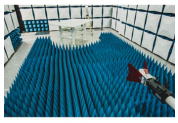
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 27 MEASUREMENT REPORT

Applicant Name:
Microsoft Corporation
One Microsoft way
Redmond, WA, 98052
United States

Date of Testing:
5/25/2021 - 9/2/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2105200048-05-R1.C3K

FCC ID:	**C3K1995**
Applicant Name:	**Microsoft Corporation**

Application Type:	Certification
Model:	1995
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	27
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01

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.

Note: This revised Test Report (S/N: 1M2105060048-05-R1.C3K) supersedes and replaces the previously issued test report on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly

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

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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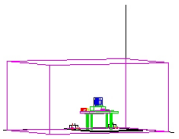
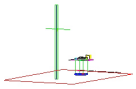


PART 27 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 30	10 MHz	QPSK	2310.0	0.240	23.81	9M00G7D
		16QAM	2310.0	0.204	23.10	8M98W7D
	5 MHz	QPSK	2307.5 - 2312.5	0.244	23.88	4M51G7D
		16QAM	2307.5 - 2312.5	0.207	23.16	4M51W7D
LTE Band 7	20 MHz	QPSK	2510.0 - 2560.0	0.383	25.83	17M9G7D
		16QAM	2510.0 - 2560.0	0.327	25.15	18M0W7D
	15 MHz	QPSK	2507.5 - 2562.5	0.374	25.73	13M4G7D
		16QAM	2507.5 - 2562.5	0.334	25.24	13M5W7D
	10 MHz	QPSK	2505.0 - 2565.0	0.408	26.11	8M98G7D
		16QAM	2505.0 - 2565.0	0.314	24.97	9M04W7D
	5 MHz	QPSK	2502.5 - 2567.5	0.376	25.75	4M51G7D
		16QAM	2502.5 - 2567.5	0.339	25.30	4M51W7D
LTE Band 41(PC2)	20 MHz	QPSK	2506.0 - 2680.0	0.424	26.27	17M9G7D
		16QAM	2506.0 - 2680.0	0.448	26.51	17M9W7D
	15 MHz	QPSK	2503.5 - 2682.5	0.425	26.28	13M5G7D
		16QAM	2503.5 - 2682.5	0.447	26.50	13M5W7D
	10 MHz	QPSK	2501.0 - 2685.0	0.427	26.30	9M00G7D
		16QAM	2501.0 - 2685.0	0.457	26.60	9M02W7D
	5 MHz	QPSK	2498.5 - 2687.5	0.426	26.29	4M51G7D
		16QAM	2498.5 - 2687.5	0.457	26.60	4M51W7D
NR Band n41	100 MHz	π/2 BPSK	2546.0 - 2640.0	0.204	23.10	96M7G7D
		QPSK	2546.0 - 2640.0	0.207	23.15	97M7G7D
		16QAM	2546.0 - 2640.0	0.156	21.94	98M1W7D
	90 MHz	π/2 BPSK	2541.0 - 2645.0	0.201	23.03	87M3G7D
		QPSK	2541.0 - 2645.0	0.210	23.21	87M8G7D
		16QAM	2541.0 - 2645.0	0.161	22.08	87M8W7D
	80 MHz	π/2 BPSK	2536.0 - 2650.0	0.203	23.07	77M6G7D
		QPSK	2536.0 - 2650.0	0.212	23.25	77M9G7D
		16QAM	2536.0 - 2650.0	0.166	22.20	77M9W7D
	60 MHz	π/2 BPSK	2526.0 - 2660.0	0.222	23.47	58M1G7D
		QPSK	2526.0 - 2660.0	0.197	22.94	58M2G7D
		16QAM	2526.0 - 2660.0	0.125	20.98	58M2W7D
	50 MHz	π/2 BPSK	2521.0 - 2665.0	0.220	23.42	45M9G7D
		QPSK	2521.0 - 2665.0	0.222	23.46	47M7G7D
		16QAM	2521.0 - 2665.0	0.142	21.53	47M9W7D
	40 MHz	π/2 BPSK	2516.0 - 2670.0	0.224	23.50	35M9G7D
		QPSK	2516.0 - 2670.0	0.228	23.59	38M0G7D
		16QAM	2516.0 - 2670.0	0.164	22.15	37M9W7D
	30 MHz	π/2 BPSK	2511.0 - 2675.0	0.224	23.50	26M9G7D
		QPSK	2511.0 - 2675.0	0.167	22.23	27M9G7D
		16QAM	2511.0 - 2675.0	0.156	21.92	28M0W7D
	20 MHz	π/2 BPSK	2506.0 - 2680.0	0.225	23.53	18M0G7D
		QPSK	2506.0 - 2680.0	0.222	23.47	18M3G7D
		16QAM	2506.0 - 2680.0	0.156	21.92	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 **Microsoft Corporation Portable Handset FCC ID:C3K1995**. 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.: 45346, 48084, 47888, 46328, 50387, M4211

2.2 Device Capabilities

This device contains the following capabilities:

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

2.3 Test Configuration

The EUT was tested per the guidance of ANSI/TIA-603-E-2016 and KDB 971168 D01 v03r01. See Section 3.2 of this test report for a description of the radiated and antenna port conducted emissions tests.

This device supports open and closed configurations. Multiple angles are tested and the worst case radiated emissions data is shown in the report.

2.4 Software and Firmware

The firmware installed during testing was Build number developer - generic 2021.728.20.

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 "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 Section 5.8.4. 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 474788 D01.

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
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Agilent	E5515C	Wireless Communications Test Set	N/A			GB46310798
Agilent	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6201525694
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Espec	ESX-2CA	Environmental Chamber	8/27/2020	Annual	8/27/2022	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3816/2NM	LISN	7/9/2020	Biennial	7/9/2022	00114451
Keysight Technologies	N9020A	MXA Signal Analyzer	9/22/2020	Annual	9/22/2021	MY54500644
Keysight Technologies	N9030A	PXA Signal Analyzer	10/16/2020	Annual	10/16/2021	MY54490576
Keysight Technologies	N9030A	PXA Signal Analyzer	9/2/2020	Annual	9/2/2021	MY55410501
Keysight Technologies	N9030B	PXA Signal Analyzer, Multi-touch	9/17/2020	Annual	9/17/2021	MY57141001
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716
Rohde & Schwarz	FSW26	2Hz-26.5GHz Signal and Spectrum Analyzer	2/10/2021	Annual	2/10/2022	103187

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: Microsoft Corporation

FCC ID: C3K1995

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

Mode(s): LTE/NR/ULCA

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	N/A	PASS	Section 7.3
	Conducted Band Edge / Spurious Emissions (LTE Band 30)	2.1051, 27.53(a)	Undesirable emissions must meet the limits detailed in 27.53(a)	PASS	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (LTE Band 7)	2.1051, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (LTE Band 41)			PASS	Sections 7.4, 7.5
	Conducted Band Edge / Spurious Emissions (NR Band n41)			PASS	Sections 7.4, 7.5
	Transmitter Conducted Output Power	2.1046	N/A	PASS	Section 7.2
	Frequency Stability	2.1055, 27.54	Fundamental emissions stay within authorized frequency block	PASS	Section 7.9
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 30)	27.50(a)(3)	< 0.25 Watts max. EIRP	PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 7)	27.50(h)(2)	< 2 Watts max. EIRP	PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 41)			PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n41)			PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 30)	2.1053, 27.53(a)	> 70 + 10log10(P[Watts])	PASS	Section 7.8
	Radiated Spurious Emissions (LTE Band 7)	2.1053, 27.53(m)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.8
	Radiated Spurious Emissions (LTE Band 41)			PASS	Section 7.8
	Radiated Spurious Emissions (NR Band n41)			PASS	Section 7.8

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST EMC Software Tool v1.0.

7.2 Conducted Power Output Data

§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.

A-MPR is implemented in this device 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

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.

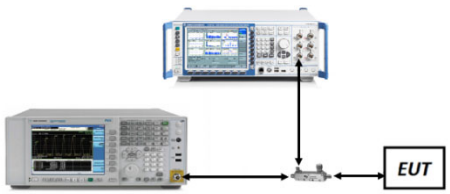


Figure 7-1. Test Instrument & Measurement Setup

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	20850	2510.0	1 / 0	24.98
		21100	2535.0	1 / 99	24.94
		21350	2560.0	1 / 0	24.95
	16-QAM	20850	2510.0	1 / 50	24.36
15 MHz	QPSK	20825	2507.5	1 / 0	24.96
		21100	2535.0	1 / 74	24.97
		21375	2562.5	1 / 0	24.96
	16-QAM	20825	2507.5	1 / 37	24.70
10 MHz	QPSK	20800	2505.0	1 / 49	24.95
		21100	2535.0	1 / 49	24.96
		21400	2565.0	1 / 25	24.90
	16-QAM	20800	2505.0	1 / 25	24.43
5 MHz	QPSK	20775	2502.5	1 / 12	24.94
		21100	2535.0	1 / 12	25.01
		21425	2567.5	1 / 24	24.95
	16-QAM	21425	2567.5	1 / 0	24.40

Table 7-2. Conducted Power Output Data (LTE Band 7 – North)

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
20 MHz	QPSK	39750	2506.0	1 / 0	24.58
		40620	2593.0	1 / 0	24.90
		41490	2680.0	1 / 0	25.21
	16-QAM	40620	2593.0	1 / 0	24.08
15 MHz	QPSK	39725	2503.5	1 / 0	24.42
		40620	2593.0	1 / 74	24.89
		41515	2682.5	1 / 0	25.16
	16-QAM	40620	2593.0	1 / 0	24.03
10 MHz	QPSK	39700	2501.0	1 / 0	24.56
		40620	2593.0	1 / 0	24.94
		41540	2685.0	1 / 0	25.21
	16-QAM	40620	2593.0	1 / 0	24.09
5 MHz	QPSK	39675	2498.5	1 / 24	24.51
		40620	2593.0	1 / 12	24.89
		41565	2687.5	1 / 12	25.15
	16-QAM	40620	2593.0	1 / 12	24.11

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

Bandwidth	Modulation	Channel	Frequency [MHz]	RB Size/Offset	Conducted Power [dBm]
100 MHz	π/2 BPSK	509202	2546.0	273 / 0	22.73
		518598	2593.0	1 / 68	22.77
		528000	2640.0	1 / 136	22.79
	QPSK	509202	2546.0	273 / 0	22.24
		518598	2593.0	1 / 68	22.83
		528000	2640.0	1 / 136	22.69
	16-QAM	518598	2593.0	1 / 68	22.18
90 MHz	π/2 BPSK	508200	2541.0	1 / 183	22.75
		518592	2593.0	1 / 61	22.80
		529002	2645.0	1 / 183	22.80
	QPSK	508200	2541.0	1 / 183	22.73
		518592	2593.0	1 / 61	22.77
		529002	2645.0	1 / 183	22.71
	16-QAM	508200	2541.0	1 / 183	22.18
80 MHz	π/2 BPSK	507204	2536.0	1 / 162	22.79
		518598	2593.0	1 / 54	22.82
		529998	2650.0	1 / 108	22.89
	QPSK	507204	2536.0	1 / 162	22.81
		518598	2593.0	1 / 54	22.86
		529998	2650.0	1 / 108	22.77
	16-QAM	507204	2536.0	1 / 162	22.24
60 MHz	π/2 BPSK	505200	2526.0	1 / 81	22.55
		518598	2593.0	1 / 121	22.79
		531996	2660.0	162 / 0	22.92
	QPSK	505200	2526.0	1 / 81	22.67
		518598	2593.0	1 / 81	22.73
		531996	2660.0	162 / 0	22.91
	16-QAM	518598	2593.0	1 / 121	22.57
50 MHz	π/2 BPSK	504204	2521.0	1 / 33	22.58
		518598	2593.0	1 / 66	22.74
		532998	2665.0	133 / 0	22.85
	QPSK	504204	2521.0	1 / 33	22.54
		518598	2593.0	1 / 99	22.84
		532998	2665.0	1 / 66	22.87
	16-QAM	504204	2521.0	1 / 66	22.46
40 MHz	π/2 BPSK	503202	2516.0	106 / 0	22.54
		518598	2593.0	1 / 26	22.92
		534000	2670.0	1 / 53	23.04
	QPSK	503202	2516.0	1 / 26	22.56
		518598	2593.0	1 / 79	22.90
		534000	2670.0	1 / 53	23.01
	16-QAM	503202	2516.0	1 / 53	22.56
30 MHz	π/2 BPSK	502203	2511.0	1 / 19	22.51
		518598	2593.0	1 / 58	22.52
		534999	2675.0	1 / 58	22.74
	QPSK	502203	2511.0	1 / 19	22.48
		518598	2593.0	1 / 58	22.46
		534999	2675.0	1 / 58	22.73
	16-QAM	502203	2511.0	1 / 58	22.41
20 MHz	π/2 BPSK	501204	2506.0	1 / 25	22.24
		518598	2593.0	1 / 13	22.28
		535998	2680.0	1 / 25	22.60
	QPSK	501204	2506.0	51 / 0	22.27
		518598	2593.0	1 / 13	22.27
		535998	2680.0	1 / 13	22.67
	16-QAM	535998	2680.0	1 / 13	22.72

Table 7-4. Conducted Power Output Data (NR Band n41 – North)

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.

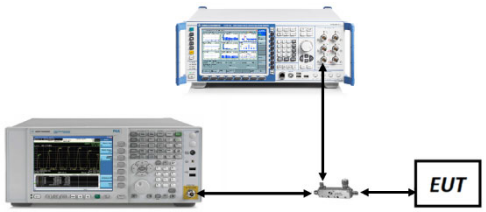
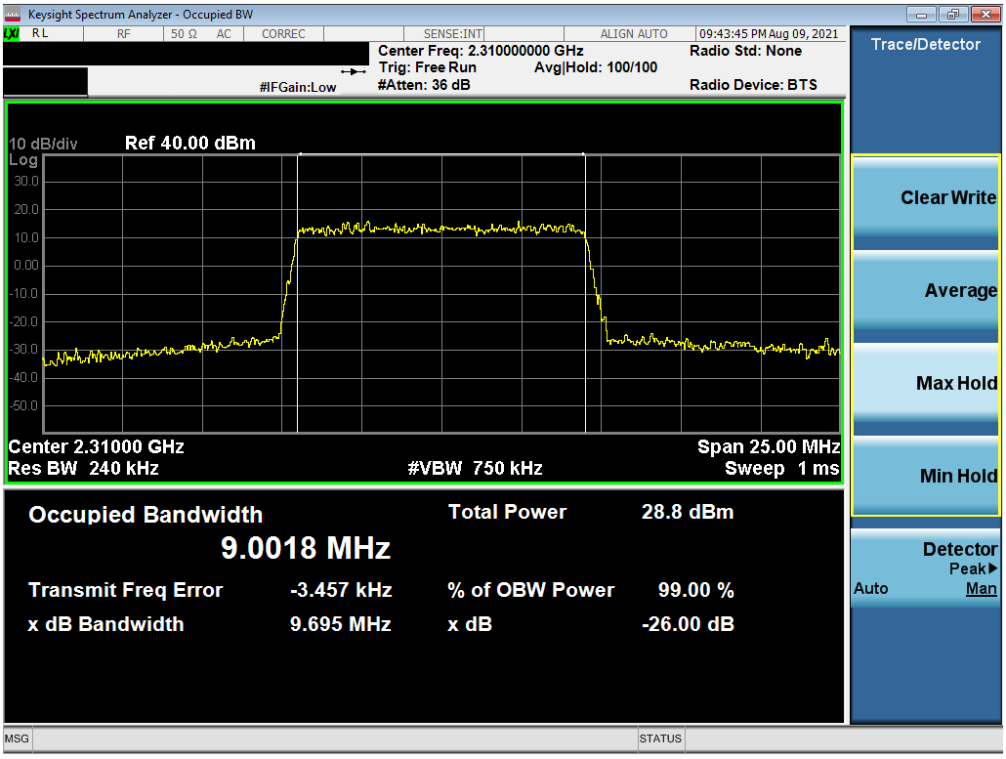


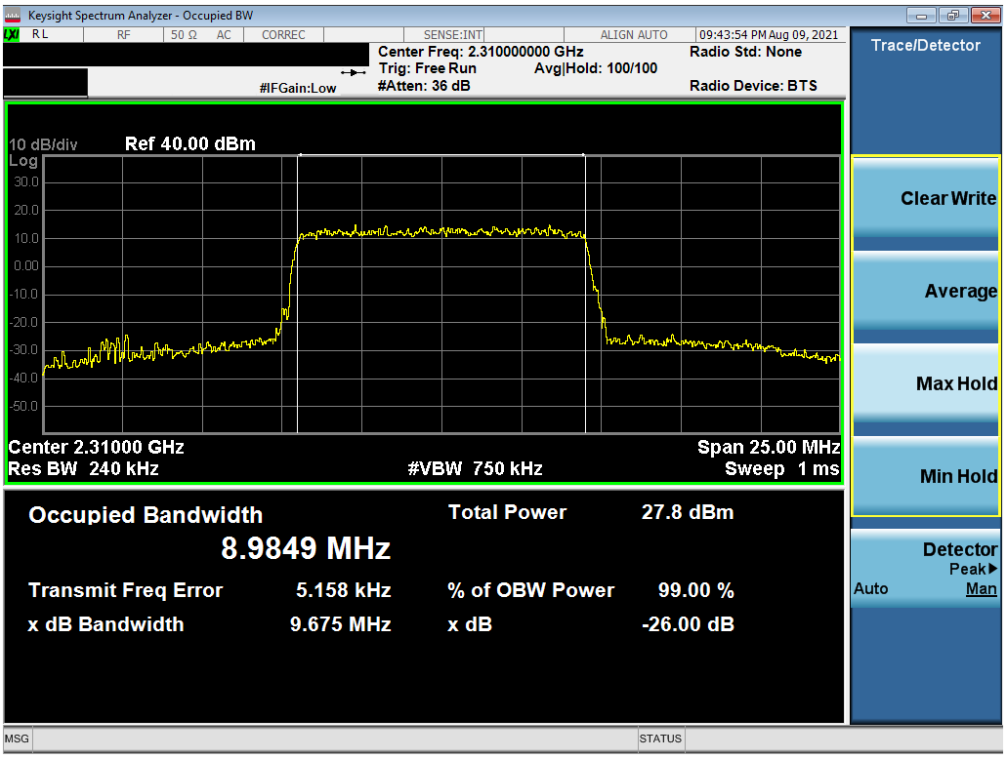
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

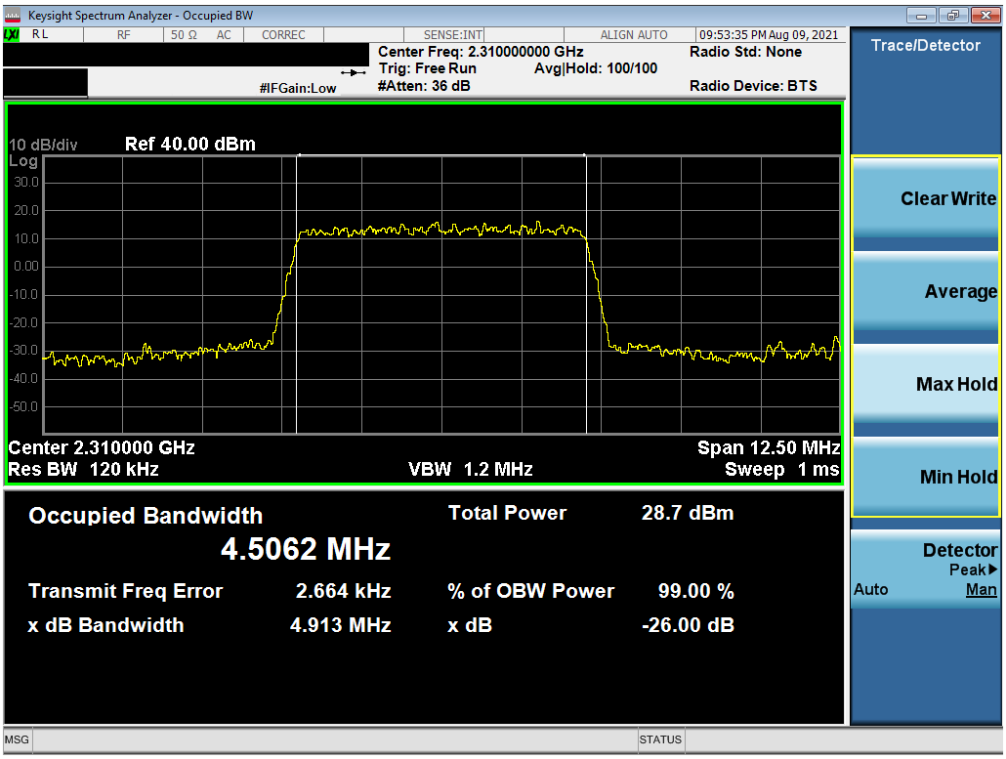
None.



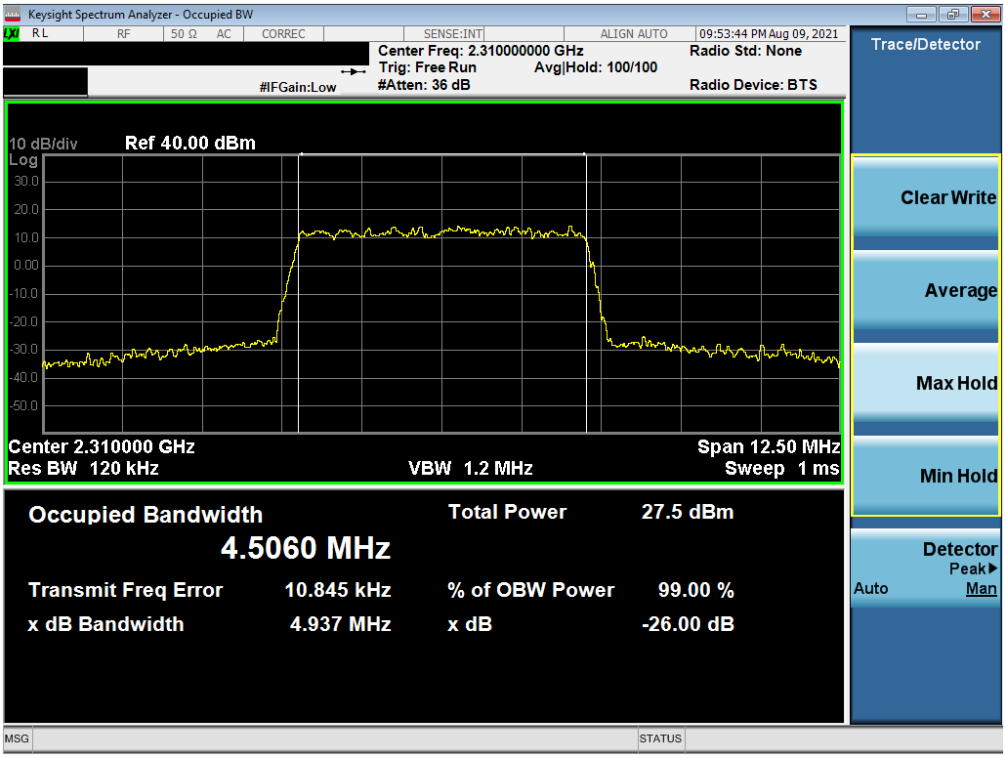
Plot 7-1. Occupied Bandwidth Plot (LTE Band 30 - 10MHz QPSK - Full RB)



Plot 7-2. Occupied Bandwidth Plot (LTE Band 30 - 10MHz 16-QAM - Full RB)

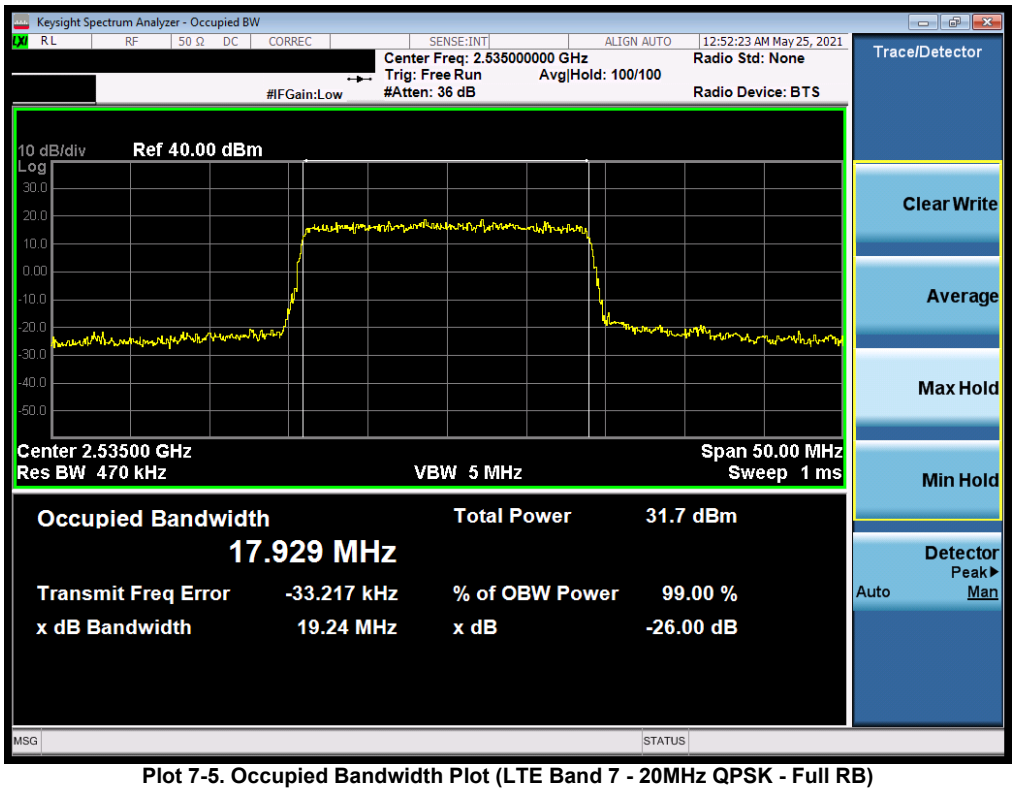


Plot 7-3. Occupied Bandwidth Plot (LTE Band 30 - 5MHz QPSK - Full RB)

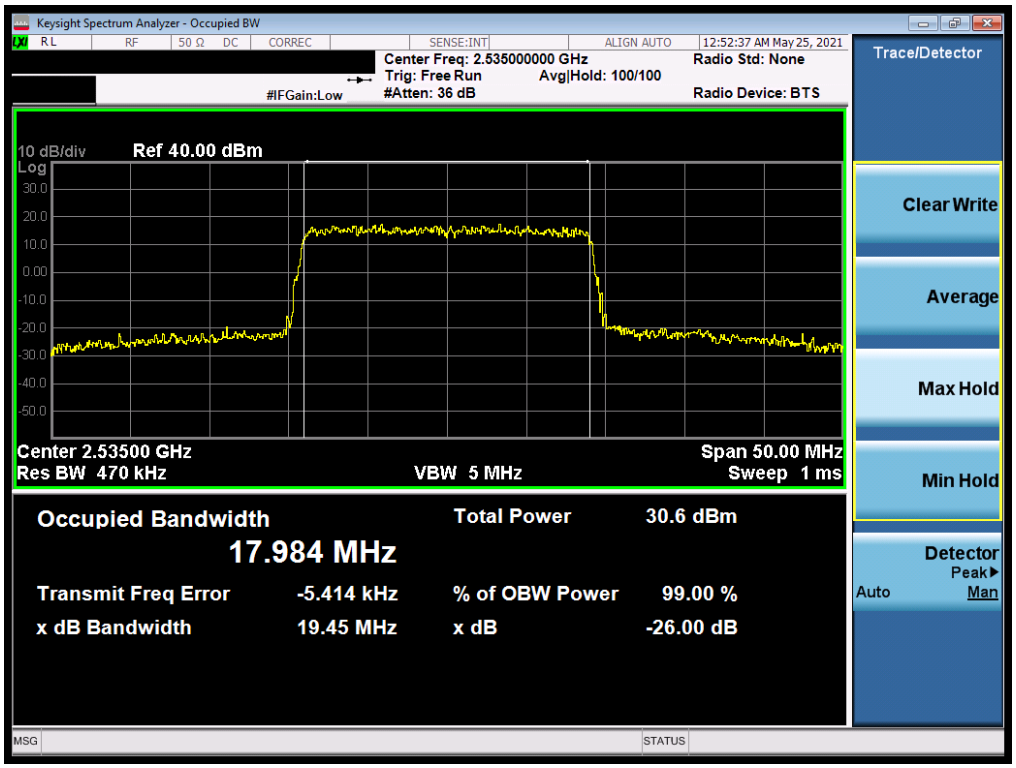


Plot 7-4. Occupied Bandwidth Plot (LTE Band 30 - 5MHz 16-QAM - Full RB)

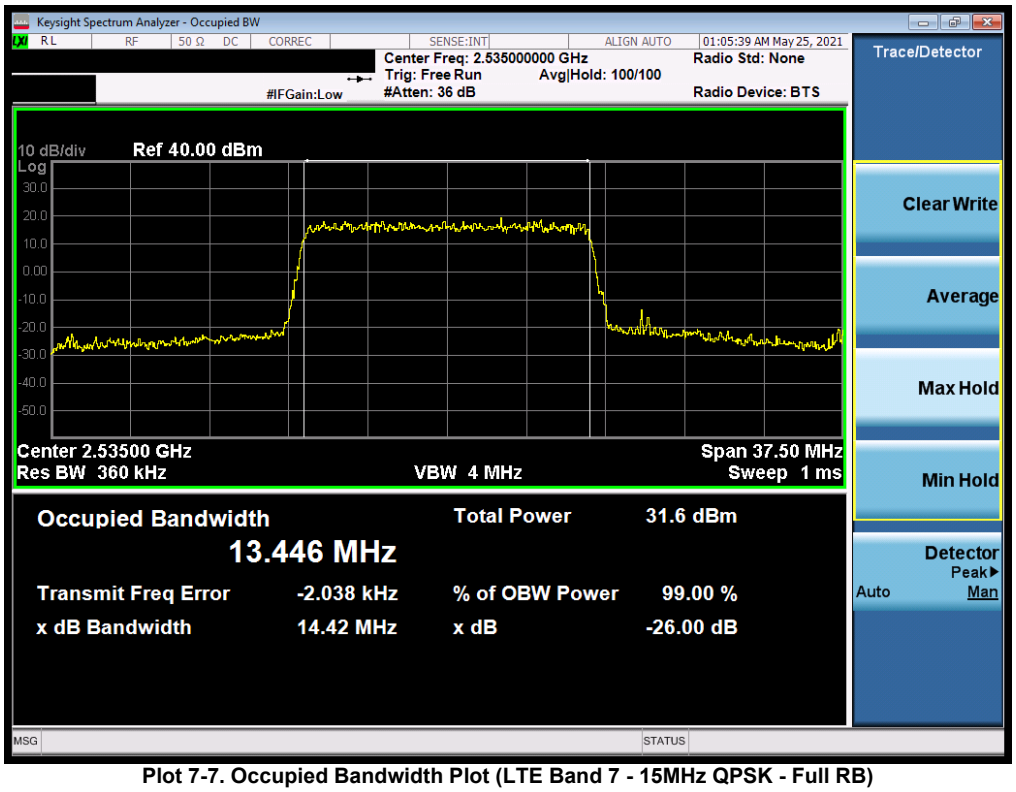
LTE Band 7



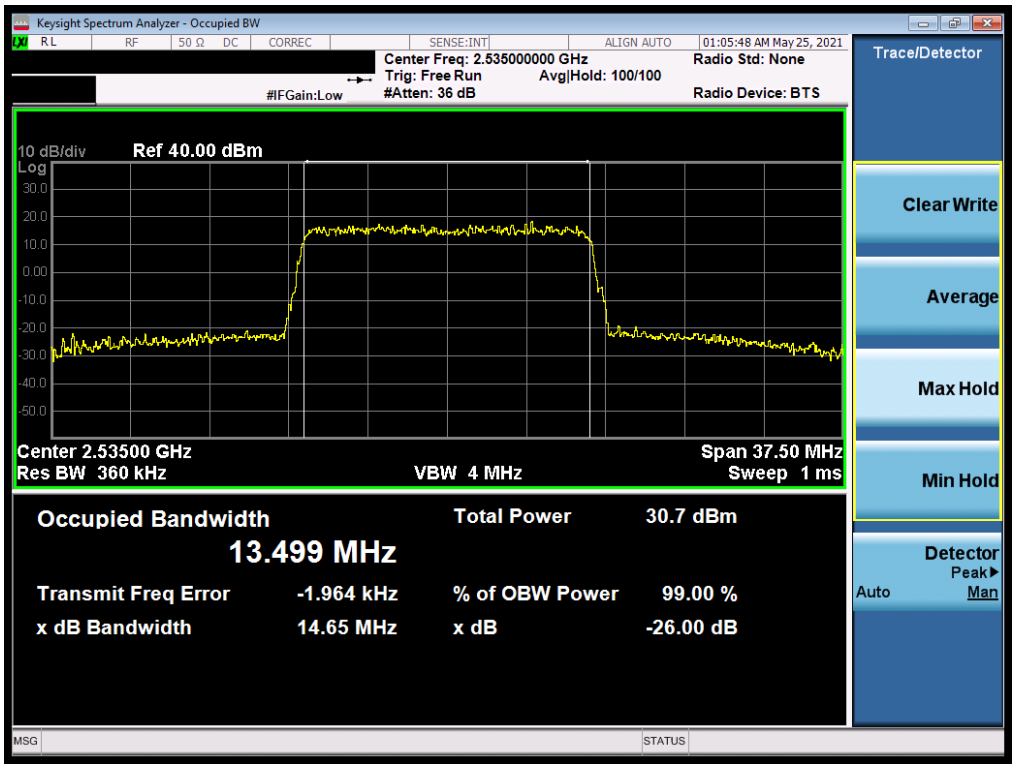
Plot 7-5. Occupied Bandwidth Plot (LTE Band 7 - 20MHz QPSK - Full RB)



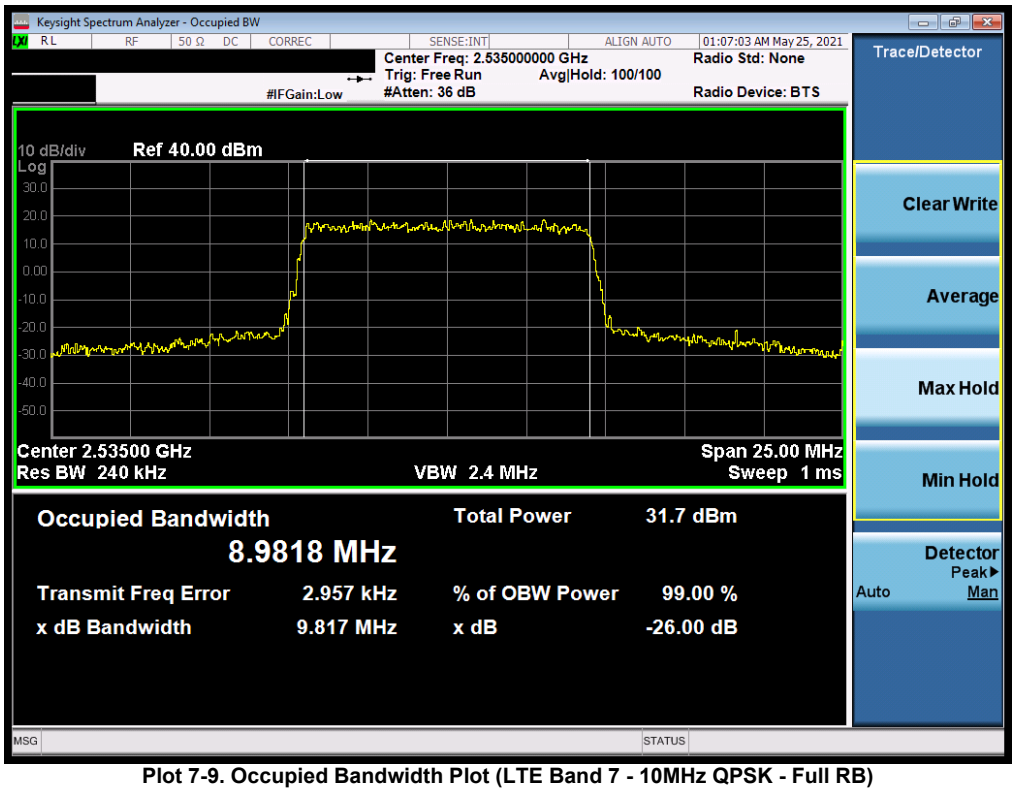
Plot 7-6. Occupied Bandwidth Plot (LTE Band 7 - 20MHz 16-QAM - Full RB)



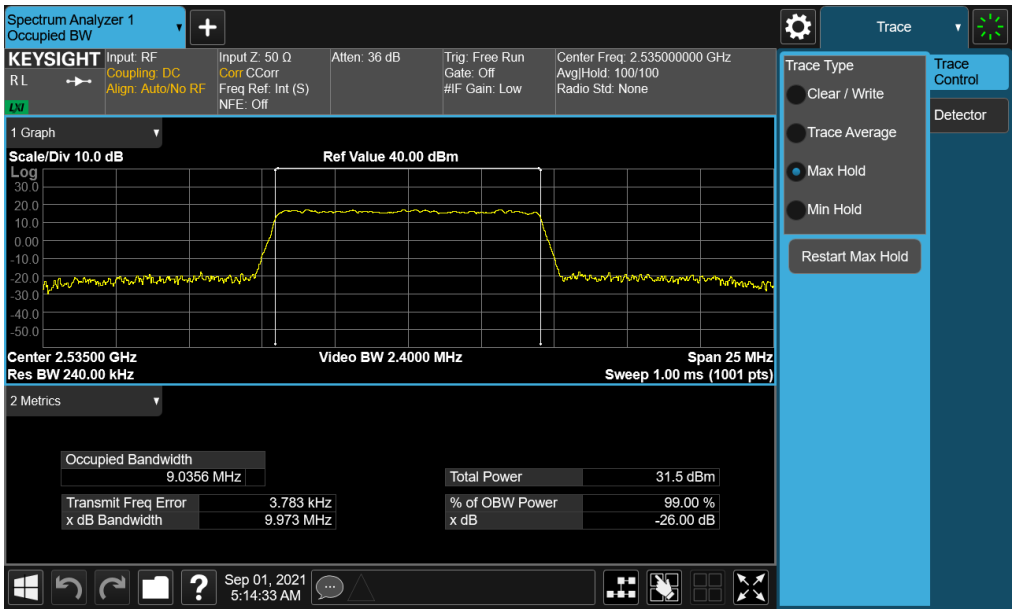
Plot 7-7. Occupied Bandwidth Plot (LTE Band 7 - 15MHz QPSK - Full RB)



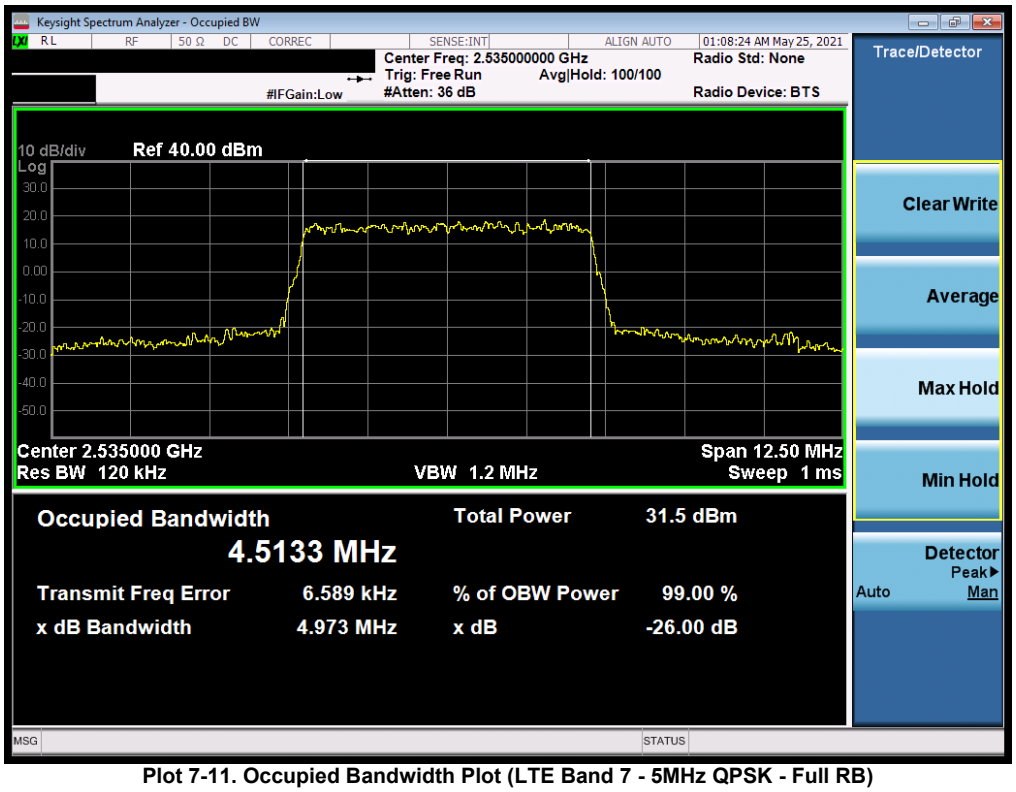
Plot 7-8. Occupied Bandwidth Plot (LTE Band 7 - 15MHz 16-QAM - Full RB)



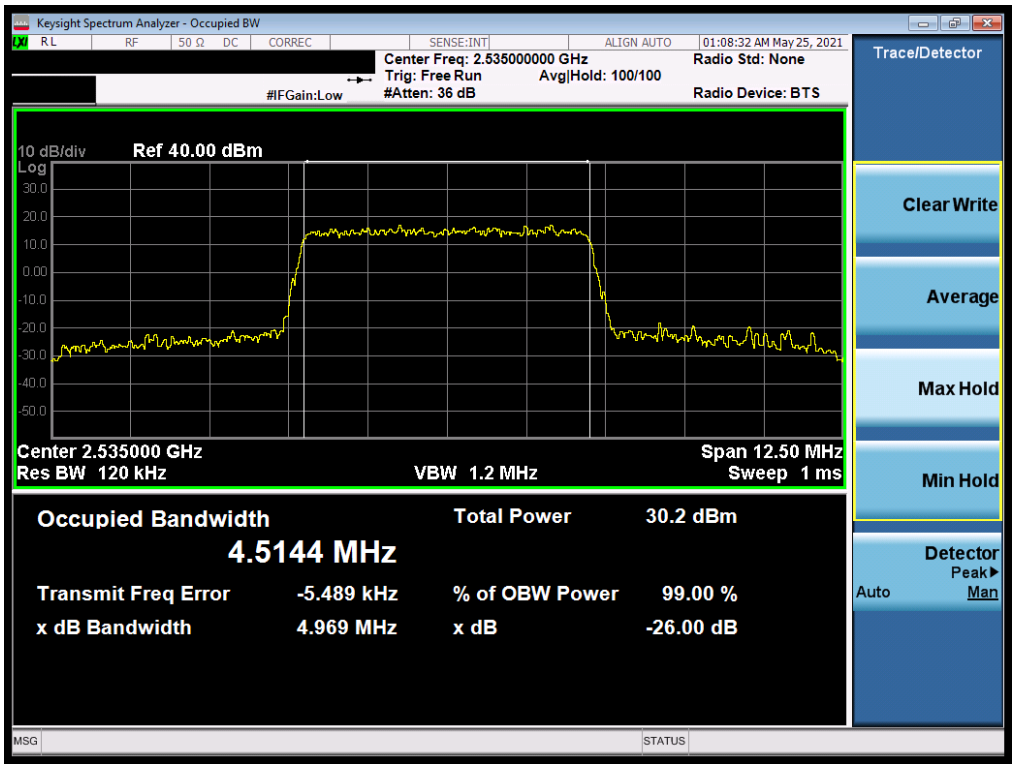
Plot 7-9. Occupied Bandwidth Plot (LTE Band 7 - 10MHz QPSK - Full RB)



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

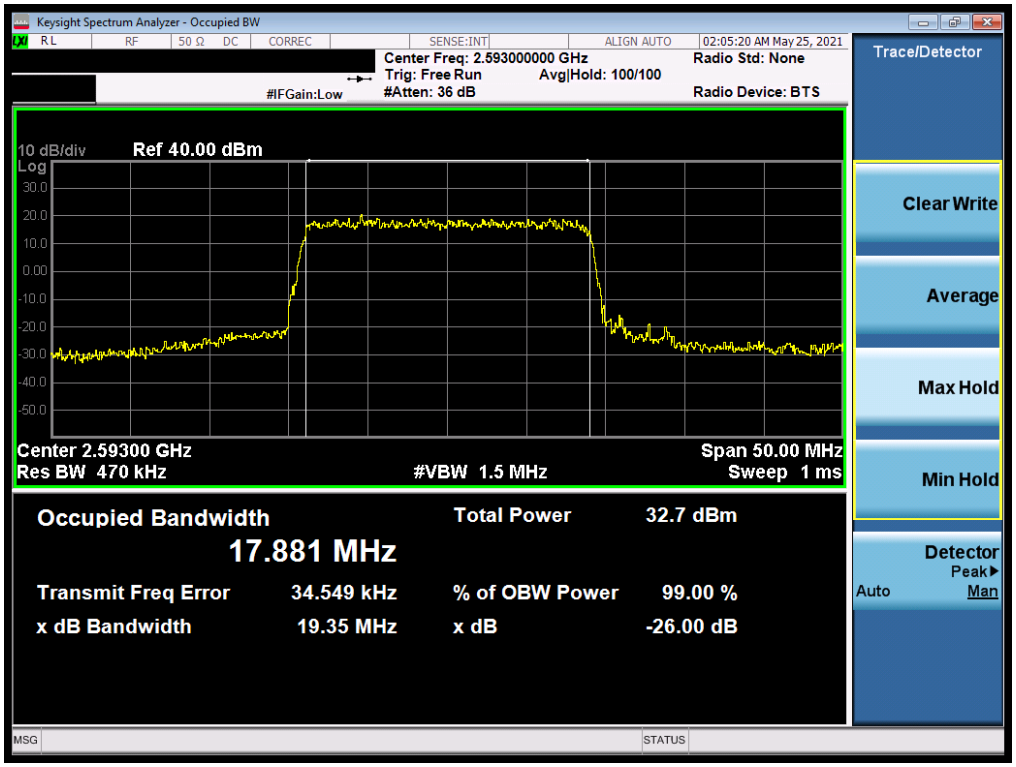


Plot 7-11. Occupied Bandwidth Plot (LTE Band 7 - 5MHz QPSK - Full RB)

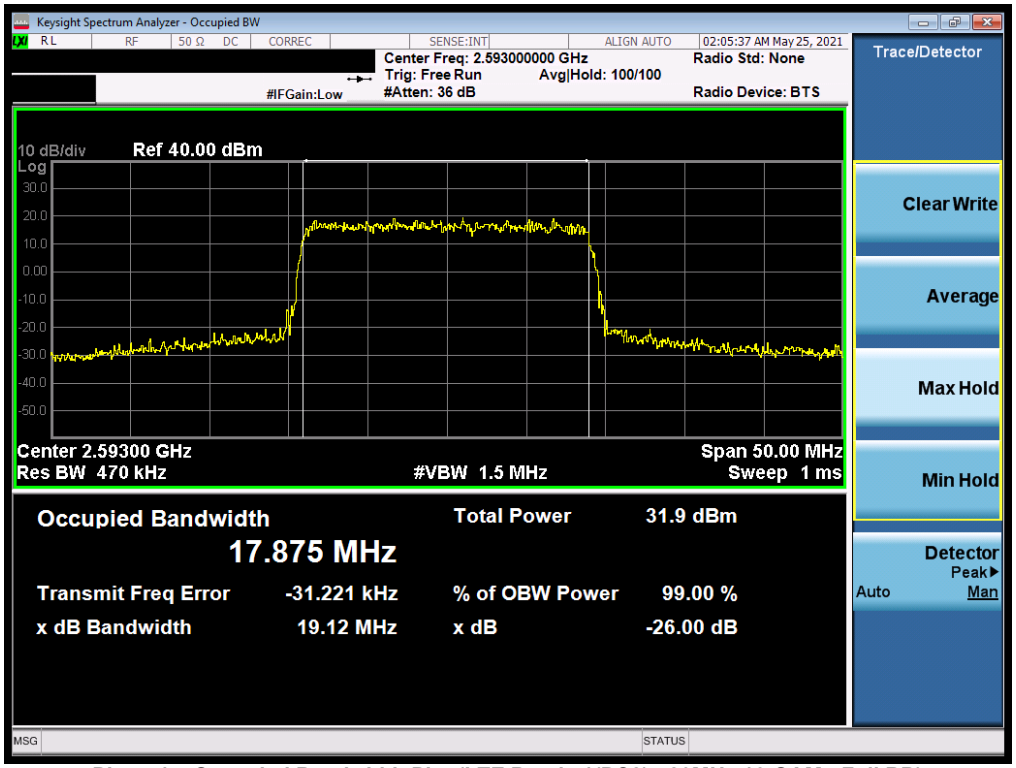


Plot 7-12. Occupied Bandwidth Plot (LTE Band 7 - 5MHz 16-QAM - Full RB)

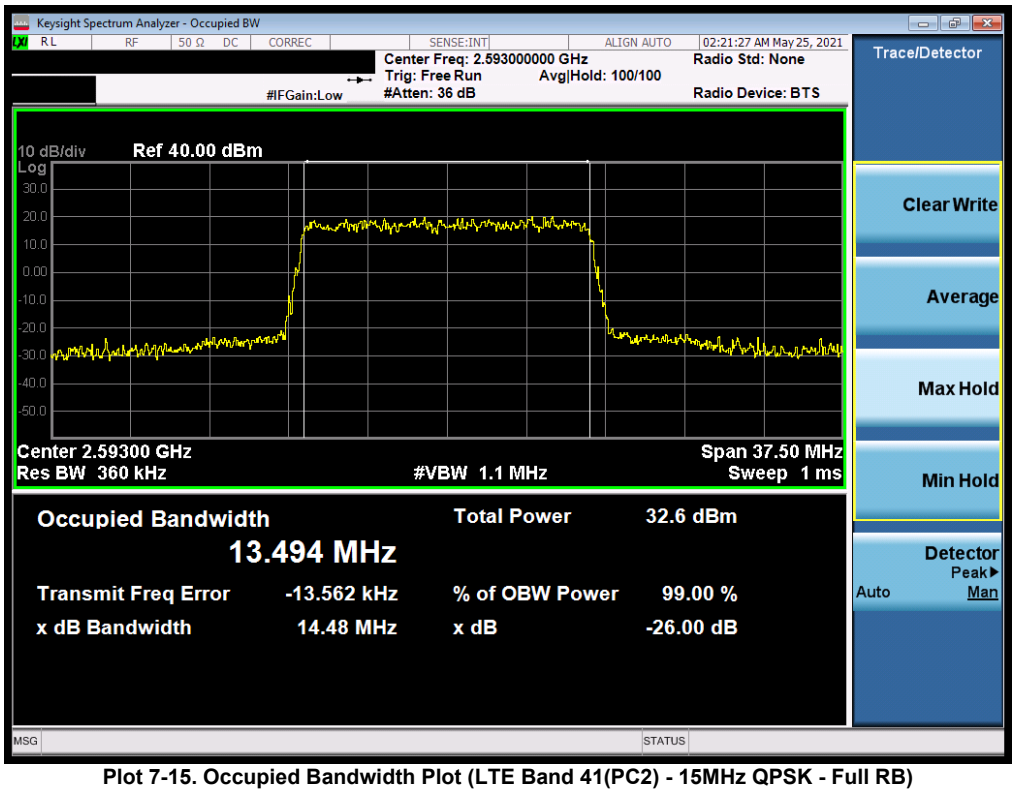
LTE Band 41(PC2)



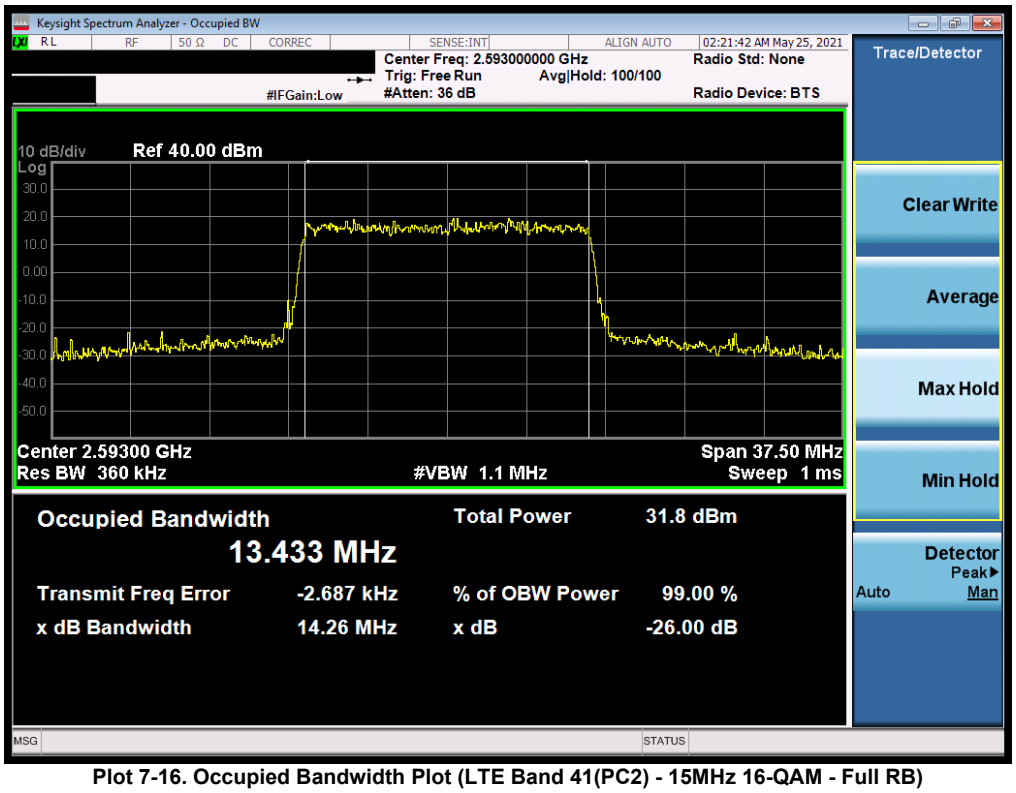
Plot 7-13. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz QPSK - Full RB)



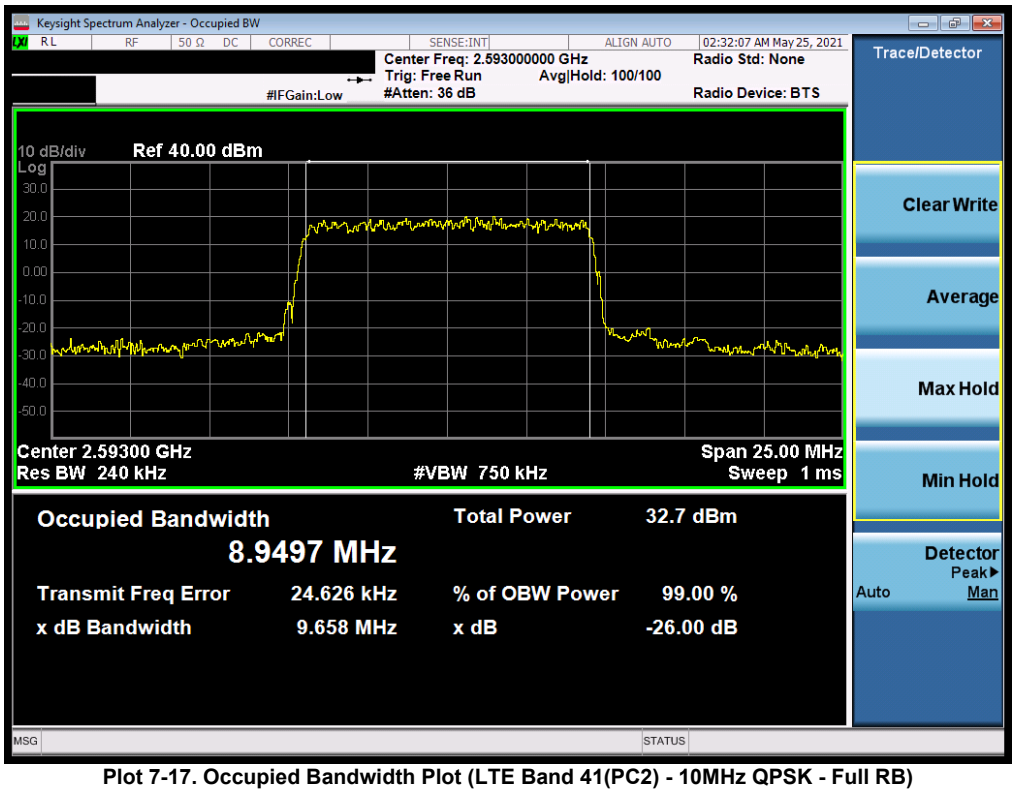
Plot 7-14. Occupied Bandwidth Plot (LTE Band 41(PC2) - 20MHz 16-QAM - Full RB)



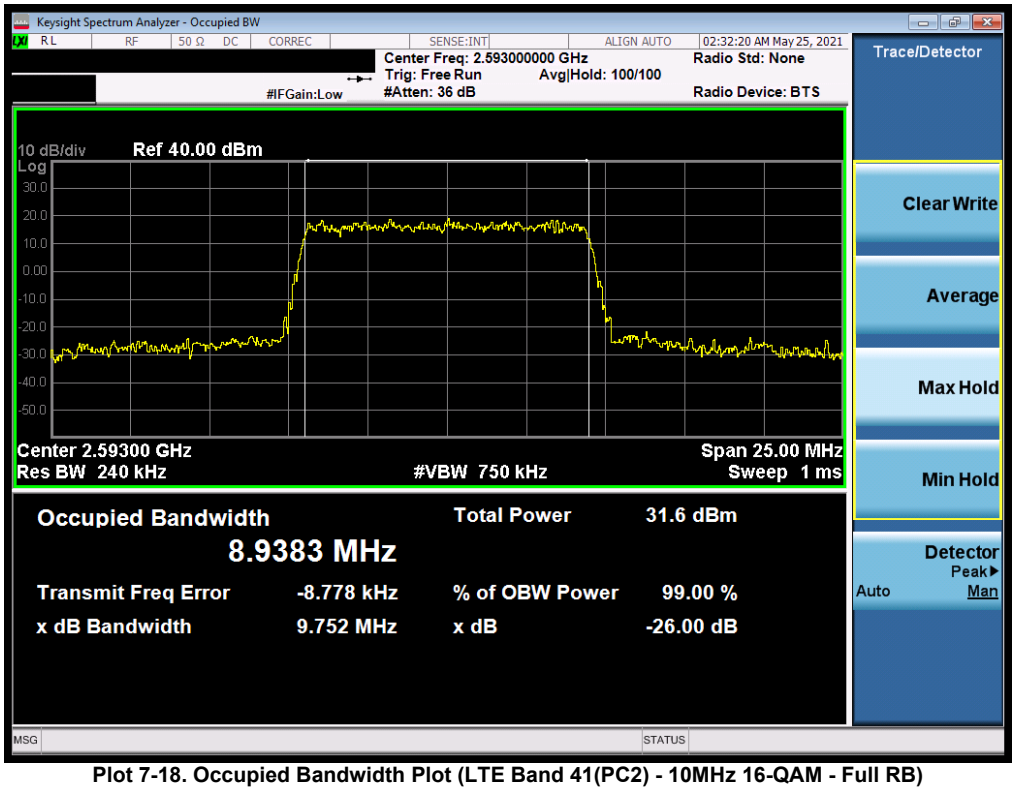
Plot 7-15. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz QPSK - Full RB)



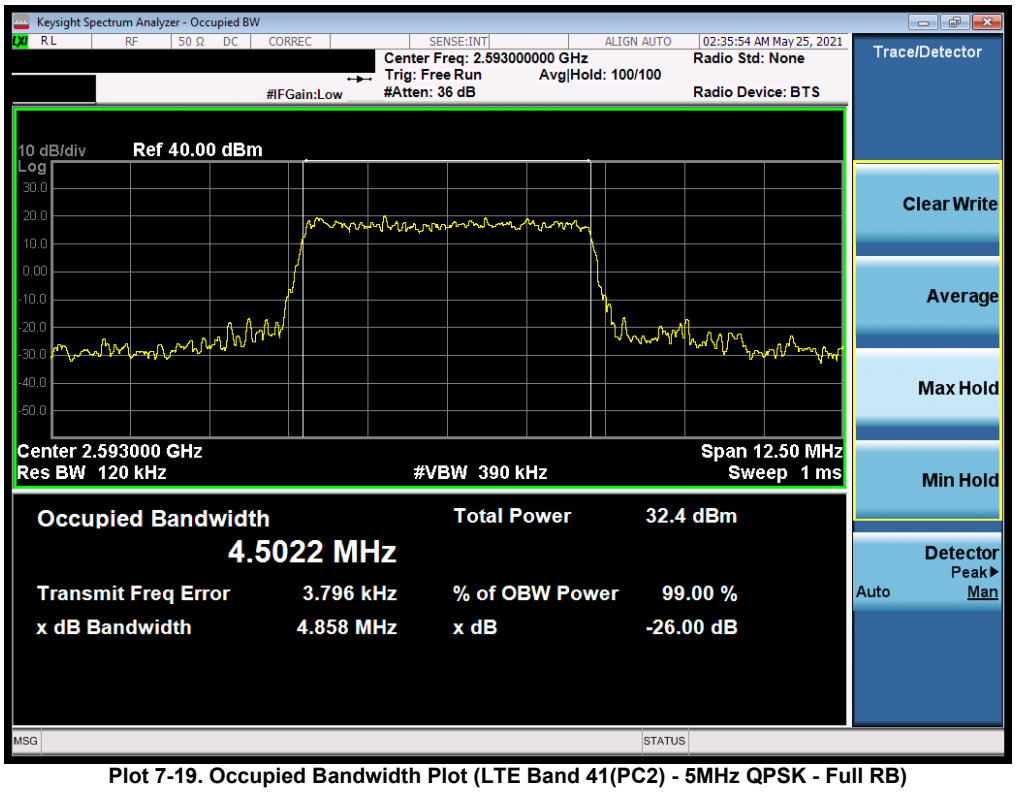
Plot 7-16. Occupied Bandwidth Plot (LTE Band 41(PC2) - 15MHz 16-QAM - Full RB)



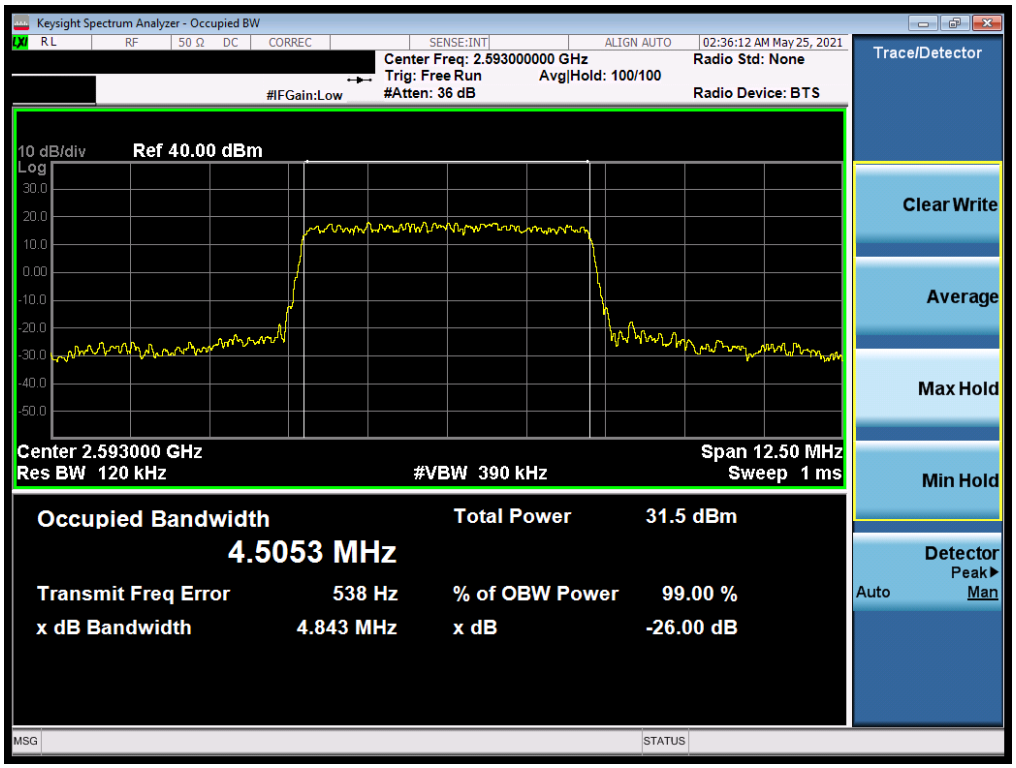
Plot 7-17. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz QPSK - Full RB)



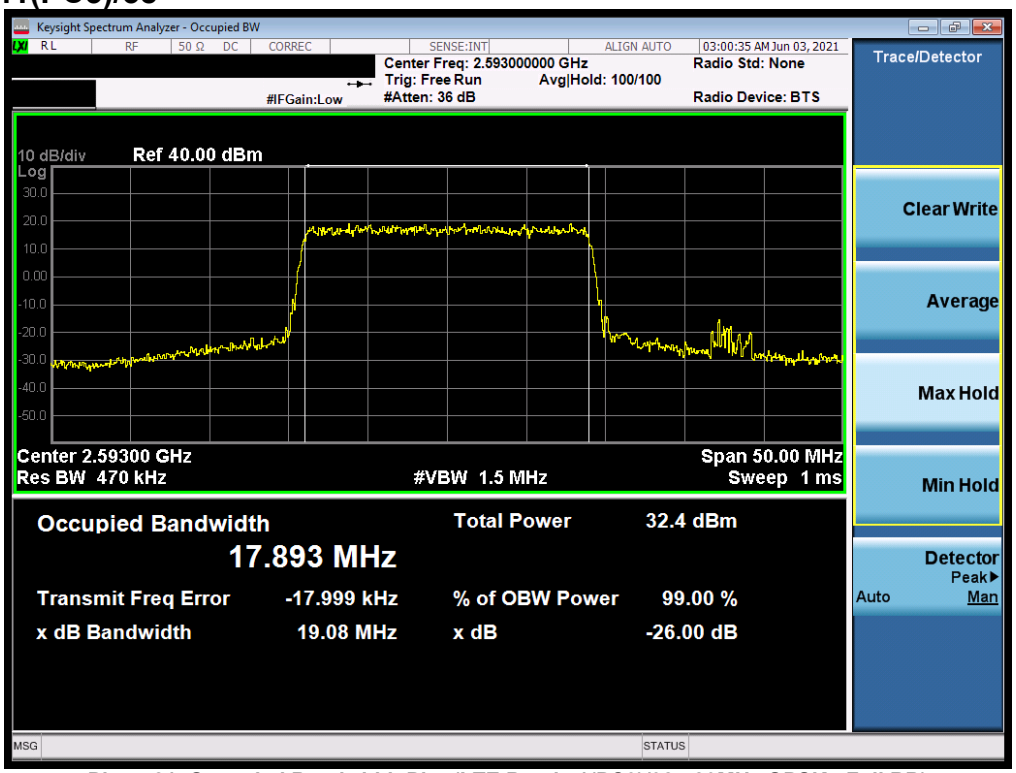
Plot 7-18. Occupied Bandwidth Plot (LTE Band 41(PC2) - 10MHz 16-QAM - Full RB)



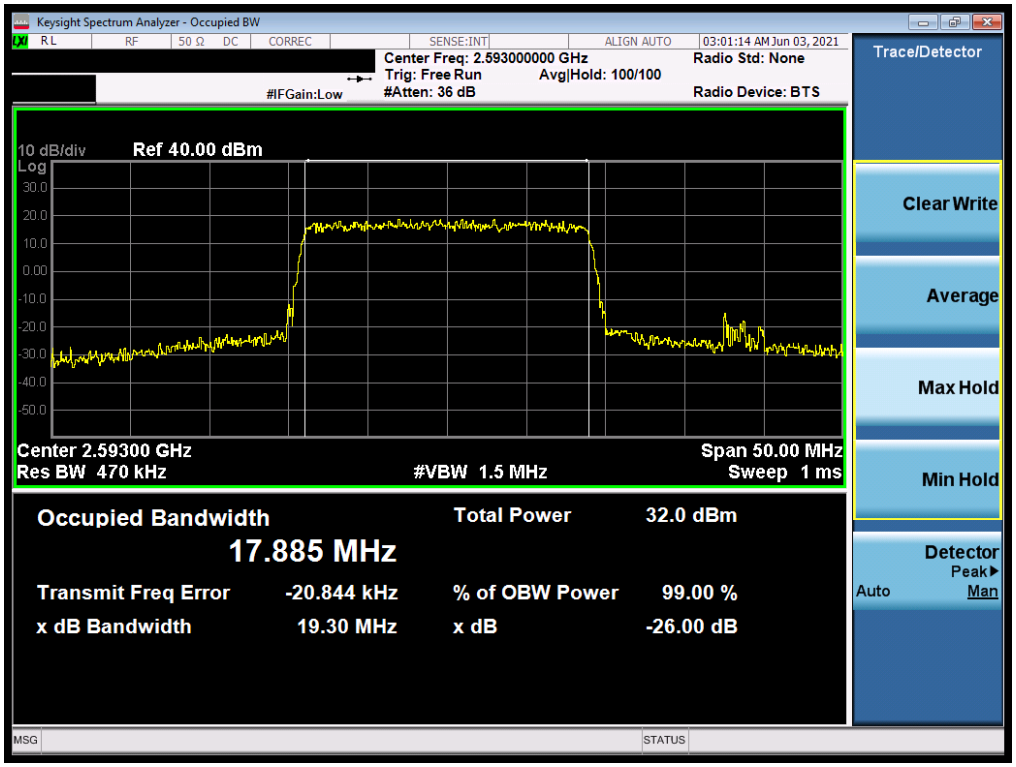
Plot 7-19. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz QPSK - Full RB)



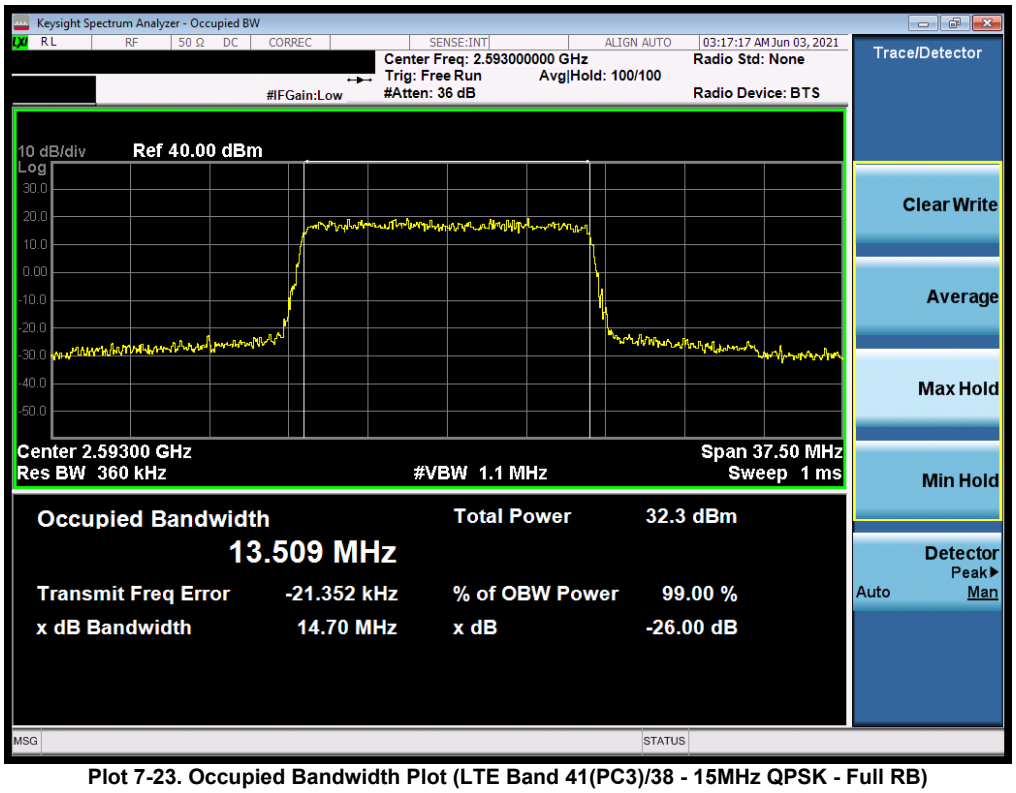
Plot 7-20. Occupied Bandwidth Plot (LTE Band 41(PC2) - 5MHz 16-QAM - Full RB)



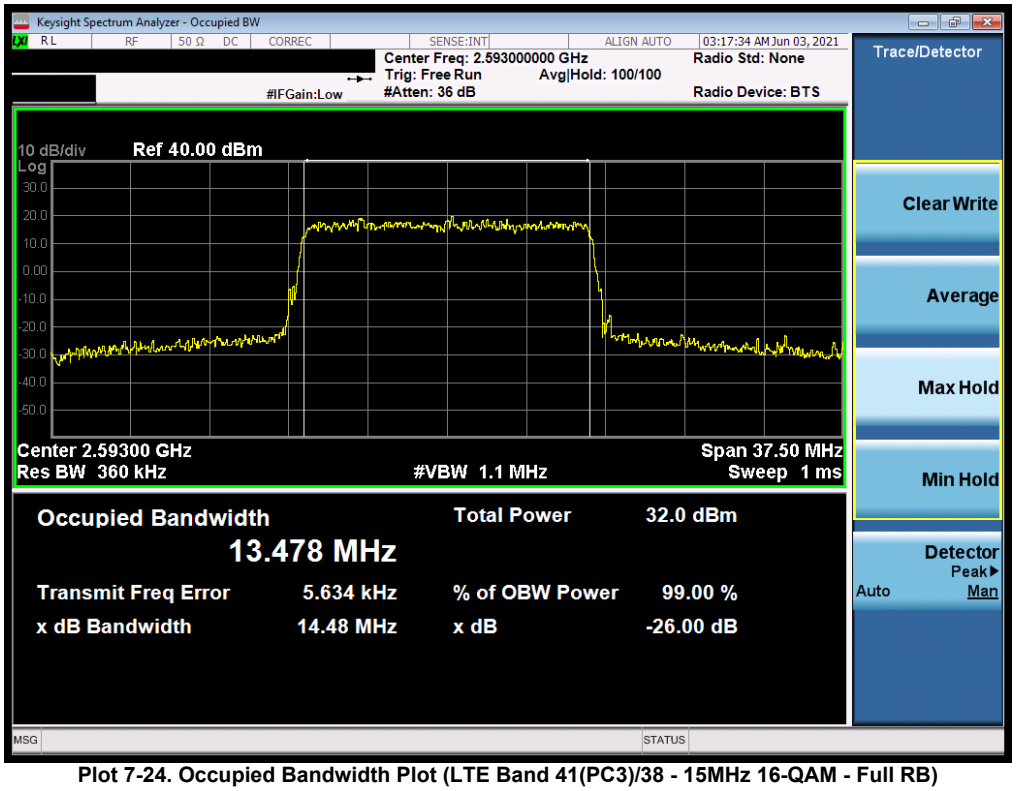
Plot 7-21. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - Full RB)



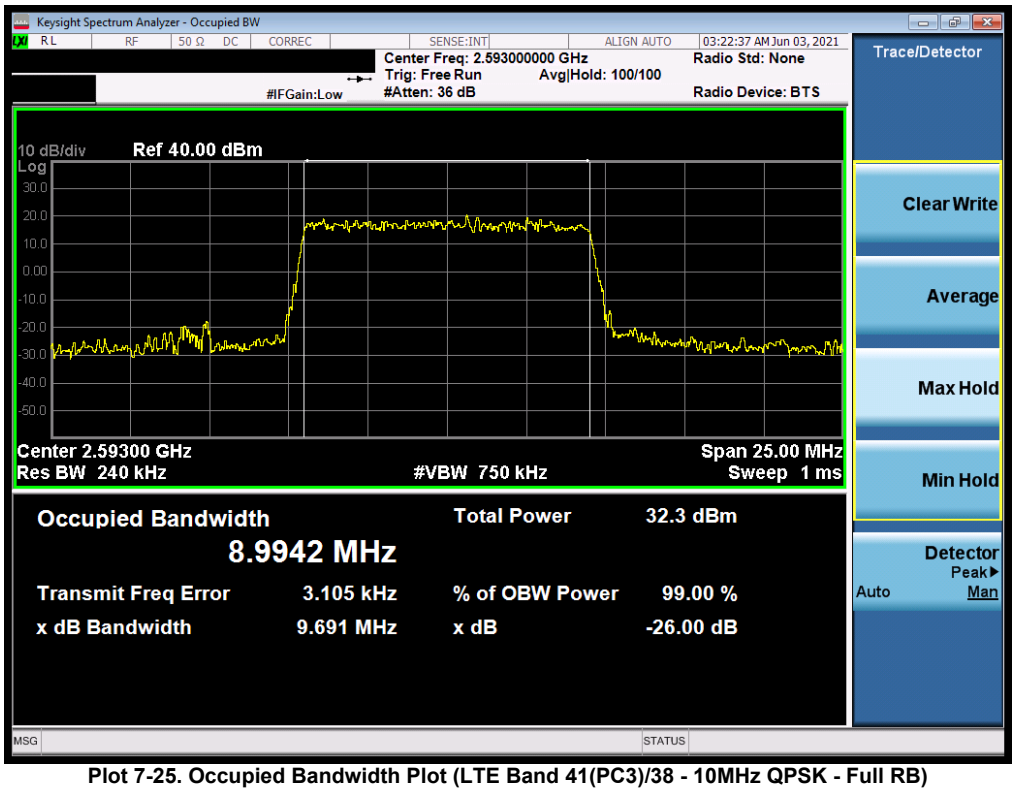
Plot 7-22. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 20MHz 16-QAM - Full RB)



Plot 7-23. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 15MHz QPSK - Full RB)

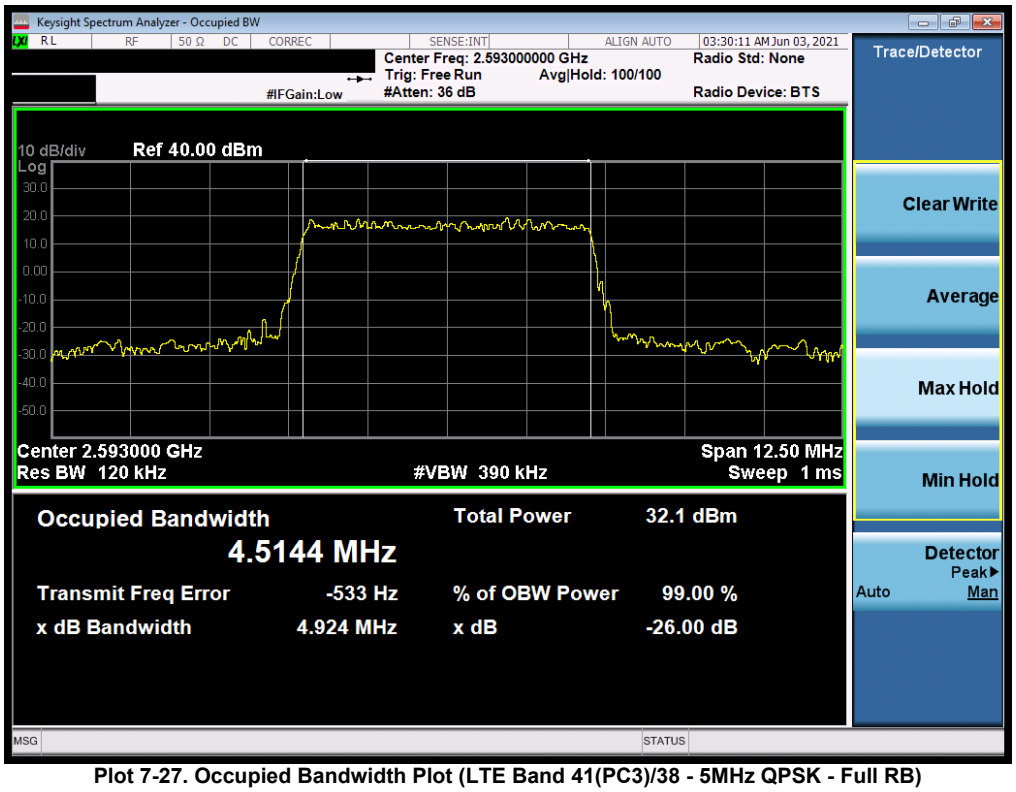


Plot 7-24. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 15MHz 16-QAM - Full RB)

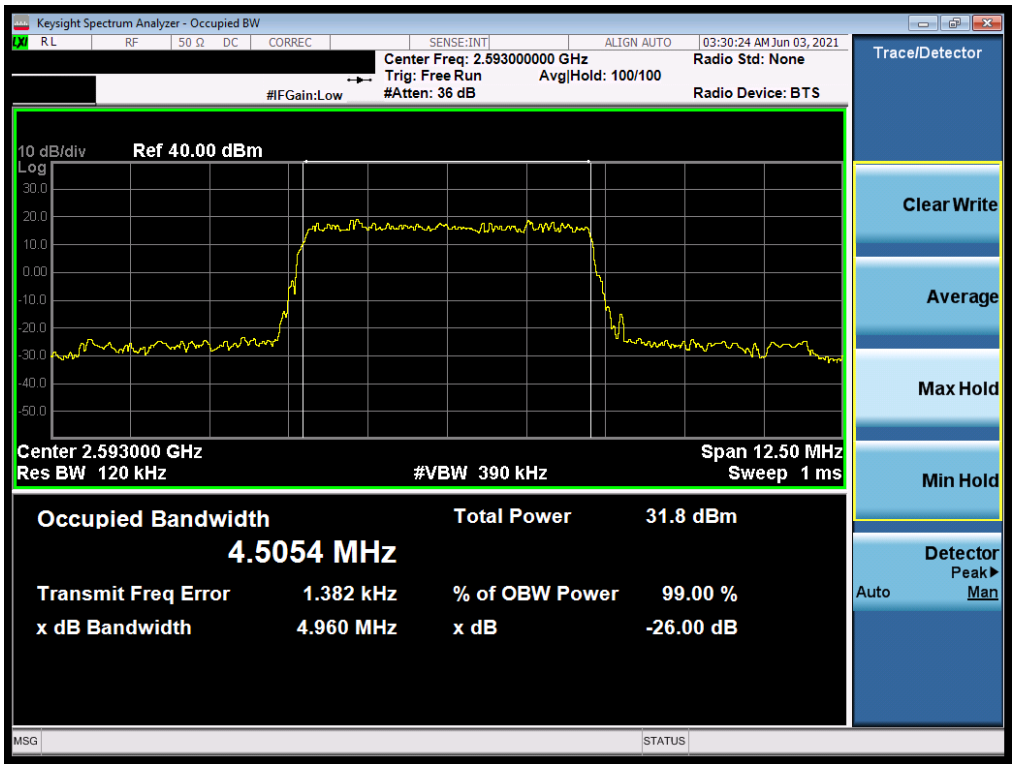


Plot 7-25. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 10MHz QPSK - Full RB)

Plot 7-26. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 10MHz 16-QAM - Full RB)

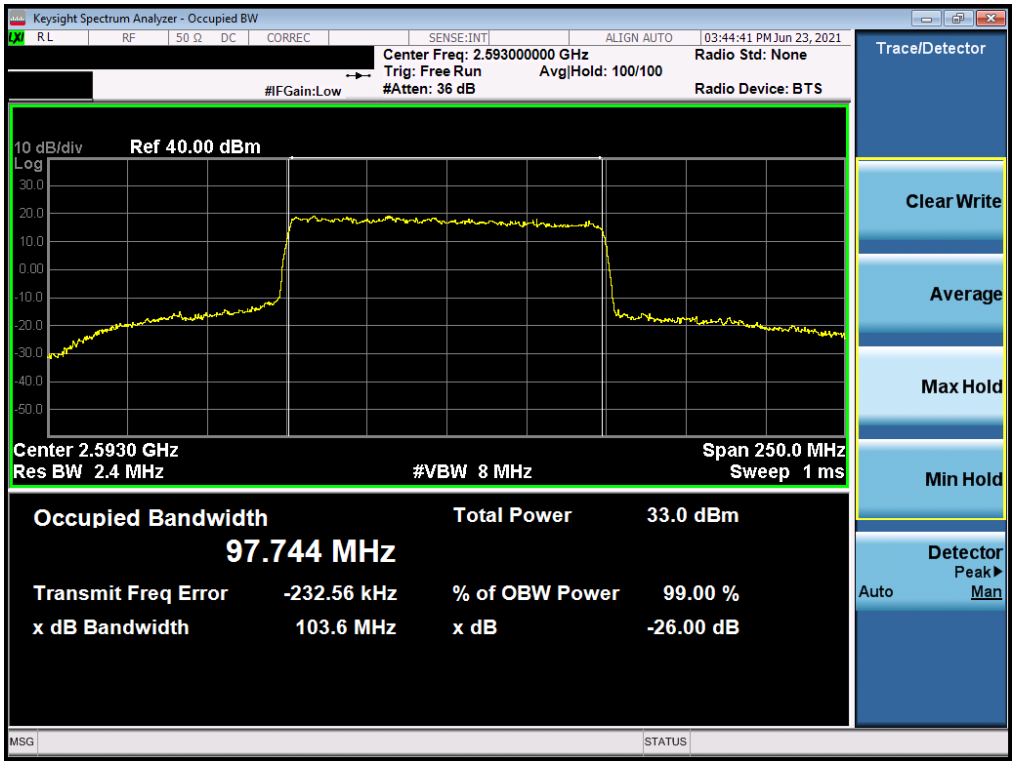


Plot 7-27. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 5MHz QPSK - Full RB)



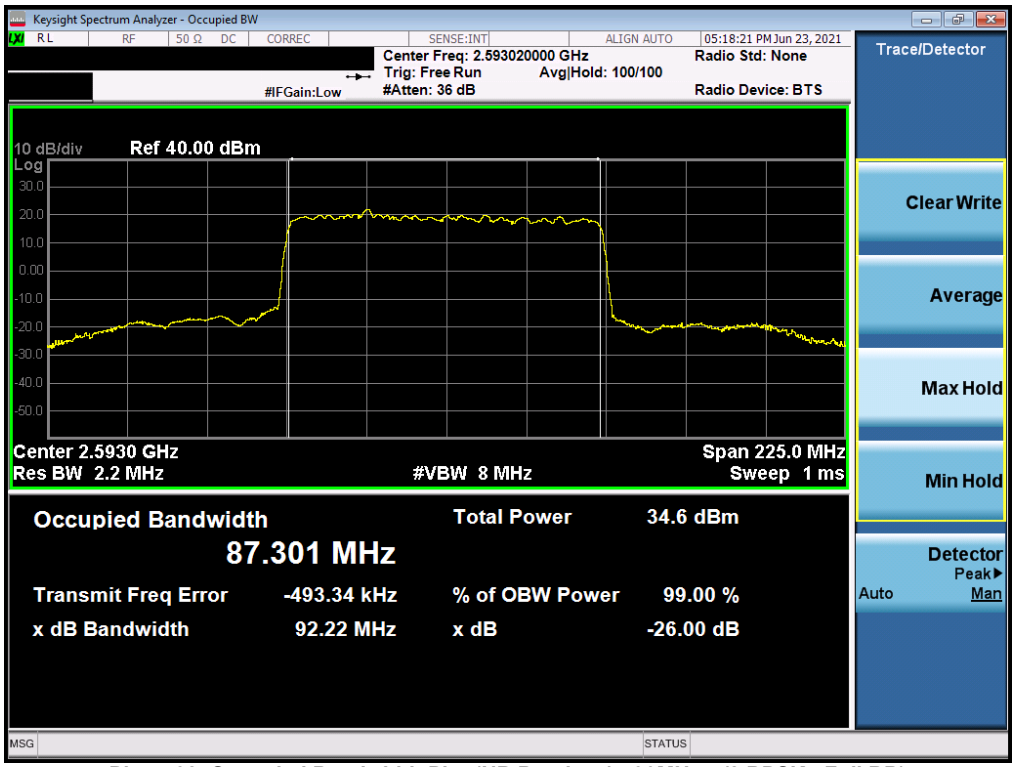
Plot 7-28. Occupied Bandwidth Plot (LTE Band 41(PC3)/38 - 5MHz 16-QAM - Full RB)

Plot 7-29. Occupied Bandwidth Plot (NR Band n41 - 100MHz π/2 BPSK - Full RB)



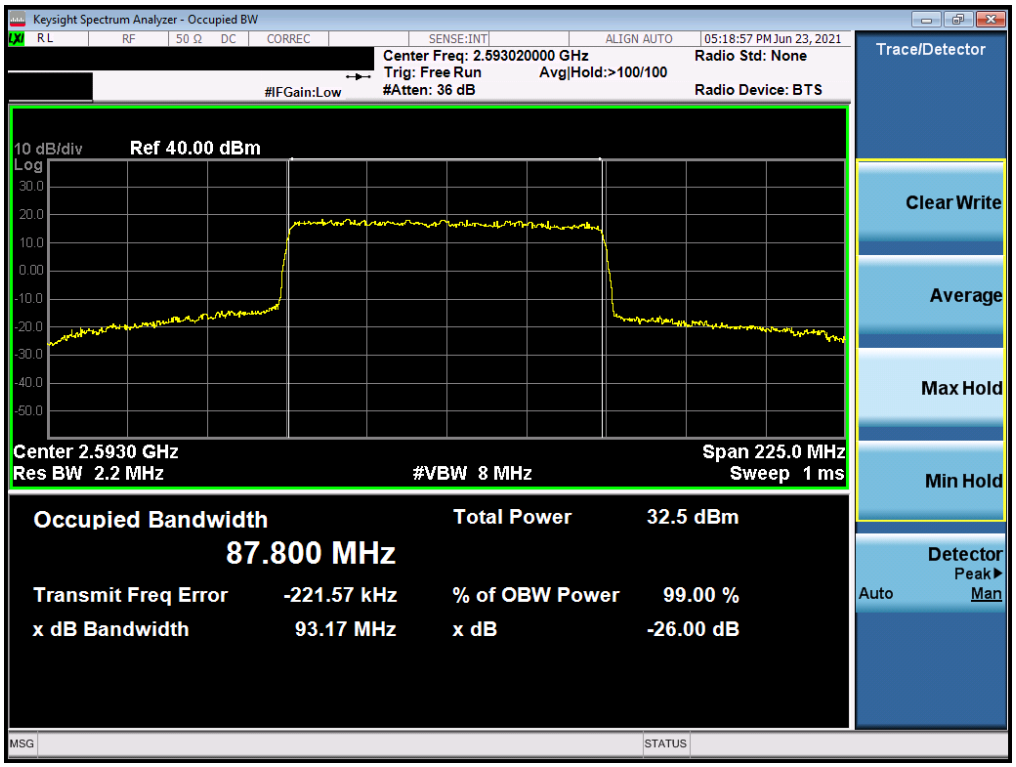
Plot 7-30. Occupied Bandwidth Plot (NR Band n41 - 100MHz QPSK - Full RB)

Plot 7-31. Occupied Bandwidth Plot (NR Band n41 - 100MHz 16-QAM - Full RB)

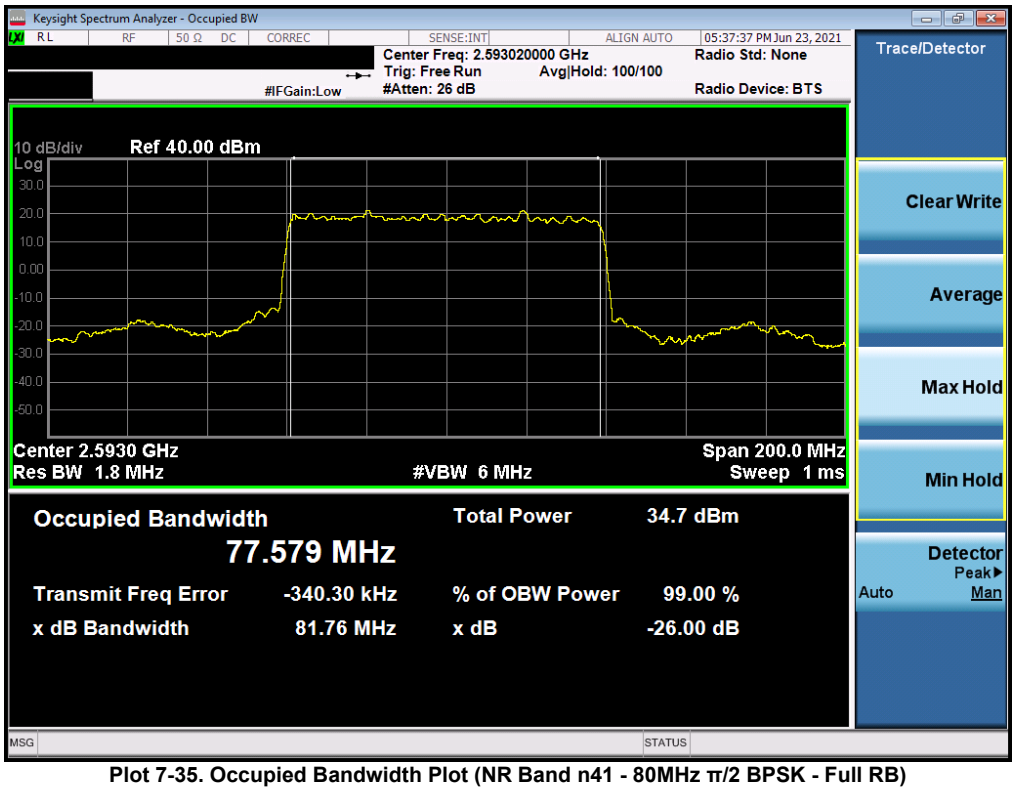


Plot 7-32. Occupied Bandwidth Plot (NR Band n41 - 90MHz π/2 BPSK - Full RB)

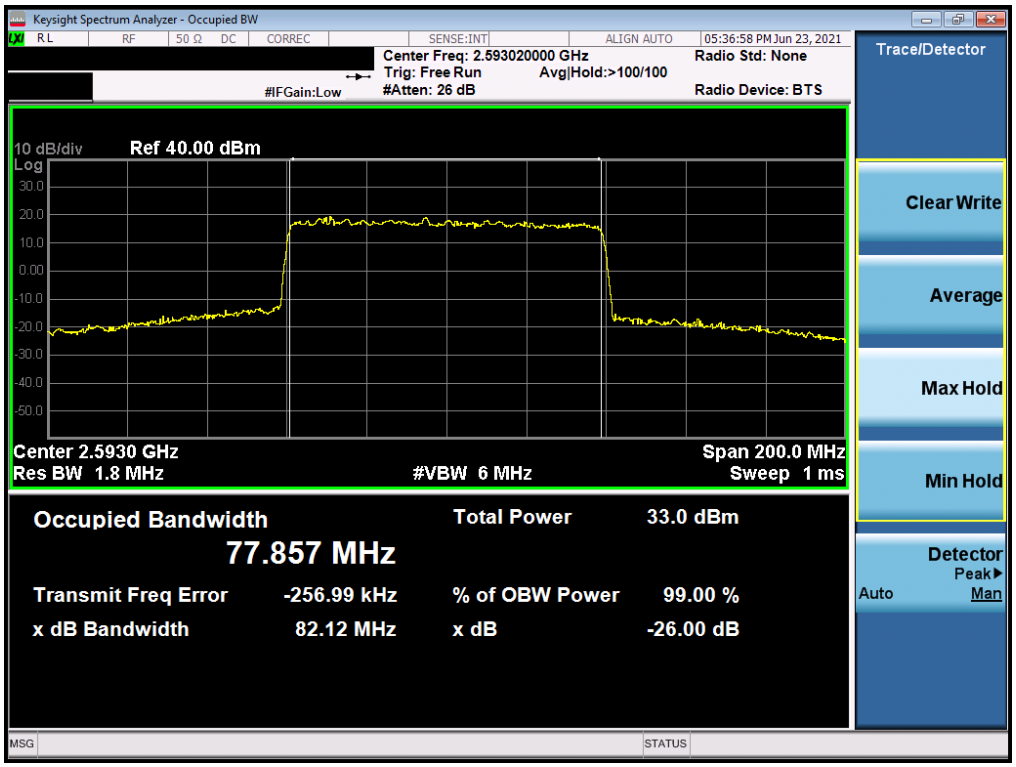
Plot 7-33. Occupied Bandwidth Plot (NR Band n41 - 90MHz QPSK - Full RB)



Plot 7-34. Occupied Bandwidth Plot (NR Band n41 - 90MHz 16-QAM - Full RB)

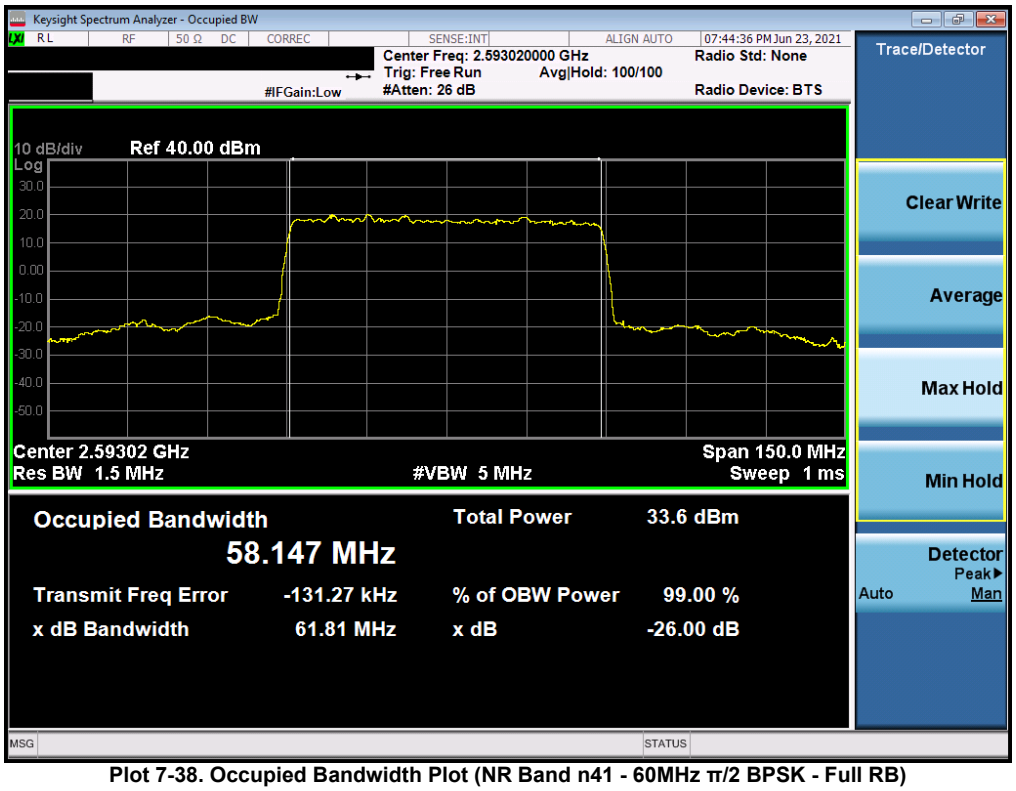


Plot 7-35. Occupied Bandwidth Plot (NR Band n41 - 80MHz π/2 BPSK - Full RB)

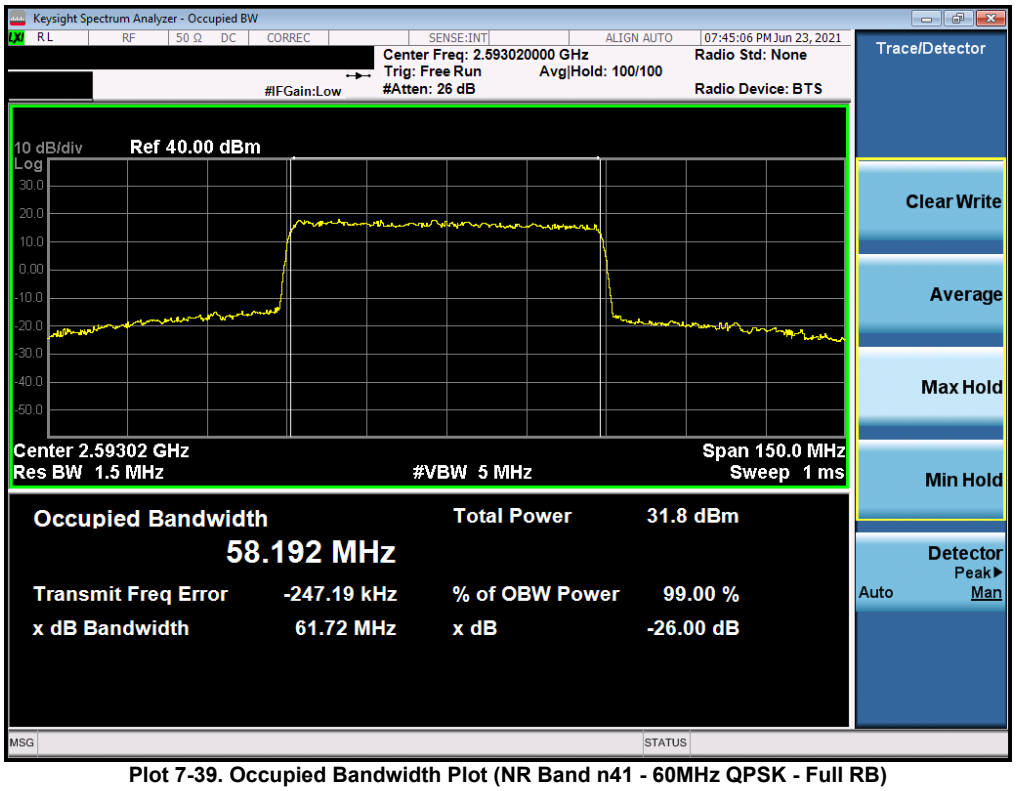


Plot 7-36. Occupied Bandwidth Plot (NR Band n41 - 80MHz QPSK - Full RB)

Plot 7-37. Occupied Bandwidth Plot (NR Band n41 - 80MHz 16-QAM - Full RB)

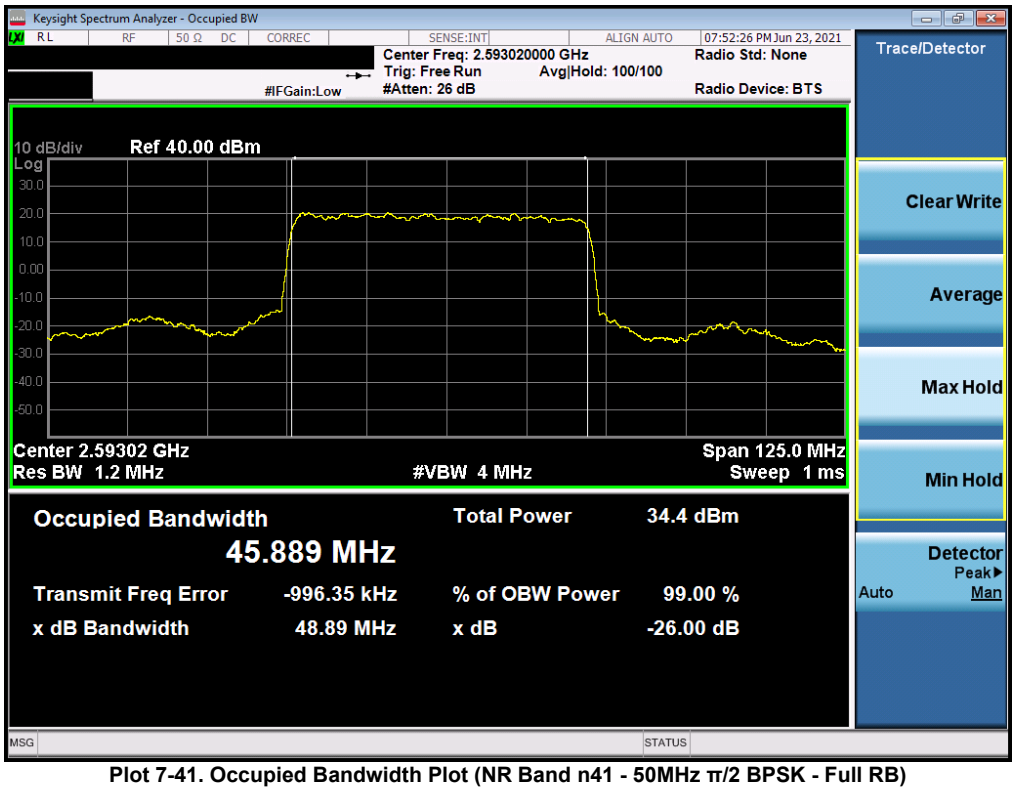


Plot 7-38. Occupied Bandwidth Plot (NR Band n41 - 60MHz π/2 BPSK - Full RB)

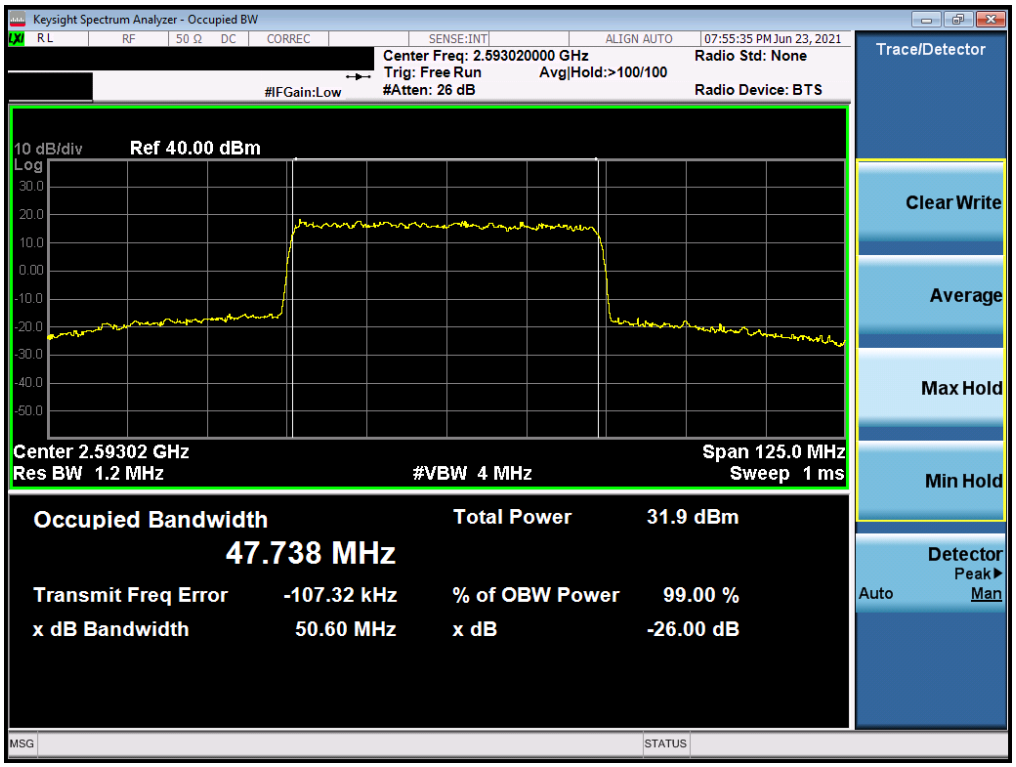


Plot 7-39. Occupied Bandwidth Plot (NR Band n41 - 60MHz QPSK - Full RB)

Plot 7-40. Occupied Bandwidth Plot (NR Band n41 - 60MHz 16-QAM - Full RB)

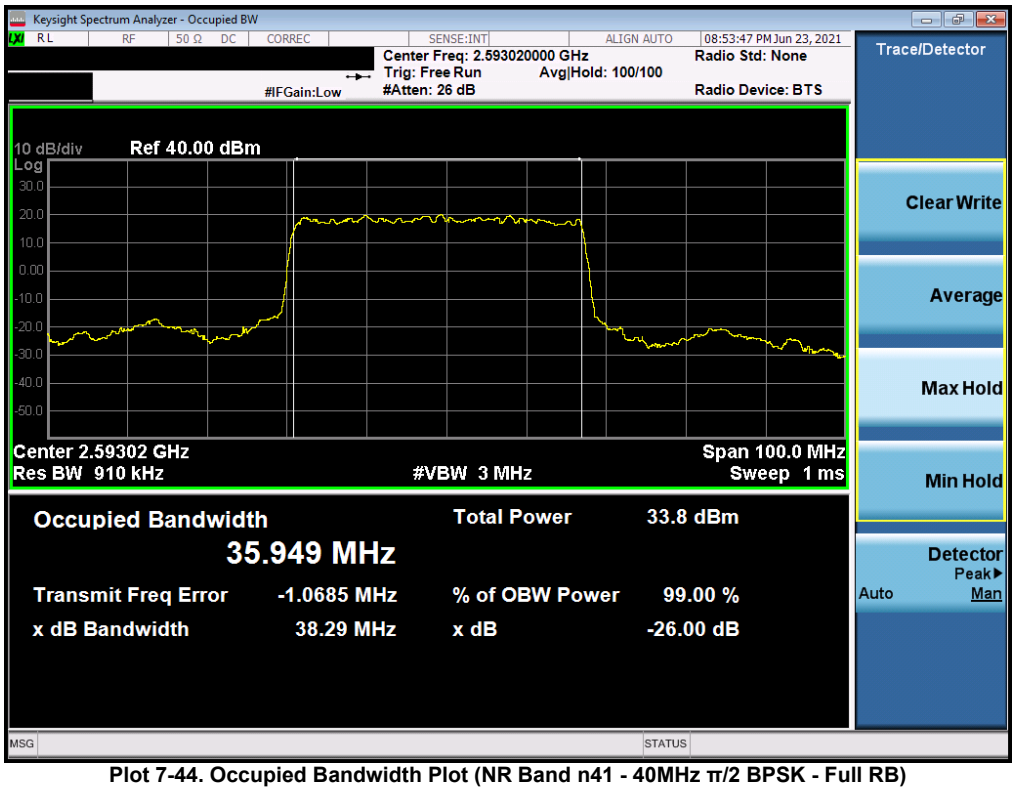


Plot 7-41. Occupied Bandwidth Plot (NR Band n41 - 50MHz π/2 BPSK - Full RB)

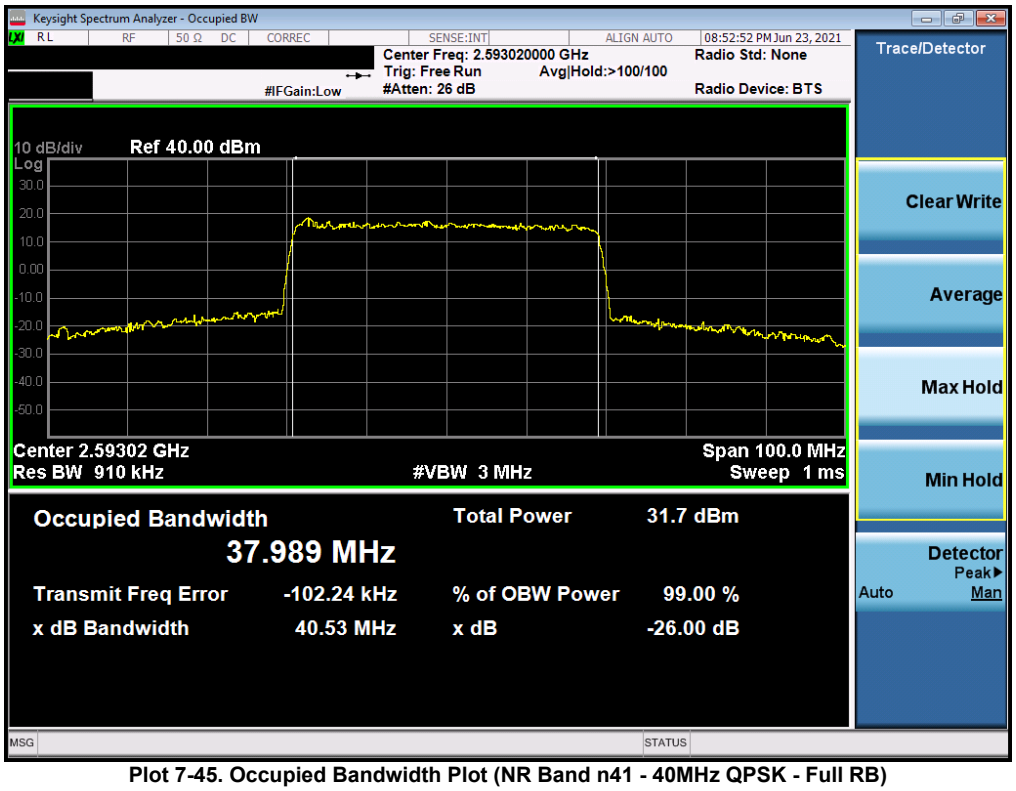


Plot 7-42. Occupied Bandwidth Plot (NR Band n41 - 50MHz QPSK - Full RB)

Plot 7-43. Occupied Bandwidth Plot (NR Band n41 - 50MHz 16-QAM - Full RB)

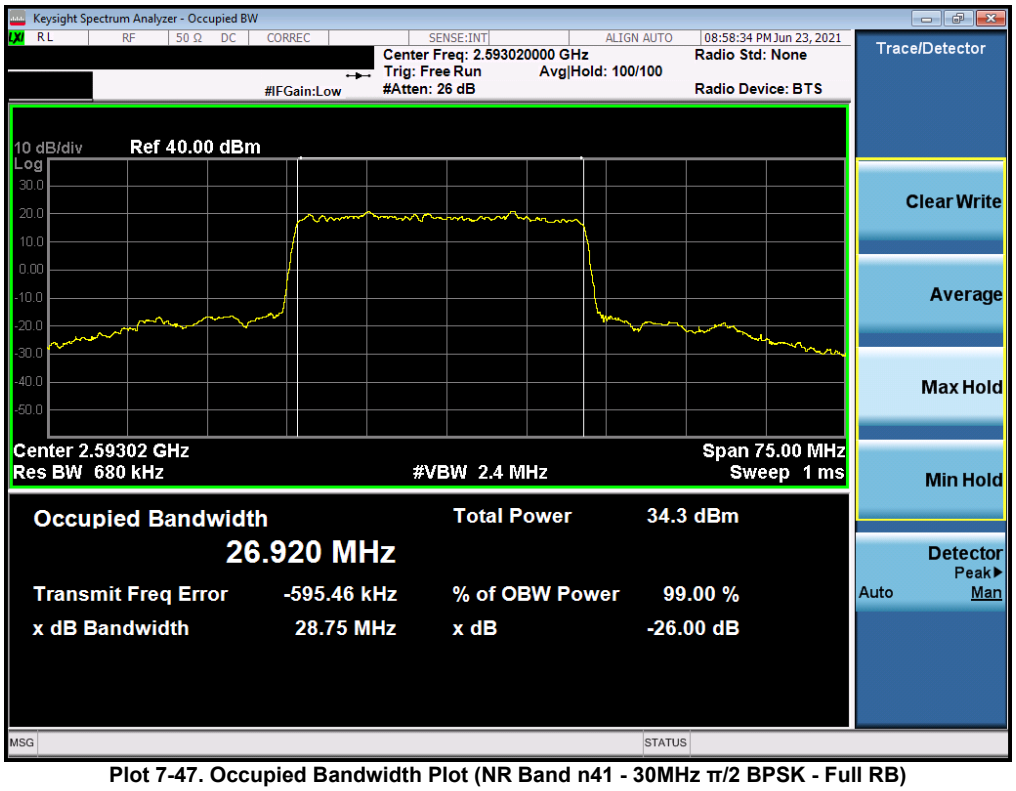


Plot 7-44. Occupied Bandwidth Plot (NR Band n41 - 40MHz π/2 BPSK - Full RB)

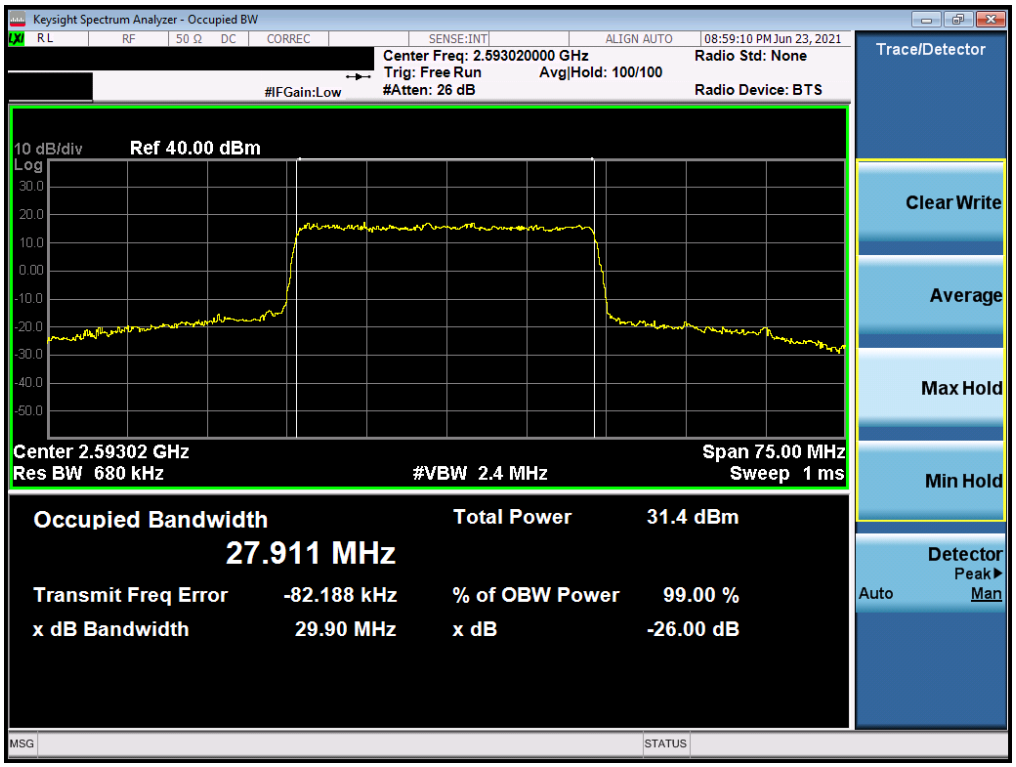


Plot 7-45. Occupied Bandwidth Plot (NR Band n41 - 40MHz QPSK - Full RB)

Plot 7-46. Occupied Bandwidth Plot (NR Band n41 - 40MHz 16-QAM - Full RB)

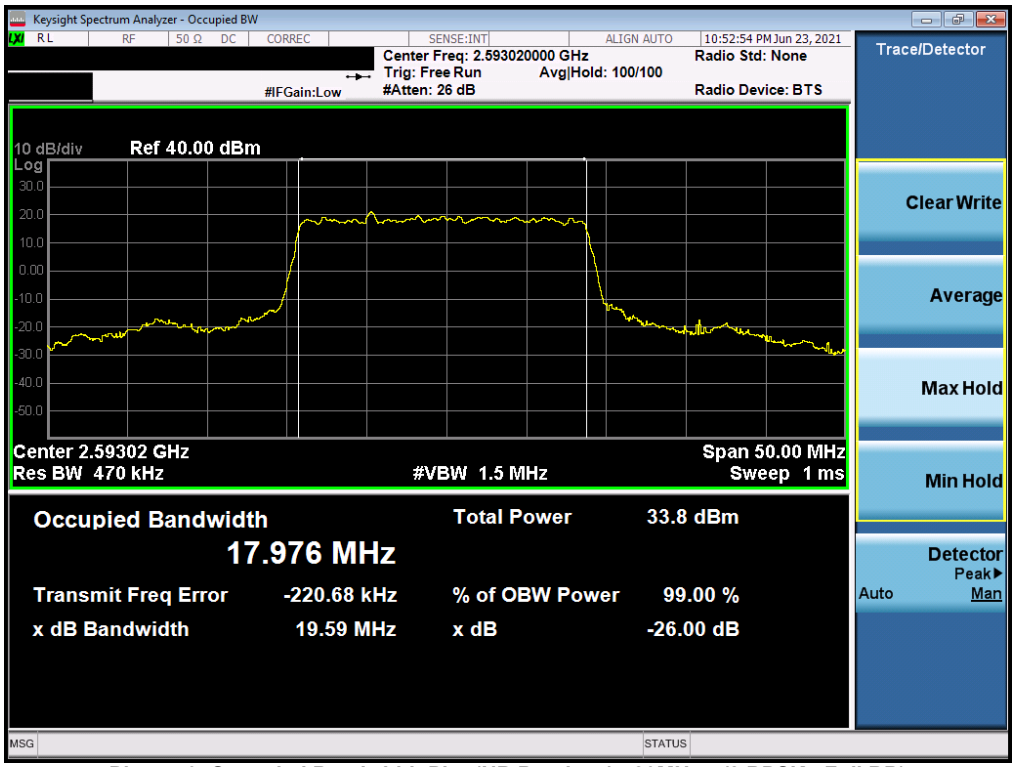


Plot 7-47. Occupied Bandwidth Plot (NR Band n41 - 30MHz π/2 BPSK - Full RB)

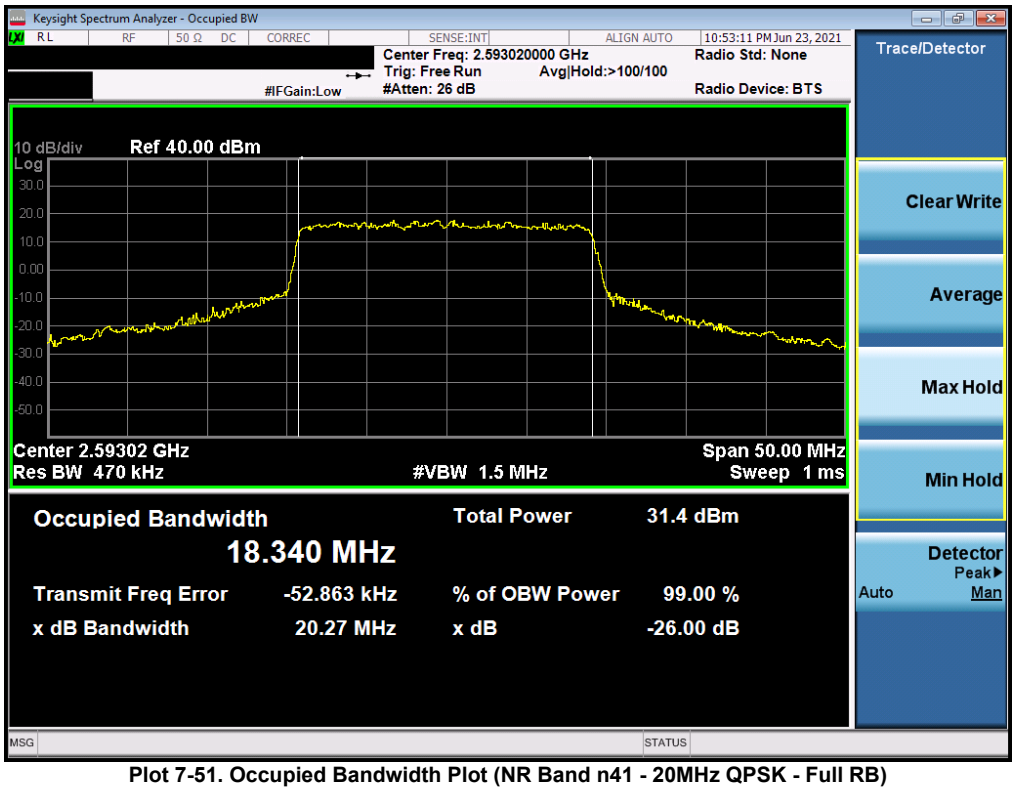


Plot 7-48. Occupied Bandwidth Plot (NR Band n41 - 30MHz QPSK - Full RB)

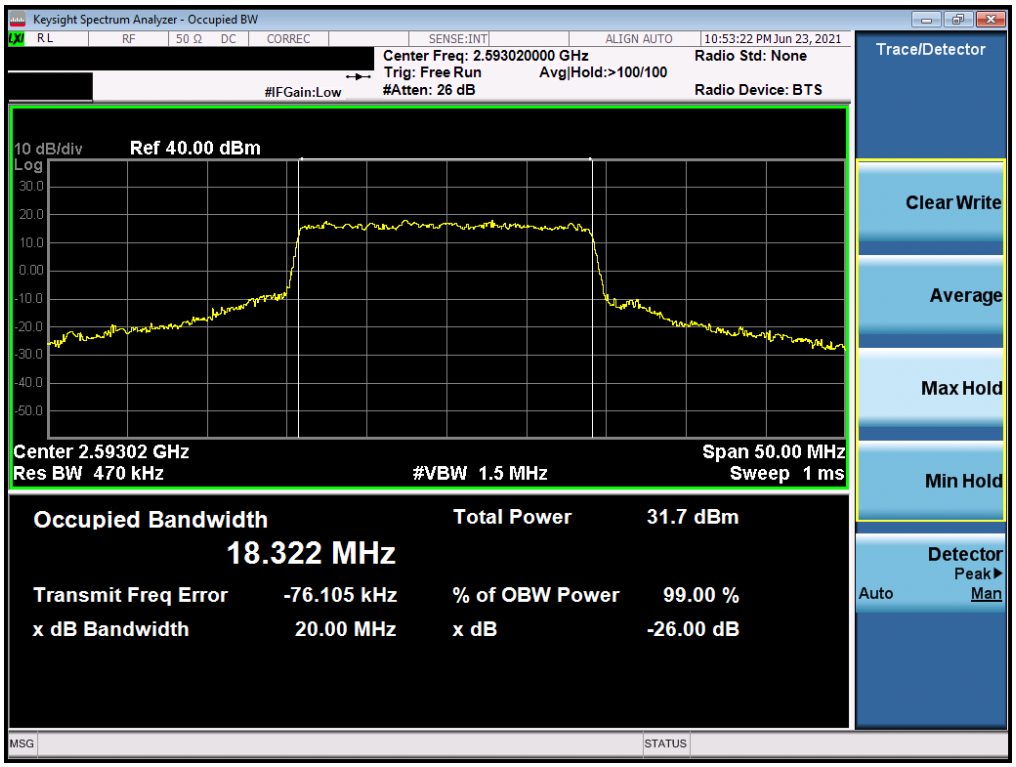
Plot 7-49. Occupied Bandwidth Plot (NR Band n41 - 30MHz 16-QAM - Full RB)



Plot 7-50. Occupied Bandwidth Plot (NR Band n41 - 20MHz π/2 BPSK - Full RB)



Plot 7-51. Occupied Bandwidth Plot (NR Band n41 - 20MHz QPSK - Full RB)



Plot 7-52. Occupied Bandwidth Plot (NR Band n41 - 20MHz 16-QAM - Full RB)

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 30, the minimum permissible attenuation level of any spurious emission <2288MHz and >2365MHz is 70 + 10 $log_{10}(P_{[Watts]})$.

For Band 7 and 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.

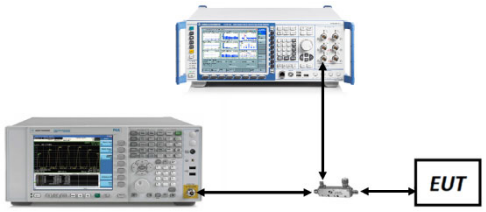
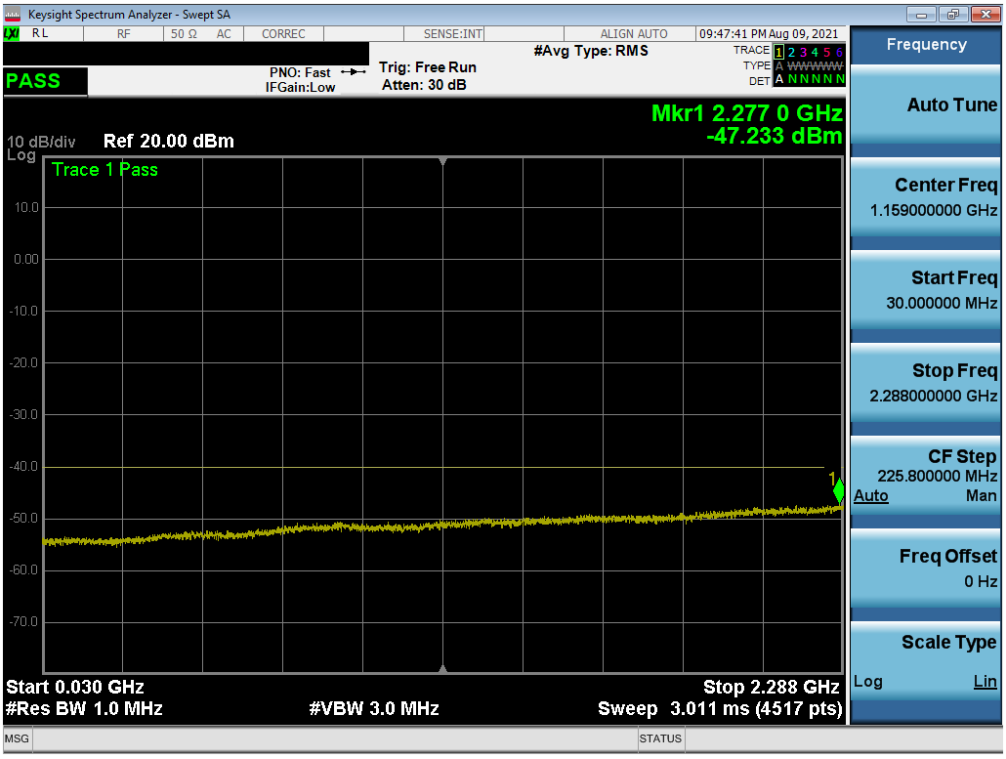


Figure 7-3. Test Instrument & Measurement Setup

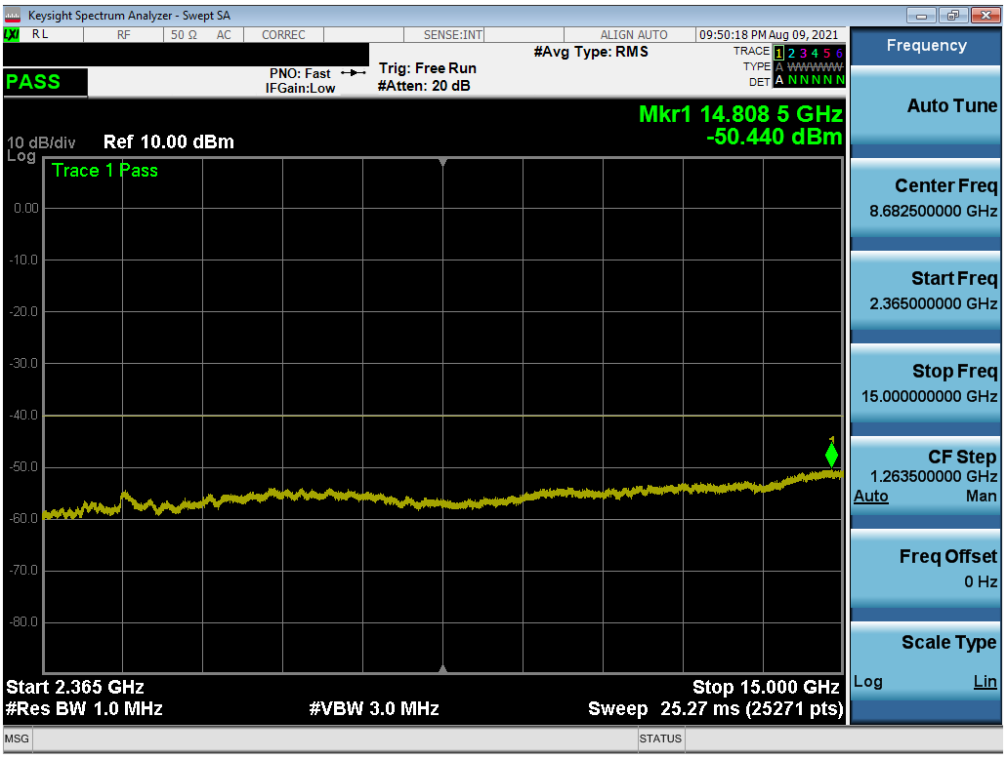
Test Notes

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.

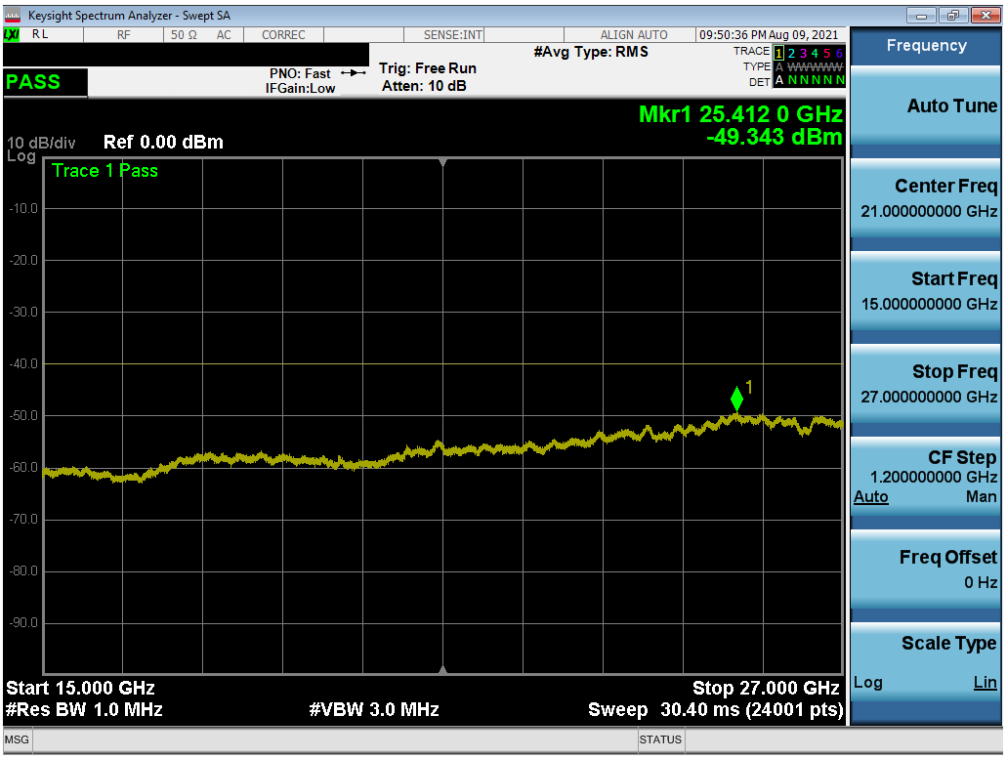
2. For NR operation, all subcarrier spacings (SCS) and transmission schemes (e.g. CP-OFDM and DFT-s-OFDM) were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.



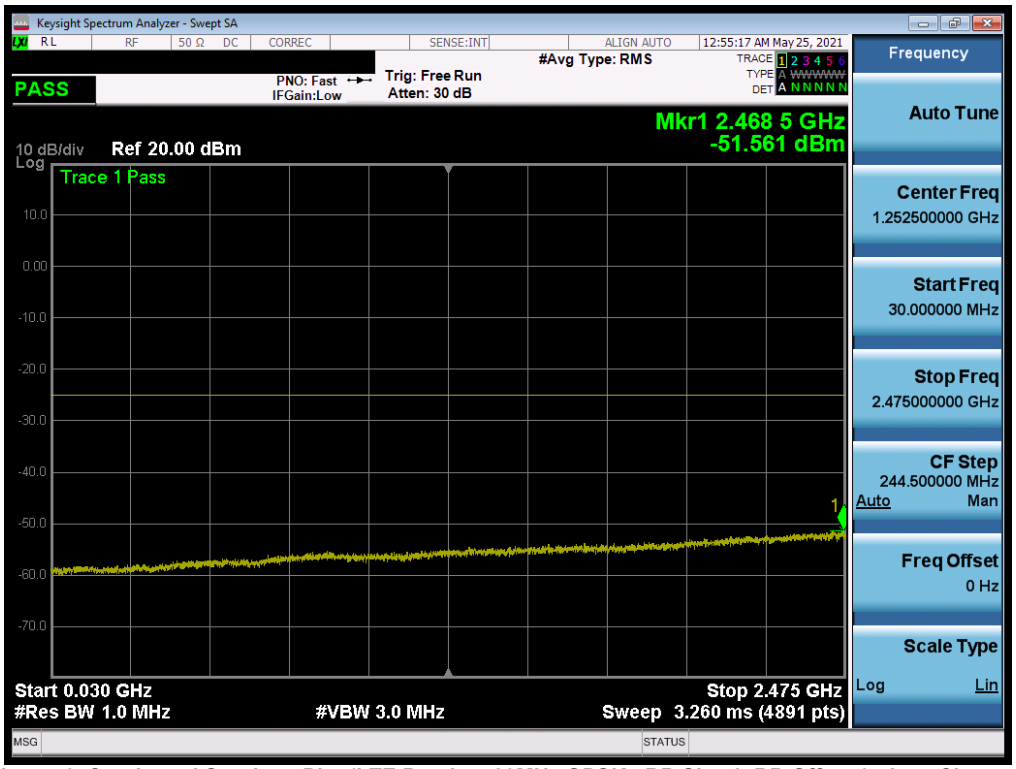
Plot 7-53. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0)



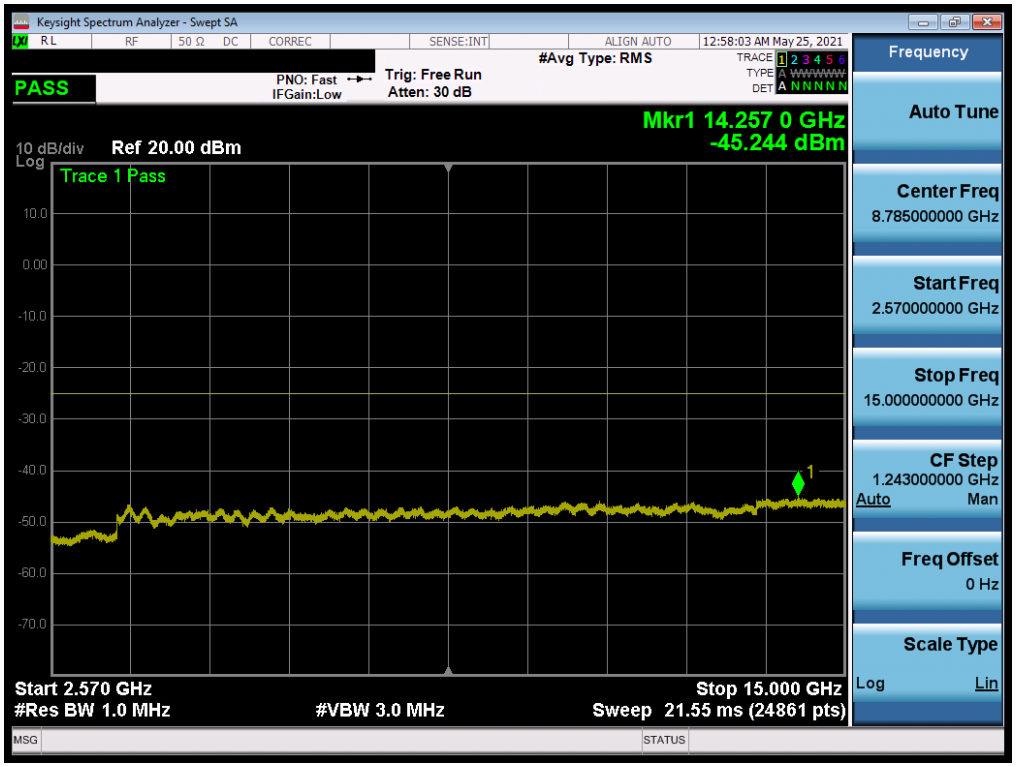
Plot 7-54. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0)



Plot 7-55. Conducted Spurious Plot (LTE Band 30 - 10MHz QPSK - RB Size 1, RB Offset 0)

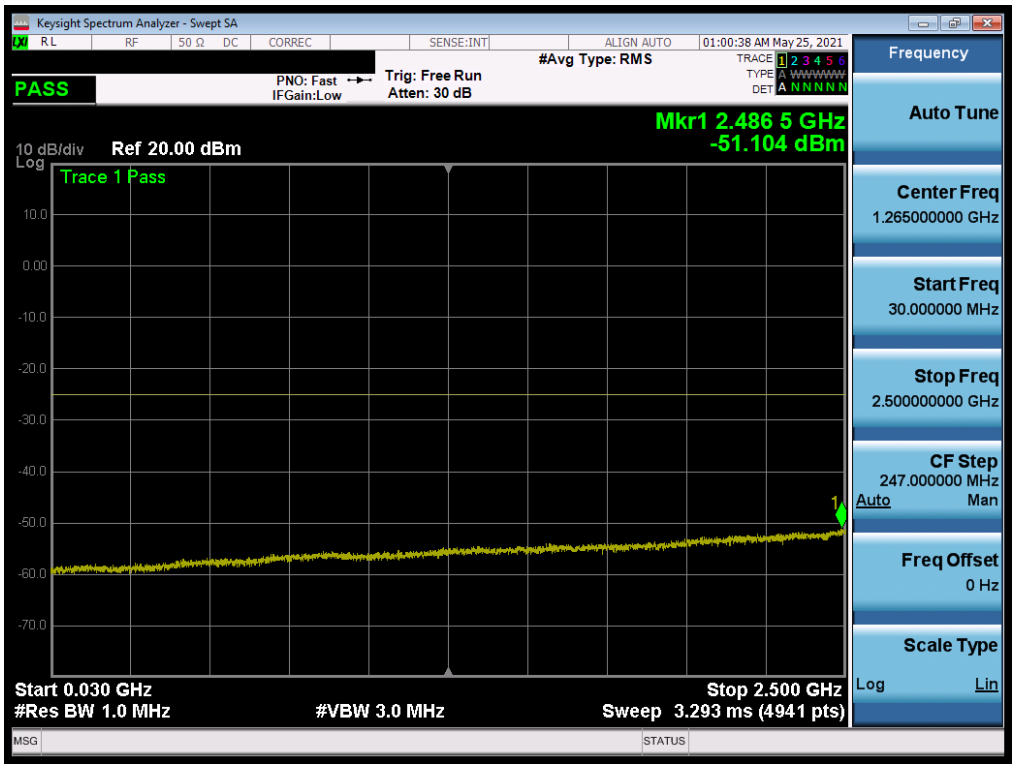


Plot 7-56. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

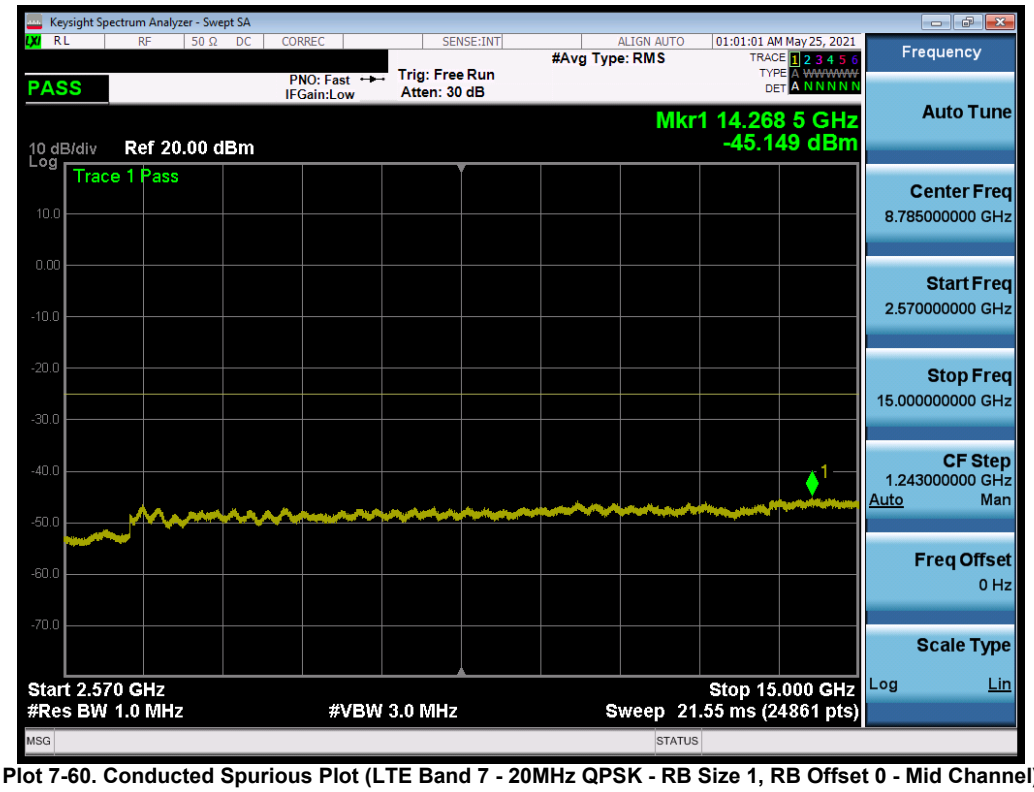


Plot 7-57. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-58. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



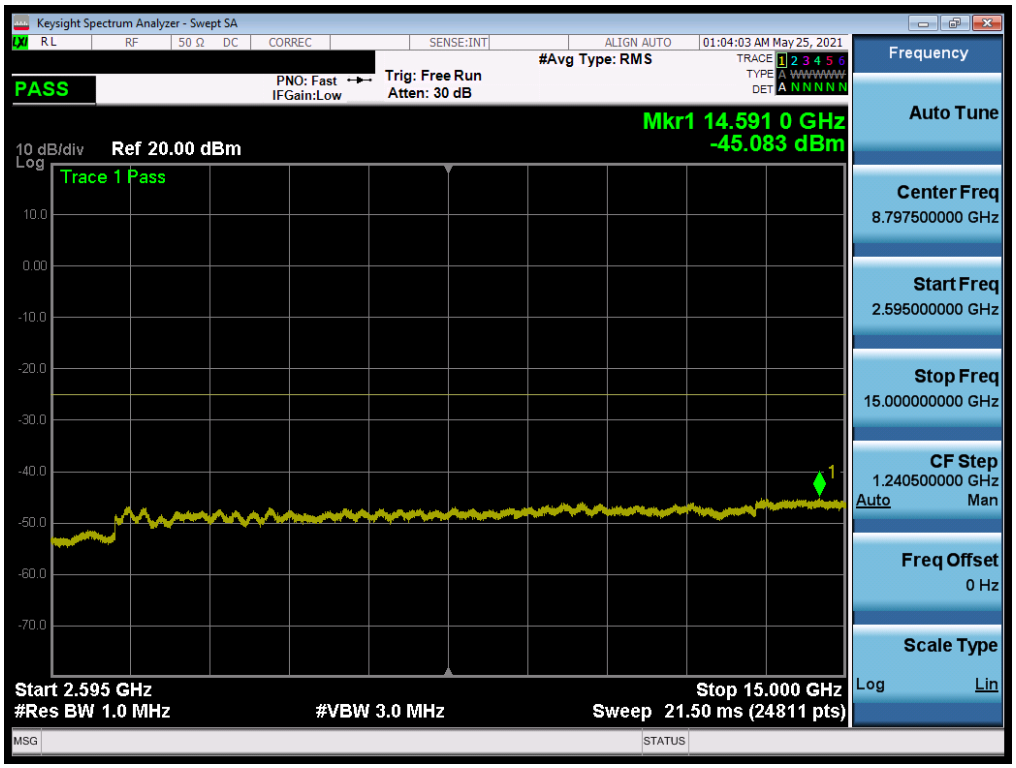
Plot 7-59. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-60. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

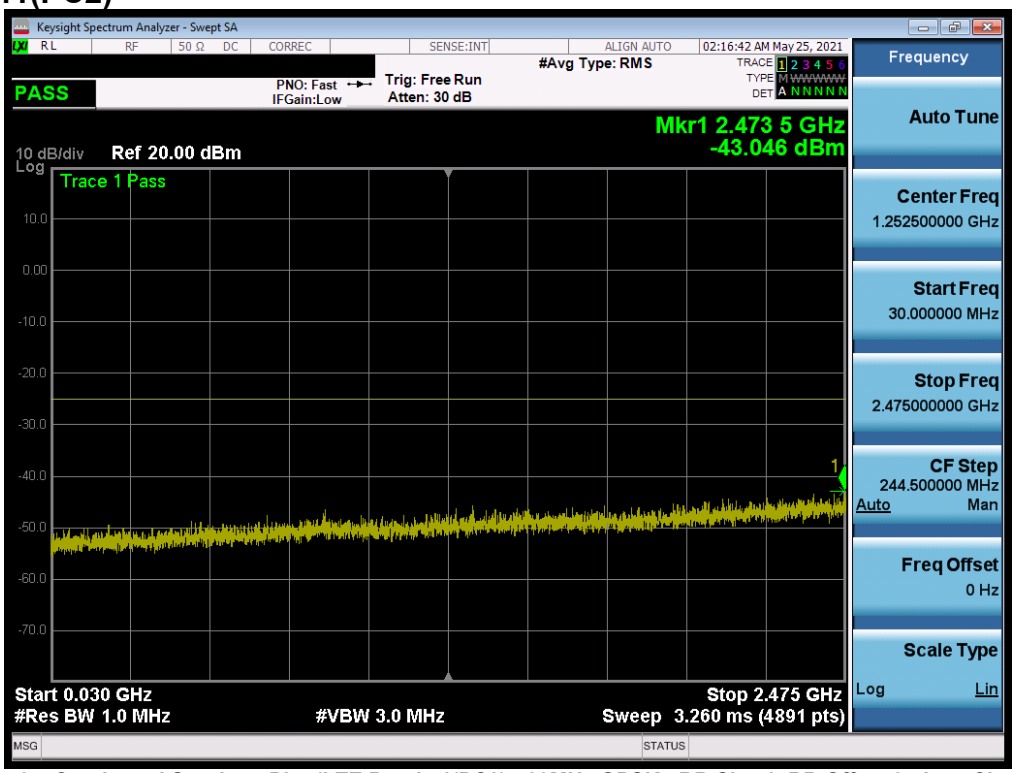
Plot 7-61. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-62. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

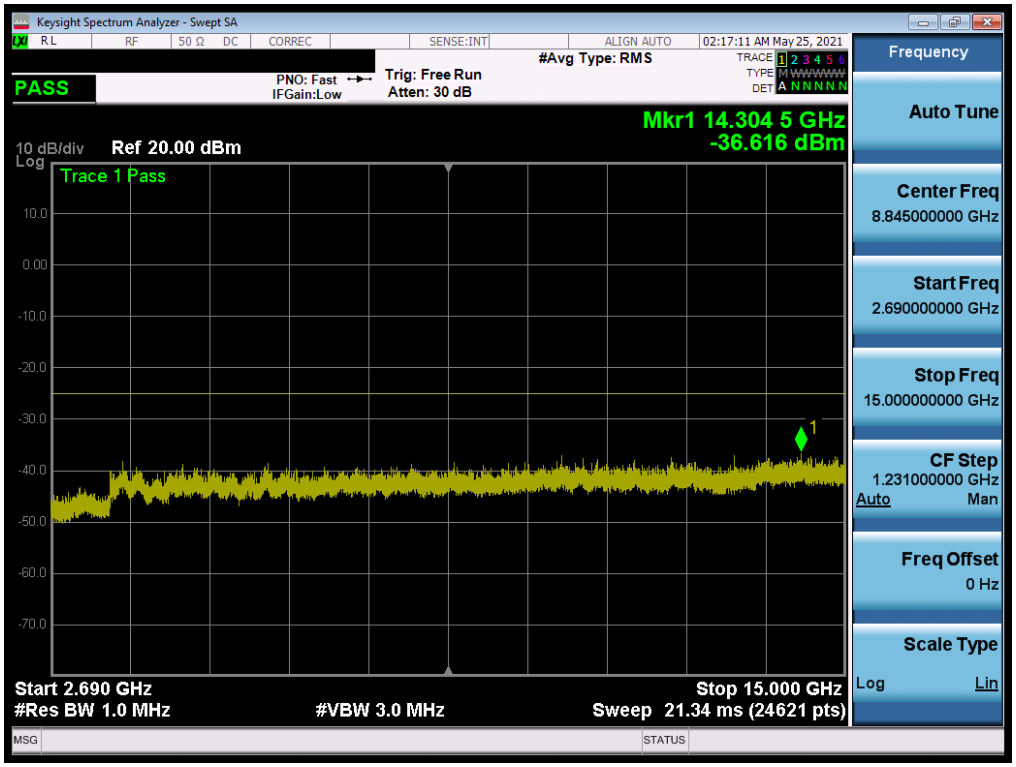


Plot 7-63. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

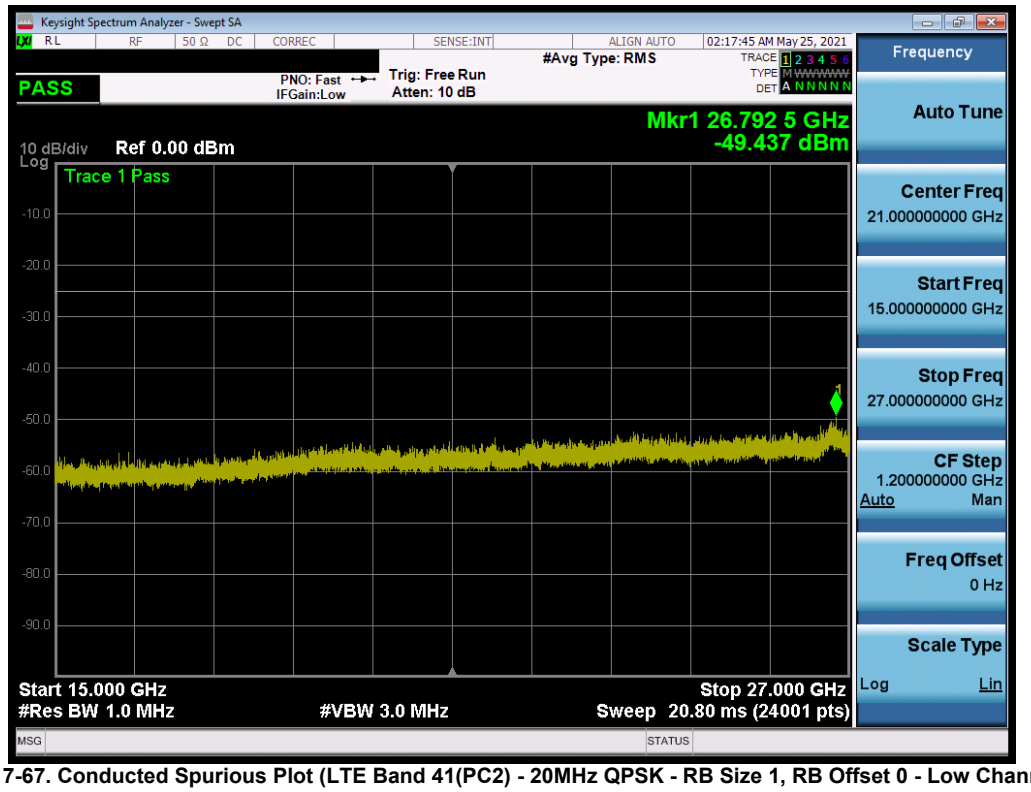
Plot 7-64. Conducted Spurious Plot (LTE Band 7 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



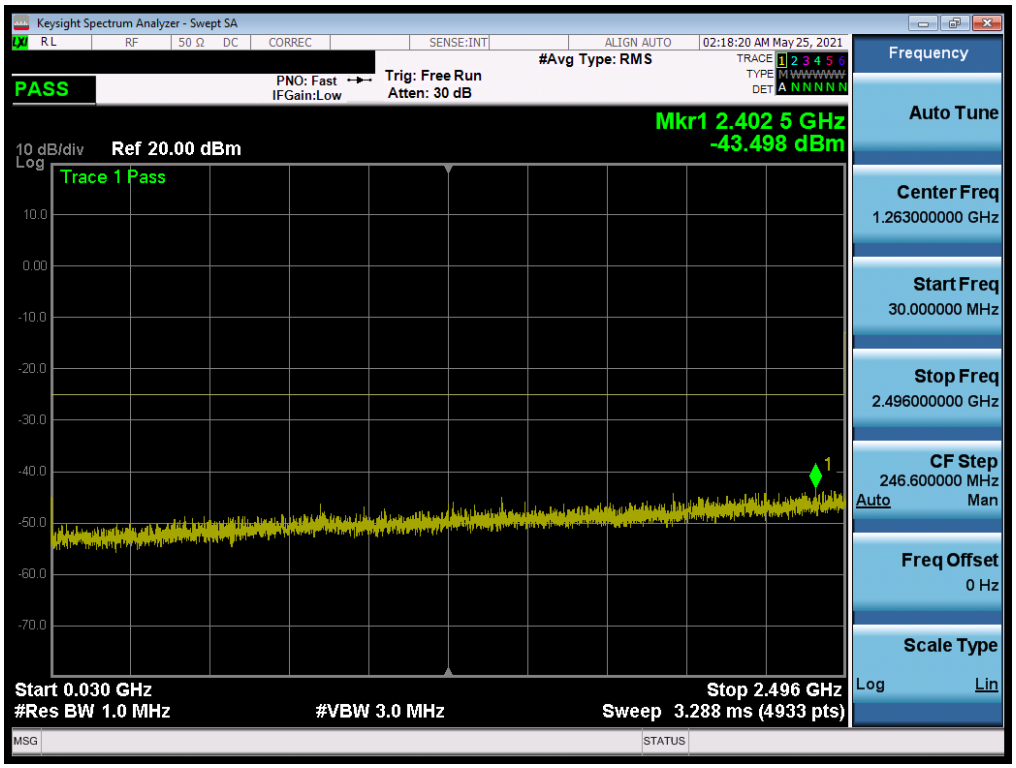
Plot 7-65. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



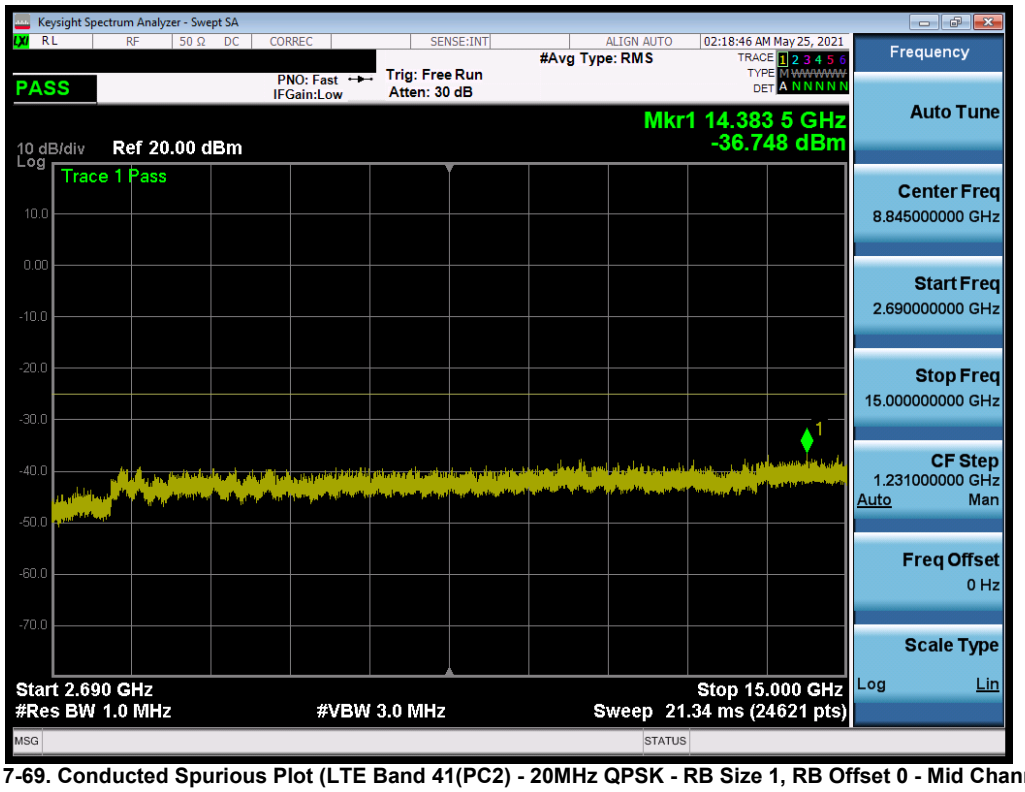
Plot 7-66. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



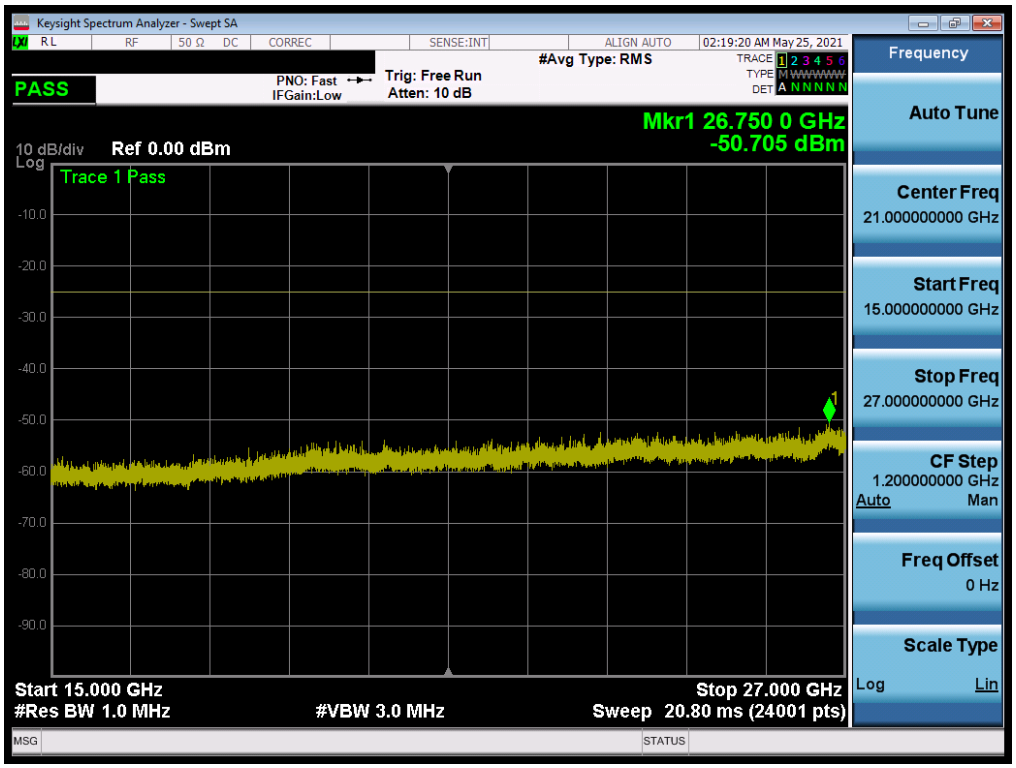
Plot 7-67. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



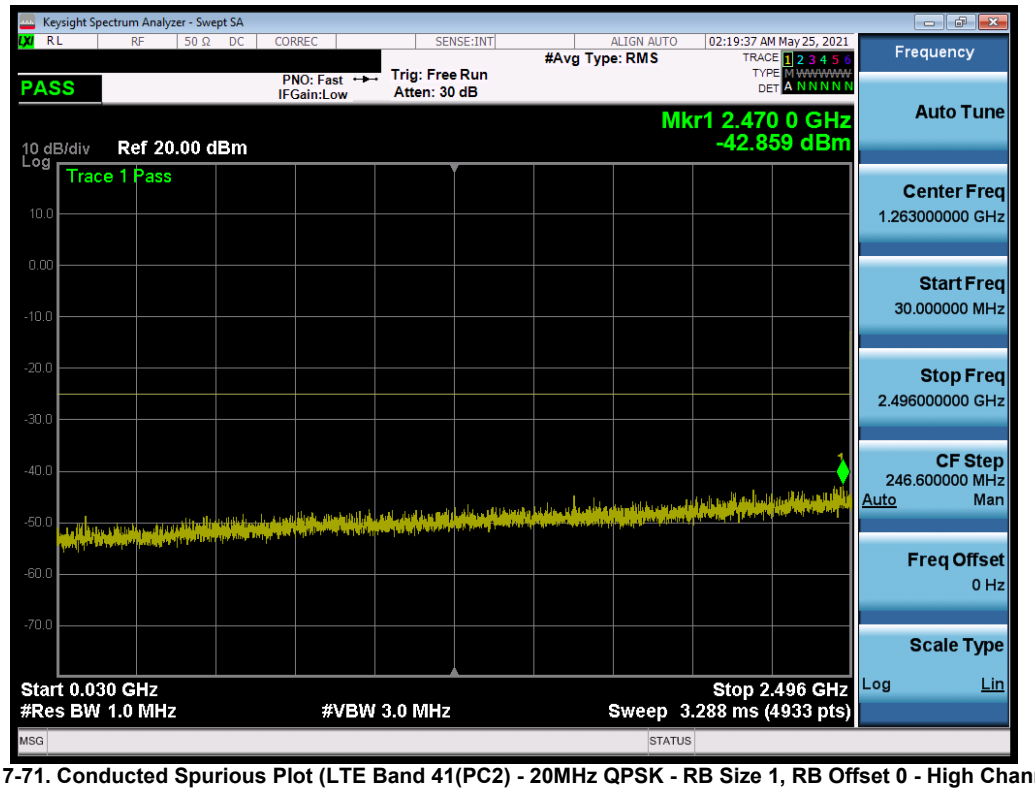
Plot 7-68. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



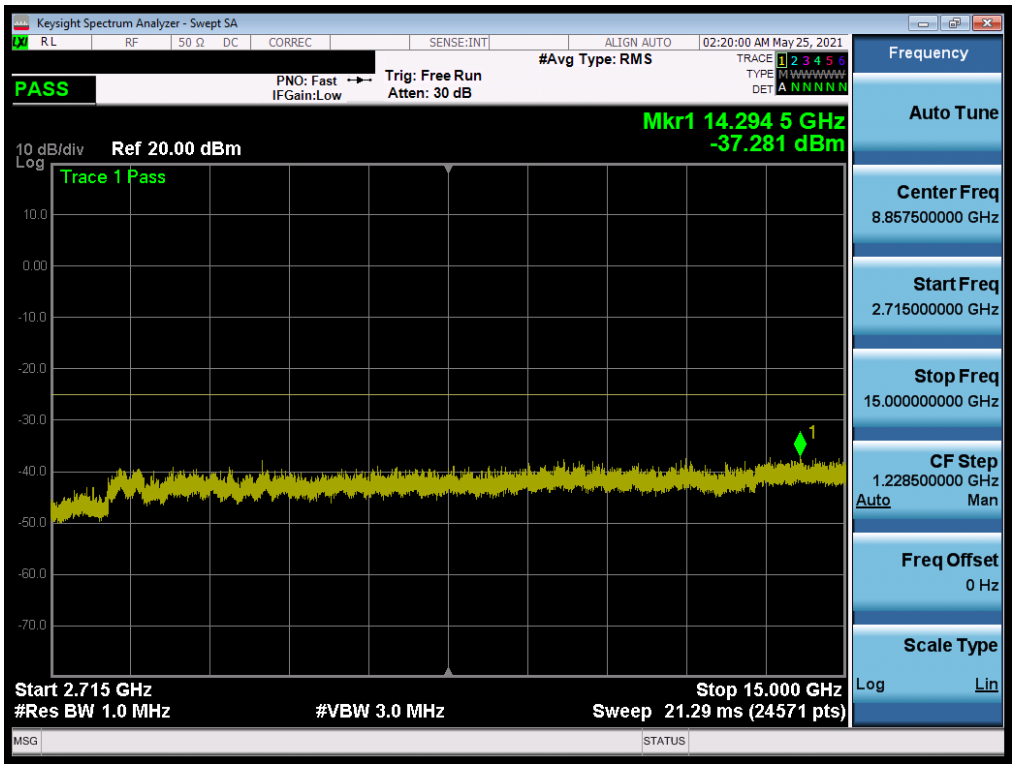
Plot 7-69. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



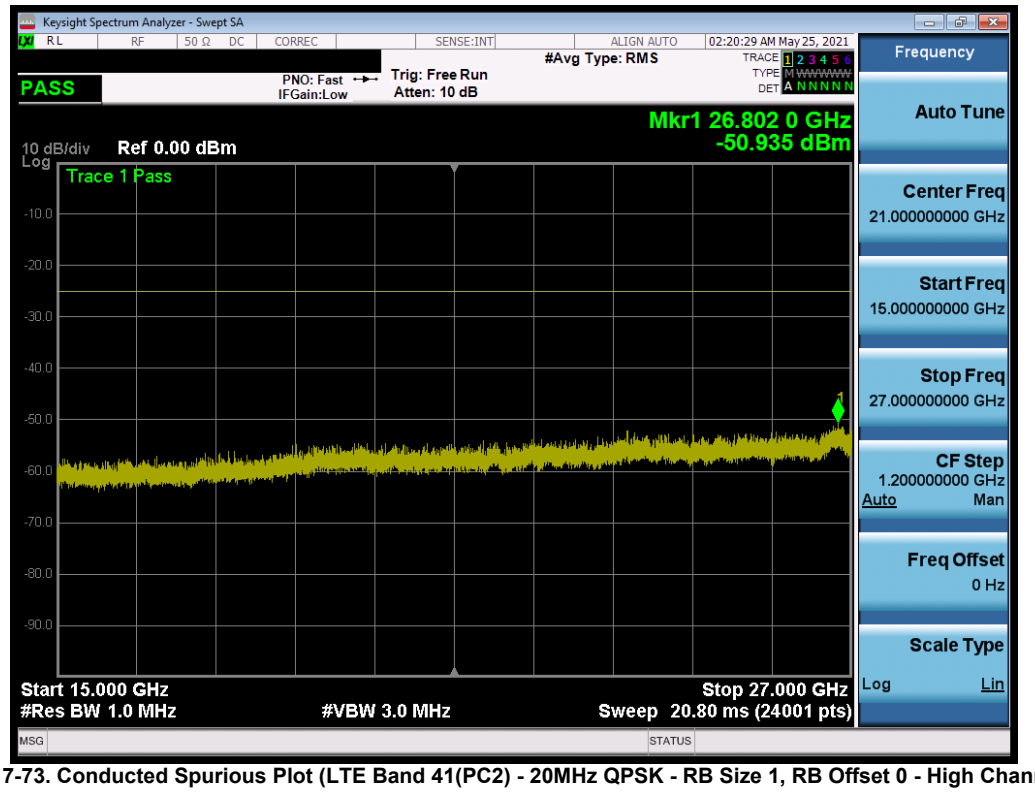
Plot 7-70. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



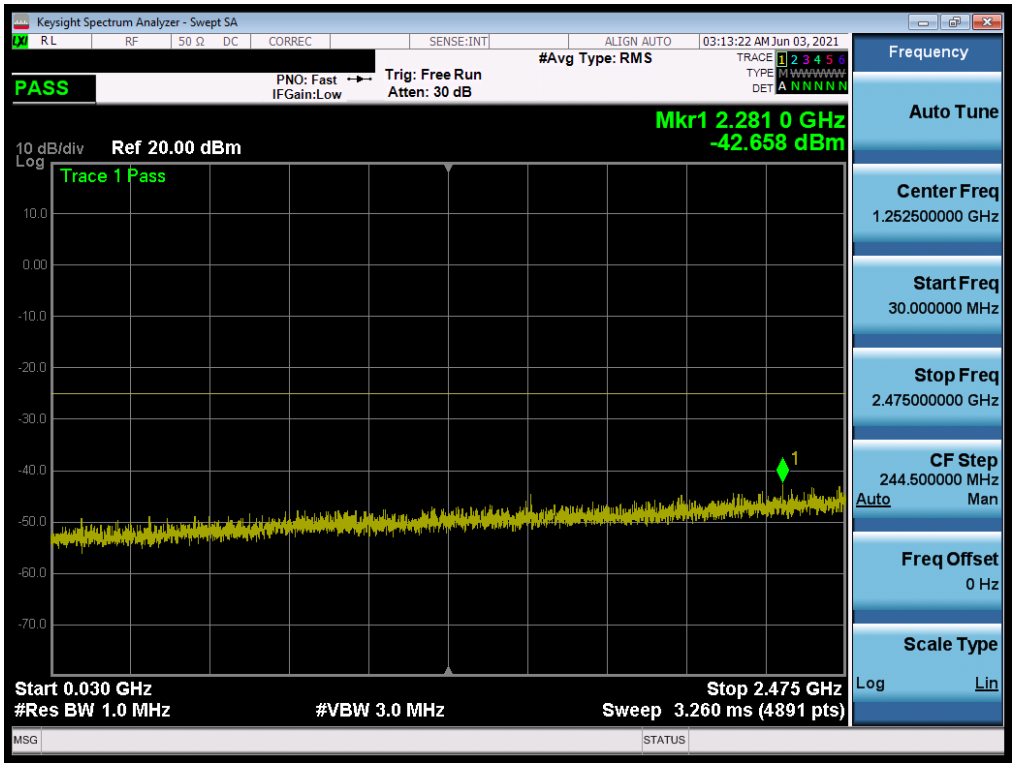
Plot 7-71. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



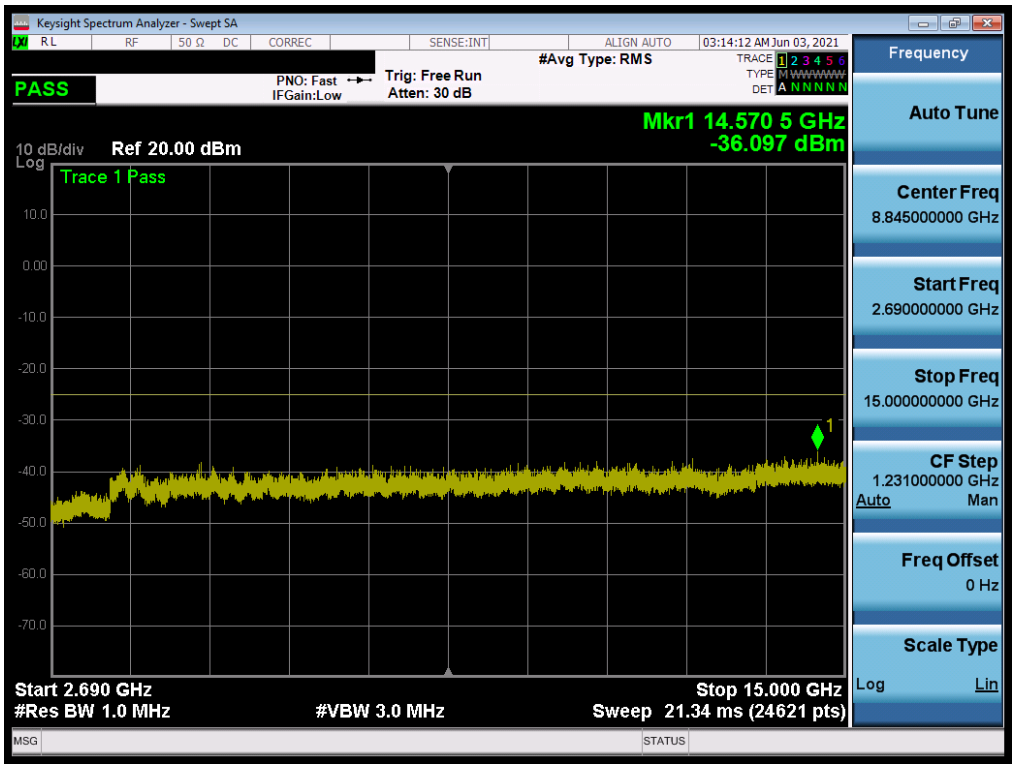
Plot 7-72. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



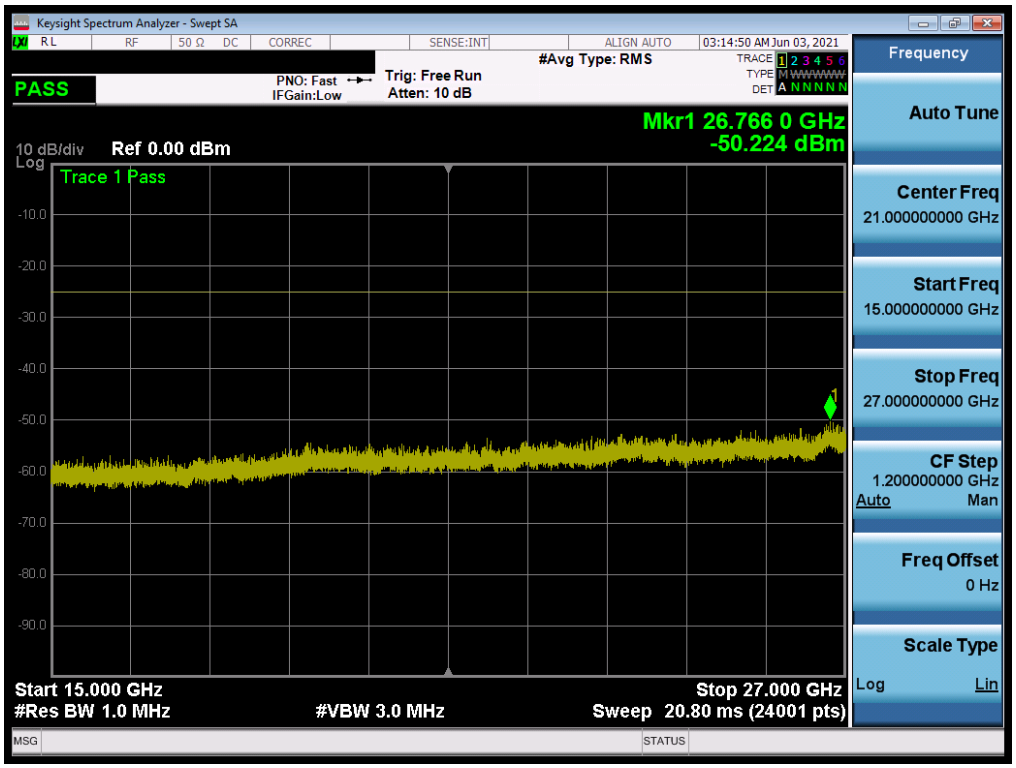
Plot 7-73. Conducted Spurious Plot (LTE Band 41(PC2) - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



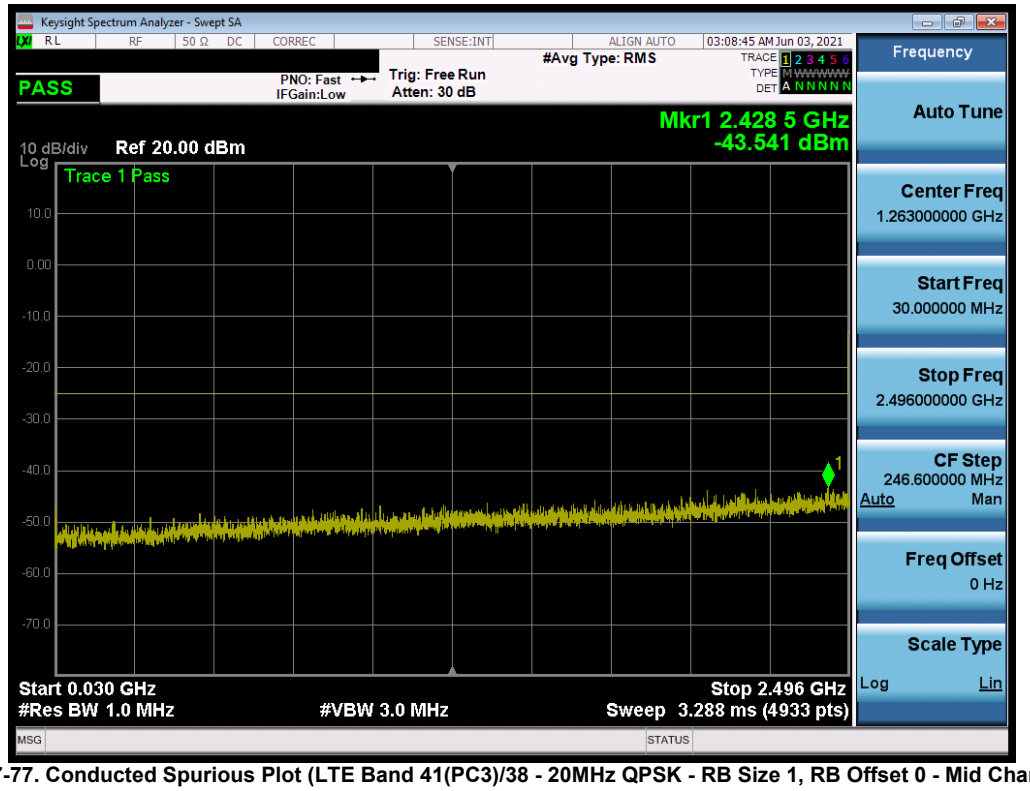
Plot 7-74. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



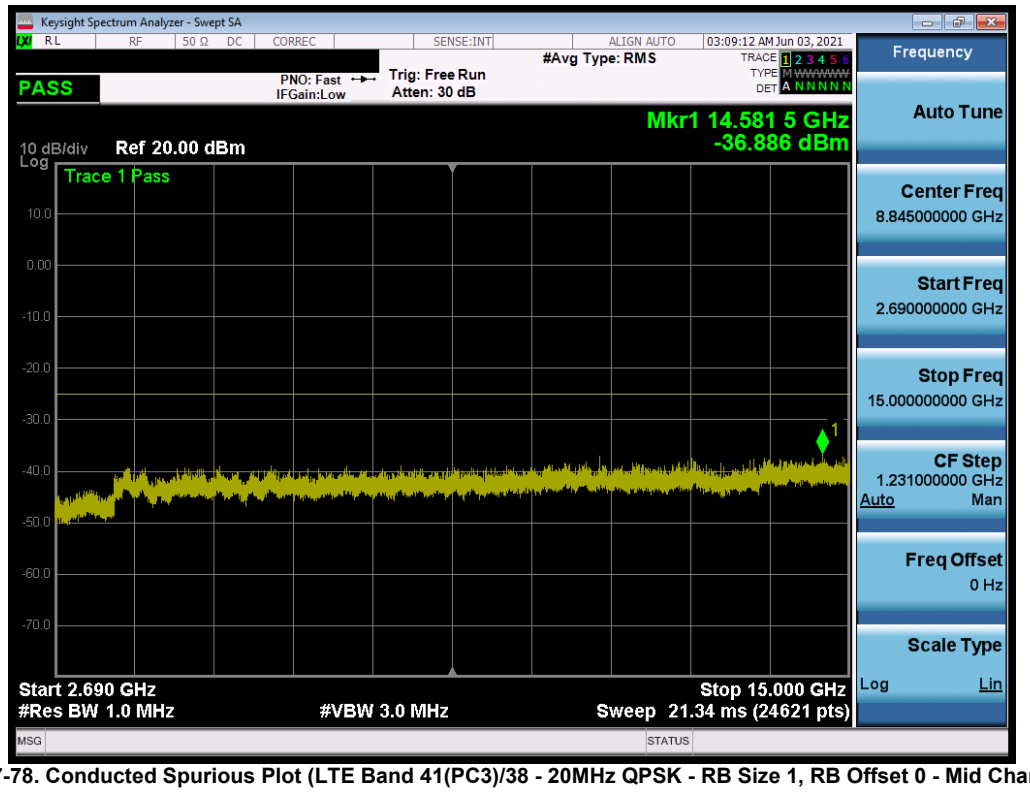
Plot 7-75. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



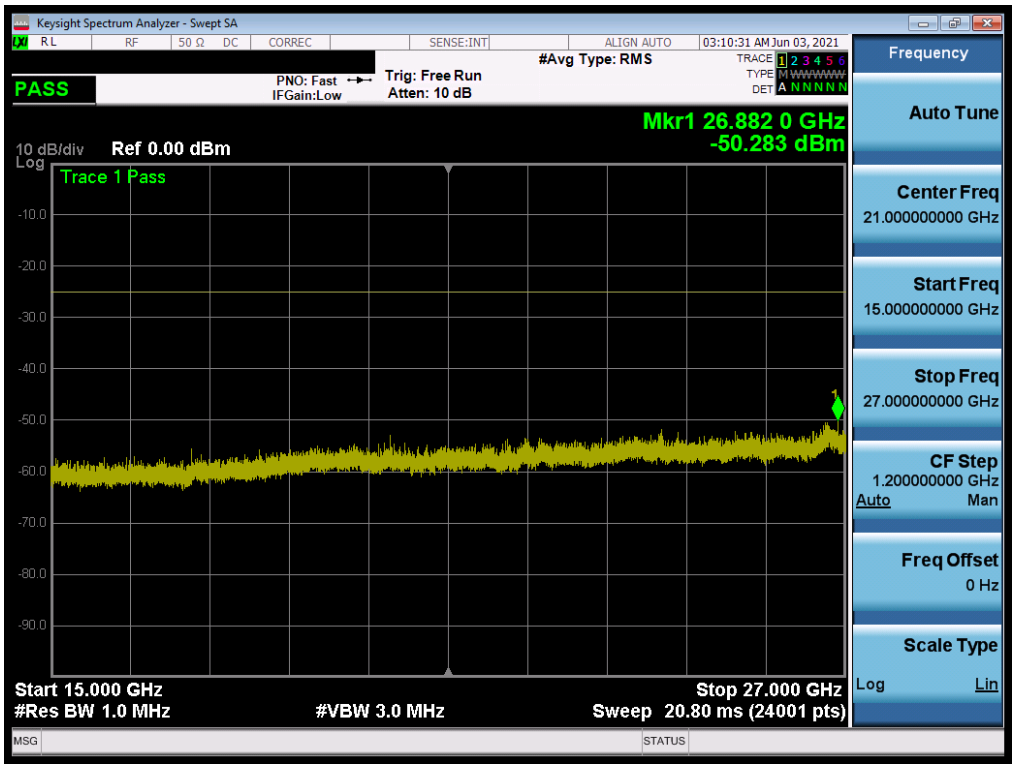
Plot 7-76. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



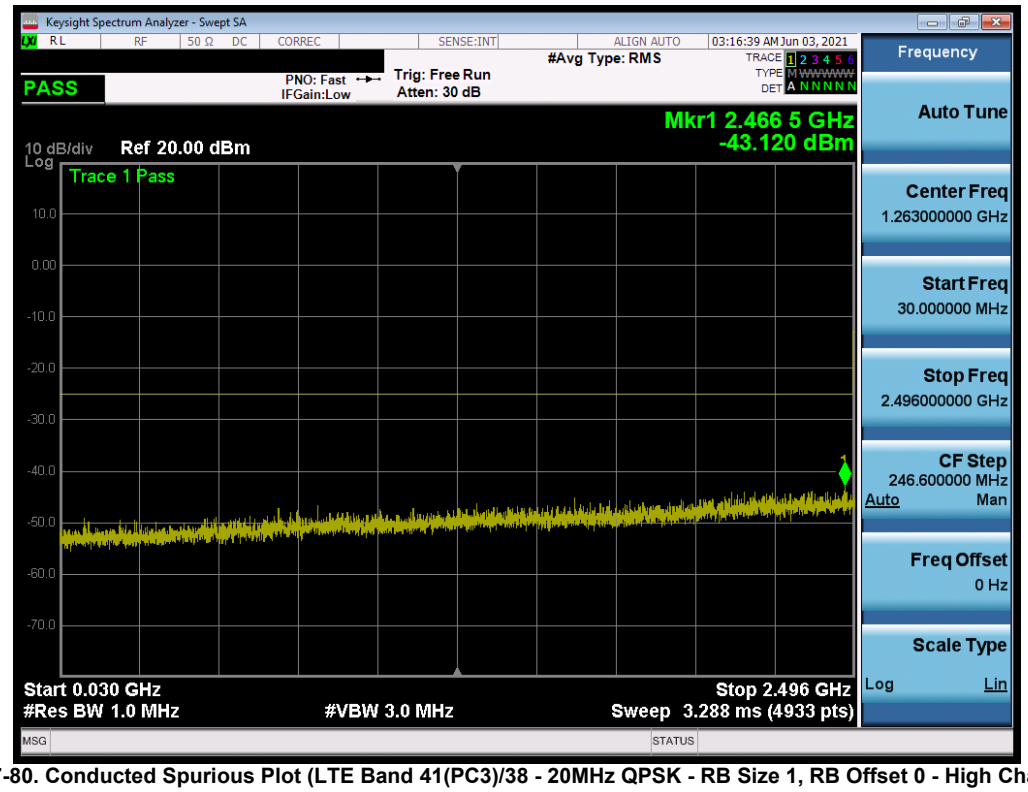
Plot 7-77. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



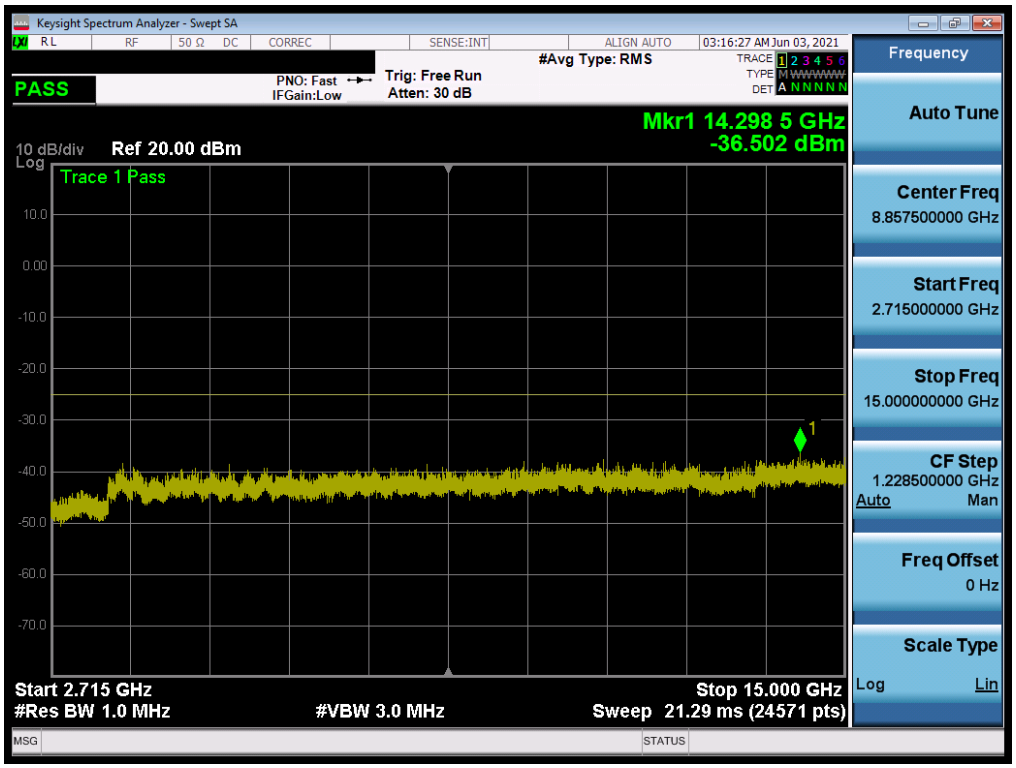
Plot 7-78. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



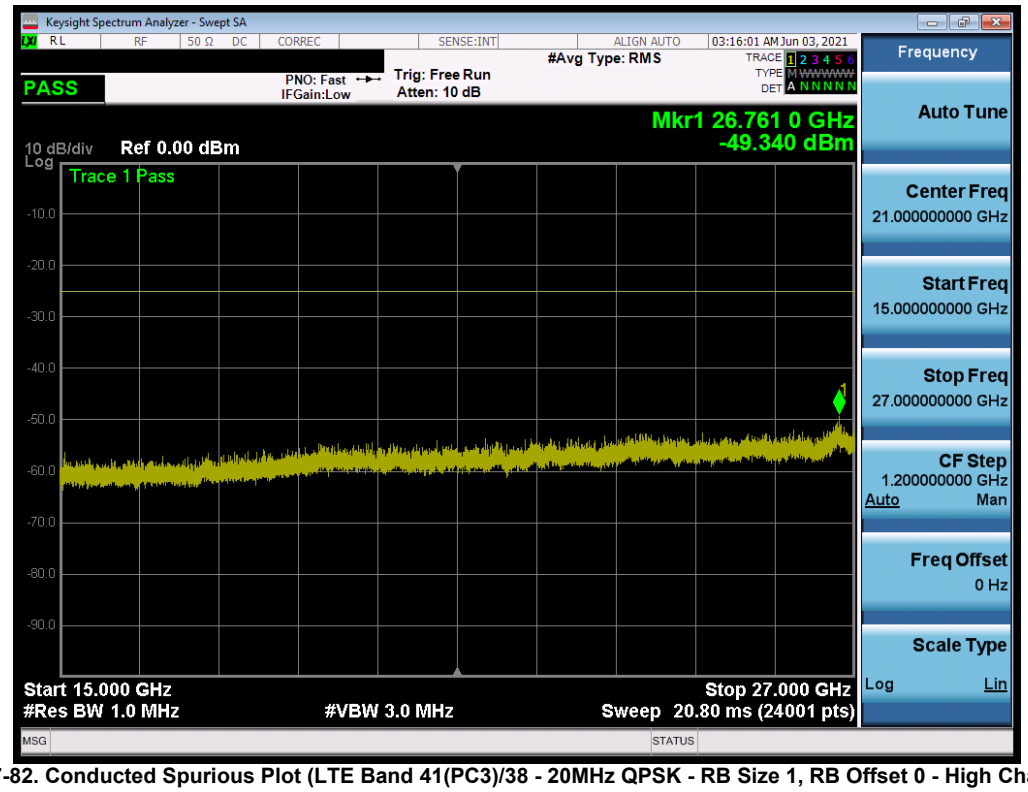
Plot 7-79. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-80. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-81. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-82. Conducted Spurious Plot (LTE Band 41(PC3)/38 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)