021	Annual	5/25/2022	100348
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and spectrum analyzer	2/10/2021	Annual	2/10/2022	103187
Rohde & Schwarz	SMW200A	Signal Generator	N/A			190456
Sunol Science	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
Virginia Diodes Inc	SAX252	SAX Module (60 - 90GHz)	2/24/2021	Biennial	2/24/2023	SAX252
Virginia Diodes Inc	SAX253	SAX Module (90 - 140GHz)	2/24/2021	Biennial	2/24/2023	SAX253
Virginia Diodes Inc	SAX254	SAX Module (140 - 220GHz)	2/24/2021	Biennial	2/24/2023	SAX254
Virginia Diodes Inc	SAX411	SAX Module (40 - 60GHz)	2/24/2021	Biennial	2/24/2023	SAX411
Virginia Diodes Inc	SAX679	SAX Module (40 - 60GHz)	8/28/2020	Biennial	8/28/2022	SAX679
Virginia Diodes Inc	SAX680	SAX Module (60 - 90GHz)	8/14/2020	Biennial	9/14/2022	SAX680
Virginia Diodes Inc	SAX681	SAX Module (90 - 140GHz)	10/22/2020	Biennial	10/22/2022	SAX681
Virginia Diodes Inc	SAX682	SAX Module (140 - 220GHz)	9/24/2020	Biennial	9/24/2022	SAX682
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/3/2021	Annual	3/3/2022	234142-001
UTiFlex	UTiFlex	FAC mmWave UTiFlex 40GHz	3/10/2021	Annual	3/10/2022	232062-001
UTiFlex	UTiFlex	1m UTiFlex 40GHz	9/10/2021	Annual	9/10/2022	232063-001

Table 5-1. Test Equipment

Notes:

For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

6.0 SAMPLE CALCULATIONS

Emission Designator

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 and 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 EIRP limits.
4) “CC” refers to “Component Carriers”.
5) Beam IDs were chosed 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

§2.1049

Test Overview

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

Test Procedure Used

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

Test Settings

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

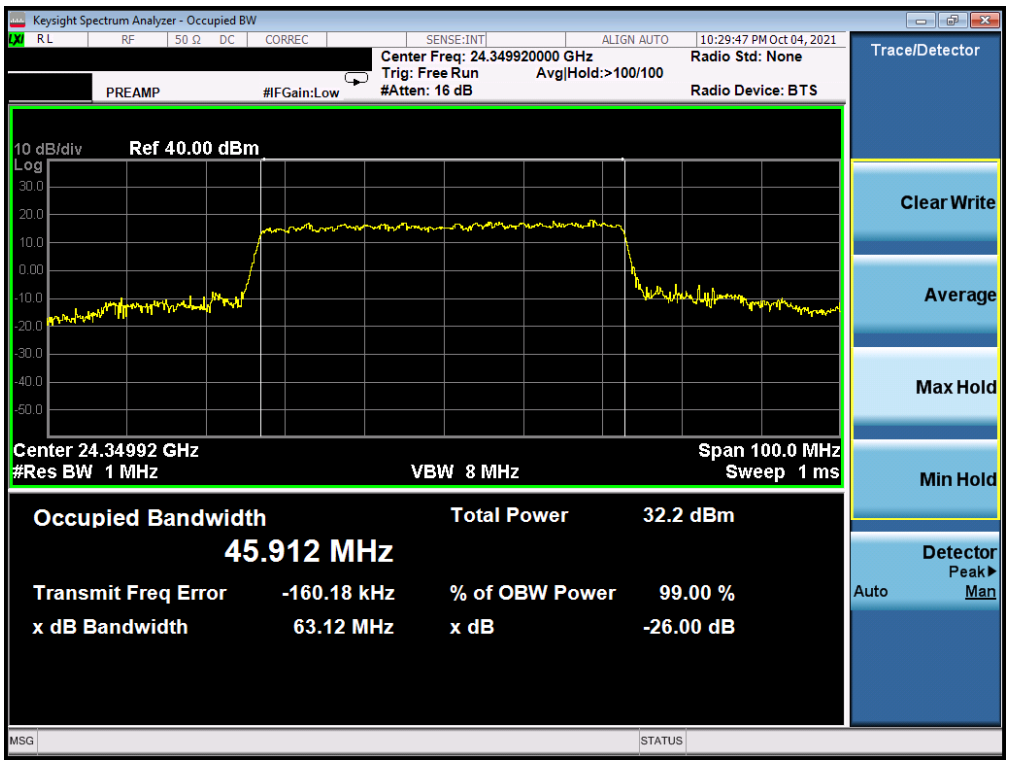
Test Notes

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.

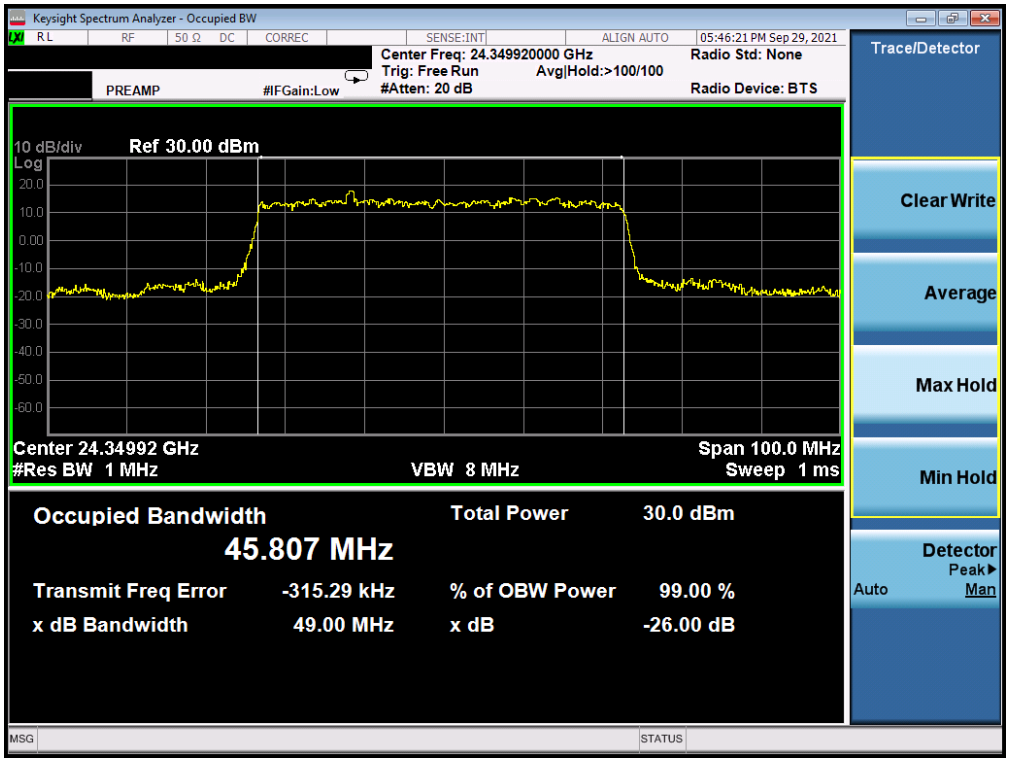
Band n258-R1 (N Patch)

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.91
			DFT-s-OFDM	pi/2-BPSK	45.81
			CP-OFDM	16QAM	45.72
			CP-OFDM	64QAM	45.88
		2	CP-OFDM	QPSK	95.43
			DFT-s-OFDM	pi/2-BPSK	95.31
			CP-OFDM	16QAM	95.52
			CP-OFDM	64QAM	95.78
	100	1	CP-OFDM	QPSK	94.84
			DFT-s-OFDM	pi/2-BPSK	91.57
			CP-OFDM	16QAM	94.53
			CP-OFDM	64QAM	94.66
		2	CP-OFDM	QPSK	194.73
			DFT-s-OFDM	pi/2-BPSK	191.80
			CP-OFDM	16QAM	194.86
			CP-OFDM	64QAM	196.10

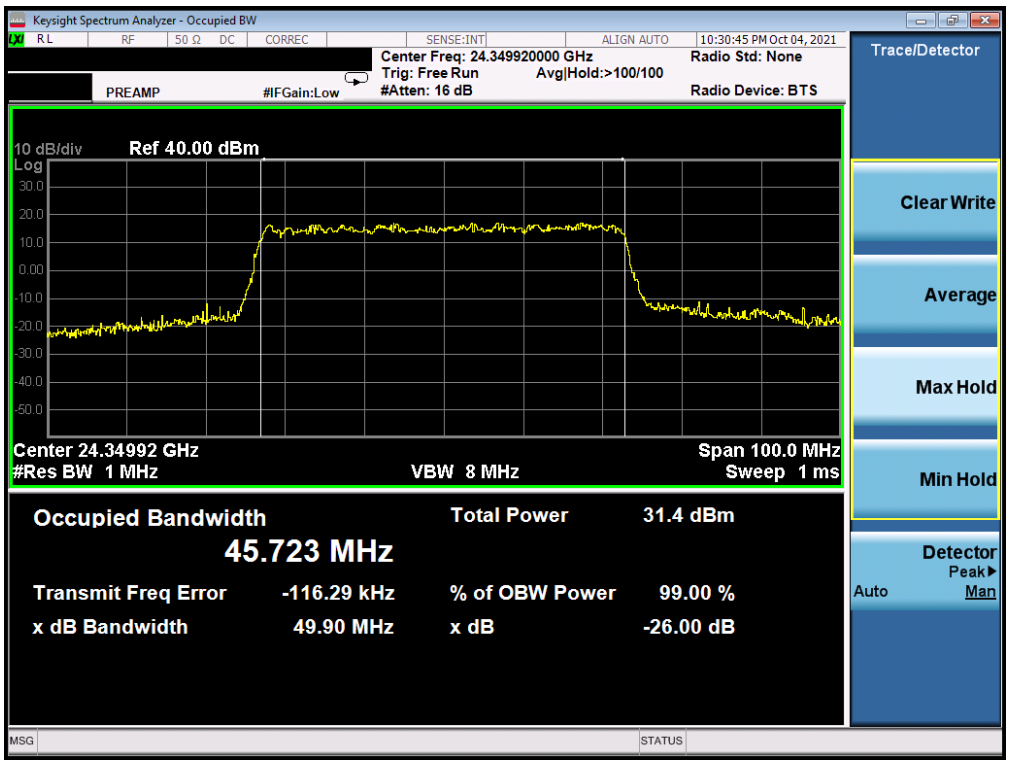
Table 7-2. Summary of Ant 2 Occupied Bandwidths (n258-R1 N Patch)



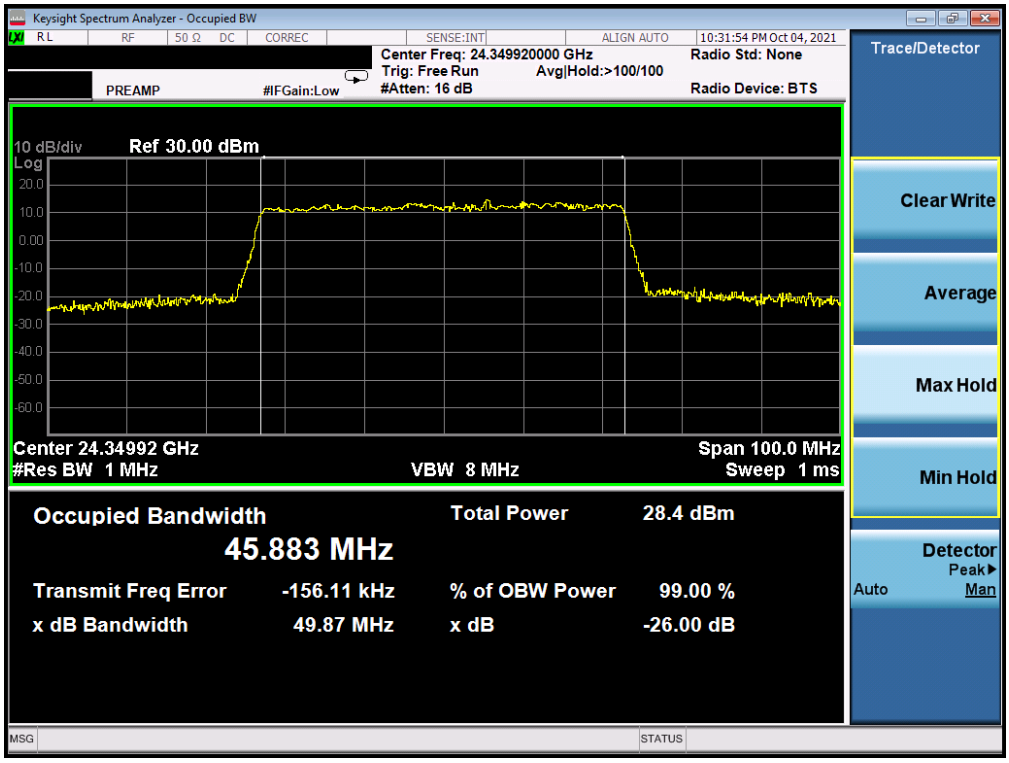
Plot 7-1. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



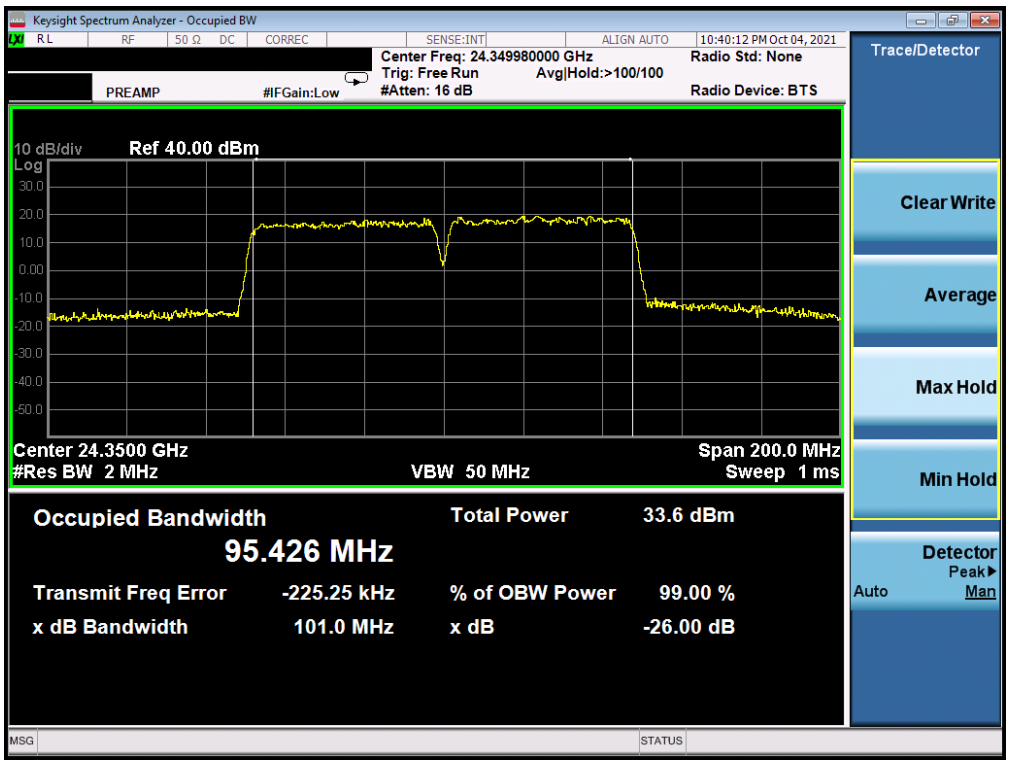
Plot 7-2. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



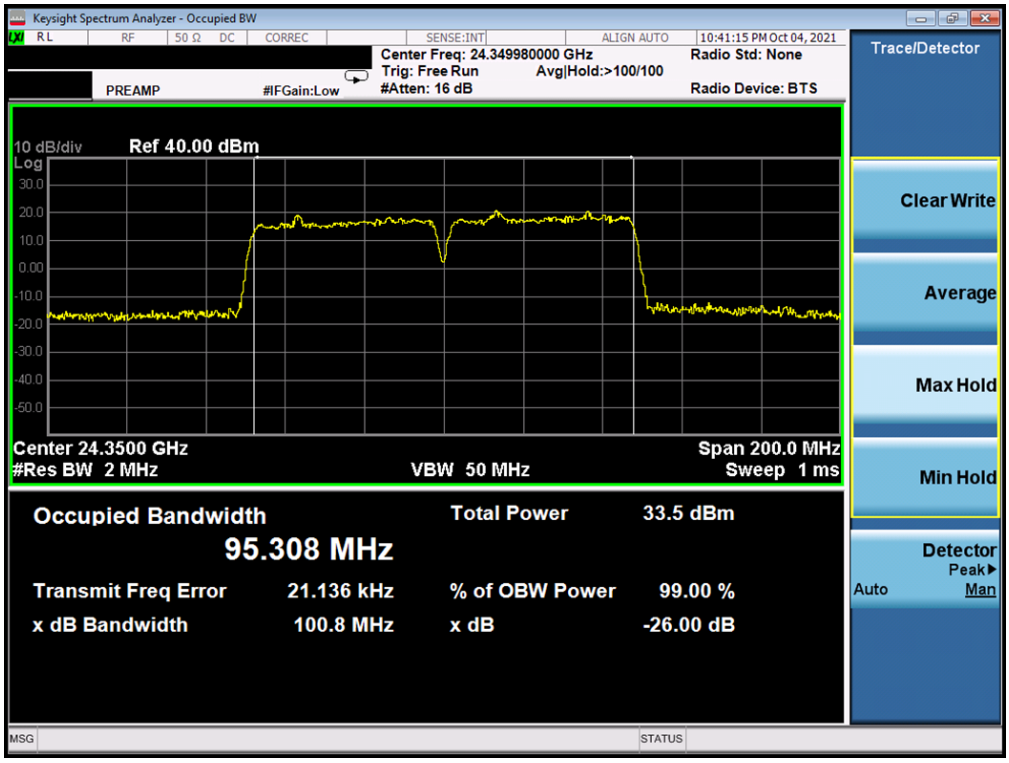
Plot 7-3. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



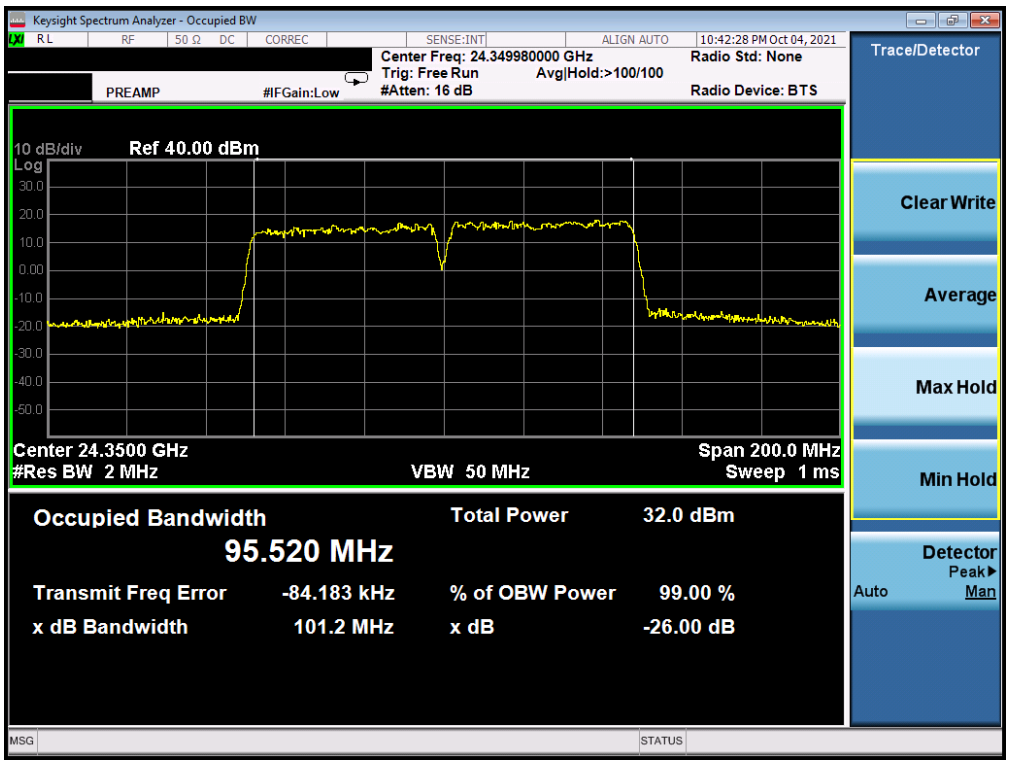
Plot 7-4. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



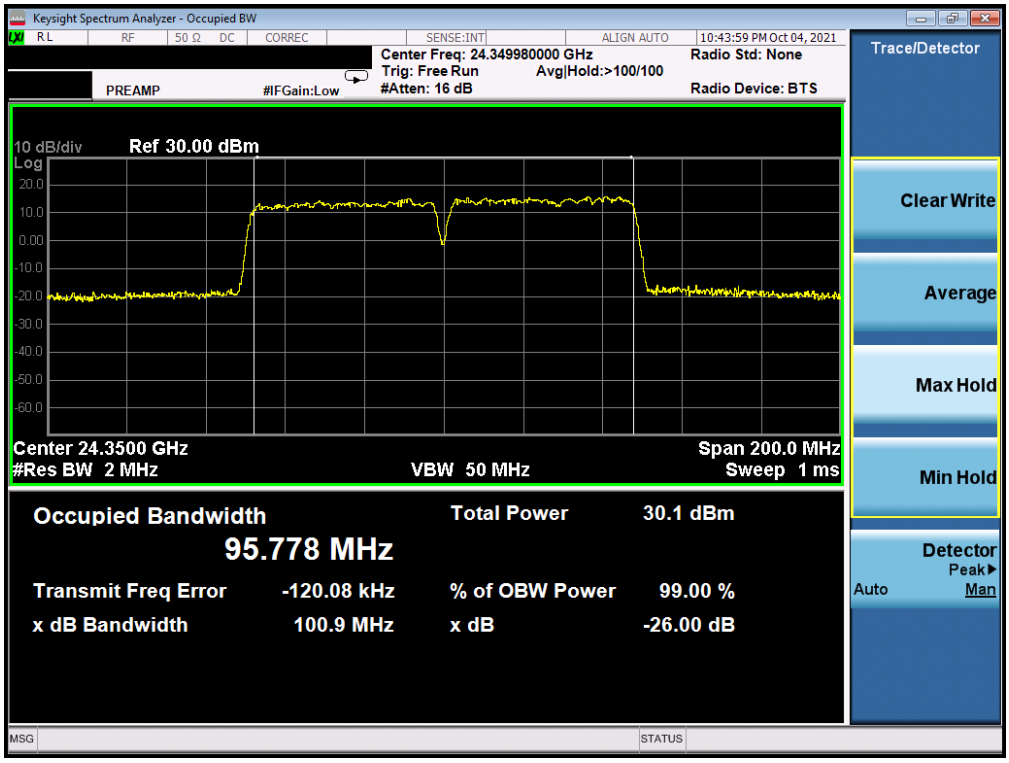
Plot 7-5. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



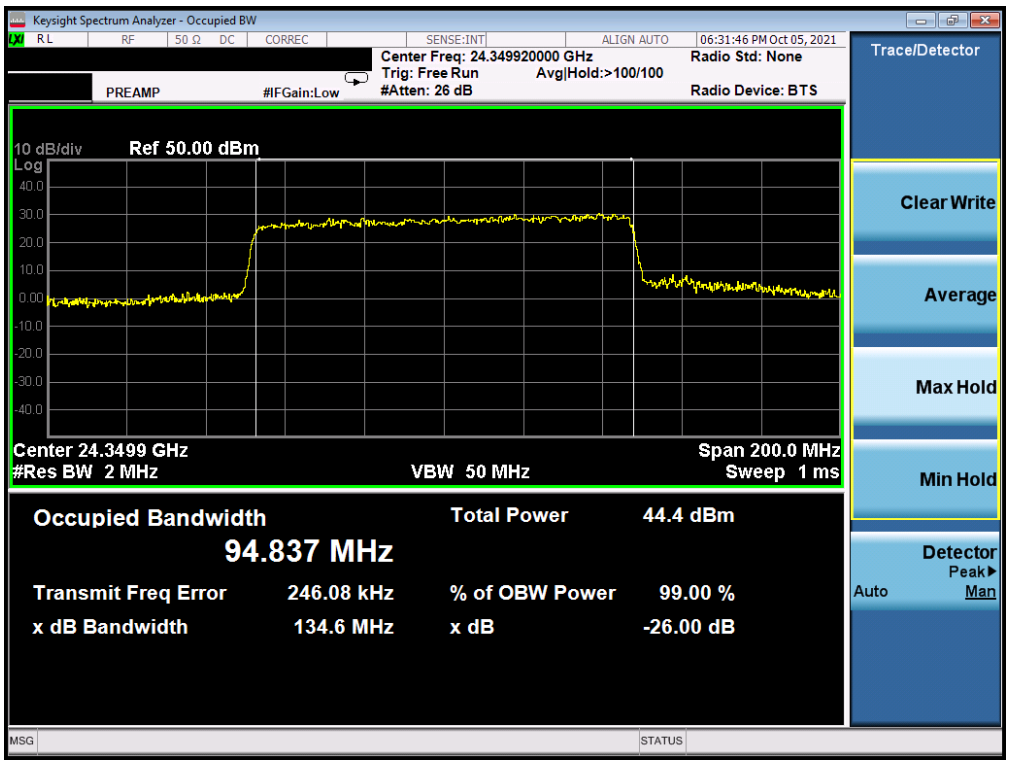
Plot 7-6. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



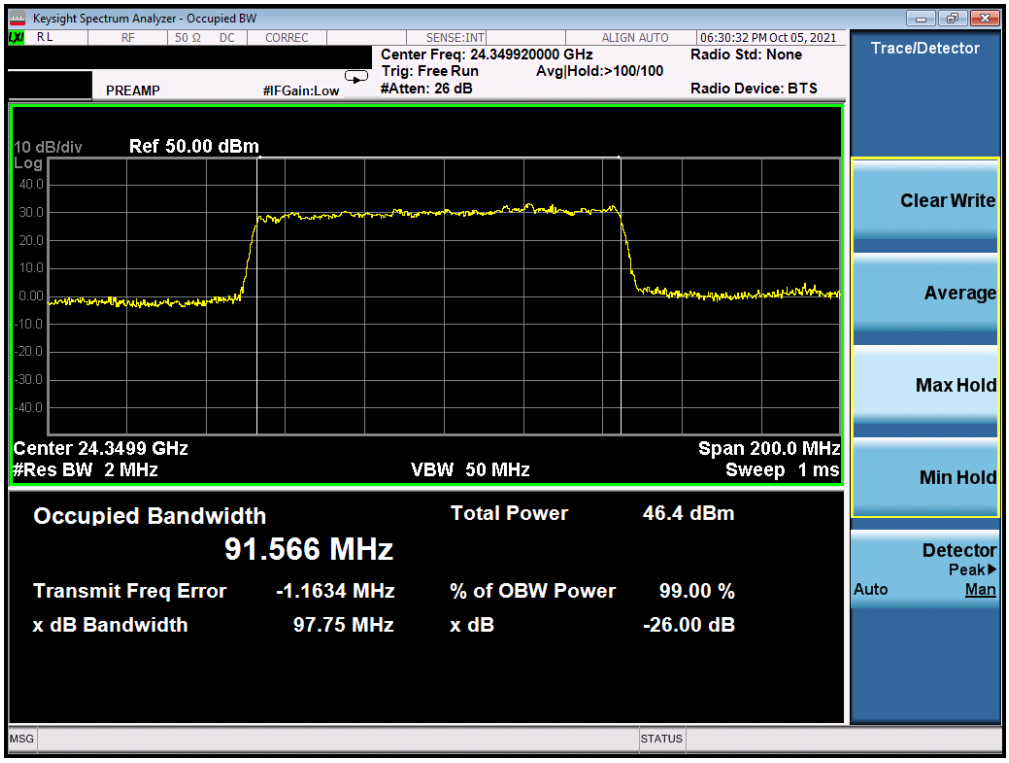
Plot 7-7. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



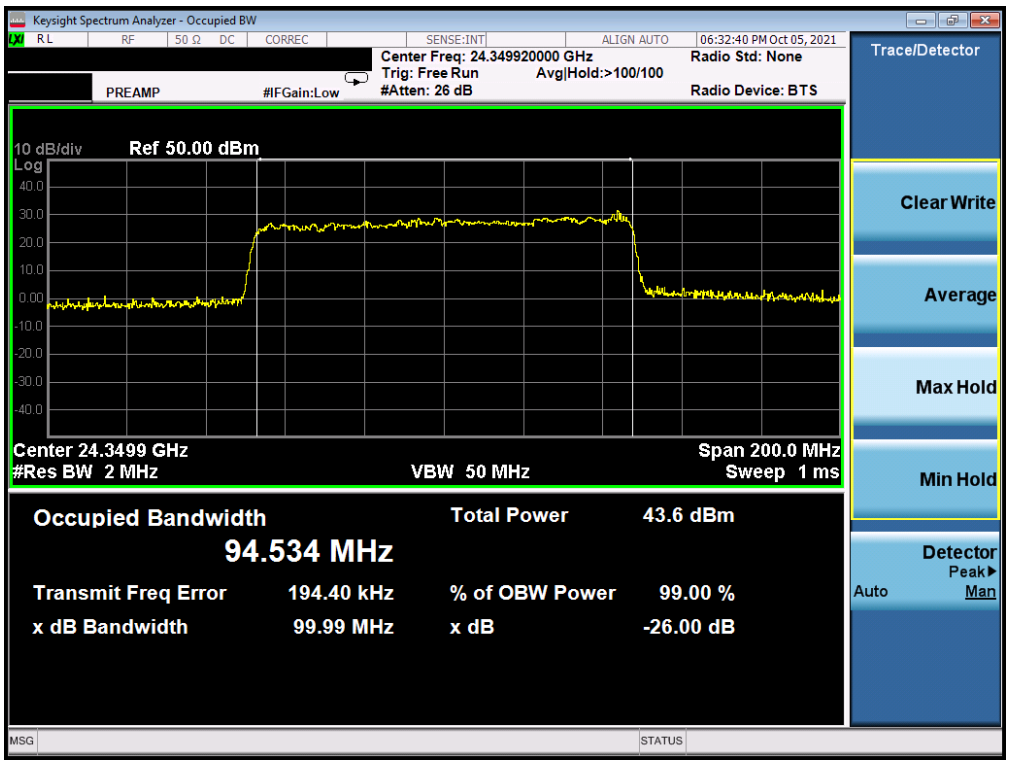
Plot 7-8. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



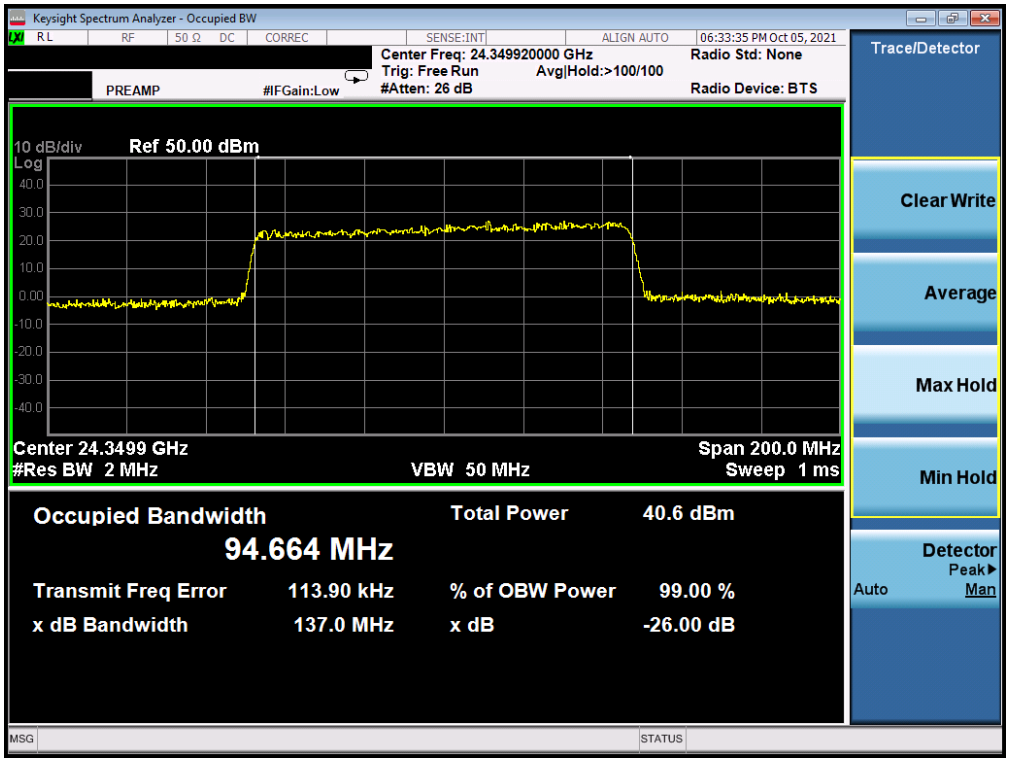
Plot 7-9. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



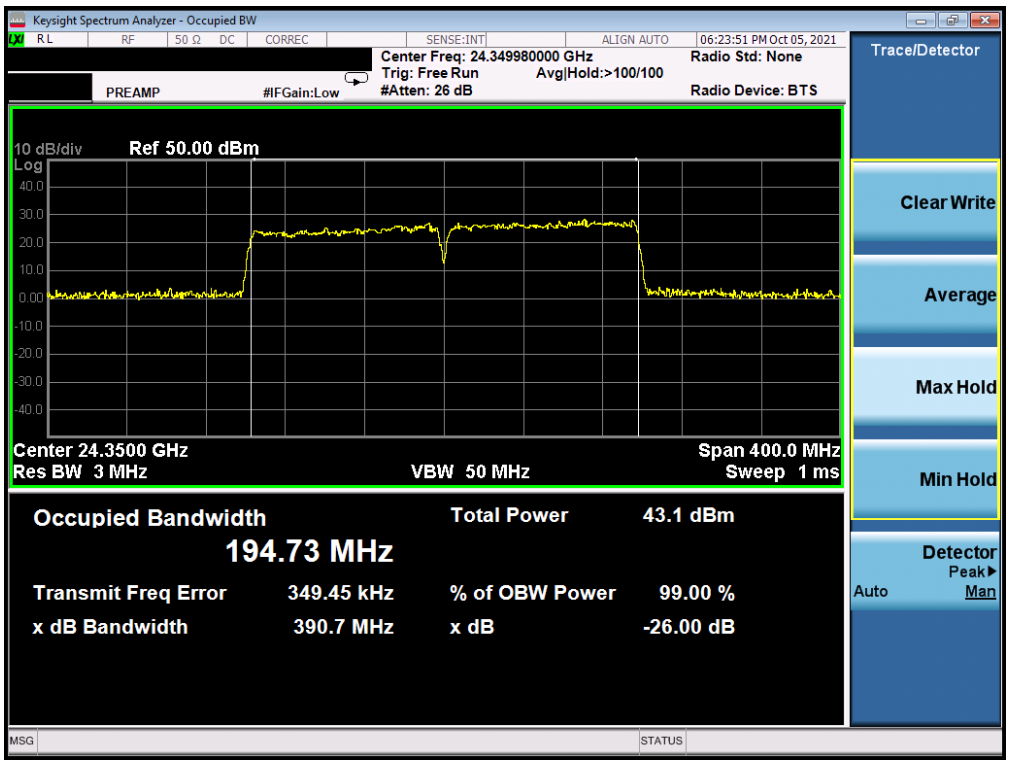
Plot 7-10. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



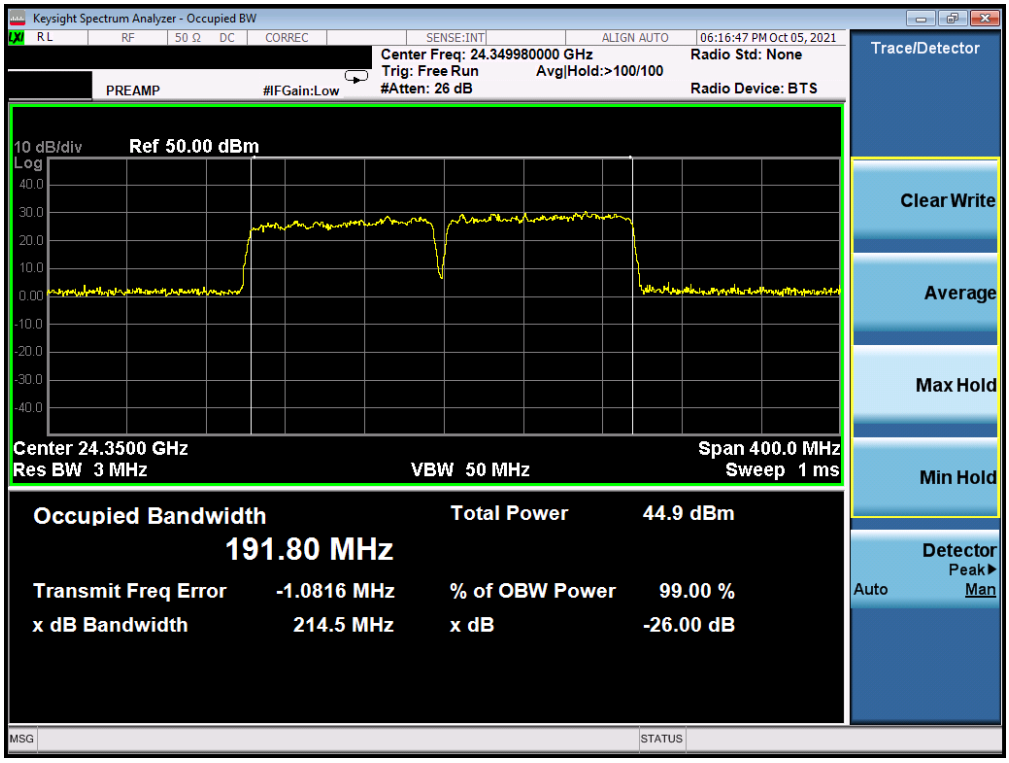
Plot 7-11. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



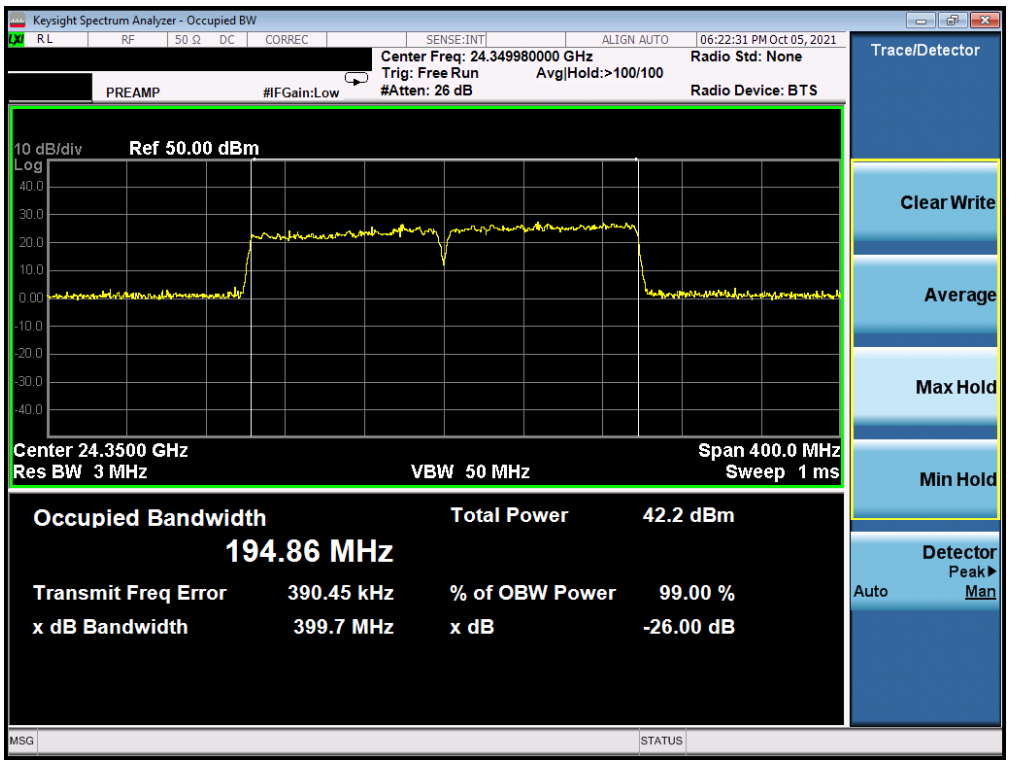
Plot 7-12. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



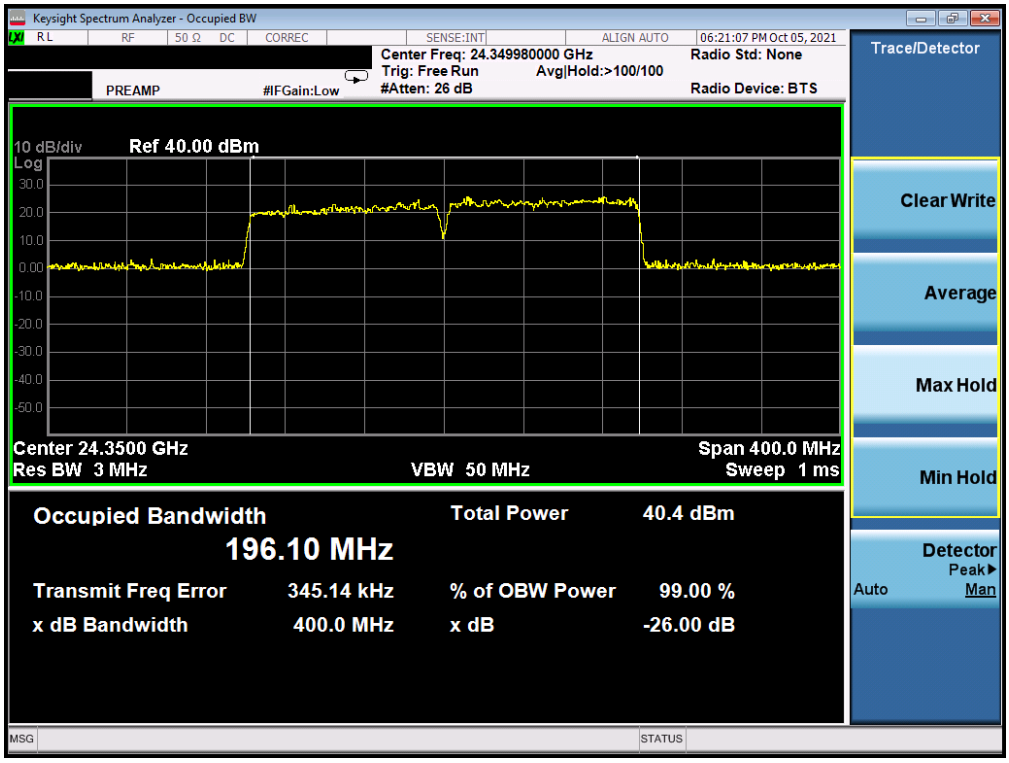
Plot 7-13. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



Plot 7-14. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)



Plot 7-15. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)

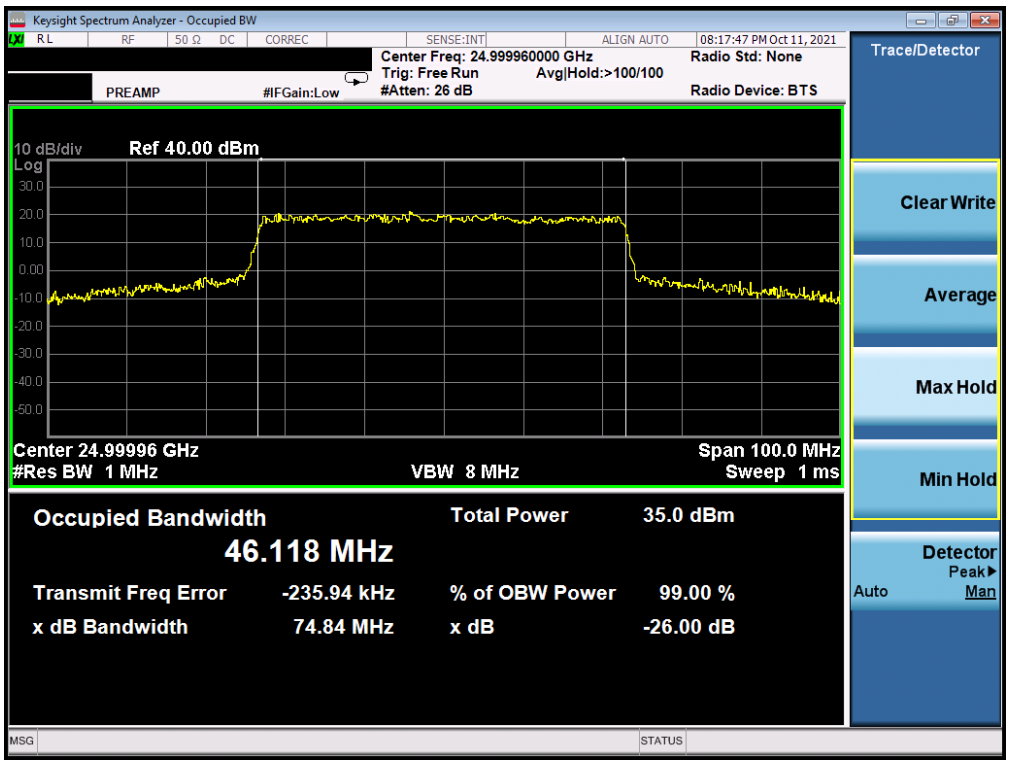


Plot 7-16. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

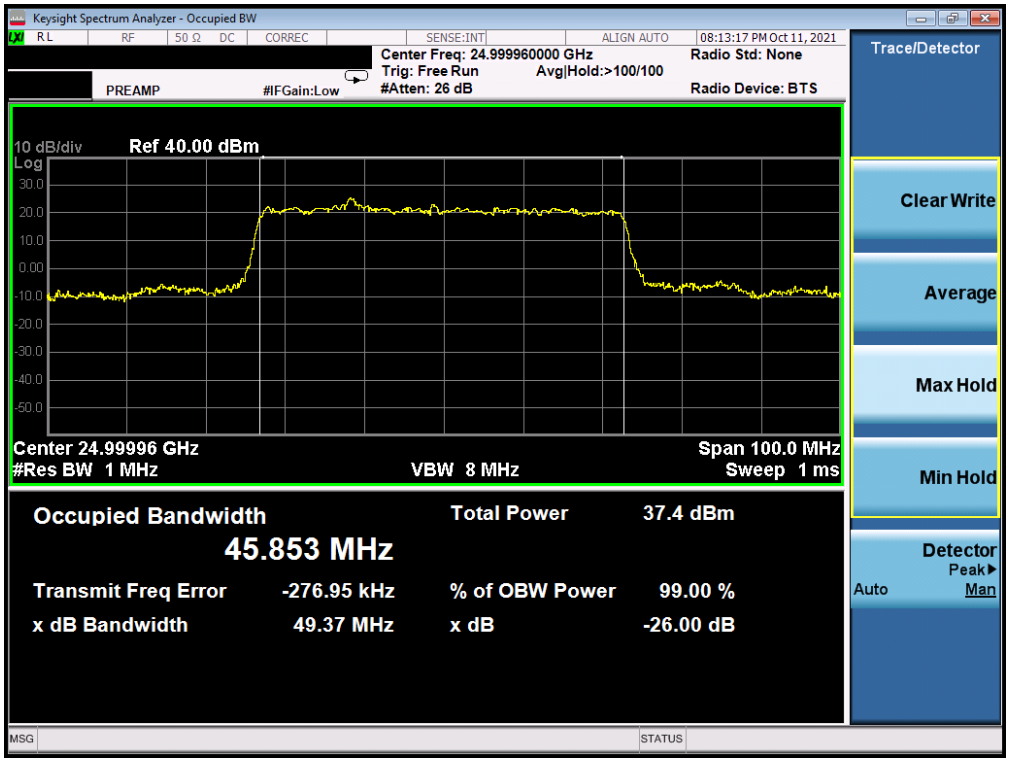
Band n258-R2 (N Patch)

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	46.12
			DFT-s-OFDM	pi/2-BPSK	45.85
			CP-OFDM	16QAM	46.03
			CP-OFDM	64QAM	46.10
		2	CP-OFDM	QPSK	95.82
			DFT-s-OFDM	pi/2-BPSK	95.92
			CP-OFDM	16QAM	96.10
			CP-OFDM	64QAM	95.94
	100	1	CP-OFDM	QPSK	94.72
			DFT-s-OFDM	pi/2-BPSK	91.27
			CP-OFDM	16QAM	94.15
			CP-OFDM	64QAM	94.00
		2	CP-OFDM	QPSK	195.47
			DFT-s-OFDM	pi/2-BPSK	191.88
			CP-OFDM	16QAM	195.06
			CP-OFDM	64QAM	196.51

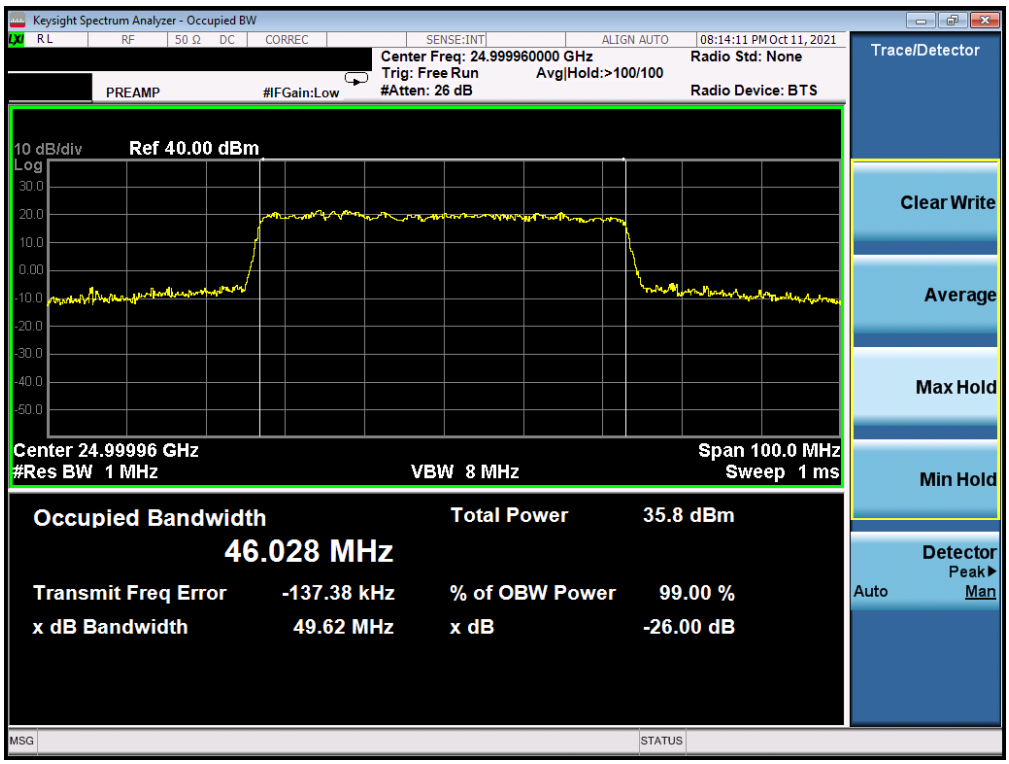
Table 7-3. Summary of Ant 2 Occupied Bandwidths (n258-R2 N Patch)



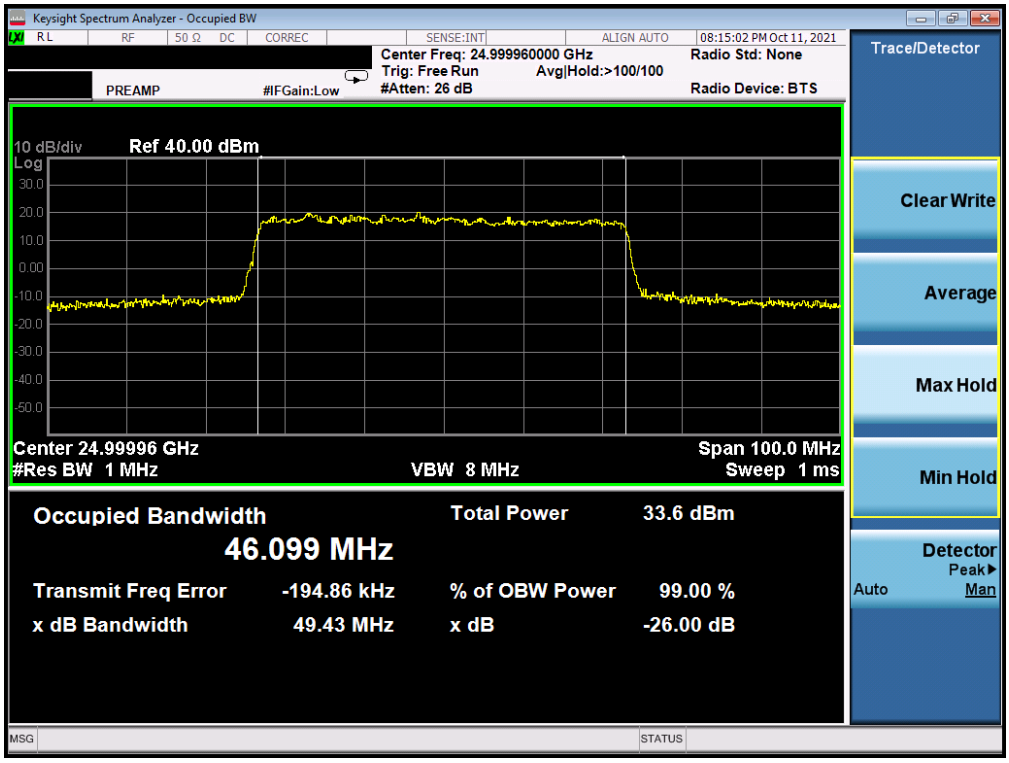
Plot 7-17. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



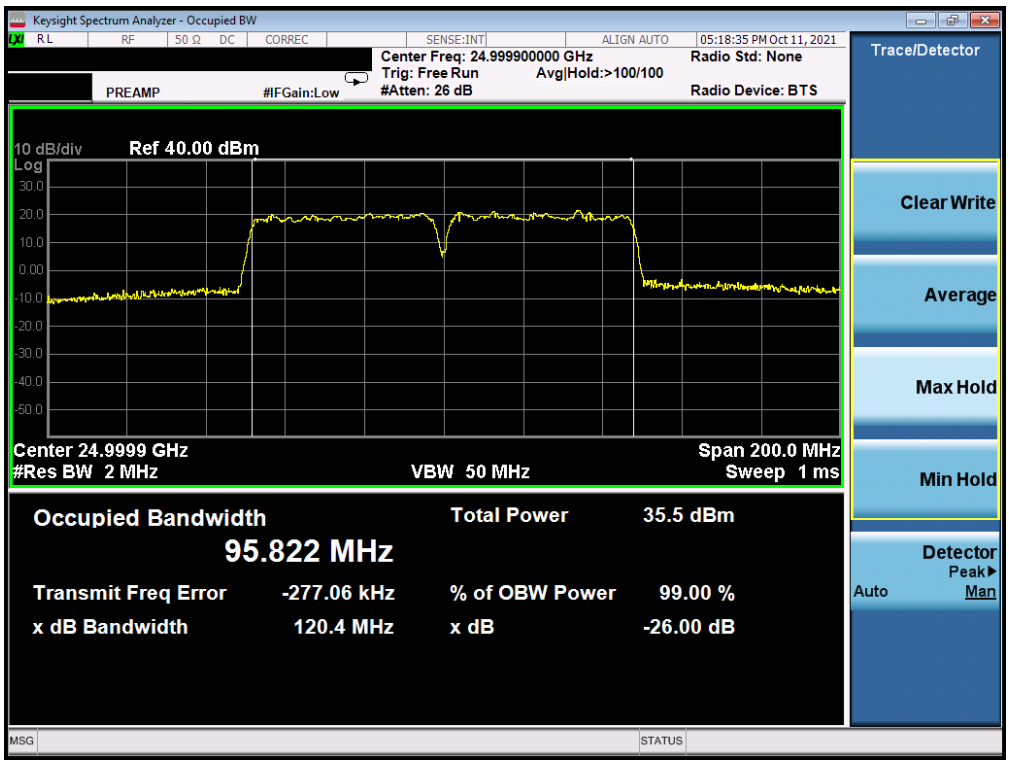
Plot 7-18. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



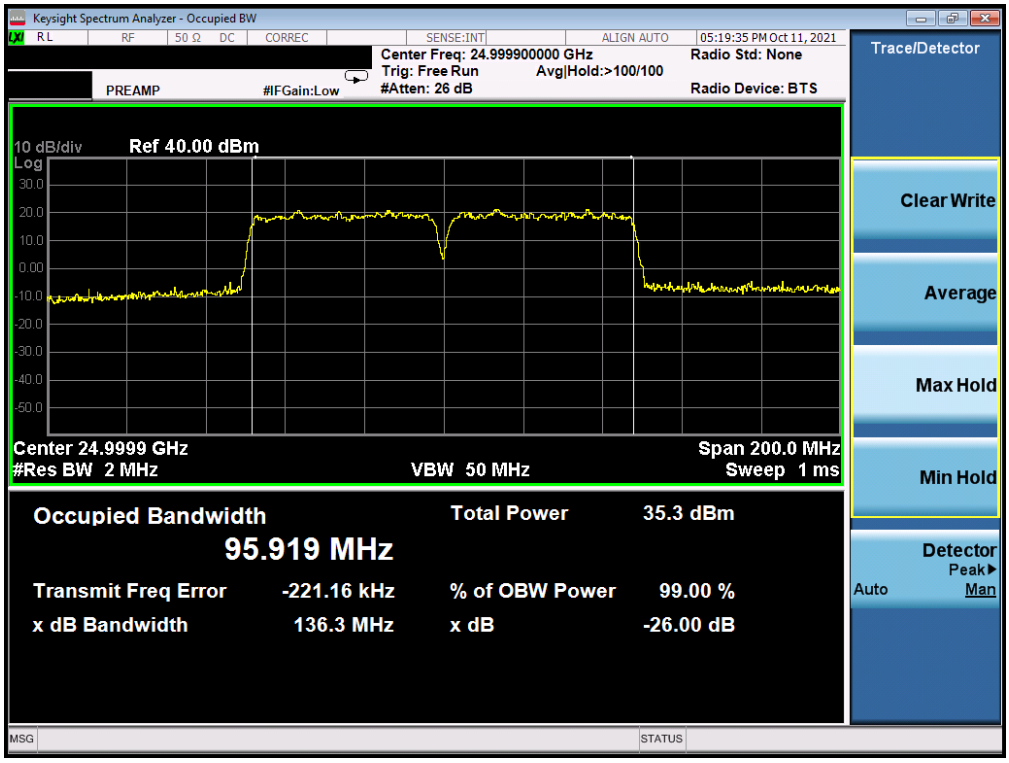
Plot 7-19. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



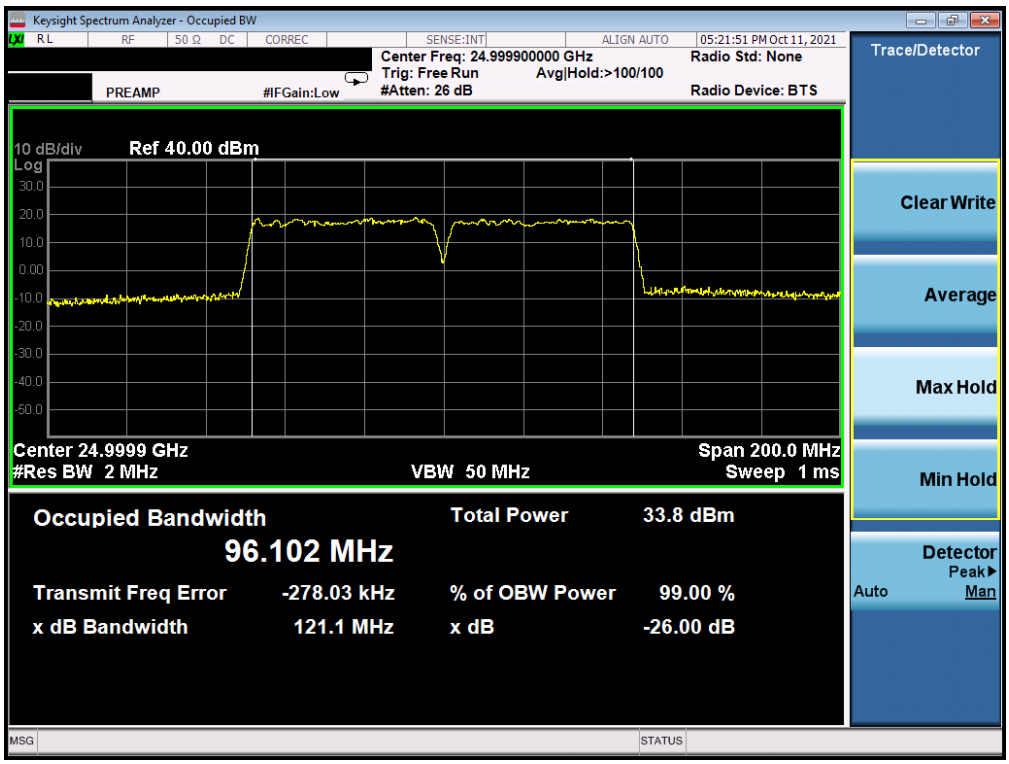
Plot 7-20. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



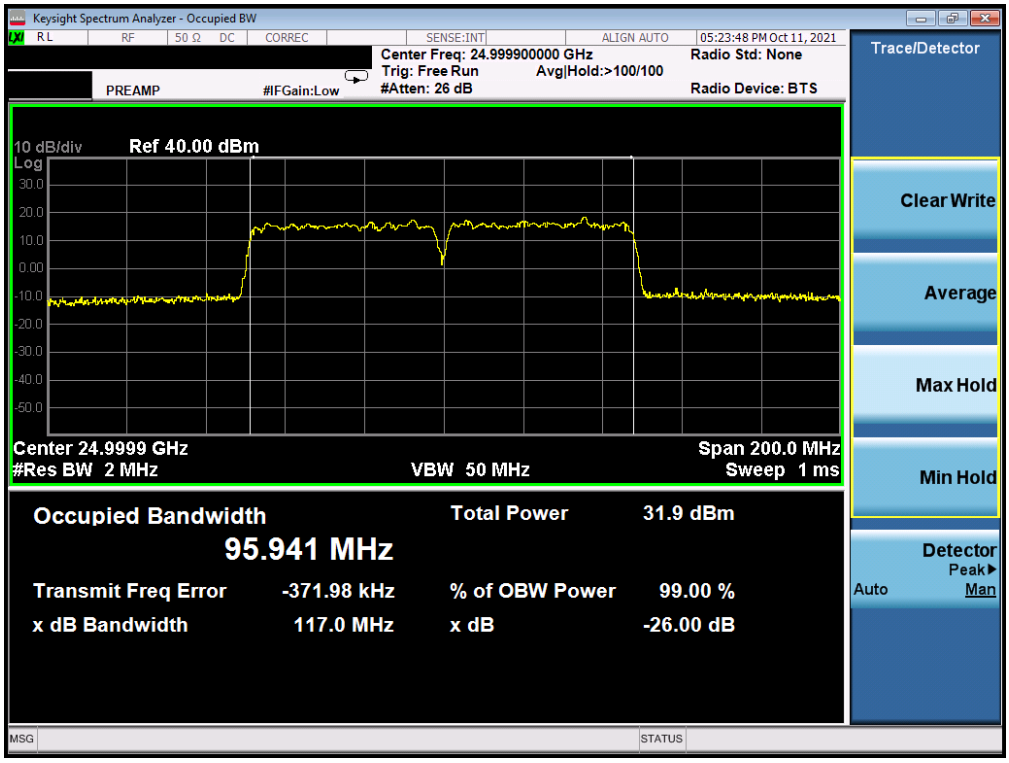
Plot 7-21. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



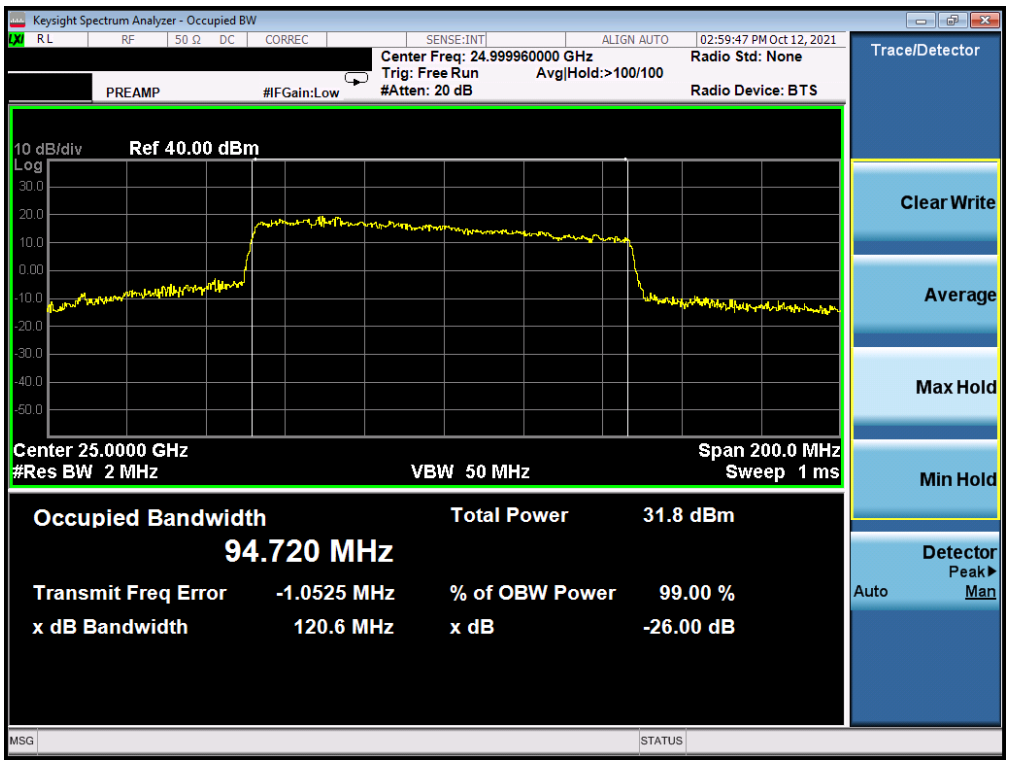
Plot 7-22. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



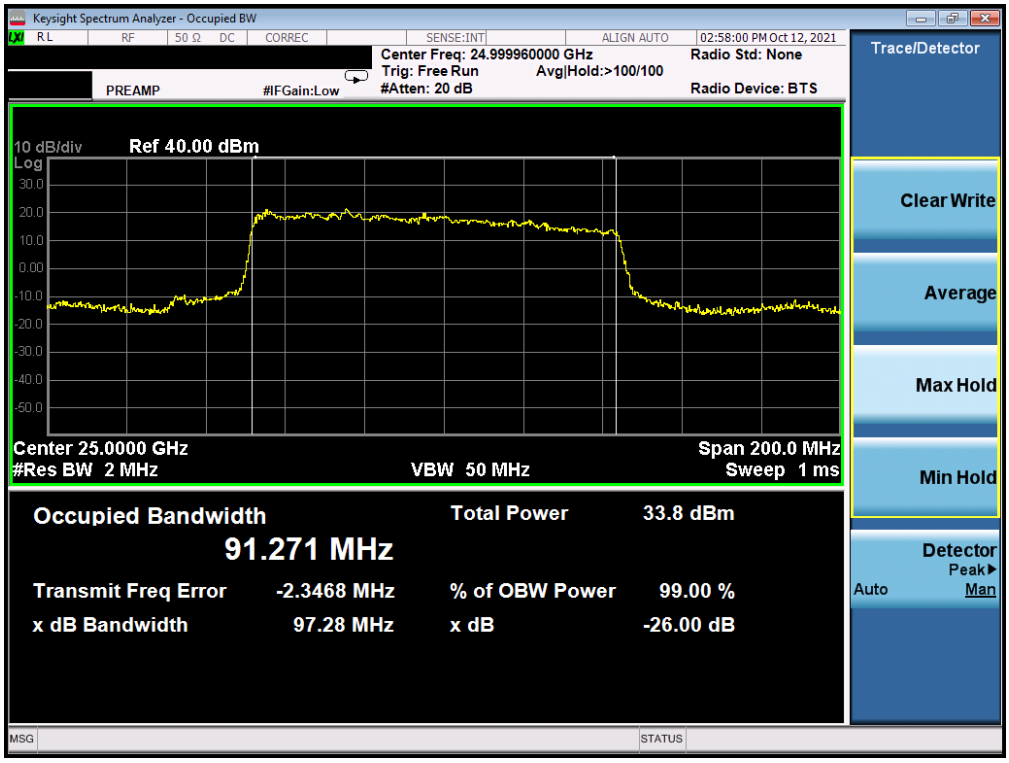
Plot 7-23. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



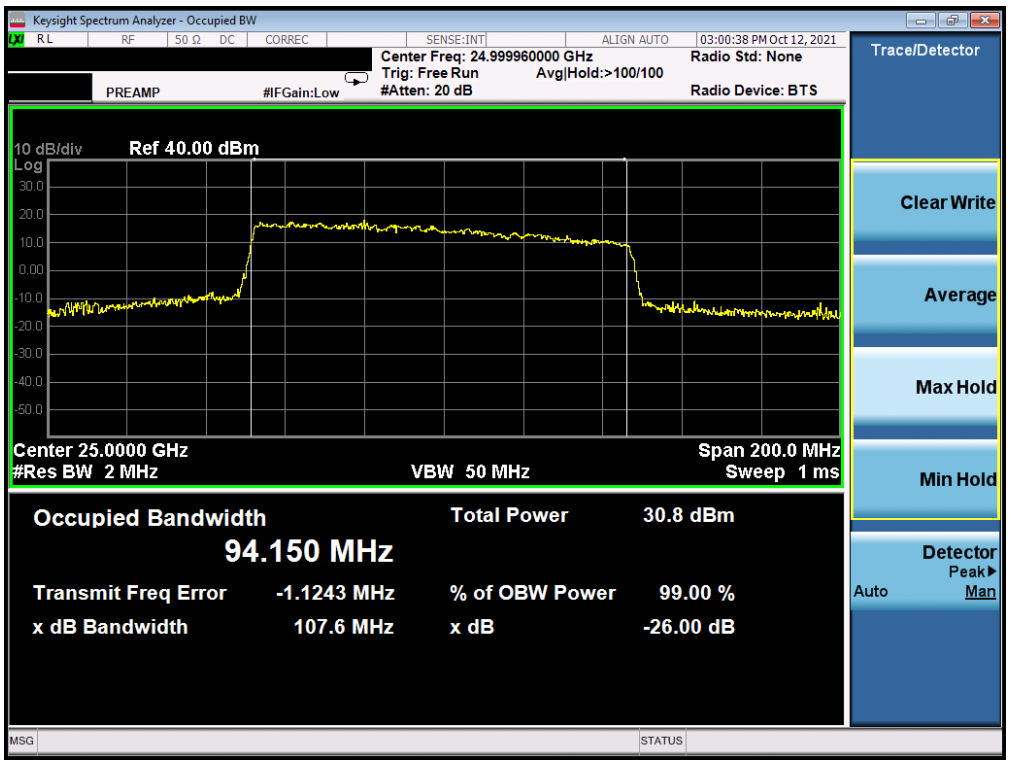
Plot 7-24. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



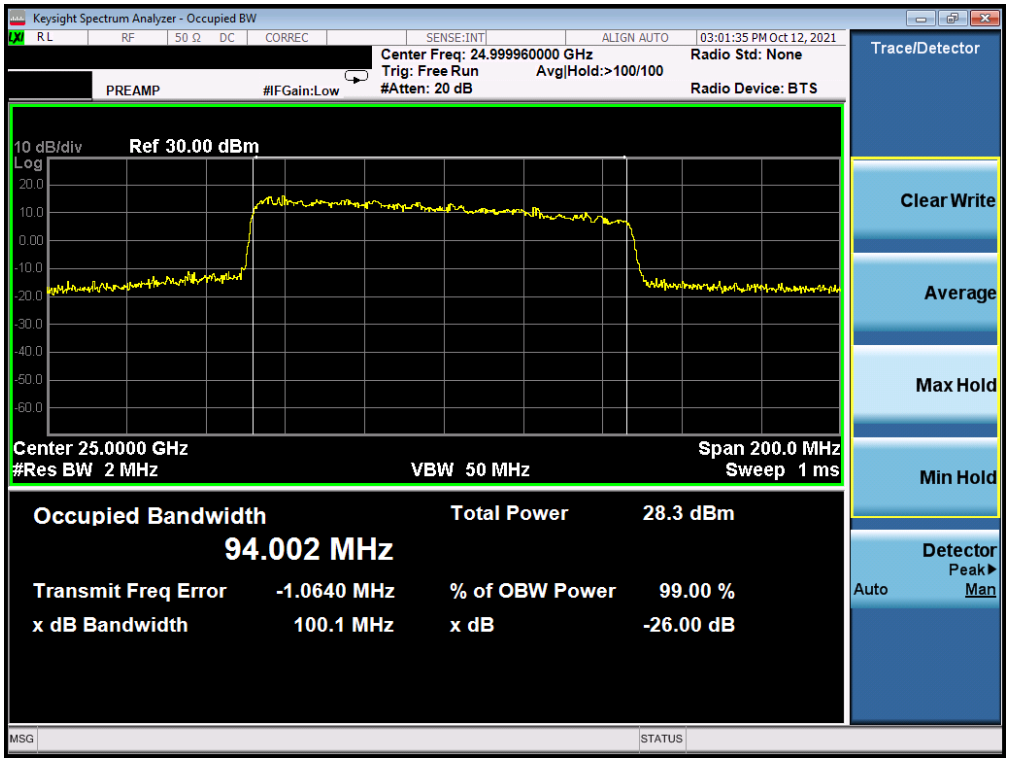
Plot 7-25. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



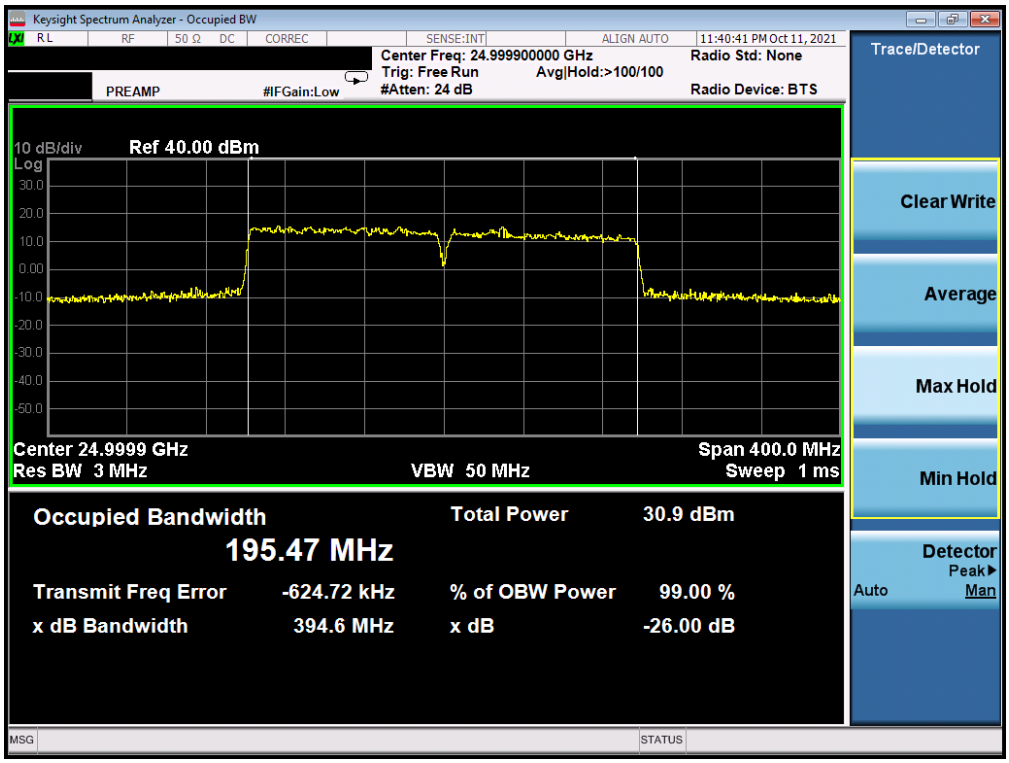
Plot 7-26. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



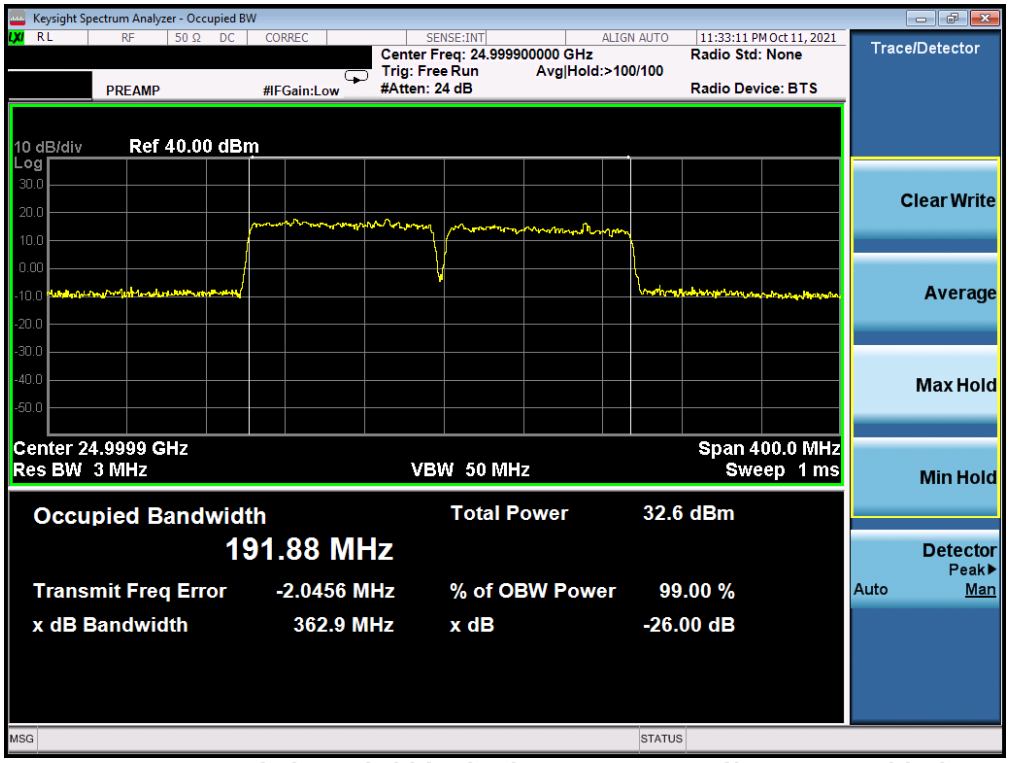
Plot 7-27. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



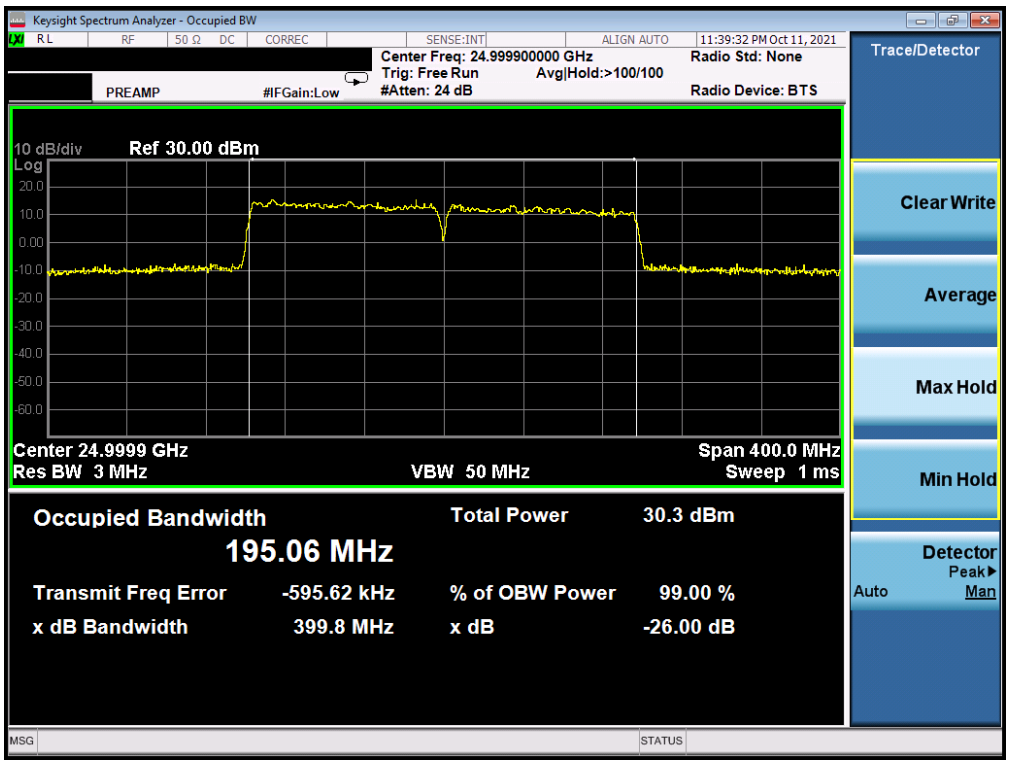
Plot 7-28. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



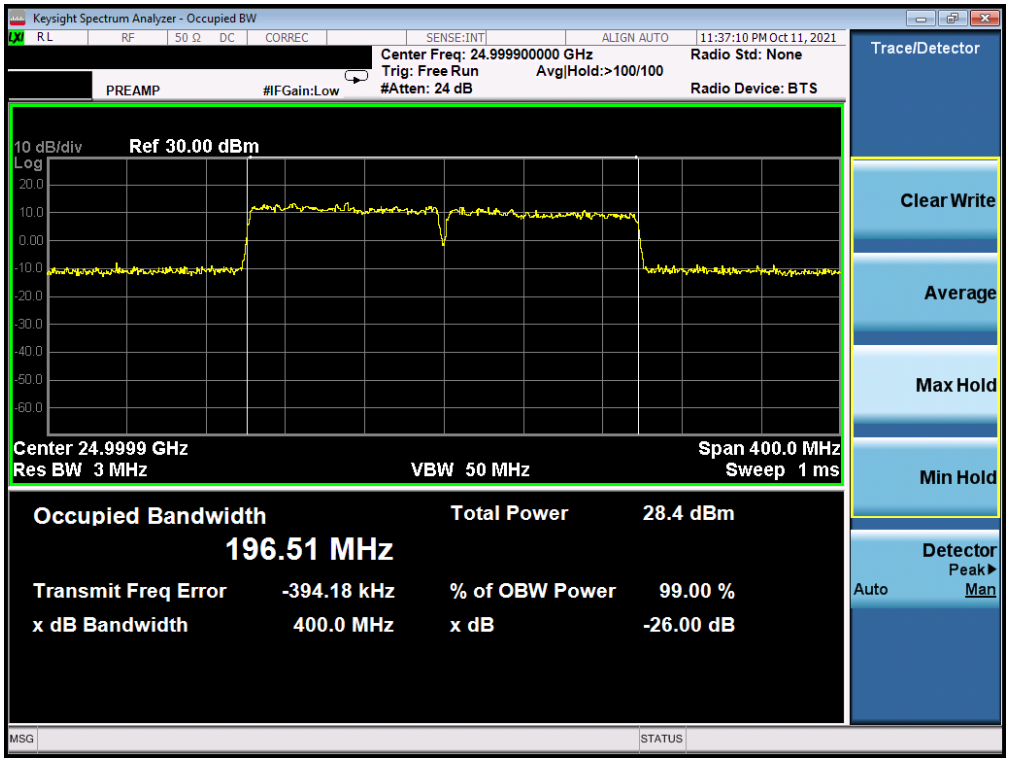
Plot 7-29. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



Plot 7-30. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)



Plot 7-31. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)

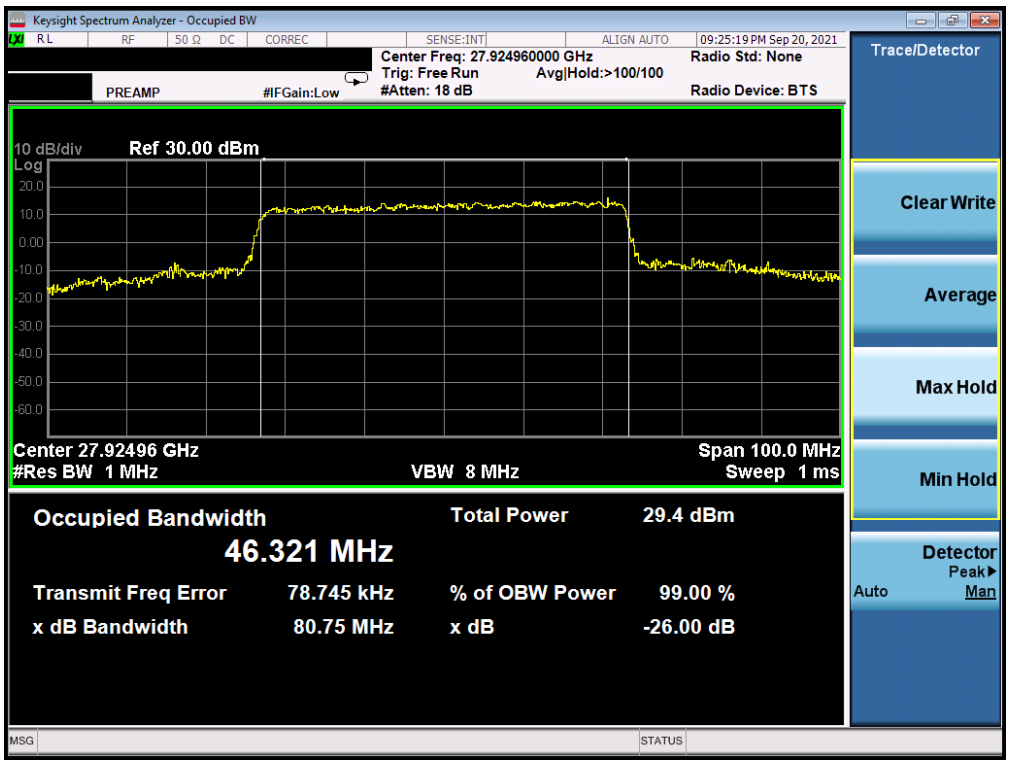


Plot 7-32. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

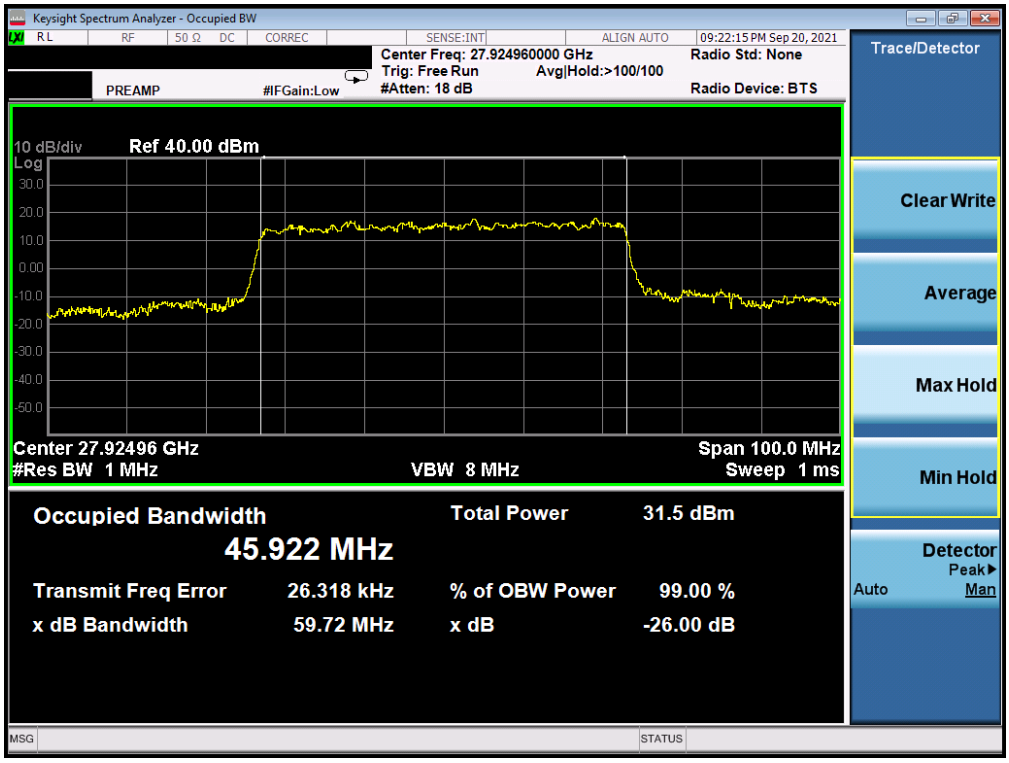
Band n261 (N Patch)

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	46.32
			DFT-s-OFDM	pi/2-BPSK	45.92
			CP-OFDM	16QAM	46.11
			CP-OFDM	64QAM	45.95
		2	CP-OFDM	QPSK	95.34
			DFT-s-OFDM	pi/2-BPSK	95.51
			CP-OFDM	16QAM	95.69
			CP-OFDM	64QAM	95.61
	100	1	CP-OFDM	QPSK	94.85
			DFT-s-OFDM	pi/2-BPSK	91.32
			CP-OFDM	16QAM	94.76
			CP-OFDM	64QAM	94.41
		2	CP-OFDM	QPSK	193.82
			DFT-s-OFDM	pi/2-BPSK	190.99
			CP-OFDM	16QAM	193.89
			CP-OFDM	64QAM	193.87

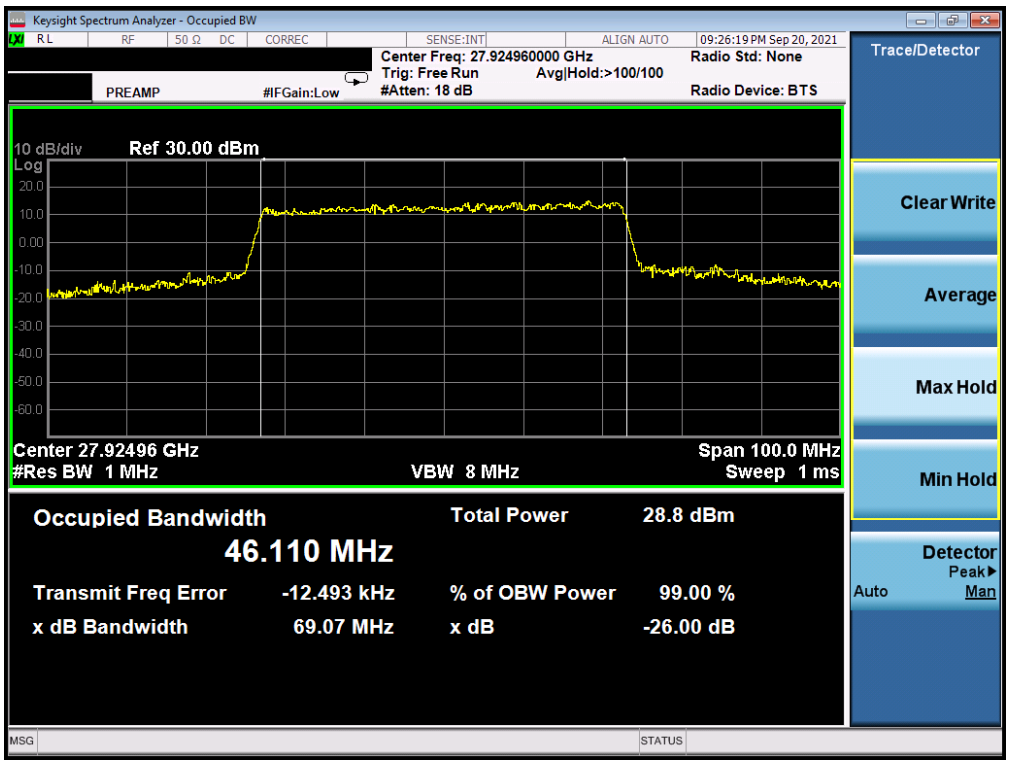
Table 7-4. Summary of Ant 2 Occupied Bandwidths (n261 N Patch)



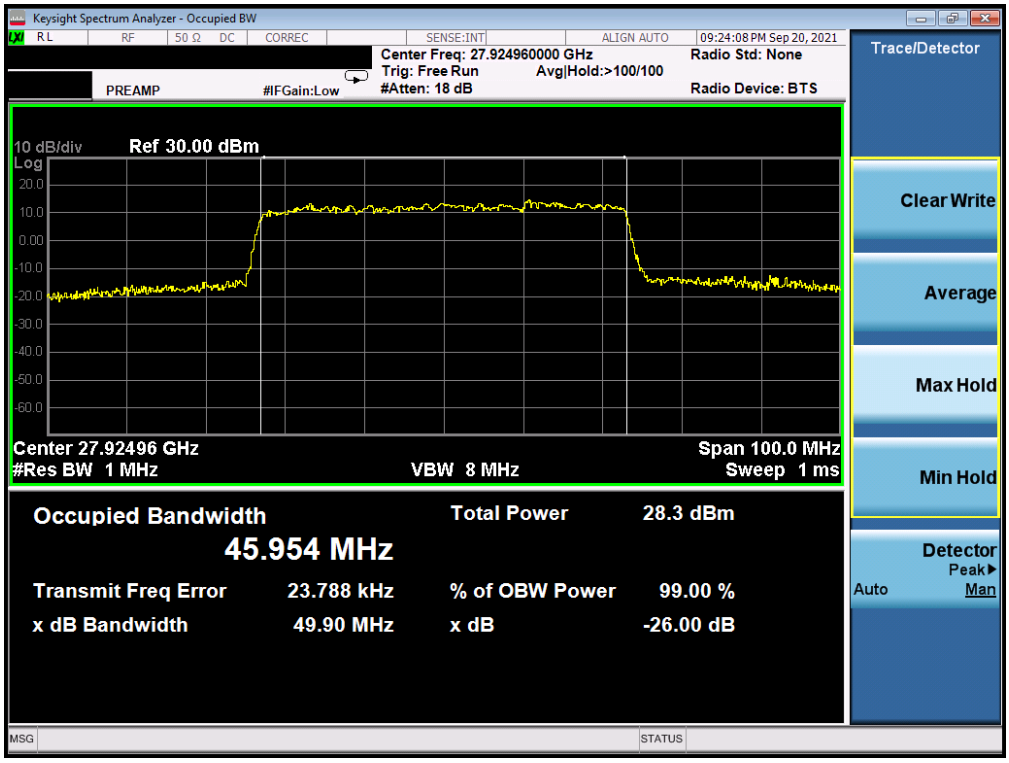
Plot 7-33. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



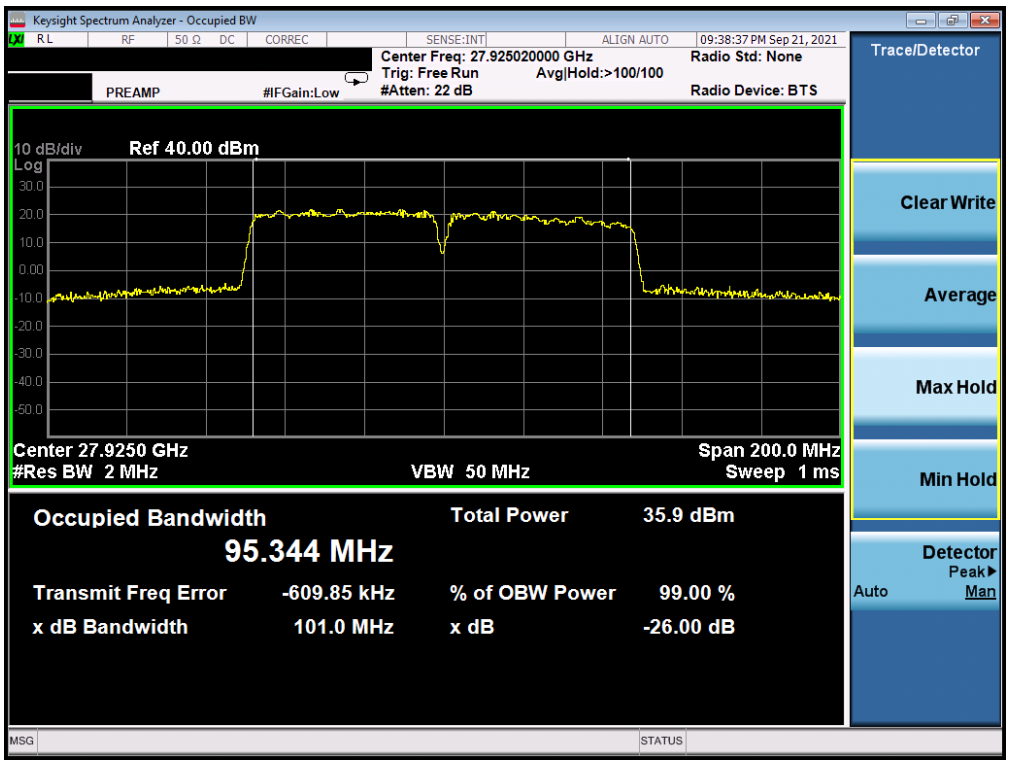
Plot 7-34. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



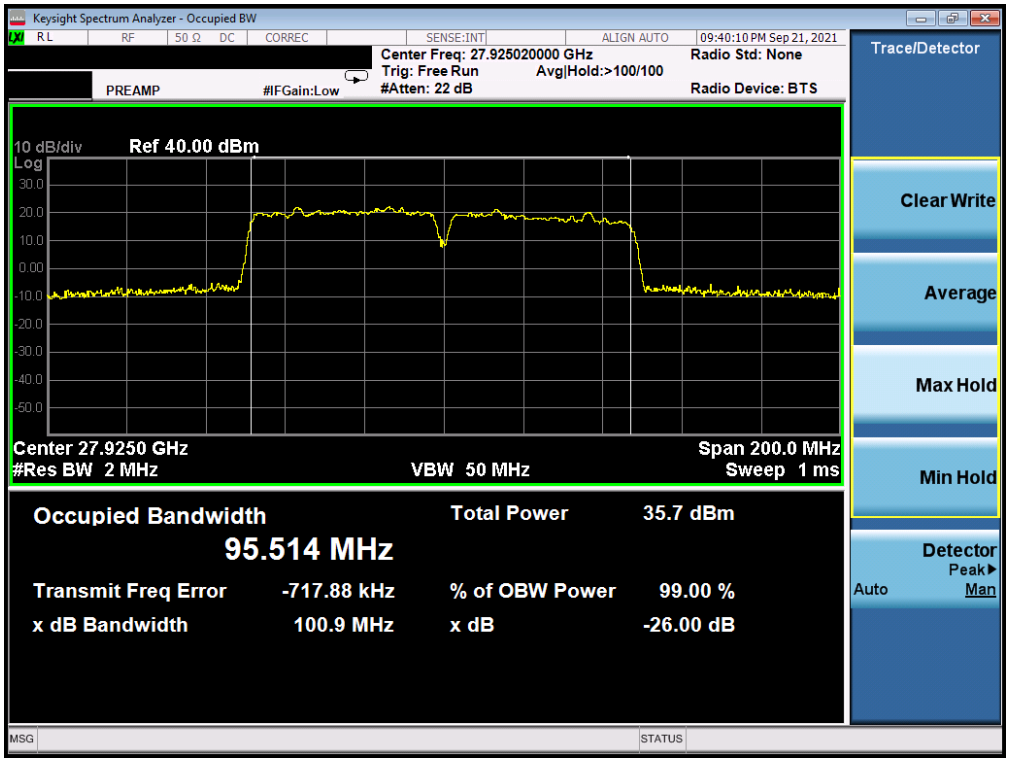
Plot 7-35. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



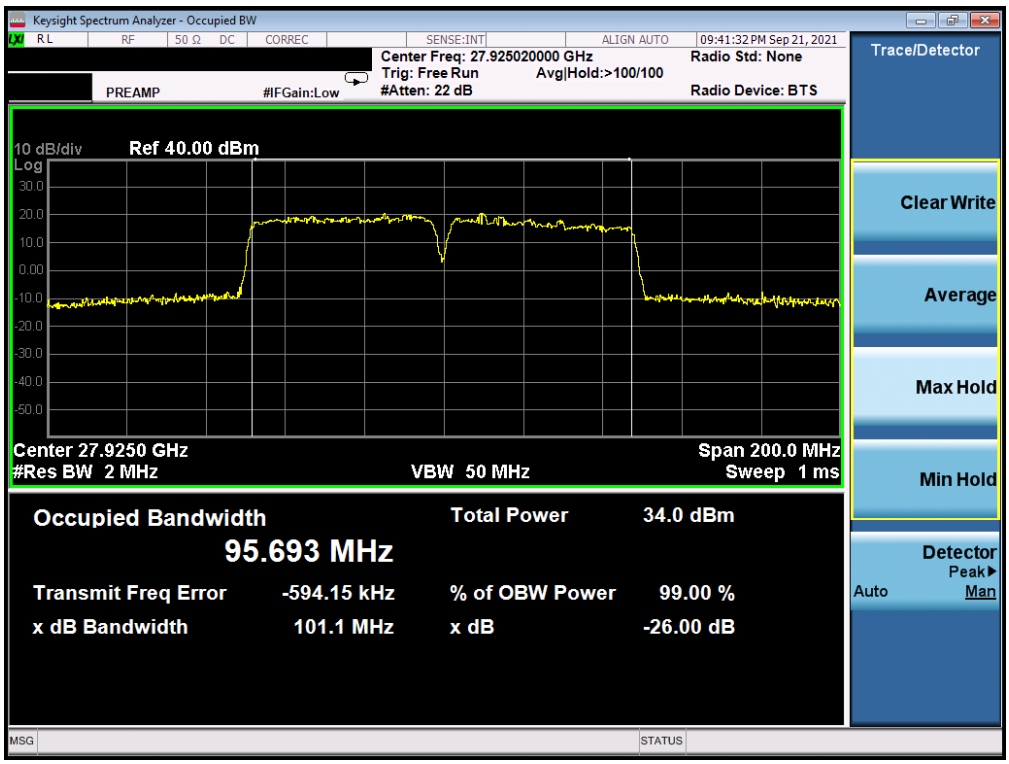
Plot 7-36. Ant 2 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



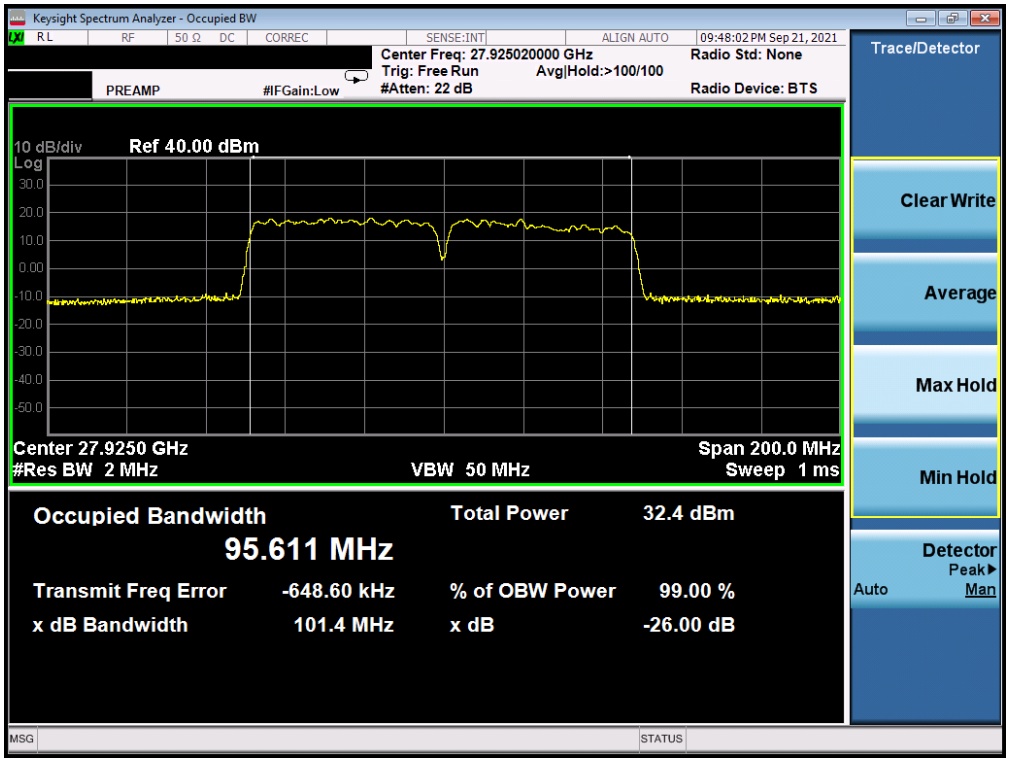
Plot 7-37. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



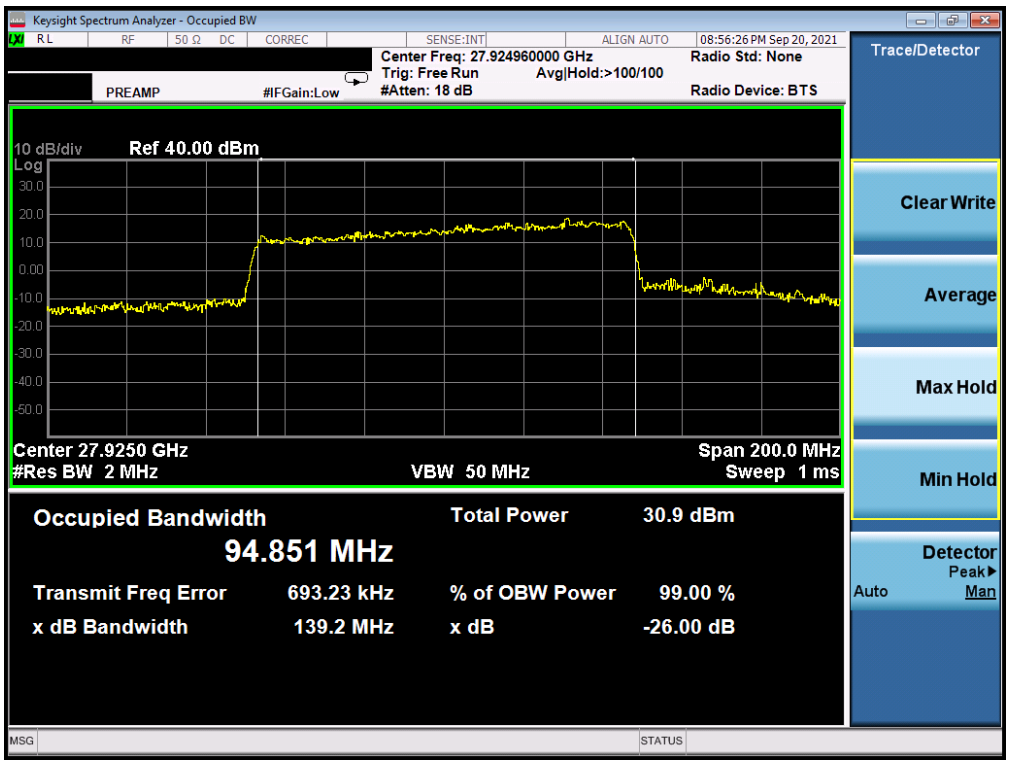
Plot 7-38. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



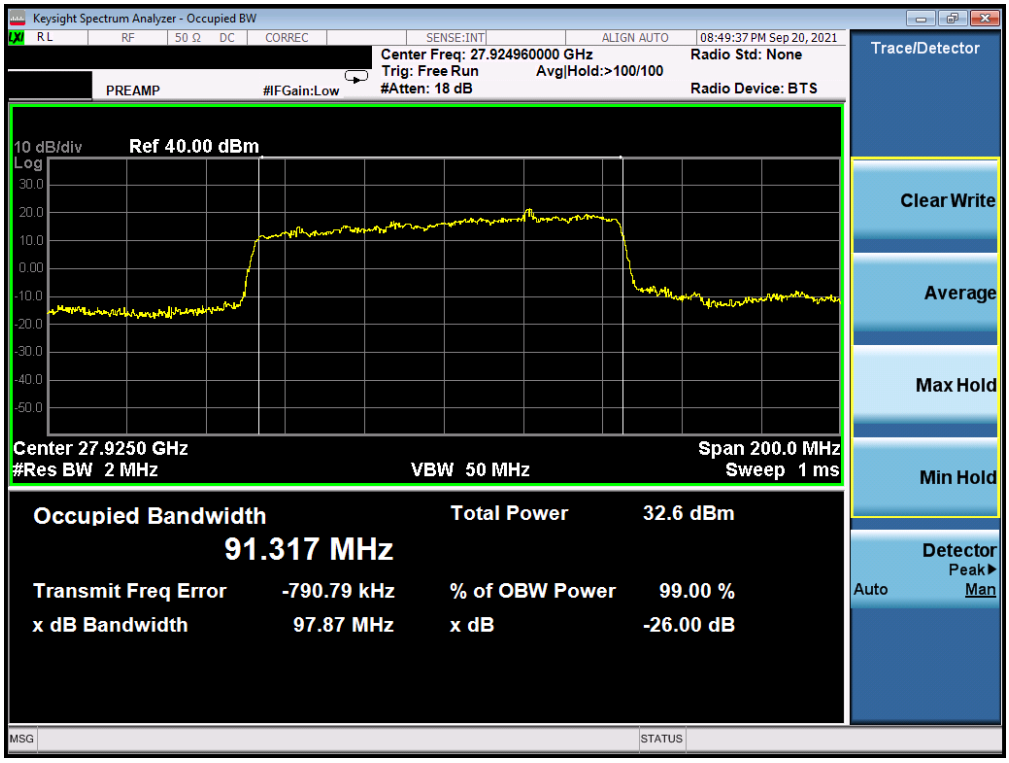
Plot 7-39. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



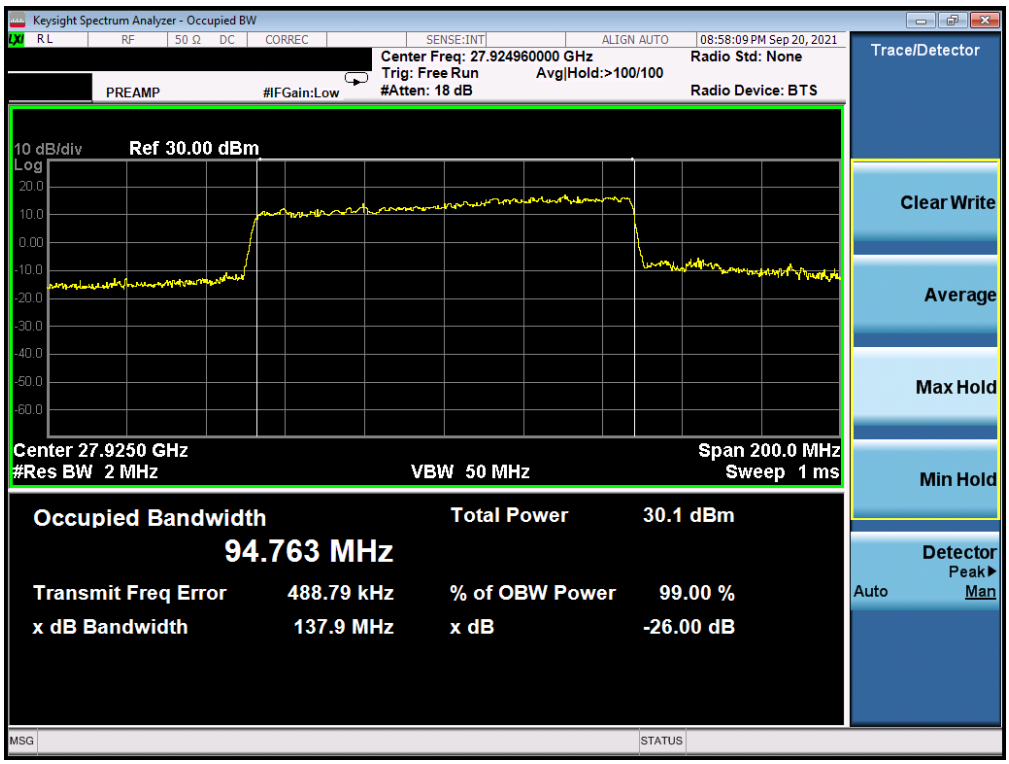
Plot 7-40. Ant 2 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



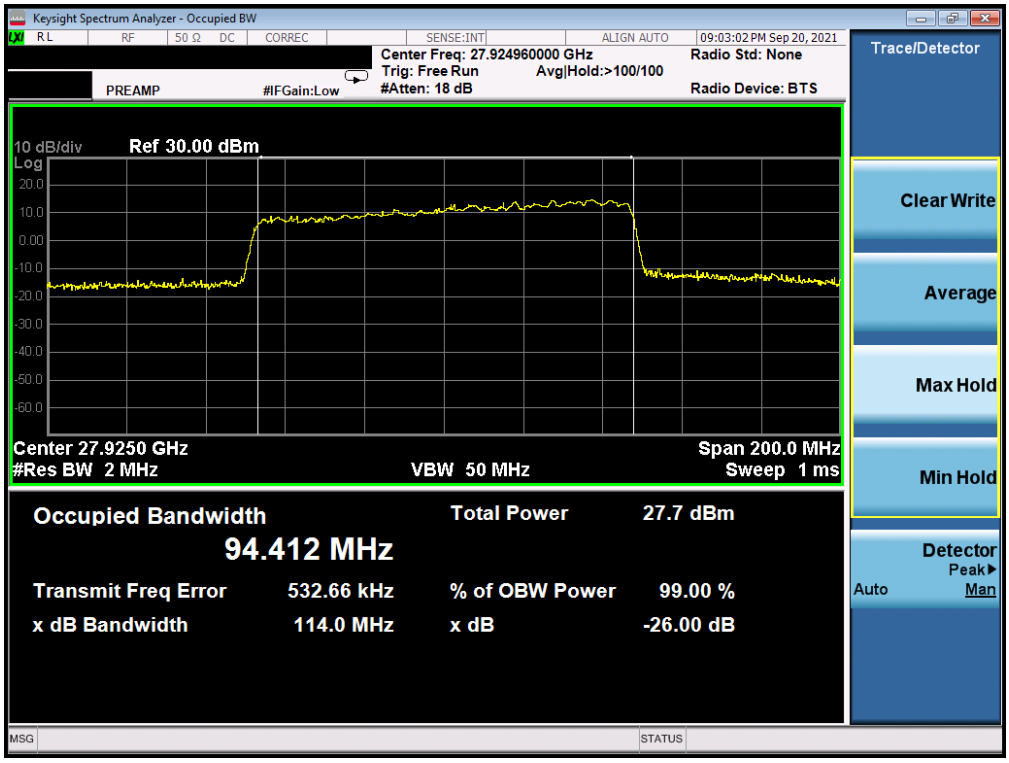
Plot 7-41. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



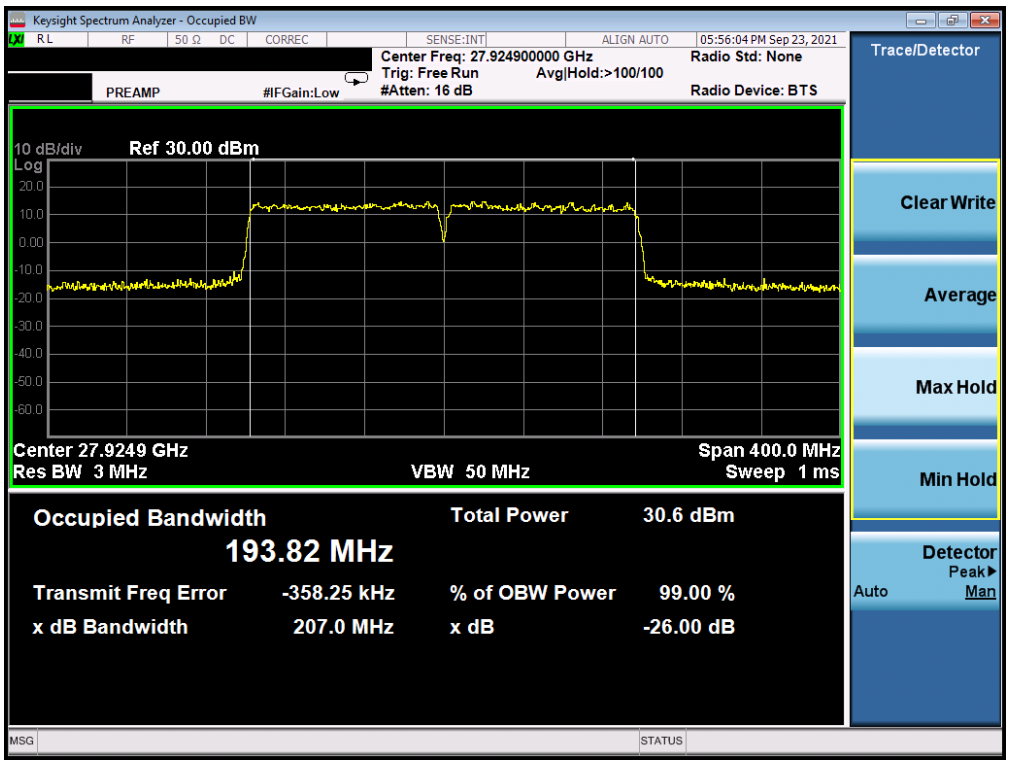
Plot 7-42. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



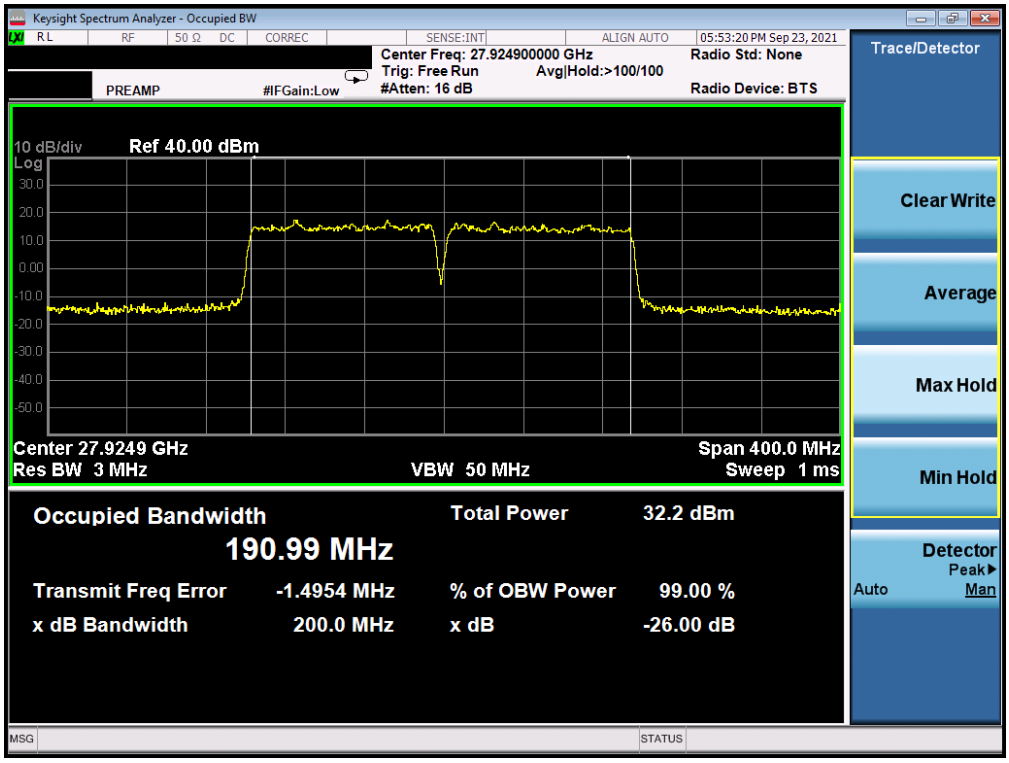
Plot 7-43. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



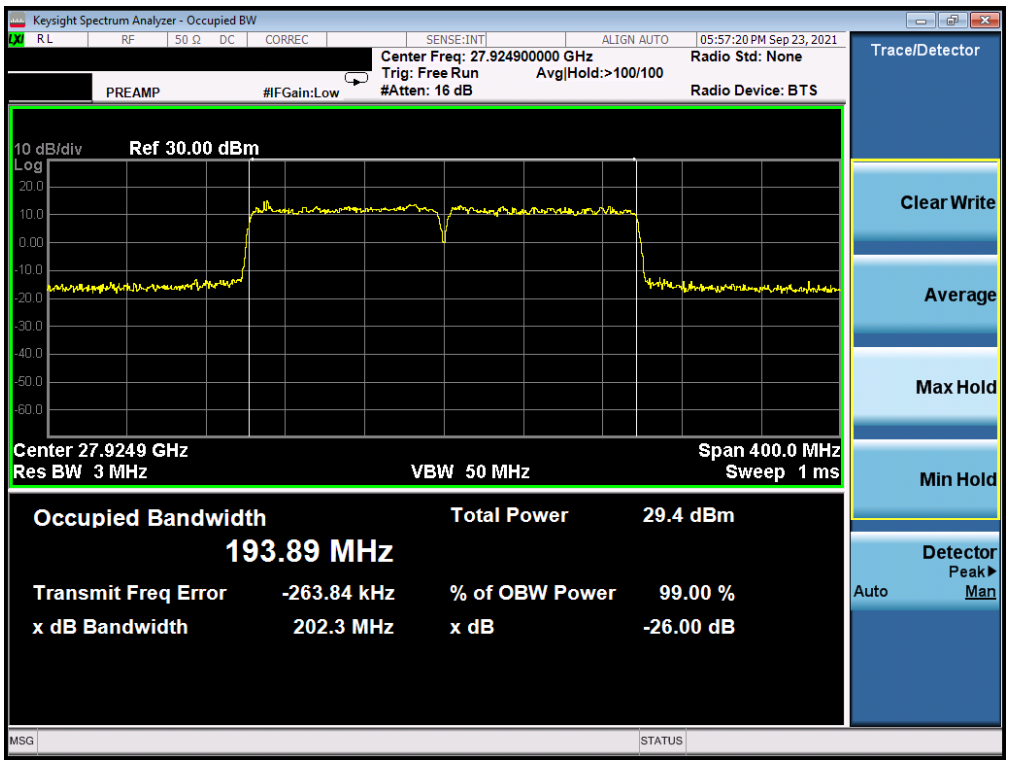
Plot 7-44. Ant 2 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



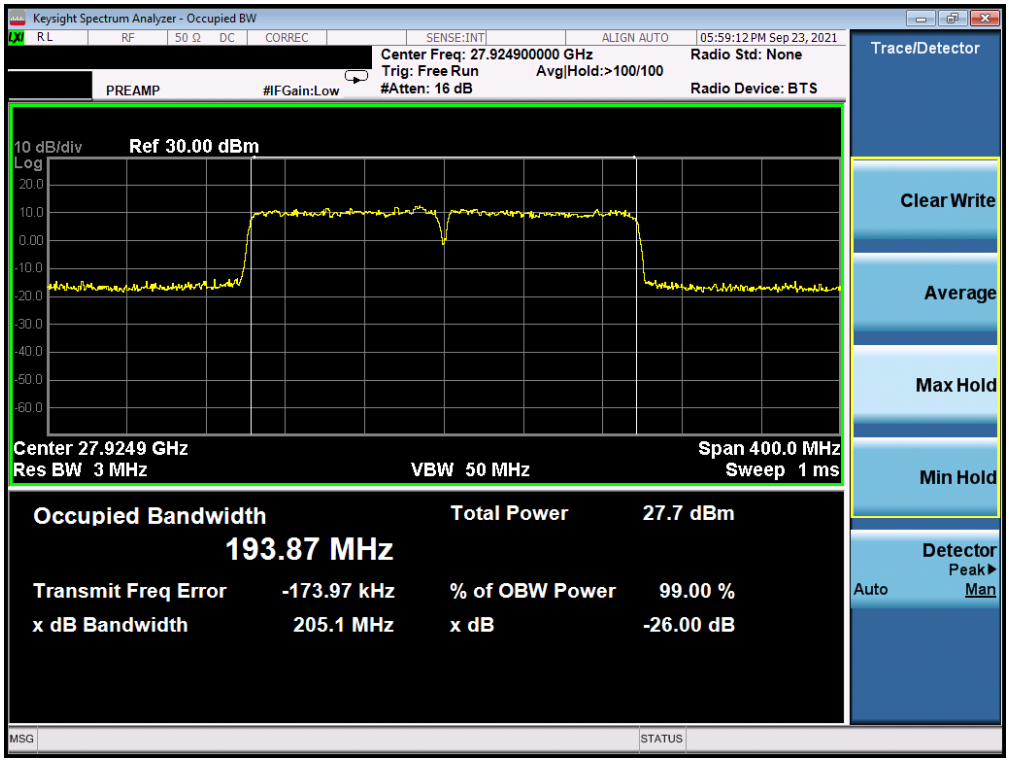
Plot 7-45. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



Plot 7-46. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)



Plot 7-47. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)

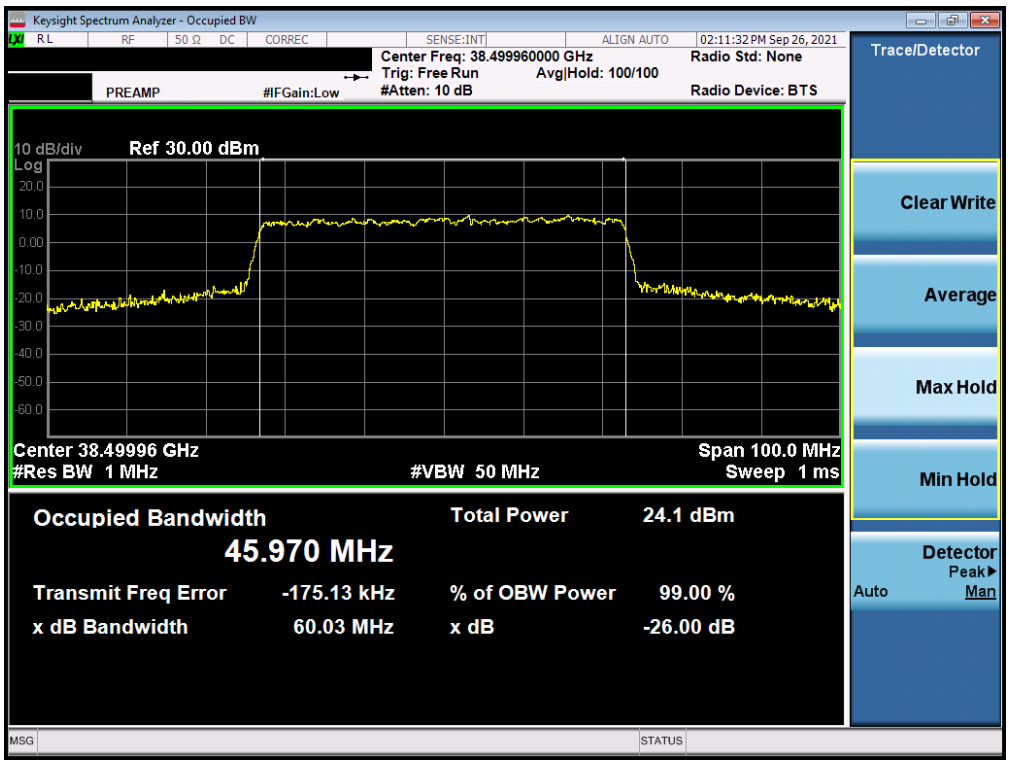


Plot 7-48. Ant 2 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

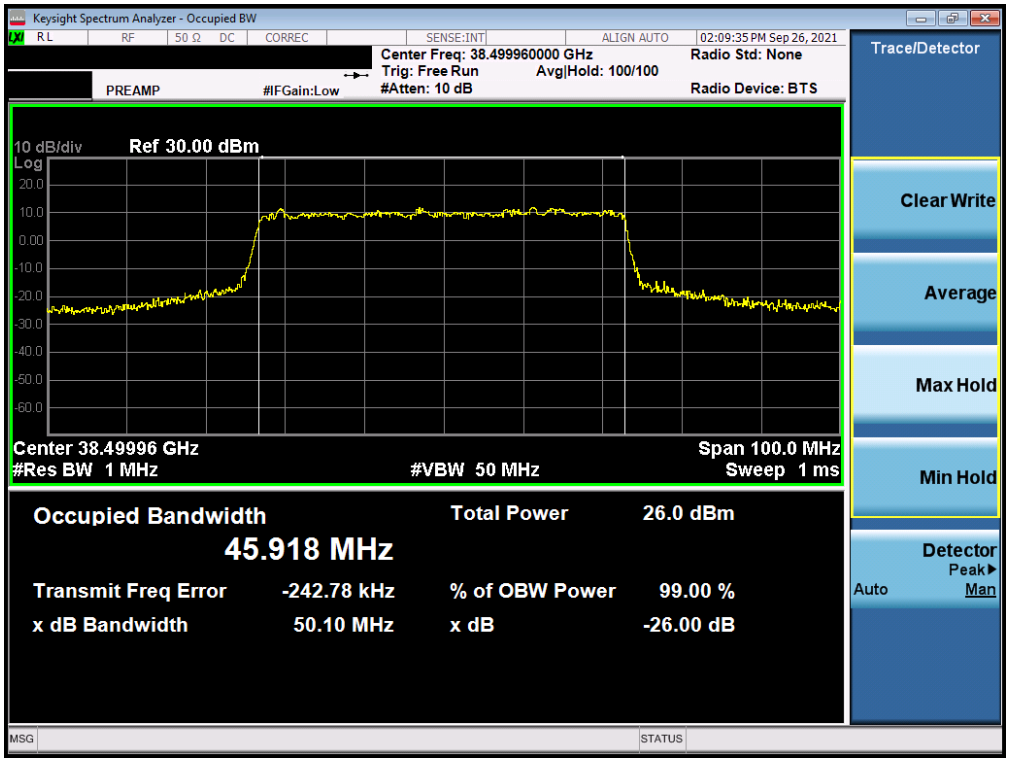
Band n260 (M Patch)

Channel	Bandwidth	CCs Active	Transmission Scheme	Modulation	OBW [MHz]
Mid	50	1	CP-OFDM	QPSK	45.97
			DFT-s-OFDM	pi/2-BPSK	45.92
			CP-OFDM	16QAM	45.85
			CP-OFDM	64QAM	46.21
		2	CP-OFDM	QPSK	95.40
			DFT-s-OFDM	pi/2-BPSK	95.54
			CP-OFDM	16QAM	95.78
			CP-OFDM	64QAM	95.70
	100	1	CP-OFDM	QPSK	95.36
			DFT-s-OFDM	pi/2-BPSK	91.94
			CP-OFDM	16QAM	94.97
			CP-OFDM	64QAM	95.41
		2	CP-OFDM	QPSK	195.29
			DFT-s-OFDM	pi/2-BPSK	193.16
			CP-OFDM	16QAM	195.67
			CP-OFDM	64QAM	196.77

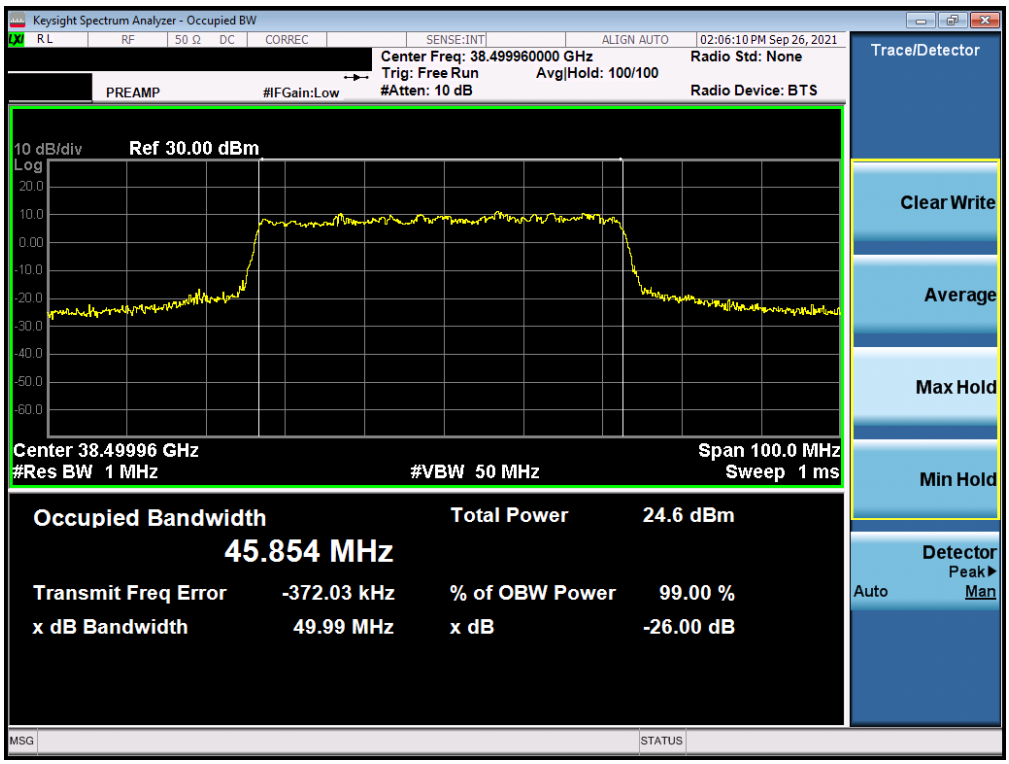
Table 7-5. Summary of Ant 1 Occupied Bandwidths (n260 M Patch)



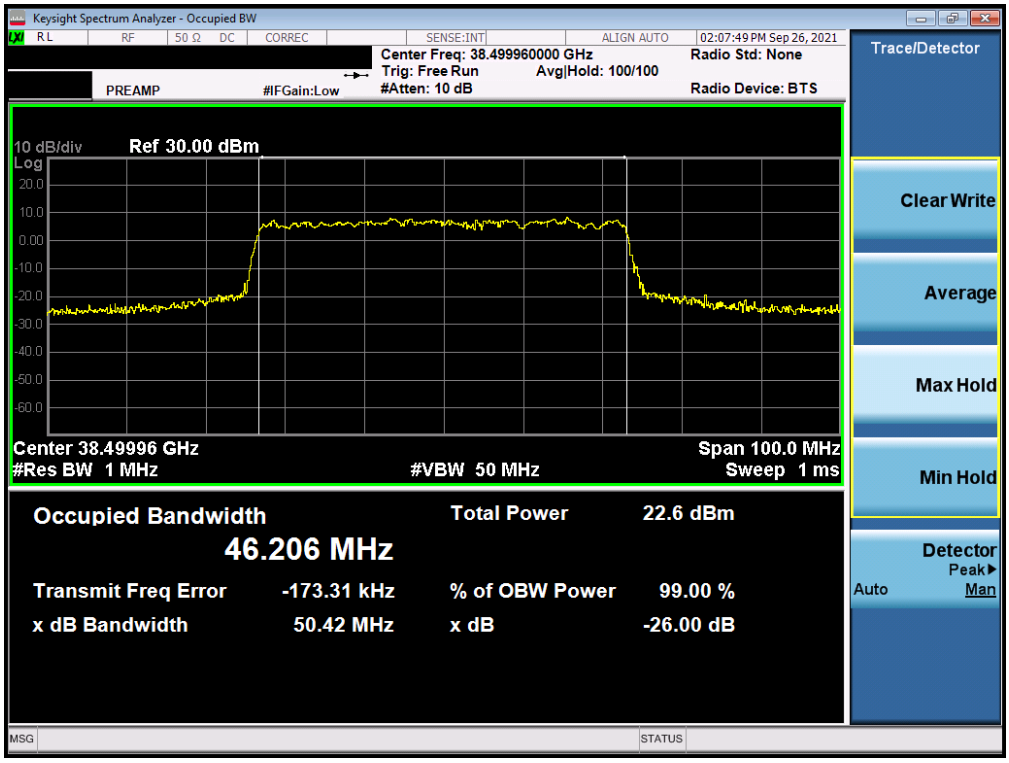
Plot 7-49. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – QPSK – Mid Channel)



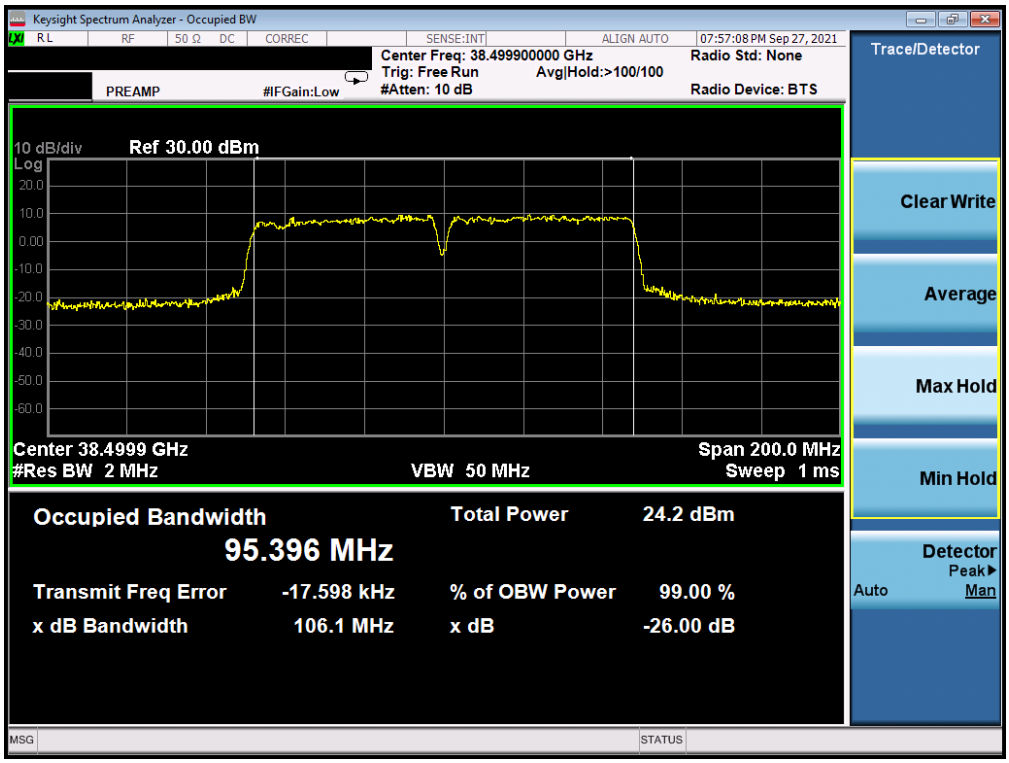
Plot 7-50. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – pi/2-BPSK – Mid Channel)



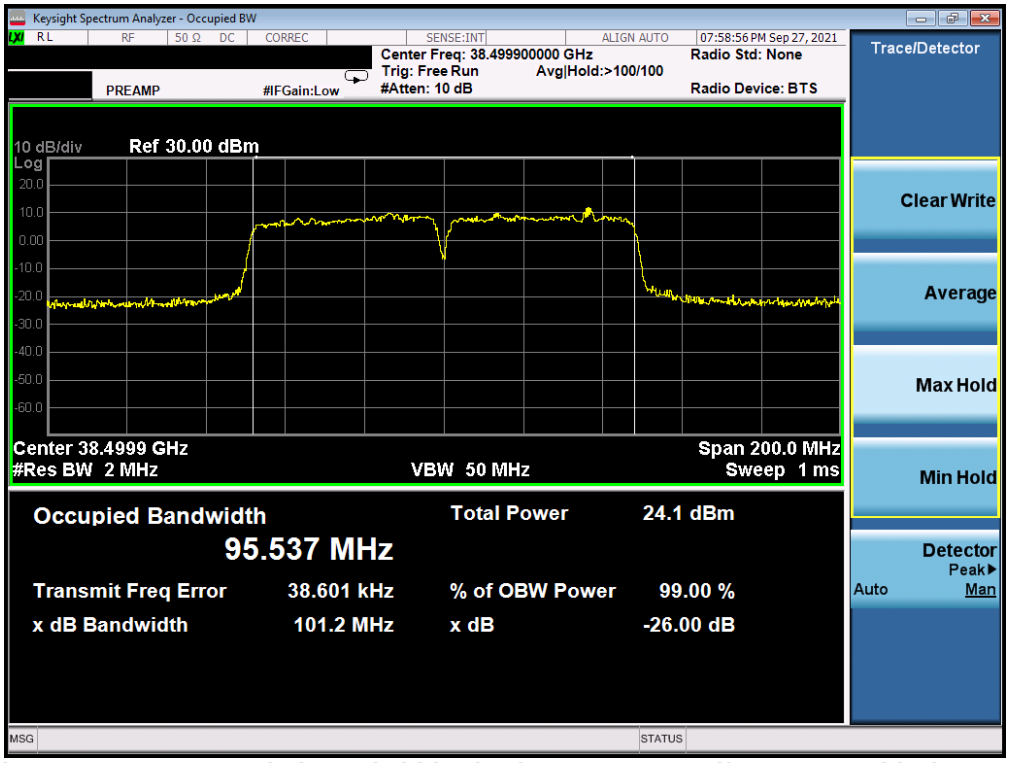
Plot 7-51. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 16QAM – Mid Channel)



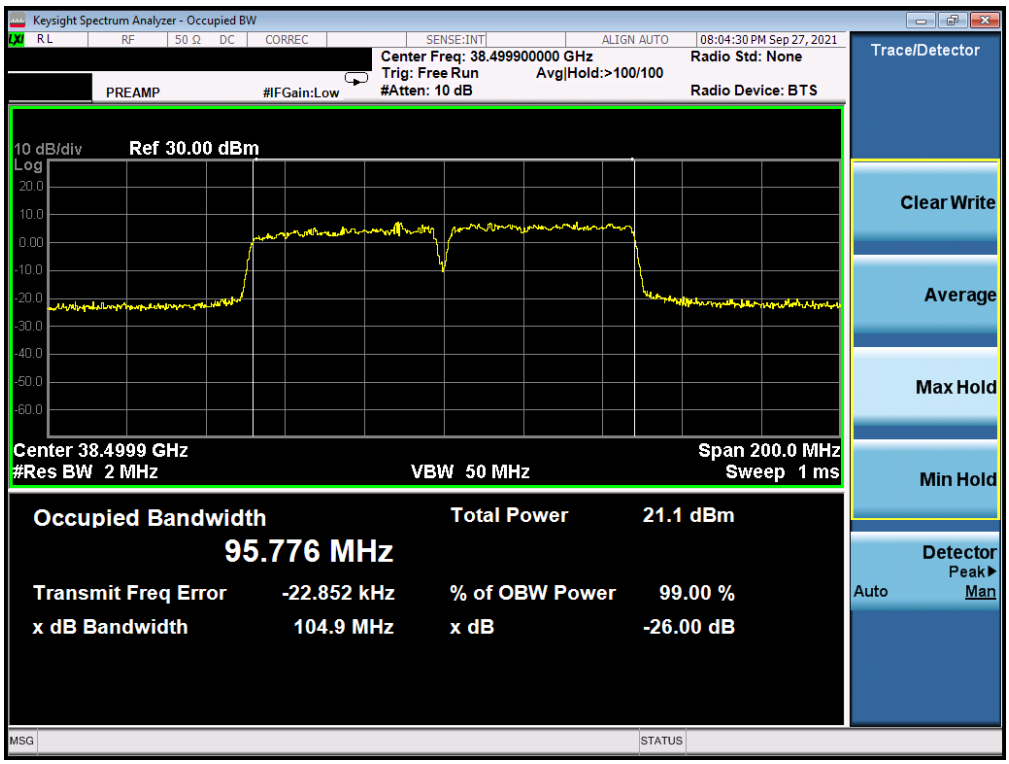
Plot 7-52. Ant 1 Occupied Bandwidth Plot (50MHz-1CC – 64QAM – Mid Channel)



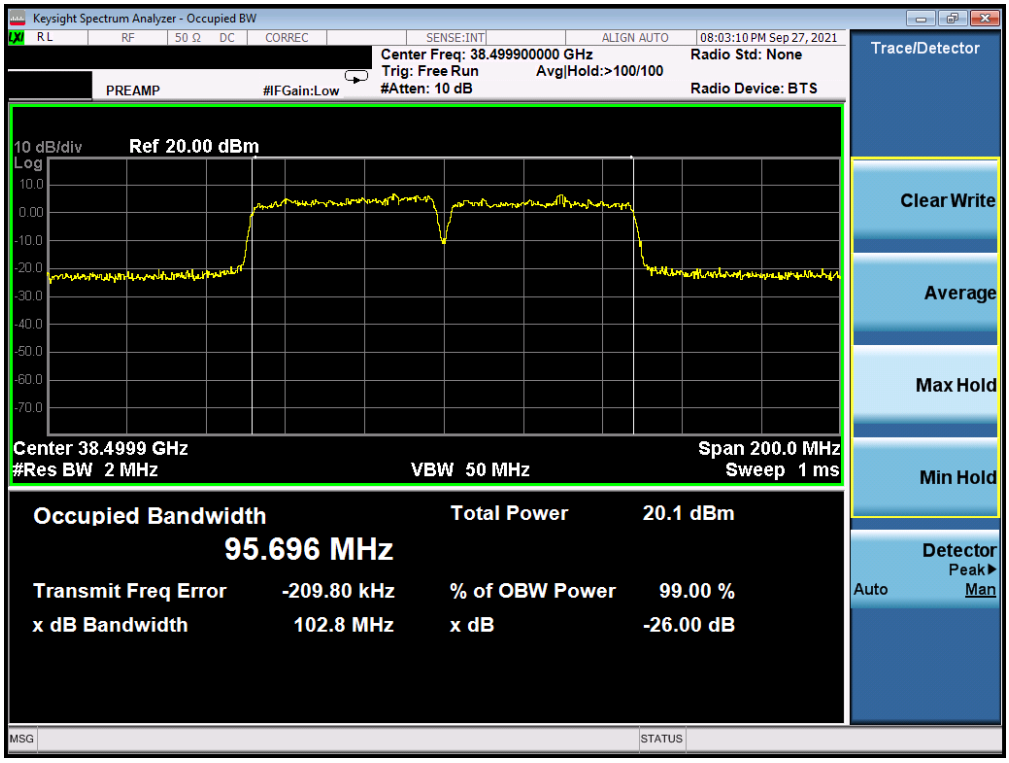
Plot 7-53. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – QPSK – Mid Channel)



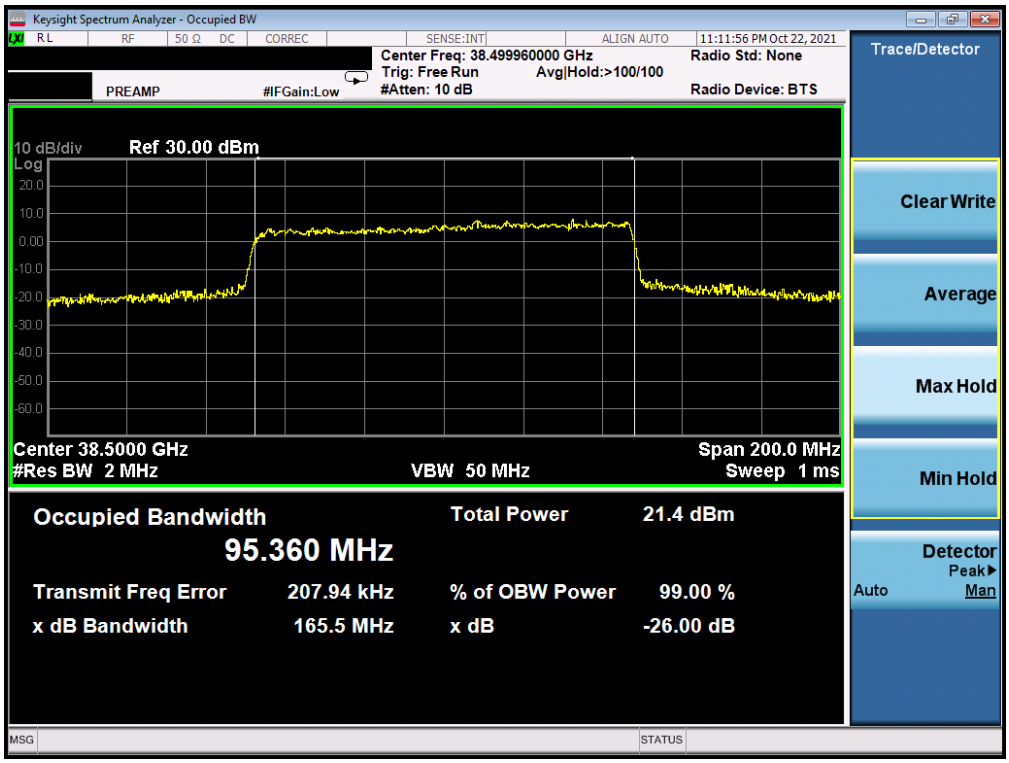
Plot 7-54. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – pi/2-BPSK – Mid Channel)



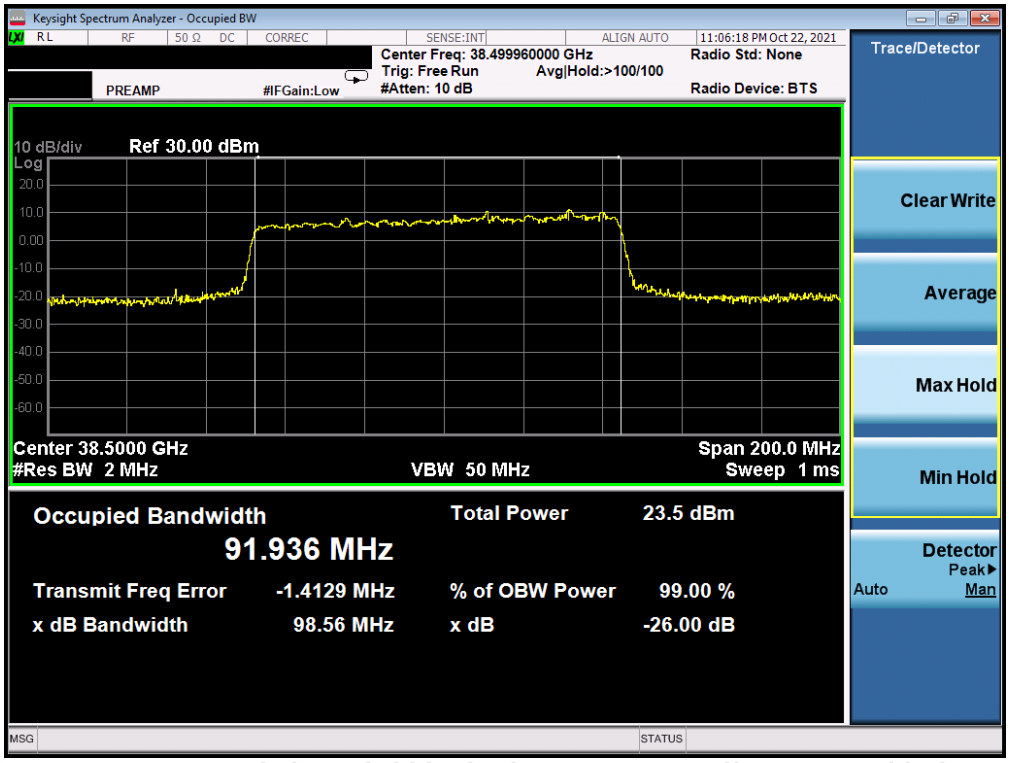
Plot 7-55. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 16QAM – Mid Channel)



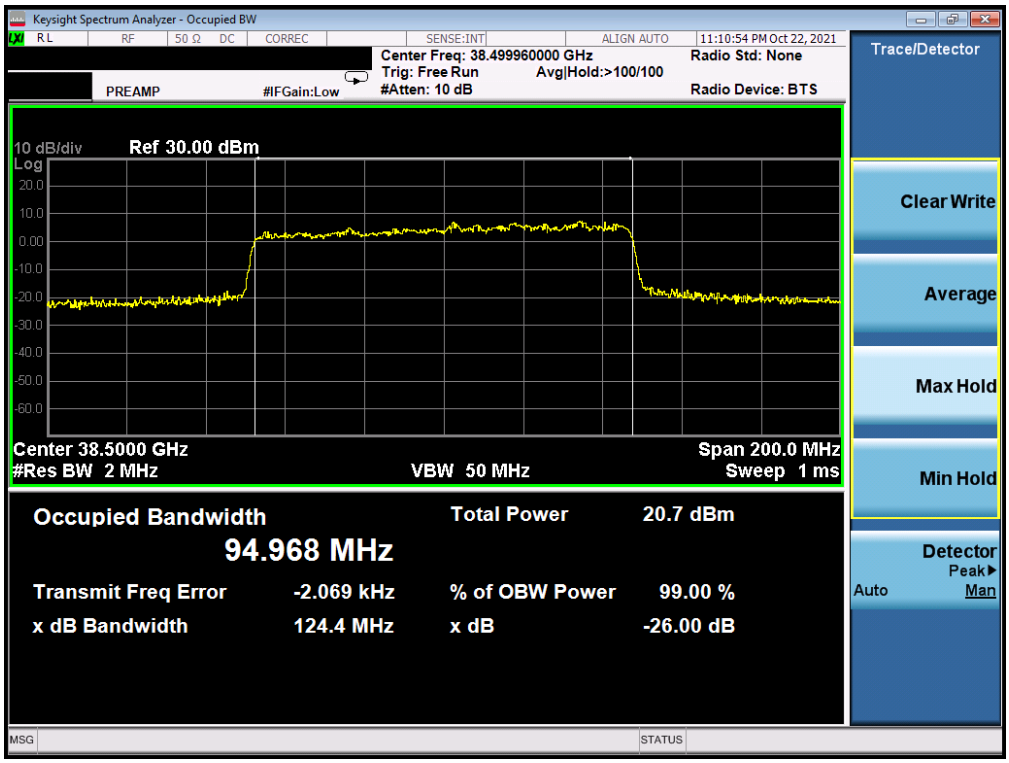
Plot 7-56. Ant 1 Occupied Bandwidth Plot (50MHz-2CC – 64QAM – Mid Channel)



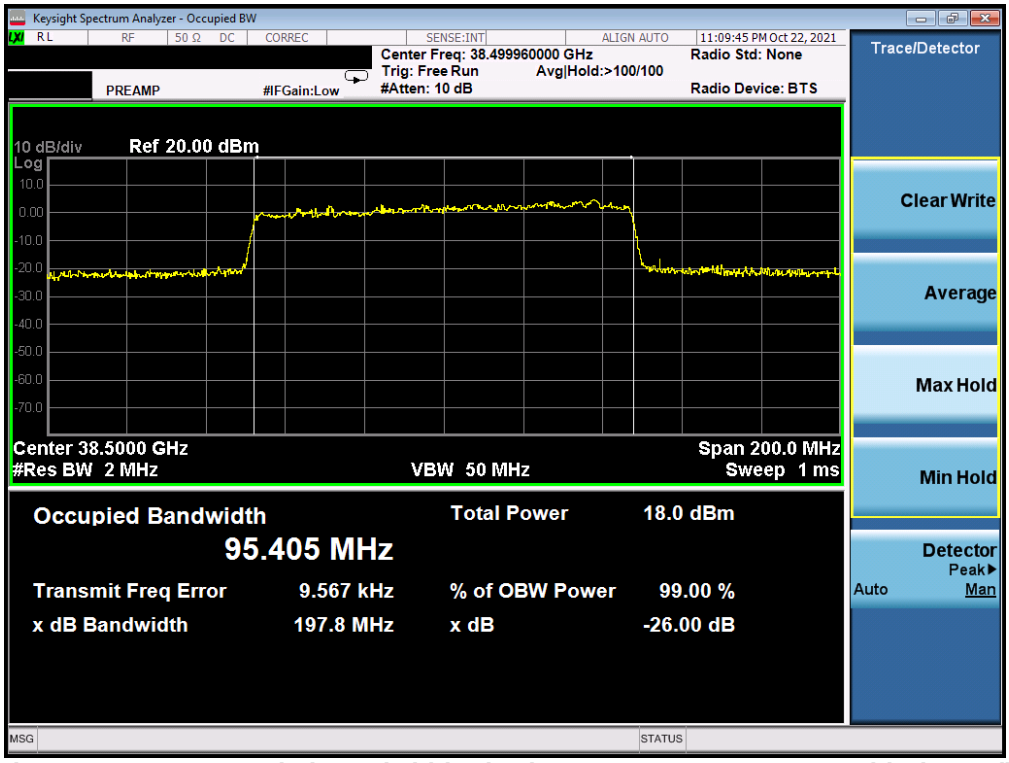
Plot 7-57. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – QPSK – Mid Channel)



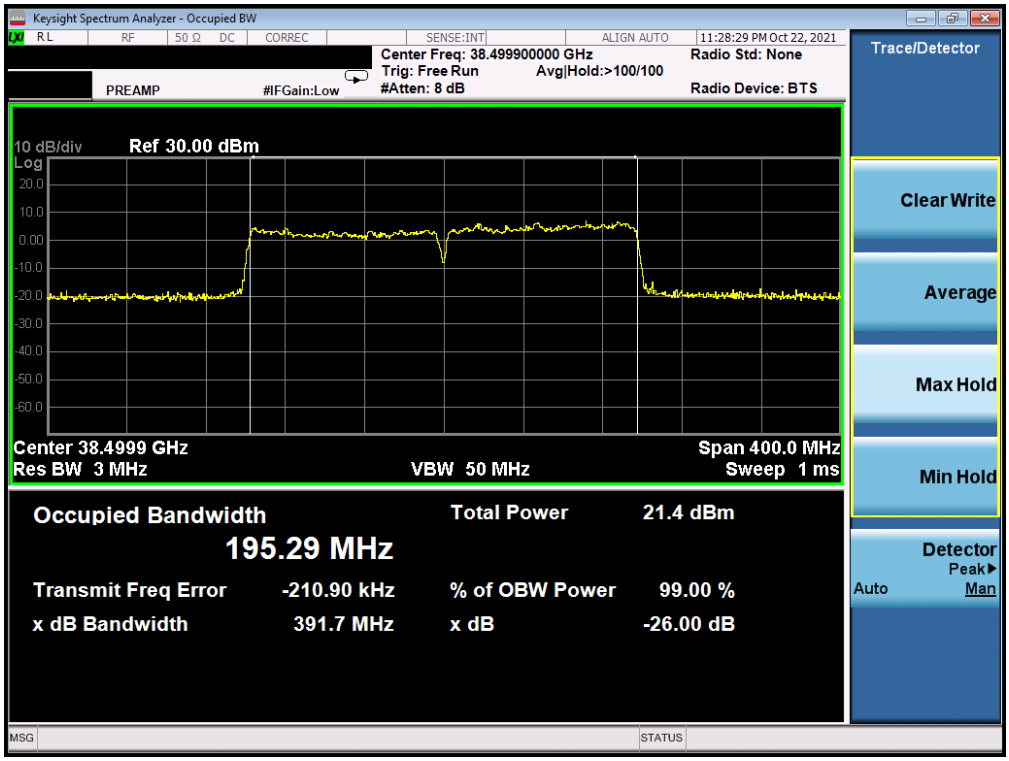
Plot 7-58. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – pi/2-BPSK – Mid Channel)



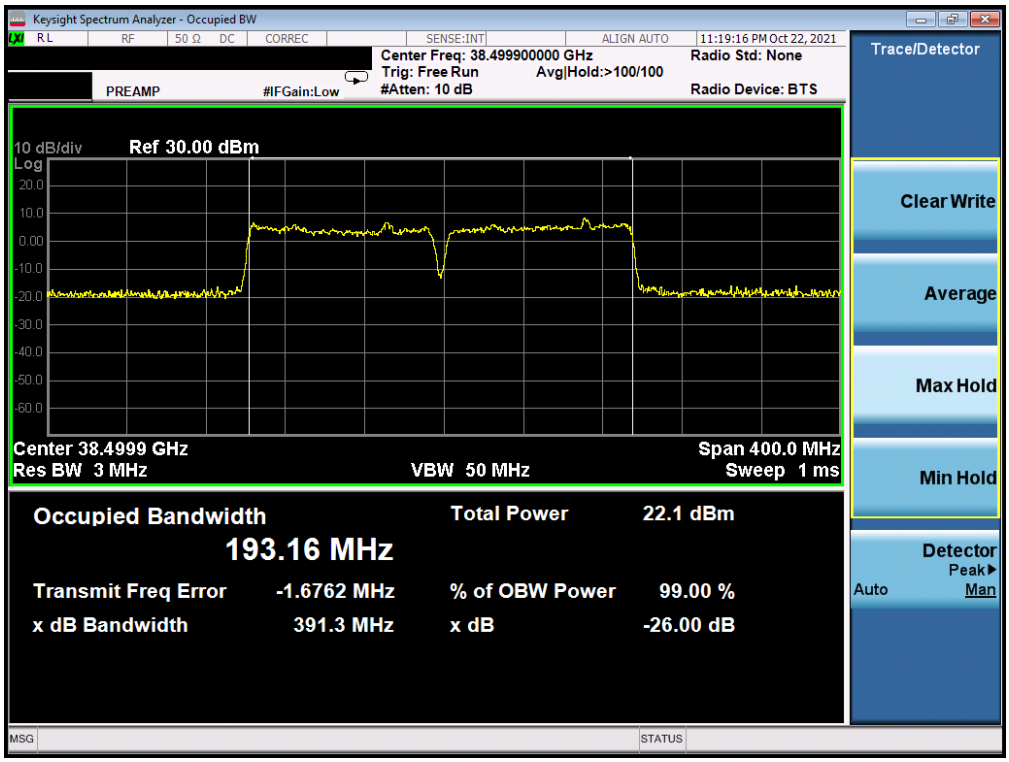
Plot 7-59. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 16QAM – Mid Channel)



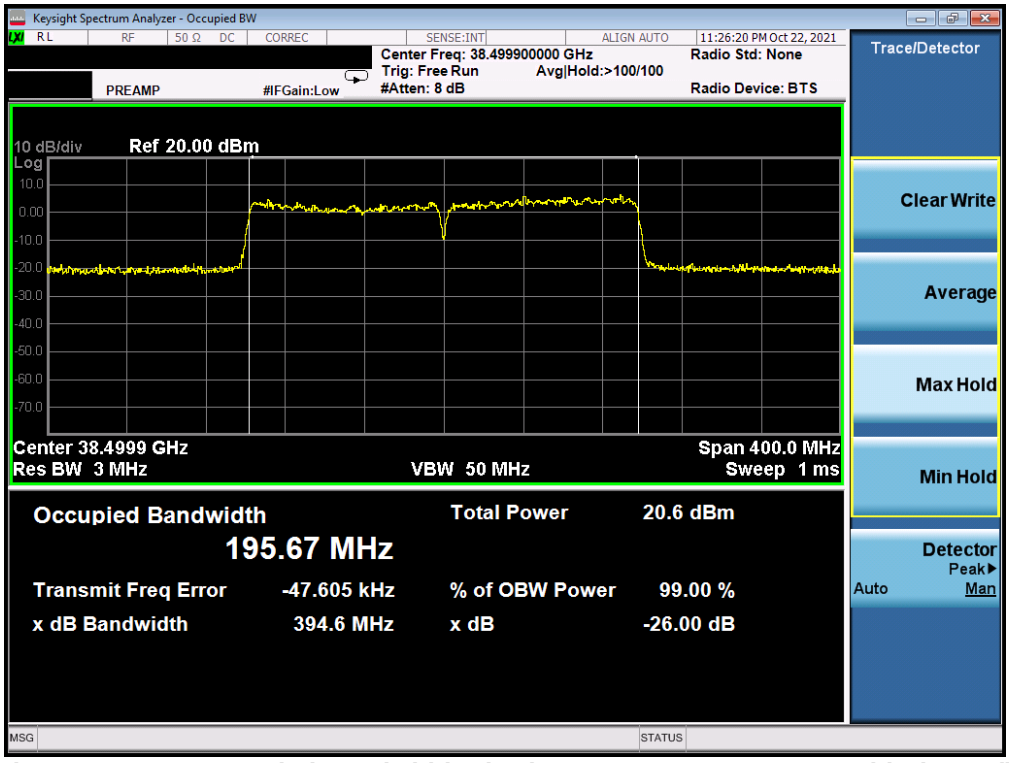
Plot 7-60. Ant 1 Occupied Bandwidth Plot (100MHz-1CC – 64QAM – Mid Channel)



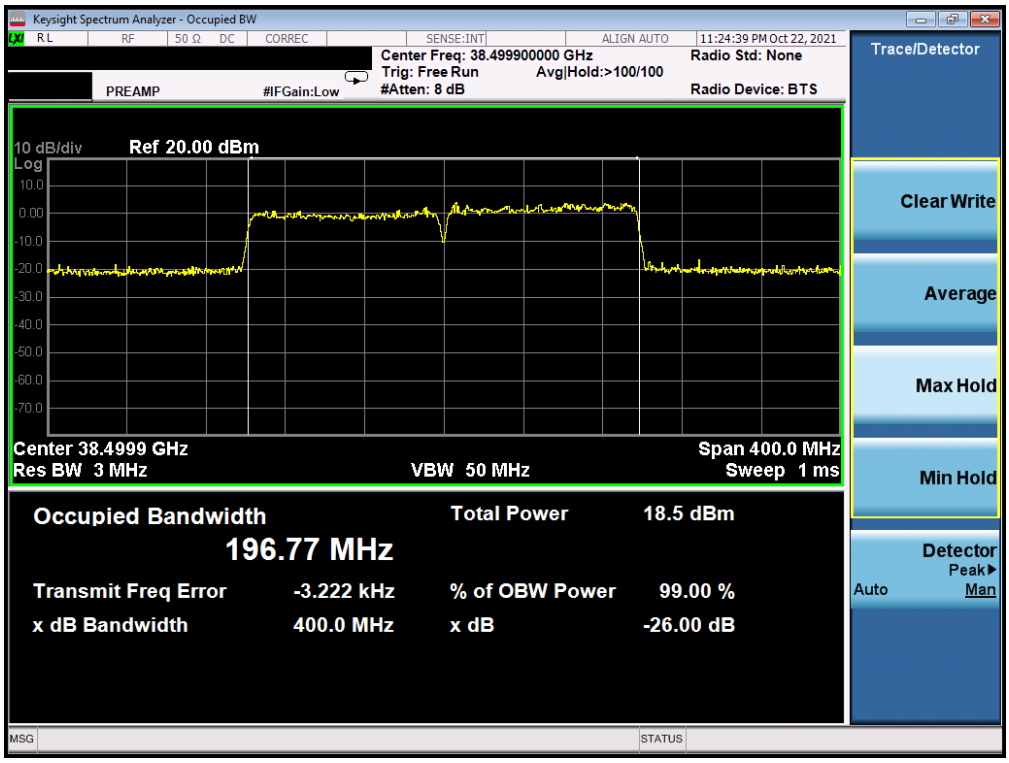
Plot 7-61. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – QPSK – Mid Channel)



Plot 7-62. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – pi/2-BPSK – Mid Channel)



Plot 7-63. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 16QAM – Mid Channel)



Plot 7-64. Ant 1 Occupied Bandwidth Plot (100MHz-2CC – 64QAM – Mid Channel)

7.3 Equivalent Isotropic Radiated Power

§2.1046, §30.202

Test Overview

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

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

Test Procedures Used

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

Test Settings

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

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 were taken at 1m test distance.

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 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). Since these EIRP plots were measured separately from the data in the EIRP tables, results displayed in the plots may marginally differ from the corresponding results displayed in EIRP data tables. However, any differences are negligible and well within the stated measurement uncertainty.

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
SISO	Low	H	156	-
		V	26	-
	Mid	H	165	-
		V	28	-
	High	H	165	-
		V	34	-
MIMO	Low	2Tx/MIMO	154	26
	Mid	2Tx/MIMO	154	26
	High	2Tx/MIMO	154	26

Table 7-6. Ant 1 (M Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	158	-
		V	40	-
	Mid	H	159	-
		V	40	-
	High	H	159	-
		V	40	-
MIMO	Low	2Tx/MIMO	168	40
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	159	31

Table 7-7. Ant 2 (N Patch) Worst Case Beam ID

Band n258-R1

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24424.92	DFT-s-OFDM	QPSK	34	V	SISO	V	64	230	1 / 19	25.33
High	24424.92	DFT-s-OFDM	QPSK	165	H	SISO	V	308	243	1 / 16	23.33
High	24424.92	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	91	263	1 / 19	26.92
High	24424.92	CP-OFDM	QPSK	34	V	SISO	V	64	230	1 / 19	22.23
High	24424.92	CP-OFDM	QPSK	165	H	SISO	V	308	243	1 / 19	20.29
High	24424.92	CP-OFDM	QPSK	26+154	H + V	MIMO	V	91	263	1 / 19	23.73
Low	24275.04	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	89	263	1 / 19	22.91
Mid	24349.92	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	50	274	1 / 19	23.06
High	24424.92	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	91	263	1 / 12	**27.16**
High	24424.92	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	91	263	1 / 19	24.43
High	24424.92	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	91	263	1 / 19	22.10

Table 7-8. Ant 1 EIRP Data (Band n258-R1 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24399.90	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	91	263	32 / 0	22.35
High	24399.9	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	91	262	32 / 0	23.27
High	24399.99	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	91	262	32 / 0	20.53
High	24399.99	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	91	262	32 / 0	18.08

Table 7-9. Ant 1 EIRP Data (Band n258-R1 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24399.96	DFT-s-OFDM	QPSK	34	V	SISO	V	66	229	1 / 42	26.90
High	24399.96	DFT-s-OFDM	QPSK	165	H	SISO	V	333	245	1 / 42	24.67
High	24399.96	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	89	270	1 / 42	**28.47**
High	24399.96	CP-OFDM	QPSK	34	V	SISO	V	66	229	1 / 42	23.43
High	24399.96	CP-OFDM	QPSK	165	H	SISO	V	333	245	1 / 42	21.68
High	24399.96	CP-OFDM	QPSK	26+154	H + V	MIMO	V	89	270	1 / 42	25.22
Low	24300.00	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	89	269	1 / 42	27.10
Mid	24349.92	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	272	85	1 / 23	26.84
High	24399.96	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	89	270	1 / 42	28.28
High	24399.96	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	89	270	1 / 23	24.78
High	24399.96	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	89	270	1 / 23	22.86

Table 7-10. Ant 1 EIRP Data (Band n258-R1 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24349.98	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	64	256	66 / 0	22.49
High	24349.98	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	64	256	66 / 0	22.74
High	24349.98	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	64	256	66 / 0	19.73
High	24349.98	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	64	256	1 / 42	18.27

Table 7-11. Ant 1 EIRP Data (Band n258-R1 - 100MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24349.92	DFT-s-OFDM	QPSK	40	V	SISO	V	24	84	1 / 19	23.53
Mid	24349.92	DFT-s-OFDM	QPSK	159	H	SISO	H	19	163	1 / 19	20.48
Mid	24349.92	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	85	22	1 / 19	29.95
Mid	24349.92	CP-OFDM	QPSK	40	V	SISO	V	24	84	1 / 19	20.74
Mid	24349.92	CP-OFDM	QPSK	159	H	SISO	H	19	163	1 / 19	17.15
Mid	24349.92	CP-OFDM	QPSK	40+168	H + V	MIMO	H	85	22	1 / 19	27.32
Low	24275.04	DFT-s-OFDM	QPSK	40+168	H + V	MIMO	H	85	23	1 / 16	25.98
High	24424.92	DFT-s-OFDM	QPSK	31+159	H + V	MIMO	H	46	19	1 / 12	23.38
Mid	24349.92	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	85	22	1 / 16	**30.21**
Mid	24349.92	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	85	22	1 / 19	27.93
Mid	24349.92	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	85	22	1 / 19	25.62

Table 7-12. Ant 2 EIRP Data (Band n258-R1 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24349.98	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	86	20	32 / 0	25.80
Mid	24349.98	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	86	20	32 / 0	25.81
Mid	24349.98	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	86	20	32 / 0	23.79
Mid	24349.98	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	86	20	32 / 0	21.91

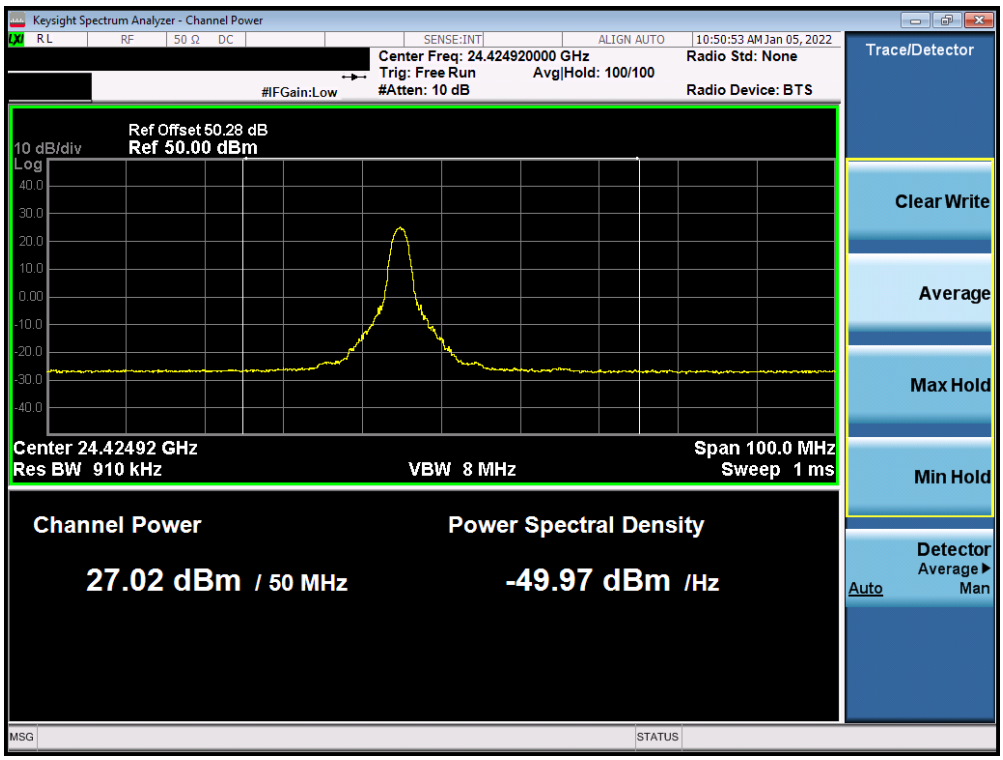
Table 7-13. Ant 2 EIRP Data (Band n258-R1 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24399.96	DFT-s-OFDM	QPSK	40	V	SISO	V	25	84	1 / 42	25.85
High	24399.96	DFT-s-OFDM	QPSK	159	H	SISO	H	12	162	1 / 33	22.03
High	24399.96	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	83	24	1 / 42	**31.05**
High	24399.96	CP-OFDM	QPSK	40	V	SISO	V	25	84	1 / 42	22.77
High	24399.96	CP-OFDM	QPSK	159	H	SISO	H	12	162	1 / 42	19.13
High	24399.96	CP-OFDM	QPSK	40+168	H + V	MIMO	H	83	24	1 / 42	28.00
Low	24300.00	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	83	22	1 / 42	30.03
Mid	24349.92	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	85	21	1 / 42	30.40
High	24399.96	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	83	24	1 / 42	29.61
High	24399.96	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	83	24	1 / 42	29.00
High	24399.96	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	83	24	1 / 33	26.74

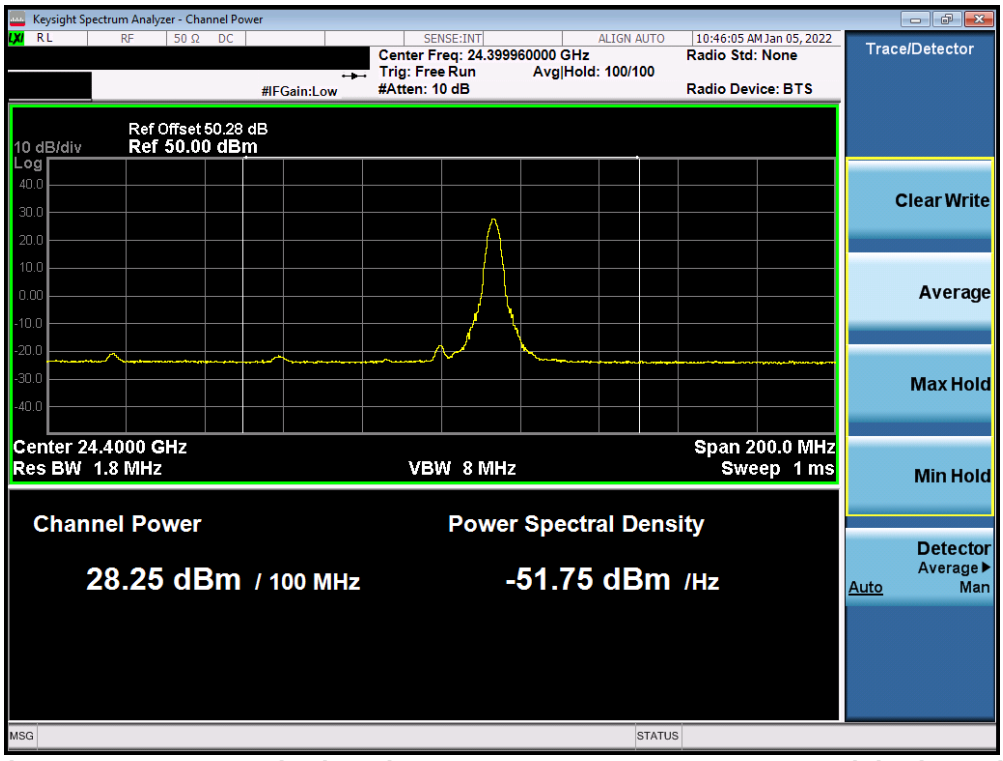
Table 7-14. Ant 2 EIRP Data (Band n258-R1 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	24349.98	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	87	23	66 / 0	26.31
High	24349.98	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	87	23	66 / 0	26.35
High	24349.98	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	87	23	66 / 0	24.32
High	24349.98	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	87	23	1 / 33	22.66

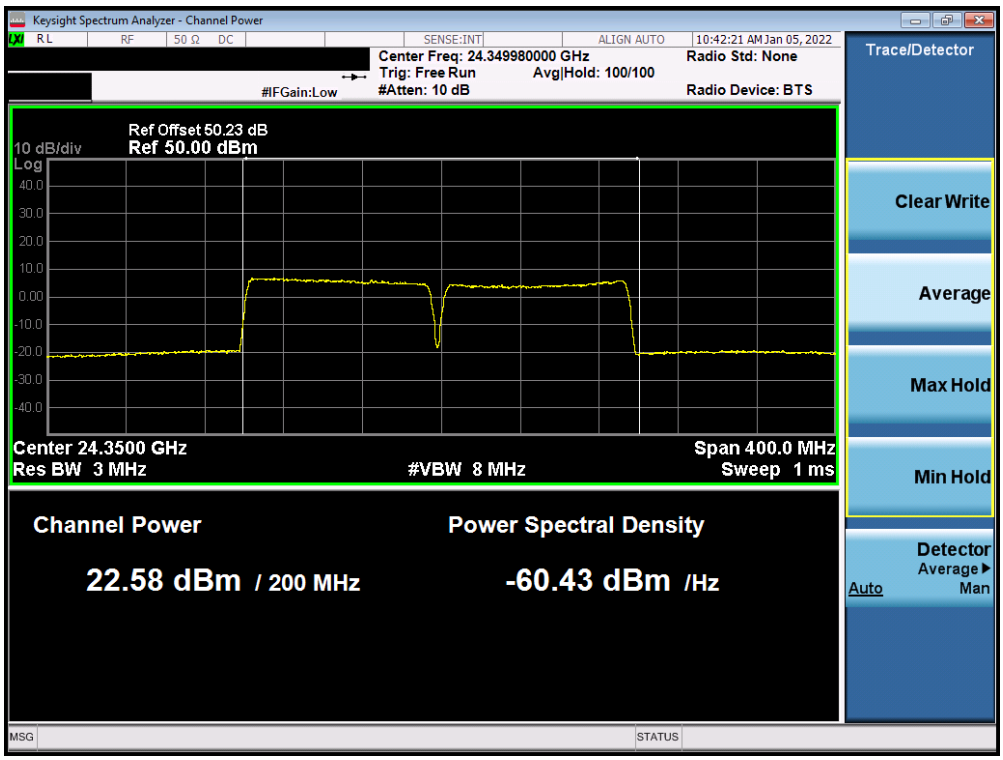
Table 7-15. Ant 2 EIRP Data (Band n258-R1 - 100MHz-2CC)



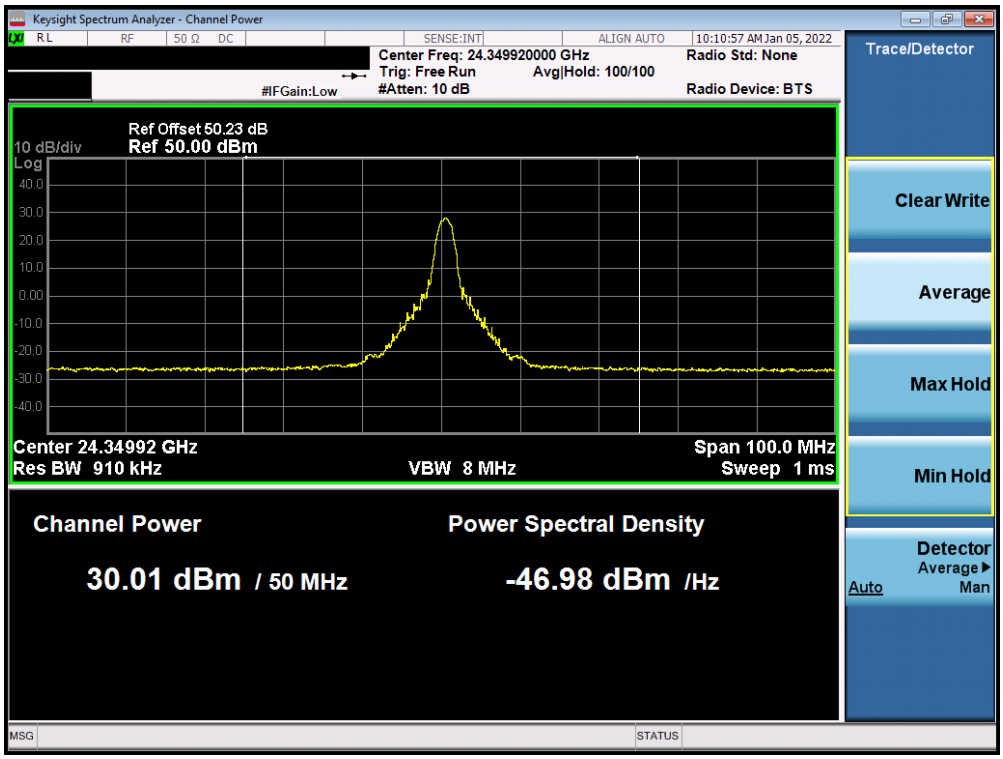
Plot 7-65. Ant 1 EIRP Plot (Band n258-R1 − 50MHz-1CC − pi/2-BPSK – High Channel)



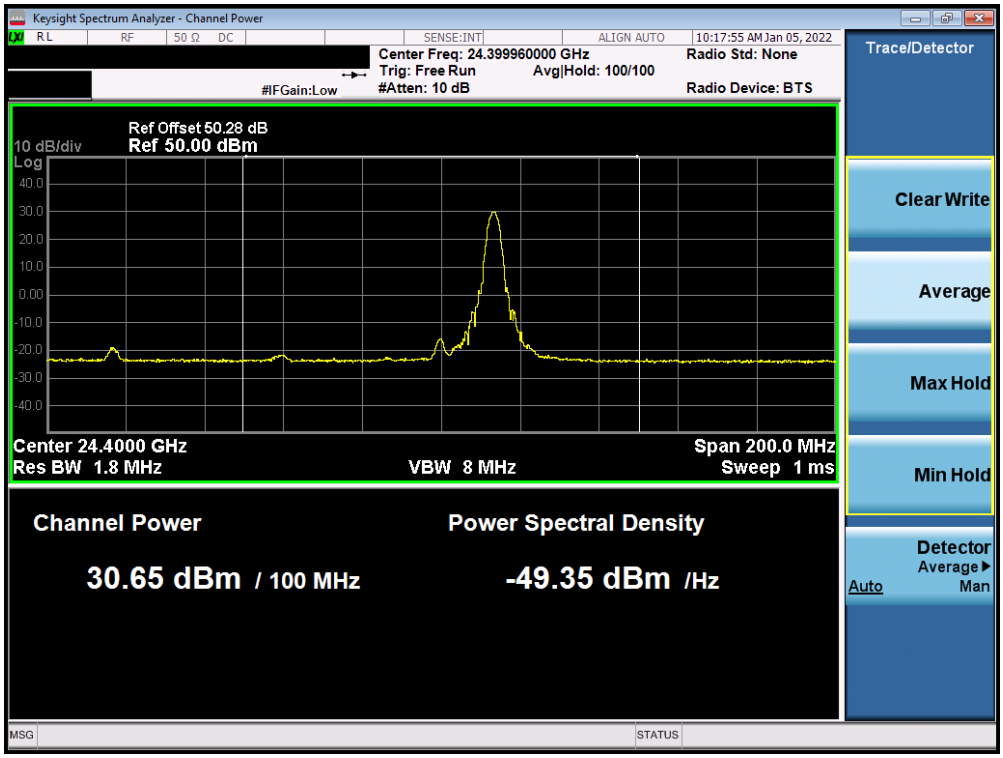
Plot 7-66. Ant 1 EIRP Plot (Band n258-R1 − 100MHz-1CC − QPSK – High Channel)



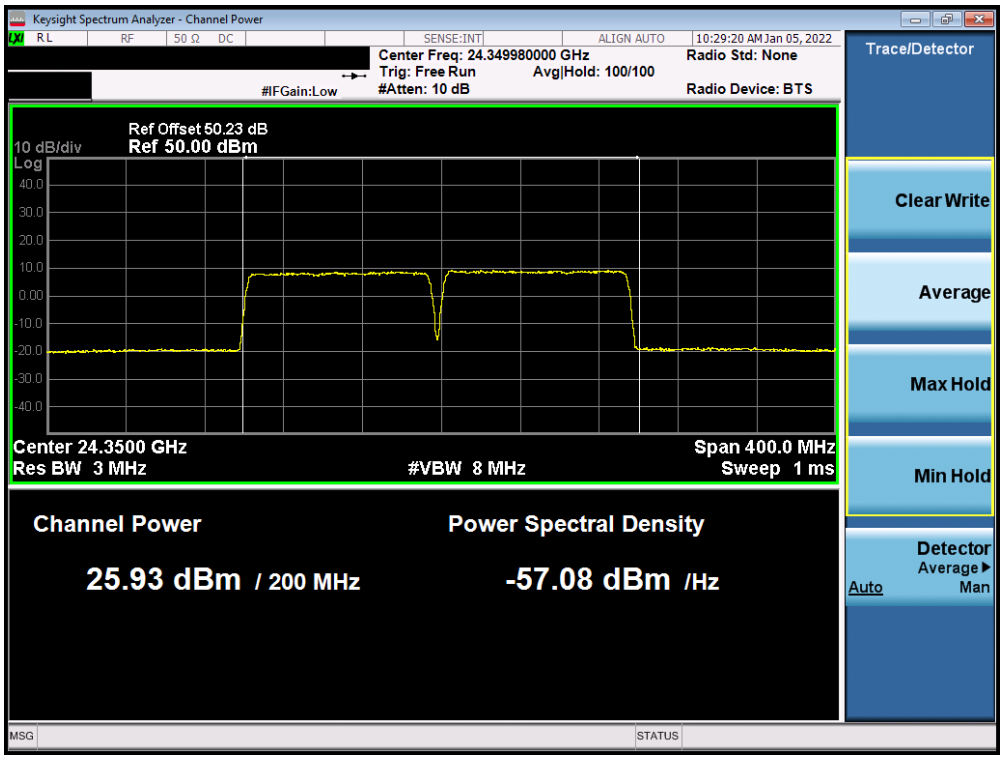
Plot 7-67. Ant 1 EIRP Plot (Band n258-R1 − 100MHz-2CC − pi/2-BPSK – High Channel)



Plot 7-68. Ant 2 EIRP Plot (Band n258-R1 − 50MHz-1CC − pi/2-BPSK – Mid Channel)



Plot 7-69. Ant 2 EIRP Plot (Band n258-R1 − 100MHz-1CC − QPSK – High Channel)



Plot 7-70. Ant 2 EIRP Plot (Band n258-R1 − 100MHz-2CC – pi/2-BPSK – High Channel)

Band n258-R2 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	156	-
		V	26	-
	Mid	H	165	-
		V	28	-
	High	H	165	-
		V	34	-
MIMO	Low	2Tx/MIMO	154	26
	Mid	2Tx/MIMO	154	26
	High	2Tx/MIMO	154	26

Table 7-16. Ant 1 (M Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	158	-
		V	40	-
	Mid	H	159	-
		V	40	-
	High	H	159	-
		V	40	-
MIMO	Low	2Tx/MIMO	168	40
	Mid	2Tx/MIMO	168	40
	High	2Tx/MIMO	168	40

Table 7-17. Ant 2 (N Patch) Worst Case Beam ID

Band n258-R2

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	25224.96	DFT-s-OFDM	QPSK	34	V	SISO	V	66	300	1 / 19	25.51
High	25224.96	DFT-s-OFDM	QPSK	165	H	SISO	H	312	317	1 / 16	24.49
High	25224.96	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	265	261	1 / 12	**28.42**
High	25224.96	CP-OFDM	QPSK	34	V	SISO	V	66	300	1 / 19	22.43
High	25224.96	CP-OFDM	QPSK	165	H	SISO	H	260	317	1 / 19	21.46
High	25224.96	CP-OFDM	QPSK	26+154	H + V	MIMO	V	265	261	1 / 12	24.93
Low	24775.08	DFT-s-OFDM	QPSK	26+154	H + V	MIMO	V	266	262	1 / 12	22.56
Mid	24999.96	DFT-s-OFDM	QPSK	26+154	H + V	MIMO	V	266	262	1 / 19	23.34
High	25224.96	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	265	261	1 / 12	28.24
High	25224.96	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	265	261	1 / 12	26.36
High	25224.96	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	265	261	1 / 12	23.87

Table 7-18. Ant 1 EIRP Data (Band n258-R2 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	25199.94	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	265	261	32 / 0	24.34
High	25199.94	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	265	261	32 / 0	24.43
High	25199.94	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	265	261	32 / 0	22.38
High	25199.94	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	265	261	32 / 0	20.44

Table 7-19. Ant 1 EIRP Data (Band n258-R2 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24999.96	DFT-s-OFDM	QPSK	34	V	SISO	V	248	120	1 / 33	26.61
Mid	24999.96	DFT-s-OFDM	QPSK	165	H	SISO	H	293	315	1 / 23	21.50
Mid	24999.96	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	265	257	1 / 42	28.85
Mid	24999.96	CP-OFDM	QPSK	34	V	SISO	V	248	120	1 / 23	23.76
Mid	24999.96	CP-OFDM	QPSK	165	H	SISO	H	293	315	1 / 23	18.55
Mid	24999.96	CP-OFDM	QPSK	26+154	H + V	MIMO	V	265	257	1 / 42	24.76
Low	24800.04	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	265	257	1 / 42	27.99
High	25200.00	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	264	258	1 / 23	27.44
Mid	24999.96	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	265	257	1 / 42	**28.87**
Mid	24999.96	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	265	257	1 / 42	26.81
Mid	24999.96	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	265	257	1 / 42	24.68

Table 7-20. Ant 1 EIRP Data (Band n258-R2 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24999.96	DFT-s-OFDM	QPSK	26+154	H + V	2Tx	V	266	257	66 / 0	23.78
Mid	24999.96	DFT-s-OFDM	π/2 BPSK	26+154	H + V	2Tx	V	266	257	66 / 0	23.67
Mid	24999.96	DFT-s-OFDM	16QAM	26+154	H + V	2Tx	V	266	257	66 / 0	21.91
Mid	24999.96	DFT-s-OFDM	64QAM	26+154	H + V	2Tx	V	266	257	66 / 0	19.99

Table 7-21. Ant 1 EIRP Data (Band n258-R2 - 100MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24999.96	DFT-s-OFDM	QPSK	40	V	SISO	V	28	93	1 / 19	26.89
Mid	24999.96	DFT-s-OFDM	QPSK	159	H	SISO	V	80	22	1 / 19	25.16
High	25224.96	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	47	342	1 / 19	**28.70**
mid	24999.96	CP-OFDM	QPSK	40	V	SISO	V	28	93	1 / 19	23.79
mid	24999.96	CP-OFDM	QPSK	159	H	SISO	V	80	22	1 / 19	22.10
High	25224.96	CP-OFDM	QPSK	40+168	H + V	MIMO	H	47	342	1 / 16	25.49
Low	24775.08	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	93	343	1 / 12	26.20
Mid	24999.96	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	92	344	1 / 19	27.06
High	25224.96	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	47	342	1 / 19	28.25
High	25224.96	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	47	342	1 / 19	26.09
High	25224.96	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	47	342	1 / 16	24.35

Table 7-22. Ant 2 EIRP Data (Band n258-R2 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	25199.94	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	47	342	32 / 0	27.03
High	25199.94	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	50	332	32 / 0	27.13
High	25199.94	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	50	332	32 / 0	24.94
High	25199.94	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	50	332	32 / 0	23.23

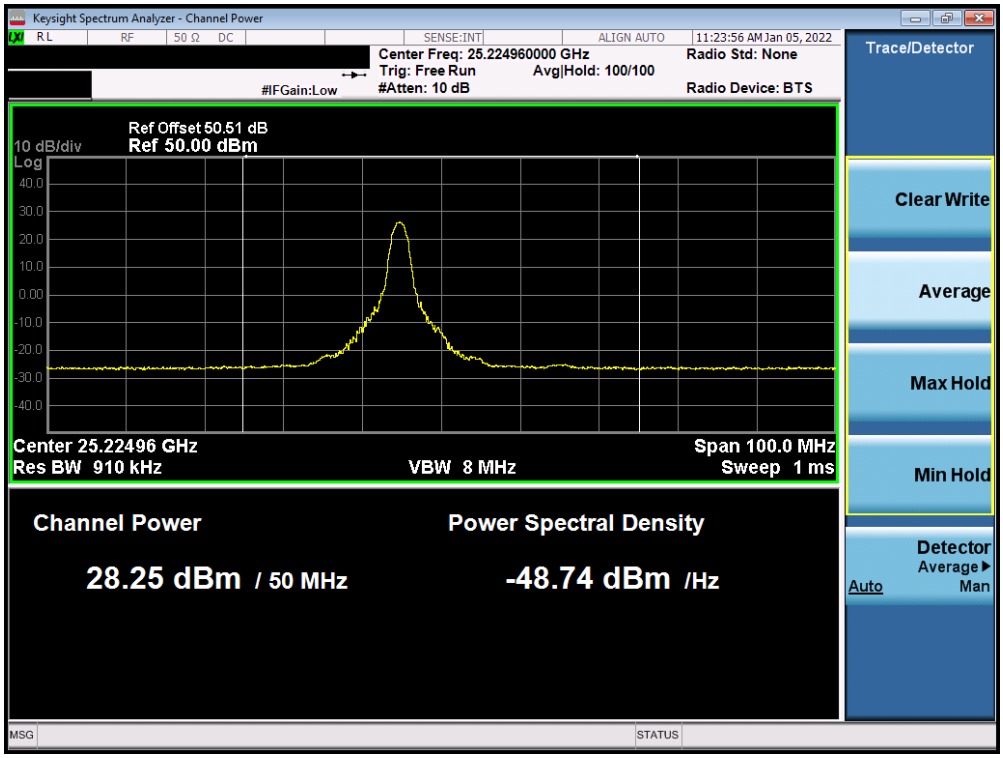
Table 7-23. Ant 2 EIRP Data (Band n258-R2 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24999.96	DFT-s-OFDM	QPSK	40	V	SISO	V	30	87	1 / 42	27.65
Mid	24999.96	DFT-s-OFDM	QPSK	159	H	SISO	V	86	22	1 / 33	25.13
Mid	24999.96	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	84	24	1 / 23	31.87
Mid	24999.96	CP-OFDM	QPSK	40	V	SISO	V	30	87	1 / 42	24.52
Mid	24999.96	CP-OFDM	QPSK	159	H	SISO	V	86	22	1 / 42	22.25
High	25200.00	CP-OFDM	QPSK	40+168	H + V	MIMO	H	84	24	1 / 42	28.90
Low	24800.04	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	101	341	1 / 42	29.66
High	25200.00	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	95	343	1 / 42	28.84
Mid	24999.96	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	84	24	1 / 33	**31.95**
Mid	24999.96	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	84	24	1 / 42	29.85
Mid	24999.96	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	84	24	1 / 33	27.89

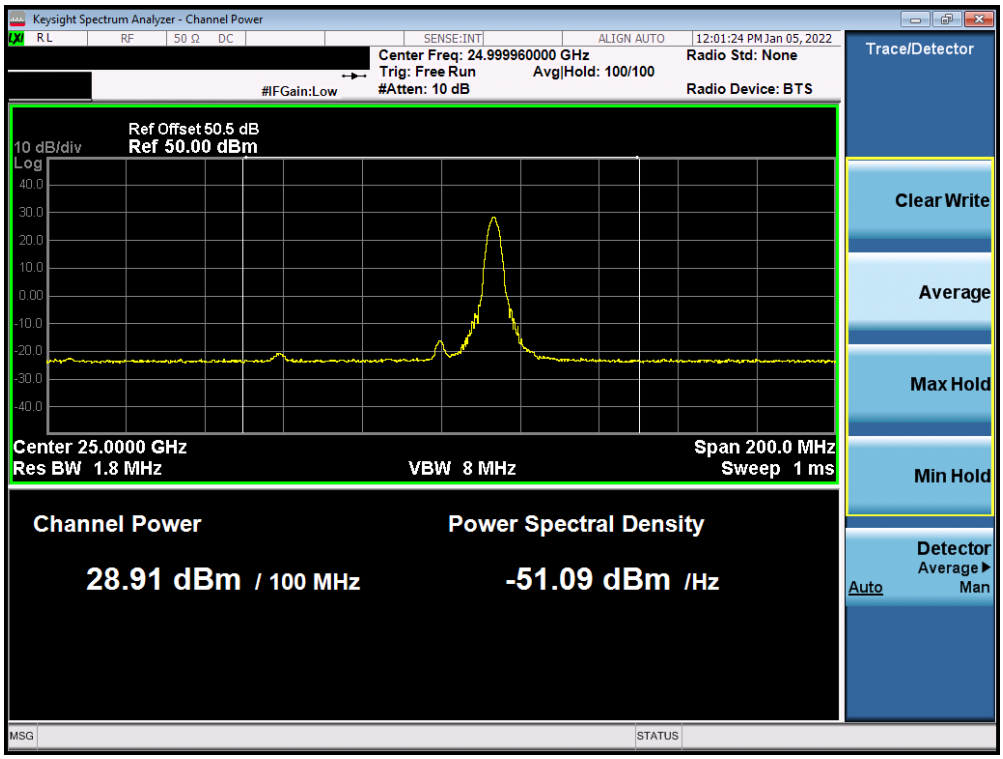
Table 7-24. Ant 2 EIRP Data (Band n258-R2 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	24999.90	DFT-s-OFDM	QPSK	40+168	H + V	2Tx	H	95	343	66 / 0	24.25
Mid	24999.90	DFT-s-OFDM	π/2 BPSK	40+168	H + V	2Tx	H	95	343	66 / 0	24.22
Mid	24999.90	DFT-s-OFDM	16QAM	40+168	H + V	2Tx	H	95	343	66 / 0	22.43
Mid	24999.90	DFT-s-OFDM	64QAM	40+168	H + V	2Tx	H	95	343	1 / 33	20.76

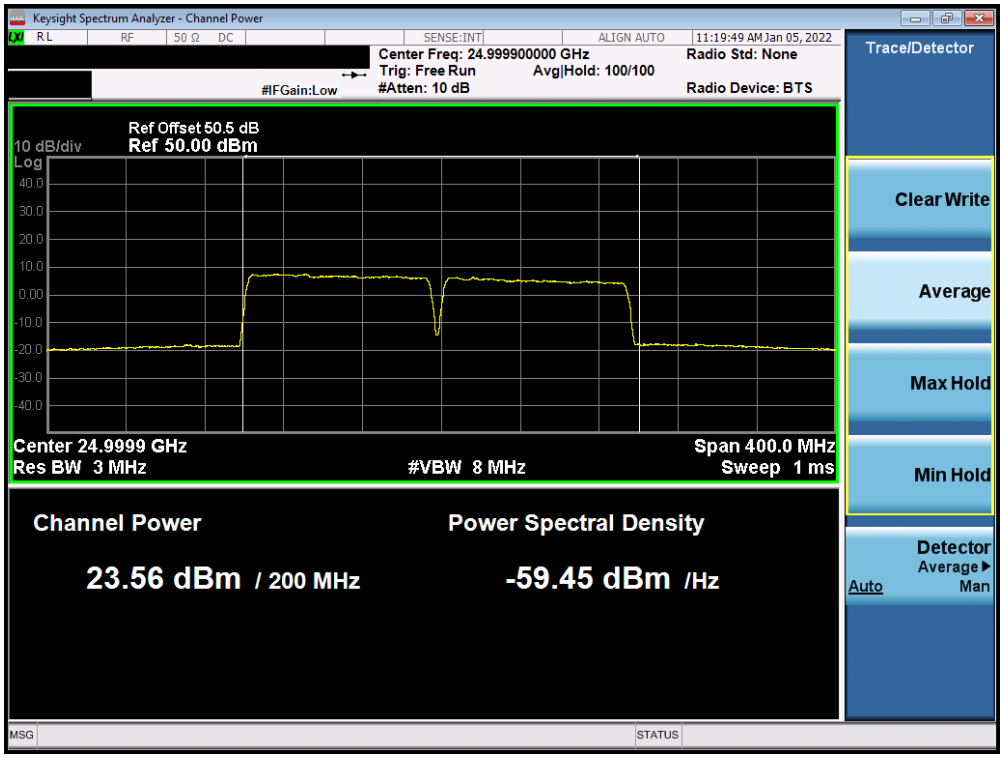
Table 7-25. Ant 2 EIRP Data (Band n258-R2 - 100MHz-2CC)



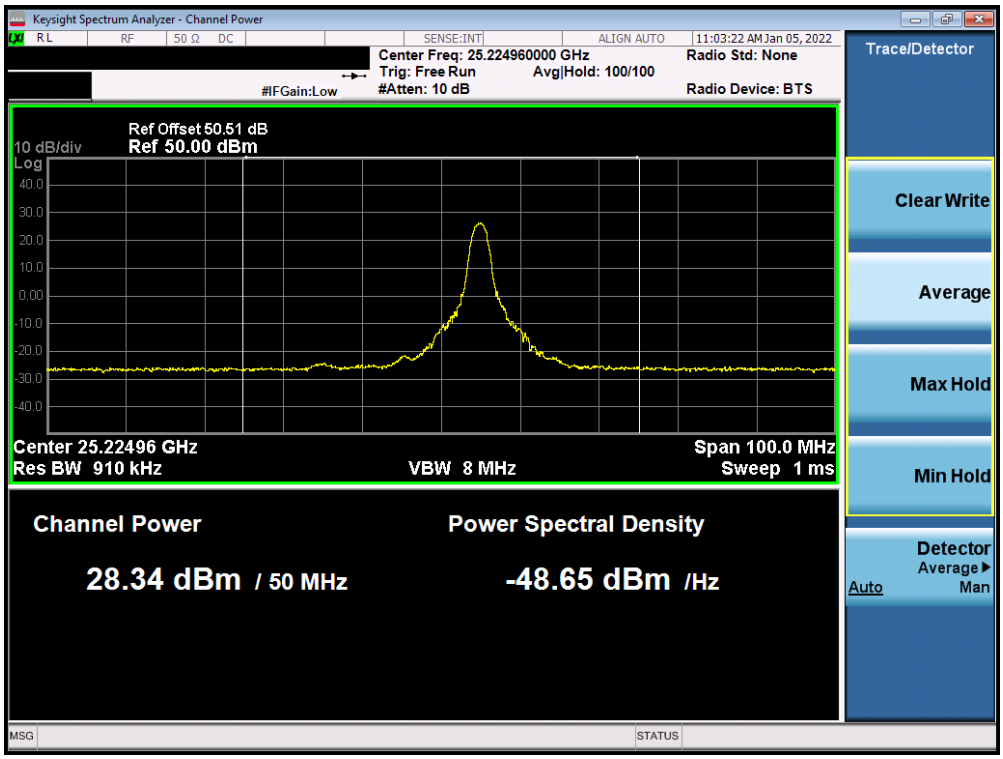
Plot 7-71. Ant 1 EIRP Plot (Band n258-R2 − 50MHz-1CC − QPSK – High Channel)



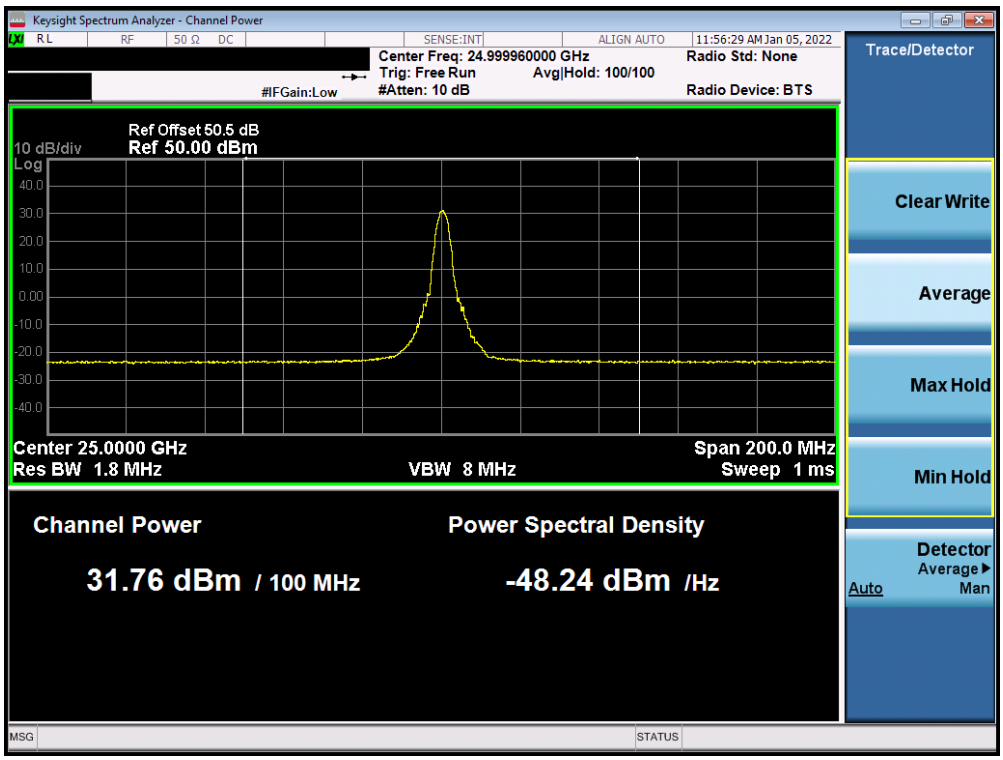
Plot 7-72. Ant 1 EIRP Plot (Band n258-R2 − 100MHz-1CC – pi/2-BPSK – Mid Channel)



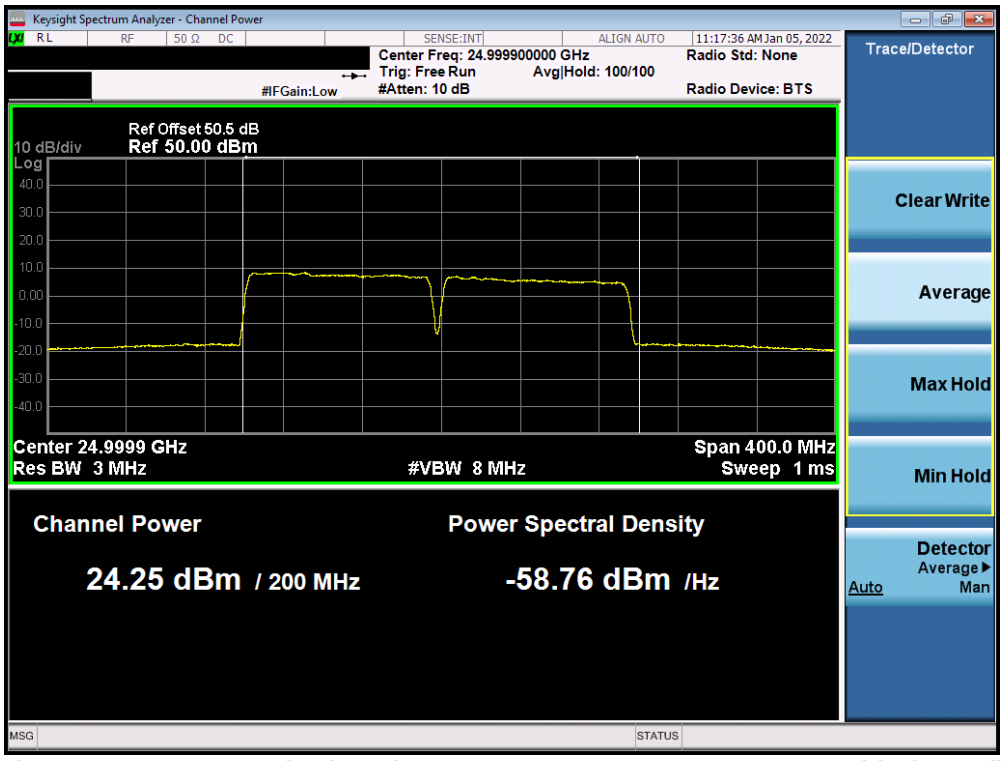
Plot 7-73. Ant 1 EIRP Plot (Band n258-R2 − 100MHz-2CC − QPSK – Mid Channel)



Plot 7-74. Ant 2 EIRP Plot (Band n258-R2 − 50MHz-1CC − QPSK – High Channel)



Plot 7-75. Ant 2 EIRP Plot (Band n258-R2 − 100MHz-1CC – pi/2-BPSK – Mid Channel)



Plot 7-76. Ant 2 EIRP Plot (Band n258-R2 − 100MHz-2CC – QPSK – Mid Channel)

Band n261 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	154	-
		V	37	-
	Mid	H	154	-
		V	27	-
	High	H	163	-
		V	36	-
MIMO	Low	2Tx/MIMO	155	27
	Mid	2Tx/MIMO	164	36
	High	2Tx/MIMO	165	37

Table 7-26. Ant 1 (M Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	168	-
		V	31	-
	Mid	H	159	-
		V	39	-
	High	H	159	-
		V	39	-
MIMO	Low	2Tx/MIMO	159	31
	Mid	2Tx/MIMO	159	31
	High	2Tx/MIMO	159	31

Table 7-27. Ant 2 (N Patch) Worst Case Beam ID

Band n261

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	27924.96	DFT-s-OFDM	QPSK	27	V	SISO	V	295	254	1 / 19	21.89
Low	27525.00	DFT-s-OFDM	QPSK	154	H	SISO	H	279	99	1 / 16	27.69
Low	27525.00	DFT-s-OFDM	QPSK	27/155	H + V	2Tx	H	293	73	1 / 16	28.99
Mid	27924.96	CP-OFDM	QPSK	27	V	SISO	V	295	254	1 / 16	19.04
Low	27525.00	CP-OFDM	QPSK	154	H	SISO	H	279	99	1 / 19	24.45
Low	27525.00	CP-OFDM	QPSK	27/155	H + V	MIMO	H	293	73	1 / 16	25.91
Mid	27924.96	DFT-s-OFDM	QPSK	36/164	H + V	2Tx	H	296	80	1 / 19	26.58
High	28324.92	DFT-s-OFDM	QPSK	37/165	H + V	2Tx	H	283	57	1 / 12	26.50
Low	27525.00	DFT-s-OFDM	π/2 BPSK	27/155	H + V	2Tx	H	293	73	1 / 19	**29.02**
Low	27525.00	DFT-s-OFDM	16QAM	27/155	H + V	2Tx	H	293	73	1 / 19	26.73
Low	27525.00	DFT-s-OFDM	64QAM	27/155	H + V	2Tx	H	293	73	1 / 16	24.65

Table 7-28. Ant 1 EIRP Data (Band n261 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Low	27550.02	DFT-s-OFDM	QPSK	27/155	H + V	2Tx	H	292	71	32 / 0	24.54
Low	27550.02	DFT-s-OFDM	π/2 BPSK	27/155	H + V	2Tx	H	292	71	32 / 0	24.65
Low	27550.02	DFT-s-OFDM	16QAM	27/155	H + V	2Tx	H	292	71	32 / 0	22.65
Low	27550.02	DFT-s-OFDM	64QAM	27/155	H + V	2Tx	H	292	71	1 / 16	20.91

Table 7-29. Ant 1 EIRP Data (Band n261 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	27924.96	DFT-s-OFDM	QPSK	27	V	SISO	V	299	304	1 / 23	22.31
Low	27550.08	DFT-s-OFDM	QPSK	154	H	SISO	H	281	97	1 / 33	27.78
Low	27550.08	DFT-s-OFDM	QPSK	27/155	H + V	2Tx	H	293	71	1 / 42	28.92
Mid	27924.96	CP-OFDM	QPSK	27	V	SISO	V	299	304	1 / 23	19.36
Low	27550.08	CP-OFDM	QPSK	154	H	SISO	H	281	97	1 / 23	24.64
Low	27550.08	CP-OFDM	QPSK	27/155	H + V	MIMO	H	293	71	1 / 42	25.95
Mid	27924.96	DFT-s-OFDM	QPSK	36/164	H + V	2Tx	H	271	84	1 / 23	26.87
High	28299.96	DFT-s-OFDM	QPSK	37/165	H + V	2Tx	H	282	57	1 / 23	26.58
Low	27550.08	DFT-s-OFDM	π/2 BPSK	27/155	H + V	2Tx	H	293	71	1 / 42	**28.95**
Low	27550.08	DFT-s-OFDM	16QAM	27/155	H + V	2Tx	H	293	71	1 / 23	27.30
Low	27550.08	DFT-s-OFDM	64QAM	27/155	H + V	2Tx	H	293	71	1 / 23	25.43

Table 7-30. Ant 1 EIRP Data (Band n261 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Low	27600.06	DFT-s-OFDM	QPSK	27/155	H + V	2Tx	H	290	68	66 / 0	23.26
Low	27600.06	DFT-s-OFDM	π/2 BPSK	27/155	H + V	2Tx	H	290	68	66 / 0	23.45
Low	27600.06	DFT-s-OFDM	16QAM	27/155	H + V	2Tx	H	290	68	66 / 0	21.32
Low	27600.06	DFT-s-OFDM	64QAM	27/155	H + V	2Tx	H	290	68	1 / 33	19.60

Table 7-31. Ant 1 EIRP Data (Band n261 - 100MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	27924.96	DFT-s-OFDM	QPSK	39	V	SISO	V	19	82	1 / 12	27.02
Low	27525.00	DFT-s-OFDM	QPSK	168	H	SISO	V	82	24	1 / 16	29.61
Low	27525.00	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	84	23	1 / 16	32.52
Mid	27924.96	CP-OFDM	QPSK	39	V	SISO	V	19	82	1 / 16	23.82
Low	27525.00	CP-OFDM	QPSK	168	H	SISO	V	82	24	1 / 16	26.72
Low	27525.00	CP-OFDM	QPSK	31+159	H + V	MIMO	H	84	23	1 / 16	29.62
Mid	27924.96	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	80	26	1 / 12	31.65
High	28324.92	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	84	24	1 / 19	31.35
Low	27525.00	DFT-s-OFDM	π/2 BPSK	31+159	H + V	2Tx	H	84	23	1 / 16	**32.54**
Low	27525.00	DFT-s-OFDM	16QAM	31+159	H + V	2Tx	H	84	23	1 / 16	30.49
Low	27525.00	DFT-s-OFDM	64QAM	31+159	H + V	2Tx	H	84	23	1 / 19	28.29

Table 7-32. Ant 2 EIRP Data (Band n261 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Low	27550.02	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	84	26	32 / 0	27.84
Low	27550.02	DFT-s-OFDM	π/2 BPSK	31+159	H + V	2Tx	H	84	26	32 / 0	27.94
Low	27550.02	DFT-s-OFDM	16QAM	31+159	H + V	2Tx	H	84	26	1 / 12	24.97
Low	27550.02	DFT-s-OFDM	64QAM	31+159	H + V	2Tx	H	84	26	1 / 16	24.25

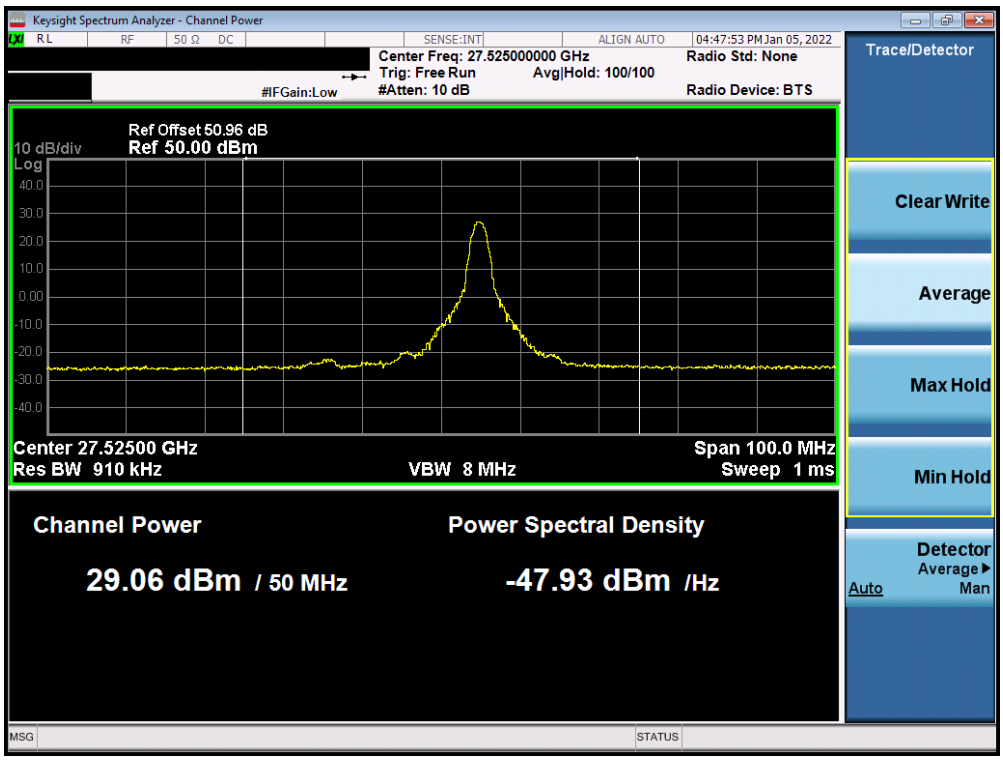
Table 7-33. Ant 2 EIRP Data (Band n261 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	27924.96	DFT-s-OFDM	QPSK	39	V	SISO	V	6	88	1 / 42	27.78
Low	27550.08	DFT-s-OFDM	QPSK	168	H	SISO	V	86	21	1 / 33	30.23
Low	27550.08	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	83	24	1 / 42	33.15
Mid	27924.96	CP-OFDM	QPSK	39	V	SISO	V	6	88	1 / 23	24.39
Low	27550.08	CP-OFDM	QPSK	168	H	SISO	V	86	21	1 / 23	27.16
Low	27550.08	CP-OFDM	QPSK	31+159	H + V	MIMO	H	83	24	1 / 42	30.06
Mid	27924.96	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	81	14	1 / 23	31.20
High	28299.96	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	84	25	1 / 33	32.31
Low	27550.08	DFT-s-OFDM	π/2 BPSK	31+159	H + V	2Tx	H	83	24	1 / 33	**33.29**
Low	27550.08	DFT-s-OFDM	16QAM	31+159	H + V	2Tx	H	83	24	1 / 23	31.11
Low	27550.08	DFT-s-OFDM	64QAM	31+159	H + V	2Tx	H	83	24	1 / 33	29.06

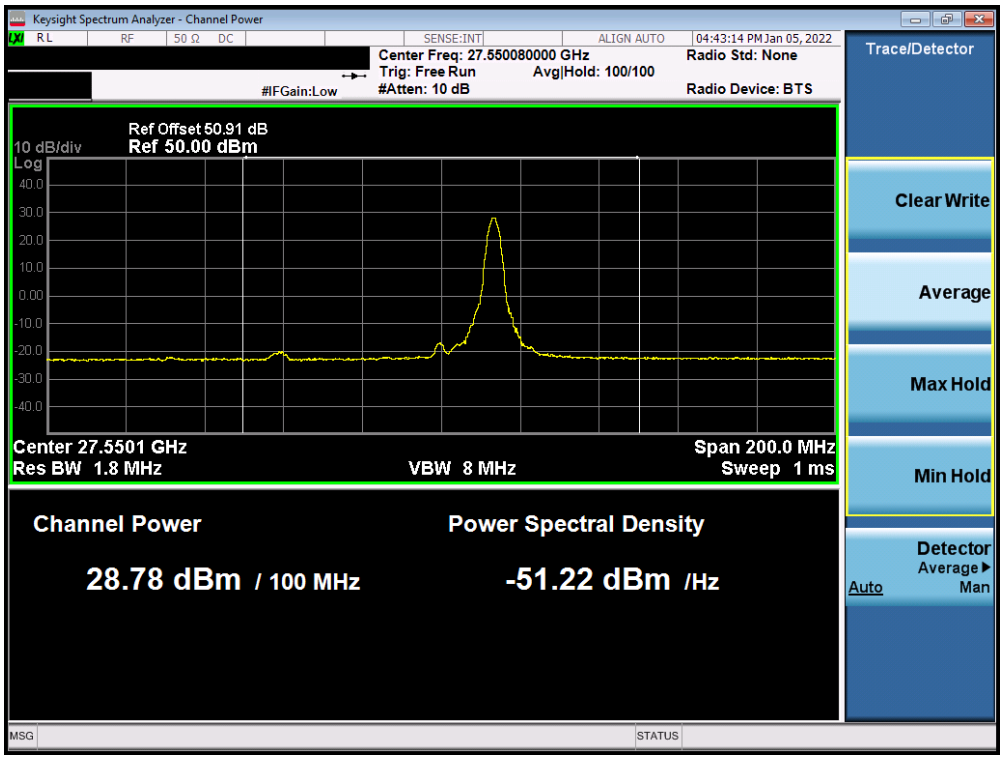
Table 7-34. Ant 2 EIRP Data (Band n261 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Low	27550.08	DFT-s-OFDM	QPSK	31+159	H + V	2Tx	H	79	25	66 / 0	27.39
Low	27550.08	DFT-s-OFDM	π/2 BPSK	31+159	H + V	2Tx	H	79	25	66 / 0	27.49
Low	27550.08	DFT-s-OFDM	16QAM	31+159	H + V	2Tx	H	79	25	1 / 42	24.09
Low	27550.08	DFT-s-OFDM	64QAM	31+159	H + V	2Tx	H	79	25	66 / 0	23.06

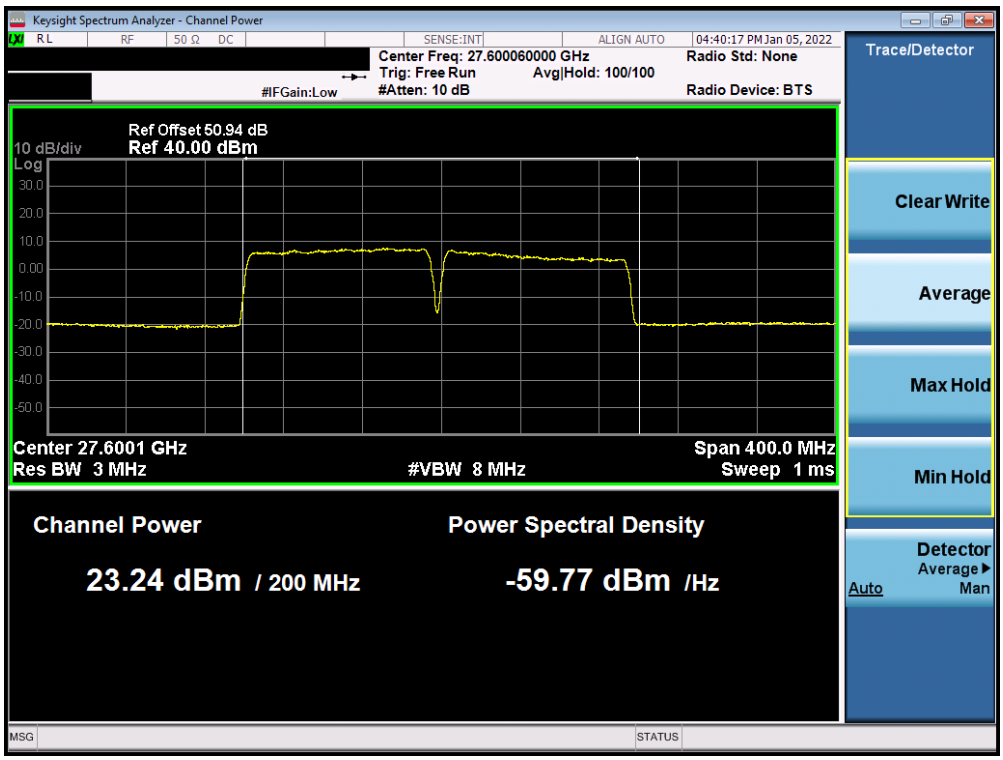
Table 7-35. Ant 2 EIRP Data (Band n261 - 100MHz-2CC)



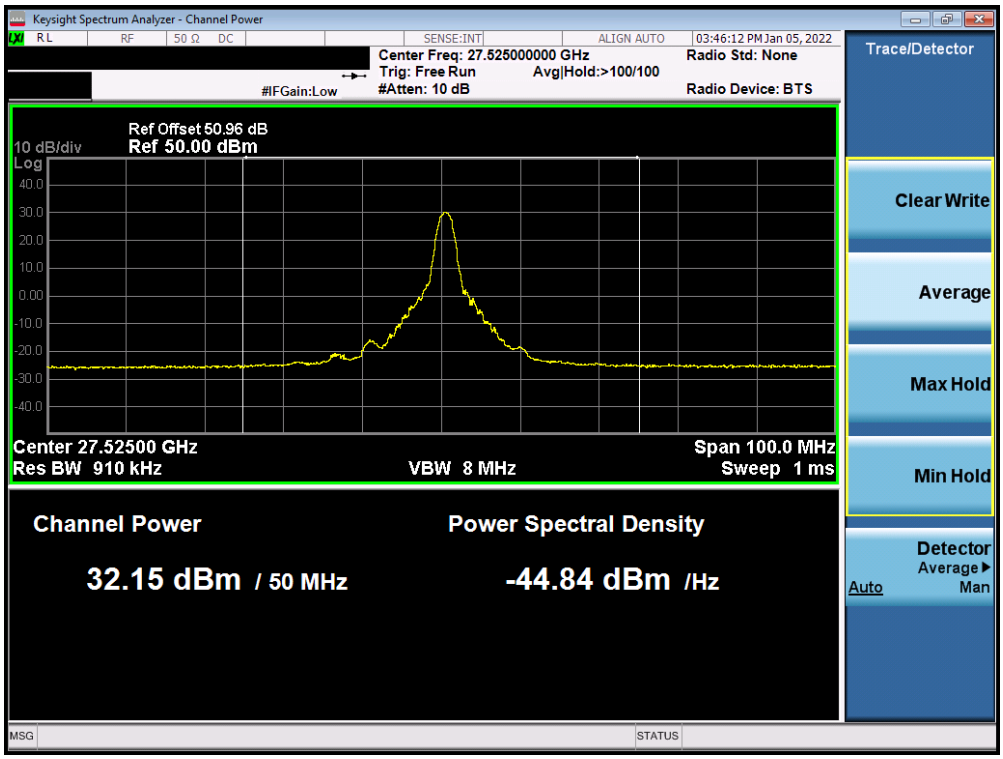
Plot 7-77. Ant 1 EIRP Plot (Band n261 − 50MHz-1CC – pi/2-BPSK – Low Channel)



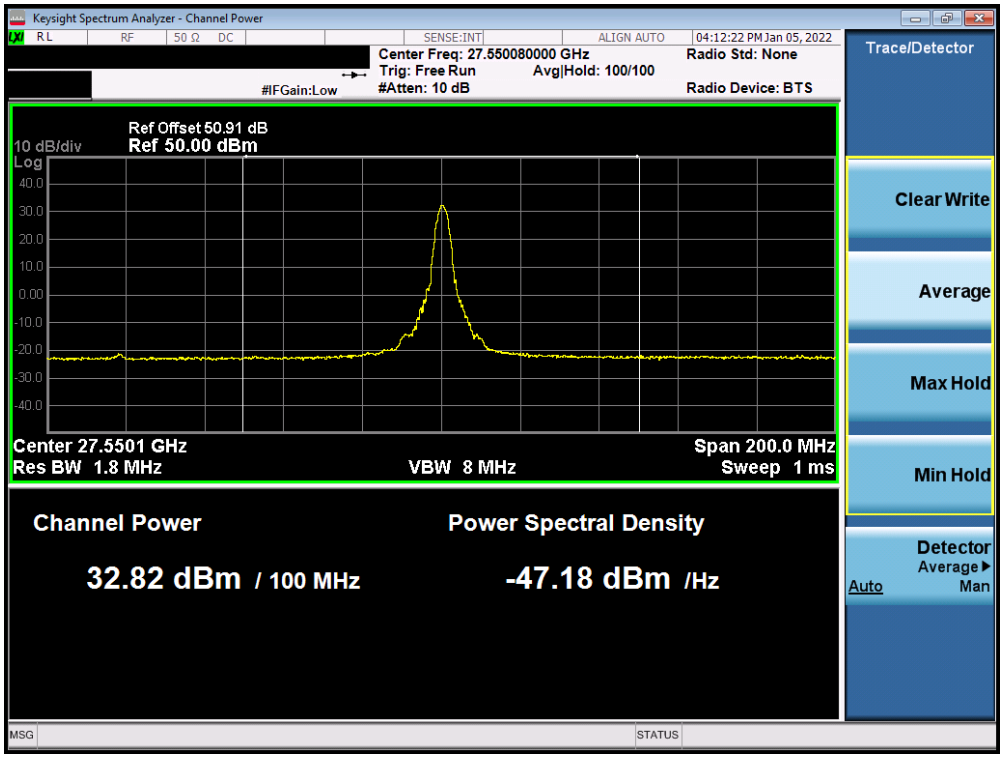
Plot 7-78. Ant 1 EIRP Plot (Band n261 − 100MHz-1CC − pi/2-BPSK – Low Channel)



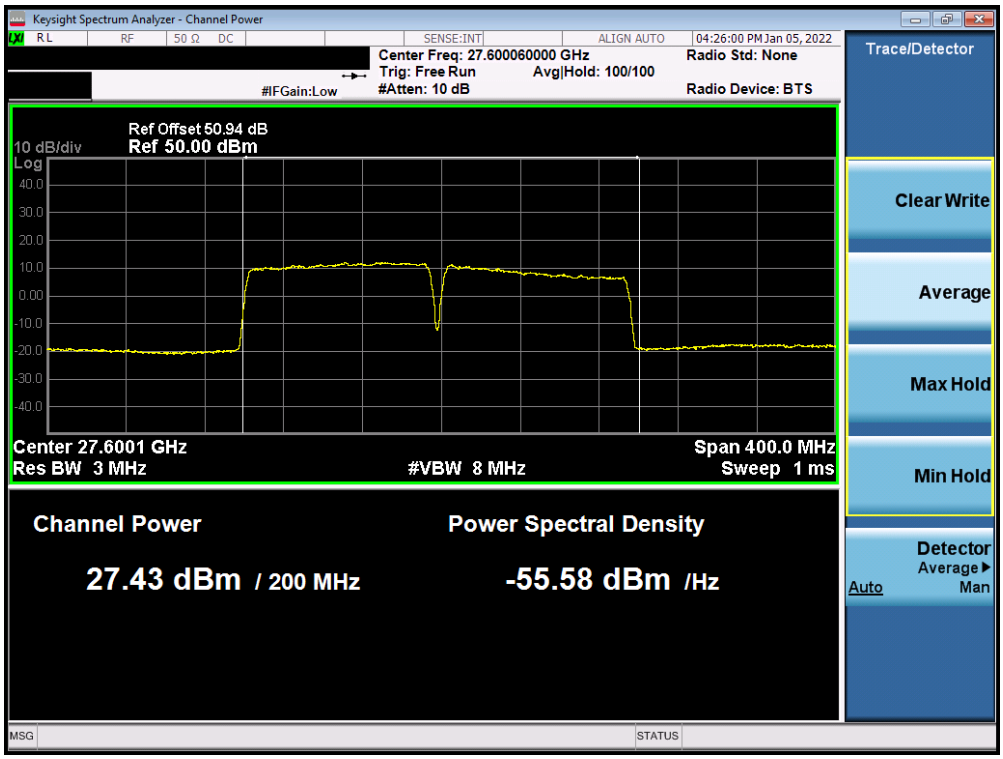
Plot 7-79. Ant 1 EIRP Plot (Band n261 − 100MHz-2CC – pi/2-BPSK – Low Channel)



Plot 7-80. Ant 2 EIRP Plot (Band n261 − 50MHz-1CC − pi/2-BPSK – Low Channel)



Plot 7-81. Ant 2 EIRP Plot (Band n261 − 100MHz-1CC − pi/2-BPSK – Low Channel)



Plot 7-82. Ant 2 EIRP Plot (Band n261 − 100MHz-2CC – pi/2-BPSK – Low Channel)

Band n260 Beam ID Configurations

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	163	-
		V	37	-
	Mid	H	163	-
		V	27	-
	High	H	163	-
		V	36	-
MIMO	Low	2Tx/MIMO	163	35
	Mid	2Tx/MIMO	163	35
	High	2Tx/MIMO	162	34

Table 7-36. Ant 1 (M Patch) Worst Case Beam ID

Mode	Channel	Beam Polarization	Beam ID	Beam ID Pair
SISO	Low	H	168	-
		V	39	-
	Mid	H	168	-
		V	39	-
	High	H	168	-
		V	30	-
MIMO	Low	2Tx/MIMO	167	39
	Mid	2Tx/MIMO	167	39
	High	2Tx/MIMO	158	30

Table 7-37. Ant 2 (N Patch) Worst Case Beam ID

Notes:

For 2Tx/MIMO beam, both beam ID 39/167 and 40/168 were investigated, the worst case was included in this report.

Band n260

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	39975.00	DFT-s-OFDM	QPSK	36	V	SISO	H	259	93	1 / 12	21.66
mid	38499.96	DFT-s-OFDM	QPSK	163	H	SISO	V	236	95	1 / 12	20.70
High	39975.00	DFT-s-OFDM	QPSK	34+162	H + V	2Tx	H	250	302	1 / 12	**28.77**
High	39975.00	CP-OFDM	QPSK	36	V	SISO	H	259	93	1 / 16	18.82
mid	38499.96	CP-OFDM	QPSK	163	H	SISO	V	236	95	1 / 19	17.38
High	39975.00	CP-OFDM	QPSK	34+162	H + V	MIMO	H	249	301	1 / 16	25.73
Low	37025.04	DFT-s-OFDM	QPSK	34+162	H + V	2Tx	H	266	261	1 / 12	20.41
Mid	38499.96	DFT-s-OFDM	QPSK	34+162	H + V	2Tx	H	280	269	1 / 12	20.71
High	39975.00	DFT-s-OFDM	π/2 BPSK	34+162	H + V	2Tx	H	249	301	1 / 16	28.68
High	39975.00	DFT-s-OFDM	16QAM	34+162	H + V	2Tx	H	249	301	1 / 12	26.53
High	39975.00	DFT-s-OFDM	64QAM	34+162	H + V	2Tx	H	249	301	1 / 16	24.33

Table 7-38. Ant 1 EIRP Data (Band n260 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	39949.98	DFT-s-OFDM	QPSK	34+159	H + V	2Tx	H	253	300	32 / 0	19.94
High	39949.98	DFT-s-OFDM	π/2 BPSK	34+162	H + V	2Tx	H	253	300	32 / 0	20.39
High	39949.98	DFT-s-OFDM	16QAM	34+162	H + V	2Tx	H	253	300	32 / 0	18.51
High	39949.98	DFT-s-OFDM	64QAM	34+162	H + V	2Tx	H	253	300	32 / 0	17.40

Table 7-39. Ant 1 EIRP Data (Band n260 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	39949.92	DFT-s-OFDM	QPSK	36	V	SISO	H	299	105	1 / 33	23.26
Mid	38499.96	DFT-s-OFDM	QPSK	163	H	SISO	V	318	21	1 / 42	21.03
High	39949.92	DFT-s-OFDM	QPSK	34+162	H + V	2Tx	H	258	306	1 / 42	31.74
High	39949.92	CP-OFDM	QPSK	36	V	SISO	H	299	105	1 / 33	20.19
Mid	38499.96	CP-OFDM	QPSK	163	H	SISO	V	318	21	1 / 42	19.12
High	39949.92	CP-OFDM	QPSK	34+162	H + V	MIMO	H	258	306	1 / 42	28.51
Low	37050.00	CP-OFDM	QPSK	34+162	H + V	MIMO	H	279	82	1 / 23	18.71
Mid	38499.96	CP-OFDM	QPSK	34+162	H + V	MIMO	V	281	83	1 / 42	19.94
High	39949.92	DFT-s-OFDM	π/2 BPSK	34+162	H + V	2Tx	H	258	306	1 / 42	**31.77**
High	39949.92	DFT-s-OFDM	16QAM	34+162	H + V	2Tx	H	258	306	1 / 42	29.35
High	39949.92	DFT-s-OFDM	64QAM	34+162	H + V	2Tx	H	258	306	1 / 42	27.71

Table 7-40. Ant 1 EIRP Data (Band n260 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
High	39899.94	DFT-s-OFDM	QPSK	34+162	H + V	2Tx	H	252	302	66 / 0	24.54
High	39899.94	DFT-s-OFDM	π/2 BPSK	34+162	H + V	2Tx	H	252	302	66 / 0	22.46
High	39899.94	DFT-s-OFDM	16QAM	34+162	H + V	2Tx	H	252	302	66 / 0	22.98
High	39899.94	DFT-s-OFDM	64QAM	34+162	H + V	2Tx	H	252	302	66 / 0	21.66

Table 7-41. Ant 1 EIRP Data (Band n260 - 100MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	38499.96	DFT-s-OFDM	QPSK	39	V	SISO	H	5	177	1 / 16	23.76
Mid	38499.96	DFT-s-OFDM	QPSK	168	H	SISO	H	40	139	1 / 16	22.60
Mid	38499.96	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	308	174	1 / 16	**25.77**
Mid	38499.96	CP-OFDM	QPSK	39	V	SISO	H	5	177	1 / 19	21.47
Mid	38499.96	CP-OFDM	QPSK	168	H	SISO	H	40	139	1 / 12	20.04
Mid	38499.96	CP-OFDM	QPSK	39/167	H + V	MIMO	H	319	172	1 / 19	23.20
Low	37025.04	DFT-s-OFDM	QPSK	39/167	H + V	MIMO	H	291	164	1 / 12	21.51
High	39975.00	DFT-s-OFDM	QPSK	39/167	H + V	MIMO	H	23	170	1 / 19	19.08
Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39/167	H + V	2Tx	H	308	174	1 / 19	25.55
Mid	38499.96	DFT-s-OFDM	16QAM	39/167	H + V	2Tx	H	308	174	1 / 19	23.56
Mid	38499.96	DFT-s-OFDM	64QAM	39/167	H + V	2Tx	H	308	174	1 / 19	21.33

Table 7-42. Ant 2 EIRP Data (Band n260 - 50MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	38499.96	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	316	177	32 / 0	21.81
Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39/167	H + V	2Tx	H	316	177	32 / 0	21.05
Mid	38499.96	DFT-s-OFDM	16QAM	39/167	H + V	2Tx	H	316	177	32 / 0	19.43
Mid	38499.96	DFT-s-OFDM	64QAM	39/167	H + V	2Tx	H	316	177	32 / 0	18.77

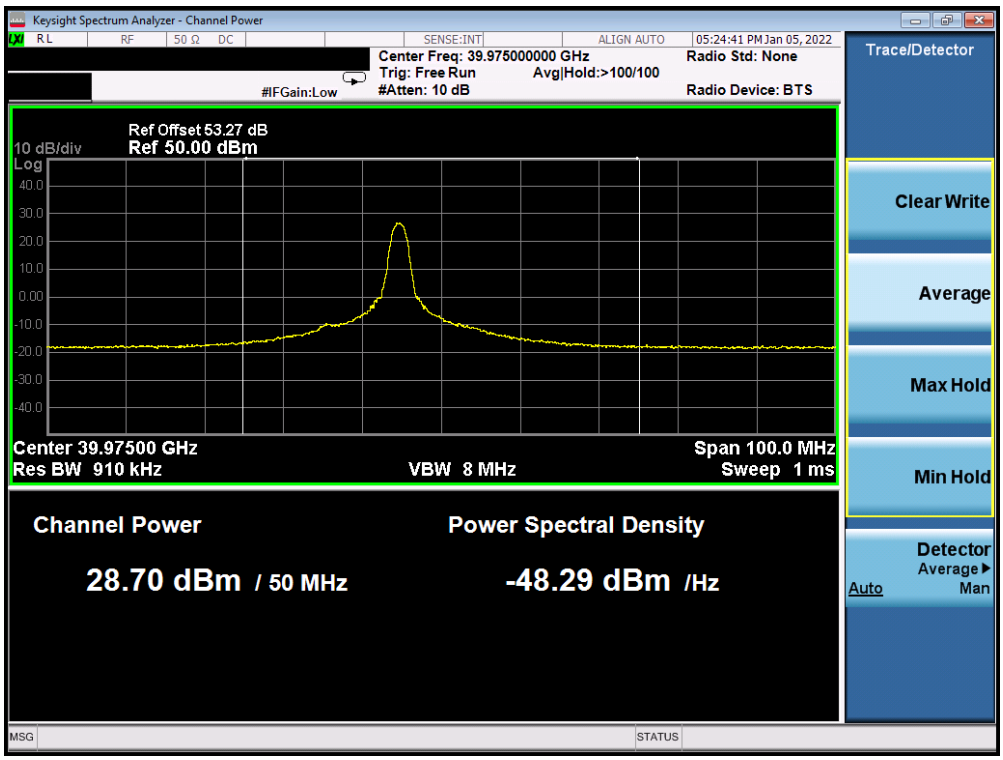
Table 7-43. Ant 2 EIRP Data (Band n260 - 50MHz-2CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	38499.96	DFT-s-OFDM	QPSK	39	V	SISO	H	3	94	1 / 33	25.20
Mid	38499.96	DFT-s-OFDM	QPSK	168	H	SISO	H	342	242	1 / 42	22.96
Mid	38499.96	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	318	177	1 / 23	**26.18**
Mid	38499.96	CP-OFDM	QPSK	39	V	SISO	H	3	94	1 / 42	22.21
Mid	38499.96	CP-OFDM	QPSK	168	H	SISO	H	342	242	1 / 23	20.14
Mid	38499.96	CP-OFDM	QPSK	39/167	H + V	MIMO	H	318	177	1 / 33	22.65
Low	37050.00	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	318	178	1 / 23	22.48
High	39949.92	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	318	176	1 / 33	18.96
Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39/167	H + V	2Tx	H	318	177	1 / 42	25.83
Mid	38499.96	DFT-s-OFDM	16QAM	39/167	H + V	2Tx	H	318	177	1 / 42	23.87
Mid	38499.96	DFT-s-OFDM	64QAM	39/167	H + V	2Tx	H	318	177	1 / 42	21.67

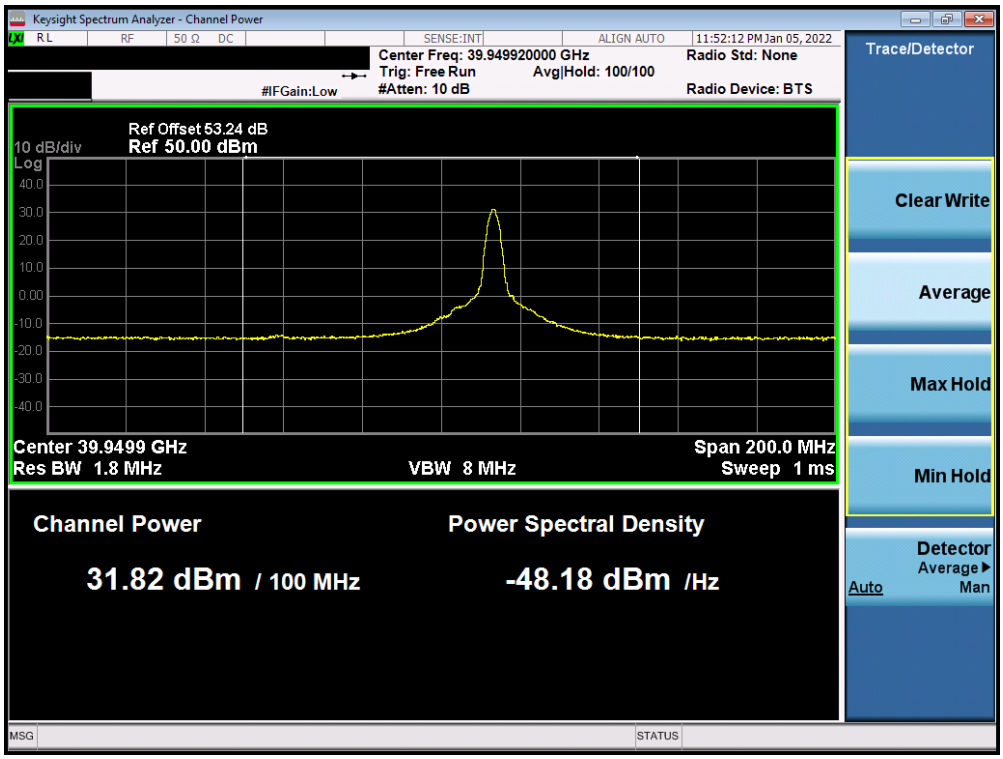
Table 7-44. Ant 2 EIRP Data (Band n260 - 100MHz-1CC)

Channel	Frequency [MHz]	Transmission Scheme	Modulation	BeamID	Beam Pol.	Ant. Div.	Ant. Pol. [H/V]	Turntable Azimuth [degrees]	Positioner Azimuth [degrees]	RB Size/Offset	EIRP [dBm]
Mid	38499.96	DFT-s-OFDM	QPSK	39/167	H + V	2Tx	H	321	179	66 / 0	21.19
Mid	38499.96	DFT-s-OFDM	π/2 BPSK	39/167	H + V	2Tx	H	321	179	66 / 0	21.47
Mid	38499.96	DFT-s-OFDM	16QAM	39/167	H + V	2Tx	H	321	179	66 / 0	19.81
Mid	38499.96	DFT-s-OFDM	64QAM	39/167	H + V	2Tx	H	321	179	66 / 0	18.02

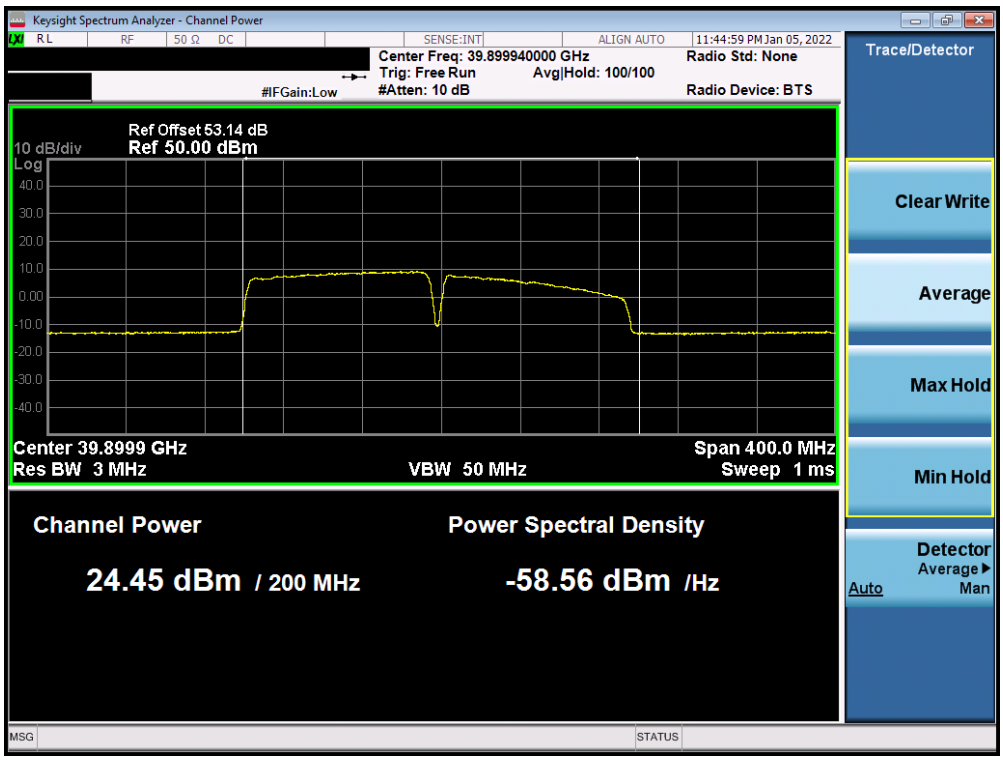
Table 7-45. Ant 2 EIRP Data (Band n260 - 100MHz-2CC)



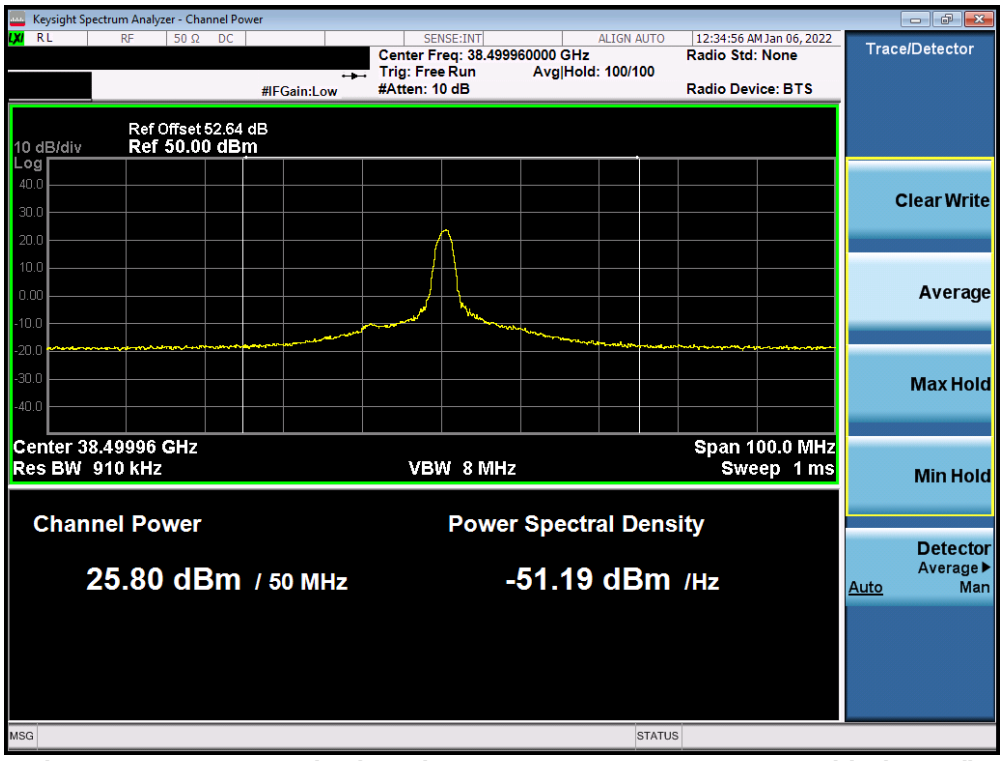
Plot 7-83. Ant 1 EIRP Plot (Band n260 − 50MHz-1CC − QPSK – High Channel)



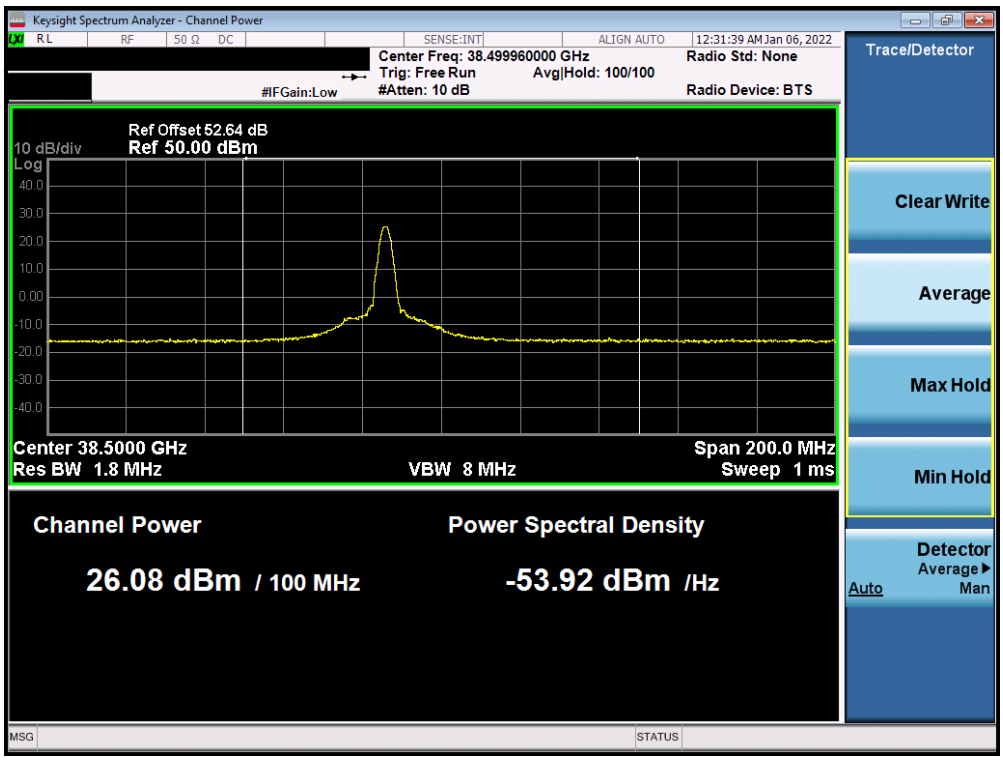
Plot 7-84. Ant 1 EIRP Plot (Band n260 − 100MHz-1CC – pi/2-BPSK – High Channel)



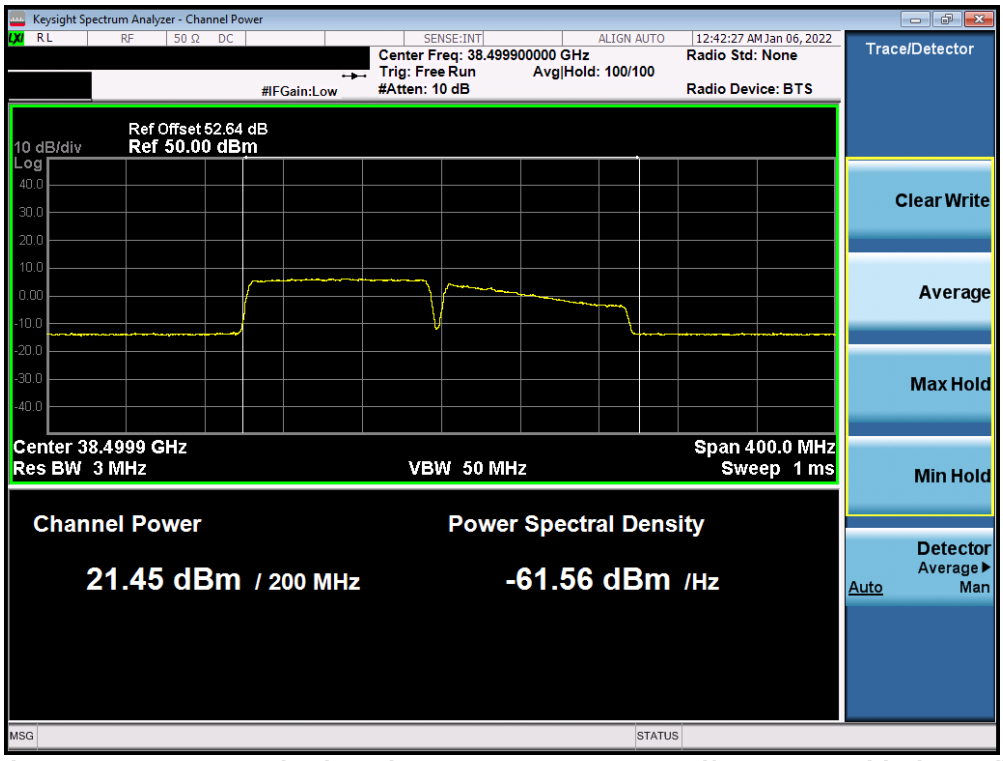
Plot 7-85. Ant 1 EIRP Plot (Band n260 − 100MHz-2CC − QPSK – High Channel)



Plot 7-86. Ant 2 EIRP Plot (Band n260 − 50MHz-1CC − QPSK – Mid Channel)



Plot 7-87. Ant 2 EIRP Plot (Band n260 − 100MHz-1CC − QPSK – Mid Channel)



Plot 7-88. Ant 2 EIRP Plot (Band n260 − 100MHz-2CC – pi/2-BPSK – Mid Channel)

7.4 Radiated Spurious and Harmonic Emissions

§2.1051, §30.203

Test Overview

The spectrum is scanned from 30MHz to 100GHz for n261 and n258 bands and from 30MHz to 200GHz for n260 band. All out of band emissions are measured in a radiated test setup while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All modulations were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The conductive power or total radiated power of any emissions outside a licensee's frequency block shall be -13dBm/1MHz.

Test Procedure Used

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

Test Settings

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

Test Notes

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

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

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

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

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

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

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

Table 7-46. Far-Field Distance & Measurement Distance per Frequency Range

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

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

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

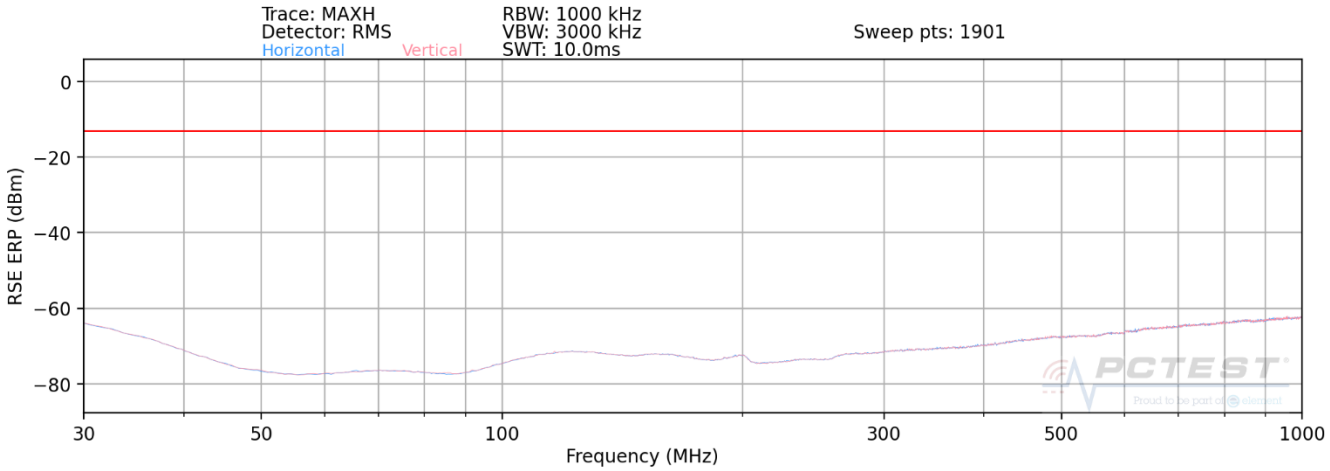
10) All RSE's were investigated in EN-DC mode and with 802.11 chipset active. It was determined that there is no new emission introduced by EN-DC mode, or the 802.11 chipset. For EN-DC mode, n261 uses LTE B2, B5, B12, B13, B48 and B66, n260 uses LTE B2, B5, B12, B13, B14,B30, B48 and B66 and n258 uses 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 and NR FR1 anchor bands. Thus, LTE Band 2 was used as a representative anchor band for EN-DC investigations.

Band n258-R1 (M Patch)

30MHz - 1GHz



Plot 7-89. Ant 1- n258-R1 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions ERP Sample Calculation (n258-R1)

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

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

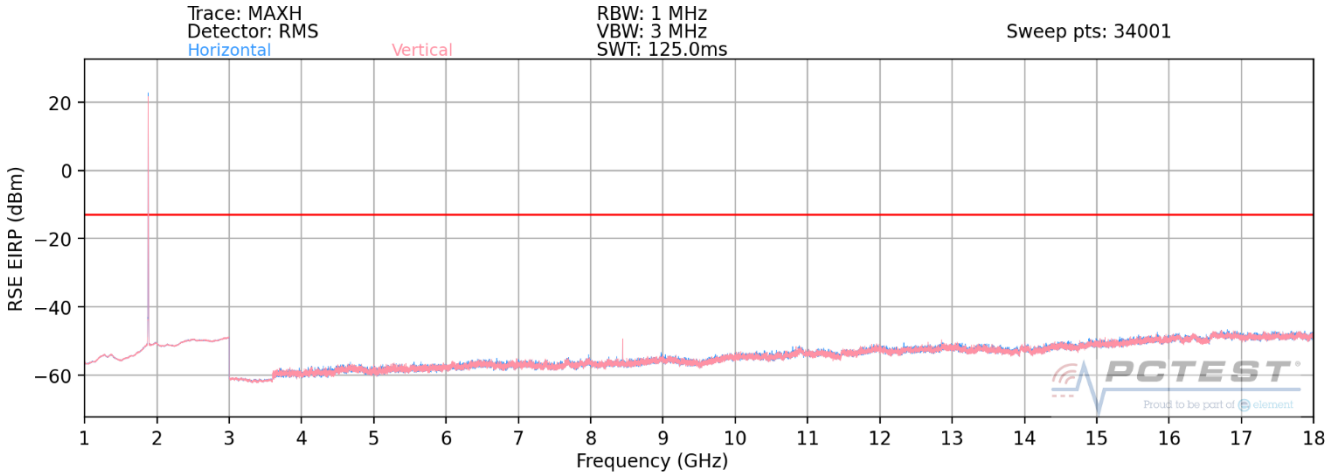
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
656.41	Low	50	2Tx	QPSK	V	315	391	-68.57	-13.00	-54.04
815.00	Mid	50	2Tx	QPSK	V	283	390	-66.29	-13.00	-54.41
987.23	High	50	2Tx	QPSK	V	289	350	-64.90	-13.00	-53.54

Table 7-47. Ant 1 – 2Tx - Spurious Emissions Table (30MHz - 1GHz)

Notes

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

1GHz - 18GHz



Plot 7-90. Ant 1-n258-R1 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor Band 2)

Spurious Emissions EIRP Sample Calculation (n258-R1)

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

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

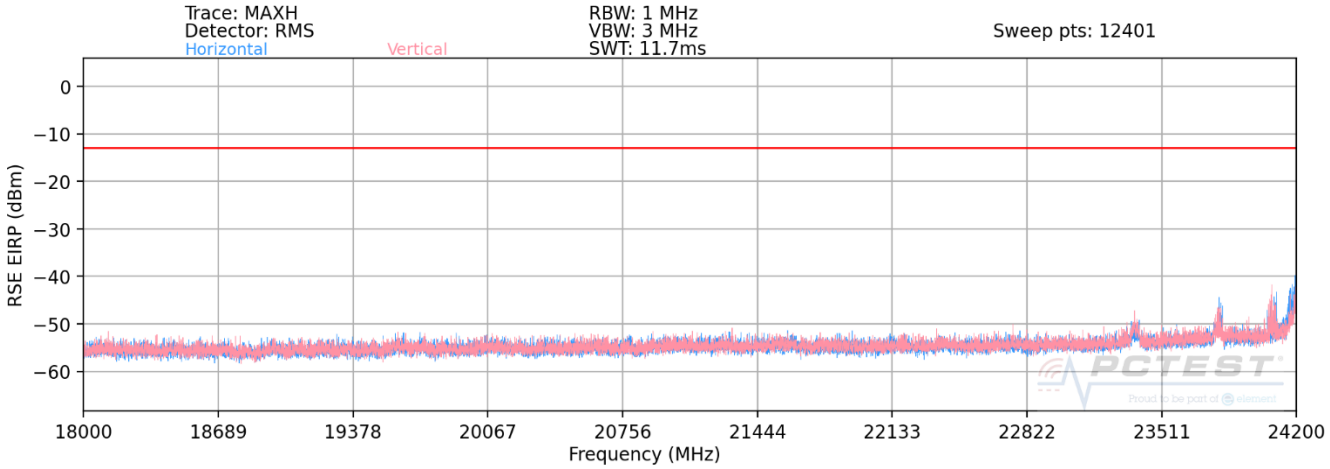
Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
4987.10	Low	50	2Tx	QPSK	V	-	-	-62.33	-13.00	-49.33
8442.00	Mid	50	2Tx	QPSK	V	10	262	-54.80	-13.00	-41.80
14996.98	High	50	2Tx	QPSK	V	-	-	-55.83	-13.00	-42.83
12254.00	High	50	2Tx	QPSK	V	-	-	-55.62	-13.00	-42.62

Table 7-48. Ant 1 - 2Tx - Spurious Emissions Table (1GHz - 18GHz)

Notes

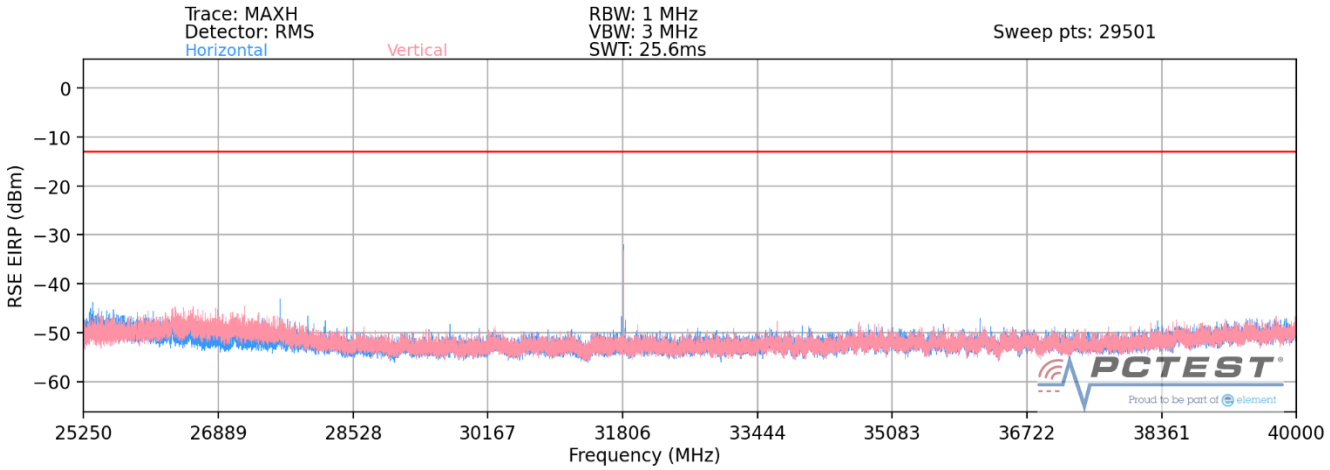
The RSE EIRP level is taken directly from the spectrum analyzer which includes the appropriate antenna factors, and cable losses. Measurements were performed at a distance of 3 meter.

18GHz - 24.2GHz



Plot 7-91. Ant 1-n258-R1 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

25.25GHz - 40GHz



Plot 7-92. Ant 1-n258-R1 Radiated Spurious Plot (1CC QPSK Mid Channel 2Tx – EN-DC Anchor B2)

Spurious Emissions EIRP Sample Calculation (n258-R1)

The raw radiated spurious level is converted to field strength in dBuV/m. Then, the RSE EIRP level is calculated by applying the additional factors shown below for a test distance of 1 meter.
RSE EIRP (dBm) = Analyzer Level (dBm) + 107 + AFCL (dB/m) + 20Log(Dm) – 104.8

Frequency [MHz]	Channnel	Bandwidth (MHz)	EUT Beam Pol.	Modulation	Antenna Polarization [H/V]	Turntable Azimuth [degrees]	Antenna Height [cm]	Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
23804.90	Low	50	2Tx	QPSK	H	360	150	-52.33	-13.00	-39.33
24197.89	Mid	50	2Tx	QPSK	H	294	150	-47.56	-13.00	-34.56
24622.65	Mid	50	2Tx	QPSK	H	295	150	-45.91	-13.00	-32.91
27641.03	High	50	2Tx	QPSK	H	330	150	-49.65	-13.00	-36.65
31816.50	High	50	2Tx	QPSK	H	294	150	-42.24	-13.00	-29.24

Table 7-49. Ant 1 - 2Tx - Spurious Emissions Table (18GHz - 40GHz)

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