

# TEST REPORT



**DT&C Co., Ltd.**

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1. Report No : DRTFCC1904-0111(1)
2. Customer
  - Name : LG Electronics USA, Inc.
  - Address : 1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632
3. Use of Report : FCC Original Grant
4. Product Name / Model Name : Mobile Phone / LM-G810EAW  
FCC ID : ZNFG810EAW
5. Test Method Used : KDB971168 D01v03r01, ANSI C63.26-2015, ANSI/TIA-603-E-2016  
Test Specification : §2, §22(H), §90
6. Date of Test : 2019.03.13 ~ 2019.04.15, 2019.05.08
7. Testing Environment : Refer to appended test report.
8. Test Result : Refer to the attached test result.

|             |                                |                               |
|-------------|--------------------------------|-------------------------------|
| Affirmation | Tested by                      | Reviewed by                   |
|             | Name : SunGeun Lee (Signature) | Name : GeunKi Son (Signature) |

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2019 . 05 . 09 .

**DT&C Co., Ltd.**

If this report is required to confirmation of authenticity, please contact to [report@dtnc.net](mailto:report@dtnc.net)

## Test Report Version

| Test Report No.    | Date          | Description                               |
|--------------------|---------------|-------------------------------------------|
| DRTFCC1904-0111    | Apr. 17, 2019 | Initial issue                             |
| DRTFCC1904-0111(1) | May. 09, 2019 | Corrected the ERP, retested the Band edge |
|                    |               |                                           |
|                    |               |                                           |
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## 1. GENERAL INFORMATION

**Applicant Name** : LG Electronics USA, Inc.  
**Address** : 1000 Sylvan Ave. Englewood Cliffs, New Jersey, United States 07632  
**FCC ID** : ZNFG810EAW  
**FCC Classification** : PCS Licensed Transmitter held to ear (PCE)  
**EUT Type** : Mobile Phone  
**Model Name** : LM-G810EAW  
**Add Model Name** : LMG810EAW, G810EAW, LM-G810EA, LMG810EA, G810EA, LM-G810RA, LMG810RA, G810RA  
**Supplying power** : DC 4.0 V  
**Antenna Information** : PIFA Antenna

| Mode        | TX Frequency (MHz) | Emission Designator | Modulation | Conducted output power |               | ERP             |               |
|-------------|--------------------|---------------------|------------|------------------------|---------------|-----------------|---------------|
|             |                    |                     |            | Max power (dBm)        | Max power (W) | Max power (dBm) | Max power (W) |
| LTE Band 26 | 821.5              | 13M4G7D             | QPSK       | 24.98                  | 0.315         | 18.95           | 0.079         |
| LTE Band 26 | 821.5              | 13M4W7D             | 16QAM      | 24.17                  | 0.261         | 18.03           | 0.064         |
| LTE Band 26 | 821.5              | 13M4W7D             | 64QAM      | 23.09                  | 0.204         | 16.08           | 0.041         |
| LTE Band 26 | 819.0              | 8M95G7D             | QPSK       | 25.05                  | 0.320         | 17.53           | 0.057         |
| LTE Band 26 | 819.0              | 8M95W7D             | 16QAM      | 24.14                  | 0.259         | 16.80           | 0.048         |
| LTE Band 26 | 819.0              | 8M92W7D             | 64QAM      | 23.24                  | 0.211         | 14.48           | 0.028         |
| LTE Band 26 | 816.5 ~ 821.5      | 4M49G7D             | QPSK       | 25.05                  | 0.320         | 18.44           | 0.070         |
| LTE Band 26 | 816.5 ~ 821.5      | 4M47W7D             | 16QAM      | 24.30                  | 0.269         | 18.22           | 0.066         |
| LTE Band 26 | 816.5 ~ 821.5      | 4M49W7D             | 64QAM      | 23.30                  | 0.214         | 15.91           | 0.039         |
| LTE Band 26 | 815.5 ~ 822.5      | 2M70G7D             | QPSK       | 25.04                  | 0.319         | 18.84           | 0.077         |
| LTE Band 26 | 815.5 ~ 822.5      | 2M69W7D             | 16QAM      | 24.35                  | 0.272         | 18.11           | 0.065         |
| LTE Band 26 | 815.5 ~ 822.5      | 2M69W7D             | 64QAM      | 23.27                  | 0.212         | 16.09           | 0.041         |
| LTE Band 26 | 814.7 ~ 823.3      | 1M08G7D             | QPSK       | 25.06                  | 0.321         | 18.74           | 0.075         |
| LTE Band 26 | 814.7 ~ 823.3      | 1M08W7D             | 16QAM      | 24.35                  | 0.272         | 17.90           | 0.062         |
| LTE Band 26 | 814.7 ~ 823.3      | 1M08W7D             | 64QAM      | 23.49                  | 0.223         | 15.80           | 0.038         |

## 2. INTRODUCTION

### 2.1 EUT DESCRIPTION

The Equipment Under Test (EUT) supports GSM/WCDMA/LTE Phone with Bluetooth, WLAN, NFC, WPC.

### 2.2 EUT CAPABILITIES

This EUT contains the following capabilities:

850/1900 GSM/EDGE, 850/1700/1900 WCDMA/HSUPA, Multi-band LTE, 802.11b/g/n/ac WLAN(2.4GHz)  
802.11a/n/ac WLAN(5GHz), Bluetooth(BDR, EDR, LE), NFC, WPC.

### 2.3 TESTING ENVIRONMENT

| Ambient Condition   |                 |
|---------------------|-----------------|
| ▪ Temperature       | +20 °C ~ +25 °C |
| ▪ Relative Humidity | 40 % ~ 45 %     |

### 2.4 MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

### 2.5 MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C 63.4-2014. All measurement uncertainty values are shown with a coverage factor of  $k = 2$  to indicate a 95 % level of confidence.

| Parameter                                | Measurement uncertainty                               |
|------------------------------------------|-------------------------------------------------------|
| Radiated Disturbance<br>(Below 1 GHz)    | 5.1 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated Disturbance<br>(1 GHz ~ 18 GHz) | 5.4 dB (The confidence level is about 95 %, $k = 2$ ) |
| Radiated Disturbance<br>(Above 18 GHz)   | 5.3 dB (The confidence level is about 95 %, $k = 2$ ) |

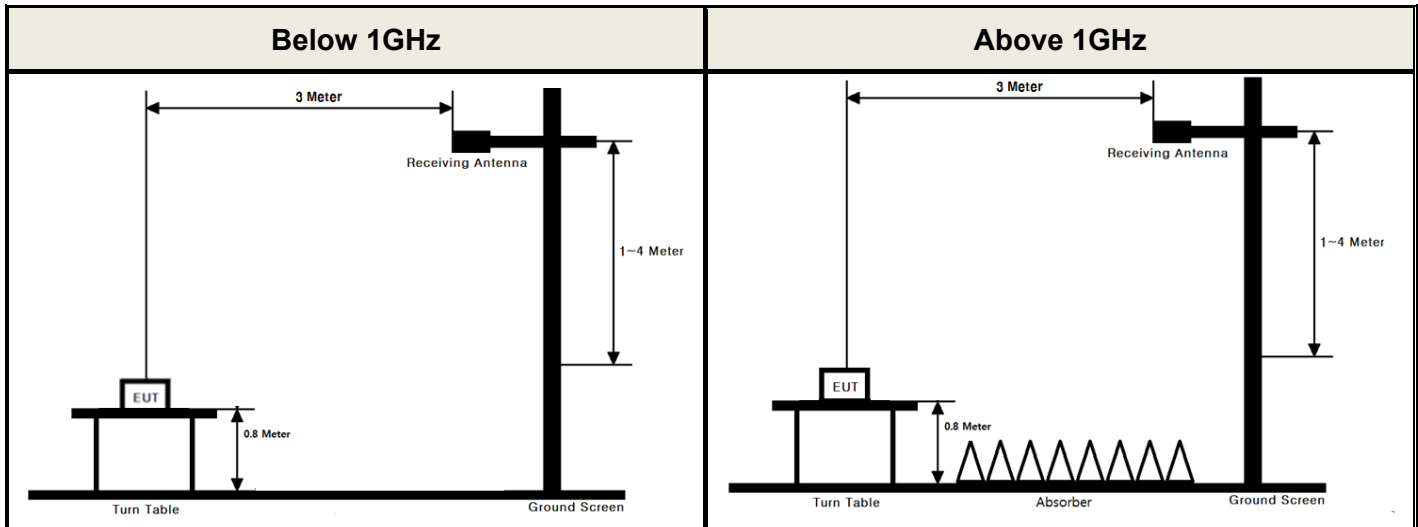
### 2.6 TEST FACILITY

|                                                                                                                                                                                                                                                    |   |                  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|------------------|
| <b>DT&amp;C Co., Ltd.</b>                                                                                                                                                                                                                          |   |                  |
| The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The site is constructed in conformance with the requirements. |   |                  |
| <b>- FCC MRA Accredited Test Firm No. : KR0034</b>                                                                                                                                                                                                 |   |                  |
| <a href="http://www.dtnet.net">www.dtnet.net</a>                                                                                                                                                                                                   |   |                  |
| Telephone                                                                                                                                                                                                                                          | : | + 82-31-321-2664 |
| FAX                                                                                                                                                                                                                                                | : | + 82-31-321-1664 |

### 3. DESCRIPTION OF TESTS

#### 3.1 ERP & EIRP (Effective Radiated Power & Equivalent Isotropic Radiated Power)

##### Test Set-up



These measurements were performed at 3 m test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

##### Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.17
- KDB971168 D01v03 - Section 5.2.2
- ANSI C63.26-2015 – Section 5.2.4.4.1

##### Test setting

1. Set span to 2 x to 3 x the OBW.
2. Set RBW = 1% to 5% of the OBW.
3. Set VBW  $\geq 3 \times$  RBW.
4. Set number of points in sweep  $\geq 2 \times$  span / RBW.
5. Sweep time:
  - 1) Set = auto-couple, or
  - 2) Set  $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$  for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6. Detector = power averaging (rms).
7. If the EUT can be configured to transmit continuously, then set the trigger to free run.
8. If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full-power transmissions).
9. Trace average at least 100 traces in power averaging (rms) mode if sweep is set to auto-couple. To accurately determine the average power over multiple symbols, it can be necessary to increase the number of traces to be averaged above 100 or, if using a manually configured sweep time, increase the sweep time.

10. Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.

The receiver antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

A half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same receive spectrum analyzer reading. The conducted power at the terminal of the substitute antenna is measured.

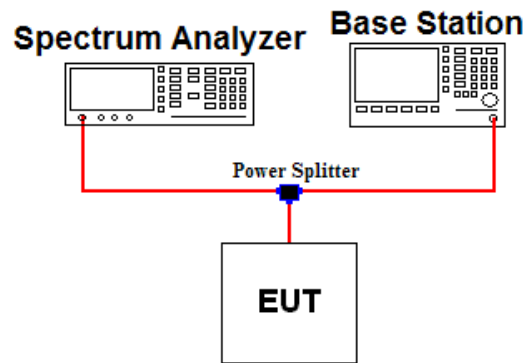
The ERP/EIRP is calculated using the following formula:

**ERP/EIRP = The conducted power at the substitute antenna's terminal [dBm] + Substitute Antenna gain [dBd for ERP , dBi for EIRP]**

For readings above 1 GHz, the above procedure is repeated using horn antennas and the difference between the gain of the horn antenna and an isotropic antenna are taken into consideration.

### 3.2 OCCUPIED BANDWIDTH.

#### *Test set-up*



#### *Test Procedure*

- KDB971168 D01v03 - Section 4.3
- ANSI C63.26-2015 – Section 5.4.4

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power of a given emission.

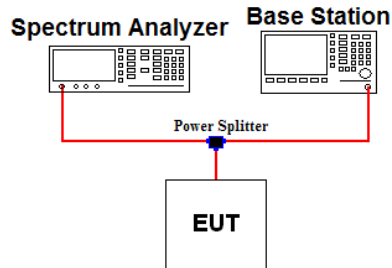
#### Test setting

1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2.  $RBW = 1 \sim 5 \%$  of the expected OBW &  $VBW \geq 3 \times RBW$
3. Detector = Peak
4. Trance mode = Max hold
5. Sweep = Auto couple
6. The trace was allowed to stabilize
7. If necessary, step 2 ~ 6 were repeated after changing the RBW such that it would be within 1 ~ 5 % of the 99 % occupied bandwidth observed in step 6.



### 3.3 BAND EDGE EMISSIONS AT ANTENNA TERMINAL

#### Test set-up



#### Test Procedure

- KDB971168 D01v03 - Section 6, KDB971168D02v02 - Section 8
- ANSI C63.26-2015 – Section 5.7

All out of band emissions are measured by means of a calibrated spectrum analyzer. Out-of-band emission requirement shall apply only to the “outer” channels included in an EA license and to spectrum adjacent to interior channels used by incumbent licensees. The EUT was setup to maximum output power at its lowest and highest channel with all bandwidths, modulations and RB configurations.

For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

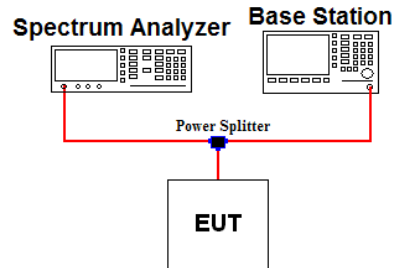
Section 90.691(a) compliance testing, use RBW = 300 Hz for offsets less than 37.5 kHz from a channel edge; RBW = 100 kHz for offsets greater than 37.5 kHz is allowed.

#### Test setting

1. Span was set large enough so as to capture all out of band emissions near the band edge
2. RBW = 300 Hz & VBW  $\geq 3 \times$  RBW (less than 37.5 kHz from a channel edge)  
RBW = 100 KHz & VBW  $\geq 3 \times$  RBW (greater than 37.5 kHz from a channel edge)
3. Detector = RMS & Trace mode = Average
4. Sweep time = Auto couple
5. The trace was allowed to stabilize

### 3.4 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL

#### Test set-up



#### Test Procedure

- KDB971168 D01v03 - Section 6
- ANSI C63.26-2015 – Section 5.7

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The EUT was setup to maximum output power at its low, middle, high channel with all bandwidths, modulations and RB configurations. The spectrum is scanned from 9 kHz up to a frequency including its 10<sup>th</sup> harmonic.

The power of any spurious emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB.

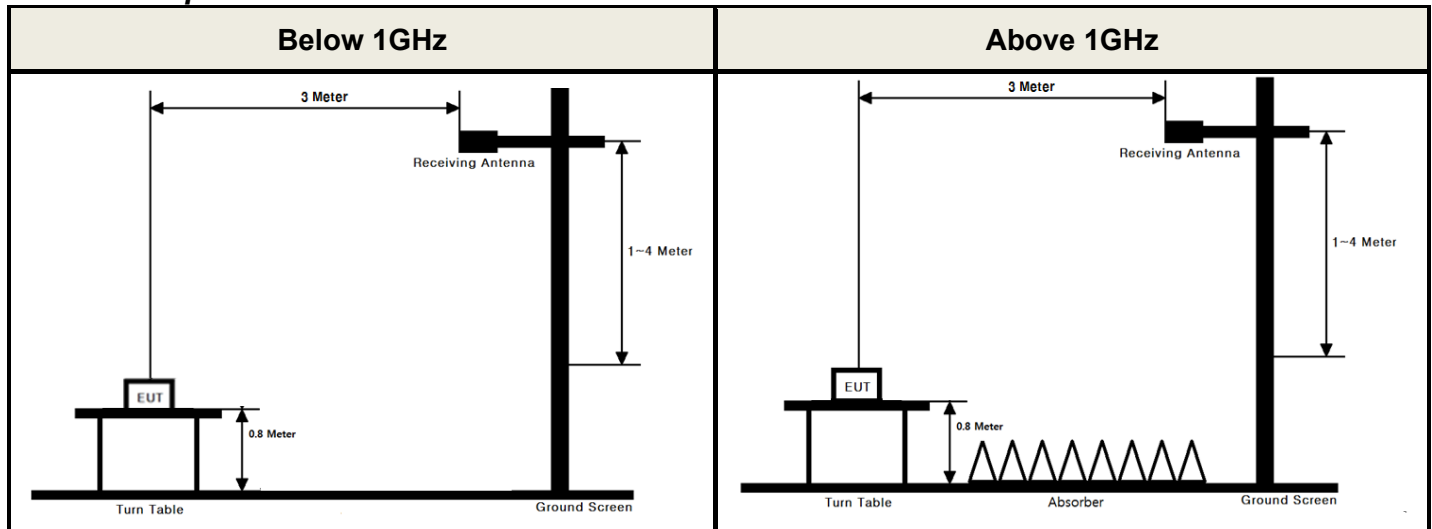
#### Test setting

1. RBW = 100 kHz(Below 1 GHz) or 1 MHz(Above 1 GHz) & VBW  $\geq 3 \times$  RBW ( Refer to Note 1)
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq 2 \times$  span / RBW
5. The trace was allowed to stabilize

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

### 3.5 UNDESIRABLE EMISSIONS

#### Test Set-up



These measurements were performed at 3 test site. The equipment under test is placed on a non-conductive table 0.8-meters above a turntable which is flush with the ground plane and 3 meters from the receive antenna. For measurements above 1GHz absorbers are placed on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1 GHz, the absorbers are removed.

#### Test Procedure

- ANSI/TIA-603-E-2016 - Section 2.2.12
- KDB971168 D01v03 - Section 5.8
- ANSI C63.26-2015 – Section 5.5

#### Test setting

1. RBW = 100 kHz for below 1 GHz and 1 MHz for above 1 GHz / VBW  $\geq 3 \times$  RBW
2. Detector = RMS & Trace mode = Max hold
3. Sweep time = Auto couple
4. Number of sweep point  $\geq 2 \times$  span / RBW
5. The trace was allowed to stabilize

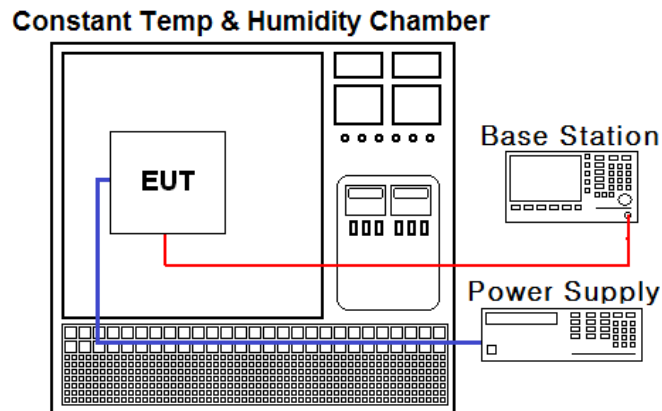
The receive antenna height and turntable rotations were adjusted for the highest reading on the receive spectrum analyzer.

For radiated power measurements below 1 GHz, a half-wave dipole was substituted in place of the EUT. This dipole antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading.

For radiated power measurements above 1 GHz, a Horn antenna was substituted in place of the EUT. This Horn antenna was driven by a signal generator and the level of the signal generator was adjusted to obtain the same spectrum analyzer reading. The difference between the gain of the horn and an isotropic antenna are taken into consideration.

### 3.6 FREQUENCY STABILITY

#### Test Set-up



#### Test Procedure

- ANSI/TIA-603-E-2016
- KDB971168 D01v03 - Section 9

The frequency stability of the transmitter is measured by:

a.) **Temperature:**

The temperature is varied from - 30 °C to + 50 °C using an environmental chamber.

b.) **Primary Supply Voltage:**

The primary supply voltage is varied from 85 % to 115 % of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacturer.

#### Specification:

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block for Part 24, 27. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5$  ppm) of the center frequency for Part 22, 90.

#### Time Period and Procedure:

1. The carrier frequency of the transmitter is measured at room temperature.  
(20 °C to provide a reference)
2. The equipment is turned on in a "standby" condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3. Frequency measurements are made at 10 °C intervals ranging from -30 °C to +50 °C.  
A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

## 4. LIST OF TEST EQUIPMENT

| Type                         | Manufacturer         | Model                      | Cal.Date<br>(yy/mm/dd) | Next.Cal. Date<br>(yy/mm/dd) | S/N        |
|------------------------------|----------------------|----------------------------|------------------------|------------------------------|------------|
| Spectrum Analyzer            | Agilent Technologies | N9020A                     | 18/07/09               | 19/07/09                     | MY46471251 |
| Spectrum Analyzer            | Agilent Technologies | N9020A                     | 18/07/09               | 19/07/09                     | MY50200834 |
| Spectrum Analyzer            | Agilent Technologies | N9030A                     | 18/07/09               | 19/07/09                     | MY53310140 |
| DC power supply              | Agilent Technologies | 66332A                     | 18/07/02               | 19/07/02                     | MY43000394 |
| Multimeter                   | FLUKE                | 17B                        | 18/12/18               | 19/12/18                     | 26030065WS |
| Power Splitter               | Anritsu              | K241B                      | 18/12/19               | 19/12/19                     | 016681     |
| Temp & Humi                  | SJ Science           | SJ-TH-S50                  | 18/07/06               | 19/07/06                     | U5542113   |
| Radio Communication Analyzer | Anritsu              | MT8820C                    | 18/07/03               | 19/07/03                     | 6200978101 |
| Thermohygrometer             | BODYCOM              | BJ5478                     | 18/12/27               | 19/12/27                     | 120612-2   |
| Thermohygrometer             | BODYCOM              | BJ5478                     | 18/12/27               | 19/12/27                     | 120612-1   |
| Signal Generator             | Rohde Schwarz        | SMBV100A                   | 18/12/19               | 19/12/19                     | 255571     |
| Signal Generator             | ANRITSU              | SMF100A                    | 18/06/07               | 19/06/07                     | 102341     |
| Loop Antenna                 | Schwarzbeck          | FMZB1513                   | 18/01/30               | 20/01/30                     | 1513-128   |
| Bilog Antenna                | Schwarzbeck          | VULB 9160                  | 18/07/13               | 20/07/13                     | 3359       |
| Dipole Antenna               | Schwarzbeck          | VHA9103                    | 18/04/13               | 20/04/13                     | 2117       |
| Dipole Antenna               | Schwarzbeck          | UHA9105                    | 18/04/13               | 20/04/13                     | 2262       |
| HORN ANT                     | ETS                  | 3117                       | 18/05/10               | 20/05/10                     | 00140394   |
| Amplifier                    | EMPOWER              | BBS3Q7ELU                  | 18/07/10               | 19/07/10                     | 1020       |
| PreAmplifier                 | H.P                  | 8447D                      | 18/12/18               | 19/12/18                     | 2944A07774 |
| PreAmplifier                 | Agilent Technologies | 8449B                      | 18/07/05               | 19/07/05                     | 3008A02108 |
| High-pass filter             | Wainwright           | WHKX12-935-1000-15000-40SS | 18/07/05               | 19/07/05                     | 7          |
| Cable                        | DTNC                 | Cable                      | 18/07/06               | 19/07/06                     | M-01       |
| Cable                        | DTNC                 | Cable                      | 18/07/06               | 19/07/06                     | M-02       |
| Cable                        | Junkosha             | MWX315                     | 18/11/19               | 19/11/19                     | M-05       |
| Cable                        | Junkosha             | MWX221                     | 18/11/19               | 19/11/19                     | M-06       |
| Cable                        | DTNC                 | Cable                      | 18/07/05               | 19/07/05                     | RF-73      |
| Cable                        | DTNC                 | Cable                      | 18/07/05               | 19/07/05                     | RF-84      |

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.

Note2: The cable is not a regular calibration item, so it has been calibrated by DT & C itself.

## 5. SUMMARY OF TEST RESULTS

| FCC Part Section(s) | Test Description                            | Test Limit                                                                                                                                                                              | Test Condition | Status<br>Note 1 |
|---------------------|---------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|------------------|
| 2.1046<br>90.635    | Conducted Output Power                      | < 100 Watts                                                                                                                                                                             | Conducted      | <b>C</b>         |
| 2.1049              | Occupied Bandwidth                          | N/A                                                                                                                                                                                     |                | <b>C</b>         |
| 2.1051<br>90.691    | Band Edge /<br>Conducted Spurious Emissions | > 43 + 10log <sub>10</sub> (P) dB for all out-of-band emissions except<br>> 50 + 10log <sub>10</sub> (P) dB at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge |                | <b>C</b>         |
| 2.1055<br>90.213    | Frequency Stability                         | < 2.5 ppm                                                                                                                                                                               |                | <b>C</b>         |
| 22.913(a.5)         | Radiated Output Power                       | < 7 Watts max. ERP                                                                                                                                                                      | Radiated       | <b>C</b> Note2,3 |
| 2.1053<br>90.691    | Undesirable Emissions                       | > 43 + 10log <sub>10</sub> (P) dB for all out-of-band emissions except<br>> 50 + 10log <sub>10</sub> (P) dB at Band Edge and for all out-of-band emissions within 37.5kHz of Block Edge |                | <b>C</b> Note2,3 |

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: This test item was performed in each axis and the worst case data was reported.

Note 3: This device supports wireless charging capability.

So per KDB 648474 D03 v01r04, the radiated test items were performed both normal and charging conditions. For wireless charging condition, the handset is placed on the representative charging pad under normal conditions and in a simulated call configuration.

## 6. SAMPLE CALCULATION

### A. Emission Designator

#### LTE Band 26(QPSK)

Emission Designator = **13M4G7D**

LTE OBW = 13.426 MHz

G = Phase Modulation

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 26(16QAM)

Emission Designator = **13M4W7D**

LTE OBW = 13.402 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

#### LTE Band 26(64QAM)

Emission Designator = **13M4W7D**

LTE OBW = 13.360 MHz

W = Amplitude/Angle Modulated

7 = Quantized/Digital Info

D = Data Transmission

### B. For substitution method

| Channel Bandwidth (MHz) | Test Frequency (MHz) | Test Mode | RB Size/ Offset | Spectrum Reading Value(dBm) | EUT Axis | Ant Pol (H/V) | Level(dBm) @ Ant Terminal | TX Ant Gain (dBd) | ERP (dBm) | ERP (W) |
|-------------------------|----------------------|-----------|-----------------|-----------------------------|----------|---------------|---------------------------|-------------------|-----------|---------|
| 15                      | 821.5                | QPSK      | 1/0             | -16.91                      | X        | H             | 17.72                     | 1.23              | 18.95     | 0.079   |

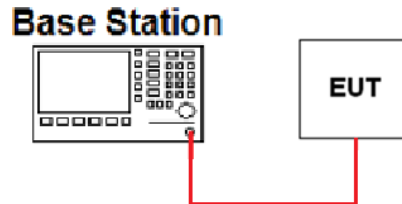
#### ERP or EIRP = Level @ Ant Terminal LEVEL(dBm) + Tx Ant. Gain

- 1) The EUT mounted on a non-conductive turntable is 0.8 meter above test site ground level.
- 2) During the test, the turn table is rotated until the maximum signal is found.
- 3) Record the field strength meter's level.
- 4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.
- 5) Increase the signal generator output till the field strength meter's level is equal to the item (3).
- 6) The signal generator output level with substituted antenna gain is the rating of ERP, EIRP or Radiated spurious emission.

## 7. TEST DATA

### 7.1 CONDUCTED OUTPUT POWER

A base station simulator was used to establish communication with the EUT. The base station simulator parameters were set to produce the maximum power from the EUT. This device was tested under all configurations and the highest power is reported. Conducted Output Powers of EUT are reported below.



Note 1: The conducted output power was measured using the Anritsu MT8820C.

| Channel Bandwidth (MHz) | Test Frequency (MHz) | Test Mode | Conducted Output power (dBm) | Conducted Output power (W) |
|-------------------------|----------------------|-----------|------------------------------|----------------------------|
| 15                      | 821.5                | QPSK      | 24.98                        | 0.315                      |
|                         |                      | 16QAM     | 24.17                        | 0.261                      |
|                         |                      | 64QAM     | 23.09                        | 0.204                      |
| 10                      | 819                  | QPSK      | 25.05                        | 0.320                      |
|                         |                      | 16QAM     | 24.14                        | 0.259                      |
|                         |                      | 64QAM     | 23.24                        | 0.211                      |
| 5                       | 816.5                | QPSK      | 25.05                        | 0.320                      |
|                         |                      | 16QAM     | 24.23                        | 0.265                      |
|                         |                      | 64QAM     | 23.24                        | 0.211                      |
|                         | 821.5                | QPSK      | 25.02                        | 0.318                      |
|                         |                      | 16QAM     | 24.30                        | 0.269                      |
|                         |                      | 64QAM     | 23.30                        | 0.214                      |
| 3                       | 815.5                | QPSK      | 25.04                        | 0.319                      |
|                         |                      | 16QAM     | 24.24                        | 0.265                      |
|                         |                      | 64QAM     | 23.20                        | 0.209                      |
|                         | 819                  | QPSK      | 25.03                        | 0.318                      |
|                         |                      | 16QAM     | 24.19                        | 0.262                      |
|                         |                      | 64QAM     | 23.27                        | 0.212                      |
|                         | 822.5                | QPSK      | 25.00                        | 0.316                      |
|                         |                      | 16QAM     | 24.35                        | 0.272                      |
|                         |                      | 64QAM     | 23.25                        | 0.211                      |
| 1.4                     | 814.7                | QPSK      | 25.06                        | 0.321                      |
|                         |                      | 16QAM     | 24.19                        | 0.262                      |
|                         |                      | 64QAM     | 23.22                        | 0.210                      |
|                         | 819                  | QPSK      | 25.00                        | 0.316                      |
|                         |                      | 16QAM     | 24.35                        | 0.272                      |
|                         |                      | 64QAM     | 23.49                        | 0.223                      |
|                         | 823.3                | QPSK      | 25.04                        | 0.319                      |
|                         |                      | 16QAM     | 24.34                        | 0.272                      |
|                         |                      | 64QAM     | 23.41                        | 0.219                      |



## **7.2 OCCUPIED BANDWIDTH**

- Plots of the EUT's Occupied Bandwidth are shown in Clause 8.1

## **7.3 BAND EDGE EMISSIONS (Conducted)**

- Plots of the EUT's Band Edge Emissions are shown in Clause 8.2

## **7.4 SPURIOUS AND HARMONICS EMISSIONS (Conducted)**

- Plots of the EUT's Spurious Emissions are shown in Clause 8.3

## 7.5 ERP

- Measurement data: Without wireless charging pad

| Channel Bandwidth (MHz) | Test Frequency (MHz) | Test Mode | RB Size/ Offset | Ant Pol (H/V) | Level(dBm) @ Ant Terminal | TX Ant Gain (dBd) | ERP (dBm) | ERP (W) |
|-------------------------|----------------------|-----------|-----------------|---------------|---------------------------|-------------------|-----------|---------|
| 15                      | 821.5                | QPSK      | 1/0             | H             | 17.72                     | 1.23              | 18.95     | 0.079   |
|                         |                      | 16QAM     | 1/0             | H             | 16.74                     | 1.23              | 17.97     | 0.063   |
|                         |                      | 64QAM     | 1/0             | H             | 14.85                     | 1.23              | 16.08     | 0.041   |
| 10                      | 819                  | QPSK      | 1/49            | H             | 16.30                     | 1.23              | 17.53     | 0.057   |
|                         |                      | 16QAM     | 1/49            | H             | 15.57                     | 1.23              | 16.80     | 0.048   |
|                         |                      | 64QAM     | 1/49            | H             | 13.25                     | 1.23              | 14.48     | 0.028   |
| 5                       | 816.5                | QPSK      | 1/12            | H             | 17.14                     | 1.24              | 18.38     | 0.069   |
|                         |                      | 16QAM     | 1/12            | H             | 16.61                     | 1.24              | 17.85     | 0.061   |
|                         |                      | 64QAM     | 1/12            | H             | 14.11                     | 1.24              | 15.35     | 0.034   |
|                         | 821.5                | QPSK      | 1/24            | H             | 16.17                     | 1.23              | 17.40     | 0.055   |
|                         |                      | 16QAM     | 1/24            | H             | 15.38                     | 1.23              | 16.61     | 0.046   |
|                         |                      | 64QAM     | 1/24            | H             | 13.46                     | 1.23              | 14.69     | 0.029   |
| 3                       | 815.5                | QPSK      | 1/7             | H             | 17.60                     | 1.24              | 18.84     | 0.077   |
|                         |                      | 16QAM     | 1/7             | H             | 16.87                     | 1.24              | 18.11     | 0.065   |
|                         |                      | 64QAM     | 1/7             | H             | 14.85                     | 1.24              | 16.09     | 0.041   |
|                         | 819                  | QPSK      | 1/0             | H             | 16.43                     | 1.23              | 17.66     | 0.058   |
|                         |                      | 16QAM     | 1/0             | H             | 15.59                     | 1.23              | 16.82     | 0.048   |
|                         |                      | 64QAM     | 1/0             | H             | 13.65                     | 1.23              | 14.88     | 0.031   |
|                         | 822.5                | QPSK      | 1/14            | H             | 16.42                     | 1.23              | 17.65     | 0.058   |
|                         |                      | 16QAM     | 1/14            | H             | 15.64                     | 1.23              | 16.87     | 0.049   |
|                         |                      | 64QAM     | 1/14            | H             | 13.86                     | 1.23              | 15.09     | 0.032   |
| 1.4                     | 814.7                | QPSK      | 1/2             | H             | 17.50                     | 1.24              | 18.74     | 0.075   |
|                         |                      | 16QAM     | 1/2             | H             | 16.66                     | 1.24              | 17.90     | 0.062   |
|                         |                      | 64QAM     | 1/2             | H             | 14.56                     | 1.24              | 15.80     | 0.038   |
|                         | 819                  | QPSK      | 1/0             | H             | 15.81                     | 1.23              | 17.04     | 0.051   |
|                         |                      | 16QAM     | 1/0             | H             | 15.36                     | 1.23              | 16.59     | 0.046   |
|                         |                      | 64QAM     | 1/0             | H             | 13.42                     | 1.23              | 14.65     | 0.029   |
|                         | 823.3                | QPSK      | 1/2             | H             | 16.20                     | 1.23              | 17.43     | 0.055   |
|                         |                      | 16QAM     | 1/2             | H             | 15.29                     | 1.23              | 16.52     | 0.045   |
|                         |                      | 64QAM     | 1/2             | H             | 13.44                     | 1.23              | 14.67     | 0.029   |

Note1: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

**- Measurement data: Without wireless charging pad**

| Channel Bandwidth (MHz) | Test Frequency (MHz) | Test Mode | RB Size/ Offset | Ant Pol (H/V) | Level(dBm) @ Ant Terminal | TX Ant Gain (dBd) | ERP (dBm) | ERP (W) |
|-------------------------|----------------------|-----------|-----------------|---------------|---------------------------|-------------------|-----------|---------|
| 15                      | 821.5                | QPSK      | 1/0             | H             | 17.39                     | 1.23              | 18.62     | 0.073   |
|                         |                      | 16QAM     | 1/0             | H             | 16.80                     | 1.23              | 18.03     | 0.064   |
|                         |                      | 64QAM     | 1/0             | H             | 14.78                     | 1.23              | 16.01     | 0.040   |
| 10                      | 819                  | QPSK      | 1/49            | H             | 15.48                     | 1.23              | 16.71     | 0.047   |
|                         |                      | 16QAM     | 1/49            | H             | 14.89                     | 1.23              | 16.12     | 0.041   |
|                         |                      | 64QAM     | 1/49            | H             | 12.77                     | 1.23              | 14.00     | 0.025   |
| 5                       | 816.5                | QPSK      | 1/12            | H             | 17.20                     | 1.24              | 18.44     | 0.070   |
|                         |                      | 16QAM     | 1/12            | H             | 16.98                     | 1.24              | 18.22     | 0.066   |
|                         |                      | 64QAM     | 1/12            | H             | 14.67                     | 1.24              | 15.91     | 0.039   |
| 3                       | 815.5                | QPSK      | 1/7             | H             | 17.46                     | 1.24              | 18.70     | 0.074   |
|                         |                      | 16QAM     | 1/7             | H             | 16.74                     | 1.24              | 17.98     | 0.063   |
|                         |                      | 64QAM     | 1/7             | H             | 14.54                     | 1.24              | 15.78     | 0.038   |
| 1.4                     | 814.7                | QPSK      | 1/2             | H             | 17.17                     | 1.24              | 18.41     | 0.069   |
|                         |                      | 16QAM     | 1/2             | H             | 16.56                     | 1.24              | 17.80     | 0.060   |
|                         |                      | 64QAM     | 1/2             | H             | 14.37                     | 1.24              | 15.61     | 0.036   |

Note1: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

## 7.6 UNDESIRABLE EMISSIONS (Radiated)

- Measurement data: Without wireless charging pad

| B.W<br>(MHz) | Test<br>Freq.<br>(MHz) | RB<br>Size/<br>Offset | Test<br>Mode | Freq.(MHz) | Ant<br>Pol<br>(H/V) | Level(dBm)<br>@ Ant<br>Terminal | TX Ant<br>Gain(dBd) | Result |       | Limit<br>(dBc) |
|--------------|------------------------|-----------------------|--------------|------------|---------------------|---------------------------------|---------------------|--------|-------|----------------|
|              |                        |                       |              |            |                     |                                 |                     | (dBm)  | (dBc) |                |
| 15           | 821.5                  | 1/0                   | QPSK         | 1631.10    | H                   | -58.30                          | 3.83                | -54.47 | 73.42 | 31.95          |
|              |                        |                       | 16QAM        | 1629.65    | H                   | -57.92                          | 3.83                | -54.09 | 72.06 | 30.97          |
|              |                        |                       | 64QAM        | 1633.40    | H                   | -57.93                          | 3.83                | -54.10 | 70.18 | 29.08          |
| 10           | 819                    | 1/49                  | QPSK         | 1652.94    | H                   | -56.48                          | 3.83                | -52.65 | 70.18 | 30.53          |
|              |                        |                       | 16QAM        | 1649.17    | H                   | -57.58                          | 3.82                | -53.76 | 70.56 | 29.80          |
|              |                        |                       | 64QAM        | 1653.30    | H                   | -57.77                          | 3.83                | -53.94 | 68.42 | 27.48          |
| 5            | 816.5                  | 1/12                  | QPSK         | 1633.20    | H                   | -57.60                          | 3.83                | -53.77 | 72.15 | 31.38          |
|              |                        |                       | 16QAM        | 1631.01    | H                   | -57.18                          | 3.83                | -53.35 | 71.20 | 30.85          |
|              |                        |                       | 64QAM        | 1633.05    | H                   | -58.16                          | 3.83                | -54.33 | 69.68 | 28.35          |
|              | 821.5                  | 1/24                  | QPSK         | 1645.82    | H                   | -56.80                          | 3.82                | -52.98 | 70.38 | 30.40          |
|              |                        |                       | 16QAM        | 1647.22    | H                   | -58.27                          | 3.82                | -54.45 | 71.06 | 29.61          |
|              |                        |                       | 64QAM        | 1647.58    | H                   | -58.35                          | 3.82                | -54.53 | 69.22 | 27.69          |
| 3            | 815.5                  | 1/7                   | QPSK         | 1631.25    | H                   | -57.91                          | 3.83                | -54.08 | 72.92 | 31.84          |
|              |                        |                       | 16QAM        | 1629.51    | H                   | -57.58                          | 3.83                | -53.75 | 71.86 | 31.11          |
|              |                        |                       | 64QAM        | 1632.60    | H                   | -57.64                          | 3.83                | -53.81 | 69.90 | 29.09          |
|              | 819                    | 1/0                   | QPSK         | 1636.14    | H                   | -57.81                          | 3.83                | -53.98 | 71.64 | 30.66          |
|              |                        |                       | 16QAM        | 1636.65    | H                   | -58.64                          | 3.83                | -54.81 | 71.63 | 29.82          |
|              |                        |                       | 64QAM        | 1631.84    | H                   | -57.82                          | 3.83                | -53.99 | 68.87 | 27.88          |
|              | 822.5                  | 1/14                  | QPSK         | 1649.22    | H                   | -58.00                          | 3.82                | -54.18 | 71.83 | 30.65          |
|              |                        |                       | 16QAM        | 1651.22    | H                   | -57.93                          | 3.82                | -54.11 | 70.98 | 29.87          |
|              |                        |                       | 64QAM        | 1650.51    | H                   | -57.59                          | 3.82                | -53.77 | 68.86 | 28.09          |
| 1.4          | 814.7                  | 1/2                   | QPSK         | 1630.40    | H                   | -58.67                          | 3.83                | -54.84 | 73.58 | 31.74          |
|              |                        |                       | 16QAM        | 1627.62    | H                   | -57.67                          | 3.83                | -53.84 | 71.74 | 30.90          |
|              |                        |                       | 64QAM        | 1627.82    | H                   | -58.42                          | 3.83                | -54.59 | 70.39 | 28.80          |
|              | 819                    | 1/0                   | QPSK         | 1638.01    | H                   | -58.08                          | 3.83                | -54.25 | 71.29 | 30.04          |
|              |                        |                       | 16QAM        | 1637.24    | H                   | -58.50                          | 3.83                | -54.67 | 71.26 | 29.59          |
|              |                        |                       | 64QAM        | 1637.63    | H                   | -57.88                          | 3.83                | -54.05 | 68.70 | 27.65          |
|              | 823.3                  | 1/2                   | QPSK         | 1649.97    | H                   | -57.61                          | 3.82                | -53.79 | 71.22 | 30.43          |
|              |                        |                       | 16QAM        | 1645.59    | H                   | -57.69                          | 3.82                | -53.87 | 70.39 | 29.52          |
|              |                        |                       | 64QAM        | 1645.46    | H                   | -57.55                          | 3.82                | -53.73 | 68.40 | 27.67          |

Note 1: Limit Calculation =  $43 + 10\log_{10}(P[\text{Watts}])$

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

**- Measurement data: With wireless charging pad**

| B.W<br>(MHz) | Test<br>Freq.<br>(MHz) | RB<br>Size/<br>Offset | Test<br>Mode | Freq.(MHz) | Ant<br>Pol<br>(H/V) | Level(dBm)<br>@ Ant<br>Terminal | TX Ant<br>Gain(dBd) | Result |       | Limit<br>(dBc) |
|--------------|------------------------|-----------------------|--------------|------------|---------------------|---------------------------------|---------------------|--------|-------|----------------|
|              |                        |                       |              |            |                     |                                 |                     | (dBm)  | (dBc) |                |
| 15           | 821.5                  | 1/0                   | QPSK         | 1630.24    | H                   | -58.80                          | 3.83                | -54.97 | 75.74 | 33.77          |
| 10           | 819                    | 1/49                  | QPSK         | 1647.28    | H                   | -57.49                          | 3.82                | -53.67 | 72.53 | 31.86          |
| 5            | 816.5                  | 1/12                  | QPSK         | 1634.00    | H                   | -57.73                          | 3.83                | -53.90 | 74.49 | 33.59          |
| 3            | 815.5                  | 1/7                   | QPSK         | 1628.90    | H                   | -58.34                          | 3.83                | -54.51 | 75.36 | 33.85          |
| 1.4          | 814.7                  | 1/2                   | QPSK         | 1629.18    | H                   | -57.43                          | 3.83                | -53.60 | 74.16 | 33.56          |

Note 1: Limit Calculation =  $43 + 10\log_{10}(P[\text{Watts}])$

Note 2: This device was tested under all bandwidths, modulations and RB configurations and the worst case data are reported in the table above.

Note 3: The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

## 7.7 FREQUENCY STABILITY

OPERATING FREQUENCY : 819 MHz  
 REFERENCE VOLTAGE : 4.0 VDC  
 LIMIT : 2.5 ppm

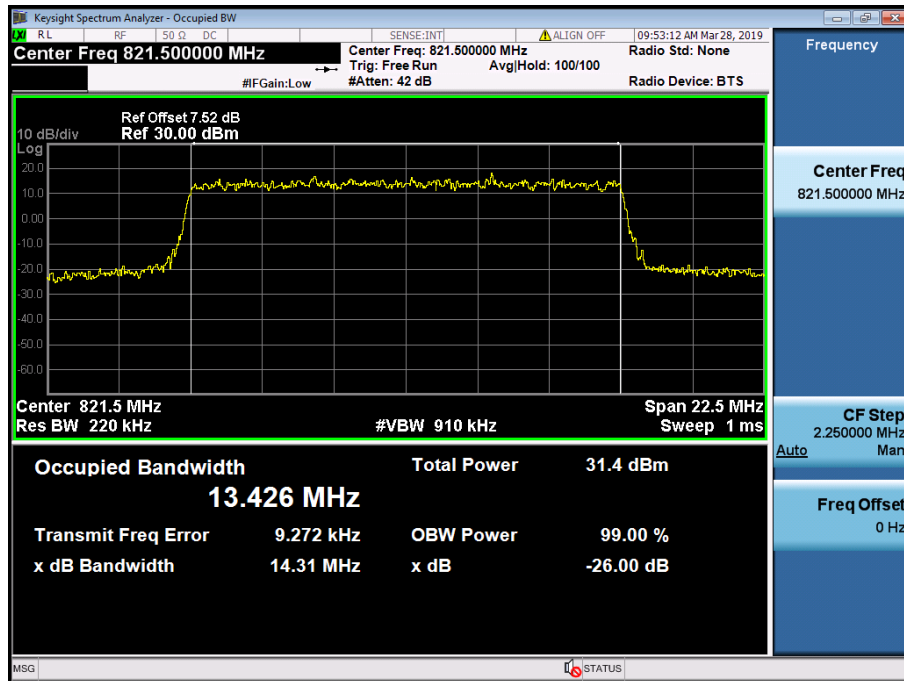
| VOLTAGE (%)   | POWER (V DC) | TEMP (°C) | FREQUENCY (Hz) | FREQ.Dev (Hz) | Deviation |              |
|---------------|--------------|-----------|----------------|---------------|-----------|--------------|
|               |              |           |                |               | (ppm)     | (%)          |
| 100%          | 4.0          | +20(Ref)  | 819,000,007    | 7             | 0.0085    | 0.000000855  |
| 100%          |              | -30       | 819,000,010    | 10            | 0.0122    | 0.000001221  |
| 100%          |              | -20       | 819,000,006    | 6             | 0.0073    | 0.000000733  |
| 100%          |              | -10       | 819,000,008    | 8             | 0.0098    | 0.000000977  |
| 100%          |              | 0         | 819,000,005    | 5             | 0.0061    | 0.000000611  |
| 100%          |              | +10       | 819,000,007    | 7             | 0.0085    | 0.000000855  |
| 100%          |              | +20       | 819,000,007    | 7             | 0.0085    | 0.000000855  |
| 100%          |              | +30       | 818,999,992    | -8            | -0.0098   | -0.000000977 |
| 100%          |              | +40       | 819,000,006    | 6             | 0.0073    | 0.000000733  |
| 100%          |              | +50       | 819,000,005    | 5             | 0.0061    | 0.000000611  |
| 110%          | 4.4          | +20       | 818,999,993    | -7            | -0.0085   | -0.000000855 |
| BATT.ENDPOINT | 3.0          | +20       | 819,000,008    | 8             | 0.0098    | 0.000000977  |

**Note.** At the request of the applicant, the voltage of highest level is tested at 110%.

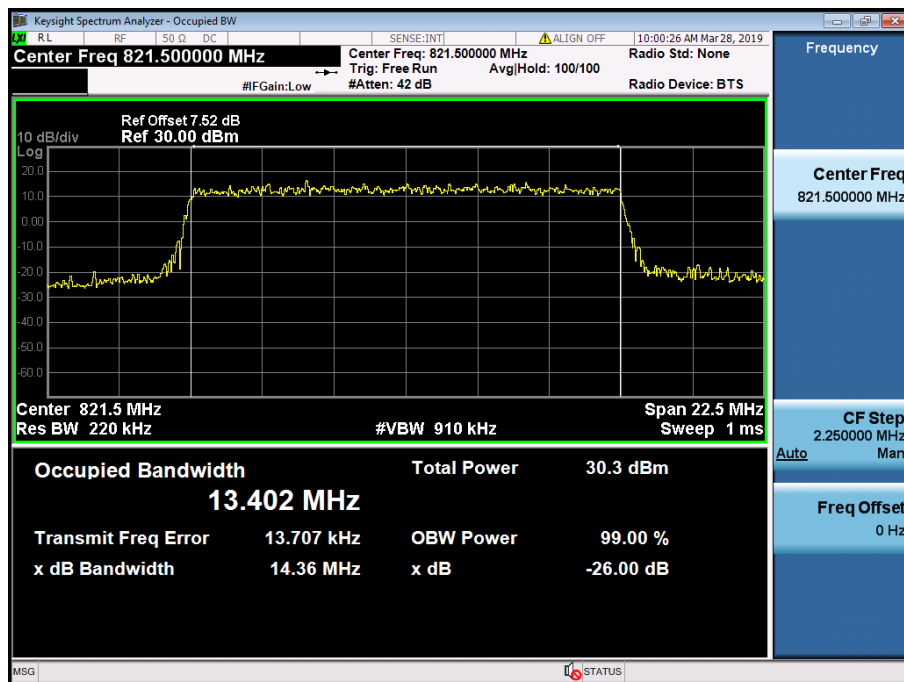
P

## 8. TEST PLOTS

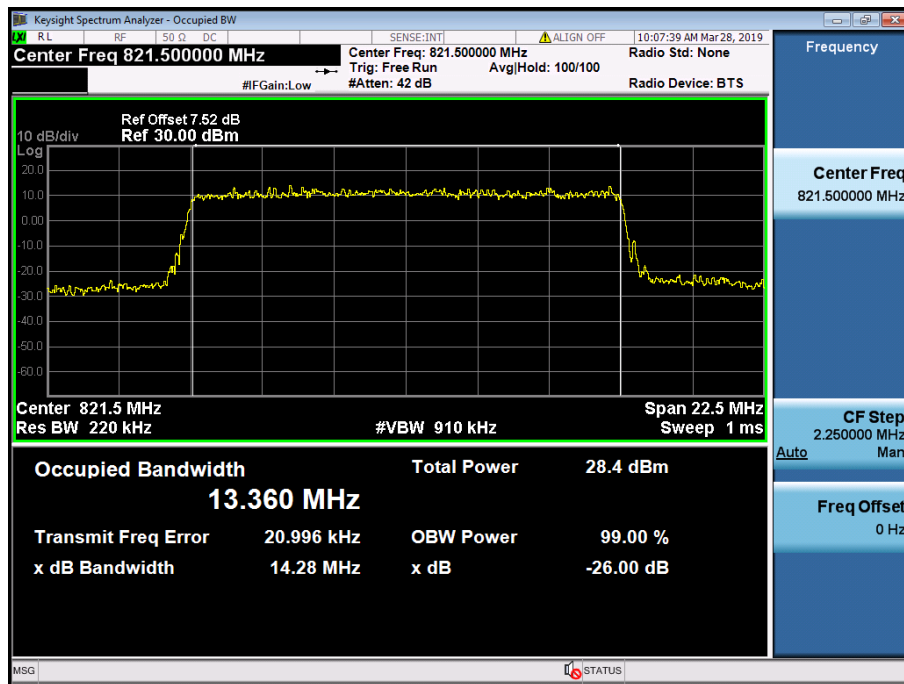
### 8.1 OCCUPIED BANDWIDTH



LTE Band 26 / 15 MHz / QPSK - RB Size 50

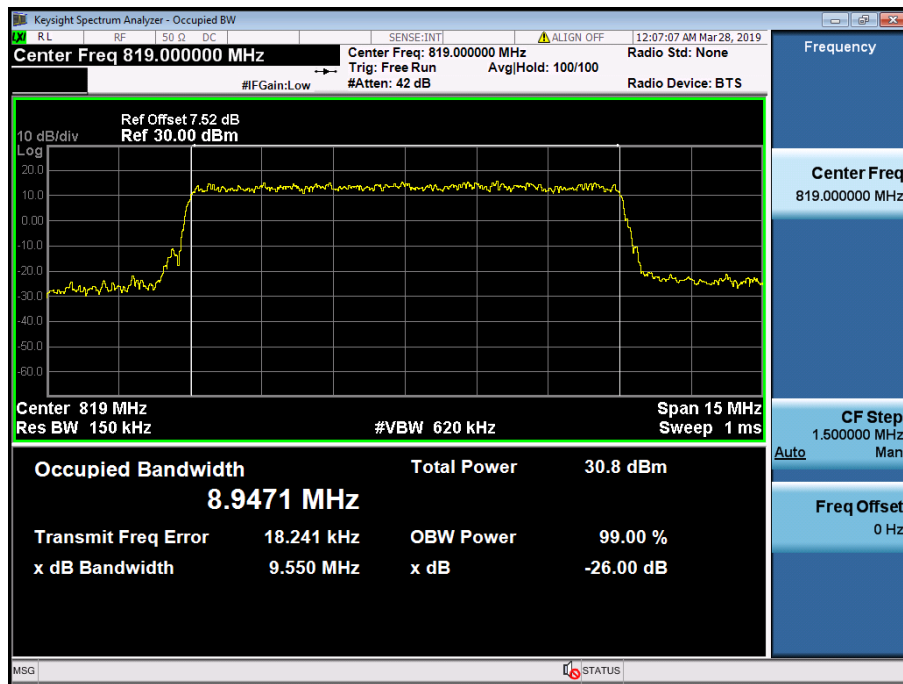


LTE Band 26 / 15 MHz / 16QAM - RB Size 50

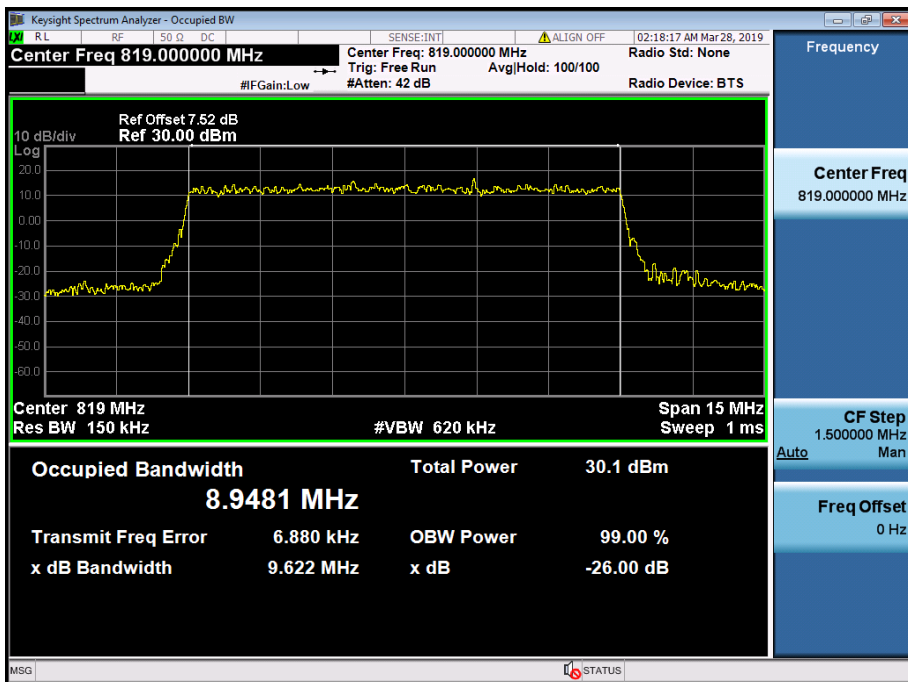


LTE Band 26 / 15 MHz / 64QAM - RB Size 50

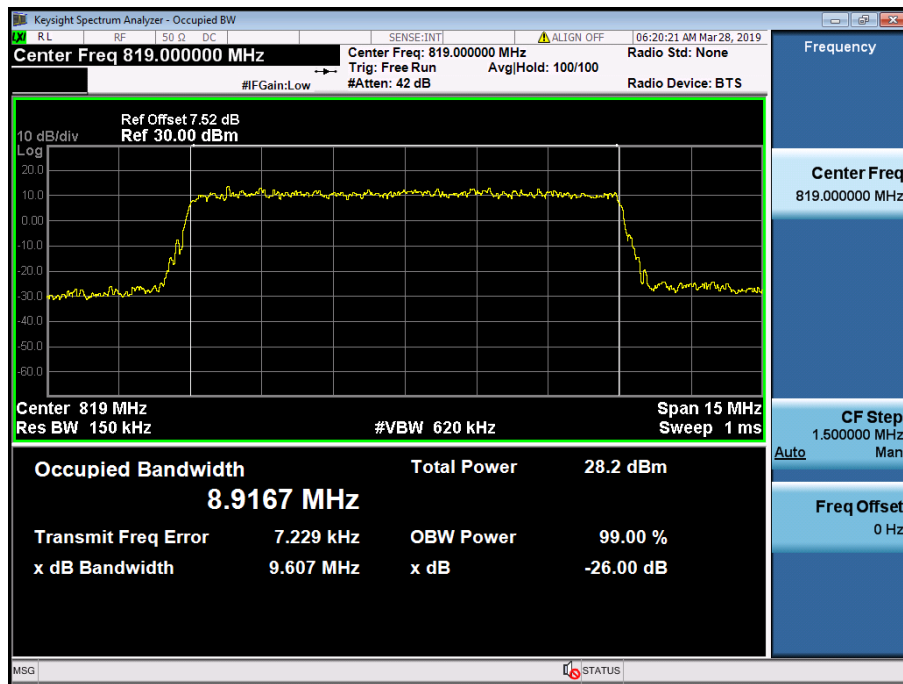




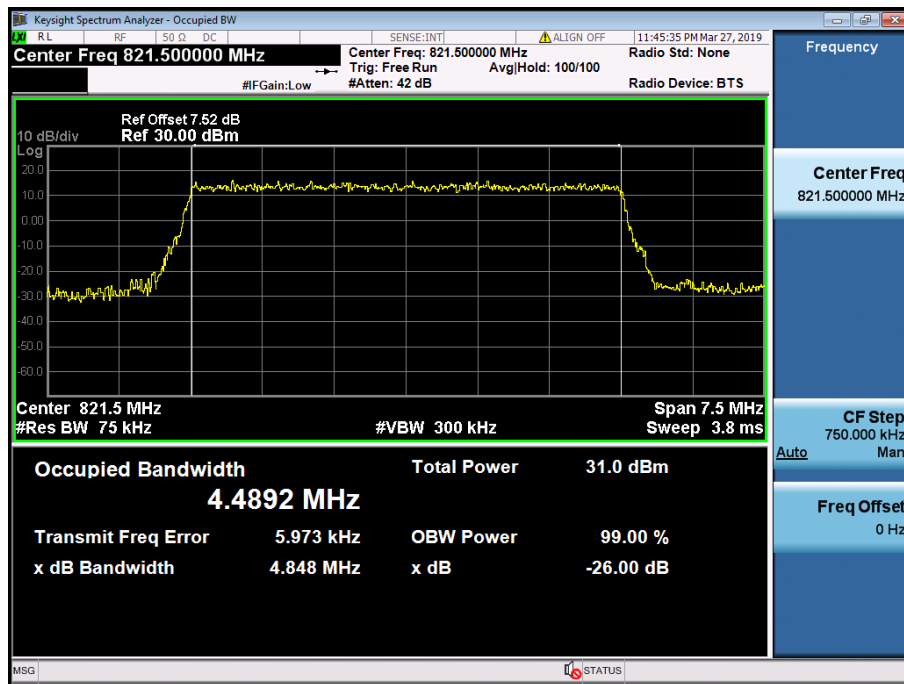
LTE Band 26 / 10 MHz / QPSK - RB Size 50



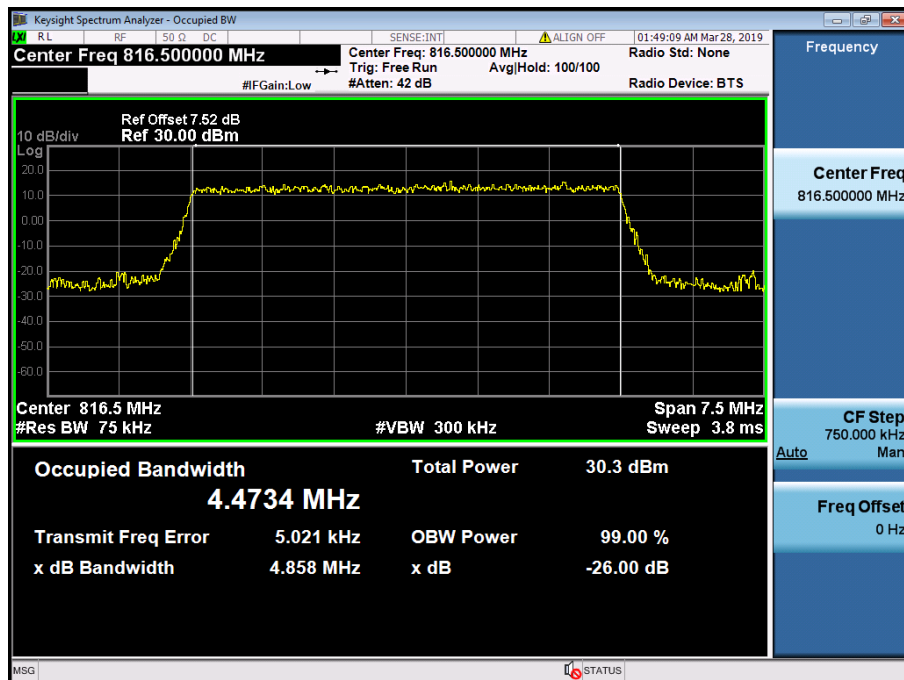
LTE Band 26 / 10 MHz / 16QAM - RB Size 50



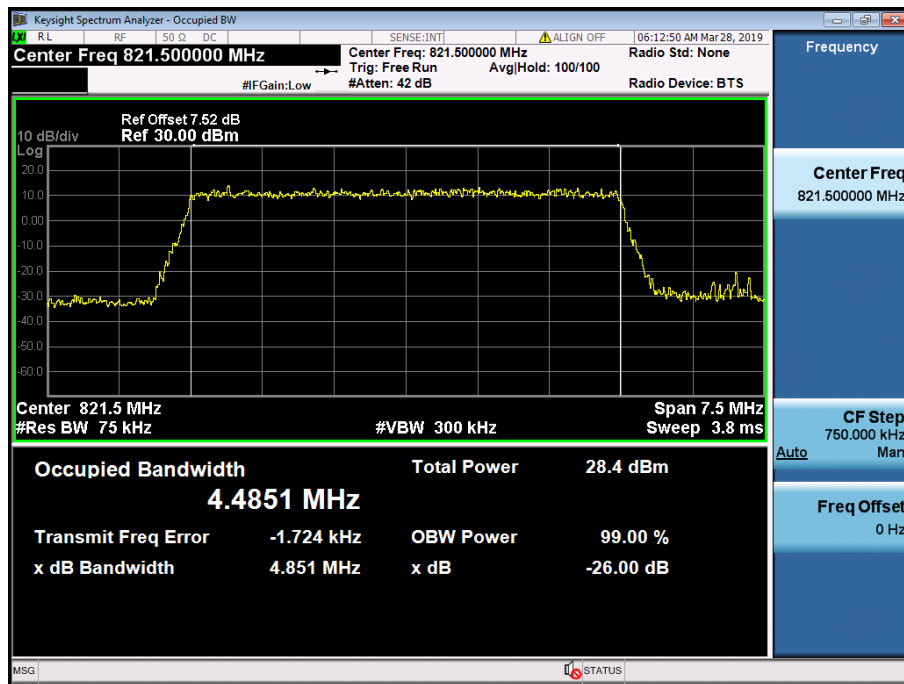
LTE Band 26 / 10 MHz / 64QAM - RB Size 50



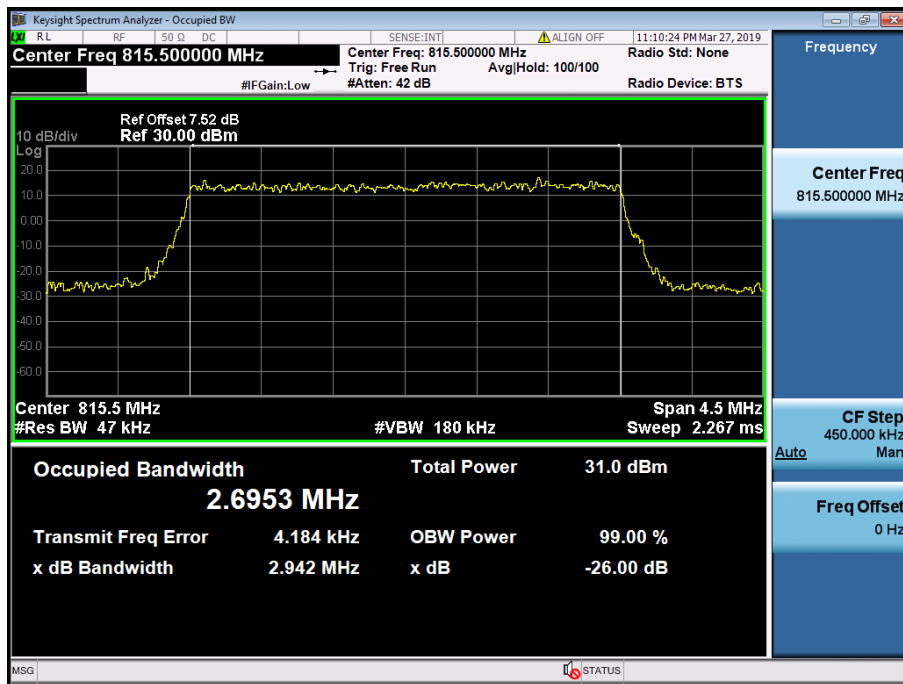
LTE Band 26 / 5 MHz / QPSK - RB Size 25



LTE Band 26 / 5 MHz / 16QAM - RB Size 25



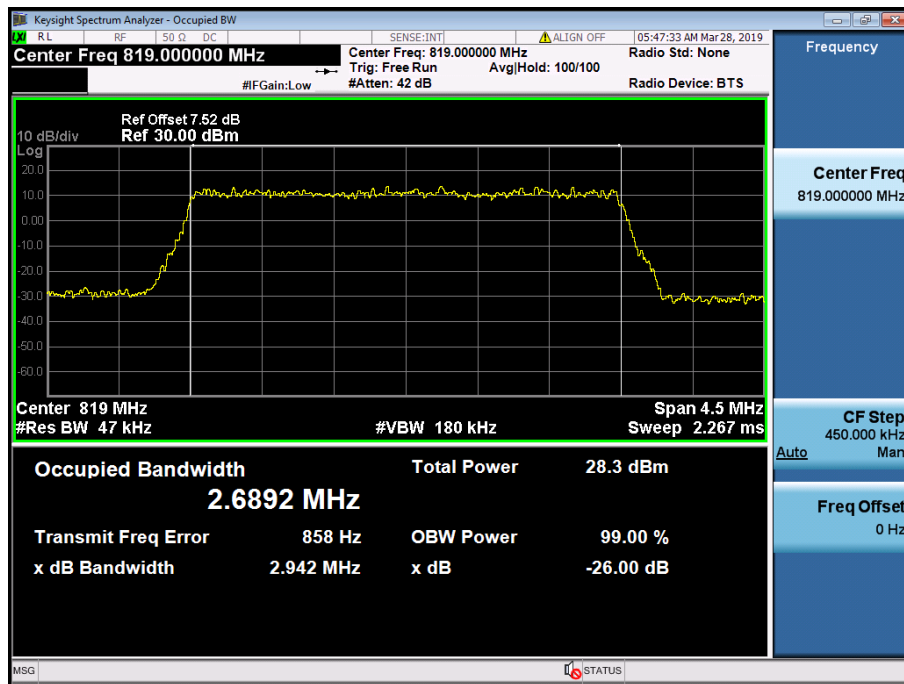
LTE Band 26 / 5 MHz / 64QAM - RB Size 25



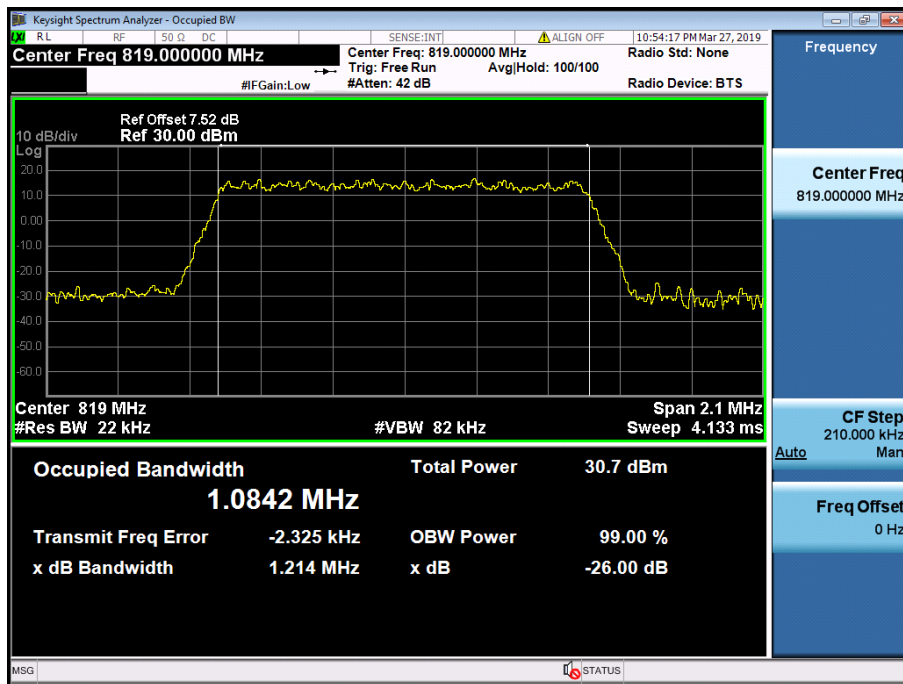
LTE Band 26 / 3 MHz / QPSK - RB Size 15



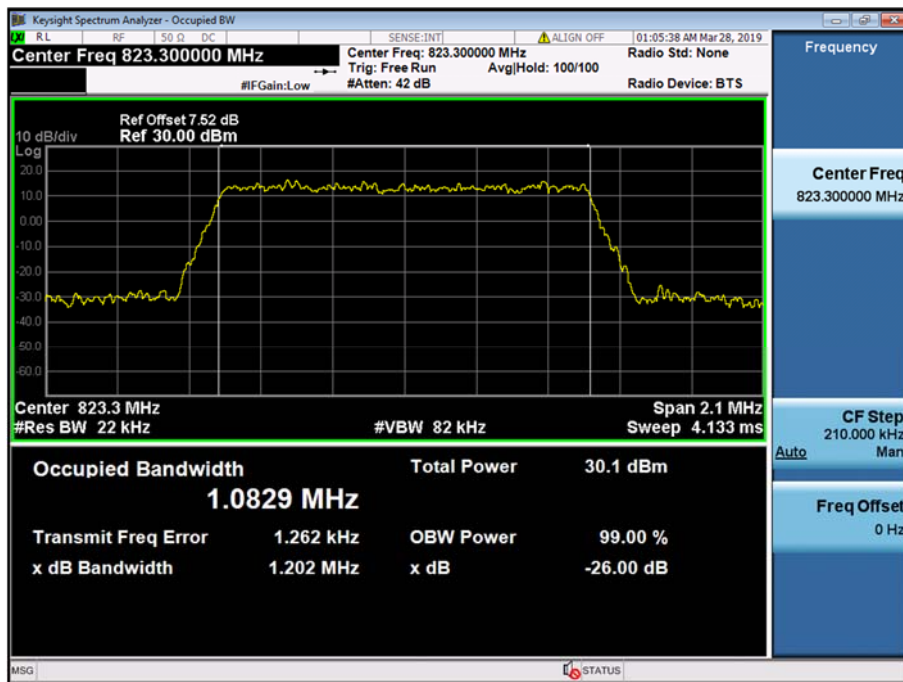
LTE Band 26 / 3 MHz / 16QAM - RB Size 15



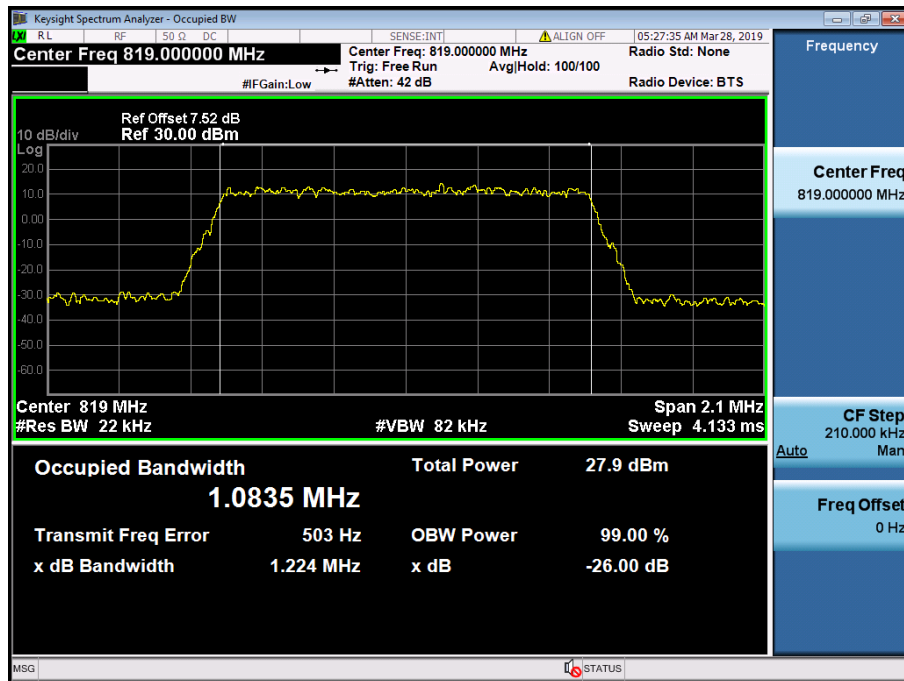
LTE Band 26 / 3 MHz / 64QAM - RB Size 15



LTE Band 26 / 1.4 MHz / QPSK - RB Size 6



LTE Band 26 / 1.4 MHz / 16QAM - RB Size 6

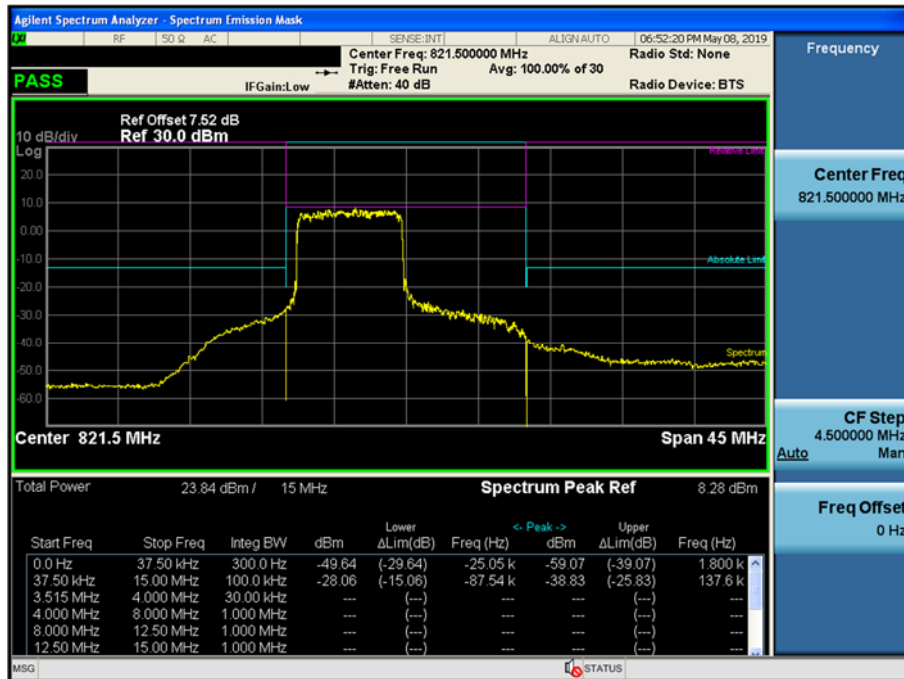


LTE Band 26 / 1.4 MHz / 64QAM - RB Size 6

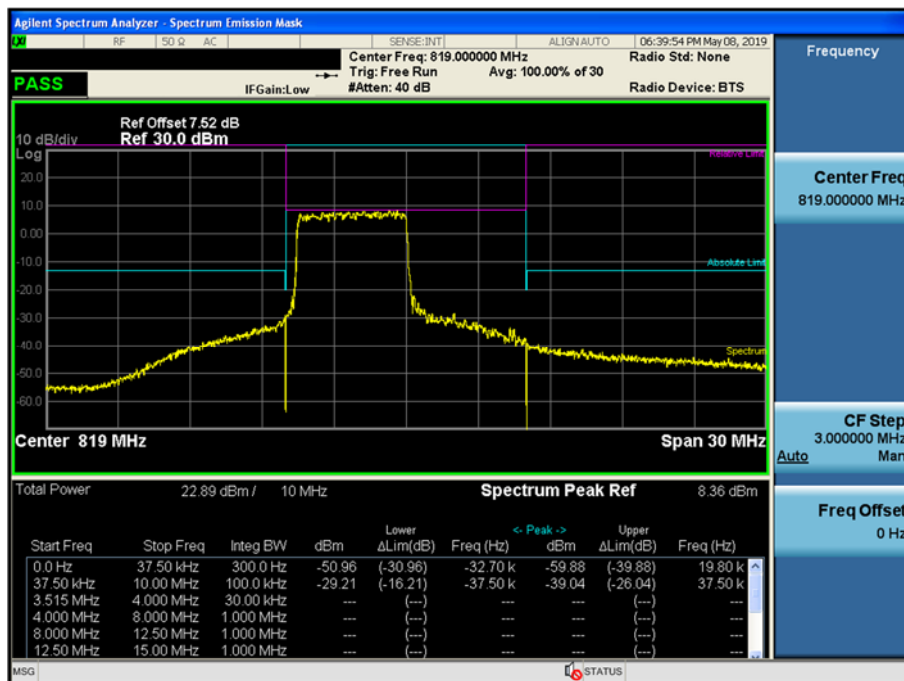


## 8.2 BAND EDGE EMISSIONS(Conducted)

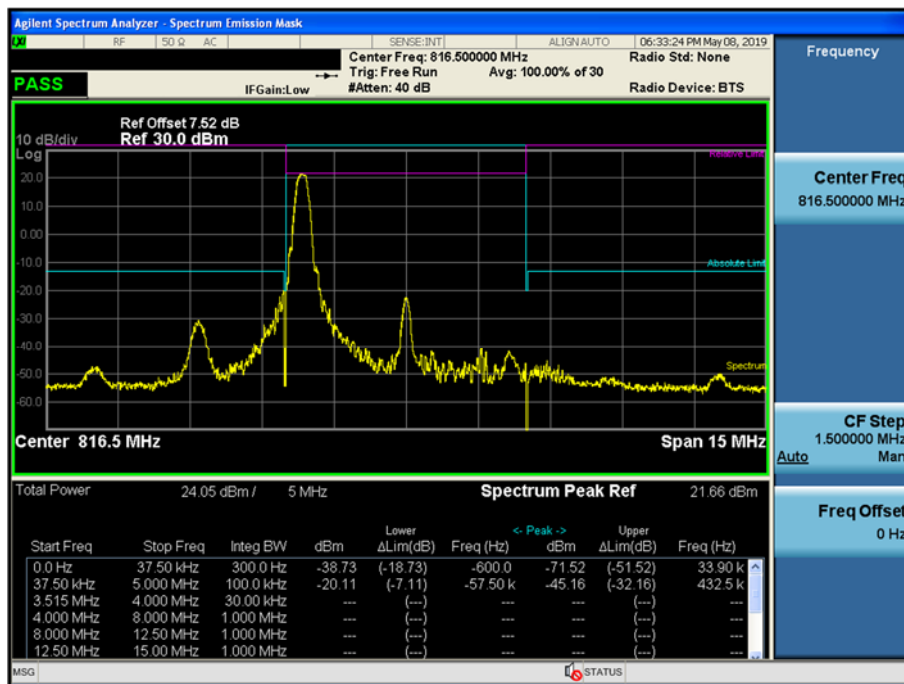
- Band Edge & Extended Band Edge



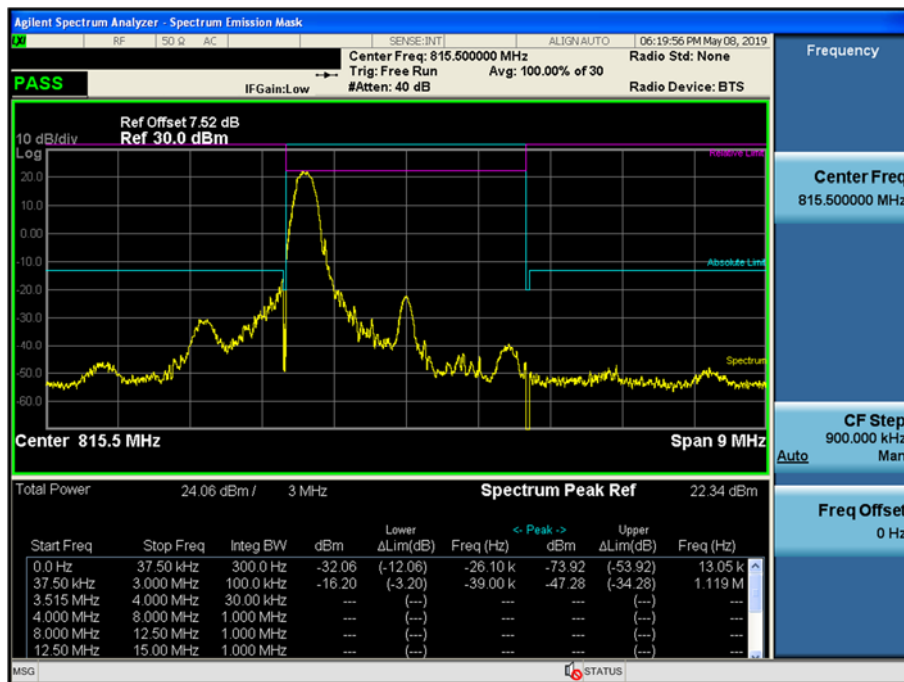
LTE Band 26 / 15MHz / QPSK - RB Size/Offset (36/0)



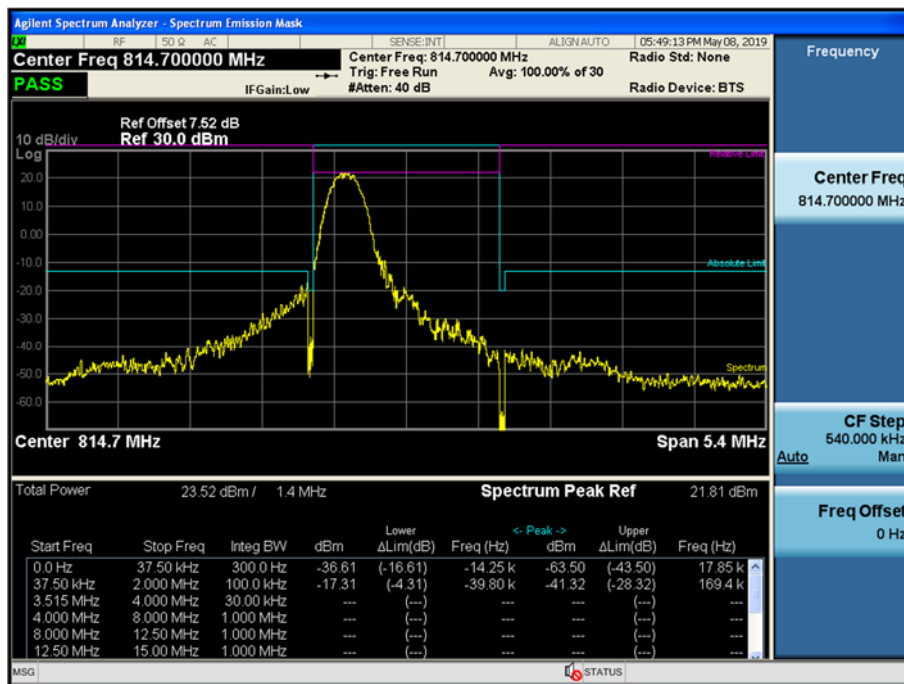
LTE Band 26 / 10MHz / QPSK - RB Size/Offset (25/0)



LTE Band 26 / 5MHz / 16QAM - RB Size/Offset (1/0)

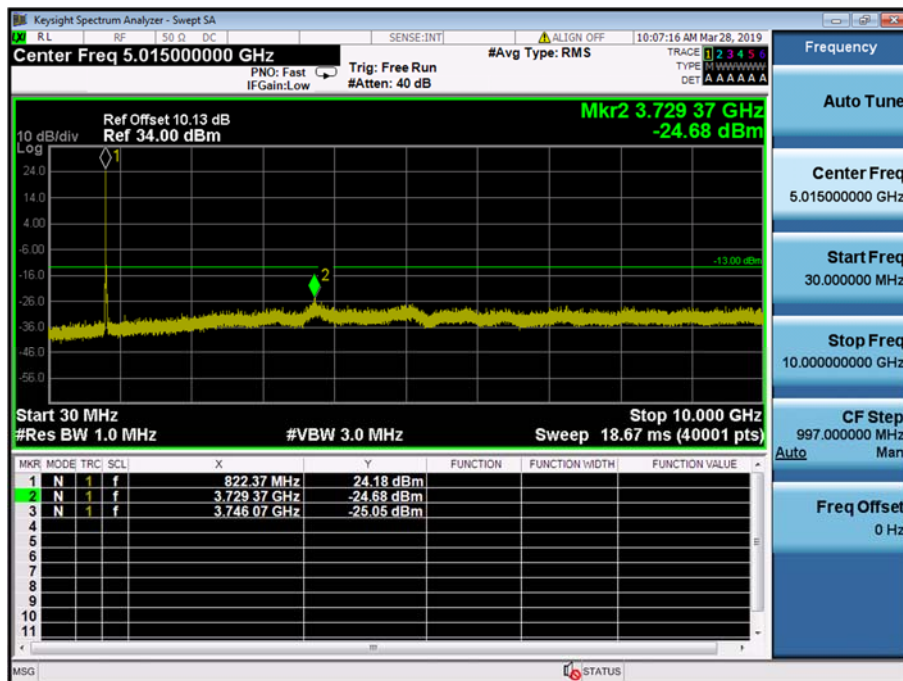


LTE Band 26 / 3MHz / 16QAM - RB Size/Offset (1/0)

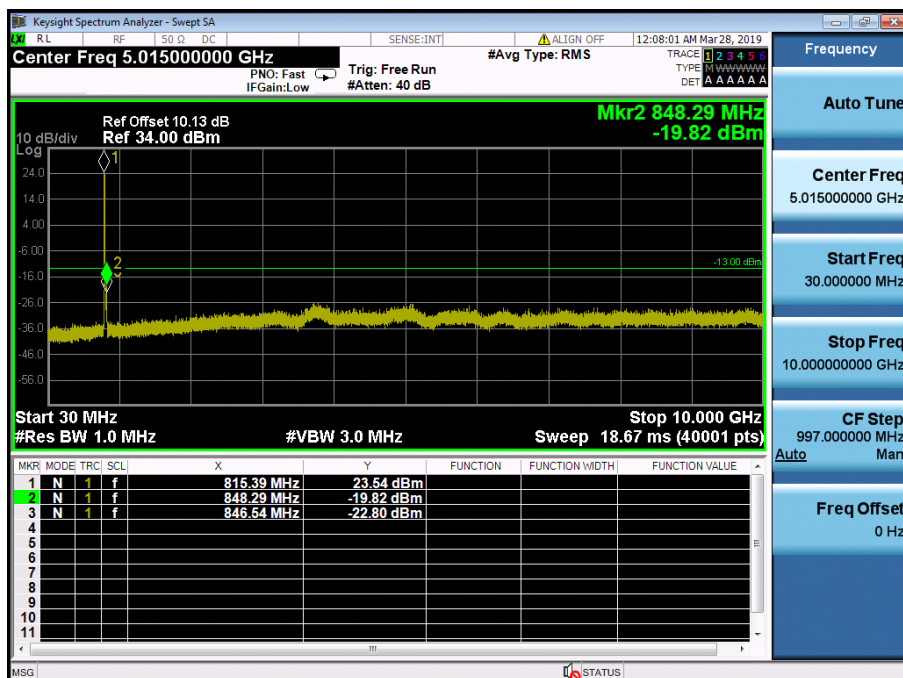


LTE Band 26 / 1.4MHz / 16QAM - RB Size/Offset (1/0)

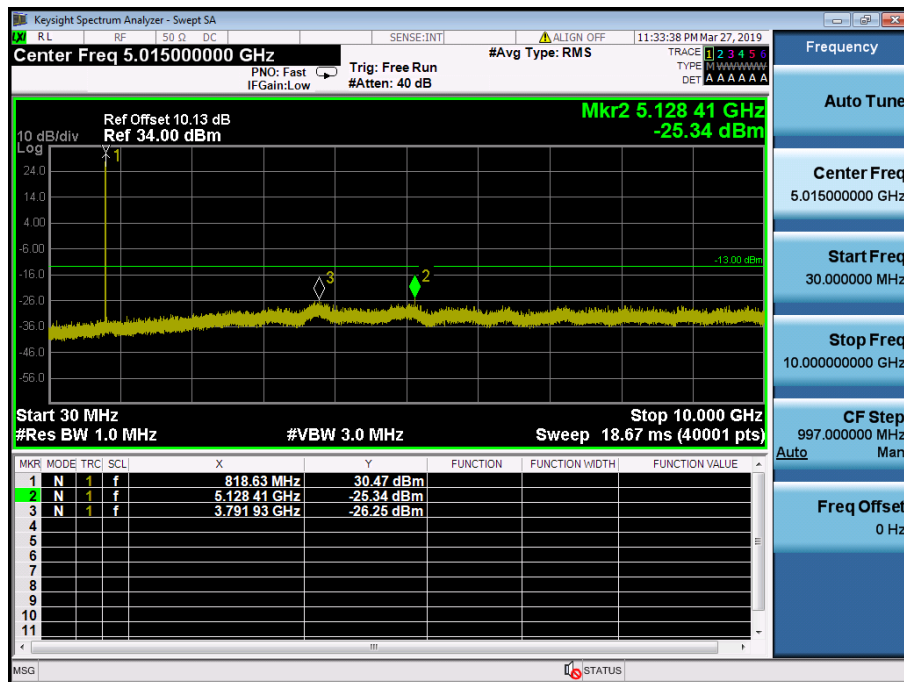
### 8.3 SPURIOUS AND HARMONICS EMISSIONS(Conducted)



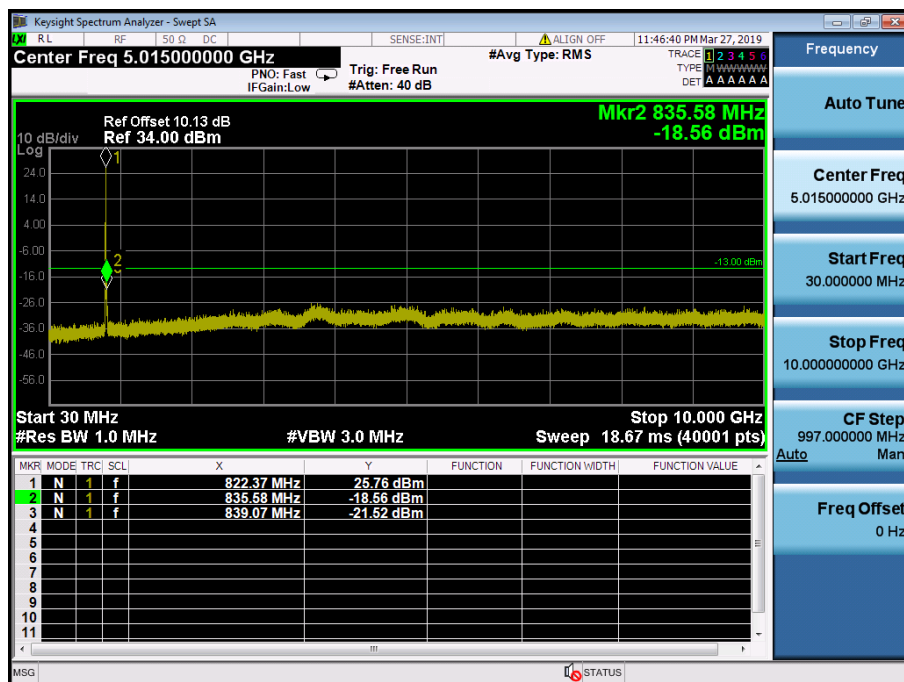
LTE Band 26 / 15MHz / 64QAM - RB Size/Offset (36/39) - Low Channel



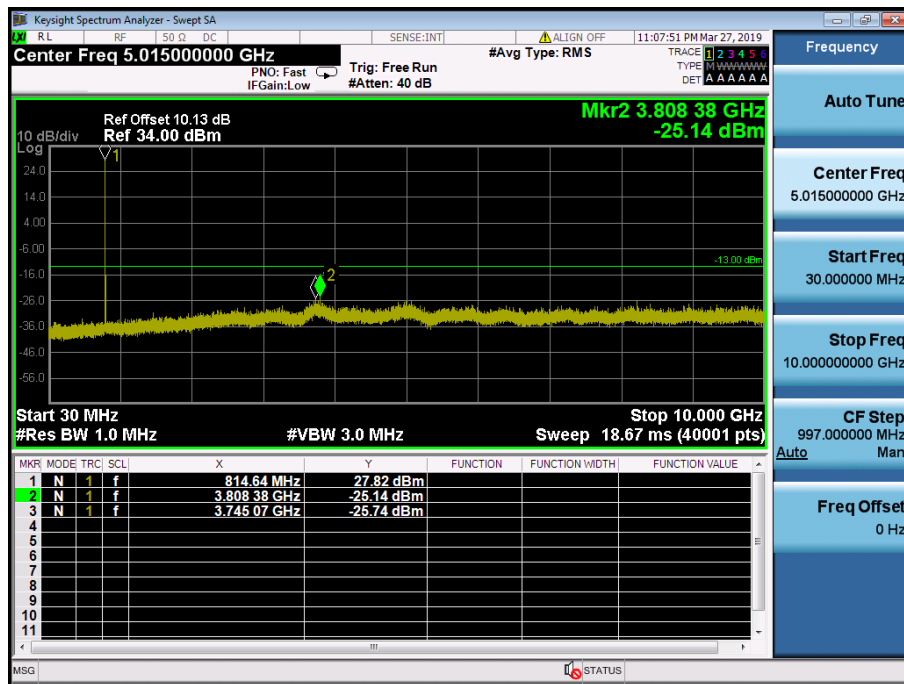
LTE Band 26 / 10MHz / QPSK - RB Size/Offset (50/0) - Low Channel



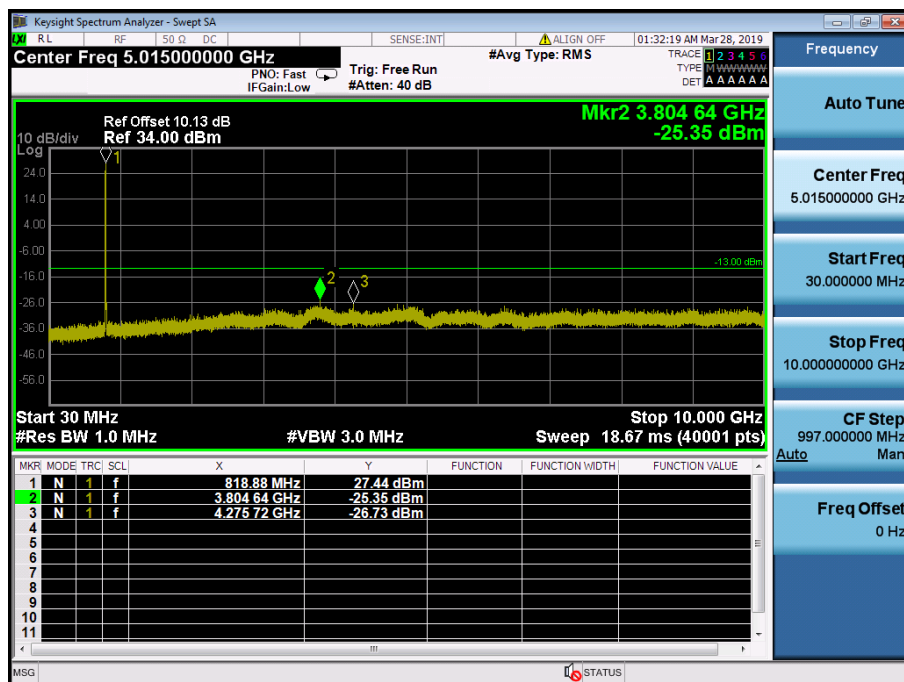
LTE Band 26 / 5MHz / QPSK - RB Size/Offset (1/24) - Low Channel



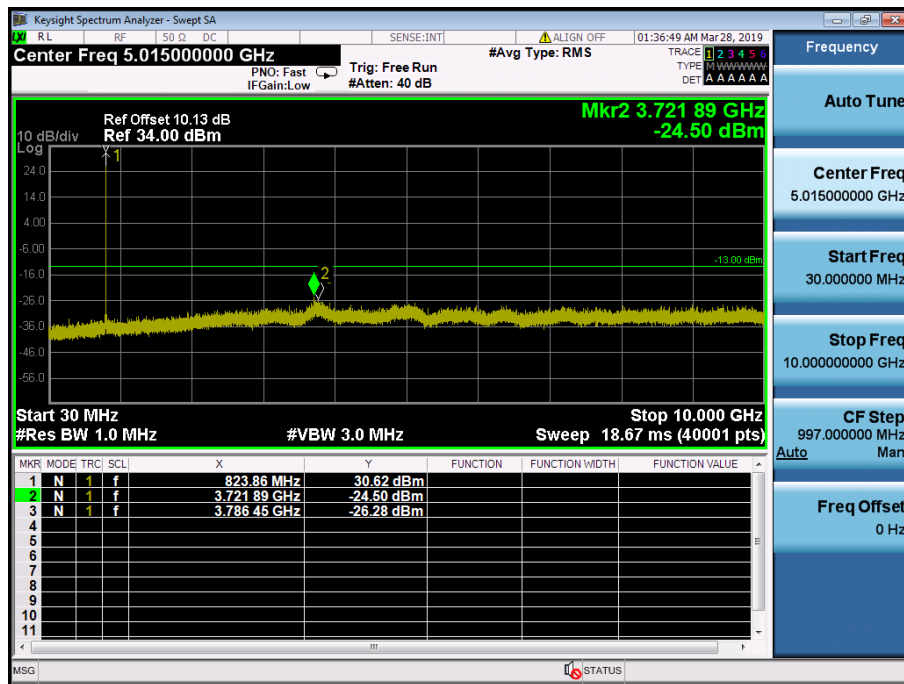
LTE Band 26 / 5MHz / QPSK - RB Size/Offset (25/0) - High Channel



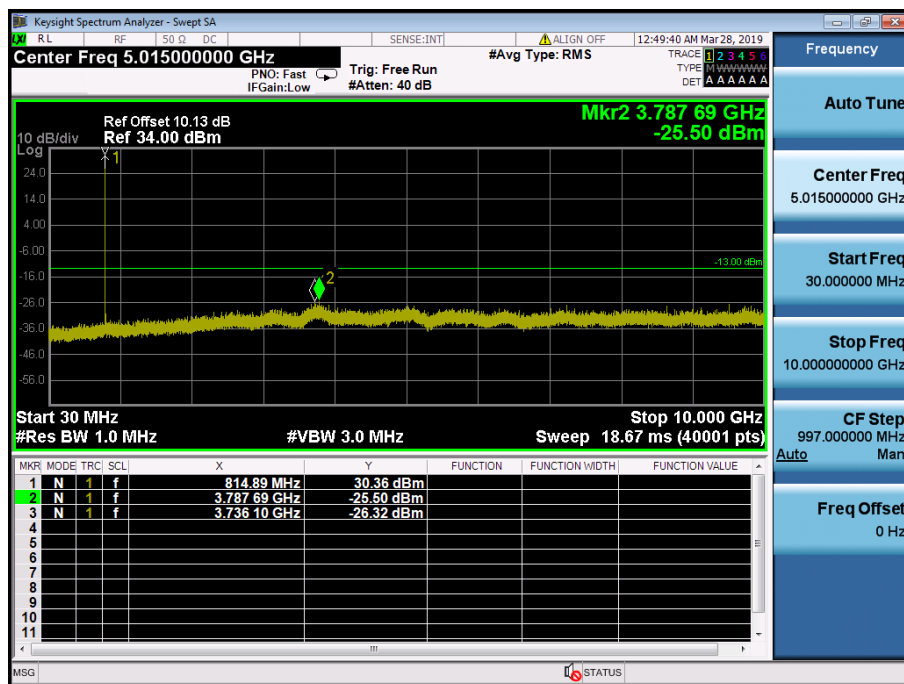
LTE Band 26 / 3MHz / QPSK - RB Size/Offset (8/0) - Low Channel



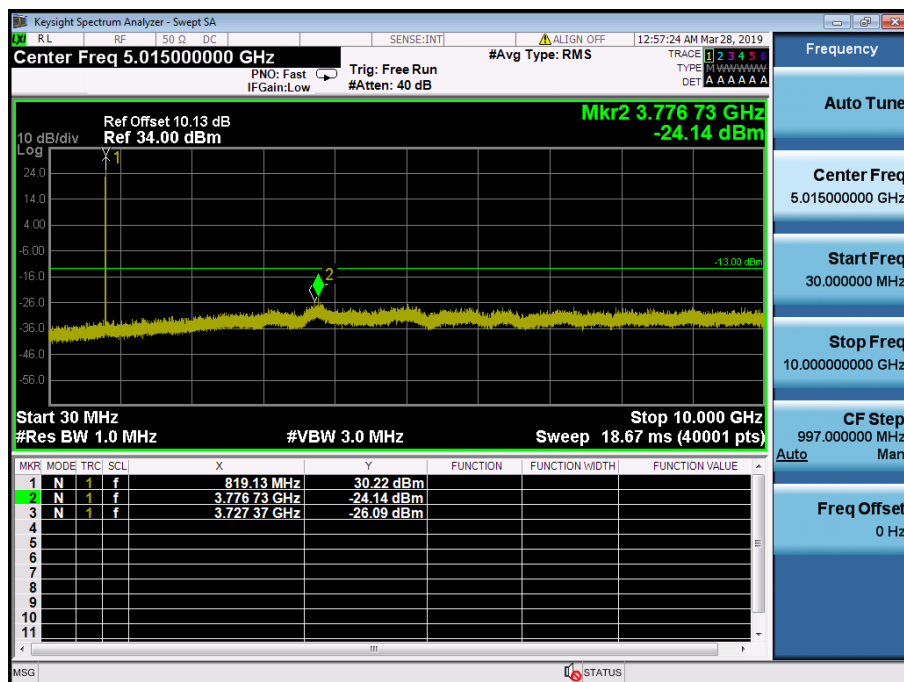
LTE Band 26 / 3MHz / 16QAM - RB Size/Offset (15/0) - Mid Channel



LTE Band 26 / 3MHz / 16QAM - RB Size/Offset (1/14) - High Channel

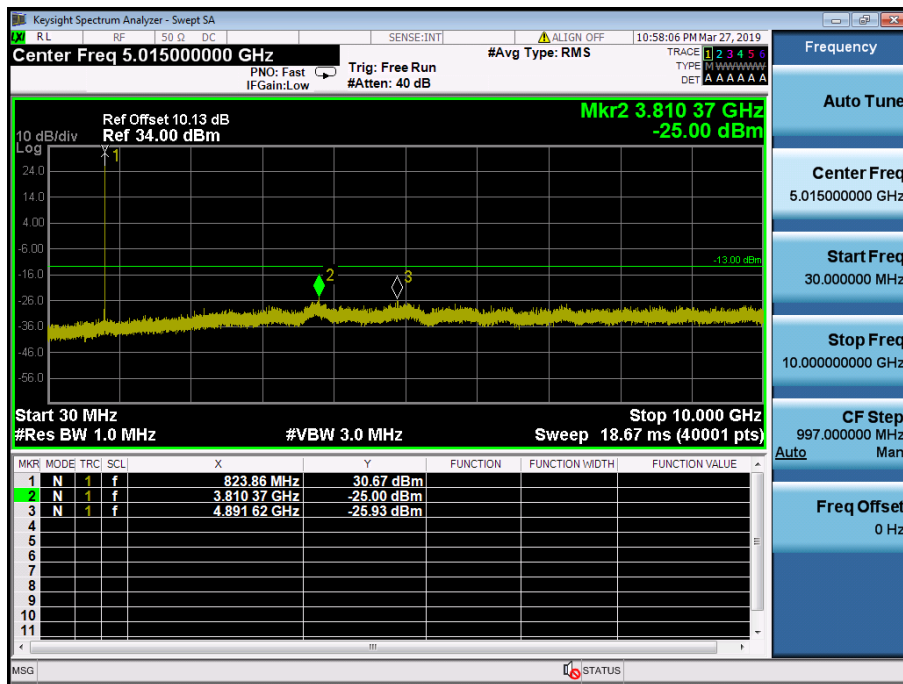


LTE Band 26 / 1.4MHz / 16QAM - RB Size/Offset (1/2) – Low Channel



LTE Band 26 / 1.4MHz / 16QAM - RB Size/Offset (3/2) – Mid Channel





LTE Band 26 / 1.4MHz / QPSK - RB Size/Offset (1/5) – High Channel