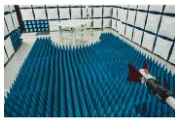
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 27 C2PC TEST REPORT

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

Date of Testing:
02/01/2022 - 02/28/2022
Test Report Issue Date:
03/02/2022
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2202030009-02.A3L

FCC ID:	**A3LSMS906E**
Applicant Name:	**Samsung Electronics Co., Ltd.**

Application Type:	Class II Permissive Change
Model:	SM-S906E/DS
Additional Model(s):	SM-S906E
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
Class II Permissive Change:	Please see FCC Change Document
Original Grant Date:	01/10/2022

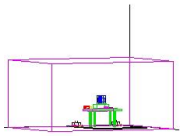
This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in §2.947. Test results reported herein relate only to the item(s) tested.

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.

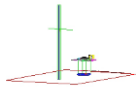
Randy Ortanez
President

ACCREDITED
CERT #2041.01

TABLE OF CONTENTS



PART 27 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
NR Band n41	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.173	22.37	97M0G7D
		QPSK	2546.0 - 2640.0	0.163	22.13	97M8G7D
		16QAM	2546.0 - 2640.0	0.128	21.08	97M8W7D
	90 MHz	π/2 BPSK	2541.0 - 2645.0	0.173	22.38	87M3G7D
		QPSK	2541.0 - 2645.0	0.158	21.97	86M0G7D
		16QAM	2541.0 - 2645.0	0.118	20.70	86M1W7D
	80 MHz	π/2 BPSK	2536.0 - 2650.0	0.177	22.48	77M6G7D
		QPSK	2536.0 - 2650.0	0.175	22.44	77M6G7D
		16QAM	2536.0 - 2650.0	0.124	20.94	77M7W7D
	60 MHz	π/2 BPSK	2526.0 - 2660.0	0.191	22.82	58M2G7D
		QPSK	2526.0 - 2660.0	0.173	22.37	58M2G7D
		16QAM	2526.0 - 2660.0	0.109	20.39	58M1W7D
	50 MHz	π/2 BPSK	2521.0 - 2665.0	0.189	22.77	46M0G7D
		QPSK	2521.0 - 2665.0	0.176	22.45	47M7G7D
		16QAM	2521.0 - 2665.0	0.133	21.24	47M7W7D
	40 MHz	π/2 BPSK	2516.0 - 2670.0	0.198	22.97	35M9G7D
		QPSK	2516.0 - 2670.0	0.195	22.89	38M0G7D
		16QAM	2516.0 - 2670.0	0.132	21.20	37M9W7D
	30 MHz	π/2 BPSK	2511.0 - 2675.0	0.196	22.91	27M0G7D
		QPSK	2511.0 - 2675.0	0.191	22.81	28M0G7D
		16QAM	2511.0 - 2675.0	0.114	20.57	28M0W7D
	20 MHz	π/2 BPSK	2506.0 - 2680.0	0.185	22.66	18M0G7D
		QPSK	2506.0 - 2680.0	0.185	22.68	18M4G7D
		16QAM	2506.0 - 2680.0	0.109	20.38	18M3W7D

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 PCTEST Test Location

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

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

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

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

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

2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Samsung Portable Handset FCC ID: A3LSMS906E**. 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.: 1502, 1510M, 1250M, 1498M

2.2 Device Capabilities

This device contains the following capabilities:

850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (FR1), 802.11b/g/n/ax WLAN, 802.11a/n/ac/ax UNII (5GHz), Bluetooth (1x, EDR, LE), NFC, Wireless Power Transfer, Ultra Wideband

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 3.4 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 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 "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Measurement Guidance for Certification of Licensed Digital Transmitters" (KDB 971168 D01 v03r01) 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/TIA-603-E-2016. 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 and calculations, conversion method is used per the formulas in KDB 971168 D01 v03r01. 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 v03r01.

Radiated power and radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI/TIA-603-E-2016.

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	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	AP2
-	AP1	EMC Cable and Switch System	3/9/2021	Annual	3/9/2022	AP1
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx4	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx4
-	LTx5	LIcensed Transmitter Cable Set	3/3/2021	Annual	3/3/2022	LTx5
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS Lindgren	3117	1-18 GHz DRG Horn (Medium)	4/20/2021	Biennial	4/20/2023	00125518
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	1/7/2022	Annual	1/7/2023	MY57141001
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	8/3/2021	Annual	8/3/2022	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	5/25/2021	Annual	5/25/2022	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	3/21/2022	101716
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	8/25/2021	Annual	8/25/2022	103200
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107
-	MVG-001	EMC Cable and Switch System	12/6/2021	Annual	12/6/2022	-

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: A3LSMS906E

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

Mode(s): NR

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
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 (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 (NR Band n41)	27.50(h)(2)	≤ 2 Watts max. EIRP	PASS	Section 7.6
	Radiated Spurious Emissions (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 PCTEST EMC Software Tool v1.0.

7.2 Transmitter Conducted Output Power

§2.1046

Test Overview

The EUT is set up to transmit at maximum power for LTE. All power levels 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

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Span = 2 x OBW to 3 x OBW
2. RBW = 1% to 5% of the OBW
3. Number of measurement points in sweep ≥ 2 x span / RBW
4. Sweep = auto-couple (less than transmission burst duration)
5. Detector = RMS (power)
6. Trigger was set to enable power measurements only on full power bursts
7. Trace was allowed to stabilize
8. Spectrum analyzer's "Channel Power" function was used to compute the power by integrating the spectrum across the OBW of the signal

Test Setup

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

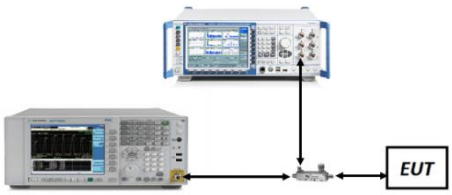


Figure 7-1. Test Instrument & Measurement Setup

Test Notes:

1. Conducted power measurements were evaluated for the two contiguous channels 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]
100 MHz	π/2 BPSK	509202	2546.0	1 / 68	24.28
		518598	2593.0	1 / 136	24.56
		528000	2640.0	1 / 136	24.46
	QPSK	509202	2546.0	1 / 68	24.14
		518598	2593.0	1 / 136	24.40
		528000	2640.0	1 / 136	24.16
	16-QAM	528000	2640.0	1 / 136	23.68
90 MHz	π/2 BPSK	508200	2541.0	1 / 183	24.58
		518592	2593.0	1 / 183	24.44
		529002	2645.0	1 / 122	24.49
	QPSK	508200	2541.0	1 / 122	24.35
		518592	2593.0	1 / 183	24.05
		529002	2645.0	1 / 122	24.13
	16-QAM	529002	2645.0	1 / 122	23.30
80 MHz	π/2 BPSK	507204	2536.0	1 / 162	24.62
		518598	2593.0	1 / 162	24.60
		529998	2650.0	1 / 162	24.59
	QPSK	507204	2536.0	1 / 162	24.08
		518598	2593.0	1 / 162	24.62
		529998	2650.0	1 / 162	24.59
	16-QAM	529998	2650.0	1 / 162	23.54
60 MHz	π/2 BPSK	505200	2526.0	1 / 121	24.54
		518598	2593.0	1 / 121	24.74
		531996	2660.0	1 / 40	24.93
	QPSK	505200	2526.0	1 / 121	24.24
		518598	2593.0	1 / 121	24.64
		531996	2660.0	1 / 40	24.21
	16-QAM	531996	2660.0	1 / 40	22.99
50 MHz	π/2 BPSK	504204	2521.0	1 / 99	24.80
		518598	2593.0	1 / 66	24.96
		532998	2665.0	1 / 99	24.80
	QPSK	504204	2521.0	1 / 99	24.29
		518598	2593.0	1 / 66	24.68
		532998	2665.0	1 / 99	24.60
	16-QAM	532998	2665.0	1 / 99	23.83
40 MHz	π/2 BPSK	503202	2516.0	106 / 0	24.18
		518598	2593.0	1 / 53	25.16
		534000	2670.0	106 / 0	24.24
	QPSK	503202	2516.0	1 / 26	24.49
		518598	2593.0	1 / 53	25.16
		534000	2670.0	1 / 53	24.79
	16-QAM	518598	2593.0	1 / 53	23.99
30 MHz	π/2 BPSK	502203	2511.0	1 / 58	24.76
		518598	2593.0	1 / 19	25.04
		534999	2675.0	1 / 19	25.03
	QPSK	502203	2511.0	1 / 58	24.83
		518598	2593.0	1 / 19	24.93
		534999	2675.0	1 / 19	24.97
	16-QAM	534999	2675.0	1 / 19	23.17
20 MHz	π/2 BPSK	501204	2506.0	51 / 0	24.79
		518598	2593.0	1 / 13	24.85
		535998	2680.0	1 / 25	24.68
	QPSK	501204	2506.0	1 / 25	25.20
		518598	2593.0	1 / 13	24.17
		535998	2680.0	1 / 25	24.84
	16-QAM	518598	2593.0	1 / 13	23.16

Table 7-2. Conducted Power Output Data (n41 – SRS-1 – ANT I)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 68	22.75
		518598	2593.0	1 / 68	22.58
		528000	2640.0	1 / 68	22.67
	QPSK	509202	2546.0	1 / 68	22.76
		518598	2593.0	1 / 68	22.93
		528000	2640.0	1 / 68	22.68
	16-QAM	528000	2640.0	1 / 68	21.62

Table 7-3. Conducted Power Output Data (n41 – SRS-2 – ANT B)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 204	20.31
		518598	2593.0	1 / 68	20.39
		528000	2640.0	1 / 204	20.34
	QPSK	509202	2546.0	1 / 204	20.26
		518598	2593.0	1 / 68	20.23
		528000	2640.0	1 / 204	20.37
	16-QAM	528000	2640.0	1 / 204	18.22

Table 7-4. Conducted Power Output Data (n41 – SRS-3 – ANT D)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	1 / 68	19.21
		518598	2593.0	1 / 68	19.18
		528000	2640.0	1 / 68	19.09
	QPSK	509202	2546.0	1 / 68	19.33
		518598	2593.0	1 / 68	18.99
		528000	2640.0	1 / 68	18.70
	16-QAM	509202	2546.0	1 / 68	17.63

Table 7-5. Conducted Power Output Data (n41 – SRS-4 – ANT E)

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

KDB 971168 D01 v03r01 – Section 4.2

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.

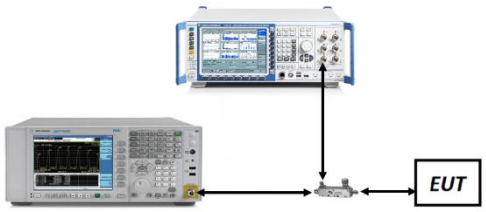
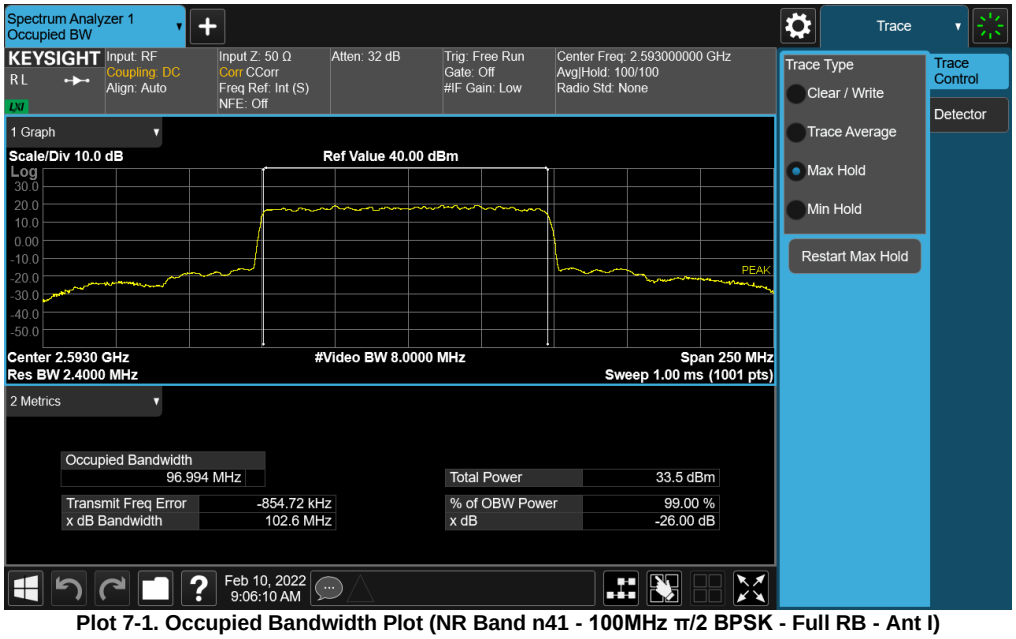


Figure 7-2. Test Instrument & Measurement Setup

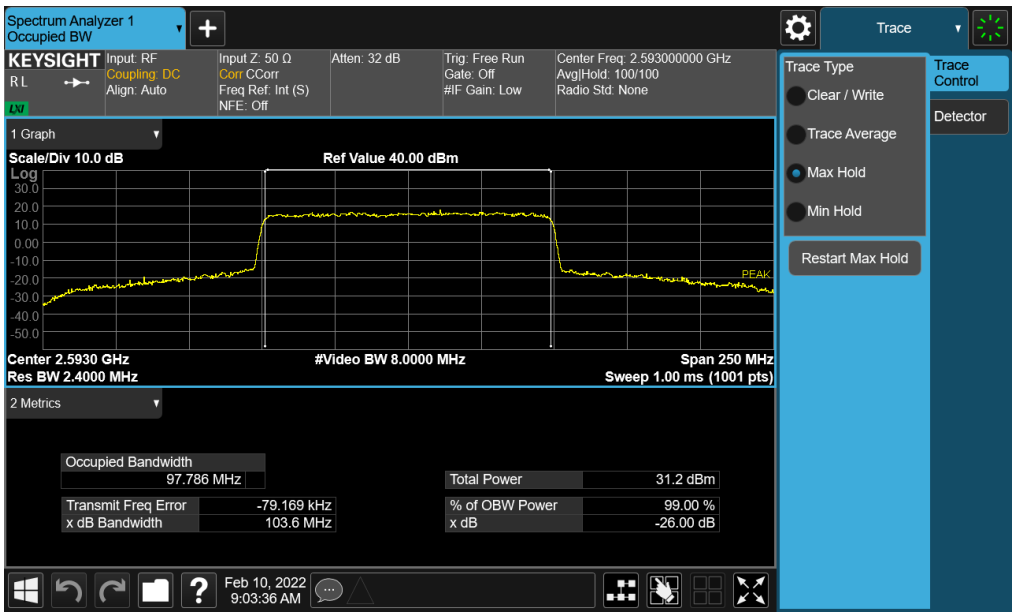
Test Notes

None.

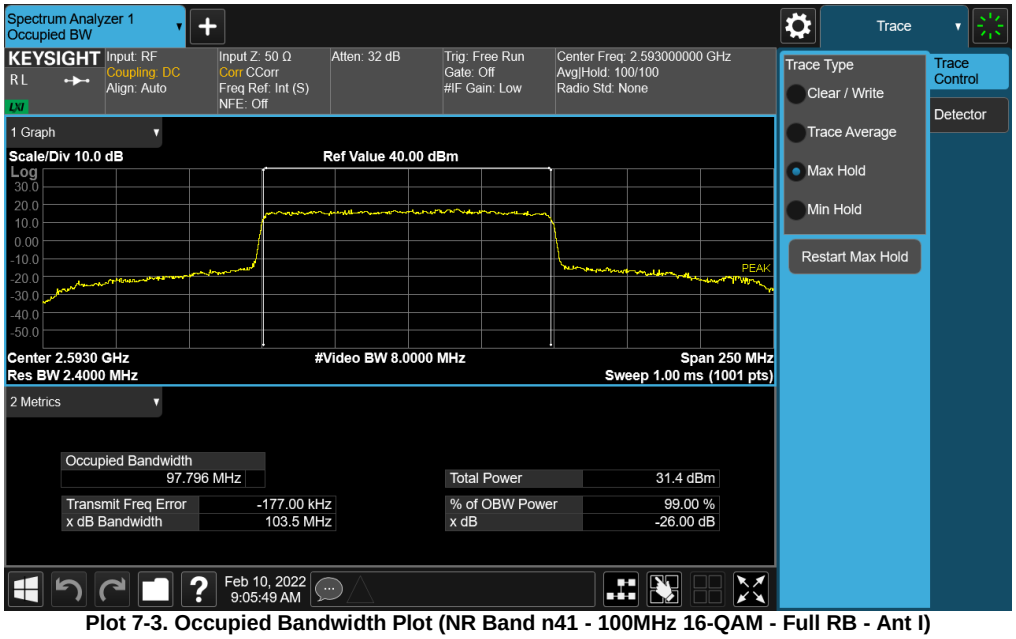
NR Band n41 – Ant I



Plot 7-1. Occupied Bandwidth Plot (NR Band n41 - 100MHz π/2 BPSK - Full RB - Ant I)

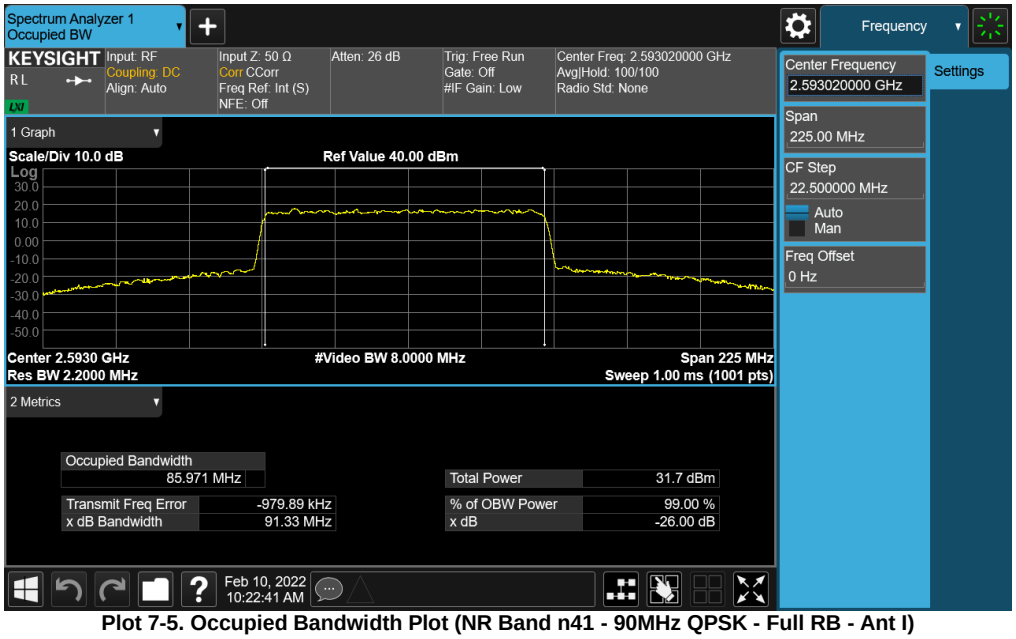


Plot 7-2. Occupied Bandwidth Plot (NR Band n41 - 100MHz QPSK - Full RB - Ant I)



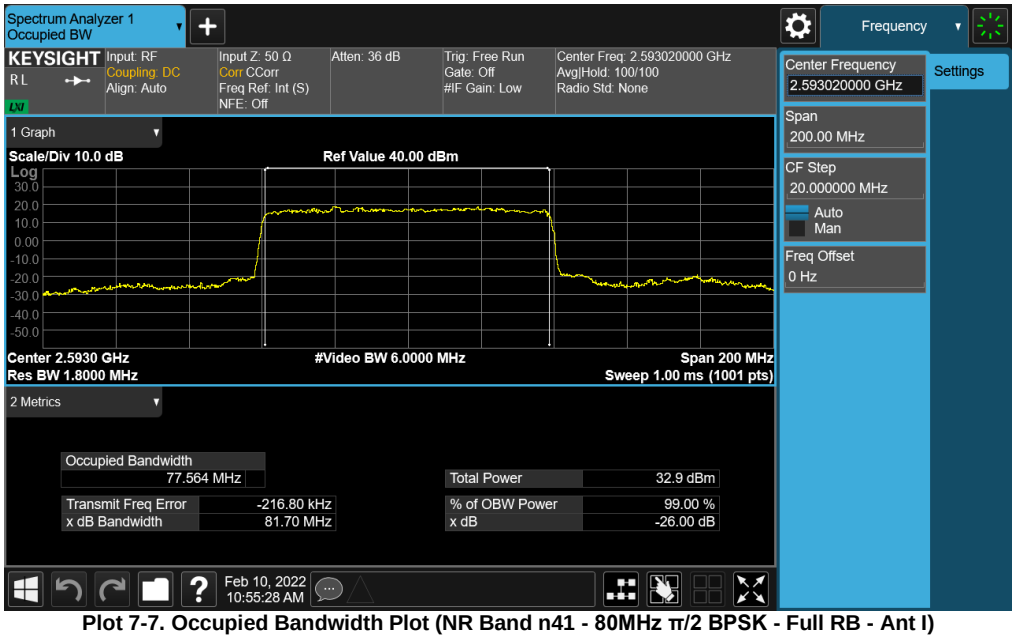
Plot 7-3. Occupied Bandwidth Plot (NR Band n41 - 100MHz 16-QAM - Full RB - Ant I)

Plot 7-4. Occupied Bandwidth Plot (NR Band n41 - 90MHz π/2 BPSK - Full RB - Ant I)



Plot 7-5. Occupied Bandwidth Plot (NR Band n41 - 90MHz QPSK - Full RB - Ant I)

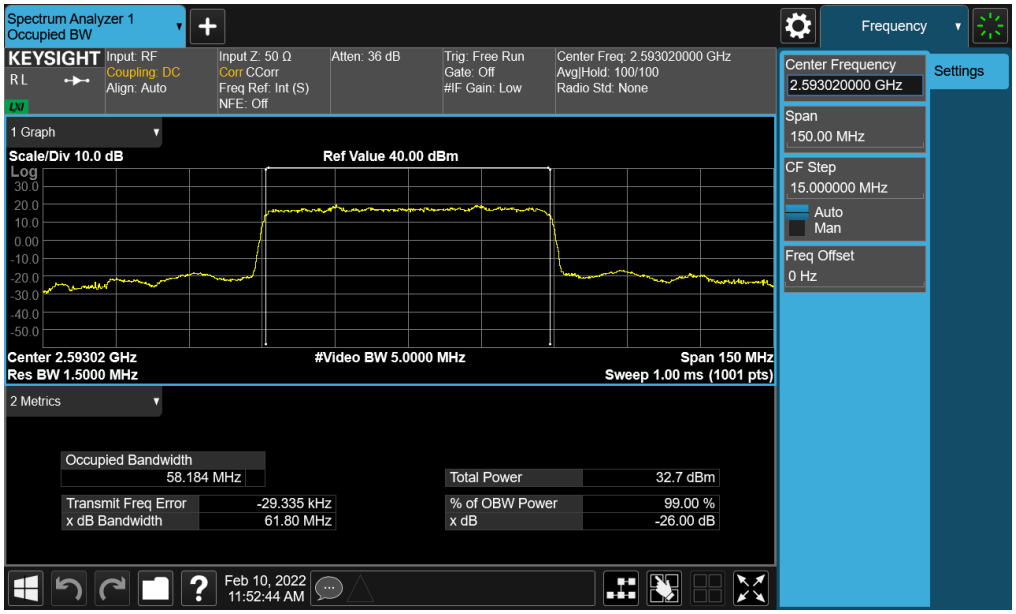
Plot 7-6. Occupied Bandwidth Plot (NR Band n41 - 90MHz 16-QAM - Full RB - Ant I)



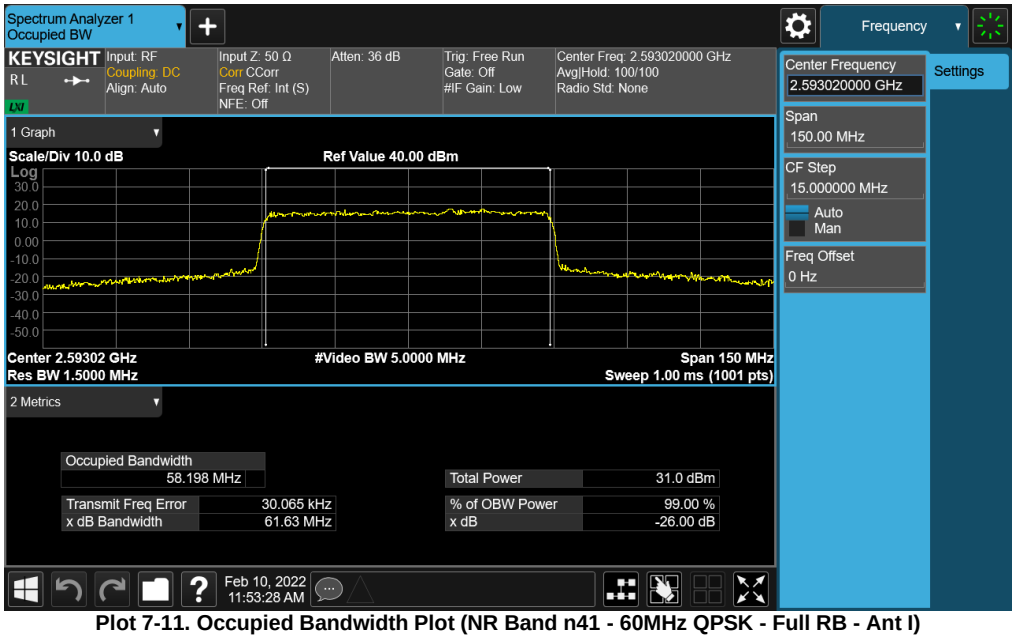
Plot 7-7. Occupied Bandwidth Plot (NR Band n41 - 80MHz π/2 BPSK - Full RB - Ant I)

Plot 7-8. Occupied Bandwidth Plot (NR Band n41 - 80MHz QPSK - Full RB - Ant I)

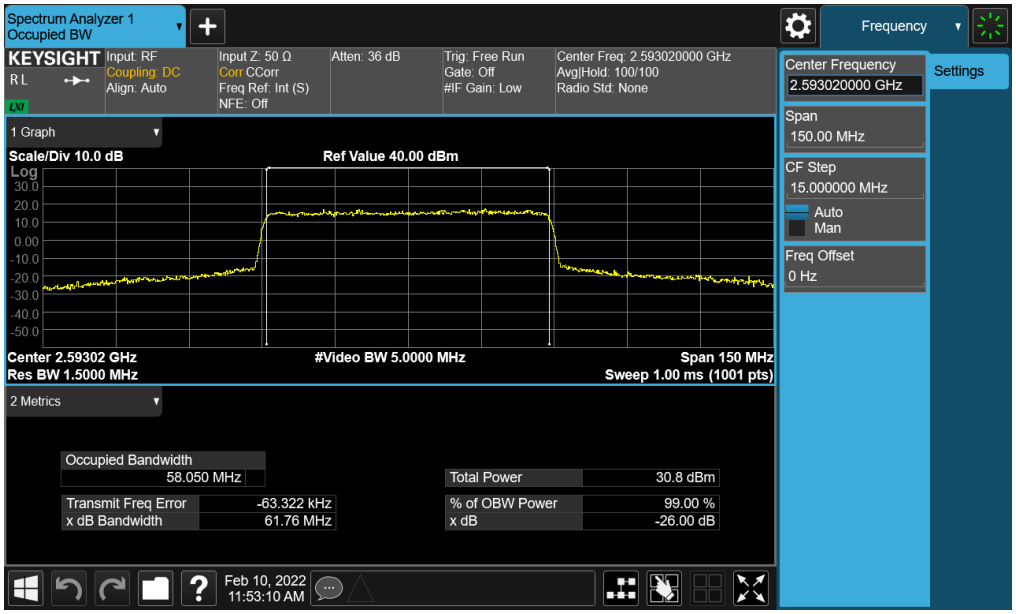
Plot 7-9. Occupied Bandwidth Plot (NR Band n41 - 80MHz 16-QAM - Full RB - Ant I)



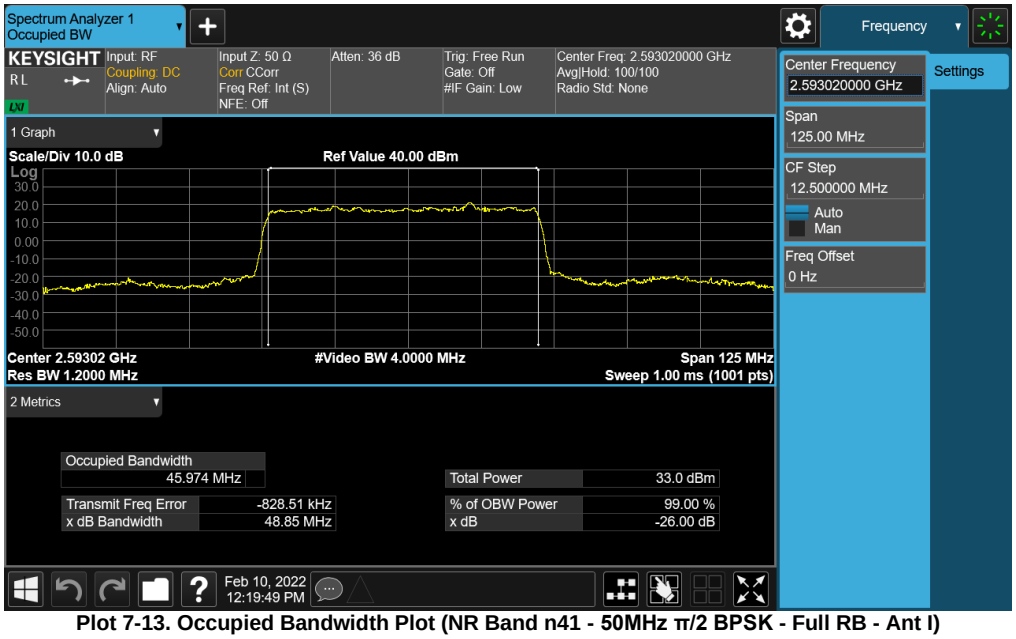
Plot 7-10. Occupied Bandwidth Plot (NR Band n41 - 60MHz π/2 BPSK - Full RB - Ant I)



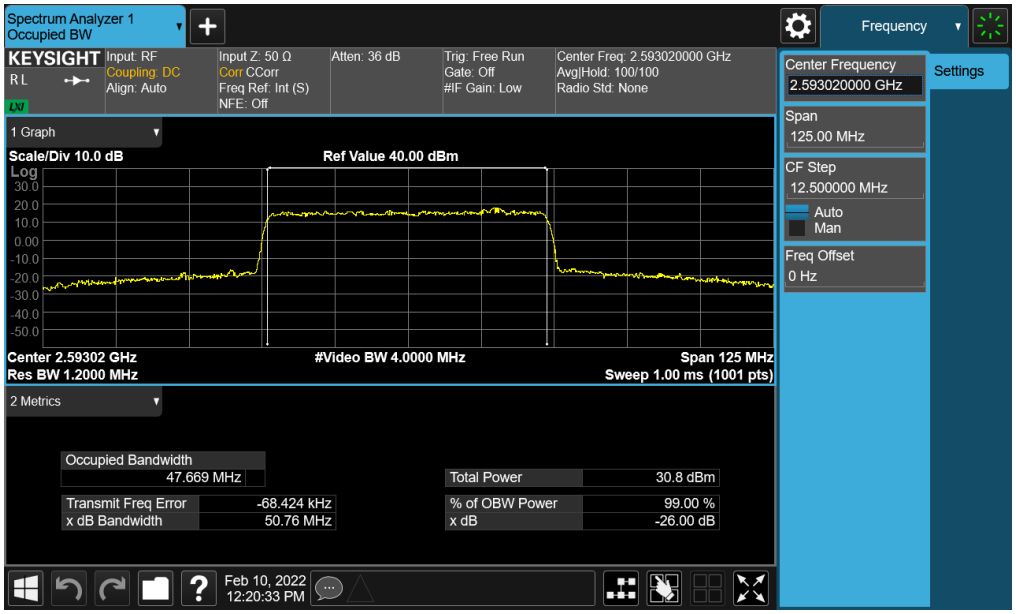
Plot 7-11. Occupied Bandwidth Plot (NR Band n41 - 60MHz QPSK - Full RB - Ant I)



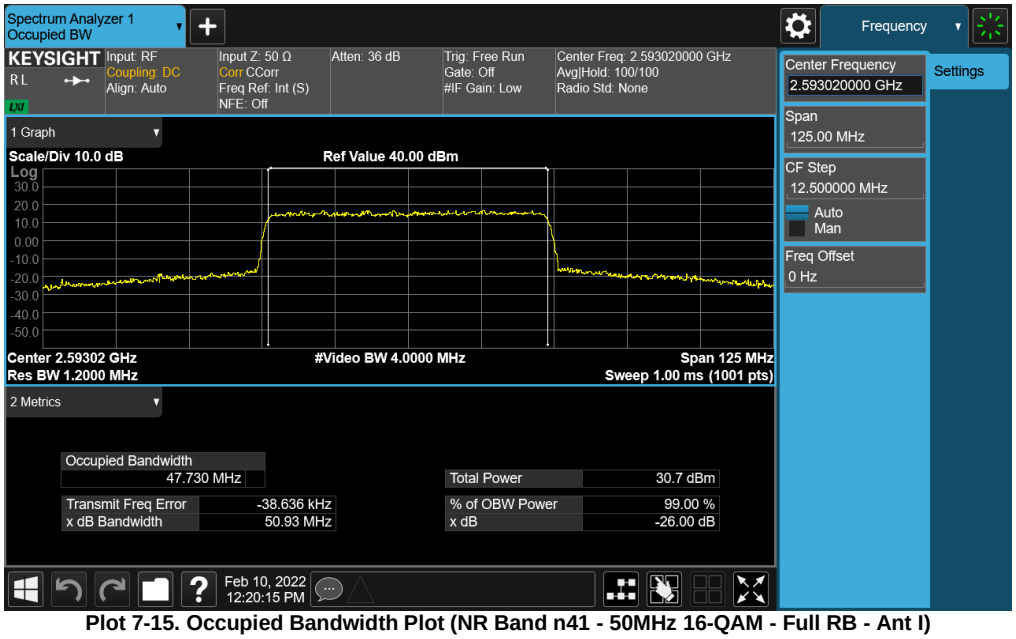
Plot 7-12. Occupied Bandwidth Plot (NR Band n41 - 60MHz 16-QAM - Full RB - Ant I)



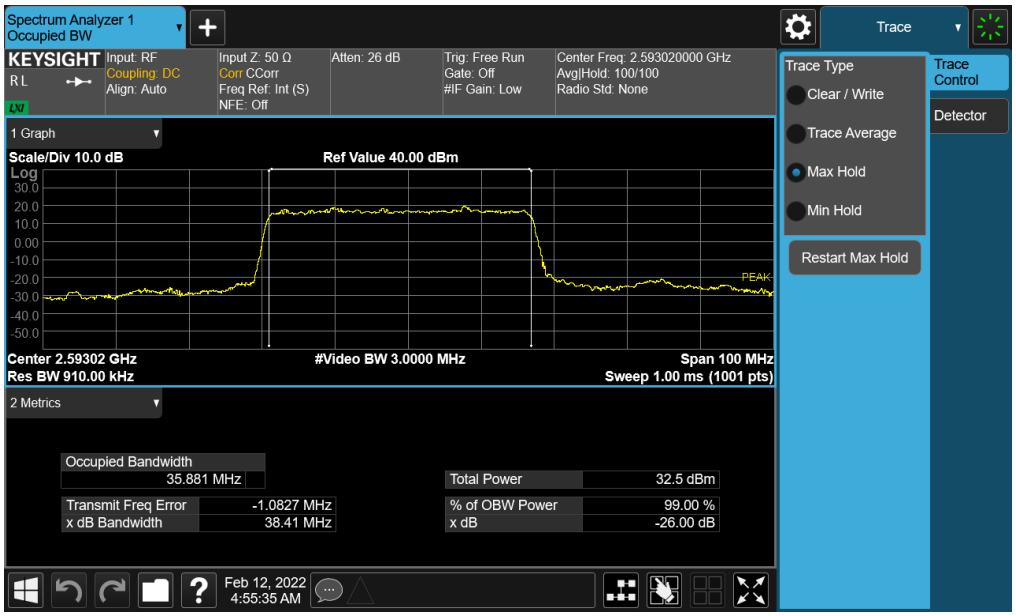
Plot 7-13. Occupied Bandwidth Plot (NR Band n41 - 50MHz π/2 BPSK - Full RB - Ant I)



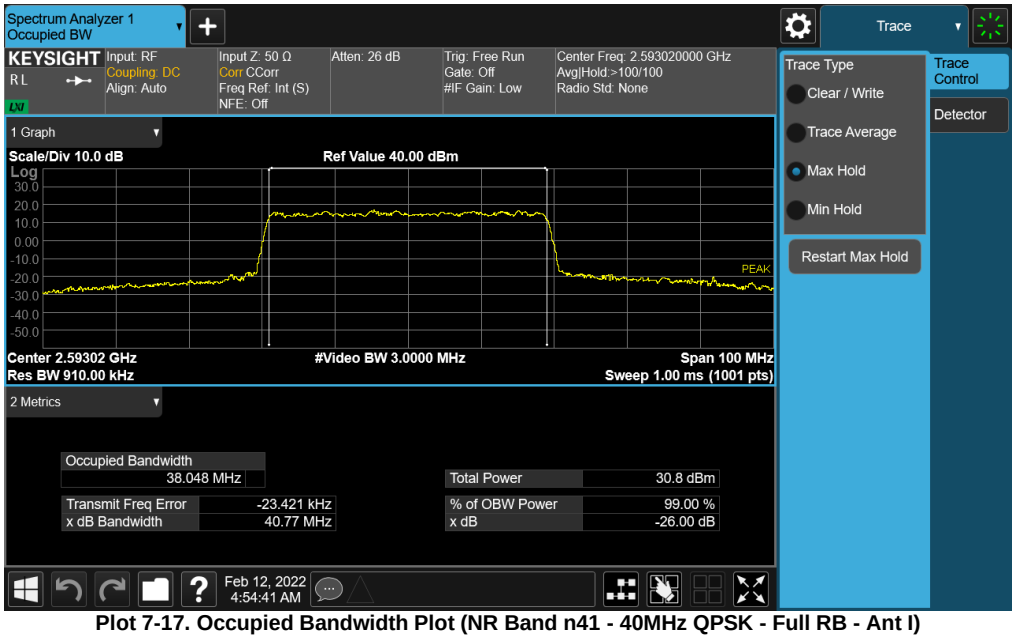
Plot 7-14. Occupied Bandwidth Plot (NR Band n41 - 50MHz QPSK - Full RB - Ant I)



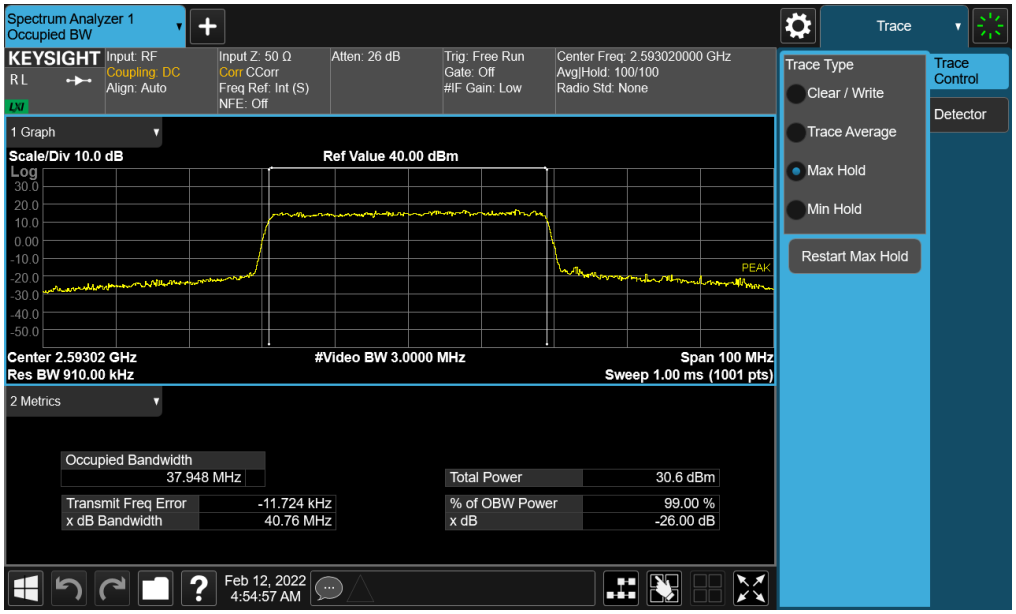
Plot 7-15. Occupied Bandwidth Plot (NR Band n41 - 50MHz 16-QAM - Full RB - Ant I)



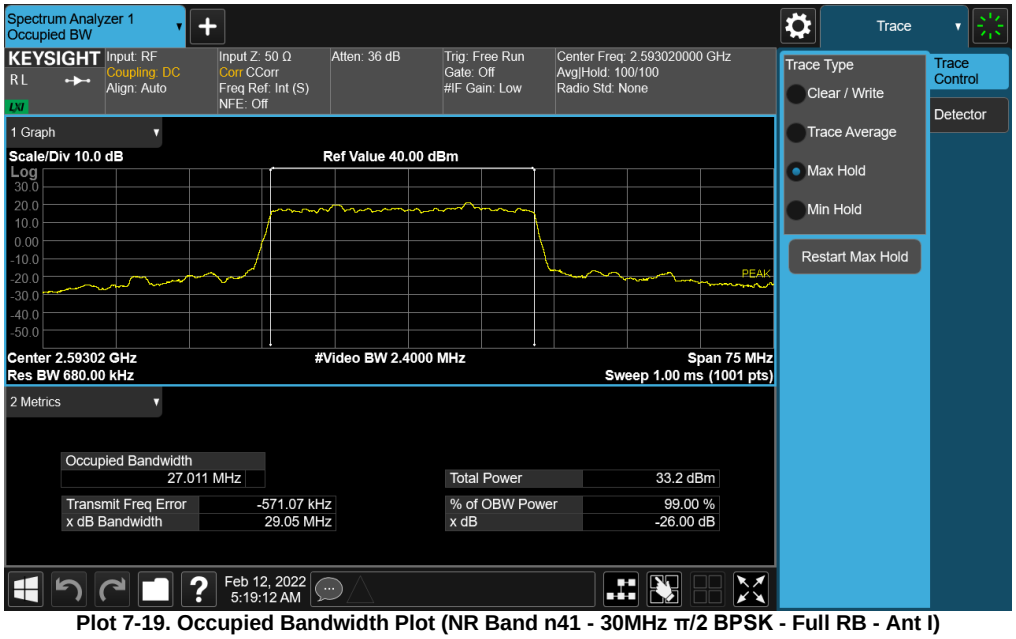
Plot 7-16. Occupied Bandwidth Plot (NR Band n41 - 40MHz π/2 BPSK - Full RB - Ant I)



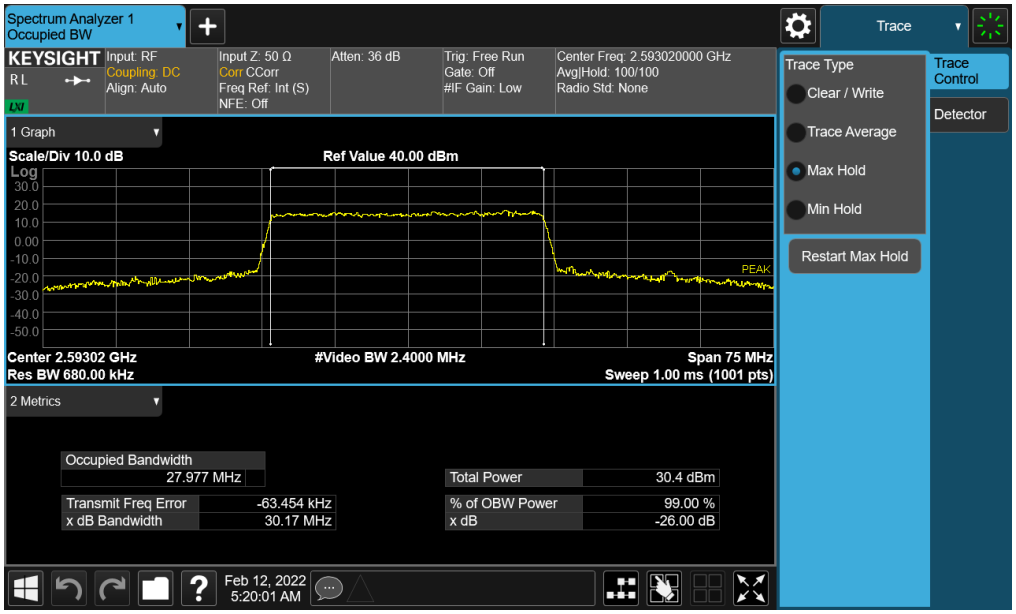
Plot 7-17. Occupied Bandwidth Plot (NR Band n41 - 40MHz QPSK - Full RB - Ant I)



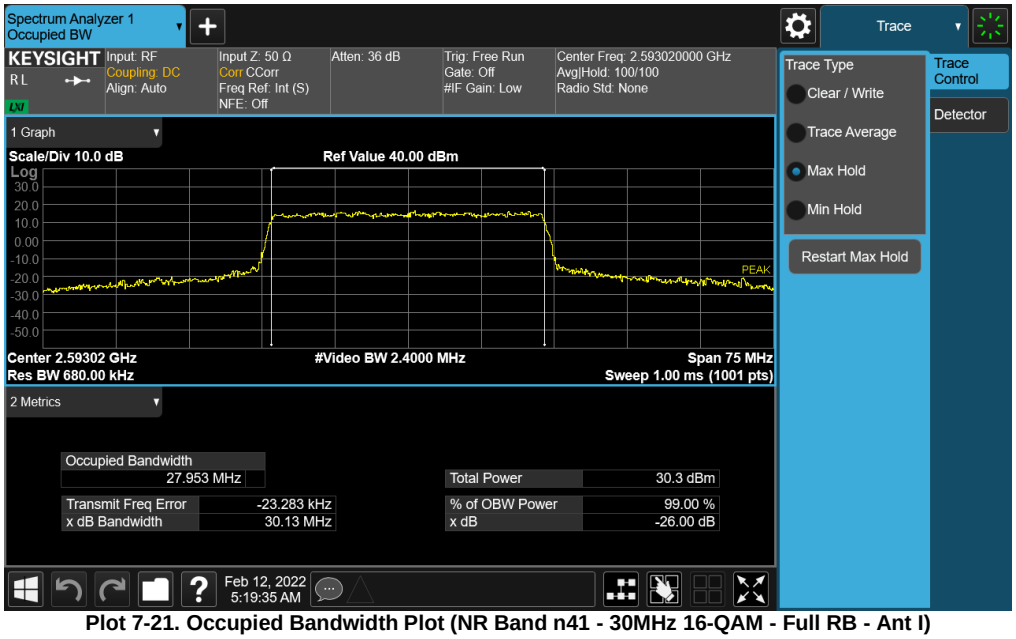
Plot 7-18. Occupied Bandwidth Plot (NR Band n41 - 40MHz 16-QAM - Full RB - Ant I)



Plot 7-19. Occupied Bandwidth Plot (NR Band n41 - 30MHz π/2 BPSK - Full RB - Ant I)

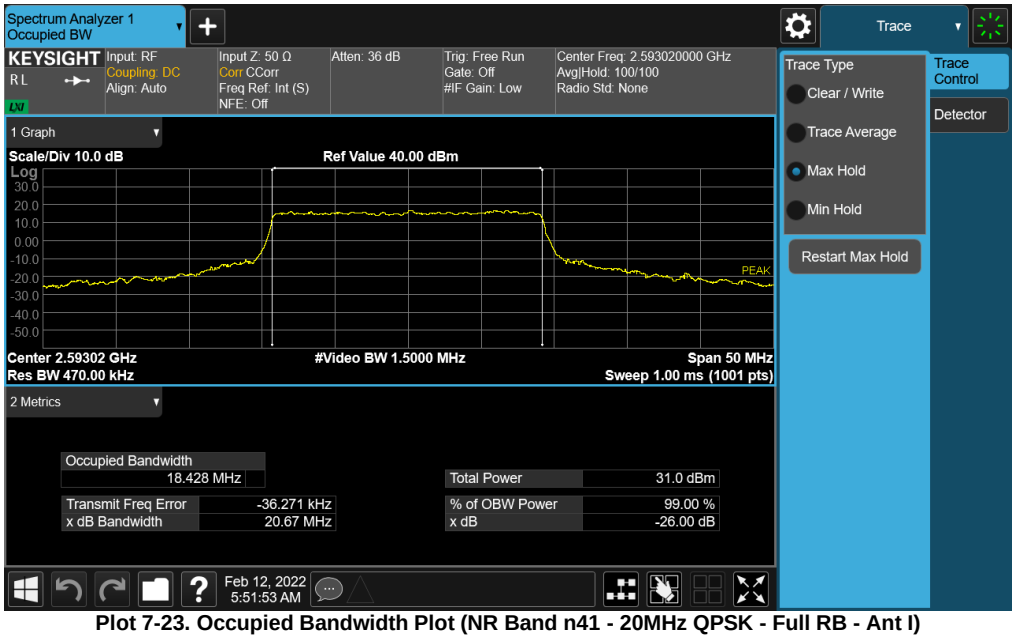


Plot 7-20. Occupied Bandwidth Plot (NR Band n41 - 30MHz QPSK - Full RB - Ant I)



Plot 7-21. Occupied Bandwidth Plot (NR Band n41 - 30MHz 16-QAM - Full RB - Ant I)

Plot 7-22. Occupied Bandwidth Plot (NR Band n41 - 20MHz π/2 BPSK - Full RB - Ant I)



Plot 7-23. Occupied Bandwidth Plot (NR Band n41 - 20MHz QPSK - Full RB - Ant I)

Plot 7-24. Occupied Bandwidth Plot (NR Band n41 - 20MHz 16-QAM - Full RB - Ant I)

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

KDB 971168 D01 v03r01 – Section 6.0

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.

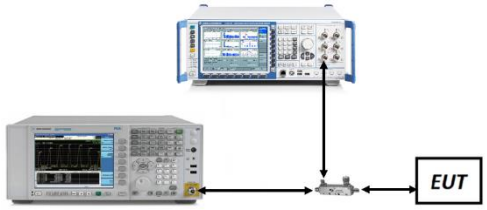


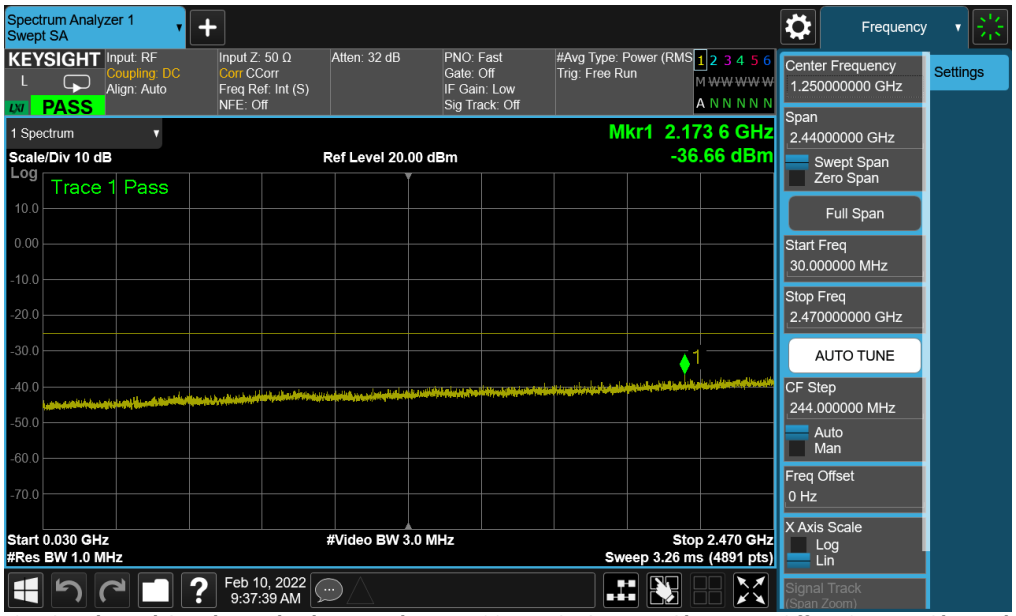
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

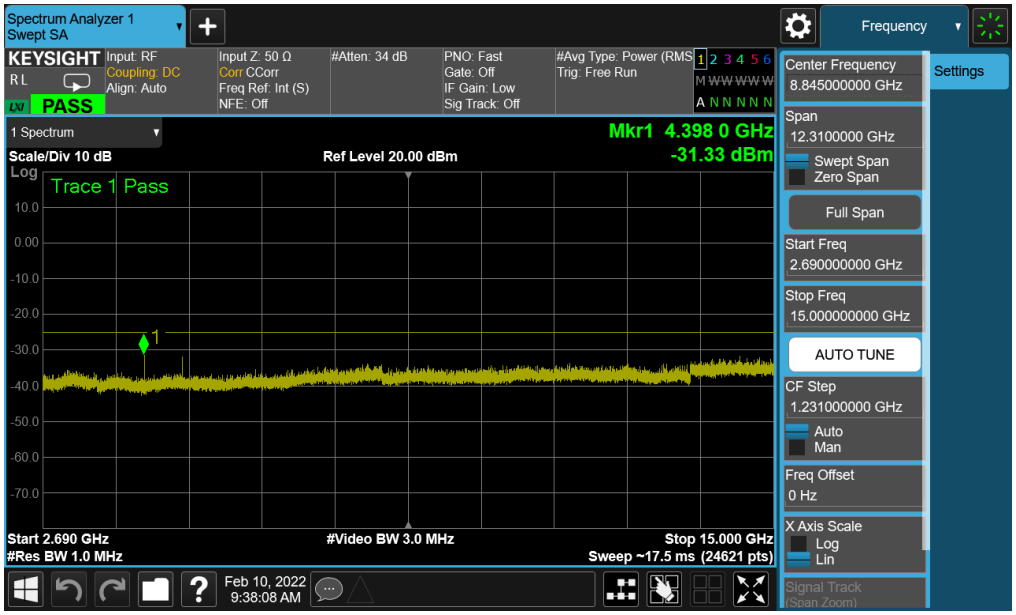
1. Per Part 27, RSS-195 and RSS-199, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

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.

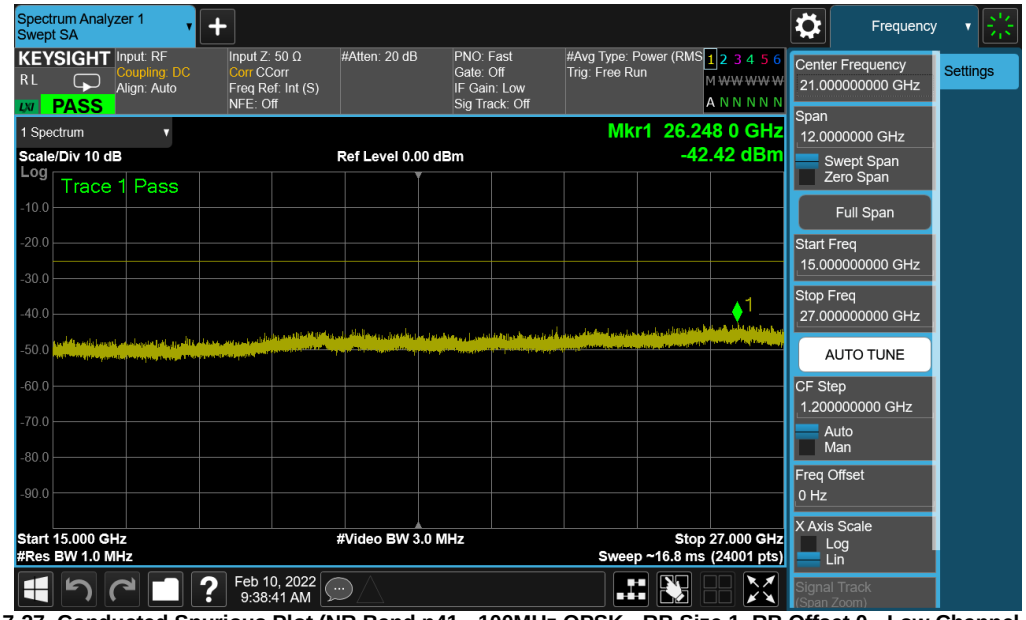
NR Band n41 – SRS 1 - Ant I



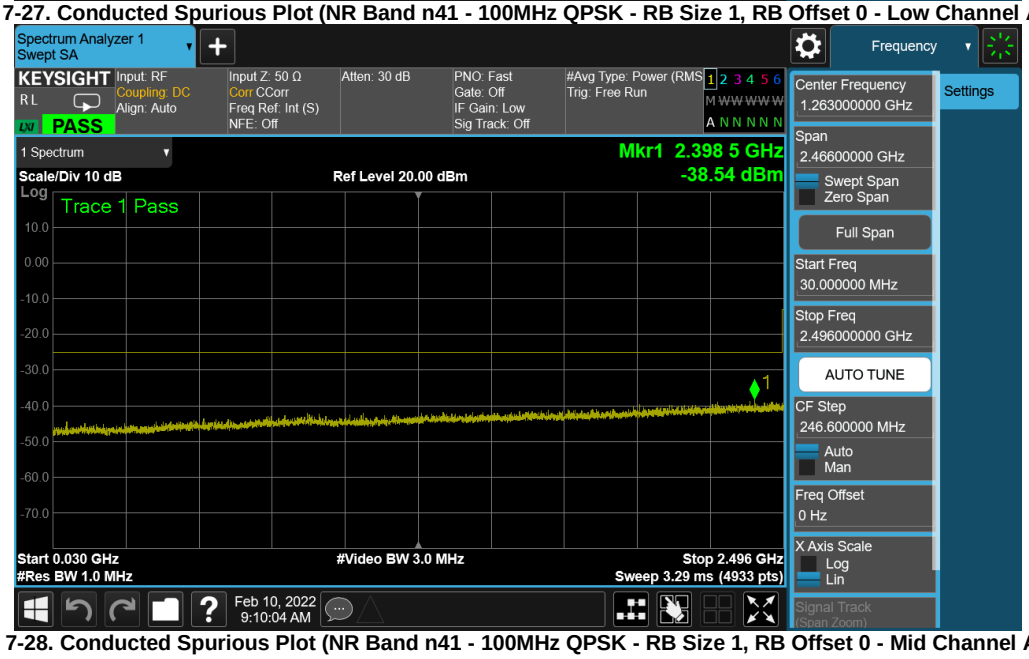
Plot 7-25. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant I)



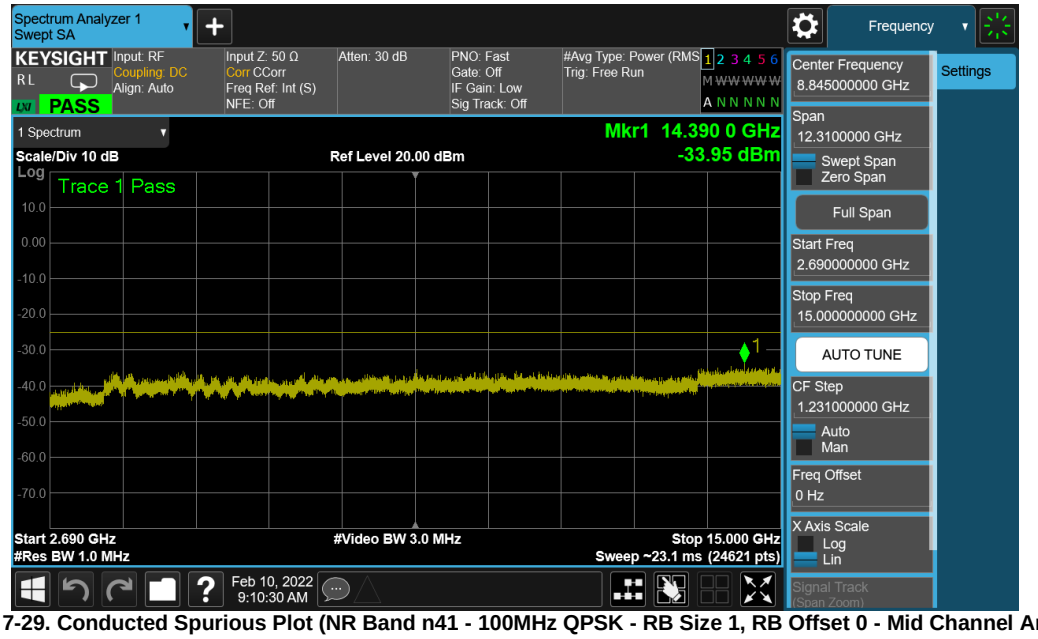
Plot 7-26. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant I)



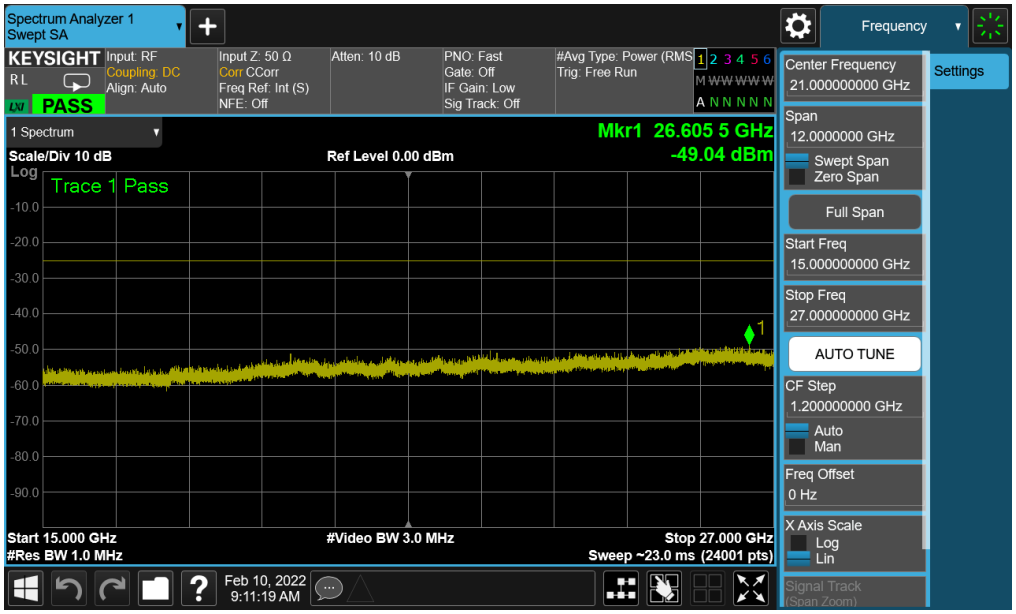
Plot 7-27. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant I)



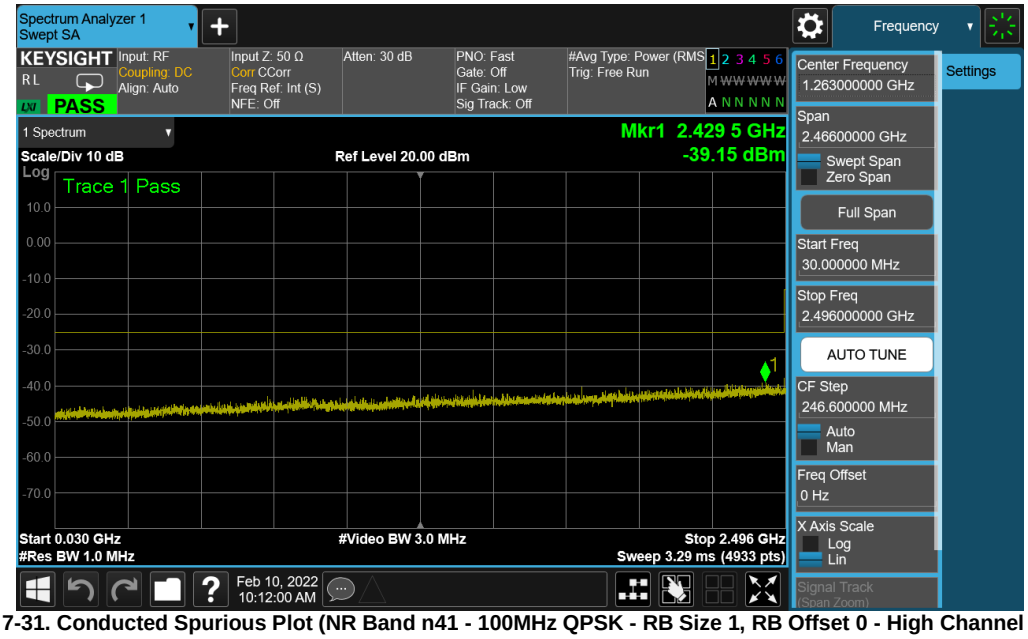
Plot 7-28. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant I)



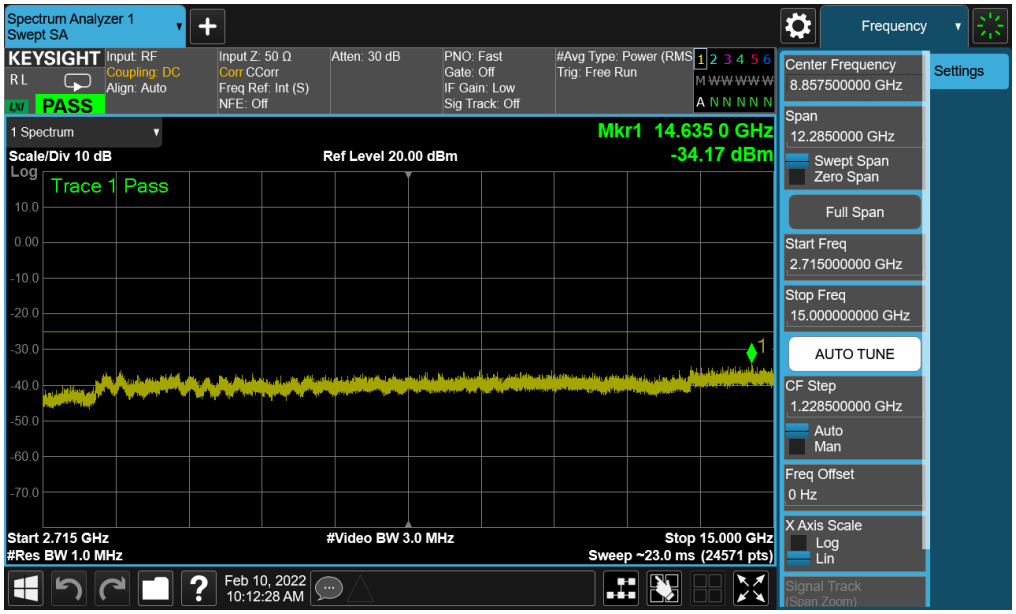
Plot 7-29. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant I)



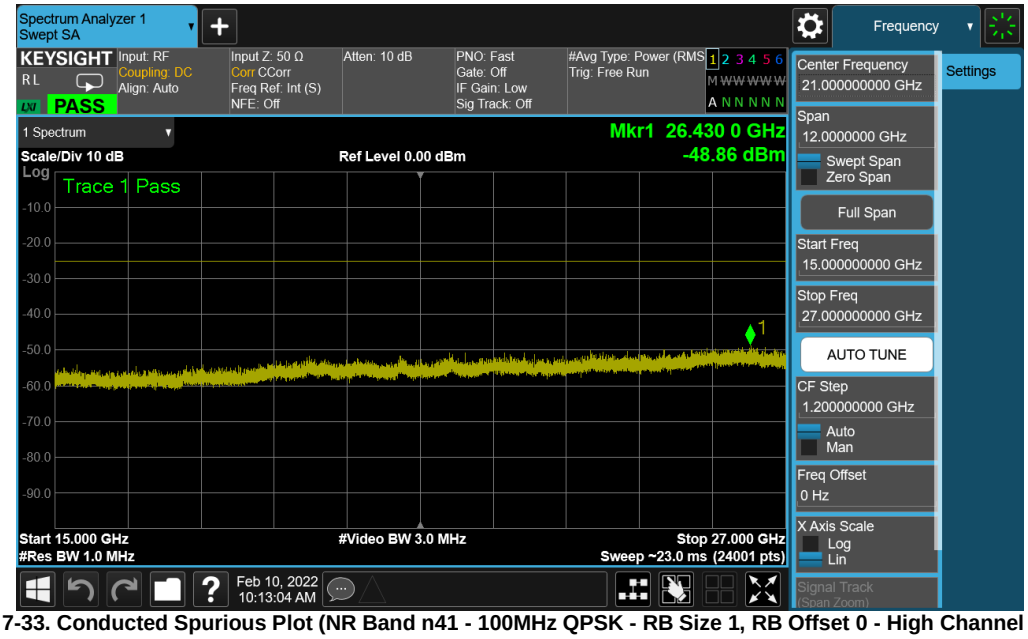
Plot 7-30. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant I)



Plot 7-31. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant I)

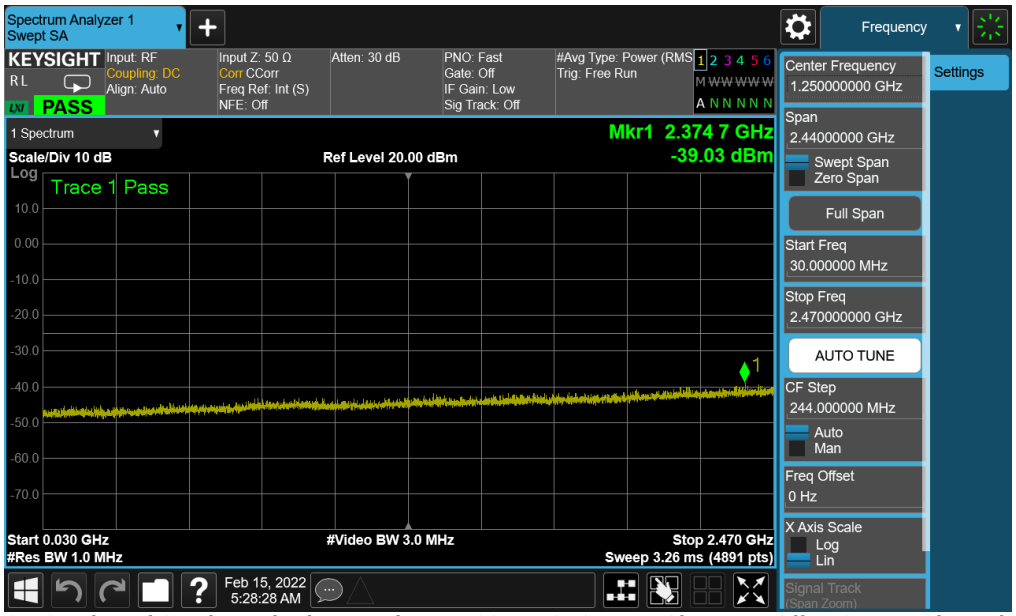


Plot 7-32. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant I)

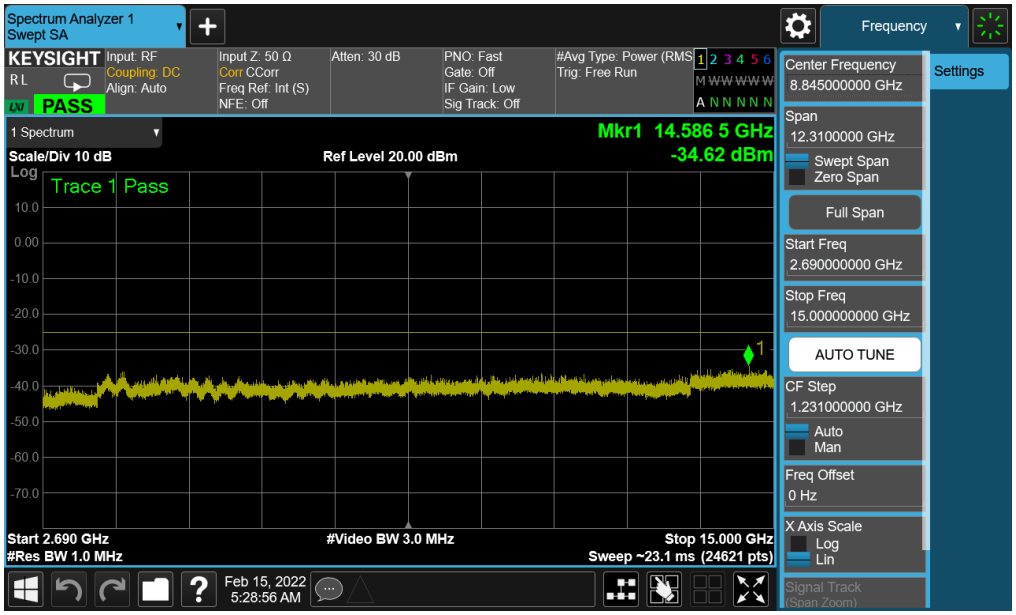


Plot 7-33. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant I)

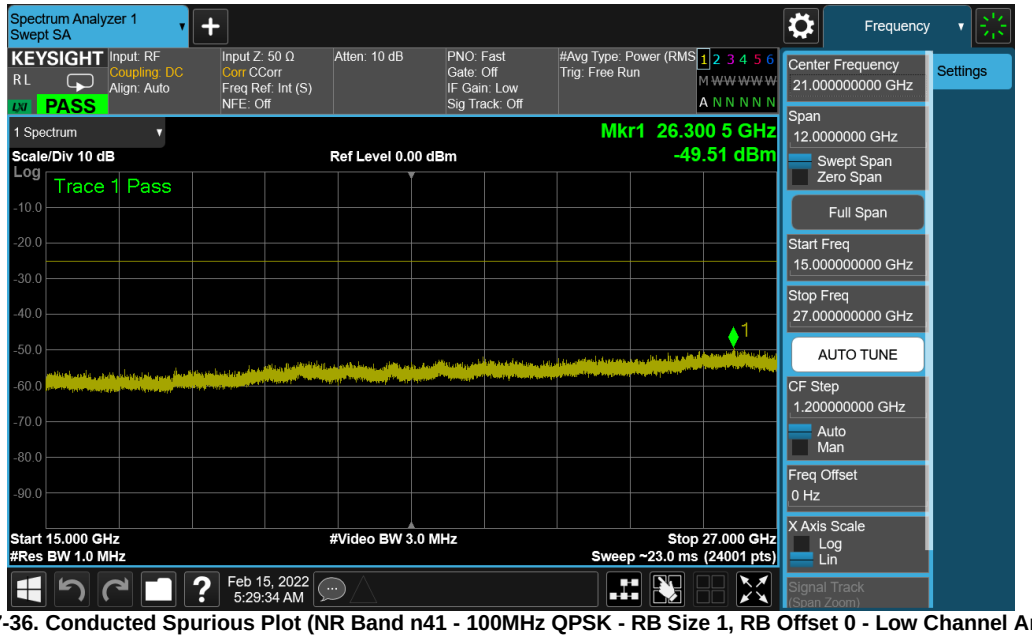
NR Band n41 –SRS-2 - Ant B



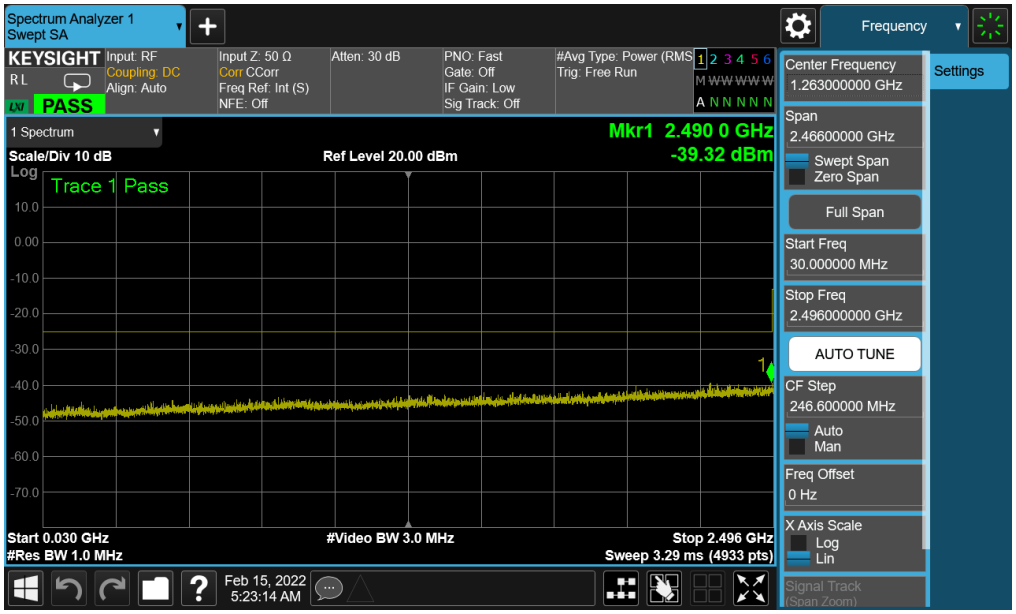
Plot 7-34. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant B)



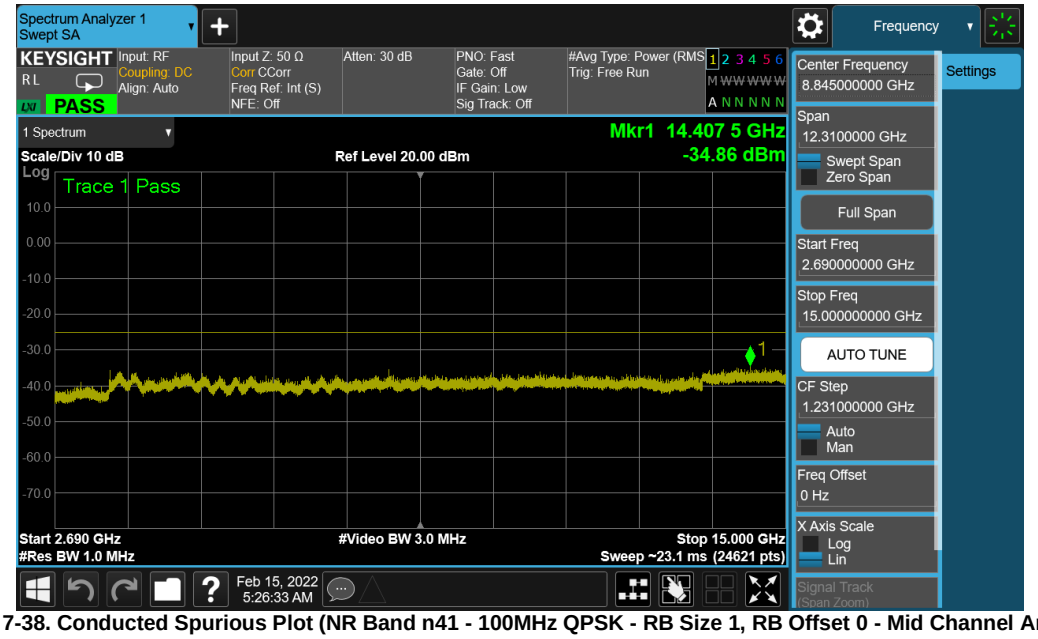
Plot 7-35. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant B)



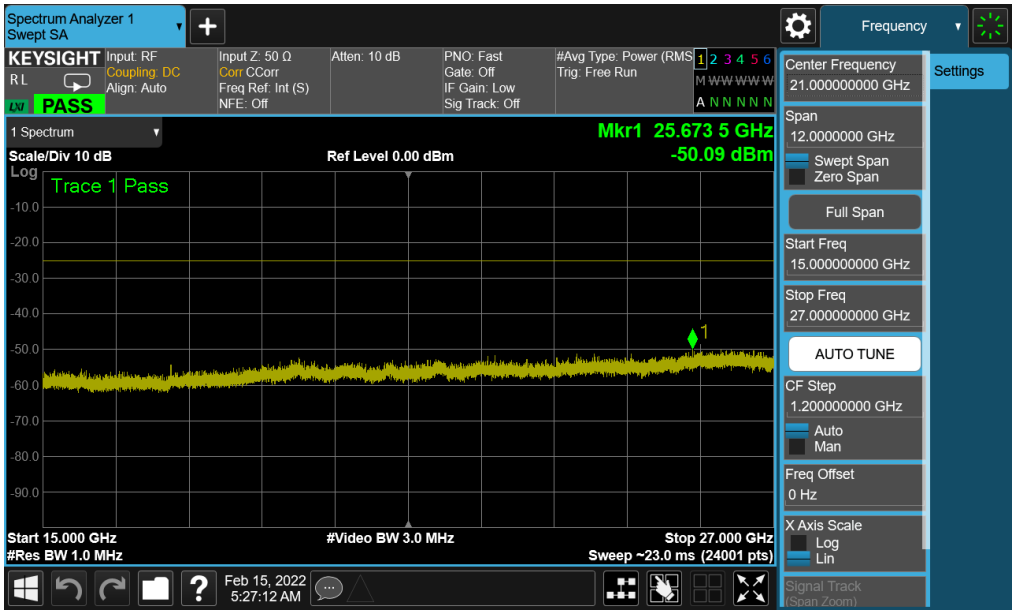
Plot 7-36. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant B)



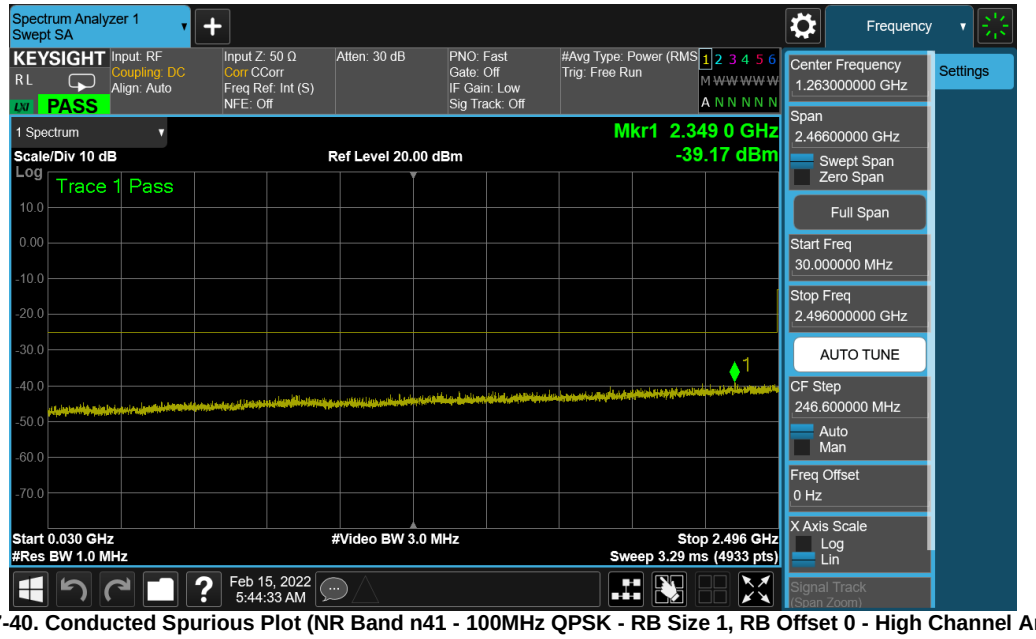
Plot 7-37. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant B)



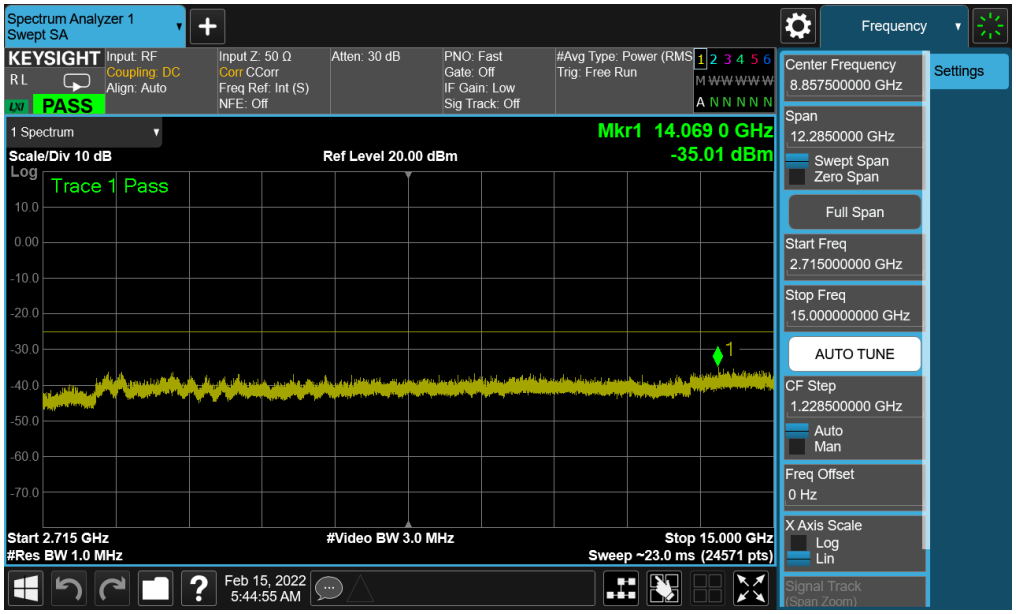
Plot 7-38. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant B)



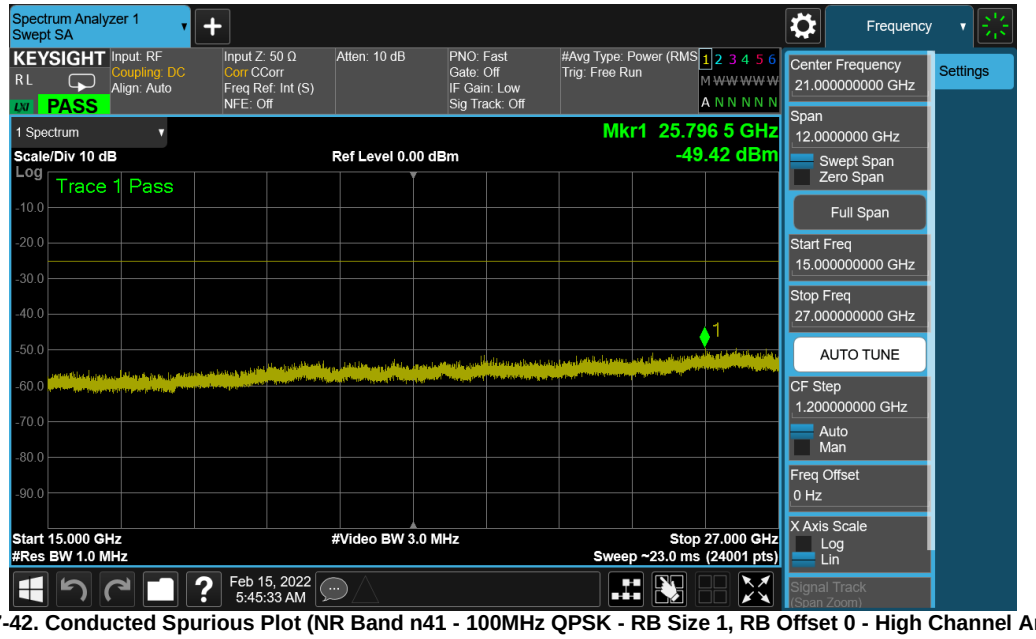
Plot 7-39. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant B)



Plot 7-40. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant B)

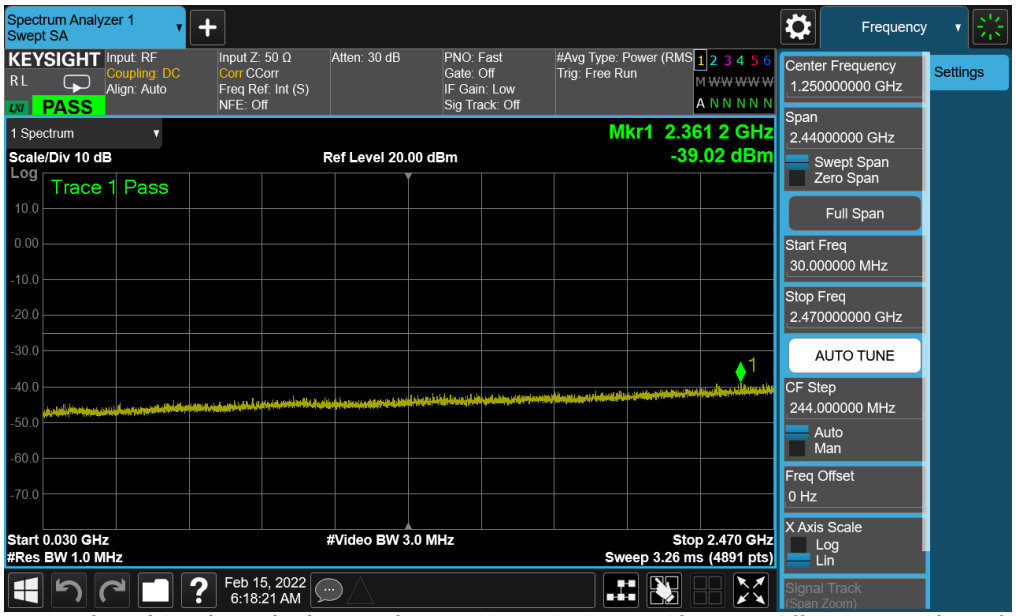


Plot 7-41. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant B)

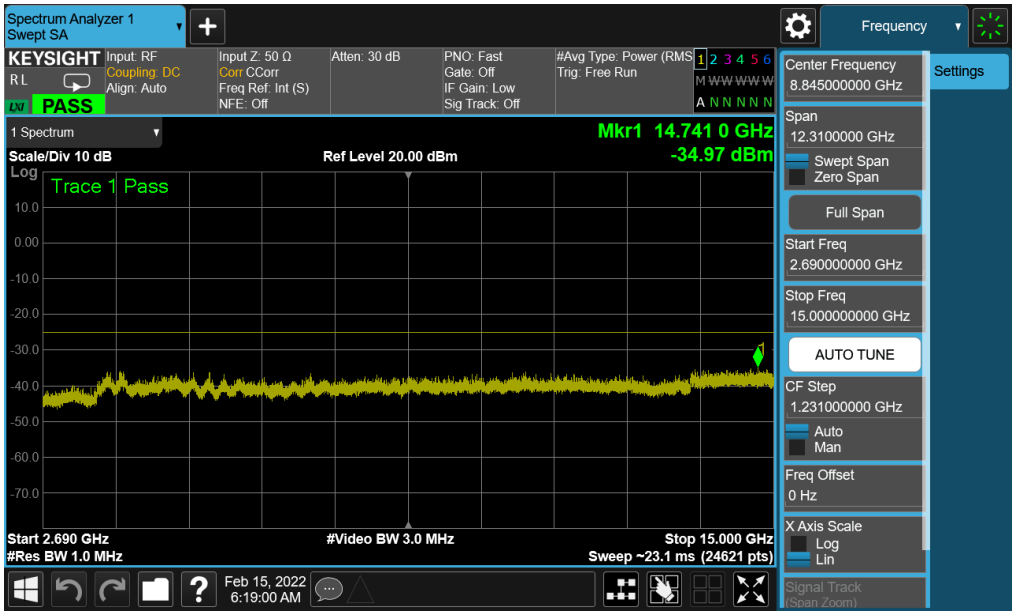


Plot 7-42. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant B)

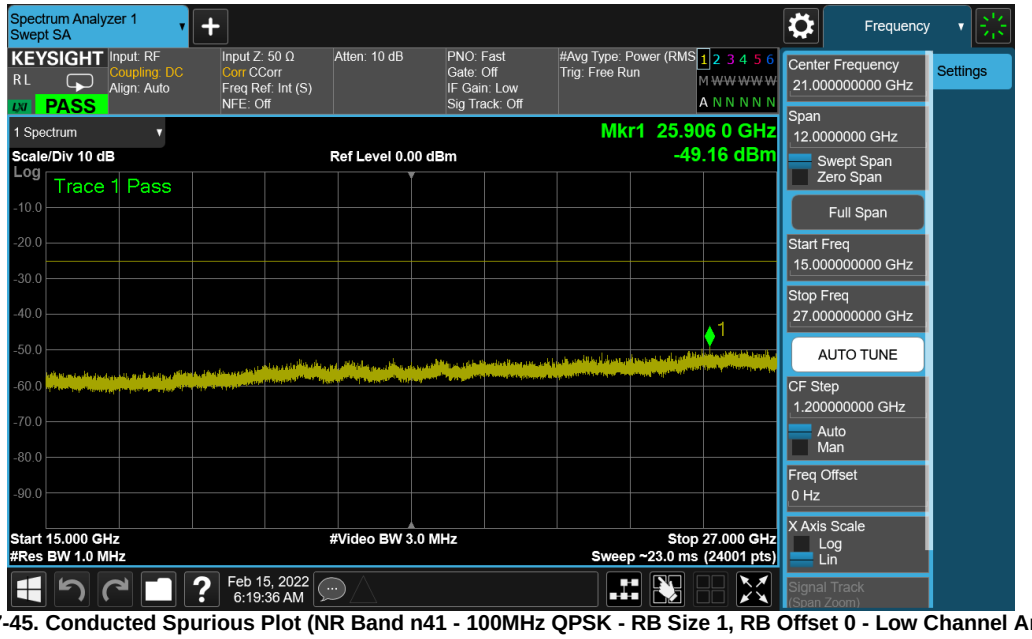
NR Band n41 – SRS 3 -Ant D



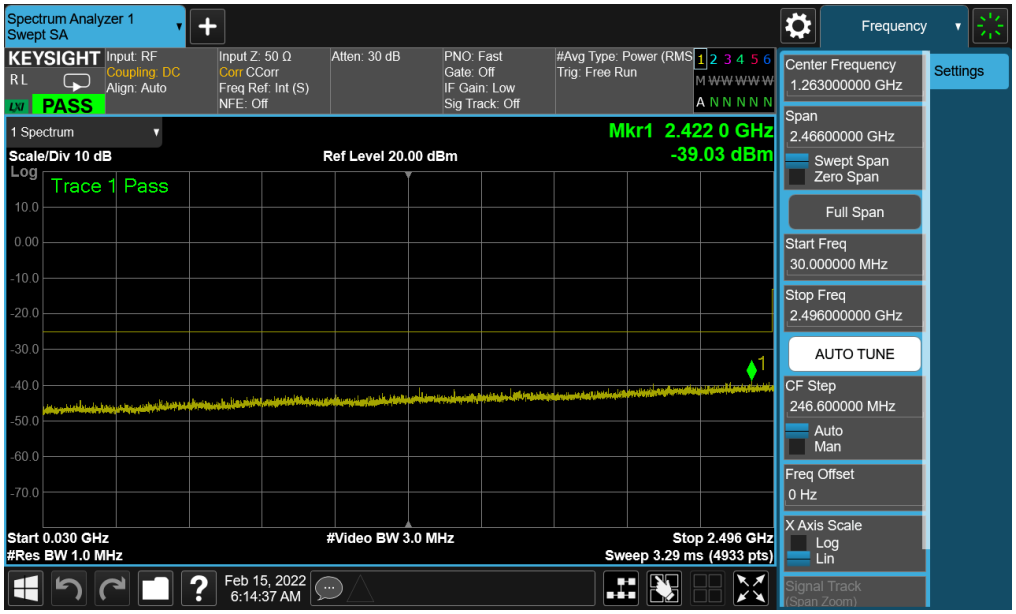
Plot 7-43. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant D)



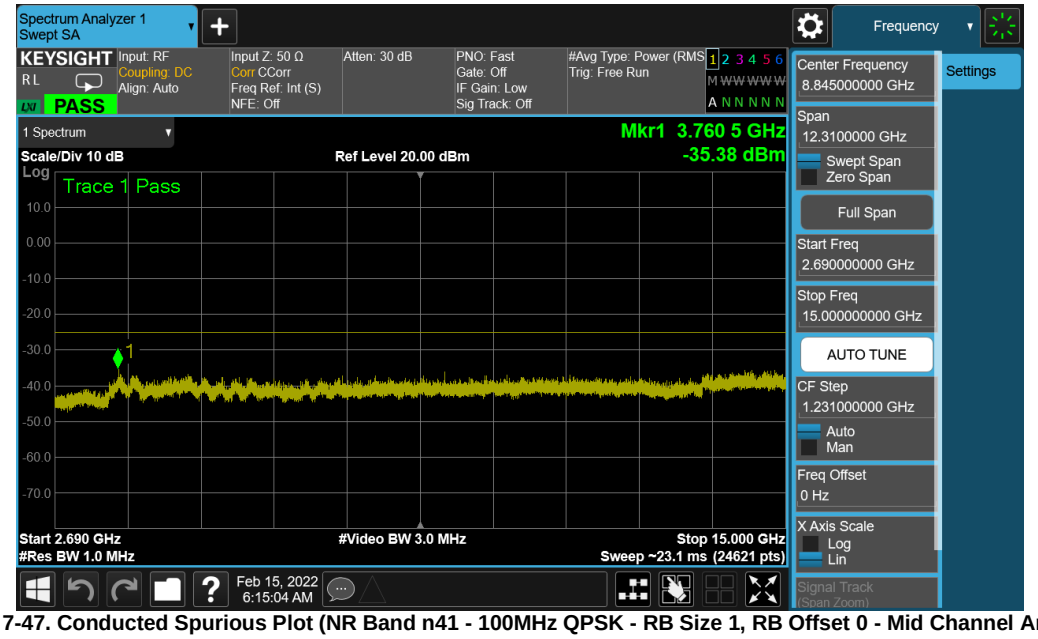
Plot 7-44. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant D)



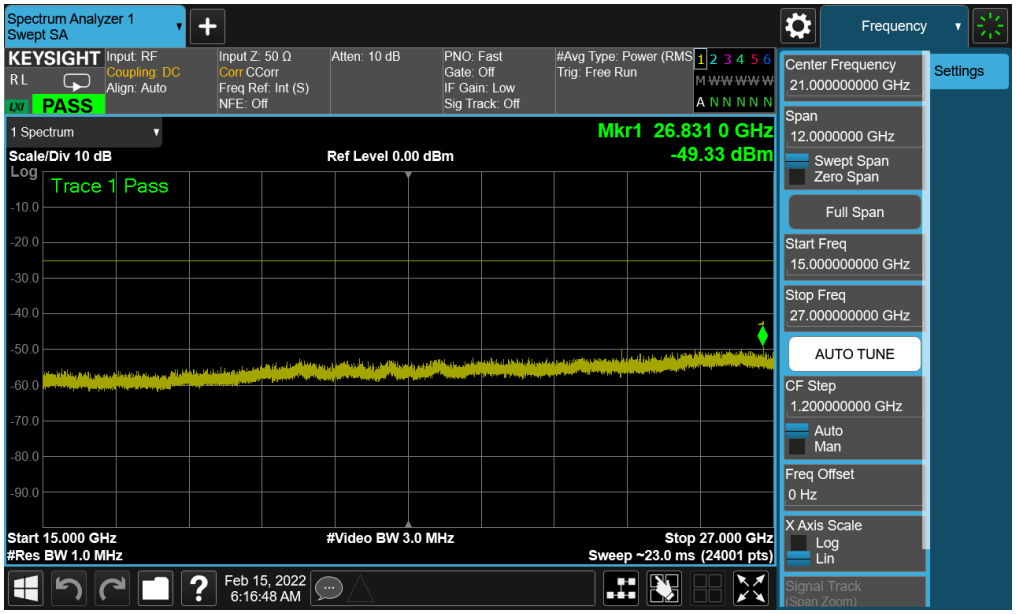
Plot 7-45. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant D)



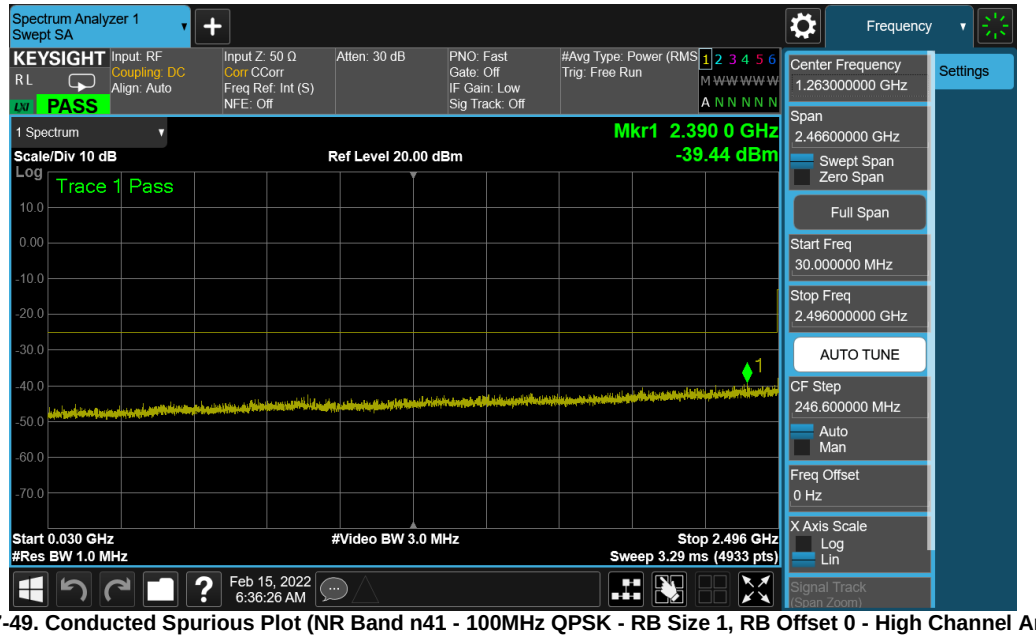
Plot 7-46. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant D)



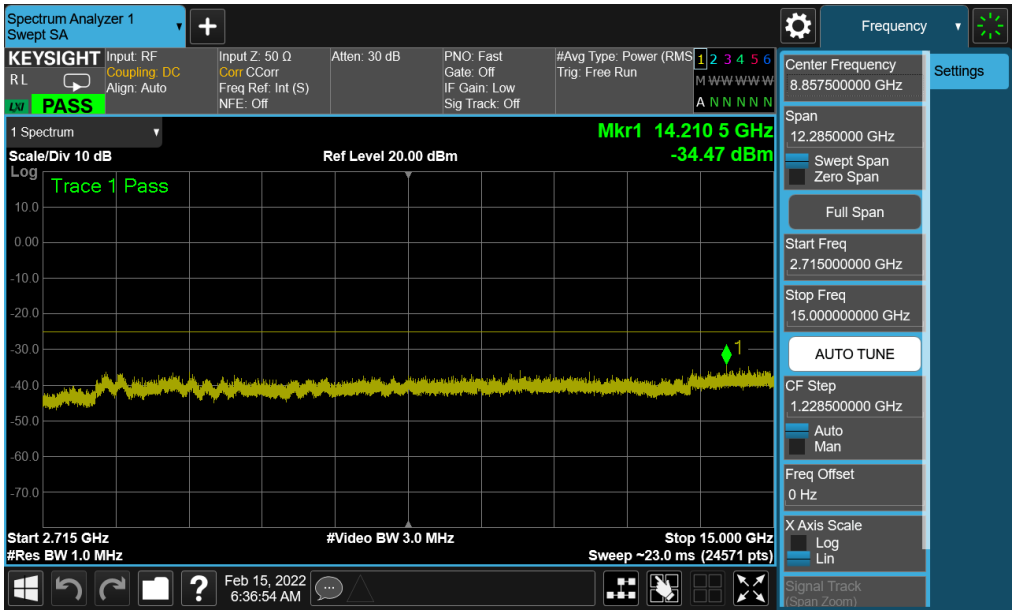
Plot 7-47. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant D)



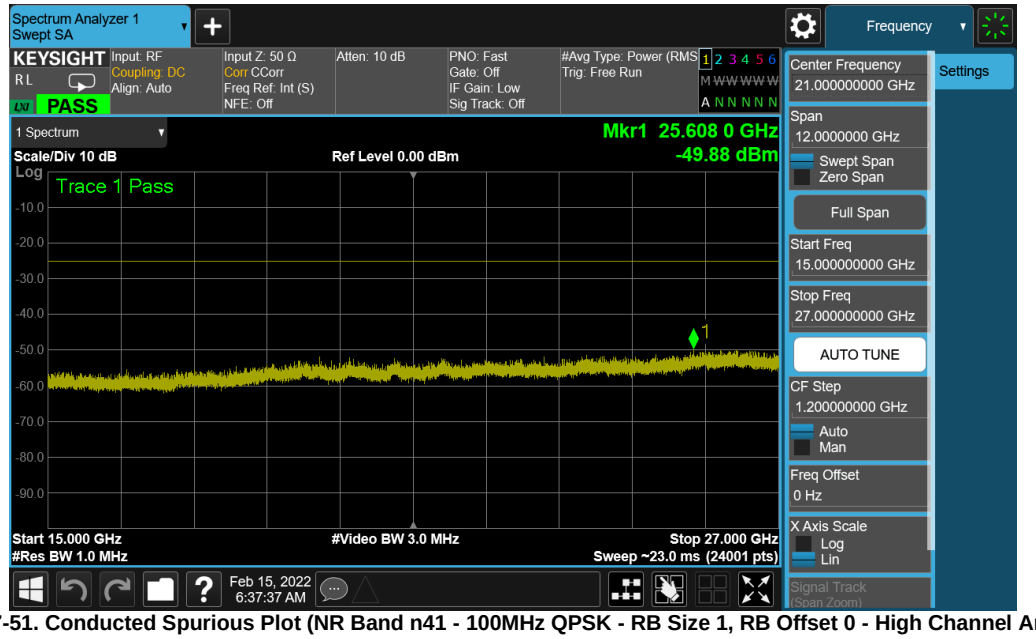
Plot 7-48. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant D)



Plot 7-49. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant D)

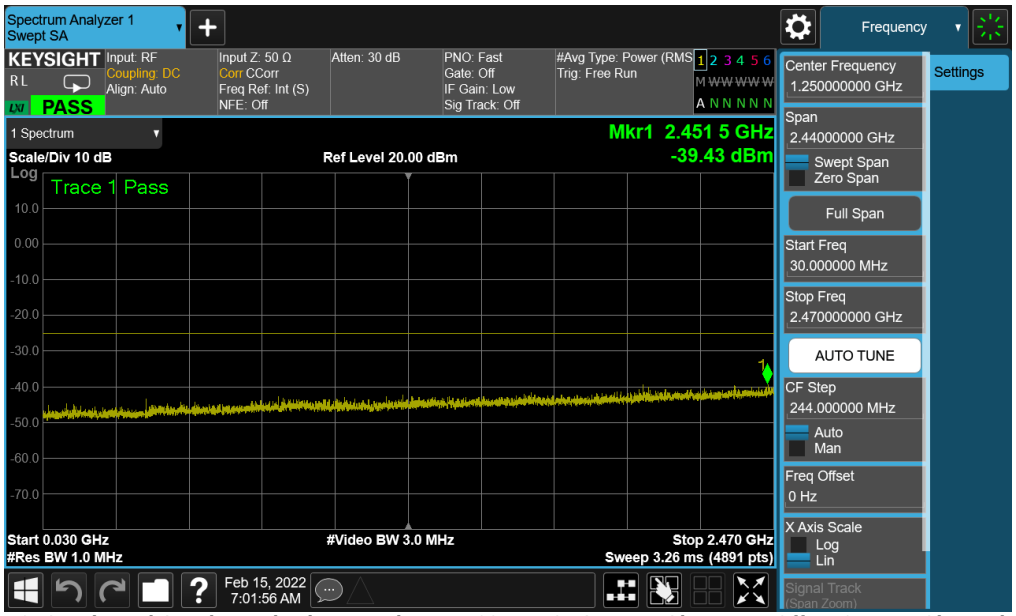


Plot 7-50. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant D)

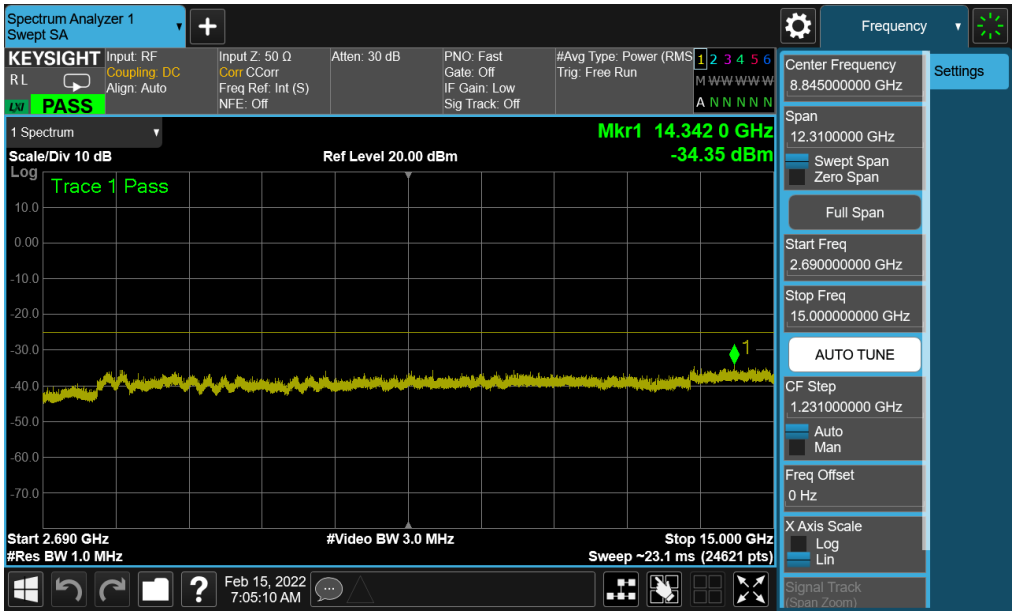


Plot 7-51. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - High Channel Ant D)

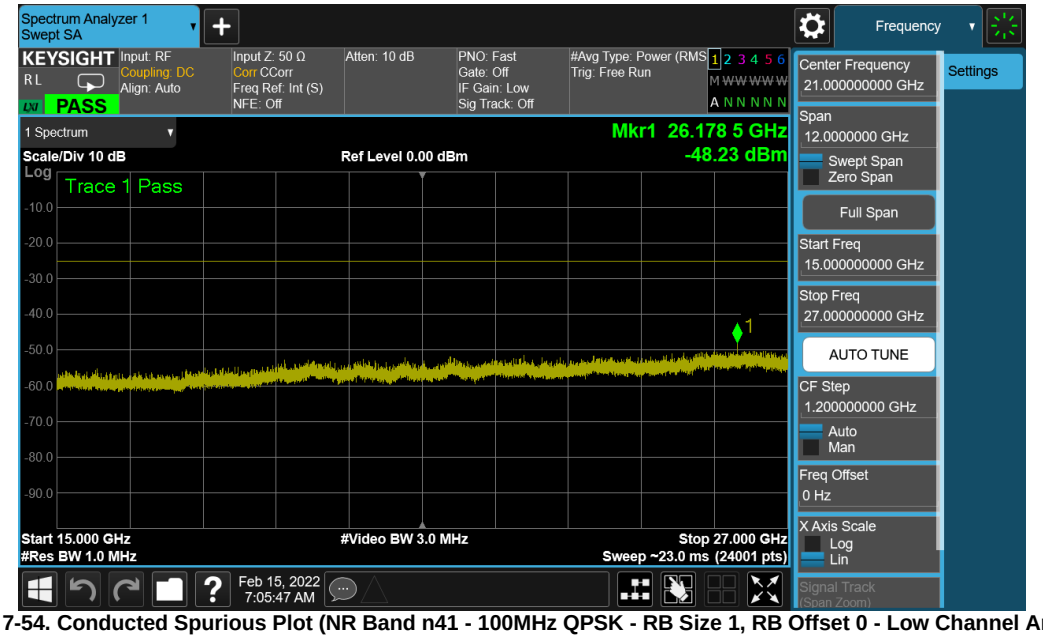
NR Band n41 – SRS 4 - Ant E



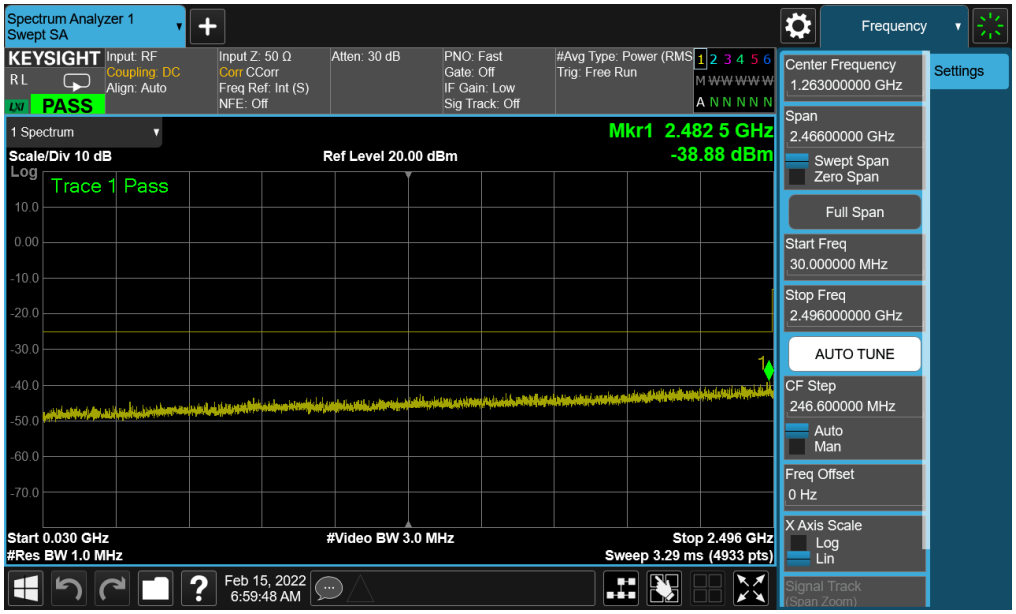
Plot 7-52. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant E)



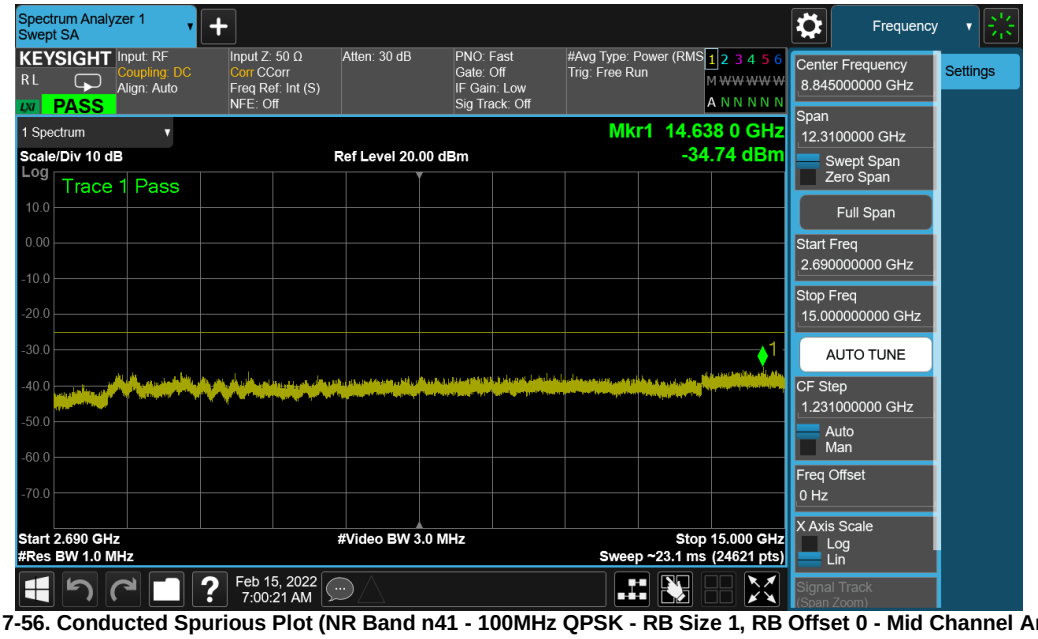
Plot 7-53. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant E)



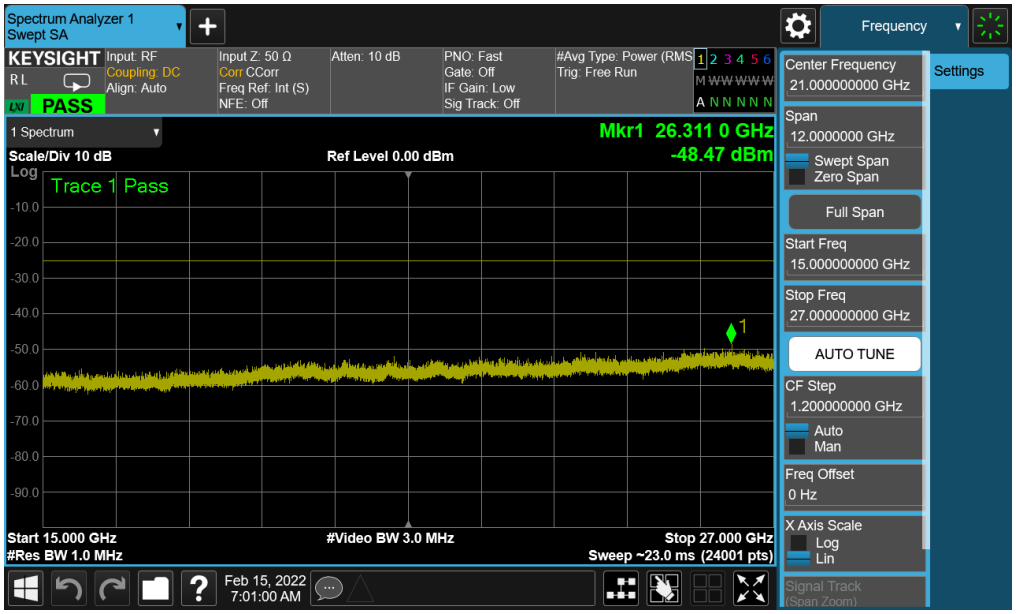
Plot 7-54. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Low Channel Ant E)



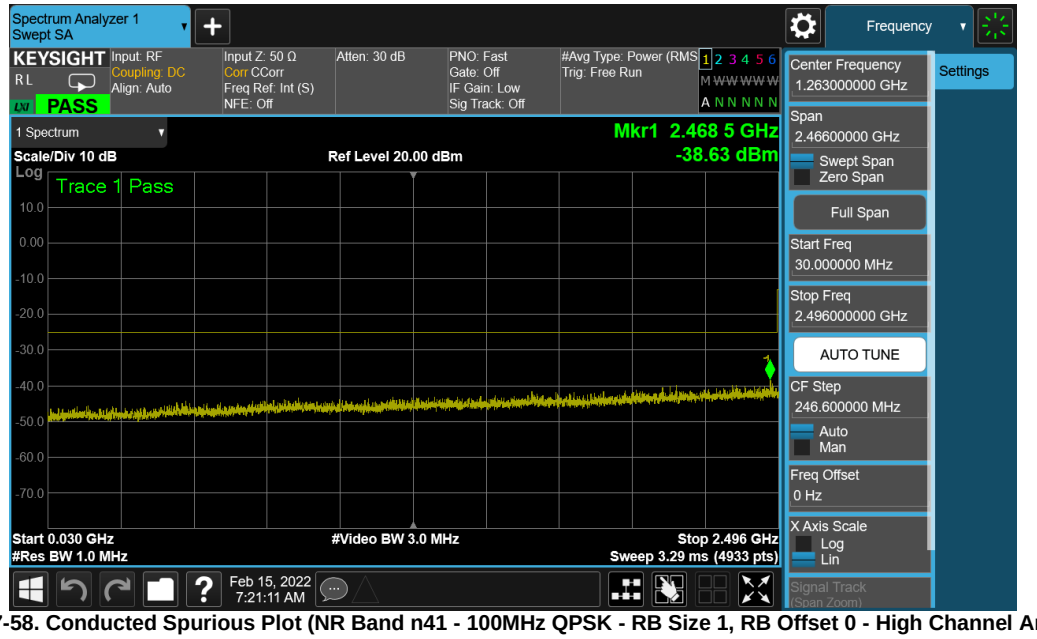
Plot 7-55. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant E)



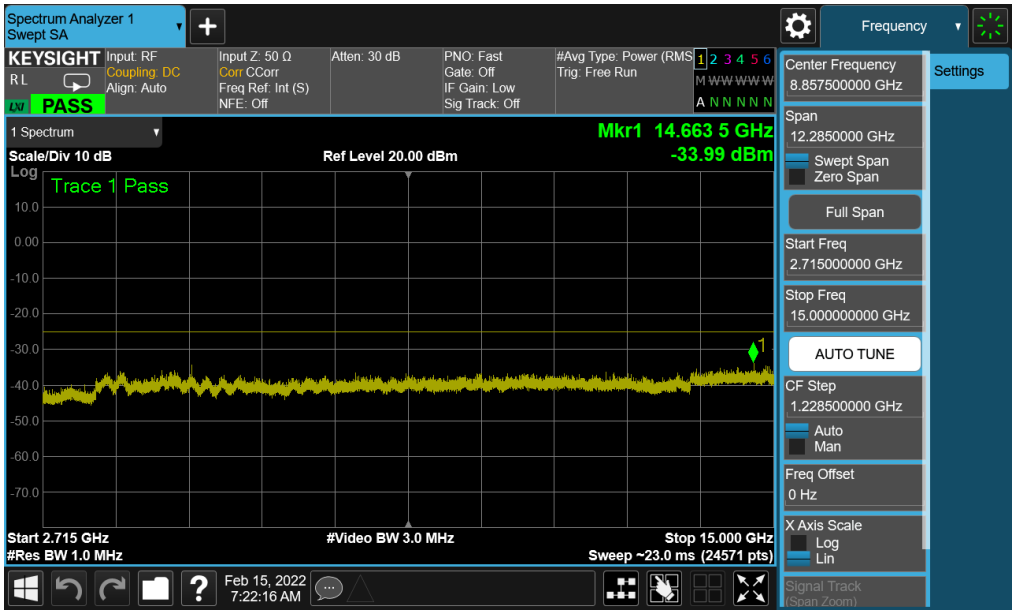
Plot 7-56. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant E)



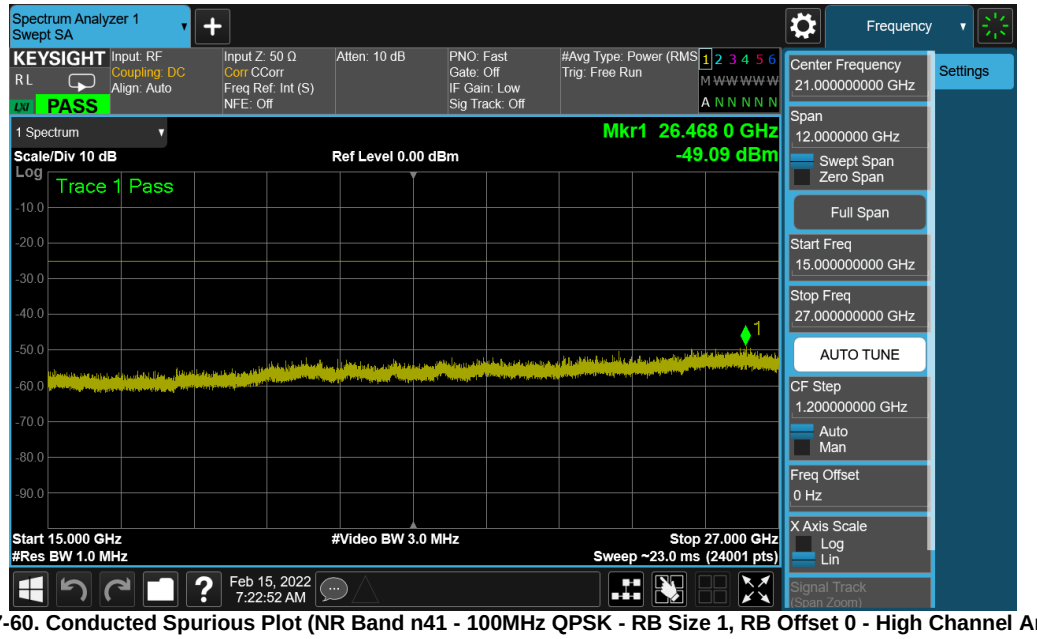
Plot 7-57. Conducted Spurious Plot (NR Band n41 - 100MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel Ant E)



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



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



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

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 Band 41 is as noted in the Test Notes on the following page.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

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.

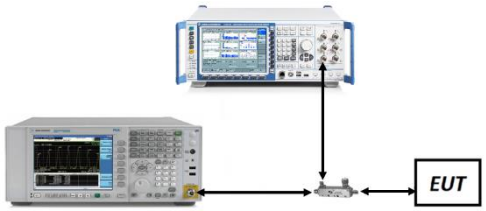


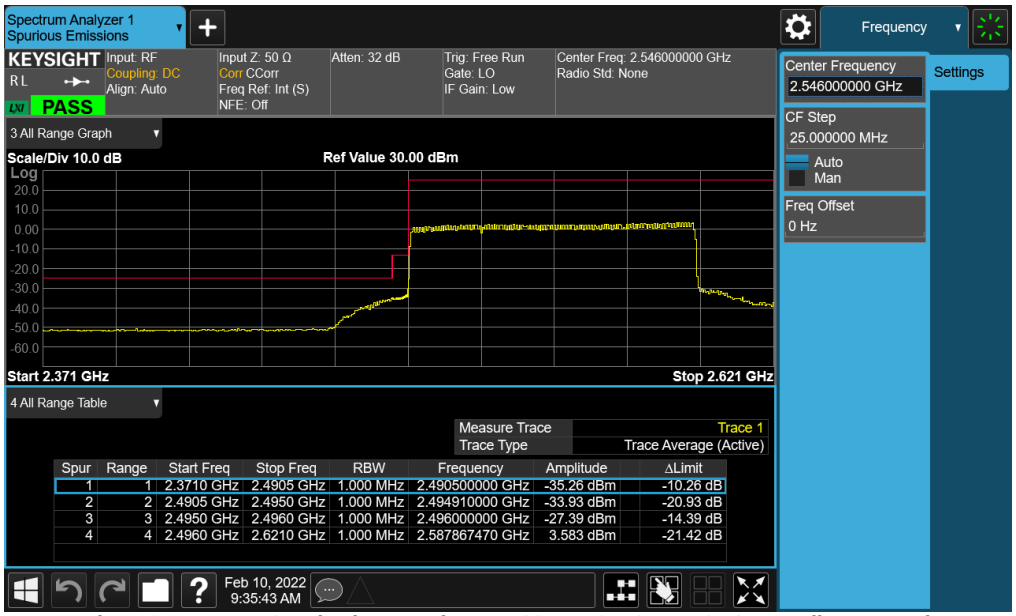
Figure 7-4. Test Instrument & Measurement Setup

Test Notes

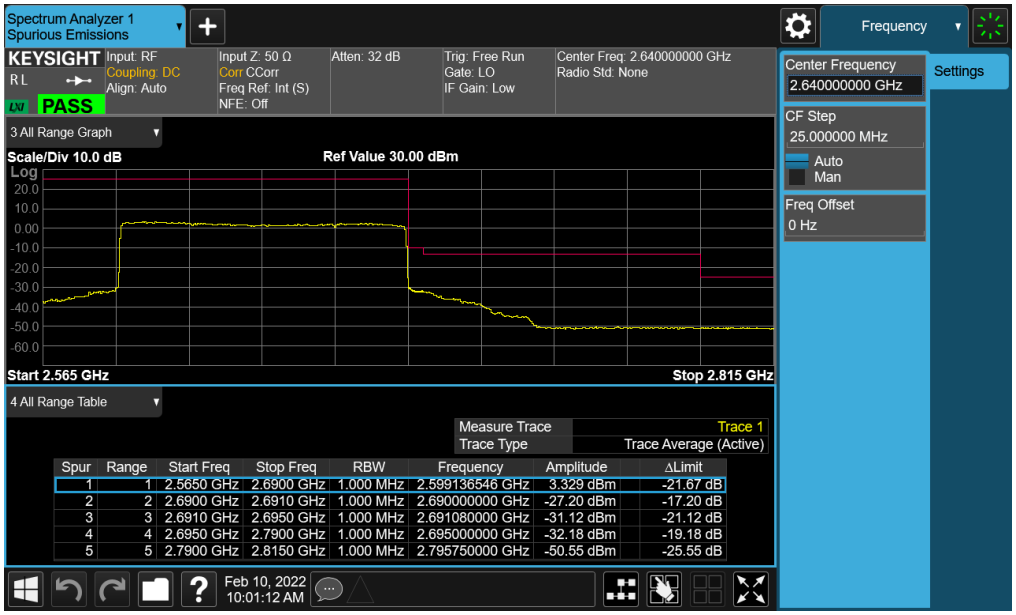
1. Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 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.

NR Band n41 – SRS 1 - Ant I



Plot 7-61. Lower ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB - Ant I)



Plot 7-62. Upper ACP Plot (NR Band n41 - 100MHz CP-OFDM-QPSK – Full RB - Ant I)