



## RF TEST REPORT

|                   |                                     |
|-------------------|-------------------------------------|
| <b>Applicant</b>  | Quectel Wireless Solutions Co., Ltd |
| <b>FCC ID</b>     | XMR201909EG91NAX                    |
| <b>Product</b>    | LTE Module                          |
| <b>Brand</b>      | Quectel                             |
| <b>Model</b>      | EG91-NAX                            |
| <b>Report No.</b> | R1907A0406-R5                       |
| <b>Issue Date</b> | November 19, 2019                   |

TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC CFR47 Part 2 (2017)/ FCC CFR47 Part 27C (2017)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

*Performed by: Peng Tao*

*Approved by: Kai Xu*

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## Summary of Measurement Results

| Number                                                                                                                                                          | Test Case                               | Clause in FCC rules                   | Verdict |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|---------------------------------------|---------|
| 1                                                                                                                                                               | RF power output                         | 2.1046                                | PASS    |
| 2                                                                                                                                                               | Effective Isotropic Radiated power      | 27.50(d)(4)/27.50(b)(10)/27.50(c)(10) | PASS    |
| 3                                                                                                                                                               | Occupied Bandwidth                      | 2.1049                                | PASS    |
| 4                                                                                                                                                               | Band Edge Compliance                    | 27.53(h)/27.53(g)/27.53(f) /27.53(c)  | PASS    |
| 5                                                                                                                                                               | Peak-to-Average Power Ratio             | 27.50(d)/KDB971168 D01(5.7)           | PASS    |
| 6                                                                                                                                                               | Frequency Stability                     | 2.1055 / 27.54                        | PASS    |
| 7                                                                                                                                                               | Spurious Emissions at Antenna Terminals | 2.1051/27.53(h)/27.53(g)/27.53(f)     | PASS    |
| 8                                                                                                                                                               | Radiates Spurious Emission              | 2.1051/27.53(h) /27.53(g) /27.53(f)   | PASS    |
| Date of Testing: May 25, 2018 ~ June 27, 2018                                                                                                                   |                                         |                                       |         |
| Note: PASS: The EUT complies with the essential requirements in the standard.<br>FAIL: The EUT does not comply with the essential requirements in the standard. |                                         |                                       |         |

**EG91-NAX (Report No.: R1907A0406-R5) is a variant of the EG91-NA (Report No.: R1805A0250-R3). Test values duplicated from Original for variant. There is no test for variant in this report.**

# 1 Test Laboratory

## 1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of **TA technology (shanghai) co., Ltd.** The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above.

## 1.2 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.  
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## 2 General Description of Equipment under Test

### Client Information

|                             |                                                                                                                          |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------|
| <b>Applicant</b>            | Quectel Wireless Solutions Co., Ltd                                                                                      |
| <b>Applicant address</b>    | Building 5, Shanghai Business Park Phase III (Area B), No.1016<br>Tianlin Road, Minhang District, Shanghai, China 200233 |
| <b>Manufacturer</b>         | Quectel Wireless Solutions Co., Ltd                                                                                      |
| <b>Manufacturer address</b> | Building 5, Shanghai Business Park Phase III (Area B), No.1016<br>Tianlin Road, Minhang District, Shanghai, China 200233 |

### General information

| EUT Description                                                                                                |                                                                                                                                 |             |             |
|----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------|-------------|
| Model                                                                                                          | EG91-NAX                                                                                                                        |             |             |
| IMEI                                                                                                           | 868050040003283                                                                                                                 |             |             |
| Hardware Version                                                                                               | R1.0                                                                                                                            |             |             |
| Software Version                                                                                               | EG91NAXGAR07A01M1G                                                                                                              |             |             |
| Power Supply                                                                                                   | External Power Supply                                                                                                           |             |             |
| Antenna Type                                                                                                   | The EUT don't have standard Antenna, The Antenna used for testing in this report is the after-market accessory (Dipole Antenna) |             |             |
| Test Mode(s)                                                                                                   | WCDMA Band IV;<br>LTE Band 4; LTE Band 12, LTE Band 13;                                                                         |             |             |
| Test Modulation                                                                                                | (WCDMA)QPSK; (LTE)QPSK 16QAM;                                                                                                   |             |             |
| HSDPA UE Category                                                                                              | 24                                                                                                                              |             |             |
| HSUPA UE Category                                                                                              | 6                                                                                                                               |             |             |
| DC-HSDPA UE Category                                                                                           | 24                                                                                                                              |             |             |
| LTE Category                                                                                                   | 1                                                                                                                               |             |             |
| Maximum E.I.R.P./ E.R.P.                                                                                       | WCDMA Band IV:                                                                                                                  | 24.11dBm    |             |
|                                                                                                                | LTE Band 4:                                                                                                                     | 25.23dBm    |             |
|                                                                                                                | LTE Band 12:                                                                                                                    | 19.44dBm    |             |
|                                                                                                                | LTE Band 13:                                                                                                                    | 22.55Bm     |             |
| Rated Power Supply Voltage:                                                                                    | 3.8V                                                                                                                            |             |             |
| Extreme Voltage                                                                                                | Minimum: 3.3V      Maximum: 4.3V                                                                                                |             |             |
| Extreme Temperature                                                                                            | Lowest: -40°C      Highest: +85°C                                                                                               |             |             |
| Operating Frequency Range(s)                                                                                   | Mode                                                                                                                            | Tx (MHz)    | Rx (MHz)    |
|                                                                                                                | WCDMA Band IV                                                                                                                   | 1710 ~ 1755 | 2110 ~ 2155 |
|                                                                                                                | LTE Band 4                                                                                                                      | 1710 ~ 1755 | 2110 ~ 2155 |
|                                                                                                                | LTE Band 12                                                                                                                     | 699 ~ 716   | 729 ~ 746   |
|                                                                                                                | LTE Band 13                                                                                                                     | 777 ~ 787   | 746 ~ 756   |
| Note: 1. The information of the EUT is declared by the manufacturer.<br>2. For LTE, 16QAM only supports 25%RB. |                                                                                                                                 |             |             |

### **3 Applied Standards**

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

#### **Test standards**

**FCC CFR47 Part 2 (2017)**

**FCC CFR47 Part 27C (2017)**

**ANSI/TIA-603-E (2016)**

**KDB 971168 D01 Power Meas License Digital Systems v03r01**

## 4 Test Configuration

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes. EUT stand-up position (Z axis), lie-down position (X, Y axis). Receiver antenna polarization (horizontal and vertical), the worst emission was found in position (Z axis, horizontal position) and the worst case was recorded.

All mode and data rates and positions and RB size and modulations were investigated.

Subsequently, only the worst case emissions are reported.

The following testing in WCDMA/LTE is set based on the maximum RF Output Power.

The following testing in different Bandwidth is set to detail in the following table:

Test modes are chosen to be reported as the worst case configuration below for WCDMA Band IV:

|                         | Test items                              | Modes/Modulation               |
|-------------------------|-----------------------------------------|--------------------------------|
|                         |                                         | WCDMA Band IV                  |
| Conducted<br>Test cases | RF power output                         | RMC<br>HSDPA/HSUPA<br>DC-HSDPA |
|                         | Occupied Bandwidth                      | RMC                            |
|                         | Band Edge Compliance                    | RMC                            |
|                         | Peak-to-Average Power Ratio             | RMC                            |
|                         | Frequency Stability                     | RMC                            |
|                         | Spurious Emissions at Antenna Terminals | RMC                            |
| Radiated<br>Test cases  | Effective Isotropic Radiated power      | RMC                            |
|                         | Radiates Spurious Emission              | RMC                            |

Test modes are chosen to be reported as the worst case configuration below for LTE Band 4/12/13:

| Test items                              | Modes                                                                                                                                                                           | Bandwidth (MHz) |   |   |    |    |    | Modulation |       | RB |     |      | Test Channel |   |   |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|---|---|----|----|----|------------|-------|----|-----|------|--------------|---|---|
|                                         |                                                                                                                                                                                 | 1.4             | 3 | 5 | 10 | 15 | 20 | QPSK       | 16QAM | 1  | 50% | 100% | L            | M | H |
| RF power output                         | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | O   | O    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | O   | O    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | O   | O    | O            | O | O |
| Effective Isotropic Radiated power      | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | O   | O    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | O   | O    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | O   | O    | O            | O | O |
| Occupied Bandwidth                      | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | -   | O    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | O | O |
| Band Edge Compliance                    | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | -   | O    | O            | - | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | - | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | - | O |
| Peak-to-Average Power Ratio             | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | -   | O    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | O | O |
| Frequency Stability                     | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | O     | O  | -   | O    | O            | - | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | - | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | O     | O  | -   | O    | O            | - | O |
| Spurious Emissions at Antenna Terminals | LTE 4                                                                                                                                                                           | O               | O | O | O  | O  | O  | O          | -     | O  | -   | -    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | O | O | O  | -  | -  | O          | -     | O  | -   | -    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | -     | O  | -   | -    | O            | O | O |
| Radiates Spurious Emission              | LTE 4                                                                                                                                                                           | O               | - | O | -  | -  | O  | O          | -     | O  | -   | -    | O            | O | O |
|                                         | LTE 12                                                                                                                                                                          | O               | - | O | O  | -  | -  | O          | -     | O  | -   | -    | O            | O | O |
|                                         | LTE 13                                                                                                                                                                          | -               | - | O | O  | -  | -  | O          | -     | O  | -   | -    | O            | O | O |
| Note                                    | 1. The mark "O" means that this configuration is chosen for testing.<br>2. The mark "-" means that this configuration is not testing.<br>3. For LTE, 16QAM only supports 25%RB. |                 |   |   |    |    |    |            |       |    |     |      |              |   |   |

## 5 Test Case Results

### 5.1 RF Power Output

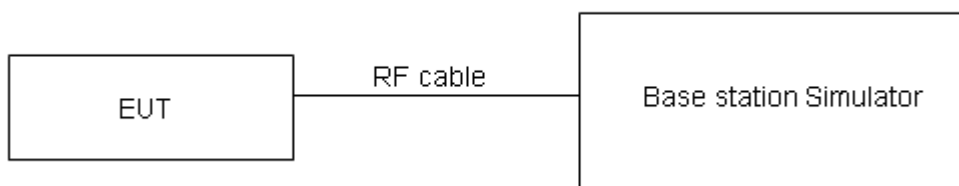
#### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

#### Methods of Measurement

During the process of the testing, The EUT is controlled by the Base Station Simulator to ensure max power transmission and proper modulation.

#### Test Setup



The loss between RF output port of the EUT and the input port of the tester has been taken into consideration.

#### Limits

No specific RF power output requirements in part 2.1046.

#### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U=0.4$  dB.

**Test Results**

| WCDMA Band IV   |              | AV Conducted Power(dBm) |              |              |
|-----------------|--------------|-------------------------|--------------|--------------|
|                 |              | Channel 1312            | Channel 1413 | Channel 1513 |
|                 |              | 1712.4 (MHz)            | 1732.6 (MHz) | 1752.6(MHz)  |
| <b>RMC</b>      | 12.2k        | 23.57                   | 23.56        | 23.51        |
|                 | 64k          | 23.43                   | 23.50        | 23.38        |
|                 | 144k         | 23.42                   | 23.40        | 23.37        |
|                 | 384k         | 23.41                   | 23.39        | 23.36        |
| <b>HSDPA</b>    | Sub - Test 1 | 23.27                   | 23.25        | 23.26        |
|                 | Sub - Test 2 | 23.25                   | 23.28        | 23.32        |
|                 | Sub - Test 3 | 22.89                   | 22.79        | 22.86        |
|                 | Sub - Test 4 | 22.83                   | 22.74        | 22.80        |
| <b>HSUPA</b>    | Sub - Test 1 | 23.32                   | 23.25        | 23.30        |
|                 | Sub - Test 2 | 22.84                   | 22.81        | 22.80        |
|                 | Sub - Test 3 | 23.32                   | 23.31        | 23.27        |
|                 | Sub - Test 4 | 23.31                   | 23.29        | 23.36        |
|                 | Sub - Test 5 | 23.26                   | 23.16        | 23.25        |
| <b>DC-HSDPA</b> | Sub - Test 1 | 23.44                   | 23.43        | 23.38        |
|                 | Sub - Test 2 | 23.42                   | 23.42        | 23.37        |
|                 | Sub - Test 3 | 22.91                   | 22.91        | 22.86        |
|                 | Sub - Test 4 | 22.90                   | 22.90        | 22.85        |



| LTE Band 4 |            |         |           | AV Conducted Power(dBm) |              |              |
|------------|------------|---------|-----------|-------------------------|--------------|--------------|
| Bandwidth  | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|            |            |         |           | 19957/1710.7            | 20175/1732.5 | 20393/1754.3 |
| 1.4MHz     | QPSK       | 1       | 0         | 23.94                   | 24.08        | 23.88        |
|            |            | 1       | 2         | 24.02                   | 24.12        | 24.05        |
|            |            | 1       | 5         | 24.13                   | 24.25        | 23.87        |
|            |            | 3       | 0         | 24.07                   | 23.93        | 23.92        |
|            |            | 3       | 2         | 23.93                   | 23.86        | 23.96        |
|            |            | 3       | 3         | 24.03                   | 23.83        | 24.02        |
|            |            | 6       | 0         | 23.06                   | 22.95        | 22.98        |
|            | 16QAM      | 1       | 0         | 23.39                   | 23.01        | 22.93        |
|            |            | 1       | 2         | 23.48                   | 23.49        | 23.12        |
|            |            | 1       | 5         | 23.51                   | 22.67        | 23.05        |
| Bandwidth  | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|            |            |         |           | 19965/1711.5            | 20175/1732.5 | 20385/1753.5 |
| 3MHz       | QPSK       | 1       | 0         | 24.02                   | 24.03        | 24.03        |
|            |            | 1       | 7         | 24.05                   | 24.30        | 24.21        |
|            |            | 1       | 14        | 23.91                   | 24.06        | 23.81        |
|            |            | 8       | 0         | 22.88                   | 22.94        | 23.03        |
|            |            | 8       | 4         | 22.85                   | 22.87        | 22.96        |
|            |            | 8       | 7         | 22.70                   | 22.98        | 22.89        |
|            |            | 15      | 0         | 22.79                   | 23.06        | 22.93        |
|            | 16QAM      | 1       | 0         | 22.89                   | 22.67        | 23.60        |
|            |            | 1       | 7         | 22.85                   | 23.00        | 23.73        |
|            |            | 1       | 14        | 22.69                   | 22.94        | 23.49        |
| Bandwidth  | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|            |            |         |           | 19975/1712.5            | 20175/1732.5 | 20375/1752.5 |
| 5MHz       | QPSK       | 1       | 0         | 23.99                   | 24.01        | 23.99        |
|            |            | 1       | 13        | 24.03                   | 24.26        | 24.18        |
|            |            | 1       | 24        | 23.88                   | 24.01        | 23.77        |
|            |            | 12      | 0         | 22.85                   | 22.89        | 22.99        |
|            |            | 12      | 6         | 22.83                   | 22.83        | 22.91        |
|            |            | 12      | 13        | 22.68                   | 22.96        | 22.85        |
|            |            | 25      | 0         | 22.77                   | 23.05        | 22.91        |
|            | 16QAM      | 1       | 0         | 22.86                   | 22.63        | 23.57        |
|            |            | 1       | 13        | 22.82                   | 22.98        | 23.70        |
|            |            | 1       | 24        | 22.66                   | 22.92        | 23.45        |
| Bandwidth  | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|            |            |         |           | 20000/1715              | 20175/1732.5 | 20350/1750   |
| 10MHz      | QPSK       | 1       | 0         | 24.01                   | 24.02        | 24.02        |
|            |            | 1       | 25        | 24.06                   | 24.31        | 24.22        |
|            |            | 1       | 49        | 23.90                   | 24.05        | 23.80        |
|            |            | 25      | 0         | 22.88                   | 22.94        | 23.03        |



|           | 16QAM      | 25      | 13        | 22.86                   | 22.88        | 22.95        |
|-----------|------------|---------|-----------|-------------------------|--------------|--------------|
|           |            | 25      | 25        | 22.70                   | 23.00        | 22.90        |
|           |            | 50      | 0         | 22.85                   | 23.07        | 22.95        |
|           |            | 1       | 0         | 22.88                   | 22.66        | 23.59        |
|           |            | 1       | 25        | 22.85                   | 23.02        | 23.73        |
|           |            | 1       | 49        | 22.69                   | 22.94        | 23.48        |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|           |            |         |           | 20025/1717.5            | 20175/1732.5 | 20325/1747.5 |
| 15MHz     | QPSK       | 1       | 0         | 24.00                   | 23.98        | 24.00        |
|           |            | 1       | 38        | 24.04                   | 24.30        | 24.19        |
|           |            | 1       | 74        | 23.87                   | 24.00        | 23.76        |
|           |            | 36      | 0         | 22.86                   | 22.90        | 23.00        |
|           |            | 36      | 18        | 22.83                   | 22.83        | 22.91        |
|           |            | 36      | 39        | 22.67                   | 22.97        | 22.86        |
|           |            | 75      | 0         | 22.83                   | 23.03        | 22.90        |
|           | 16QAM      | 1       | 0         | 22.83                   | 22.64        | 23.57        |
|           |            | 1       | 38        | 22.83                   | 22.99        | 23.71        |
|           |            | 1       | 74        | 22.66                   | 22.90        | 23.45        |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) |              |              |
|           |            |         |           | 20050/1720              | 20175/1732.5 | 20300/1745   |
| 20MHz     | QPSK       | 1       | 0         | 23.97                   | 23.94        | 23.97        |
|           |            | 1       | 50        | 24.03                   | 24.26        | 24.17        |
|           |            | 1       | 99        | 23.85                   | 23.99        | 23.73        |
|           |            | 50      | 0         | 22.83                   | 22.85        | 22.96        |
|           |            | 50      | 25        | 22.81                   | 22.79        | 22.88        |
|           |            | 50      | 50        | 22.64                   | 22.92        | 22.82        |
|           |            | 100     | 0         | 22.80                   | 22.98        | 22.86        |
|           | 16QAM      | 1       | 0         | 22.81                   | 22.60        | 23.52        |
|           |            | 1       | 50        | 22.79                   | 22.97        | 23.67        |
|           |            | 1       | 99        | 22.64                   | 22.87        | 23.43        |

| LTE Band 12 |            |         |           | AV Conducted Power(dBm) |             |             |
|-------------|------------|---------|-----------|-------------------------|-------------|-------------|
| Bandwidth   | Modulation | RB size | RB offset | Channel/Frequency (MHz) |             |             |
|             |            |         |           | 23017/699.7             | 23095/707.5 | 23173/715.3 |
| 1.4MHz      | QPSK       | 1       | 0         | 23.76                   | 23.95       | 23.57       |
|             |            | 1       | 2         | 23.67                   | 23.83       | 23.68       |
|             |            | 1       | 5         | 23.81                   | 23.91       | 23.53       |
|             |            | 3       | 0         | 23.74                   | 23.76       | 23.78       |
|             |            | 3       | 2         | 23.58                   | 23.71       | 23.69       |
|             |            | 3       | 3         | 23.69                   | 23.81       | 23.64       |
|             |            | 6       | 0         | 22.70                   | 22.78       | 22.83       |



|           | 16QAM      | 1       | 0         | 23.53                   | 23.16       | 22.71       |
|-----------|------------|---------|-----------|-------------------------|-------------|-------------|
|           |            | 1       | 2         | 23.83                   | 23.07       | 22.68       |
|           |            | 1       | 5         | 23.63                   | 22.90       | 22.60       |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) |             |             |
|           |            |         |           | 23025/700.5             | 23095/707.5 | 23165/714.5 |
| 3MHz      | QPSK       | 1       | 0         | 23.92                   | 23.75       | 23.64       |
|           |            | 1       | 7         | 24.23                   | 23.94       | 23.82       |
|           |            | 1       | 14        | 23.51                   | 23.73       | 23.65       |
|           |            | 8       | 0         | 22.86                   | 22.98       | 22.87       |
|           |            | 8       | 4         | 22.99                   | 23.03       | 22.68       |
|           |            | 8       | 7         | 22.85                   | 22.89       | 22.97       |
|           |            | 15      | 0         | 22.85                   | 22.93       | 22.99       |
|           | 16QAM      | 1       | 0         | 22.59                   | 23.27       | 22.84       |
|           |            | 1       | 7         | 22.55                   | 23.73       | 23.28       |
|           |            | 1       | 14        | 22.58                   | 23.36       | 22.68       |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) |             |             |
|           |            |         |           | 23035/701.5             | 23095/707.5 | 23155/713.5 |
| 5MHz      | QPSK       | 1       | 0         | 23.91                   | 23.71       | 23.62       |
|           |            | 1       | 13        | 24.21                   | 23.93       | 23.79       |
|           |            | 1       | 24        | 23.48                   | 23.68       | 23.61       |
|           |            | 12      | 0         | 22.84                   | 22.94       | 22.84       |
|           |            | 12      | 6         | 22.96                   | 22.98       | 22.64       |
|           |            | 12      | 13        | 22.82                   | 22.86       | 22.93       |
|           |            | 25      | 0         | 22.83                   | 22.89       | 22.94       |
|           | 16QAM      | 1       | 0         | 22.54                   | 23.25       | 22.82       |
|           |            | 1       | 13        | 22.53                   | 23.70       | 23.26       |
|           |            | 1       | 24        | 22.55                   | 23.32       | 22.65       |
| Bandwidth | Modulation | RB size | RB offset | Channel/Frequency (MHz) |             |             |
|           |            |         |           | 23060/704               | 23095/707.5 | 23130/711   |
| 10MHz     | QPSK       | 1       | 0         | 23.88                   | 23.67       | 23.59       |
|           |            | 1       | 25        | 24.20                   | 23.89       | 23.77       |
|           |            | 1       | 49        | 23.46                   | 23.67       | 23.58       |
|           |            | 25      | 0         | 22.81                   | 22.89       | 22.80       |
|           |            | 25      | 13        | 22.94                   | 22.94       | 22.61       |
|           |            | 25      | 25        | 22.79                   | 22.81       | 22.89       |
|           |            | 50      | 0         | 22.80                   | 22.84       | 22.90       |
|           | 16QAM      | 1       | 0         | 22.52                   | 23.21       | 22.77       |
|           |            | 1       | 25        | 22.49                   | 23.68       | 23.22       |
|           |            | 1       | 49        | 22.53                   | 23.29       | 22.63       |

| LTE Band 13 |            |         |           | Conducted Power(dBm)    |           |             |
|-------------|------------|---------|-----------|-------------------------|-----------|-------------|
| Bandwidth   | Modulation | RB size | RB offset | Channel/Frequency (MHz) |           |             |
|             |            |         |           | 23205/779.5             | 23230/782 | 23255/784.5 |
| 5MHz        | QPSK       | 1       | 0         | 23.73                   | 23.60     | 23.61       |
|             |            | 1       | 13        | 23.64                   | 23.75     | 23.95       |
|             |            | 1       | 24        | 23.58                   | 23.74     | 23.82       |
|             |            | 12      | 0         | 22.81                   | 22.69     | 22.81       |
|             |            | 12      | 6         | 22.65                   | 22.71     | 22.83       |
|             |            | 12      | 13        | 22.74                   | 22.76     | 22.96       |
|             |            | 25      | 0         | 22.76                   | 22.78     | 22.89       |
|             | 16QAM      | 1       | 0         | 22.88                   | 22.86     | 22.46       |
|             |            | 1       | 13        | 22.49                   | 22.81     | 22.64       |
|             |            | 1       | 24        | 23.12                   | 22.65     | 22.56       |
| Bandwidth   | Modulation | RB size | RB offset | Channel/Frequency (MHz) |           |             |
|             |            |         |           | /                       | 23230/782 | /           |
| 10MHz       | QPSK       | 1       | 0         | /                       | 23.61     | /           |
|             |            | 1       | 25        | /                       | 23.77     | /           |
|             |            | 1       | 49        | /                       | 23.73     | /           |
|             |            | 25      | 0         | /                       | 22.71     | /           |
|             |            | 25      | 13        | /                       | 22.73     | /           |
|             |            | 25      | 25        | /                       | 22.82     | /           |
|             |            | 50      | 0         | /                       | 22.74     | /           |
|             | 16QAM      | 1       | 0         | /                       | 22.98     | /           |
|             |            | 1       | 25        | /                       | 23.23     | /           |
|             |            | 1       | 49        | /                       | 23.01     | /           |

## 5.2 Effective Isotropic Radiated Power

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Methods of Measurement

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI/TIA-603-E (2016).

a) Connect the equipment as illustrated. Mount the equipment with the manufacturer specified antenna in a vertical orientation on a manufacturer specified mounting surface located on a non-conducting rotating platform of a RF anechoic chamber (preferred) or a standard radiation site.

b) Key the transmitter, then rotate the EUT 360° azimuthally and record spectrum analyzer power level (LVL) measurements at angular increments that are sufficiently small to permit resolution of all peaks. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading at each angular increment. (Note: several batteries may be needed to offset the effect of battery voltage droop, which should not exceed 5% of the manufactured specified battery voltage during transmission).

c) Replace the transmitter under test with a vertically polarized half-wave dipole (or an antenna whose gain is known relative to an ideal half-wave dipole). The center of the antenna should be at the same location as the center of the antenna under test.

d) Connect the antenna to a signal generator with a known output power and record the path loss (in dB) as LOSS. If a standard radiation test site is used, raise and lower the test antenna to obtain a maximum reading.  $LOSS = \text{Generator Output Power (dBm)} - \text{Analyzer reading (dBm)}$

e) Determine the effective radiated output power at each angular position from the readings in steps b) and d) using the following equation:  $ERP \text{ (dBm)} = LVL \text{ (dBm)} + LOSS \text{ (dB)}$

f) The maximum ERP is the maximum value determined in the preceding step.

g) When calculating ERP, in addition to knowing the antenna radiation and matching characteristics, it is necessary to know the loss values of all elements (e.g. transmission line attenuation, mismatches, filters, combiners) interposed between the point where transmitter output power is measured, and the point where power is applied to the antenna. ERP can then be calculated as follows:

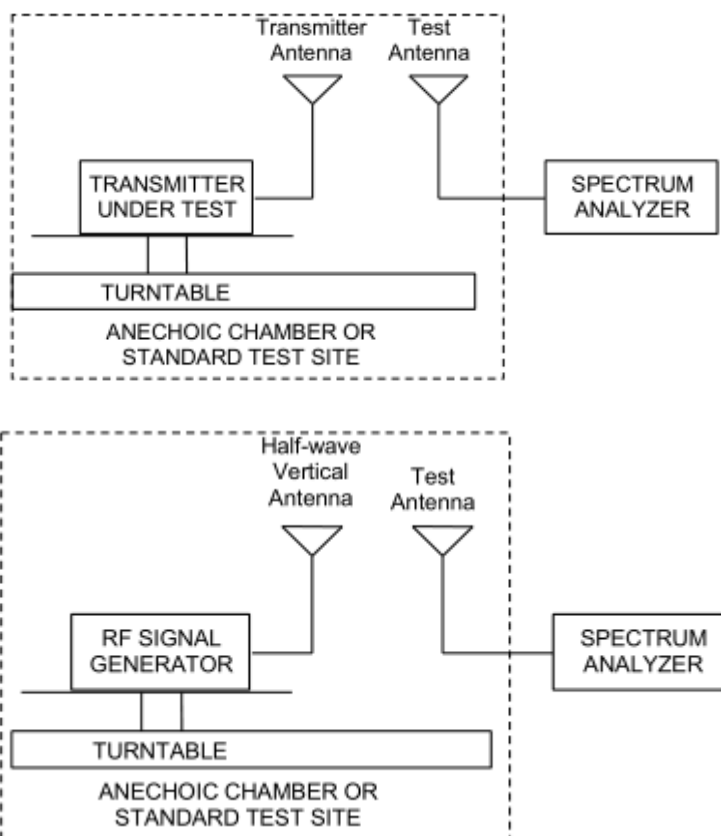
$$ERP \text{ (dBm)} = \text{Output Power (dBm)} - \text{Losses (dB)} + \text{Antenna Gain (dBd)}$$

where: dBd refers to gain relative to an ideal dipole.

$$EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15 \text{ (dB.)}$$

The RB allocation refers to section 5.1, using the maximum output power configuration.

## Test setup



Note: Area side:2.4mX3.6m

The radiated emission was measured in the following position: EUT stand-up position (Z axis), lie-down position (X, Y axis). The worst emission was found in stand-up position (Z axis) and the worst case was recorded.

## Limits

Rule Part 27.50(b) (10) specifies that “Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP”

Rule Part 27.50(c) (10) specifies that “Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP”

Rule Part 27.50(d) (4) specifies that “Fixed, mobile and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”

|                        |                                |
|------------------------|--------------------------------|
| Part 27.50(b)(10)Limit | $\leq 3 \text{ W}$ (34.77 dBm) |
| Part 27.50(c)(10)Limit | $\leq 3 \text{ W}$ (34.77 dBm) |
| Part 27.50(d)(4)Limit  | $\leq 1 \text{ W}$ (30 dBm)    |

## Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U = 1.19 \text{ dB}$

**Test Results**

The measurement is performed for both of horizontal and vertical antenna Polarization, and only the data of worst mode is recorded in this report.

| Mode                 | Channel | Frequency (MHz) | Polarization | EIRP (dBm) | Limit (dBm) | Conclusion |
|----------------------|---------|-----------------|--------------|------------|-------------|------------|
| <b>WCDMA Band IV</b> | Low     | 1712.4          | Horizontal   | 23.69      | 30          | Pass       |
|                      | Mid     | 1732.6          | Horizontal   | 24.00      | 30          | Pass       |
|                      | High    | 1752.6          | Horizontal   | 24.11      | 30          | Pass       |

| <b>LTE Band 4</b>      |         |                 |              |            |             |            |
|------------------------|---------|-----------------|--------------|------------|-------------|------------|
| Bandwidth              | Channel | Frequency (MHz) | Polarization | EIRP (dBm) | Limit (dBm) | Conclusion |
| <b>1.4 MHz (QPSK)</b>  | Low     | 1710.7          | Horizontal   | 25.13      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.61      | 30          | Pass       |
|                        | High    | 1754.3          | Horizontal   | 24.64      | 30          | Pass       |
| <b>3 MHz (QPSK)</b>    | Low     | 1711.5          | Horizontal   | 25.08      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.49      | 30          | Pass       |
|                        | High    | 1753.5          | Horizontal   | 24.48      | 30          | Pass       |
| <b>5 MHz (QPSK)</b>    | Low     | 1712.5          | Horizontal   | 25.22      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.61      | 30          | Pass       |
|                        | High    | 1752.5          | Horizontal   | 24.70      | 30          | Pass       |
| <b>10 MHz (QPSK)</b>   | Low     | 1715            | Horizontal   | 25.12      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.50      | 30          | Pass       |
|                        | High    | 1750            | Horizontal   | 24.51      | 30          | Pass       |
| <b>15 MHz (QPSK)</b>   | Low     | 1717.5          | Horizontal   | 25.19      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.63      | 30          | Pass       |
|                        | High    | 1747.5          | Horizontal   | 24.73      | 30          | Pass       |
| <b>20 MHz (QPSK)</b>   | Low     | 1720            | Horizontal   | 25.23      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.79      | 30          | Pass       |
|                        | High    | 1745            | Horizontal   | 24.66      | 30          | Pass       |
| <b>1.4 MHz (16QAM)</b> | Low     | 1710.7          | Horizontal   | 25.01      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.13      | 30          | Pass       |
|                        | High    | 1754.3          | Horizontal   | 24.21      | 30          | Pass       |
| <b>3 MHz (16QAM)</b>   | Low     | 1711.5          | Horizontal   | 24.83      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.21      | 30          | Pass       |
|                        | High    | 1753.5          | Horizontal   | 24.31      | 30          | Pass       |
| <b>5 MHz (16QAM)</b>   | Low     | 1712.5          | Horizontal   | 24.94      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.32      | 30          | Pass       |
|                        | High    | 1752.5          | Horizontal   | 24.55      | 30          | Pass       |
| <b>10 MHz (16QAM)</b>  | Low     | 1715            | Horizontal   | 24.76      | 30          | Pass       |
|                        | Mid     | 1732.5          | Horizontal   | 24.31      | 30          | Pass       |
|                        | High    | 1750            | Horizontal   | 24.08      | 30          | Pass       |



|                           |      |        |            |       |    |      |
|---------------------------|------|--------|------------|-------|----|------|
| <b>15 MHz<br/>(16QAM)</b> | Low  | 1717.5 | Horizontal | 25.02 | 30 | Pass |
|                           | Mid  | 1732.5 | Horizontal | 24.31 | 30 | Pass |
|                           | High | 1747.5 | Horizontal | 24.48 | 30 | Pass |
| <b>20 MHz<br/>(16QAM)</b> | Low  | 1720   | Horizontal | 24.78 | 30 | Pass |
|                           | Mid  | 1732.5 | Horizontal | 24.35 | 30 | Pass |
|                           | High | 1745   | Horizontal | 24.29 | 30 | Pass |

| <b>LTE Band 12</b>         |                |                            |                     |                      |                        |                   |
|----------------------------|----------------|----------------------------|---------------------|----------------------|------------------------|-------------------|
| <b>Bandwidth</b>           | <b>Channel</b> | <b>Frequency<br/>(MHz)</b> | <b>Polarization</b> | <b>ERP<br/>(dBm)</b> | <b>Limit<br/>(dBm)</b> | <b>Conclusion</b> |
| <b>1.4 MHz<br/>(QPSK)</b>  | Low            | 699.7                      | Horizontal          | 18.88                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 19.23                | 34.77                  | Pass              |
|                            | High           | 715.3                      | Horizontal          | 19.26                | 34.77                  | Pass              |
| <b>3 MHz<br/>(QPSK)</b>    | Low            | 700.5                      | Horizontal          | 19.04                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 19.39                | 34.77                  | Pass              |
|                            | High           | 714.5                      | Horizontal          | 19.44                | 34.77                  | Pass              |
| <b>5 MHz<br/>(QPSK)</b>    | Low            | 701.5                      | Horizontal          | 18.79                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 19.22                | 34.77                  | Pass              |
|                            | High           | 713.5                      | Horizontal          | 18.99                | 34.77                  | Pass              |
| <b>10 MHz<br/>(QPSK)</b>   | Low            | 704                        | Horizontal          | 18.69                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 19.11                | 34.77                  | Pass              |
|                            | High           | 711                        | Horizontal          | 19.08                | 34.77                  | Pass              |
| <b>1.4 MHz<br/>(16QAM)</b> | Low            | 699.7                      | Horizontal          | 18.53                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 18.82                | 34.77                  | Pass              |
|                            | High           | 715.3                      | Horizontal          | 19.03                | 34.77                  | Pass              |
| <b>3 MHz<br/>(16QAM)</b>   | Low            | 700.5                      | Horizontal          | 18.62                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 18.90                | 34.77                  | Pass              |
|                            | High           | 714.5                      | Horizontal          | 18.88                | 34.77                  | Pass              |
| <b>5 MHz<br/>(16QAM)</b>   | Low            | 701.5                      | Horizontal          | 18.64                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 18.90                | 34.77                  | Pass              |
|                            | High           | 713.5                      | Horizontal          | 18.74                | 34.77                  | Pass              |
| <b>10 MHz<br/>(16QAM)</b>  | Low            | 704                        | Horizontal          | 18.49                | 34.77                  | Pass              |
|                            | Mid            | 707.5                      | Horizontal          | 18.77                | 34.77                  | Pass              |
|                            | High           | 711                        | Horizontal          | 18.84                | 34.77                  | Pass              |



| LTE Band 13   |         |                 |              |           |             |            |
|---------------|---------|-----------------|--------------|-----------|-------------|------------|
| Bandwidth     | Channel | Frequency (MHz) | Polarization | ERP (dBm) | Limit (dBm) | Conclusion |
| 5MHz (QPSK)   | Low     | 779.5           | Horizontal   | 22.11     | 34.77       | Pass       |
|               | Mid     | 782             | Horizontal   | 22.03     | 34.77       | Pass       |
|               | High    | 784.5           | Horizontal   | 22.36     | 34.77       | Pass       |
| 10MHz (QPSK)  | Mid     | 782             | Horizontal   | 22.55     | 34.77       | Pass       |
| 5MHz (16QAM)  | Low     | 779.5           | Horizontal   | 21.86     | 34.77       | Pass       |
|               | Mid     | 782             | Horizontal   | 21.72     | 34.77       | Pass       |
|               | High    | 784.5           | Horizontal   | 21.94     | 34.77       | Pass       |
| 10MHz (16QAM) | Mid     | 782             | Horizontal   | 22.47     | 34.77       | Pass       |

## 5.3 Occupied Bandwidth

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The occupied bandwidth is measured using spectrum analyzer.

RBW is set to 51 kHz, VBW is set to 160 kHz for WCDMA Band IV.

RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 4/12 (1.4MHz).

RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 4/12 (3MHz).

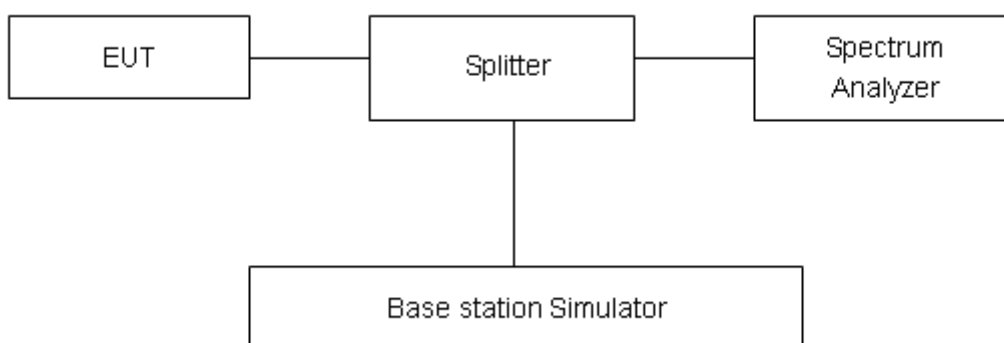
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 4/12/13 (5MHz).

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 4/12/13 (10MHz).

RBW is set to 300 kHz, VBW is set to 1MHz for LTE Band 4 (15MHz/20MHz).

99% power and -26dBc occupied bandwidths are recorded. Spectrum analyzer plots are included on the following pages.

### Test Setup



### Limits

No specific occupied bandwidth requirements in part 2.1049.

### Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 2$ ,  $U=624\text{Hz}$ .

**Test Result**

| Mode                | Channel | Frequency (MHz) | 99% Power Bandwidth(MHz) | -26dBc Bandwidth(MHz) |
|---------------------|---------|-----------------|--------------------------|-----------------------|
| WCDMA Band IV (RMC) | 1312    | 1712.4          | 4.1211                   | 4.659                 |
|                     | 1413    | 1732.6          | 4.1166                   | 4.670                 |
|                     | 1513    | 1752.6          | 4.1172                   | 4.682                 |

| LTE Band 4 |            |                 |         |                 |                          |                       |
|------------|------------|-----------------|---------|-----------------|--------------------------|-----------------------|
| RB         | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | 99% Power Bandwidth(MHz) | -26dBc Bandwidth(MHz) |
| 100%       | QPSK       | 1.4             | 19957   | 1710.7          | 1.1274                   | 1.3370                |
|            |            |                 | 20175   | 1732.5          | 1.1077                   | 1.3150                |
|            |            |                 | 20393   | 1754.3          | 1.1108                   | 1.3350                |
|            |            | 3               | 19965   | 1711.5          | 2.7345                   | 3.0400                |
|            |            |                 | 20175   | 1732.5          | 2.7353                   | 3.0640                |
|            |            |                 | 20385   | 1753.5          | 2.7424                   | 3.0340                |
|            |            | 5               | 19975   | 1712.5          | 4.5308                   | 5.0300                |
|            |            |                 | 20175   | 1732.5          | 4.5140                   | 4.9760                |
|            |            |                 | 20375   | 1752.5          | 4.5177                   | 5.0220                |
|            |            | 10              | 20000   | 1715            | 9.0214                   | 10.0400               |
|            |            |                 | 20175   | 1732.5          | 9.0081                   | 10.0200               |
|            |            |                 | 20350   | 1750            | 9.0092                   | 10.0800               |
|            |            | 15              | 20025   | 1717.5          | 13.4740                  | 14.7000               |
|            |            |                 | 20175   | 1732.5          | 13.4380                  | 14.5600               |
|            |            |                 | 20325   | 1747.5          | 13.4310                  | 14.6100               |
|            |            | 20              | 20050   | 1720            | 17.8960                  | 19.2100               |
|            |            |                 | 20175   | 1732.5          | 17.9110                  | 19.0400               |
|            |            |                 | 20300   | 1745            | 17.8610                  | 19.3600               |
|            | 16QAM      | 1.4             | 19957   | 1710.7          | 0.3272                   | 0.4604                |
|            |            |                 | 20175   | 1732.5          | 0.3229                   | 0.4644                |
|            |            |                 | 20393   | 1754.3          | 0.3144                   | 0.4702                |
|            |            | 3               | 19965   | 1711.5          | 0.4026                   | 0.5520                |
|            |            |                 | 20175   | 1732.5          | 0.4055                   | 0.5578                |
|            |            |                 | 20385   | 1753.5          | 0.4075                   | 0.5416                |
|            |            | 5               | 19975   | 1712.5          | 0.4913                   | 0.6869                |
|            |            |                 | 20175   | 1732.5          | 0.4934                   | 0.6827                |
|            |            |                 | 20375   | 1752.5          | 0.4789                   | 0.6779                |
|            |            | 10              | 20000   | 1715            | 0.8854                   | 1.2250                |
|            |            |                 | 20175   | 1732.5          | 0.8542                   | 1.1550                |



|  |  |    |       |        |        |        |
|--|--|----|-------|--------|--------|--------|
|  |  |    | 20350 | 1750   | 0.8818 | 1.1890 |
|  |  | 15 | 20025 | 1717.5 | 1.1618 | 1.5790 |
|  |  |    | 20175 | 1732.5 | 1.1293 | 1.5530 |
|  |  |    | 20325 | 1747.5 | 1.1097 | 1.5420 |
|  |  |    | 20050 | 1720   | 1.2408 | 1.7520 |
|  |  | 20 | 20175 | 1732.5 | 1.2067 | 1.6770 |
|  |  |    | 20300 | 1745   | 1.2187 | 1.7130 |

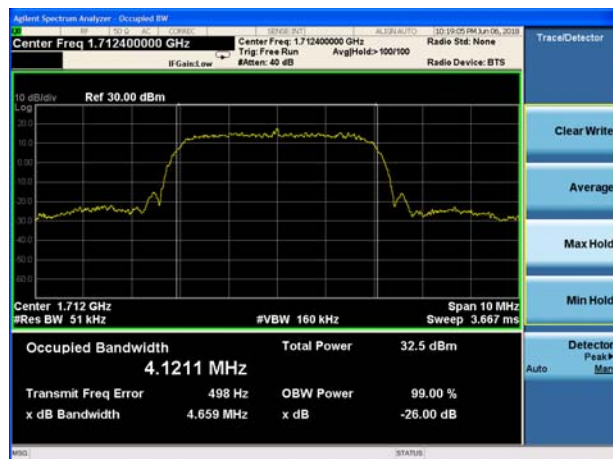
| LTE Band 12 |            |                 |         |                 |                          |                       |
|-------------|------------|-----------------|---------|-----------------|--------------------------|-----------------------|
| RB          | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | 99% Power Bandwidth(MHz) | -26dBc Bandwidth(MHz) |
| 100%        | QPSK       | 1.4             | 23017   | 699.7           | 1.1165                   | 1.3150                |
|             |            |                 | 23095   | 707.5           | 1.1136                   | 1.3350                |
|             |            |                 | 23173   | 715.3           | 1.1154                   | 1.3190                |
|             |            | 3               | 23025   | 700.5           | 2.7422                   | 3.0590                |
|             |            |                 | 23095   | 707.5           | 2.7444                   | 3.0520                |
|             |            |                 | 23165   | 714.5           | 2.7392                   | 3.0720                |
|             |            | 5               | 23035   | 701.5           | 4.5137                   | 5.0130                |
|             |            |                 | 23095   | 707.5           | 4.5160                   | 4.9720                |
|             |            |                 | 23155   | 713.5           | 4.5174                   | 5.0130                |
|             |            | 10              | 23060   | 704             | 9.0155                   | 10.1000               |
|             |            |                 | 23095   | 707.5           | 9.0102                   | 10.0300               |
|             |            |                 | 23130   | 711             | 9.0204                   | 9.9670                |
|             | 16QAM      | 1.4             | 23017   | 699.7           | 0.3314                   | 0.4775                |
|             |            |                 | 23095   | 707.5           | 0.3212                   | 0.4597                |
|             |            |                 | 23173   | 715.3           | 0.3138                   | 0.4574                |
|             |            | 3               | 23025   | 700.5           | 0.4025                   | 0.5570                |
|             |            |                 | 23095   | 707.5           | 0.4097                   | 0.5657                |
|             |            |                 | 23165   | 714.5           | 0.4048                   | 0.5427                |
|             |            | 5               | 23035   | 701.5           | 0.4960                   | 0.7097                |
|             |            |                 | 23095   | 707.5           | 0.4936                   | 0.7157                |
|             |            |                 | 23155   | 713.5           | 0.4699                   | 0.6754                |
|             |            | 10              | 23060   | 704             | 0.8933                   | 1.2160                |
|             |            |                 | 23095   | 707.5           | 0.8720                   | 1.2100                |
|             |            |                 | 23130   | 711             | 0.8918                   | 1.2210                |



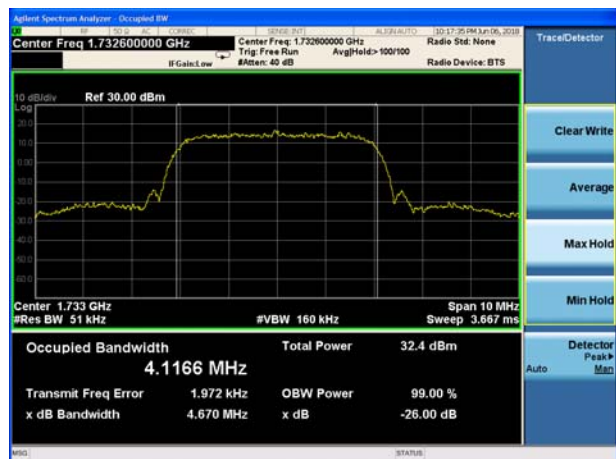
| LTE Band 13 |            |                 |         |                 |                          |                       |
|-------------|------------|-----------------|---------|-----------------|--------------------------|-----------------------|
| RB          | Modulation | Bandwidth (MHz) | Channel | Frequency (MHz) | 99% Power Bandwidth(MHz) | -26dBc Bandwidth(MHz) |
| 100%        | QPSK       | 5               | 23205   | 779.5           | 4.4928                   | 4.9500                |
|             |            |                 | 23230   | 782             | 4.5330                   | 5.0620                |
|             |            |                 | 23255   | 784.5           | 4.5082                   | 4.9480                |
|             |            | 10              | 23230   | 782             | 9.0350                   | 10.0500               |
|             | 16QAM      | 5               | 23205   | 779.5           | 0.4991                   | 0.7263                |
|             |            |                 | 23230   | 782             | 0.4698                   | 0.6870                |
|             |            |                 | 23255   | 784.5           | 0.4875                   | 0.6893                |
|             |            | 10              | 23230   | 782             | 0.9025                   | 1.2680                |



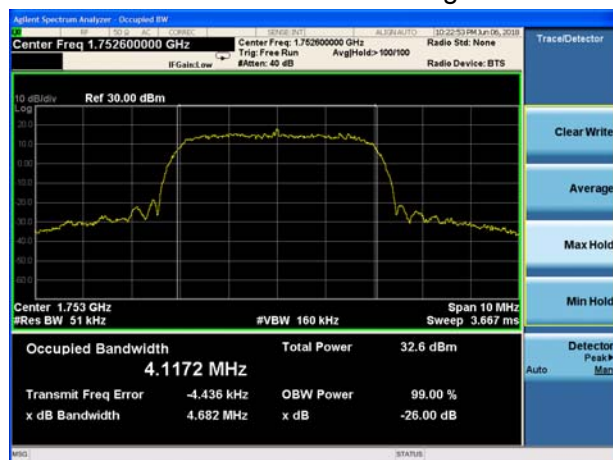
## WCDMA Band IV CH-Low



## WCDMA Band IV CH Middle

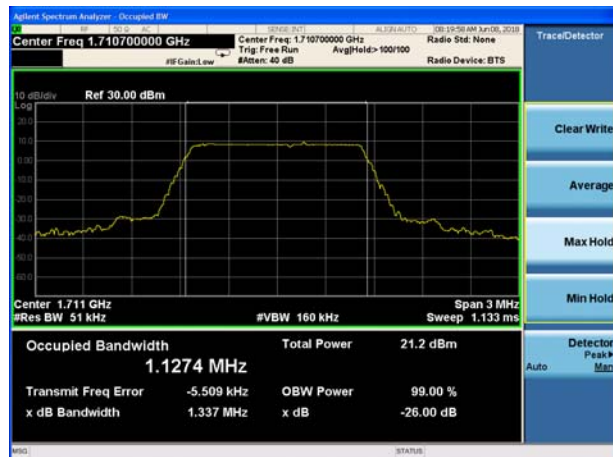


## WCDMA Band IV CH High

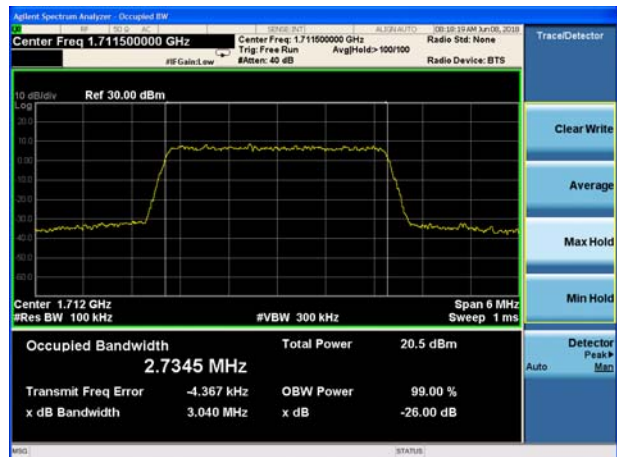




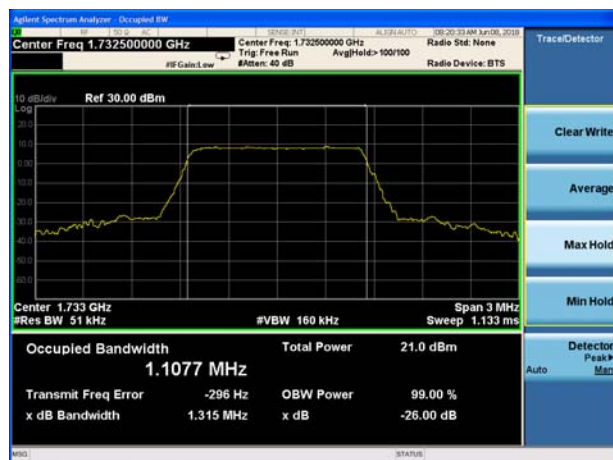
## LTE Band 4 QPSK 1.4MHz CH-Low



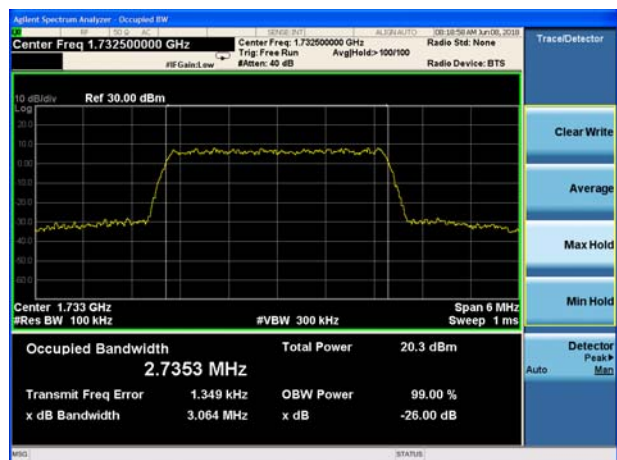
## LTE Band 4 QPSK 3MHz CH-Low



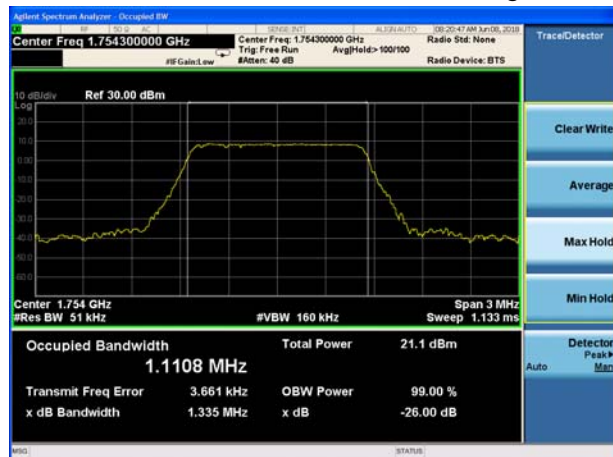
## LTE Band 4 QPSK 1.4MHz CH-Middle



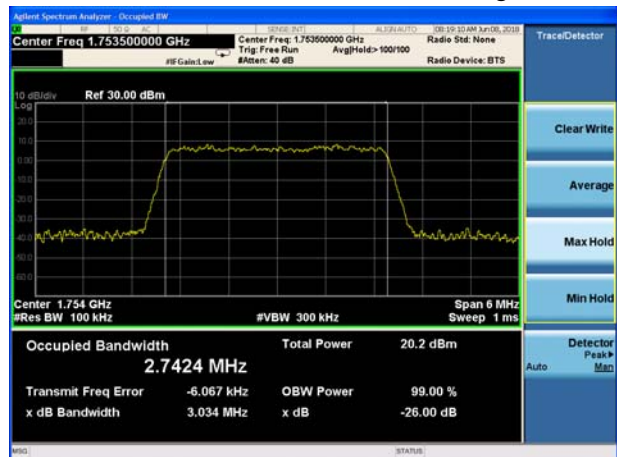
## LTE Band 4 QPSK 3MHz CH-Middle



## LTE Band 4 QPSK 1.4MHz CH-High

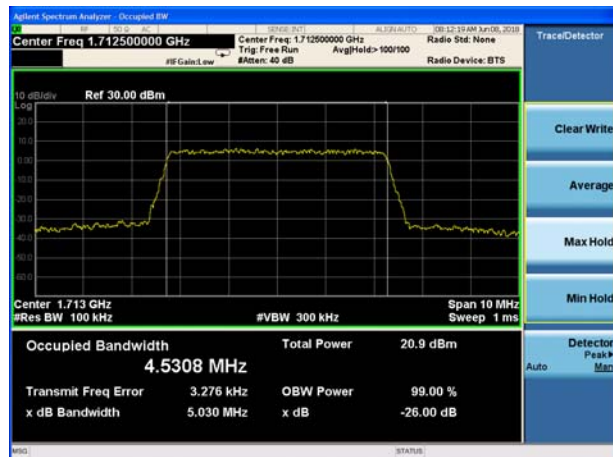


## LTE Band 4 QPSK 3MHz CH-High

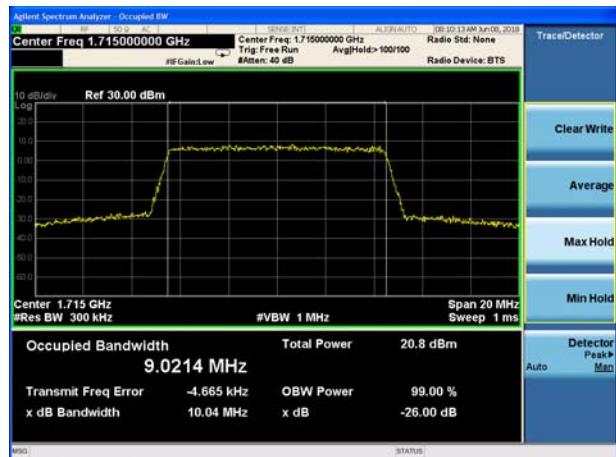




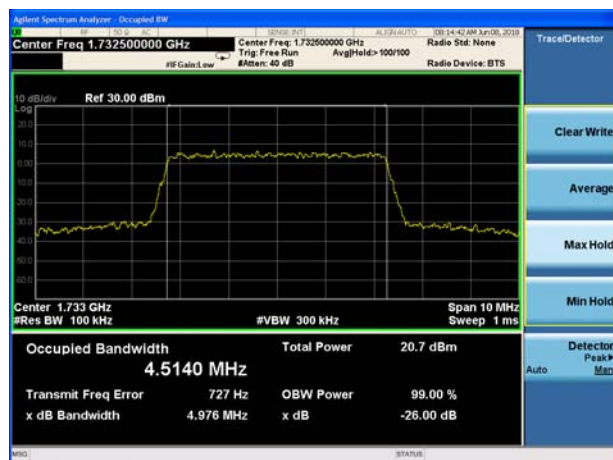
## LTE Band 4 QPSK 5MHz CH-Low



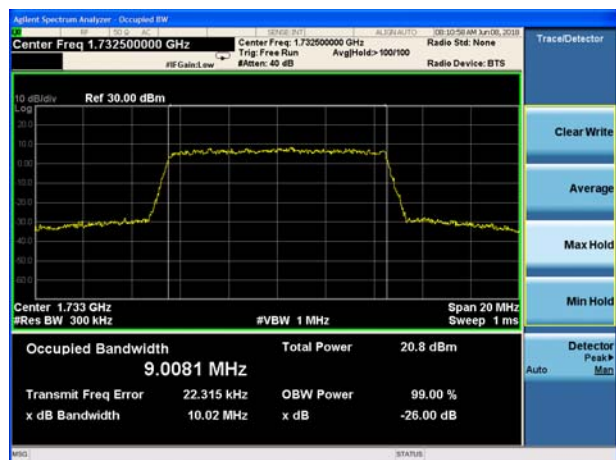
## LTE Band 4 QPSK 10MHz CH-Low



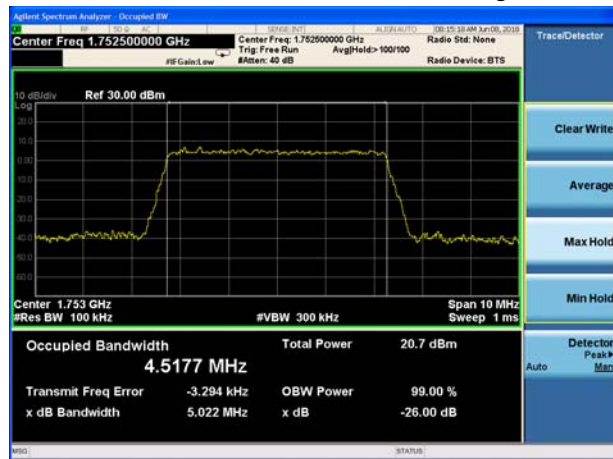
## LTE Band 4 QPSK 5MHz CH-Middle



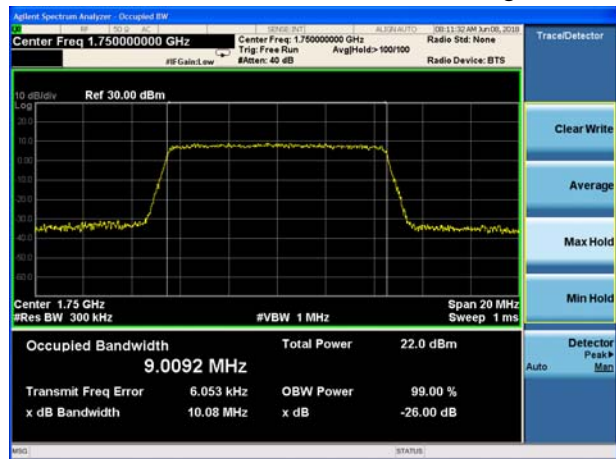
## LTE Band 4 QPSK 10MHz CH-Middle



## LTE Band 4 QPSK 5MHz CH-High

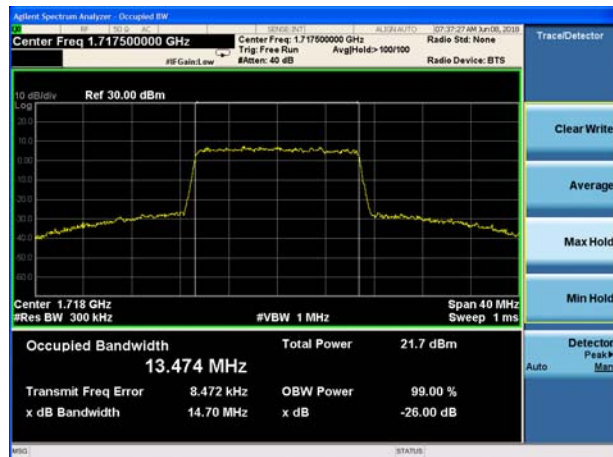


## LTE Band 4 QPSK 10MHz CH-High

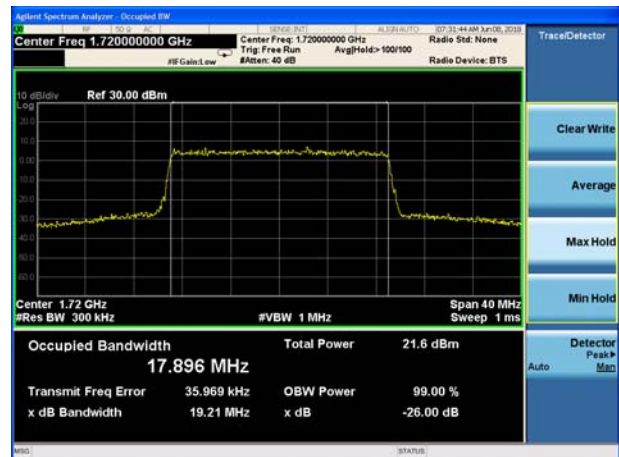




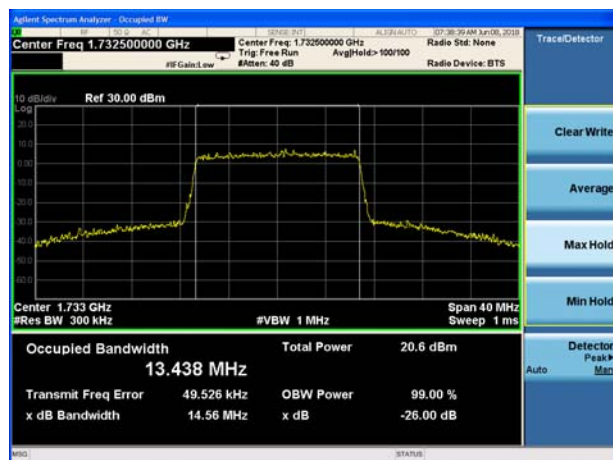
## LTE Band 4 QPSK 15MHz CH-Low



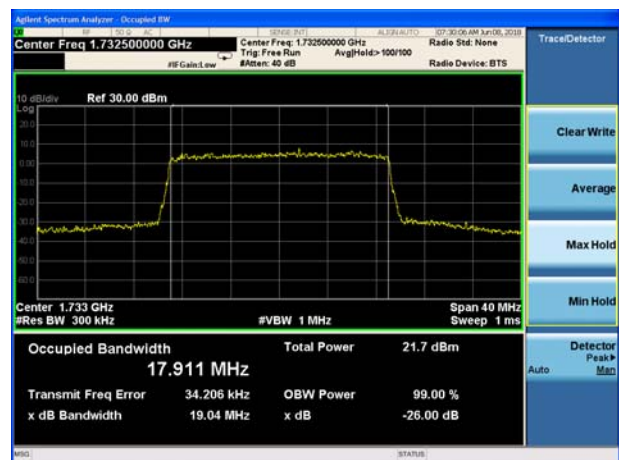
## LTE Band 4 QPSK 20MHz CH-Low



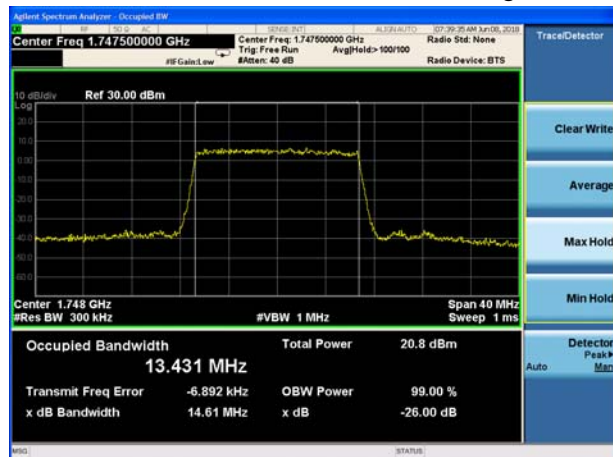
## LTE Band 4 QPSK 15MHz CH-Middle



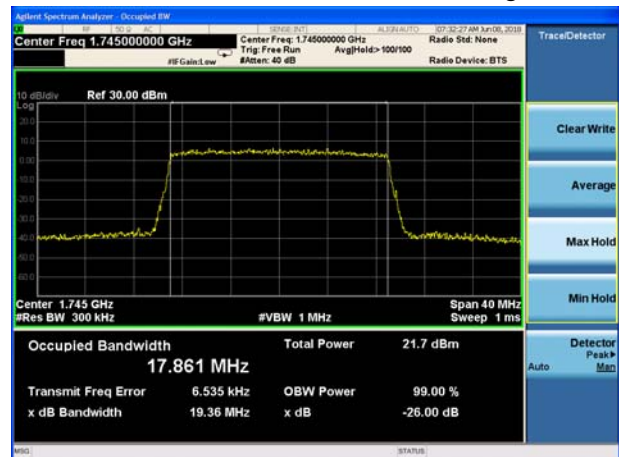
## LTE Band 4 QPSK 20MHz CH-Middle



## LTE Band 4 QPSK 15MHz CH-High



## LTE Band 4 QPSK 20MHz CH-High

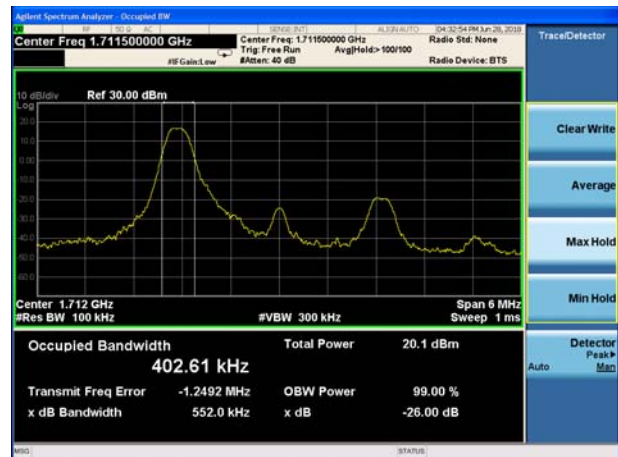




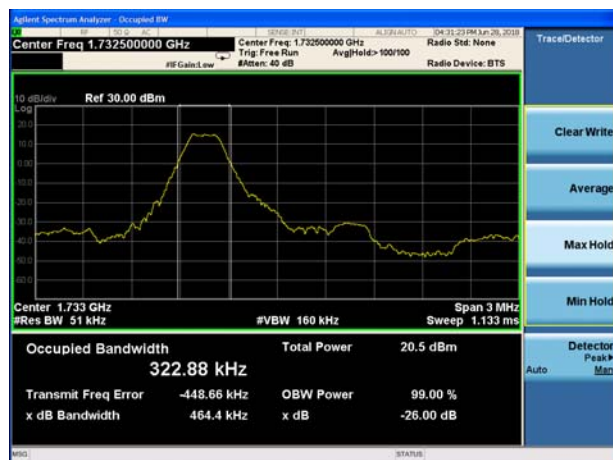
## LTE Band 4 16QAM 1.4MHz CH-Low



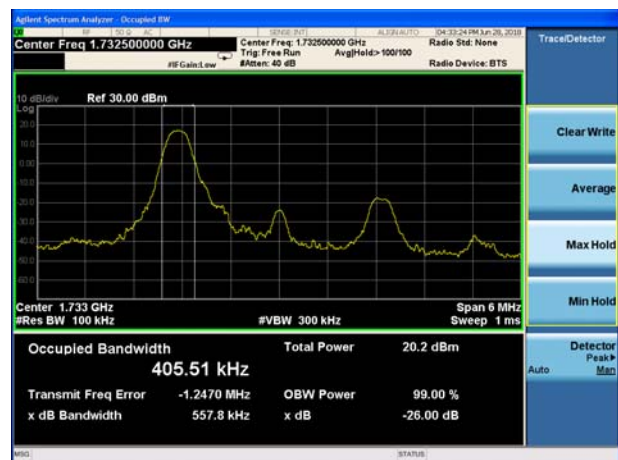
## LTE Band 4 16QAM 3MHz CH-Low



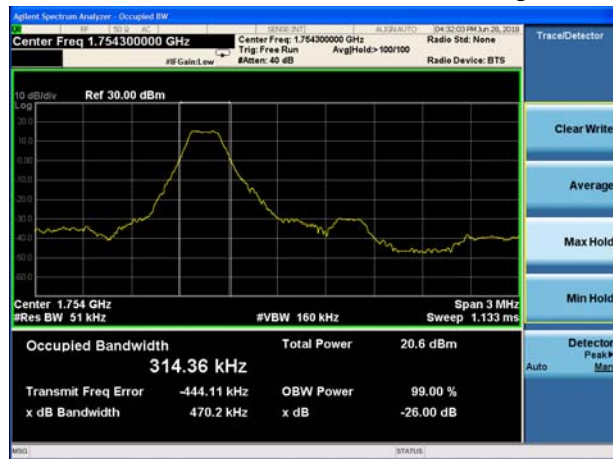
## LTE Band 4 16QAM 1.4MHz CH-Middle



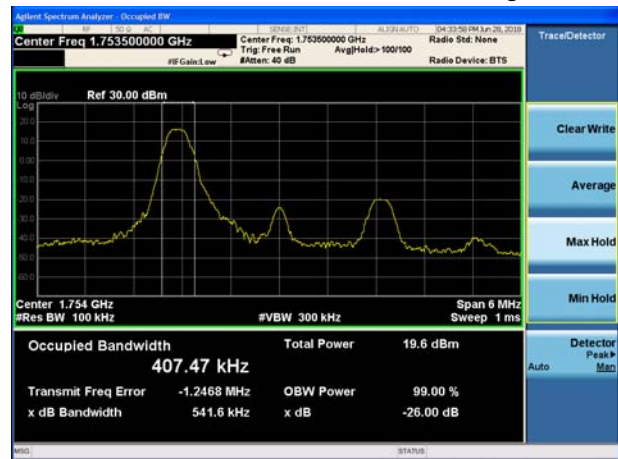
## LTE Band 4 16QAM 3MHz CH-Middle



## LTE Band 4 16QAM 1.4MHz CH-High

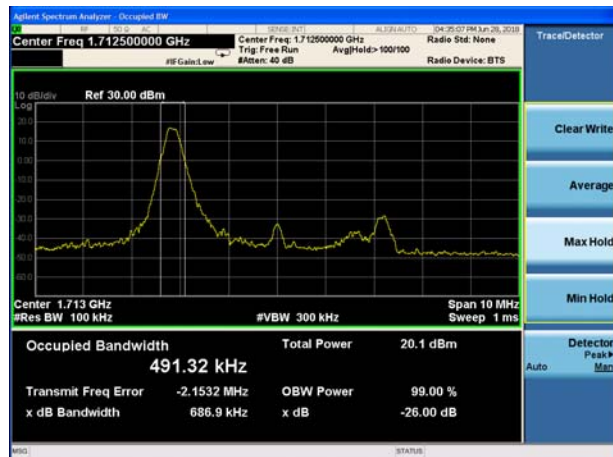


## LTE Band 4 16QAM 3MHz CH-High

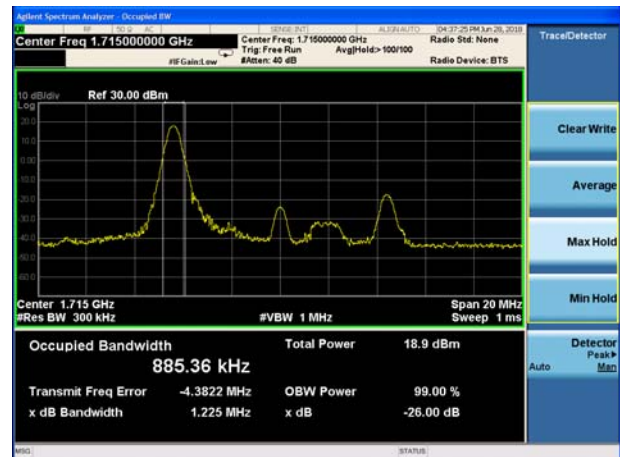




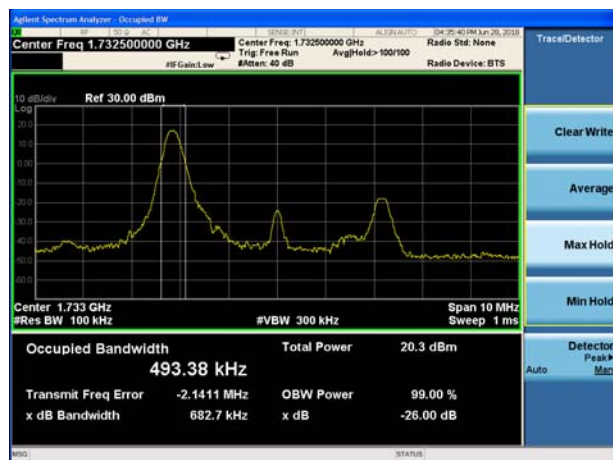
## LTE Band 4 16QAM 5MHz CH-Low



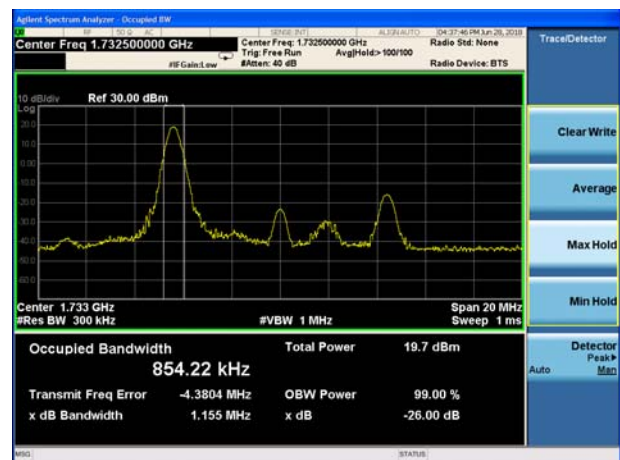
## LTE Band 4 16QAM 10MHz CH-Low



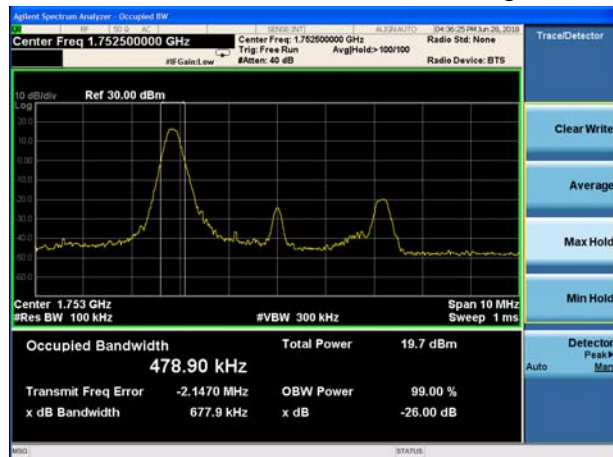
## LTE Band 4 16QAM 5MHz CH-Middle



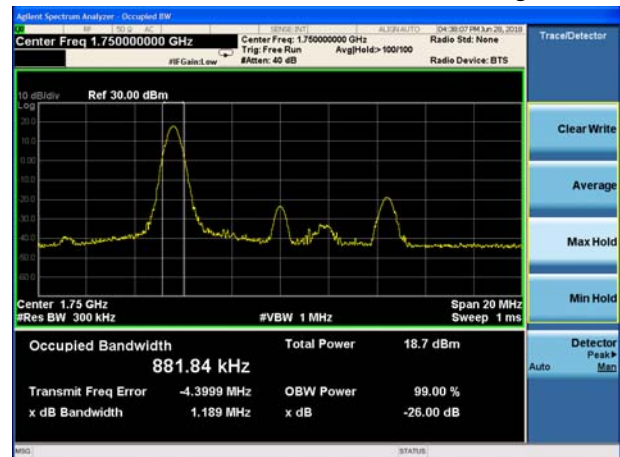
## LTE Band 4 16QAM 10MHz CH-Middle



## LTE Band 4 16QAM 5MHz CH-High

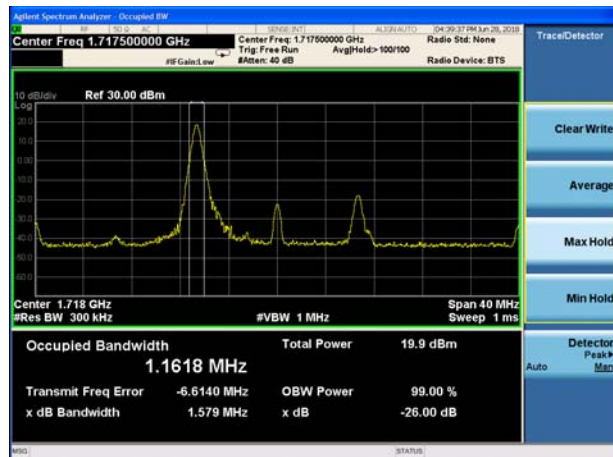


## LTE Band 4 16QAM 10MHz CH-High

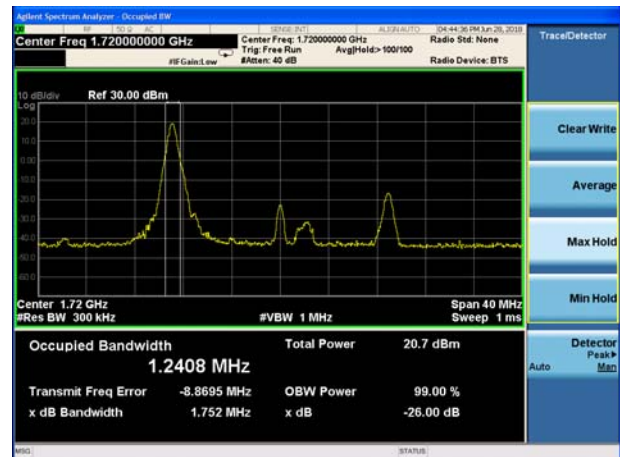




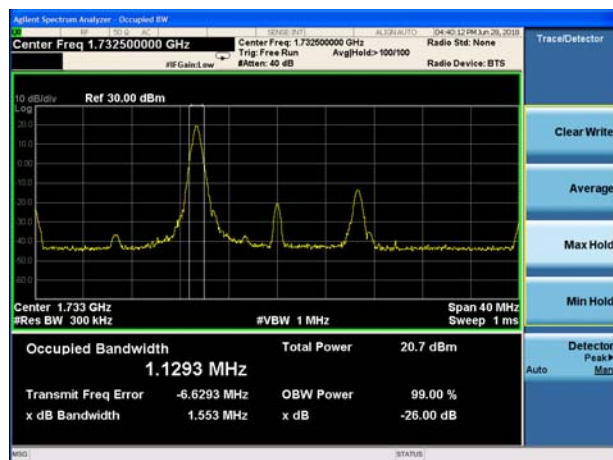
## LTE Band 4 16QAM 15MHz CH-Low



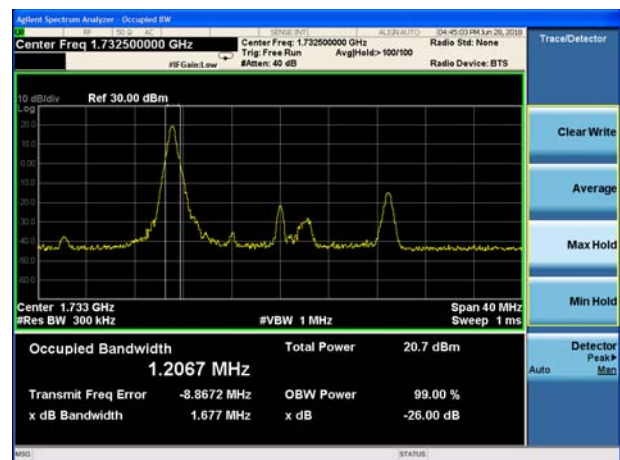
## LTE Band 4 16QAM 20MHz CH-Low



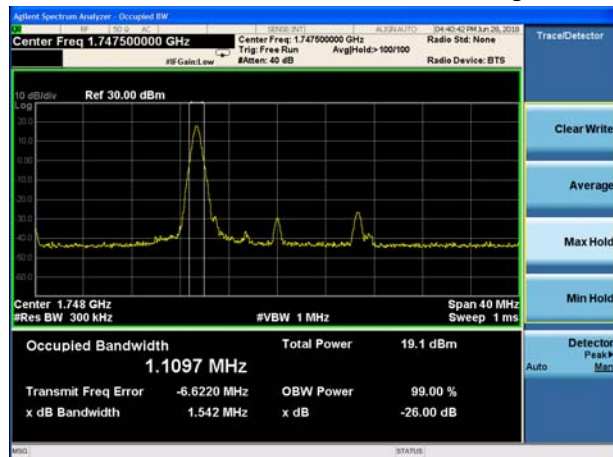
## LTE Band 4 16QAM 15MHz CH-Middle



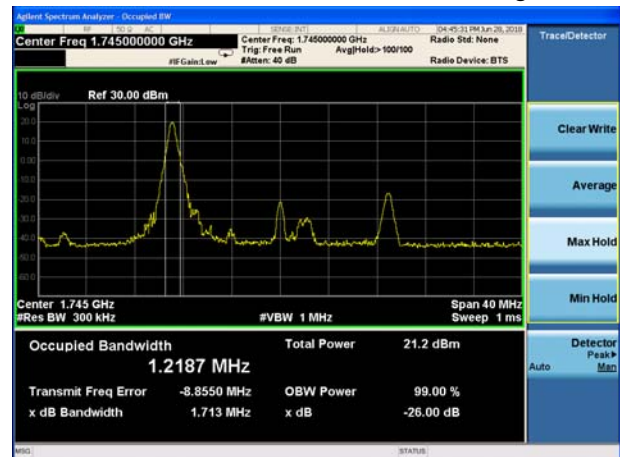
## LTE Band 4 16QAM 20MHz CH-Middle



## LTE Band 4 16QAM 15MHz CH-High



## LTE Band 4 16QAM 20MHz CH-High

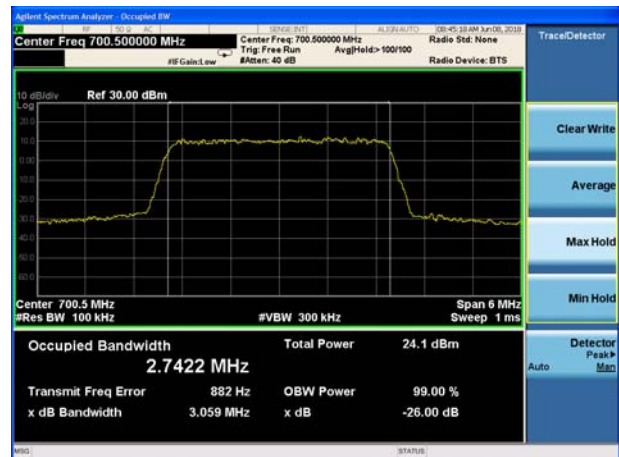




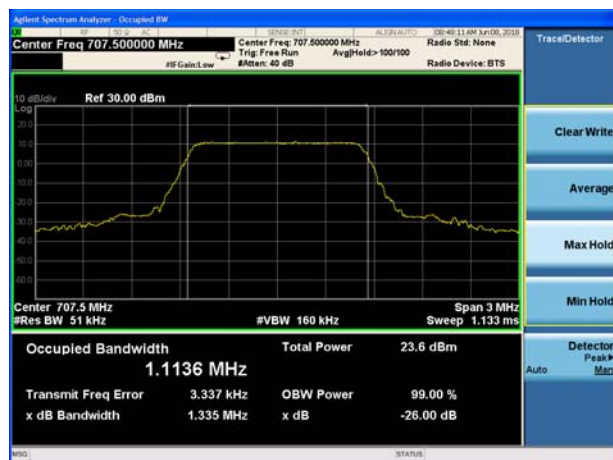
## LTE Band 12 QPSK 1.4MHz CH-Low



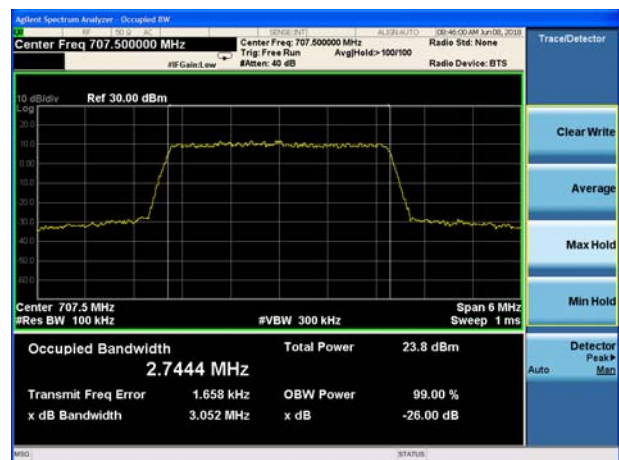
## LTE Band 12 QPSK 3MHz CH-Low



## LTE Band 12 QPSK 1.4MHz CH-Middle



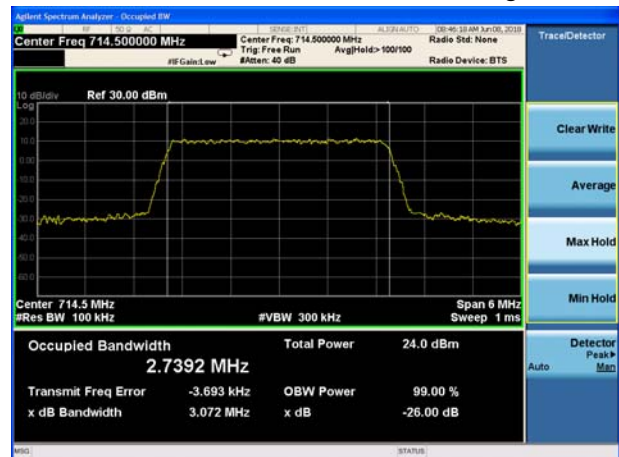
## LTE Band 12 QPSK 3MHz CH-Middle



## LTE Band 12 QPSK 1.4MHz CH-High

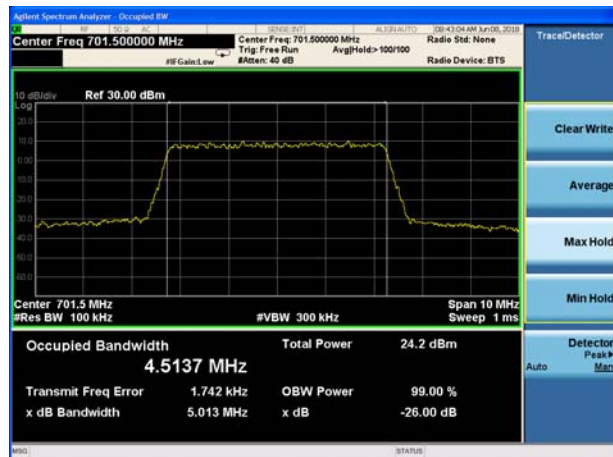


## LTE Band 12 QPSK 3MHz CH-High

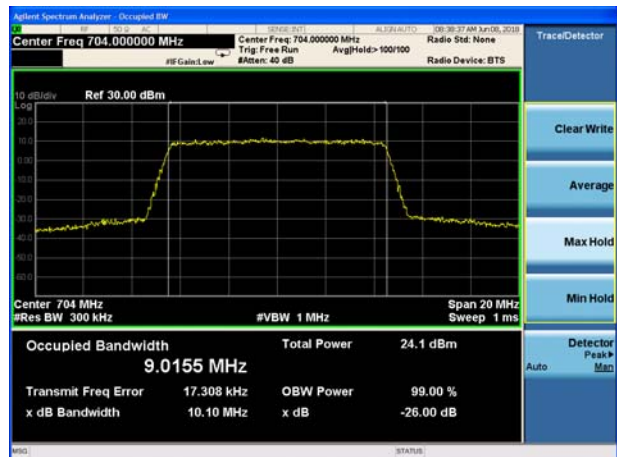




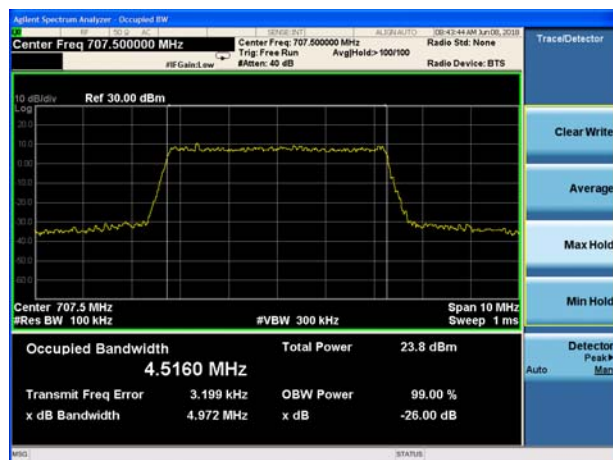
## LTE Band 12 QPSK 5MHz CH-Low



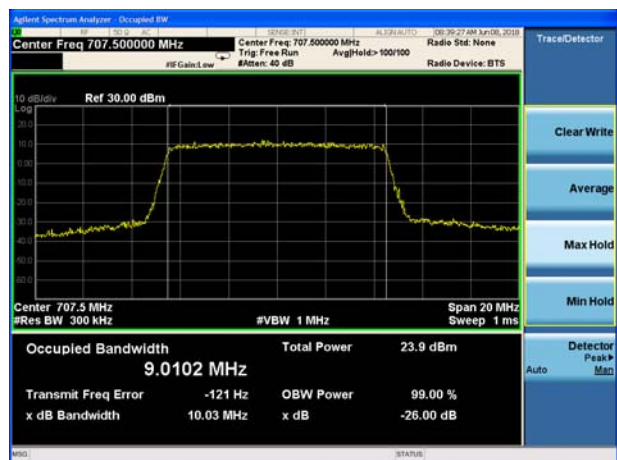
## LTE Band 12 QPSK 10MHz CH-Low



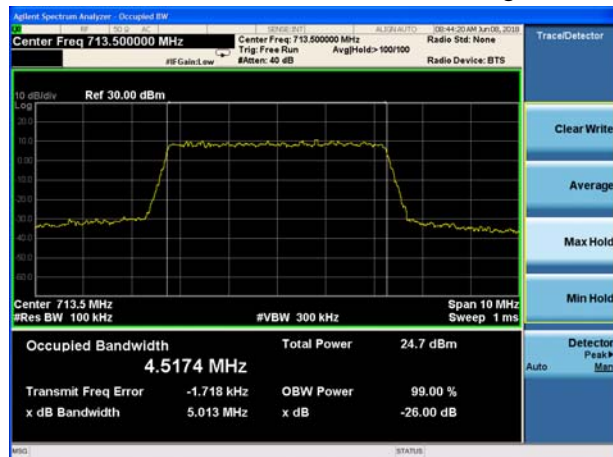
## LTE Band 12 QPSK 5MHz CH-Middle



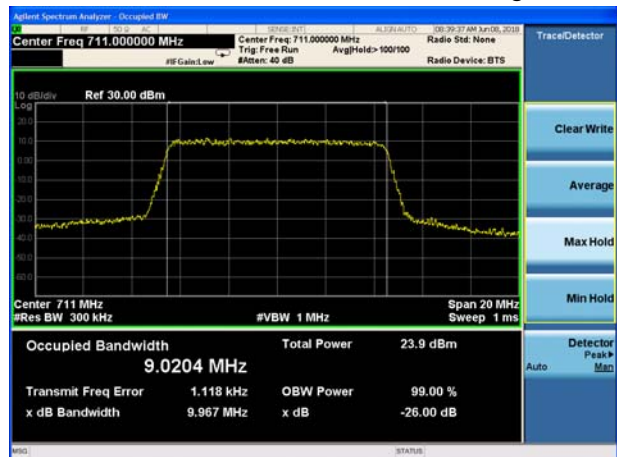
## LTE Band 12 QPSK 10MHz CH-Middle



## LTE Band 12 QPSK 5MHz CH-High



## LTE Band 12 QPSK 10MHz CH-High





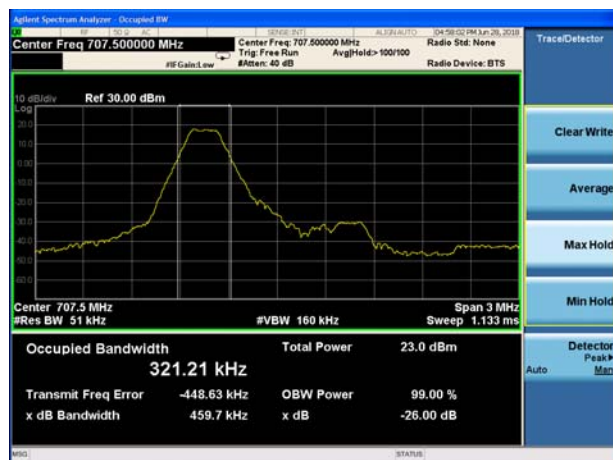
## LTE Band 12 16QAM 1.4MHz CH-Low



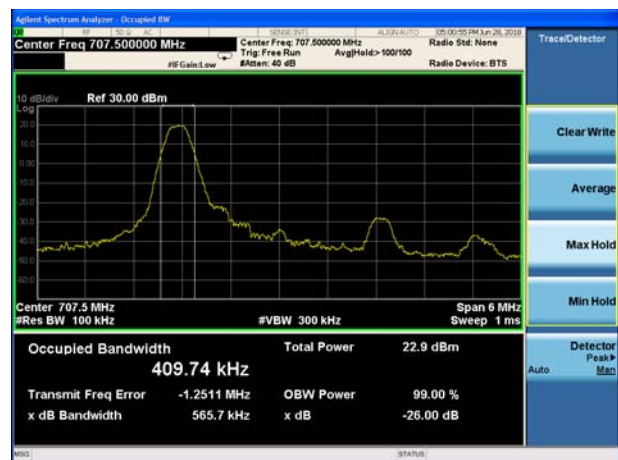
## LTE Band 12 16QAM 3MHz CH-Low



## LTE Band 12 16QAM 1.4MHz CH-Middle



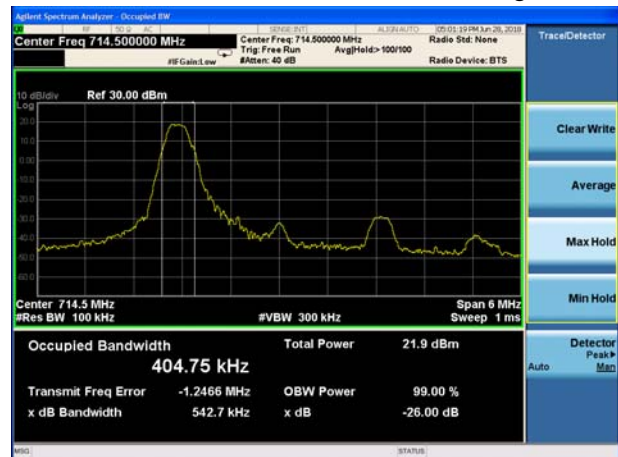
## LTE Band 12 16QAM 3MHz CH-Middle



## LTE Band 12 16QAM 1.4MHz CH-High

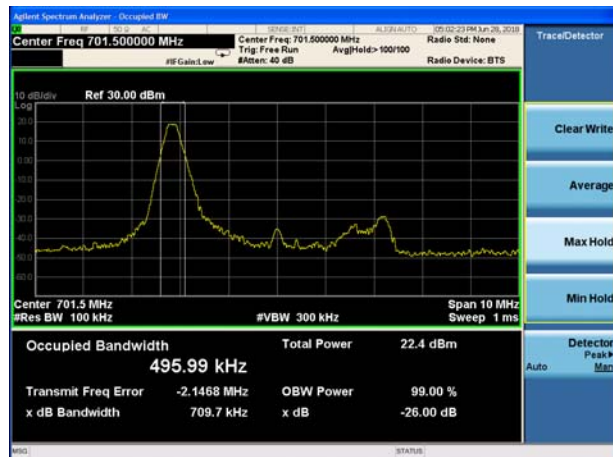


## LTE Band 12 16QAM 3MHz CH-High

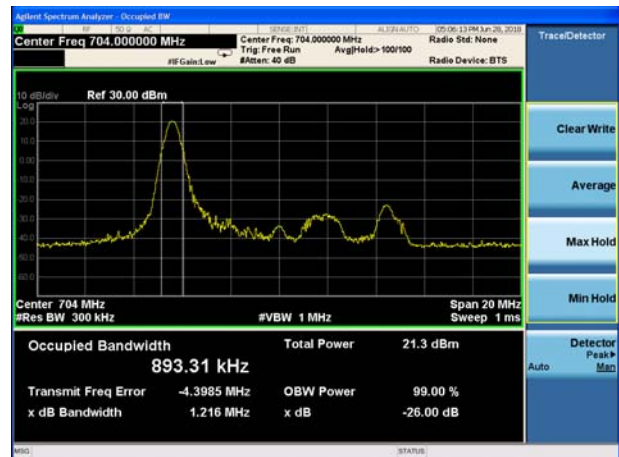




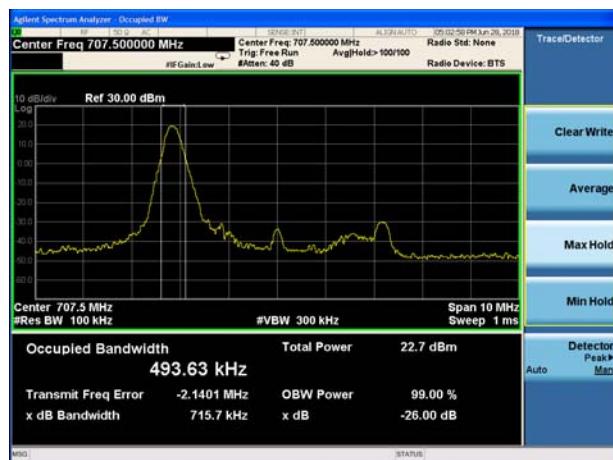
## LTE Band 12 16QAM 5MHz CH-Low



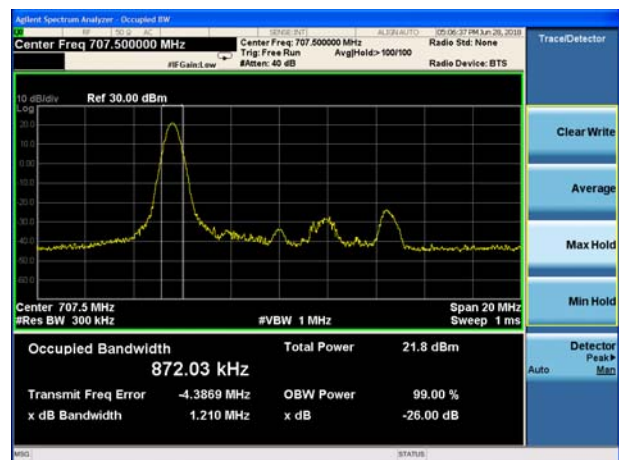
## LTE Band 12 16QAM 10MHz CH-Low



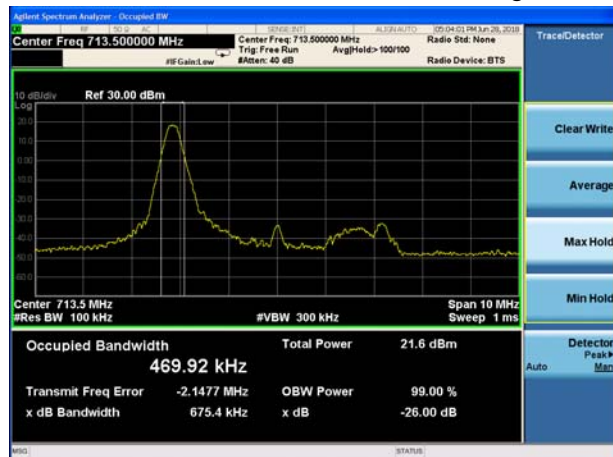
## LTE Band 12 16QAM 5MHz CH-Middle



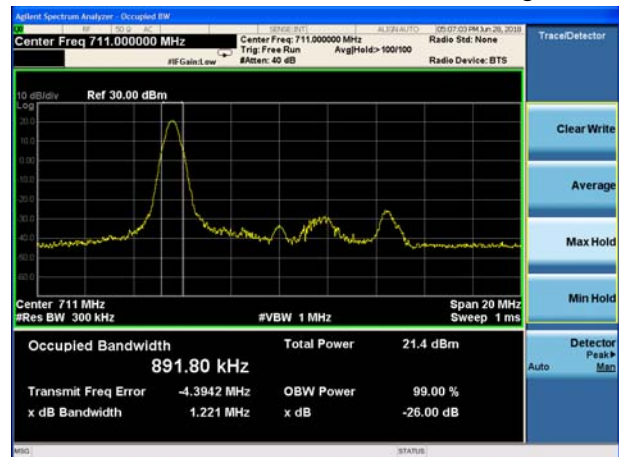
## LTE Band 12 16QAM 10MHz CH-Middle



## LTE Band 12 16QAM 5MHz CH-High

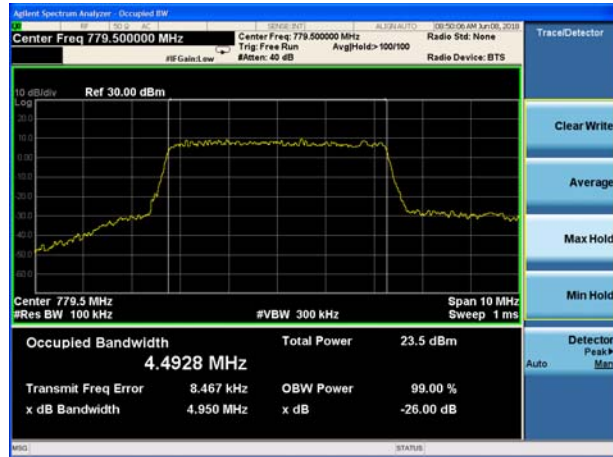


## LTE Band 12 16QAM 10MHz CH-High

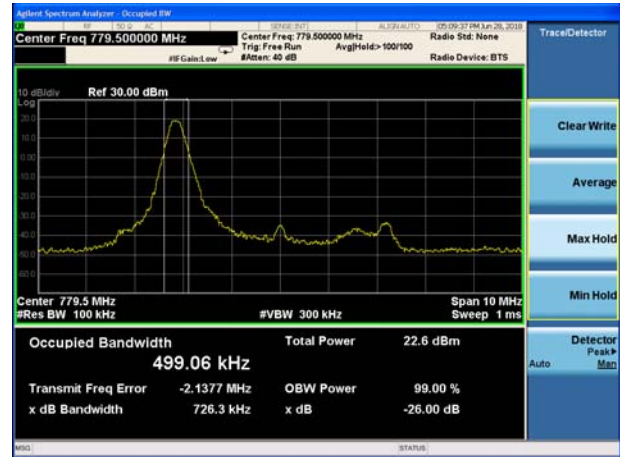




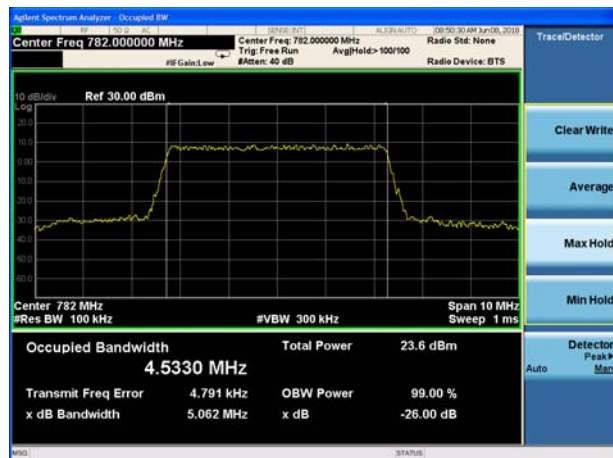
## LTE Band 13 QPSK 5MHz CH-Low



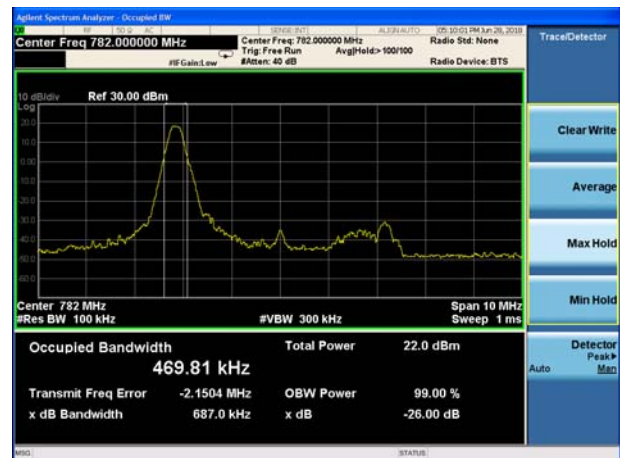
## LTE Band 13 16QAM 5MHz CH-Low



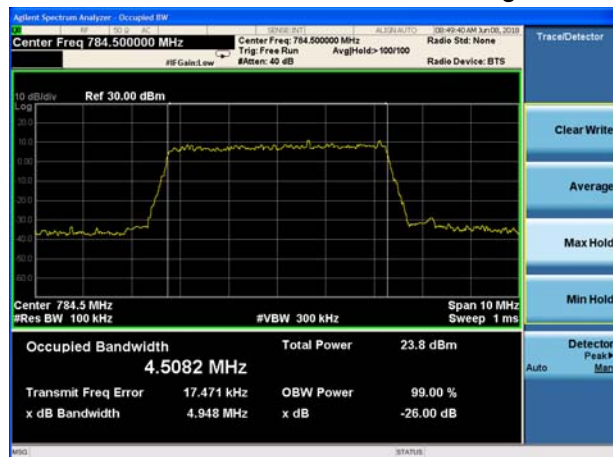
## LTE Band 13 QPSK 5MHz CH-Middle



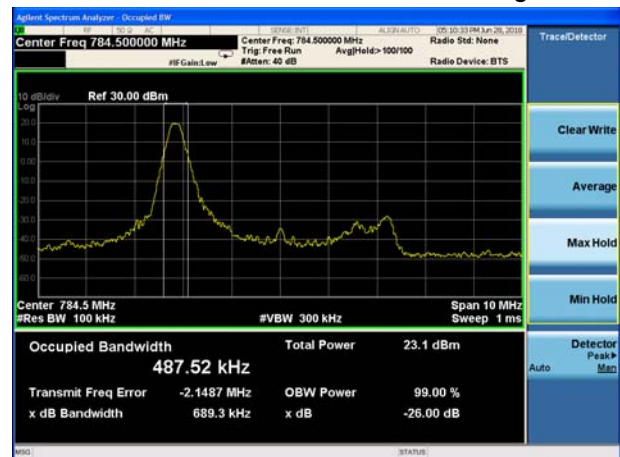
## LTE Band 13 16QAM 5MHz CH-Middle



## LTE Band 13 QPSK 5MHz CH-High

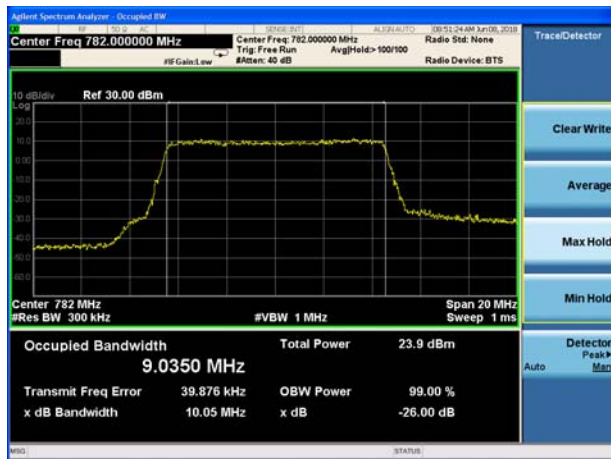


## LTE Band 13 16QAM 5MHz CH-High

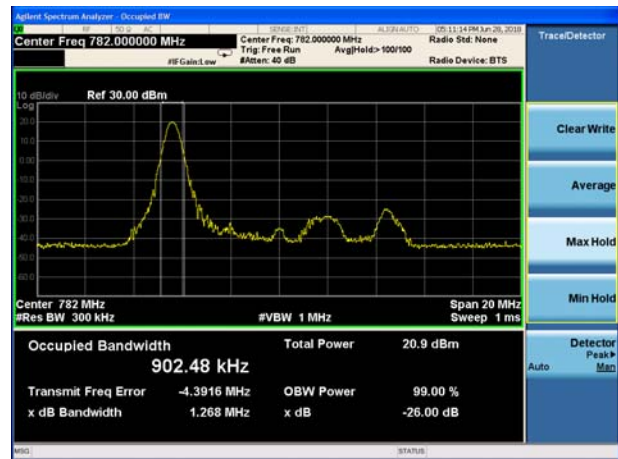




## LTE Band 13 QPSK 10MHz CH-Middle



## LTE Band 13 16QAM 10MHz CH-Middle



## 5.4 Band Edge Compliance

### Ambient condition

| Temperature | Relative humidity | Pressure |
|-------------|-------------------|----------|
| 23°C ~25°C  | 45%~50%           | 101.5kPa |

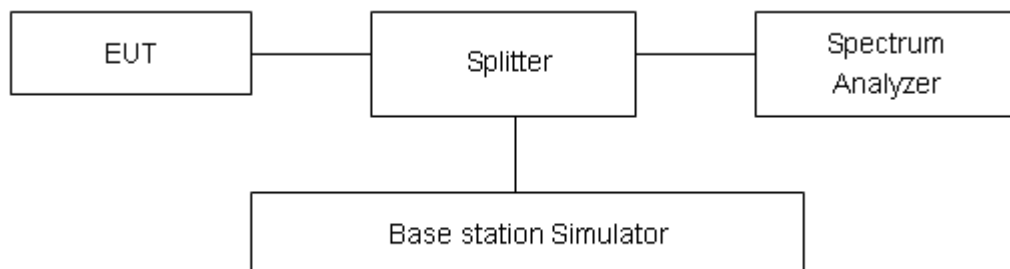
### Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The band edge of the lowest and highest channels were measured.

The testing follows KDB 971168 D01 v03r01 Section 6.0

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured.
3. RBW is set to 51 kHz, VBW is set to 160 kHz for WCDMA Band IV.  
RBW is set to 15 kHz, VBW is set to 51 kHz for LTE Band 4 (1.4MHz).  
RBW is set to 30 kHz, VBW is set to 100 kHz for LTE Band 4 (3MHz).  
RBW is set to 51 kHz, VBW is set to 160 kHz for LTE Band 4 (5MHz).  
RBW is set to 100 kHz, VBW is set to 300kHz for LTE Band 4 (10MHz).  
RBW is set to 150 kHz, VBW is set to 510 kHz for LTE Band 4(15MHz).  
RBW is set to 200 kHz, VBW is set to 620 kHz for LTE Band 4(20MHz)  
RBW is set to 100 kHz, VBW is set to 300kHz for LTE Band 12(1.4MHz/3MHz/5MHz/10MHz).  
RBW is set to 10 kHz, VBW is set to 30 kHz for LTE Band 13 (763MHz~775MHz).  
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 13 (775MHz~777MHz).  
RBW is set to 100 kHz, VBW is set to 300 kHz for LTE Band 13 (787MHz~793MHz).  
RBW is set to 10 kHz, VBW is set to 30 kHz for LTE Band 13 (793MHz~805MHz).  
on spectrum analyzer.
4. Set spectrum analyzer with RMS detector.
5. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
6. Checked that all the results comply with the emission limit line.

### Test Setup



**Limits**

Rule Part 27.53(h)/ specifies that “ for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB”

Part 27.53(g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Rule Part 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

Part 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $76 + 10 \log (P)$  dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

**Measurement Uncertainty**

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor  $k = 1.96$ ,  $U=0.684$ dB.

## Test Result

All the test traces in the plots shows the test results clearly.





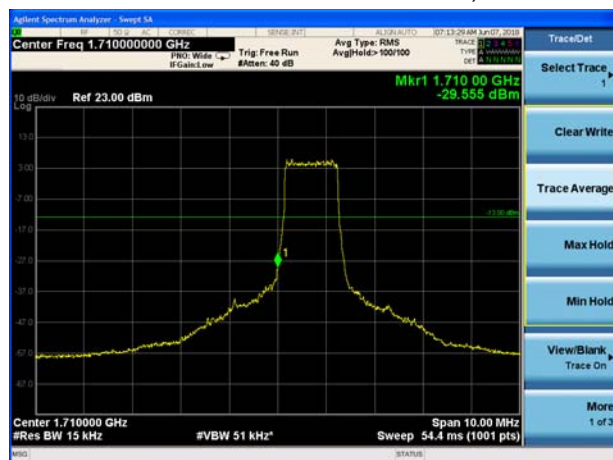
## LTE Band 4 QPSK 1.4MHz CH-Low, 1 RB



## LTE Band 4 QPSK 1.4MHz CH-High, 1 RB



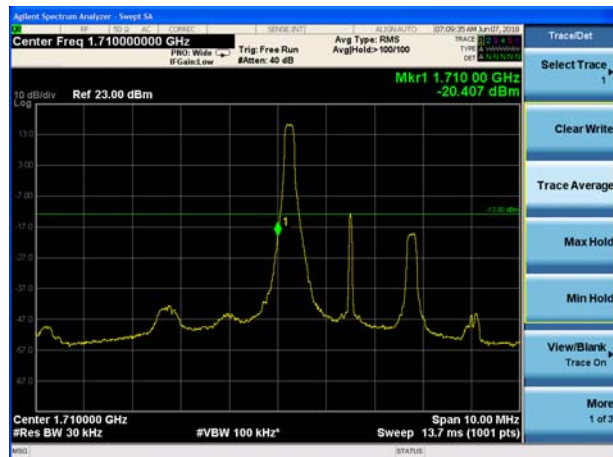
## LTE Band 4 QPSK 1.4MHz CH-Low, 100%RB



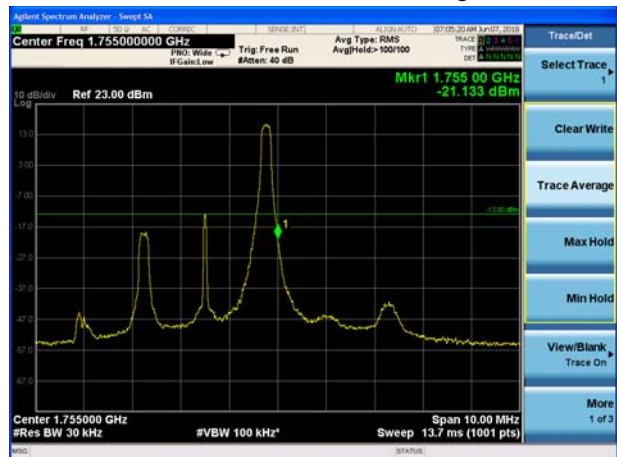
## LTE Band 4 QPSK 1.4MHz CH-High, 100%RB



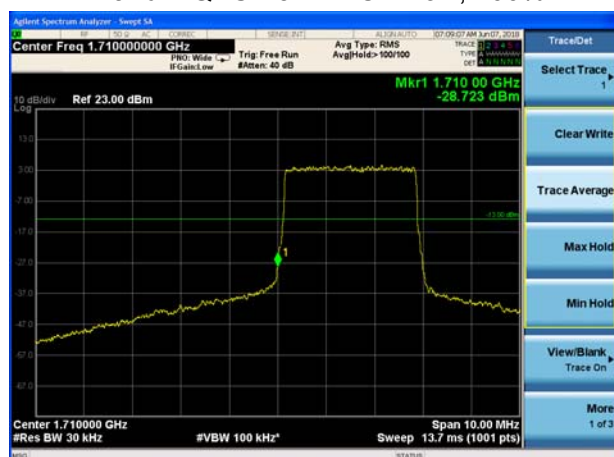
## LTE Band 4 QPSK 3MHz CH-Low, 1 RB



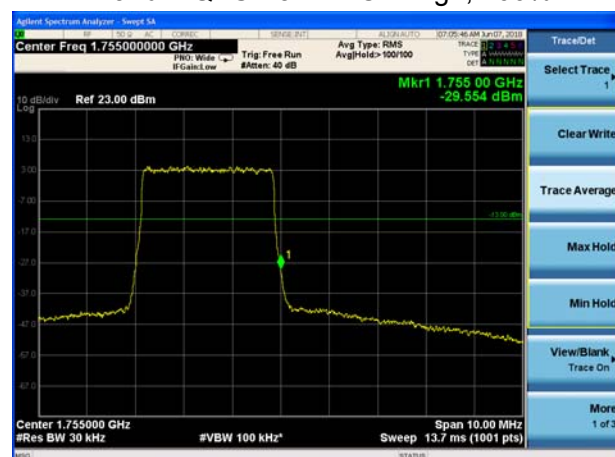
## LTE Band 4 QPSK 3MHz CH-High, 1 RB



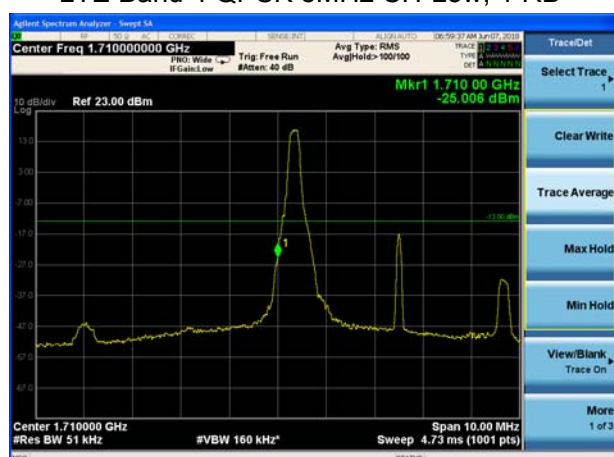
LTE Band 4 QPSK 3MHz CH-Low, 100%RB



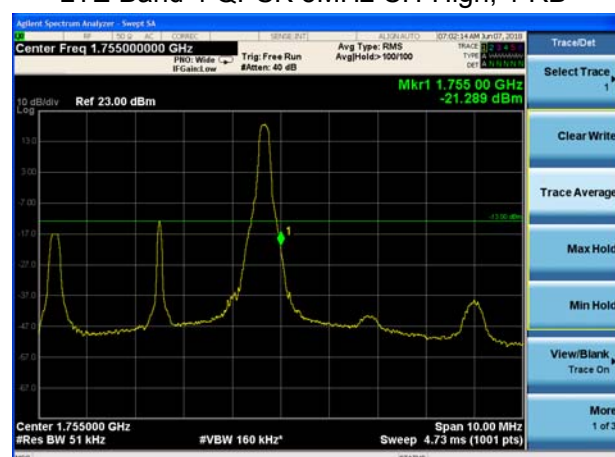
LTE Band 4 QPSK 3MHz CH-High, 100%RB



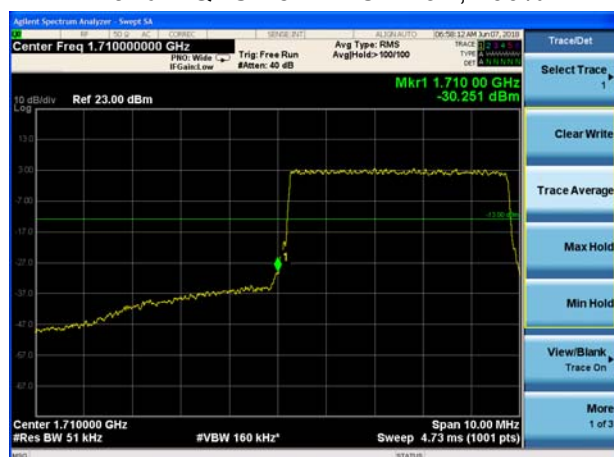
LTE Band 4 QPSK 5MHz CH-Low, 1 RB



LTE Band 4 QPSK 5MHz CH-High, 1 RB



LTE Band 4 QPSK 5MHz CH-Low, 100%RB

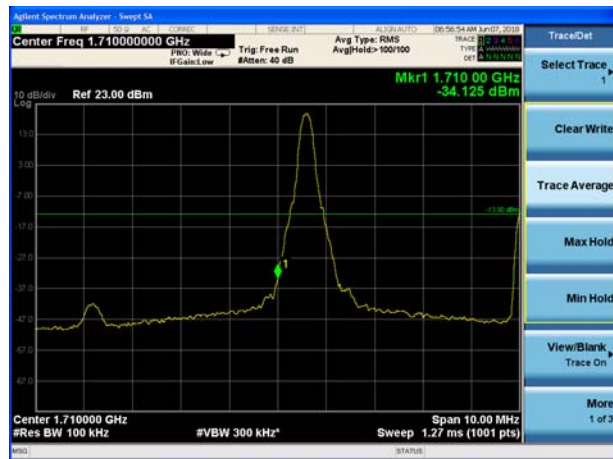


LTE Band 4 QPSK 5MHz CH-High, 100%RB

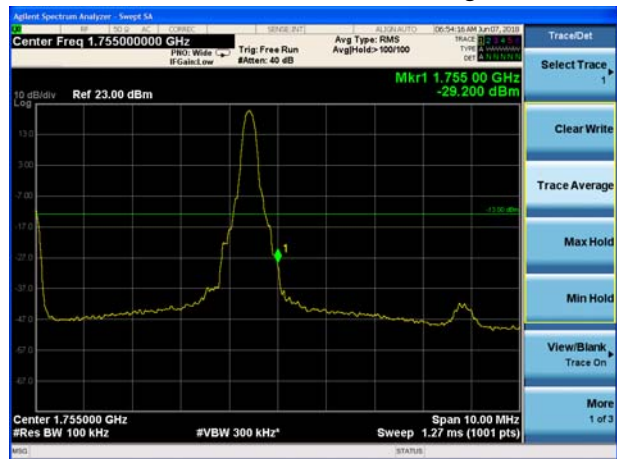




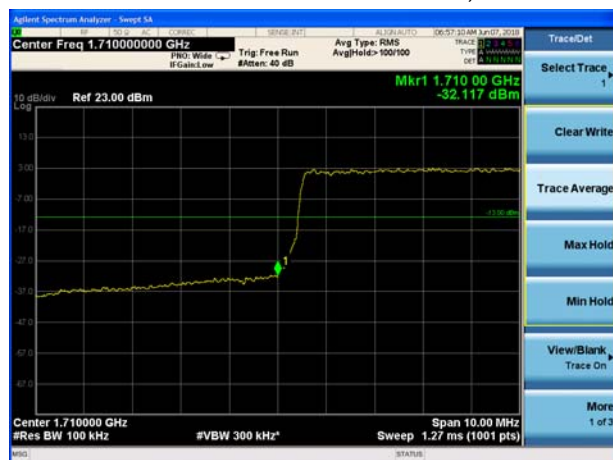
## LTE Band 4 QPSK 10MHz CH-Low, 1 RB



## LTE Band 4 QPSK 10MHz CH-High, 1 RB



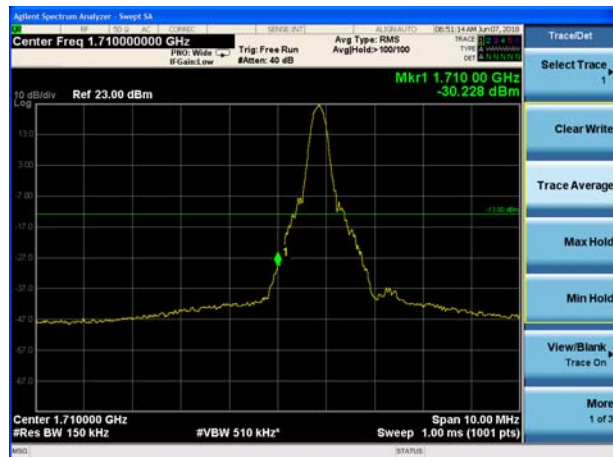
## LTE Band 4 QPSK 10MHz CH-Low, 100%RB



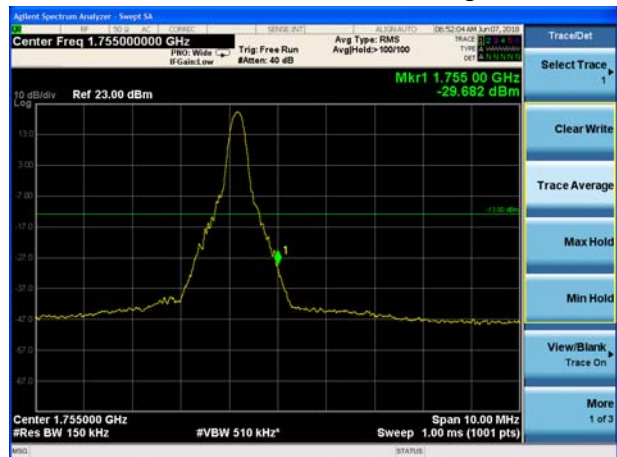
## LTE Band 4 QPSK 10MHz CH-High, 100%RB



## LTE Band 4 QPSK 15MHz CH-Low, 1 RB

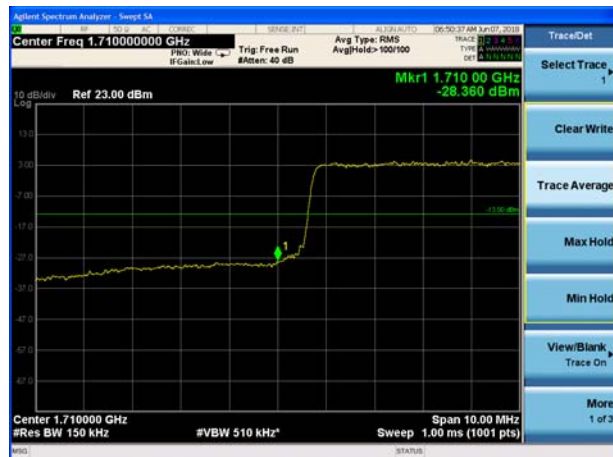


## LTE Band 4 QPSK 15MHz CH-High, 1 RB





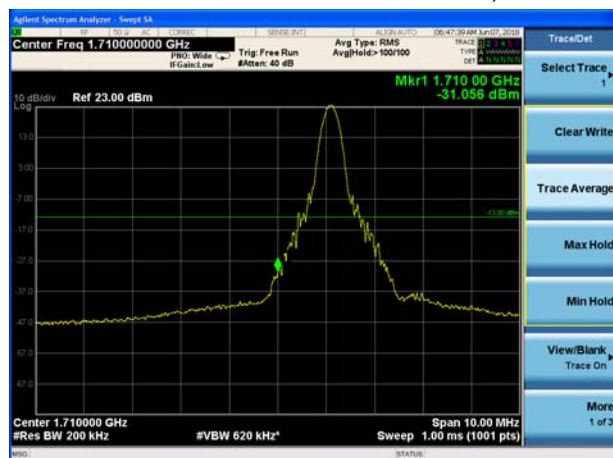
## LTE Band 4 QPSK 15MHz CH-Low, 100%RB



## LTE Band 4 QPSK 15MHz CH-High, 100%RB



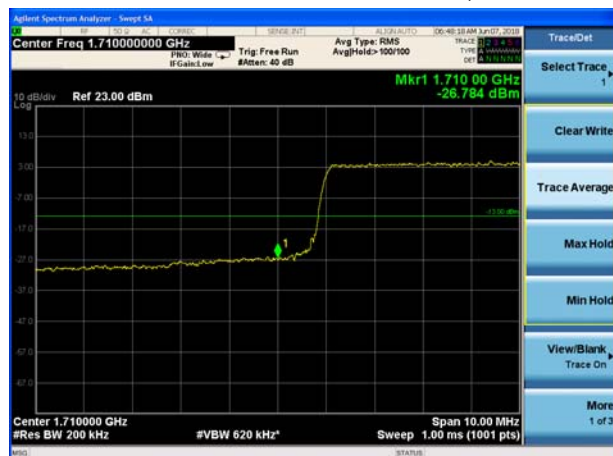
## LTE Band 4 QPSK 20MHz CH-Low, 1 RB



## LTE Band 4 QPSK 20MHz CH-High, 1 RB



## LTE Band 4 QPSK 20MHz CH-Low, 100%RB



## LTE Band 4 QPSK 20MHz CH-High, 100%RB





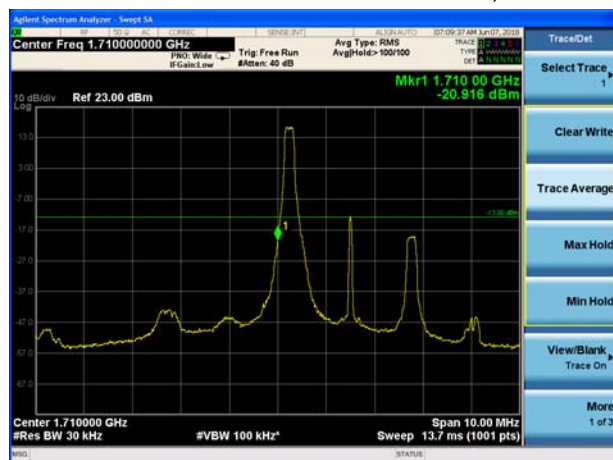
## LTE Band 4 16QAM 1.4MHz CH-Low, 1 RB



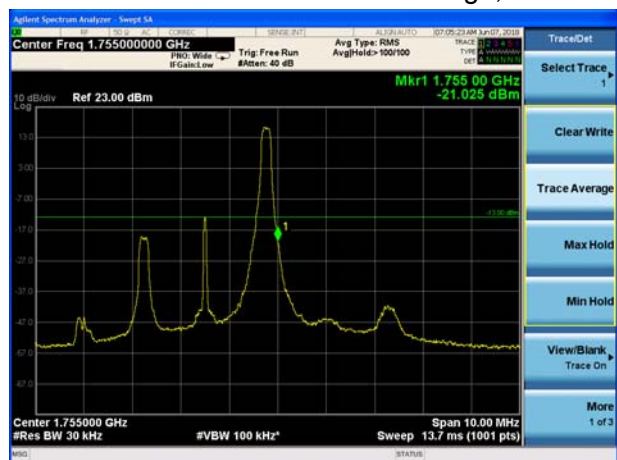
## LTE Band 4 16QAM 1.4MHz CH-High, 1 RB



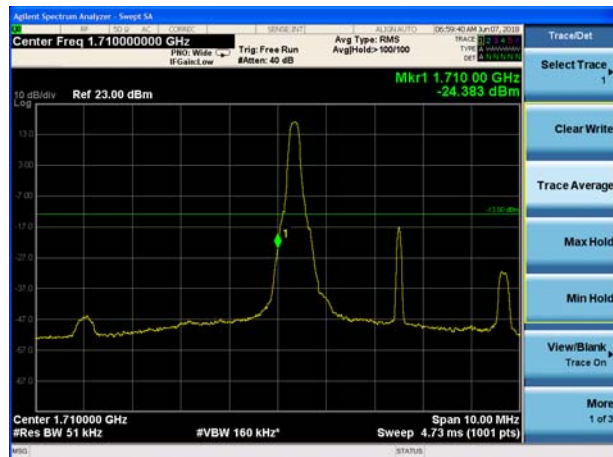
## LTE Band 4 16QAM 3MHz CH-Low, 1 RB



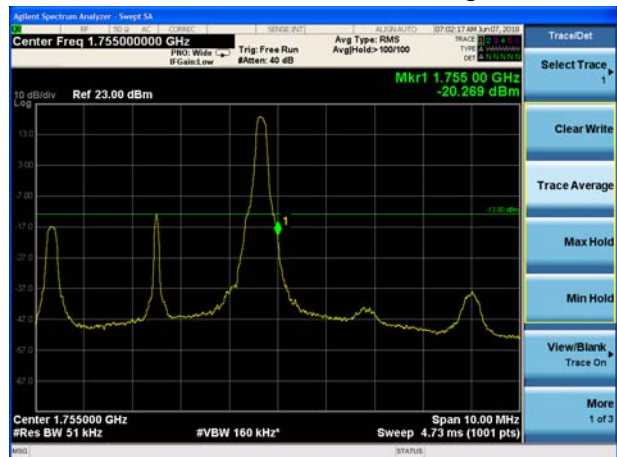
## LTE Band 4 16QAM 3MHz CH-High, 1 RB



## LTE Band 4 16QAM 5MHz CH-Low, 1 RB

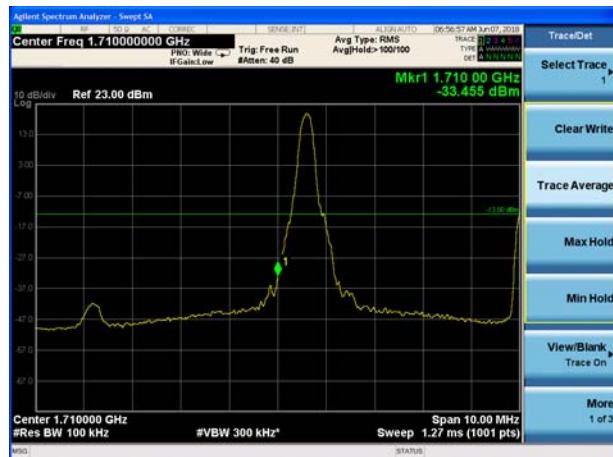


## LTE Band 4 16QAM 5MHz CH-High, 1 RB

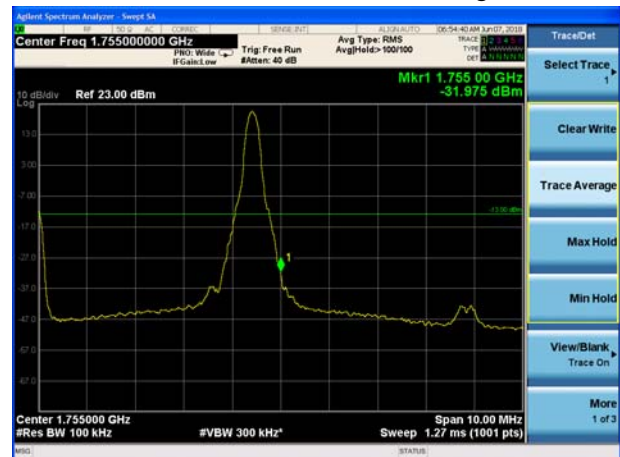




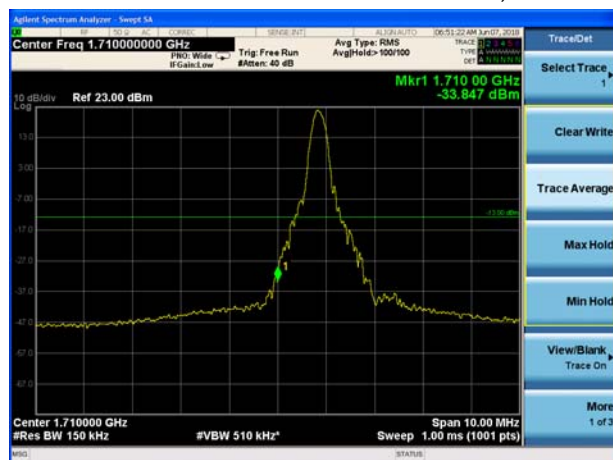
## LTE Band 4 16QAM 10MHz CH-Low, 1 RB



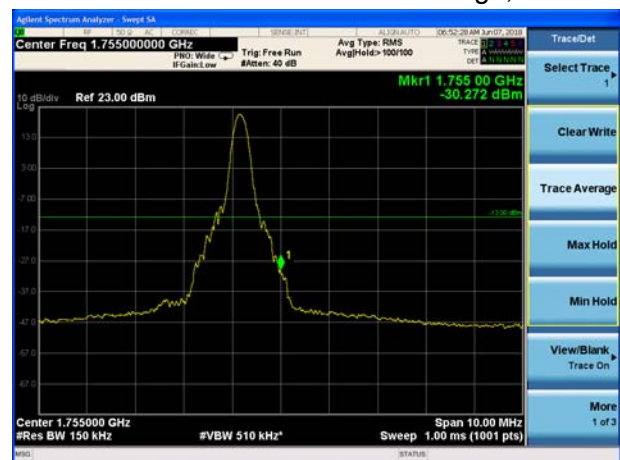
## LTE Band 4 16QAM 10MHz CH-High, 1 RB



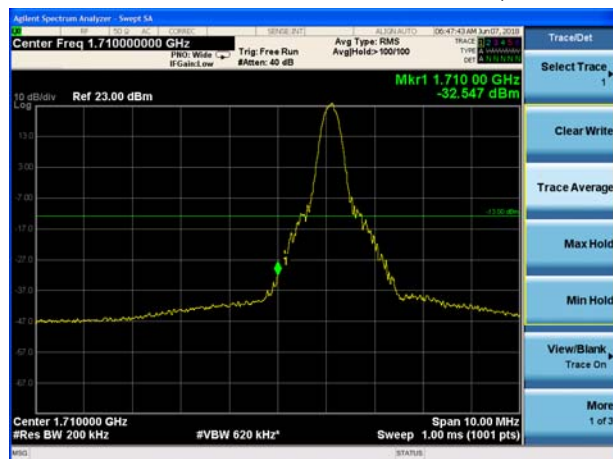
## LTE Band 4 16QAM 15MHz CH-Low, 1 RB



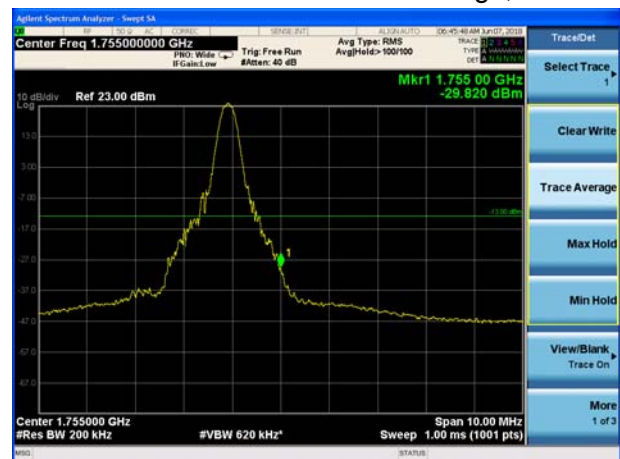
## LTE Band 4 16QAM 15MHz CH-High, 1 RB



## LTE Band 4 16QAM 20MHz CH-Low, 1 RB

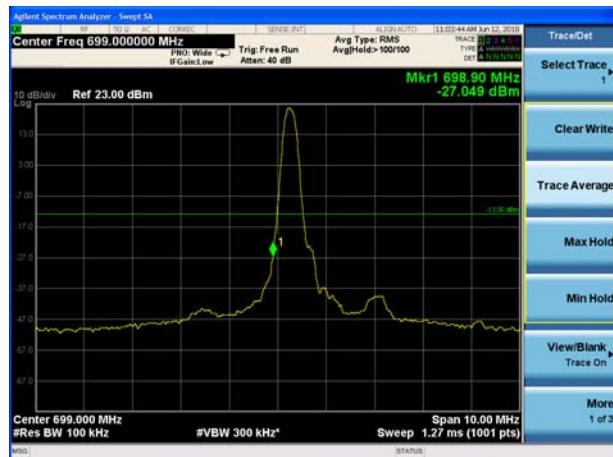


## LTE Band 4 16QAM 20MHz CH-High, 1 RB

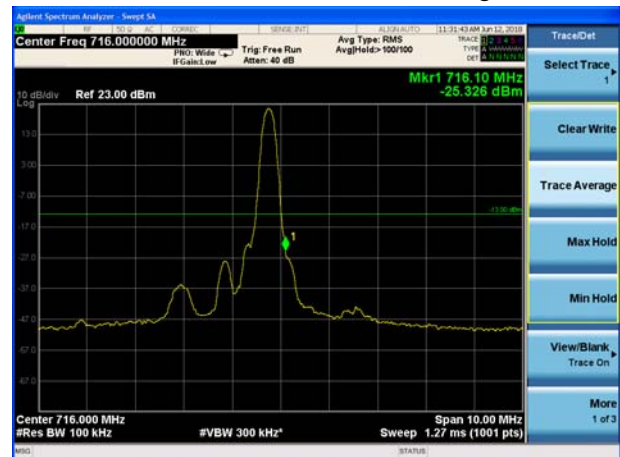
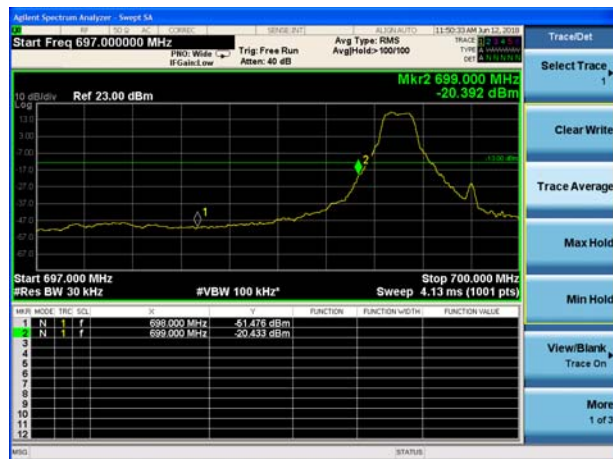
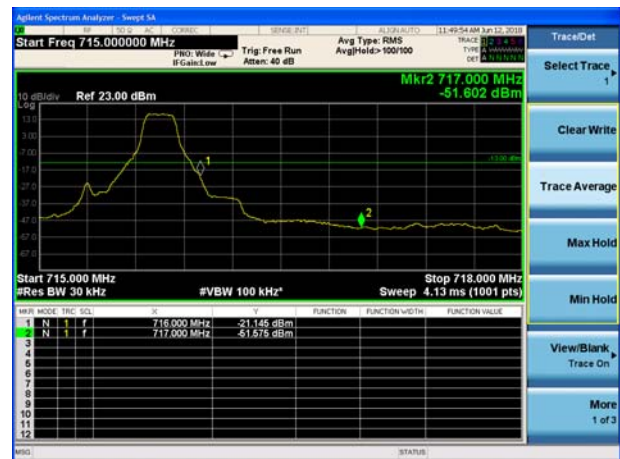




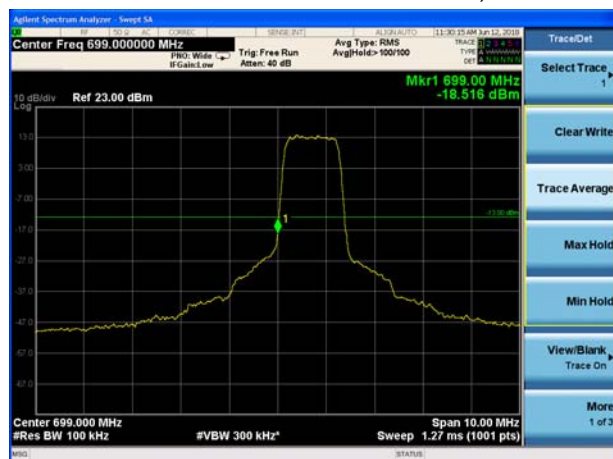
## LTE Band 12 QPSK 1.4MHz CH-Low, 1 RB



## LTE Band 12 QPSK 1.4MHz CH-High, 1 RB

LTE Band 12 QPSK 1.4MHz CH-Low, 1 RB  
698MHz~699MHzLTE Band 12 QPSK 1.4MHz CH-High, 1 RB  
716MHz~717MHz

## LTE Band 12 QPSK 1.4MHz CH-Low, 100%RB

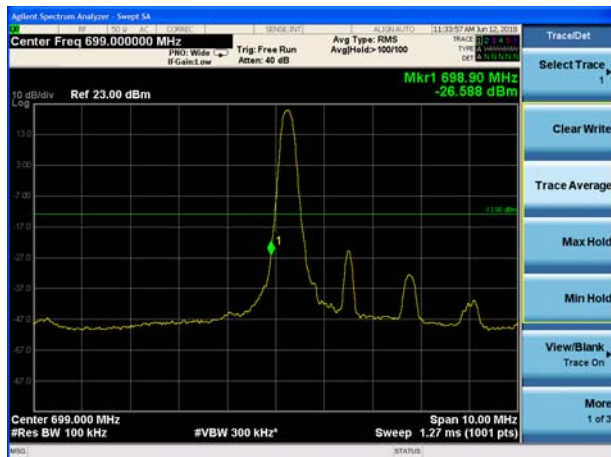


## LTE Band 12 QPSK 1.4MHz CH-High, 100%RB

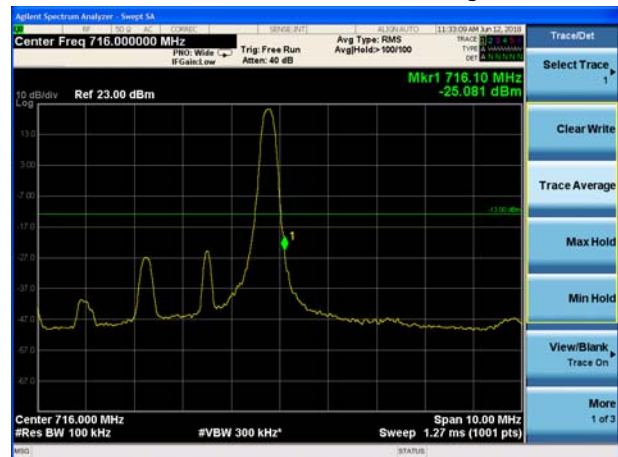
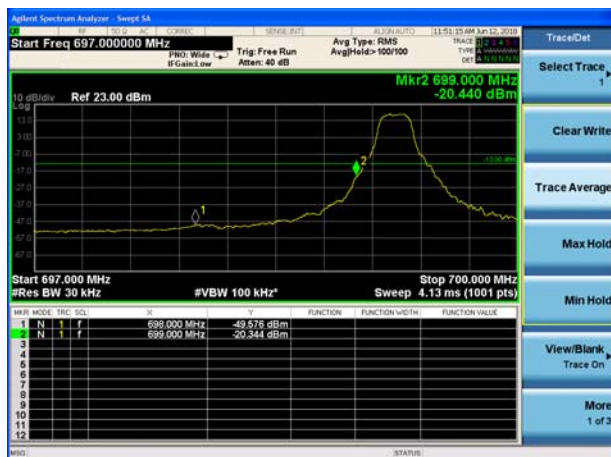
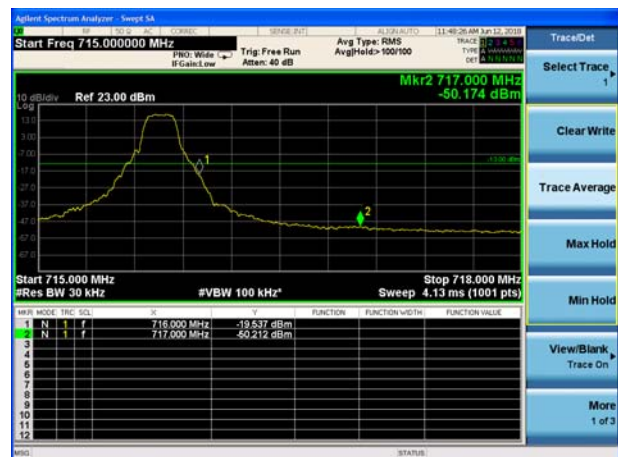




## LTE Band 12 QPSK 3MHz CH-Low, 1 RB



## LTE Band 12 QPSK 3MHz CH-High, 1 RB

LTE Band 12 QPSK 3MHz CH-Low, 1RB  
698MHz~699MHzLTE Band 12 QPSK 3MHz CH-High, 1RB  
698MHz~699MHz

## LTE Band 12 QPSK 3MHz CH-Low, 100%RB

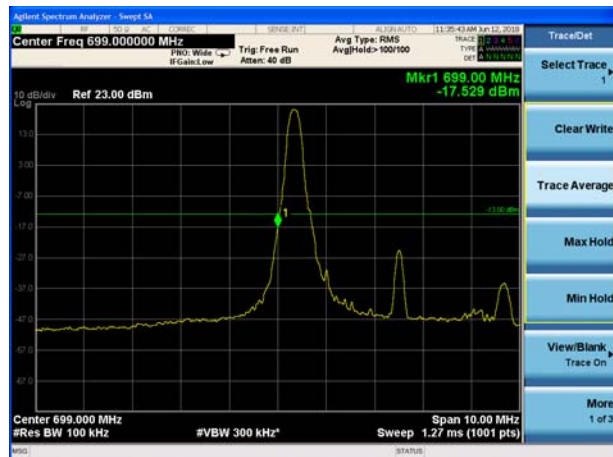


## LTE Band 12 QPSK 3MHz CH-High, 100%RB

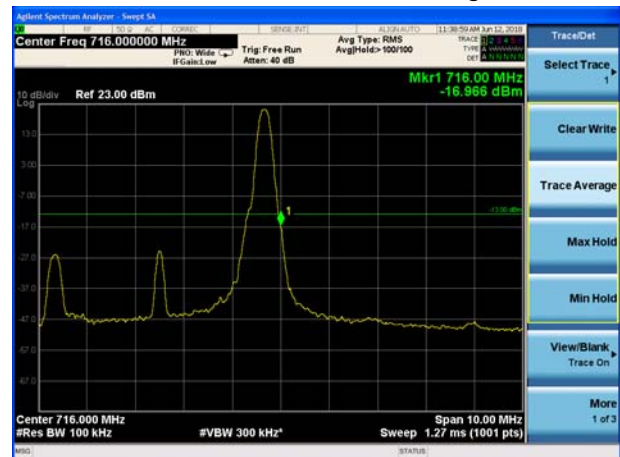




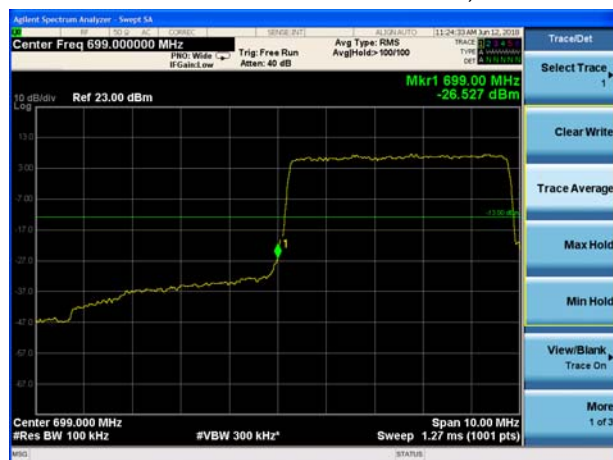
## LTE Band 12 QPSK 5MHz CH-Low, 1 RB



## LTE Band 12 QPSK 5MHz CH-High, 1 RB



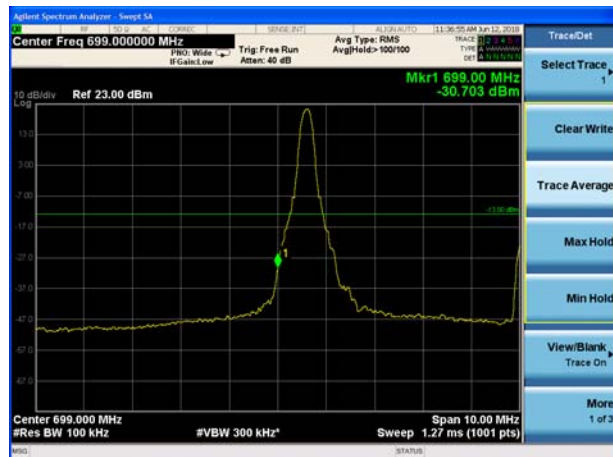
## LTE Band 12 QPSK 5MHz CH-Low, 100%RB



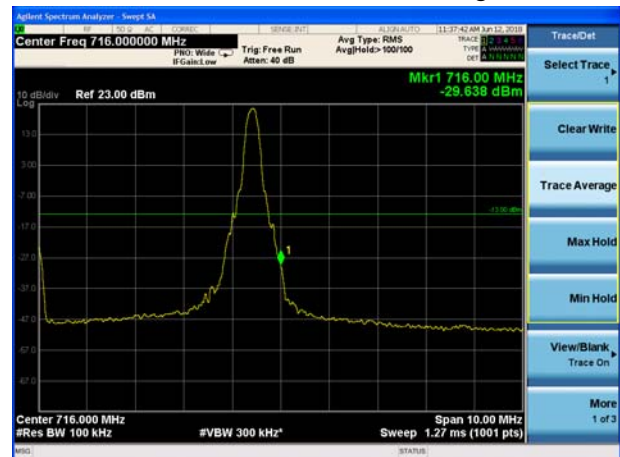
## LTE Band 12 QPSK 5MHz CH-High, 100%RB



## LTE Band 12 QPSK 10MHz CH-Low, 1 RB



## LTE Band 12 QPSK 10MHz CH-High, 1 RB





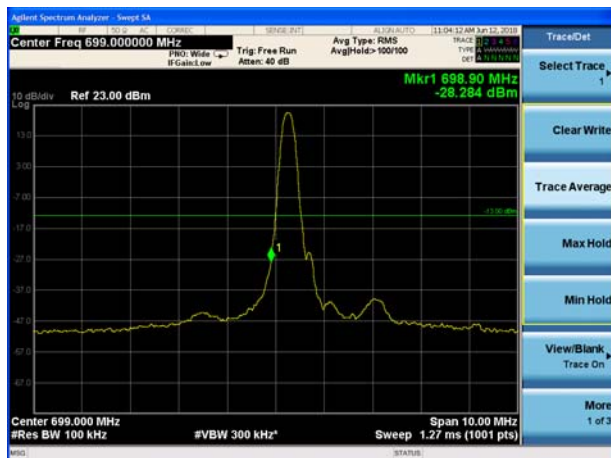
## LTE Band 12 QPSK 10MHz CH-Low, 100%RB



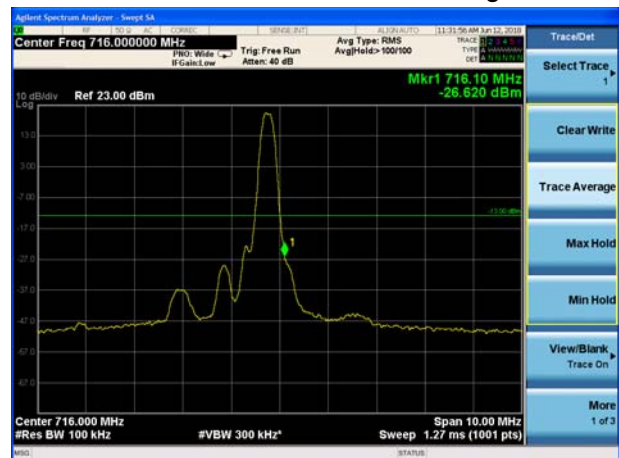
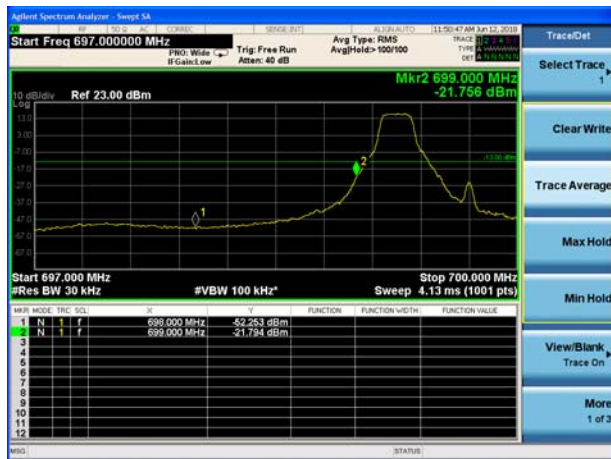
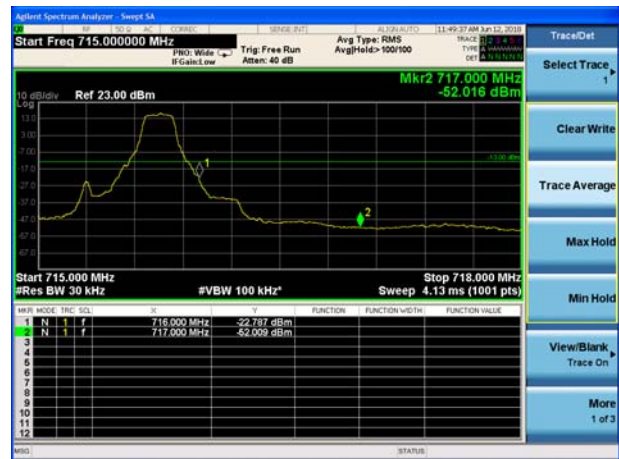
## LTE Band 12 QPSK 10MHz CH-High, 100%RB



## LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB

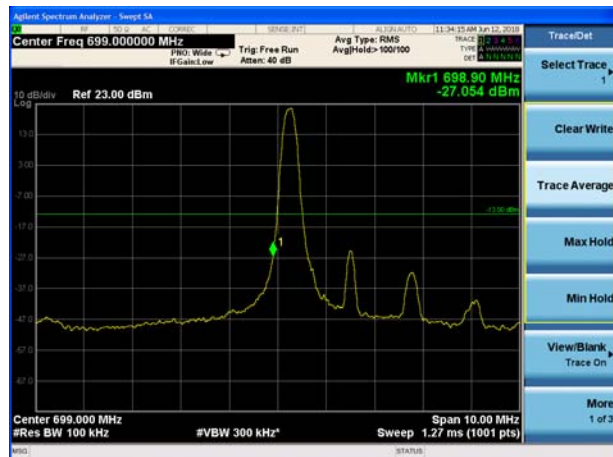


## LTE Band 12 16QAM 1.4MHz CH-High, 1 RB

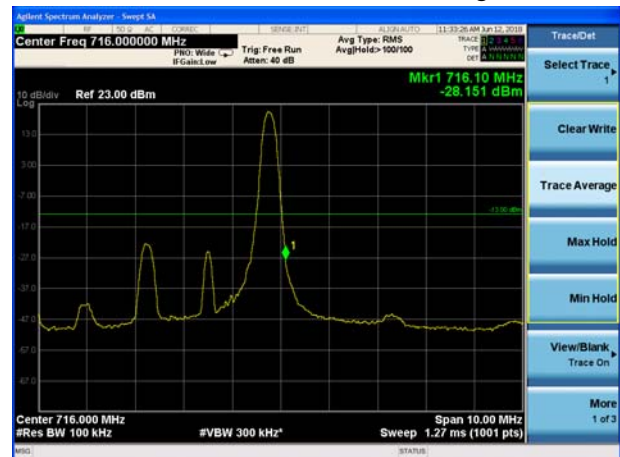
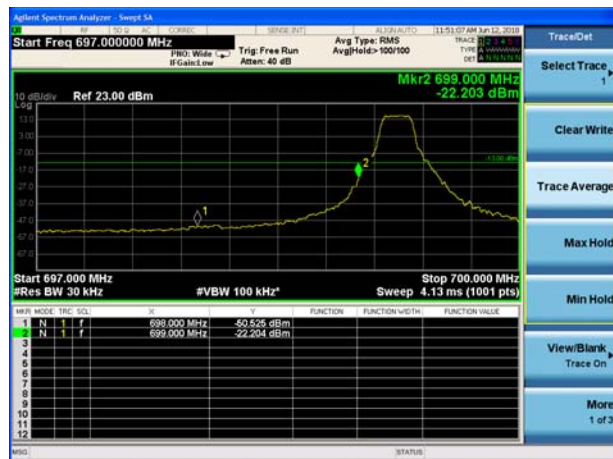
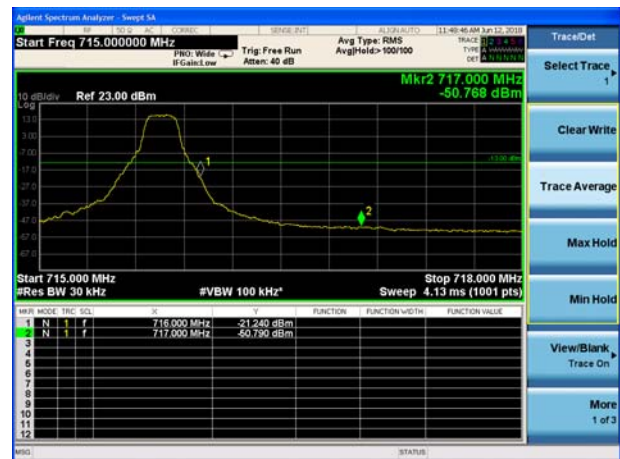
LTE Band 12 16QAM 1.4MHz CH-Low, 1 RB  
698MHz~699MHzLTE Band 12 16QAM 1.4MHz CH-High, 1 RB  
716MHz~717MHz



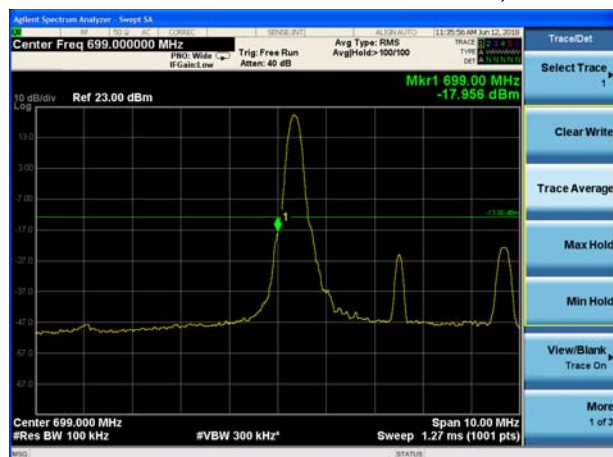
## LTE Band 12 16QAM 3MHz CH-Low, 1 RB



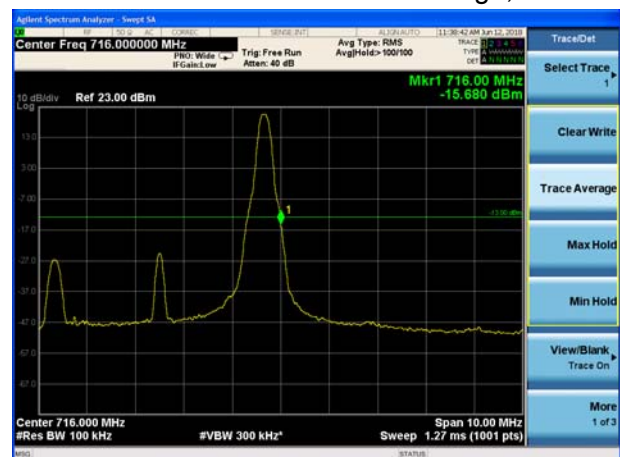
## LTE Band 12 16QAM 3MHz CH-High, 1 RB

LTE Band 12 16QAM 3MHz CH-Low, 1 RB  
698MHz~699MHzLTE Band 12 16QAM 3MHz CH-High, 1 RB  
716MHz~717MHz

## LTE Band 12 16QAM 5MHz CH-Low, 1 RB

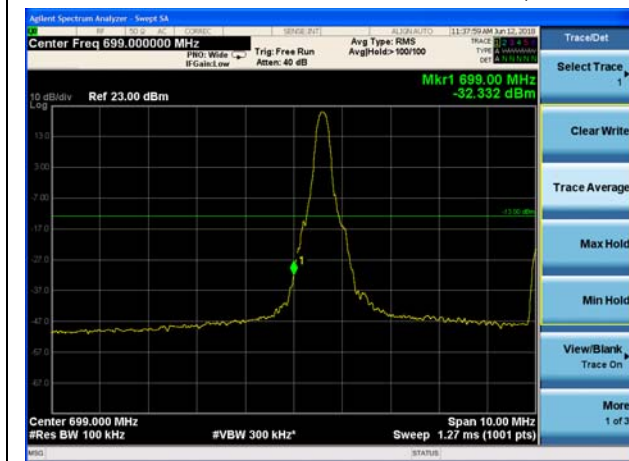


## LTE Band 12 16QAM 5MHz CH-High, 1 RB





## LTE Band 12 16QAM 10MHz CH-Low, 1 RB



## LTE Band 12 16QAM 10MHz CH-High, 1 RB

