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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:
08/28/2023 - 10/27/2023
Test Report Issue Date:
11/10/2023
Test Site/Location:
Element lab., Columbia, MD, USA
Test Report Serial No.:
1M2308210093-04.A3L

FCC ID:	**A3LSMS928B**
Applicant Name:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-S928B/DS
Additional Model(s):	SM-S928B
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

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Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 41(PC2)	20 MHz	QPSK	2506.0 - 2680.0	0.341	25.33	18M0G7D
		16QAM	2506.0 - 2680.0	0.270	24.31	18M1W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.327	25.15	13M6G7D
		16QAM	2503.5 - 2682.5	0.314	24.96	13M5W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.346	25.39	9M05G7D
		16QAM	2501.0 - 2685.0	0.286	24.56	9M03W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.348	25.41	4M52G7D
		16QAM	2498.5 - 2687.5	0.305	24.84	4M52W7D
NR Band n41(PC3)	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.183	22.62	97M1G7D
		QPSK	2546.0 - 2640.0	0.203	23.07	98M1G7D
		16QAM	2546.0 - 2640.0	0.170	22.31	97M9W7D
	90 MHz	π/2 BPSK	2541.0 - 2645.0	0.189	22.76	87M4G7D
		QPSK	2541.0 - 2645.0	0.203	23.07	87M9G7D
		16QAM	2541.0 - 2645.0	0.146	21.65	87M8W7D
	80 MHz	π/2 BPSK	2536.0 - 2650.0	0.179	22.52	77M4G7D
		QPSK	2536.0 - 2650.0	0.194	22.87	77M7G7D
		16QAM	2536.0 - 2650.0	0.162	22.10	77M8W7D
	70 MHz	π/2 BPSK	2531.0 - 2655.0	0.170	22.30	64M5G7D
		QPSK	2531.0 - 2655.0	0.195	22.91	67M7G7D
		16QAM	2531.0 - 2655.0	0.159	22.01	67M7W7D
	60 MHz	π/2 BPSK	2526.0 - 2660.0	0.165	22.16	58M1G7D
		QPSK	2526.0 - 2660.0	0.178	22.50	58M0G7D
		16QAM	2526.0 - 2660.0	0.125	20.98	58M1W7D
	50 MHz	π/2 BPSK	2521.0 - 2665.0	0.174	22.41	45M9G7D
		QPSK	2521.0 - 2665.0	0.189	22.76	47M7G7D
		16QAM	2521.0 - 2665.0	0.156	21.92	47M8W7D
	40 MHz	π/2 BPSK	2516.0 - 2670.0	0.175	22.44	35M9G7D
		QPSK	2516.0 - 2670.0	0.193	22.85	38M1G7D
		16QAM	2516.0 - 2670.0	0.144	21.58	38M2W7D
	30 MHz	π/2 BPSK	2511.0 - 2675.0	0.179	22.52	27M1G7D
		QPSK	2511.0 - 2675.0	0.199	22.99	28M0G7D
		16QAM	2511.0 - 2675.0	0.157	21.97	28M1W7D
	20 MHz	π/2 BPSK	2506.0 - 2680.0	0.153	21.85	18M0G7D
		QPSK	2506.0 - 2680.0	0.163	22.11	18M3G7D
		16QAM	2506.0 - 2680.0	0.138	21.39	18M4W7D
	15MHz	π/2 BPSK	2506.0 - 2680.0	0.153	21.85	13M0G7D
		QPSK	2506.0 - 2680.0	0.165	22.17	13M7G7D
		16QAM	2506.0 - 2680.0	0.132	21.19	13M6G7D
	10 MHz	π/2 BPSK	2506.0 - 2680.0	0.179	22.54	8M67G7D
		QPSK	2506.0 - 2680.0	0.199	22.98	8M67G7D
		16QAM	2506.0 - 2680.0	0.139	21.43	8M69G7D

EUT Overview

Antenna-2						
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 41(PC2)	20 MHz	QPSK	2506.0 - 2680.0	0.341	25.32	18M1G7D
		16QAM	2506.0 - 2680.0	0.276	24.40	18M1W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.329	25.18	13M5G7D
		16QAM	2503.5 - 2682.5	0.266	24.25	13M6W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.355	25.51	9M06G7D
		16QAM	2501.0 - 2685.0	0.279	24.45	9M04W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.305	24.85	4M54G7D
		16QAM	2498.5 - 2687.5	0.198	22.96	4M54W7D
NR Band n41(PC3)	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.150	21.76	N/A
		QPSK	2546.0 - 2640.0	0.122	20.87	
		16QAM	2546.0 - 2640.0	0.101	20.04	

EUT Overview

Antenna-3					
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n41(PC3)	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.083	19.18
		QPSK	2546.0 - 2640.0	0.083	19.19
		16QAM	2546.0 - 2640.0	0.065	18.10

EUT Overview

Antenna-4					
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n41(PC3)	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.095	19.78
		QPSK	2546.0 - 2640.0	0.080	19.03
		16QAM	2546.0 - 2640.0	0.068	18.35

EUT Overview

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

These measurement tests were conducted at the Element laboratory located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at Element 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 (2451B) test laboratory with the site description on file with ISED.

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

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS928B**. 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.

Test Device Serial No.: 0361M, 0358M, 0364M, 1107M, 0741M, 1177M, 0747M

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), NFC, Wireless Power Transfer, UWB

This device uses a tuner circuit that dynamically updates the antenna impedance parameters to optimize antenna performance for certain bands and modes of operation. The tuner for this device was set to simulate a "free space" condition where the transmit antenna is matched to the medium into which it is transmitting and, thus, the power is at its maximum level.

Band	Ant1	Ant2	Ant3	Ant4
LTE Band 41	Ant B	Ant F	N/A	N/A
NR Band 41	Ant F	Ant B	Ant E	Ant D

Table 2-1. Antenna 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-N5100 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 Software and Firmware

Testing was performed on device(s) using software/firmware version S928BXXU0AWH9 installed on the EUT.

2.5 EMI Suppression Device(s)/Modifications

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

3.0 DESCRIPTION OF TESTS

3.1 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

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
-	AP2-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-001
-	AP1-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP1-002
-	ETS-001	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-001
	ETS-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	ETS-002
	MD 1M 18-40	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	MD 1M 18-40
-	LTx1	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx1
-	LTx2	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx2
-	LTx3	LIcensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx3
-	LTx6-40	LIcensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTx6-40
Emco	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
Emco	3116	Horn Antenna (18 - 40GHz)	7/5/2022	Biennial	7/5/2024	9203-2178
Espec	ESX-2CA	Environmental Chamber	5/25/2022	Biennial	5/25/2024	OCPS5H0612K05
ETS Lindgren	3116C	1-18 GHz DRG Horn Antenna	2/27/2023	Biennial	2/27/2024	00218893
ETS Lindgren	3115	Double Ridged Guide Horn	4/12/2022	Biennial	4/12/2024	82333
Keysight Technologies	N9020A	MXA Signal Analyzer	3/15/2023	Annual	3/15/2024	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	8/29/2023	Annual	8/29/2024	MY49430494
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Keysight Technologies	N9030A	PXA Signal Analyzer	8/7/2023	Annual	8/7/2024	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer	1/31/2023	Annual	1/31/2024	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/7/2023	Annual	9/7/2024	MY57141001
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Anritsu	MT8000A	Radio Communication Test Station	1/5/2023	Annual	1/5/2024	83821
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	9/25/2023	Annual	9/25/2024	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/11/2023	Annual	9/11/2024	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	11/6/2022	Annual	11/6/2023	103187
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	1/13/2023	Annual	1/13/2024	103200
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	2/21/2023	Biennial	2/21/2025	A051107
Sunol	JB6	LB6 Antenna	3/2/2023	Biennial	3/2/2025	A082816

Table 5-1. Test Equipment

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.

6.0 SAMPLE CALCULATIONS

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

Spurious Radiated Emission

Example: Spurious emission at 3700.40 MHz

The receive spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analyzer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 3700.40 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.50 dBm so this harmonic was 25.50 dBm – (-24.80) = 50.3 dBc.

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMS928B

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

Mode(s): LTE/NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Transmitter Conducted Output Power*	2.1046(a), 2.1046(c)	N/A	PASS	Section 7.2
	Occupied Bandwidth	2.1049(h)	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (LTE Band 41; NR Band n41)	2.1051, 27.53(m)(4)	Undesirable emissions must meet the limits detailed in 27.53(m)(4)	PASS	Sections 7.4, 7.5
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Equivalent Isotropic Radiated Power (LTE Band 41; NR Band n41)	27.50(h)(2)	≤ 2 Watts max. EIRP	PASS	Section 7.6
	Radiated Spurious Emissions (LTE Band 41; NR Band n41)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.7

* 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 v1.1.

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.

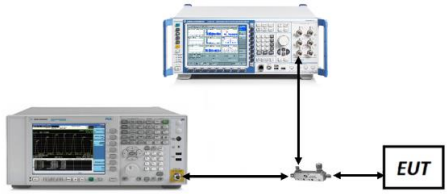


Figure 7-1. Test Instrument & Measurement Setup

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	509202	2546.01	1 / 271	24.58
		518598	2592.99	1 / 136	24.43
		528000	2640.00	1 / 1	24.45
	QPSK	509202	2546.01	1 / 271	24.52
		518598	2592.99	1 / 136	24.39
		528000	2640.00	1 / 1	24.42
	16-QAM	509202	2546.01	1 / 271	23.71
		518598	2592.99	1 / 136	23.62
		528000	2640.00	1 / 1	23.61
90 MHz	π/2 BPSK	508200	2541.00	1 / 243	24.52
		518598	2592.99	1 / 1	24.11
		528996	2644.98	1 / 243	24.59
	QPSK	508200	2541.00	1 / 243	24.52
		518598	2592.99	1 / 243	24.06
		528996	2644.98	1 / 243	24.59
	16-QAM	508200	2541.00	1 / 1	22.52
		518598	2592.99	1 / 1	23.65
		528996	2644.98	1 / 1	22.55
80 MHz	π/2 BPSK	507204	2536.02	1 / 215	24.25
		518598	2592.99	1 / 1	24.15
		529998	2649.99	1 / 1	24.35
	QPSK	507204	2536.02	1 / 215	24.32
		518598	2592.99	1 / 1	24.12
		529998	2649.99	1 / 1	24.39
	16-QAM	507204	2536.02	1 / 1	22.54
		518598	2592.99	1 / 1	23.45
		529998	2649.99	1 / 1	23.40
70 MHz	π/2 BPSK	506202	2531.01	1 / 94	24.26
		518598	2592.99	1 / 1	24.02
		531000	2655.00	1 / 1	24.13
	QPSK	506202	2531.01	1 / 94	24.36
		518598	2592.99	1 / 187	24.05
		531000	2655.00	1 / 1	24.20
	16-QAM	506202	2531.01	1 / 1	23.00
		518598	2592.99	1 / 1	23.11
		531000	2655.00	1 / 1	23.31
60 MHz	π/2 BPSK	505200	2526.00	1 / 160	23.88
		518598	2592.99	1 / 160	23.92
		531996	2659.98	1 / 160	23.99
	QPSK	505200	2526.00	1 / 160	23.95
		518598	2592.99	1 / 160	23.99
		531996	2659.98	1 / 160	23.98
	16-QAM	505200	2526.00	1 / 1	22.21
		518598	2592.99	1 / 1	22.34
		531996	2659.98	1 / 1	22.28
50 MHz	π/2 BPSK	504204	2521.02	1 / 131	24.18
		518598	2592.99	1 / 131	24.24
		532998	2664.99	1 / 1	24.24
	QPSK	504204	2521.02	1 / 131	24.21
		518598	2592.99	1 / 131	24.25
		532998	2664.99	1 / 1	24.24
	16-QAM	504204	2521.02	1 / 1	22.43
		518598	2592.99	1 / 1	22.44
		532998	2664.99	1 / 1	23.22
40 MHz	π/2 BPSK	503202	2516.01	1 / 104	24.22
		518598	2592.99	1 / 53	24.27
		534000	2670.00	1 / 1	23.90
	QPSK	503202	2516.01	1 / 53	24.30
		518598	2592.99	1 / 53	24.31
		534000	2670.00	1 / 1	23.95
	16-QAM	503202	2516.01	1 / 1	23.04
		518598	2592.99	1 / 1	23.25
		534000	2670.00	1 / 1	22.88
30 MHz	π/2 BPSK	502200	2511.00	1 / 76	24.36
		518598	2592.99	1 / 76	24.21
		534996	2674.98	1 / 76	24.35
	QPSK	502200	2511.00	1 / 76	24.44
		518598	2592.99	1 / 76	24.23
		534996	2674.98	1 / 76	24.43
	16-QAM	502200	2511.00	1 / 1	23.43
		518598	2592.99	1 / 1	22.89
		534996	2674.98	1 / 1	23.27
20 MHz	π/2 BPSK	501204	2506.02	1 / 49	23.49
		518598	2592.99	1 / 49	23.51
		535998	2679.99	1 / 1	23.68
	QPSK	501204	2506.02	1 / 49	23.54
		518598	2592.99	1 / 49	23.56
		535998	2679.99	1 / 1	23.71
	16-QAM	501204	2506.02	1 / 1	22.27
		518598	2592.99	1 / 1	22.25
		535998	2679.99	1 / 1	22.69
15MHz	π/2 BPSK	501204	2506.02	1 / 49	23.61
		518598	2592.99	1 / 49	23.67
		535998	2679.99	1 / 49	23.68
	QPSK	501204	2506.02	1 / 49	23.62
		518598	2592.99	1 / 49	23.66
		535998	2679.99	1 / 49	23.70
	16-QAM	501204	2506.02	1 / 1	22.46
		518598	2592.99	1 / 1	22.45
		535998	2679.99	1 / 1	22.49
10 MHz	π/2 BPSK	501204	2506.02	1 / 49	24.38
		518598	2592.99	1 / 49	24.37
		535998	2679.99	1 / 1	23.56
	QPSK	501204	2506.02	1 / 49	24.43
		518598	2592.99	1 / 49	24.41
		535998	2679.99	1 / 1	23.63
	16-QAM	501204	2506.02	1 / 1	23.34
		518598	2592.99	1 / 1	23.32
		535998	2679.99	1 / 1	22.60

Table 7-2. Conducted Power Data (NR Band 41 (PC3) – Ant1)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 50	24.63
		40620	2593.0	1 / 0	24.98
		41490	2680.0	1 / 50	24.42
	16-QAM	39750	2506.0	1 / 50	23.24
		40620	2593.0	1 / 0	23.23
		41490	2680.0	1 / 50	23.21
15 MHz	QPSK	39725	2503.5	1 / 0	24.12
		40620	2593.0	1 / 0	24.71
		41515	2682.5	1 / 0	24.24
	16-QAM	39725	2503.5	1 / 0	23.66
		40620	2593.0	1 / 0	23.37
		41515	2682.5	1 / 0	23.86
10 MHz	QPSK	39700	2501.0	1 / 25	24.52
		40620	2593.0	1 / 0	24.93
		41540	2685.0	1 / 25	24.48
	16-QAM	39700	2501.0	1 / 25	23.12
		40620	2593.0	1 / 0	23.67
		41540	2685.0	1 / 25	23.05
5 MHz	QPSK	39675	2498.5	1 / 12	24.48
		40620	2593.0	1 / 0	24.20
		41565	2687.5	1 / 12	24.50
	16-QAM	39675	2498.5	1 / 12	23.84
		40620	2593.0	1 / 0	23.50
		41565	2687.5	1 / 12	23.65

Table 7-3. Conducted Power Data (LTE Band 41 (PC2) – Ant2)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	24.02
		518598	2592.99	1 / 1	24.07
		528000	2640.00	1 / 1	23.74
	QPSK	509202	2546.01	1 / 136	23.09
		518598	2592.99	1 / 1	23.25
		528000	2640.00	1 / 1	22.91
	16-QAM	509202	2546.01	1 / 136	22.10
		518598	2592.99	1 / 1	22.44
		528000	2640.00	1 / 1	22.05

Table 7-4. Conducted Power Data (NR Band 41 (PC3) – Ant2)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	22.28
		518598	2592.99	1 / 1	22.27
		528000	2640.00	1 / 136	22.22
	QPSK	509202	2546.01	1 / 136	22.32
		518598	2592.99	1 / 1	22.39
		528000	2640.00	1 / 136	22.27
	16-QAM	509202	2546.01	1 / 136	21.64
		518598	2592.99	1 / 1	21.26
		528000	2640.00	1 / 136	21.15

Table 7-1. Conducted Power Data (NR Band 41 (PC3) – Ant3)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 271	21.72
		518598	2592.99	1 / 136	21.92
		528000	2640.00	1 / 1	21.66
	QPSK	509202	2546.01	1 / 271	20.88
		518598	2592.99	1 / 136	21.05
		528000	2640.00	1 / 1	20.73
	16-QAM	509202	2546.01	1 / 271	20.18
		518598	2592.99	1 / 136	20.01
		528000	2640.00	1 / 1	20.01

Table 7-2. Conducted Power Data (NR Band 41 (PC3) – Ant4)

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.

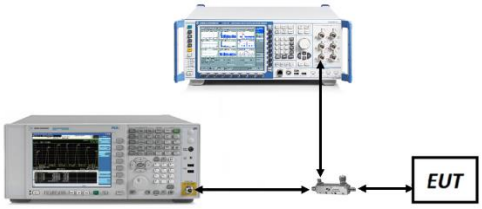


Figure 7-2. Test Instrument & Measurement Setup

Test Notes

None.

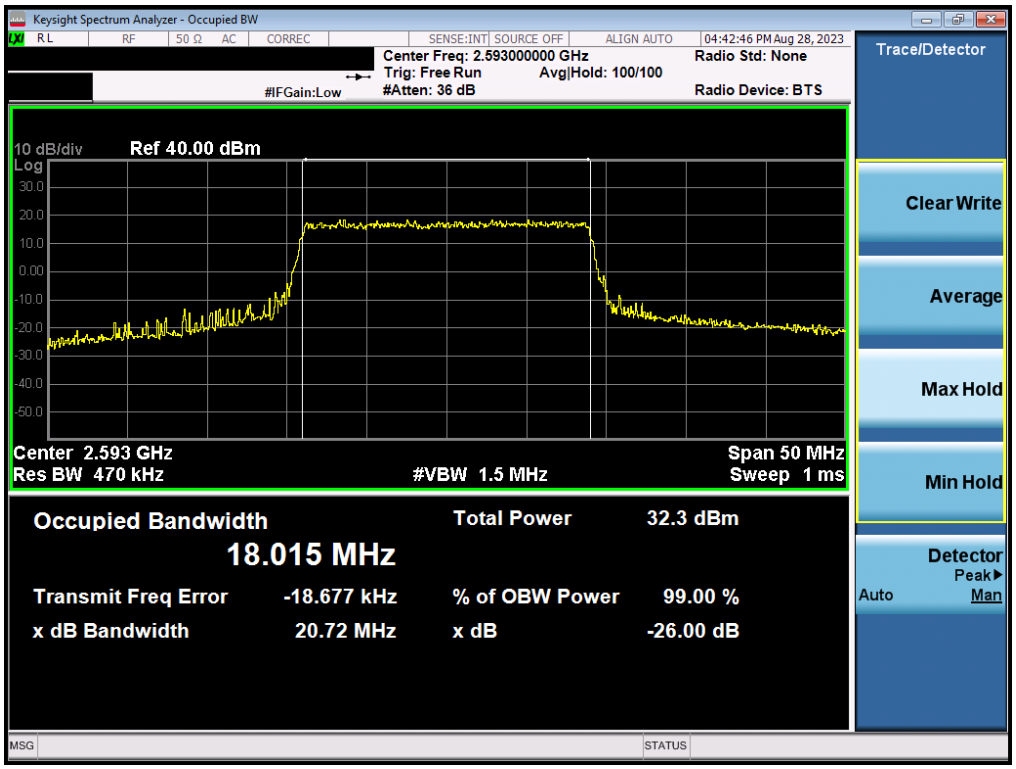
Mode	Bandwidth	Modulation	OBW [MHz]
LTE-B41PC2	20MHz	QPSK	18.02
		16QAM	18.07
	15MHz	QPSK	13.55
		16QAM	13.51
	10MHz	QPSK	9.05
		16QAM	9.03
	5MHz	QPSK	4.52
		16QAM	4.52
NR-n41PC3	100MHz	BPSK	97.10
		QPSK	98.10
		16QAM	97.91
	90MHz	BPSK	87.40
		QPSK	87.93
		16QAM	87.78
	80MHz	BPSK	77.38
		QPSK	77.70
		16QAM	77.80
	70MHz	BPSK	64.50
		QPSK	67.69
		16QAM	67.72
	60MHz	BPSK	58.10
		QPSK	58.02
		16QAM	58.13
	50MHz	BPSK	45.93
		QPSK	47.72
		16QAM	47.79
	40MHz	BPSK	35.94
		QPSK	38.06
		16QAM	38.15
	30MHz	BPSK	27.07
		QPSK	27.97
		16QAM	28.07
	20MHz	BPSK	18.02
		QPSK	18.30
		16QAM	18.37
	15MHz	BPSK	13.02
		QPSK	13.68
		16QAM	13.65
	10MHz	BPSK	8.67
		QPSK	8.67
		16QAM	8.69

Table 7-5. Occupied Bandwidth Test Results – Ant1

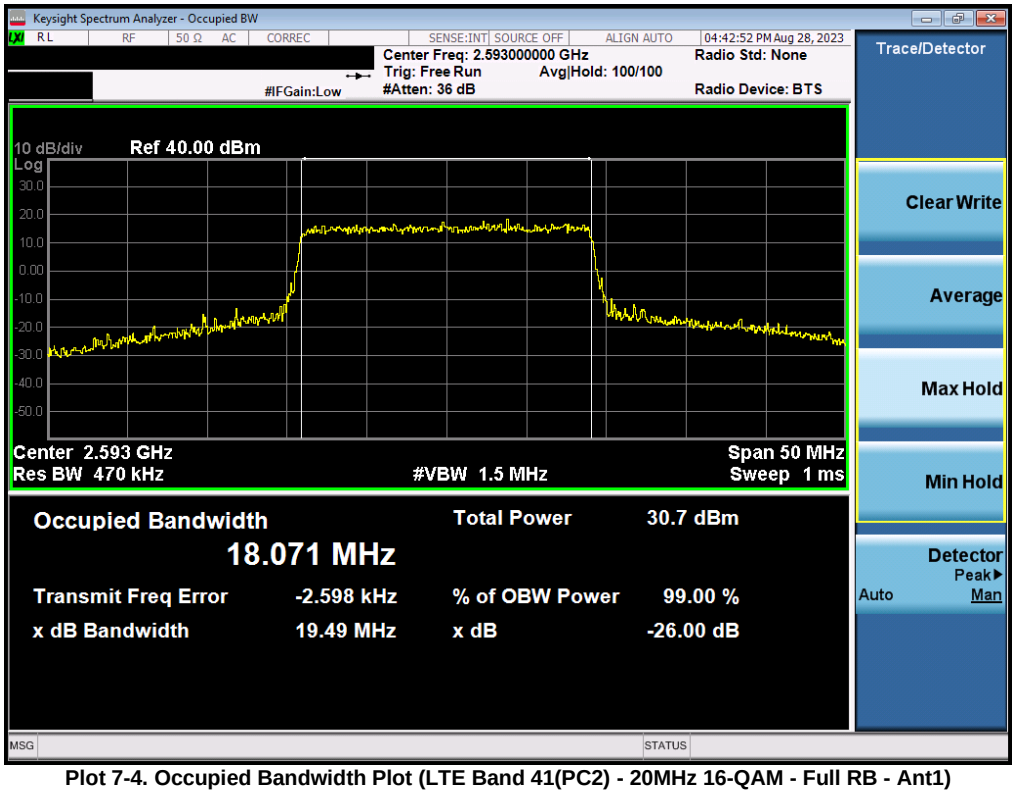
Mode	Bandwidth	Modulation	OBW [MHz]
LTE-B41PC2	20MHz	QPSK	18.12
		16QAM	18.08
	15MHz	QPSK	13.54
		16QAM	13.58
	10MHz	QPSK	9.06
		16QAM	9.04
	5MHz	QPSK	4.54
		16QAM	4.54

Table 7-6. Occupied Bandwidth Test Results – Ant2

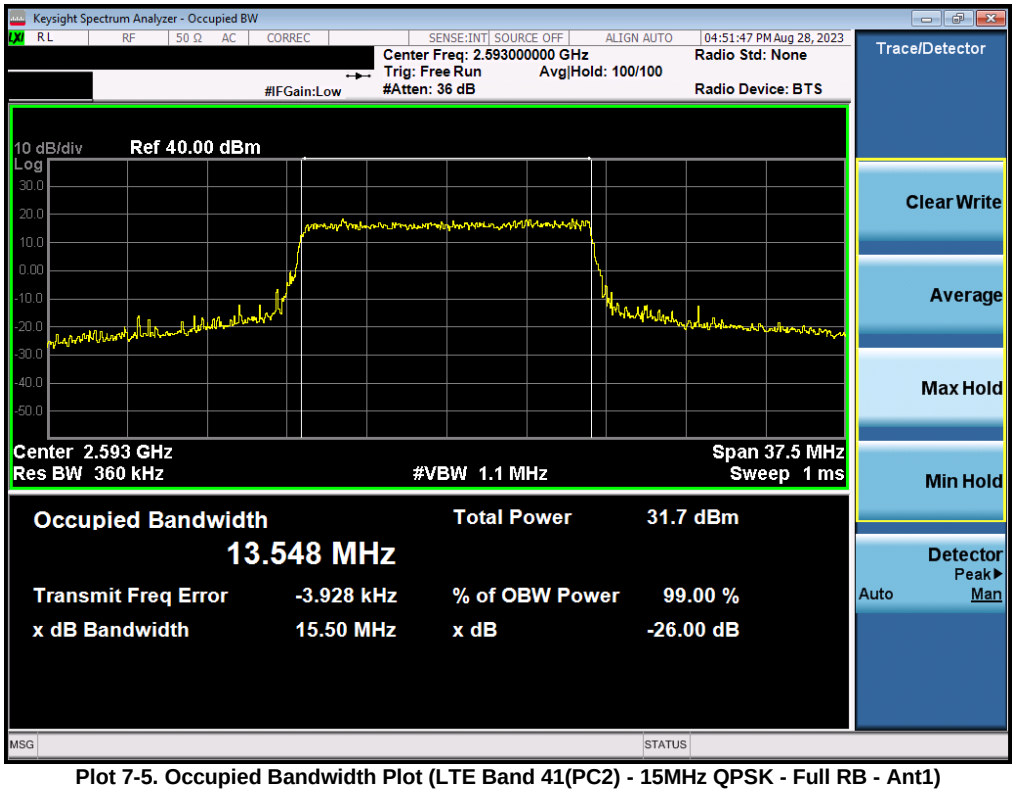
LTE Band 41(PC2) – Ant1



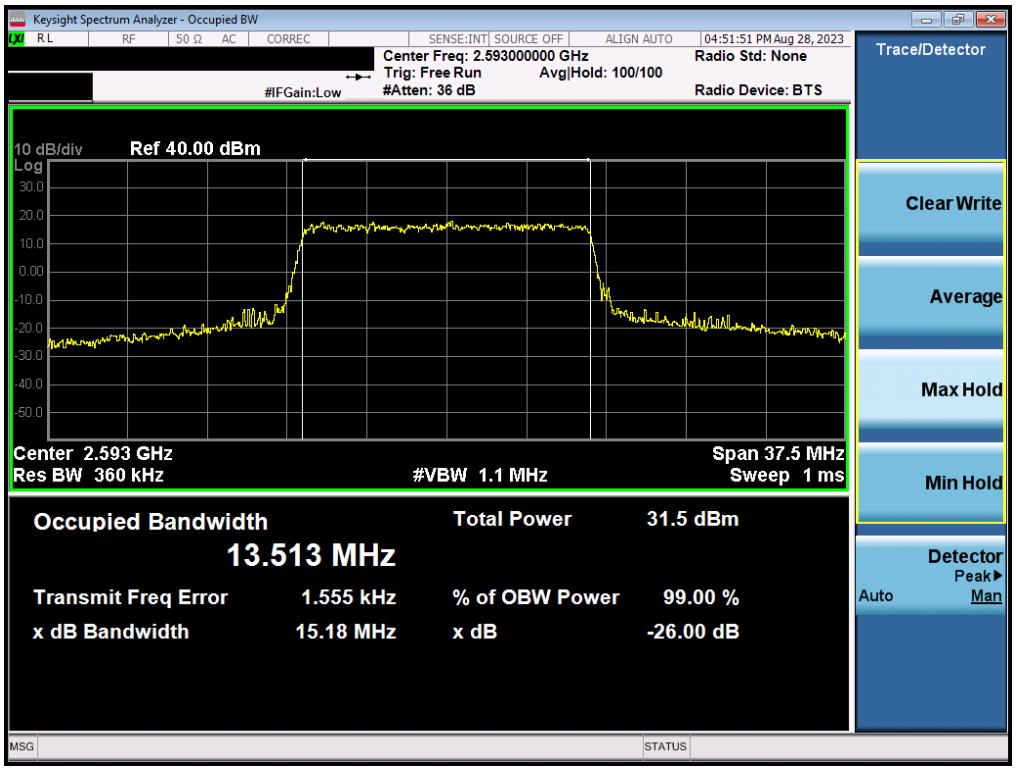
Plot 7-3. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz QPSK - Full RB - Ant1)



Plot 7-4. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz 16-QAM - Full RB - Ant1)

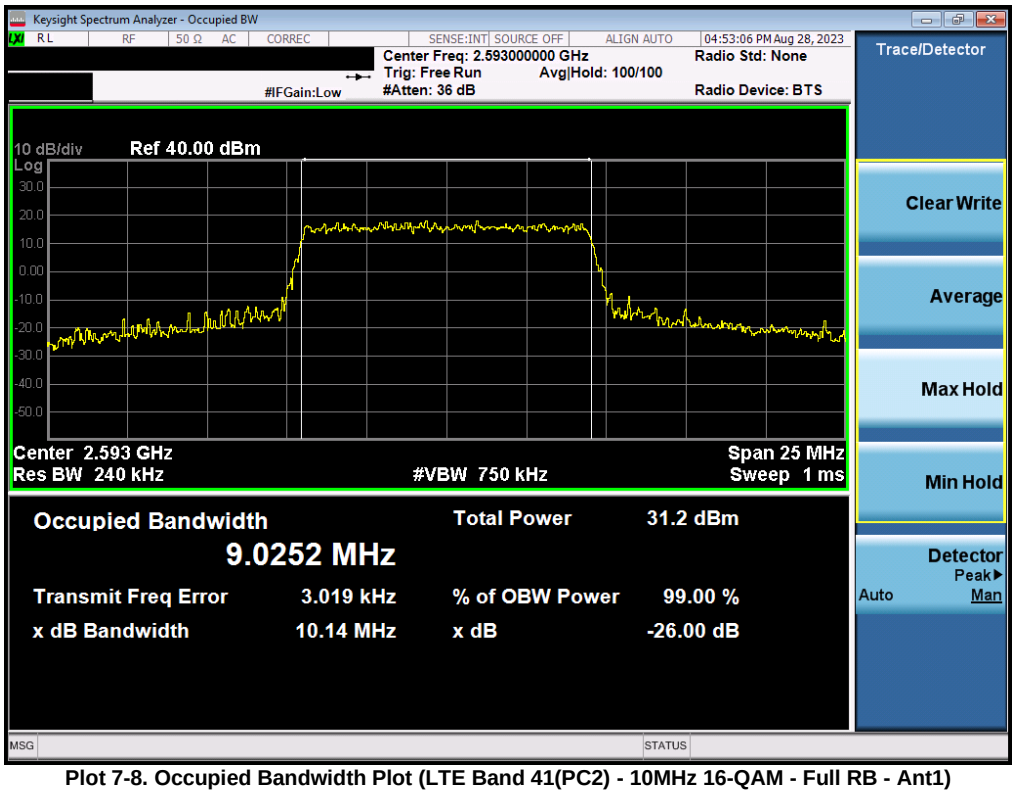


Plot 7-5. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz QPSK - Full RB - Ant1)

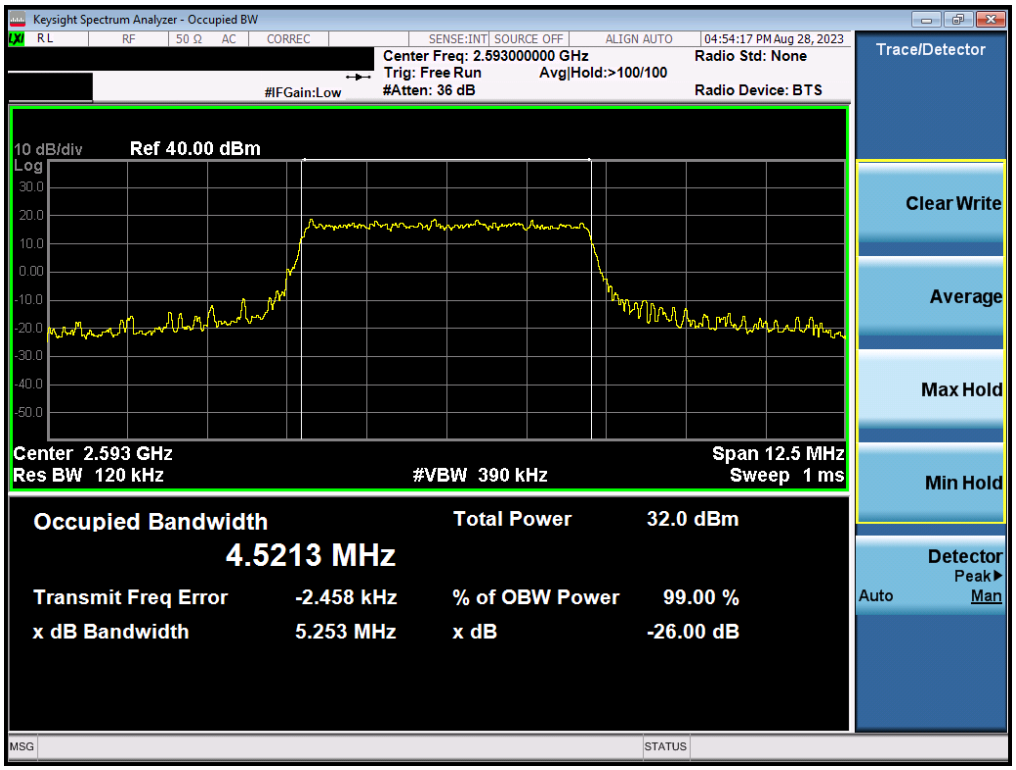


Plot 7-6. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz 16-QAM - Full RB - Ant1)

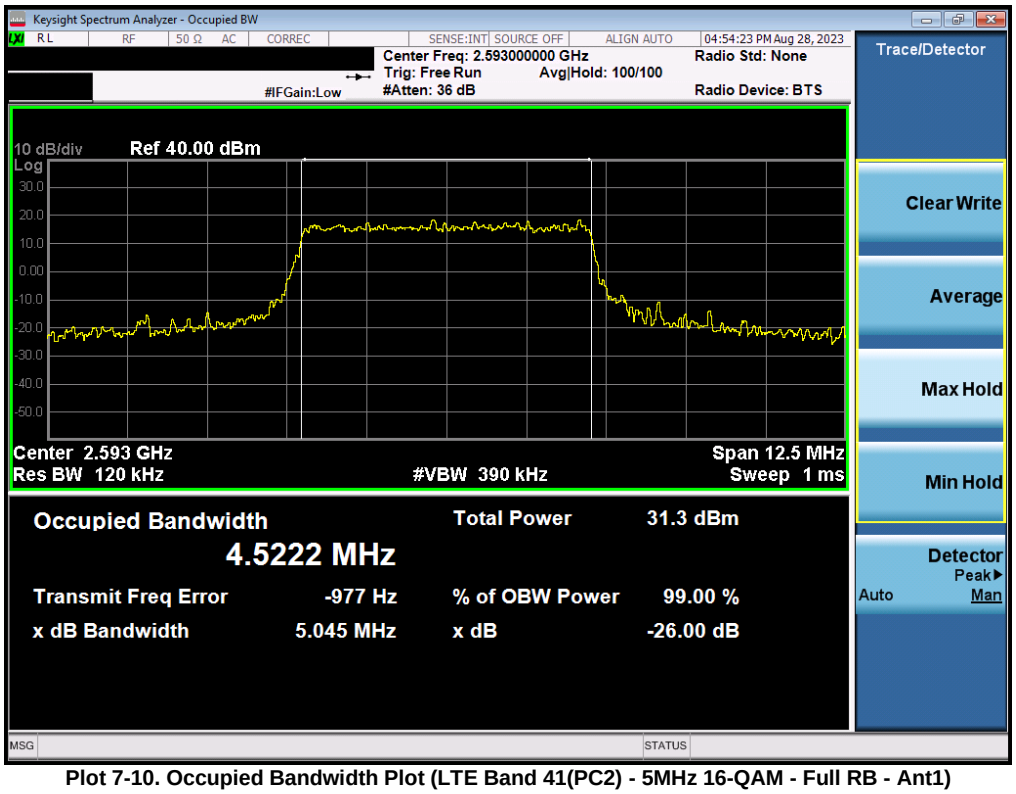
Plot 7-7. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz QPSK - Full RB - Ant1)



Plot 7-8. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz 16-QAM - Full RB - Ant1)

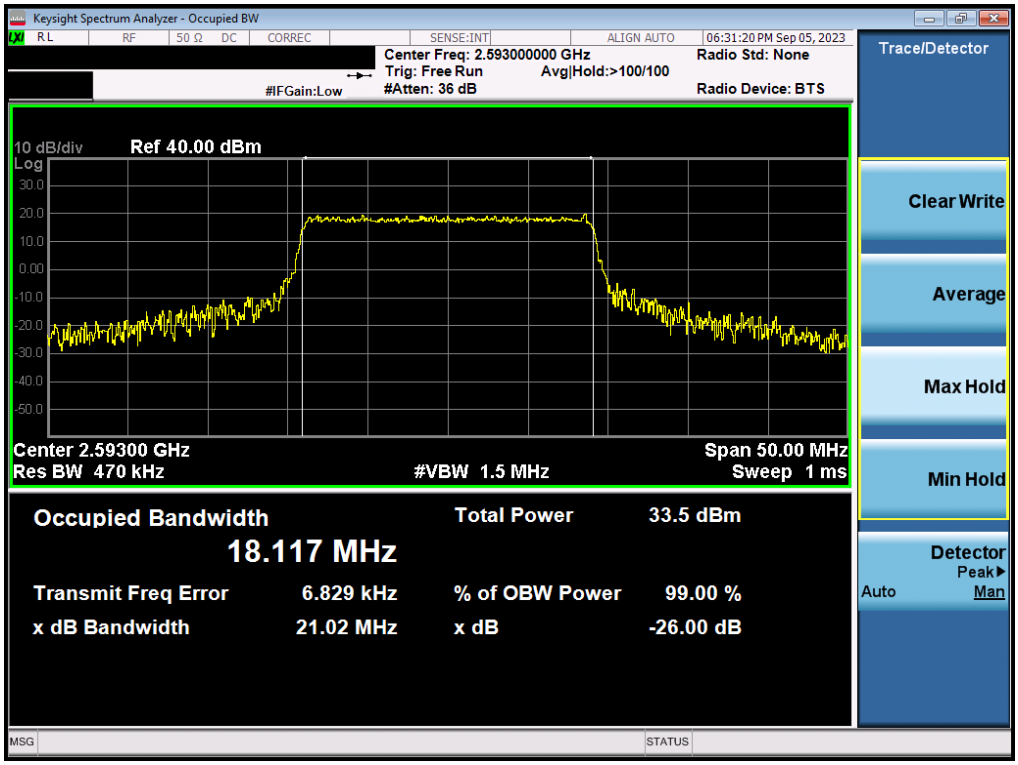


Plot 7-9. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz QPSK - Full RB - Ant1)

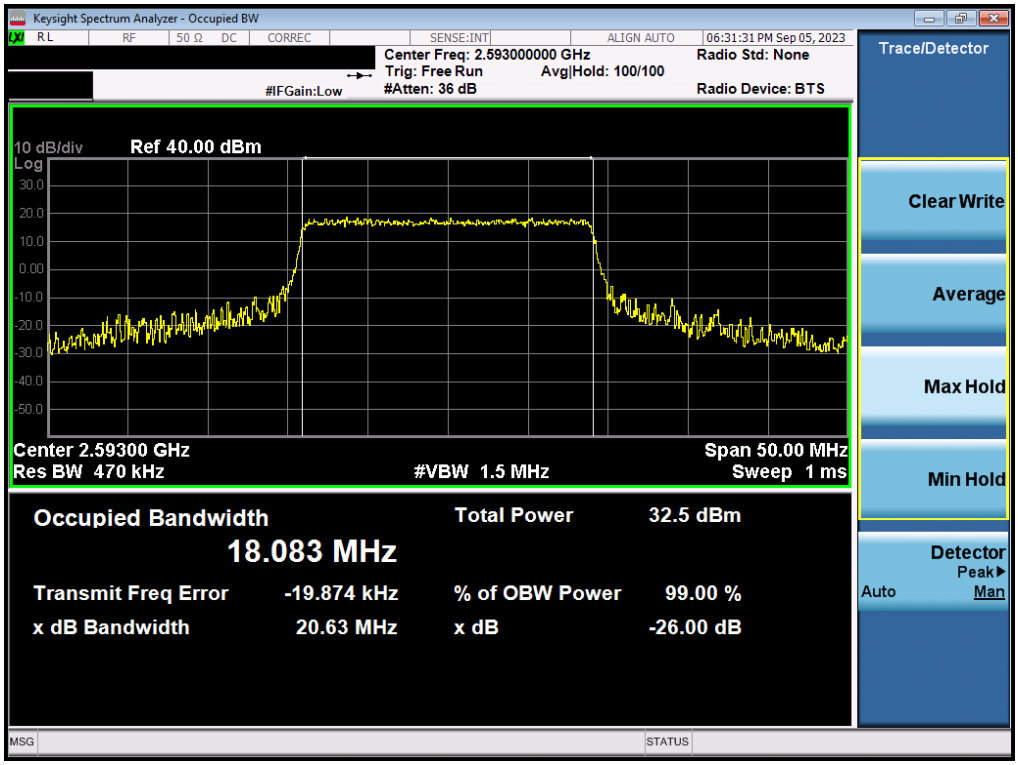


Plot 7-10. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz 16-QAM - Full RB - Ant1)

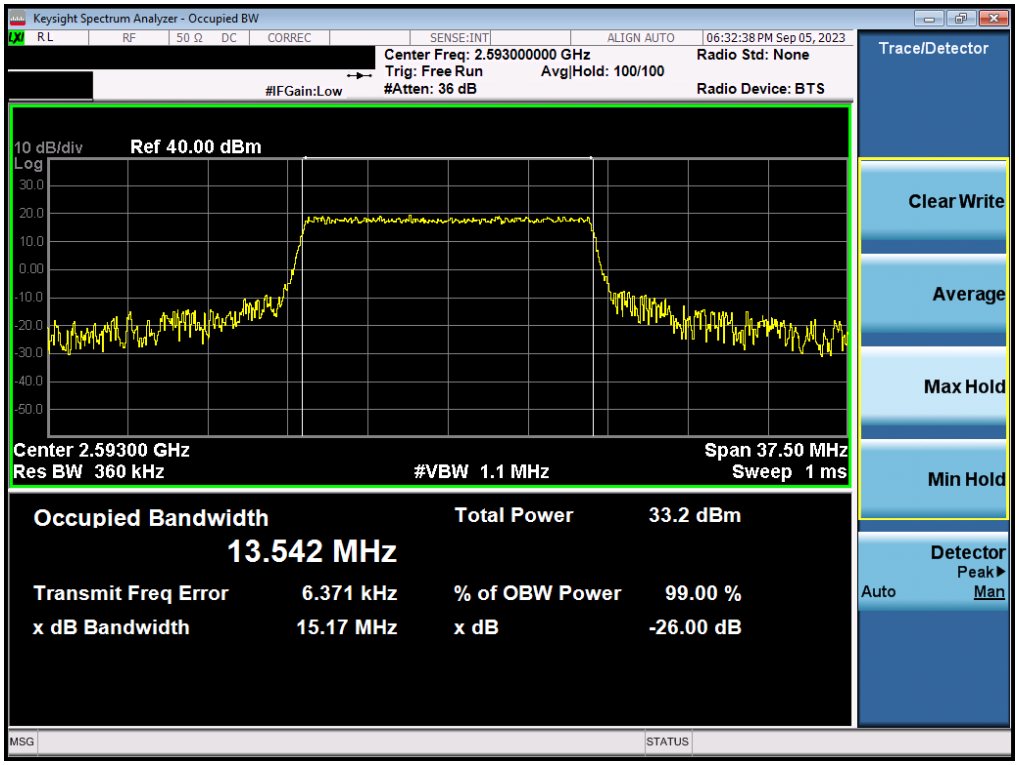
LTE Band 41(PC2) – Ant2



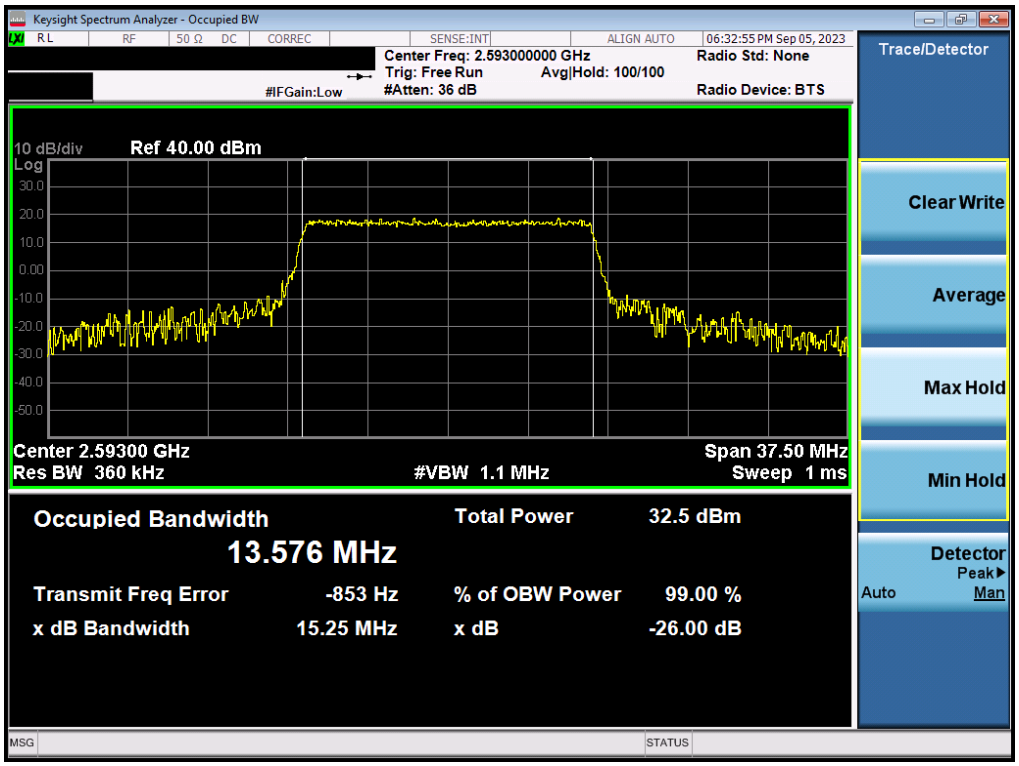
Plot 7-11. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz QPSK - Full RB - Ant2)



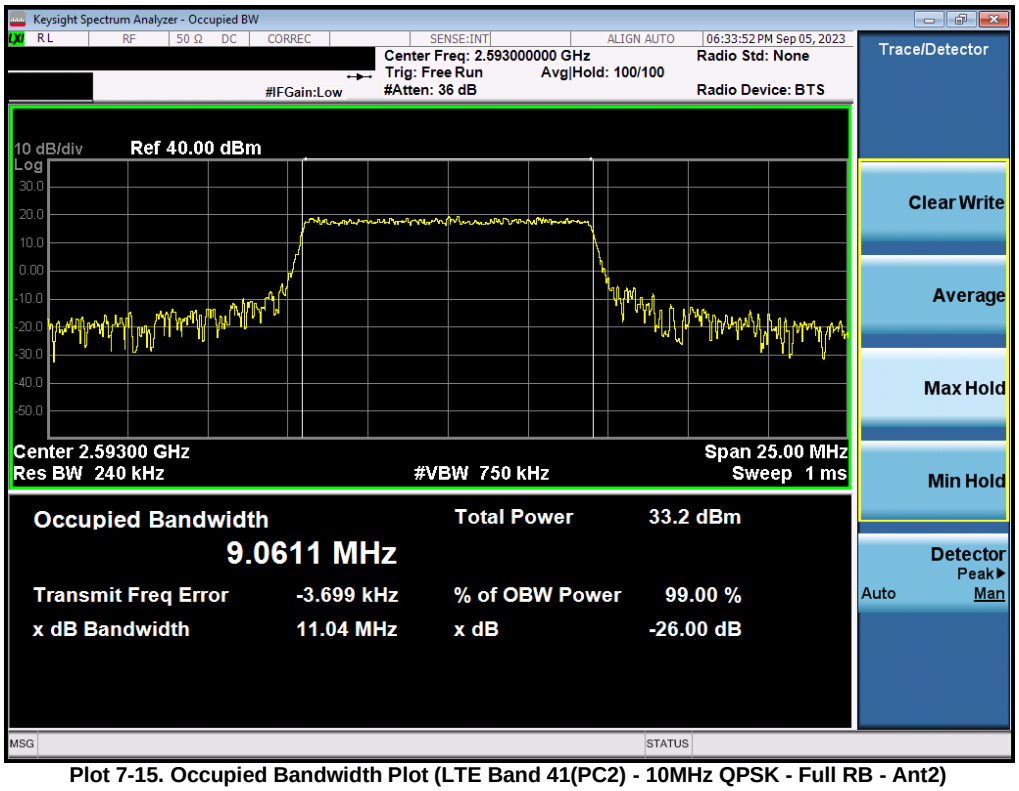
Plot 7-12. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz 16-QAM - Full RB - Ant2)



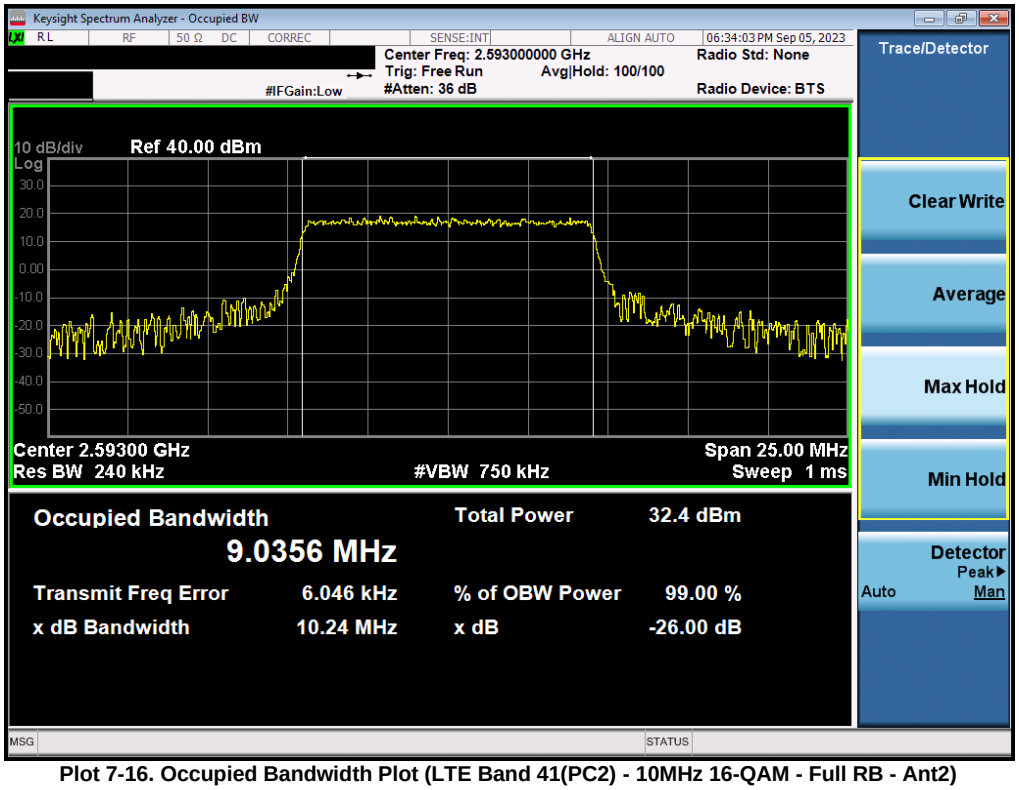
Plot 7-13. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz QPSK - Full RB - Ant2)



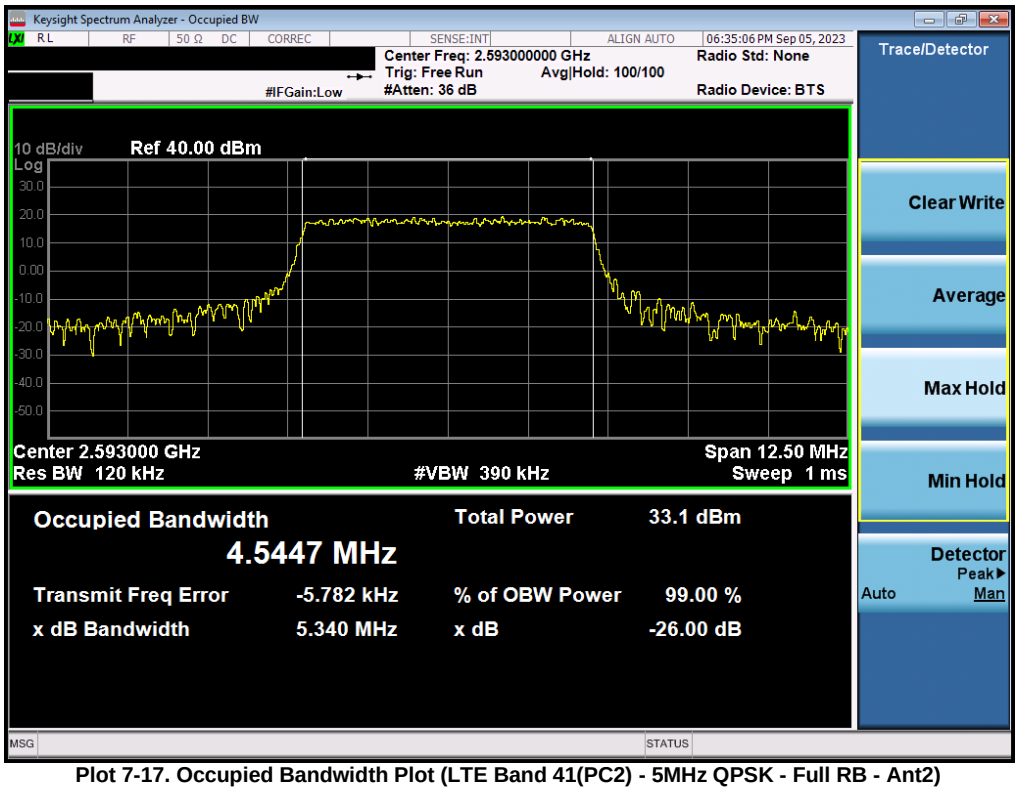
Plot 7-14. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz 16-QAM - Full RB - Ant2)



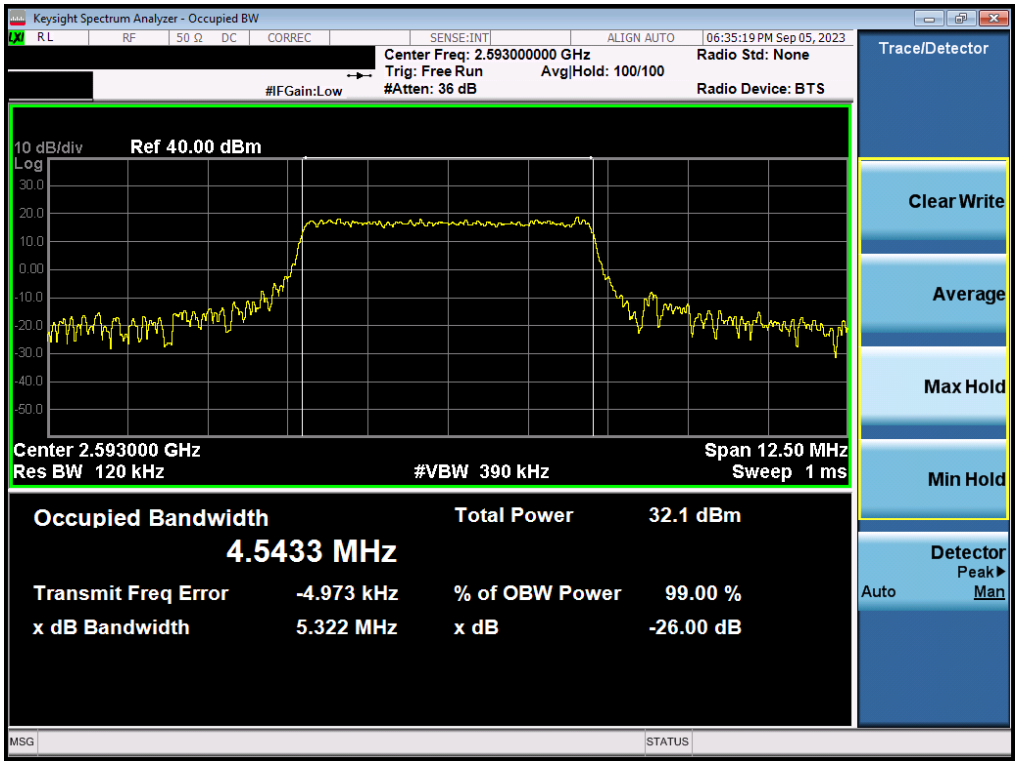
Plot 7-15. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz QPSK - Full RB - Ant2)



Plot 7-16. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz 16-QAM - Full RB - Ant2)

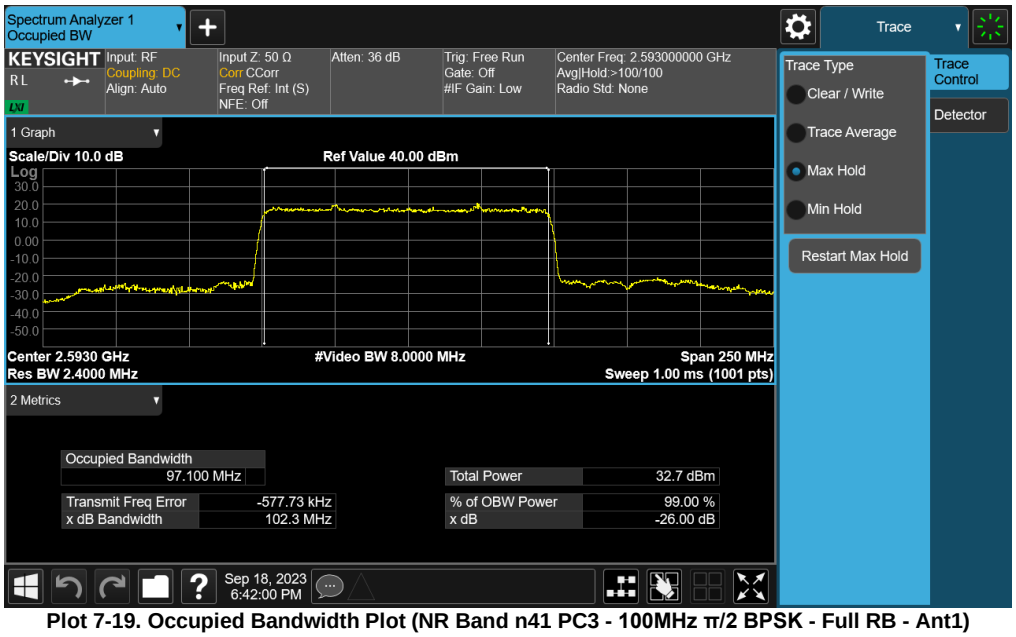


Plot 7-17. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz QPSK - Full RB - Ant2)

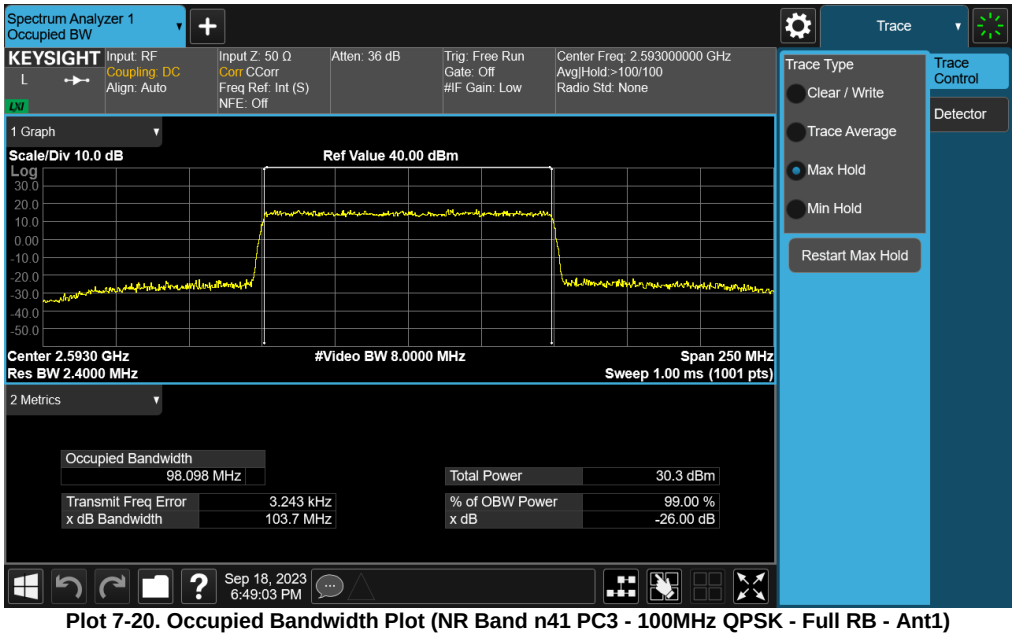


Plot 7-18. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz 16-QAM - Full RB - Ant2)

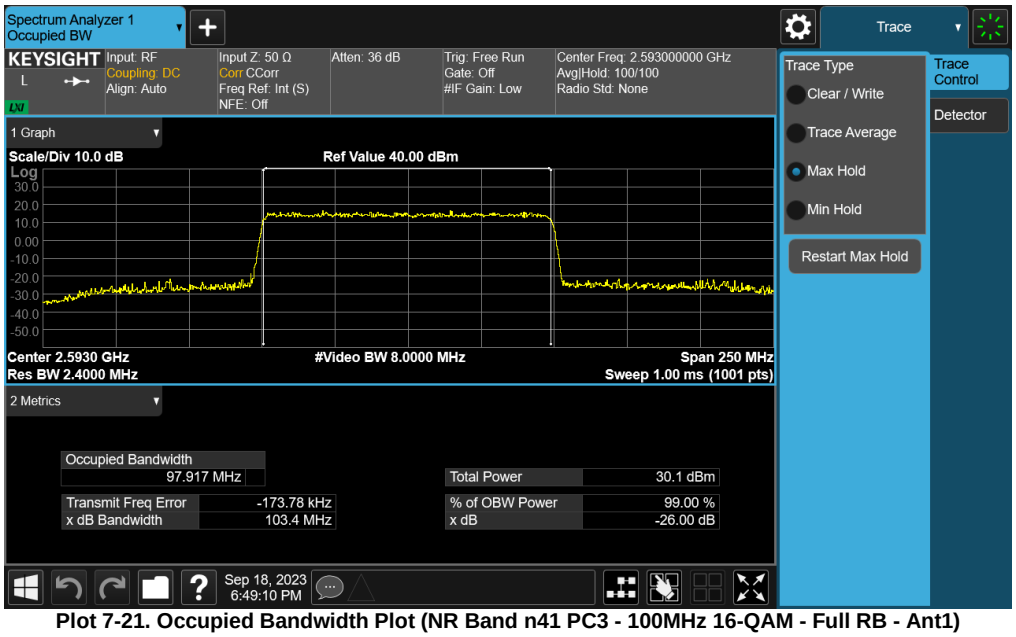
NR Band n41 – Ant1



Plot 7-19. Occupied Bandwidth Plot (NR Band n41 PC3 - 100MHz π/2 BPSK - Full RB - Ant1)

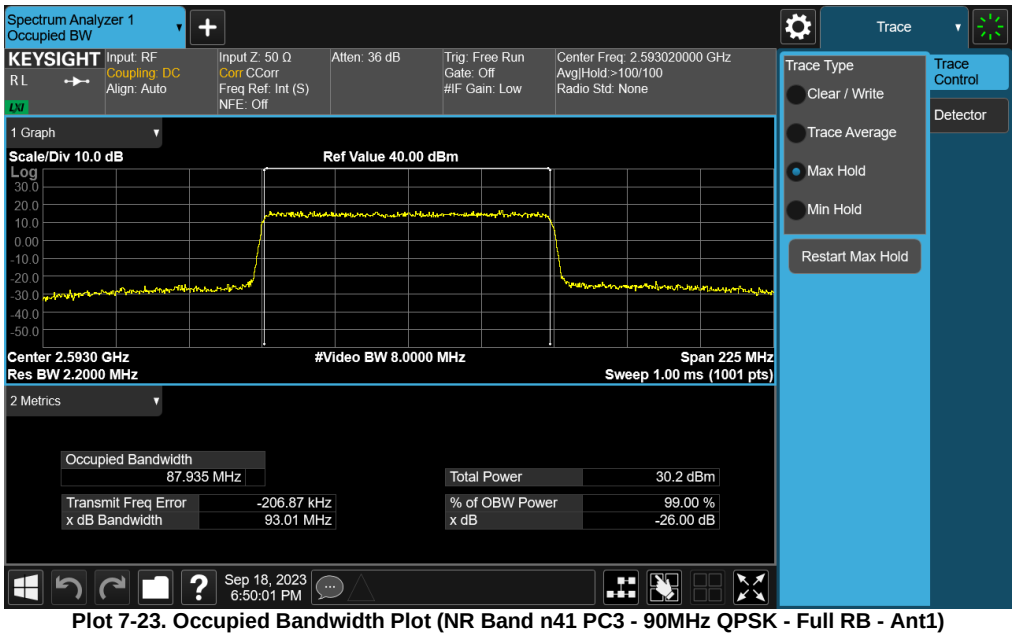


Plot 7-20. Occupied Bandwidth Plot (NR Band n41 PC3 - 100MHz QPSK - Full RB - Ant1)

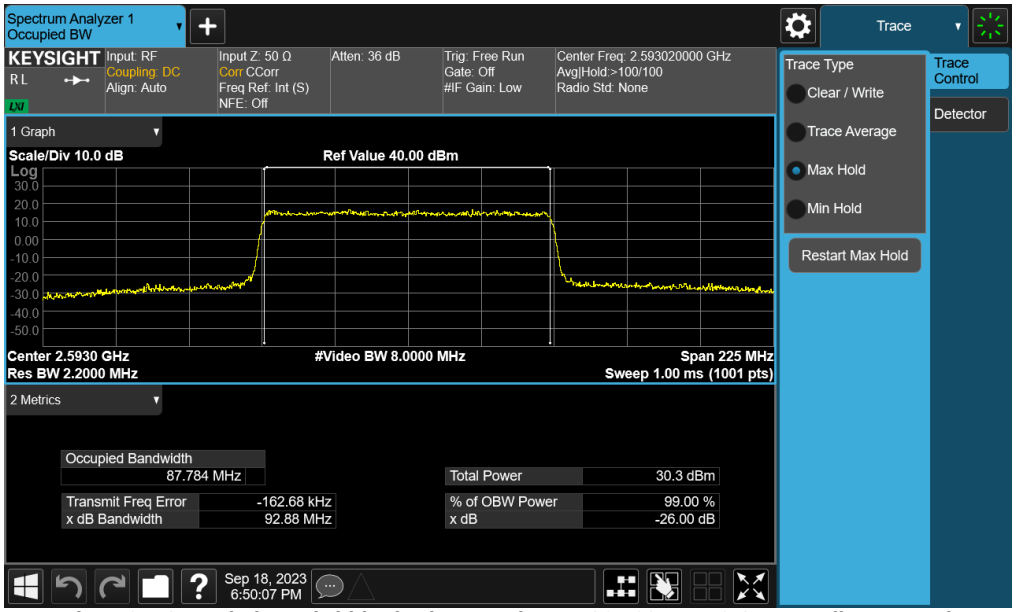


Plot 7-21. Occupied Bandwidth Plot (NR Band n41 PC3 - 100MHz 16-QAM - Full RB - Ant1)

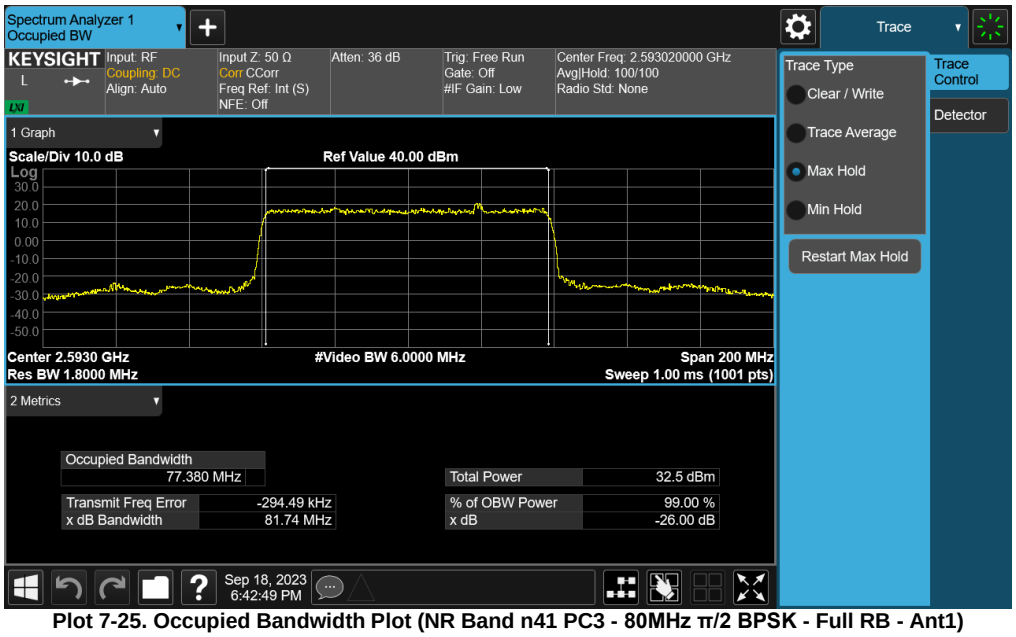
Plot 7-22. Occupied Bandwidth Plot (NR Band n41 PC3 - 90MHz π/2 BPSK - Full RB - Ant1)



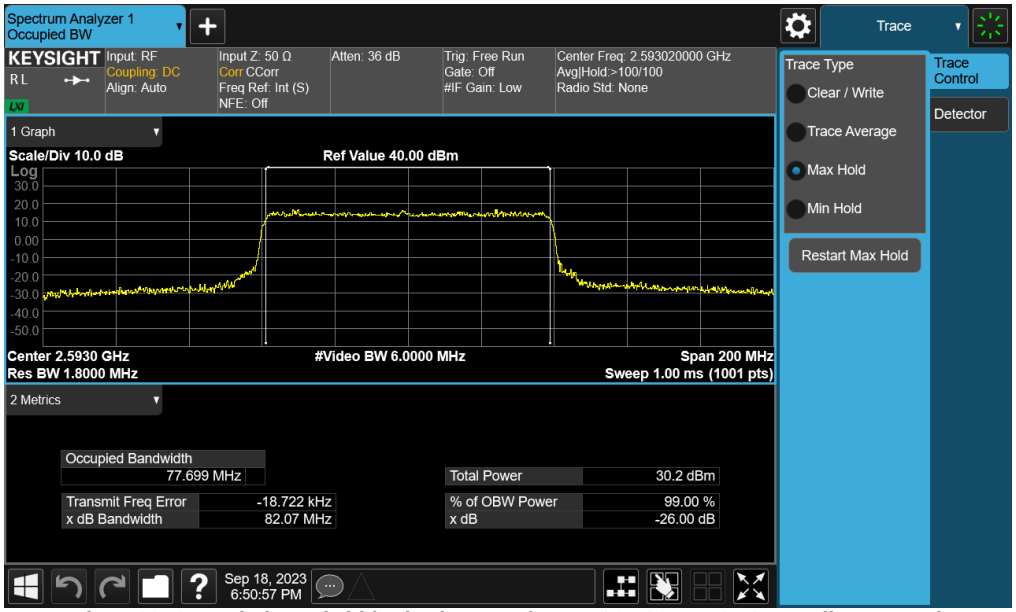
Plot 7-23. Occupied Bandwidth Plot (NR Band n41 PC3 - 90MHz QPSK - Full RB - Ant1)



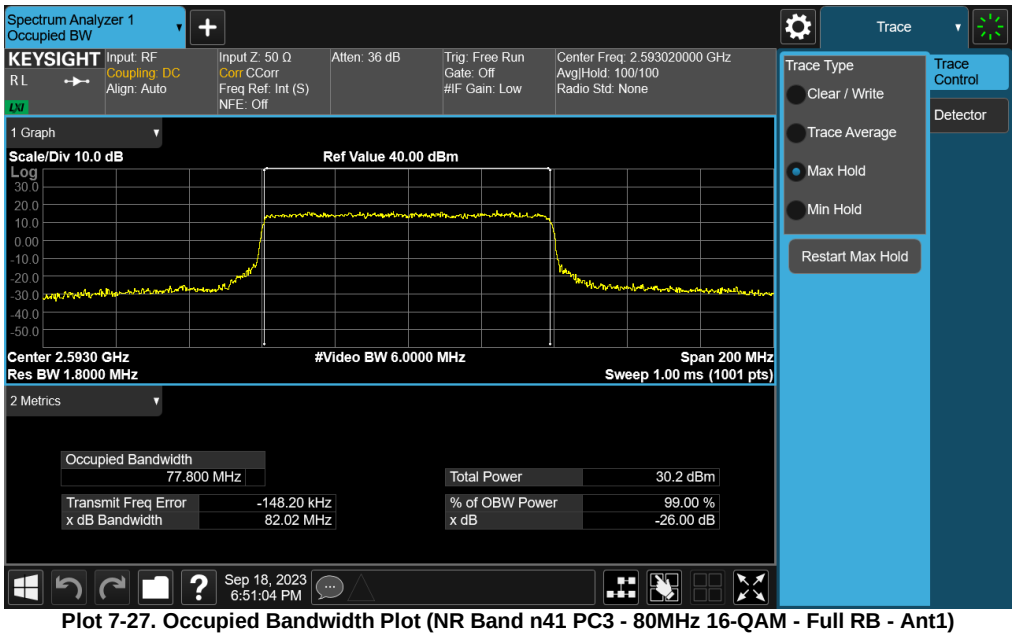
Plot 7-24. Occupied Bandwidth Plot (NR Band n41 PC3 - 90MHz 16-QAM - Full RB - Ant1)



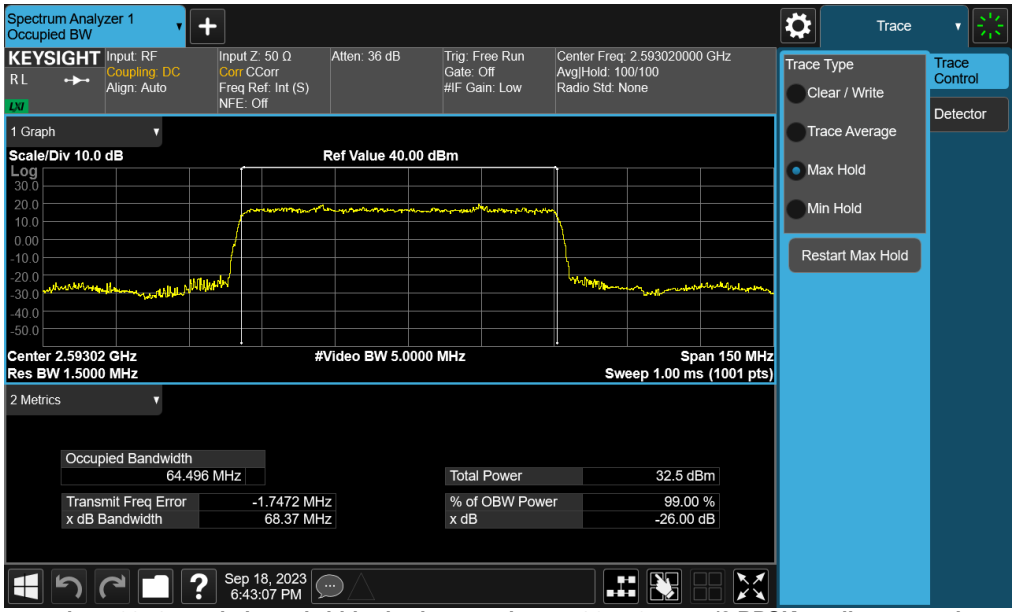
Plot 7-25. Occupied Bandwidth Plot (NR Band n41 PC3 - 80MHz π/2 BPSK - Full RB - Ant1)



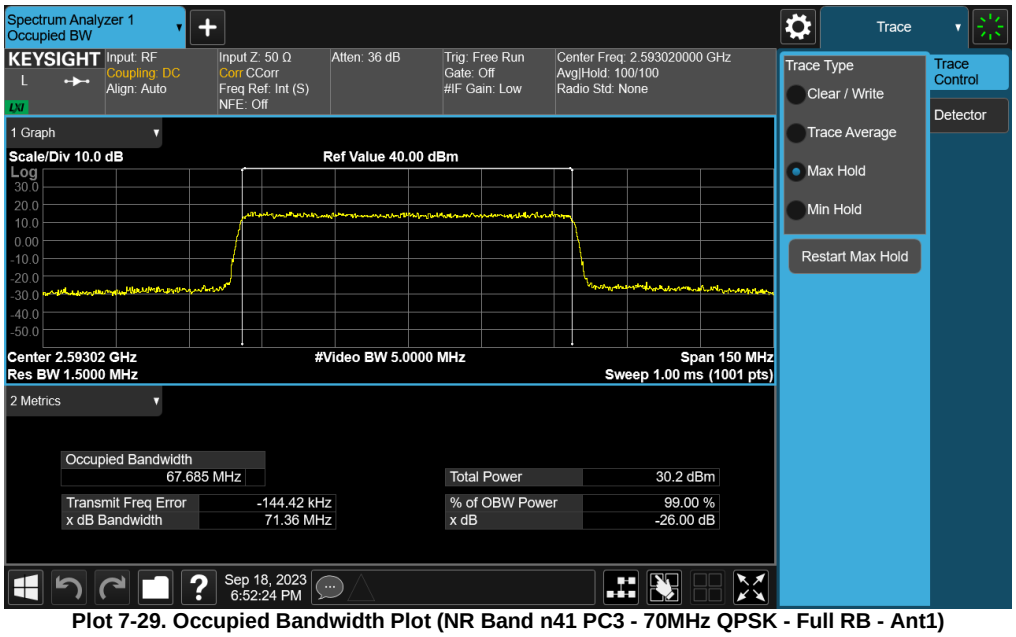
Plot 7-26. Occupied Bandwidth Plot (NR Band n41 PC3 - 80MHz QPSK - Full RB - Ant1)



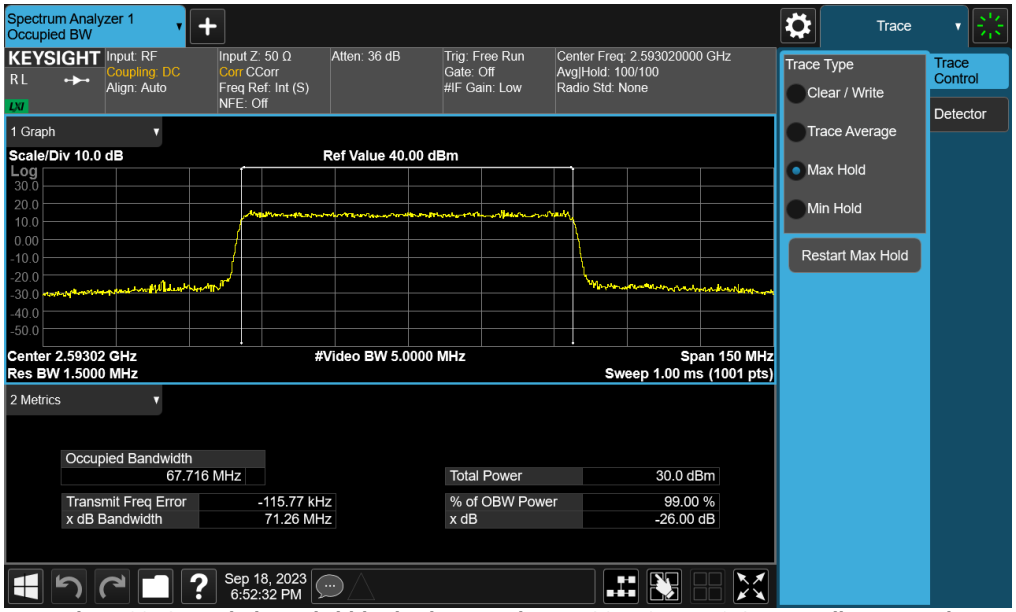
Plot 7-27. Occupied Bandwidth Plot (NR Band n41 PC3 - 80MHz 16-QAM - Full RB - Ant1)



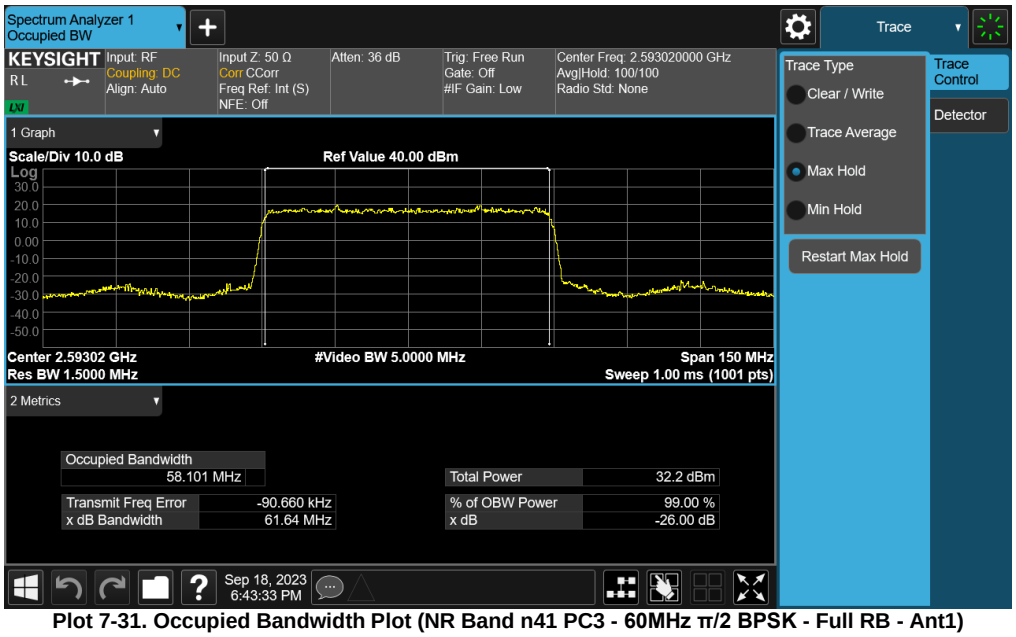
Plot 7-28. Occupied Bandwidth Plot (NR Band n41 PC3 - 70MHz π/2 BPSK - Full RB - Ant1)



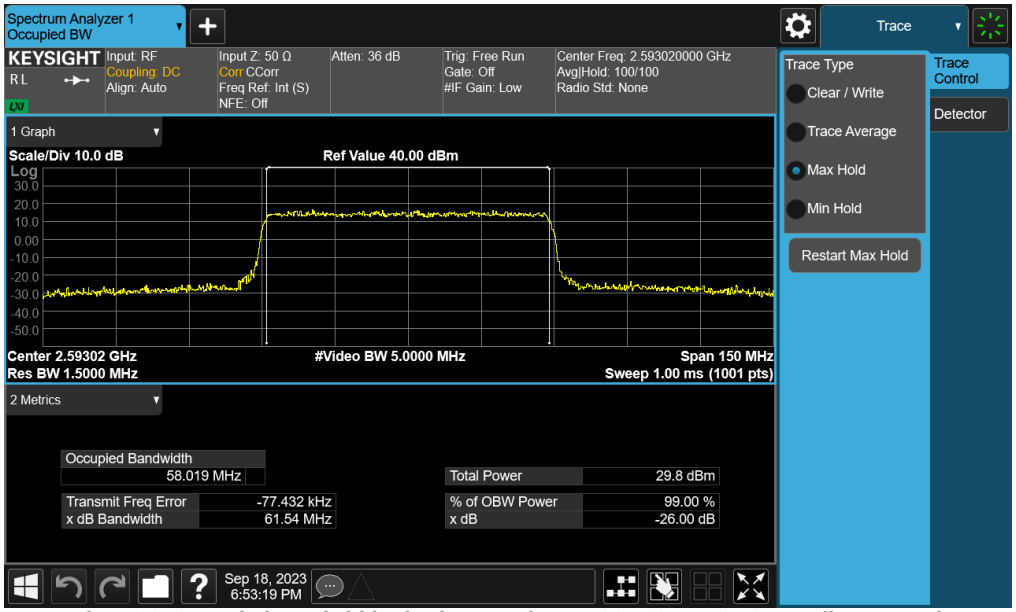
Plot 7-29. Occupied Bandwidth Plot (NR Band n41 PC3 - 70MHz QPSK - Full RB - Ant1)



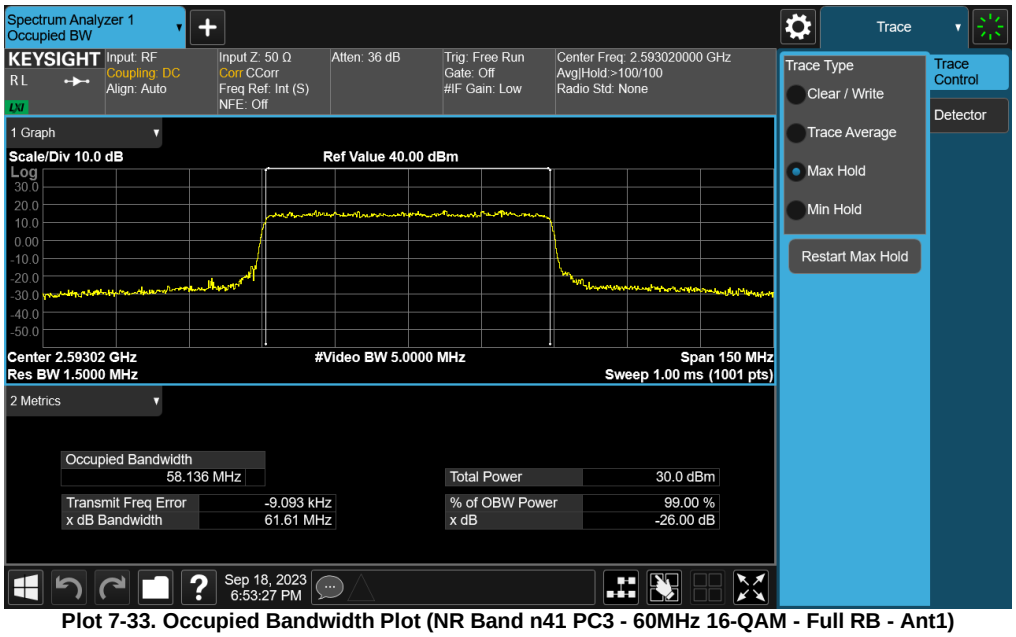
Plot 7-30. Occupied Bandwidth Plot (NR Band n41 PC3 - 70MHz 16-QAM - Full RB - Ant1)



Plot 7-31. Occupied Bandwidth Plot (NR Band n41 PC3 - 60MHz π/2 BPSK - Full RB - Ant1)

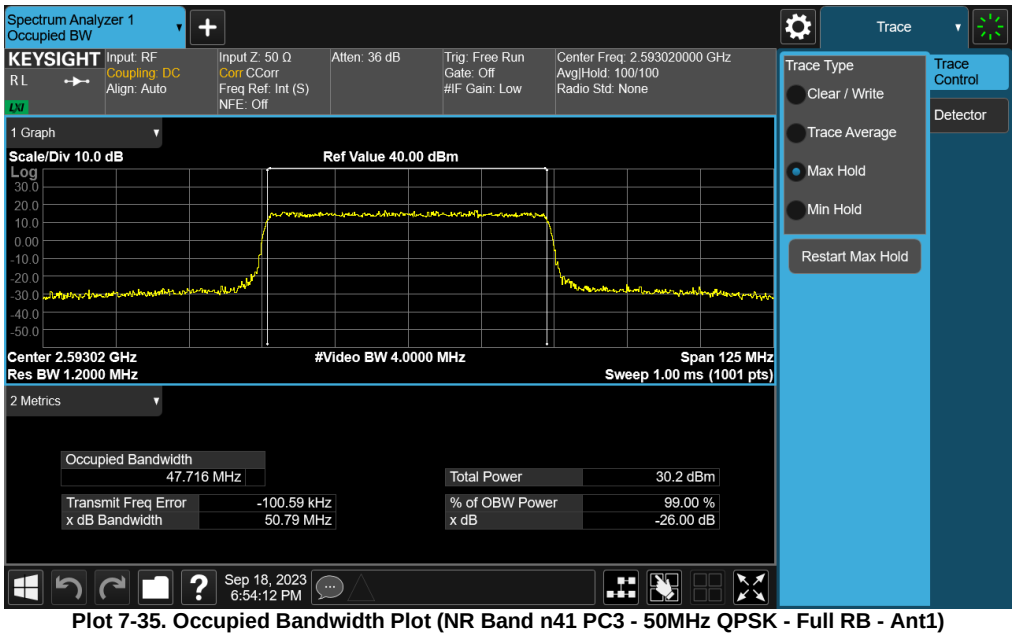


Plot 7-32. Occupied Bandwidth Plot (NR Band n41 PC3 - 60MHz QPSK - Full RB - Ant1)

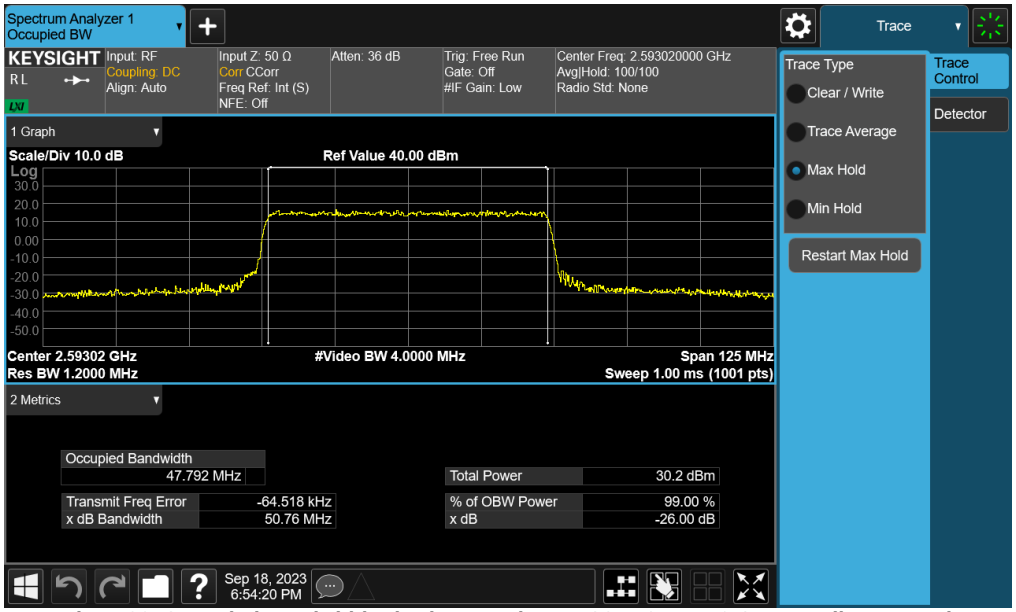


Plot 7-33. Occupied Bandwidth Plot (NR Band n41 PC3 - 60MHz 16-QAM - Full RB - Ant1)

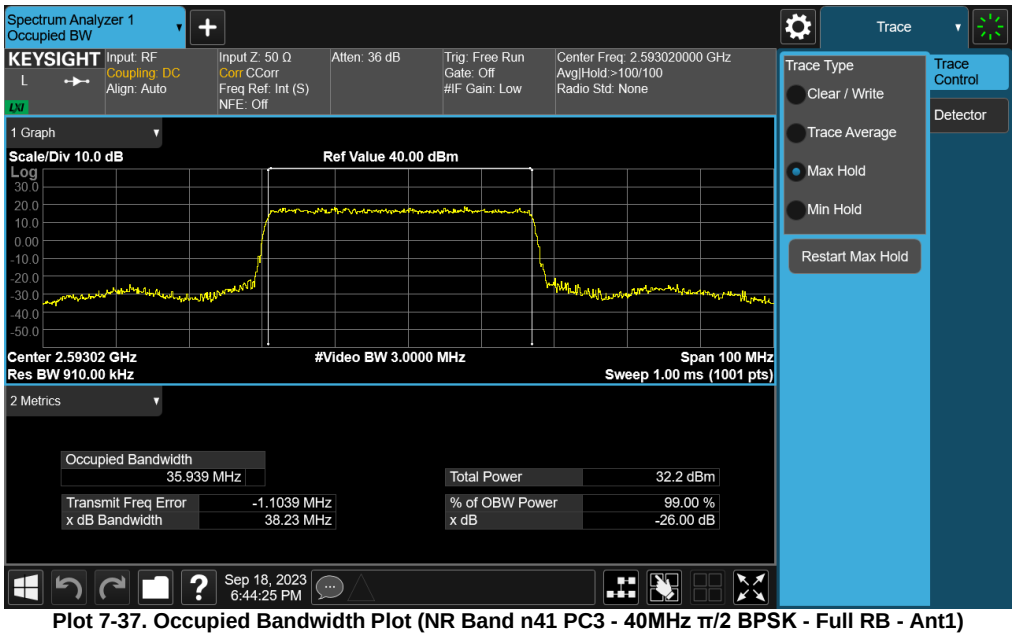
Plot 7-34. Occupied Bandwidth Plot (NR Band n41 PC3 - 50MHz π/2 BPSK - Full RB - Ant1)



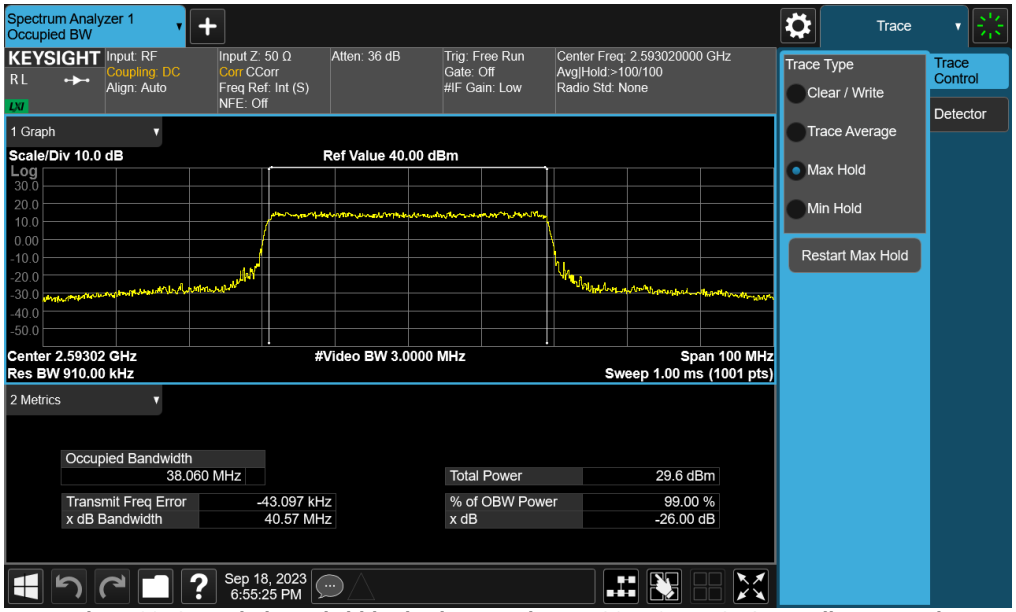
Plot 7-35. Occupied Bandwidth Plot (NR Band n41 PC3 - 50MHz QPSK - Full RB - Ant1)



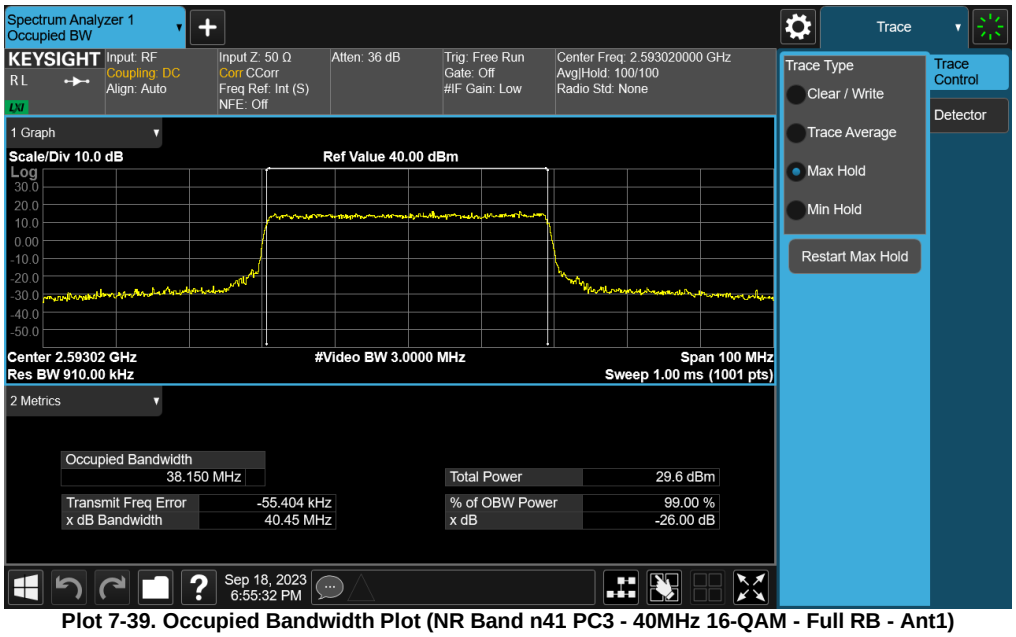
Plot 7-36. Occupied Bandwidth Plot (NR Band n41 PC3 - 50MHz 16-QAM - Full RB - Ant1)



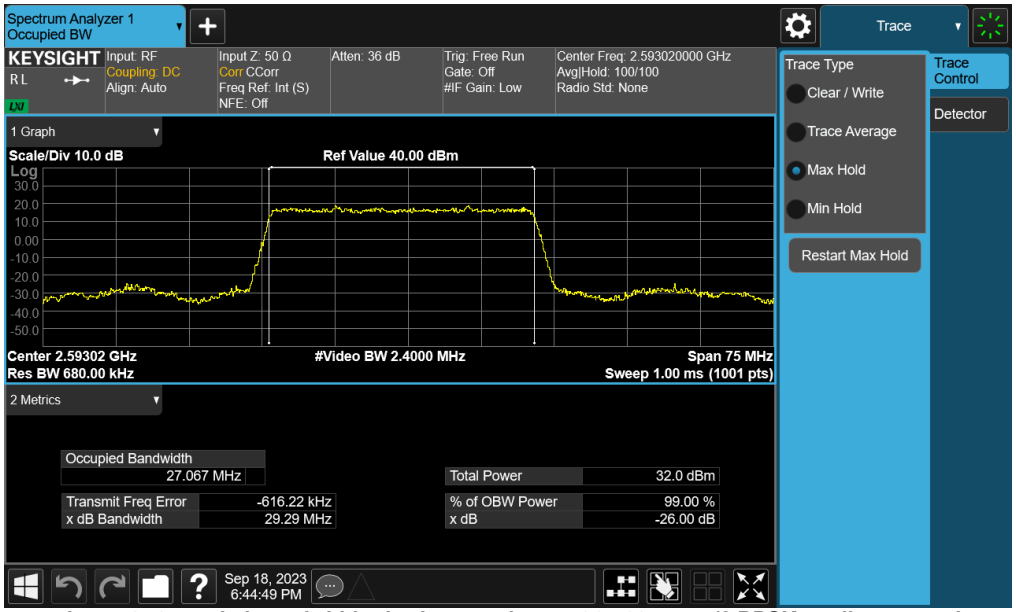
Plot 7-37. Occupied Bandwidth Plot (NR Band n41 PC3 - 40MHz π/2 BPSK - Full RB - Ant1)



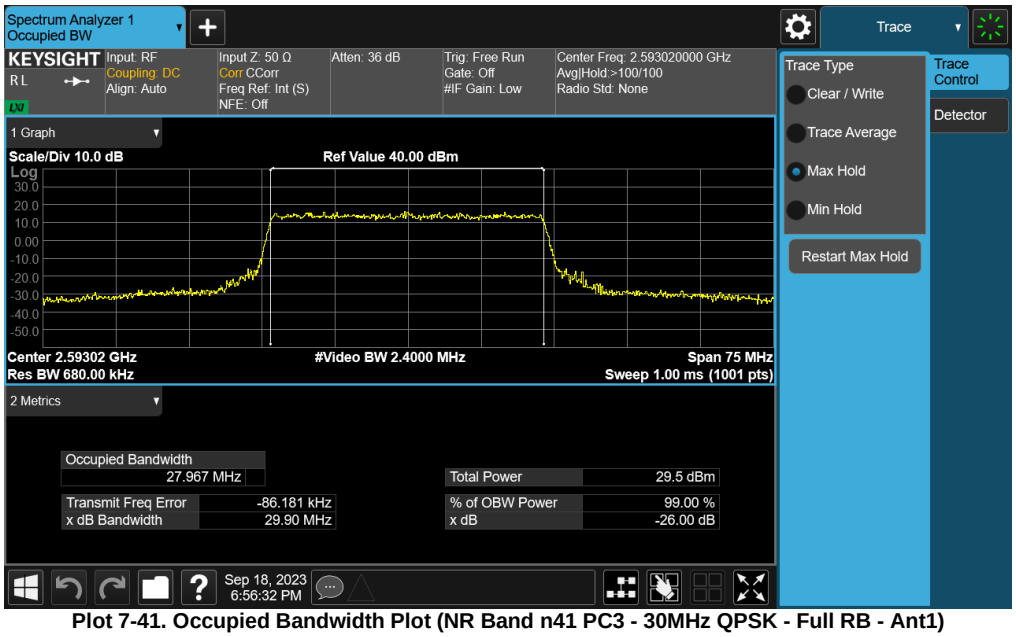
Plot 7-38. Occupied Bandwidth Plot (NR Band n41 PC3 - 40MHz QPSK - Full RB - Ant1)



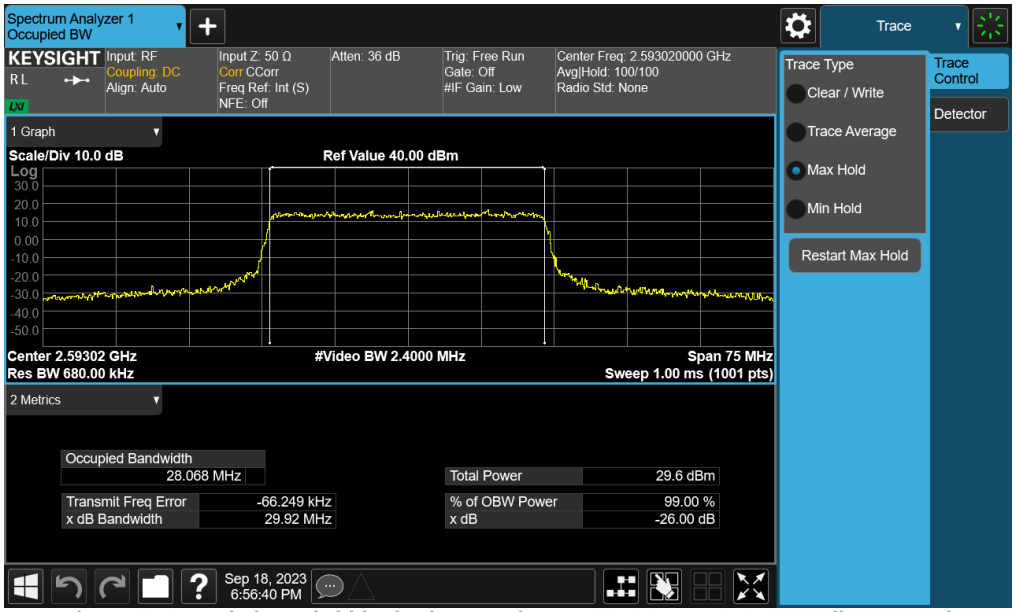
Plot 7-39. Occupied Bandwidth Plot (NR Band n41 PC3 - 40MHz 16-QAM - Full RB - Ant1)



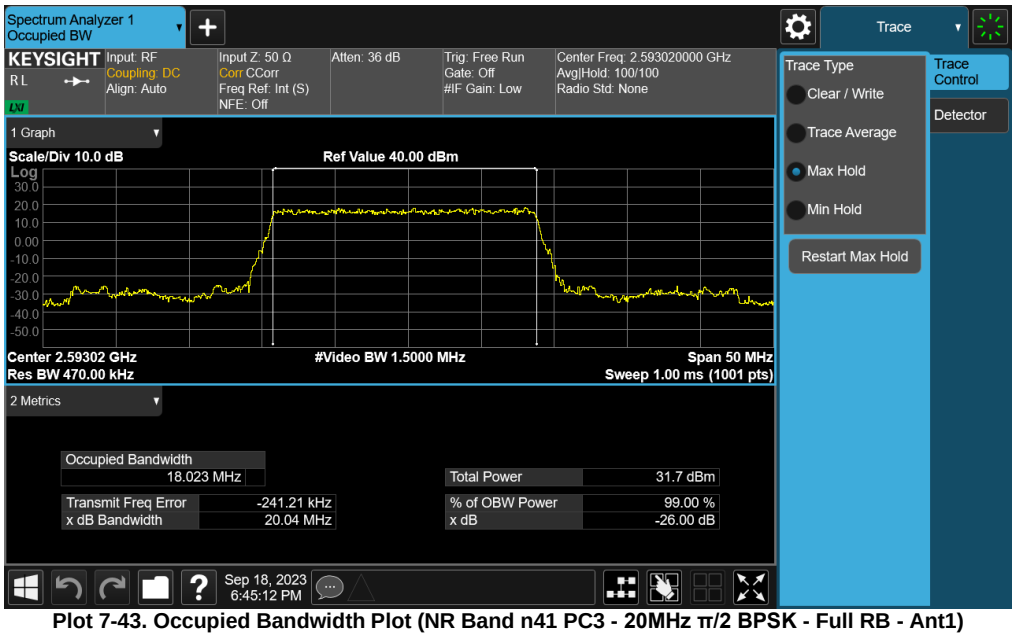
Plot 7-40. Occupied Bandwidth Plot (NR Band n41 PC3 - 30MHz π/2 BPSK - Full RB - Ant1)



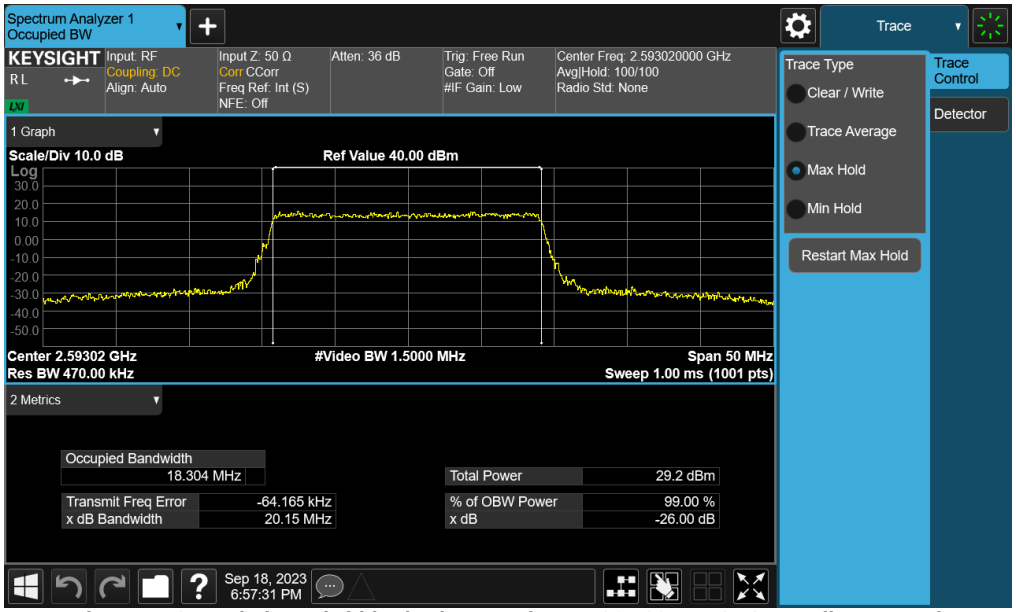
Plot 7-41. Occupied Bandwidth Plot (NR Band n41 PC3 - 30MHz QPSK - Full RB - Ant1)



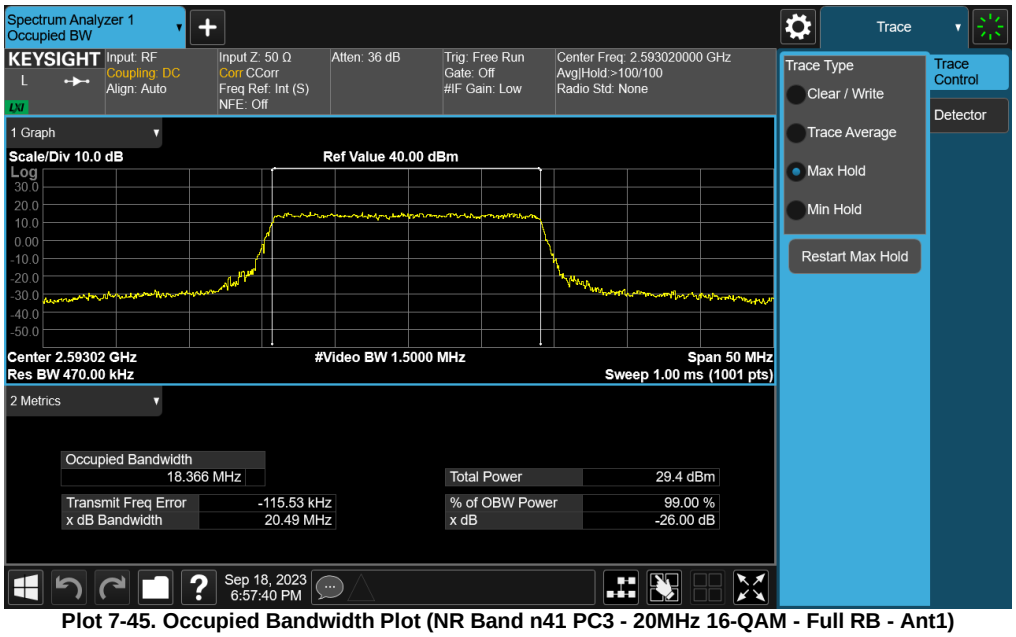
Plot 7-42. Occupied Bandwidth Plot (NR Band n41 PC3 - 30MHz 16-QAM - Full RB - Ant1)



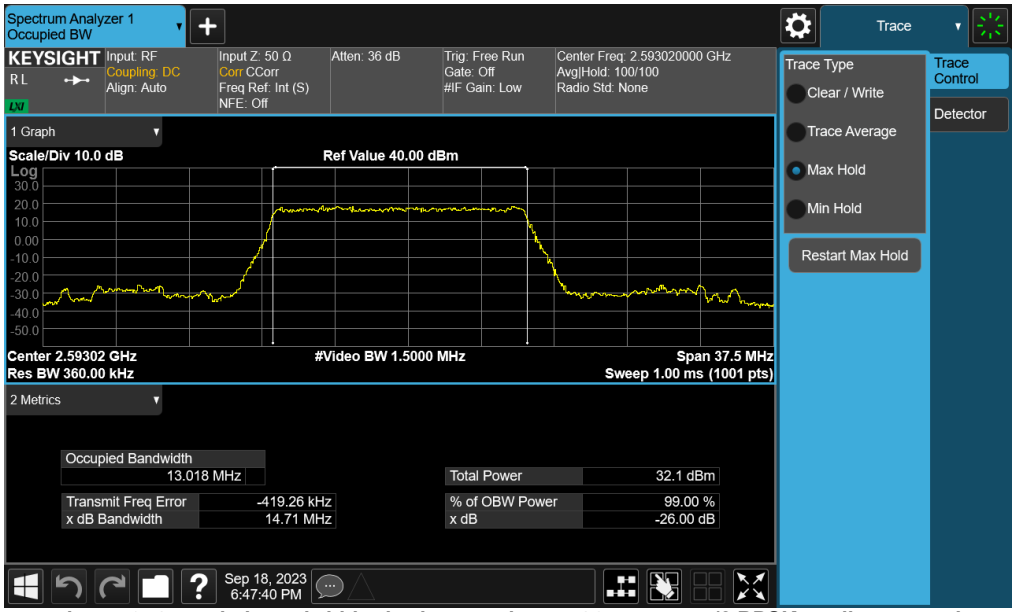
Plot 7-43. Occupied Bandwidth Plot (NR Band n41 PC3 - 20MHz π/2 BPSK - Full RB - Ant1)



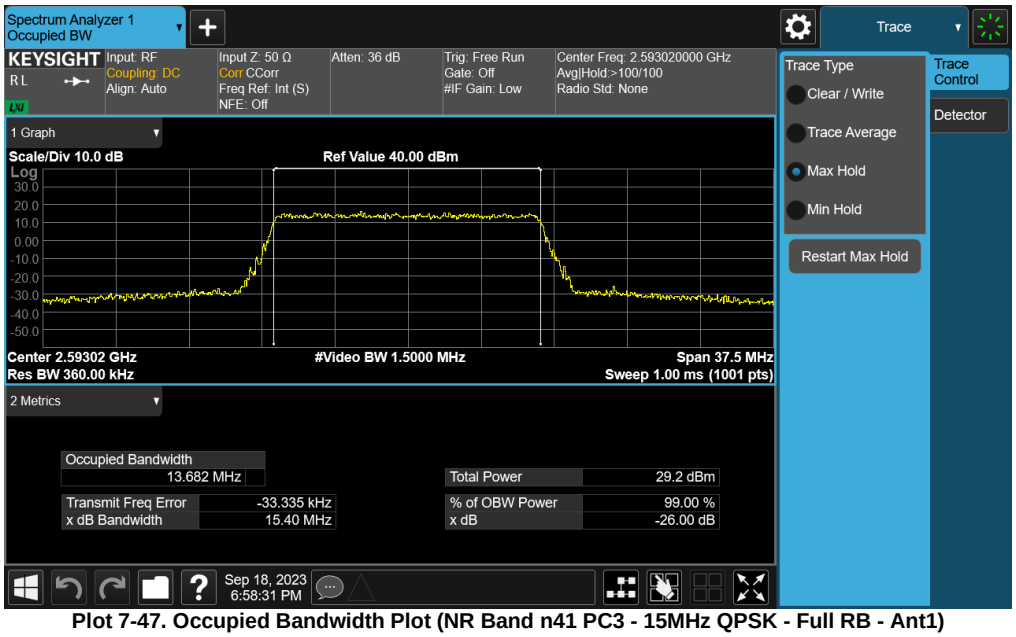
Plot 7-44. Occupied Bandwidth Plot (NR Band n41 PC3 - 20MHz QPSK - Full RB - Ant1)



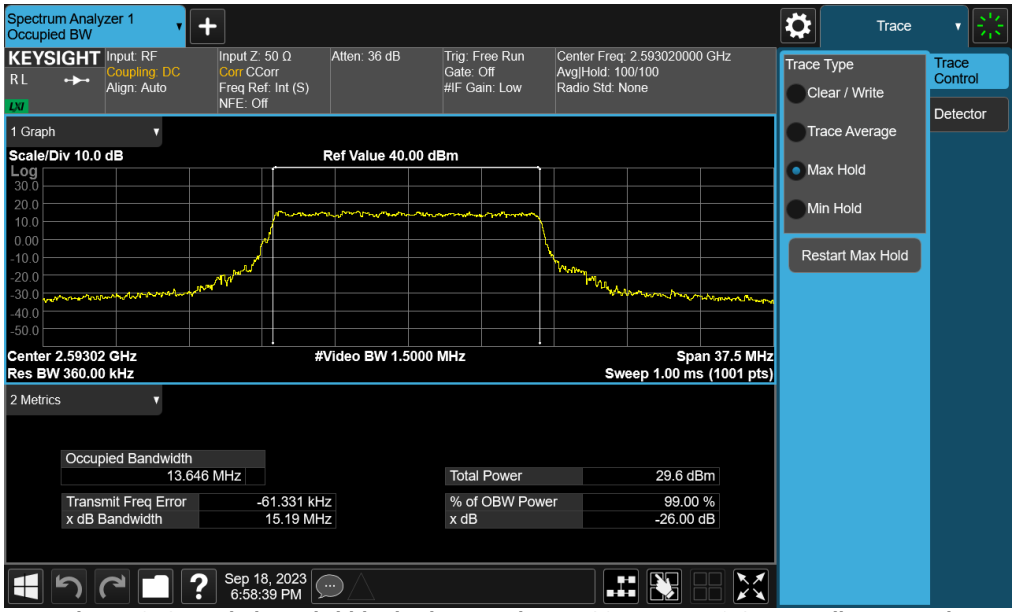
Plot 7-45. Occupied Bandwidth Plot (NR Band n41 PC3 - 20MHz 16-QAM - Full RB - Ant1)



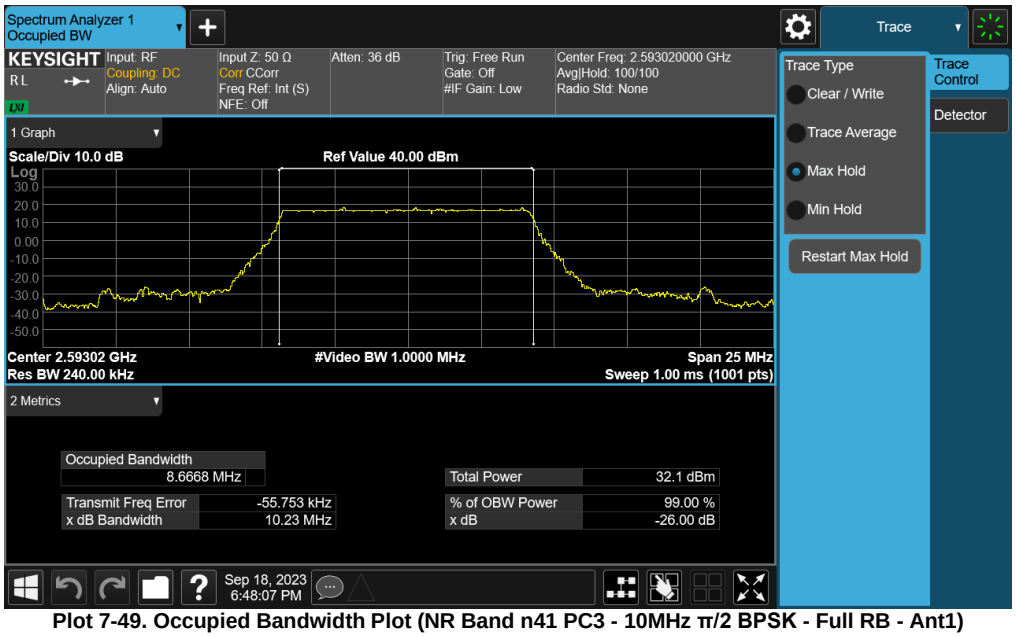
Plot 7-46. Occupied Bandwidth Plot (NR Band n41 PC3 - 15MHz π/2 BPSK - Full RB - Ant1)



Plot 7-47. Occupied Bandwidth Plot (NR Band n41 PC3 - 15MHz QPSK - Full RB - Ant1)

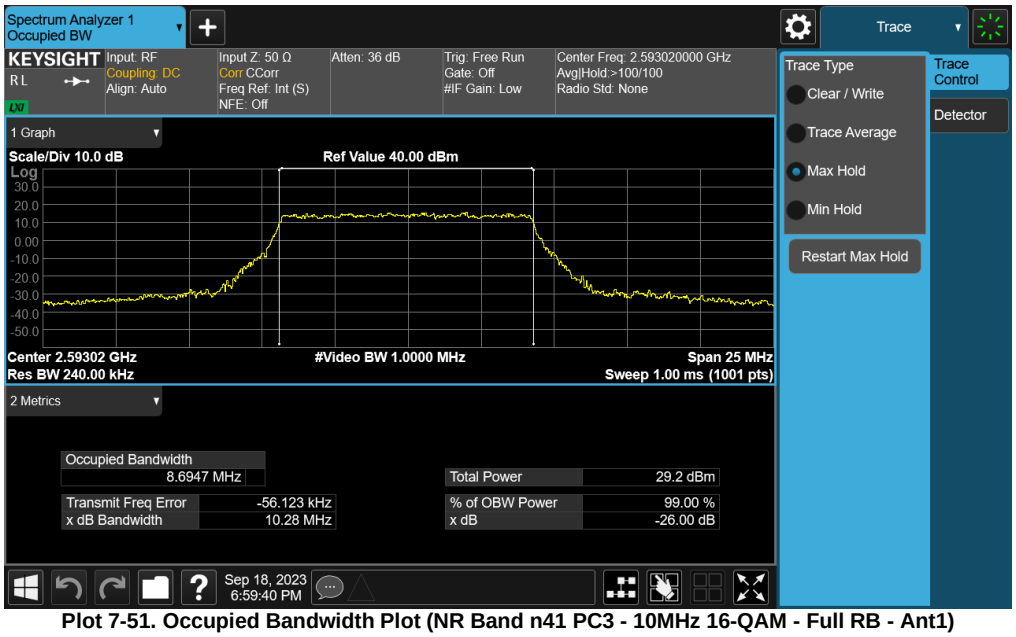


Plot 7-48. Occupied Bandwidth Plot (NR Band n41 PC3 - 15MHz 16-QAM - Full RB - Ant1)



Plot 7-49. Occupied Bandwidth Plot (NR Band n41 PC3 - 10MHz π/2 BPSK - Full RB - Ant1)

Plot 7-50. Occupied Bandwidth Plot (NR Band n41 PC3 - 10MHz QPSK - Full RB - Ant1)



Plot 7-51. Occupied Bandwidth Plot (NR Band n41 PC3 - 10MHz 16-QAM - Full RB - Ant1)

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.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

For Band 41, the minimum permissible attenuation level of any spurious emission is 55 + 10$log_{10}(P_{[Watts]})$.

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 10GHz (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.

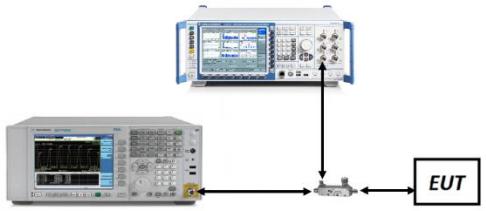


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

1. Per Part 27, RSS-195 and RSS-199, 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]
LTE-B41PC2	20MHz	Low	30.0 - 2475.0	-41.96	-25	-16.96
		Low	2690.0 - 15000.0	-38.04	-25	-13.04
		Low	15000.0 - 27000.0	-44.26	-25	-19.26
		Mid	30.0 - 2500.0	-42.32	-25	-17.32
		Mid	2690.0 - 15000.0	-38.77	-25	-13.77
		Mid	15000.0 - 27000.0	-44.36	-25	-19.36
		High	30.0 - 2500.0	-42.74	-25	-17.74
		High	2690.0 - 15000.0	-38.73	-25	-13.73
		High	15000.0 - 27000.0	-43.85	-25	-18.85
NR-n41PC3	100MHz	Low	30.0 - 2475.0	-43.68	-25	-18.68
		Low	2690.0 - 15000.0	-37.81	-25	-12.81
		Low	15000.0 - 27000.0	-51.62	-25	-26.62
		Mid	30.0 - 2500.0	-42.33	-25	-17.33
		Mid	2690.0 - 15000.0	-38.63	-25	-13.63
		Mid	15000.0 - 27000.0	-52.79	-25	-27.79
		High	30.0 - 2500.0	-43.26	-25	-18.26
		High	2690.0 - 15000.0	-37.69	-25	-12.69
		High	15000.0 - 27000.0	-51.36	-25	-26.36

Table 7-7. Conducted Spurious Emission Test Results – Ant1

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B41PC2	20MHz	Low	30.0 - 2475.0	-42.36	-25	-17.36
		Low	2690.0 - 15000.0	-37.34	-25	-12.34
		Low	15000.0 - 27000.0	-51.13	-25	-26.13
		Mid	30.0 - 2500.0	-43.02	-25	-18.02
		Mid	2690.0 - 15000.0	-37.54	-25	-12.54
		Mid	15000.0 - 27000.0	-50.84	-25	-25.84
		High	30.0 - 2500.0	-43.18	-25	-18.18
		High	2690.0 - 15000.0	-37.84	-25	-12.84
		High	15000.0 - 27000.0	-51.66	-25	-26.66
NR-n41PC3	100MHz	Low	30.0 - 2475.0	-38.97	-25	-13.97
		Low	2690.0 - 15000.0	-33.94	-25	-8.94
		Low	15000.0 - 27000.0	-43.90	-25	-18.90
		Mid	30.0 - 2500.0	-38.39	-25	-13.39
		Mid	2690.0 - 15000.0	-32.77	-25	-7.77
		Mid	15000.0 - 27000.0	-44.41	-25	-19.41
		High	30.0 - 2500.0	-39.46	-25	-14.46
		High	2690.0 - 15000.0	-33.45	-25	-8.45
		High	15000.0 - 27000.0	-43.17	-25	-18.17

Table 7-8. Conducted Spurious Emission Test Results – Ant2

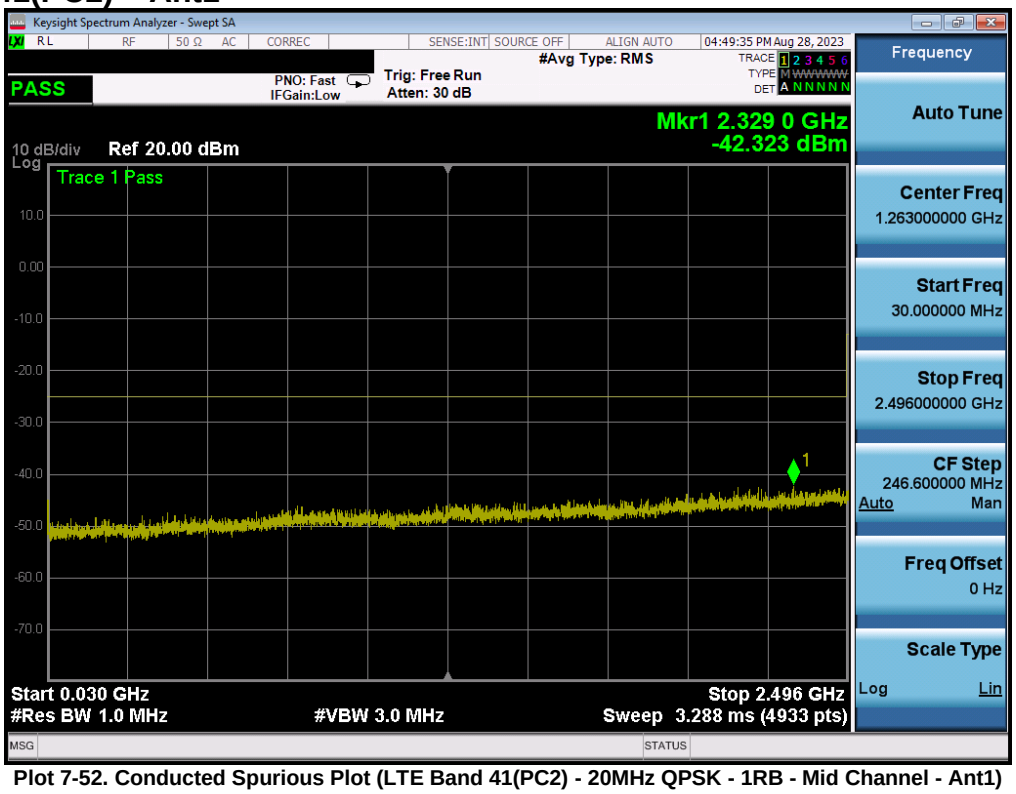
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n41PC3	100MHz	Low	30.0 - 2475.0	-38.25	-25	-13.25
		Low	2690.0 - 15000.0	-33.14	-25	-8.14
		Low	15000.0 - 27000.0	-43.19	-25	-18.19
		Mid	30.0 - 2500.0	-38.78	-25	-13.78
		Mid	2690.0 - 15000.0	-33.82	-25	-8.82
		Mid	15000.0 - 27000.0	-44.11	-25	-19.11
		High	30.0 - 2500.0	-37.58	-25	-12.58
		High	2690.0 - 15000.0	-32.98	-25	-7.98
		High	15000.0 - 27000.0	-43.80	-25	-18.80

Table 7-9. Conducted Spurious Emission Test Results – Ant3

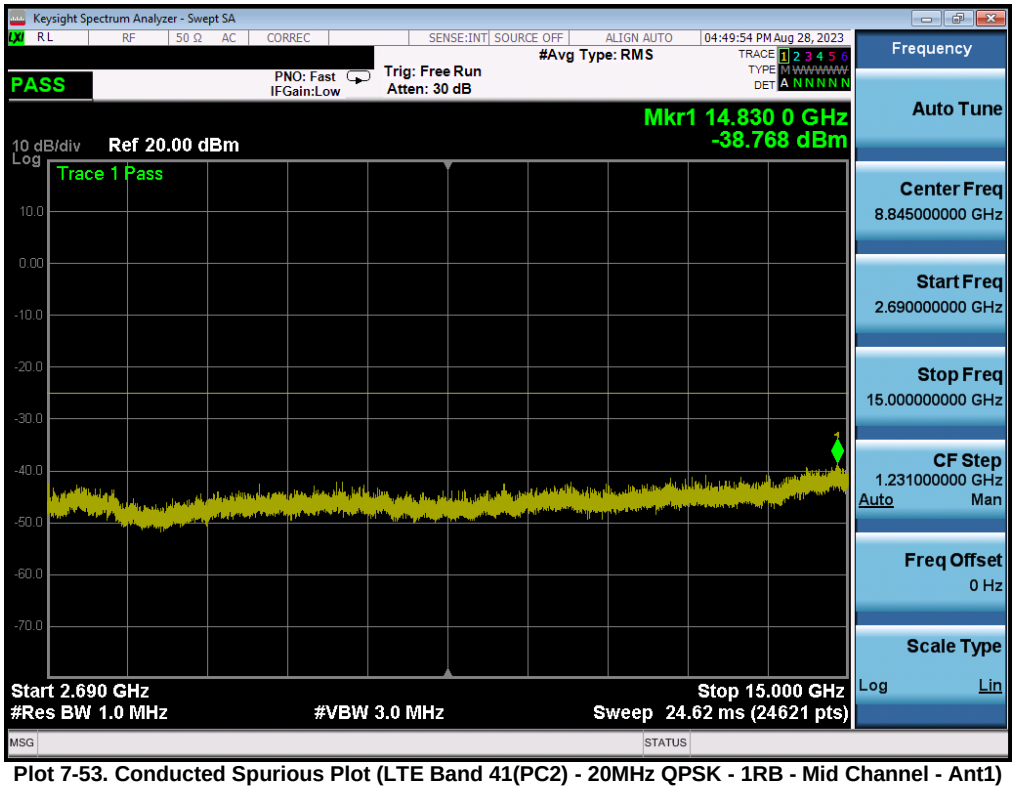
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n41PC3	100MHz	Low	30.0 - 2475.0	-39.30	-25	-14.30
		Low	2690.0 - 15000.0	-35.60	-25	-10.60
		Low	15000.0 - 27000.0	-50.28	-25	-25.28
		Mid	30.0 - 2500.0	-39.58	-25	-14.58
		Mid	2690.0 - 15000.0	-35.39	-25	-10.39
		Mid	15000.0 - 27000.0	-50.00	-25	-25.00
		High	30.0 - 2500.0	-39.33	-25	-14.33
		High	2690.0 - 15000.0	-35.52	-25	-10.52
		High	15000.0 - 27000.0	-49.64	-25	-24.64

Table 7-10. Conducted Spurious Emission Test Results – Ant4

LTE Band 41(PC2) – Ant1



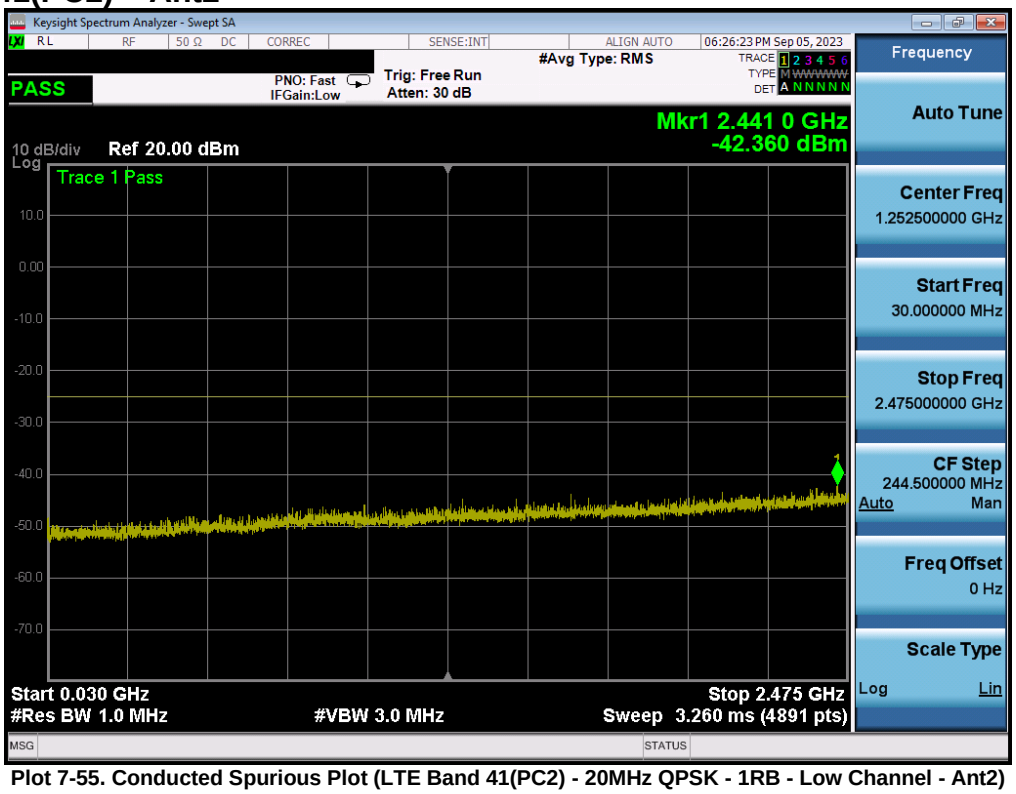
Plot 7-52. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Mid Channel - Ant1)



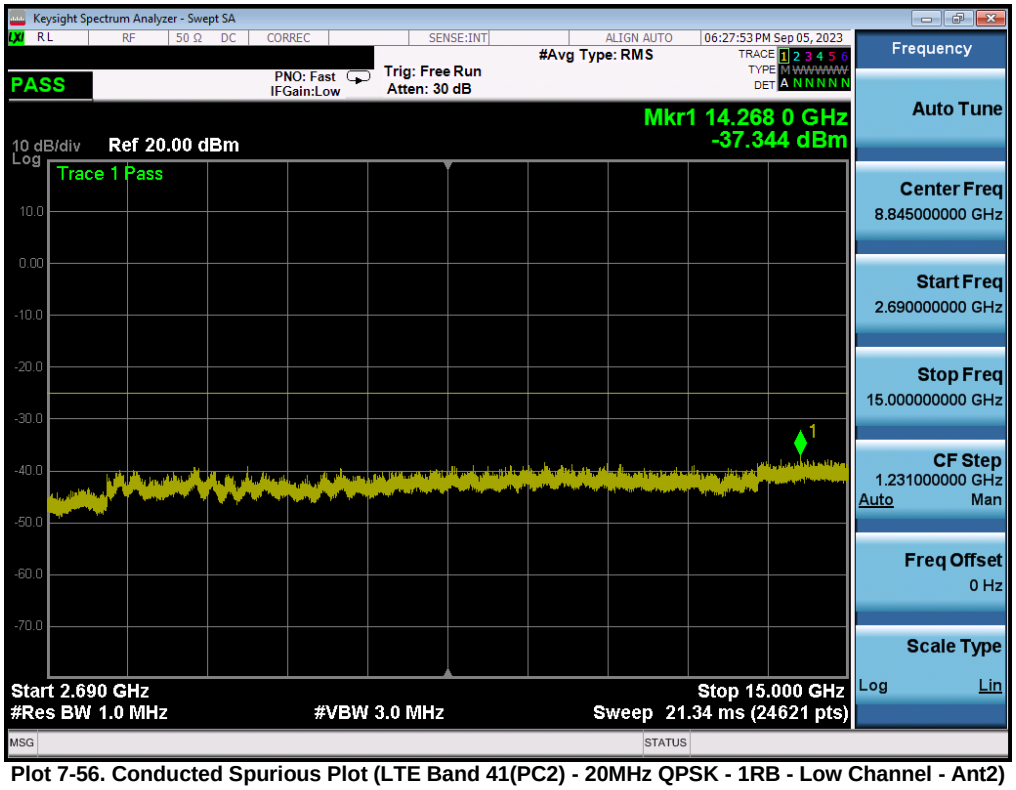
Plot 7-53. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Mid Channel - Ant1)

Plot 7-54. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Mid Channel - Ant1)

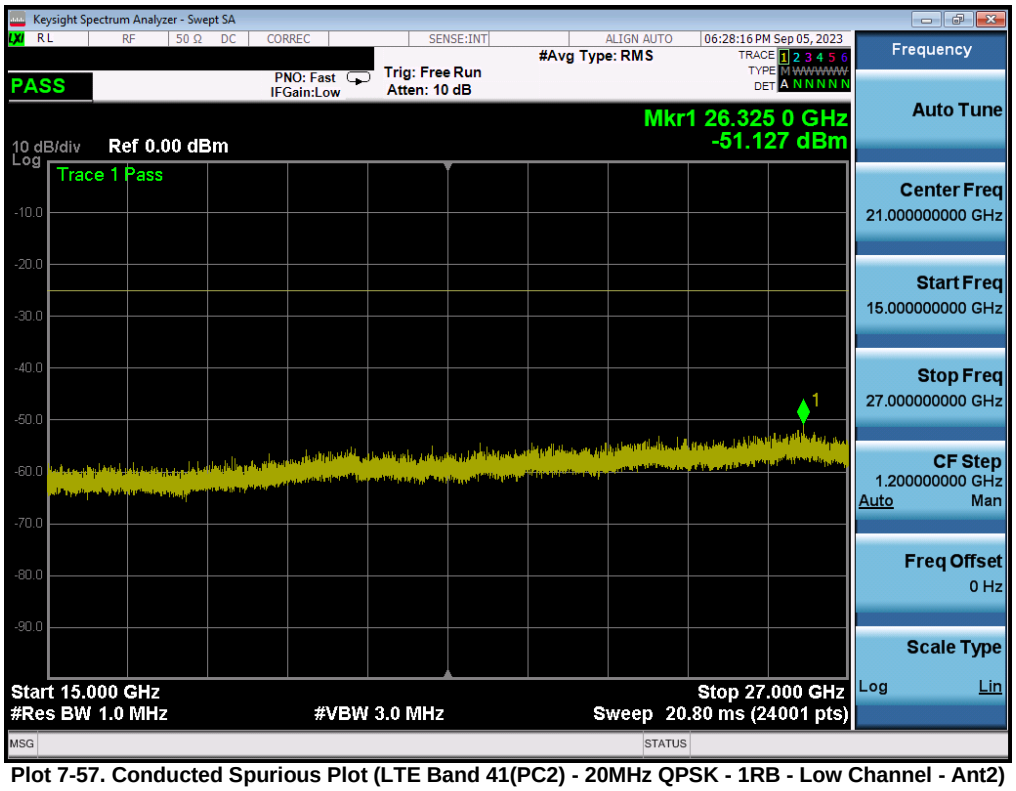
LTE Band 41(PC2) – Ant2



Plot 7-55. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Low Channel - Ant2)

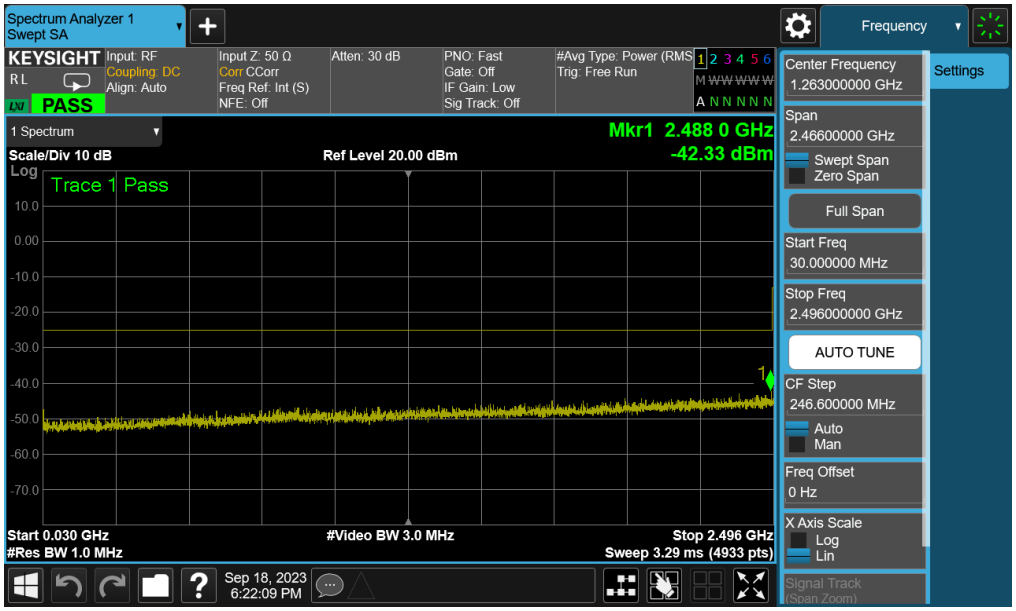


Plot 7-56. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Low Channel - Ant2)

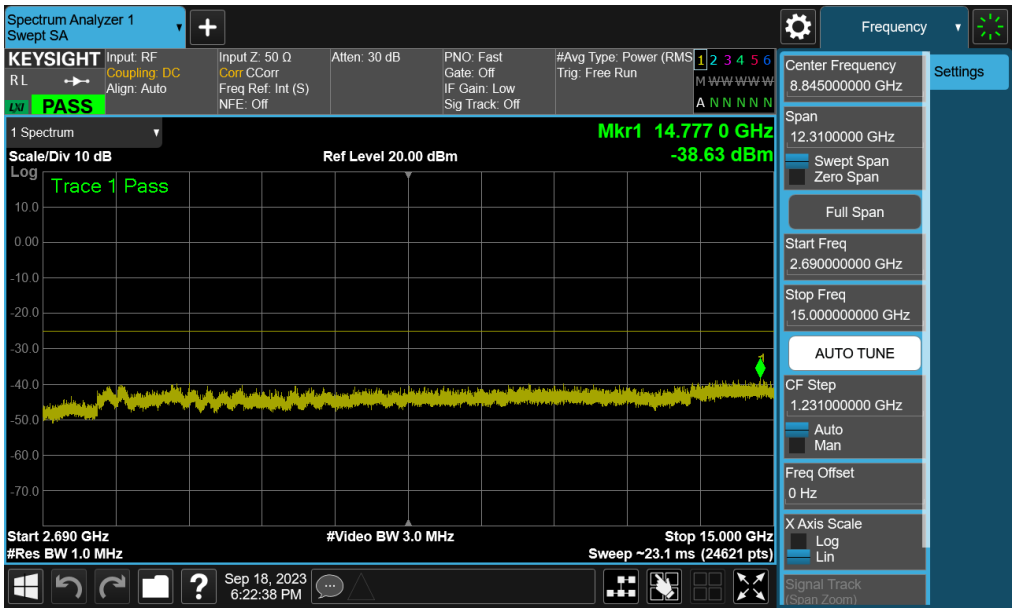


Plot 7-57. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - 1RB - Low Channel - Ant2)

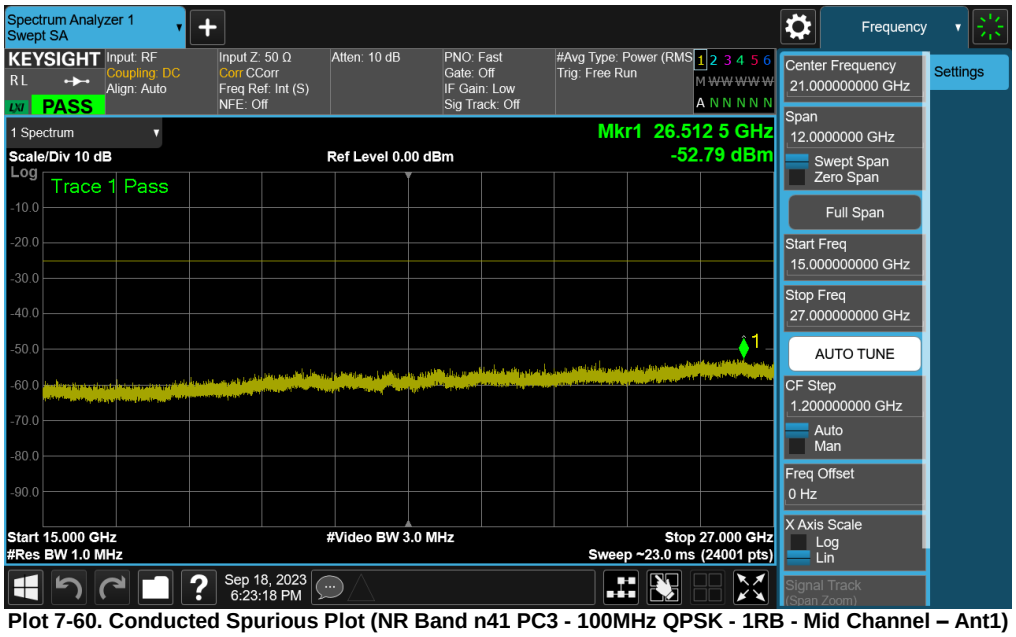
NR Band n41 PC3 – Ant1



Plot 7-58. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant1)

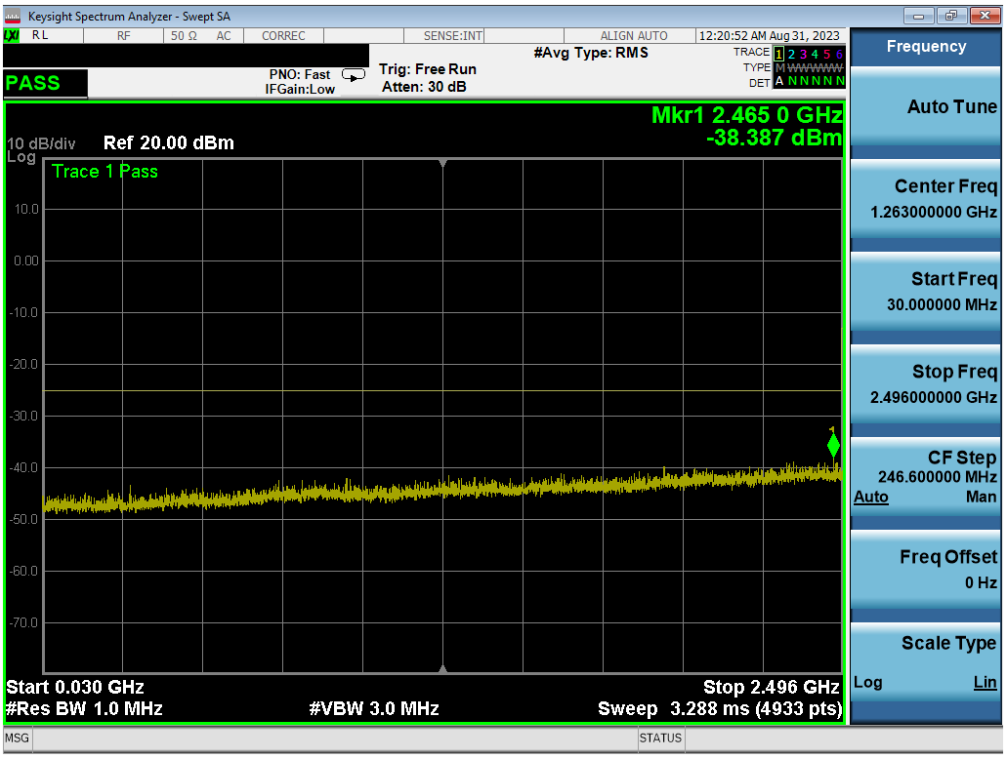


Plot 7-59. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant1)

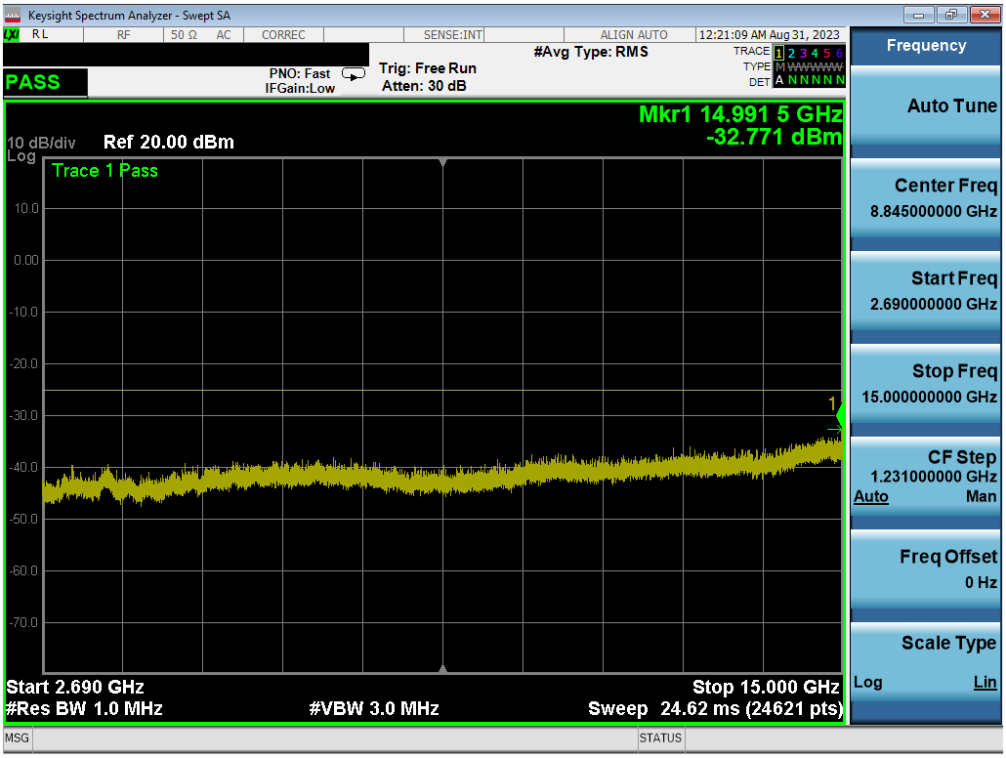


Plot 7-60. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant1)

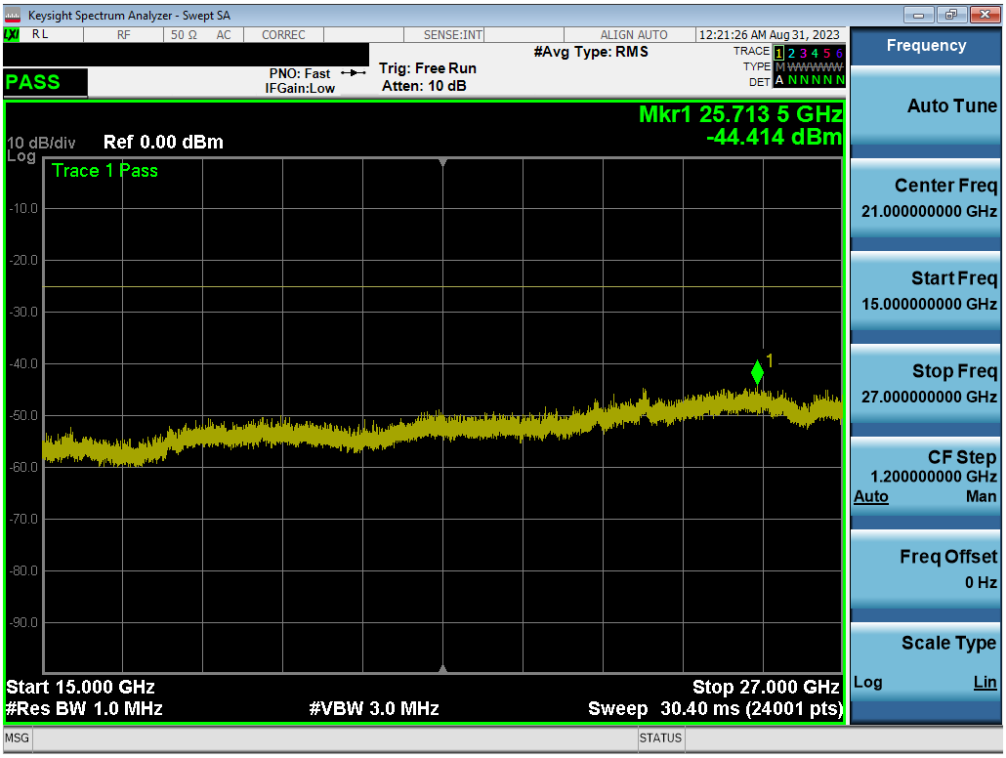
NR Band n41 PC3 – Ant2



Plot 7-61. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant2)

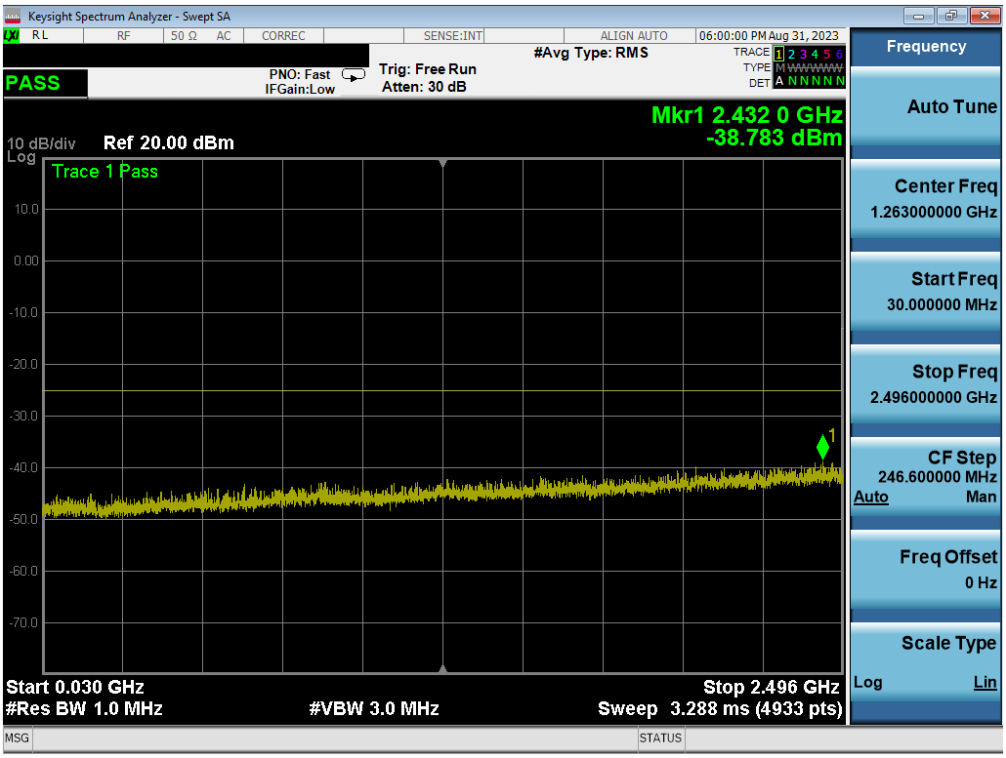


Plot 7-62. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant2)

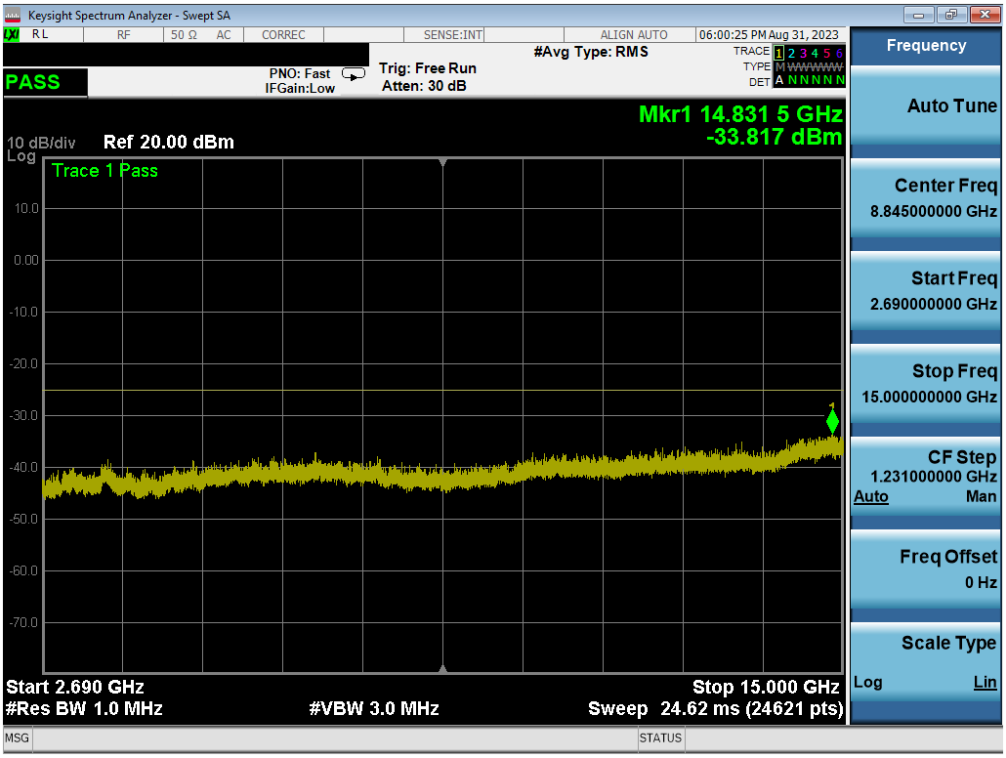


Plot 7-63. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant2)

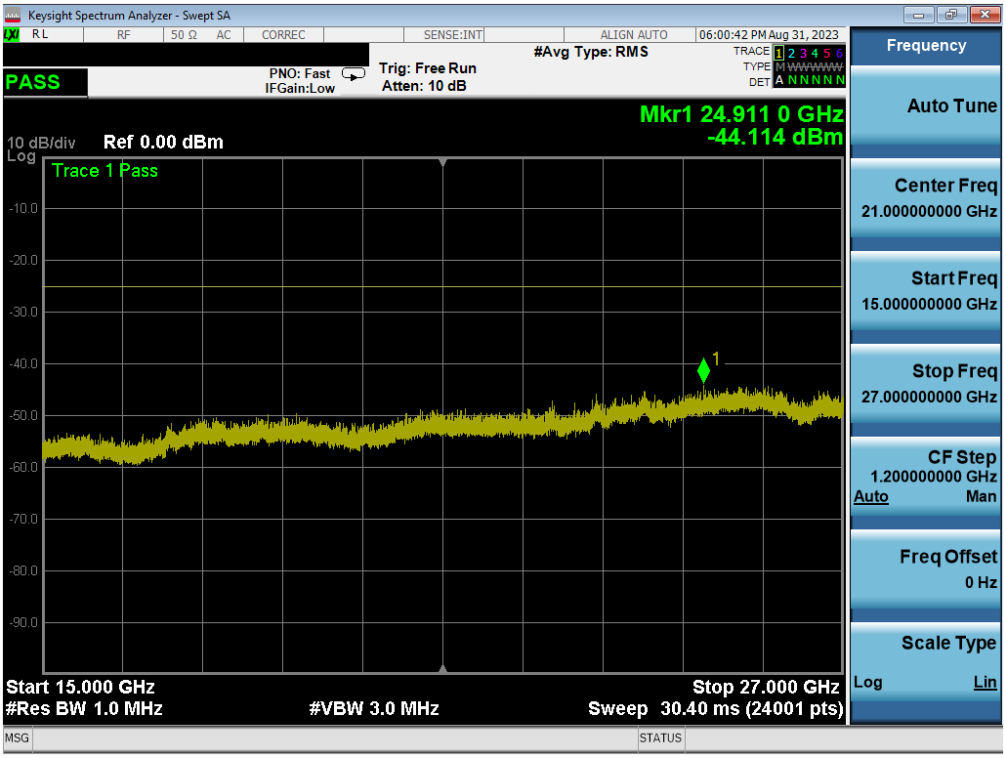
NR Band n41 PC3 – Ant3



Plot 7-64. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant3)

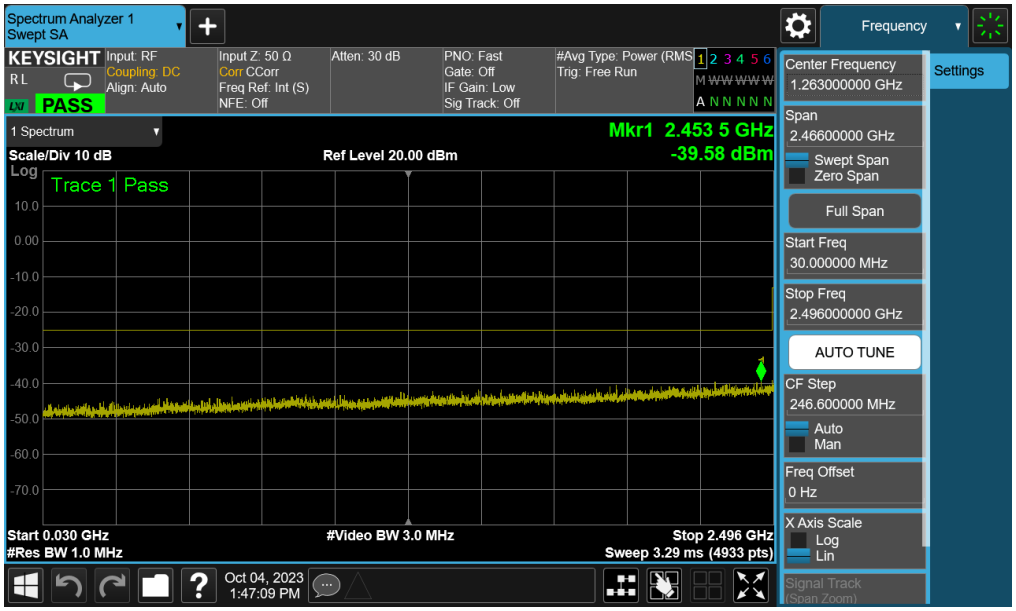


Plot 7-65. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant3)

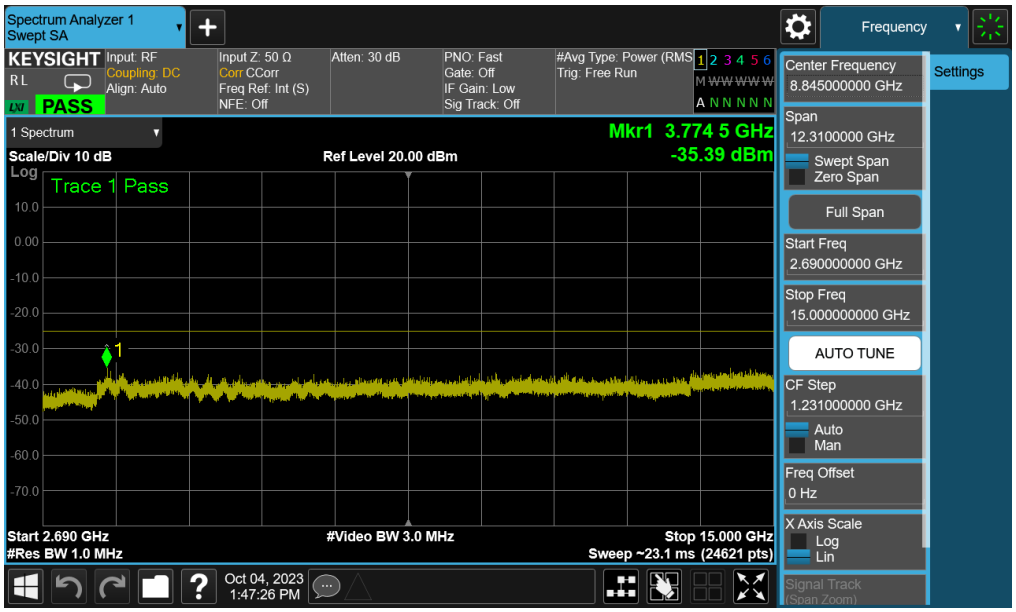


Plot 7-66. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant3)

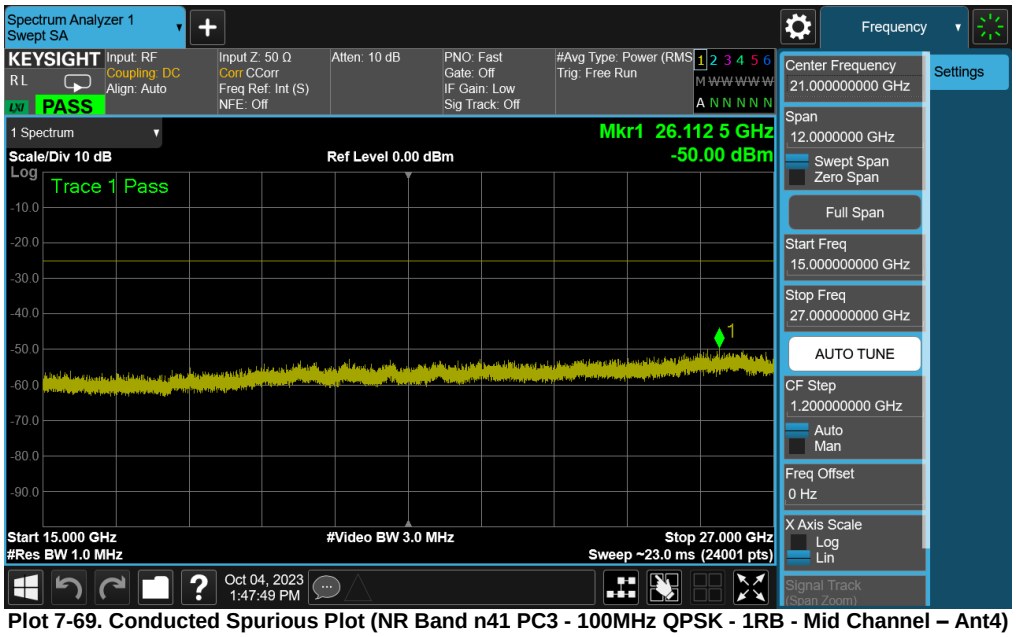
NR Band n41 PC3 – Ant4



Plot 7-67. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant4)



Plot 7-68. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant4)



Plot 7-69. Conducted Spurious Plot (NR Band n41 PC3 - 100MHz QPSK - 1RB - Mid Channel – Ant4)

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.

The minimum permissible attenuation level for 41 is as noted in the Test Notes on the following page.

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.

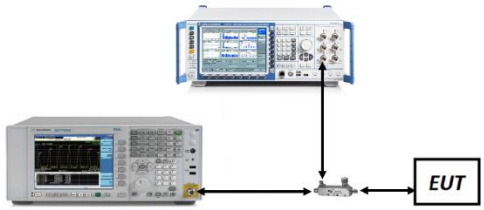


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

1. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 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	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B41PC2	20MHz	Low	Band Edge	-32.16	-25	-7.16
		High	Band Edge	-21.30	-10	-11.30
	15MHz	Low	Band Edge	-29.61	-25	-4.61
		High	Band Edge	-20.15	-10	-10.15
	10MHz	Low	Band Edge	-30.99	-25	-5.99
		High	Band Edge	-22.32	-13	-9.32
	5MHz	Low	Band Edge	-23.91	-13	-10.91
		High	Band Edge	-18.71	-10	-8.71
NR-n41PC3	100MHz	Low	Band Edge	-27.60	-13	-14.60
		High	Band Edge	-28.55	-10	-18.55
	90MHz	Low	Band Edge	-29.56	-13	-16.56
		High	Band Edge	-30.57	-10	-20.57
	80MHz	Low	Band Edge	-43.02	-25	-18.02
		High	Band Edge	-30.82	-10	-20.82
	70MHz	Low	Band Edge	-42.40	-25	-17.40
		High	Band Edge	-35.10	-10	-25.10
	60MHz	Low	Band Edge	-43.19	-25	-18.19
		High	Band Edge	-25.07	-10	-15.07
	50MHz	Low	Band Edge	-42.64	-25	-17.64
		High	Band Edge	-38.12	-13	-25.12
	40MHz	Low	Band Edge	-41.79	-25	-16.79
		High	Band Edge	-49.75	-25	-24.75
	30MHz	Low	Band Edge	-41.30	-25	-16.30
		High	Band Edge	-47.85	-25	-22.85
	20MHz	Low	Band Edge	-38.77	-25	-13.77
		High	Band Edge	-45.51	-25	-20.51
	15MHz	Low	Band Edge	-39.39	-25	-14.39
		High	Band Edge	-45.06	-25	-20.06
	10MHz	Low	Band Edge	-40.46	-25	-15.46
		High	Band Edge	-33.45	-10	-23.45

Table 7-11. Conducted Band Edge Test Results – Ant1

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
LTE-B41PC2	20MHz	Low	Band Edge	-36.43	-25	-11.43
		High	Band Edge	-42.65	-25	-17.65
	15MHz	Low	Band Edge	-36.44	-25	-11.44
		High	Band Edge	-41.05	-25	-16.05
	10MHz	Low	Band Edge	-37.75	-25	-12.75
		High	Band Edge	-39.42	-25	-14.42
	5MHz	Low	Band Edge	-26.98	-13	-13.98
		High	Band Edge	-38.78	-25	-13.78
NR-n41PC3	100MHz	Low	Band Edge	-28.63	-25	-3.63
		High	Band Edge	-28.44	-10	-18.44

Table 7-12. Conducted Band Edge Test Results – Ant2

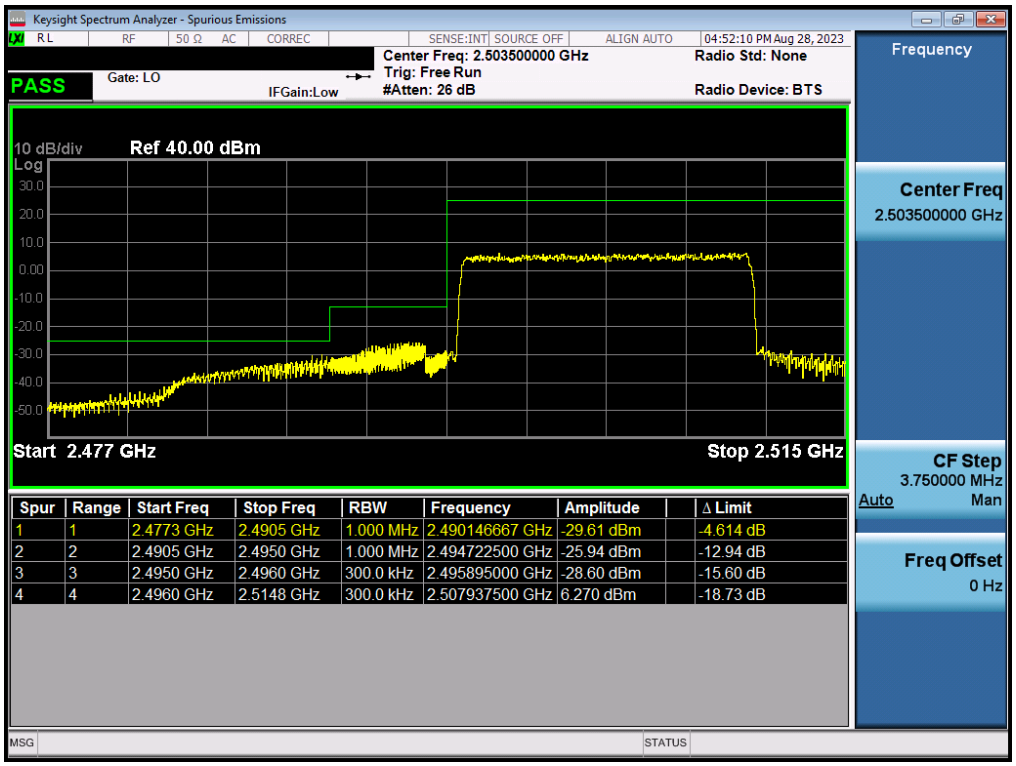
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n41PC3	100MHz	Low	Band Edge	-29.03	-13	-16.03
		High	Band Edge	-33.19	-10	-23.19

Table 7-13. Conducted Band Edge Test Results – Ant3

Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR-n41PC3	100MHz	Low	Band Edge	-31.79	-25	-6.79
		High	Band Edge	-28.12	-10	-18.12

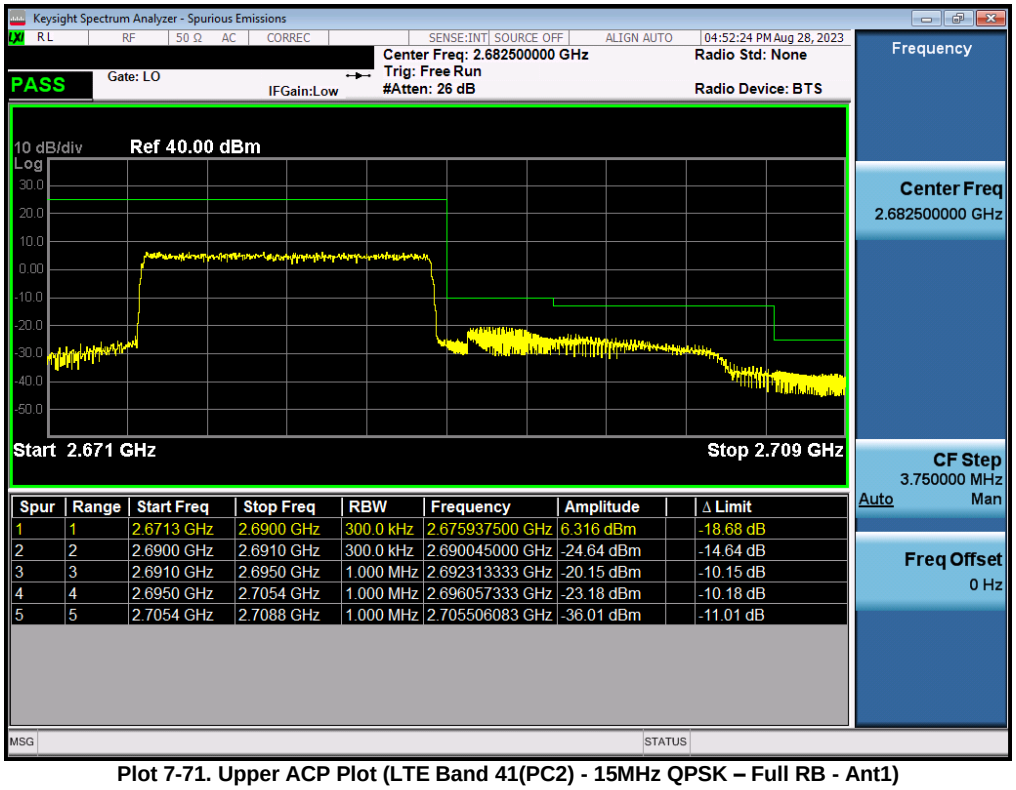
Table 7-14. Conducted Band Edge Test Results – Ant4

LTE Band 41(PC2) – Ant1



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4773 GHz	2.4905 GHz	1.000 MHz	2.490146667 GHz	-29.61 dBm	-4.614 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494722500 GHz	-25.94 dBm	-12.94 dB
3	3	2.4950 GHz	2.4960 GHz	300.0 kHz	2.495895000 GHz	-28.60 dBm	-15.60 dB
4	4	2.4960 GHz	2.5148 GHz	300.0 kHz	2.507937500 GHz	6.270 dBm	-18.73 dB

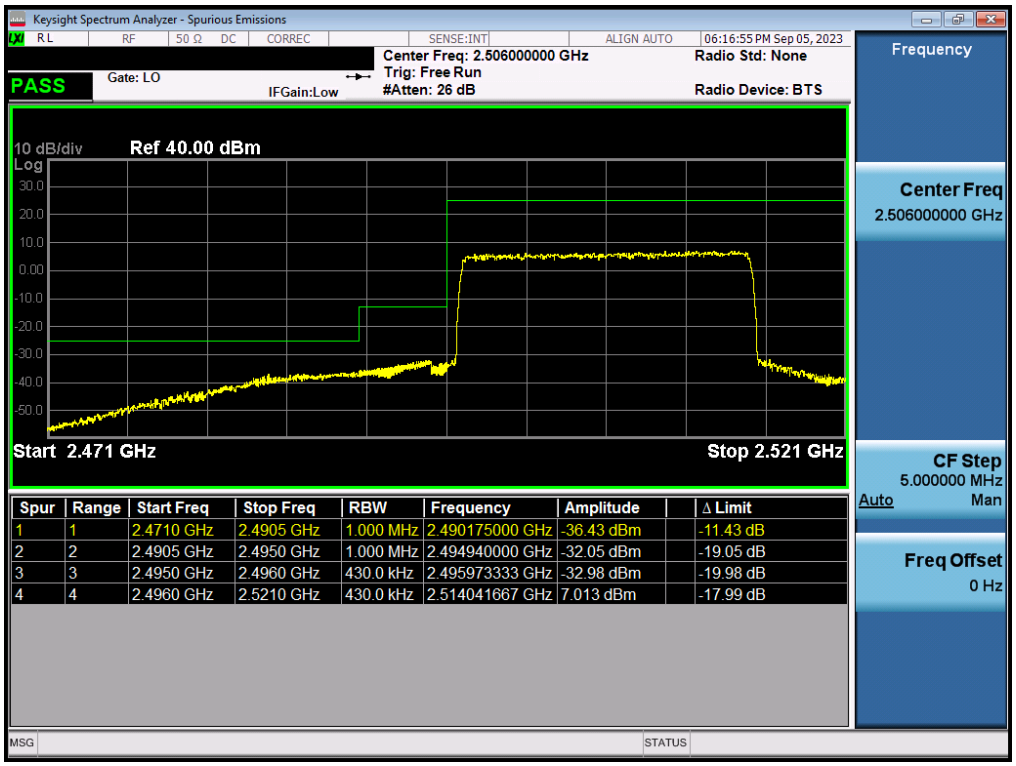
Plot 7-70. Lower ACP Plot (LTE Band 41(PC2) - 15MHz QPSK – Full RB - Ant1)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6713 GHz	2.6900 GHz	300.0 kHz	2.675937500 GHz	6.316 dBm	-18.68 dB
2	2	2.6900 GHz	2.6910 GHz	300.0 kHz	2.690045000 GHz	-24.64 dBm	-14.64 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.692313333 GHz	-20.15 dBm	-10.15 dB
4	4	2.6950 GHz	2.7054 GHz	1.000 MHz	2.696057333 GHz	-23.18 dBm	-10.18 dB
5	5	2.7054 GHz	2.7088 GHz	1.000 MHz	2.705506083 GHz	-36.01 dBm	-11.01 dB

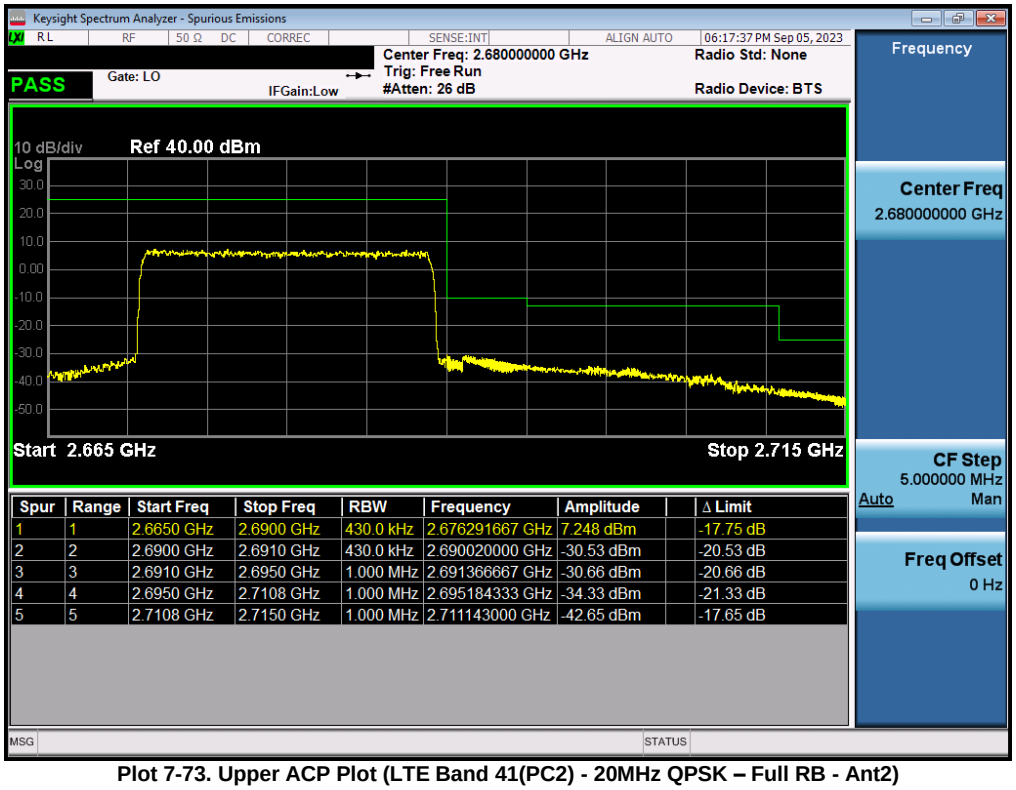
Plot 7-71. Upper ACP Plot (LTE Band 41(PC2) - 15MHz QPSK – Full RB - Ant1)

LTE Band 41(PC2) – Ant2



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4710 GHz	2.4905 GHz	1.000 MHz	2.490175000 GHz	-36.43 dBm	-11.43 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494940000 GHz	-32.05 dBm	-19.05 dB
3	3	2.4950 GHz	2.4960 GHz	430.0 kHz	2.495973333 GHz	-32.98 dBm	-19.98 dB
4	4	2.4960 GHz	2.5210 GHz	430.0 kHz	2.514041667 GHz	7.013 dBm	-17.99 dB

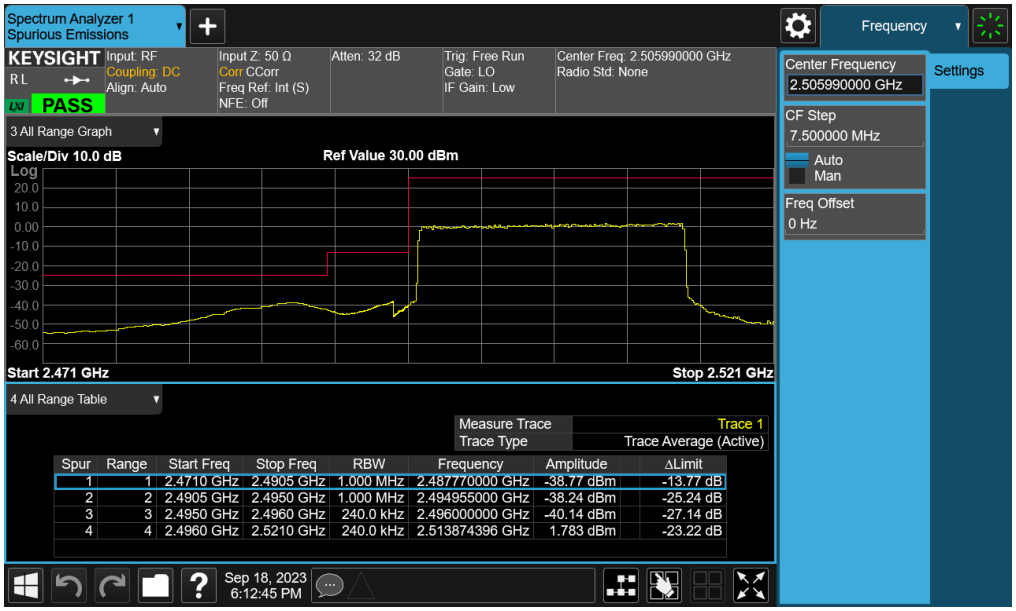
Plot 7-72. Lower ACP Plot (LTE Band 41(PC2) - 20MHz QPSK – Full RB - Ant2)



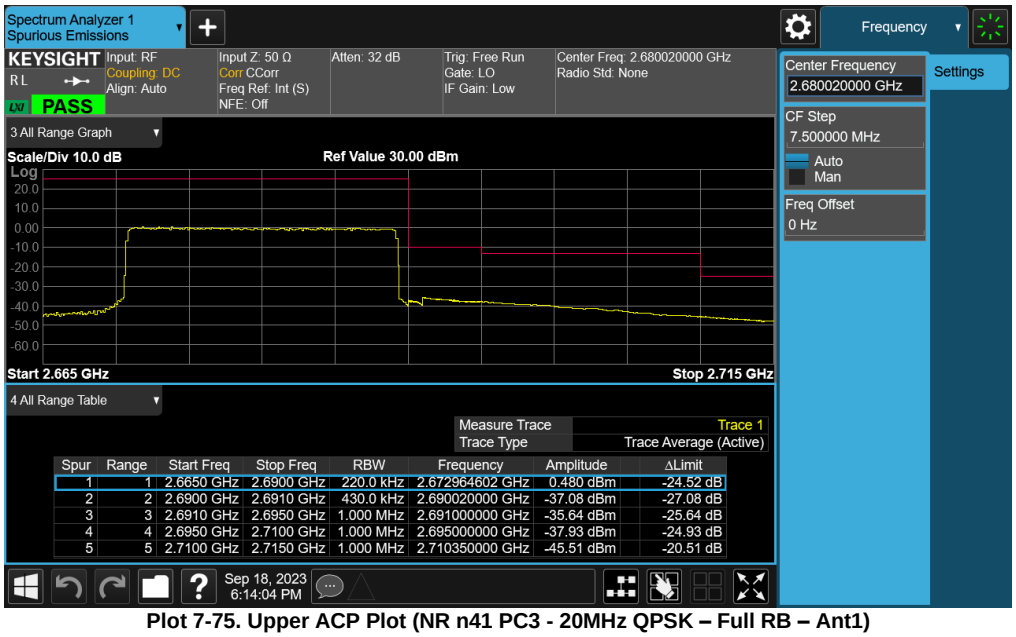
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6650 GHz	2.6900 GHz	430.0 kHz	2.676291667 GHz	7.248 dBm	-17.75 dB
2	2	2.6900 GHz	2.6910 GHz	430.0 kHz	2.690020000 GHz	-30.53 dBm	-20.53 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691366667 GHz	-30.66 dBm	-20.66 dB
4	4	2.6950 GHz	2.7108 GHz	1.000 MHz	2.695184333 GHz	-34.33 dBm	-21.33 dB
5	5	2.7108 GHz	2.7150 GHz	1.000 MHz	2.711143000 GHz	-42.65 dBm	-17.65 dB

Plot 7-73. Upper ACP Plot (LTE Band 41(PC2) - 20MHz QPSK – Full RB - Ant2)

NR Band n41 PC3 – Ant1

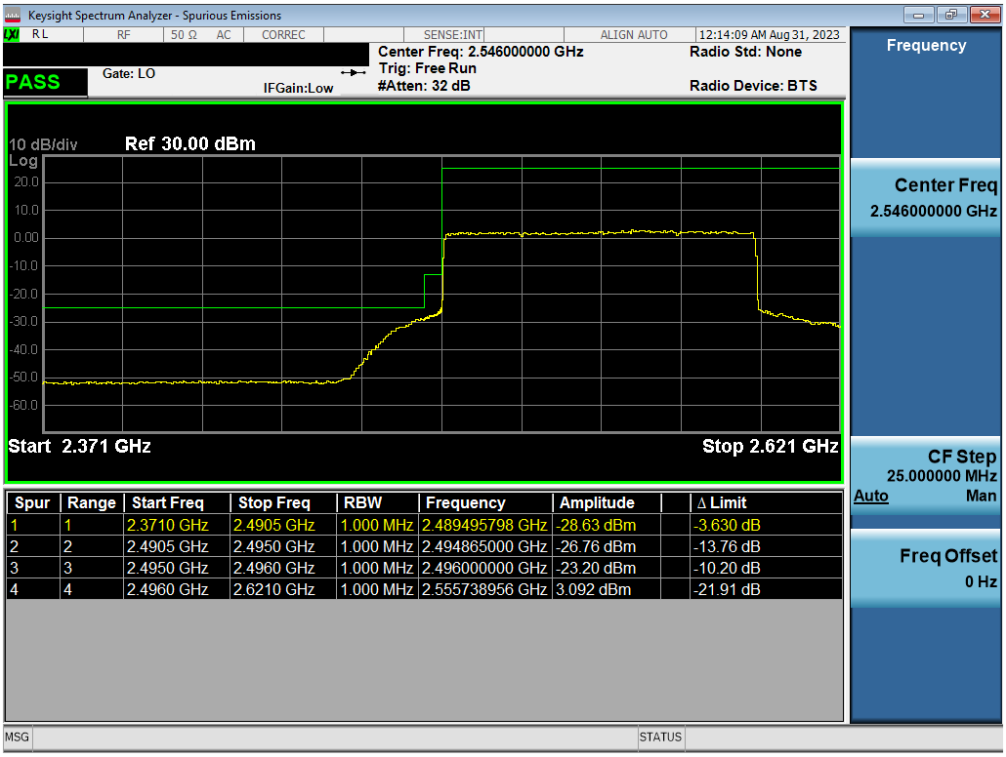


Plot 7-74. Lower ACP Plot (NR n41 PC3 - 20MHz QPSK – Full RB – Ant1)



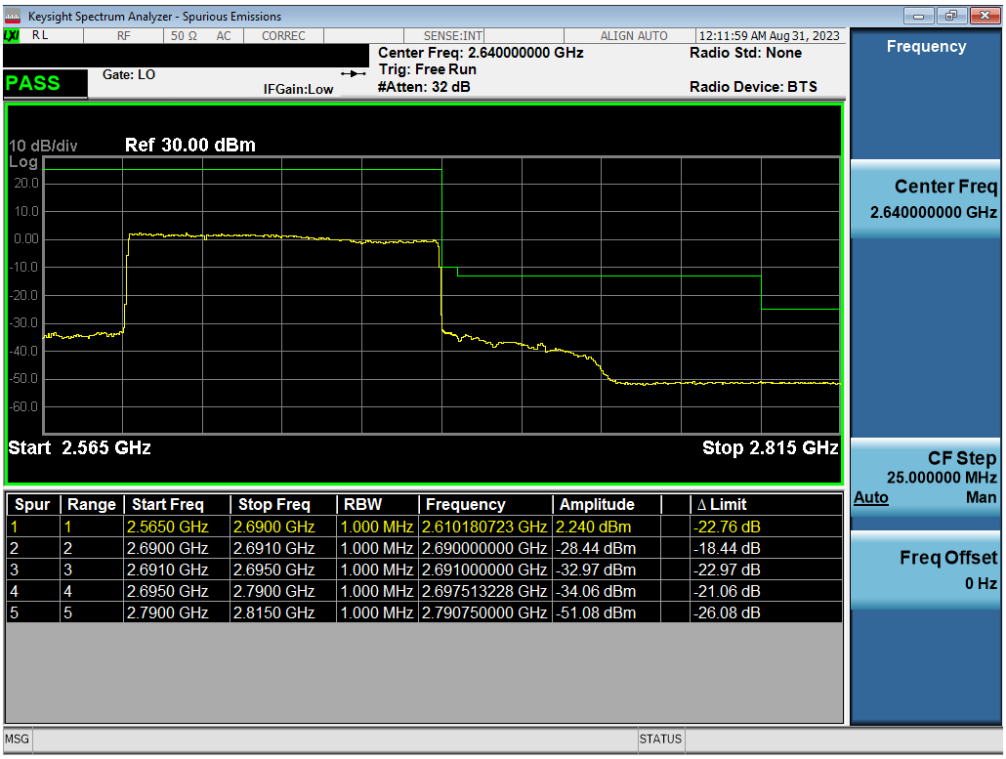
Plot 7-75. Upper ACP Plot (NR n41 PC3 - 20MHz QPSK – Full RB – Ant1)

NR Band n41 PC3 – Ant2



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.3710 GHz	2.4905 GHz	1.000 MHz	2.489495798 GHz	-28.63 dBm	-3.630 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494865000 GHz	-26.76 dBm	-13.76 dB
3	3	2.4950 GHz	2.4960 GHz	1.000 MHz	2.496000000 GHz	-23.20 dBm	-10.20 dB
4	4	2.4960 GHz	2.6210 GHz	1.000 MHz	2.555738956 GHz	3.092 dBm	-21.91 dB

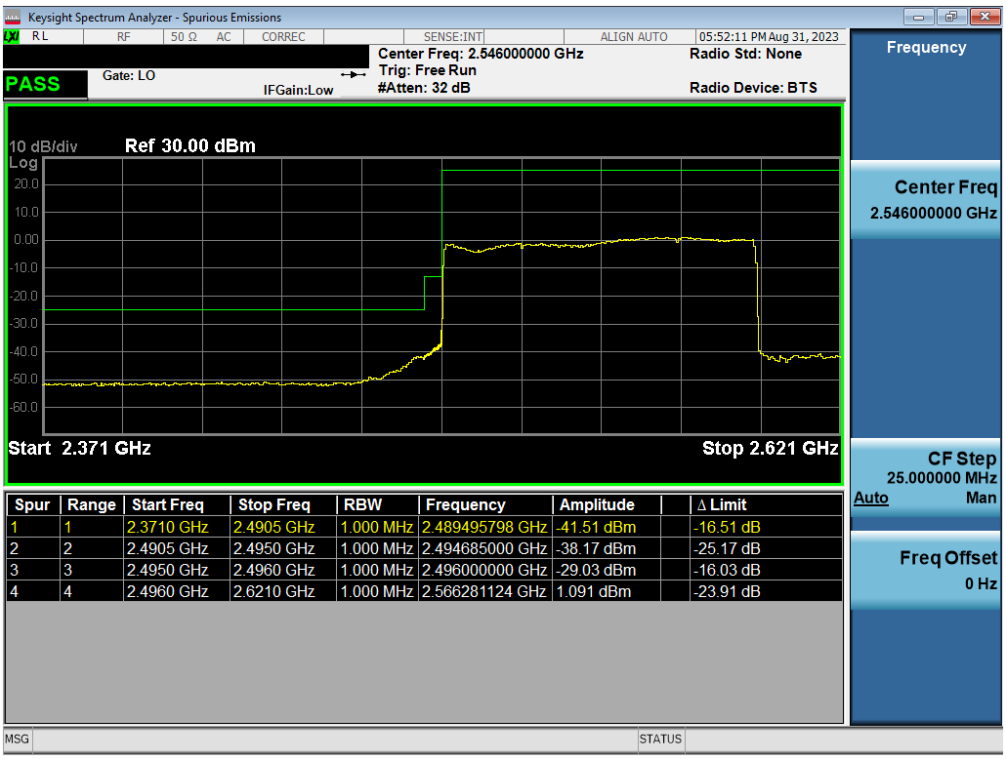
Plot 7-76. Lower ACP Plot (NR n41 PC3 - 100MHz QPSK – Full RB – Ant2)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5650 GHz	2.6900 GHz	1.000 MHz	2.610180723 GHz	2.240 dBm	-22.76 dB
2	2	2.6900 GHz	2.6910 GHz	1.000 MHz	2.690000000 GHz	-28.44 dBm	-18.44 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691000000 GHz	-32.97 dBm	-22.97 dB
4	4	2.6950 GHz	2.7900 GHz	1.000 MHz	2.697513228 GHz	-34.06 dBm	-21.06 dB
5	5	2.7900 GHz	2.8150 GHz	1.000 MHz	2.790750000 GHz	-51.08 dBm	-26.08 dB

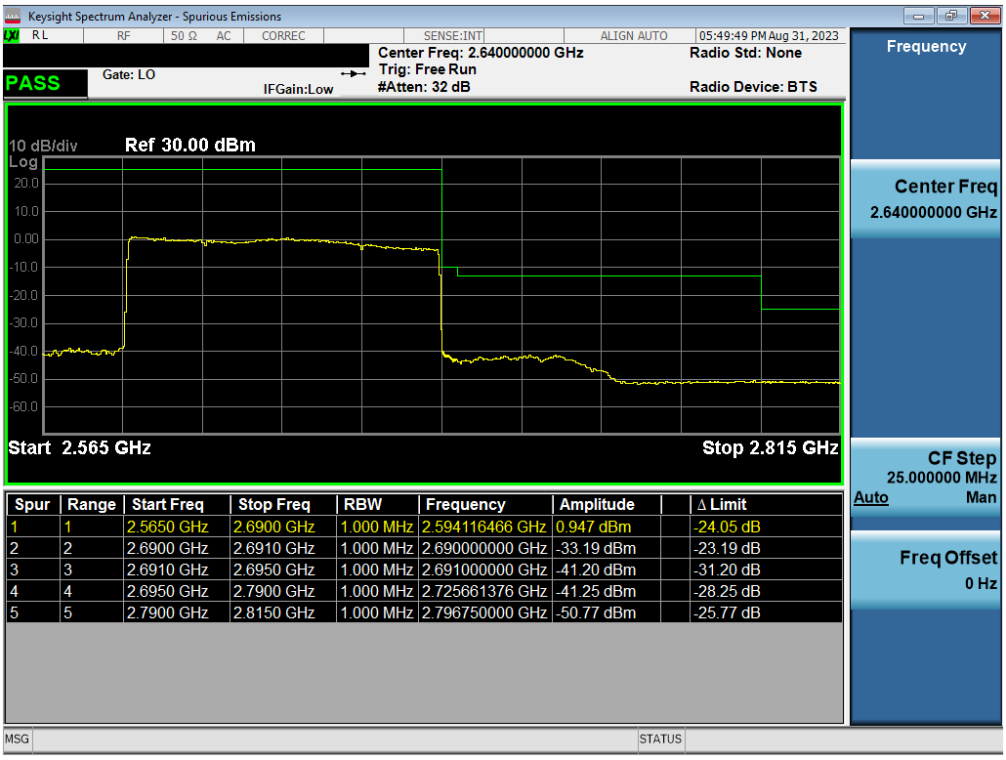
Plot 7-77. Upper ACP Plot (NR n41 PC3 - 100MHz QPSK – Full RB – Ant2)

NR Band n41 PC3 – Ant3



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.3710 GHz	2.4905 GHz	1.000 MHz	2.489495798 GHz	-41.51 dBm	-16.51 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494685000 GHz	-38.17 dBm	-25.17 dB
3	3	2.4950 GHz	2.4960 GHz	1.000 MHz	2.496000000 GHz	-29.03 dBm	-16.03 dB
4	4	2.4960 GHz	2.6210 GHz	1.000 MHz	2.566281124 GHz	1.091 dBm	-23.91 dB

Plot 7-78. Lower ACP Plot (NR n41 PC3 - 100MHz QPSK – Full RB – Ant3)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.5650 GHz	2.6900 GHz	1.000 MHz	2.594116466 GHz	0.947 dBm	-24.05 dB
2	2	2.6900 GHz	2.6910 GHz	1.000 MHz	2.690000000 GHz	-33.19 dBm	-23.19 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691000000 GHz	-41.20 dBm	-31.20 dB
4	4	2.6950 GHz	2.7900 GHz	1.000 MHz	2.725661376 GHz	-41.25 dBm	-28.25 dB
5	5	2.7900 GHz	2.8150 GHz	1.000 MHz	2.796750000 GHz	-50.77 dBm	-25.77 dB

Plot 7-79. Upper ACP Plot (NR n41 PC3 - 100MHz QPSK – Full RB – Ant3)