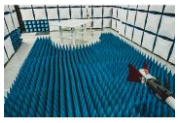
PCTEST
7185 Oakland Mills Road, Columbia, MD 21046 USA
Tel. 410.290.6652 / Fax 410.290.6654
http://www.pctest.com



PART 24 MEASUREMENT REPORT

Applicant Name:
LG Electronics USA, Inc.
111 Sylvan Avenue, North Building
Englewood Cliffs, NJ 07632
United States

Date of Testing:
4/27/2020 - 6/25/2020
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2004230076-03.ZNF

FCC ID:	**ZNFG900VM**
Applicant Name:	**LG Electronics USA, Inc.**

Application Type:	Certification
Model:	LM-G900VM
Additional Models:	LMG900VM, G900VM, LM-G900QM6, LMG900QM6, G900QM6, LM-G902V, LMG902V, G902V
EUT Type:	Portable Handset
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part:	24
Test Procedure(s):	ANSI C63.26-2015, ANSI/TIA-603-E-2016, KDB 971168 D01 v03r01, KDB 648474 D03 v01r04

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

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

Randy Ortanez
President

ACCREDITED
CERT #2041.01

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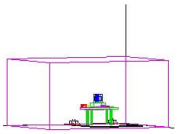
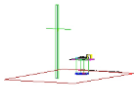


PART 24 MEASUREMENT REPORT



Mode	Bandwidth	Modulation	Tx Frequency Range [MHz]	EIRP		Emission Designator
				Max. Power [W]	Max. Power [dBm]	
GSM/GPRS	N/A	GMSK	1850.2 - 1909.8	0.494	26.94	242KGXW
EDGE		8-PSK	1850.2 - 1909.8	0.174	22.40	245KG7W
WCDMA	N/A	Spread Spectrum	1852.4 - 1907.6	0.277	24.43	4M16F9W
CDMA	N/A	Spread Spectrum	1851.25 - 1908.75	0.164	22.15	1M28F9W
LTE Band 2	20 MHz	QPSK	1860 - 1905	0.185	22.67	18M0G7D
		16QAM	1860 - 1905	0.170	22.30	18M0W7D
		64QAM	1860 - 1905	0.162	22.10	17M9W7D
	15 MHz	QPSK	1857.5 - 1907.5	0.195	22.90	13M5G7D
		16QAM	1857.5 - 1907.5	0.199	22.98	13M5W7D
		64QAM	1857.5 - 1907.5	0.182	22.60	13M5W7D
	10 MHz	QPSK	1855 - 1910	0.188	22.74	8M99G7D
		16QAM	1855 - 1910	0.190	22.79	9M02W7D
		64QAM	1855 - 1910	0.184	22.65	9M03W7D
	5 MHz	QPSK	1852.5 - 1912.5	0.186	22.70	4M56G7D
		16QAM	1852.5 - 1912.5	0.198	22.96	4M52W7D
		64QAM	1852.5 - 1912.5	0.183	22.61	4M53W7D
	3 MHz	QPSK	1851.5 - 1913.5	0.187	22.72	2M71G7D
		16QAM	1851.5 - 1913.5	0.186	22.70	2M70W7D
		64QAM	1851.5 - 1913.5	0.183	22.61	2M71W7D
	1.4 MHz	QPSK	1850.7 - 1914.3	0.190	22.78	1M09G7D
		16QAM	1850.7 - 1914.3	0.190	22.79	1M11W7D
		64QAM	1850.7 - 1914.3	0.174	22.39	1M09W7D
NR Band n2	20 MHz	π/2 BPSK	1860 - 1905	0.086	19.36	18M0G7D
		QPSK	1860 - 1905	0.087	19.38	17M9G7D
		16QAM	1860 - 1905	0.075	18.76	17M9W7D
		64QAM	1860 - 1905	0.052	17.19	18M0W7D
		256QAM	1860 - 1905	0.032	15.03	17M9W7D
	15 MHz	π/2 BPSK	1857.5 - 1907.5	0.092	19.63	13M5G7D
		QPSK	1857.5 - 1907.5	0.096	19.82	13M5G7D
		16QAM	1857.5 - 1907.5	0.073	18.66	13M5W7D
		64QAM	1857.5 - 1907.5	0.046	16.61	13M5W7D
		256QAM	1857.5 - 1907.5	0.029	14.57	13M5W7D
	10 MHz	π/2 BPSK	1855 - 1910	0.091	19.58	9M03G7D
		QPSK	1855 - 1910	0.091	19.61	8M97G7D
		16QAM	1855 - 1910	0.067	18.29	9M01W7D
		64QAM	1855 - 1910	0.045	16.53	8M99W7D
		256QAM	1855 - 1910	0.029	14.55	9M00W7D
	5 MHz	π/2 BPSK	1852.5 - 1912.5	0.089	19.48	4M52G7D
		QPSK	1852.5 - 1912.5	0.086	19.34	4M50G7D
		16QAM	1852.5 - 1912.5	0.069	18.40	4M55W7D
		64QAM	1852.5 - 1912.5	0.047	16.75	4M51W7D
		256QAM	1852.5 - 1912.5	0.028	14.42	4M53W7D

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 17025-2005 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 **LG Portable Handset FCC ID:ZNFG900VM**. 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 24.

Test Device Serial No.: 00367, 00375, 00458

2.2 Device Capabilities

This device contains the following capabilities:

CDMA, GSM/GPRS/EDGE, WCDMA/HSPA, LTE, NR, WLAN, UNII, BT (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 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.

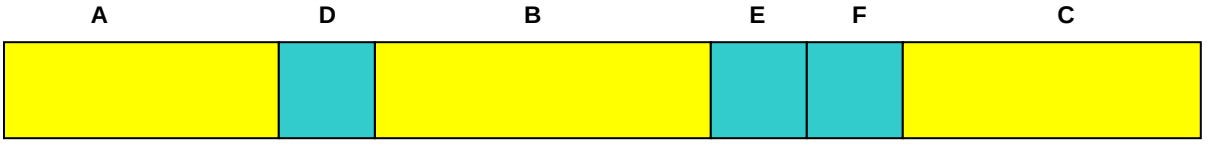
3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

The measurement procedures described in the "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.

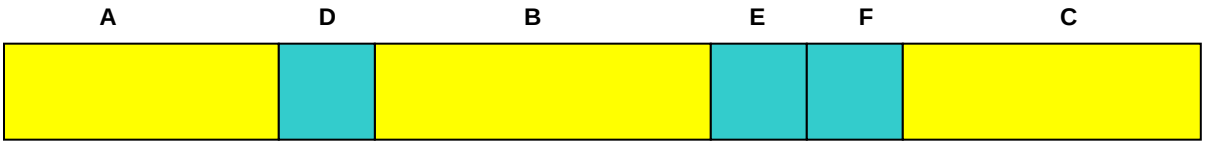
Deviation from Measurement Procedure……..None

3.2 PCS - Base Frequency Blocks



BLOCK 1: 1930 – 1945 MHz (A)
BLOCK 2: 1945 – 1950 MHz (D)
BLOCK 3: 1950 – 1965 MHz (B)
BLOCK 4: 1965 – 1970 MHz (E)
BLOCK 5: 1970 – 1975 MHz (F)
BLOCK 6: 1975 – 1990 MHz (C)

3.3 PCS - Mobile Frequency Blocks



BLOCK 1: 1850 – 1865 MHz (A)
BLOCK 2: 1865 – 1870 MHz (D)
BLOCK 3: 1870 – 1885 MHz (B)
BLOCK 4: 1885 – 1890 MHz (E)
BLOCK 5: 1890 – 1895 MHz (F)
BLOCK 6: 1895 – 1910 MHz (C)

3.4 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 $P_{g\ [dBm]} - \text{cable loss}_{\ [dB]}$.

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
-	LTx3	LIcensed Transmitter Cable Set	10/30/2019	Annual	10/30/2020	LTx3
Agilent	N9038A	MXE EMI Receiver	7/17/2019	Annual	7/17/2020	MY51210133
Agilent	N9030A	PXA Signal Analyzer (44GHz)	6/12/2019	Annual	6/12/2020	MY52350166
Com-Power	AL-130	9kHz - 30MHz Loop Antenna	10/10/2019	Biennial	10/10/2021	121034
Espec	ESX-2CA	Environmental Chamber	6/13/2019	Annual	6/13/2020	17620
ETS Lindgren	3164-08	Quad Ridge Horn Antenna	2/22/2019	Biennial	2/22/2021	128338
Keysight Technologies	N9020A	MXA Signal Analyzer	4/29/2019	Annual	4/29/2020	MY54500644
Mini Circuits	TVA-11-422	RF Power Amp	N/A			QA1317001
Mini-Circuits	SSG-4000HP	Synthesized Signal Generator	N/A			11208010032
Mini Circuits	PWR-4GHS	USB Power Sensor	6/18/2020	Annual	6/18/2021	12001070013
Rohde & Schwarz	CMW500	Radio Communication Tester	N/A			112347
Rohde & Schwarz	ESU26	EMI Test Receiver (26.5GHz)	6/5/2019	Annual	6/5/2020	100342
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/23/2019	Annual	9/23/2020	100348
Rohde & Schwarz	FSW67	Signal / Spectrum Analyzer	5/6/2019	Annual	5/6/2020	103200
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/11/2019	Annual	7/11/2020	102134
Rohde & Schwarz	SFUNIT-Rx	Shielded Filter Unit	7/8/2019	Annual	7/8/2020	102133
Sunol	DRH-118	Horn Antenna (1-18GHz)	10/3/2019	Biennial	10/3/2021	A050307
Sunol	JB5	Bi-Log Antenna (30M - 5GHz)	5/19/2018	Biennial	5/19/2020	A051107

Table 5-1. Test Equipment

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

2. Equipment with a calibration date of “N/A” shown in this list was not used to make direct calibrated measurements.

6.0 SAMPLE CALCULATIONS

GSM Emission Designator

Emission Designator = 250KGXW
GSM BW = 250 kHz
G = Phase Modulation
X = Cases not otherwise covered
W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 250KG7W
EDGE BW = 250 kHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination (Audio/Data)

CDMA Emission Designator

Emission Designator = 1M25F9W
CDMA BW = 1.25 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

WCDMA Emission Designator

Emission Designator = 4M16F9W
WCDMA BW = 4.16 MHz
F = Frequency Modulation
9 = Composite Digital Info
W = Combination (Audio/Data)

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: LG Electronics USA, Inc.

FCC ID: ZNFG900VM

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

Mode(s): GSM/GPRS/EDGE/WCDMA/CDMA/LTE/NR

Test Condition	Test Description	FCC Part Section(s)	RSS Section(s)	Test Limit	Test Result	Reference
CONDUCTED	Occupied Bandwidth	2.1049	RSS-133(2.3)	N/A	PASS	Section 7.2
	Conducted Band Edge / Spurious Emissions	2.1051, 24.238(a)	RSS-133(6.5)	> 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-133(4.1)	N/A	PASS	See RF Exposure Report
	Frequency Stability	2.1055, 24.235	RSS-133(6.3)	Fundamental emissions stay within authorized frequency block	PASS	Section 7.8
RADIATED	Effective Radiated Power / Equivalent Isotropic Radiated Power	24.232(c)	RSS-132(5.4)	< 7 Watts max. ERP	PASS	Section 7.6
	Radiated Spurious Emissions	2.1053, 24.238(a)	RSS-133(6.5)	> 43 + 10 log10 (P[Watts]) for all out-of-band emissions	PASS	Section 7.7

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 2G/3G Automation Version 4.5, LTE Automation Version 5.3.

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.

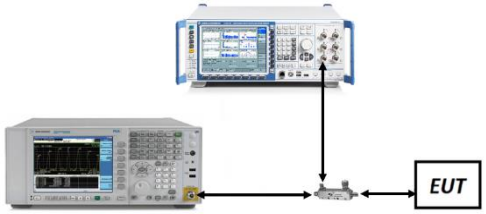
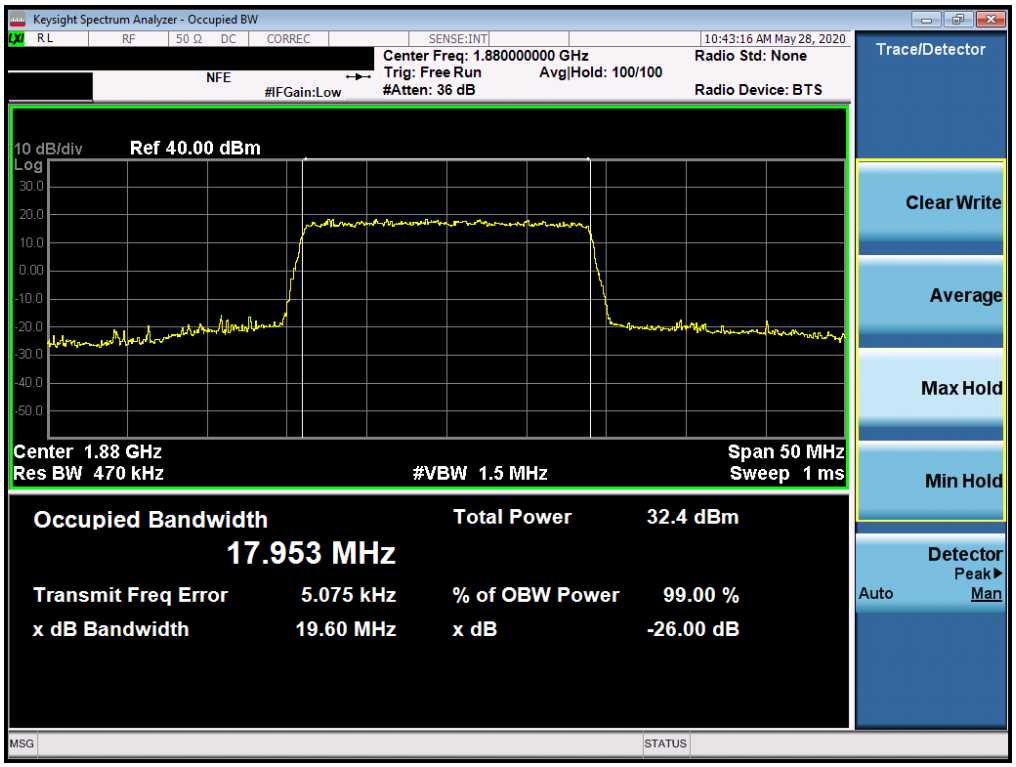


Figure 7-1. Test Instrument & Measurement Setup

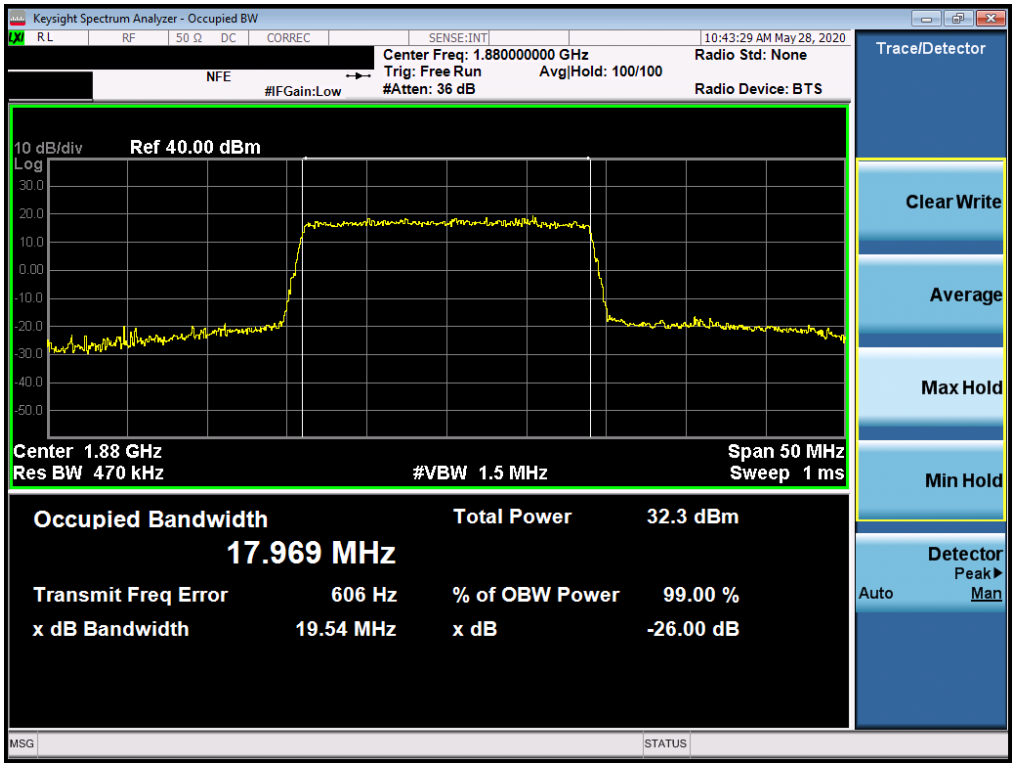
Test Notes

None.

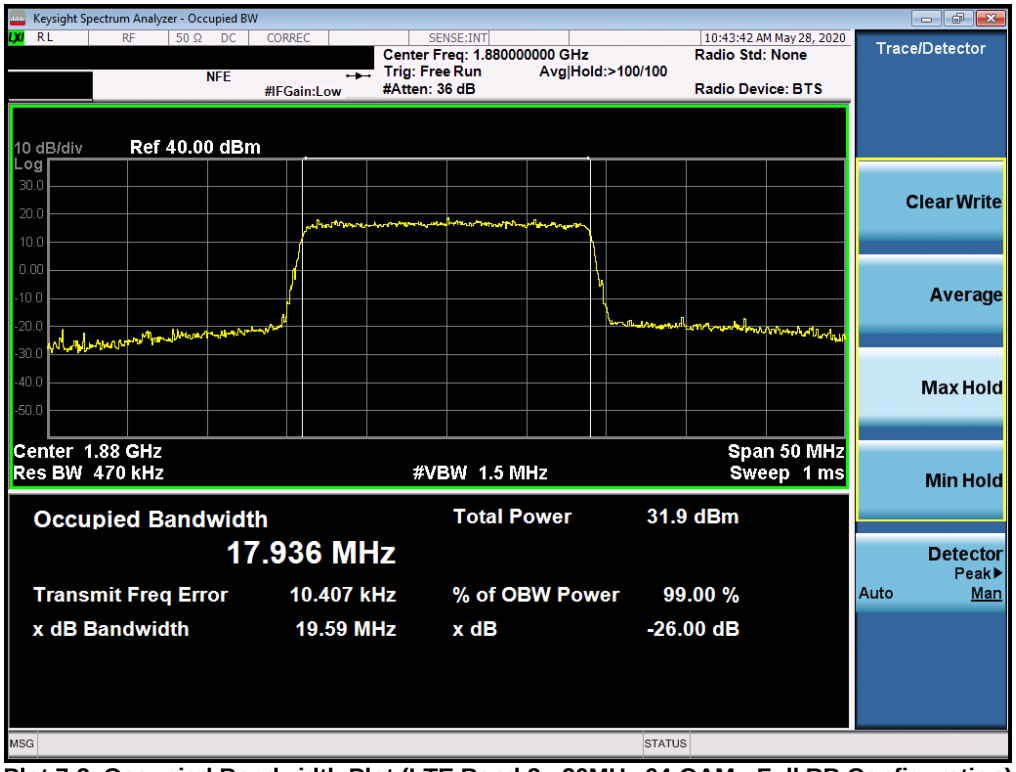
LTE Band 2



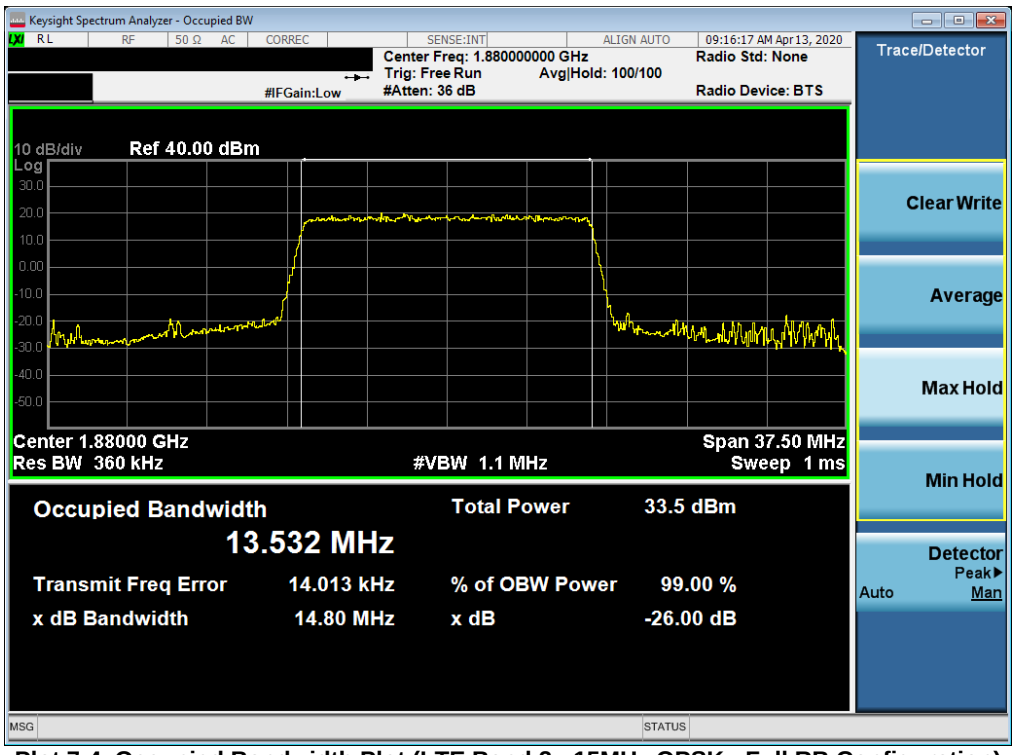
Plot 7-1. Occupied Bandwidth Plot (LTE Band 2 - 20MHz QPSK - Full RB Configuration)



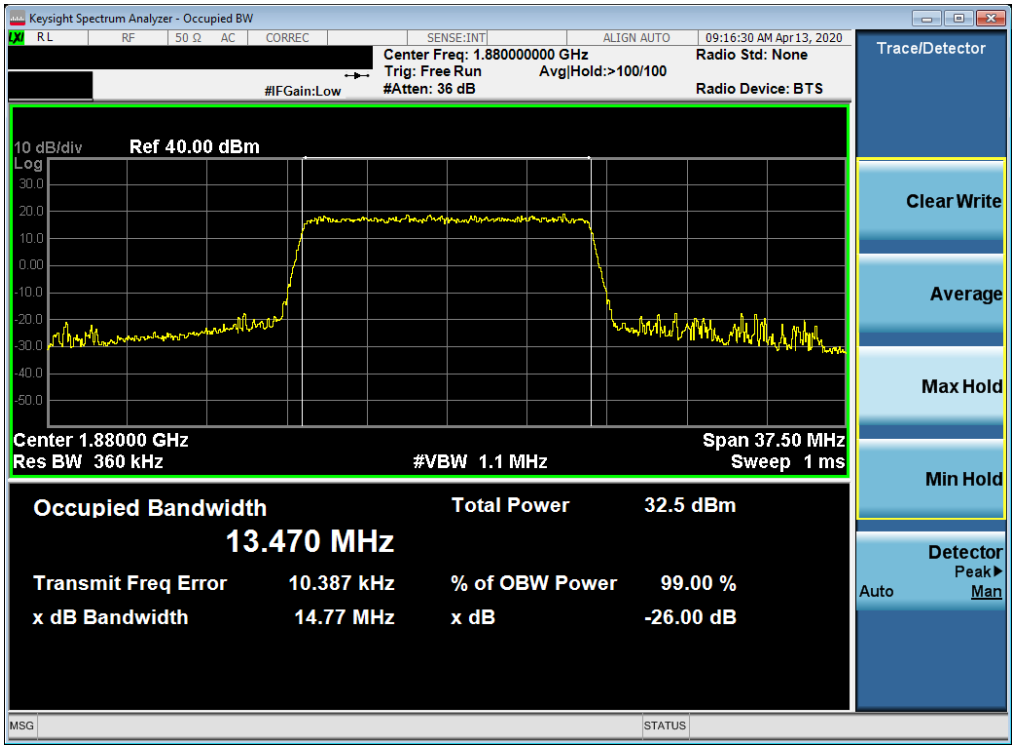
Plot 7-2. Occupied Bandwidth Plot (LTE Band 2 - 20MHz 16-QAM - Full RB Configuration)



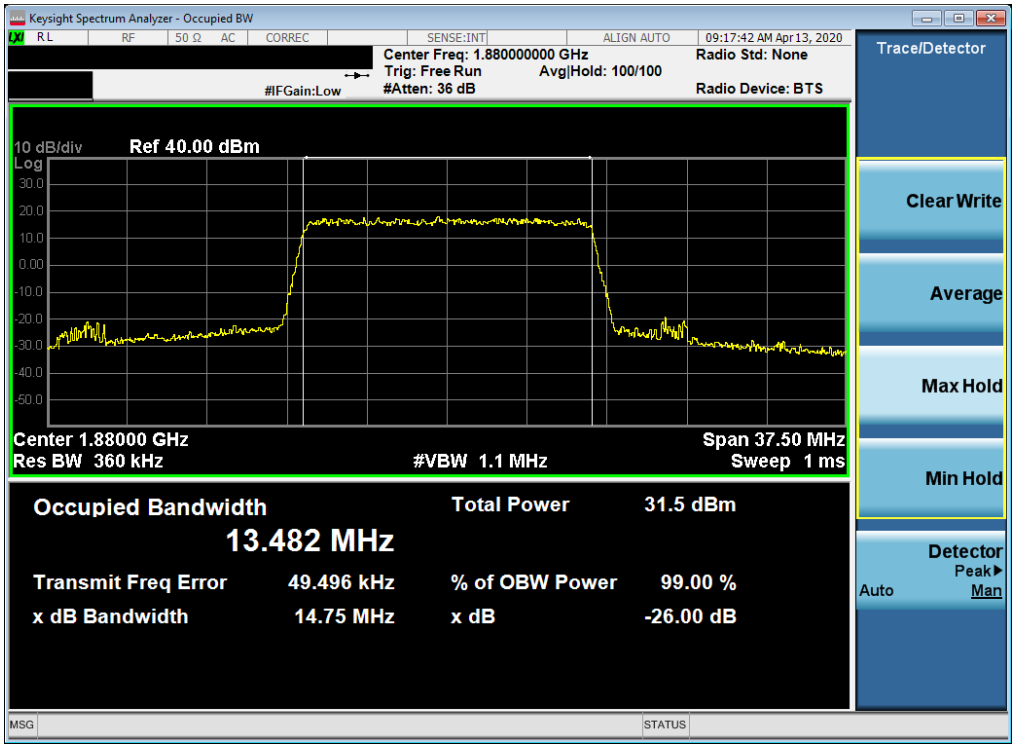
Plot 7-3. Occupied Bandwidth Plot (LTE Band 2 - 20MHz 64-QAM - Full RB Configuration)



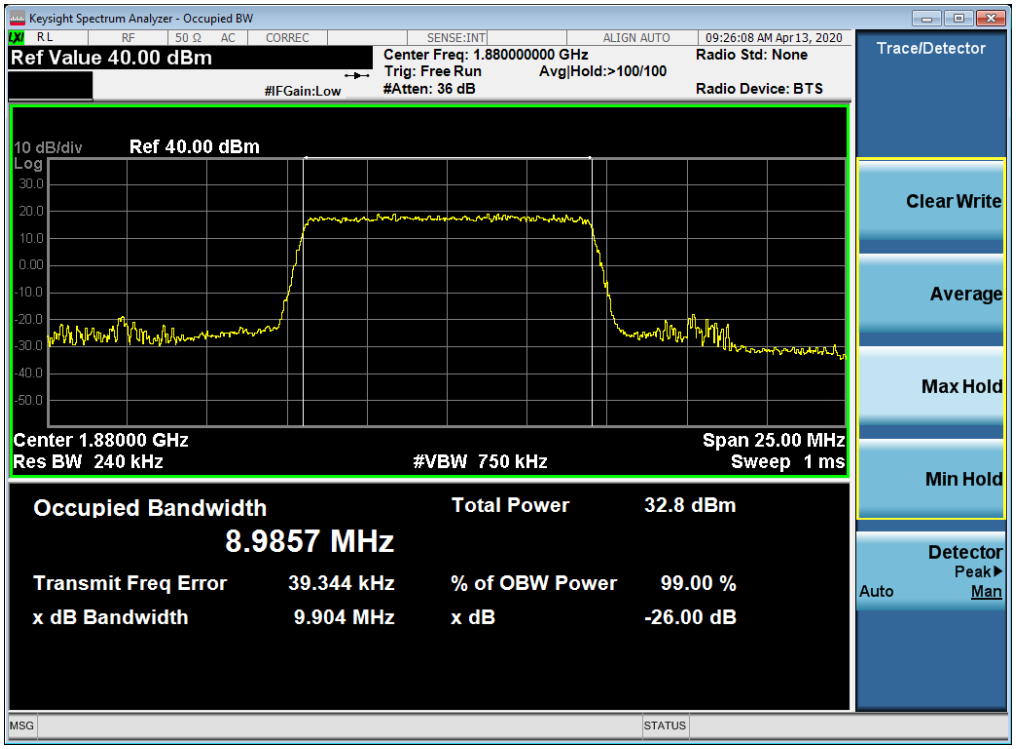
Plot 7-4. Occupied Bandwidth Plot (LTE Band 2 - 15MHz QPSK - Full RB Configuration)



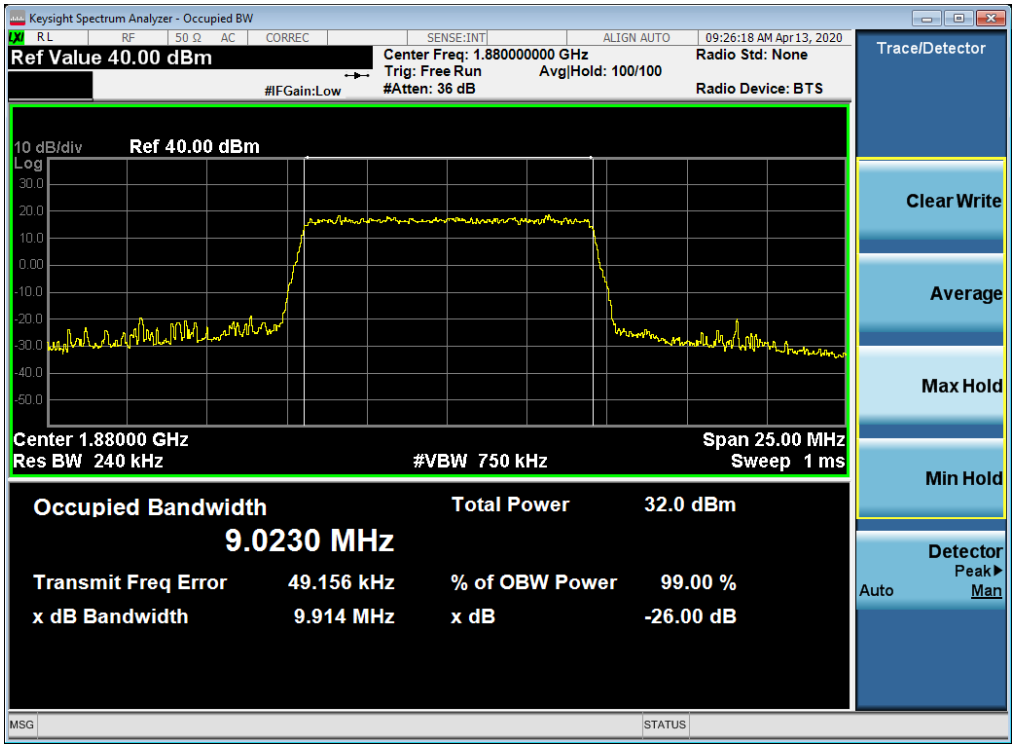
Plot 7-5. Occupied Bandwidth Plot (LTE Band 2 - 15MHz 16-QAM - Full RB Configuration)



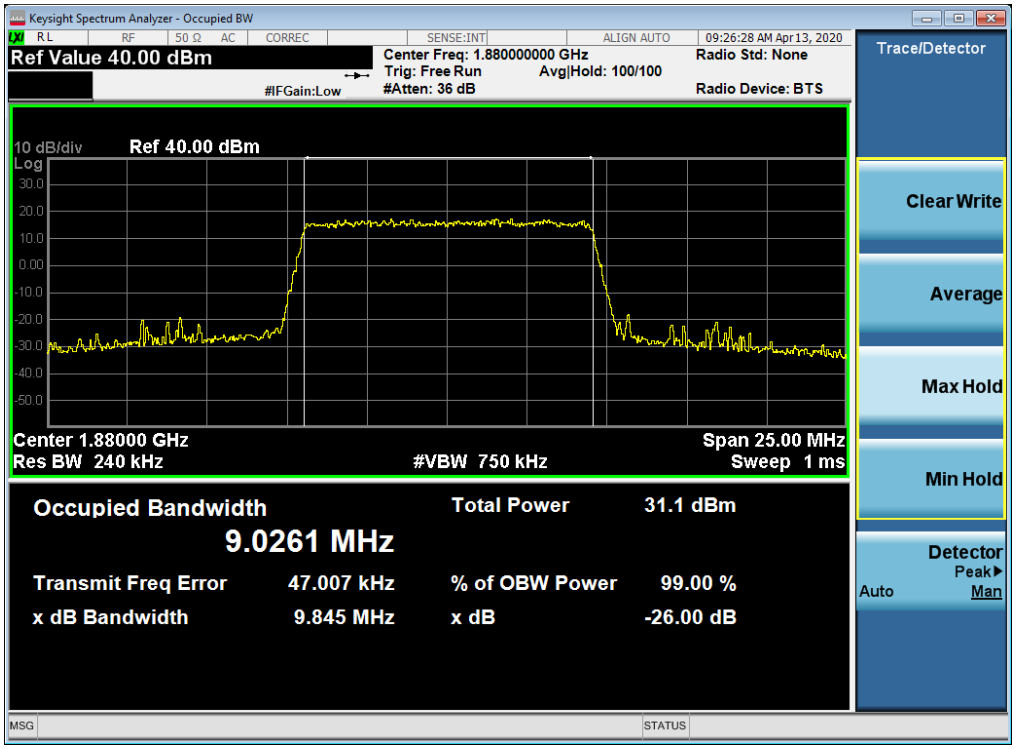
Plot 7-6. Occupied Bandwidth Plot (LTE Band 2 - 15MHz 64-QAM - Full RB Configuration)



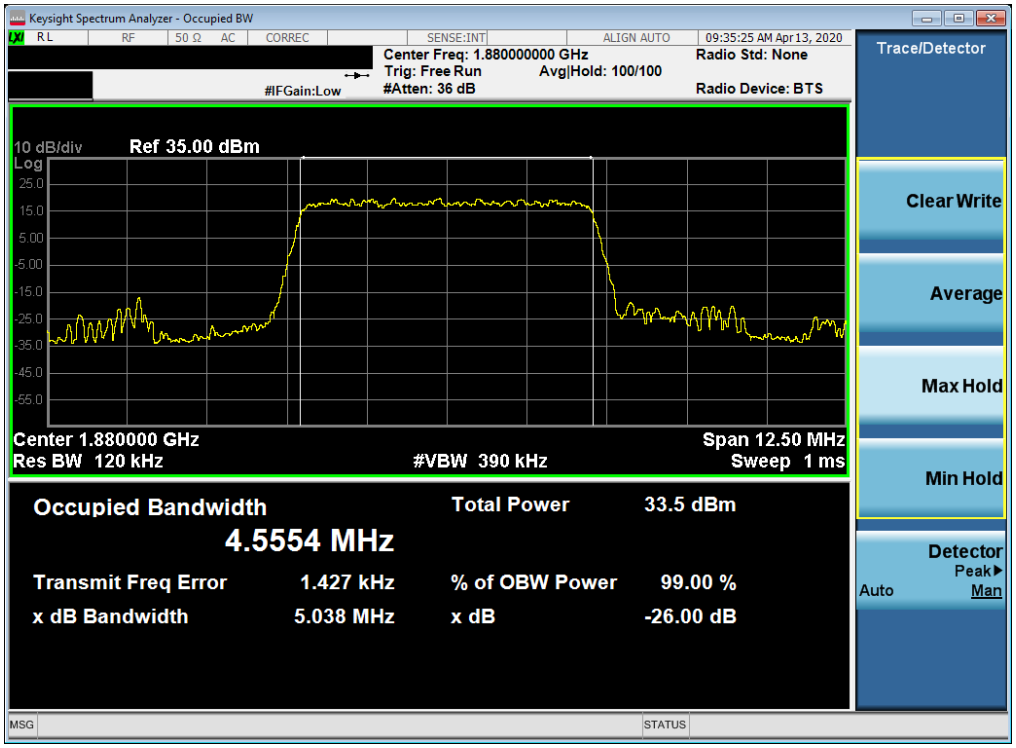
Plot 7-7. Occupied Bandwidth Plot (LTE Band 2 - 10MHz QPSK - Full RB Configuration)



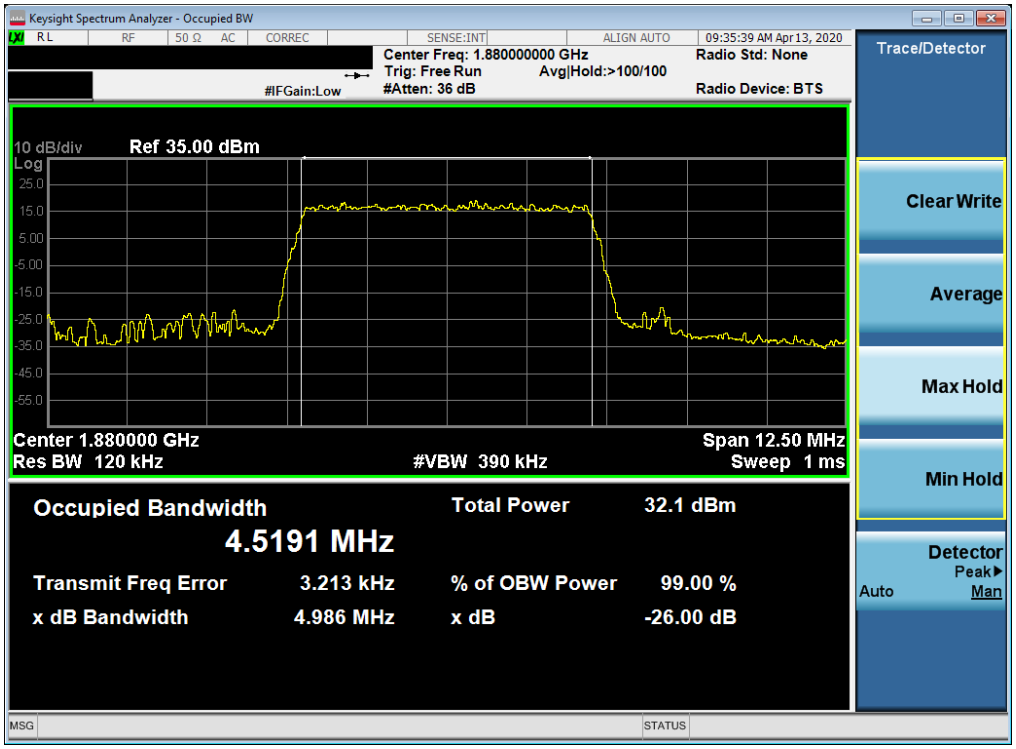
Plot 7-8. Occupied Bandwidth Plot (LTE Band 2 - 10MHz 16-QAM - Full RB Configuration)



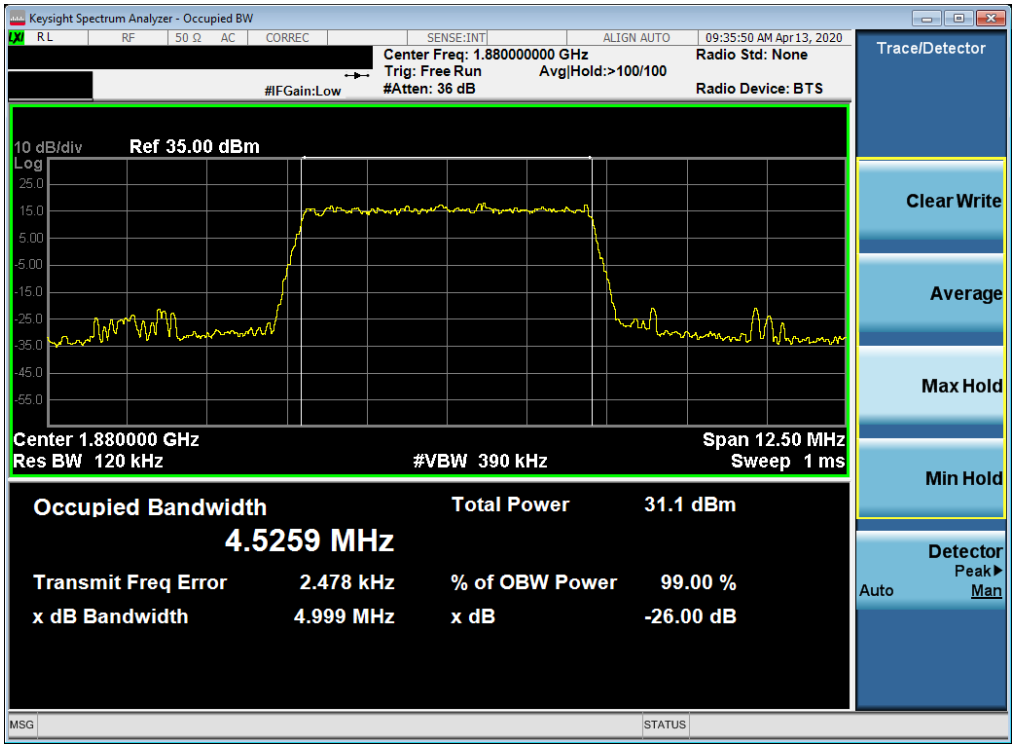
Plot 7-9. Occupied Bandwidth Plot (LTE Band 2 - 10MHz 64-QAM - Full RB Configuration)



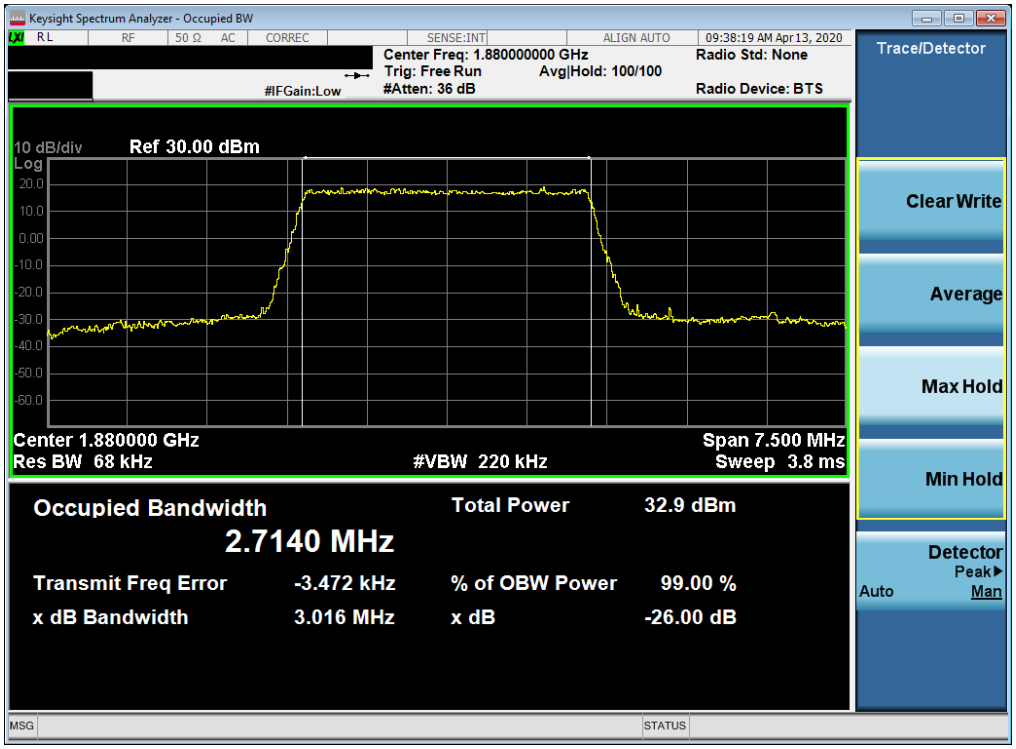
Plot 7-10. Occupied Bandwidth Plot (LTE Band 2 - 5MHz QPSK - Full RB Configuration)



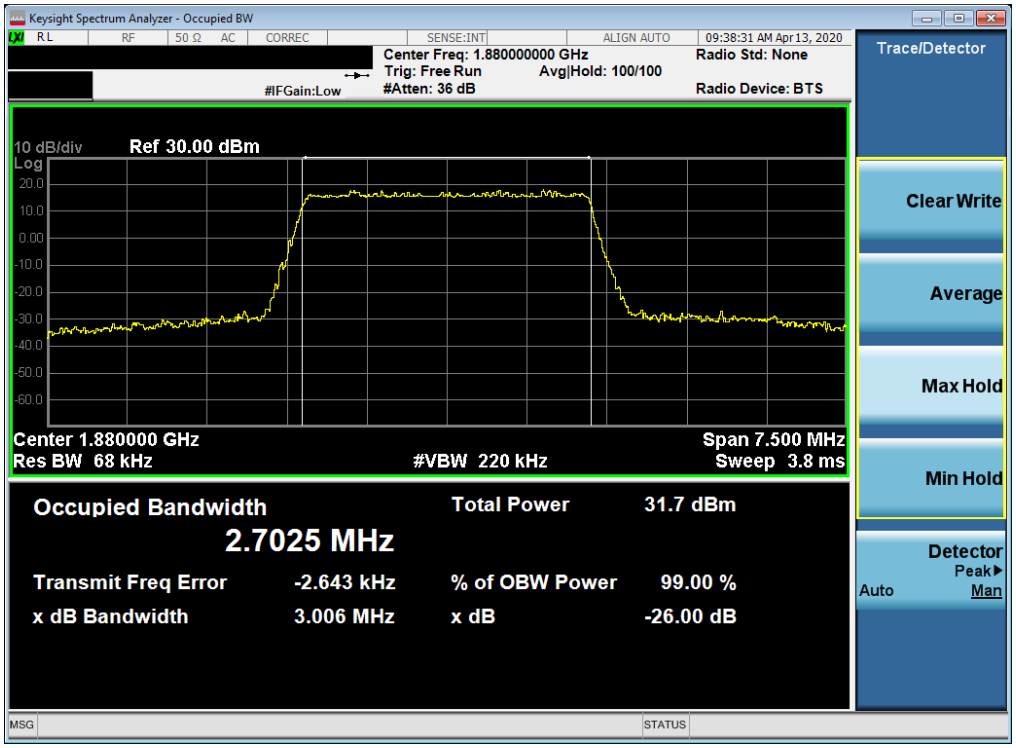
Plot 7-11. Occupied Bandwidth Plot (LTE Band 2 - 5MHz 16-QAM - Full RB Configuration)



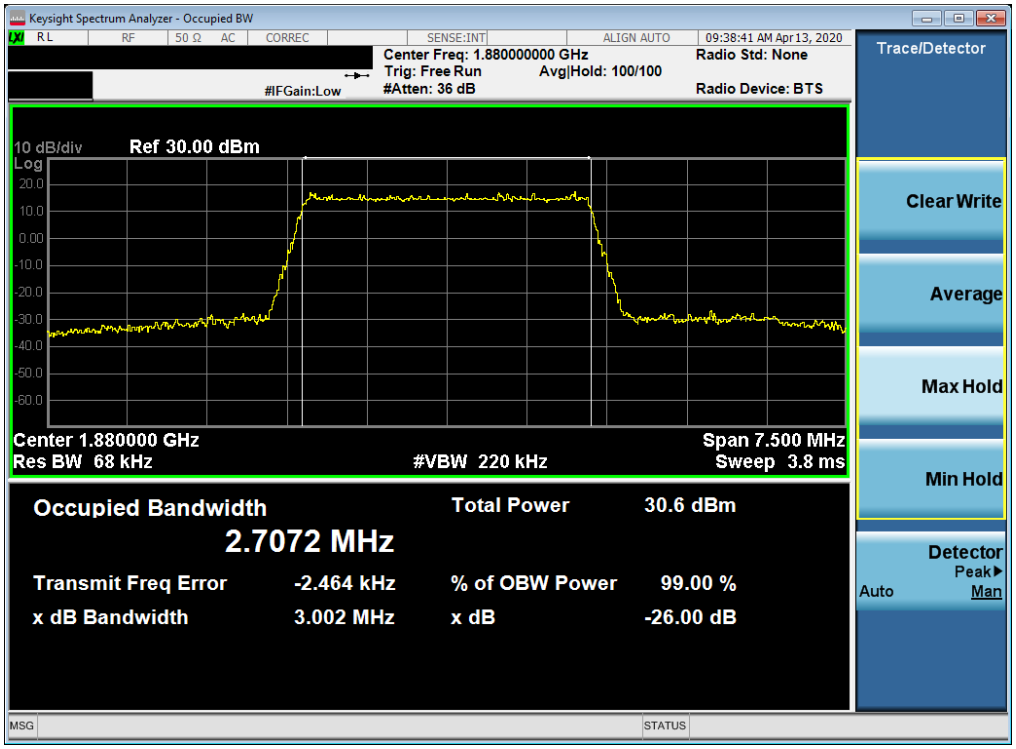
Plot 7-12. Occupied Bandwidth Plot (LTE Band 2 - 5MHz 64-QAM - Full RB Configuration)



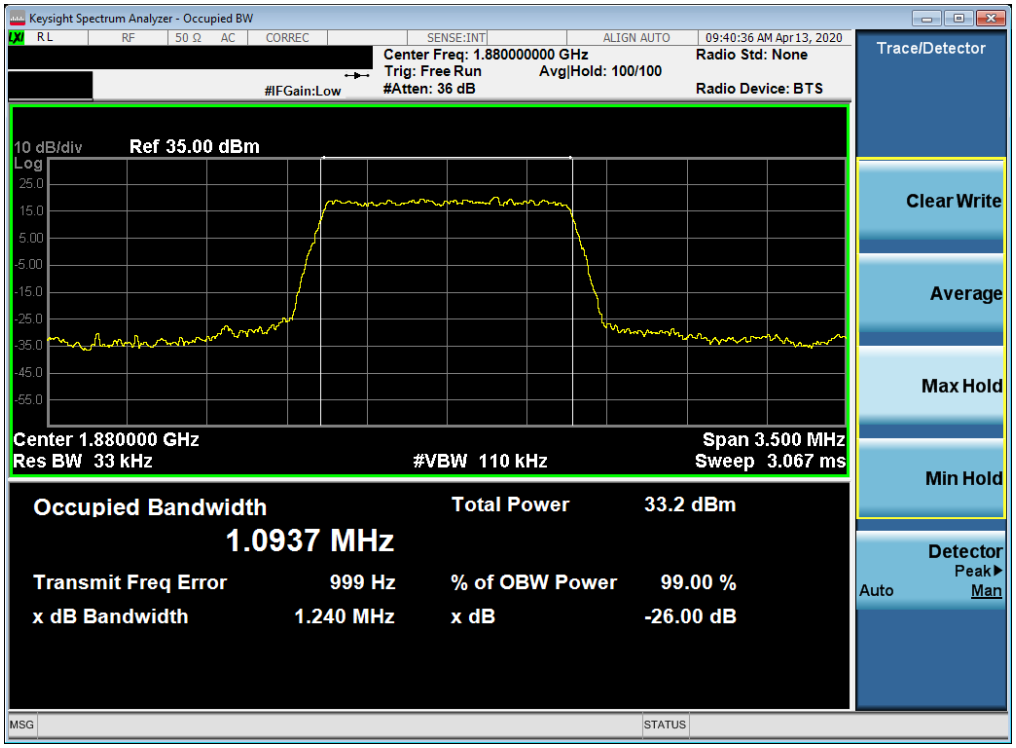
Plot 7-13. Occupied Bandwidth Plot (LTE Band 2 - 3MHz QPSK - Full RB Configuration)



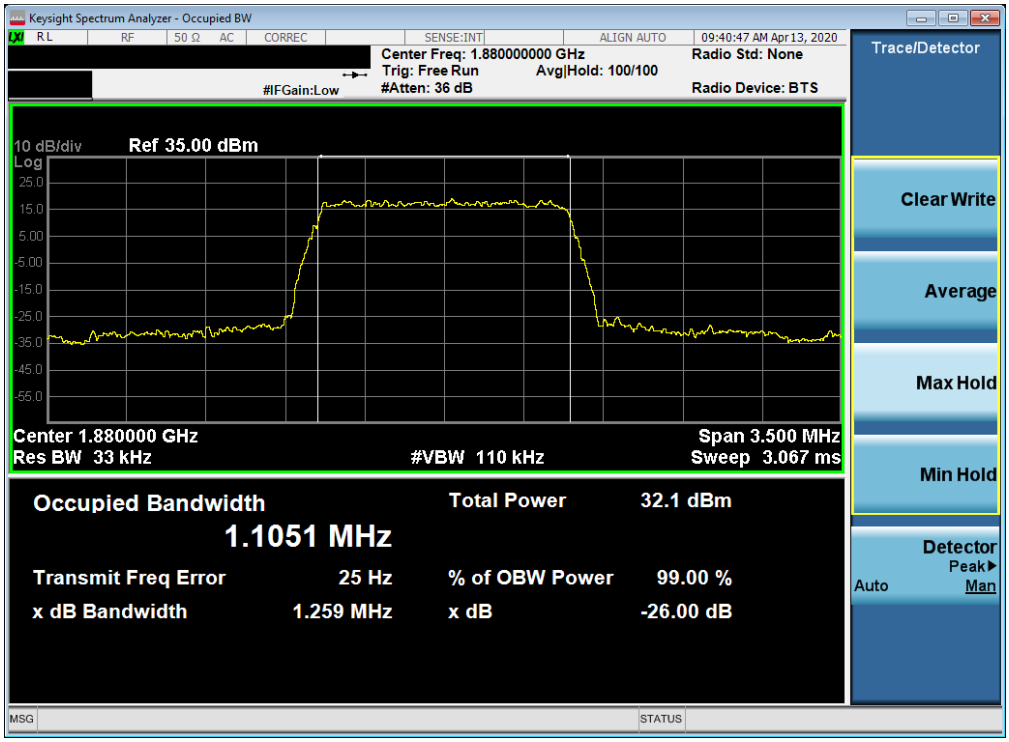
Plot 7-14. Occupied Bandwidth Plot (LTE Band 2 - 3MHz 16-QAM - Full RB Configuration)



Plot 7-15. Occupied Bandwidth Plot (LTE Band 2 - 3MHz 64-QAM - Full RB Configuration)

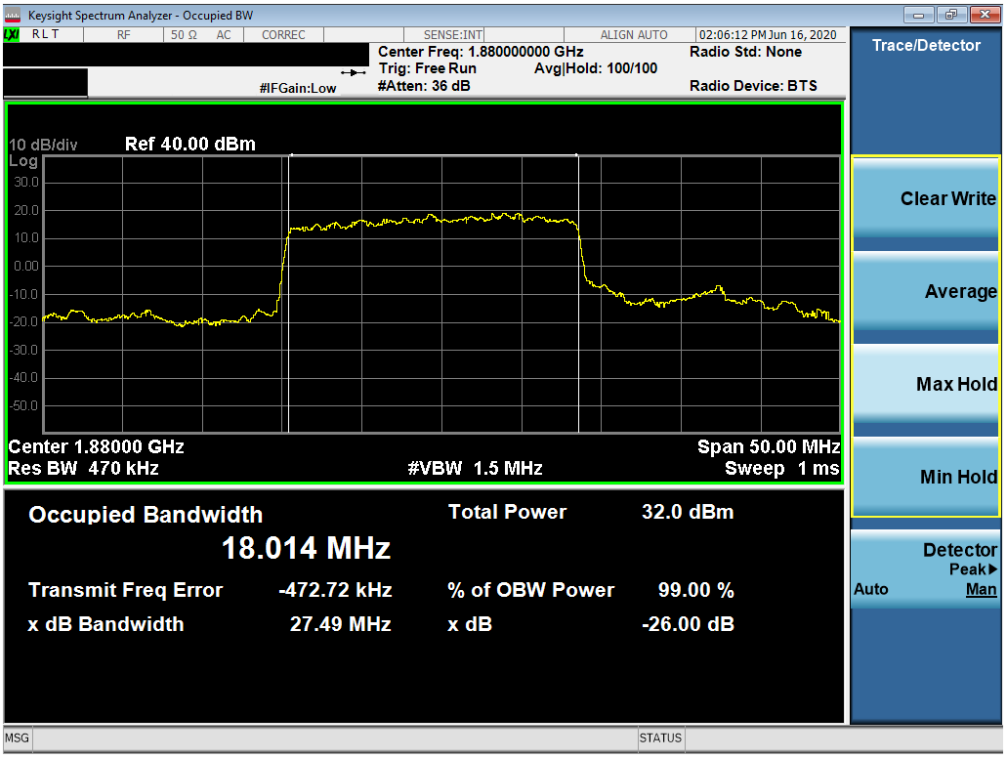


Plot 7-16. Occupied Bandwidth Plot (LTE Band 2 - 1.4MHz QPSK - Full RB Configuration)

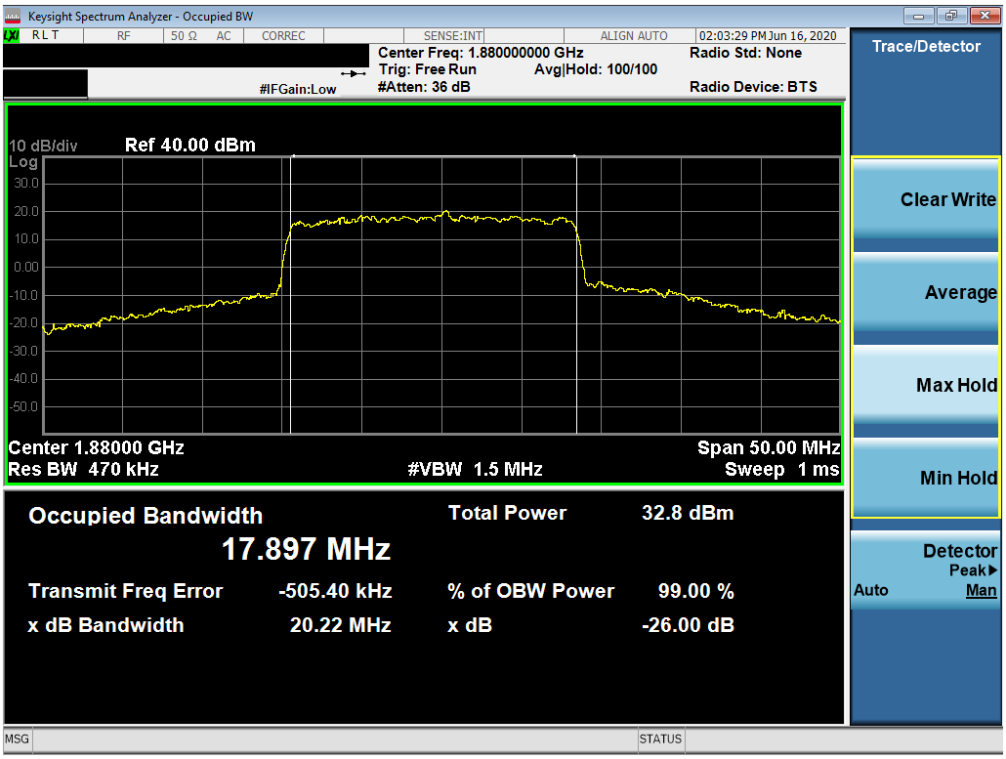


Plot 7-17. Occupied Bandwidth Plot (LTE Band 2 - 1.4MHz 16-QAM - Full RB Configuration)

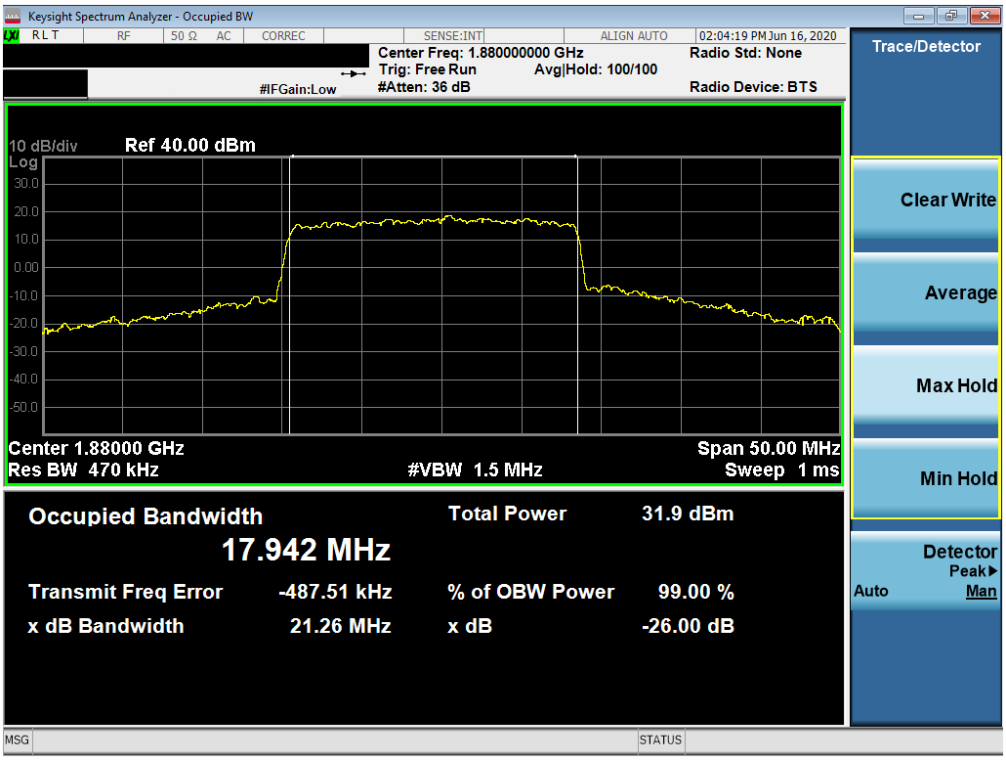
Plot 7-18. Occupied Bandwidth Plot (LTE Band 2 - 1.4MHz 64-QAM - Full RB Configuration)



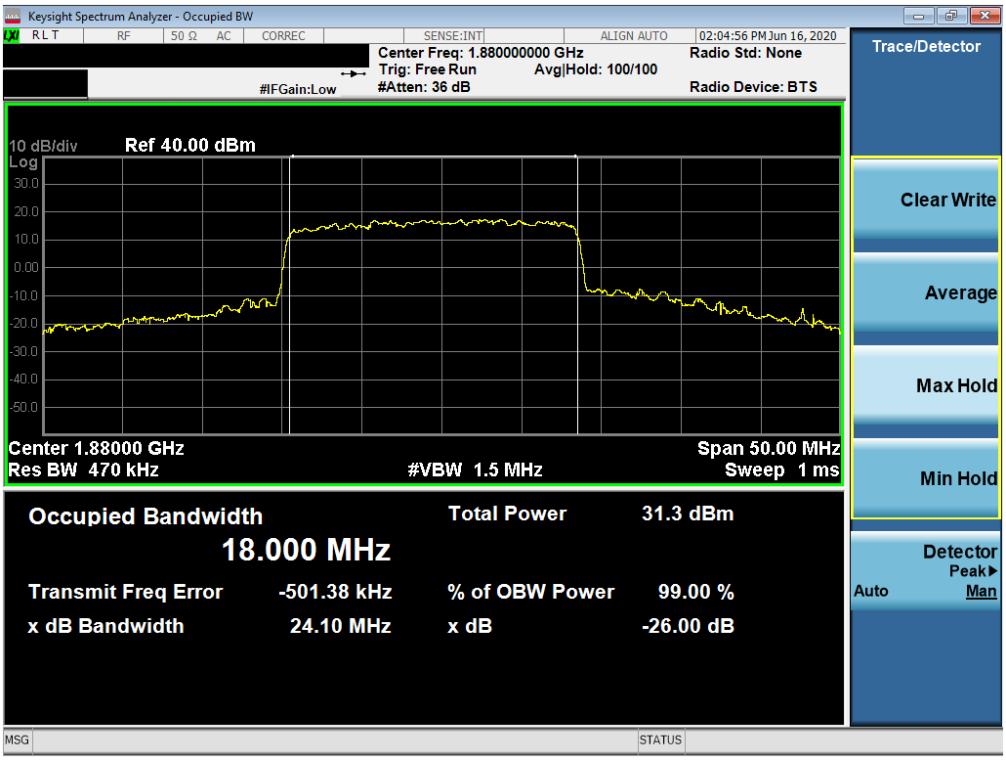
Plot 7-19. Occupied Bandwidth Plot (NR Band n2 - 20.0MHz DFT-s-OFDM BPSK - Full RB)



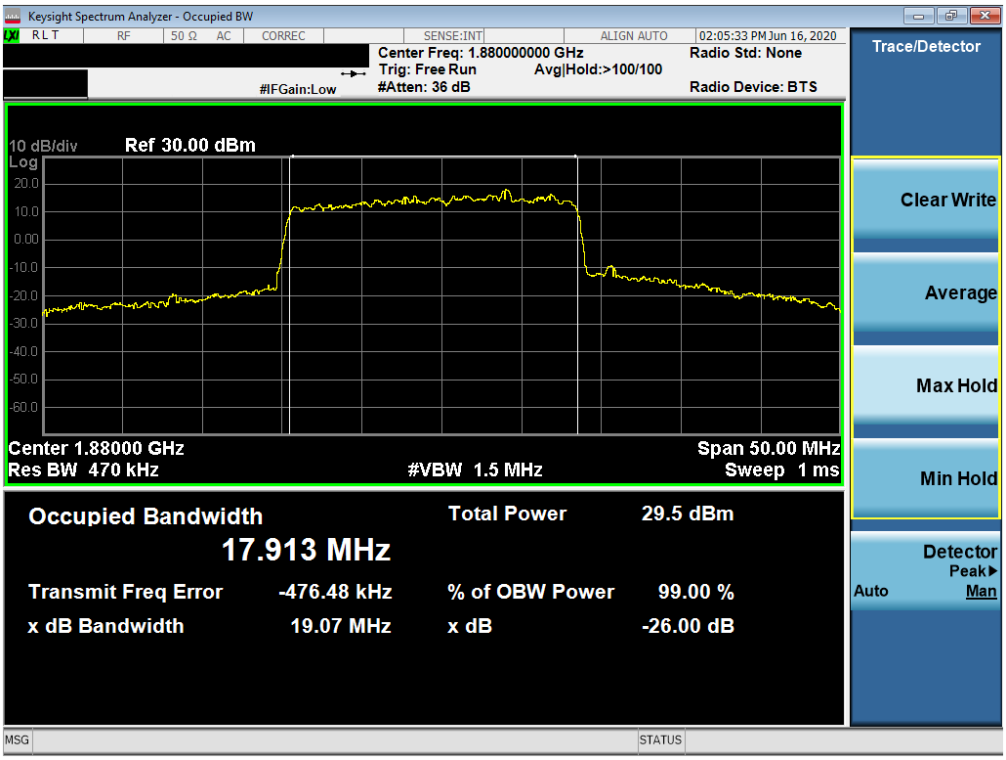
Plot 7-20. Occupied Bandwidth Plot (NR Band n2 - 20.0MHz CP-OFDM QPSK - Full RB)



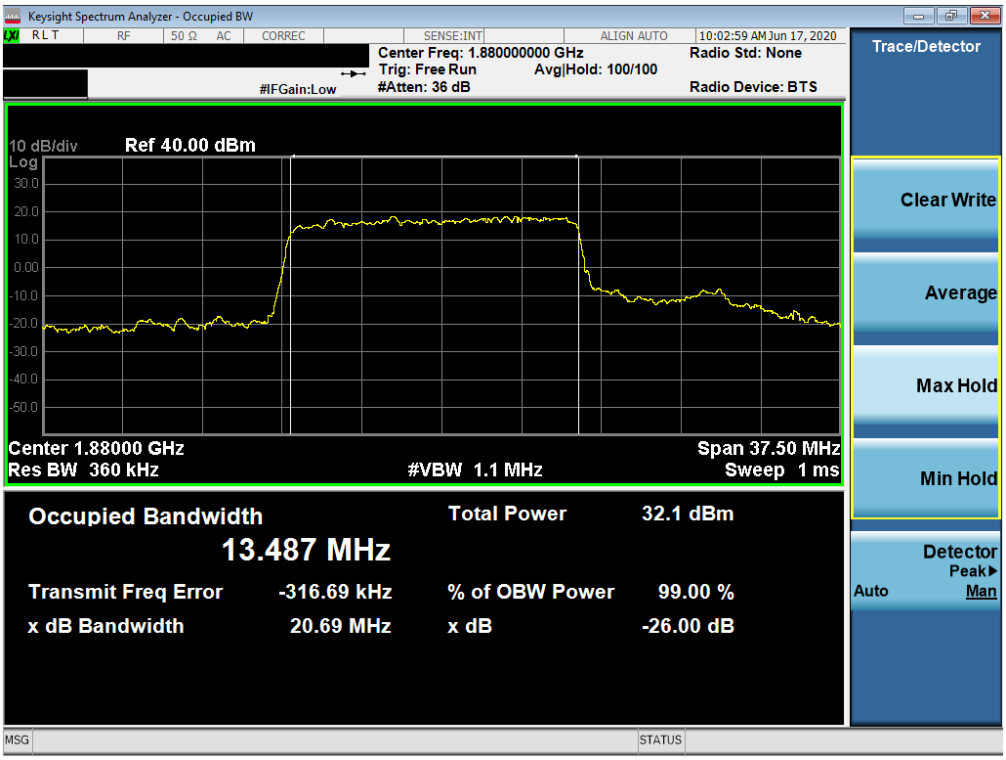
Plot 7-21. Occupied Bandwidth Plot (NR Band n2 - 20.0MHz CP-OFDM 16QAM - Full RB)



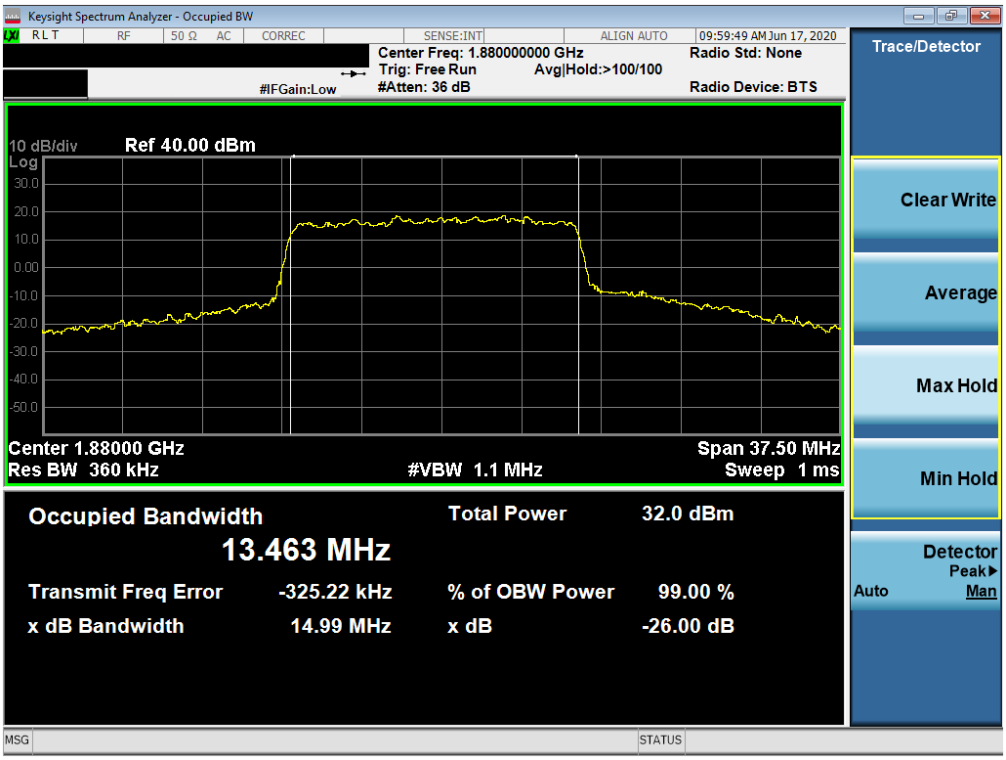
Plot 7-22. Occupied Bandwidth Plot (NR Band n2 - 20.0MHz CP-OFDM 64QAM - Full RB)



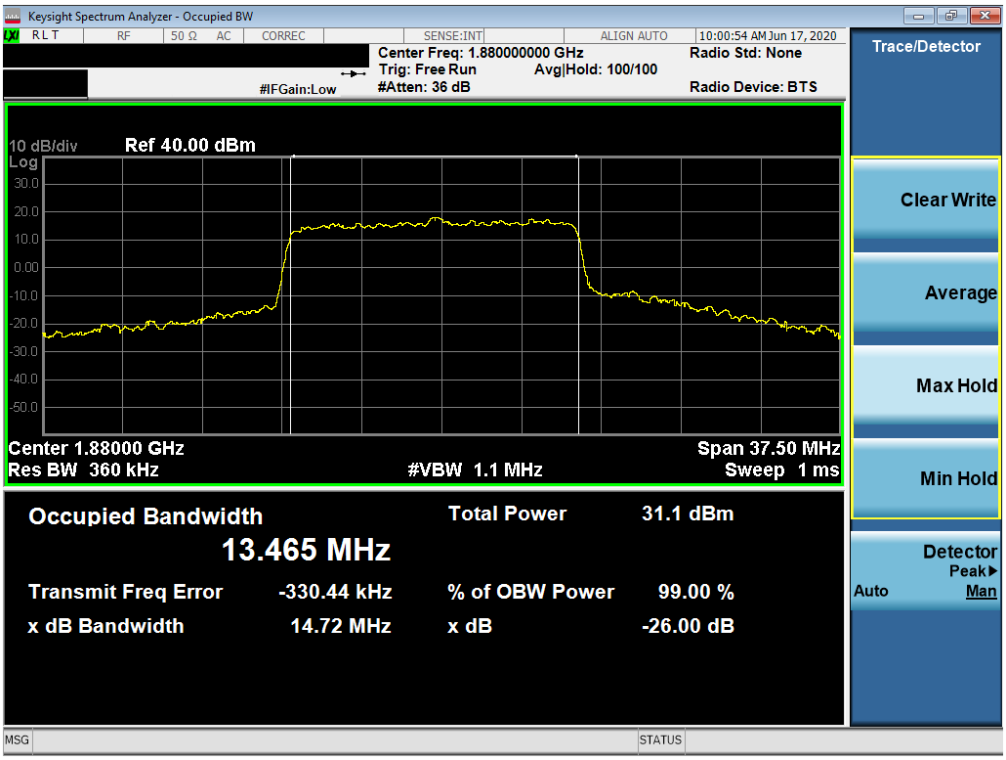
Plot 7-23. Occupied Bandwidth Plot (NR Band n2 - 20.0MHz CP-OFDM 256QAM - Full RB)



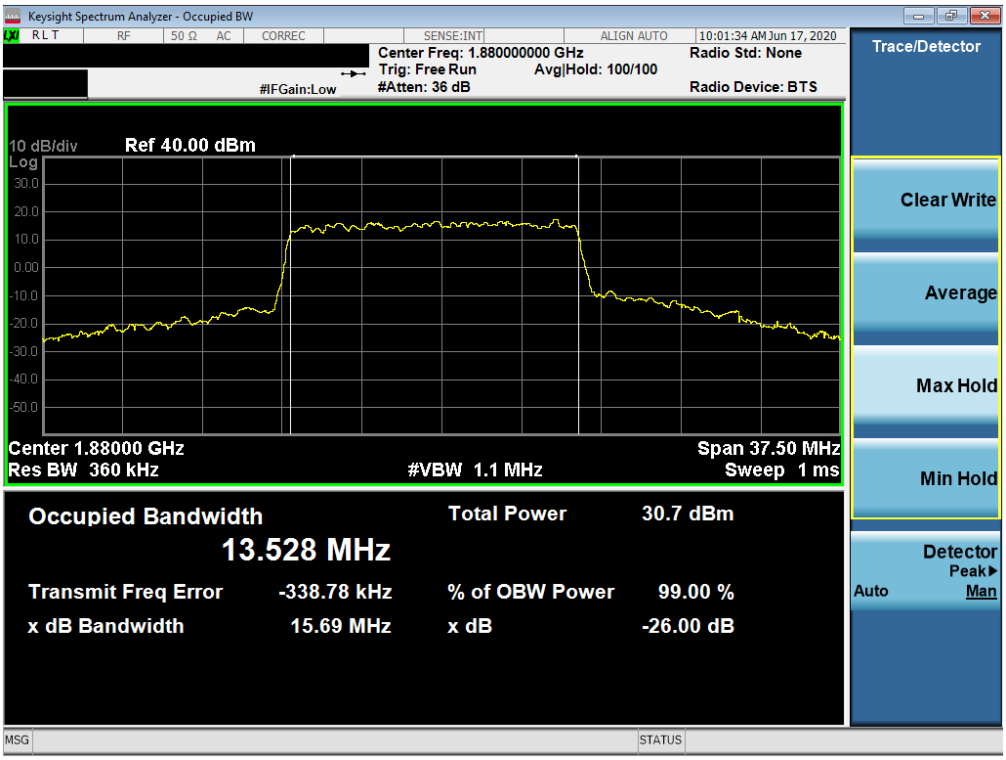
Plot 7-24. Occupied Bandwidth Plot (NR Band n2 - 15.0MHz DFT-s-OFDM BPSK - Full RB)



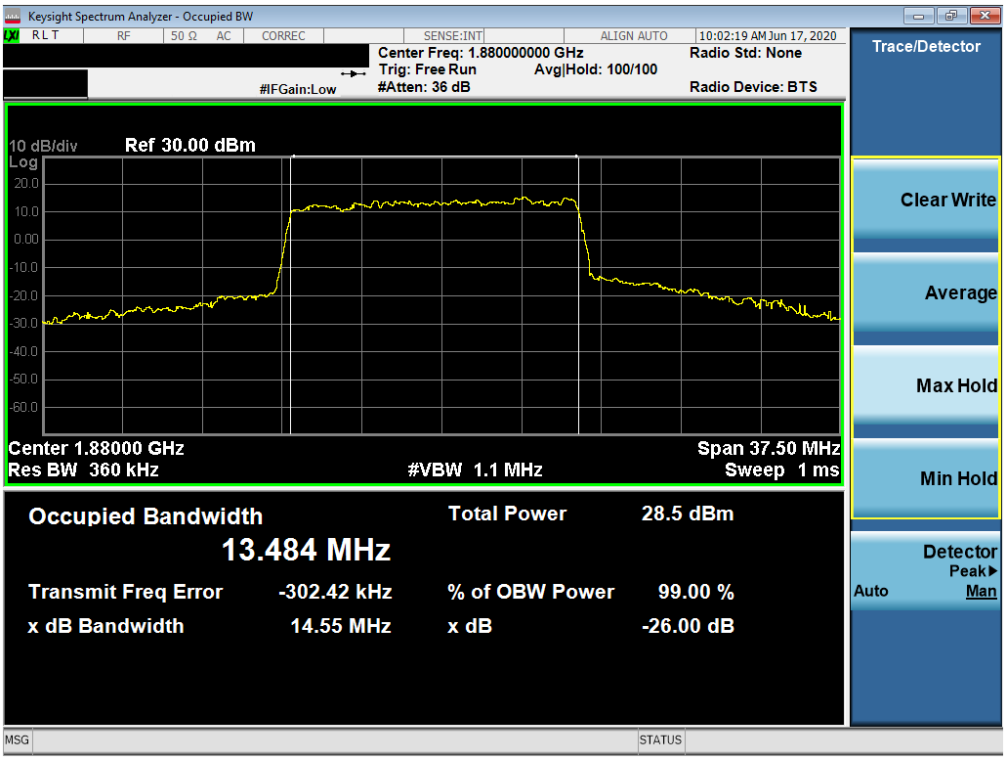
Plot 7-25. Occupied Bandwidth Plot (NR Band n2 - 15.0MHz CP-OFDM QPSK - Full RB)



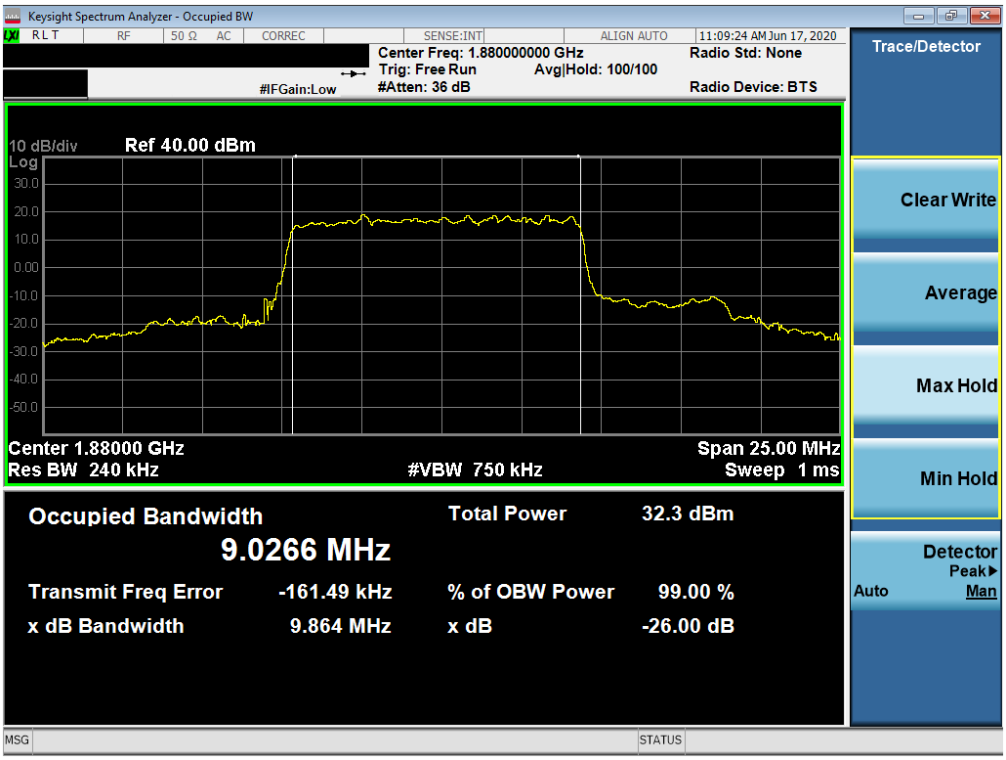
Plot 7-26. Occupied Bandwidth Plot (NR Band n2 - 15.0MHz CP-OFDM 16QAM - Full RB)



Plot 7-27. Occupied Bandwidth Plot (NR Band n2 - 15.0MHz CP-OFDM 64QAM - Full RB)

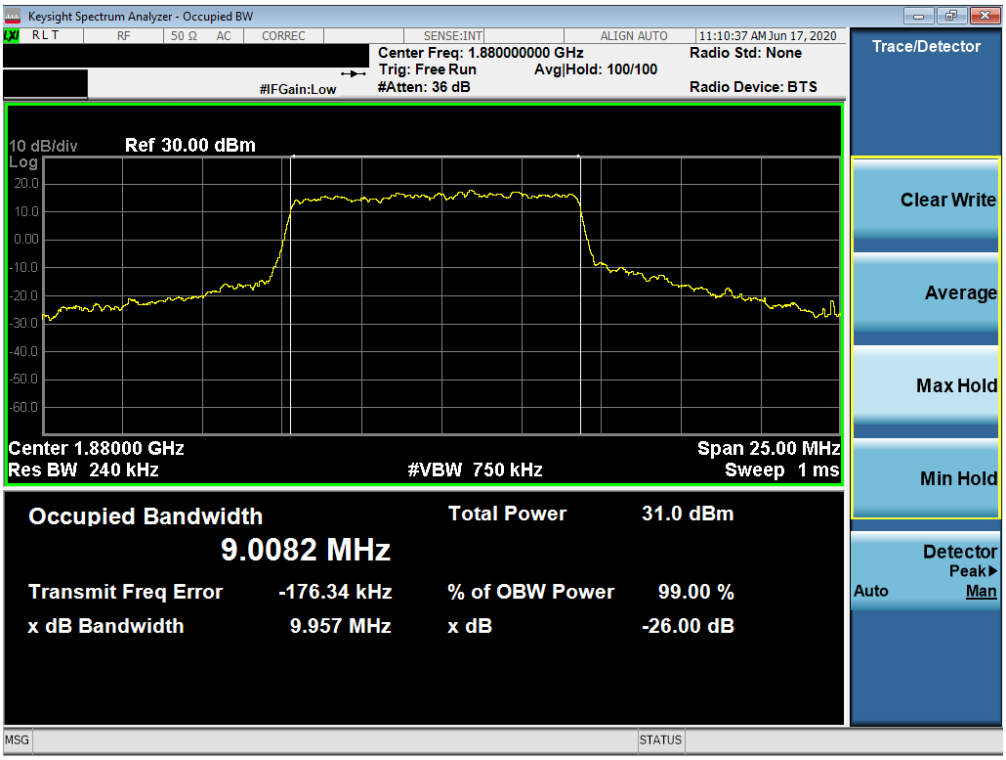


Plot 7-28. Occupied Bandwidth Plot (NR Band n2 - 15.0MHz CP-OFDM 256QAM - Full RB)

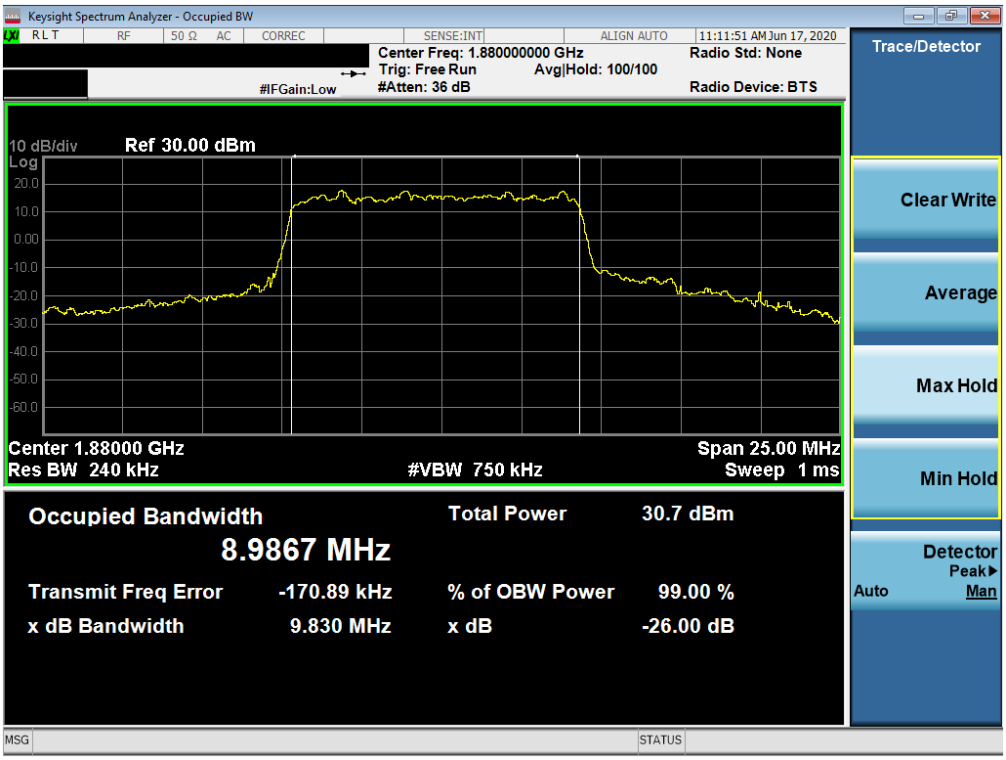


Plot 7-29. Occupied Bandwidth Plot (NR Band n2 - 10.0MHz DFT-s-OFDM BPSK - Full RB)

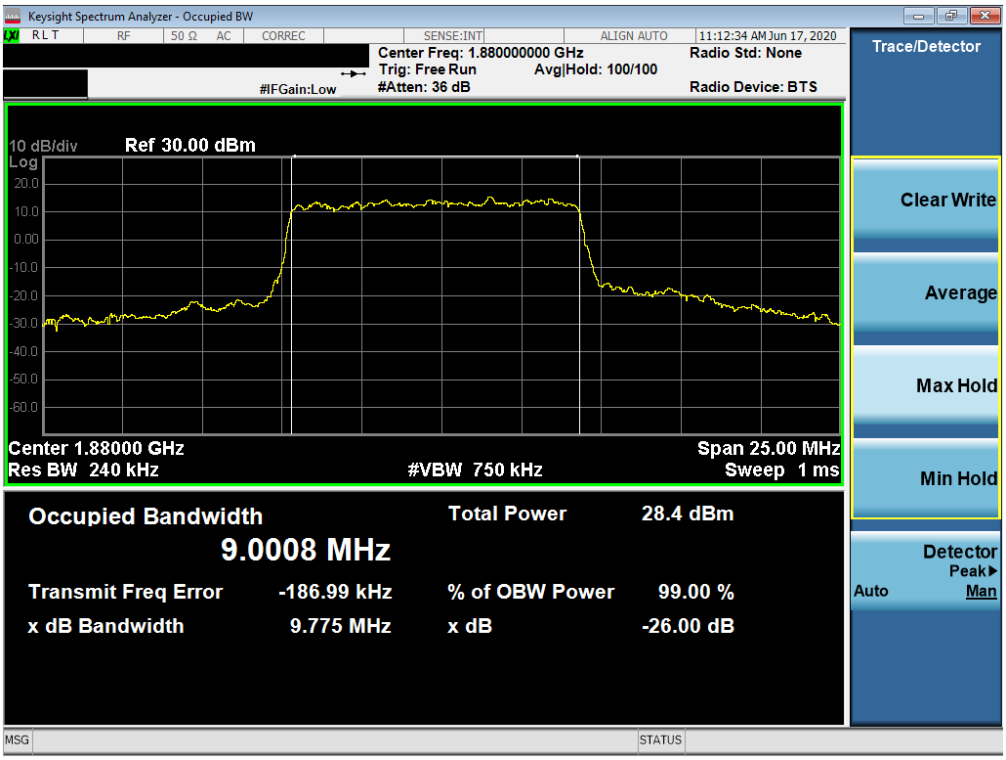
Plot 7-30. Occupied Bandwidth Plot (NR Band n2 - 10.0MHz CP-OFDM QPSK - Full RB)



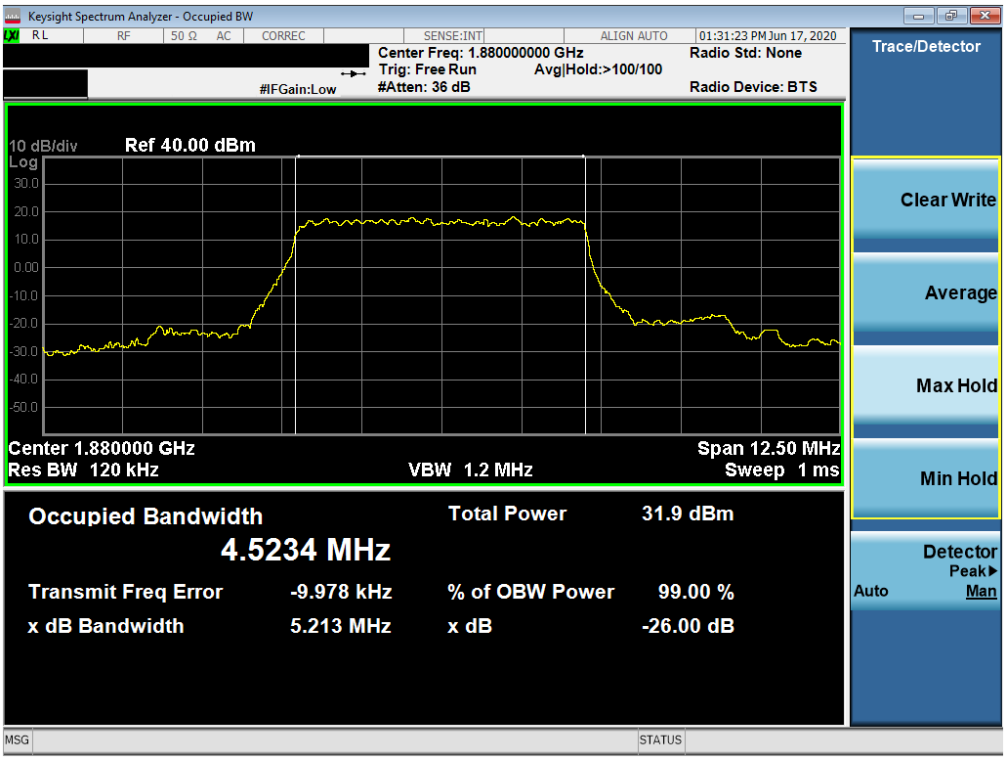
Plot 7-31. Occupied Bandwidth Plot (NR Band n2 - 10.0MHz CP-OFDM 16QAM - Full RB)



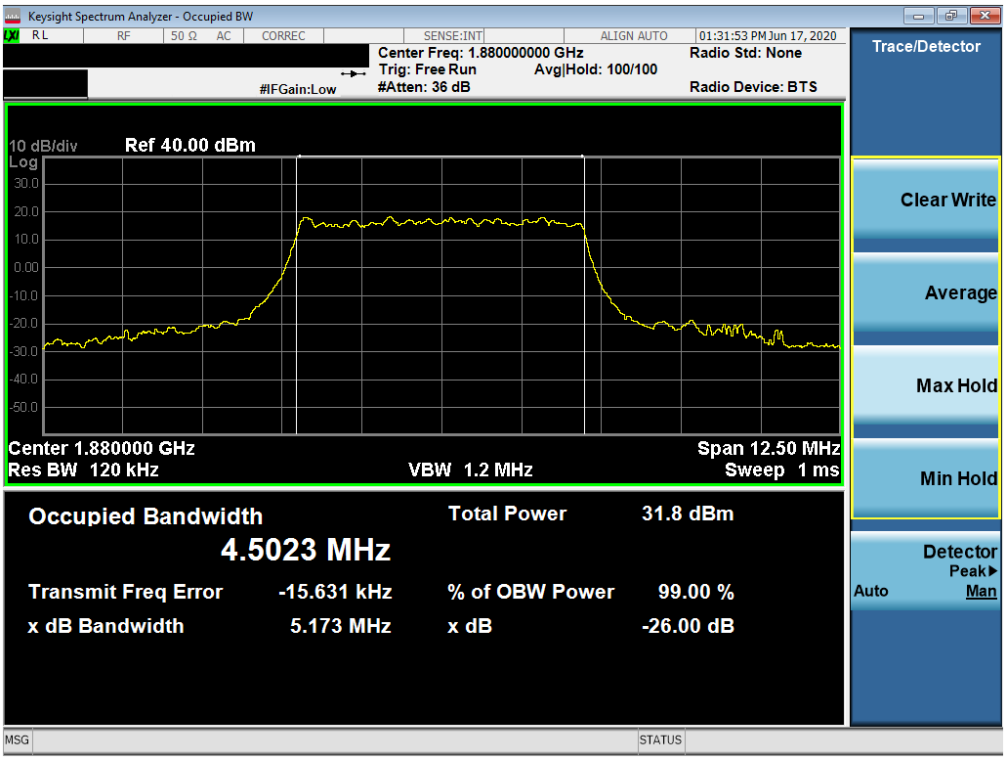
Plot 7-32. Occupied Bandwidth Plot (NR Band n2 - 10.0MHz CP-OFDM 64QAM - Full RB)



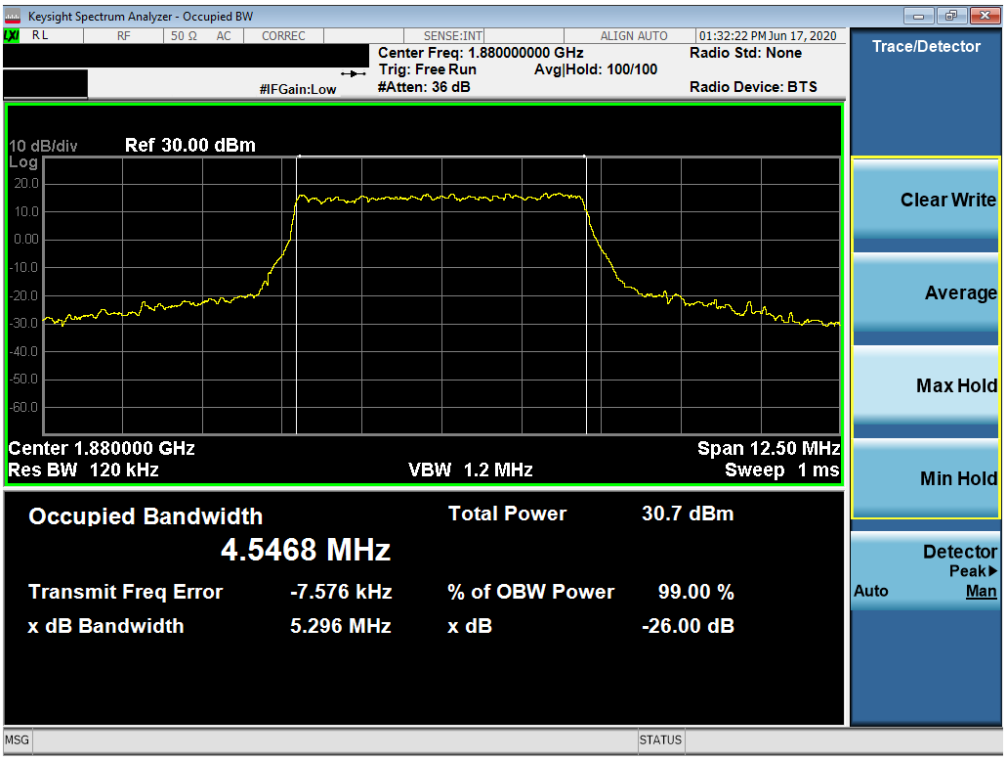
Plot 7-33. Occupied Bandwidth Plot (NR Band n2 - 10.0MHz CP-OFDM 256QAM - Full RB)



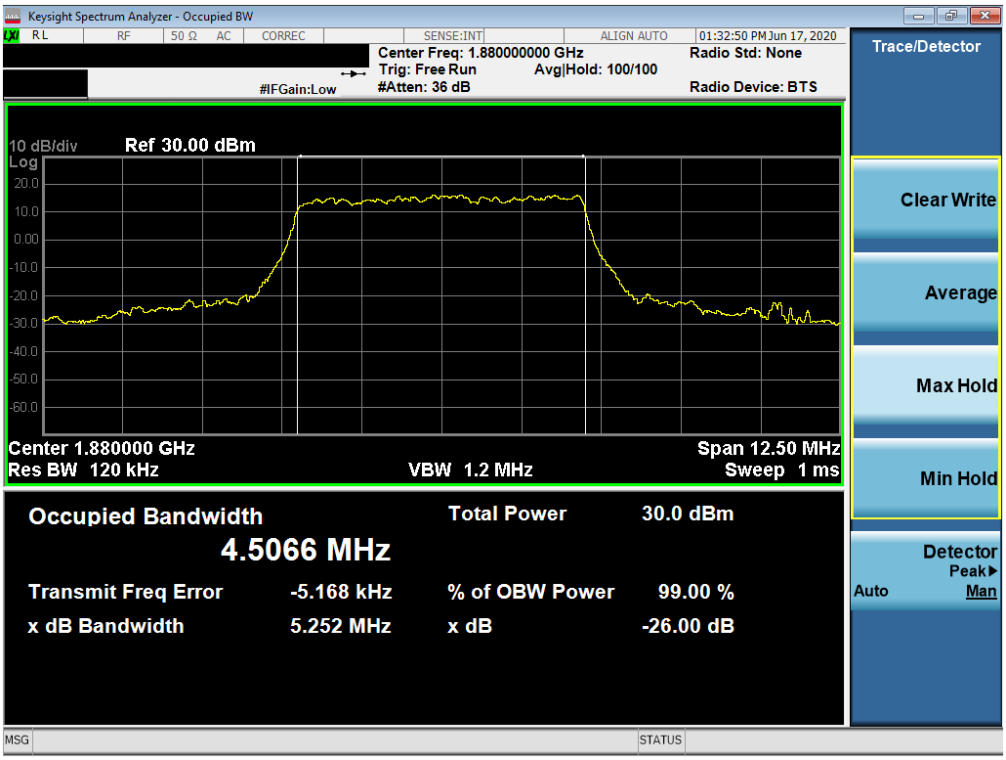
Plot 7-34. Occupied Bandwidth Plot (NR Band n2 - 5.0MHz DFT-s-OFDM BPSK - Full RB)



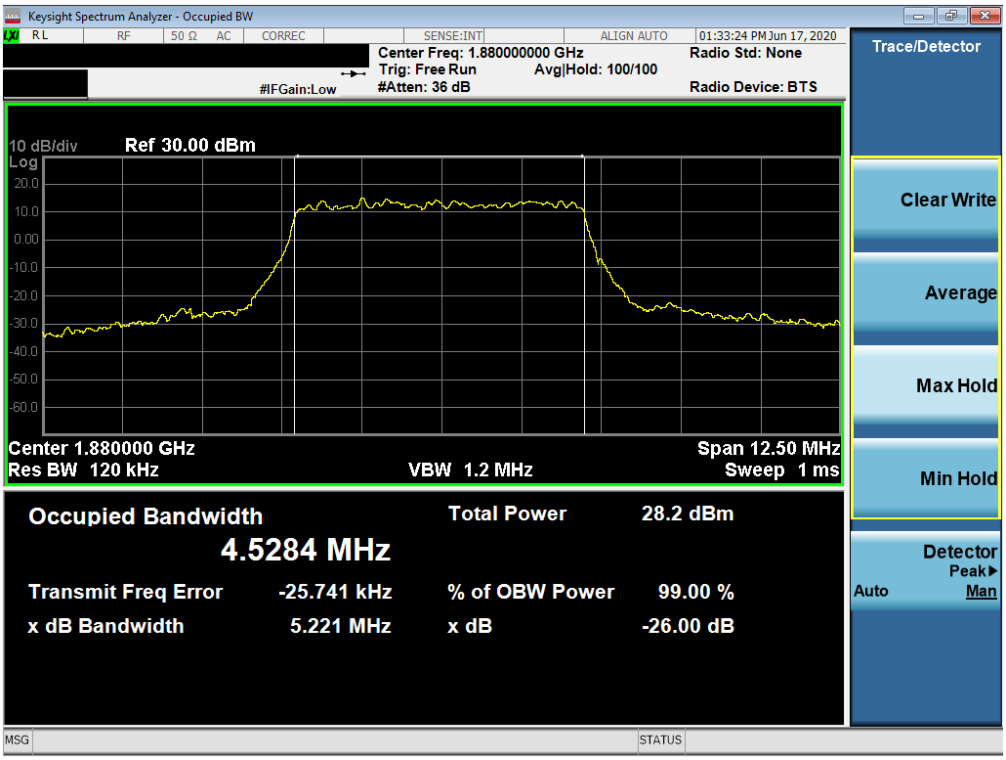
Plot 7-35. Occupied Bandwidth Plot (NR Band n2 - 5.0MHz CP-OFDM QPSK - Full RB)



Plot 7-36. Occupied Bandwidth Plot (NR Band n2 - 5.0MHz CP-OFDM 16QAM - Full RB)

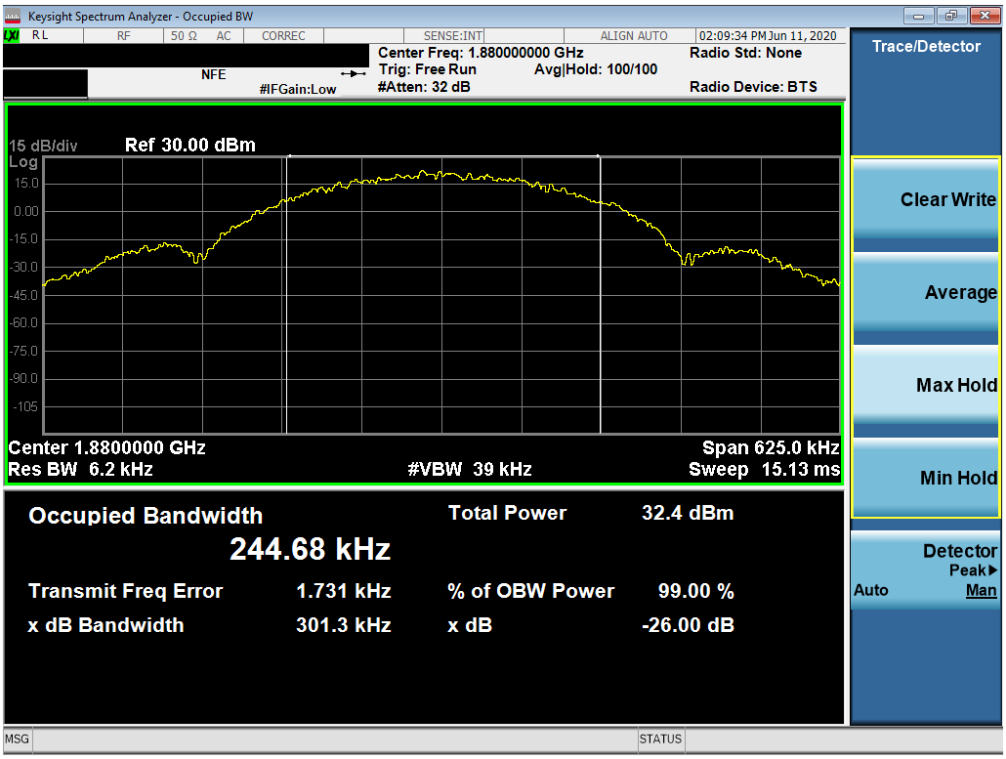


Plot 7-37. Occupied Bandwidth Plot (NR Band n2 - 5.0MHz CP-OFDM 64QAM - Full RB)



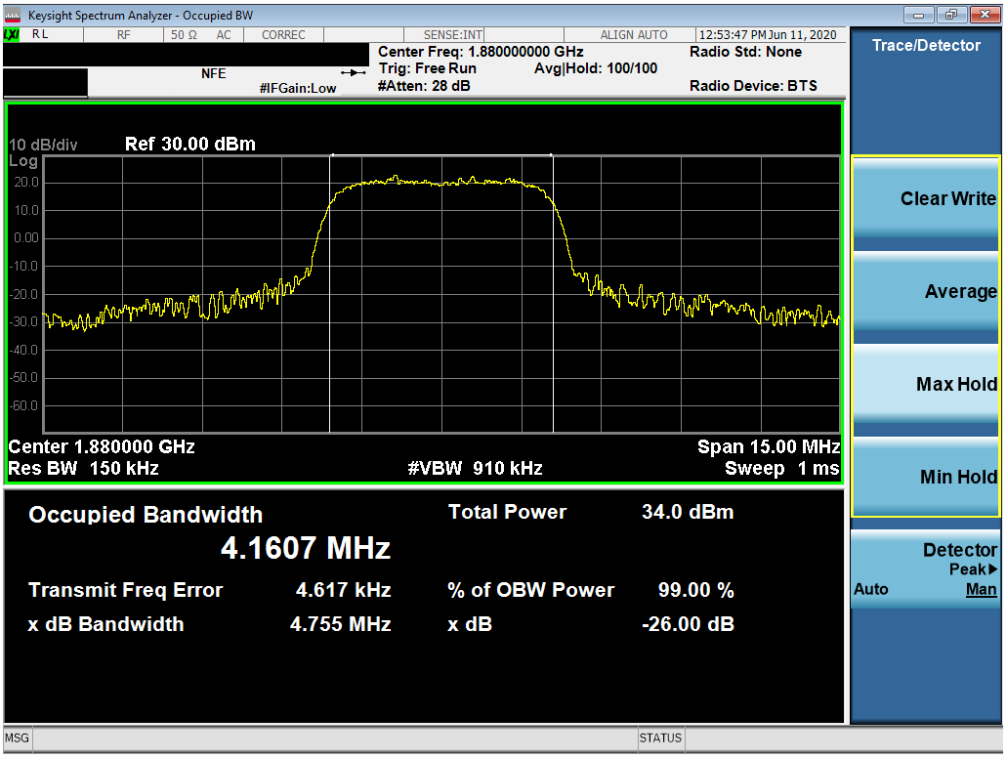
Plot 7-38. Occupied Bandwidth Plot (NR Band n2 - 5.0MHz CP-OFDM 256QAM - Full RB)

Plot 7-39. Occupied Bandwidth Plot (GPRS, Ch. 661)

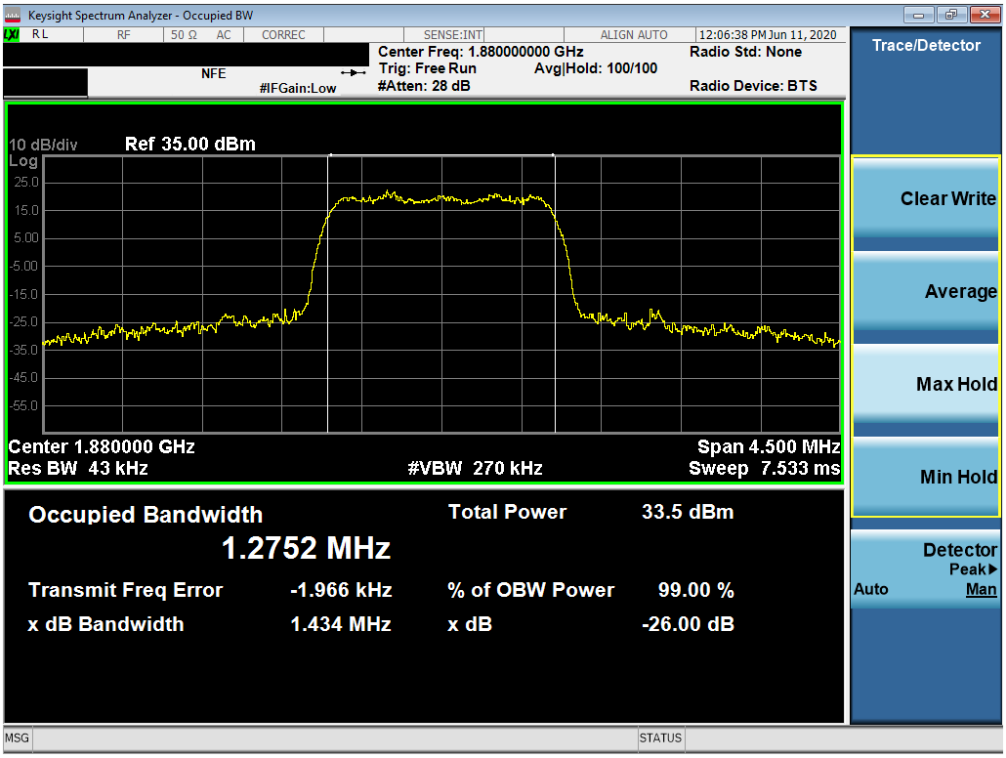


Plot 7-40. Occupied Bandwidth Plot (EDGE, Ch. 661)

WCDMA PCS



Plot 7-41. Occupied Bandwidth Plot (WCDMA, Ch. 9400)



Plot 7-42. Occupied Bandwidth Plot (CDMA, Ch. 600)

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 20GHz (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.

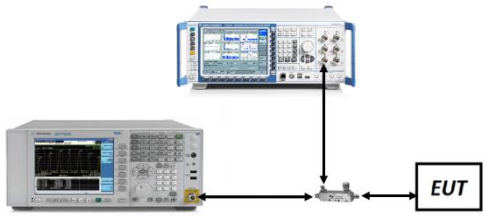


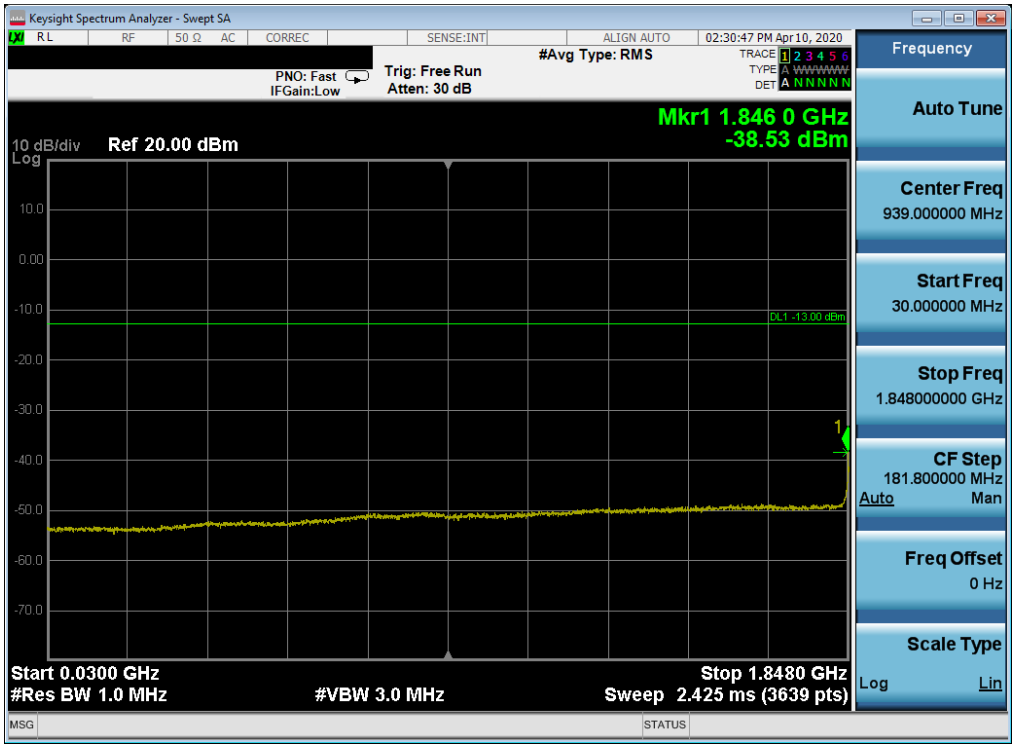
Figure 7-2. Test Instrument & Measurement Setup

Test Notes

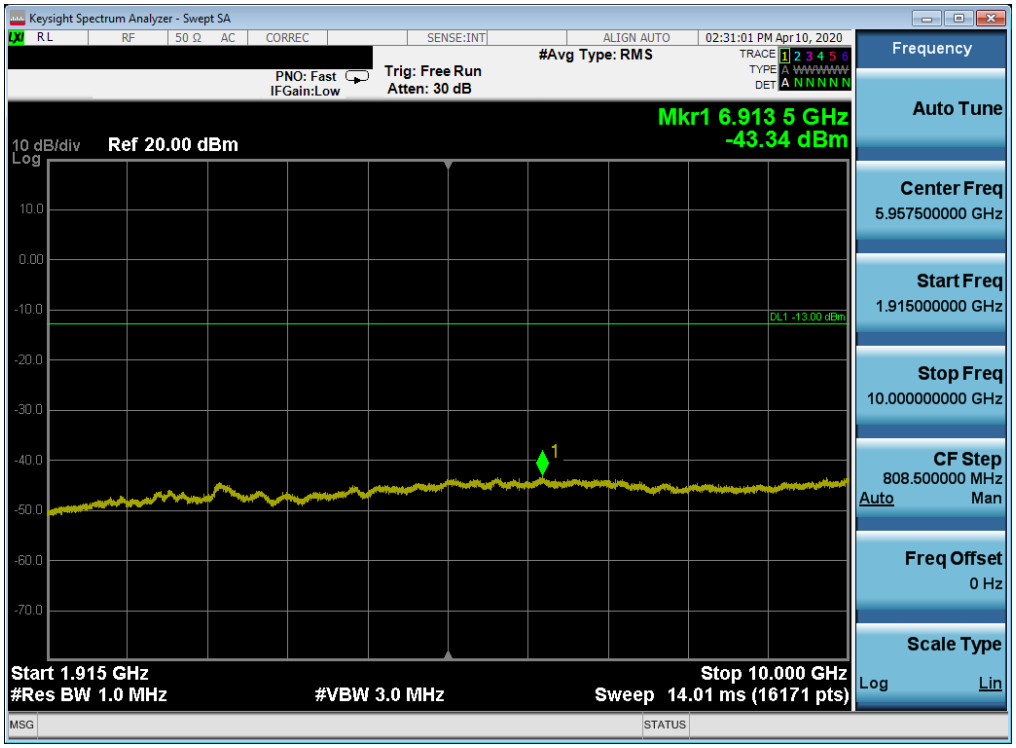
1. Per Part 24 and RSS-133, compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth 100 kHz or greater for measurements below 1GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth 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.

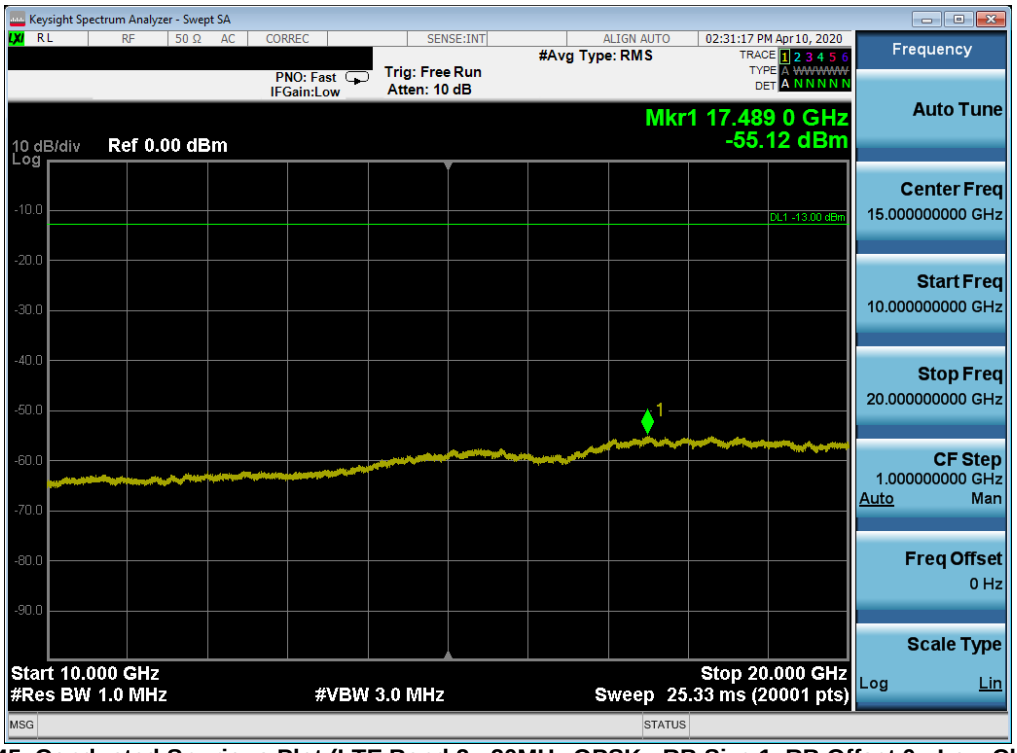
LTE Band 2



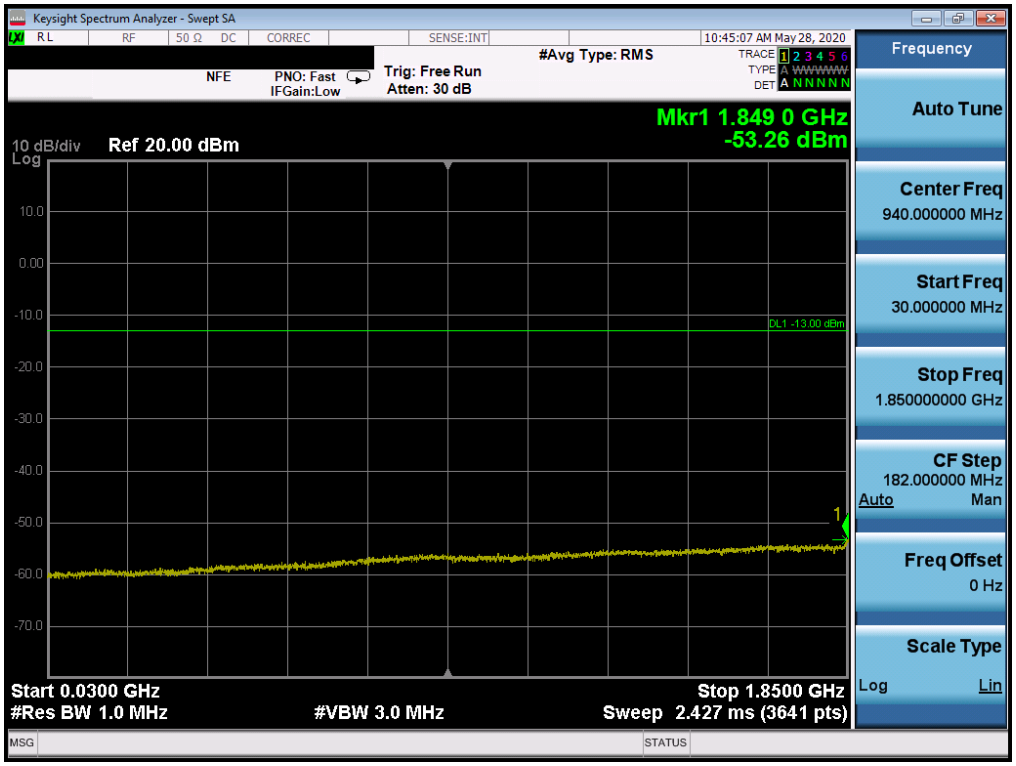
Plot 7-43. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



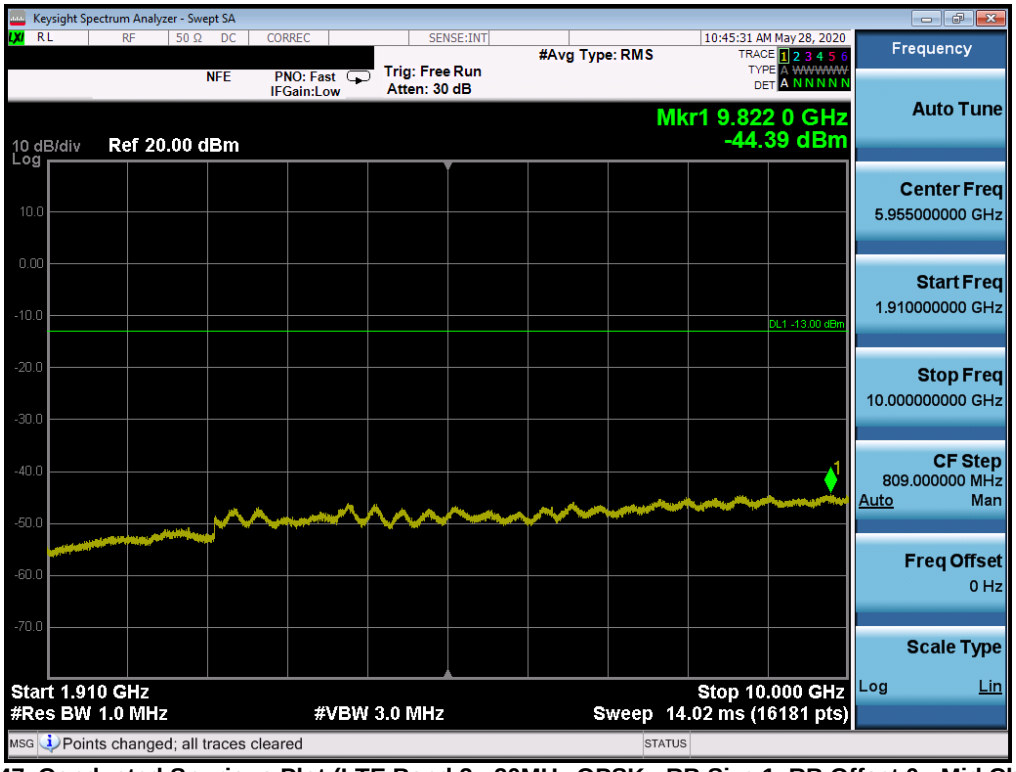
Plot 7-44. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



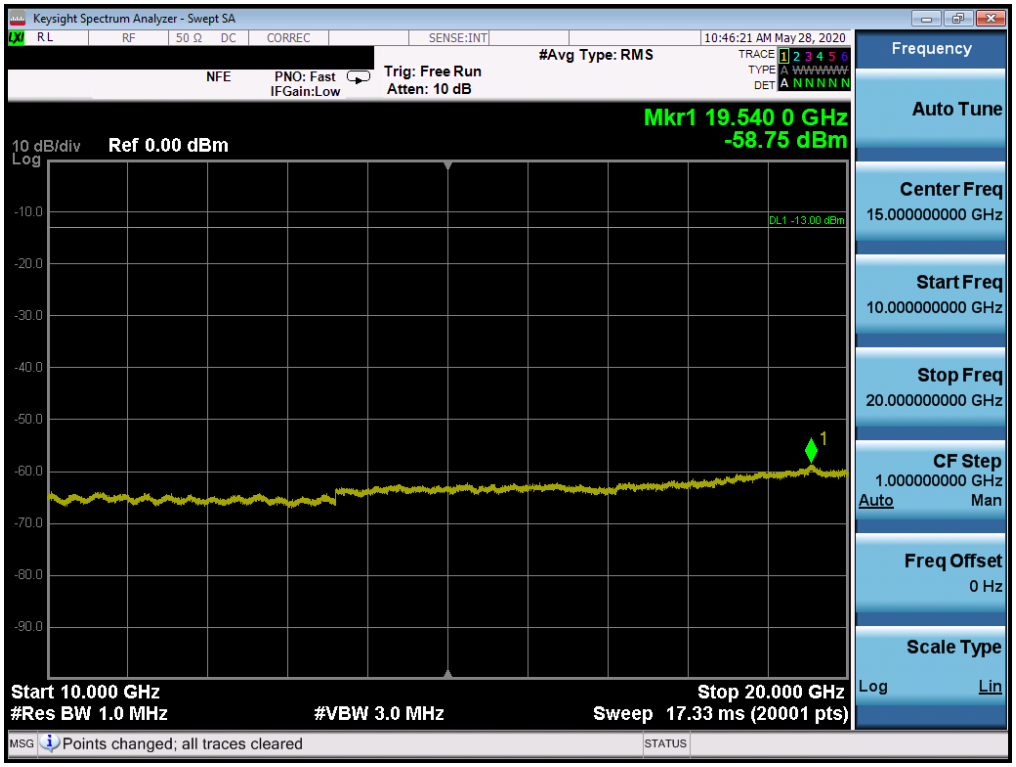
Plot 7-45. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



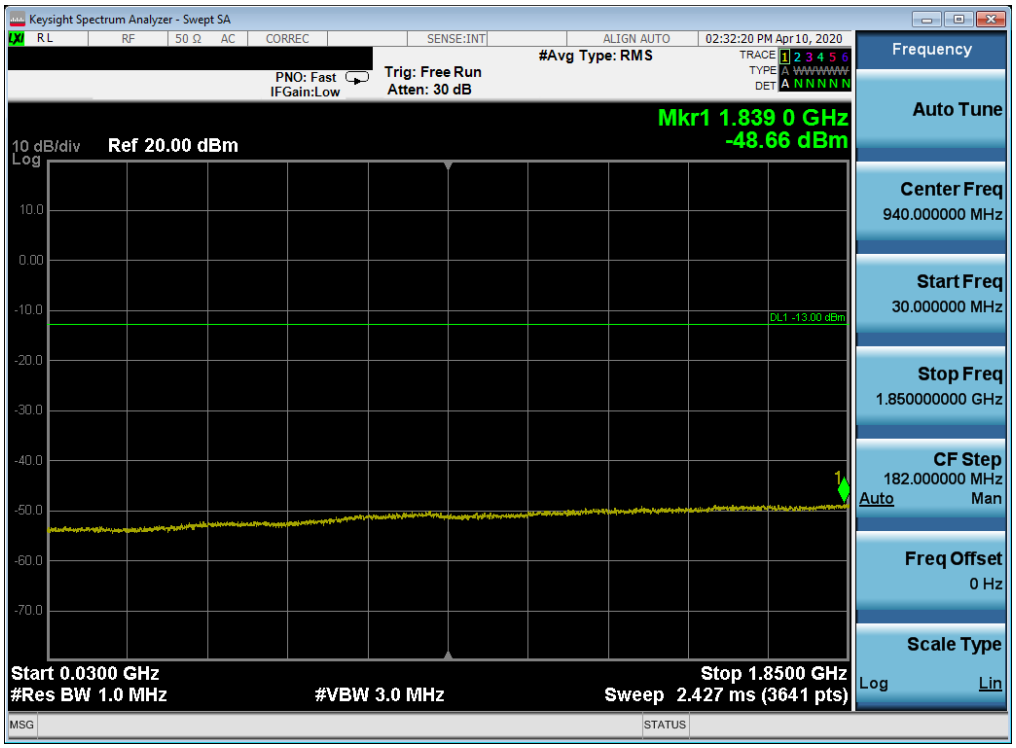
Plot 7-46. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



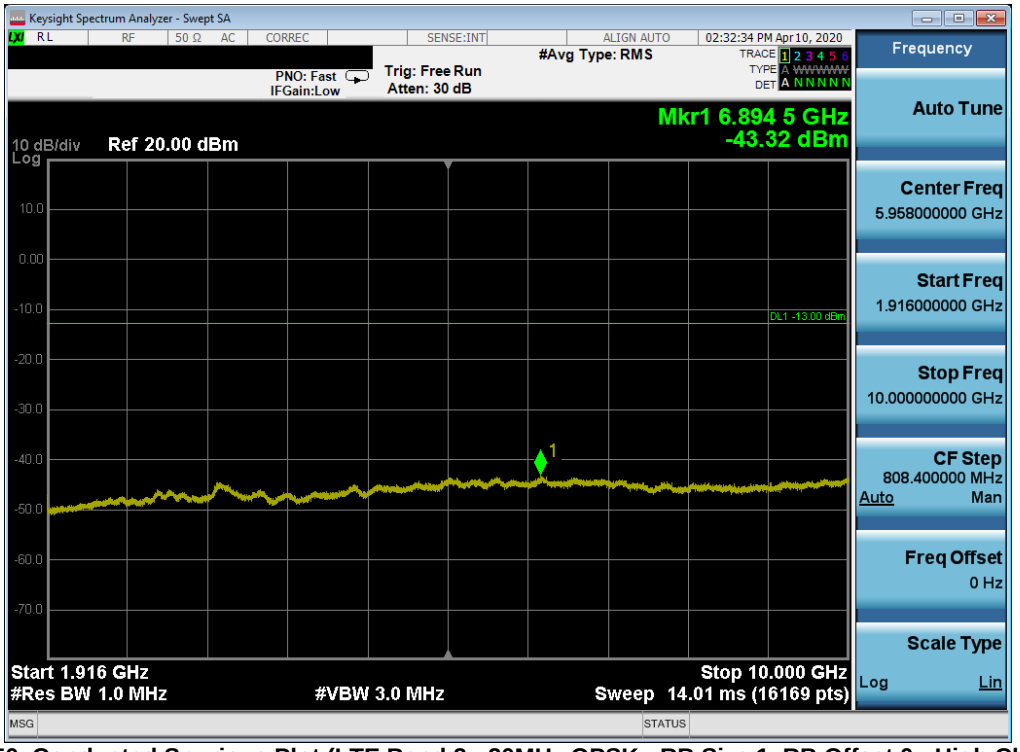
Plot 7-47. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



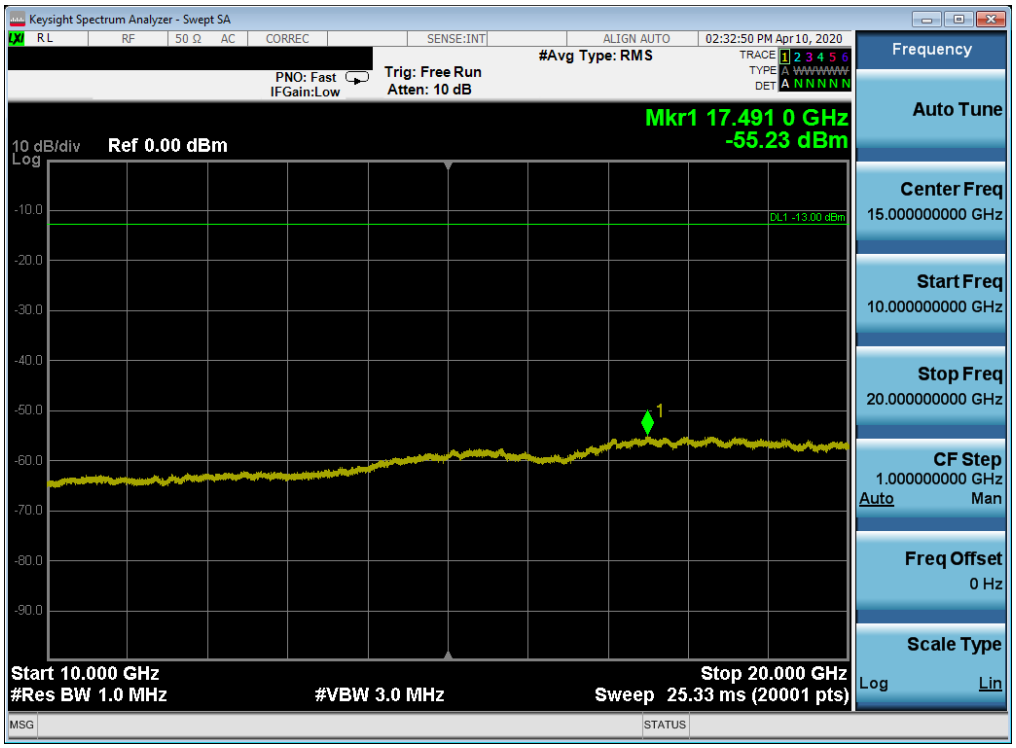
Plot 7-48. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-49. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

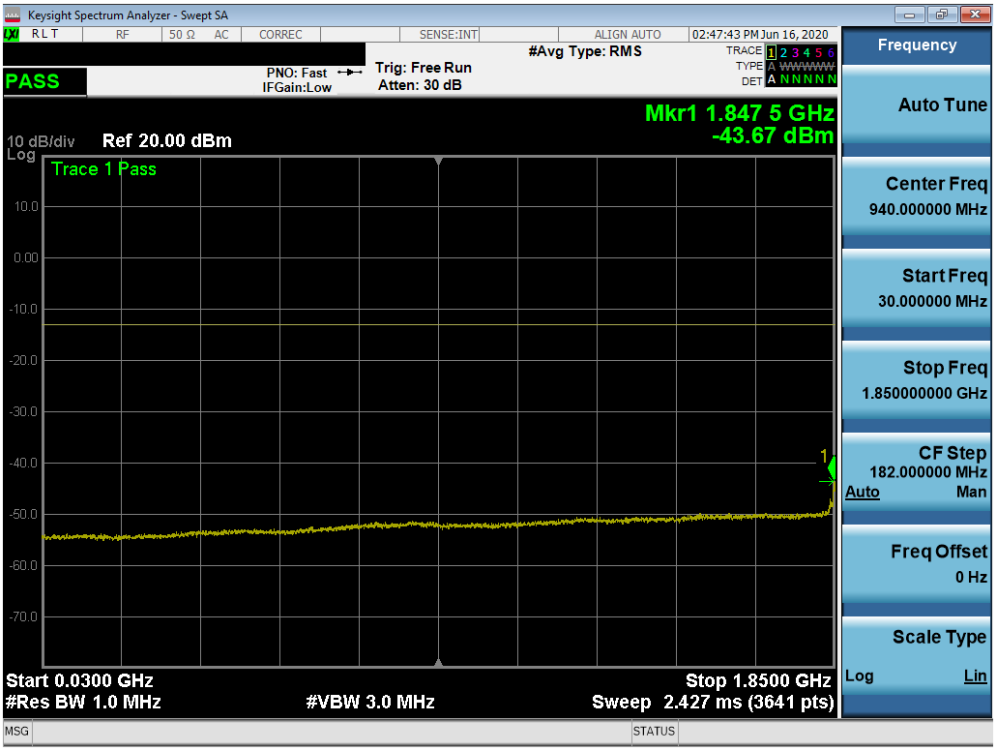


Plot 7-50. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

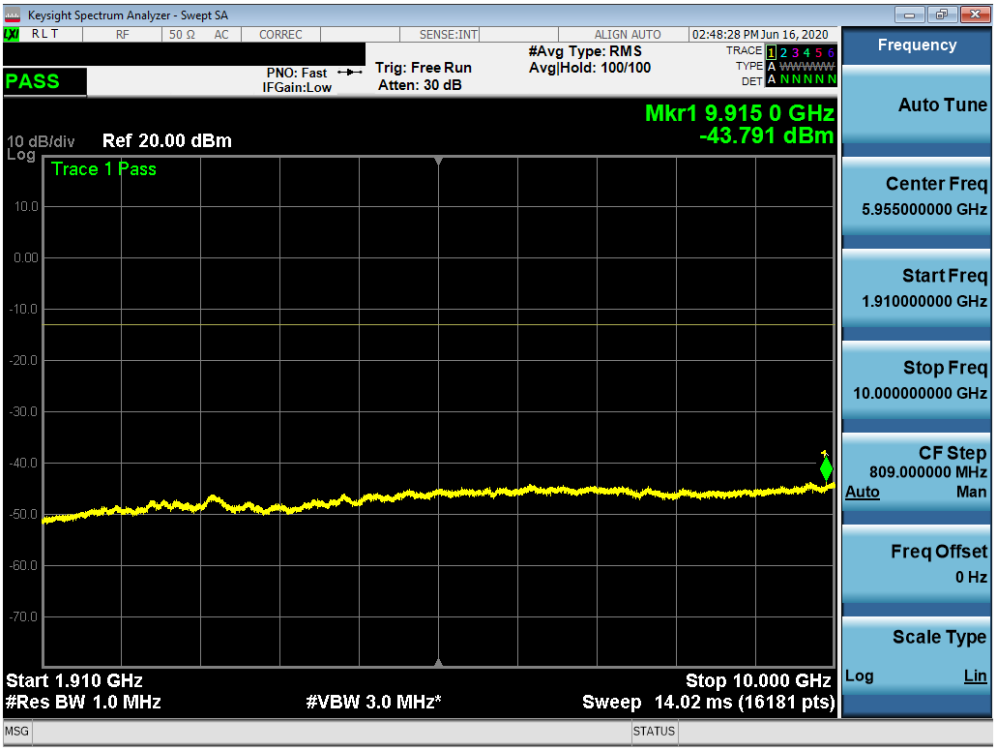


Plot 7-51. Conducted Spurious Plot (LTE Band 2 - 20MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

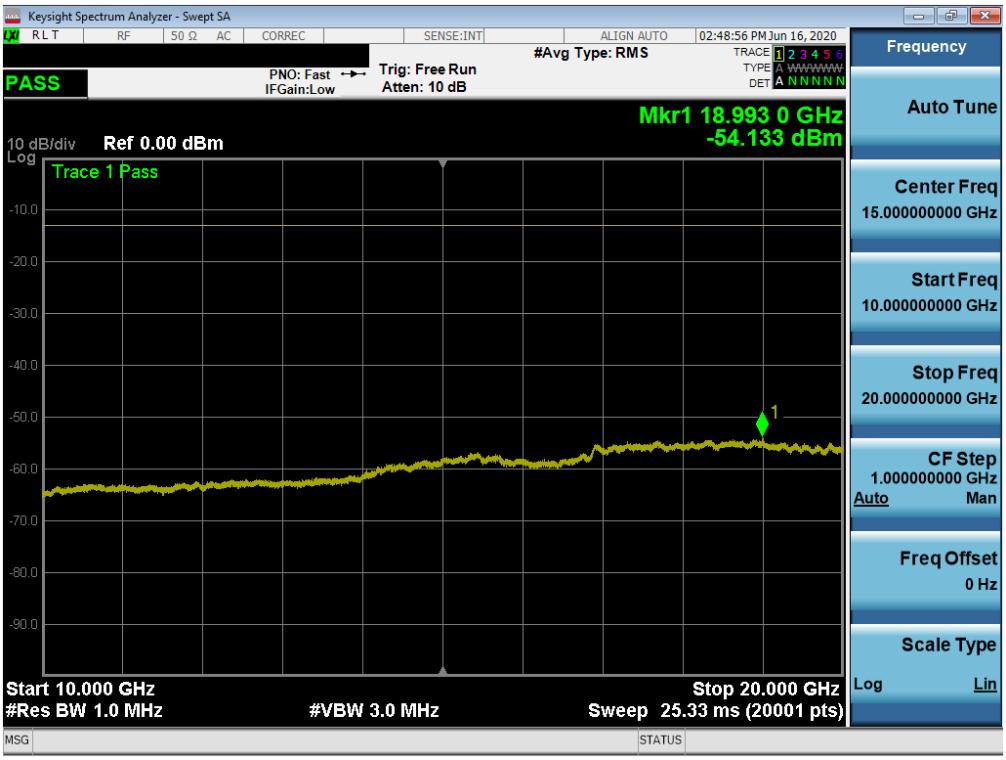
NR Band n2



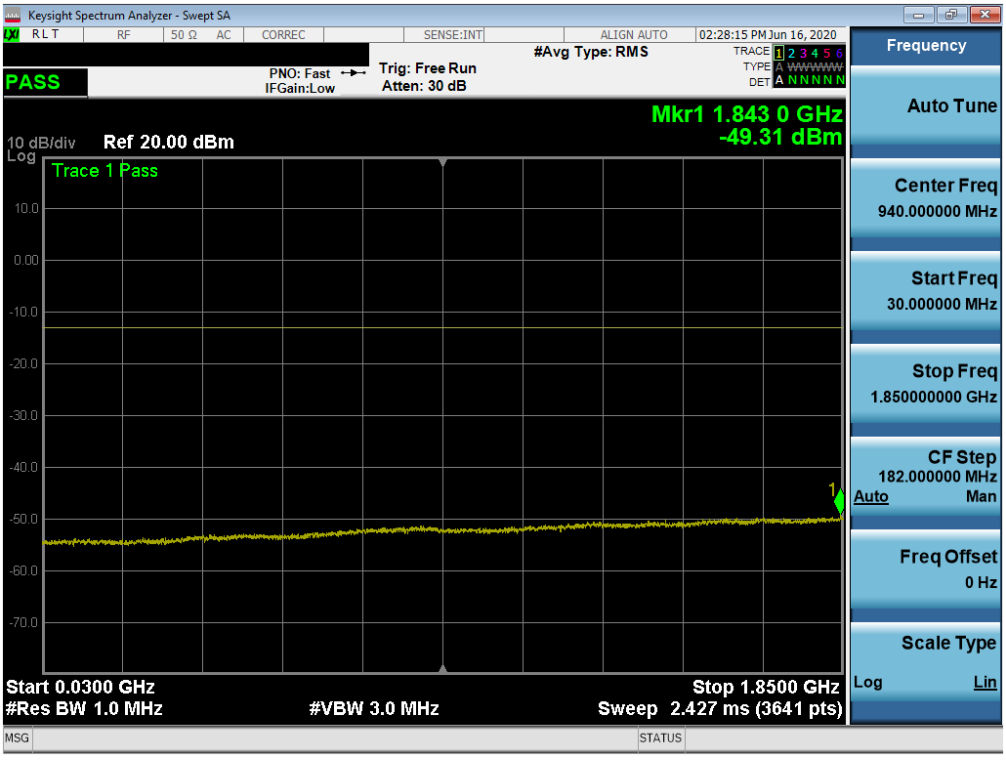
Plot 7-52. Conducted Spurious Plot (NR Band n2 -20.0MHz - RB Size 1, RB Offset 0 - Low Channel)



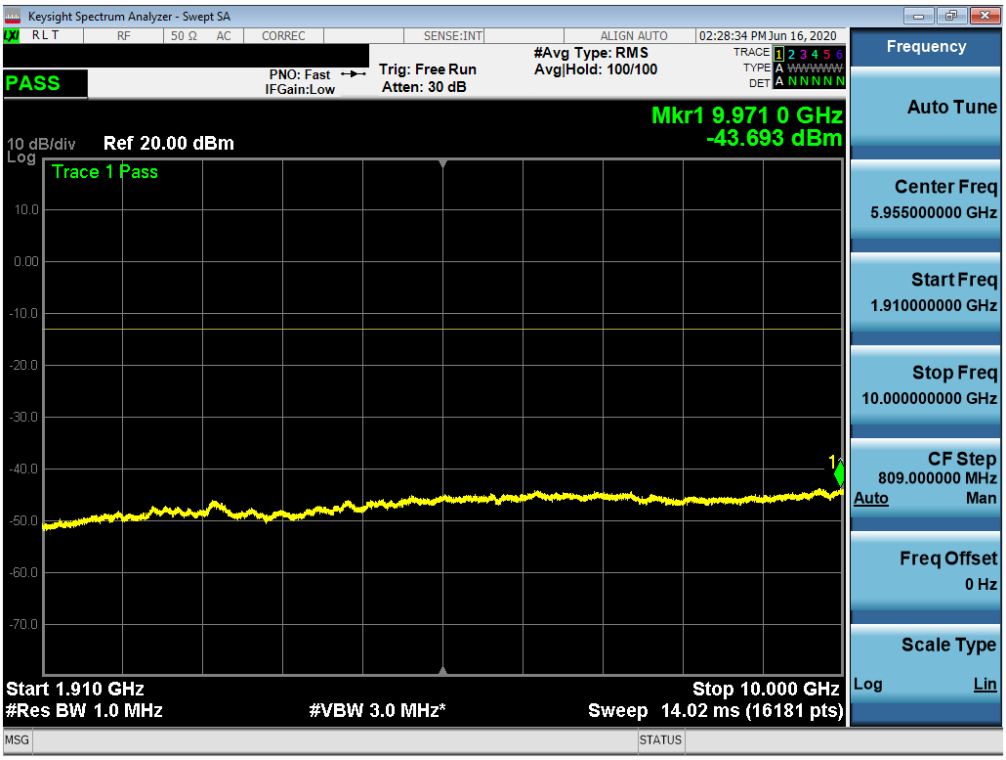
Plot 7-53. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - Low Channel)



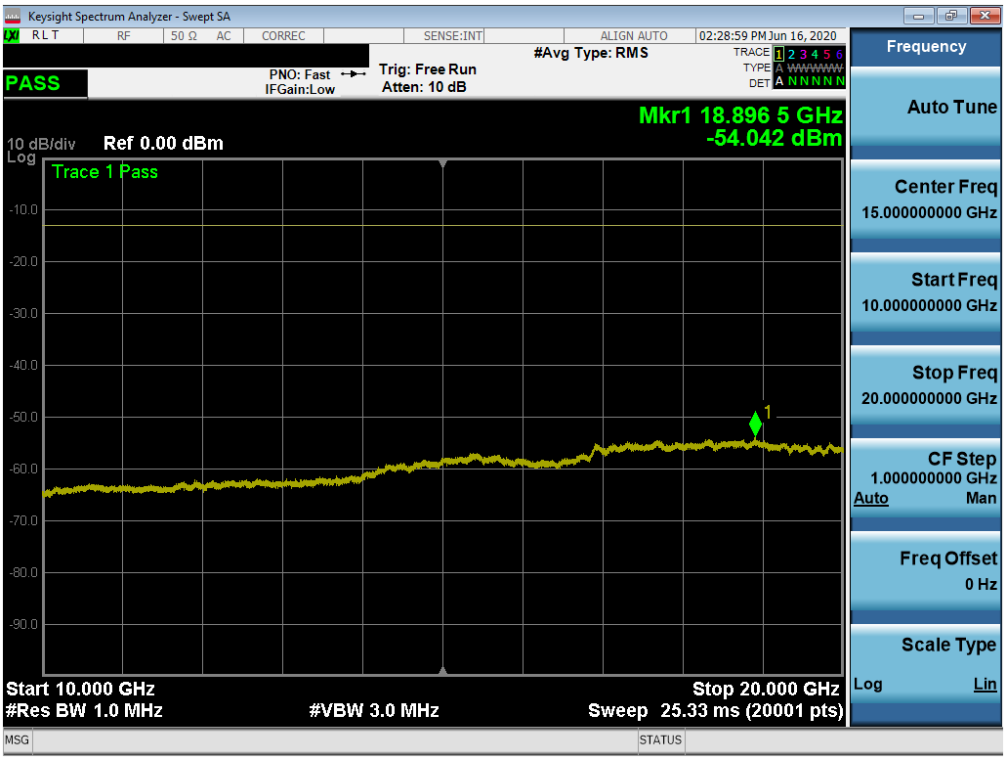
Plot 7-54. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - Low Channel)



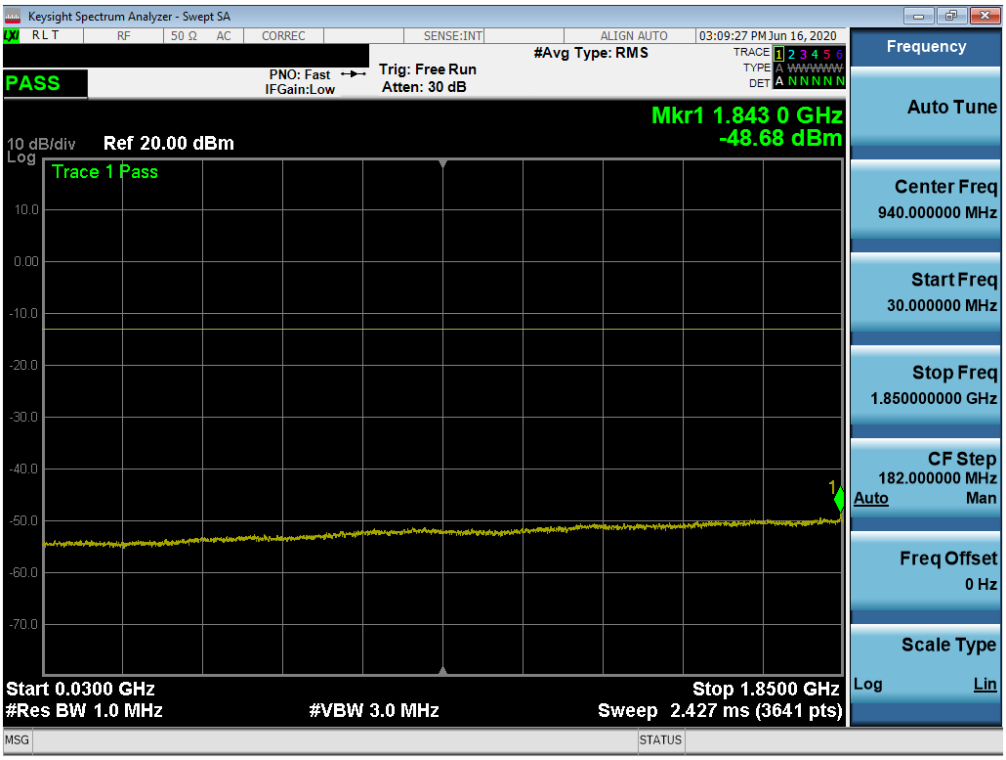
Plot 7-55. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)



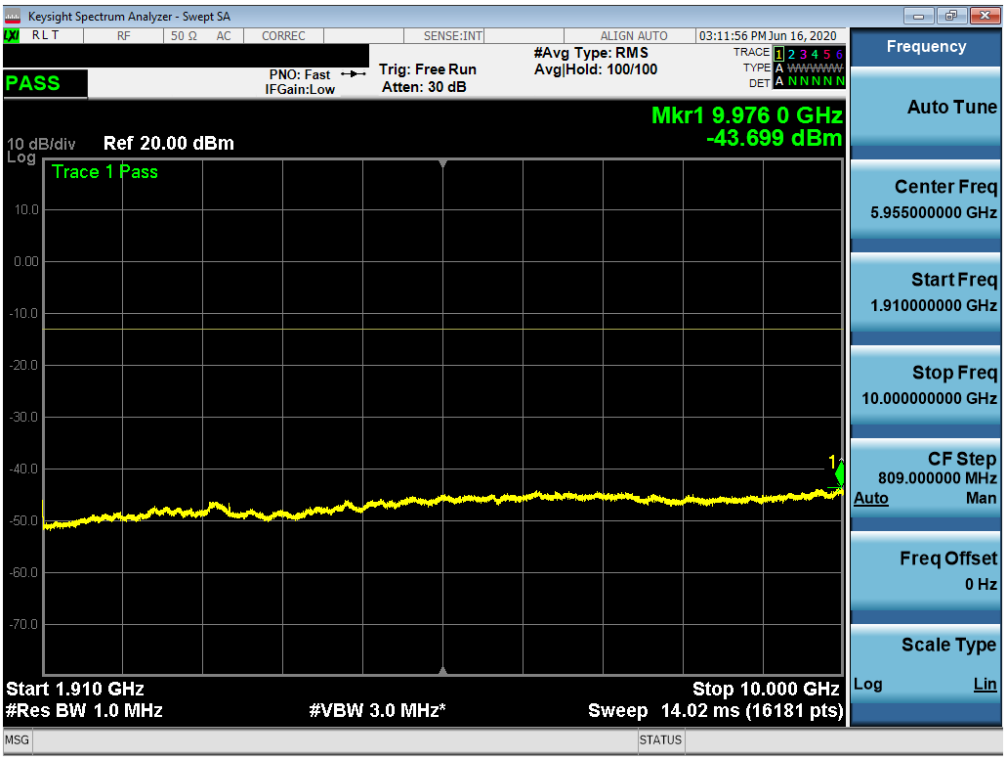
Plot 7-56. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)



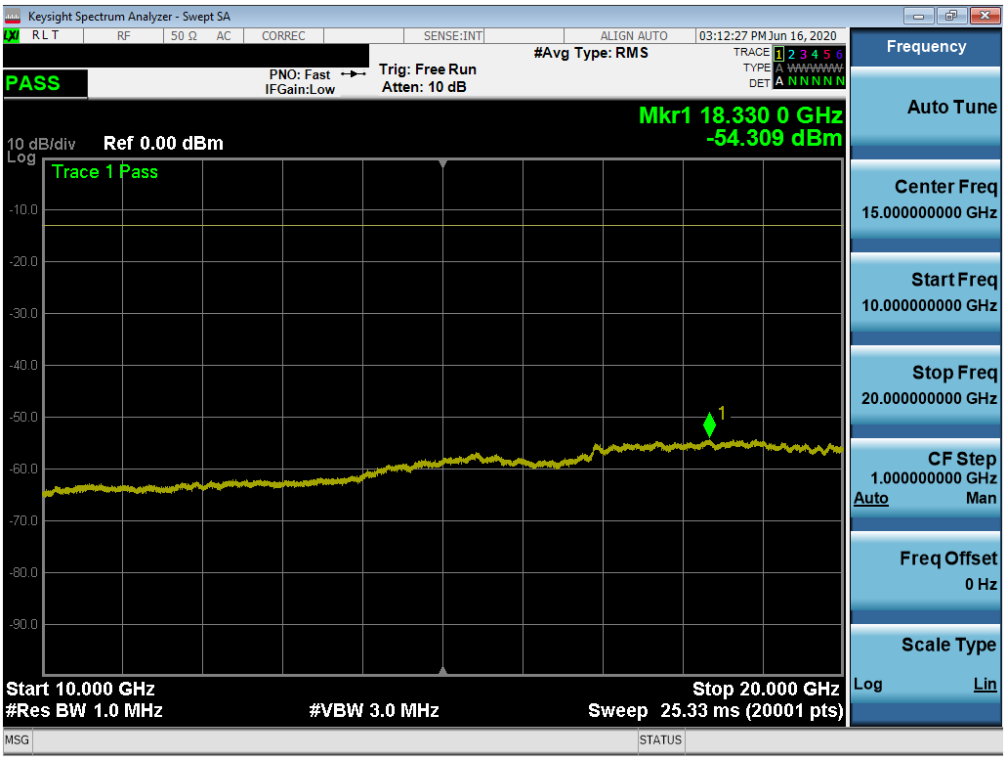
Plot 7-57. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - Mid Channel)



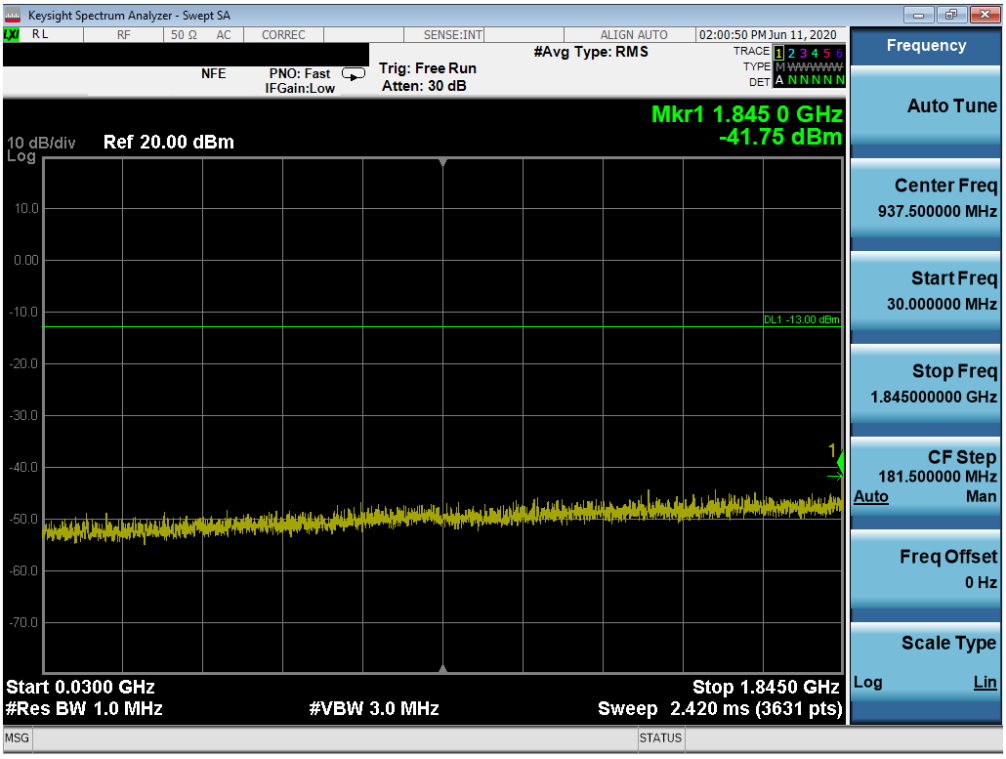
Plot 7-58. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - High Channel)



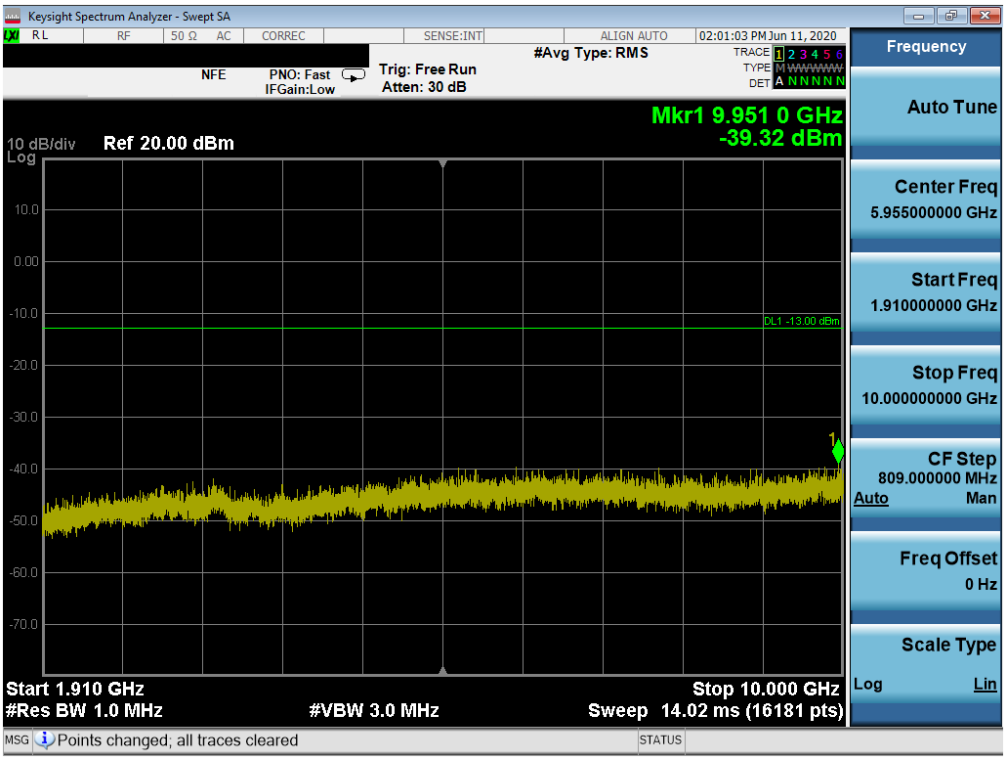
Plot 7-59. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - High Channel)



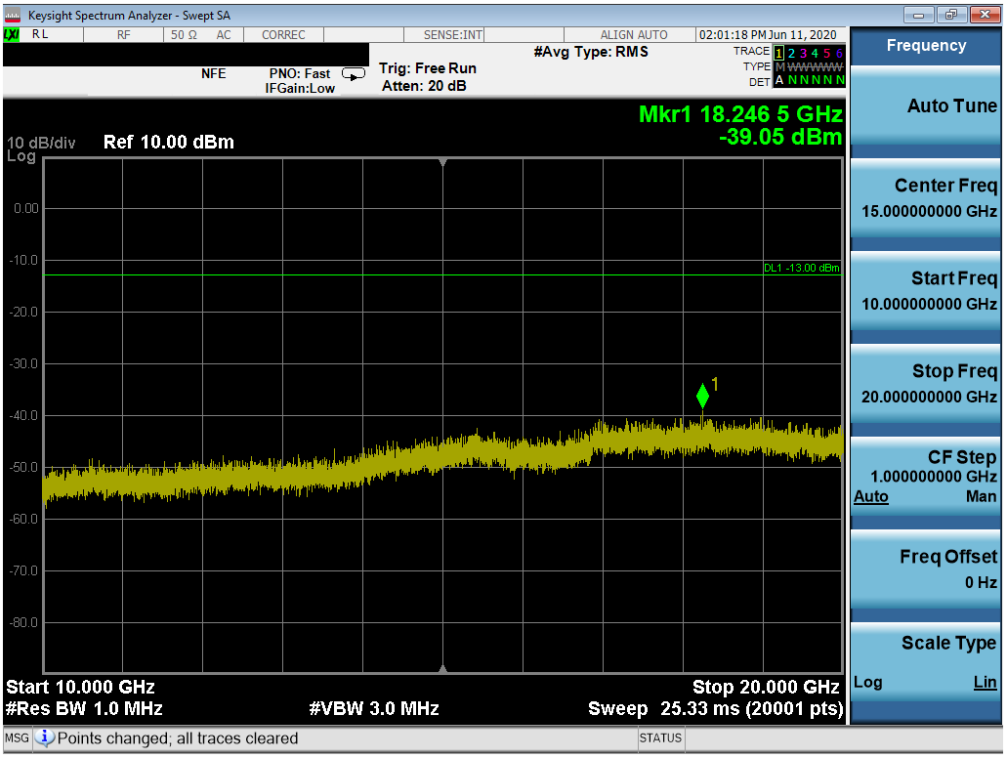
Plot 7-60. Conducted Spurious Plot (NR Band n2 - 20.0MHz - RB Size 1, RB Offset 0 - High Channel)



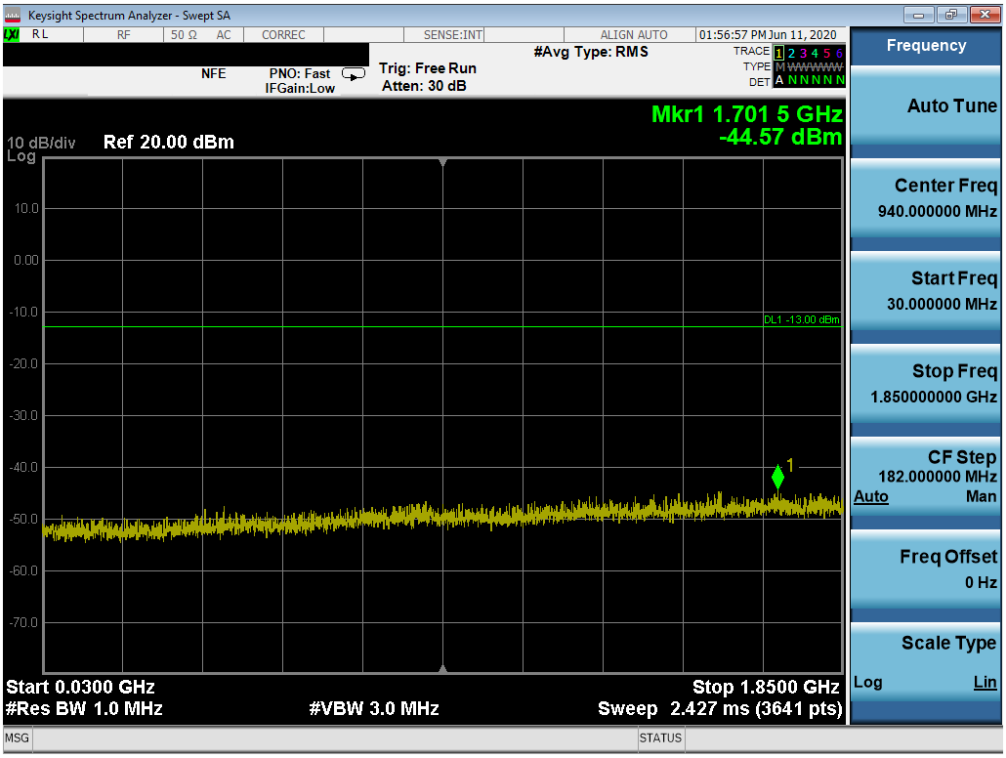
Plot 7-61. Conducted Spurious Plot (GPRS Ch. 512)



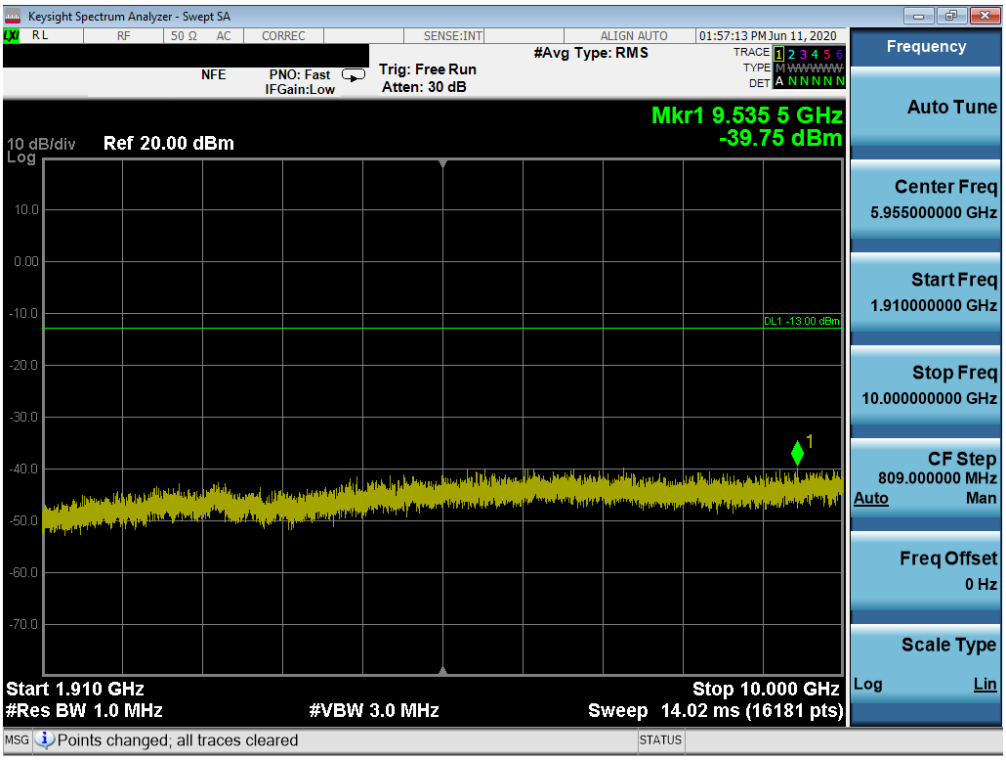
Plot 7-62. Conducted Spurious Plot (GPRS Ch. 512)



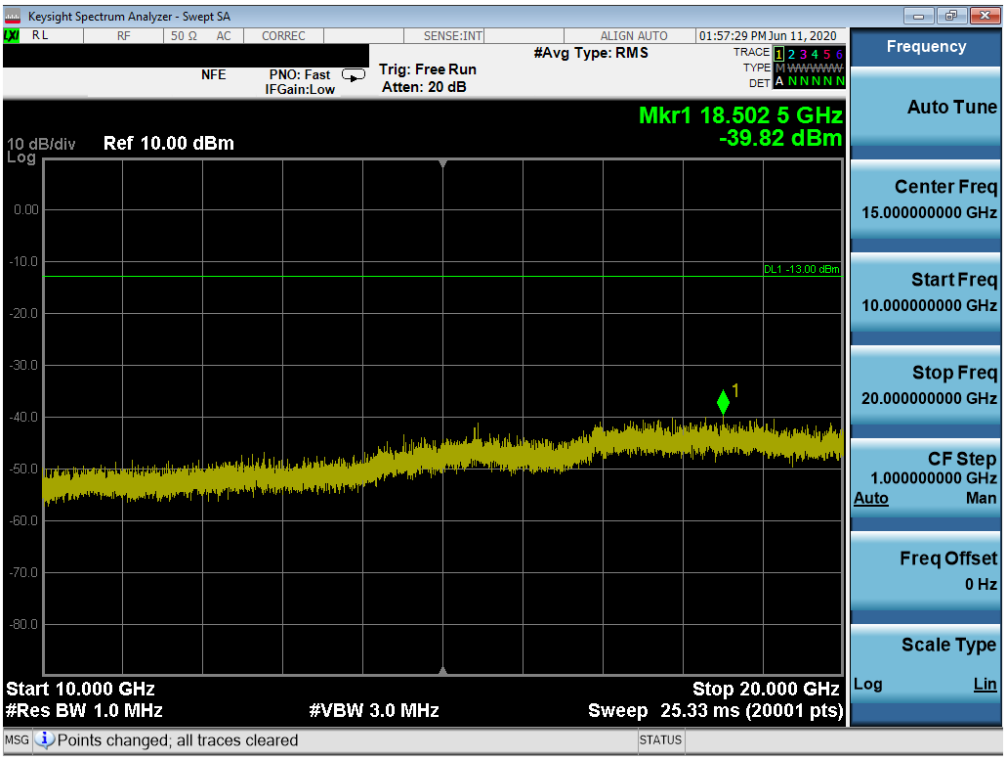
Plot 7-63. Conducted Spurious Plot (GPRS Ch. 512)



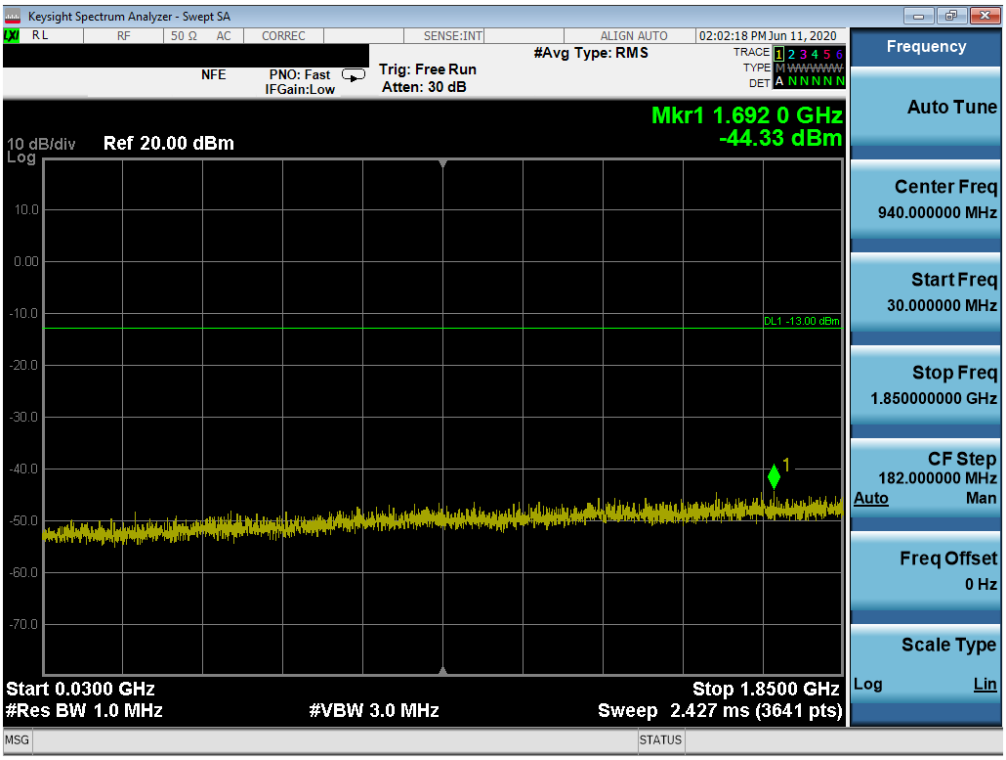
Plot 7-64. Conducted Spurious Plot (GPRS Ch. 661)



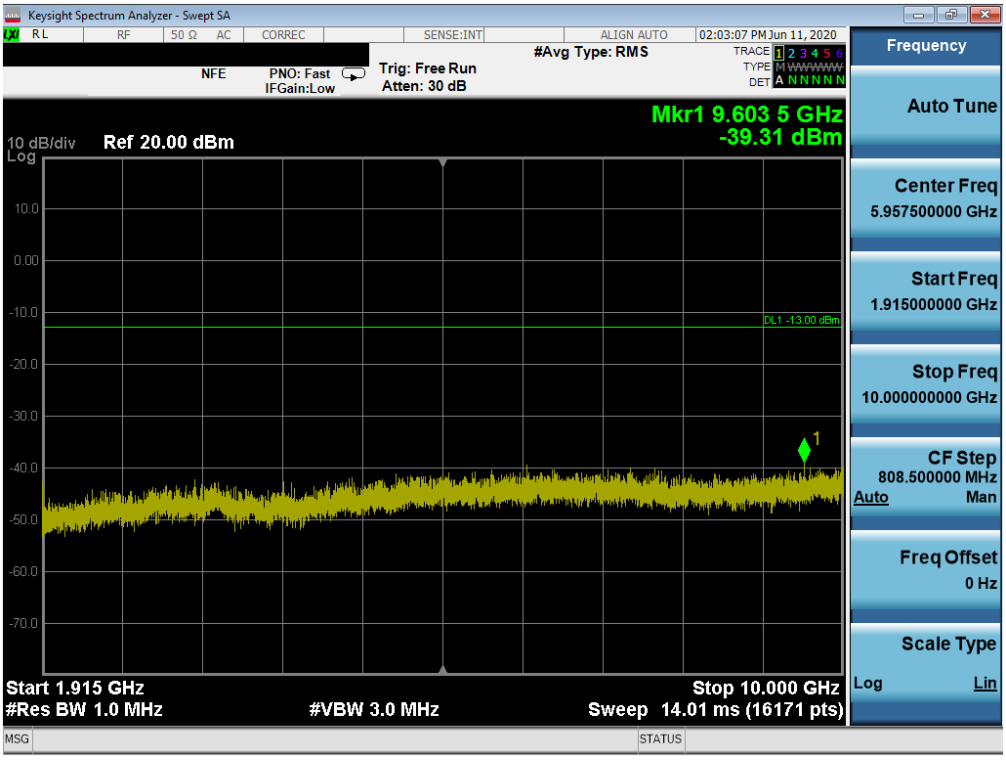
Plot 7-65. Conducted Spurious Plot (GPRS Ch. 661)



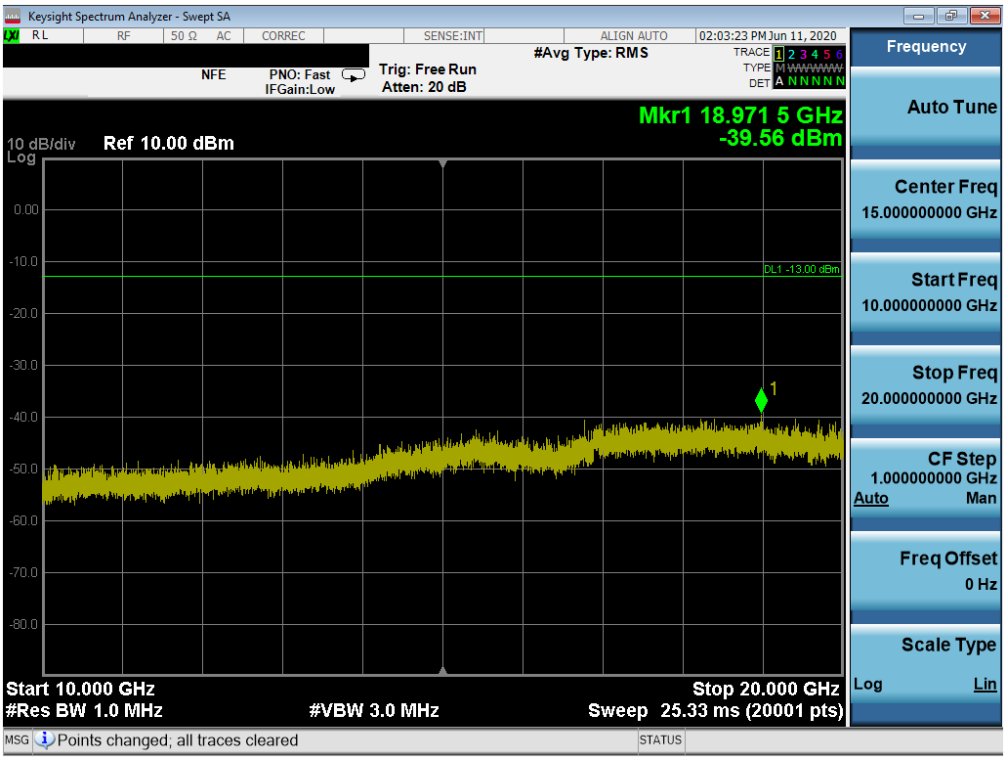
Plot 7-66. Conducted Spurious Plot (GPRS Ch. 661)



Plot 7-67. Conducted Spurious Plot (GPRS Ch. 810)

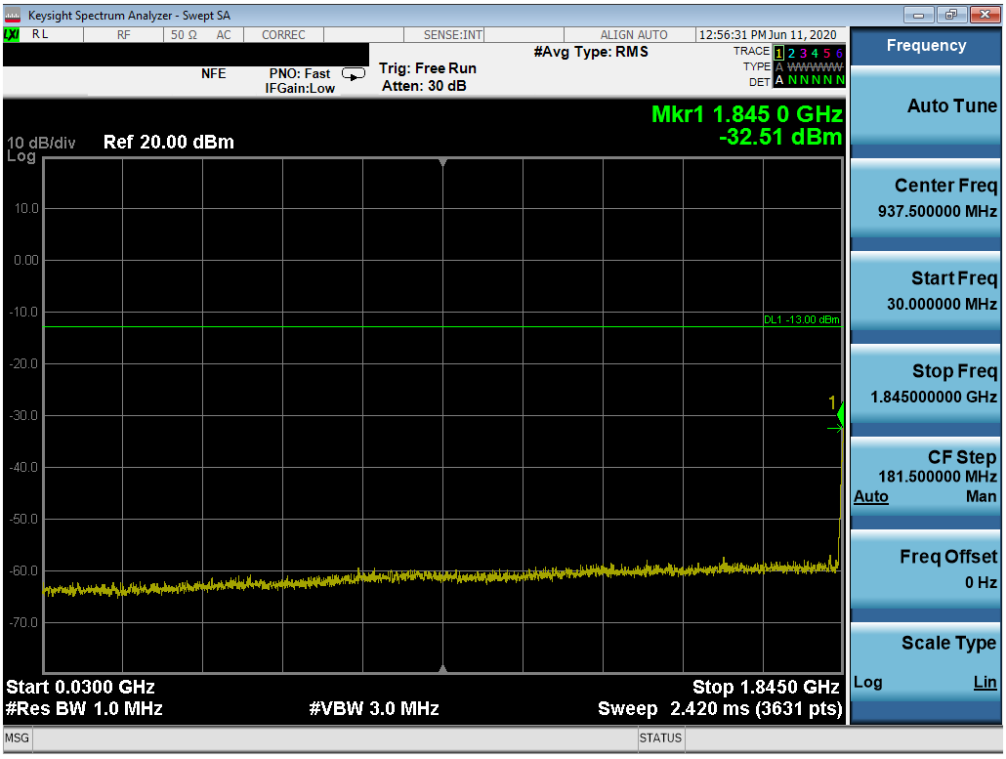


Plot 7-68. Conducted Spurious Plot (GPRS Ch. 810)

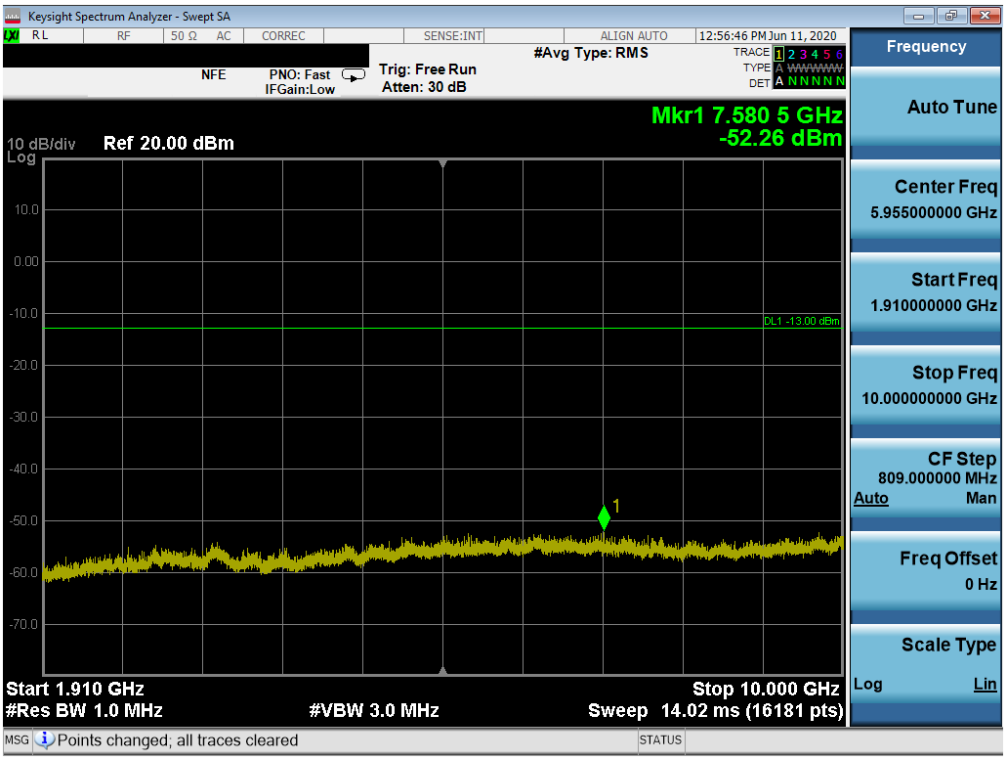


Plot 7-69. Conducted Spurious Plot (GPRS Ch. 810)

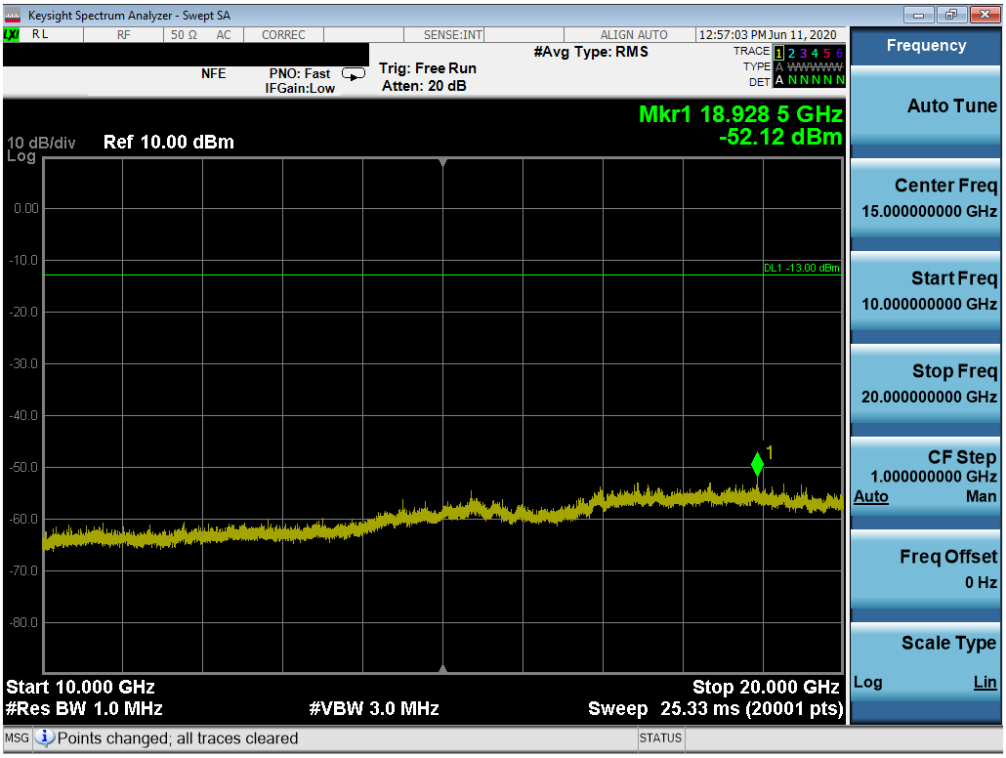
WCDMA PCS



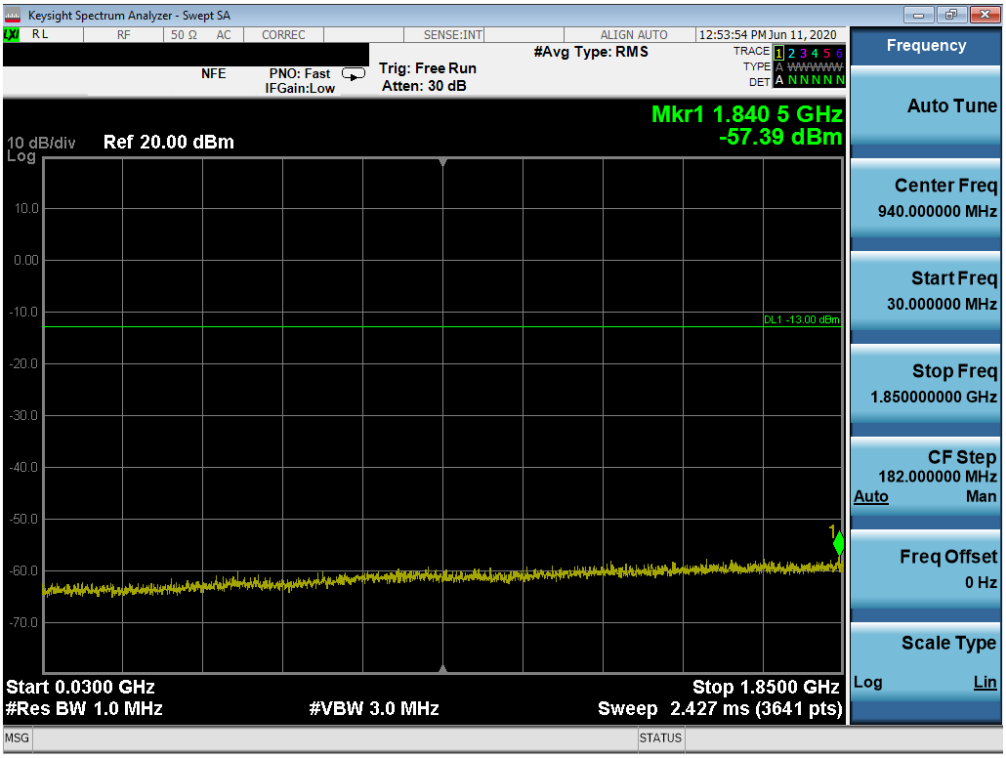
Plot 7-70. Conducted Spurious Plot (WCDMA Ch. 9262)



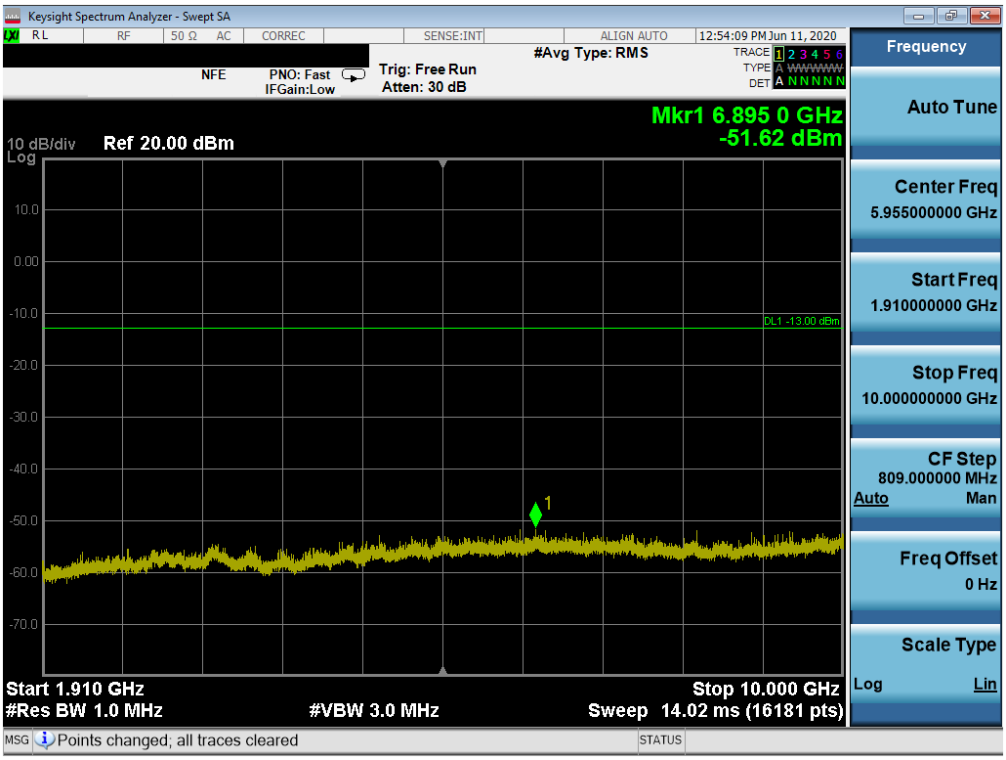
Plot 7-71. Conducted Spurious Plot (WCDMA Ch. 9262)



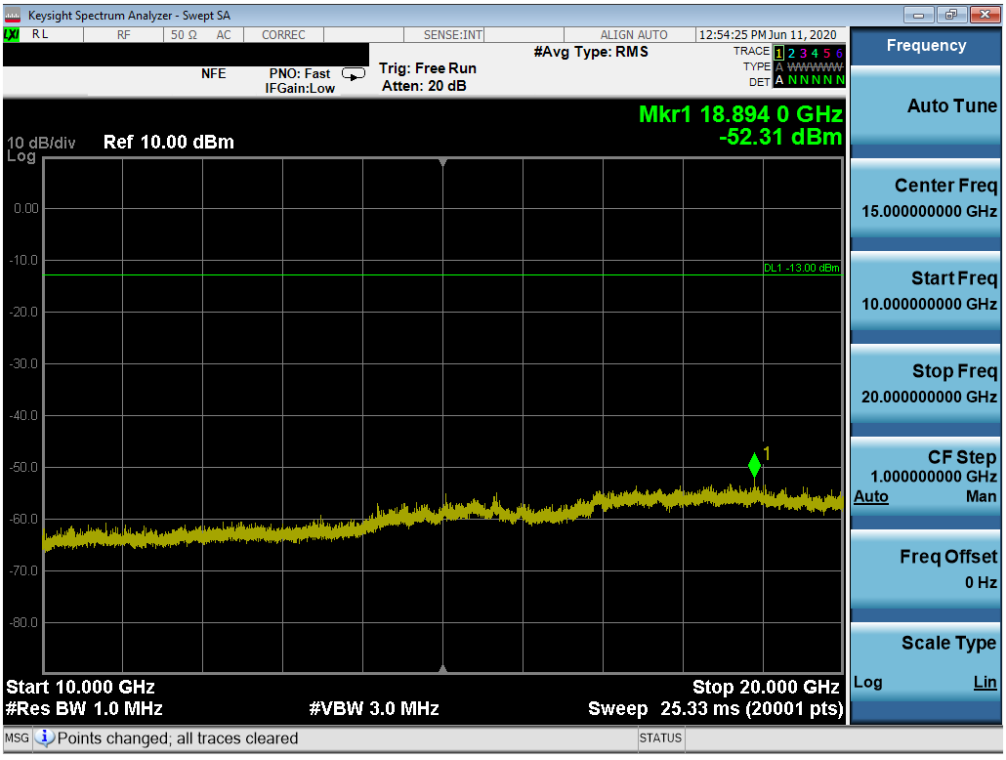
Plot 7-72. Conducted Spurious Plot (WCDMA Ch. 9262)



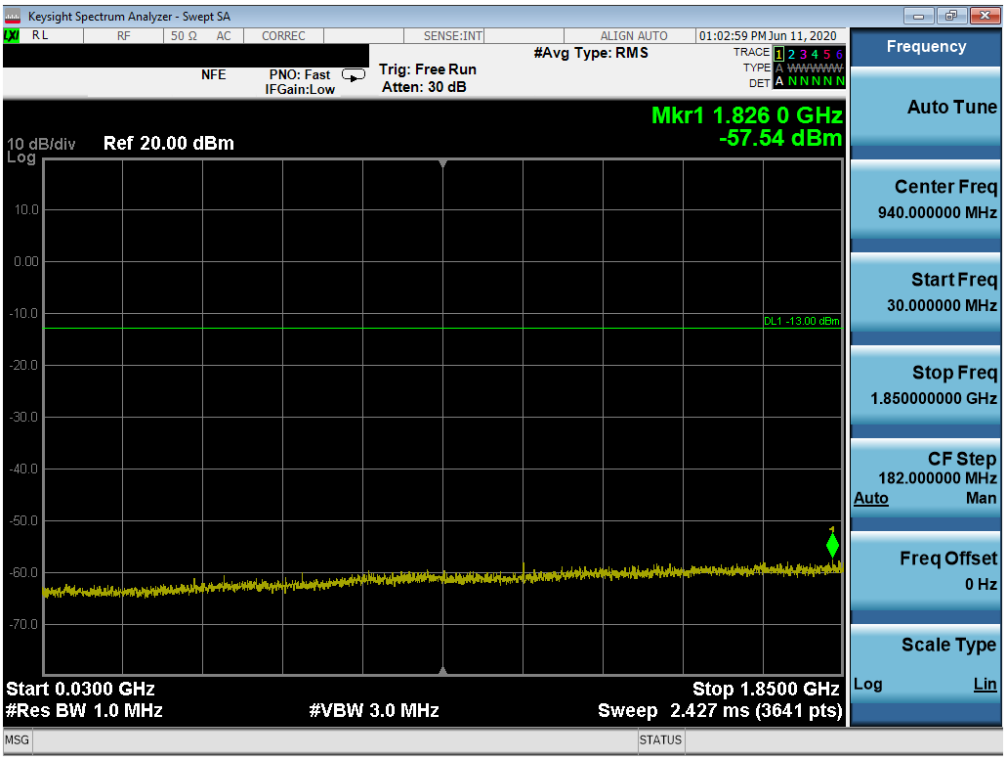
Plot 7-73. Conducted Spurious Plot (WCDMA Ch. 9400)



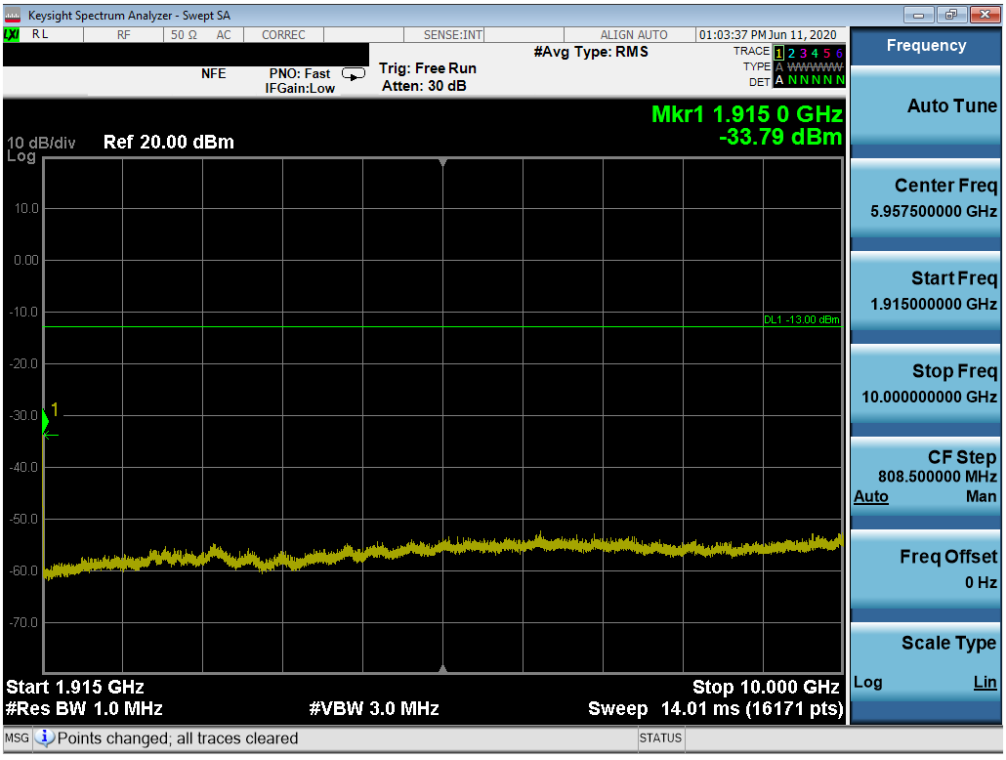
Plot 7-74. Conducted Spurious Plot (WCDMA Ch. 9400)



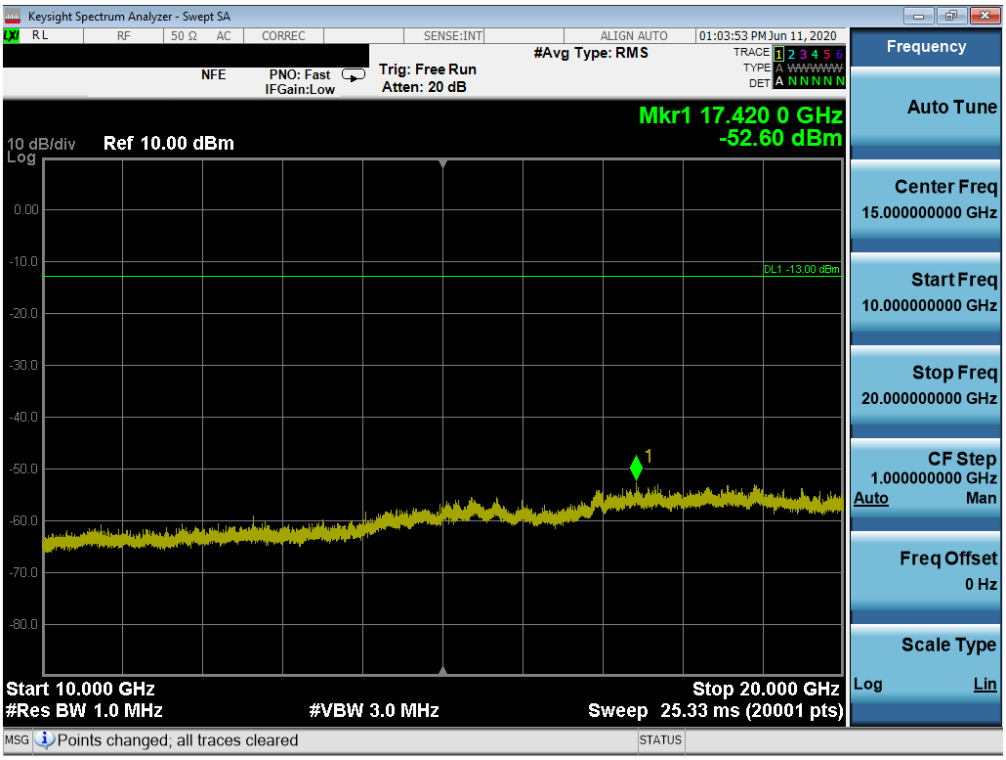
Plot 7-75. Conducted Spurious Plot (WCDMA Ch. 9400)



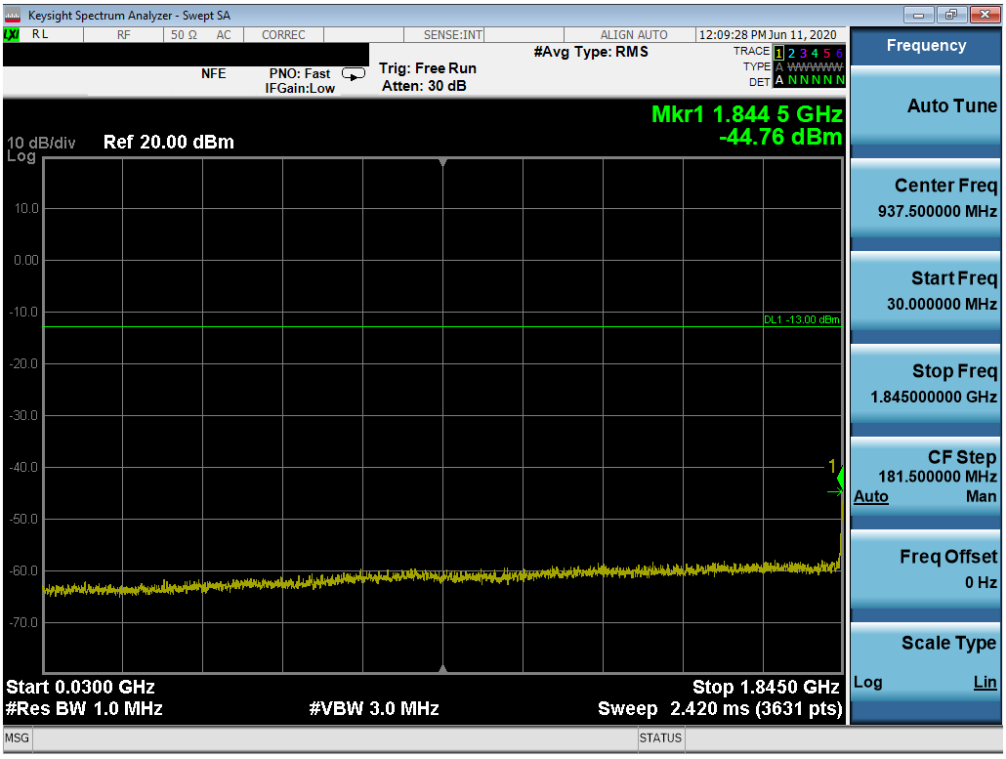
Plot 7-76. Conducted Spurious Plot (WCDMA Ch. 9538)



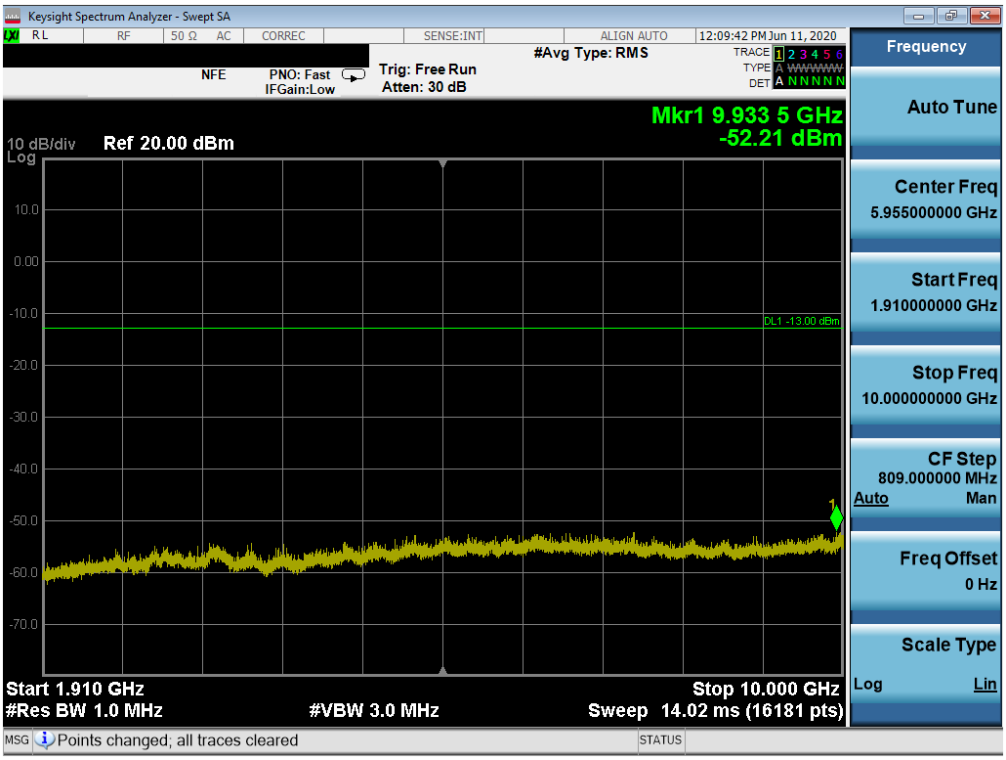
Plot 7-77. Conducted Spurious Plot (WCDMA Ch. 9538)



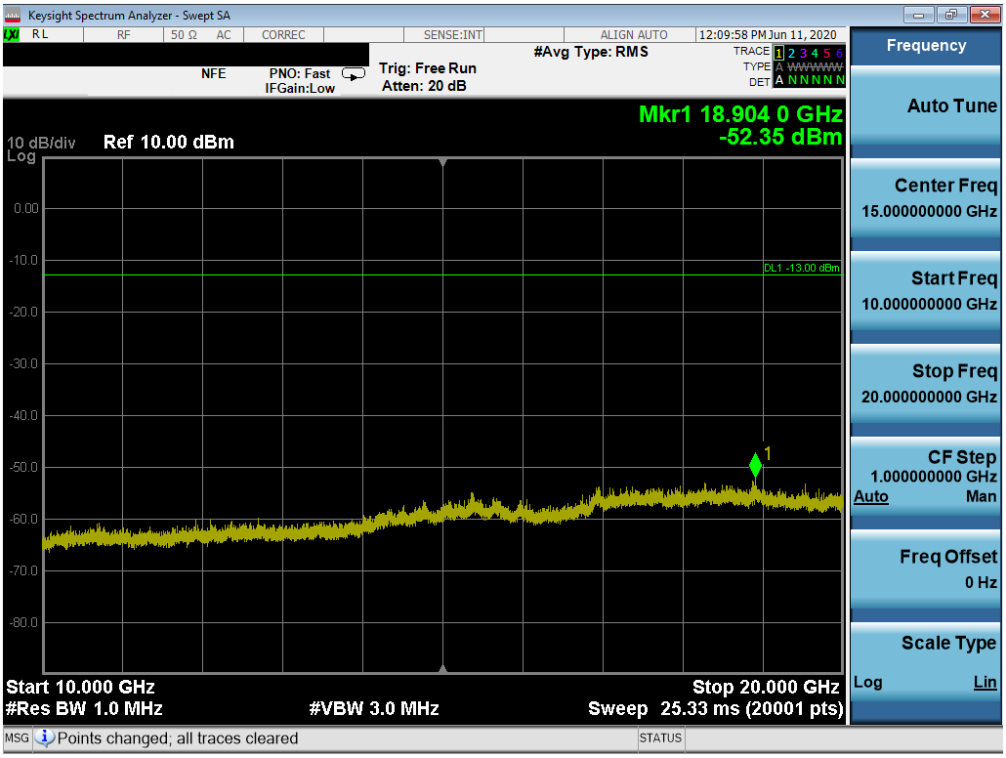
Plot 7-78. Conducted Spurious Plot (WCDMA Ch. 9538)



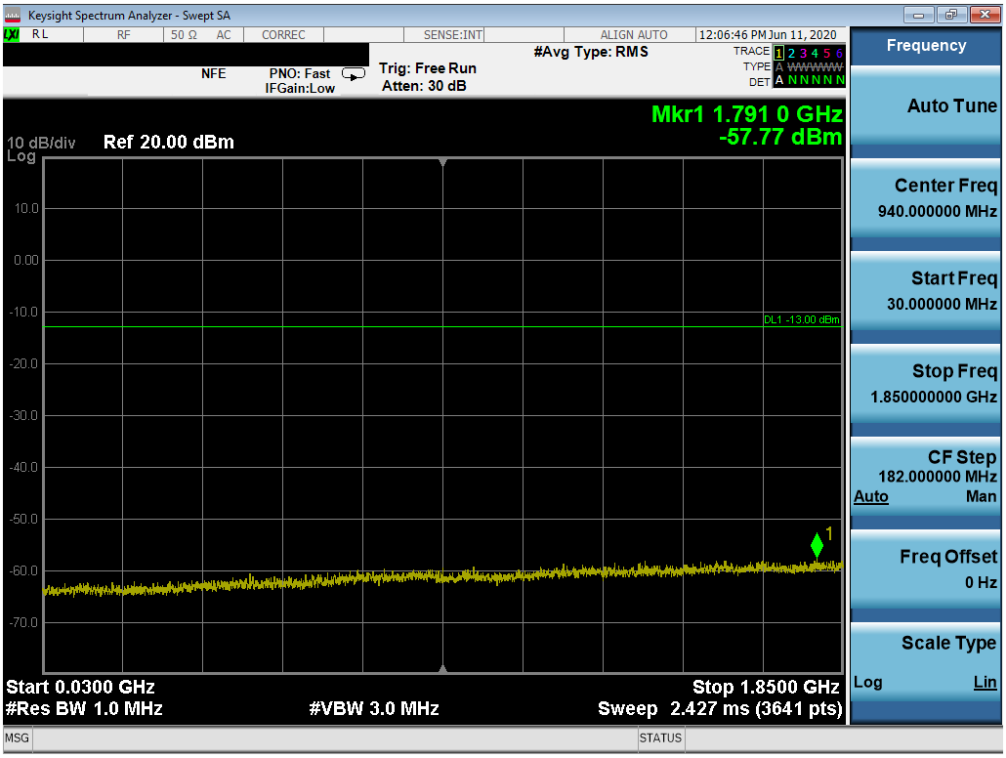
Plot 7-79. Conducted Spurious Plot (CDMA Ch. 25)



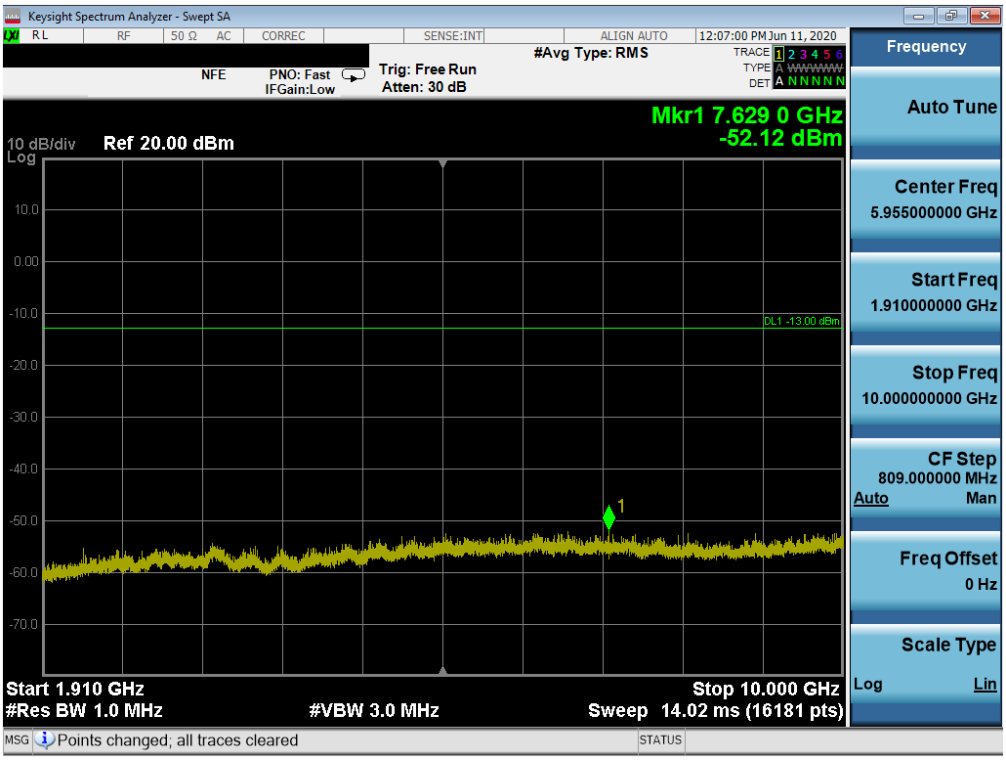
Plot 7-80. Conducted Spurious Plot (CDMA Ch. 25)



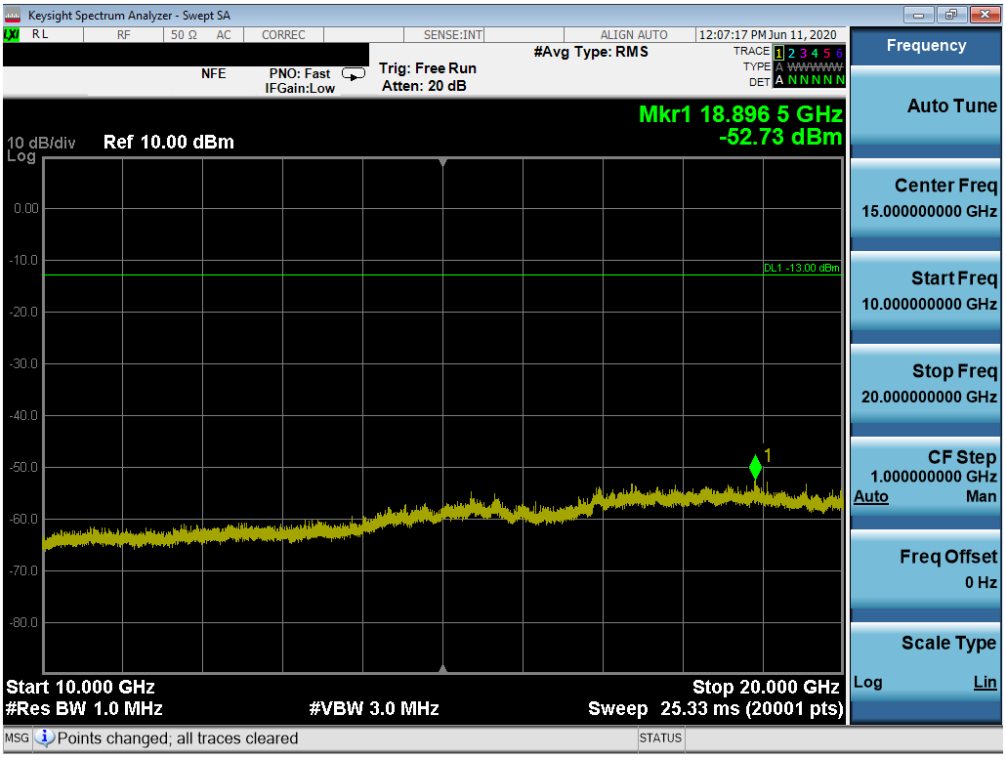
Plot 7-81. Conducted Spurious Plot (CDMA Ch. 25)



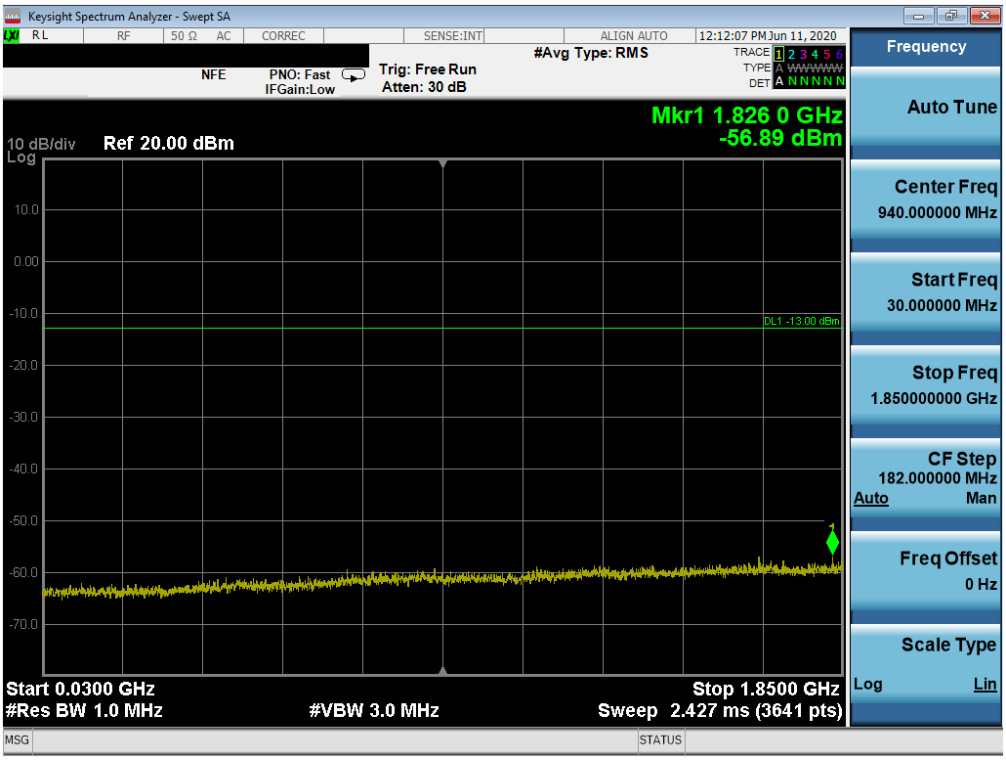
Plot 7-82. Conducted Spurious Plot (CDMA Ch. 600)



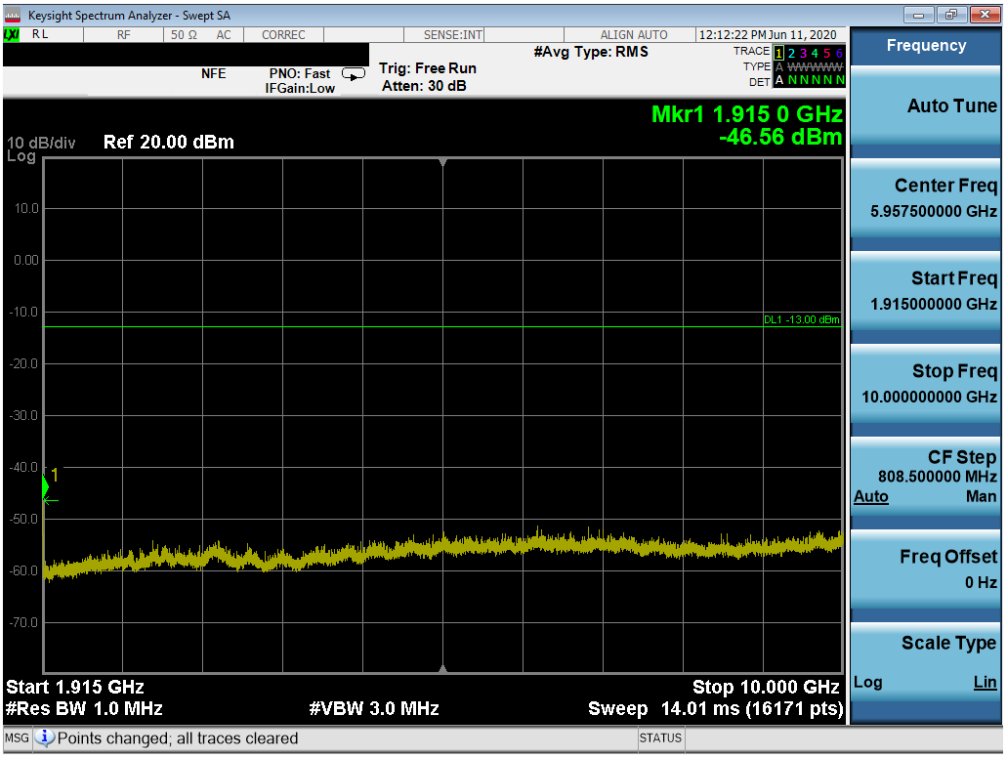
Plot 7-83. Conducted Spurious Plot (CDMA Ch. 600)



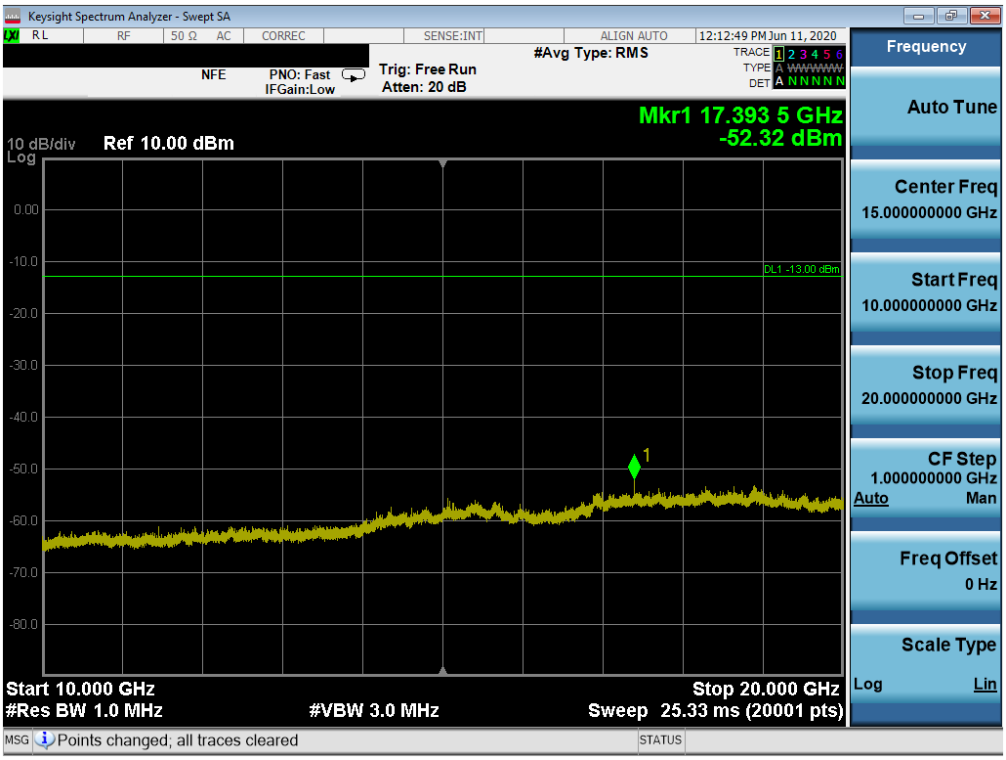
Plot 7-84. Conducted Spurious Plot (CDMA Ch. 600)



Plot 7-85. Conducted Spurious Plot (CDMA Ch. 1175)



Plot 7-86. Conducted Spurious Plot (CDMA Ch. 1175)



Plot 7-87. Conducted Spurious Plot (CDMA Ch. 1175)

7.4 Band Edge Emissions at Antenna Terminal

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level 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 and stop frequency were set such that the band edge would be placed in the center of the plot
2. Span was set large enough so as to capture all out of band emissions near the band edge
3. RBW ≥ 1% of the emission bandwidth
4. VBW ≥ 3 x RBW
5. Detector = RMS
6. Number of sweep points ≥ 2 x Span/RBW
7. Trace mode = trace average for continuous emissions, max hold for pulse emissions
8. Sweep time = auto couple
9. The trace was allowed to stabilize

Test Setup

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

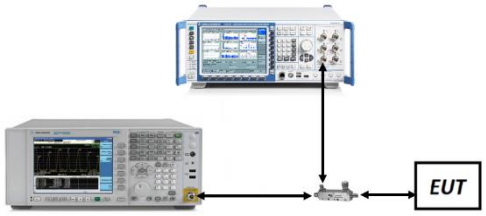


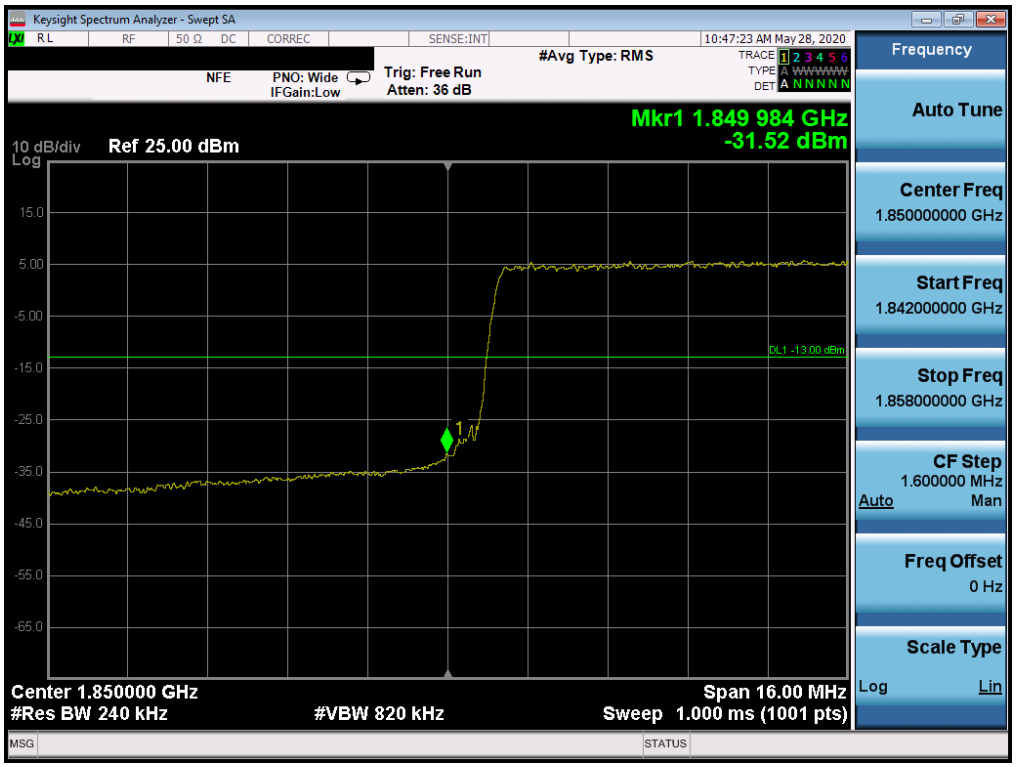
Figure 7-3. Test Instrument & Measurement Setup

Test Notes

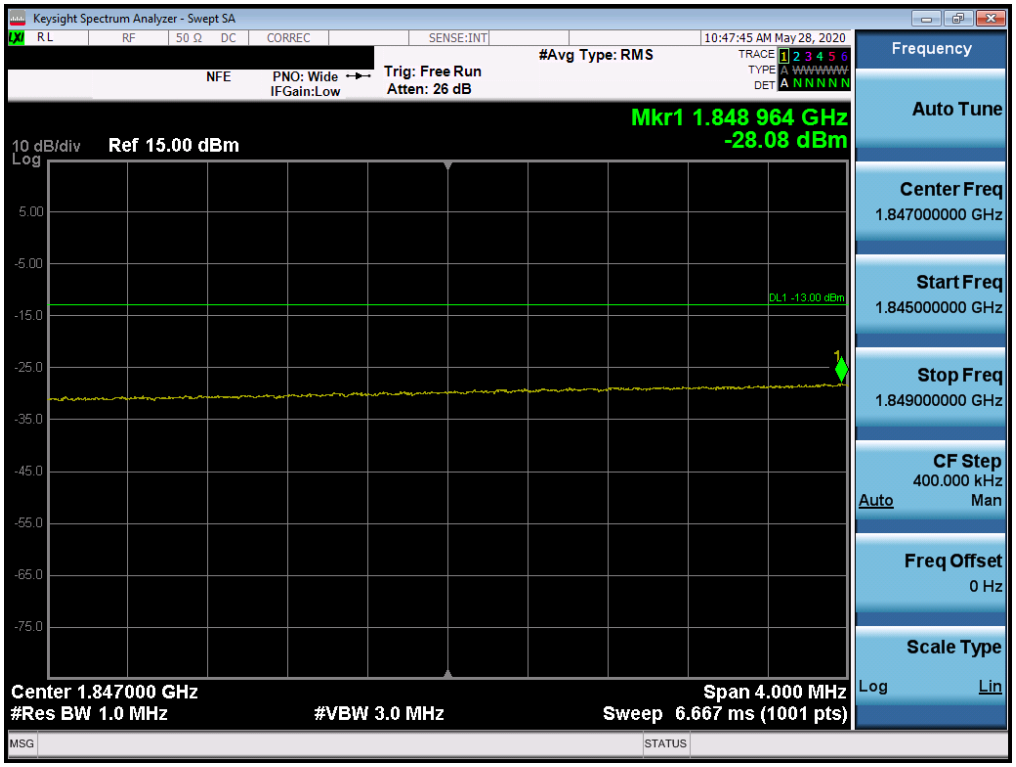
1. Per 22.917(b) and RSS-132(5.5), in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed to demonstrate compliance with the out-of-band emissions limit. 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.

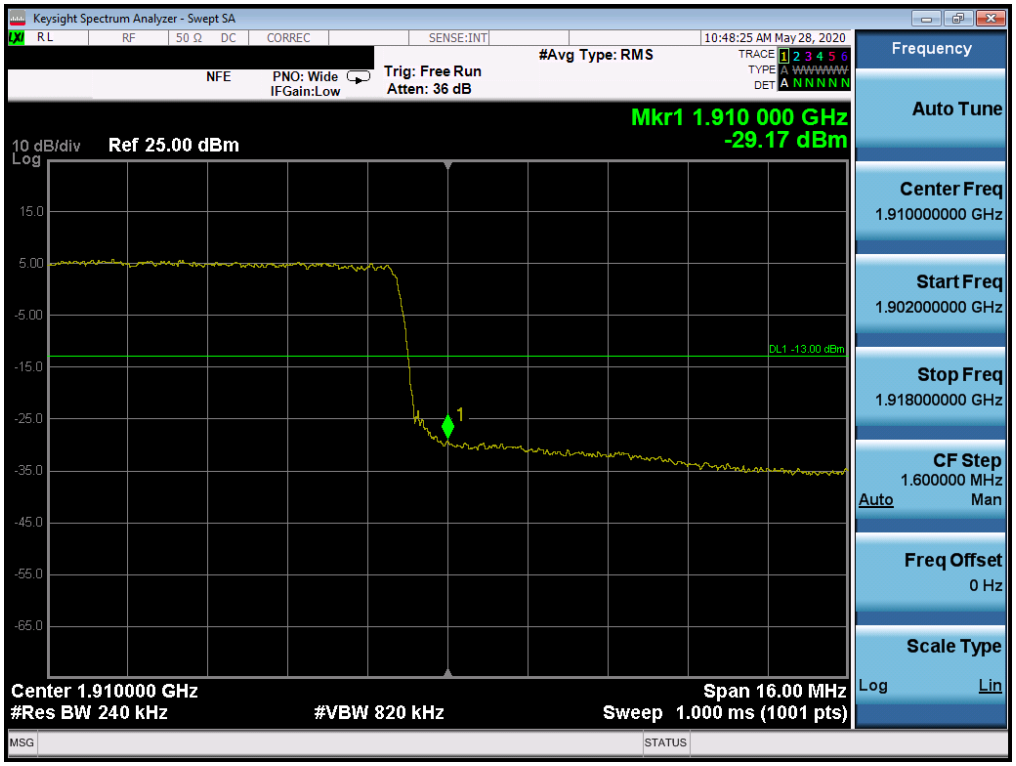
LTE Band 2



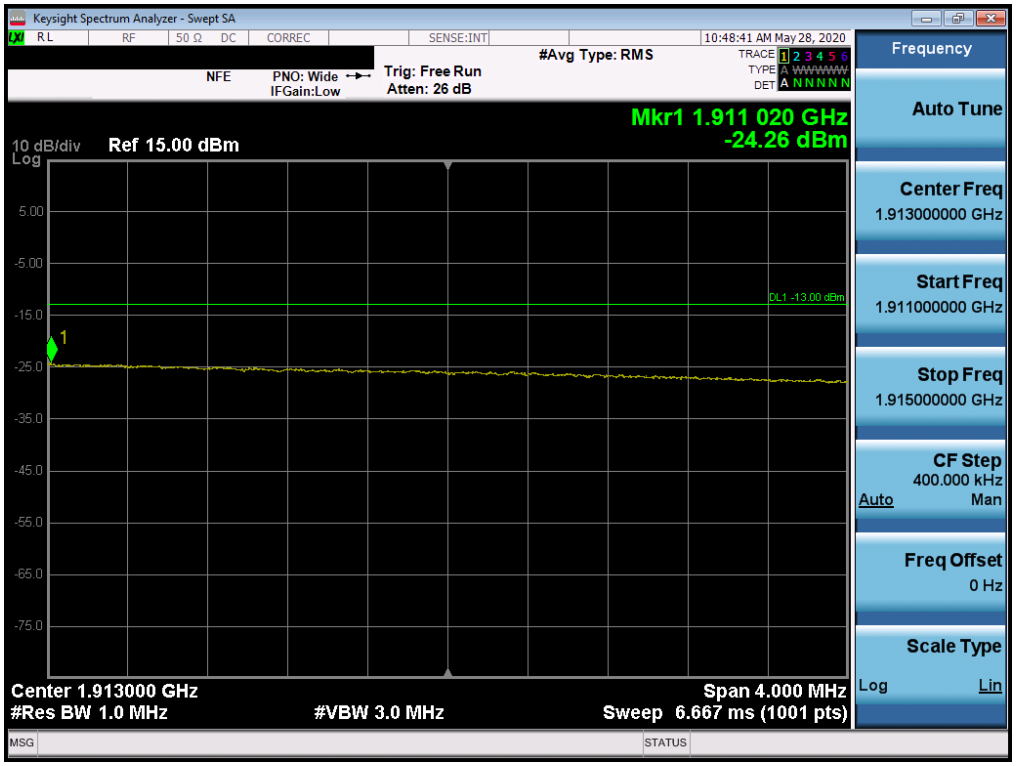
Plot 7-88. Lower Band Edge Plot (LTE Band 2 - 20MHz QPSK – Full RB Configuration)



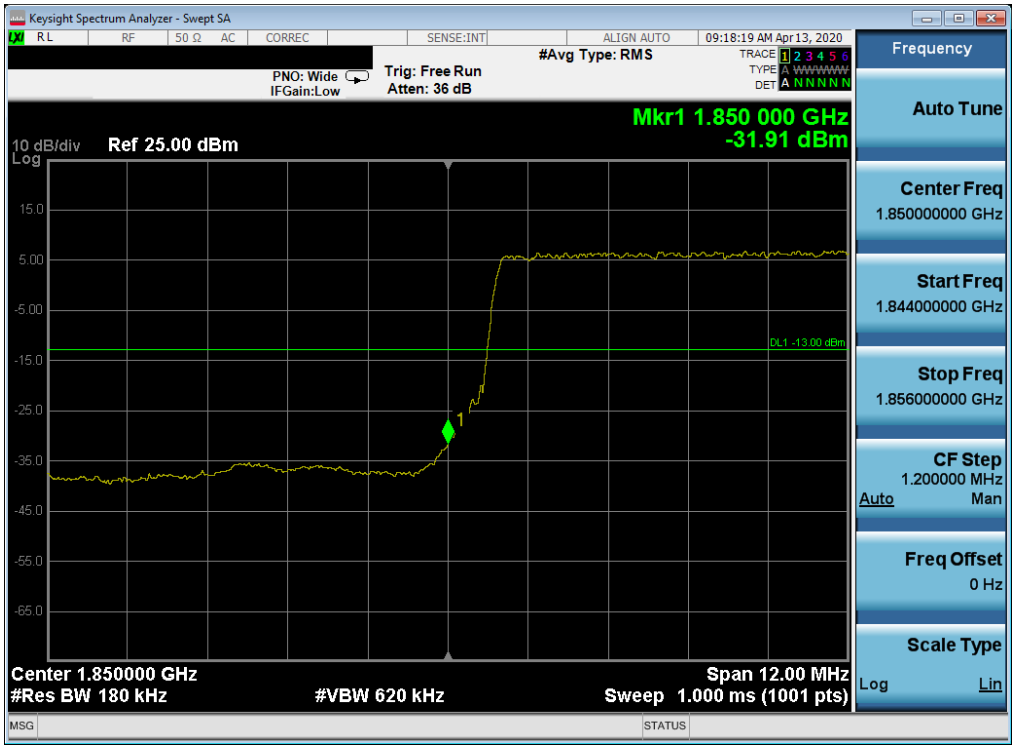
Plot 7-89. Extended Lower Band Edge Plot (LTE Band 2 - 20MHz QPSK – Full RB Configuration)



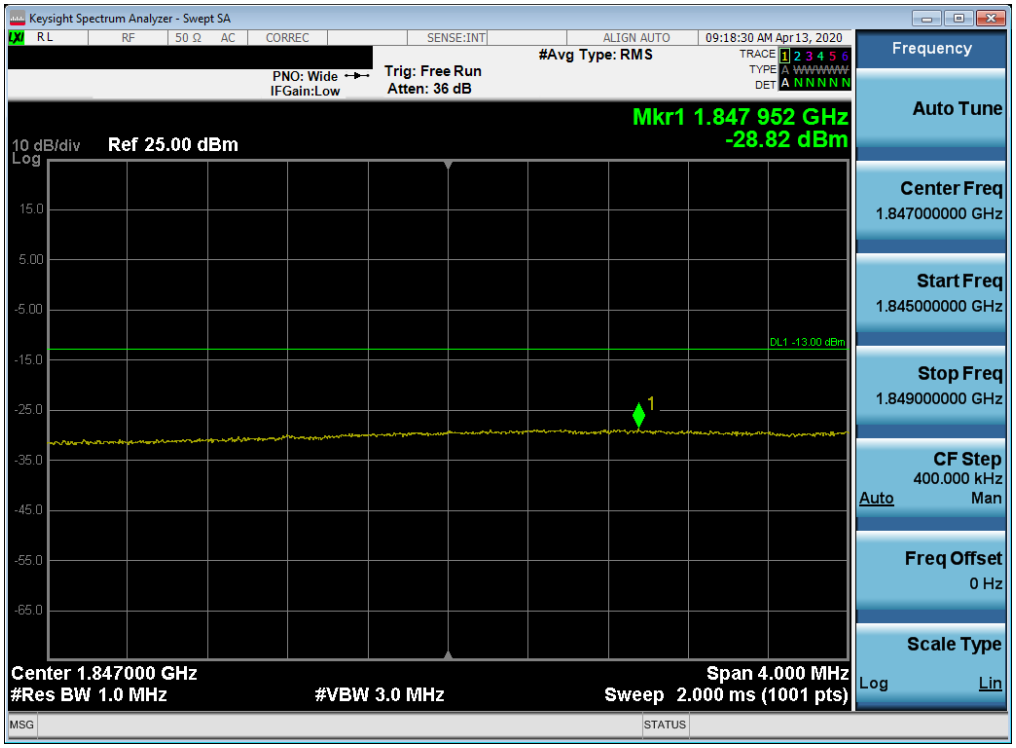
Plot 7-90. Upper Band Edge Plot (LTE Band 2 - 20MHz QPSK – Full RB Configuration)



Plot 7-91. Extended Upper Band Edge Plot (LTE Band 2 - 20MHz QPSK – Full RB Configuration)

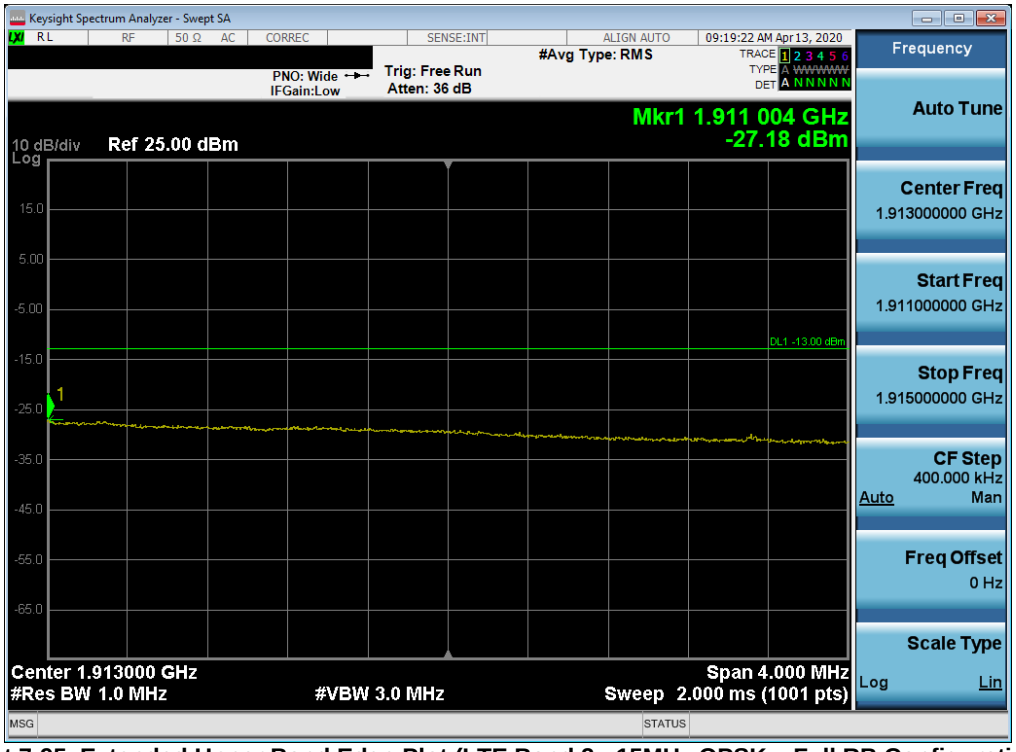


Plot 7-92. Lower Band Edge Plot (LTE Band 2 - 15MHz QPSK – Full RB Configuration)

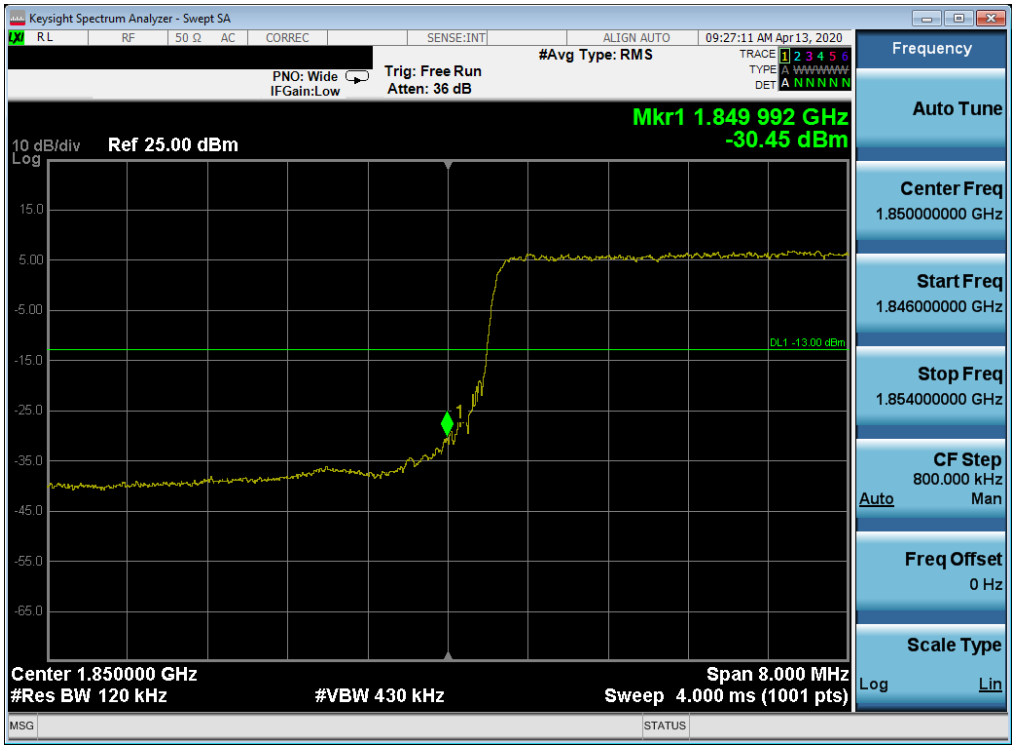


Plot 7-93. Extended Lower Band Edge Plot (LTE Band 2 - 15MHz QPSK – Full RB Configuration)

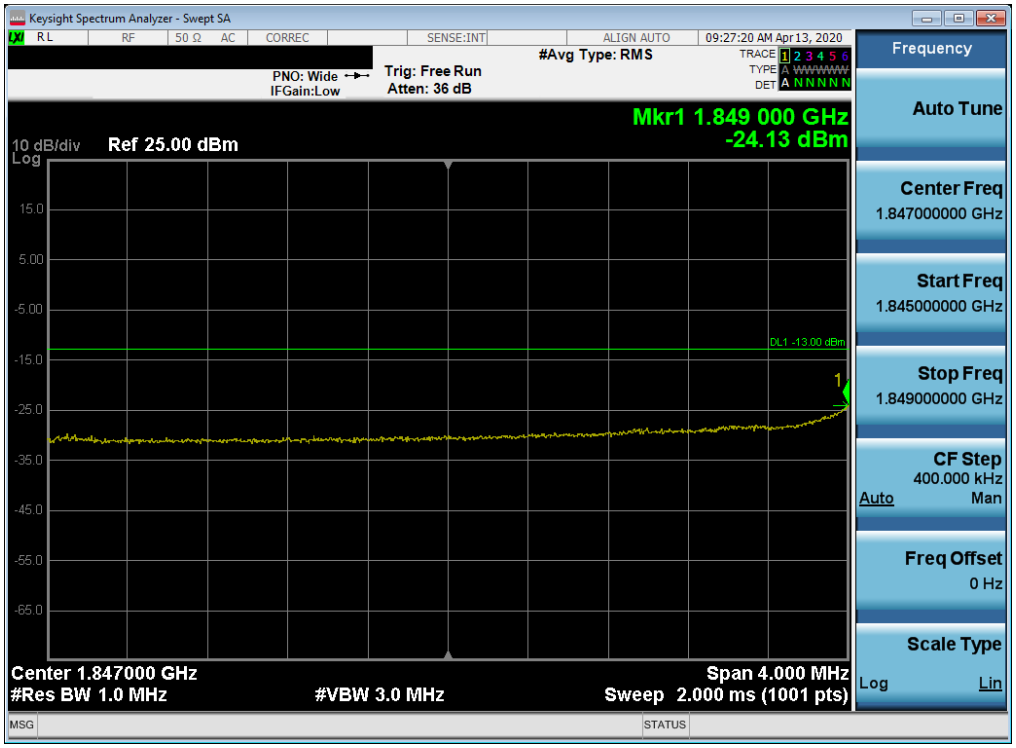
Plot 7-94. Upper Band Edge Plot (LTE Band 2 - 15MHz QPSK – Full RB Configuration)



Plot 7-95. Extended Upper Band Edge Plot (LTE Band 2 - 15MHz QPSK – Full RB Configuration)



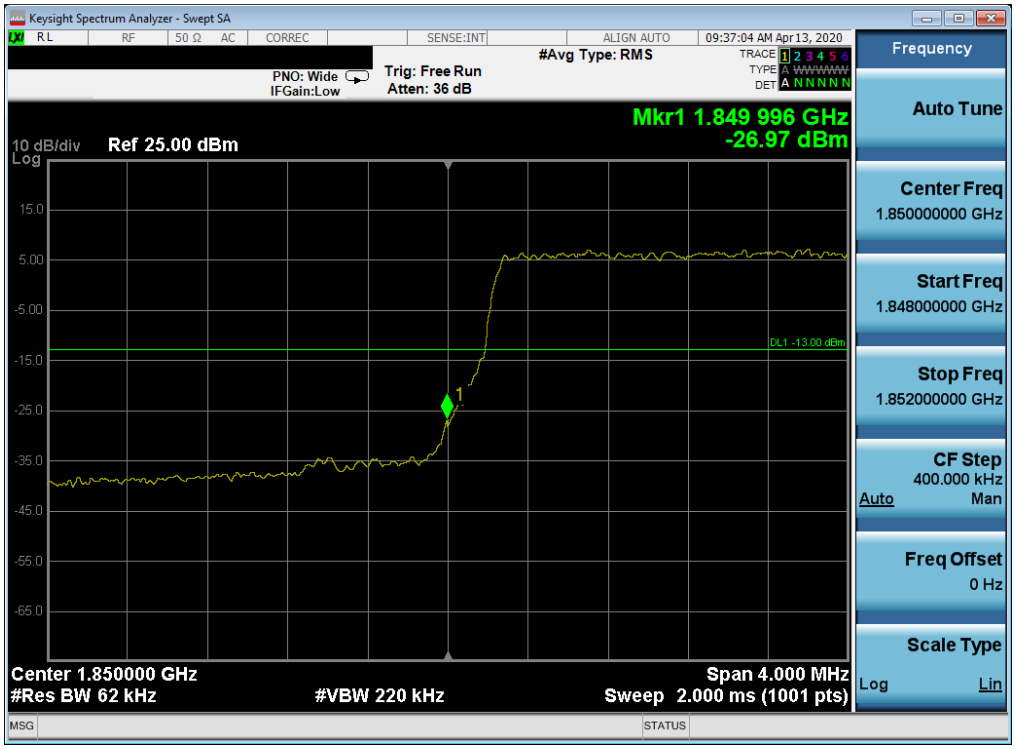
Plot 7-96. Lower Band Edge Plot (LTE Band 2 - 10MHz QPSK – Full RB Configuration)



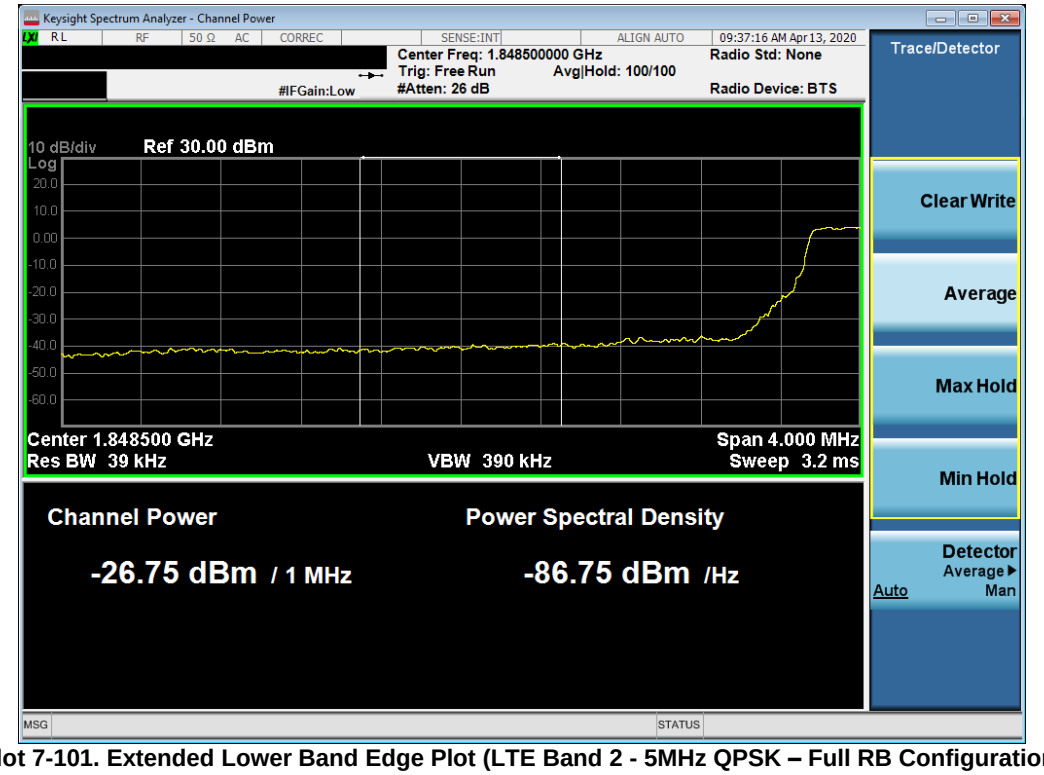
Plot 7-97. Extended Lower Band Edge Plot (LTE Band 2 - 10MHz QPSK – Full RB Configuration)

Plot 7-98. Upper Band Edge Plot (LTE Band 2 - 10MHz QPSK – Full RB Configuration)

Plot 7-99. Extended Upper Band Edge Plot (LTE Band 2 - 10MHz QPSK – Full RB Configuration)

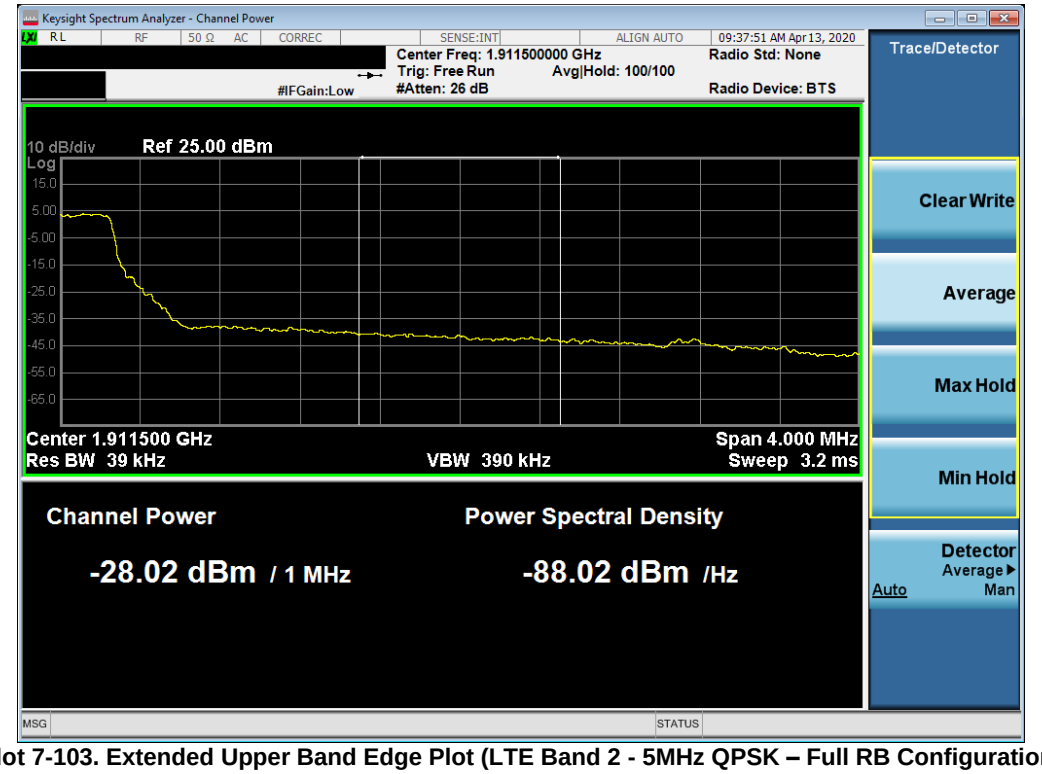


Plot 7-100. Lower Band Edge Plot (LTE Band 2 - 5MHz QPSK – Full RB Configuration)

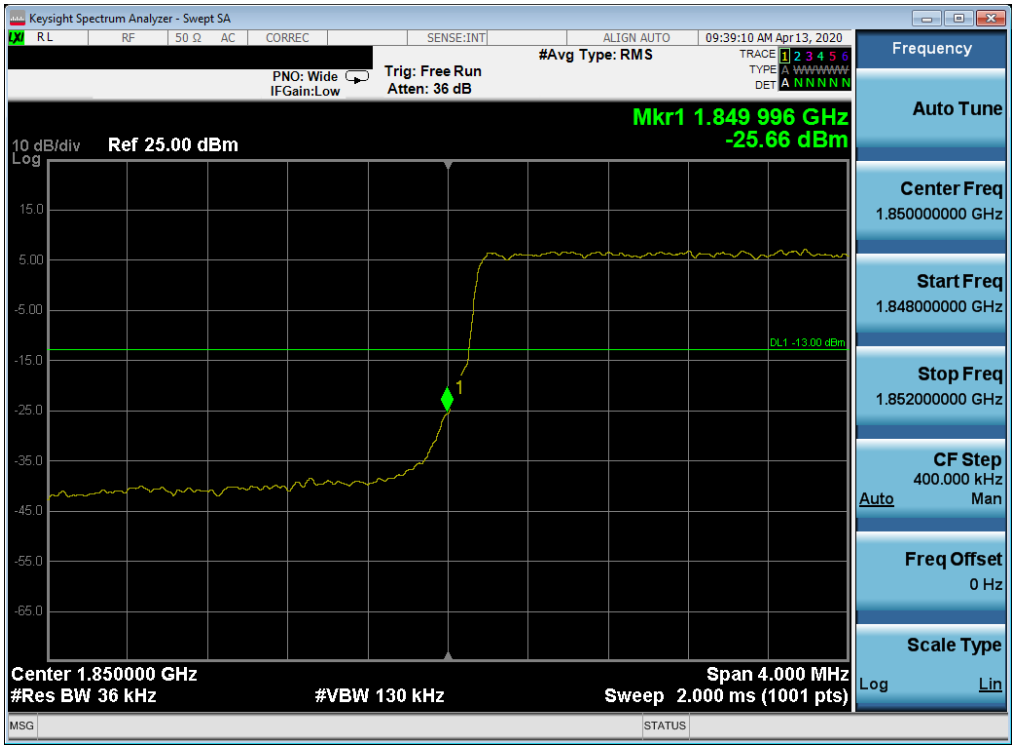


Plot 7-101. Extended Lower Band Edge Plot (LTE Band 2 - 5MHz QPSK – Full RB Configuration)

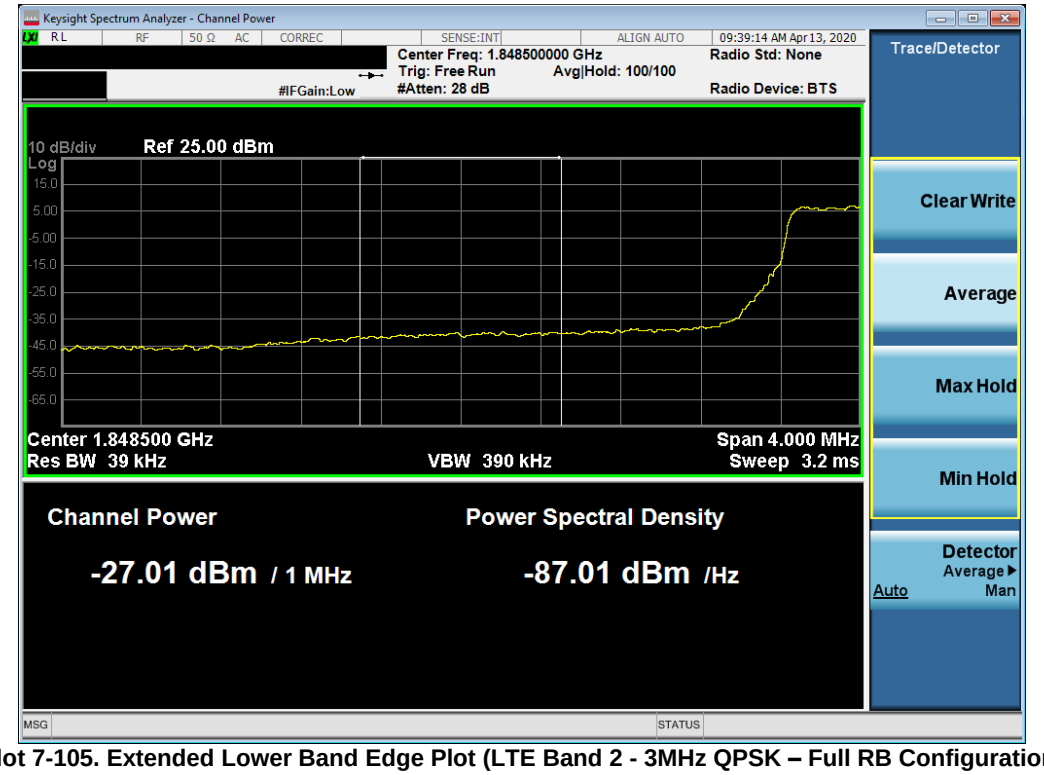
Plot 7-102. Upper Band Edge Plot (LTE Band 2 - 5MHz QPSK – Full RB Configuration)



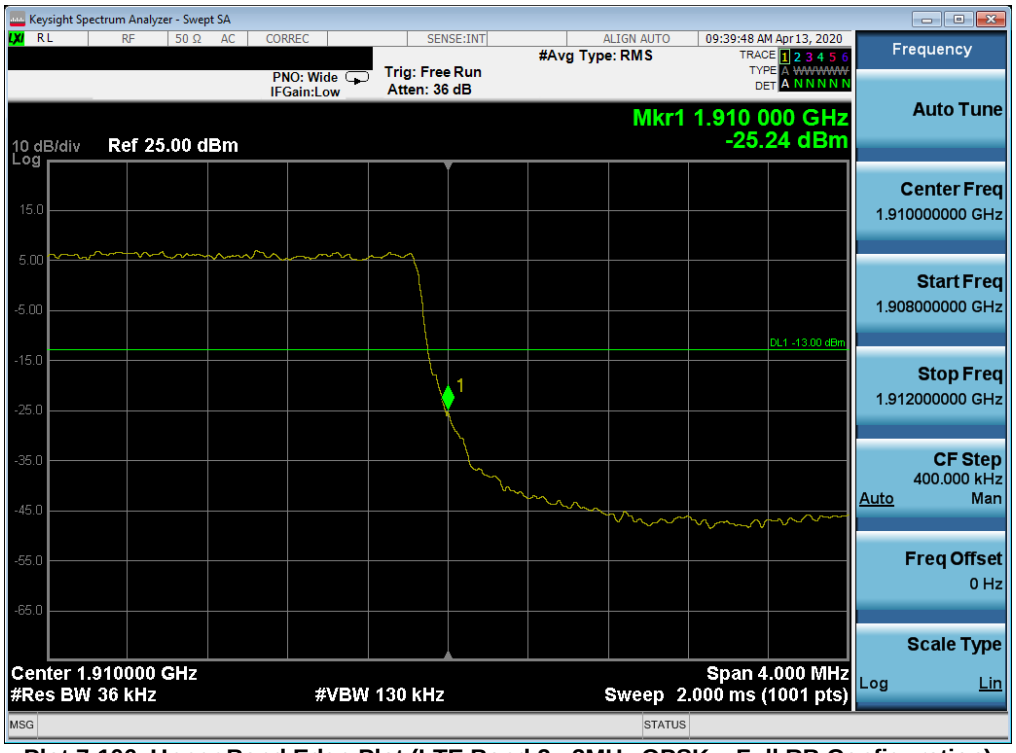
Plot 7-103. Extended Upper Band Edge Plot (LTE Band 2 - 5MHz QPSK – Full RB Configuration)



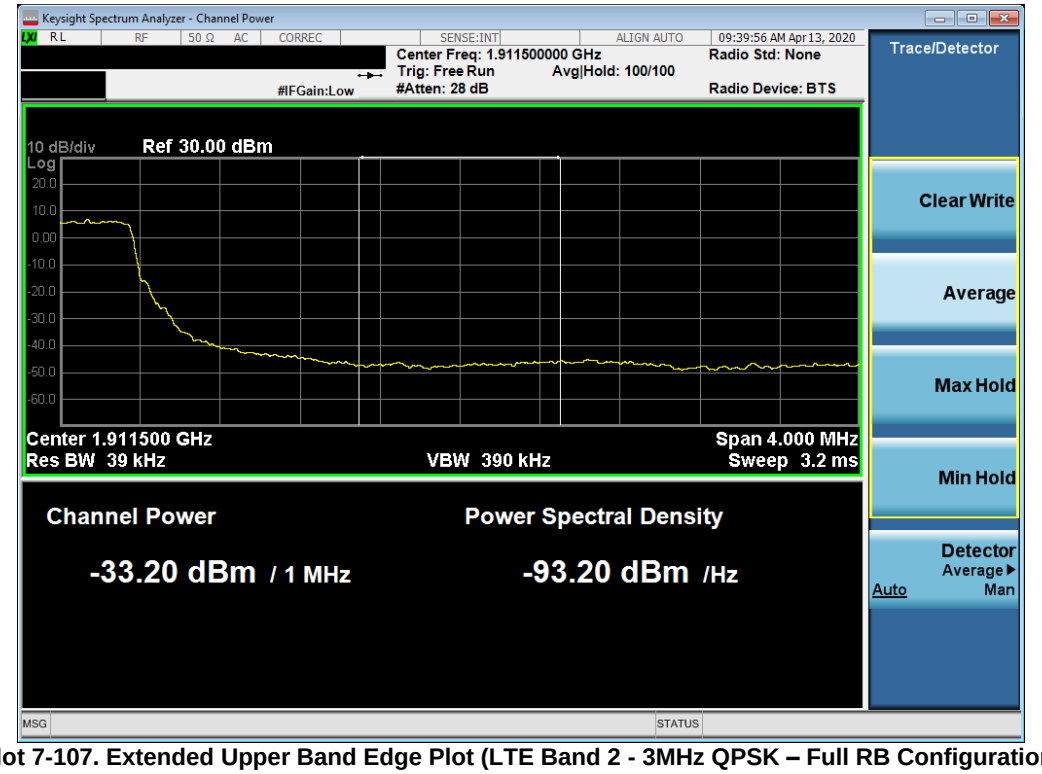
Plot 7-104. Lower Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB Configuration)



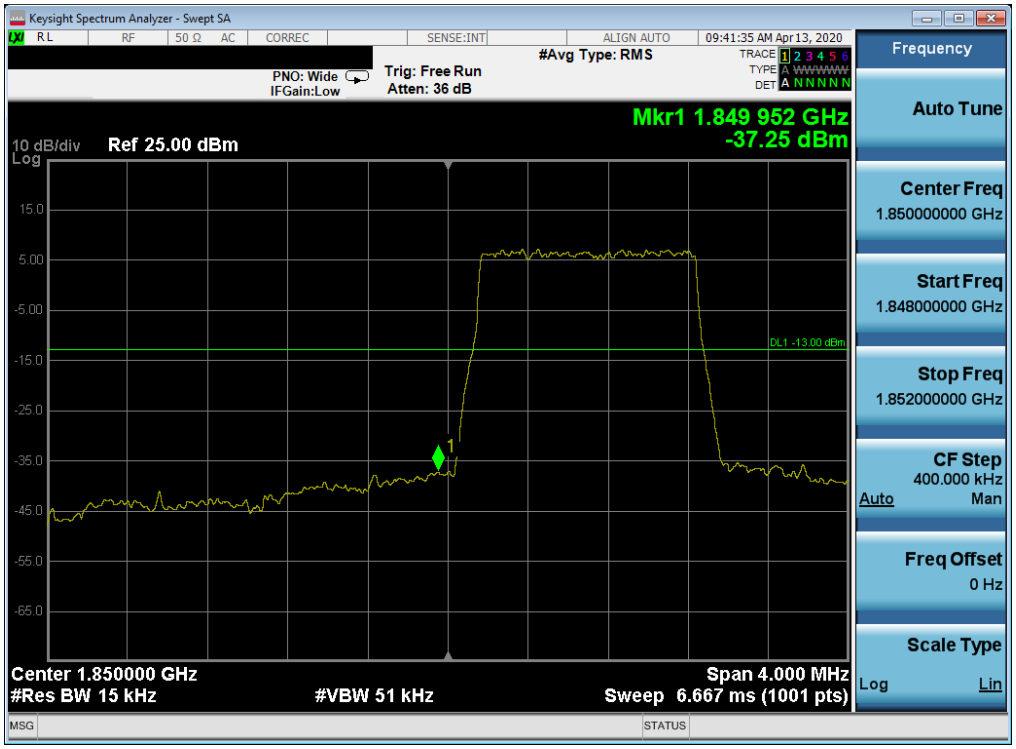
Plot 7-105. Extended Lower Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB Configuration)



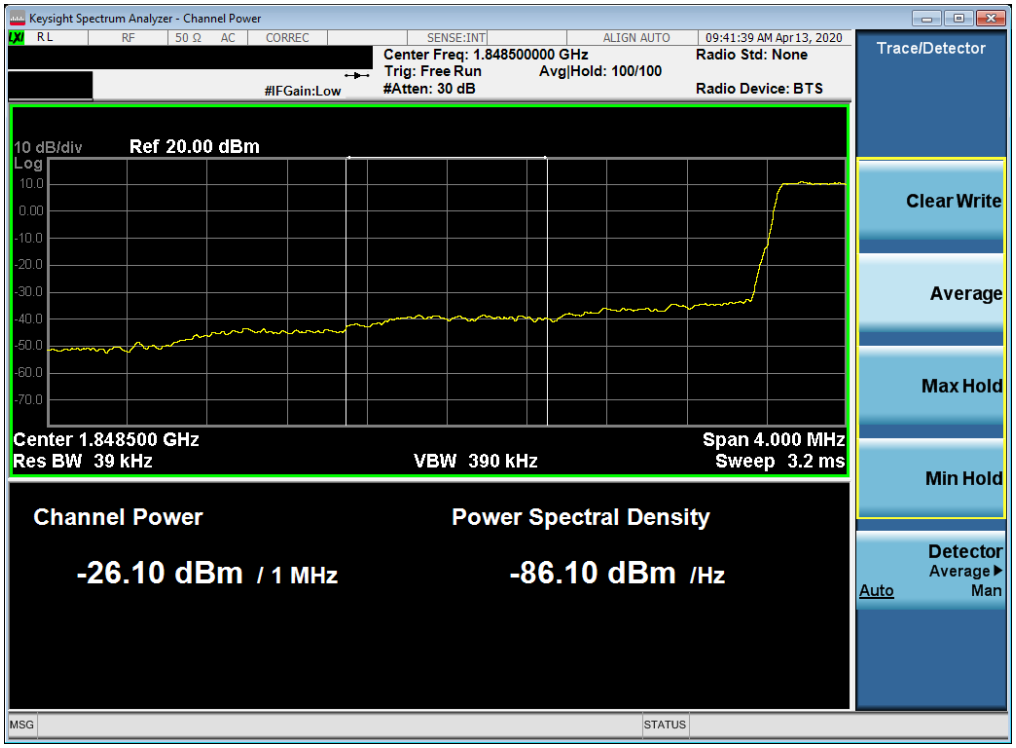
Plot 7-106. Upper Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB Configuration)



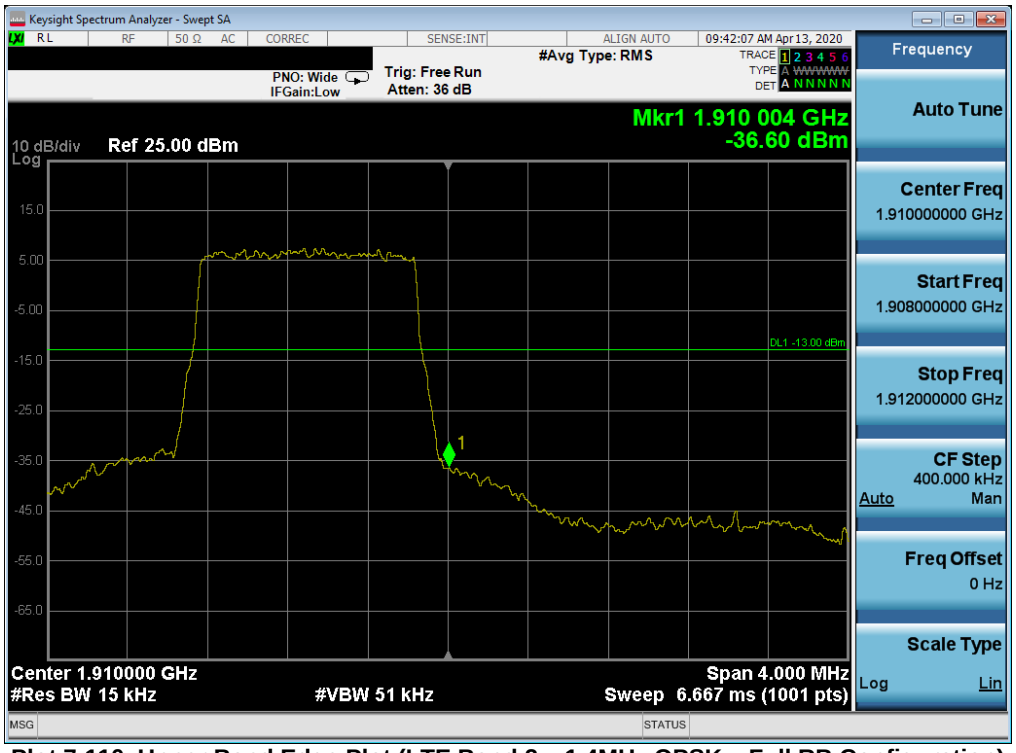
Plot 7-107. Extended Upper Band Edge Plot (LTE Band 2 - 3MHz QPSK – Full RB Configuration)



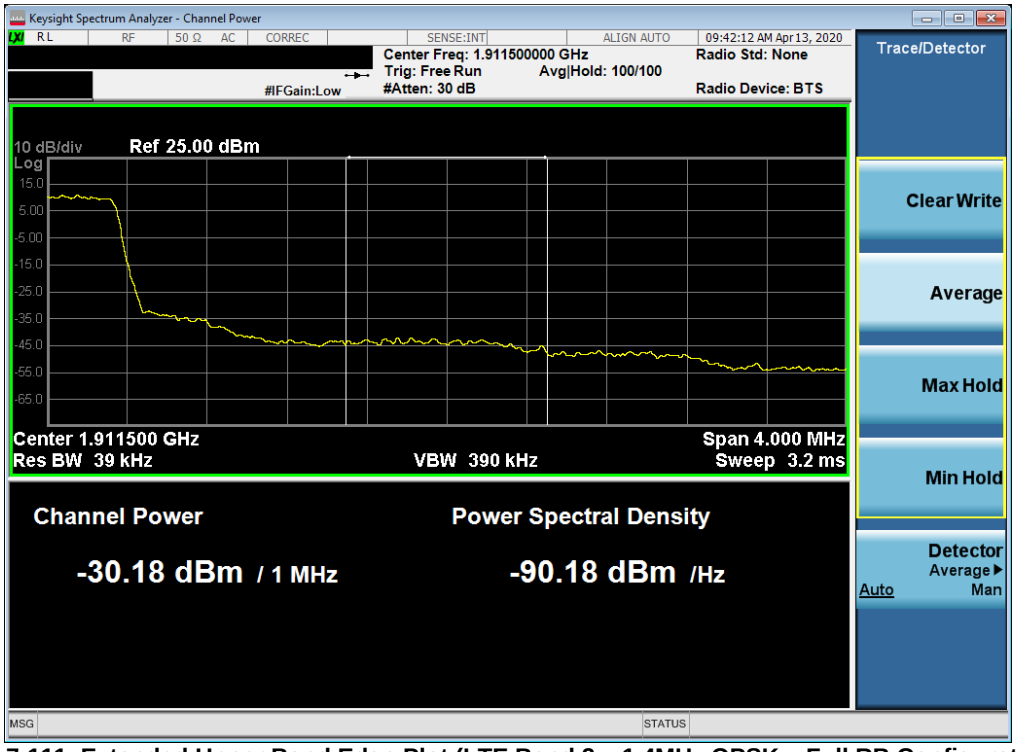
Plot 7-108. Lower Band Edge Plot (LTE Band 2 – 1.4MHz QPSK – Full RB Configuration)



Plot 7-109. Extended Lower Band Edge Plot (LTE Band 2 – 1.4MHz QPSK – Full RB Configuration)

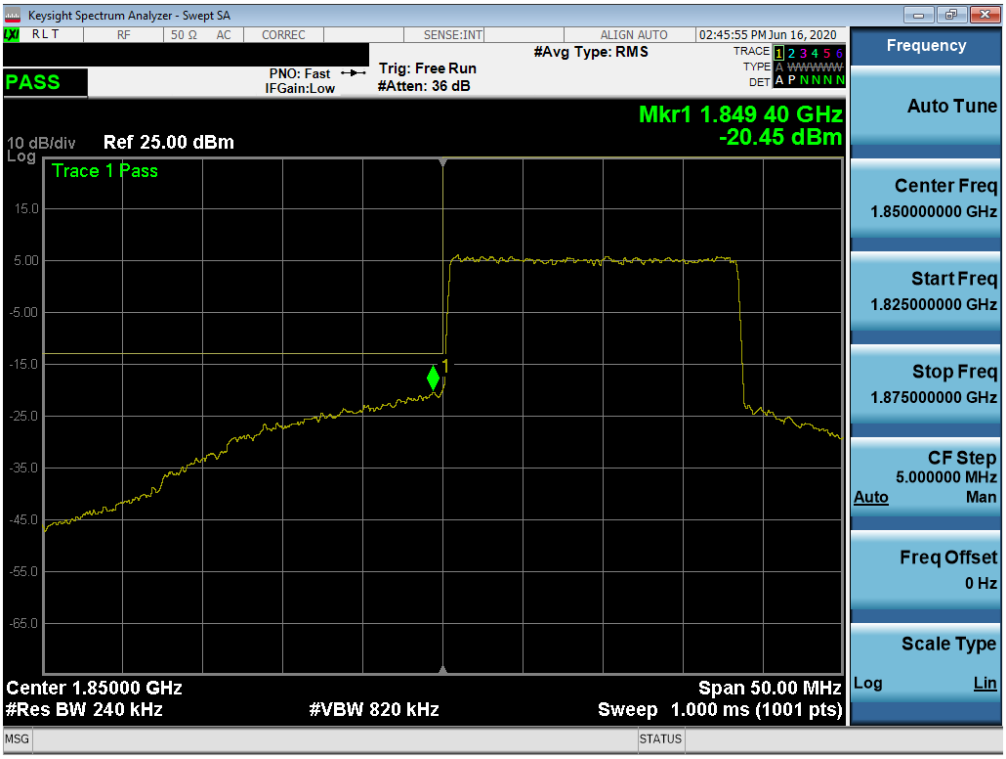


Plot 7-110. Upper Band Edge Plot (LTE Band 2 – 1.4MHz QPSK – Full RB Configuration)

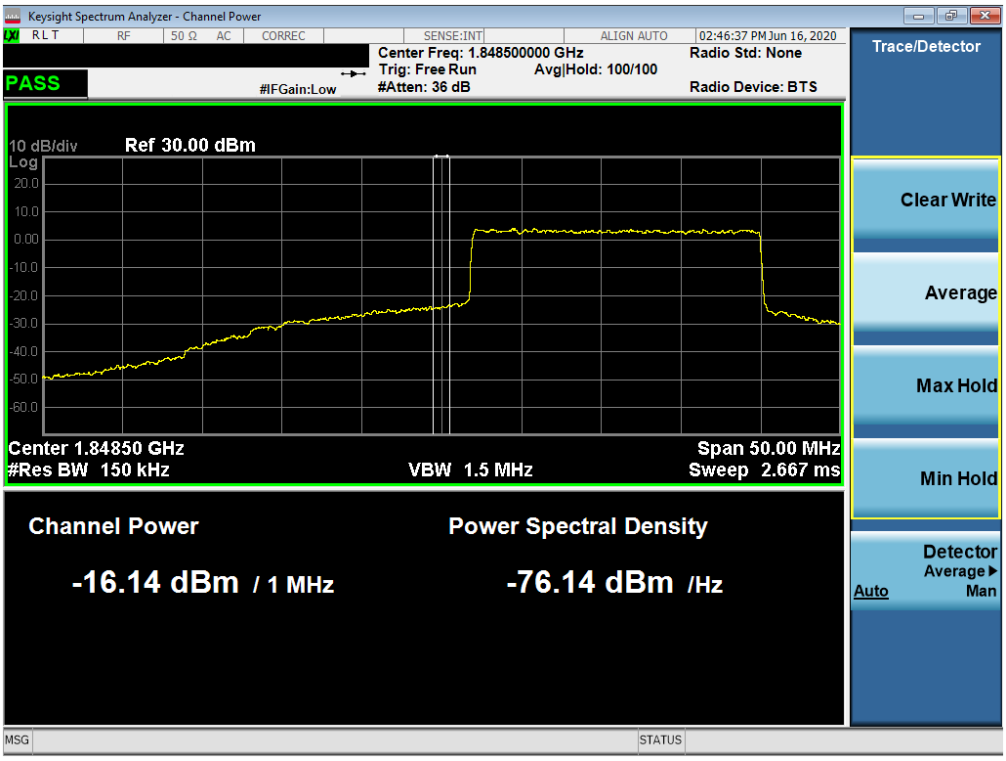


Plot 7-111. Extended Upper Band Edge Plot (LTE Band 2 – 1.4MHz QPSK – Full RB Configuration)

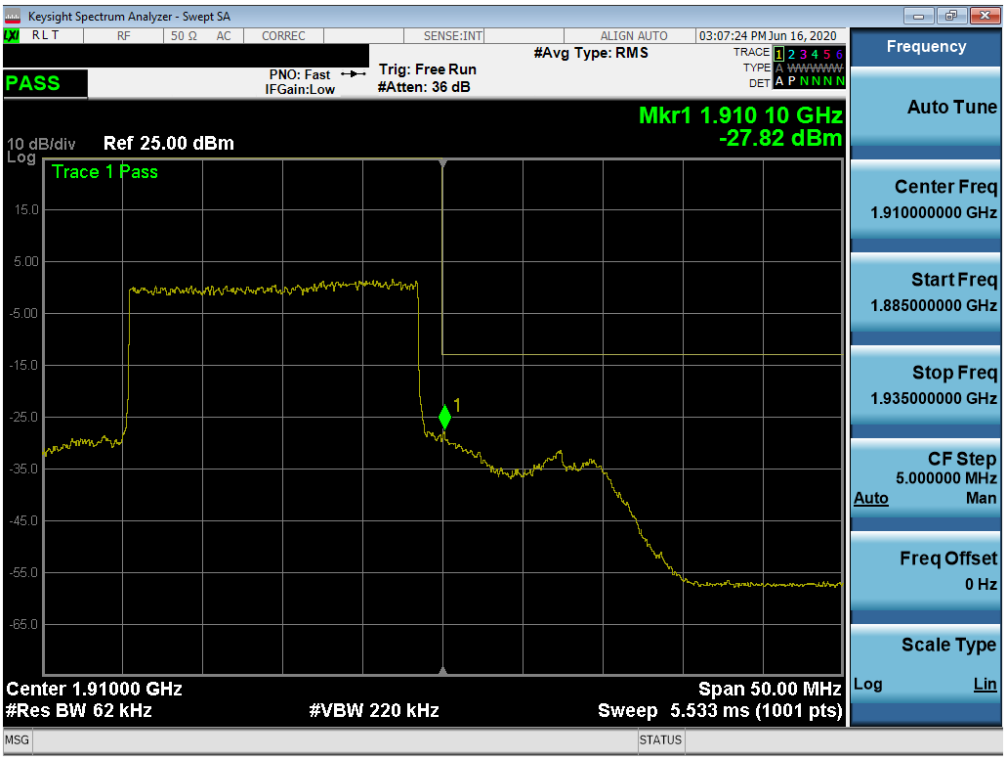
NR Band n2



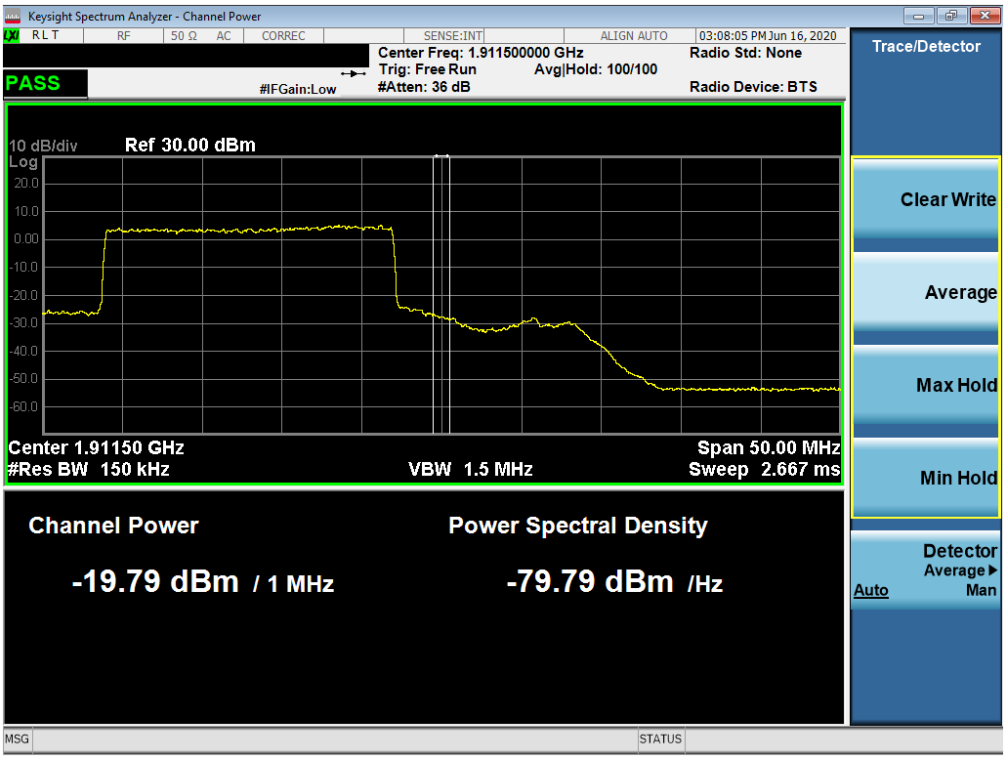
Plot 7-112. Lower Band Edge Plot (NR Band n2 – 20.0MHz - Full RB)



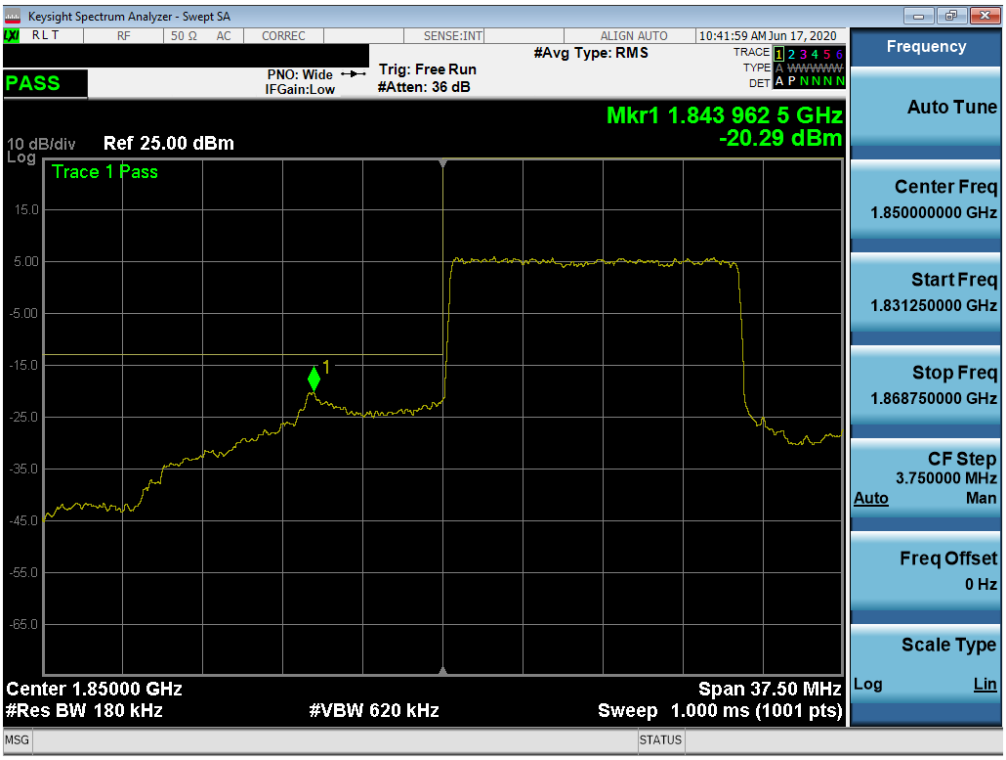
Plot 7-113. Lower Extended Band Edge Plot (NR Band n2 – 20.0MHz - Full RB)



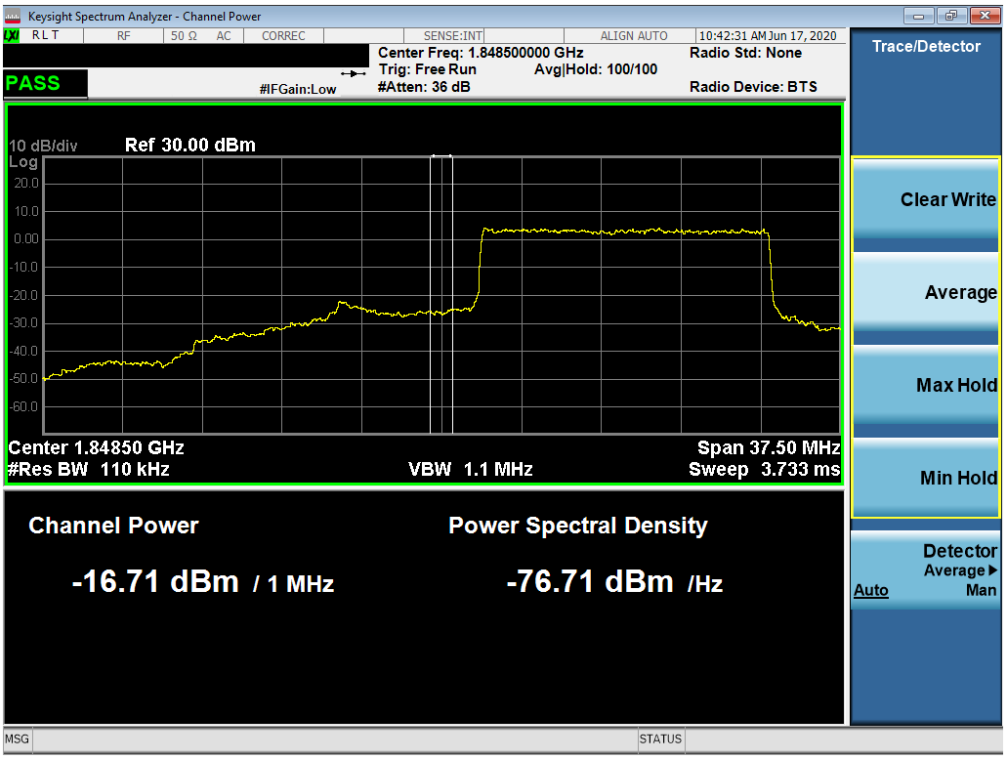
Plot 7-114. Upper Band Edge Plot (NR Band n2 – 20.0MHz - Full RB)



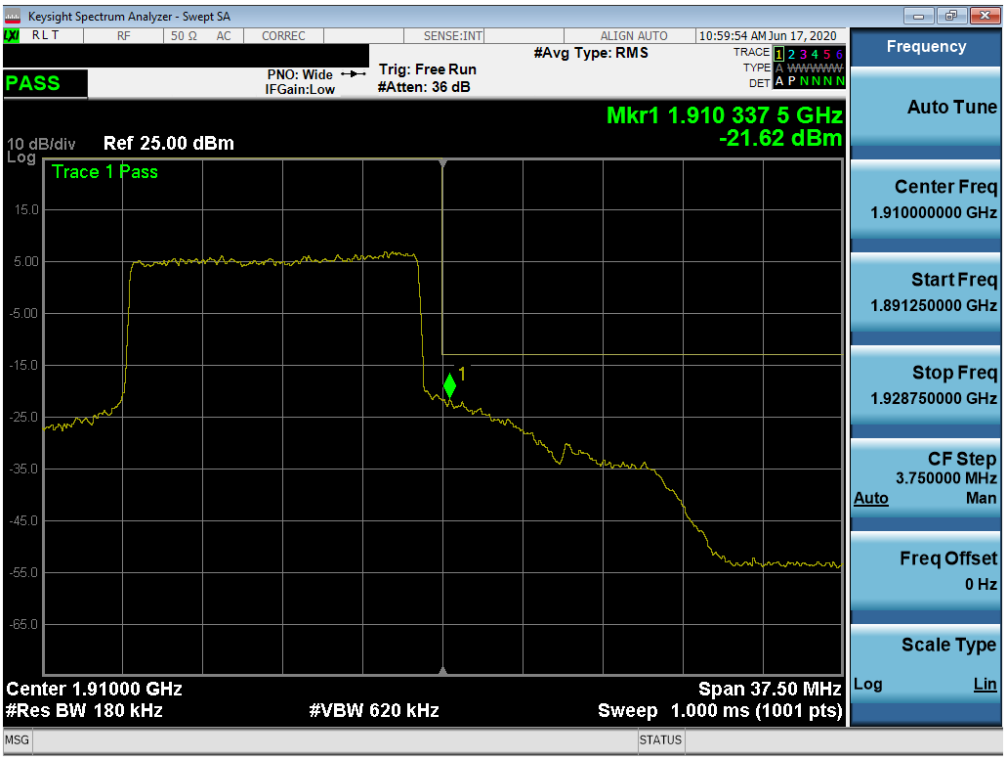
Plot 7-115. Upper Extended Band Edge Plot (NR Band n2 – 20.0MHz - Full RB)



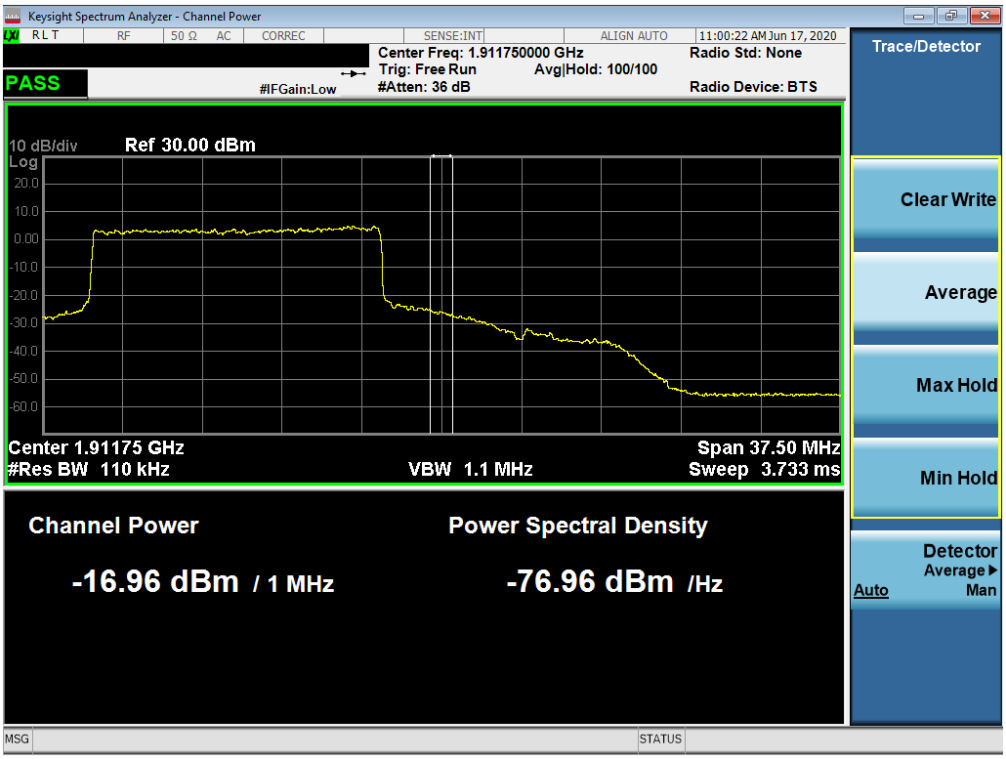
Plot 7-116. Lower Band Edge Plot (NR Band n2 – 15.0MHz - Full RB)



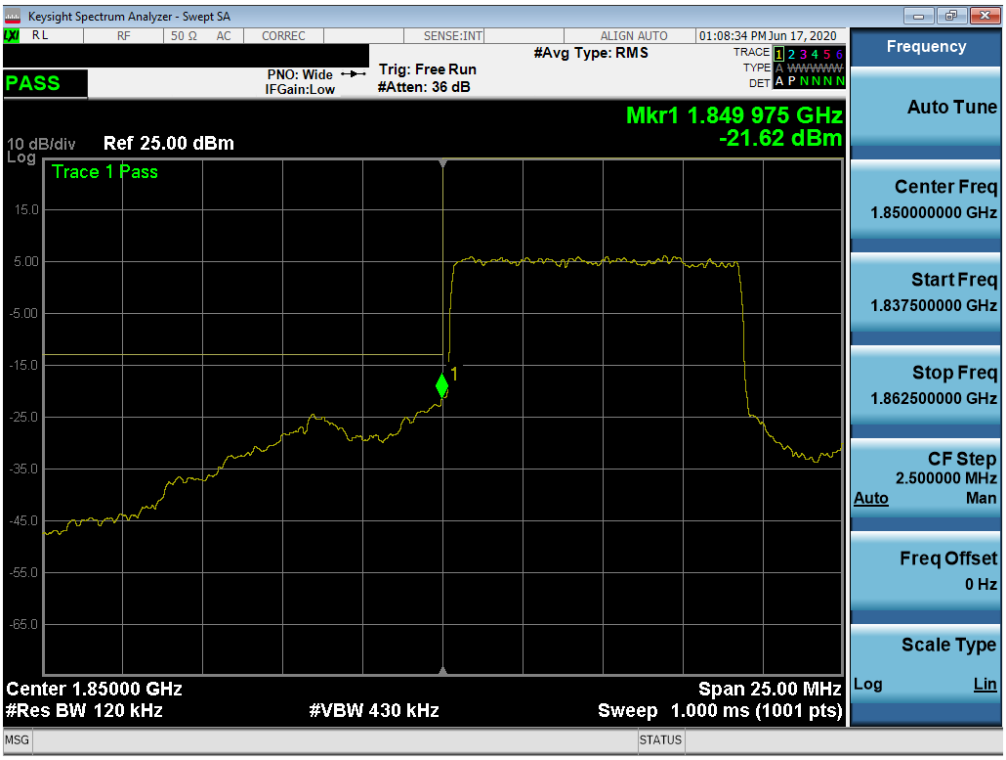
Plot 7-117. Lower Extended Band Edge Plot (NR Band n2 – 15.0MHz - Full RB)



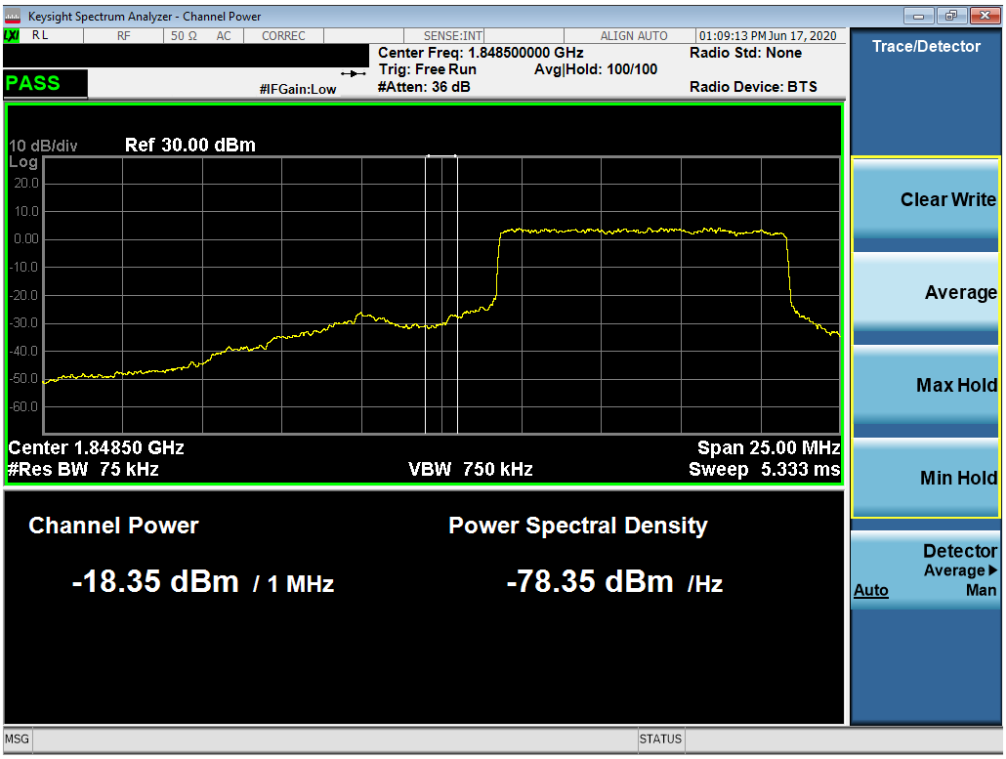
Plot 7-118. Upper Band Edge Plot (NR Band n2 – 15.0MHz - Full RB)



Plot 7-119. Upper Extended Band Edge Plot (NR Band n2 – 15.0MHz - Full RB)



Plot 7-120. Lower Band Edge Plot (NR Band n2 – 10.0MHz - Full RB)



Plot 7-121. Lower Extended Band Edge Plot (NR Band n2 – 10.0MHz - Full RB)