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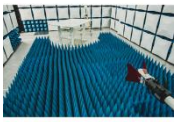

MEASUREMENT REPORT
LTE

Applicant Name:
Apple Inc.
One Apple Park Way
Cupertino, CA 95014
United States

Date of Testing:
05/01/2020 - 08/18/2020
Test Site/Location:
PCTEST Lab. Morgan Hill, CA, USA
Test Report Serial No.:
1C2004270026-03-R1.BCG

FCC ID:	**BCG-A2356**
APPLICANT:	**Apple Inc.**

Application Type:	Certification
Model:	A2356
EUT Type:	Watch
FCC Classification:	PCS Licensed Transmitter Worn on Body (PCT)
FCC Rule Part(s):	22, 24, & 27
Test Procedure(s):	ANSI C63.26-2015, TIA-603-E-2016, KDB 971168 D01 v03r01

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

This revised Test Report (S/N: 1C2004270026-03-R1.BCG) supersedes and replaces the previously issued test report (S/N: 1C2004270026-03.BCG) on the same subject device for the same type of testing as indicated. Please discard or destroy the previously issued test report(s) and dispose of it accordingly.

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

Randy Ortanez
President

ACCREDITED
CERT #2041.02

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TABLE OF CONTENTS

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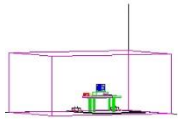
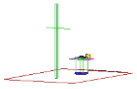


MEASUREMENT REPORT
FCC Part 22, 24, & 27



LTE	FCC Rule Part	Tx Frequency (MHz)	ERP		EIRP		Emission Designator	Modulation
			Max. Power (mW)	Max. Power (dBm)	Max. Power (mW)	Max. Power (dBm)		
Band 5	22H	824.7 - 848.3	0.495	-3.05	0.813	-0.90	1M10G7W	QPSK
Band 5	22H	824.7 - 848.3	0.440	-3.57	0.721	-1.42	1M11D7W	16QAM
Band 5	22H	825.5 - 847.5	0.495	-3.05	0.813	-0.90	2M72G7W	QPSK
Band 5	22H	825.5 - 847.5	0.436	-3.61	0.714	-1.46	2M72D7W	16QAM
Band 5	22H	826.5 - 846.5	0.495	-3.05	0.813	-0.90	4M57G7W	QPSK
Band 5	22H	826.5 - 846.5	0.433	-3.64	0.710	-1.49	4M54D7W	16QAM
Band 5	22H	829 - 844	0.495	-3.05	0.813	-0.90	9M07G7W	QPSK
Band 5	22H	829 - 844	0.433	-3.64	0.710	-1.49	5M46D7W	16QAM
Band 26	22H	824.7 - 848.3	0.495	-3.05	0.813	-0.90	1M10G7W	QPSK
Band 26	22H	824.7 - 848.3	0.440	-3.57	0.721	-1.42	1M11D7W	16QAM
Band 26	22H	825.5 - 847.5	0.495	-3.05	0.813	-0.90	2M72G7W	QPSK
Band 26	22H	825.5 - 847.5	0.438	-3.59	0.718	-1.44	2M72D7W	16QAM
Band 26	22H	826.5 - 846.5	0.495	-3.05	0.813	-0.90	4M57G7W	QPSK
Band 26	22H	826.5 - 846.5	0.433	-3.64	0.710	-1.49	4M54D7W	16QAM
Band 26	22H	829 - 844	0.495	-3.05	0.813	-0.90	9M07G7W	QPSK
Band 26	22H	829 - 844	0.438	-3.59	0.718	-1.44	5M46D7W	16QAM

EUT Overview (Low Bands)

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LTE	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (mW)	Max. Power (dBm)		
Band 4	27	1710.7 - 1754.3	16.144	12.08	1M11G7W	QPSK
Band 4	27	1710.7 - 1754.3	14.421	11.59	1M11D7W	16QAM
Band 4	27	1711.5 - 1753.5	16.069	12.06	2M72G7W	QPSK
Band 4	27	1711.5 - 1753.5	14.256	11.54	2M72D7W	16QAM
Band 4	27	1712.5 - 1752.5	16.634	12.21	4M54G7W	QPSK
Band 4	27	1712.5 - 1752.5	14.655	11.66	4M54D7W	16QAM
Band 4	27	1715 - 1750	16.255	12.11	9M14G7W	QPSK
Band 4	27	1715 - 1750	14.223	11.53	5M29D7W	16QAM
Band 4	27	1717.5 - 1747.5	16.982	12.30	13M7G7W	QPSK
Band 4	27	1717.5 - 1747.5	14.555	11.63	6M27D7W	16QAM
Band 4	27	1720 - 1745	16.672	12.22	18M3G7W	QPSK
Band 4	27	1720 - 1745	14.355	11.57	7M37D7W	16QAM
Band 66	27	1710.7 - 1779.3	16.982	12.30	1M11G7W	QPSK
Band 66	27	1710.7 - 1779.3	14.191	11.52	1M11D7W	16QAM
Band 66	27	1711.5 - 1778.5	16.293	12.12	2M72G7W	QPSK
Band 66	27	1711.5 - 1778.5	14.454	11.60	2M72D7W	16QAM
Band 66	27	1712.5 - 1777.5	16.788	12.25	4M54G7W	QPSK
Band 66	27	1712.5 - 1777.5	14.555	11.63	4M54D7W	16QAM
Band 66	27	1715 - 1775	16.218	12.10	9M14G7W	QPSK
Band 66	27	1715 - 1775	14.388	11.58	5M29D7W	16QAM
Band 66	27	1717.5 - 1772.5	16.331	12.13	13M7G7W	QPSK
Band 66	27	1717.5 - 1772.5	14.555	11.63	6M27D7W	16QAM
Band 66	27	1720 - 1770	16.181	12.09	18M3G7W	QPSK
Band 66	27	1720 - 1770	14.421	11.59	7M37D7W	16QAM
Band 2	24E	1850.7 - 1909.3	28.840	14.60	1M10G7W	QPSK
Band 2	24E	1850.7 - 1909.3	25.586	14.08	1M11D7W	16QAM
Band 2	24E	1851.5 - 1908.5	28.840	14.60	2M73G7W	QPSK
Band 2	24E	1851.5 - 1908.5	25.119	14.00	2M73D7W	16QAM
Band 2	24E	1852.5 - 1907.5	28.840	14.60	4M56G7W	QPSK
Band 2	24E	1852.5 - 1907.5	24.547	13.90	4M56D7W	16QAM
Band 2	24E	1855 - 1905	28.840	14.60	9M12G7W	QPSK
Band 2	24E	1855 - 1905	25.586	14.08	5M62D7W	16QAM
Band 2	24E	1857.5 - 1902.5	28.840	14.60	13M6G7W	QPSK
Band 2	24E	1857.5 - 1902.5	25.468	14.06	5M92D7W	16QAM
Band 2	24E	1860 - 1900	28.840	14.60	18M2G7W	QPSK
Band 2	24E	1860 - 1900	25.410	14.05	7M46D7W	16QAM
Band 25	24E	1850.7 - 1914.3	28.840	14.60	1M10G7W	QPSK
Band 25	24E	1850.7 - 1914.3	25.468	14.06	1M11D7W	16QAM
Band 25	24E	1851.5 - 1913.5	28.840	14.60	2M73G7W	QPSK
Band 25	24E	1851.5 - 1913.5	25.351	14.04	2M73D7W	16QAM
Band 25	24E	1852.5 - 1912.5	28.840	14.60	4M56G7W	QPSK
Band 25	24E	1852.5 - 1912.5	24.946	13.97	4M56D7W	16QAM
Band 25	24E	1855 - 1910	28.840	14.60	9M12G7W	QPSK
Band 25	24E	1855 - 1910	25.351	14.04	5M62D7W	16QAM
Band 25	24E	1857.5 - 1907.5	28.840	14.60	13M6G7W	QPSK
Band 25	24E	1857.5 - 1907.5	25.763	14.11	5M92D7W	16QAM
Band 25	24E	1860 - 1905	28.840	14.60	18M2G7W	QPSK
Band 25	24E	1860 - 1905	25.351	14.04	7M46D7W	16QAM

EUT Overview (Mid Bands)

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LTE	FCC Rule Part	Tx Frequency (MHz)	EIRP		Emission Designator	Modulation
			Max. Power (mW)	Max. Power (dBm)		
Band 7	27	2502.5 - 2567.5	42.855	16.32	4M56G7W	QPSK
Band 7	27	2502.5 - 2567.5	35.400	15.49	4M54D7W	16QAM
Band 7	27	2505 - 2565	42.756	16.31	9M12G7W	QPSK
Band 7	27	2505 - 2565	36.728	15.65	5M27D7W	16QAM
Band 7	27	2507.5 - 2562.5	42.658	16.30	13M6G7W	QPSK
Band 7	27	2507.5 - 2562.5	35.975	15.56	5M91D7W	16QAM
Band 7	27	2510 - 2560	42.364	16.27	18M3G7W	QPSK
Band 7	27	2510 - 2560	36.224	15.59	7M40D7W	16QAM
Band 41	27	2498.5 - 2687.5	43.652	16.40	4M56G7W	QPSK
Band 41	27	2498.5 - 2687.5	34.594	15.39	4M56D7W	16QAM
Band 41	27	2501 - 2685	43.652	16.40	9M11G7W	QPSK
Band 41	27	2501 - 2685	35.727	15.53	5M42D7W	16QAM
Band 41	27	2503.5 - 2682.5	43.652	16.40	13M7G7W	QPSK
Band 41	27	2503.5 - 2682.5	33.113	15.20	5M99D7W	16QAM
Band 41	27	2506 - 2680	43.652	16.40	18M2G7W	QPSK
Band 41	27	2506 - 2680	34.198	15.34	7M27D7W	16QAM

EUT Overview (High Bands)

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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 facility located at 18855 Adams Court, Morgan Hill, CA 95037. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014 and KDB 414788 D01 v01r01.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST located in Morgan Hill, CA 95037, U.S.A.

- PCTEST is an ISO 17025-2005 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.02 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 (22831) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Apple Watch FCC ID: BCG-A2356**. The test data contained in this report pertains only to the emissions due to the EUT's LTE function.

Test Device Serial No.: DVPCR025Q7TX, DVPCF00SPWFJ

2.2 Device Capabilities

This device contains the following capabilities:

850/1700/1900 WCDMA/HSPA, Multi-band LTE, 802.11b/g/n WLAN, Bluetooth (1x, EDR, HDR4, HDR8, LE), NFC

LTE Band 26 (814.7 – 849 MHz) overlaps the entire frequency range of LTE Band 5 (824 – 849 MHz). Therefore, test data provided in this report covers Band 5 and the portion of Band 26 subject to Part 22.

LTE Band 66 (1710 - 1780 MHz) overlaps the entire frequency range of LTE Band 4 (1710 - 1755 MHz). Therefore, test data provided in this report covers Band 4 as well as Band 66.

LTE Band 25 (1850 - 1915 MHz) overlaps the entire frequency range of LTE Band 2 (1850 - 1910 MHz). Therefore, test data provided in this report covers Band 2 as well as Band 25.

This device supports simultaneous transmission operations, which allows for multiple transmitters to transmit simultaneously on the same antenna. The table below shows all configurations possible.

Simultaneous Tx Config	Antenna FCM		
	WLAN	Bluetooth	LTE/WCDMA
	802.11 b/g/n	BDR, EDR, HDR4/8, LE	Mid band/ High band
Config 1	×	✓	✓
Config 2	✓	×	✓

Table 2-1. Simultaneous Transmission Configuration

✓= Support ; × = NOT Support

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2.3 Antenna Description

Following antennas were used for the testing.

Frequency [MHz]	Antenna Gain (dBi)	
	BCM	FCM
814-849	-25.9	N/A
1710-1785	N/A	-11.7
1850-1915	N/A	-9.4
2496-2690	N/A	-7.1

Table 2-2. Highest Antenna Gain

2.4 Test Support Equipment

1	Apple MacBook	Model:	A1398	S/N:	C2QKP008F6F3
	w/AC/DC Adapter	Model:	A1435	S/N:	N/A
2	Apple USB Cable	Model:	Kanzi	S/N:	32530F
	w/ Charging Dock	Model:	FAPS73	S/N:	17481001320
	w/ Dock	Model:	X241	S/N:	CYV7614004
3	USB Lightning Cable	Model:	N/A	S/N:	N/A
	w/ AC Adapter	Model:	A1385	S/N:	N/A
4	Wireless Charging Pad (WCP)	Model:	EVT	S/N:	DLC9223004YLNWL43
5	X1456 Test Pathfinder Sinsa Board	Model:	920-06235-01	S/N:	N/A
	SiP Cradle	Model:	P1 X1819B	S/N:	N/A
6	DC Power Supply	Model:	KPS3010D	S/N:	N/A

Table 2-3. Test Support Equipment List

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2.5 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015, 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.

The worst case configuration was investigated for various types of wristbands, metal and non-metal wristbands. The EUT was also investigated with and without wireless charger. The worst case configuration found was used for all testing.

For emissions from 1GHz – 18GHz, low, mid, and high channels were tested with highest power and worst case configuration. The emissions below 1GHz and above 18GHz were tested with the highest transmitting power and the worst case channel.

The EUT was manipulated through three orthogonal planes of X-orientation (flatbed), Y-orientation (landscape), and Z-orientation (portrait) during the testing. Only the worst case emissions were reported in this test report.

This device only supports 27RBs or less for 16-QAM uplink.

All possible simultaneous transmission configurations have been investigated and the worst case config has been reported.

Description	WLAN	LTE (Band 41)
Antenna	FCM	FCM
Channel	6	39750
Operating Frequency (MHz)	2437	2506
Mode/Modulation	802.11b	QPSK/1RB/20MHz

Table 2-4. Worst Case Simultaneous Transmission Configuration

2.6 Software and Firmware

The test was conducted with firmware version wOS 7.0 installed on the EUT.

2.7 EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and no modifications were made during testing.

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3.0 DESCRIPTION OF TESTS

3.1 Measurement Procedure

The measurement procedures described in the document titled "Land Mobile FM or PM – Communications Equipment – Measurements and Performance Standards" (ANSI C63.26-2015/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 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. Per the guidelines of KDB 412172 D01 v01r01, radiated power levels are measured using the following formula:

$$\text{ERP or EIRP} = P_T + G_T - L_C$$

Where P_T is the transmitter output power, expressed in dBm, G_T is the gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP), and L_C signal attenuation in the connecting cable between the transmitter and antenna in dB.

Per the guidance of ANSI C63.26-2015/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 $_{[dB]}$.

The calculated P_d levels are then compared to the absolute spurious emission limit of -13dBm which is equivalent to the required minimum attenuation of 43 + $10\log_{10}$(Power $_{[Watts]}$). For Band 7 and 41, the calculated P_d levels are compared to the absolute spurious emission limit of -25dBm which is equivalent to the required minimum attenuation of 55 + $10\log_{10}$(Power $_{[Watts]}$).

Per KDB 414788 D01 v01r01, radiated emission test sites other than open-field test sites (e.g., shielded anechoic chambers), may be employed for emission measurements below 30MHz if characterized so that the measurements correspond to those obtained at an open-field test site. To determine test site equivalency, a reference sample transmitting at 149kHz was measured on an open field test site (asphalt with no ground plane) and then measured in the 3m semi-anechoic chamber. A calibrated 60cm loop antenna was used while the reference device was rotated through the X, Y and Z axis in order to capture the worst case level. A maximum deviation of 2.77dB at 149kHz was measured when comparing the 3 meter semi-anechoic chamber to the open field site.

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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	1.30
Radiated Disturbance (<1GHz)	4.15
Radiated Disturbance (>1GHz)	4.59
Radiated Disturbance (>18GHz)	4.96

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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
Agilent Technologies	N9030A	3Hz-44GHz PXA Signal Analyzer	3/4/2020	Annual	3/4/2021	MY49430244
ATM	180-442A-KF	20dB Nominal Gain Horn Antenna	10/29/2019	Annual	10/29/2020	T058701-02
ESPEC	SU-241	Tabletop Temperature Chamber	9/3/2019	Annual	9/3/2020	92009574
ETS-Lindgren	3142E–PA	Pre-Amplifier (30MHz - 6GHz)	9/19/2019	Annual	9/19/2020	213236
ETS-Lindgren	3142E	BiConiLog Antenna (30MHz - 6GHz)	1/6/2020	Annual	1/6/2021	224569
ETS-Lindgren	3117	Double Ridged Guide Antenna (1-18 GHz)	4/21/2020	Annual	4/21/2021	205956
Rohde & Schwarz	FSV40	Signal Analyzer (10Hz-40GHz)	3/2/2020	Annual	3/2/2021	101619
Rohde & Schwarz	ESW26	EMI Test Receiver	6/1/2020	Annual	6/1/2021	101299
Rohde & Schwarz	ESW44	EMI Test Receiver	9/13/2019	Annual	9/13/2020	101570
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	11/16/2019	Annual	11/16/2020	164715
Rohde & Schwarz	CMW500	Wideband Radio Communication Tester	4/16/2020	Annual	4/16/2021	166869
Rohde & Schwarz	TS-PR1840	Pre-Amplifier (18GHz - 40GHz)	9/19/2019	Annual	9/19/2020	100051
Rohde & Schwarz	TC-TA18	Cross Polarized Vivaldi Antenna (400MHz-18GHz)	11/14/2019	Annual	11/14/2020	101057
Rohde & Schwarz	HFH2-Z2	Loop Antenna	3/12/2020	Annual	3/12/2021	100546

Table 5-1. Test Equipment List

Notes:

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.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7W

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
W = Combination of Any

QAM Modulation

Emission Designator = 8M45D7W

LTE BW = 8.45 MHz
D = Amplitude/Angle Modulated
7 = Quantized/Digital Info
W = Combination of Any

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).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Apple Inc.

FCC ID: BCG-A2356

FCC Classification: PCS Licensed Transmitter Worn on Body (PCT)

Mode(s): LTE

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
2.1049	Occupied Bandwidth	N/A	CONDUCTED	PASS	Section 7.2
2.1051 22.917(a) 24.238(a) 27.53(h)	Out of Band Emissions	> 43 + 10 $\log_{10}$ (P[Watts]) at Band Edge and for all out-of-band emissions			Section 7.3, 7.4
27.53(m)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.3, 7.4
27.53(a)	Out of Band Emissions	Undesirable emissions must meet the limits detailed in 27.53(a)			Section 7.3, 7.4
24.232(d) 27.50(d)(5)	Peak-Average Ratio	< 13 dB			Section 7.5
2.1046	Transmitter Conducted Output Power	N/A			Refer to RF Exposure Report
2.1055 22.355 24.235 27.54	Frequency Stability	< 2.5 ppm (Part 22) and fundamental emissions stay within authorized frequency block (Part 24, 27)			Section 7.8

Table 7-1. Summary of Conducted Test Results

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FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
22.913(a)(5)	Effective Radiated Power / Equivalent Isotropic Radiated Power (Band 26/5)	< 7 Watts max. ERP	CONDUCTED	PASS	Section 7.6
24.232(c) 27.50(h)(2)	Equivalent Isotropic Radiated Power (Band 25/2, 7, 41)	< 2 Watts max. EIRP			Section 7.6
27.50(d)(4)	Equivalent Isotropic Radiated Power (Band 66/4)	< 1 Watts max. EIRP			Section 7.6
2.1053 22.917(a) 24.238(a) 27.53(h)	Undesirable Emissions	> 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions	RADIATED		Section 7.7
27.53(m)	Undesirable Emissions	Undesirable emissions must meet the limits detailed in 27.53(m)			Section 7.7

Table 7-2. Summary of Radiated 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 (Sections 7.2, 7.3, 7.4, 7.5) 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) 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 "LTE Automation," Version 5.3.

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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.

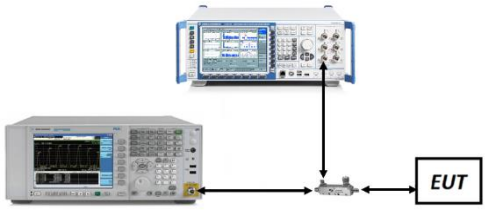

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

1. This device only supports 27RBs or less for 16-QAM uplink.
2. All RB sizes have been investigated and Full RB configuration was found and reported as worst case.

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LTE	BW (MHz)	Modulation	Occupied BW [kHz]
Band 5	1.4	QPSK	1104.2
Band 5	1.4	16QAM	1107.8
Band 5	3	QPSK	2721.2
Band 5	3	16QAM	2724.8
Band 5	5	QPSK	4568.5
Band 5	5	16QAM	4536.1
Band 5	10	QPSK	9074.6
Band 5	10	16QAM	5462.1
Band 26	1.4	QPSK	1104.2
Band 26	1.4	16QAM	1107.8
Band 26	3	QPSK	2721.2
Band 26	3	16QAM	2724.8
Band 26	5	QPSK	4568.5
Band 26	5	16QAM	4536.1
Band 26	10	QPSK	9074.6
Band 26	10	16QAM	5462.1

Table 7-3. Occupied Band Width Results (Low Bands)

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LTE	BW (MHz)	Modulation	Occupied BW [kHz]
Band 4	1.4	QPSK	1110.6
Band 4	1.4	16QAM	1107.1
Band 4	3	QPSK	2724.6
Band 4	3	16QAM	2724.7
Band 4	5	QPSK	4536.4
Band 4	5	16QAM	4537.5
Band 4	10	QPSK	9144.2
Band 4	10	16QAM	5290.6
Band 4	15	QPSK	13653.0
Band 4	15	16QAM	6266.6
Band 4	20	QPSK	18280.0
Band 4	20	16QAM	7373.4
Band 66	1.4	QPSK	1110.6
Band 66	1.4	16QAM	1107.1
Band 66	3	QPSK	2724.6
Band 66	3	16QAM	2724.7
Band 66	5	QPSK	4536.4
Band 66	5	16QAM	4537.5
Band 66	10	QPSK	9144.2
Band 66	10	16QAM	5290.6
Band 66	15	QPSK	13653.0
Band 66	15	16QAM	6266.6
Band 66	20	QPSK	18280.0
Band 66	20	16QAM	7373.4
Band 2	1.4	QPSK	1104.8
Band 2	1.4	16QAM	1110.7
Band 2	3	QPSK	2728.9
Band 2	3	16QAM	2725.4
Band 2	5	QPSK	4556.0
Band 2	5	16QAM	4555.5
Band 2	10	QPSK	9115.2
Band 2	10	16QAM	5615.0
Band 2	15	QPSK	13633.0
Band 2	15	16QAM	5923.8
Band 2	20	QPSK	18245.0
Band 2	20	16QAM	7457.4
Band 25	1.4	QPSK	1104.8
Band 25	1.4	16QAM	1110.7
Band 25	3	QPSK	2728.9
Band 25	3	16QAM	2725.4
Band 25	5	QPSK	4556.0
Band 25	5	16QAM	4555.5
Band 25	10	QPSK	9115.2
Band 25	10	16QAM	5615.0
Band 25	15	QPSK	13633.0
Band 25	15	16QAM	5923.8
Band 25	20	QPSK	18245.0
Band 25	20	16QAM	7457.4

Table 7-4. Occupied Band Width Results (Mid Bands)

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LTE	BW (MHz)	Modulation	Occupied BW [kHz]
Band 7	5	QPSK	4561.7
Band 7	5	16QAM	4541.2
Band 7	10	QPSK	9121.5
Band 7	10	16QAM	5271.2
Band 7	15	QPSK	13623.0
Band 7	15	16QAM	5909.9
Band 7	20	QPSK	18327.0
Band 7	20	16QAM	7396.7
Band 41	5	QPSK	4559.4
Band 41	5	16QAM	4555.6
Band 41	10	QPSK	9112.0
Band 41	10	16QAM	5422.3
Band 41	15	QPSK	13666.0
Band 41	15	16QAM	5985.2
Band 41	20	QPSK	18180.0
Band 41	20	16QAM	7273.8

Table 7-5. Occupied Band Width Results (High Bands)

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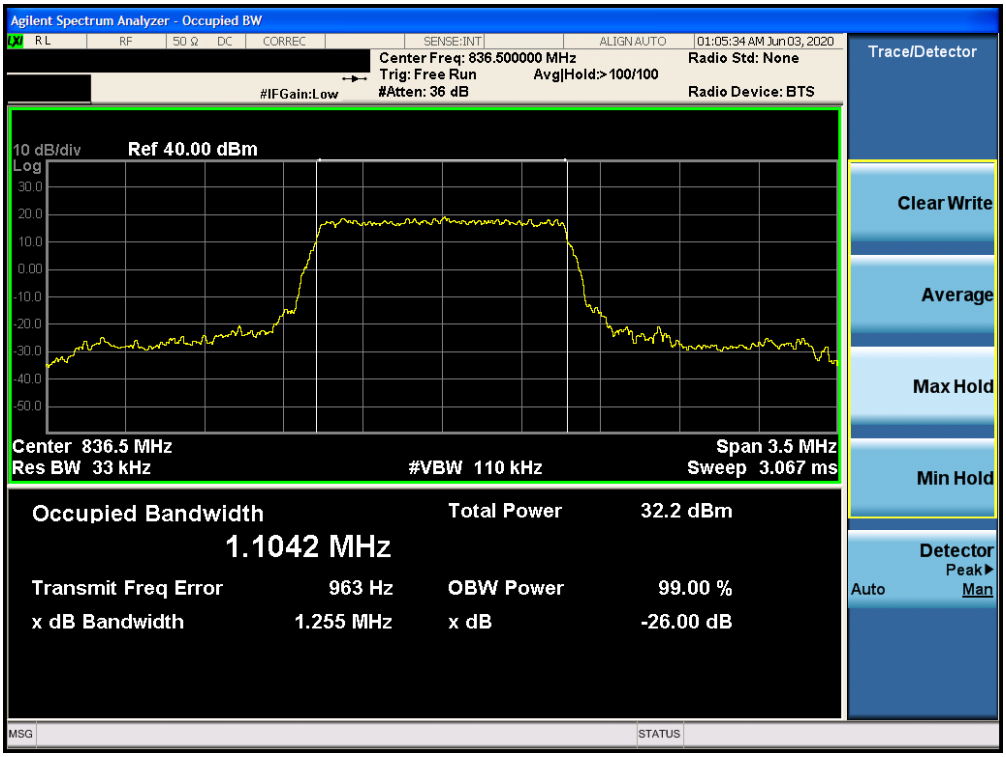
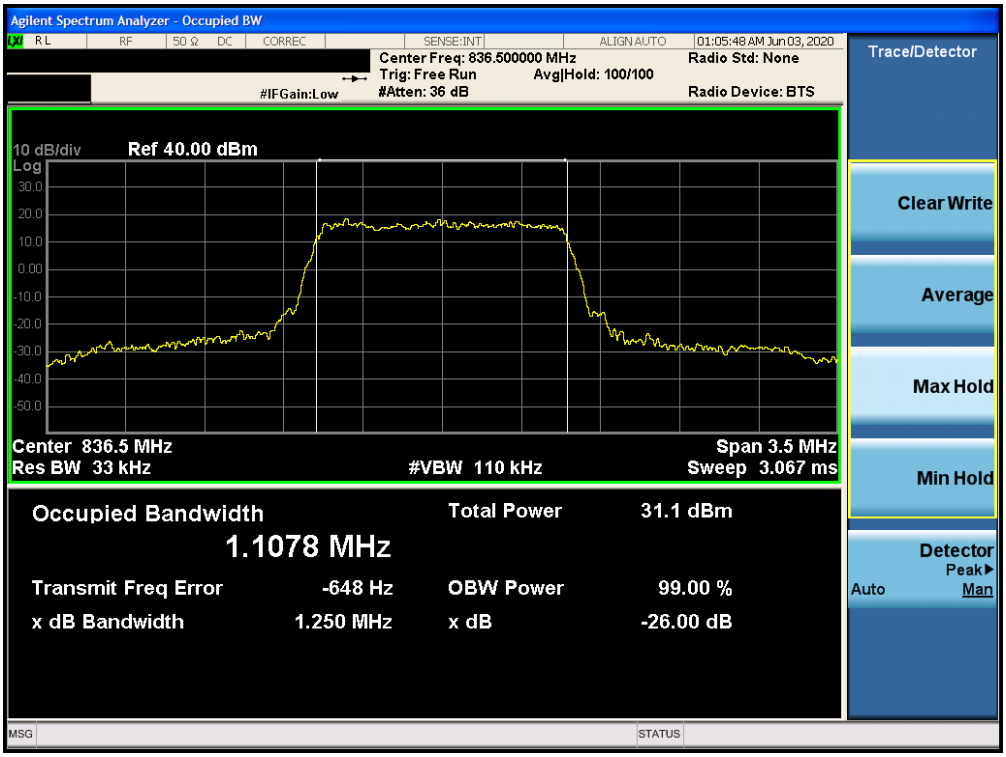
Band 26/5



Plot 7-1. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-2. Occupied Bandwidth Plot (Band 26/5 - 1.4MHz 16-QAM - Full RB Configuration)

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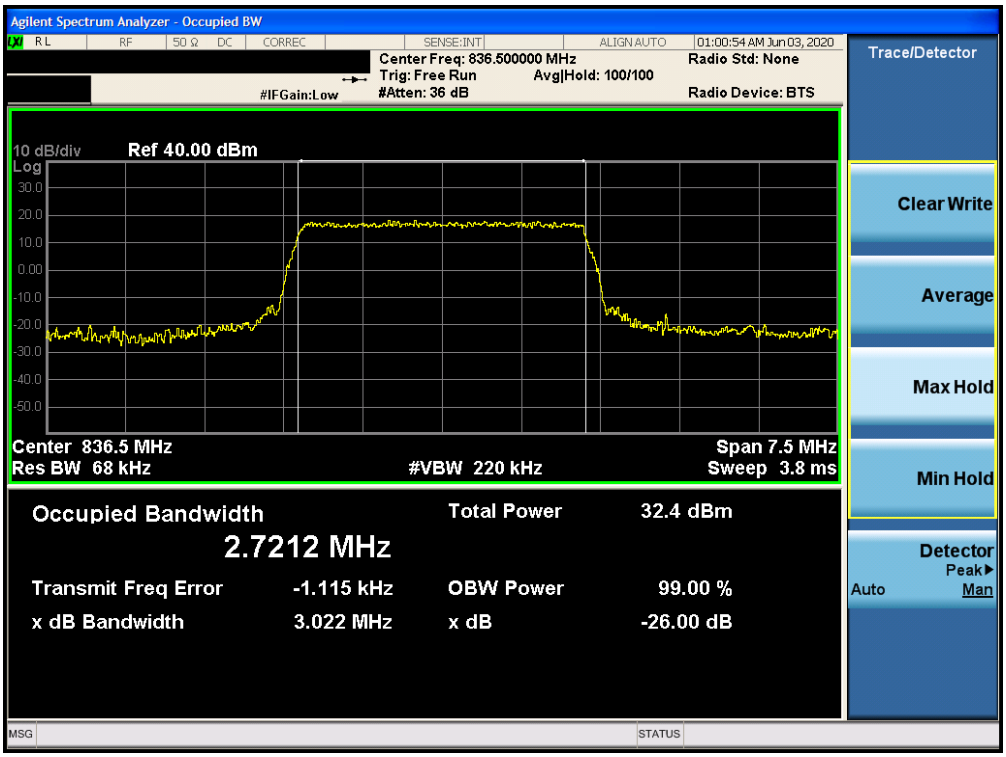
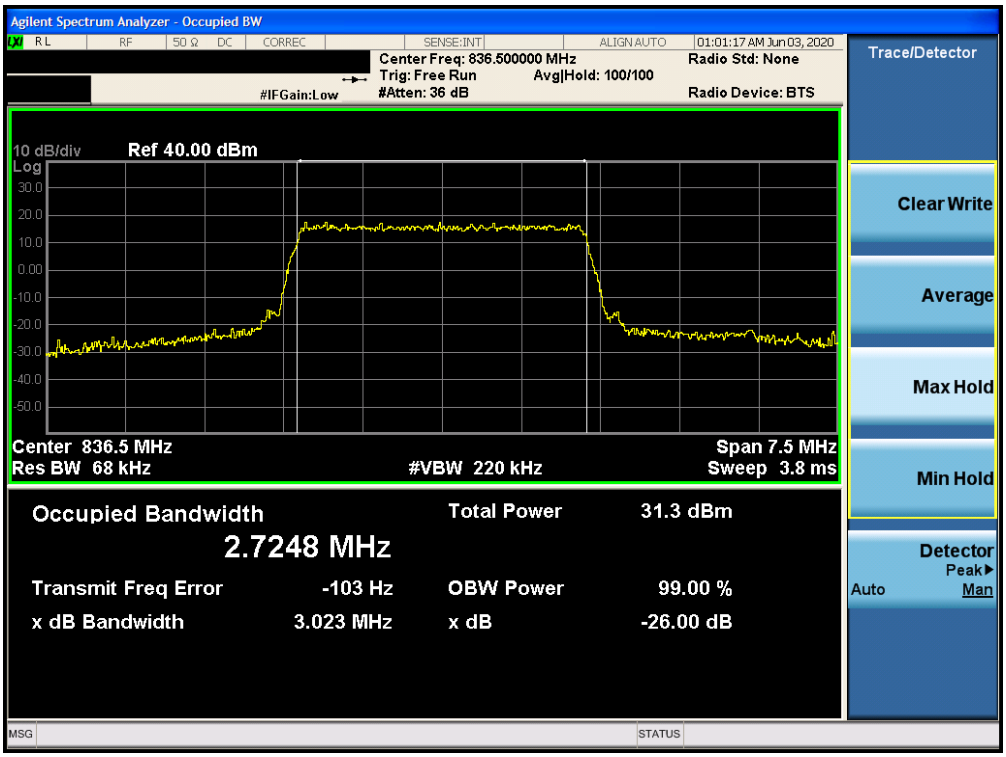


Plot 7-3. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-4. Occupied Bandwidth Plot (Band 26/5 - 3.0MHz 16-QAM - Full RB Configuration)

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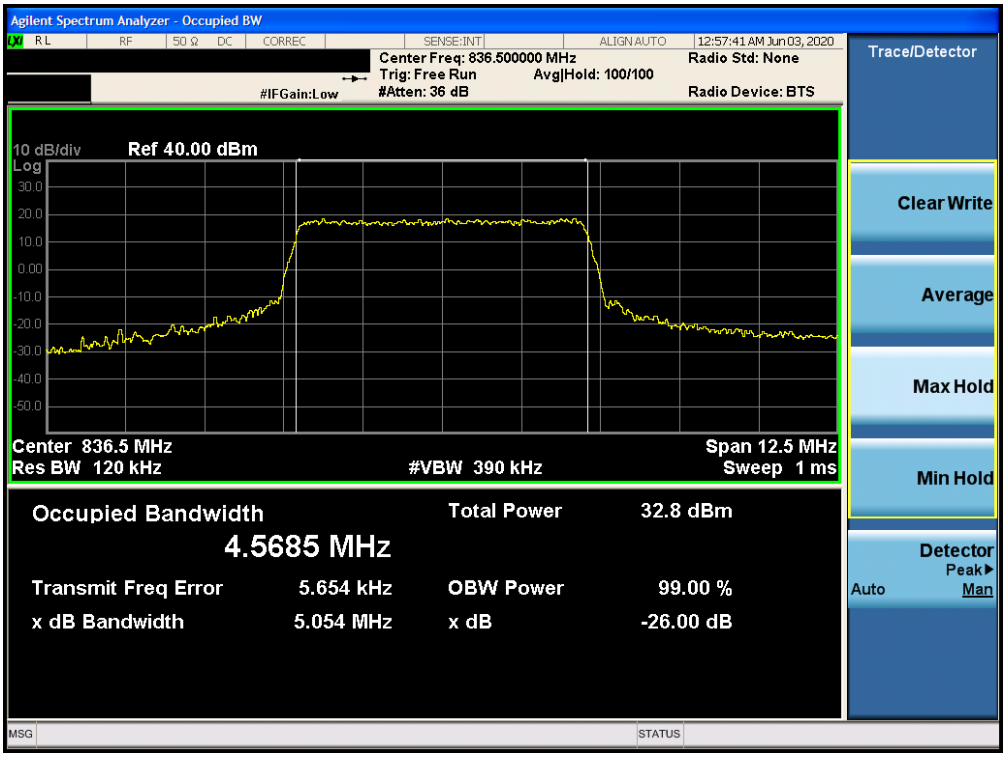
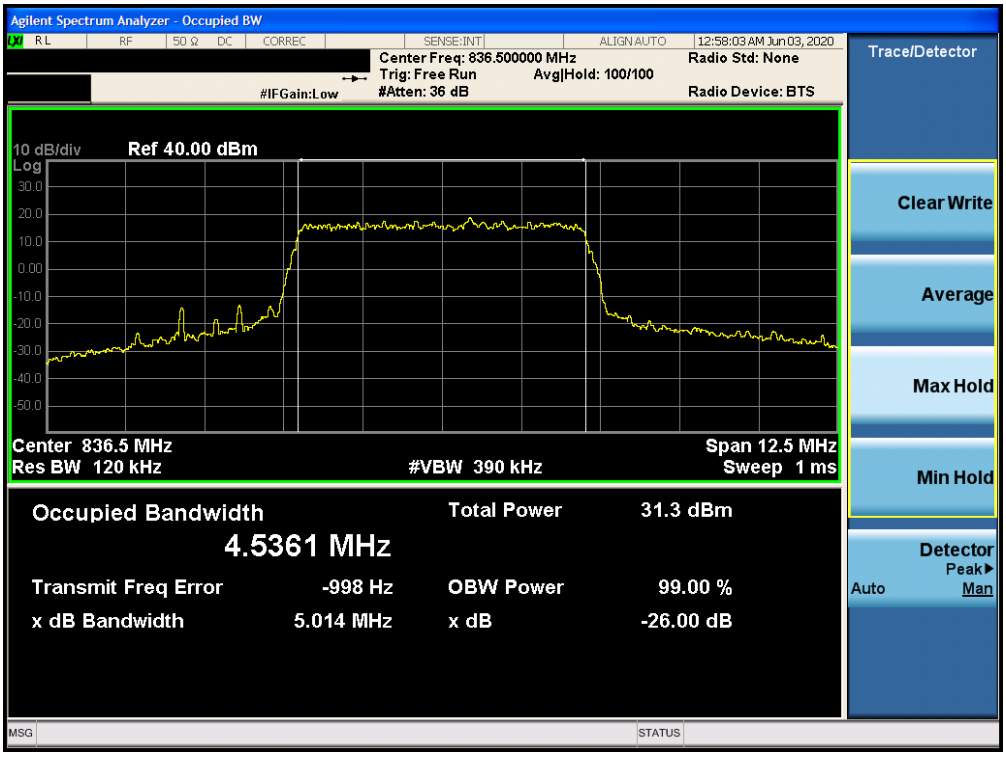


Plot 7-5. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-6. Occupied Bandwidth Plot (Band 26/5 - 5.0MHz 16-QAM - Full RB Configuration)

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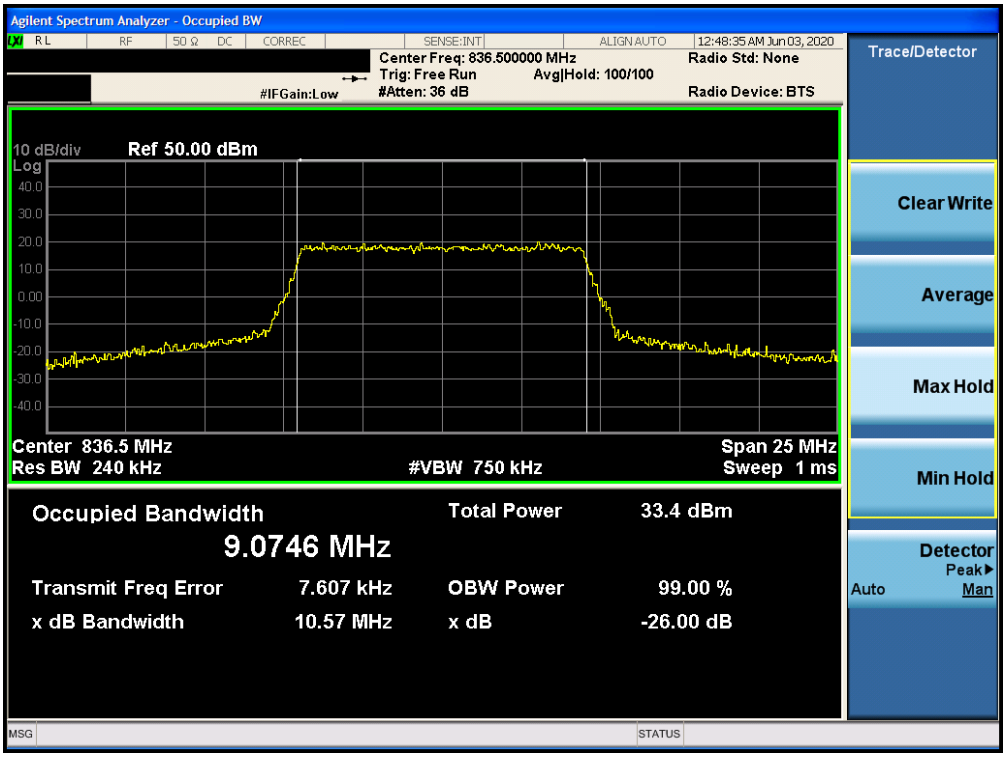

Plot 7-7. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-8. Occupied Bandwidth Plot (Band 26/5 - 10.0MHz 16-QAM - Full RB Configuration)

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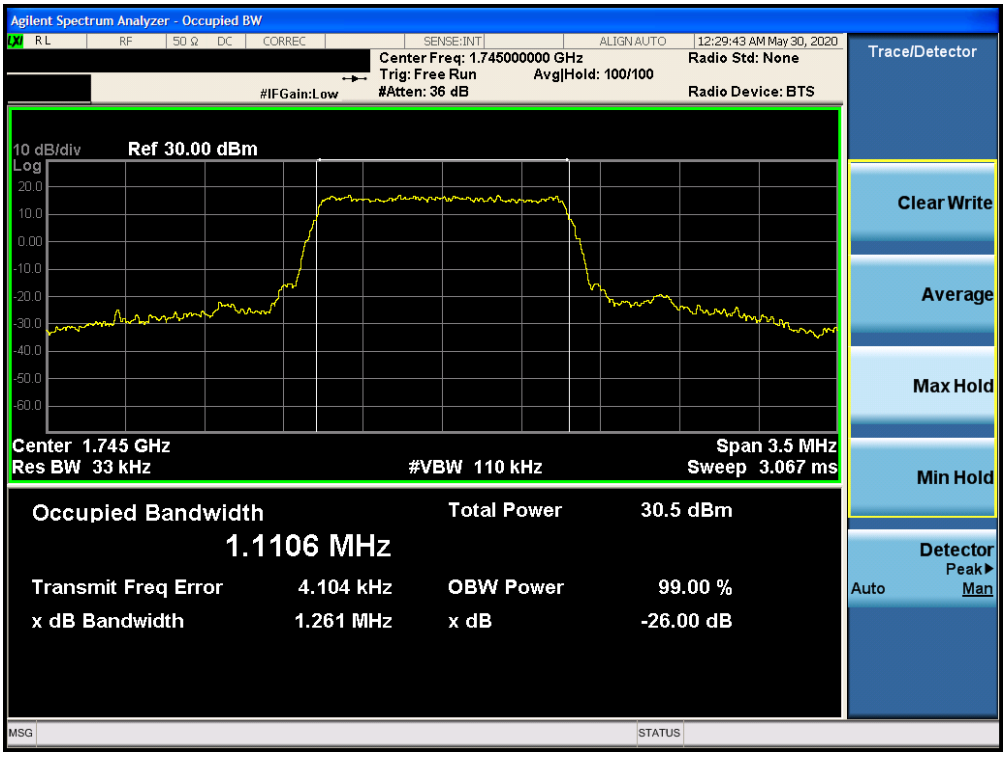
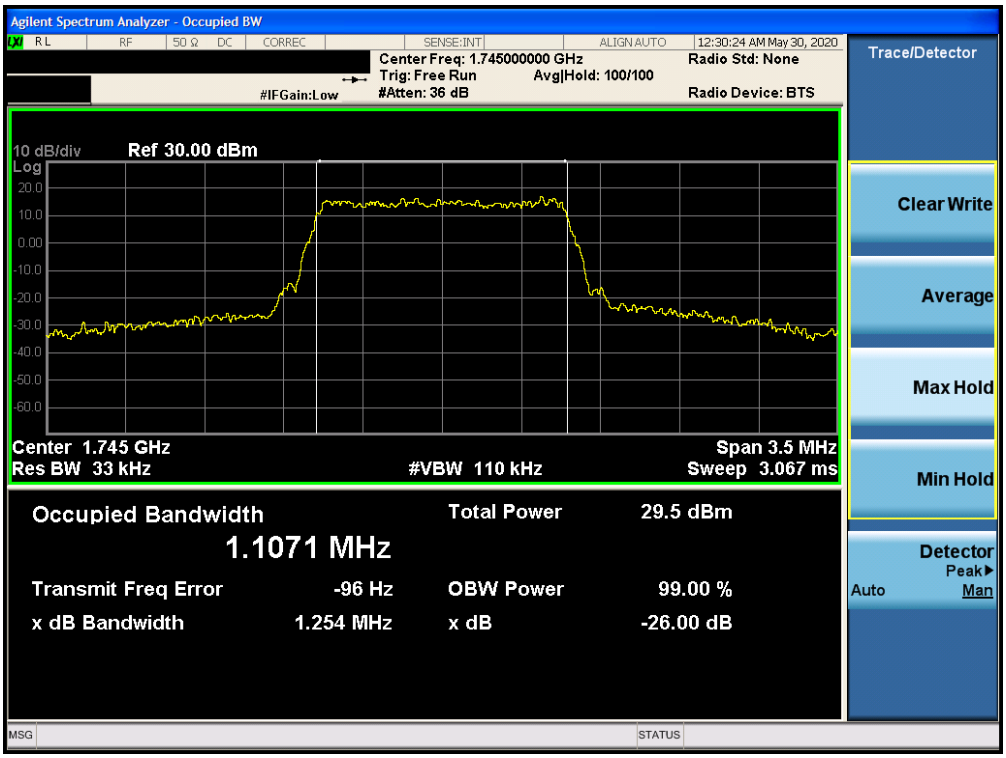
Band 66/4



Plot 7-9. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-10. Occupied Bandwidth Plot (Band 66/4 - 1.4MHz 16-QAM - Full RB Configuration)

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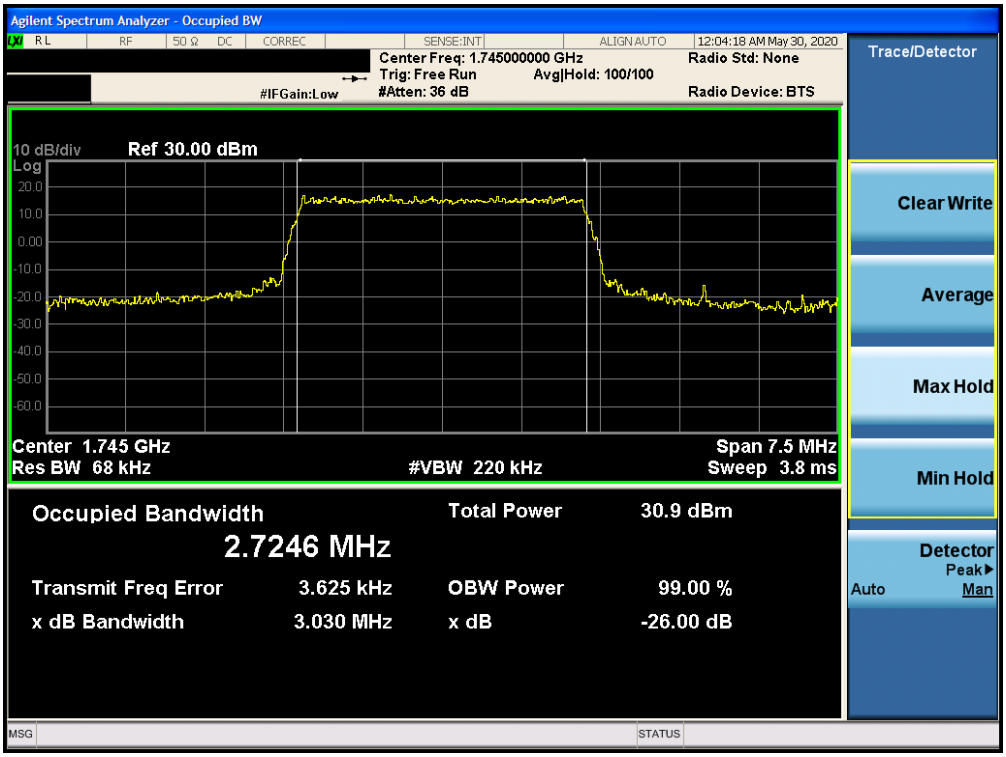
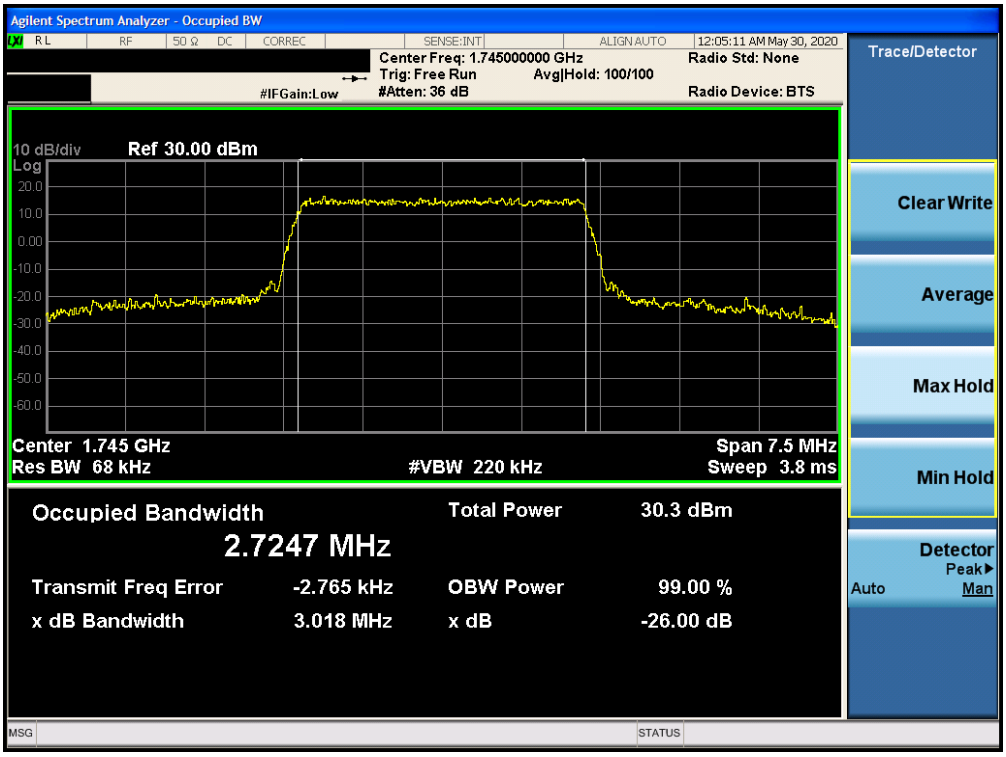


Plot 7-11. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-12. Occupied Bandwidth Plot (Band 66/4 - 3.0MHz 16-QAM - Full RB Configuration)

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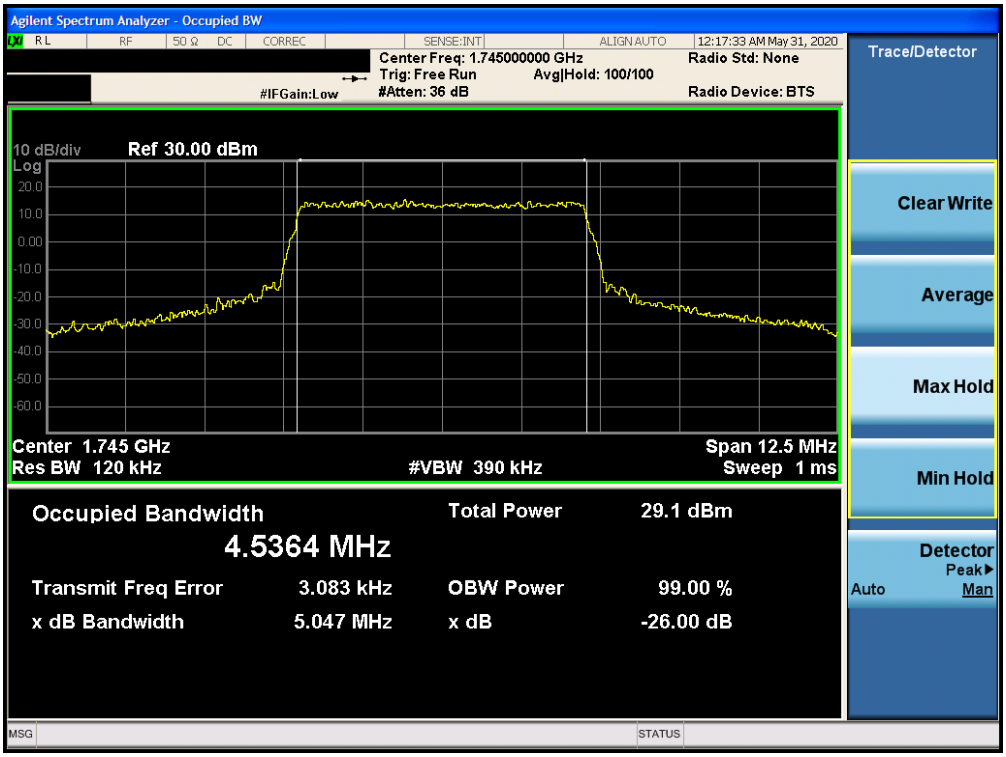
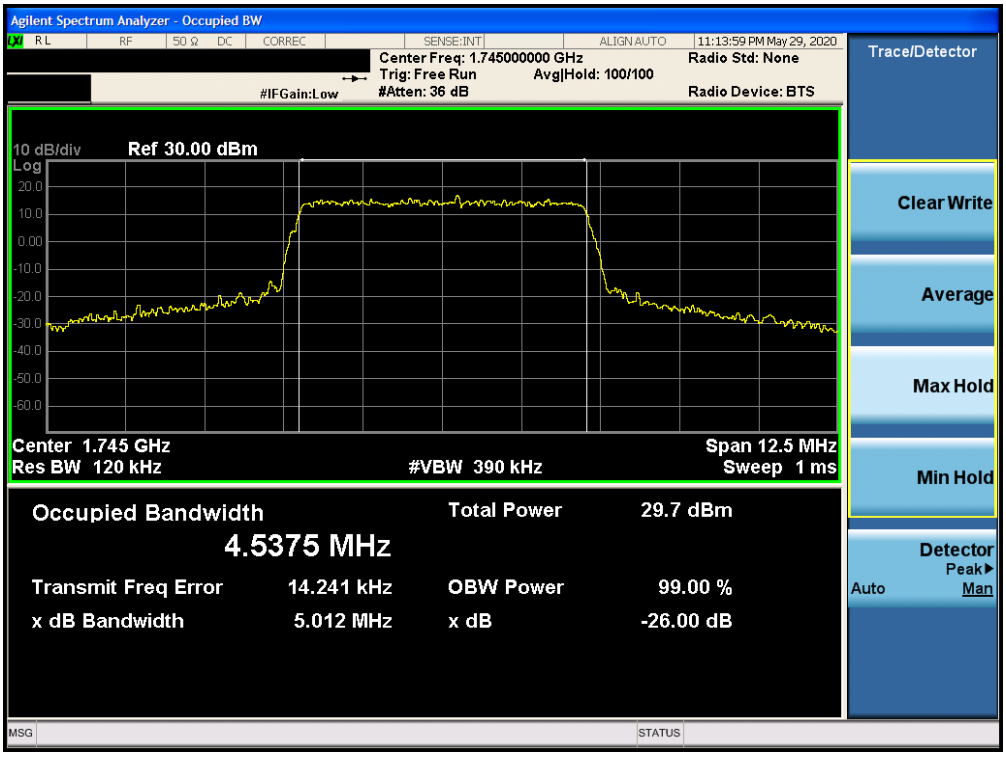


Plot 7-13. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-14. Occupied Bandwidth Plot (Band 66/4 - 5.0MHz 16-QAM - Full RB Configuration)

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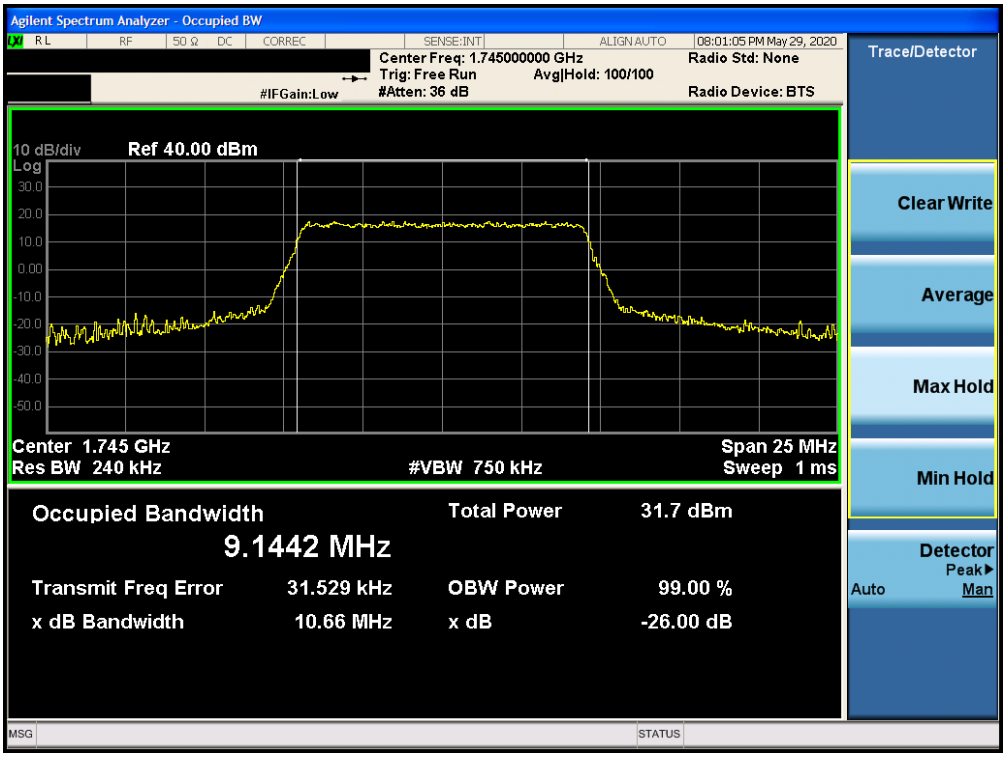

Plot 7-15. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-16. Occupied Bandwidth Plot (Band 66/4 - 10.0MHz 16-QAM - Full RB Configuration)

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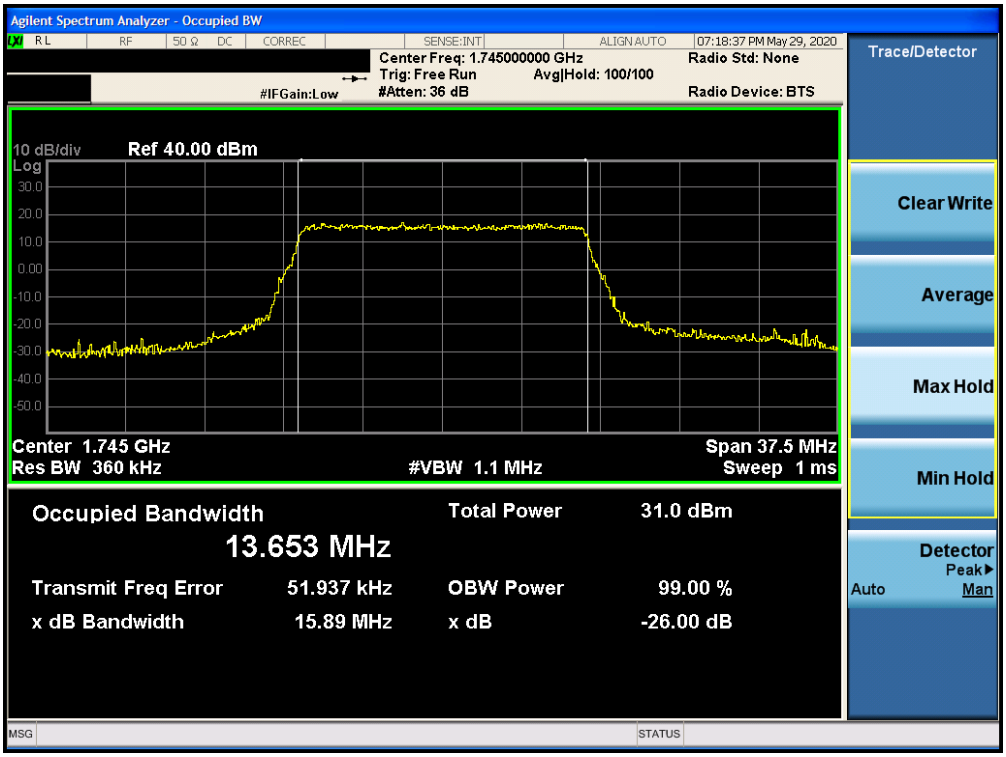
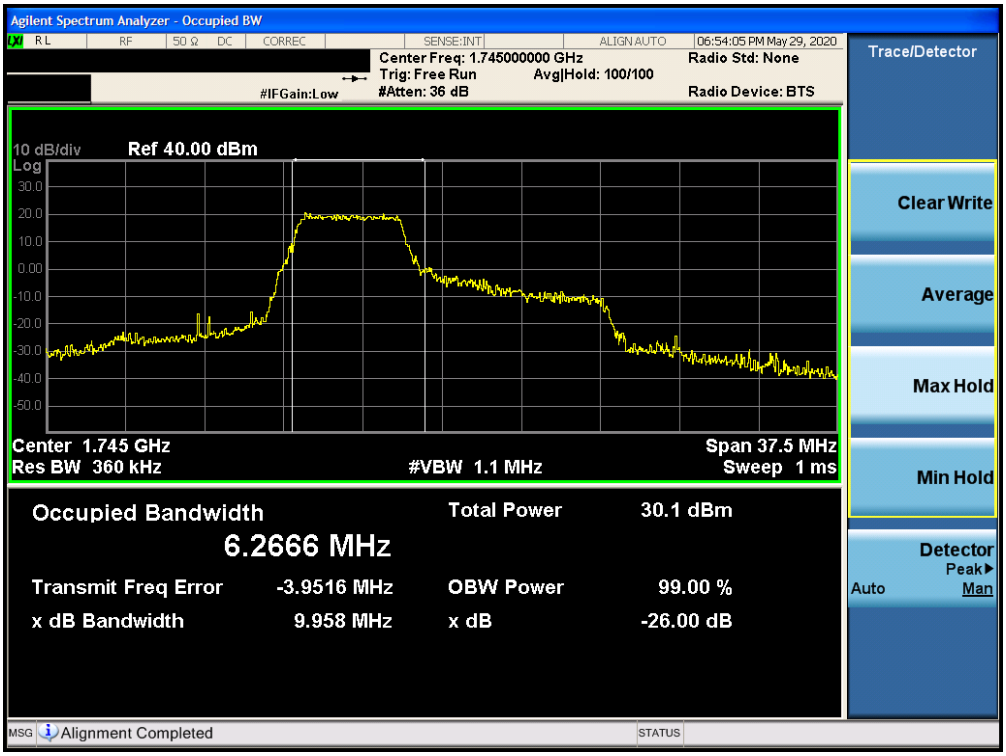


Plot 7-17. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-18. Occupied Bandwidth Plot (Band 66/4 - 15.0MHz 16-QAM - Full RB Configuration)

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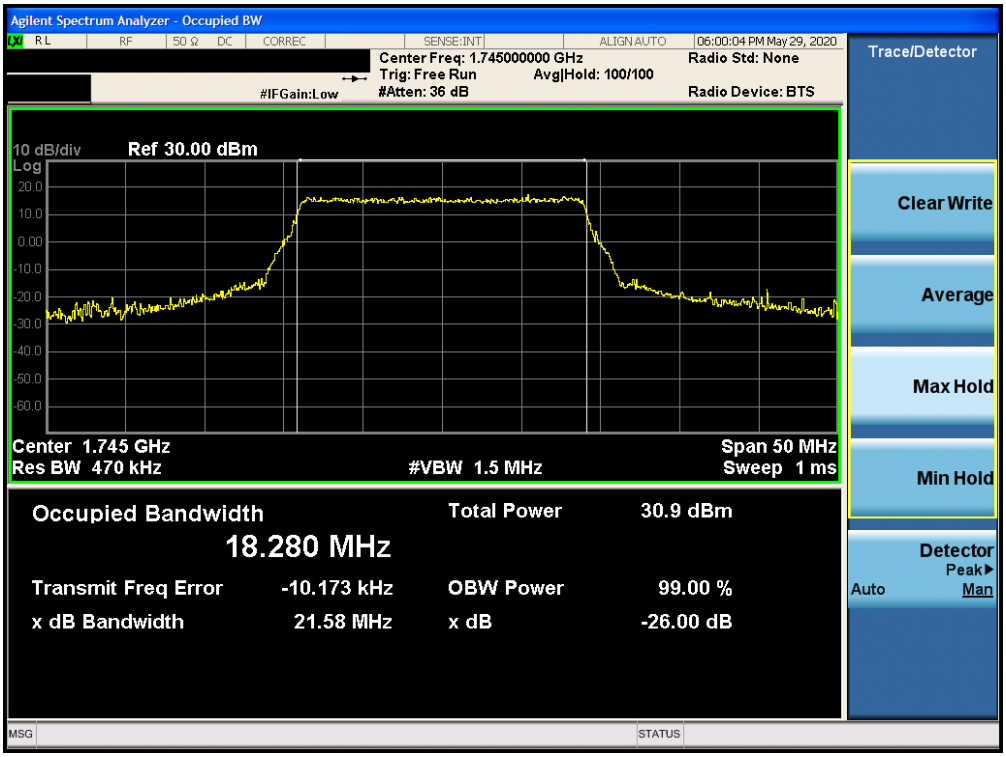

Plot 7-19. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz QPSK - Full RB Configuration)

Plot 7-20. Occupied Bandwidth Plot (Band 66/4 - 20.0MHz 16-QAM - Full RB Configuration)

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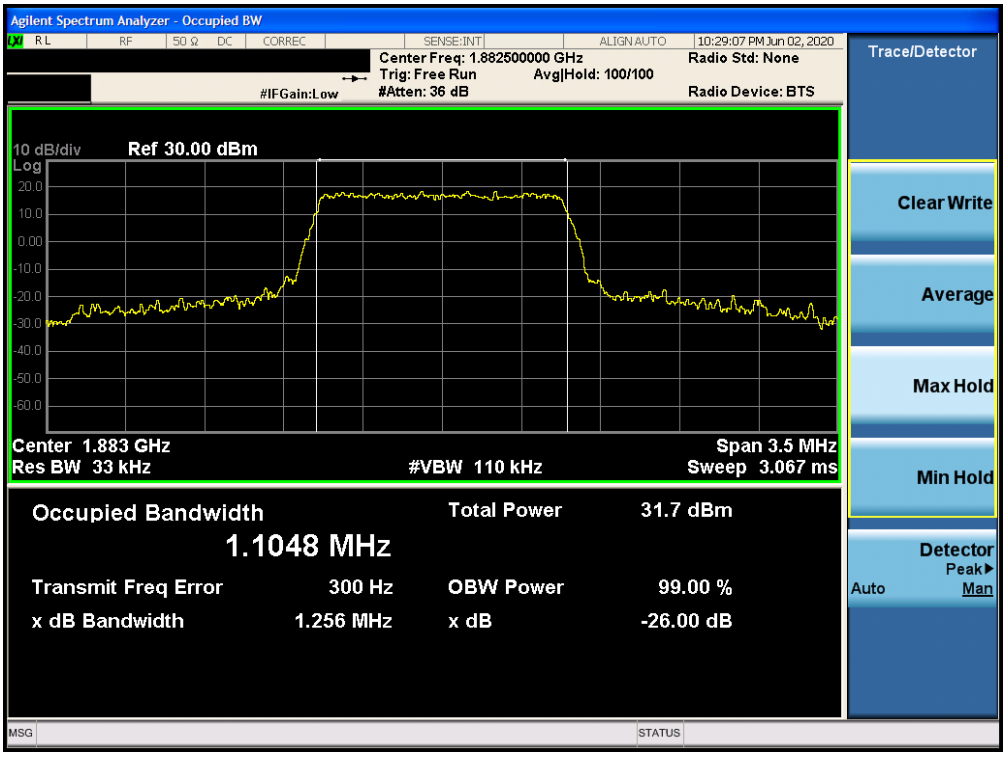
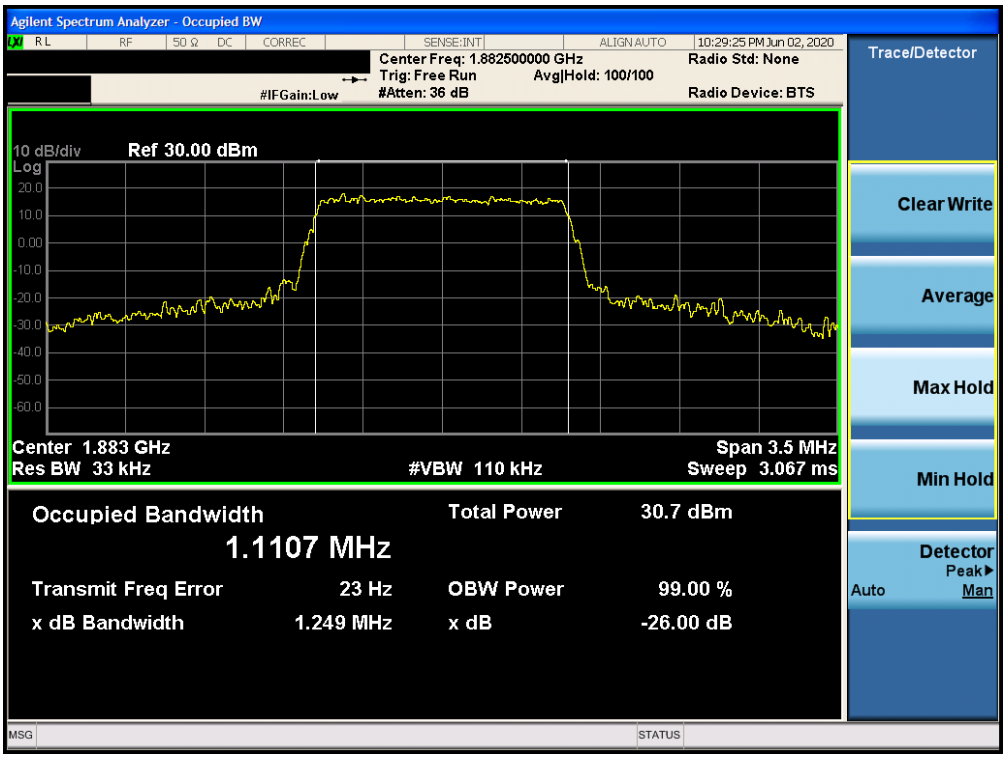
Band 25/2



Plot 7-21. Occupied Bandwidth Plot (Band 25/2 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-22. Occupied Bandwidth Plot (Band 25/2 - 1.4MHz 16-QAM - Full RB Configuration)

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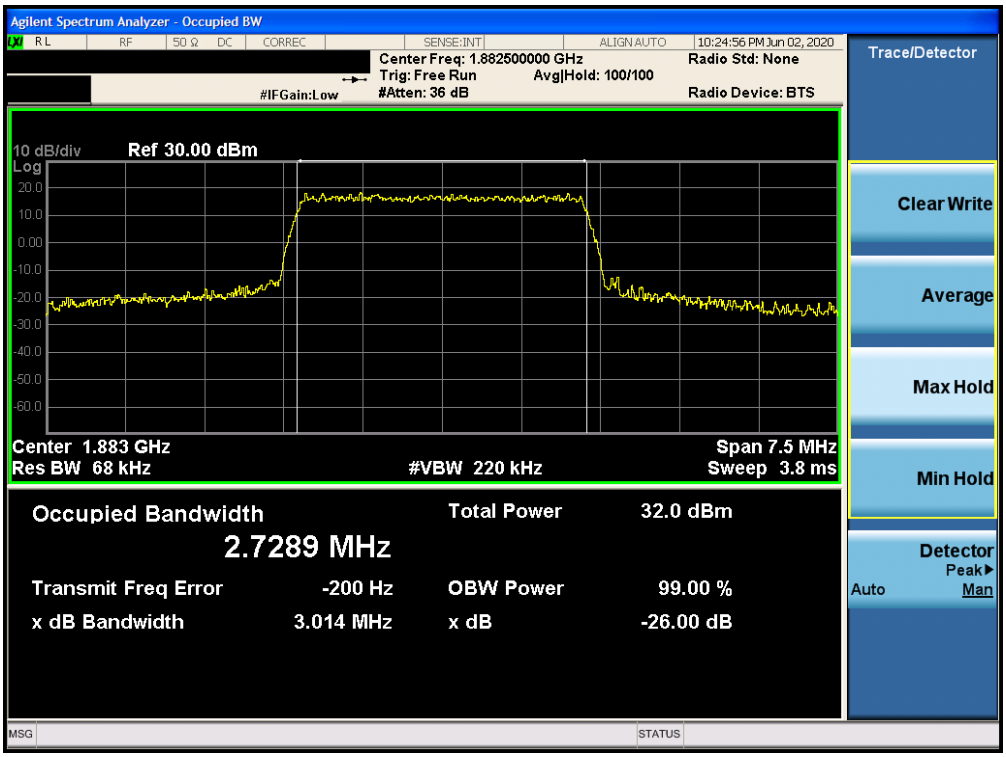
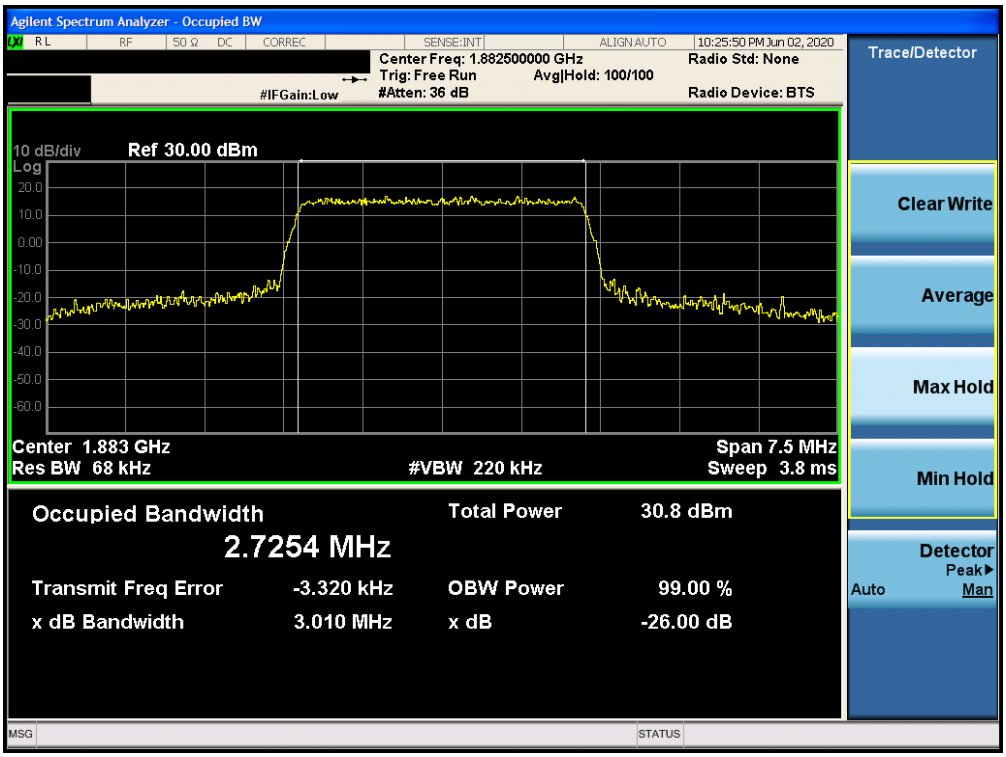


Plot 7-23. Occupied Bandwidth Plot (Band 25/2 - 3.0MHz QPSK - Full RB Configuration)



Plot 7-24. Occupied Bandwidth Plot (Band 25/2 - 3.0MHz 16-QAM - Full RB Configuration)

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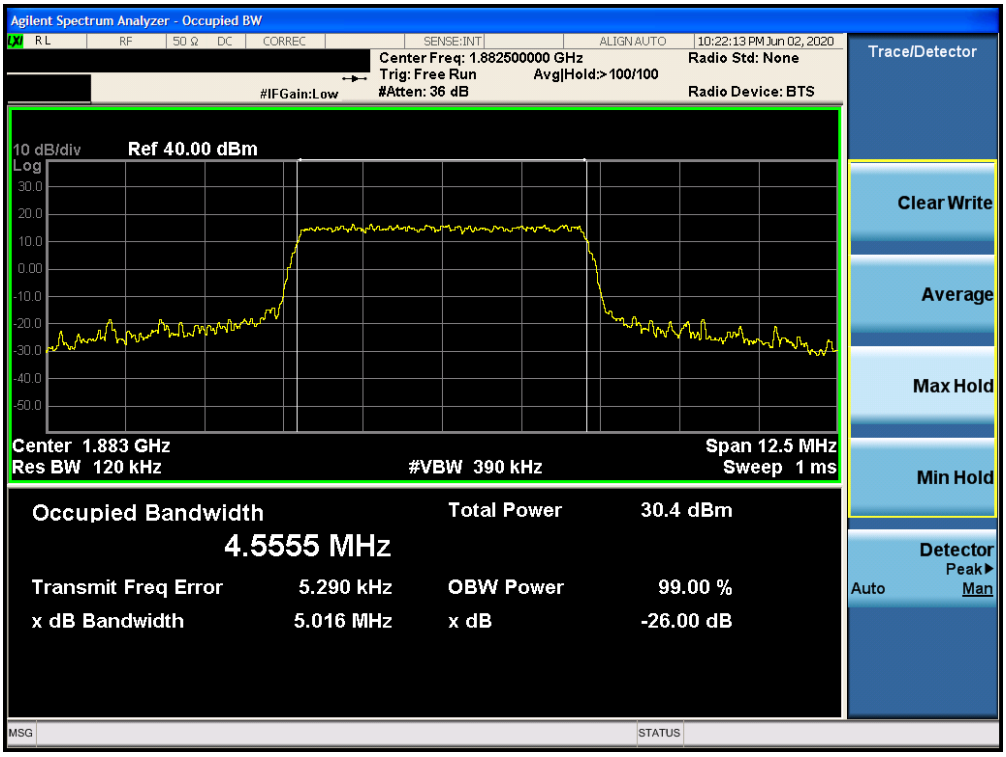
Plot 7-25. Occupied Bandwidth Plot (Band 25/2 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-26. Occupied Bandwidth Plot (Band 25/2 - 5.0MHz 16-QAM - Full RB Configuration)

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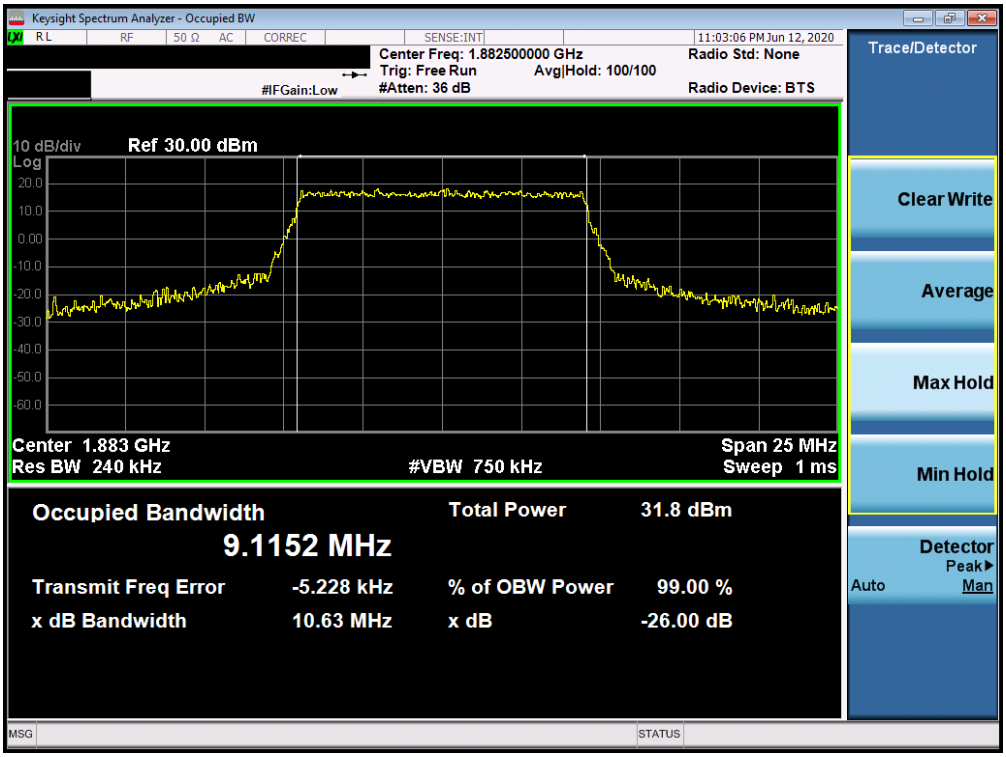
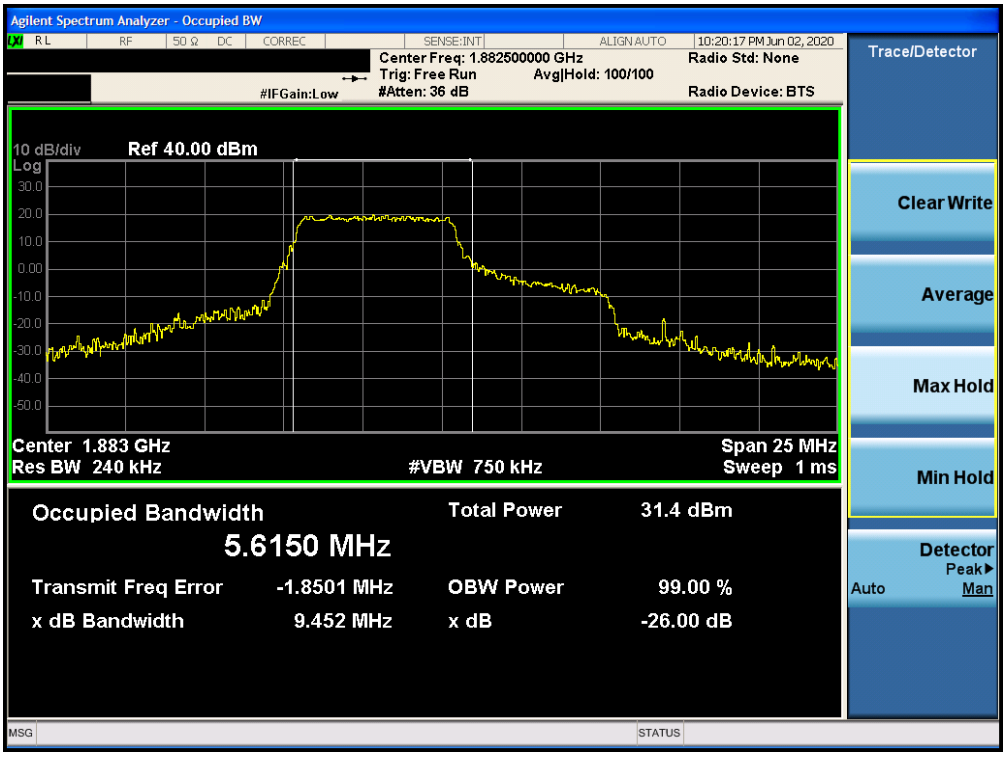


Plot 7-27. Occupied Bandwidth Plot (Band 25/2 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-28. Occupied Bandwidth Plot (Band 25/2 - 10.0MHz 16-QAM - Full RB Configuration)

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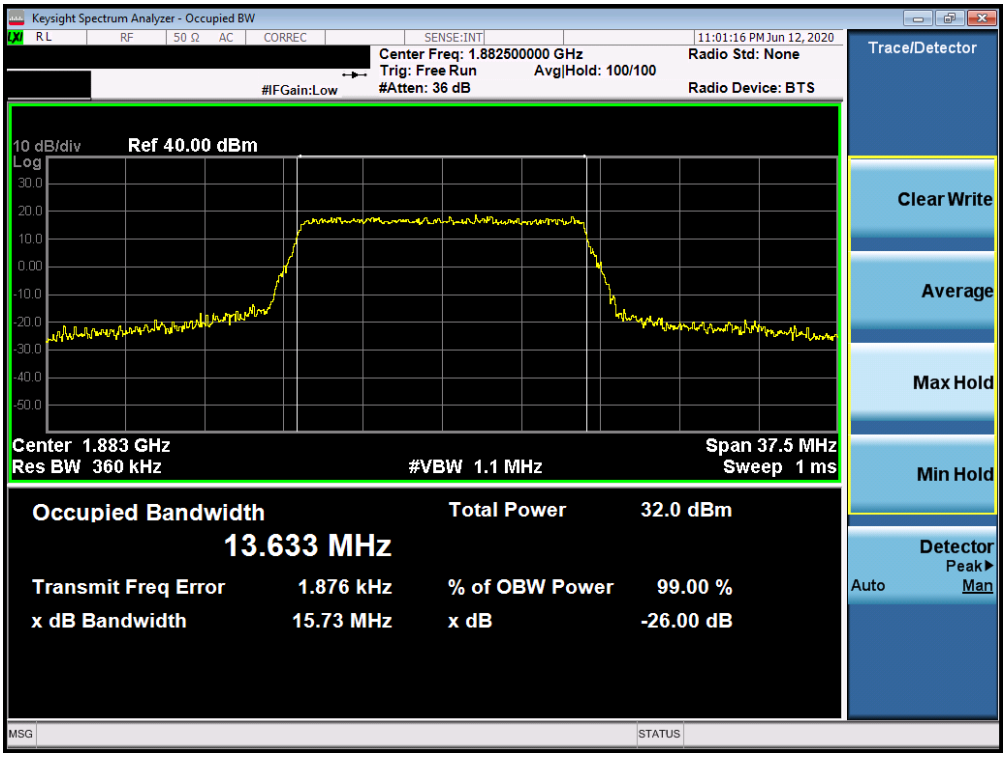
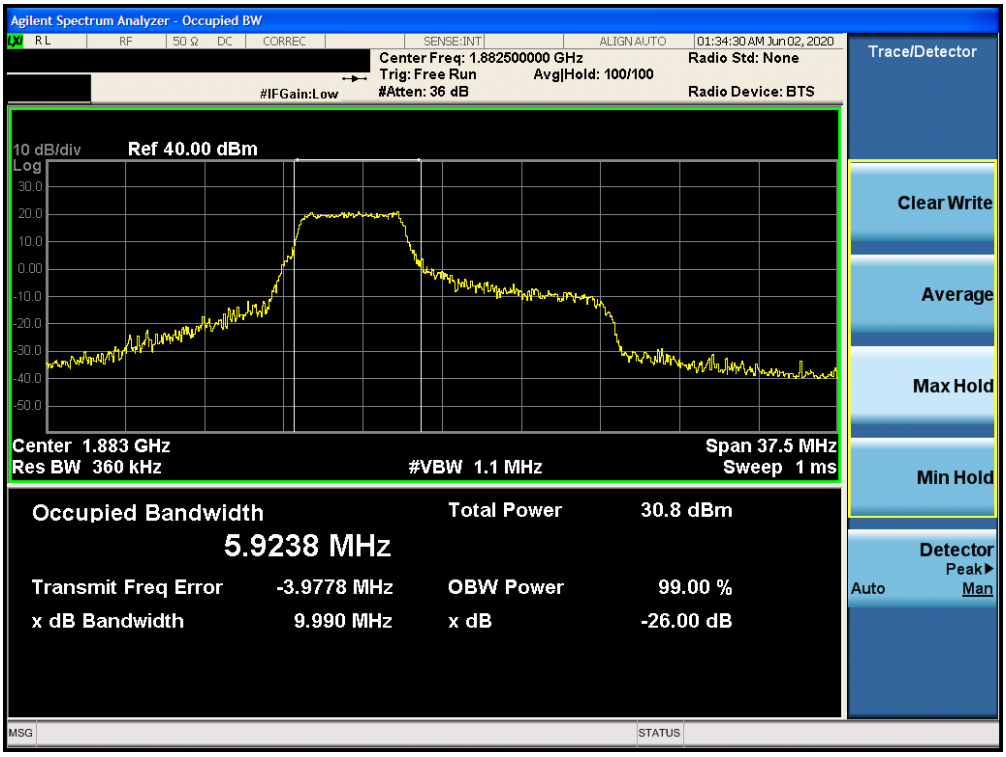


Plot 7-29. Occupied Bandwidth Plot (Band 25/2 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-30. Occupied Bandwidth Plot (Band 25/2 - 15.0MHz 16-QAM - Full RB Configuration)

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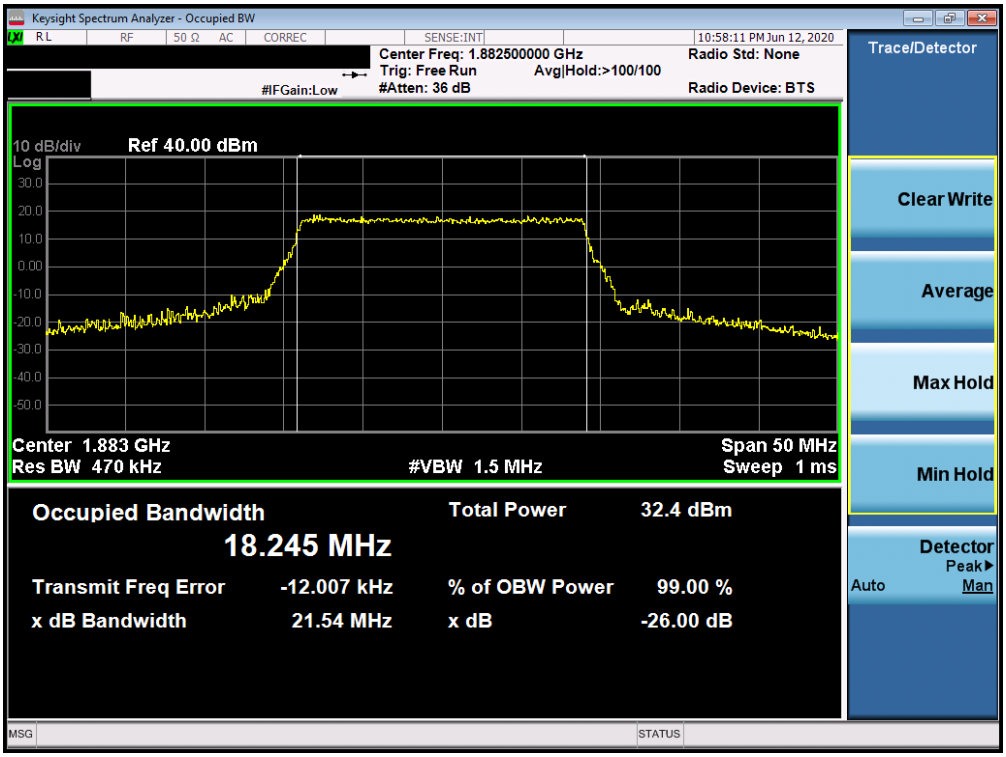
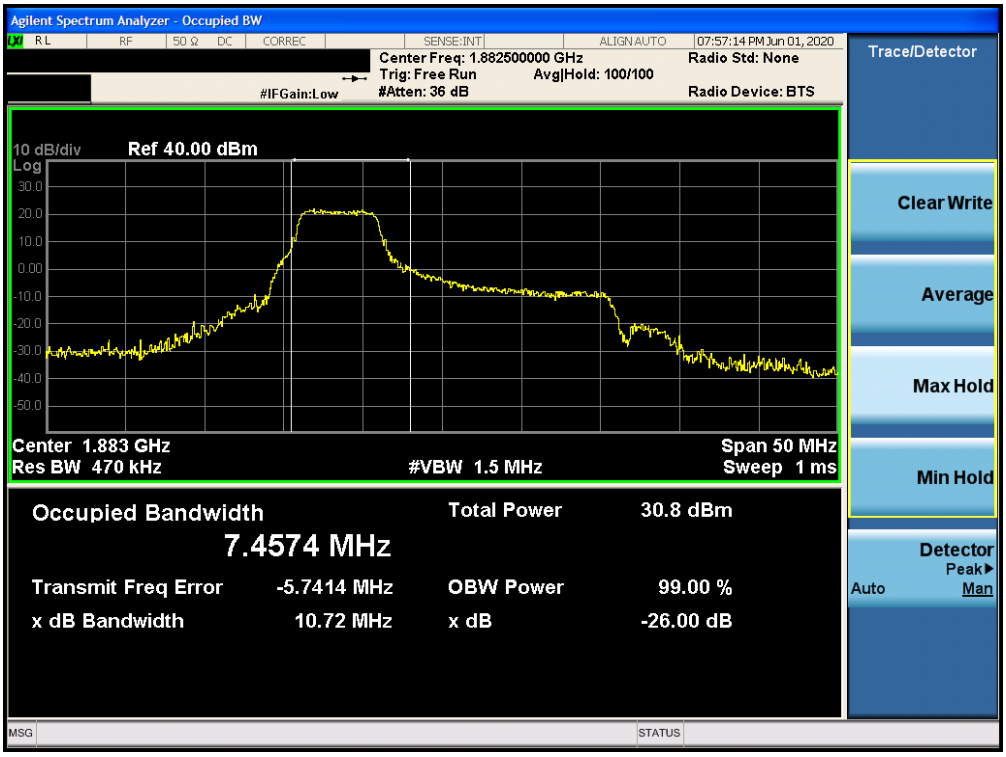


Plot 7-31. Occupied Bandwidth Plot (Band 25/2 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-32. Occupied Bandwidth Plot (Band 25/2 - 20.0MHz 16-QAM - Full RB Configuration)

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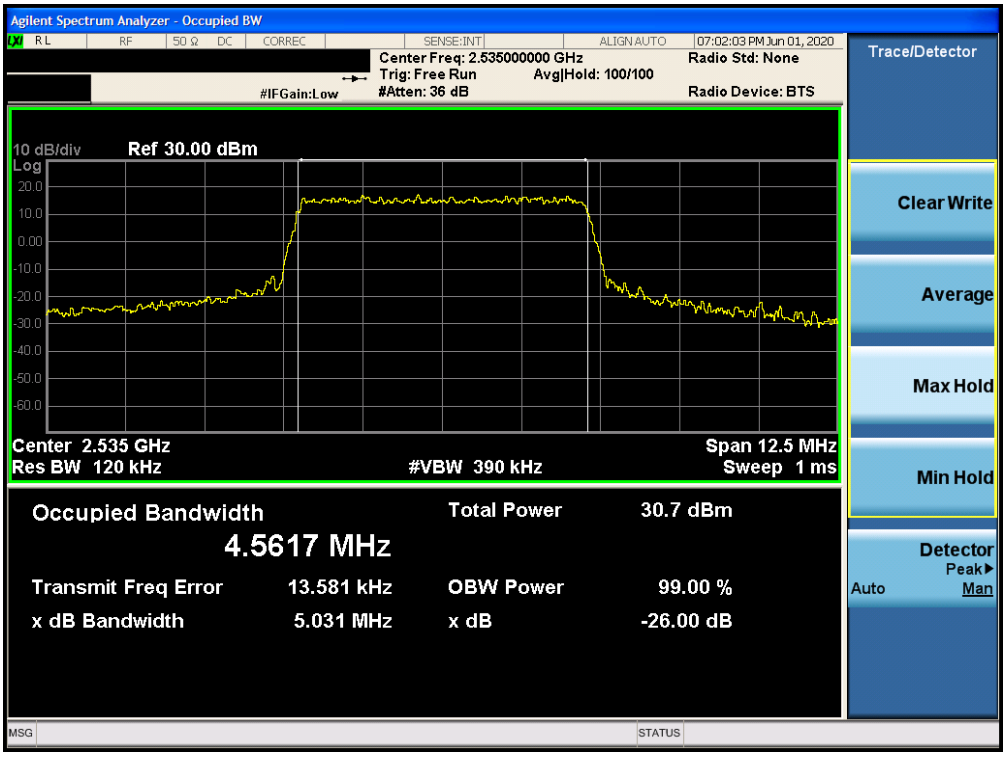
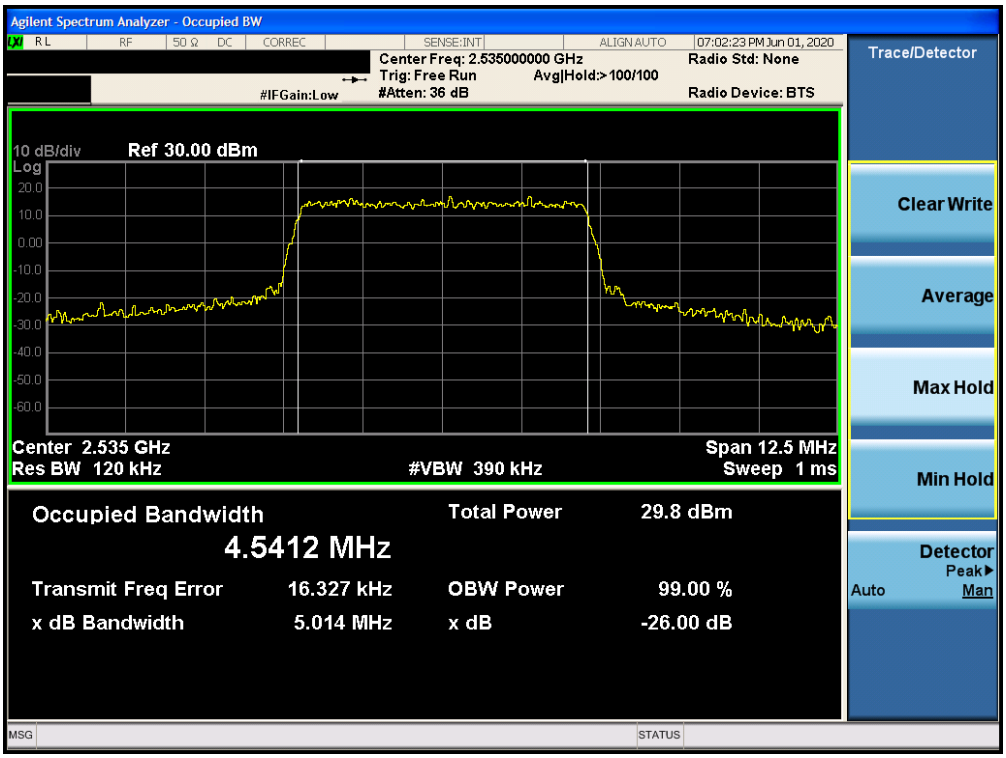
Band 7



Plot 7-33. Occupied Bandwidth Plot (Band 7 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-34. Occupied Bandwidth Plot (Band 7 - 5.0MHz 16-QAM - Full RB Configuration)

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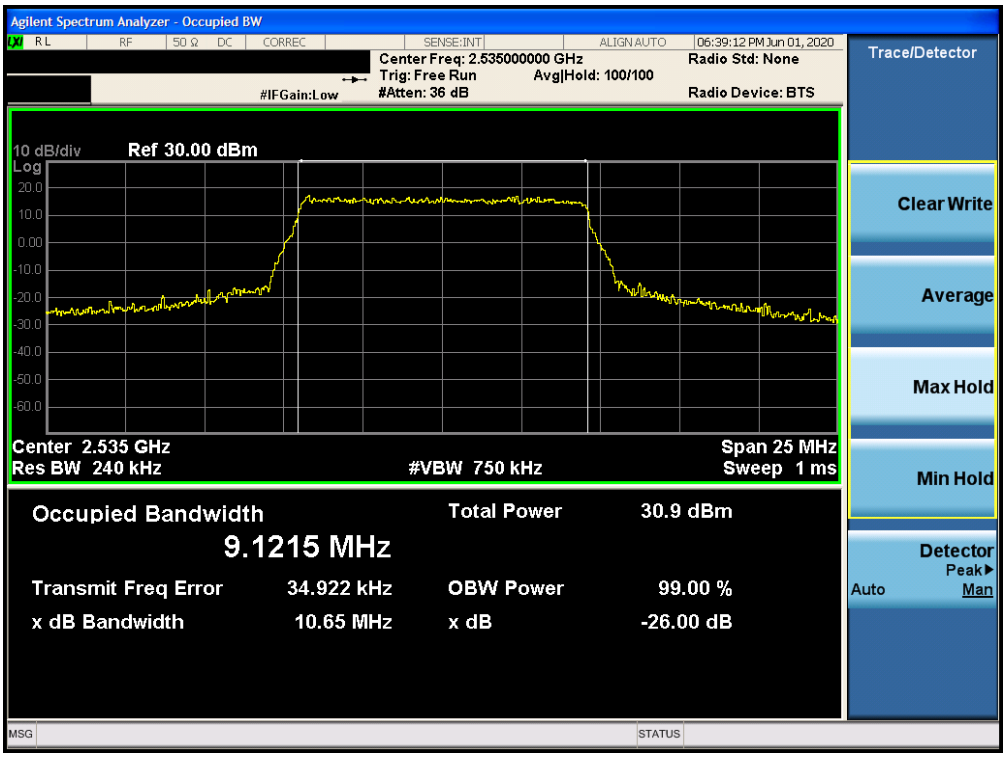

Plot 7-35. Occupied Bandwidth Plot (Band 7 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-36. Occupied Bandwidth Plot (Band 7 - 10.0MHz 16-QAM - Full RB Configuration)

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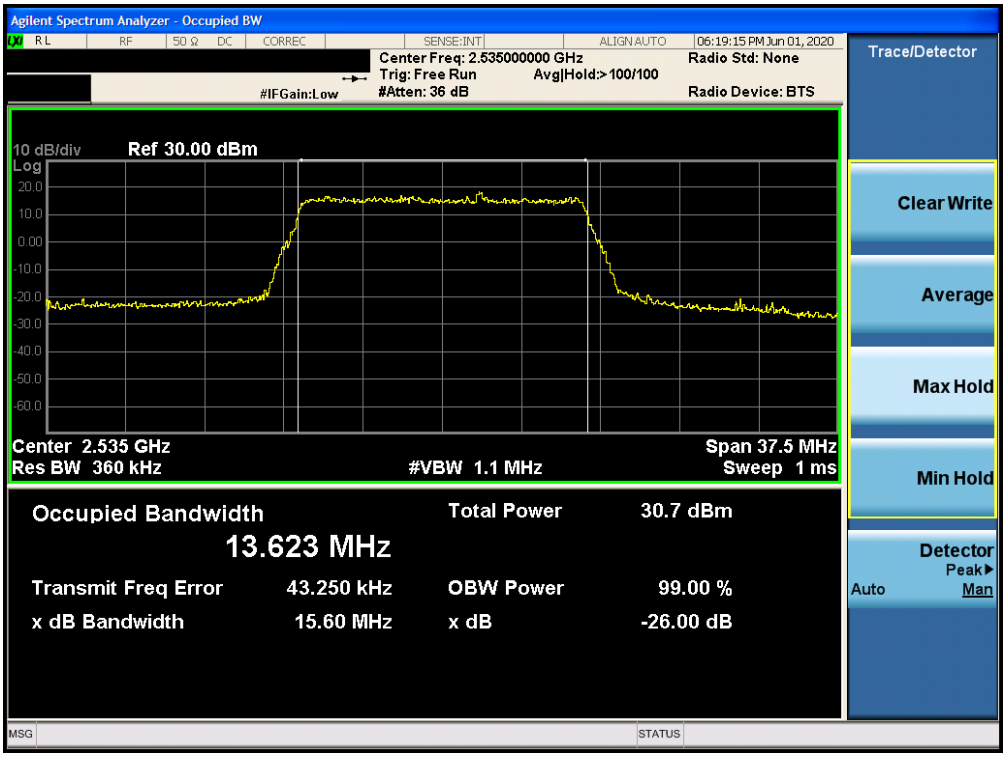

Plot 7-37. Occupied Bandwidth Plot (Band 7 - 15.0MHz QPSK - Full RB Configuration)

Plot 7-38. Occupied Bandwidth Plot (Band 7 - 15.0MHz 16-QAM - Full RB Configuration)

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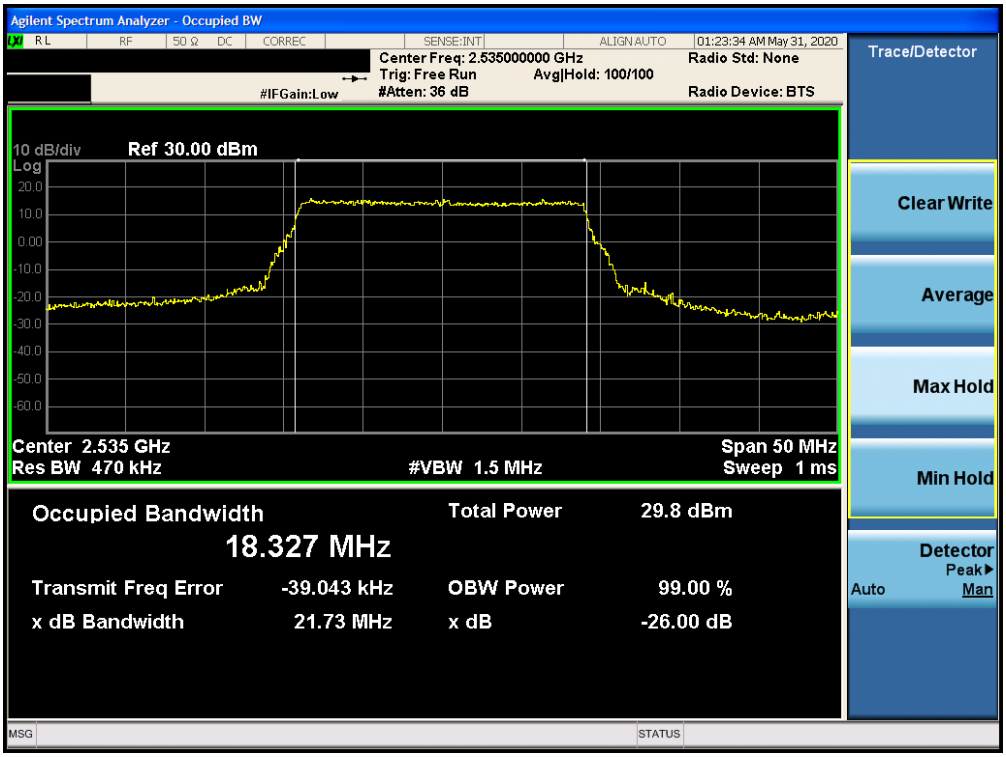
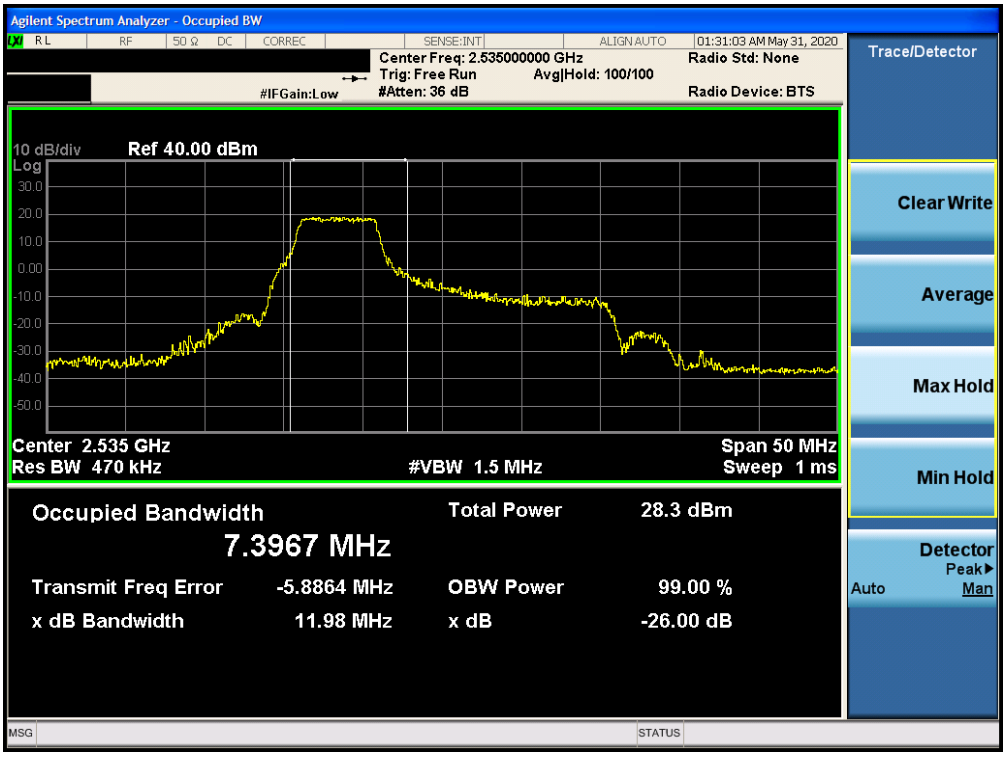


Plot 7-39. Occupied Bandwidth Plot (Band 7 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-40. Occupied Bandwidth Plot (Band 7 - 20.0MHz 16-QAM - Full RB Configuration)

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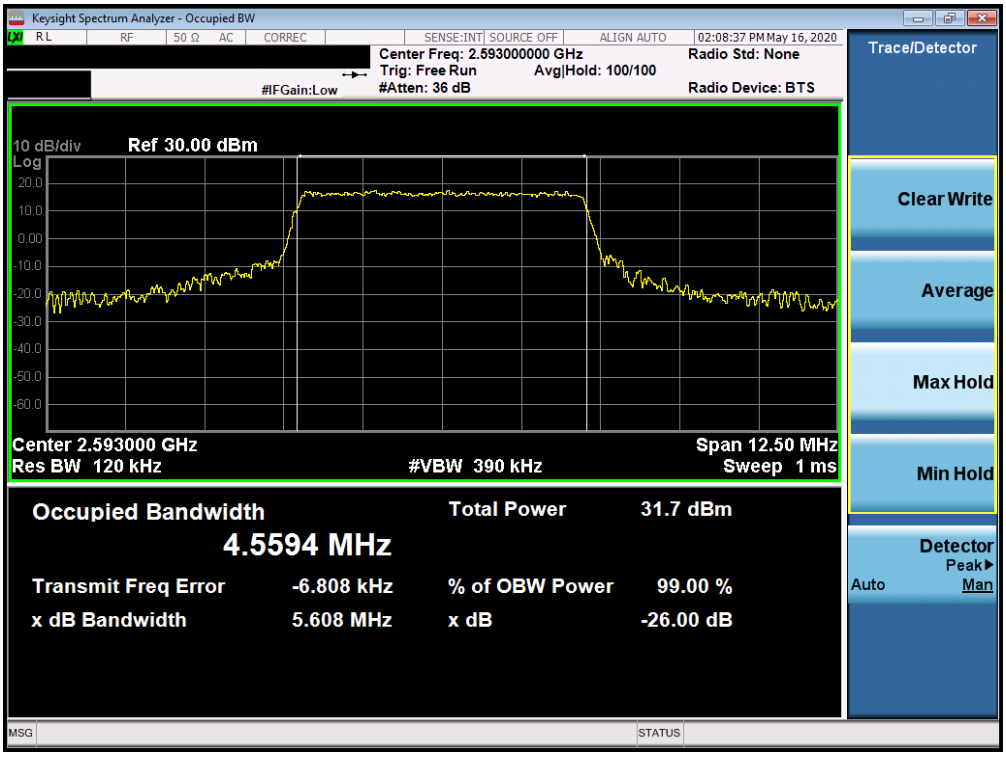
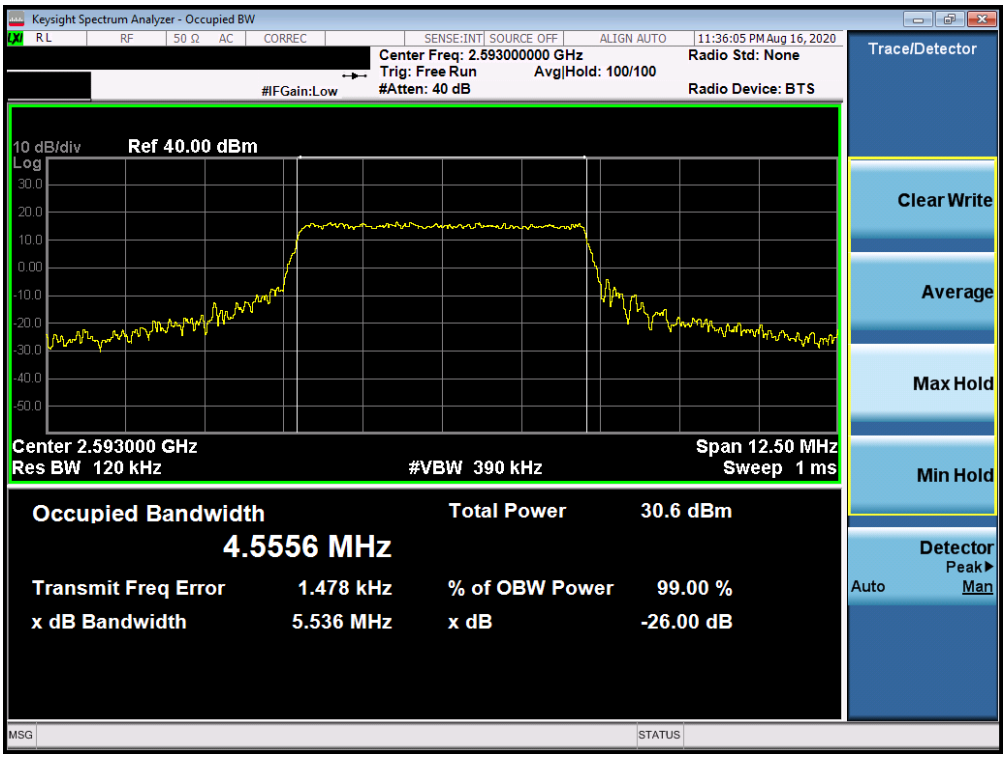
Band 41



Plot 7-41. Occupied Bandwidth Plot (Band 41 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-42. Occupied Bandwidth Plot (Band 41 - 5.0MHz 16-QAM - Full RB Configuration)

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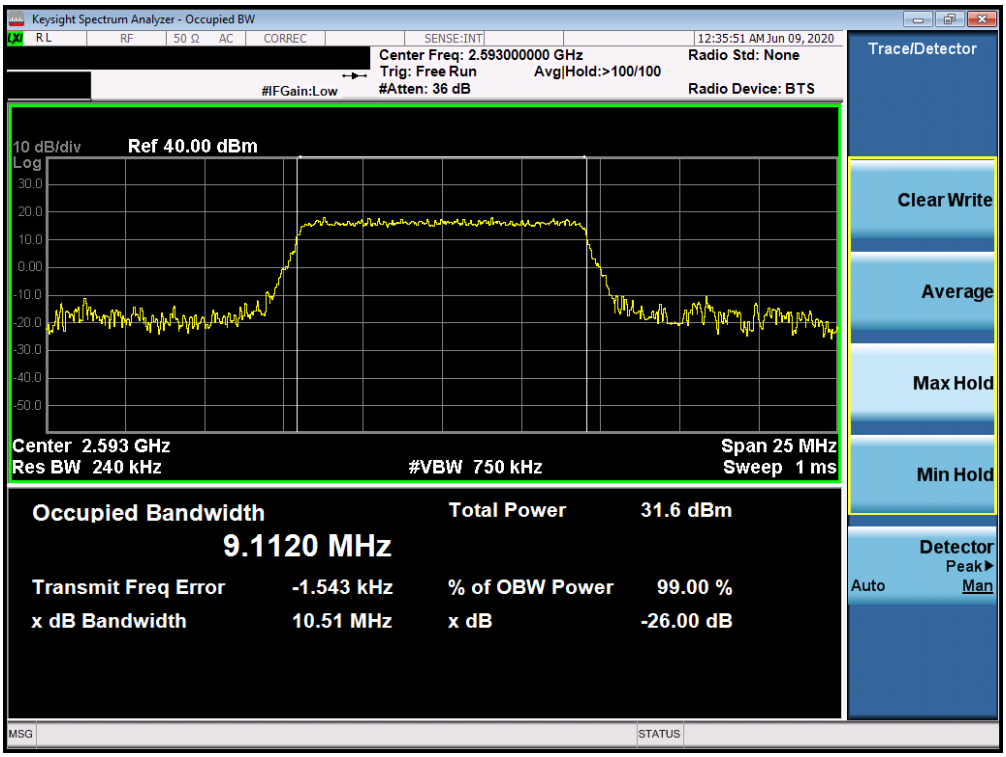

Plot 7-43. Occupied Bandwidth Plot (Band 41 - 10.0MHz QPSK - Full RB Configuration)

Plot 7-44. Occupied Bandwidth Plot (Band 41 - 10.0MHz 16-QAM - Full RB Configuration)

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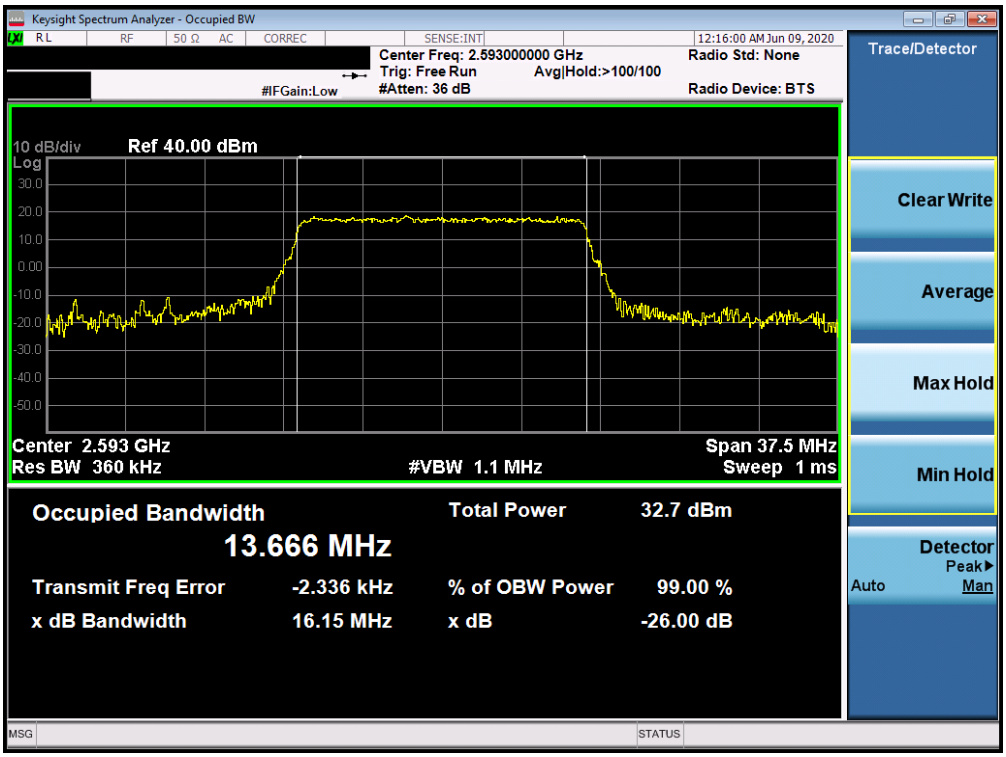
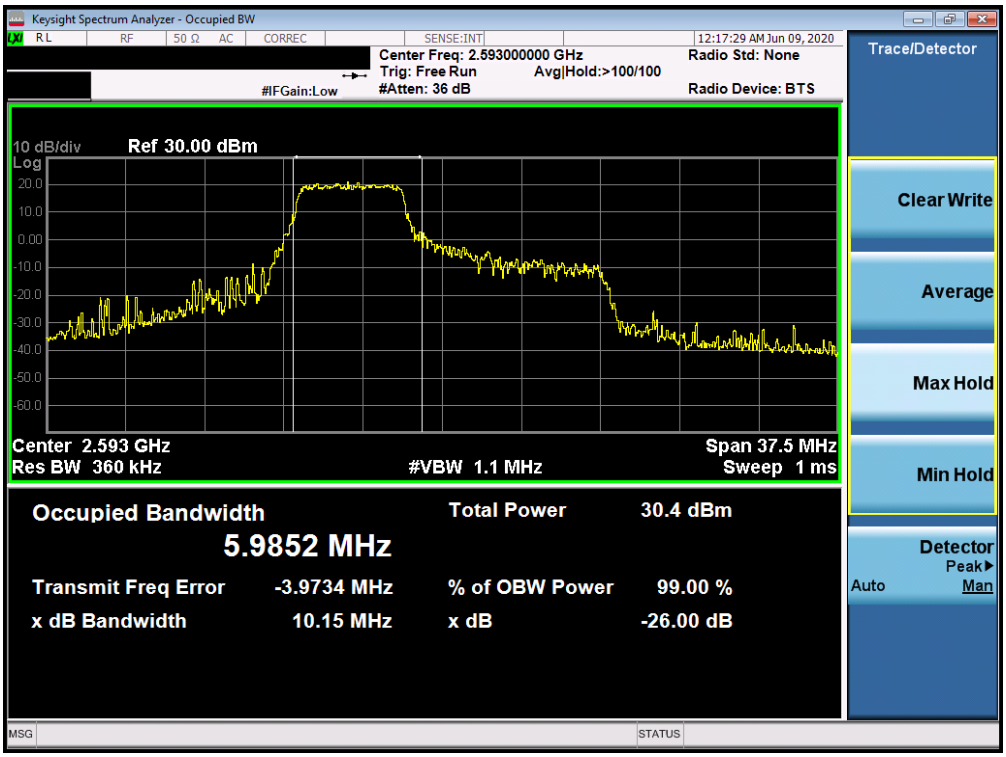


Plot 7-45. Occupied Bandwidth Plot (Band 41 - 15.0MHz QPSK - Full RB Configuration)



Plot 7-46. Occupied Bandwidth Plot (Band 41 - 15.0MHz 16-QAM - Full RB Configuration)

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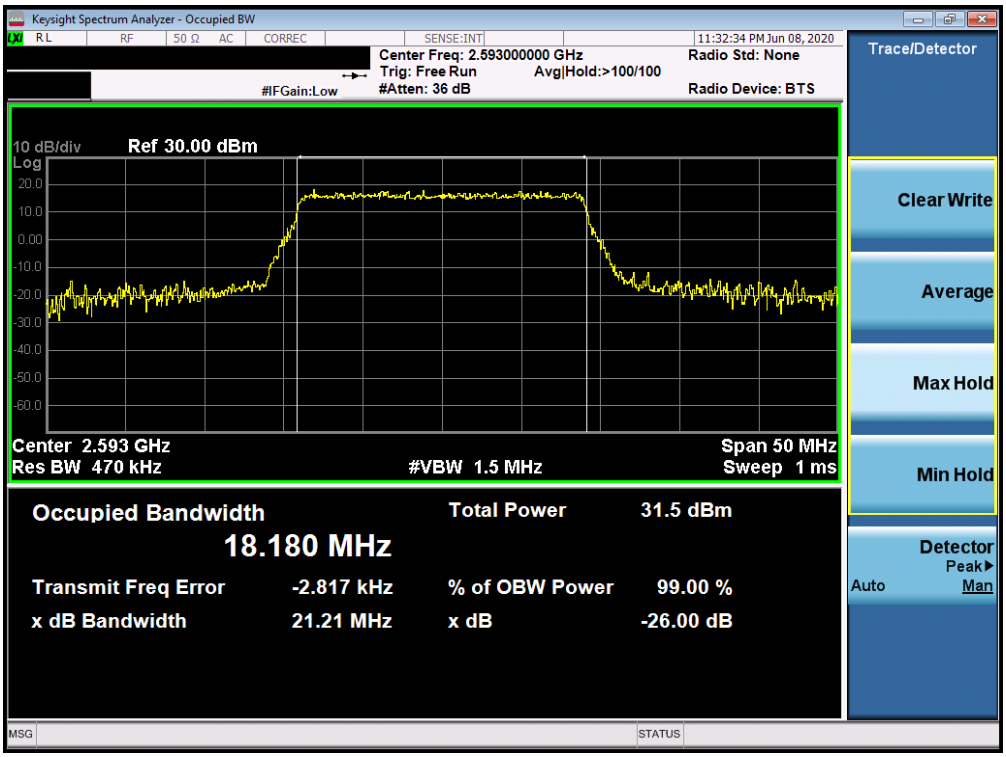
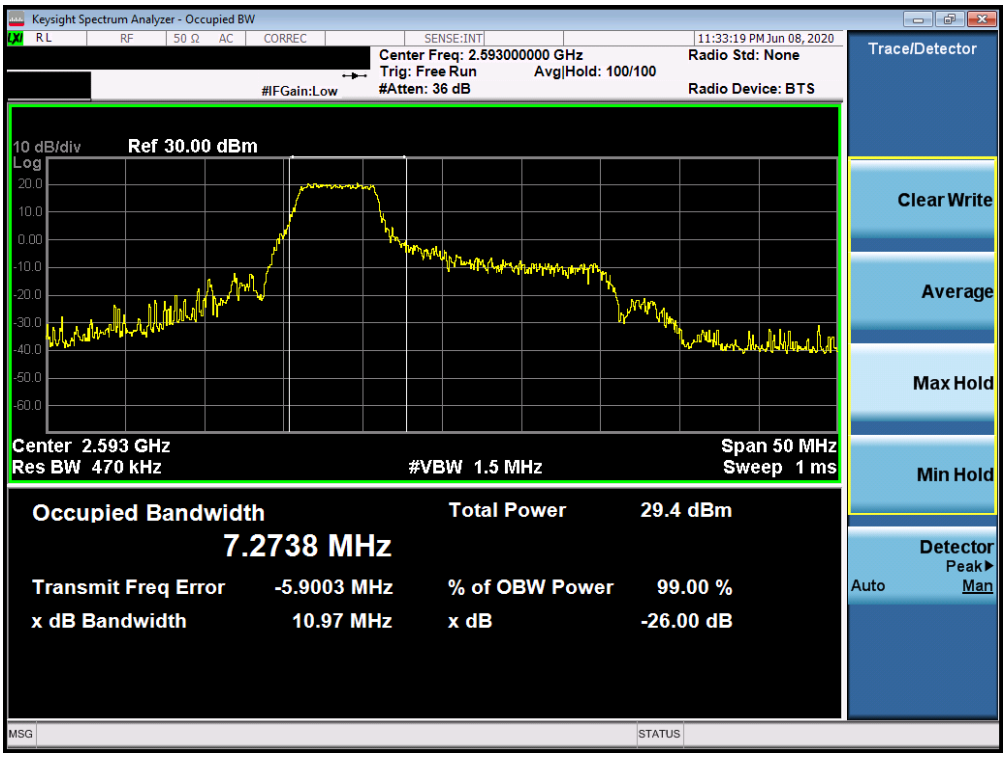


Plot 7-47. Occupied Bandwidth Plot (Band 41 - 20.0MHz QPSK - Full RB Configuration)



Plot 7-48. Occupied Bandwidth Plot (Band 41 - 20.0MHz 16-QAM - Full RB Configuration)

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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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

For Band 7 and 41, the minimum permissible attenuation level of any spurious emission is 55 + 10 $log_{10}(P_{[Watts]})$.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

1. Start frequency was set to 30MHz and stop frequency was set to at least 10 * the fundamental frequency (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.

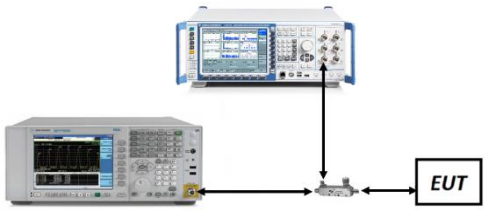

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and 1 MHz or greater for frequencies greater than 1 GHz. 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.

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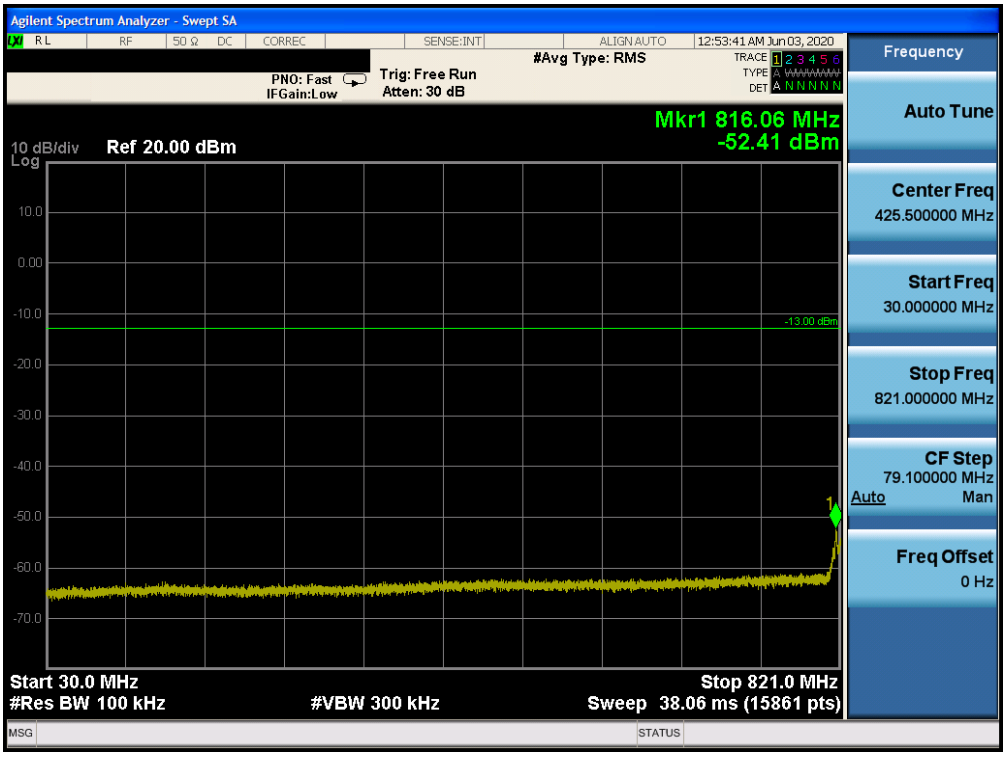
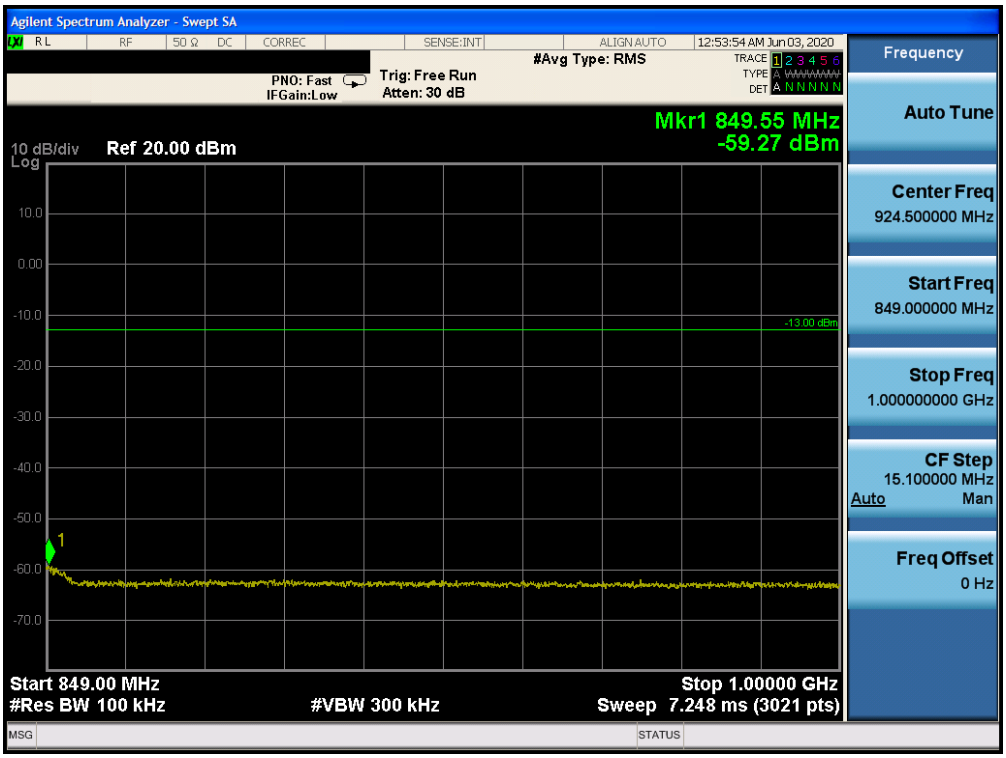
Band 26/5



Plot 7-49. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-50. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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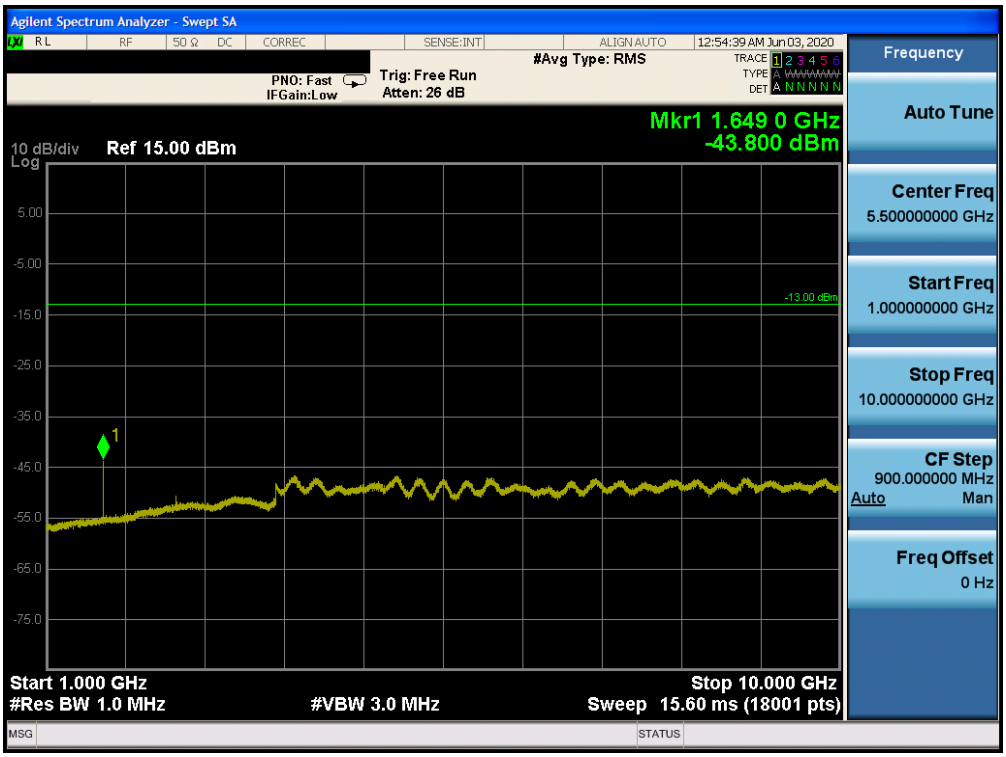
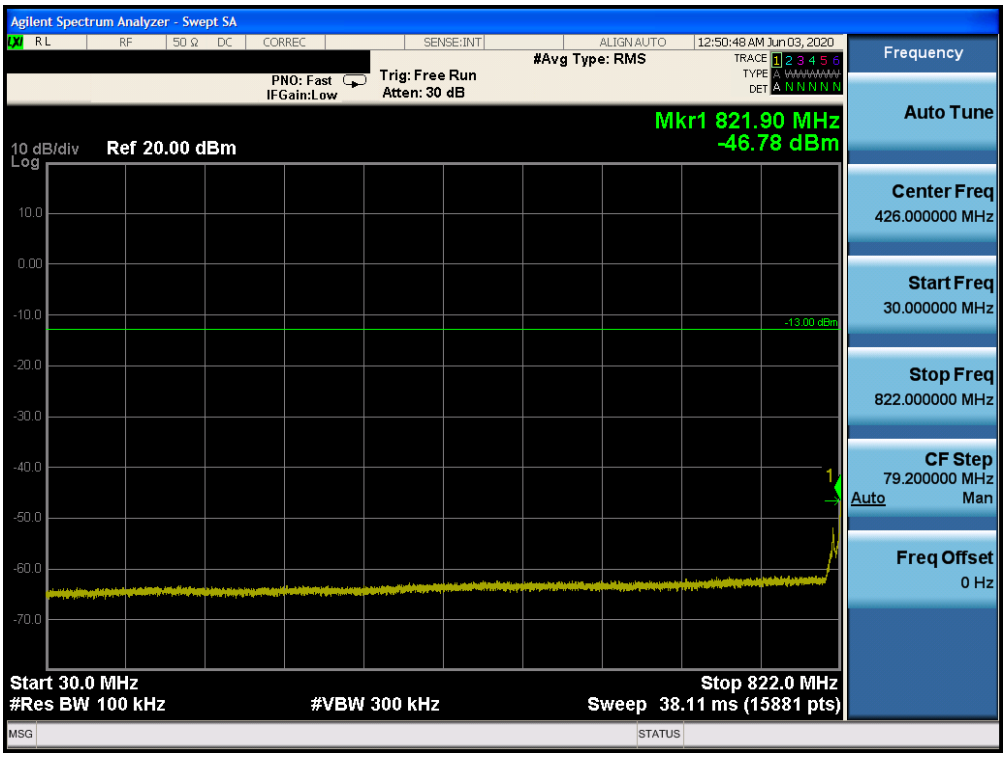


Plot 7-51. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-52. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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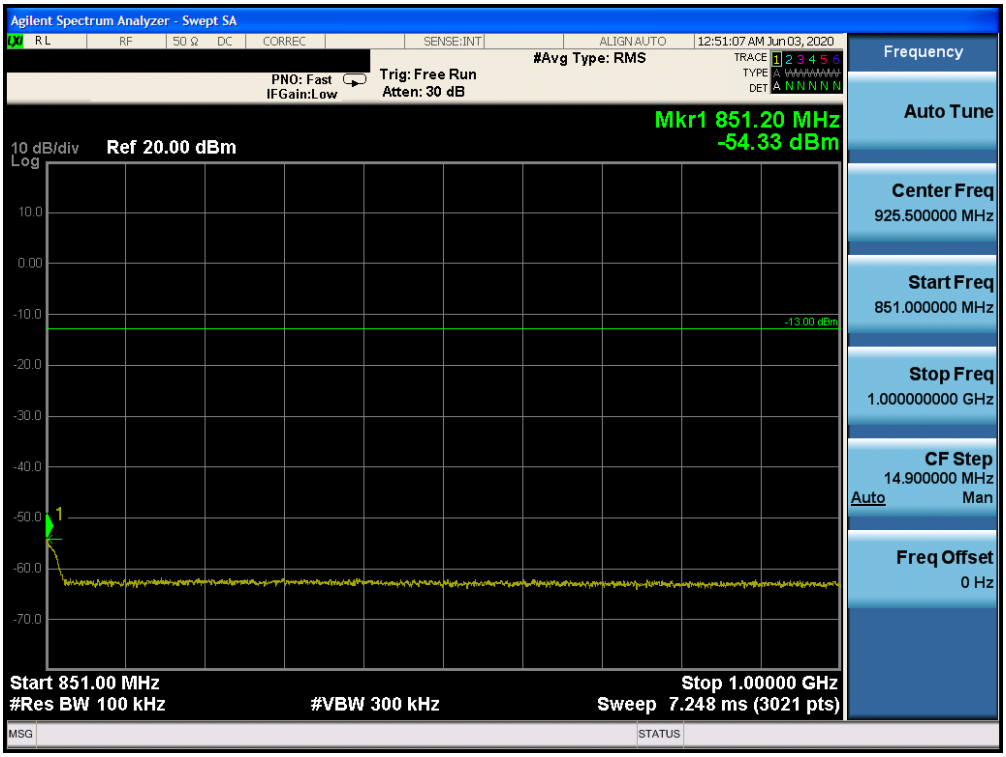
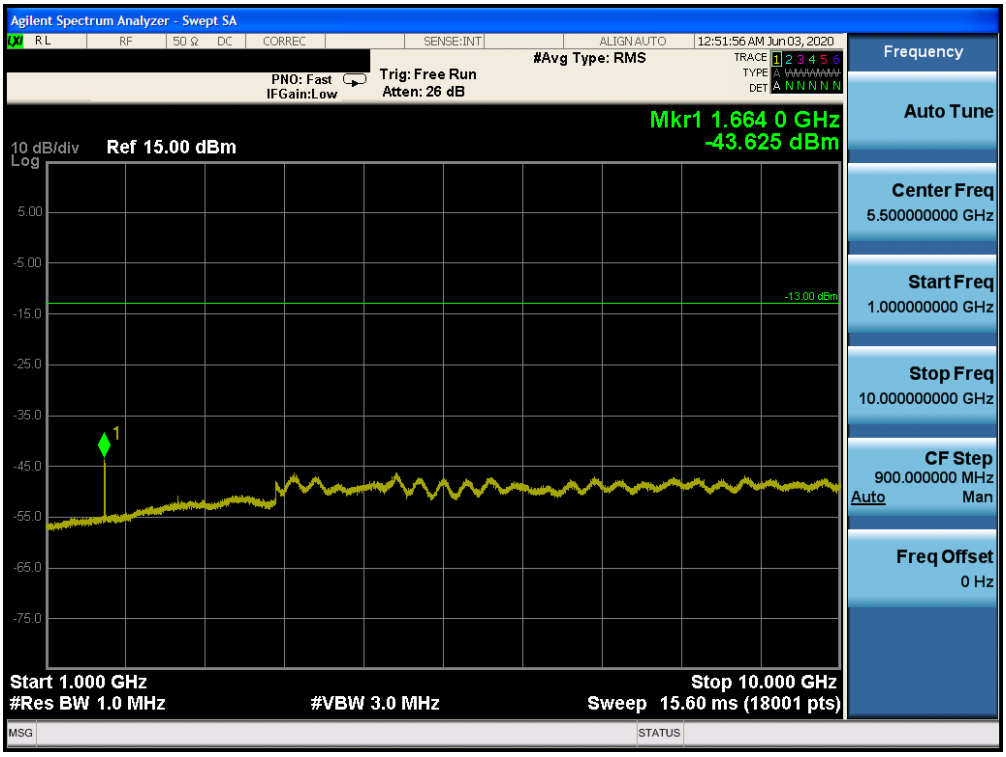


Plot 7-53. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-54. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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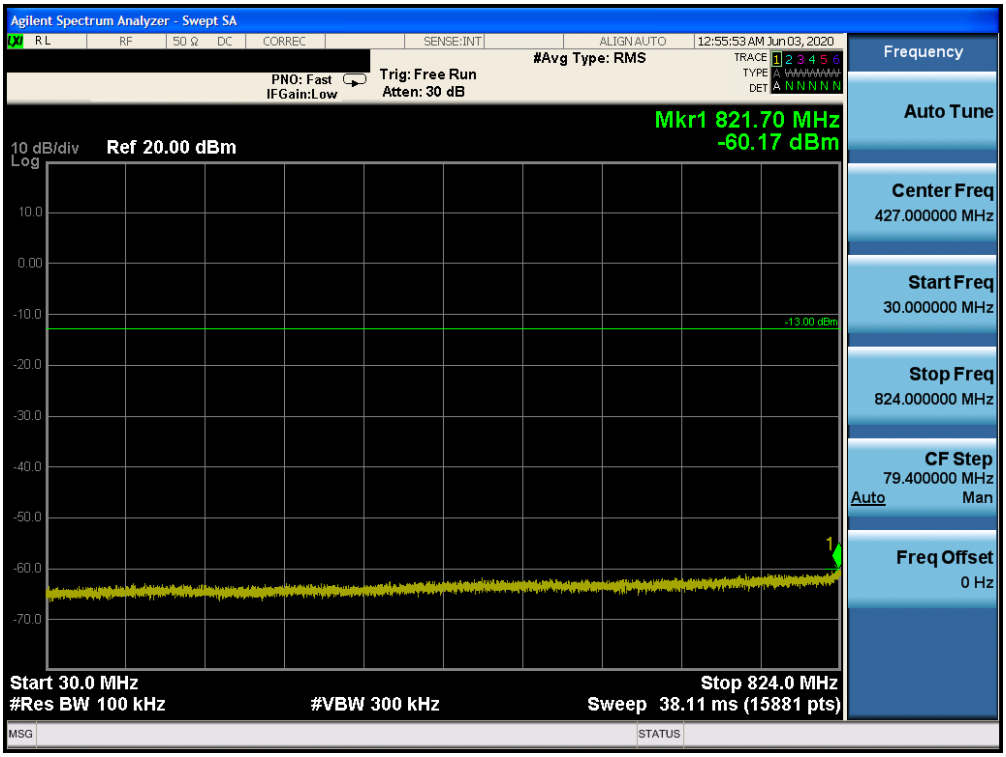
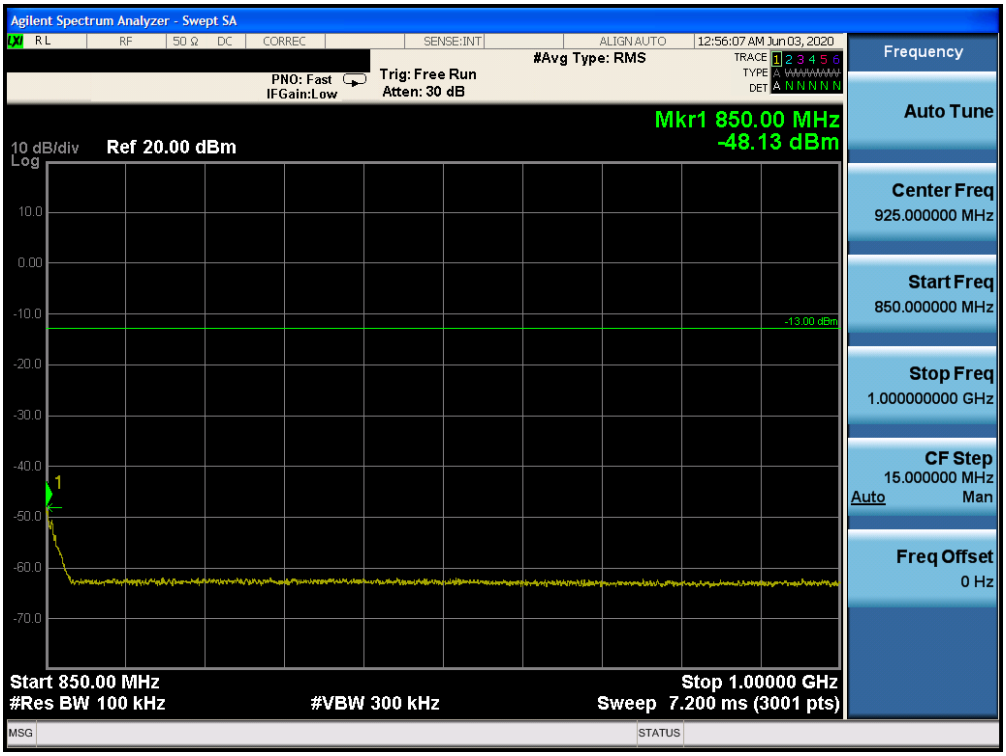


Plot 7-55. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-56. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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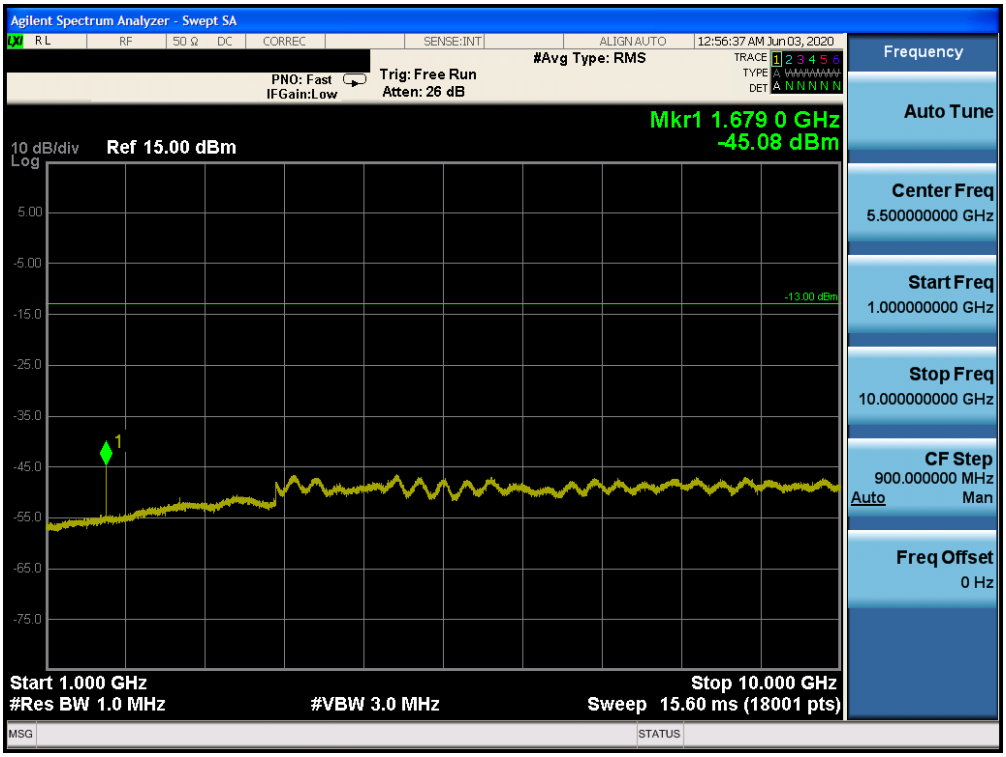

Plot 7-57. Conducted Spurious Plot (Band 26/5 - 10.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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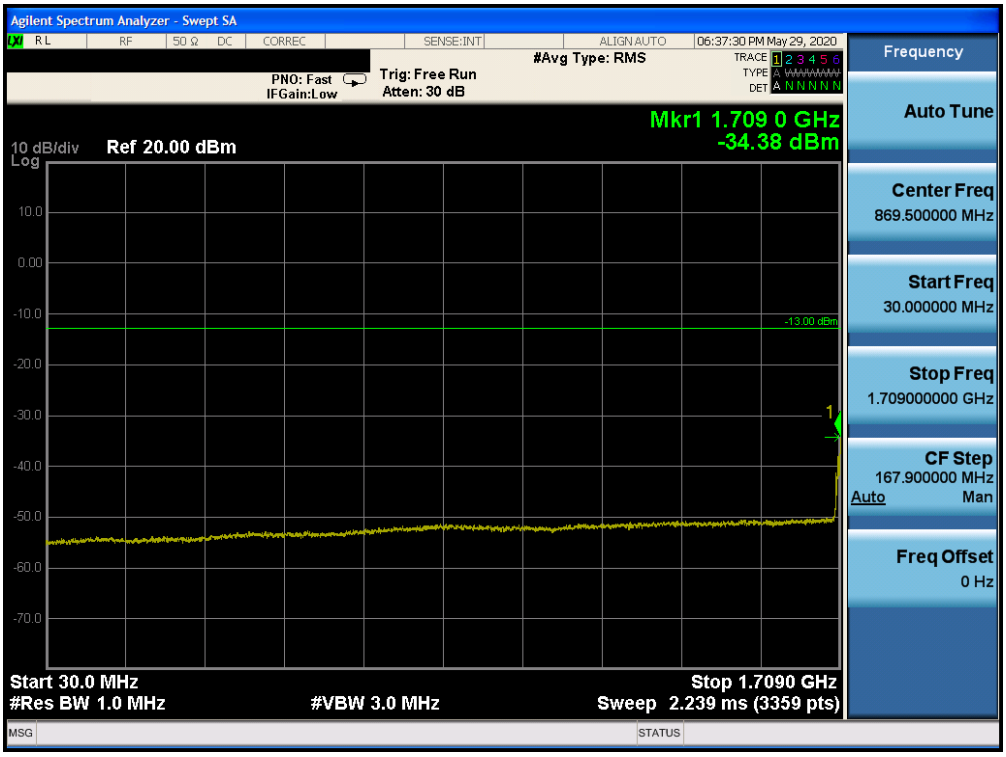
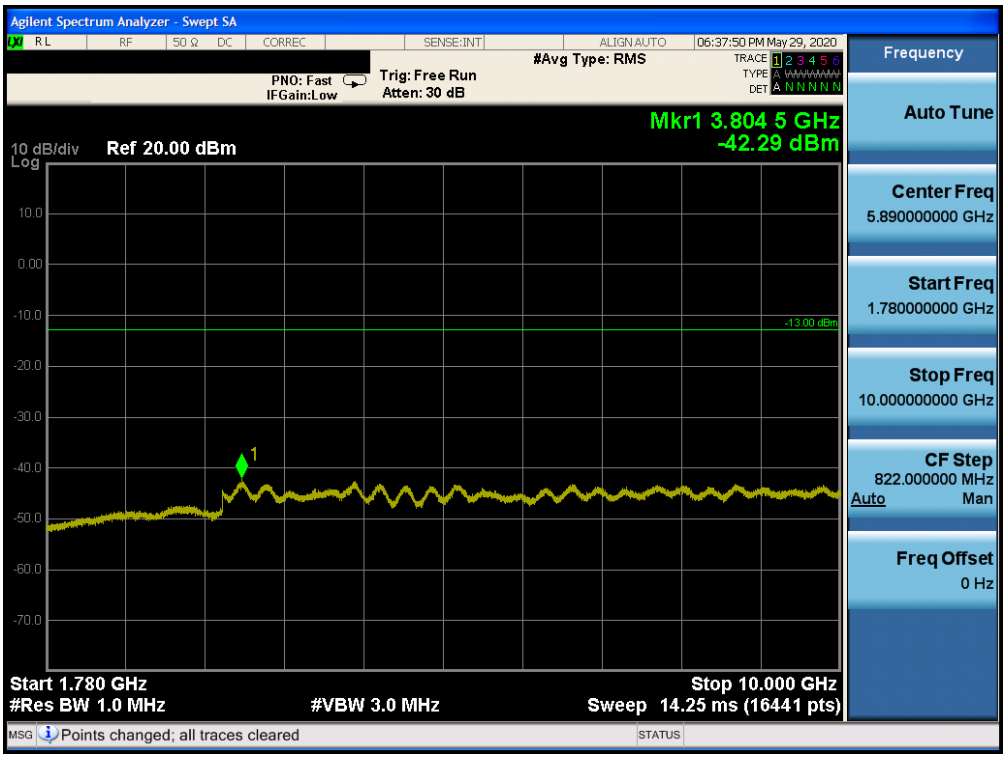
Band 66/4



Plot 7-58. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-59. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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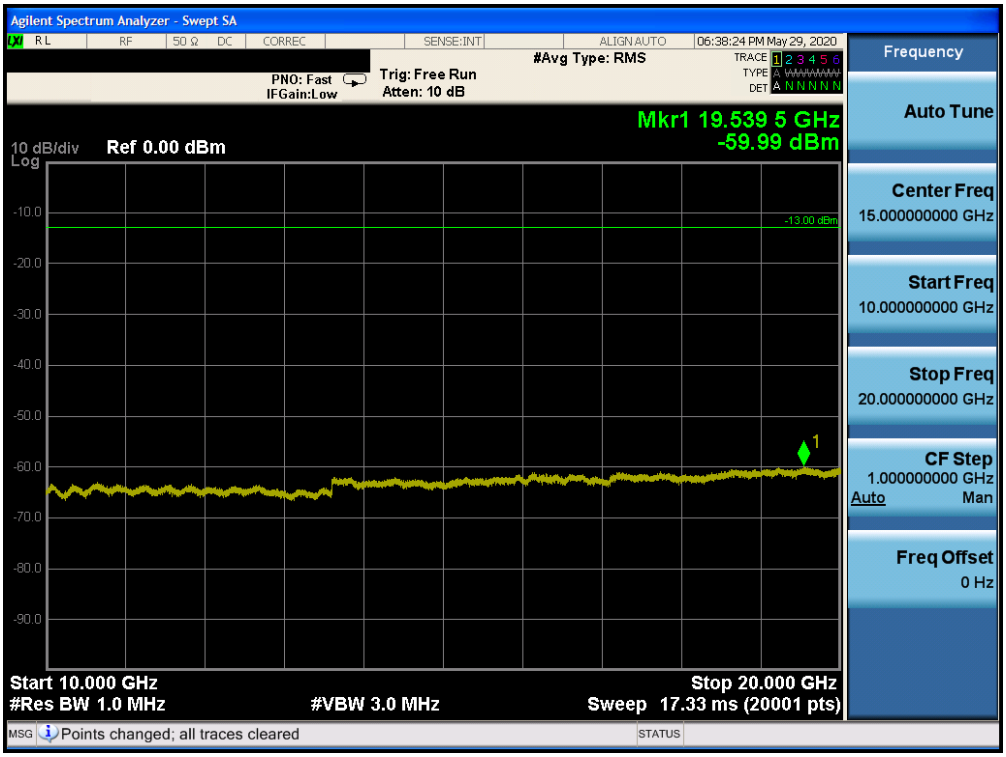
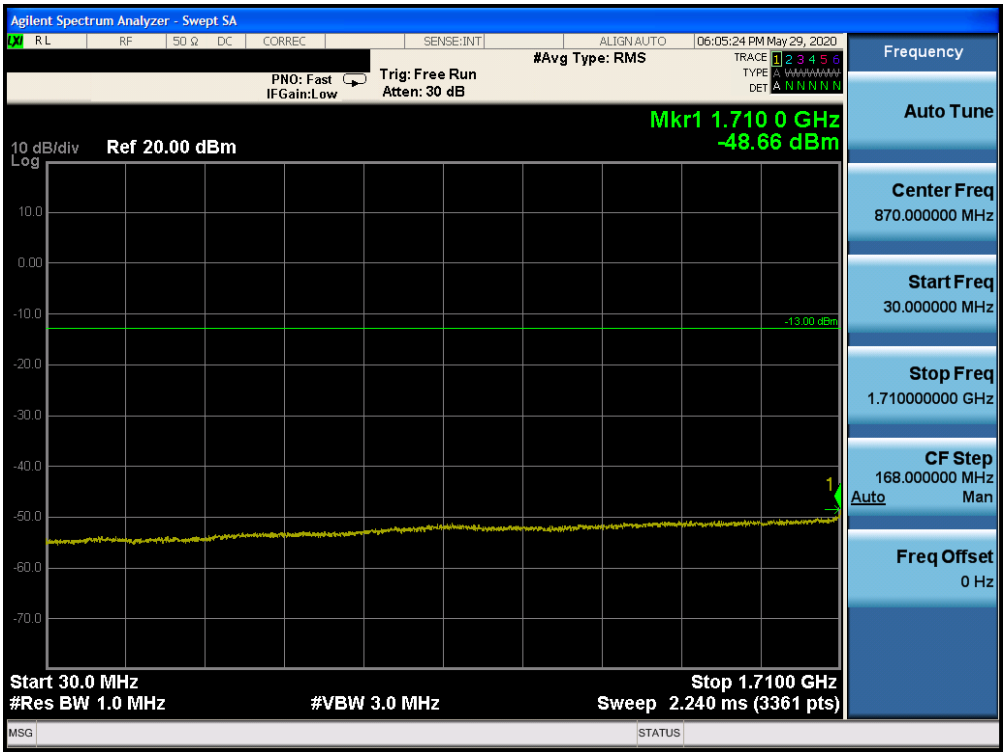


Plot 7-60. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-61. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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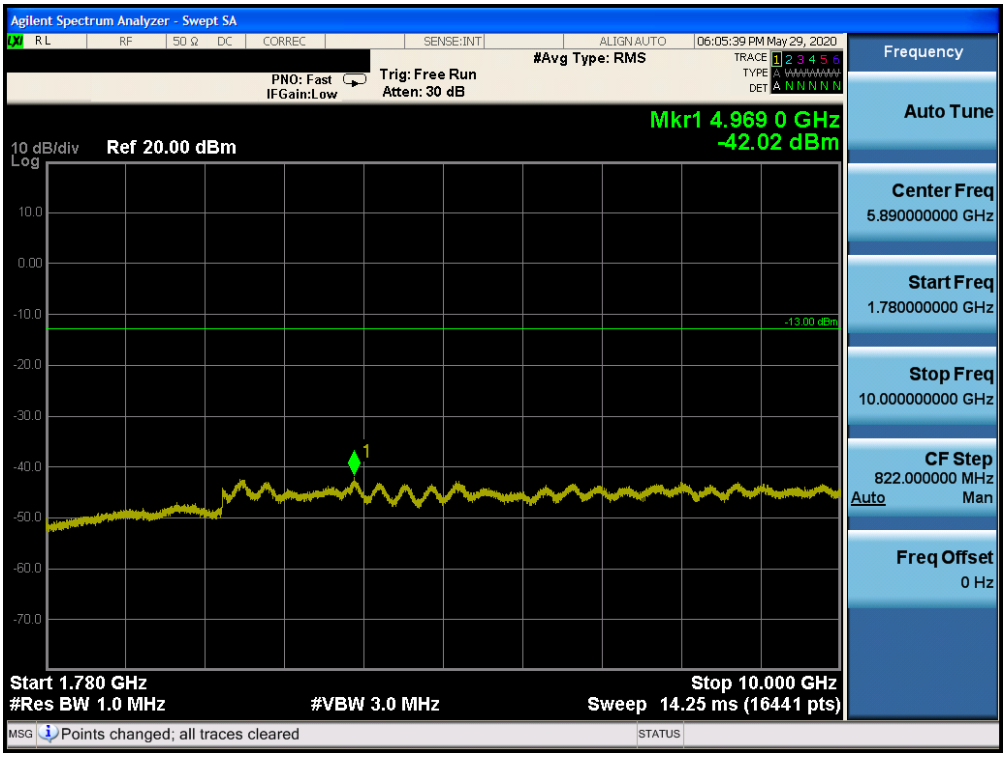
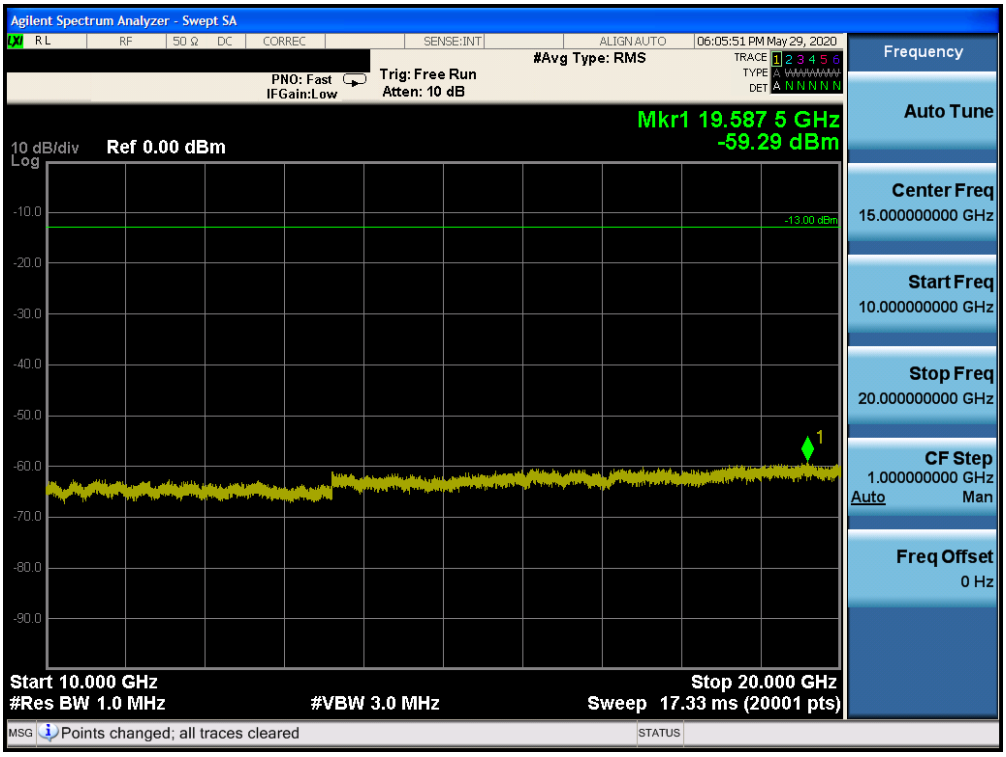


Plot 7-62. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-63. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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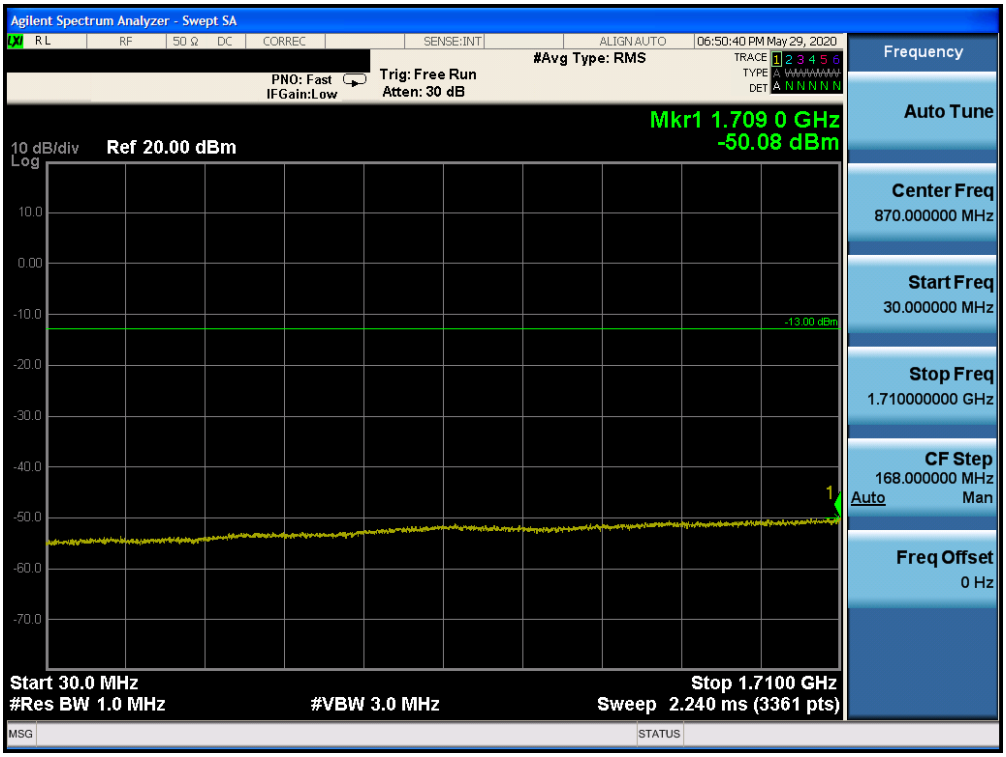
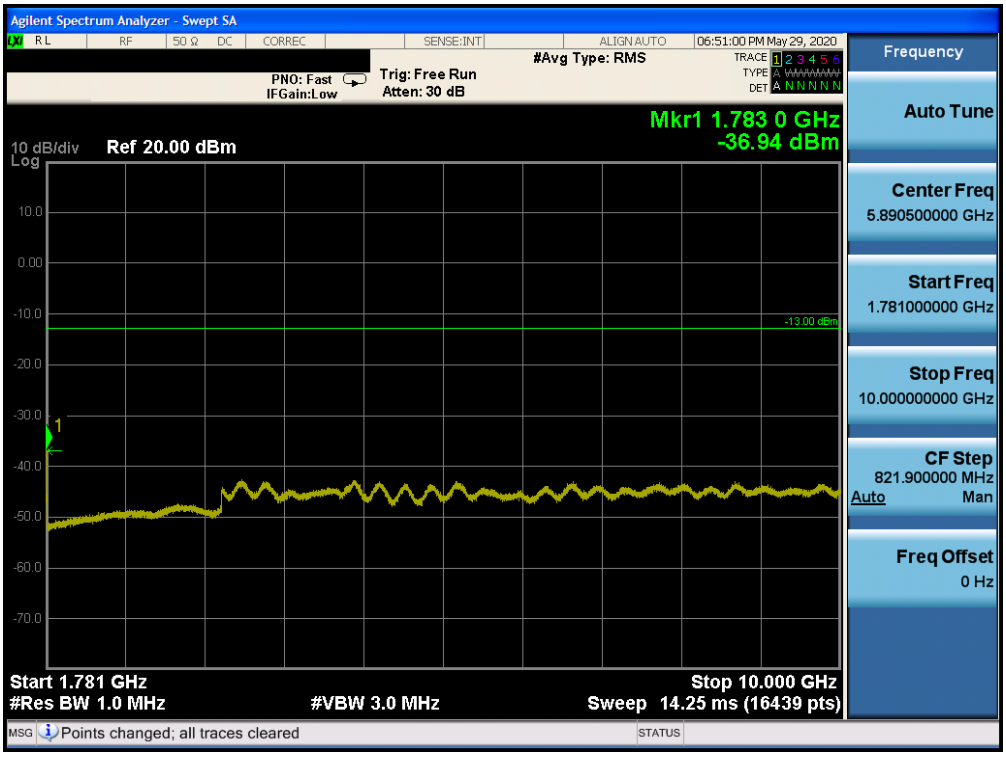


Plot 7-64. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-65. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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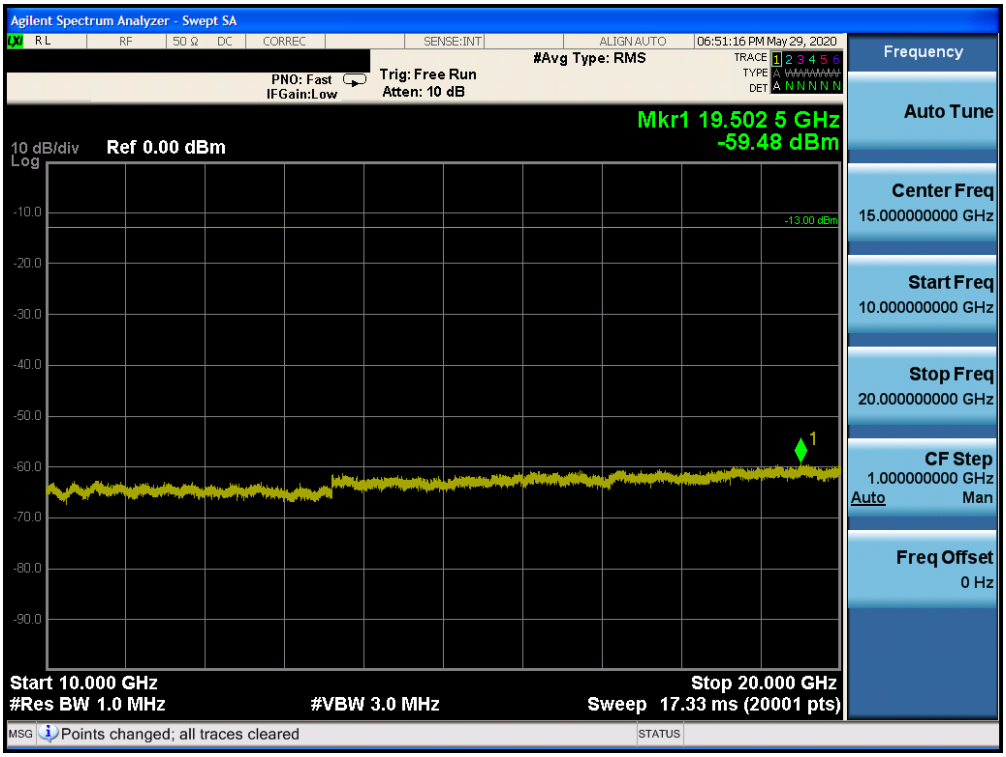

Plot 7-66. Conducted Spurious Plot (Band 66/4 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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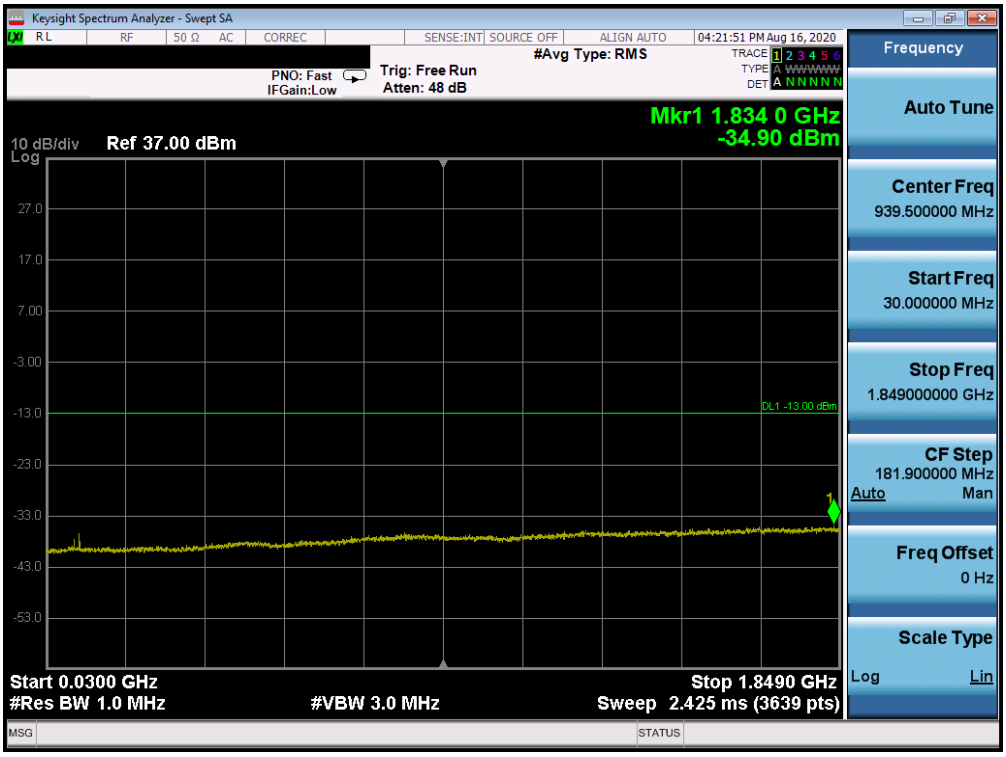
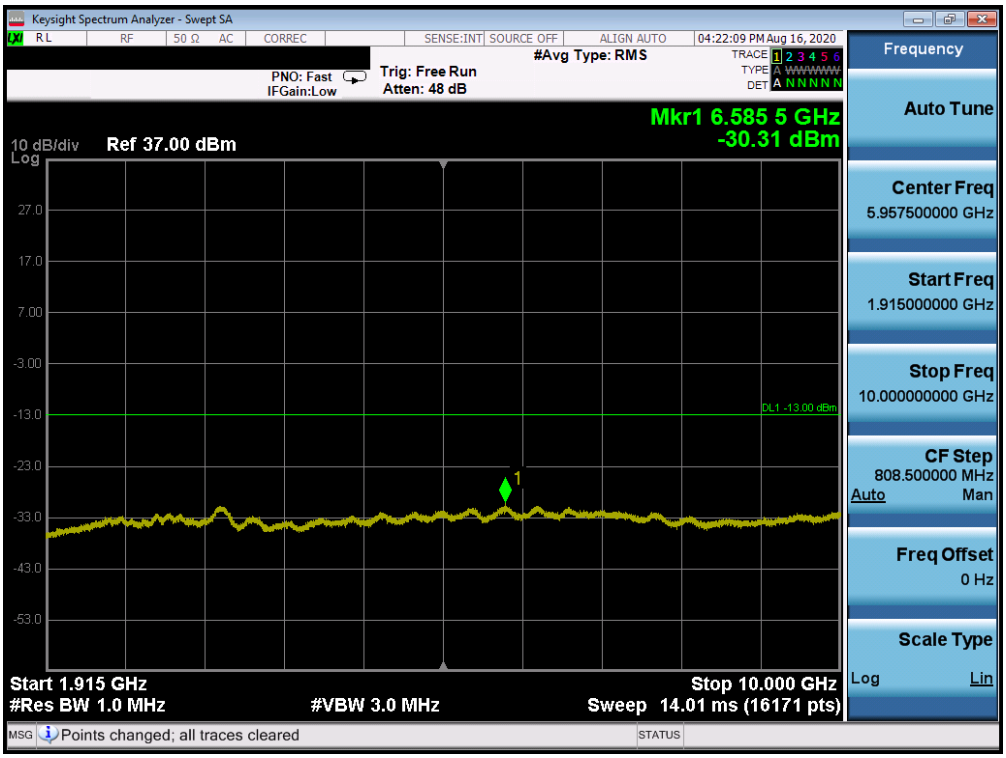
Band 25/2



Plot 7-67. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-68. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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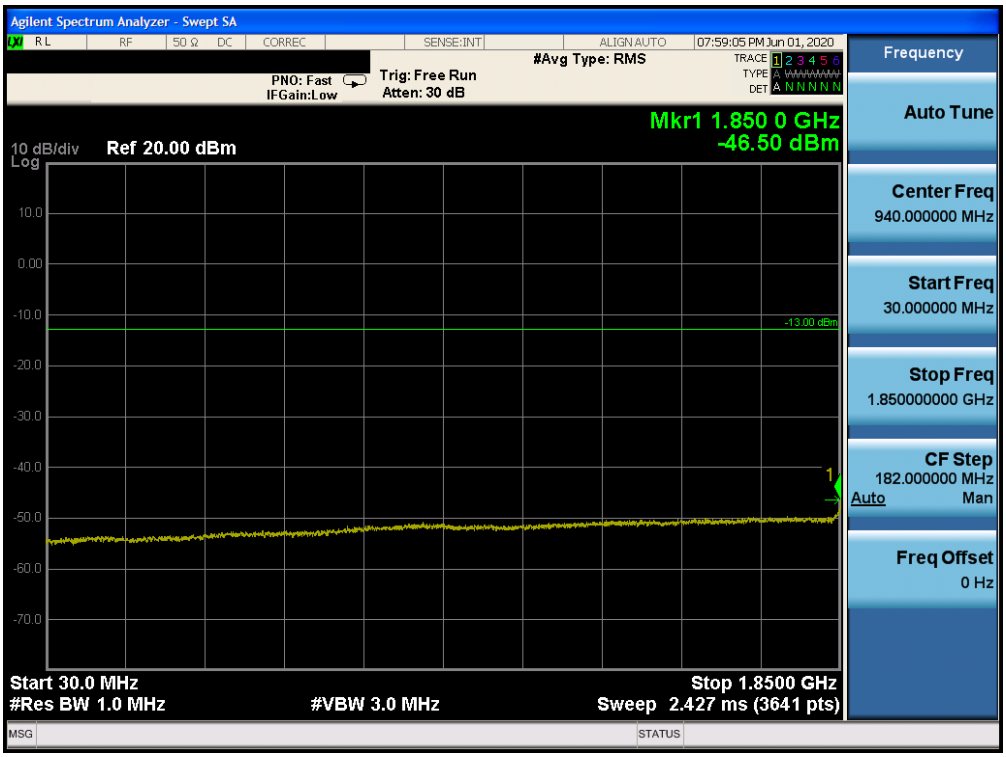
Plot 7-69. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-70. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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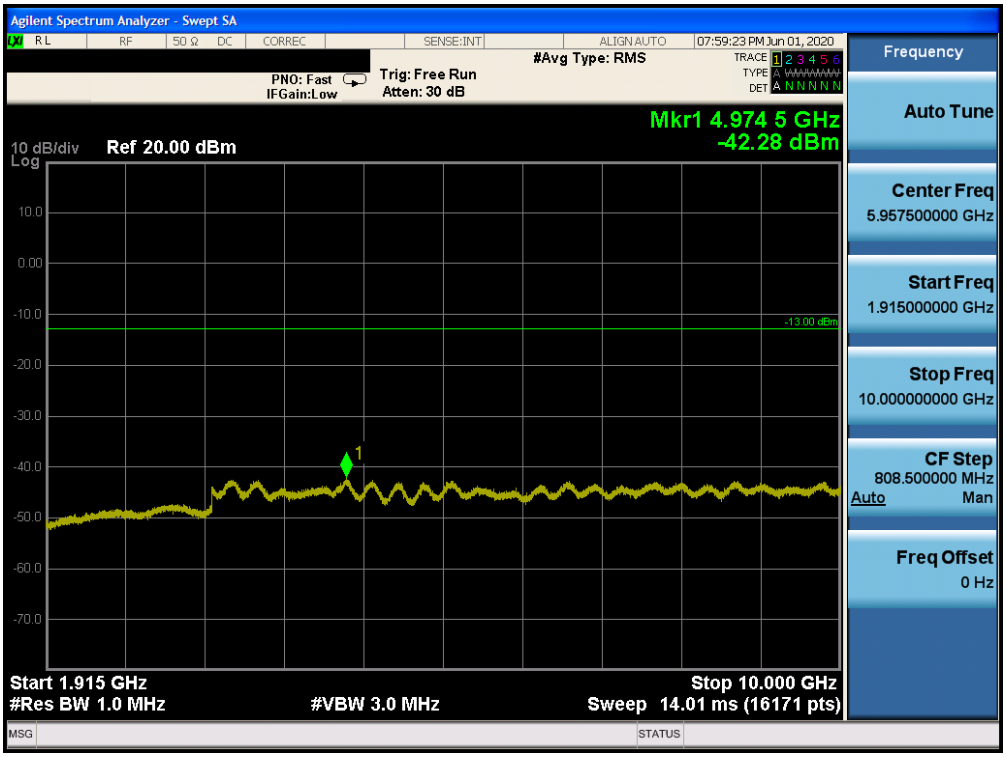
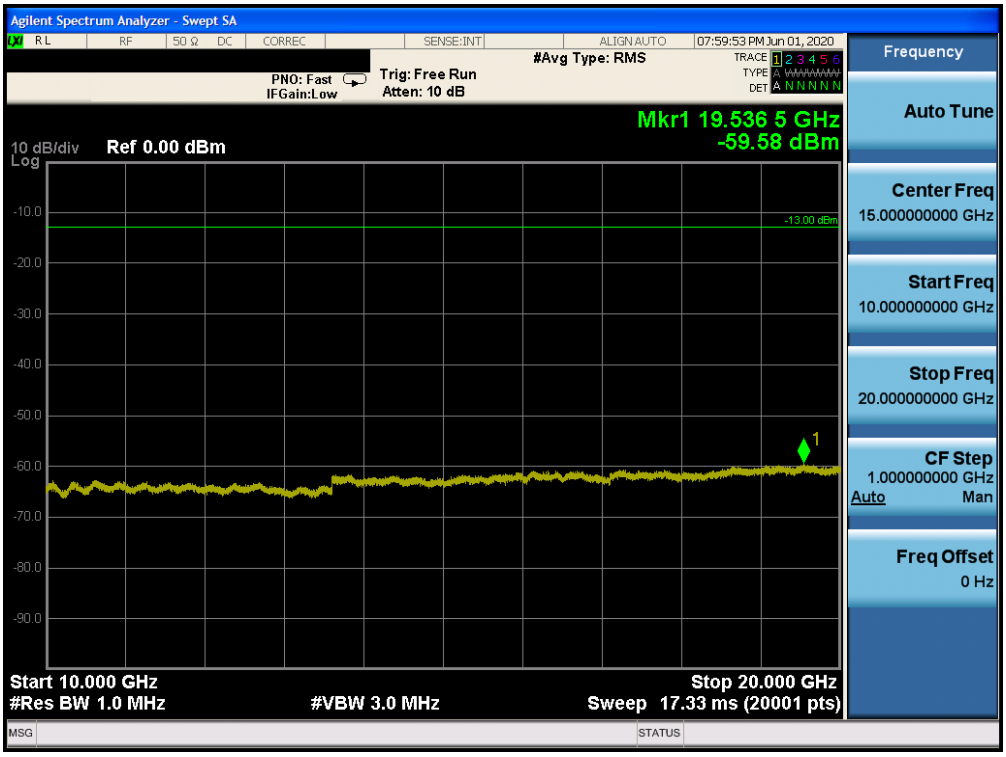


Plot 7-71. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-72. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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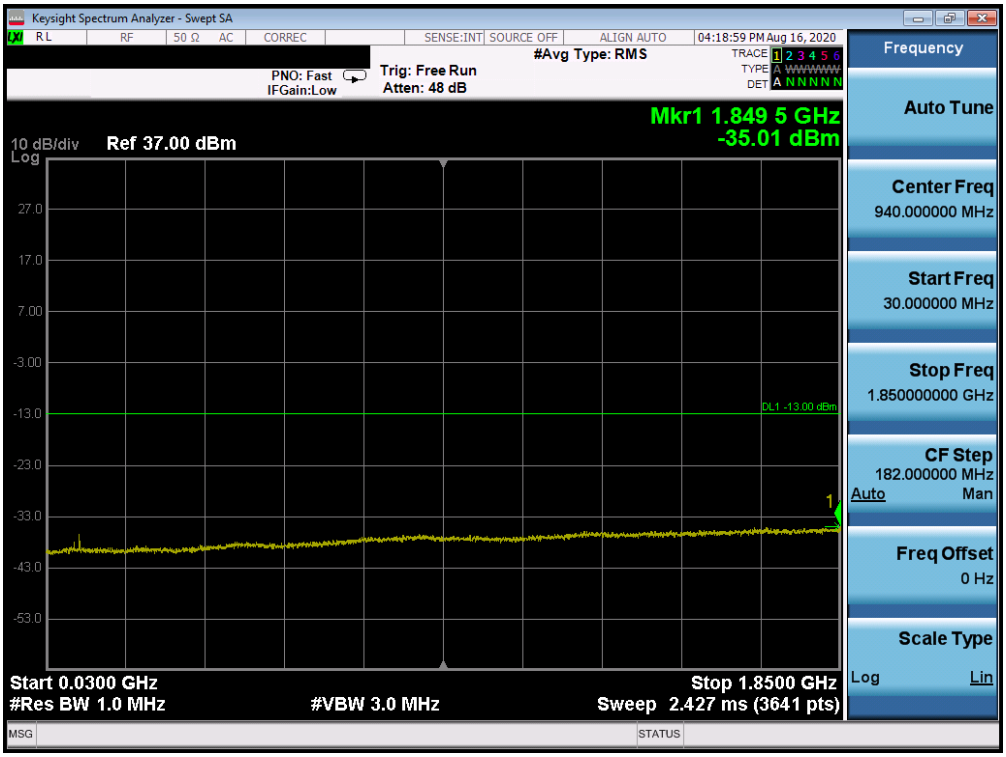
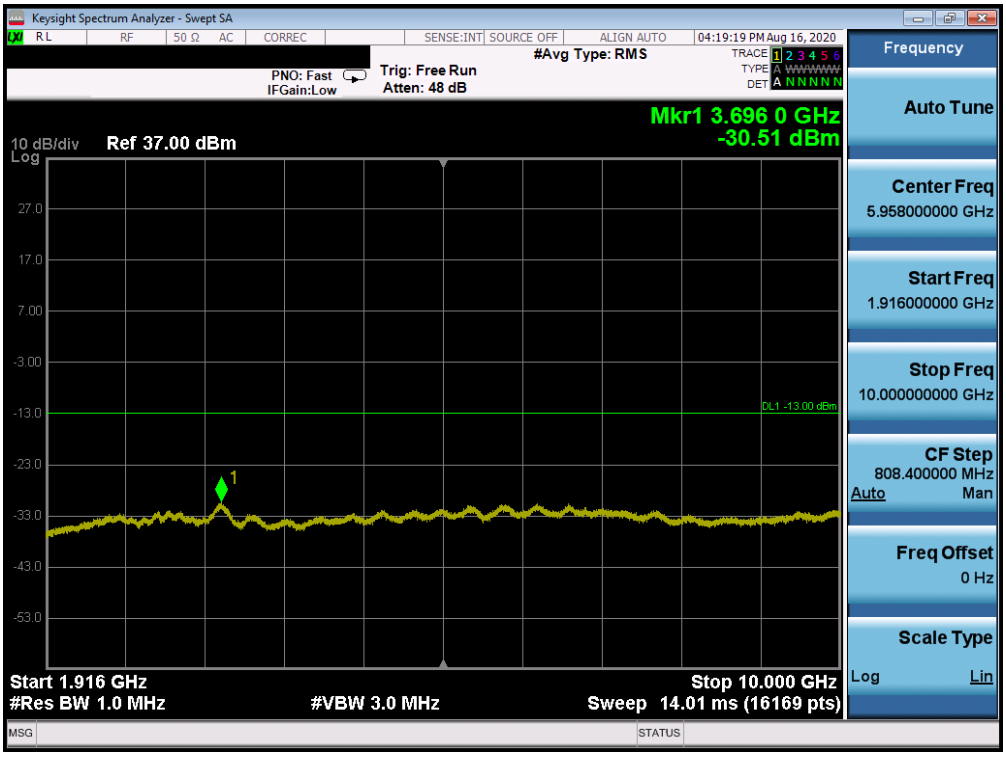


Plot 7-73. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-74. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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Plot 7-75. Conducted Spurious Plot (Band 25/2 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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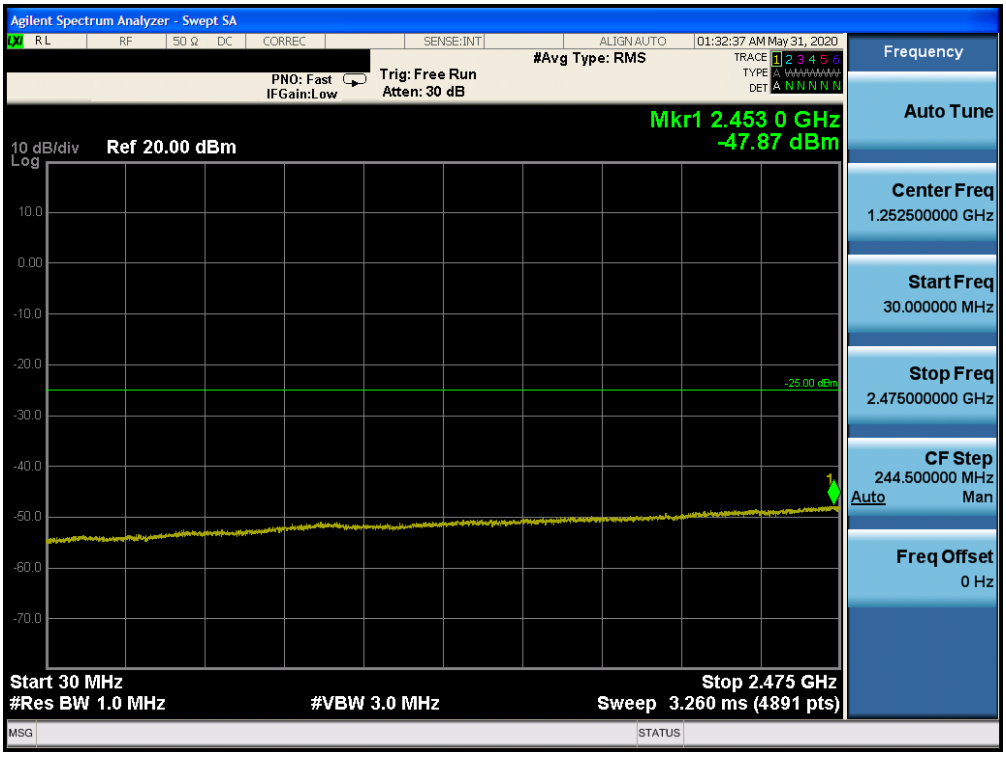
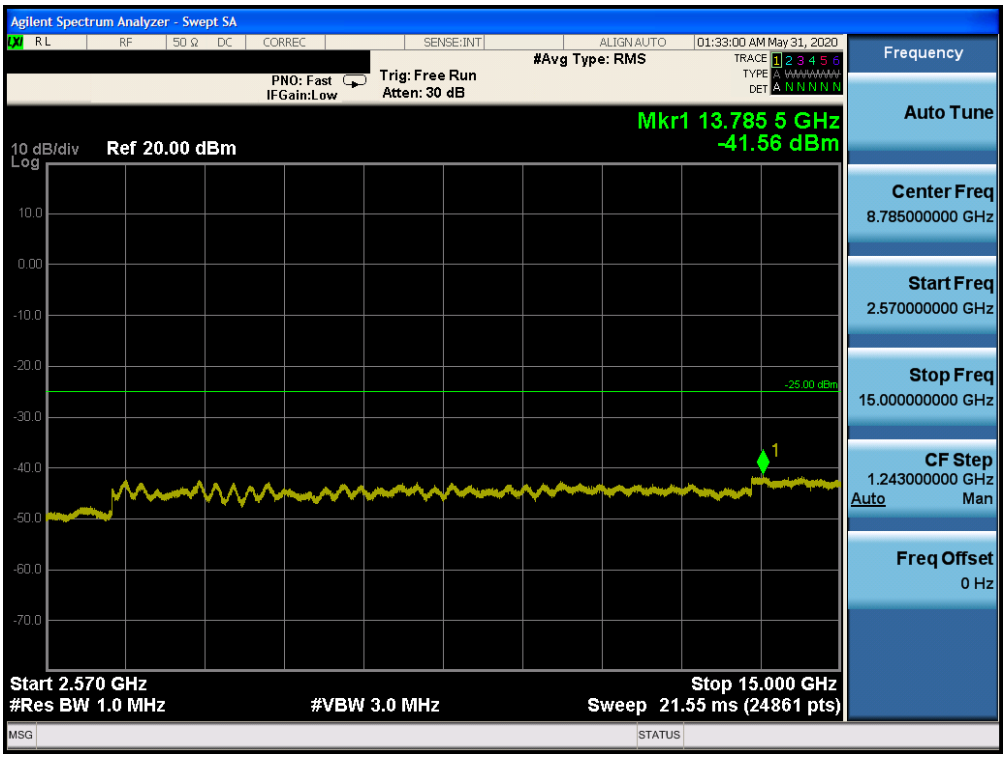
Band 7



Plot 7-76. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-77. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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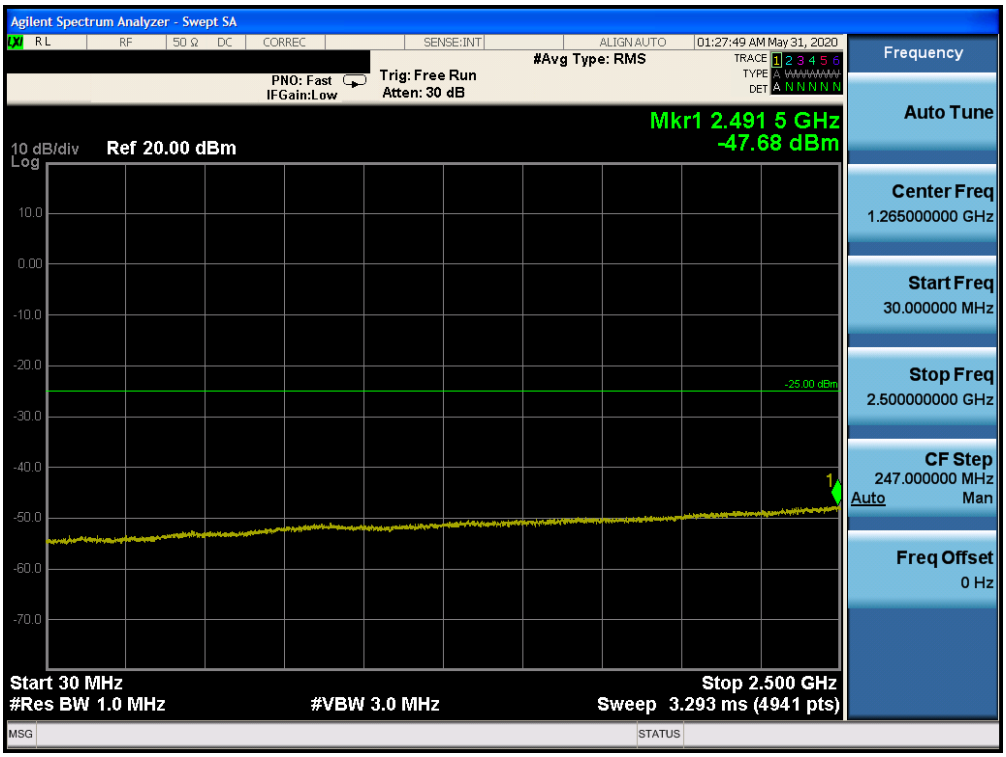
Plot 7-78. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-79. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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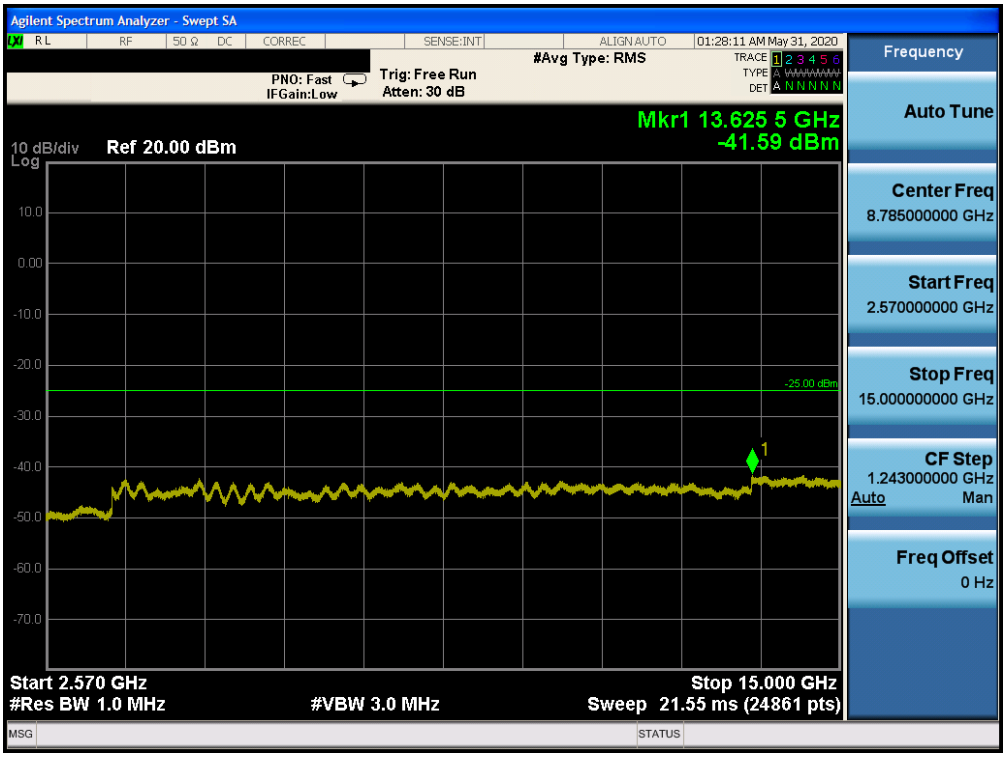
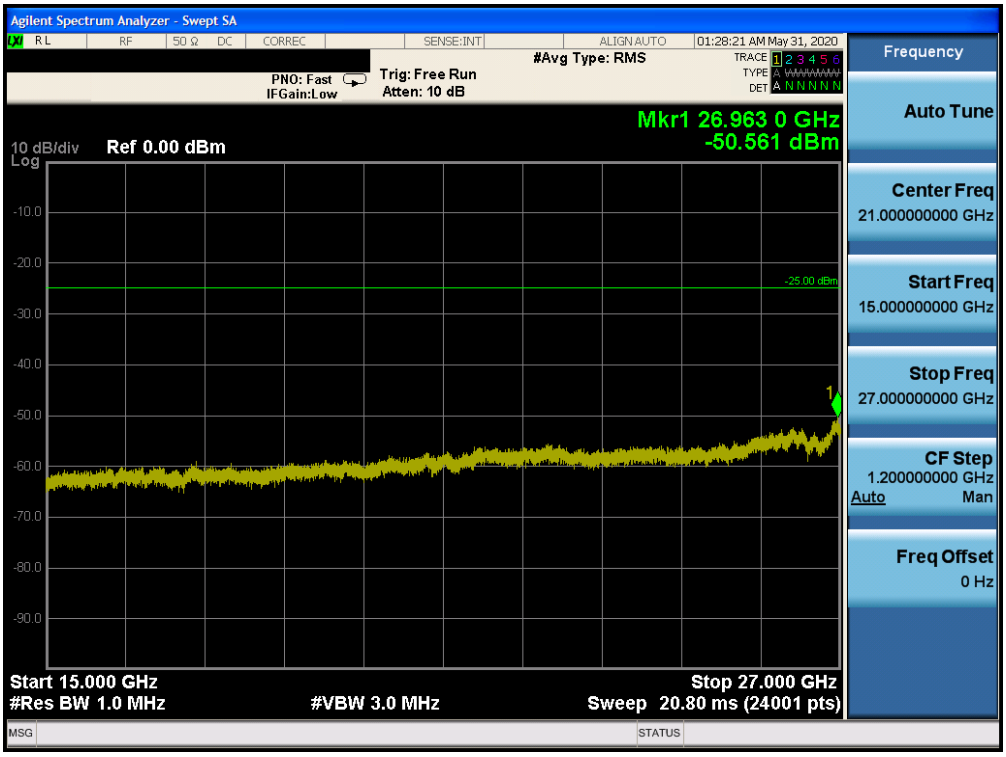


Plot 7-80. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-81. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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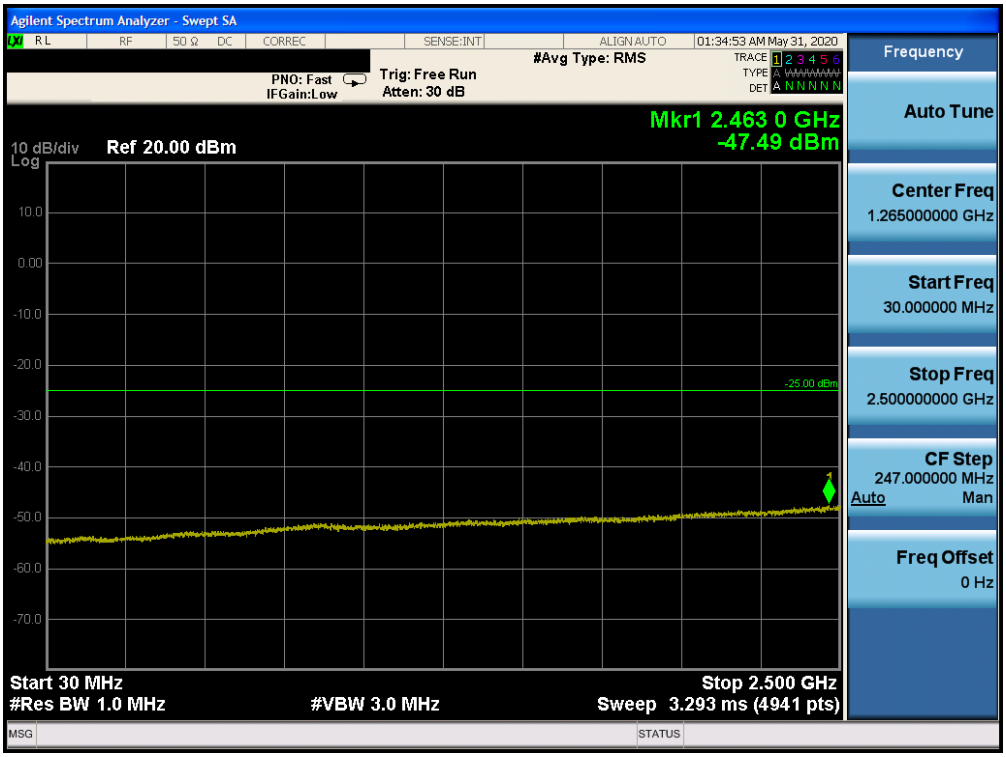
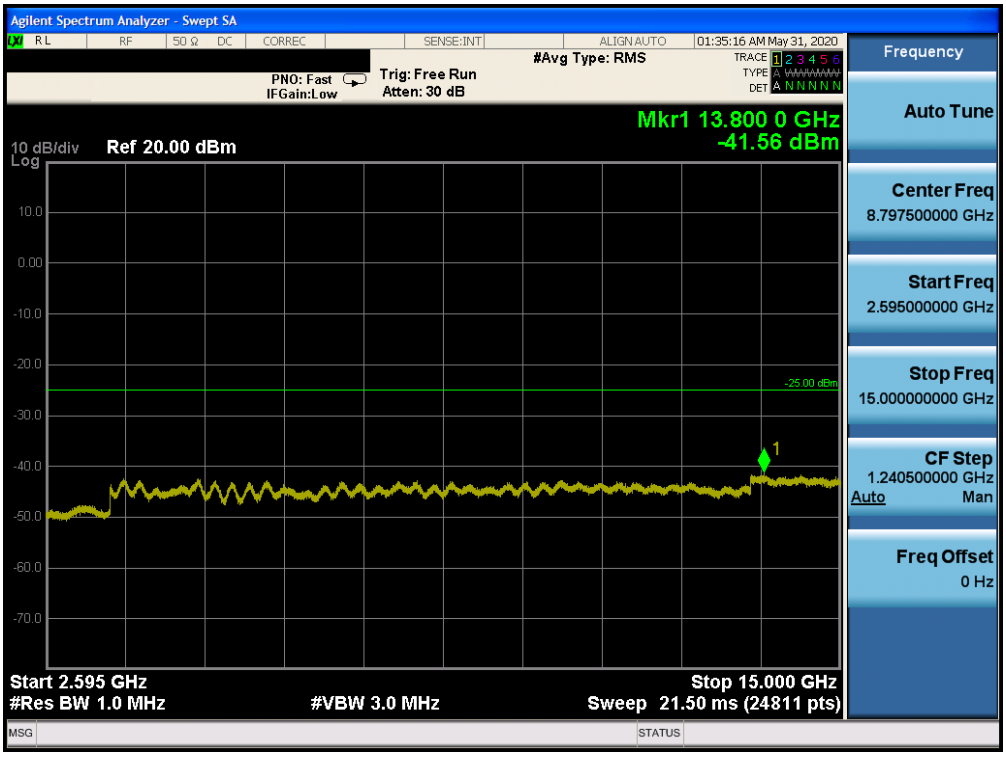


Plot 7-82. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-83. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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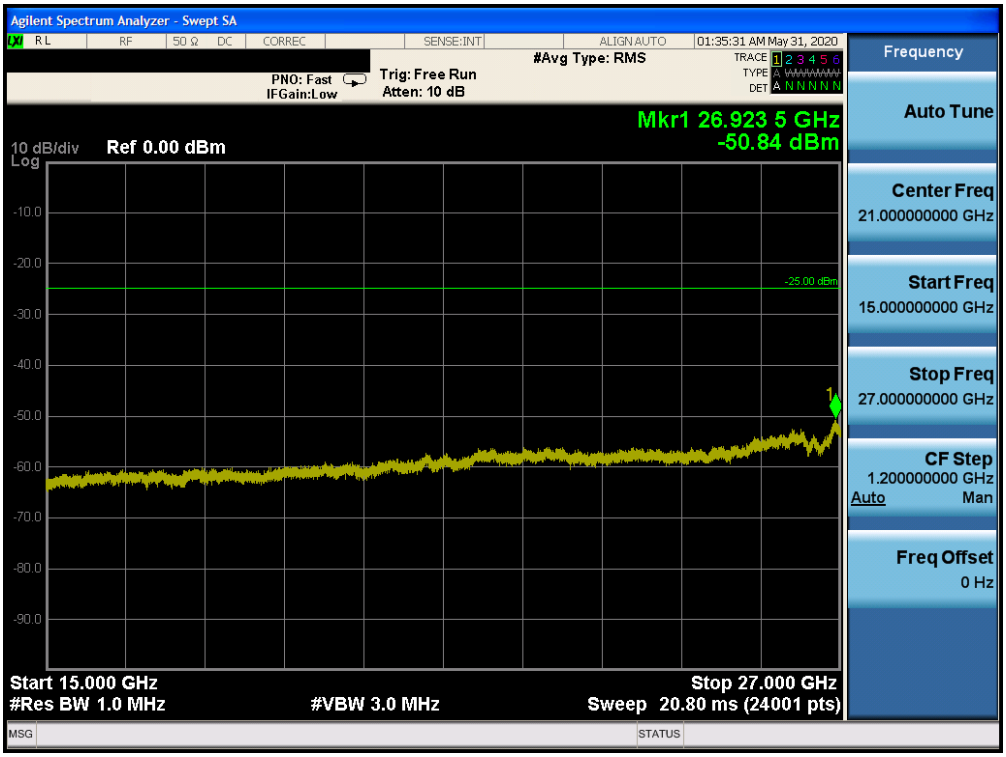

Plot 7-84. Conducted Spurious Plot (Band 7 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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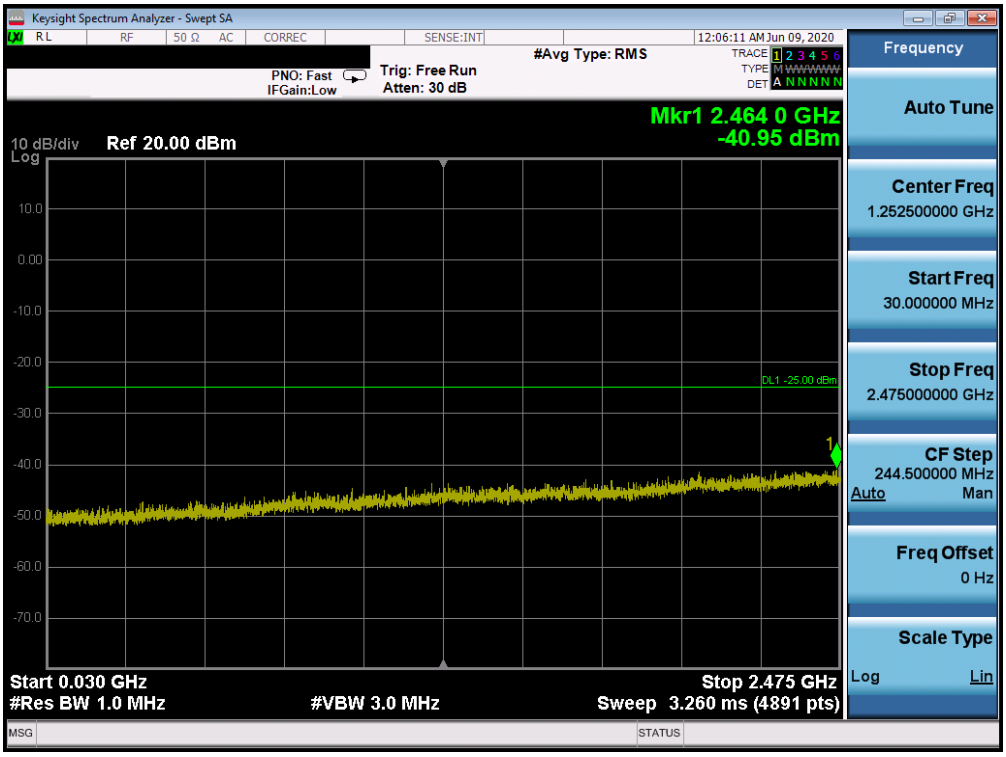
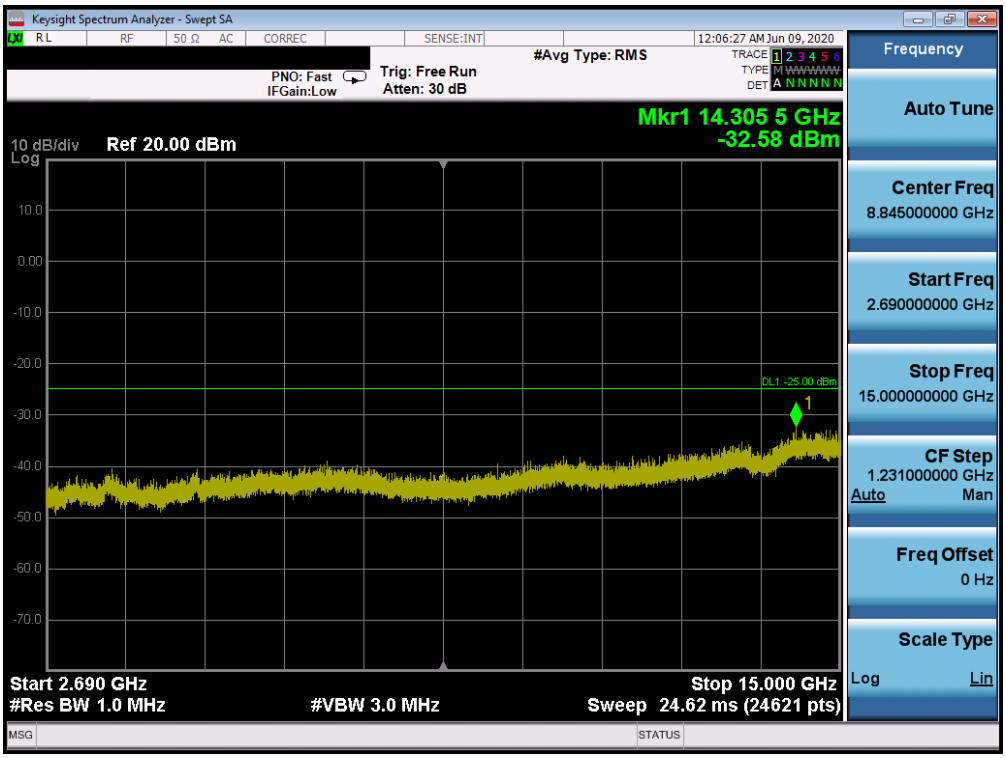
Band 41



Plot 7-85. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-86. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)

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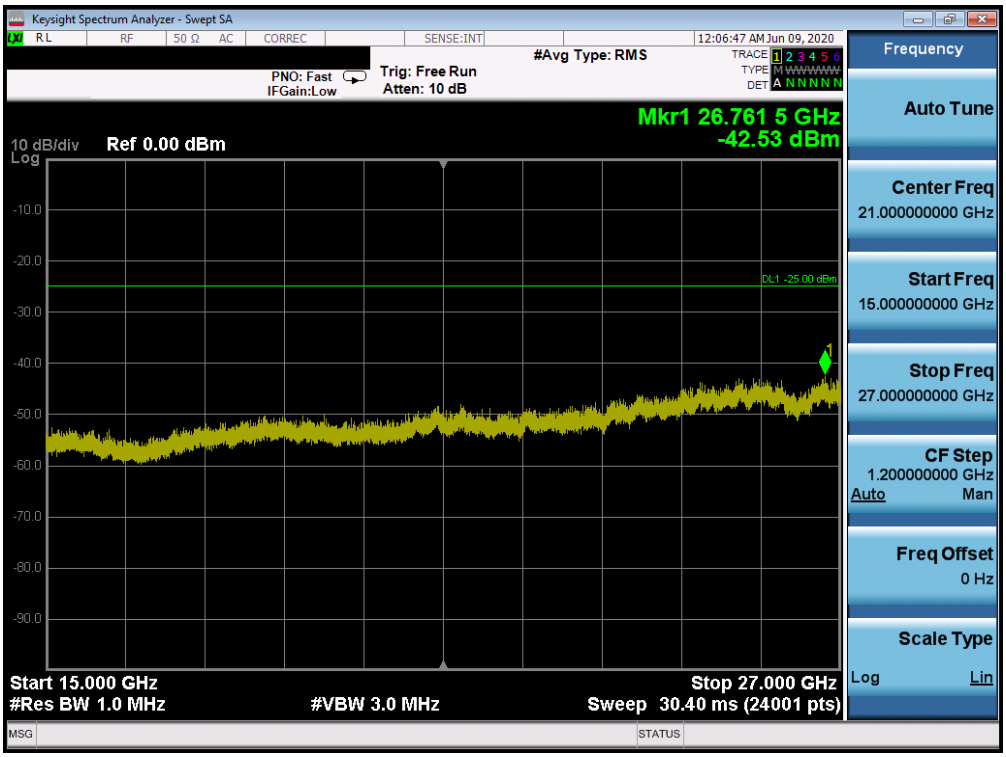
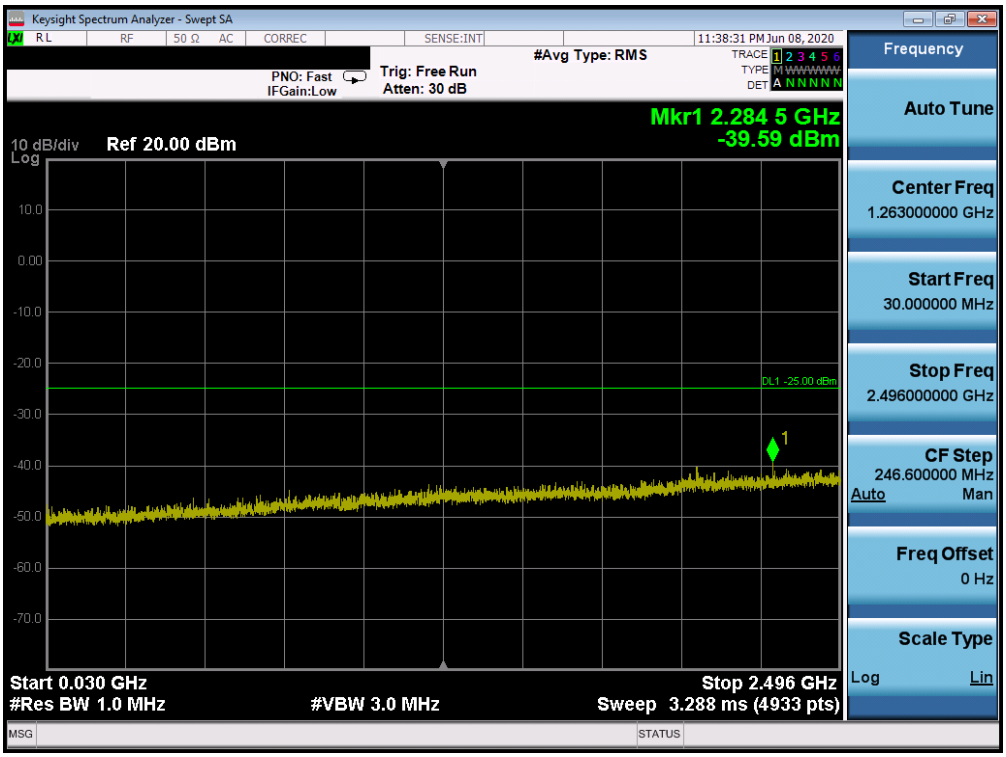


Plot 7-87. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Low Channel)



Plot 7-88. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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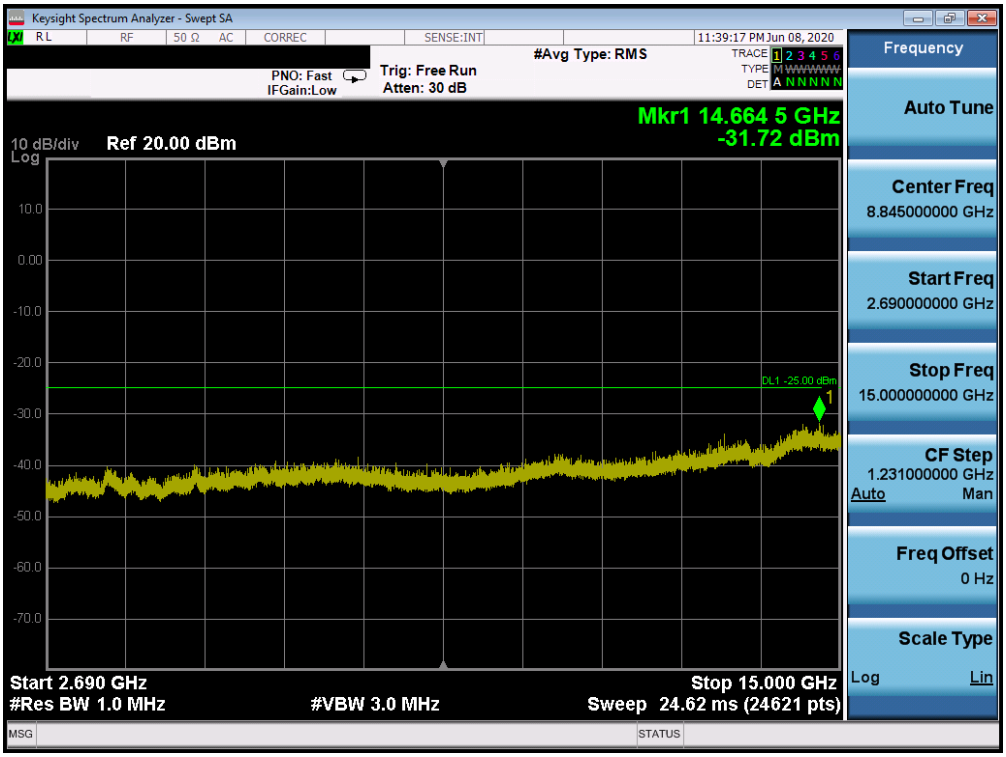
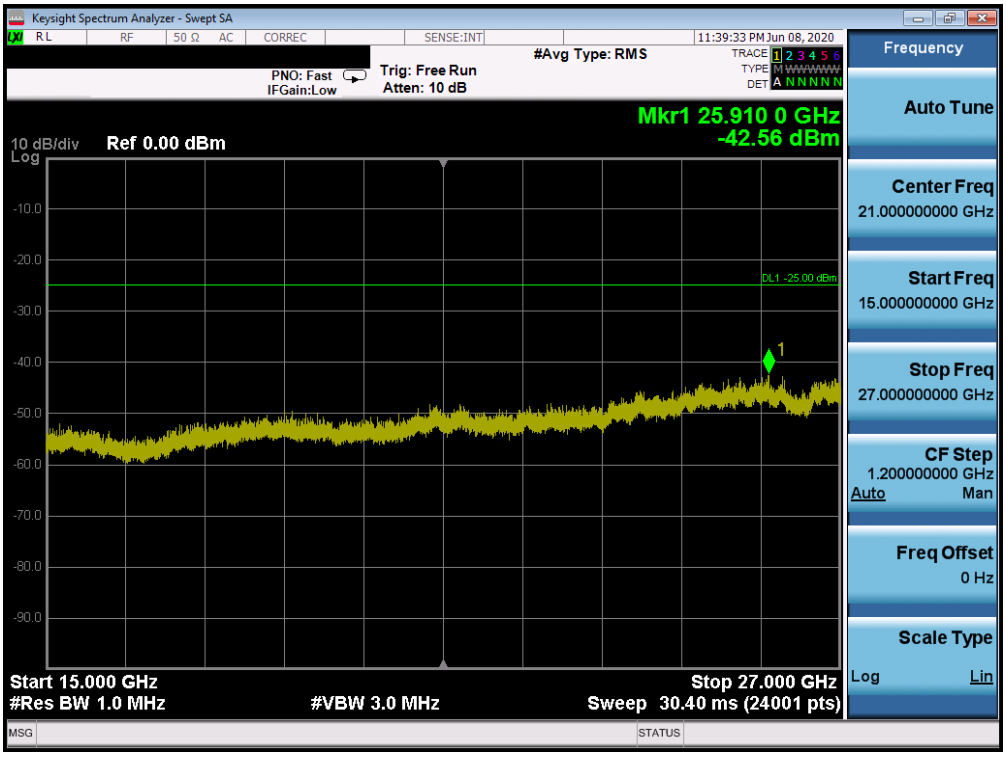


Plot 7-89. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)



Plot 7-90. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - Mid Channel)

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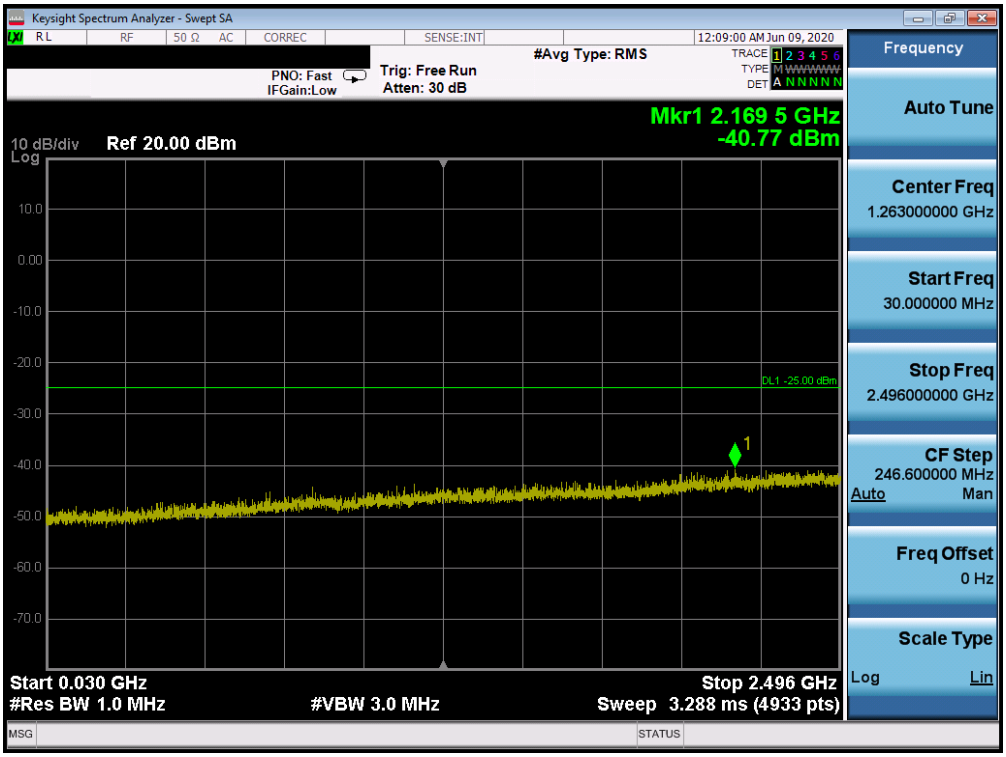
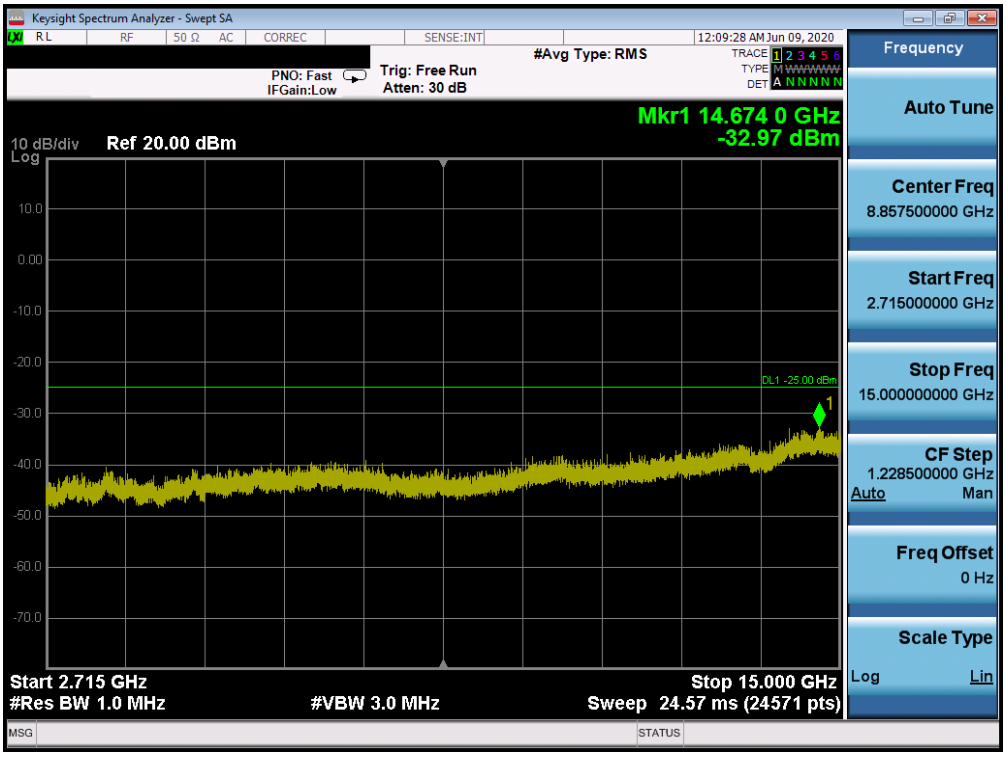


Plot 7-91. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)



Plot 7-92. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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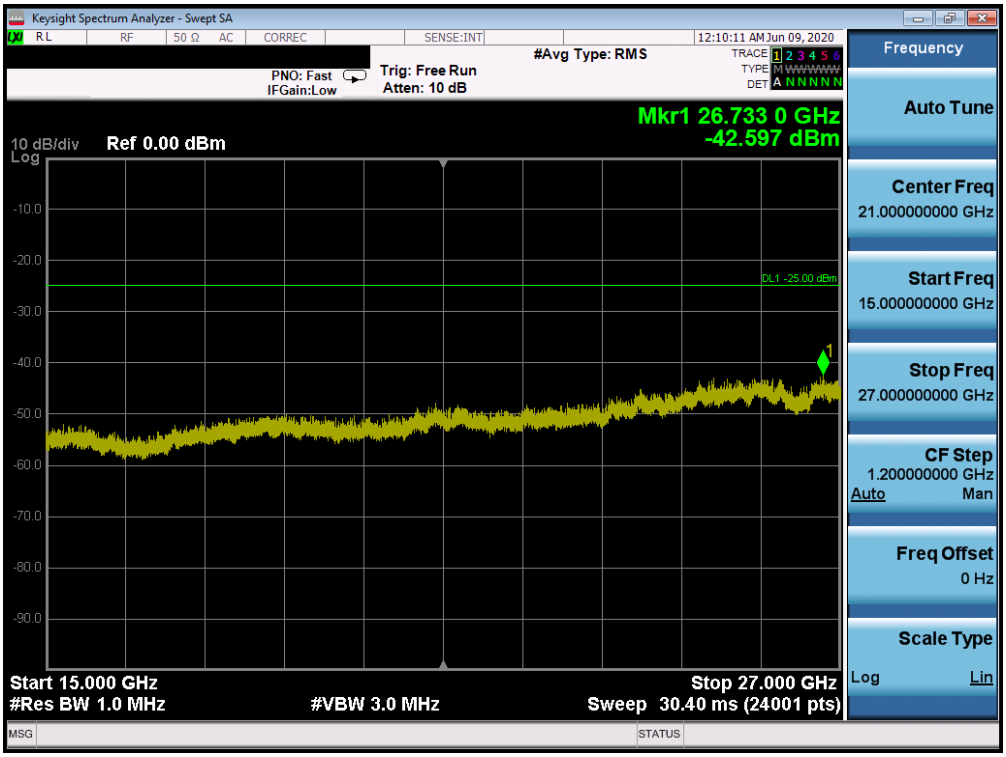

Plot 7-93. Conducted Spurious Plot (Band 41 - 20.0MHz QPSK - RB Size 1, RB Offset 0 - High Channel)

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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 its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

The minimum permissible attenuation level of any spurious emission is 43 + 10 $log_{10}(P_{[Watts]})$, where P is the transmitter power in Watts.

The minimum permissible attenuation level for Band 7 and 41 is as noted in the Test Notes on the following page.

Test Procedure Used

KDB 971168 D01 v03r01 – Section 6.0

Test Settings

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

Test Setup

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

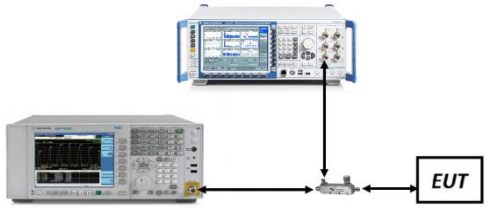

Figure 7-3. Test Instrument & Measurement Setup

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Test Notes

Per 22.917(b) 24.238(a) 27.53(h)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.

Per 27.53(m) for operations in the BRS/EBS bands, the attenuation factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz.

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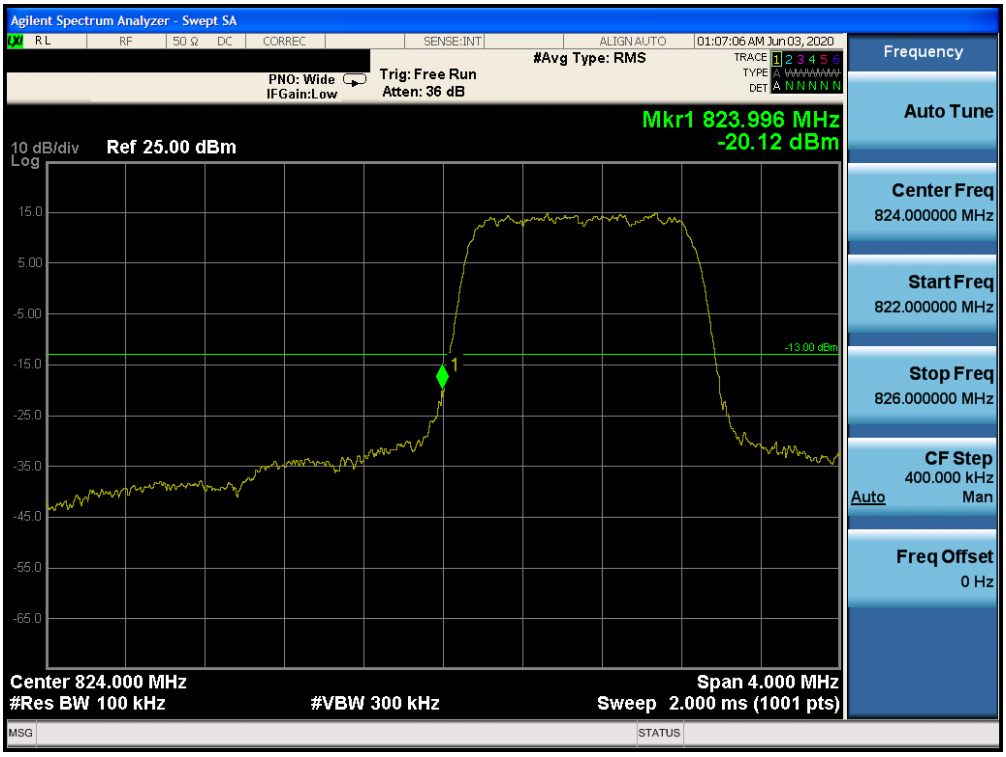
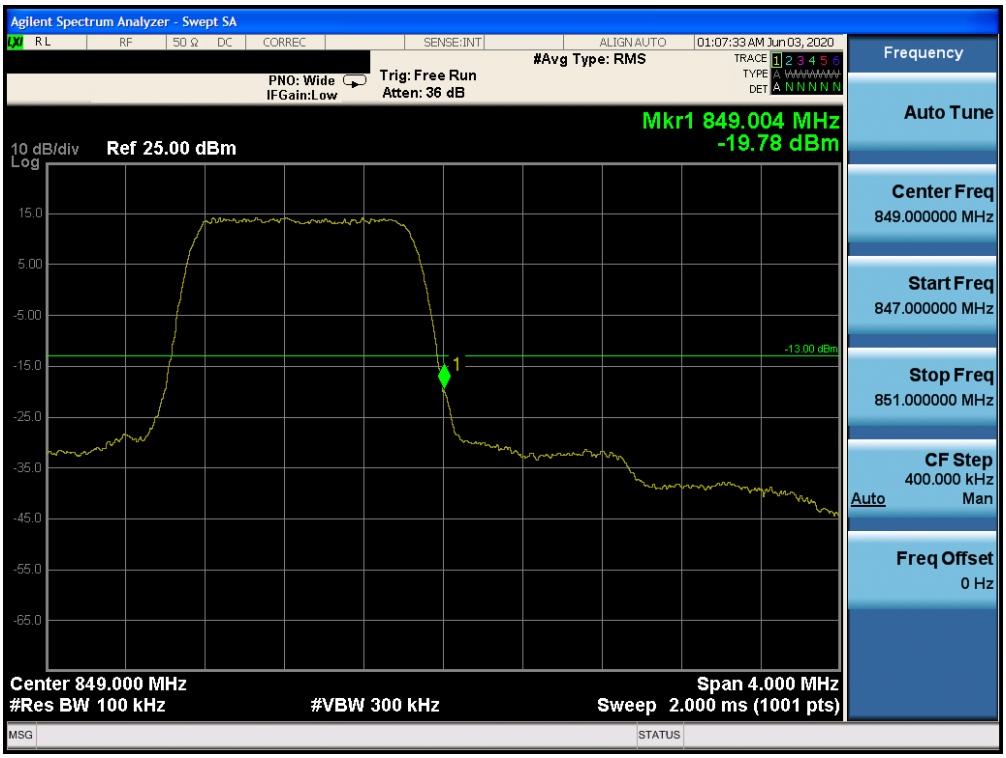
Band 26



Plot 7-94. Lower Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)



Plot 7-95. Upper Band Edge Plot (Band 26 - 1.4MHz QPSK - Full RB Configuration)

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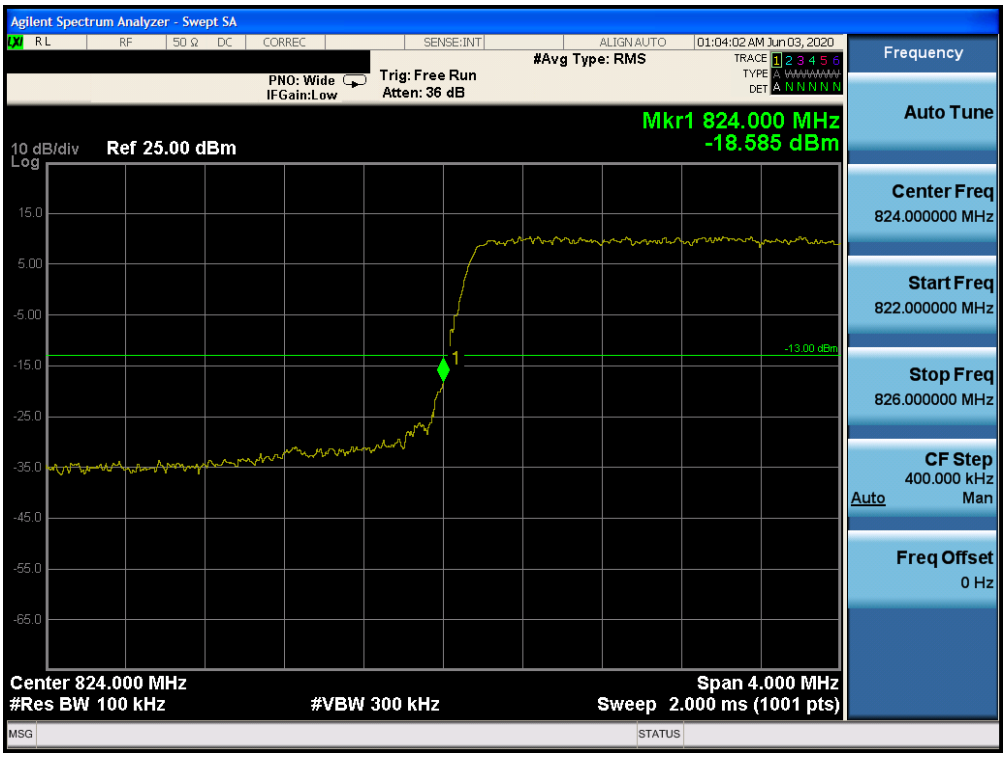

Plot 7-96. Lower Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

Plot 7-97. Upper Band Edge Plot (Band 26 - 3.0MHz QPSK - Full RB Configuration)

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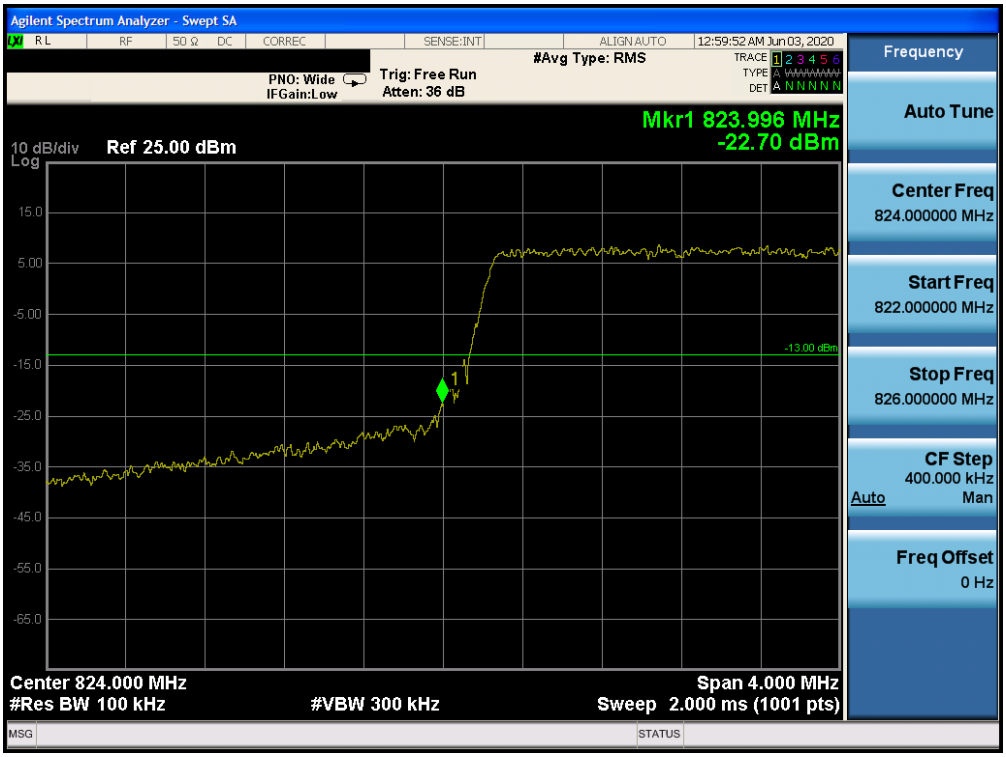
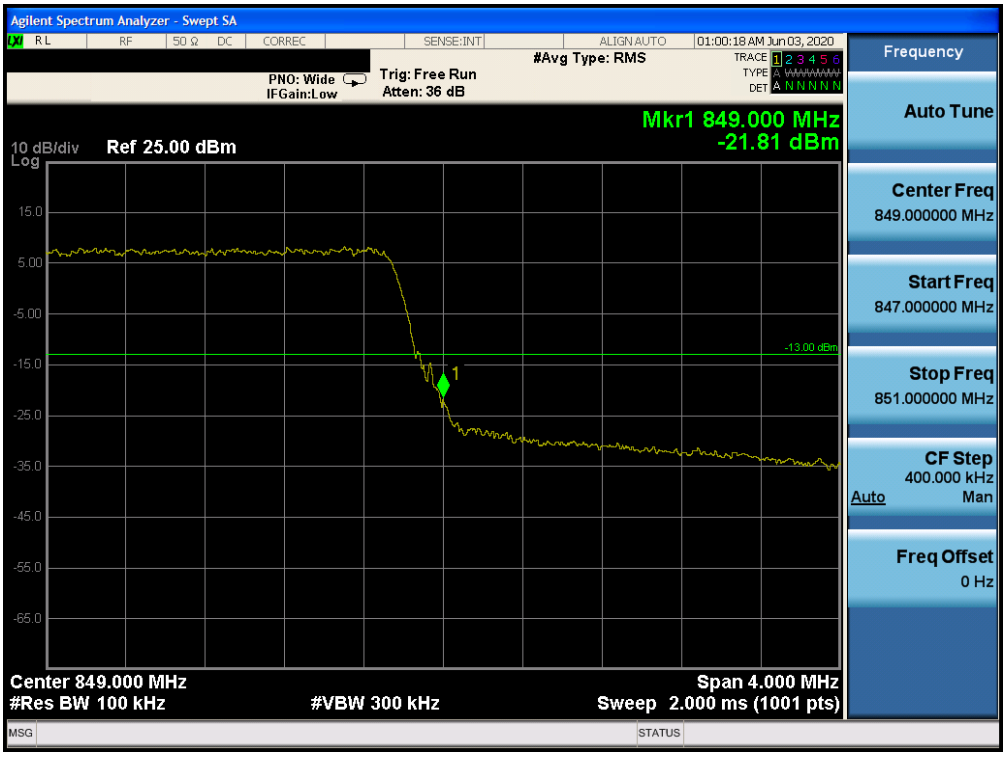


Plot 7-98. Lower Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)



Plot 7-99. Upper Band Edge Plot (Band 26 - 5.0MHz QPSK - Full RB Configuration)

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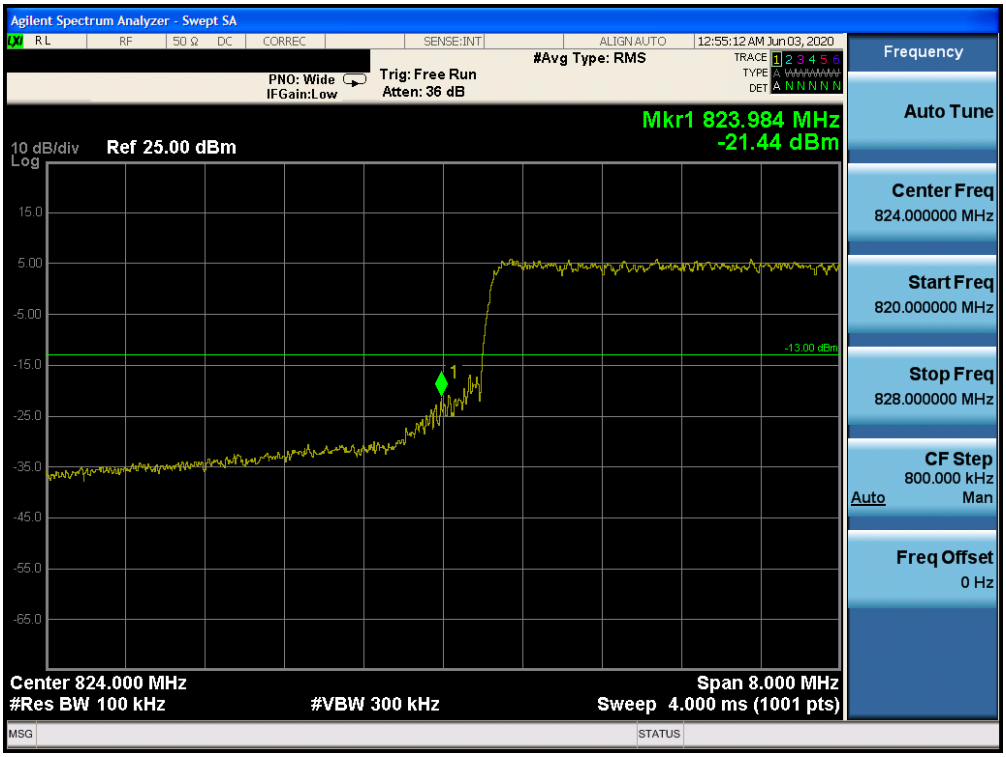
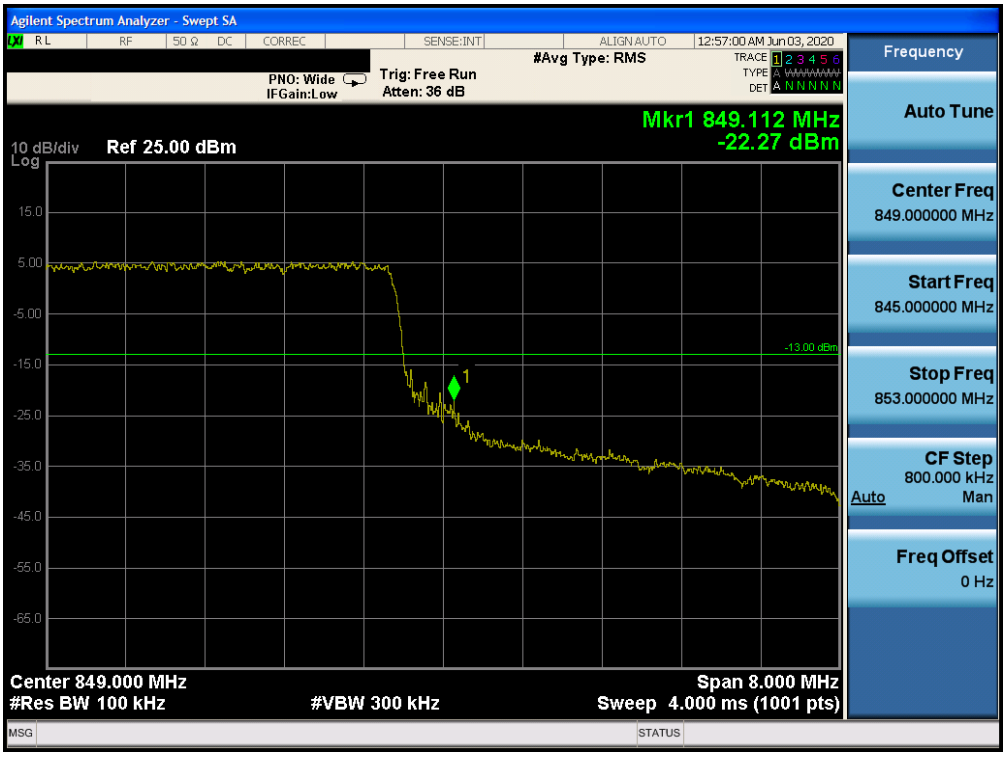


Plot 7-100. Lower Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)



Plot 7-101. Upper Band Edge Plot (Band 26 - 10.0MHz QPSK - Full RB Configuration)

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