

RF TEST REPORT



Report No.: FCC_SL17042701-SPC-011_040213_LTE
Supersede Report No.:

Applicant	SpiderCloud Wireless, Inc.		
Product Name	SpiderCloud Radio Node		
Model No.	SCRN-220-020413 & SCRN-220-020413E		
Test Standard	47CFR Part24/27		
Test Method	TIA-603-D: 2010		
Date of test	06/05/2017 - 06/14/2017		
Issue Date	06/15/2017		
Test Result	<u>Pass</u>	Fail	
Equipment complied with the specification		[x]	
Equipment did not comply with the specification		[]	
			
Shuo Zhang		Chen Ge	
Test Engineer		Engineer Reviewer	
<p>This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only</p>			

Issued By:
SIEMIC Laboratories
775 Montague Expressway, Milpitas, 95035 CA



775 Montague Expressway, Milpitas, CA 95035, USA • Phone: (+1) 408 526 1188 • Facsimile (+1) 408 526 1088

Visit us at: www.siemc.com; Follow us at:    

Laboratory Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Accreditation Body	Scope
USA	FCC, A2LA	EMC , RF/Wireless , Telecom
Canada	IC, A2LA, NIST	EMC, RF/Wireless , Telecom
Taiwan	BSMI , NCC , NIST	EMC, RF, Telecom , Safety
Hong Kong	OFTA , NIST	RF/Wireless , Telecom
Australia	NATA, NIST	EMC, RF, Telecom , Safety
Korea	KCC/RRA, NIST	EMI, EMS, RF , Telecom, Safety
Japan	VCCI, JATE, TELEC, RFT	EMI, RF/Wireless, Telecom
Mexico	NOM, COFETEL, Caniety	Safety, EMC , RF/Wireless, Telecom
Europe	A2LA, NIST	EMC, RF, Telecom , Safety
Israel	MOC, NIST	EMC, RF, Telecom, Safety

Accreditations for Product Certifications

Country	Accreditation Body	Scope
USA	FCC TCB, NIST	EMC , RF , Telecom
Canada	IC FCB , NIST	EMC , RF , Telecom
Singapore	iDA, NIST	EMC , RF , Telecom
EU	NB	EMC & R&TTE Directive
Japan	MIC (RCB 208)	RF , Telecom
HongKong	OFTA (US002)	RF , Telecom

CONTENTS

1	REPORT REVISION HISTORY	4
2	EXECUTIVE SUMMARY	5
3	CUSTOMER INFORMATION	5
4	TEST SITE INFORMATION	5
5	MODIFICATION	5
6	EUT INFORMATION	6
6.1	EUT Description	6
6.2	Radio Description	7
6.3	EUT test modes/configuration Description	8
6.4	EUT Photos - External	9
6.5	EUT Photos - Internal	10
6.6	EUT Test Setup Photos	12
7	SUPPORTING EQUIPMENT/SOFTWARE AND CABLING DESCRIPTION.....	14
7.1	Supporting Equipment	14
7.2	Test Software Description	14
8	TEST SUMMARY	15
9	MEASUREMENT UNCERTAINTY	16
9.1	Conducted Emissions	16
9.2	Radiated Emissions (30MHz to 1GHz)	16
9.3	Radiated Emissions (1GHz to 40GHz)	17
9.4	RF conducted measurement	17
10	MEASUREMENTS, EXAMINATION AND DERIVED RESULTS.....	18
10.1	RF Output Power	18
10.2	Peak-Average Ratio	89
10.3	Occupied Bandwidth	126
10.4	Band Edge	163
10.5	Radiated Spurious Emission below 1GHz	206
10.6	Radiated Spurious Emissions above 1GHz	211
10.7	Frequency Stability	218
ANNEX A. TEST INSTRUMENT		220
ANNEX B. SIEMIC ACCREDITATION		221

1 Report Revision History

Report No.	Report Version	Description	Issue Date
FCC_SL17042701-SPC-011_040213_LTE	None	Original	06/15/2017

2 Executive Summary

The purpose of this test program was to demonstrate compliance of following product

Company: SpiderCloud Wireless, Inc.
Product: SpiderCloud Radio Node
Model: SCRN-220-020413 & SCRN-220-020413E

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1st page.

3 Customer information

Applicant Name	SpiderCloud Wireless
Applicant Address	475 Sycamore Dr, Milpitas, CA, 95035, USA
Manufacturer Name	Flextronics International USA, Inc
Manufacturer Address	927 Gibraltar Dr., Bldg. 6, Milpitas, CA, 95035, USA

4 Test site information

Lab performing tests	SIEMIC Laboratories
Lab Address	775 Montague Expressway, Milpitas, CA 95035
FCC Test Site No.	881796
IC Test Site No.	4842D-2
VCCI Test Site No.	A0133

5 Modification

Index	Item	Description	Note
-	-	-	-

6 EUT Information

6.1 EUT Description

Product Name:	Spider Cloud Radio Node
Model No.:	Spider Cloud Wireless, Inc.
Trade Name:	SCRN-220-020413 & SCRN-220-020413E
Serial No.:	SCRN-220-020413 P/N: 02949-02 S/N: 1710X40334
Input Power:	EUT main input power. 56V .6A & PoE Power 100-240VAC 50-60Hz
Hardware version:	02880-02
Software version:	6.1.1
Date of EUT received:	May 8, 2017
Equipment Class/ Category:	ITE/Class A
Highest frequency generated or used in the device or	2200 MHz
Port/Connectors:	RJ45
Remark:	The EUT was tested in three Frequency Radio Bands 12, 4, and 2.
AC Power Cord Type:	IEC Type B (PoE)
DC Power Cable Type:	N/A

6.2 Radio Description

Item	LTE	LTE
Operating Band /Radio Type	LTE Band 2	LTE Band 4
Bandwidth	5MHz, 10MHz, 15MHz, 20MHz	5MHz, 10MHz, 15MHz, 20MHz
Modulation	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM
Antenna Type	Internal Omni-directional antenna External Omni-directional antenna	Internal Omni-directional antenna External Omni-directional antenna
Antenna Gain	4 dBi / 3dBi	4 dBi / 3dBi
Frequency TX(MHz)	TX: 1930 MHz to 1990 MHz RX: 1850 MHz to 1910 MHz	TX: 2110 MHz to 2155 MHz RX: 1710 MHz to 1755 MHz

Item	LTE	LTE
Operating Band /Radio Type	LTE Band 25	LTE Band 66
Bandwidth	5MHz, 10MHz, 15MHz, 20MHz	5MHz, 10MHz, 15MHz, 20MHz
Modulation	QPSK/16QAM/64QAM	QPSK/16QAM/64QAM
Antenna Type	Internal Omni-directional antenna External Omni-directional antenna	Internal Omni-directional antenna External Omni-directional antenna
Antenna Gain	4 dBi / 3dBi	4 dBi / 3dBi
Frequency TX(MHz)	TX: 1930 MHz to 1995 MHz RX: 1850 MHz to 1915 MHz	TX: 2110 MHz to 2200 MHz RX: 1710 MHz to 1780 MHz

Item	LTE
Operating Band /Radio Type	LTE Band 13
Bandwidth	5MHz, 10MHz
Modulation	QPSK/16QAM/64QAM
Antenna Type	Internal Omni-directional antenna External Omni-directional antenna
Antenna Gain	4 dBi / 3dBi
Frequency TX(MHz)	TX: 746 MHz to 756 MHz RX: 777 MHz to 787 MHz

6.3 EUT test modes/configuration Description

Test mode

	Final Test Mode	Note
Final_test_mode_1	Continuous transmission, 5MHz, QPSK, Low CH	LTE
Final_test_mode_2	Continuous transmission, 5MHz, QPSK, Mid CH	LTE
Final_test_mode_3	Continuous transmission, 5MHz, QPSK, High CH	LTE
Final_test_mode_4	Continuous transmission, 5MHz, 64QAM, Low CH	LTE
Final_test_mode_5	Continuous transmission, 5MHz, 64QAM, Mid CH	LTE
Final_test_mode_5	Continuous transmission, 5MHz, 64QAM, High CH	LTE
Final_test_mode_7	Continuous transmission, 10MHz, QPSK, Low CH	LTE
Final_test_mode_8	Continuous transmission, 10MHz, QPSK, Mid CH	LTE
Final_test_mode_9	Continuous transmission, 10MHz, QPSK, High CH	LTE
Final_test_mode_10	Continuous transmission, 10MHz, 64QAM, Low CH	LTE
Final_test_mode_11	Continuous transmission, 10MHz, 64QAM, Mid CH	LTE
Final_test_mode_12	Continuous transmission, 10MHz, 64QAM, High CH	LTE
Final_test_mode_13	Continuous transmission, 15MHz, QPSK, Low CH	LTE
Final_test_mode_14	Continuous transmission, 15MHz, QPSK, Mid CH	LTE
Final_test_mode_15	Continuous transmission, 15MHz, QPSK, High CH	LTE
Final_test_mode_16	Continuous transmission, 15MHz, 64QAM, Low CH	LTE
Final_test_mode_17	Continuous transmission, 15MHz, 64QAM, Mid CH	LTE
Final_test_mode_18	Continuous transmission, 15MHz, 64QAM, High CH	LTE
Final_test_mode_19	Continuous transmission, 20MHz, QPSK, Low CH	LTE
Final_test_mode_20	Continuous transmission, 20MHz, QPSK, Mid CH	LTE
Final_test_mode_21	Continuous transmission, 20MHz, QPSK, High CH	LTE
Final_test_mode_22	Continuous transmission, 20MHz, 64QAM, Low CH	LTE
Final_test_mode_23	Continuous transmission, 20MHz, 64QAM, Mid CH	LTE
Final_test_mode_24	Continuous transmission, 20MHz, 64QAM, High CH	LTE
Remark: N/A.		

6.4 EUT Photos - External



EUT – Front View



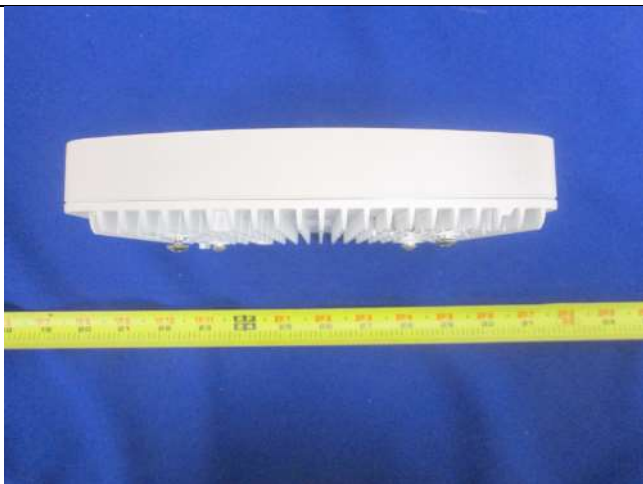
EUT- Rear View



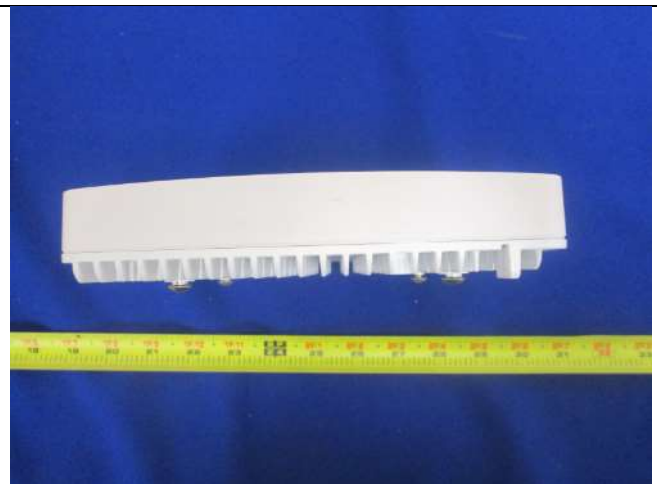
EUT – Left View



EUT- Right View

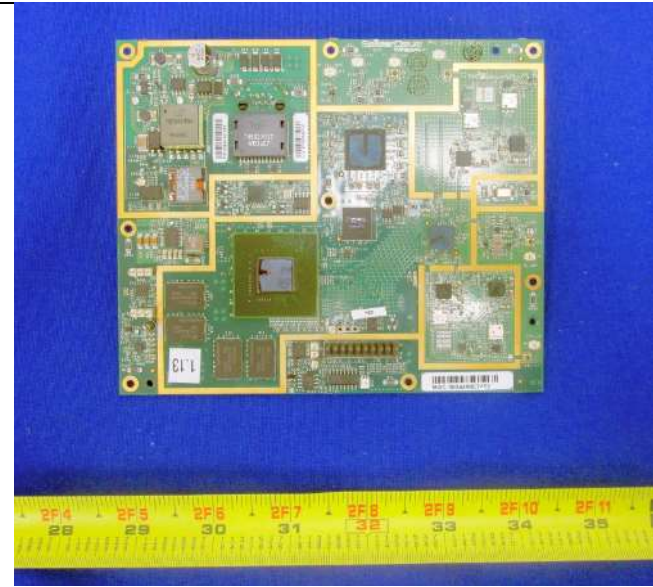


EUT- Top View

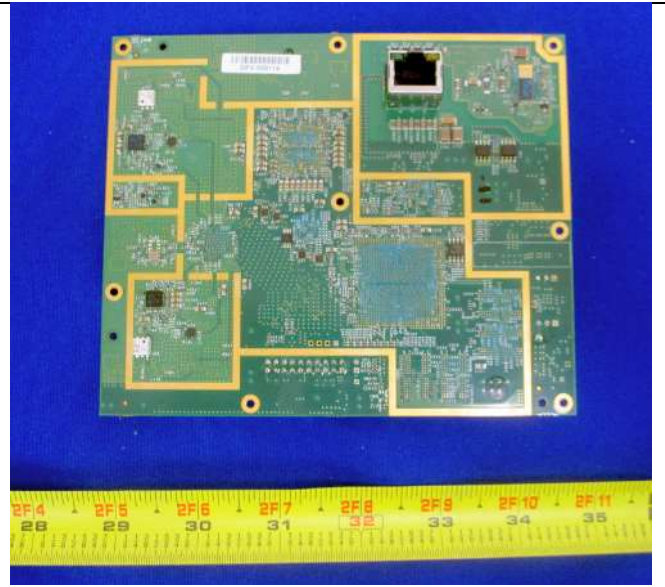


EUT – Bottom View

6.5 EUT Photos - Internal



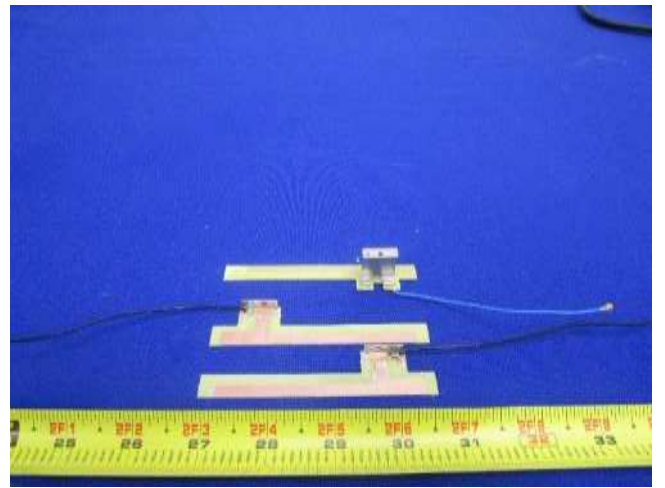
Main Board - Top View



Main Board - Bottom View



Internal Antenna View 1



Internal Antenna View 1



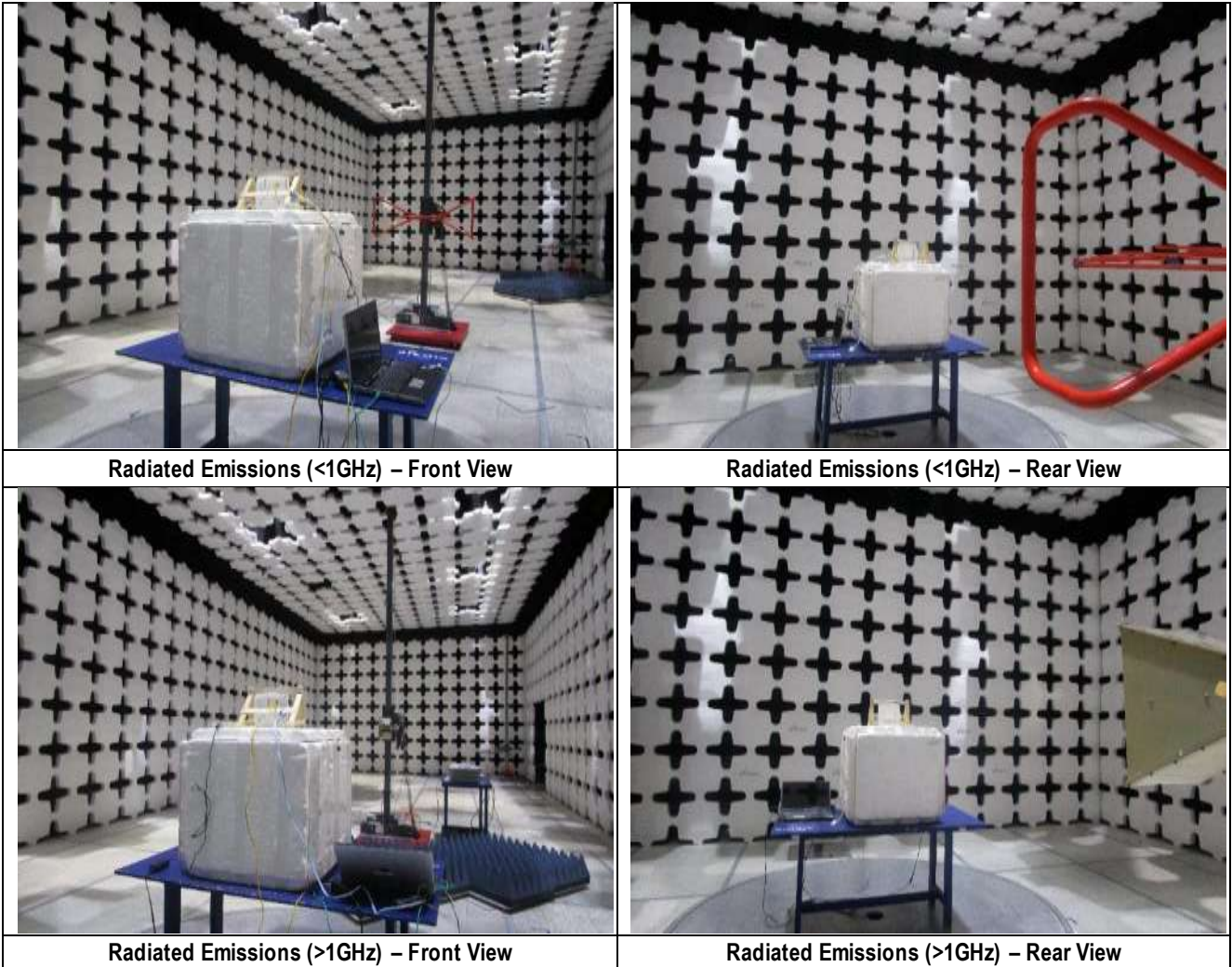
External Antenna View 1



External Antenna View 2

6.6 EUT Test Setup Photos

Internal Antenna:



External Antenna:



Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View



Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

7 Supporting Equipment/Software and cabling Description

7.1 Supporting Equipment

Item	Supporting Equipment Description	Model	Serial Number	Manufacturer	Note
1	10MHz Clock	OX200-SC	141871594391	Metric Test	-
2	POE	POE36U-1AT-R	N/A	PHIHONG	-
					-

7.2 Test Software Description

Test Item	Software	Description
RF testing	TmciDviClient	Enable EUT continuous TX mode and change to different channel

8 Test Summary

Test Item	Test standard		Test Method/Procedure		Pass / Fail
E.R.P/ E.I.R.P	FCC	47CFR24.232, 27.50	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Occupied Bandwidth	FCC	47CFR24.238, 27.53	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Peak-Average Ratio	FCC	47CFR24.232, 27.50	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Spurious and harmonic Emission at antenna port	FCC	47CFR2.1051, 47CFR24.238, 27.53	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Band Edge	FCC	47CFR2.1053, 47CFR24.238, 27.53	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Radiated spurious and harmonic emission	FCC	47CFR2.1051, 47CFR24.238, 27.53	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Frequency stability	FCC	47CFR2.1053, 47CFR24.135, 27.53	FCC	TIA-603-D: 2010	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> N/A
Remark	<ol style="list-style-type: none"> All measurement uncertainties do not take into consideration for all presented test results. The applicant shall ensure frequency stability by showing that an emission is maintained within the band of operation under all normal operating conditions as specified in the user's manual. 				

9 Measurement Uncertainty

9.1 Conducted Emissions

The test is to measure the conducted emissions to the mains port of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the LISN
- Uncertainty of cables
- Uncertainty due to the mismatches
- Etc, see the below table for details

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
LISN Insertion Loss	0.40	Normal	2	1	0.20
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch LISN - Receiver	0.25	U-Shape	1.414	1	0.1768033
LISN Impedance	2.5	Triangular	2.449	1	1.0208248
Combined Standard Uncertainty					1.928133
Expanded Uncertainty (K=2)					3.856266

The total derived measurement uncertainty is +/- 3.86 dB.

9.2 Radiated Emissions (30MHz to 1GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- NSA Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Filter Insertion Loss	0.25	Normal	2	1	0.125
Antenna Factor	0.65	Normal	2	1	0.325
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.86605081
PRF Response	1.5	Rectangular	1.732	1	0.86605081
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
NSA Calibration	4.0	U-Shape	1.414	1	2.8288543
Combined Standard Uncertainty					3.0059131
Expanded Uncertainty (K=2)					6.0118262

The total derived measurement uncertainty is +/- 6.00 dB.

9.3 Radiated Emissions (1GHz to 40GHz)

The test is to measure the radiated emissions of the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the receiver
- Uncertainty of the antenna
- Uncertainty of cables
- Uncertainty due to the mismatches
- VSWR Calibration
- Etc., details see the below table

Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Receiver Reading	0.12	Rectangular	1.732	1	0.0692840
Cable Insertion Loss	0.21	Normal	2	1	0.1050000
Filter Insertion Loss	0.25	Normal	2	1	0.1250000
Antenna Factor	0.65	Normal	2	1	0.3250000
Receiver CW accuracy	0.5	Rectangular	1.732	1	0.2886836
Pulse Amplitude Response	1.5	Rectangular	1.732	1	0.8660508
PRF Response	1.5	Rectangular	1.732	1	0.8660508
Mismatch Filter - Receiver	0.25	U-Shape	1.414	1	0.1768033
VSWR Calibration	2.0	U-Shape	1.414	1	1.4144272
Combined Standard Uncertainty					4.2363
Expanded Uncertainty (K=2)					8.4726

The total derived measurement uncertainty is +/- 8.47 dB.

9.4 RF conducted measurement

The test is to measure the RF output power from the EUT.

Some error sources that can contribute to the total uncertainty:

- Uncertainty of the Reference Level Uncertainty
- Uncertainty of variable attenuators
- Uncertainty of cables
- Uncertainty due to the mismatches

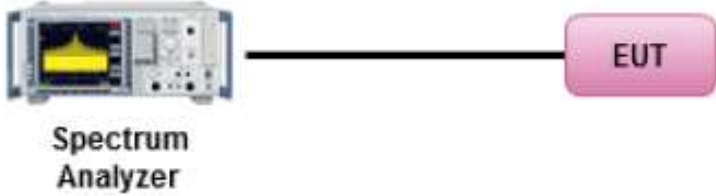
Source of Uncertainty	Value (dB)	Probability Distribution	Division	Sensitivity Coefficient	Expanded Uncertainty
Reference Level	0.12	Rectangular	1.732	1	0.069284
Cable Insertion Loss	0.21	Normal	2	1	0.105
Attenuator	0.25	Normal	2	1	0.125
Mismatch	0.25	U-Shape	1.414	1	0.1768033
Combined Standard Uncertainty					0.476087
Expanded Uncertainty (K=2)					0.952174

The total derived measurement uncertainty is +/- 0.95 dB.

10 Measurements, Examination and Derived Results

10.1 RF Output Power

Requirement(s):

Spec	Item	Requirement	Applicable
47CFR24.232	-	Mobile/portable stations are limited to 2 watts EIRP peak power and the equipment must employ means to limit the power to the minimum necessary for successful communications.	<input checked="" type="checkbox"/>
47CFR27.50	-	The maximum effective radiated power (ERP) of fixed and base station must not exceed 1000 Watts.	<input checked="" type="checkbox"/>
Test Setup	 <p>The diagram shows a Spectrum Analyzer on the left connected by a cable to a pink rounded rectangle labeled 'EUT' on the right.</p>		
Test Procedure	<ul style="list-style-type: none"> - EUT was set for low, mid, high channel with modulated mode and highest RF output power. - The spectrum analyzer was connected to the antenna terminal. 		
Test Date	06/08/2017 – 06/10/2017	Environmental condition	Temperature 22°C Relative Humidity 48% Atmospheric Pressure 1008mbar
Remark	<p>For LTE mode, EUT is using 2x2 MIMO, which has 2 transmit antennas. They are correlated to each other. The directional gain is calculated per the formula at below,</p> <p>Directional gain dBi = $G_{max} + 10 \log_{10} N$</p> <p>The max gain of single internal antenna is 4 dBi. So the directional gain = 7 dBi The max gain of single external antenna is 3 dBi. So the directional gain = 6 dBi</p>		
Result	<input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail		

Test Data Yes N/A

Test Plot Yes (See below) N/A

Test was done by Chen Ge at RF Test Site.

Internal antenna:

Test Data for LTE band 2:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	1932.5	24.00	24.03	27.03	4	31.03
	Mid	1960	23.68	23.72	26.71	4	30.71
	High	1987.5	24.51	24.52	27.53	4	31.53
5MHz BW, 64QAM	Low	1932.5	23.85	23.87	26.87	4	30.87
	Mid	1960	23.63	23.72	26.69	4	30.69
	High	1987.5	24.35	24.26	27.32	4	31.32
10MHz BW, QPSK	Low	1935	24.42	24.40	27.42	4	31.42
	Mid	1960	23.67	23.69	26.69	4	30.69
	High	1985	24.53	24.51	27.53	4	31.53
10MHz BW, 64QAM	Low	1935	24.37	24.35	27.37	4	31.37
	Mid	1960	23.66	23.62	26.65	4	30.65
	High	1985	24.41	24.33	27.38	4	31.38
15MHz BW, QPSK	Low	1937.5	24.12	24.29	27.22	4	31.22
	Mid	1960	23.61	23.65	26.64	4	30.64
	High	1982.5	24.61	24.64	27.64	4	31.64
15MHz BW, 64QAM	Low	1937.5	24.22	24.24	27.24	4	31.24
	Mid	1960	23.63	23.60	26.63	4	30.63
	High	1982.5	24.55	24.63	27.60	4	31.6
20MHz BW, QPSK	Low	1940	24.39	24.37	27.39	4	31.39
	Mid	1960	23.78	23.78	26.79	4	30.79
	High	1980	24.58	24.56	27.58	4	31.58
20MHz BW, 64QAM	Low	1940	24.29	24.32	27.32	4	31.32
	Mid	1960	23.71	23.69	26.71	4	30.71
	High	1980	24.57	24.59	27.59	4	31.59

Test Data for LTE band 4:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	2112.5	23.80	23.73	26.78	4	30.78
	Mid	2132.5	23.99	24.04	27.03	4	31.03
	High	2152.5	24.45	24.41	27.44	4	31.44
5MHz BW, 64QAM	Low	2112.5	23.71	23.70	26.72	4	30.72
	Mid	2132.5	23.73	23.68	26.72	4	30.72
	High	2152.5	24.28	24.24	27.27	4	31.27
10MHz BW, QPSK	Low	2115.0	23.84	23.89	26.88	4	30.88
	Mid	2132.5	24.07	24.07	27.08	4	31.08
	High	2150.0	24.40	24.40	27.41	4	31.41
10MHz BW, 64QAM	Low	2115.0	23.69	23.74	26.73	4	30.73
	Mid	2132.5	23.79	23.84	26.83	4	30.83
	High	2150.0	24.18	24.19	27.20	4	31.20
15MHz BW, QPSK	Low	2117.5	24.03	24.06	27.06	4	31.06
	Mid	2132.5	24.07	24.10	27.10	4	31.10
	High	2147.5	24.24	24.45	27.36	4	31.36
15MHz BW, 64QAM	Low	2117.5	23.75	23.73	26.75	4	30.75
	Mid	2132.5	23.73	23.80	26.78	4	30.78
	High	2147.5	24.00	24.05	27.04	4	31.04
20MHz BW, QPSK	Low	2120.0	24.00	24.07	27.05	4	31.05
	Mid	2132.5	24.16	24.04	27.11	4	31.11
	High	2145.0	24.26	24.31	27.30	4	31.30
20MHz BW, 64QAM	Low	2120.0	23.96	23.96	26.97	4	30.97
	Mid	2132.5	24.19	24.19	27.20	4	31.20
	High	2145.0	24.23	24.24	27.25	4	31.25

Test Data for LTE band 25:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	High	1992.5	24.22	24.22	27.23	4	31.23
5MHz BW, 64QAM	High	1992.5	24.34	24.32	27.34	4	31.34
10MHz BW, QPSK	High	1990	24.33	24.35	27.35	4	31.35
10MHz BW, 64QAM	High	1990	24.28	24.28	27.29	4	31.29
15MHz BW, QPSK	High	1987.5	24.51	24.51	27.52	4	31.52
15MHz BW, 64QAM	High	1987.5	24.28	24.33	27.32	4	31.32
20MHz BW, QPSK	High	1985	24.60	24.58	27.60	4	31.60
20MHz BW, 64QAM	High	1985	24.54	24.48	27.52	4	31.52

Test Data for LTE band 66:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	High	2197.5	24.45	24.43	27.45	4	31.45
5MHz BW, 64QAM	High	2197.5	24.23	24.57	27.41	4	31.41
10MHz BW, QPSK	High	2195	24.45	24.40	27.44	4	31.44
10MHz BW, 64QAM	High	2195	24.56	24.46	27.52	4	31.52
15MHz BW, QPSK	High	2192.5	24.28	24.35	27.33	4	31.33
15MHz BW, 64QAM	High	2192.5	24.24	24.42	27.34	4	31.34
20MHz BW, QPSK	High	2190	24.22	24.18	27.21	4	31.21
20MHz BW, 64QAM	High	2190	24.24	24.23	27.25	4	31.25

Test Data for LTE band 13:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
10MHz BW, QPSK	Mid	751	24.50	24.46	27.49	4	31.49
10MHz BW, QPSK	Mid	751	24.51	24.47	27.50	4	31.50

External antenna:

Test Data for LTE band 2:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	1932.5	24.00	24.03	27.03	3	30.03
	Mid	1960	23.68	23.72	26.71	3	29.71
	High	1987.5	24.51	24.52	27.53	3	30.53
5MHz BW, 64QAM	Low	1932.5	23.85	23.87	26.87	3	29.87
	Mid	1960	23.63	23.72	26.69	3	29.69
	High	1987.5	24.35	24.26	27.32	3	30.32
10MHz BW, QPSK	Low	1935	24.42	24.40	27.42	3	30.42
	Mid	1960	23.67	23.69	26.69	3	29.69
	High	1985	24.53	24.51	27.53	3	30.53
10MHz BW, 64QAM	Low	1935	24.37	24.35	27.37	3	30.37
	Mid	1960	23.66	23.62	26.65	3	29.65
	High	1985	24.41	24.33	27.38	3	30.38
15MHz BW, QPSK	Low	1937.5	24.12	24.29	27.22	3	30.22
	Mid	1960	23.61	23.65	26.64	3	29.64
	High	1982.5	24.61	24.64	27.64	3	30.64
15MHz BW, 64QAM	Low	1937.5	24.22	24.24	27.24	3	30.24
	Mid	1960	23.63	23.60	26.63	3	29.63
	High	1982.5	24.55	24.63	27.60	3	30.60
20MHz BW, QPSK	Low	1940	24.39	24.37	27.39	3	30.39
	Mid	1960	23.78	23.78	26.79	3	29.79
	High	1980	24.58	24.56	27.58	3	30.58
20MHz BW, 64QAM	Low	1940	24.29	24.32	27.32	3	30.32
	Mid	1960	23.71	23.69	26.71	3	29.71
	High	1980	24.57	24.59	27.59	3	30.59

Test Data for LTE band 4:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	Low	2112.5	23.80	23.73	26.78	3	29.78
	Mid	2132.5	23.99	24.04	27.03	3	30.03
	High	2152.5	24.45	24.41	27.44	3	30.44
5MHz BW, 64QAM	Low	2112.5	23.71	23.70	26.72	3	29.72
	Mid	2132.5	23.73	23.68	26.72	3	29.72
	High	2152.5	24.28	24.24	27.27	3	30.27
10MHz BW, QPSK	Low	2115.0	23.84	23.89	26.88	3	29.88
	Mid	2132.5	24.07	24.07	27.08	3	30.08
	High	2150.0	24.40	24.40	27.41	3	30.41
10MHz BW, 64QAM	Low	2115.0	23.69	23.74	26.73	3	29.73
	Mid	2132.5	23.79	23.84	26.83	3	29.83
	High	2150.0	24.18	24.19	27.20	3	30.20
15MHz BW, QPSK	Low	2117.5	24.03	24.06	27.06	3	30.06
	Mid	2132.5	24.07	24.10	27.10	3	30.10
	High	2147.5	24.24	24.45	27.36	3	30.36
15MHz BW, 64QAM	Low	2117.5	23.75	23.73	26.75	3	29.75
	Mid	2132.5	23.73	23.80	26.78	3	29.78
	High	2147.5	24.00	24.05	27.04	3	30.04
20MHz BW, QPSK	Low	2120.0	24.00	24.07	27.05	3	30.05
	Mid	2132.5	24.16	24.04	27.11	3	30.11
	High	2145.0	24.26	24.31	27.30	3	30.30
20MHz BW, 64QAM	Low	2120.0	23.96	23.96	26.97	3	29.97
	Mid	2132.5	24.19	24.19	27.20	3	30.20
	High	2145.0	24.23	24.24	27.25	3	30.25

Test Data for LTE band 25:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	High	1992.5	24.22	24.22	27.23	3	30.23
5MHz BW, 64QAM	High	1992.5	24.34	24.32	27.34	3	30.34
10MHz BW, QPSK	High	1990	24.33	24.35	27.35	3	30.35
10MHz BW, 64QAM	High	1990	24.28	24.28	27.29	3	30.29
15MHz BW, QPSK	High	1987.5	24.51	24.51	27.52	3	30.52
15MHz BW, 64QAM	High	1987.5	24.28	24.33	27.32	3	30.32
20MHz BW, QPSK	High	1985	24.60	24.58	27.60	3	30.60
20MHz BW, 64QAM	High	1985	24.54	24.48	27.52	3	30.52

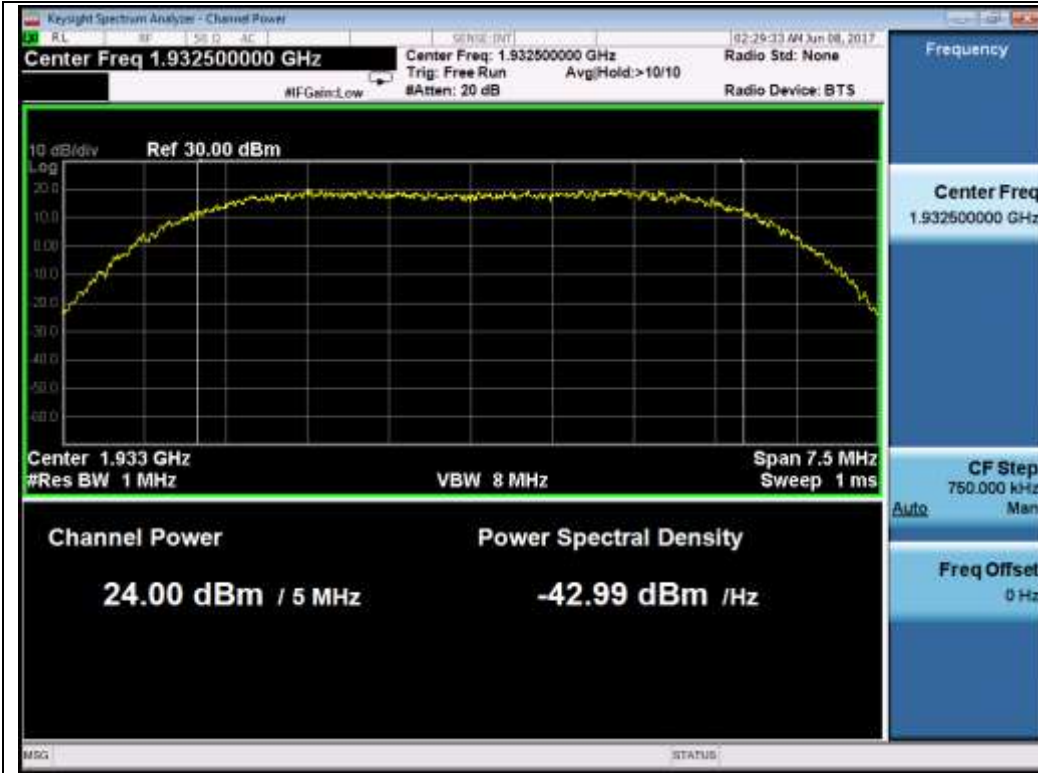
Test Data for LTE band 66:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
5MHz BW, QPSK	High	2197.5	24.45	24.43	27.45	3	30.45
5MHz BW, 64QAM	High	2197.5	24.23	24.57	27.41	3	30.41
10MHz BW, QPSK	High	2195	24.45	24.40	27.44	3	30.44
10MHz BW, 64QAM	High	2195	24.56	24.46	27.52	3	30.52
15MHz BW, QPSK	High	2192.5	24.28	24.35	27.33	3	30.33
15MHz BW, 64QAM	High	2192.5	24.24	24.42	27.34	3	30.34
20MHz BW, QPSK	High	2190	24.22	24.18	27.21	3	30.21
20MHz BW, 64QAM	High	2190	24.24	24.23	27.25	3	30.25

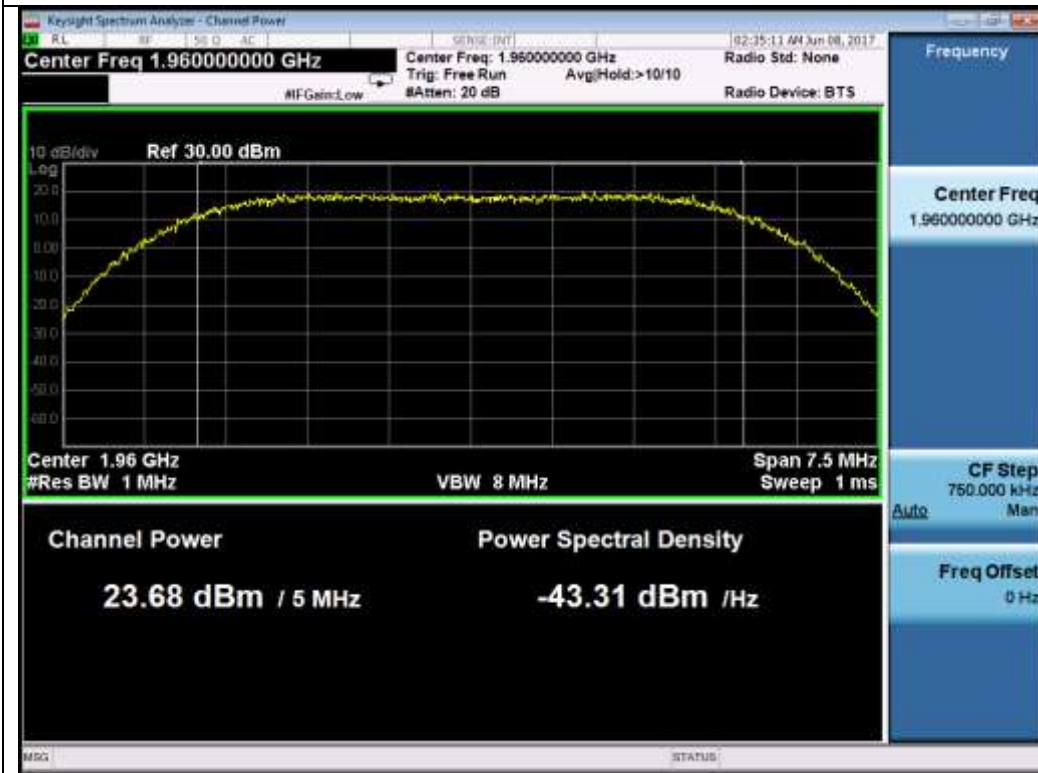
Test Data for LTE band 13:

Type	Channel	Frequency (MHz)	Measured PW -Port 1(dBm)	Measured PW -Port 2(dBm)	Combined Power (dBm)	Antenna Gain (dBi)	E.I.R.P (dBm)
10MHz BW, QPSK	Mid	751	24.50	24.46	27.49	3	30.49
10MHz BW, QPSK	Mid	751	24.51	24.47	27.50	3	30.50

Test Plots for Band 2
Chain 1:



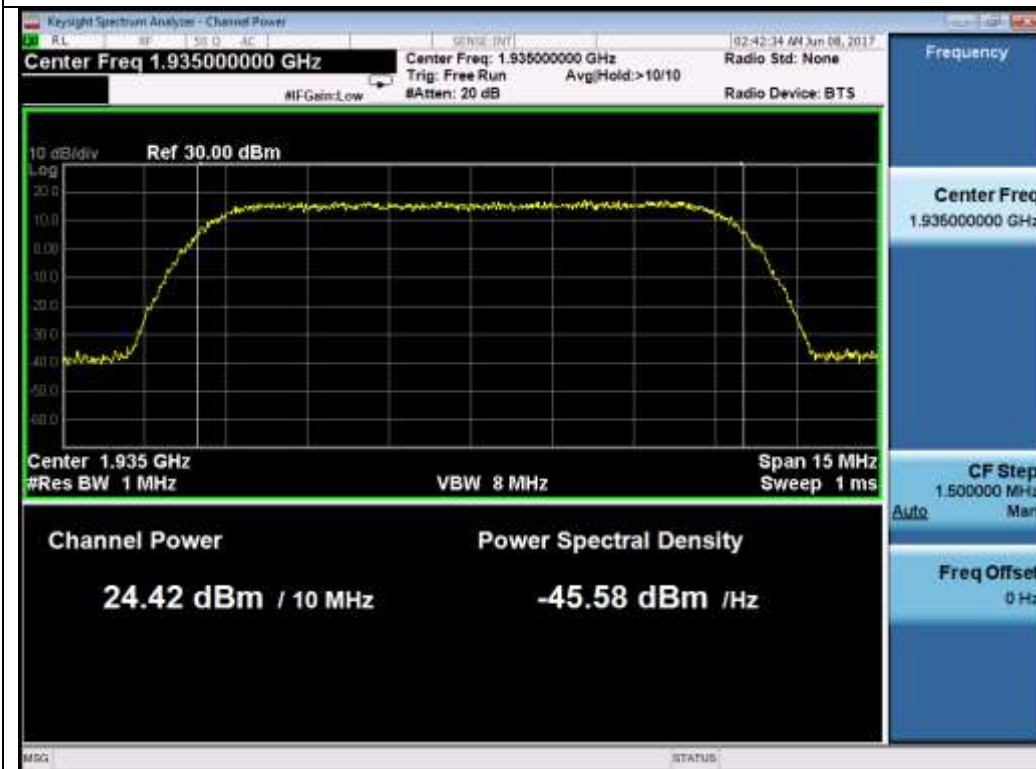
5M QPSK Low



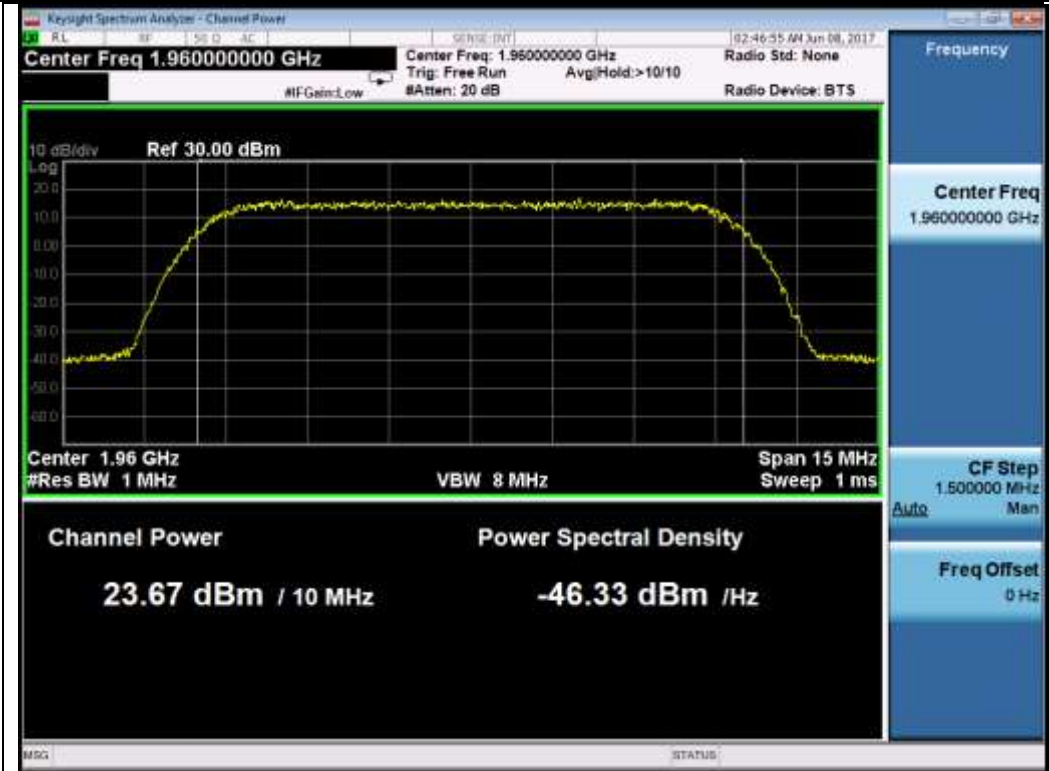
5M QPSK Mid



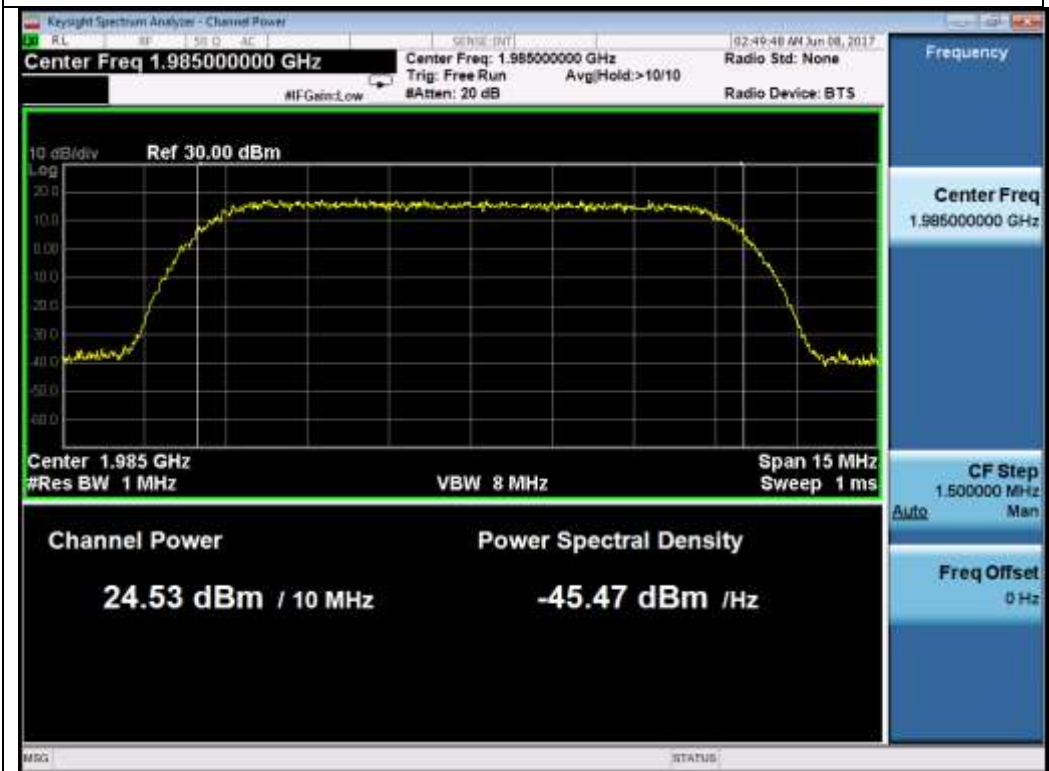
5M QPSK High



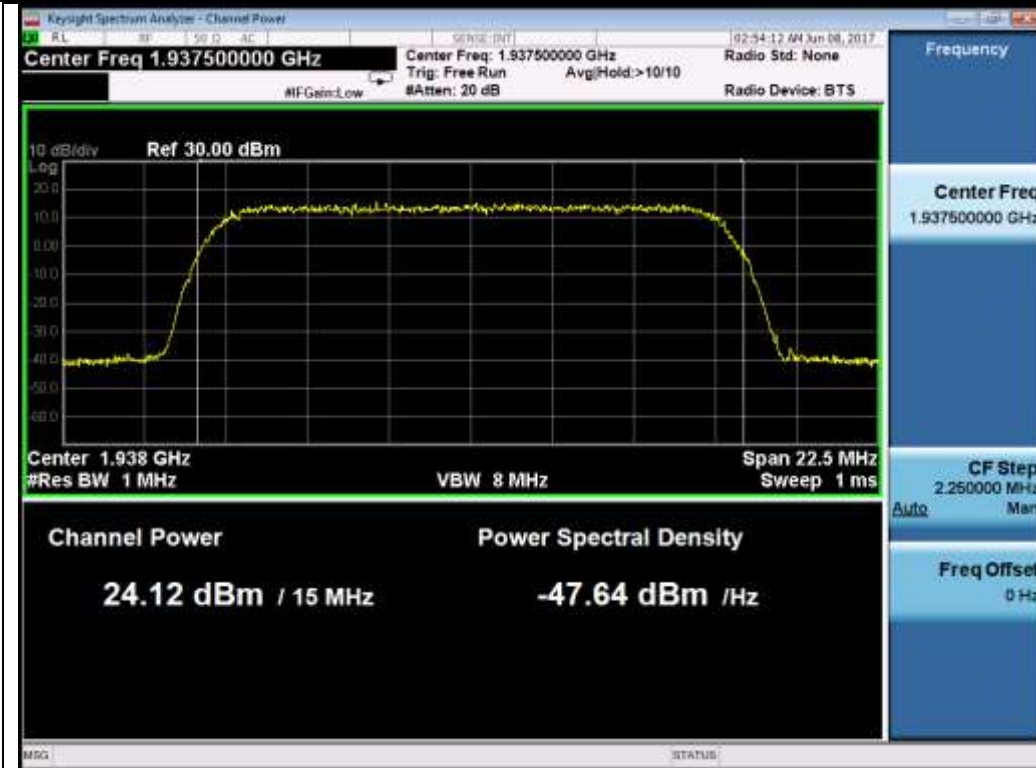
10M QPSK Low



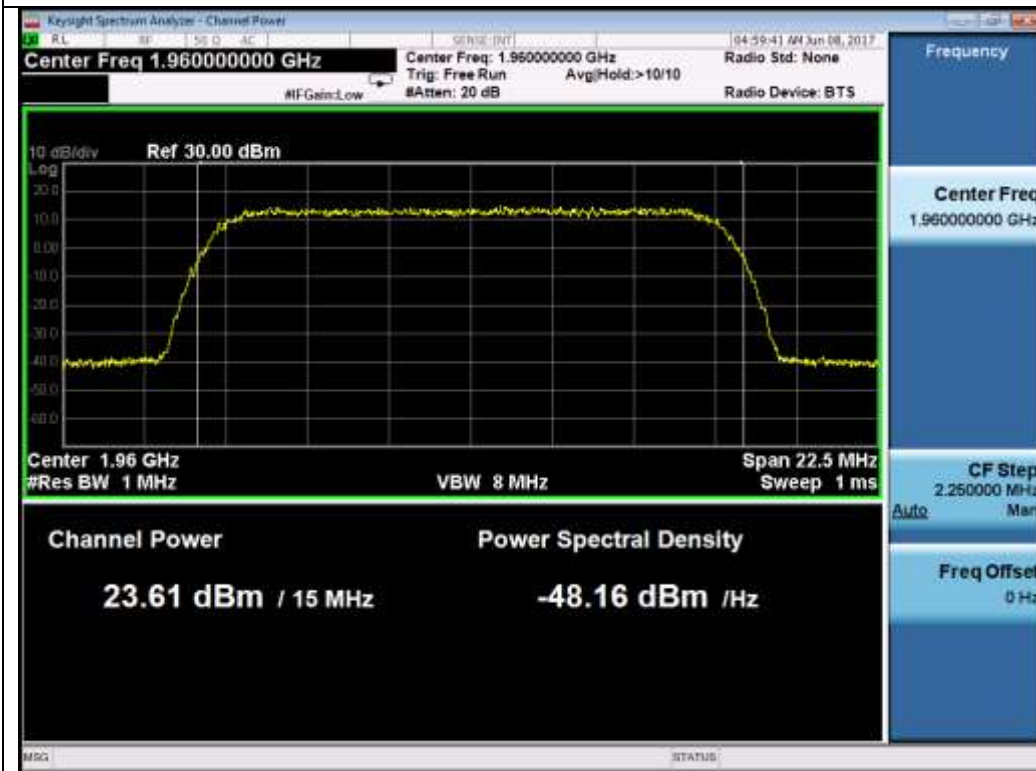
10M QPSK Mid



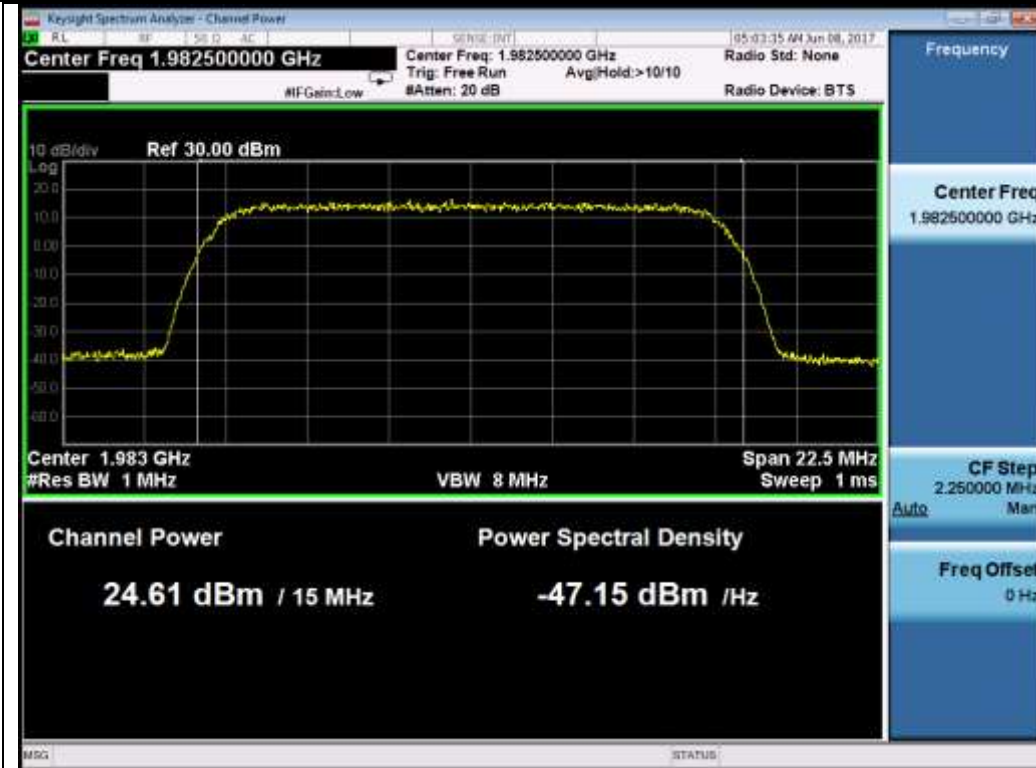
10M QPSK High



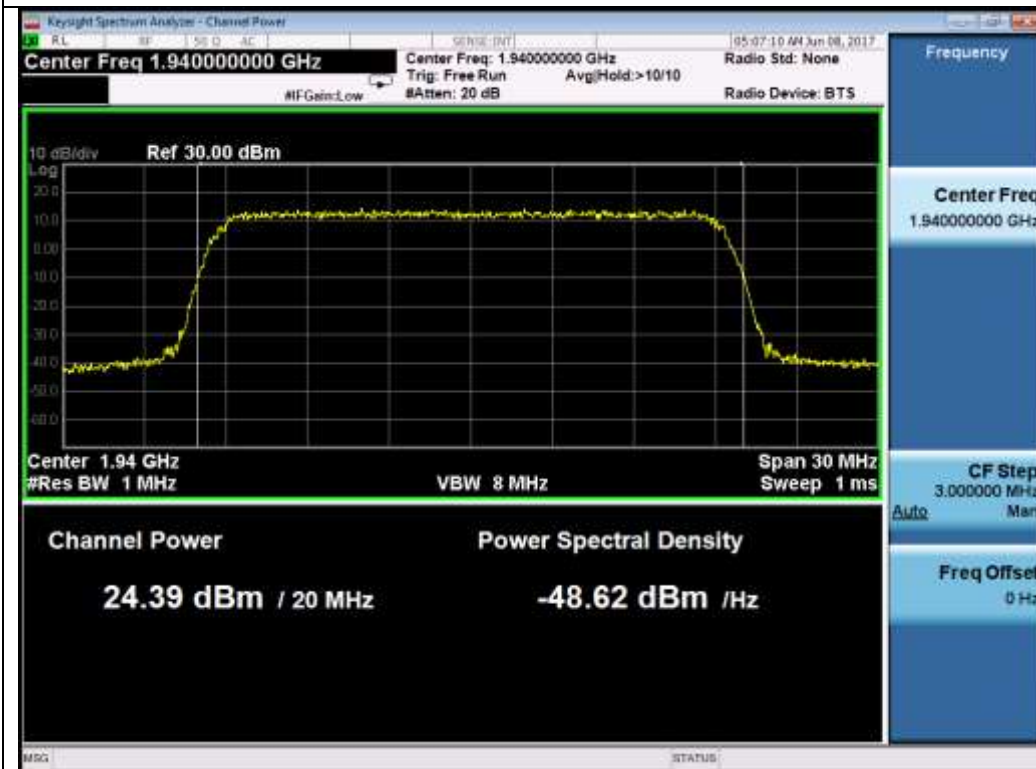
15M QPSK Low



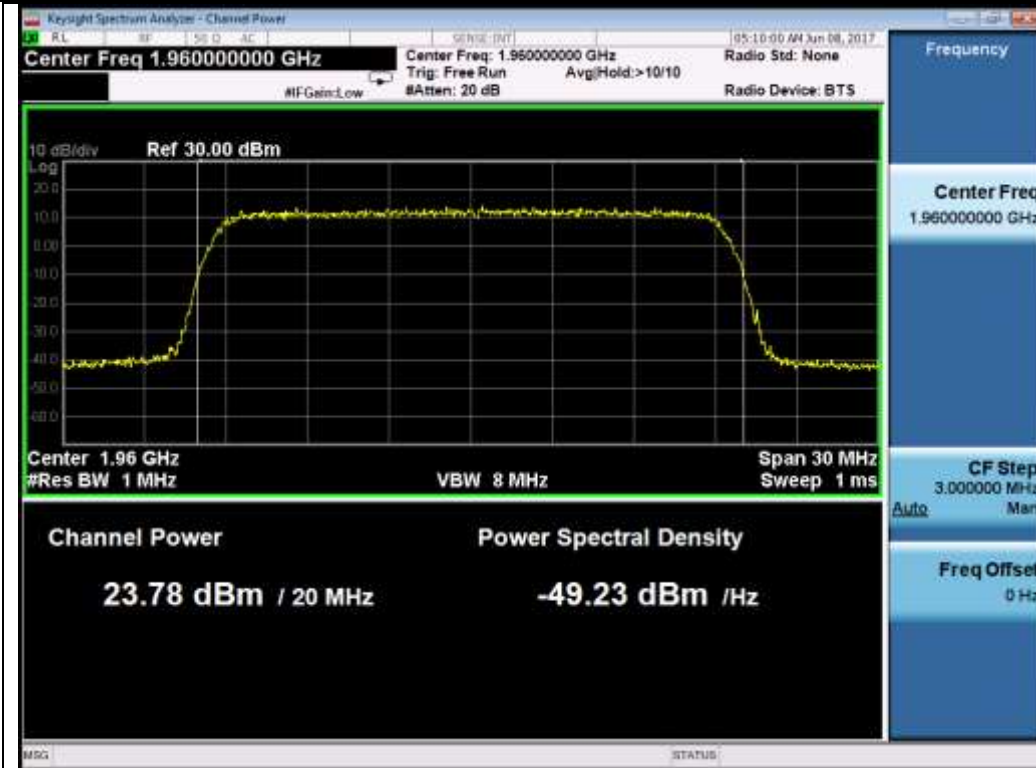
15M QPSK Mid



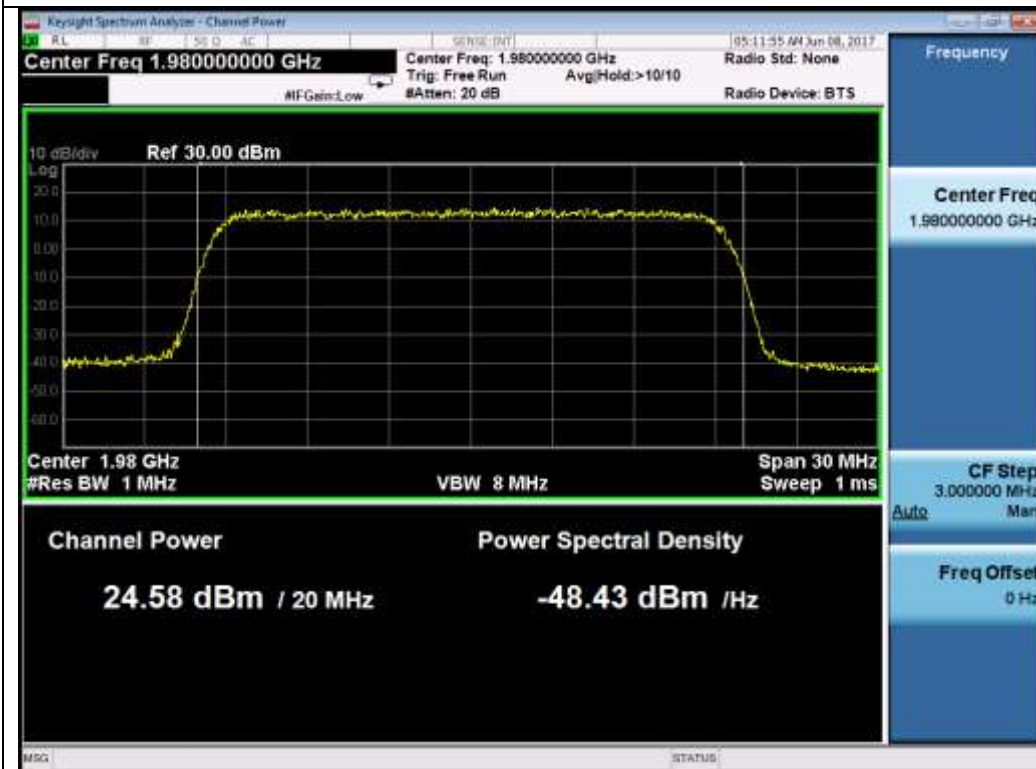
15M QPSK High



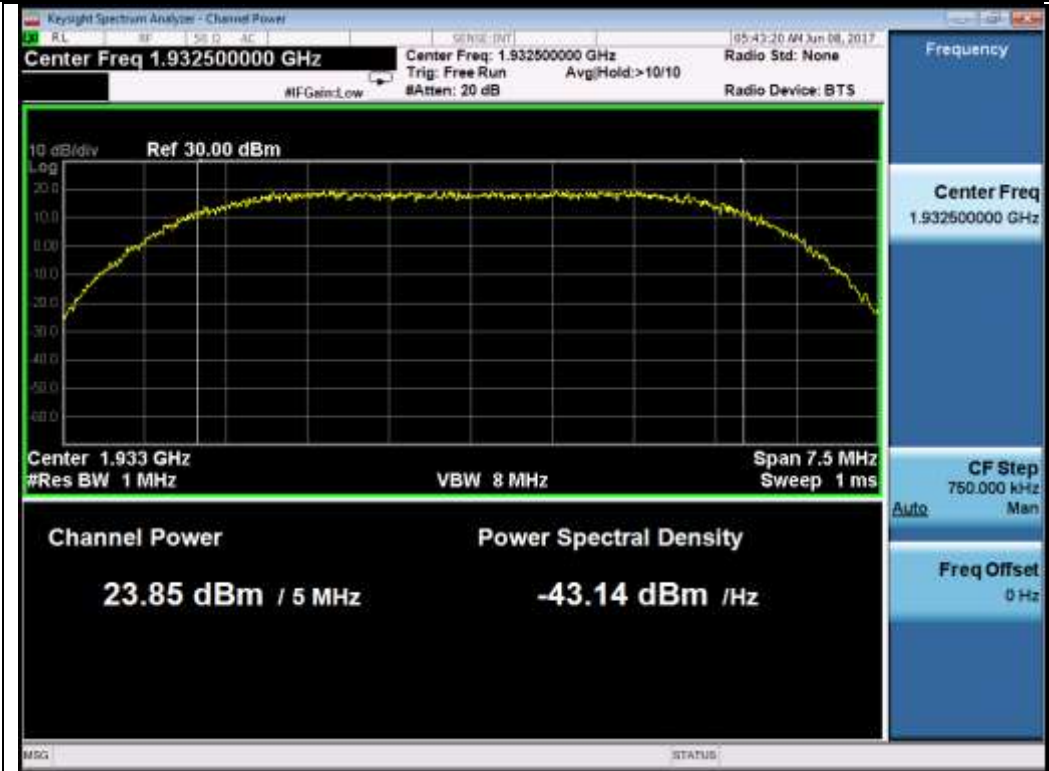
20M QPSK Low



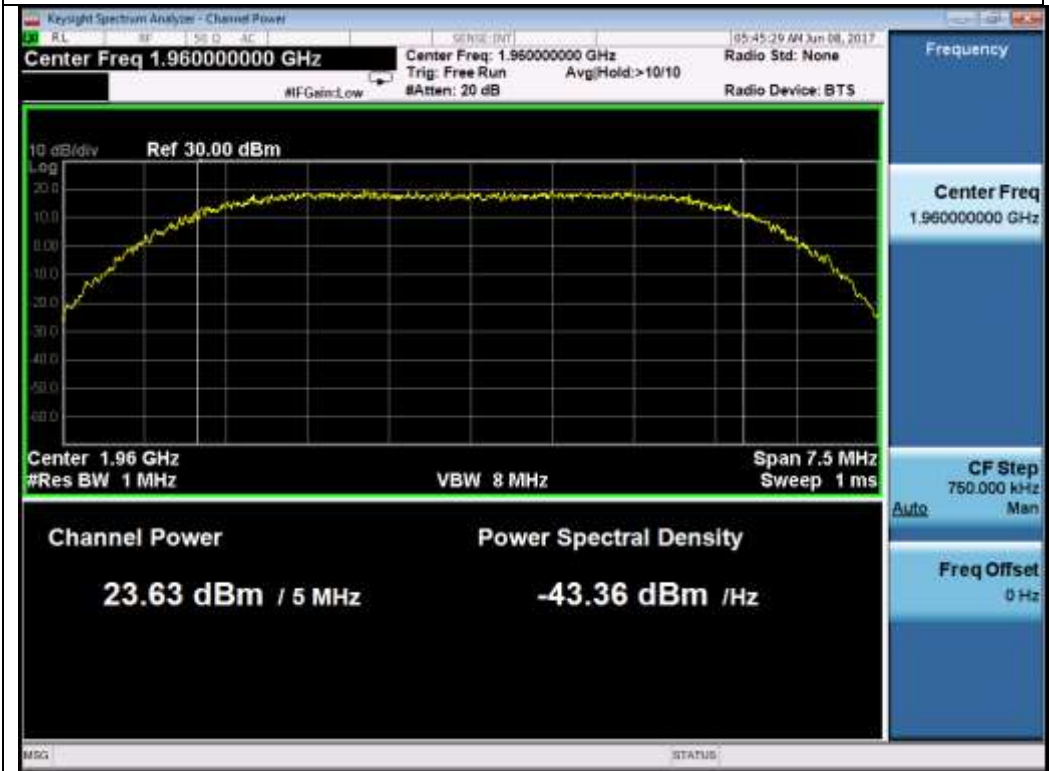
20M QPSK Mid



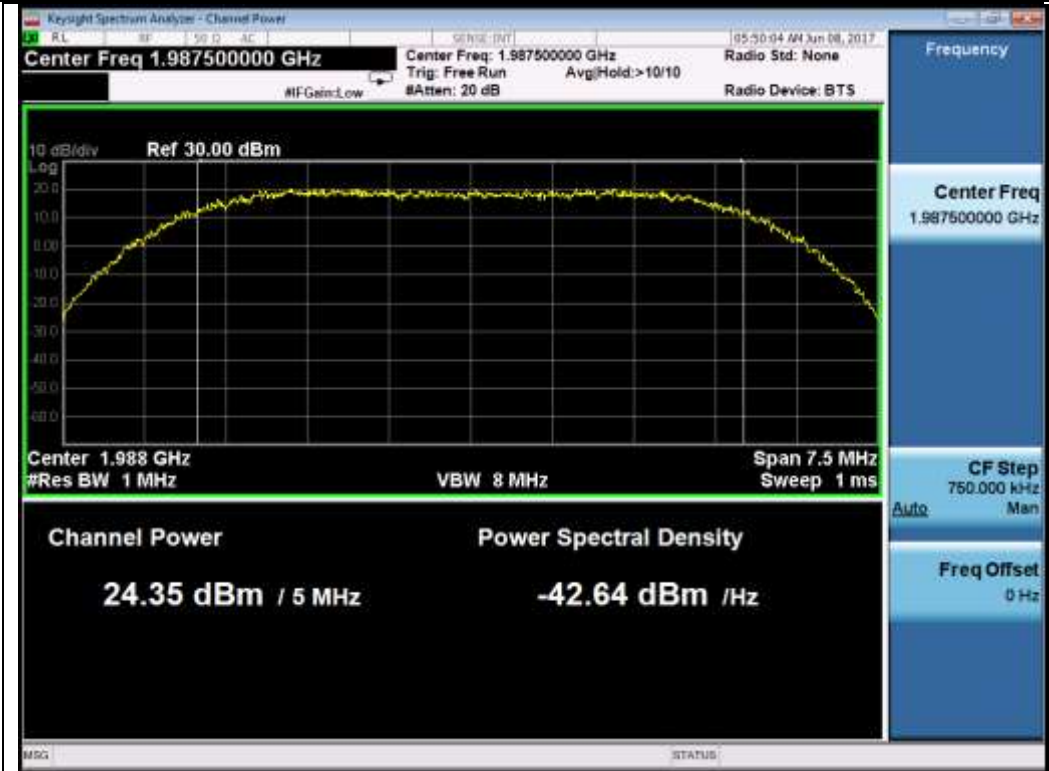
20M QPSK High



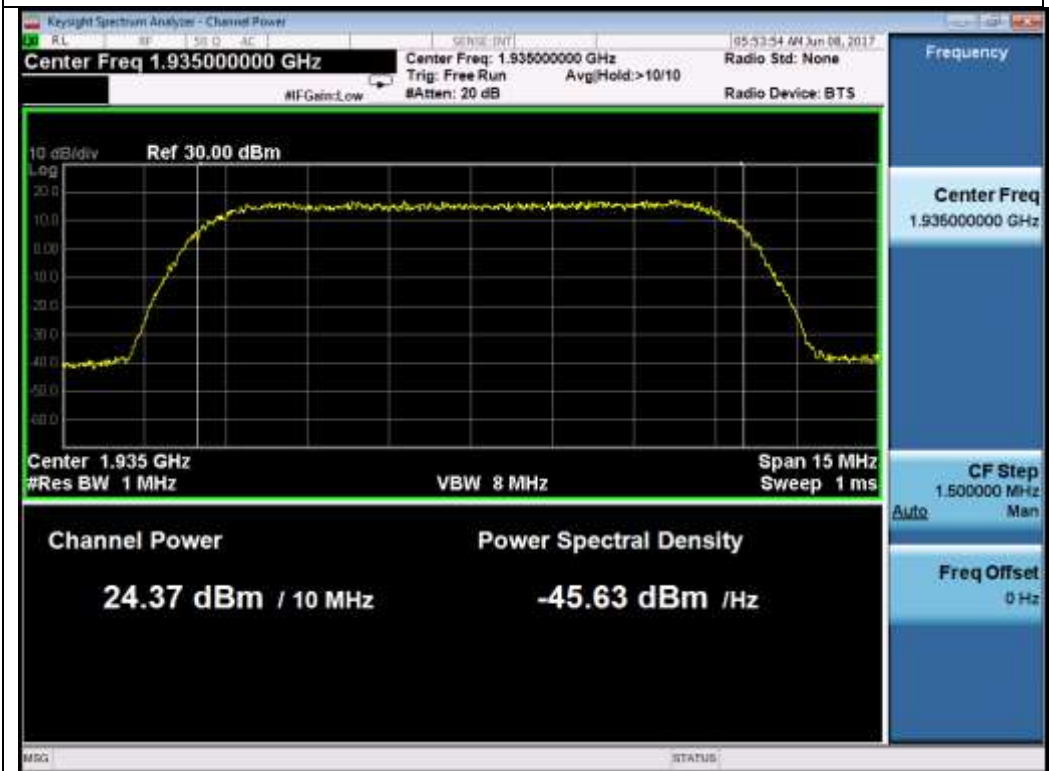
5M 64QAM Low



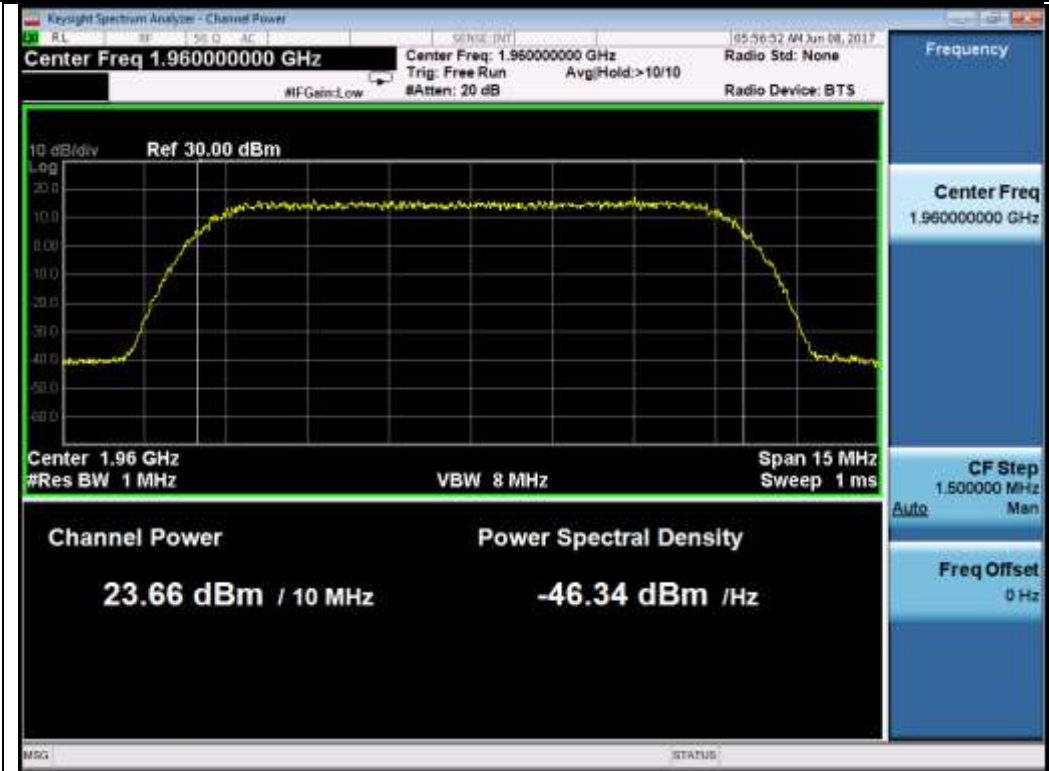
5M 64QAM Mid



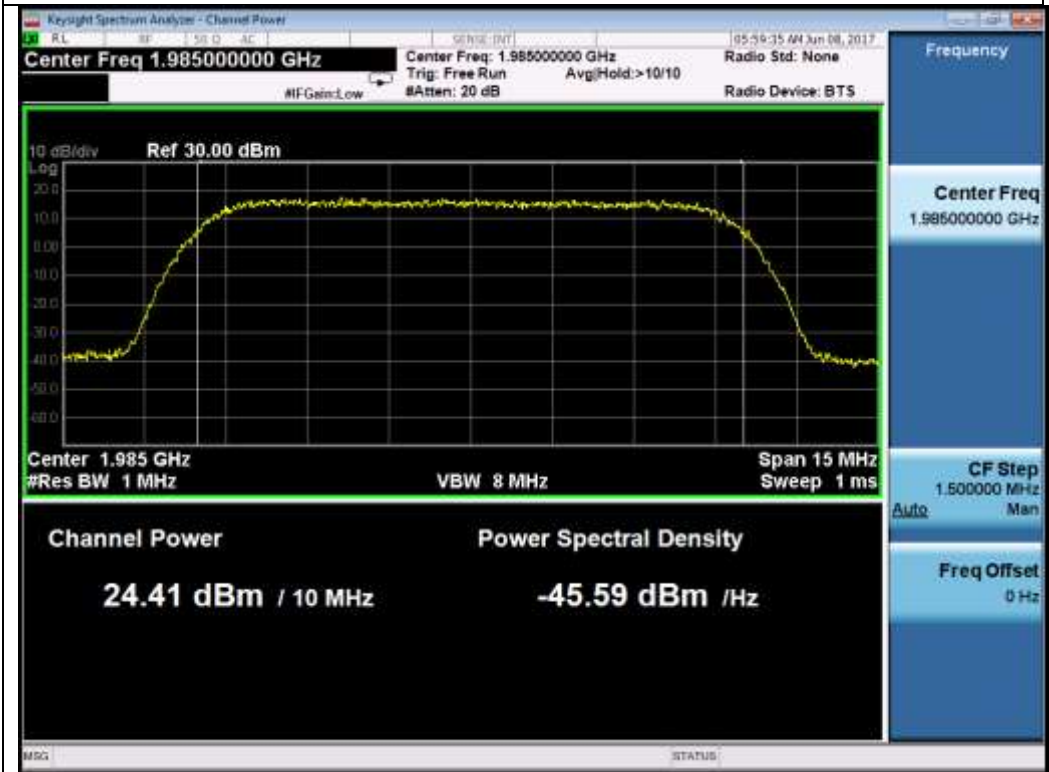
5M 64QAM High



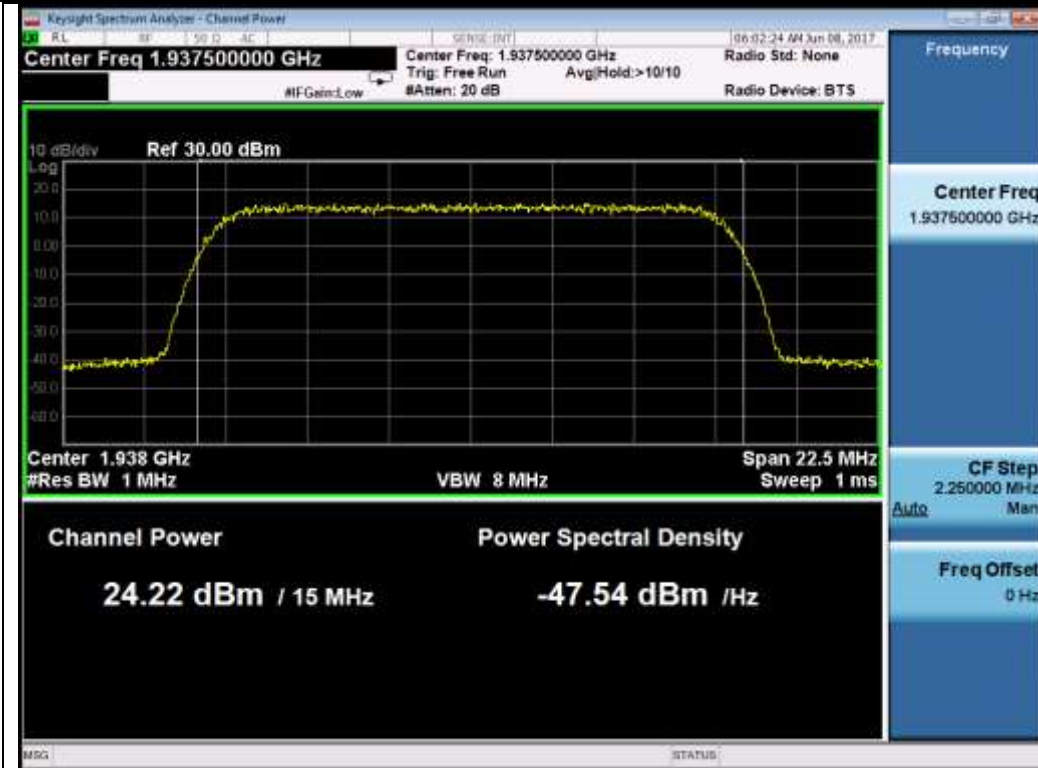
10M 64QAM Low



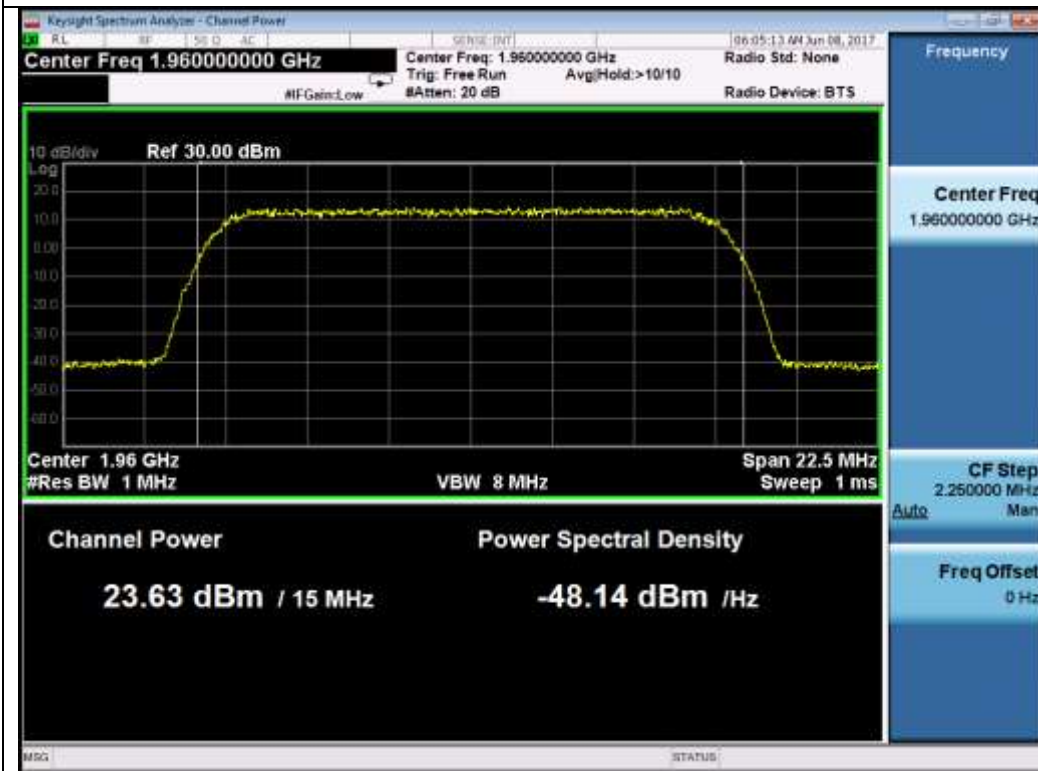
10M 64QAM Mid



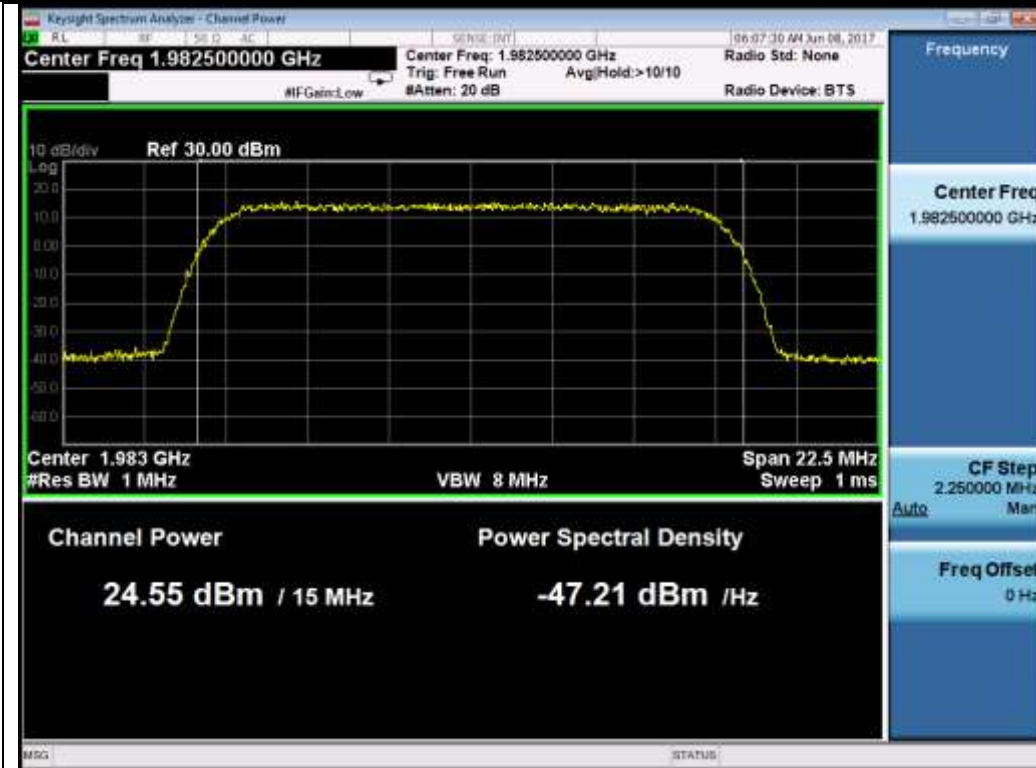
10M 64QAM High



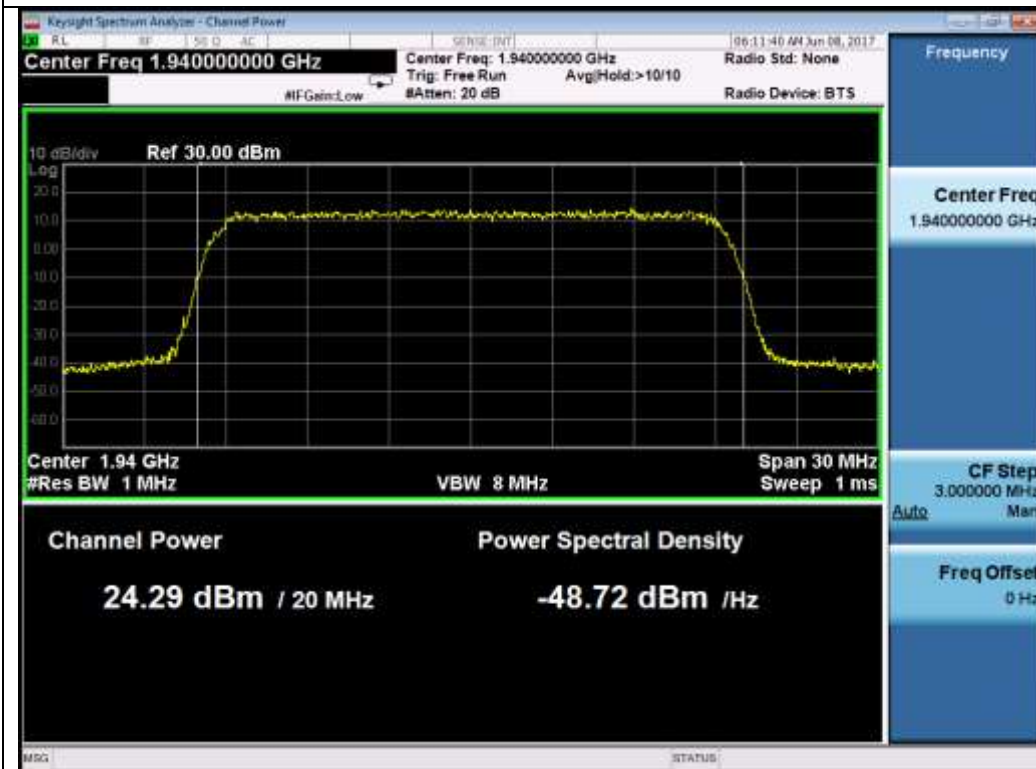
15M 64QAM Low



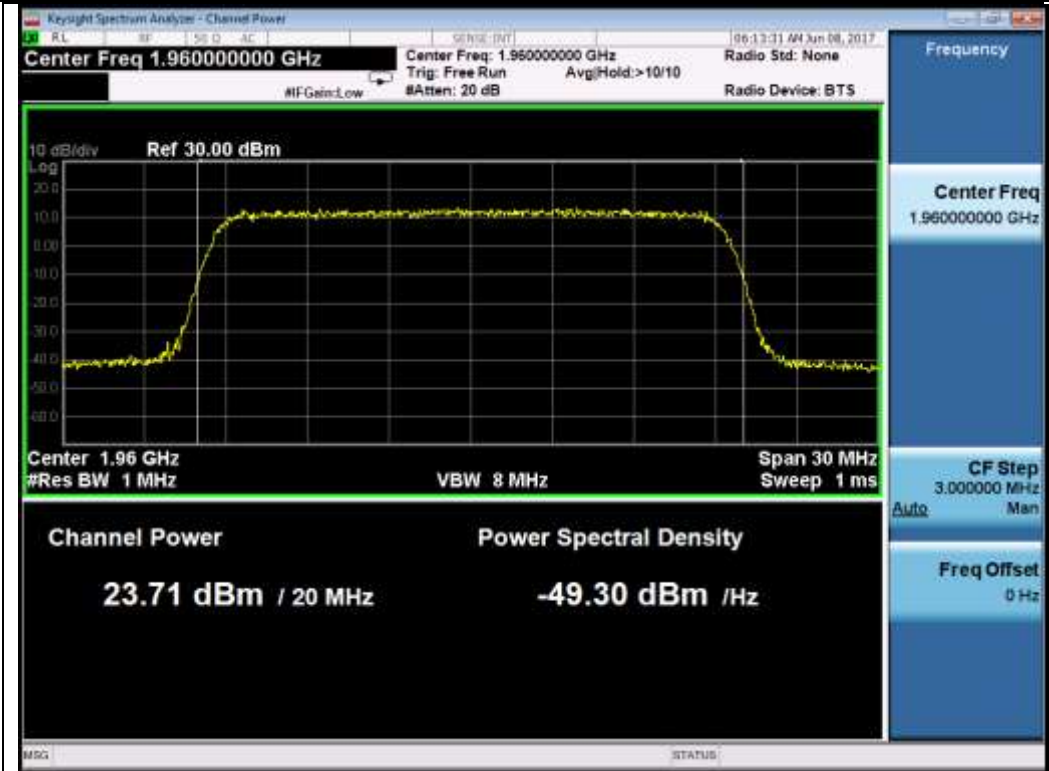
15M 64QAM Mid



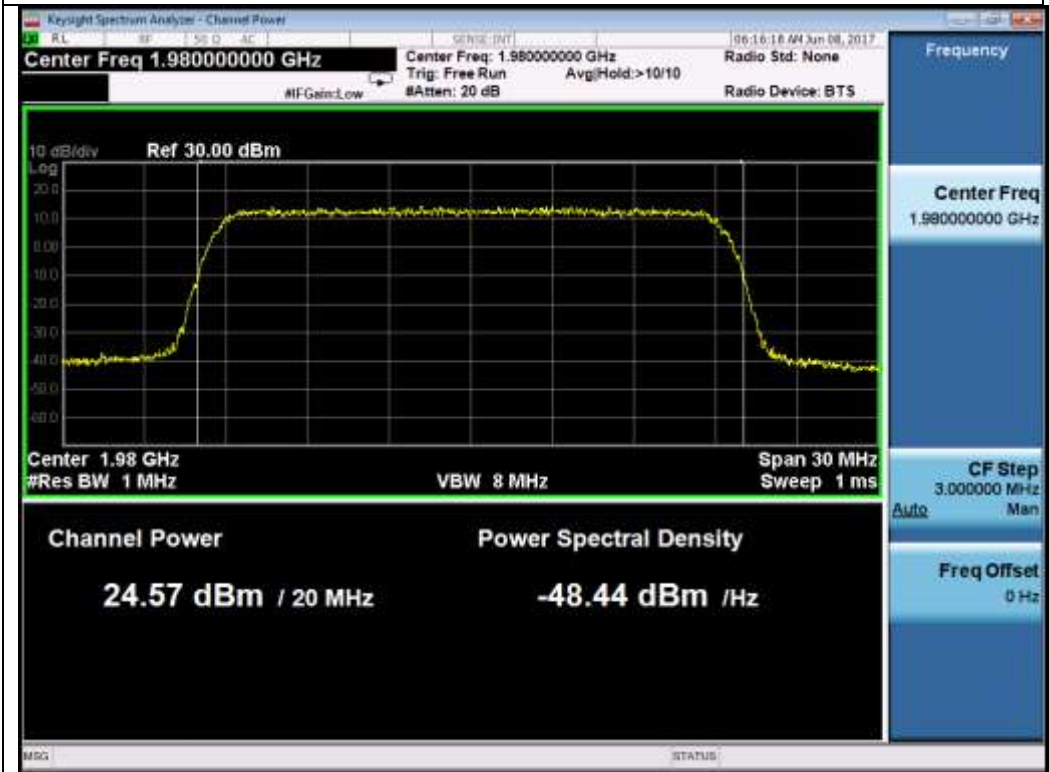
15M 64QAM High



20M 64QAM Low

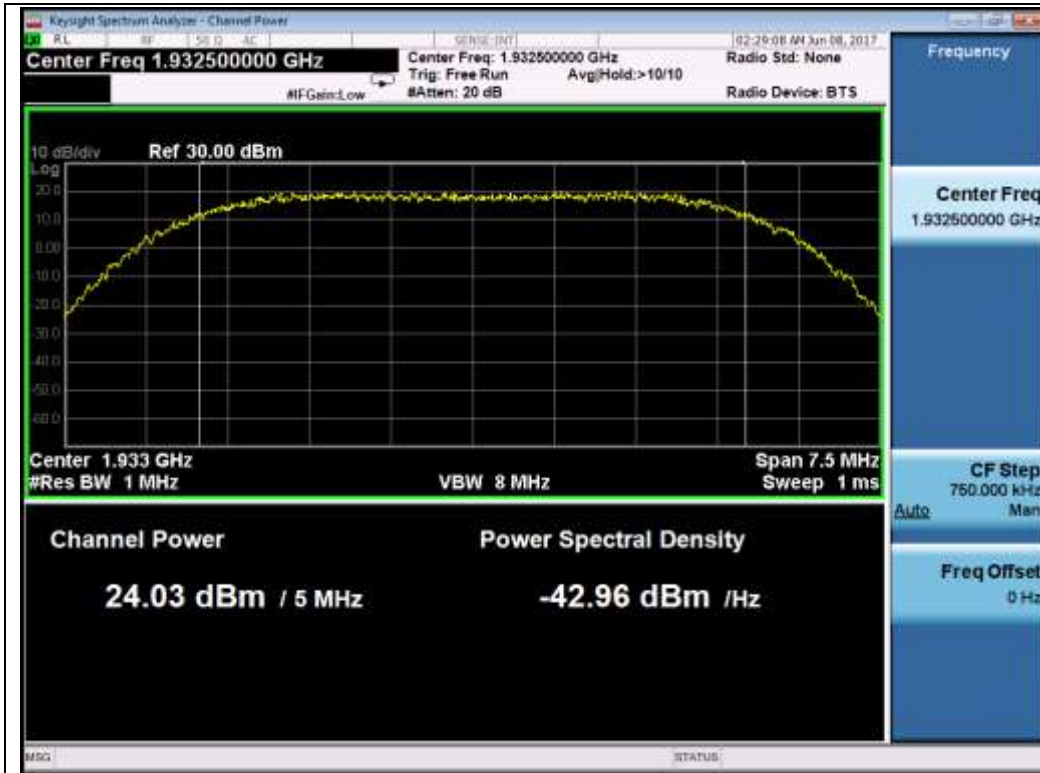


20M 64QAM Mid

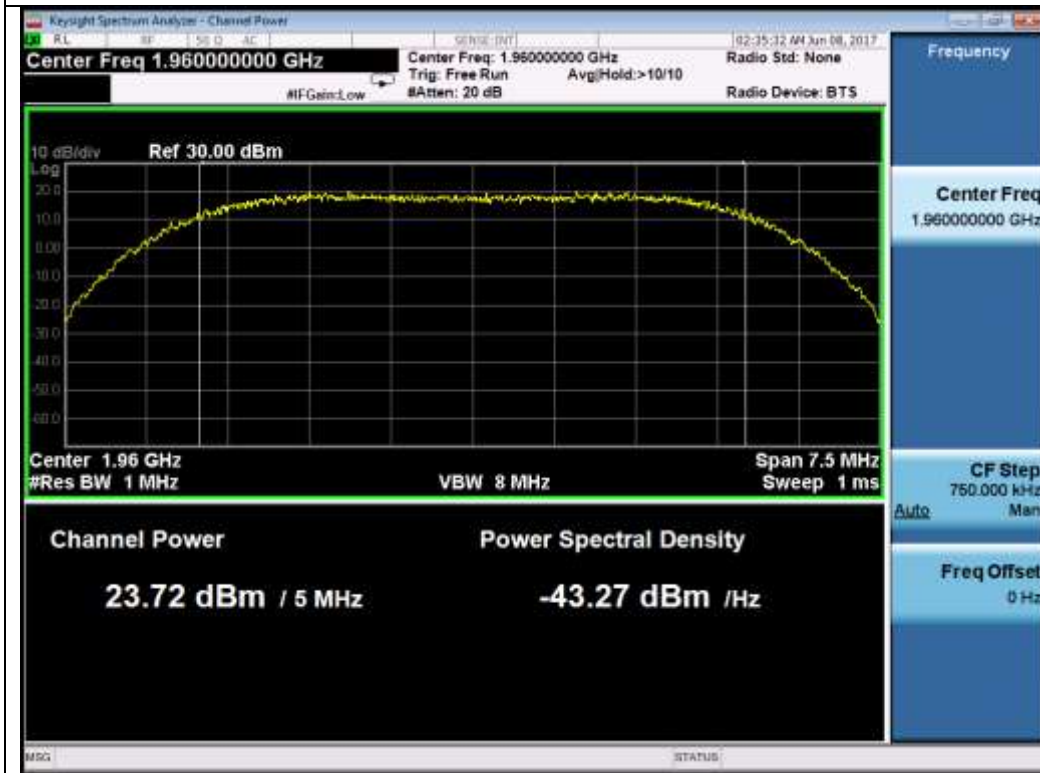


20M 64QAM High

Chain 2:



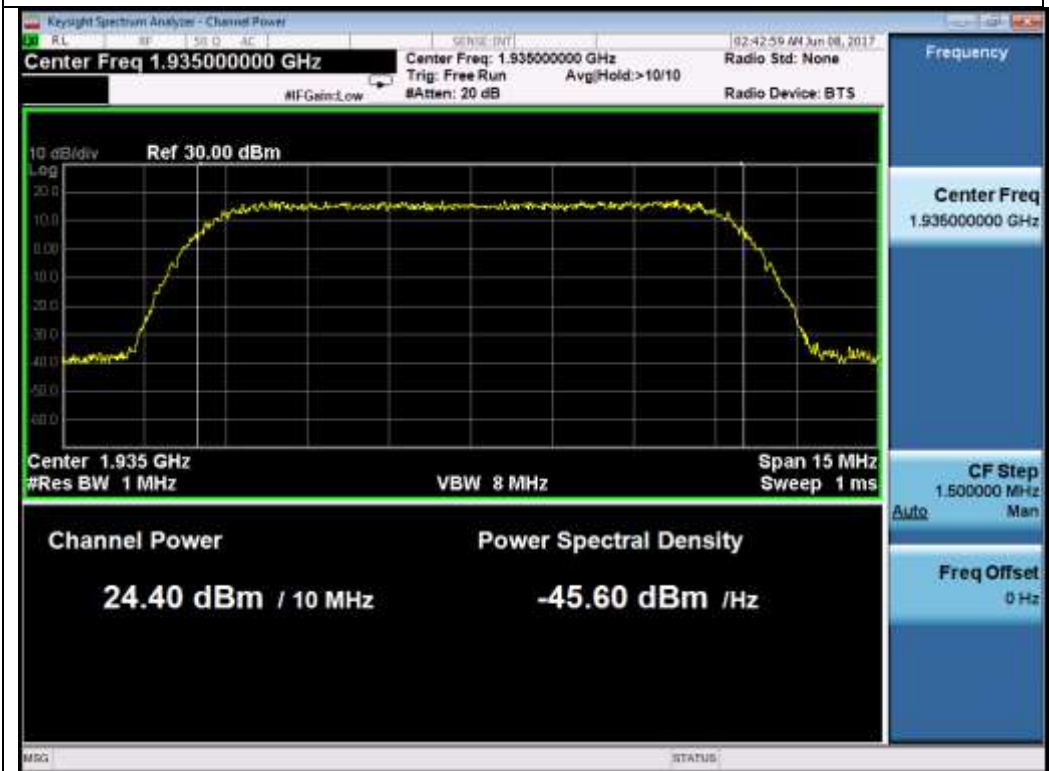
5M QPSK Low



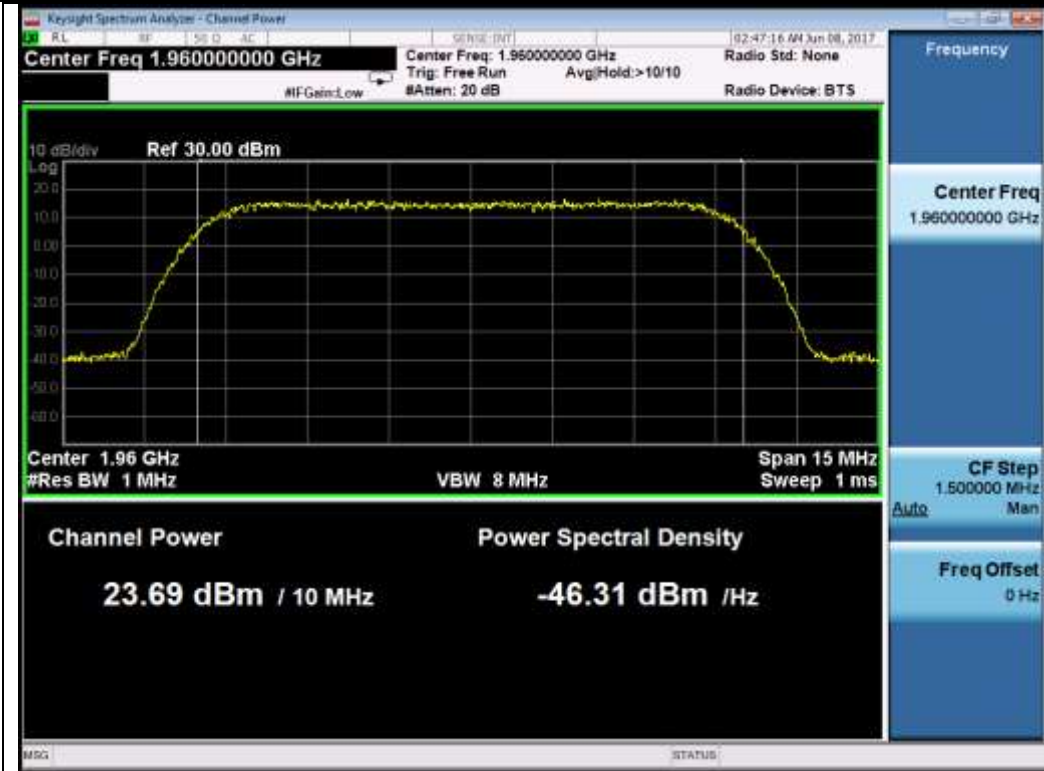
5M QPSK Mid



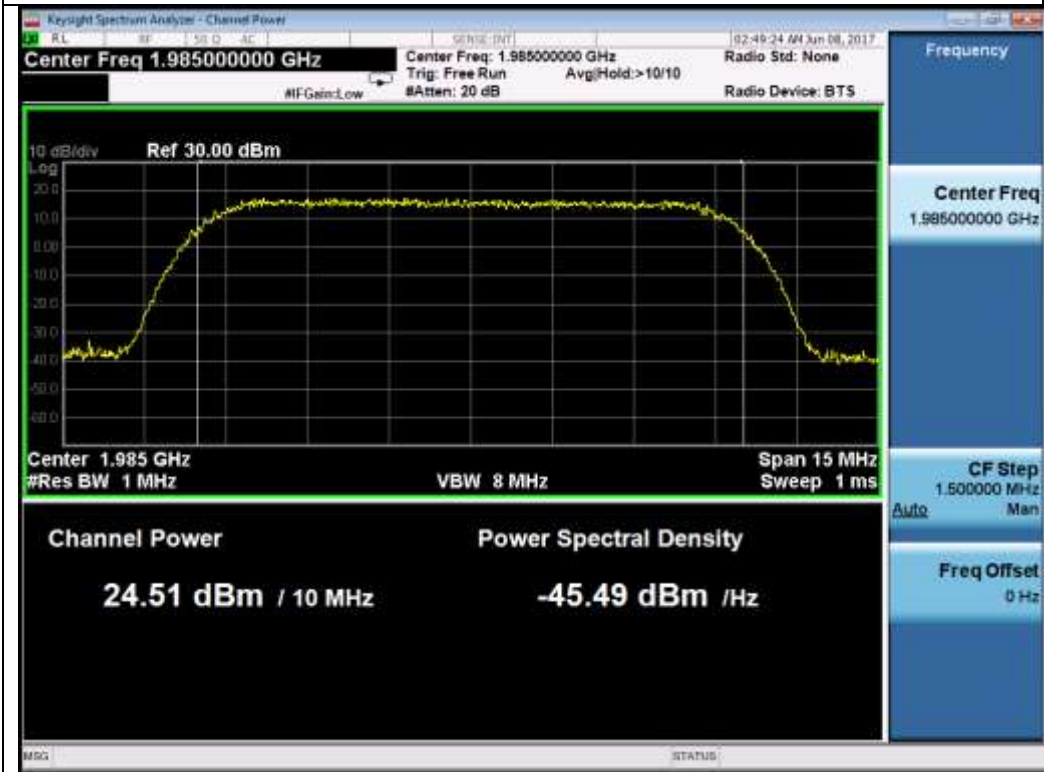
5M QPSK High



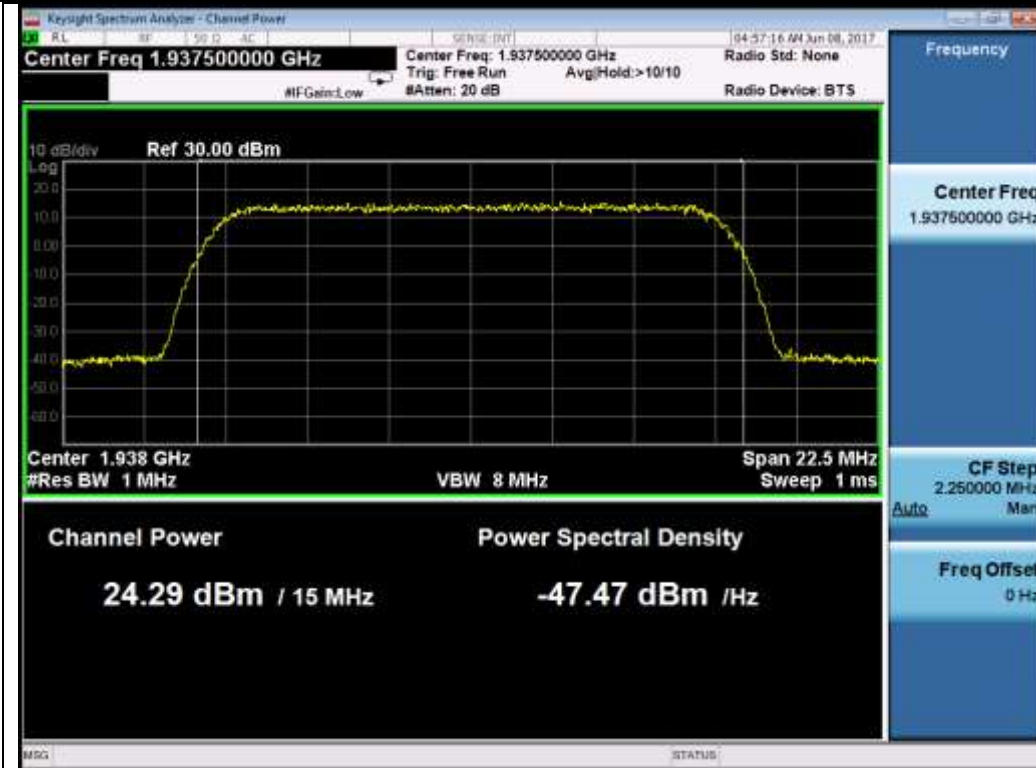
10M QPSK Low



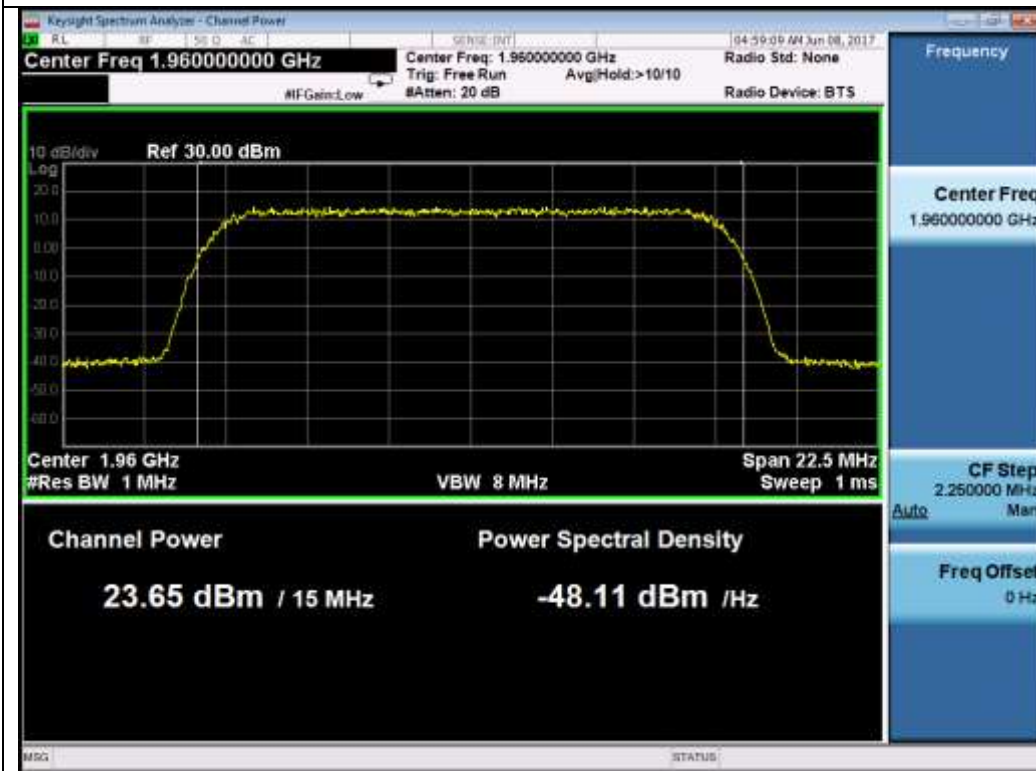
10M QPSK Mid



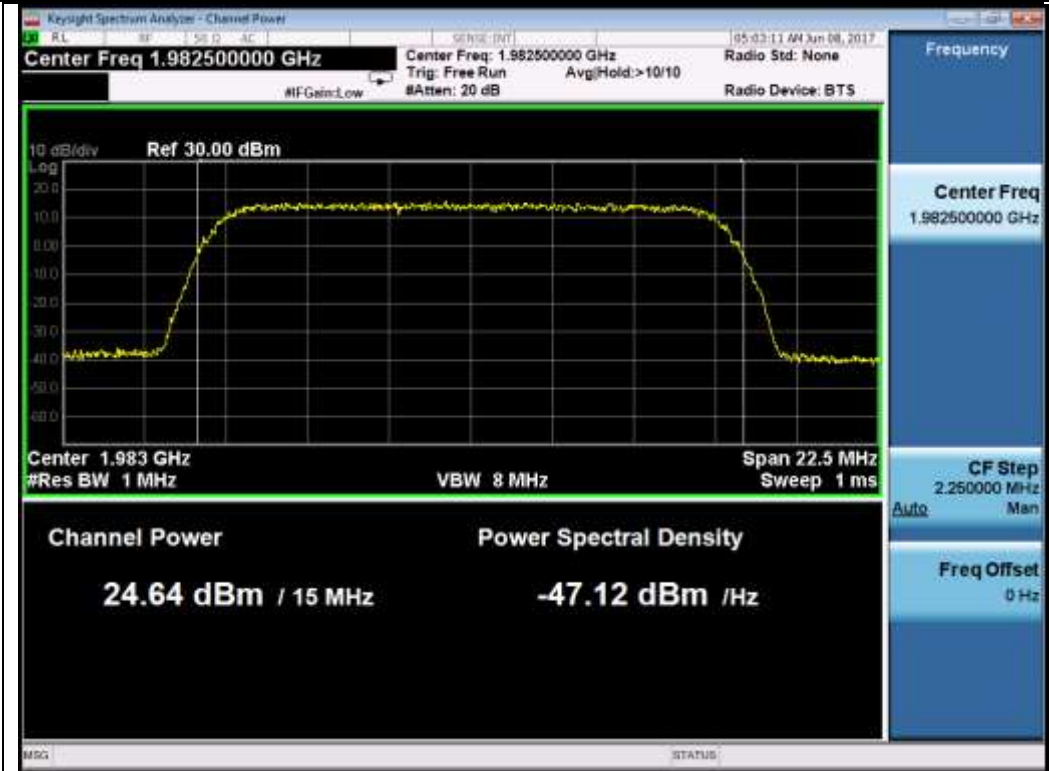
10M QPSK High



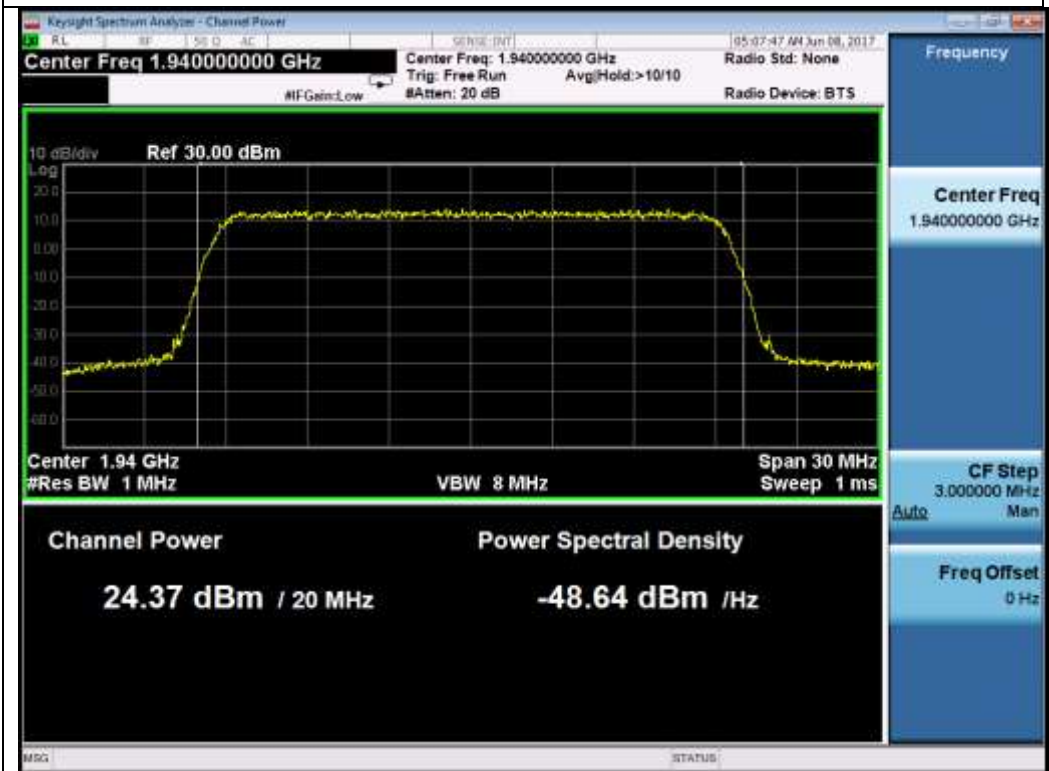
15M QPSK Low



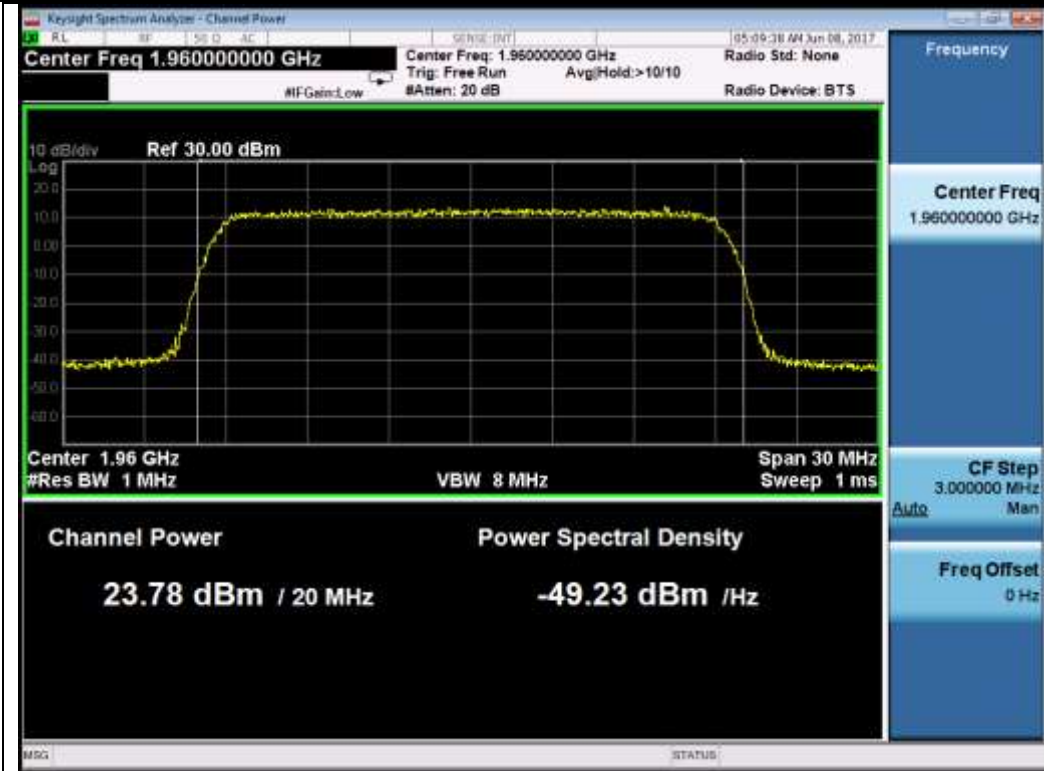
15M QPSK Mid



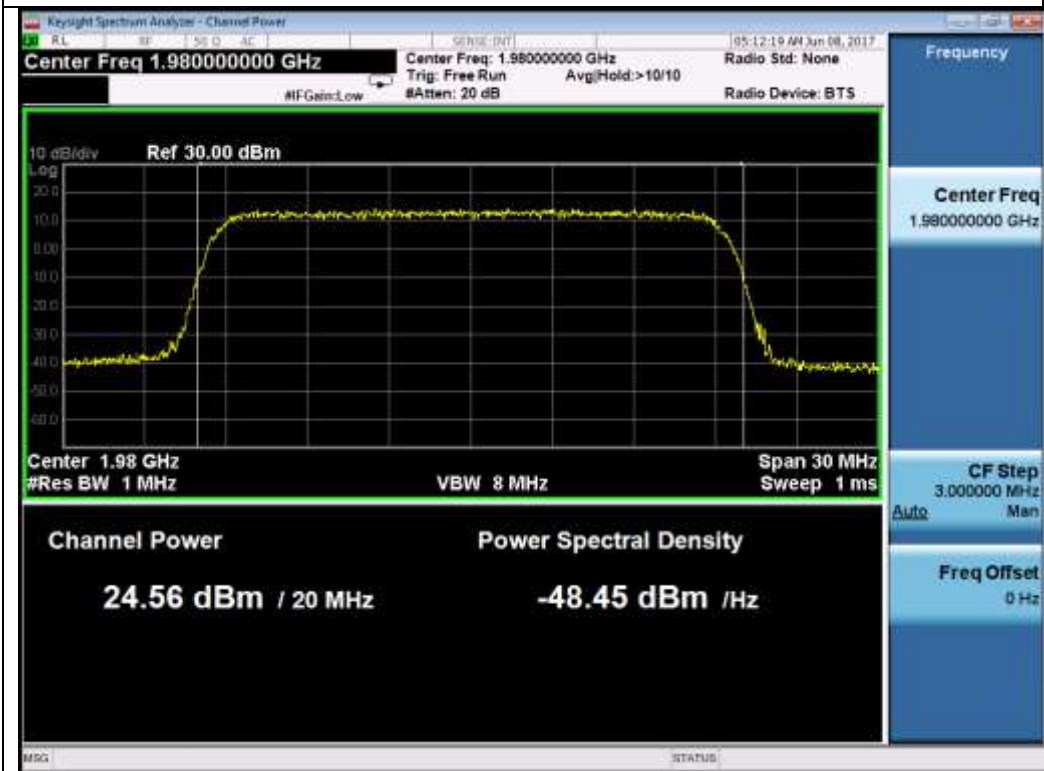
15M QPSK High



20M QPSK Low



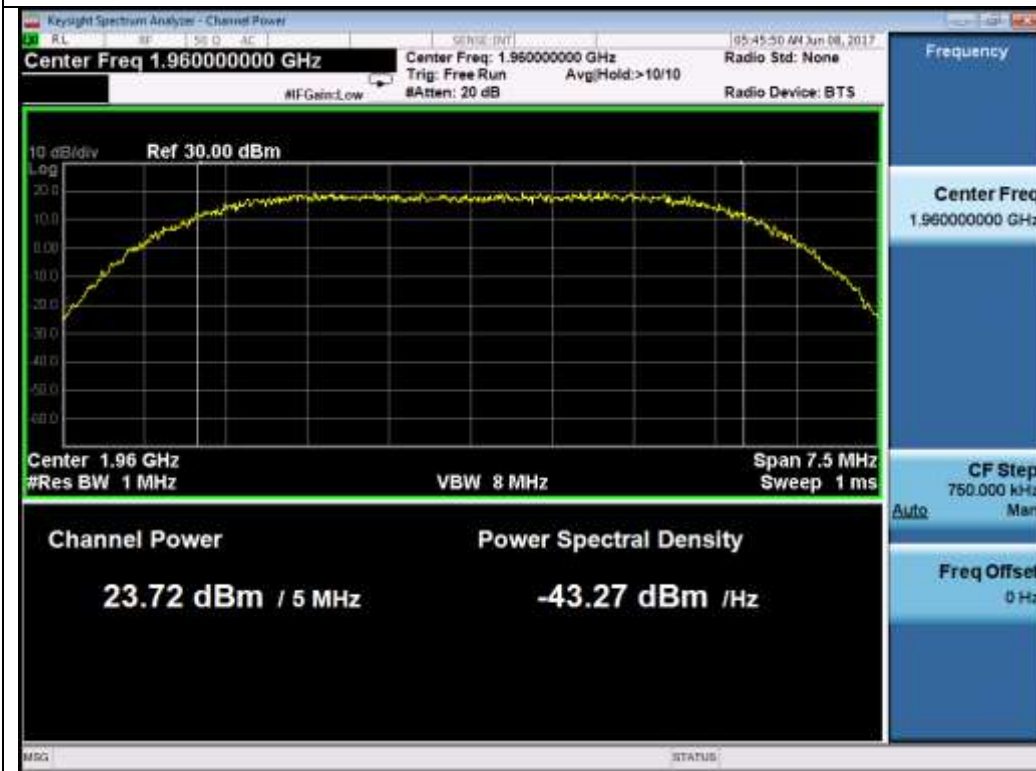
20M QPSK Mid



20M QPSK High



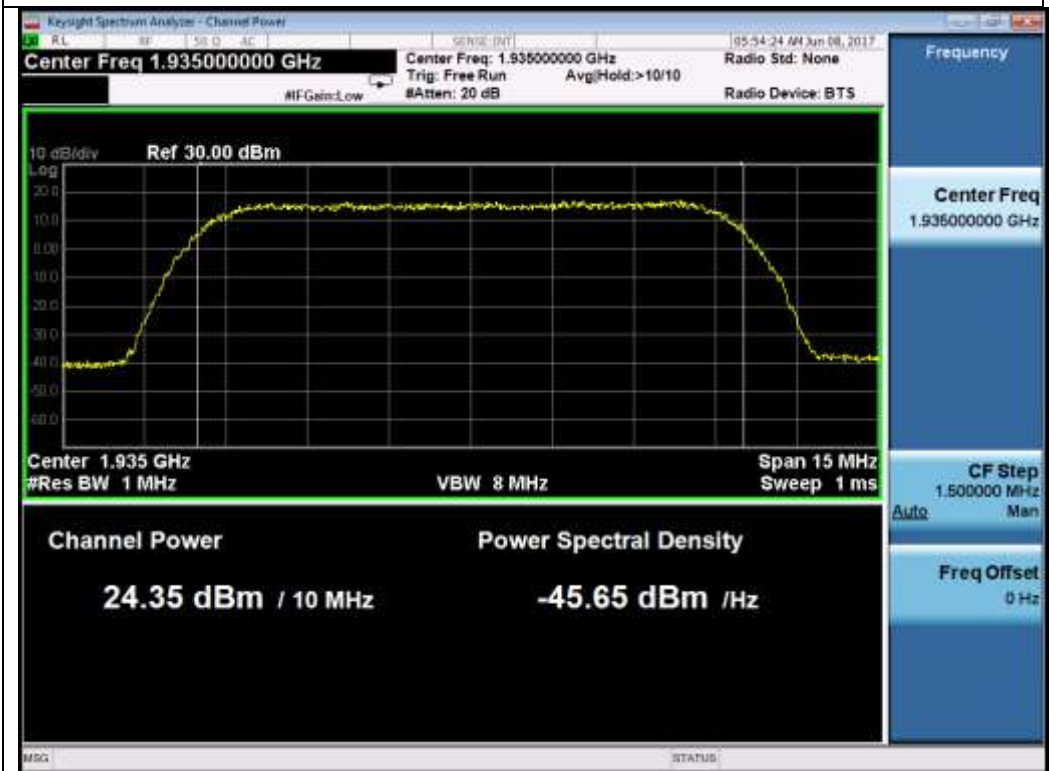
5M 64QAM Low



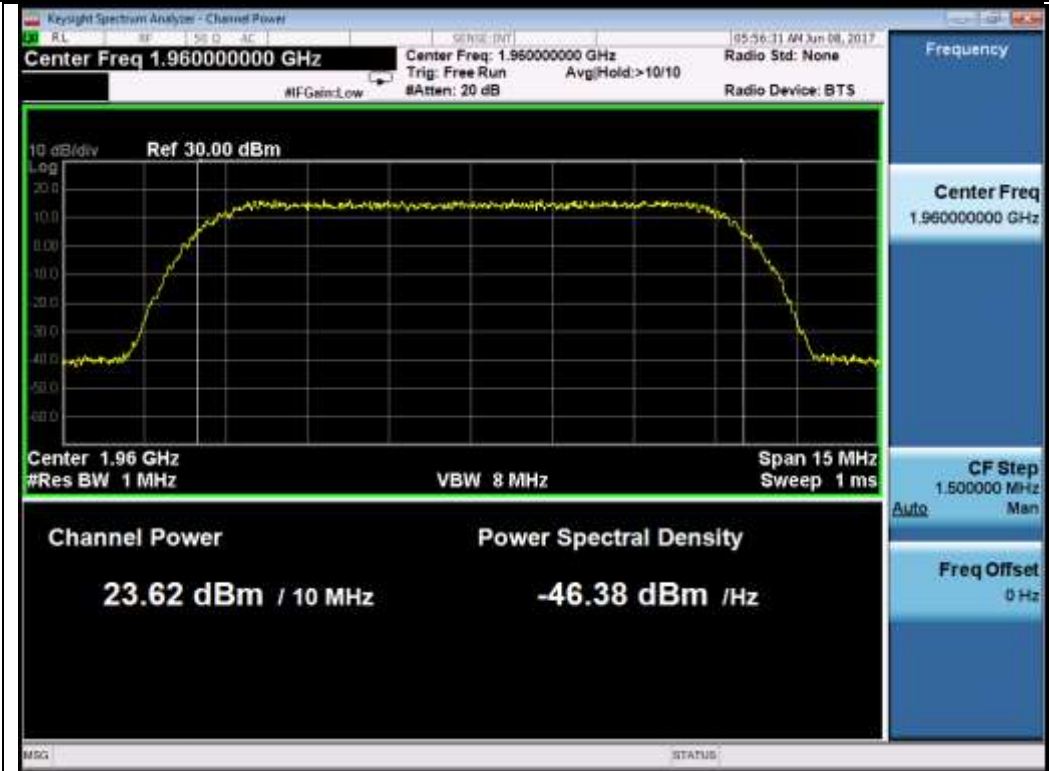
5M 64QAM Mid



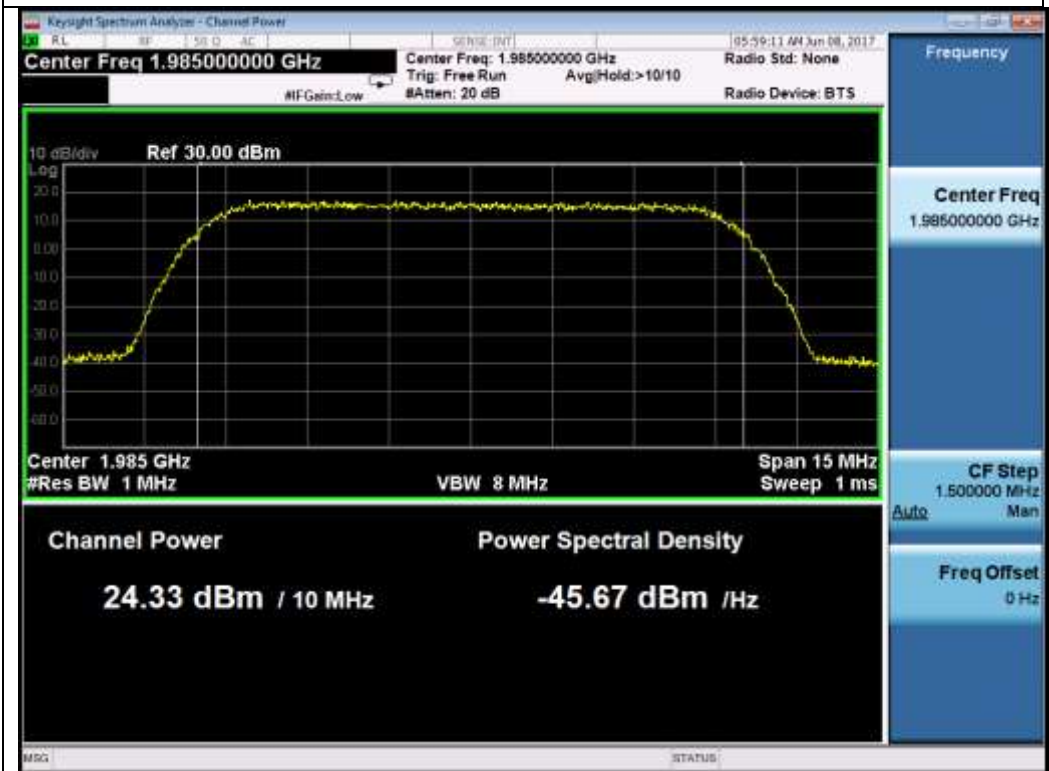
5M 64QAM High



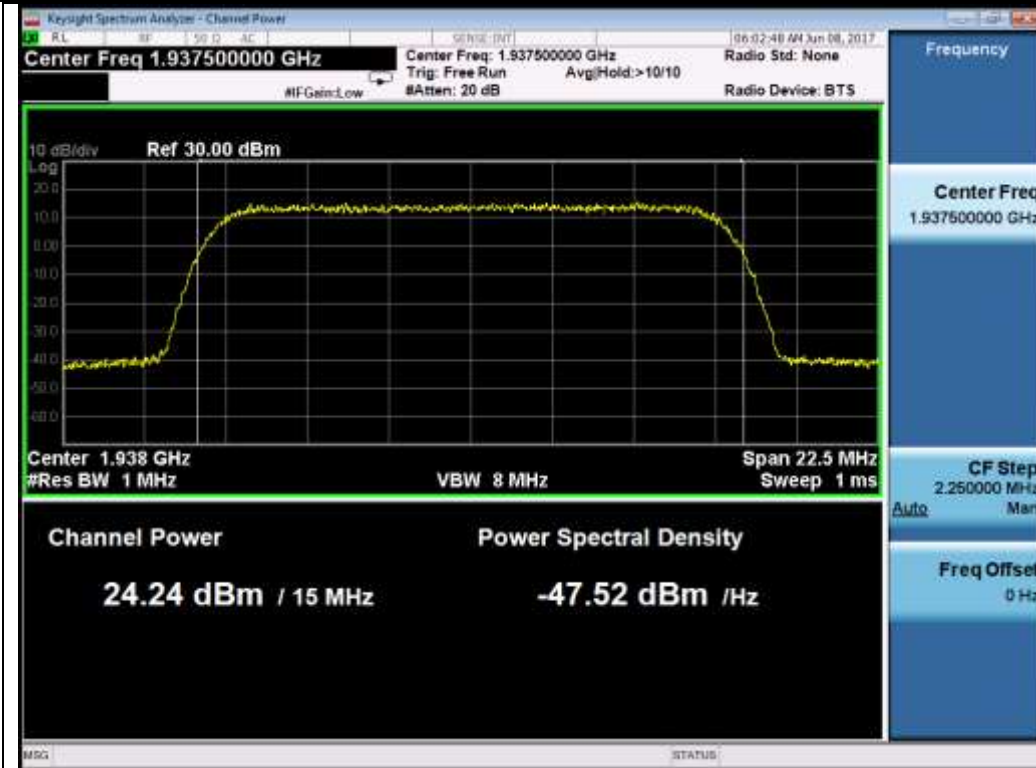
10M 64QAM Low



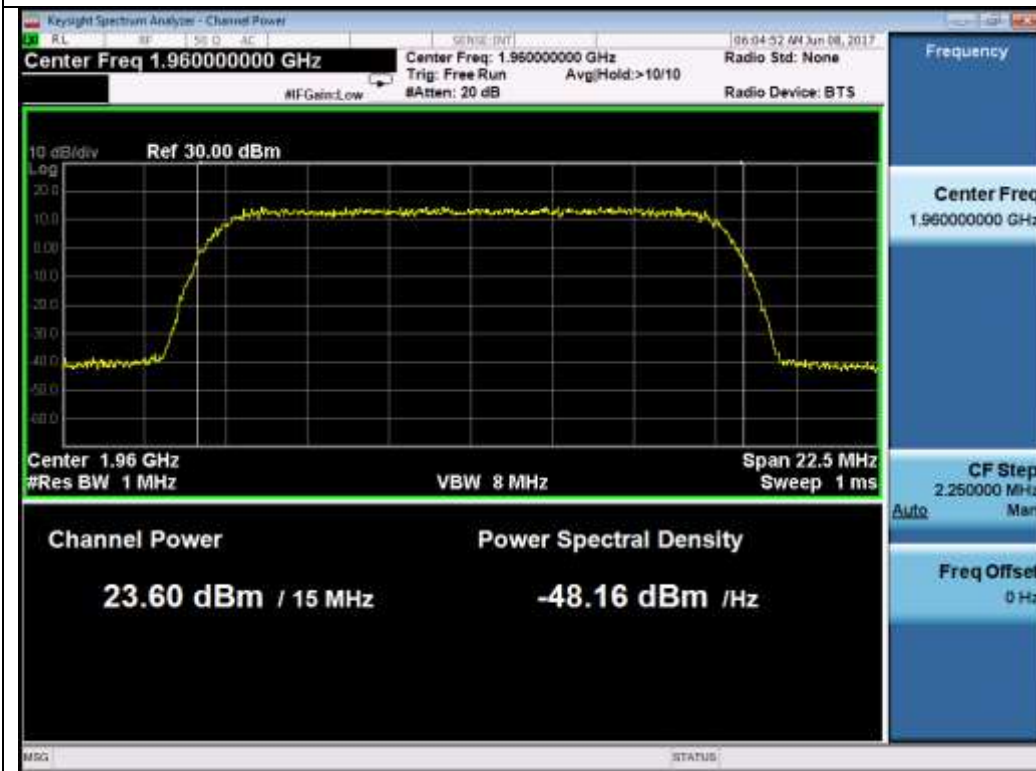
10M 64QAM Mid



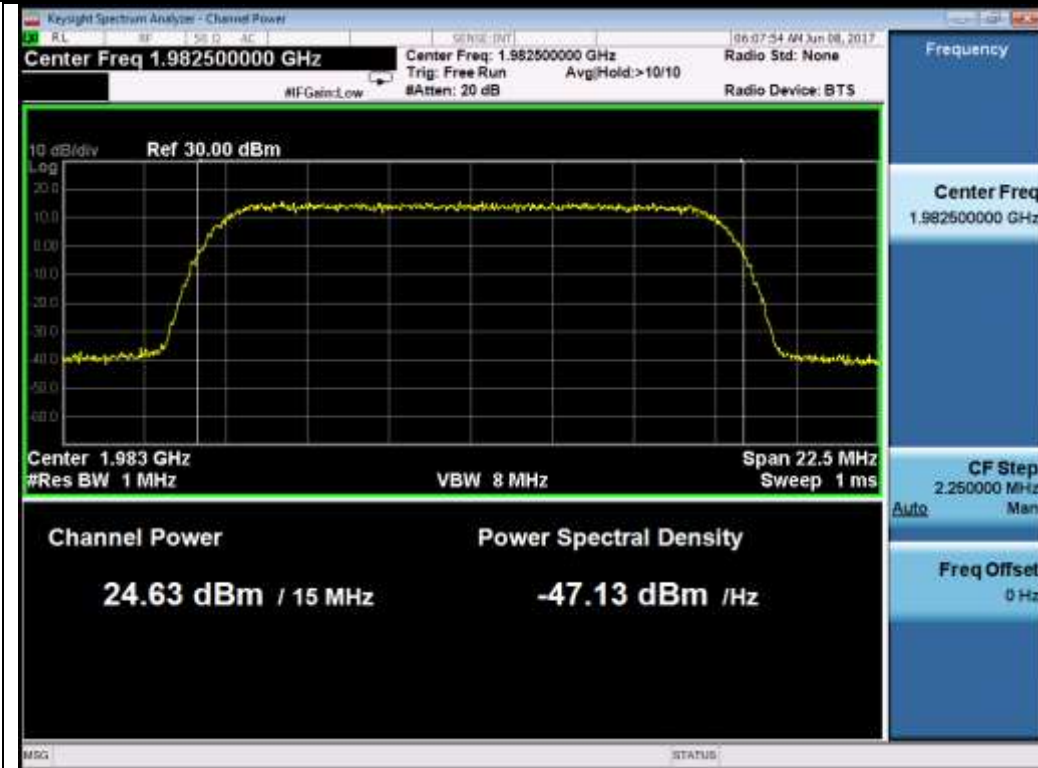
10M 64QAM High



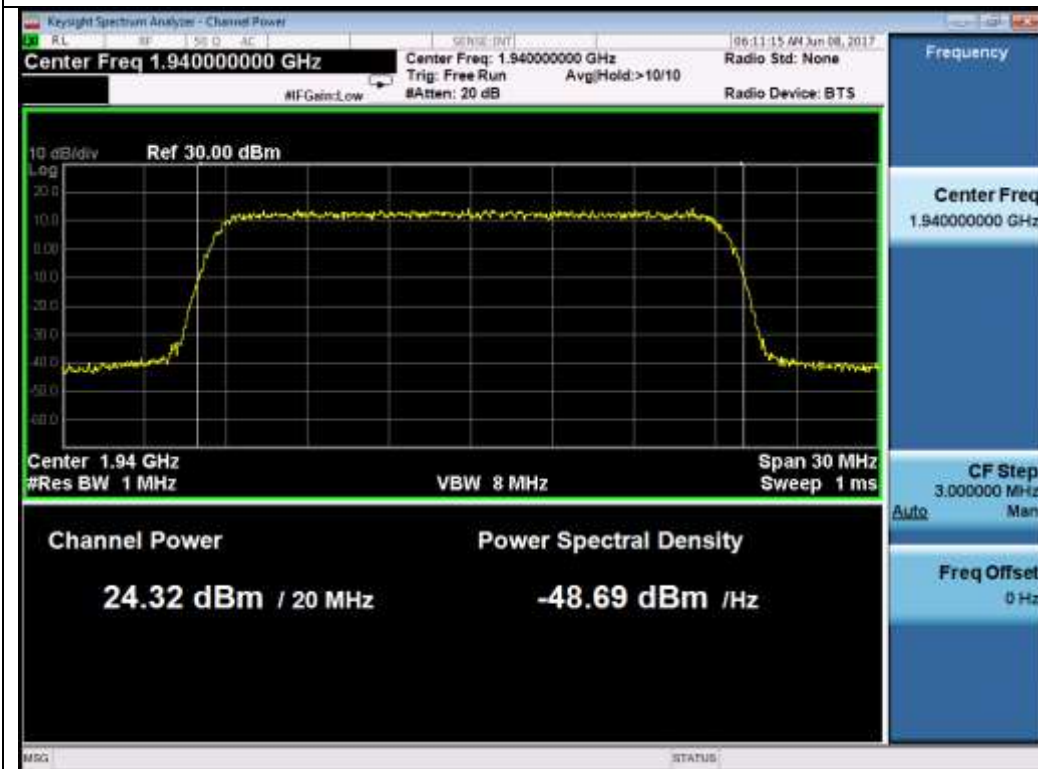
15M 64QAM Low



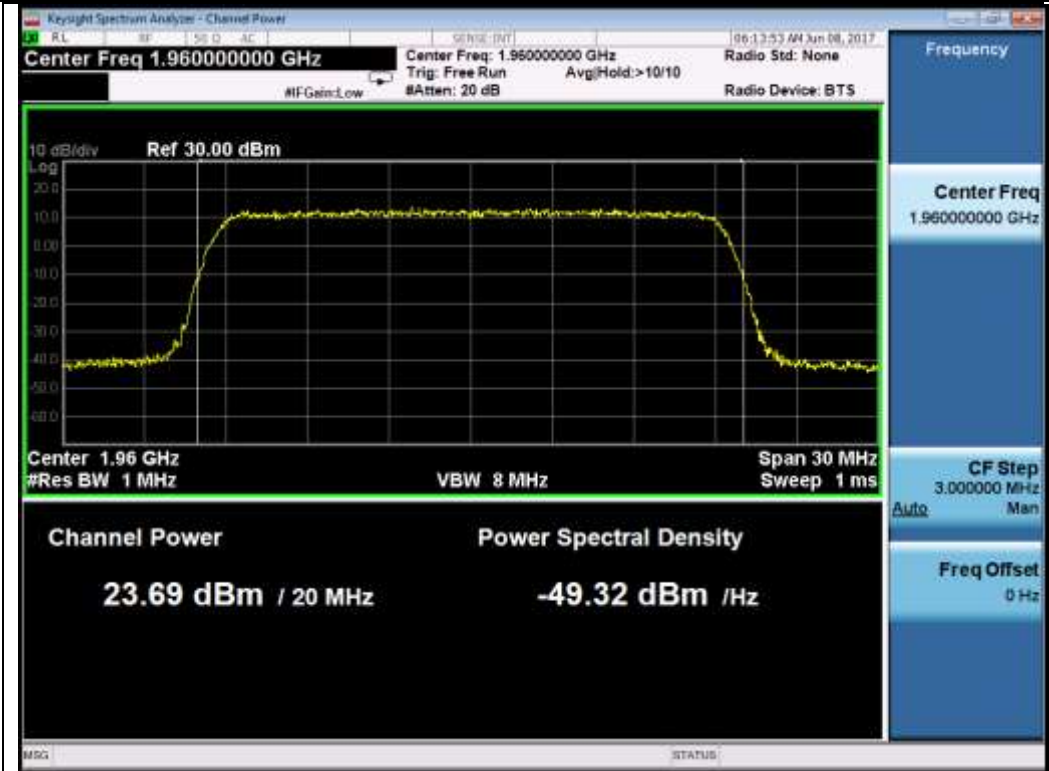
15M 64QAM Mid



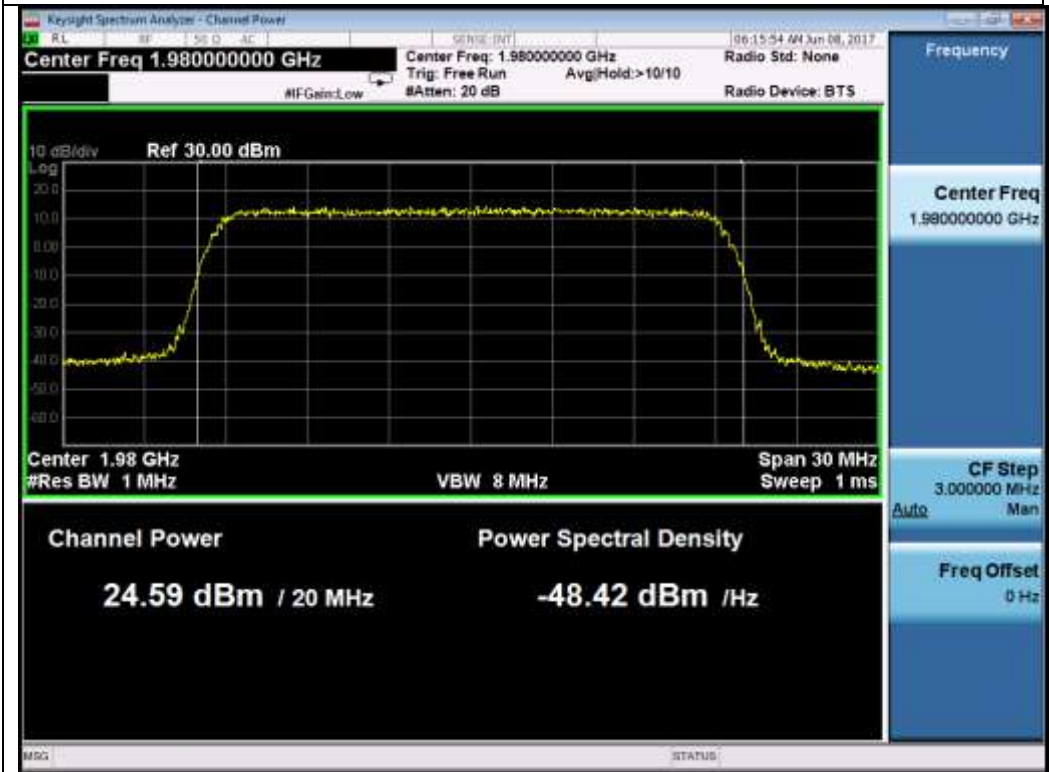
15M 64QAM High



20M 64QAM Low

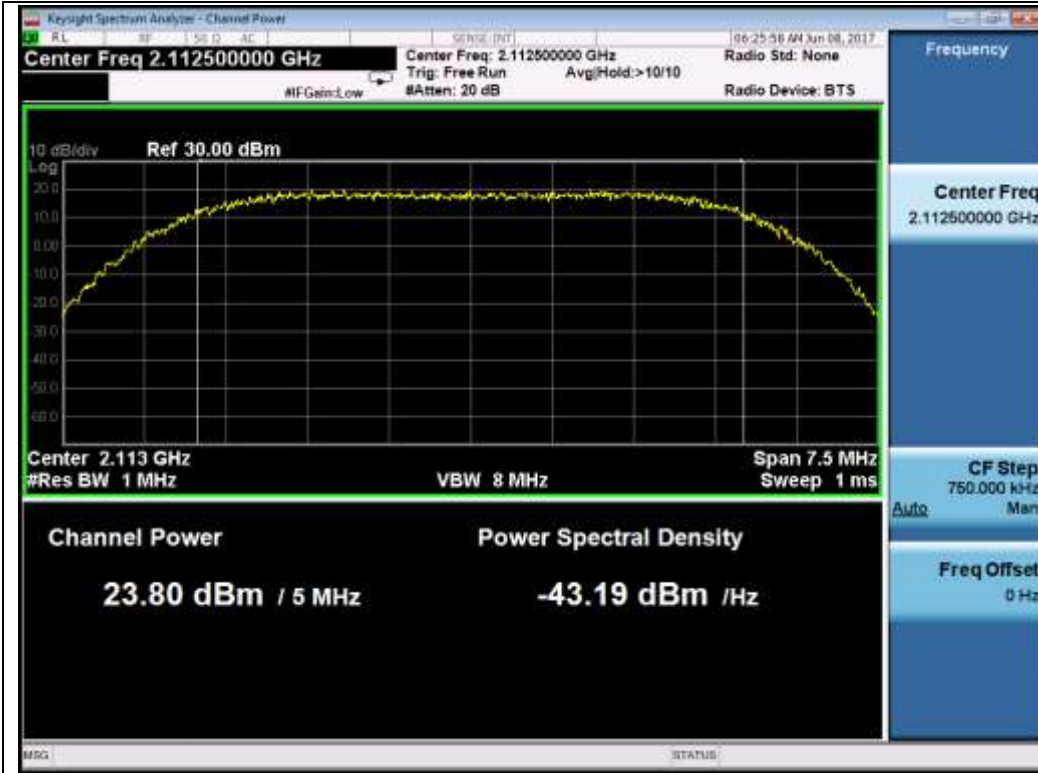


20M 64QAM Mid

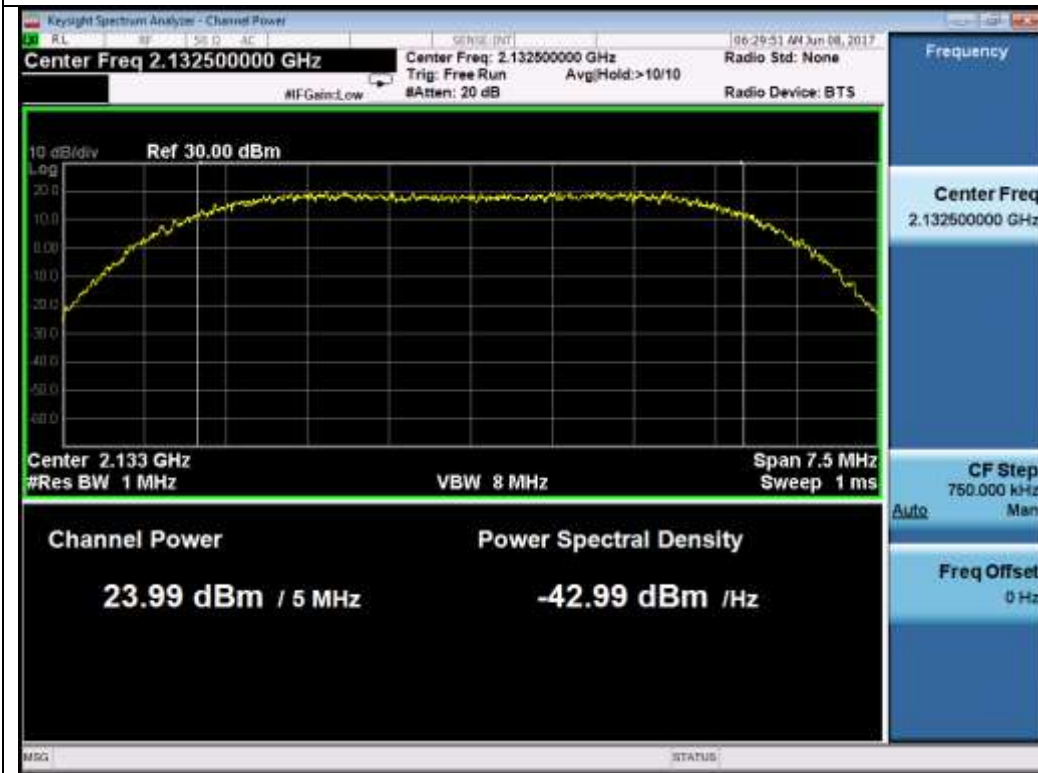


20M 64QAM High

Test Plots for Band 4
Chain 1:



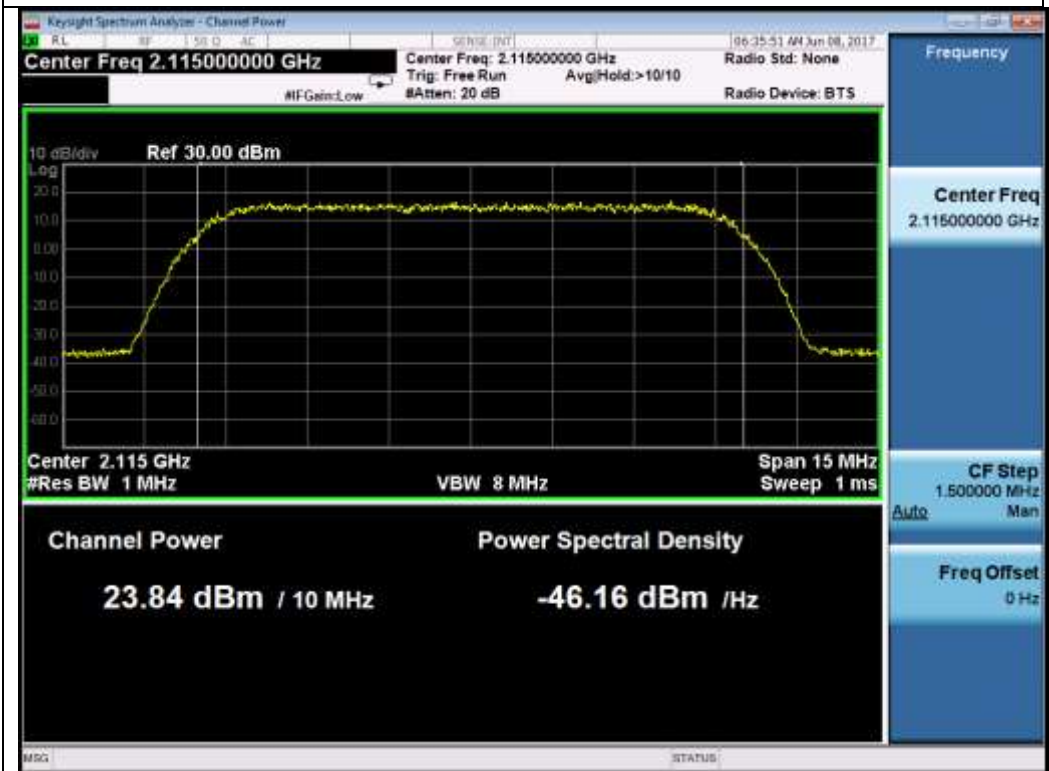
5M QPSK Low



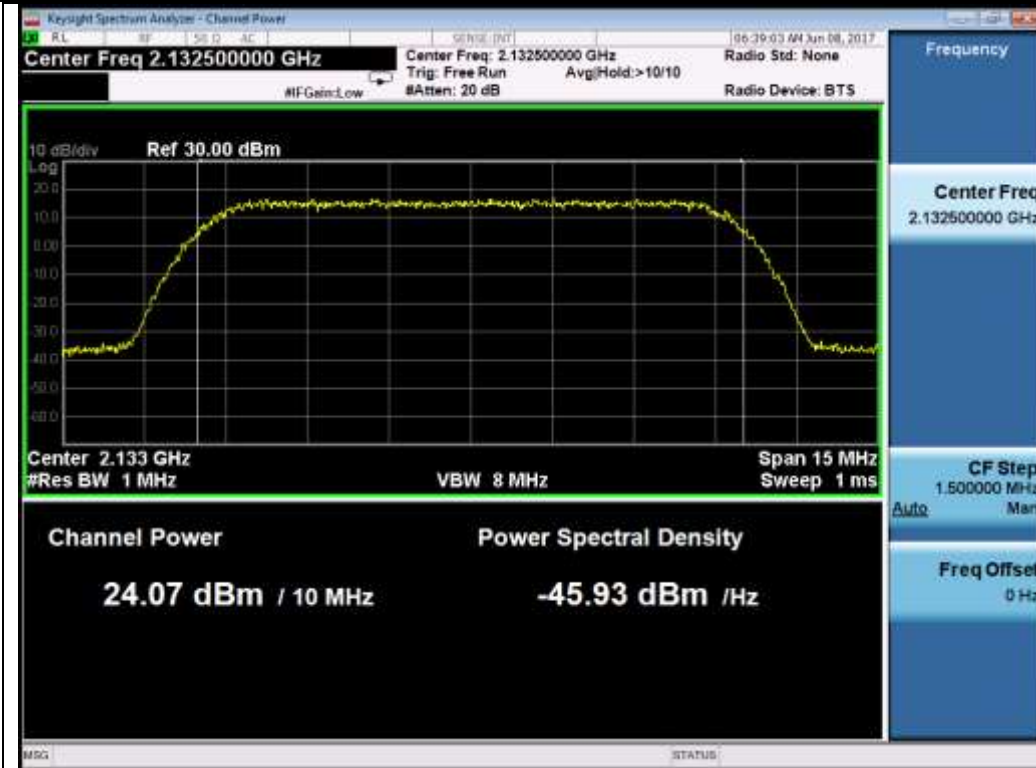
5M QPSK Mid



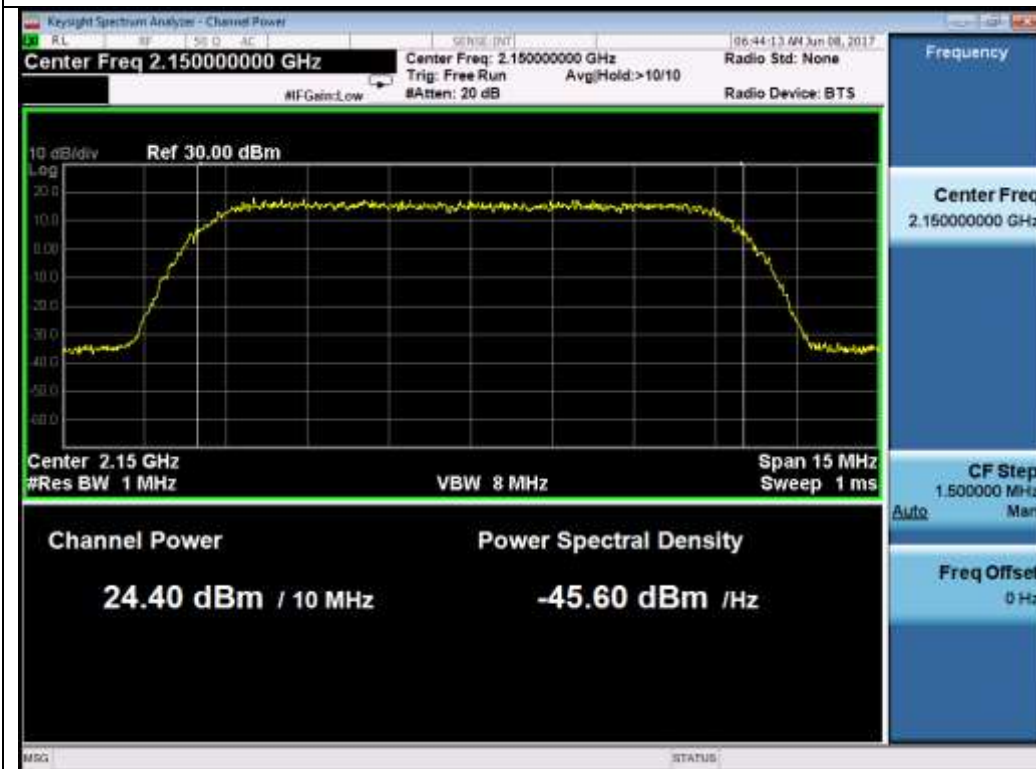
5M QPSK High



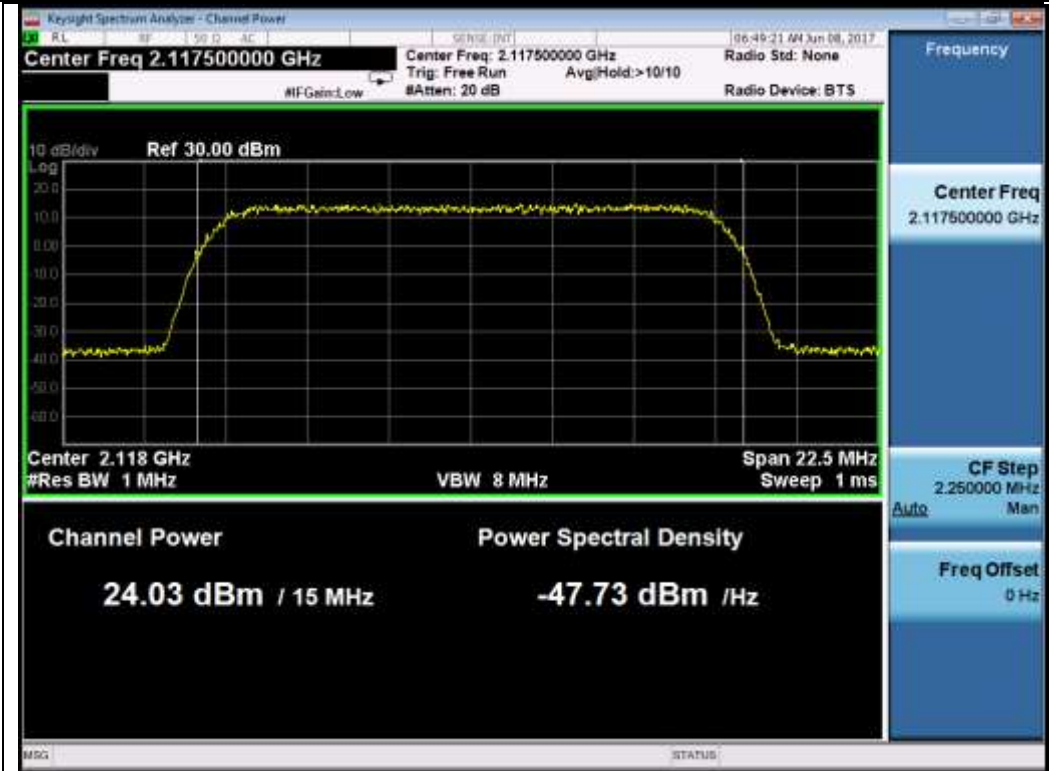
10M QPSK Low



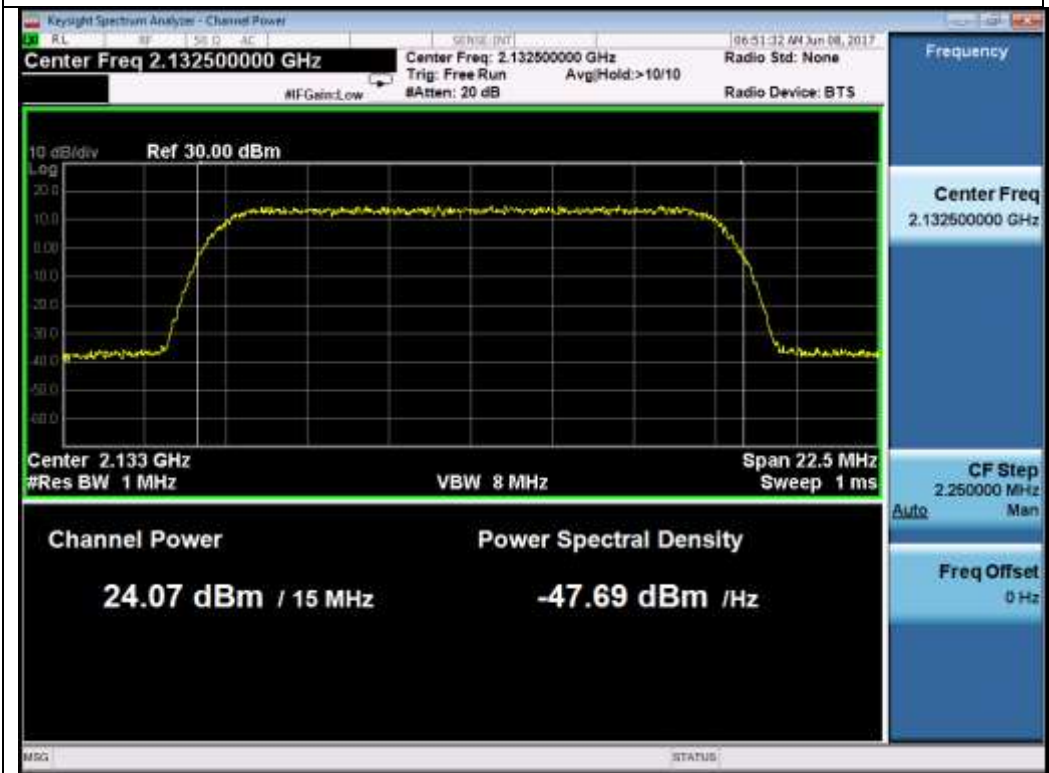
10M QPSK Mid



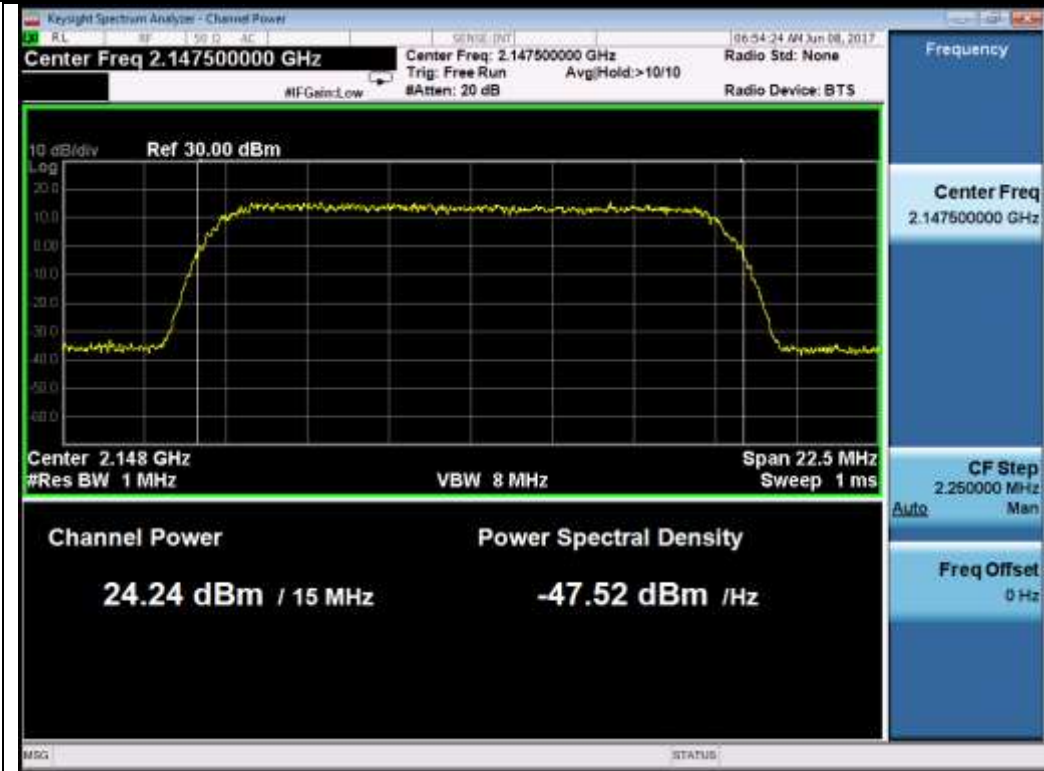
10M QPSK High



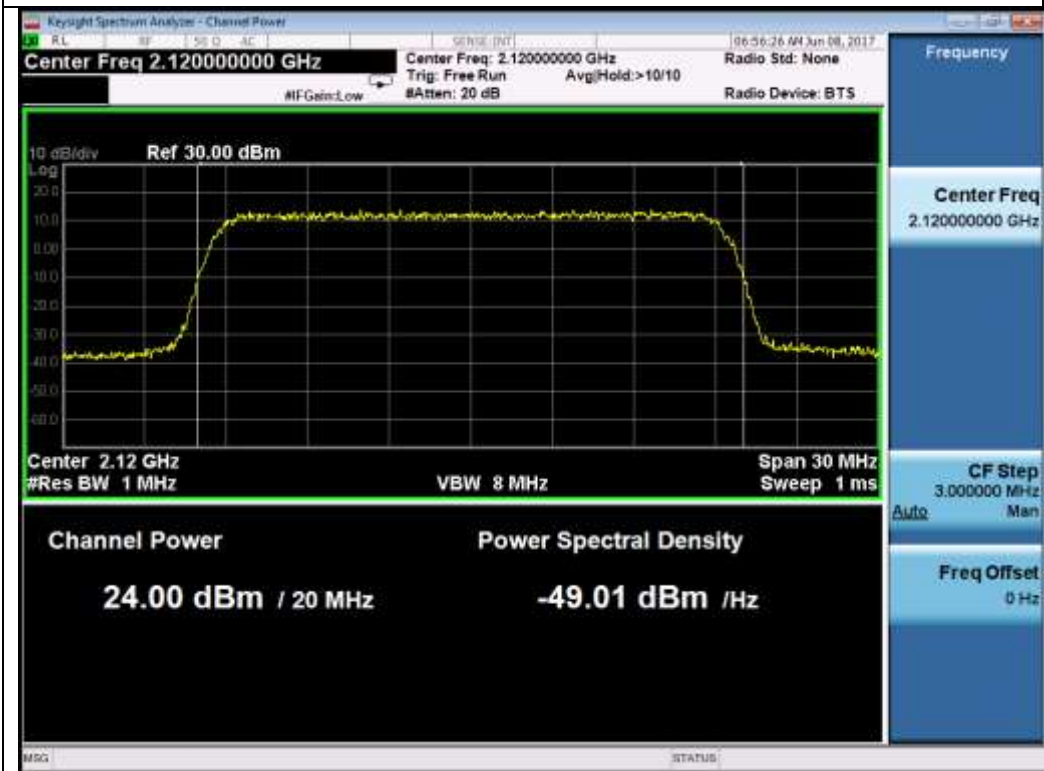
15M QPSK Low



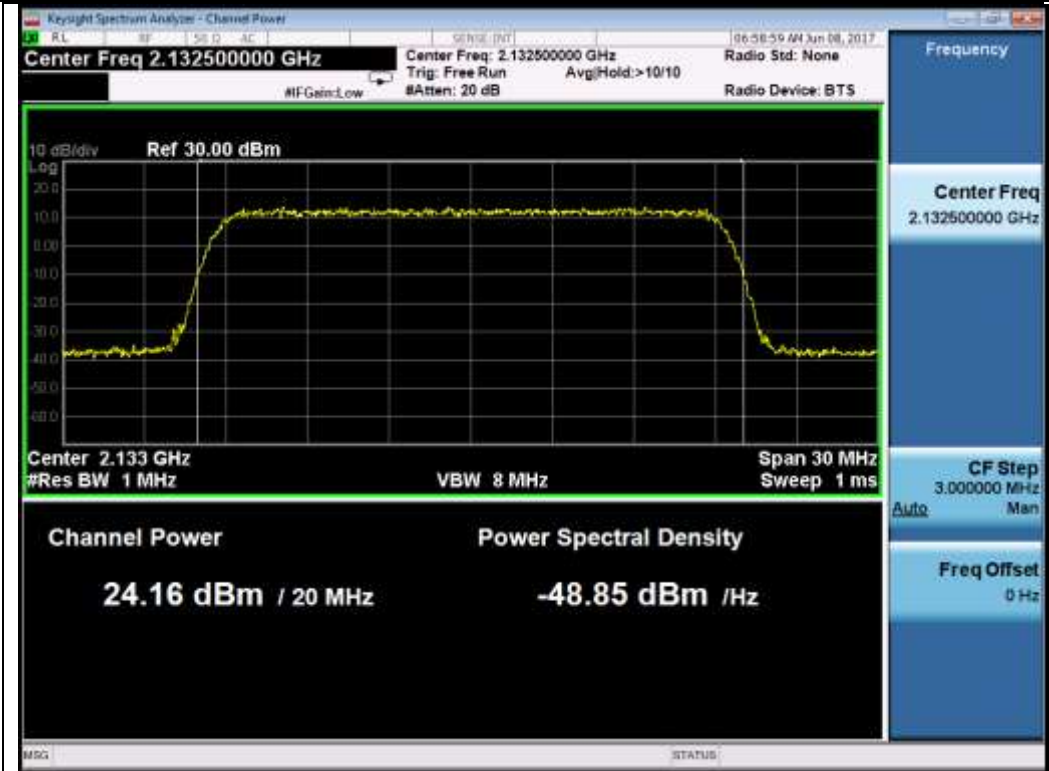
15M QPSK Mid



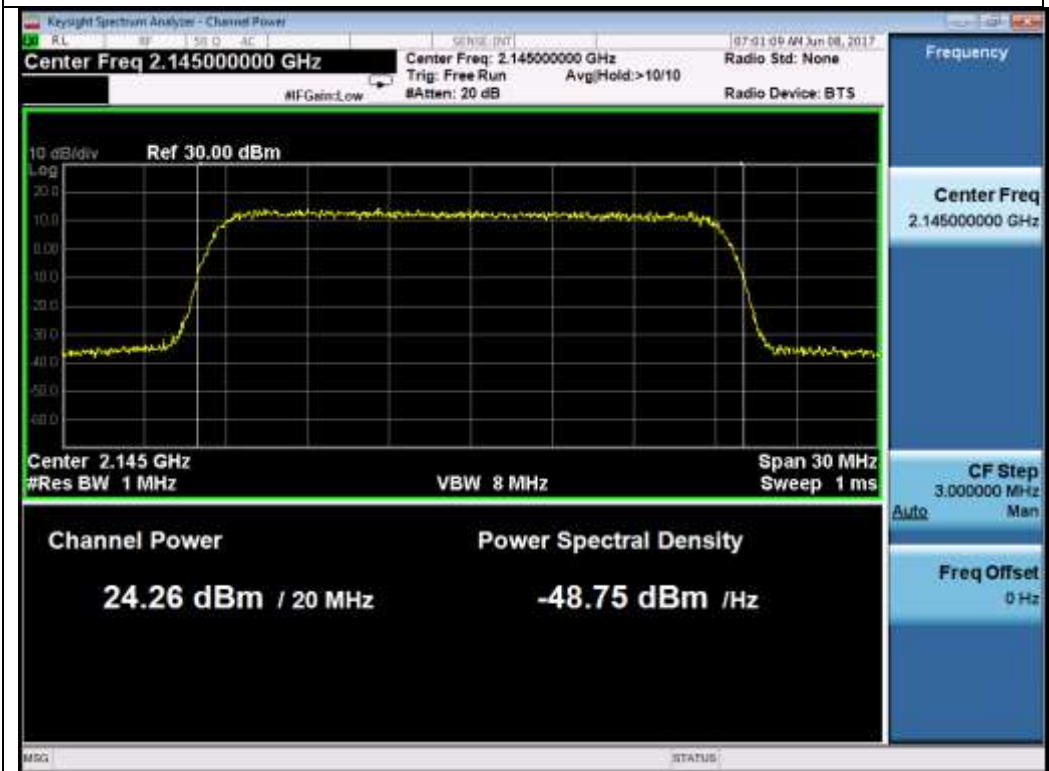
15M QPSK High



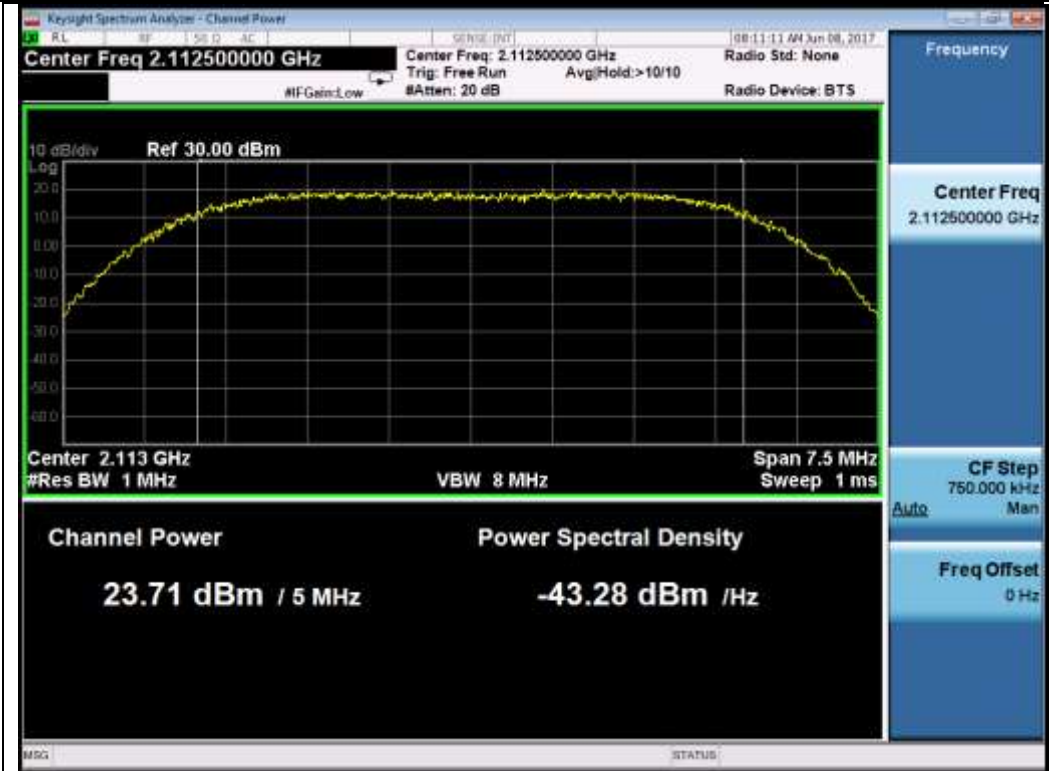
20M QPSK Low



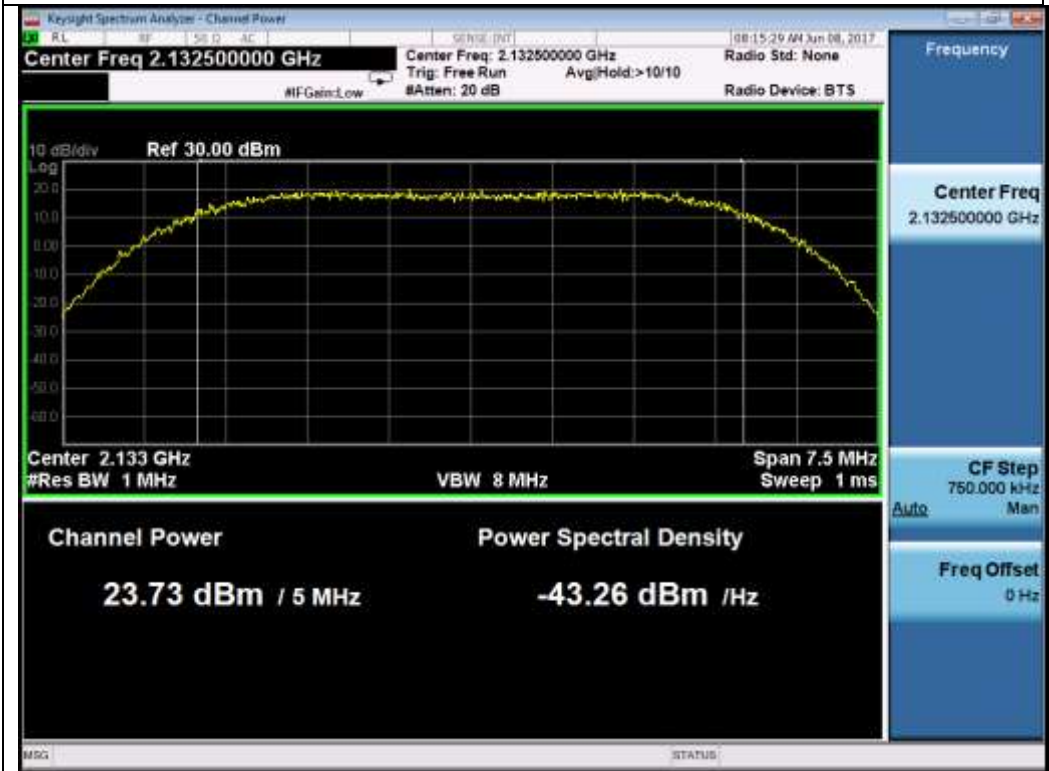
20M QPSK Mid



20M QPSK High



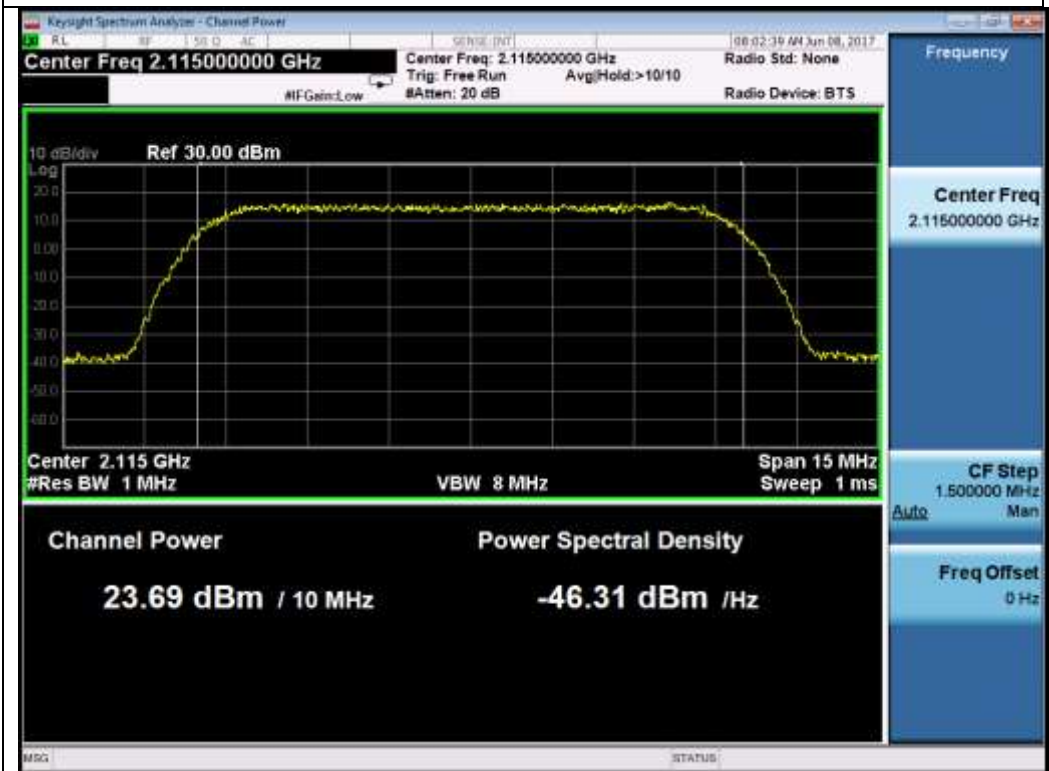
5M 64QAM Low



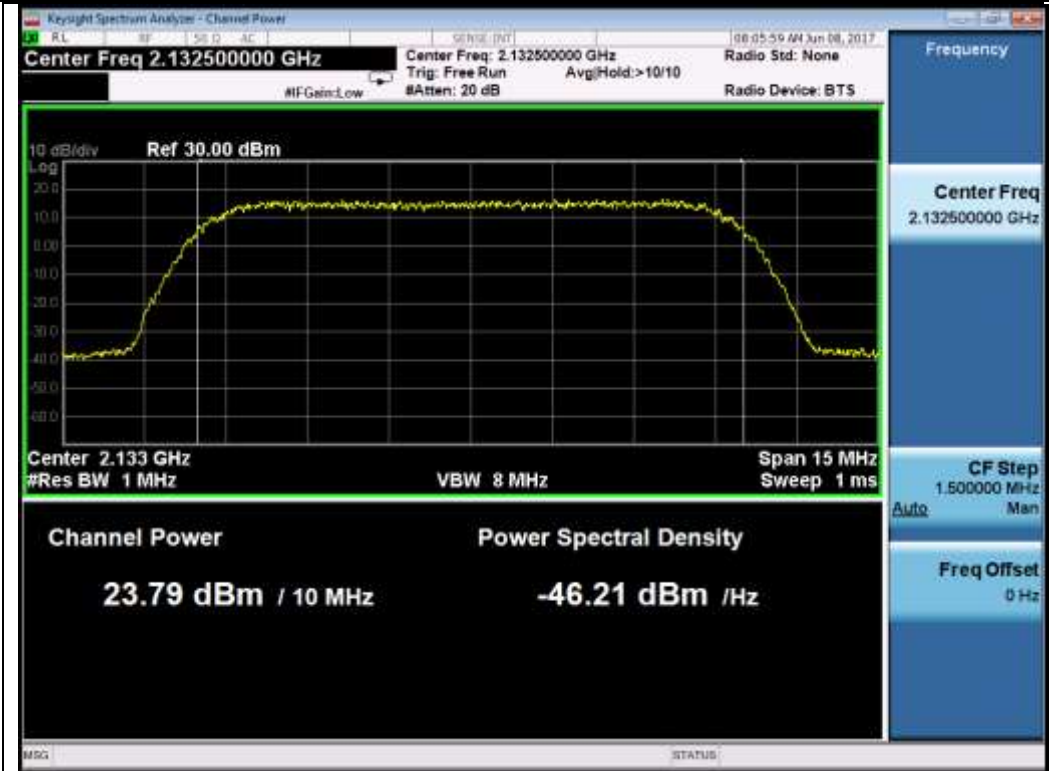
5M 64QAM Mid



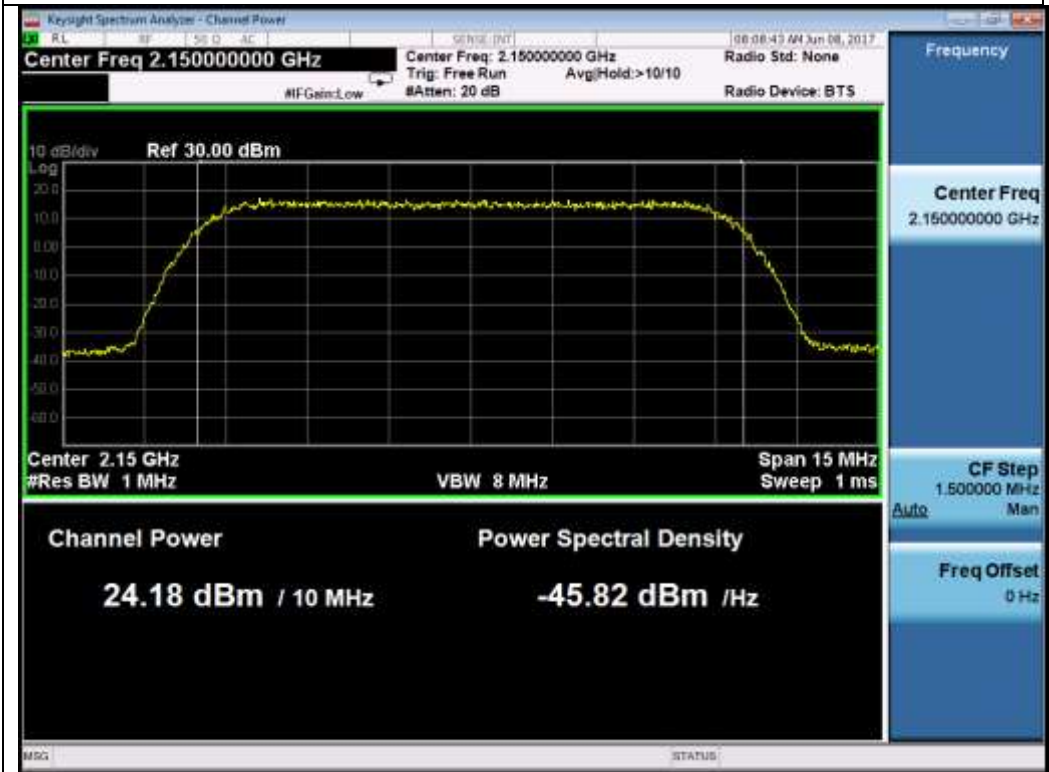
5M 64QAM High



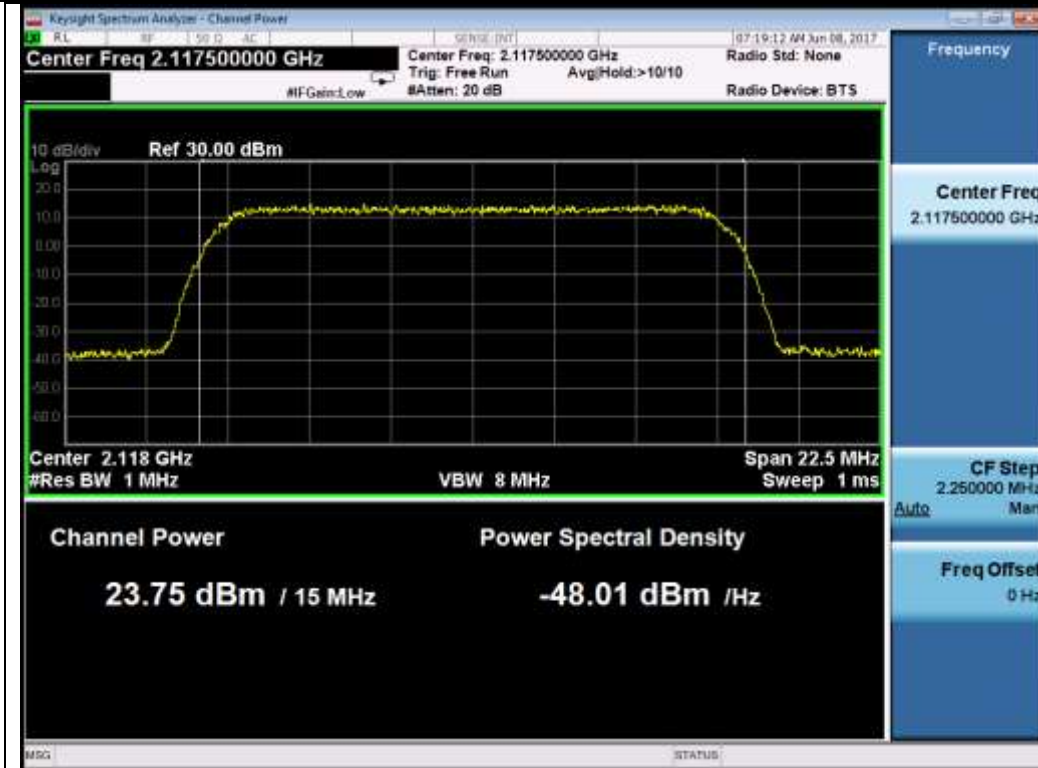
10M 64QAM Low



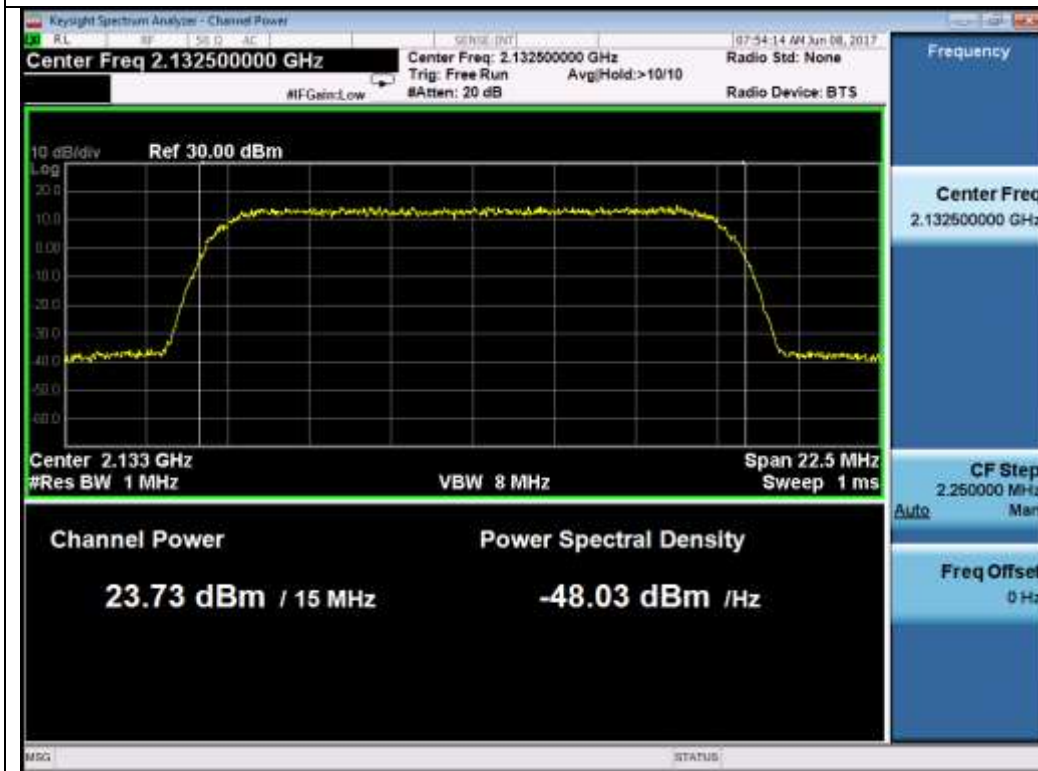
10M 64QAM Mid



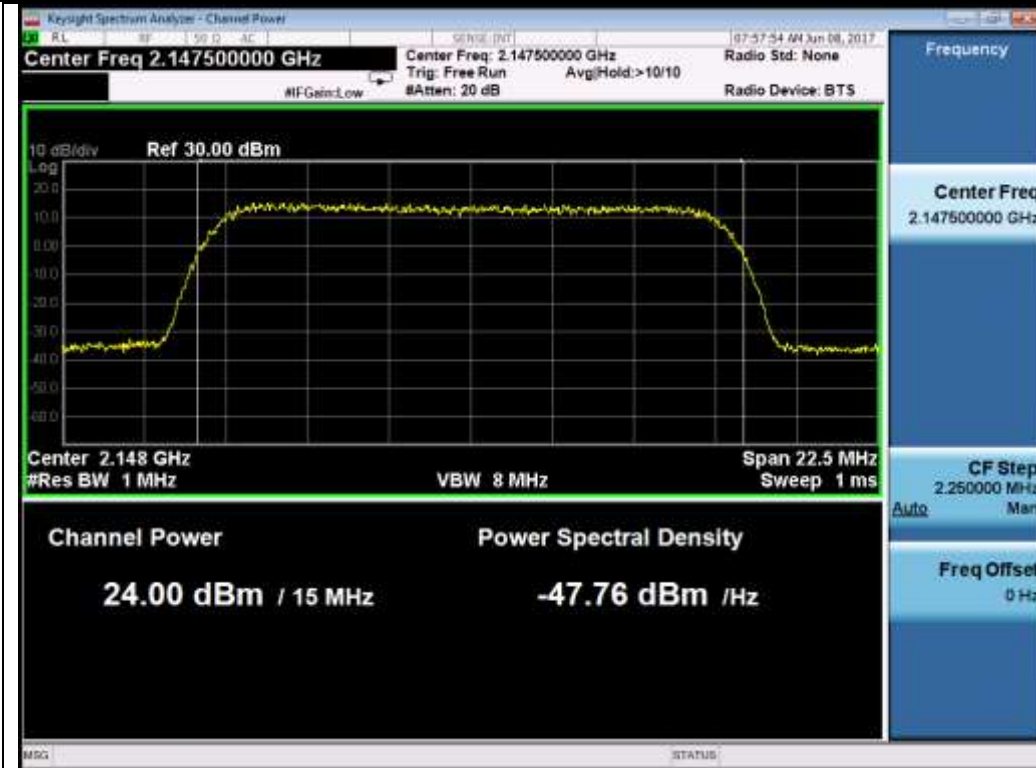
10M 64QAM High



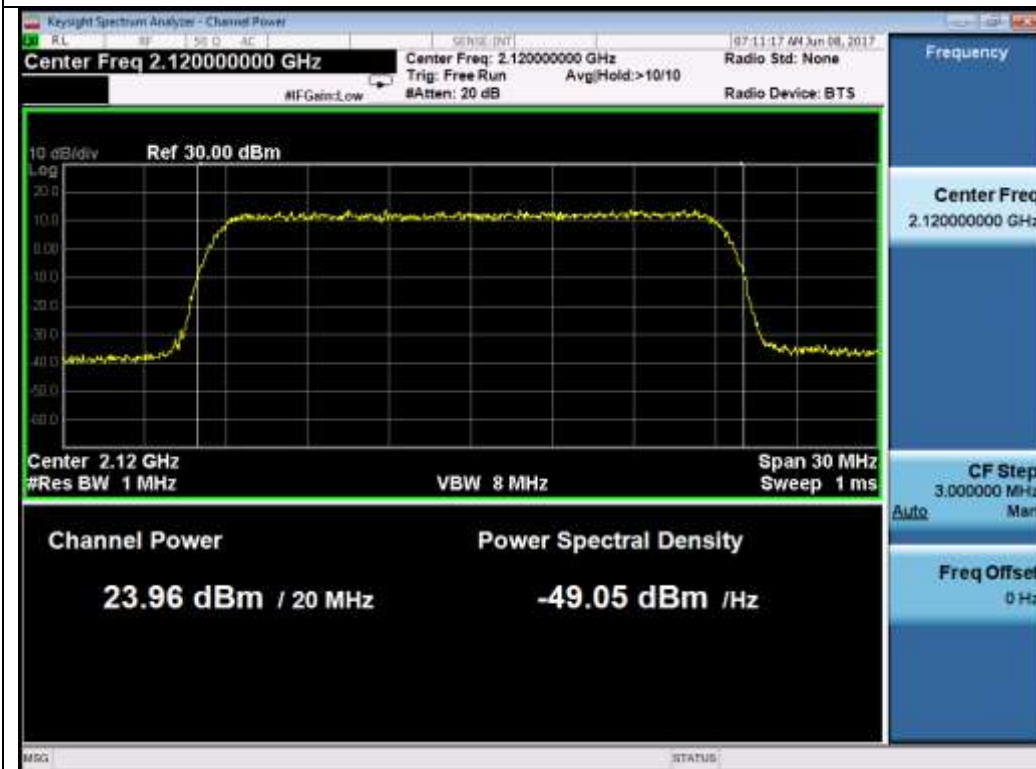
15M 64QAM Low



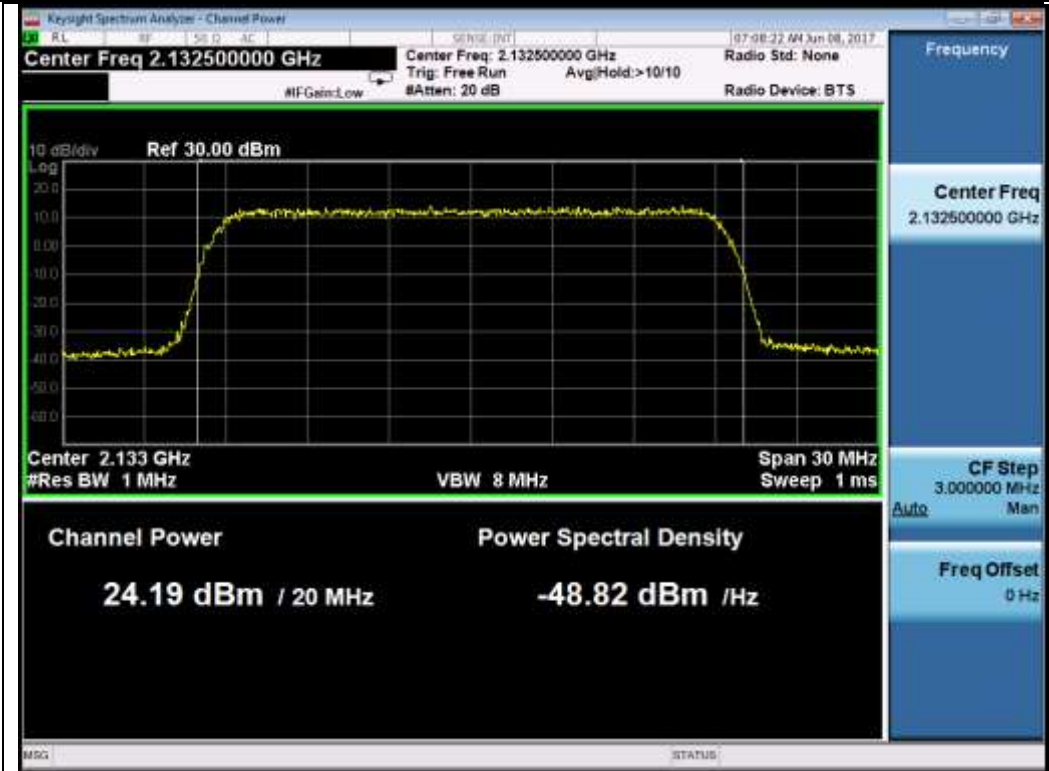
15M 64QAM Mid



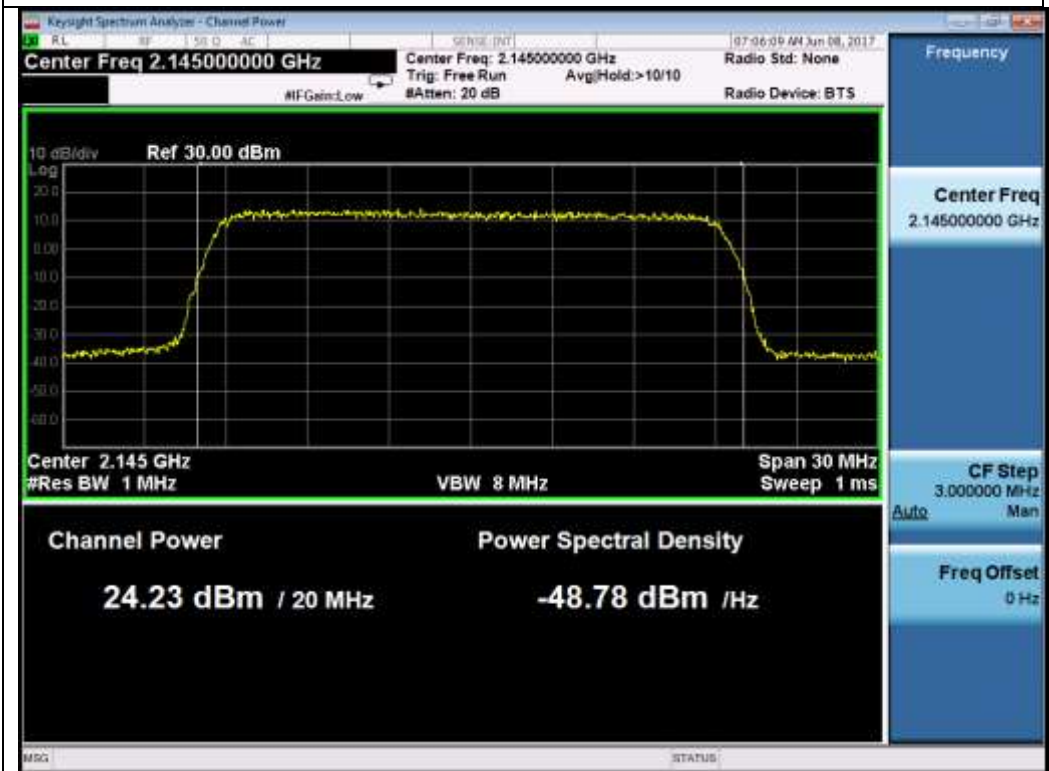
15M 64QAM High



20M 64QAM Low



20M 64QAM Mid



20M 64QAM High

Chain 2:



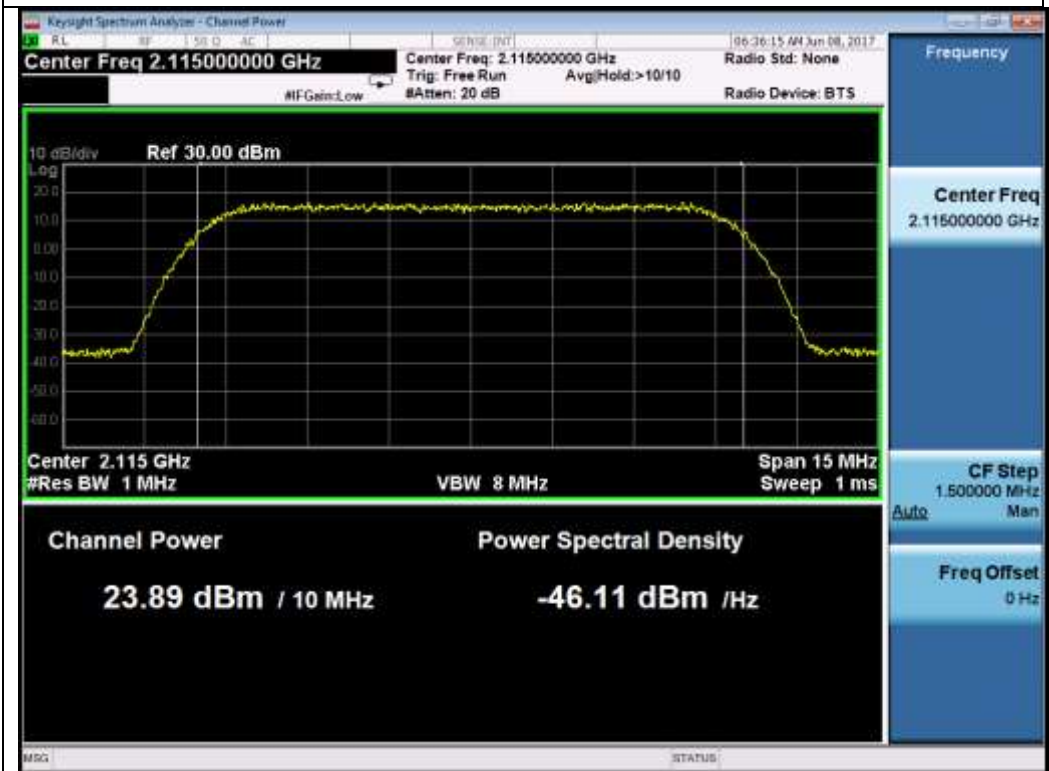
5M QPSK Low



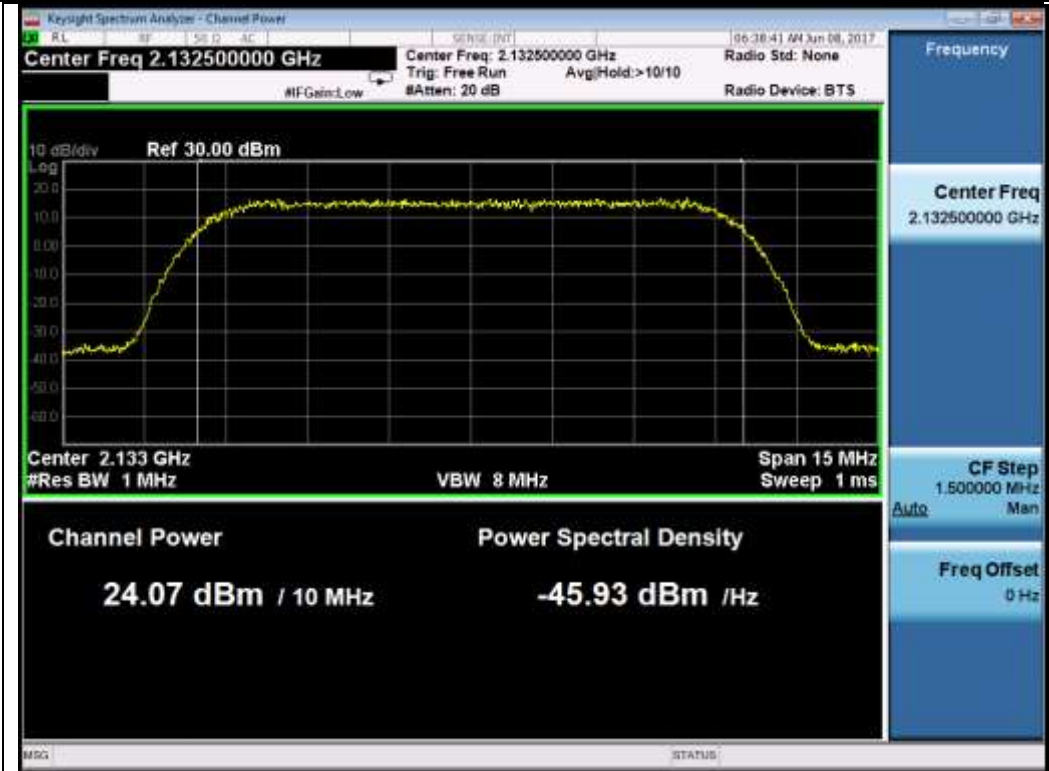
5M QPSK Mid



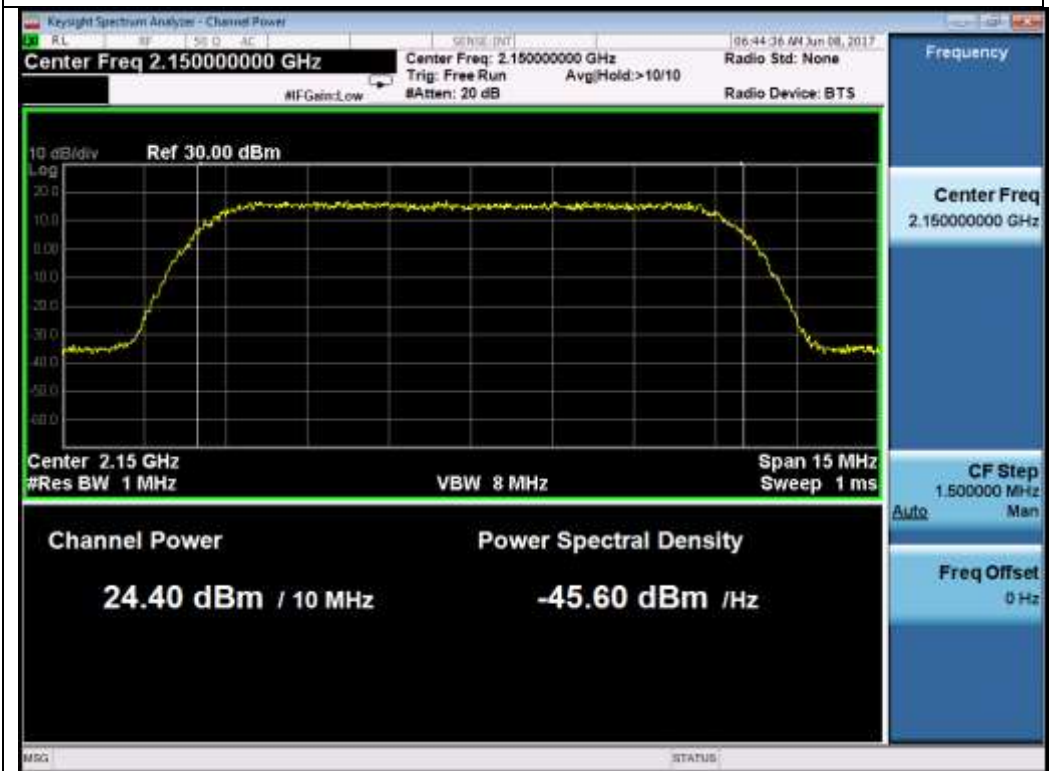
5M QPSK High



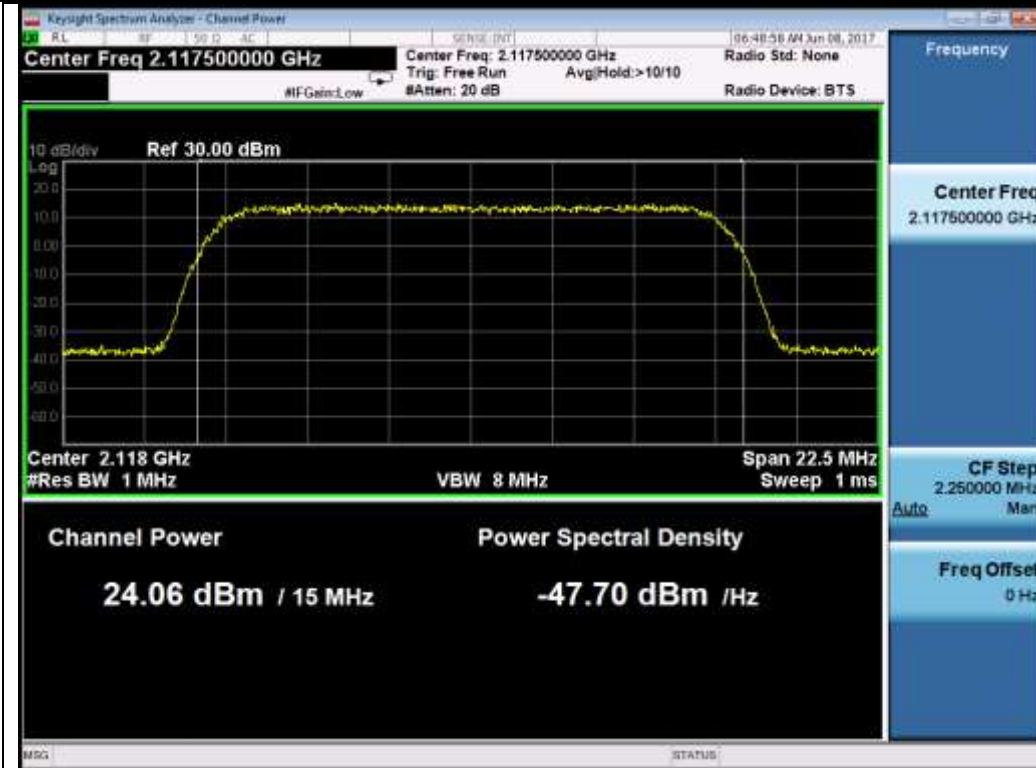
10M QPSK Low



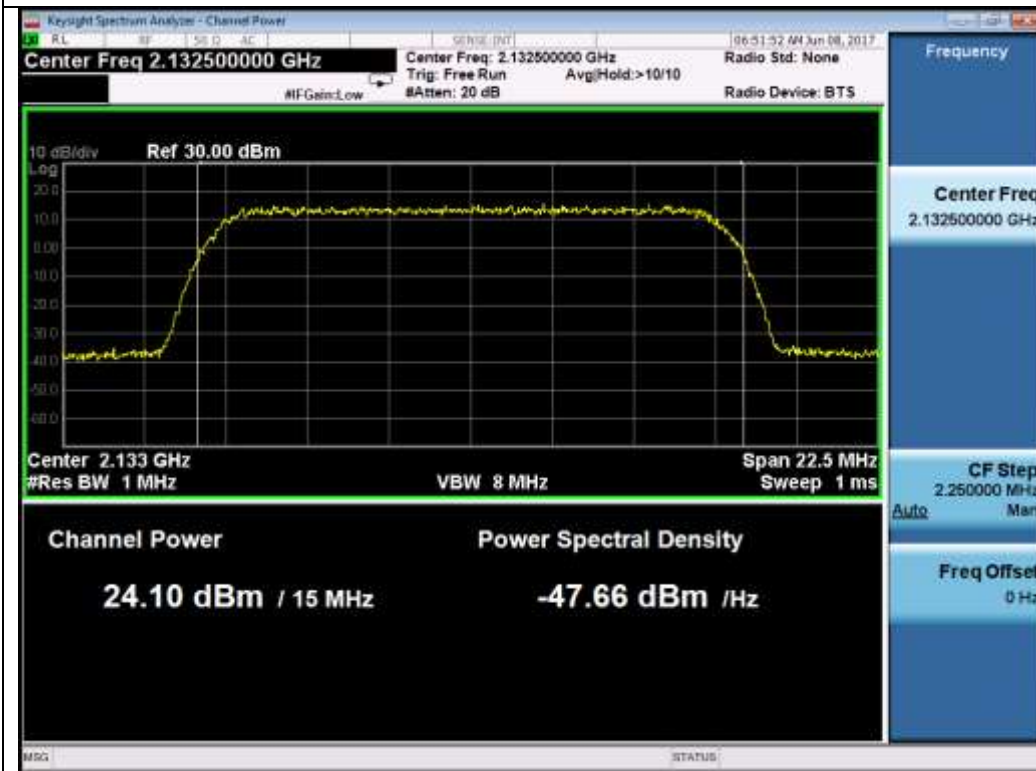
10M QPSK Mid



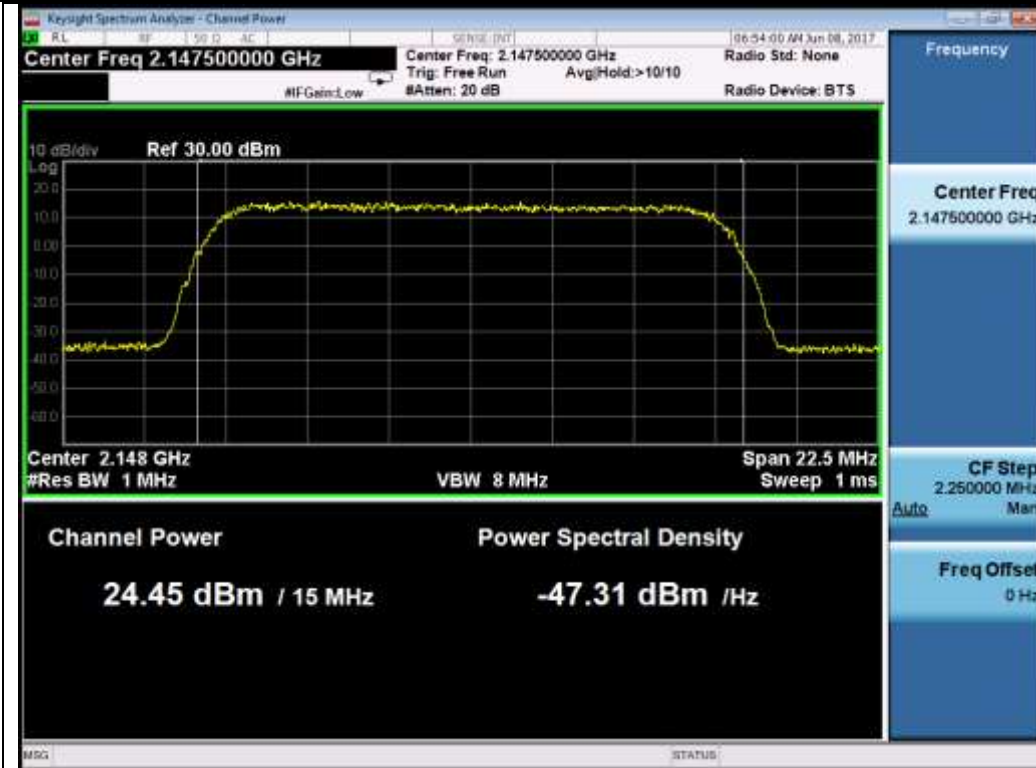
10M QPSK High



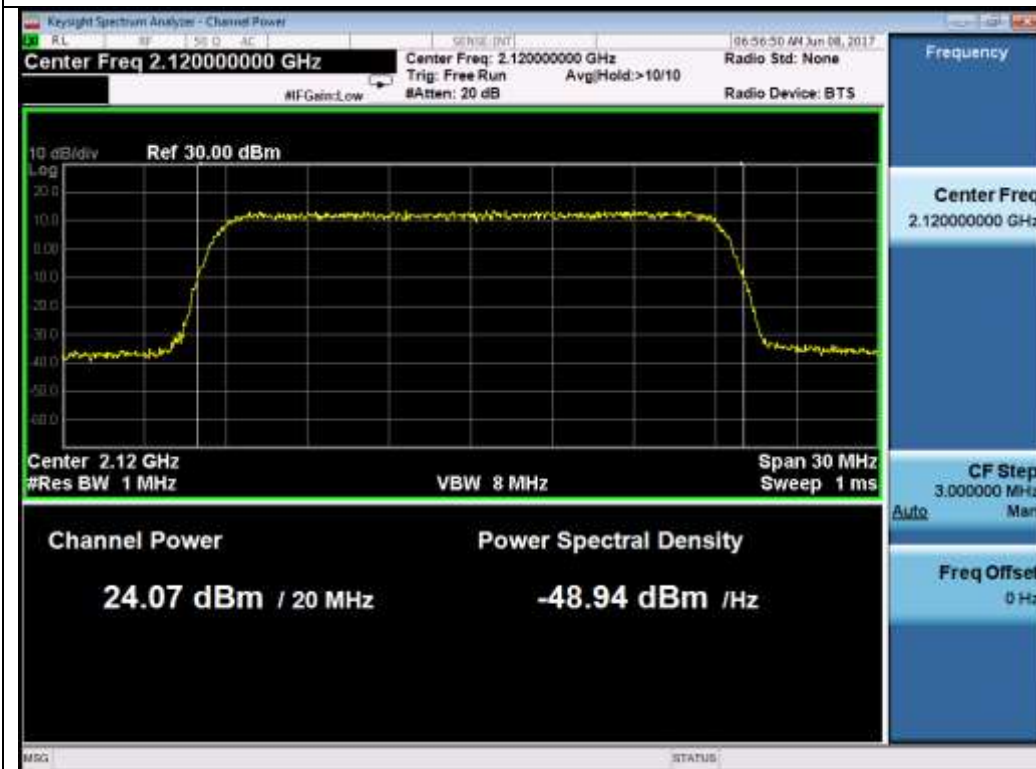
15M QPSK Low



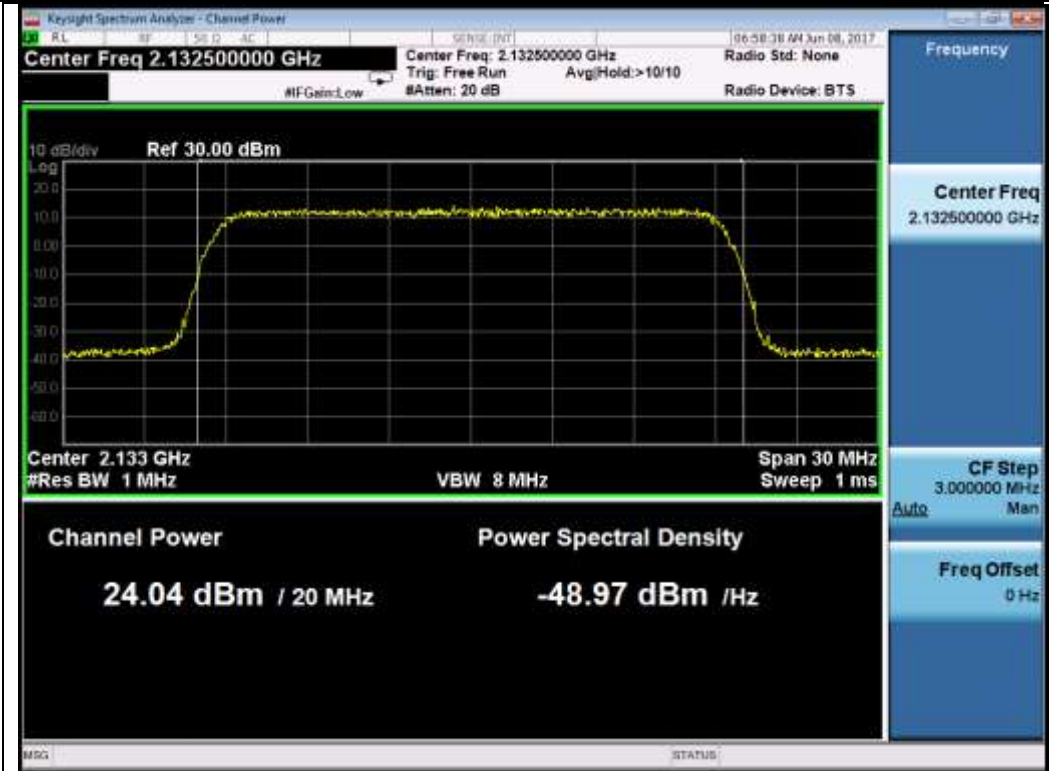
15M QPSK Mid



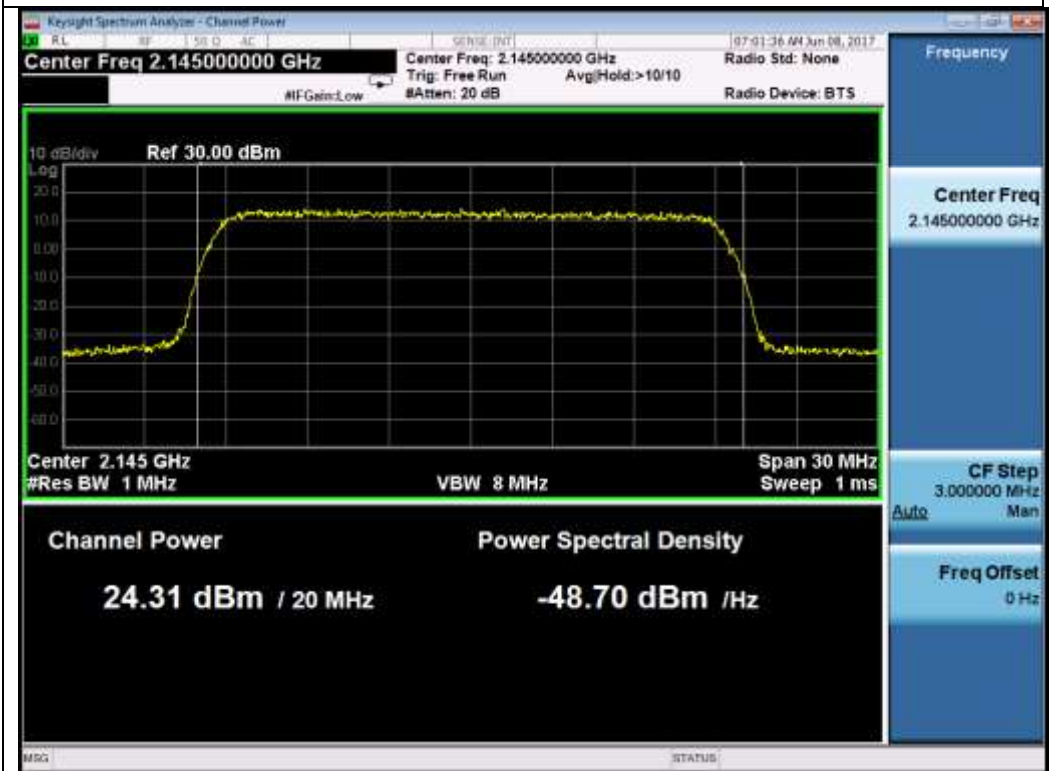
15M QPSK High



20M QPSK Low



20M QPSK Mid



20M QPSK High



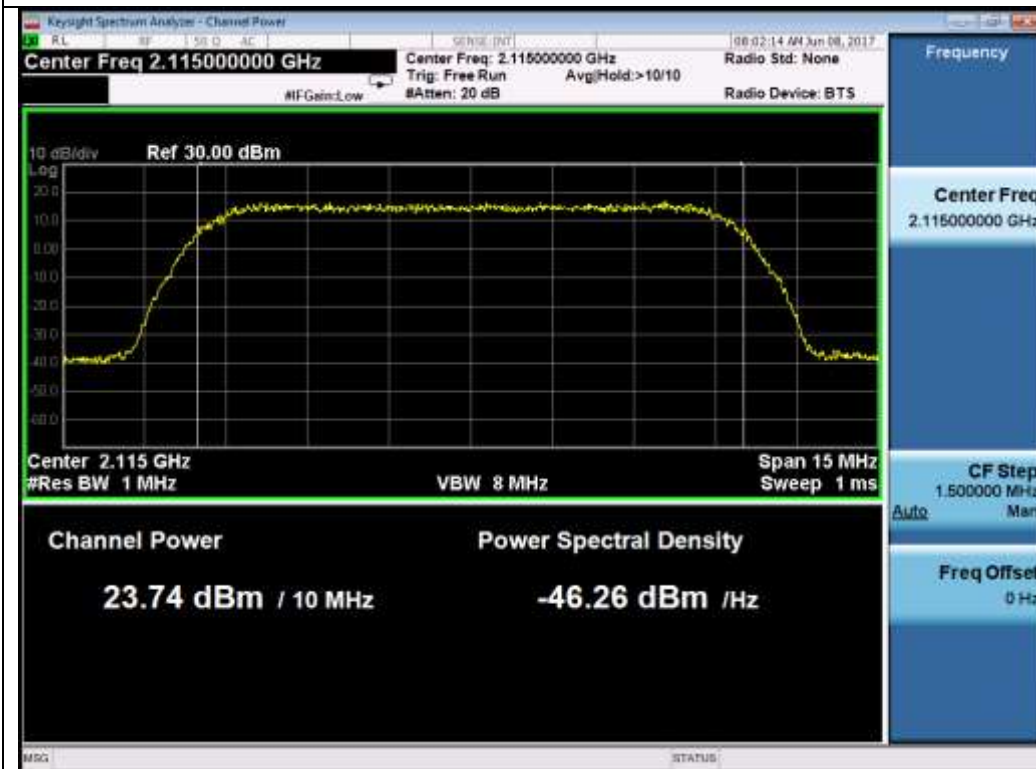
5M 64QAM Low



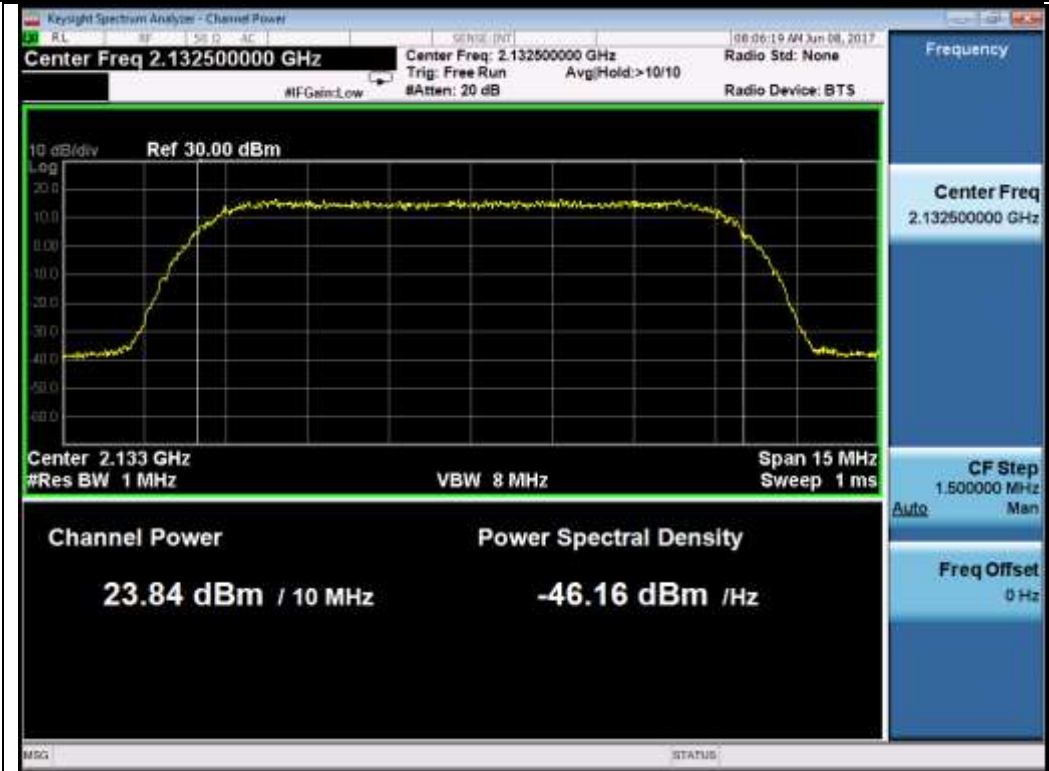
5M 64QAM Mid



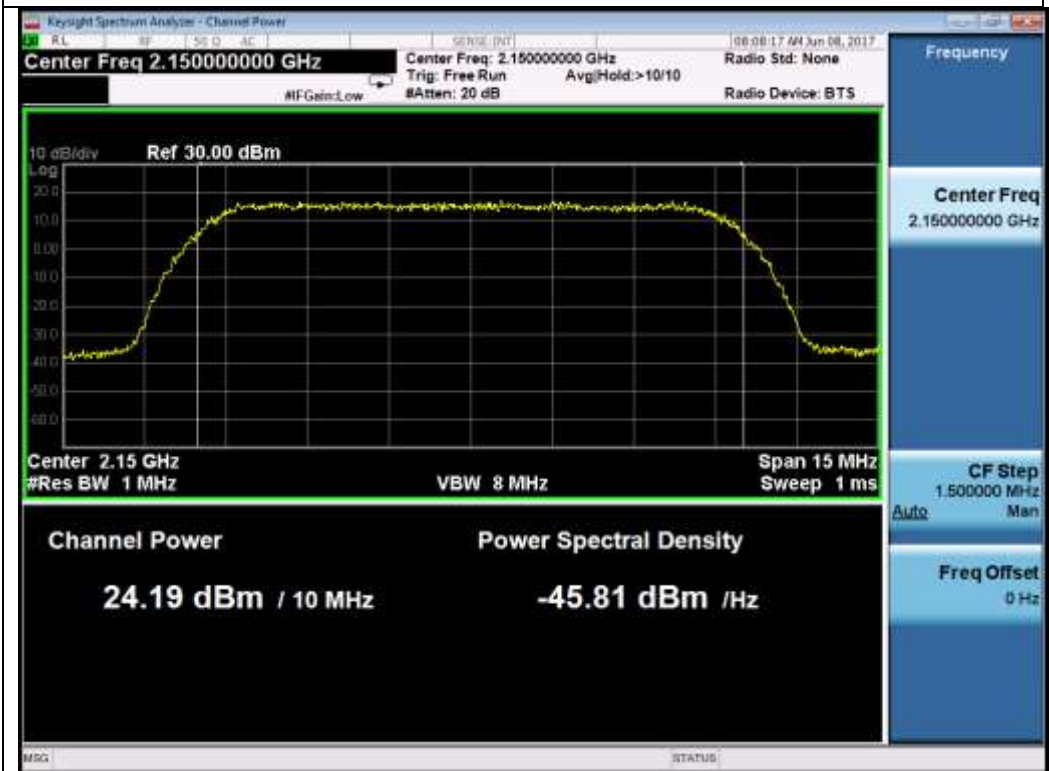
5M 64QAM High



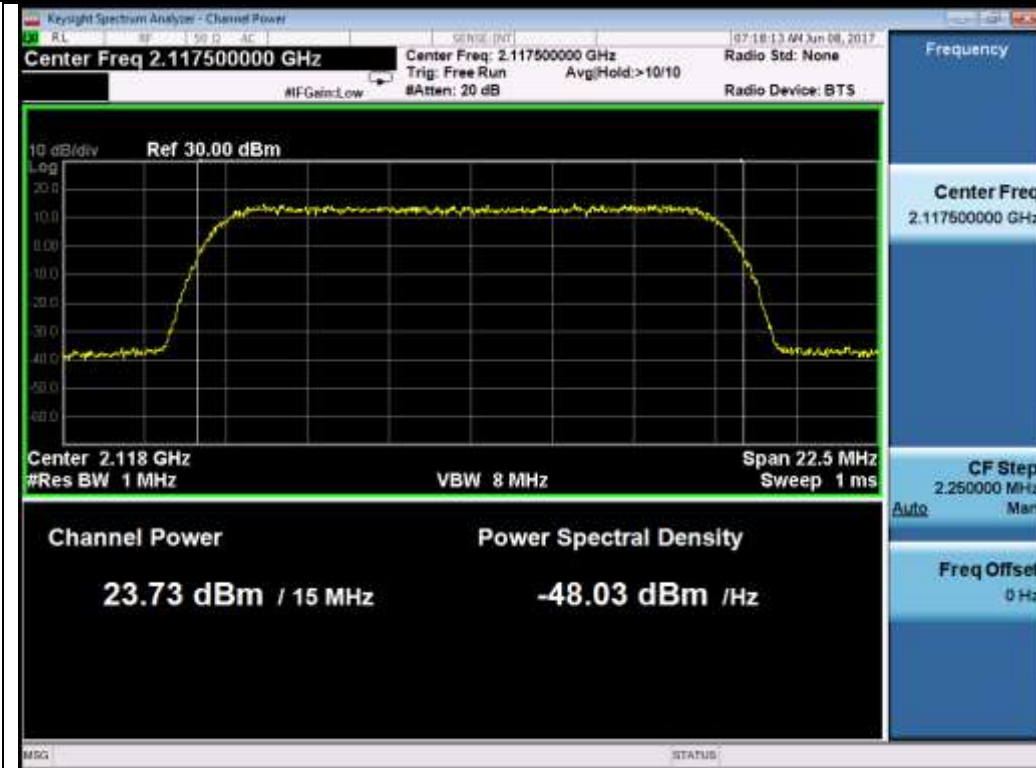
10M 64QAM Low



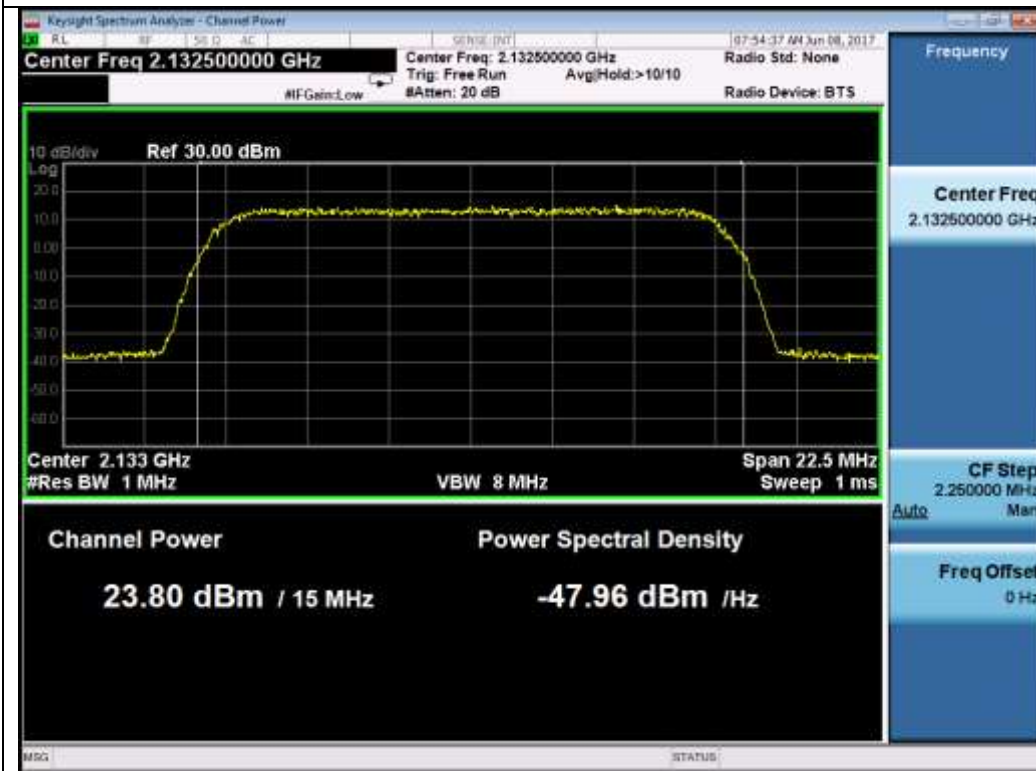
10M 64QAM Mid



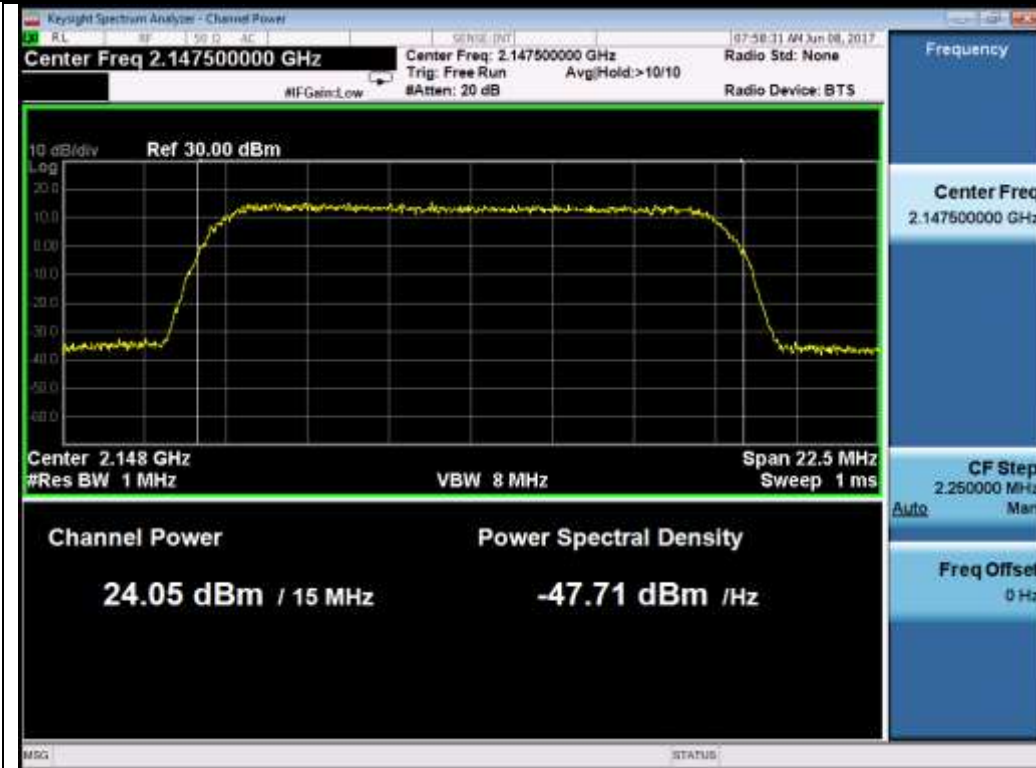
10M 64QAM High



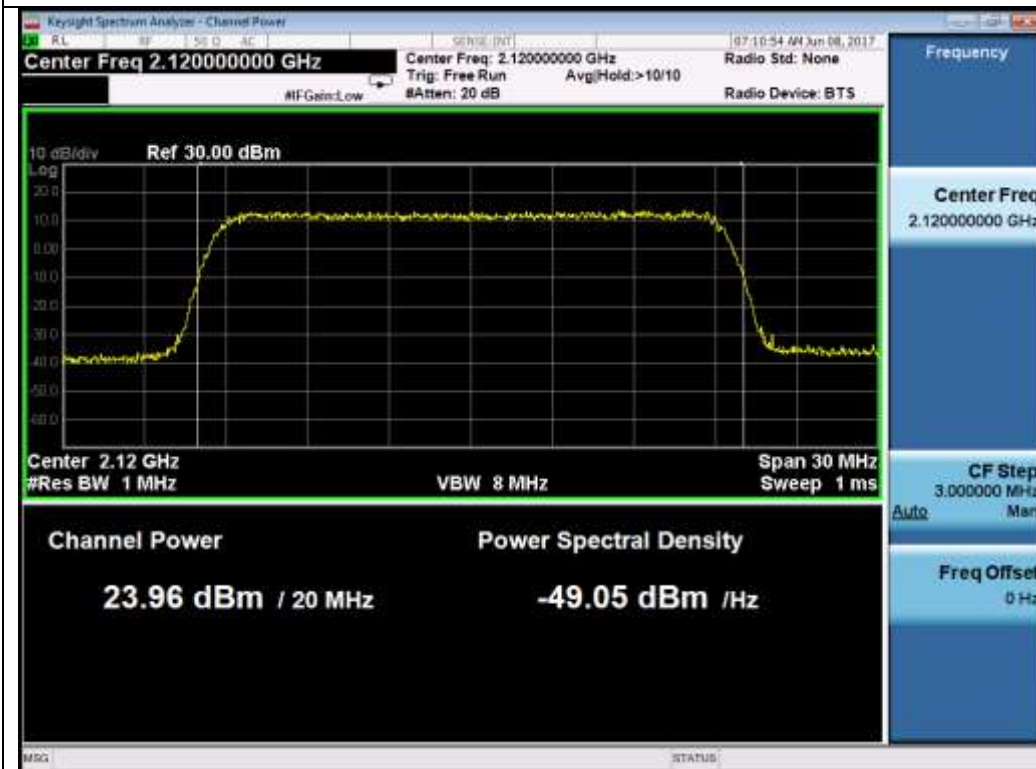
15M 64QAM Low



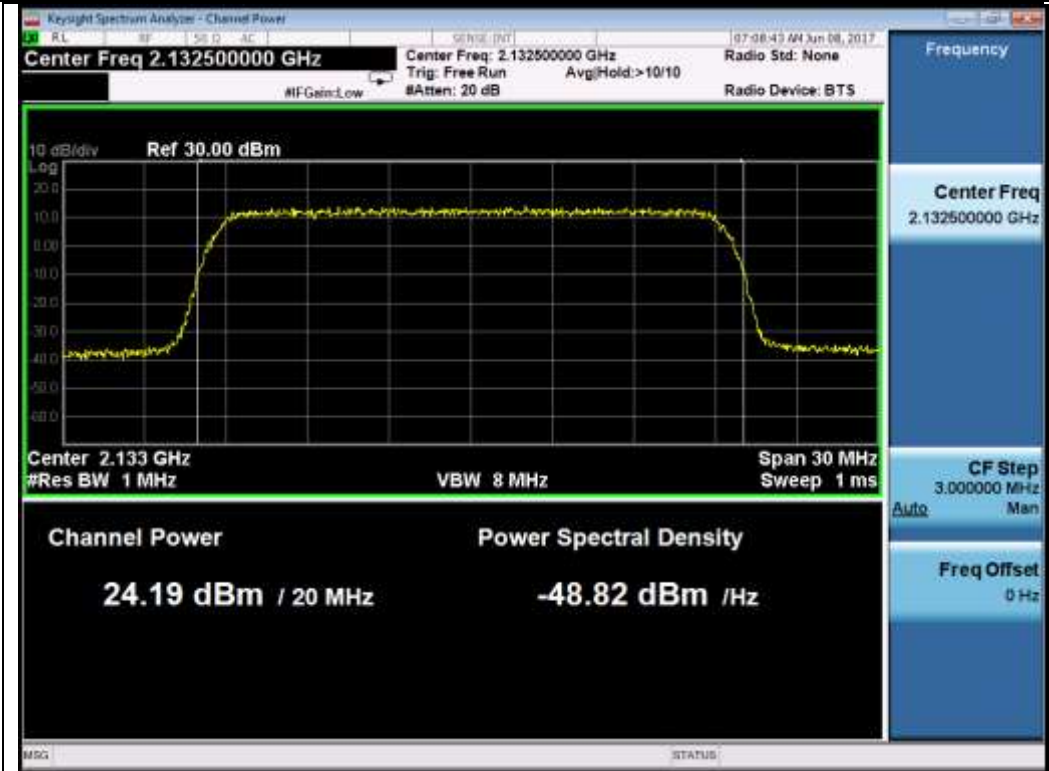
15M 64QAM Mid



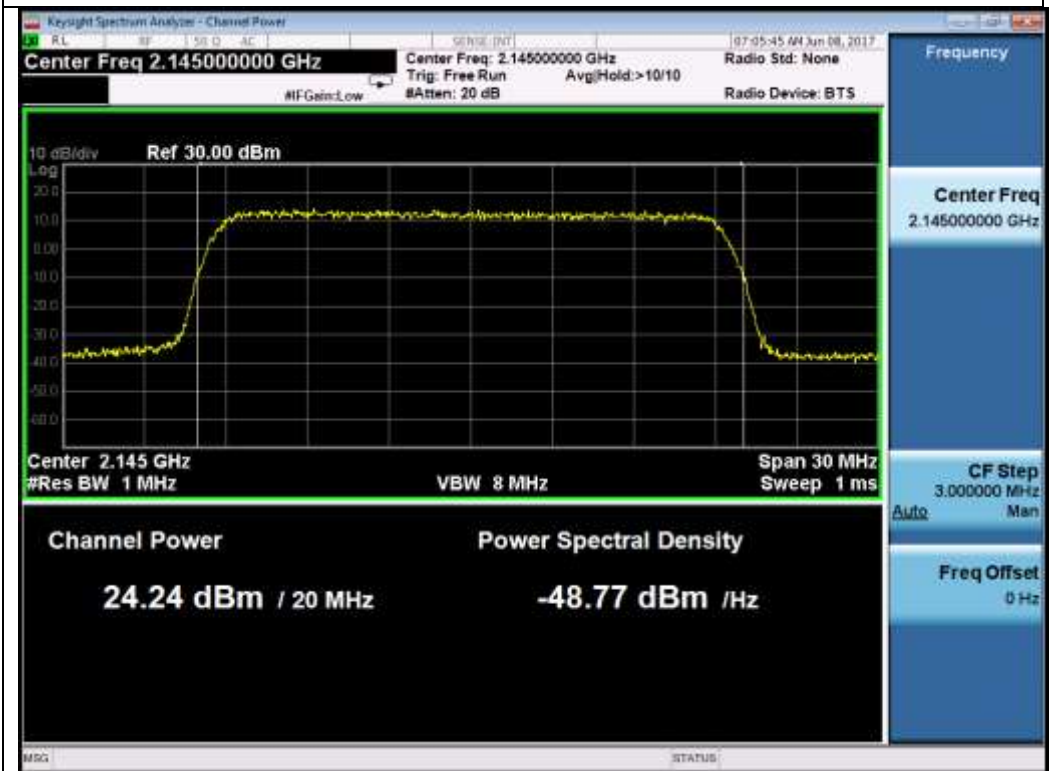
15M 64QAM High



20M 64QAM Low



20M 64QAM Mid

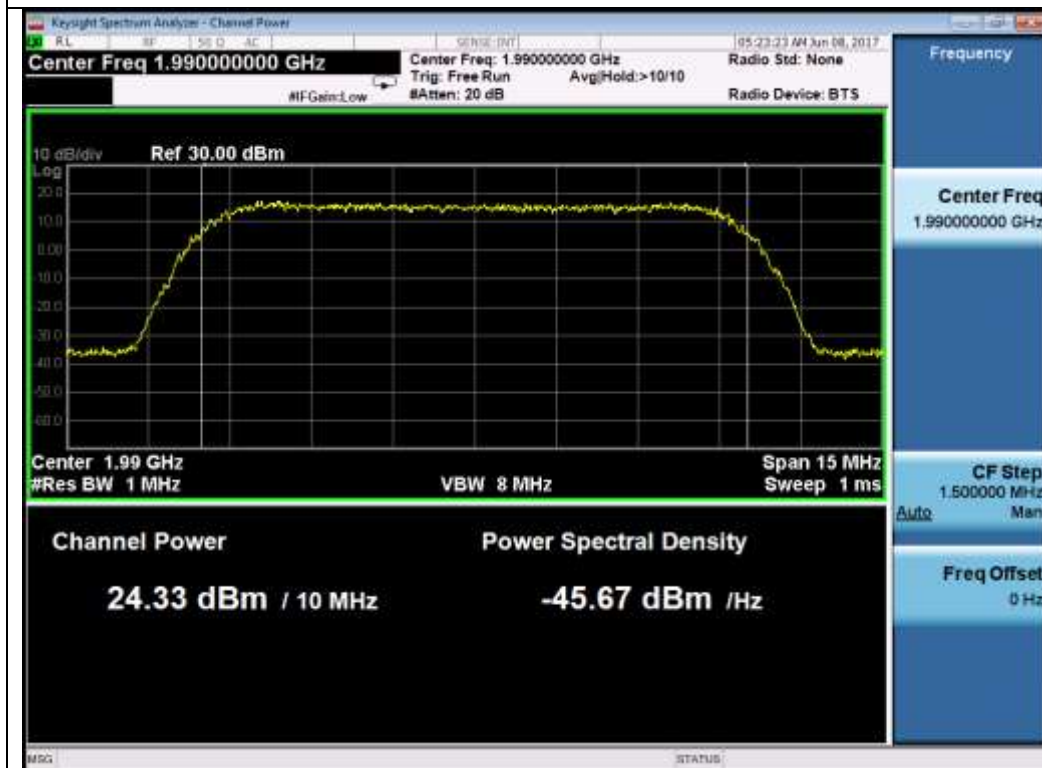


20M 64QAM High

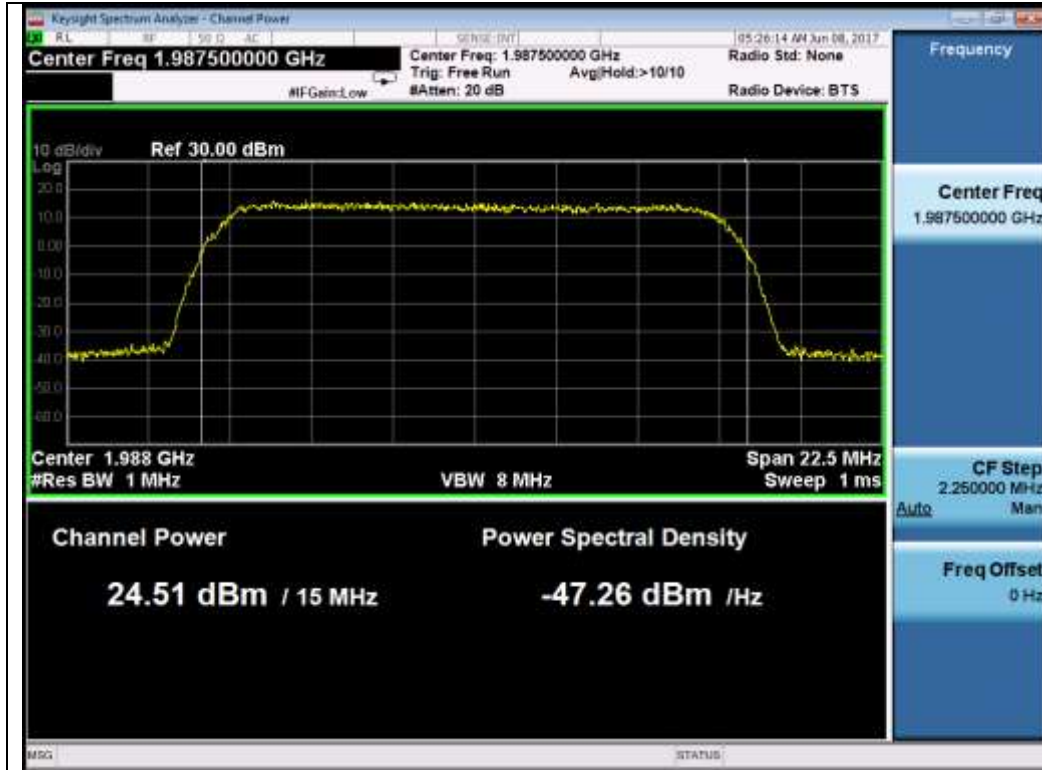
Test Plots for Band 25
Chain 1:



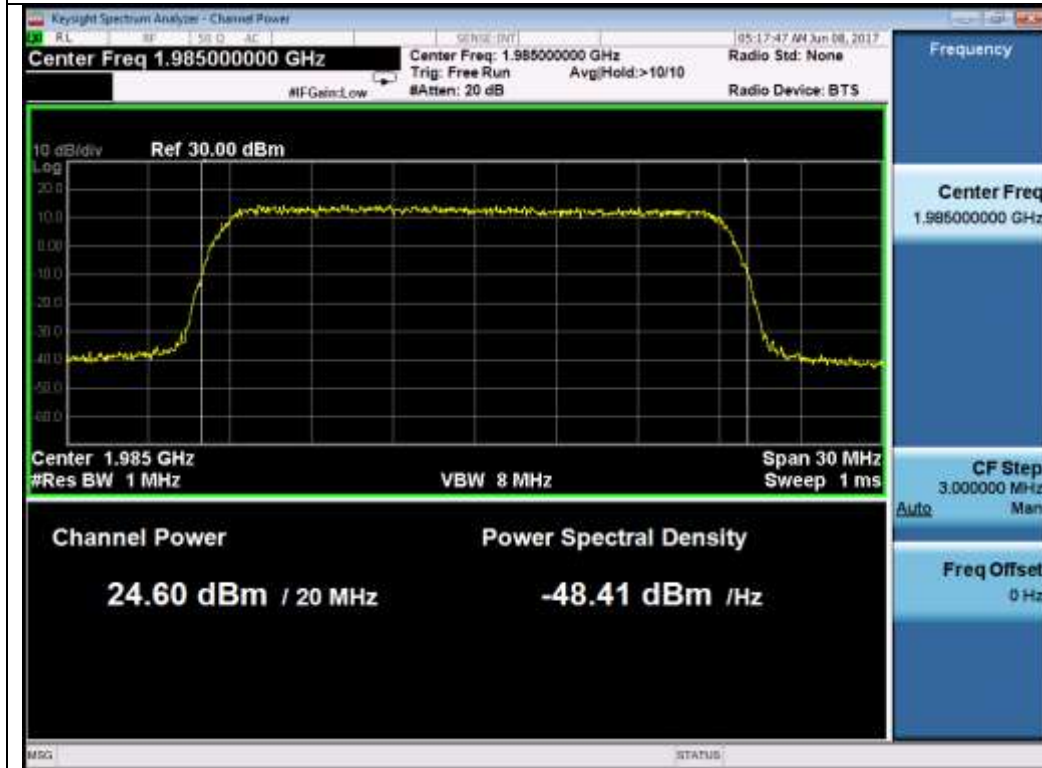
5M QPSK High



10M QPSK Mid



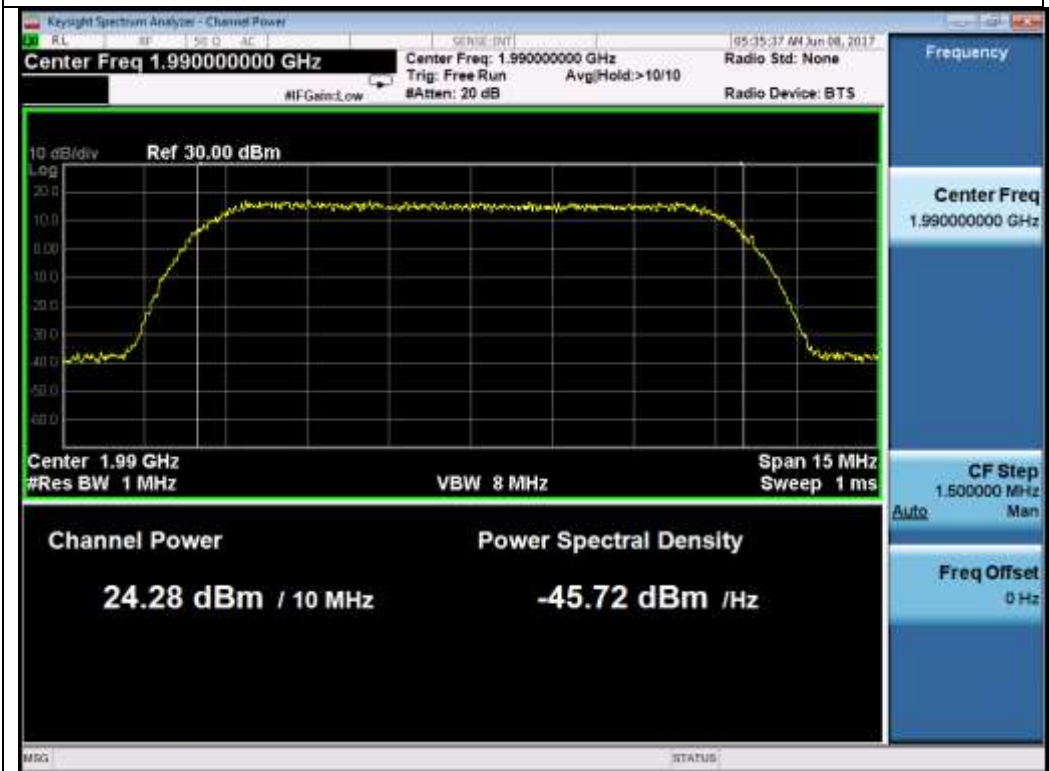
15M QPSK High



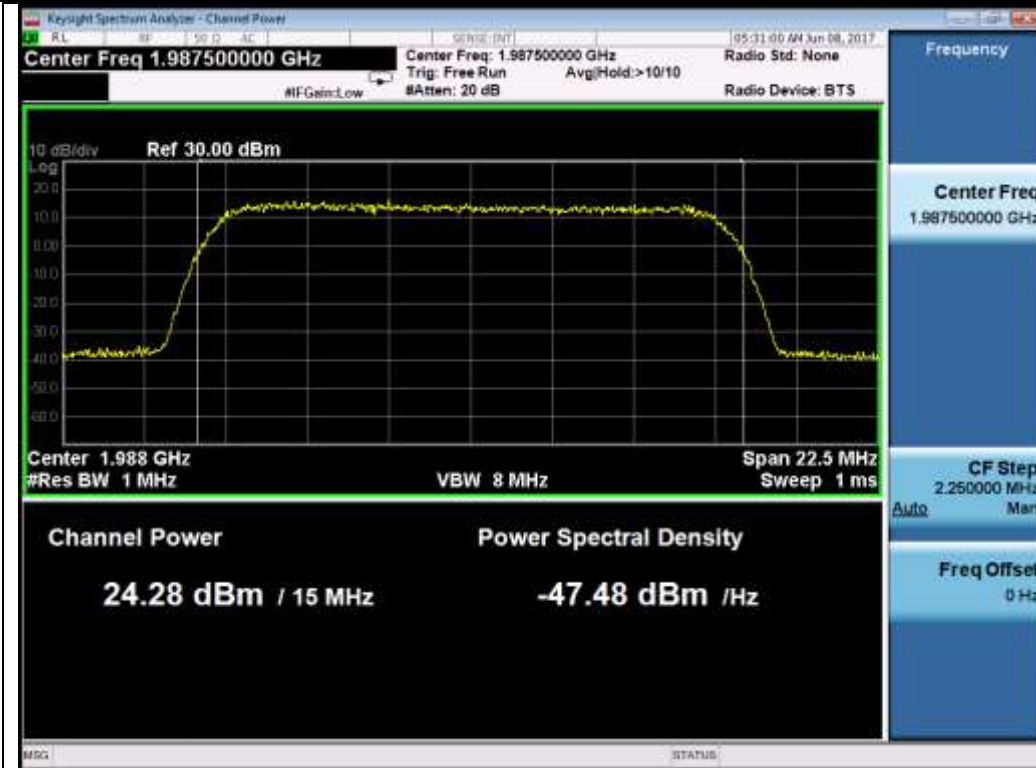
20M QPSK High



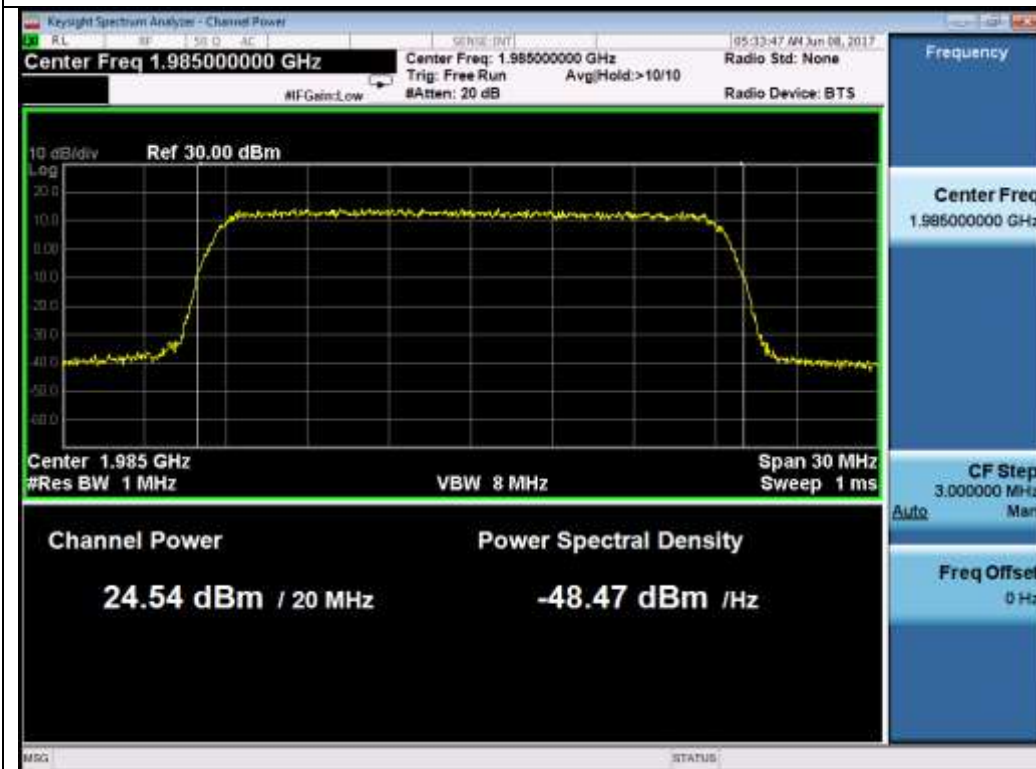
5M 64QAM High



10M 64QAM High

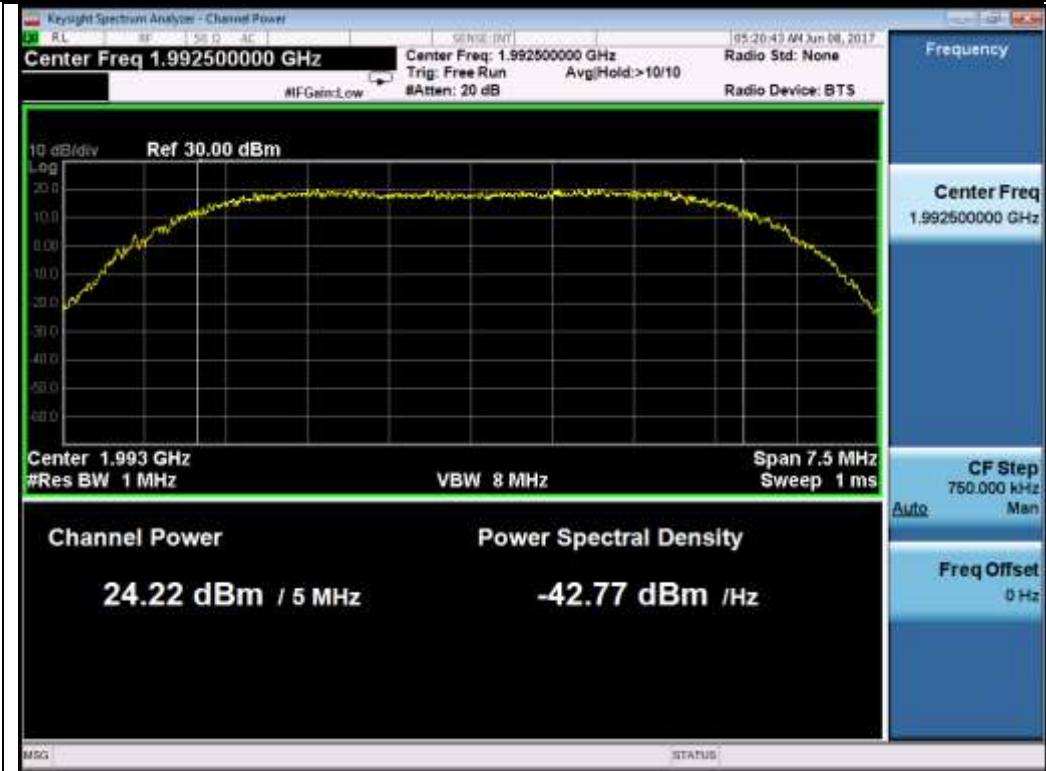


15M 64QAM High

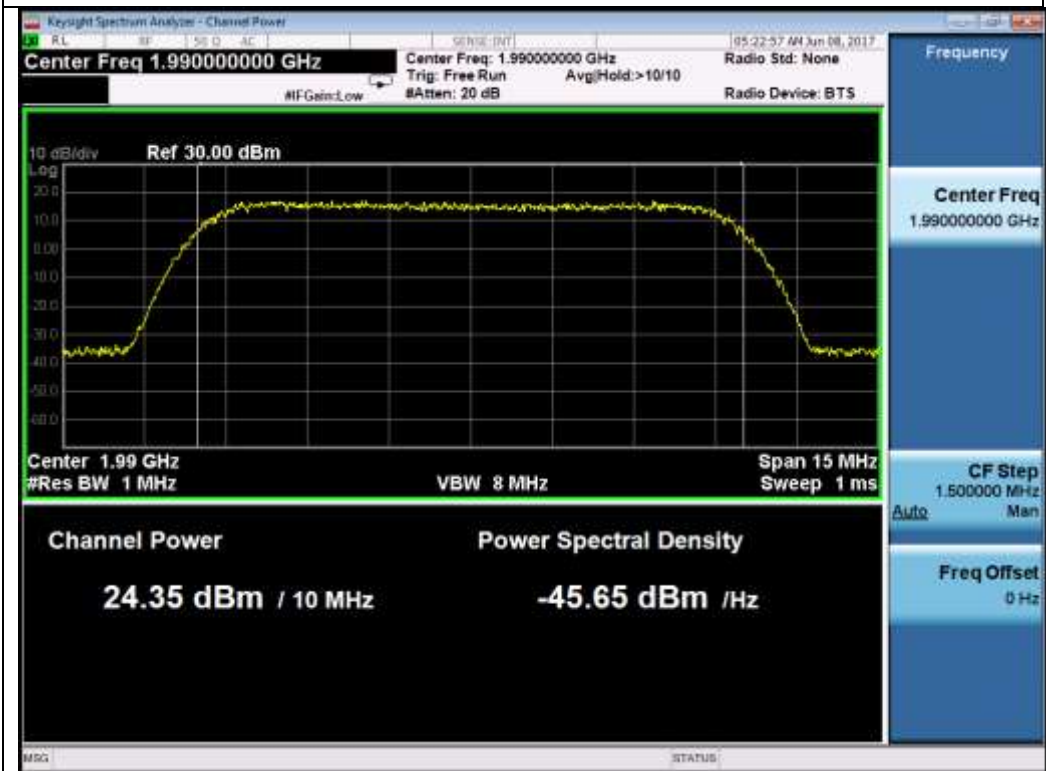


20M 64QAM High

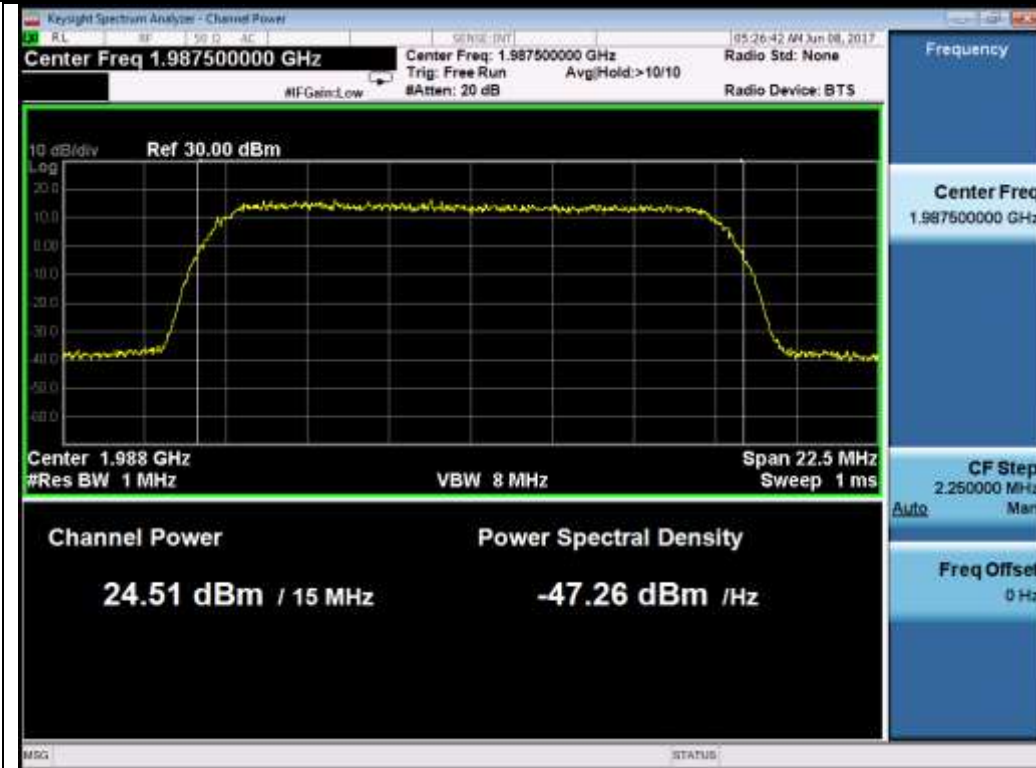
Chain 2:



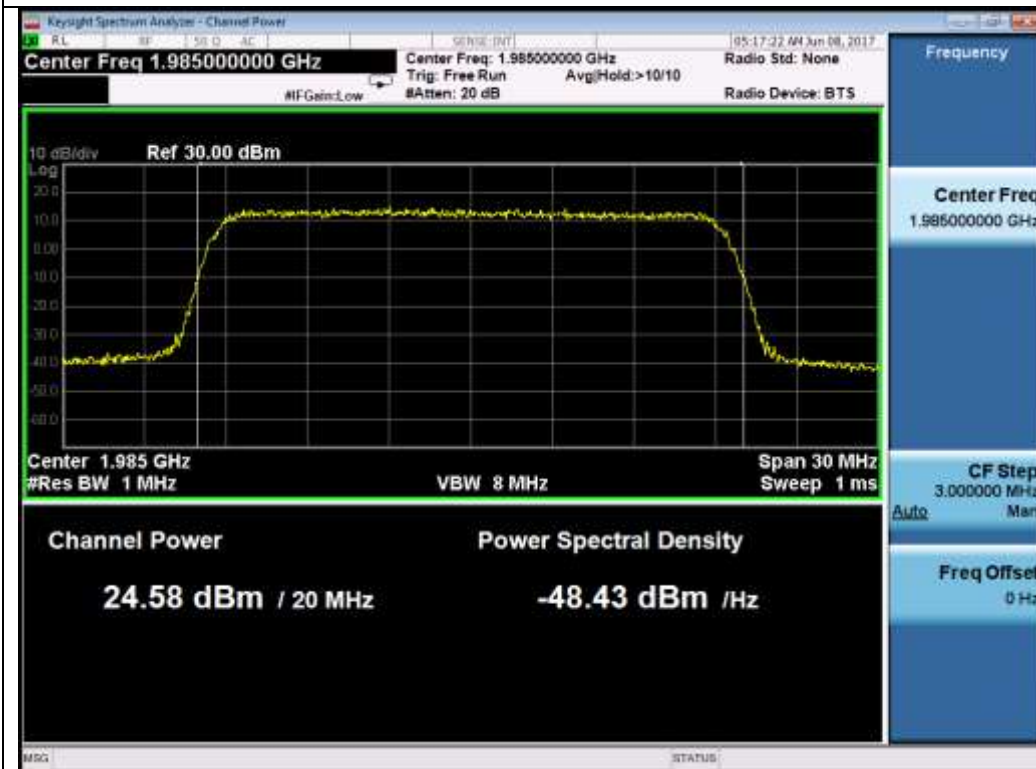
5M QPSK High



10M QPSK Mid



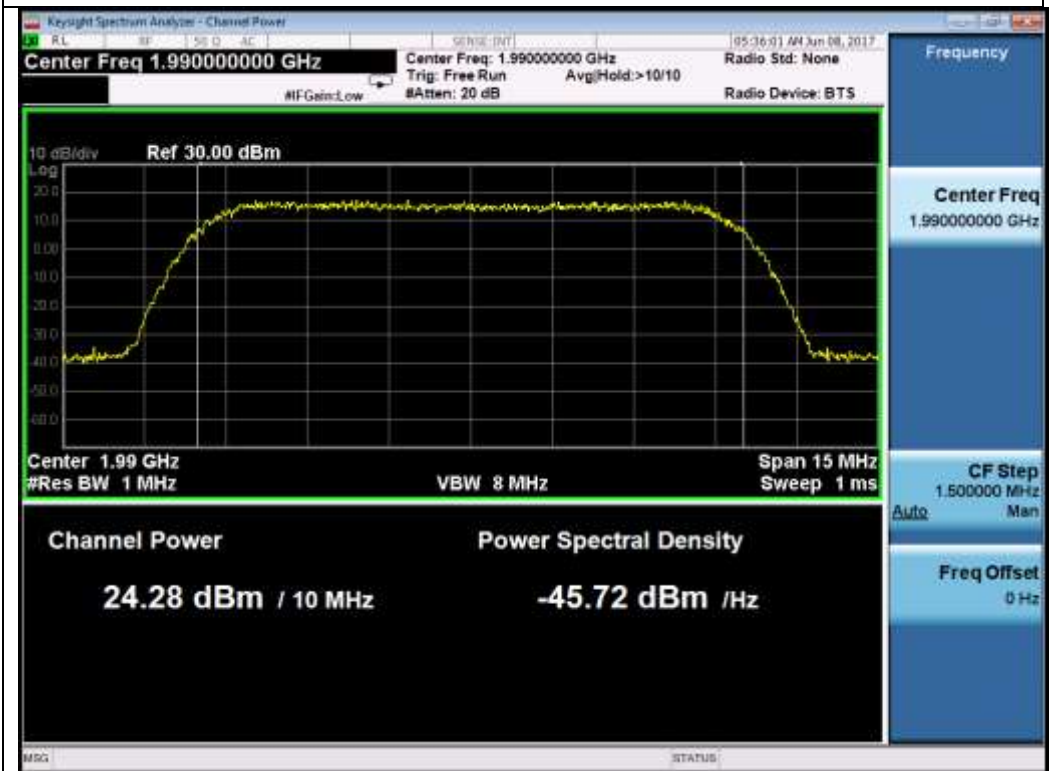
15M QPSK High



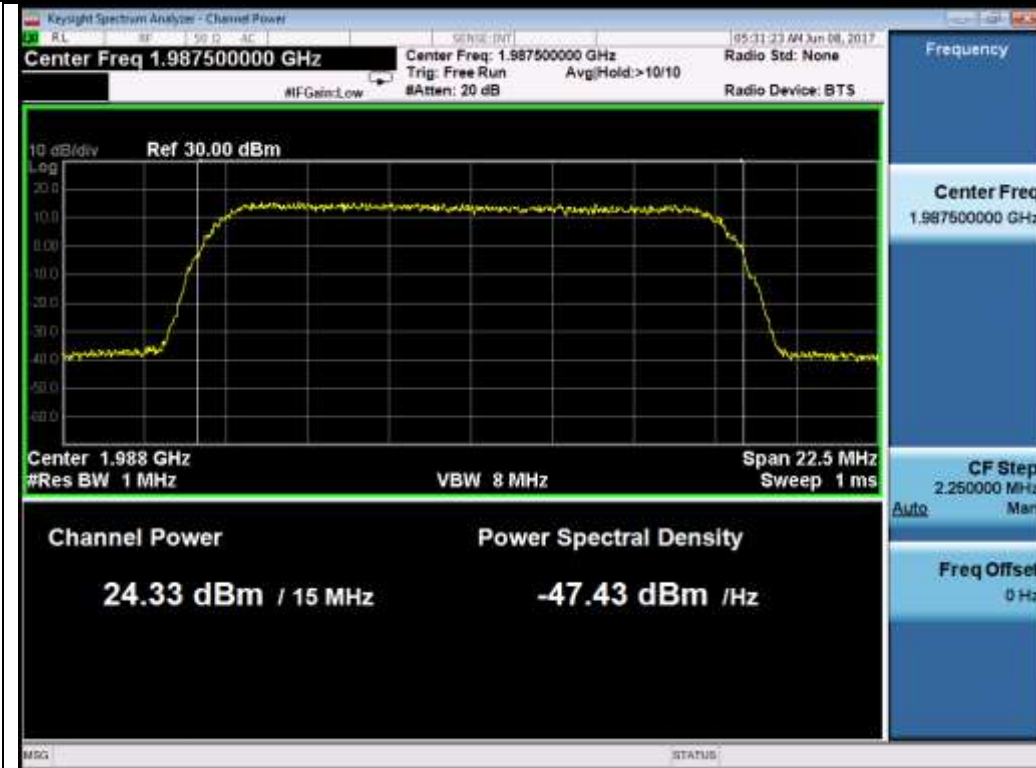
20M QPSK High



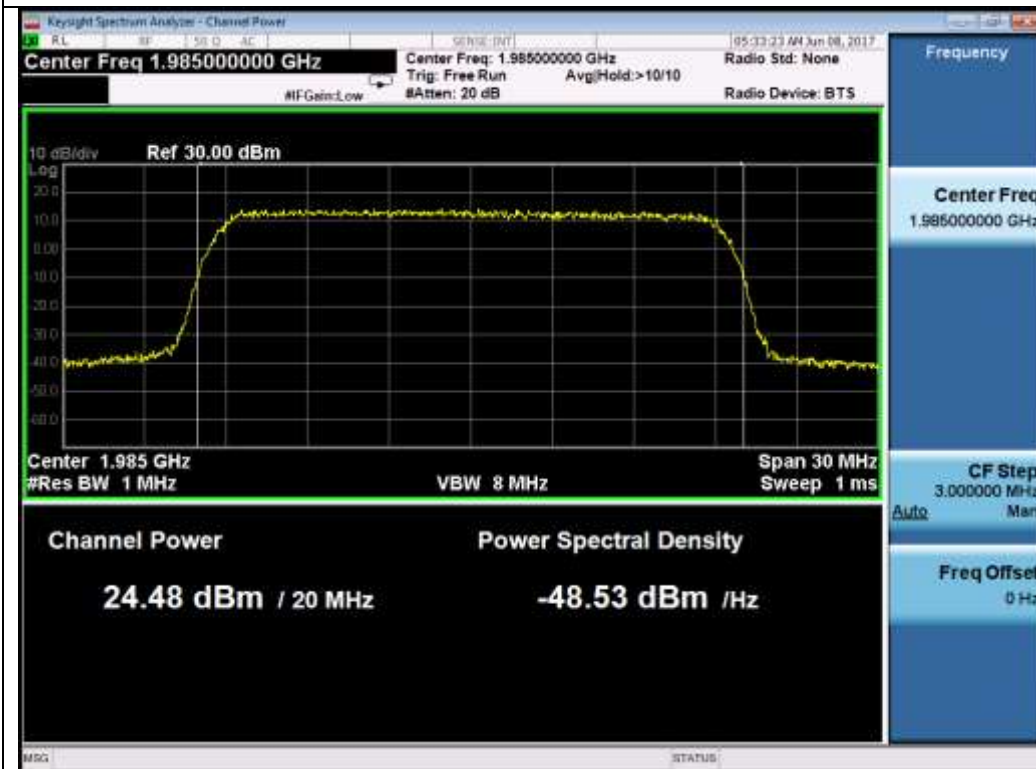
5M 64QAM High



10M 64QAM High



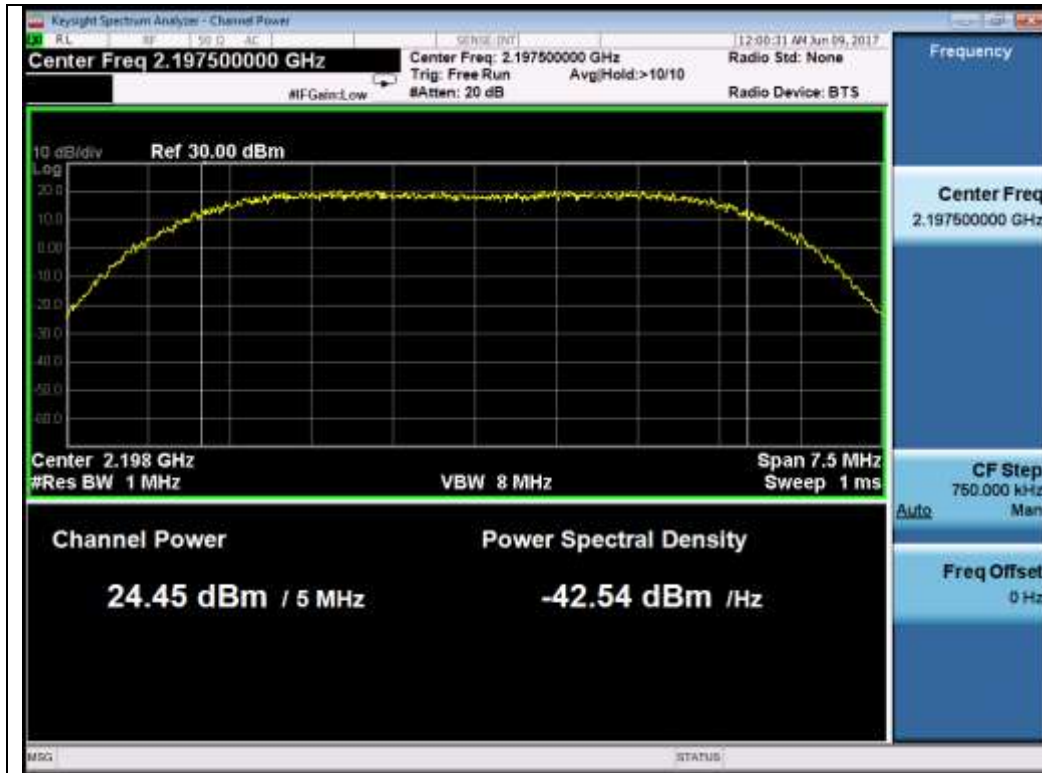
15M 64QAM High



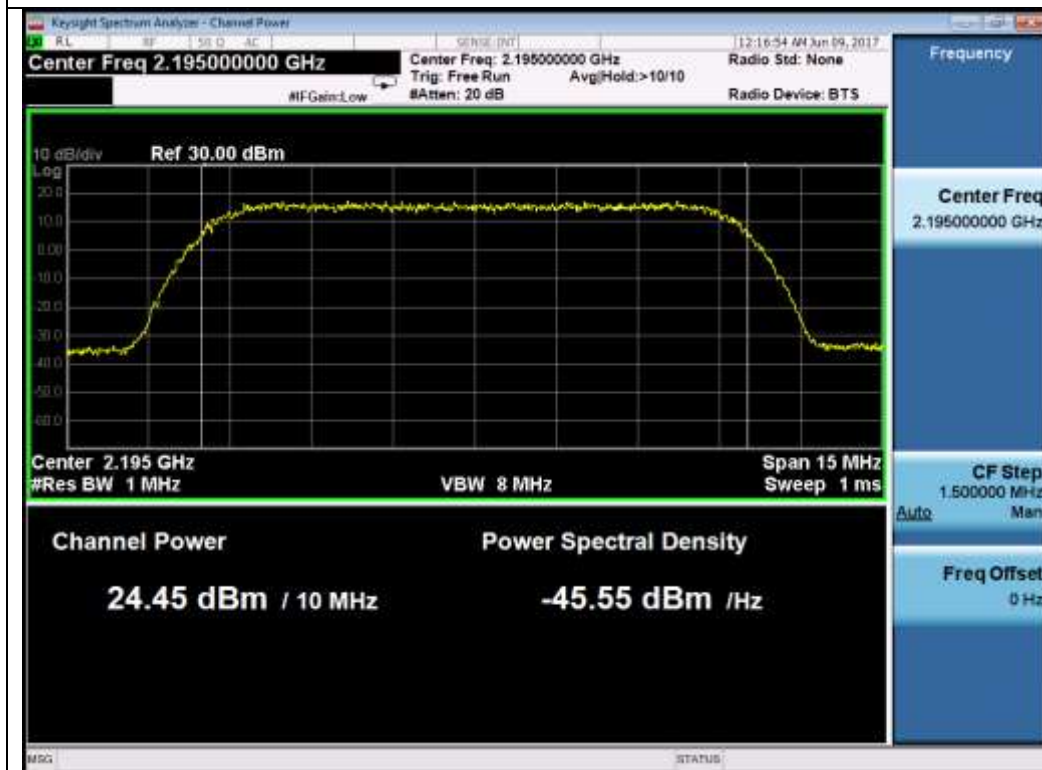
20M 64QAM High

Test Plots for LTE band 66:

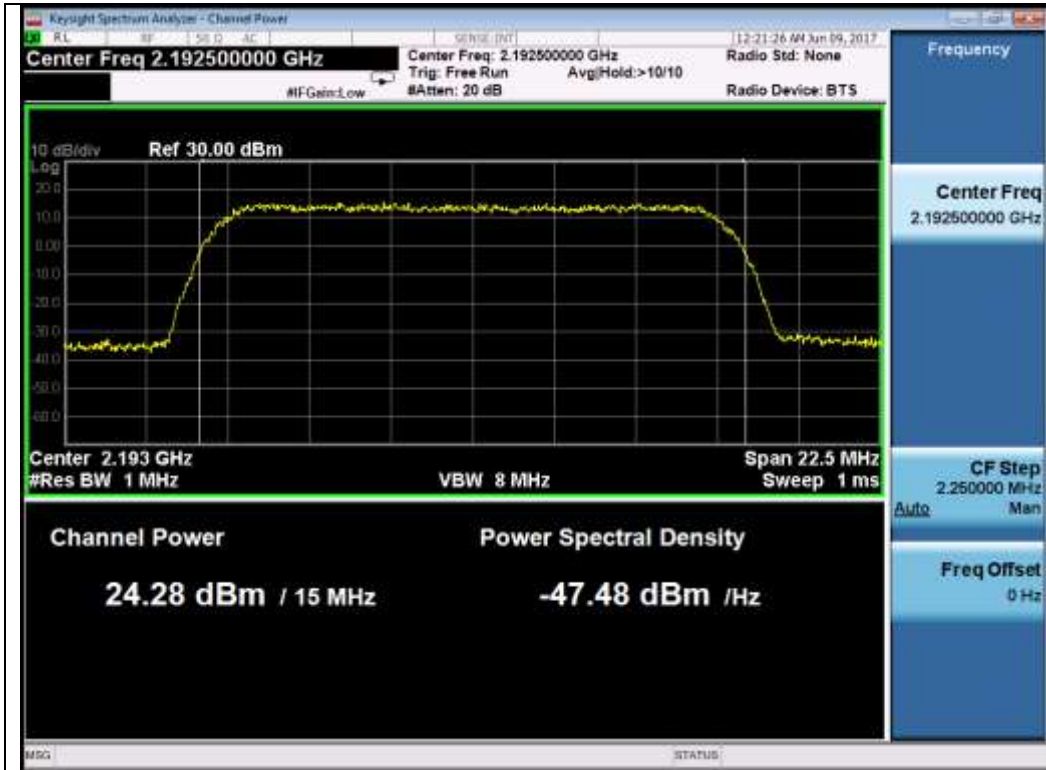
Chain1:



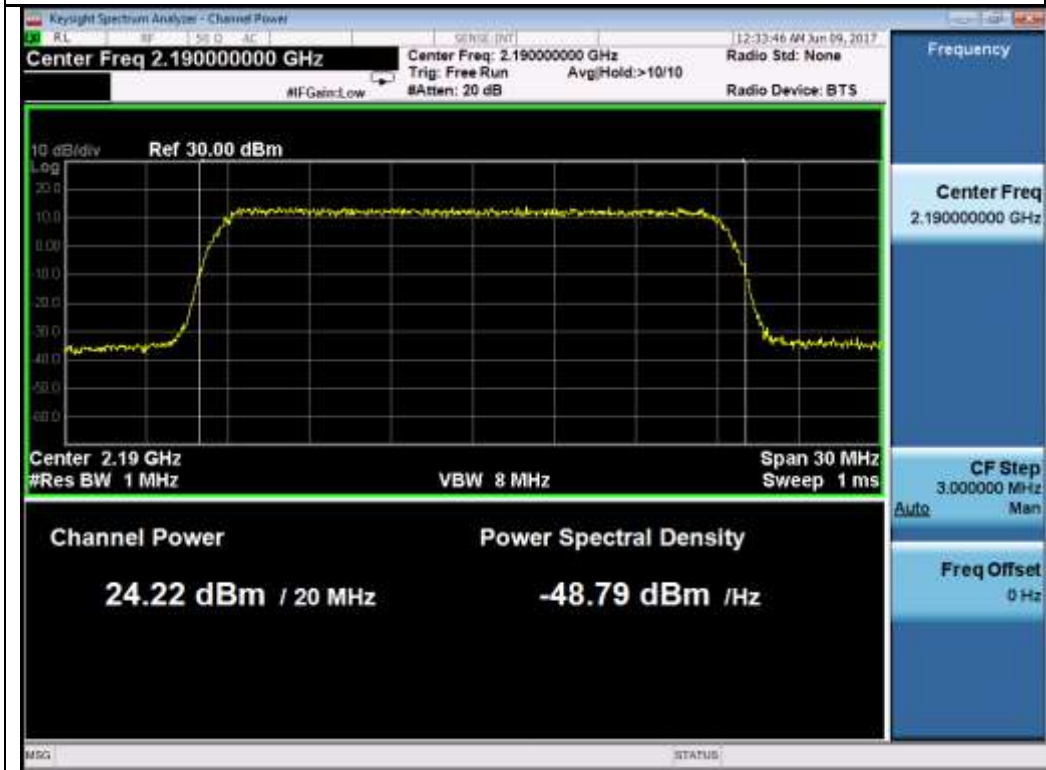
5M QPSK High



10M QPSK High



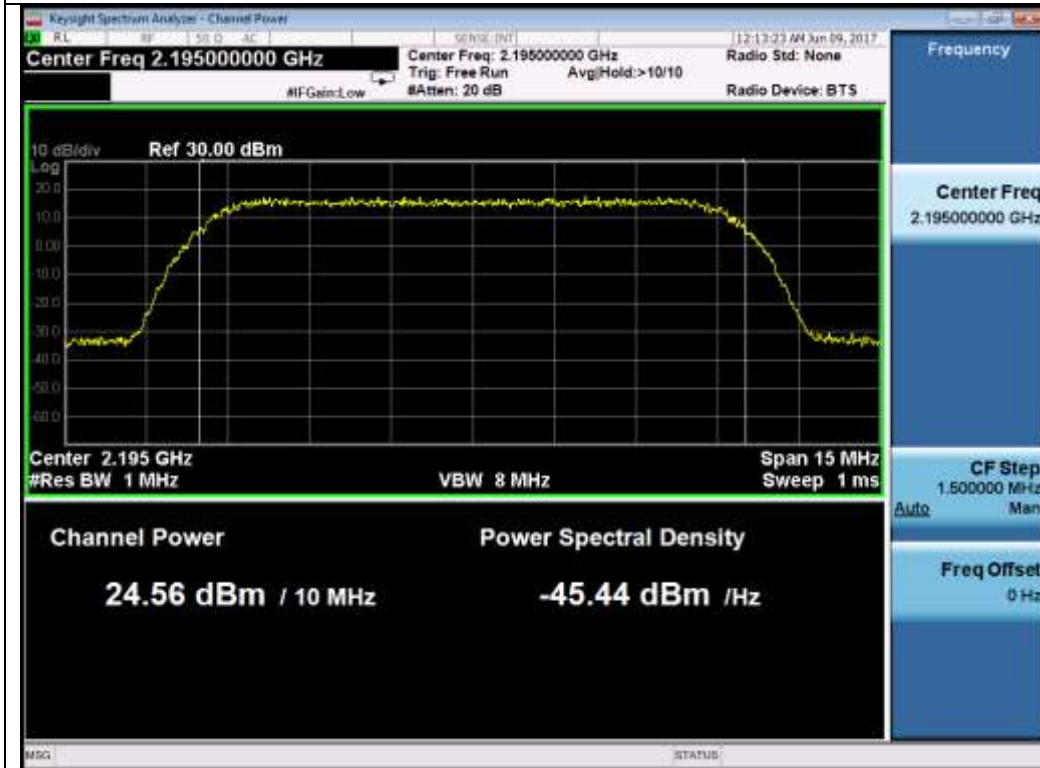
15M QPSK High



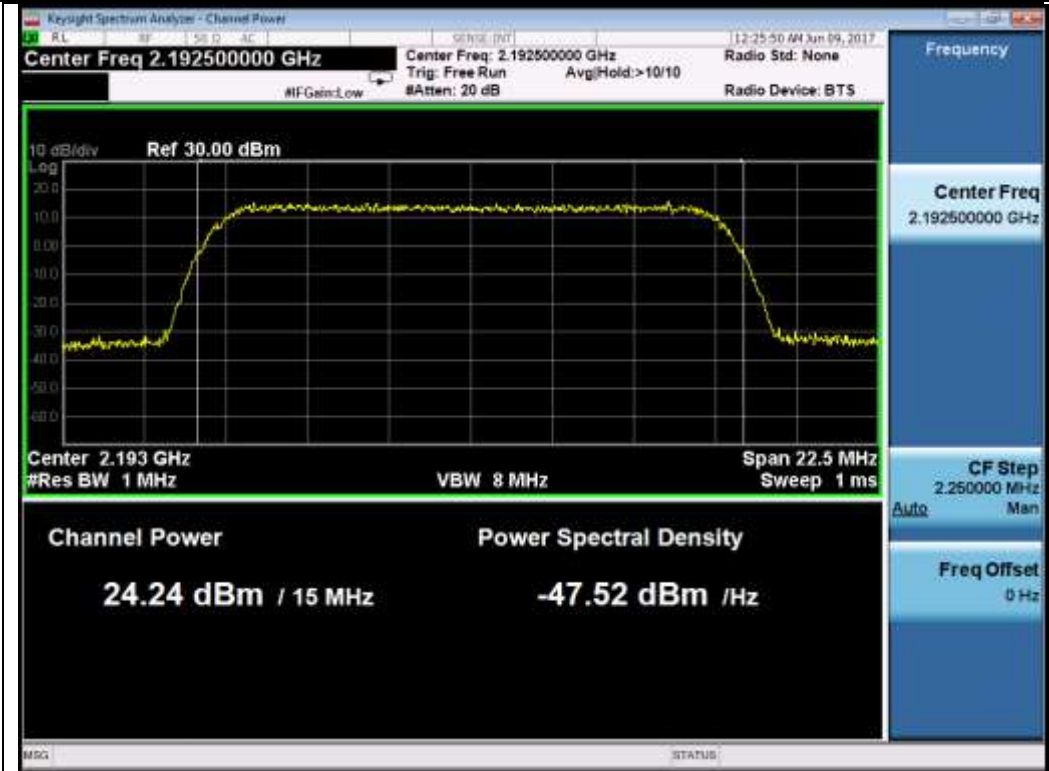
20M QPSK High



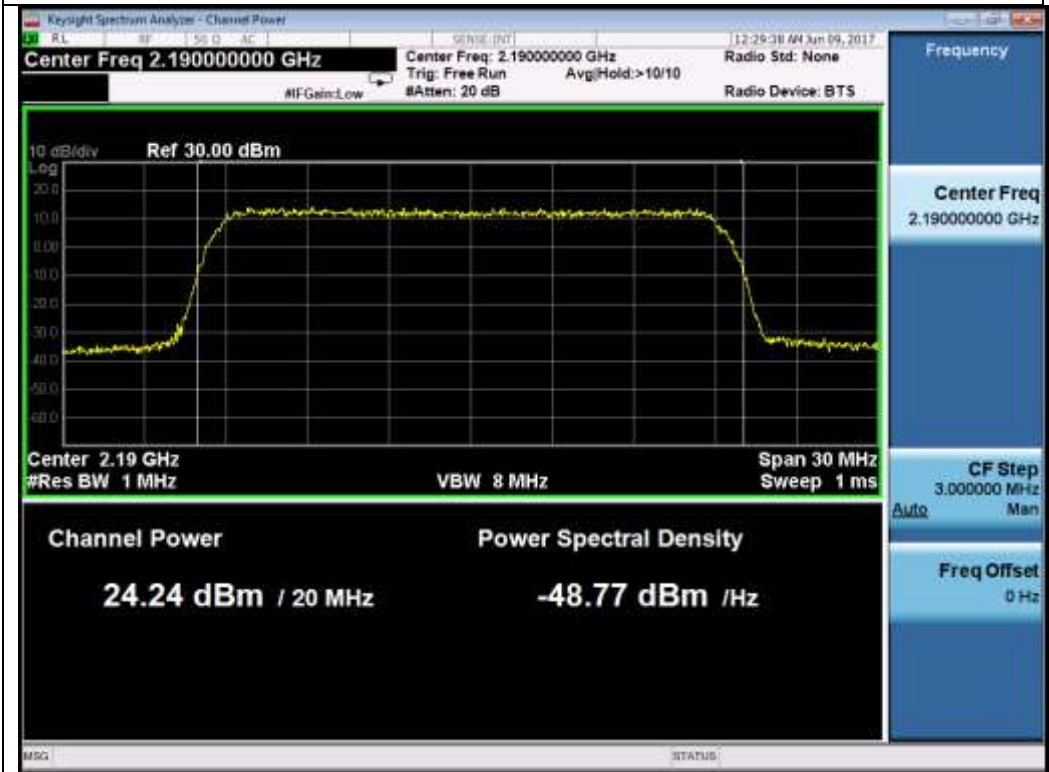
5M 64QAM High



10M 64QAM High



15M 64QAM High

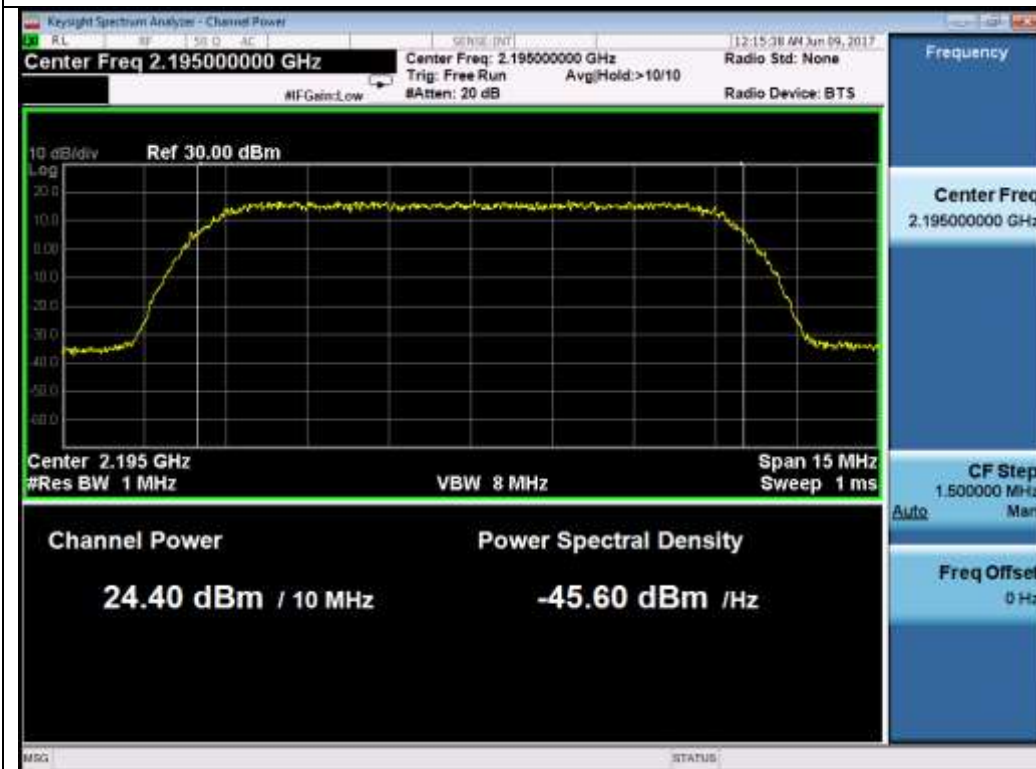


20M 64QAM High

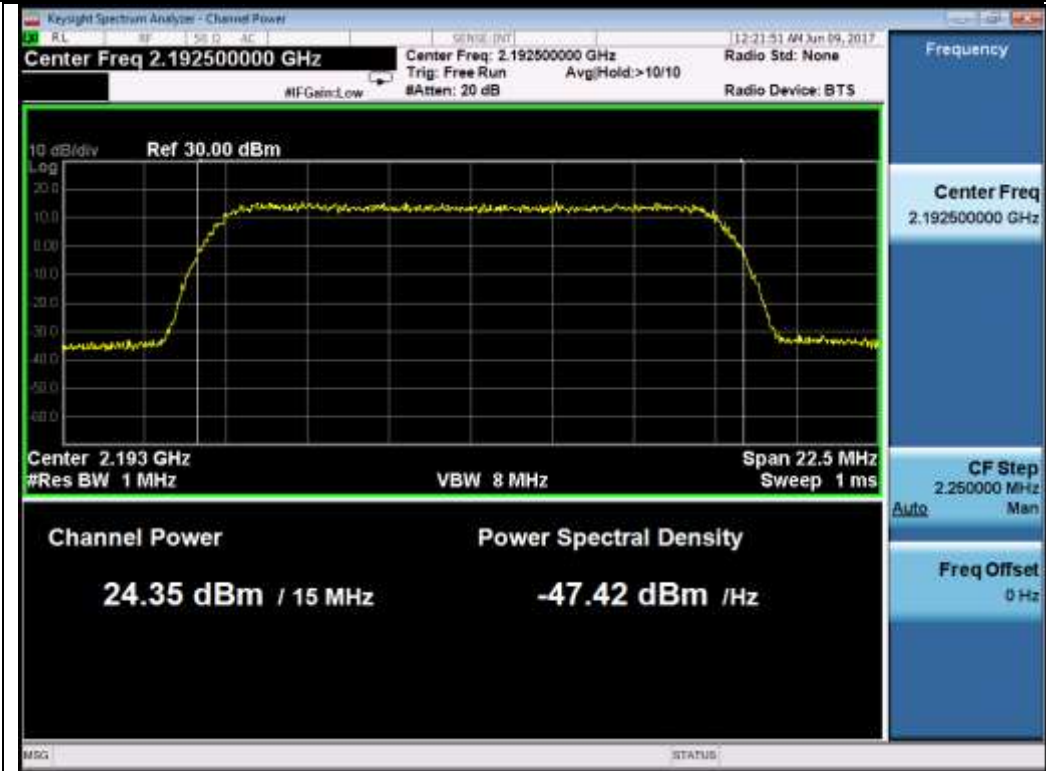
Chain2:



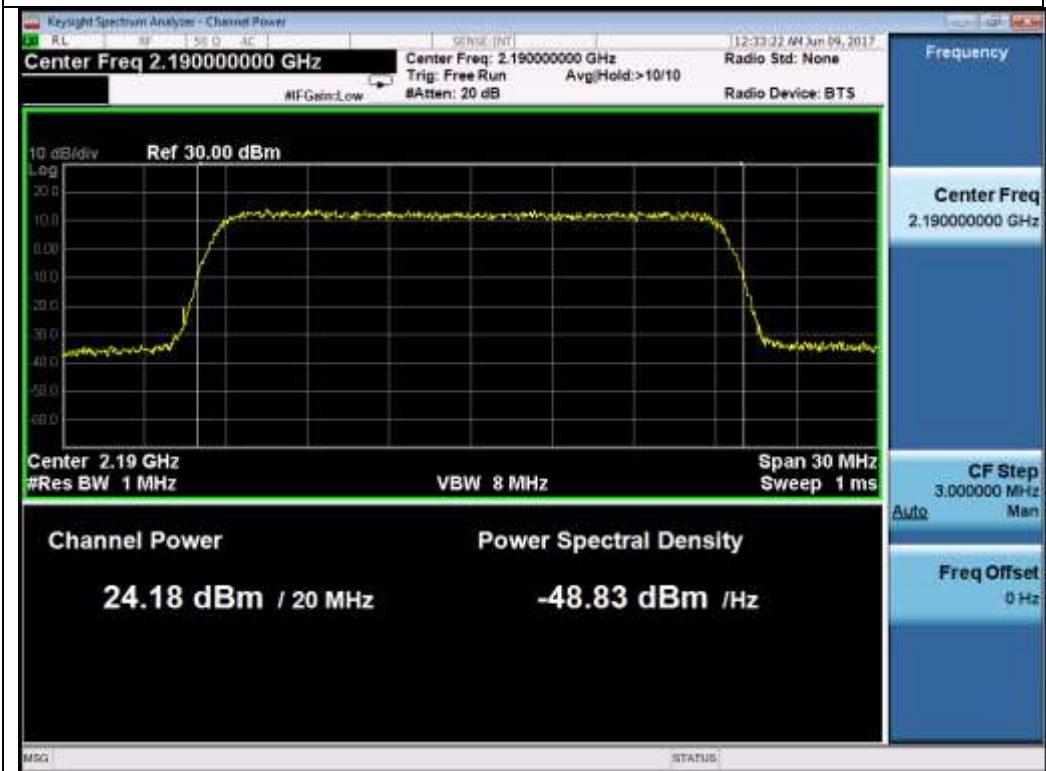
5M QPSK High



10M QPSK High



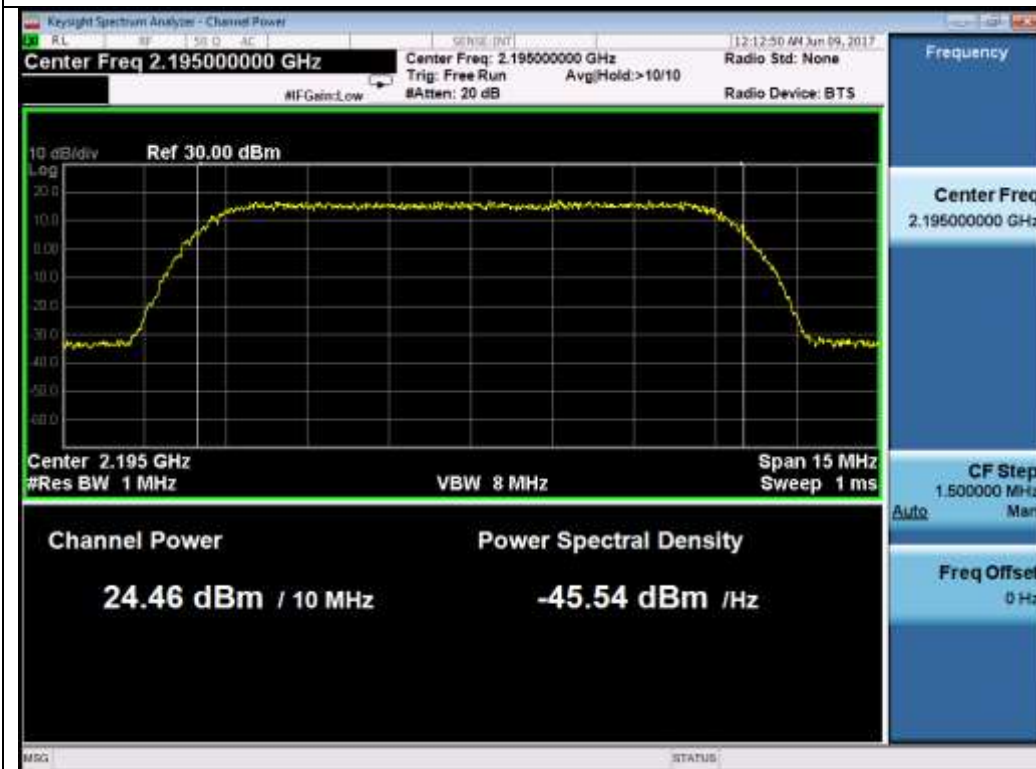
15M QPSK High



20M QPSK High



5M 64QAM High



10M 64QAM High