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PART 27 MEASUREMENT REPORT

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

Date of Testing:
5/30/2023 - 7/31/2023
Test Report Issue Date:
8/9/2023
Test Site/Location:
Element Lab., Columbia, MD, USA
Test Report Serial No.:
1M2304260063-07.A3L

FCC ID:	**A3LSMS711B**
Applicant Name:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-S711B/DS
Additional Model(s):	SM-S711B
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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Antenna B						
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	0.242	23.84	18M0G7D
		16QAM	2506.0 - 2680.0	0.203	23.07	18M0W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.233	23.68	13M4G7D
		16QAM	2503.5 - 2682.5	0.216	23.34	13M4W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.227	23.56	9M00G7D
		16QAM	2501.0 - 2685.0	0.209	23.19	9M05W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.229	23.59	4M51G7D
		16QAM	2498.5 - 2687.5	0.212	23.26	4M53W7D
LTE Band 41(PC3)	20 MHz	QPSK	2506.0 - 2680.0	0.196	22.93	18M0G7D
		16QAM	2506.0 - 2680.0	0.116	20.64	17M9W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.193	22.86	13M4G7D
		16QAM	2503.5 - 2682.5	0.115	20.59	13M5W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.191	22.80	9M02G7D
		16QAM	2501.0 - 2685.0	0.115	20.60	9M02W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.189	22.76	4M53G7D
		16QAM	2498.5 - 2687.5	0.116	20.65	4M53W7D
NR Band n41	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.181	22.59	96M8G7D
		QPSK	2546.0 - 2640.0	0.177	22.48	97M8G7D
		16QAM	2546.0 - 2640.0	0.132	21.20	98M0G7D
	90 MHz	π/2 BPSK	2541.0 - 2645.0	0.196	22.92	87M0G7D
		QPSK	2541.0 - 2645.0	0.176	22.44	87M7G7D
		16QAM	2541.0 - 2645.0	0.127	21.05	87M6G7D
	80 MHz	π/2 BPSK	2536.0 - 2650.0	0.177	22.48	77M5G7D
		QPSK	2536.0 - 2650.0	0.177	22.48	77M6G7D
		16QAM	2536.0 - 2650.0	0.126	21.00	77M8G7D
	70 MHz	π/2 BPSK	2536.0 - 2650.0	0.192	22.83	64M4G7D
		QPSK	2536.0 - 2650.0	0.181	22.59	67M8G7D
		16QAM	2536.0 - 2650.0	0.123	20.89	67M6G7D
	60 MHz	π/2 BPSK	2526.0 - 2660.0	0.183	22.63	58M0G7D
		QPSK	2526.0 - 2660.0	0.167	22.22	58M0G7D
		16QAM	2526.0 - 2660.0	0.140	21.47	58M2G7D
	50 MHz	π/2 BPSK	2521.0 - 2665.0	0.186	22.69	45M9G7D
		QPSK	2521.0 - 2665.0	0.180	22.56	47M7G7D
		16QAM	2521.0 - 2665.0	0.134	21.28	47M6G7D
	40 MHz	π/2 BPSK	2516.0 - 2670.0	0.199	22.98	36M0G7D
		QPSK	2516.0 - 2670.0	0.186	22.70	38M1G7D
		16QAM	2516.0 - 2670.0	0.149	21.73	38M0G7D
	30 MHz	π/2 BPSK	2511.0 - 2675.0	0.177	22.47	27M1G7D
		QPSK	2511.0 - 2675.0	0.187	22.71	28M1G7D
		16QAM	2511.0 - 2675.0	0.095	19.76	28M0G7D
	20 MHz	π/2 BPSK	2506.0 - 2680.0	0.171	22.34	18M0G7D
		QPSK	2506.0 - 2680.0	0.203	23.08	18M3G7D
		16QAM	2506.0 - 2680.0	0.132	21.21	18M4G7D
	15 MHz	π/2 BPSK	2506.0 - 2680.0	0.165	22.16	13M0G7D
		QPSK	2506.0 - 2680.0	0.173	22.38	13M7G7D
		16QAM	2506.0 - 2680.0	0.114	20.58	13M7G7D
	10 MHz	π/2 BPSK	2506.0 - 2680.0	0.240	23.81	8M64G7D
		QPSK	2506.0 - 2680.0	0.208	23.18	8M67G7D
		16QAM	2506.0 - 2680.0	0.161	22.06	8M61G7D

Antenna F					
Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP	
				Max. Power [W]	Max. Power [dBm]
NR Band n41	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.141	21.49
		QPSK	2546.0 - 2640.0	0.133	21.23
		16QAM	2546.0 - 2640.0	0.120	20.78

Antenna D					
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	0.057	17.55
		QPSK	2546.0 - 2640.0	0.058	17.62
		16QAM	2546.0 - 2640.0	0.028	14.46

Antenna E					
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	0.050	16.95
		QPSK	2546.0 - 2640.0	0.060	17.75
		16QAM	2546.0 - 2640.0	0.037	15.68

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: A3LSMS711B**. 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.: 1050M, 0974M, 81050M, 0874M, 0073M, 1056M, 0168M, 0877M

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

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	N/A	N/A	N/A
NR Band n41	ANT B	ANT F	ANT D	ANT E

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 S711BXXU0_0627_0900_devFull 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
-	AP2-002	EMC Cable and Switch System	1/11/2023	Annual	1/11/2024	AP2-002
-	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
-	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
-	LTX4	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX4
-	LTX5	Licensed Transmitter Cable Set	1/12/2023	Annual	1/12/2024	LTX5
Anritsu	MT8821C	Radio Communication Analyzer	N/A			620152694
EMCO	3115	Horn Antenna (1-18GHz)	8/8/2022	Biennial	8/8/2024	9704-5182
EMCO	3116	Horn Antenna (18-40GHz)	7/20/2021	Biennial	8/30/2023	9203-2178
Keysight Technologies	N9030A	PXA Signal Analyzer (3Hz-26.5GHz)	9/6/2022	Annual	9/6/2023	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer (44GHz)	3/15/2023	Annual	3/15/2024	MY52350166
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Test Antenna	9/28/2022	Biennial	9/28/2024	101058
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/29/2022	Annual	8/29/2023	100342
Rohde & Schwarz	ESW44	EMI Test Receiver (2Hz-44GHz)	3/1/2023	Annual	3/1/2024	101716
Rohde & Schwarz	VULB9162	Bi-Log Antenna	2/21/2023	Biennial	2/21/2025	00301
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	8/30/2022	Biennial	8/30/2024	A051107

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: A3LSMS711B

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

Mode(s): NR/LTE

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 (FCC)

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 v1.0.

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.

A-MPR is implemented in this device when operating at Power Class 2 in LTE Band 41 per the A-MPR specification in 3GPP TS 36.101. The conducted powers are shown herein to cover the different A-MPR levels specified in the standard. Measurement equipment was set up with triggering/gating on the spectrum analyzer such that powers were measured only during the on-time of the signal.

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.

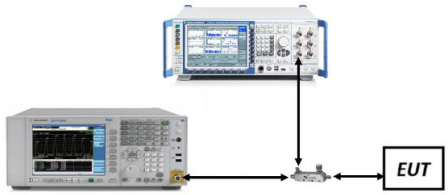


Figure 7-1. Test Instrument & Measurement Setup

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.

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 0	25.20
		40620	2593.0	1 / 0	25.03
		41490	2680.0	1 / 0	24.86
	16-QAM	41490	2680.0	1 / 0	23.61
	64-QAM	41490	2680.0	1 / 0	23.05
	256-QAM	41490	2680.0	1 / 0	21.72
15 MHz	QPSK	39725	2503.5	1 / 0	25.07
		40620	2593.0	1 / 0	25.02
		41515	2682.5	1 / 0	24.70
	16-QAM	41515	2682.5	1 / 0	23.88
	64-QAM	41515	2682.5	1 / 0	23.00
	256-QAM	41515	2682.5	1 / 0	21.68
10 MHz	QPSK	39700	2501.0	1 / 49	25.18
		40620	2593.0	1 / 0	25.19
		41540	2685.0	1 / 49	24.58
	16-QAM	41540	2685.0	1 / 0	23.73
	64-QAM	41540	2685.0	1 / 0	22.71
	256-QAM	41540	2685.0	1 / 0	21.67
5 MHz	QPSK	39675	2498.5	1 / 12	25.12
		40620	2593.0	1 / 0	25.00
		41565	2687.5	1 / 12	24.61
	16-QAM	41565	2687.5	1 / 12	23.80
	64-QAM	41565	2687.5	1 / 12	22.70
	256-QAM	41565	2687.5	1 / 12	21.45

Table 7-2. Conducted Output Power Test Results (LTE Band 41 PC2– Ant1)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 0	24.35
		40620	2593.0	1 / 0	24.31
		41490	2680.0	1 / 0	24.01
	16-QAM	41490	2680.0	1 / 0	21.93
	64-QAM	41490	2680.0	1 / 0	21.01
	256-QAM	41490	2680.0	1 / 0	19.70
15 MHz	QPSK	39725	2503.5	1 / 37	24.36
		40620	2593.0	1 / 0	24.25
		41515	2682.5	1 / 0	23.94
	16-QAM	41515	2682.5	1 / 0	21.88
	64-QAM	41515	2682.5	1 / 0	21.15
	256-QAM	41515	2682.5	1 / 0	19.58
10 MHz	QPSK	39700	2501.0	1 / 49	24.39
		40620	2593.0	1 / 0	24.26
		41540	2685.0	1 / 0	23.88
	16-QAM	41540	2685.0	1 / 0	21.89
	64-QAM	41540	2685.0	1 / 0	21.05
	256-QAM	41540	2685.0	1 / 0	19.71
5 MHz	QPSK	39675	2498.5	1 / 24	24.28
		40620	2593.0	1 / 0	24.16
		41565	2687.5	1 / 12	23.84
	16-QAM	41565	2687.5	1 / 12	21.94
	64-QAM	40620	2593.0	1 / 0	21.43
	256-QAM	41565	2687.5	1 / 12	19.47

Table 7-3. Conducted Output Power Test Results (LTE Band 41 PC3– Ant1)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 136	23.60
		518598	2593.0	1 / 68	23.75
		528000	2640.0	1 / 204	23.74
	QPSK	509202	2546.0	1 / 136	23.84
		518598	2593.0	1 / 204	23.83
		528000	2640.0	1 / 204	23.84
	16-QAM	528000	2640.0	1 / 204	23.13
	64-QAM	528000	2640.0	1 / 204	21.75
	256-QAM	528000	2640.0	1 / 204	19.40
90 MHz	π/2 BPSK	508200	2541.0	1 / 122	23.96
		518592	2593.0	1 / 183	23.78
		529002	2645.0	1 / 183	24.07
	QPSK	508200	2541.0	1 / 122	23.64
		518592	2593.0	1 / 61	23.68
		529002	2645.0	1 / 183	23.80
	16-QAM	529002	2645.0	1 / 183	22.99
	64-QAM	508200	2541.0	1 / 122	21.76
	256-QAM	508200	2541.0	1 / 122	20.09
80 MHz	π/2 BPSK	507204	2536.0	1 / 54	23.65
		518598	2593.0	1 / 54	23.86
		529998	2650.0	1 / 162	23.63
	QPSK	507204	2536.0	1 / 54	23.56
		518598	2593.0	1 / 54	23.98
		529998	2650.0	1 / 162	23.84
	16-QAM	518598	2593.0	1 / 54	23.08
	64-QAM	518598	2593.0	1 / 54	21.90
	256-QAM	529998	2650.0	1 / 162	19.86
70 MHz	π/2 BPSK	506196	2531.0	1 / 1	23.68
		518598	2593.0	1 / 1	23.86
		531000	2655.0	1 / 94	23.98
	QPSK	506196	2531.0	1 / 1	24.08
		518598	2593.0	1 / 1	24.15
		531000	2655.0	1 / 94	23.95
	16-QAM	518598	2593.0	1 / 1	22.97
	64-QAM	518598	2593.0	1 / 1	21.52
	256-QAM	531000	2655.0	1 / 94	19.85
60 MHz	π/2 BPSK	505200	2526.0	1 / 81	23.56
		518598	2593.0	1 / 40	24.13
		531996	2660.0	1 / 40	23.78
	QPSK	505200	2526.0	1 / 81	24.35
		518598	2593.0	1 / 40	24.06
		531996	2660.0	1 / 40	23.58
	16-QAM	518598	2593.0	1 / 40	23.55
	64-QAM	505200	2526.0	1 / 81	22.18
	256-QAM	531996	2660.0	1 / 40	20.15
50 MHz	π/2 BPSK	504204	2521.0	1 / 99	23.94
		518598	2593.0	1 / 33	23.60
		532998	2665.0	1 / 99	23.84
	QPSK	504204	2521.0	1 / 99	24.09
		518598	2593.0	1 / 66	24.16
		532998	2665.0	1 / 99	23.92
	16-QAM	518598	2593.0	1 / 66	23.36
	64-QAM	532998	2665.0	1 / 99	21.38
	256-QAM	532998	2665.0	1 / 99	19.35
40 MHz	π/2 BPSK	503202	2516.0	1 / 53	23.50
		518598	2593.0	1 / 53	22.93
		534000	2670.0	1 / 26	24.13
	QPSK	503202	2516.0	1 / 53	23.94
		518598	2593.0	1 / 53	23.35
		534000	2670.0	1 / 26	24.06
	16-QAM	534000	2670.0	1 / 26	23.67
	64-QAM	534000	2670.0	1 / 26	22.00
	256-QAM	534000	2670.0	1 / 26	20.21
30 MHz	π/2 BPSK	502203	2511.0	1 / 39	23.57
		518598	2593.0	1 / 58	23.35
		534999	2675.0	1 / 39	23.62
	QPSK	502203	2511.0	1 / 39	24.19
		518598	2593.0	1 / 19	24.03
		534999	2675.0	1 / 39	24.07
	16-QAM	502203	2511.0	1 / 39	22.42
	64-QAM	502203	2511.0	1 / 39	20.49
	256-QAM	534999	2675.0	1 / 39	20.48
20 MHz	π/2 BPSK	501204	2506.0	1 / 25	23.49
		518598	2593.0	1 / 37	23.42
		535998	2680.0	1 / 25	23.48
	QPSK	501204	2506.0	1 / 25	23.97
		518598	2593.0	1 / 13	24.09
		535998	2680.0	1 / 25	24.44
	16-QAM	535998	2680.0	1 / 25	23.14
	64-QAM	535998	2680.0	1 / 25	22.32
	256-QAM	501204	2506.0	1 / 25	20.07
15 MHz	π/2 BPSK	500700	2503.5	1 / 1	23.42
		518598	2593.0	1 / 19	22.70
		536496	2682.5	1 / 19	23.31
	QPSK	500700	2503.5	1 / 1	23.46
		518598	2593.0	1 / 1	23.27
		536496	2682.5	1 / 1	23.74
	16-QAM	500700	2503.5	1 / 1	23.24
	64-QAM	500700	2503.5	1 / 1	22.59
	256-QAM	500700	2503.5	1 / 1	20.36
10 MHz	π/2 BPSK	500202	2501.0	1 / 12	23.57
		518598	2593.0	1 / 22	24.70
		537000	2685.0	1 / 22	24.96
	QPSK	500202	2501.0	1 / 12	23.03
		518598	2593.0	1 / 22	24.16
		537000	2685.0	1 / 22	24.54
	16-QAM	500202	2501.0	1 / 12	24.71
	64-QAM	500202	2501.0	1 / 12	21.96
	256-QAM	500202	2501.0	1 / 12	20.23

Table 7-4. Conducted Output Power Test Results (NR Band n41 – Ant1)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	23.32
		518598	2592.99	1 / 1	24.44
		528000	2640.00	1 / 136	23.56
	QPSK	509202	2546.01	1 / 136	23.31
		518598	2592.99	1 / 1	24.24
		528000	2640.00	1 / 136	23.51
	16-QAM	509202	2546.01	1 / 136	22.72

Table 7-5. Conducted Output Power Test Results (NR Band n41 – Ant2)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 1	21.84
		518598	2592.99	1 / 1	22.41
		528000	2640.00	1 / 136	22.62
	QPSK	509202	2546.01	1 / 1	22.09
		518598	2592.99	1 / 1	22.61
		528000	2640.00	1 / 136	22.63
	16-QAM	509202	2546.01	1 / 1	22.65

Table 7-6. Conducted Output Power Test Results (NR Band n41 – Ant3)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.01	1 / 136	24.20
		518598	2592.99	1 / 271	24.35
		528000	2640.00	1 / 271	24.50
	QPSK	509202	2546.01	1 / 136	24.19
		518598	2592.99	1 / 271	24.18
		528000	2640.00	1 / 271	24.40
	16-QAM	528000	2640.00	1 / 1	23.45

Table 7-7. Conducted Output Power Test Results (NR Band n41 – 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.

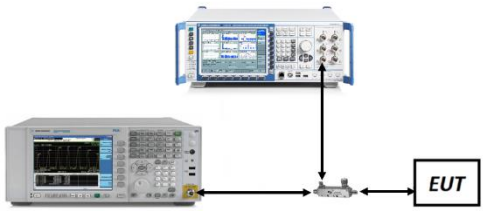


Figure 7-2. Test Instrument & Measurement Setup

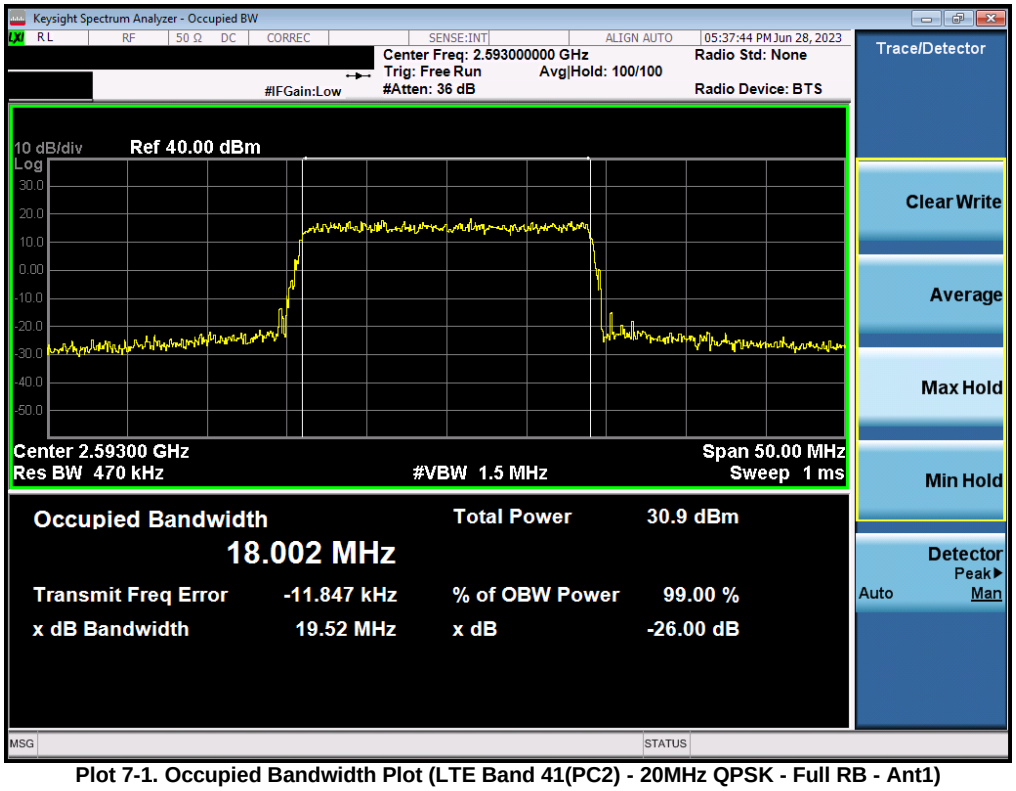
Test Notes

None.

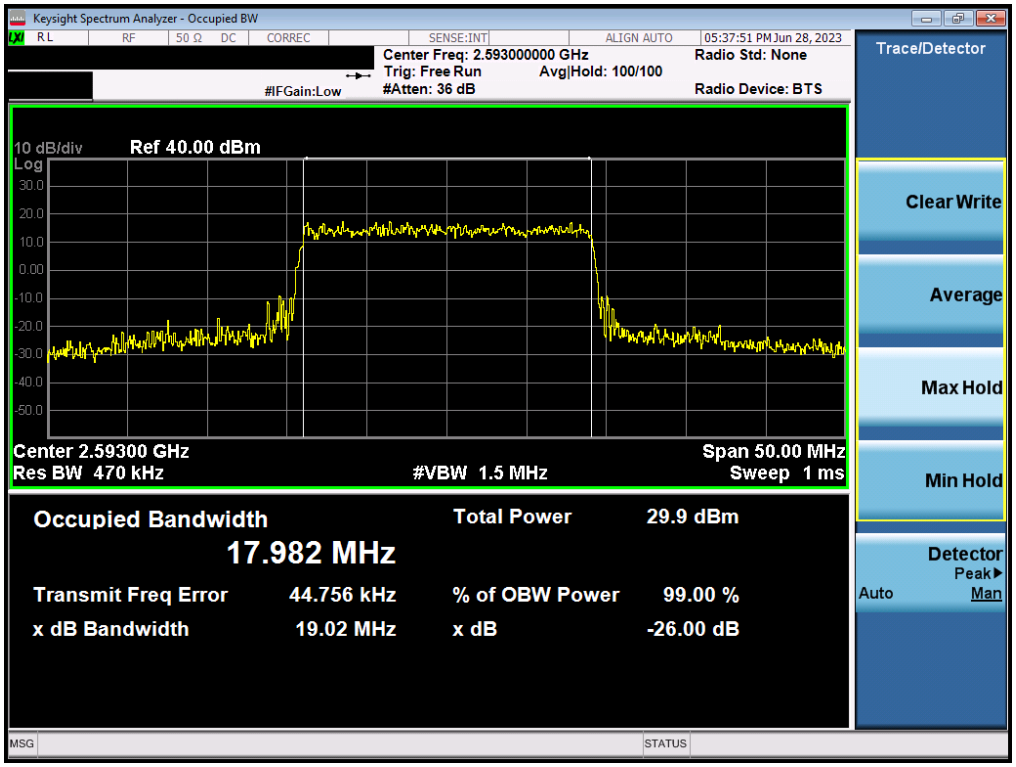
Mode	Bandwidth	Modulation	OBW [MHz]
LTE Band 41 (PC2)	20 MHz	QPSK	18.00
		16QAM	17.98
	15 MHz	QPSK	13.44
		16QAM	13.45
	10 MHz	QPSK	9.00
		16QAM	9.05
	5 MHz	QPSK	4.51
		16QAM	4.53
LTE Band 41(PC3)	20 MHz	QPSK	18.01
		16QAM	17.90
	15 MHz	QPSK	13.42
		16QAM	13.54
	10 MHz	QPSK	9.02
		16QAM	9.02
	5 MHz	QPSK	4.53
		16QAM	4.53

Table 7-8. Occupied Bandwidth Test Results – Ant1

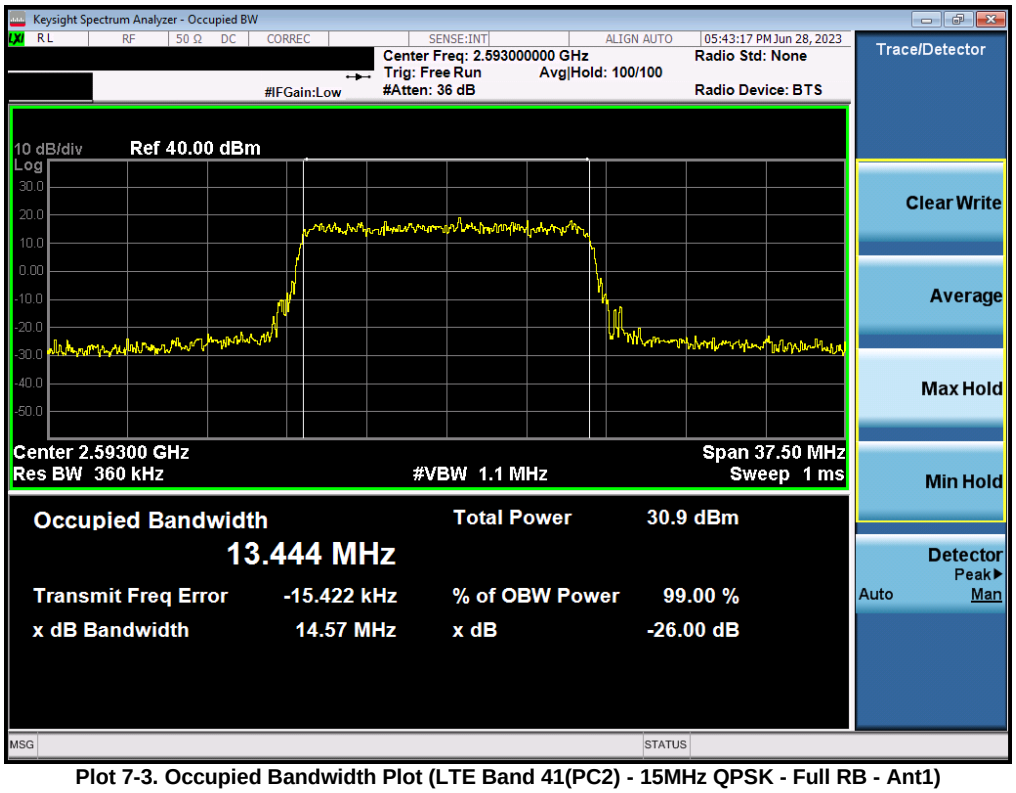
LTE Band 41(PC2) – Ant1



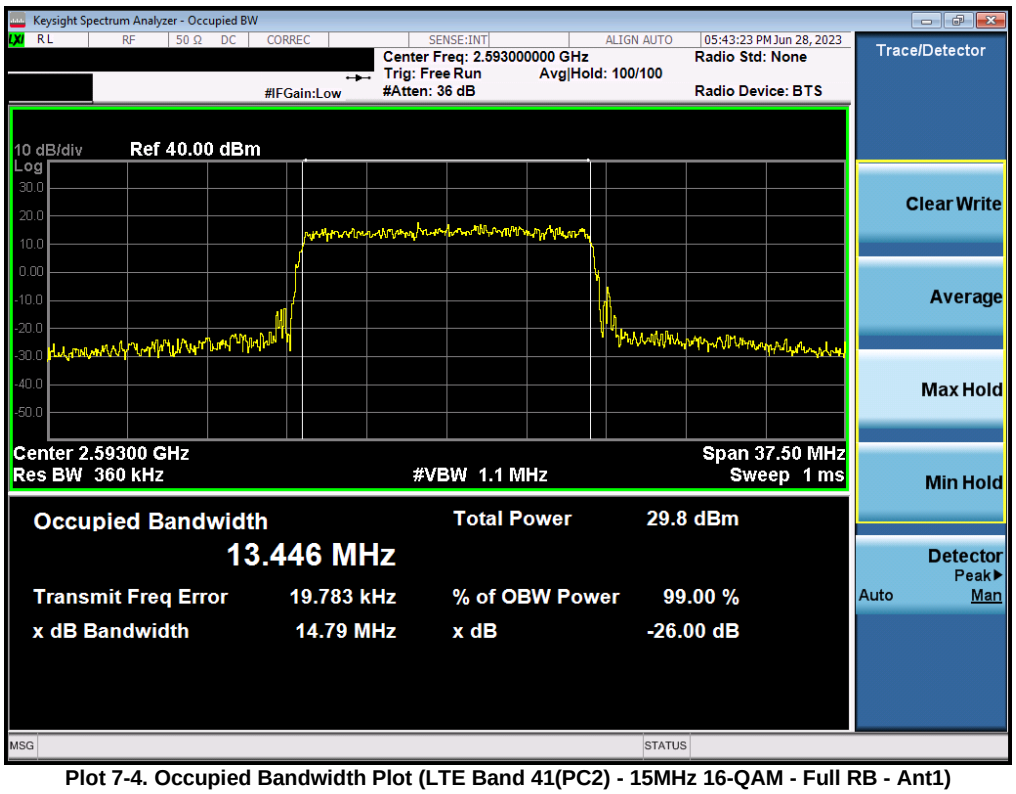
Plot 7-1. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz QPSK - Full RB - Ant1)



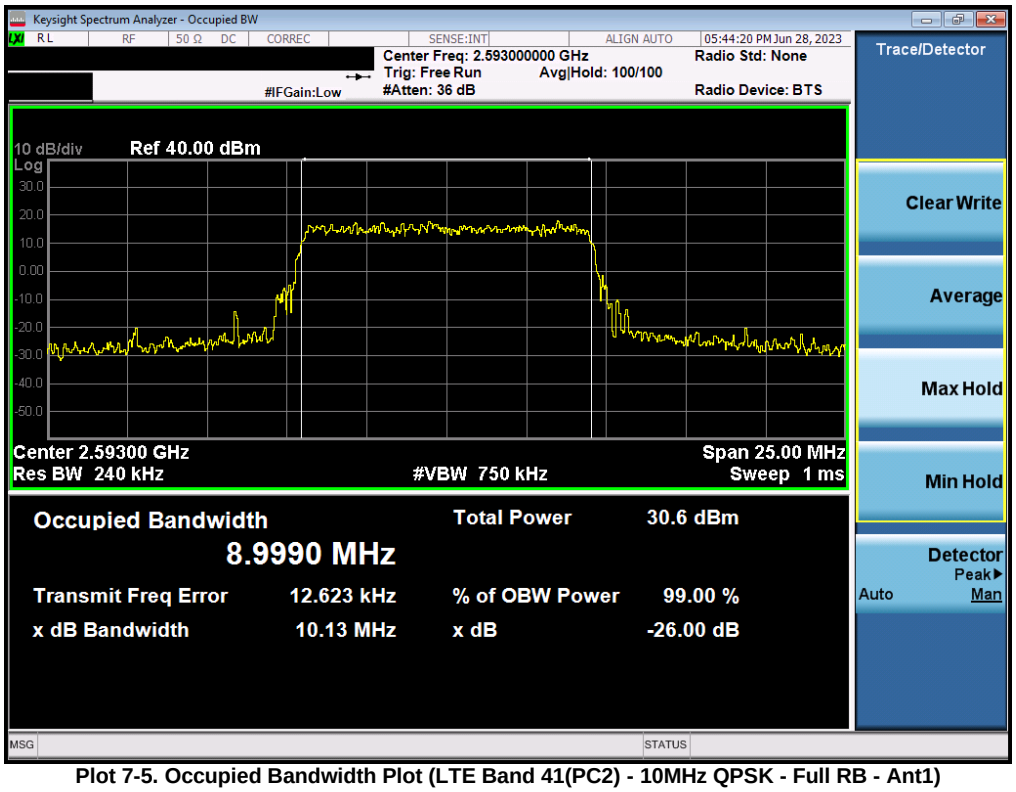
Plot 7-2. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz 16-QAM - Full RB - Ant1)



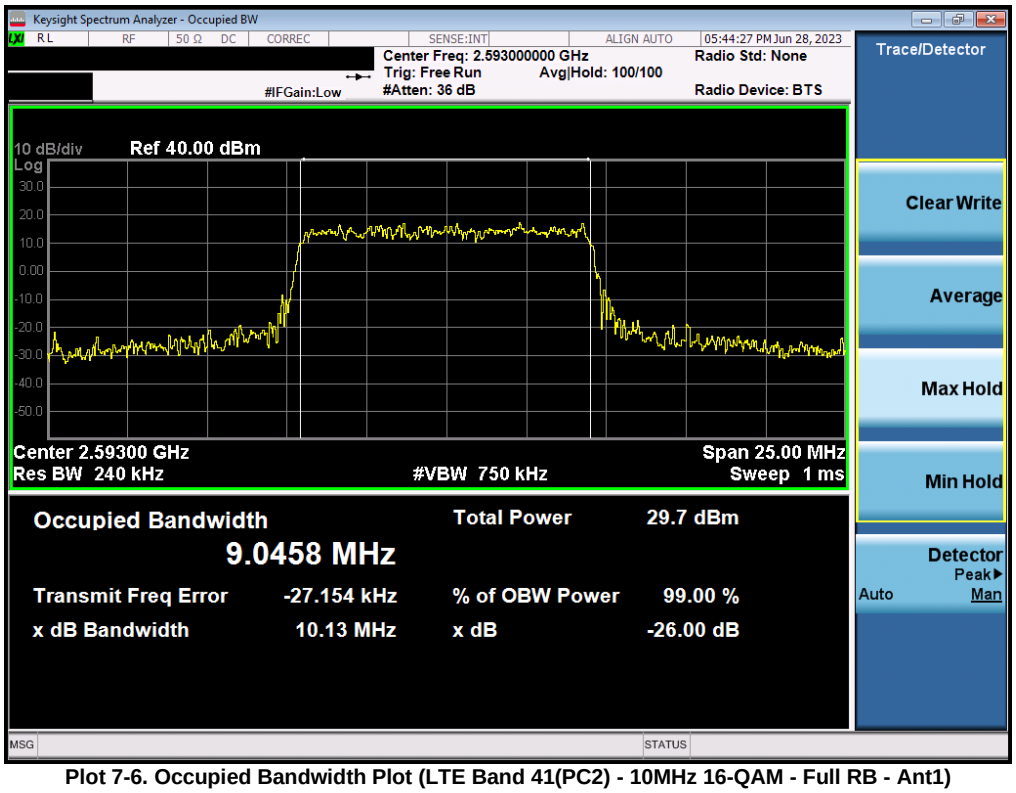
Plot 7-3. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz QPSK - Full RB - Ant1)



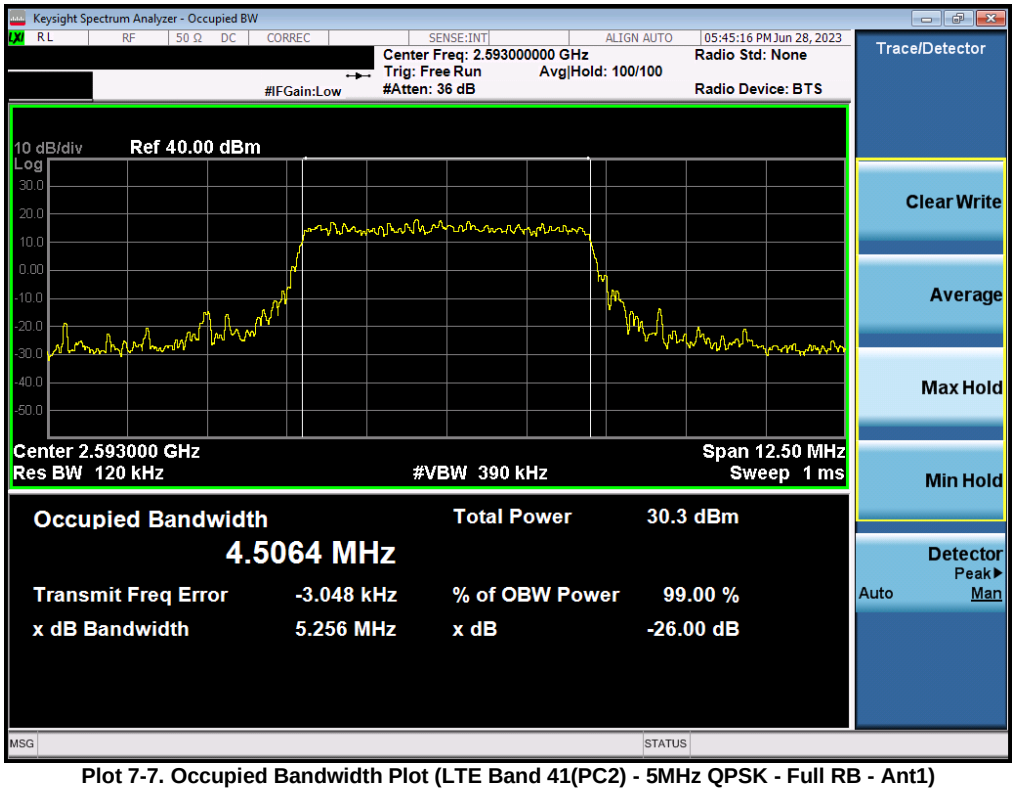
Plot 7-4. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz 16-QAM - Full RB - Ant1)



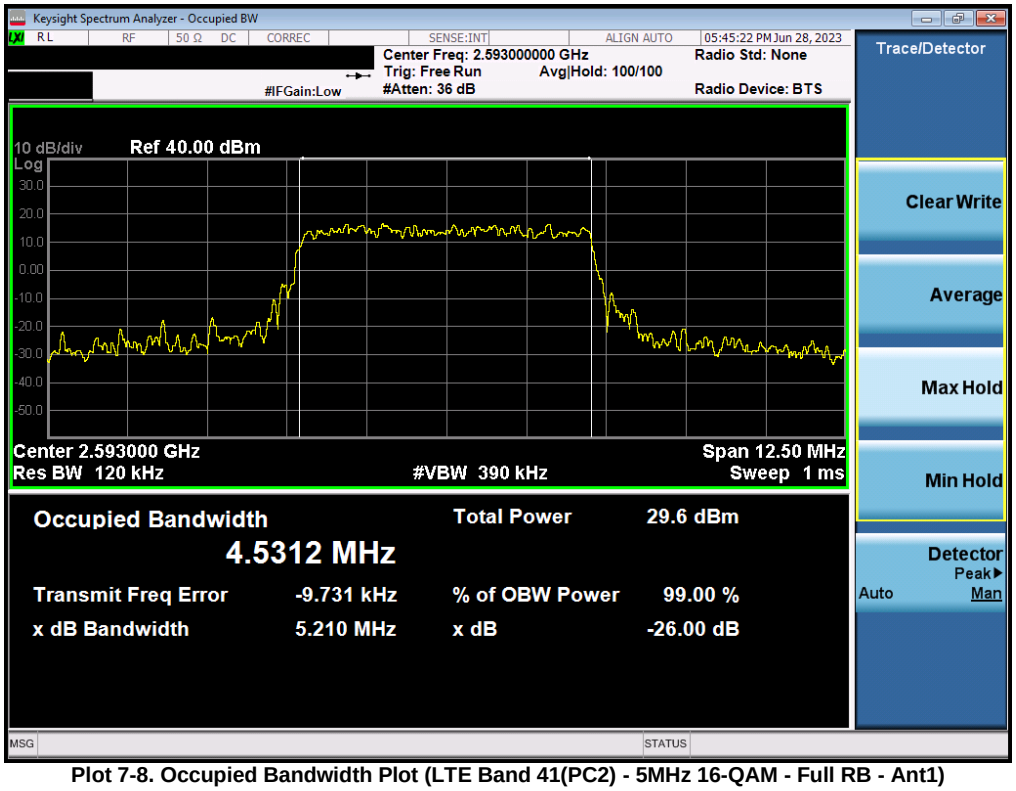
Plot 7-5. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz QPSK - Full RB - Ant1)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz 16-QAM - Full RB - Ant1)

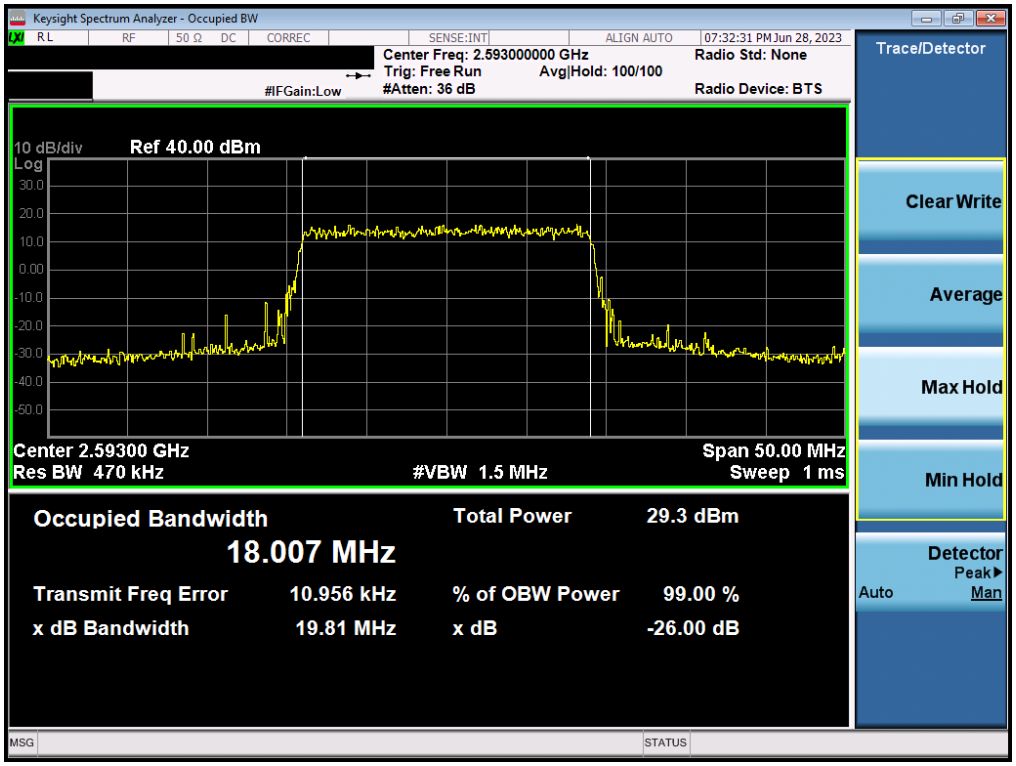


Plot 7-7. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz QPSK - Full RB - Ant1)

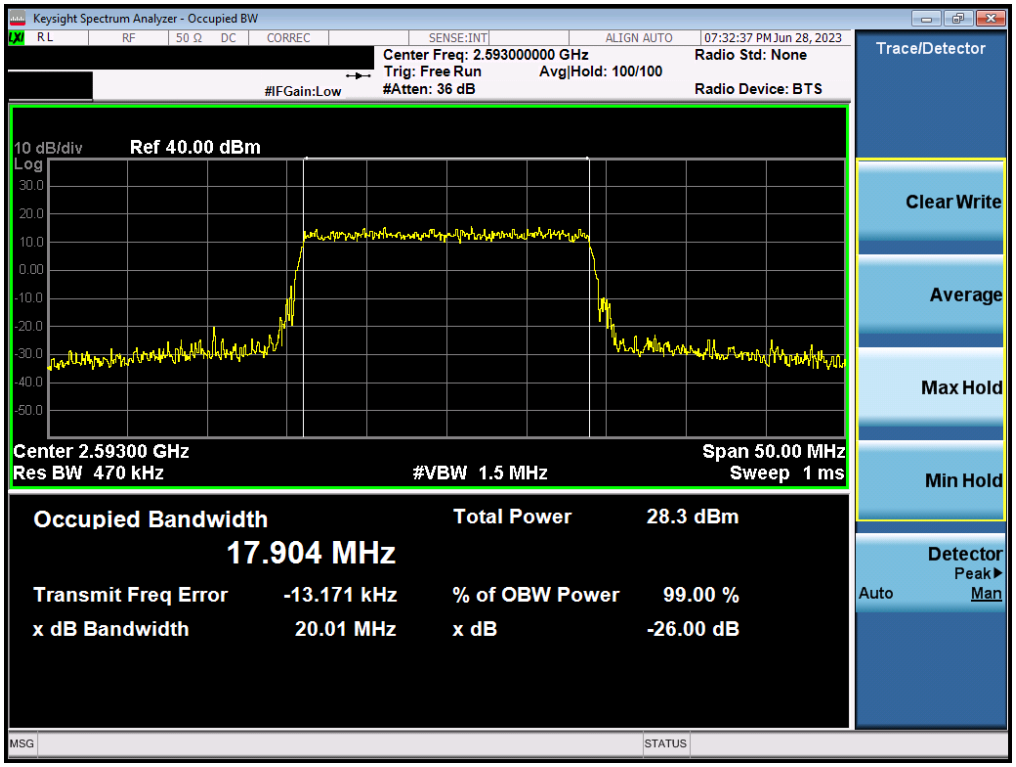


Plot 7-8. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz 16-QAM - Full RB - Ant1)

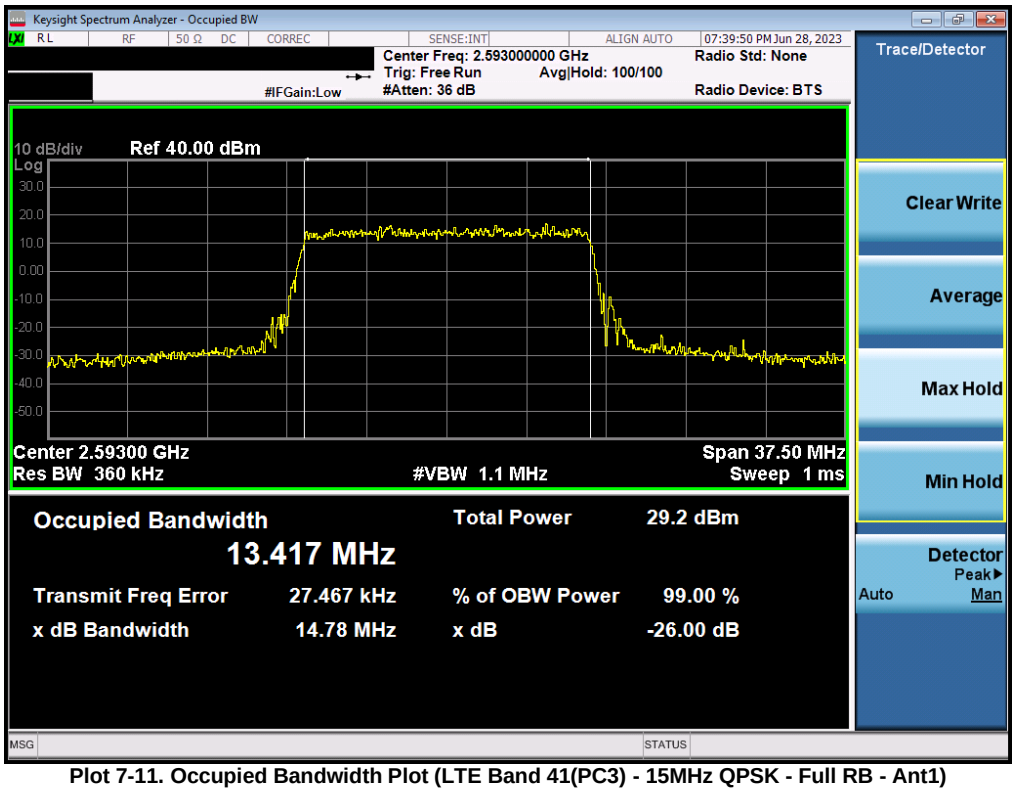
LTE Band 41(PC3) – Ant1



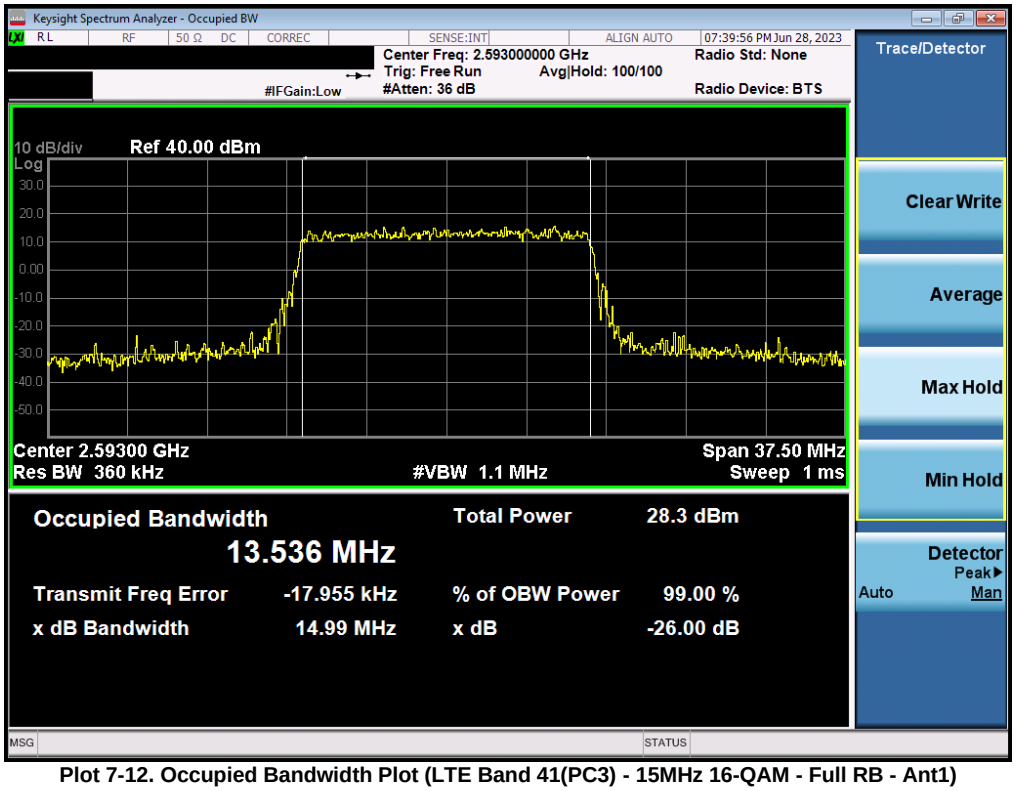
Plot 7-9. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz QPSK - Full RB - Ant1)



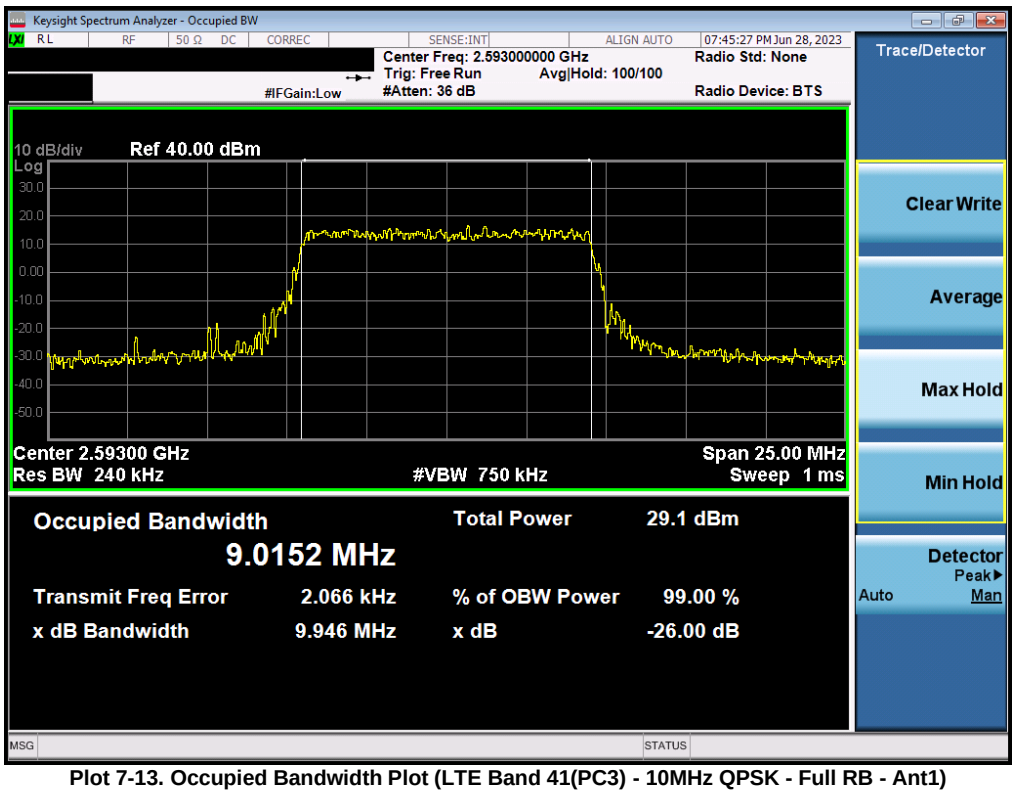
Plot 7-10. Occupied Bandwidth Plot (LTE Band 41(PC3) - 20MHz 16-QAM - Full RB - Ant1)



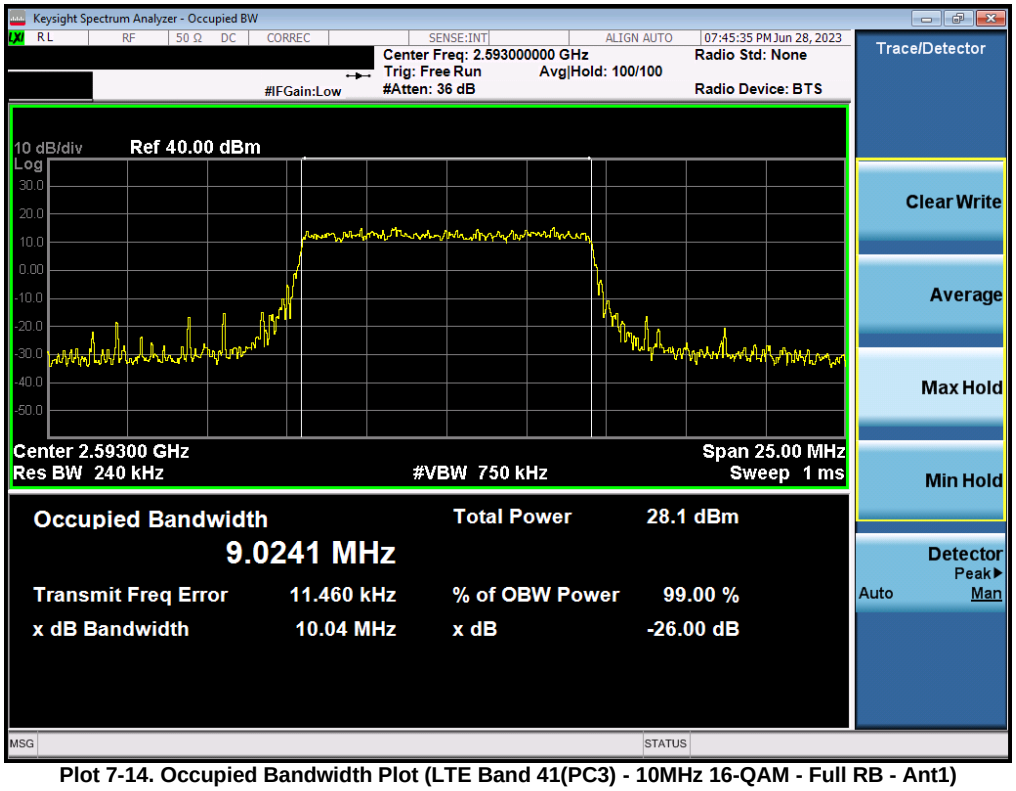
Plot 7-11. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz QPSK - Full RB - Ant1)



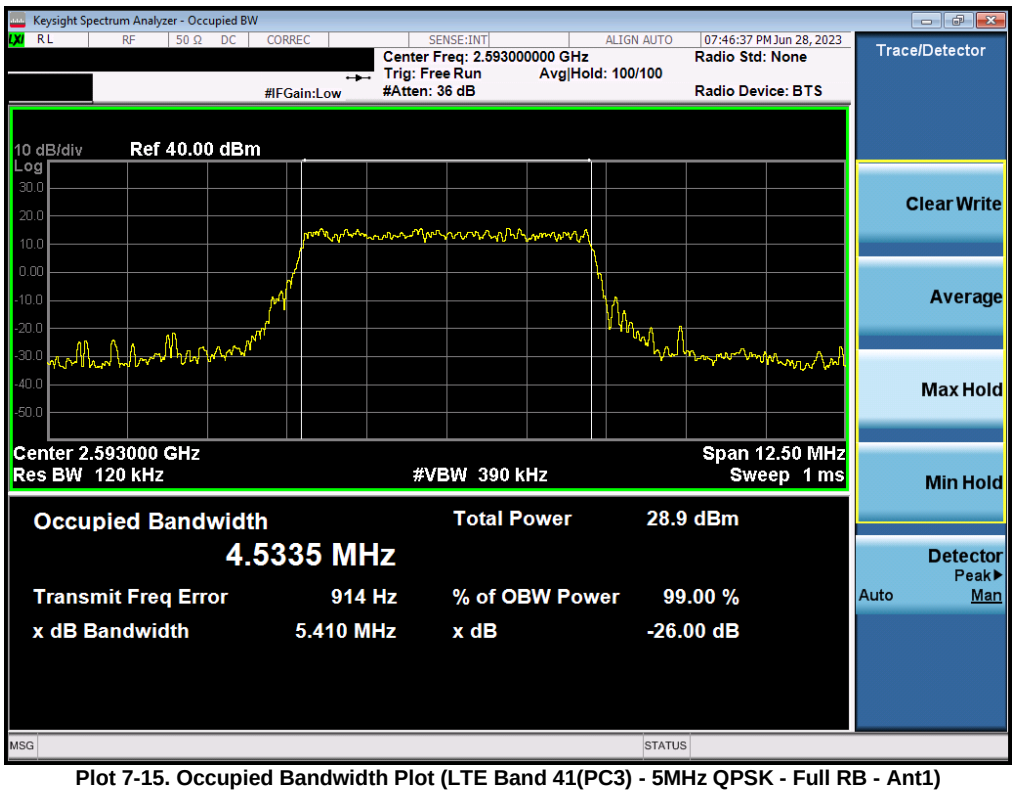
Plot 7-12. Occupied Bandwidth Plot (LTE Band 41(PC3) - 15MHz 16-QAM - Full RB - Ant1)



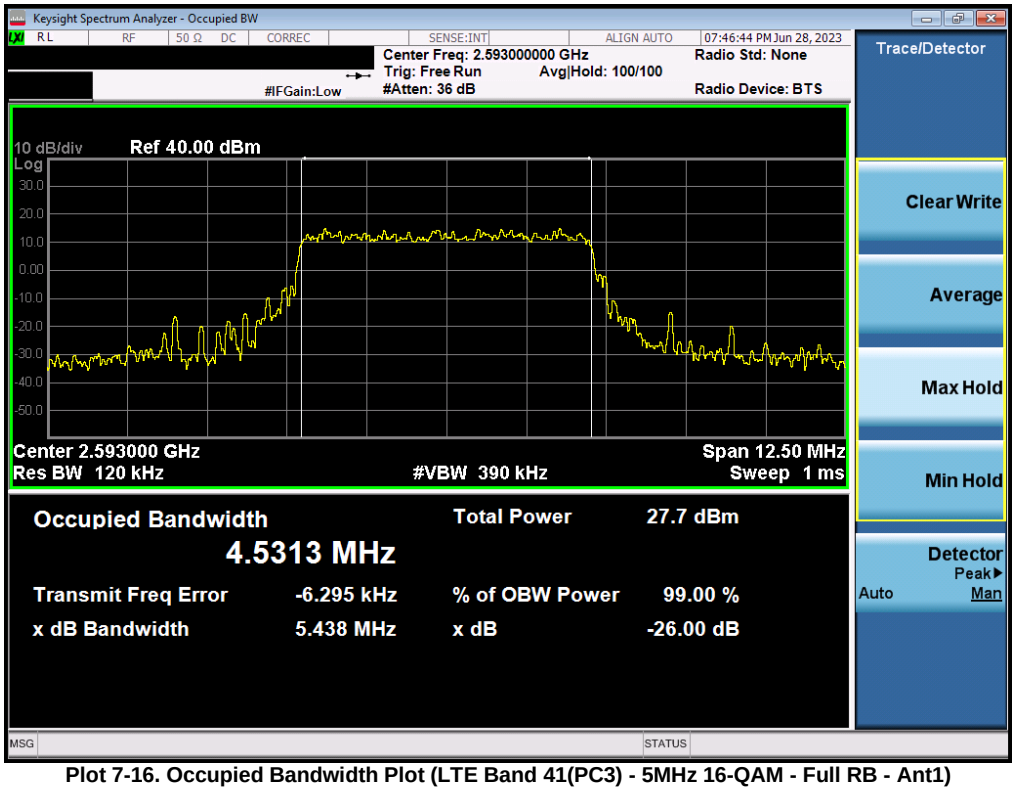
Plot 7-13. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz QPSK - Full RB - Ant1)



Plot 7-14. Occupied Bandwidth Plot (LTE Band 41(PC3) - 10MHz 16-QAM - Full RB - Ant1)



Plot 7-15. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz QPSK - Full RB - Ant1)

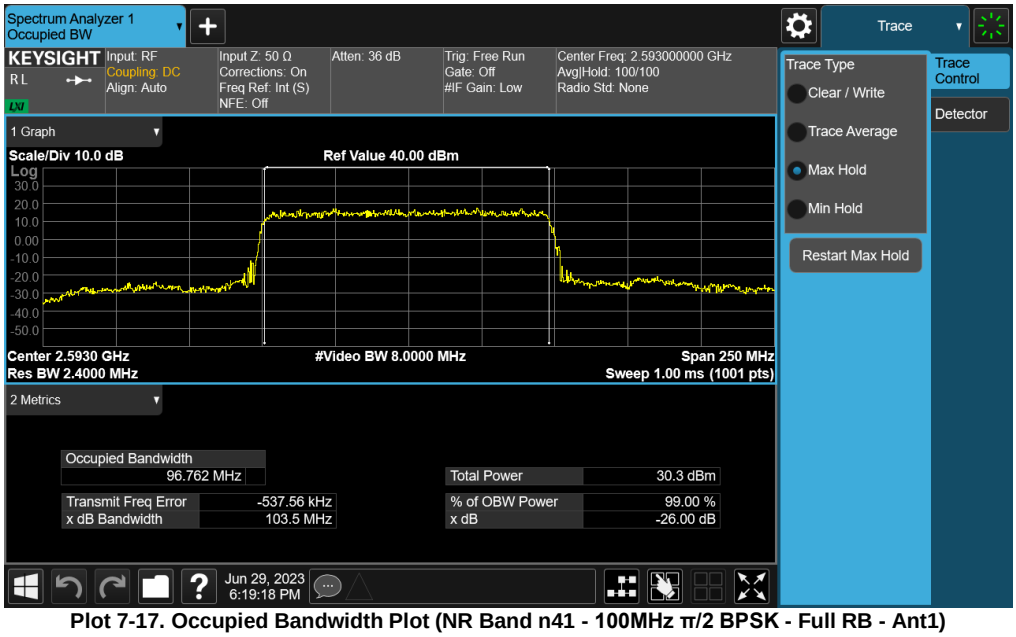


Plot 7-16. Occupied Bandwidth Plot (LTE Band 41(PC3) - 5MHz 16-QAM - Full RB - Ant1)

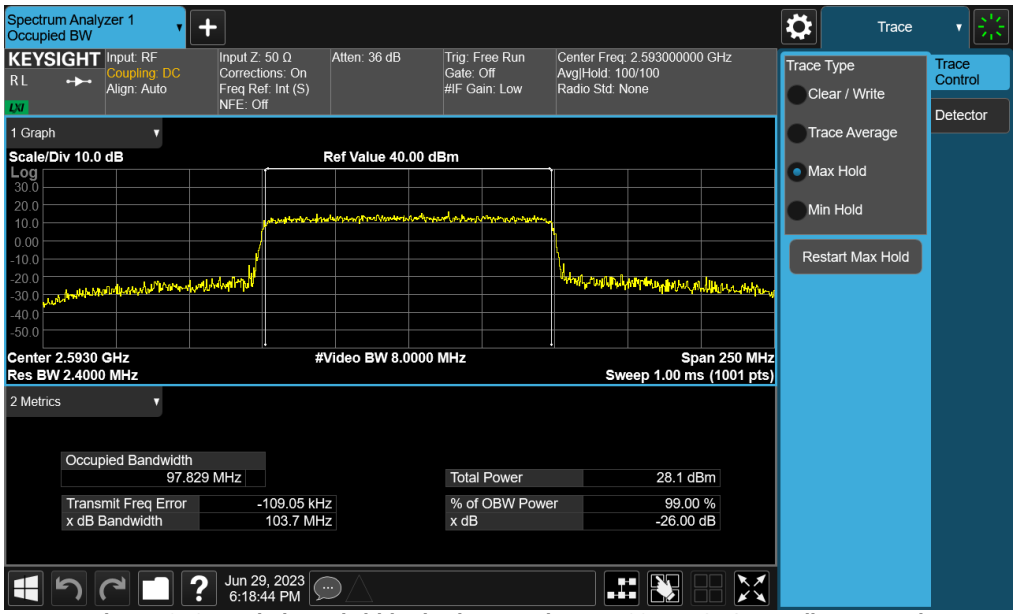
Mode	Bandwidth	Modulation	OBW [MHz]
NR Band n41	100 MHz	π/2 BPSK	96.76
		QPSK	97.83
		16QAM	97.97
	90 MHz	π/2 BPSK	86.98
		QPSK	87.73
		16QAM	87.64
	80 MHz	π/2 BPSK	77.51
		QPSK	77.59
		16QAM	77.82
	70 MHz	π/2 BPSK	64.44
		QPSK	67.78
		16QAM	67.61
	60 MHz	π/2 BPSK	58.03
		QPSK	57.98
		16QAM	58.18
	50 MHz	π/2 BPSK	45.92
		QPSK	47.70
		16QAM	47.56
	40 MHz	π/2 BPSK	35.99
		QPSK	38.13
		16QAM	38.04
	30MHz	π/2 BPSK	27.06
		QPSK	28.08
		16QAM	28.01
	20 MHz	π/2 BPSK	18.00
		QPSK	18.29
		16QAM	18.38
	15 MHz	π/2 BPSK	12.98
		QPSK	13.68
		16QAM	13.71
	10 MHz	π/2 BPSK	8.64
		QPSK	8.67
		16QAM	8.61

Table 7-9. Occupied Bandwidth Test Results – Ant1

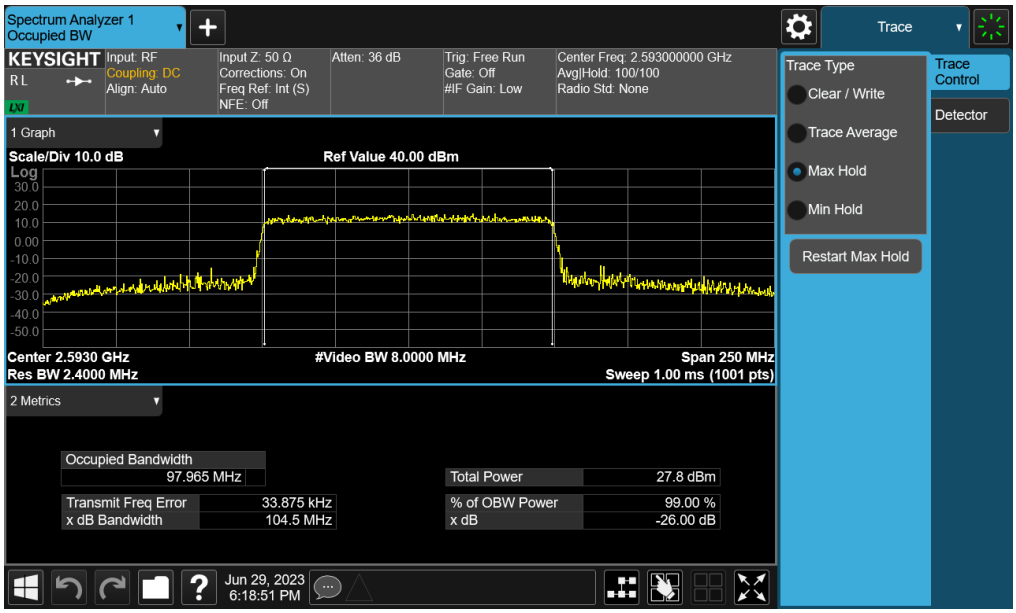
NR Band n41 – Ant1



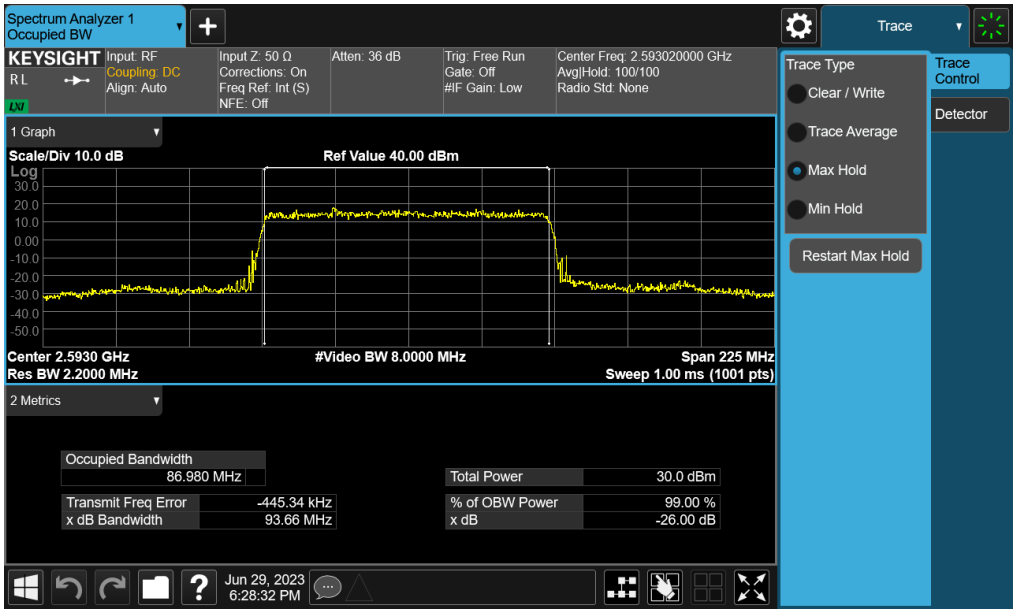
Plot 7-17. Occupied Bandwidth Plot (NR Band n41 - 100MHz π/2 BPSK - Full RB - Ant1)



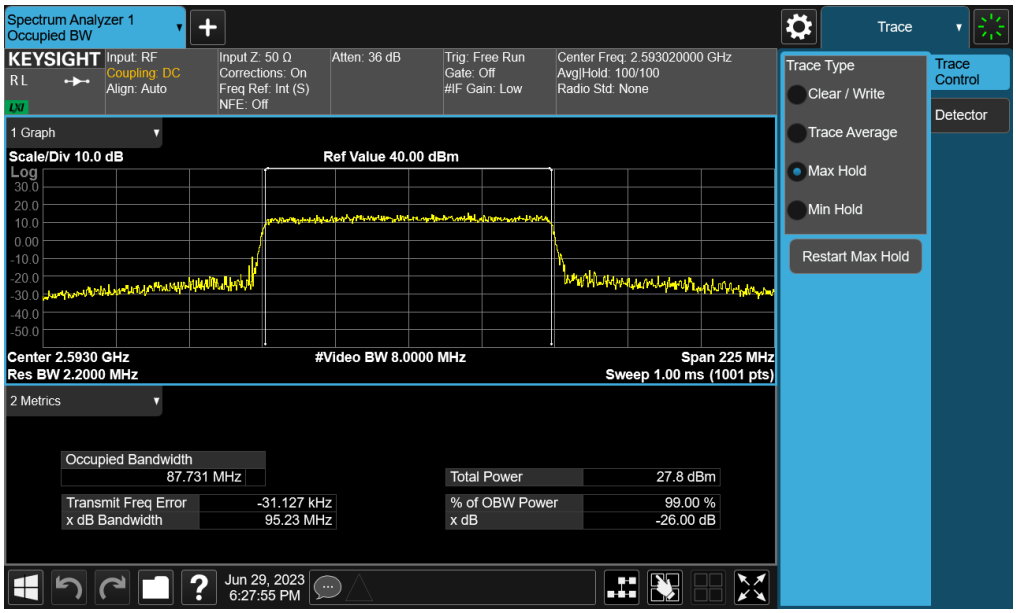
Plot 7-18. Occupied Bandwidth Plot (NR Band n41 - 100MHz QPSK - Full RB - Ant1)



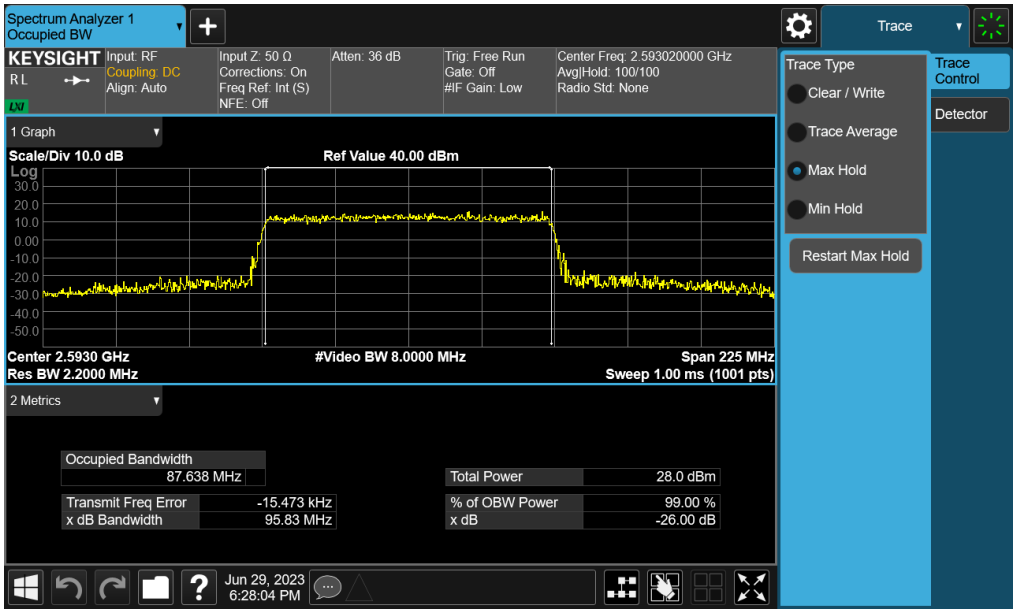
Plot 7-19. Occupied Bandwidth Plot (NR Band n41 - 100MHz 16-QAM - Full RB - Ant1)



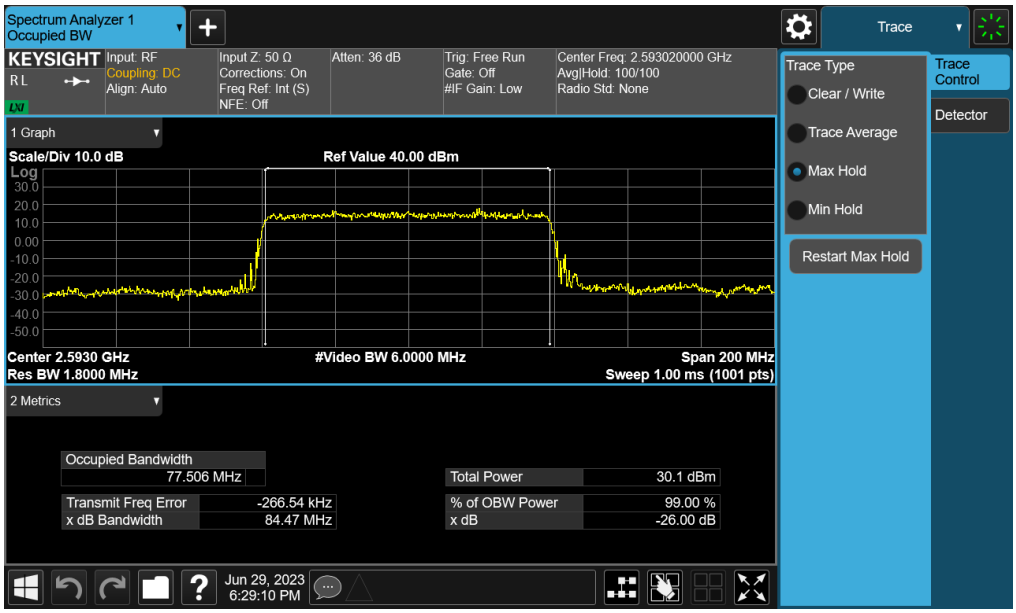
Plot 7-20. Occupied Bandwidth Plot (NR Band n41 - 90MHz π/2 BPSK - Full RB - Ant1)



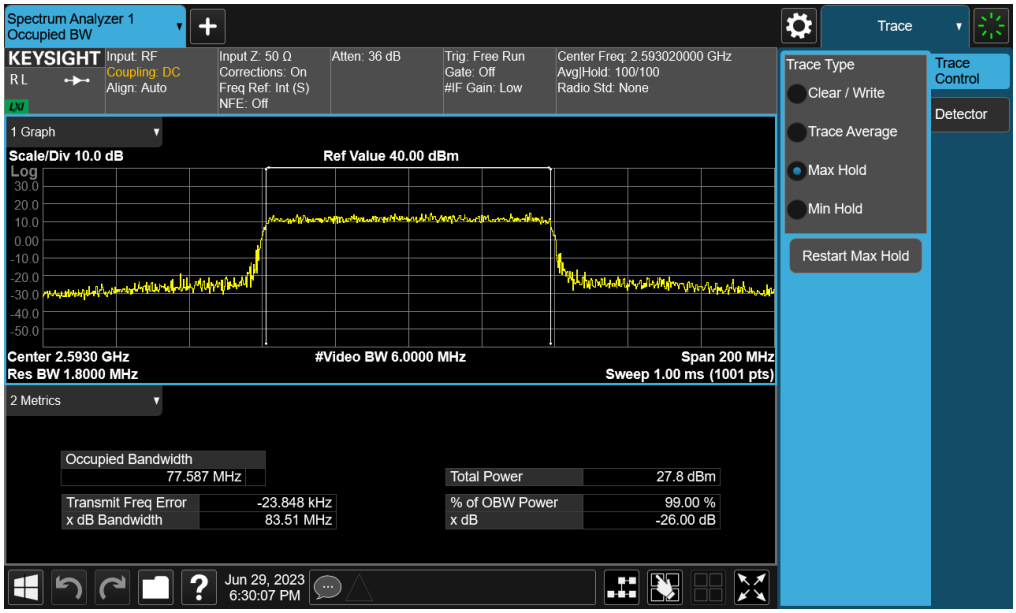
Plot 7-21. Occupied Bandwidth Plot (NR Band n41 - 90MHz QPSK - Full RB - Ant1)



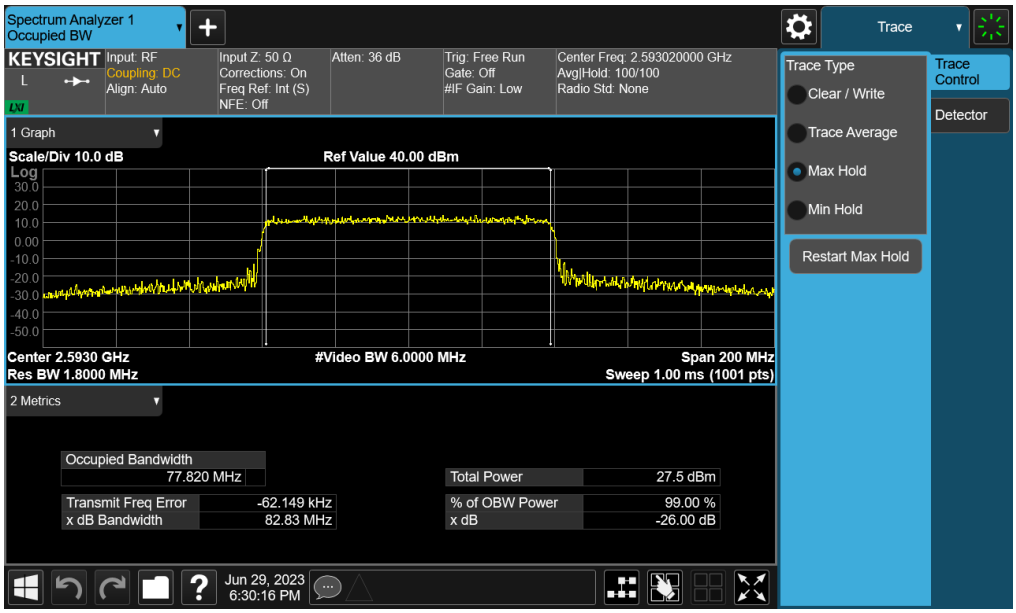
Plot 7-22. Occupied Bandwidth Plot (NR Band n41 - 90MHz 16-QAM - Full RB - Ant1)



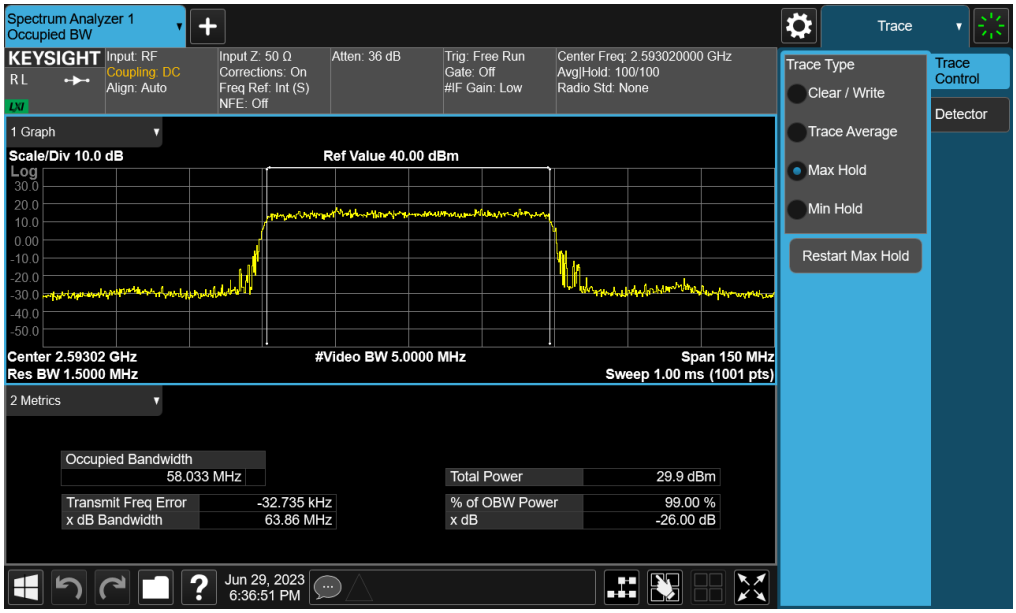
Plot 7-23. Occupied Bandwidth Plot (NR Band n41 - 80MHz π/2 BPSK - Full RB - Ant1)



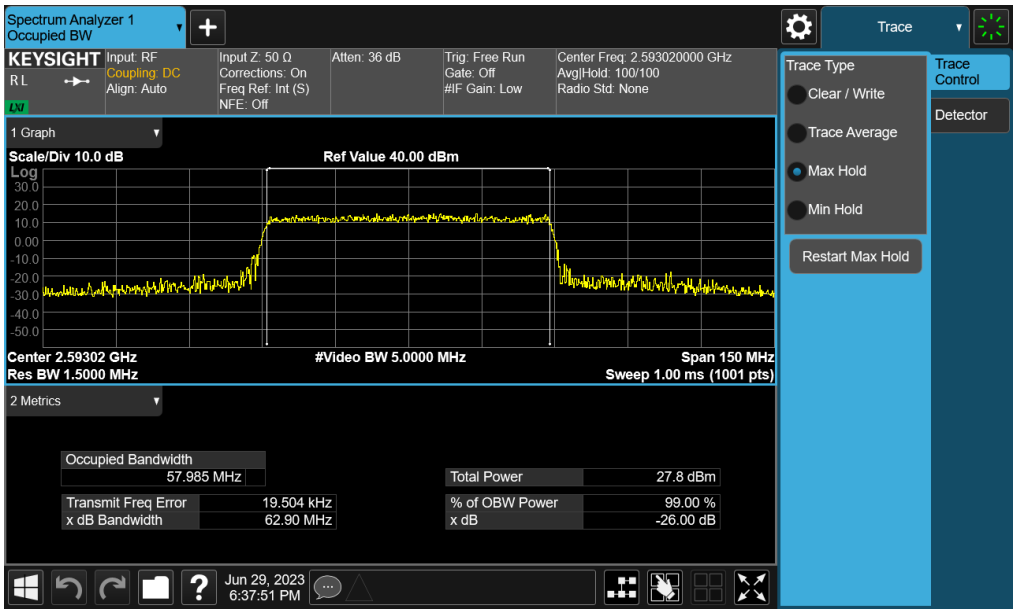
Plot 7-24. Occupied Bandwidth Plot (NR Band n41 - 80MHz QPSK - Full RB - Ant1)



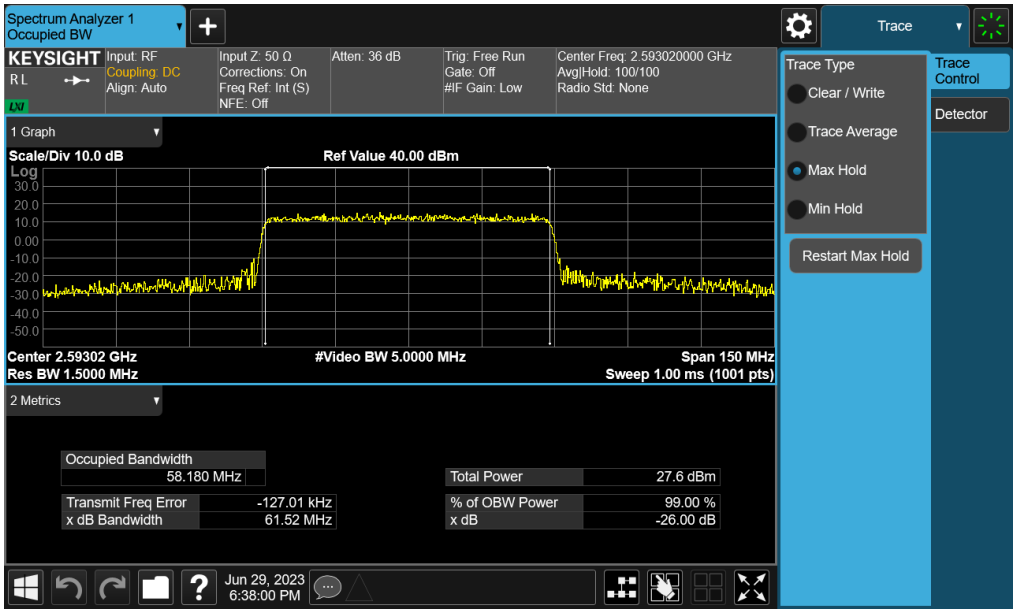
Plot 7-25. Occupied Bandwidth Plot (NR Band n41 - 80MHz 16-QAM - Full RB - Ant1)



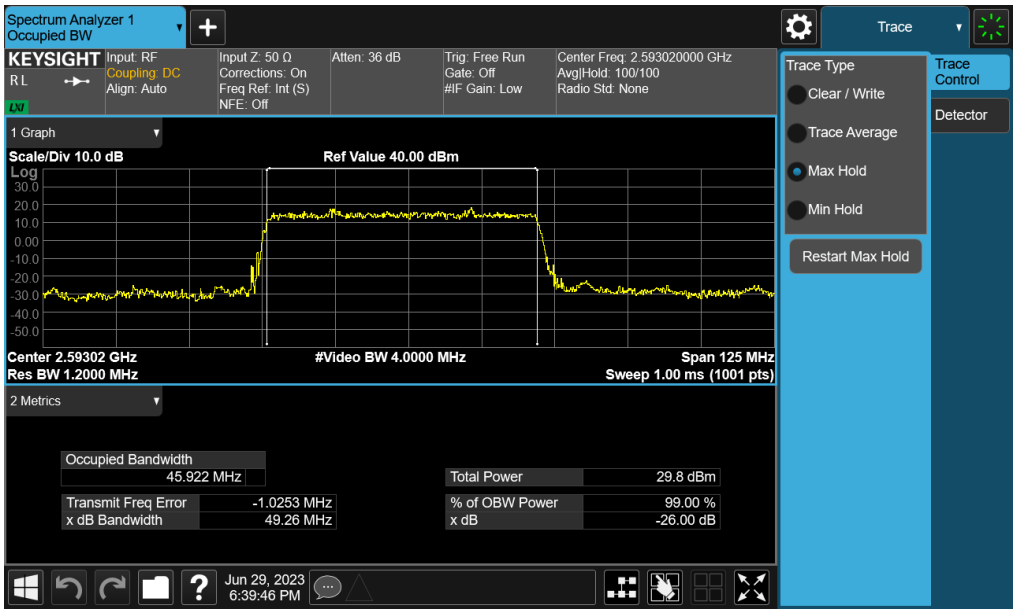
Plot 7-26. Occupied Bandwidth Plot (NR Band n41 - 60MHz π/2 BPSK - Full RB - Ant1)



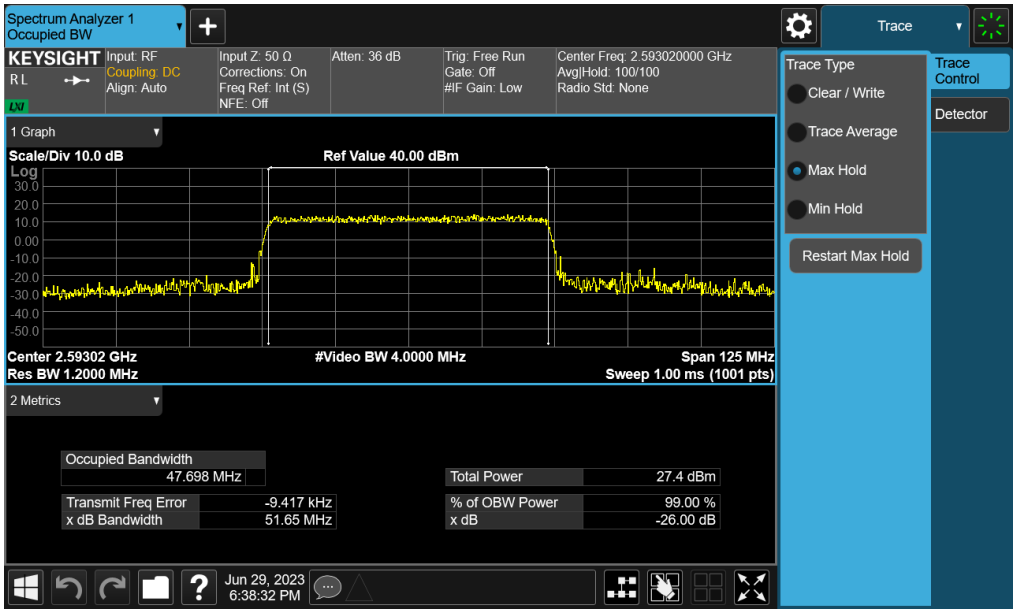
Plot 7-27. Occupied Bandwidth Plot (NR Band n41 - 60MHz QPSK - Full RB - Ant1)



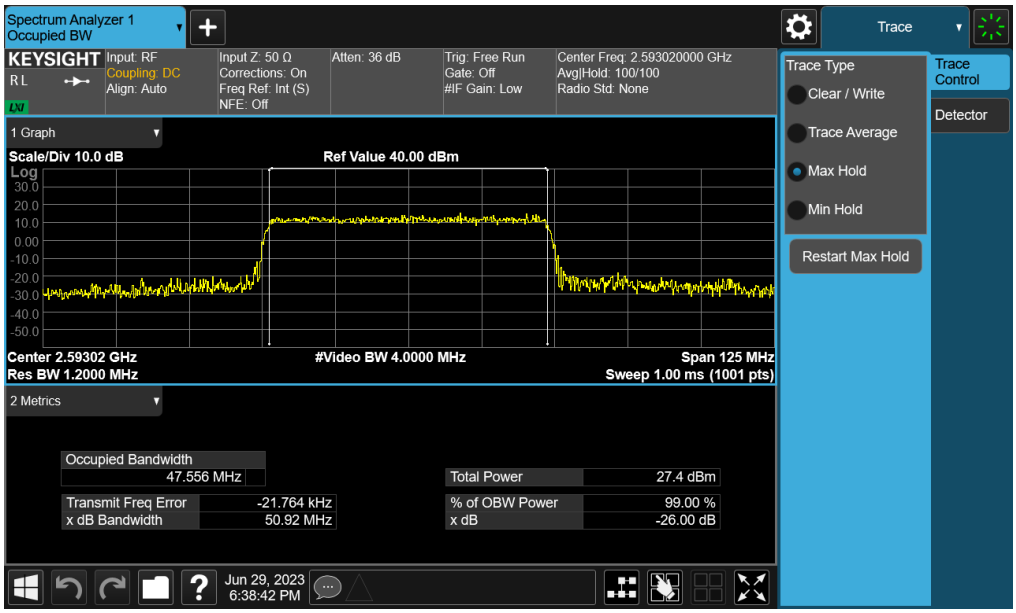
Plot 7-28. Occupied Bandwidth Plot (NR Band n41 - 60MHz 16-QAM - Full RB - Ant1)



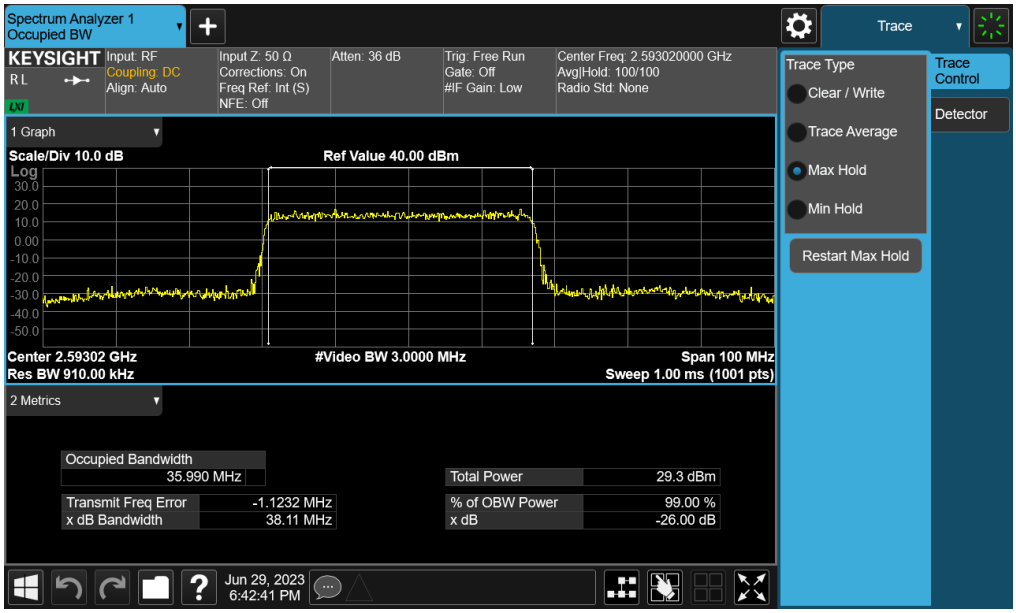
Plot 7-29. Occupied Bandwidth Plot (NR Band n41 - 50MHz π/2 BPSK - Full RB - Ant1)



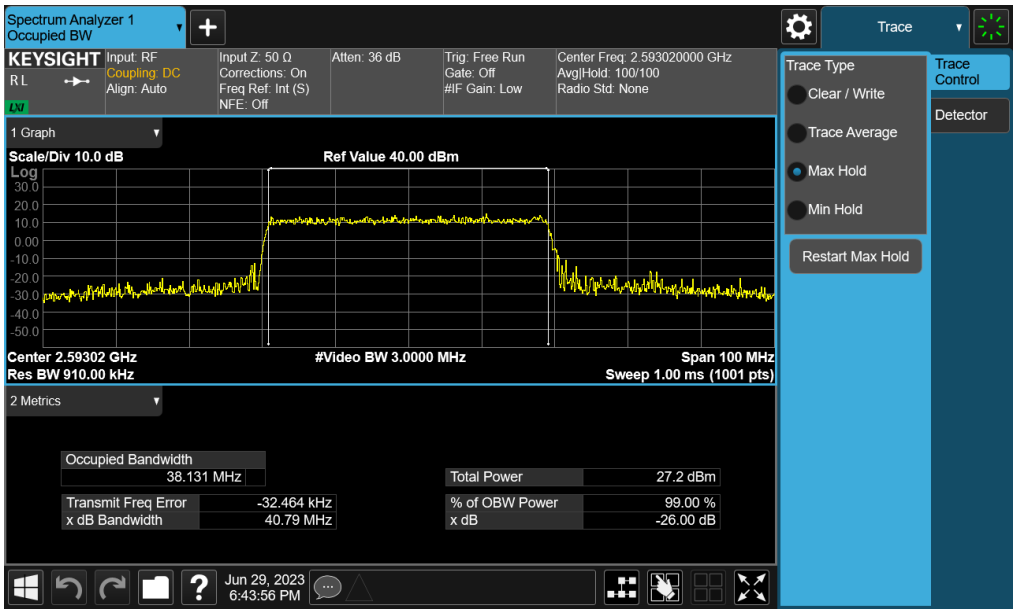
Plot 7-30. Occupied Bandwidth Plot (NR Band n41 - 50MHz QPSK - Full RB - Ant1)



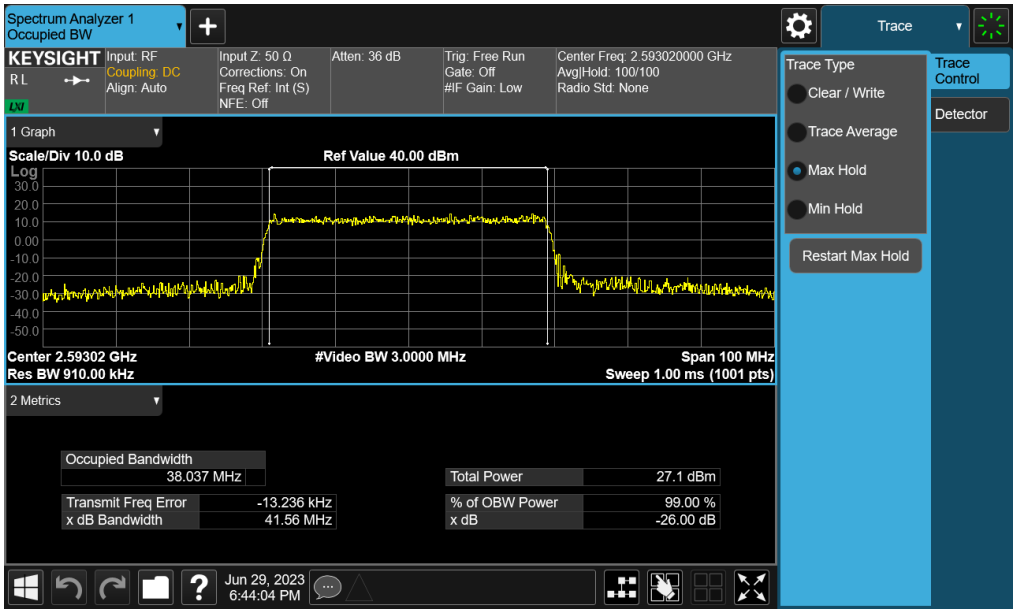
Plot 7-31. Occupied Bandwidth Plot (NR Band n41 - 50MHz 16-QAM - Full RB - Ant1)



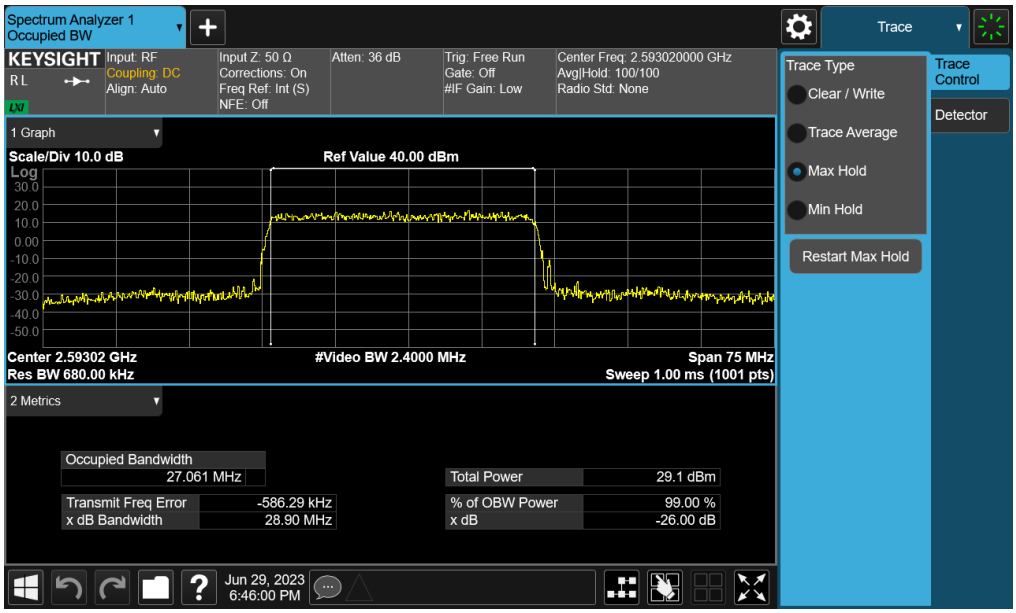
Plot 7-32. Occupied Bandwidth Plot (NR Band n41 - 40MHz π/2 BPSK - Full RB - Ant1)



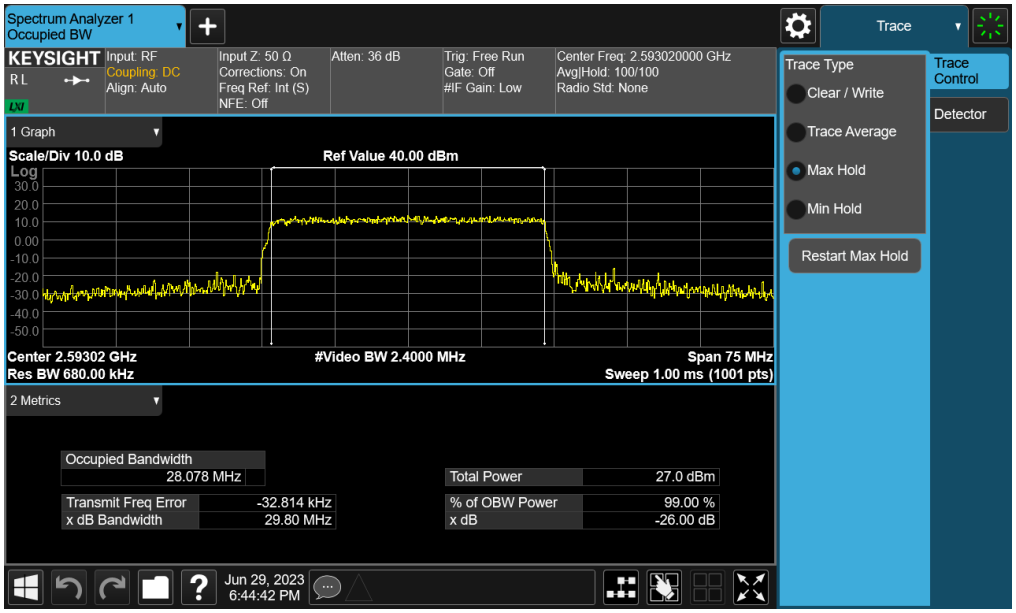
Plot 7-33. Occupied Bandwidth Plot (NR Band n41 - 40MHz QPSK - Full RB - Ant1)



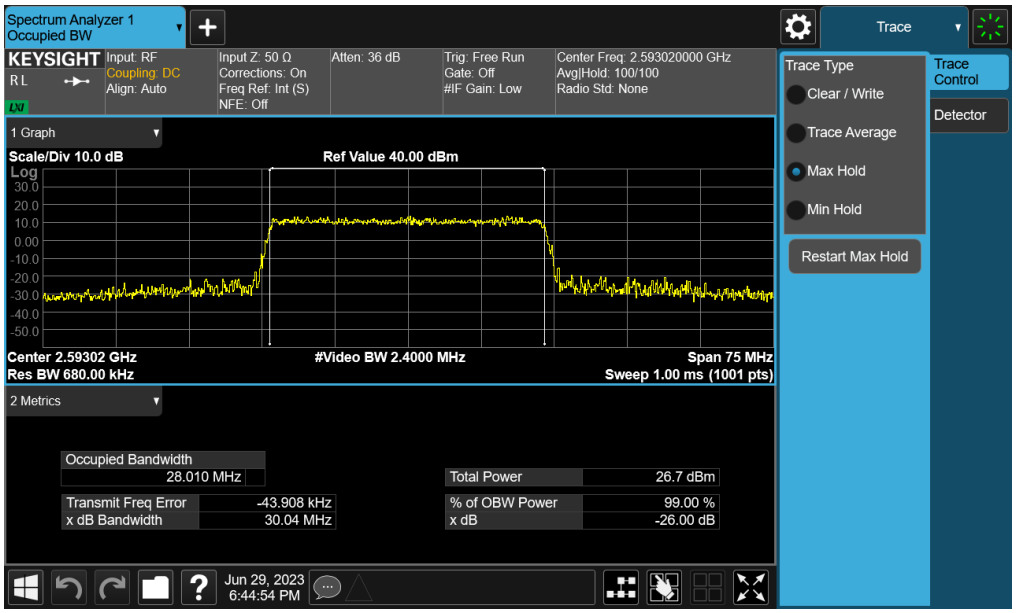
Plot 7-34. Occupied Bandwidth Plot (NR Band n41 - 40MHz 16-QAM - Full RB - Ant1)



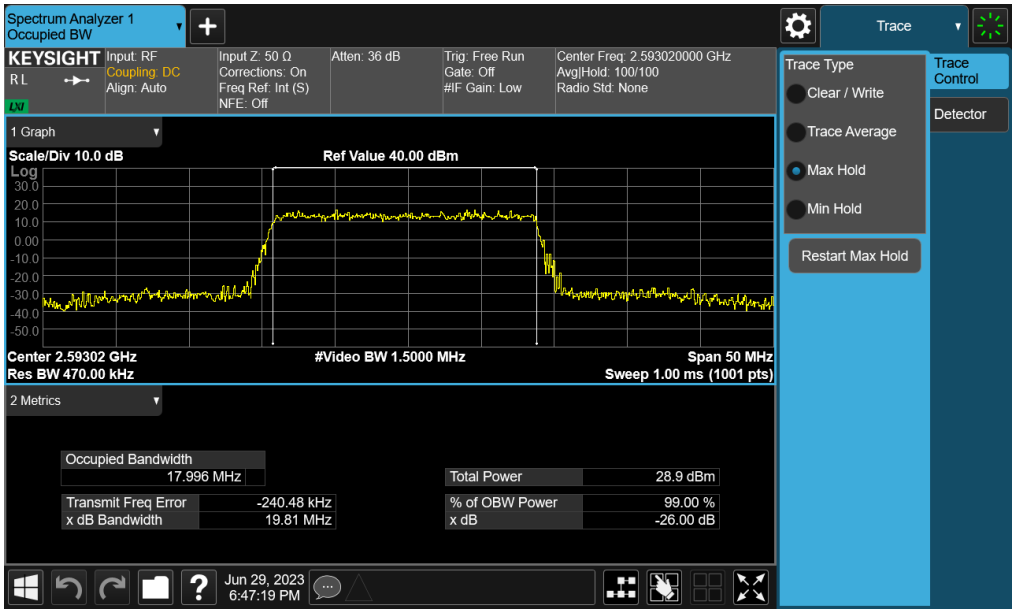
Plot 7-35. Occupied Bandwidth Plot (NR Band n41 - 30MHz π/2 BPSK - Full RB - Ant1)



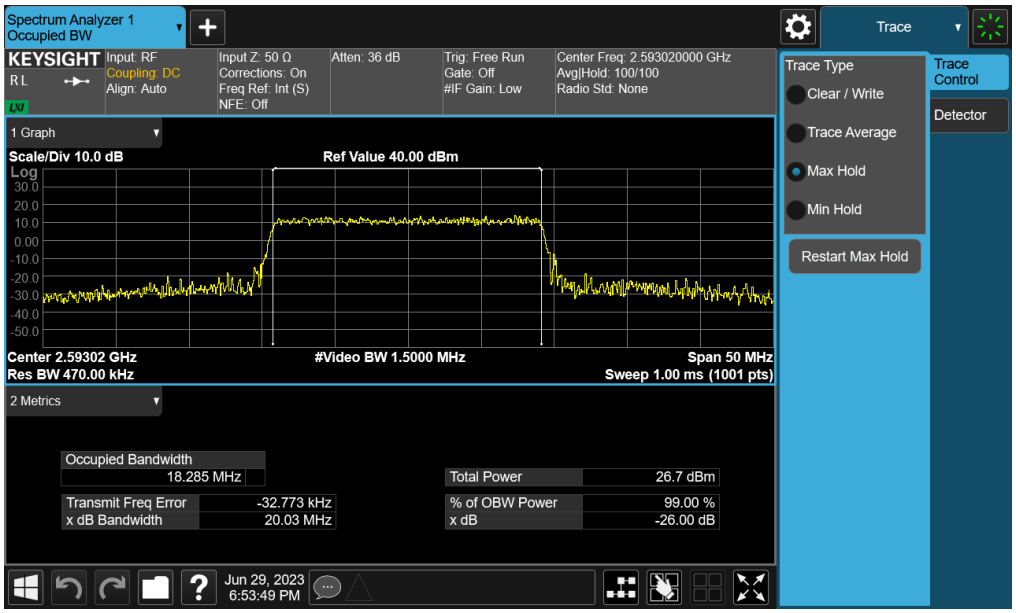
Plot 7-36. Occupied Bandwidth Plot (NR Band n41 - 30MHz QPSK - Full RB - Ant1)



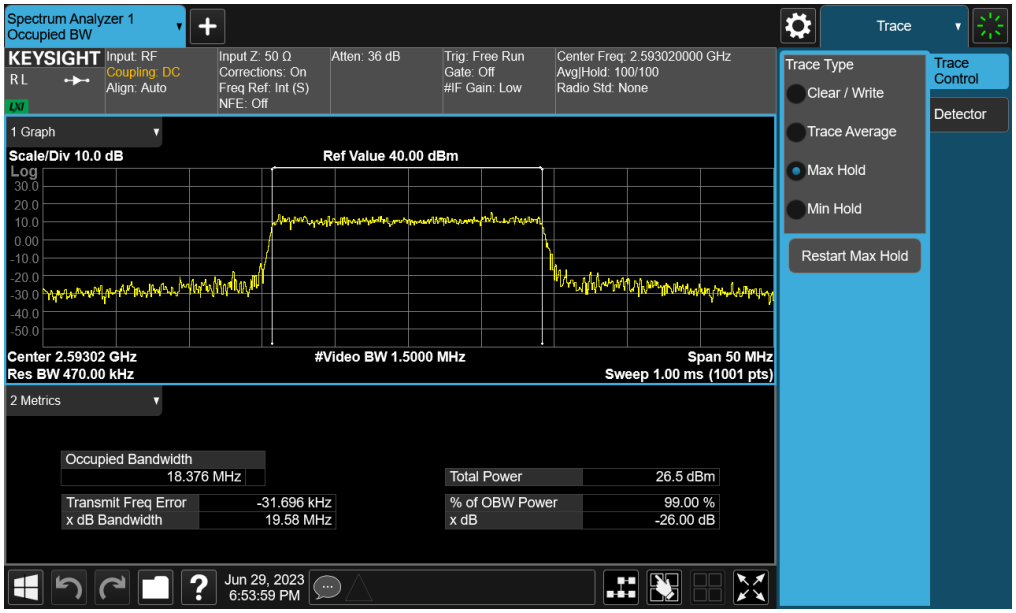
Plot 7-37. Occupied Bandwidth Plot (NR Band n41 - 30MHz 16-QAM - Full RB - Ant1)



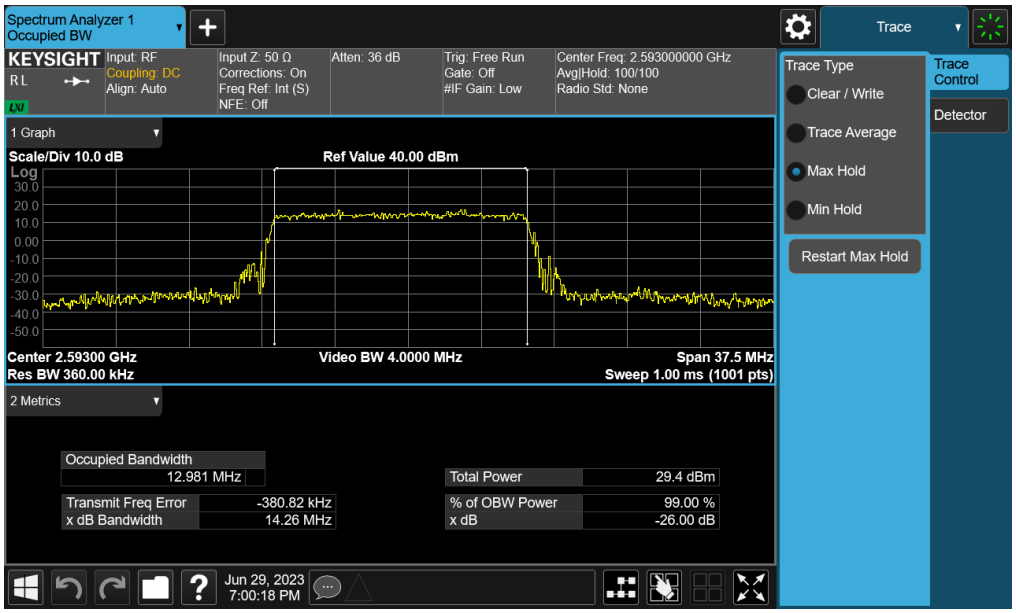
Plot 7-38. Occupied Bandwidth Plot (NR Band n41 - 20MHz π/2 BPSK - Full RB - Ant1)



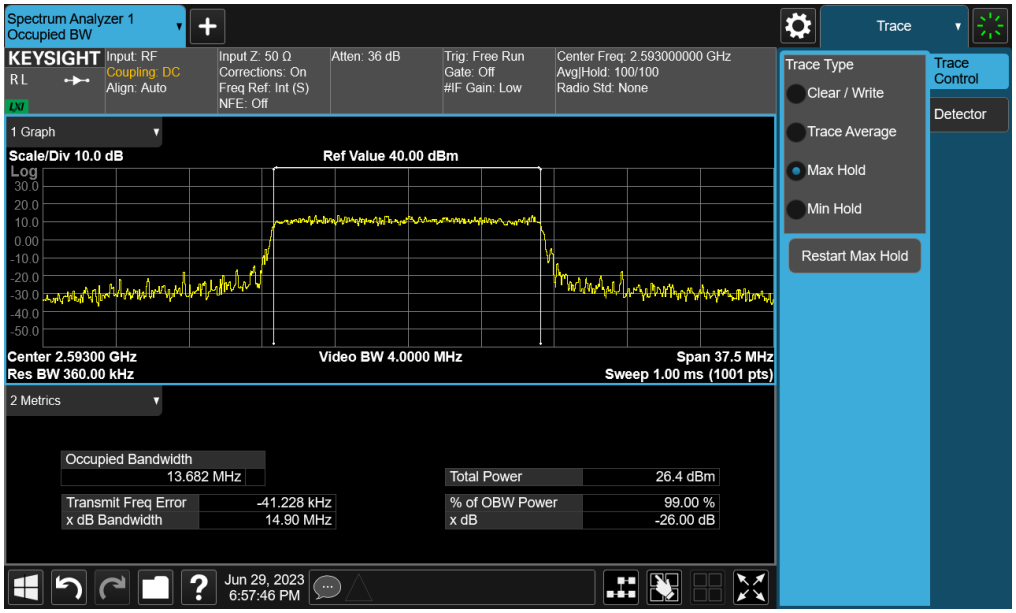
Plot 7-39. Occupied Bandwidth Plot (NR Band n41 - 20MHz QPSK - Full RB - Ant1)



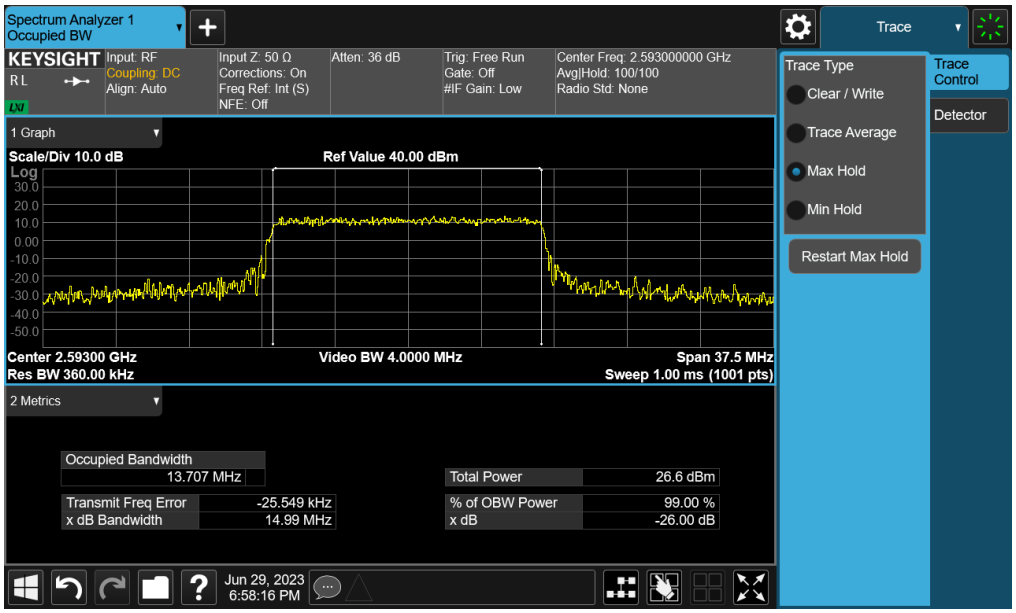
Plot 7-40. Occupied Bandwidth Plot (NR Band n41 - 20MHz 16-QAM - Full RB - Ant1)



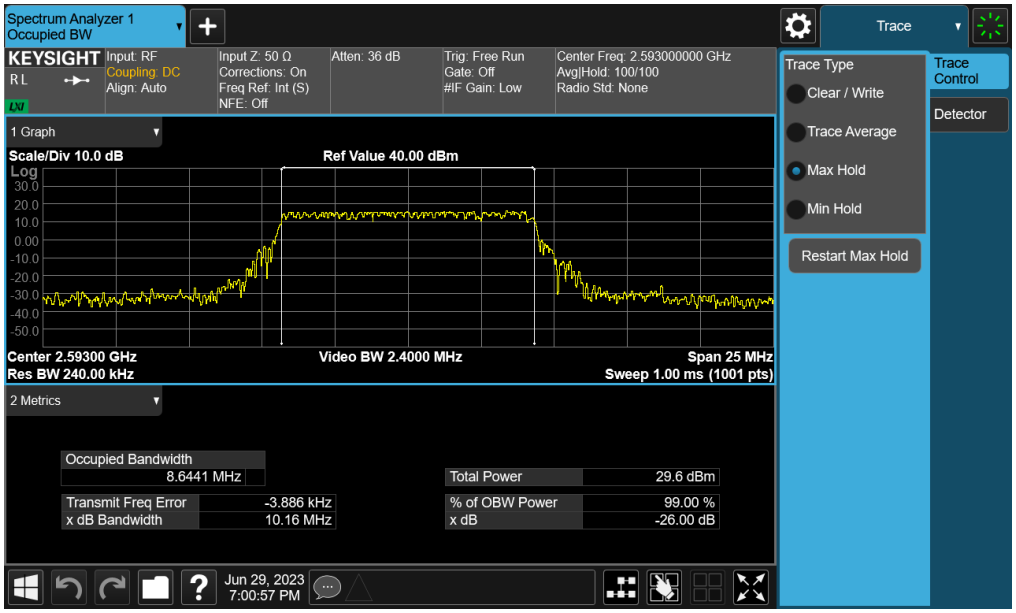
Plot 7-41. Occupied Bandwidth Plot (NR Band n41 - 15MHz π/2 BPSK - Full RB - Ant1)



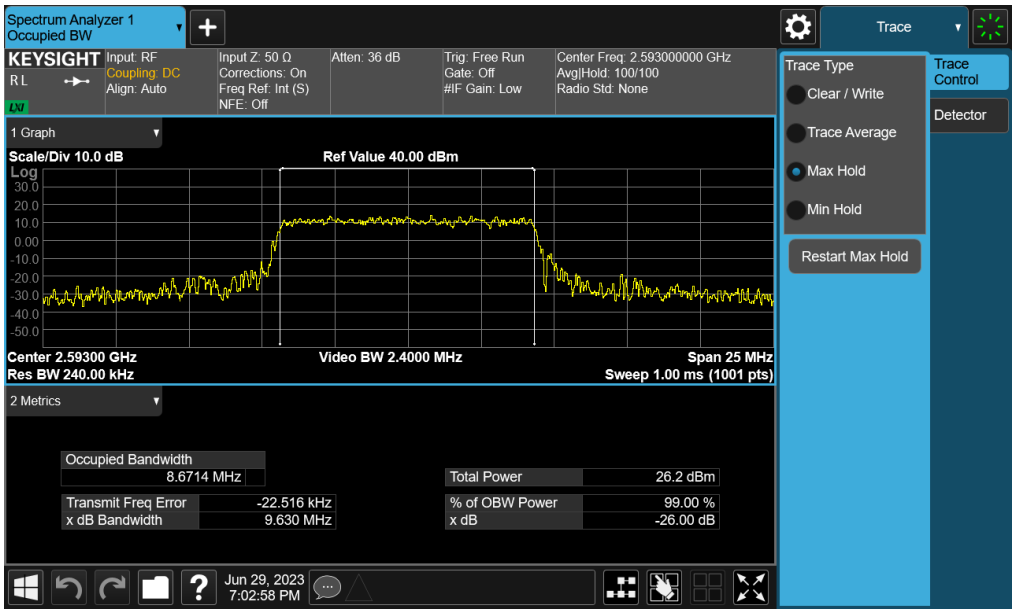
Plot 7-42. Occupied Bandwidth Plot (NR Band n41 - 15MHz QPSK - Full RB - Ant1)



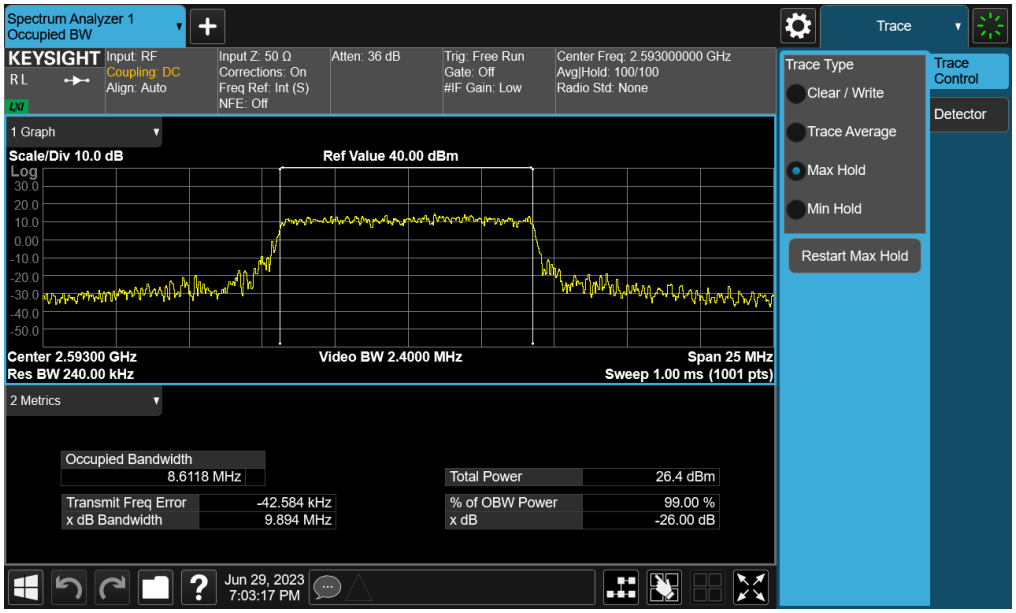
Plot 7-43. Occupied Bandwidth Plot (NR Band n41 - 15MHz 16-QAM - Full RB - Ant1)



Plot 7-44. Occupied Bandwidth Plot (NR Band n41 - 10MHz π/2 BPSK - Full RB - Ant1)



Plot 7-45. Occupied Bandwidth Plot (NR Band n41 - 10MHz QPSK - Full RB - Ant1)



Plot 7-46. Occupied Bandwidth Plot (NR Band n41 - 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.

For 41, the minimum permissible attenuation level of any spurious emission is 55 + 10log$_{10}$(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.

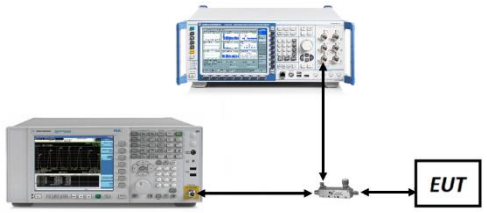


Figure 7-3. Test Instrument & Measurement Setup

Test Notes

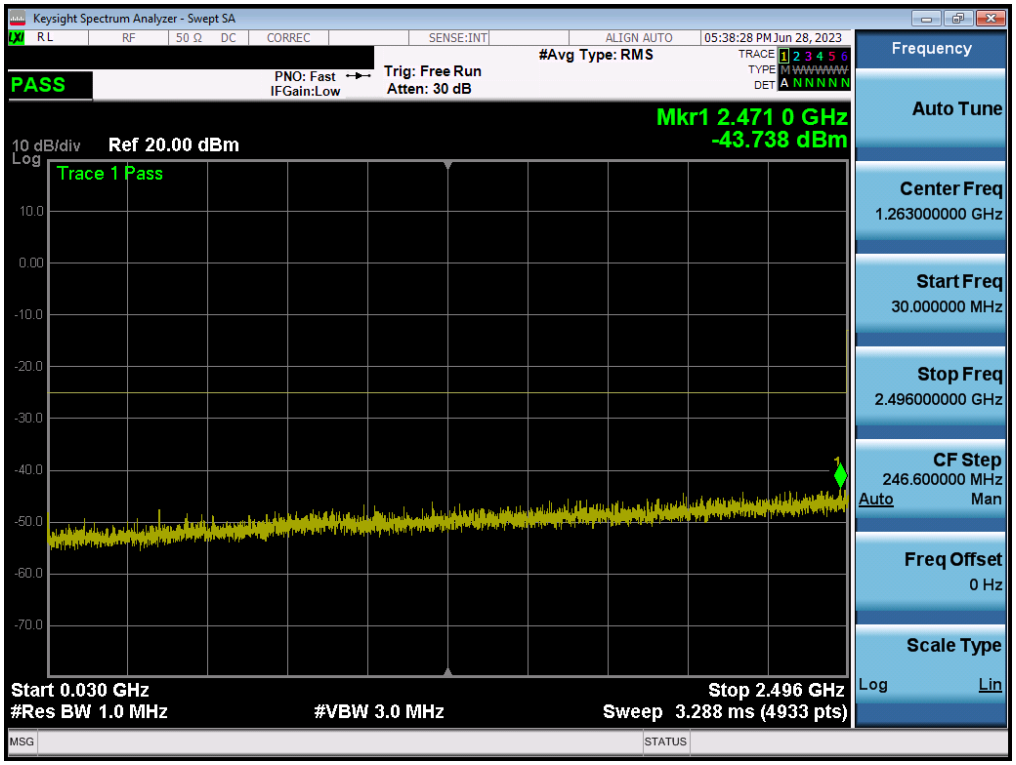
1. Per Part 27, RSS-195 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz.

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.

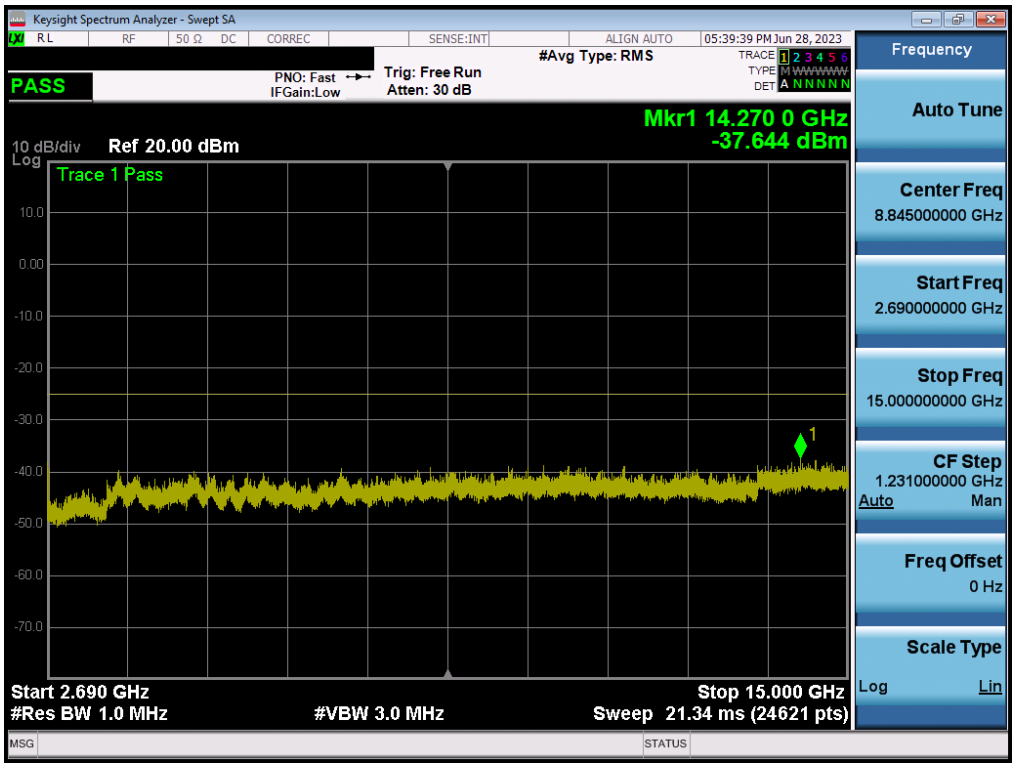
Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
LTE Band 41 PC2	20MHz	Low	30.0 - 2,475.0	-43.59	-25	-18.59
		Low	2,690.0 - 15,000.0	-37.66	-25	-12.66
		Low	15,000.0 - 27,000.0	-52.11	-25	-27.10
		Mid	30.0 - 2,496.0	-43.74	-25	-18.74
		Mid	2,690.0 - 15,000.0	-37.64	-25	-12.64
		Mid	15,000.0 - 27,000.0	-51.29	-25	-26.29
		High	30.0 - 2,475.0	-43.24	-25	-18.24
		High	2,690.0 - 15,000.0	-38.27	-25	-13.27
		High	15,000.0 - 27,000.0	-51.67	-25	-26.67
LTE Band 41 PC3	20MHz	Low	30.0 - 2,475.0	-41.92	-25	-16.92
		Low	2,690.0 - 15,000.0	-37.38	-25	-12.38
		Low	15,000.0 - 27,000.0	-51.85	-25	-26.85
		Mid	30.0 - 2,496.0	-43.12	-25	-18.12
		Mid	2,690.0 - 15,000.0	-37.73	-25	-12.73
		Mid	15,000.0 - 27,000.0	-51.38	-25	-26.38
		High	30.0 - 2,475.0	-42.95	-25	-17.95
		High	2,690.0 - 15,000.0	-37.80	-25	-12.80
		High	15,000.0 - 27,000.0	-52.15	-25	-27.15

Table 7-10. Spurious and Harmonic Emissions Test Results – Ant1

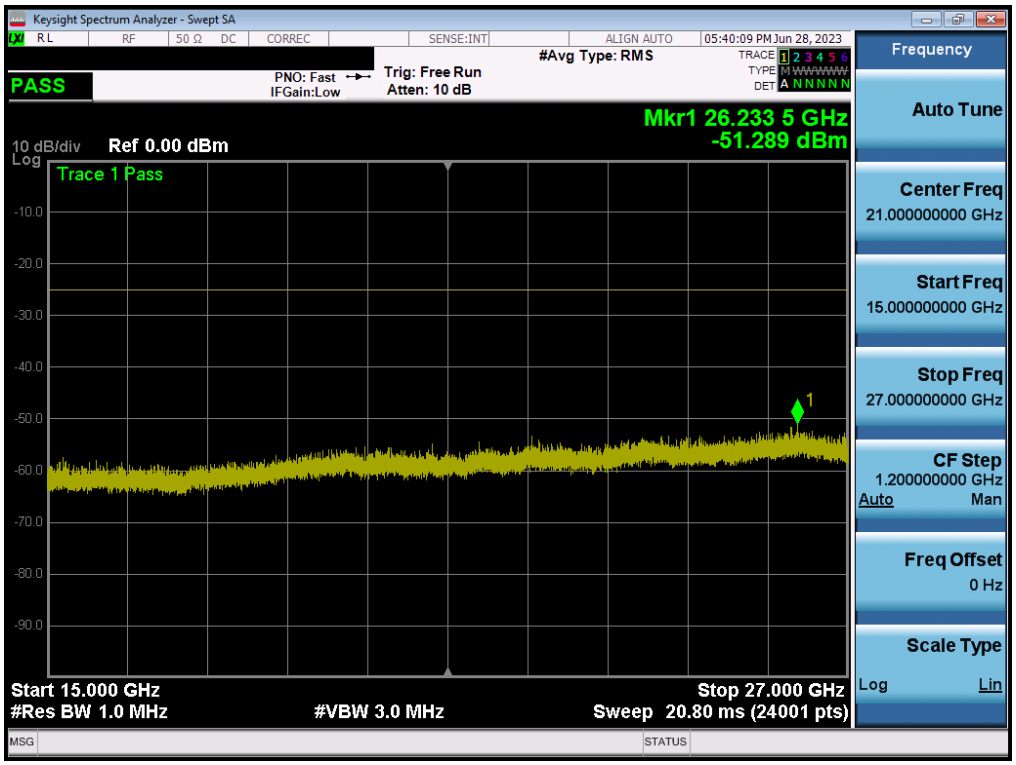
LTE Band 41(PC2) – Ant1



Plot 7-47. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)

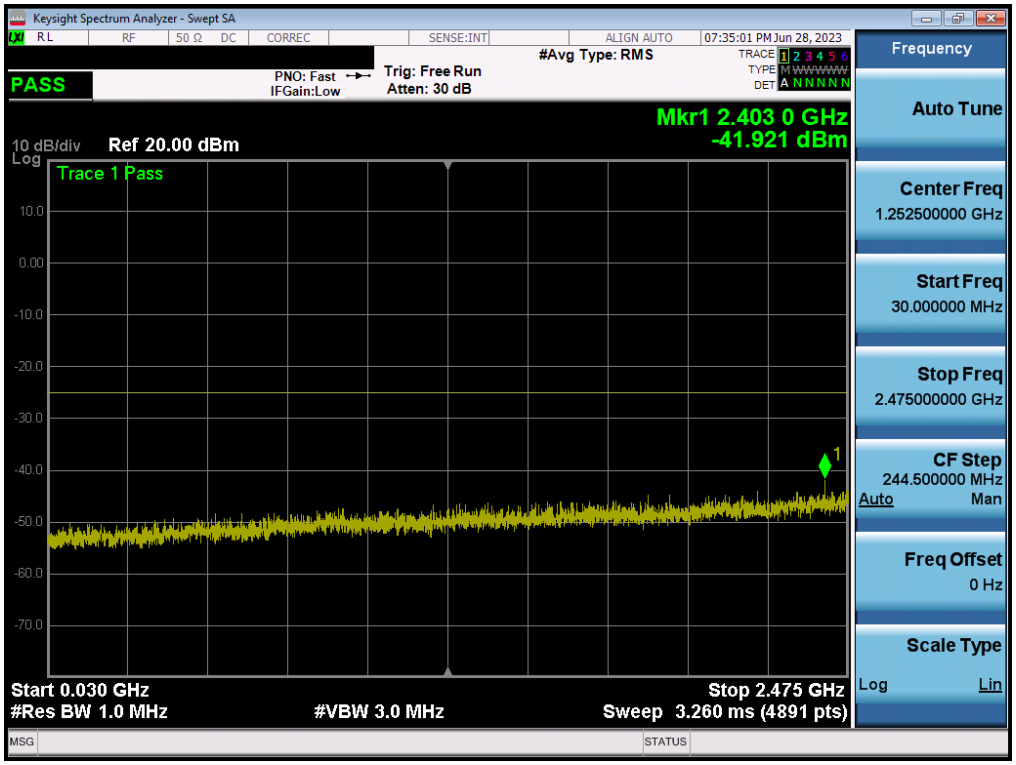


Plot 7-48. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)

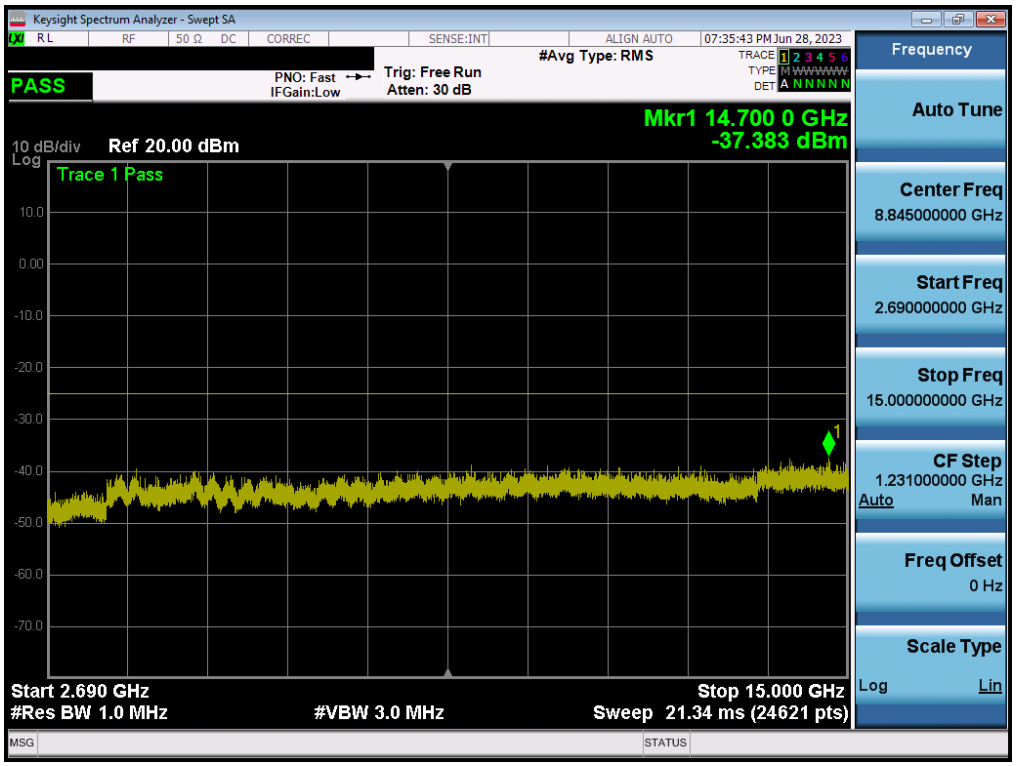


Plot 7-49. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)

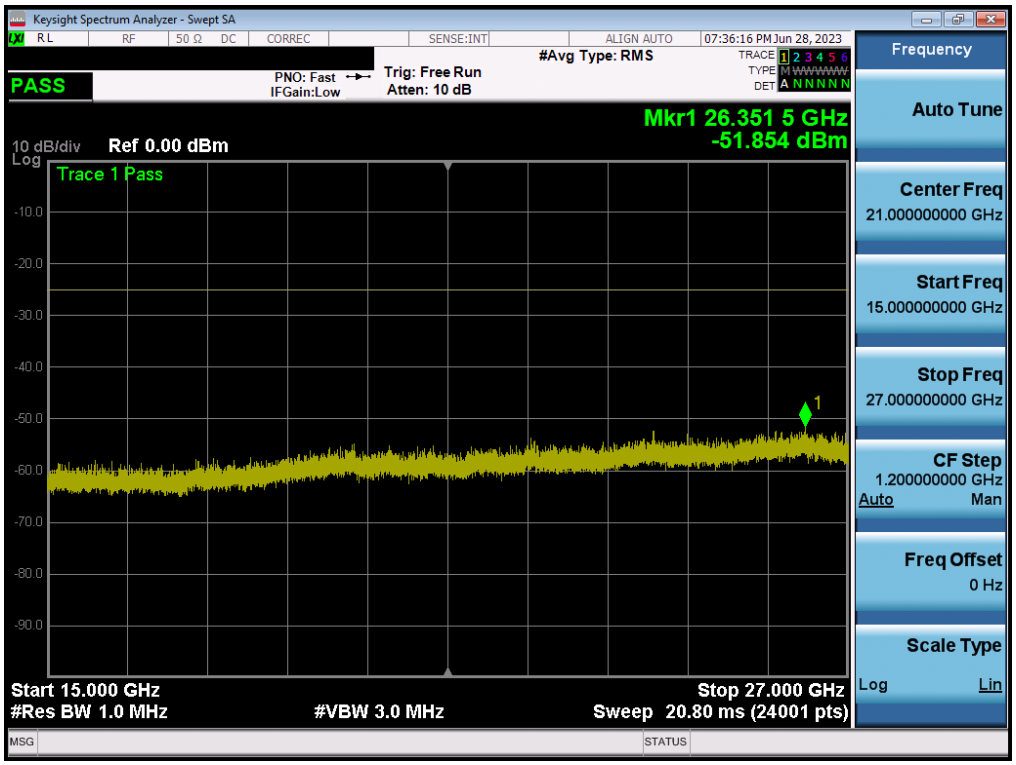
LTE Band 41(PC3) – Ant1



Plot 7-50. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1)



Plot 7-51. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1)

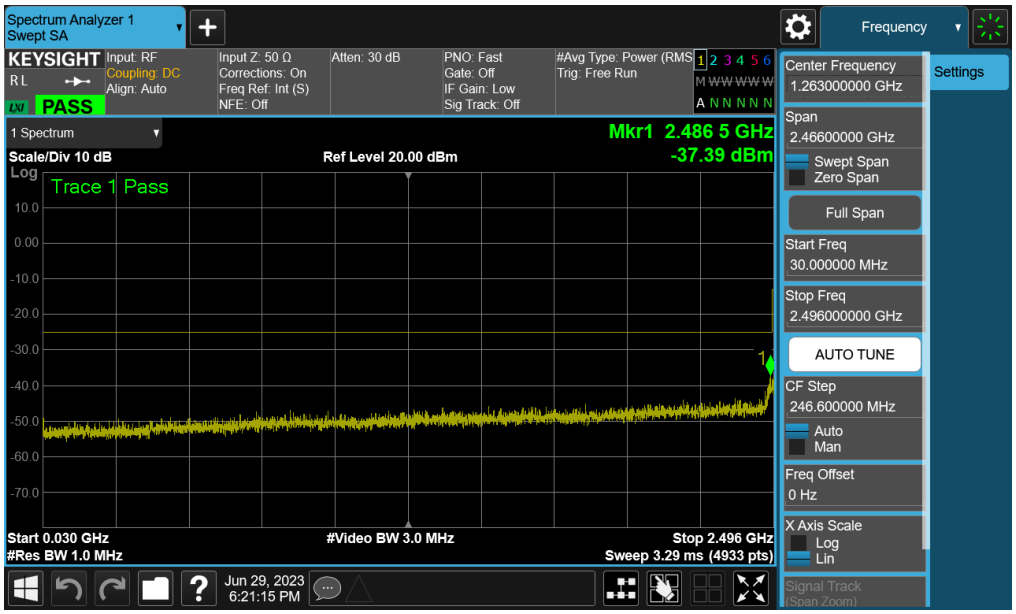


Plot 7-52. Conducted Spurious Plot (LTE Band 41(PC3) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel - Ant1)

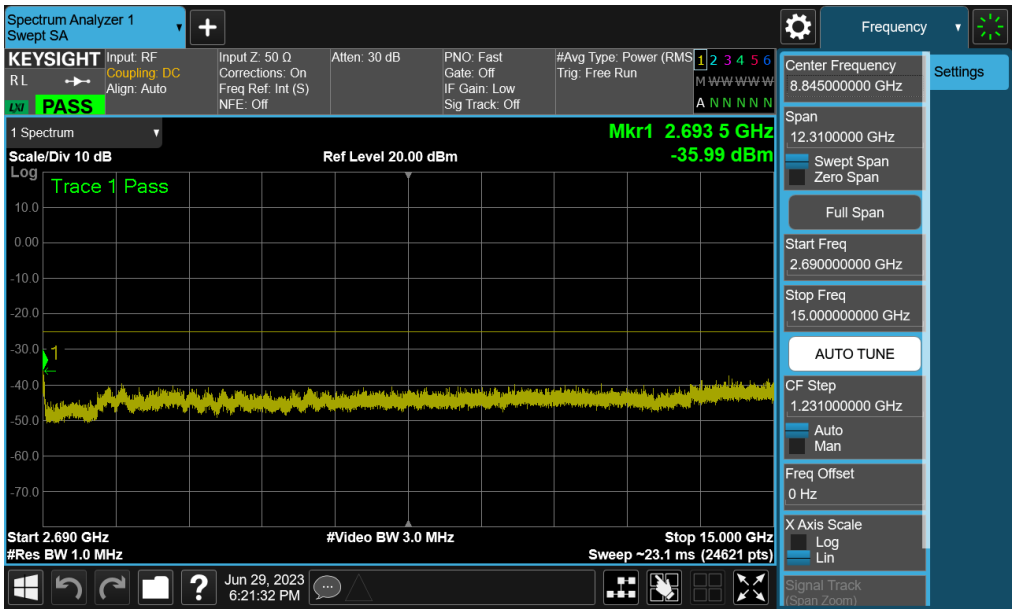
NR Band n41 – Ant1

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n41	100MHz	Low	30.0 - 2,470.0	-43.64	-25	-18.64
		Low	2,690.0 - 15,000.0	-38.29	-25	-13.28
		Low	15,000.0 - 27,000.0	-52.12	-25	-27.12
		Mid	30.0 - 2,496.0	-37.39	-25	-12.39
		Mid	2,690.0 - 15,000.0	-36.00	-25	-10.99
		Mid	15,000.0 - 27,000.0	-51.73	-25	-26.73
		High	30.0 - 2,475.0	-41.43	-25	-16.43
		High	2,690.0 - 15,000.0	-38.48	-25	-13.48
		High	15,000.0 - 27,000.0	-51.43	-25	-26.43

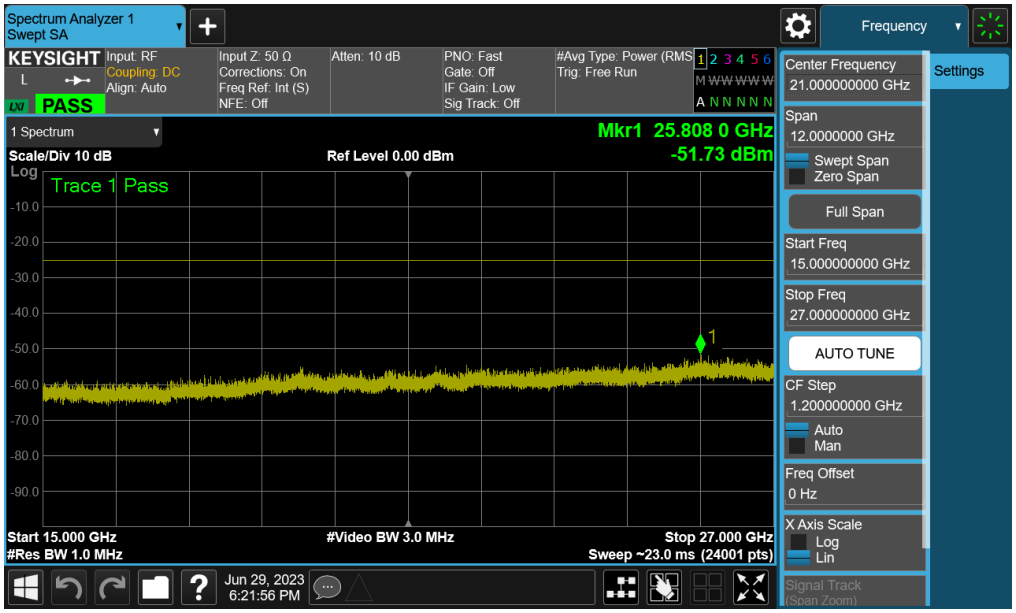
Table 7-11. Spurious and Harmonic Emissions Test Results - Ant1



Plot 7-53. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)



Plot 7-54. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)

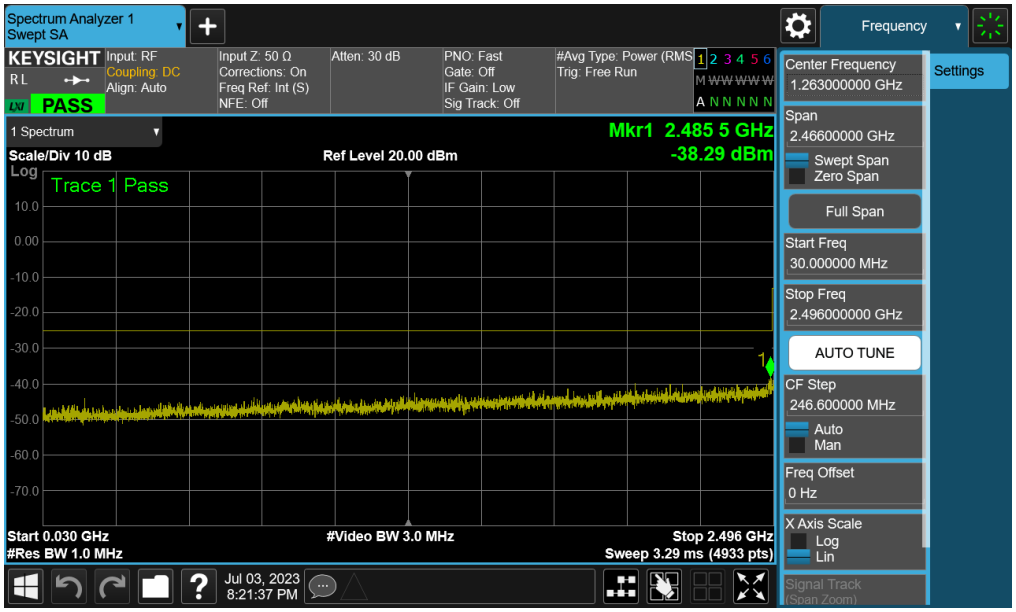


Plot 7-55. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant1)

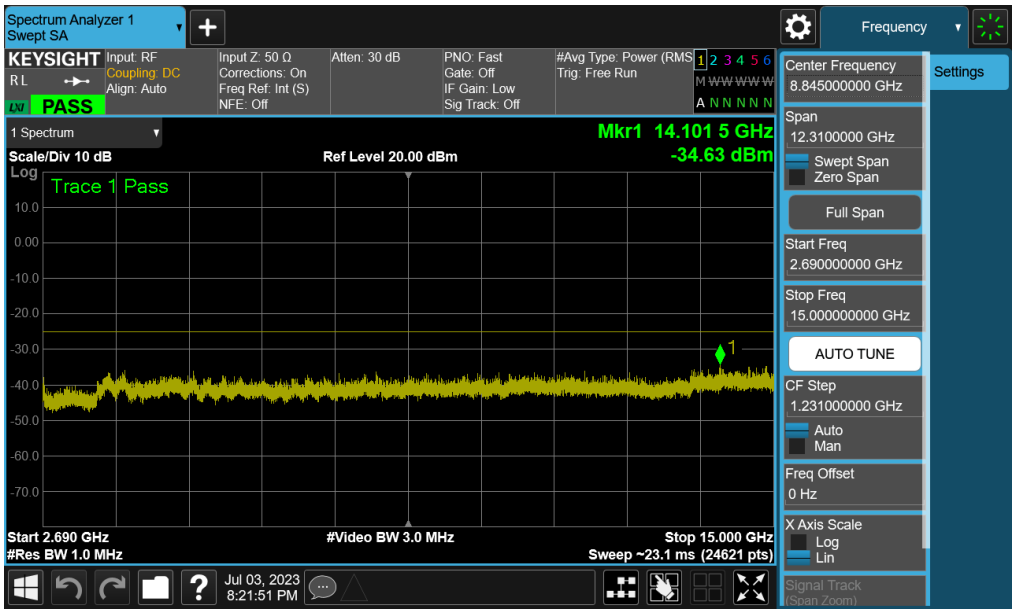
NR Band n41 – Ant2

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n41	100MHz	Low	30.0 - 2,470.0	-40.07	-25	-15.07
		Low	2,690.0 - 15,000.0	-35.14	-25	-10.14
		Low	15,000.0 - 27,000.0	-49.50	-25	-24.50
		Mid	30.0 - 2,496.0	-38.29	-25	-13.29
		Mid	2,690.0 - 15,000.0	-34.63	-25	-9.63
		Mid	15,000.0 - 27,000.0	-49.14	-25	-24.14
		High	30.0 - 2,475.0	-39.08	-25	-14.08
		High	2,690.0 - 15,000.0	-35.12	-25	-10.12
		High	15,000.0 - 27,000.0	-49.83	-25	-24.83

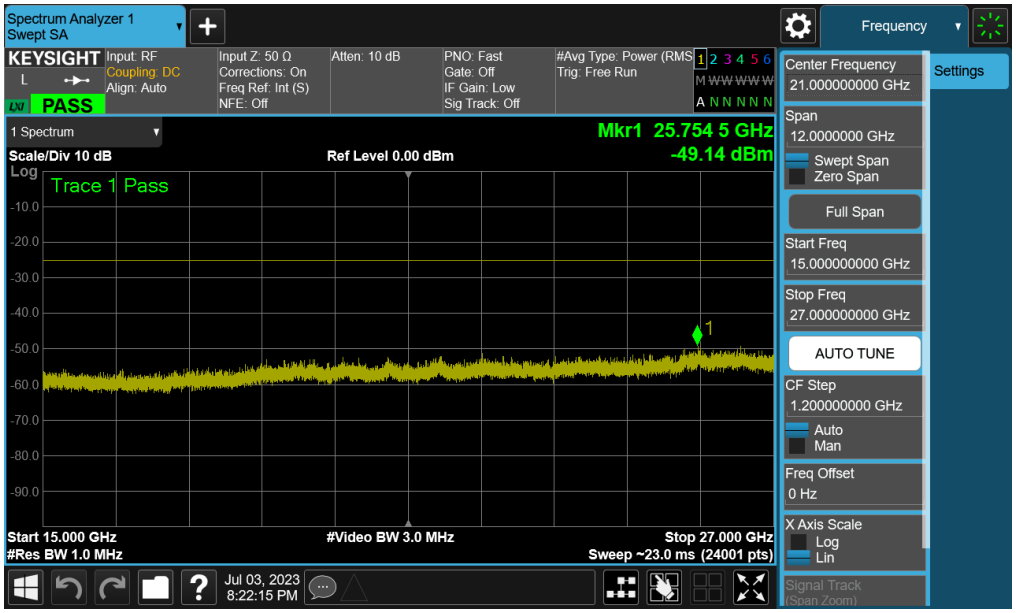
Table 7-12. Spurious and Harmonic Emissions Test Results – Ant2



Plot 7-56. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant2)



Plot 7-57. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant2)

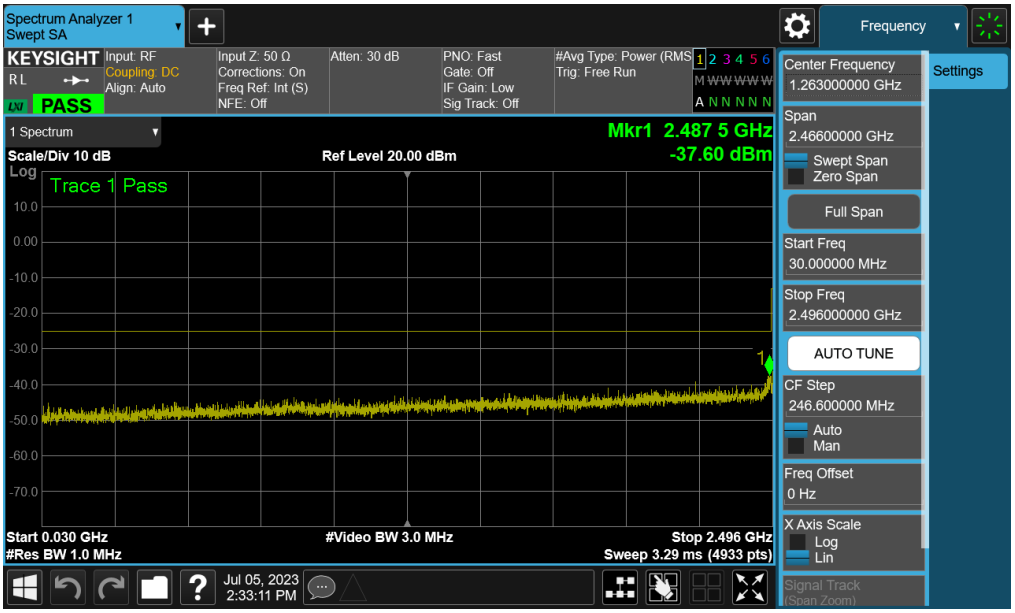


Plot 7-58. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant2)

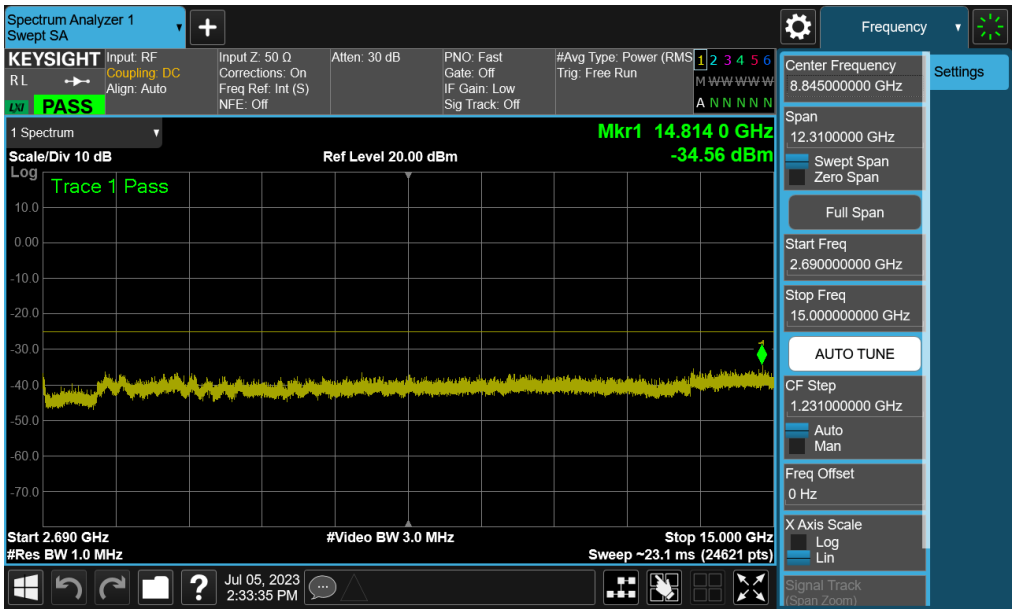
NR Band n41 – Ant3

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n41	100MHz	Low	30.0 - 2,470.0	-40.15	-25	-15.15
		Low	2,690.0 - 15,000.0	-34.87	-25	-9.87
		Low	15,000.0 - 27,000.0	-49.23	-25	-24.23
		Mid	30.0 - 2,496.0	-37.60	-25	-12.60
		Mid	2,690.0 - 15,000.0	-34.56	-25	-9.56
		Mid	15,000.0 - 27,000.0	-50.17	-25	-25.17
		High	30.0 - 2,475.0	-39.50	-25	-14.50
		High	2,690.0 - 15,000.0	-35.44	-25	-10.44
		High	15,000.0 - 27,000.0	-49.79	-25	-24.79

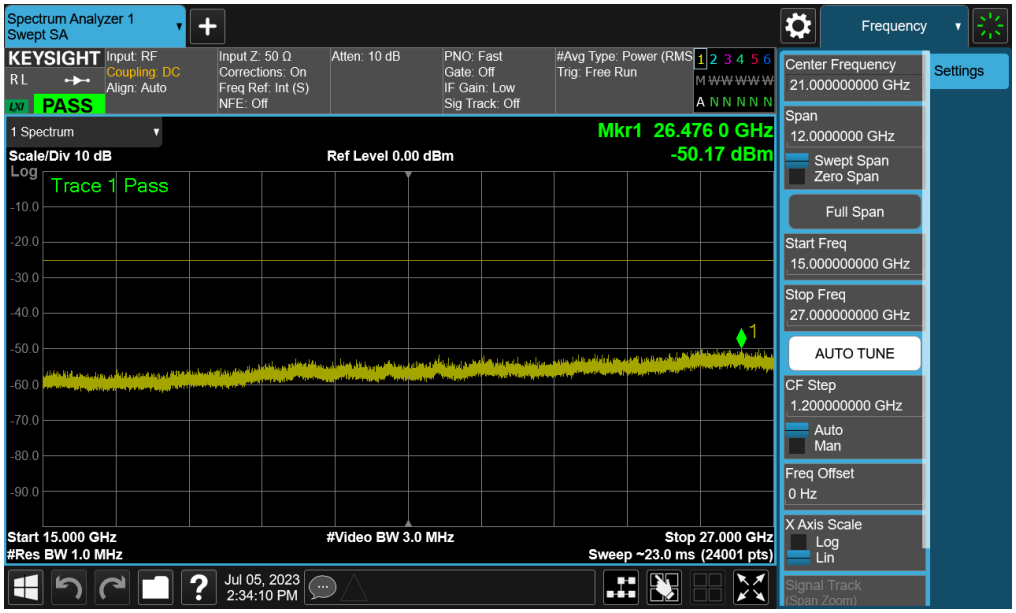
Table 7-13. Spurious and Harmonic Emissions Test Results – Ant3



Plot 7-59. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant3)



Plot 7-60. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant3)

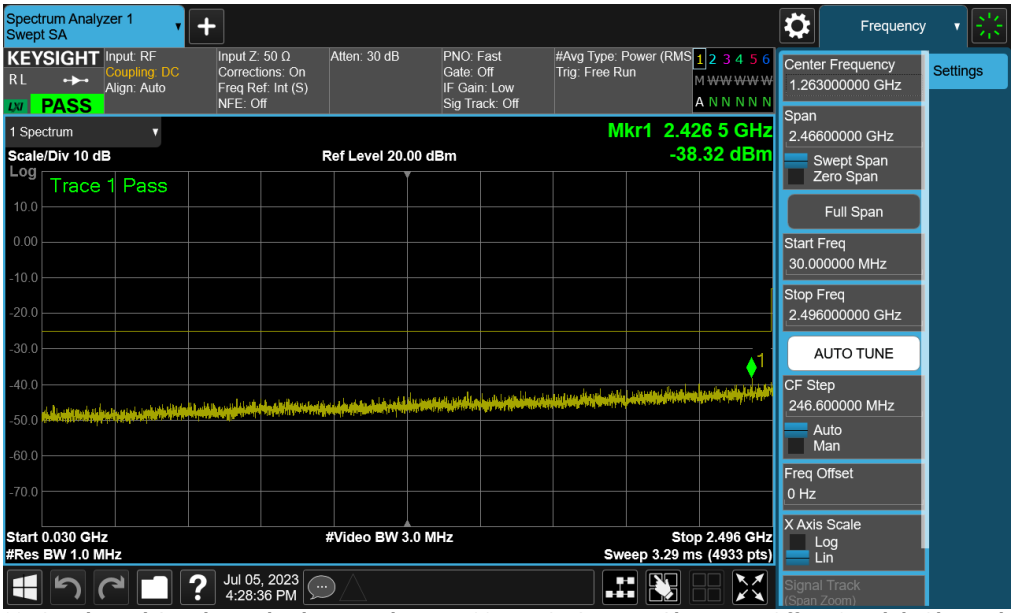


Plot 7-61. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel - Ant3)

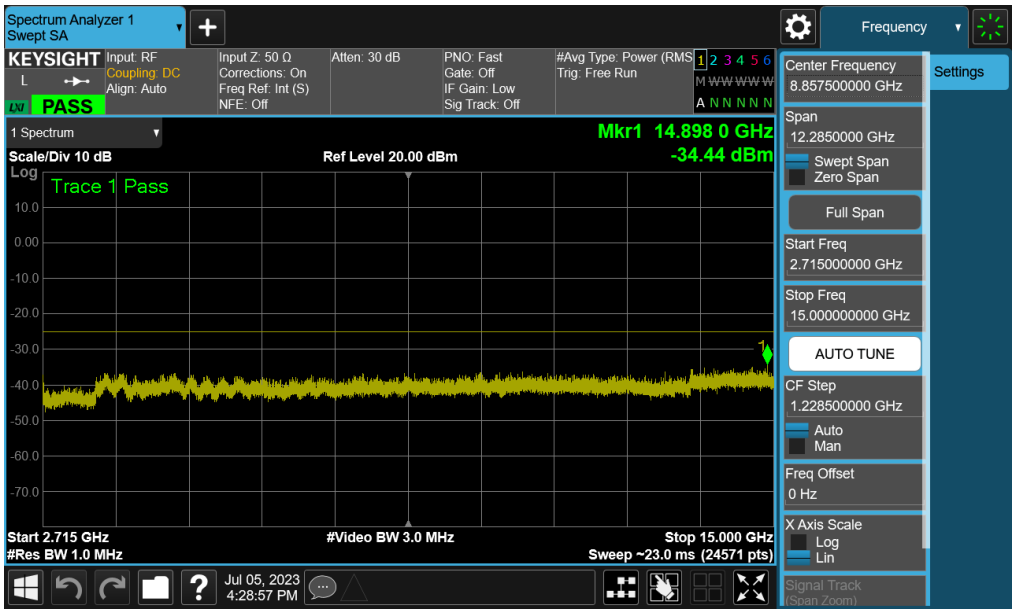
NR Band n41 – Ant4

Mode	Bandwidth	Channel	Range [MHz]	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n41	100MHz	Low	30.0 - 2,470.0	-39.71	-25	-14.71
		Low	2,690.0 - 15,000.0	-35.19	-25	-10.19
		Low	15,000.0 - 27,000.0	-49.01	-25	-24.00
		Mid	30.0 - 2,496.0	-38.93	-25	-13.93
		Mid	2,690.0 - 15,000.0	-34.80	-25	-9.80
		Mid	15,000.0 - 27,000.0	-49.25	-25	-24.25
		High	30.0 - 2,475.0	-38.32	-25	-13.32
		High	2,690.0 - 15,000.0	-34.44	-25	-9.44
		High	15,000.0 - 27,000.0	-49.97	-25	-24.97

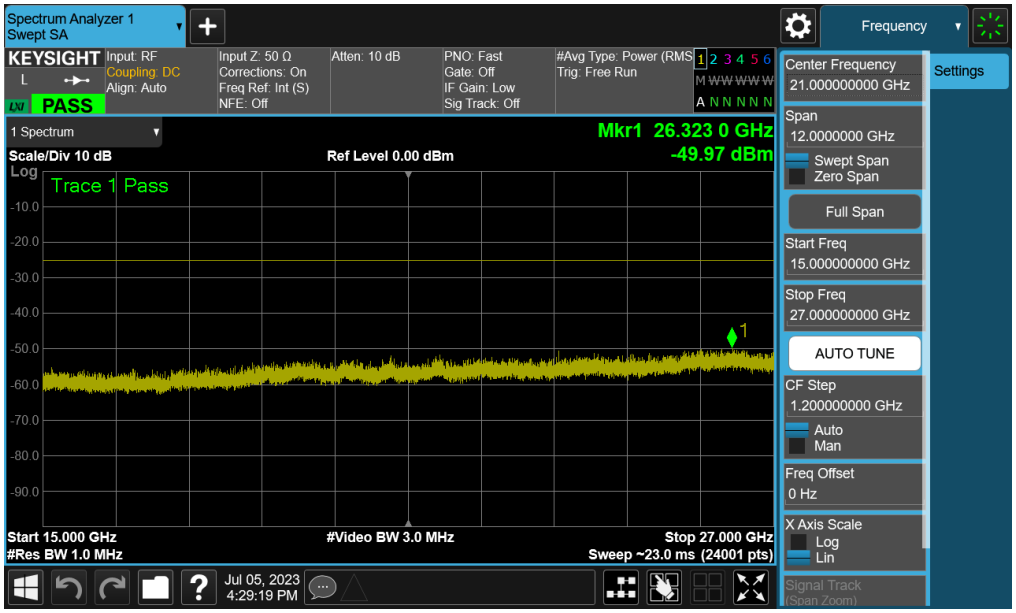
Table 7-14. Spurious and Harmonic Emissions Test Results – Ant4



Plot 7-62. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel - Ant4)



Plot 7-63. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant4)



Plot 7-64. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High 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.

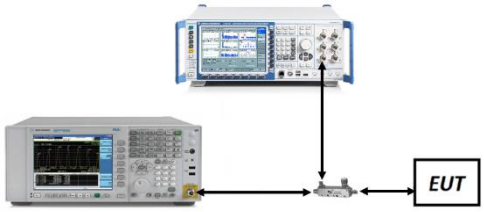


Figure 7-4. Test Instrument & Measurement Setup

Test Notes

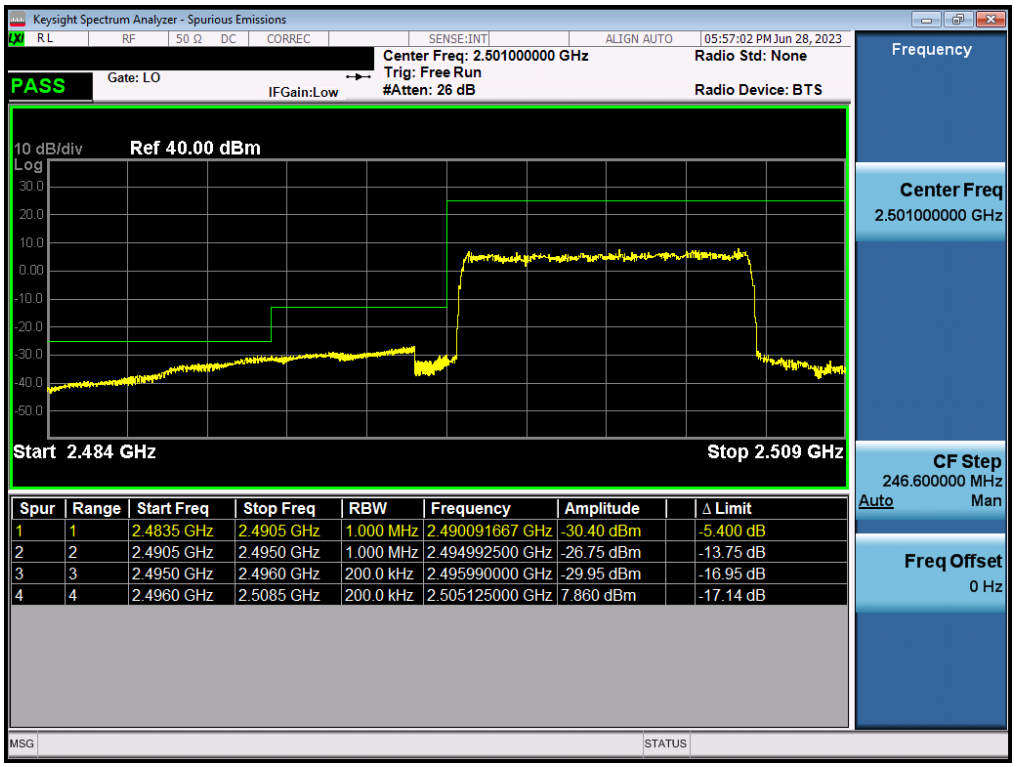
1. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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 Band 41 PC2	20MHz	Low	Band Edge	-32.60	-25	-7.60
		High	Band Edge	-41.38	-25	-16.38
	15MHz	Low	Band Edge	-31.54	-25	-6.54
		High	Band Edge	-38.63	-25	-13.63
	10MHz	Low	Band Edge	-30.40	-25	-5.40
		High	Band Edge	-37.73	-25	-12.73
	5MHz	Low	Band Edge	-35.33	-25	-10.33
		High	Band Edge	-36.83	-25	-11.83
LTE Band 41 PC3	20MHz	Low	Band Edge	-35.38	-25	-10.38
		High	Band Edge	-44.86	-25	-19.86
	15MHz	Low	Band Edge	-35.76	-25	-10.76
		High	Band Edge	-43.34	-25	-18.34
	10MHz	Low	Band Edge	-35.17	-25	-10.17
		High	Band Edge	-40.72	-25	-15.72
	5MHz	Low	Band Edge	-37.87	-25	-12.87
		High	Band Edge	-38.76	-25	-13.76
NR Band n41	100MHz	Low	Band Edge	-33.42	-25	-8.42
		High	Band Edge	-33.88	-13	-20.88
	90MHz	Low	Band Edge	-35.20	-25	-10.20
		High	Band Edge	-35.81	-13	-22.81
	80MHz	Low	Band Edge	-35.24	-25	-10.24
		High	Band Edge	-33.32	-13	-20.32
	70MHz	Low	Band Edge	-34.85	-25	-9.85
		High	Band Edge	-34.66	-13	-21.66
	60MHz	Low	Band Edge	-36.53	-25	-11.53
		High	Band Edge	-26.96	-10	-16.96
	50MHz	Low	Band Edge	-33.34	-25	-8.34
		High	Band Edge	-31.26	-13	-18.26
	40MHz	Low	Band Edge	-34.07	-25	-9.07
		High	Band Edge	-33.00	-13	-20.00
	30MHz	Low	Band Edge	-33.21	-25	-8.21
		High	Band Edge	-43.10	-25	-18.10
	20MHz	Low	Band Edge	-32.38	-25	-7.38
		High	Band Edge	-40.53	-25	-15.53
	15MHz	Low	Band Edge	-30.68	-25	-5.68
		High	Band Edge	-41.27	-25	-16.27
	10MHz	Low	Band Edge	-29.95	-25	-4.95
		High	Band Edge	-38.35	-25	-13.35

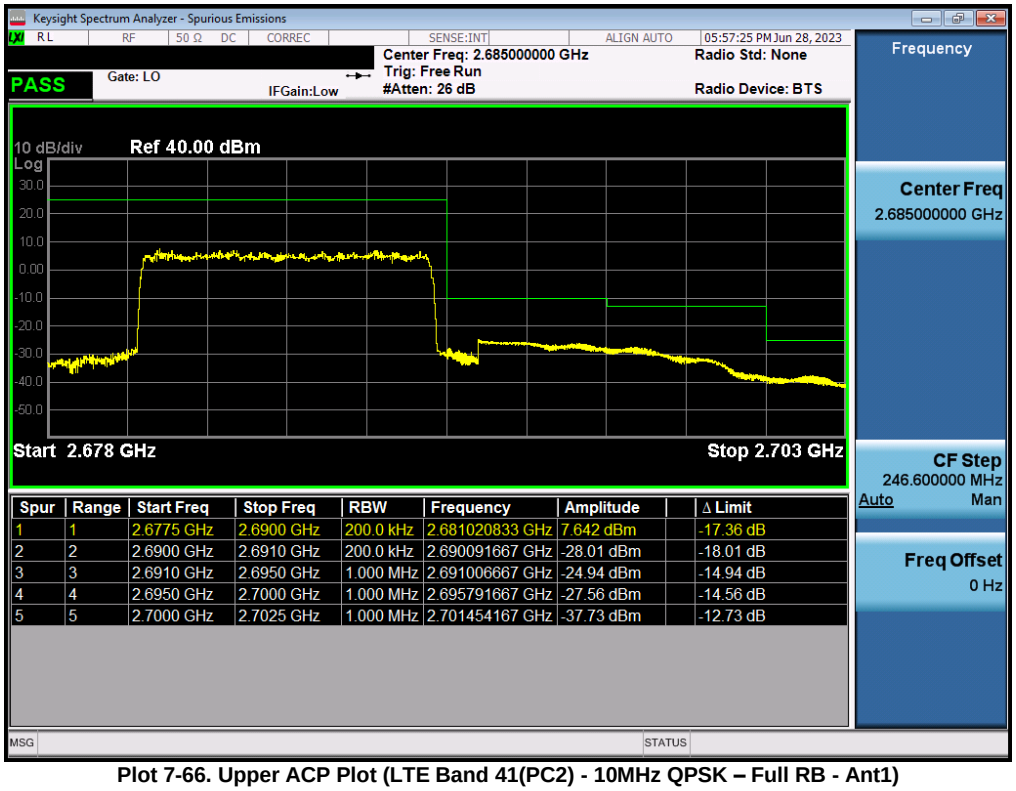
Table 7-15. Band Edge Emissions Test Results – Ant1

LTE Band 41(PC2) – Ant1



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4835 GHz	2.4905 GHz	1.000 MHz	2.490091667 GHz	-30.40 dBm	-5.400 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494992500 GHz	-26.75 dBm	-13.75 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495990000 GHz	-29.95 dBm	-16.95 dB
4	4	2.4960 GHz	2.5085 GHz	200.0 kHz	2.505125000 GHz	7.860 dBm	-17.14 dB

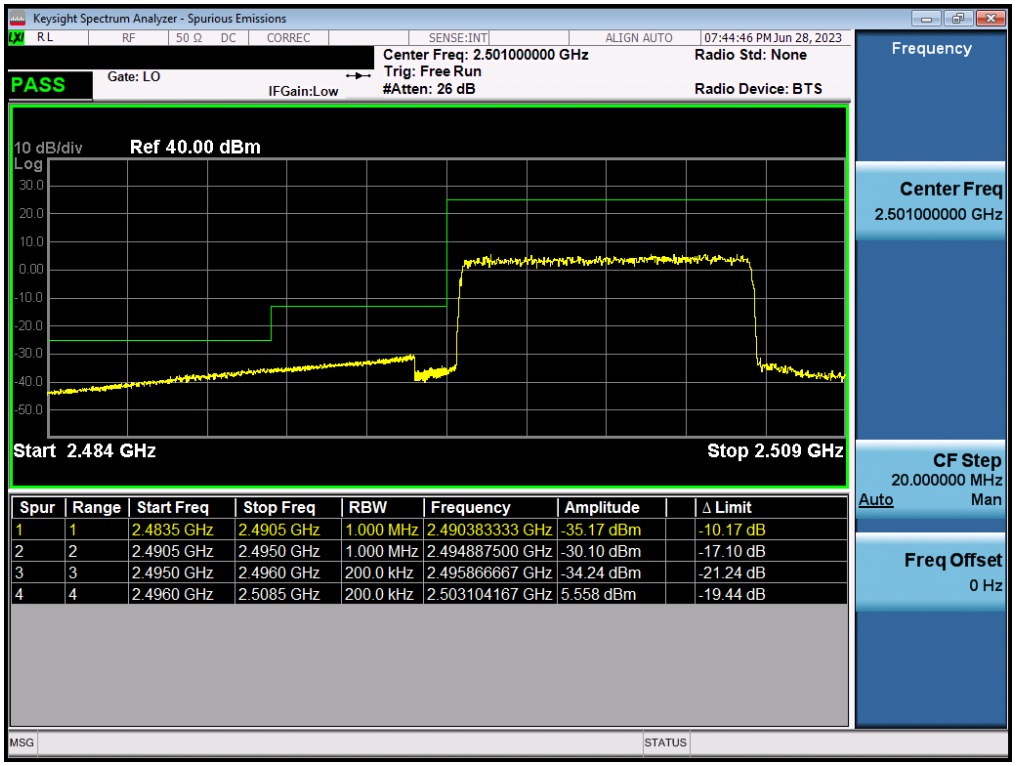
Plot 7-65. Lower ACP Plot (LTE Band 41(PC2) - 10MHz QPSK – Full RB - Ant1)



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6775 GHz	2.6900 GHz	200.0 kHz	2.681020833 GHz	7.642 dBm	-17.36 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690091667 GHz	-28.01 dBm	-18.01 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691006667 GHz	-24.94 dBm	-14.94 dB
4	4	2.6950 GHz	2.7000 GHz	1.000 MHz	2.695791667 GHz	-27.56 dBm	-14.56 dB
5	5	2.7000 GHz	2.7025 GHz	1.000 MHz	2.701454167 GHz	-37.73 dBm	-12.73 dB

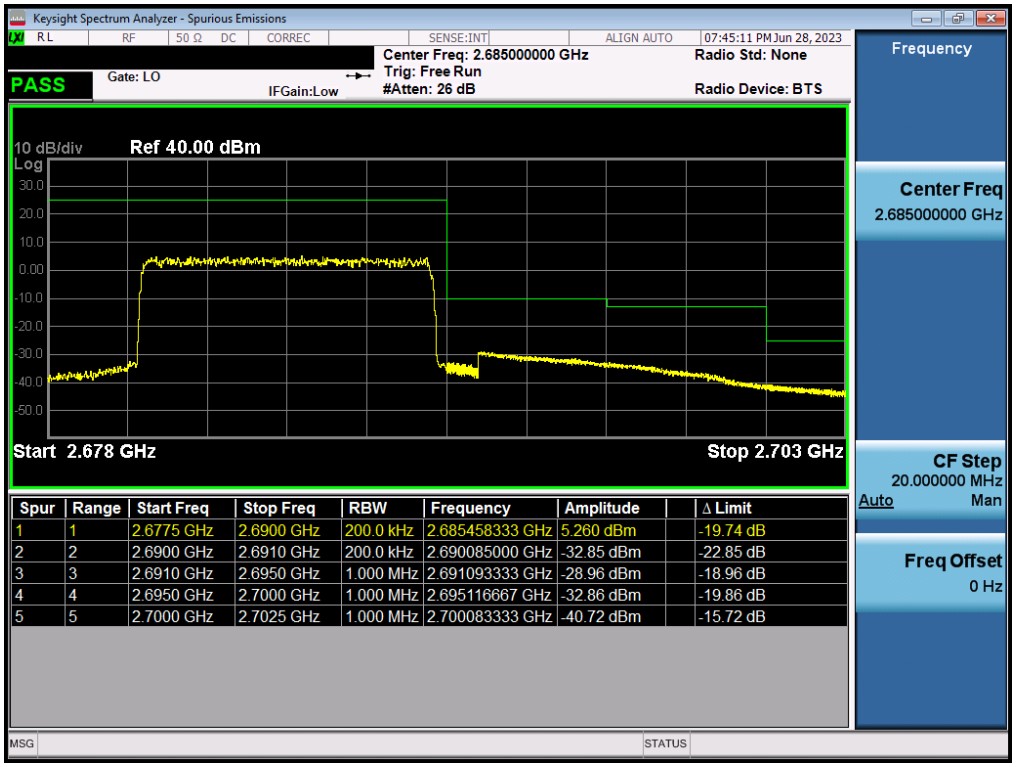
Plot 7-66. Upper ACP Plot (LTE Band 41(PC2) - 10MHz QPSK – Full RB - Ant1)

LTE Band 41(PC3) – Ant1



Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.4835 GHz	2.4905 GHz	1.000 MHz	2.490383333 GHz	-35.17 dBm	-10.17 dB
2	2	2.4905 GHz	2.4950 GHz	1.000 MHz	2.494887500 GHz	-30.10 dBm	-17.10 dB
3	3	2.4950 GHz	2.4960 GHz	200.0 kHz	2.495866667 GHz	-34.24 dBm	-21.24 dB
4	4	2.4960 GHz	2.5085 GHz	200.0 kHz	2.503104167 GHz	5.558 dBm	-19.44 dB

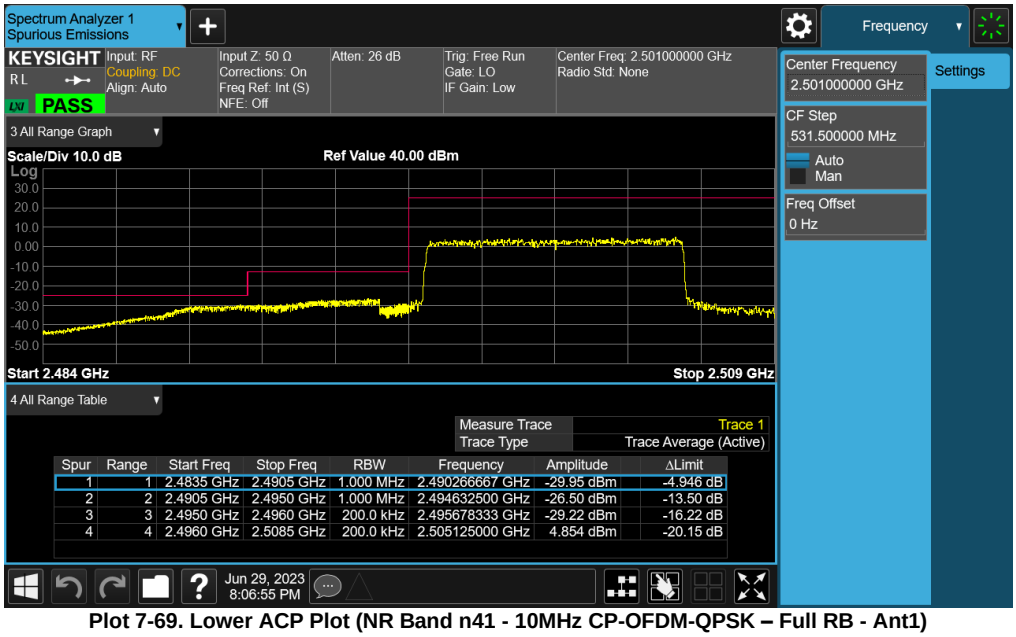
Plot 7-67. Lower ACP Plot (LTE Band 41(PC3) - 10MHz QPSK – Full RB - Ant1)



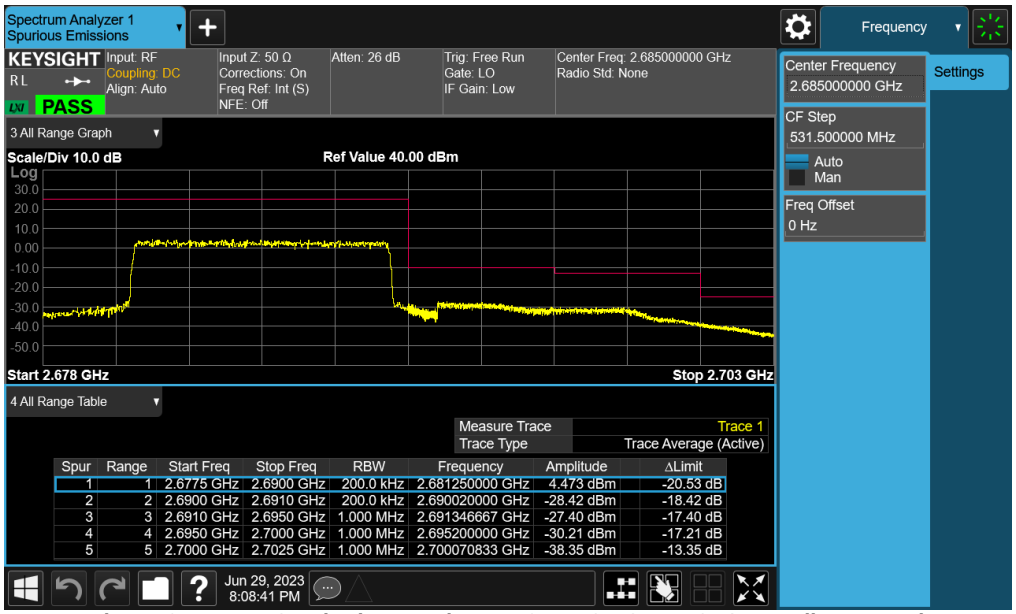
Spur	Range	Start Freq	Stop Freq	RBW	Frequency	Amplitude	Δ Limit
1	1	2.6775 GHz	2.6900 GHz	200.0 kHz	2.685458333 GHz	5.260 dBm	-19.74 dB
2	2	2.6900 GHz	2.6910 GHz	200.0 kHz	2.690085000 GHz	-32.85 dBm	-22.85 dB
3	3	2.6910 GHz	2.6950 GHz	1.000 MHz	2.691093333 GHz	-28.96 dBm	-18.96 dB
4	4	2.6950 GHz	2.7000 GHz	1.000 MHz	2.695116667 GHz	-32.86 dBm	-19.86 dB
5	5	2.7000 GHz	2.7025 GHz	1.000 MHz	2.700083333 GHz	-40.72 dBm	-15.72 dB

Plot 7-68. Upper ACP Plot (LTE Band 41(PC3) - 10MHz QPSK – Full RB - Ant1)

NR Band n41 – Ant1



Plot 7-69. Lower ACP Plot (NR Band n41 - 10MHz CP-OFDM-QPSK – Full RB - Ant1)

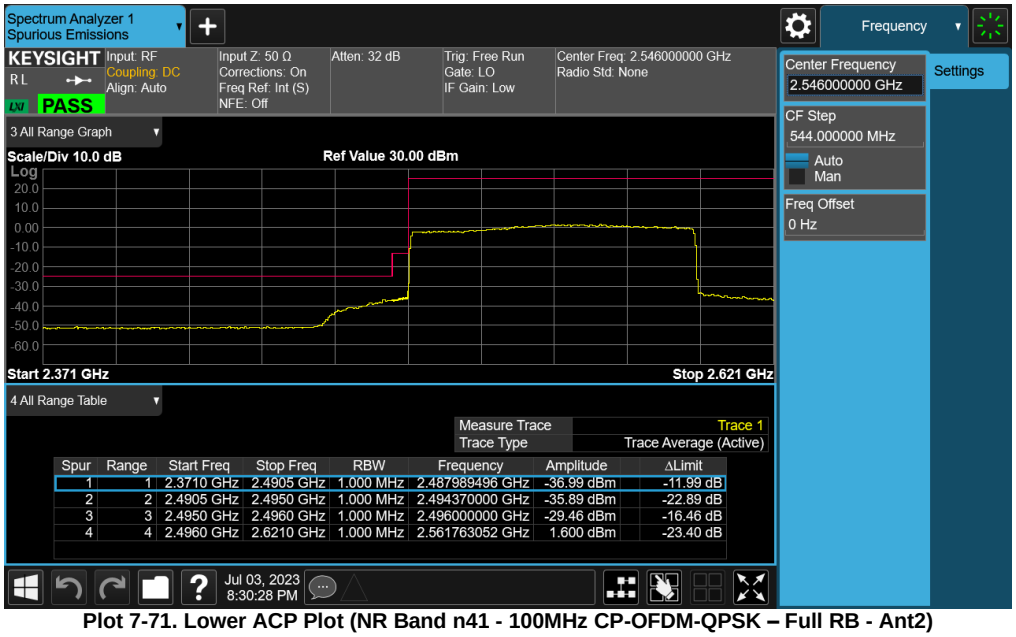


Plot 7-70. Upper ACP Plot (NR Band n41 - 10MHz CP-OFDM-QPSK – Full RB - Ant1)

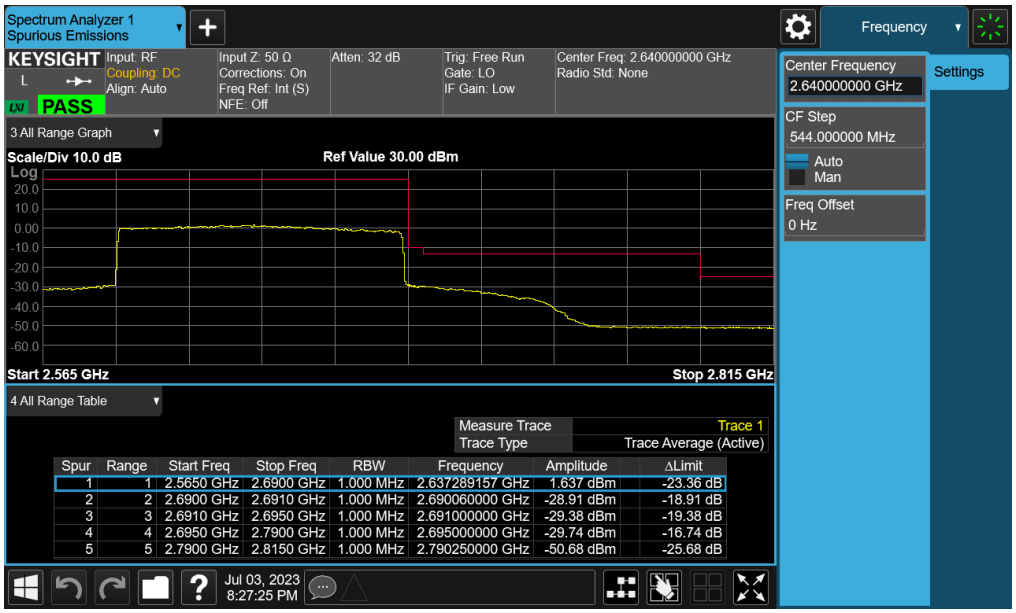
Mode	Bandwidth	Channel	Test Case	Level [dBm]	Limit [dBm]	Margin [dB]
NR Band n41	100MHz	Low	Band Edge	-36.99	-25	-11.99
		High	Band Edge	-29.74	-13	-16.74

Table 7-16. Band Edge Emissions Test Results – Ant2

NR Band n41 – Ant2



Plot 7-71. Lower ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB - Ant2)



Plot 7-72. Upper ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB - Ant2)