



MS ISO/IEC 17025  
TESTING  
SMM No. 0825

**MOTOROLA PENANG ADV. COMM. LABORATORY**

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Penang, Malaysia.

**FCC / ISED TEST REPORT**

**Report Revision** : Rev.A

**Date/s Tested** : 27-Dec-2018 - 23-Jan-2019  
**Manufacturer/Location** : Motorola Solutions - Schaumburg  
**Requestor** : HOPKINS, SEAN  
**Product Type** : Hand-held  
**Product Version (PMN)** : P1B  
**Model Number (HVIN)** : H55TGT9PW8AN  
**Frequency Band** : Refer to section 1.4  
**Applicant Name** : Motorola Solutions, Inc  
**Applicant Address** : 8000 West Sunrise Boulevard, Fort Lauderdale, Florida  
33322  
**FCC Registrations** : 461337  
**ISED Registrations** : 109AK  
**Firmware Version (FVIN)** : D00.00.31

The equipment was tested accordance to the requirement listed below:

(LTE Band 13)  
FCC 47 CFR Part 2 / 27  
ISED RSS GEN Issue 5,  
April 2018  
ISED RSS 130 Issue 1,  
October 2013

**PASS**



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Prepared By:

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**Technician**

Approved By:

**Goh Aik Hong**  
**Responsible Engineer**

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### REVISION HISTORY

| Revision History | Description    | Date        | Originator            |
|------------------|----------------|-------------|-----------------------|
| Rev A.           | Initial Report | 26-Feb-2019 | Maheshvaran Rajagopal |
|                  |                |             |                       |

## 1.0. Summary of Test Results

| FCC Clause             | ISED Clause                 | Test Item                             | Results        | Remarks                        | Serial Number Tested |
|------------------------|-----------------------------|---------------------------------------|----------------|--------------------------------|----------------------|
| 2.1046<br>27.50(b)(12) | RSS-Gen 6.12<br>RSS-130 4.4 | Conducted RF Output Power             | Pass           | Meet the requirement of limit. | 437P1B0011           |
| -                      | RSS 130 4.4                 | Peak-to-Average Power Ratio           | Pass           | Meet the requirement of limit. | 437P1B0011           |
| 2.1049                 | RSS-Gen 6.7                 | Occupied Bandwidth (26dBc, 99%)       | Pass           | Meet the requirement of limit. | 437P1B0011           |
| 2.1055<br>27.54        | RSS-130 4.3                 | Frequency Stability                   | Pass           | Meet the requirement of limit. | 437P1B0011           |
| 2.1051<br>27.53(c)(5)  | RSS-Gen 6.13<br>RSS-130 4.6 | Band Edge Conducted Spurious Emission | Pass           | Meet the requirement of limit. | 437P1B0011           |
| 2.1051<br>27.53(c)(2)  | RSS-Gen 6.13<br>RSS-130 4.6 | Conducted Spurious Emissions          | Pass           | Meet the requirement of limit. | 437P1B0011           |
| 2.1053<br>27.53(c)(2)  | RSS-130 4.6                 | Radiated Spurious Emission            | Not Performed. | Not Performed.                 | Not Performed.       |
| 2.1049<br>27.50(b)(10) | RSS-130 4.4                 | Effective Radiated Power (ERP)        | Not Performed. | Not Performed.                 | Not Performed.       |

### 1.1. Measurement Uncertainty

| Measurement                    | Frequency        | Expanded Uncertainty (k=1.96) (±dB) |
|--------------------------------|------------------|-------------------------------------|
| Radiated Emissions up to 1 GHz | 30MHz ~ 200MHz   | 5.01                                |
|                                | 200MHz ~ 1000MHz | 5.01                                |
| Radiated Emissions above 1 GHz | 1GHz ~ 18GHz     | 5.01                                |
|                                | 18GHz ~ 25GHz    | 5.01                                |

### 1.2. Equipment List

| Description                                                           | Model  | Serial Number | Calibration Date | Calibration Due Date |
|-----------------------------------------------------------------------|--------|---------------|------------------|----------------------|
| <b>Broadband ATE 1 (Test Software Version : R&amp;S CMWRun 1.8.9)</b> |        |               |                  |                      |
| Wideband Radio Communication Tester                                   | CMW500 | 153174        | 12-Apr-17        | 12-Apr-19            |
| Signal Analyzer                                                       | FSV40  | 101431        | 13-Jul-17        | 12-Jul-19            |
| Chamber                                                               | SH-641 | 92002651      | 5-Mar-18         | 5-Mar-19             |
| Power Supply                                                          | 6623A  | 3417A03546    | 15-Nov-17        | 15-Nov-19            |

### 1.3. General Information

#### General Description of EUT

|                                |                      |                                 |                    |         |
|--------------------------------|----------------------|---------------------------------|--------------------|---------|
| Product                        | Hand-held            |                                 |                    |         |
| Brand                          | Motorola Solutions   |                                 |                    |         |
| Test Model                     | H55TGT9PW8AN         |                                 |                    |         |
| Power Supply Rating            | 7.5 Vdc              |                                 |                    |         |
| Mode of operation              | LTE Band 13          |                                 |                    |         |
| Modulation Type                | QPSK, 16QAM          |                                 |                    |         |
| Operating Frequency            | LTE Band 13          | Channel Bandwidth 5MHz          | 779.5MHz~784.5MHz  |         |
|                                |                      | Channel Bandwidth 10MHz         | 782MHz             |         |
| Max. Conducted RF Output Power | LTE Band 13<br>QPSK  | Channel Bandwidth 5MHz          | 22.876dBm (0.194W) |         |
|                                |                      | Channel Bandwidth 10MHz         | 22.109dBm (0.163W) |         |
|                                | LTE Band 13<br>16QAM | Channel Bandwidth 5MHz          | 22.765dBm (0.189W) |         |
|                                |                      | Channel Bandwidth 10MHz         | 22.127dBm (0.169W) |         |
| Emission Designator            | LTE Band 13          |                                 | QPSK               | 16QAM   |
|                                |                      | Channel Bandwidth 5MHz          | 4M47G7D            | 4M48D7W |
|                                |                      | Channel Bandwidth 10MHz         | 8M91G7D            | 8M91D7W |
| Antenna Type                   | LTE Band 13          | Stamped Metal with -3.0dBi gain |                    |         |
| SW Version                     | D00.00.31            |                                 |                    |         |
| HW Version                     | P1B                  |                                 |                    |         |

Note:

1. The EUT contains following accessory devices and data cable.

| Item                           | Brand              | Model or P/N | Specification |
|--------------------------------|--------------------|--------------|---------------|
| DMR Portable Programming Cable | Motorola Solutions | PMKN4012B    | -             |

### Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| NO. | Product                             | Brand | Model No. | Serial No. | FCC ID |
|-----|-------------------------------------|-------|-----------|------------|--------|
| 1   | Wideband Radio Communication Tester | R&S   | CMW500    | 153174     | NA     |

Note:

- Item 1 acted as a communication partner to transfer data.

### EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

### General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 27**

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

**KDB 971168 D02 Misc OOB License Digital Systems v02r01**

**ANSI C63.26-2015**

**NOTE:** All test items have been performed and recorded as per the above standards.

### Deviation from standard

Not applicable as no deviation from standard test method.

#### 1.4. Channel number and frequency info

| Band        | Bandwidth supported | Available Channel Number | Test Channel Number |             |              | Test Channel Frequency (MHz) |             |              |
|-------------|---------------------|--------------------------|---------------------|-------------|--------------|------------------------------|-------------|--------------|
|             |                     |                          | Low Channel         | Mid Channel | High Channel | Low Channel                  | Mid Channel | High Channel |
| LTE Band 13 | 5 MHz               | 23025 ~ 23255            | 23205               | 23230       | 23255        | 779.5                        | 782         | 784.5        |
|             | 10 MHz              | 23230                    |                     | 23230       |              |                              | 782         |              |

## 1.5. Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

The following channel(s) was (were) selected for the final test as listed below:

### LTE Band 13

| Test Item                             | Available Channel | Tested Channel      | Channel Bandwidth | Uplink Modulation | Mode                                                             |
|---------------------------------------|-------------------|---------------------|-------------------|-------------------|------------------------------------------------------------------|
| Conducted RF Output Power             | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM       | As per table 1.6.2                                               |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   |                                                                  |
| Peak to Average Power Ratio           | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM       | 25 RB / 0 RB Offset                                              |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   | 50 RB / 0 RB Offset                                              |
| Occupied Bandwidth                    | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM       | 25 RB / 0 RB Offset                                              |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   | 50 RB / 0 RB Offset                                              |
| Frequency Stability                   | 23025 ~ 23255     | 23205, 23255        | 5 MHz             | QPSK              | 25 RB / 0 RB Offset                                              |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   | 50 RB / 0 RB Offset                                              |
| Band Edge Conducted Spurious Emission | 23025 ~ 23255     | 23205, 23255        | 5 MHz             | QPSK, 16QAM       | 1 RB / 0 RB Offset<br>1 RB / 24 RB Offset<br>25 RB / 0 RB Offset |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   | 1 RB / 0 RB Offset<br>1 RB / 49 RB Offset<br>50 RB / 0 RB Offset |
| Conducted Spurious Emission           | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK              | 1 RB / 13 RB Offset                                              |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   | 1 RB / 0 RB Offset                                               |
| Radiated Spurious Emission            | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK              | Not Performed.                                                   |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   |                                                                  |
| Effective Radiated Power (ERP)        | 23025 ~ 23255     | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM       | Not Performed.                                                   |
|                                       | 23025 ~ 23255     | 23230               | 10 MHz            |                   |                                                                  |

#### NOTE:

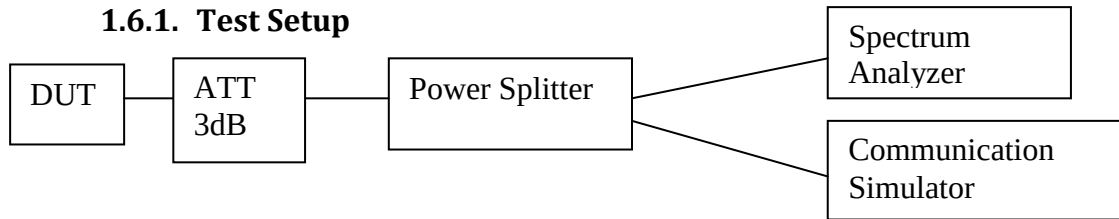
1. The Conducted RF Output Power for QPSK and 16QAM, measured value of QPSK is higher than 16QAM mode. Therefore, only Conducted Spurious Emission had been tested under QPSK modes.
2. Band Edge was performed with 1 and full Resource Block at the lowest and highest operating frequency band.
3. Peak to Average and Occupied Bandwidth were performed with full Resource Block which is the worst case.
4. Frequency stability was performed with full Resource Block in QPSK modulation.

#### Test Condition:

| Test Item                             | Environmental Conditions | Input Power | Tested By   |
|---------------------------------------|--------------------------|-------------|-------------|
| Conducted RF Output Power             | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Peak-to-Average Power Ratio           | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Occupied Bandwidth                    | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Frequency Stability                   | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Band Edge Conducted Spurious Emission | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Conducted Spurious Emission           | 25°C, 50% RH             | 7.5V DC     | Maheshvaran |
| Radiated Spurious Emission            | Not Performed.           |             |             |
| Effective Radiated Power (ERP)        | Not Performed.           |             |             |

## 1.6. Conducted RF Output Power

### 1.6.1. Test Setup



1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. All the measurement was done at low, mid, high channel for each band and different modulation.
5. Record the average power into the test report.

### 1.6.2. Limits

FCC: Portable stations (hand-held devices) transmitting in the 776-788 MHz band is limited to 3 watts ERP.  
 ISED: The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

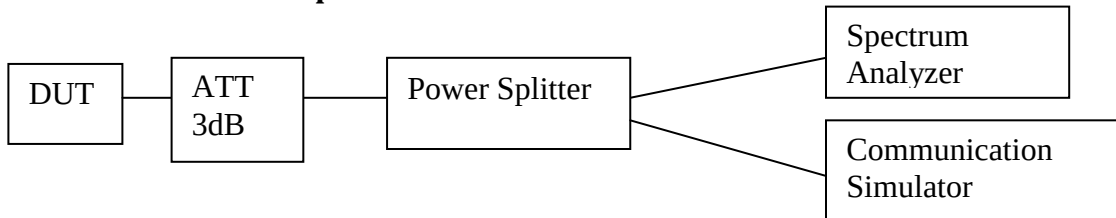
### 1.6.3. Conducted RF Output Power – LTE Band 13 (777–787MHz)

| Conducted Output Power (dBm) |         |           |                 |         |           |                  |         |               |
|------------------------------|---------|-----------|-----------------|---------|-----------|------------------|---------|---------------|
| LTE Band/BW                  | RB Size | RB Offset | QPSK Modulation |         |           | 16QAM Modulation |         |               |
|                              |         |           | Low CH          | Mid CH  | High CH   | Low CH           | Mid CH  | High CH       |
|                              |         |           | 23205           | 23230   | 23255     | 23205            | 23230   | 23255         |
|                              |         |           | 779.5MHz        | 782 MHz | 784.5 MHz | 779.5 MHz        | 782 MHz | 784.5 MHz     |
| Band 13 / 5MHz               | 1       | 0         | 22.752          | 22.778  | 22.801    | <b>21.864</b>    | 21.793  | 22.09         |
|                              | 1       | 13        | <b>22.876</b>   | 22.781  | 22.804    | 21.936           | 21.84   | <b>22.109</b> |
|                              | 1       | 24        | 22.826          | 22.739  | 22.723    | 21.949           | 21.759  | 22.023        |
|                              | 12      | 0         | 21.842          | 21.824  | 21.798    | 20.829           | 20.897  | 20.881        |
|                              | 12      | 6         | 21.887          | 21.845  | 21.841    | 20.881           | 20.891  | 20.896        |
|                              | 12      | 13        | 21.827          | 21.836  | 21.81     | 20.837           | 20.865  | 20.862        |
|                              | 25      | 0         | 21.852          | 21.814  | 21.837    | 20.902           | 20.879  | 20.915        |

| LTE<br>Band/BW             | RB<br>Size | RB<br>Offset | QPSK Modulation |               |         | 16QAM Modulation |               |         |
|----------------------------|------------|--------------|-----------------|---------------|---------|------------------|---------------|---------|
|                            |            |              | Low CH          | Mid CH        | High CH | Low CH           | Mid CH        | High CH |
|                            |            |              |                 | 23230         |         |                  | 23230         |         |
|                            |            |              |                 | 782 MHz       |         |                  | 782 MHz       |         |
| <b>Band 13 /<br/>10MHz</b> | <b>1</b>   | <b>0</b>     |                 | <b>22.765</b> |         |                  | 22.111        |         |
|                            | <b>1</b>   | <b>25</b>    |                 | 22.72         |         |                  | <b>22.127</b> |         |
|                            | <b>1</b>   | <b>49</b>    |                 | 22.694        |         |                  | 22.024        |         |
|                            | <b>25</b>  | <b>0</b>     |                 | 21.841        |         |                  | 20.954        |         |
|                            | <b>25</b>  | <b>13</b>    |                 | 21.832        |         |                  | 20.978        |         |
|                            | <b>25</b>  | <b>25</b>    |                 | 21.826        |         |                  | 20.953        |         |
|                            | <b>50</b>  | <b>0</b>     |                 | 21.819        |         |                  | 20.929        |         |

## 1.7. Peak-to-Average Power Ratio

### 1.7.1. Test Setup



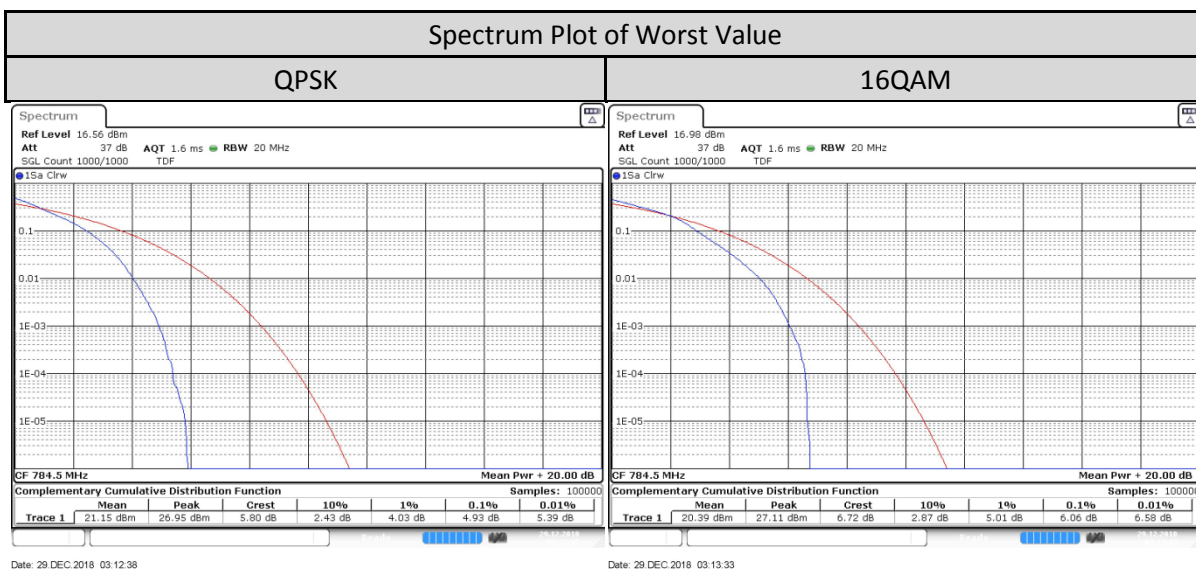
1. The DUT transmitter output port was connected to communication simulator with above setup.
2. Path loss for the measurement included.
3. Set DUT to transmit maximum power through communication simulator
4. Set the CCDF (Complementary Cumulative Distribution Function) option in the spectrum analyzer.
5. Spectrum Analyzer setting, RBW = 20MHz.
6. Recorded the maximum PAR level associated with a probability of 0.1% as Peak to Average Ratio.
7. All the measurement was done at low, mid, high channel for each band and different modulation.

### 1.7.2. Test Limit

The peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

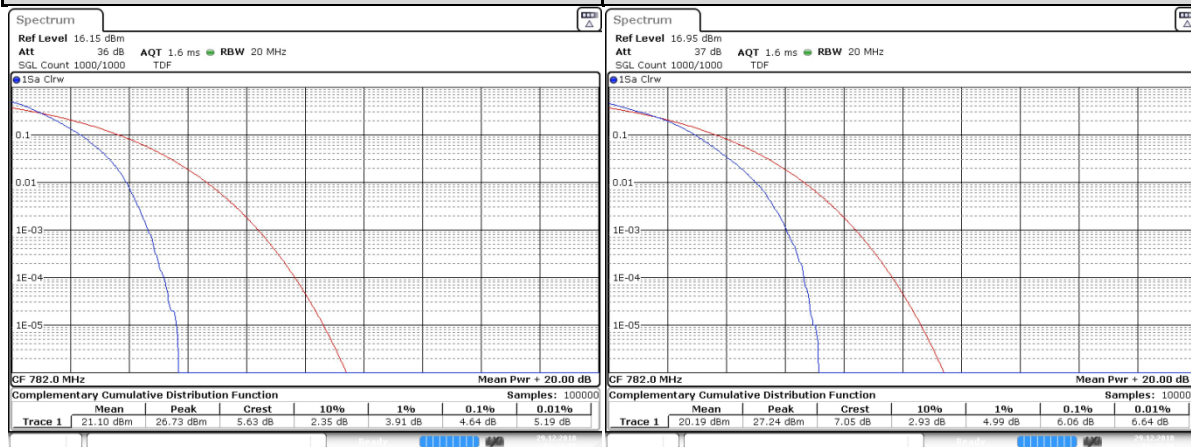
### 1.7.3. Peak-to-Average Power Ratio - LTE Band 13 (777-787MHz)

| LTE Band/BW/RB Size/RB Offset | Channel Number | Tx Frequency | Peak To Average (dB) |                  |
|-------------------------------|----------------|--------------|----------------------|------------------|
|                               |                |              | QPSK Modulation      | 16QAM Modulation |
| <b>Band 13/5MHz/25/0</b>      | Low CH 23205   | 779.5 MHz    | <b>4.754</b>         | <b>5.913</b>     |
|                               | Mid CH 23230   | 782 MHz      | <b>4.841</b>         | <b>5.971</b>     |
|                               | High CH 23255  | 784.5 MHz    | <b>4.928</b>         | <b>6.058</b>     |



| LTE Band/BW/RB<br>Size/RB Offset | Channel Number | Tx<br>Frequency | Peak To Average (dB) |                  |
|----------------------------------|----------------|-----------------|----------------------|------------------|
|                                  |                |                 | QPSK<br>Modulation   | 16QAM Modulation |
| <b>Band<br/>13/10MHz/50/0</b>    | Low CH         |                 |                      |                  |
|                                  | Mid CH 23230   | 782 MHz         | 4.638                | 6.058            |
|                                  | High CH        |                 |                      |                  |

| Spectrum Plot of Worst Value |       |
|------------------------------|-------|
| QPSK                         | 16QAM |

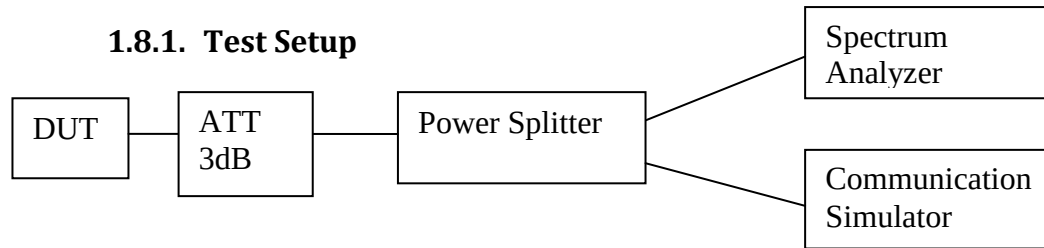


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## 1.8. Occupied Bandwidth

### 1.8.1. Test Setup



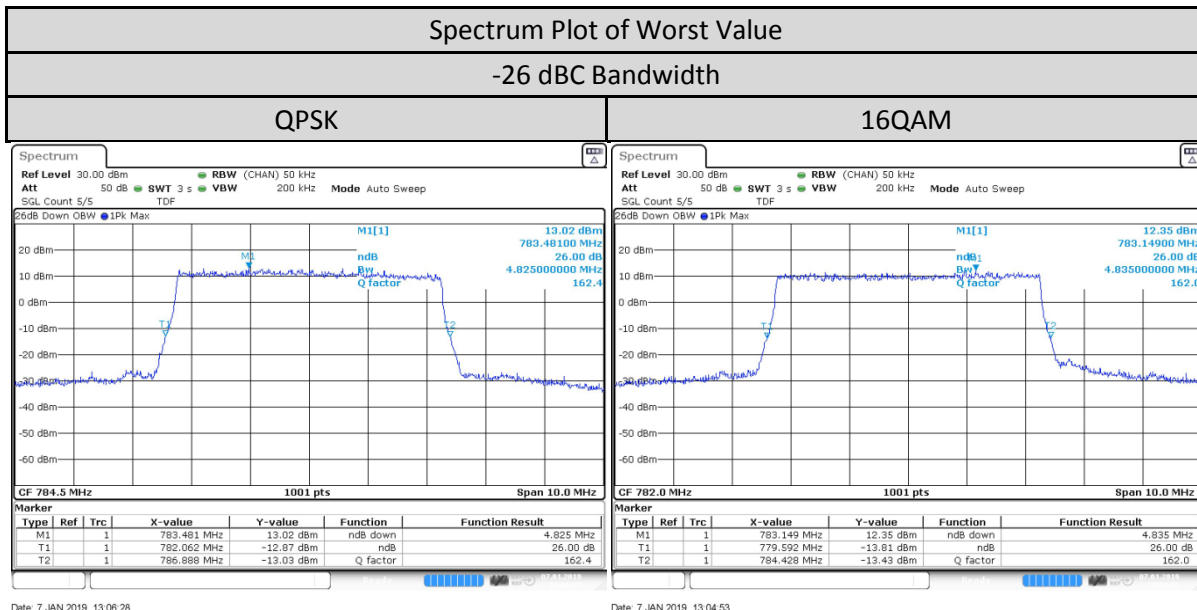
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) For LTE measurement, set DUT to transmit maximum power & full RB size through communication simulator.
- 4) For LTE measurement, set DUT to transmit maximum power through communication simulator.
- 5) Spectrum Analyzer setting, RBW is 1% of OBW and VBW is 3 times of RBW.
- 6) Measure & record -26dBc and 99% occupied bandwidth (BW).
- 7) All the measurement was done at low, mid, high channel for each band and different modulation.

### 1.8.2. Test Limit

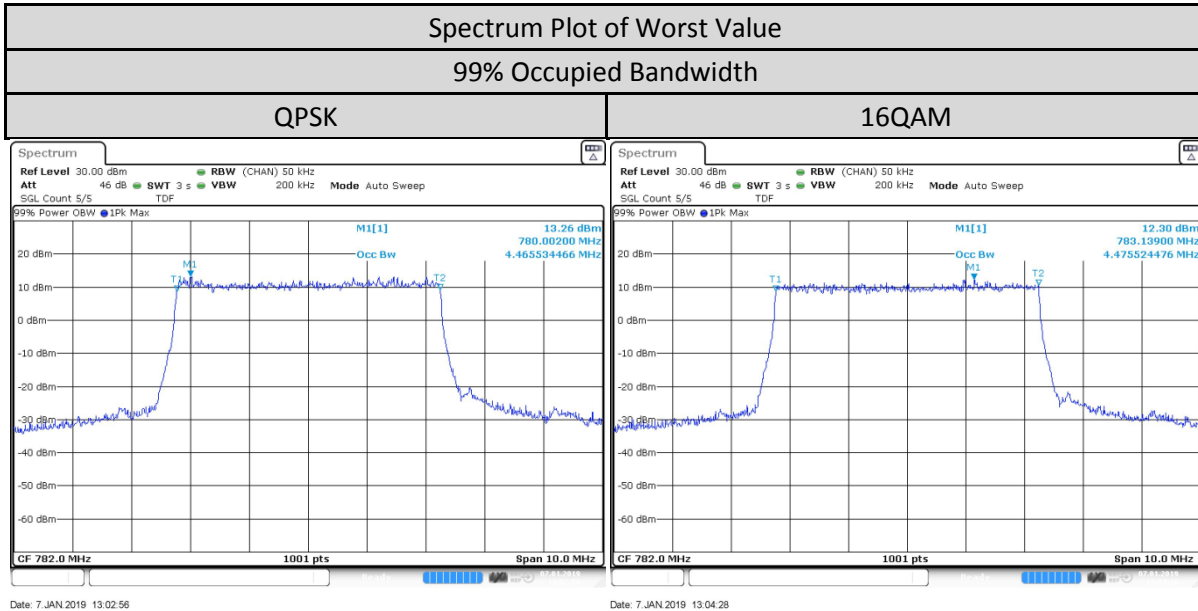
For measurement 99% of occupied bandwidth that is required by FCC 2.1049 and RSS Gen 6.6.

### 1.8.3. Occupied Bandwidth - LTE Band 13 (777-787MHz)

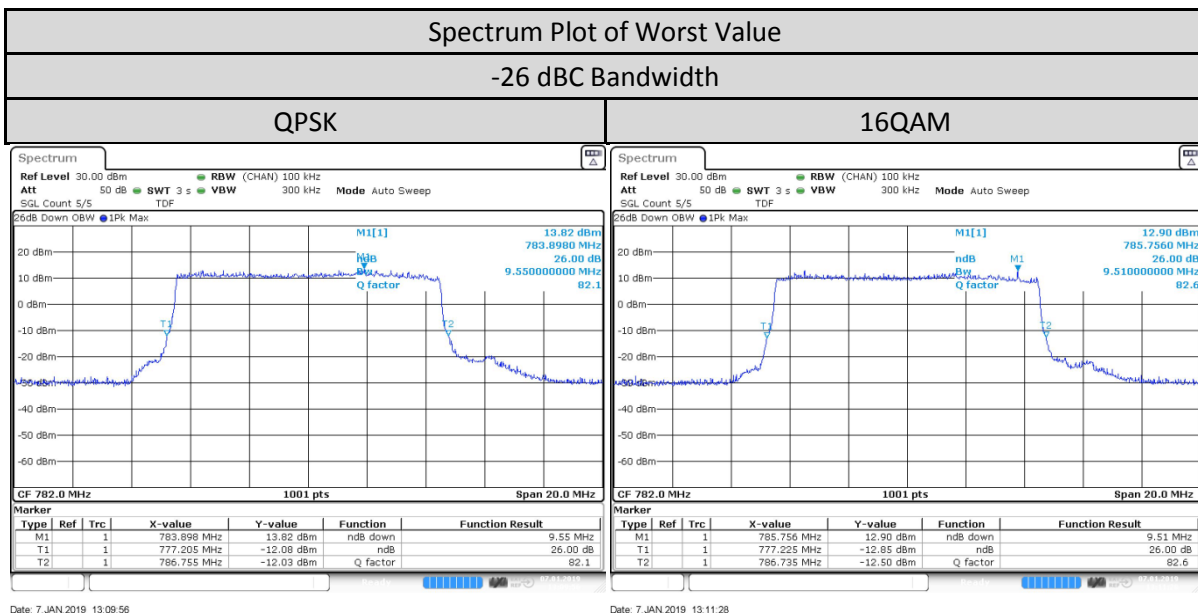
| LTE Band/BW/RB Size/RB Offset | Channel Number | Tx Frequency | -26 dBc Bandwidth (MHz) |                  |
|-------------------------------|----------------|--------------|-------------------------|------------------|
|                               |                |              | QPSK Modulation         | 16QAM Modulation |
| <b>Band 13/5MHz/25/0</b>      | Low CH 23205   | 779.5 MHz    | 4.785                   | 4.765            |
|                               | Mid CH 23230   | 782 MHz      | 4.795                   | <b>4.835</b>     |
|                               | High CH 23255  | 784.5 MHz    | <b>4.825</b>            | 4.805            |



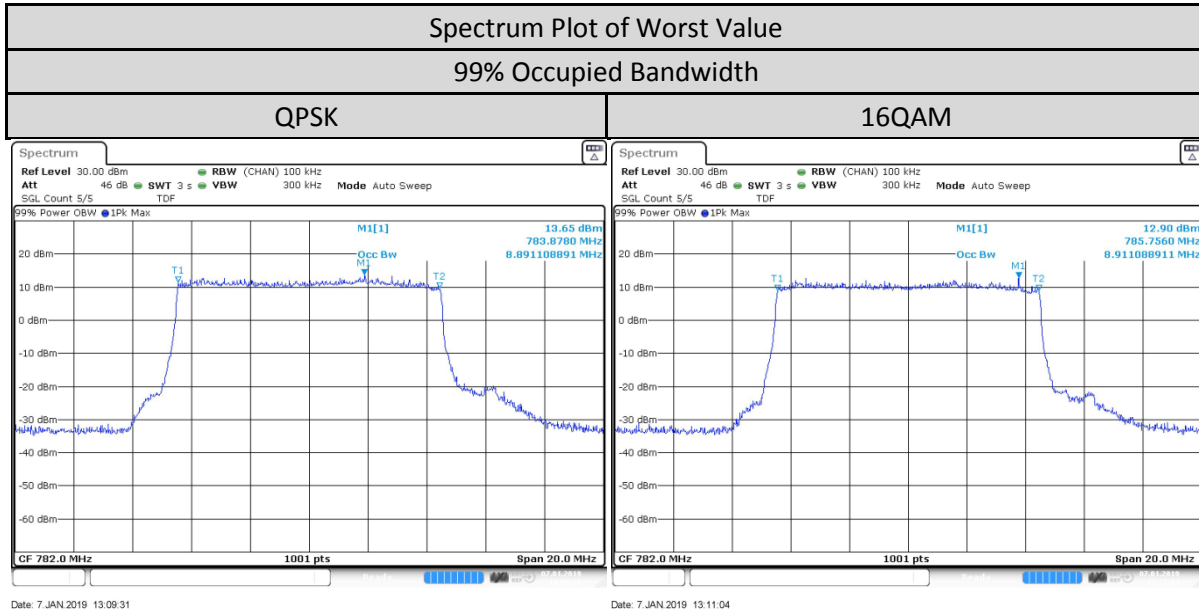
| LTE Band/BW/RB Size/RB Offset | Channel Number | Tx Frequency | 99% Occupied Bandwidth (MHz) |                  |
|-------------------------------|----------------|--------------|------------------------------|------------------|
|                               |                |              | QPSK Modulation              | 16QAM Modulation |
| Band 13/5MHz/25/0             | Low CH 23205   | 779.5 MHz    | 4.466                        | 4.456            |
|                               | Mid CH 23230   | 782 MHz      | 4.466                        | 4.476            |
|                               | High CH 23255  | 784.5 MHz    | 4.466                        | 4.456            |



| LTE Band/BW/RB Size/RB Offset | Channel Number | Tx Frequency | -26 dBc Bandwidth (MHz) |                  |
|-------------------------------|----------------|--------------|-------------------------|------------------|
|                               |                |              | QPSK Modulation         | 16QAM Modulation |
| Band 13/10MHz/50/0            | Low CH         |              |                         |                  |
|                               | Mid CH 23230   | 782 MHz      | 9.55                    | 9.51             |
|                               | High CH        |              |                         |                  |

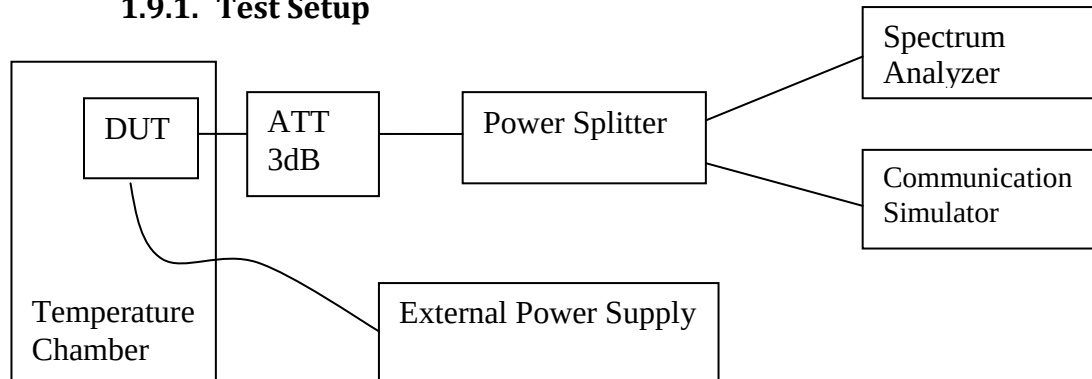


| LTE Band/BW/RB Size/RB Offset | Channel Number | Tx Frequency | 99% Occupied Bandwidth (MHz) |                  |
|-------------------------------|----------------|--------------|------------------------------|------------------|
|                               |                |              | QPSK Modulation              | 16QAM Modulation |
| <b>Band 13/10MHz/50/0</b>     | Low CH         |              |                              |                  |
|                               | Mid CH 23230   | 782 MHz      | 8.891                        | 8.911            |
|                               | High CH        |              |                              |                  |



## 1.9. Frequency Stability

### 1.9.1. Test Setup



- 1) The DUT is placed in the temperature chamber and DUT is power up by external power supply to control the DC input voltage.
- 2) The temperature chamber could control the temperature and humidity and external power supply could control the test voltage range from minimum to maximum operating voltage.
- 3) Measured frequency error from the communication simulator by vary below step :
  - i. Vary temperature of the temperature chamber from -30 ~ 50 deg C (10 deg C / Step) and set external supply voltage constant at nominal voltage.
  - ii. Vary external supply voltage from minimum to maximum operation voltage support by DUT and set temperature chamber constant at room temp.
- 4) All the measurement was done at mid channel for each band.

### 1.9.2. Test Limit

The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 1.9.3. Frequency Stability - LTE Band 13 (777-787MHz)

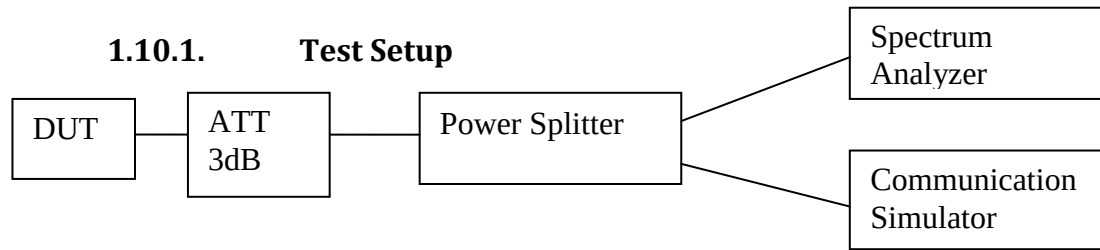
| Band           | Temp<br>( Deg C) | Frequency Error VS Temperature |                       |                 |                       |
|----------------|------------------|--------------------------------|-----------------------|-----------------|-----------------------|
|                |                  | Channel Bandwidth: 5 MHz       |                       |                 |                       |
|                |                  | Low Channel                    |                       | High Channel    |                       |
|                |                  | 779.5MHz                       |                       | 784.5MHz        |                       |
|                |                  | Frequency (MHz)                | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| LTE<br>Band 13 | 50               | 779.500008                     | 0.010369              | 784.500011      | 0.013494              |
|                | 40               | 779.499993                     | -0.009451             | 784.500012      | 0.014807              |
|                | 30               | 779.499994                     | -0.007873             | 784.500009      | 0.011944              |
|                | 20               | 779.500007                     | 0.008515              | 784.500013      | 0.016302              |
|                | 10               | 779.500007                     | 0.008442              | 784.50001       | 0.01333               |
|                | 0                | 779.500004                     | 0.004992              | 784.500009      | 0.011524              |
|                | -10              | 779.500004                     | 0.005249              | 784.50001       | 0.013165              |
|                | -20              | 779.500006                     | 0.007634              | 784.50001       | 0.012618              |
|                | -30              | 779.50001                      | 0.012204              | 784.50001       | 0.012892              |

| Band        | Voltage (V) | Frequency Error VS Voltage |                       |                 |                       |
|-------------|-------------|----------------------------|-----------------------|-----------------|-----------------------|
|             |             | Channel Bandwidth: 5 MHz   |                       |                 |                       |
|             |             | Low Channel                |                       | High Channel    |                       |
|             |             | 779.5MHz                   |                       | 784.5MHz        |                       |
| LTE Band 13 |             | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
|             | 9           | 779.499994                 | -0.007249             | 784.500011      | 0.013457              |
|             | 7.5         | 779.500006                 | 0.007873              | 784.500012      | 0.014934              |
|             | 6           | 779.500005                 | 0.007029              | 784.500008      | 0.009974              |

| Band        | Temp ( Deg C) | Frequency Error VS Temperature |                       |
|-------------|---------------|--------------------------------|-----------------------|
|             |               | Channel Bandwidth: 10 MHz      |                       |
|             |               | Mid Channel                    |                       |
|             |               | 782MHz                         |                       |
| LTE Band 13 |               | Frequency (MHz)                | Frequency Error (ppm) |
|             | 50            | 781.999992                     | -0.01061              |
|             | 40            | 781.999999                     | -0.01264              |
|             | 30            | 781.999991                     | -0.012037             |
|             | 20            | 781.999992                     | -0.00975              |
|             | 10            | 781.999993                     | -0.008506             |
|             | 0             | 781.999999                     | -0.012183             |
|             | -10           | 781.999993                     | -0.009128             |
|             | -20           | 781.999993                     | -0.008744             |
|             | -30           | 781.999992                     | -0.009988             |

| Band        | Voltage (V) | Frequency Error VS Voltage |                       |
|-------------|-------------|----------------------------|-----------------------|
|             |             | Channel Bandwidth: 10 MHz  |                       |
|             |             | Mid Channel                |                       |
|             |             | 782MHz                     |                       |
| LTE Band 13 |             | Frequency (MHz)            | Frequency Error (ppm) |
|             | 9           | 781.999991                 | -0.011195             |
|             | 7.5         | 781.999991                 | -0.011104             |
|             | 6           | 781.999991                 | -0.011708             |

## 1.10. Band Edge Conducted Spurious Emission



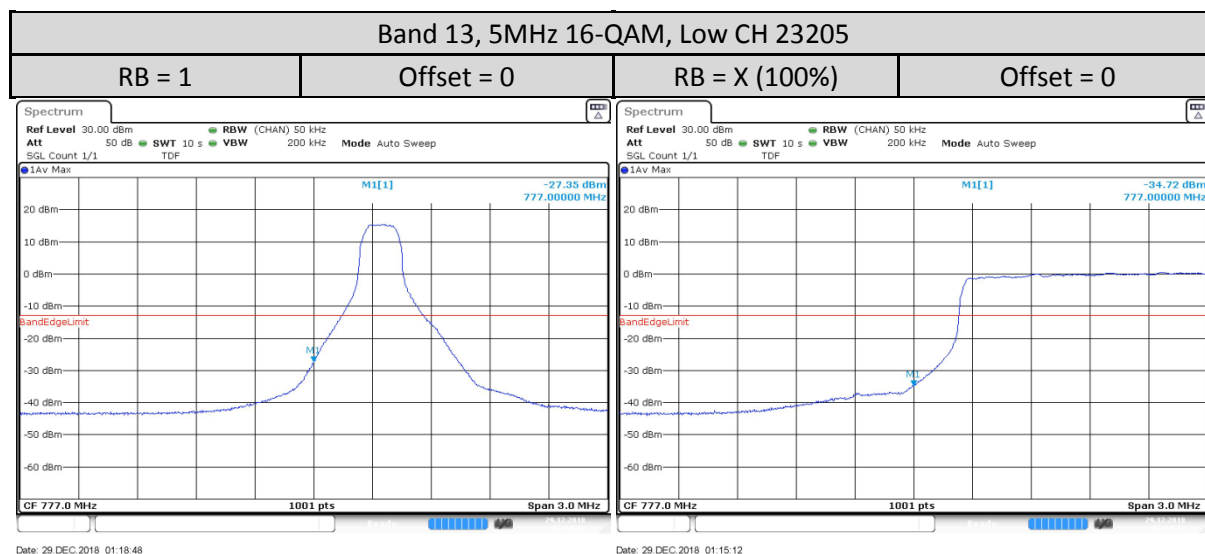
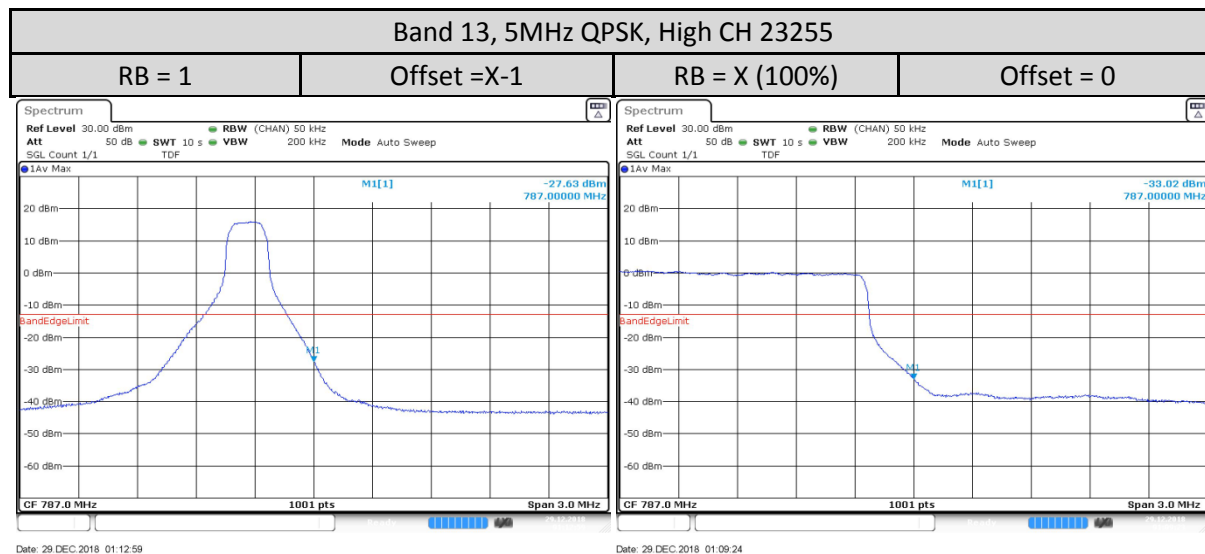
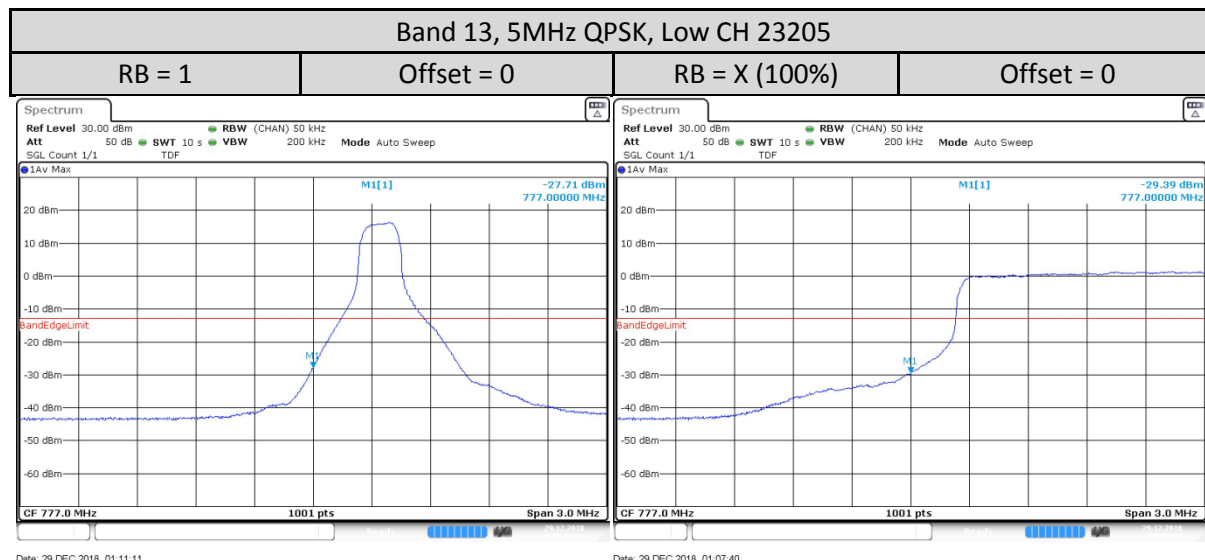
- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) The band edges of lowest and highest channels with the highest RF powers were measured.
- 5) The center frequency of spectrum is the band edge frequency, span is 3MHz, RBW is 1~3% of OBW and VBW is at least 3 times of RBW.
- 6) Record the maximum trace plot into the test report.

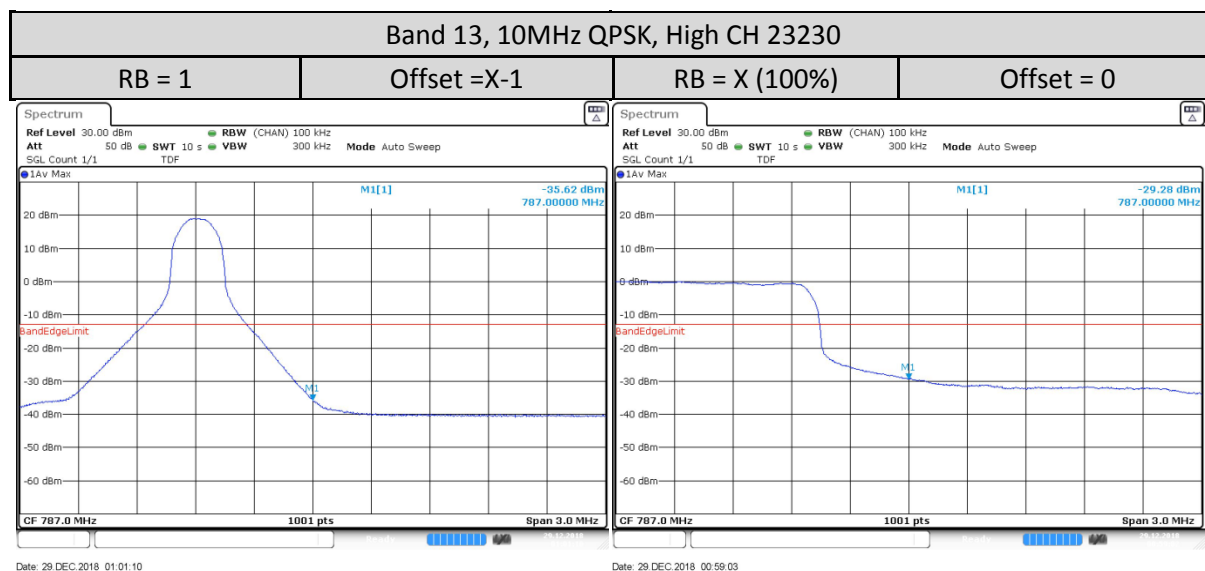
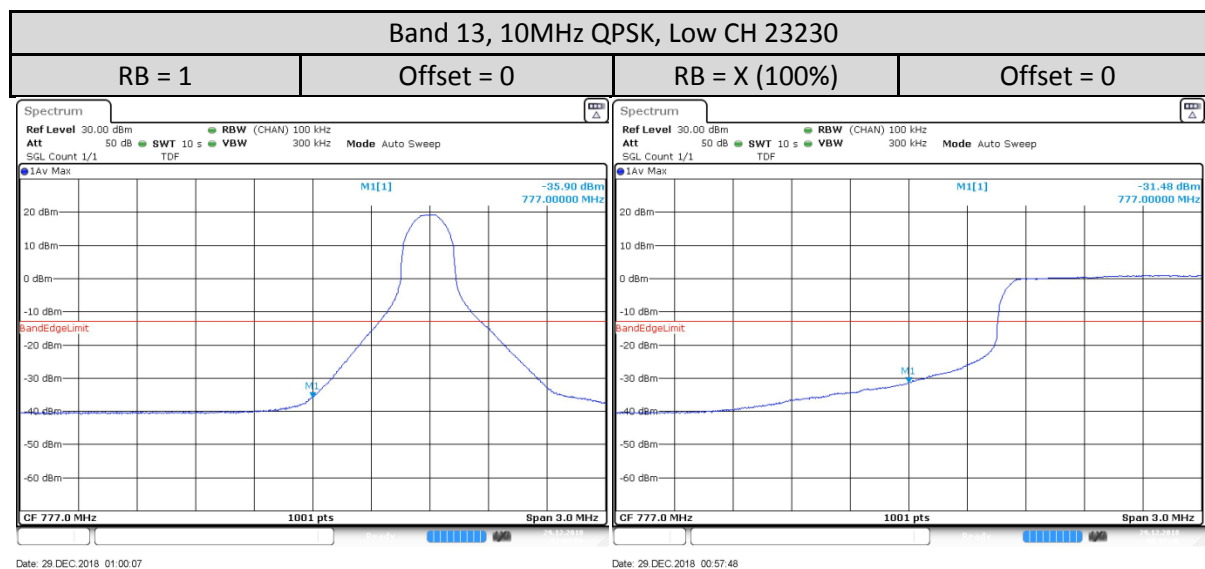
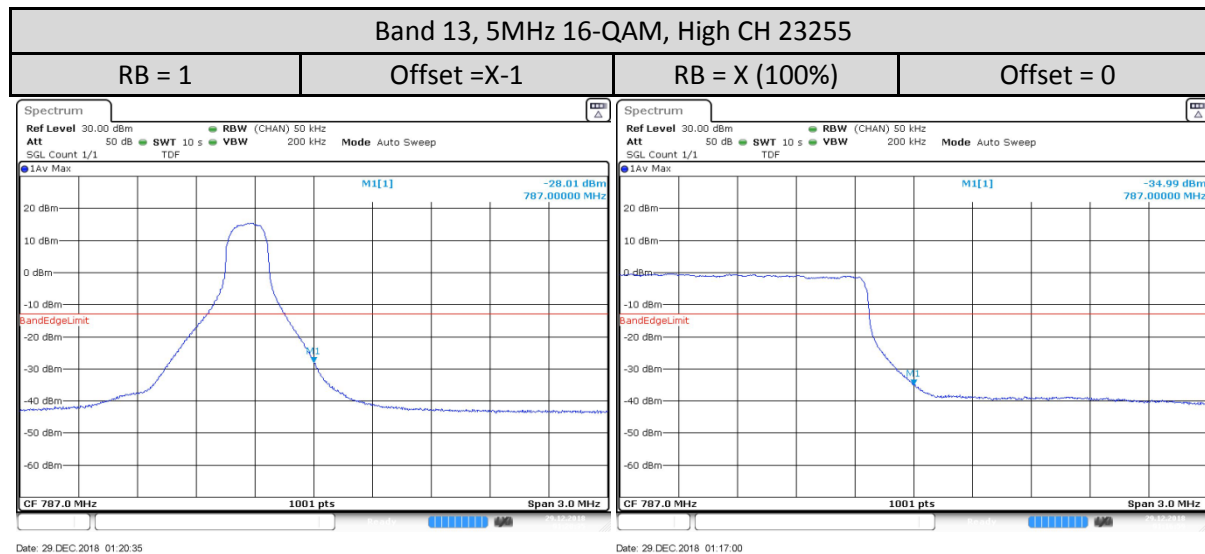
### 1.10.2. Test Limit

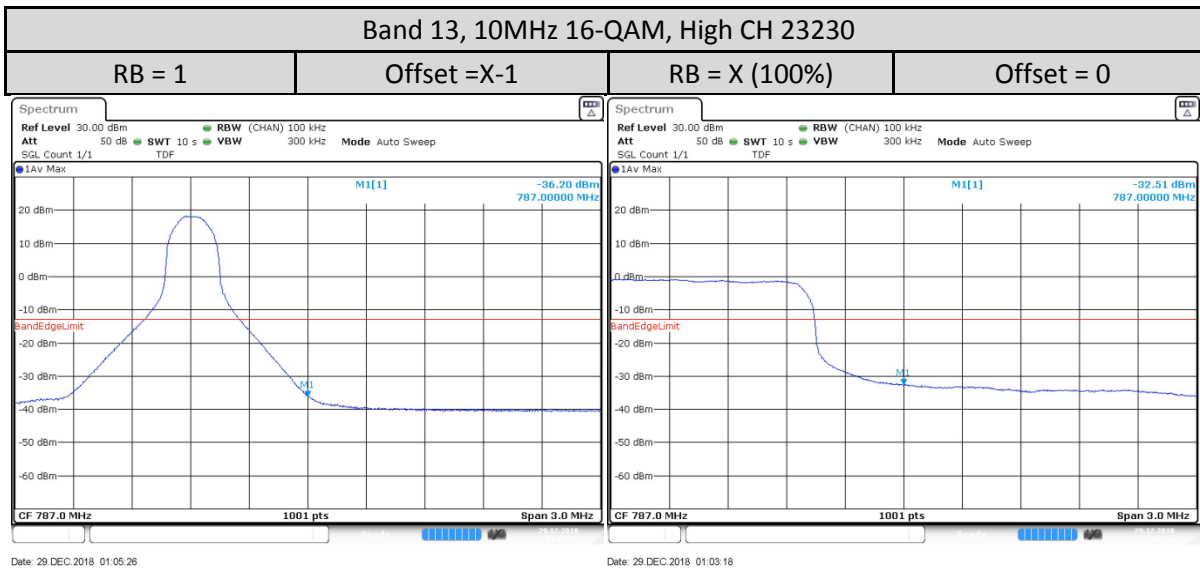
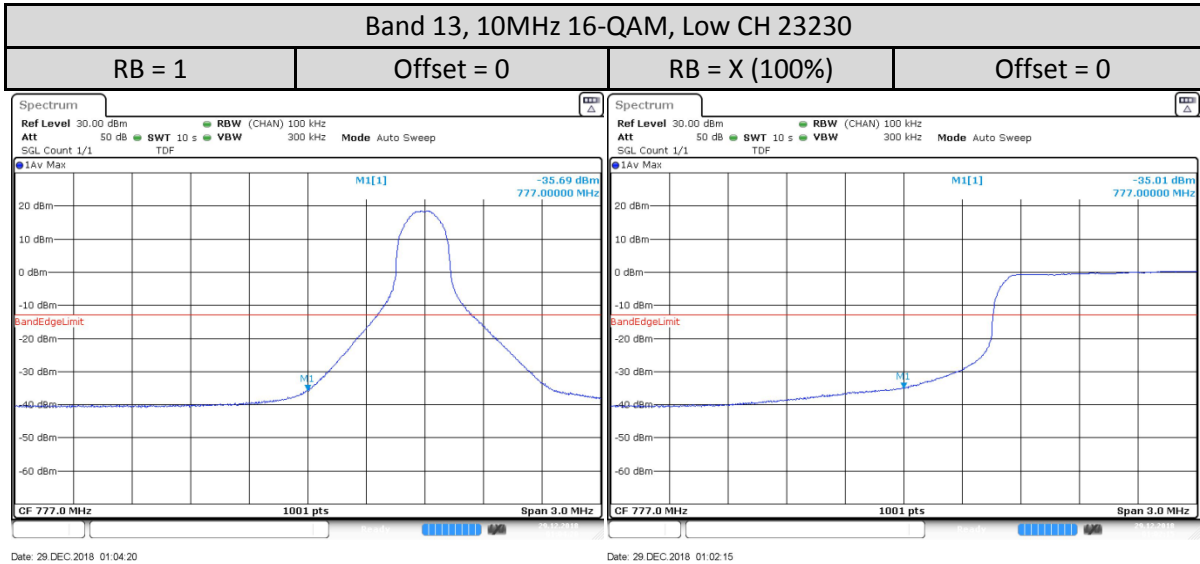
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (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 (1) and (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;

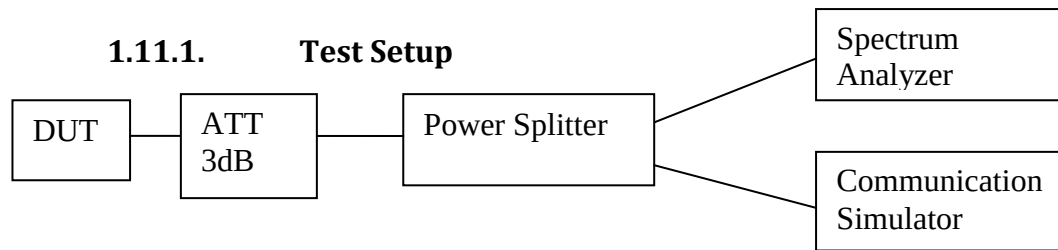
### 1.10.3. Band Edge Conducted Spurious Emission – LTE Band 13 (777-787MHz)







## 1.11. Conducted Spurious Emission



- 1) The DUT transmitter output port was connected to communication simulator with above setup.
- 2) Path loss for the measurement included.
- 3) Set DUT to transmit maximum power through communication simulator.
- 4) Spectrum Analyzer setting, RBW = 100 kHz or greater, VBW = 3\*RBW.
- 5) The spurious emission of lowest, middle and highest channels with the highest RF powers were measured.
- 6) Record the maximum trace plot into the test report.

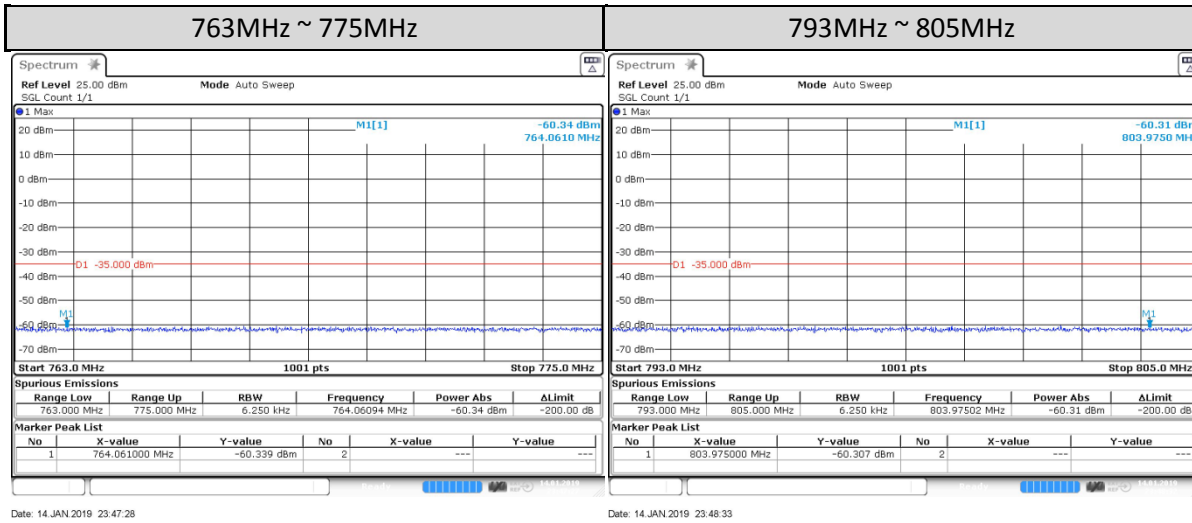
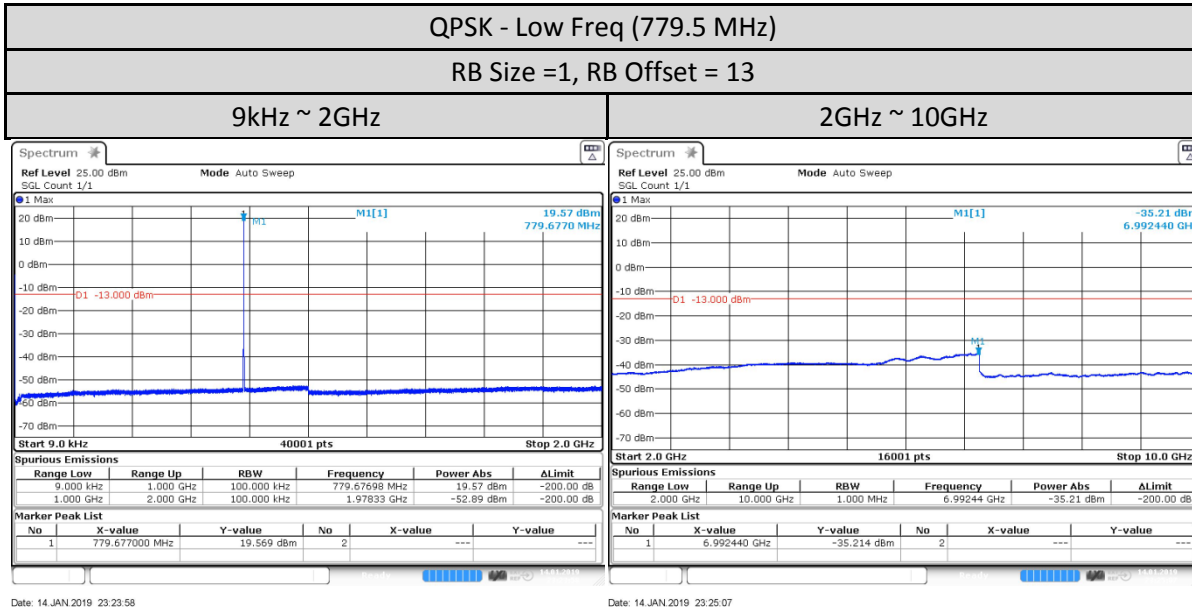
### 1.11.2. Test Limit

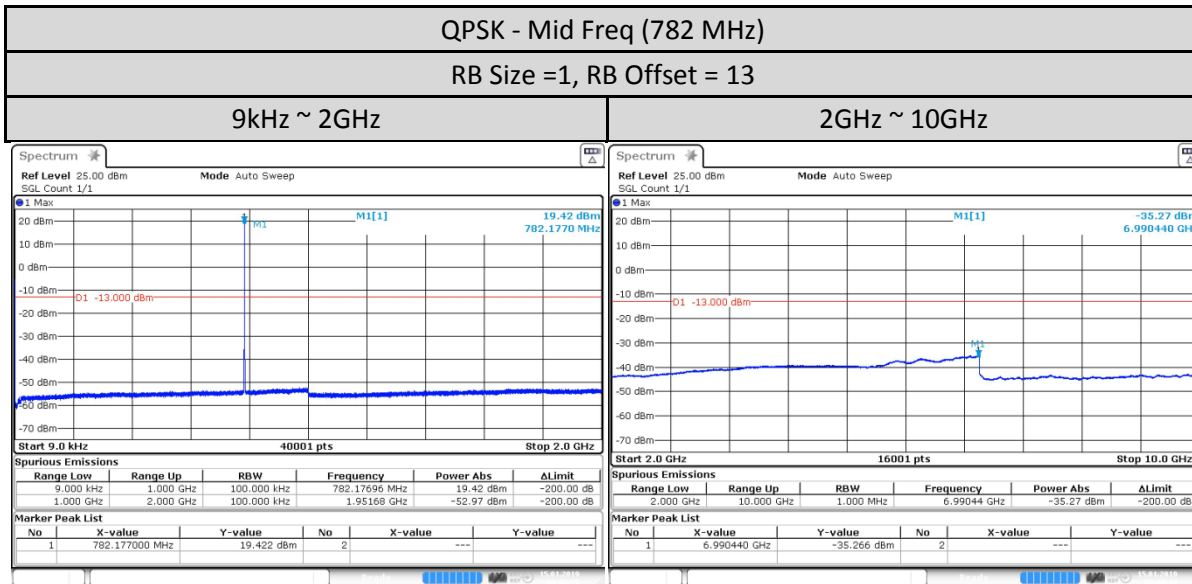
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (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 (1) and (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;

### 1.11.3. Conducted Spurious Emissions – LTE Band 13 (777-787MHz)

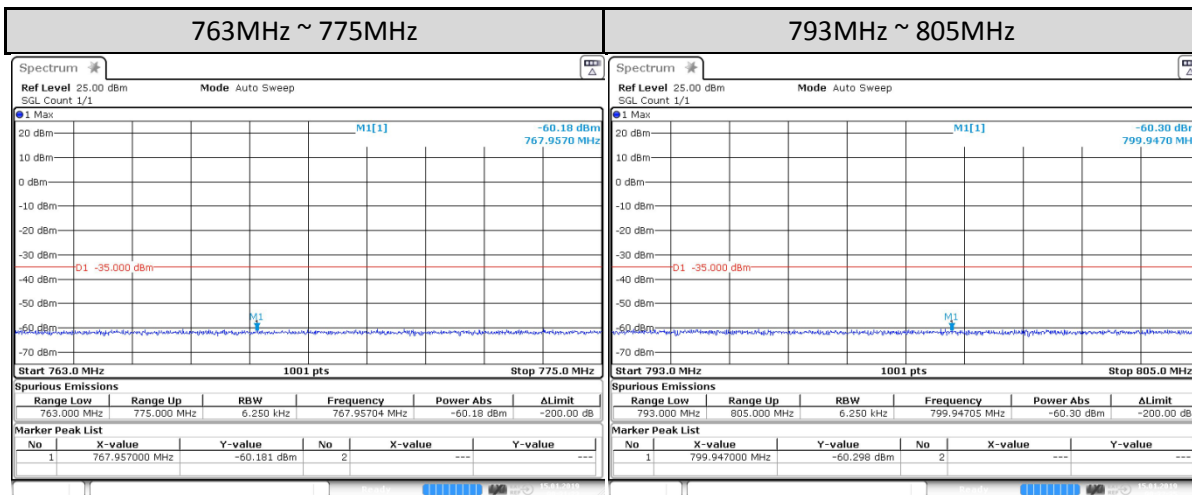
**5MHz**





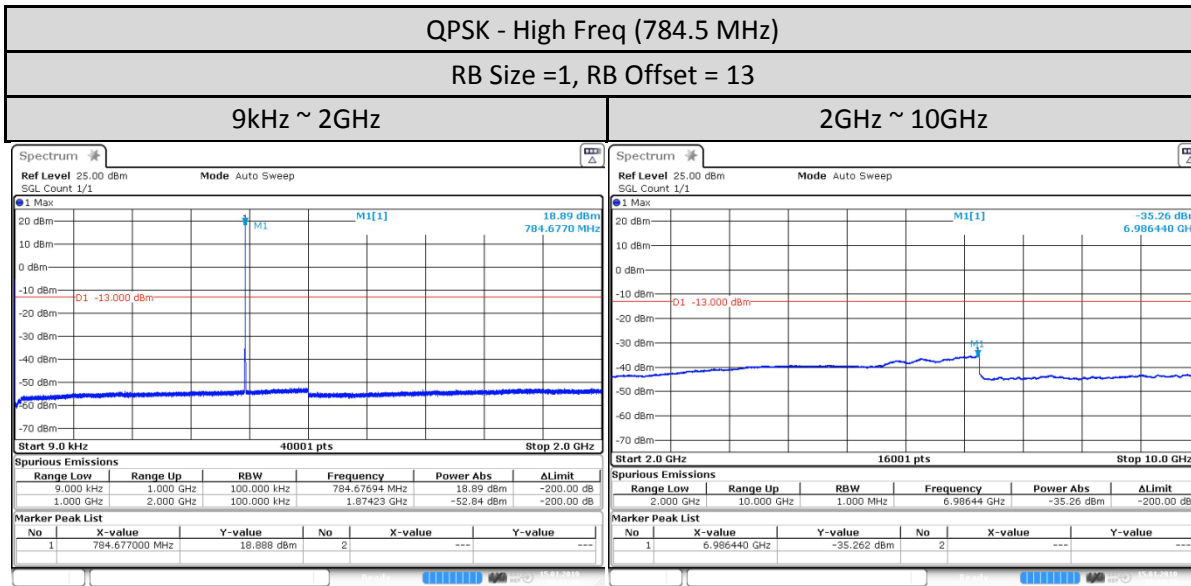
Date: 15 JAN 2019 00:07:58

Date: 15 JAN 2019 00:09:11



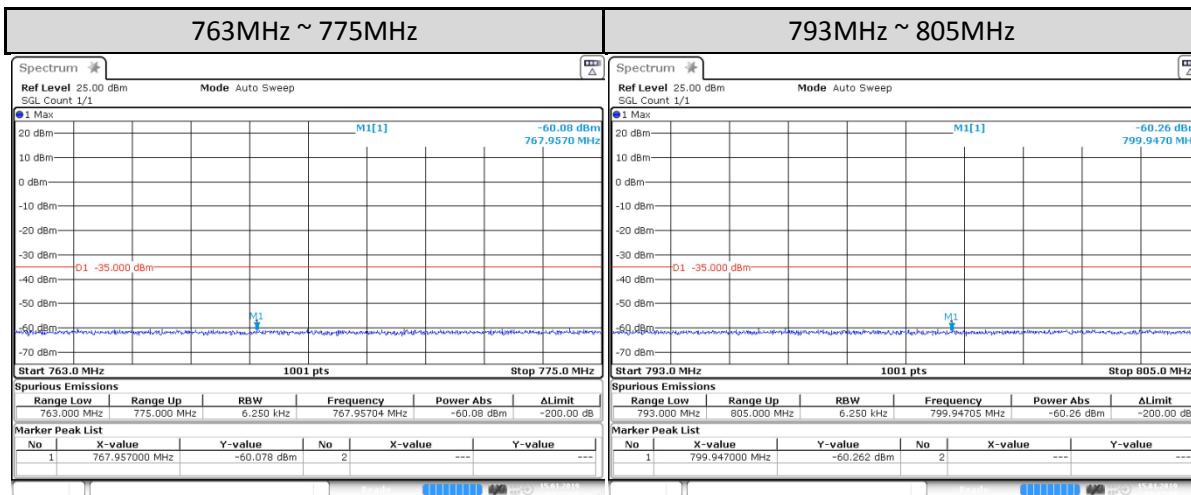
Date: 15 JAN 2019 00:31:23

Date: 15 JAN 2019 00:32:35



Date: 15 JAN 2019 00:51:46

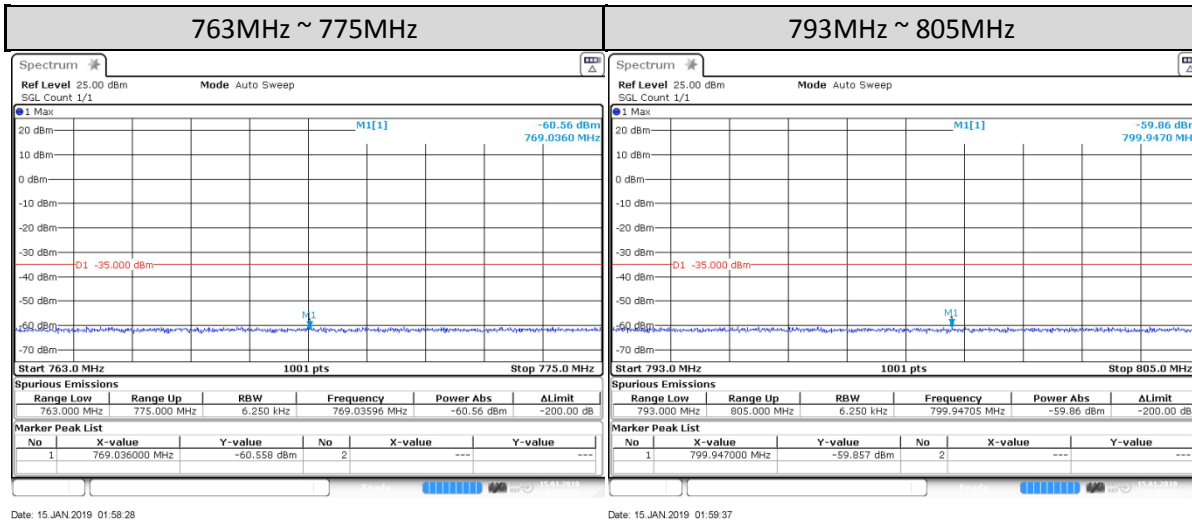
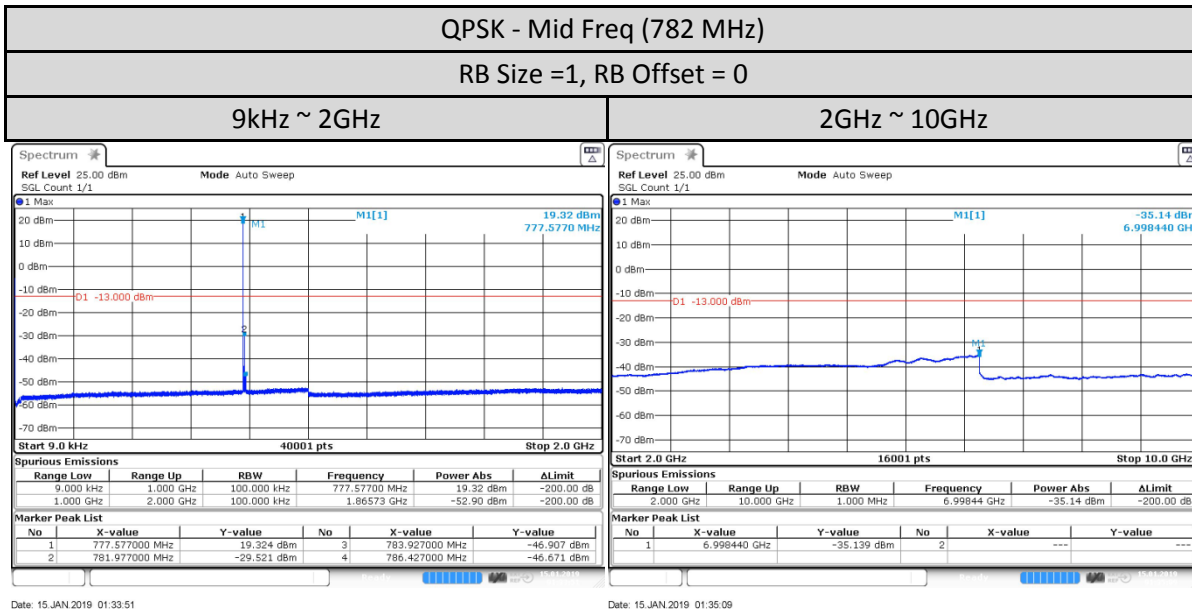
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Date: 15 JAN 2019 01:15:58

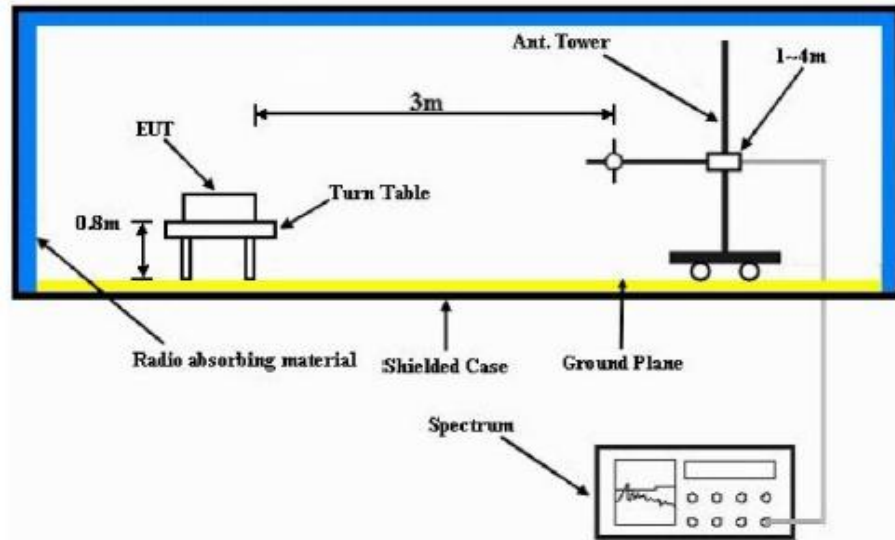
Date: 15 JAN 2019 01:17:08

## 10MHz



## 1.12. Radiated Spurious Emission

### 1.12.1. Test Setup



- 1) The spectrum setting for scanning Radiated Emission below 1 GHz is RBW = 100 kHz, VBW = 300 kHz and above 1 GHz is RBW = 1MHz, VBW = 3MHz. Detector mode is positive peak.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the Turn Table at 0.8m height for below 1GHz measurement and at 1.5m height for above 1GHz measurement, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4) Final Radiated Spurious Emission = “Read Value” + Measured substitution value.

### 1.12.2. Test Limit

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:

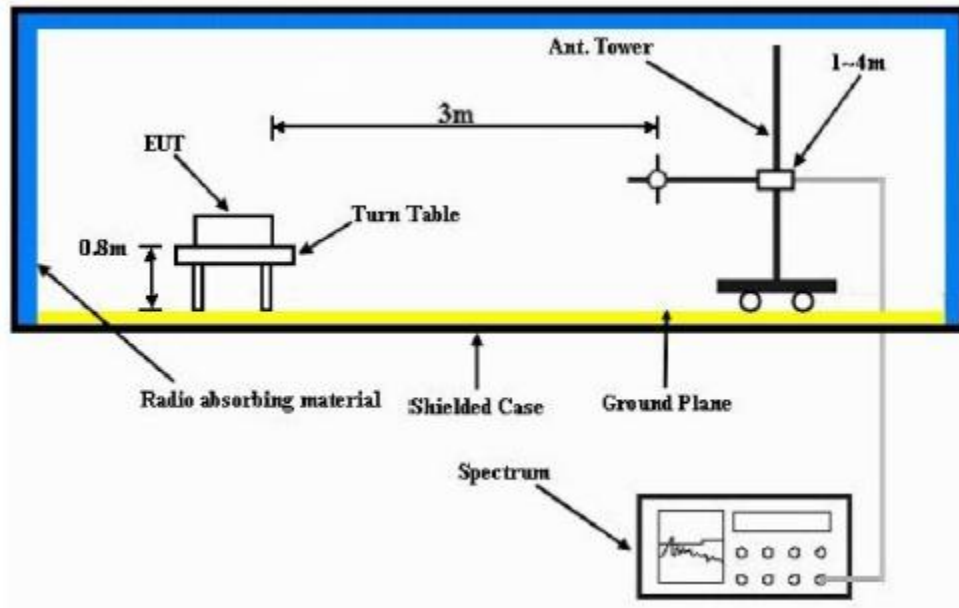
- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band 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 (1) and (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;

**1.12.3. Radiated Spurious Emission – LTE Band 13 (777–787MHz)**

**Not Performed.**

### 1.13. Effective Radiated Power (ERP)

#### 1.13.1. Test Setup



- 1) All measurements were done at low, middle and high operational frequency range. RBW is 1% to 5% of OBW, VBW is 3\*RBW. Detector mode is RMS.
- 2) In the semi-anechoic chamber, setup as illustrated above the EUT placed on the Turn Table at 0.8m height for below 1Ghz measurement and at 1.5m height for above 1GHz measurement, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- 3) The substitution antenna is substituted for EUT at the same position and signals generator (S.G) export the CW signal to the substitution antenna via a TX cable. The receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum radiation power. Record the power level of maximum radiation power from spectrum. So, the Measured substitution value = Ref level of S.G + TX cables loss – Substituted Antenna Gain.
- 4)  $ERP = \text{“Read Value”} + \text{Measured substitution value.}$

#### 1.13.2. Test Limit

FCC: Portable stations (hand-held devices) transmitting in the 776-788 MHz band is limited to 3 watts ERP.  
ISED: The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.

#### 1.13.3. Effective Radiated Power (ERP) - LTE Band 13 (777-787MHz)

**Not Performed.**

--End of Test Report--