

# FCC Test Report

## (Part 24)

Product Name : 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC  
VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router  
Model No : BEC 6500X, BEC 6500VAL, BEC 6500AT, BEC 6500AEL, BiPAC  
4500VAOZ, BiPAC 4500VAPZ, BiPAC 4500AZ, BiPAC 4500AZL  
FCC ID : QI3BIL-6500X

Applicant : Billion Electric Co., Ltd.

Address : 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist.,  
New Taipei City 231, Taiwan (R.O.C.)

Date of Receipt : 2019/01/21

Issued Date : 2019/02/12

Report No. : 1910238R-HPUSP40V00

Report Version : V1.0



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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## Test Report

Issued Date : 2019/02/12

Report No.: 1910066R-HPUSP40V00



Product Name : 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router

Applicant : Billion Electric Co., Ltd.

Address : 8F., No.192, Sec. 2, Zhongxing Rd., Xindian Dist., New Taipei City 231, Taiwan (R.O.C.)

Manufacturer : Billion Electric Co., Ltd.

Trade Name : BEC, Billion

Model No. : BEC 6500X, BEC 6500VAL, BEC 6500AT, BEC 6500AEL, BiPAC 4500VAOZ, BiPAC 4500VAPZ, BiPAC 4500AZ, BiPAC 4500AZL

EUT Rated Voltage : AC 100-240V/50-60Hz

EUT Test Voltage : AC 120V/60Hz

Measurement Standard : FCC CFR Title 47 Part 2 Part24

Measurement Reference : TIA/EIA 603-E, ANSI C63.26 2015

Test Result : Complied

Documented By : Elephant Chen  
( Adm. Assistant / Elephant Chen )

Tested By : Vorana Chen  
( Senior Engineer / Vorana Chen )

Approved By :   
( Director / Vincent Lin )

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## 1. GENERAL INFORMATION

### 1.1. EUT Description

|              |                                                                                                                           |
|--------------|---------------------------------------------------------------------------------------------------------------------------|
| Product Name | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |
| Model No.    | BEC 6500X, BEC 6500VAL, BEC 6500AT, BEC 6500AEL, BiPAC 4500VAOZ, BiPAC 4500VAPZ, BiPAC 4500AZ, BiPAC 4500AZL              |
| Trade Name   | BEC, Billion                                                                                                              |
| IMEI No.     | 35907306                                                                                                                  |
| FCC ID       | QI3BIL-6500X                                                                                                              |
| Modulation   | LTE Band 2: QPSK/16-QAM                                                                                                   |
| TX Frequency | LTE Band 2: 1850~1910MHz                                                                                                  |
| Rx Frequency | LTE Band 2: 1930~1990MHz                                                                                                  |
| Bandwidth    | LTE Band 2: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz                                                                            |
| HW Version   | AAP4520VAOZG10                                                                                                            |
| SW Version   | v1.04.1.318                                                                                                               |
| Antenna Type | Dipole Antenna                                                                                                            |

### 1.2. Antenna List

| No | Manufacturer         | Part No            | Antenna Type   | Peak Gain                   |
|----|----------------------|--------------------|----------------|-----------------------------|
| 1  | Grand-Tek Technology | OA-L71-05-04-C5-BL | Dipole Antenna | 2dBi for 1.71 GHz ~2.17 GHz |

### 1.3. The different description of Model

| The different description of Model                             |                                            |             |                |                  |      |                 |
|----------------------------------------------------------------|--------------------------------------------|-------------|----------------|------------------|------|-----------------|
| Model No.                                                      | Product Name                               | Trade Name  | SIM slot (2FF) | Wireless         | VoIP | VPN (*software) |
| BEC 6500X                                                      | 4G/LTE Multi-Service 11ac Broadband Router | BEC Billion | 1              | 802.11a/b/g/n/ac | ○    | ○               |
| BEC 6500VAL                                                    |                                            |             | 1              |                  | ○    | X               |
| BEC 6500AT                                                     |                                            |             | 1              |                  | X    | ○               |
| BEC 6500AEL                                                    |                                            |             | 1              |                  | X    | X               |
| BiPAC 4500VAOZ                                                 | 4G/LTE Wireless-AC VoIP Broadband Router   |             | 1              |                  | ○    | ○               |
| BiPAC 4500VAPZ                                                 | 4G/LTE Wireless-AC Broadband Router        |             | 1              |                  | ○    | X               |
| BiPAC 4500AZ                                                   |                                            |             | 1              |                  | X    | ○               |
| BiPAC 4500AZL                                                  |                                            |             | 1              |                  | X    | X               |
| Remarks: "○" means function available , "X" means not support. |                                            |             |                |                  |      |                 |

#### 1.4. Operational Description

The information contained within this report is intended to show verification of compliance of the 1900MHz to the requirements of FCC 47 CFR Part 2 and 24.

The EUT provide all functions described as above. The EUT is tested with maximum rated TX power via the Base Station simulator.

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined

as:

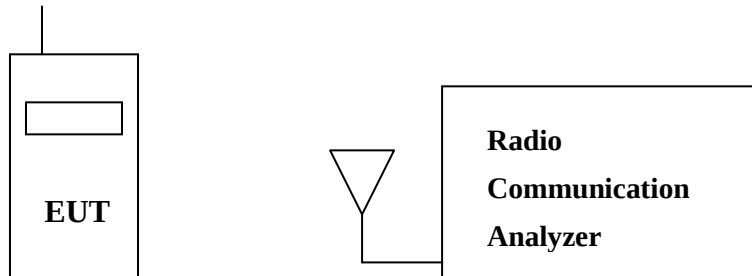
|            |                              |
|------------|------------------------------|
| Test Mode: | LTE Band 2 (1.4M)-QPSK/16QAM |
|            | LTE Band 2 (3M)-QPSK/16QAM   |
|            | LTE Band 2 (5M)-QPSK/16QAM   |
|            | LTE Band 2 (10M)-QPSK/16QAM  |
|            | LTE Band 2 (15M)-QPSK/16QAM  |
|            | LTE Band 2 (20M)-QPSK/16QAM  |

Note :

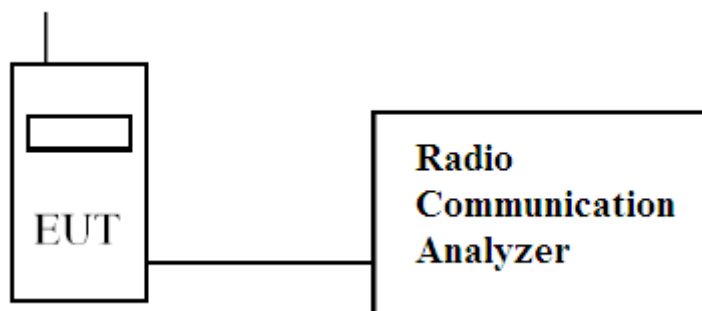
The maximum power levels are chosen in the LTE Band 2, only these modes were used for all tests.

## 1.5. Configuration of tested System

### (a) Configuration of Radiated measurement



### (b) Configuration of Conducted measurement



## 1.6. EUT Setup Procedures

- (1) Setup the EUT and simulators as shown on 1.3
- (2) Turn on the power of all equipments.
- (3) The EUT was set to communicate with MT8820C.
- (4) Repeat the above procedure (3).

### 1.7. Test Facility

Ambient conditions in the laboratory:

| Items                      | Required (IEC 68-1) | Actual |
|----------------------------|---------------------|--------|
| Temperature (°C)           | 15-35               | 21     |
| Humidity (%RH)             | 25-75               | 53     |
| Barometric pressure (mbar) | 860-1060            | 986    |

The related certificate for our laboratories about the test site and management system can be downloaded from DEKRA Testing and Certification Co., Ltd. Web Site:

<http://www.dekra.com.tw/english/about/certificates.aspx?bval=5>

The address and introduction of DEKRA Testing and Certification Co., Ltd. laboratories can be founded in our Web site: [http://www.dekra.com.tw/index\\_en.aspx](http://www.dekra.com.tw/index_en.aspx)

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E-Mail : [info.tw@dekra.com](mailto:info.tw@dekra.com)

FCC Accreditation Number: TW3023

### 1.8. Type of Emission

| Band | Bandwidth (MHz) | Modulation |         |
|------|-----------------|------------|---------|
|      |                 | QPSK       | 16QAM   |
| 2    | 1.4             | 1M09G7D    | 1M09W7D |
| 2    | 3               | 2M74G7D    | 2M72W7D |
| 2    | 5               | 4M50G7D    | 4M48W7D |
| 2    | 10              | 9M05G7D    | 9M05W7D |
| 2    | 15              | 13M5G7D    | 13M5W7D |
| 2    | 20              | 18M6G7D    | 18M5W7D |

### 1.9. Voltages and AC currents

|                   |                                       |                                        |
|-------------------|---------------------------------------|----------------------------------------|
| LTE Band 2 (1.4M) | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.13A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |
| LTE Band 2 (3M)   | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.13A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |
| LTE Band 2 (5M)   | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.13A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |
| LTE Band 2 (10M)  | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.13A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |
| LTE Band 2 (15M)  | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.14A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |
| LTE Band 2 (20M)  | EUT Transmitting (in maximum power) : | AC voltage : 120V , AC current : 0.14A |
|                   | EUT Standby :                         | AC voltage : 120V , AC current : 0.10A |

## 2. Technical Test

### 2.1. Summary of test result

| FCC Standard | Test Item                                     | Result | Note |
|--------------|-----------------------------------------------|--------|------|
| 2.1046       | Conducted Output Power                        | Pass   |      |
| 24.232(c)    |                                               |        |      |
| 2.1049       | Occupied Bandwidth                            | Pass   |      |
| 24.238(b)    |                                               |        |      |
| 2.1051       | Spurious Emission at Antenna Terminals        | Pass   |      |
| 24.238(a)    |                                               |        |      |
| 2.1051       | Conducted Emission                            | Pass   |      |
| 24.238(a)    |                                               |        |      |
| 2.1053       | Field Strength of Spurious Radiation          | Pass   |      |
| 24.238(a)    |                                               |        |      |
| 2.1055       | Frequency Stability for Temperature & Voltage | Pass   |      |
| 24.235       |                                               |        |      |
| 24.232 (d)   | Peak to Average Ratio                         | Pass   |      |

## 2.2. List of test Equipment

Conducted /CTR

| Instrument                              | Manufacturer  | Type No.       | Serial No    | Cal. Date  |
|-----------------------------------------|---------------|----------------|--------------|------------|
| Spectrum Analyzer                       | Agilent       | N9010A         | MY54510317   | 2018/04/13 |
| Directional coupler                     | Agilent       | 87300C         | MY44300353   | 2018/12/04 |
| Directional coupler                     | Agilent       | 778D-012       | 50550        | 2018/12/04 |
| Low pass Filter                         | Mini Circuits | BLP-1200       | 15542        | 2018/12/06 |
| Notch Filter Assembly                   | K&L           | 5TNF-1700/2000 | 190          | 2018/12/04 |
| Standard Temperature & Humidity Chamber | WIT           | TH-1S-B        | EQ-201-00146 | 2018/02/12 |
| Communication Tester                    | Anritsu       | MT8820C        | 6201465467   | 2018/07/20 |

Radiated / Site3

| Instrument            | Manufacturer    | Type No.       | Serial No  | Cal. Date  |
|-----------------------|-----------------|----------------|------------|------------|
| Bilog Antenna         | Schaffner Chase | CBL6112B       | 2707       | 2018/06/24 |
| Horn Antenna          | R&S             | 9120D          | 556        | 2018/04/02 |
| Pre-Amplifier         | Agilent         | 87405C         | MY55380068 | 2018/08/10 |
| Low pass Filter       | Mini Circuits   | BLP-1200       | 15542      | 2018/12/06 |
| Notch Filter Assembly | K&L             | 5TNF-1700/2000 | 190        | 2018/12/04 |
| Spectrum Analyzer     | Agilent         | N9010A         | MY54510317 | 2018/04/13 |
| Communication Tester  | Anritsu         | MT8820C        | 6201465467 | 2018/07/20 |

## 2.3. Measurement Uncertainty

### Conducted Emission

The measurement uncertainty of confidence of 95% is evaluated as  $\pm 1.52$  dB

### Radiated Emission (Below 1GHz)

The measurement uncertainty of confidence of 95% is evaluated as  $\pm 4.22$  dB .

### Radiated Emission (Above 1GHz)

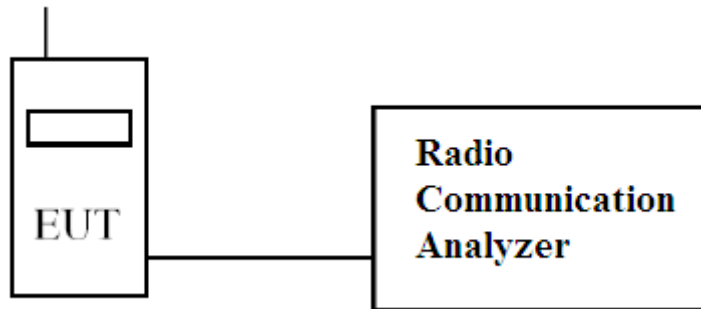
The measurement uncertainty of confidence of 95% is evaluated as  $\pm 4.08$  dB

### 3. Conducted Output Power Measurement

#### 3.1. Test Specification

According to FCC Part 2.1046, 24.232.

#### 3.2. Test Setup



#### 3.3. Limits

| Band            | Limit |
|-----------------|-------|
| LTE Band 2/1900 | <2W   |

#### 3.4. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the output power was measured at the antenna terminals of the EUT.

### 3.5. Test Result of Maximum Power Output

| Band                    | Channel            | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|-------------------------|--------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/1.4MHz | 18607<br>1850.7MHz | QPSK       | 1      | #0        | 0   | <b>22.46</b>          | <b>0.1762</b> |
|                         |                    |            | 1      | #Mid      | 0   | 22.33                 | 0.1710        |
|                         |                    |            | 1      | #Max      | 0   | 22.24                 | 0.1675        |
|                         |                    |            | 50%    | #0        | 1   | 22.23                 | 0.1671        |
|                         |                    |            | 50%    | #Mid      | 1   | 22.30                 | 0.1698        |
|                         |                    |            | 50%    | #Max      | 1   | 22.23                 | 0.1671        |
|                         |                    |            | 100%   | --        | 1   | 21.24                 | 0.1330        |
|                         |                    | 16QAM      | 1      | #0        | 1   | <b>21.99</b>          | <b>0.1581</b> |
|                         |                    |            | 1      | #Mid      | 1   | 21.94                 | 0.1563        |
|                         |                    |            | 1      | #Max      | 1   | 21.86                 | 0.1535        |
|                         |                    |            | 50%    | #0        | 2   | 21.39                 | 0.1377        |
|                         |                    |            | 50%    | #Mid      | 2   | 21.46                 | 0.1400        |
|                         |                    |            | 50%    | #Max      | 2   | 21.36                 | 0.1368        |
|                         |                    |            | 100%   | --        | 2   | 20.32                 | 0.1076        |
|                         | 18900<br>1880MHz   | QPSK       | 1      | #0        | 0   | 22.11                 | 0.1626        |
|                         |                    |            | 1      | #Mid      | 0   | <b>22.42</b>          | <b>0.1746</b> |
|                         |                    |            | 1      | #Max      | 0   | 22.35                 | 0.1718        |
|                         |                    |            | 50%    | #0        | 1   | 22.37                 | 0.1726        |
|                         |                    |            | 50%    | #Mid      | 1   | 22.37                 | 0.1726        |
|                         |                    |            | 50%    | #Max      | 1   | 22.24                 | 0.1675        |
|                         |                    |            | 100%   | --        | 1   | 21.27                 | 0.1340        |
|                         |                    | 16QAM      | 1      | #0        | 1   | 21.25                 | 0.1334        |
|                         |                    |            | 1      | #Mid      | 1   | 21.46                 | 0.1400        |
|                         |                    |            | 1      | #Max      | 1   | <b>21.48</b>          | <b>0.1406</b> |
|                         |                    |            | 50%    | #0        | 2   | 21.36                 | 0.1368        |
|                         |                    |            | 50%    | #Mid      | 2   | 21.29                 | 0.1346        |
|                         |                    |            | 50%    | #Max      | 2   | 21.20                 | 0.1318        |
|                         |                    |            | 100%   | --        | 2   | 20.30                 | 0.1072        |
|                         | 19193<br>1909.3MHz | QPSK       | 1      | #0        | 0   | 22.39                 | 0.1734        |
|                         |                    |            | 1      | #Mid      | 0   | 22.38                 | 0.1730        |
|                         |                    |            | 1      | #Max      | 0   | 22.39                 | 0.1734        |
|                         |                    |            | 50%    | #0        | 1   | 22.23                 | 0.1671        |
|                         |                    |            | 50%    | #Mid      | 1   | <b>22.42</b>          | <b>0.1746</b> |
|                         |                    |            | 50%    | #Max      | 1   | 22.33                 | 0.1710        |
|                         |                    |            | 100%   | --        | 1   | 21.30                 | 0.1349        |
|                         |                    | 16QAM      | 1      | #0        | 1   | 21.50                 | 0.1413        |
|                         |                    |            | 1      | #Mid      | 1   | <b>21.59</b>          | <b>0.1442</b> |
|                         |                    |            | 1      | #Max      | 1   | 21.43                 | 0.1390        |
|                         |                    |            | 50%    | #0        | 2   | 21.31                 | 0.1352        |
|                         |                    |            | 50%    | #Mid      | 2   | 21.30                 | 0.1349        |
|                         |                    |            | 50%    | #Max      | 2   | 21.19                 | 0.1315        |
|                         |                    |            | 100%   | --        | 2   | 20.29                 | 0.1069        |

| Band                  | Channel            | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|-----------------------|--------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/3MHz | 18615<br>1851.5MHz | QPSK       | 1      | #0        | 0   | 22.56                 | 0.1803        |
|                       |                    |            | 1      | #Mid      | 0   | <b>22.74</b>          | <b>0.1879</b> |
|                       |                    |            | 1      | #Max      | 0   | 22.48                 | 0.1770        |
|                       |                    |            | 50%    | #0        | 1   | 21.45                 | 0.1396        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.54                 | 0.1426        |
|                       |                    |            | 50%    | #Max      | 1   | 21.50                 | 0.1413        |
|                       |                    |            | 100%   | --        | 1   | 21.48                 | 0.1406        |
|                       |                    | 16QAM      | 1      | #0        | 1   | 21.54                 | 0.1426        |
|                       |                    |            | 1      | #Mid      | 1   | <b>21.67</b>          | <b>0.1469</b> |
|                       |                    |            | 1      | #Max      | 1   | 21.55                 | 0.1429        |
|                       |                    |            | 50%    | #0        | 2   | 20.49                 | 0.1119        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.36                 | 0.1086        |
|                       |                    |            | 50%    | #Max      | 2   | 20.38                 | 0.1091        |
|                       |                    |            | 100%   | --        | 2   | 20.30                 | 0.1072        |
|                       | 18900<br>1880MHz   | QPSK       | 1      | #0        | 0   | 22.28                 | 0.1690        |
|                       |                    |            | 1      | #Mid      | 0   | <b>22.33</b>          | <b>0.1710</b> |
|                       |                    |            | 1      | #Max      | 0   | 22.24                 | 0.1675        |
|                       |                    |            | 50%    | #0        | 1   | 21.26                 | 0.1337        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.32                 | 0.1355        |
|                       |                    |            | 50%    | #Max      | 1   | 21.30                 | 0.1349        |
|                       |                    |            | 100%   | --        | 1   | 21.27                 | 0.1340        |
|                       |                    | 16QAM      | 1      | #0        | 1   | 21.52                 | 0.1419        |
|                       |                    |            | 1      | #Mid      | 1   | <b>21.73</b>          | <b>0.1489</b> |
|                       |                    |            | 1      | #Max      | 1   | 21.51                 | 0.1416        |
|                       |                    |            | 50%    | #0        | 2   | 20.36                 | 0.1086        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.35                 | 0.1084        |
|                       |                    |            | 50%    | #Max      | 2   | 20.36                 | 0.1086        |
|                       |                    |            | 100%   | --        | 2   | 20.26                 | 0.1062        |
|                       | 19185<br>1908.5MHz | QPSK       | 1      | #0        | 0   | 22.34                 | 0.1714        |
|                       |                    |            | 1      | #Mid      | 0   | <b>22.66</b>          | <b>0.1845</b> |
|                       |                    |            | 1      | #Max      | 0   | 22.23                 | 0.1671        |
|                       |                    |            | 50%    | #0        | 1   | 21.18                 | 0.1312        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.23                 | 0.1327        |
|                       |                    |            | 50%    | #Max      | 1   | 21.28                 | 0.1343        |
|                       |                    |            | 100%   | --        | 1   | 21.24                 | 0.1330        |
|                       |                    | 16QAM      | 1      | #0        | 1   | 21.25                 | 0.1334        |
|                       |                    |            | 1      | #Mid      | 1   | <b>21.49</b>          | <b>0.1409</b> |
|                       |                    |            | 1      | #Max      | 1   | 21.42                 | 0.1387        |
|                       |                    |            | 50%    | #0        | 2   | 20.36                 | 0.1086        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.44                 | 0.1107        |
|                       |                    |            | 50%    | #Max      | 2   | 20.34                 | 0.1081        |
|                       |                    |            | 100%   | --        | 2   | 20.26                 | 0.1062        |

| Band                  | Channel            | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|-----------------------|--------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/5MHz | 18625<br>1852.5MHz | QPSK       | 1      | #0        | 0   | 22.47                 | 0.1766        |
|                       |                    |            | 1      | #Mid      | 0   | <b>22.50</b>          | <b>0.1778</b> |
|                       |                    |            | 1      | #Max      | 0   | 22.42                 | 0.1746        |
|                       |                    |            | 50%    | #0        | 1   | 21.48                 | 0.1406        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.51                 | 0.1416        |
|                       |                    |            | 50%    | #Max      | 1   | 21.42                 | 0.1387        |
|                       |                    |            | 100%   | --        | 1   | 21.52                 | 0.1419        |
|                       |                    | 16QAM      | 1      | #0        | 1   | <b>21.63</b>          | <b>0.1455</b> |
|                       |                    |            | 1      | #Mid      | 1   | 21.45                 | 0.1396        |
|                       |                    |            | 1      | #Max      | 1   | 21.61                 | 0.1449        |
|                       |                    |            | 50%    | #0        | 2   | 20.37                 | 0.1089        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.56                 | 0.1138        |
|                       |                    |            | 50%    | #Max      | 2   | 20.50                 | 0.1122        |
|                       |                    |            | 100%   | --        | 2   | 20.47                 | 0.1114        |
|                       | 18900<br>1880MHz   | QPSK       | 1      | #0        | 0   | <b>22.45</b>          | <b>0.1758</b> |
|                       |                    |            | 1      | #Mid      | 0   | 22.31                 | 0.1702        |
|                       |                    |            | 1      | #Max      | 0   | 22.37                 | 0.1726        |
|                       |                    |            | 50%    | #0        | 1   | 21.33                 | 0.1358        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.38                 | 0.1374        |
|                       |                    |            | 50%    | #Max      | 1   | 21.26                 | 0.1337        |
|                       |                    |            | 100%   | --        | 1   | 21.30                 | 0.1349        |
|                       |                    | 16QAM      | 1      | #0        | 1   | <b>21.80</b>          | <b>0.1514</b> |
|                       |                    |            | 1      | #Mid      | 1   | 21.78                 | 0.1507        |
|                       |                    |            | 1      | #Max      | 1   | 21.64                 | 0.1459        |
|                       |                    |            | 50%    | #0        | 2   | 20.31                 | 0.1074        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.35                 | 0.1084        |
|                       |                    |            | 50%    | #Max      | 2   | 20.29                 | 0.1069        |
|                       |                    |            | 100%   | --        | 2   | 20.31                 | 0.1074        |
|                       | 19175<br>1907.5MHz | QPSK       | 1      | #0        | 0   | 22.30                 | 0.1698        |
|                       |                    |            | 1      | #Mid      | 0   | <b>22.49</b>          | <b>0.1774</b> |
|                       |                    |            | 1      | #Max      | 0   | 22.34                 | 0.1714        |
|                       |                    |            | 50%    | #0        | 1   | 21.25                 | 0.1334        |
|                       |                    |            | 50%    | #Mid      | 1   | 21.26                 | 0.1337        |
|                       |                    |            | 50%    | #Max      | 1   | 21.21                 | 0.1321        |
|                       |                    |            | 100%   | --        | 1   | 21.24                 | 0.1330        |
|                       |                    | 16QAM      | 1      | #0        | 1   | 21.52                 | 0.1419        |
|                       |                    |            | 1      | #Mid      | 1   | <b>21.66</b>          | <b>0.1466</b> |
|                       |                    |            | 1      | #Max      | 1   | 21.38                 | 0.1374        |
|                       |                    |            | 50%    | #0        | 2   | 20.25                 | 0.1059        |
|                       |                    |            | 50%    | #Mid      | 2   | 20.26                 | 0.1062        |
|                       |                    |            | 50%    | #Max      | 2   | 20.24                 | 0.1057        |
|                       |                    |            | 100%   | --        | 2   | 20.21                 | 0.1050        |

| Band                   | Channel          | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|------------------------|------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/10MHz | 18650<br>1855MHz | QPSK       | 1      | #0        | 0   | 22.50                 | 0.1778        |
|                        |                  |            | 1      | #Mid      | 0   | <b>22.63</b>          | <b>0.1832</b> |
|                        |                  |            | 1      | #Max      | 0   | 22.35                 | 0.1718        |
|                        |                  |            | 50%    | #0        | 1   | 21.40                 | 0.1380        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.36                 | 0.1368        |
|                        |                  |            | 50%    | #Max      | 1   | 21.31                 | 0.1352        |
|                        |                  |            | 100%   | --        | 1   | 21.33                 | 0.1358        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.65                 | 0.1462        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.70</b>          | <b>0.1479</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.47                 | 0.1403        |
|                        |                  |            | 50%    | #0        | 2   | 20.27                 | 0.1064        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.39                 | 0.1094        |
|                        |                  |            | 50%    | #Max      | 2   | 20.29                 | 0.1069        |
|                        |                  |            | 100%   | --        | 2   | 20.34                 | 0.1081        |
|                        | 18900<br>1880MHz | QPSK       | 1      | #0        | 0   | 22.29                 | 0.1694        |
|                        |                  |            | 1      | #Mid      | 0   | <b>22.53</b>          | <b>0.1791</b> |
|                        |                  |            | 1      | #Max      | 0   | 22.19                 | 0.1656        |
|                        |                  |            | 50%    | #0        | 1   | 21.36                 | 0.1368        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.31                 | 0.1352        |
|                        |                  |            | 50%    | #Max      | 1   | 21.26                 | 0.1337        |
|                        |                  |            | 100%   | --        | 1   | 21.24                 | 0.1330        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.47                 | 0.1403        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.68</b>          | <b>0.1472</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.35                 | 0.1365        |
|                        |                  |            | 50%    | #0        | 2   | 20.31                 | 0.1074        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.29                 | 0.1069        |
|                        |                  |            | 50%    | #Max      | 2   | 20.27                 | 0.1064        |
|                        |                  |            | 100%   | --        | 2   | 20.25                 | 0.1059        |
|                        | 19150<br>1905MHz | QPSK       | 1      | #0        | 0   | 22.30                 | 0.1698        |
|                        |                  |            | 1      | #Mid      | 0   | <b>22.83</b>          | <b>0.1919</b> |
|                        |                  |            | 1      | #Max      | 0   | 22.27                 | 0.1687        |
|                        |                  |            | 50%    | #0        | 1   | 21.21                 | 0.1321        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.31                 | 0.1352        |
|                        |                  |            | 50%    | #Max      | 1   | 21.19                 | 0.1315        |
|                        |                  |            | 100%   | --        | 1   | 21.26                 | 0.1337        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.61                 | 0.1449        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.73</b>          | <b>0.1489</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.41                 | 0.1384        |
|                        |                  |            | 50%    | #0        | 2   | 20.21                 | 0.1050        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.28                 | 0.1067        |
|                        |                  |            | 50%    | #Max      | 2   | 20.20                 | 0.1047        |
|                        |                  |            | 100%   | --        | 2   | 20.27                 | 0.1064        |

| Band                   | Channel            | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|------------------------|--------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/15MHz | 18675<br>1857.5MHz | QPSK       | 1      | #0        | 0   | <b>22.37</b>          | <b>0.1726</b> |
|                        |                    |            | 1      | #Mid      | 0   | 22.18                 | 0.1652        |
|                        |                    |            | 1      | #Max      | 0   | 22.05                 | 0.1603        |
|                        |                    |            | 50%    | #0        | 1   | 21.23                 | 0.1327        |
|                        |                    |            | 50%    | #Mid      | 1   | 21.21                 | 0.1321        |
|                        |                    |            | 50%    | #Max      | 1   | 21.23                 | 0.1327        |
|                        |                    |            | 100%   | --        | 1   | 21.29                 | 0.1346        |
|                        |                    | 16QAM      | 1      | #0        | 1   | 21.44                 | 0.1393        |
|                        |                    |            | 1      | #Mid      | 1   | <b>21.48</b>          | <b>0.1406</b> |
|                        |                    |            | 1      | #Max      | 1   | 21.36                 | 0.1368        |
|                        |                    |            | 50%    | #0        | 2   | 20.25                 | 0.1059        |
|                        |                    |            | 50%    | #Mid      | 2   | 20.27                 | 0.1064        |
|                        |                    |            | 50%    | #Max      | 2   | 20.27                 | 0.1064        |
|                        |                    |            | 100%   | --        | 2   | 20.32                 | 0.1076        |
|                        | 18900<br>1880MHz   | QPSK       | 1      | #0        | 0   | 22.31                 | 0.1702        |
|                        |                    |            | 1      | #Mid      | 0   | <b>22.47</b>          | <b>0.1766</b> |
|                        |                    |            | 1      | #Max      | 0   | 22.13                 | 0.1633        |
|                        |                    |            | 50%    | #0        | 1   | 21.29                 | 0.1346        |
|                        |                    |            | 50%    | #Mid      | 1   | 21.41                 | 0.1384        |
|                        |                    |            | 50%    | #Max      | 1   | 21.28                 | 0.1343        |
|                        |                    |            | 100%   | --        | 1   | 21.30                 | 0.1349        |
|                        |                    | 16QAM      | 1      | #0        | 1   | 21.64                 | 0.1459        |
|                        |                    |            | 1      | #Mid      | 1   | <b>21.66</b>          | <b>0.1466</b> |
|                        |                    |            | 1      | #Max      | 1   | 21.44                 | 0.1393        |
|                        |                    |            | 50%    | #0        | 2   | 20.30                 | 0.1072        |
|                        |                    |            | 50%    | #Mid      | 2   | 20.39                 | 0.1094        |
|                        |                    |            | 50%    | #Max      | 2   | 20.23                 | 0.1054        |
|                        |                    |            | 100%   | --        | 2   | 20.29                 | 0.1069        |
|                        | 19125<br>1902.5MHz | QPSK       | 1      | #0        | 0   | 22.29                 | 0.1694        |
|                        |                    |            | 1      | #Mid      | 0   | <b>22.33</b>          | <b>0.1710</b> |
|                        |                    |            | 1      | #Max      | 0   | 22.09                 | 0.1618        |
|                        |                    |            | 50%    | #0        | 1   | 21.36                 | 0.1368        |
|                        |                    |            | 50%    | #Mid      | 1   | 21.38                 | 0.1374        |
|                        |                    |            | 50%    | #Max      | 1   | 21.22                 | 0.1324        |
|                        |                    |            | 100%   | --        | 1   | 21.28                 | 0.1343        |
|                        |                    | 16QAM      | 1      | #0        | 1   | <b>21.56</b>          | <b>0.1432</b> |
|                        |                    |            | 1      | #Mid      | 1   | 21.53                 | 0.1422        |
|                        |                    |            | 1      | #Max      | 1   | 21.31                 | 0.1352        |
|                        |                    |            | 50%    | #0        | 2   | 20.32                 | 0.1076        |
|                        |                    |            | 50%    | #Mid      | 2   | 20.31                 | 0.1074        |
|                        |                    |            | 50%    | #Max      | 2   | 20.21                 | 0.1050        |
|                        |                    |            | 100%   | --        | 2   | 20.29                 | 0.1069        |

| Band                   | Channel          | Modulation | RB No. | RB Offset | MPR | Max Power (Conducted) | Max Power (W) |
|------------------------|------------------|------------|--------|-----------|-----|-----------------------|---------------|
| Band 2 (1900MHz)/20MHz | 18700<br>1860MHz | QPSK       | 1      | #0        | 0   | <b>22.37</b>          | <b>0.1726</b> |
|                        |                  |            | 1      | #Mid      | 0   | 22.26                 | 0.1683        |
|                        |                  |            | 1      | #Max      | 0   | 21.86                 | 0.1535        |
|                        |                  |            | 50%    | #0        | 1   | 21.23                 | 0.1327        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.21                 | 0.1321        |
|                        |                  |            | 50%    | #Max      | 1   | 21.14                 | 0.1300        |
|                        |                  |            | 100%   | --        | 1   | 21.15                 | 0.1303        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.38                 | 0.1374        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.52</b>          | <b>0.1419</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.24                 | 0.1330        |
|                        |                  |            | 50%    | #0        | 2   | 20.20                 | 0.1047        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.19                 | 0.1045        |
|                        |                  |            | 50%    | #Max      | 2   | 20.07                 | 0.1016        |
|                        |                  |            | 100%   | --        | 2   | 20.17                 | 0.1040        |
|                        | 18900<br>1880MHz | QPSK       | 1      | #0        | 0   | 22.33                 | 0.1710        |
|                        |                  |            | 1      | #Mid      | 0   | <b>22.49</b>          | <b>0.1774</b> |
|                        |                  |            | 1      | #Max      | 0   | 21.98                 | 0.1578        |
|                        |                  |            | 50%    | #0        | 1   | 21.35                 | 0.1365        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.36                 | 0.1368        |
|                        |                  |            | 50%    | #Max      | 1   | 21.29                 | 0.1346        |
|                        |                  |            | 100%   | --        | 1   | 21.34                 | 0.1361        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.59                 | 0.1442        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.80</b>          | <b>0.1514</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.31                 | 0.1352        |
|                        |                  |            | 50%    | #0        | 2   | 20.36                 | 0.1086        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.36                 | 0.1086        |
|                        |                  |            | 50%    | #Max      | 2   | 20.33                 | 0.1079        |
|                        |                  |            | 100%   | --        | 2   | 20.37                 | 0.1089        |
|                        | 19100<br>1900MHz | QPSK       | 1      | #0        | 0   | 22.25                 | 0.1679        |
|                        |                  |            | 1      | #Mid      | 0   | <b>22.34</b>          | <b>0.1714</b> |
|                        |                  |            | 1      | #Max      | 0   | 22.01                 | 0.1589        |
|                        |                  |            | 50%    | #0        | 1   | 21.30                 | 0.1349        |
|                        |                  |            | 50%    | #Mid      | 1   | 21.43                 | 0.1390        |
|                        |                  |            | 50%    | #Max      | 1   | 21.30                 | 0.1349        |
|                        |                  |            | 100%   | --        | 1   | 21.39                 | 0.1377        |
|                        |                  | 16QAM      | 1      | #0        | 1   | 21.50                 | 0.1413        |
|                        |                  |            | 1      | #Mid      | 1   | <b>21.78</b>          | <b>0.1507</b> |
|                        |                  |            | 1      | #Max      | 1   | 21.17                 | 0.1309        |
|                        |                  |            | 50%    | #0        | 2   | 20.26                 | 0.1062        |
|                        |                  |            | 50%    | #Mid      | 2   | 20.37                 | 0.1089        |
|                        |                  |            | 50%    | #Max      | 2   | 20.30                 | 0.1072        |
|                        |                  |            | 100%   | --        | 2   | 20.33                 | 0.1079        |

### 3.6. Maximum Conducted Power and ERP/EIRP Power

According to KDB 412172 D01 Section 1.2 Power Approach

$$\text{EIRP} = P_T + G_T - L_C = \text{ERP} + 2.15 \text{ dB}, \text{ERP} = \text{EIRP} - 2.15 \text{ dB}$$

$P_T$  = transmitter output power in dBm

$G_T$  = gain of the transmitting antenna in dBi

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna in dB

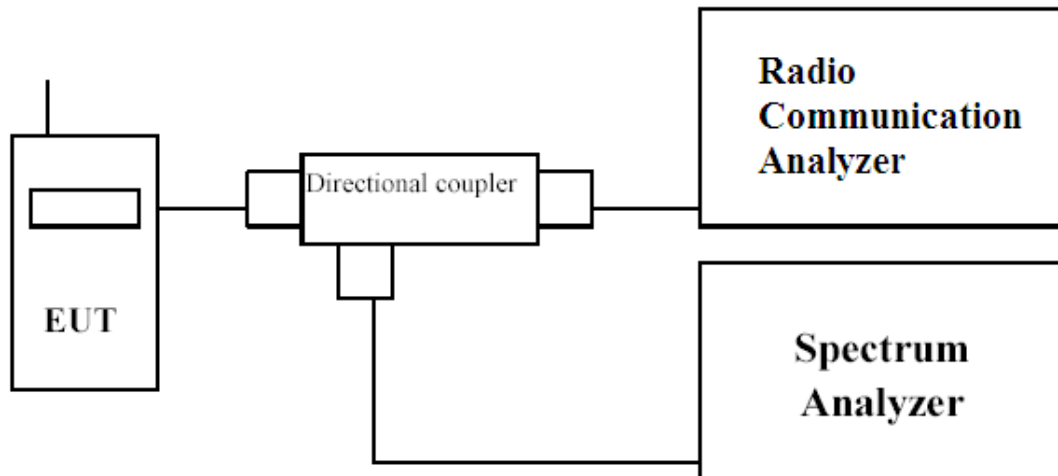
| LTE Band | BW   | Modulation | Conducted Peak Power (dBm) | Conducted Peak Power (W) | Antenna Gain (dBi) | Maximum EIRP (W) | Maximum EIRP Limit (W) |
|----------|------|------------|----------------------------|--------------------------|--------------------|------------------|------------------------|
| 2        | 1.4M | QPSK       | 22.46                      | 0.176                    | 2                  | 0.279            | 2                      |
|          |      | 16QAM      | 21.99                      | 0.158                    | 2                  | 0.251            | 2                      |
|          | 3M   | QPSK       | 22.74                      | 0.188                    | 2                  | 0.298            | 2                      |
|          |      | 16QAM      | 21.73                      | 0.149                    | 2                  | 0.236            | 2                      |
|          | 5M   | QPSK       | 22.50                      | 0.178                    | 2                  | 0.282            | 2                      |
|          |      | 16QAM      | 21.80                      | 0.151                    | 2                  | 0.240            | 2                      |
|          | 10M  | QPSK       | 22.83                      | 0.192                    | 2                  | 0.304            | 2                      |
|          |      | 16QAM      | 21.73                      | 0.149                    | 2                  | 0.236            | 2                      |
|          | 15M  | QPSK       | 22.47                      | 0.177                    | 2                  | 0.280            | 2                      |
|          |      | 16QAM      | 21.66                      | 0.147                    | 2                  | 0.232            | 2                      |
|          | 20M  | QPSK       | 22.49                      | 0.177                    | 2                  | 0.281            | 2                      |
|          |      | 16QAM      | 21.80                      | 0.151                    | 2                  | 0.240            | 2                      |

#### 4. Occupied Bandwidth

##### 4.1. Test Secification

According to FCC Part 2.1049, 24.238

##### 4.2. Test Setup



##### 4.3. Test Procedure

The EUT is tested with maximum rated TX power via the Base Station simulator, and the occupied bandwidth was measured at the antenna terminals of the EUT.

The Resolution BW of the analyzer is set to 1 %~5% of the emission bandwidth. The EUT's occupied bandwidth is measured as the width of the signal between two points, one below the carrier center frequency and one above the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

The plots below show the resultant display from the Spectrum Analyser.

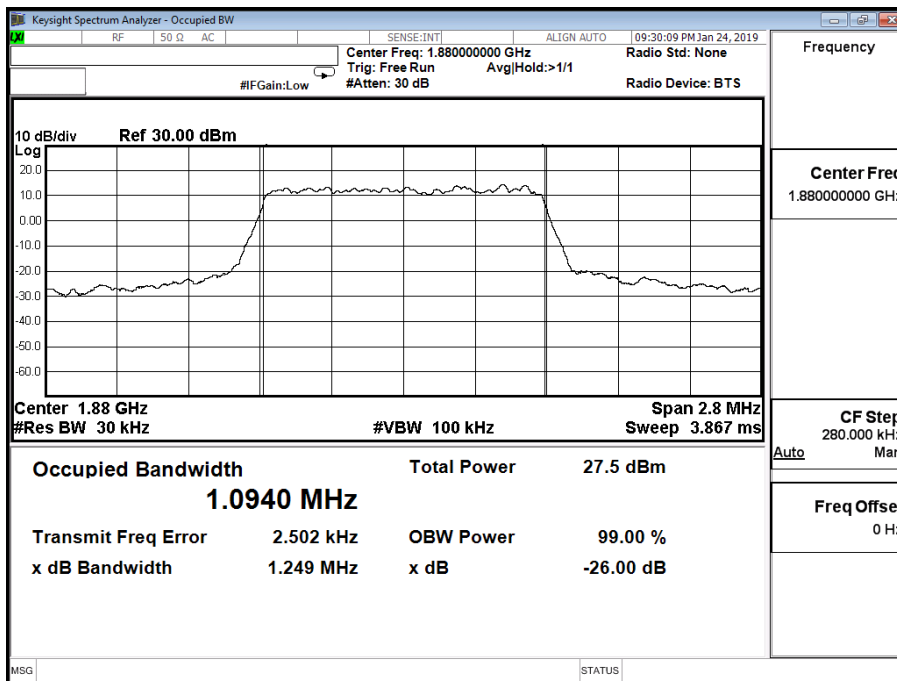
#### 4.4. Test Result of Occupied Bandwidth

|           |                                                                                                                           |
|-----------|---------------------------------------------------------------------------------------------------------------------------|
| Product   | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |
| Test Mode | Occupied Bandwidth                                                                                                        |
| Test Site | CTR                                                                                                                       |

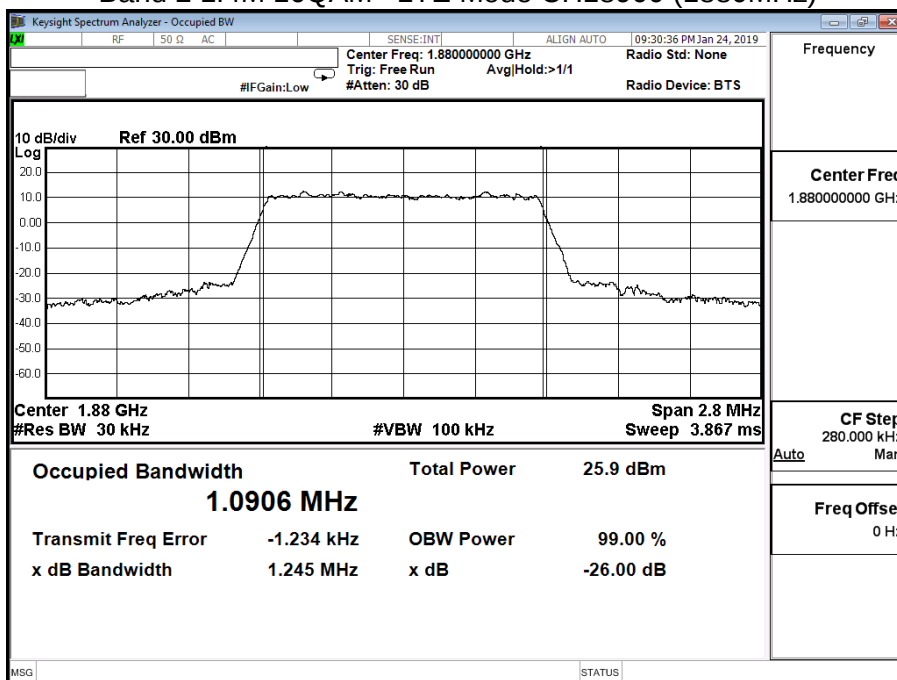
| Test Mode         | Channel | TX Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB bandwidth (MHz) | Result |
|-------------------|---------|--------------------|------------------------------|-----------------------|--------|
| Band 2 1.4M QPSK  | 18900   | 1880               | 1.0940                       | 1.249                 | Pass   |
| Band 2 1.4M 16QAM | 18900   | 1880               | 1.0906                       | 1.245                 | Pass   |
| Band 2 3M QPSK    | 18900   | 1880               | 2.7368                       | 3.095                 | Pass   |
| Band 2 3M 16QAM   | 18900   | 1880               | 2.7202                       | 3.059                 | Pass   |
| Band 2 5M QPSK    | 18900   | 1880               | 4.5013                       | 4.948                 | Pass   |
| Band 2 5M 16QAM   | 18900   | 1880               | 4.4835                       | 4.924                 | Pass   |
| Band 2 10M QPSK   | 18900   | 1880               | 9.0451                       | 10.01                 | Pass   |
| Band 2 10M 16QAM  | 18900   | 1880               | 9.0507                       | 9.994                 | Pass   |
| Band 2 15M QPSK   | 18900   | 1880               | 13.471                       | 14.68                 | Pass   |
| Band 2 15M 16QAM  | 18900   | 1880               | 13.466                       | 14.60                 | Pass   |
| Band 2 20M QPSK   | 18900   | 1880               | 18.590                       | 20.62                 | Pass   |
| Band 2 20M 16QAM  | 18900   | 1880               | 18.516                       | 20.40                 | Pass   |

|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 1.4M                                                                                                               |           |     |

## Band 2 1.4M QPSK - LTE Mode CH18900 (1880MHz)

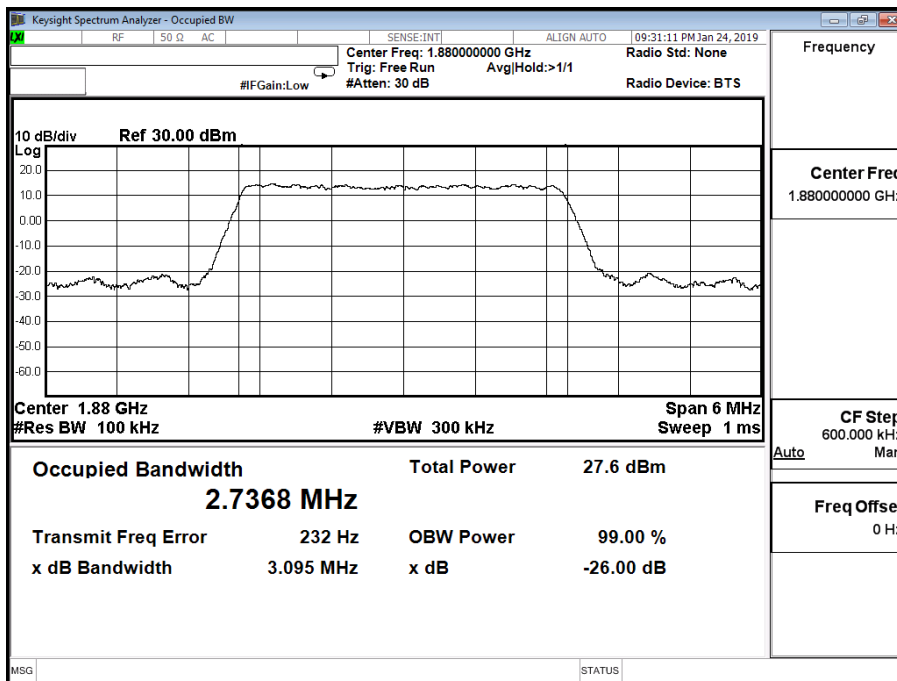


## Band 2 1.4M 16QAM - LTE Mode CH18900 (1880MHz)

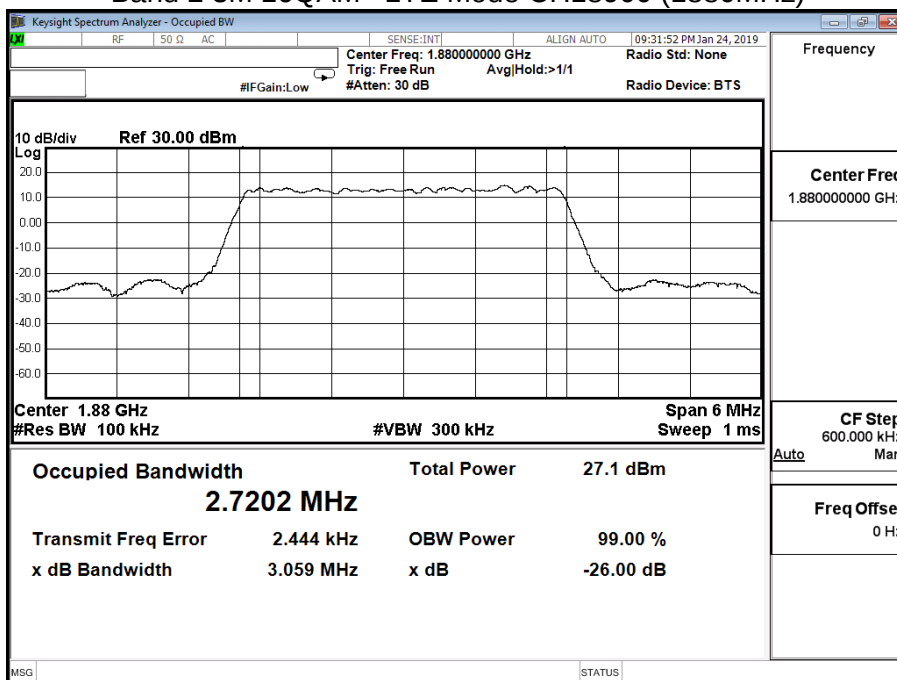


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 3M                                                                                                                 |           |     |

## Band 2 3M QPSK - LTE Mode CH18900 (1880MHz)

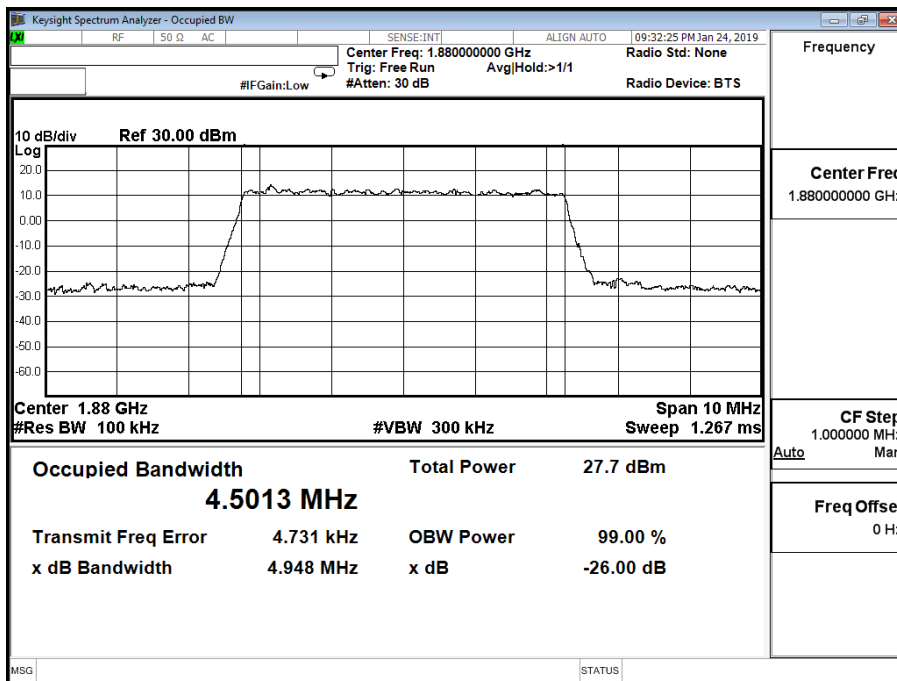


## Band 2 3M 16QAM - LTE Mode CH18900 (1880MHz)

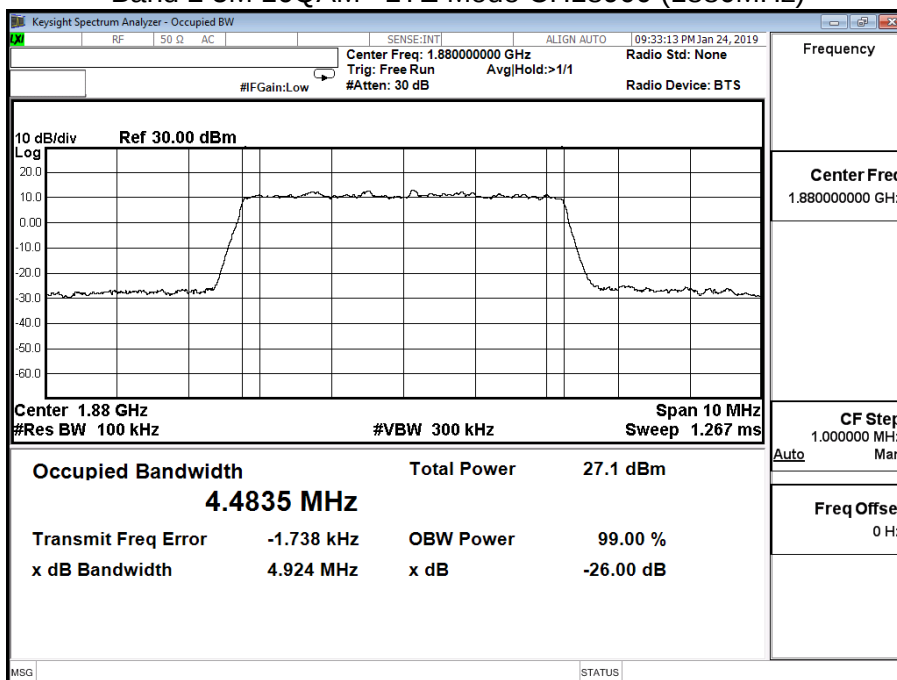


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 5M                                                                                                                 |           |     |

## Band 2 5M QPSK - LTE Mode CH18900 (1880MHz)

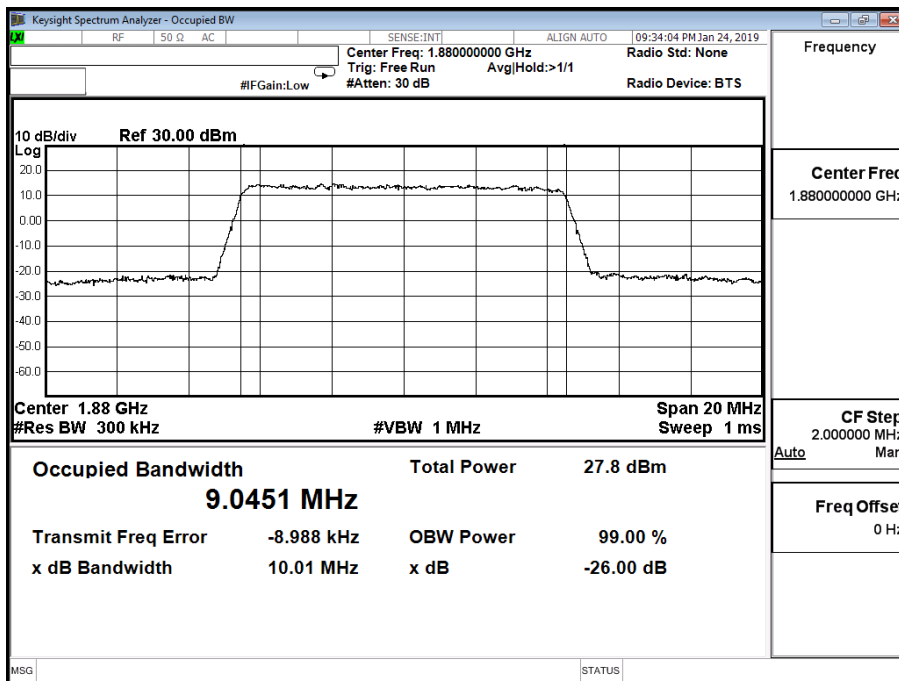


## Band 2 5M 16QAM - LTE Mode CH18900 (1880MHz)

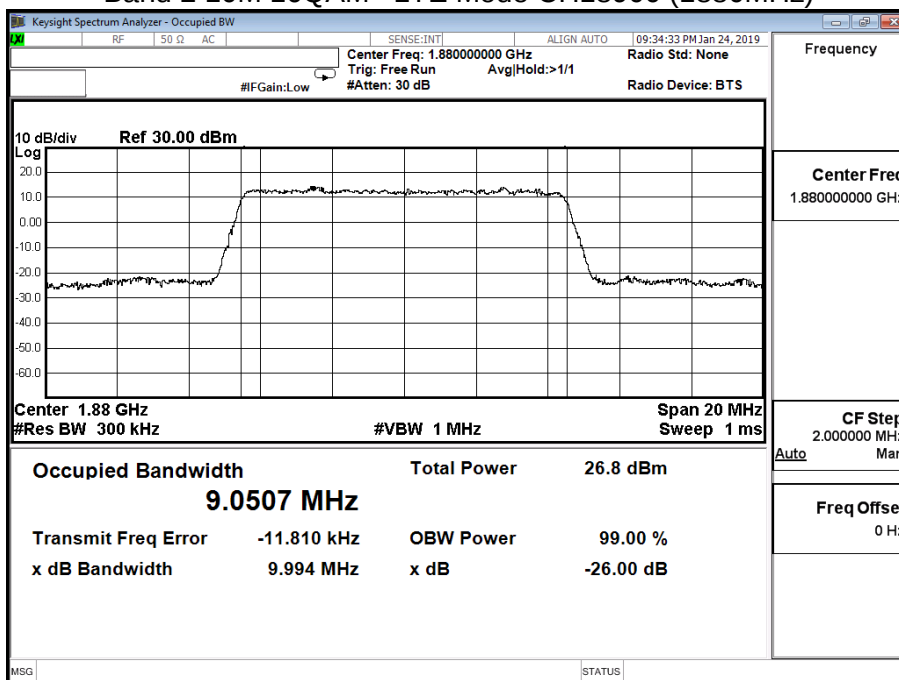


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 10M                                                                                                                |           |     |

## Band 2 10M QPSK - LTE Mode CH18900 (1880MHz)

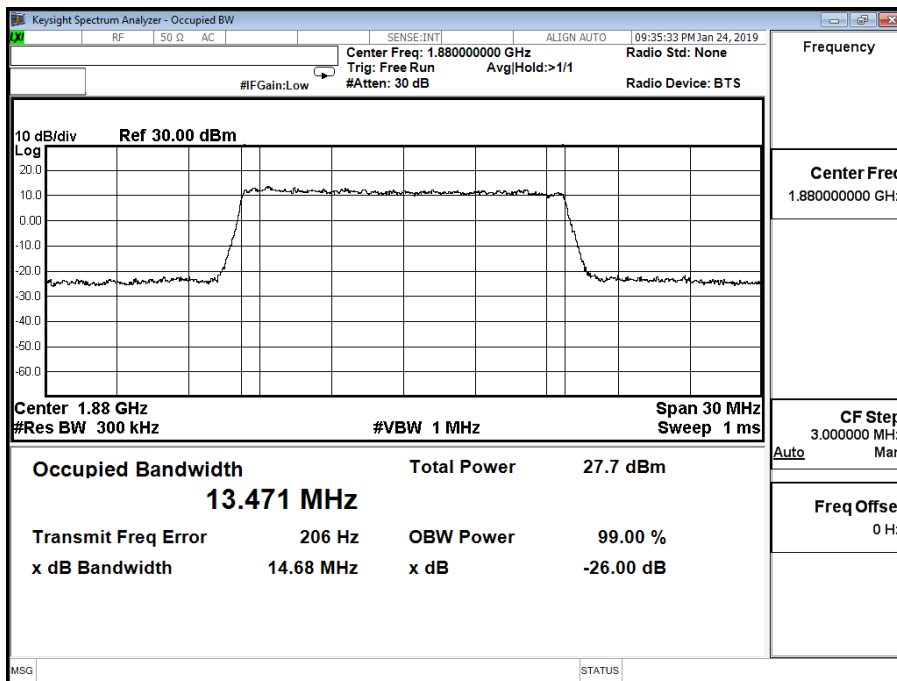


## Band 2 10M 16QAM - LTE Mode CH18900 (1880MHz)

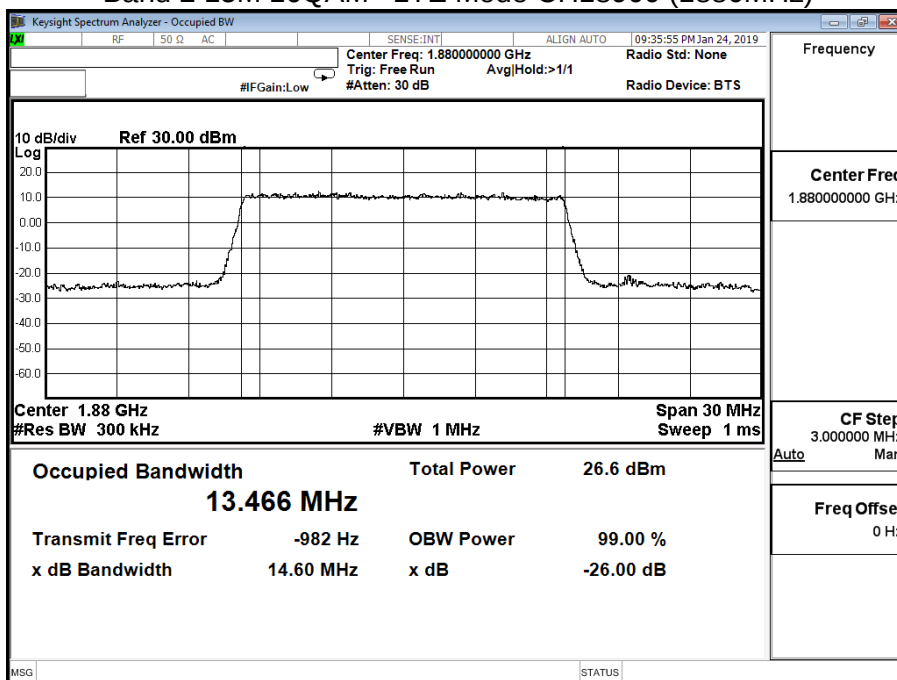


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 15M                                                                                                                |           |     |

## Band 2 15M QPSK - LTE Mode CH18900 (1880MHz)

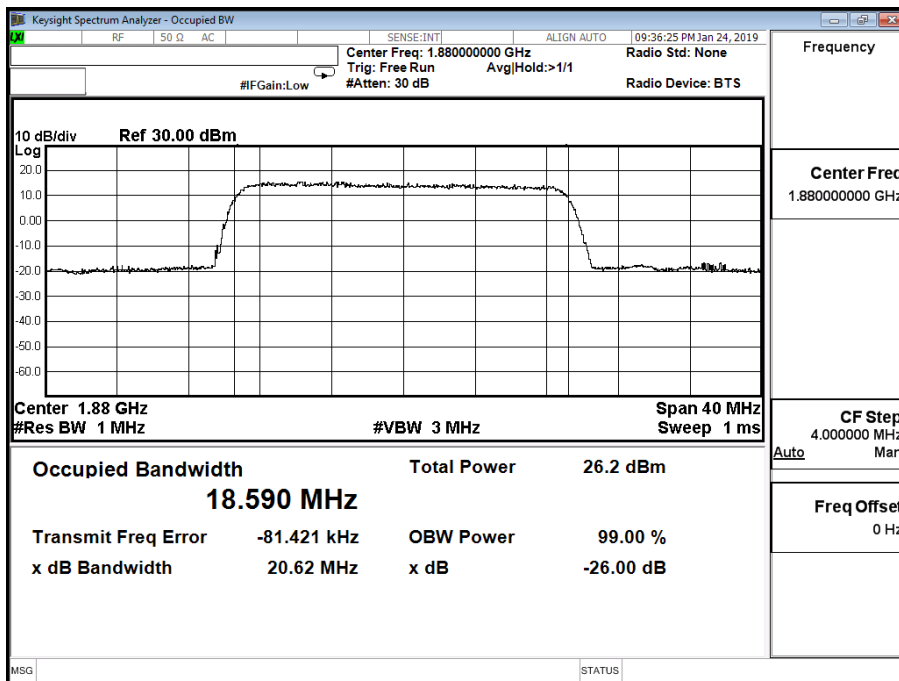


## Band 2 15M 16QAM - LTE Mode CH18900 (1880MHz)

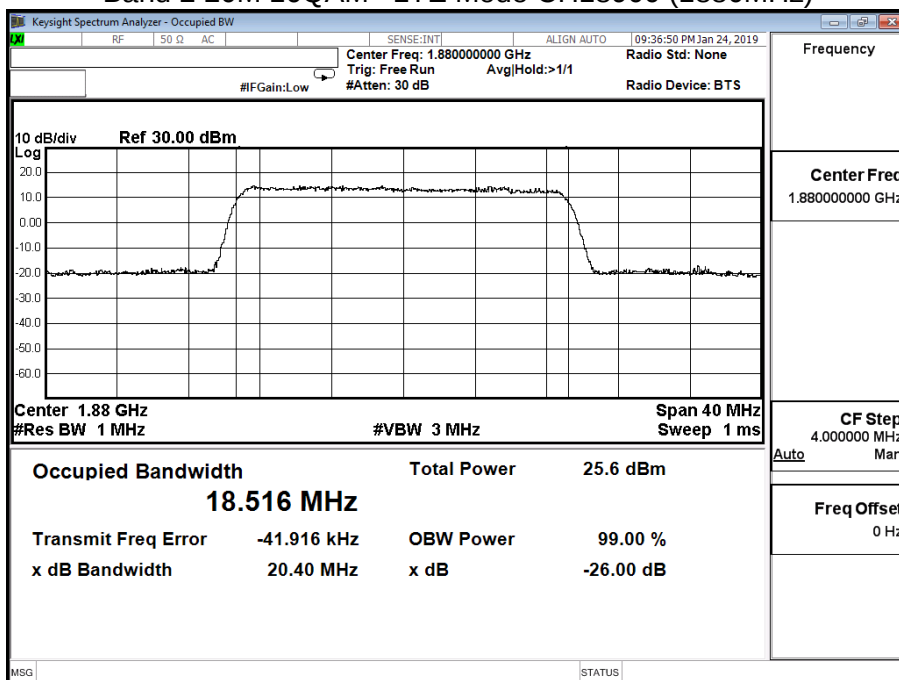


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Occupied Bandwidth                                                                                                        |           |     |
| Date of Test   | 2019/01/24                                                                                                                | Test Site | CTR |
| Test Condition | Band 2 20M                                                                                                                |           |     |

## Band 2 20M QPSK - LTE Mode CH18900 (1880MHz)



## Band 2 20M 16QAM - LTE Mode CH18900 (1880MHz)

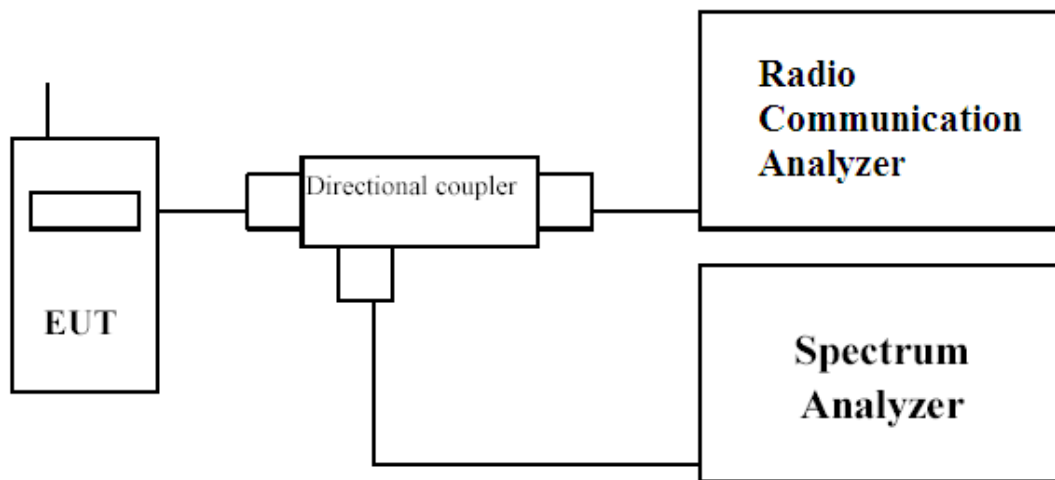


## 5. Spurious Emission At Antenna Terminals (+/-1MHz)

### 5.1. Test Specification

According to Part 2.1051, 24.238

### 5.2. Setup



### 5.3. Limits

The spurious (unwanted) emission limits specified in the individual FCC rule parts applicable to licensed digital transmitters (typically referred to under the heading 'emission limits') normally apply to any and all emissions that are present outside of the authorized frequency band/block and apply to emissions in both the out-of-band and spurious domains. unwanted emissions are required by the licensed rule parts to be attenuated below the transmitter power by a factor of at least  $43 + 10\log(P)$  dB, where P represents the transmitter power expressed in watts

### 5.4. Test Procedure

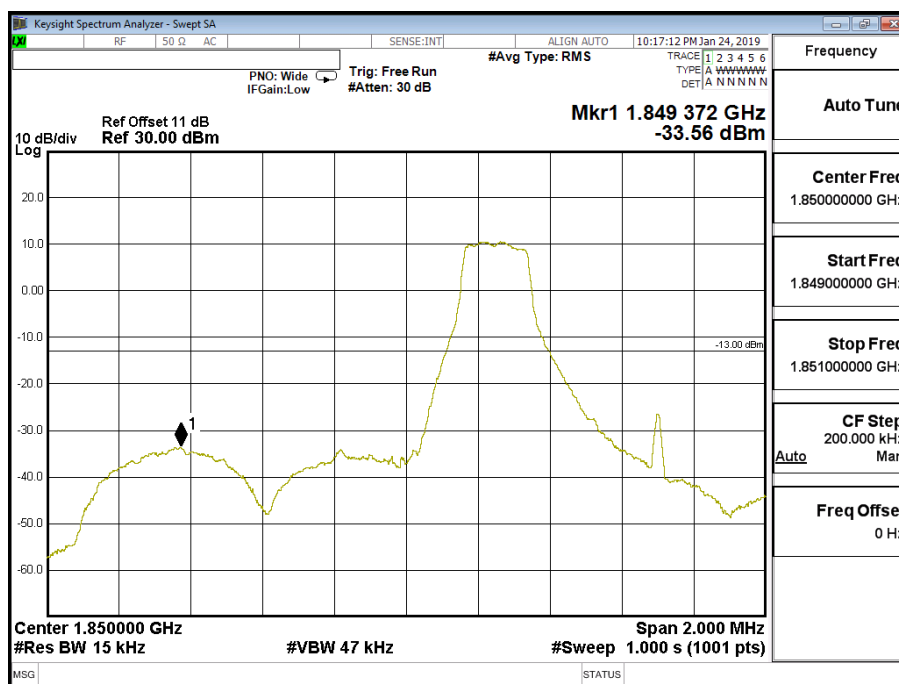
In accordance with Part 27.53 at least 1% of the emission bandwidth was used for the resolution and video bandwidths up to 1MHz away from the Block Edge. At greater than 1MHz, the resolution and video bandwidth were increased to 1MHz/3MHz.

The reference power and path losses of all channels used for testing in each frequency block were measured.

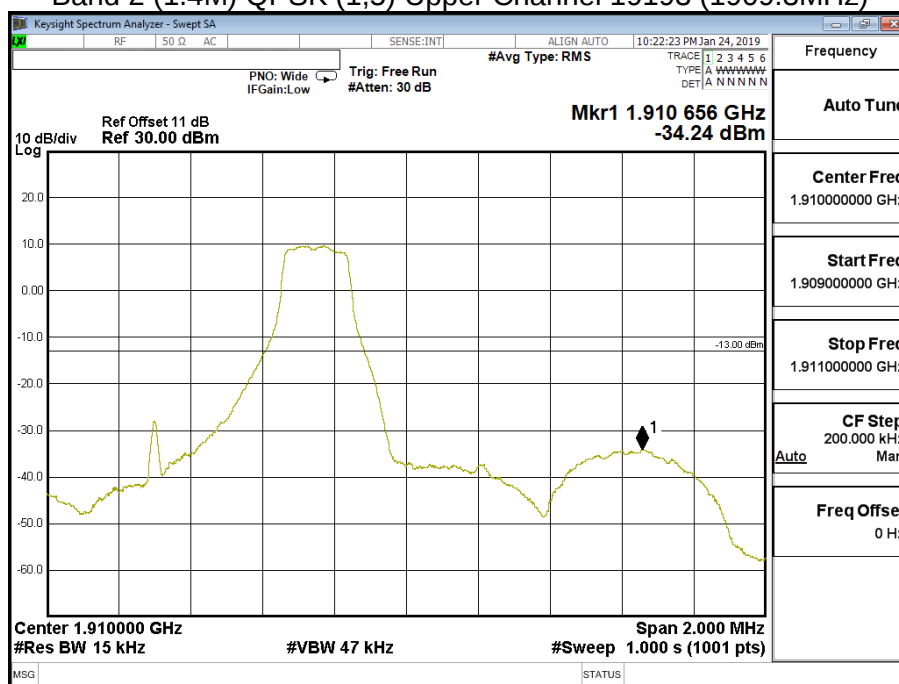
### 5.5. Test Result of Spurious Emission At Antenna Terminals (+/-1MHz)

|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (1.4M))                                                                                           |           |     |

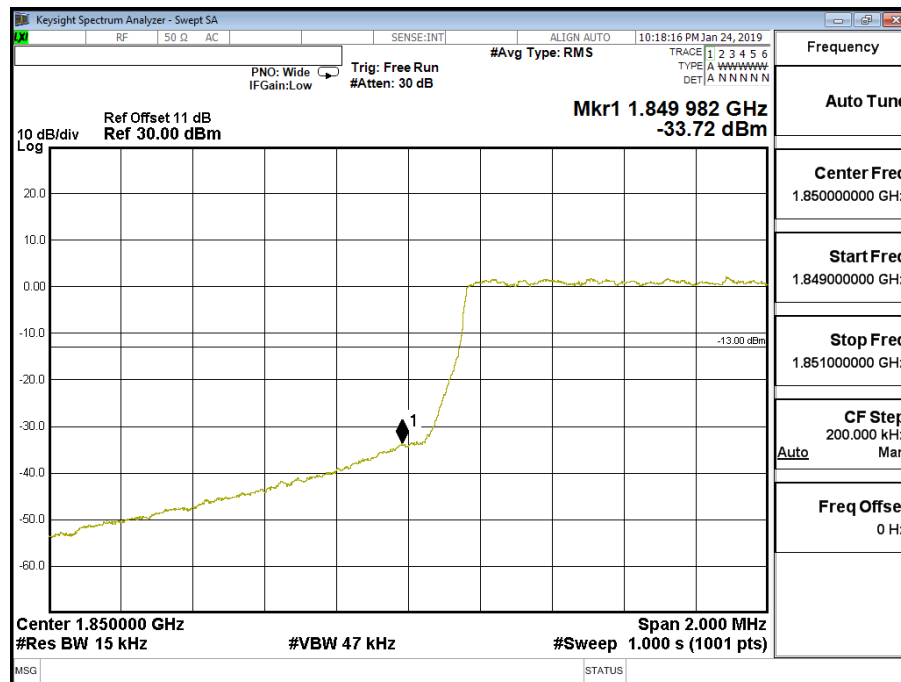
Band 2 (1.4M) QPSK (1,0) Lower Channel 18607 (1850.7MHz)



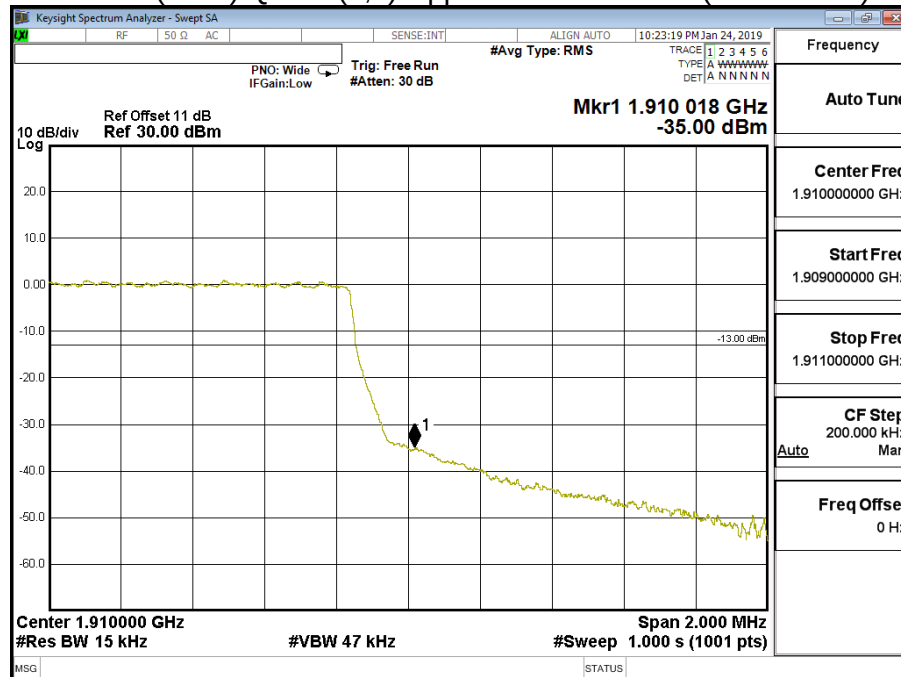
Band 2 (1.4M) QPSK (1,5) Upper Channel 19193 (1909.3MHz)



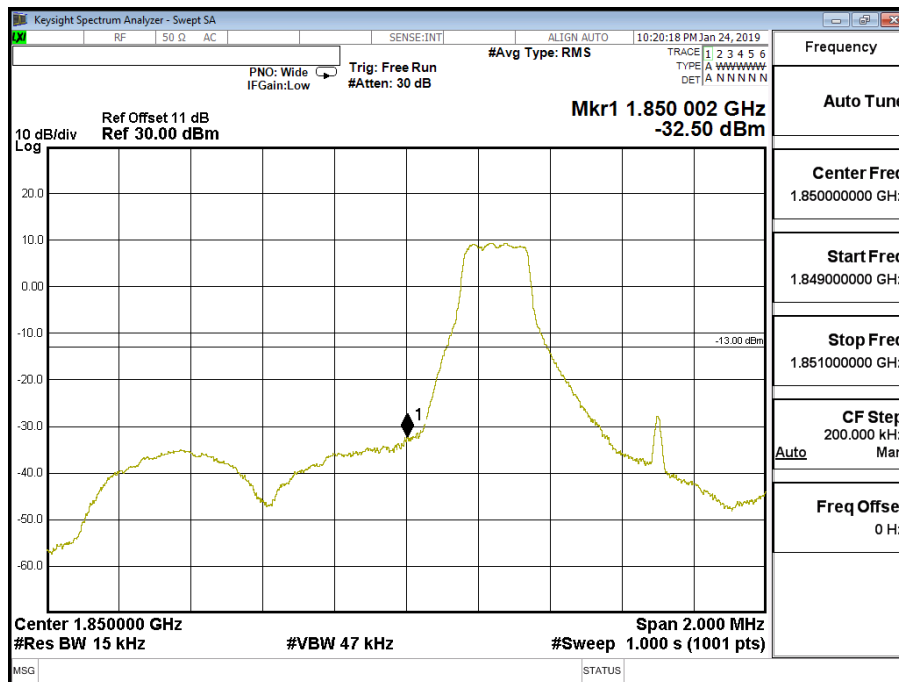
## Band 2 (1.4M) QPSK (6,0) Lower Channel 18607 (1850.7MHz)



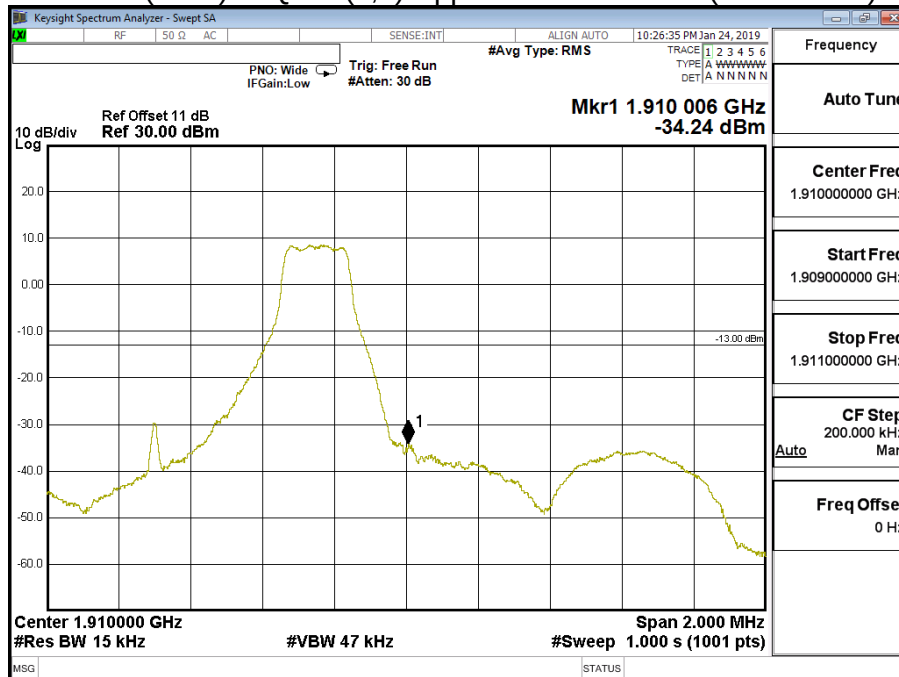
## Band 2 (1.4M) QPSK (6,0) Upper Channel 19193 (1909.3MHz)



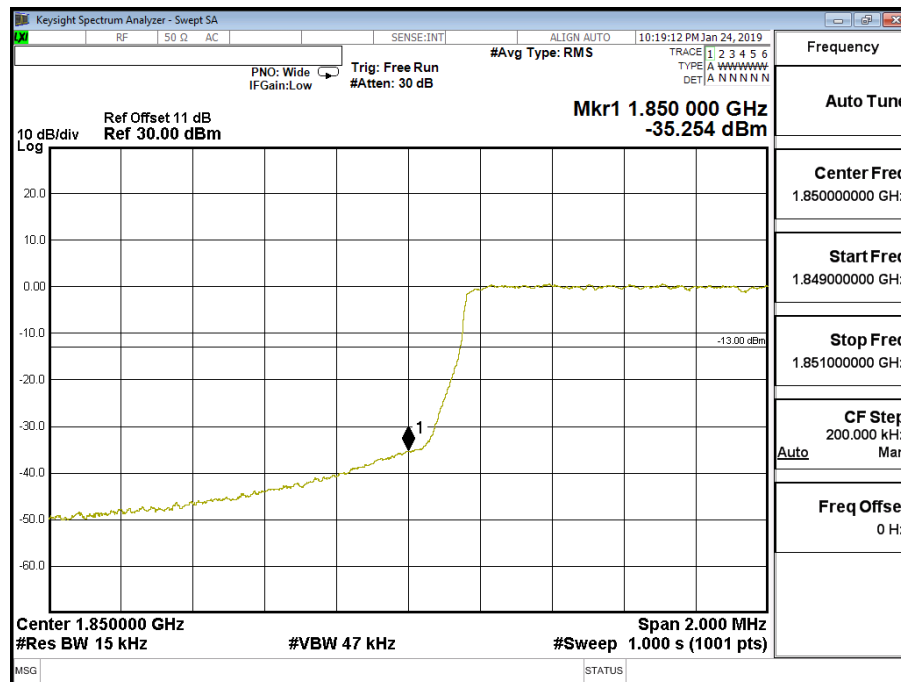
## Band 2 (1.4M) 16QAM (1,0) Lower Channel 18607 (1850.7MHz)



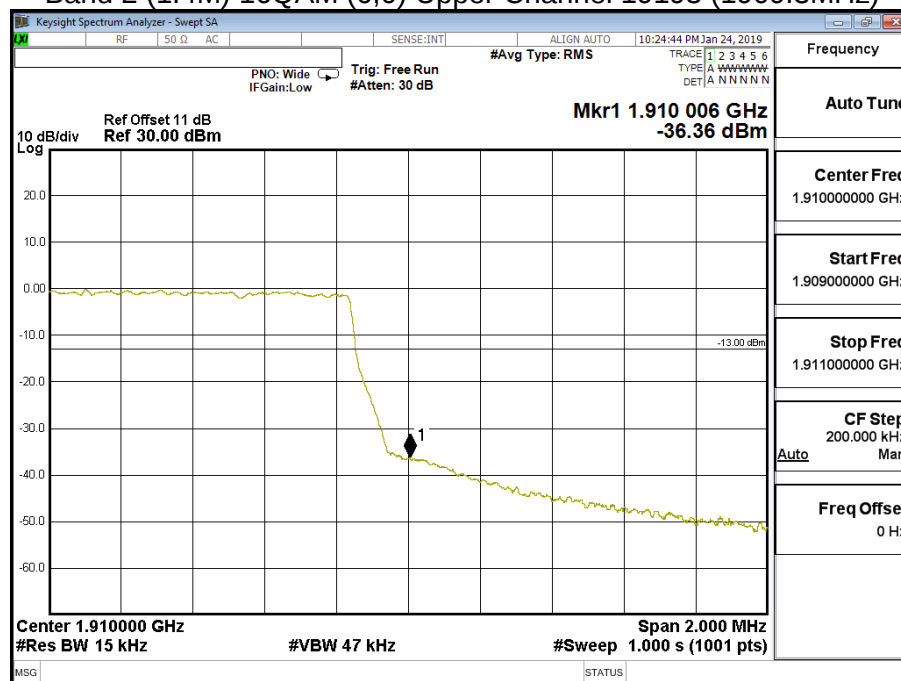
## Band 2 (1.4M) 16QAM (1,5) Upper Channel 19193 (1909.3MHz)



## Band 2 (1.4M) 16QAM (6,0) Lower Channel 18607 (1850.7MHz)

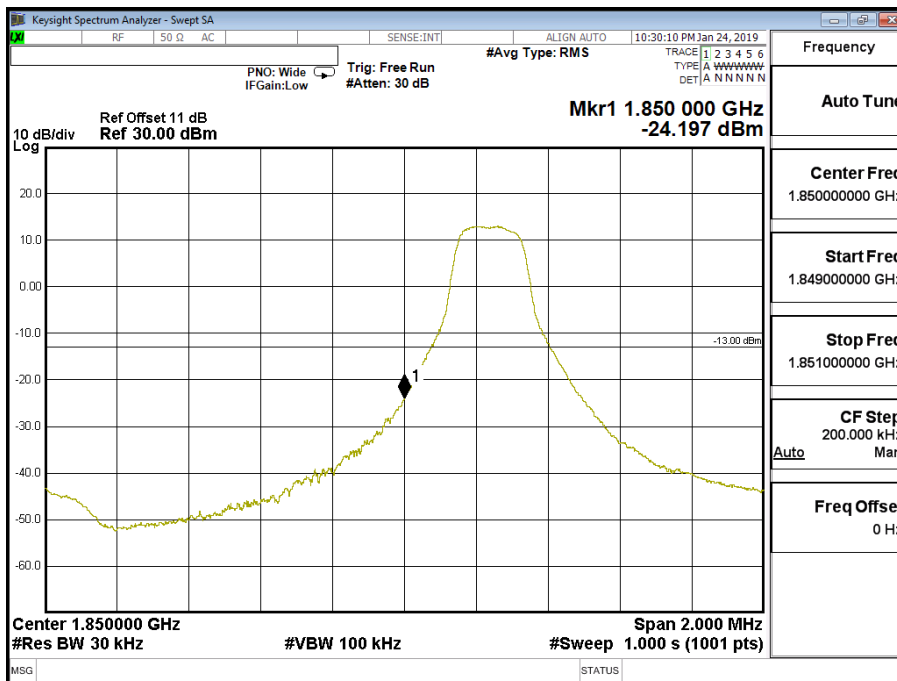


## Band 2 (1.4M) 16QAM (6,0) Upper Channel 19193 (1909.3MHz)

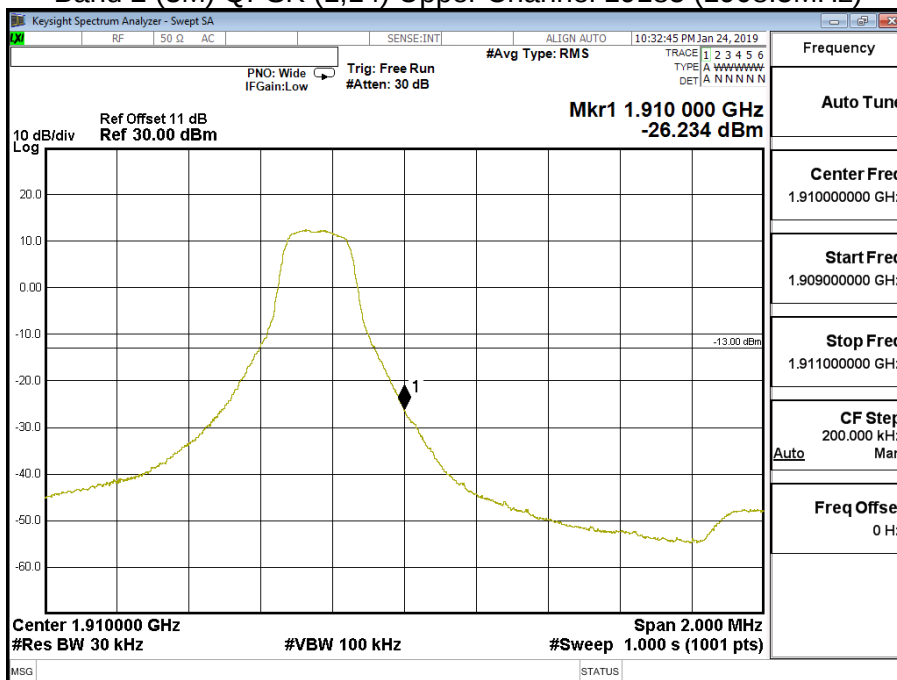


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (3M))                                                                                             |           |     |

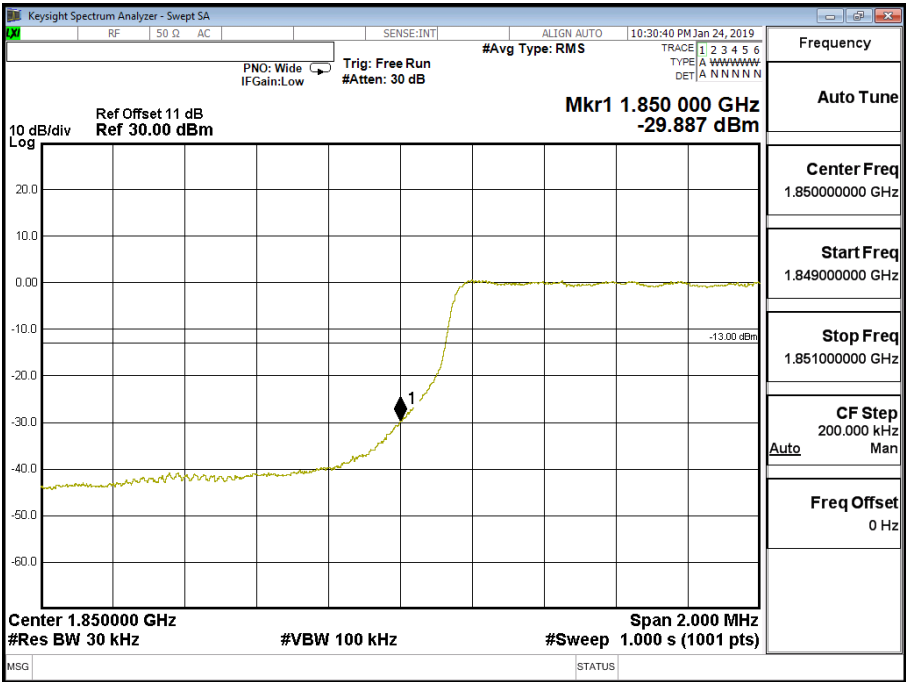
## Band 2 (3M) QPSK (1,0) Lower Channel 18615 (1851.5MHz)



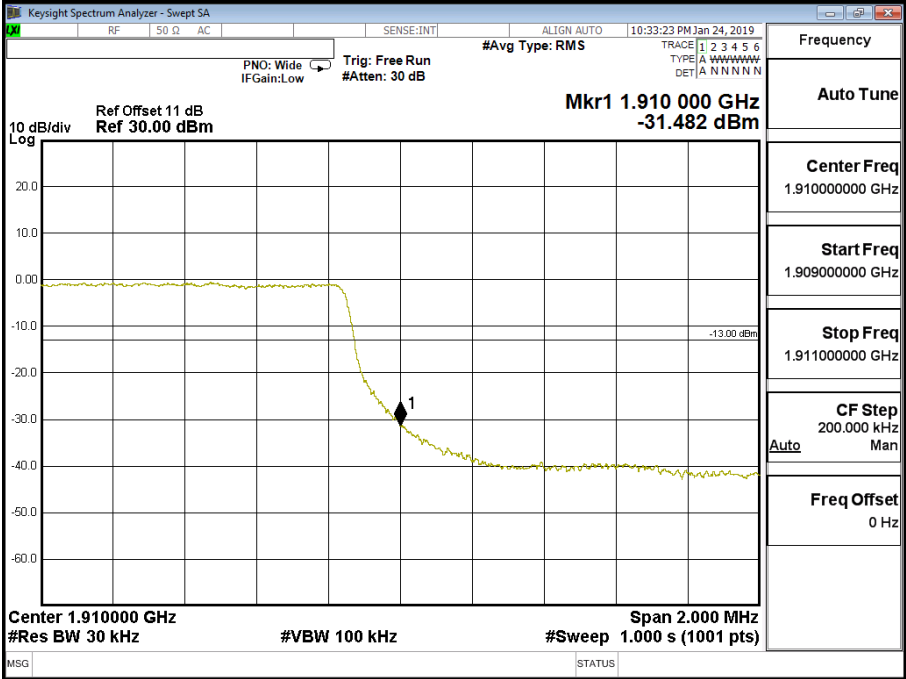
## Band 2 (3M) QPSK (1,14) Upper Channel 19185 (1908.5MHz)



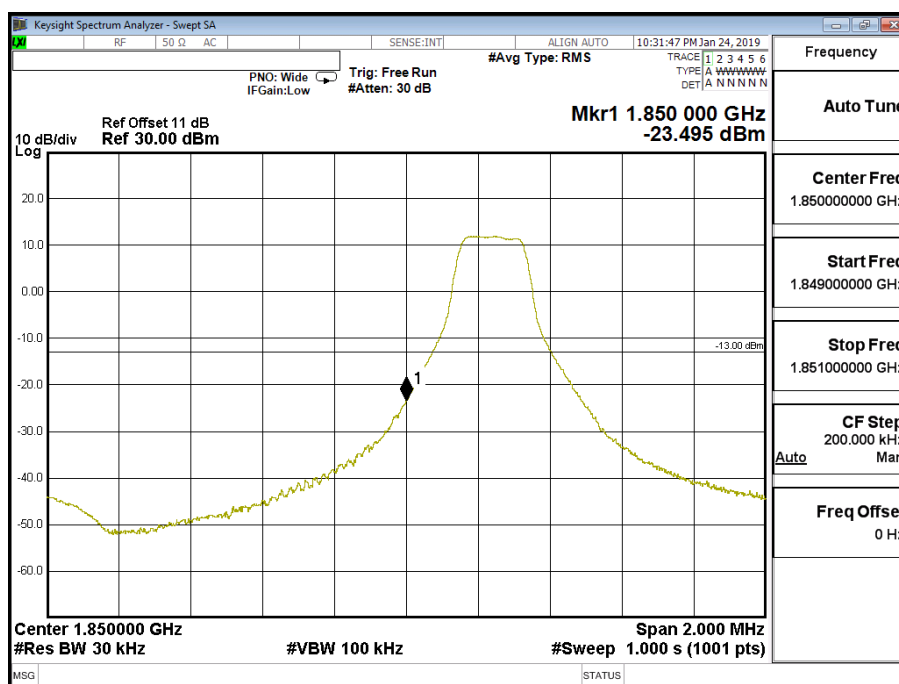
Band 2 (3M) QPSK (15,0) Lower Channel 18615 (1851.5MHz)



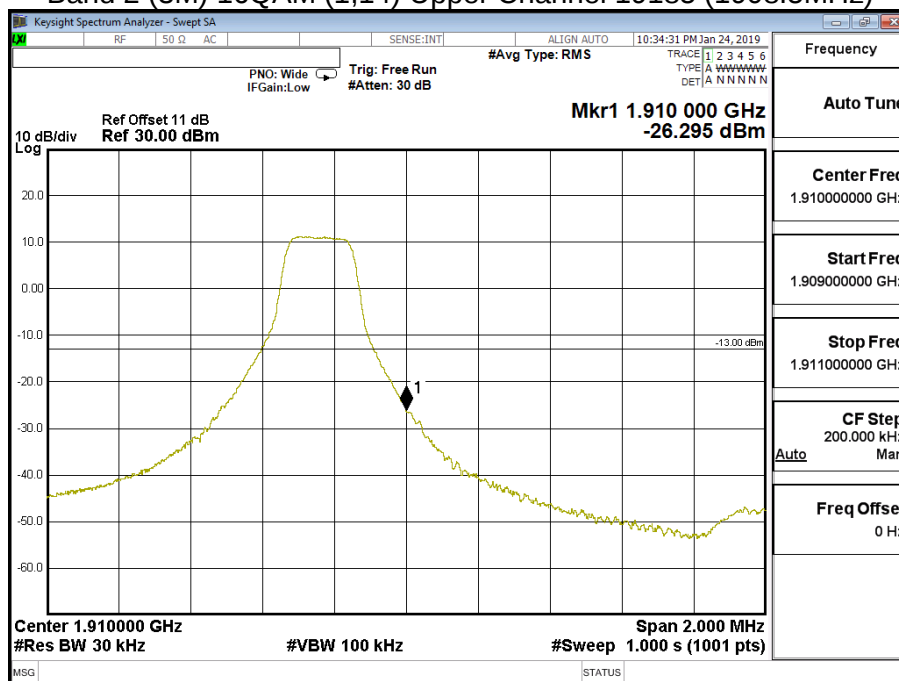
Band 2 (3M) QPSK (15,0) Upper Channel 19185 (1908.5MHz)



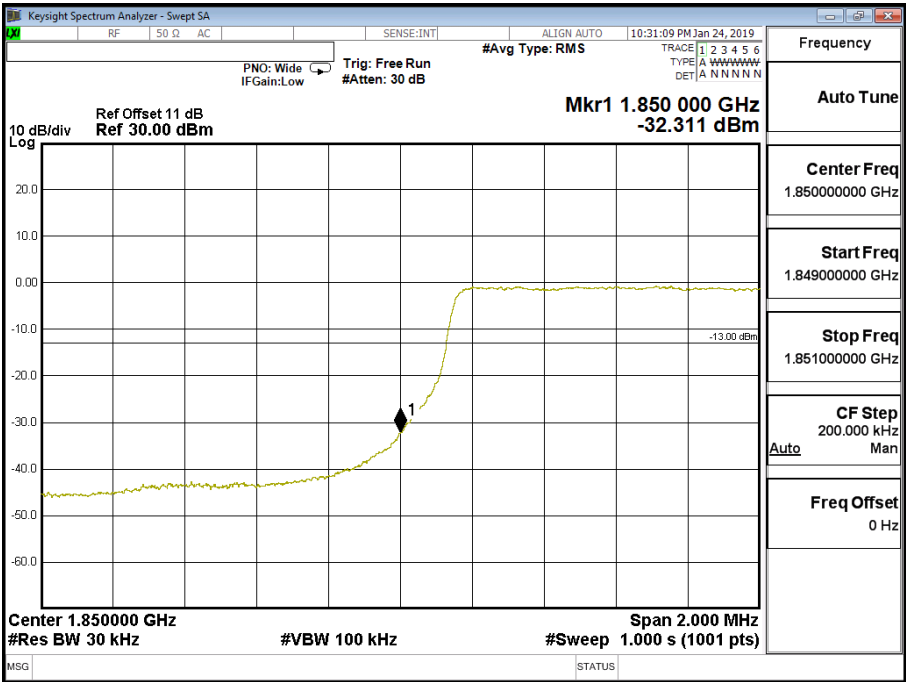
## Band 2 (3M) 16QAM (1,0) Lower Channel 18615 (1851.5MHz)



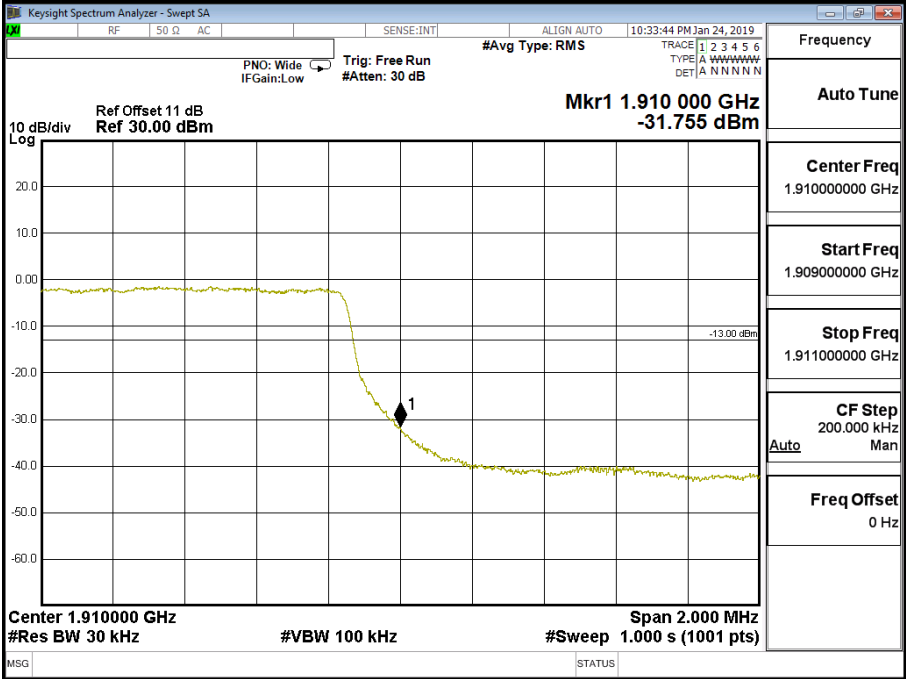
## Band 2 (3M) 16QAM (1,14) Upper Channel 19185 (1908.5MHz)



Band 2 (3M) 16QAM (15,0) Lower Channel 18615 (1851.5MHz)

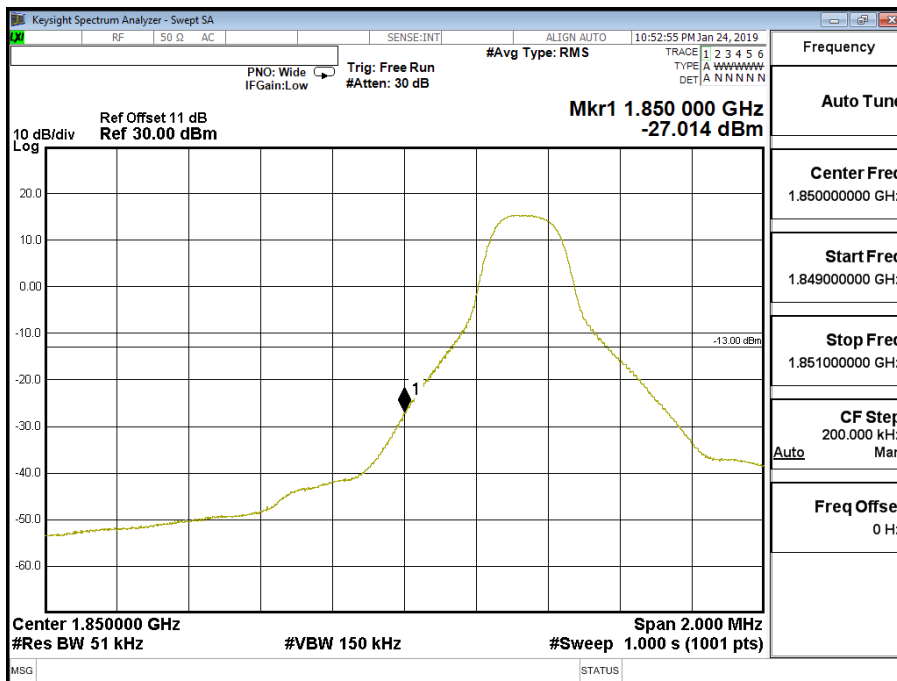


Band 2 (3M) 16QAM (15,0) Upper Channel 19185 (1908.5MHz)

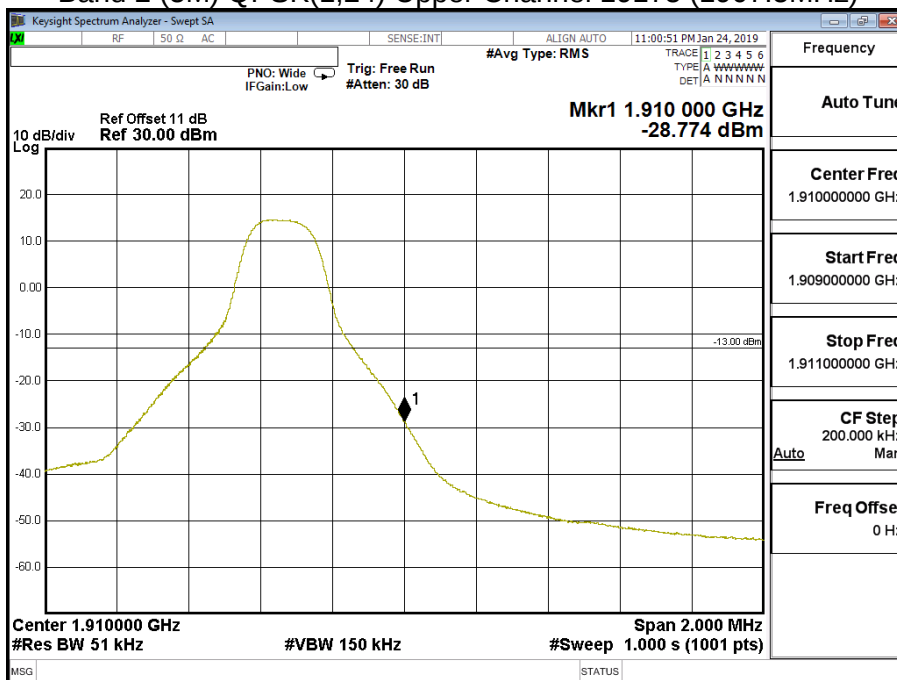


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (5M))                                                                                             |           |     |

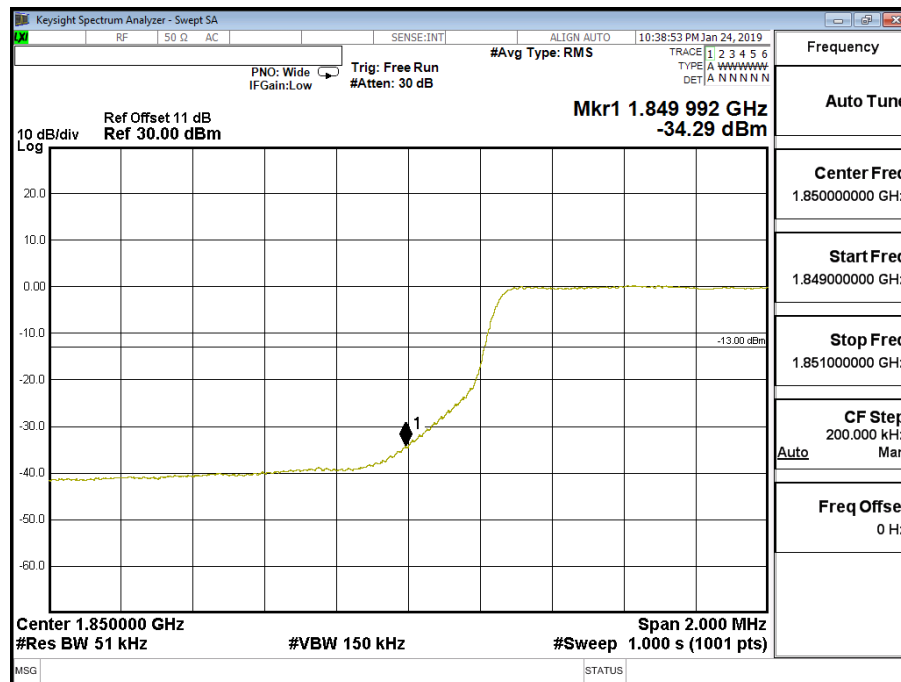
## Band 2 (5M) QPSK(1,0) Lower Channel 18625 (1852.5MHz)



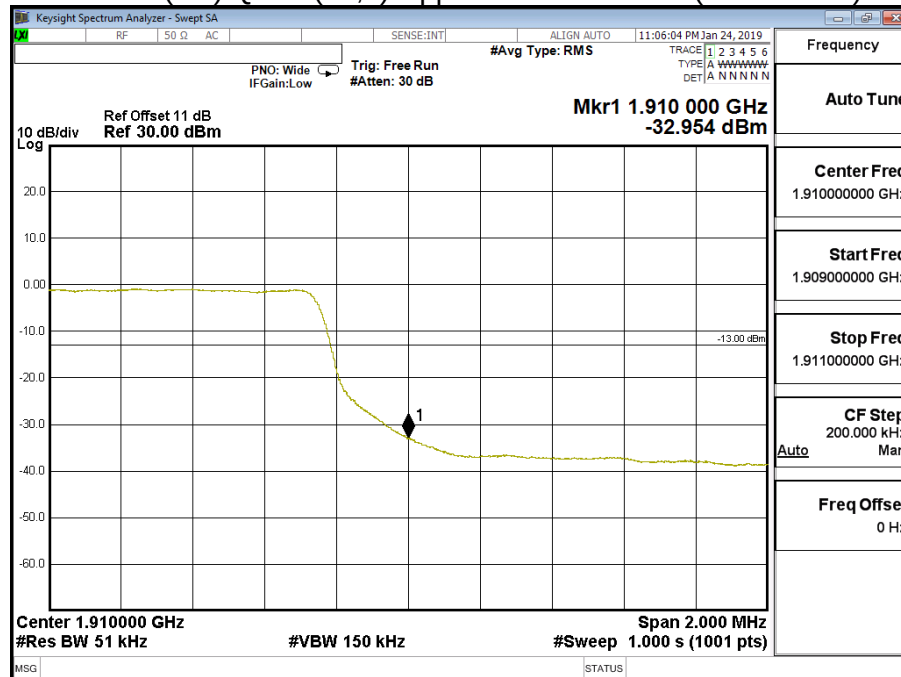
## Band 2 (5M) QPSK(1,24) Upper Channel 19175 (1907.5MHz)



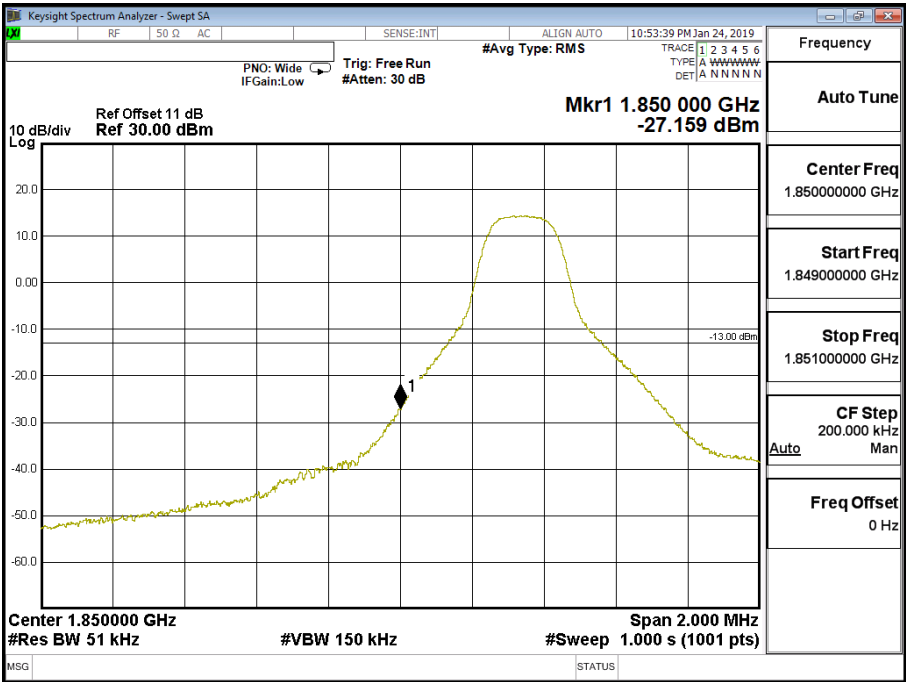
## Band 2 (5M) QPSK(25,0) Lower Channel 18625 (1852.5MHz)



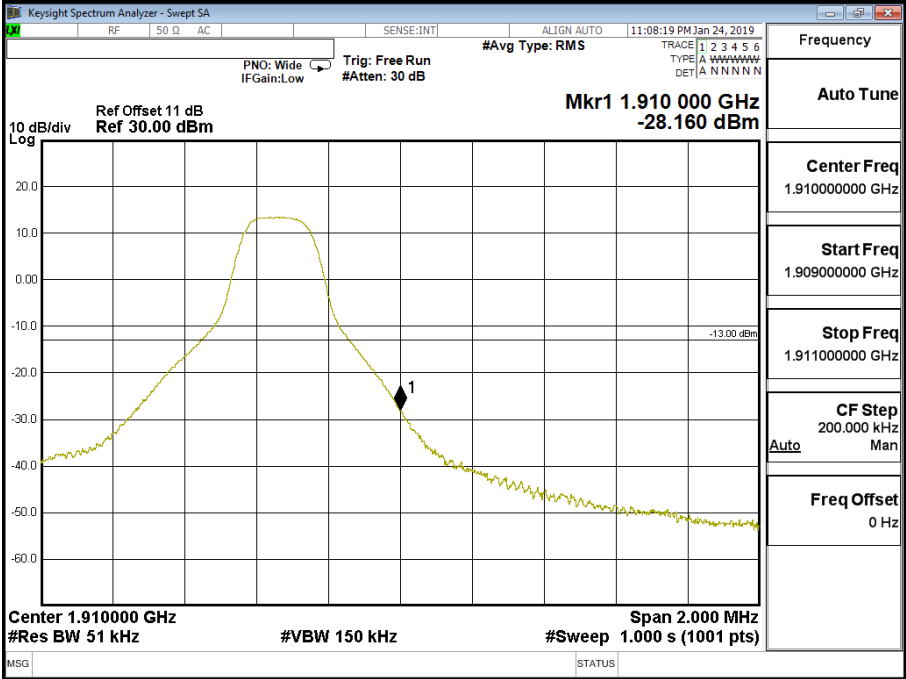
## Band 2 (5M) QPSK(25,0) Upper Channel 19175 (1907.5MHz)



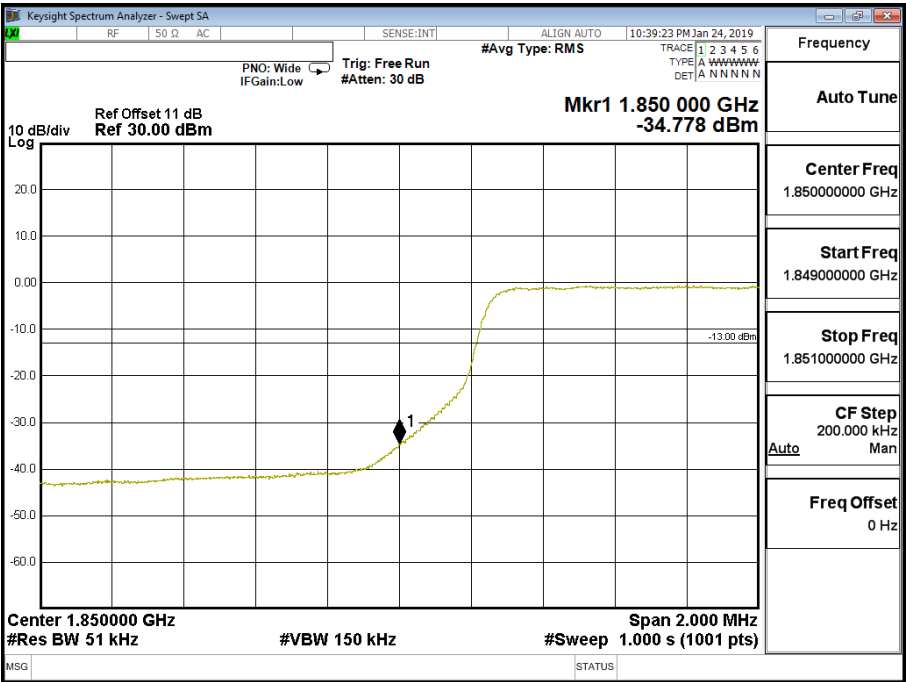
Band 2 (5M) 16QAM(1,0) Lower Channel 18625 (1852.5MHz)



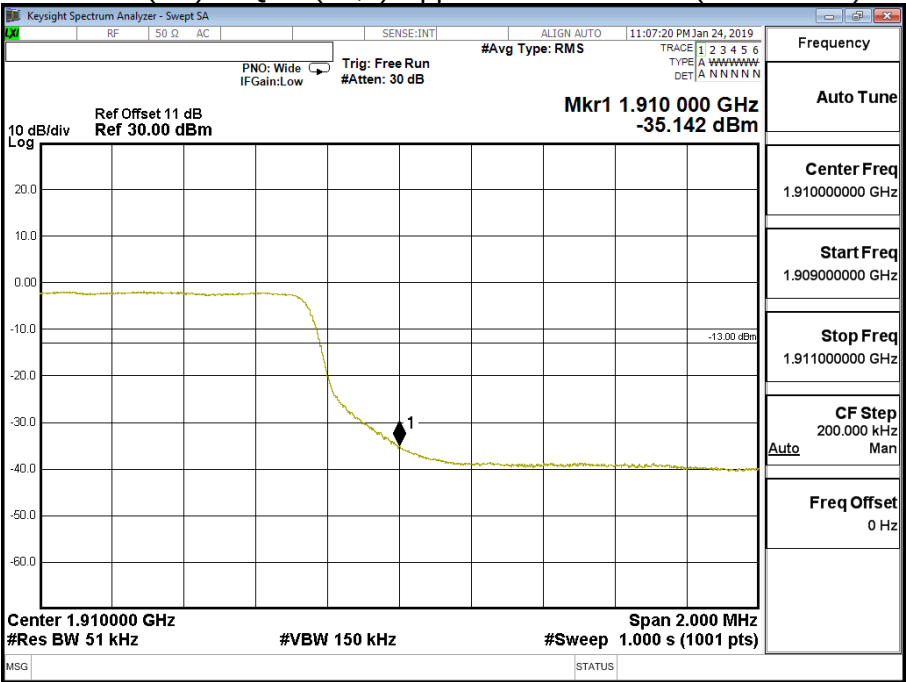
Band 2 (5M) 16QAM(1,24) Upper Channel 19175 (1907.5MHz)



Band 2 (5M) 16QAM(25,0) Lower Channel 18625 (1852.5MHz)

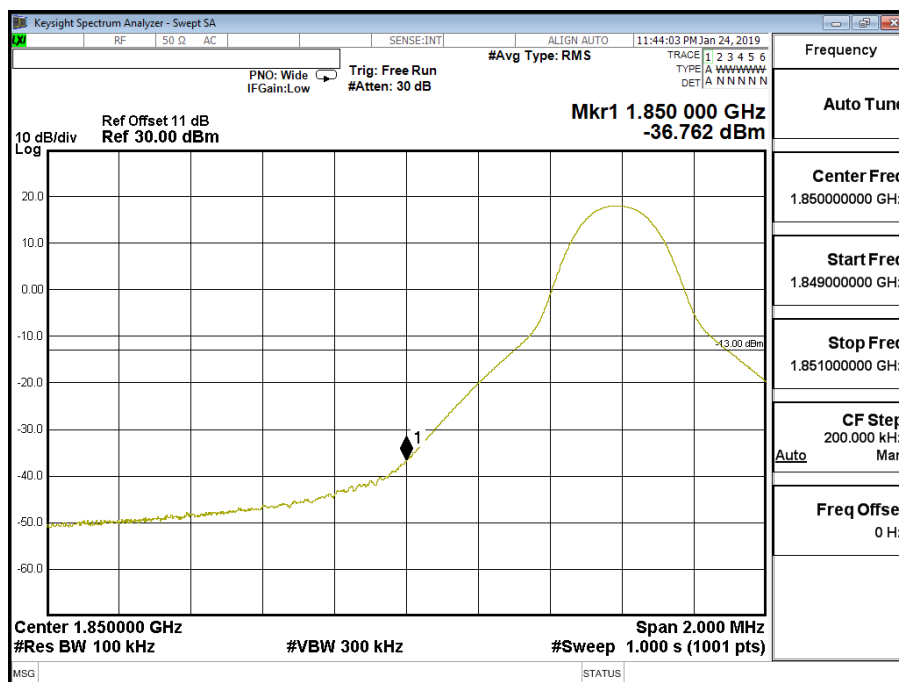


Band 2 (5M) 16QAM(25,0) Upper Channel 19175 (1907.5MHz)

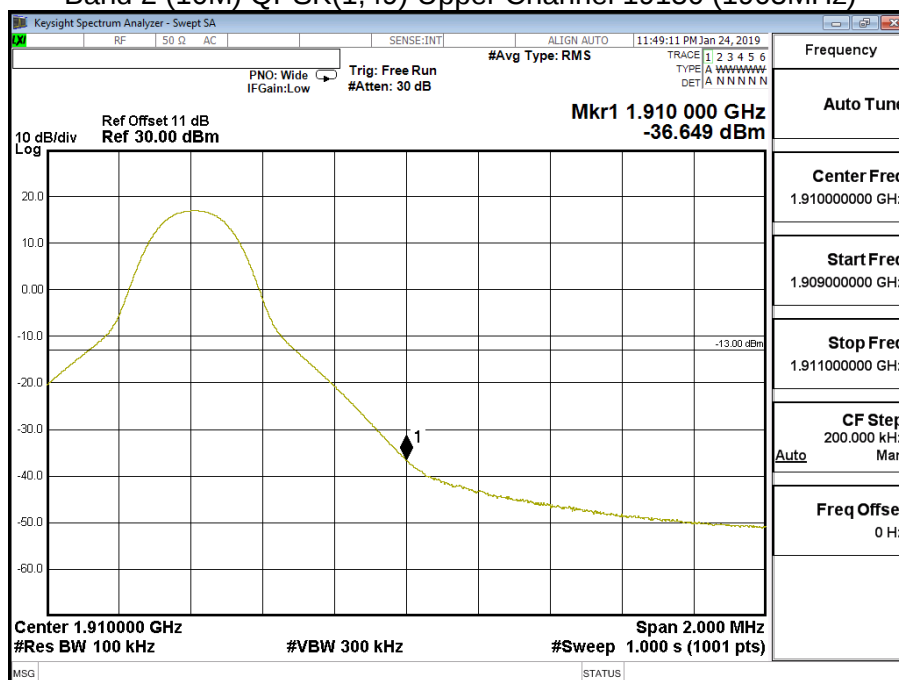


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (10M))                                                                                            |           |     |

Band 2 (10M) QPSK(1,0) Lower Channel 18650 (1855MHz)



Band 2 (10M) QPSK(1,49) Upper Channel 19150 (1905MHz)



Keysight Spectrum Analyzer - Swept SA

RF 50  $\Omega$  AC SENSE:INT ALIGN AUTO 11:44:29 PM Jan 24, 2019

PNO: Wide IF Gain: Low Trig: Free Run #Atten: 30 dB #Avg Type: RMS

Ref Offset 11 dB Ref 30.00 dBm

Mkr1 1.850 000 GHz -35.346 dBm

10 dB/div Log

Center 1.850000 GHz Span 2.000 MHz

#Res BW 100 kHz #VBW 300 kHz #Sweep 1.000 s (1001 pts)

Frequency

Auto Tune

Center Freq 1.850000000 GHz

Start Freq 1.849000000 GHz

Stop Freq 1.851000000 GHz

CF Step 200.000 kHz

Auto

Freq Offset 0 Hz

MSG STATUS

Keysight Spectrum Analyzer - Swept SA

RF 50  $\Omega$  AC

SENSE:INT

ALIGN AUTO

11:49:29 PM Jan 24, 2019

#Avg Type: RMS

Trig: Free Run

#Atten: 30 dB

PNO: Wide IF Gain: Low

TRACE 1 2 3 4 5 6

TYPE A WWWWWW

DET A NNNNN

Frequency

Auto Tune

Center Freq 1.91000000 GHz

Start Freq 1.909000000 GHz

Stop Freq 1.911000000 GHz

CF Step 200.000 kHz

Auto

Freq Offset 0 Hz

10 dB/div Log

Ref Offset 11 dB

Ref 30.00 dBm

Mkr1 1.910 000 GHz -33.793 dBm

The plot shows a spectrum with a signal at 1.910 GHz. The y-axis is labeled '10 dB/div Log' and ranges from -60.0 to 20.0. The x-axis is labeled 'Frequency' and ranges from 1.909000000 GHz to 1.911000000 GHz. A marker '1' is placed on the signal at 1.910 000 GHz, indicating a power level of -33.793 dBm. The signal is a narrowband peak on a slightly rising noise floor.

Center 1.910000 GHz

#Res BW 100 kHz

#VBW 300 kHz

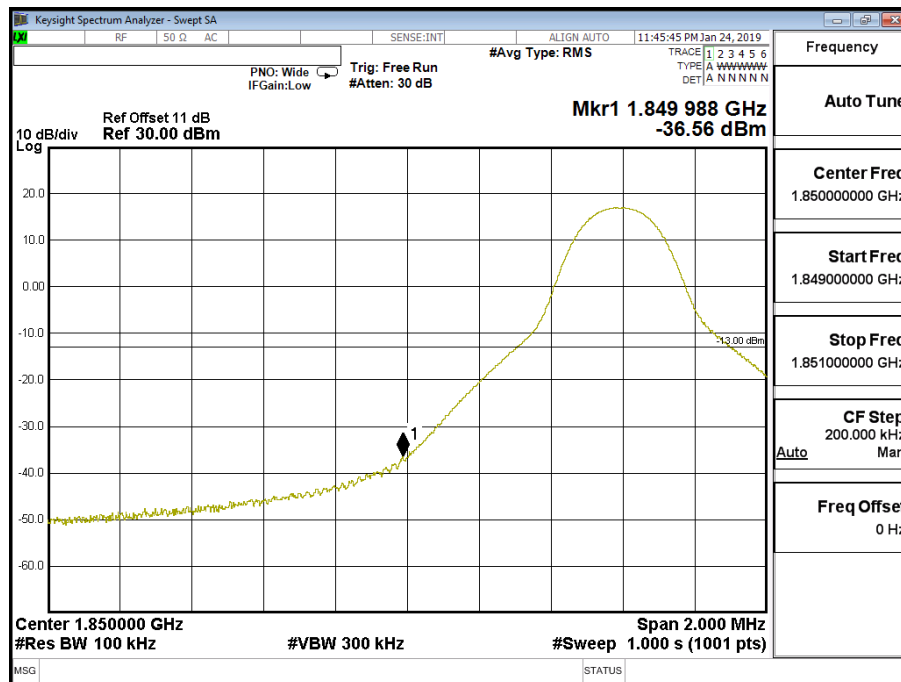
Span 2.000 MHz

#Sweep 1.000 s (1001 pts)

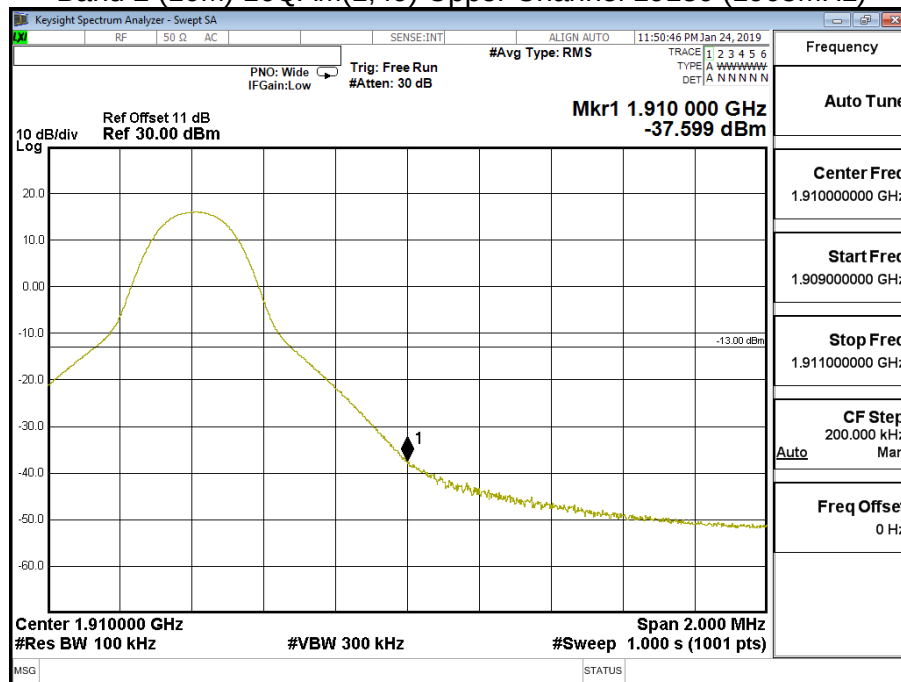
MSG

STATUS

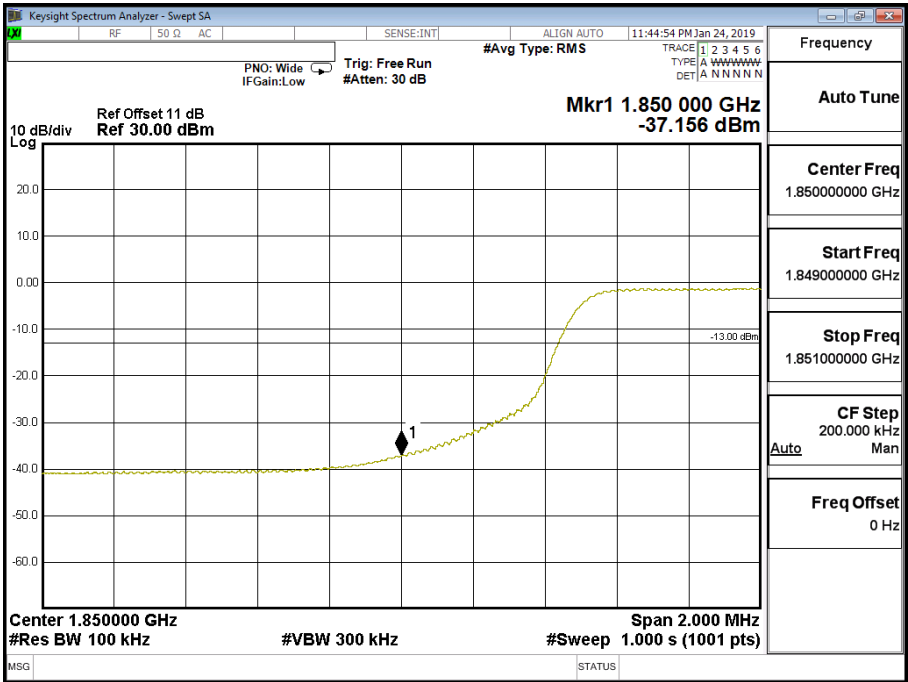
## Band 2 (10M) 16QAM(1,0) Lower Channel 18650 (1855MHz)



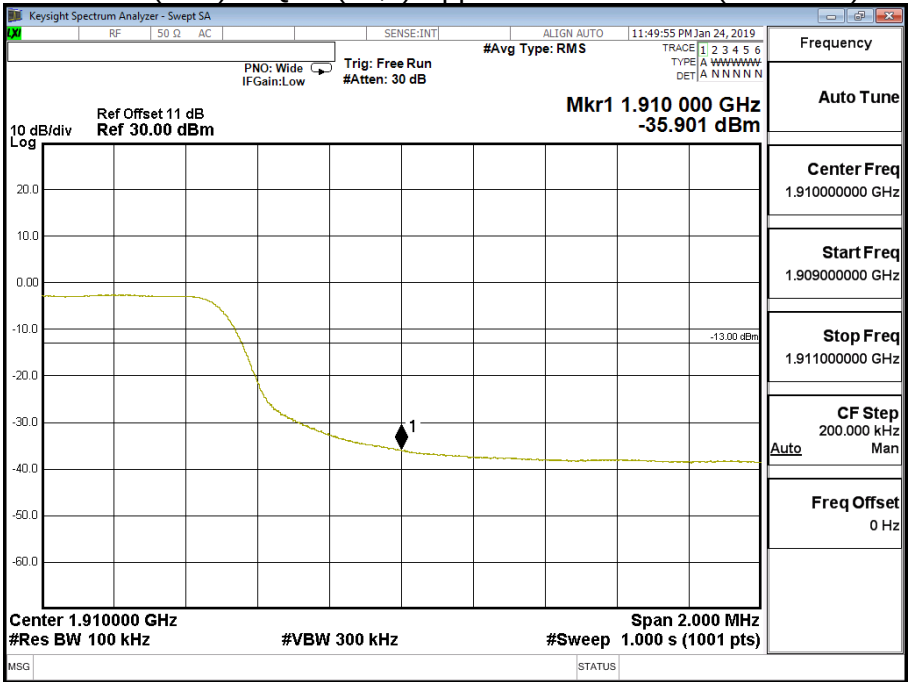
## Band 2 (10M) 16QAM(1,49) Upper Channel 19150 (1905MHz)



Band 2 (10M) 16QAM(50,0) Lower Channel 18650 (1855MHz)

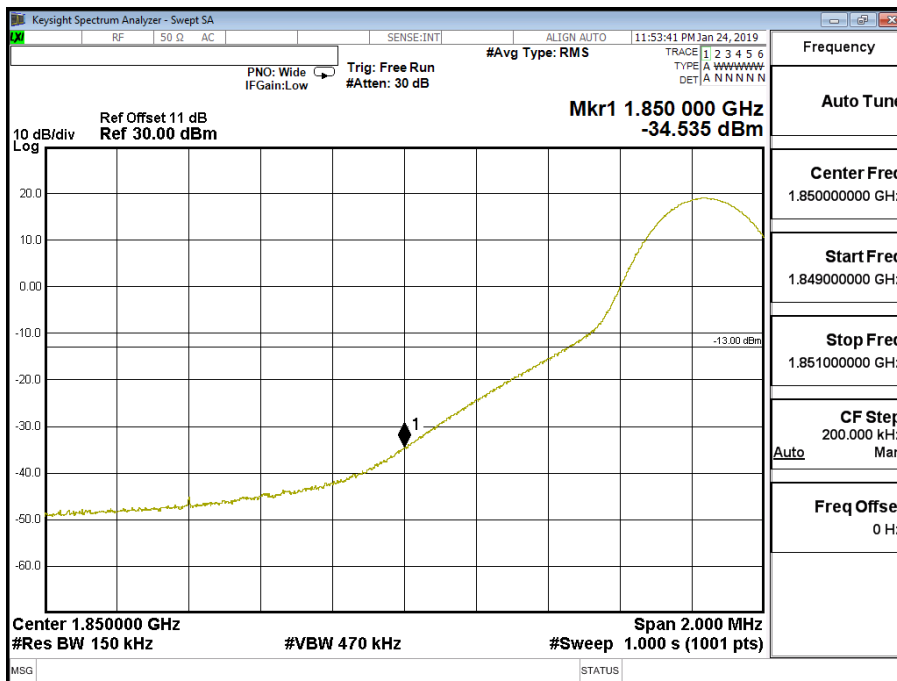


Band 2 (10M) 16QAM(50,0) Upper Channel 19150 (1905MHz)

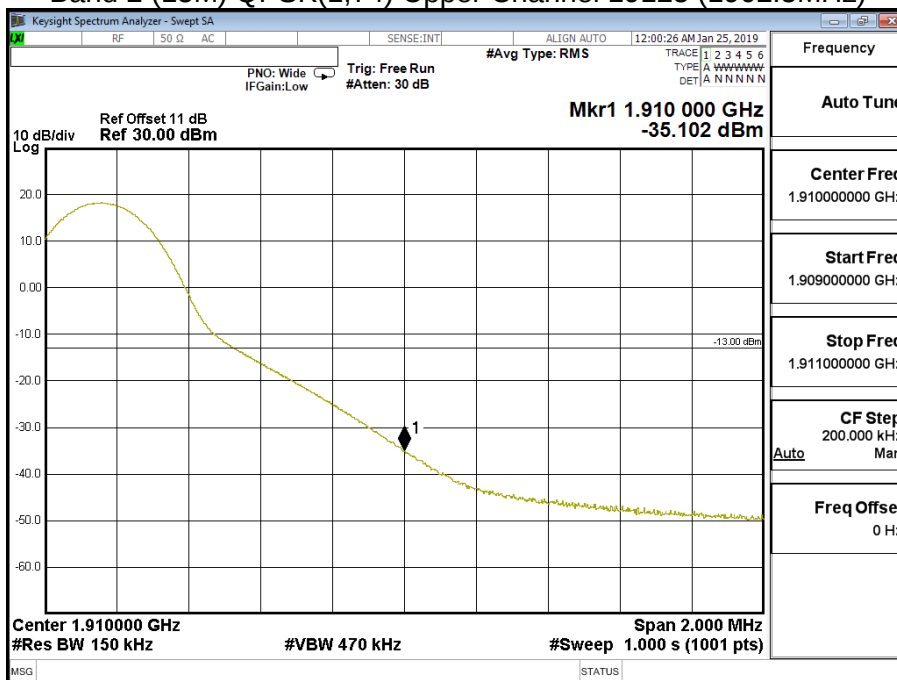


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (15M))                                                                                            |           |     |

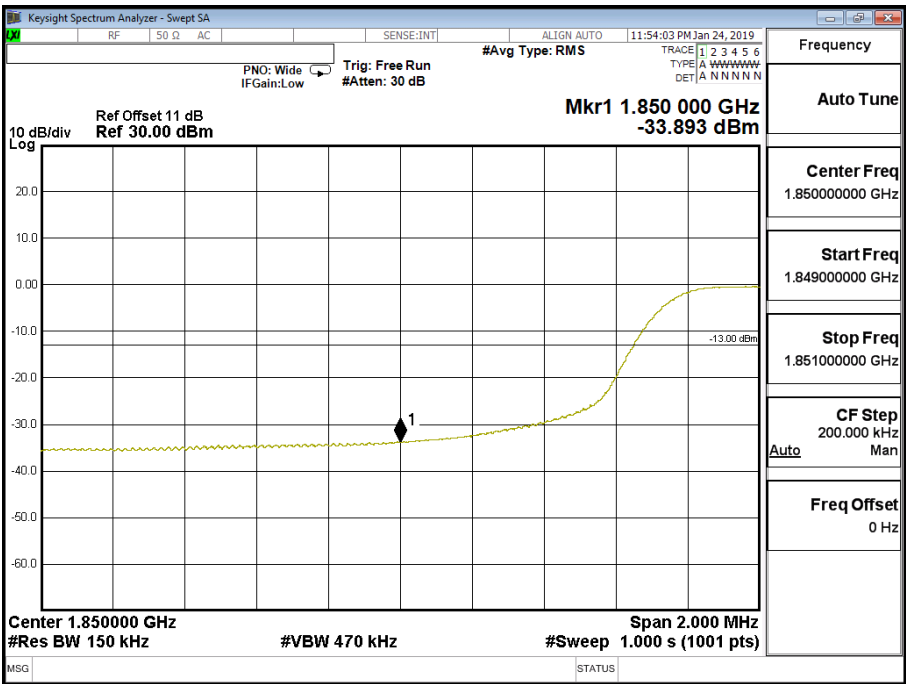
## Band 2 (15M)QPSK(1,0) Lower Channel 18675 (1857.5MHz)



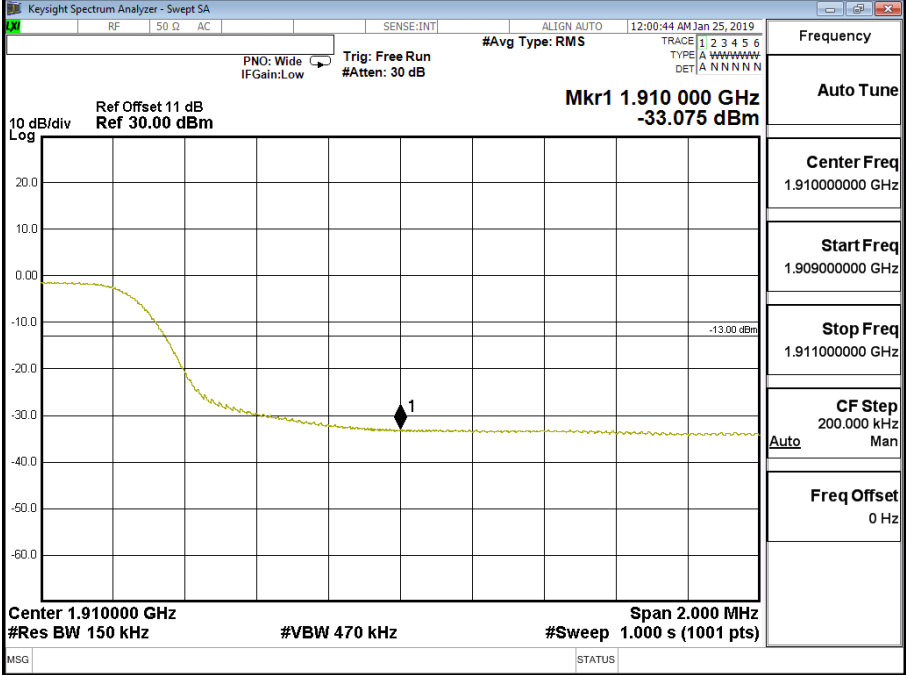
## Band 2 (15M) QPSK(1,74) Upper Channel 19125 (1902.5MHz)



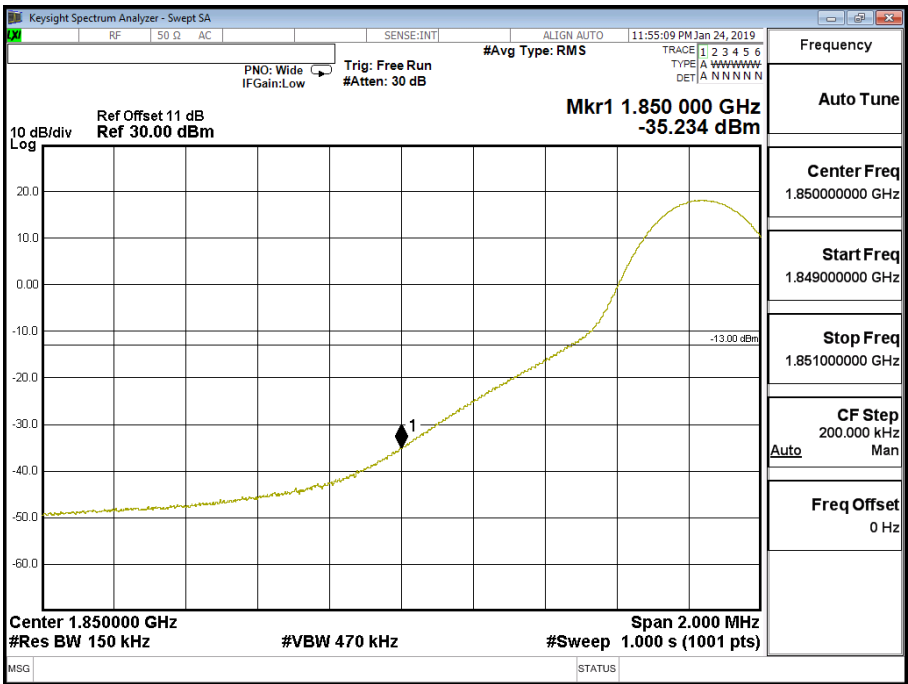
Band 2 (15M) QPSK(75,0) Lower Channel 18675 (1857.5MHz)



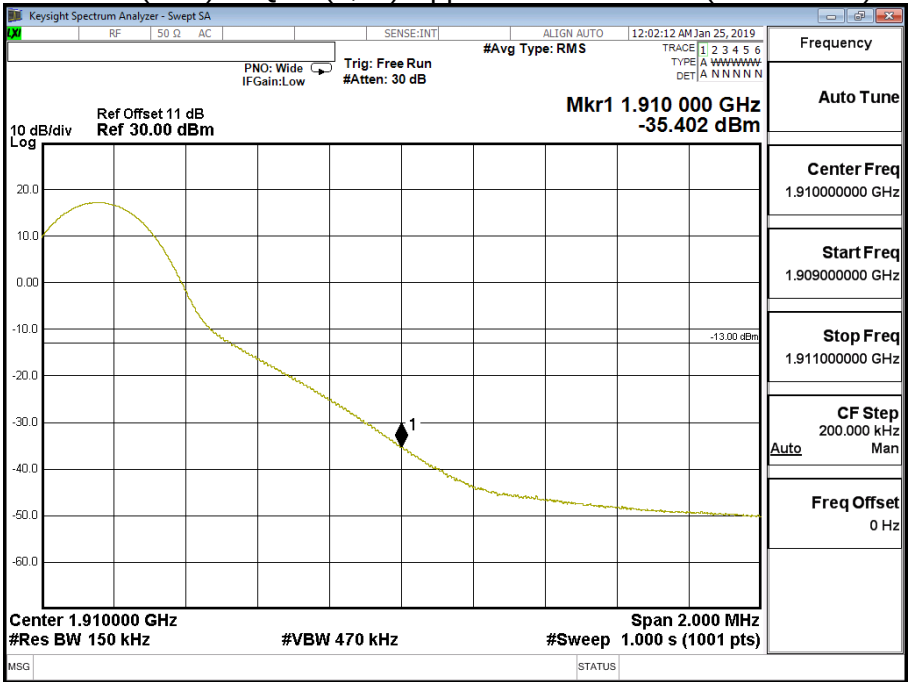
Band 2 (15M) QPSK(75,0) Upper Channel 19125 (1902.5MHz)



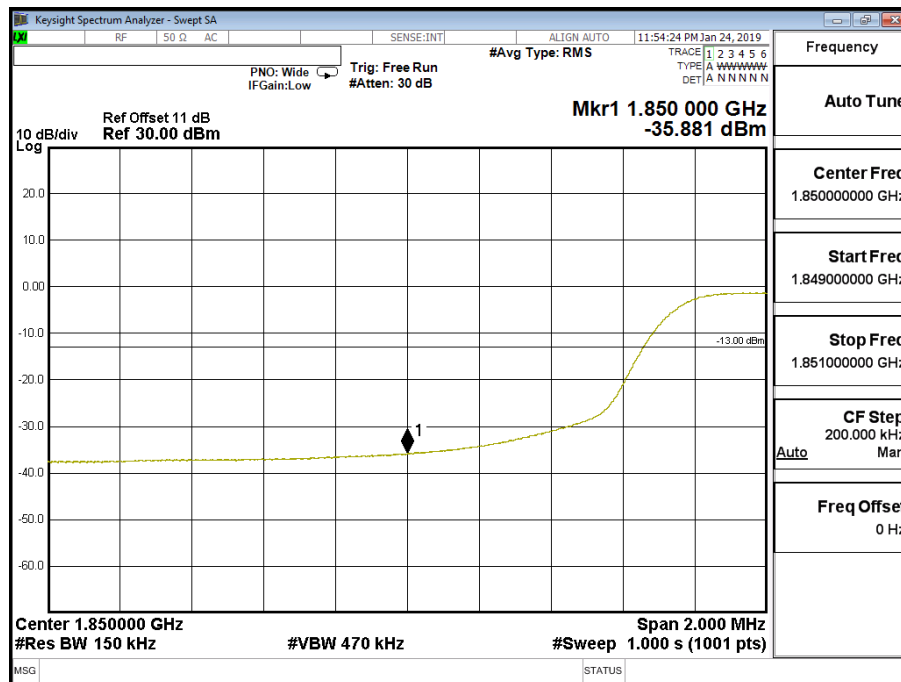
Band 2 (15M) 16QAM(1,0) Lower Channel 18675 (1857.5MHz)



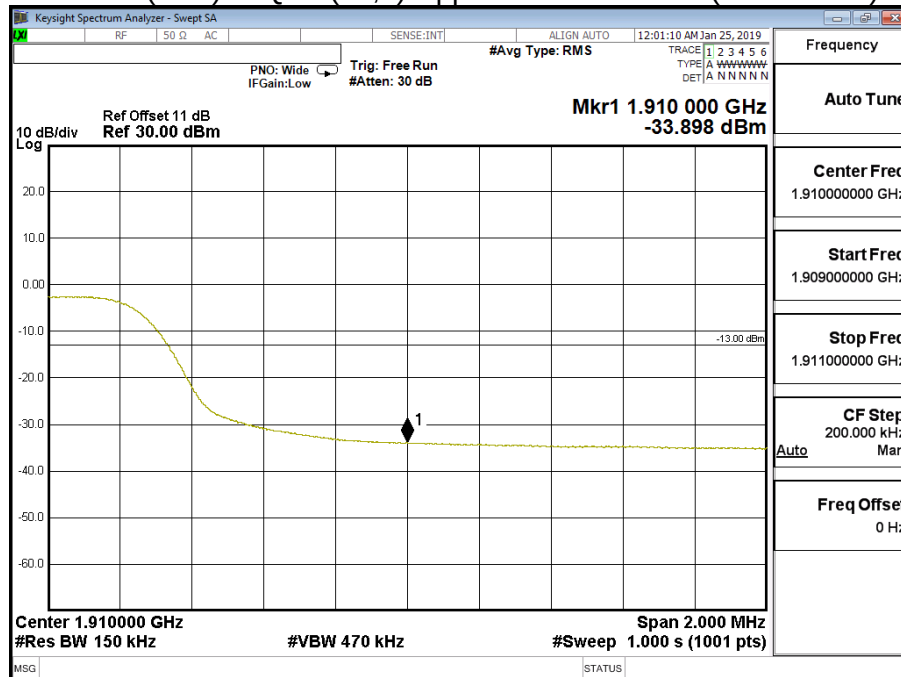
Band 2 (15M) 16QAM(1,74) Upper Channel 19125 (1902.5MHz)



## Band 2 (15M) 16QAM(75,0) Lower Channel 18675 (1857.5MHz)

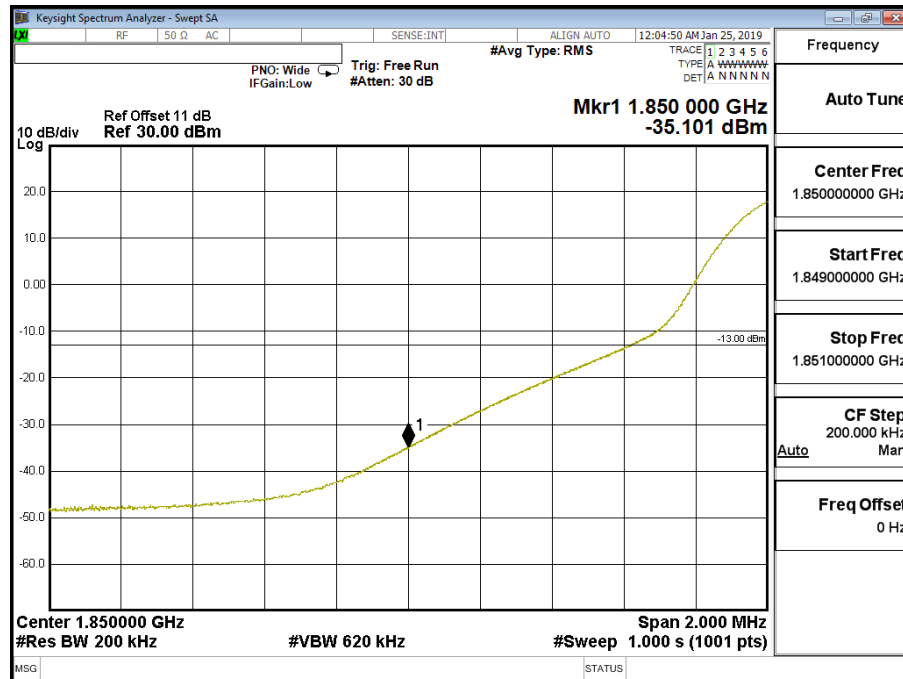


## Band 2 (15M) 16QAM(75,0) Upper Channel 19125 (1902.5MHz)

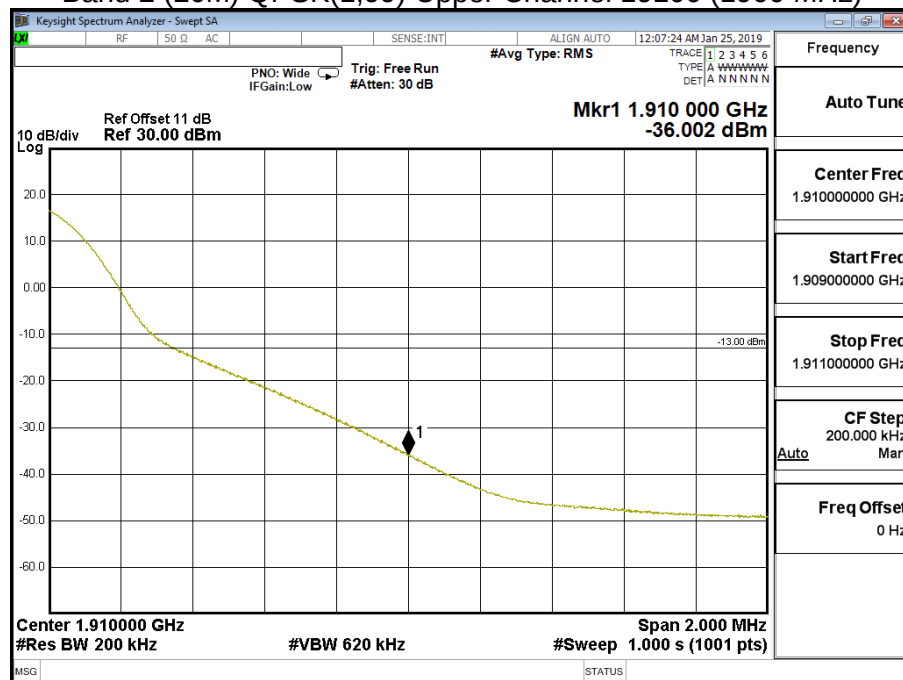


|                |                                                                                                                           |           |     |
|----------------|---------------------------------------------------------------------------------------------------------------------------|-----------|-----|
| Product        | 4G/LTE Multi-Service 11ac Broadband Router, 4G/LTE Wireless-AC VoIP Broadband Router, 4G/LTE Wireless-AC Broadband Router |           |     |
| Test Mode      | Spurious Emission At Antenna Terminals (+/-1MHz)                                                                          |           |     |
| Date of Test   | 2019/01/25                                                                                                                | Test Site | CTR |
| Test Condition | Block Edge Test (Band 2 (20M))                                                                                            |           |     |

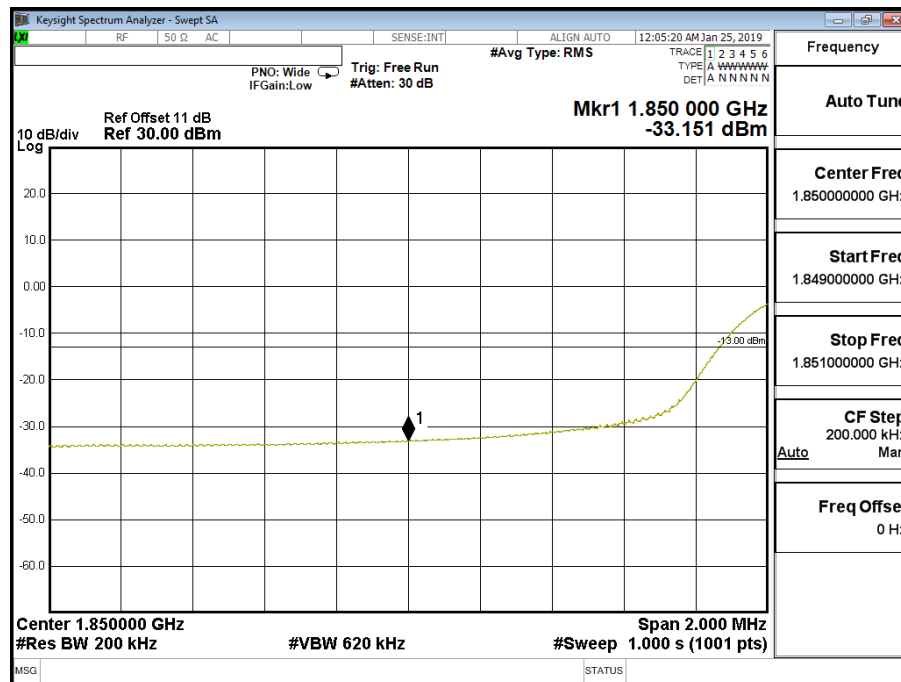
Band 2 (20M) QPSK(1,0) Lower Channel 18700 (1860MHz)



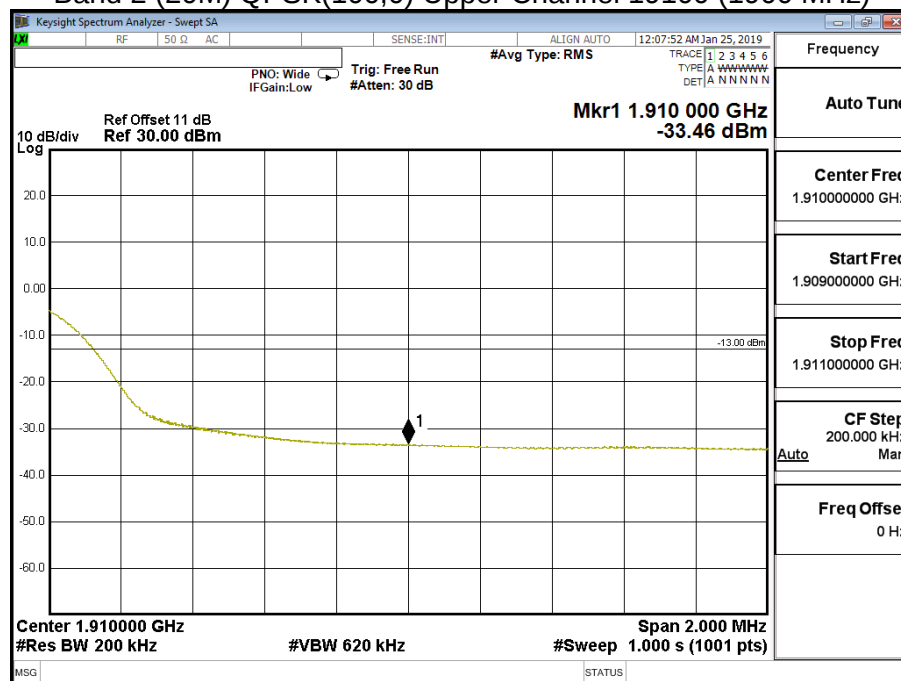
Band 2 (20M) QPSK(1,99) Upper Channel 19100 (1900 MHz)



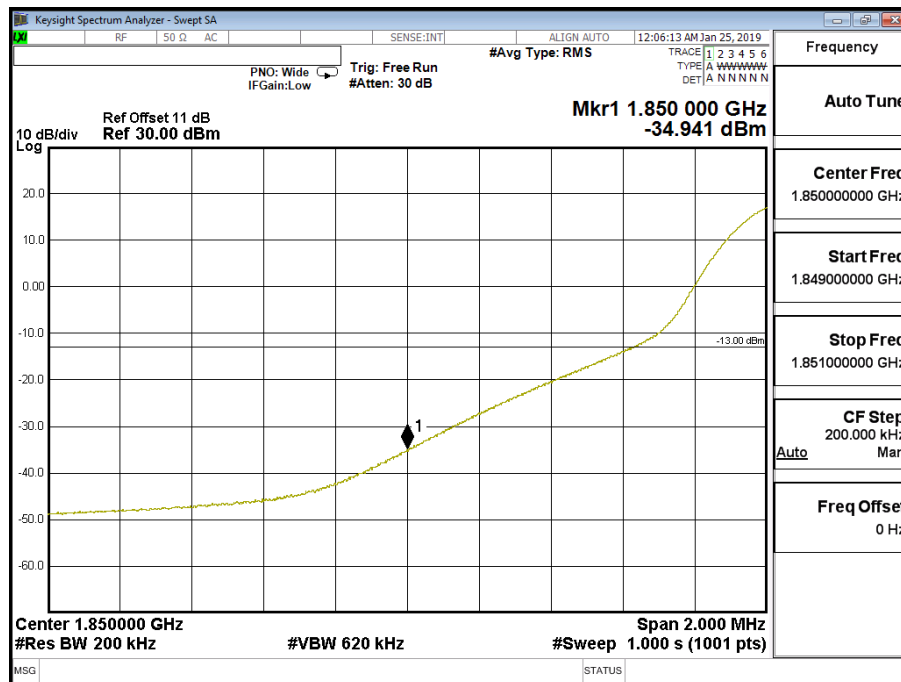
## Band 2 (20M) QPSK(100,0) Lower Channel 18700 (1860MHz)



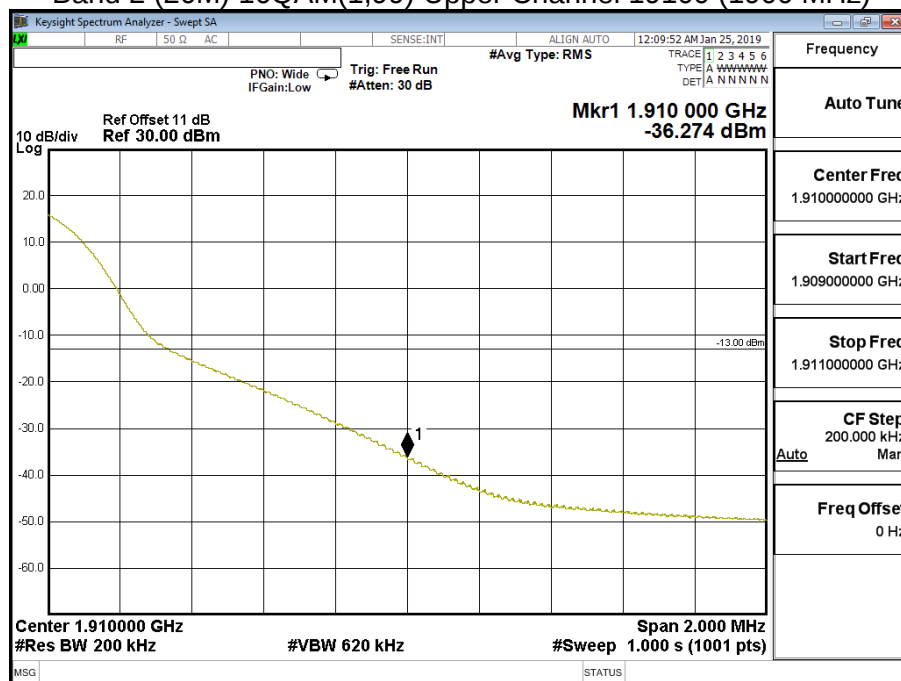
## Band 2 (20M) QPSK(100,0) Upper Channel 19100 (1900 MHz)



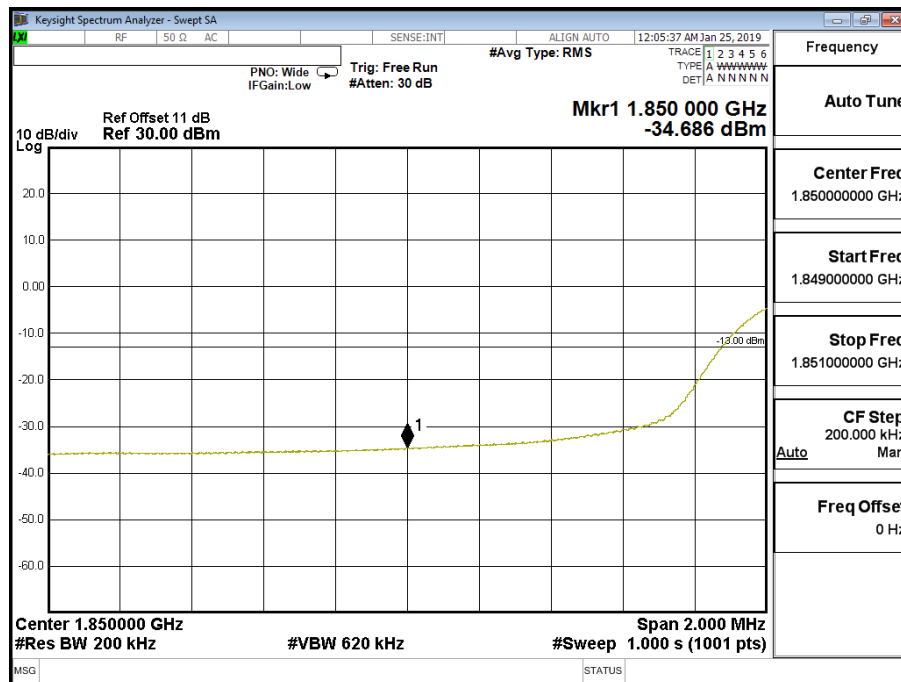
## Band 2 (20M) 16QAM(1,0) Lower Channel 18700 (1860MHz)



## Band 2 (20M) 16QAM(1,99) Upper Channel 19100 (1900 MHz)



## Band 2 (20M) 16QAM(100,0) Lower Channel 18700 (1860MHz)



## Band 2 (20M) 16QAM(100,0) Upper Channel 19100 (1900 MHz)

