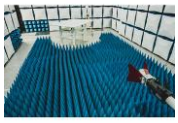
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 27 MEASUREMENT REPORT

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

Date of Testing:
1/08 - 2/19/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2101040001-24-R1.A3L

FCC ID:	**A3LSMA426U**
APPLICANT:	**Samsung Electronics Co., Ltd.**

Application Type:	Certification
Model:	SM-A426U
Additional Model(s):	SM-A426U1/DS, SM-S426DL, SM-A426U1
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

Note: This revised Test Report (S/N: 1M2101040001-24-R1.A3L) 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.

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

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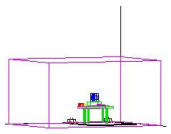
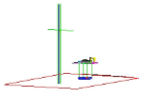


MEASUREMENT REPORT
FCC Part 27



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	ERP		EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	Max. Power [W]	Max. Power [dBm]	
LTE Band 12	10 MHz	QPSK	704.0 - 711.0	0.110	20.42	0.181	22.57	8M94G7D
		16QAM	704.0 - 711.0	0.106	20.25	0.174	22.40	8M97W7D
		64QAM	704.0 - 711.0	0.080	19.04	0.132	21.19	8M95W7D
	5 MHz	QPSK	701.5 - 713.5	0.110	20.42	0.181	22.57	4M51G7D
		16QAM	701.5 - 713.5	0.101	20.03	0.165	22.18	4M48W7D
		64QAM	701.5 - 713.5	0.080	19.05	0.132	21.20	4M51W7D
	3 MHz	QPSK	700.5 - 714.5	0.111	20.45	0.182	22.60	2M70G7D
		16QAM	700.5 - 714.5	0.101	20.04	0.166	22.19	2M71W7D
		64QAM	700.5 - 714.5	0.078	18.93	0.128	21.08	2M70W7D
	1.4 MHz	QPSK	699.7 - 715.3	0.107	20.31	0.176	22.46	1M09G7D
		16QAM	699.7 - 715.3	0.100	20.01	0.165	22.16	1M10W7D
		64QAM	699.7 - 715.3	0.077	18.84	0.126	20.99	1M10W7D
LTE Band 13	10 MHz	QPSK	782.0	0.130	21.15	0.214	23.30	8M97G7D
		16QAM	782.0	0.118	20.71	0.193	22.86	8M94W7D
		64QAM	782.0	0.089	19.47	0.145	21.62	8M96W7D
	5 MHz	QPSK	779.5 - 784.5	0.131	21.18	0.215	23.33	4M52G7D
		16QAM	779.5 - 784.5	0.110	20.40	0.180	22.55	4M51W7D
		64QAM	779.5 - 784.5	0.081	19.06	0.132	21.21	4M51W7D
LTE Band 71	20 MHz	QPSK	673.0 - 688.0	0.071	18.52	0.117	20.67	17M9G7D
		16QAM	673.0 - 688.0	0.059	17.70	0.097	19.85	17M9W7D
		64QAM	673.0 - 688.0	0.047	16.77	0.078	18.92	17M9W7D
	15 MHz	QPSK	670.5 - 690.5	0.067	18.24	0.109	20.39	13M5G7D
		16QAM	670.5 - 690.5	0.055	17.40	0.074	19.55	13M5W7D
		64QAM	670.5 - 690.5	0.045	16.55	0.113	18.70	13M5W7D
	10 MHz	QPSK	668.0 - 693.0	0.069	18.38	0.113	20.53	9M01G7D
		16QAM	668.0 - 693.0	0.056	17.47	0.092	19.62	9M01W7D
		64QAM	668.0 - 693.0	0.046	16.66	0.076	18.81	9M02W7D
	5 MHz	QPSK	665.5 - 695.5	0.068	18.30	0.111	20.45	4M53G7D
		16QAM	665.5 - 695.5	0.054	17.33	0.089	19.48	4M53W7D
		64QAM	665.5 - 695.5	0.046	16.60	0.075	18.75	4M53W7D
NR Band n71	20 MHz	π/2 BPSK	673.0 - 688.0	0.049	16.92	0.081	19.07	17M9G7D
		QPSK	673.0 - 688.0	0.049	16.86	0.080	19.01	19M0G7D
		16QAM	673.0 - 688.0	0.037	15.69	0.061	17.84	18M9W7D
		64QAM	673.0 - 688.0	0.028	14.47	0.046	16.62	18M9W7D
		256QAM	673.0 - 688.0	0.018	12.57	0.030	14.72	19M0W7D
	15 MHz	π/2 BPSK	670.5 - 690.5	0.046	16.65	0.076	18.80	13M5G7D
		QPSK	670.5 - 690.5	0.049	16.86	0.080	19.01	14M1G7D
		16QAM	670.5 - 690.5	0.038	15.75	0.062	17.90	14M2W7D
		64QAM	670.5 - 690.5	0.027	14.28	0.044	16.43	14M1W7D
		256QAM	670.5 - 690.5	0.018	12.60	0.030	14.75	14M1W7D
	10 MHz	π/2 BPSK	668.0 - 693.0	0.048	16.85	0.080	19.00	9M01G7D
		QPSK	668.0 - 693.0	0.049	16.91	0.081	19.06	9M31G7D
		16QAM	668.0 - 693.0	0.035	15.47	0.058	17.62	9M36W7D
		64QAM	668.0 - 693.0	0.027	14.36	0.045	16.51	9M35W7D
		256QAM	668.0 - 693.0	0.018	12.46	0.029	14.61	9M31W7D
	5 MHz	π/2 BPSK	665.5 - 695.5	0.049	16.91	0.081	19.06	4M51G7D
		QPSK	665.5 - 695.5	0.052	17.14	0.085	19.29	4M51G7D
		16QAM	665.5 - 695.5	0.037	15.68	0.061	17.83	4M51W7D
		64QAM	665.5 - 695.5	0.025	14.06	0.042	16.21	4M51W7D
		256QAM	665.5 - 695.5	0.018	12.49	0.029	14.64	4M52W7D

Overview Table (<1GHz Bands)

Mode	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
			Max. Power [W]	Max. Power [dBm]	
WCDMA1700	Spread Spectrum	1712.4 - 1752.6	0.274	24.37	4M21F9W

Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
LTE Band 66/4	20 MHz	QPSK	1720.0 - 1770.0	0.197	22.94	18M0G7D
		16QAM	1720.0 - 1770.0	0.170	22.29	18M1W7D
		64QAM	1720.0 - 1770.0	0.135	21.31	18M0W7D
	15 MHz	QPSK	1717.5 - 1772.5	0.188	22.74	13M5G7D
		16QAM	1717.5 - 1772.5	0.159	22.01	13M5W7D
		64QAM	1717.5 - 1772.5	0.137	21.38	13M5W7D
	10 MHz	QPSK	1715.0 - 1775.0	0.196	22.93	9M04G7D
		16QAM	1715.0 - 1775.0	0.157	21.95	9M02W7D
		64QAM	1715.0 - 1775.0	0.133	21.25	9M01W7D
	5 MHz	QPSK	1712.5 - 1777.5	0.185	22.67	4M53G7D
		16QAM	1712.5 - 1777.5	0.157	21.97	4M53W7D
		64QAM	1712.5 - 1777.5	0.131	21.16	4M54W7D
	3 MHz	QPSK	1711.5 - 1778.5	0.188	22.74	2M72G7D
		16QAM	1711.5 - 1778.5	0.168	22.25	2M72W7D
		64QAM	1711.5 - 1778.5	0.133	21.23	2M72W7D
	1.4 MHz	QPSK	1710.7 - 1779.3	0.188	22.75	1M10G7D
		16QAM	1710.7 - 1779.3	0.163	22.12	1M11W7D
		64QAM	1710.7 - 1779.3	0.134	21.26	1M09W7D
NR Band n66	20 MHz	π/2 BPSK	1720.0 - 1770.0	0.236	23.72	18M0G7D
		QPSK	1720.0 - 1770.0	0.227	23.56	19M2G7D
		16QAM	1720.0 - 1770.0	0.165	22.18	19M2W7D
		64QAM	1720.0 - 1770.0	0.130	21.15	19M1W7D
		256QAM	1720.0 - 1770.0	0.081	19.08	19M1W7D
	15 MHz	π/2 BPSK	1717.5 - 1772.5	0.238	23.77	13M5G7D
		QPSK	1717.5 - 1772.5	0.228	23.57	14M1G7D
		16QAM	1717.5 - 1772.5	0.166	22.21	14M1W7D
		64QAM	1717.5 - 1772.5	0.129	21.09	14M2W7D
		256QAM	1717.5 - 1772.5	0.080	19.04	14M0W7D
	10 MHz	π/2 BPSK	1715.0 - 1775.0	0.249	23.96	9M03G7D
		QPSK	1715.0 - 1775.0	0.231	23.64	9M41G7D
		16QAM	1715.0 - 1775.0	0.162	22.08	9M40W7D
		64QAM	1715.0 - 1775.0	0.130	21.14	9M38W7D
		256QAM	1715.0 - 1775.0	0.081	19.07	9M38W7D
	5 MHz	π/2 BPSK	1712.5 - 1777.5	0.250	23.98	4M51G7D
		QPSK	1712.5 - 1777.5	0.237	23.75	4M55G7D
		16QAM	1712.5 - 1777.5	0.171	22.32	4M55W7D
		64QAM	1712.5 - 1777.5	0.132	21.19	4M52W7D
		256QAM	1712.5 - 1777.5	0.080	19.03	4M51W7D

Overview Table (>1GHz Bands)

1.0 SM-A426U1/DS, SM-S426DL, SM-A426U1INTRODUCTION

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: A3LSMA426U**. 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.: 01719, 01685, 01800, 13623, 01776, 01875, 01792, 13276

2.2 Device Capabilities

This device contains the following capabilities:

800/850/1900 CDMA/EvDO Rev0/A, 1x Advanced (BC0, BC1, BC10), 850/1900 GSM/GPRS/EDGE, 850/1700/1900 WCDMA/HSPA, Multi-band LTE, 5G NR (n5, n71, n41, n66, n2, n25, n77, n260, n261), 802.11b/g/n WLAN, 802.11a/n/ac 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 7.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

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 document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI/TIA-603-E-2016) and "Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems" (KDB 971168 D01 v03r01) were used in the measurement of the EUT**.**

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 wooden turntable 80cm above the ground plane and 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. Radiated power levels are also investigated with the receive antenna horizontally and vertically polarized. The maximized power level is recorded using the spectrum analyzer "Channel Power" function with the integration band set to the emissions' occupied bandwidth, a RMS detector, RBW = 100kHz, VBW = 300kHz, and a 1 second sweep time over a minimum of 10 sweeps, per the guidelines of KDB 971168 D01 v03r01.

Per the guidance of ANSI/TIA-603-E-2016, a half-wave dipole is then 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 fundamental radiated power measurements, the guidance of KDB 971168 D01 v03r01 is used to record the EUT power level that is subsequently matched via the aforementioned substitution method given in ANSI/TIA-603-E-2016.

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.

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
-	LTx2	Licensed Transmitter Cable Set	4/9/2020	Annual	4/9/2021	LTx2
-	LTx4	Licensed Transmitter Cable Set	7/9/2020	Annual	7/9/2021	LTx4
Agilent	N9020A	MXA Signal Analyzer	8/4/2020	Annual	8/4/2021	US46470561
Agilent	N9030A	PXA Signal Analyzer (44GHz)	7/17/2020	Annual	7/17/2021	MY52350166
Agilent	E5515C	Wireless Communications Test Set	N/A			GB45360985
Anritsu	MT8821C	Radio Communication Analyzer	N/A			6200901190
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	3/12/2020	Biennial	3/12/2022	128337
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Rohde & Schwarz	CMU200	Base Station Simulator	N/A			836536/0005
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			100976
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	7/15/2020	Annual	7/15/2021	100342
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/10/2020	Annual	2/10/2021	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	2/21/2020	Annual	2/21/2021	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	DRH-118	Horn Antenna (1-18 GHz)	8/27/2019	Biennial	8/27/2021	A042511
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	7/27/2020	Biennial	7/27/2022	A051107

Table 5-1. Summary of Test Results

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

Emission Designator

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 – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average 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 analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

7.0 TEST RESULTS

7.1 Summary

Company Name: Samsung Electronics Co., Ltd.

FCC ID: A3LSMA426U

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

Mode(s): WCDMA/LTE/NR

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	RSS-139(2.3)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 27.53	RSS-139(6.6)	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Sections 7.3, 7.4
	Transmitter Conducted Output Power	2.1046	RSS-139(4.1)	N/A	PASS	See RF Exposure Report
	Frequency Stability	2.1055, 27.54	RSS-139(6.4)	Fundamental emissions stay within authorized frequency block	PASS	Section 7.10
	Uplink Carrier Aggregation	27.53(h)	RSS-199(4.5)	> 43 + 10log10(P[Watts]) at Band Edge and for all out-of-band emissions	PASS	Section 7.6
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 71)	27.50(b)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (NR Band n71)				PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 12)				PASS	Section 7.7
	Effective Radiated Power / Equivalent Isotropic Radiated Power (LTE Band 13)	27.50(c)(10)	RSS-130(4.4)	< 3 Watts max. ERP < 5 Watts max. EIRP	PASS	Section 7.7
	Equivalent Isotropic Radiated Power (WCDMA)	27.50(d)(4)	RSS-139(6.5)	< 1 Watts max. EIRP	PASS	Section 7.7
	Equivalent Isotropic Radiated Power (NR Band n66)				PASS	Section 7.7
	Equivalent Isotropic Radiated Power (LTE Band 4/66)				PASS	Section 7.7
	Radiated Spurious Emissions (LTE Band 13)	2.1053, 27.53(f)	RSS-139(6.6)	< -70 dBW/MHz (for wideband signals) < -80 dBW (for discrete emissions less than 700Hz BW) For all emissions in the band 1559 - 1610 MHz	PASS	Section 7.8
	Radiated Spurious Emissions	2.1053, 27.53	RSS-139(6.6)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	Section 7.8
	Uplink Carrier Aggregation	27.53	RSS-199(4.5)	Undesirable emissions must meet the limits detailed in 27.53(m)	PASS	Section 7.9

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 shown in Section 7.0 were 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) For conducted spurious emissions, automated test software was used to measure emissions and capture the corresponding plots necessary to show compliance. The measurement software utilized is PCTEST 2G/3G Automation Version 4.2.

7.2 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.

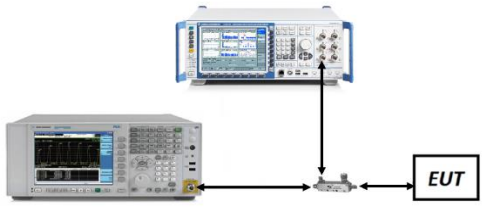
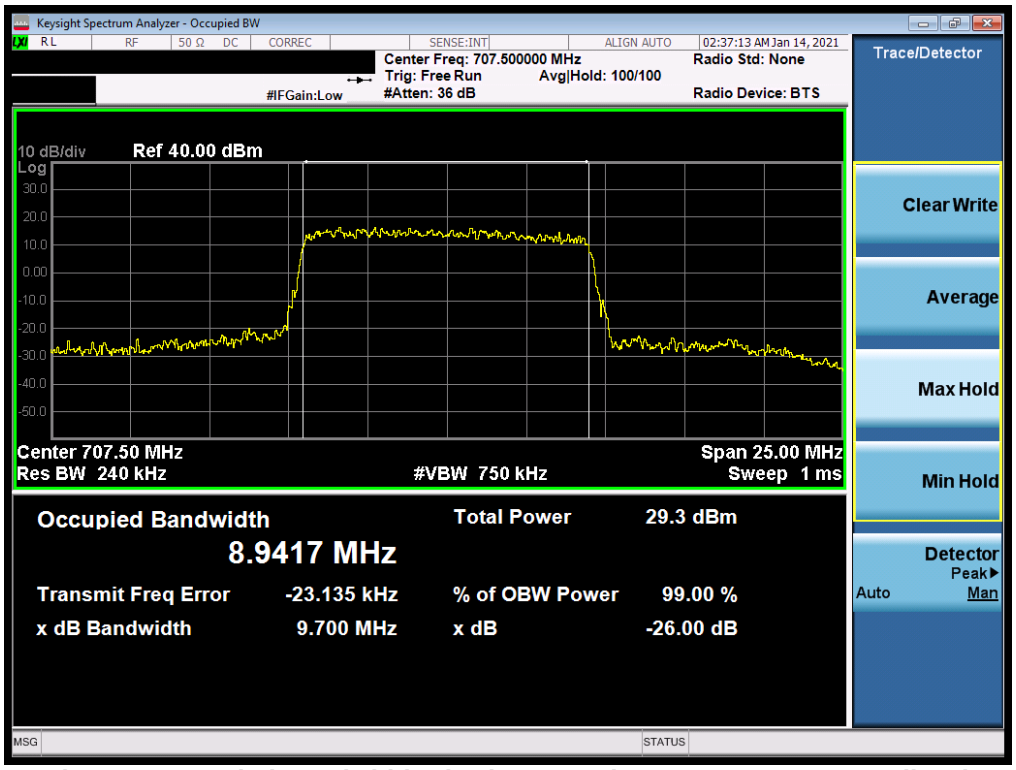


Figure 7-1. Test Instrument & Measurement Setup

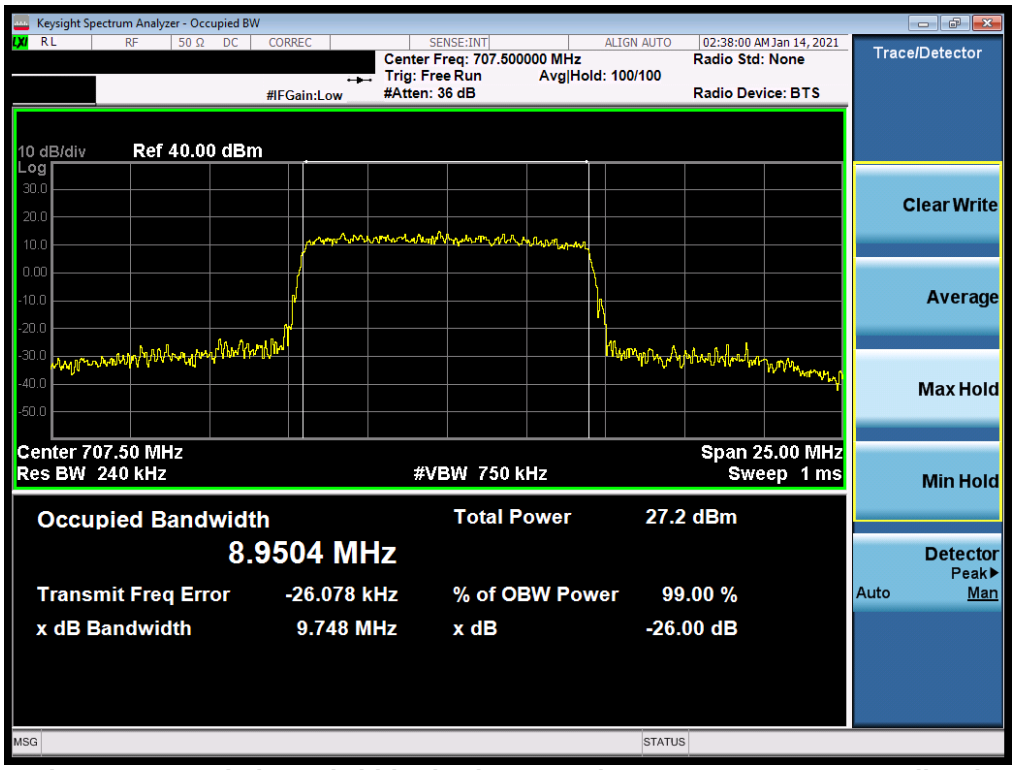
Test Notes

None.

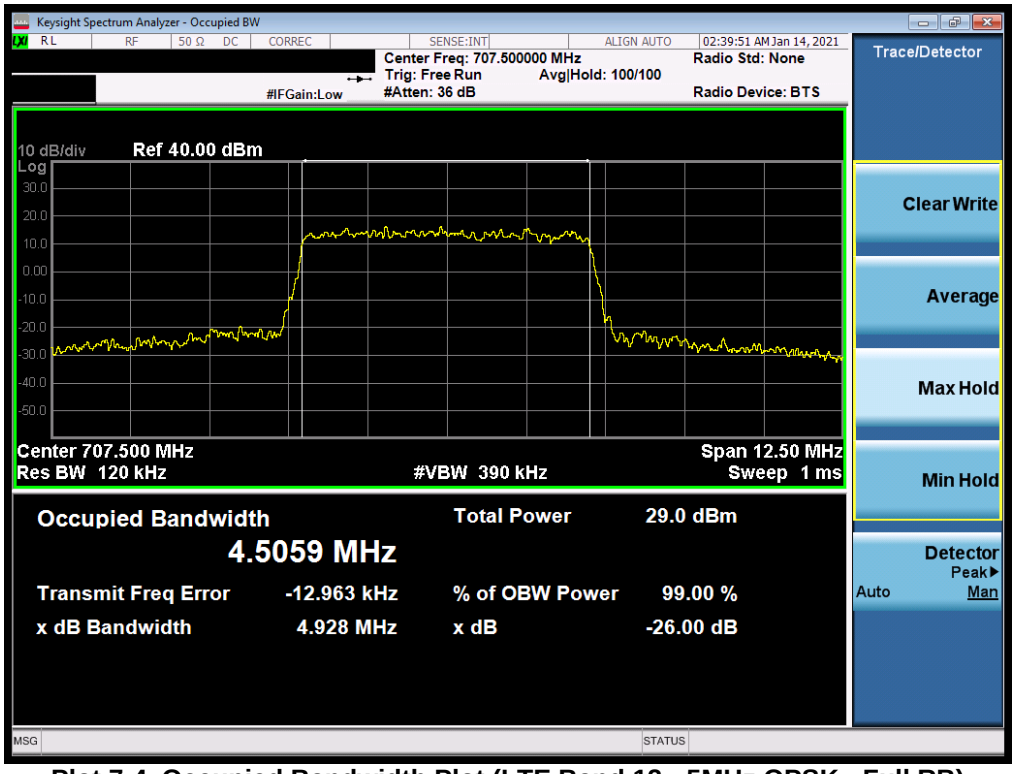


Plot 7-1. Occupied Bandwidth Plot (LTE Band 12 - 10MHz QPSK - Full RB)

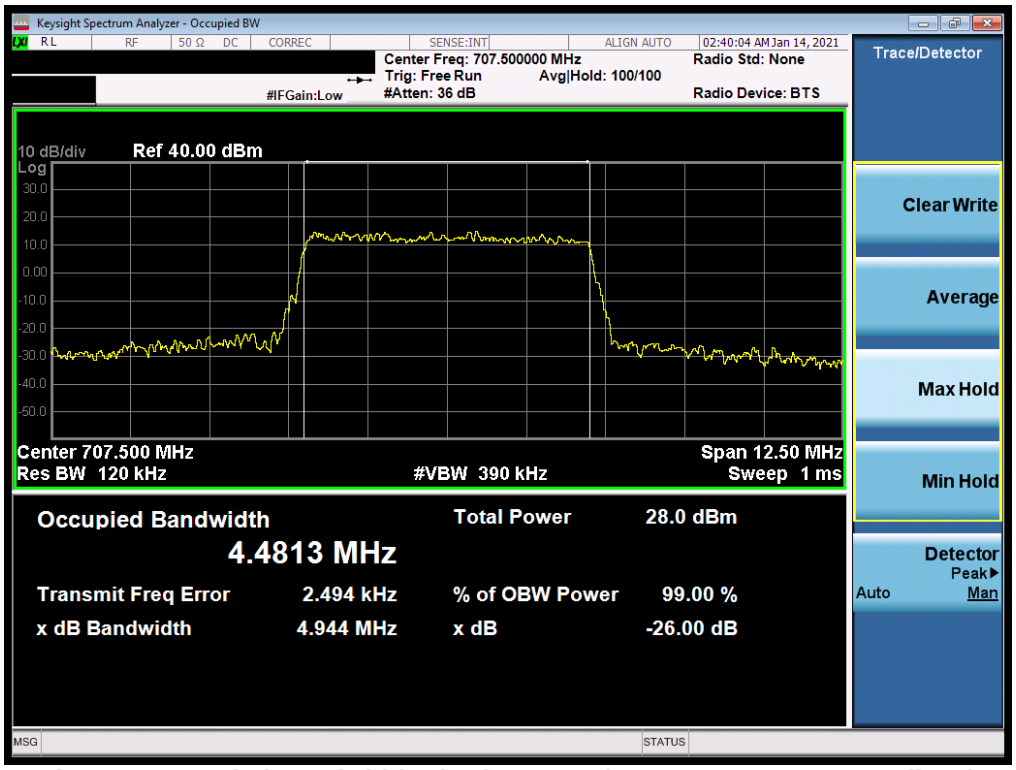
Plot 7-2. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 16-QAM - Full RB)



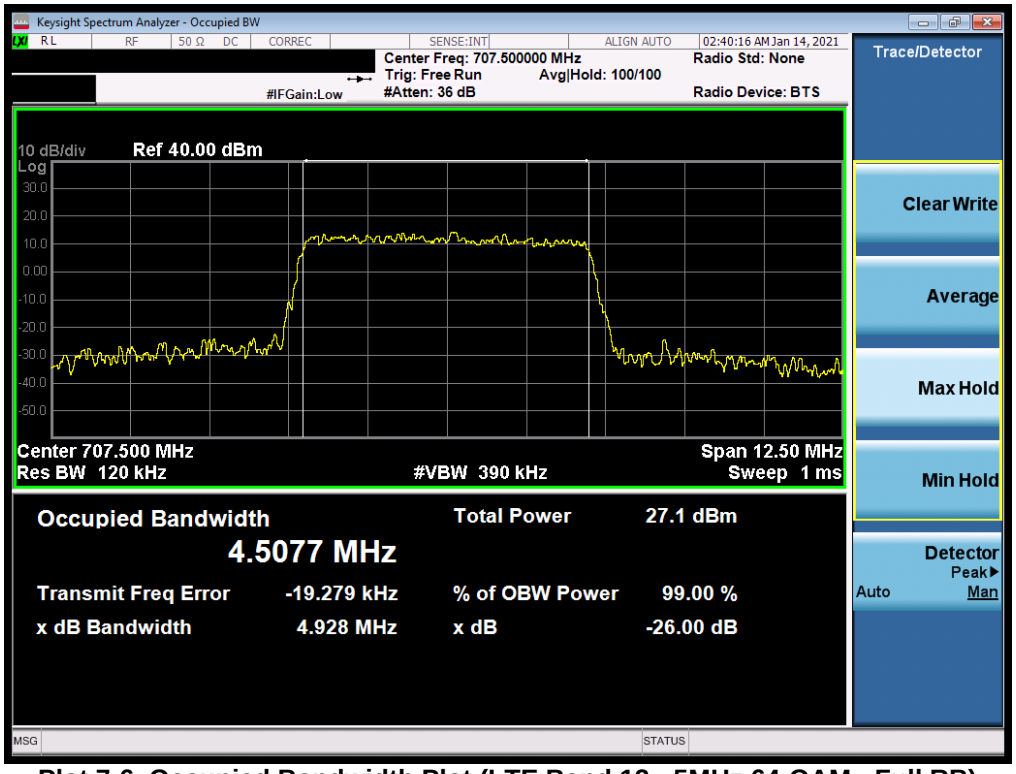
Plot 7-3. Occupied Bandwidth Plot (LTE Band 12 - 10MHz 64-QAM - Full RB)



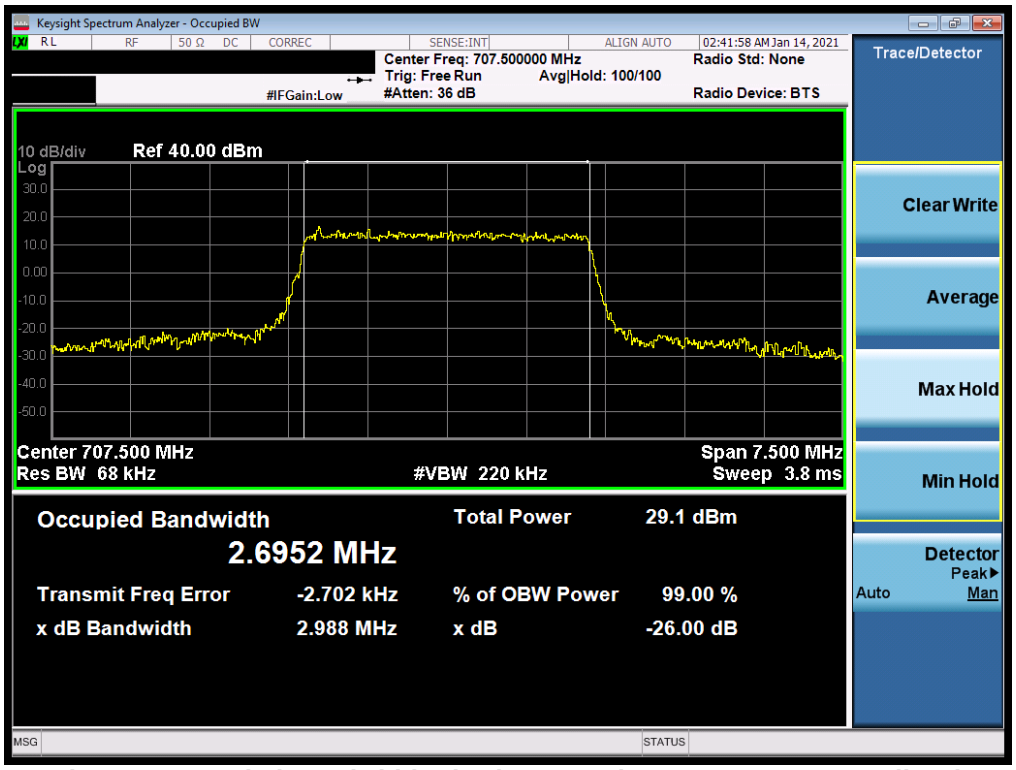
Plot 7-4. Occupied Bandwidth Plot (LTE Band 12 - 5MHz QPSK - Full RB)



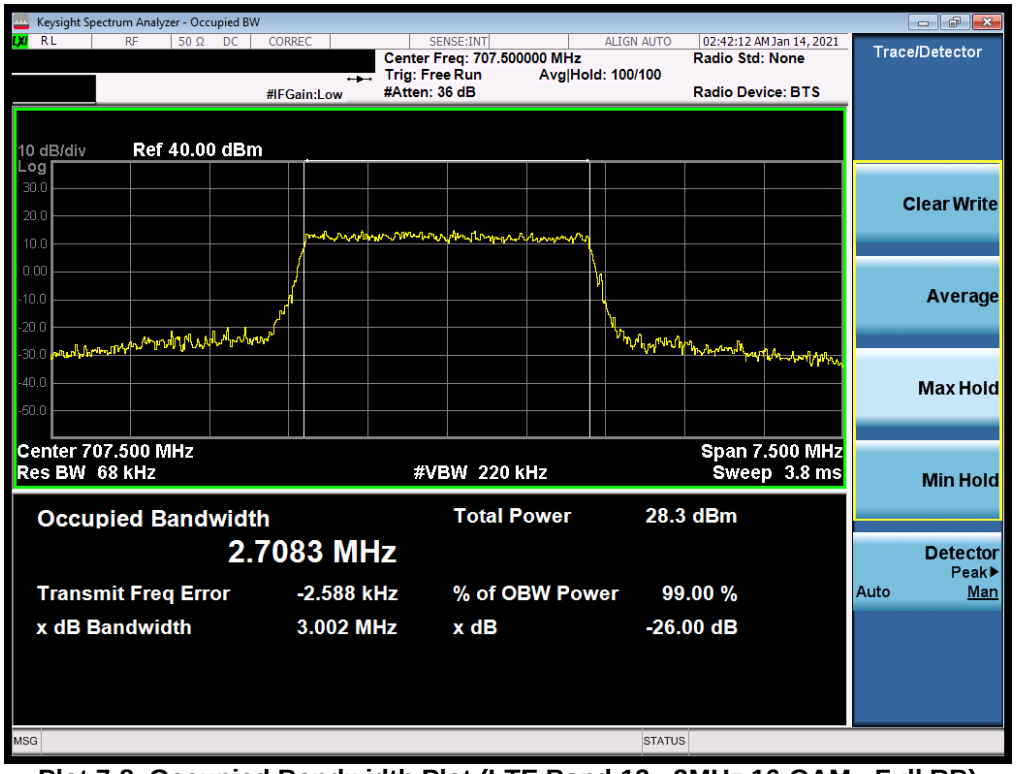
Plot 7-5. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 16-QAM - Full RB)



Plot 7-6. Occupied Bandwidth Plot (LTE Band 12 - 5MHz 64-QAM - Full RB)

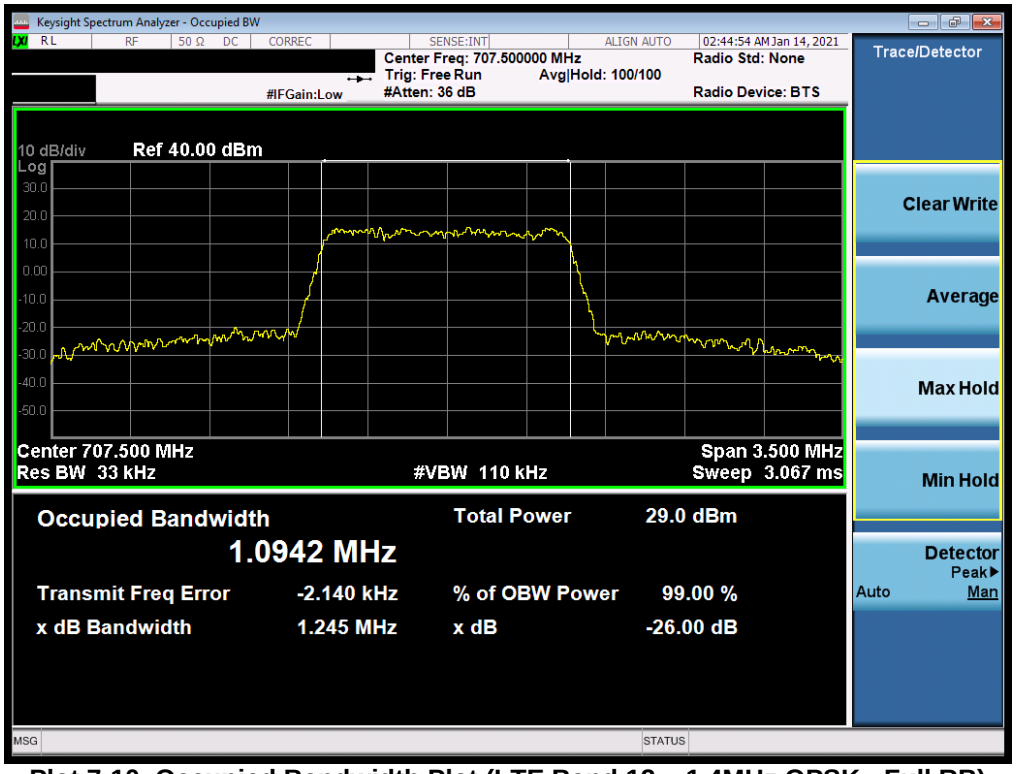


Plot 7-7. Occupied Bandwidth Plot (LTE Band 12 - 3MHz QPSK - Full RB)

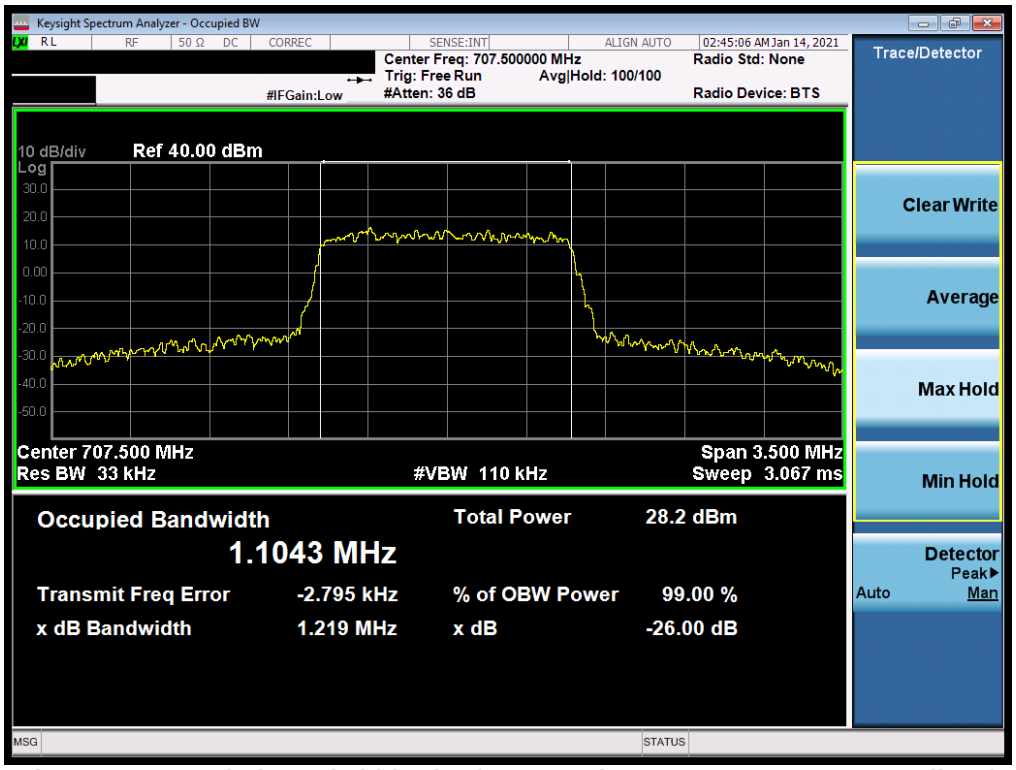


Plot 7-8. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 16-QAM - Full RB)

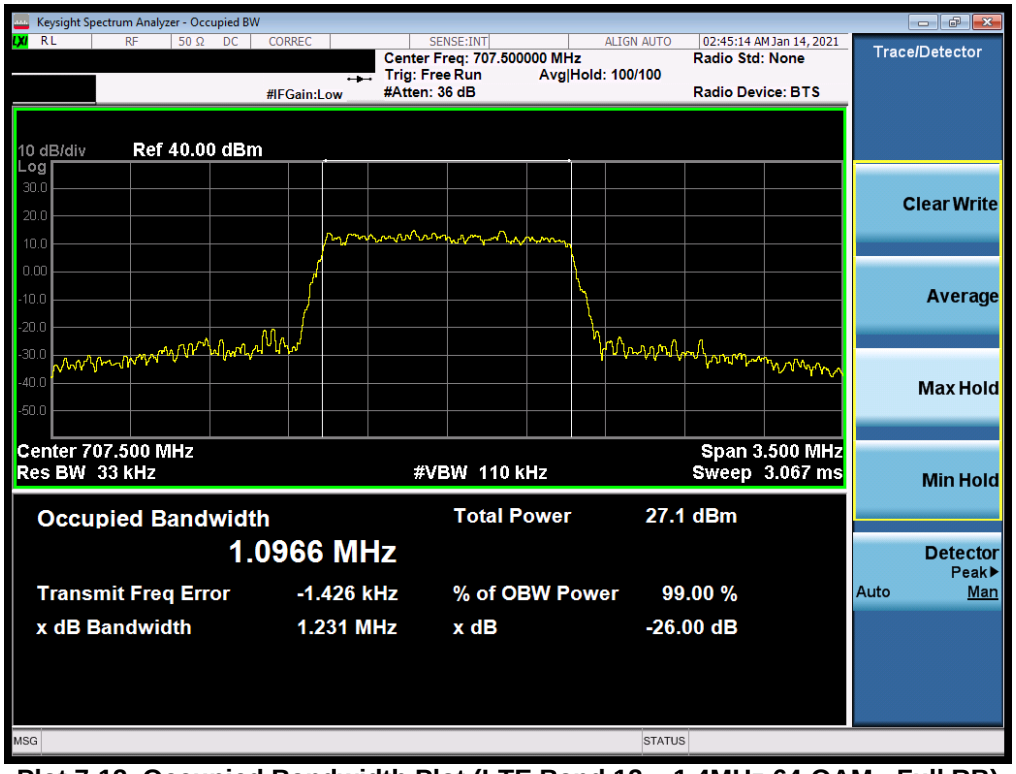
Plot 7-9. Occupied Bandwidth Plot (LTE Band 12 - 3MHz 64-QAM - Full RB)



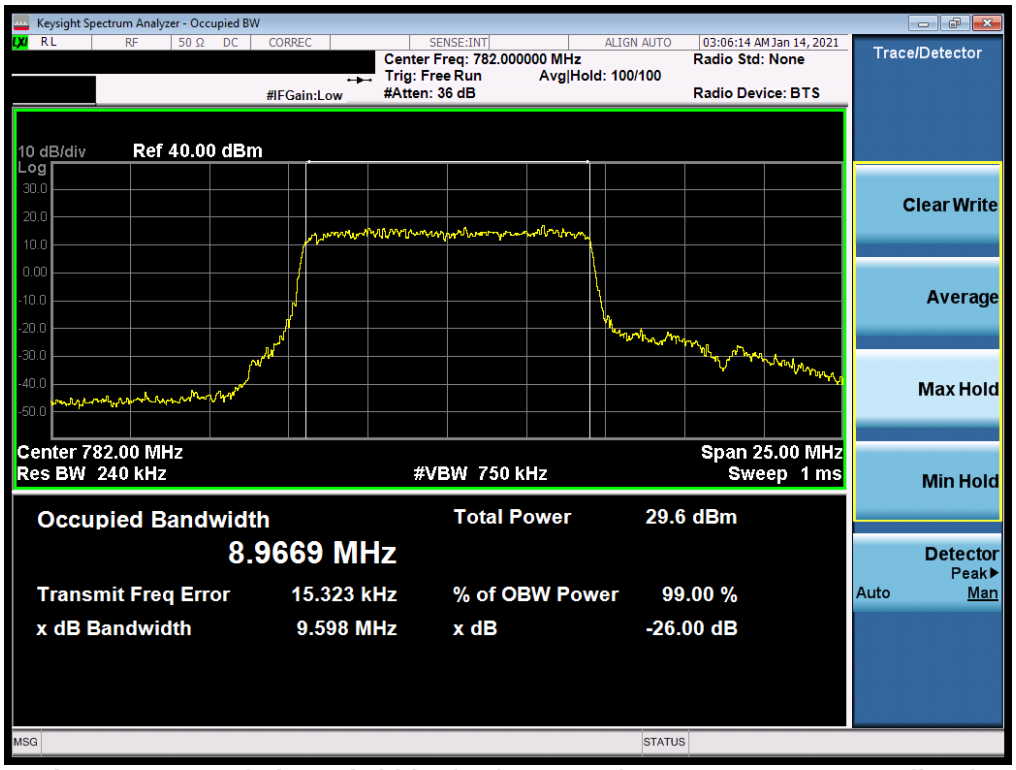
Plot 7-10. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz QPSK - Full RB)



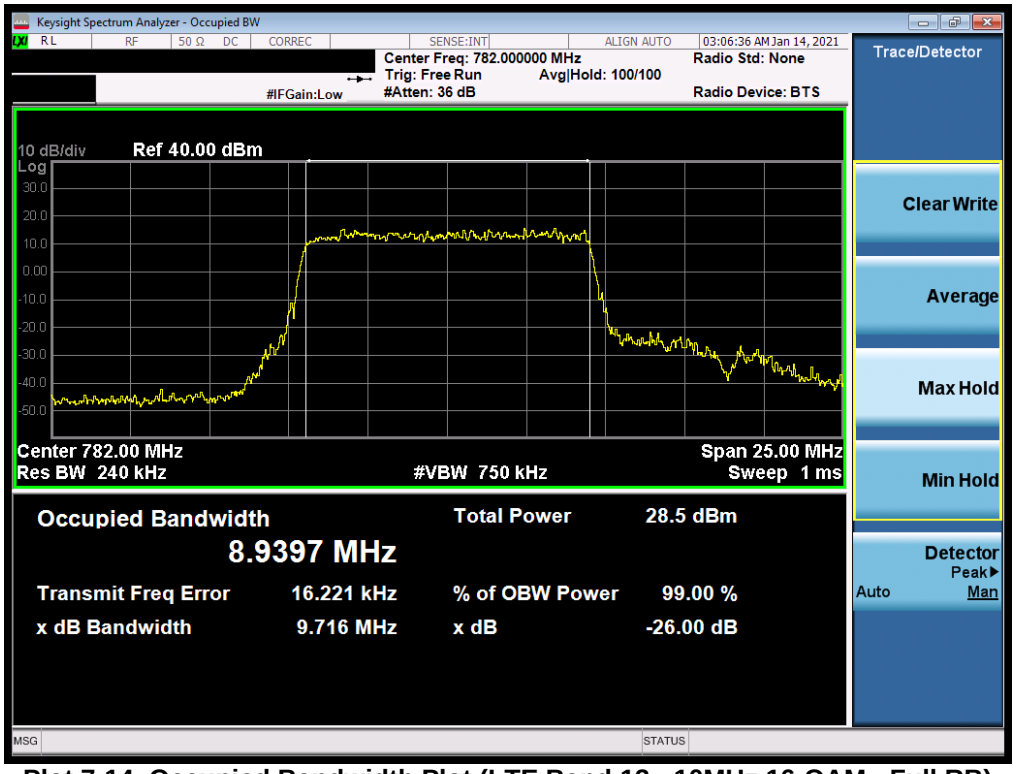
Plot 7-11. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 16-QAM - Full RB)



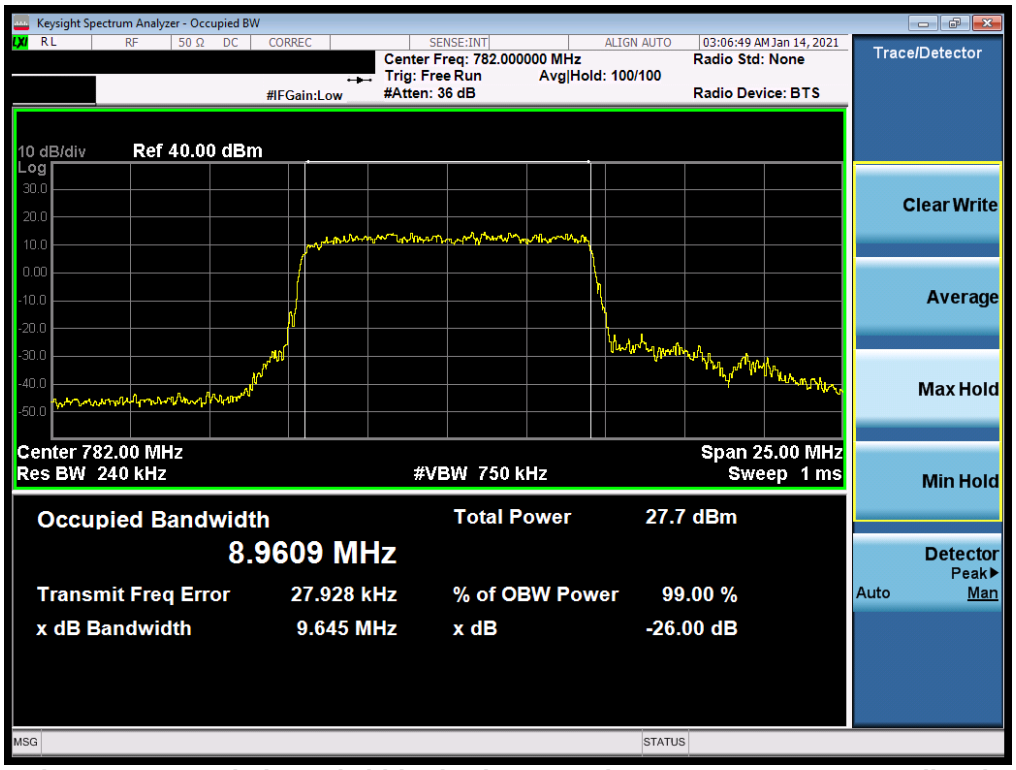
Plot 7-12. Occupied Bandwidth Plot (LTE Band 12 – 1.4MHz 64-QAM - Full RB)



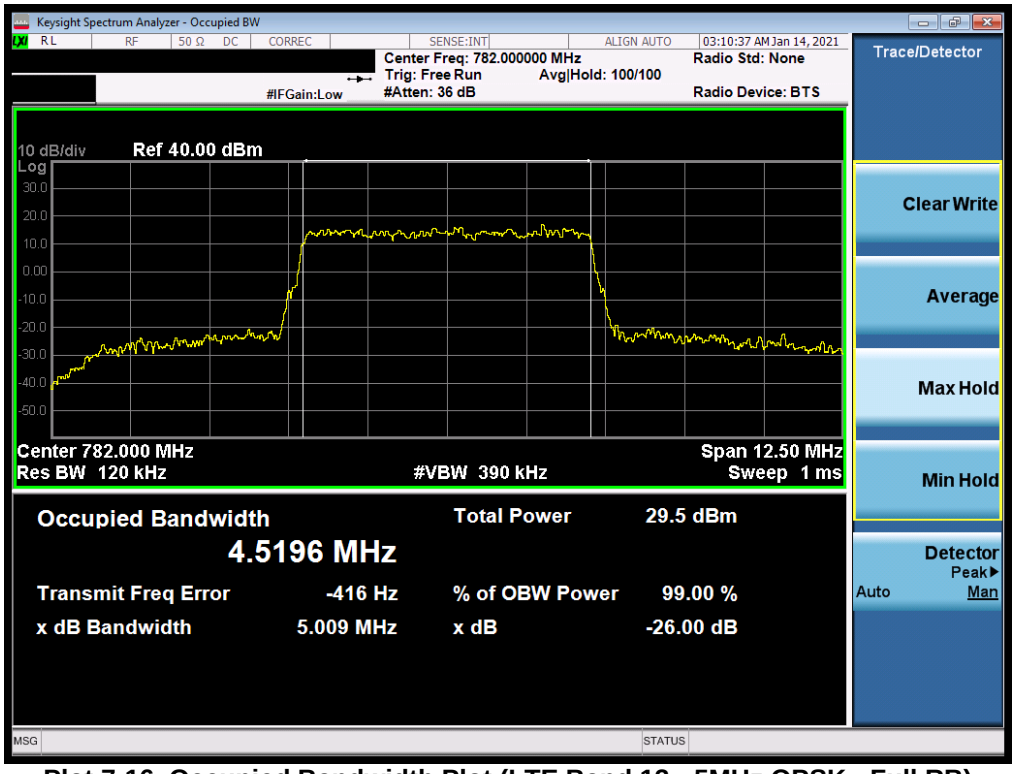
Plot 7-13. Occupied Bandwidth Plot (LTE Band 13 - 10MHz QPSK - Full RB)



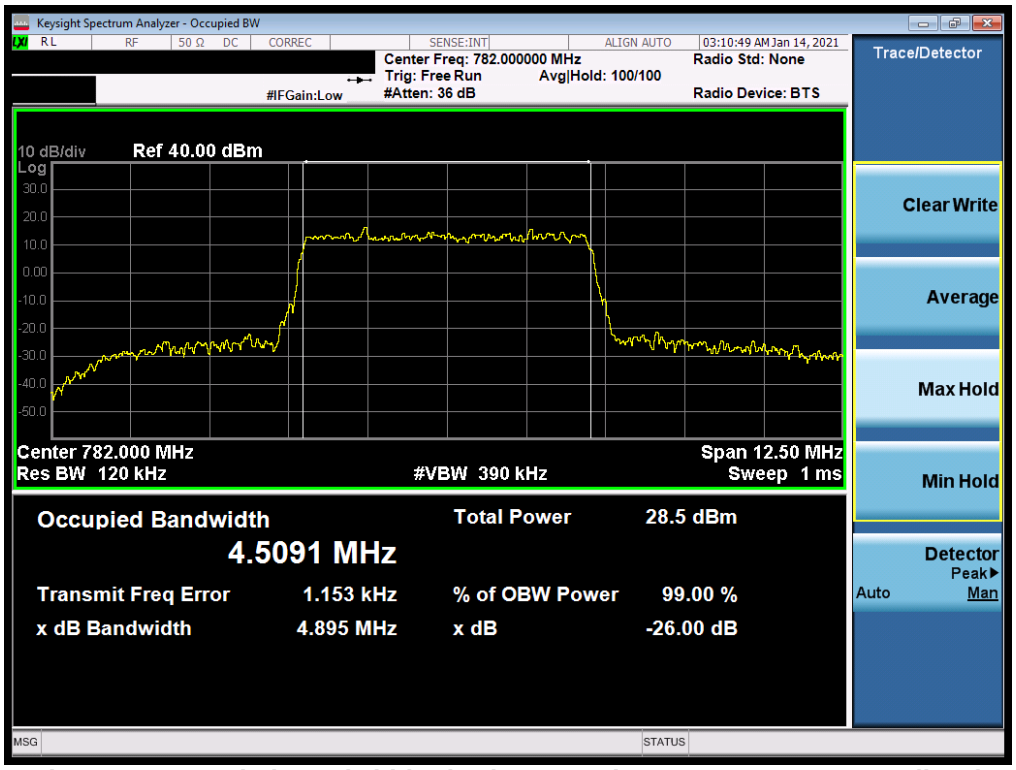
Plot 7-14. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 16-QAM - Full RB)



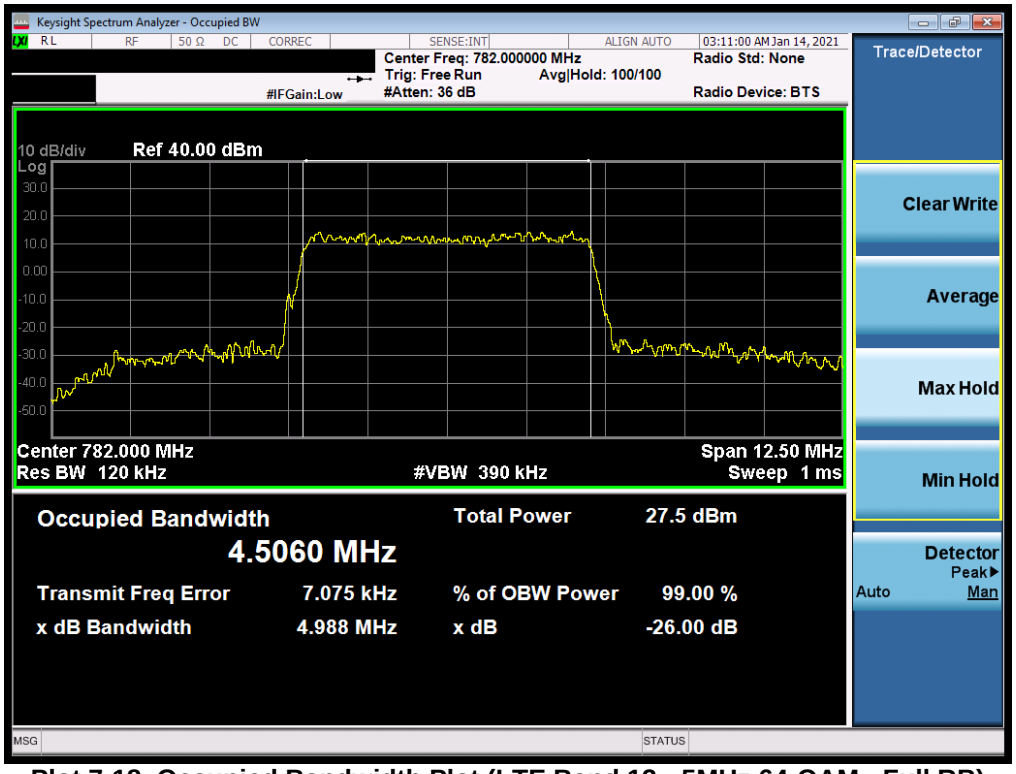
Plot 7-15. Occupied Bandwidth Plot (LTE Band 13 - 10MHz 64-QAM - Full RB)



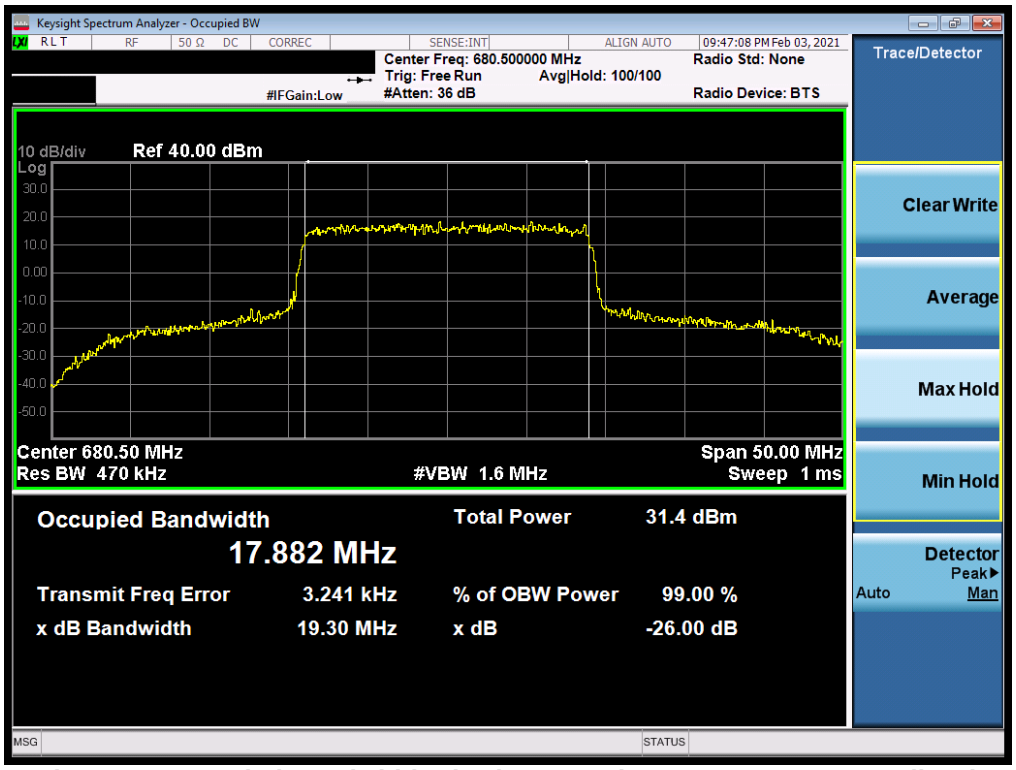
Plot 7-16. Occupied Bandwidth Plot (LTE Band 13 - 5MHz QPSK - Full RB)



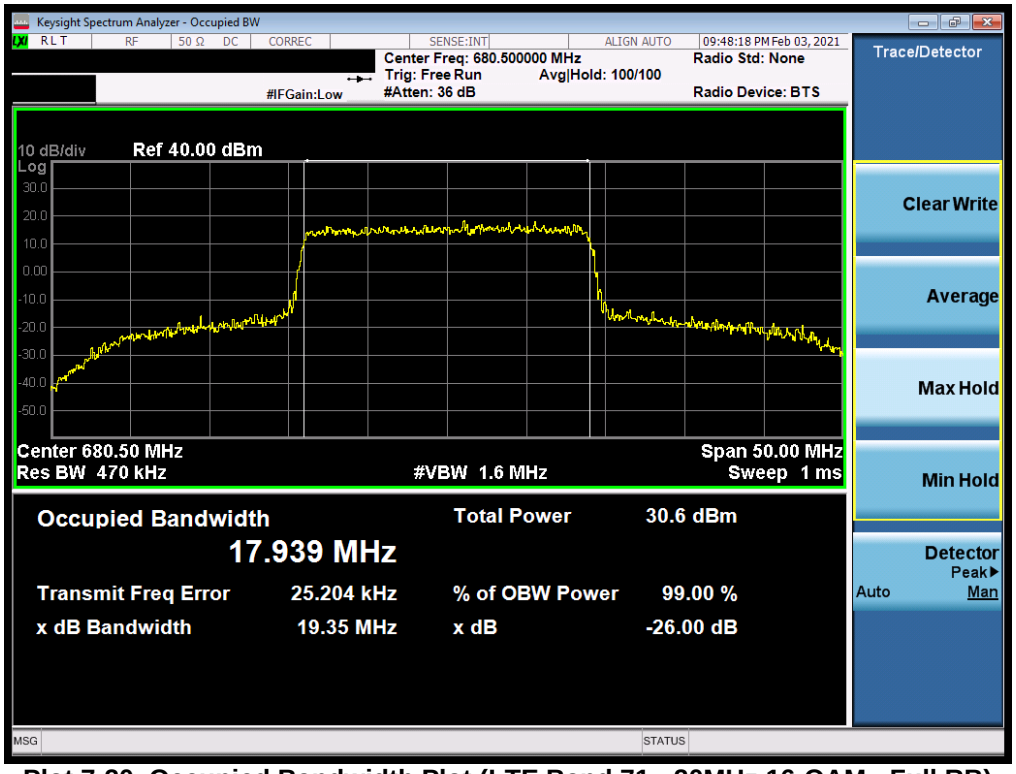
Plot 7-17. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 16-QAM - Full RB)



Plot 7-18. Occupied Bandwidth Plot (LTE Band 13 - 5MHz 64-QAM - Full RB)

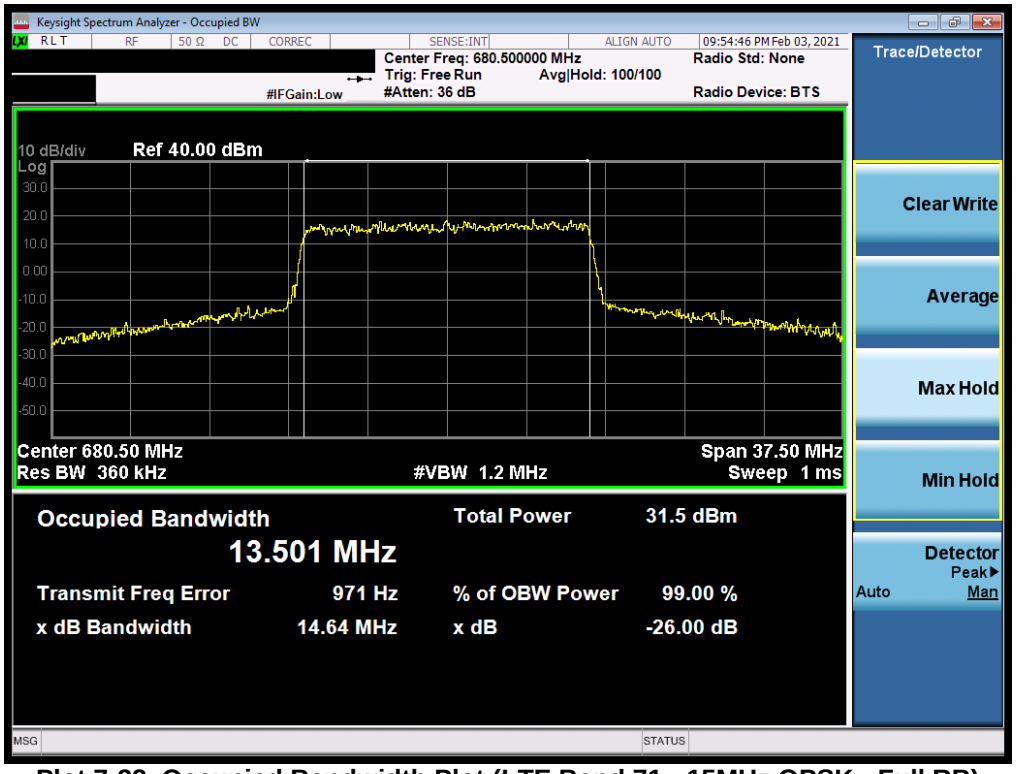


Plot 7-19. Occupied Bandwidth Plot (LTE Band 71 - 20MHz QPSK - Full RB)

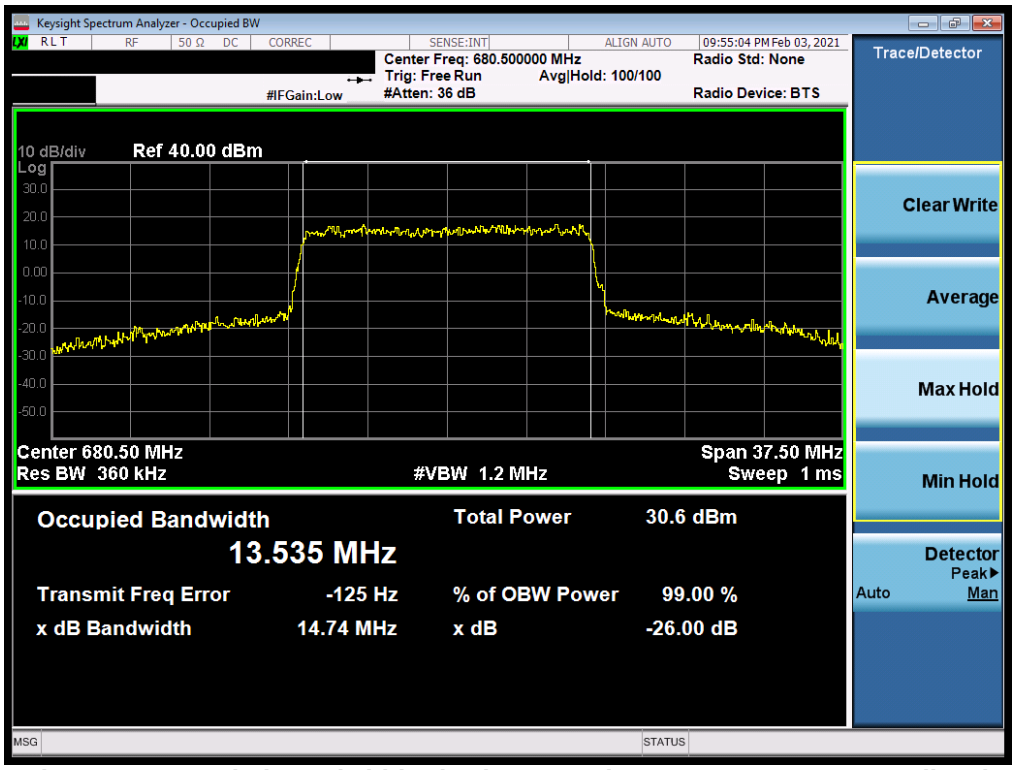


Plot 7-20. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 16-QAM - Full RB)

Plot 7-21. Occupied Bandwidth Plot (LTE Band 71 - 20MHz 64-QAM - Full RB)



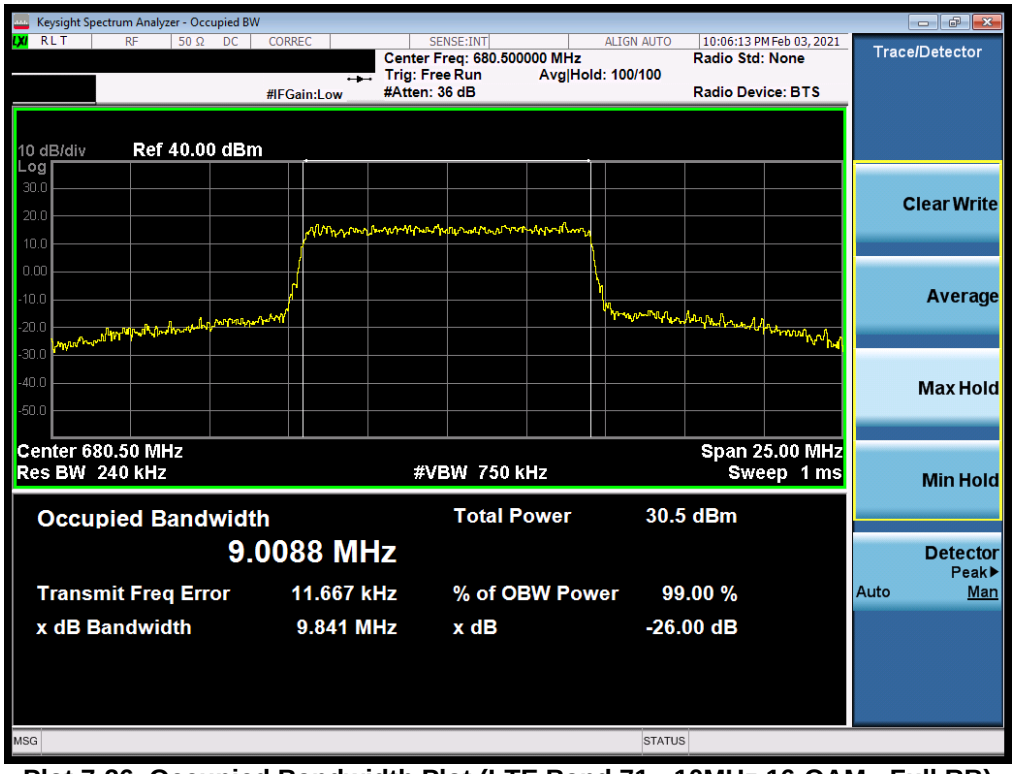
Plot 7-22. Occupied Bandwidth Plot (LTE Band 71 - 15MHz QPSK - Full RB)



Plot 7-23. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 16-QAM - Full RB)

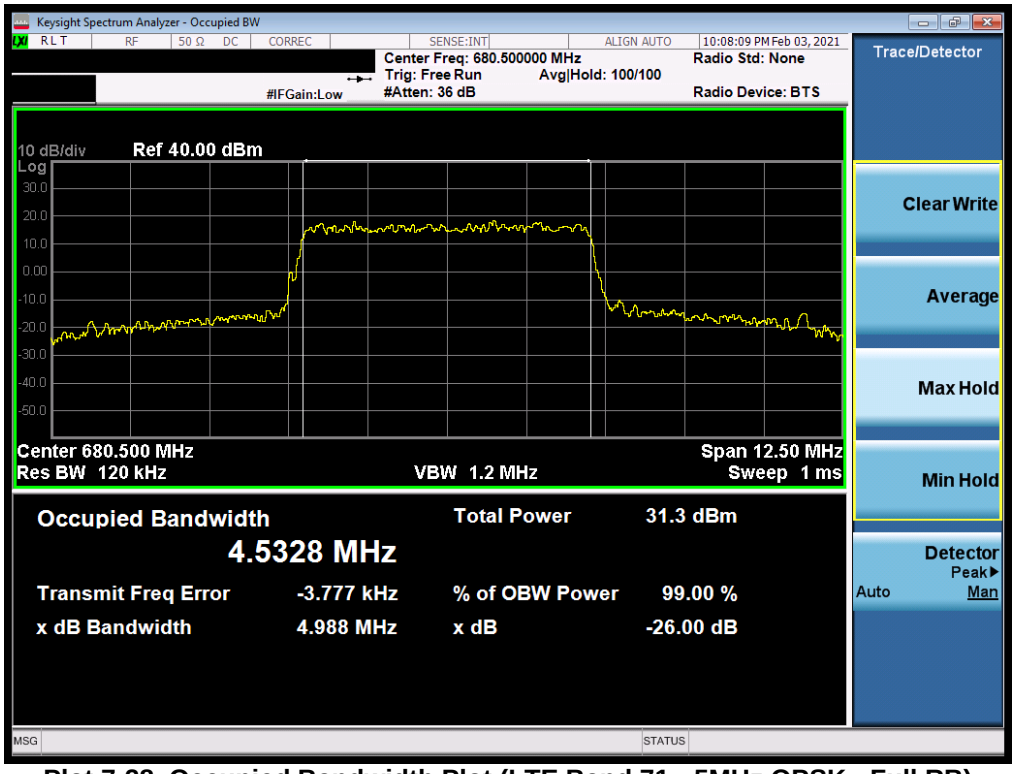
Plot 7-24. Occupied Bandwidth Plot (LTE Band 71 - 15MHz 64-QAM - Full RB)

Plot 7-25. Occupied Bandwidth Plot (LTE Band 71 - 10MHz QPSK - Full RB)



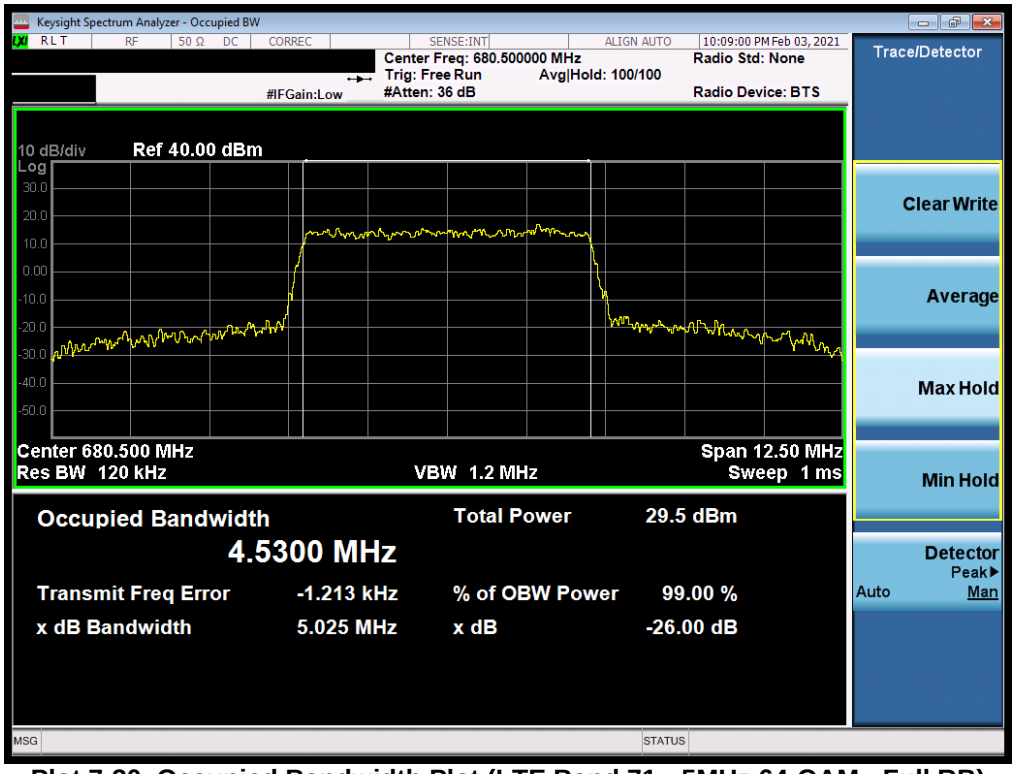
Plot 7-26. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 16-QAM - Full RB)

Plot 7-27. Occupied Bandwidth Plot (LTE Band 71 - 10MHz 64-QAM - Full RB)

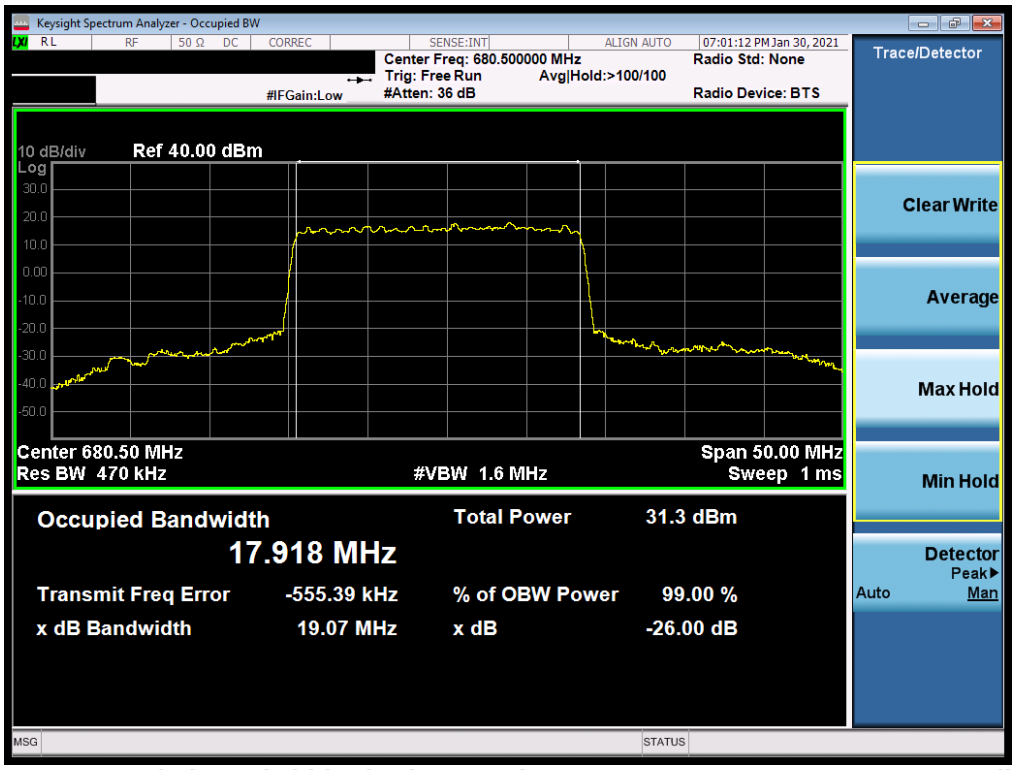


Plot 7-28. Occupied Bandwidth Plot (LTE Band 71 - 5MHz QPSK - Full RB)

Plot 7-29. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 16-QAM - Full RB)



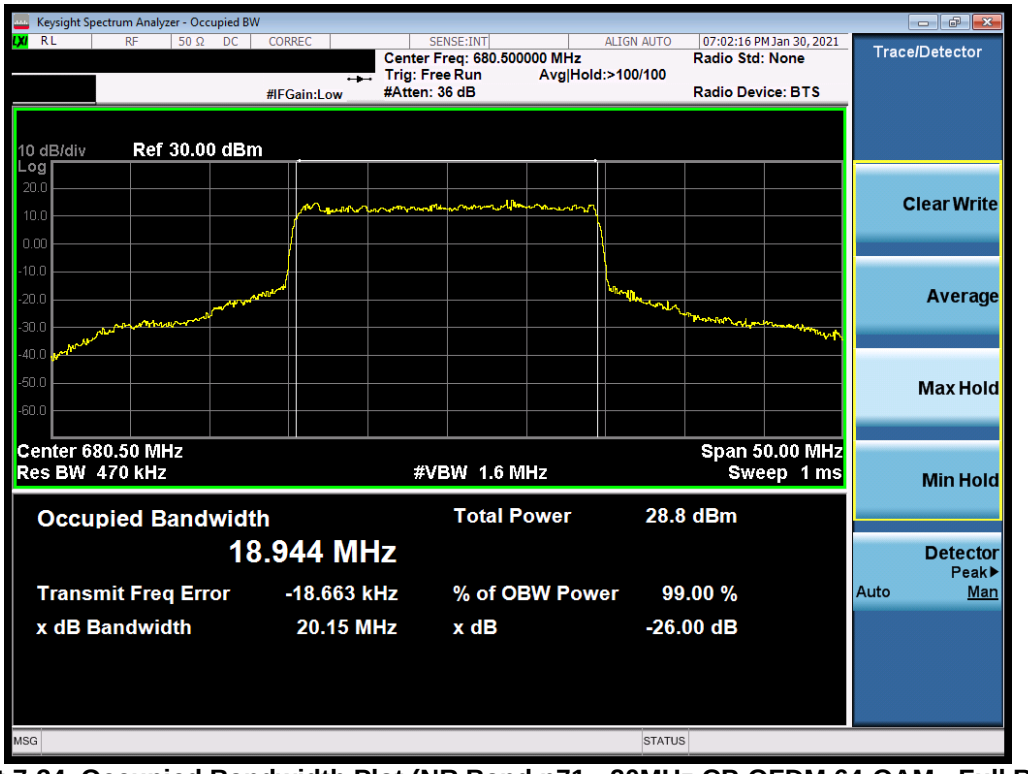
Plot 7-30. Occupied Bandwidth Plot (LTE Band 71 - 5MHz 64-QAM - Full RB)



Plot 7-31. Occupied Bandwidth Plot (NR Band n71 - 20MHz DFT-s-OFDM BPSK - Full RB)

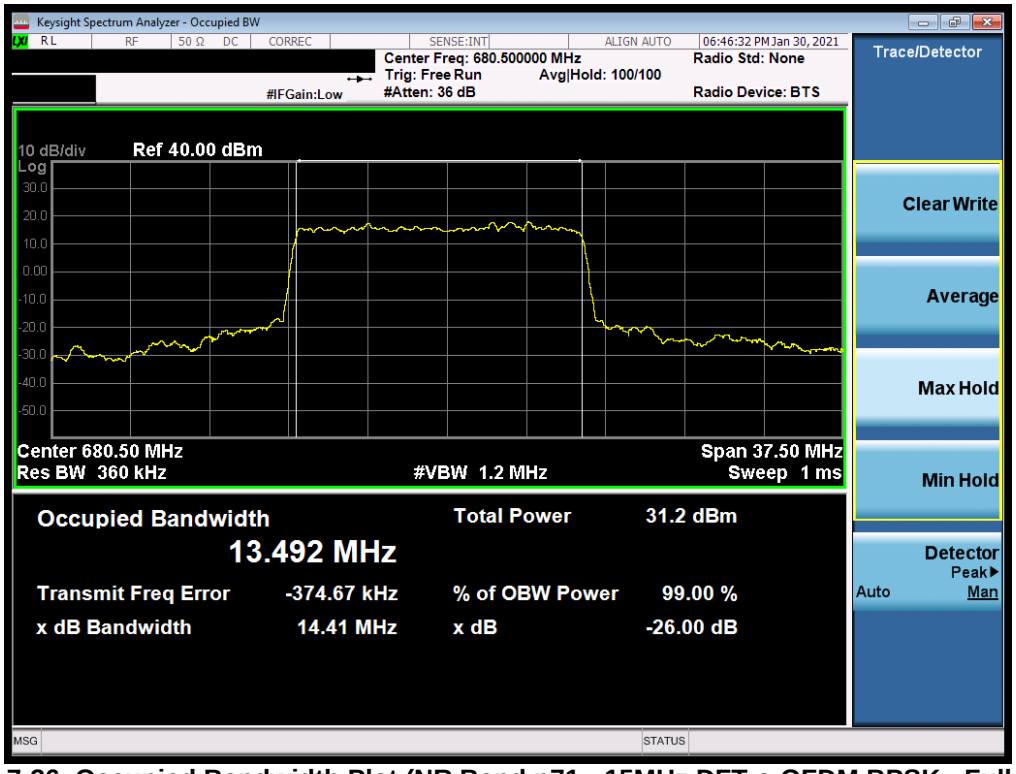
Plot 7-32. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM QPSK - Full RB)

Plot 7-33. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM 16-QAM - Full RB)



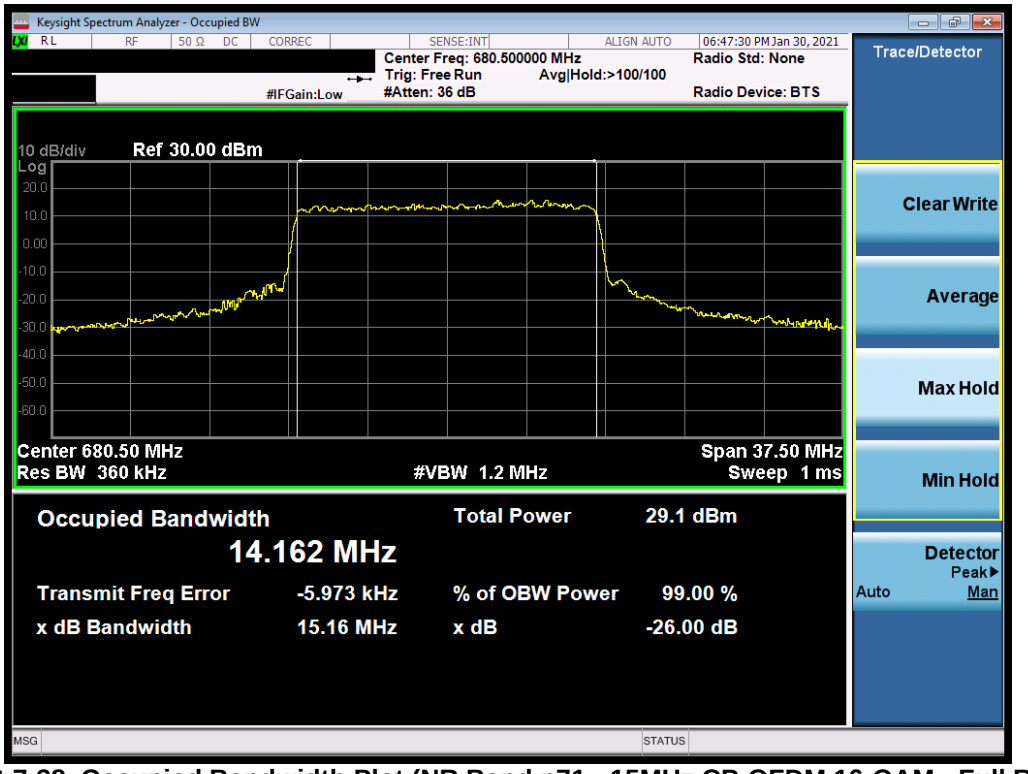
Plot 7-34. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM 64-QAM - Full RB)

Plot 7-35. Occupied Bandwidth Plot (NR Band n71 - 20MHz CP-OFDM 256-QAM - Full RB)



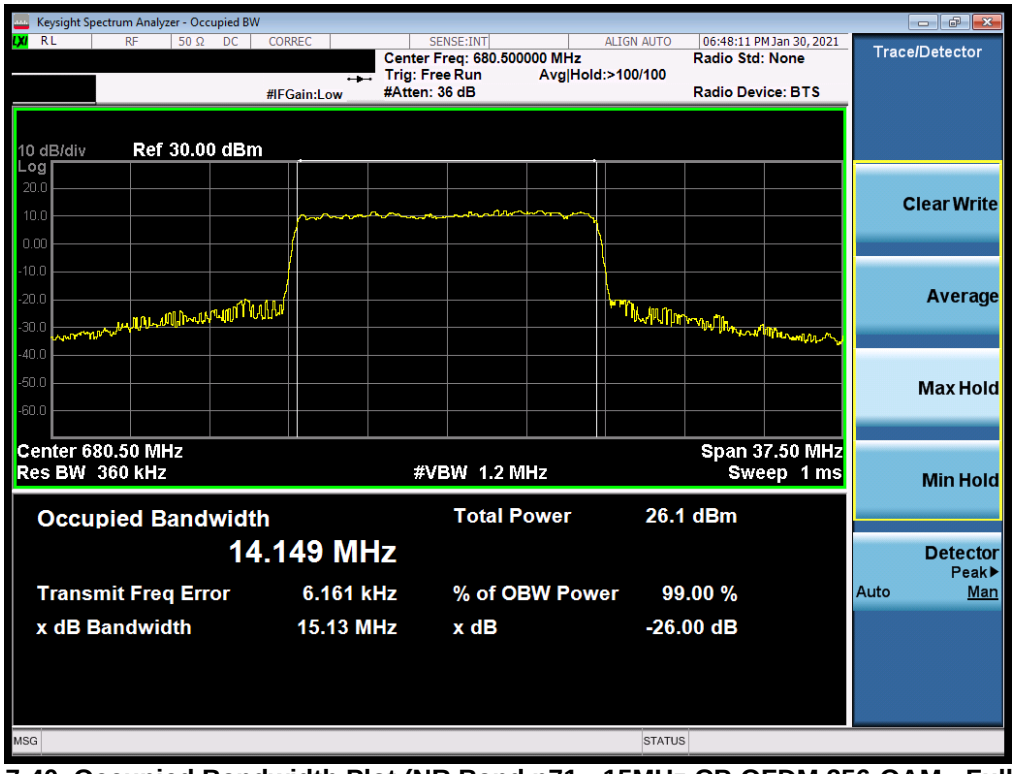
Plot 7-36. Occupied Bandwidth Plot (NR Band n71 - 15MHz DFT-s-OFDM BPSK - Full RB)

Plot 7-37. Occupied Bandwidth Plot (NR Band n71 - 15MHz QPSK - Full RB)

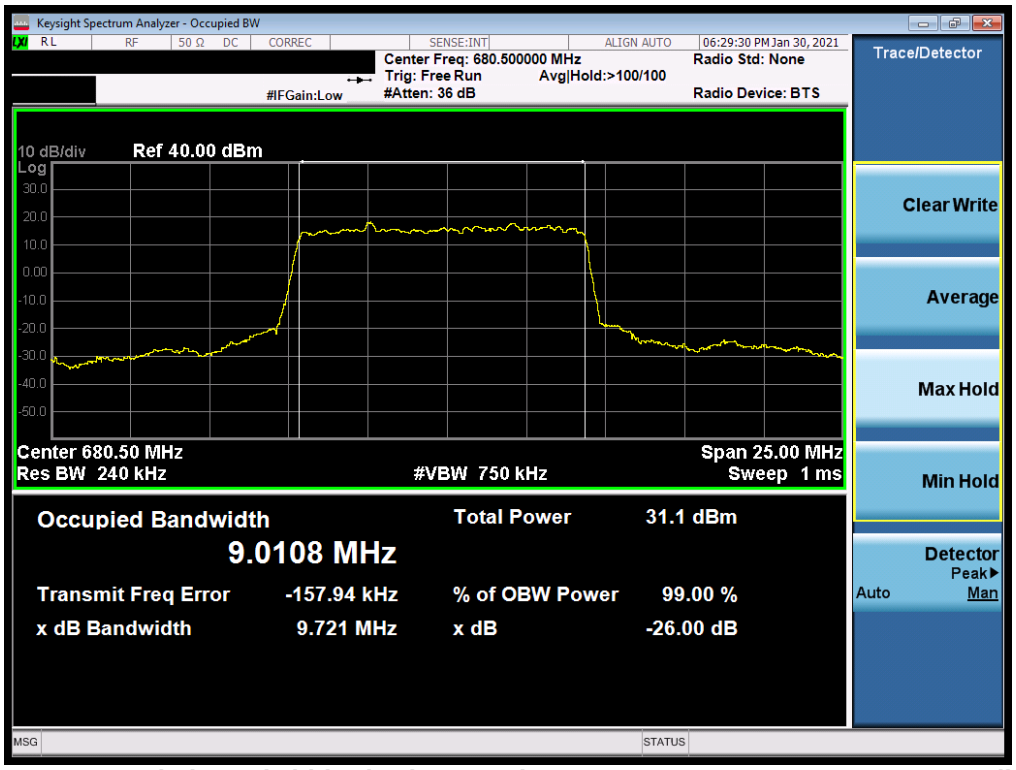


Plot 7-38. Occupied Bandwidth Plot (NR Band n71 - 15MHz CP-OFDM 16-QAM - Full RB)

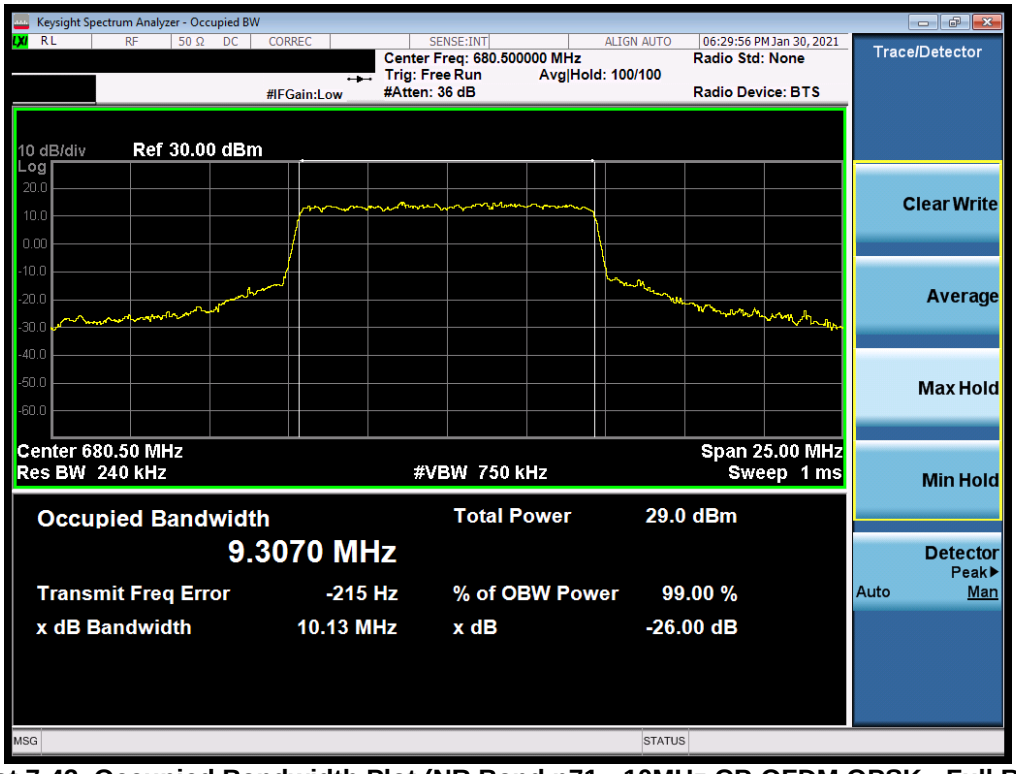
Plot 7-39. Occupied Bandwidth Plot (NR Band n71 - 15MHz CP-OFDM 64-QAM - Full RB)



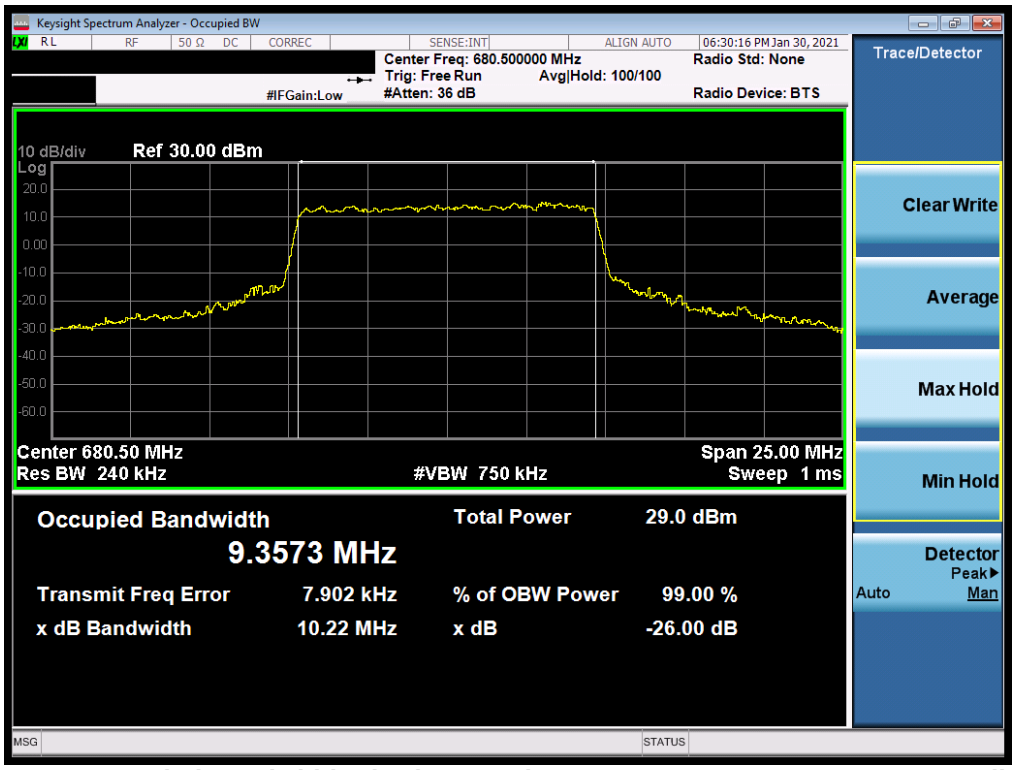
Plot 7-40. Occupied Bandwidth Plot (NR Band n71 - 15MHz CP-OFDM 256-QAM - Full RB)



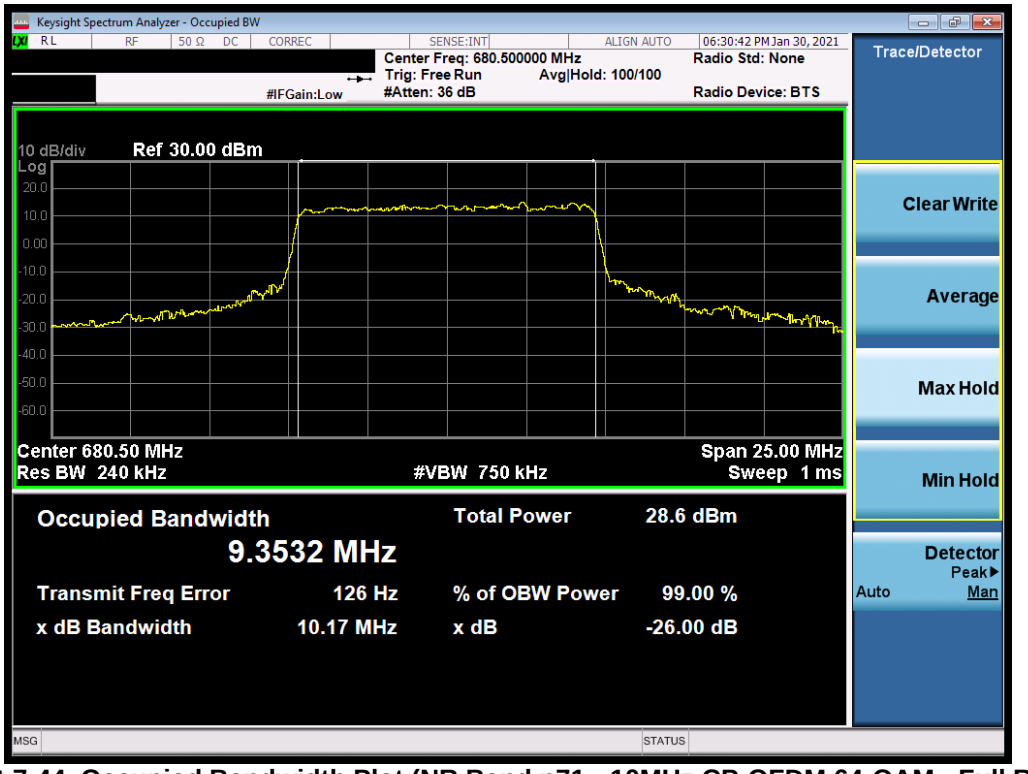
Plot 7-41. Occupied Bandwidth Plot (NR Band n71 - 10MHz DFT-s-OFDM BPSK - Full RB)



Plot 7-42. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM QPSK - Full RB)

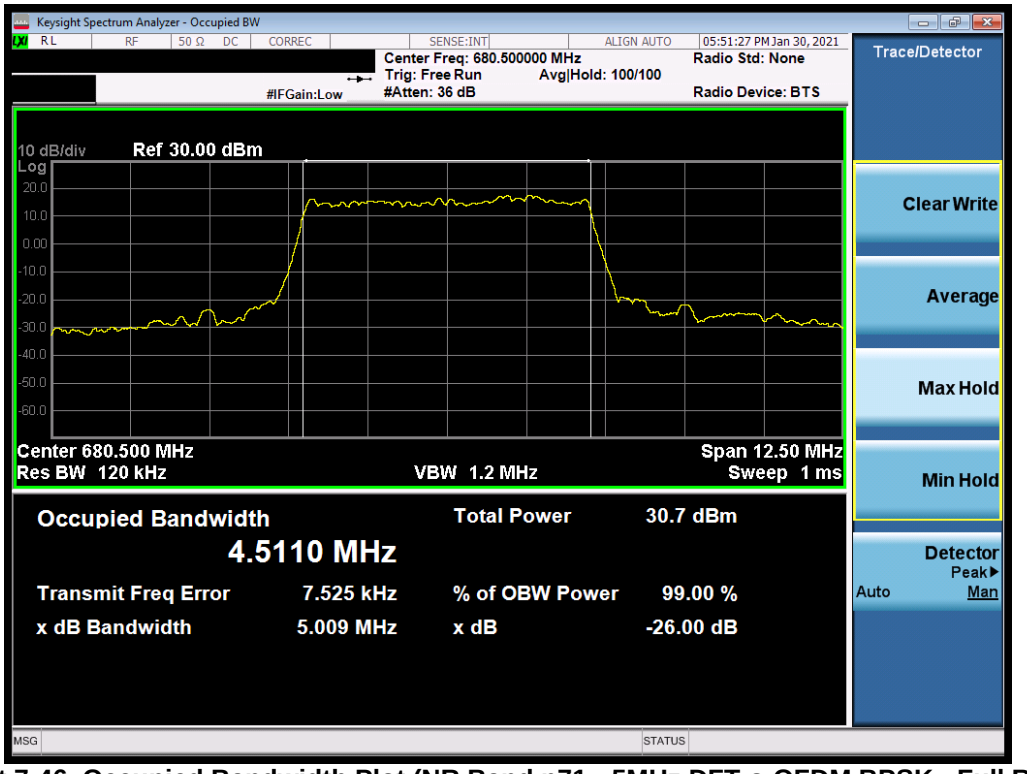


Plot 7-43. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM 16-QAM - Full RB)

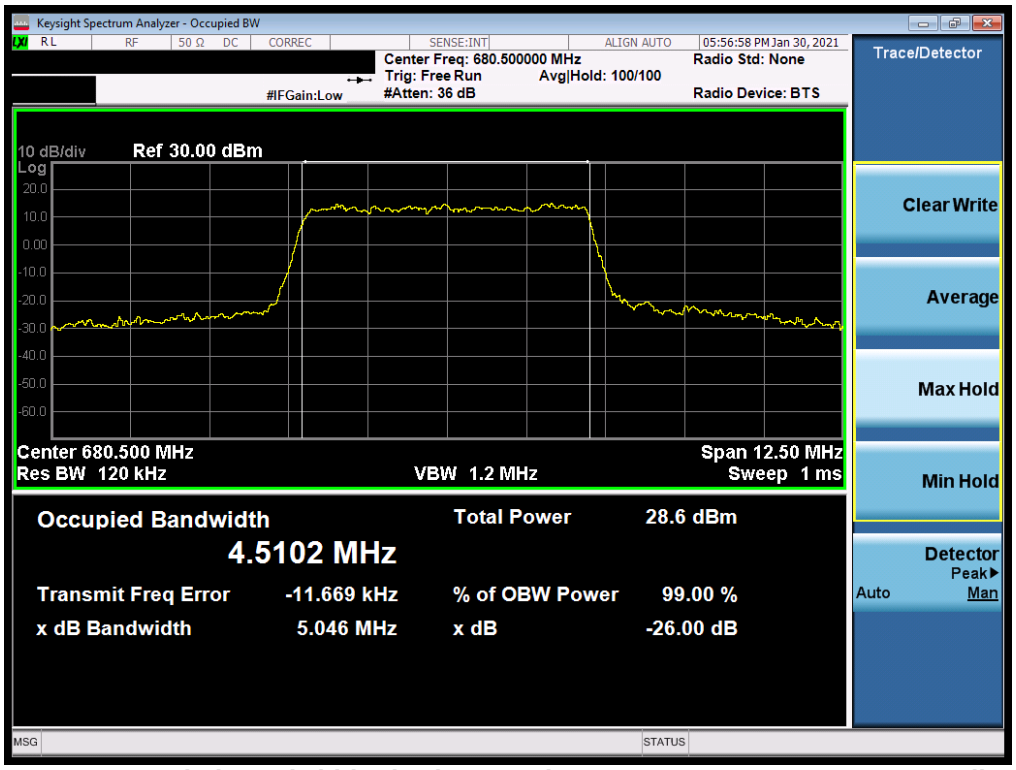


Plot 7-44. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM 64-QAM - Full RB)

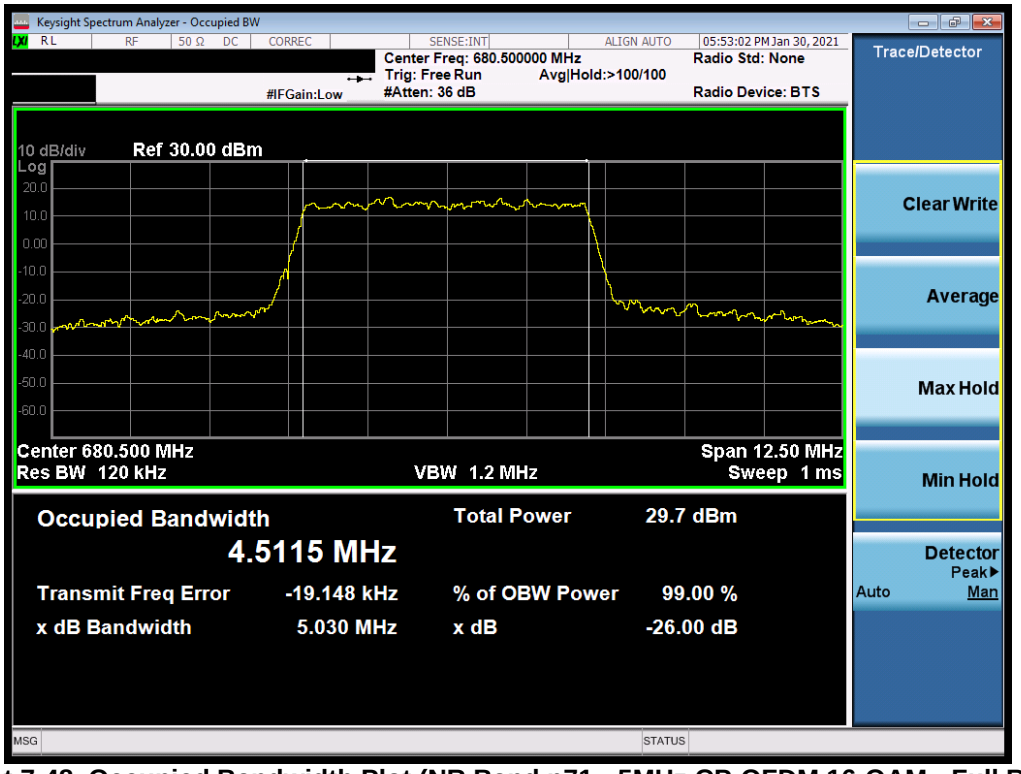
Plot 7-45. Occupied Bandwidth Plot (NR Band n71 - 10MHz CP-OFDM 256-QAM - Full RB)



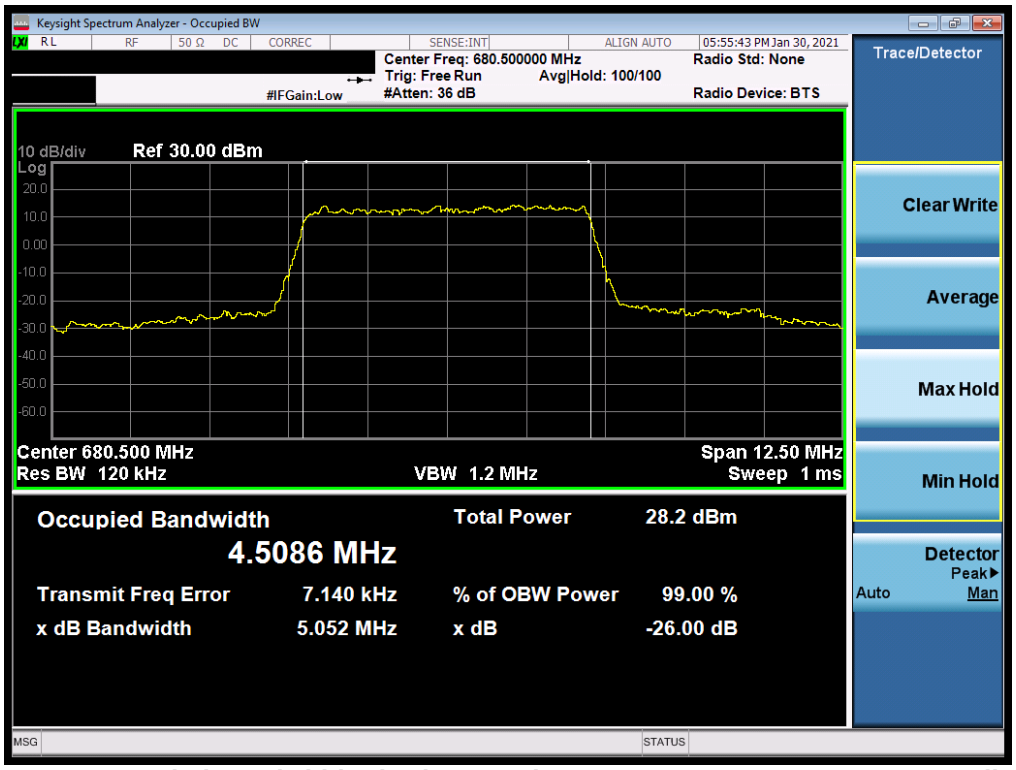
Plot 7-46. Occupied Bandwidth Plot (NR Band n71 - 5MHz DFT-s-OFDM BPSK - Full RB)



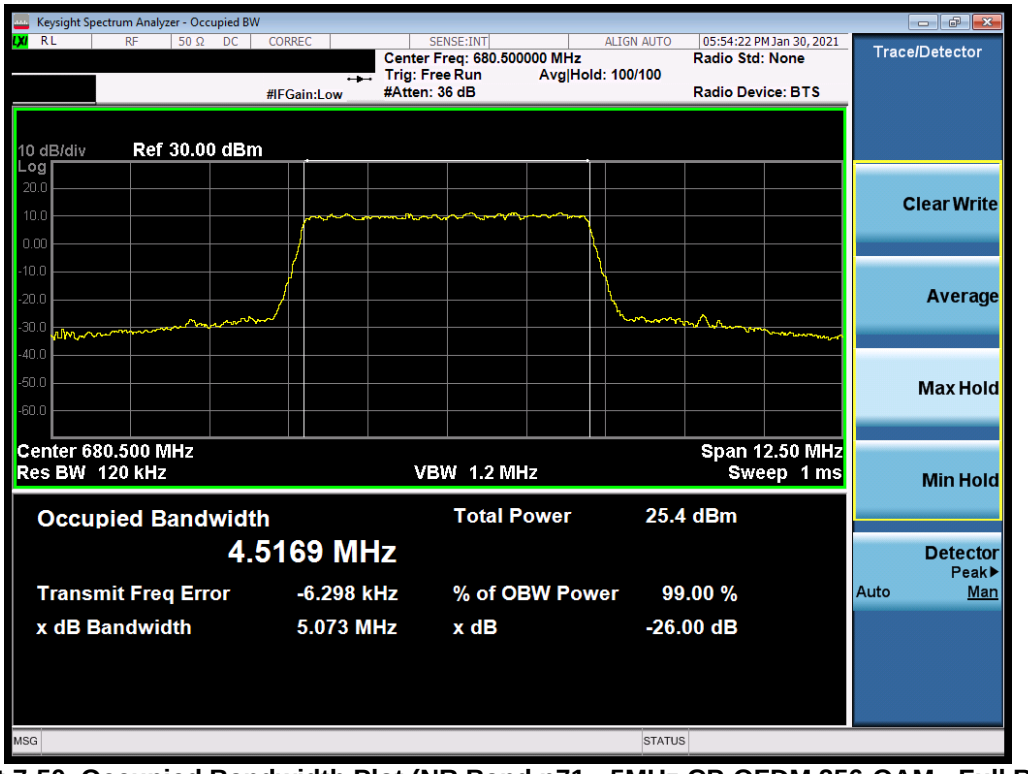
Plot 7-47. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM QPSK - Full RB)



Plot 7-48. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM 16-QAM - Full RB)

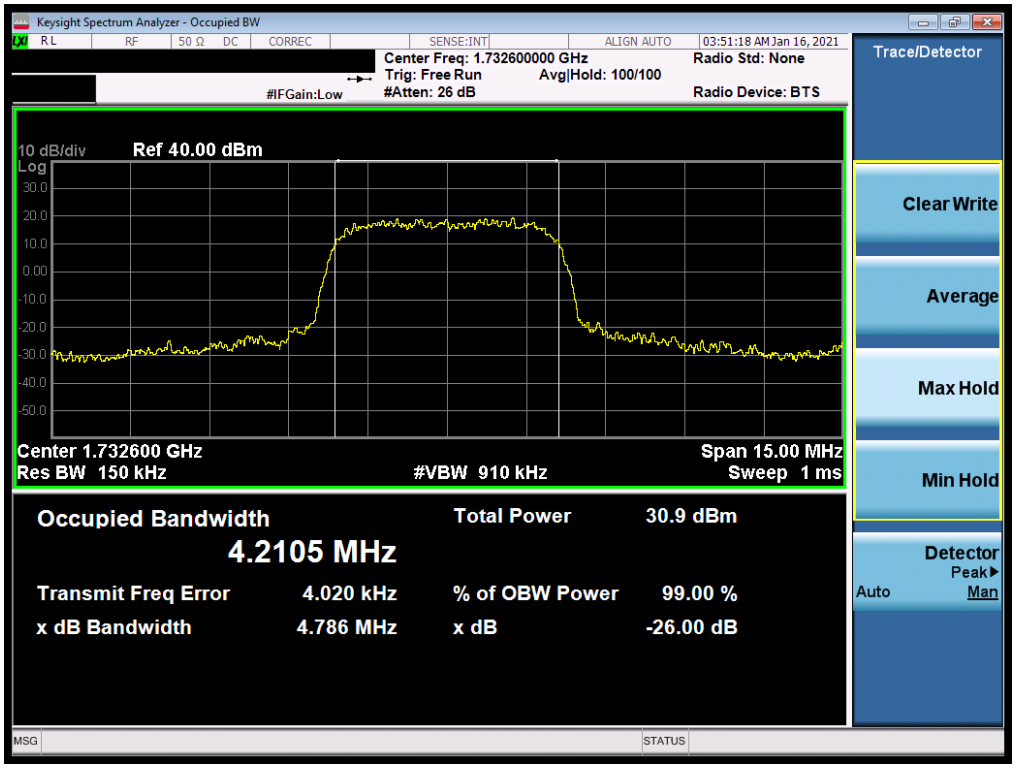


Plot 7-49. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM 64-QAM - Full RB)

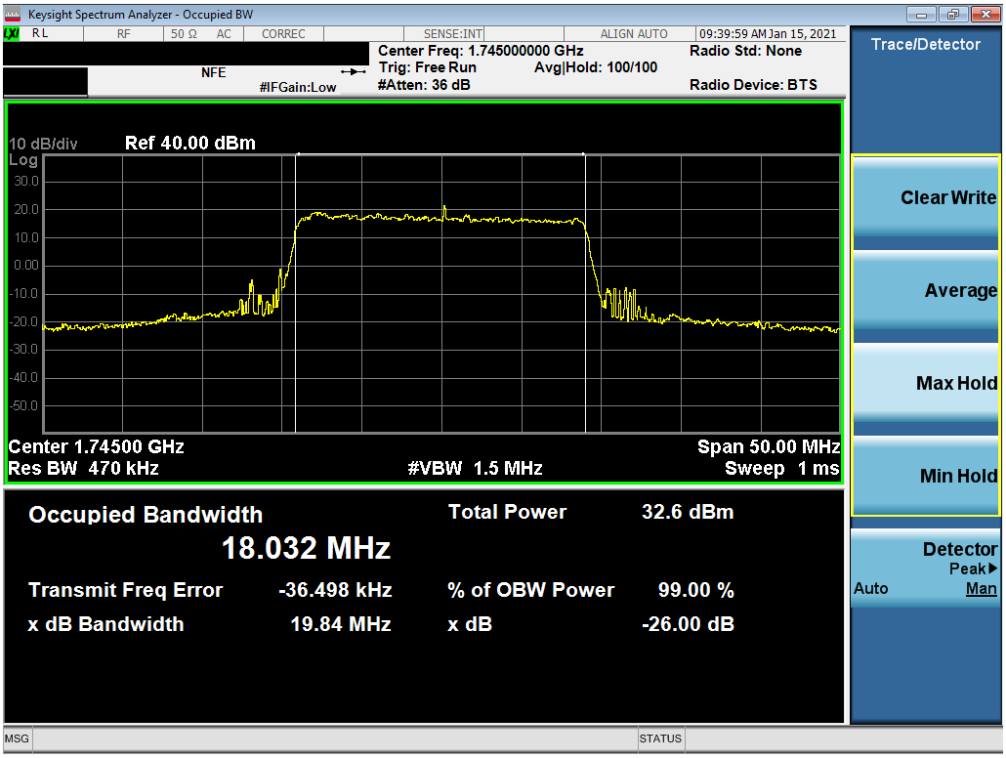


Plot 7-50. Occupied Bandwidth Plot (NR Band n71 - 5MHz CP-OFDM 256-QAM - Full RB)

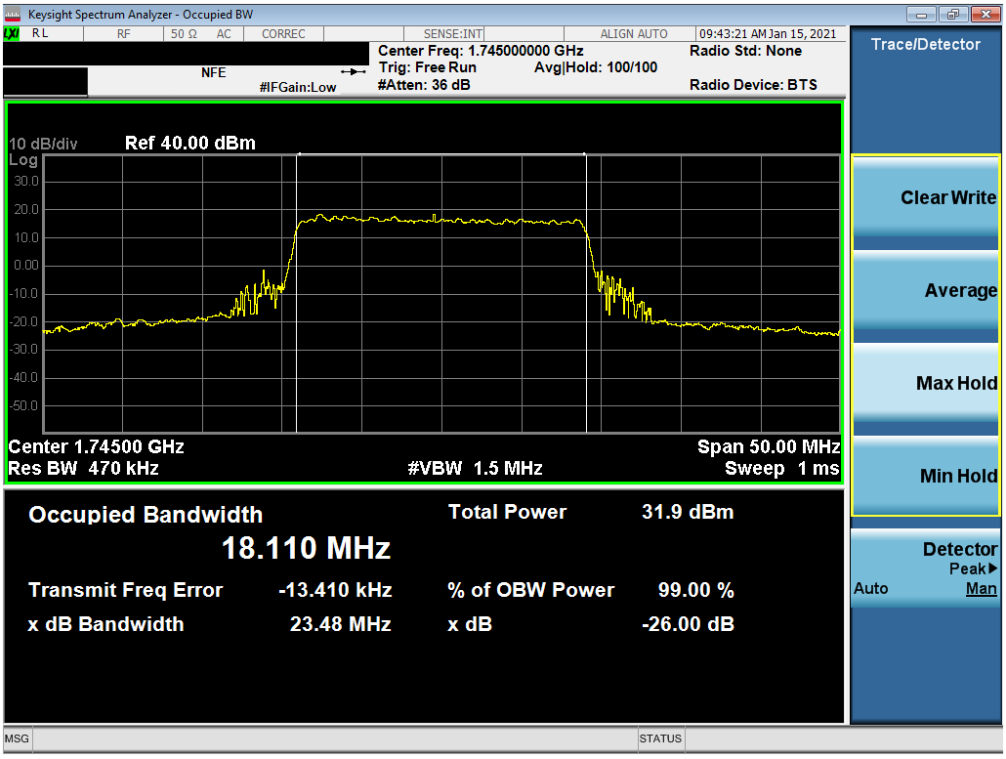
WCDMA AWS



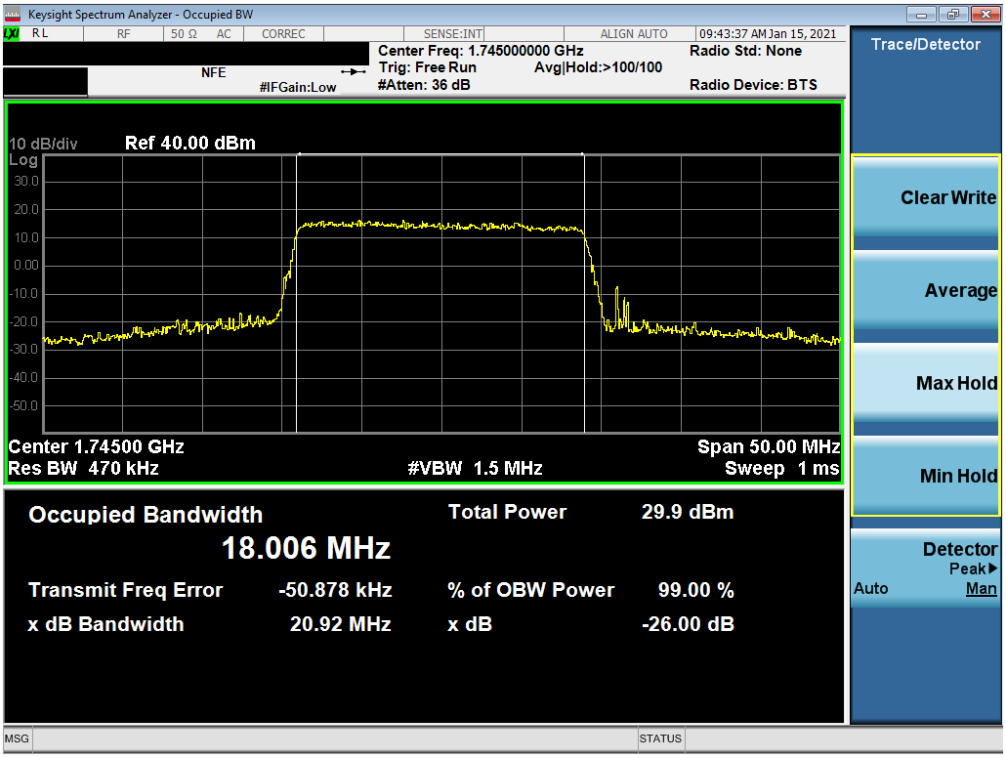
Plot 7-51. Occupied Bandwidth Plot (WCDMA, Ch. 1413)



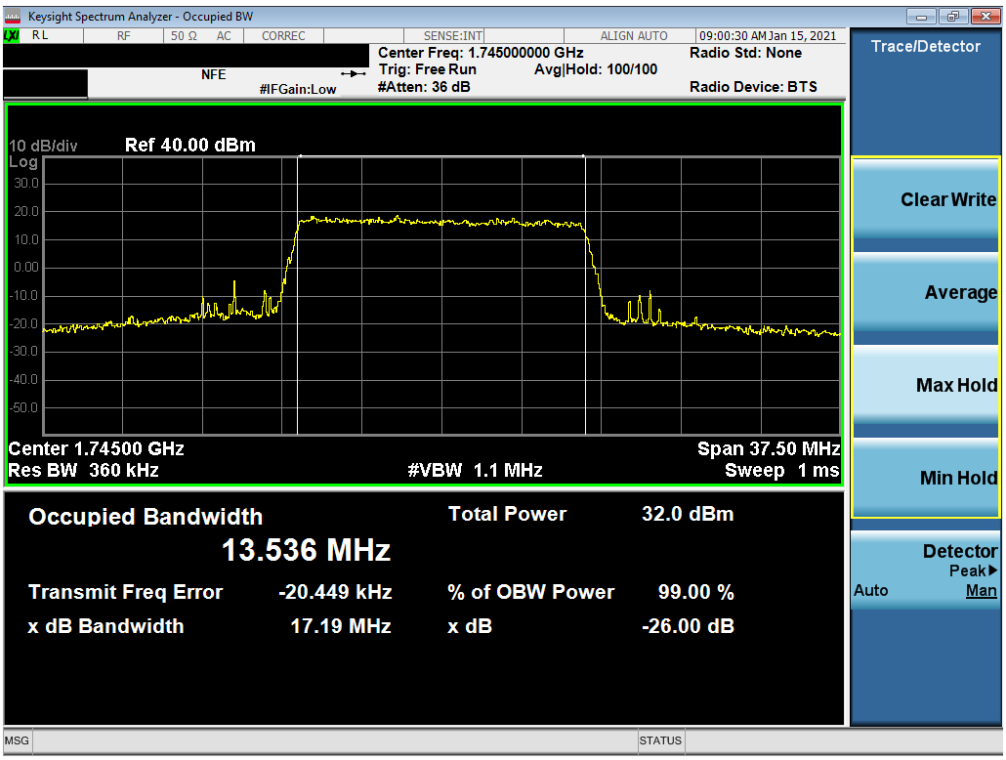
Plot 7-52. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz QPSK - Full RB)



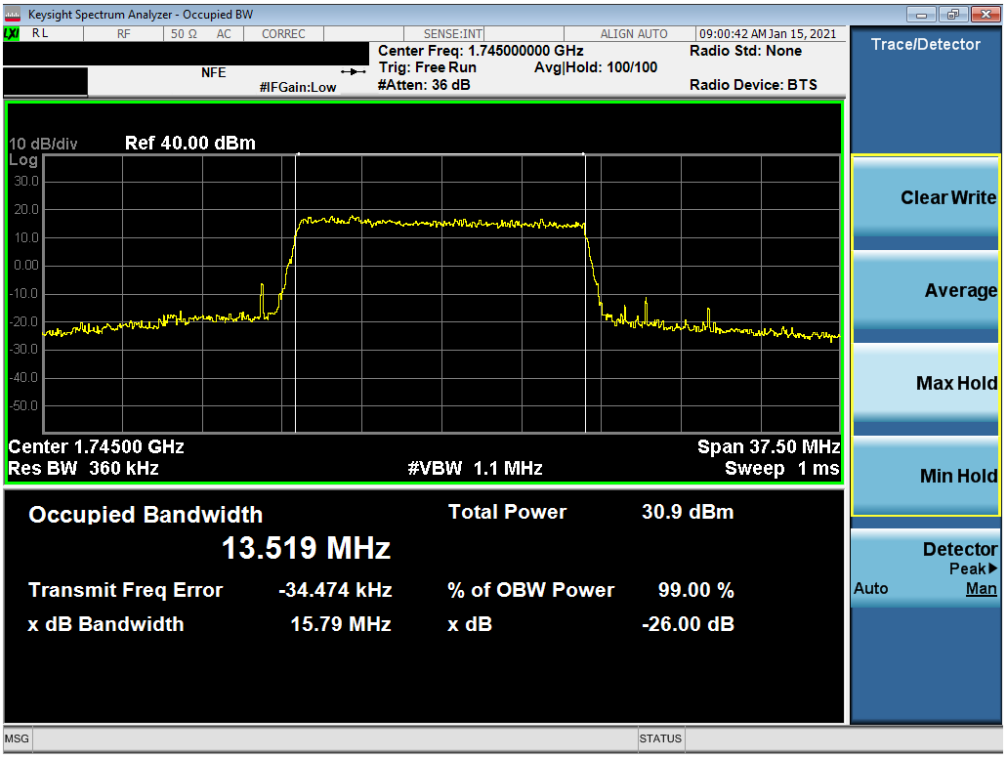
Plot 7-53. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 16-QAM - Full RB)



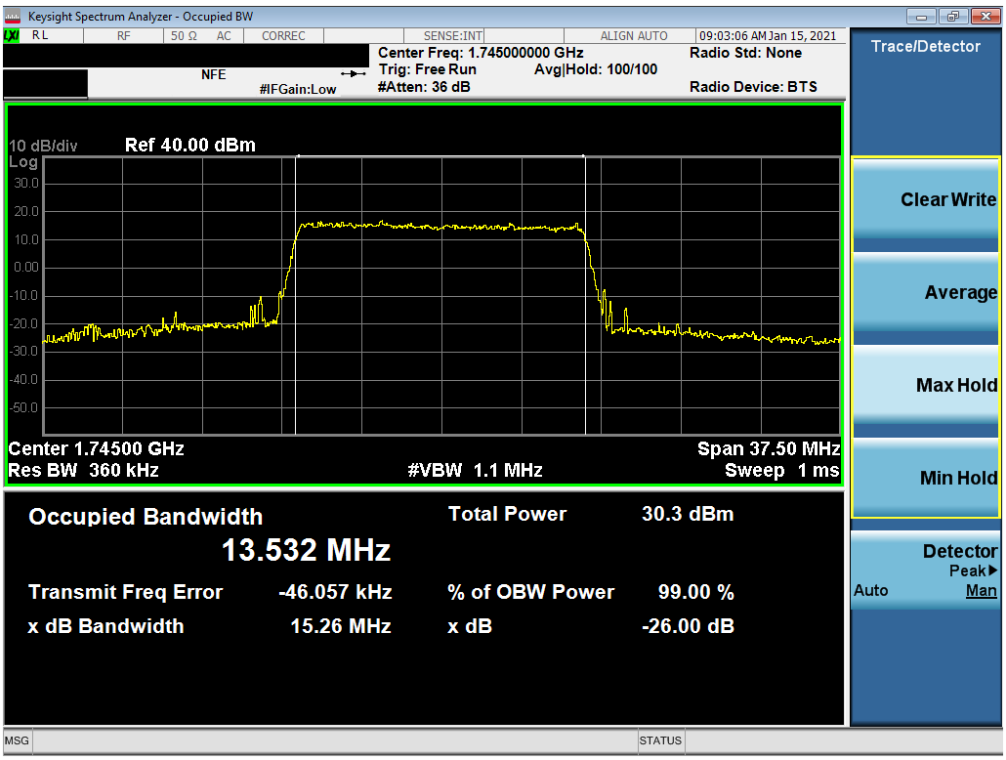
Plot 7-54. Occupied Bandwidth Plot (LTE Band 66/4 - 20MHz 64-QAM - Full RB)



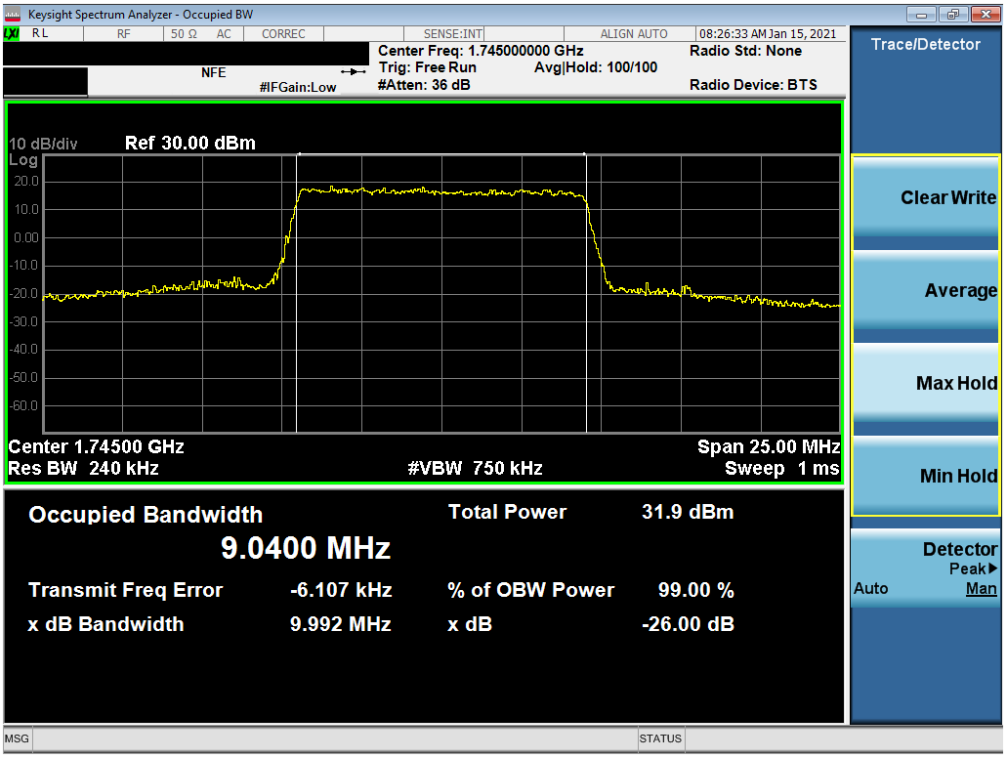
Plot 7-55. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz QPSK - Full RB)



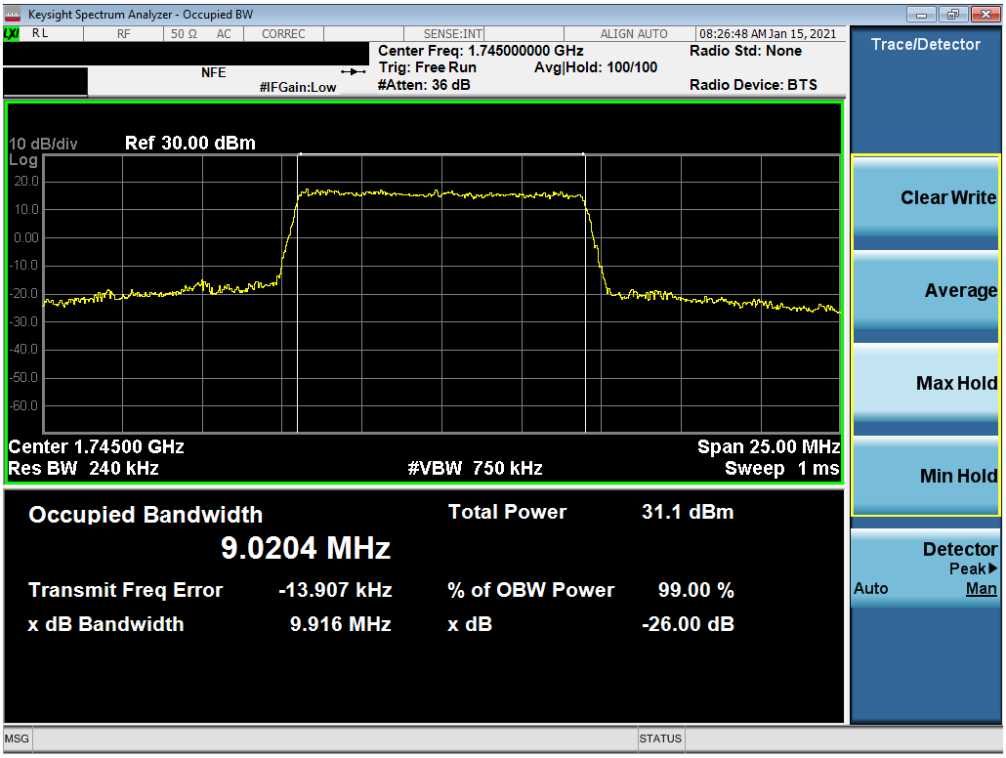
Plot 7-56. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 16-QAM - Full RB)



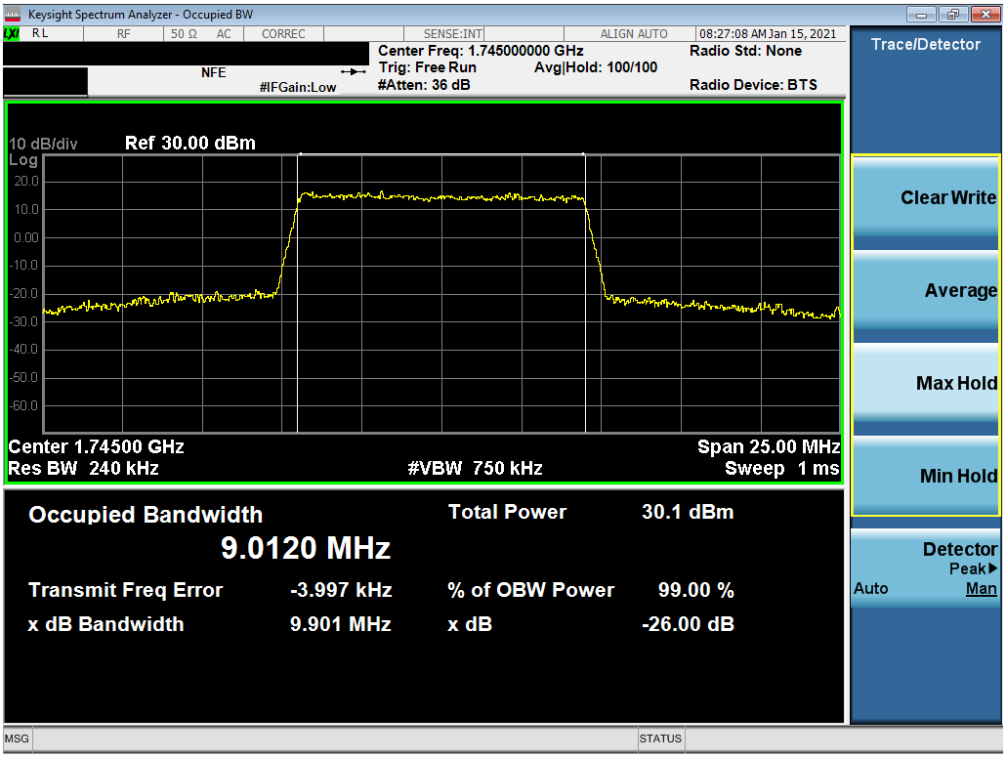
Plot 7-57. Occupied Bandwidth Plot (LTE Band 66/4 - 15MHz 64-QAM - Full RB)



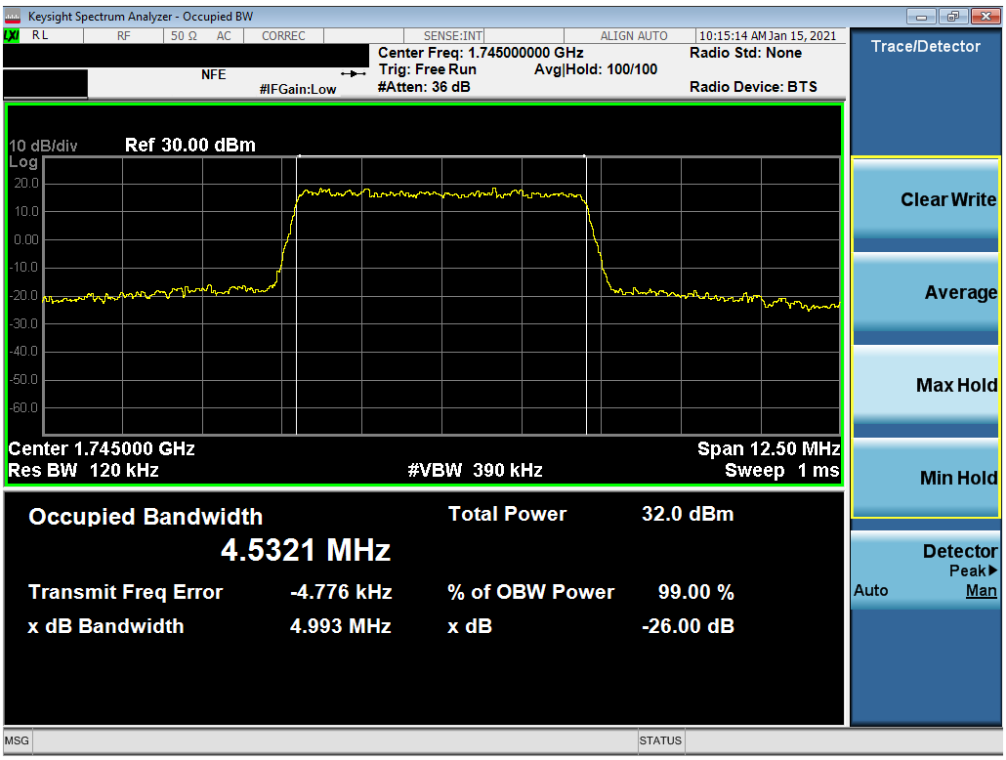
Plot 7-58. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz QPSK - Full RB)



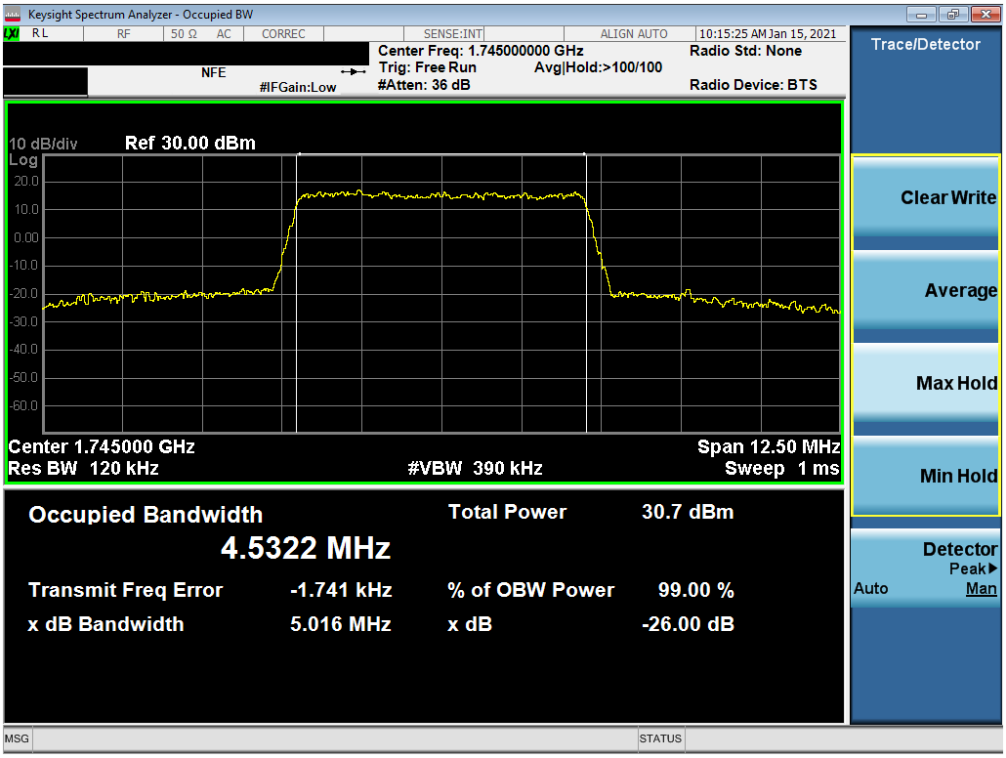
Plot 7-59. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 16-QAM - Full RB)



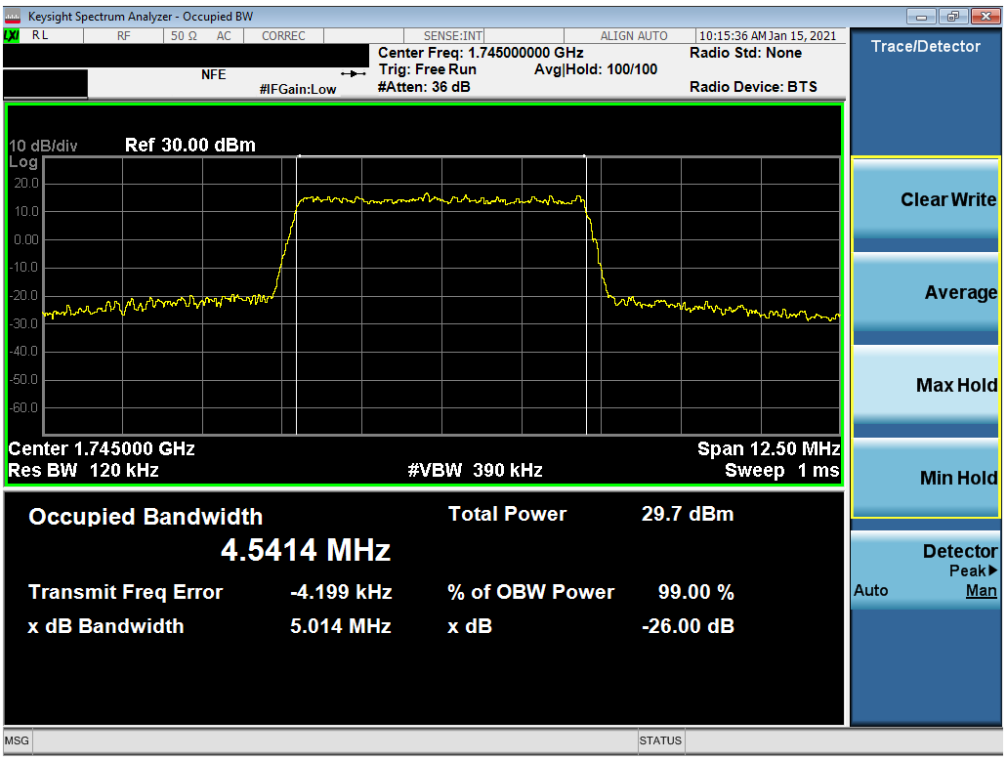
Plot 7-60. Occupied Bandwidth Plot (LTE Band 66/4 - 10MHz 64-QAM - Full RB)



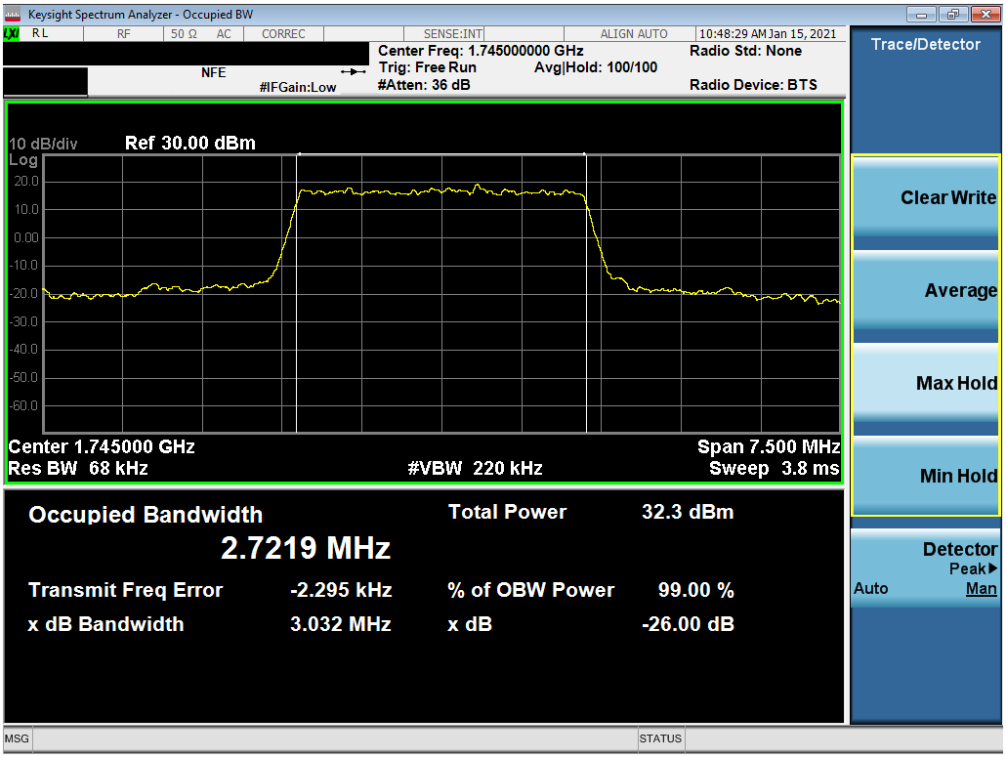
Plot 7-61. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz QPSK - Full RB)



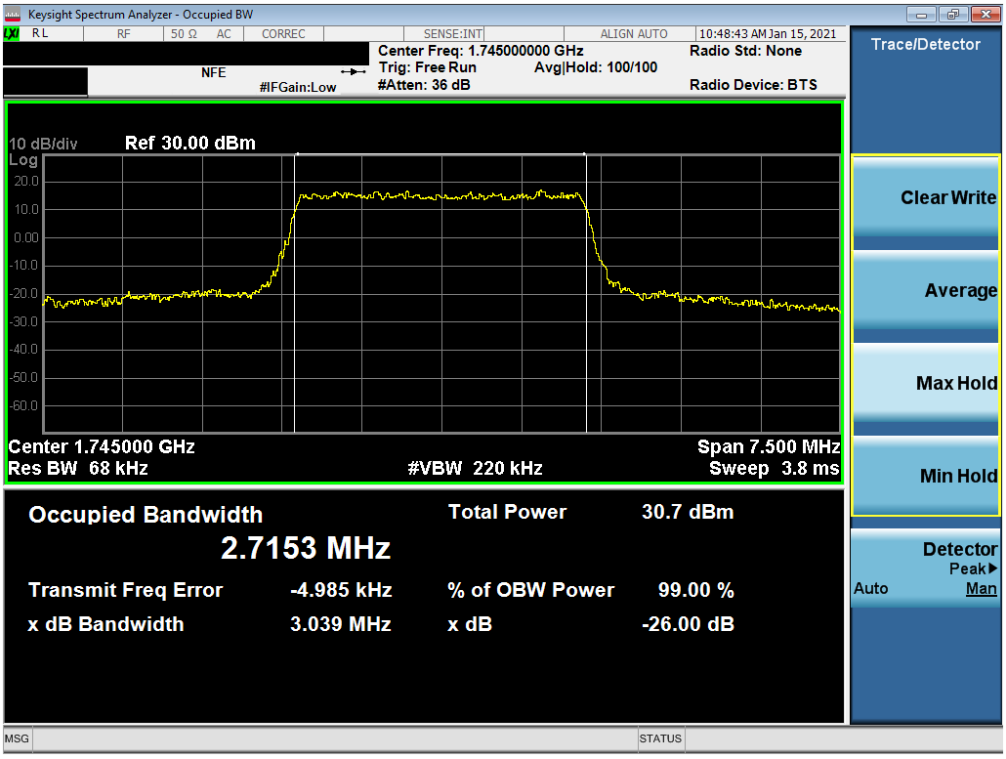
Plot 7-62. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 16-QAM - Full RB)



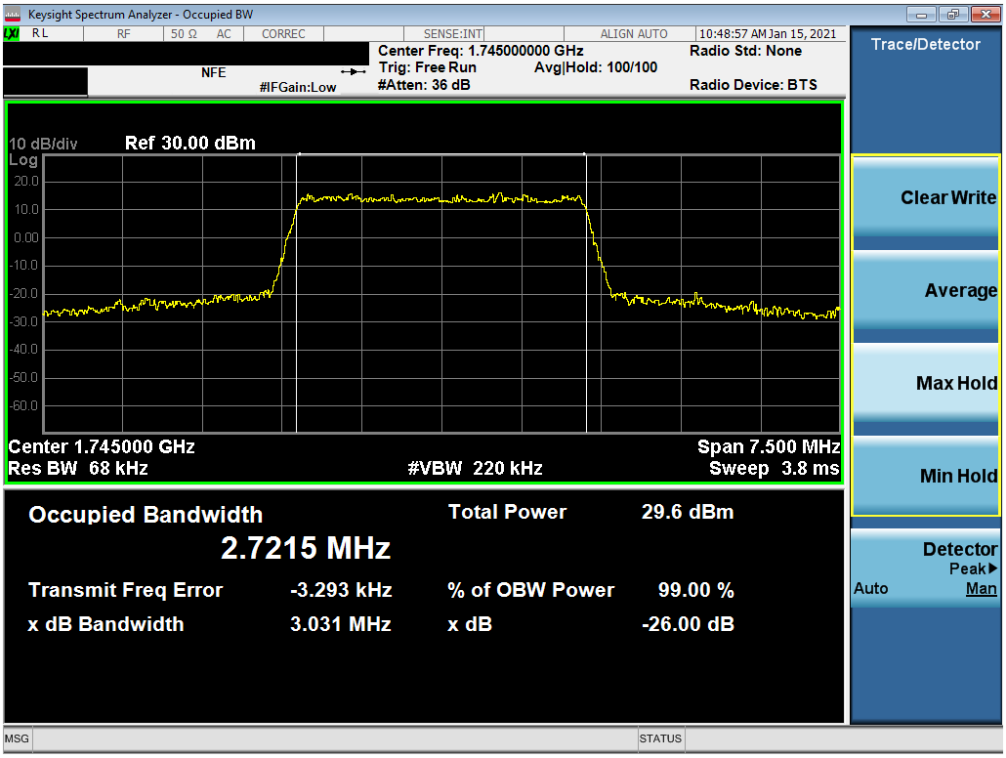
Plot 7-63. Occupied Bandwidth Plot (LTE Band 66/4 - 5MHz 64-QAM - Full RB)



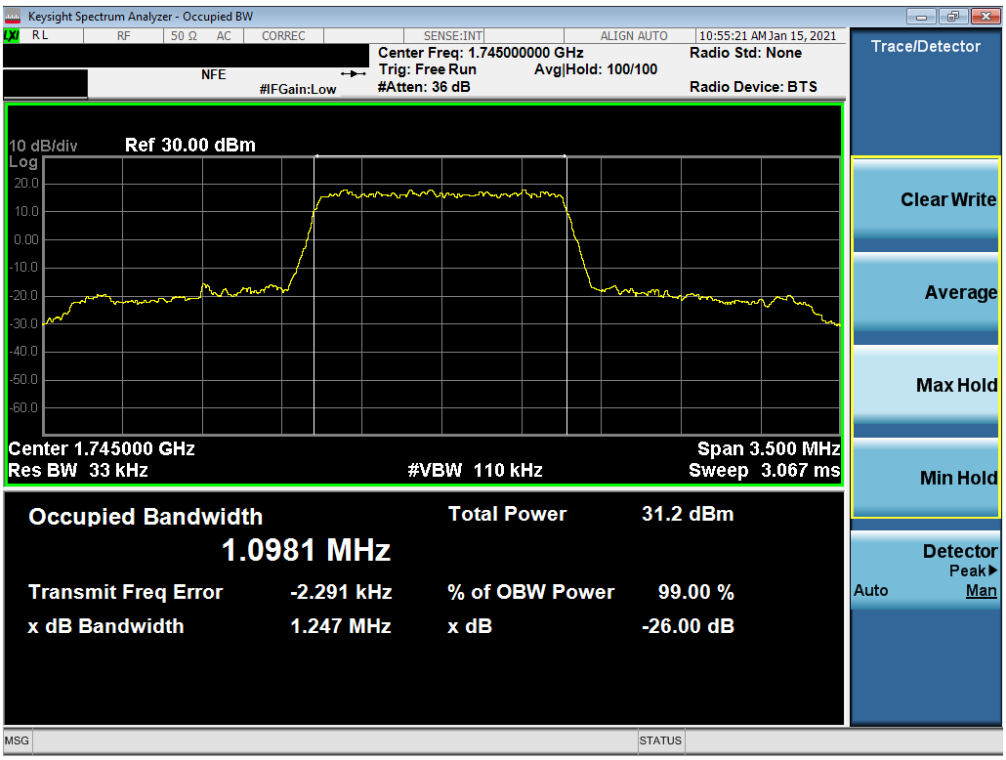
Plot 7-64. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz QPSK - Full RB)



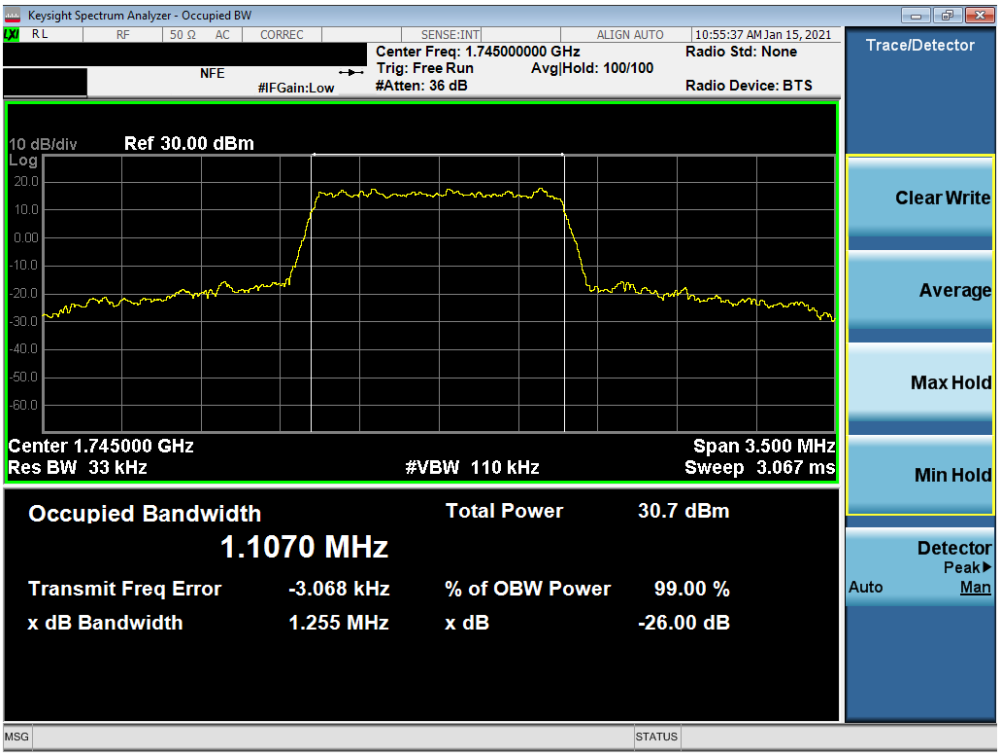
Plot 7-65. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 16-QAM - Full RB)



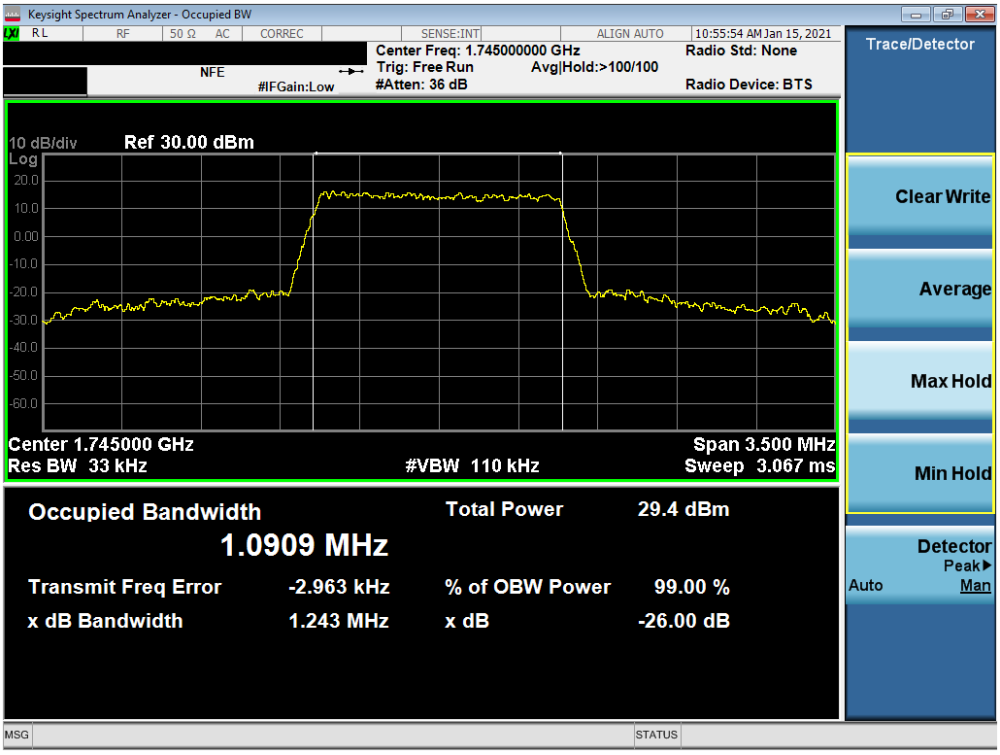
Plot 7-66. Occupied Bandwidth Plot (LTE Band 66/4 - 3MHz 64-QAM - Full RB)



Plot 7-67. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz QPSK - Full RB)

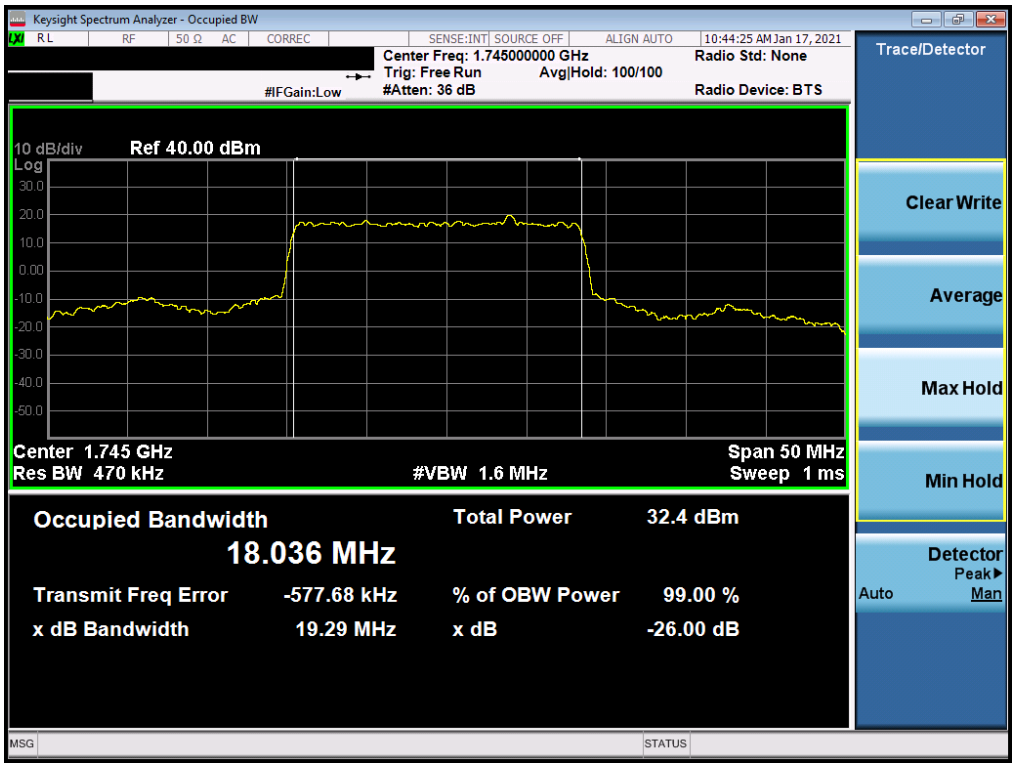


Plot 7-68. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 16-QAM - Full RB)

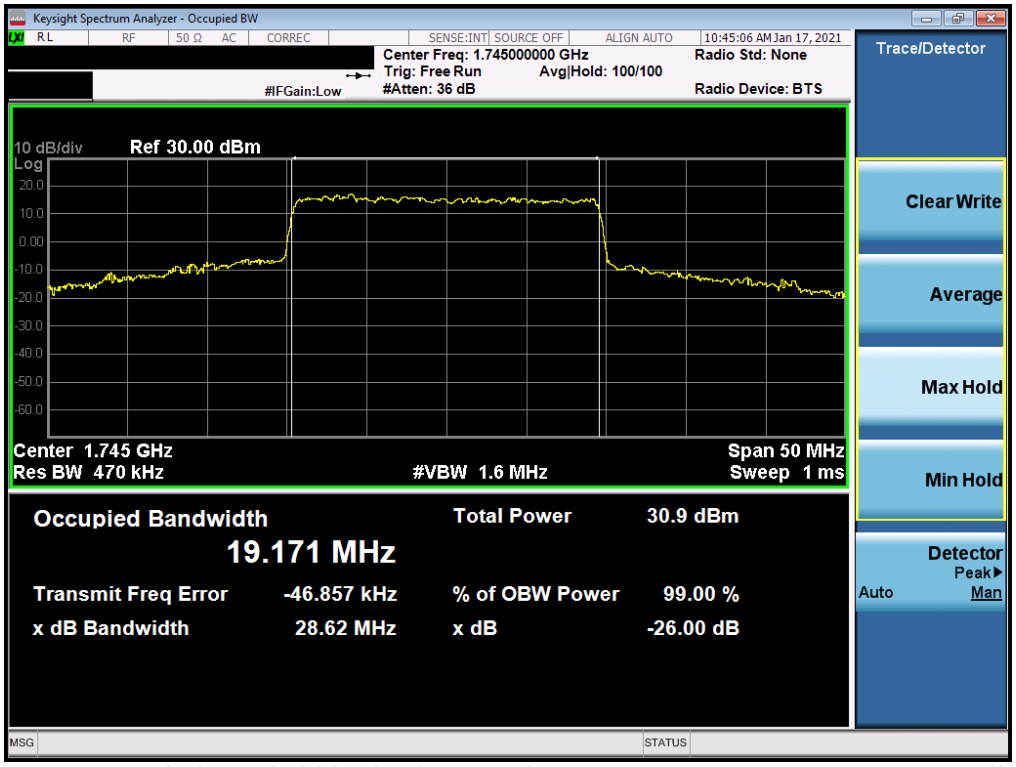


Plot 7-69. Occupied Bandwidth Plot (LTE Band 66/4 - 1.4MHz 64-QAM - Full RB)

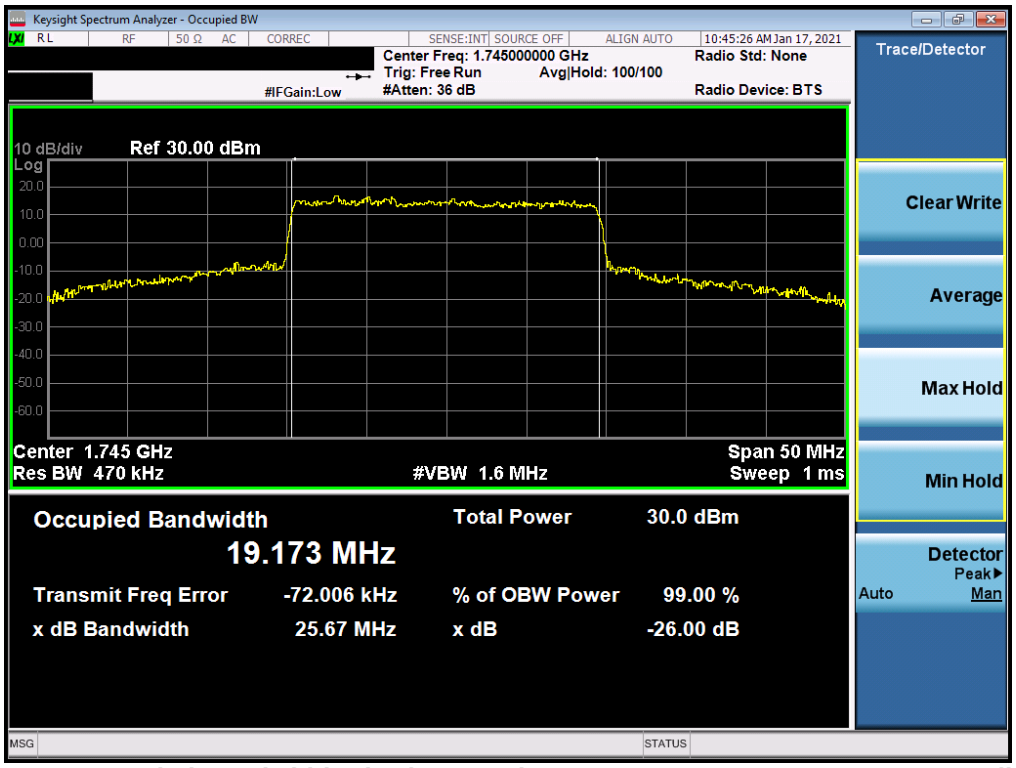
NR Band n66



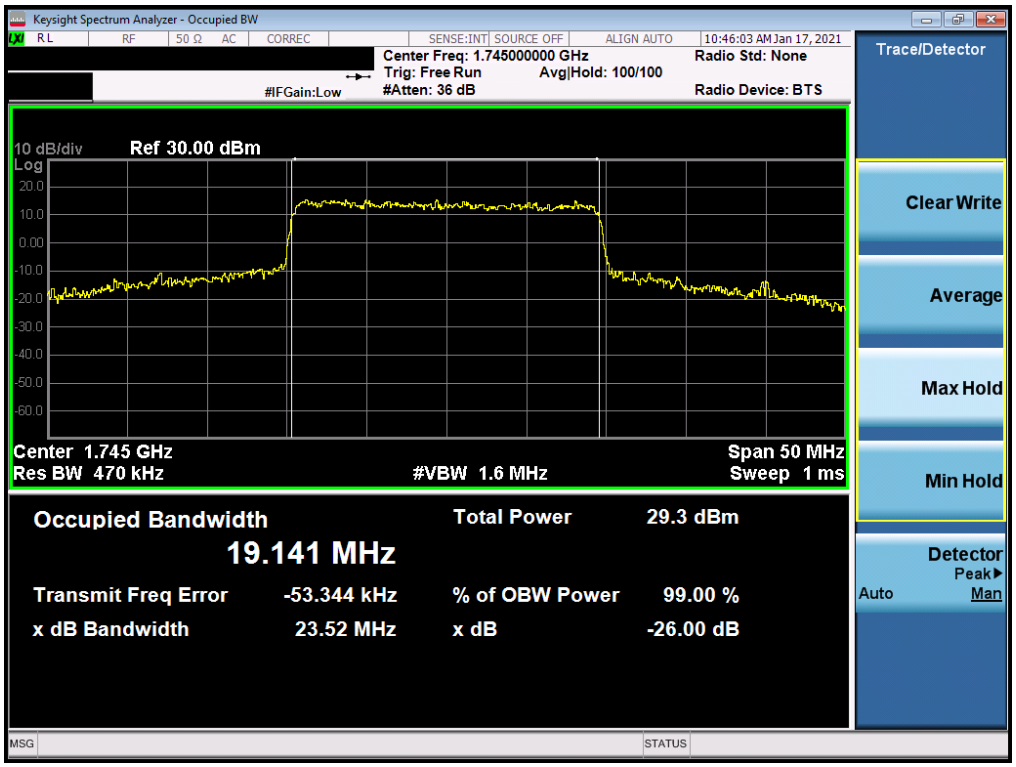
Plot 7-70. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz DFT-s-OFDM BPSK - Full RB)



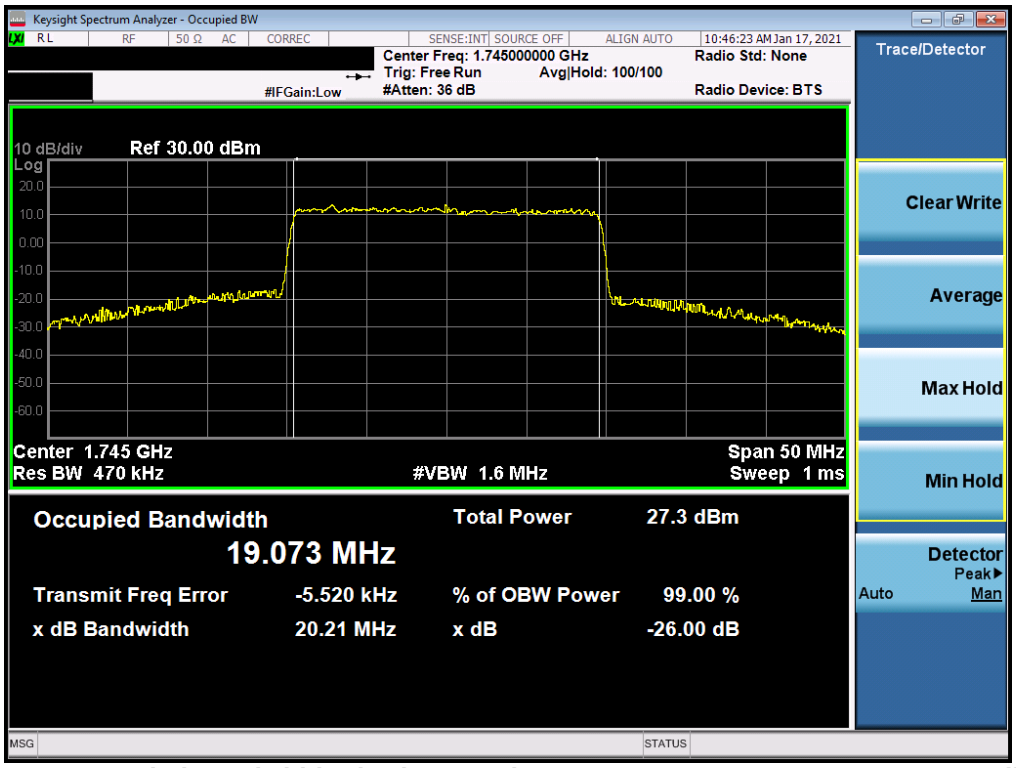
Plot 7-71. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM QPSK - Full RB)



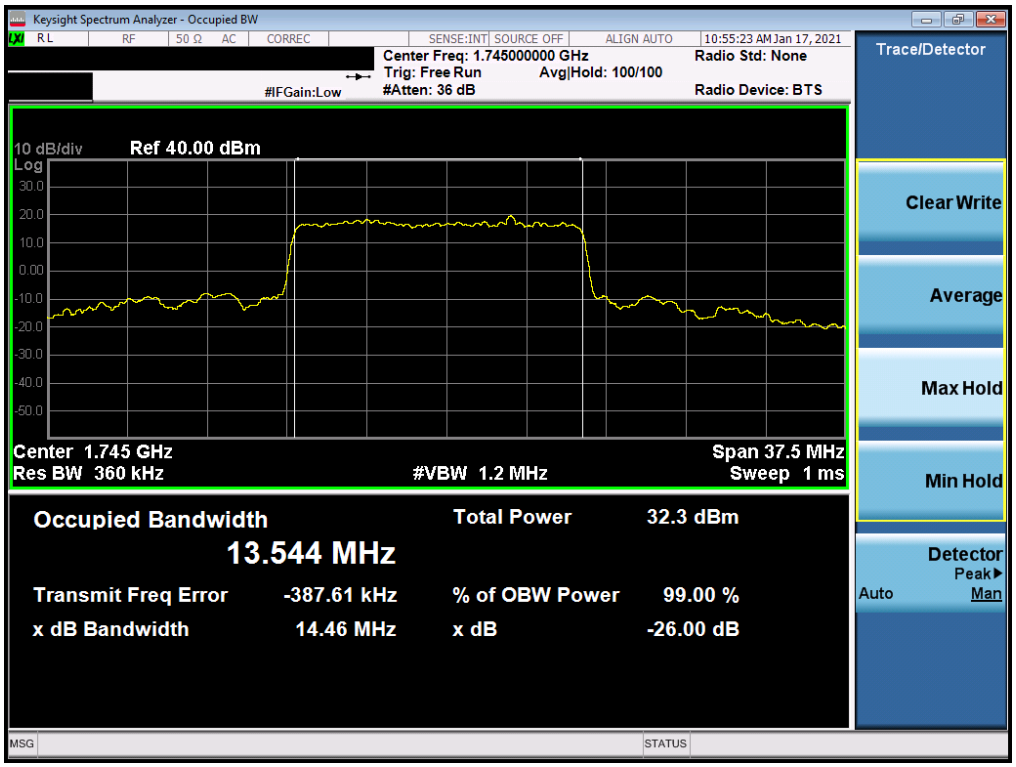
Plot 7-72. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 16QAM - Full RB)



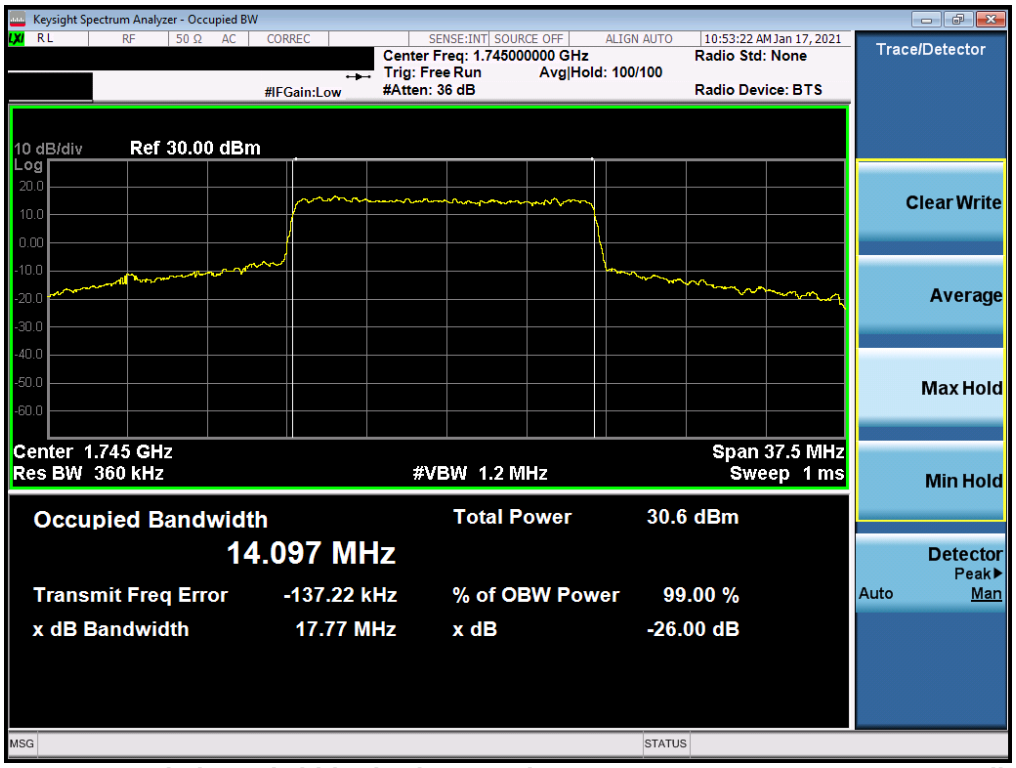
Plot 7-73. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 64QAM - Full RB)



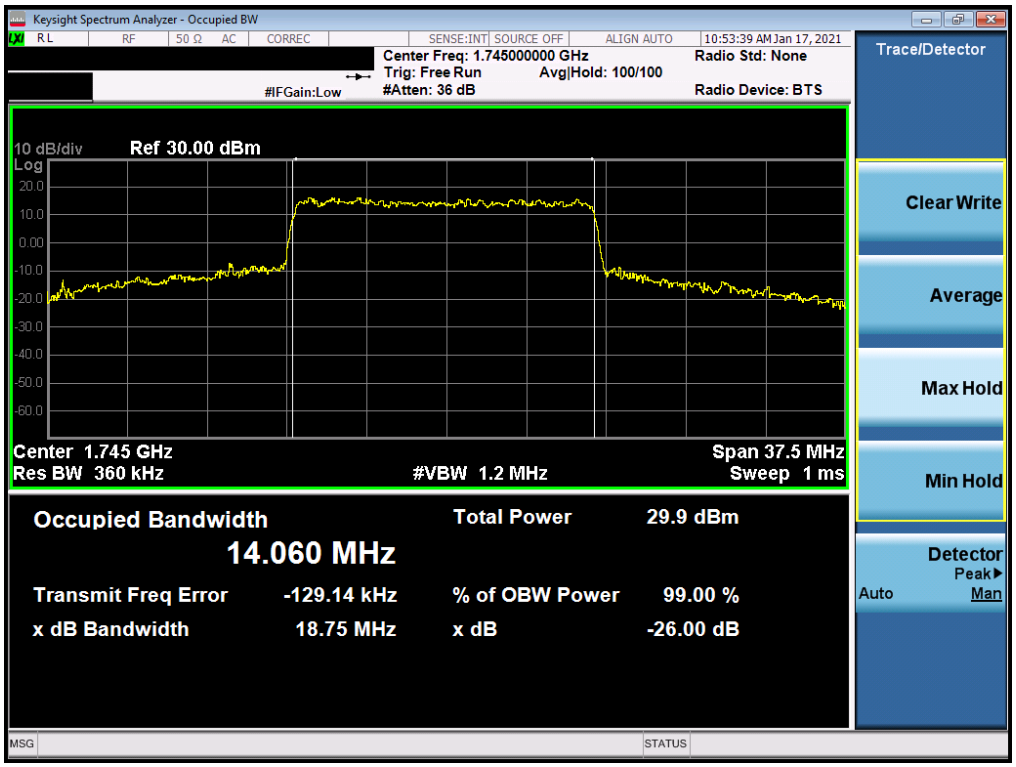
Plot 7-74. Occupied Bandwidth Plot (NR Band n66 - 20.0MHz CP-OFDM 256QAM - Full RB)



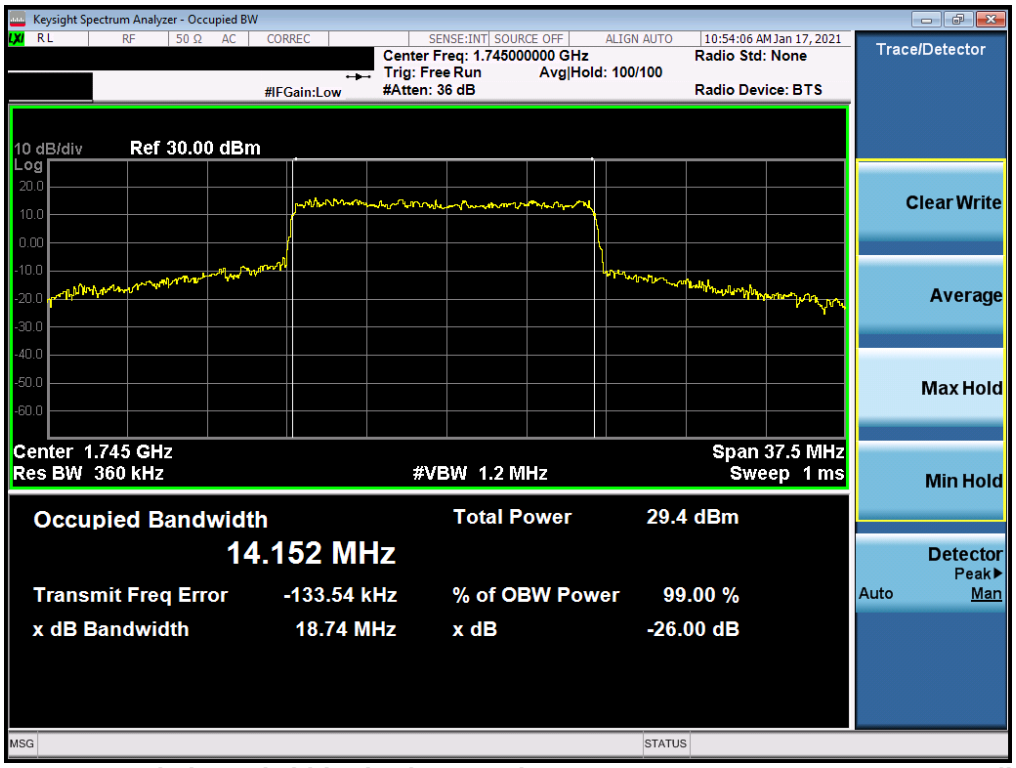
Plot 7-75. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz DFT-s-OFDM BPSK - Full RB)



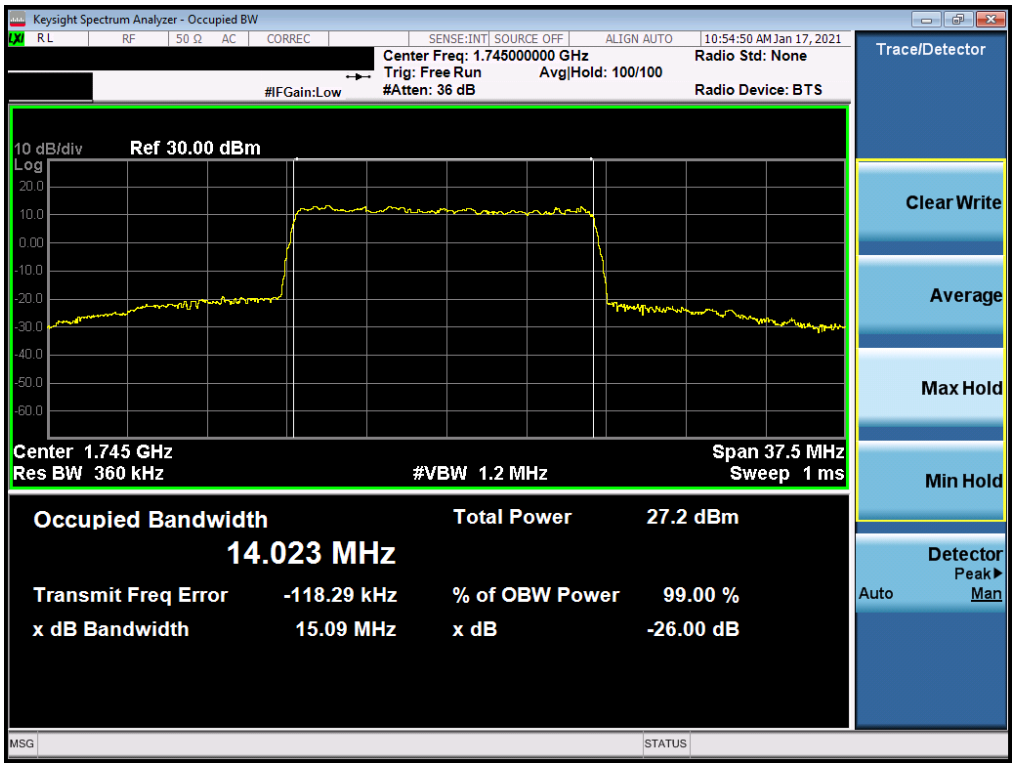
Plot 7-76. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM QPSK - Full RB)



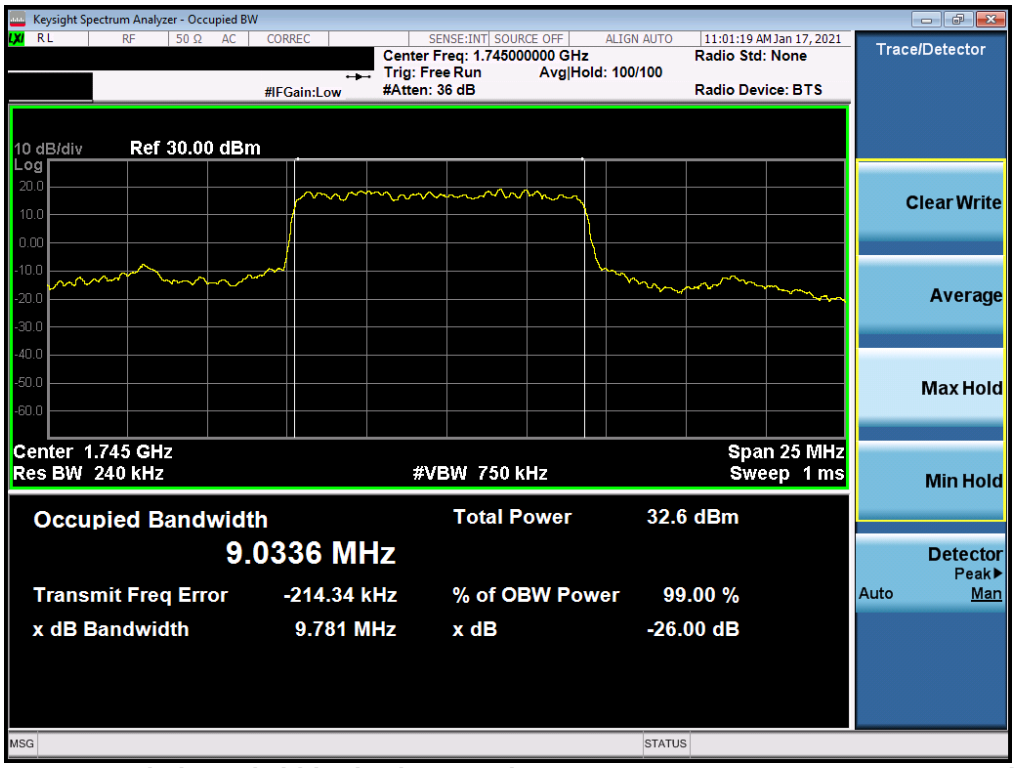
Plot 7-77. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 16QAM - Full RB)



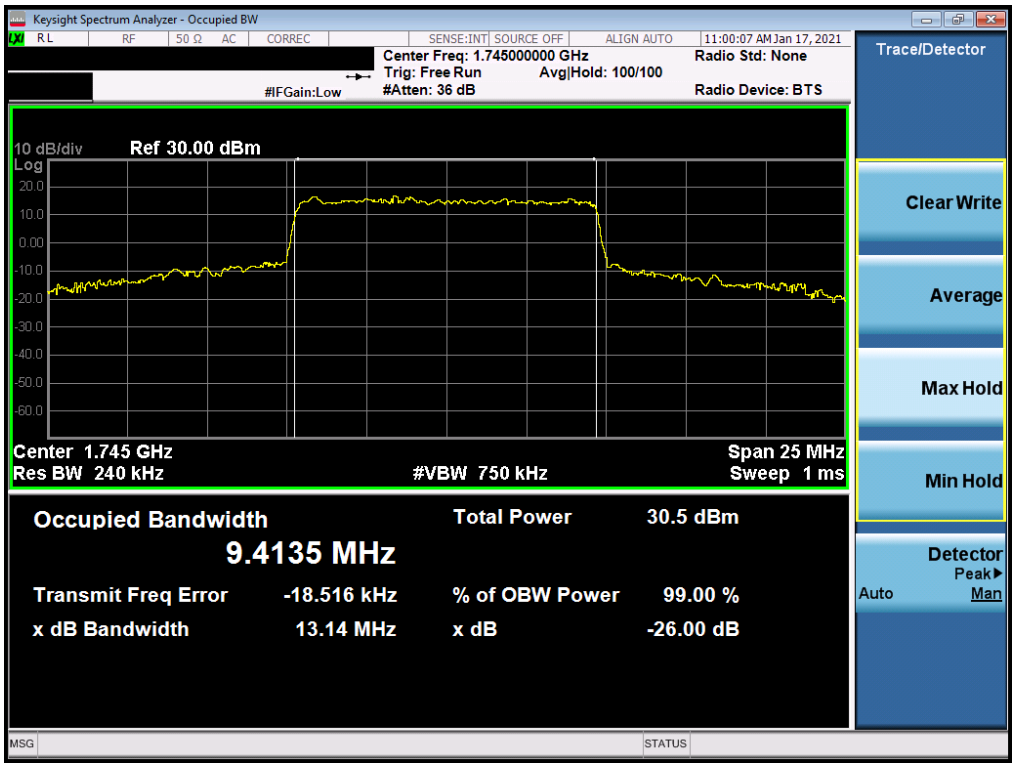
Plot 7-78. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 64QAM - Full RB)



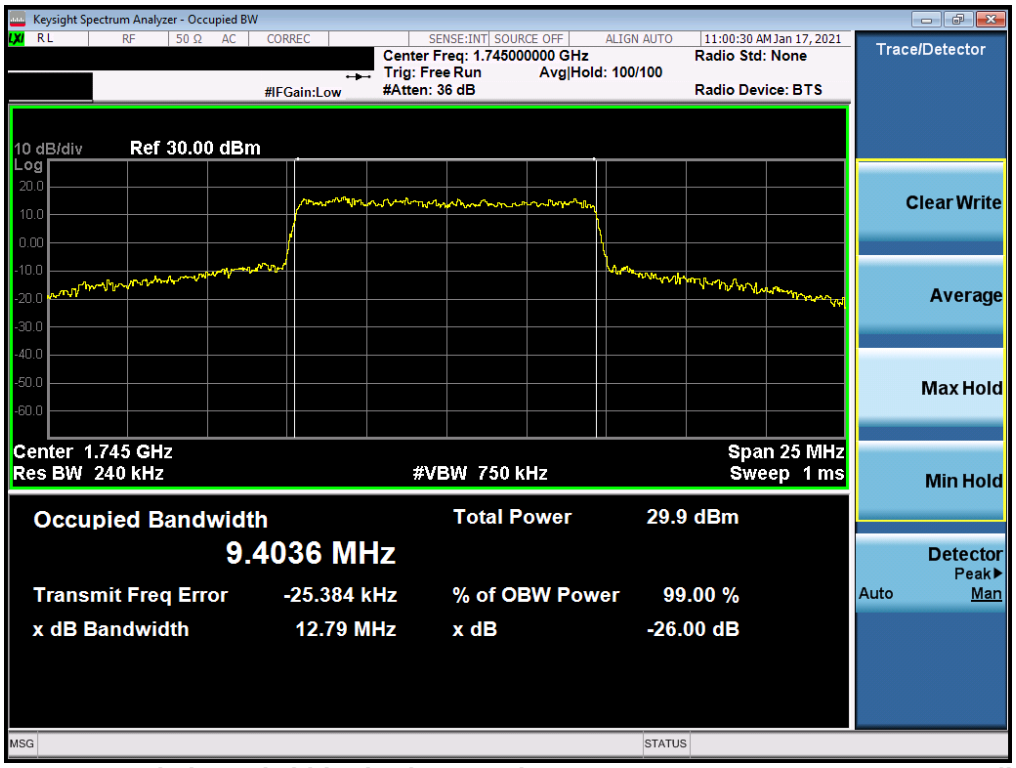
Plot 7-79. Occupied Bandwidth Plot (NR Band n66 - 15.0MHz CP-OFDM 256QAM - Full RB)



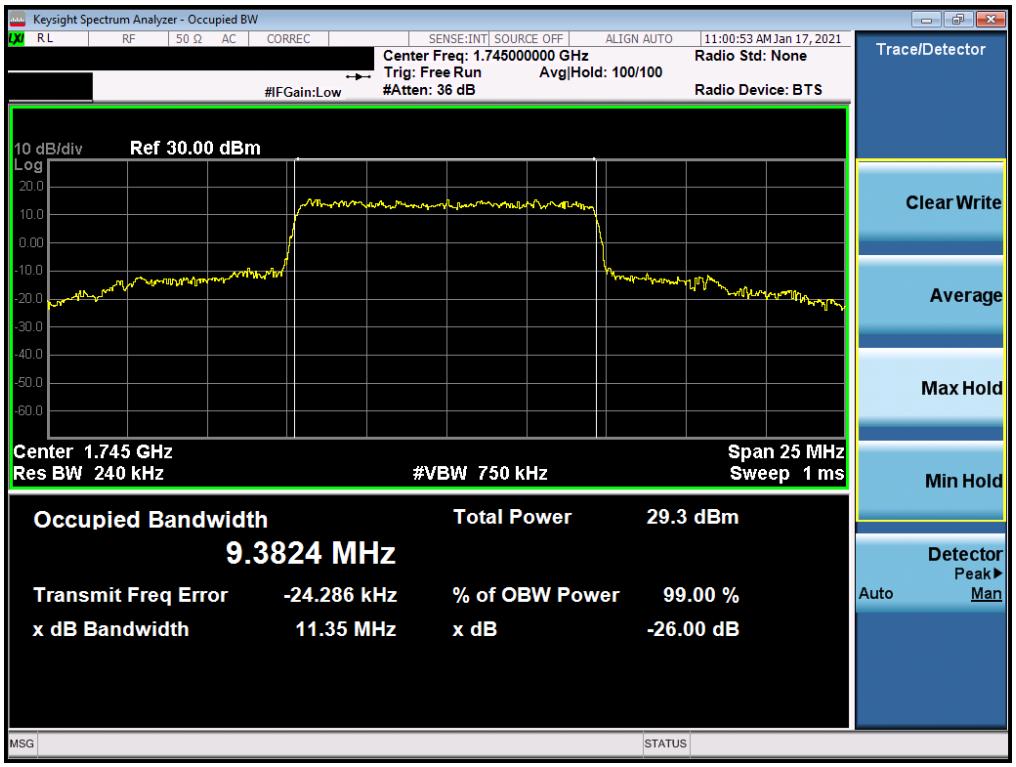
Plot 7-80. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz DFT-s-OFDM BPSK - Full RB)



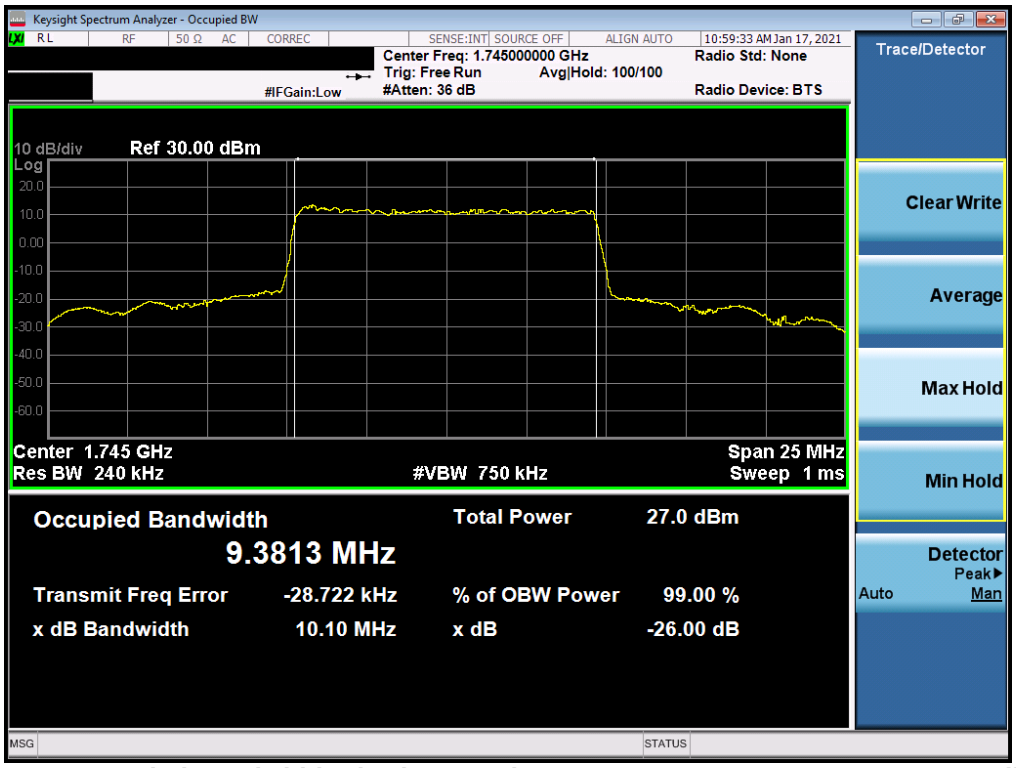
Plot 7-81. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM QPSK - Full RB)



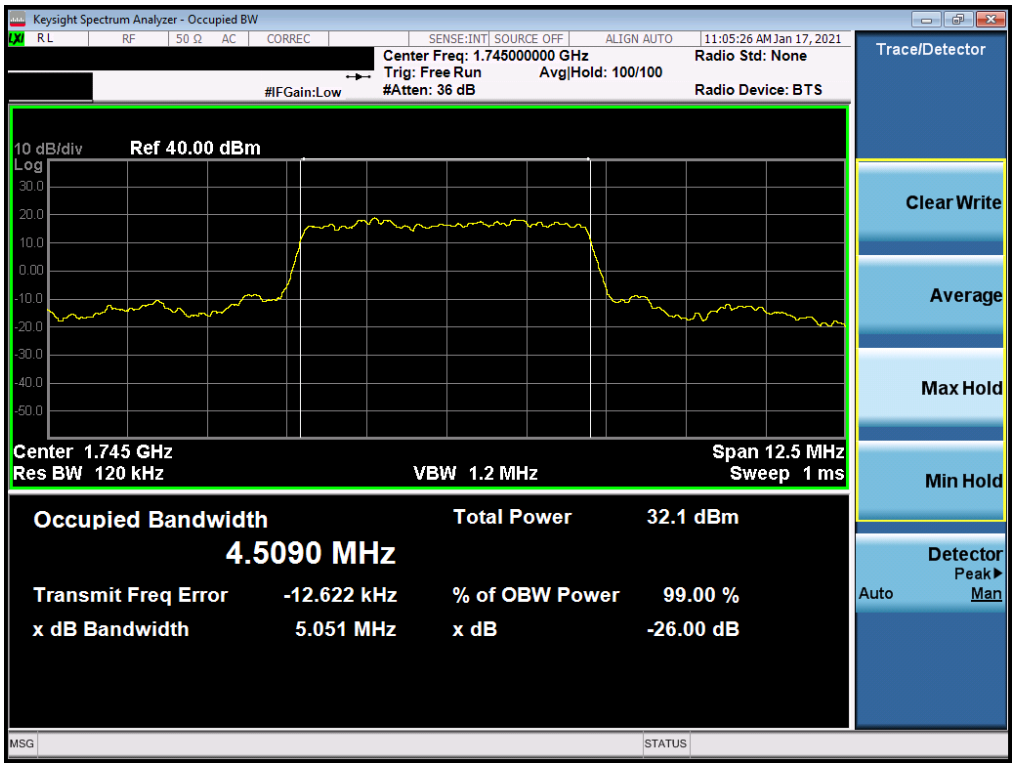
Plot 7-82. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 16QAM - Full RB)



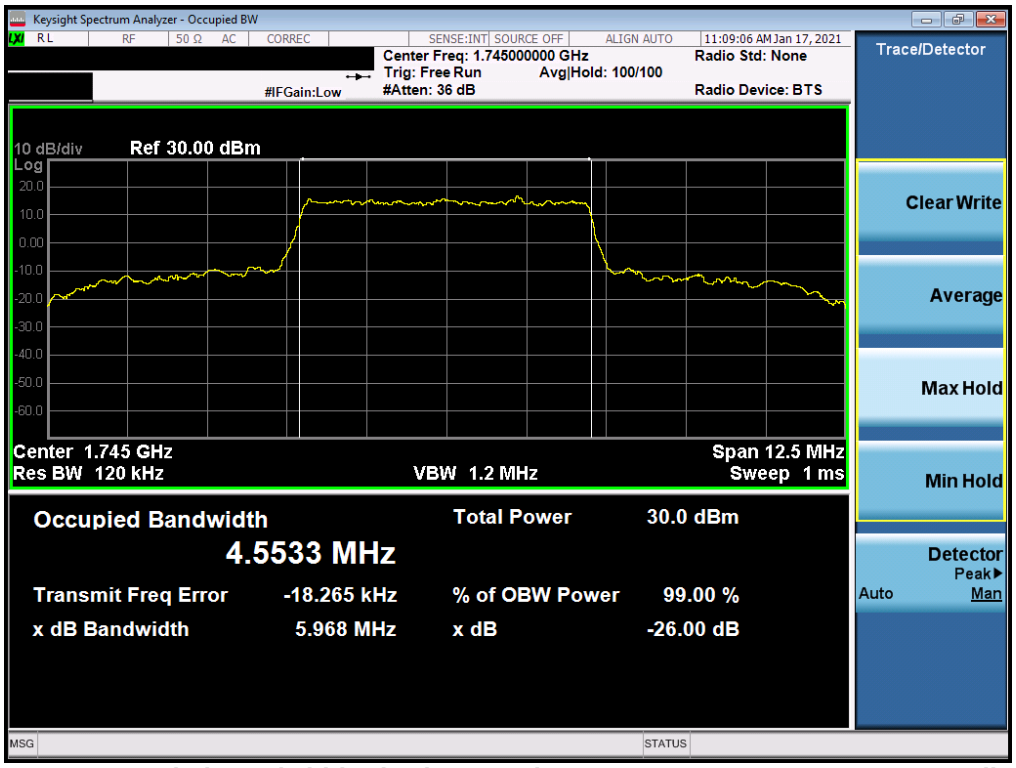
Plot 7-83. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 64QAM - Full RB)



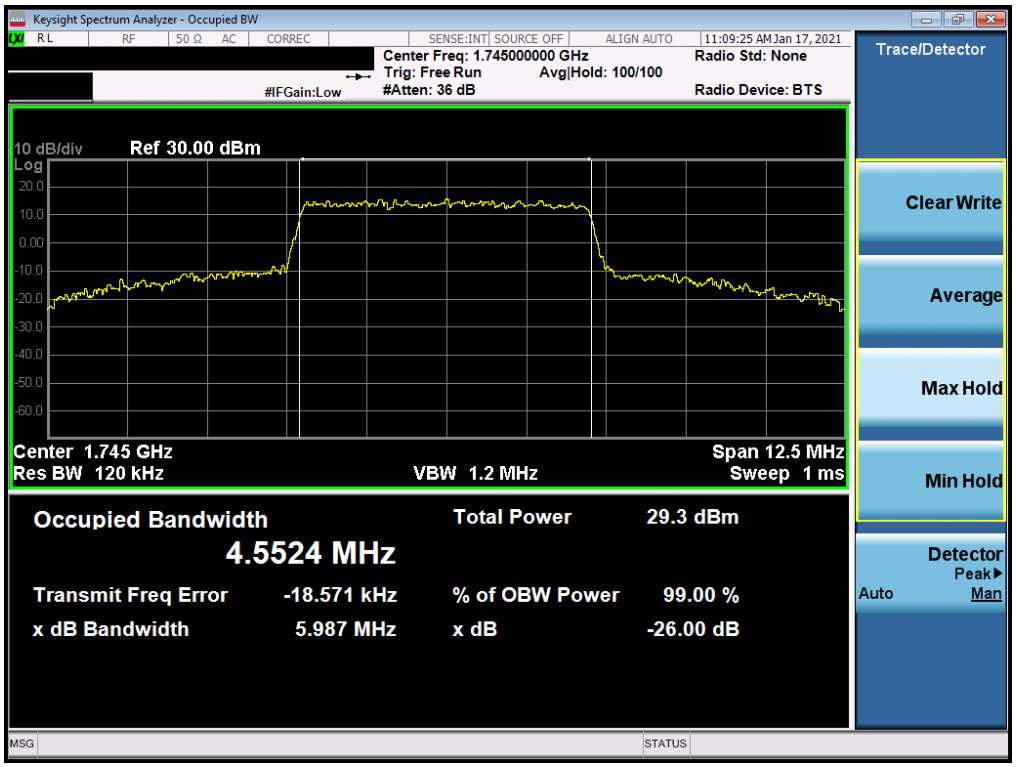
Plot 7-84. Occupied Bandwidth Plot (NR Band n66 - 10.0MHz CP-OFDM 256QAM - Full RB)



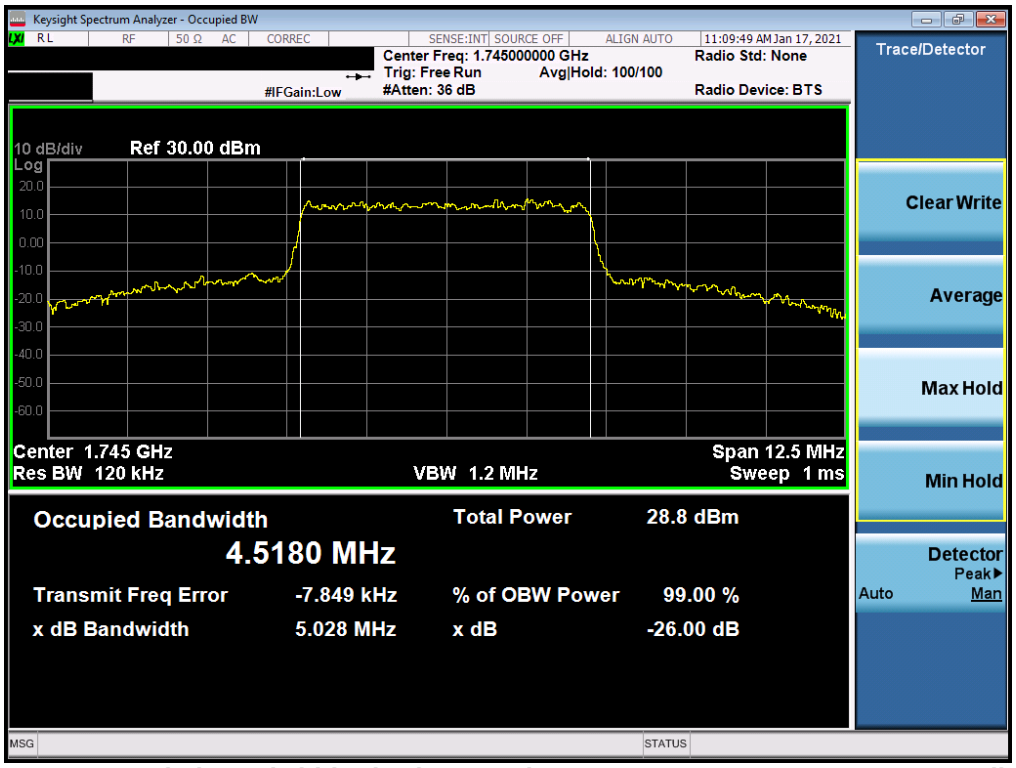
Plot 7-85. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz DFT-s-OFDM BPSK - Full RB)



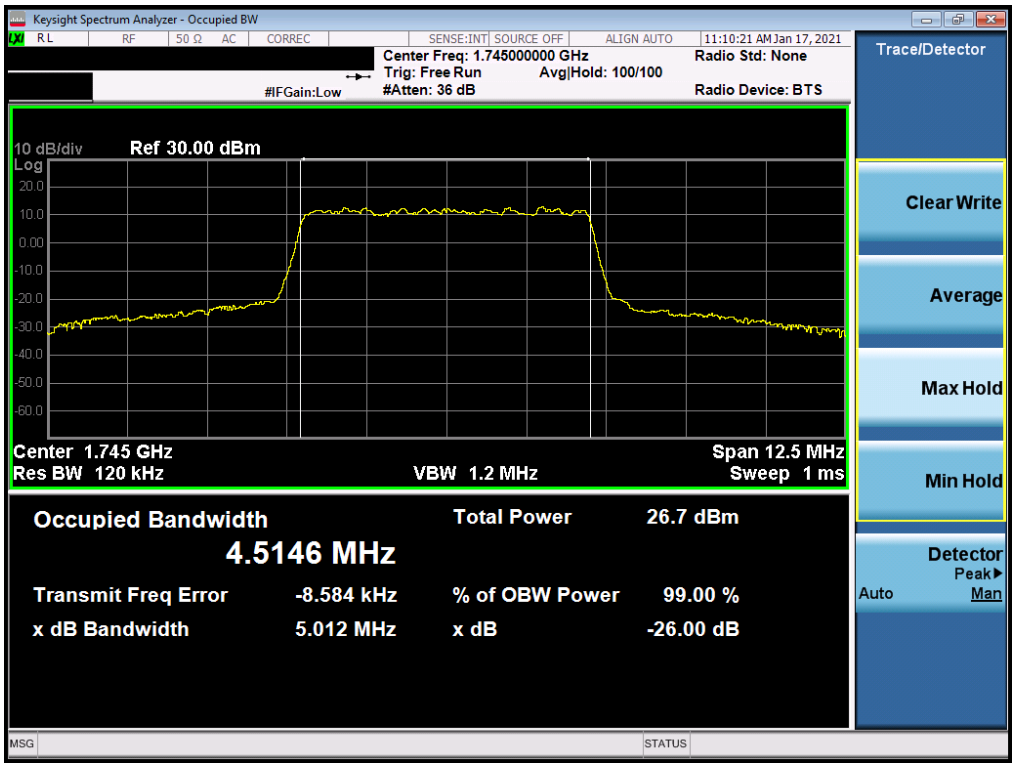
Plot 7-86. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM QPSK - Full RB)



Plot 7-87. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 16QAM - Full RB)



Plot 7-88. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 64QAM - Full RB)



Plot 7-89. Occupied Bandwidth Plot (NR Band n66 - 5.0MHz CP-OFDM 256QAM - Full RB)

7.3 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.

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 18GHz (separated into at least two plots per channel)
2. RBW ≥ 100kHz
3. VBW ≥ 3 x RBW
4. Detector = RMS
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

Test Setup

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

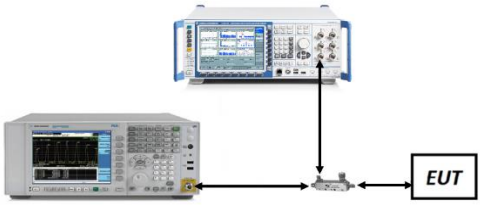


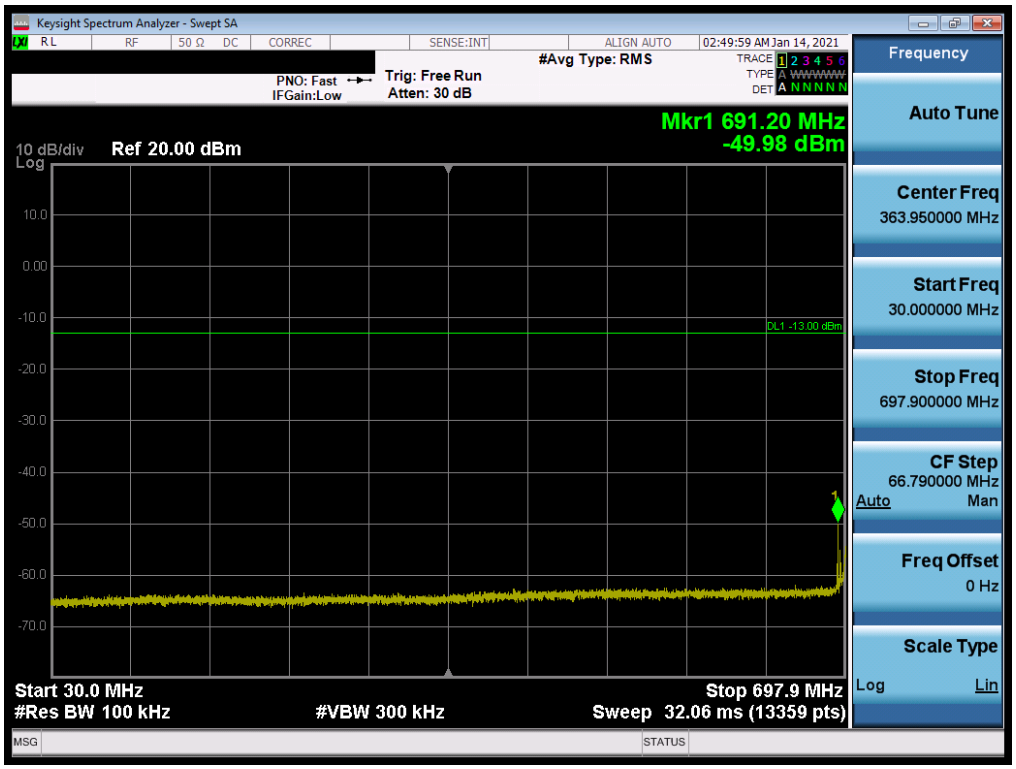
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

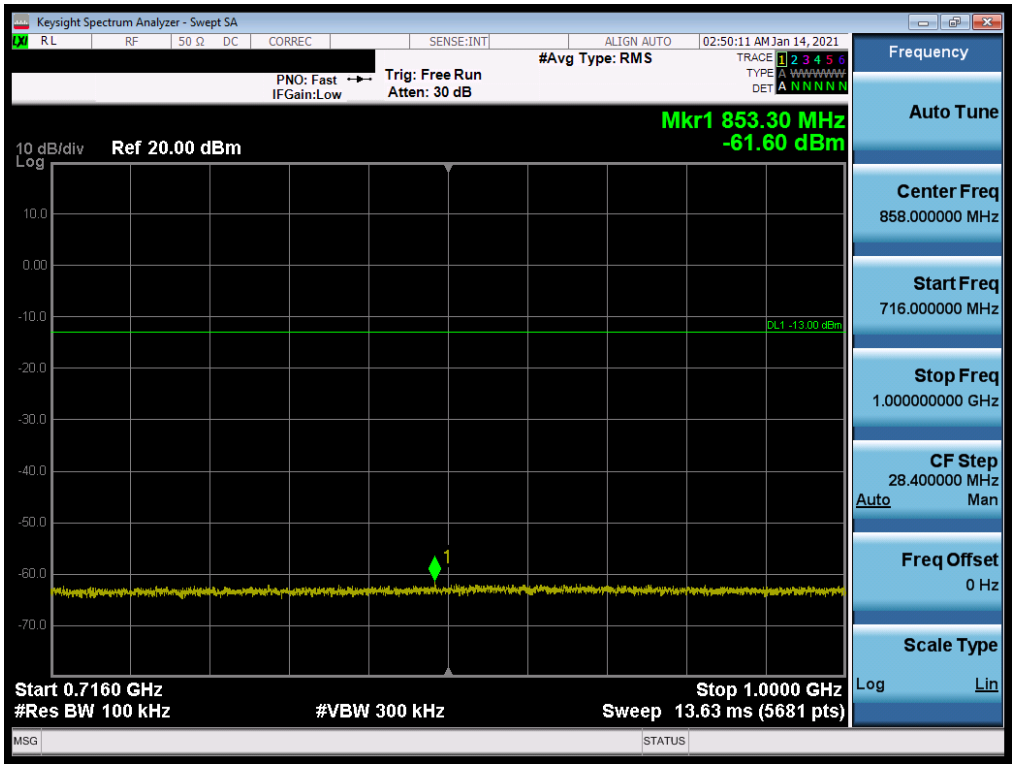
1. Per Part 27 and RSS-139, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth 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.

LTE Band 12

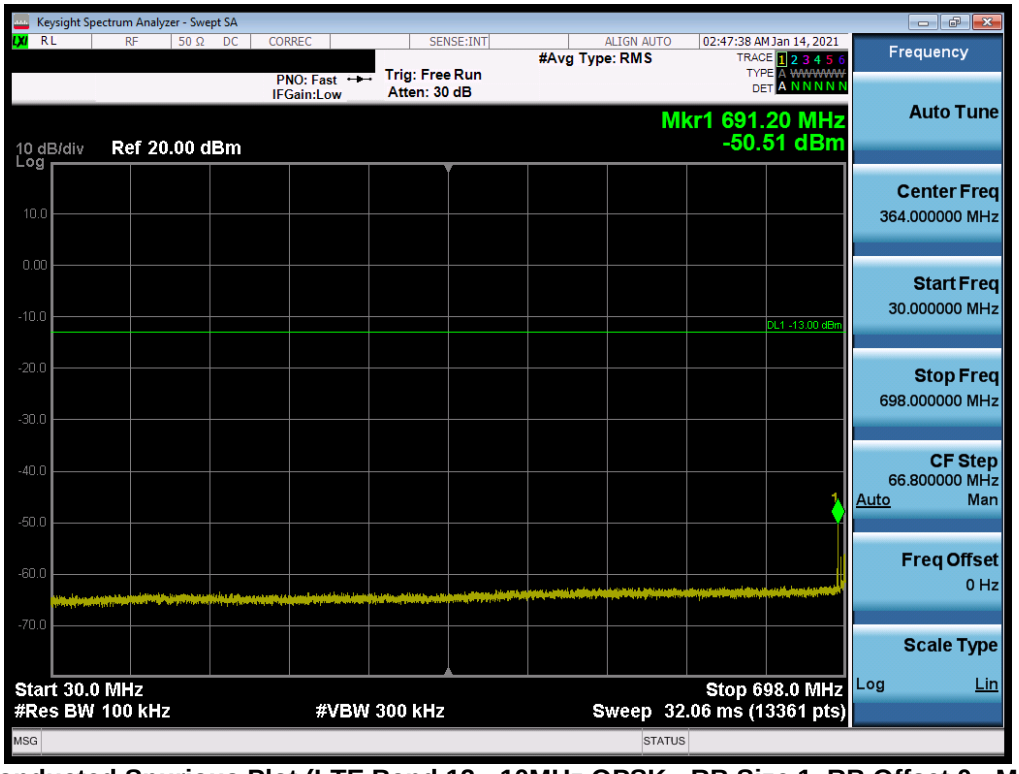


Plot 7-90. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

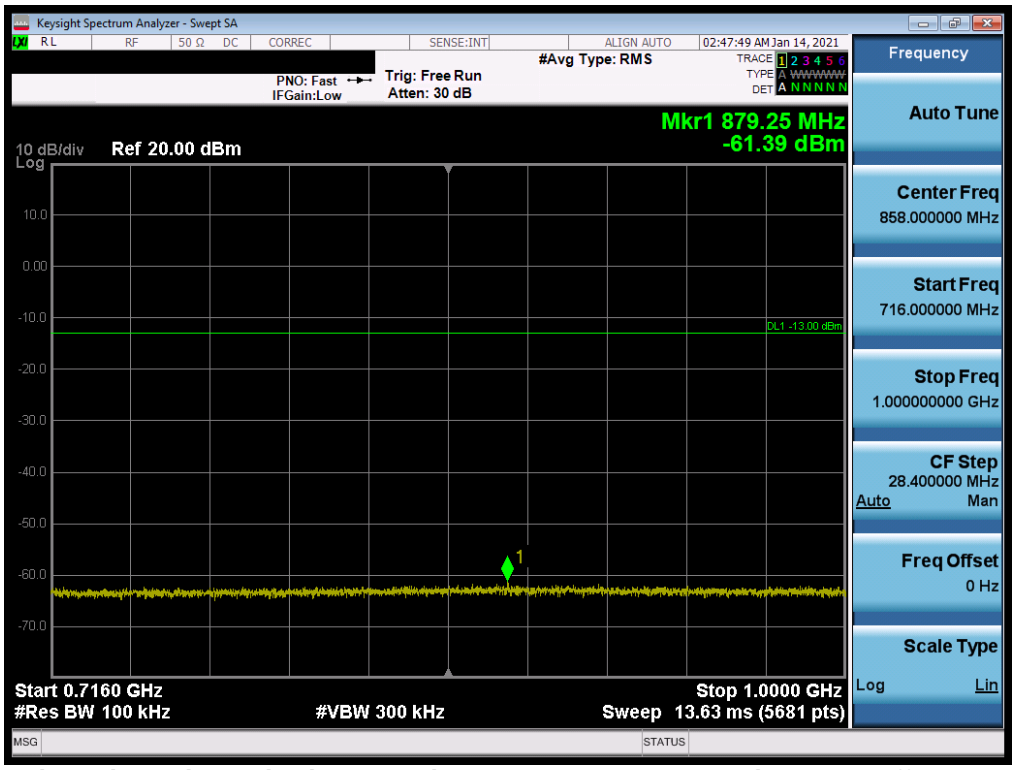


Plot 7-91. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

Plot 7-92. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

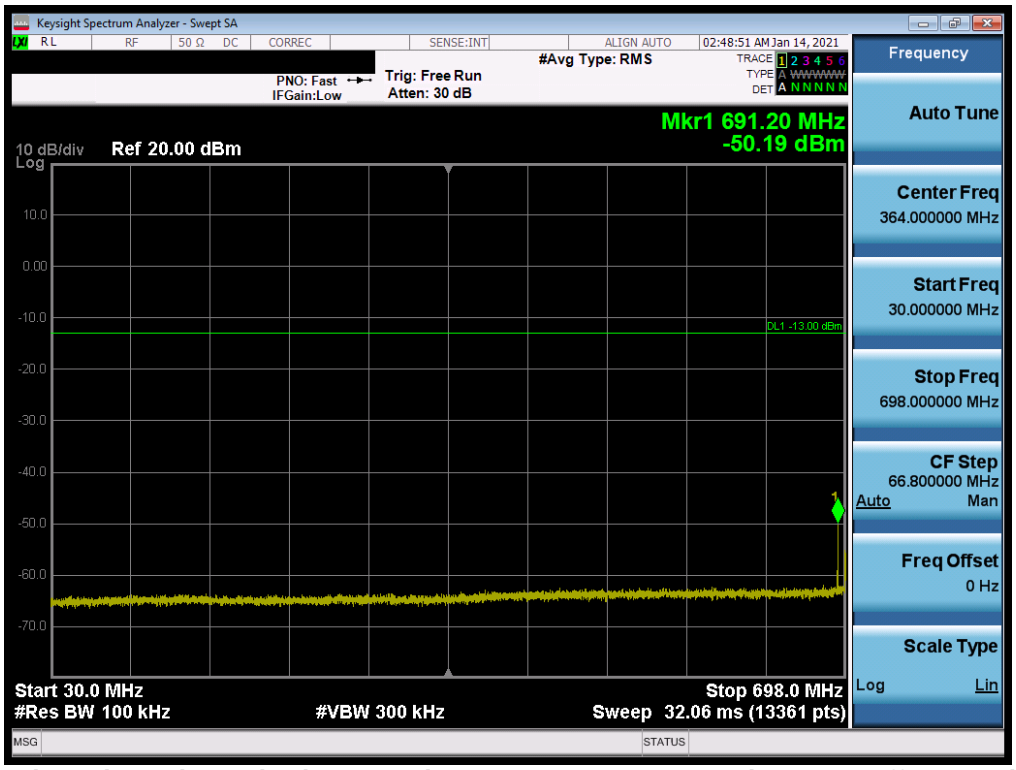


Plot 7-93. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

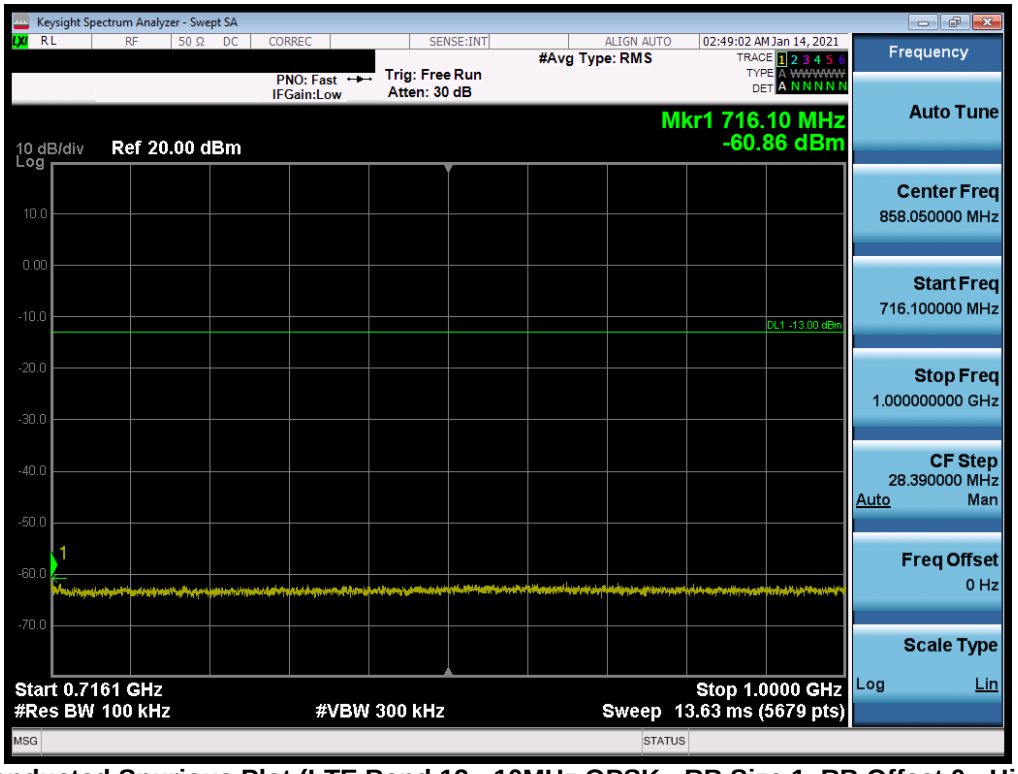


Plot 7-94. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

Plot 7-95. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-96. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-97. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

Plot 7-98. Conducted Spurious Plot (LTE Band 12 - 10MHz QPSK - RB Size 1, RB Offset 0 - High Channel)