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PART 27 MEASUREMENT REPORT

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

Date of Testing:
09/02/2025 - 10/10/2025
Test Report Issue Date:
11/18/2025
Test Site/Location:
Element Lab., Columbia, MD, USA
Test Report Serial No.:
1M2508250079-10.A3L

FCC ID:	**A3LSMS948B**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-S948B/DS
Additional Model(s):	SM-S948B
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, KDB 648474 D03 v01r04

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

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

RJ Ortanez
Executive Vice President

ACCREDITED
CERT #2041.01

TEST REPORT REVISION HISTORY

Rev. No.	Report S/N	Description	Issue Date
-	1M2508250079-10.A3L	Initial Release	11/18/2025

TABLE OF CONTENTS

PART 27 MEASUREMENT REPORT

Antenna-1 Main						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n77 PC2 (3450 - 3550MHz)	100 MHz	π/2 BPSK	3500.0	0.392	25.93	97M2G7D
		QPSK	3500.0	0.399	26.01	98M1G7D
		16QAM	3500.0	0.342	25.34	98M0W7D
	90 MHz	π/2 BPSK	3495.0 - 3505.0	0.400	26.02	87M3G7D
		QPSK	3495.0 - 3505.0	0.400	26.02	87M8G7D
		16QAM	3495.0 - 3505.0	0.349	25.42	88M0W7D
	80 MHz	π/2 BPSK	3490.0 - 3510.0	0.391	25.92	77M5G7D
		QPSK	3490.0 - 3510.0	0.397	25.98	77M9G7D
		16QAM	3490.0 - 3510.0	0.343	25.35	78M1W7D
	70 MHz	π/2 BPSK	3485.0 - 3515.0	0.390	25.91	64M7G7D
		QPSK	3485.0 - 3515.0	0.399	26.01	67M9G7D
		16QAM	3485.0 - 3515.0	0.344	25.36	67M8W7D
	60 MHz	π/2 BPSK	3480.0 - 3520.0	0.403	26.05	58M2G7D
		QPSK	3480.0 - 3520.0	0.407	26.09	58M1G7D
		16QAM	3480.0 - 3520.0	0.345	25.37	58M2W7D
	50 MHz	π/2 BPSK	3475.0 - 3525.0	0.424	26.27	46M0G7D
		QPSK	3475.0 - 3525.0	0.420	26.23	47M7G7D
		16QAM	3475.0 - 3525.0	0.366	25.63	47M7W7D
	40 MHz	π/2 BPSK	3470.0 - 3530.0	0.413	26.15	35M9G7D
		QPSK	3470.0 - 3530.0	0.415	26.18	38M0G7D
		16QAM	3470.0 - 3530.0	0.362	25.58	38M0W7D
	30 MHz	π/2 BPSK	3465.0 - 3535.0	0.416	26.19	27M0G7D
		QPSK	3465.0 - 3535.0	0.424	26.27	28M0G7D
		16QAM	3465.0 - 3535.0	0.356	25.51	28M1W7D
	25MHz	π/2 BPSK	3462.5 - 3537.5	0.414	26.17	23M0G7D
		QPSK	3462.5 - 3537.5	0.419	26.22	23M3G7D
		16QAM	3462.5 - 3537.5	0.362	25.58	23M3W7D
	20 MHz	π/2 BPSK	3460.0 - 3540.0	0.382	25.82	18M0G7D
		QPSK	3460.0 - 3540.0	0.388	25.88	18M3G7D
		16QAM	3460.0 - 3540.0	0.333	25.22	18M4W7D
	15 MHz	π/2 BPSK	3457.5 - 3542.5	0.384	25.84	13M0G7D
		QPSK	3457.5 - 3542.5	0.396	25.97	13M7G7D
		16QAM	3457.5 - 3542.5	0.340	25.31	13M7W7D
	10 MHz	π/2 BPSK	3455.0 - 3545.0	0.389	25.89	8M66G7D
		QPSK	3455.0 - 3545.0	0.392	25.93	8M72G7D
		16QAM	3455.0 - 3545.0	0.327	25.14	8M72W7D

Antenna-1 Main						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n77 PC2 (3700 - 3980MHz)	100 MHz	π/2 BPSK	3750.0 - 3930.0	0.484	26.85	97M1G7D
		QPSK	3750.0 - 3930.0	0.490	26.90	98M0G7D
		16QAM	3750.0 - 3930.0	0.397	25.99	97M8W7D
	90 MHz	π/2 BPSK	3745.0 - 3935.0	0.472	26.74	87M2G7D
		QPSK	3745.0 - 3935.0	0.491	26.91	87M9G7D
		16QAM	3745.0 - 3935.0	0.400	26.02	87M8W7D
	80 MHz	π/2 BPSK	3740.0 - 3940.0	0.461	26.64	77M6G7D
		QPSK	3740.0 - 3940.0	0.490	26.90	77M8G7D
		16QAM	3740.0 - 3940.0	0.397	25.99	77M6W7D
	70 MHz	π/2 BPSK	3735.0 - 3945.0	0.463	26.66	64M5G7D
		QPSK	3735.0 - 3945.0	0.491	26.91	67M8G7D
		16QAM	3735.0 - 3945.0	0.397	25.99	67M7W7D
	60 MHz	π/2 BPSK	3730.0 - 3950.0	0.456	26.59	58M1G7D
		QPSK	3730.0 - 3950.0	0.472	26.74	58M1G7D
		16QAM	3730.0 - 3950.0	0.377	25.77	58M1W7D
	50 MHz	π/2 BPSK	3725.0 - 3955.0	0.481	26.82	45M9G7D
		QPSK	3725.0 - 3955.0	0.501	27.00	47M8G7D
		16QAM	3725.0 - 3955.0	0.405	26.08	47M8W7D
	40 MHz	π/2 BPSK	3720.0 - 3960.0	0.453	26.56	36M0G7D
		QPSK	3720.0 - 3960.0	0.475	26.77	38M1G7D
		16QAM	3720.0 - 3960.0	0.383	25.83	37M9W7D
	30 MHz	π/2 BPSK	3715.0 - 3965.0	0.464	26.67	27M0G7D
		QPSK	3715.0 - 3965.0	0.480	26.81	28M0G7D
		16QAM	3715.0 - 3965.0	0.384	25.84	28M0W7D
	25 MHz	π/2 BPSK	3712.5 - 3967.5	0.467	26.69	23M0G7D
		QPSK	3712.5 - 3967.5	0.489	26.89	23M3G7D
		16QAM	3712.5 - 3967.5	0.400	26.02	23M3W7D
	20 MHz	π/2 BPSK	3710.0 - 3970.0	0.458	26.61	18M0G7D
		QPSK	3710.0 - 3970.0	0.476	26.78	18M4G7D
		16QAM	3710.0 - 3970.0	0.388	25.89	18M4W7D
	15 MHz	π/2 BPSK	3707.5 - 3972.5	0.465	26.68	13M0G7D
		QPSK	3707.5 - 3972.5	0.472	26.74	13M7G7D
		16QAM	3707.5 - 3972.5	0.390	25.91	13M7W7D
	10 MHz	π/2 BPSK	3705.0 - 3975.0	0.454	26.57	8M59G7D
		QPSK	3705.0 - 3975.0	0.475	26.77	8M69G7D
		16QAM	3705.0 - 3975.0	0.393	25.95	8M66W7D

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 Element Test Location

Measurements were conducted at the Element laboratory(ies) indicated in Section 1.3 below. All measurement facilities are compliant with the test site requirements specified in ANSI C63.4:2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at Element lab located in Columbia, MD 21046, U.S.A.

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

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

- Element Washington DC LLC facility is a registered test laboratory with the site description on file with ISED (Wireless Test Lab number 2451B) and FCC (Designation Number US1113).

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

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS948B**. The test data contained in this report pertains only to the emissions due to the EUT's licensed transmitters that operate under the provisions of Part 27.

The authorization for this device utilize data referencing from FCC ID: A3LSMS948U as permitted per KDB 484596 D01 v03. Data referencing data test results are included in Appendix A of this report.

Test Device Serial No.: 0532M, 0545M, 0533M, 0502M, 0789M, 0490M, 0267M, 1153M, 1154M

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), 802.11b/g/n/ac/ax/be WLAN, 802.11a/n/ac/ax/be UNII (5GHz and 6GHz), Bluetooth (1x, EDR, LE), Wireless Power Transfer, UWB

This device can transmit in the 5G NR Band n77 band over four separate antennas labelled SRS-1, SRS-2, SRS-3, and SRS-4. SRS operation can occur on either the main or switching path. With SRS operations, any of these four antennas can transmit an SRS signal to check the channel quality for transmission in the n77 Band. However, these antennas cannot simultaneously transmit and only the SRS-1 antenna is capable of data transmission. The test data is marked to indicate the specific antenna transmitting in the n77 band.

Antenna SRS-Label	Alternate Label
NR Band n77 – Main – SRS-1	Ant F
NR Band n77 – Main – SRS-2	Ant C
NR Band n77 – Main – SRS-3	Ant H
NR Band n77 – Main – SRS-4	Ant D

Table 2-1. Antenna Labelling Scheme Correlation

Band	Ant1	Ant2	Ant3	Ant4
NR Band n77 - Main	Ant F	Ant C	Ant H	Ant D

Table 2-2. Antenna Report Naming Convention

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26:2015. See Section 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports wireless charging capability and, thus, is subject to the test requirements of KDB 648474 D03 v01r04. Additional radiated spurious emission measurements were performed with the EUT lying flat on an authorized wireless charging pad (WCP) Model: EP-2400 while operating under normal conditions in a simulated call or data transmission configuration. The worst case radiated emissions data is shown in this report.

2.4 Duty Cycle Information

For all 5G NR and LTE operations in FDD mode, the EUT duty cycle was set to 100%.

For 5G NR operations, the EUT was set to transmit either via a Factory Test Mode (FTM) software provided by the manufacturer or in an online mode. The EUT duty cycle was set to 100% in all cases during FTM operation. During online operation the EUT duty cycle was set to an operational max using a callbox, where the max duty cycle was determined to be 20.0%. Gated and triggered measurement settings were used in this case. SRS and UL-MIMO operations were conducted using FTM while all other cases were conducted in an online mode.

2.5 Software and Firmware

Testing was performed on device(s) using software/firmware version S948USQU0AYIB installed on the EUT.

2.6 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 Evaluation Procedure

The measurement procedures described in the "American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services" (ANSI C63.26:2015) were used in the measurement of the EUT.

Deviation from Measurement Procedure……..None

3.2 Radiated Power and Radiated Spurious Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. 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.

The equipment under test was transmitting while connected to its integral antenna and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated power measurements, substitution method is used per the guidance of ANSI C63.26:2015. For emissions below 1GHz, a half-wave dipole is substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator with the level of the signal generator being adjusted to obtain the same receive spectrum analyzer level previously recorded from the spurious emission from the EUT. The power of the emission is calculated using the following formula:

$$P_{d\ [dBm]} = P_{g\ [dBm]} - \text{cable loss}_{\ [dB]} + \text{antenna gain}_{\ [dBd/dBi]};$$

where P_d is the dipole equivalent power, P_g is the generator output into the substitution antenna, and the antenna gain is the gain of the substitute antenna used relative to either a half-wave dipole (dBd) or an isotropic source (dBi). The substitute level is equal to $P_{g\ [dBm]}$ – cable loss $_{[dB]}$.

For radiated spurious emissions measurements, the field strength conversion method is used per the formulas in Section 5.2.7 of ANSI C63.26:2015. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4:2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01 v01r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26:2015.

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

Table 4-1. Measurement Uncertainty Budget

5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). 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
-	MD 1M 40	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	MD 1M 40
-	AP1-002	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	AP1-002
-	AP2-001	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	AP2-001
-	AP2-002	EMC Cable and Switch System	2/25/2025	Annual	2/25/2026	AP2-002
-	ETS-001	EMC Cable and Switch System	12/11/2024	Annual	12/11/2025	ETS-001
-	ETS-002	EMC Cable and Switch System	12/11/2024	Annual	12/11/2025	ETS-002
-	LTx6-40	Licensed Transmitter Cable Set	2/25/2025	Annual	2/25/2026	LTx6-40
-	WL40-1	Conducted Cable Set (40GHz)	2/25/2025	Annual	2/25/2026	WL40-1
-	WL40-2	Conducted Cable Set (40GHz)	2/25/2025	Annual	2/25/2026	WL40-2
-	WL40-3	Conducted Cable Set (40GHz)	2/25/2025	Annual	2/25/2026	WL40-3
Agilent	N9038A	MXE EMI Receiver	9/16/2024	Annual	11/22/2025	MY51210133
Anritsu	MT8821C	Radio Communication Analyze	9/15/2025	Annual	9/15/2026	6201381794
Anritsu	MT8821C	Radio Communication Analyze	3/14/2025	Annual	3/14/2026	6262044715
EMCO	3115	Horn Antenna (1-18GHz)	9/6/2024	Biennial	9/6/2026	9704-5182
Espec	ESX-2CA	Environmental Chamber	11/20/2024	Biennial	11/20/2026	17620
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	6/4/2025	Biennial	6/4/2027	125518
Keysight Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	9/15/2025	Annual	9/15/2026	MY49430494
Keysight Technologies	N9020A	MXA Signal Analyzer	5/7/2025	Annual	5/7/2026	US46470561
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	6/6/2025	Annual	6/6/2026	MY52350166
Keysight Technologies	N9030A	PXA Signal Analyzer	6/16/2025	Annual	6/16/2026	MY55410501
Keysight Technologies	N9020A	MXA Signal Analyzer	6/4/2025	Annual	6/4/2026	MY54500644
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	11/25/2024	Annual	11/25/2025	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/25/2025	Annual	3/25/2026	101716
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	9/11/2024	Biennial	9/11/2026	A051107

Table 5-1. Test Equipment Calibration Table

Notes:

1. 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.

2. Equipment with a calibration date of “N/A” shown in this list was not used to make direct calibrated measurements.

Component	Serial Number
MegaPhase Cable, Model: TM40-K1K1-36	18160102 001
MCL 10dB Attenuator, Model: BW-K10 2W44+	1902

Table 5-2. WL40-1 Conducted Cable Set Components

Component	Serial Number
MegaPhase Cable, Model: TM40-K1K1-30	18165902 001
MCL 10dB Attenuator, Model: BW-K10 2W44+	2108

Table 5-3. WL40-2 Conducted Cable Set Components

Component	Serial Number
MegaPhase Cable, Model: TM40-K1K1-30	20335602 001
MCL 10dB Attenuator, Model: BW-K10 2W44+	2108

Table 5-4. WL40-3 Conducted Cable Set Components

Component	Serial Number
Fairview Microwave Directional Coupler, FM2CP1122-10	2122
MCL 6dB Attenuator, Model: BW-K6 2W44+	2013
MegaPhase Cable, Model: TM40-K1K1-30	20233002 003

Table 5-5. LTx6-40 Conducted Cable Set Components

Component	Serial Number
Pasternack Cable RG214/U	111815
MegaPhase (CAGE 1GVT4) Cable GR18-N5N5-24	14042714 001

Table 5-6. ETS-001 EMC Cable and Switch System Components

Component	Serial Number
MegaPhase (CAGE 1GVT4) Cable GR18-N5N5-24	14042714 001
MegaPhase (CAGE 1GVT4) Cable NC29-N1N1-324	20502201 001
Rohde & Schwarz SF Unit	102134
Minicircuits Cable CBL=0.5M-NMNM+	15440

Table 5-7. ETS-002 EMC Cable and Switch System Components

Component	Serial Number
Sucoflex 106A Cable	501992
MegaPhase Cable N29-N1N1-324	20335606 001
Rohde & Schwarz SF Unit	102133
MiniCircuits Cable CBL-2FT-SMSM+	77745
MegaPhase Cable 10511-1	15034701 001
MiniCircuits Switch RC 2SPDT-A18	11703270 041
Sucoflex 104 Cable	320259/4
Sucoflex 104 Cable	321999/4
Sucoflex 104 Cable	321995/4

Table 5-8. AP1-002 EMC Cable and Switch System Components

Component	Serial Number
Flex Cable	P2A-0001
Micro-Coax Utilfex Cable UFB311A-Q-3346-50U50U MFR 64639	231978-003
Chamber Passthrough	CP4/X12
Micro-Coax Utilfex Cable UFB311A-1-0629-50U50U MFR 64639	231986-003
Micro-Coax Utiflex Cable UFB142A-0-0629-5GU200 MFR 6463	232069-001
Rohde & Schwarz TS-PR8 Pre-Amplifier	102335
Rohde & Schwarz OSP130 Open Switch and Control Unit	101181

Table 5-9. AP2-001 EMC Cable and Switch System Components

Component	Serial Number
MiniCircuits Cable CBL-0.5M-SMNM+	47261
Micro-Coax Utilfex Cable UFB311A-Q-3346-50U50U MFR 64639	231978-001
Micro-Coax Utilfex Cable UFB311A-1-0629-50U50U MFR 64639	231986-002
MegaPhase (CAGE 1GVT4) Cable NC29-N1N1-324	19046401 001
Megaphase (CAGE 1GVT4) Flex Cable 10511-1	15044701-006
Micro-Coax Utiflex Cable UFB311A-Q-3346-50U50U MFR 64639	231978-002
Micro-Coax Utilfex Cable UFB311A-1-0629-50U50U MFR 64639	231986-004
Micro-Coax Utiflex Cable UFB142A-0-0629-5GU200 MFR 64639	232069-001
Rohde & Schwarz SF Unit	102138
Rohde & Schwarz OSP130 Open Switch and Control Unit	101181
Micro-Coax Utilfex Cable UFB311A-Q-3346-50U50U MFR 64639	231978-003
· Micro-Coax Utilfex Cable UFB311A-1-0629-50U50U MFR 64639	231986-003
Rohde & Schwarz TS-PR8 Pre-Amplifier	102335

Table 5-10. AP2-002 EMC Cable and Switch System Components

Component	Serial Number
MegaPhase Cable TM40-K1K1-30	20233002-004
UTIPLEX Cable, 64639	232063-001
Rohde & Schwarz Pre-amp TS-PR1840 18G-40G	9037.7670.02

Table 5-11. MD 1M 18-40 EMC Cable and Switch System Components

6.0 SAMPLE EMISSION DESIGNATORS

QPSK Modulation

Emission Designator = 8M62G7D
LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D
LTE BW = 8.45 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: A3LSMS948B

FCC Classification: PCS Licensed Transmitter Held to Ear (PCE)

Mode(s): NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference	Data Referencing
CONDUCTED	Transmitter Conducted Output Power	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2	Yes
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3	Yes
	Conducted Band Edge / Spurious Emissions (NR Band n77)	2.1051, 27.53(l), 27.53(n)	≤ -13 dBm / MHz	PASS	Sections 7.4, 7.5	Yes
	Peak-to-Average Ratio (NR Band n77)	27.50(j)(4), 27.50(k)(4)	≤ 13 dB	PASS	Section 7.6	Yes
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block.	PASS	Section 7.9	Yes
RADIATED	Equivalent Isotropic Radiated Power (NR Band n77)	27.50(j)(3), 27.50(k)(3)	≤ 1 Watt EIRP	PASS	Section 7.7	Yes
	Radiated Spurious Emissions (NR Band n77)	2.1053, 27.53(l), 27.53(n)	≤ -13 dBm / MHz	PASS	Section 7.8	Yes

* The only transmitter output conducted powers included in this report are those where the Pmax value, per the tune-up document, is higher than any of the DSI power levels. For the remaining conducted power measurements, see the **RF Exposure Report**.

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is EMC Software Tool v2.3.0.
5) Data was referenced from model SM-S948U for the certification of SM-S948B/DS. See Section 9.0 for spotcheck results.

7.2 Conducted Output Power Data

Test Overview

All emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates 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.

Test Procedure Used

ANSI C63.26:2015 – Section 5.2

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

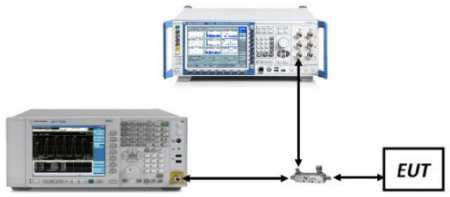


Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. Conducted power measurements were evaluated using various combinations of RB size, RB offset, modulation, and channel bandwidth. Channel bandwidth data is shown in the tables below based only on the channel bandwidths that were supported in this device.

2. All other conducted power measurements are contained in the RF exposure report for this filing.

3. Conducted power was found to reduce for the higher order QAM modulations when compared to 16QAM. Due to this trend, only the worst-case QAM (16QAM) powers are included in this section.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 271	26.29
	QPSK	633334	3500.01	1 / 271	26.33
	16-QAM	633334	3500.01	1 / 271	25.36
90 MHz	π/2 BPSK	633000	3495.00	1 / 243	26.19
		633334	3500.01	1 / 243	26.25
		633666	3504.99	1 / 243	26.38
	QPSK	633000	3495.00	1 / 243	26.21
		633334	3500.01	1 / 243	26.31
		633666	3504.99	1 / 243	26.34
	16-QAM	633334	3500.01	1 / 243	25.44
80 MHz	π/2 BPSK	632668	3490.02	1 / 215	26.28
		633334	3500.01	1 / 215	26.25
		634000	3510.00	1 / 215	26.28
	QPSK	632668	3490.02	1 / 215	26.30
		633334	3500.01	1 / 215	26.27
		634000	3510.00	1 / 215	26.26
	16-QAM	632668	3490.02	1 / 215	25.37
70 MHz	π/2 BPSK	632334	3485.01	1 / 187	26.15
		633334	3500.01	1 / 187	26.21
		634332	3514.98	1 / 187	26.27
	QPSK	632334	3485.01	1 / 187	26.16
		633334	3500.01	1 / 187	26.20
		634332	3514.98	1 / 187	26.33
	16-QAM	634332	3514.98	1 / 187	25.38
60 MHz	π/2 BPSK	632000	3480.00	1 / 160	26.31
		633334	3500.01	1 / 160	26.27
		634666	3519.99	1 / 160	26.41
	QPSK	632000	3480.00	1 / 160	26.36
		633334	3500.01	1 / 160	26.32
		634666	3519.99	1 / 160	26.41
	16-QAM	634666	3519.99	1 / 160	25.39
50 MHz	π/2 BPSK	631668	3475.02	1 / 66	26.44
		633334	3500.01	1 / 66	26.54
		635000	3525.00	1 / 66	26.63
	QPSK	631668	3475.02	1 / 66	26.48
		633334	3500.01	1 / 131	26.54
		635000	3525.00	1 / 1	26.55
	16-QAM	631668	3475.02	1 / 66	25.54
		633334	3500.01	1 / 131	25.65
		635000	3525.00	1 / 66	25.62
40 MHz	π/2 BPSK	631334	3470.01	1 / 53	26.34
		633334	3500.01	1 / 104	26.42
		635332	3529.98	1 / 1	26.51
	QPSK	631334	3470.01	1 / 53	26.33
		633334	3500.01	1 / 104	26.41
		635332	3529.98	1 / 1	26.50
	16-QAM	635332	3529.98	1 / 53	25.60
30 MHz	π/2 BPSK	631000	3465.00	1 / 76	26.33
		633334	3500.01	1 / 1	26.45
		635666	3534.99	1 / 76	26.55
	QPSK	631000	3465.00	1 / 1	26.30
		633334	3500.01	1 / 76	26.47
		635666	3534.99	1 / 76	26.59
	16-QAM	635666	3534.99	1 / 76	25.53
25 MHz	π/2 BPSK	630834	3462.51	1 / 63	26.38
		633334	3500.01	1 / 63	26.45
		635832	3537.48	1 / 1	26.53
	QPSK	630834	3462.51	1 / 63	26.37
		633334	3500.01	1 / 63	26.45
		635832	3537.48	1 / 1	26.54
	16-QAM	635832	3537.48	1 / 1	25.60
20 MHz	π/2 BPSK	630668	3460.02	1 / 49	25.98
		633334	3500.01	1 / 1	26.10
		636000	3540.00	1 / 1	26.18
	QPSK	630668	3460.02	1 / 49	25.97
		633334	3500.01	1 / 49	26.11
		636000	3540.00	1 / 1	26.20
	16-QAM	636000	3540.00	1 / 1	25.24
15 MHz	π/2 BPSK	630500	3457.50	1 / 36	26.18
		633334	3500.01	1 / 36	26.15
		636166	3542.49	1 / 36	26.20
	QPSK	630500	3457.50	1 / 36	26.18
		633334	3500.01	1 / 19	26.12
		636166	3542.49	1 / 36	26.29
	16-QAM	636166	3542.49	1 / 36	25.33
10 MHz	π/2 BPSK	630334	3455.01	1 / 22	25.97
		633334	3500.01	1 / 1	26.15
		636332	3544.98	1 / 1	26.25
	QPSK	630334	3455.01	1 / 1	25.96
		633334	3500.01	1 / 22	26.18
		636332	3544.98	1 / 22	26.25
	16-QAM	636332	3544.98	1 / 1	25.16

Table 7-2. Conducted Power Results – n77 – Ant1 – DoD Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	22.13
	QPSK	633334	3500.01	1 / 271	22.12
	16-QAM	633334	3500.01	1 / 271	21.16

Table 7-3. Conducted Power Results – n77 – Ant2 – DoD Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 271	25.39
	QPSK	633334	3500.01	1 / 271	25.36
	16-QAM	633334	3500.01	1 / 271	25.24

Table 7-4. Conducted Power Results – n77 – Ant3 – DoD Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	633334	3500.01	1 / 136	21.61
	QPSK	633334	3500.01	1 / 271	21.66
	16-QAM	633334	3500.01	1 / 271	20.77

Table 7-5. Conducted Power Results – n77 – Ant4 – DoD Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 1	26.78
		656000	3840.00	1 / 1	26.98
		662000	3930.00	1 / 1	26.94
	QPSK	650000	3750.00	1 / 1	26.44
		656000	3840.00	1 / 1	26.76
		662000	3930.00	1 / 1	26.71
	16-QAM	656000	3840.00	1 / 1	25.65
90 MHz	π/2 BPSK	649668	3745.02	1 / 243	26.57
		656000	3840.00	1 / 1	26.87
		662332	3934.98	1 / 1	26.94
	QPSK	649668	3745.02	1 / 1	26.50
		656000	3840.00	1 / 1	26.77
		662332	3934.98	1 / 1	26.92
	16-QAM	656000	3840.00	1 / 1	25.68
80 MHz	π/2 BPSK	649334	3740.01	1 / 1	26.62
		656000	3840.00	1 / 1	26.77
		662666	3939.99	1 / 1	26.79
	QPSK	649334	3740.01	1 / 1	26.44
		656000	3840.00	1 / 1	26.76
		662666	3939.99	1 / 1	26.71
	16-QAM	656000	3840.00	1 / 1	25.65
70 MHz	π/2 BPSK	649000	3735.00	1 / 1	26.48
		656000	3840.00	1 / 1	26.79
		663000	3945.00	1 / 187	26.56
	QPSK	649000	3735.00	1 / 187	26.45
		656000	3840.00	1 / 1	26.77
		663000	3945.00	1 / 1	26.57
	16-QAM	656000	3840.00	1 / 1	25.65
60 MHz	π/2 BPSK	648668	3730.02	1 / 1	26.60
		656000	3840.00	1 / 1	26.72
		663332	3949.98	1 / 1	26.62
	QPSK	648668	3730.02	1 / 1	26.49
		656000	3840.00	1 / 1	26.55
		663332	3949.98	1 / 1	26.54
	16-QAM	656000	3840.00	1 / 1	25.43
50 MHz	π/2 BPSK	648334	3725.01	1 / 66	26.60
		656000	3840.00	1 / 1	26.95
		663666	3954.99	1 / 66	26.75
	QPSK	648334	3725.01	1 / 66	26.51
		656000	3840.00	1 / 1	26.86
		663666	3954.99	1 / 1	26.59
	16-QAM	656000	3840.00	1 / 1	25.74
40 MHz	π/2 BPSK	648000	3720.00	1 / 1	26.65
		656000	3840.00	1 / 53	26.69
		664000	3960.00	1 / 1	26.53
	QPSK	648000	3720.00	1 / 53	26.51
		656000	3840.00	1 / 1	26.63
		664000	3960.00	1 / 1	26.44
	16-QAM	656000	3840.00	1 / 1	25.49
30 MHz	π/2 BPSK	647668	3715.02	1 / 76	26.56
		656000	3840.00	1 / 1	26.80
		664332	3964.98	1 / 1	26.64
	QPSK	647668	3715.02	1 / 39	26.45
		656000	3840.00	1 / 1	26.67
		664332	3964.98	1 / 1	26.57
	16-QAM	656000	3840.00	1 / 1	25.50
25 MHz	π/2 BPSK	647500	3712.50	1 / 32	26.71
		656000	3840.00	1 / 1	26.82
		664500	3967.50	1 / 1	26.60
	QPSK	647500	3712.50	1 / 1	26.62
		656000	3840.00	1 / 1	26.75
		664500	3967.50	1 / 1	26.47
	16-QAM	656000	3840.00	1 / 1	25.68
20 MHz	π/2 BPSK	647334	3710.01	1 / 25	26.52
		656000	3840.00	1 / 1	26.74
		664666	3969.99	1 / 25	26.48
	QPSK	647334	3710.01	1 / 25	26.37
		656000	3840.00	1 / 1	26.64
		664666	3969.99	1 / 1	26.40
	16-QAM	656000	3840.00	1 / 1	25.55
15 MHz	π/2 BPSK	647168	3707.52	1 / 1	26.52
		656000	3840.00	1 / 1	26.81
		664832	3972.48	1 / 1	26.54
	QPSK	647168	3707.52	1 / 36	26.39
		656000	3840.00	1 / 36	26.60
		664832	3972.48	1 / 1	26.48
	16-QAM	656000	3840.00	1 / 1	25.57
10 MHz	π/2 BPSK	647000	3705.00	1 / 22	26.49
		656000	3840.00	1 / 1	26.70
		664332	3975.00	1 / 22	26.49
	QPSK	647000	3705.00	1 / 22	26.36
		656000	3840.00	1 / 22	26.63
		664332	3975.00	1 / 22	26.45
	16-QAM	656000	3840.00	1 / 1	25.61

Table 7-6. Conducted Power Results – n77 – Ant1 – C-Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	21.69
		656000	3840.00	1 / 1	21.79
		662000	3930.00	1 / 1	21.27
	QPSK	650000	3750.00	1 / 136	21.57
		656000	3840.00	1 / 1	21.74
		662000	3930.00	1 / 1	21.25
	16-QAM	656000	3840.00	1 / 1	20.59

Table 7-7. Conducted Power Results – n77 – Ant2 – C-Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	25.05
		656000	3840.00	1 / 136	25.77
		662000	3930.00	1 / 1	25.68
	QPSK	650000	3750.00	1 / 136	25.01
		656000	3840.00	1 / 136	25.66
		662000	3930.00	1 / 1	25.69
	16-QAM	662000	3930.00	1 / 1	25.57

Table 7-8. Conducted Power Results – n77 – Ant3 – C-Band – Main

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	650000	3750.00	1 / 136	21.34
		656000	3840.00	1 / 136	21.86
		662000	3930.00	1 / 136	21.78
	QPSK	650000	3750.00	1 / 136	21.26
		656000	3840.00	1 / 136	21.74
		662000	3930.00	1 / 136	21.73
	16-QAM	656000	3840.00	1 / 136	20.63

Table 7-9. Conducted Power Results – n77 – Ant4 – C-Band – Main

7.3 Occupied Bandwidth

Test Overview

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

Test Procedure Used

ANSI C63.26:2015 – Section 5.4.4

Test Settings

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB 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 Setup

The EUT and measurement equipment were set up as shown in the diagram below.

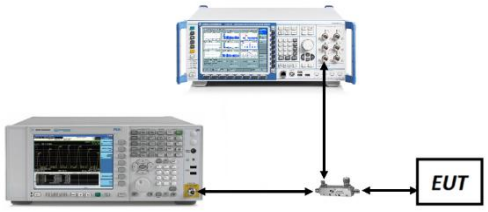


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

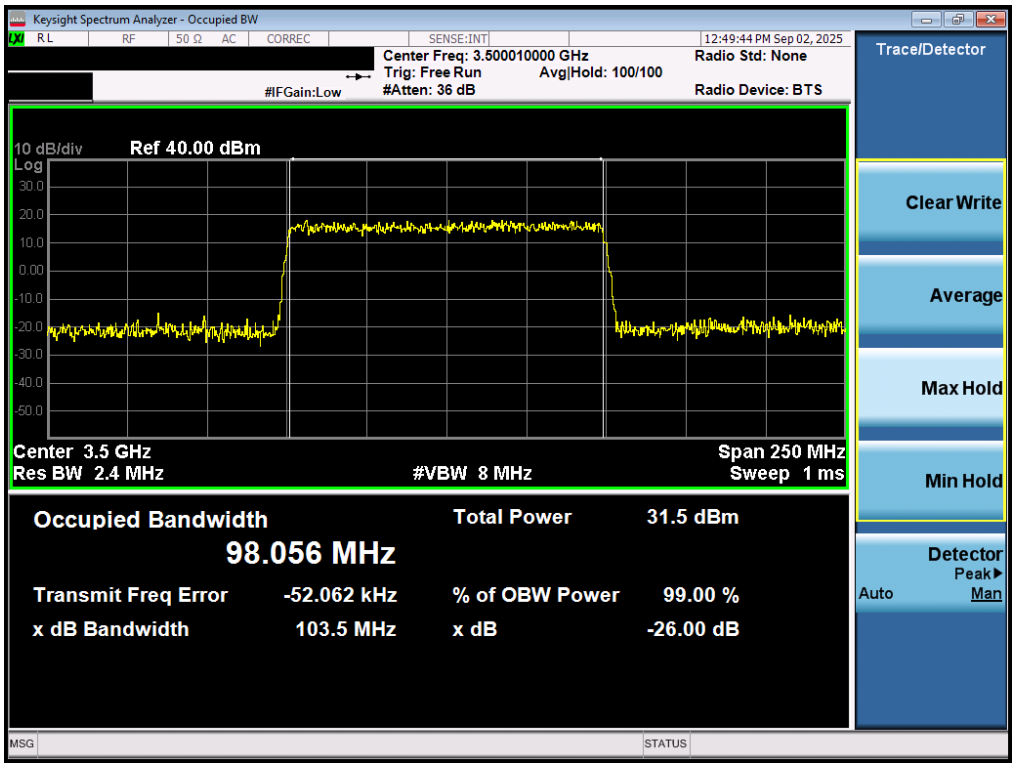
None.

Mode	Bandwidth	Modulation	OBW [MHz]
NR-n77PC2 DoD Band	100MHz	π/2 BPSK	97.169
		QPSK	98.056
		16QAM	98.010
	90MHz	π/2 BPSK	87.287
		QPSK	87.837
		16QAM	88.014
	80MHz	π/2 BPSK	77.523
		QPSK	77.921
		16QAM	78.091
	70MHz	π/2 BPSK	64.673
		QPSK	67.881
		16QAM	67.797
	60MHz	π/2 BPSK	58.211
		QPSK	58.099
		16QAM	58.202
	50MHz	π/2 BPSK	45.975
		QPSK	47.741
		16QAM	47.731
	40MHz	π/2 BPSK	35.945
		QPSK	38.018
		16QAM	38.020
	30MHz	π/2 BPSK	27.046
		QPSK	28.048
		16QAM	28.082
	25MHz	π/2 BPSK	22.981
		QPSK	23.326
		16QAM	23.314
	20MHz	π/2 BPSK	18.042
		QPSK	18.318
		16QAM	18.372
	15MHz	π/2 BPSK	12.994
		QPSK	13.718
		16QAM	13.695
	10MHz	π/2 BPSK	8.663
		QPSK	8.719
		16QAM	8.716

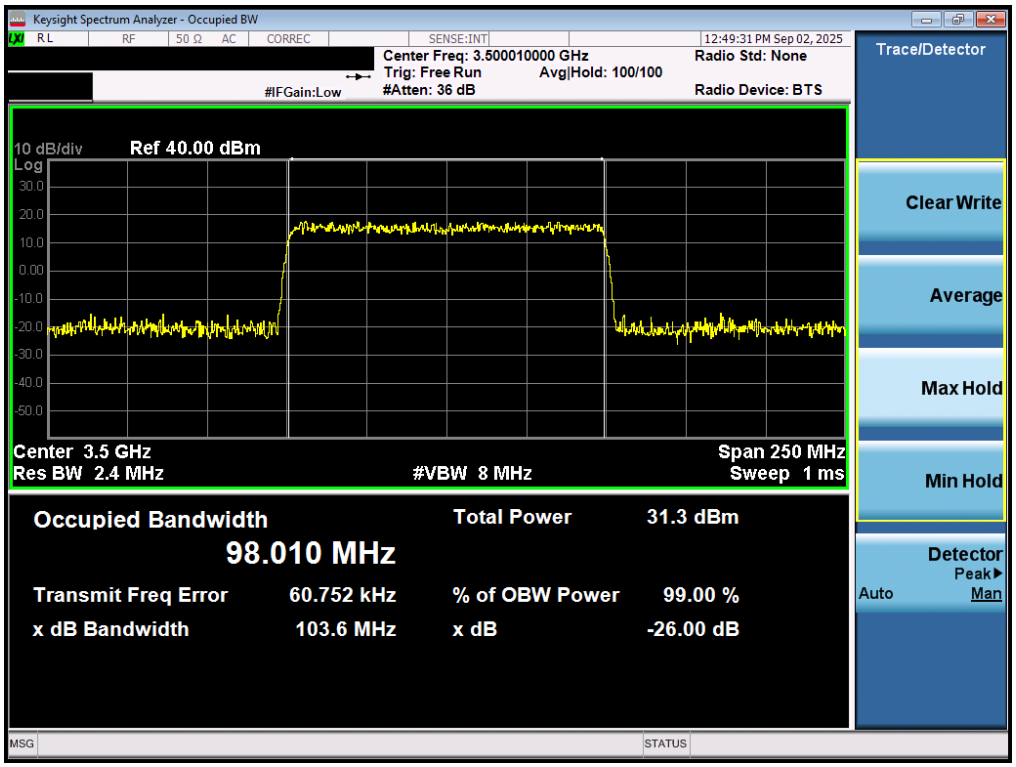
Table 7-10. Occupied Bandwidth Results - Ant1 - DoD Band – Main

NR Band n77PC2 - Ant1 - DoD Band - Main

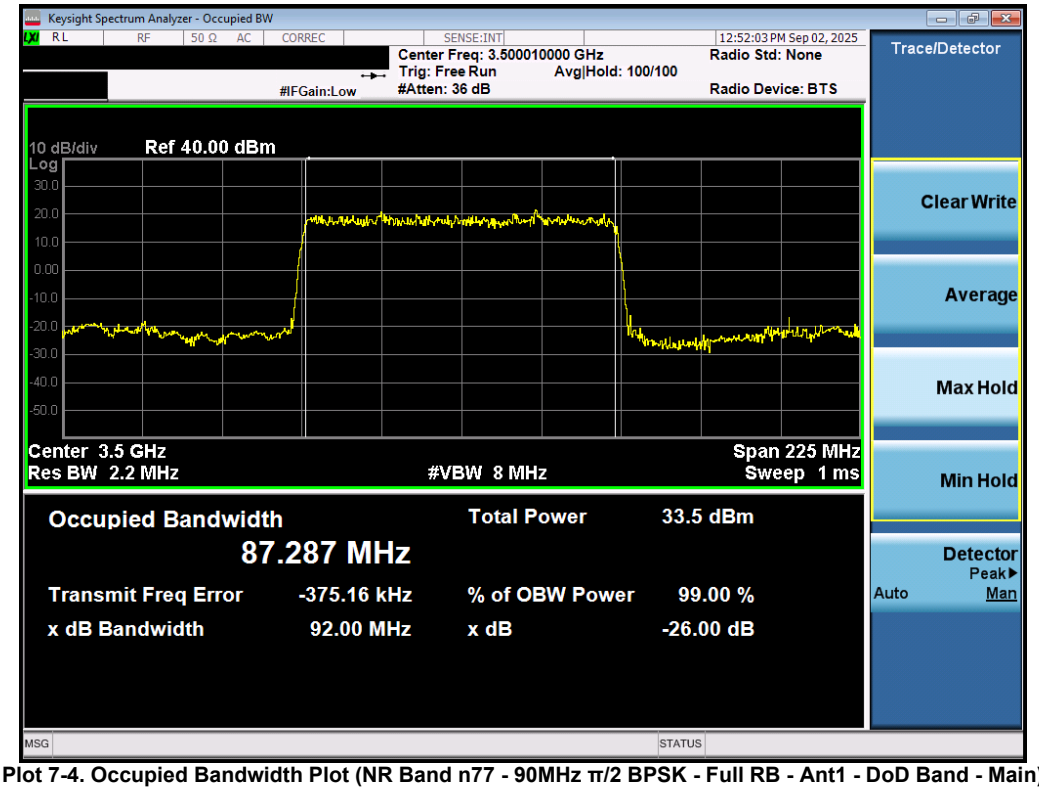
Plot 7-1. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



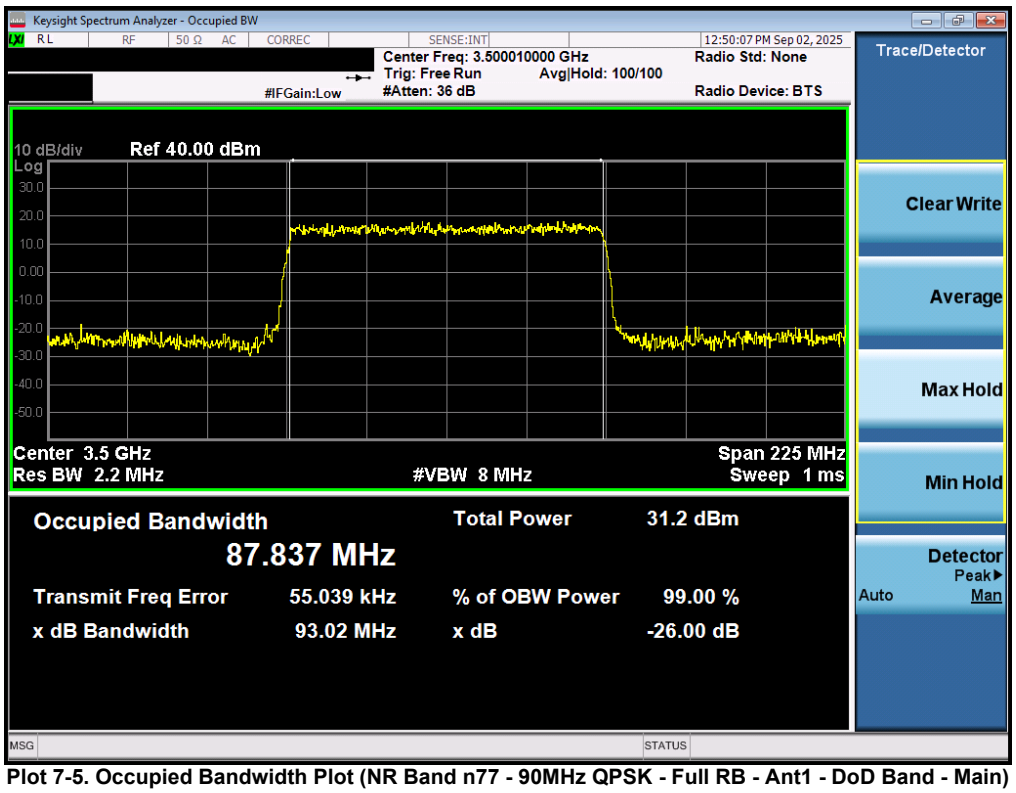
Plot 7-2. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz QPSK - Full RB - Ant1 - DoD Band - Main)



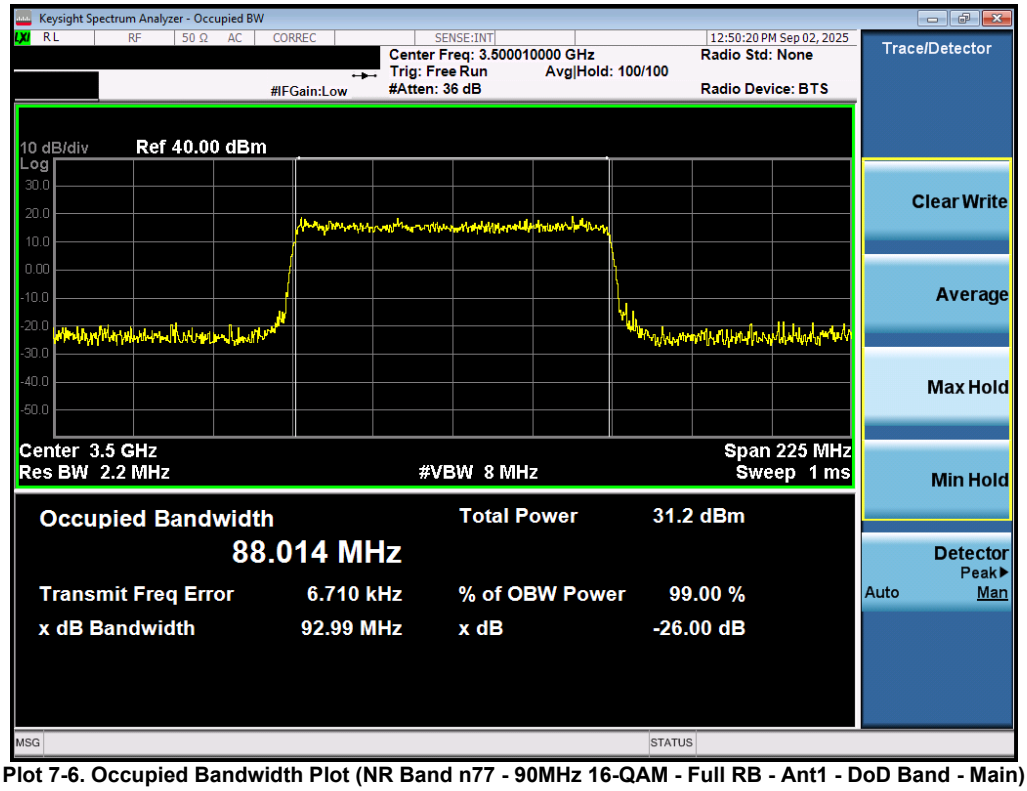
Plot 7-3. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



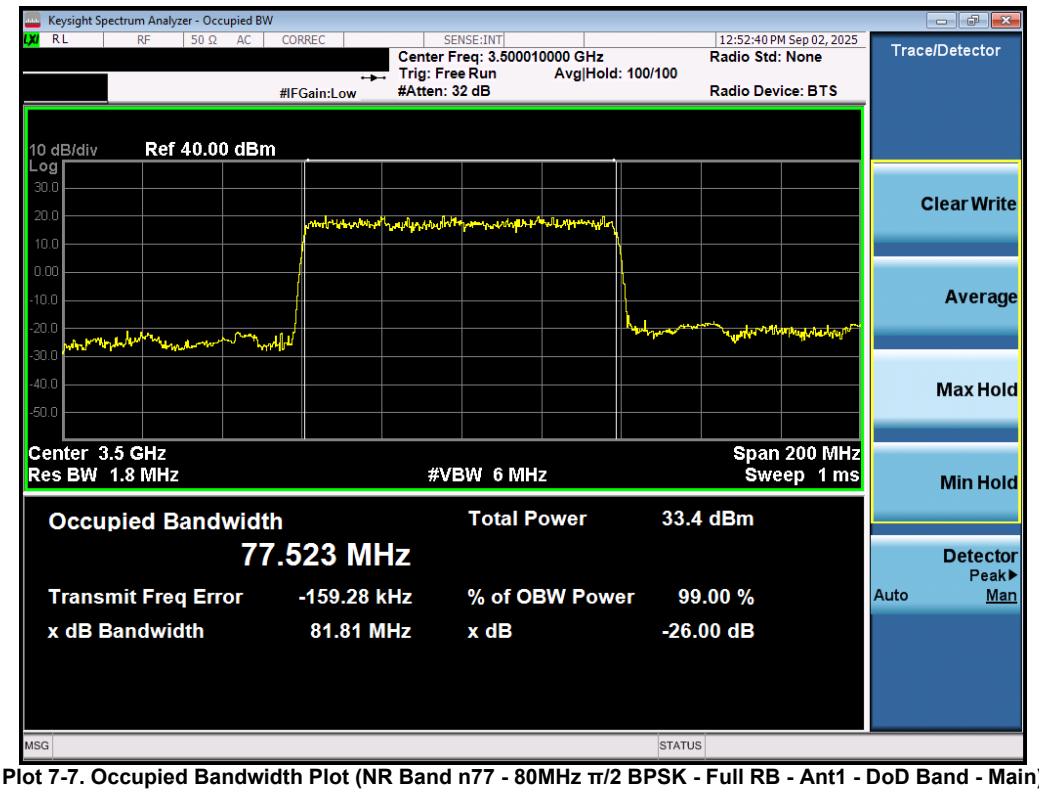
Plot 7-4. Occupied Bandwidth Plot (NR Band n77 - 90MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



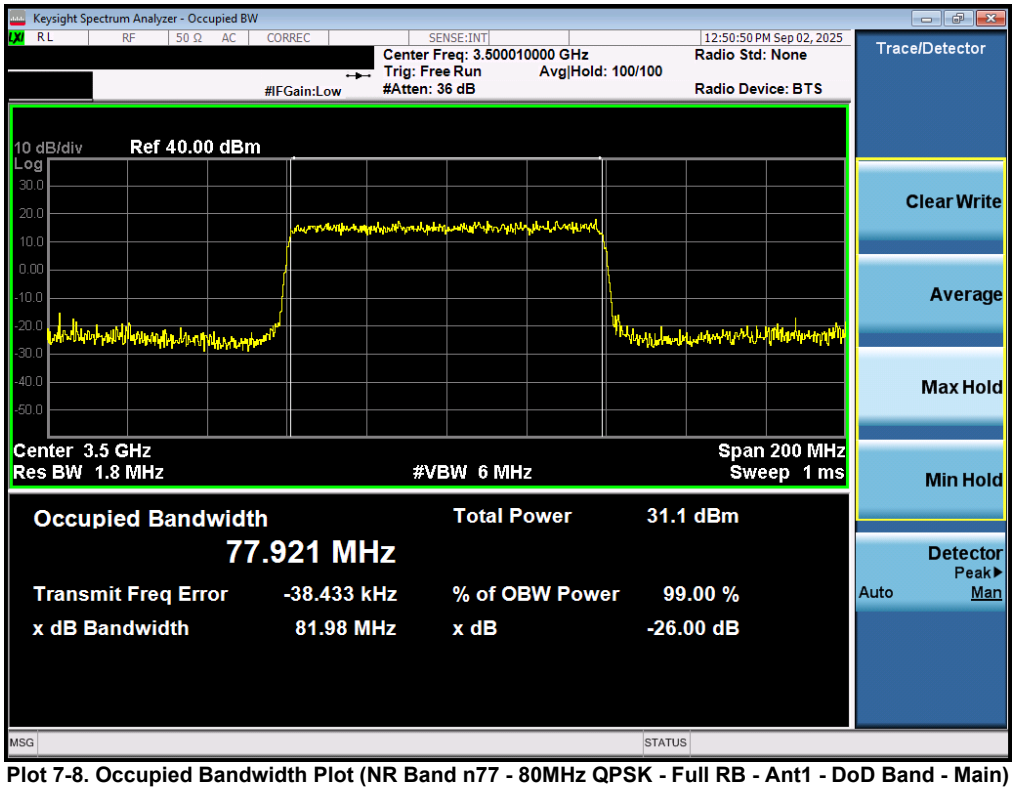
Plot 7-5. Occupied Bandwidth Plot (NR Band n77 - 90MHz QPSK - Full RB - Ant1 - DoD Band - Main)



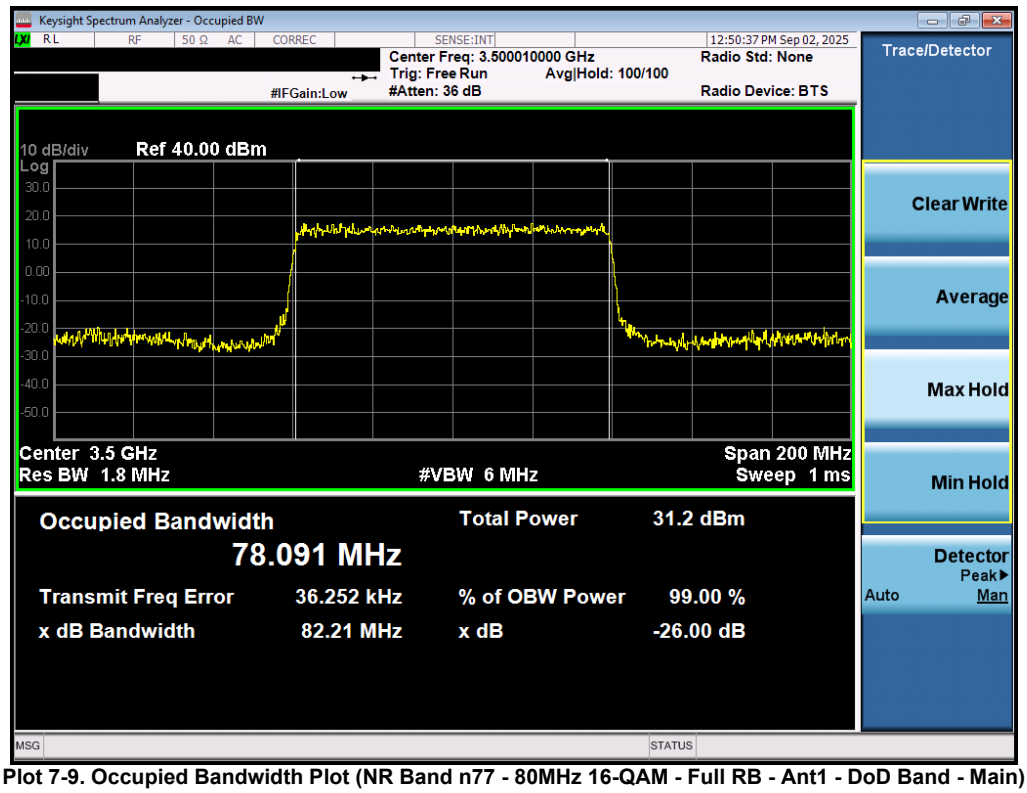
Plot 7-6. Occupied Bandwidth Plot (NR Band n77 - 90MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



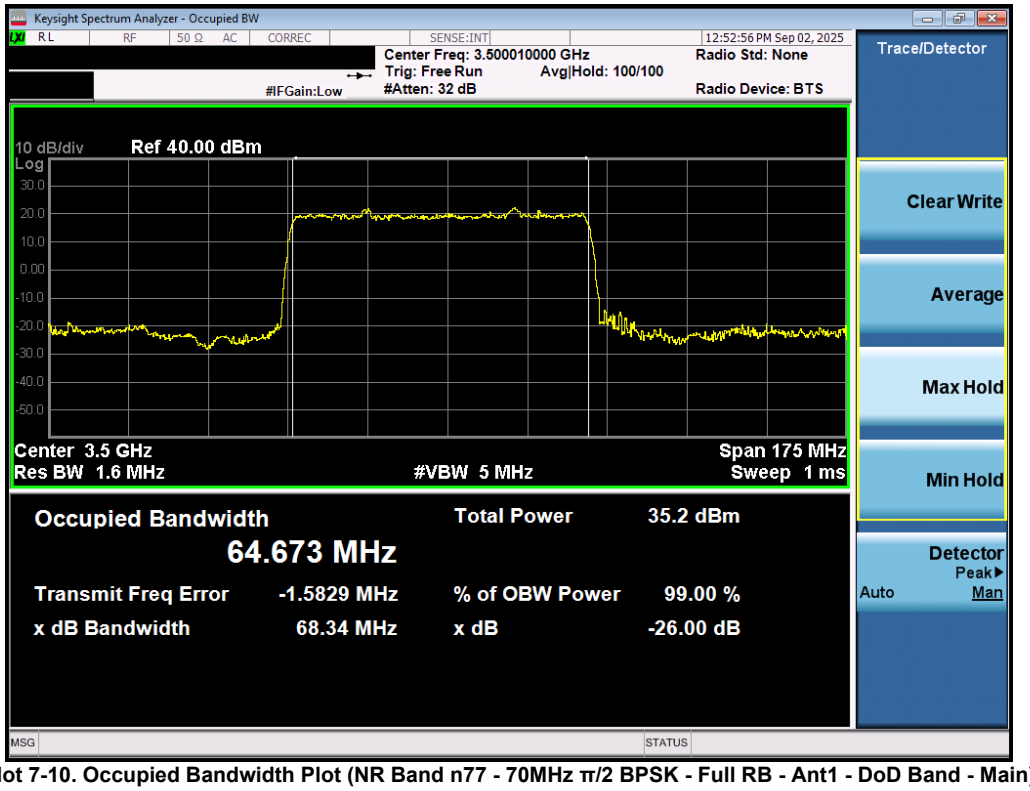
Plot 7-7. Occupied Bandwidth Plot (NR Band n77 - 80MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



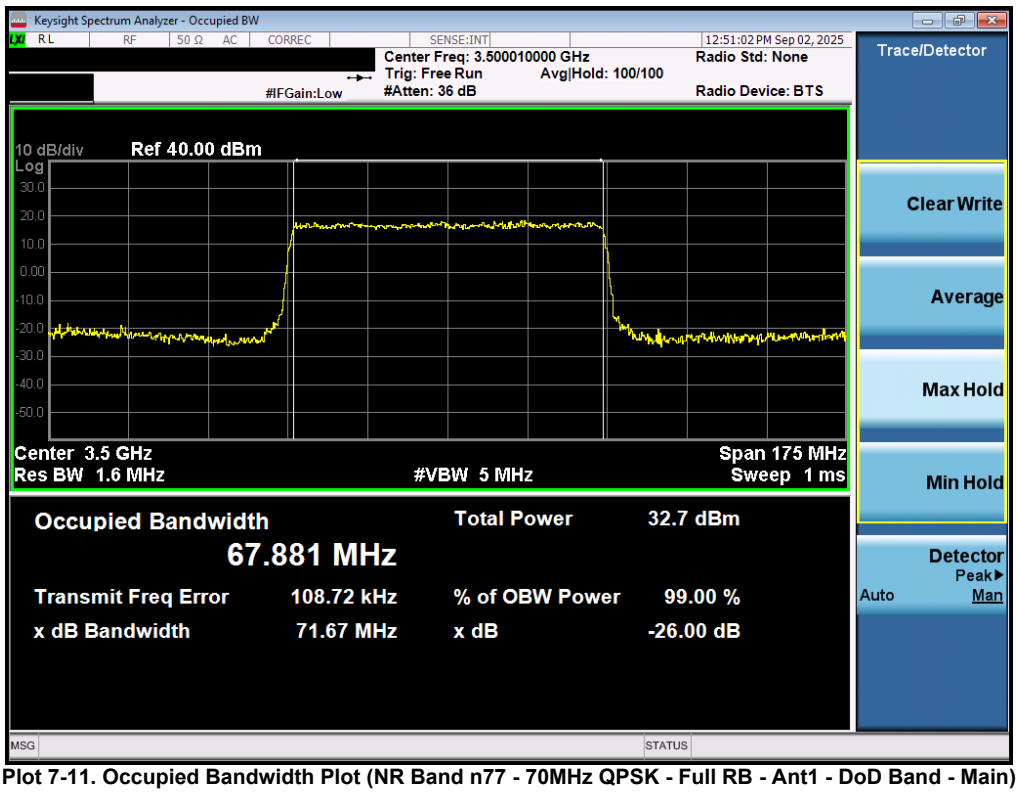
Plot 7-8. Occupied Bandwidth Plot (NR Band n77 - 80MHz QPSK - Full RB - Ant1 - DoD Band - Main)



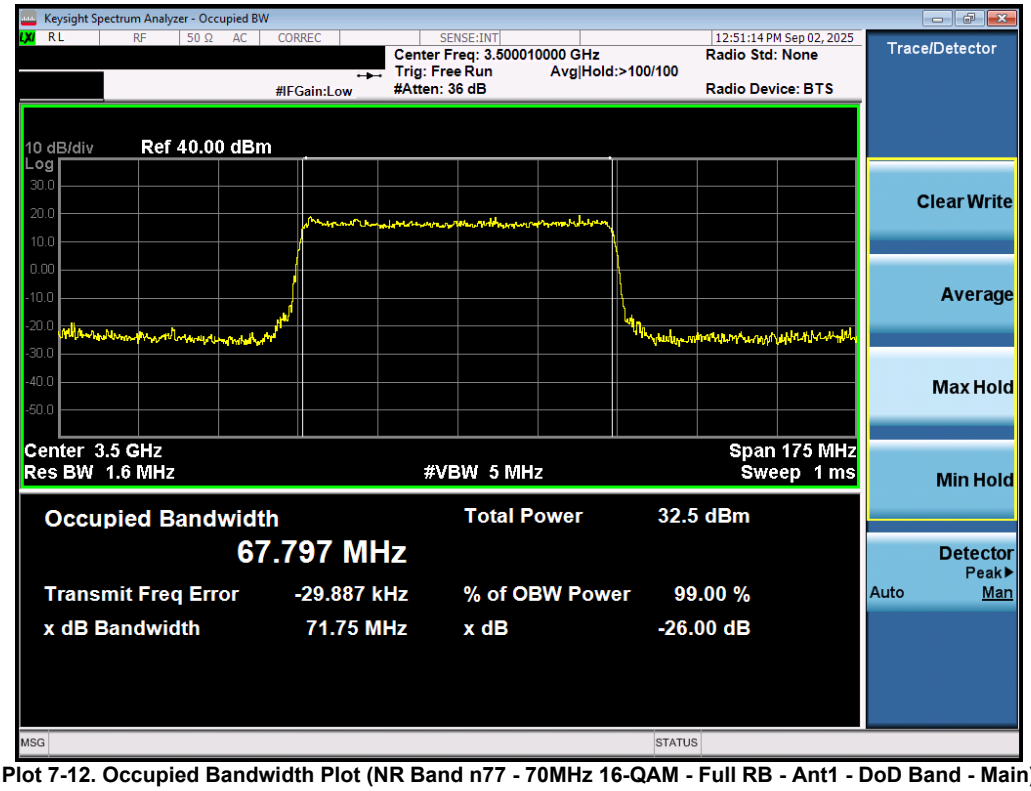
Plot 7-9. Occupied Bandwidth Plot (NR Band n77 - 80MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



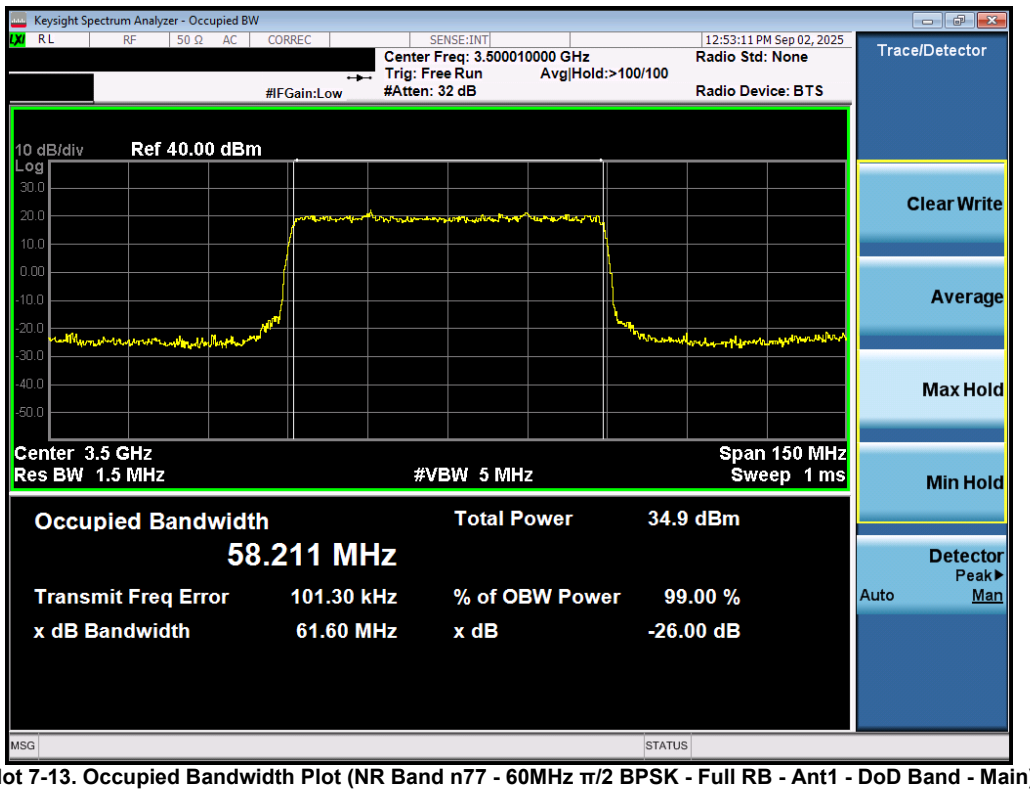
Plot 7-10. Occupied Bandwidth Plot (NR Band n77 - 70MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



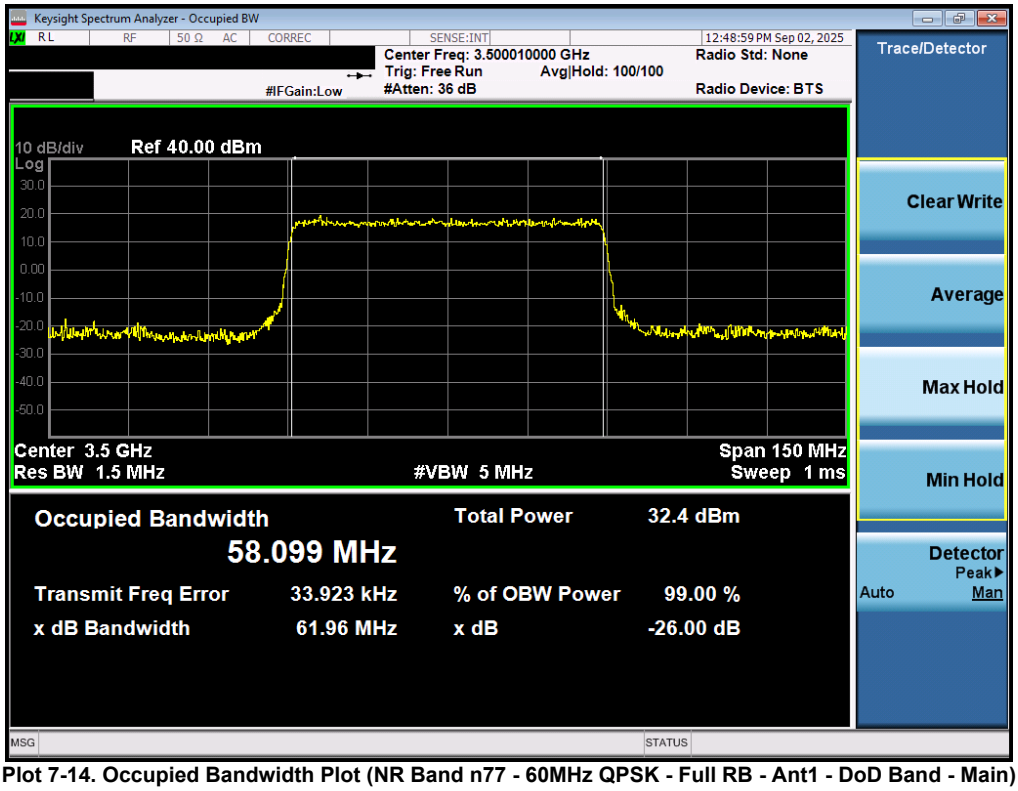
Plot 7-11. Occupied Bandwidth Plot (NR Band n77 - 70MHz QPSK - Full RB - Ant1 - DoD Band - Main)



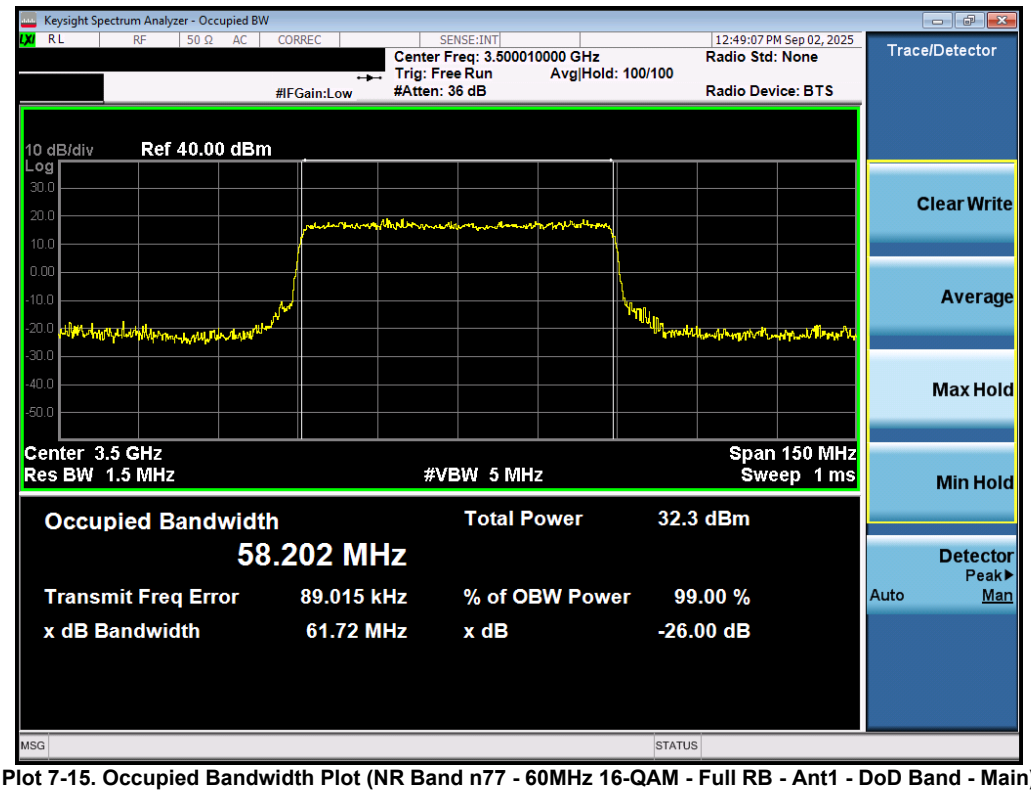
Plot 7-12. Occupied Bandwidth Plot (NR Band n77 - 70MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



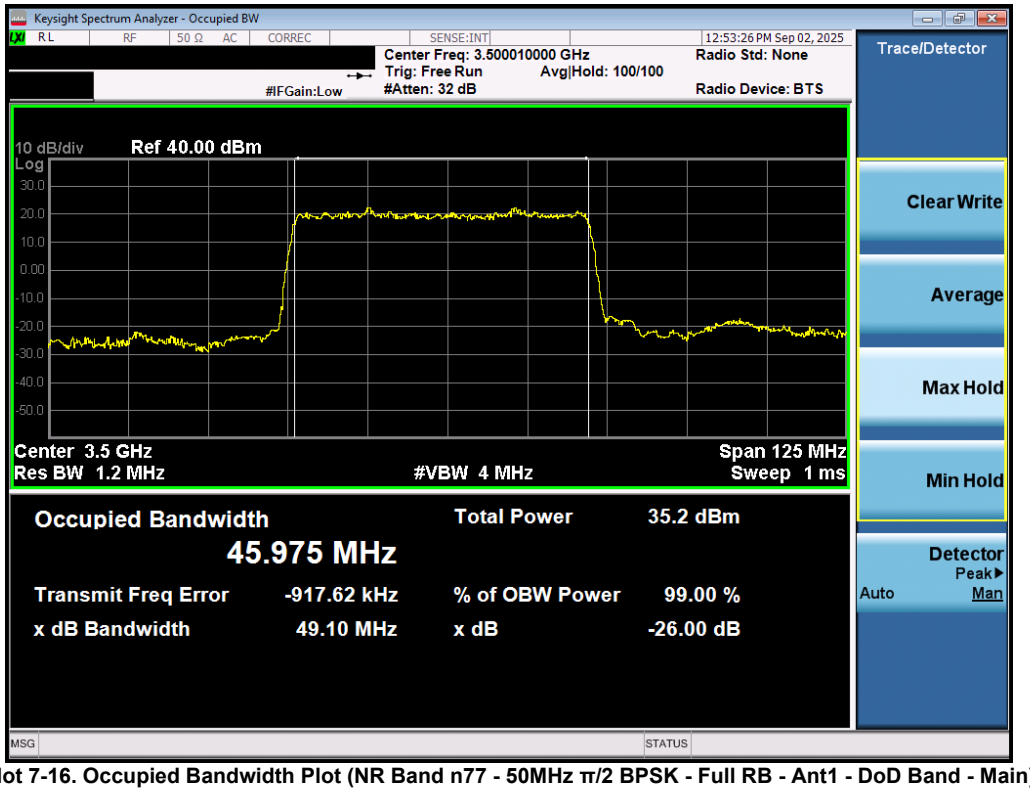
Plot 7-13. Occupied Bandwidth Plot (NR Band n77 - 60MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



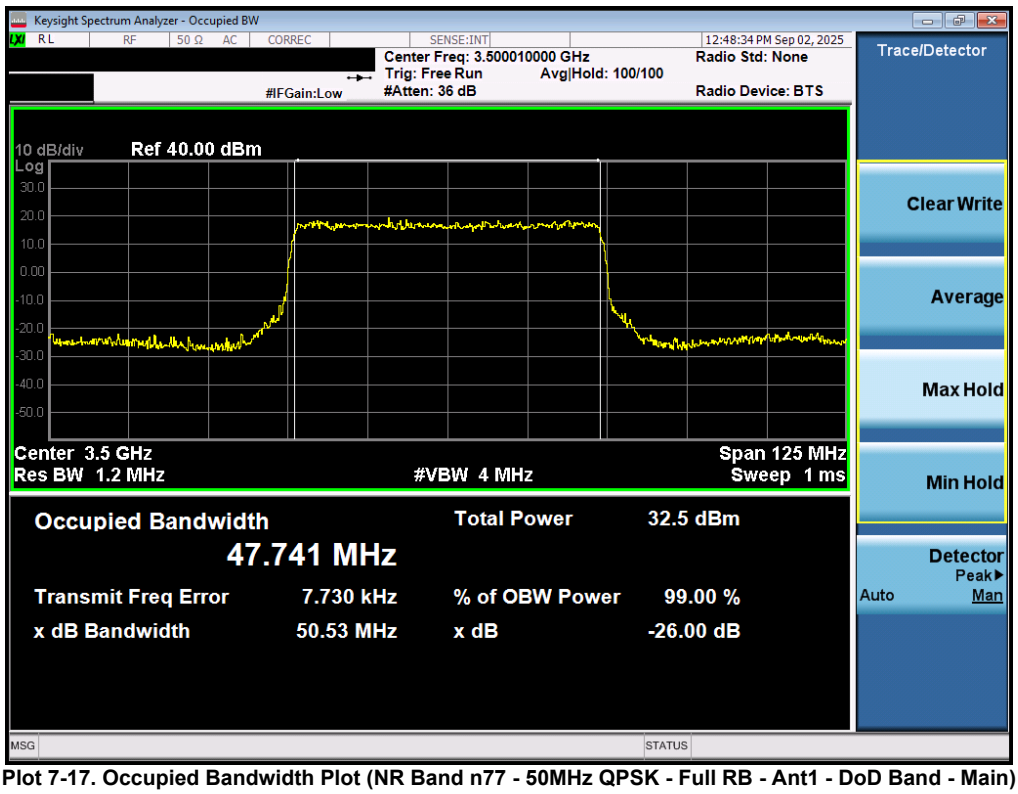
Plot 7-14. Occupied Bandwidth Plot (NR Band n77 - 60MHz QPSK - Full RB - Ant1 - DoD Band - Main)



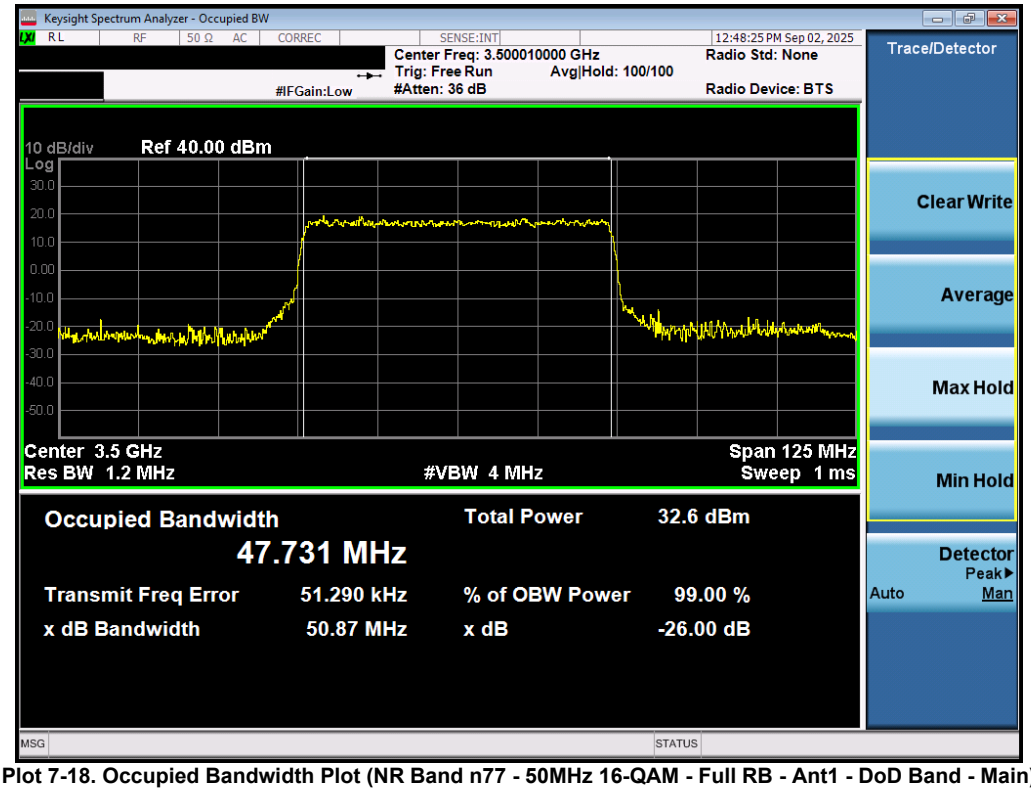
Plot 7-15. Occupied Bandwidth Plot (NR Band n77 - 60MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



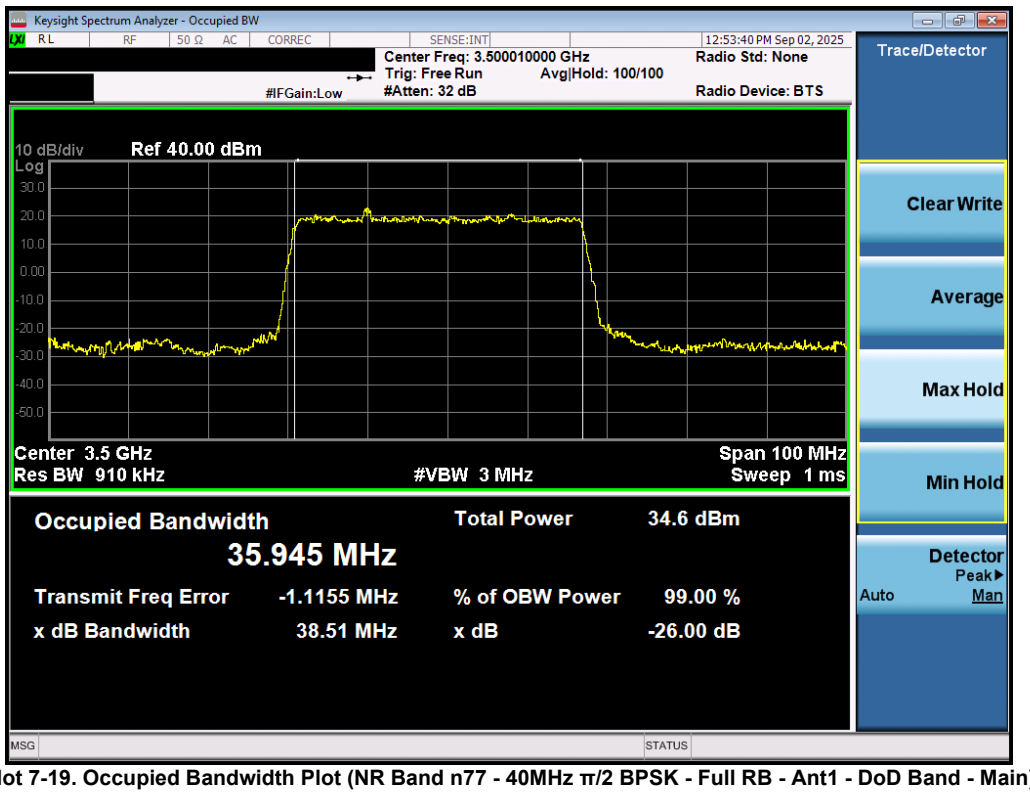
Plot 7-16. Occupied Bandwidth Plot (NR Band n77 - 50MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



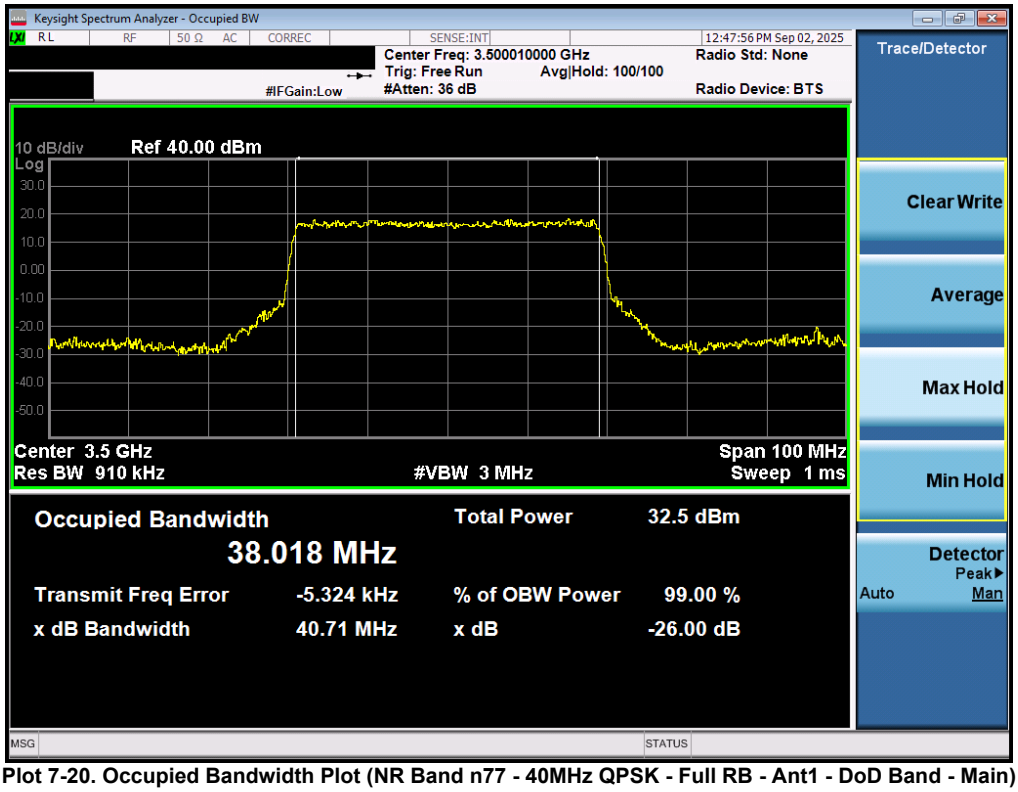
Plot 7-17. Occupied Bandwidth Plot (NR Band n77 - 50MHz QPSK - Full RB - Ant1 - DoD Band - Main)



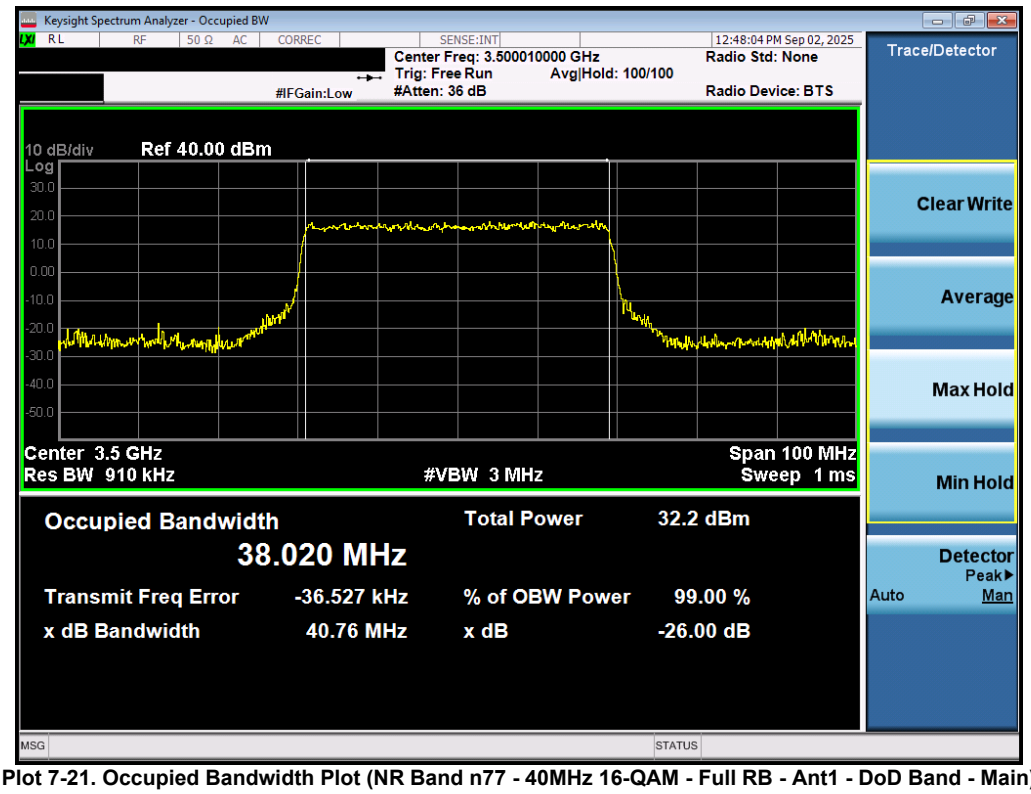
Plot 7-18. Occupied Bandwidth Plot (NR Band n77 - 50MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



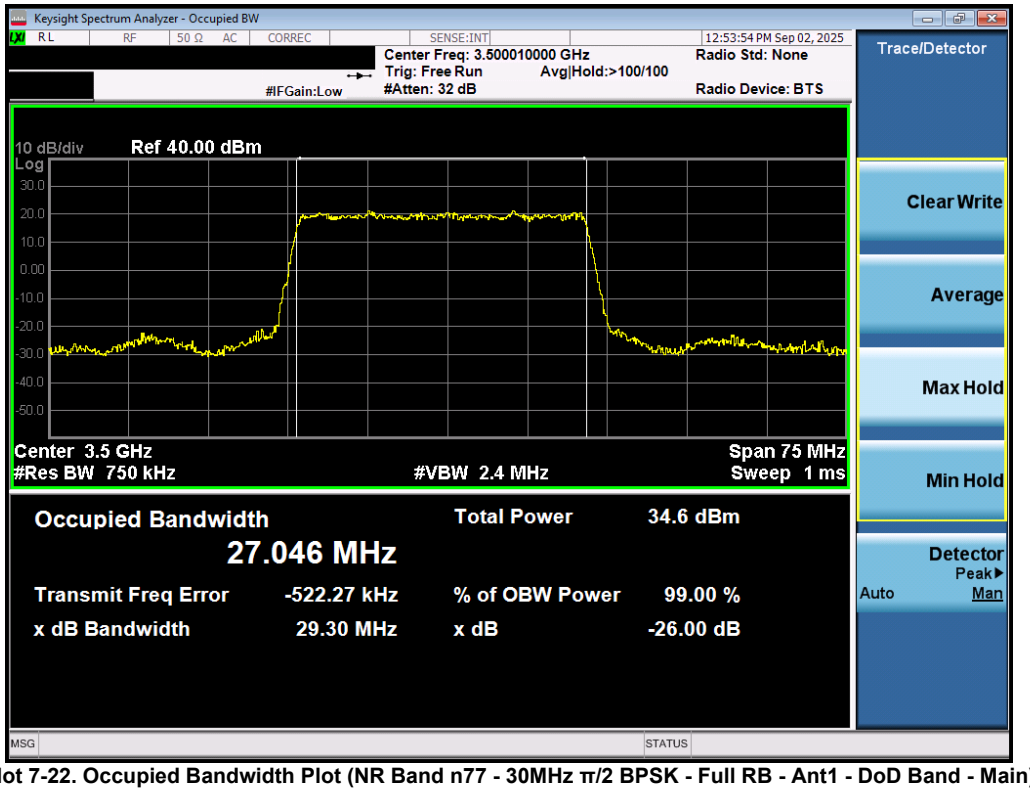
Plot 7-19. Occupied Bandwidth Plot (NR Band n77 - 40MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



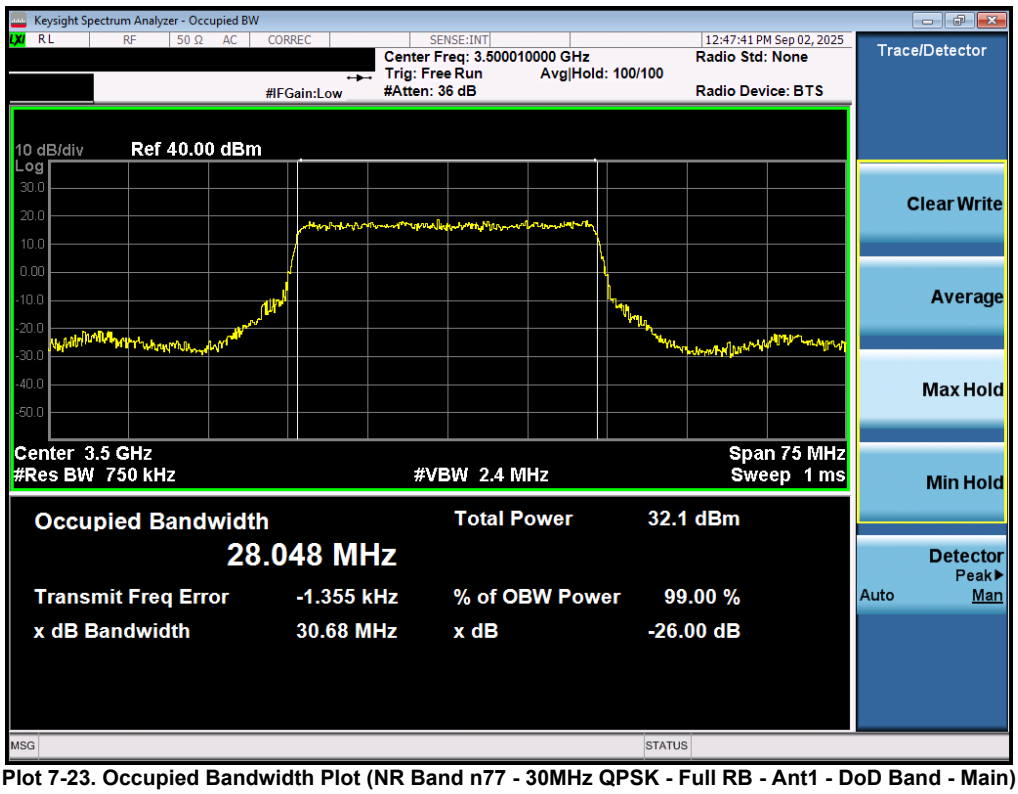
Plot 7-20. Occupied Bandwidth Plot (NR Band n77 - 40MHz QPSK - Full RB - Ant1 - DoD Band - Main)



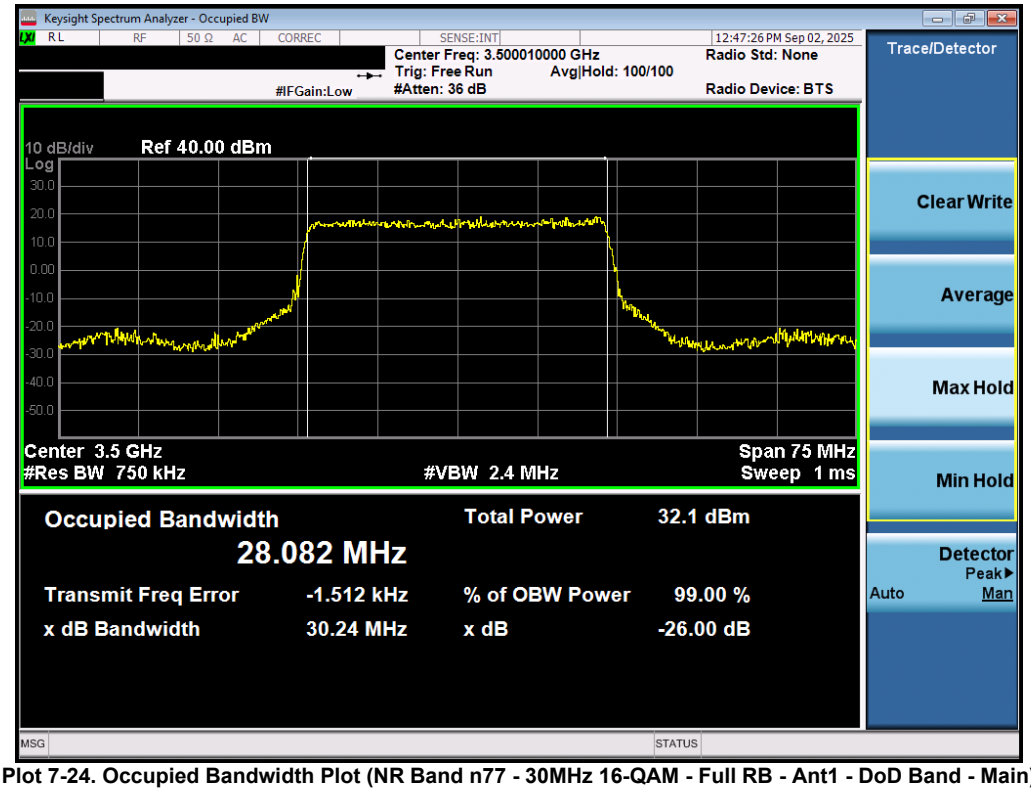
Plot 7-21. Occupied Bandwidth Plot (NR Band n77 - 40MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



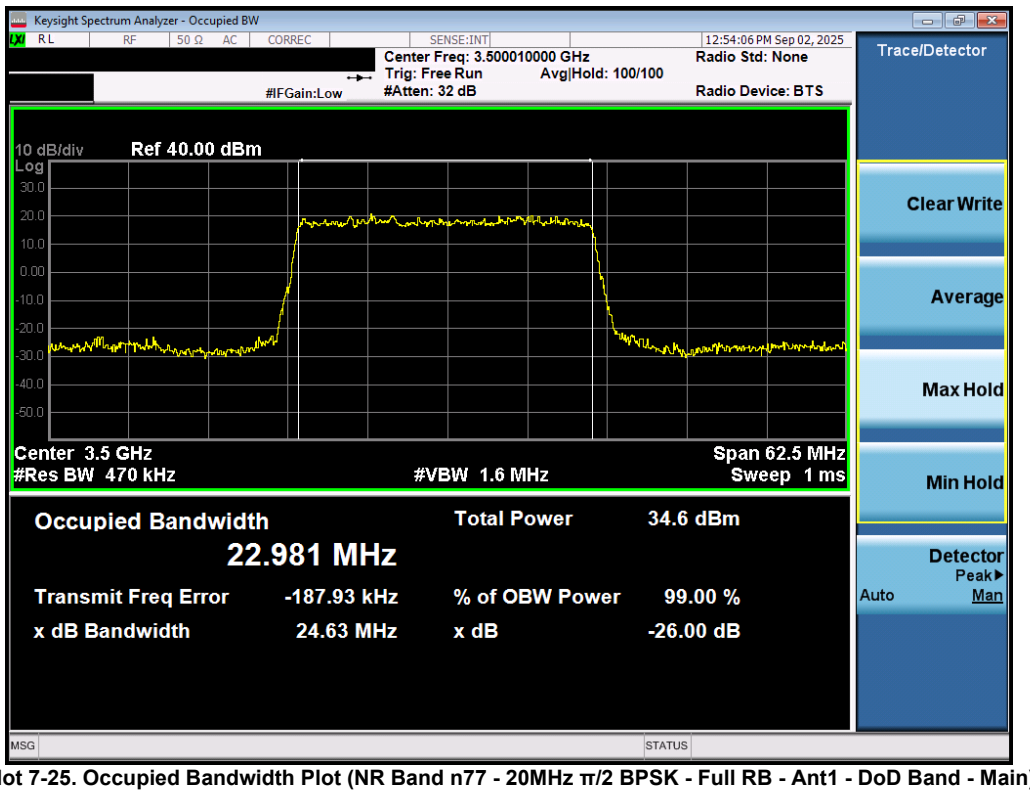
Plot 7-22. Occupied Bandwidth Plot (NR Band n77 - 30MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



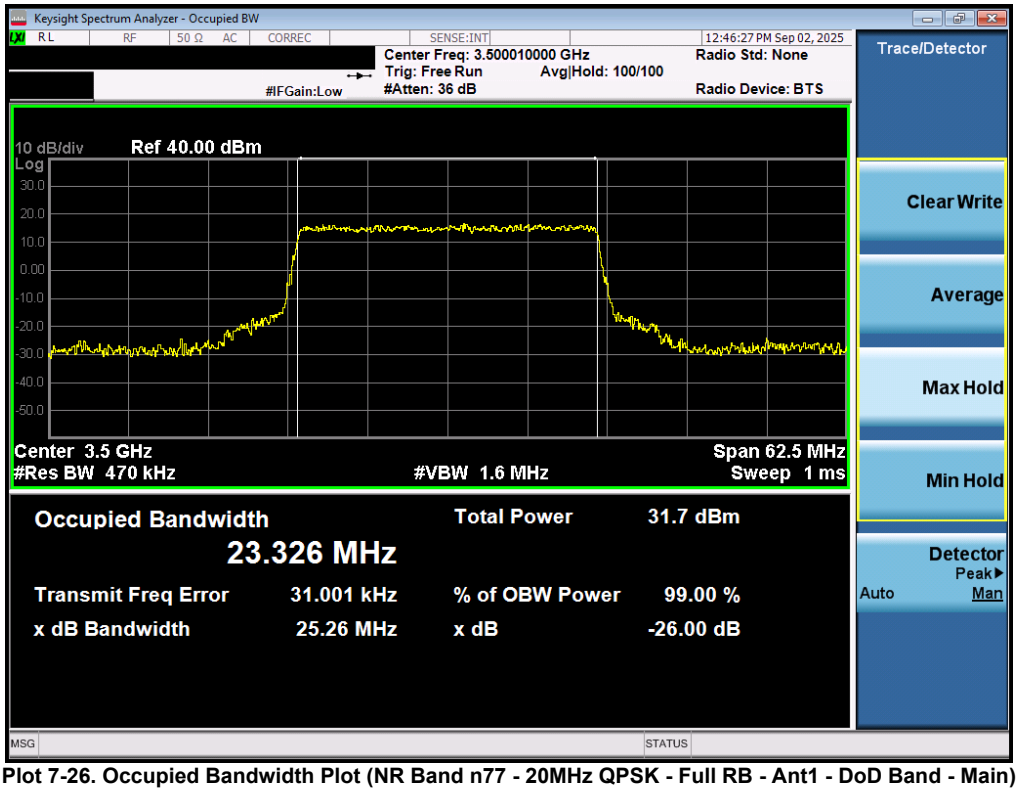
Plot 7-23. Occupied Bandwidth Plot (NR Band n77 - 30MHz QPSK - Full RB - Ant1 - DoD Band - Main)



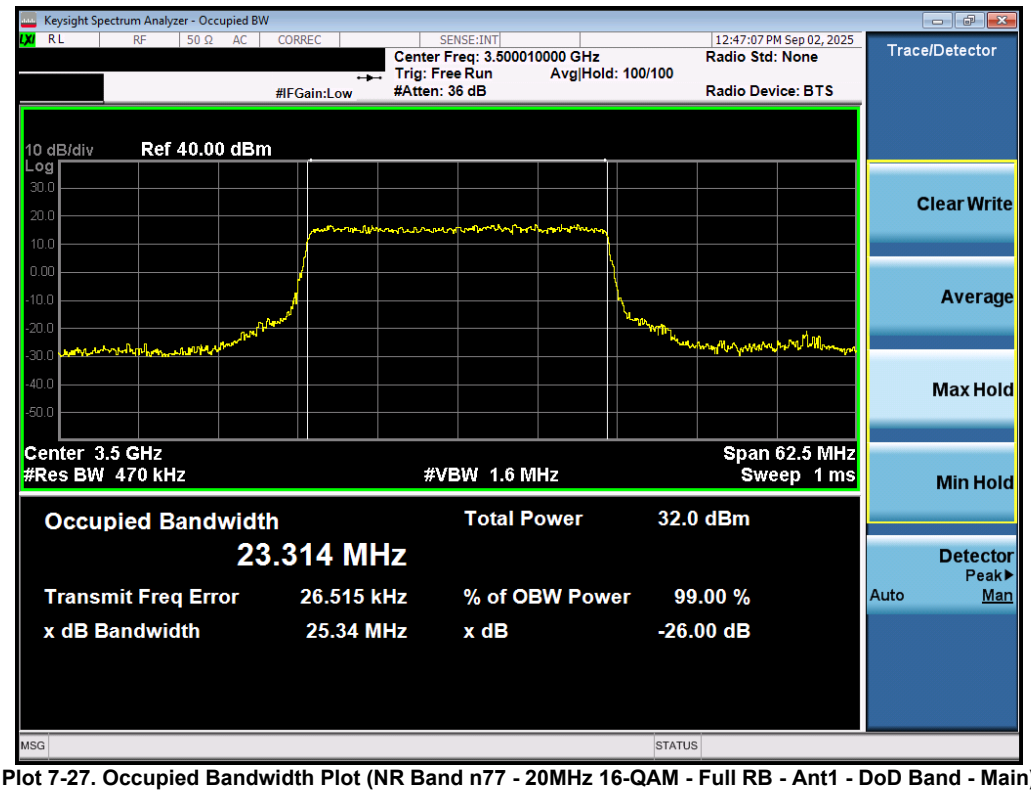
Plot 7-24. Occupied Bandwidth Plot (NR Band n77 - 30MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



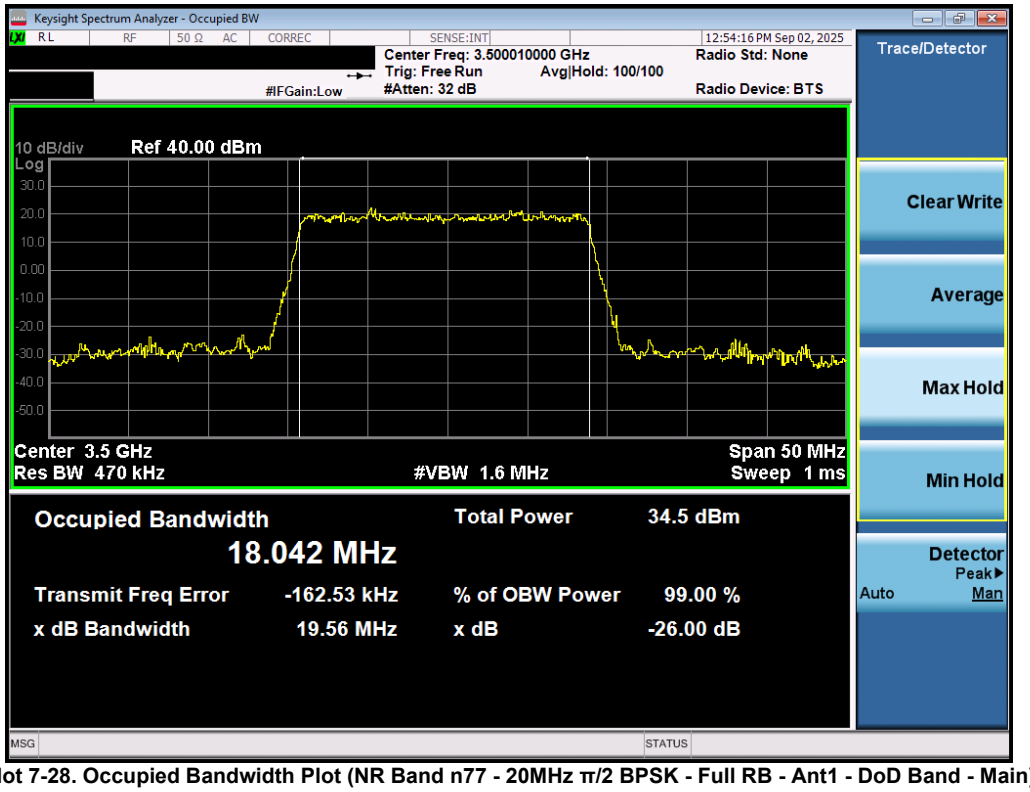
Plot 7-25. Occupied Bandwidth Plot (NR Band n77 - 20MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



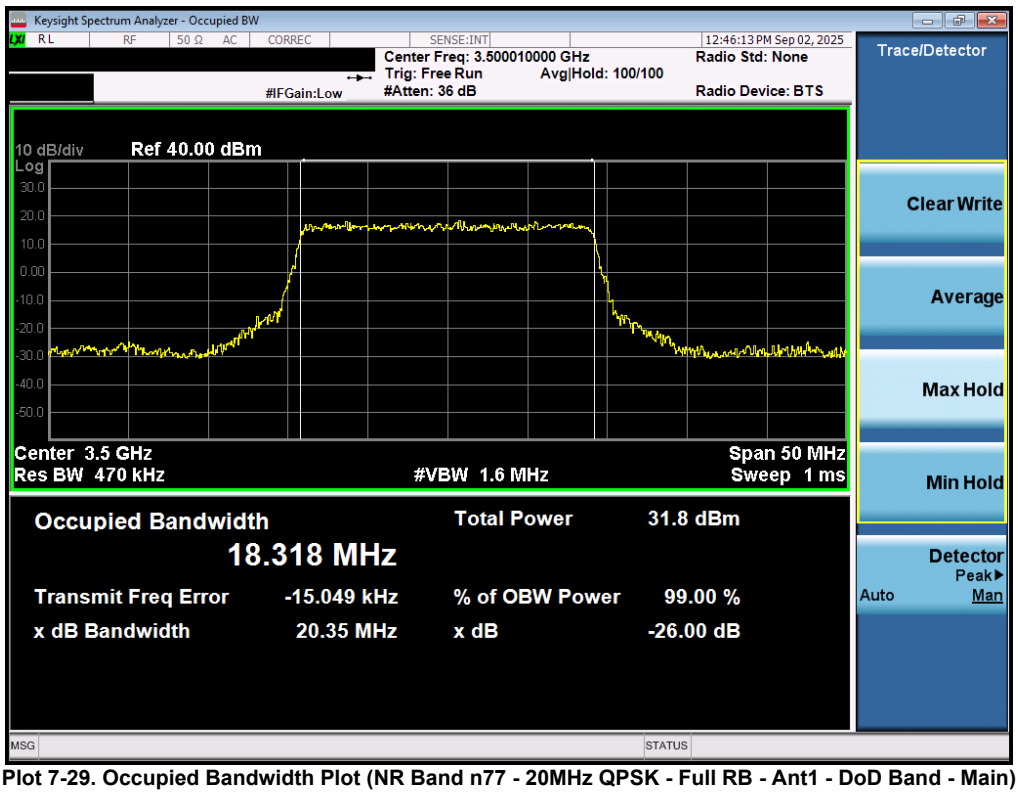
Plot 7-26. Occupied Bandwidth Plot (NR Band n77 - 20MHz QPSK - Full RB - Ant1 - DoD Band - Main)



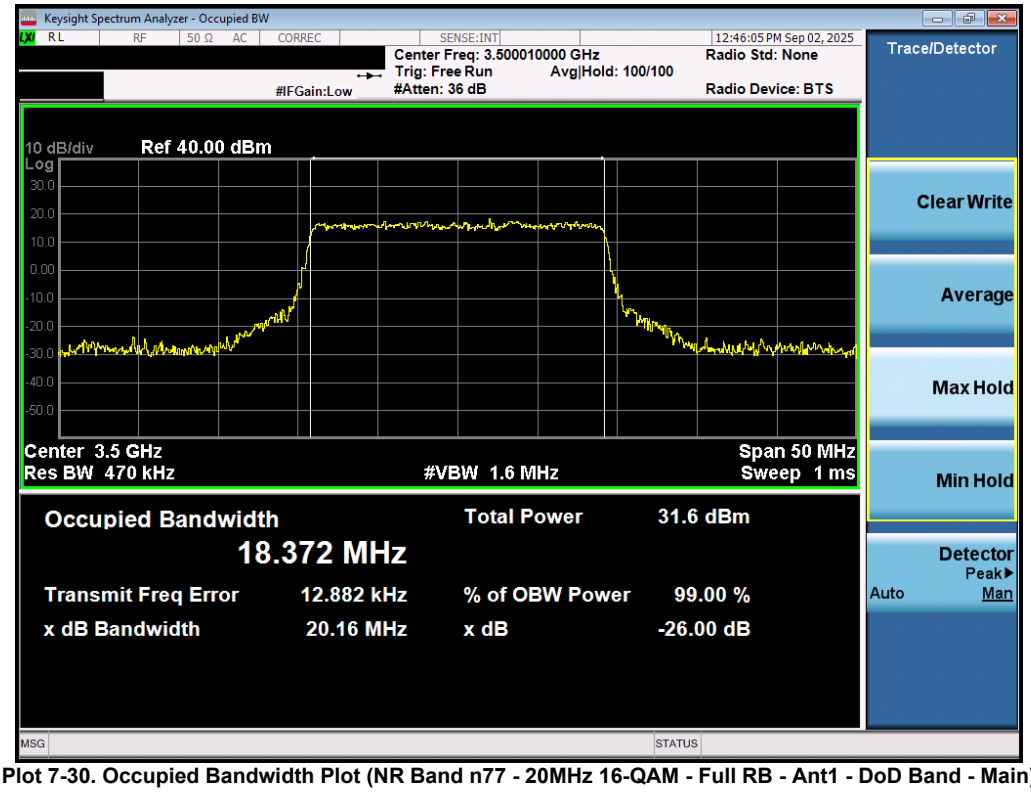
Plot 7-27. Occupied Bandwidth Plot (NR Band n77 - 20MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



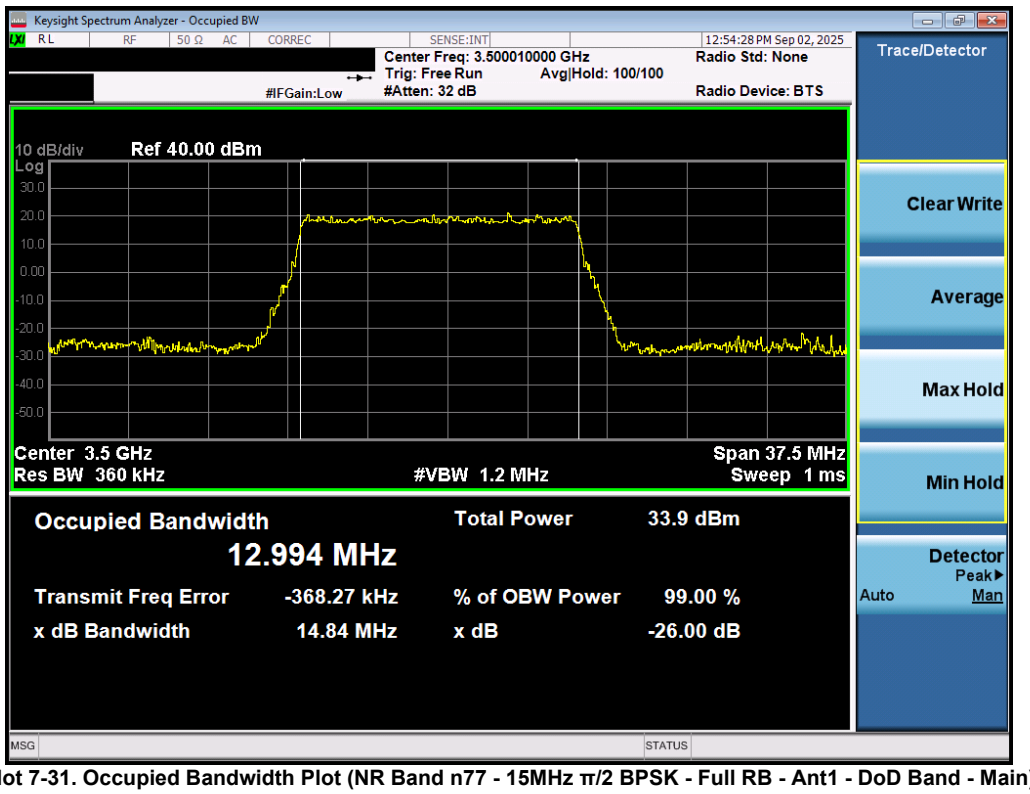
Plot 7-28. Occupied Bandwidth Plot (NR Band n77 - 20MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



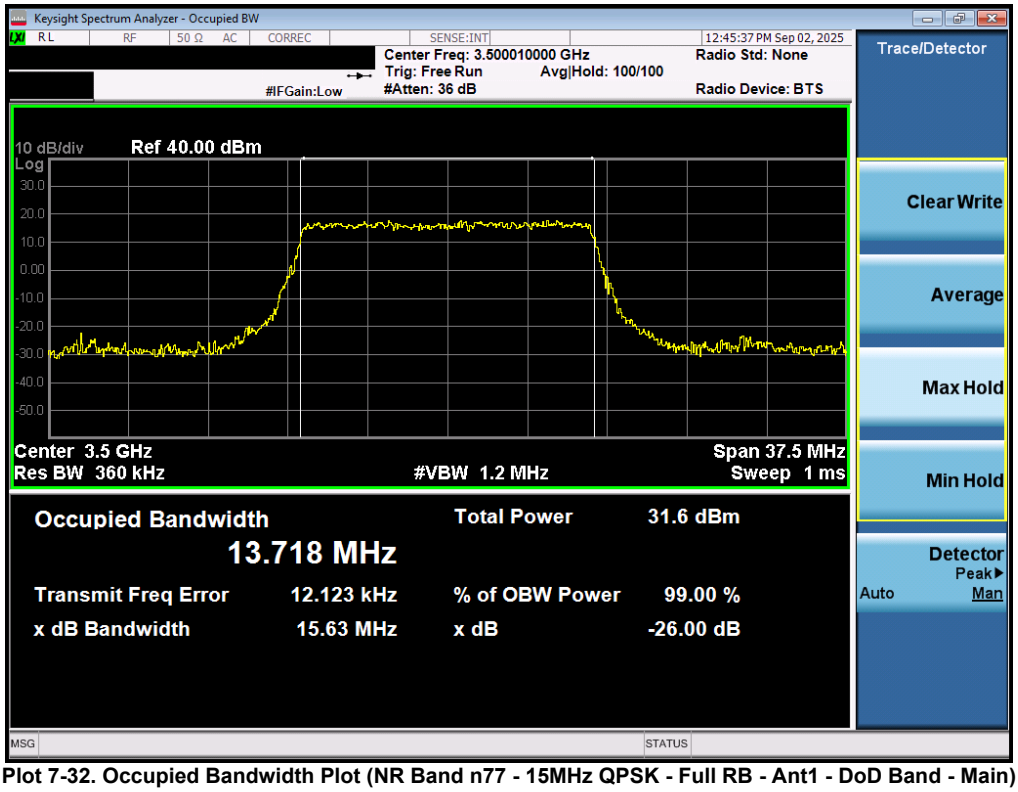
Plot 7-29. Occupied Bandwidth Plot (NR Band n77 - 20MHz QPSK - Full RB - Ant1 - DoD Band - Main)



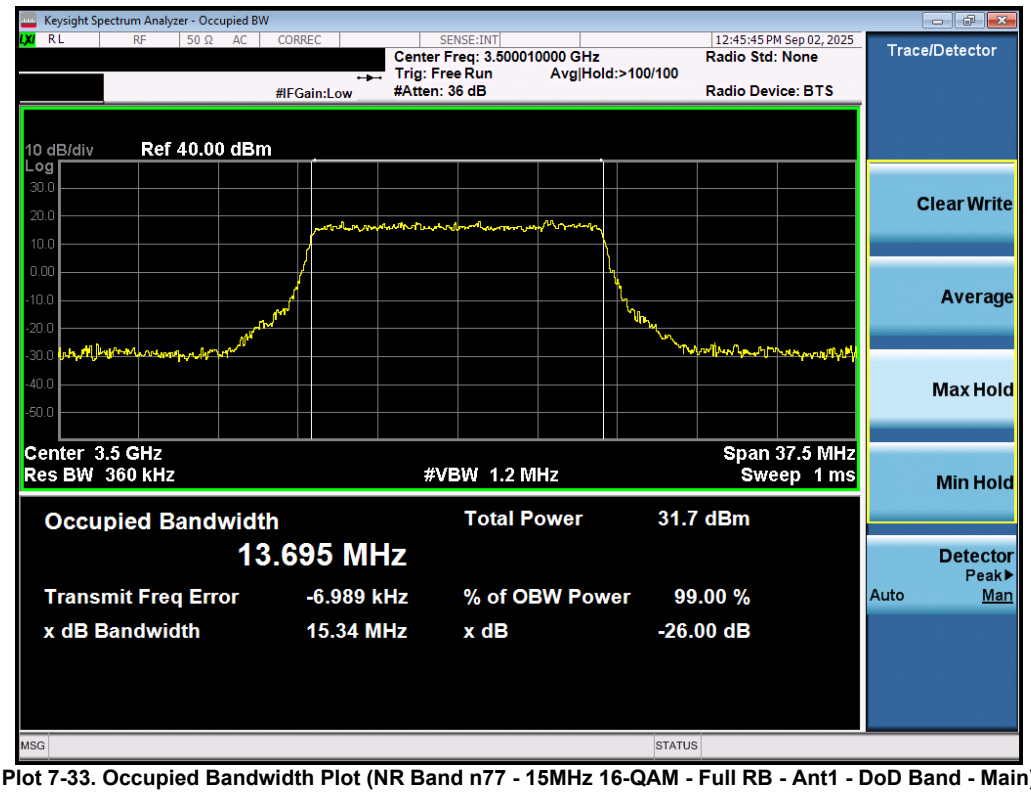
Plot 7-30. Occupied Bandwidth Plot (NR Band n77 - 20MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



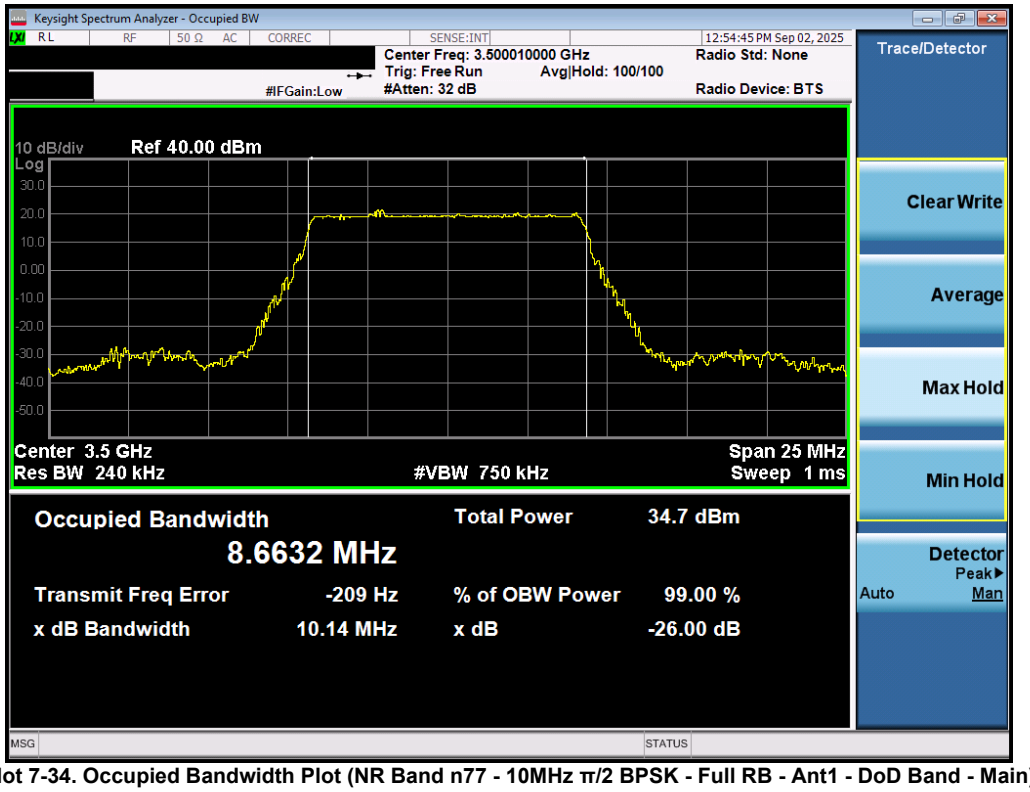
Plot 7-31. Occupied Bandwidth Plot (NR Band n77 - 15MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



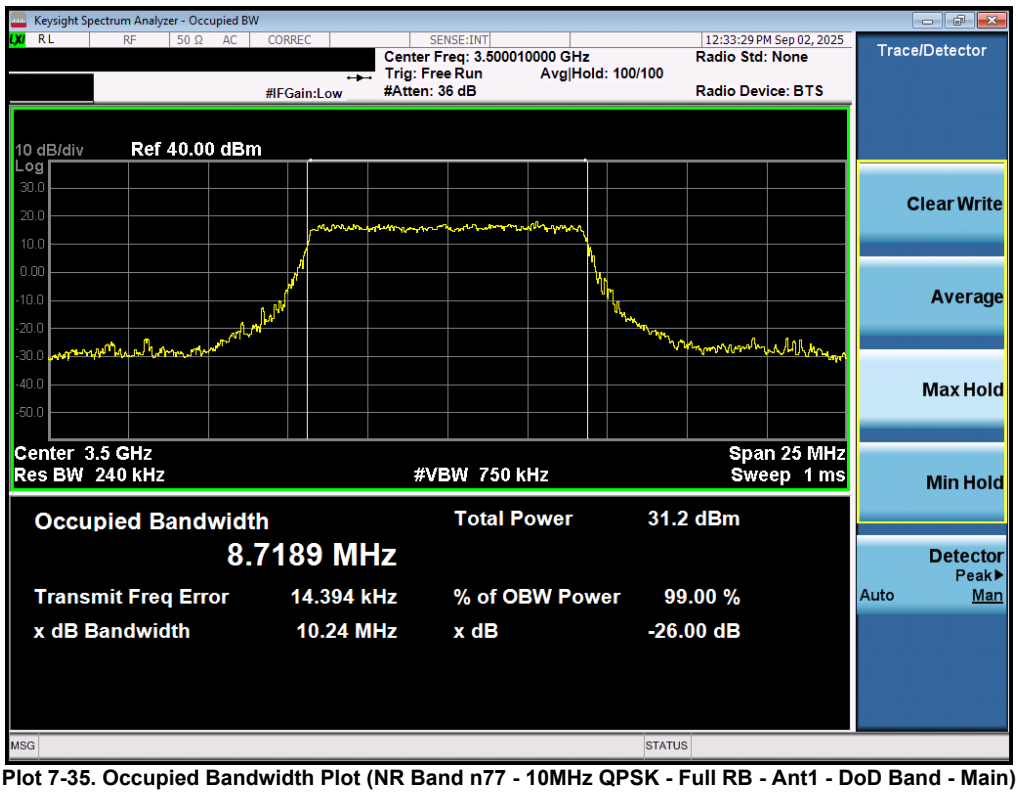
Plot 7-32. Occupied Bandwidth Plot (NR Band n77 - 15MHz QPSK - Full RB - Ant1 - DoD Band - Main)



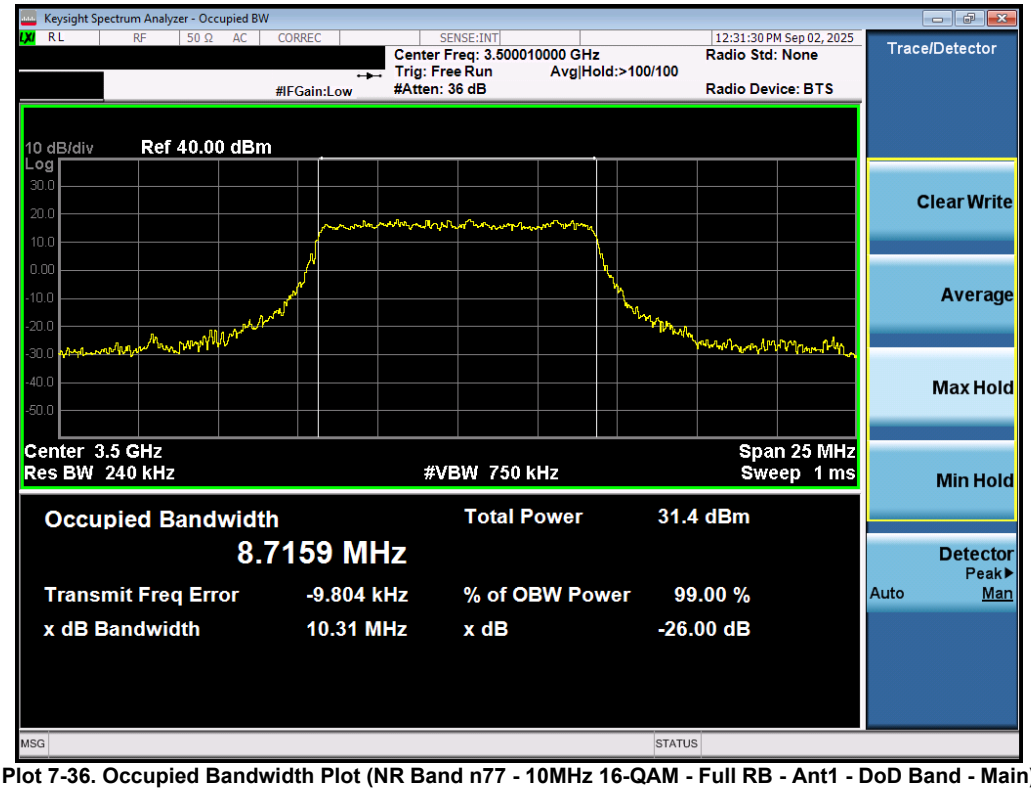
Plot 7-33. Occupied Bandwidth Plot (NR Band n77 - 15MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)



Plot 7-34. Occupied Bandwidth Plot (NR Band n77 - 10MHz π/2 BPSK - Full RB - Ant1 - DoD Band - Main)



Plot 7-35. Occupied Bandwidth Plot (NR Band n77 - 10MHz QPSK - Full RB - Ant1 - DoD Band - Main)

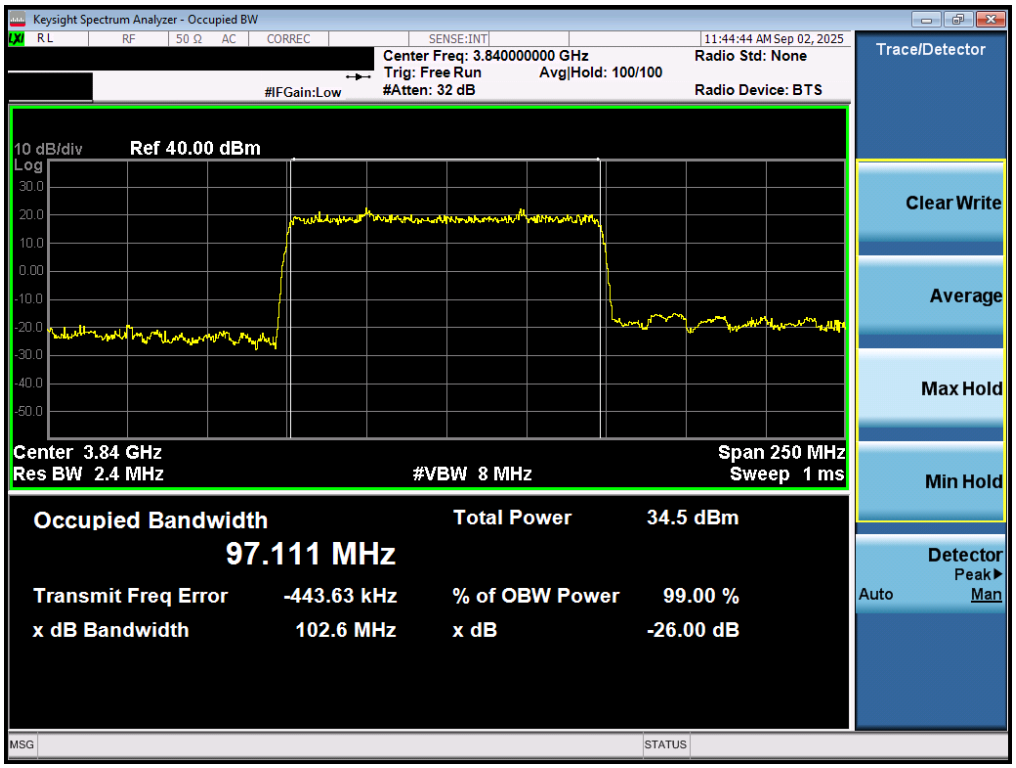


Plot 7-36. Occupied Bandwidth Plot (NR Band n77 - 10MHz 16-QAM - Full RB - Ant1 - DoD Band - Main)

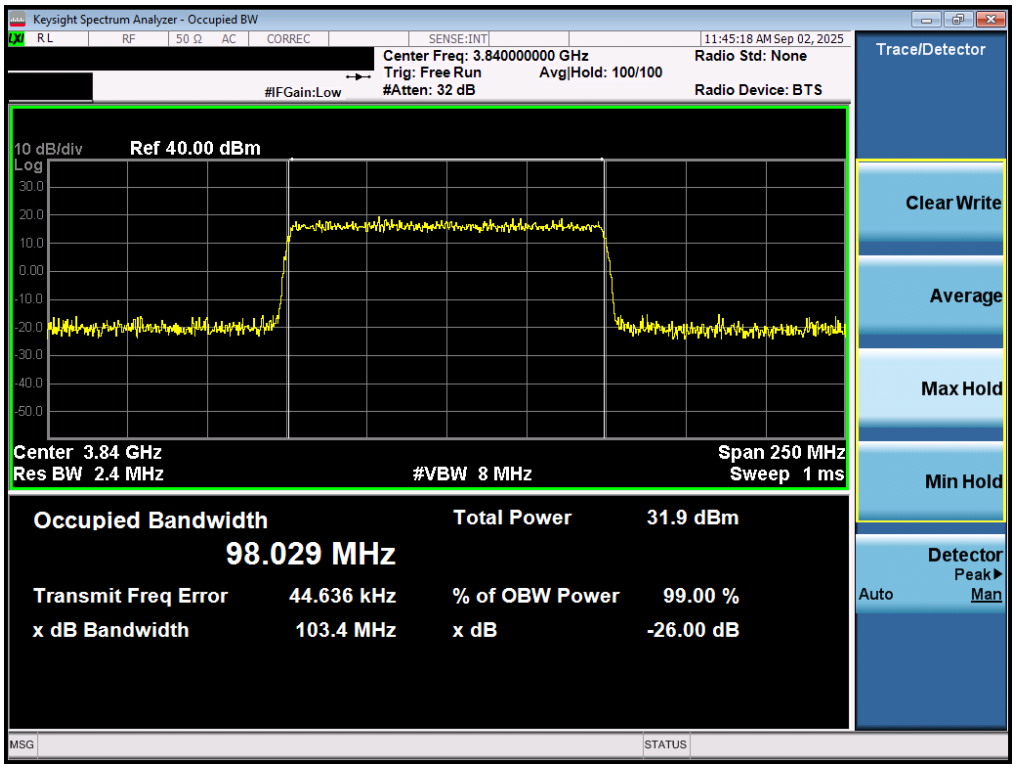
Mode	Bandwidth	Modulation	OBW [MHz]
NR-n77PC2 C-Band	100MHz	π/2 BPSK	97.111
		QPSK	98.029
		16QAM	97.804
	90MHz	π/2 BPSK	87.151
		QPSK	87.890
		16QAM	87.756
	80MHz	π/2 BPSK	77.556
		QPSK	77.804
		16QAM	77.615
	70MHz	π/2 BPSK	64.547
		QPSK	67.772
		16QAM	67.723
	60MHz	π/2 BPSK	58.125
		QPSK	58.098
		16QAM	58.126
	50MHz	π/2 BPSK	45.949
		QPSK	47.812
		16QAM	47.848
	40MHz	π/2 BPSK	35.987
		QPSK	38.067
		16QAM	37.929
	30MHz	π/2 BPSK	27.031
		QPSK	27.973
		16QAM	28.031
	25MHz	π/2 BPSK	22.981
		QPSK	23.325
		16QAM	23.331
	20MHz	π/2 BPSK	18.030
		QPSK	18.351
		16QAM	18.366
	15MHz	π/2 BPSK	12.971
		QPSK	13.700
		16QAM	13.690
	10MHz	π/2 BPSK	8.594
		QPSK	8.692
		16QAM	8.661

Table 7-11. Occupied Bandwidth Results - Ant1 – C-Band – Main

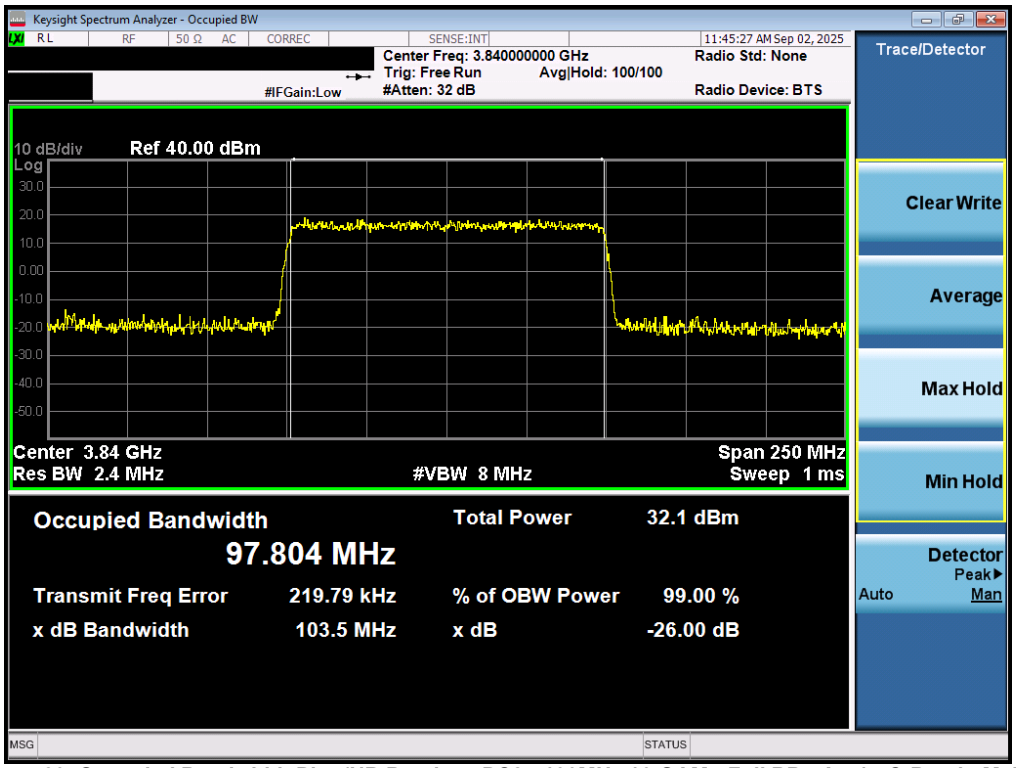
NR Band n77PC2 - Ant1 - C-Band - Main



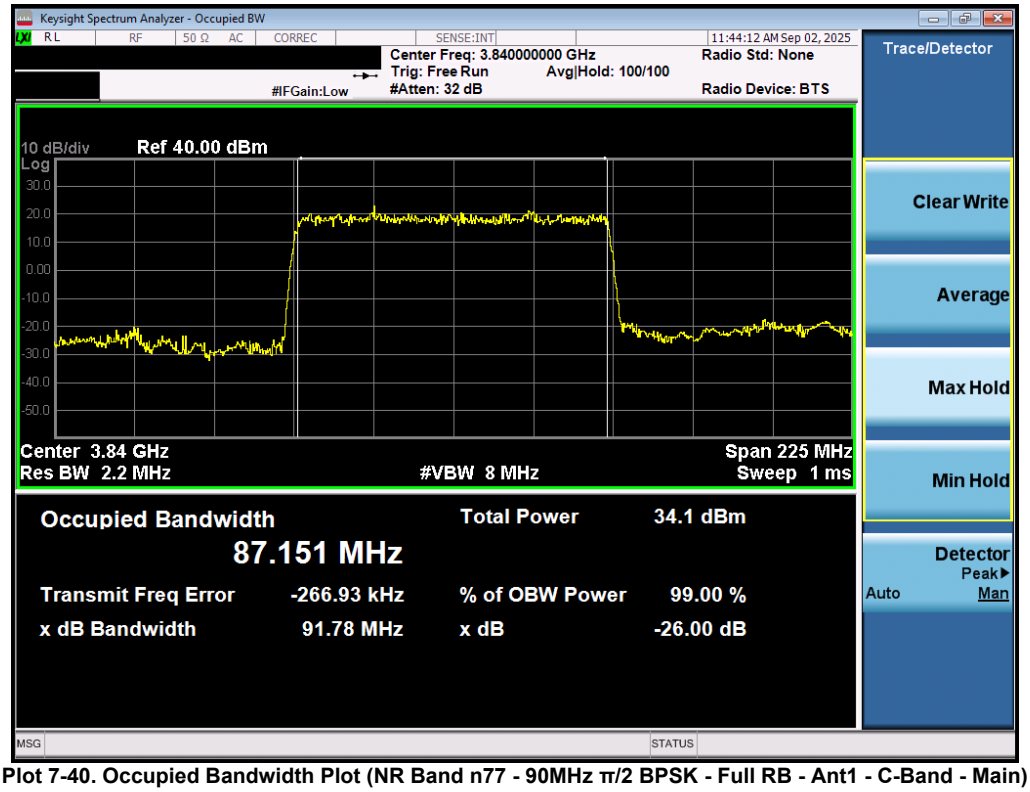
Plot 7-37. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



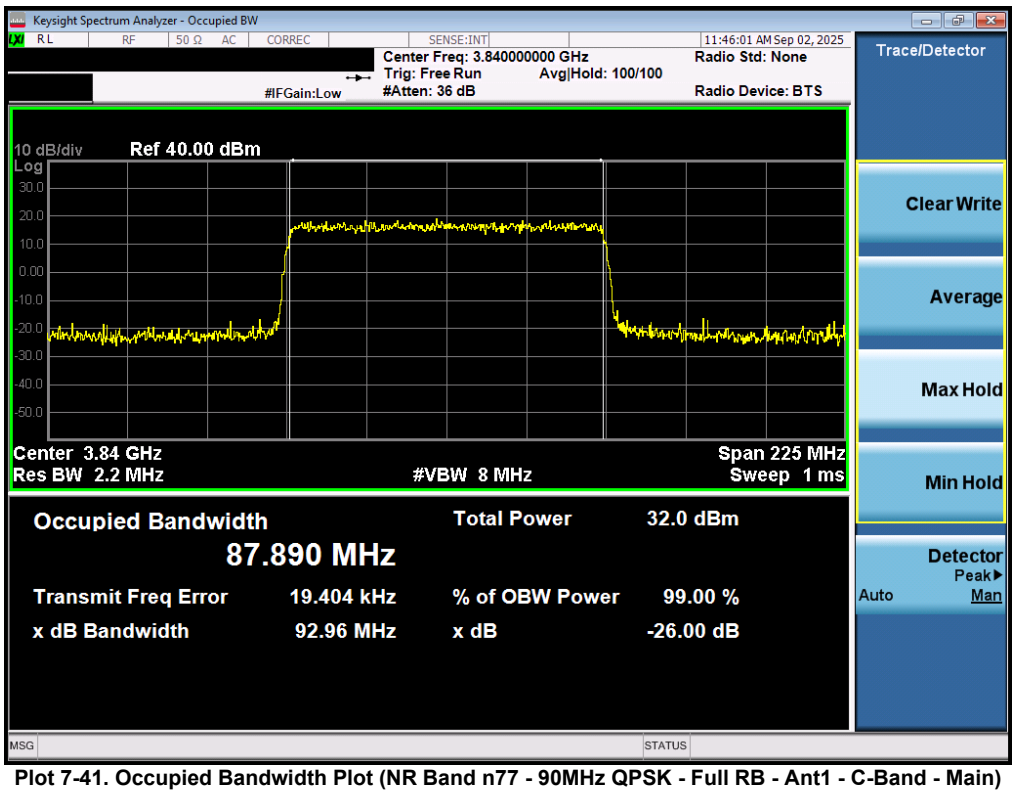
Plot 7-38. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz QPSK - Full RB - Ant1 - C-Band - Main)



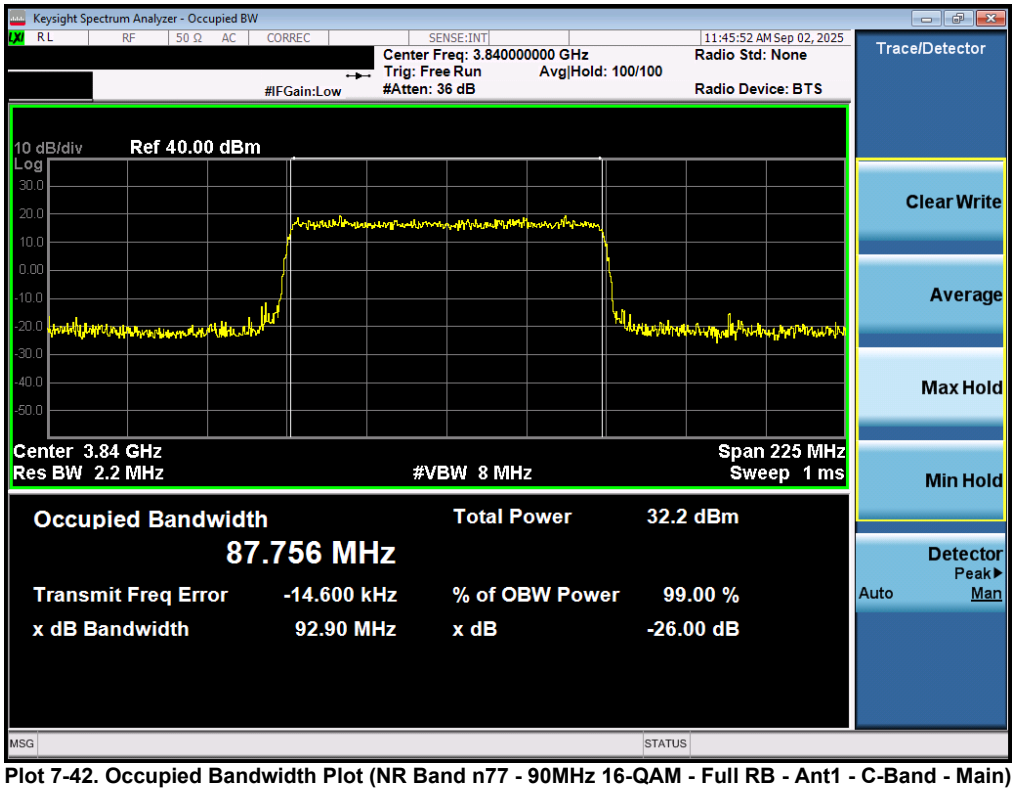
Plot 7-39. Occupied Bandwidth Plot (NR Band n77PC2 - 100MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



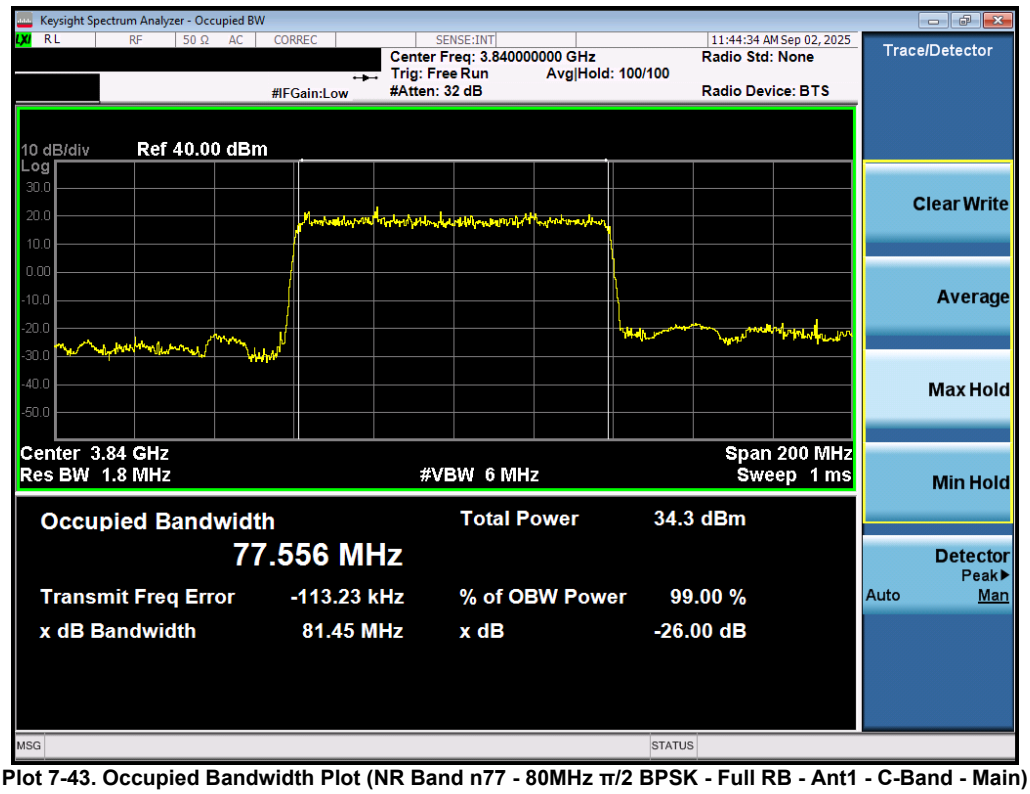
Plot 7-40. Occupied Bandwidth Plot (NR Band n77 - 90MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



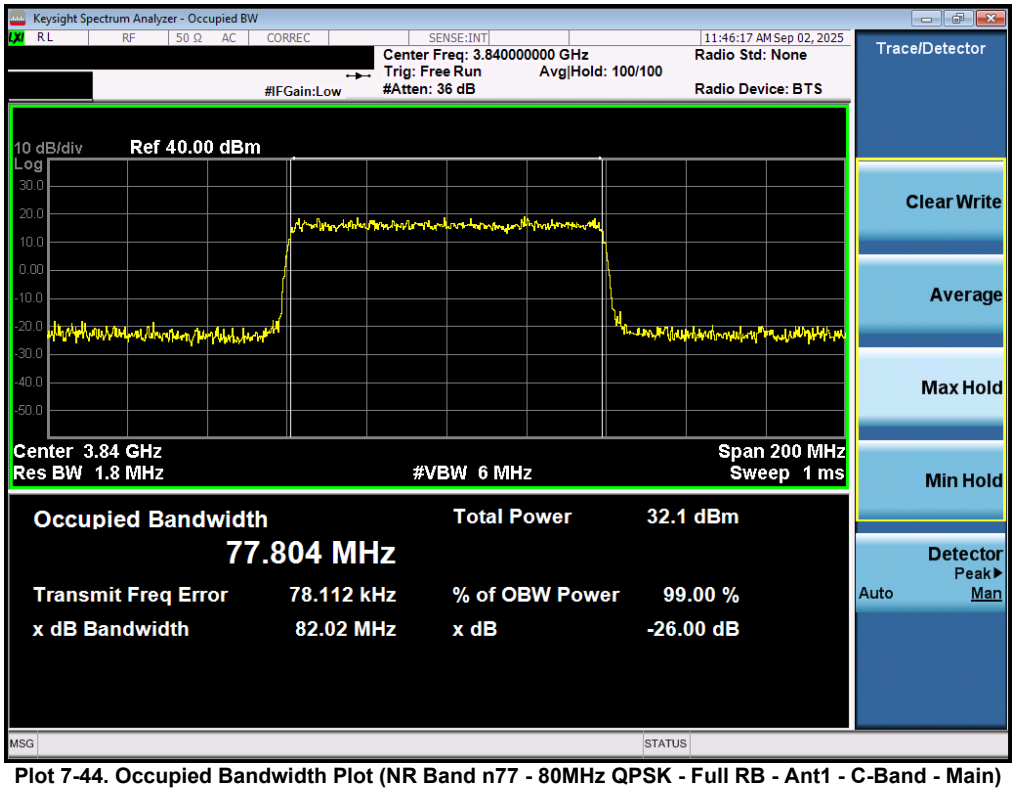
Plot 7-41. Occupied Bandwidth Plot (NR Band n77 - 90MHz QPSK - Full RB - Ant1 - C-Band - Main)



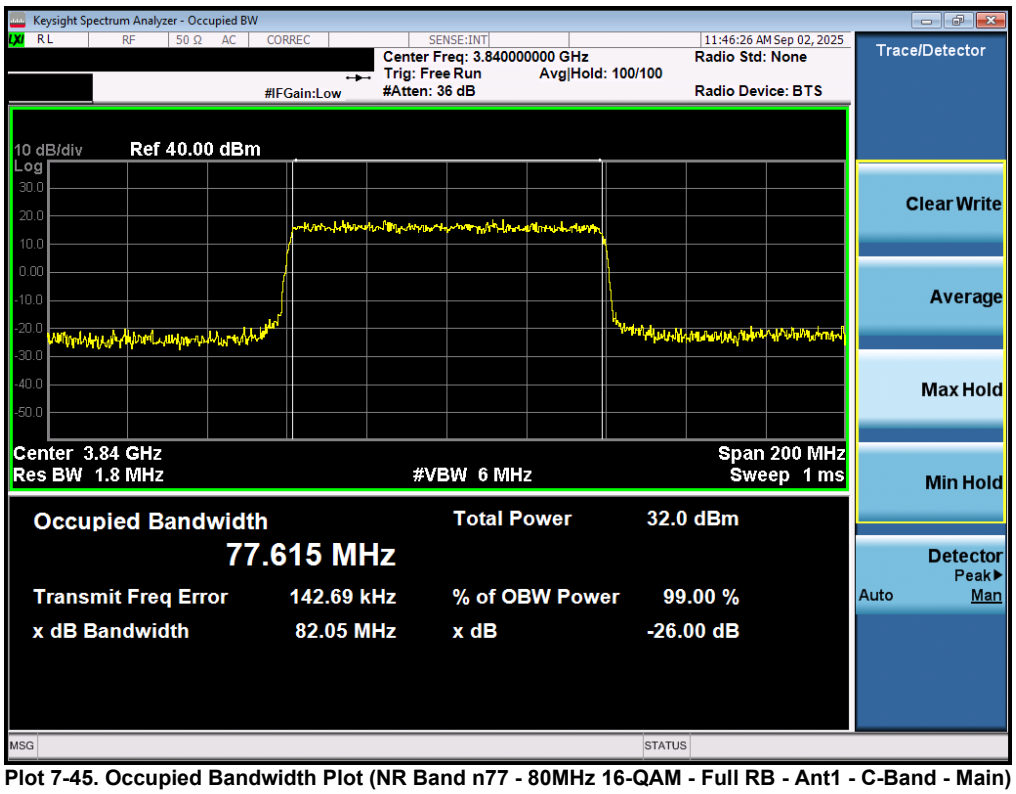
Plot 7-42. Occupied Bandwidth Plot (NR Band n77 - 90MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



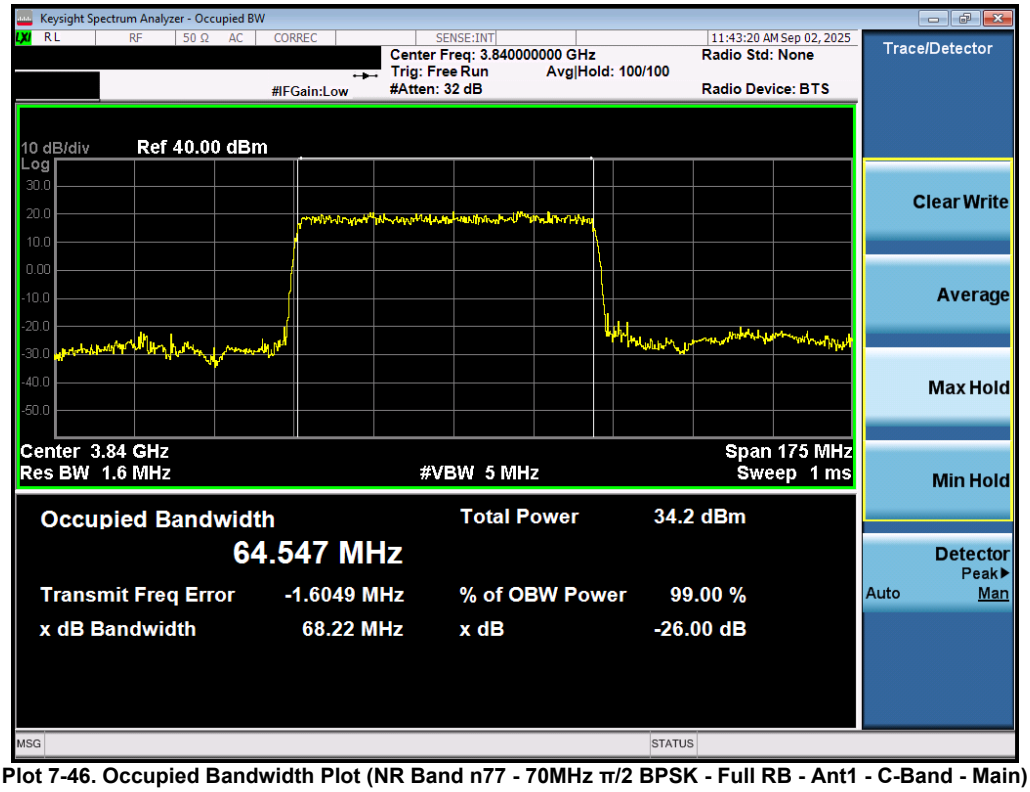
Plot 7-43. Occupied Bandwidth Plot (NR Band n77 - 80MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



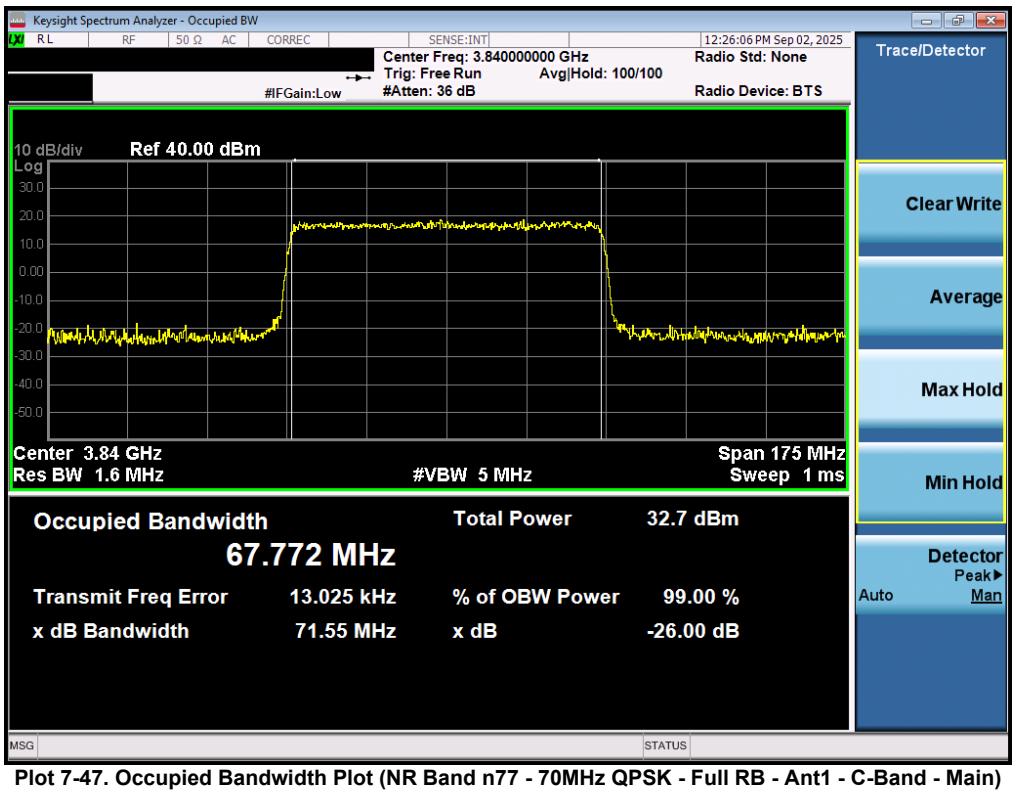
Plot 7-44. Occupied Bandwidth Plot (NR Band n77 - 80MHz QPSK - Full RB - Ant1 - C-Band - Main)



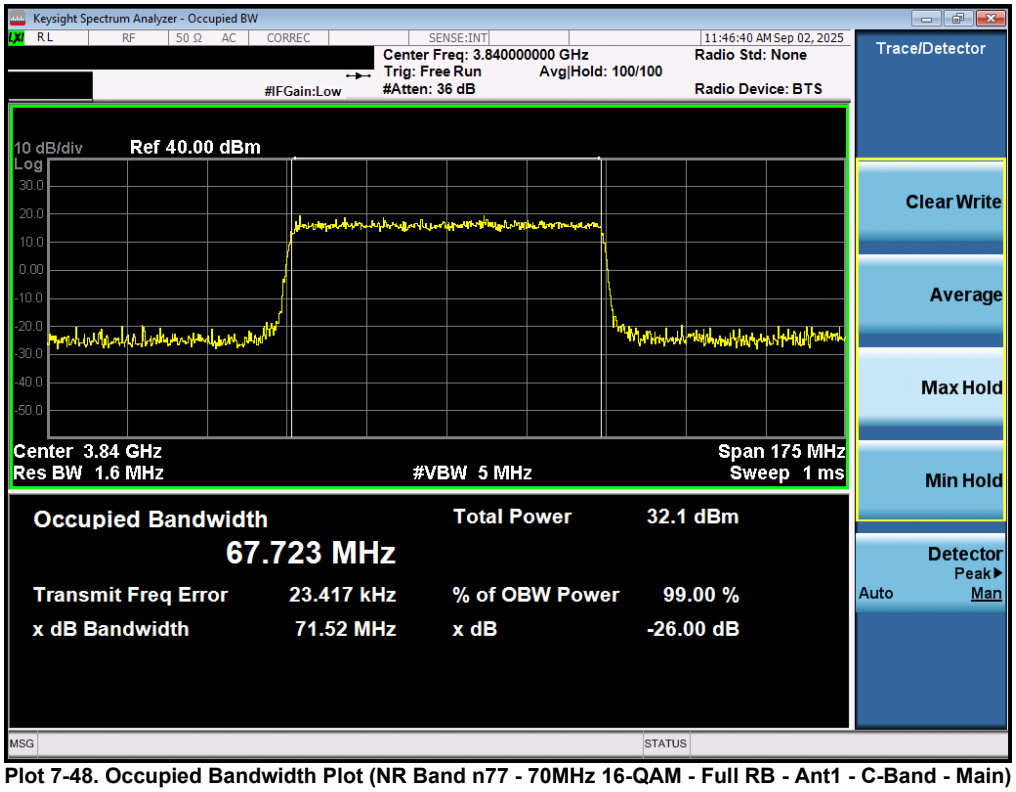
Plot 7-45. Occupied Bandwidth Plot (NR Band n77 - 80MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



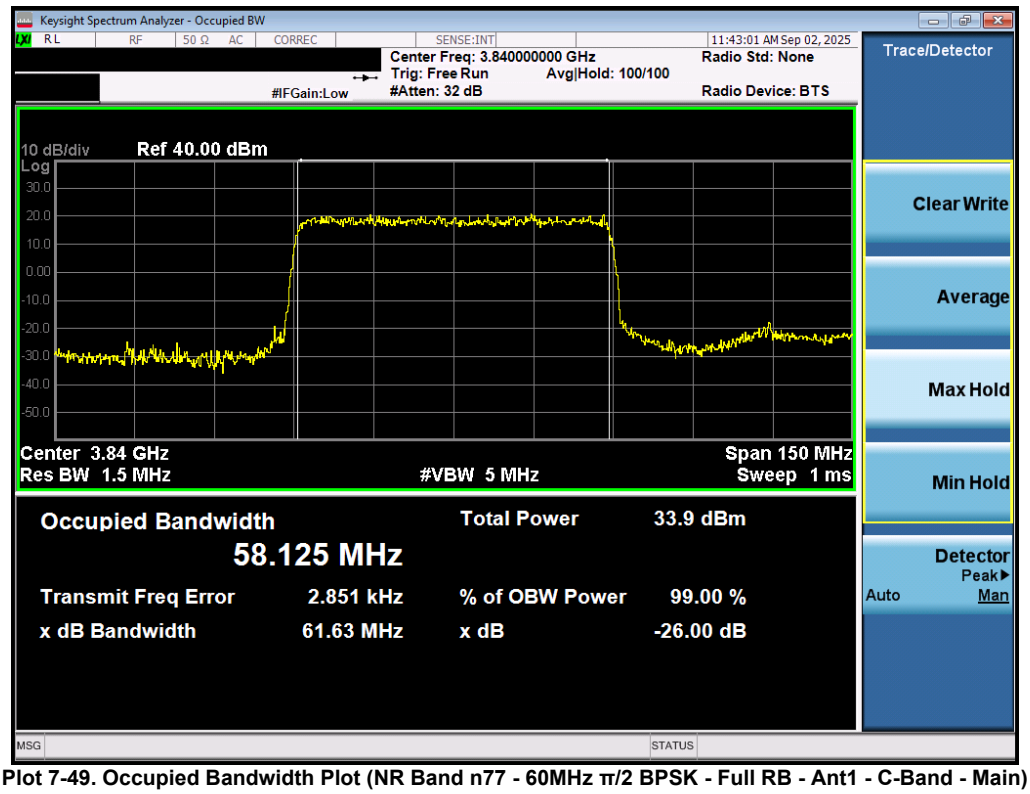
Plot 7-46. Occupied Bandwidth Plot (NR Band n77 - 70MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



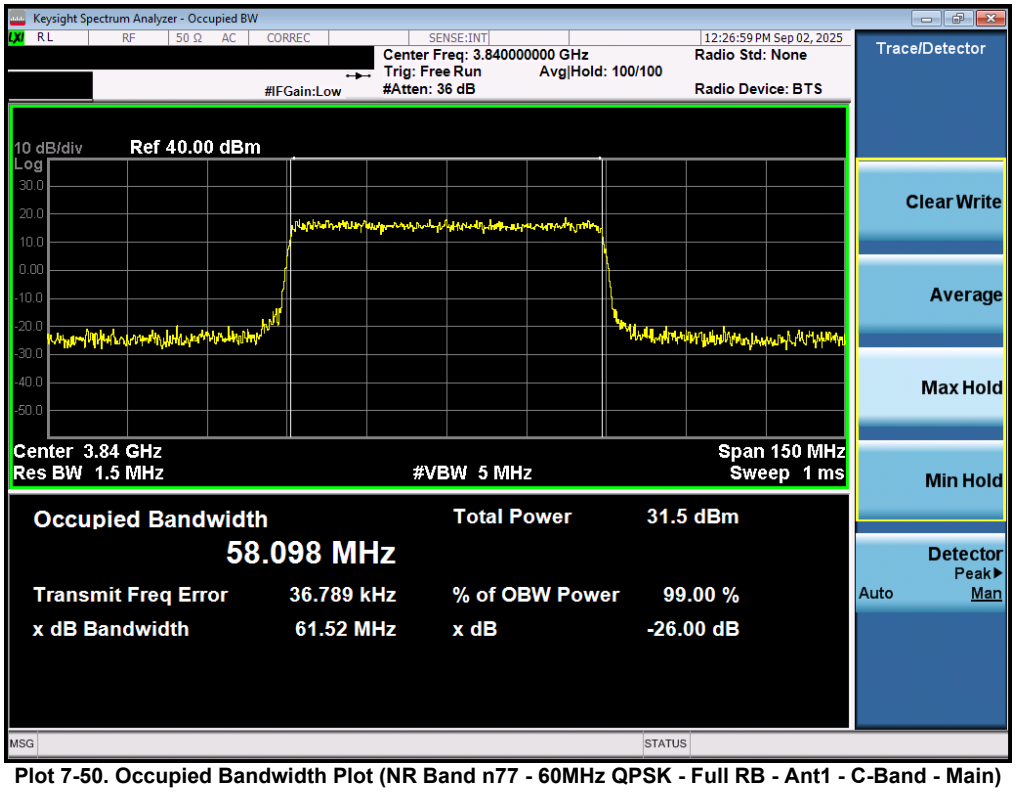
Plot 7-47. Occupied Bandwidth Plot (NR Band n77 - 70MHz QPSK - Full RB - Ant1 - C-Band - Main)



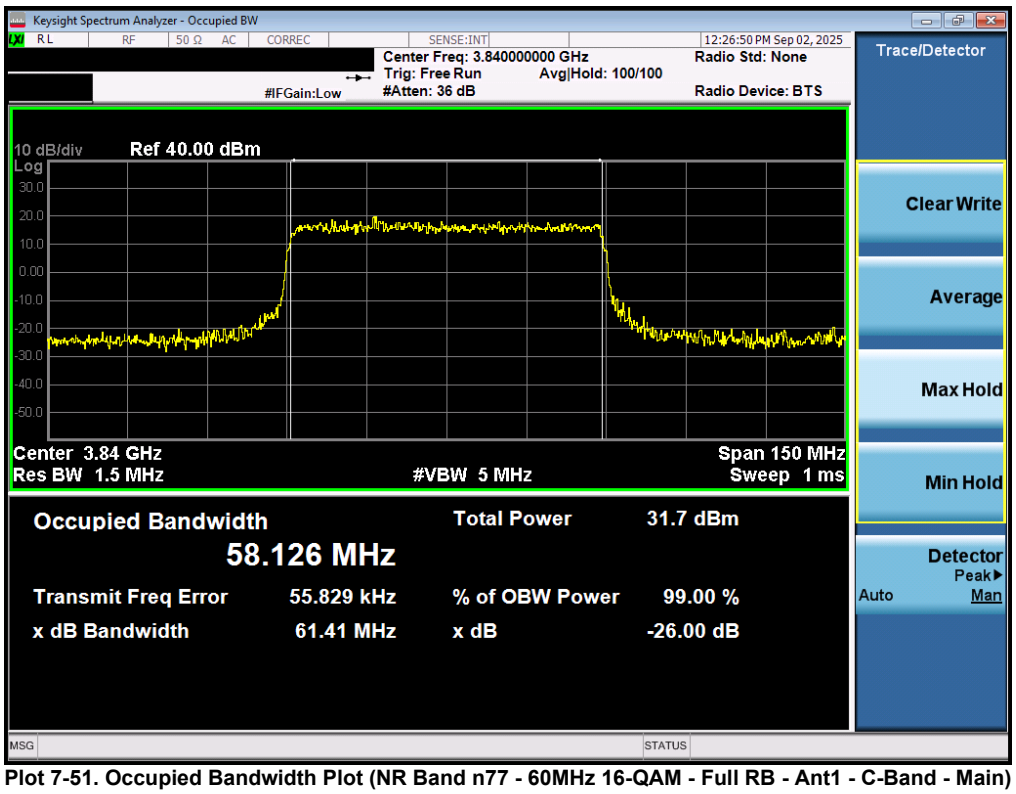
Plot 7-48. Occupied Bandwidth Plot (NR Band n77 - 70MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



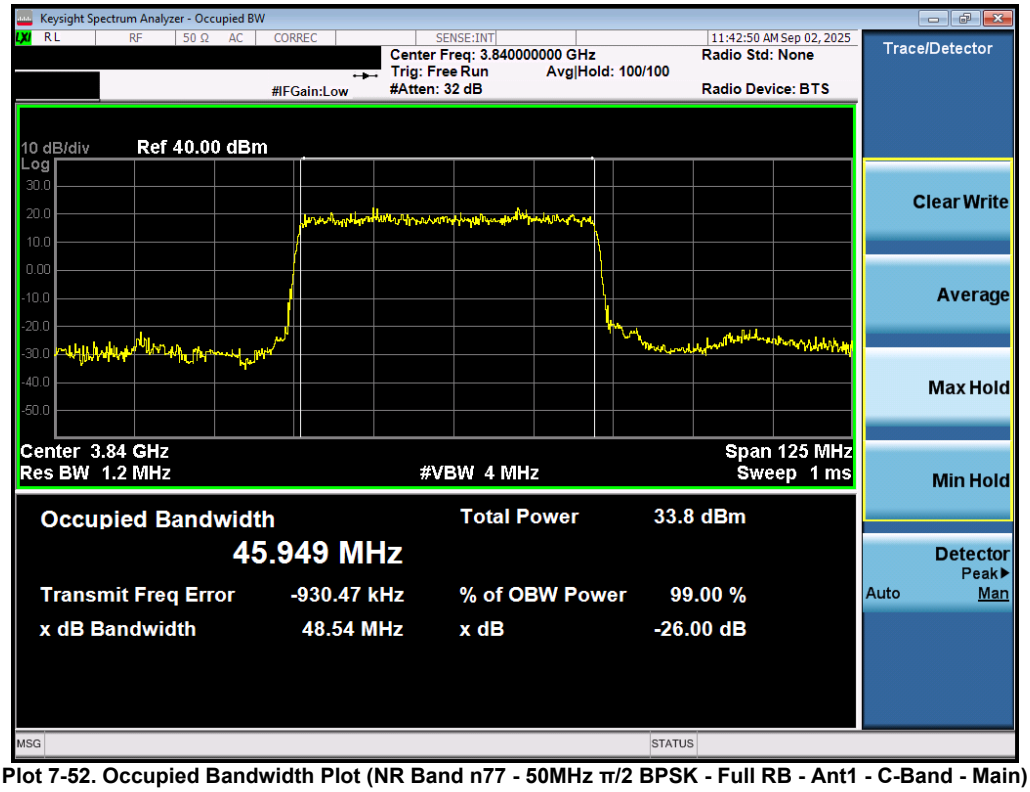
Plot 7-49. Occupied Bandwidth Plot (NR Band n77 - 60MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



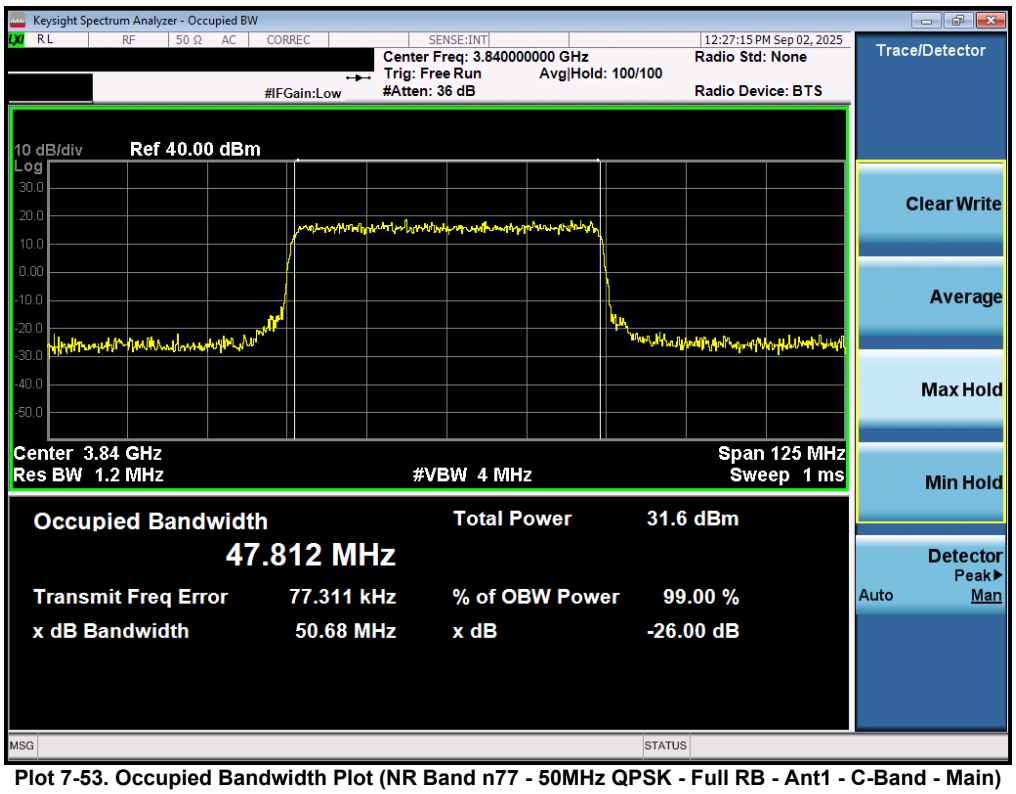
Plot 7-50. Occupied Bandwidth Plot (NR Band n77 - 60MHz QPSK - Full RB - Ant1 - C-Band - Main)



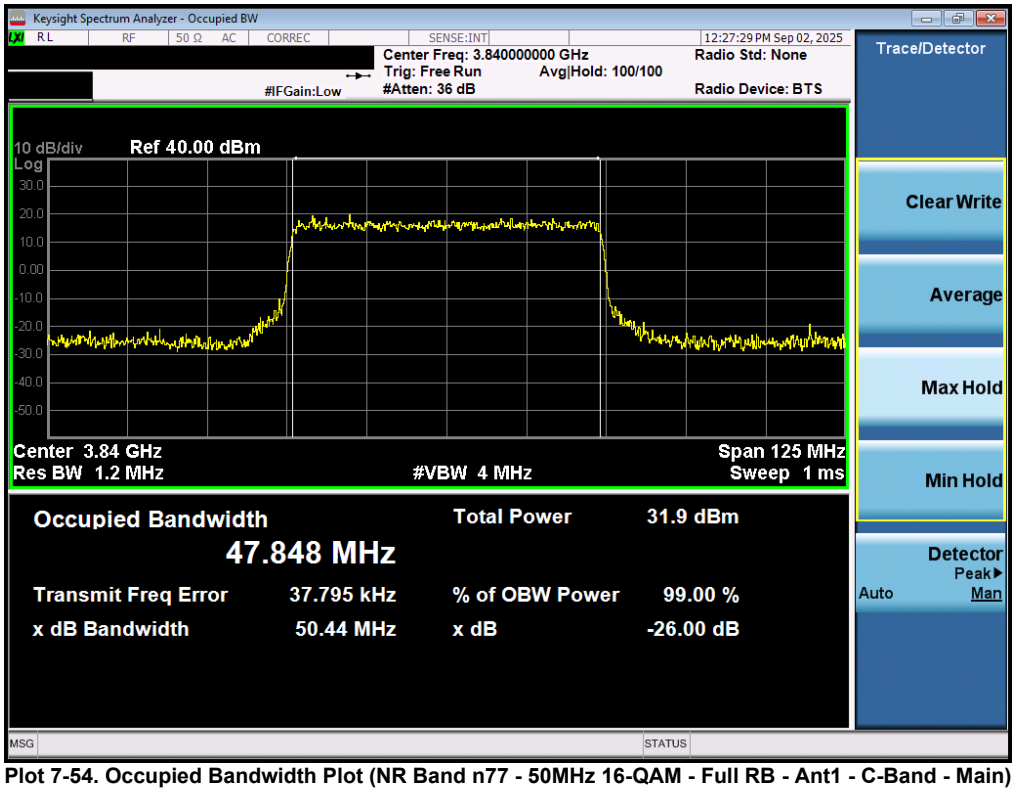
Plot 7-51. Occupied Bandwidth Plot (NR Band n77 - 60MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



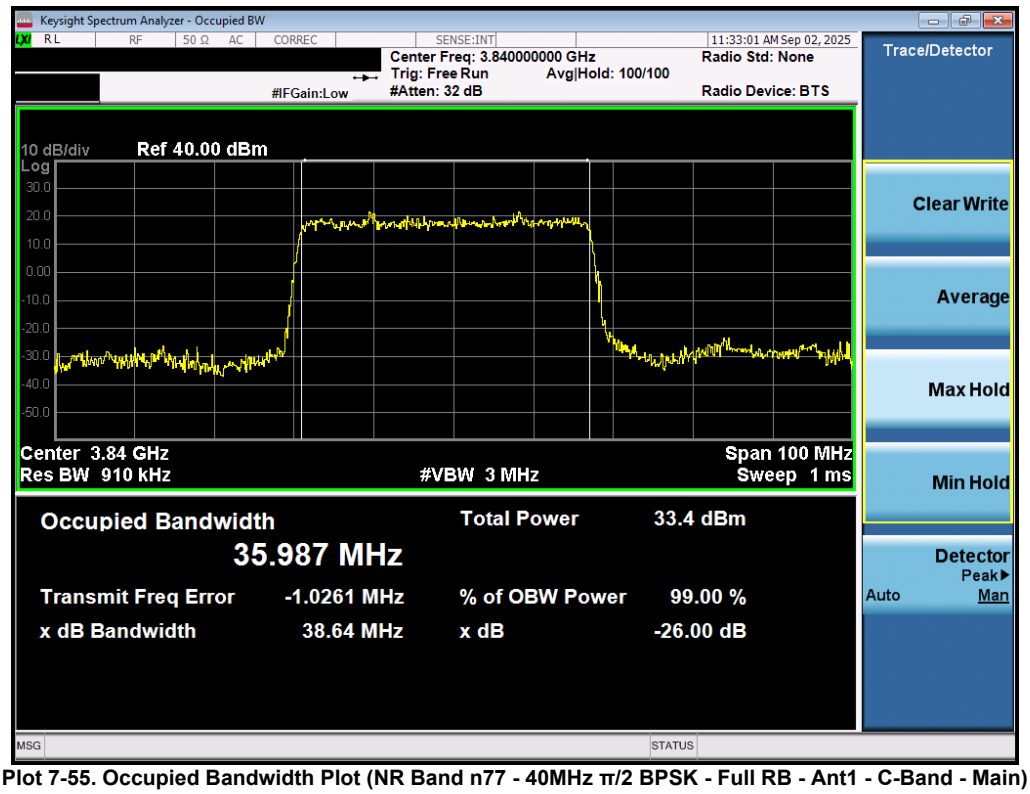
Plot 7-52. Occupied Bandwidth Plot (NR Band n77 - 50MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



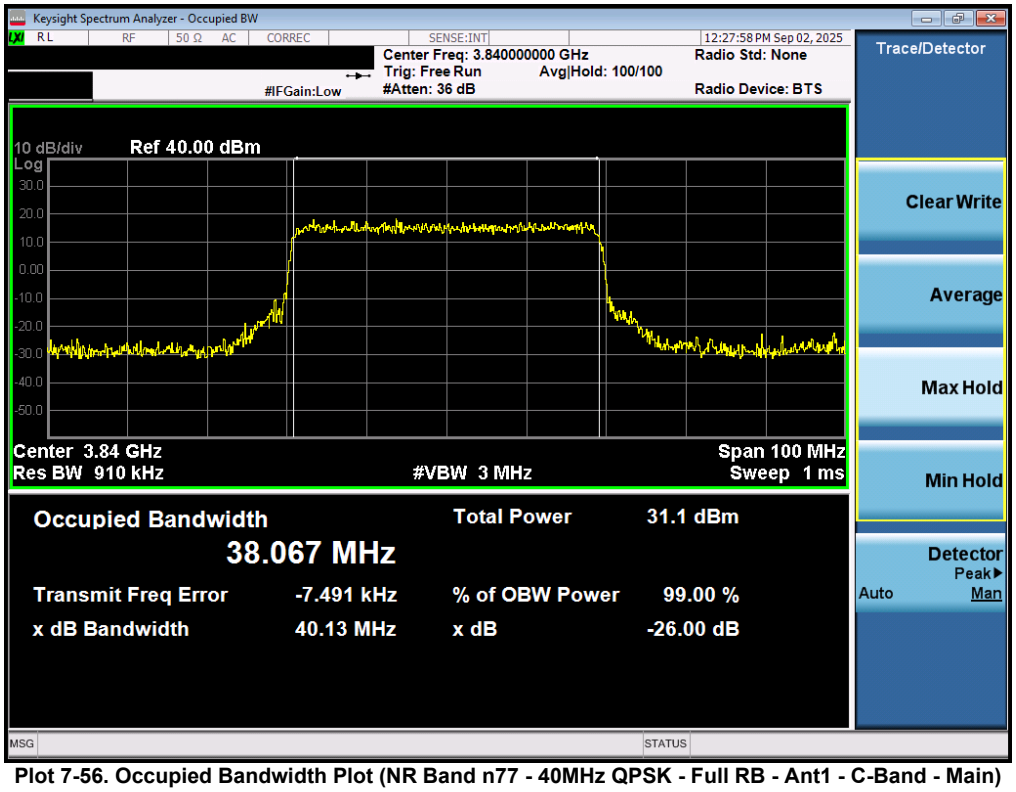
Plot 7-53. Occupied Bandwidth Plot (NR Band n77 - 50MHz QPSK - Full RB - Ant1 - C-Band - Main)



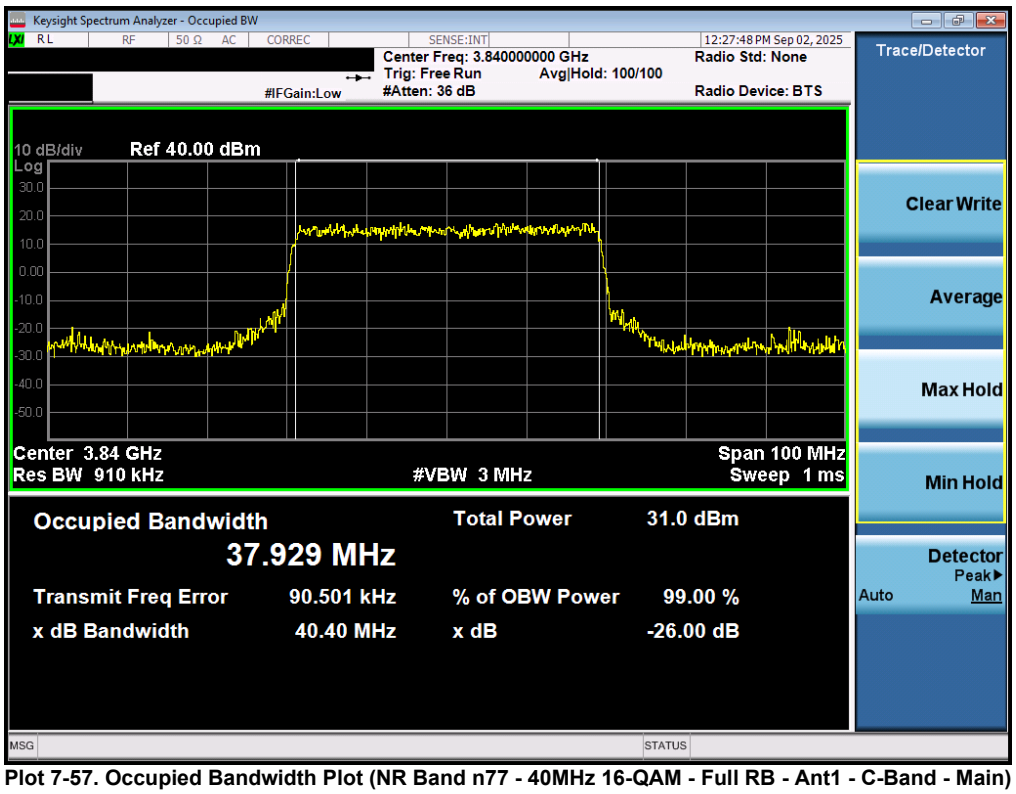
Plot 7-54. Occupied Bandwidth Plot (NR Band n77 - 50MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



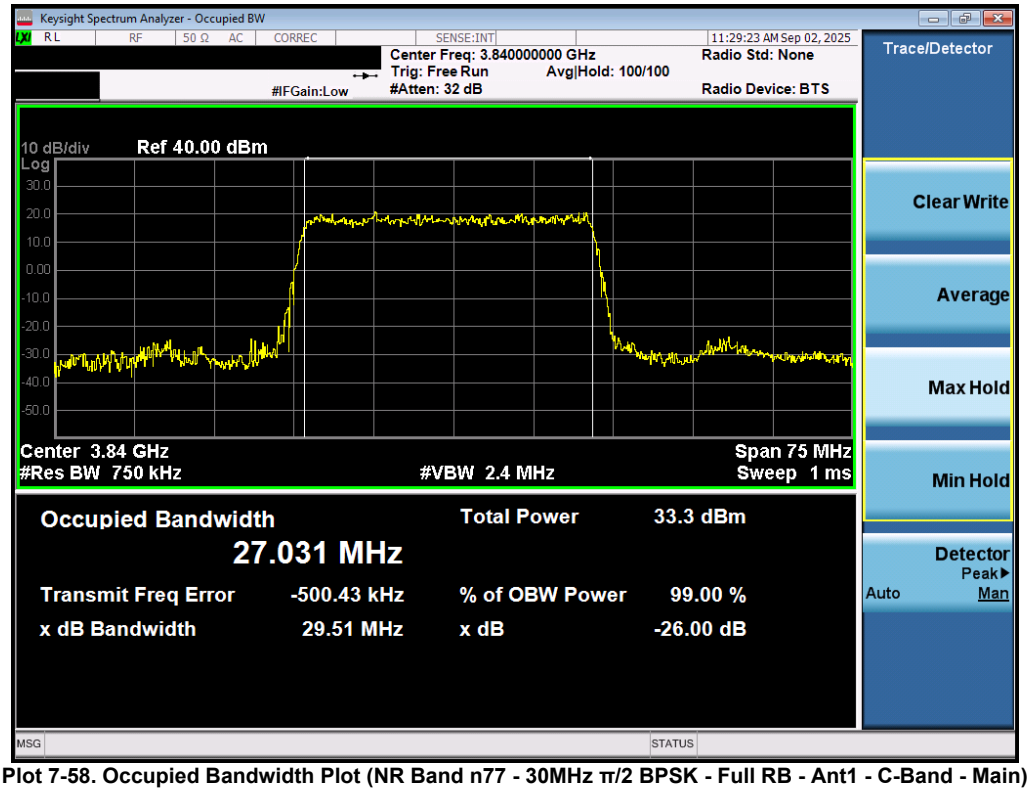
Plot 7-55. Occupied Bandwidth Plot (NR Band n77 - 40MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



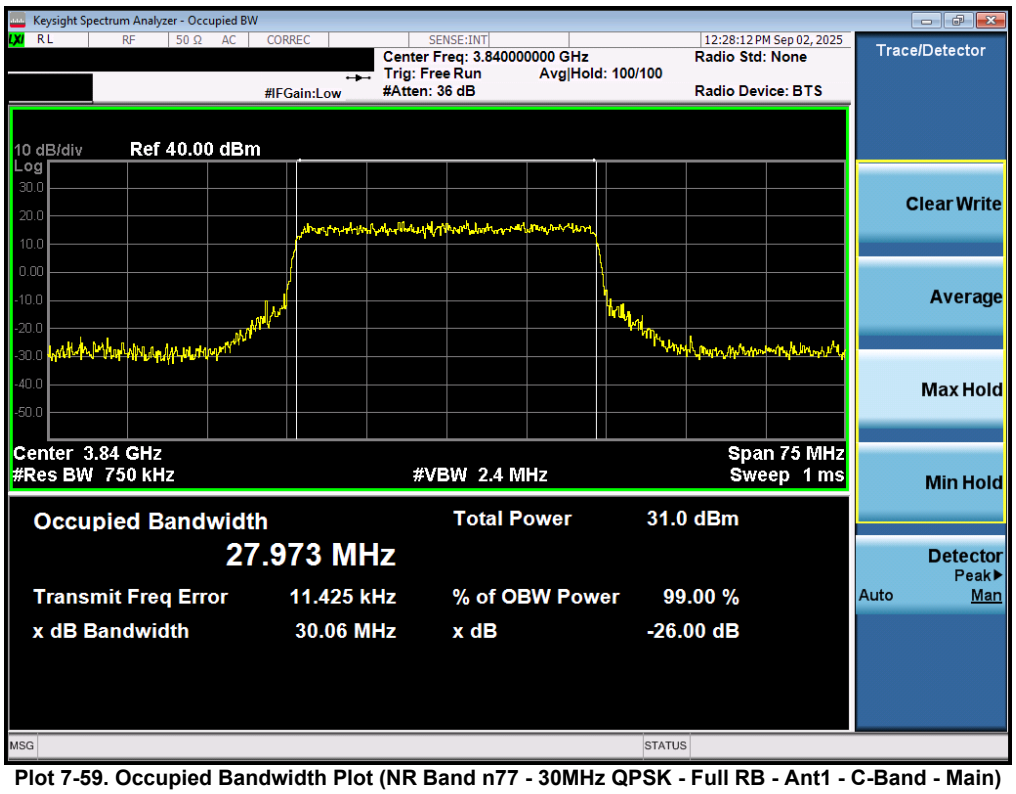
Plot 7-56. Occupied Bandwidth Plot (NR Band n77 - 40MHz QPSK - Full RB - Ant1 - C-Band - Main)



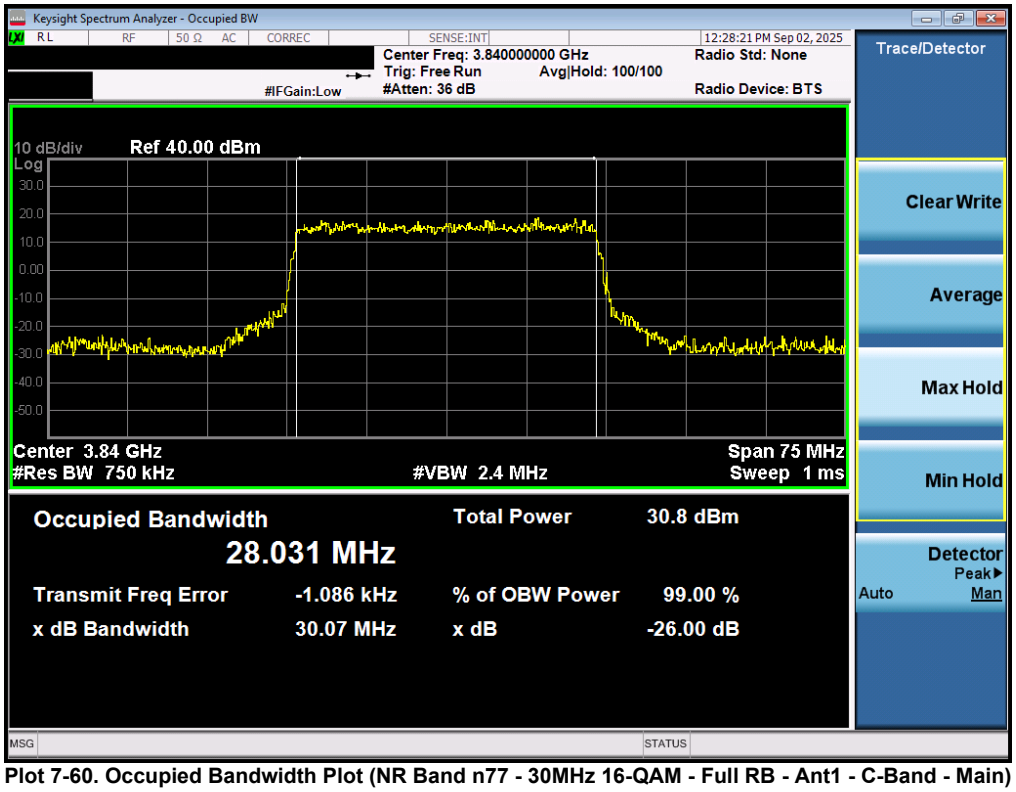
Plot 7-57. Occupied Bandwidth Plot (NR Band n77 - 40MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



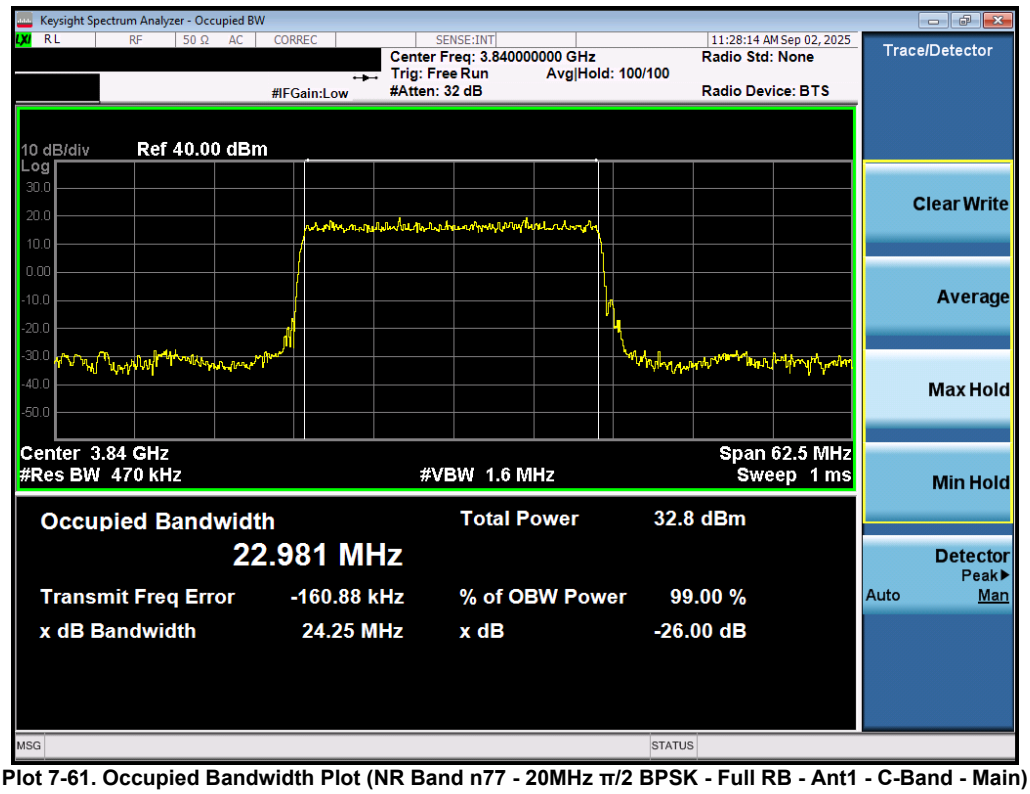
Plot 7-58. Occupied Bandwidth Plot (NR Band n77 - 30MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



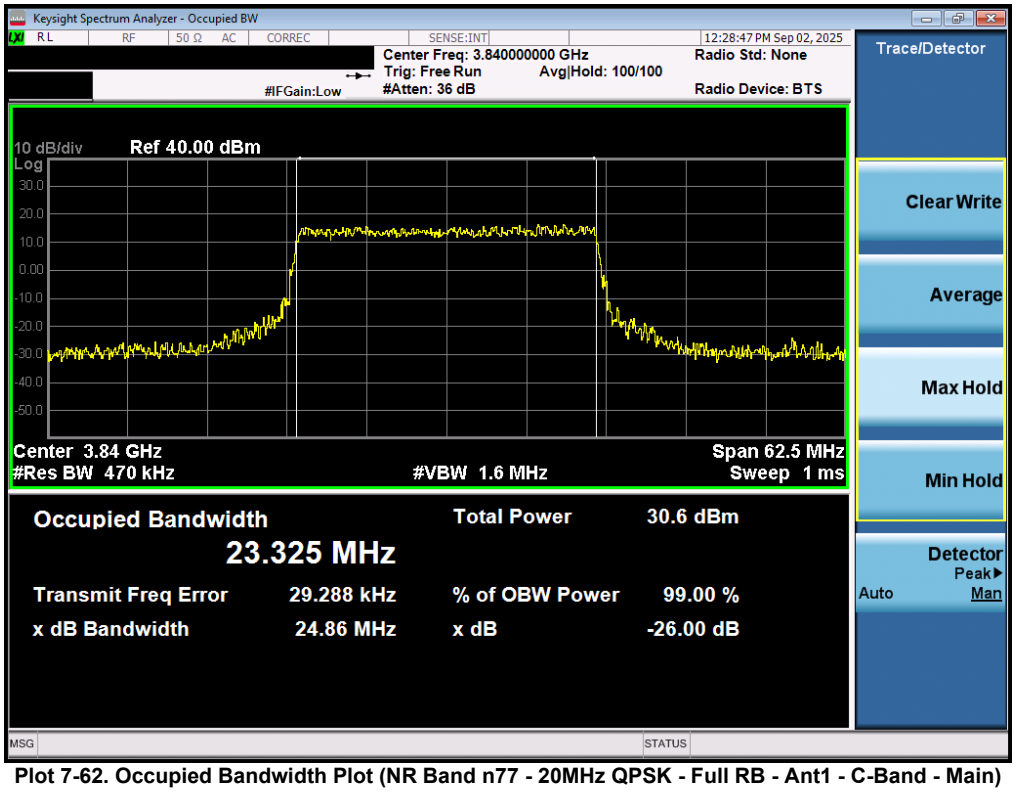
Plot 7-59. Occupied Bandwidth Plot (NR Band n77 - 30MHz QPSK - Full RB - Ant1 - C-Band - Main)



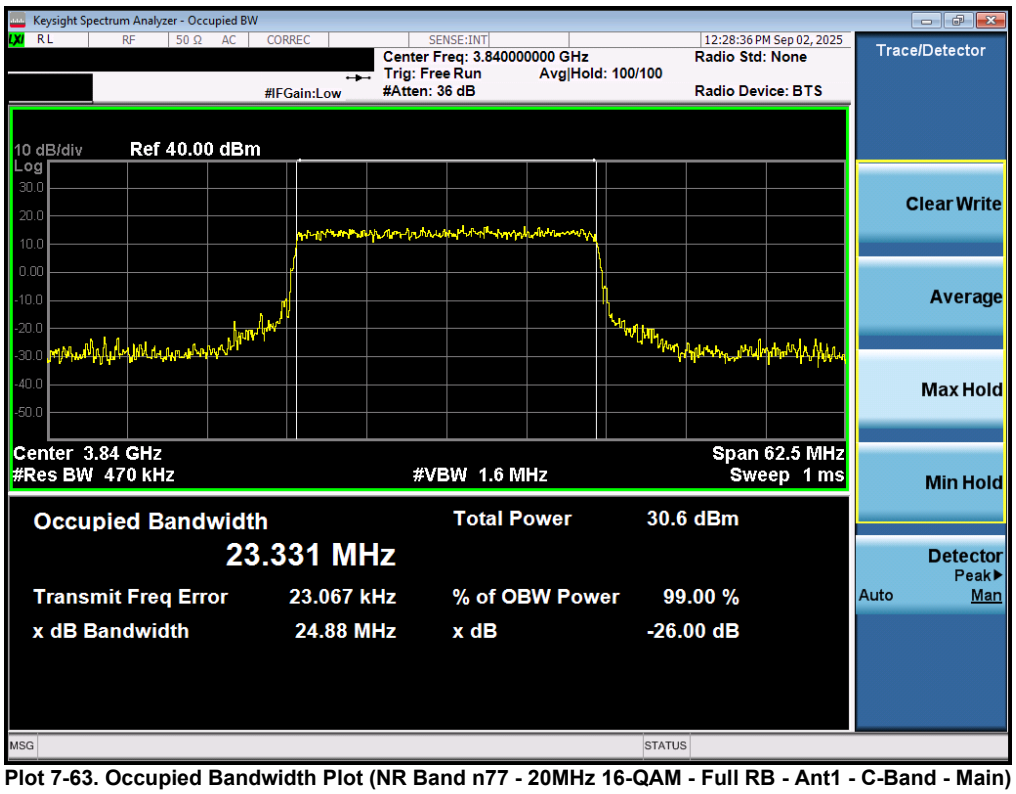
Plot 7-60. Occupied Bandwidth Plot (NR Band n77 - 30MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



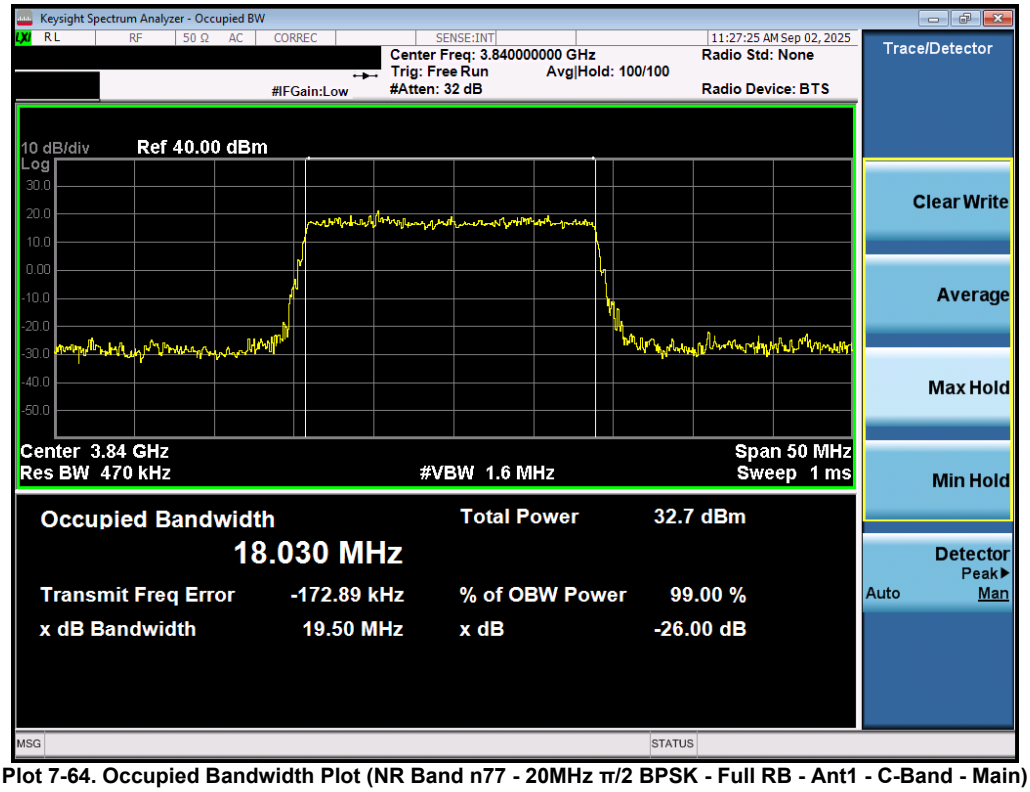
Plot 7-61. Occupied Bandwidth Plot (NR Band n77 - 20MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



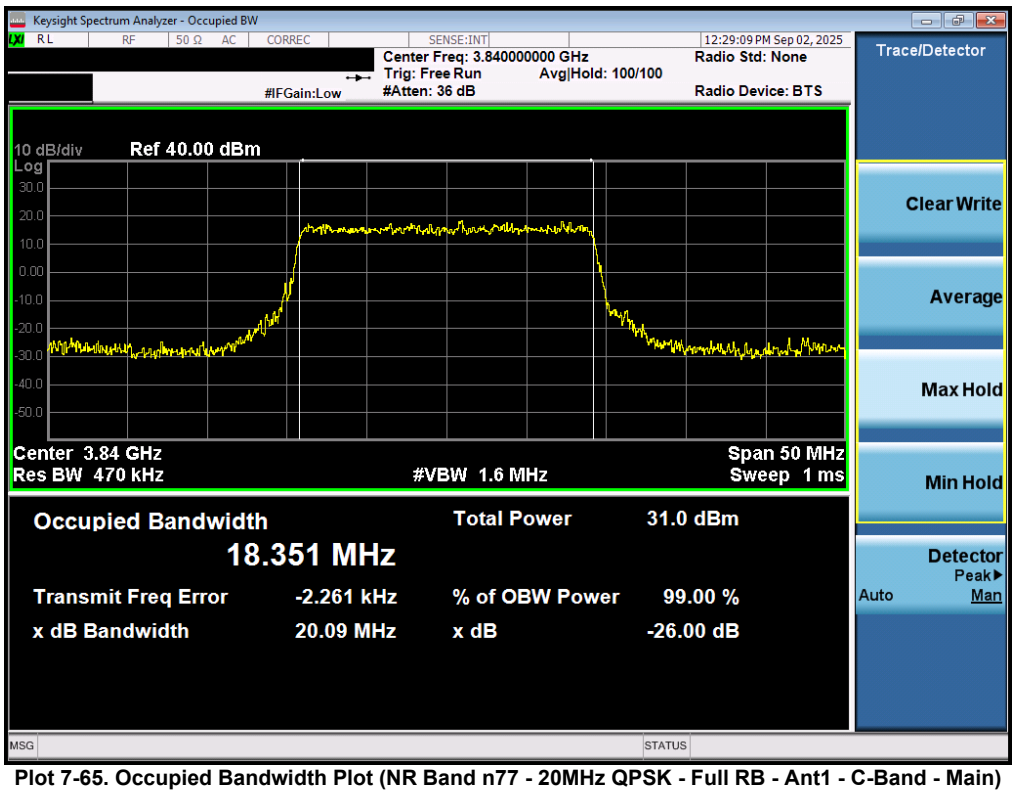
Plot 7-62. Occupied Bandwidth Plot (NR Band n77 - 20MHz QPSK - Full RB - Ant1 - C-Band - Main)



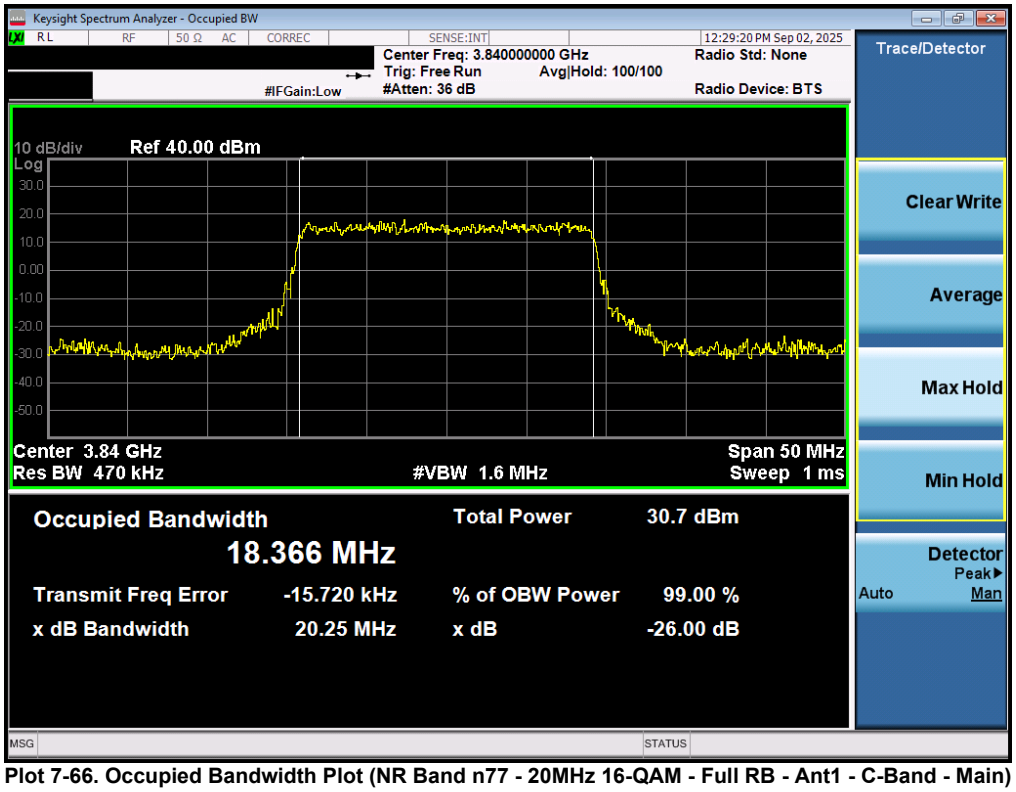
Plot 7-63. Occupied Bandwidth Plot (NR Band n77 - 20MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



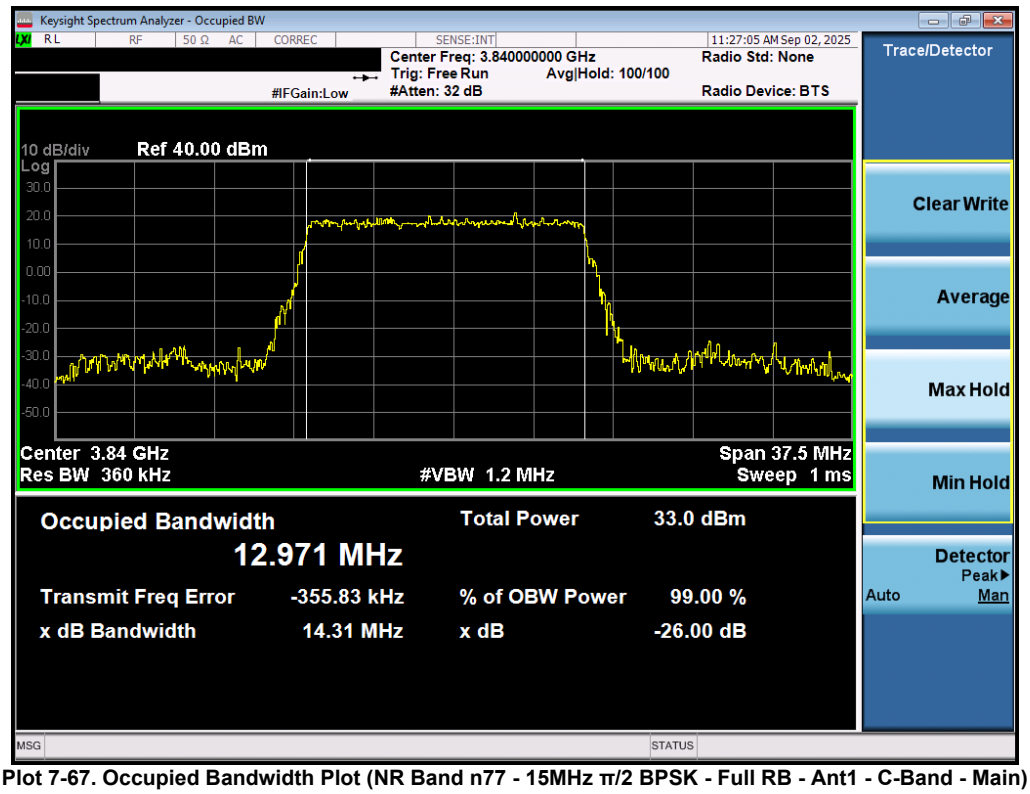
Plot 7-64. Occupied Bandwidth Plot (NR Band n77 - 20MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



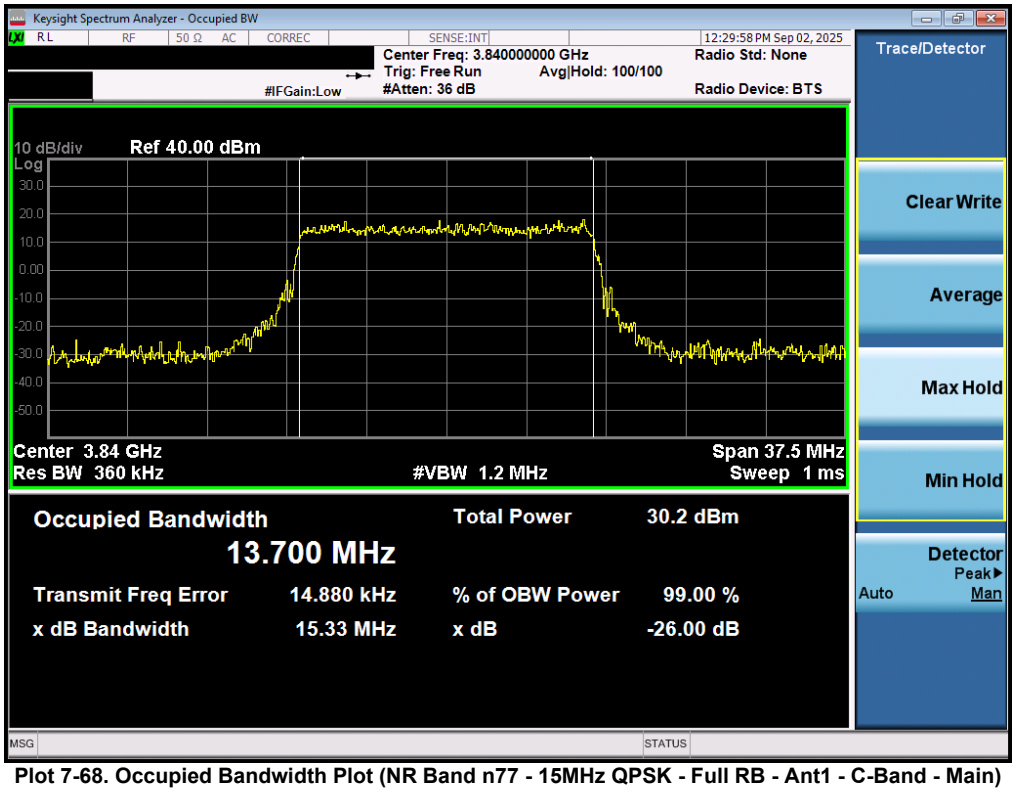
Plot 7-65. Occupied Bandwidth Plot (NR Band n77 - 20MHz QPSK - Full RB - Ant1 - C-Band - Main)



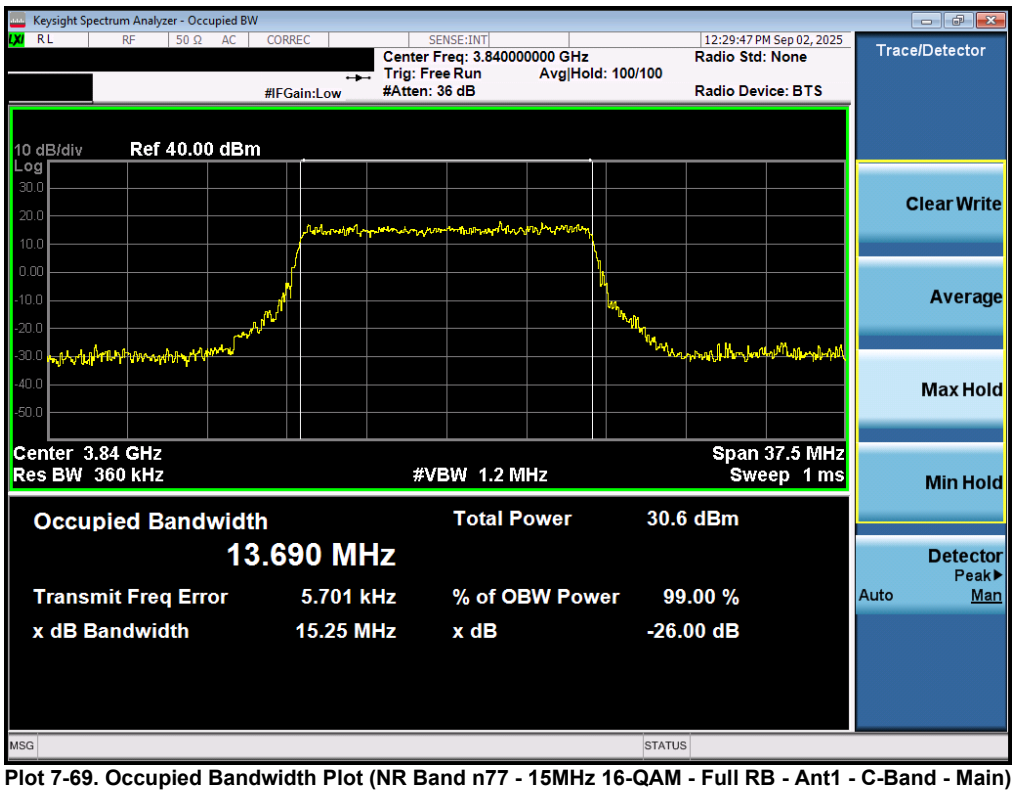
Plot 7-66. Occupied Bandwidth Plot (NR Band n77 - 20MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



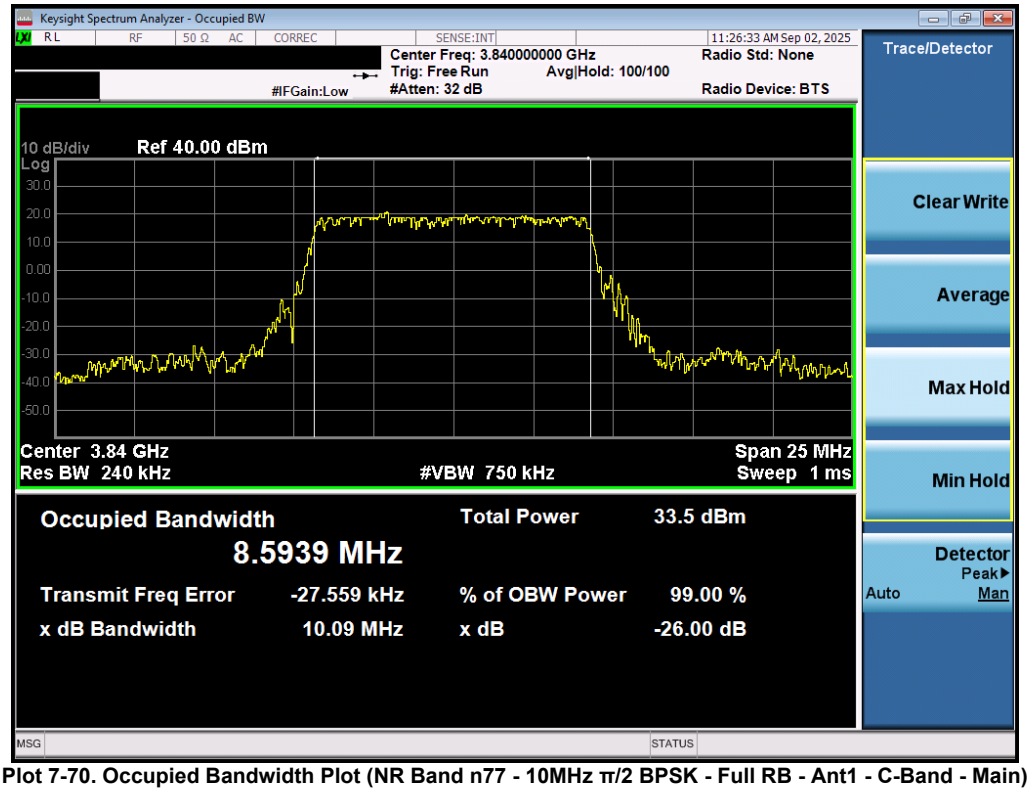
Plot 7-67. Occupied Bandwidth Plot (NR Band n77 - 15MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



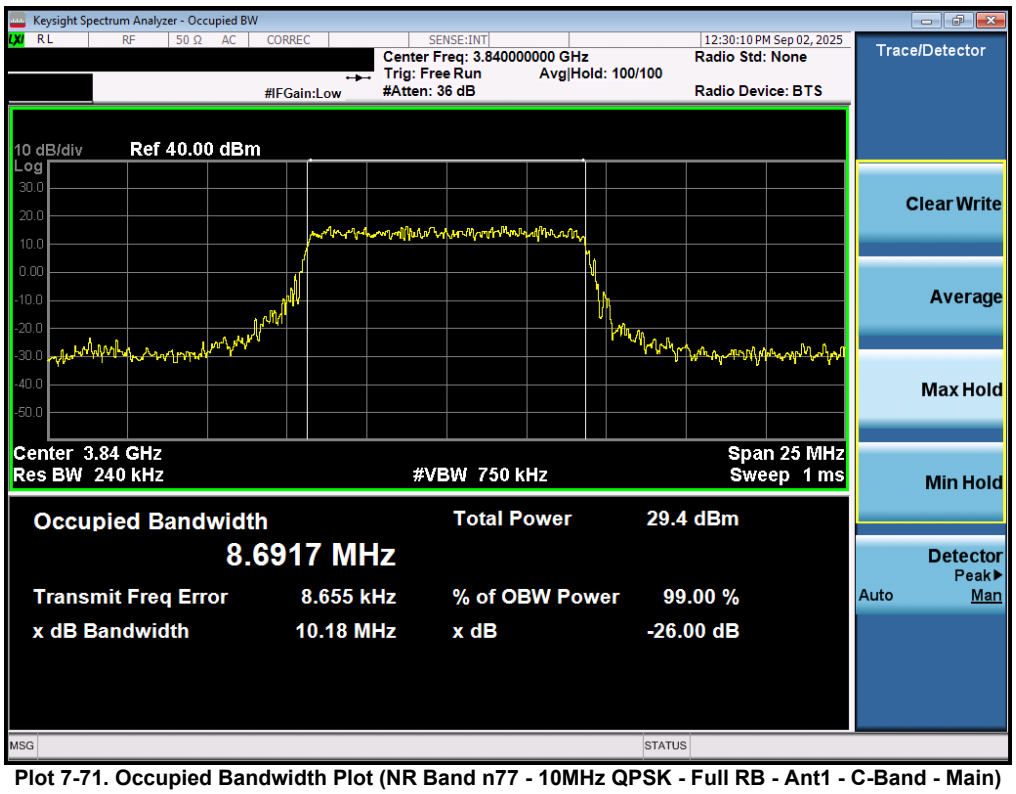
Plot 7-68. Occupied Bandwidth Plot (NR Band n77 - 15MHz QPSK - Full RB - Ant1 - C-Band - Main)



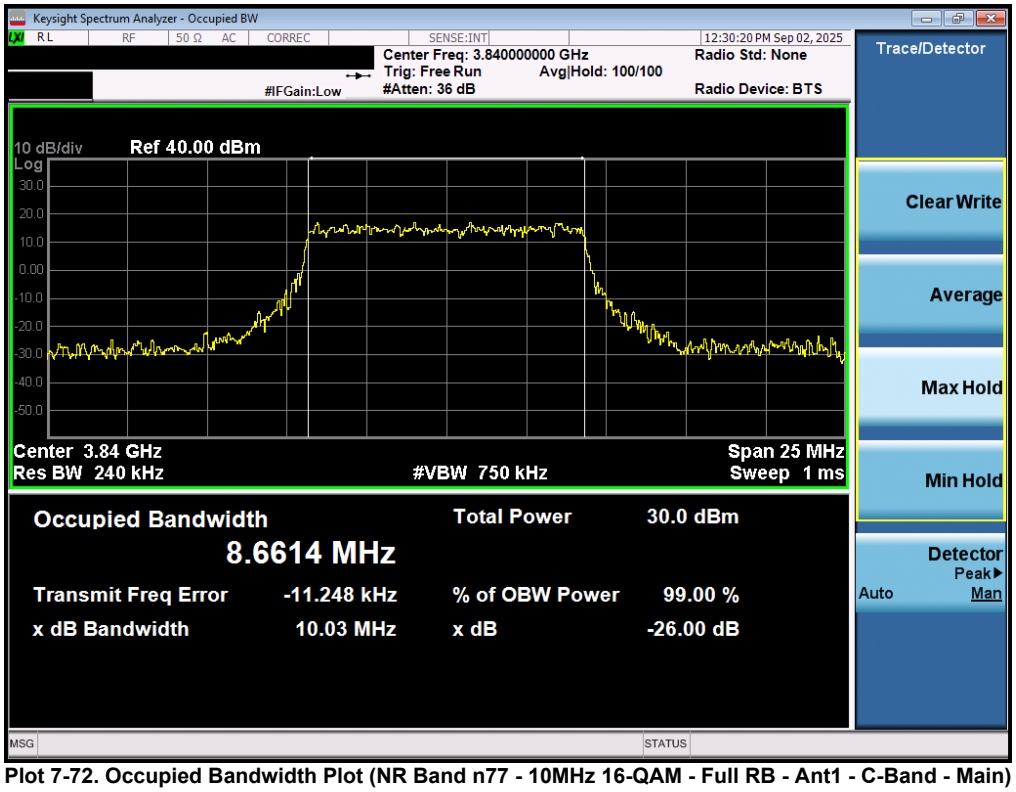
Plot 7-69. Occupied Bandwidth Plot (NR Band n77 - 15MHz 16-QAM - Full RB - Ant1 - C-Band - Main)



Plot 7-70. Occupied Bandwidth Plot (NR Band n77 - 10MHz π/2 BPSK - Full RB - Ant1 - C-Band - Main)



Plot 7-71. Occupied Bandwidth Plot (NR Band n77 - 10MHz QPSK - Full RB - Ant1 - C-Band - Main)



Plot 7-72. Occupied Bandwidth Plot (NR Band n77 - 10MHz 16-QAM - Full RB - Ant1 - C-Band - Main)

7.4 Spurious and Harmonic Emissions at Antenna Terminal

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates 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.

For operations in the 3700 – 3980MHz band and the 3450 – 3550MHz band, the maximum permissible conducted power level of any spurious emission is -13dBm/MHz.

Test Procedure Used

ANSI C63.26:2015 – Section 5.7.4

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to the tenth harmonic of the highest transmit frequency (separated into at least two plots per channel)
2. Detector = RMS
3. Trace mode = trace average for continuous emissions, max hold for pulse emissions
4. Sweep time = auto couple
5. The trace was allowed to stabilize
6. Please see test notes below for RBW and VBW settings

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

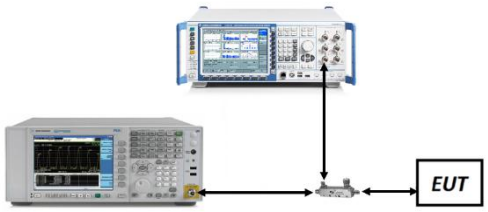


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per Part 27.53(l), Part 27.53(n), compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.

2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

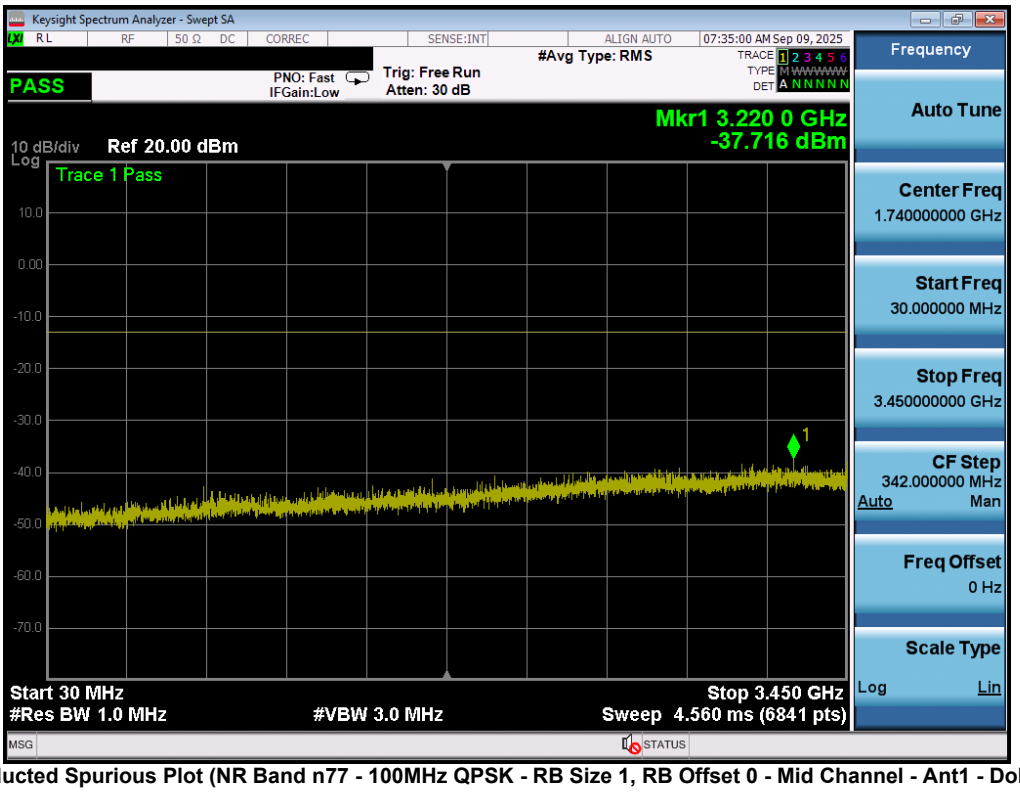
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77 PC2 DoD Band	100MHz	Mid	30.0 - 3450.0	-37.72	-13	-24.72
		Mid	3550.0 - 20000.0	-31.58	-13	-18.58
		Mid	20000.0 - 40000.0	-41.72	-13	-28.72

Table 7-12. Conducted Spurious Results – n77 – Ant1 – DoD Band – Main

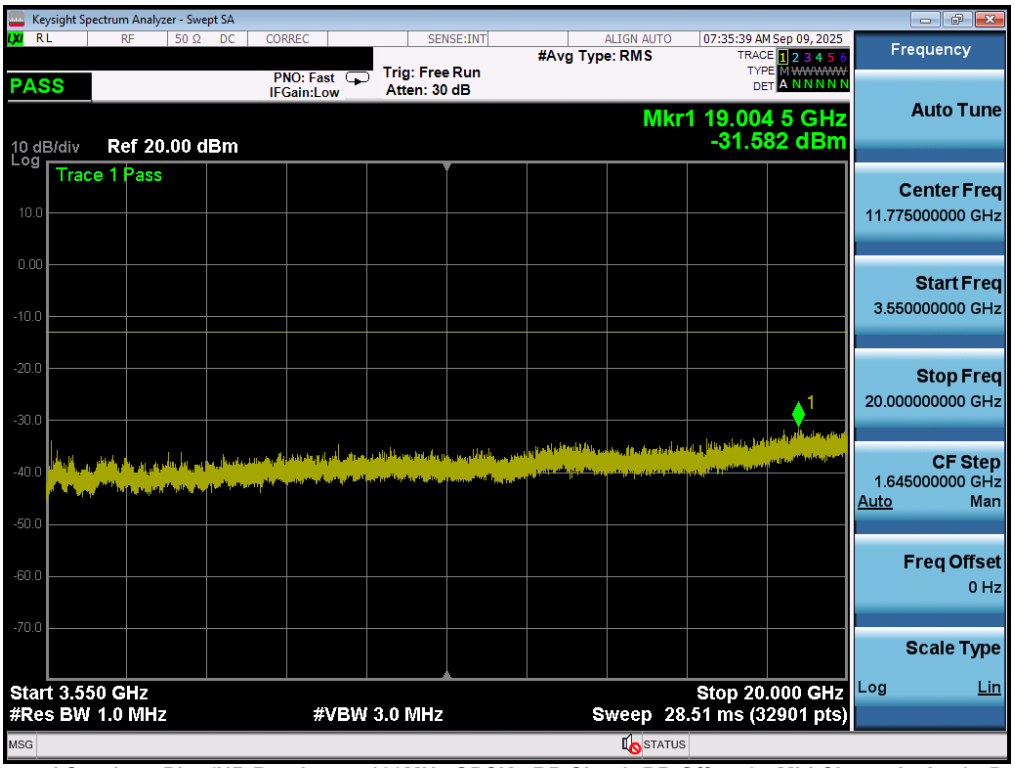
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77 PC2 C Band	100MHz	Low	30.0 - 3700.0	-33.11	-13	-20.11
		Low	3980.0 - 20000.0	-30.41	-13	-17.41
		Low	20000.0 - 40000.0	-41.09	-13	-28.09
		Mid	30.0 - 3700.0	-37.93	-13	-24.93
		Mid	3980.0 - 20000.0	-30.82	-13	-17.82
		Mid	20000.0 - 40000.0	-41.26	-13	-28.26
		High	30.0 - 3700.0	-38.7	-13	-25.70
		High	3980.0 - 20000.0	-31.17	-13	-18.17
		High	20000.0 - 40000.0	-41.74	-13	-28.74

Table 7-13. Conducted Spurious Results – n77 – Ant1 – C-Band – Main

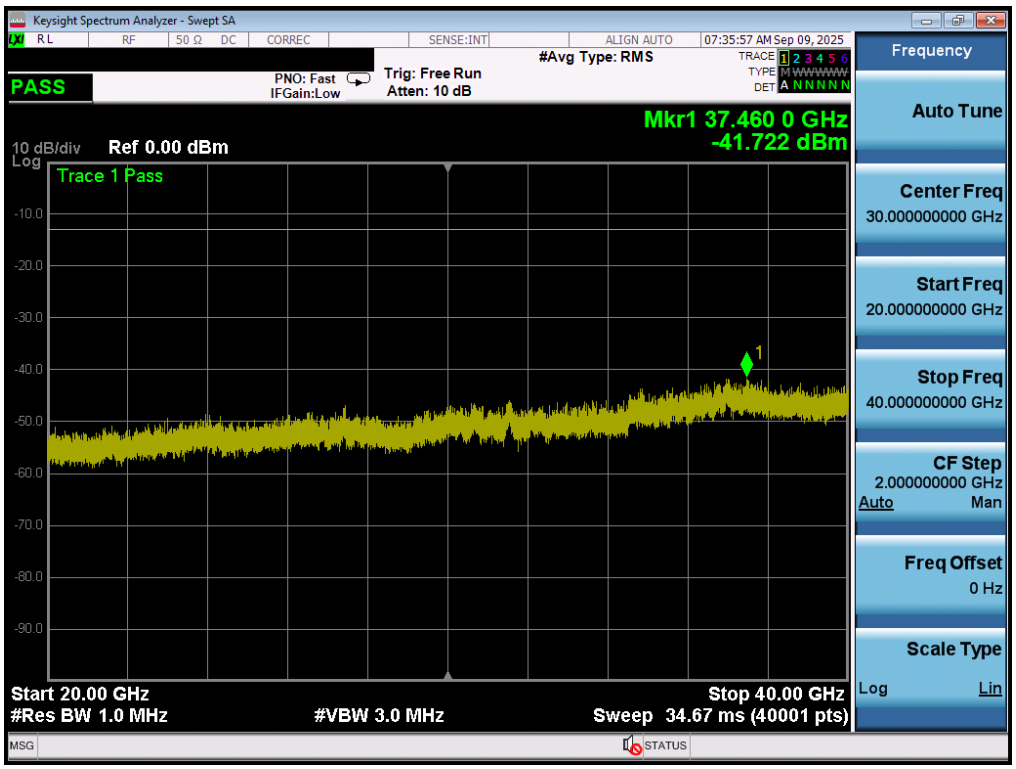
NR Band n77 – Ant1 – DoD Band – Main



Plot 7-73. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - DoD Band - Main)

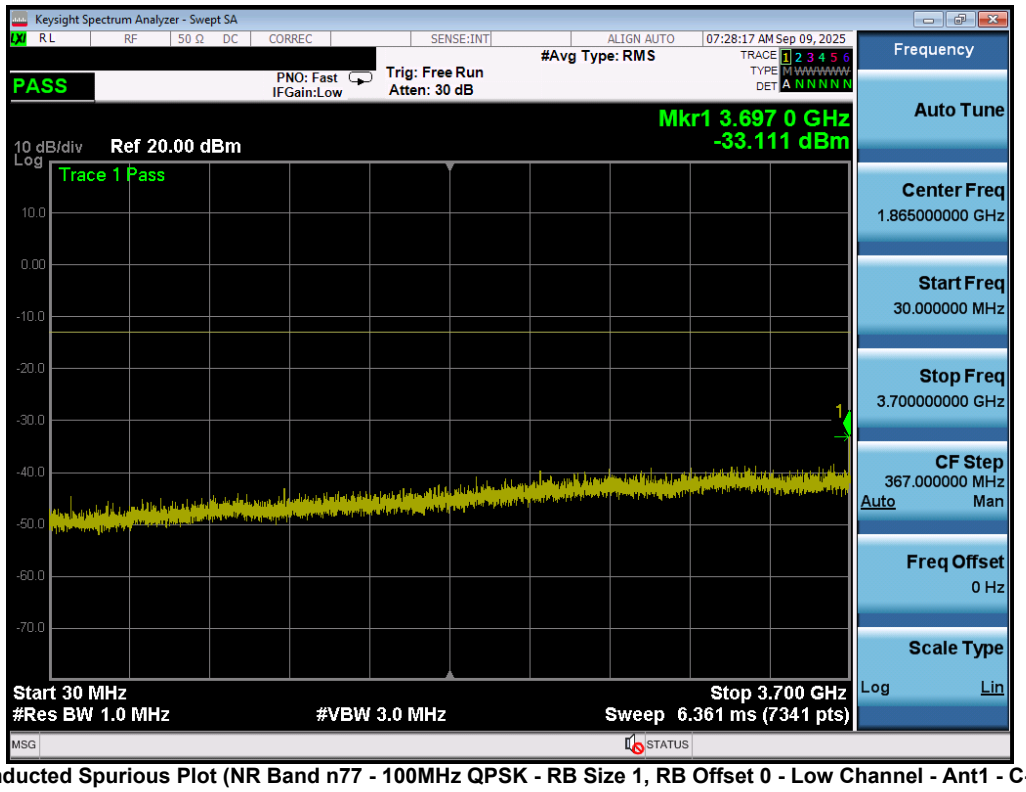


Plot 7-74. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - DoD Band - Main)

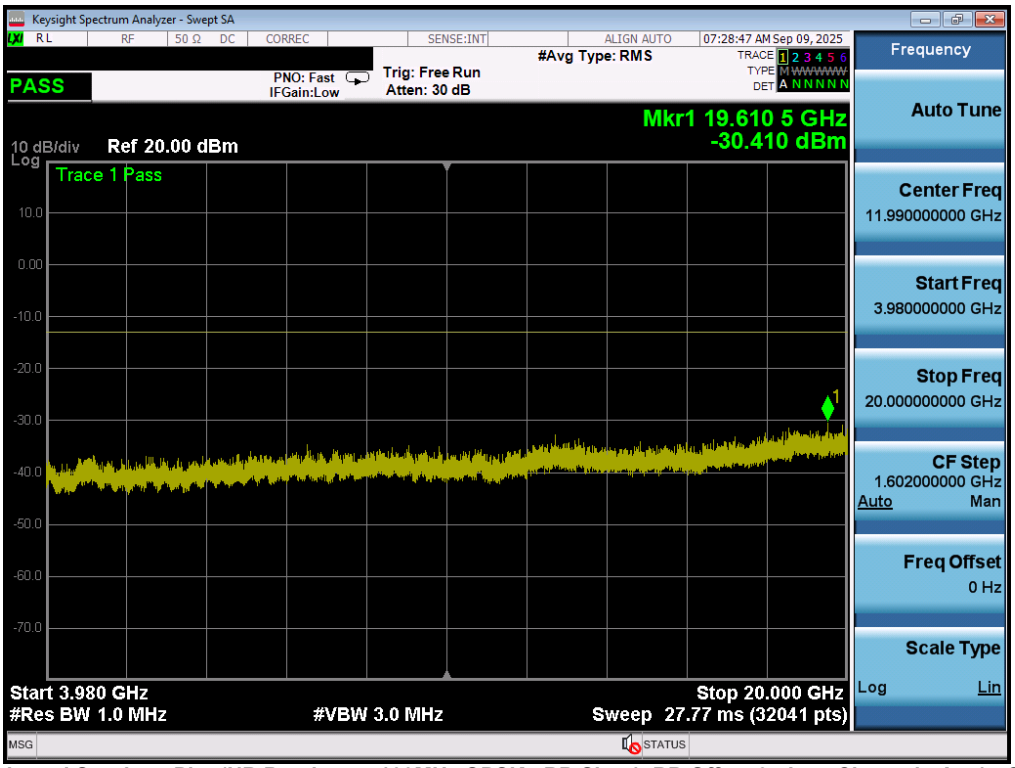


Plot 7-75. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - DoD Band - Main)

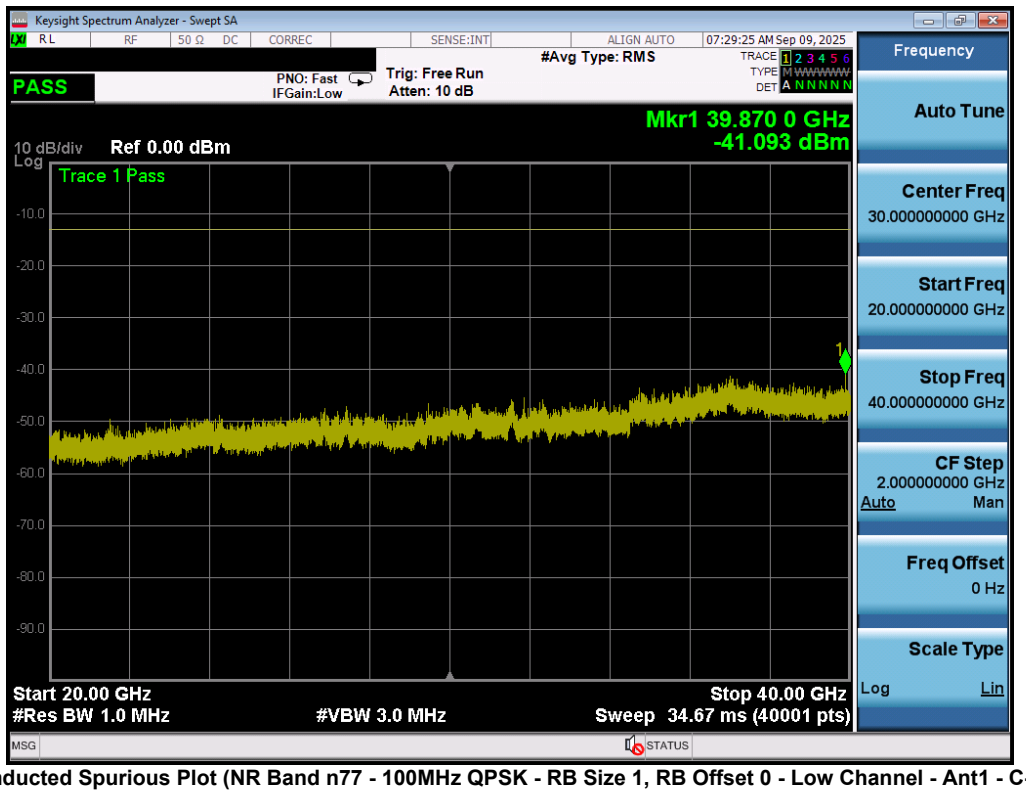
NR Band n77 – Ant1 – C-Band – Main



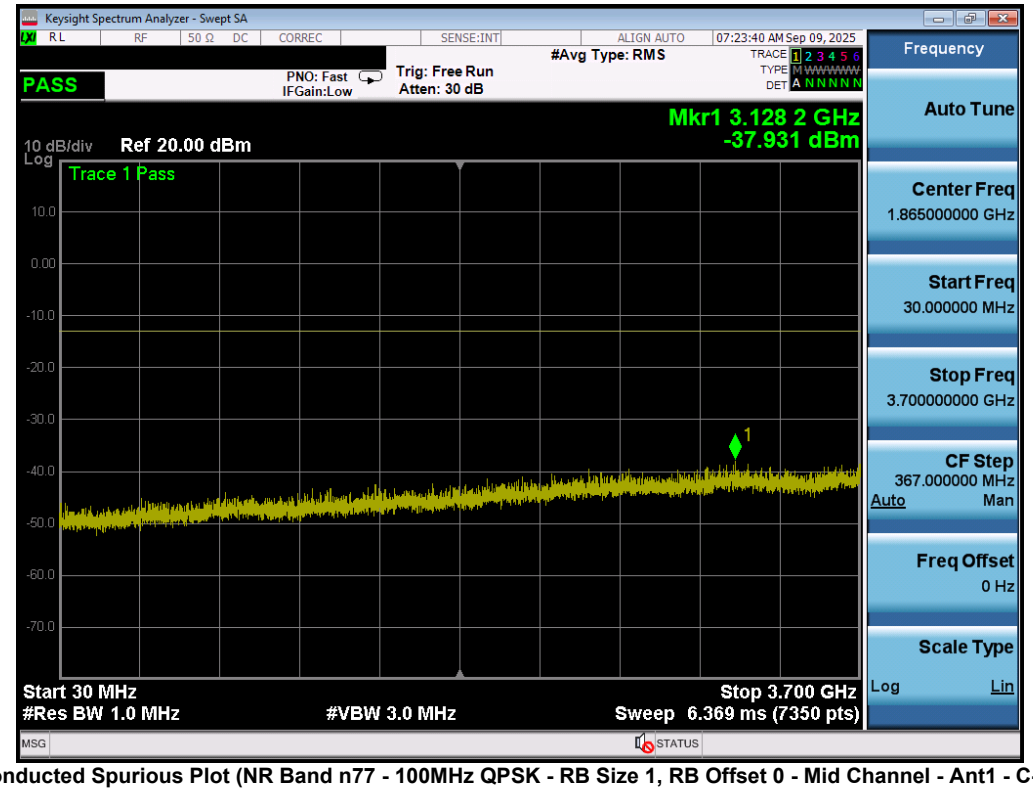
Plot 7-76. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1 - C-Band - Main)



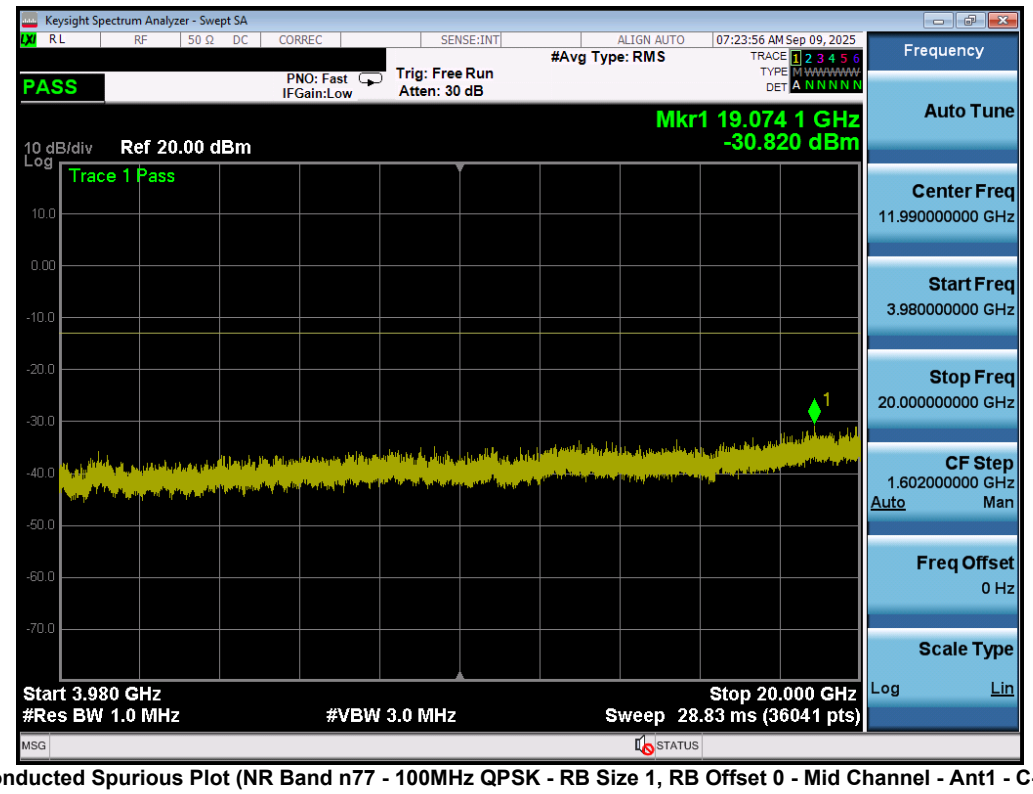
Plot 7-77. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1 - C-Band - Main)



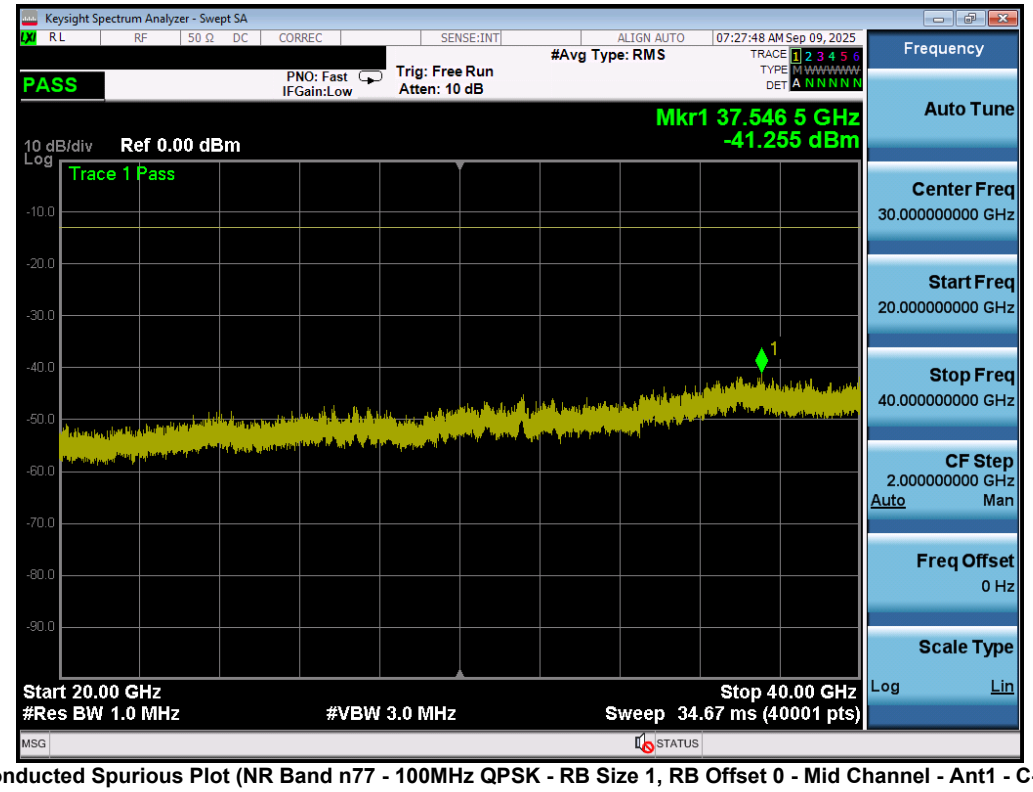
Plot 7-78. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1 - C-Band - Main)



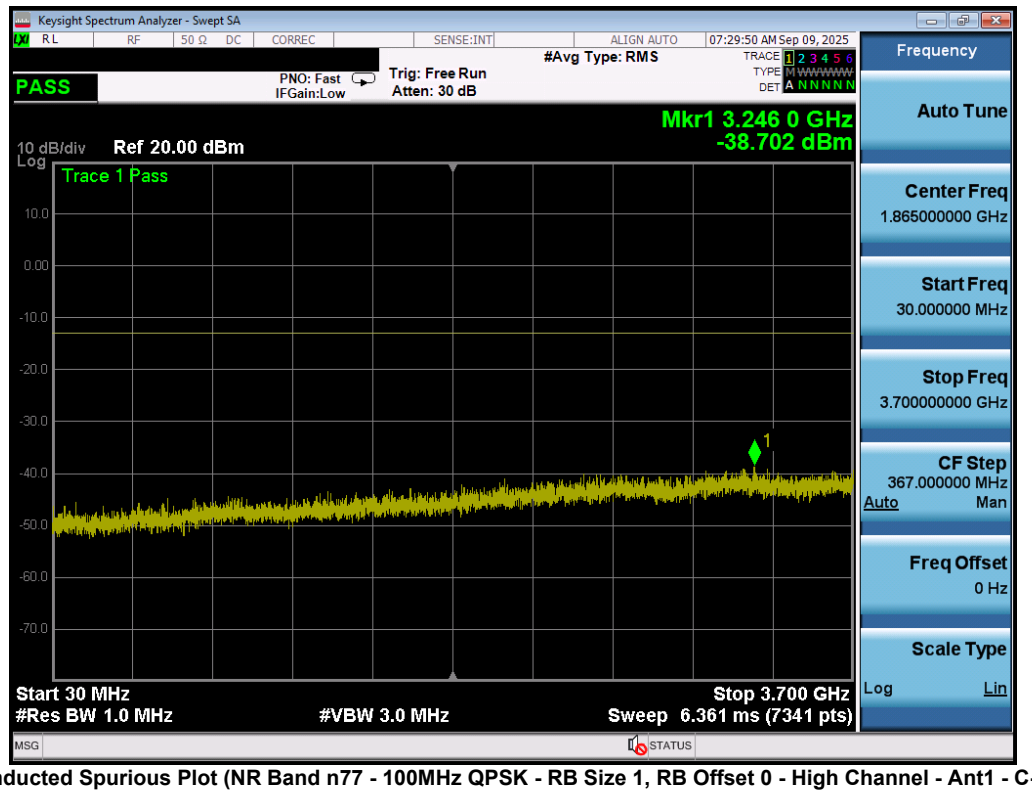
Plot 7-79. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - C-Band - Main)



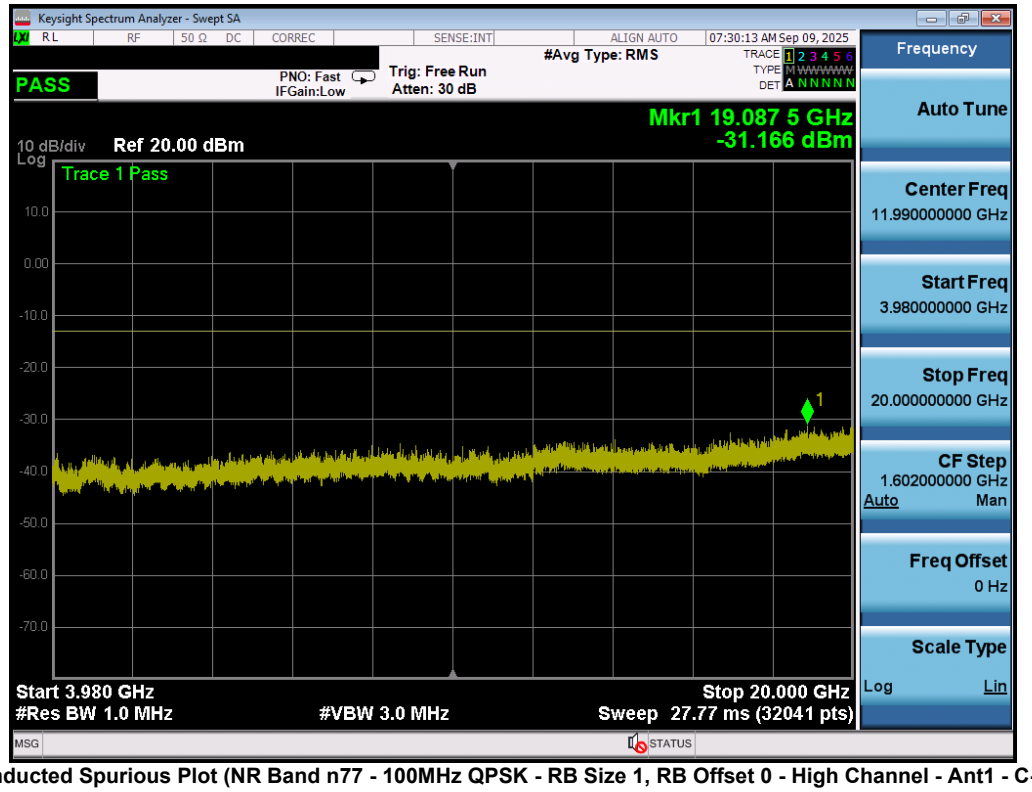
Plot 7-80. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - C-Band - Main)



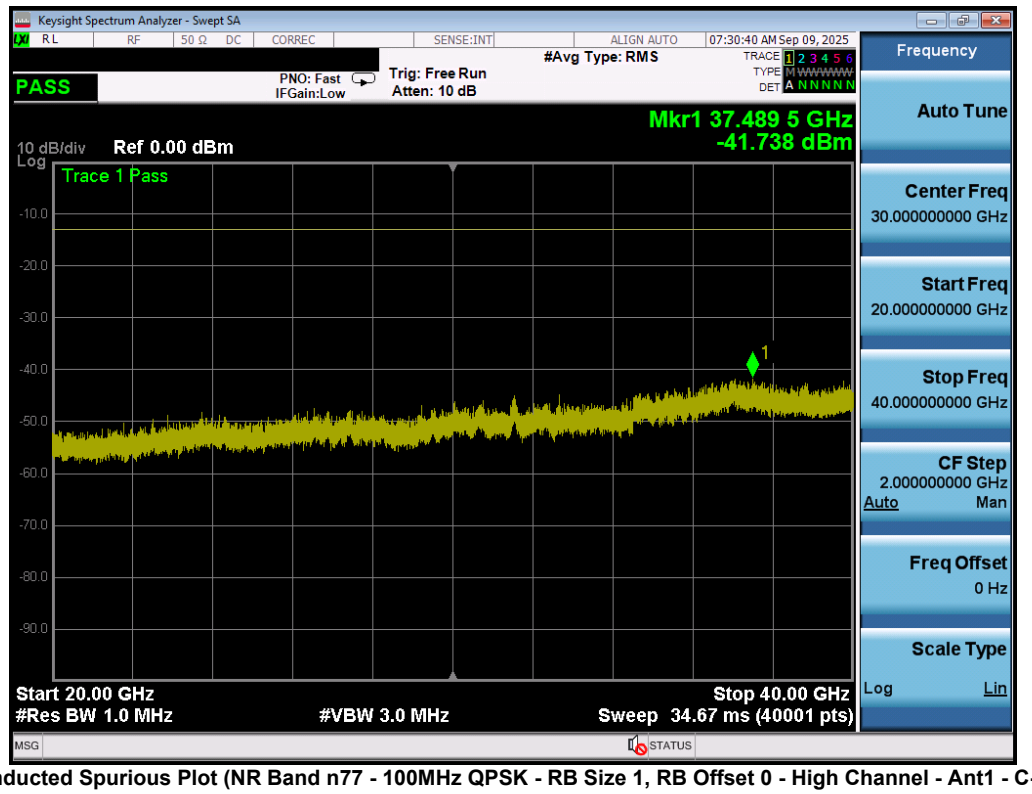
Plot 7-81. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1 - C-Band - Main)



Plot 7-82. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel - Ant1 - C-Band - Main)



Plot 7-83. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel - Ant1 - C-Band - Main)



Plot 7-84. Conducted Spurious Plot (NR Band n77 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel - Ant1 - C-Band - Main)

7.5 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates 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.

For operations in the 3700 – 3980MHz band and the 3450 – 3550MHz band, the maximum permissible conducted power level of any out-of-band emission is -13dBm/MHz.

Test Procedure Used

ANSI C63.26:2015 – Section 5.7.3

Test Settings

1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

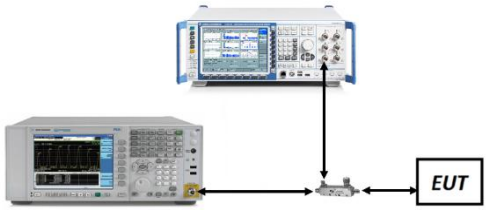


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. Per Part 27.53(l), compliance with the -13dBm/MHz conducted power limit for out-of-band emissions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be either one percent of the emission bandwidth of the fundamental emission of the transmitter or 350 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.

2. Per Part 27.53(n), compliance with the -13dBm/MHz conducted power limit for out-of-band emissions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed, but limited to a maximum of 200 kHz. In the bands between 1 and 5 MHz removed from the licensee's frequency block, the minimum resolution bandwidth for the measurement shall be 500 kHz.

3. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

4. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

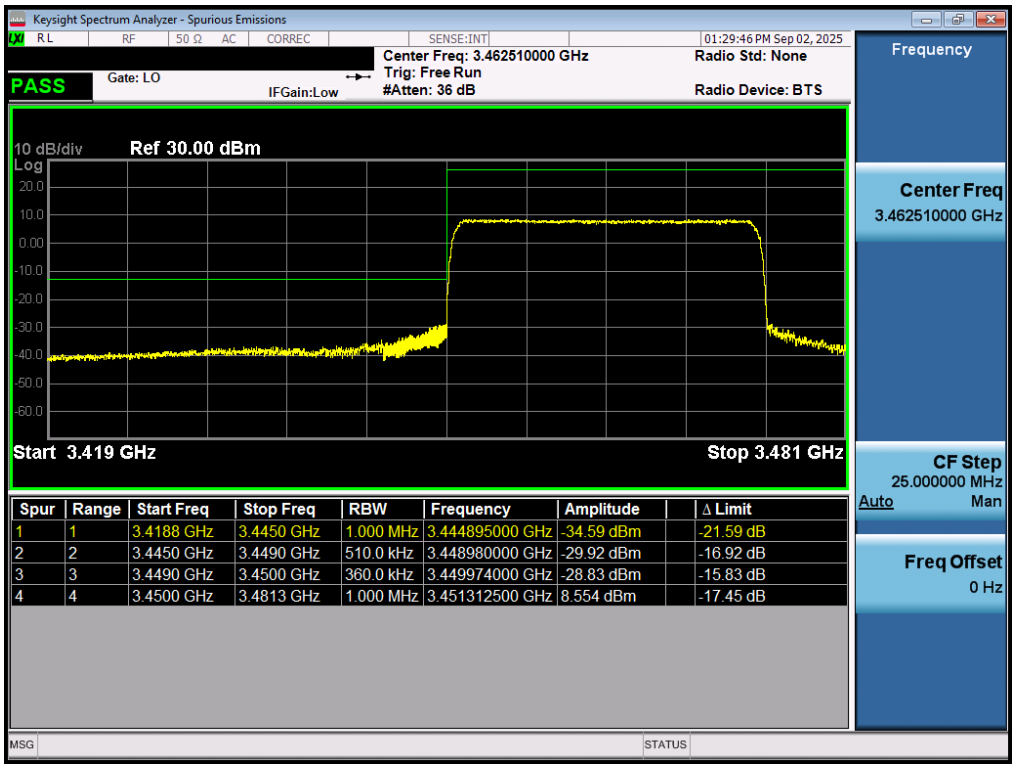
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77 PC2 DoD Band	100MHz	Low	Band Edge	-33.48	-13	-20.48
		High	Band Edge	-30.28	-13	-17.28
	90MHz	Low	Band Edge	-36.04	-13	-23.04
		High	Band Edge	-34.24	-13	-21.24
	80MHz	Low	Band Edge	-34.60	-13	-21.60
		High	Band Edge	-32.61	-13	-19.61
	70MHz	Low	Band Edge	-34.60	-13	-21.60
		High	Band Edge	-33.73	-13	-20.73
	60MHz	Low	Band Edge	-32.43	-13	-19.43
		High	Band Edge	-32.20	-13	-19.20
	50MHz	Low	Band Edge	-31.51	-13	-18.51
		High	Band Edge	-28.58	-13	-15.58
	40MHz	Low	Band Edge	-29.85	-13	-16.85
		High	Band Edge	-30.22	-13	-17.22
	30MHz	Low	Band Edge	-28.49	-13	-15.49
		High	Band Edge	-28.88	-13	-15.88
	25MHz	Low	Band Edge	-28.83	-13	-15.83
		High	Band Edge	-26.15	-13	-13.15
	20MHz	Low	Band Edge	-29.33	-13	-16.33
		High	Band Edge	-30.02	-13	-17.02
	15MHz	Low	Band Edge	-27.99	-13	-14.99
		High	Band Edge	-27.81	-13	-14.81
	10MHz	Low	Band Edge	-26.98	-13	-13.98
		High	Band Edge	-26.81	-13	-13.81

Table 7-14. Conducted Band Edge Results - Ant1 - DoD Band – Main

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n77 PC2 C Band	100MHz	Low	Band Edge	-30.59	-13	-17.59
		High	Band Edge	-31.15	-13	-18.15
	90MHz	Low	Band Edge	-34.38	-13	-21.38
		High	Band Edge	-31.58	-13	-18.58
	80MHz	Low	Band Edge	-31.95	-13	-18.95
		High	Band Edge	-30.30	-13	-17.30
	70MHz	Low	Band Edge	-33.75	-13	-20.75
		High	Band Edge	-33.03	-13	-20.03
	60MHz	Low	Band Edge	-30.47	-13	-17.47
		High	Band Edge	-30.45	-13	-17.45
	50MHz	Low	Band Edge	-30.25	-13	-17.25
		High	Band Edge	-30.78	-13	-17.78
	40MHz	Low	Band Edge	-24.34	-13	-11.34
		High	Band Edge	-23.24	-13	-10.24
	30MHz	Low	Band Edge	-28.04	-13	-15.04
		High	Band Edge	-28.12	-13	-15.12
	25MHz	Low	Band Edge	-29.32	-13	-16.32
		High	Band Edge	-28.66	-13	-15.66
	20MHz	Low	Band Edge	-28.08	-13	-15.08
		High	Band Edge	-29.14	-13	-16.14
	15MHz	Low	Band Edge	-26.79	-13	-13.79
		High	Band Edge	-27.68	-13	-14.68
	10MHz	Low	Band Edge	-25.58	-13	-12.58
		High	Band Edge	-25.34	-13	-12.34

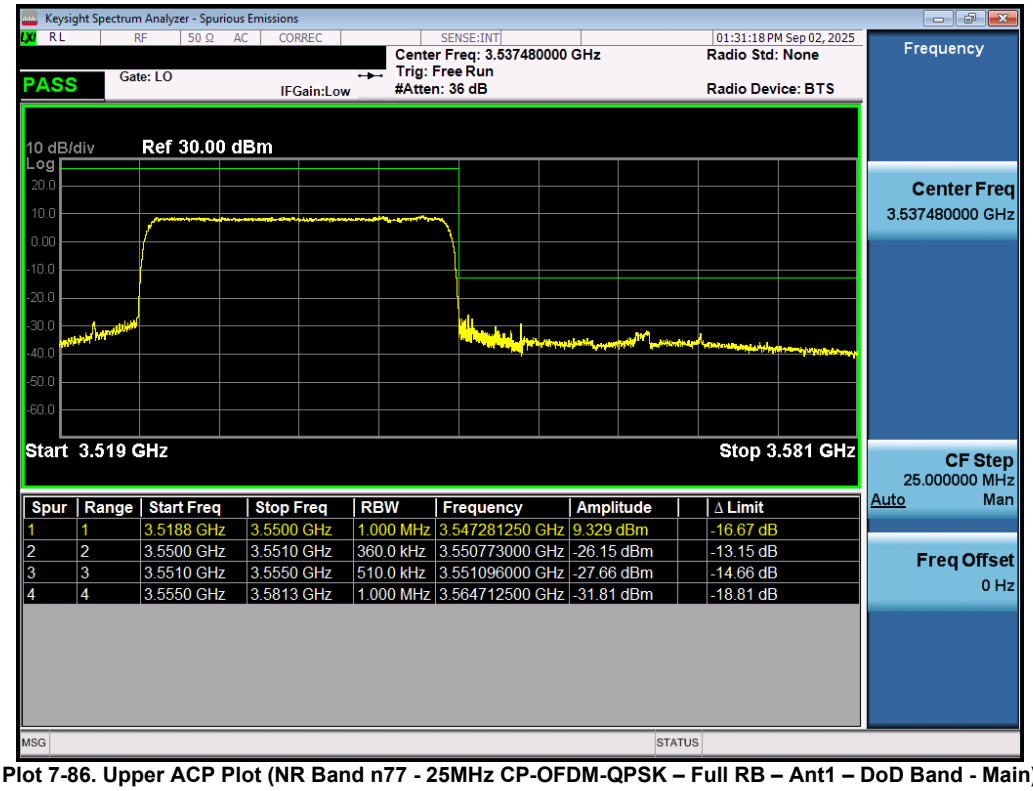
Table 7-15. Conducted Band Edge Results - Ant1 – C-Band – Main

NR Band n77 – Ant1 – DoD Band – Main



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.4188 GHz	3.4450 GHz	1.000 MHz	3.444895000 GHz	-34.59 dBm	-21.59 dB
2	2	3.4450 GHz	3.4490 GHz	510.0 kHz	3.448980000 GHz	-29.92 dBm	-16.92 dB
3	3	3.4490 GHz	3.4500 GHz	360.0 kHz	3.449974000 GHz	-28.83 dBm	-15.83 dB
4	4	3.4500 GHz	3.4813 GHz	1.000 MHz	3.451312500 GHz	8.554 dBm	-17.45 dB

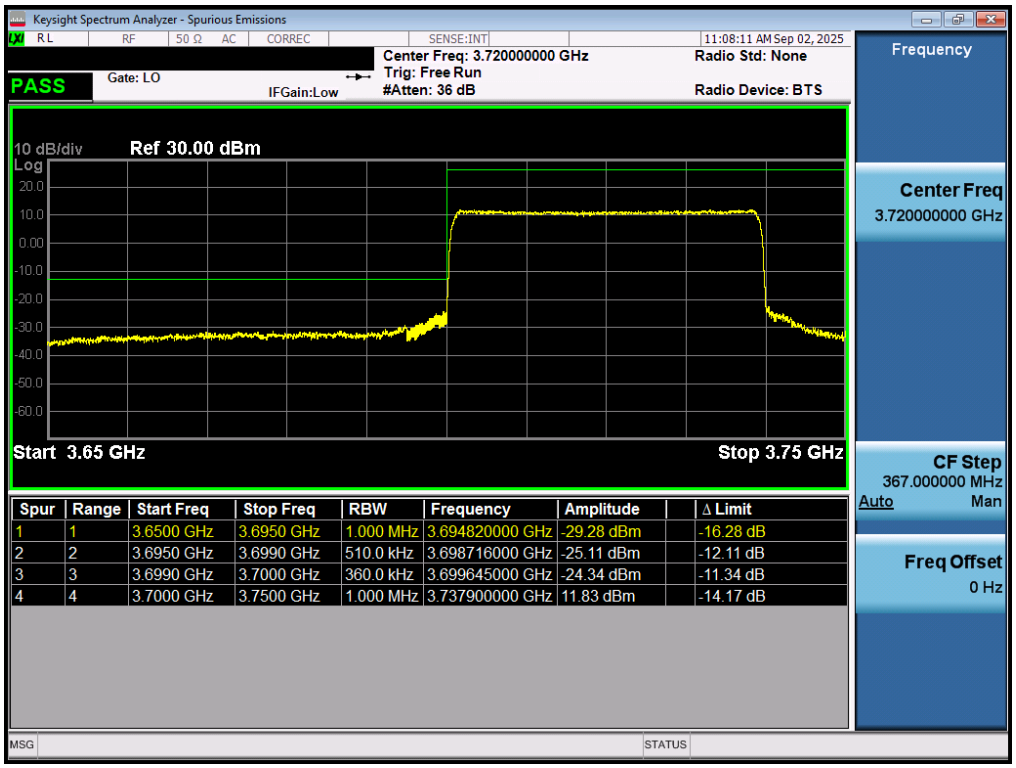
Plot 7-85. Lower ACP Plot (NR Band n77 - 25MHz CP-OFDM-QPSK – Full RB – Ant1 – DoD Band - Main)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.5188 GHz	3.5500 GHz	1.000 MHz	3.547281250 GHz	9.329 dBm	-16.67 dB
2	2	3.5500 GHz	3.5510 GHz	360.0 kHz	3.550773000 GHz	-26.15 dBm	-13.15 dB
3	3	3.5510 GHz	3.5550 GHz	510.0 kHz	3.551096000 GHz	-27.66 dBm	-14.66 dB
4	4	3.5550 GHz	3.5813 GHz	1.000 MHz	3.564712500 GHz	-31.81 dBm	-18.81 dB

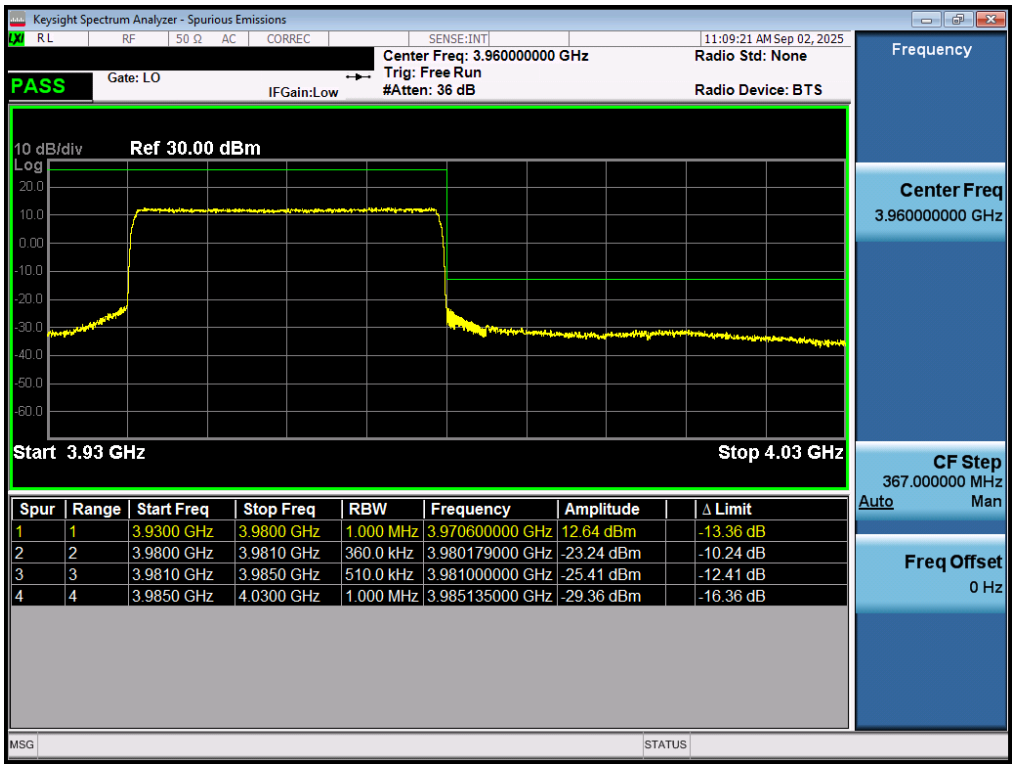
Plot 7-86. Upper ACP Plot (NR Band n77 - 25MHz CP-OFDM-QPSK – Full RB – Ant1 – DoD Band - Main)

NR Band n77 – Ant1 – C Band – Main



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.6500 GHz	3.6950 GHz	1.000 MHz	3.694820000 GHz	-29.28 dBm	-16.28 dB
2	2	3.6950 GHz	3.6990 GHz	510.0 kHz	3.698716000 GHz	-25.11 dBm	-12.11 dB
3	3	3.6990 GHz	3.7000 GHz	360.0 kHz	3.699645000 GHz	-24.34 dBm	-11.34 dB
4	4	3.7000 GHz	3.7500 GHz	1.000 MHz	3.737900000 GHz	11.83 dBm	-14.17 dB

Plot 7-87. Lower ACP Plot (NR Band n77 - 40MHz CP-OFDM-QPSK – Full RB – Ant1 – C Band - Main)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	3.9300 GHz	3.9800 GHz	1.000 MHz	3.970600000 GHz	12.64 dBm	-13.36 dB
2	2	3.9800 GHz	3.9810 GHz	360.0 kHz	3.980179000 GHz	-23.24 dBm	-10.24 dB
3	3	3.9810 GHz	3.9850 GHz	510.0 kHz	3.981000000 GHz	-25.41 dBm	-12.41 dB
4	4	3.9850 GHz	4.0300 GHz	1.000 MHz	3.985135000 GHz	-29.36 dBm	-16.36 dB

Plot 7-88. Upper ACP Plot (NR Band n77 - 40MHz CP-OFDM-QPSK – Full RB – Ant1 – C Band - Main

7.6 Peak-Average Ratio

Test Overview

A peak to average ratio measurement is performed at the conducted port of the EUT. The spectrum analyzers Complementary Cumulative Distribution Function (CCDF) measurement profile is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth. The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signal spends at or above the level defines the probability for that particular power level.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

Test Procedure Used

ANSI C63.26:2015 – Section 5.2.3.4

Test Settings

1. The signal analyzer's CCDF measurement profile is enabled
2. Frequency = carrier center frequency
3. Measurement BW ≥ OBW or specified reference bandwidth
4. The signal analyzer was set to collect one million samples to generate the CCDF curve
5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

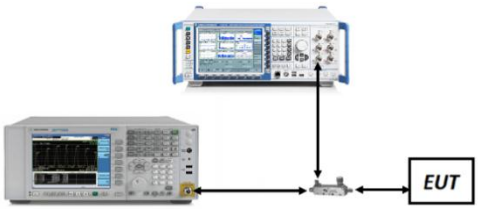


Figure 7-5. Test Instrument & Measurement Setup

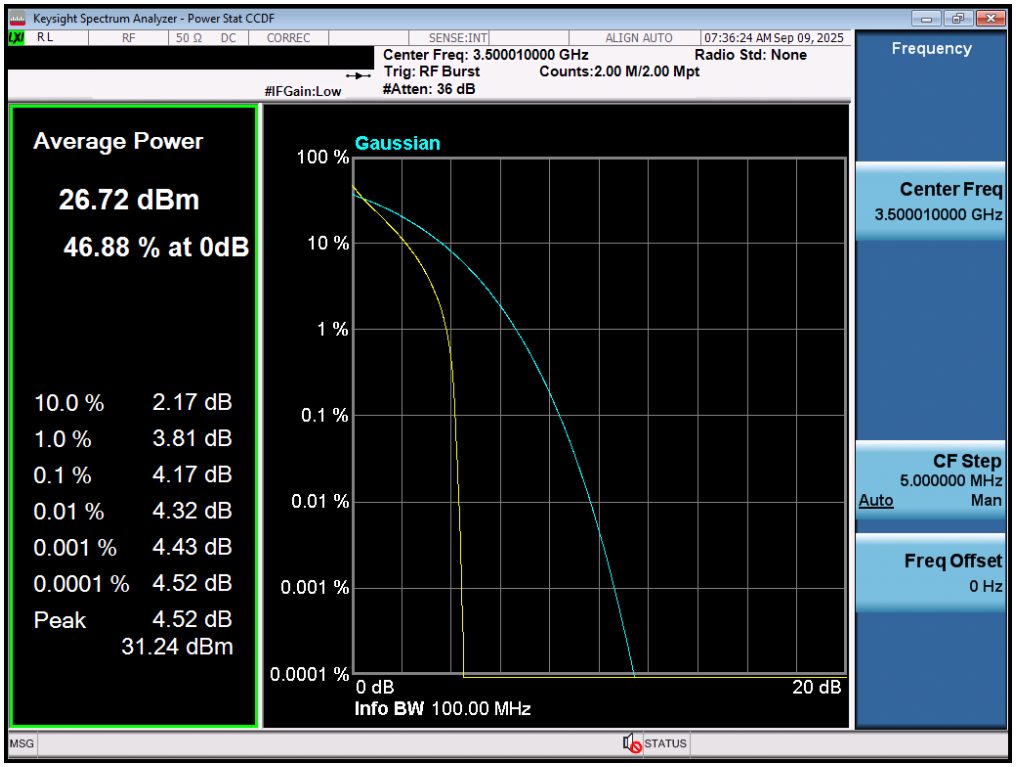
Test Notes

For the QAM modulations, 256QAM was found to have the worst-case peak-to-average ratio so it is the only QAM measurement included in this section.

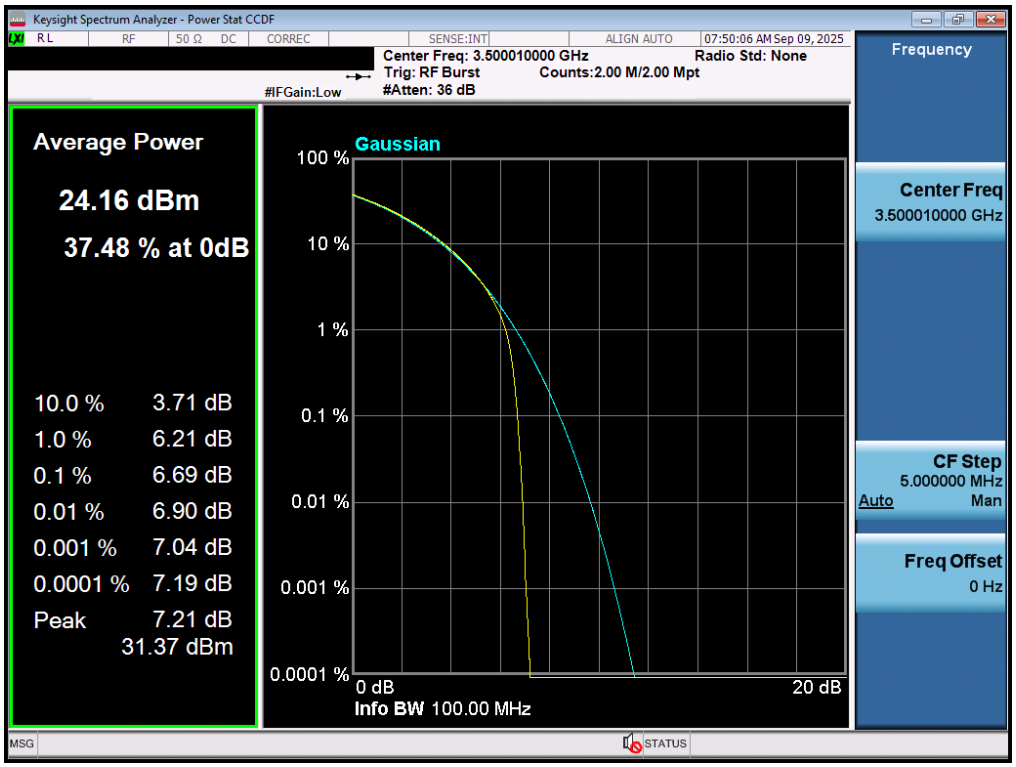
Mode	Bandwidth	Modulation	Average Power	PAR at 0.1%	PAR Limit [dB]	Margin [dB]
NR-n77PC2 DoD Band	100MHz	π/2 BPSK	26.72	4.17	13	-8.83
		QPSK	24.16	6.69	13	-6.31
		256QAM	20.59	8.37	13	-4.63
	90MHz	π/2 BPSK	26.69	3.99	13	-9.01
		QPSK	24.10	6.64	13	-6.36
		256QAM	20.62	8.35	13	-4.65
	80MHz	π/2 BPSK	26.73	4.04	13	-8.96
		QPSK	24.09	6.65	13	-6.35
		256QAM	20.60	8.36	13	-4.64
	70MHz	π/2 BPSK	26.70	3.88	13	-9.12
		QPSK	24.08	6.63	13	-6.37
		256QAM	20.67	8.31	13	-4.69
	60MHz	π/2 BPSK	26.52	4.05	13	-8.95
		QPSK	24.00	6.64	13	-6.36
		256QAM	20.44	8.32	13	-4.68
	50MHz	π/2 BPSK	26.80	4.01	13	-8.99
		QPSK	24.27	6.55	13	-6.45
		256QAM	20.82	8.37	13	-4.63
	40MHz	π/2 BPSK	26.63	3.75	13	-9.25
		QPSK	24.15	6.44	13	-6.56
		256QAM	20.65	8.36	13	-4.64
	30MHz	π/2 BPSK	26.58	3.83	13	-9.17
		QPSK	24.08	6.46	13	-6.54
		256QAM	20.65	8.36	13	-4.64
	25MHz	π/2 BPSK	26.63	3.81	13	-9.19
		QPSK	24.13	6.56	13	-6.44
		256QAM	20.67	8.36	13	-4.64
	20MHz	π/2 BPSK	26.48	3.72	13	-9.28
		QPSK	24.07	6.41	13	-6.59
		256QAM	20.53	8.35	13	-4.65
	15MHz	π/2 BPSK	26.41	3.92	13	-9.08
		QPSK	23.96	6.45	13	-6.55
		256QAM	20.51	8.32	13	-4.68
	10MHz	π/2 BPSK	26.42	3.86	13	-9.14
		QPSK	23.99	6.54	13	-6.46
		256QAM	20.54	8.38	13	-4.62

Table 7-16. PAR Results - Ant1 - DoD Band – Main

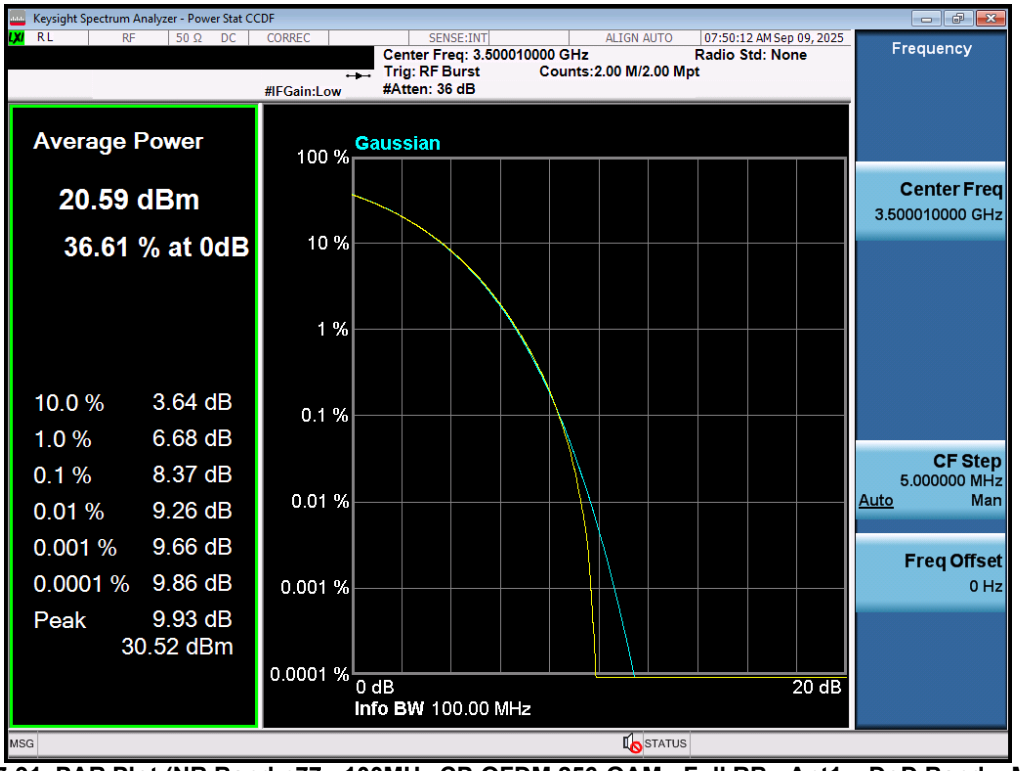
NR Band n77 – Ant1 – DoD Band – Main



Plot 7-89. PAR Plot (NR Band n77 - 100MHz DFT-s-OFDM BPSK - Full RB - Ant1 – DoD Band – Main)



Plot 7-90. PAR Plot (NR Band n77 - 100MHz CP-OFDM QPSK - Full RB - Ant1 – DoD Band – Main)

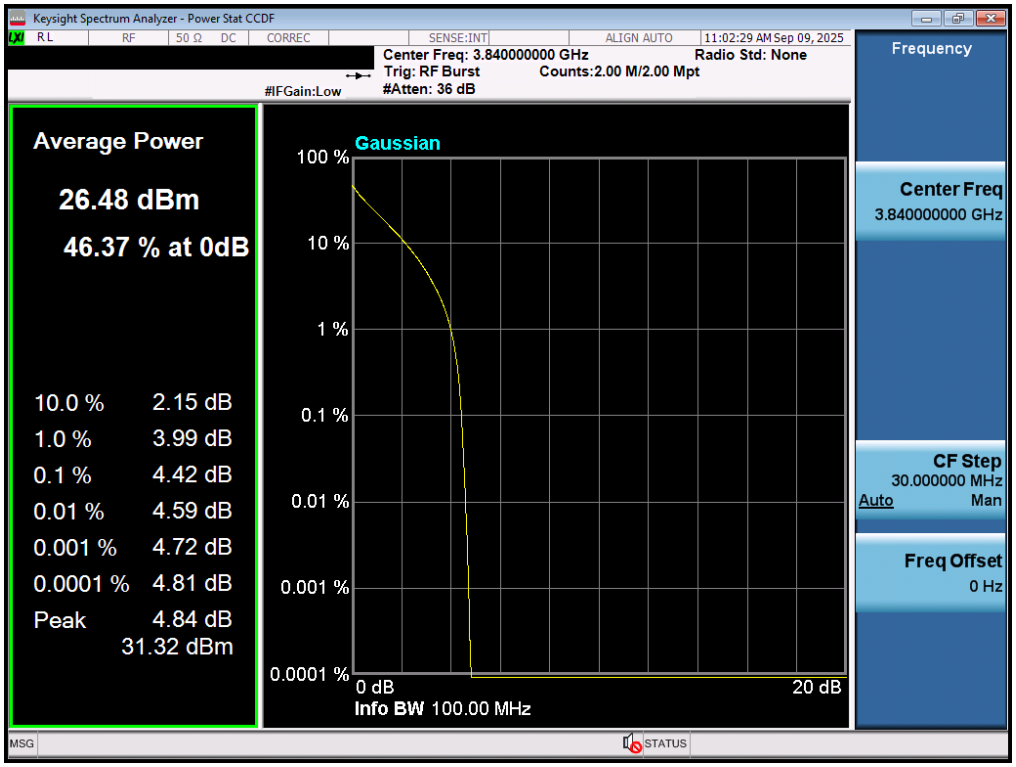


Plot 7-91. PAR Plot (NR Band n77 - 100MHz CP-OFDM 256-QAM - Full RB - Ant1 – DoD Band – Main)

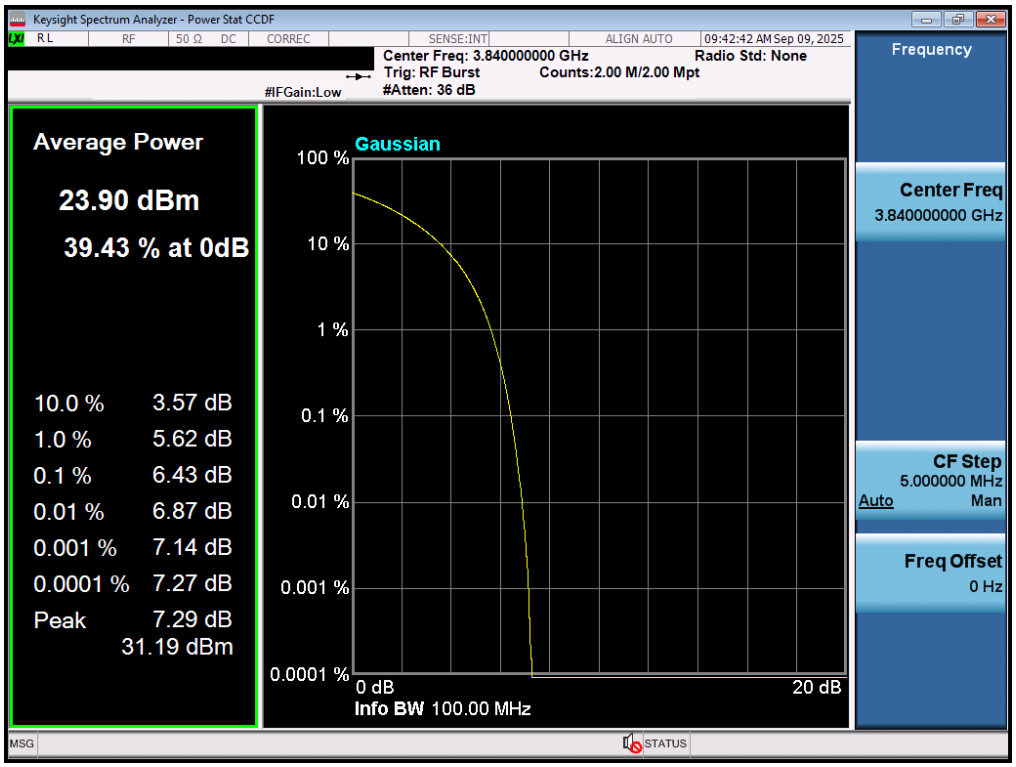
Mode	Bandwidth	Modulation	Average Power	PAR at 0.1%	PAR Limit [dB]	Margin [dB]
NR-n77PC2 C-Band	100MHz	π/2 BPSK	26.48	4.42	13	-8.58
		QPSK	23.90	6.43	13	-6.57
		256QAM	20.37	7.93	13	-5.07
	90MHz	π/2 BPSK	26.42	3.99	13	-9.01
		QPSK	23.86	6.45	13	-6.55
		256QAM	20.39	7.94	13	-5.06
	80MHz	π/2 BPSK	26.45	4.00	13	-9.00
		QPSK	23.86	6.44	13	-6.56
		256QAM	20.33	7.92	13	-5.08
	70MHz	π/2 BPSK	26.47	3.89	13	-9.11
		QPSK	23.85	6.46	13	-6.54
		256QAM	20.33	7.92	13	-5.08
	60MHz	π/2 BPSK	26.26	3.96	13	-9.04
		QPSK	23.79	6.50	13	-6.50
		256QAM	20.21	7.96	13	-5.04
	50MHz	π/2 BPSK	26.57	3.96	13	-9.04
		QPSK	23.96	6.36	13	-6.64
		256QAM	20.51	7.91	13	-5.09
	40MHz	π/2 BPSK	26.38	3.78	13	-9.22
		QPSK	23.77	6.36	13	-6.64
		256QAM	20.30	7.88	13	-5.12
	30MHz	π/2 BPSK	26.36	3.86	13	-9.14
		QPSK	23.79	6.31	13	-6.69
		256QAM	20.32	7.89	13	-5.11
	25MHz	π/2 BPSK	26.32	3.50	13	-9.50
		QPSK	23.77	6.44	13	-6.56
		256QAM	20.29	7.92	13	-5.08
	20MHz	π/2 BPSK	26.34	3.38	13	-9.62
		QPSK	23.79	6.25	13	-6.75
		256QAM	20.32	7.87	13	-5.13
	15MHz	π/2 BPSK	26.36	3.78	13	-9.22
		QPSK	23.82	6.25	13	-6.75
		256QAM	20.36	7.89	13	-5.11
	10MHz	π/2 BPSK	26.26	3.95	13	-9.05
		QPSK	23.74	6.27	13	-6.73
		256QAM	20.25	7.92	13	-5.08

Table 7-17. PAR Results - Ant1 – C-Band – Main

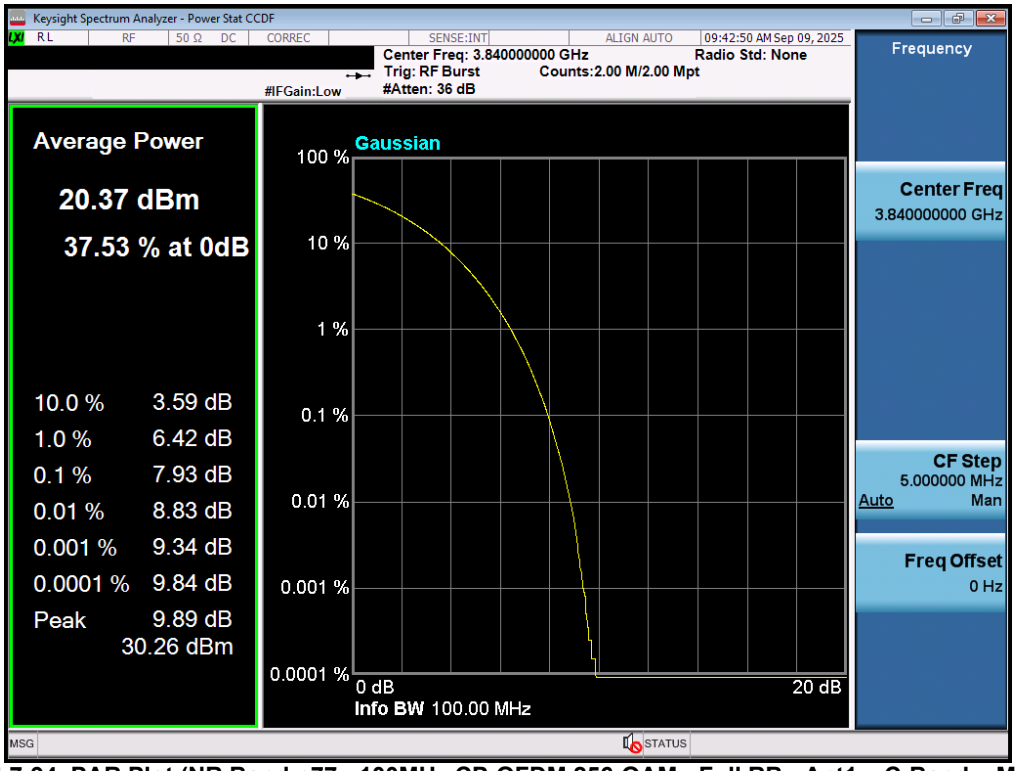
NR Band n77 – Ant1 – C-Band – Main



Plot 7-92. PAR Plot (NR Band n77 - 100MHz DFT-s-OFDM BPSK - Full RB - Ant1 – C-Band – Main)



Plot 7-93. PAR Plot (NR Band n77 - 100MHz CP-OFDM QPSK - Full RB - Ant1 – C-Band – Main)



Plot 7-94. PAR Plot (NR Band n77 - 100MHz CP-OFDM 256-QAM - Full RB - Ant1 – C-Band – Main)

7.7 Radiated Power (EIRP)

Test Overview

Equivalent Isotropic Radiated Power (EIRP) measurements are performed using the substitution method described in ANSI C63.26:2015 with the EUT transmitting into an integral antenna. Measurements are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as RMS average measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

ANSI C63.26:2015 – Section 5.2.4.4

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power" measurement capability for signals with continuous operation. For signals with burst transmission, the signal analyzer's "time domain power" measurement capability is used
2. RBW = 1 – 5% of the expected OBW, not to exceed 1MHz
3. VBW ≥ 3 x RBW
4. Span = 1.5 times the OBW
5. No. of sweep points ≥ 2 x span / RBW
6. Detector = RMS
7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto". Trigger is set to enable triggering only on full power bursts with the sweep time set less than or equal to the transmission burst duration.
8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation. For signals with burst transmission, the "gating" function was enabled to ensure that measurements are performed during times in which the transmitter is operating at its maximum power.
9. Trace mode = trace averaging (RMS) over 100 sweeps
10. The trace was allowed to stabilize.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

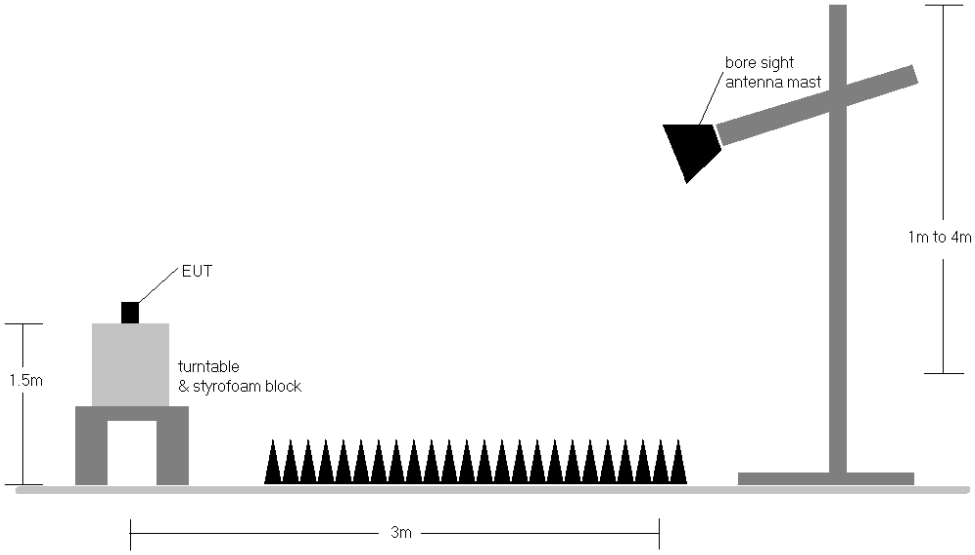


Figure 7-6. Radiated Test Setup >1GHz

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) This unit was tested with its standard battery.

3) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) 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.

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	π/2 BPSK	3500.01	H	166	345	6.46	1 / 271	19.47	25.93	0.392	30.00	-4.07
	QPSK	3500.01	H	166	345	6.46	1 / 271	19.55	**26.01**	0.399	30.00	-3.99
	16-QAM	3500.01	H	166	345	6.46	1 / 271	18.88	25.34	0.342	30.00	-4.66
90 MHz	π/2 BPSK	3495.00	H	166	345	6.46	1 / 243	19.38	25.83	0.383	30.00	-4.17
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 243	19.43	25.89	0.389	30.00	-4.11
	π/2 BPSK	3504.99	H	166	345	6.47	1 / 243	19.56	**26.02**	0.400	30.00	-3.98
	QPSK	3495.00	H	166	345	6.46	1 / 243	19.44	25.89	0.389	30.00	-4.11
	QPSK	3500.01	H	166	345	6.46	1 / 243	19.53	25.99	0.398	30.00	-4.01
	QPSK	3504.99	H	166	345	6.47	1 / 243	19.56	**26.02**	0.400	30.00	-3.98
	16-QAM	3500.01	H	166	345	6.46	1 / 243	18.96	25.42	0.349	30.00	-4.58
80 MHz	π/2 BPSK	3490.02	H	166	345	6.45	1 / 215	19.47	25.92	0.391	30.00	-4.08
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 215	19.43	25.89	0.389	30.00	-4.11
	π/2 BPSK	3510.00	H	166	345	6.47	1 / 215	19.45	25.92	0.391	30.00	-4.08
	QPSK	3490.02	H	166	345	6.45	1 / 215	19.53	**25.98**	0.397	30.00	-4.02
	QPSK	3500.01	H	166	345	6.46	1 / 215	19.49	25.95	0.394	30.00	-4.05
	QPSK	3510.00	H	166	345	6.47	1 / 215	19.47	25.94	0.393	30.00	-4.06
	16-QAM	3490.02	H	166	345	6.45	1 / 215	18.90	25.35	0.343	30.00	-4.65
70 MHz	π/2 BPSK	3485.01	H	166	345	6.45	1 / 187	19.35	25.79	0.380	30.00	-4.21
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 187	19.39	25.85	0.385	30.00	-4.15
	π/2 BPSK	3514.98	H	166	345	6.47	1 / 187	19.44	25.91	0.390	30.00	-4.09
	QPSK	3485.01	H	166	345	6.45	1 / 187	19.40	25.84	0.384	30.00	-4.16
	QPSK	3500.01	H	166	345	6.46	1 / 187	19.42	25.88	0.388	30.00	-4.12
	QPSK	3514.98	H	166	345	6.47	1 / 187	19.54	**26.01**	0.399	30.00	-3.99
	16-QAM	3514.98	H	166	345	6.47	1 / 187	18.89	25.36	0.344	30.00	-4.64
60 MHz	π/2 BPSK	3480.00	H	166	345	6.44	1 / 160	19.51	25.95	0.394	30.00	-4.05
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 160	19.45	25.91	0.390	30.00	-4.09
	π/2 BPSK	3519.99	H	166	345	6.48	1 / 160	19.58	26.05	0.403	30.00	-3.95
	QPSK	3480.00	H	166	345	6.44	1 / 160	19.60	26.04	0.402	30.00	-3.96
	QPSK	3500.01	H	166	345	6.46	1 / 160	19.54	26.00	0.399	30.00	-4.00
	QPSK	3519.99	H	166	345	6.48	1 / 160	19.62	**26.09**	0.407	30.00	-3.91
	16-QAM	3519.99	H	166	345	6.48	1 / 160	18.90	25.37	0.345	30.00	-4.63
50 MHz	π/2 BPSK	3475.02	H	166	345	6.43	1 / 66	19.65	26.08	0.406	30.00	-3.92
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 66	19.72	26.18	0.415	30.00	-3.82
	π/2 BPSK	3525.00	H	166	345	6.48	1 / 66	19.80	**26.27**	0.424	30.00	-3.73
	QPSK	3475.02	H	166	345	6.43	1 / 66	19.73	26.16	0.413	30.00	-3.84
	QPSK	3500.01	H	166	345	6.46	1 / 131	19.76	26.22	0.419	30.00	-3.78
	QPSK	3525.00	H	166	345	6.48	1 / 1	19.76	26.23	0.420	30.00	-3.77
	16-QAM	3475.02	H	166	345	6.43	1 / 66	19.09	25.52	0.357	30.00	-4.48
	16-QAM	3500.01	H	166	345	6.46	1 / 131	19.17	25.63	0.366	30.00	-4.37
	16-QAM	3525.00	H	166	345	6.48	1 / 66	19.13	25.60	0.363	30.00	-4.40
40 MHz	π/2 BPSK	3470.01	H	166	345	6.43	1 / 53	19.56	25.98	0.397	30.00	-4.02
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 104	19.60	26.06	0.404	30.00	-3.94
	π/2 BPSK	3529.98	H	166	345	6.48	1 / 1	19.67	26.15	0.413	30.00	-3.85
	QPSK	3470.01	H	166	345	6.43	1 / 53	19.59	26.01	0.399	30.00	-3.99
	QPSK	3500.01	H	166	345	6.46	1 / 104	19.63	26.09	0.407	30.00	-3.91
	QPSK	3529.98	H	166	345	6.48	1 / 1	19.70	**26.18**	0.415	30.00	-3.82
	16-QAM	3529.98	H	166	345	6.48	1 / 53	19.10	25.58	0.362	30.00	-4.42
30 MHz	π/2 BPSK	3465.00	H	166	345	6.42	1 / 76	19.55	25.97	0.396	30.00	-4.03
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 1	19.63	26.09	0.407	30.00	-3.91
	π/2 BPSK	3534.99	H	166	345	6.48	1 / 76	19.71	26.19	0.416	30.00	-3.81
	QPSK	3465.00	H	166	345	6.42	1 / 1	19.56	25.98	0.397	30.00	-4.02
	QPSK	3500.01	H	166	345	6.46	1 / 76	19.69	26.15	0.413	30.00	-3.85
	QPSK	3534.99	H	166	345	6.48	1 / 76	19.79	**26.27**	0.424	30.00	-3.73
	16-QAM	3534.99	H	166	345	6.48	1 / 76	19.03	25.51	0.356	30.00	-4.49
25 MHz	π/2 BPSK	3462.51	H	166	345	6.42	1 / 63	19.61	26.02	0.400	30.00	-3.98
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 63	19.63	26.09	0.407	30.00	-3.91
	π/2 BPSK	3537.48	H	166	345	6.48	1 / 1	19.69	26.17	0.414	30.00	-3.83
	QPSK	3462.51	H	166	345	6.42	1 / 63	19.64	26.05	0.403	30.00	-3.95
	QPSK	3500.01	H	166	345	6.46	1 / 63	19.67	26.13	0.411	30.00	-3.87
	QPSK	3537.48	H	166	345	6.48	1 / 1	19.74	**26.22**	0.419	30.00	-3.78
	16-QAM	3537.48	H	166	345	6.48	1 / 1	19.10	25.58	0.362	30.00	-4.42
20 MHz	π/2 BPSK	3460.02	H	166	345	6.42	1 / 49	19.21	25.62	0.365	30.00	-4.38
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 1	19.28	25.74	0.375	30.00	-4.26
	π/2 BPSK	3540.00	H	166	345	6.49	1 / 1	19.34	25.82	0.382	30.00	-4.18
	QPSK	3460.02	H	166	345	6.42	1 / 49	19.24	25.65	0.368	30.00	-4.35
	QPSK	3500.01	H	166	345	6.46	1 / 49	19.33	25.79	0.380	30.00	-4.21
	QPSK	3540.00	H	166	345	6.49	1 / 1	19.40	**25.88**	0.388	30.00	-4.12
	16-QAM	3540.00	H	166	345	6.49	1 / 1	18.74	25.22	0.333	30.00	-4.78
15 MHz	π/2 BPSK	3457.50	H	166	345	6.41	1 / 36	19.41	25.82	0.382	30.00	-4.18
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 36	19.33	25.79	0.380	30.00	-4.21
	π/2 BPSK	3542.49	H	166	345	6.49	1 / 36	19.36	25.84	0.384	30.00	-4.16
	QPSK	3457.50	H	166	345	6.41	1 / 36	19.45	25.86	0.386	30.00	-4.14
	QPSK	3500.01	H	166	345	6.46	1 / 19	19.34	25.80	0.381	30.00	-4.20
	QPSK	3542.49	H	166	345	6.49	1 / 36	19.49	**25.97**	0.396	30.00	-4.03
	16-QAM	3542.49	H	166	345	6.49	1 / 36	18.83	25.31	0.340	30.00	-4.69
10 MHz	π/2 BPSK	3455.01	H	166	345	6.41	1 / 22	19.21	25.61	0.364	30.00	-4.39
	π/2 BPSK	3500.01	H	166	345	6.46	1 / 1	19.33	25.79	0.380	30.00	-4.21
	π/2 BPSK	3544.98	H	166	345	6.49	1 / 1	19.41	25.89	0.389	30.00	-4.11
	QPSK	3455.01	H	166	345	6.41	1 / 1	19.24	25.64	0.367	30.00	-4.36
	QPSK	3500.01	H	166	345	6.46	1 / 22	19.40	25.86	0.386	30.00	-4.14
	QPSK	3544.98	H	166	345	6.49	1 / 22	19.45	**25.93**	0.392	30.00	-4.07
	16-QAM	3544.98	H	166	345	6.49	1 / 1	18.66	25.14	0.327	30.00	-4.86
100 MHz	QPSK (CP-OFDM)	3500.0	H	166	345	6.46	1 / 136	18.66	25.12	0.325	30.00	-4.88
	QPSK (Opposite Pol.)	3500.0	V	127	33	6.48	1 / 271	18.25	24.73	0.297	30.00	-5.27
	QPSK (WCP)	3500.0	H	178	345	6.46	1 / 271	19.00	25.46	0.352	30.00	-4.54

Table 7-18. Radiated Power Test Results - Ant1 - DoD Band – Main

Bandwidth	Mod.	Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Ant. Gain [dBi]	RB Size/Offset	Substitute Level [dBm]	EIRP [dBm]	EIRP [Watts]	EIRP Limit [dBm]	Margin [dB]
100 MHz	π/2 BPSK	3750.00	H	201	325	7.03	1 / 1	19.44	26.47	0.444	30.00	-3.53
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.72	26.85	0.484	30.00	-3.15
	π/2 BPSK	3930.00	H	159	334	7.39	1 / 1	18.66	26.05	0.403	30.00	-3.95
	QPSK	3750.00	H	201	325	7.03	1 / 1	19.66	26.69	0.467	30.00	-3.31
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.77	**26.90**	0.490	30.00	-3.10
	QPSK	3930.00	H	159	334	7.39	1 / 1	18.46	25.85	0.385	30.00	-4.15
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.86	25.99	0.397	30.00	-4.01
90 MHz	π/2 BPSK	3745.02	H	201	325	7.03	1 / 243	19.23	26.26	0.423	30.00	-3.74
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.61	26.74	0.472	30.00	-3.26
	π/2 BPSK	3934.98	H	159	334	7.40	1 / 1	18.65	26.05	0.403	30.00	-3.95
	QPSK	3745.02	H	201	325	7.03	1 / 1	19.72	26.75	0.473	30.00	-3.25
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.78	**26.91**	0.491	30.00	-3.09
	QPSK	3934.98	H	159	334	7.40	1 / 1	18.66	26.06	0.404	30.00	-3.94
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.89	26.02	0.400	30.00	-3.98
80 MHz	π/2 BPSK	3740.01	H	201	325	7.03	1 / 1	19.28	26.31	0.428	30.00	-3.69
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.51	26.64	0.461	30.00	-3.36
	π/2 BPSK	3939.99	H	159	334	7.41	1 / 1	18.50	25.90	0.389	30.00	-4.10
	QPSK	3740.01	H	201	325	7.03	1 / 1	19.66	26.69	0.467	30.00	-3.31
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.77	**26.90**	0.490	30.00	-3.10
	QPSK	3939.99	H	159	334	7.41	1 / 1	18.45	25.85	0.385	30.00	-4.15
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.86	25.99	0.397	30.00	-4.01
70 MHz	π/2 BPSK	3735.00	H	201	325	7.03	1 / 1	19.14	26.17	0.414	30.00	-3.83
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.53	26.66	0.463	30.00	-3.34
	π/2 BPSK	3945.00	H	159	334	7.41	1 / 187	18.26	25.67	0.369	30.00	-4.33
	QPSK	3735.00	H	201	325	7.03	1 / 187	19.67	26.70	0.468	30.00	-3.30
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.78	**26.91**	0.491	30.00	-3.09
	QPSK	3945.00	H	159	334	7.41	1 / 1	18.30	25.71	0.373	30.00	-4.29
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.86	25.99	0.397	30.00	-4.01
60 MHz	π/2 BPSK	3730.02	H	201	325	7.03	1 / 1	19.26	26.29	0.426	30.00	-3.71
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.46	26.59	0.456	30.00	-3.41
	π/2 BPSK	3949.98	H	159	334	7.42	1 / 1	18.32	25.73	0.374	30.00	-4.27
	QPSK	3730.02	H	201	325	7.03	1 / 1	19.71	**26.74**	0.472	30.00	-3.26
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.56	26.69	0.467	30.00	-3.31
	QPSK	3949.98	H	159	334	7.42	1 / 1	18.27	25.68	0.370	30.00	-4.32
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.64	25.77	0.377	30.00	-4.23
50 MHz	π/2 BPSK	3725.01	H	201	325	7.03	1 / 66	19.26	26.29	0.426	30.00	-3.71
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.69	26.82	0.481	30.00	-3.18
	π/2 BPSK	3954.99	H	159	334	7.43	1 / 66	18.44	25.86	0.386	30.00	-4.14
	QPSK	3725.01	H	201	325	7.03	1 / 66	19.73	26.76	0.475	30.00	-3.24
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.87	**27.00**	0.501	30.00	-3.00
	QPSK	3954.99	H	159	334	7.43	1 / 1	18.31	25.73	0.374	30.00	-4.27
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.95	26.08	0.405	30.00	-3.92
40 MHz	π/2 BPSK	3720.00	H	201	325	7.03	1 / 1	19.31	26.34	0.431	30.00	-3.66
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 53	19.43	26.56	0.453	30.00	-3.44
	π/2 BPSK	3960.00	H	159	334	7.44	1 / 1	18.21	25.64	0.367	30.00	-4.36
	QPSK	3720.00	H	201	325	7.03	1 / 53	19.73	26.76	0.475	30.00	-3.24
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.64	**26.77**	0.475	30.00	-3.23
	QPSK	3960.00	H	159	334	7.44	1 / 1	18.15	25.58	0.362	30.00	-4.42
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.70	25.83	0.383	30.00	-4.17
30 MHz	π/2 BPSK	3715.02	H	201	325	7.03	1 / 76	19.22	26.25	0.422	30.00	-3.75
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.54	26.67	0.464	30.00	-3.33
	π/2 BPSK	3964.98	H	159	334	7.45	1 / 1	18.31	25.75	0.376	30.00	-4.25
	QPSK	3715.02	H	201	325	7.03	1 / 39	19.67	26.70	0.468	30.00	-3.30
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.68	**26.81**	0.480	30.00	-3.19
	QPSK	3964.98	H	159	334	7.45	1 / 1	18.27	25.71	0.373	30.00	-4.29
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.71	25.84	0.384	30.00	-4.16
25 MHz	π/2 BPSK	3712.50	H	166	345	7.03	1 / 32	19.37	26.40	0.437	30.00	-3.60
	π/2 BPSK	3840.00	H	166	345	7.13	1 / 1	19.56	26.69	0.467	30.00	-3.31
	π/2 BPSK	3967.50	H	166	345	7.45	1 / 1	18.26	25.71	0.373	30.00	-4.29
	QPSK	3712.50	H	166	345	7.03	1 / 1	19.84	26.87	0.487	30.00	-3.13
	QPSK	3840.00	H	166	345	7.13	1 / 1	19.76	**26.89**	0.489	30.00	-3.11
	QPSK	3967.50	H	166	345	7.45	1 / 1	18.16	25.61	0.364	30.00	-4.39
	16-QAM	3840.00	H	166	345	7.13	1 / 1	18.89	26.02	0.400	30.00	-3.98
20 MHz	π/2 BPSK	3710.01	H	201	325	7.03	1 / 25	19.18	26.21	0.418	30.00	-3.79
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.48	26.61	0.458	30.00	-3.39
	π/2 BPSK	3969.99	H	159	334	7.46	1 / 25	18.14	25.59	0.363	30.00	-4.41
	QPSK	3710.01	H	201	325	7.03	1 / 25	19.59	26.62	0.460	30.00	-3.38
	QPSK	3840.00	H	133	335	7.13	1 / 1	19.65	**26.78**	0.476	30.00	-3.22
	QPSK	3969.99	H	159	334	7.46	1 / 1	18.09	25.54	0.358	30.00	-4.46
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.76	25.89	0.388	30.00	-4.11
15 MHz	π/2 BPSK	3707.52	H	201	325	7.03	1 / 1	19.18	26.21	0.418	30.00	-3.79
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.55	26.68	0.465	30.00	-3.32
	π/2 BPSK	3972.48	H	159	334	7.46	1 / 1	18.19	25.65	0.368	30.00	-4.35
	QPSK	3707.52	H	201	325	7.03	1 / 36	19.61	26.64	0.462	30.00	-3.36
	QPSK	3840.00	H	133	335	7.13	1 / 36	19.61	**26.74**	0.472	30.00	-3.26
	QPSK	3972.48	H	159	334	7.46	1 / 1	18.16	25.62	0.365	30.00	-4.38
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.78	25.91	0.390	30.00	-4.09
10 MHz	π/2 BPSK	3705.00	H	201	325	7.03	1 / 22	19.15	26.18	0.415	30.00	-3.82
	π/2 BPSK	3840.00	H	133	335	7.13	1 / 1	19.44	26.57	0.454	30.00	-3.43
	π/2 BPSK	3975.00	H	159	334	7.47	1 / 22	18.14	25.60	0.363	30.00	-4.40
	QPSK	3705.00	H	201	325	7.03	1 / 22	19.58	26.61	0.458	30.00	-3.39
	QPSK	3840.00	H	133	335	7.13	1 / 22	19.64	**26.77**	0.475	30.00	-3.23
	QPSK	3975.00	H	159	334	7.47	1 / 22	18.13	25.59	0.363	30.00	-4.41
	16-QAM	3840.00	H	133	335	7.13	1 / 1	18.82	25.95	0.393	30.00	-4.05
100 MHz	QPSK (CP-OFDM)	3840.00	H	133	335	7.13	1 / 136	18.70	25.83	0.383	30.00	-4.17
	QPSK (Opposite Pol.)	3840.00	V	378	331	7.13	1 / 1	18.18	25.31	0.340	30.00	-4.69
	QPSK (WCP)	3840.00	H	188	351	7.13	1 / 1	17.03	24.16	0.261	30.00	-5.84

Table 7-19. Radiated Power Test Results - Ant1 - C-Band – Main

7.8 Radiated Spurious Emissions Measurements

Test Overview

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

Test Procedures Used

ANSI C63.26:2015 – Section 5.5.4

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

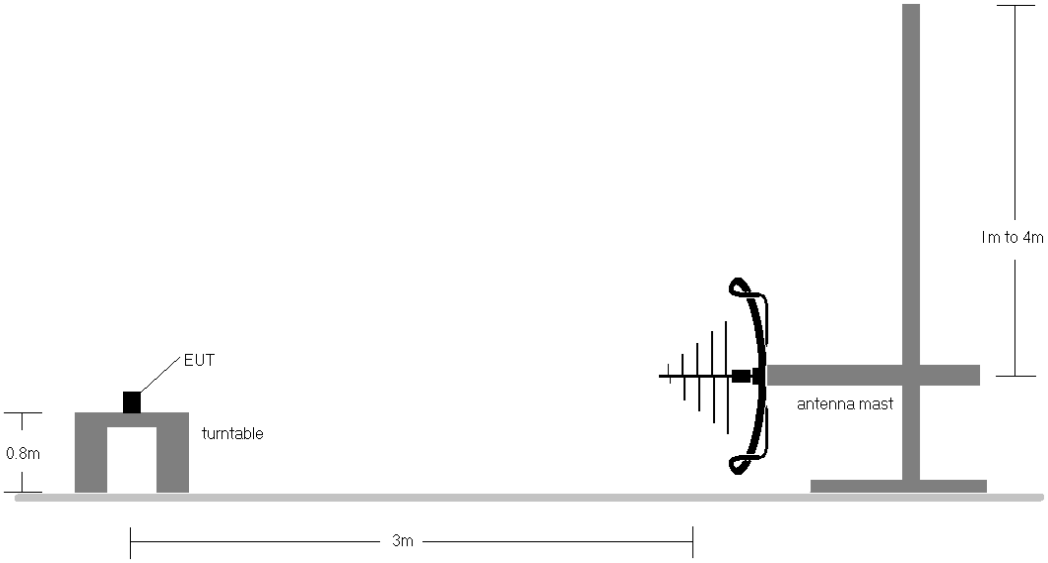


Figure 7-7. Test Instrument & Measurement Setup < 1GHz

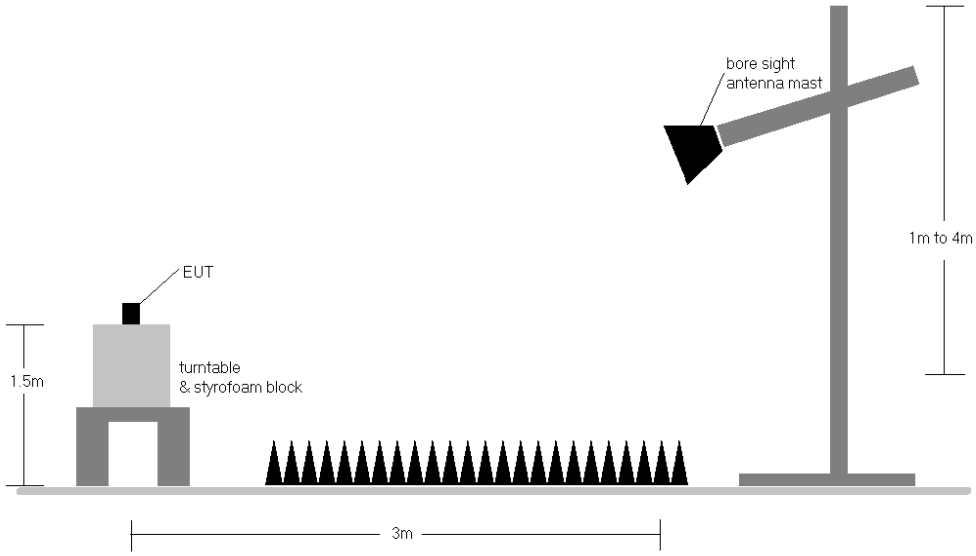


Figure 7-8. Test Instrument & Measurement Setup >1 GHz

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in ANSI C63.26:2015 Section 5.2.7:

   b) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   d) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) 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.

3) This unit was tested with its standard battery.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

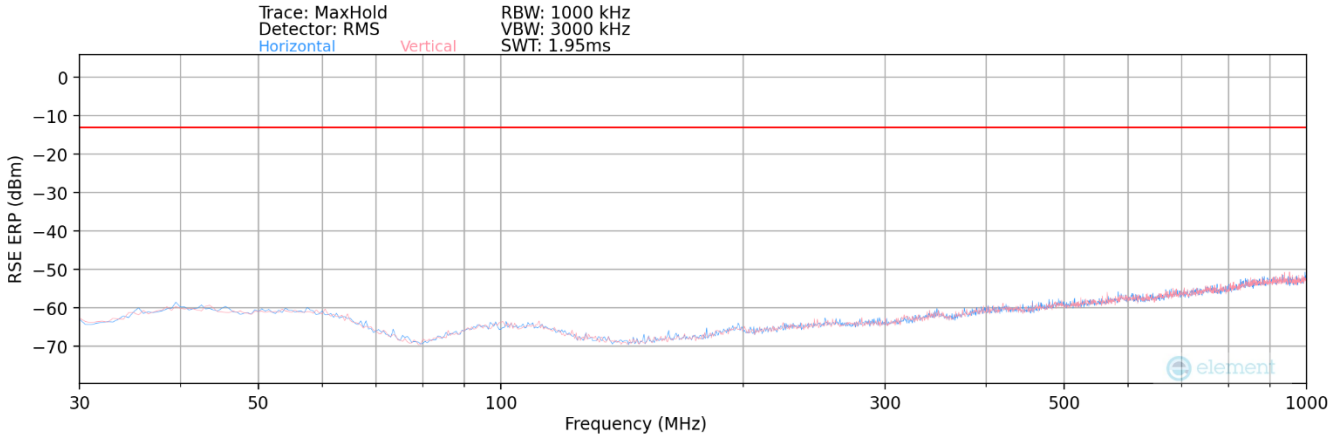
5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

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

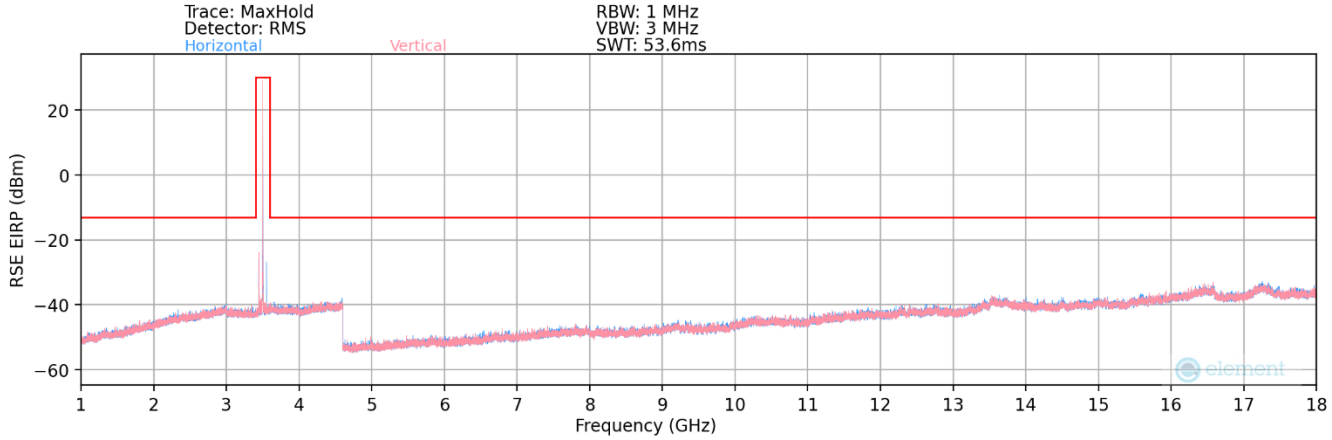
7) For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst-case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

8) Spurious emissions shown in this section are measured while operating in EN-DC mode with Sub 6GHz NR carrier as well as an LTE carrier (anchor). Spurious emissions from the NR carrier device, is subject to the rules under which the NR carrier operates. Spurious emissions caused by the LTE carrier must meet the requirements of the rules under which the LTE carrier operates.

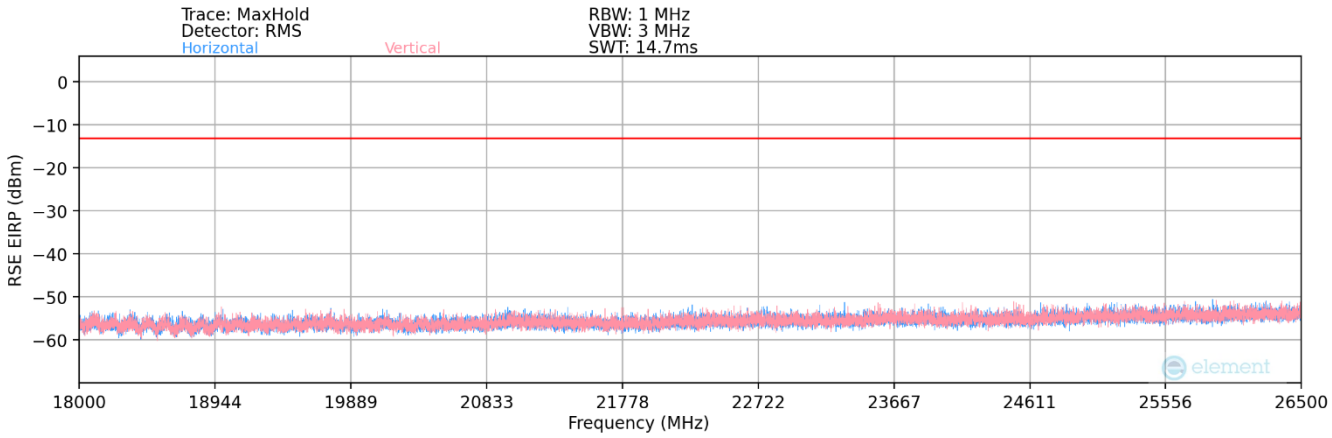
NR Band n77 – DoD Band



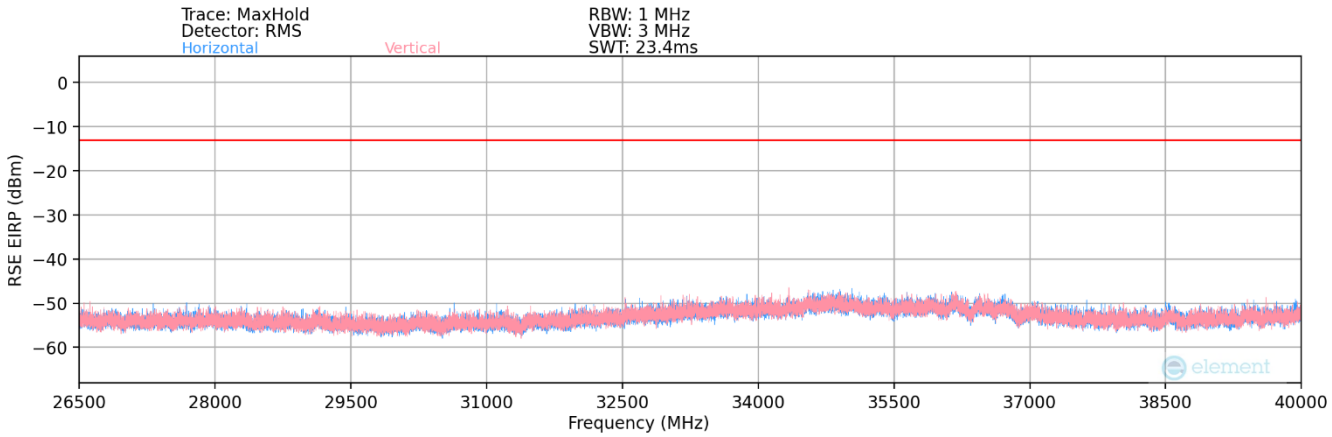
Plot 7-95. Radiated Spurious Plot (NR Band n77) – DoD Band



Plot 7-96. Radiated Spurious Plot (NR Band n77) – DoD Band



Plot 7-97. Radiated Spurious Plot (NR Band n77) – DoD Band



Plot 7-98. Radiated Spurious Plot (NR Band n77) – DoD Band

Bandwidth (MHz):	100
Frequency (MHz):	3500.01
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	ERP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
39.00	V	-	-	-60.92	-12.78	33.30	-64.11	-13.00	-51.11
175.04	V	-	-	-65.19	-15.55	26.26	-71.14	-13.00	-58.14
582.39	V	-	-	-67.41	-4.87	34.72	-62.69	-13.00	-49.69

Table 7-20. Radiated Spurious Data (NR Band n77) – DoD Band

Bandwidth (MHz):	100
Frequency (MHz):	3500.01
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7000.02	V	131	353	-72.50	14.81	49.31	-45.95	-13.00	-32.95
10500.03	V	-	-	-73.18	20.12	53.94	-41.32	-13.00	-28.32
14000.04	V	105	333	-71.79	25.85	61.06	-34.20	-13.00	-21.20
17500.05	V	-	-	-74.68	29.56	61.88	-33.38	-13.00	-20.38
21000.06	V	-	-	-55.81	2.82	54.00	-50.80	-13.00	-37.80
24500.07	V	-	-	-55.39	4.12	55.73	-49.07	-13.00	-36.07

Table 7-21. Radiated Spurious Data (NR Band n77 – Mid Channel) – DoD Band

Case:	w/ Wireless Charging Pad
Bandwidth (MHz):	100
Frequency (MHz):	3500.01
RB / Offset:	1 / 136

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
7000.02	V	-	-	-72.72	14.81	49.09	-46.17	-13.00	-33.17
10500.03	V	-	-	-73.17	20.12	53.95	-41.31	-13.00	-28.31
14000.04	V	247	352	-73.36	25.85	59.49	-35.77	-13.00	-22.77
17500.05	V	-	-	-74.60	29.56	61.96	-33.30	-13.00	-20.30

Table 7-22. Radiated Spurious Data (NR Band n77) – DoD Band – with WCP