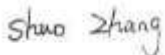
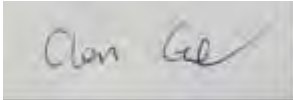


# RF TEST REPORT



Report No.: FCC\_SL17042701-SPC-011\_020412\_LTE  
Supersede Report No.:

|                                                                                                                                      |                                     |                                                                                      |  |
|--------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------------|--|
| Applicant                                                                                                                            | SpiderCloud Wireless, Inc.          |                                                                                      |  |
| Product Name                                                                                                                         | SpiderCloud Radio Node              |                                                                                      |  |
| Model No.                                                                                                                            | SCRN-220-040212 & SCRN-220-040212-E |                                                                                      |  |
| Test Standard                                                                                                                        | 47CFR Part 24/27                    |                                                                                      |  |
| 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                                                                    |  |
| This test report may be reproduced in full only<br>Test result presented in this test report is applicable to the tested sample only |                                     |                                                                                      |  |

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



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## 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/RRR, 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          |

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## 1 Report Revision History

| Report No.                        | Report Version | Description | Issue Date |
|-----------------------------------|----------------|-------------|------------|
| FCC_SL17042701-SPC-011_020412_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-220-040212 & SCRN-220-040212-E

against the current Stipulated Standards. The specified model product stated above has demonstrated compliance with the Stipulated Standard listed on 1<sup>st</sup> 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-220-040212 & SCRN-220-040212-E                                |
| Serial No.:                                                                                 | SCRN-220-020412<br>P/N: 02949-02<br>S/N: 1710X38370                |
| Input Power:                                                                                | EUT main input power. 56V .6A & PoE Power 100-240VAC 50-60Hz       |
| Hardware version:                                                                           | 02949-02                                                           |
| 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 on which the device operates or tunes: | 2200 MHz                                                           |
| Port/Connectors:                                                                            | RJ45                                                               |
| Remark:                                                                                     | The EUT was tested in three Frequency Radio Bands 2, 25, 4, 66, 12 |
| 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<br>External Omni-directional antenna | Internal Omni-directional antenna<br>External Omni-directional antenna |
| Antenna Gain               | 4 dBi / 3dBi                                                           | 4 dBi / 3dBi                                                           |
| Frequency TX(MHz)          | TX: 1930 MHz to 1990 MHz<br>RX: 1850 MHz to 1910 MHz                   | TX: 2110 MHz to 2155 MHz<br>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<br>External Omni-directional antenna | Internal Omni-directional antenna<br>External Omni-directional antenna |
| Antenna Gain               | 4 dBi / 3dBi                                                           | 4 dBi / 3dBi                                                           |
| Frequency TX(MHz)          | TX: 1930 MHz to 1995 MHz<br>RX: 1850 MHz to 1915 MHz                   | TX: 2110 MHz to 2200 MHz<br>RX: 1710 MHz to 1780 MHz                   |

| Item                       | LTE                                                                    |
|----------------------------|------------------------------------------------------------------------|
| Operating Band /Radio Type | LTE Band 12                                                            |
| Bandwidth                  | 5MHz, 10MHz                                                            |
| Modulation                 | QPSK/16QAM/64QAM                                                       |
| Antenna Type               | Internal Omni-directional antenna<br>External Omni-directional antenna |
| Antenna Gain               | 4 dBi / 3dBi                                                           |
| Frequency TX(MHz)          | TX: 729 MHz to 746 MHz<br>RX: 699 MHz to 716 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



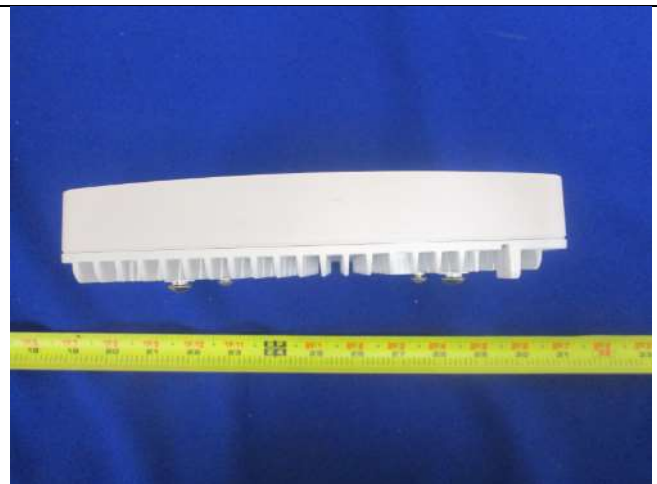
EUT – Left View



EUT– Right View

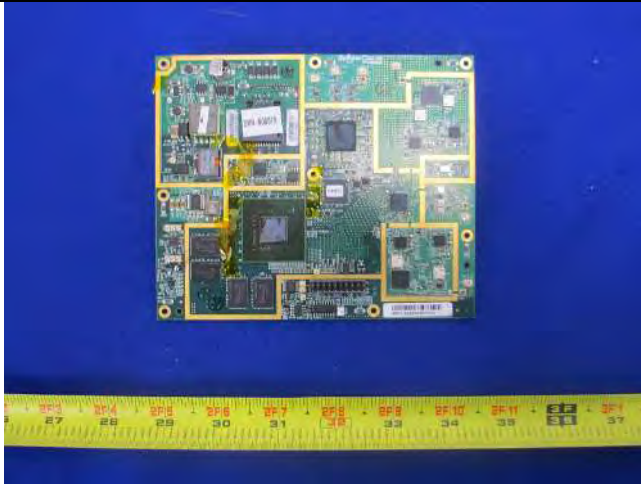


EUT– Top View

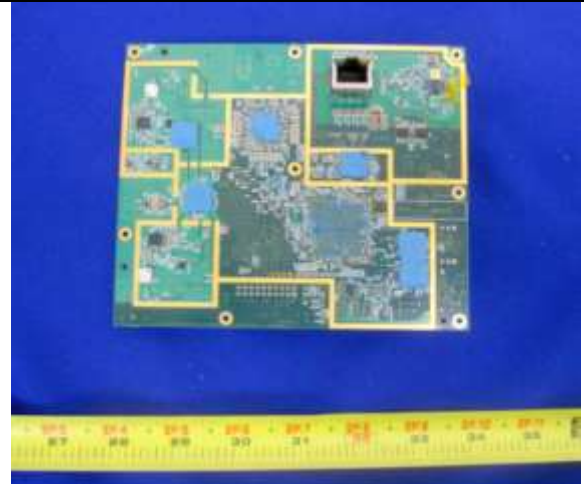


EUT – Bottom View

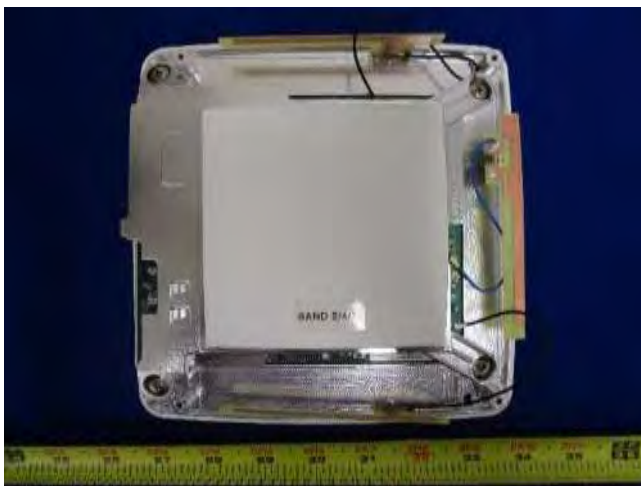
## 6.5 EUT Photos - Internal



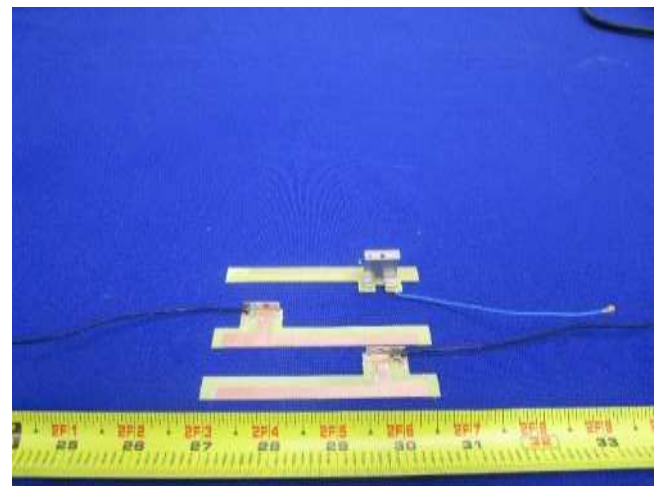
Main Board - Top View



Main Board – Bottom View



Internal Antenna View 1



Internal Antenna View 1



External Antenna View 1



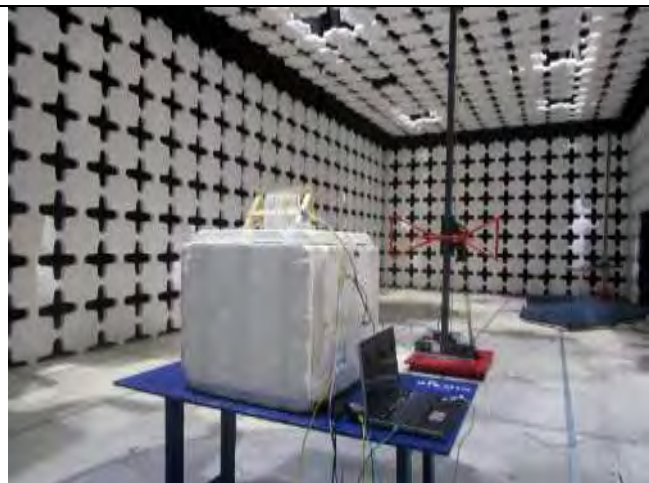
External Antenna View 2





## 6.6 EUT Test Setup Photos

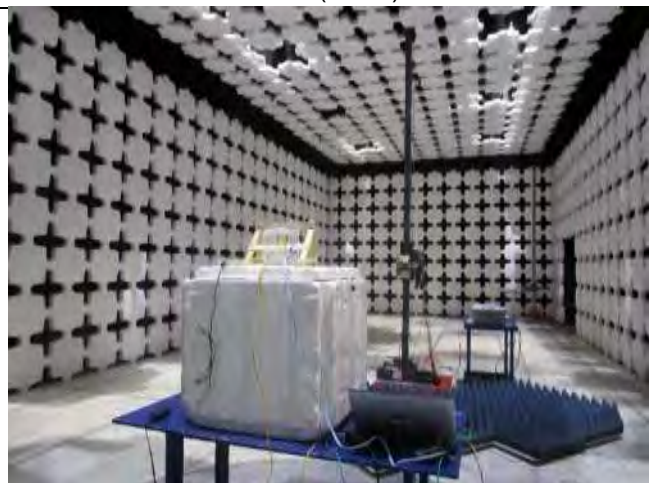
Internal Antenna:



Radiated Emissions (<1GHz) – Front View



Radiated Emissions (<1GHz) – Rear View

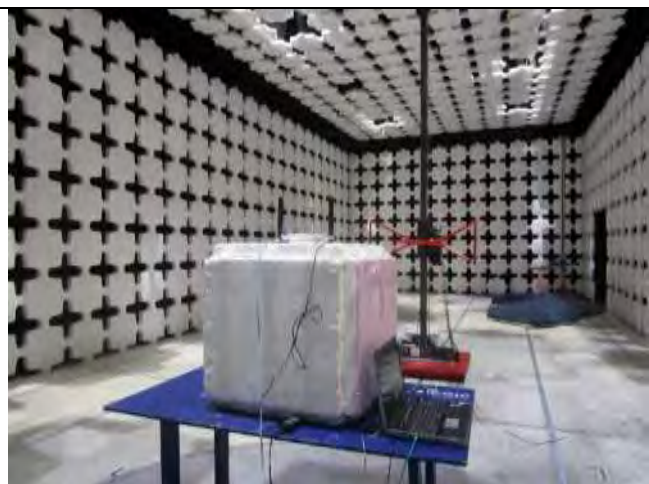


Radiated Emissions (>1GHz) – Front View



Radiated Emissions (>1GHz) – Rear View

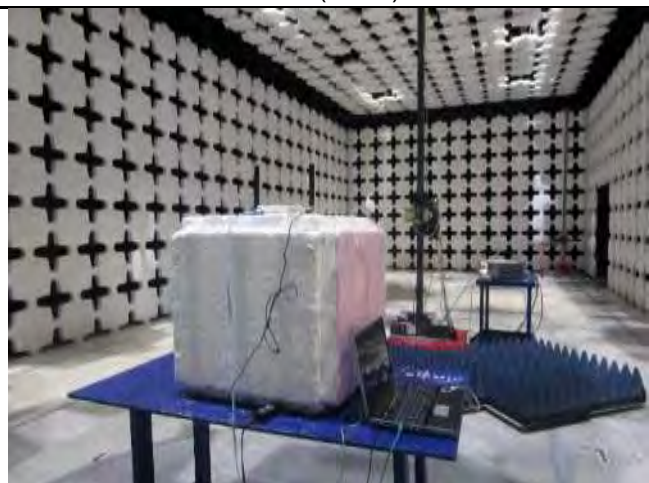
External Antenna:



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<br><input type="checkbox"/> N/A |
| Occupied Bandwidth                             | FCC                                                                                                                                                                                                                                                                                                                                                    | 47CFR24.238, 27.53              | FCC                   | TIA-603-D: 2010 | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> N/A |
| Peak-Average Ratio                             | FCC                                                                                                                                                                                                                                                                                                                                                    | 47CFR24.232, 27.50              | FCC                   | TIA-603-D: 2010 | <input checked="" type="checkbox"/> Pass<br><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<br><input type="checkbox"/> N/A |
| Band Edge                                      | FCC                                                                                                                                                                                                                                                                                                                                                    | 47CFR2.1053, 47CFR24.238, 27.53 | FCC                   | TIA-603-D: 2010 | <input checked="" type="checkbox"/> Pass<br><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<br><input type="checkbox"/> N/A |
| Frequency stability                            | FCC                                                                                                                                                                                                                                                                                                                                                    | 47CFR2.1053, 47CFR24.135, 27.53 | FCC                   | TIA-603-D: 2010 | <input checked="" type="checkbox"/> Pass<br><input type="checkbox"/> N/A |
| Remark                                         | <ol style="list-style-type: none"> <li>All measurement uncertainties do not take into consideration for all presented test results.</li> <li>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.</li> </ol> |                                 |                       |                 |                                                                          |



## 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             |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>3.856266</b>      |

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            |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>6.0118262</b>     |

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               |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>8.4726</b>        |

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             |
| <b>Expanded Uncertainty (K=2)</b> |            |                          |          |                         | <b>0.952174</b>      |

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     |                                                                                                                                   |                                                                                                                                                                                |                                                                            |
| Test Procedure | <ul style="list-style-type: none"> <li>- EUT was set for low, mid, high channel with modulated mode and highest RF output power.</li> <li>- The spectrum analyzer was connected to the antenna terminal.</li> </ul> |                                                                                                                                                                                |                                                                            |
| Test Date      | 06/08/2017 – 06/10/2017                                                                                                                                                                                             | Environmental condition                                                                                                                                                        | Temperature 22°C<br>Relative Humidity 48%<br>Atmospheric Pressure 1008mbar |
| Remark         | N/A                                                                                                                                                                                                                 |                                                                                                                                                                                |                                                                            |
| 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 12:

| 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     | 731.5           | 24.32                    | 24.29                    | 27.32                | 4                  | 31.32         |
|                 | Mid     | 737.5           | 24.54                    | 24.57                    | 27.57                | 4                  | 31.57         |
|                 | High    | 743.5           | 24.31                    | 24.35                    | 27.34                | 4                  | 31.34         |
| 5MHz BW, 64QAM  | Low     | 731.5           | 24.28                    | 24.29                    | 27.30                | 4                  | 31.30         |
|                 | Mid     | 737.5           | 24.35                    | 24.34                    | 27.36                | 4                  | 31.36         |
|                 | High    | 743.5           | 24.34                    | 24.38                    | 27.37                | 4                  | 31.37         |
| 10MHz BW, QPSK  | Low     | 734             | 24.40                    | 24.40                    | 27.41                | 4                  | 31.41         |
|                 | Mid     | 737.5           | 24.38                    | 24.37                    | 27.39                | 4                  | 31.39         |
|                 | High    | 741             | 24.49                    | 24.46                    | 27.49                | 4                  | 31.49         |
| 10MHz BW, 64QAM | Low     | 734             | 24.42                    | 24.40                    | 27.42                | 4                  | 31.42         |
|                 | Mid     | 737.5           | 24.40                    | 24.40                    | 27.41                | 4                  | 31.41         |
|                 | High    | 741             | 24.46                    | 24.51                    | 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:

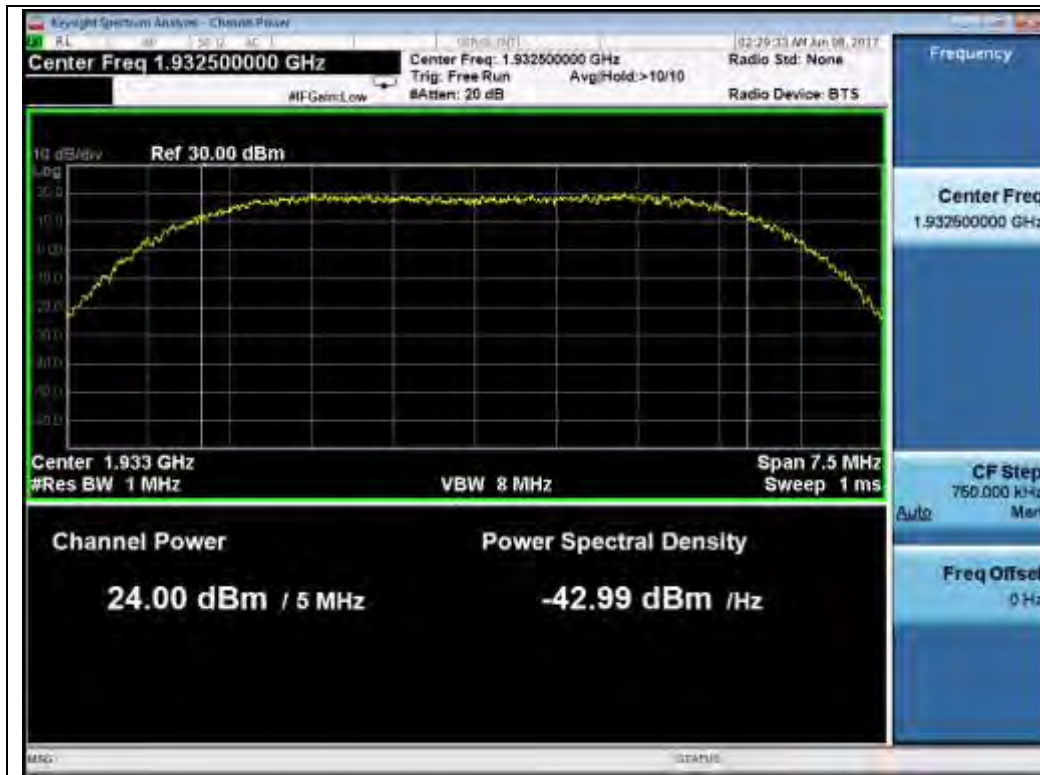
| Type            | Channel | Frequency (MHz) | Measured PW –Port 1(dBm) | Measured PW –Port 2(dBm) | Combined Power (dBm) | Antenna Gain (dBi) | E.I.R.P (dBm) |
|-----------------|---------|-----------------|--------------------------|--------------------------|----------------------|--------------------|---------------|
| 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 12:

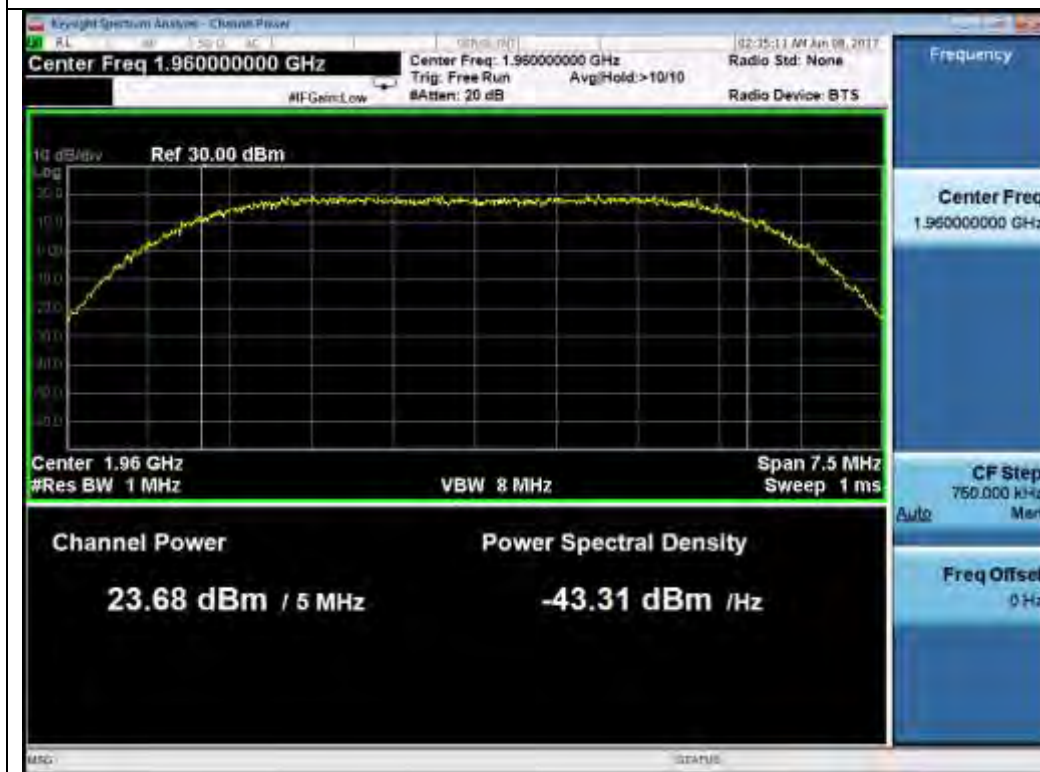
| Type            | Channel | Frequency (MHz) | Measured PW –Port 1(dBm) | Measured PW –Port 2(dBm) | Combined Power (dBm) | Antenna Gain (dBi) | E.I.R.P (dBm) |
|-----------------|---------|-----------------|--------------------------|--------------------------|----------------------|--------------------|---------------|
| 5MHz BW, QPSK   | Low     | 731.5           | 24.32                    | 24.29                    | 27.32                | 3                  | 30.32         |
|                 | Mid     | 737.5           | 24.54                    | 24.57                    | 27.57                | 3                  | 30.57         |
|                 | High    | 743.5           | 24.31                    | 24.35                    | 27.34                | 3                  | 30.34         |
| 5MHz BW, 64QAM  | Low     | 731.5           | 24.28                    | 24.29                    | 27.30                | 3                  | 30.30         |
|                 | Mid     | 737.5           | 24.35                    | 24.34                    | 27.36                | 3                  | 30.36         |
|                 | High    | 743.5           | 24.34                    | 24.38                    | 27.37                | 3                  | 30.37         |
| 10MHz BW, QPSK  | Low     | 734             | 24.40                    | 24.40                    | 27.41                | 3                  | 30.41         |
|                 | Mid     | 737.5           | 24.38                    | 24.37                    | 27.39                | 3                  | 30.39         |
|                 | High    | 741             | 24.49                    | 24.46                    | 27.49                | 3                  | 30.49         |
| 10MHz BW, 64QAM | Low     | 734             | 24.42                    | 24.40                    | 27.42                | 3                  | 30.42         |
|                 | Mid     | 737.5           | 24.40                    | 24.40                    | 27.41                | 3                  | 30.41         |
|                 | High    | 741             | 24.46                    | 24.51                    | 27.50                | 3                  | 30.50         |



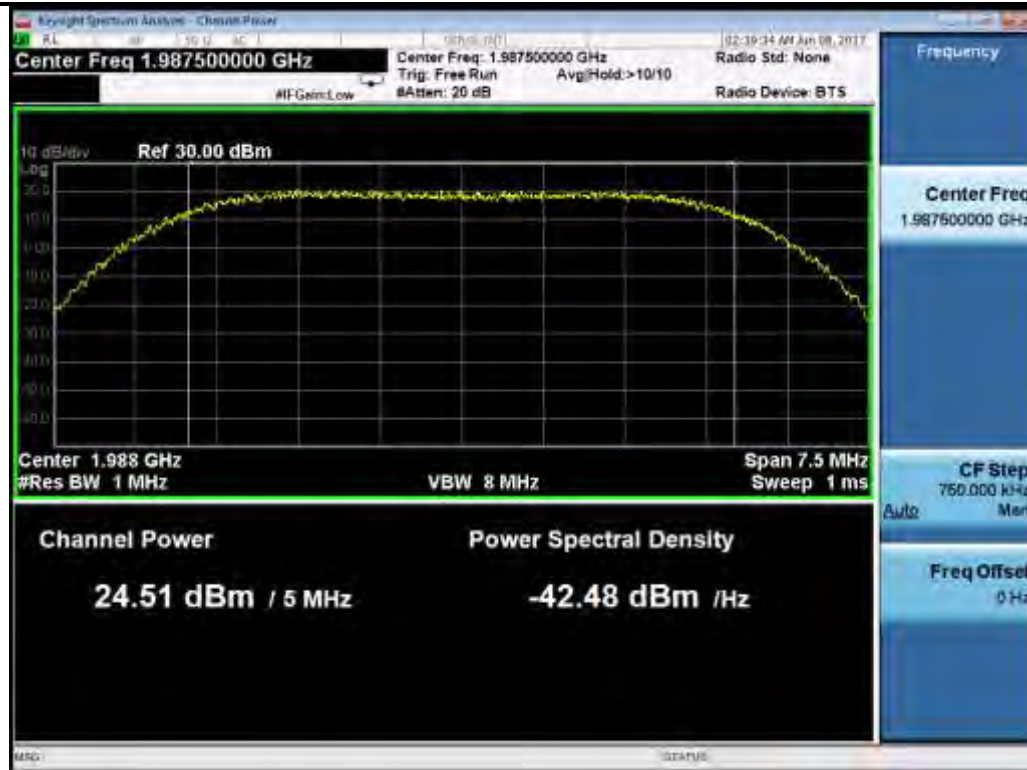
Test Plots for Band 2  
Chain 1:



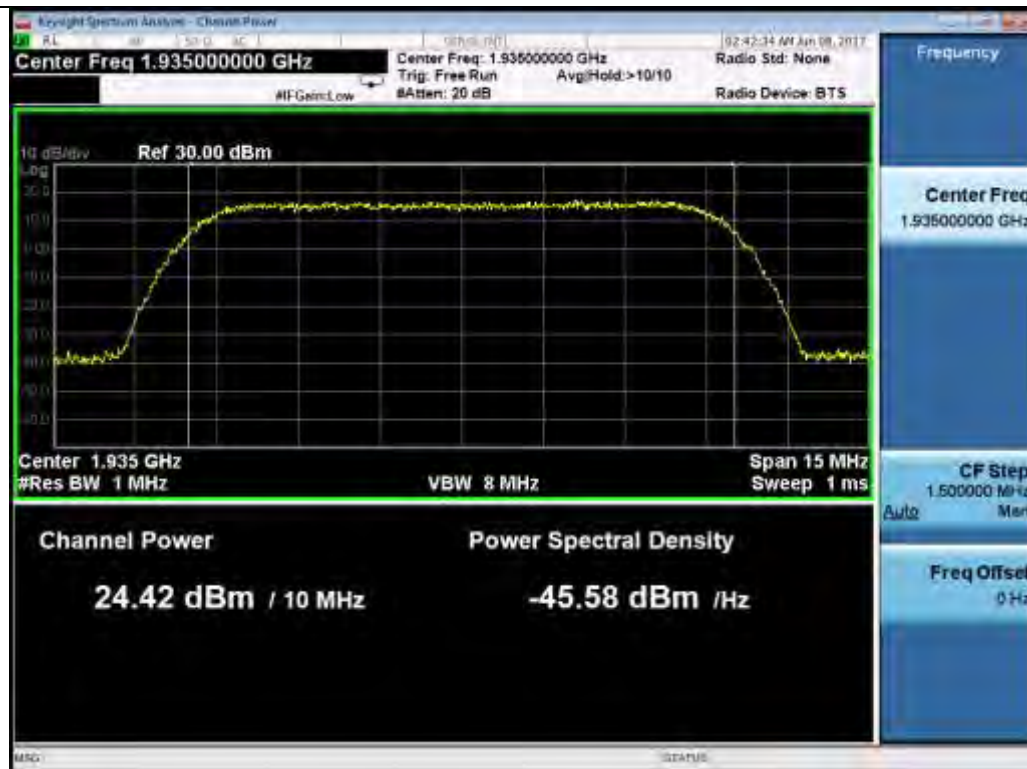
5M QPSK Low



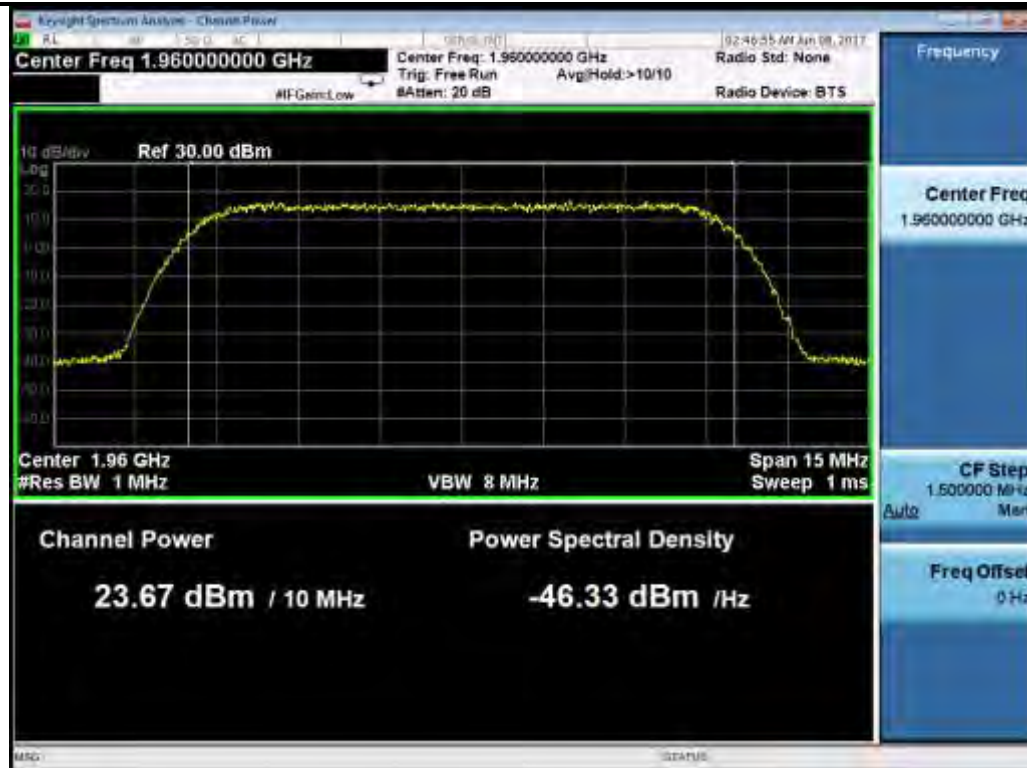
5M QPSK Mid



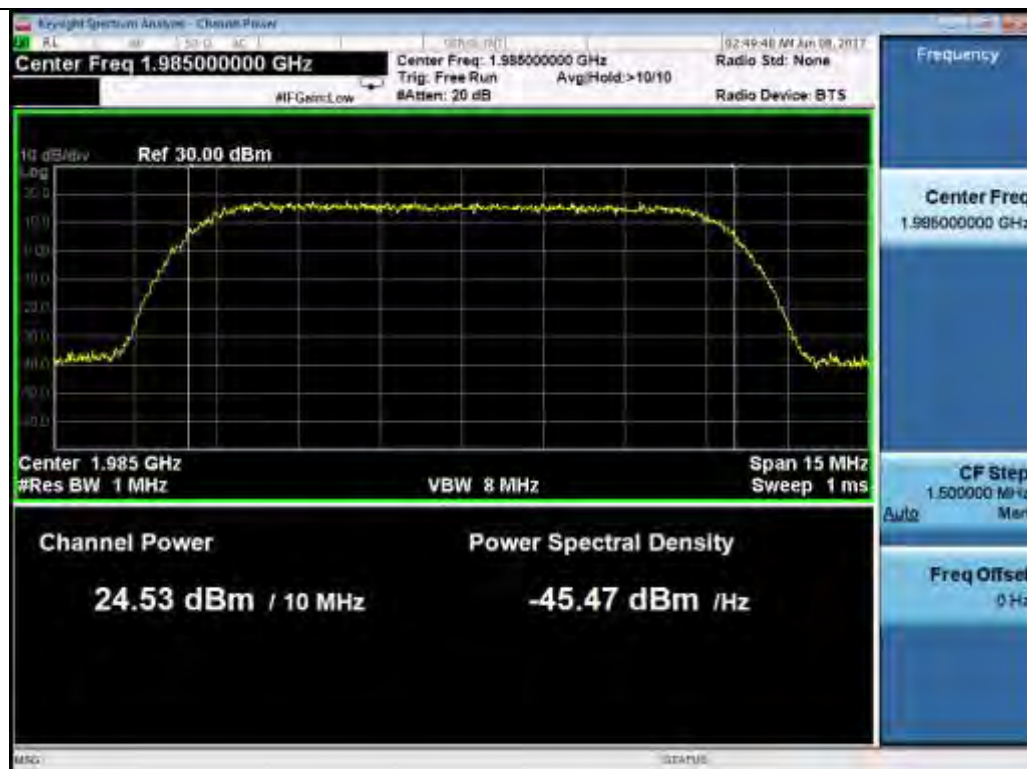
5M QPSK High



10M QPSK Low

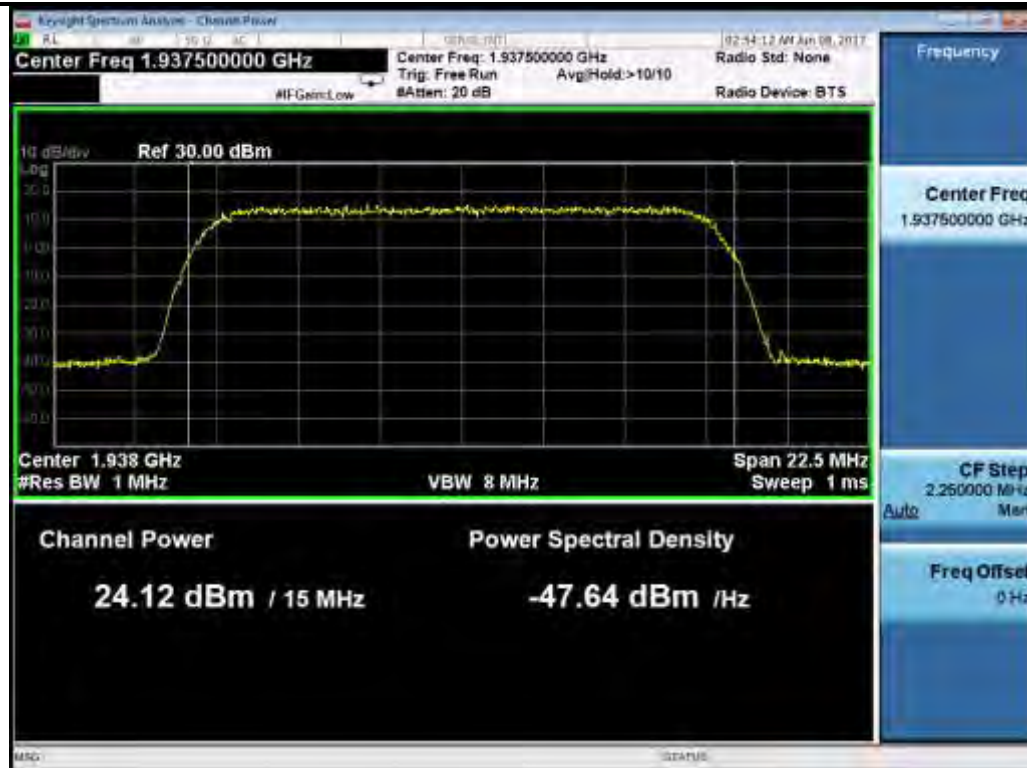


10M QPSK Mid

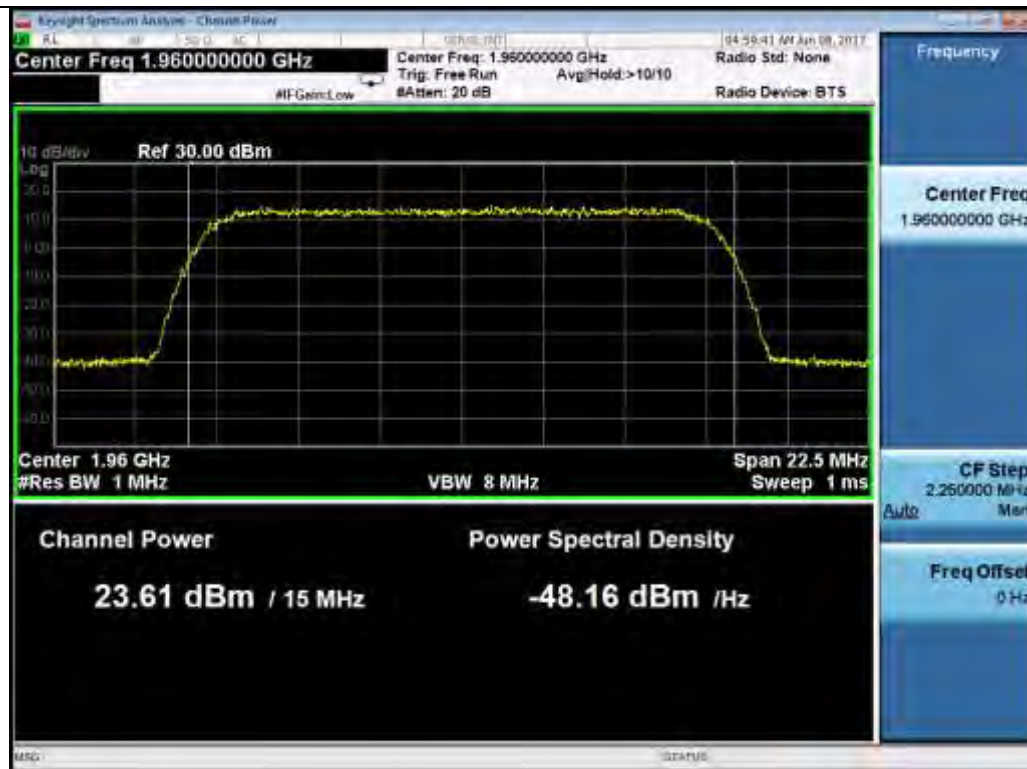


10M QPSK High

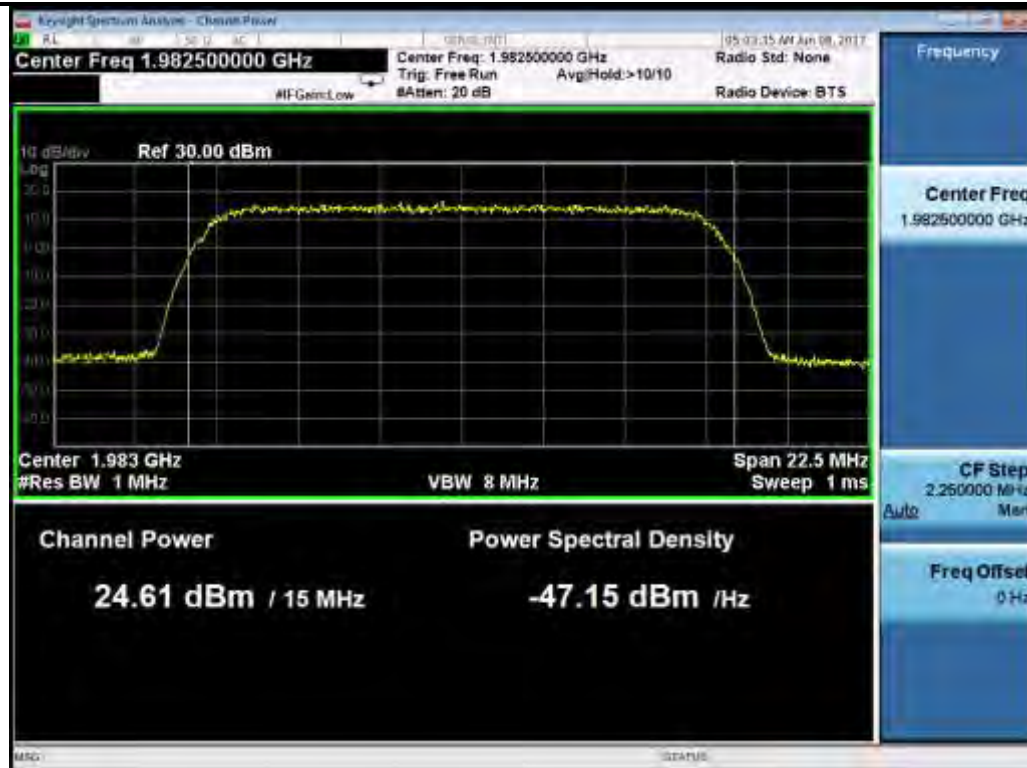




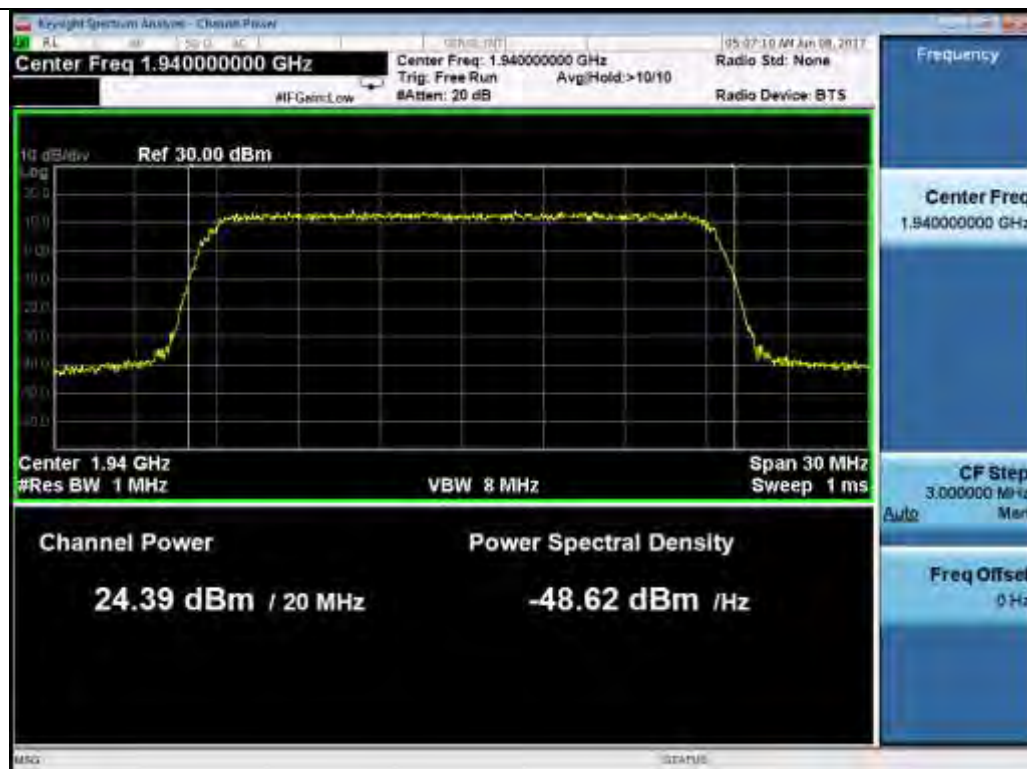
15M QPSK Low



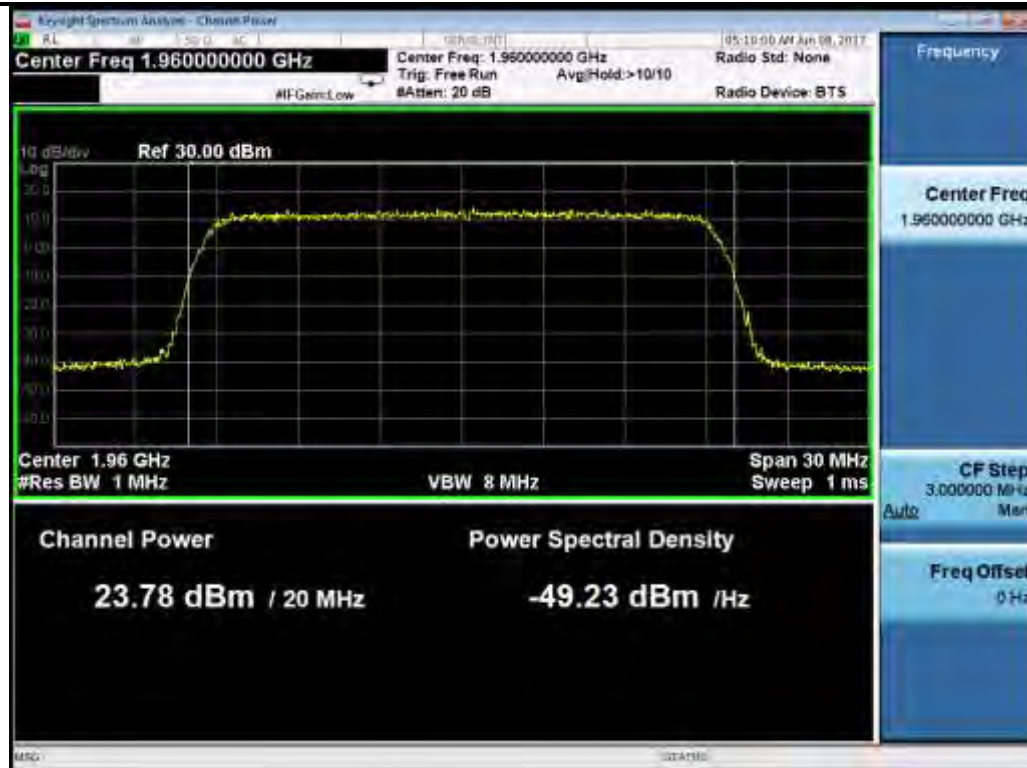
15M QPSK Mid



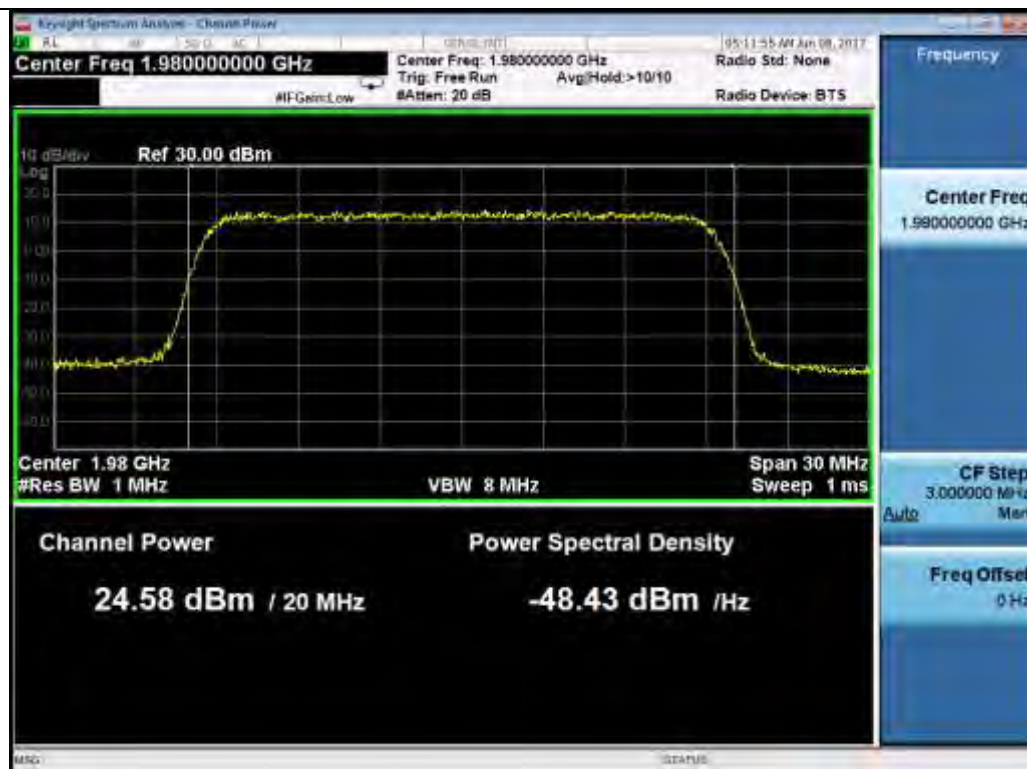
15M QPSK High



20M QPSK Low

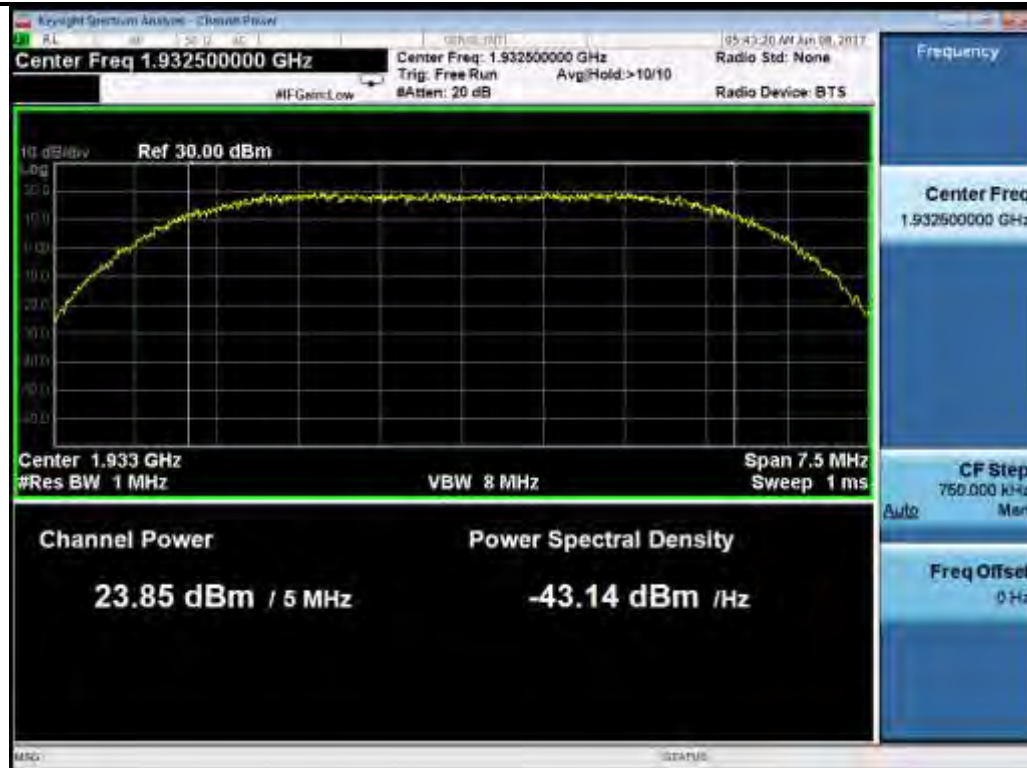


20M QPSK Mid



20M QPSK High





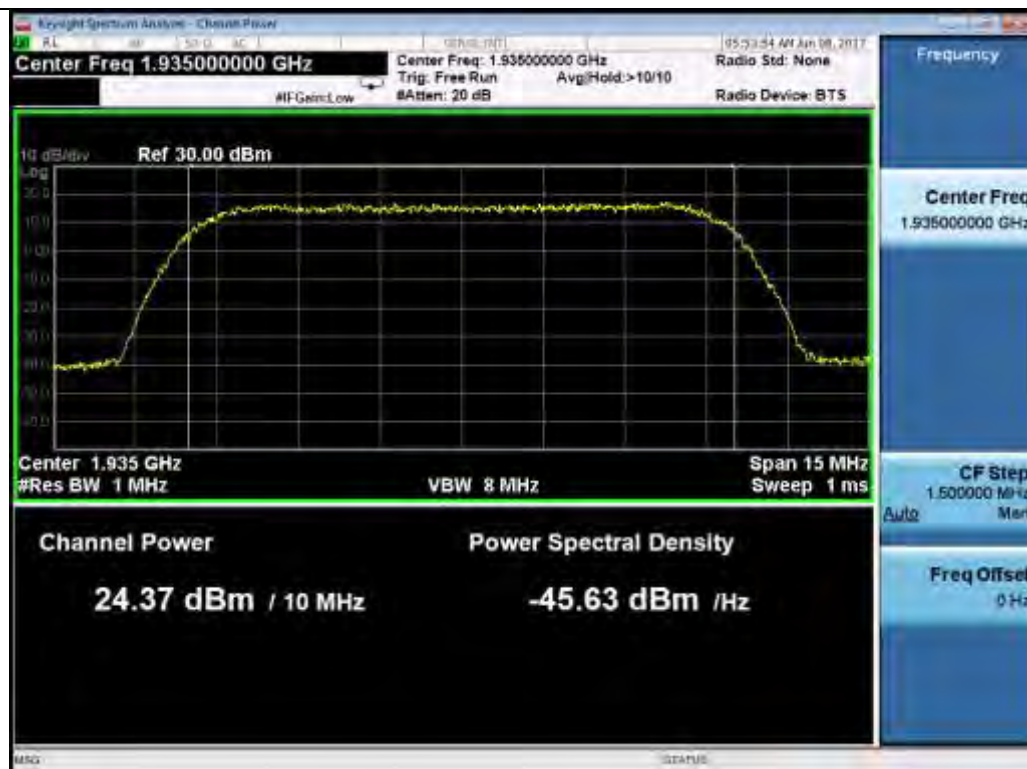
5M 64QAM Low



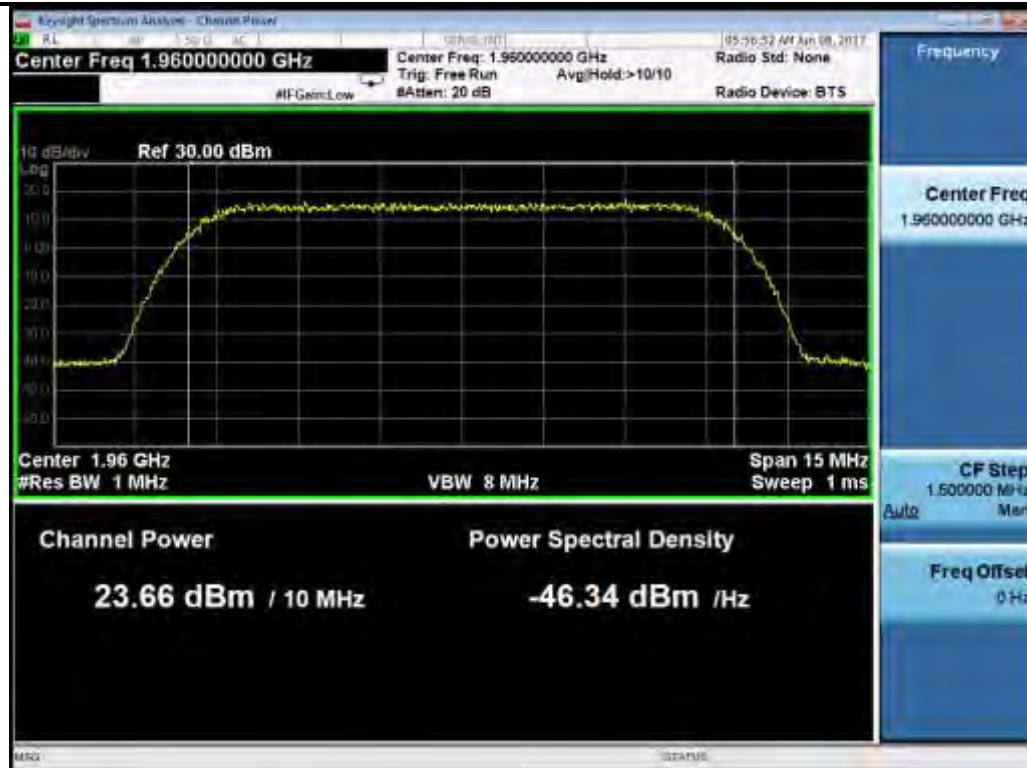
5M 64QAM Mid



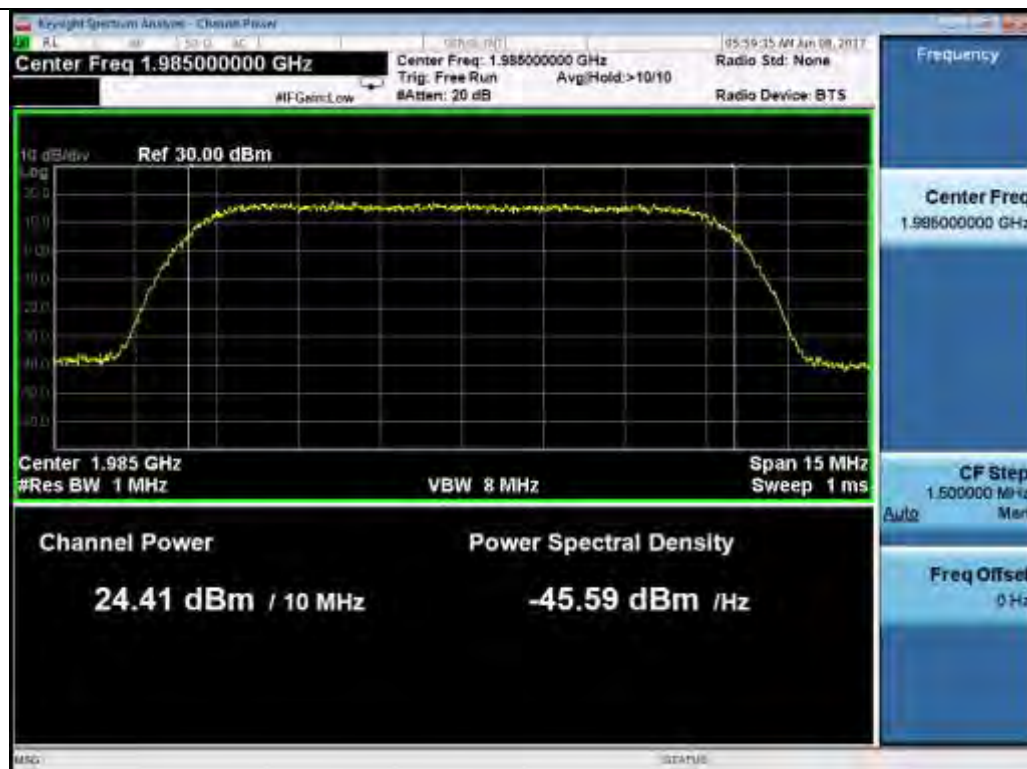
5M 64QAM High



10M 64QAM Low

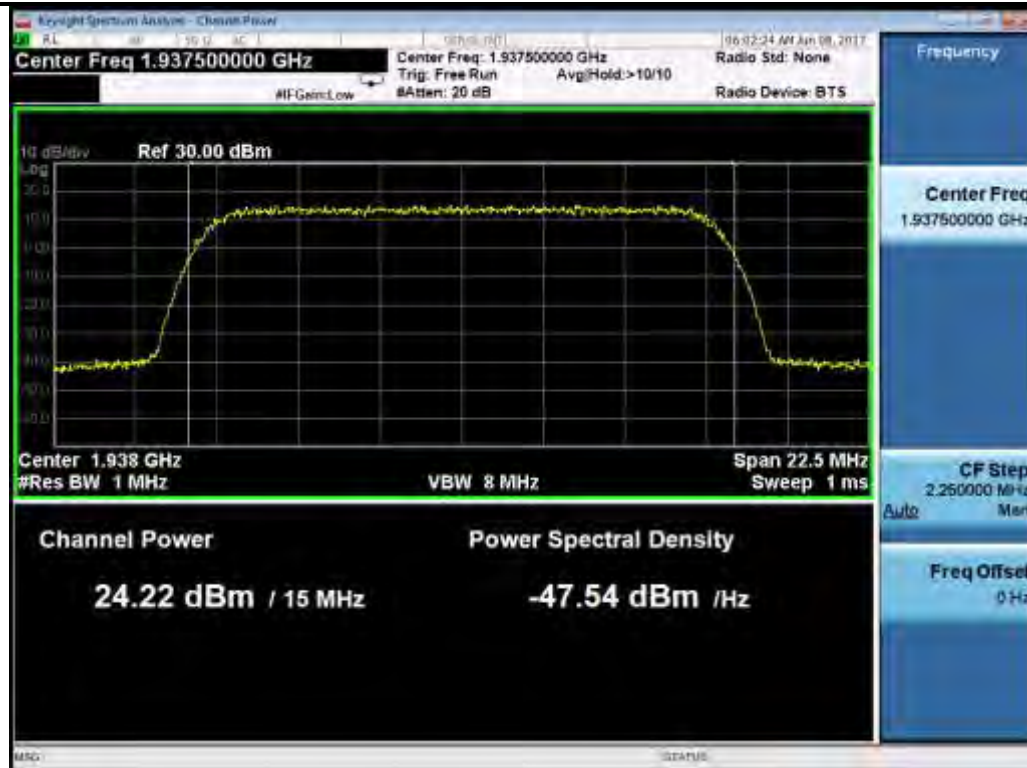


10M 64QAM Mid

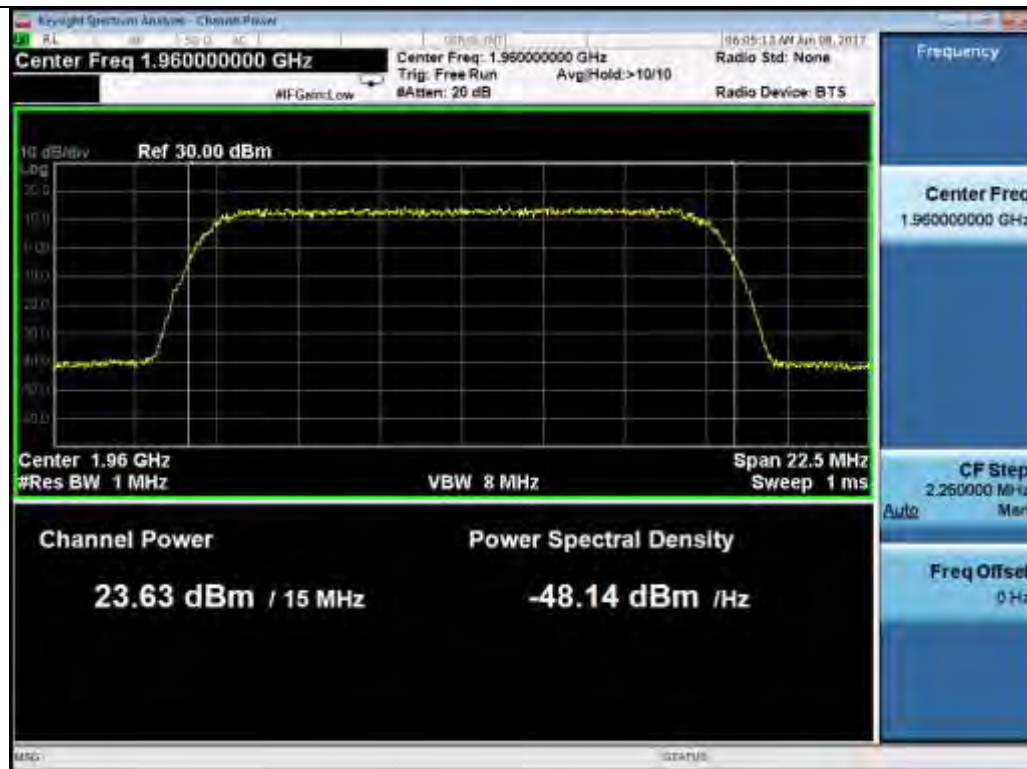


10M 64QAM High

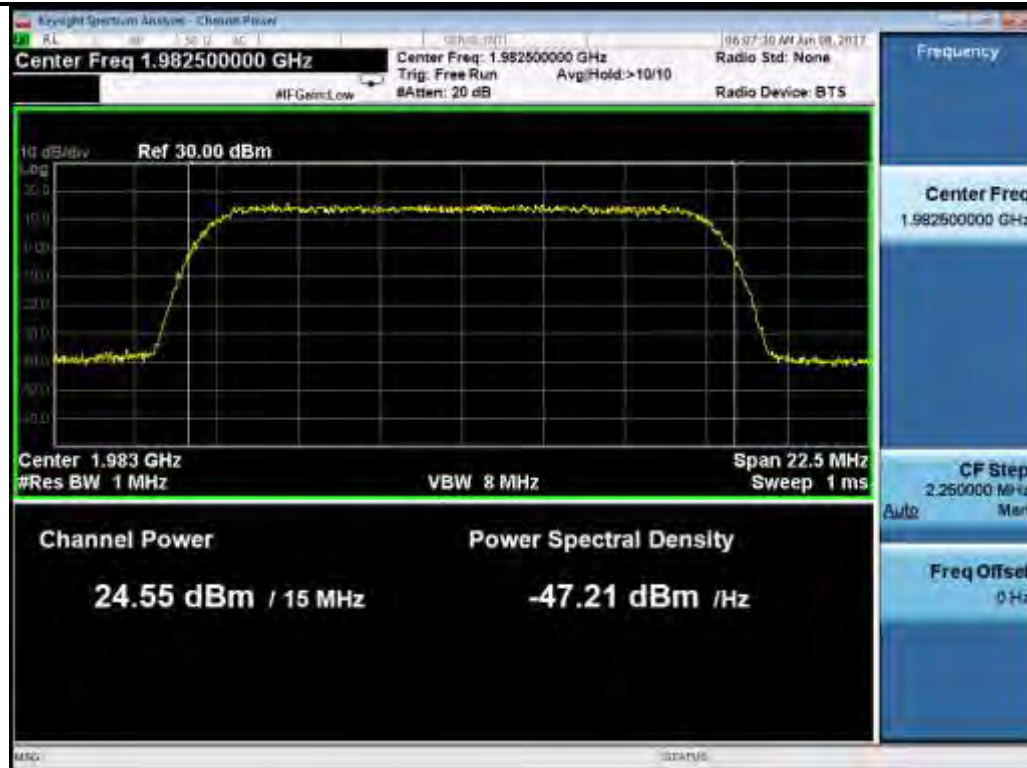




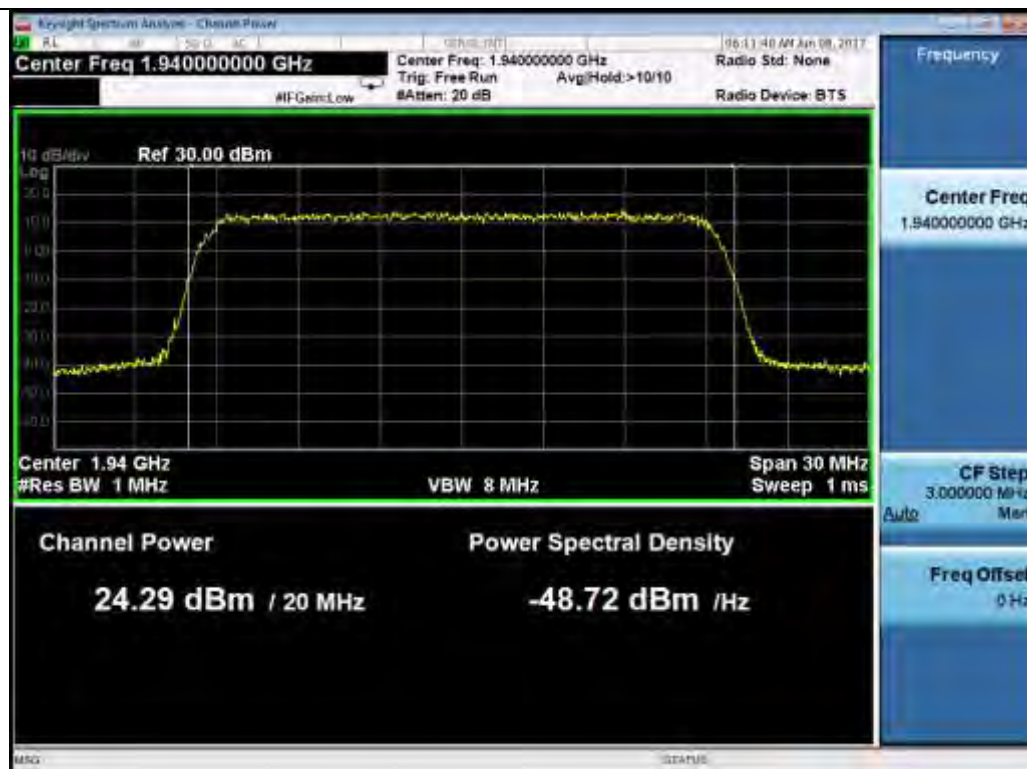
15M 64QAM Low



15M 64QAM Mid

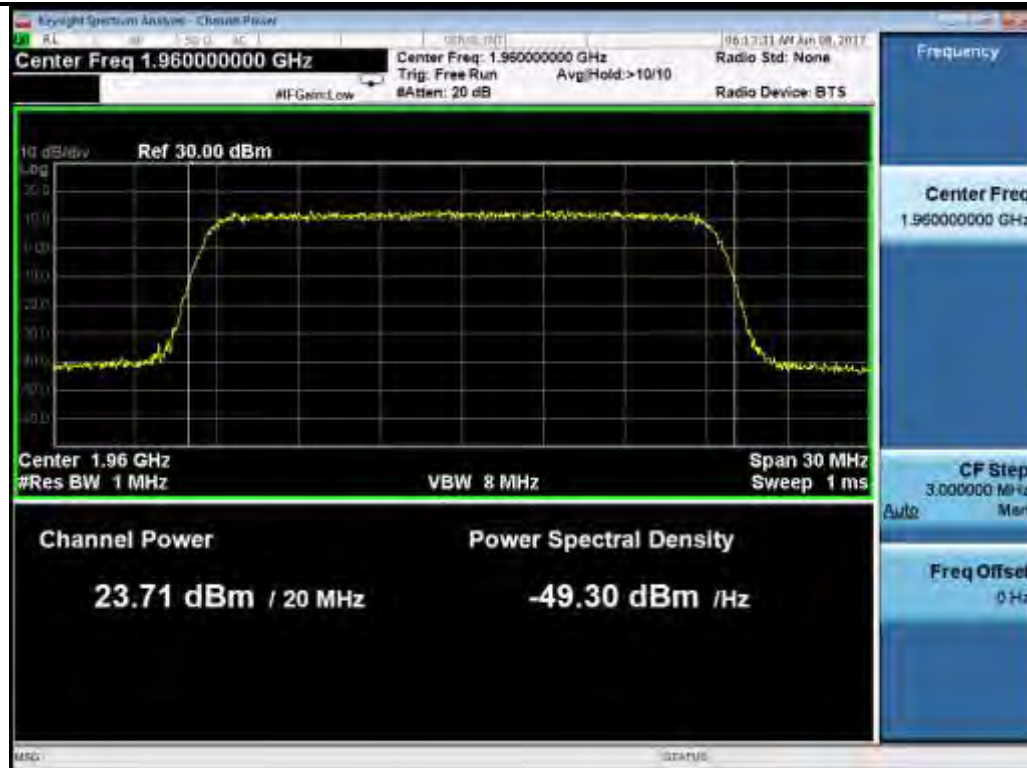


15M 64QAM High

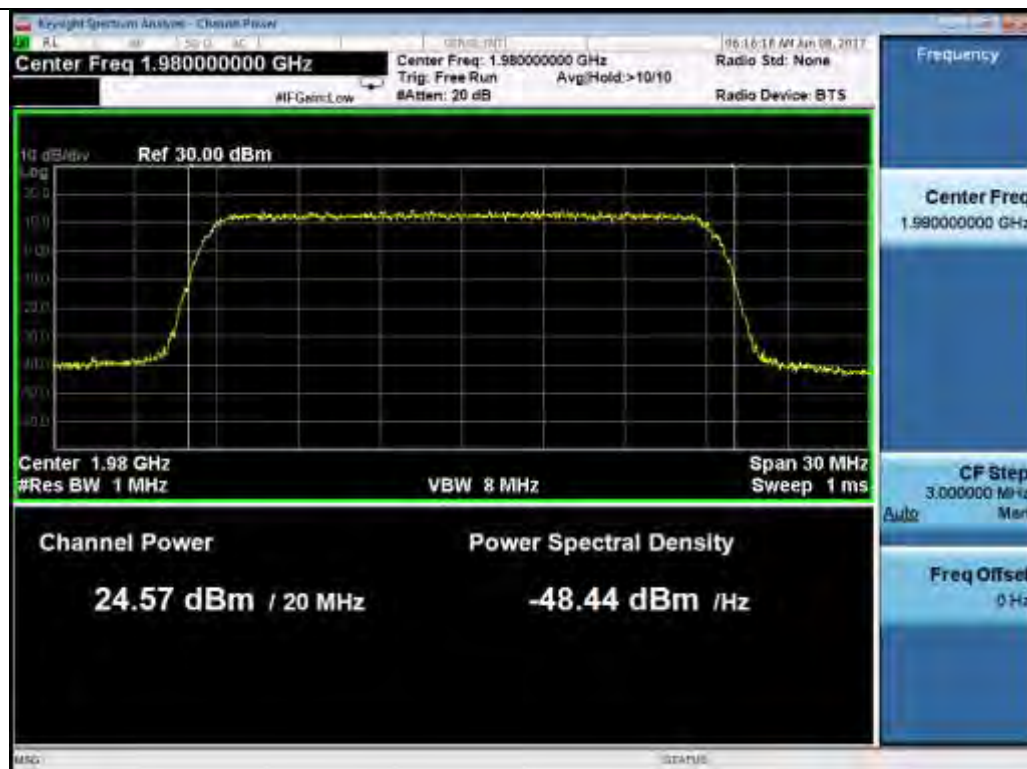


20M 64QAM Low



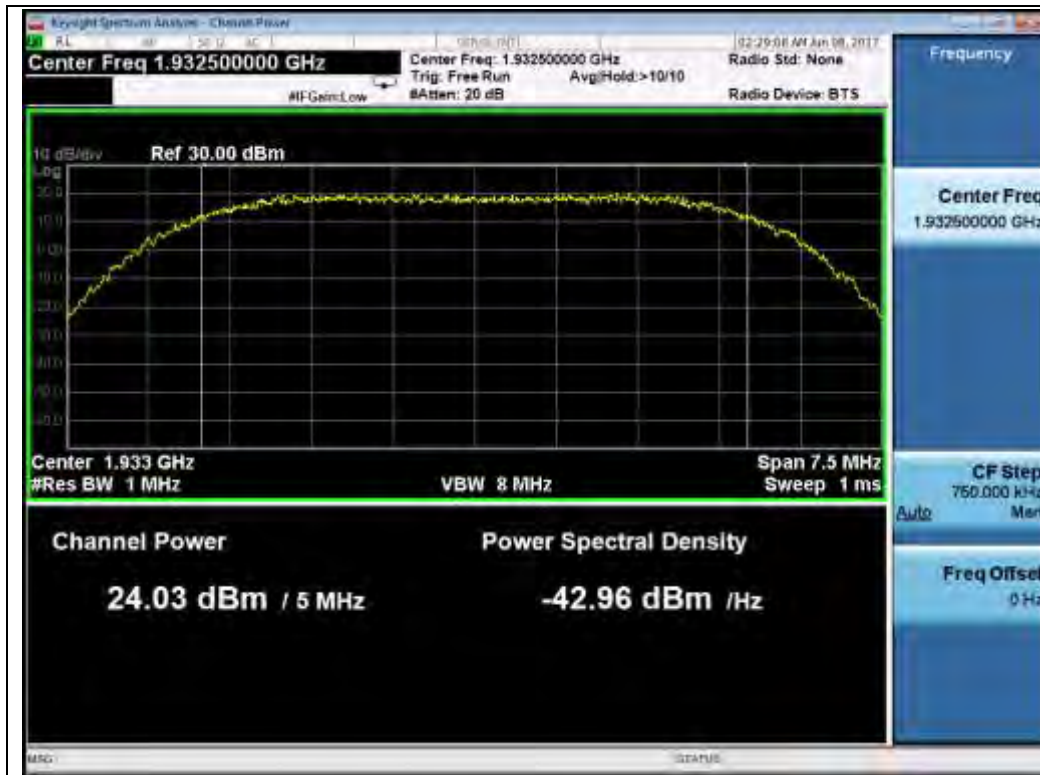


20M 64QAM Mid



20M 64QAM High

Chain 2:



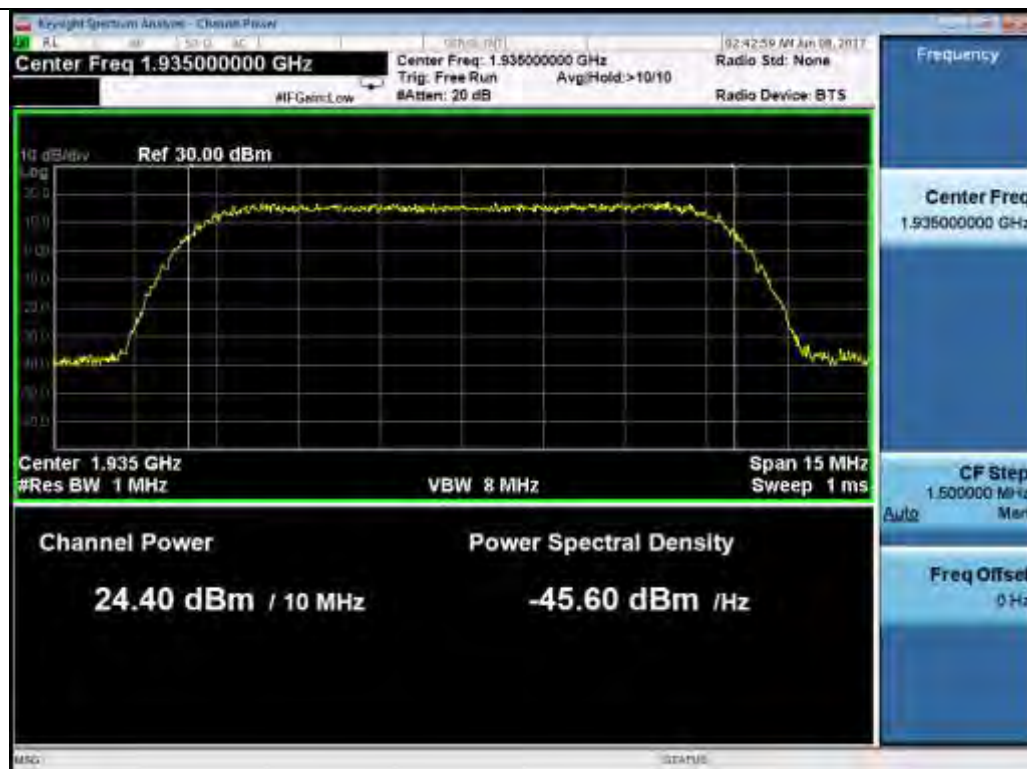
5M QPSK Low



5M QPSK Mid

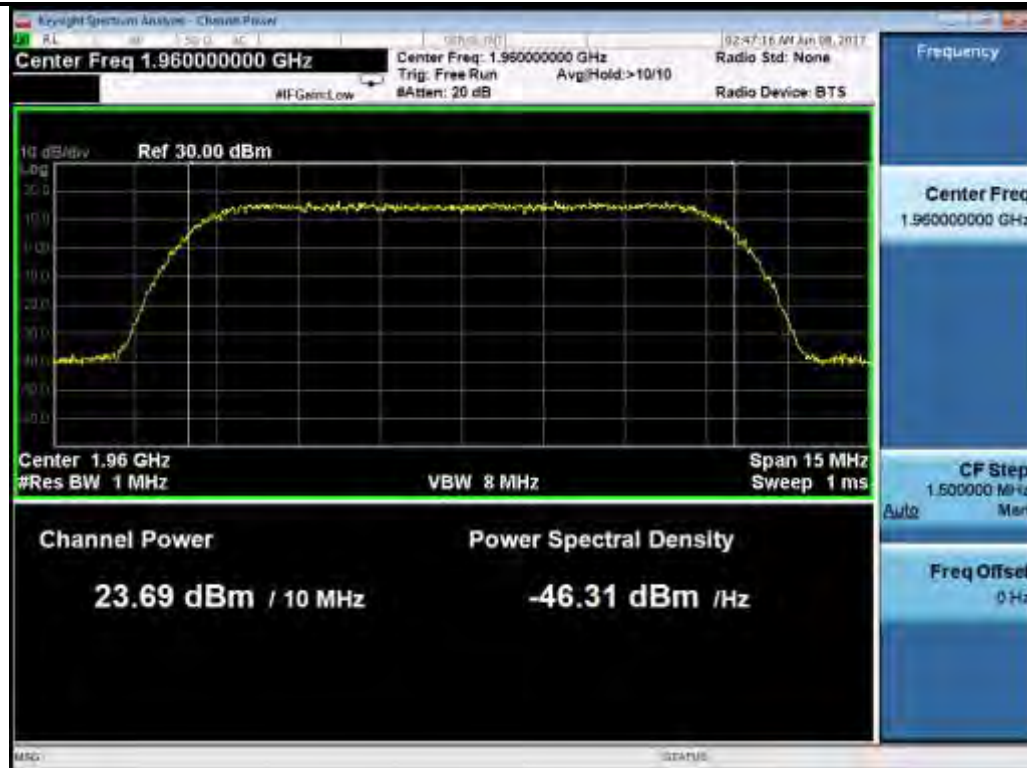


5M QPSK High

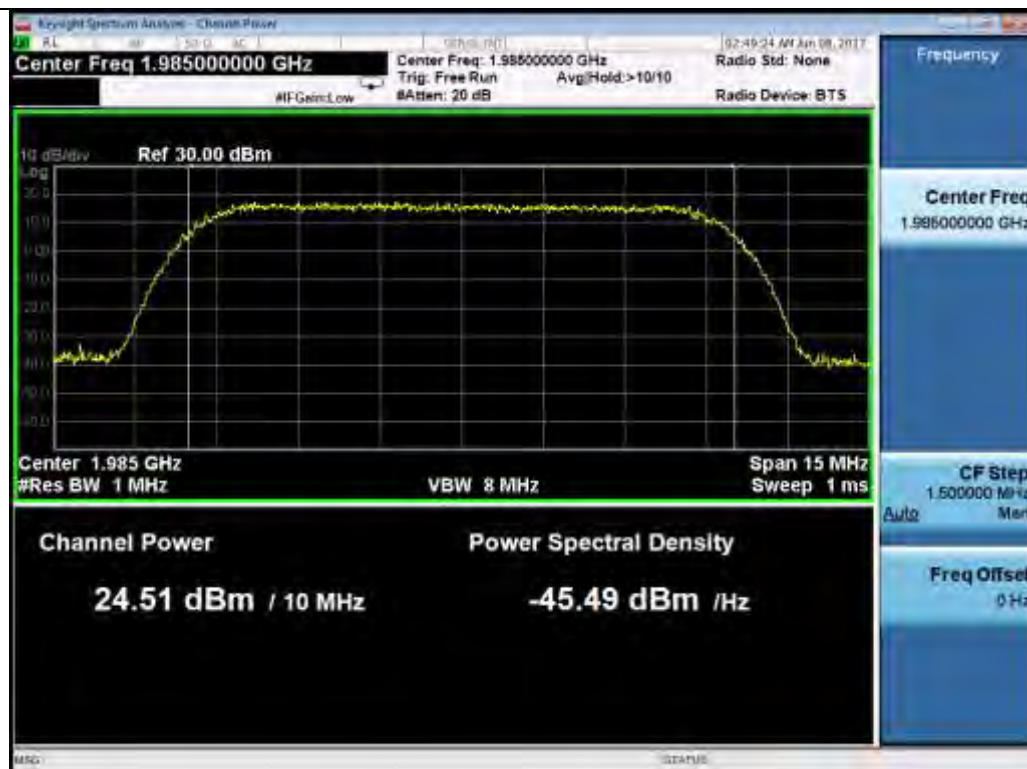


10M QPSK Low

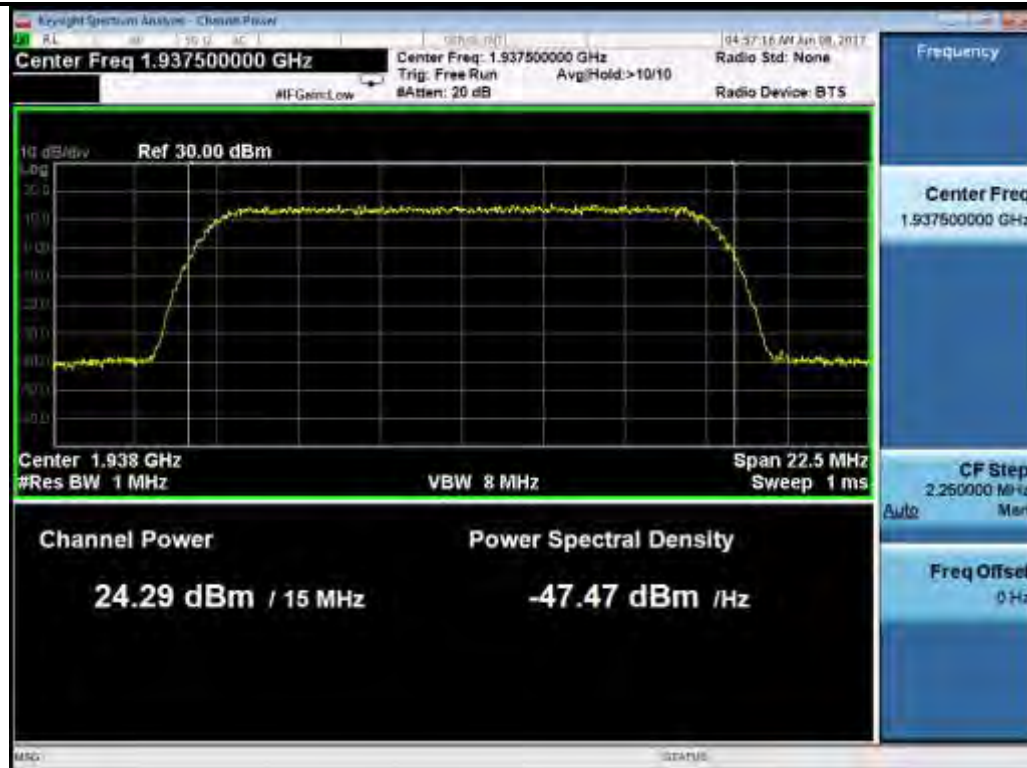




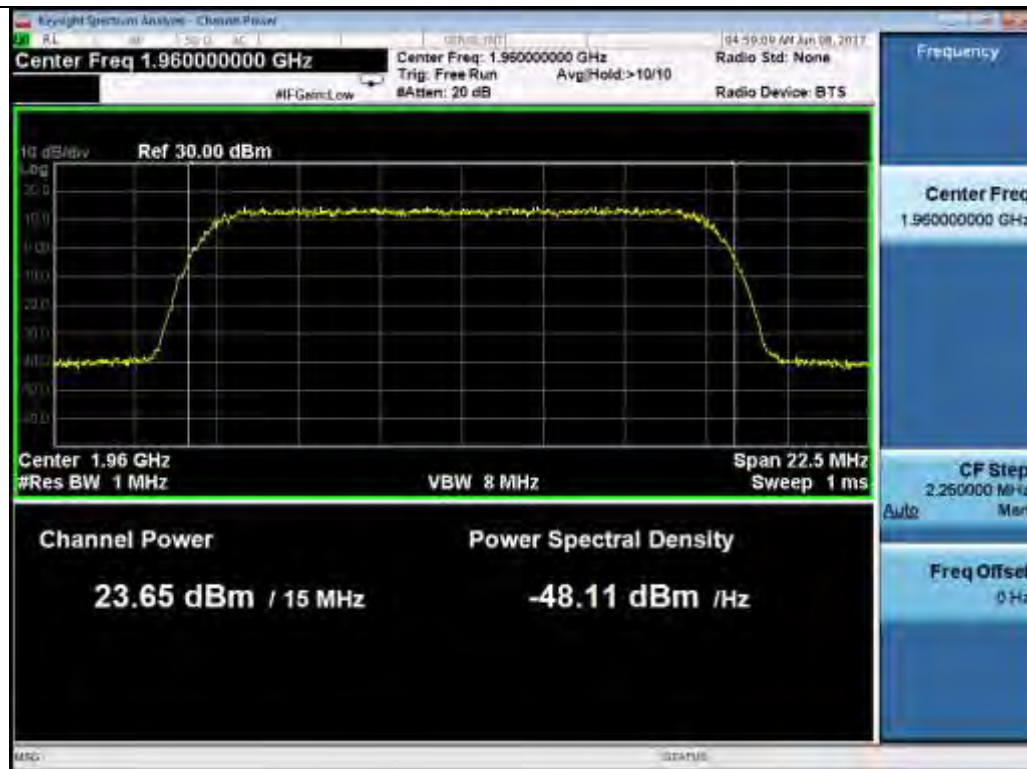
10M QPSK Mid



10M QPSK High

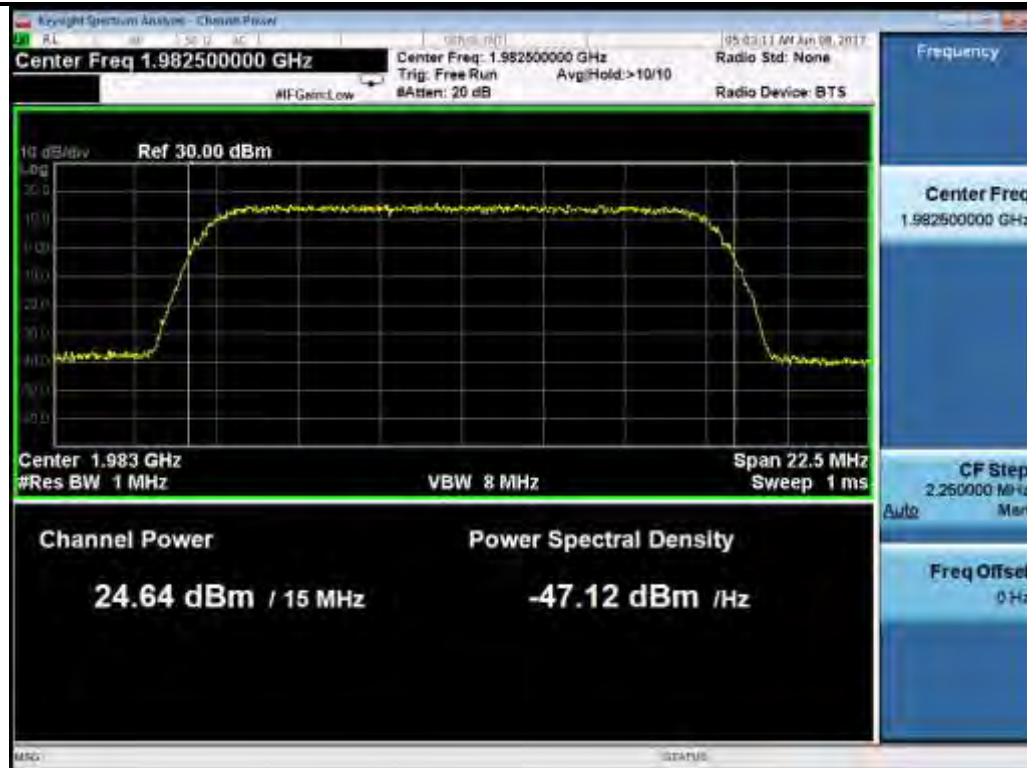


15M QPSK Low

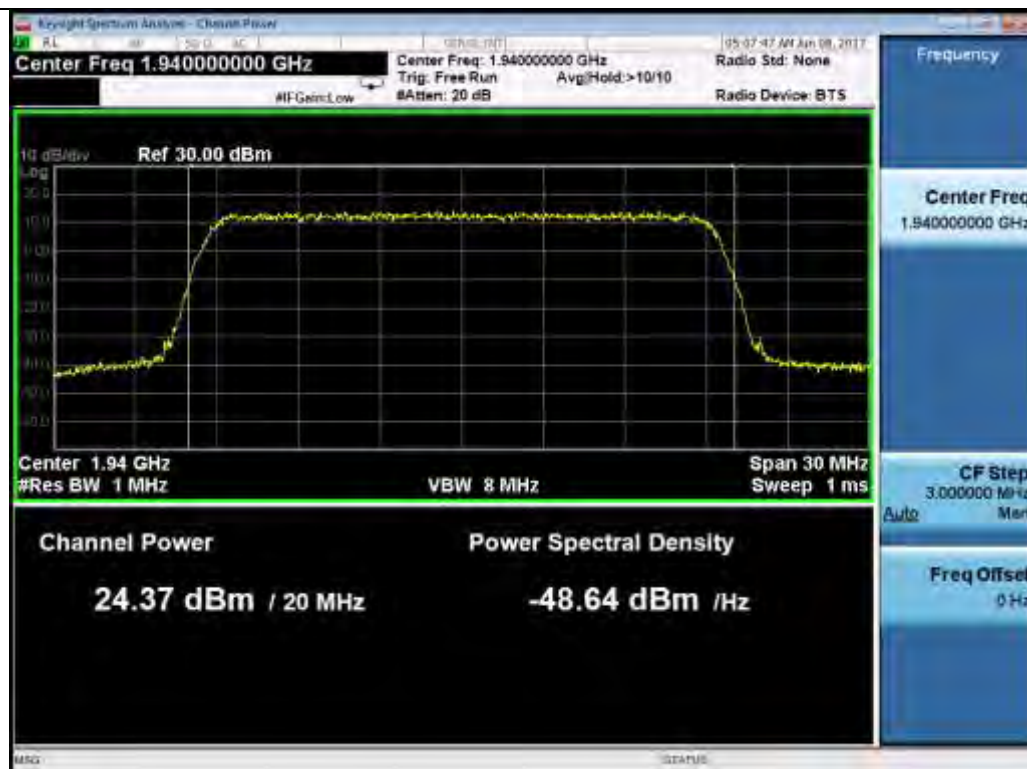


15M QPSK Mid

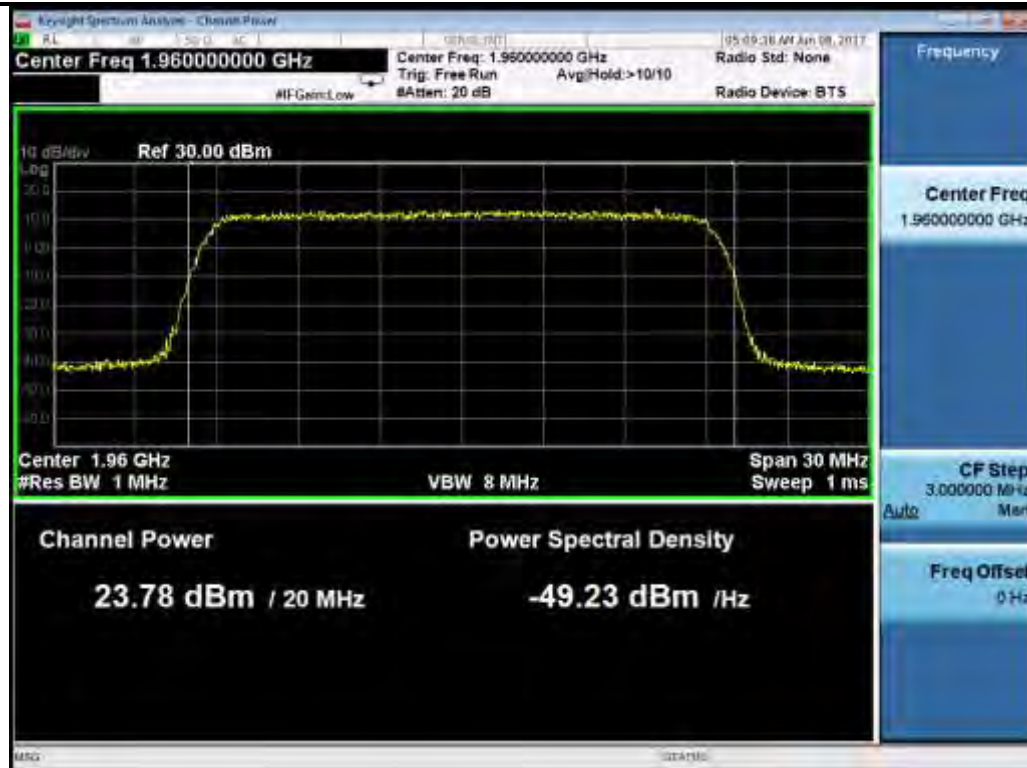




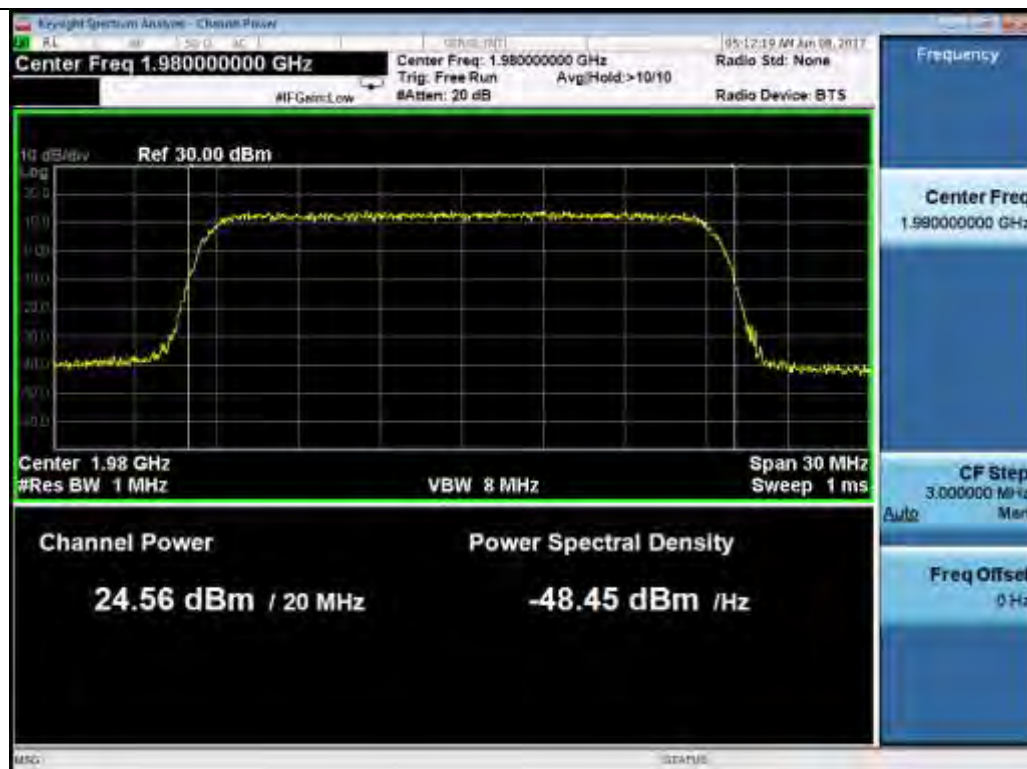
15M QPSK High



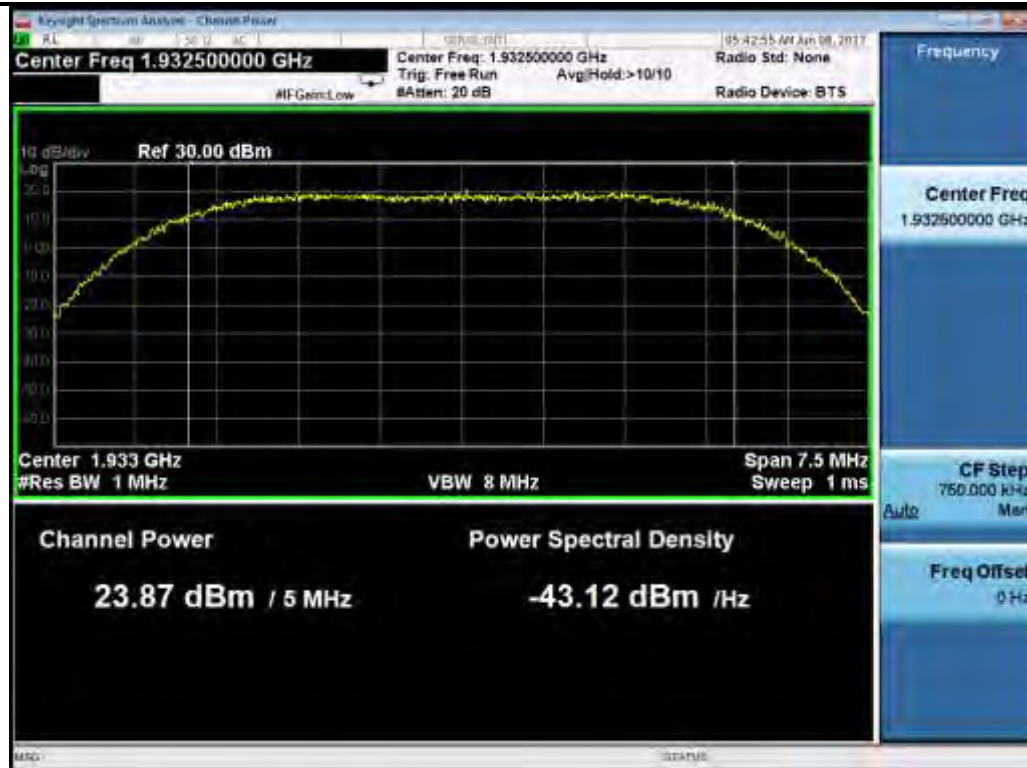
20M QPSK Low



20M QPSK Mid



20M QPSK High



5M 64QAM Low

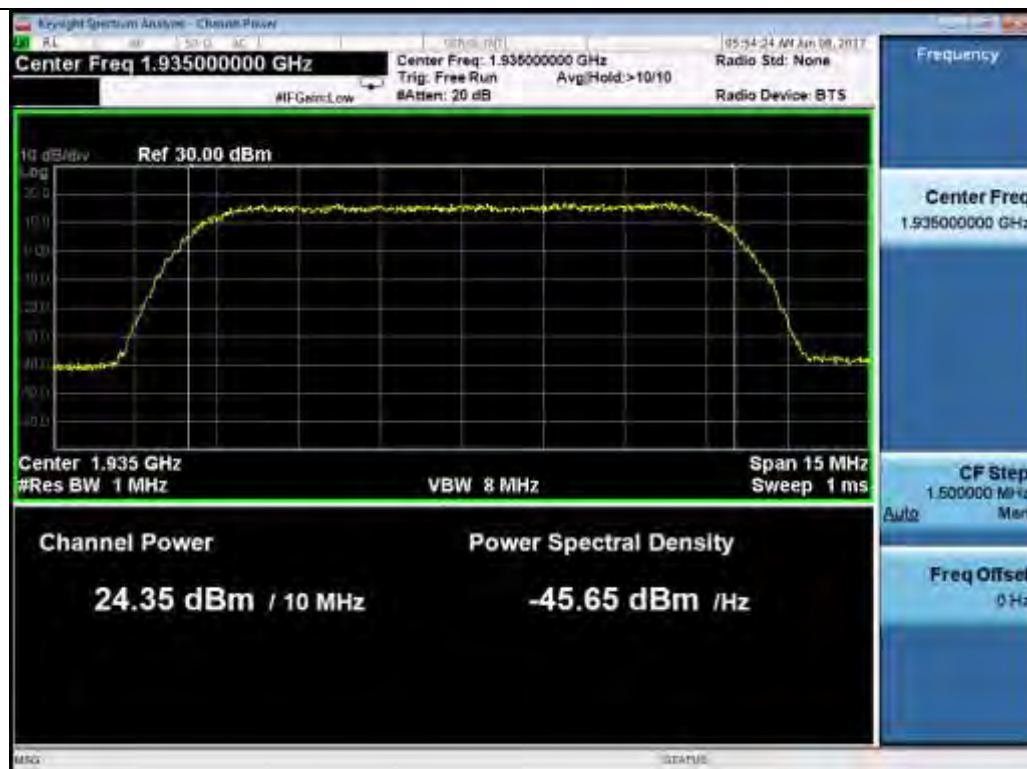


5M 64QAM Mid



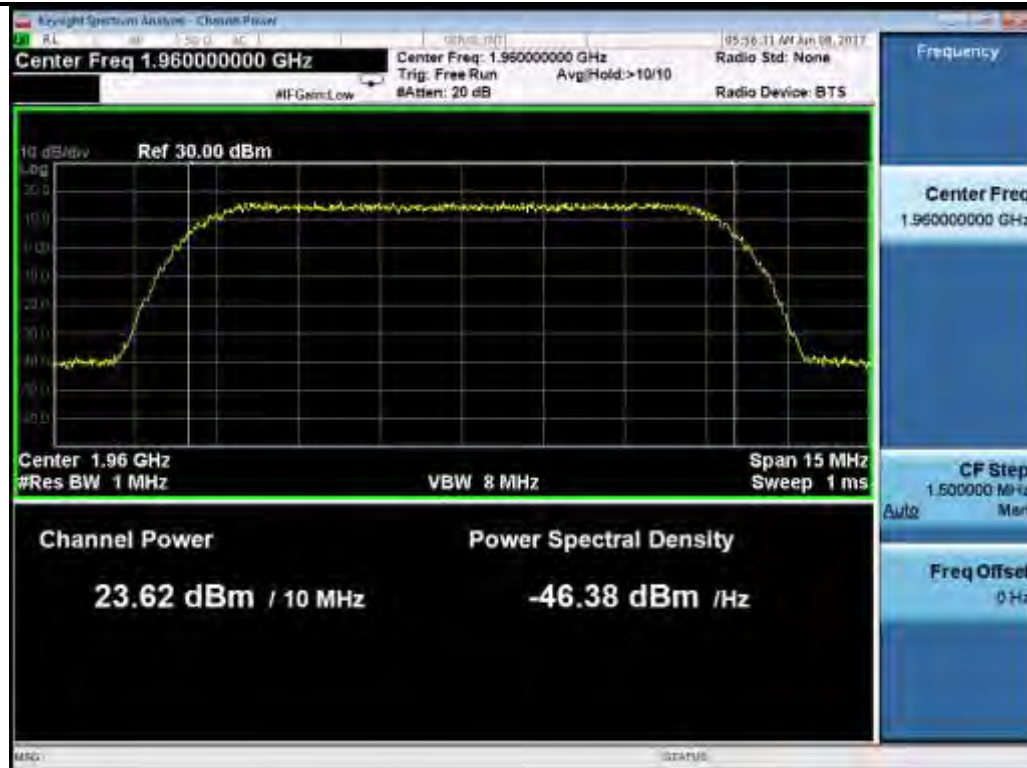


5M 64QAM High

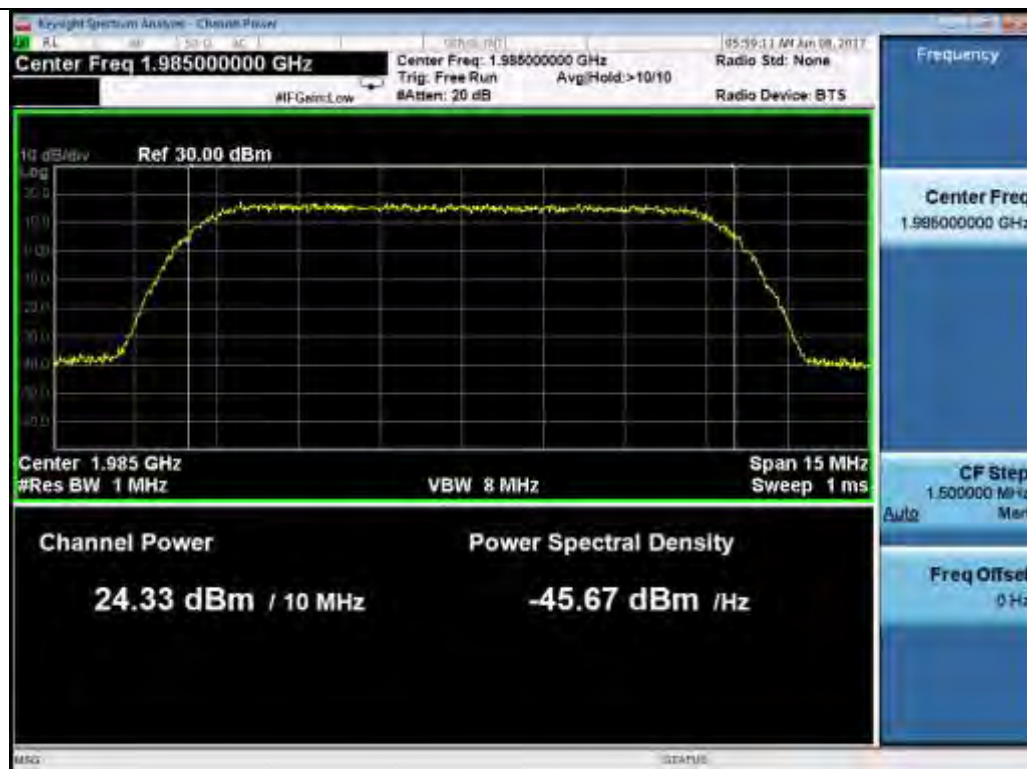


10M 64QAM Low

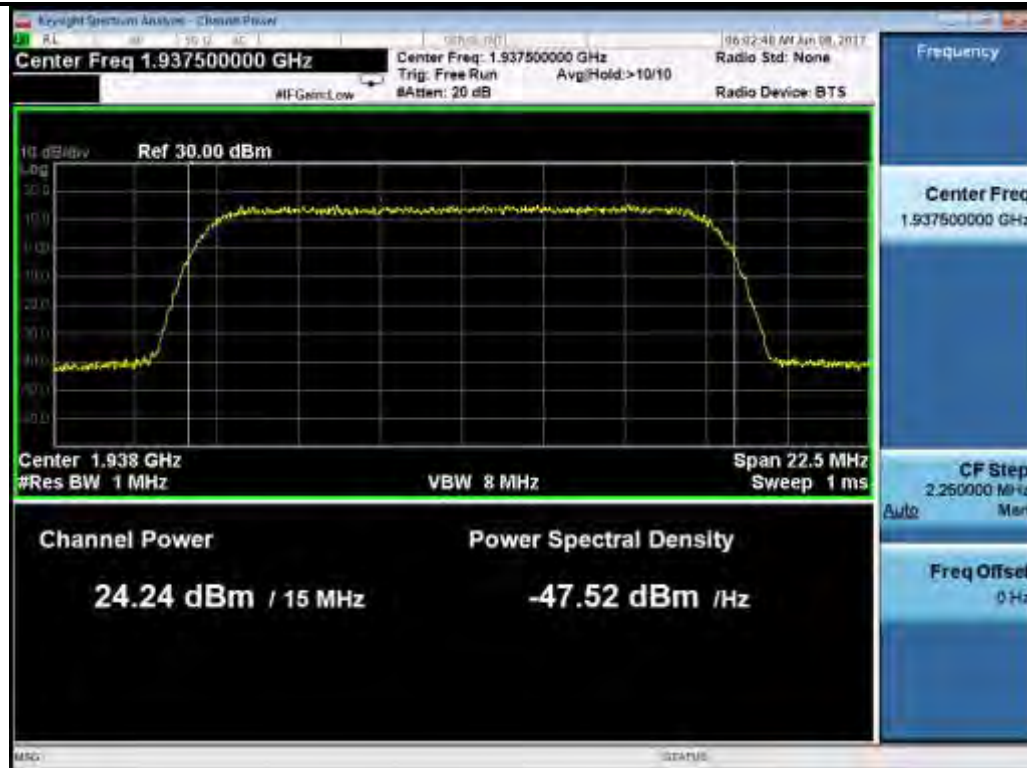




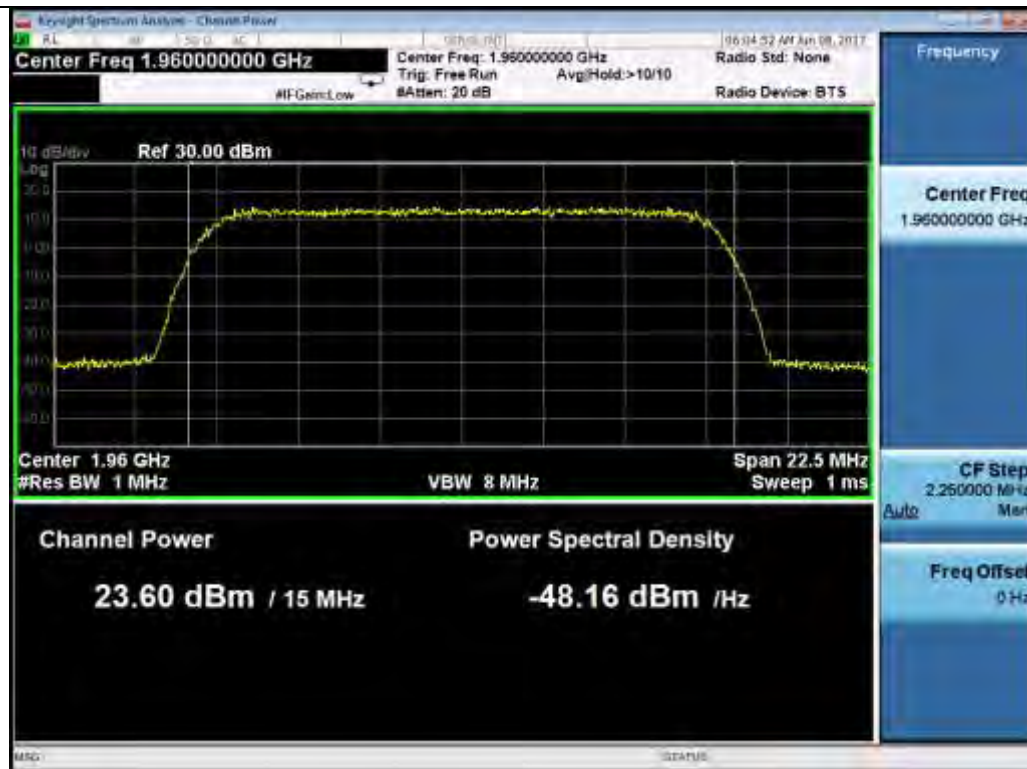
10M 64QAM Mid



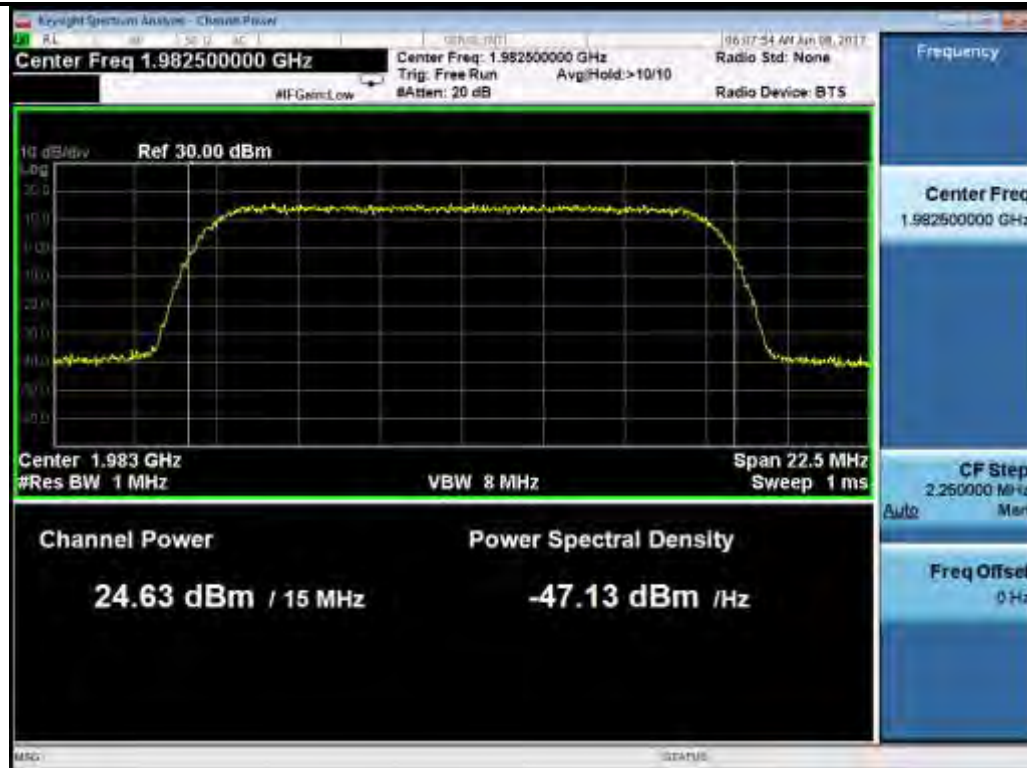
10M 64QAM High



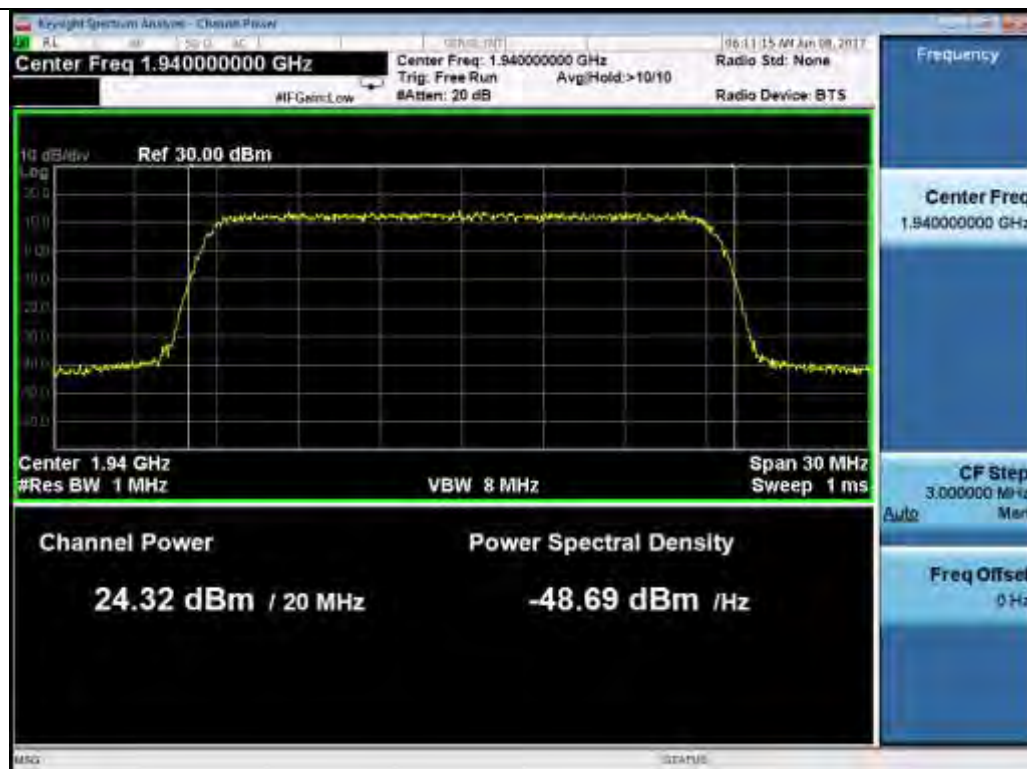
15M 64QAM Low



15M 64QAM Mid

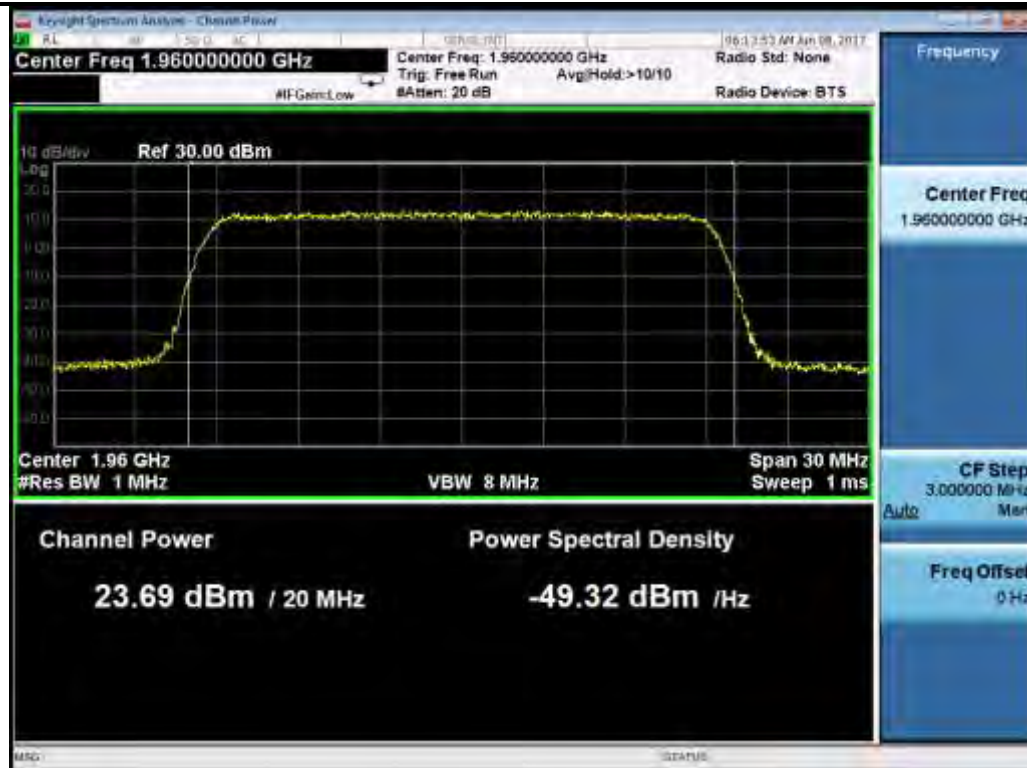


15M 64QAM High

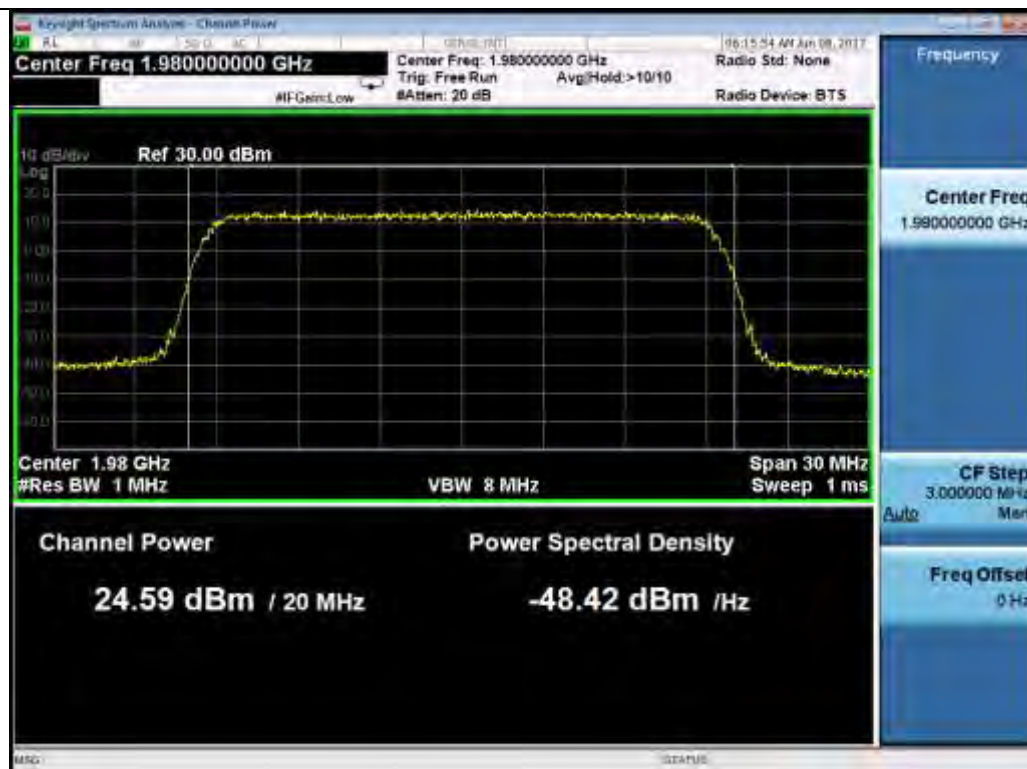


20M 64QAM Low





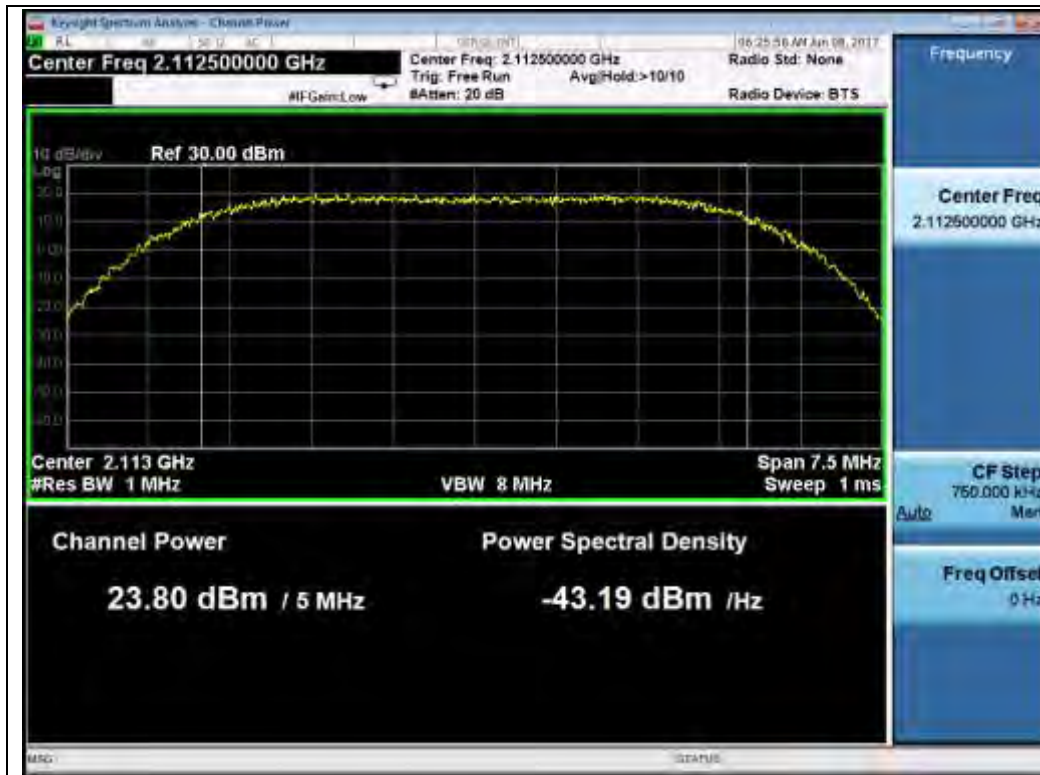
20M 64QAM Mid



20M 64QAM High



Test Plots for Band 4  
Chain 1:



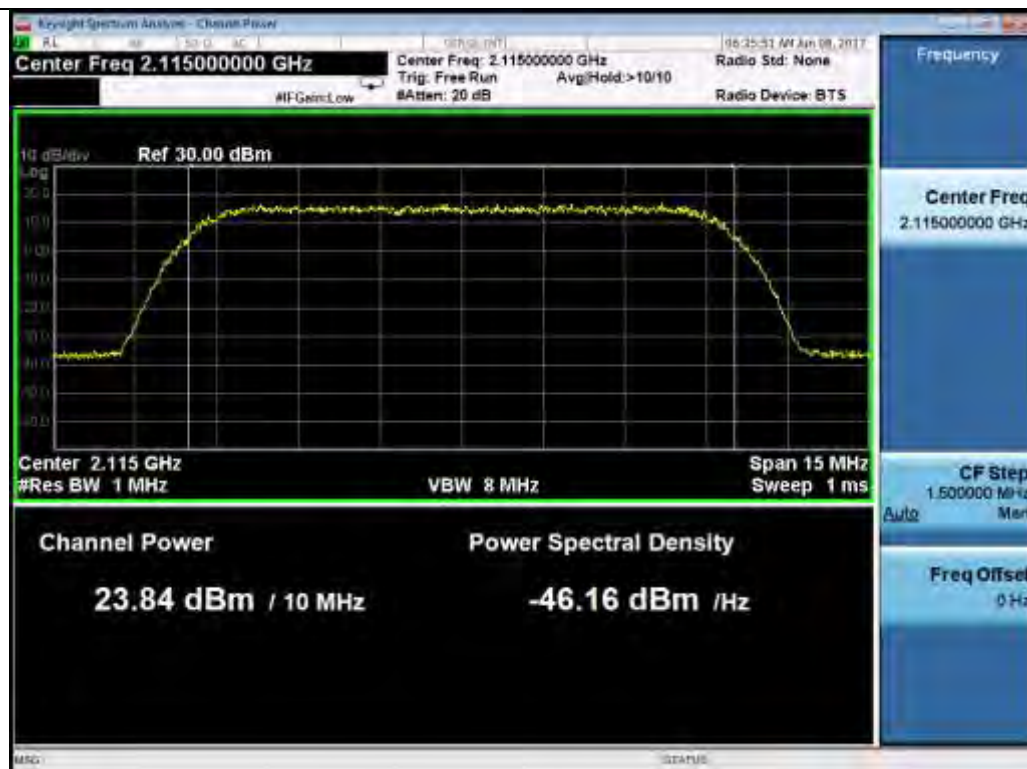
5M QPSK Low



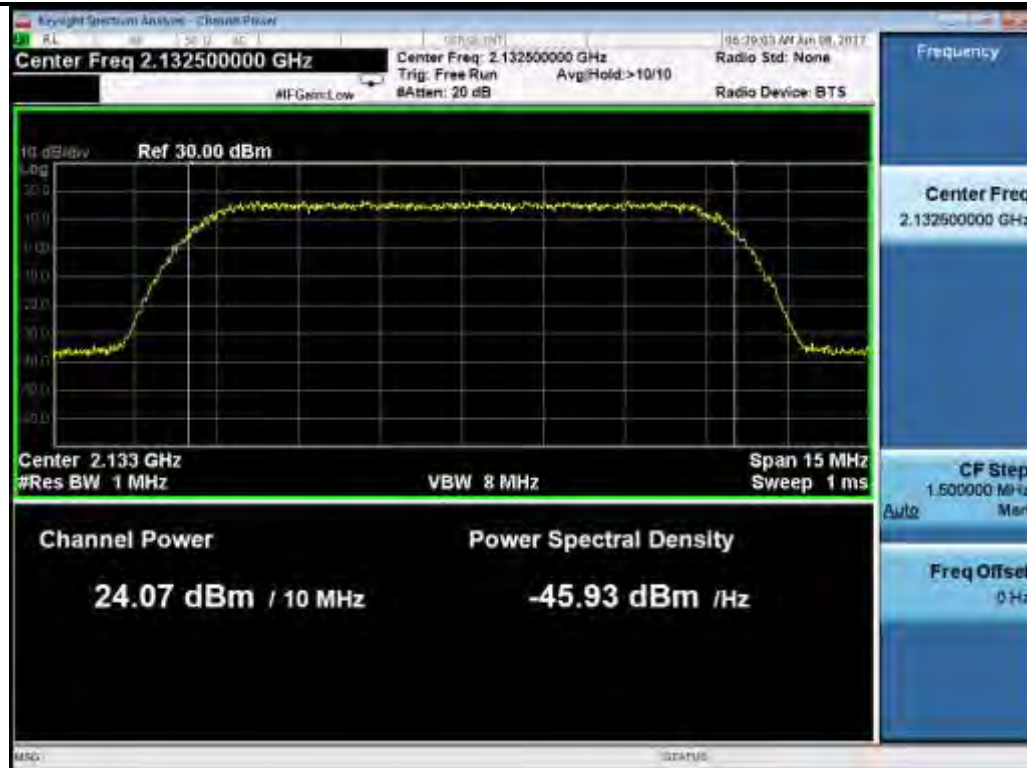
5M QPSK Mid



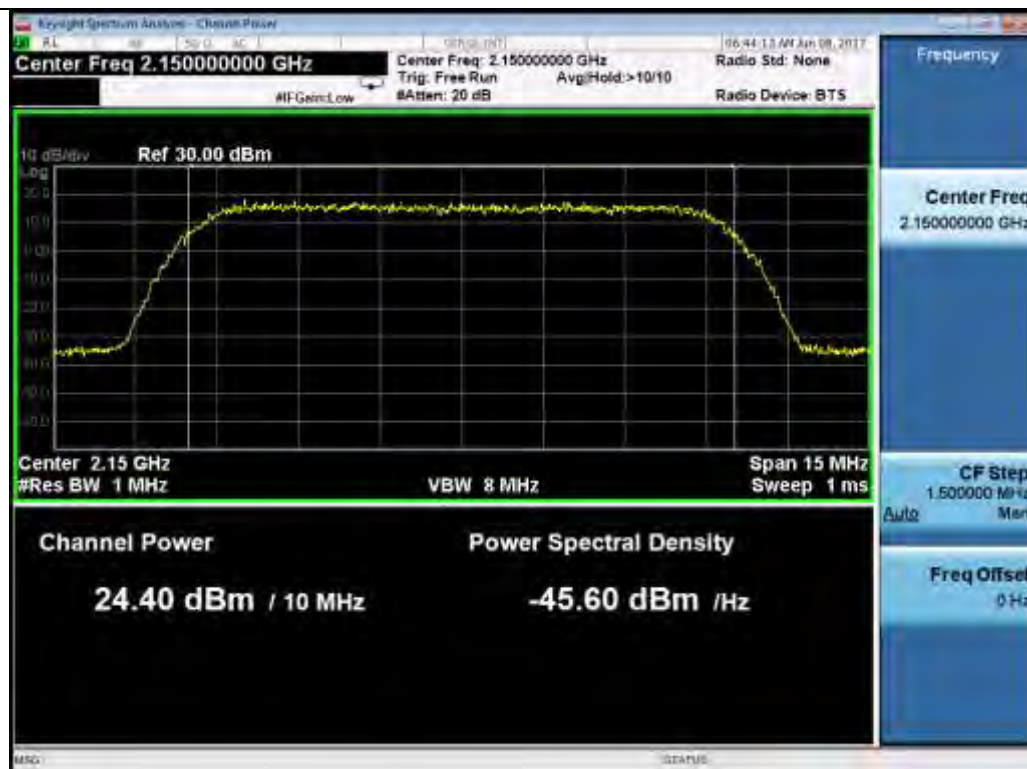
5M QPSK High



10M QPSK Low

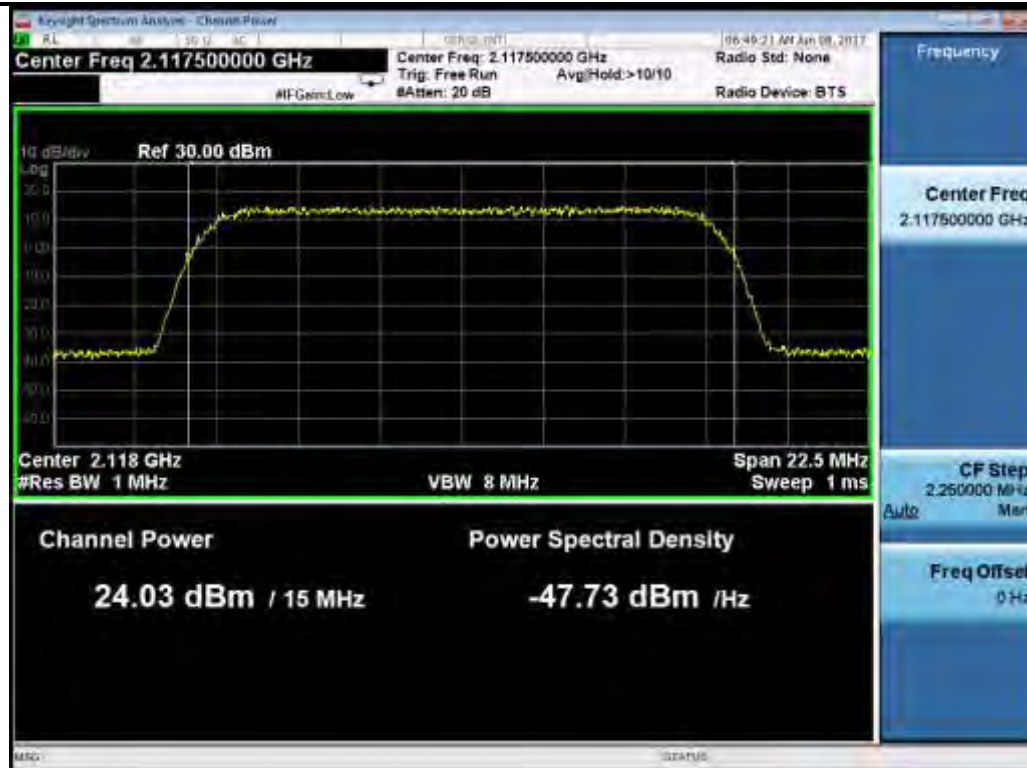


10M QPSK Mid

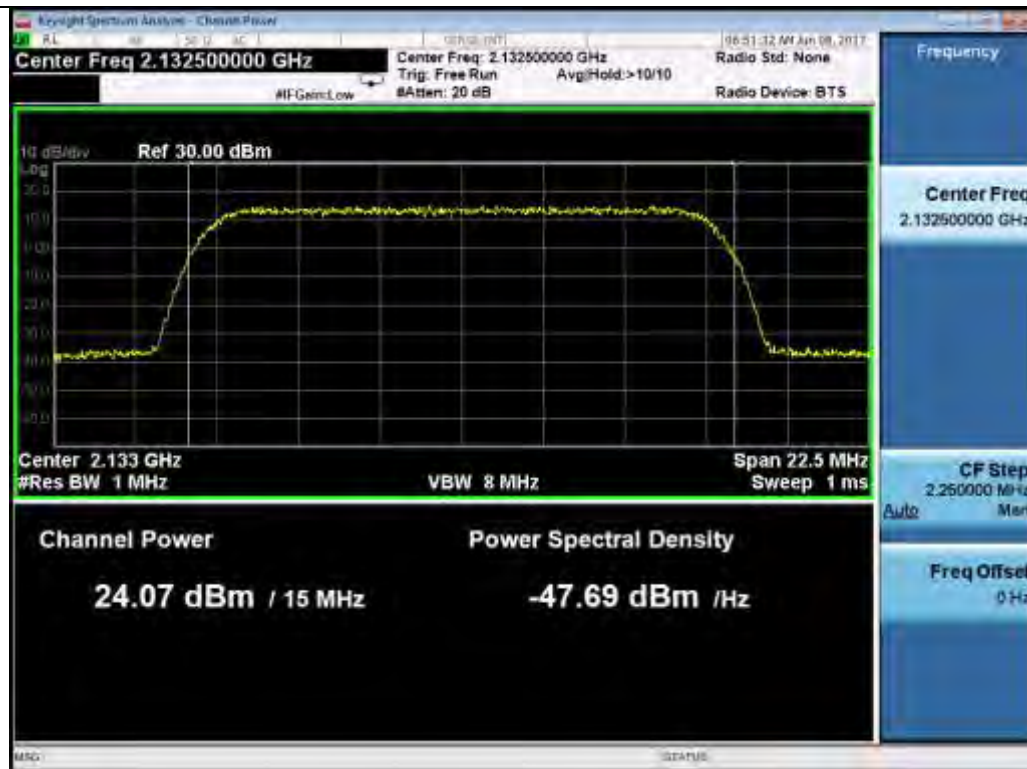


10M QPSK High



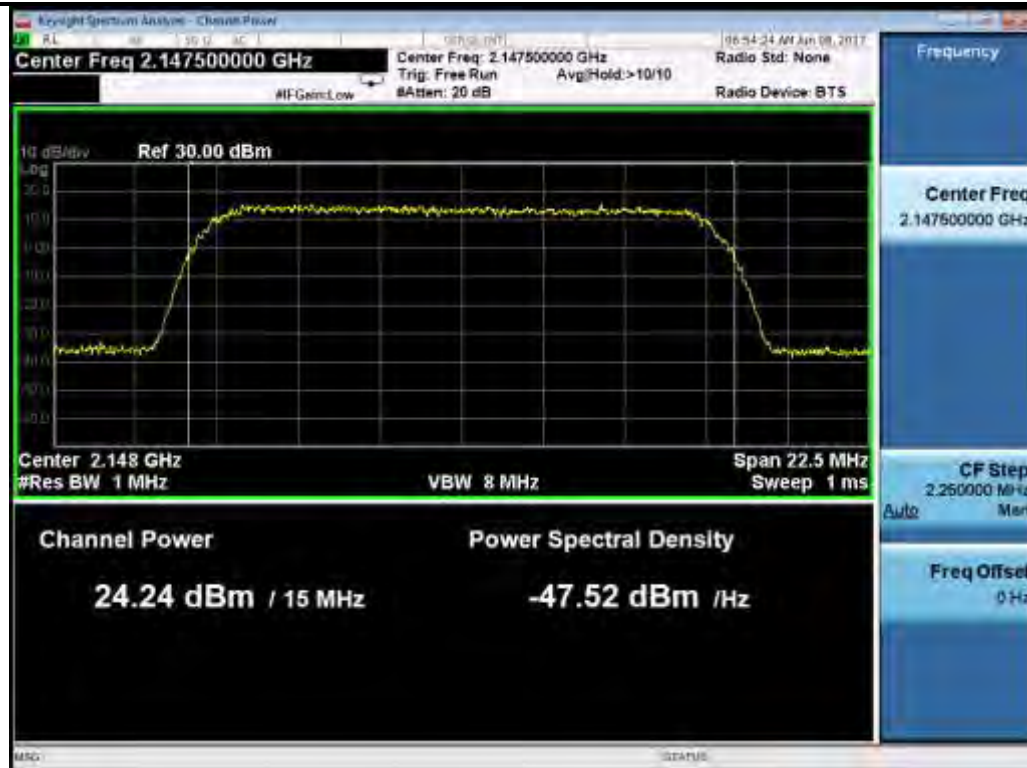


15M QPSK Low

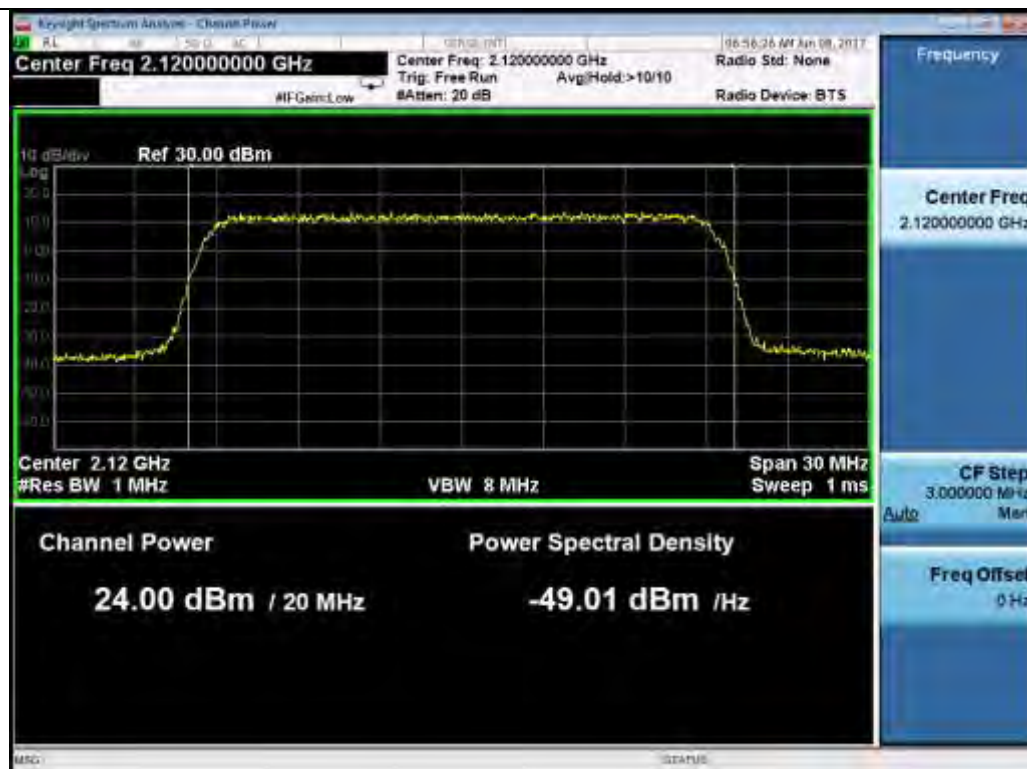


15M QPSK Mid

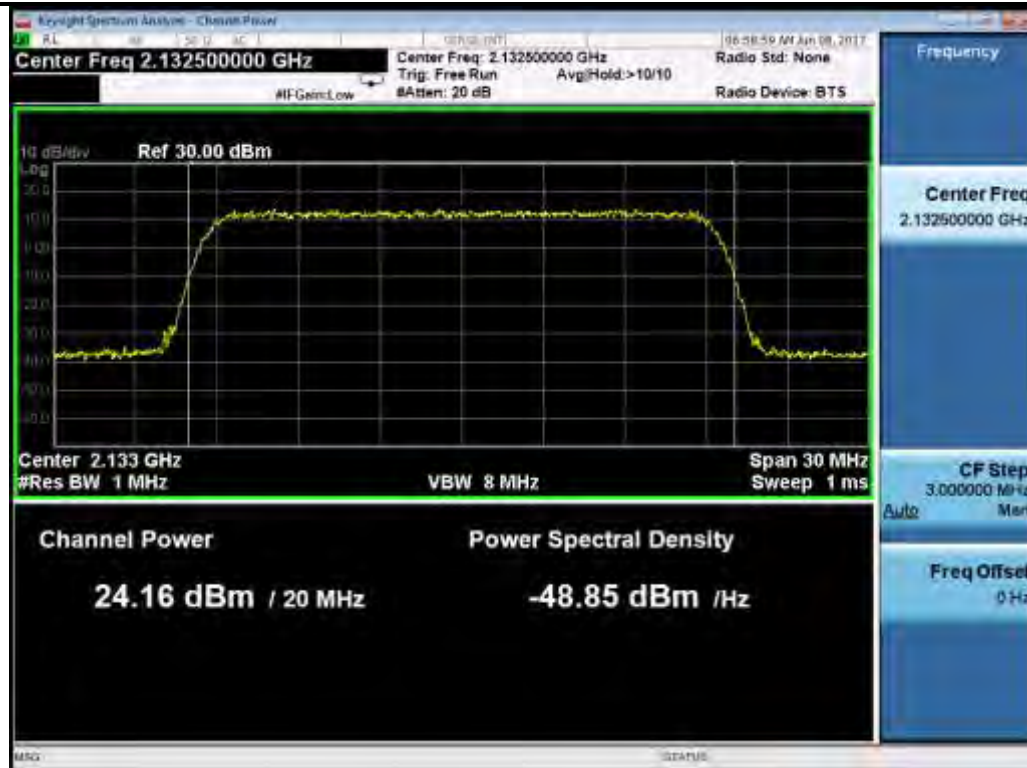




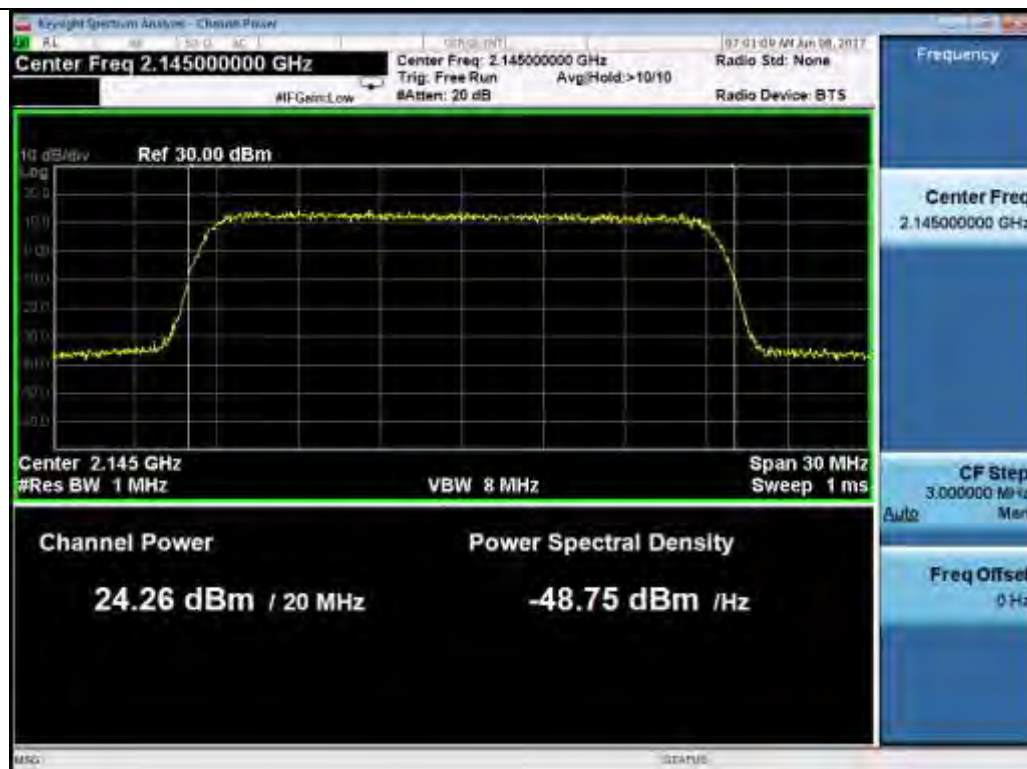
15M QPSK High



20M QPSK Low



20M QPSK Mid



20M QPSK High



5M 64QAM Low

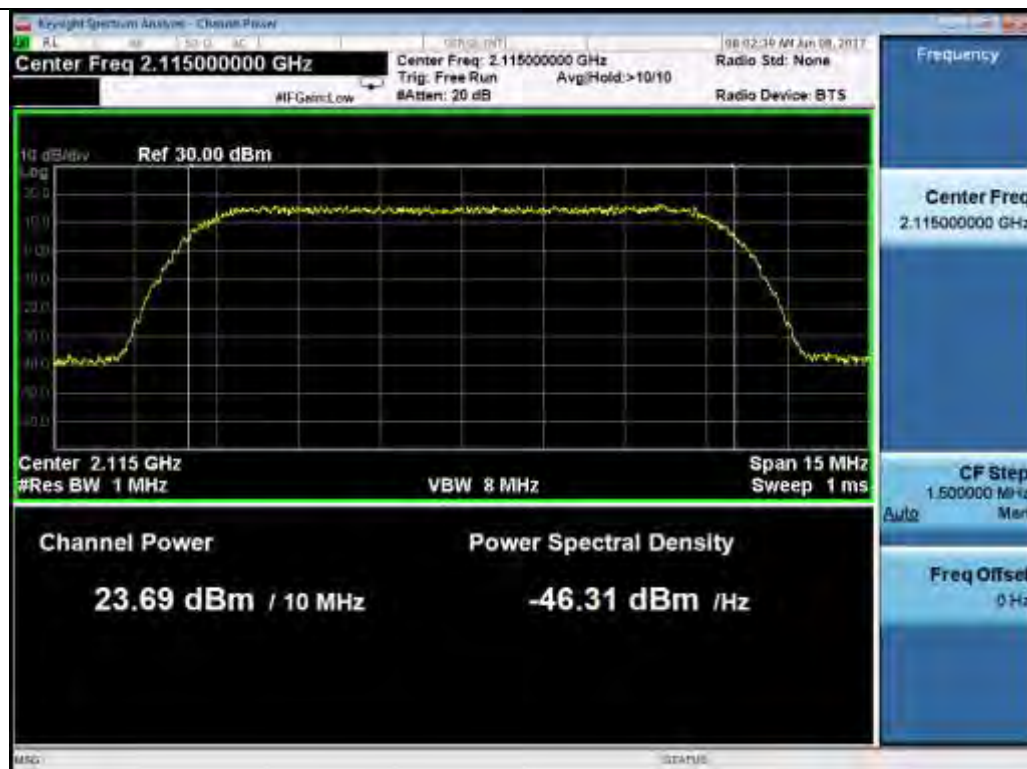


5M 64QAM Mid



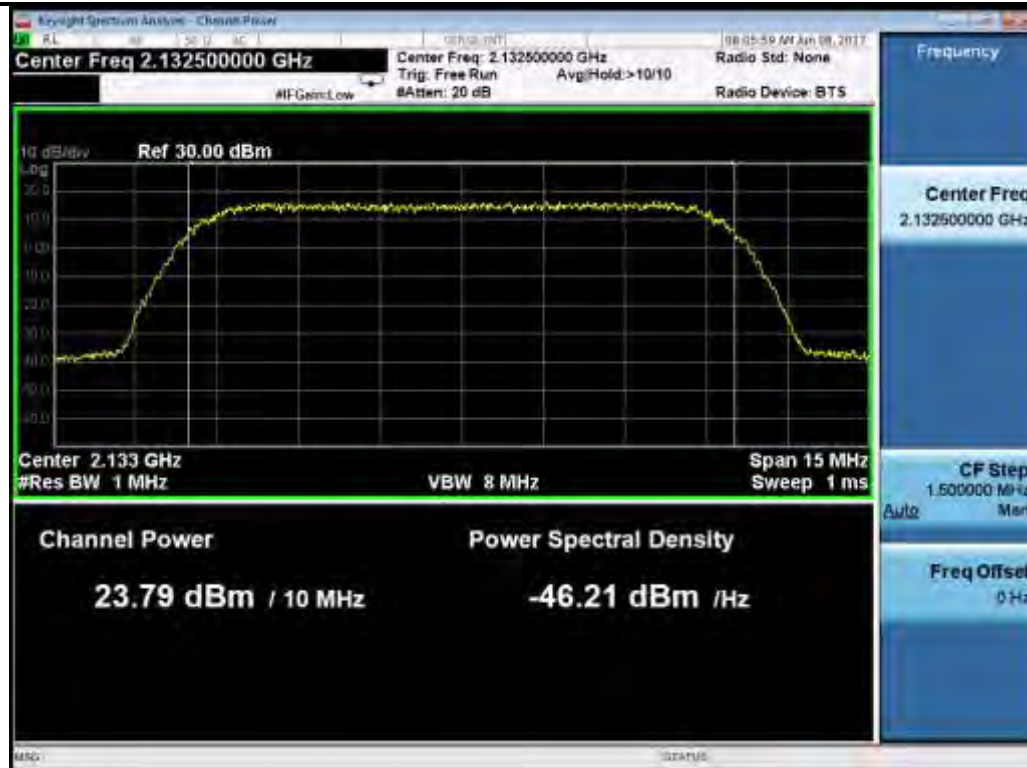


5M 64QAM High

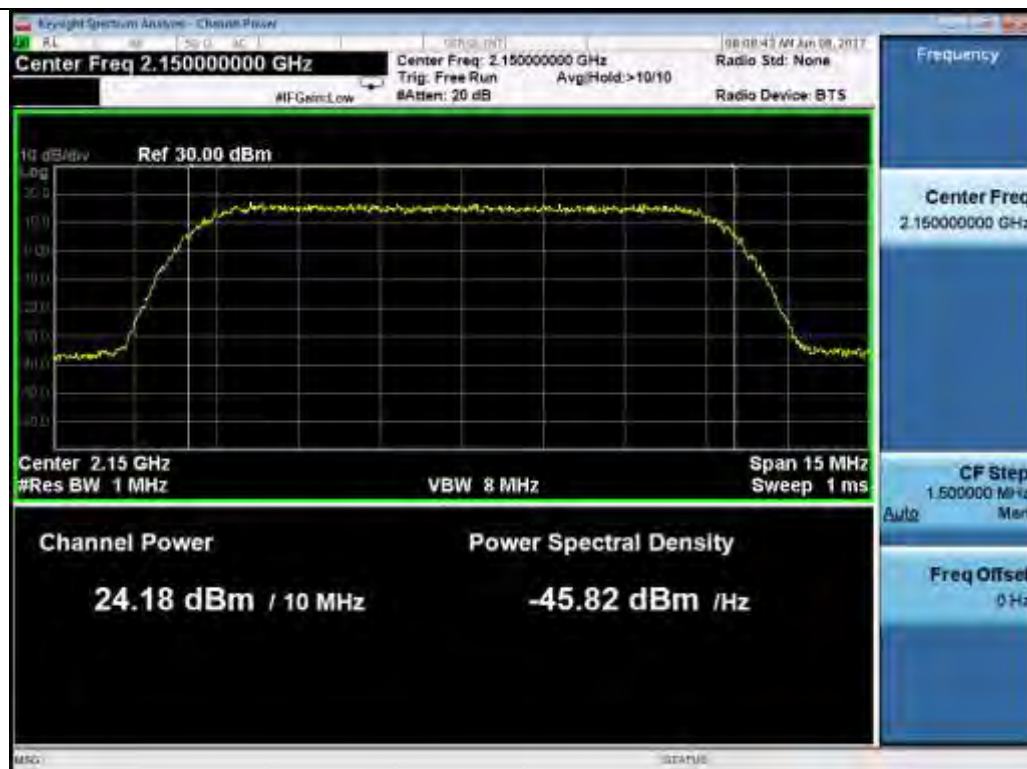


10M 64QAM Low

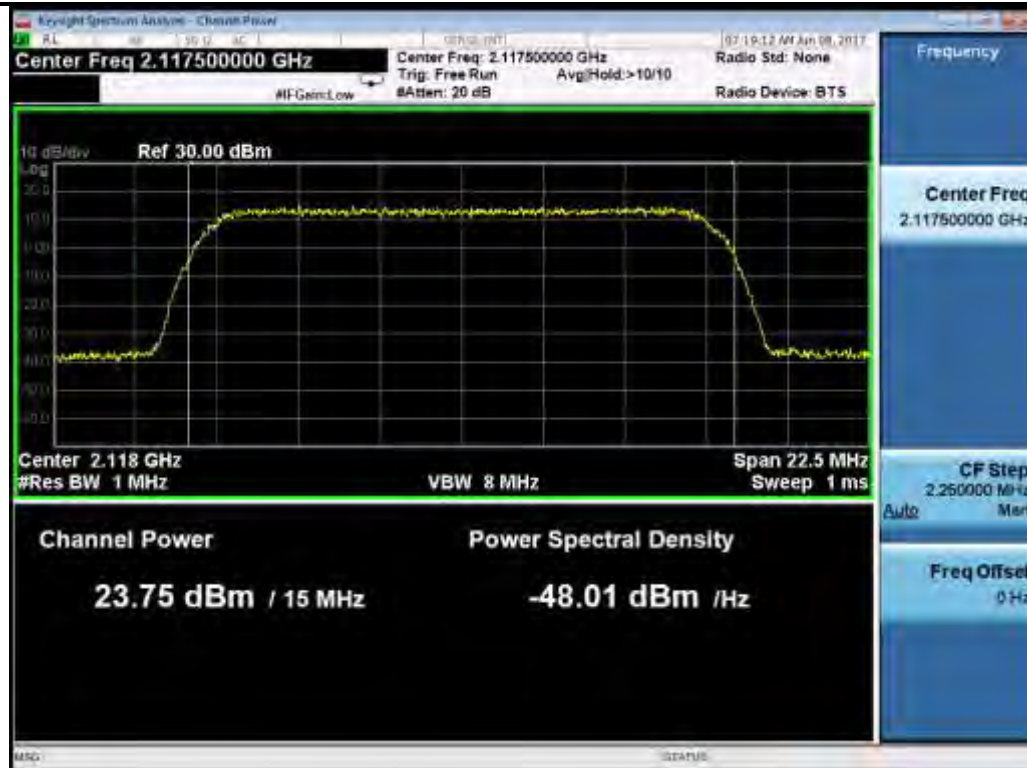




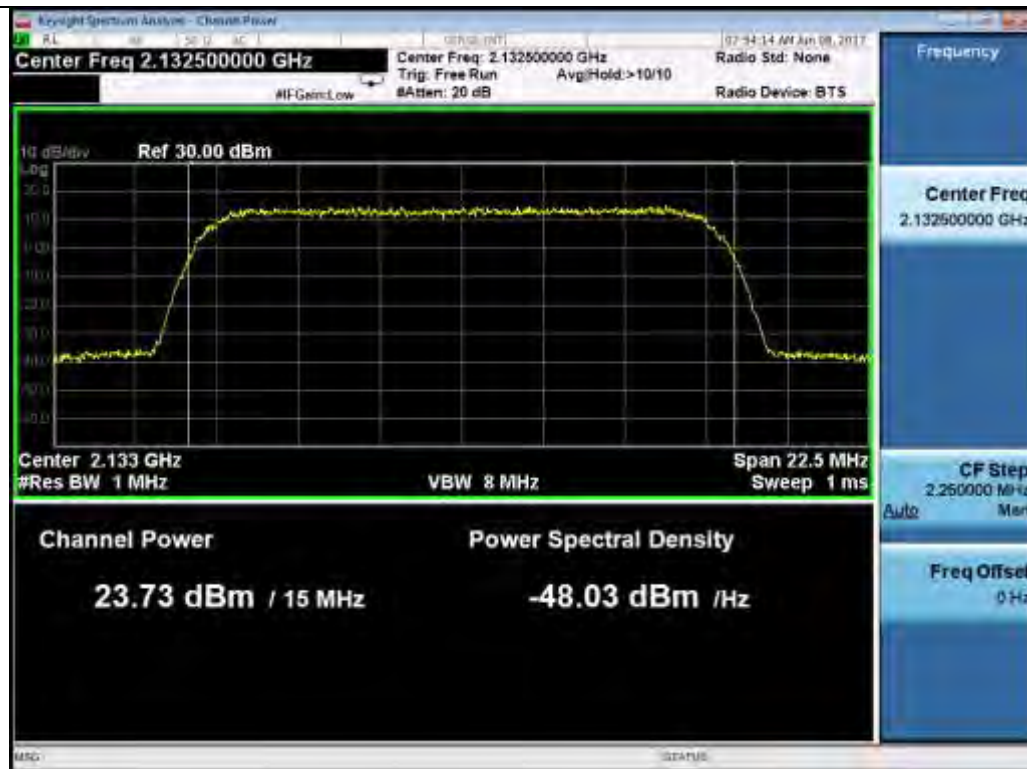
10M 64QAM Mid



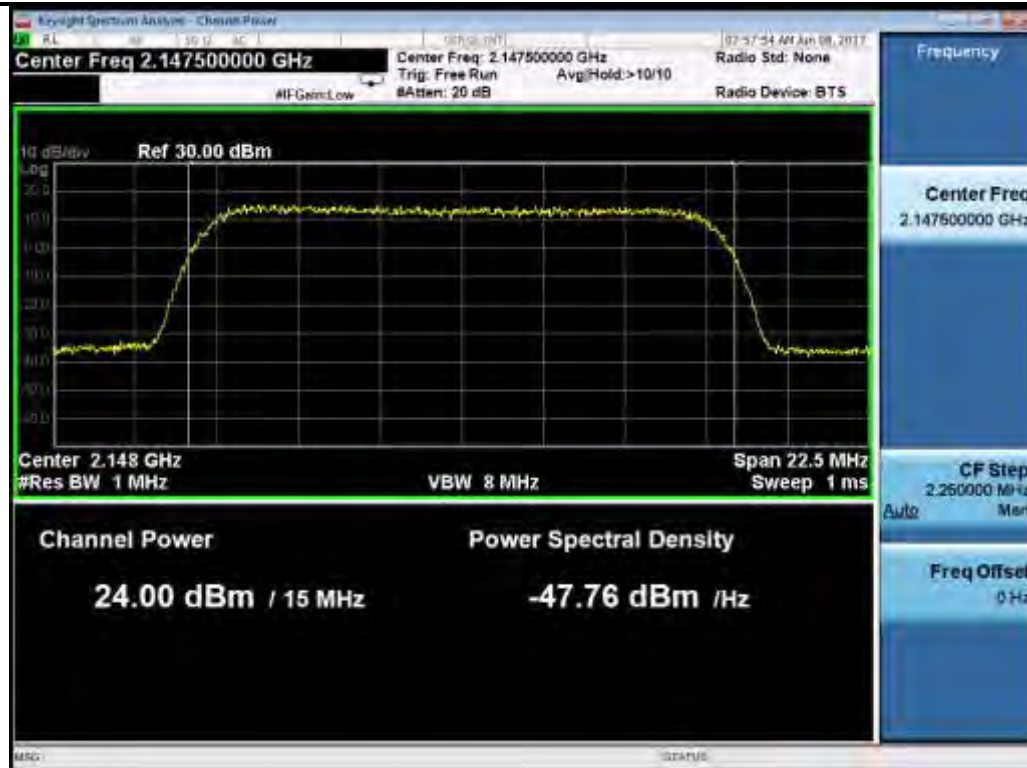
10M 64QAM High



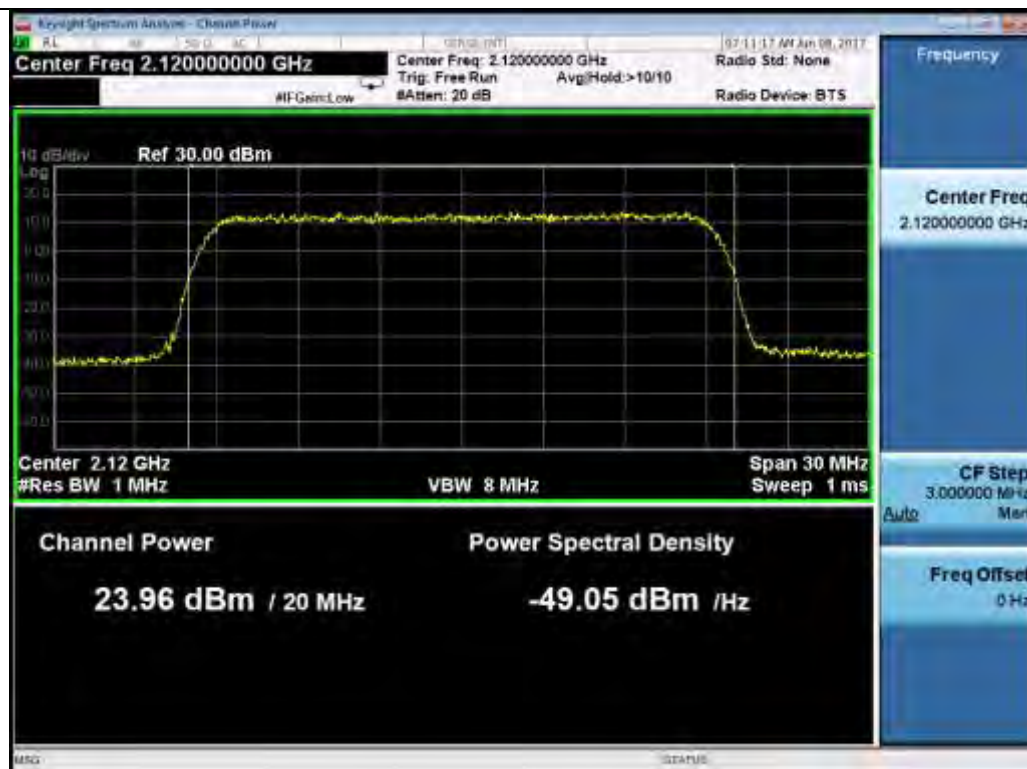
15M 64QAM Low



15M 64QAM Mid

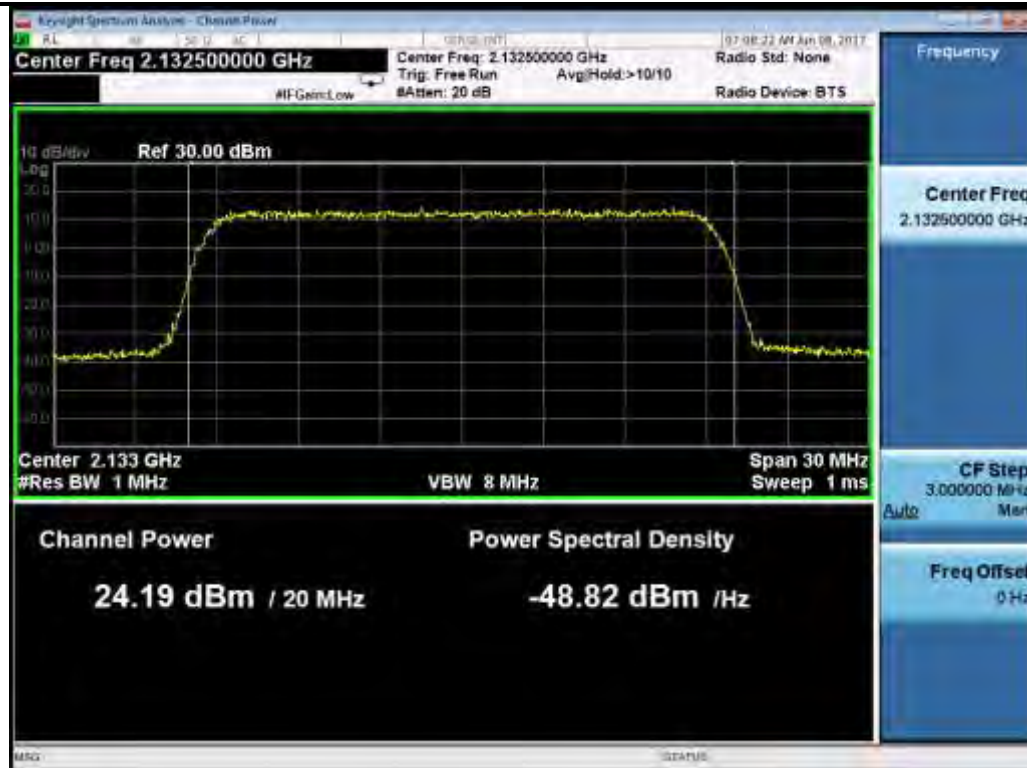


15M 64QAM High

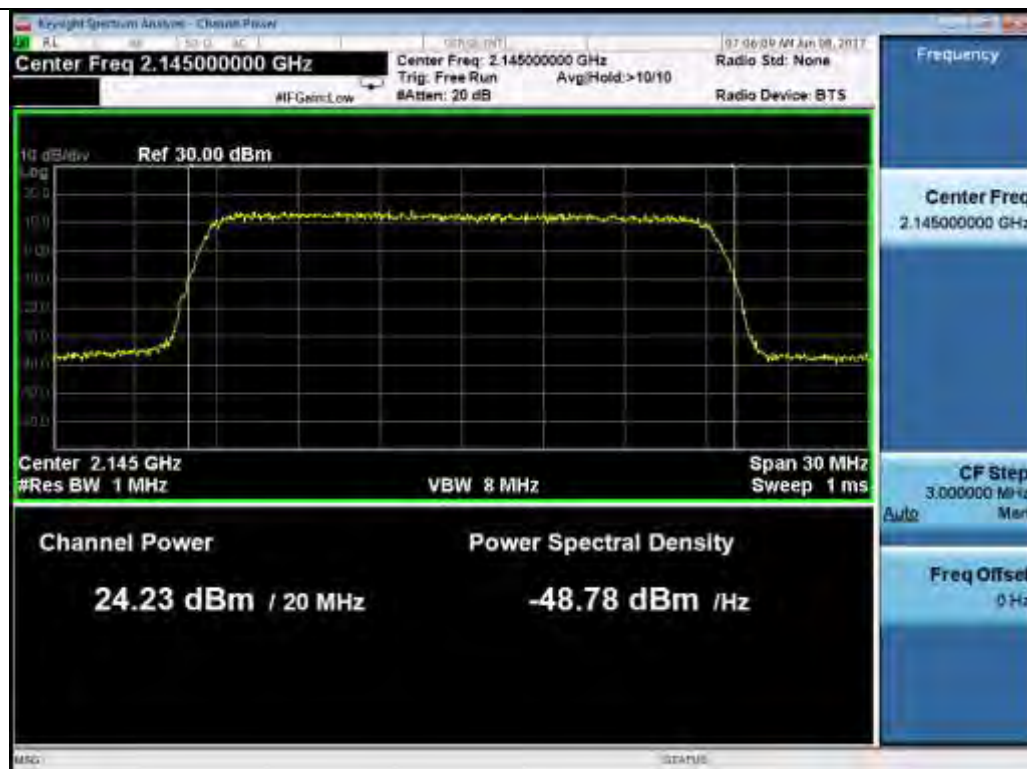


20M 64QAM Low





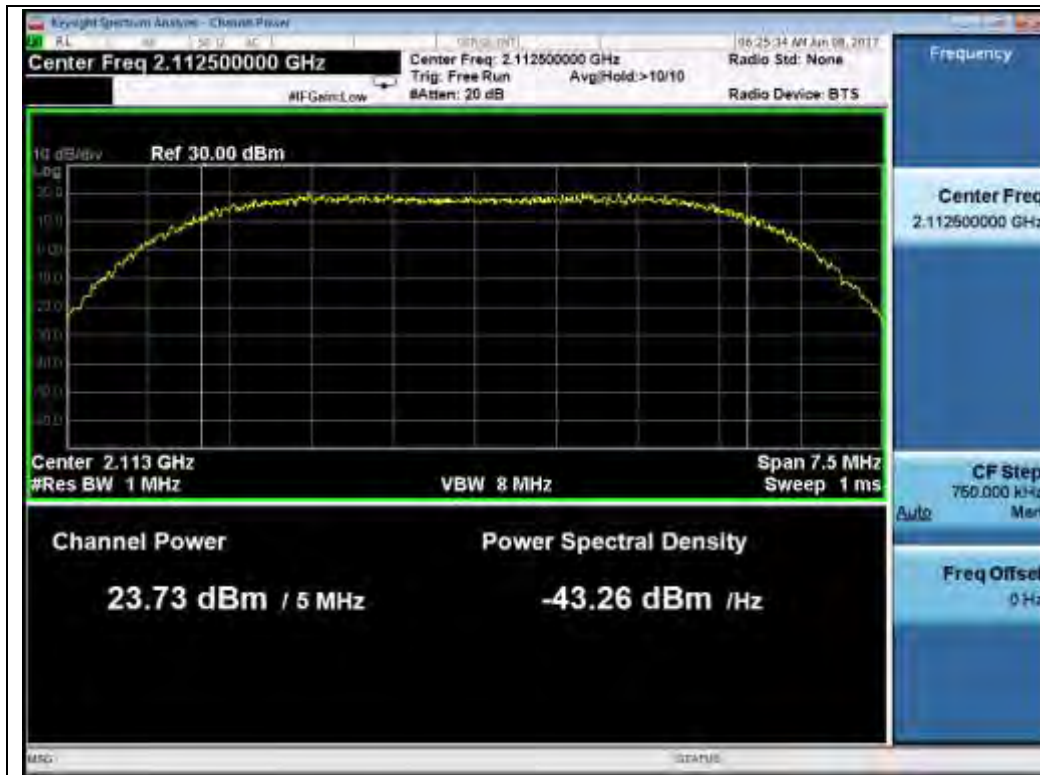
20M 64QAM Mid



20M 64QAM High



Chain 2:



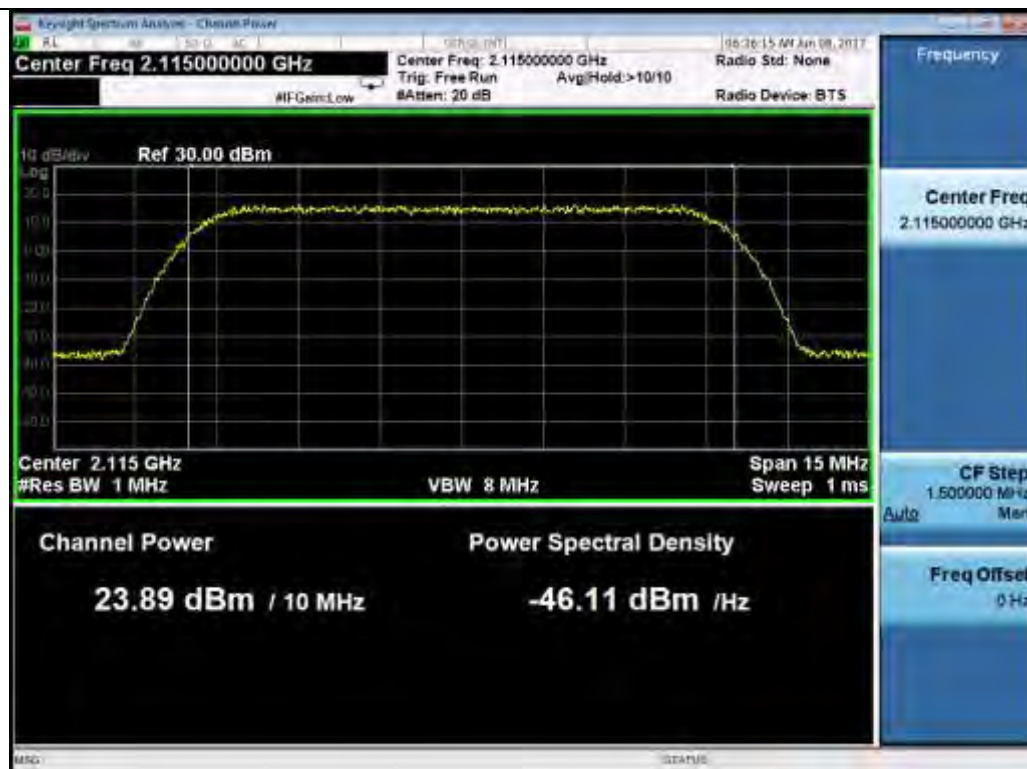
5M QPSK Low



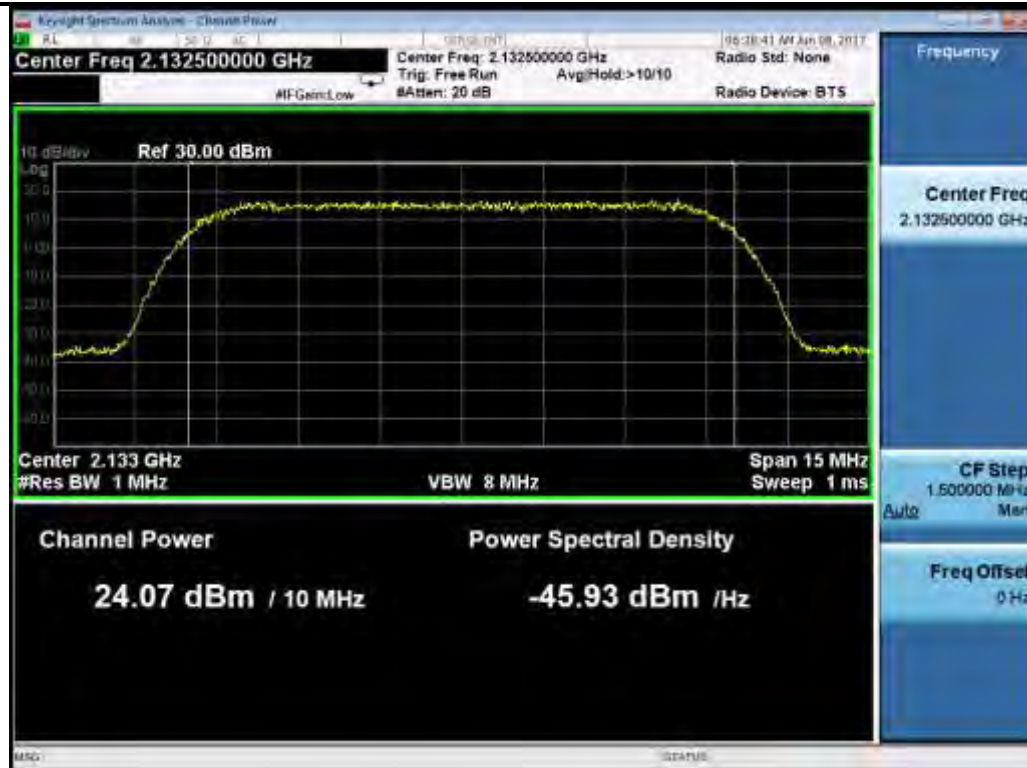
5M QPSK Mid



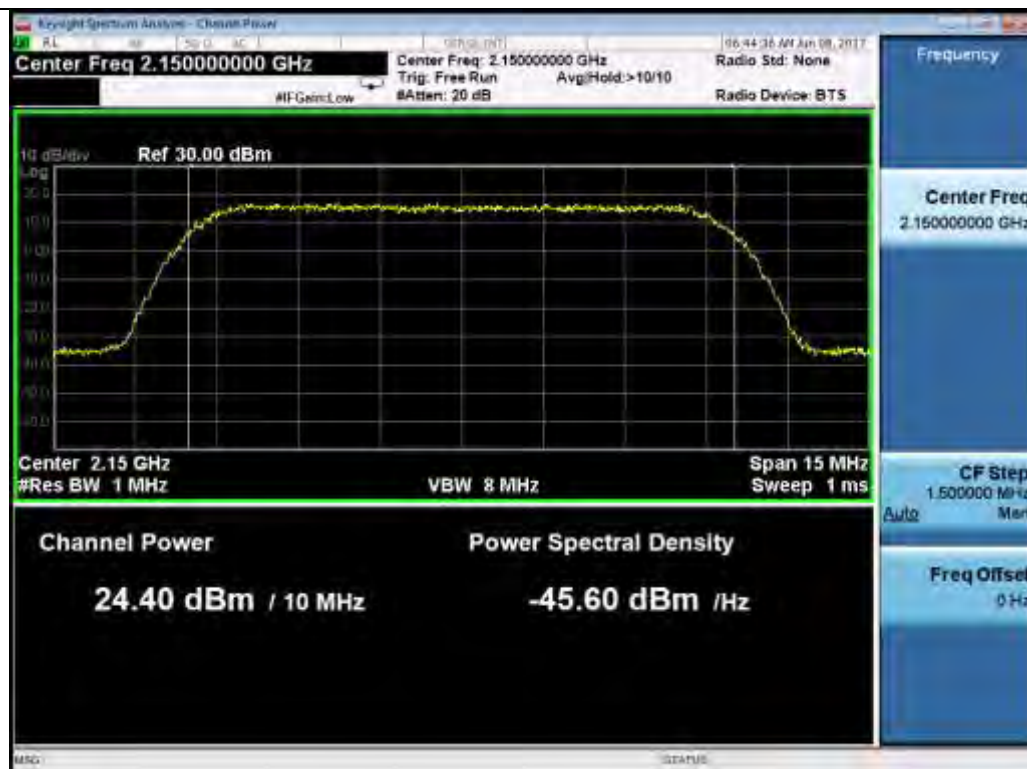
5M QPSK High



10M QPSK Low

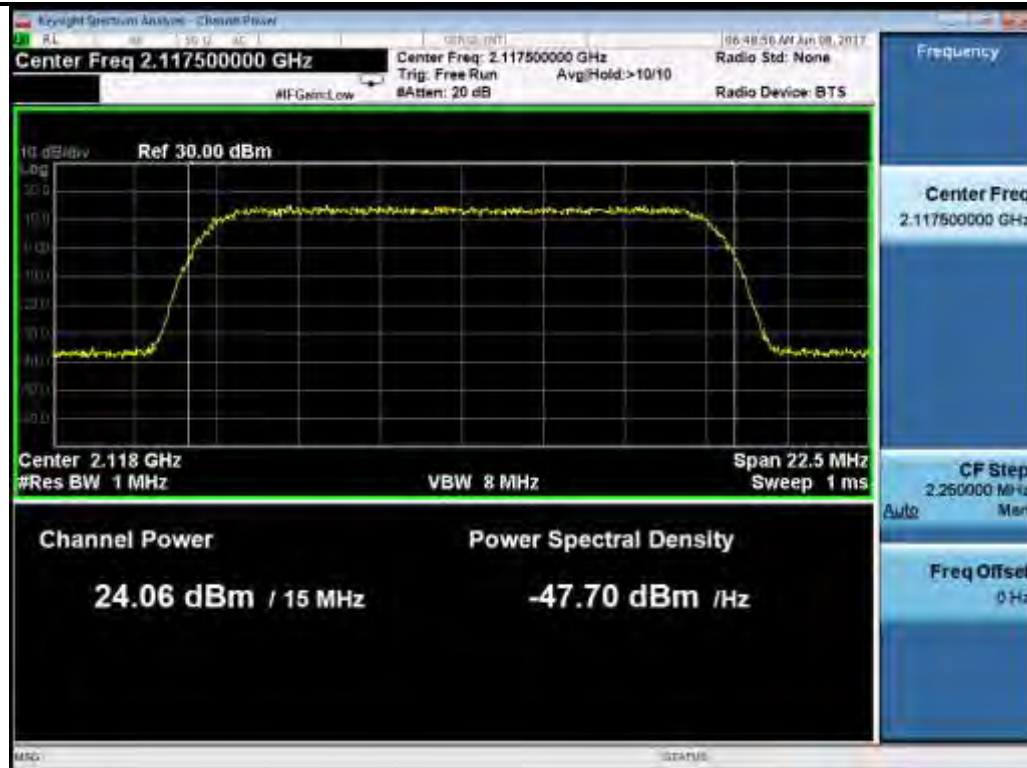


10M QPSK Mid

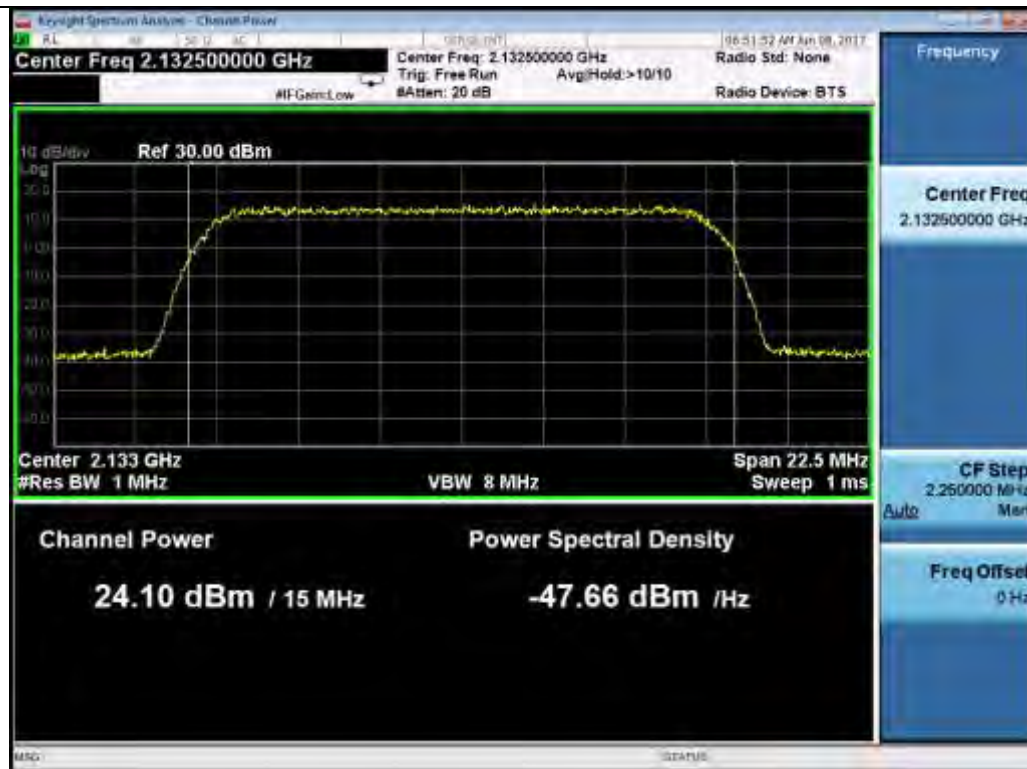


10M QPSK High



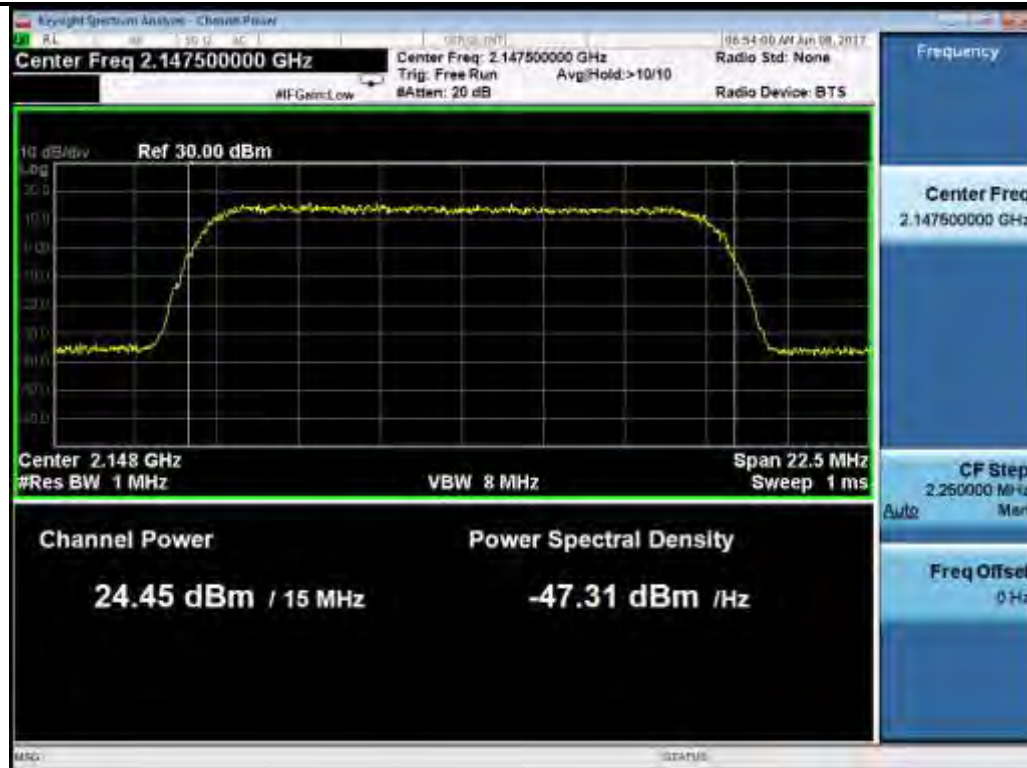


15M QPSK Low

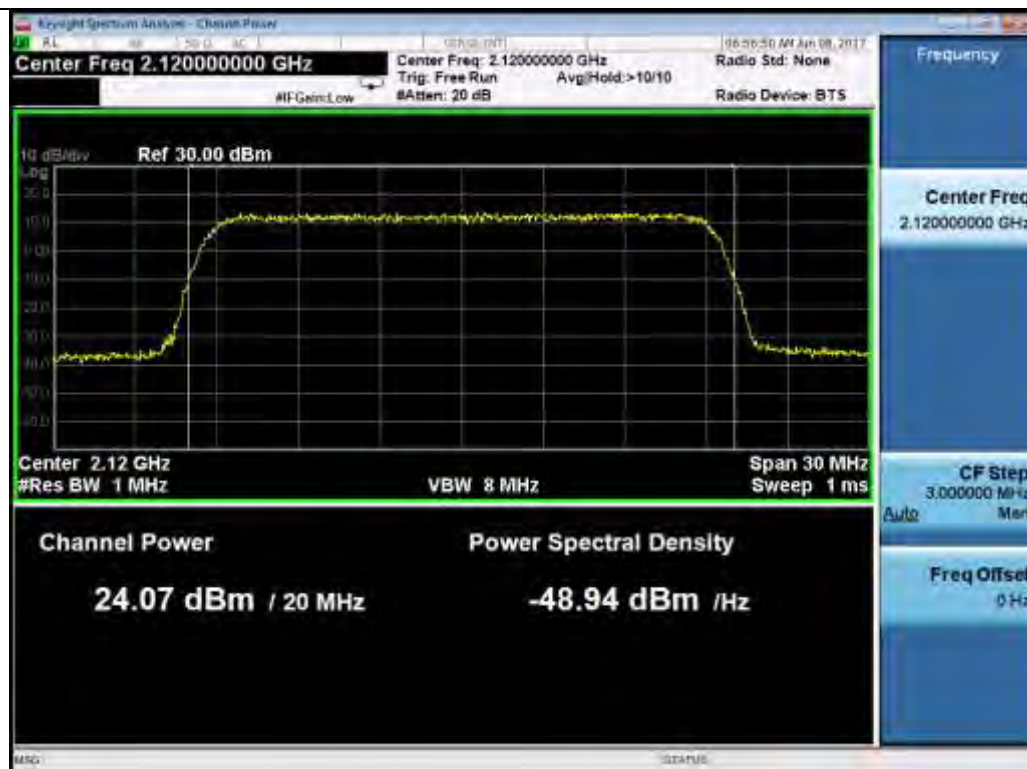


15M QPSK Mid

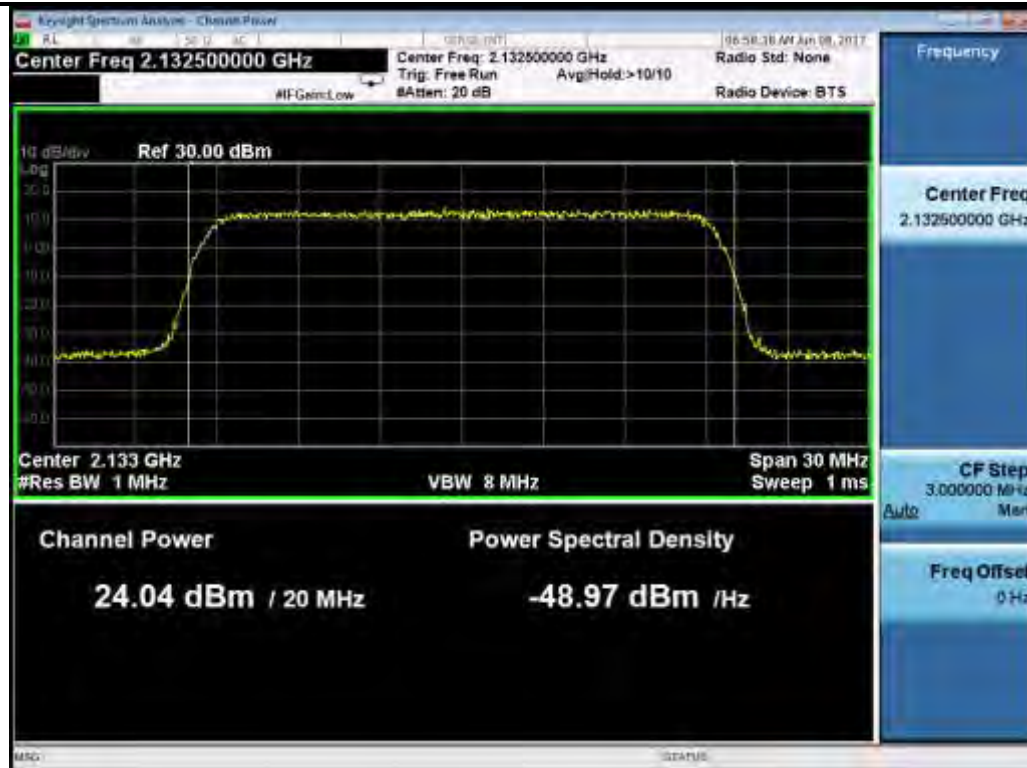




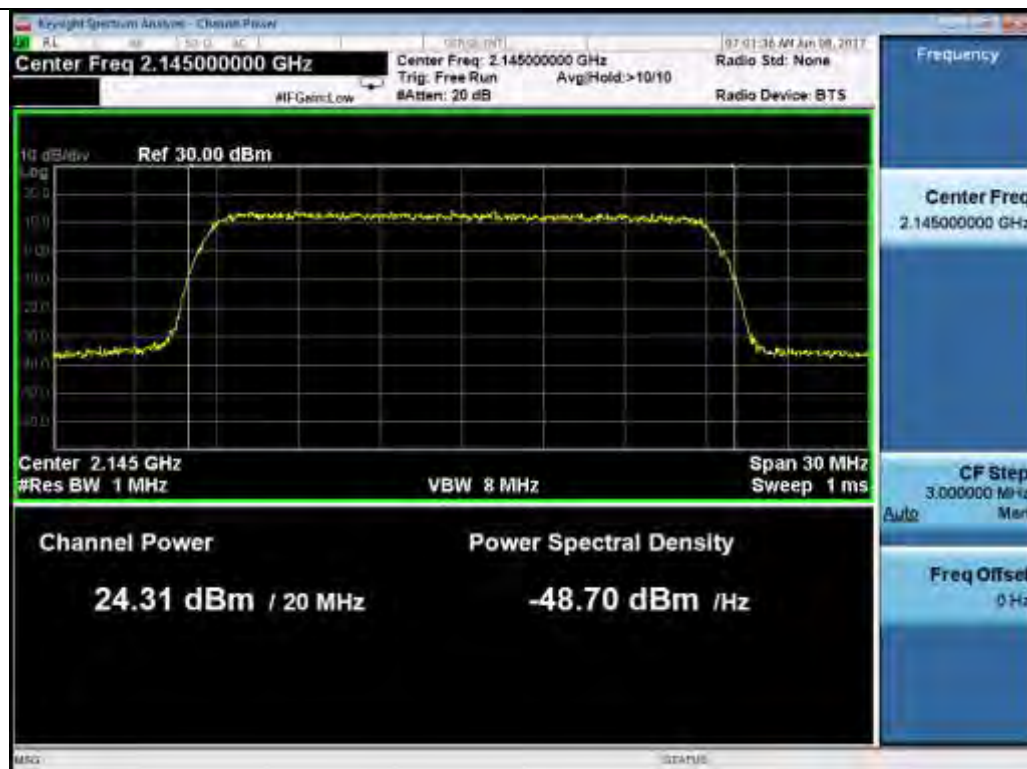
15M QPSK High



20M QPSK Low



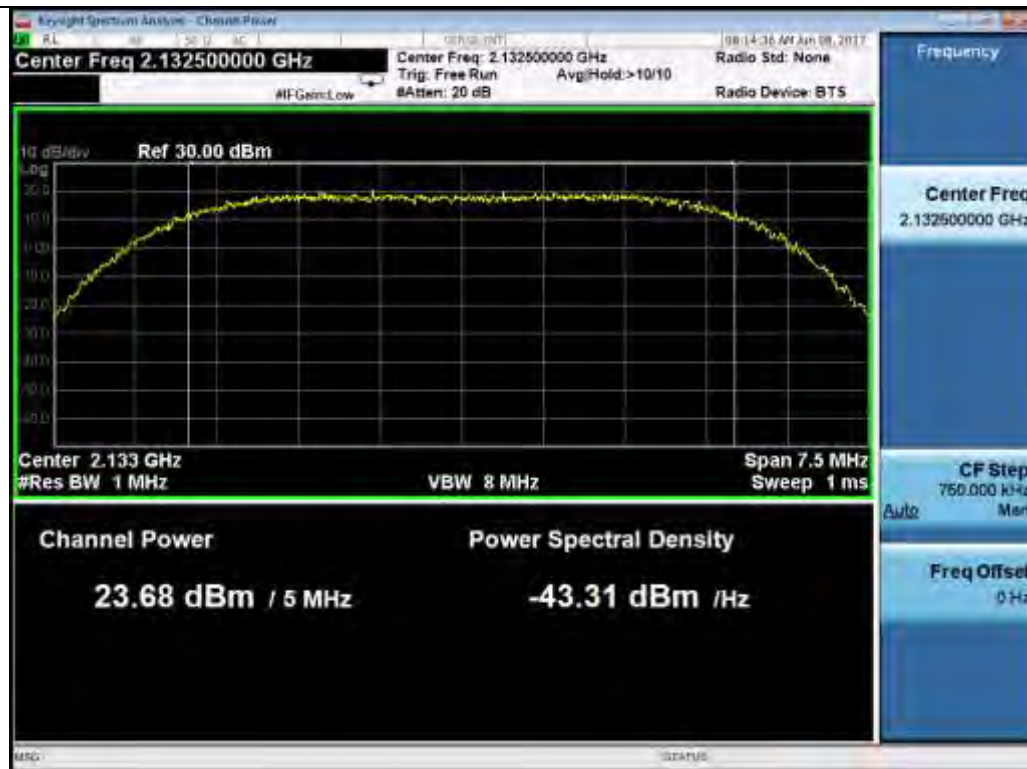
20M QPSK Mid



20M QPSK High



5M 64QAM Low

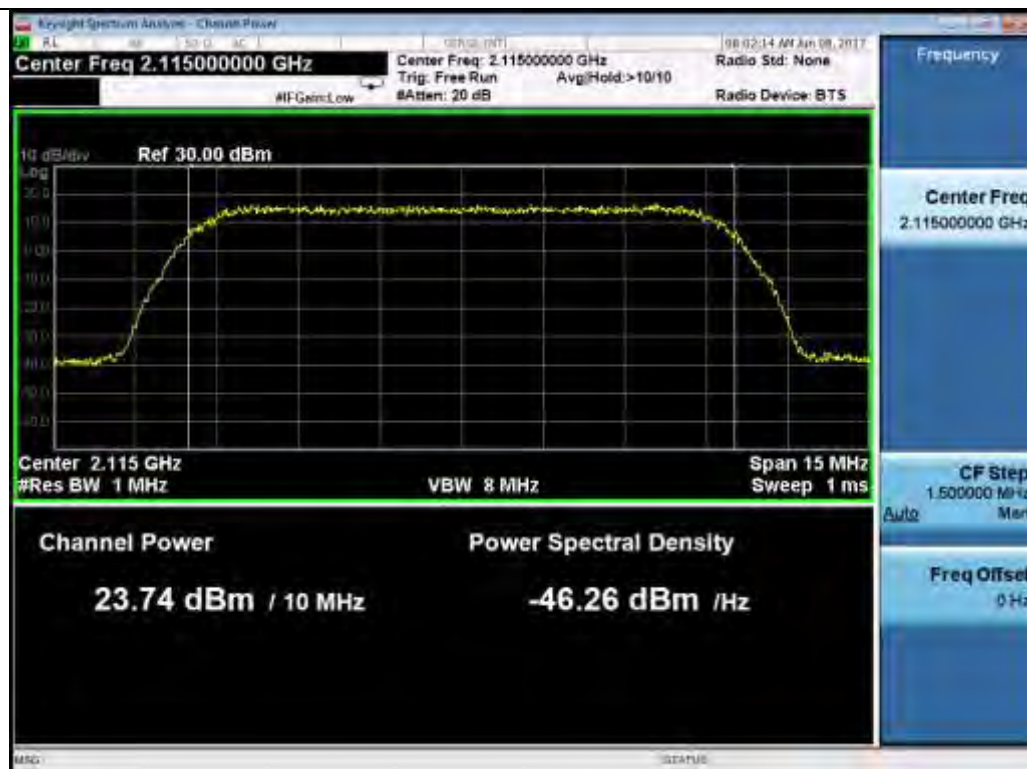


5M 64QAM Mid



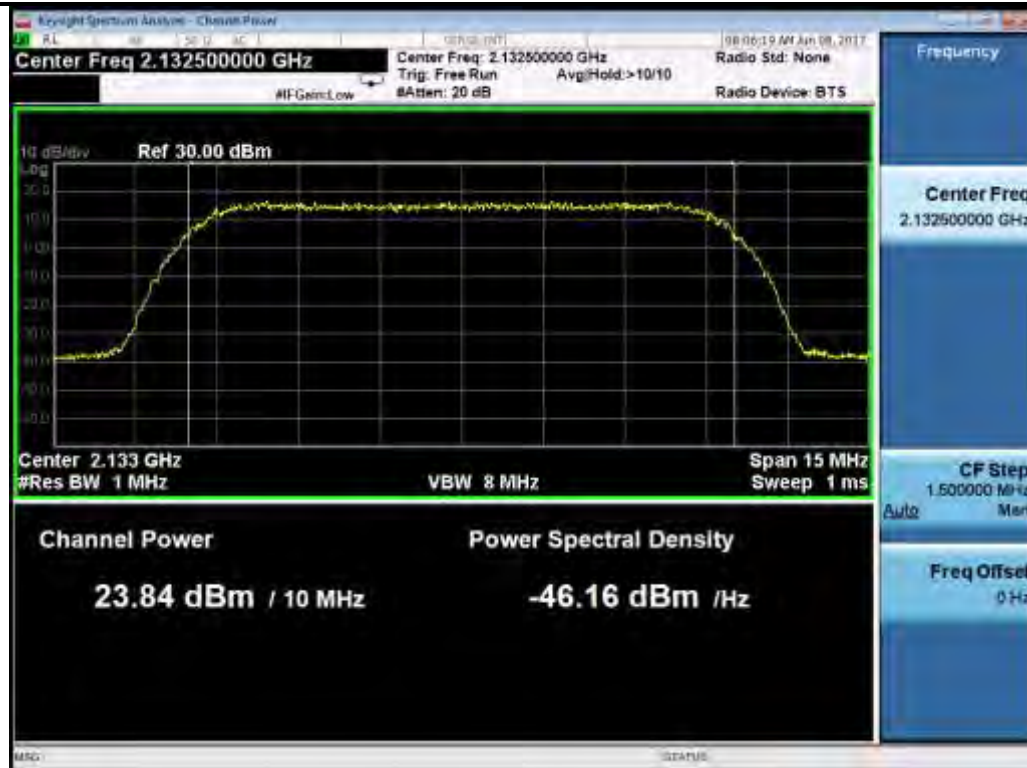


5M 64QAM High

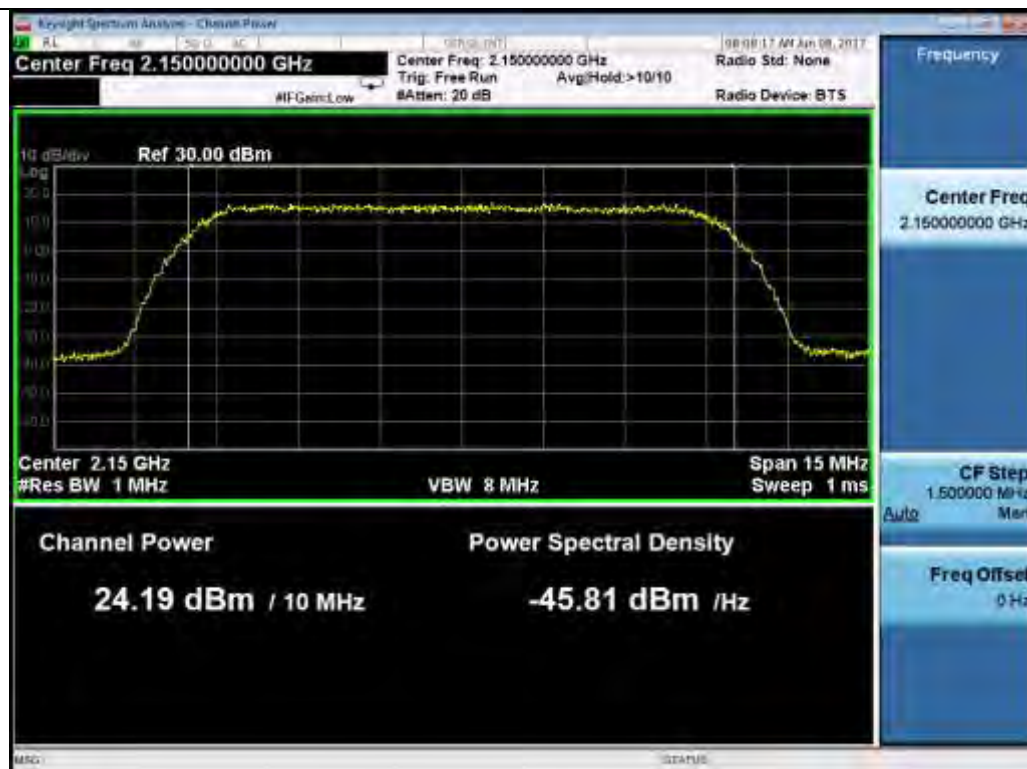


10M 64QAM Low

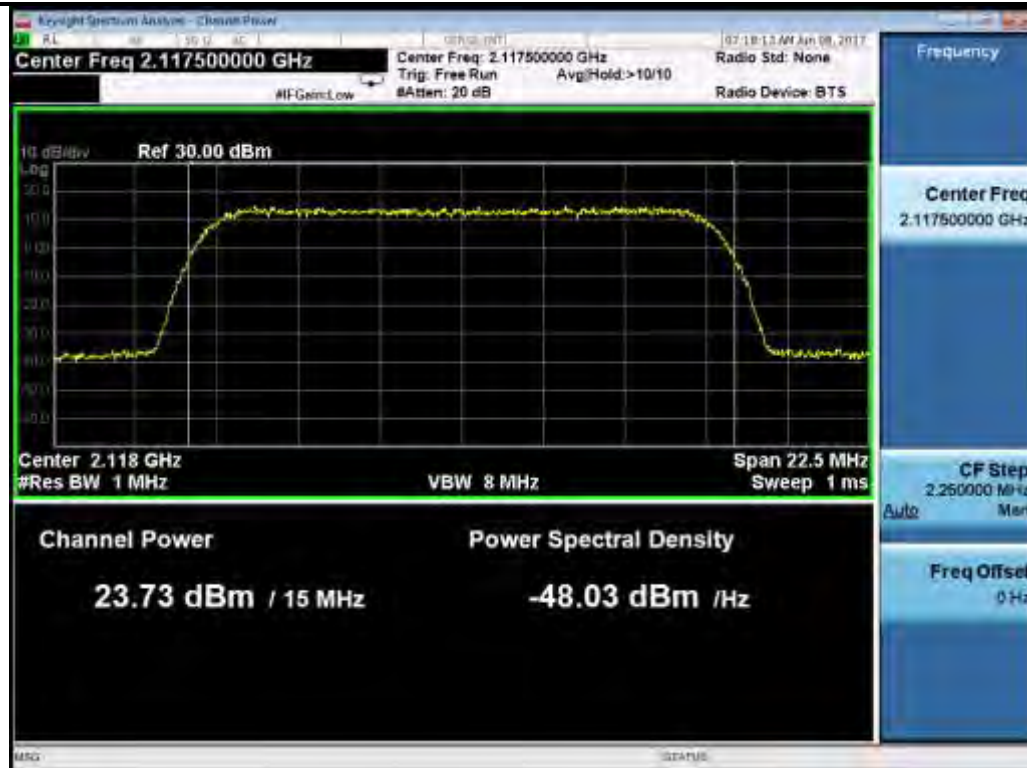




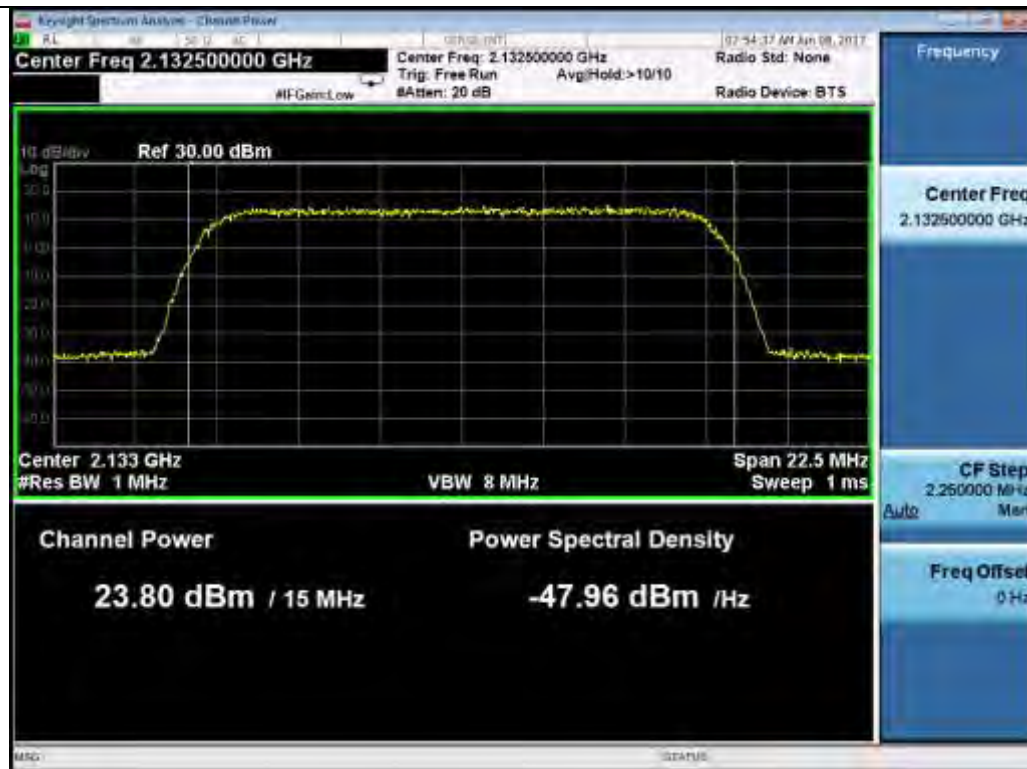
10M 64QAM Mid



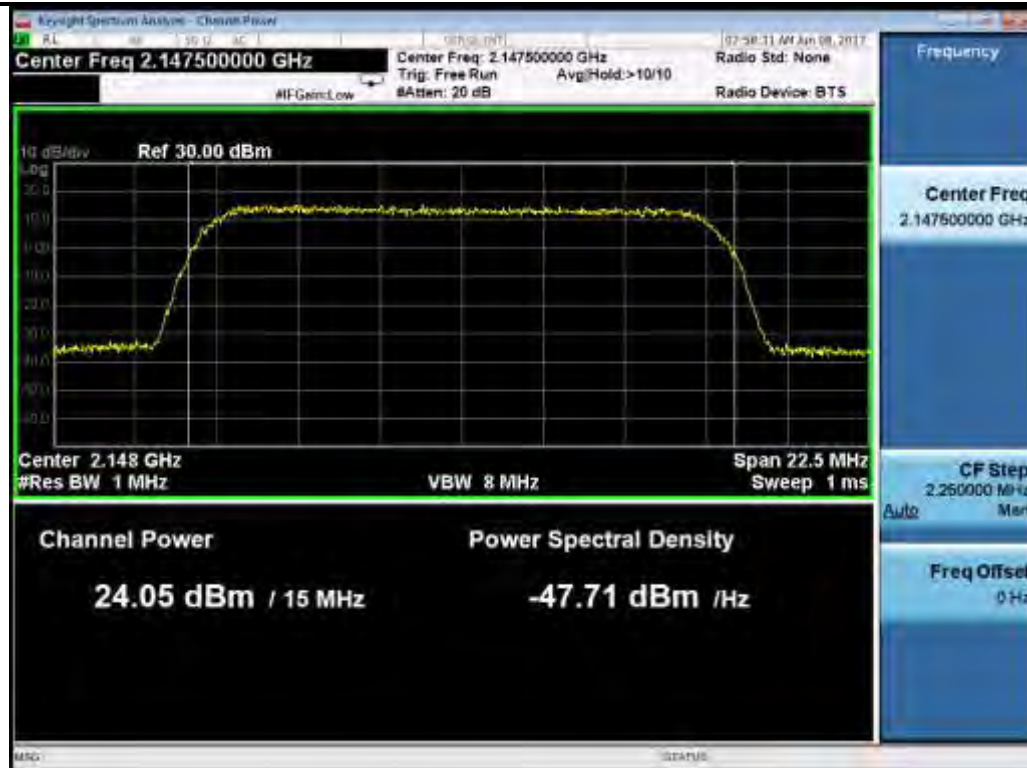
10M 64QAM High



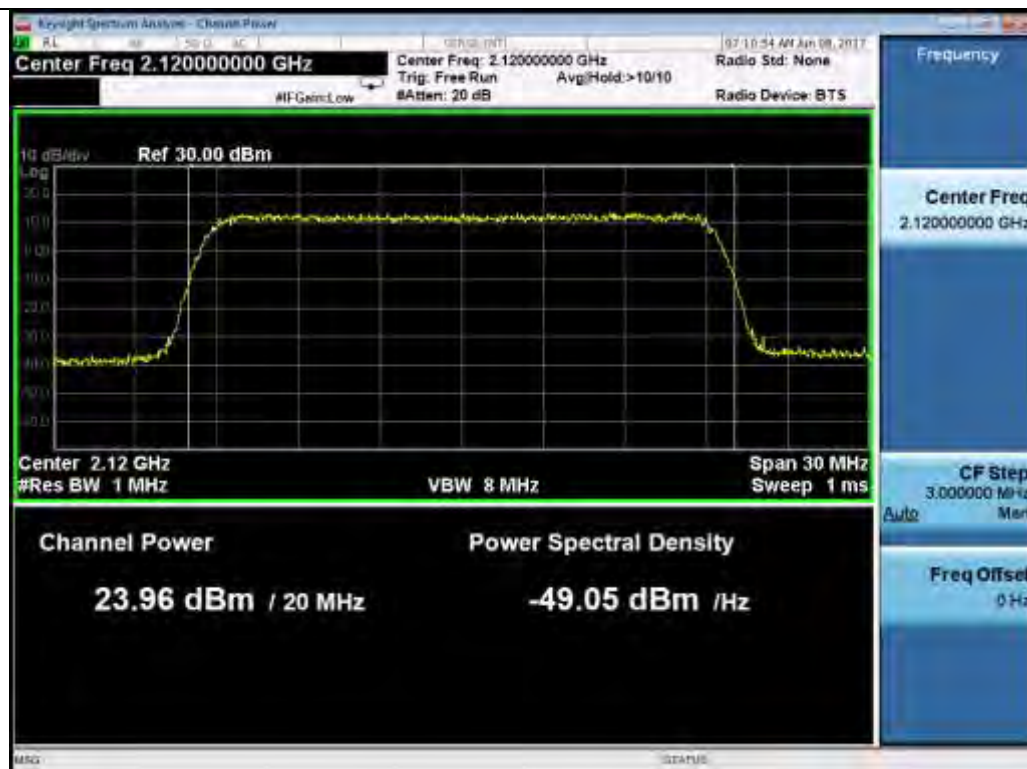
15M 64QAM Low



15M 64QAM Mid

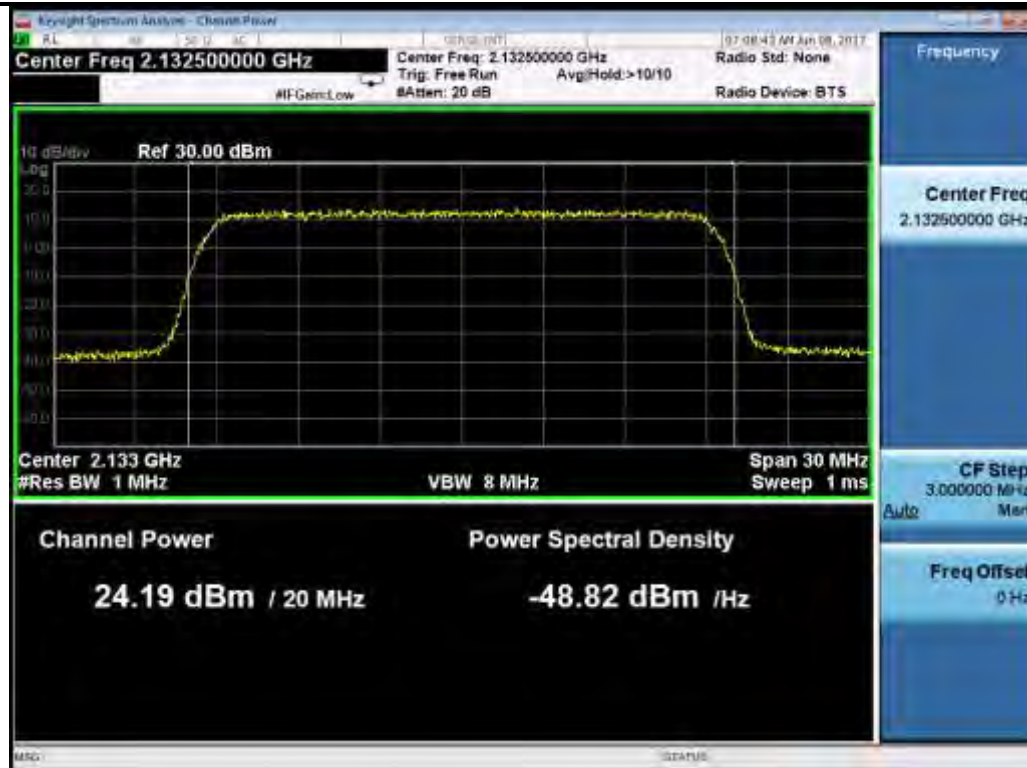


15M 64QAM High

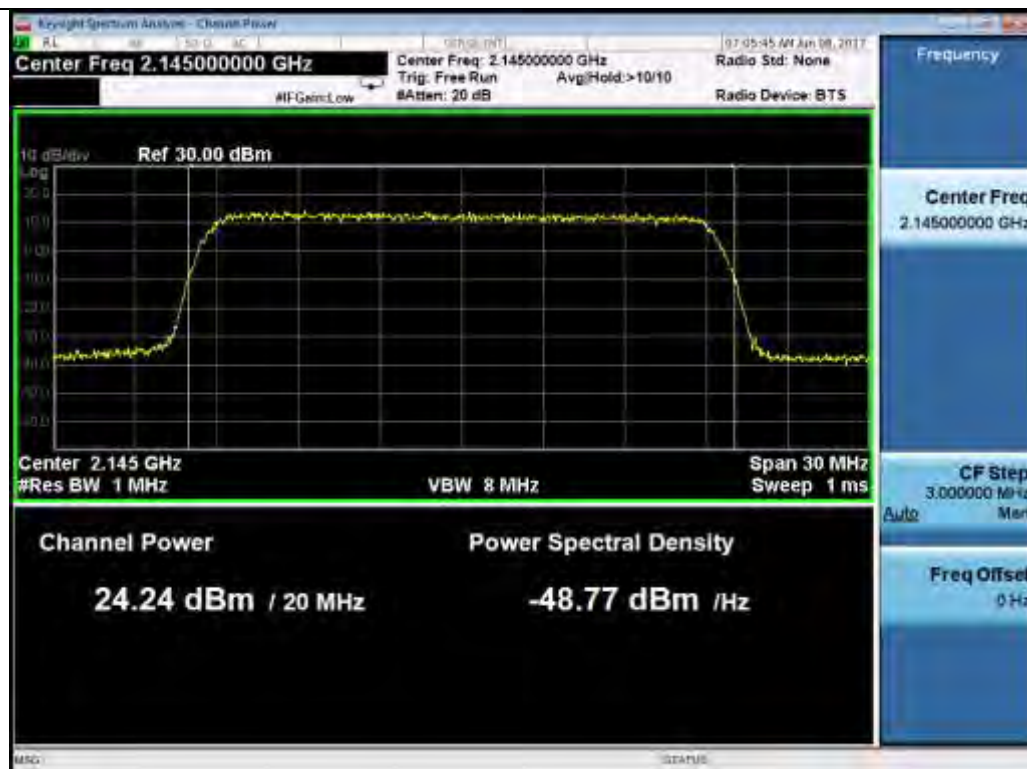


20M 64QAM Low





20M 64QAM Mid



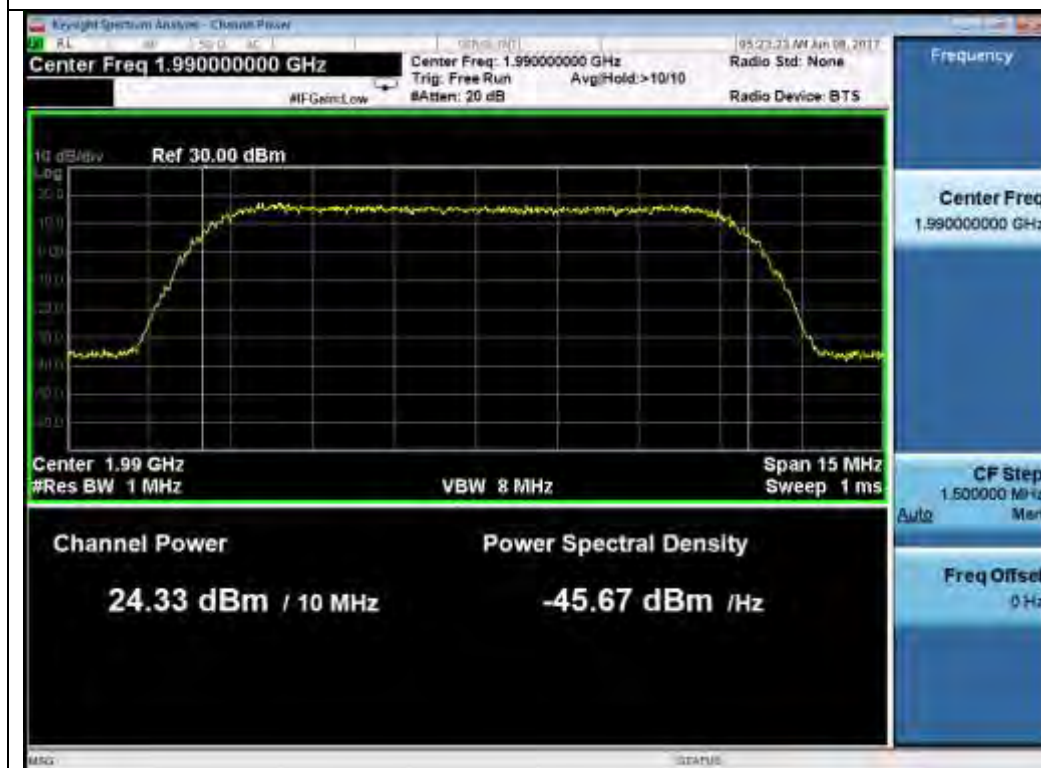
20M 64QAM High



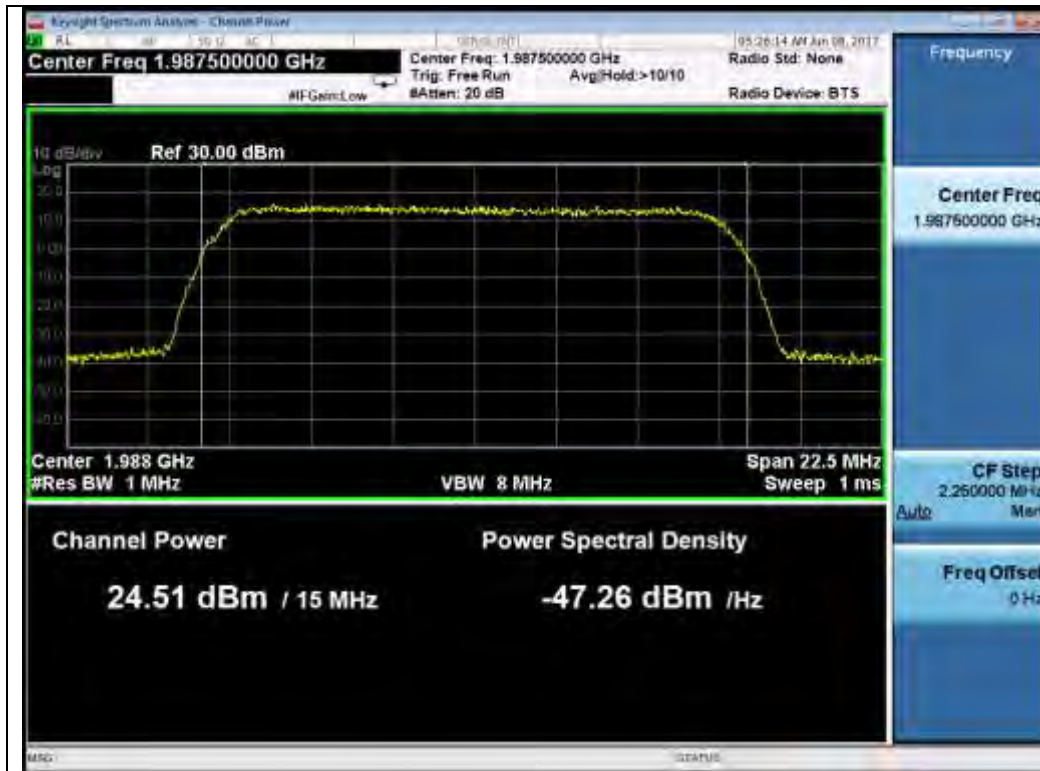
Test Plots for Band 25  
Chain 1:



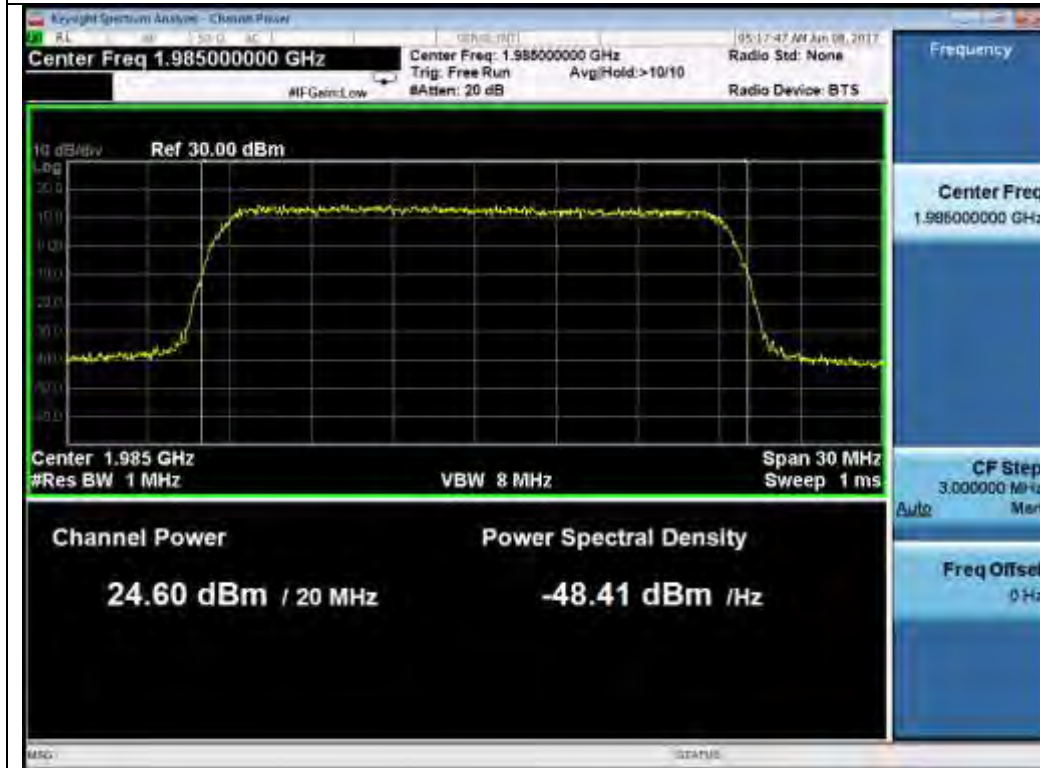
5M QPSK High



10M QPSK Mid



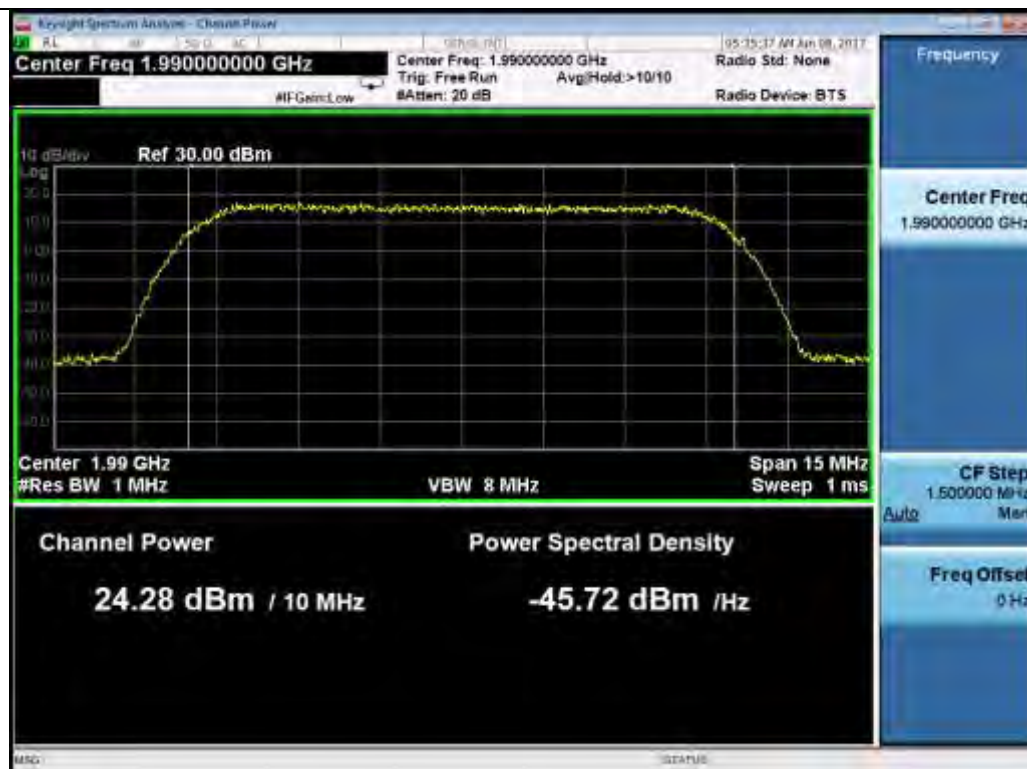
15M QPSK High



20M QPSK High

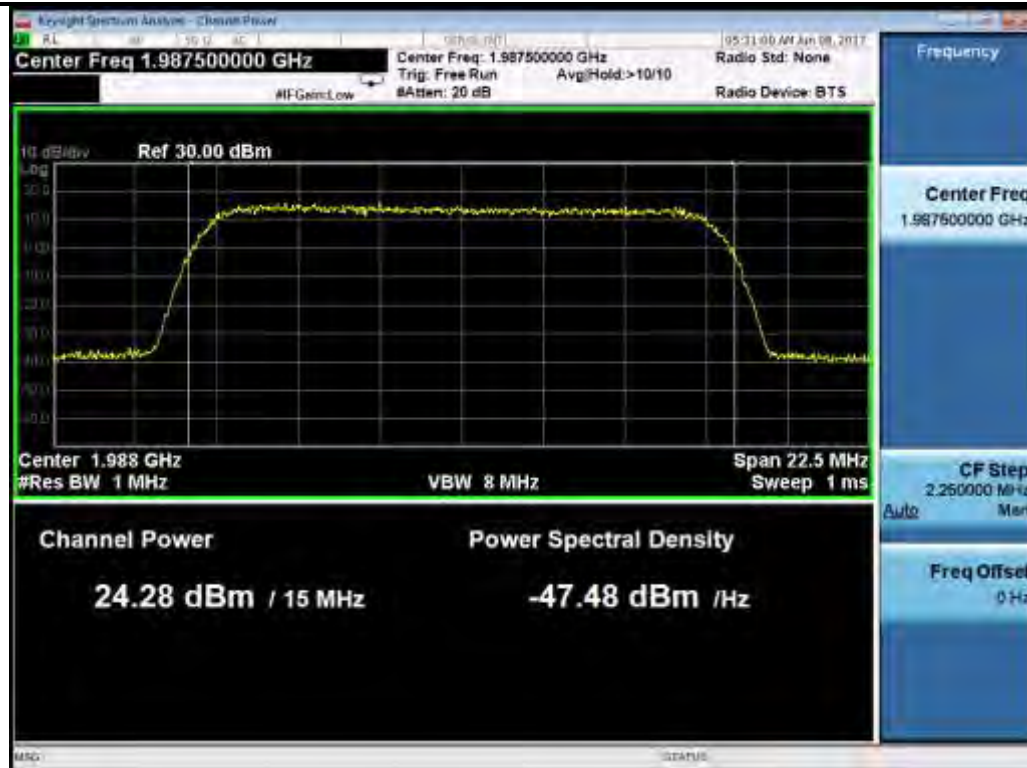


5M 64QAM High

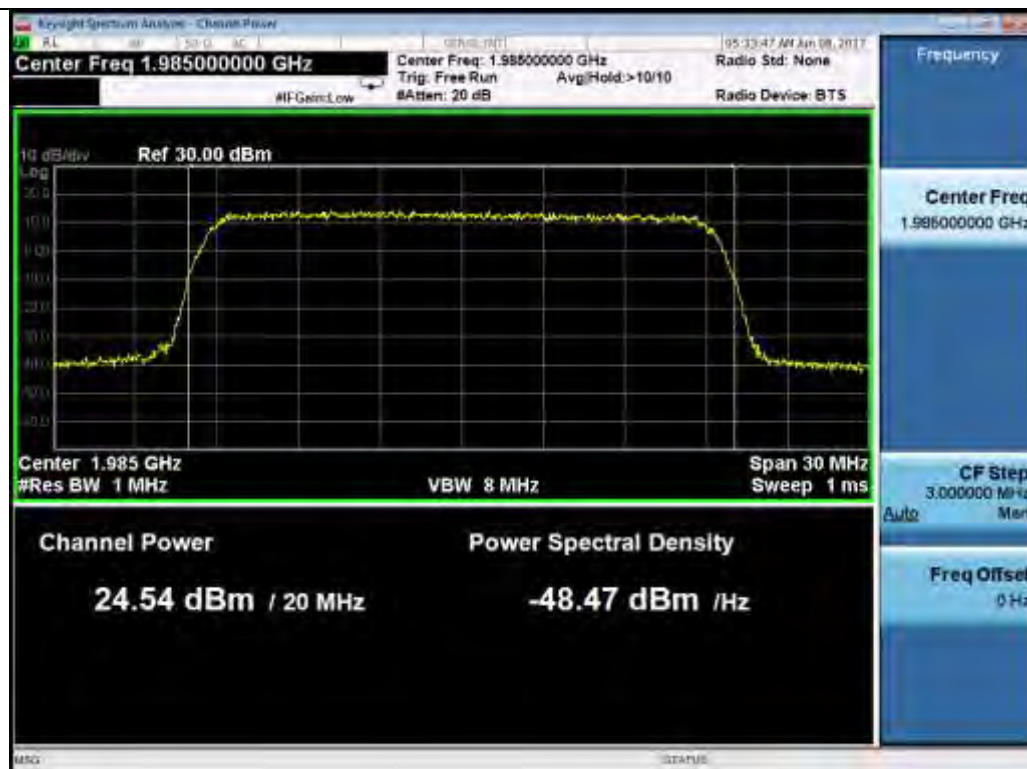


10M 64QAM High





15M 64QAM High



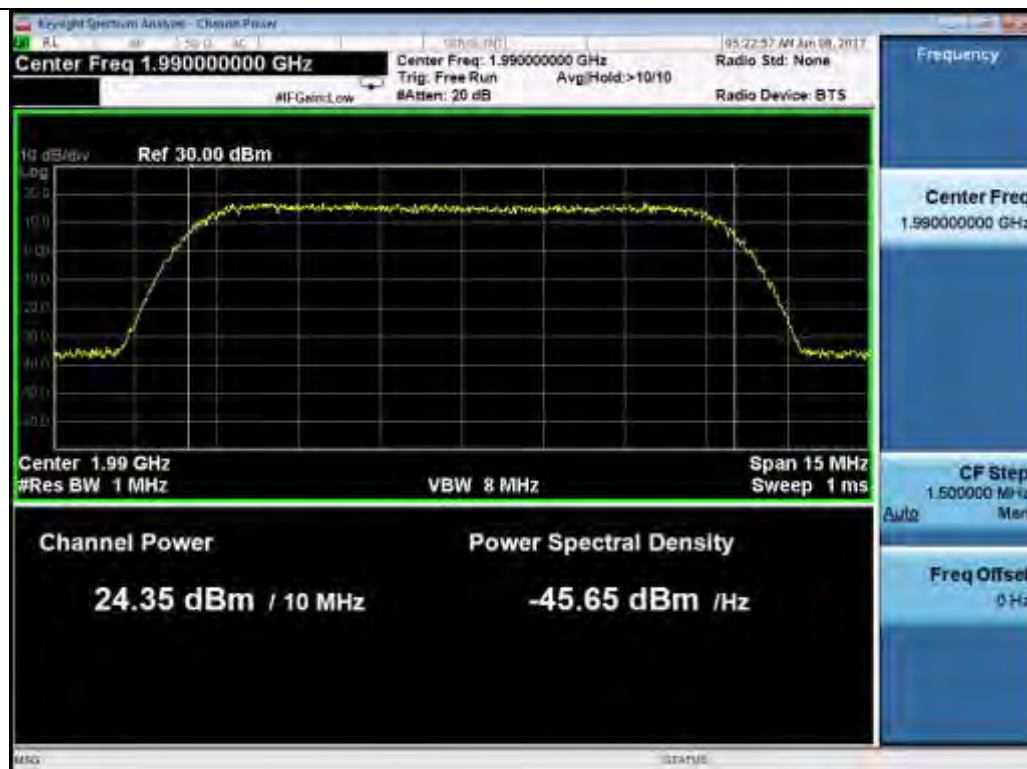
20M 64QAM High

Chain 2:

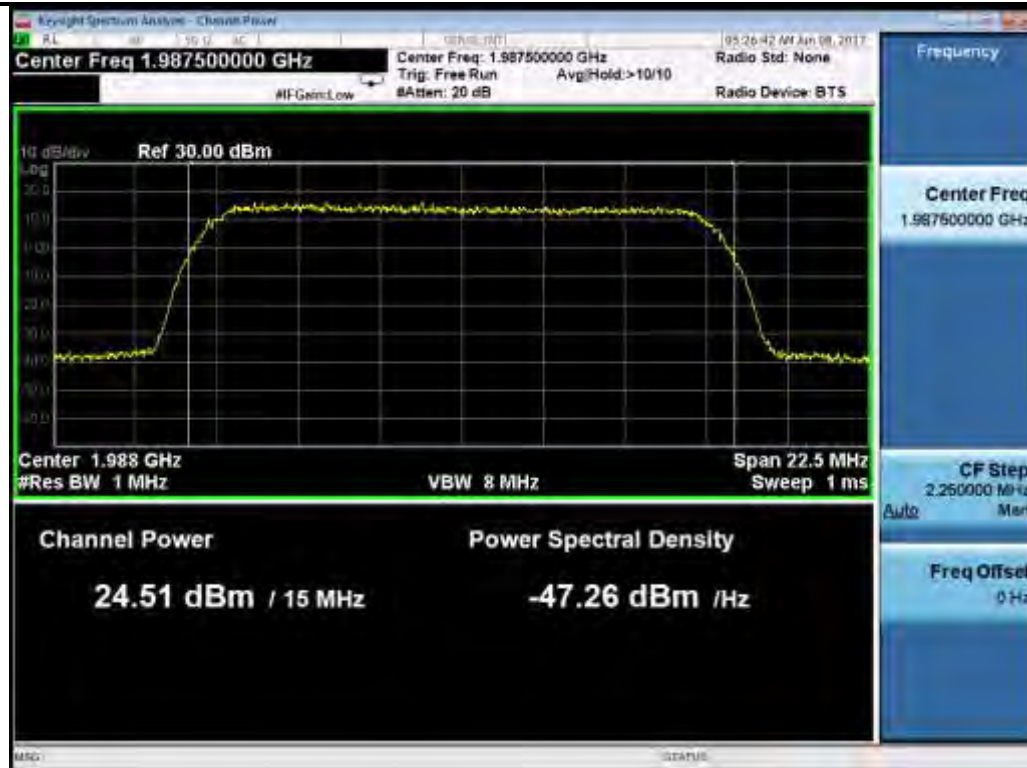




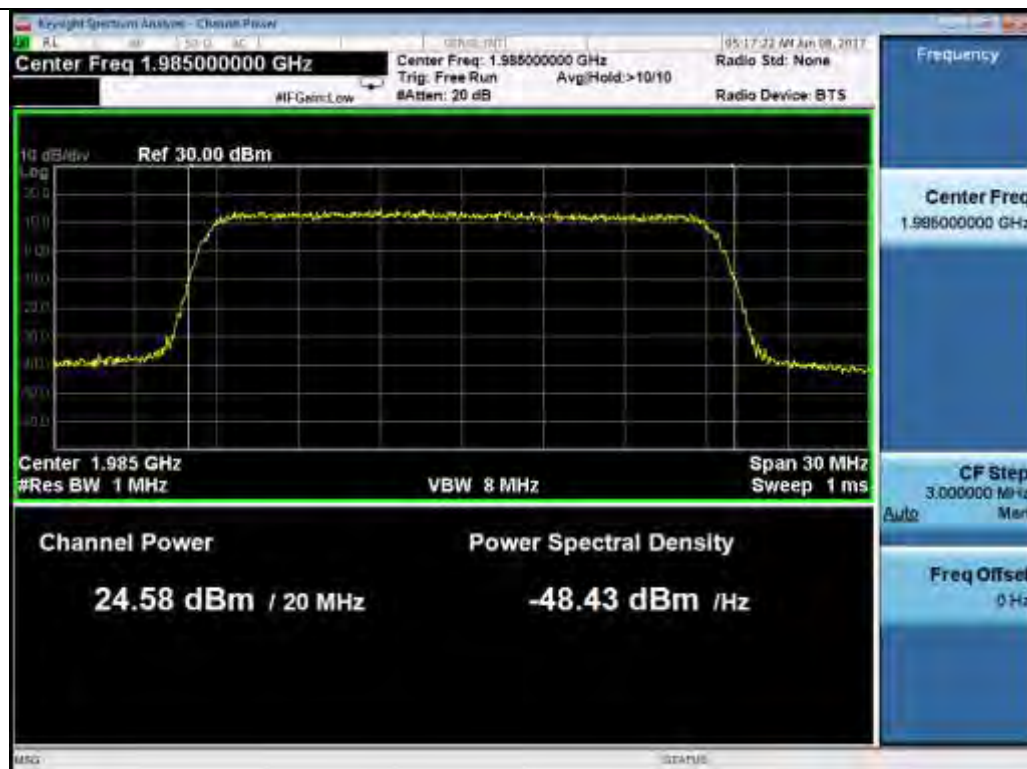
5M QPSK High



10M QPSK Mid



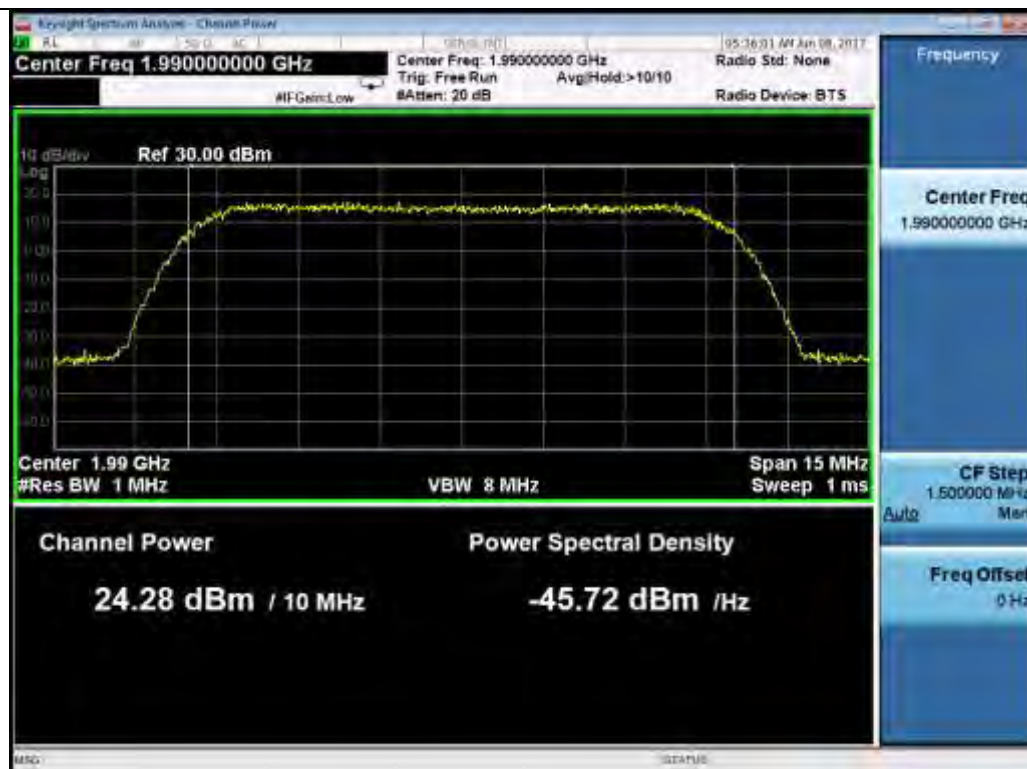
15M QPSK High



20M QPSK High

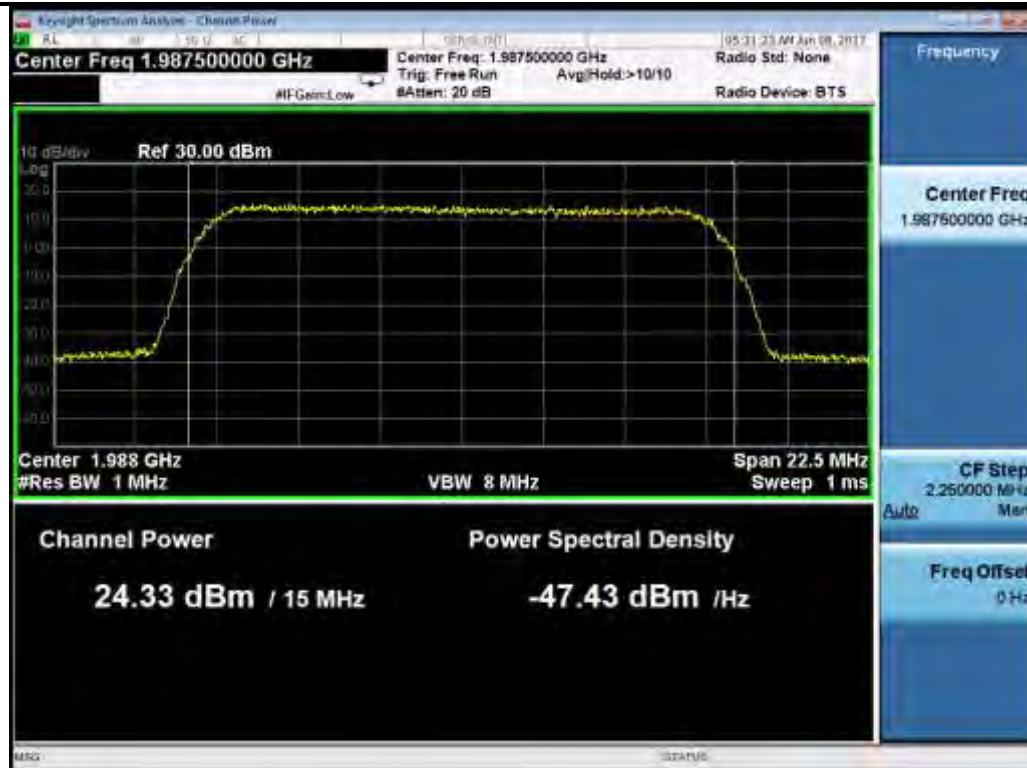


5M 64QAM High

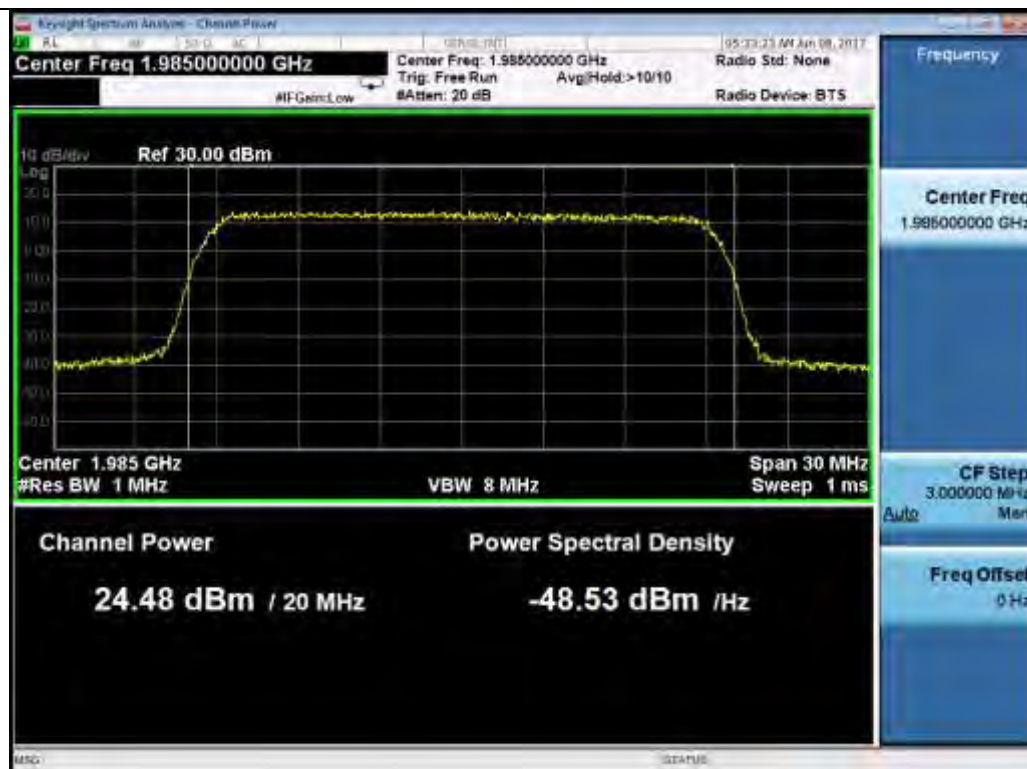


10M 64QAM High





15M 64QAM High

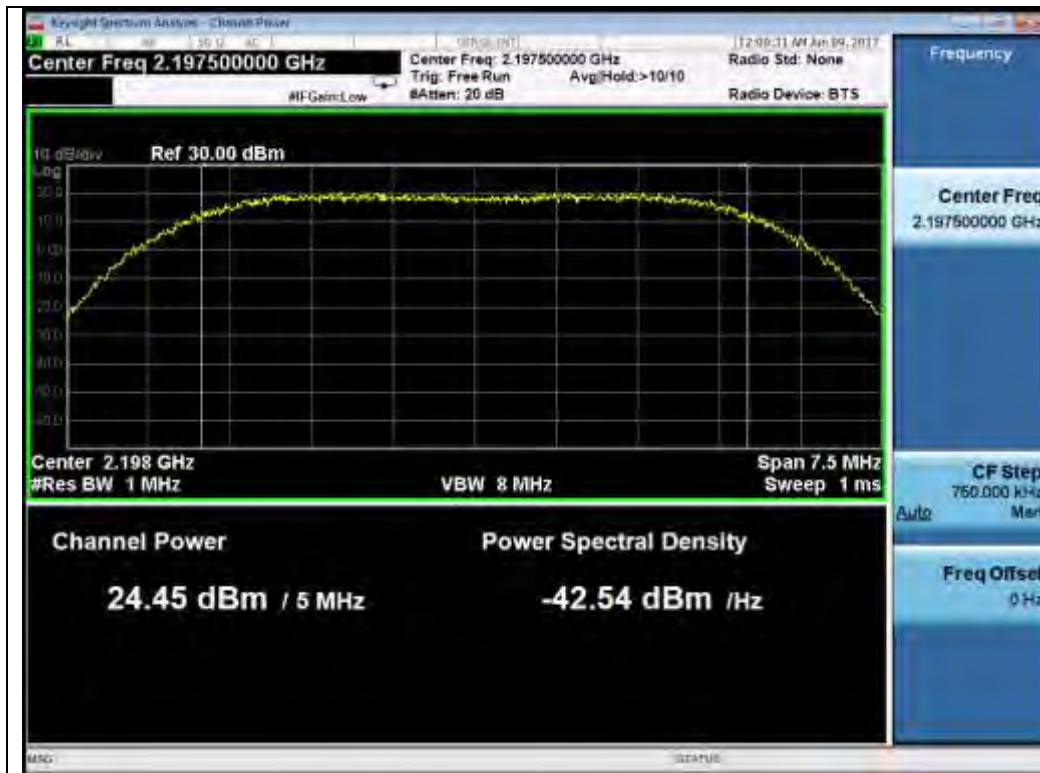


20M 64QAM High

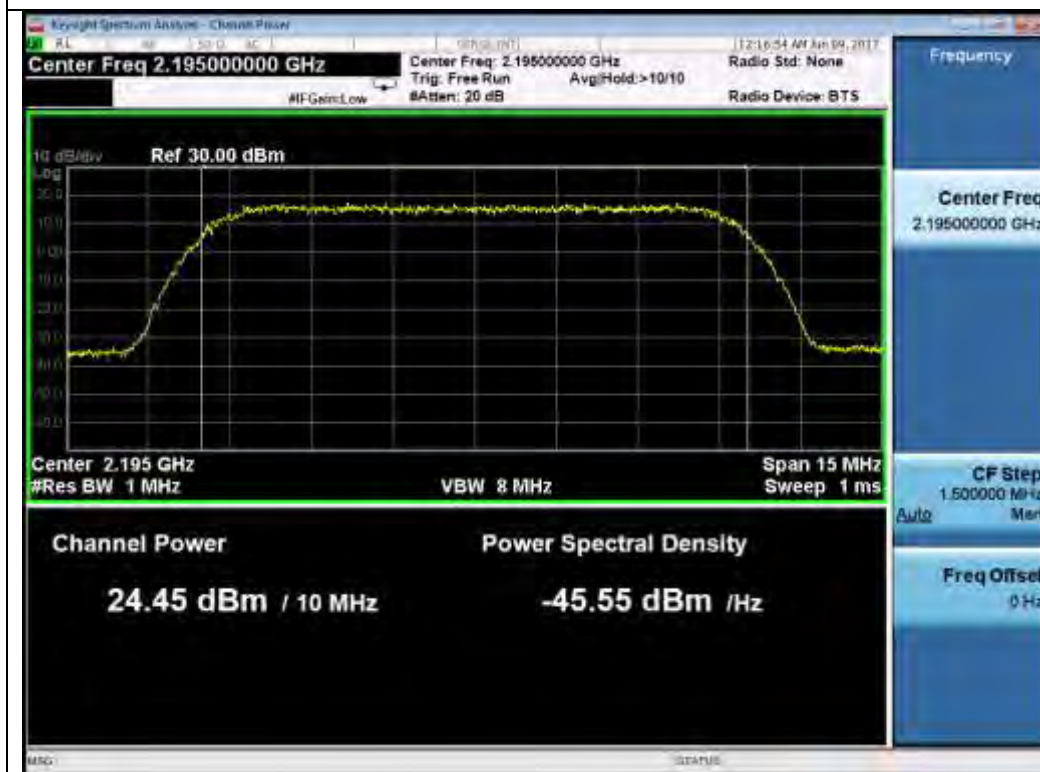


Test Plots for LTE band 66:

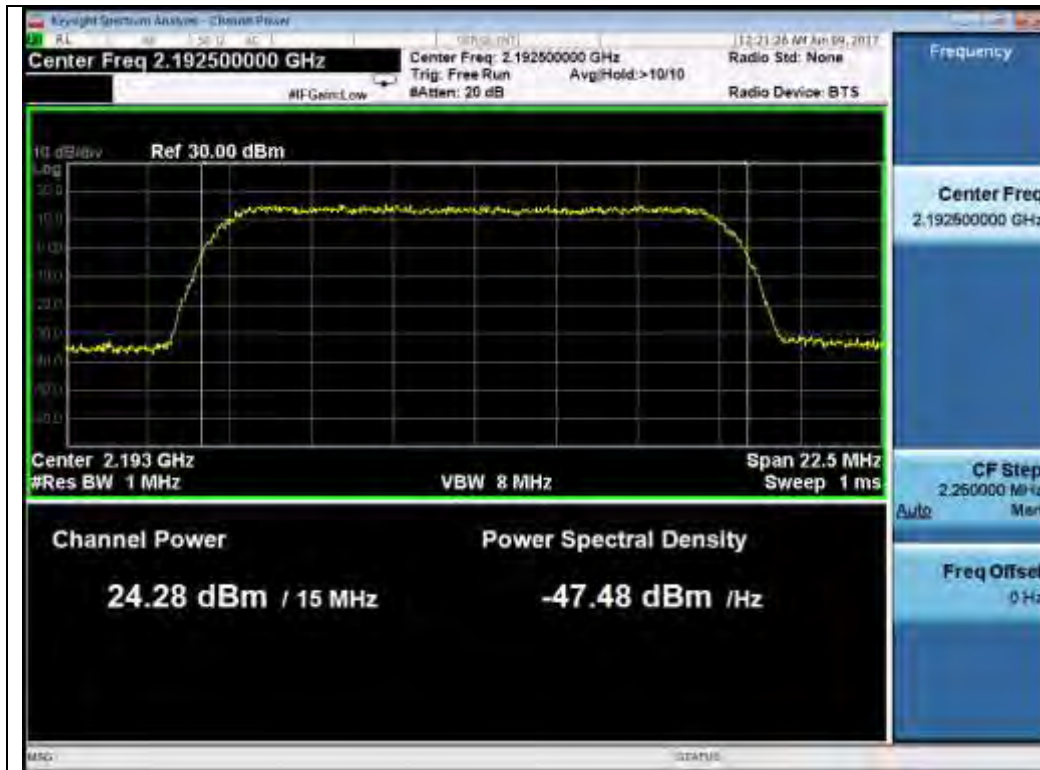
Chain1:



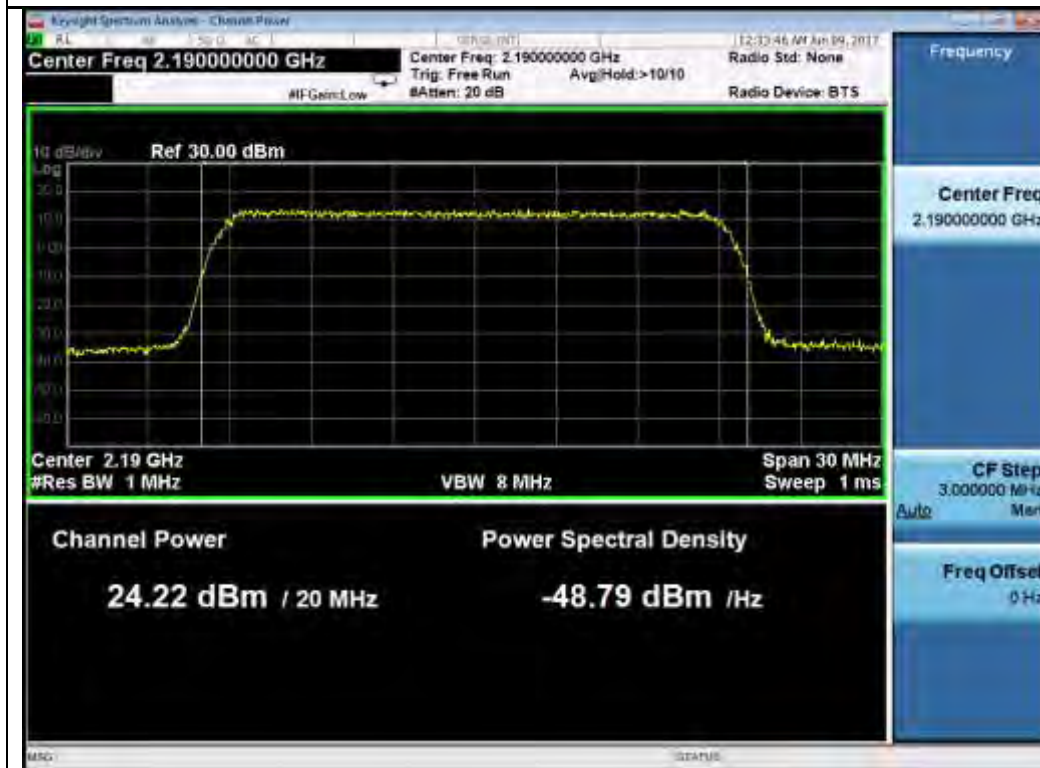
5M QPSK High



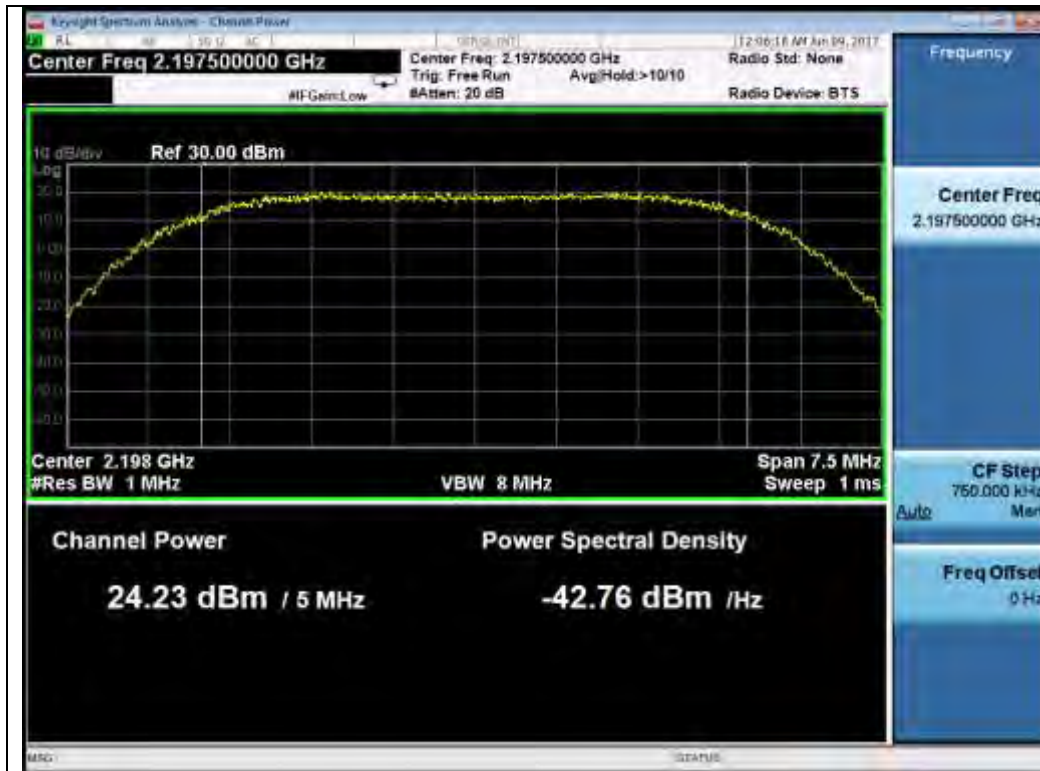
10M QPSK High



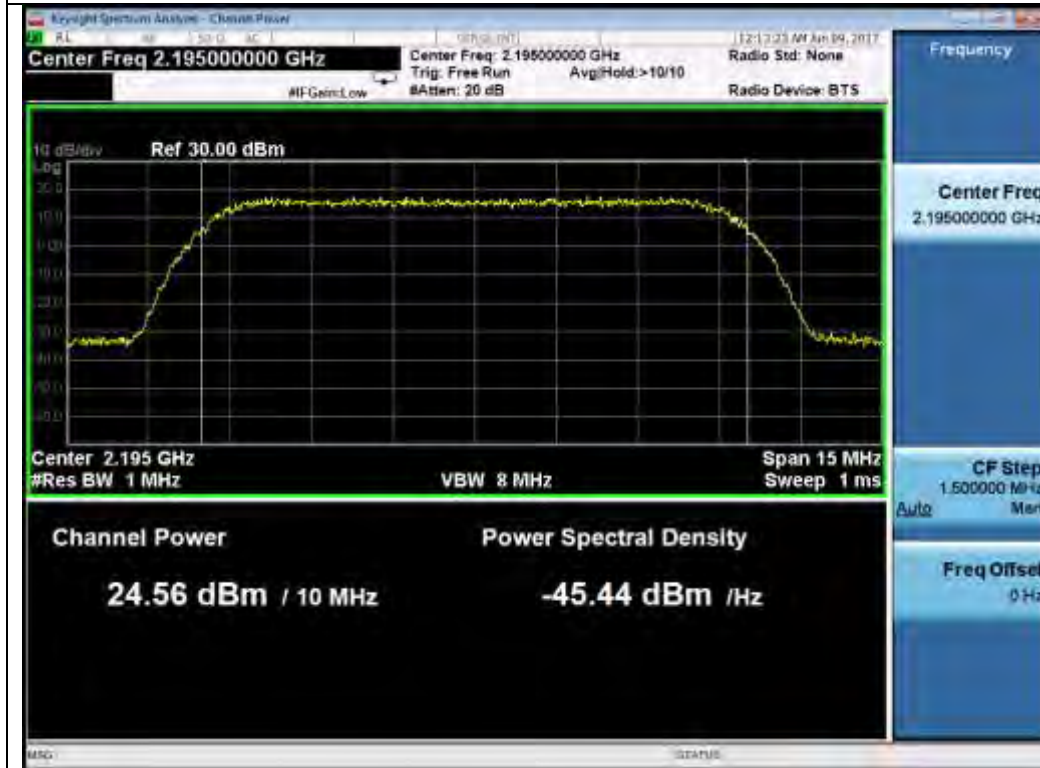
15M QPSK High



20M QPSK High

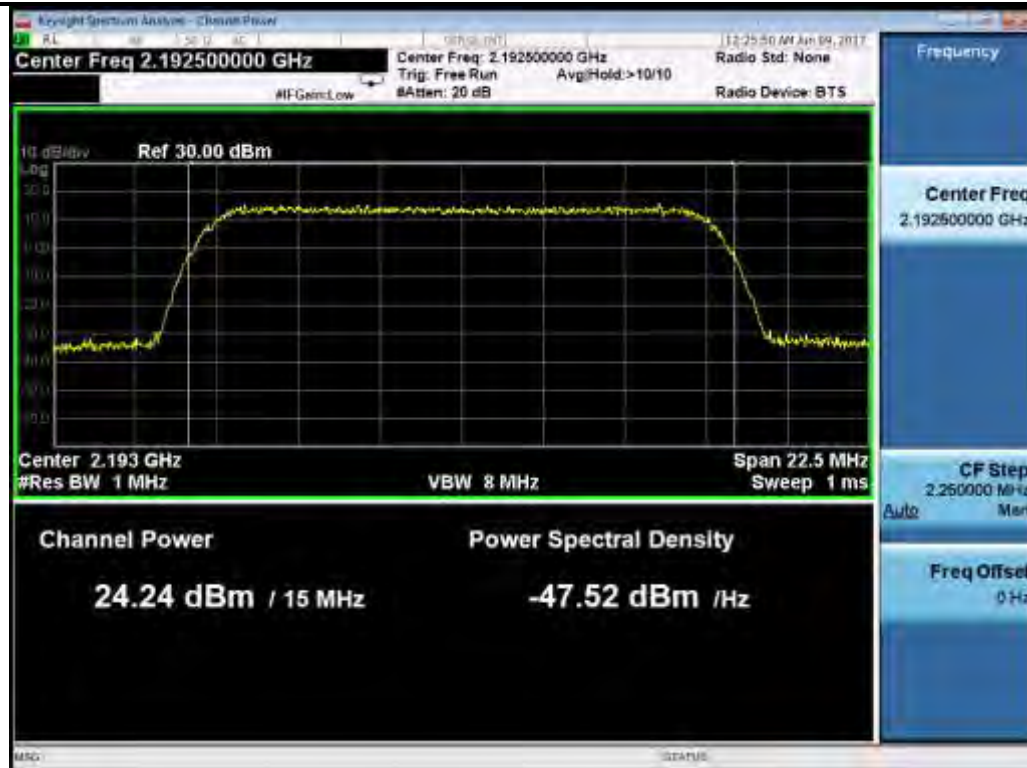


5M 64QAM High

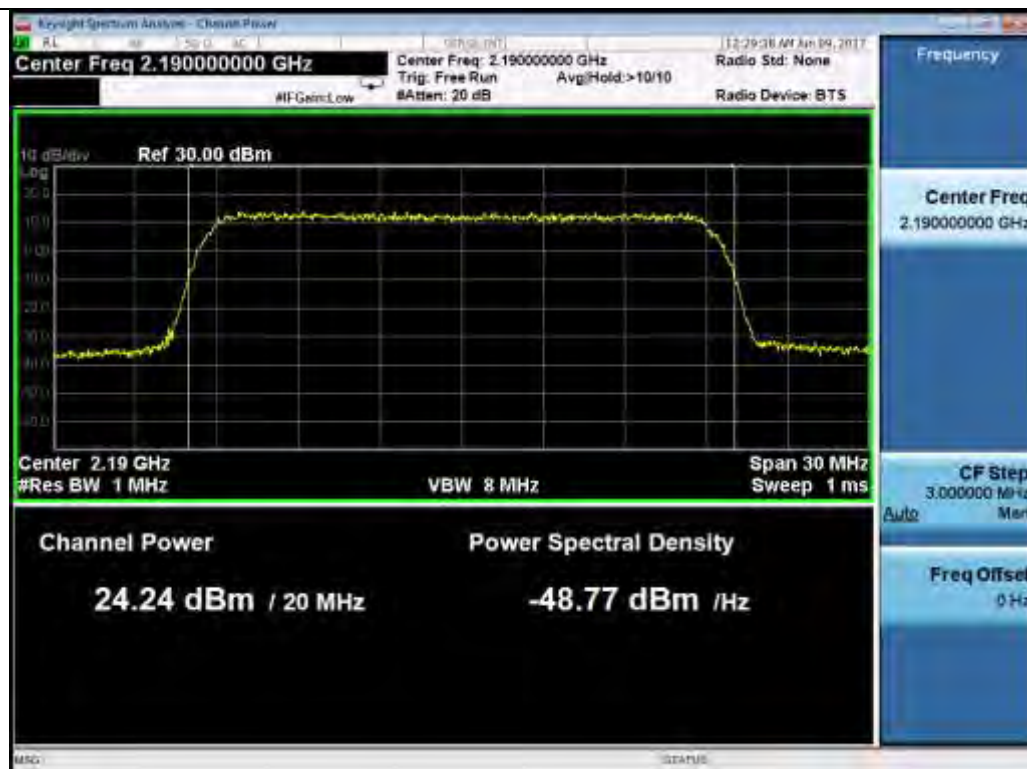


10M 64QAM High





15M 64QAM High



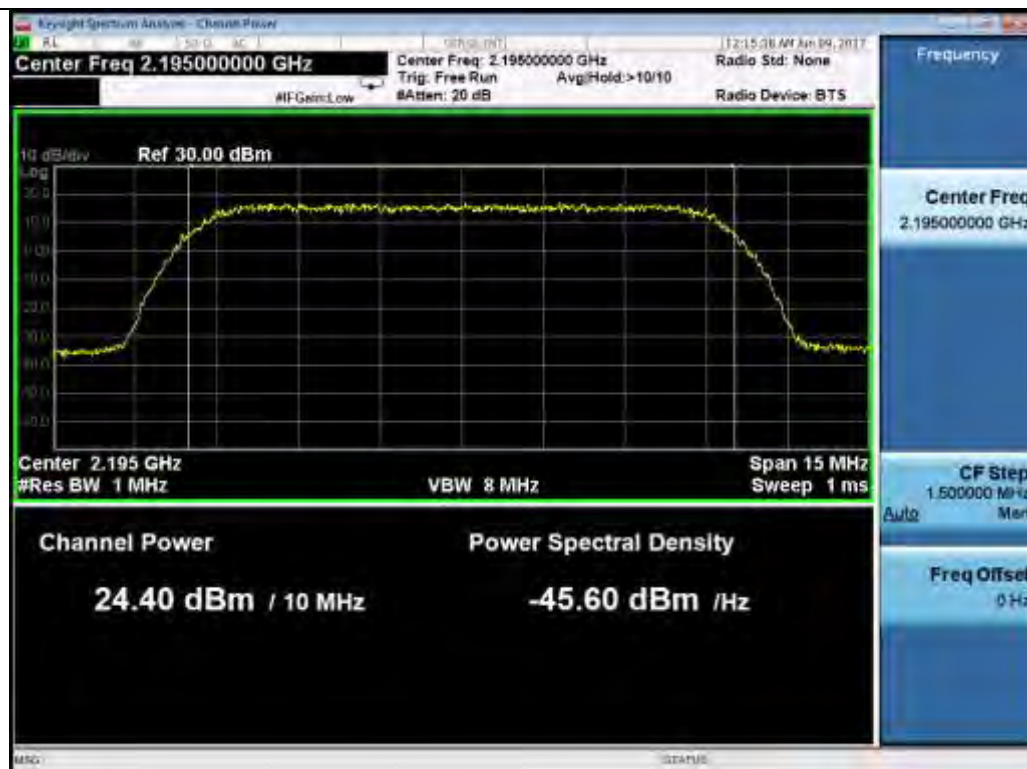
20M 64QAM High

Chain2:

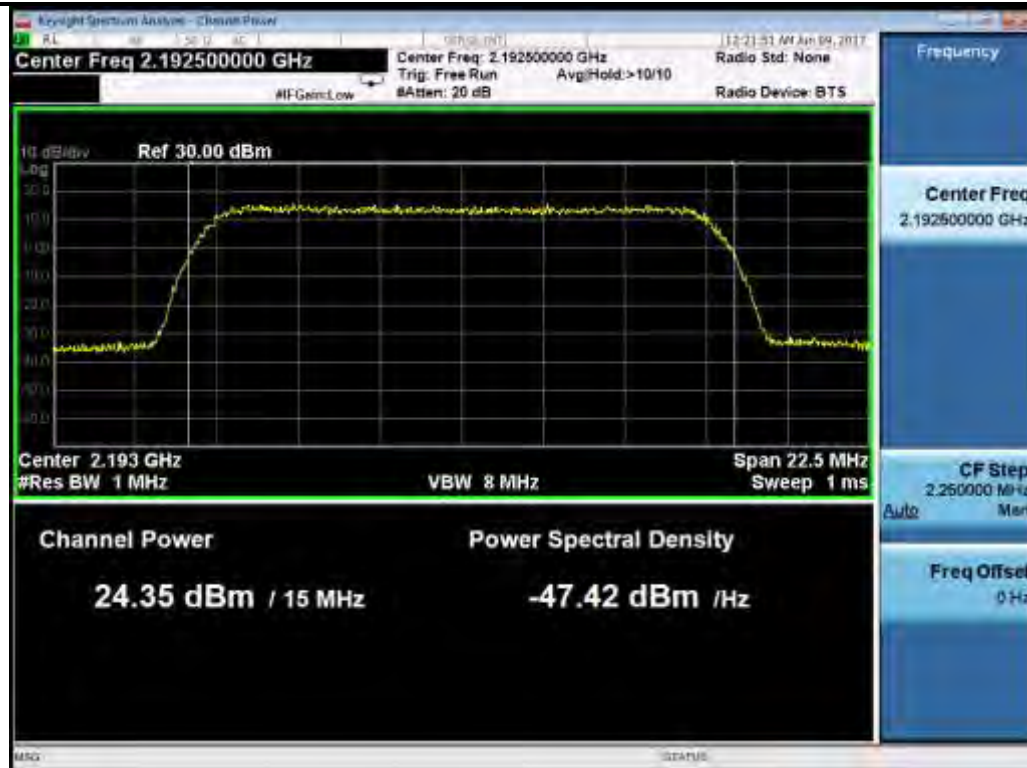




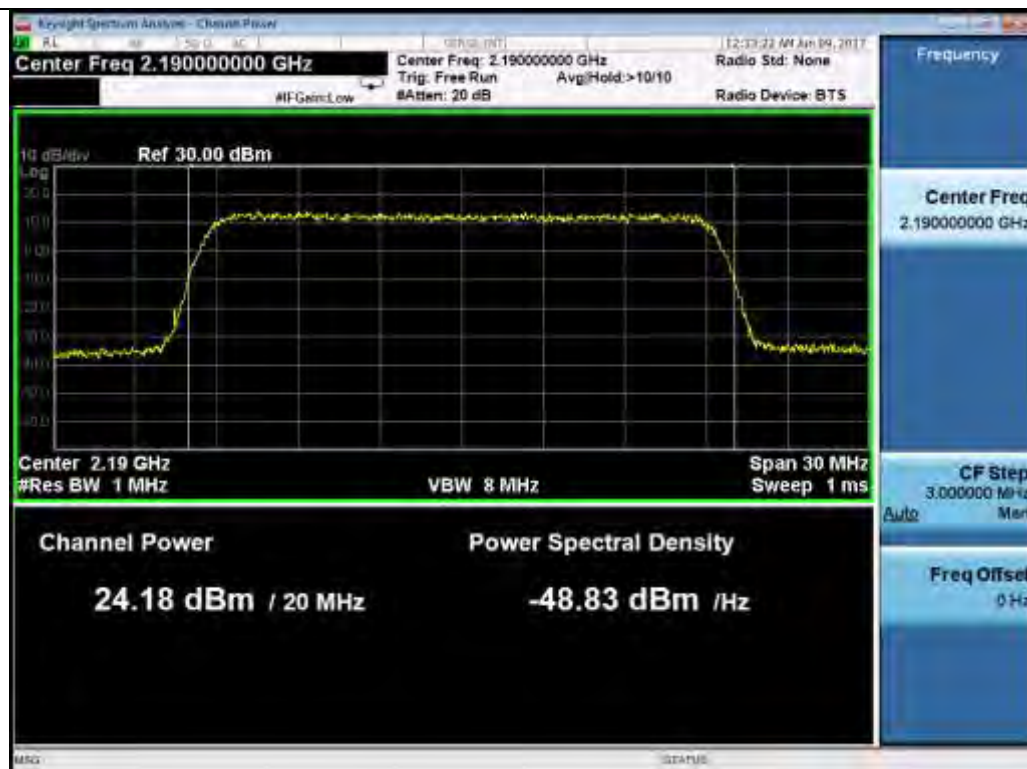
5M QPSK High



10M QPSK High



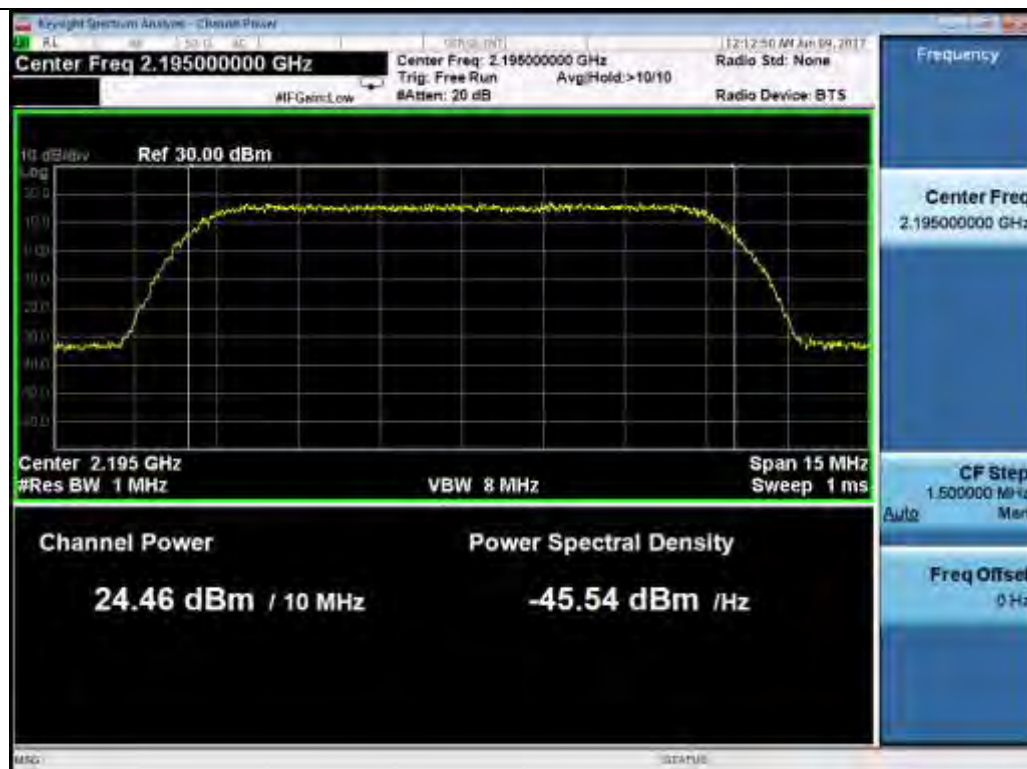
15M QPSK High



20M QPSK High

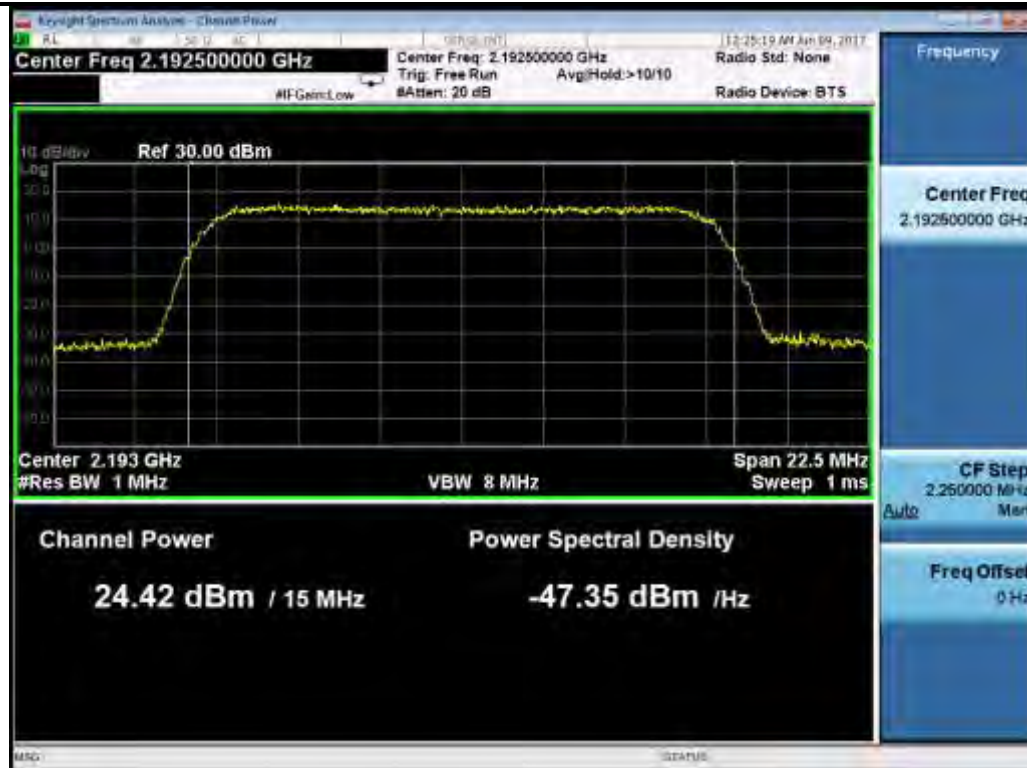


5M 64QAM High

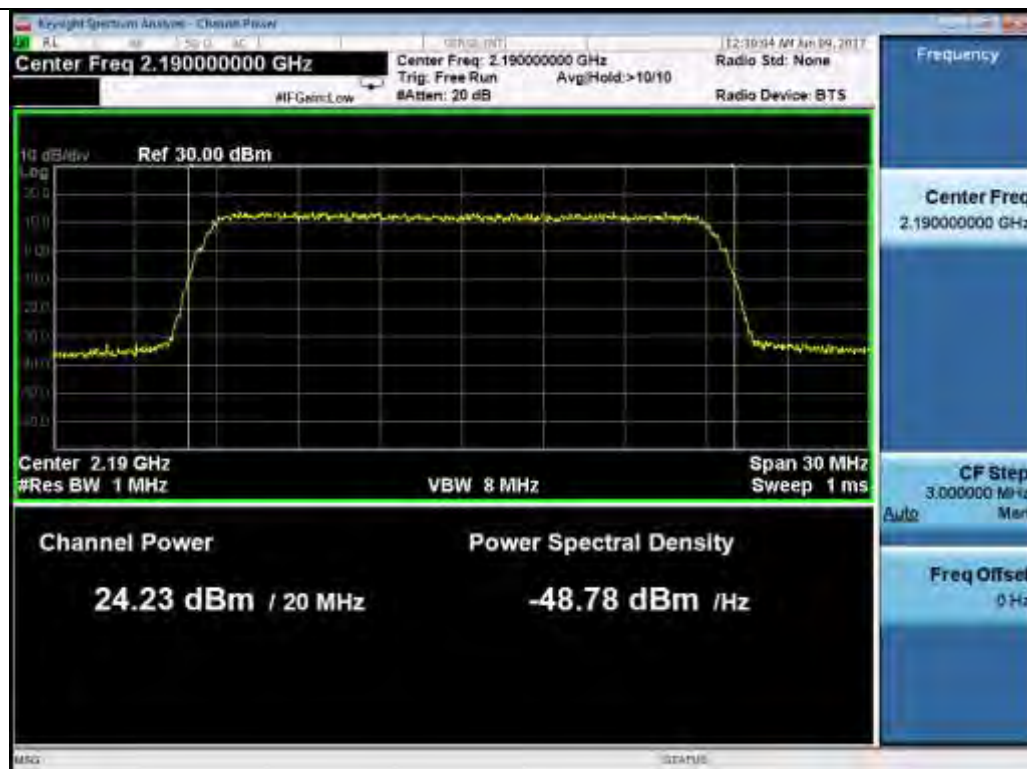


10M 64QAM High





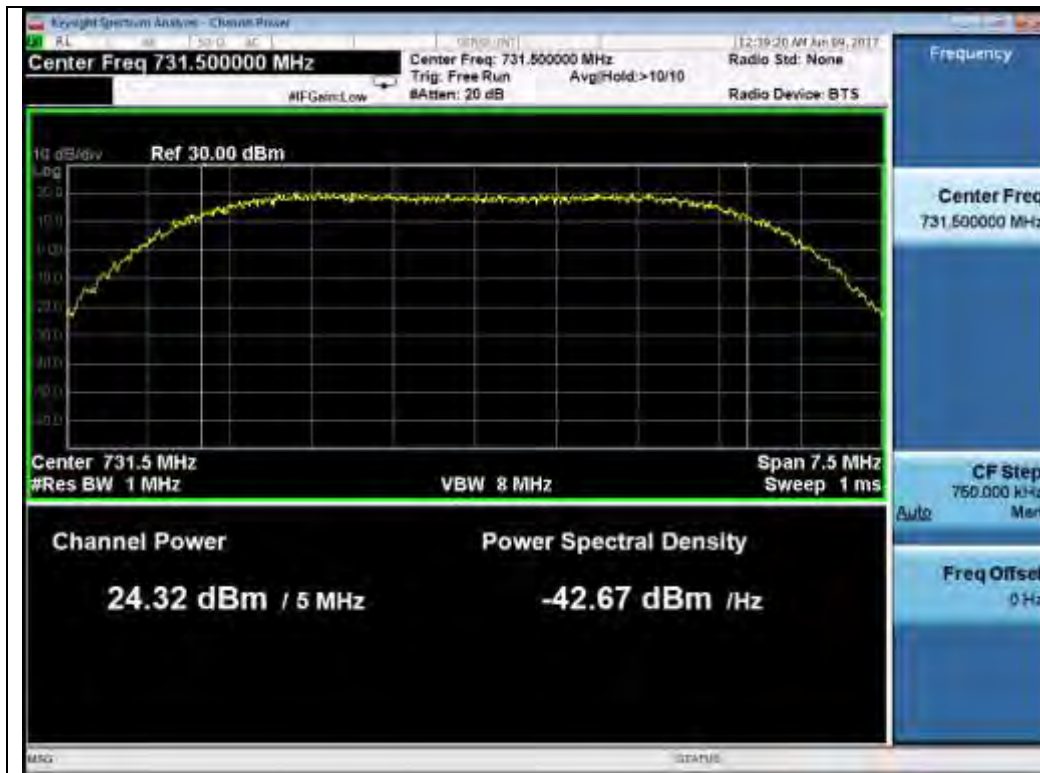
15M 64QAM High



20M 64QAM High



Test Plots for Band 12  
Chain 1:



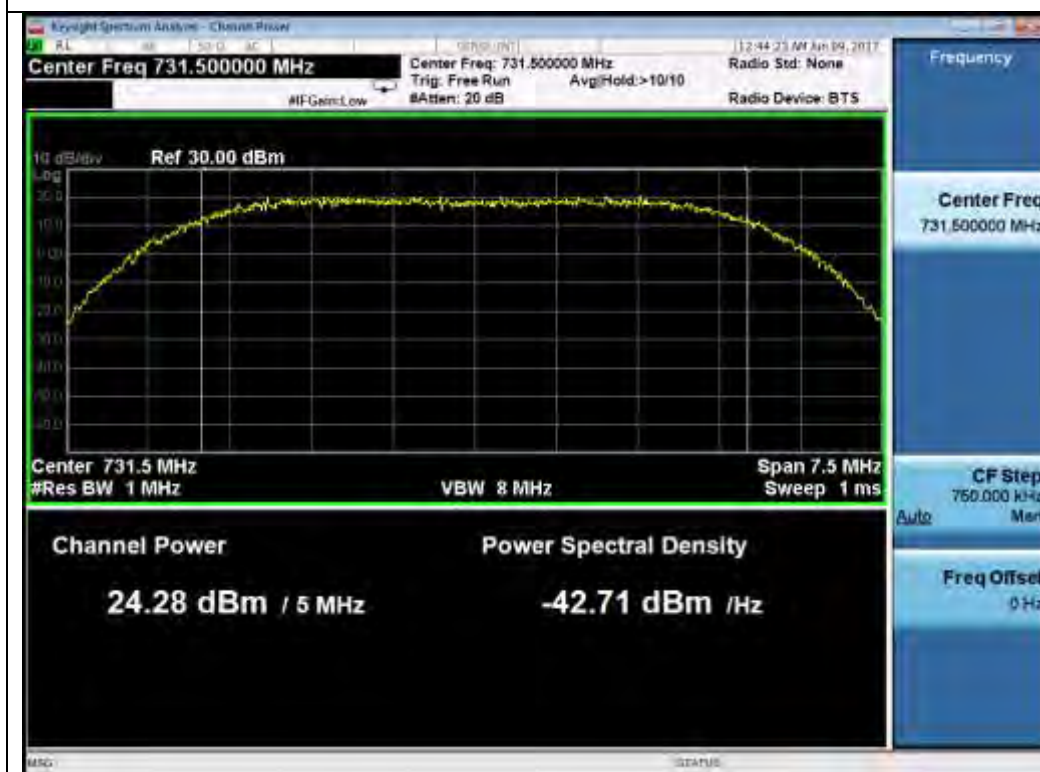
5M QPSK Low



5M QPSK Mid



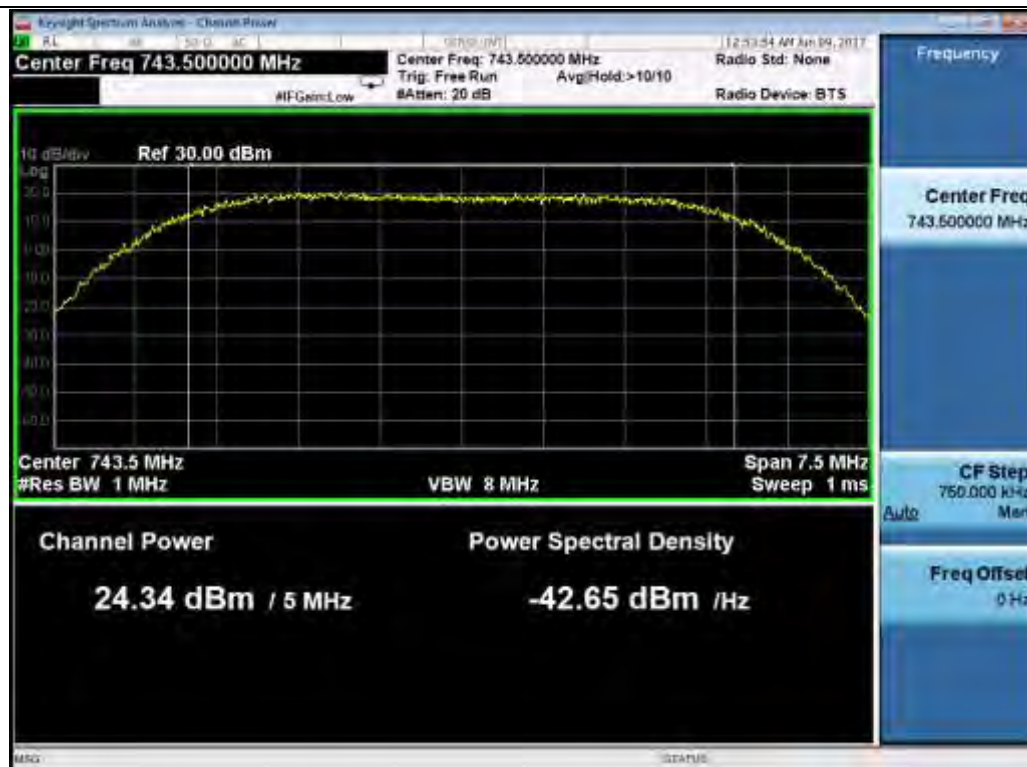
5M QPSK High



5M 64QAM Low

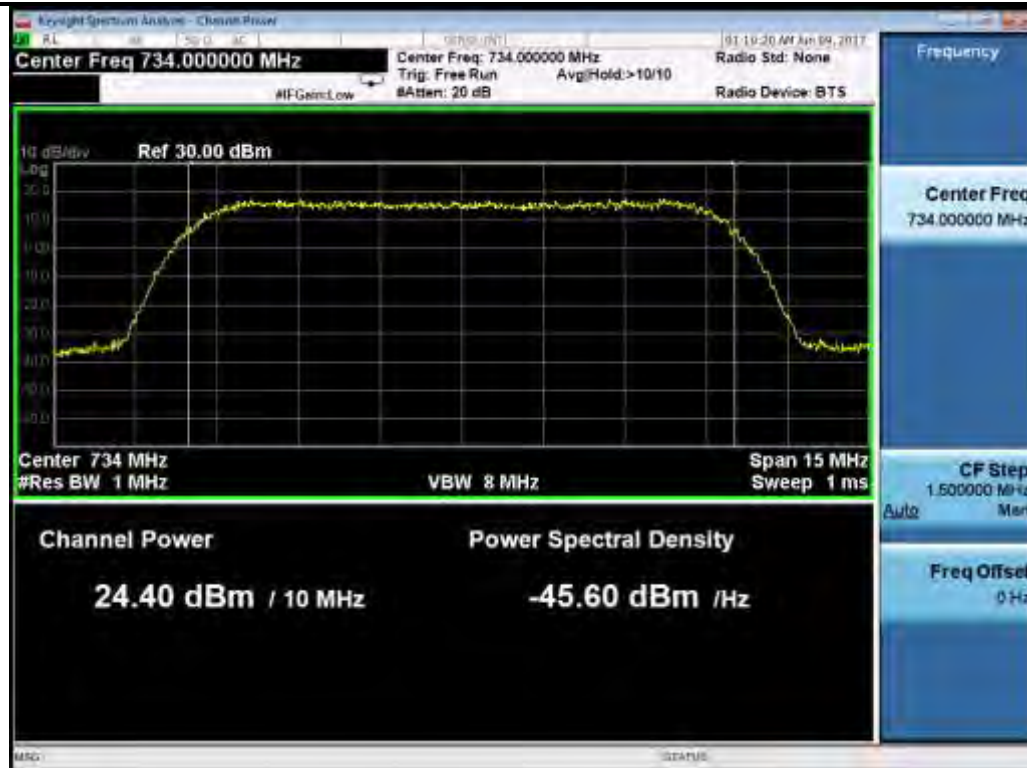


5M 64QAM Mid

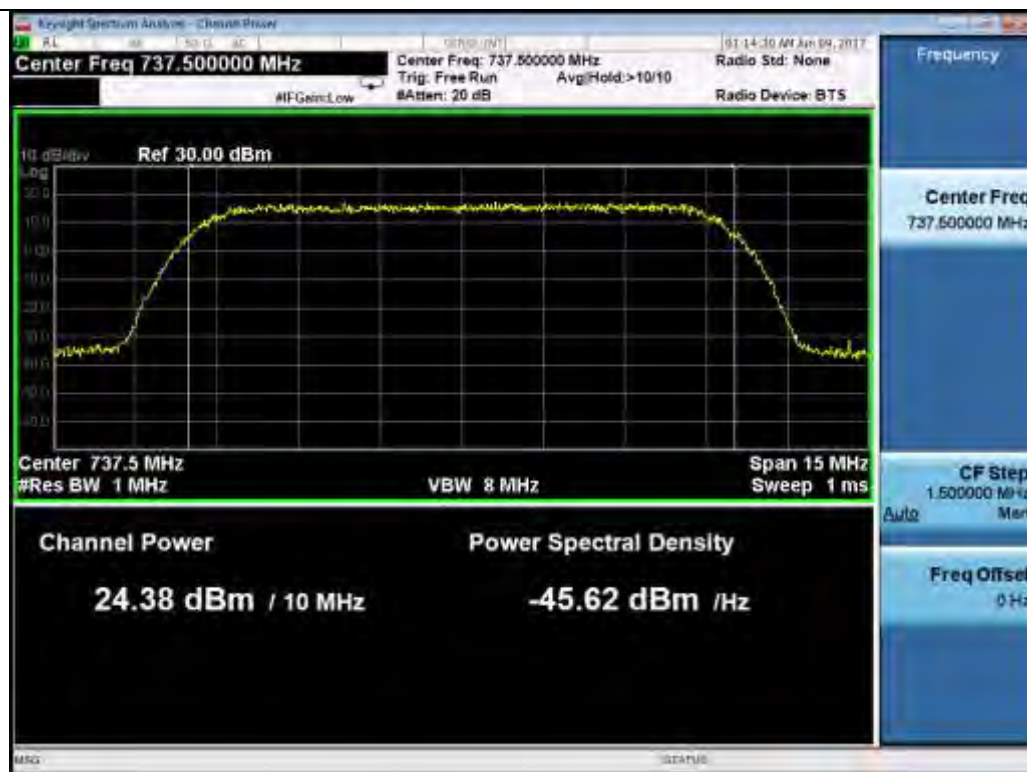


5M 64QAM High





10M QPSK Low

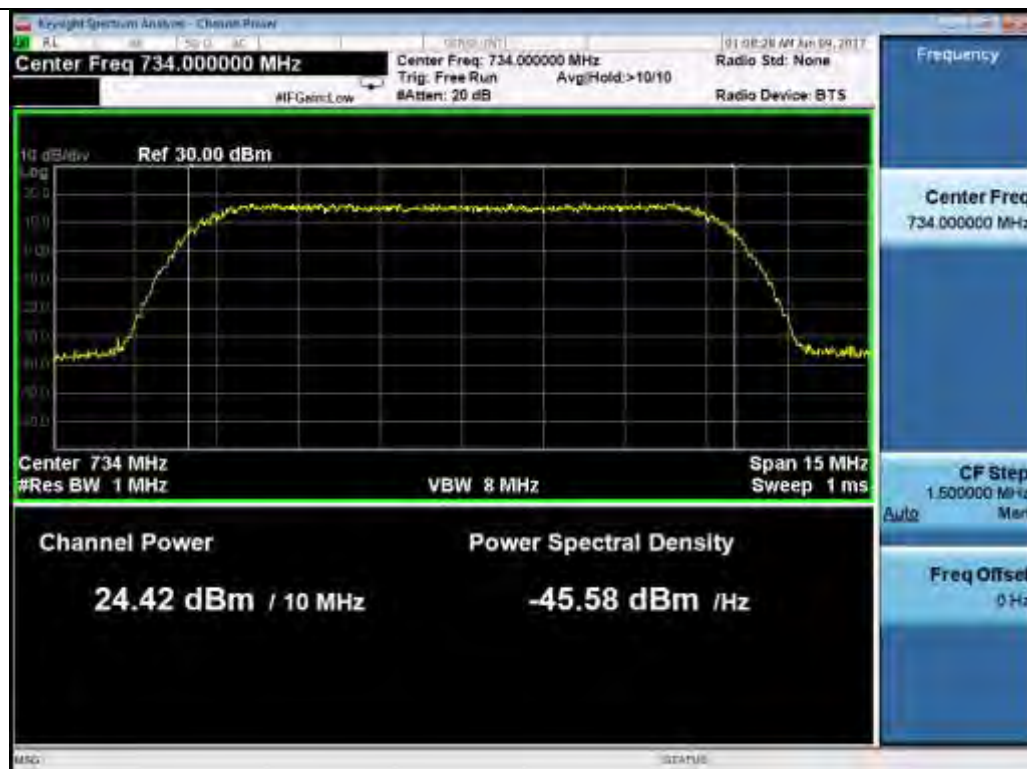


10M QPSK Mid





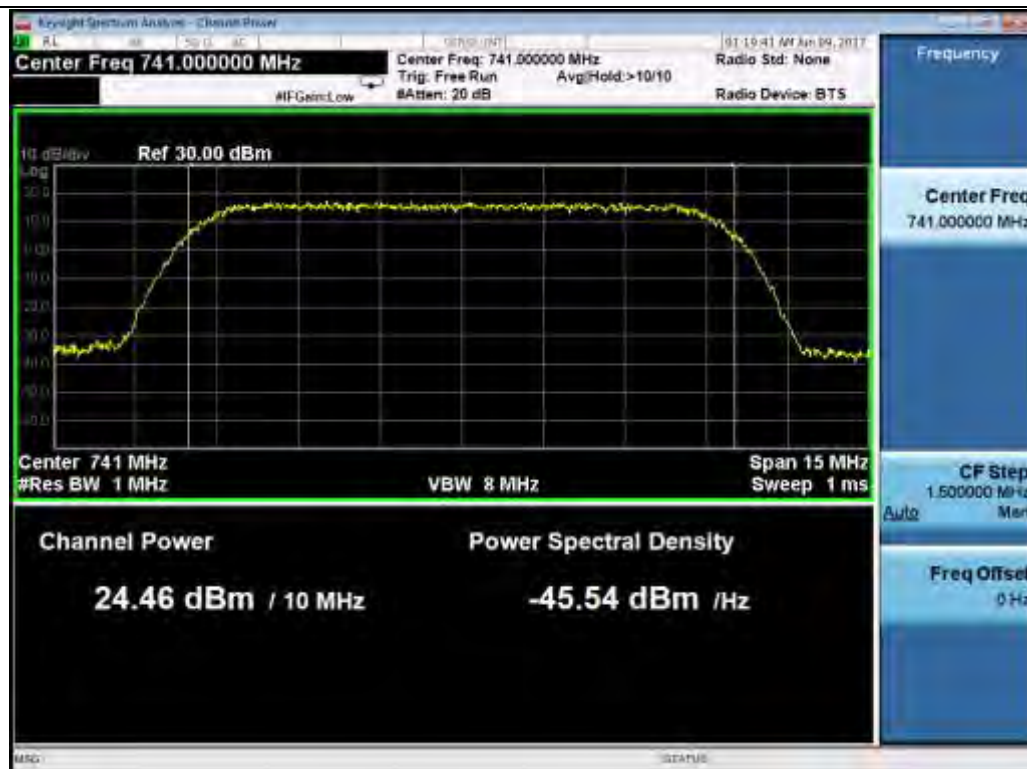
10M QPSK High



10M 64QAM Low



10M 64QAM Mid

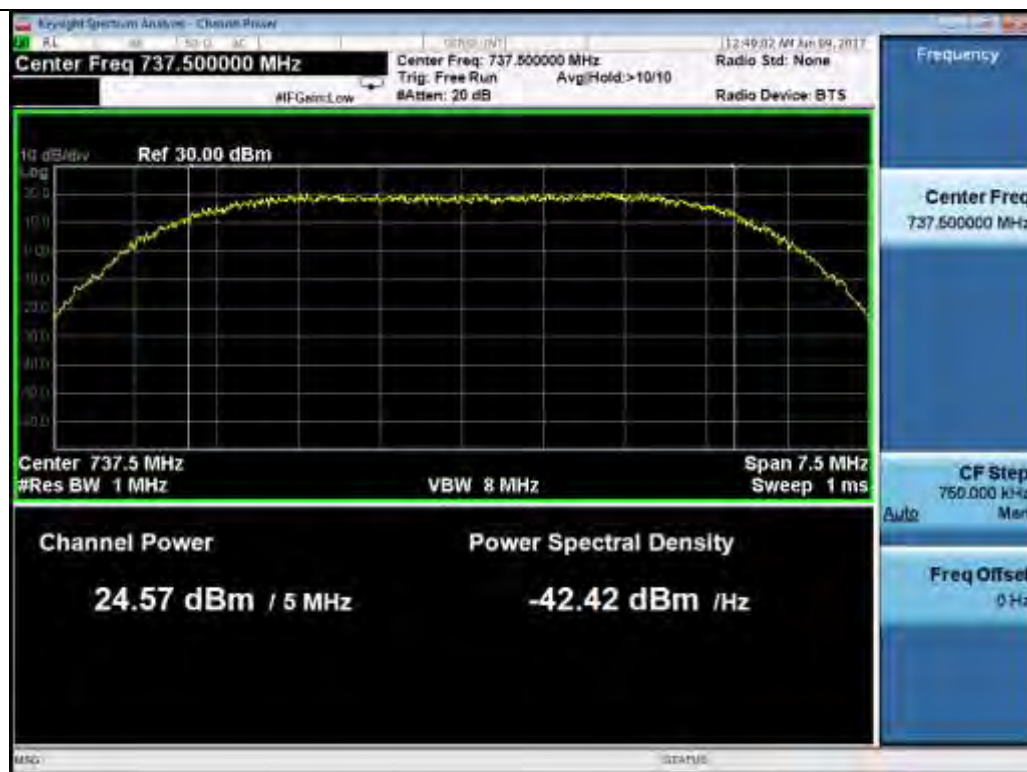


10M 64QAM High

Chain 2:



5M QPSK Low

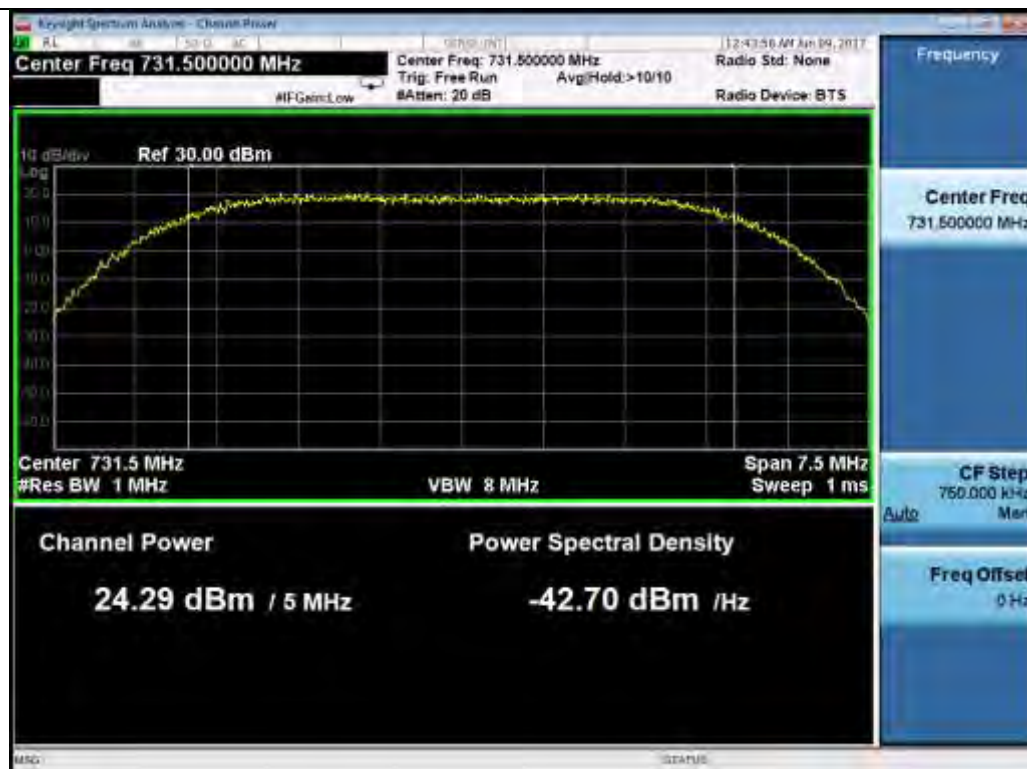


5M QPSK Mid





5M QPSK High

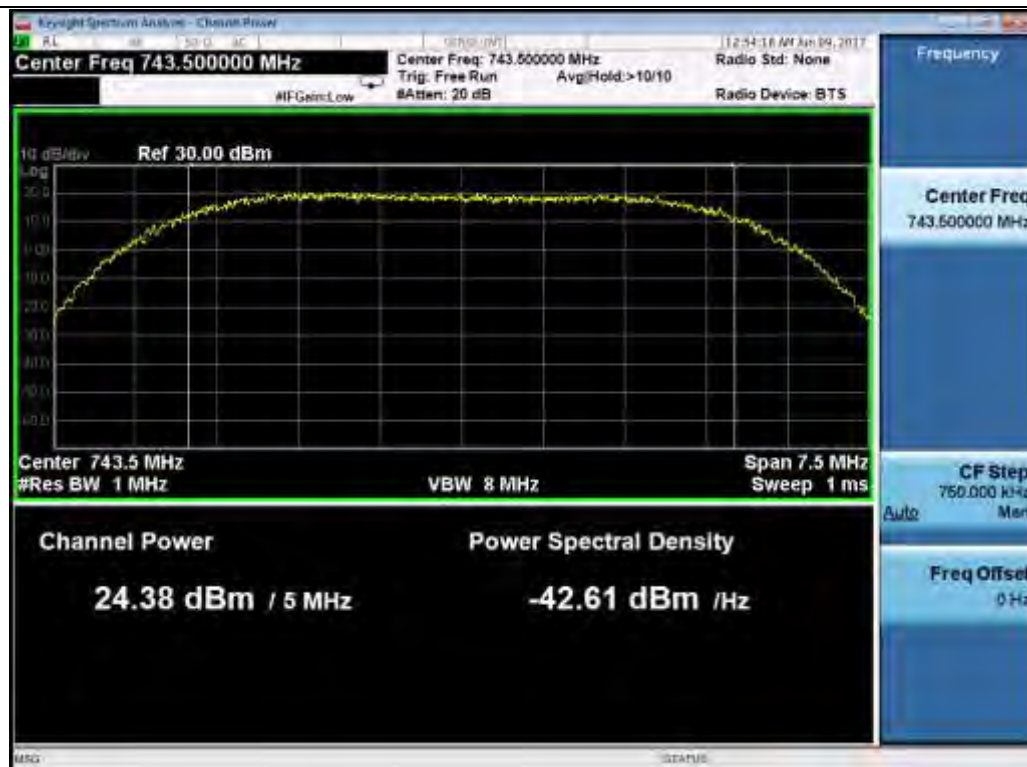


5M 64QAM Low





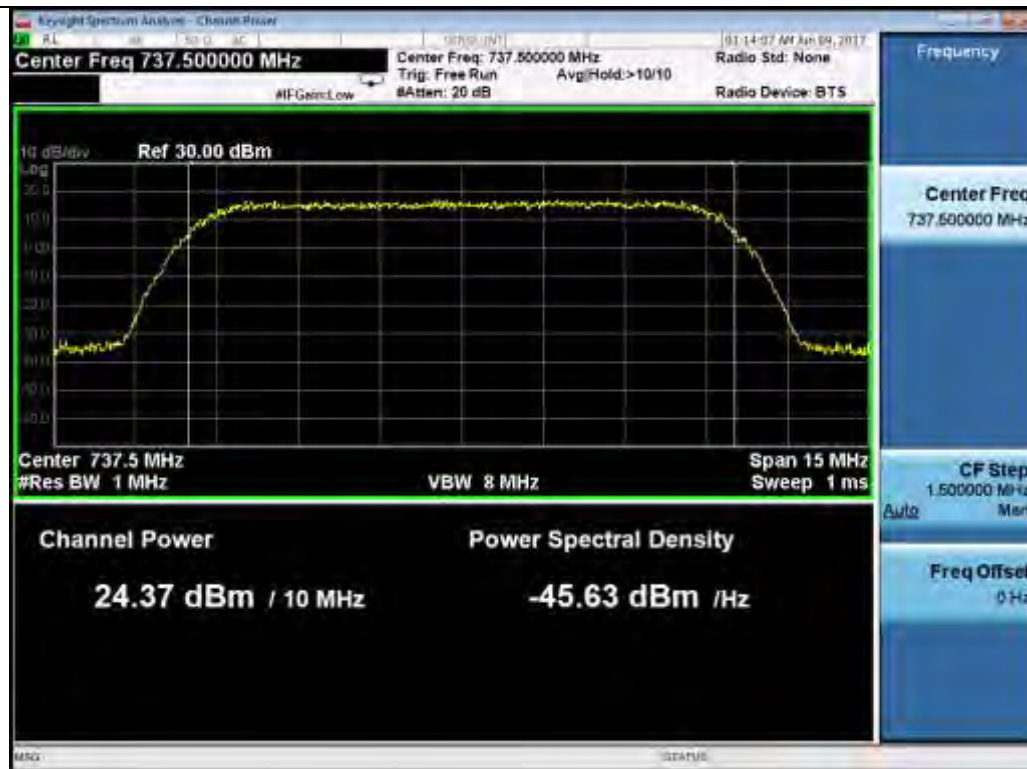
5M 64QAM Mid



5M 64QAM High



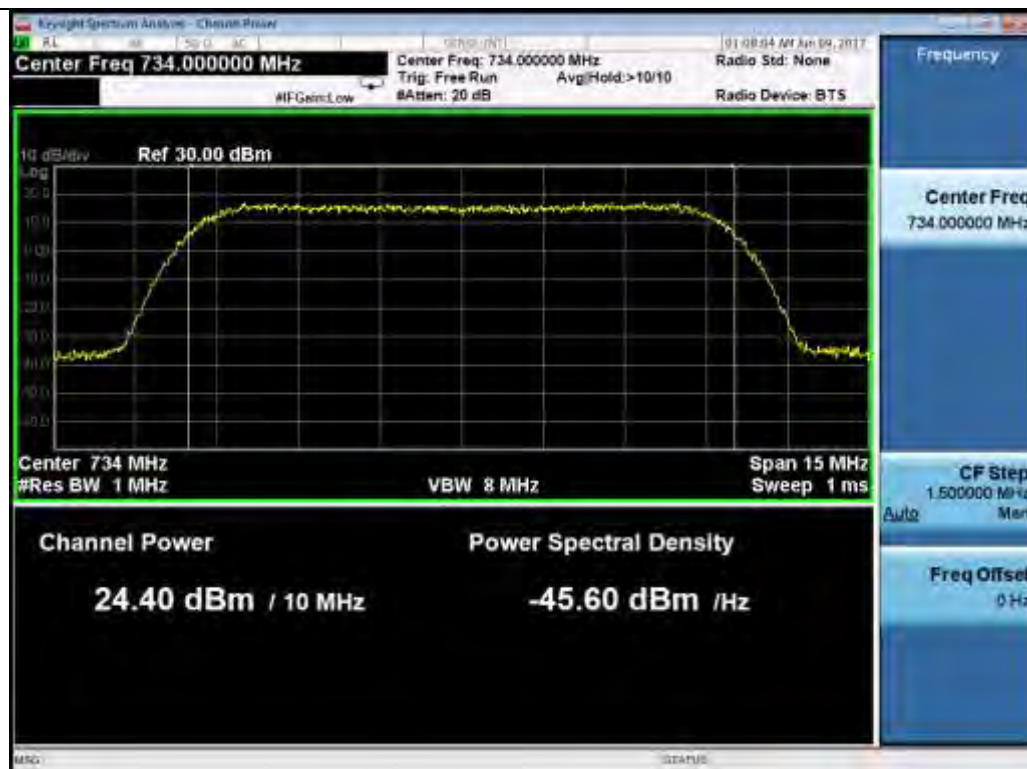
10M QPSK Low



10M QPSK Mid



10M QPSK High

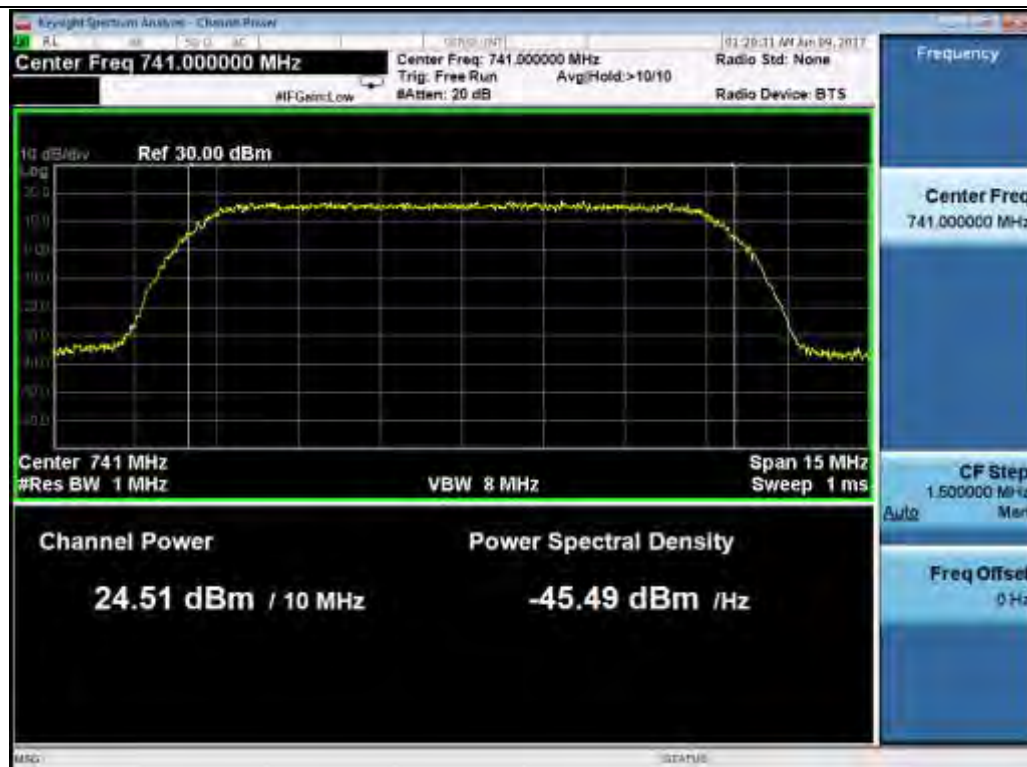


10M 64QAM Low





10M 64QAM Mid



10M 64QAM High



## 10.2 Peak-Average Ratio

Requirement(s):

| Spec           | Item                                                                                                                                                                                                                | Requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Applicable                                                                 |
|----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------|
| 47CFR24.232    | (d)                                                                                                                                                                                                                 | Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.                       | <input checked="" type="checkbox"/>                                        |
| 47CFR27.50     | (b)                                                                                                                                                                                                                 | The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission. | <input checked="" type="checkbox"/>                                        |
| Test Setup     |                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                            |
| Test Procedure | <ul style="list-style-type: none"> <li>- EUT was set for low, mid, high channel with modulated mode and highest RF output power.</li> <li>- The spectrum analyzer was connected to the antenna terminal.</li> </ul> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                            |
| Test Date      | 06/08/2017 – 06/10/2017                                                                                                                                                                                             | Environmental condition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Temperature 23°C<br>Relative Humidity 48%<br>Atmospheric Pressure 1008mbar |
| Remark         | NONE                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                            |
| 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.

Test Data for LTE band 2:

| Type            | Channel | Frequency (MHz) | Peak-Average Ratio (dB) | Peak-Average Ratio (dB) |
|-----------------|---------|-----------------|-------------------------|-------------------------|
| 5MHz BW, QPSK   | Low     | 1932.5          | 8.18                    | 13                      |
|                 | Mid     | 1960            | 8.16                    | 13                      |
|                 | High    | 1987.5          | 8.17                    | 13                      |
| 5MHz BW, 64QAM  | Low     | 1932.5          | 8.22                    | 13                      |
|                 | Mid     | 1960            | 8.26                    | 13                      |
|                 | High    | 1987.5          | 8.12                    | 13                      |
| 10MHz BW, QPSK  | Low     | 1935            | 7.70                    | 13                      |
|                 | Mid     | 1960            | 7.84                    | 13                      |
|                 | High    | 1985            | 7.57                    | 13                      |
| 10MHz BW, 64QAM | Low     | 1935            | 7.78                    | 13                      |
|                 | Mid     | 1960            | 7.70                    | 13                      |
|                 | High    | 1985            | 7.66                    | 13                      |
| 15MHz BW, QPSK  | Low     | 1937.5          | 8.92                    | 13                      |
|                 | Mid     | 1960            | 8.86                    | 13                      |
|                 | High    | 1982.5          | 8.86                    | 13                      |
| 15MHz BW, 64QAM | Low     | 1937.5          | 8.81                    | 13                      |
|                 | Mid     | 1960            | 8.85                    | 13                      |
|                 | High    | 1982.5          | 8.83                    | 13                      |
| 20MHz BW, QPSK  | Low     | 1940            | 9.51                    | 13                      |
|                 | Mid     | 1960            | 9.59                    | 13                      |
|                 | High    | 1980            | 9.62                    | 13                      |
| 20MHz BW, 64QAM | Low     | 1940            | 9.41                    | 13                      |
|                 | Mid     | 1960            | 9.41                    | 13                      |
|                 | High    | 1980            | 9.35                    | 13                      |

Test Data for LTE band 4:

| Type            | Channel | Frequency (MHz) | Peak-Average Ratio (dB) | Peak-Average Ratio (dB) |
|-----------------|---------|-----------------|-------------------------|-------------------------|
| 5MHz BW, QPSK   | Low     | 2112.5          | 8.17                    | 13                      |
|                 | Mid     | 2132.5          | 8.26                    | 13                      |
|                 | High    | 2152.5          | 8.16                    | 13                      |
| 5MHz BW, 64QAM  | Low     | 2112.5          | 8.26                    | 13                      |
|                 | Mid     | 2132.5          | 8.32                    | 13                      |
|                 | High    | 2152.5          | 8.22                    | 13                      |
| 10MHz BW, QPSK  | Low     | 2115.0          | 7.72                    | 13                      |
|                 | Mid     | 2132.5          | 7.70                    | 13                      |
|                 | High    | 2150.0          | 7.75                    | 13                      |
| 10MHz BW, 64QAM | Low     | 2115.0          | 7.77                    | 13                      |
|                 | Mid     | 2132.5          | 7.73                    | 13                      |
|                 | High    | 2150.0          | 7.71                    | 13                      |
| 15MHz BW, QPSK  | Low     | 2117.5          | 8.90                    | 13                      |
|                 | Mid     | 2132.5          | 8.89                    | 13                      |
|                 | High    | 2147.5          | 8.92                    | 13                      |
| 15MHz BW, 64QAM | Low     | 2117.5          | 8.86                    | 13                      |
|                 | Mid     | 2132.5          | 8.83                    | 13                      |
|                 | High    | 2147.5          | 8.83                    | 13                      |
| 20MHz BW, QPSK  | Low     | 2120.0          | 9.51                    | 13                      |
|                 | Mid     | 2132.5          | 9.57                    | 13                      |
|                 | High    | 2145.0          | 9.61                    | 13                      |
| 20MHz BW, 64QAM | Low     | 2120.0          | 9.35                    | 13                      |
|                 | Mid     | 2132.5          | 9.44                    | 13                      |
|                 | High    | 2145.0          | 9.38                    | 13                      |

Test Data for LTE band 25:

| Type            | Channel | Frequency (MHz) | Peak-Average Ratio (dB) | Peak-Average Ratio (dB) |
|-----------------|---------|-----------------|-------------------------|-------------------------|
| 5MHz BW, QPSK   | High    | 1992.5          | 8.09                    | 13                      |
| 5MHz BW, 64QAM  | High    | 1992.5          | 8.05                    | 13                      |
| 10MHz BW, QPSK  | High    | 1990            | 7.77                    | 13                      |
| 10MHz BW, 64QAM | High    | 1990            | 7.73                    | 13                      |
| 15MHz BW, QPSK  | High    | 1987.5          | 8.86                    | 13                      |
| 15MHz BW, 64QAM | High    | 1987.5          | 8.83                    | 13                      |
| 20MHz BW, QPSK  | High    | 1985            | 9.58                    | 13                      |
| 20MHz BW, 64QAM | High    | 1985            | 9.37                    | 13                      |



Test Data for LTE band 66:

| Type            | Channel | Frequency (MHz) | Peak-Average Ratio (dB) | Peak-Average Ratio (dB) |
|-----------------|---------|-----------------|-------------------------|-------------------------|
| 5MHz BW, QPSK   | High    | 2197.5          | 8.08                    | 13                      |
| 5MHz BW, 64QAM  | High    | 2197.5          | 8.16                    | 13                      |
| 10MHz BW, QPSK  | High    | 2195            | 7.87                    | 13                      |
| 10MHz BW, 64QAM | High    | 2195            | 7.75                    | 13                      |
| 15MHz BW, QPSK  | High    | 2192.5          | 9.00                    | 13                      |
| 15MHz BW, 64QAM | High    | 2192.5          | 9.53                    | 13                      |
| 20MHz BW, QPSK  | High    | 2190            | 9.68                    | 13                      |
| 20MHz BW, 64QAM | High    | 2190            | 9.66                    | 13                      |

Test Data for LTE band 12:

| Type            | Channel | Frequency (MHz) | Peak-Average Ratio (dB) | Peak-Average Ratio (dB) |
|-----------------|---------|-----------------|-------------------------|-------------------------|
| 5MHz BW, QPSK   | Low     | 731.5           | 8.16                    | 13                      |
|                 | Mid     | 737.5           | 8.01                    | 13                      |
|                 | High    | 743.5           | 8.21                    | 13                      |
| 5MHz BW, 64QAM  | Low     | 731.5           | 8.26                    | 13                      |
|                 | Mid     | 737.5           | 8.30                    | 13                      |
|                 | High    | 731.5           | 8.26                    | 13                      |
| 10MHz BW, QPSK  | Low     | 734             | 7.88                    | 13                      |
|                 | Mid     | 737.5           | 7.95                    | 13                      |
|                 | High    | 741             | 7.91                    | 13                      |
| 10MHz BW, 64QAM | Low     | 734             | 7.98                    | 13                      |
|                 | Mid     | 737.5           | 8.21                    | 13                      |
|                 | High    | 741             | 7.92                    | 13                      |

Test Plots for LTE band 2:



BW 5M QPSK Low



BW 5M QPSK Mid



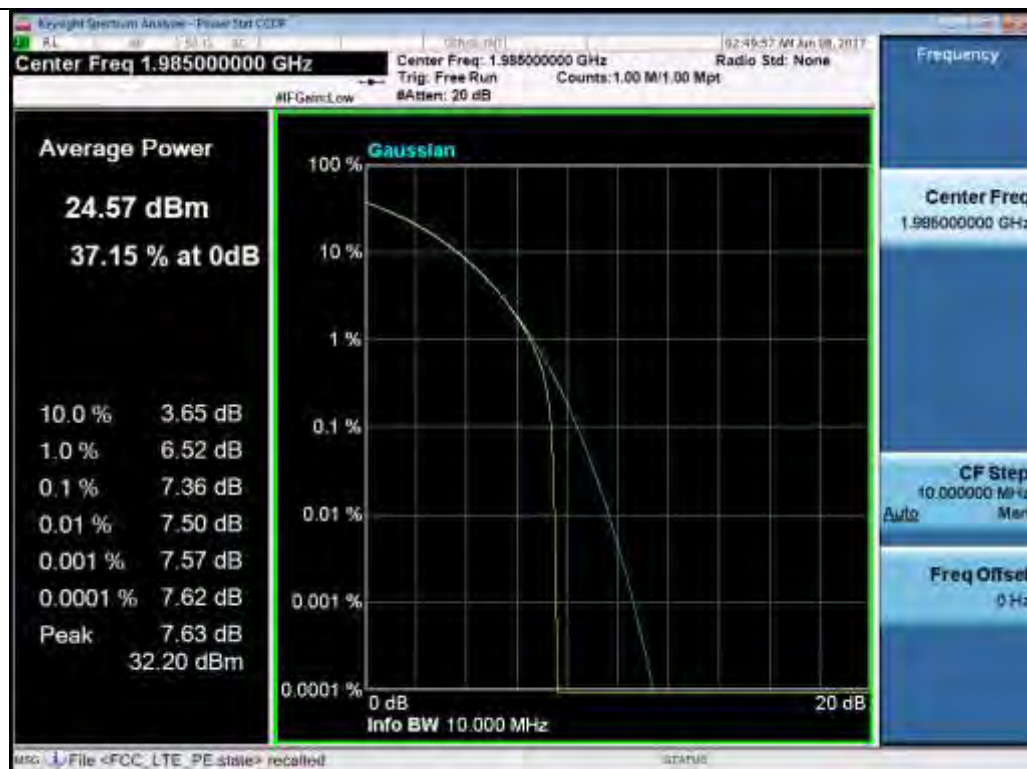
BW 5M QPSK High



BW 10M QPSK Low

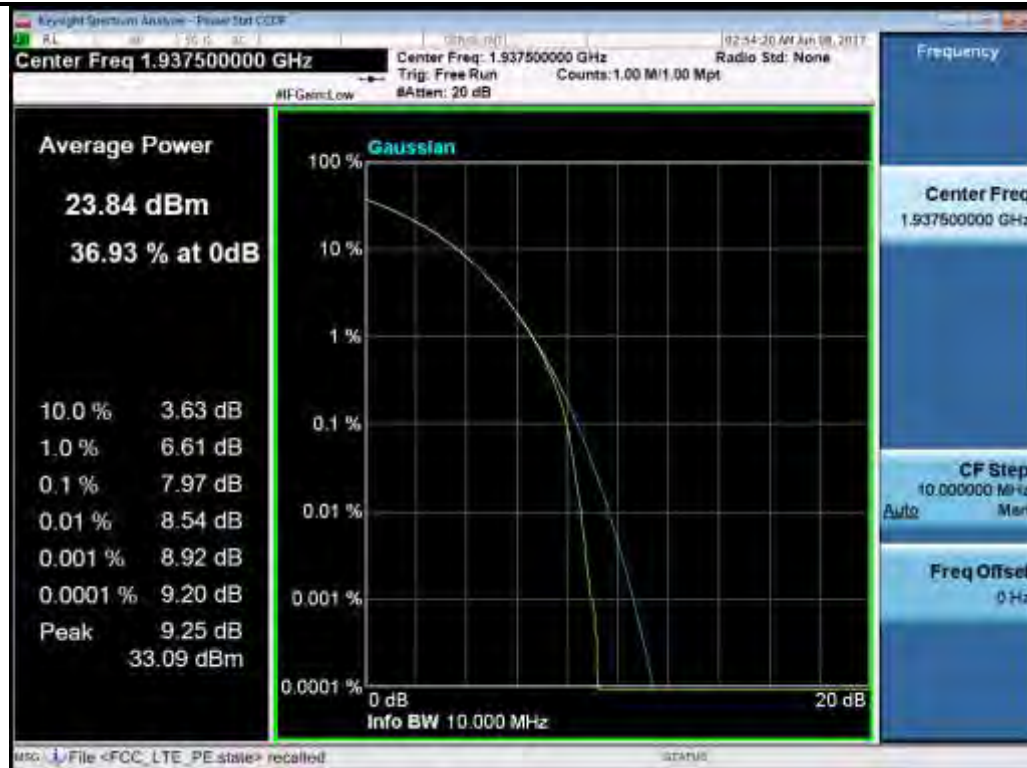


BW 10M QPSK Mid

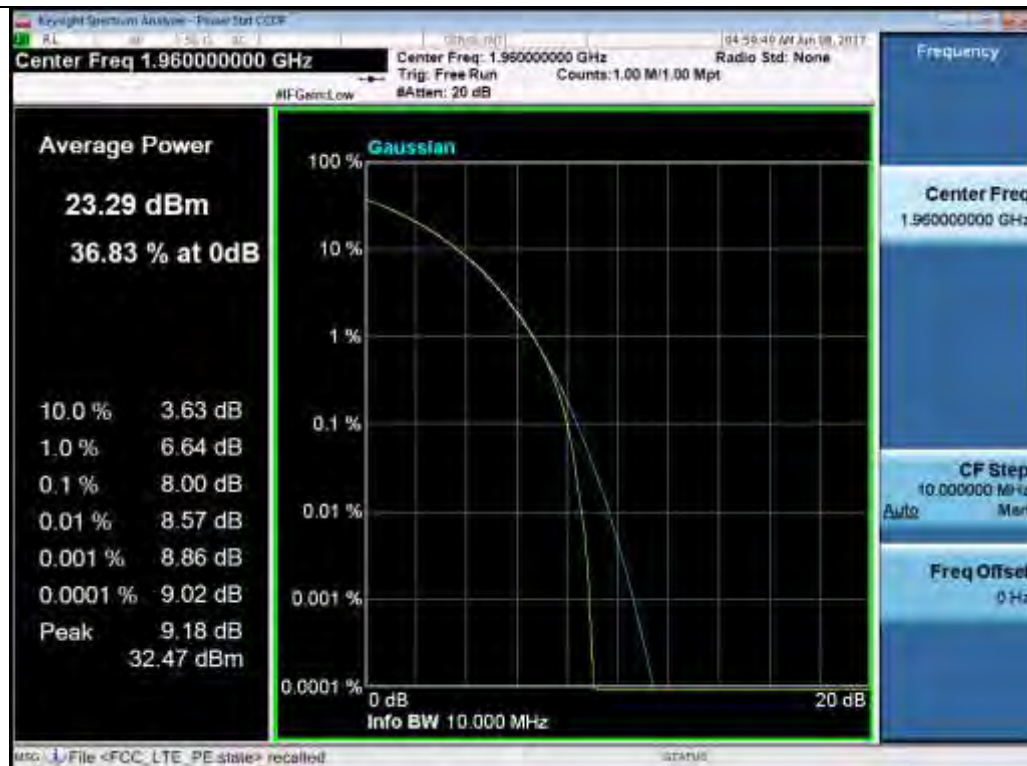


BW 10M QPSK High

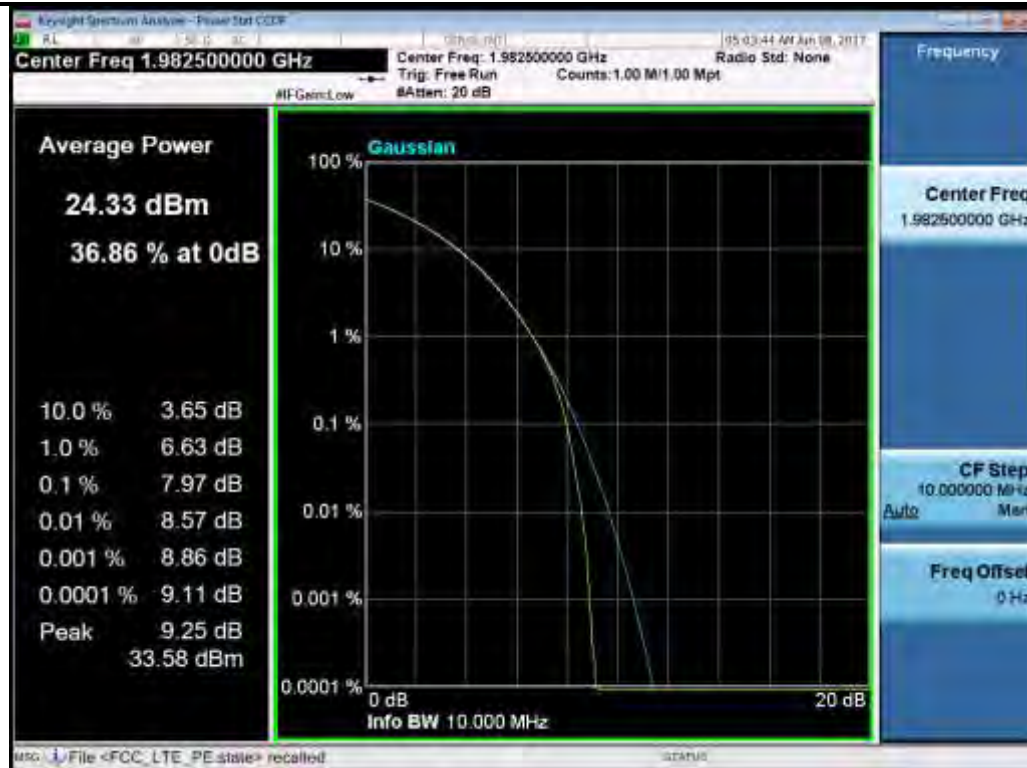




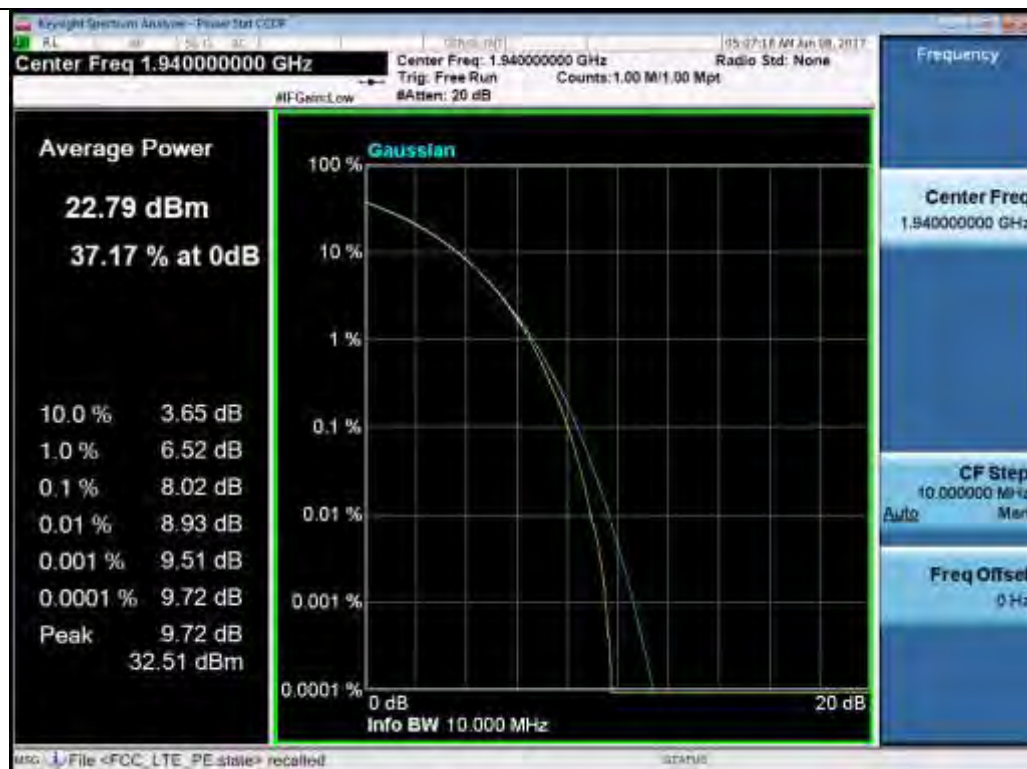
BW 15M QPSK Low



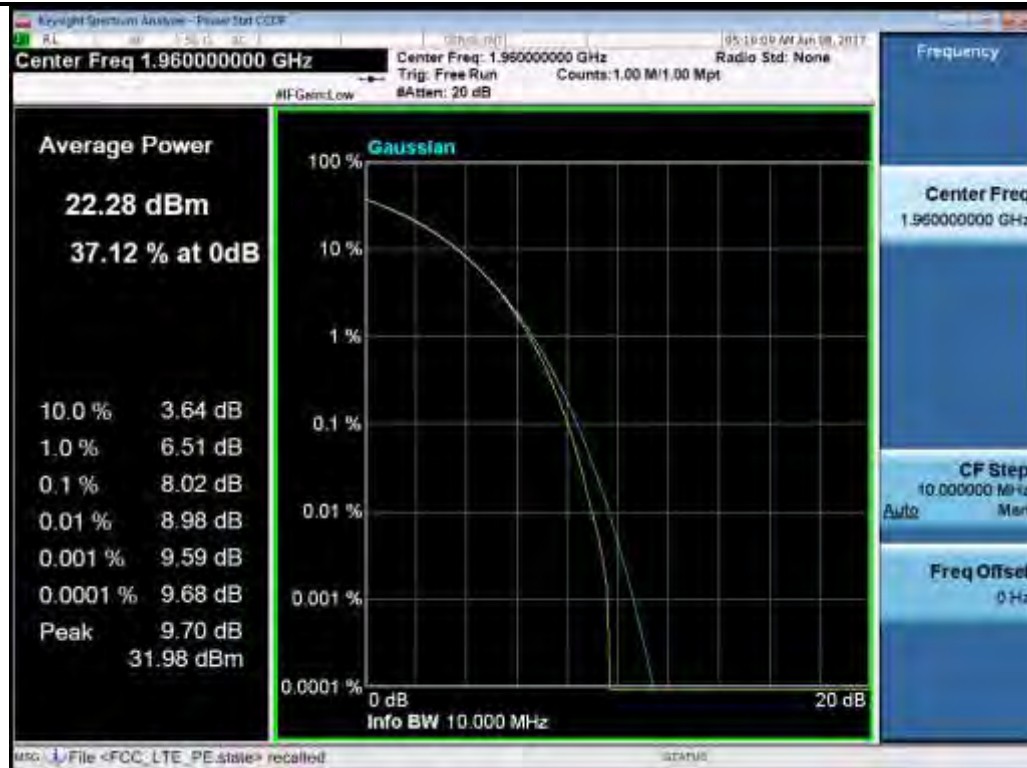
BW 15M QPSK Mid



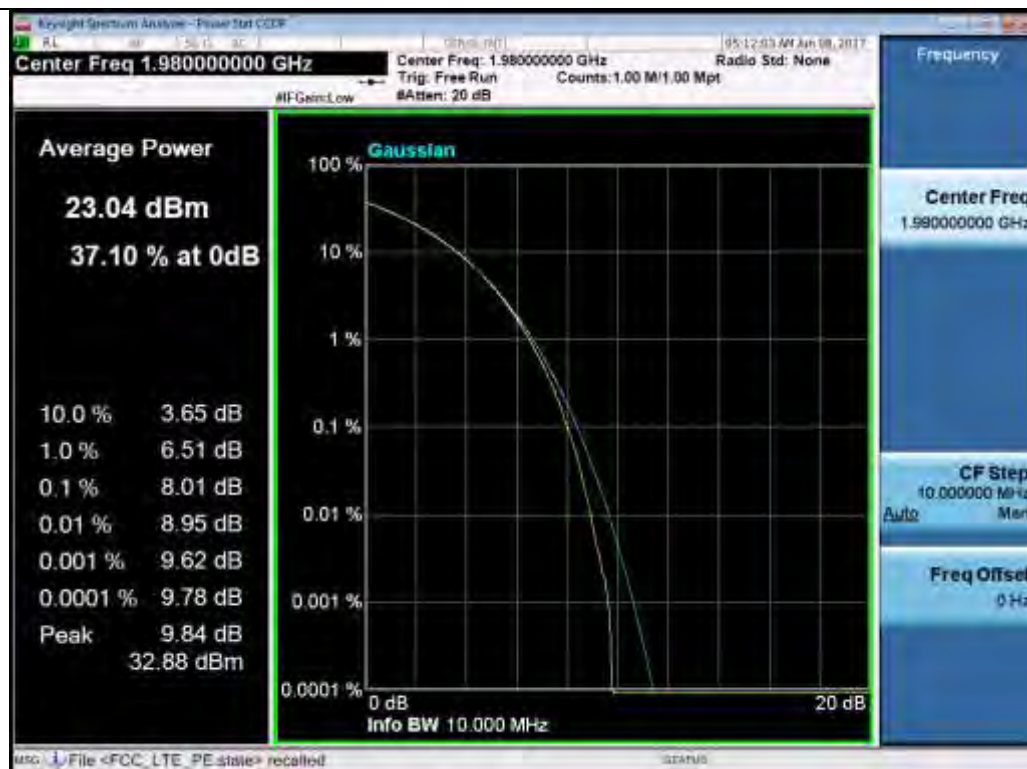
BW 15M QPSK High



BW 20M QPSK Low

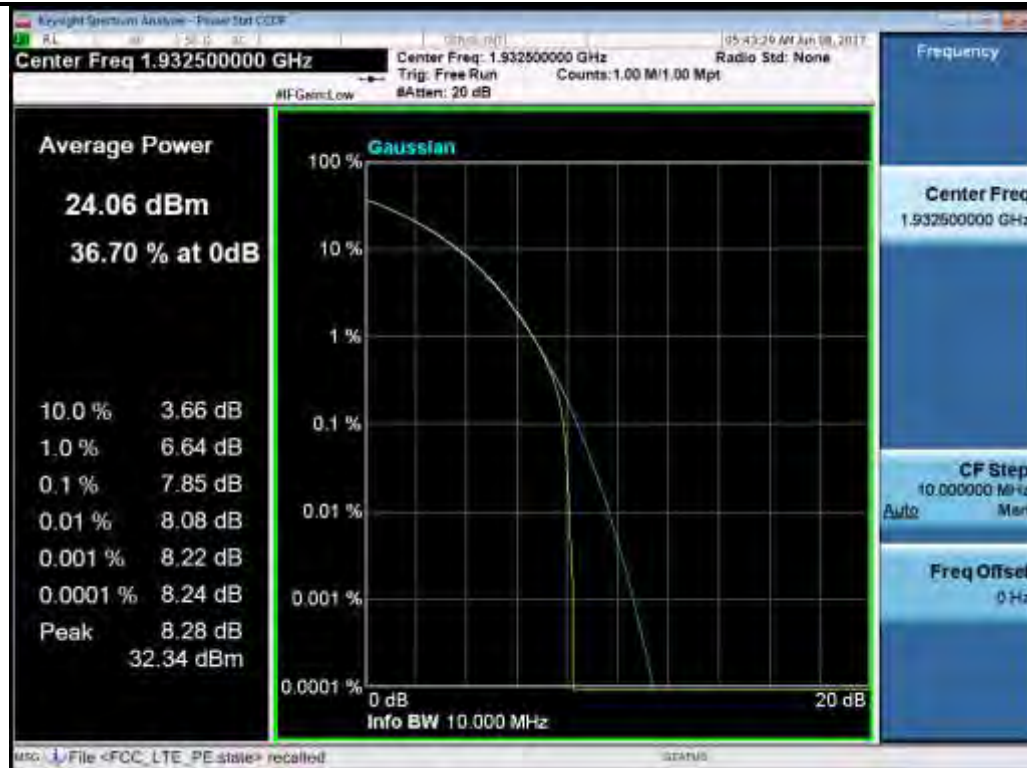


BW 20M QPSK Mid

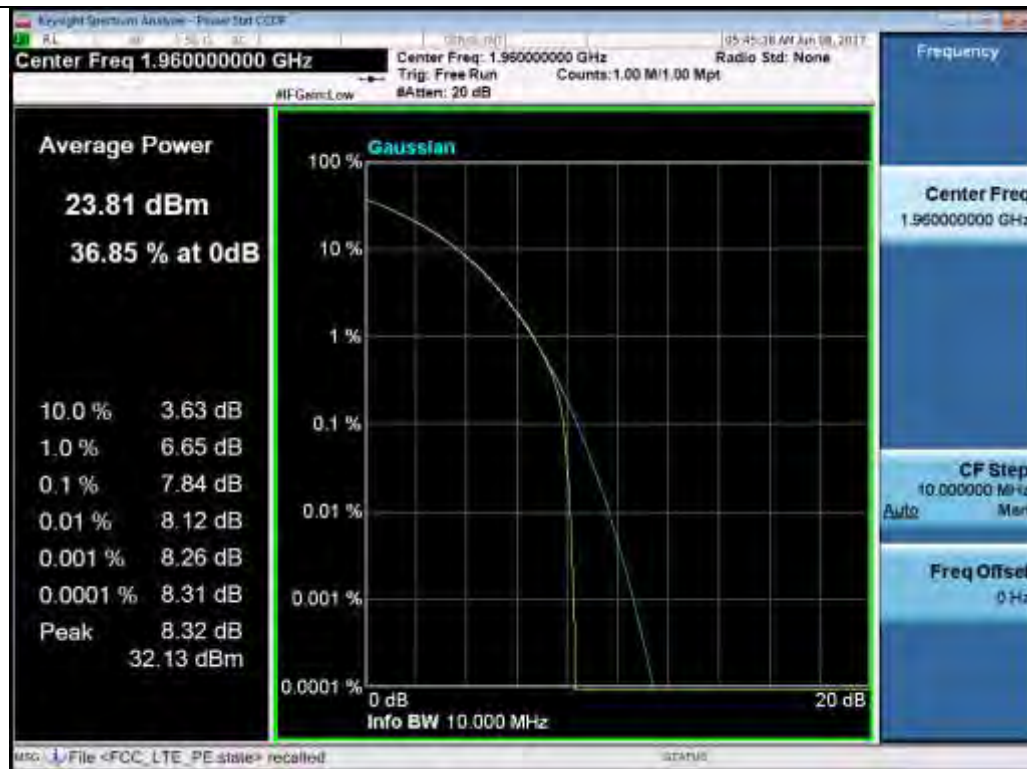


BW 20M QPSK High



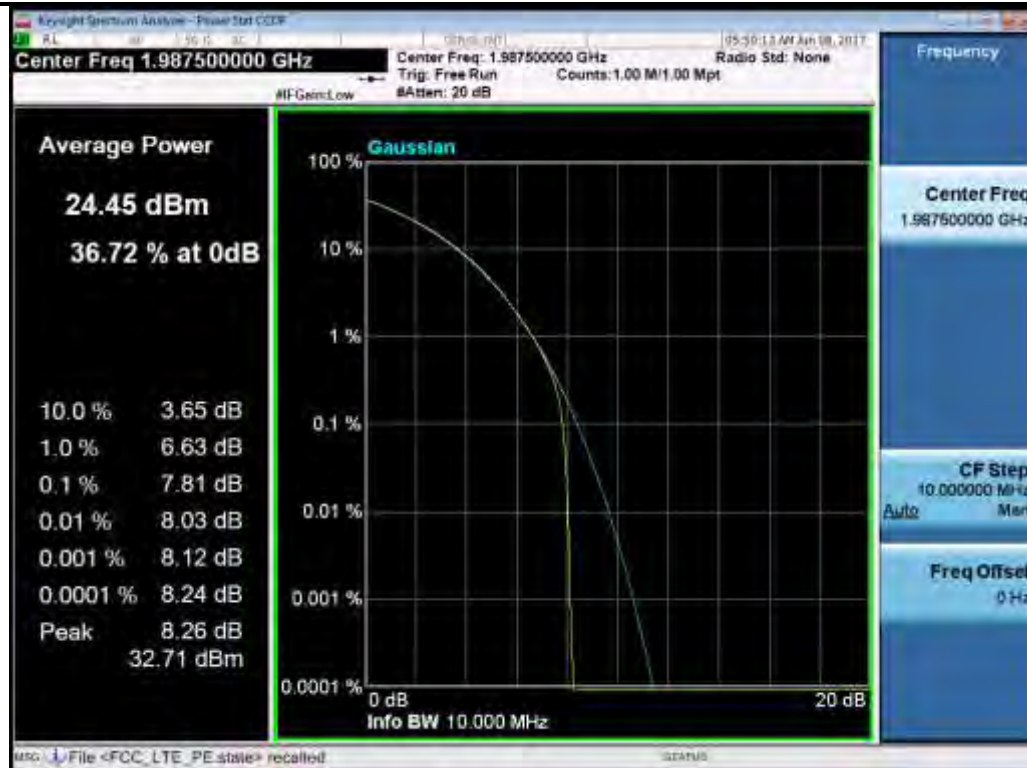


BW 5M 64QAM Low



BW 5M 64QAM Mid

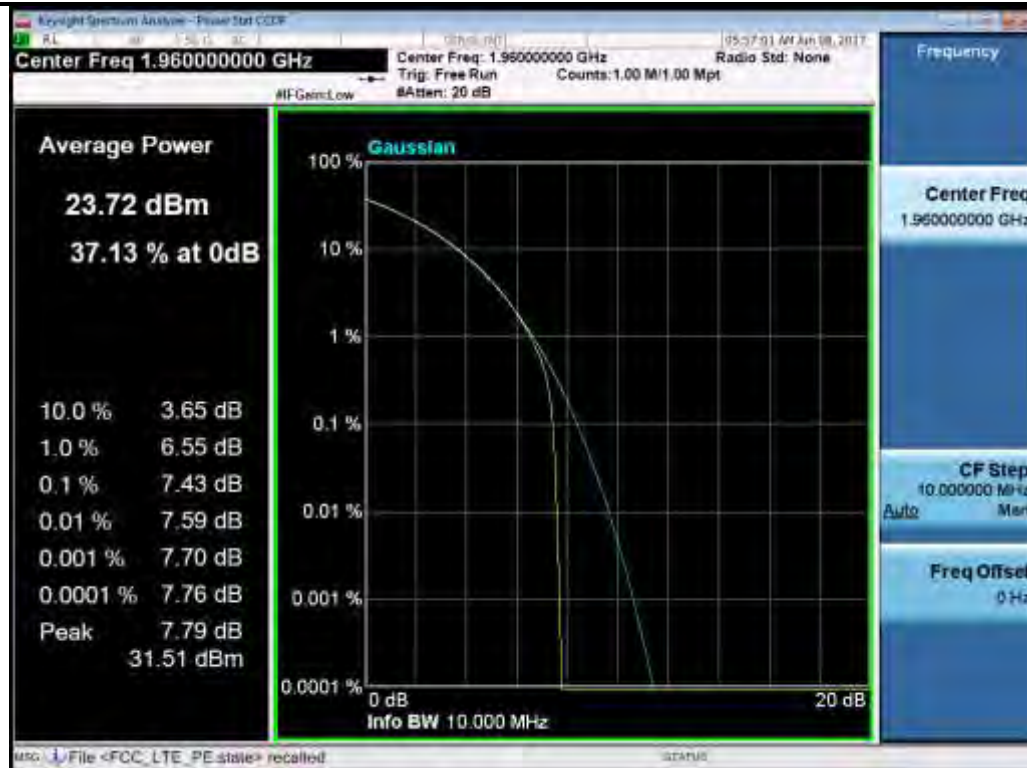




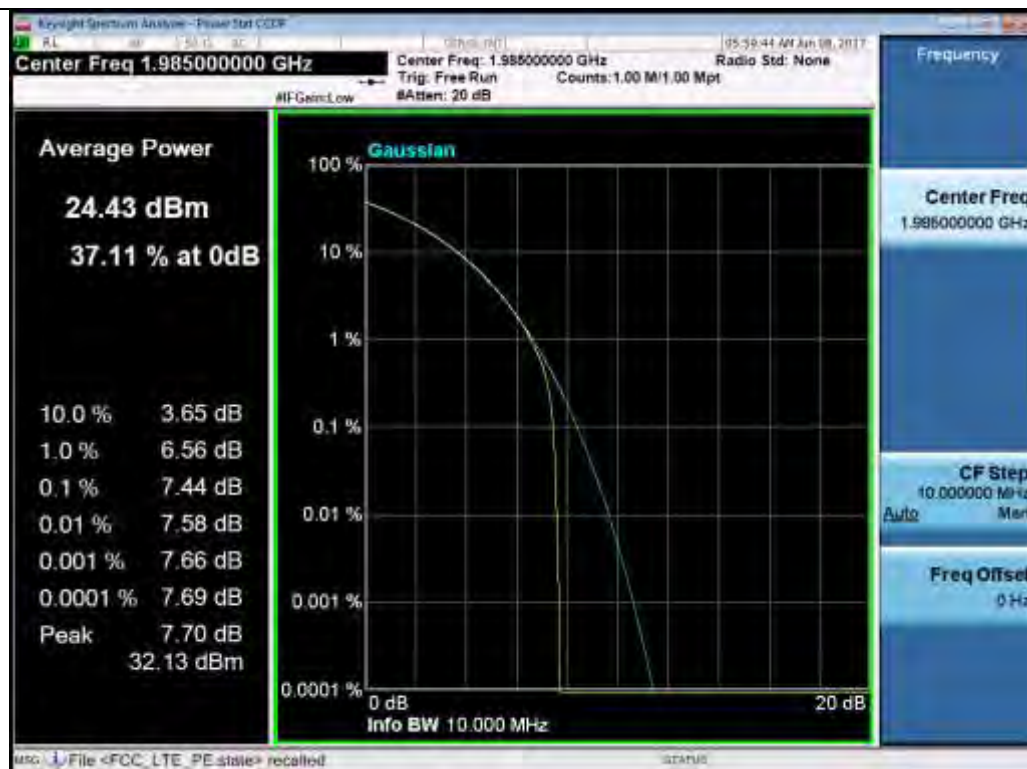
BW 5M 64QAM High



BW 10M 64QAM Low



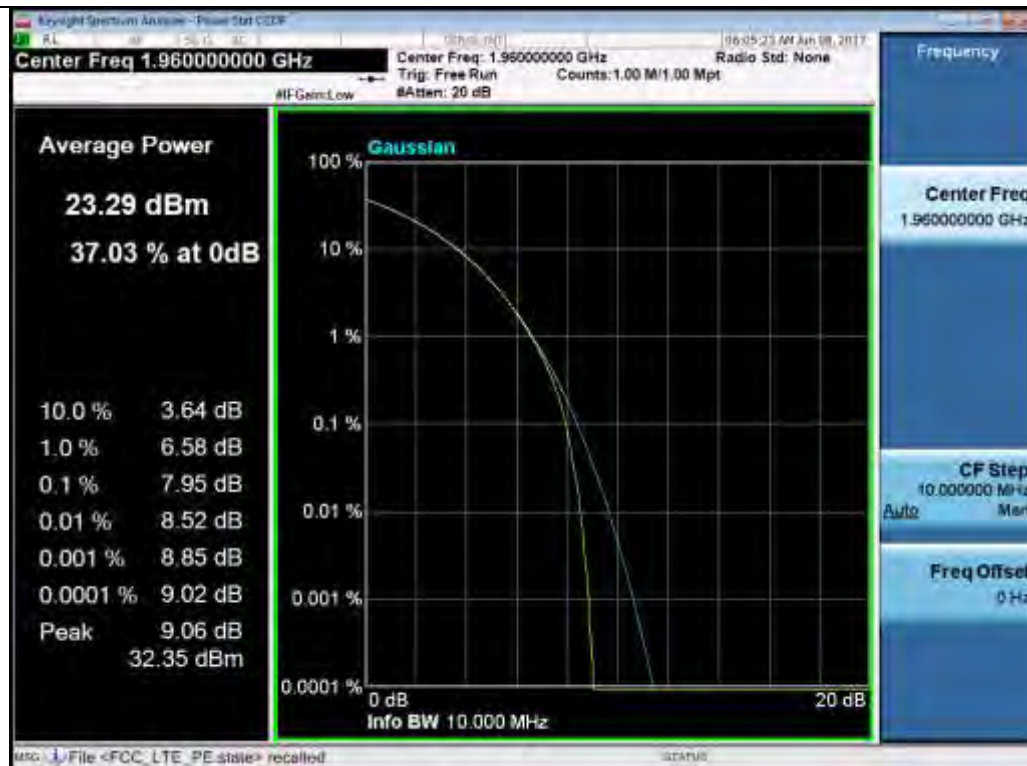
BW 10M 64QAM Mid



BW 10M 64QAM High

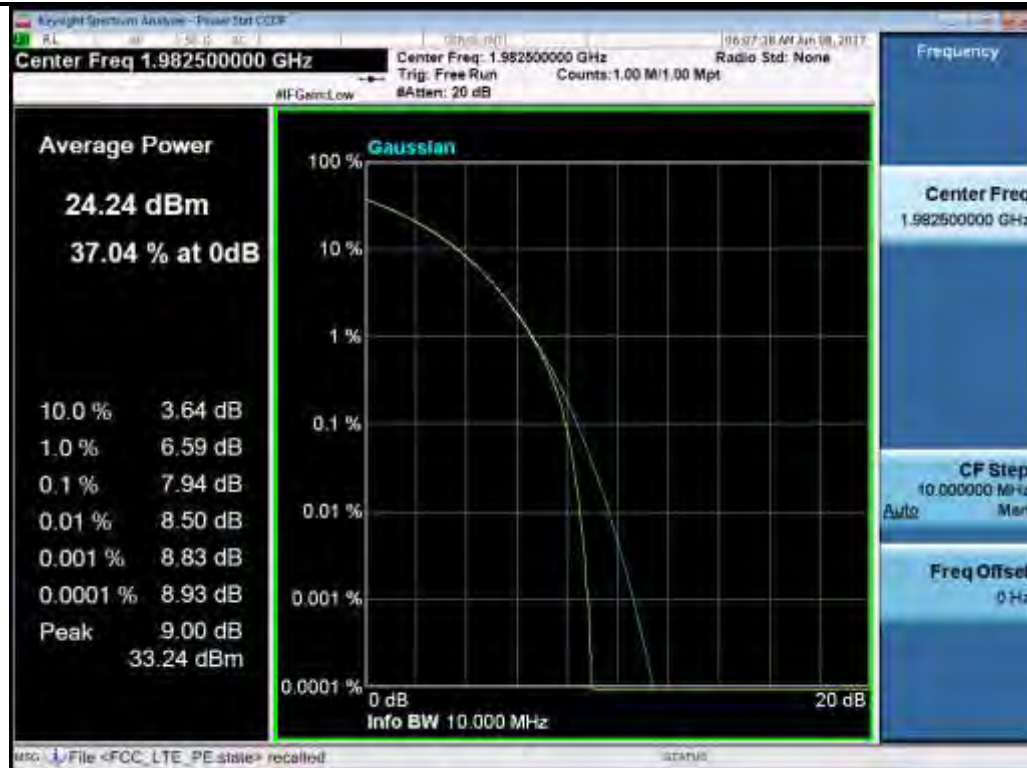


BW 15M 64QAM Low

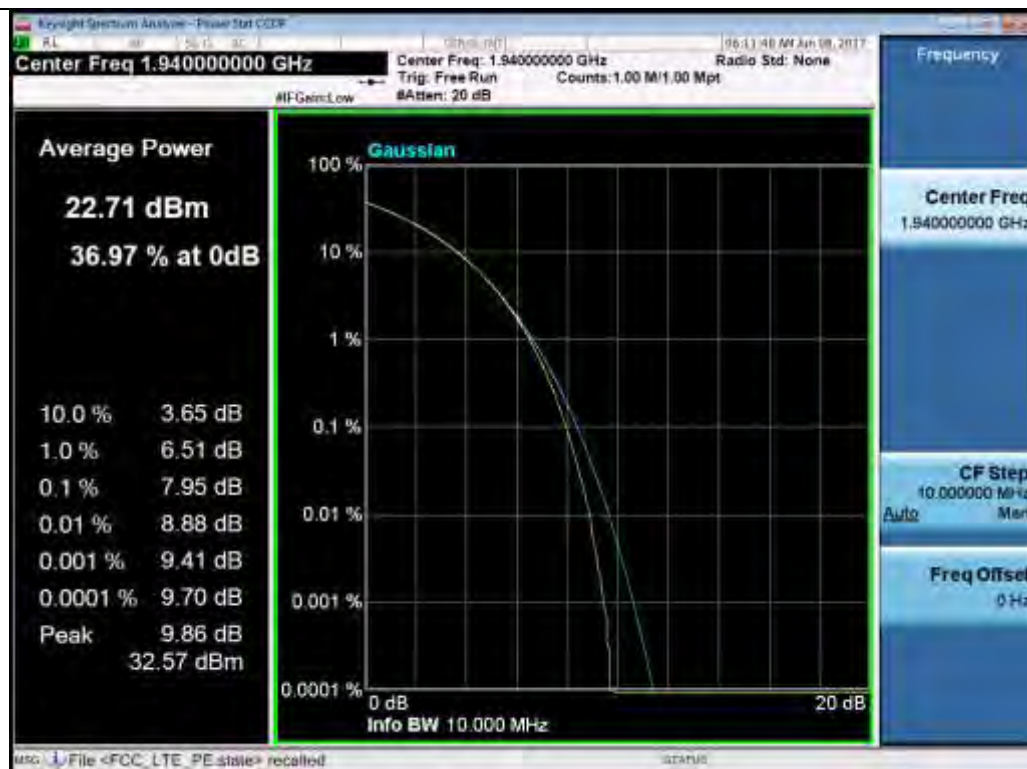


BW 15M 64QAM Mid



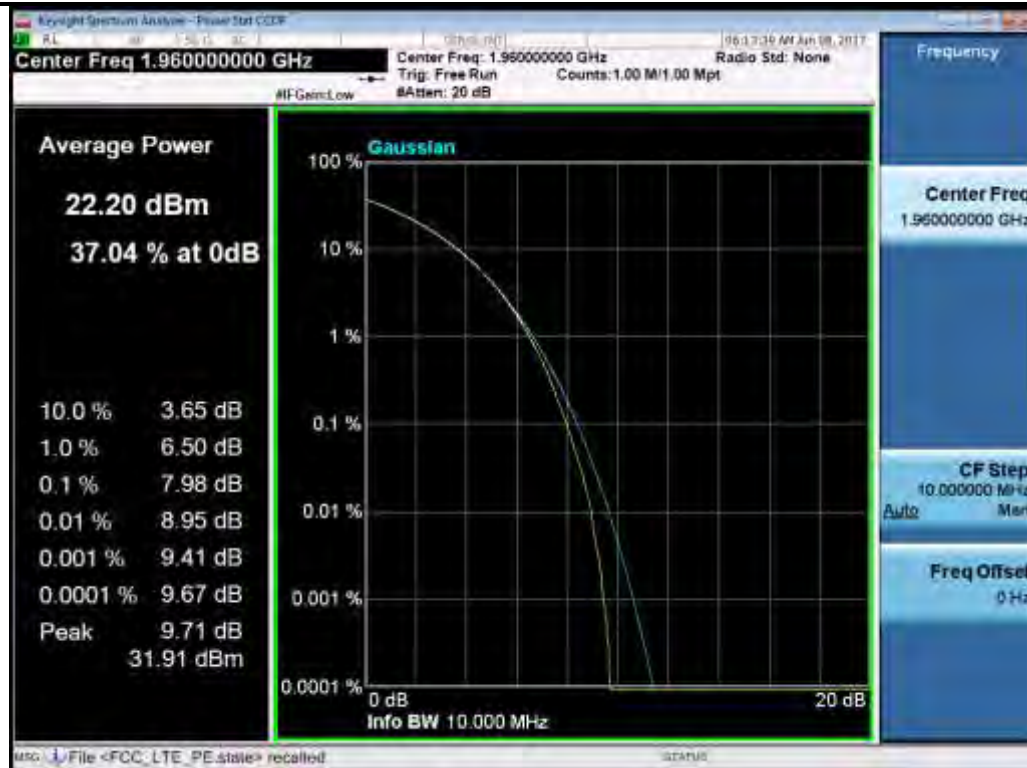


BW 15M 64QAM High

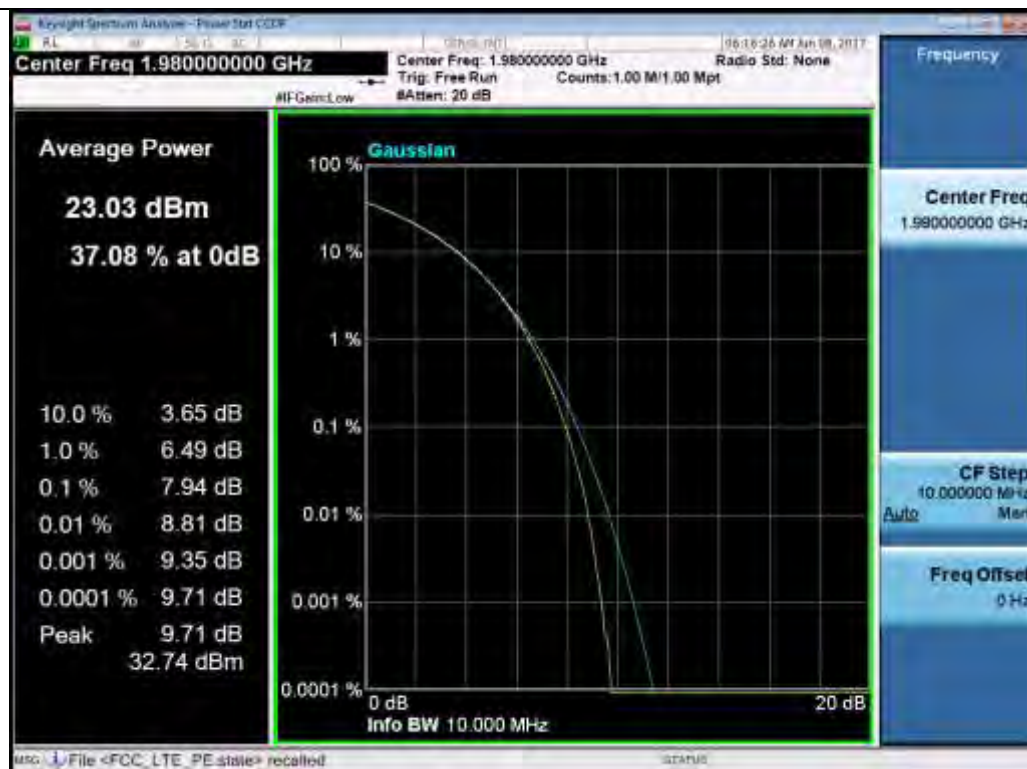


BW 20M 64QAM Low





BW 20M 64QAM Mid



BW 20M 64QAM High

Test Plots for LTE band 4:



BW 5M QPSK Low



BW 5M QPSK Mid

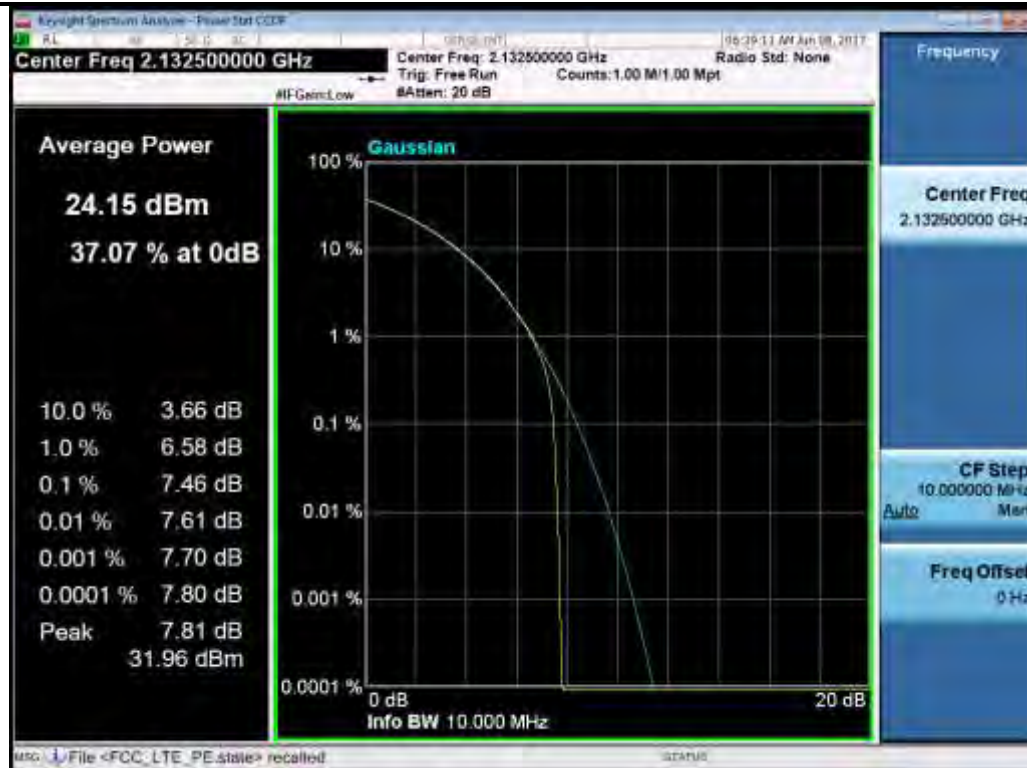


BW 5M QPSK High

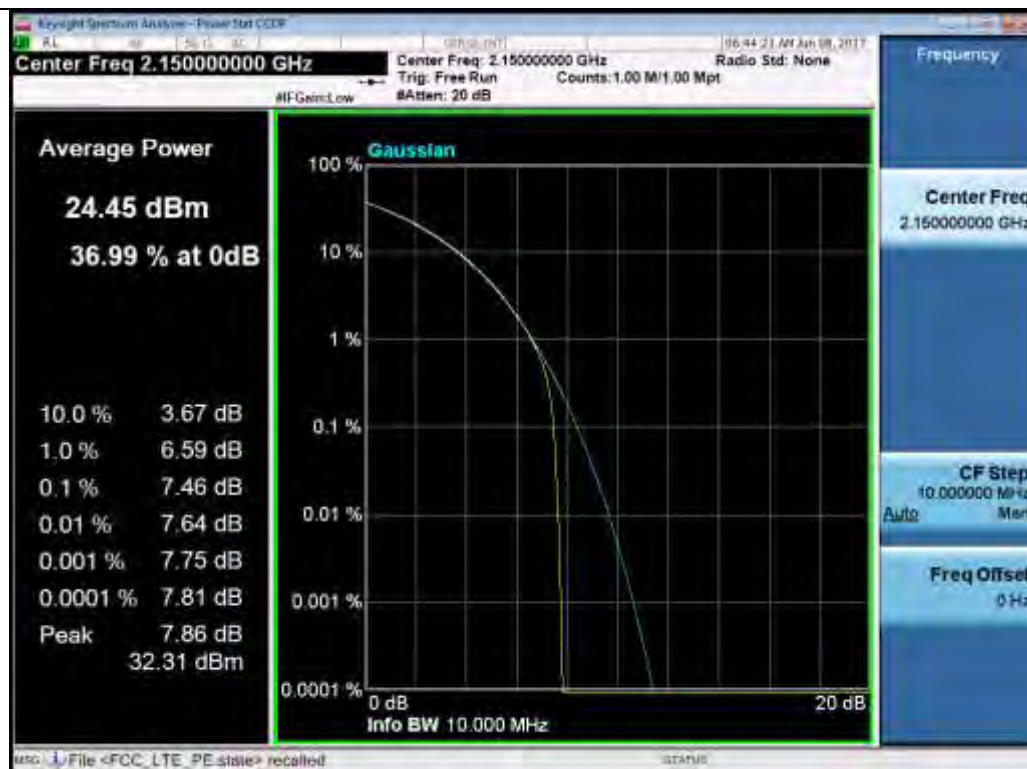


BW 10M QPSK Low



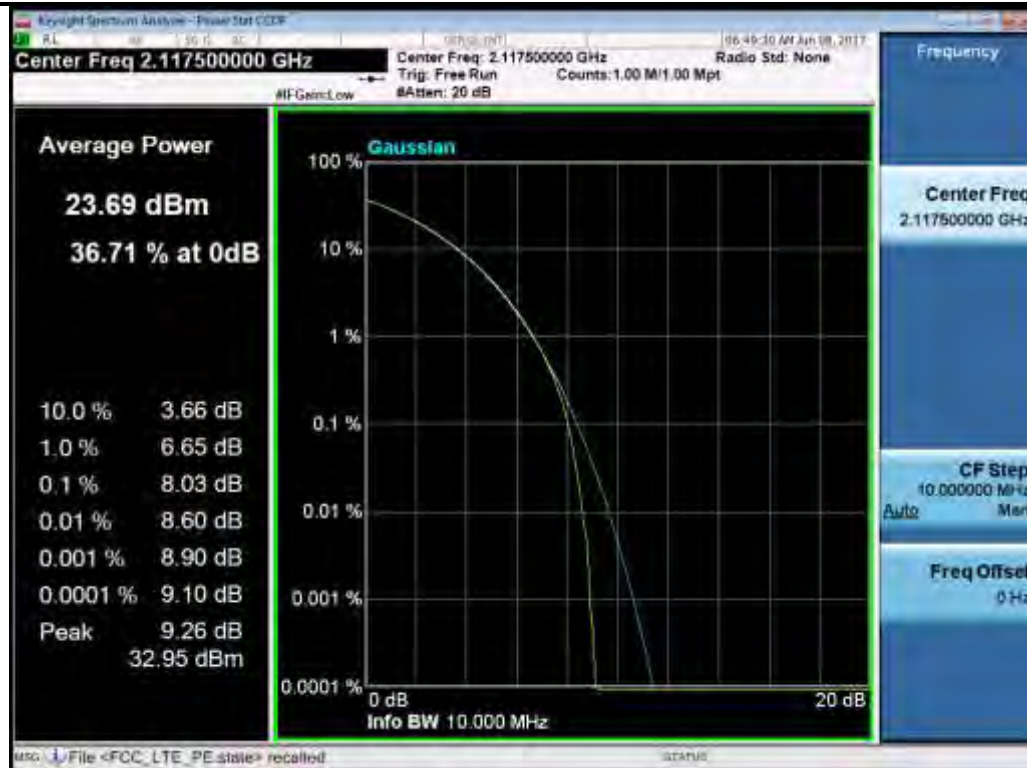


BW 10M QPSK Mid

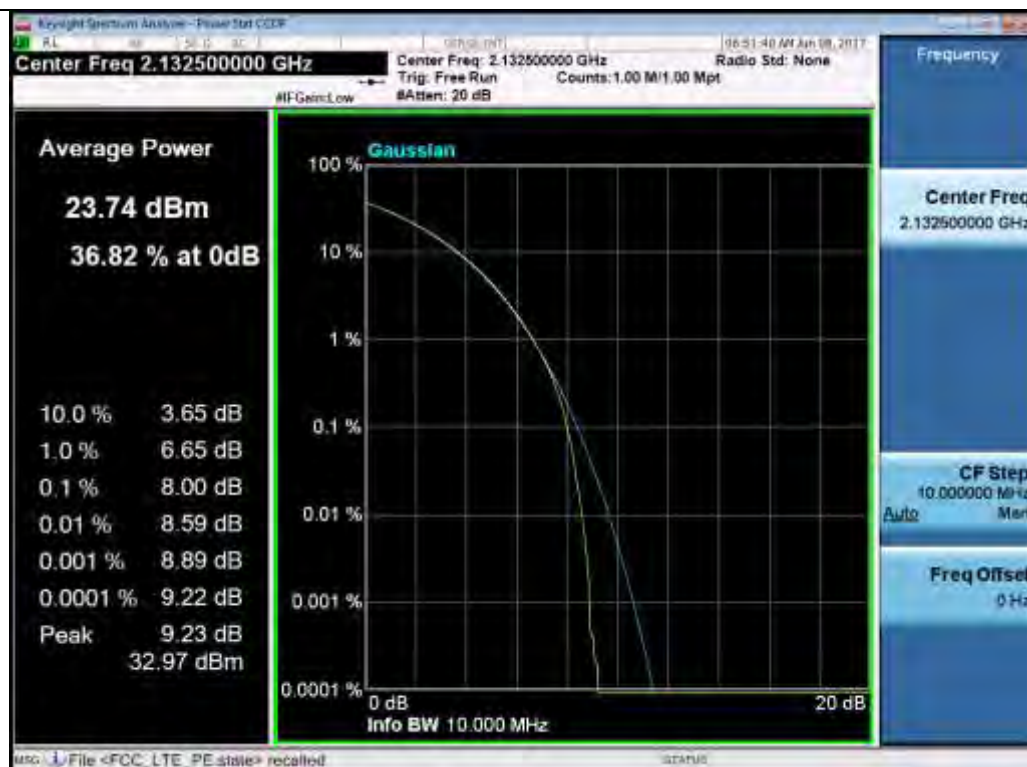


BW 10M QPSK High





BW 15M QPSK Low



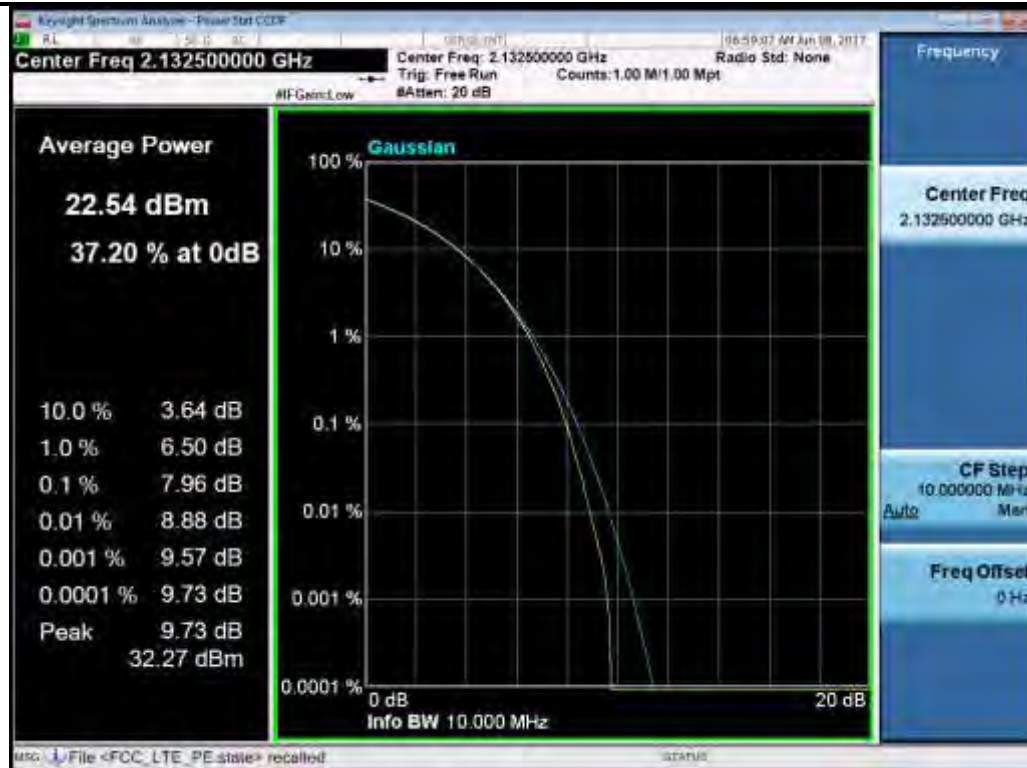
BW 15M QPSK Mid



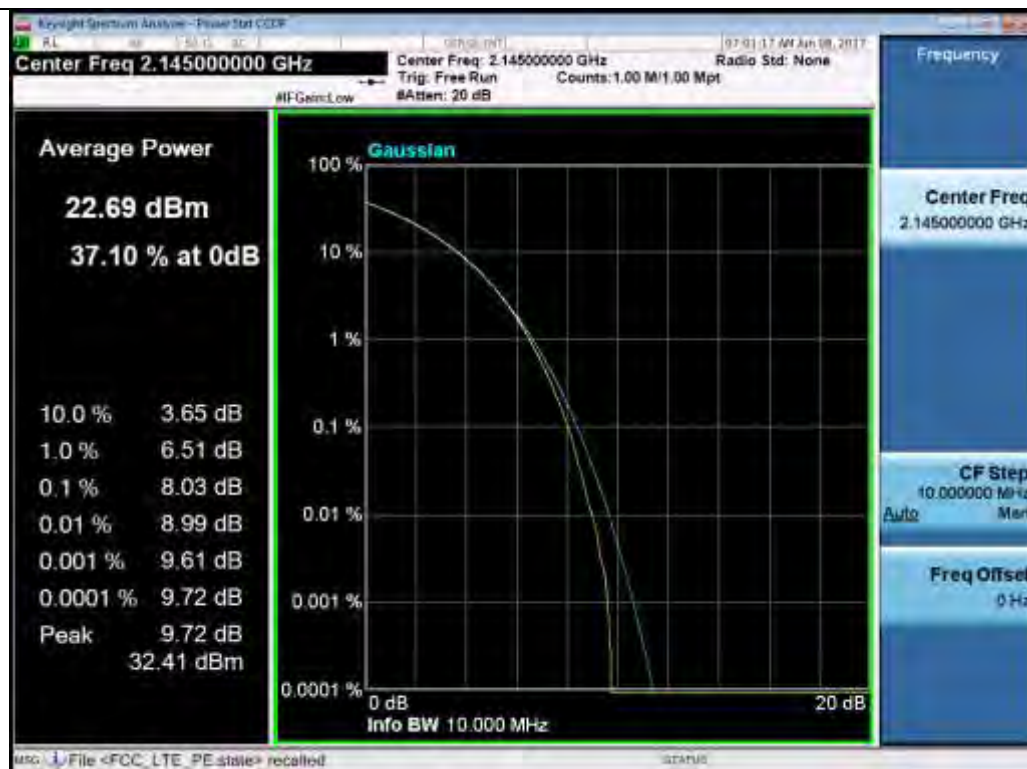
BW 15M QPSK High



BW 20M QPSK Low

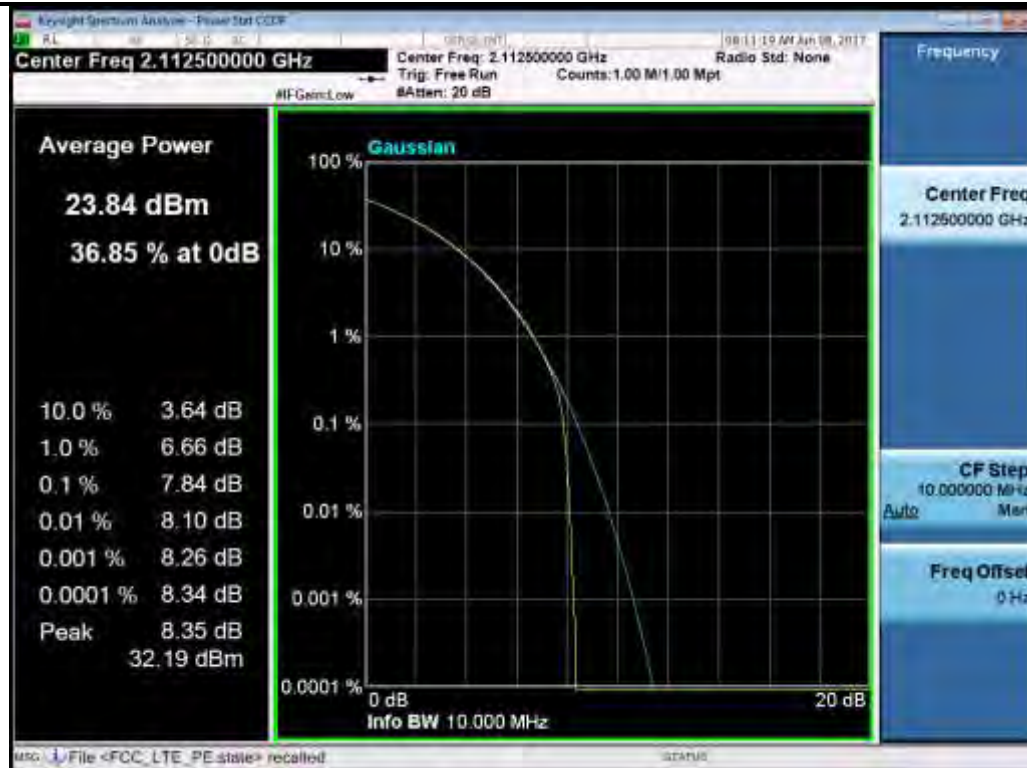


BW 20M QPSK Mid



BW 20M QPSK High

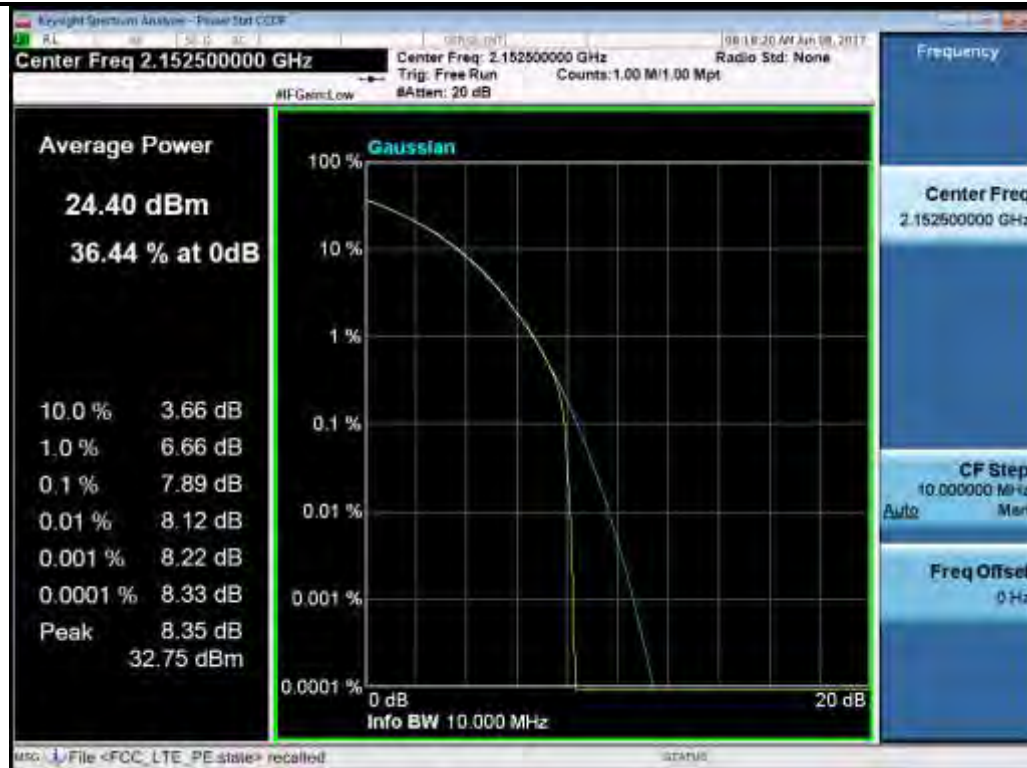




BW 5M 64QAM Low



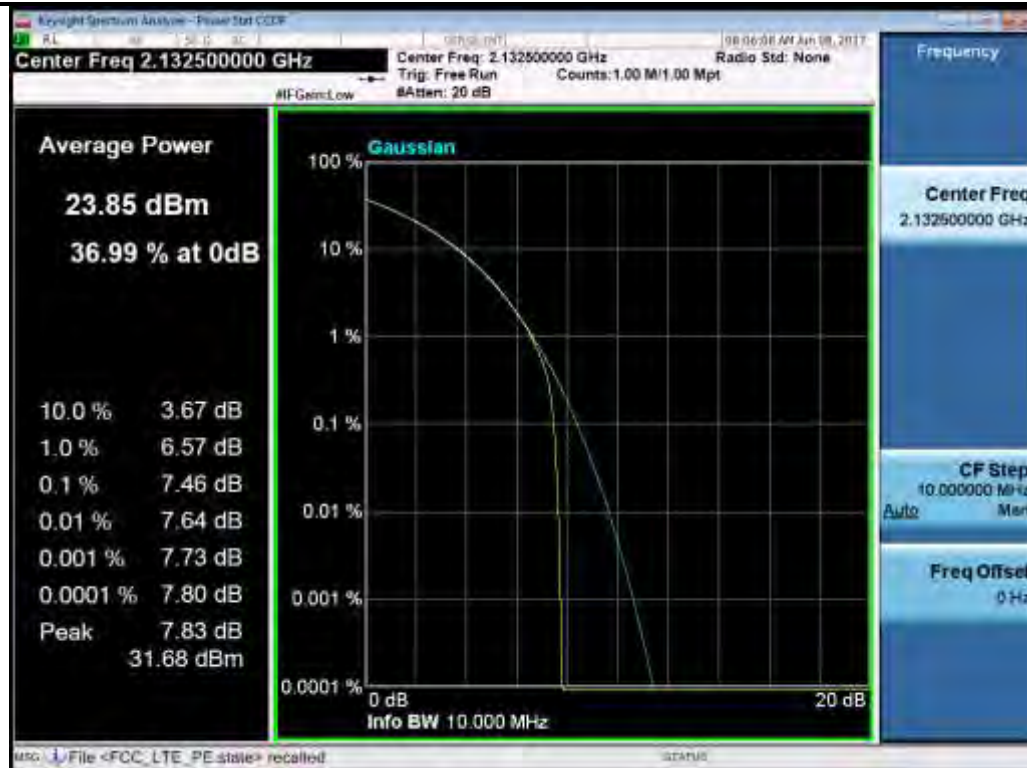
BW 5M 64QAM Mid



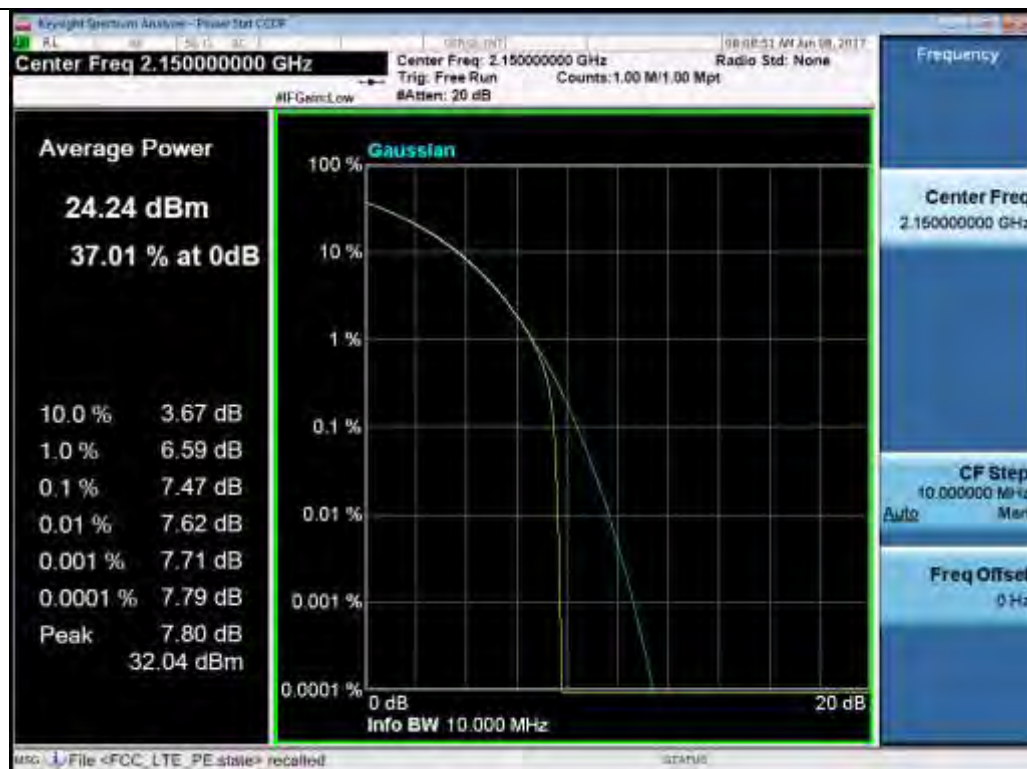
BW 5M 64QAM High



BW 10M 64QAM Low

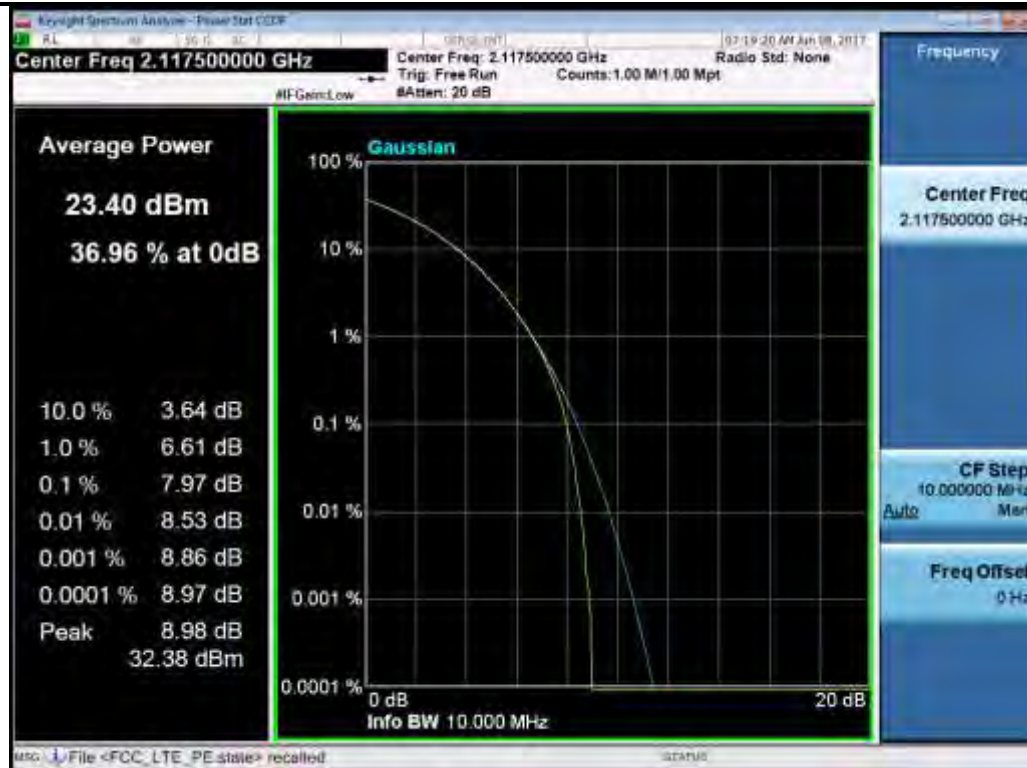


BW 10M 64QAM Mid

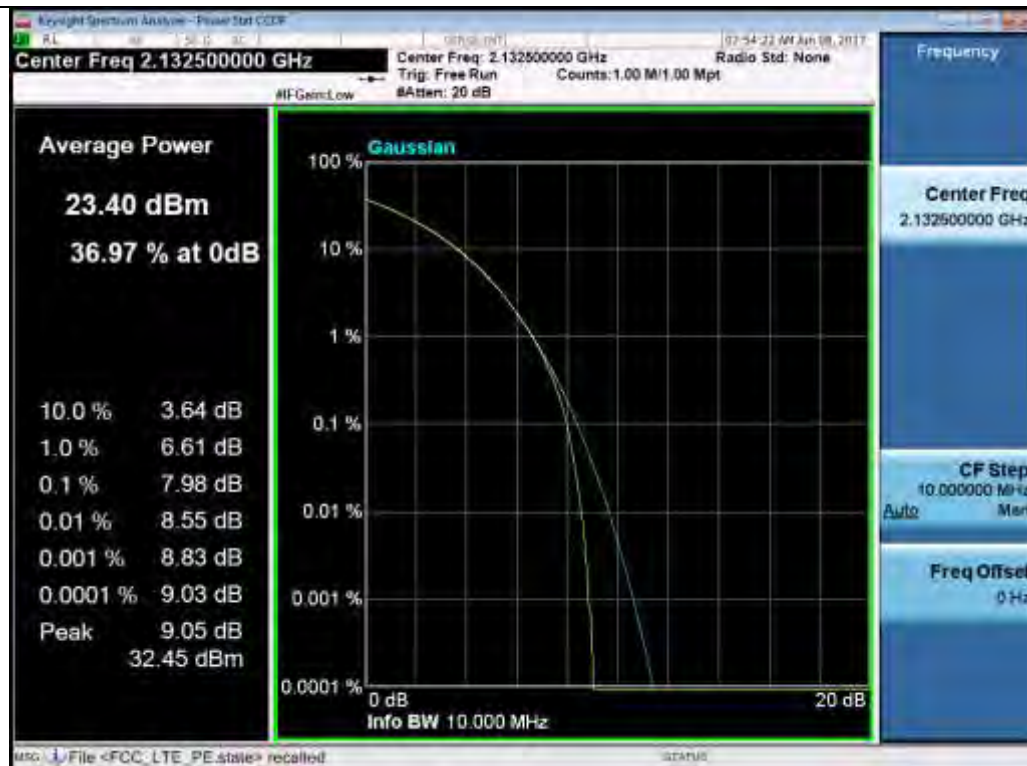


BW 10M 64QAM High

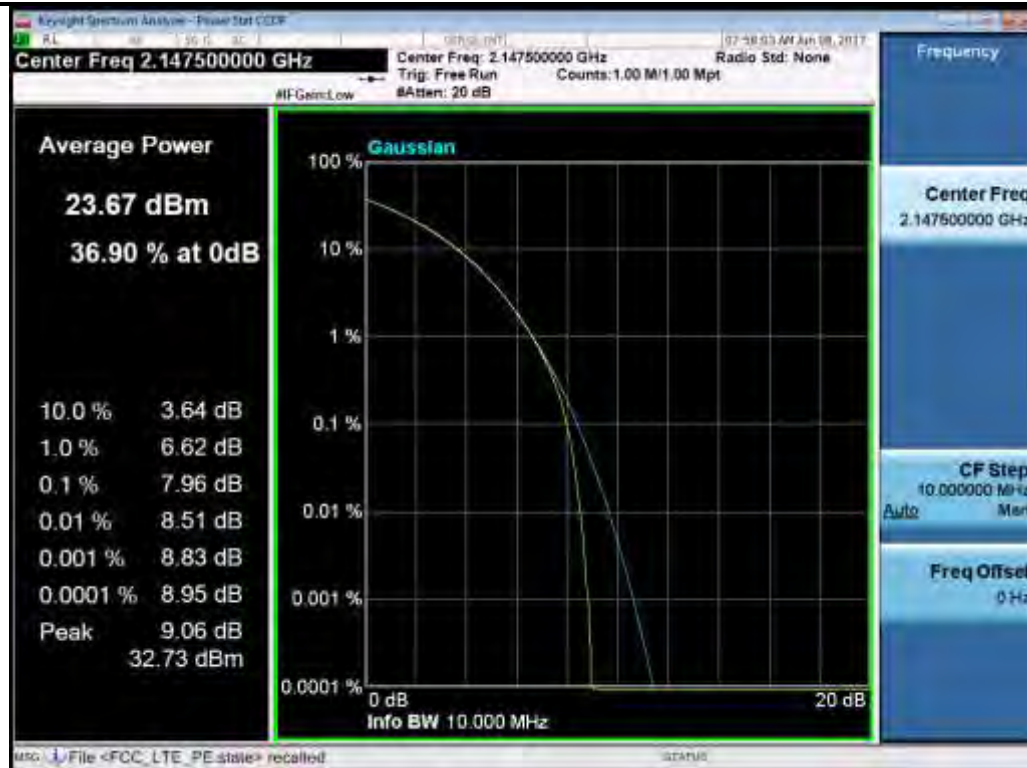




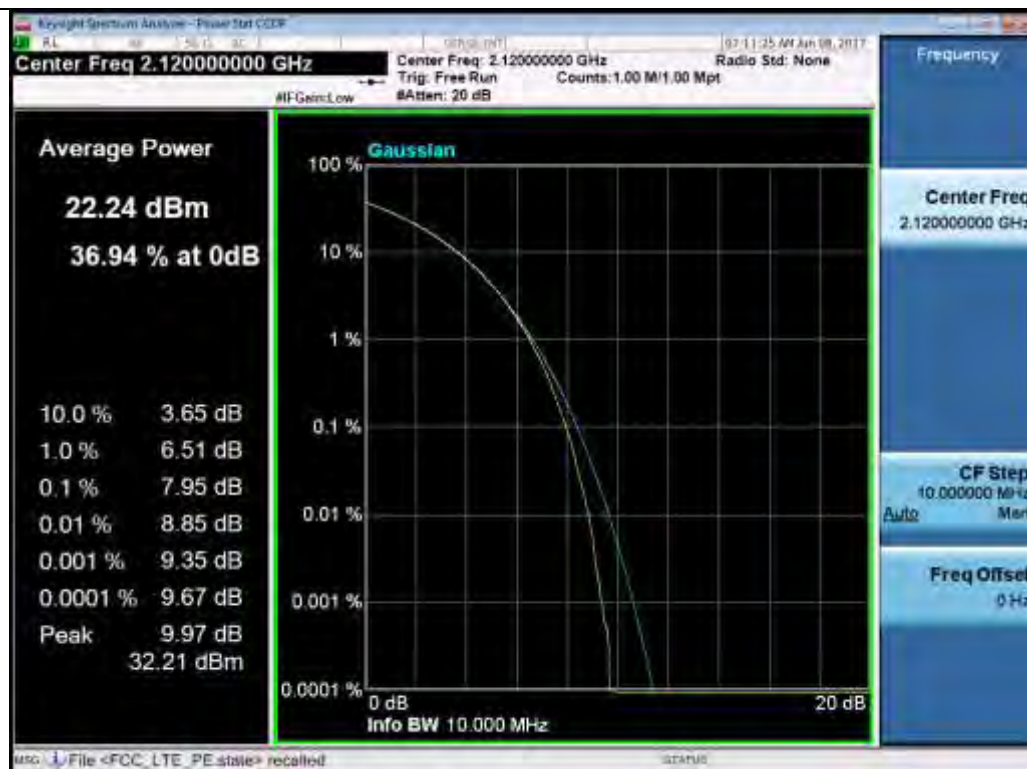
BW 15M 64QAM Low



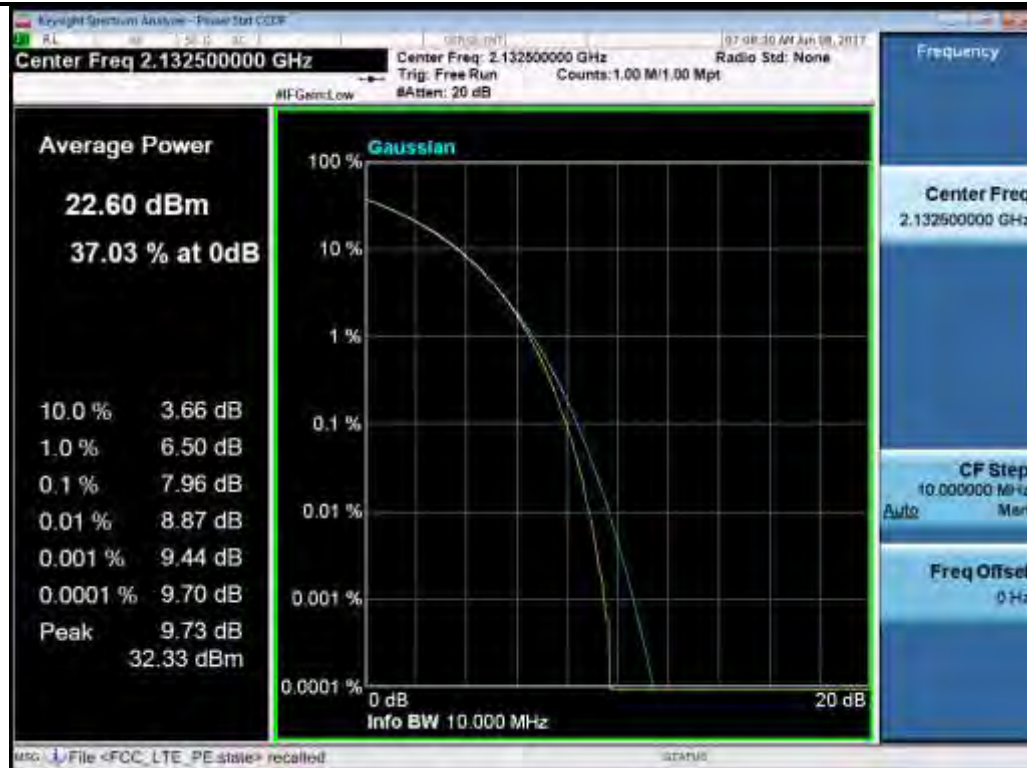
BW 15M 64QAM Mid



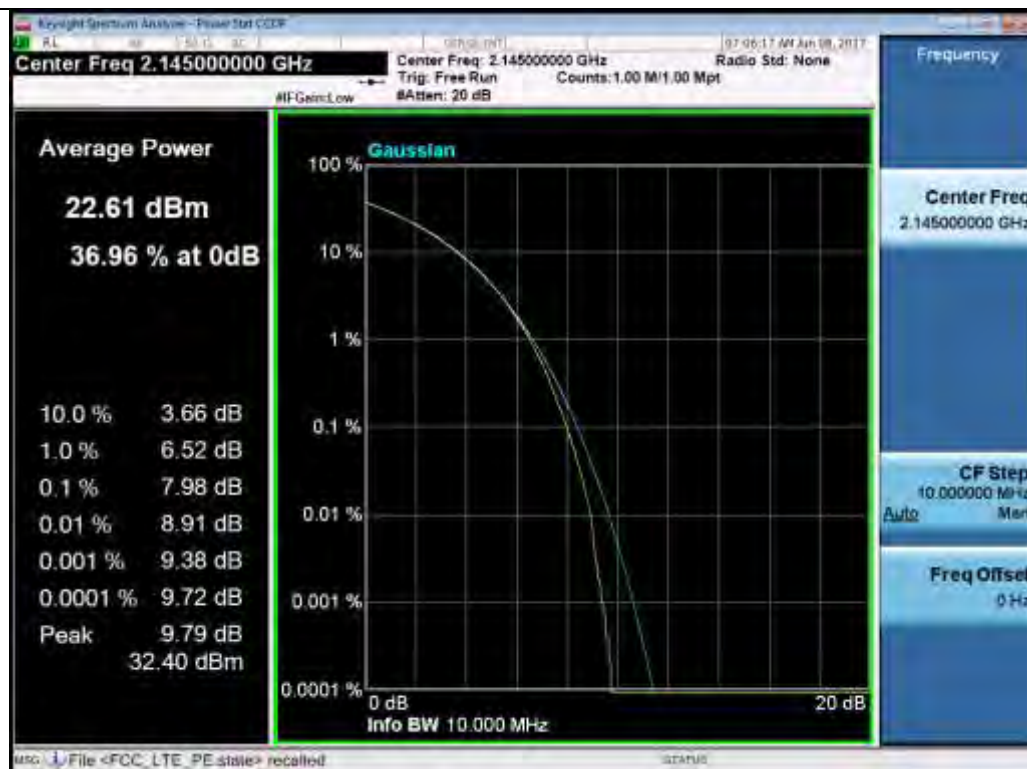
BW 15M 64QAM High



BW 20M 64QAM Low



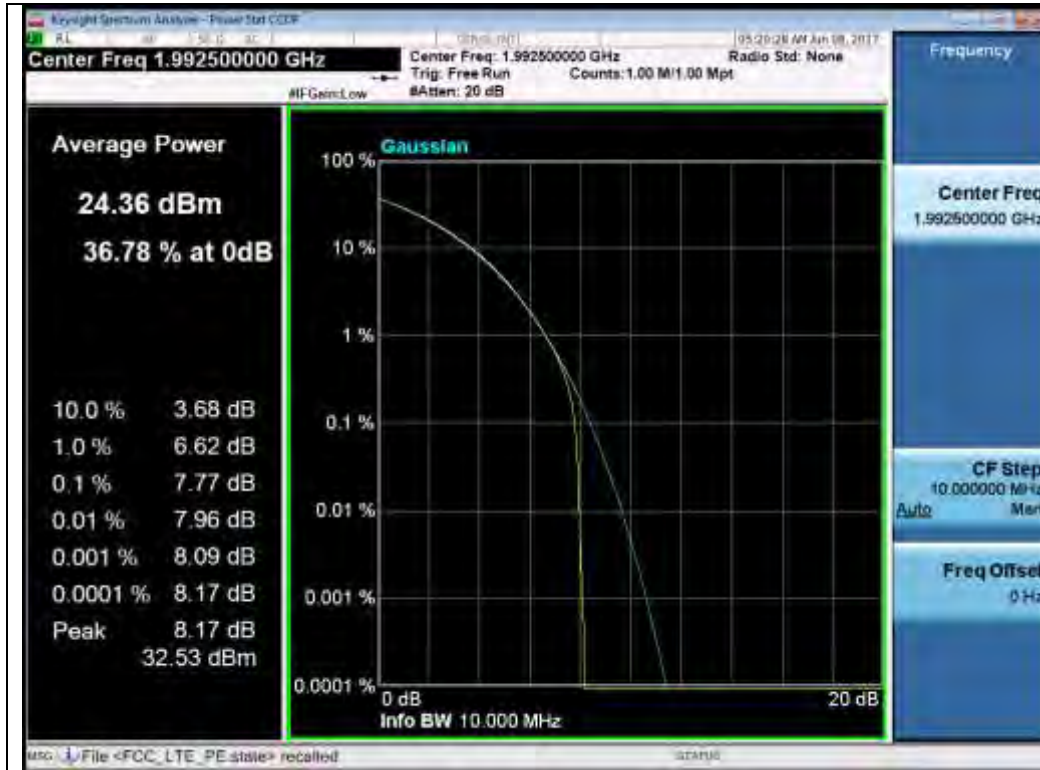
BW 20M 64QAM Mid



BW 20M 64QAM High



Test Plots for LTE band 25:



BW 5M QPSK High



BW 10M QPSK High



BW 15M QPSK High



BW 20M QPSK High

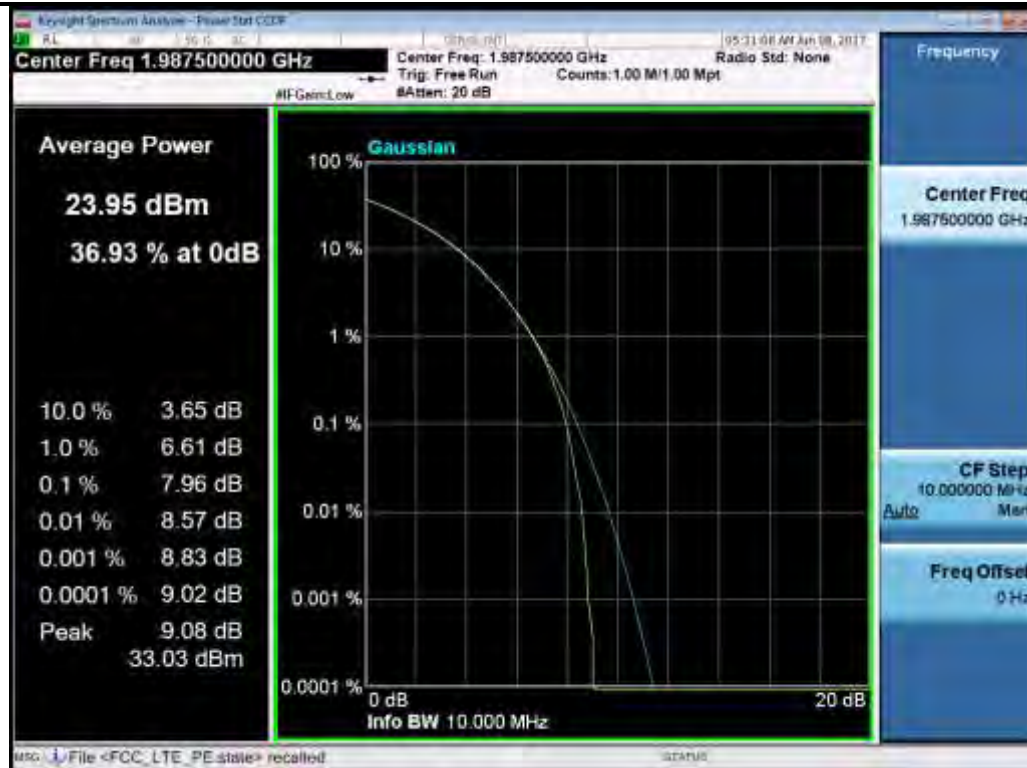


BW 5M 64QAM High

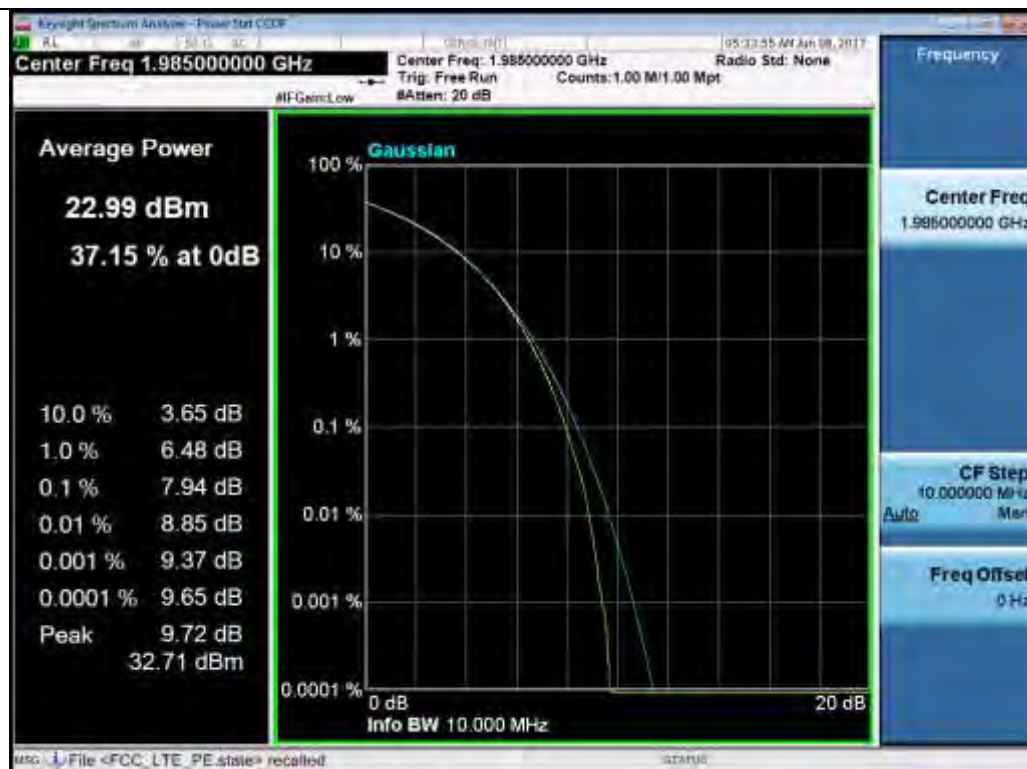


BW 10M 64QAM High





BW 15M 64QAM High

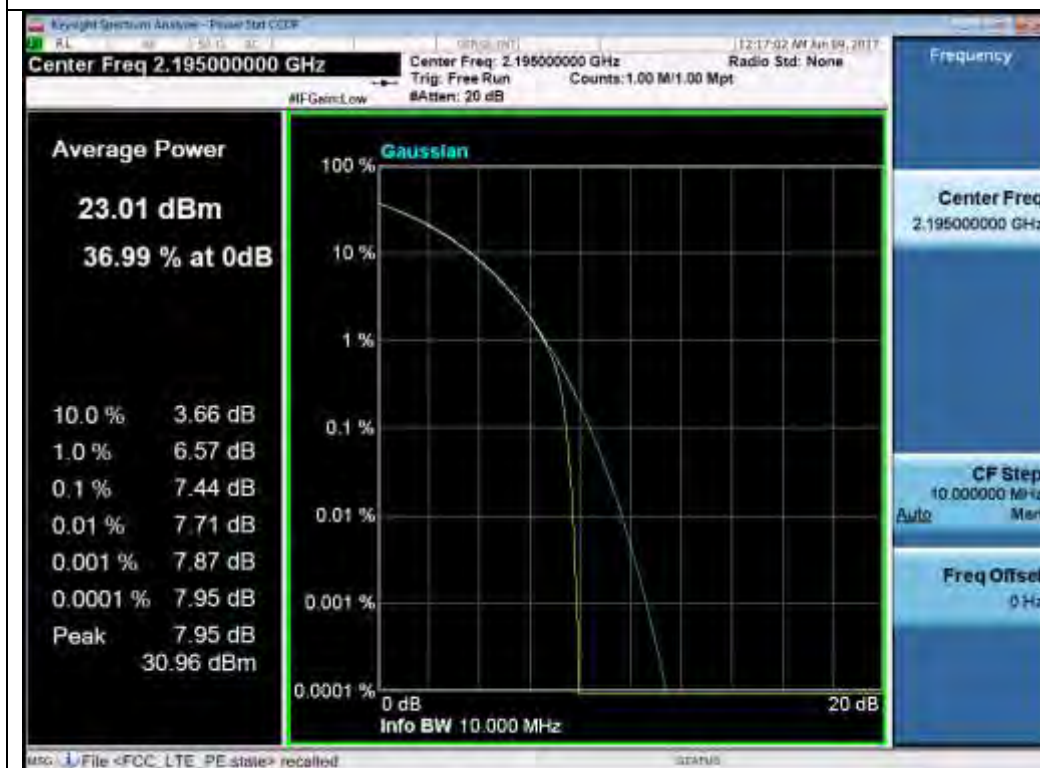


BW 20M 64QAM High

Test Plots for LTE band 66:



BW 5M QPSK High



BW 10M QPSK High



BW 15M QPSK High



BW 20M QPSK High

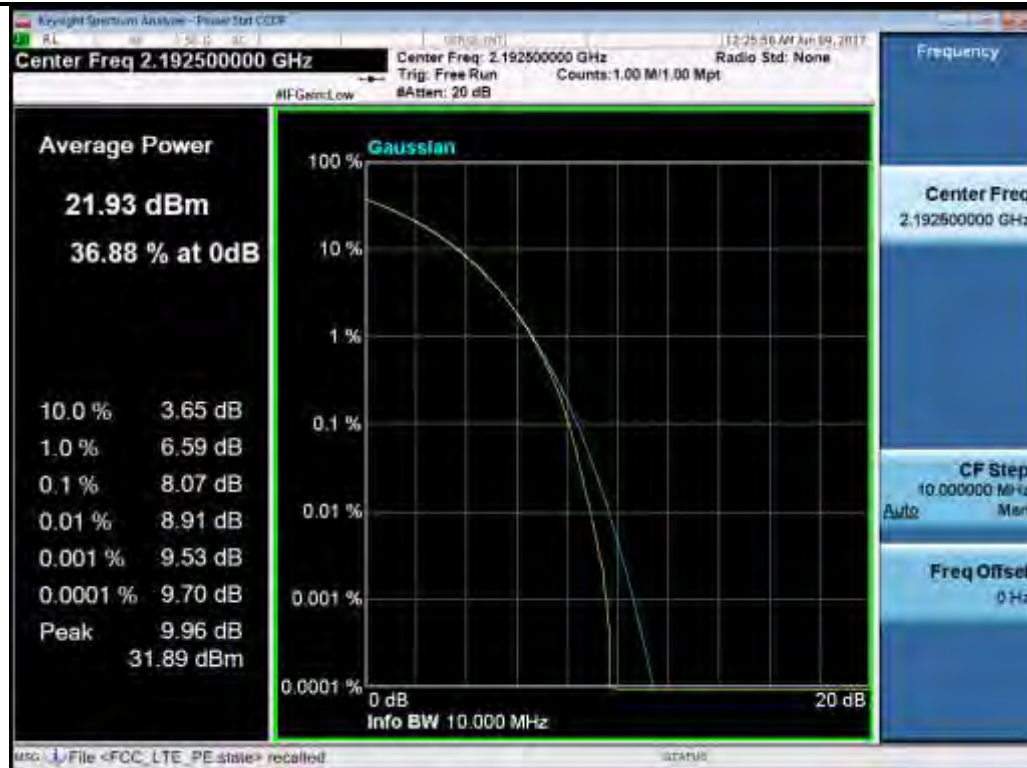




BW 5M 64QAM High



BW 10M 64QAM High

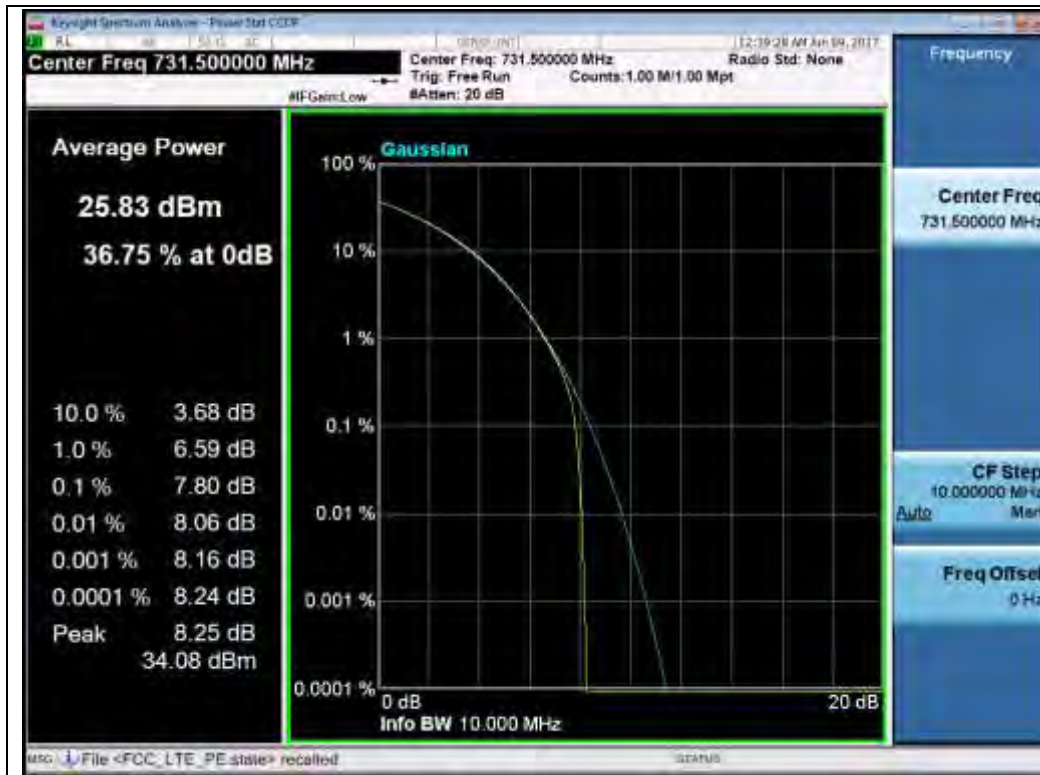


BW 15M 64QAM High



BW 20M 64QAM High

Test Plots for LTE band 12:

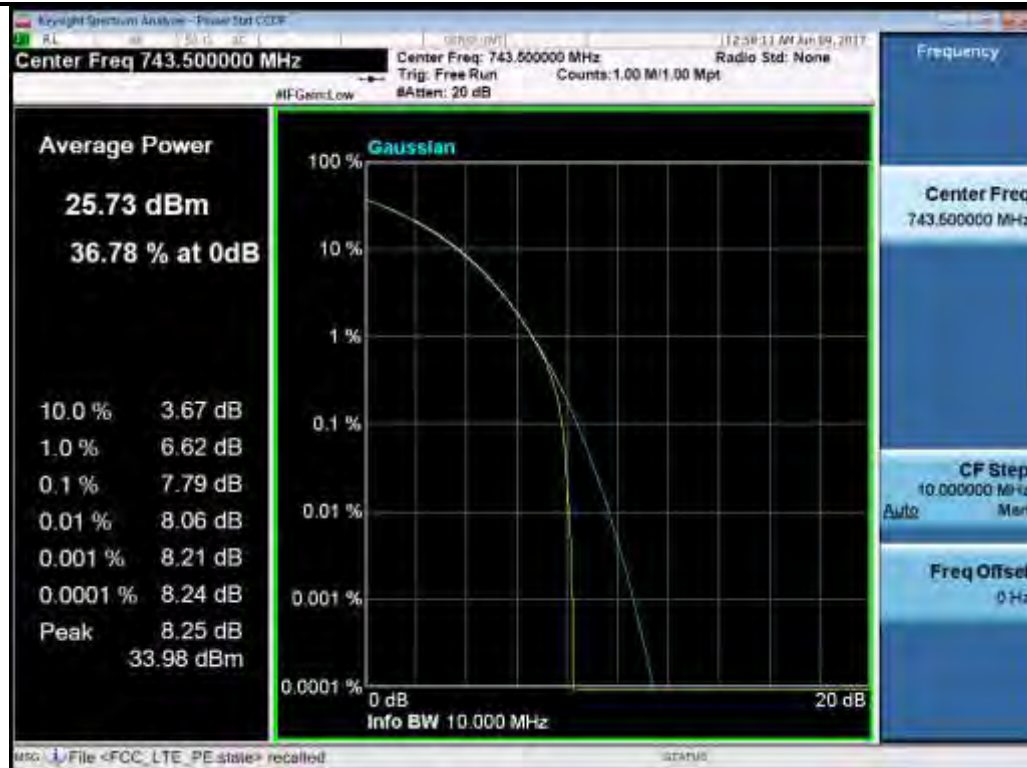


5M QPSK Low

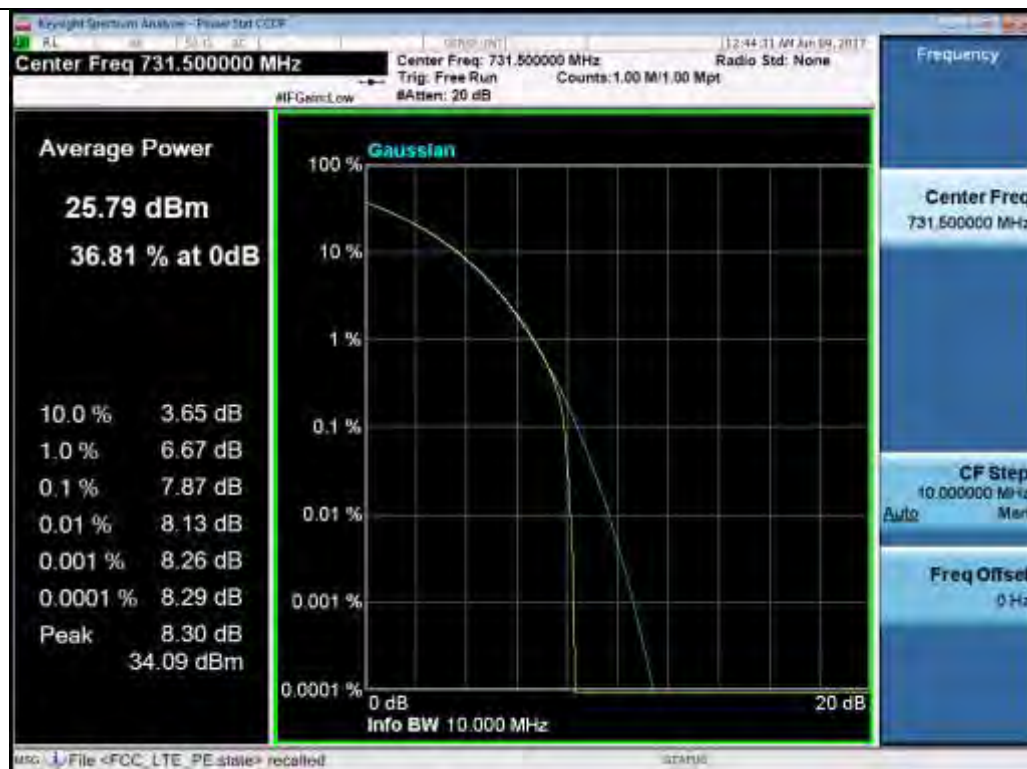


5M QPSK Mid





5M QPSK High



5M 64QAM Low