

# FCC TEST REPORT

## (PART 27)

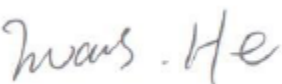
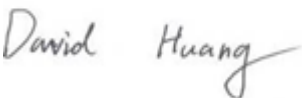
|            |                                                                                      |
|------------|--------------------------------------------------------------------------------------|
| Applicant: | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd                     |
| Address:   | Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen |

|                          |                                                                                      |
|--------------------------|--------------------------------------------------------------------------------------|
| Manufacturer or Supplier | Yulong Computer Telecommunication Scientific (Shenzhen) Co., Ltd                     |
| Address                  | Building B, Boton Science Park, Chaguang Road, Xili Town, Nanshan District, Shenzhen |
| Product                  | Feature phone                                                                        |
| Brand Name               | coolpad                                                                              |
| Model Name               | Coolpad 3312A                                                                        |
| FCC ID                   | R38YL3312A                                                                           |
| Date of tests            | Oct. 12, 2018 ~ Nov. 30, 2018                                                        |

The tests have been carried out according to the requirements of the following standard:

- ☒ FCC Part 27, Subpart C, M      ☒ ANSI/TIA/EIA-603-D  
☒ FCC Part 2                      ☒ ANSI/TIA/EIA-603-E    ☒ ANSI C63.26-2015

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

|                                                                                     |                                                                                      |
|-------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Prepared by Evans He<br>Engineer / Mobile Department                                | Approved by David Huang<br>Manager / Mobile Department                               |
|  |  |
| Date: Nov. 30, 2018                                                                 | Date: Nov. 30, 2018                                                                  |

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|          |                                                                                                     |           |
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## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE | DATE ISSUED   |
|----------------|-------------------|---------------|
| RF181011N013-6 | Original release  | Nov. 30, 2018 |

## 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 27 & Part 2 |                                         |               |                                                                                       |
|----------------------------------------|-----------------------------------------|---------------|---------------------------------------------------------------------------------------|
| STANDARD SECTION                       | TEST TYPE AND LIMIT                     | RESULT        | REMARK                                                                                |
| 2.1046<br>27.50(h)(2)                  | Equivalent Isotropically Radiated Power | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 2.1055<br>27.54                        | Frequency Stability                     | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 2.1049<br>27.53(m)(6)                  | Occupied Bandwidth                      | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 27.50(d)(5)                            | Peak to average ratio                   | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53(m)(4)(6)               | Band Edge Measurements                  | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53(m)(4)(6)               | Conducted Spurious Emissions            | N/A<br>(note) | Meet the requirement of limit.                                                        |
| 2.1053<br>27.53(m)(4)(6)               | Radiated Spurious Emissions             | PASS          | Meet the requirement of limit.<br>Minimum passing margin is<br>-13.75dB at 562.95MHz. |

**NOTE : Test Lab Information:**

**Lab:** Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch

**Test Lab Address:** Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao'an District Shenzhen, Guangdong, 518108, People's  
Republic of China

## 1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

| MEASUREMENT         | FREQUENCY     | UNCERTAINTY |
|---------------------|---------------|-------------|
| Conducted emissions | 9kHz~30MHz    | 3.11dB      |
| Radiated emissions  | 9KHz ~ 30MHz  | 3.11dB      |
|                     | 30MHz ~ 1GMHz | 5.12dB      |
|                     | 1GHz ~ 18GHz  | 5.34dB      |
|                     | 18GHz ~ 40GHz | 5.02dB      |

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 1.2 TEST SITE AND INSTRUMENTS

| Instrument                 | Model     | Serial #   | Cal Date    | Cal Due     |
|----------------------------|-----------|------------|-------------|-------------|
| EMI test receiver          | ESL6      | 100262     | Jan. 05, 18 | Jan. 04, 19 |
| Active Antenna             | AL-130    | 121031     | Feb. 08, 18 | Feb. 07, 19 |
| 3m Semi-anechoic Chamber   | 9m*6m*6m  | N/A        | Oct. 18, 18 | Oct. 17, 19 |
| Signal Amplifier           | 8447E     | 443008     | Jan. 25, 18 | Jan. 24, 19 |
| MXA signal analyzer        | N9020A    | MY49100060 | Jan. 05, 18 | Jan. 04, 19 |
| Horn Antenna               | HAH-118   | 71259      | Jan. 26, 18 | Jan. 25, 19 |
| Horn Antenna               | HAH-118   | 71283      | Feb. 02, 18 | Feb. 01, 19 |
| AMPLIFIER                  | EM01G26G  | 60613      | Feb. 25, 18 | Feb. 24, 19 |
| AMPLIFIER                  | Emc012645 | 980077     | Jan. 05, 18 | Jan. 04, 19 |
| Bilog Antenna (30MHz~6GHz) | JB6       | A110712    | Feb. 08, 18 | Feb. 07, 19 |
| DC Power Supply            | E3640A    | MY40004013 | Jan. 05, 18 | Jan. 04, 19 |
| MXA Signal Analyzer        | N9020A    | MY49100060 | Jan. 05, 18 | Jan. 04, 19 |



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|                                             |               |                            |             |             |
|---------------------------------------------|---------------|----------------------------|-------------|-------------|
| MXG Vector Signal Generator                 | N5182A        | MY50140530                 | Jan. 05, 18 | Jan. 04, 19 |
| Series Signal Generator                     | E4421B        | US40051152                 | May. 12, 18 | May. 11, 19 |
| RF control unit                             | JS0806-0806-2 | 188060112                  | Apr. 25, 18 | Apr. 24, 19 |
| Wireless Connectivity Tester                | CMW270        | 1201.0002K75-1016<br>01-PE | Apr. 25, 18 | Apr. 24, 19 |
| Universal Radio Communication Tester        | CMU200        | 121393                     | Jan. 05, 18 | Jan. 04, 19 |
| Programmable Temperature & Humidity Chamber | HYL-TH-225DH  | DG-180746                  | Jul. 15, 18 | Jul. 14, 19 |
| Test Software                               | EZ-EMC        | ver.lcp-03A1               | N/A         | N/A         |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
  2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
  3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
  4. The FCC Site Registration No. is 535293.

## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                              |                                                                                             |                                 |
|------------------------------|---------------------------------------------------------------------------------------------|---------------------------------|
| <b>PRODUCT</b>               | Feature phone                                                                               |                                 |
| <b>MODEL NAME</b>            | Coolpad 3312A                                                                               |                                 |
| <b>POWER SUPPLY</b>          | 5.0Vdc (adapter or host equipment)<br>3.7Vdc (Li-ion, ion battery )                         |                                 |
| <b>MODULATION TECHNOLOGY</b> | LTE Band 41                                                                                 | QPSK, 16QAM                     |
| <b>FREQUENCY RANGE</b>       | LTE Band 41<br>Channel Bandwidth: 5MHz                                                      | 2498.5MHz ~ 2687.5MHz           |
|                              | LTE Band 41<br>Channel Bandwidth: 10MHz                                                     | 2501.0MHz ~ 2685.0MHz           |
|                              | LTE Band 41<br>Channel Bandwidth: 15MHz                                                     | 2503.5MHz ~ 2682.5MHz           |
|                              | LTE Band 41<br>Channel Bandwidth: 20MHz                                                     | 2506.0MHz ~ 2680.0MHz           |
| <b>EMISSION DESIGNATOR</b>   | LTE Band 41<br>Channel Bandwidth: 5MHz                                                      | QPSK: 4M48G7D<br>16QAM: 4M48W7D |
|                              | LTE Band 41<br>Channel Bandwidth: 10MHz                                                     | QPSK: 8M94G7D<br>16QAM: 8M94W7D |
|                              | LTE Band 41<br>Channel Bandwidth: 15MHz                                                     | QPSK: 13M4G7D<br>16QAM: 13M4W7D |
|                              | LTE Band 41<br>Channel Bandwidth: 20MHz                                                     | QPSK: 17M8G7D<br>16QAM: 17M8W7D |
| <b>MAX. EIRP POWER</b>       | LTE Band 41<br>Channel Bandwidth: 5MHz                                                      | 163.68mW                        |
|                              | LTE Band 41<br>Channel Bandwidth: 10MHz                                                     | 164.06mW                        |
|                              | LTE Band 41<br>Channel Bandwidth: 15MHz                                                     | 162.18mW                        |
|                              | LTE Band 41<br>Channel Bandwidth: 20MHz                                                     | 160.69mW                        |
| <b>ANTENNA TYPE</b>          | FPC antenna                                                                                 |                                 |
| <b>ANTENNA GAIN</b>          | 1.3dBi gain for LTE Band 41                                                                 |                                 |
| <b>HW VERSION</b>            | P1                                                                                          |                                 |
| <b>SW VERSION</b>            | 3312A.SPRINT.181214.0D                                                                      |                                 |
| <b>I/O PORTS</b>             | Refer to user's manual                                                                      |                                 |
| <b>DATA CABLE</b>            | USB cable: non-shielded, detachable, 1.0m<br>Earphone cable: non-shielded, detachable, 1.2m |                                 |



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**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The EUT was powered by the following adapter:

| ADAPTER |                                |
|---------|--------------------------------|
| BRAND:  | N/A                            |
| MODEL:  | RD0501000-USBA-18MG            |
| INPUT:  | AC 100-240V~50/60Hz, 0.25A MAX |
| OUTPUT: | DC 5V,1000mA                   |

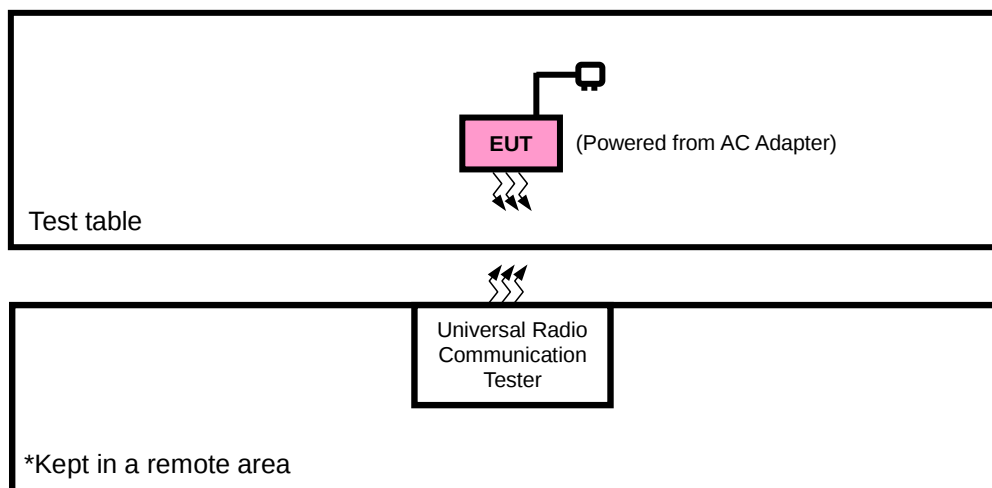
3. The EUT matched the following USB cable:

| USB CABLE    |           |
|--------------|-----------|
| BRAND:       | N/A       |
| MODEL:       | N/A       |
| SIGNAL LINE: | 1.0 METER |

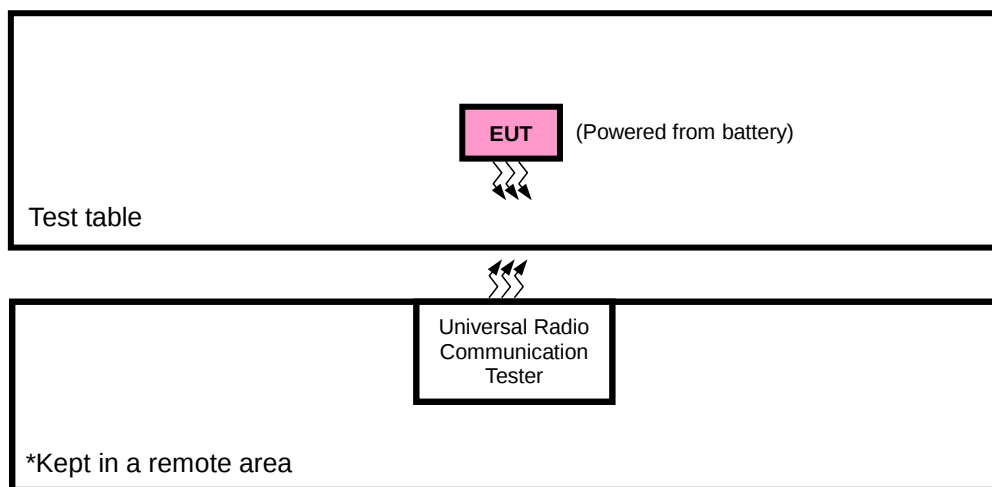
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 2.2 CONFIGURATION OF SYSTEM UNDER TEST

### FOR RADIATION EMISSION TEST



### FOR CONDUCTED & E.I.R.P TEST



## 2.3 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   | Laptop  | Lenovo | E40       | LR-1EHRX   | N/A    |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | DC Line: Unshielded, Detachable 2.0m                |
| 2   | AC Line: Unshielded, Detachable 1.2m                |

**NOTE:** All power cords of the above support units are no shielded (1.8m).

## 2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

| EUT<br>CONFIGURE<br>MODE | DESCRIPTION                             |
|--------------------------|-----------------------------------------|
| A                        | EUT + Adapter + USB Cable with LTE link |
| B                        | EUT + Battery with LTE link             |

**LTE BAND 41 MODE**

| EUT<br>CONFIGURE<br>MODE | TEST ITEM                   | AVAILABLE<br>CHANNEL | TESTED CHANNEL      | CHANNEL<br>BANDWIDTH | MODULATION  | MODE                 |
|--------------------------|-----------------------------|----------------------|---------------------|----------------------|-------------|----------------------|
| B                        | EIRP                        | 39675 to 41565       | 39675, 40620, 41565 | 5MHz                 | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                          |                             | 39700 to 41540       | 39700, 40620, 41540 | 10MHz                | QPSK, 16QAM | 1 RB / 0RB Offset    |
|                          |                             | 39725 to 41515       | 39725, 40620, 41515 | 15MHz                | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                          |                             | 39750 to 41490       | 39750, 40620, 41490 | 20MHz                | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| B                        | FREQUENCY<br>STABILITY      | 39675 to 41565       | 39675, 41565        | 5MHz                 | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39700 to 41540       | 39700, 41540        | 10MHz                | QPSK        | 1 RB / 0RB Offset    |
|                          |                             | 39725 to 41515       | 39725, 41515        | 15MHz                | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39750 to 41490       | 39750, 41490        | 20MHz                | QPSK        | 1 RB / 0 RB Offset   |
| B                        | OCCUPIED<br>BANDWIDTH       | 39675 to 41565       | 39675, 40620, 41565 | 5MHz                 | QPSK, 16QAM | 25 RB / 0 RB Offset  |
|                          |                             | 39700 to 41540       | 39700, 40620, 41540 | 10MHz                | QPSK, 16QAM | 50 RB / 0 RB Offset  |
|                          |                             | 39725 to 41515       | 39725, 40620, 41515 | 15MHz                | QPSK, 16QAM | 75 RB / 0 RB Offset  |
|                          |                             | 39750 to 41490       | 39750, 40620, 41490 | 20MHz                | QPSK, 16QAM | 100 RB / 0 RB Offset |
| B                        | PEAK TO<br>AVERAGE<br>RATIO | 39675 to 41565       | 39675, 40620, 41565 | 5MHz                 | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                          |                             | 39700 to 41540       | 39700, 40620, 41540 | 10MHz                | QPSK, 16QAM | 1 RB / 0RB Offset    |
|                          |                             | 39725 to 41515       | 39725, 40620, 41515 | 15MHz                | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                          |                             | 39750 to 41490       | 39750, 40620, 41490 | 20MHz                | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| B                        | BAND EDGE                   | 39675 to 41565       | 39675               | 5MHz                 | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             |                      | 41565               | 5MHz                 | QPSK        | 25 RB / 0 RB Offset  |
|                          |                             | 39700 to 41540       | 39700               | 10MHz                | QPSK        | 1 RB / 24 RB Offset  |
|                          |                             |                      | 41540               | 10MHz                | QPSK        | 25 RB / 0 RB Offset  |
|                          |                             | 39725 to 41515       | 39725               | 15MHz                | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             |                      | 41515               | 15MHz                | QPSK        | 50 RB / 0 RB Offset  |
|                          |                             | 39750 to 41490       | 39750               | 20MHz                | QPSK        | 1 RB / 49 RB Offset  |
|                          |                             |                      | 41490               | 20MHz                | QPSK        | 50 RB / 0 RB Offset  |
|                          |                             | 39725 to 41515       | 39725               | 15MHz                | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             |                      | 41515               | 15MHz                | QPSK        | 75 RB / 0 RB Offset  |
|                          |                             | 39750 to 41490       | 39750               | 20MHz                | QPSK        | 1 RB / 74 RB Offset  |
|                          |                             |                      | 41490               | 20MHz                | QPSK        | 75 RB / 0 RB Offset  |
| B                        | CONDCUDET<br>ED<br>EMISSION | 39675 to 41565       | 39675, 40620, 41565 | 5MHz                 | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39700 to 41540       | 39700, 40620, 41540 | 10MHz                | QPSK        | 1 RB / 0RB Offset    |
|                          |                             | 39725 to 41515       | 39725, 40620, 41515 | 15MHz                | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39750 to 41490       | 39750, 40620, 41490 | 20MHz                | QPSK        | 1 RB / 0 RB Offset   |
| A                        | RADIATED<br>EMISSION        | 39675 to 41565       | 40620               | 5MHz                 | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39700 to 41540       | 39700, 40620, 41540 | 10MHz                | QPSK        | 1 RB / 0RB Offset    |
|                          |                             | 39725 to 41515       | 40620               | 15MHz                | QPSK        | 1 RB / 0 RB Offset   |
|                          |                             | 39750 to 41490       | 40620               | 20MHz                | QPSK        | 1 RB / 0 RB Offset   |

**Note:** This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

**TEST CONDITION:**

| TEST ITEM             | ENVIRONMENTAL CONDITIONS | INPUT POWER         | TESTED BY   |
|-----------------------|--------------------------|---------------------|-------------|
| EIRP                  | 22deg. C, 60%RH          | 3.7Vdc from Battery | Evans He    |
| FREQUENCY STABILITY   | 23deg. C, 60%RH          | DC 3.4V/3.7V/4.2V   | Aaron Liang |
| OCCUPIED BANDWIDTH    | 24deg. C, 60%RH          | 3.7Vdc from Battery | Aaron Liang |
| PEAK TO AVERAGE RATIO | 24deg. C, 61%RH          | 3.7Vdc from Battery | Aaron Liang |
| BAND EDGE             | 21deg. C, 60%RH          | 3.7Vdc from Battery | Aaron Liang |
| CONDUCTED EMISSION    | 23deg. C, 60%RH          | 3.7Vdc from Battery | Evans He    |
| RADIATED EMISSION     | 23deg. C, 61%RH          | 5Vdc from adapter   | Evans He    |

## 2.5 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 v03**

**ANSI/TIA/EIA-603-D**

**ANSI/TIA/EIA-603-E**

**ANSI C63.26-2015**

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

### 3 TEST TYPES AND RESULTS

#### 3.1 OUTPUT POWER MEASUREMENT

##### 3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

##### 3.1.2 TEST PROCEDURES

###### EIRP MEASUREMENT:

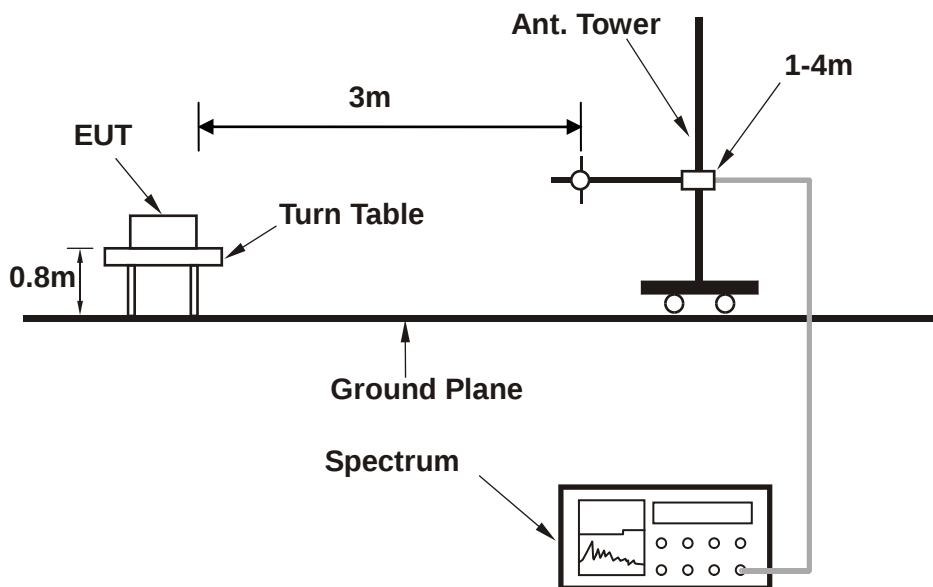
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the 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.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$

###### CONDUCTED POWER MEASUREMENT:

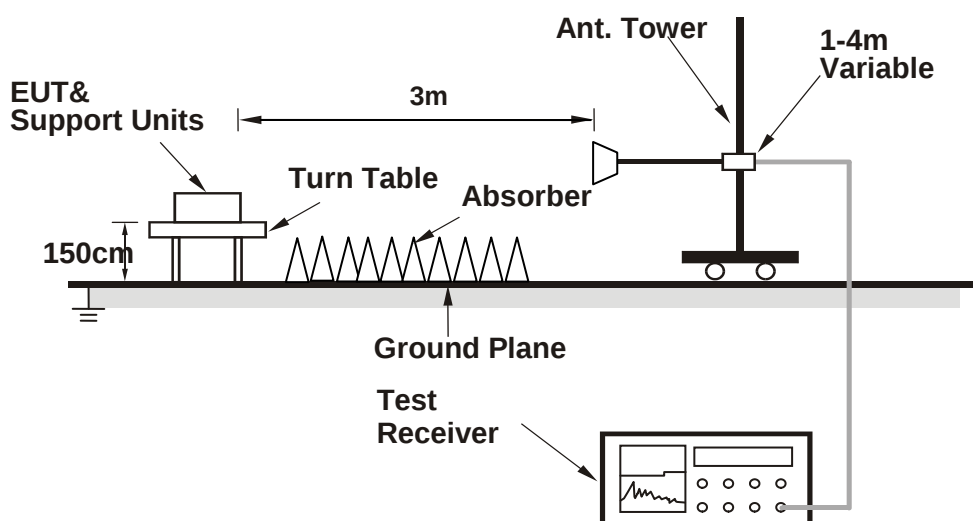
- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

### 3.1.3 TEST SETUP

#### ERP MEASUREMENT:

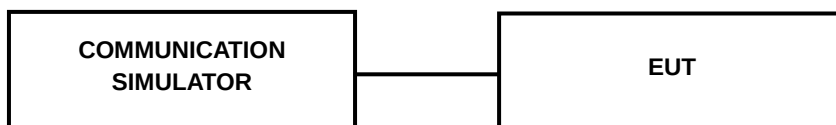


#### EIRP MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

#### CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 3.1.4 TEST RESULTS

#### AVERAGE CONDUCTED OUTPUT POWER (dBm)

| LTE Band 41 |            |         |           |                       |                       |                     |                       |                       |               |
|-------------|------------|---------|-----------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|---------------|
| BW          | Modulation | RB Size | RB Offset | Low CH (39675)        | Low CH (40148)        | Mid CH (40620)      | High CH (41093)       | High CH (41565)       | 3GPP MPR (dB) |
|             |            |         |           | Frequency (2498.5)MHz | Frequency (2545.8)MHz | Frequency (2593)MHz | Frequency (2640.3)MHz | Frequency (2687.5)MHz |               |
| 5MHz        | QPSK       | 1       | 0         | 23.83                 | 23.73                 | 23.82               | 23.79                 | 23.76                 | 0             |
|             |            | 1       | 12        | 23.88                 | 23.78                 | 23.87               | 23.84                 | 23.81                 | 0             |
|             |            | 1       | 24        | 23.75                 | 23.65                 | 23.74               | 23.71                 | 23.68                 | 0             |
|             |            | 12      | 0         | 22.81                 | 22.71                 | 22.80               | 22.77                 | 22.74                 | 1             |
|             |            | 12      | 6         | 22.95                 | 22.85                 | 22.94               | 22.91                 | 22.88                 | 1             |
|             |            | 12      | 13        | 22.79                 | 22.69                 | 22.78               | 22.75                 | 22.72                 | 1             |
|             |            | 25      | 0         | 22.85                 | 22.75                 | 22.84               | 22.81                 | 22.78                 | 1             |
|             | 16QAM      | 1       | 0         | 22.08                 | 21.98                 | 22.07               | 22.04                 | 22.01                 | 1             |
|             |            | 1       | 12        | 22.35                 | 22.25                 | 22.34               | 22.31                 | 22.28                 | 1             |
|             |            | 1       | 24        | 22.03                 | 21.93                 | 22.02               | 21.99                 | 21.96                 | 1             |
|             |            | 12      | 0         | 21.72                 | 21.62                 | 21.71               | 21.68                 | 21.65                 | 2             |
|             |            | 12      | 6         | 21.85                 | 21.75                 | 21.84               | 21.81                 | 21.78                 | 2             |
|             |            | 12      | 13        | 21.89                 | 21.79                 | 21.88               | 21.85                 | 21.82                 | 2             |
|             |            | 25      | 0         | 21.99                 | 21.89                 | 21.98               | 21.95                 | 21.92                 | 2             |
| BW          | Modulation | RB Size | RB Offset | Low CH (39700)        | Low CH (40160)        | Mid CH (40620)      | High CH (41080)       | High CH (41540)       | 3GPP MPR (dB) |
|             |            |         |           | Frequency (2501)MHz   | Frequency (2547)MHz   | Frequency (2593)MHz | Frequency (2639)MHz   | Frequency (2685)MHz   |               |
| 10MHz       | QPSK       | 1       | 0         | 23.86                 | 23.76                 | 23.85               | 23.82                 | 23.79                 | 0             |
|             |            | 1       | 24        | 23.91                 | 23.81                 | 23.90               | 23.87                 | 23.84                 | 0             |
|             |            | 1       | 49        | 23.78                 | 23.68                 | 23.77               | 23.74                 | 23.71                 | 0             |
|             |            | 25      | 0         | 22.84                 | 22.74                 | 22.83               | 22.80                 | 22.77                 | 1             |
|             |            | 25      | 12        | 22.98                 | 22.88                 | 22.97               | 22.94                 | 22.91                 | 1             |
|             |            | 25      | 25        | 22.82                 | 22.72                 | 22.81               | 22.78                 | 22.75                 | 1             |
|             |            | 50      | 0         | 22.88                 | 22.78                 | 22.87               | 22.84                 | 22.81                 | 1             |
|             | 16QAM      | 1       | 0         | 22.11                 | 22.01                 | 22.10               | 22.07                 | 22.04                 | 1             |
|             |            | 1       | 24        | 22.38                 | 22.28                 | 22.37               | 22.34                 | 22.31                 | 1             |
|             |            | 1       | 49        | 22.06                 | 21.96                 | 22.05               | 22.02                 | 21.99                 | 1             |
|             |            | 25      | 0         | 21.75                 | 21.65                 | 21.74               | 21.71                 | 21.68                 | 2             |
|             |            | 25      | 12        | 21.88                 | 21.78                 | 21.87               | 21.84                 | 21.81                 | 2             |
|             |            | 25      | 25        | 21.92                 | 21.82                 | 21.91               | 21.88                 | 21.85                 | 2             |
|             |            | 50      | 0         | 22.02                 | 21.92                 | 22.01               | 21.98                 | 21.95                 | 2             |

| LTE Band 41 |            |         |           |                       |                       |                     |                       |                       |               |
|-------------|------------|---------|-----------|-----------------------|-----------------------|---------------------|-----------------------|-----------------------|---------------|
| BW          | Modulation | RB Size | RB Offset | Low CH (39725)        | Low CH (40173)        | Mid CH (40620)      | High CH (41068)       | High CH (41515)       | 3GPP MPR (dB) |
|             |            |         |           | Frequency (2503.5)MHz | Frequency (2548.3)MHz | Frequency (2593)MHz | Frequency (2637.8)MHz | Frequency (2682.5)MHz |               |
| 15MHz       | QPSK       | 1       | 0         | 23.90                 | 23.80                 | 23.89               | 23.86                 | 23.83                 | 0             |
|             |            | 1       | 37        | 23.95                 | 23.85                 | 23.94               | 23.91                 | 23.88                 | 0             |
|             |            | 1       | 74        | 23.82                 | 23.72                 | 23.81               | 23.78                 | 23.75                 | 0             |
|             |            | 36      | 0         | 22.88                 | 22.78                 | 22.87               | 22.84                 | 22.81                 | 1             |
|             |            | 36      | 19        | 23.02                 | 22.92                 | 23.01               | 22.98                 | 22.95                 | 1             |
|             |            | 36      | 39        | 22.86                 | 22.76                 | 22.85               | 22.82                 | 22.79                 | 1             |
|             |            | 75      | 0         | 22.92                 | 22.82                 | 22.91               | 22.88                 | 22.85                 | 1             |
|             | 16QAM      | 1       | 0         | 22.15                 | 22.05                 | 22.14               | 22.11                 | 22.08                 | 1             |
|             |            | 1       | 37        | 22.42                 | 22.32                 | 22.41               | 22.38                 | 22.35                 | 1             |
|             |            | 1       | 74        | 22.10                 | 22.00                 | 22.09               | 22.06                 | 22.03                 | 1             |
|             |            | 36      | 0         | 21.79                 | 21.69                 | 21.78               | 21.75                 | 21.72                 | 2             |
|             |            | 36      | 19        | 21.92                 | 21.82                 | 21.91               | 21.88                 | 21.85                 | 2             |
|             |            | 36      | 39        | 21.96                 | 21.86                 | 21.95               | 21.92                 | 21.89                 | 2             |
|             |            | 75      | 0         | 22.06                 | 21.96                 | 22.05               | 22.02                 | 21.99                 | 2             |
| BW          | Modulation | RB Size | RB Offset | Low CH (39750)        | Low CH (40185)        | Mid CH (40620)      | High CH (41055)       | High CH (41490)       | 3GPP MPR (dB) |
|             |            |         |           | Frequency (2506)MHz   | Frequency (2549.5)MHz | Frequency (2593)MHz | Frequency (2636.5)MHz | Frequency (2680)MHz   |               |
| 20MHz       | QPSK       | 1       | 0         | 23.96                 | 23.86                 | 23.95               | 23.92                 | 23.89                 | 0             |
|             |            | 1       | 50        | <b>24.01</b>          | 23.91                 | 24.00               | 23.97                 | 23.94                 | 0             |
|             |            | 1       | 99        | 23.88                 | 23.78                 | 23.87               | 23.84                 | 23.81                 | 0             |
|             |            | 50      | 0         | 22.94                 | 22.84                 | 22.93               | 22.90                 | 22.87                 | 1             |
|             |            | 50      | 25        | 23.08                 | 22.98                 | 23.07               | 23.04                 | 23.01                 | 1             |
|             |            | 50      | 50        | 22.92                 | 22.82                 | 22.91               | 22.88                 | 22.85                 | 1             |
|             |            | 100     | 0         | 22.98                 | 22.88                 | 22.97               | 22.94                 | 22.91                 | 1             |
|             | 16QAM      | 1       | 0         | 22.21                 | 22.11                 | 22.20               | 22.17                 | 22.14                 | 1             |
|             |            | 1       | 50        | 22.48                 | 22.38                 | 22.47               | 22.44                 | 22.41                 | 1             |
|             |            | 1       | 99        | 22.16                 | 22.06                 | 22.15               | 22.12                 | 22.09                 | 1             |
|             |            | 50      | 0         | 21.85                 | 21.75                 | 21.84               | 21.81                 | 21.78                 | 2             |
|             |            | 50      | 25        | 21.98                 | 21.88                 | 21.97               | 21.94                 | 21.91                 | 2             |
|             |            | 50      | 50        | 22.02                 | 21.92                 | 22.01               | 21.98                 | 21.95                 | 2             |
|             |            | 100     | 0         | 22.12                 | 22.02                 | 22.11               | 22.08                 | 22.05                 | 2             |

**EIRP**

**LTE BAND 41**

**CHANNEL BANDWIDTH: 5MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39675   | 2498.5          | -25.43        | 46.64                 | 21.21     | 132.13   | H                  | 2         |
| 40620   | 2593            | -25.52        | 46.57                 | 21.05     | 127.35   | H                  | 2         |
| 41565   | 2687.5          | -24.43        | 45.58                 | 21.15     | 130.32   | H                  | 2         |
| 39675   | 2498.5          | -25.77        | 46.75                 | 20.98     | 125.31   | V                  | 2         |
| 40620   | 2593            | -24.07        | 45.82                 | 21.75     | 149.62   | V                  | 2         |
| 41565   | 2687.5          | -24.77        | 46.14                 | 21.37     | 137.09   | V                  | 2         |

**CHANNEL BANDWIDTH: 5MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39675   | 2498.5          | -25.37        | 46.64                 | 21.27     | 133.97   | H                  | 2         |
| 40620   | 2593            | -25.5         | 46.57                 | 21.07     | 127.94   | H                  | 2         |
| 41565   | 2687.5          | -24.25        | 45.58                 | 21.33     | 135.83   | H                  | 2         |
| 39675   | 2498.5          | -24.61        | 46.75                 | 22.14     | 163.68   | V                  | 2         |
| 40620   | 2593            | -24.67        | 45.82                 | 21.15     | 130.32   | V                  | 2         |
| 41565   | 2687.5          | -24.79        | 46.14                 | 21.35     | 136.46   | V                  | 2         |

**CHANNEL BANDWIDTH: 10MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39700   | 2501            | -24.28        | 45.67                 | 21.39     | 137.72   | H                  | 2         |
| 40620   | 2593            | -25.08        | 46.36                 | 21.28     | 134.28   | H                  | 2         |
| 41540   | 2685            | -24.37        | 45.43                 | 21.06     | 127.64   | H                  | 2         |
| 39700   | 2501            | -25.69        | 46.86                 | 21.17     | 130.92   | V                  | 2         |
| 40620   | 2593            | -24.65        | 46.8                  | 22.15     | 164.06   | V                  | 2         |
| 41540   | 2685            | -25.61        | 46.87                 | 21.26     | 133.66   | V                  | 2         |

**CHANNEL BANDWIDTH: 10Mz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39700   | 2501            | -24.4         | 45.67                 | 21.27     | 133.97   | H                  | 2         |
| 40620   | 2593            | -25.01        | 46.36                 | 21.35     | 136.46   | H                  | 2         |
| 41540   | 2685            | -24.15        | 45.43                 | 21.28     | 134.28   | H                  | 2         |
| 39700   | 2501            | -25.28        | 46.86                 | 21.58     | 143.88   | V                  | 2         |
| 40620   | 2593            | -24.74        | 46.8                  | 22.06     | 160.69   | V                  | 2         |
| 41540   | 2685            | -25.26        | 46.87                 | 21.61     | 144.88   | V                  | 2         |

**CHANNEL BANDWIDTH: 15MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39725   | 2503.5          | -24.11        | 45.22                 | 21.11     | 129.12   | H                  | 2         |
| 40620   | 2593            | -24.3         | 45.16                 | 20.86     | 121.9    | H                  | 2         |
| 41515   | 2682.5          | -24.33        | 45.35                 | 21.02     | 126.47   | H                  | 2         |
| 39725   | 2503.5          | -24.84        | 46.81                 | 21.97     | 157.4    | V                  | 2         |
| 40620   | 2593            | -23.54        | 45.58                 | 22.04     | 159.96   | V                  | 2         |
| 41515   | 2682.5          | -25.11        | 46.84                 | 21.73     | 148.94   | V                  | 2         |

**CHANNEL BANDWIDTH: 15MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39725   | 2503.5          | -24.26        | 45.22                 | 20.96     | 124.74   | H                  | 2         |
| 40620   | 2593            | -24.02        | 45.16                 | 21.14     | 130.02   | H                  | 2         |
| 41515   | 2682.5          | -24.03        | 45.35                 | 21.32     | 135.52   | H                  | 2         |
| 39725   | 2503.5          | -24.71        | 46.81                 | 22.1      | 162.18   | V                  | 2         |
| 40620   | 2593            | -24.32        | 45.58                 | 21.26     | 133.66   | V                  | 2         |
| 41515   | 2682.5          | -25.64        | 46.84                 | 21.2      | 131.83   | V                  | 2         |

**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39750   | 2506            | -25.12        | 46.38                 | 21.26     | 133.66   | H                  | 2         |
| 40620   | 2593            | -25.14        | 46.41                 | 21.27     | 133.97   | H                  | 2         |
| 41490   | 2680            | -23.6         | 44.94                 | 21.34     | 136.14   | H                  | 2         |
| 39750   | 2506            | -25.02        | 46.65                 | 21.63     | 145.55   | V                  | 2         |
| 40620   | 2593            | -24.75        | 46.68                 | 21.93     | 155.96   | V                  | 2         |
| 41490   | 2680            | -25.46        | 46.71                 | 21.25     | 133.35   | V                  | 2         |

**CHANNEL BANDWIDTH: 20MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 39750   | 2506            | -25.24        | 46.38                 | 21.14     | 130.02   | H                  | 2         |
| 40620   | 2593            | -25.57        | 46.41                 | 20.84     | 121.34   | H                  | 2         |
| 41490   | 2680            | -23.54        | 44.94                 | 21.4      | 138.04   | H                  | 2         |
| 39750   | 2506            | -24.59        | 46.65                 | 22.06     | 160.69   | V                  | 2         |
| 40620   | 2593            | -25.12        | 46.68                 | 21.56     | 143.22   | V                  | 2         |
| 41490   | 2680            | -24.79        | 46.71                 | 21.92     | 155.6    | V                  | 2         |

**REMARKS:** 1. EIRP Output Power (dBm) = SPA LVL (dBm) + Correction Factor (dB).  
2. Correction factor (dB) = Free Space Loss + Antenna Factor + Cable Loss

## 3.2 FREQUENCY STABILITY MEASUREMENT

### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

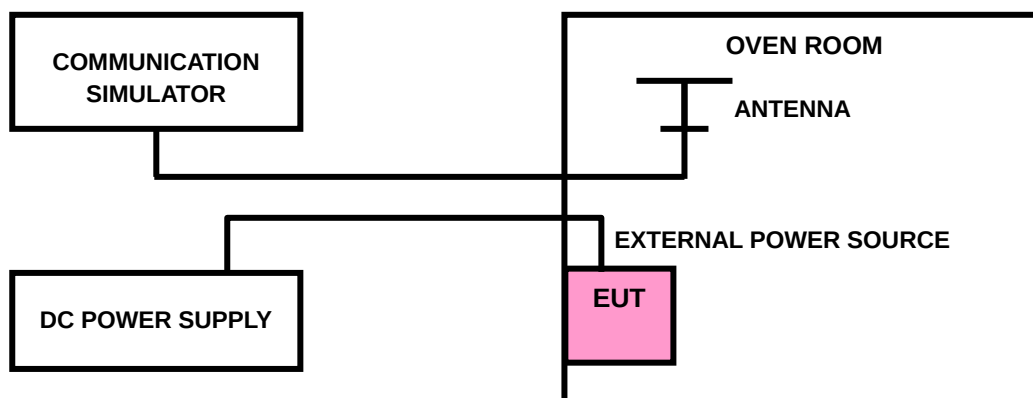
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 3.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the  $\pm 0.5^{\circ}\text{C}$  during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

**NOTE:** The frequency error was recorded frequency error from the communication simulator.

### 3.2.3 TEST SETUP



### 3.2.4 TEST RESULTS

#### LTE BAND 41

##### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 5MHz                  |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0022                | 0.0019       | 2.5         |
| 3.4             | -0.0027               | -0.0025      | 2.5         |
| 4.2             | 0.0021                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.2Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0145               | -0.0143      | 2.5         |
| -20        | -0.0132               | -0.0131      | 2.5         |
| -10        | -0.0117               | -0.0115      | 2.5         |
| 0          | -0.0095               | -0.0093      | 2.5         |
| 10         | -0.0076               | -0.0074      | 2.5         |
| 20         | -0.0064               | -0.0062      | 2.5         |
| 30         | -0.0048               | -0.0045      | 2.5         |
| 40         | -0.0026               | -0.0023      | 2.5         |
| 50         | -0.0009               | -0.0006      | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 10MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0025                | 0.0025       | 2.5         |
| 3.4             | -0.0026               | -0.0026      | 2.5         |
| 4.2             | 0.0021                | 0.0021       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.2Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0149               | -0.0149      | 2.5         |
| -20        | -0.0125               | -0.0125      | 2.5         |
| -10        | -0.0107               | -0.0107      | 2.5         |
| 0          | -0.0079               | -0.0079      | 2.5         |
| 10         | -0.0062               | -0.0062      | 2.5         |
| 20         | -0.0046               | -0.0046      | 2.5         |
| 30         | -0.0026               | -0.0026      | 2.5         |
| 40         | -0.0012               | -0.0012      | 2.5         |
| 50         | 0.0005                | 0.0005       | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 15MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0008                | 0.0010       | 2.5         |
| 3.4             | -0.0009               | -0.0009      | 2.5         |
| 4.2             | 0.0007                | 0.0009       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.2Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 15MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0063               | -0.0059      | 2.5         |
| -20        | -0.0062               | -0.0058      | 2.5         |
| -10        | -0.0055               | -0.0051      | 2.5         |
| 0          | -0.0043               | -0.0040      | 2.5         |
| 10         | -0.0039               | -0.0036      | 2.5         |
| 20         | -0.0031               | -0.0029      | 2.5         |
| 30         | -0.0026               | -0.0024      | 2.5         |
| 40         | -0.0018               | -0.0017      | 2.5         |
| 50         | -0.0004               | -0.0003      | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 20MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0011                | 0.0012       | 2.5         |
| 3.4             | -0.0013               | -0.0012      | 2.5         |
| 4.2             | 0.0010                | 0.0012       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.2Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

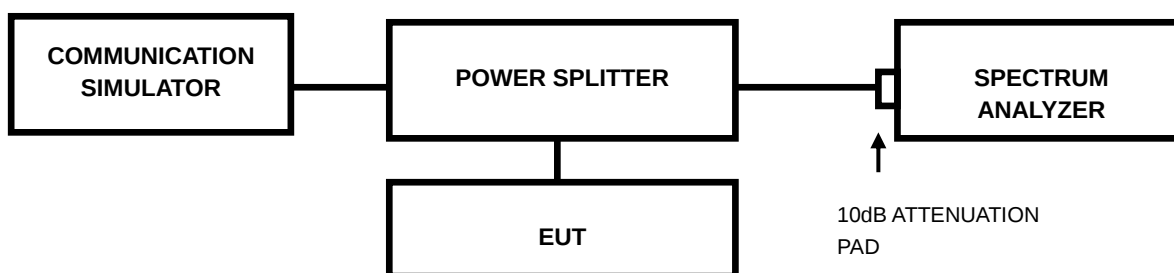
| TEMP. (°C) | 20MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0051               | -0.0048      | 2.5         |
| -20        | -0.0044               | -0.0041      | 2.5         |
| -10        | -0.0040               | -0.0037      | 2.5         |
| 0          | -0.0032               | -0.0030      | 2.5         |
| 10         | -0.0051               | -0.0048      | 2.5         |
| 20         | -0.0044               | -0.0041      | 2.5         |
| 30         | -0.0040               | -0.0037      | 2.5         |
| 40         | -0.0032               | -0.0030      | 2.5         |
| 50         | -0.0051               | -0.0048      | 2.5         |

### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

#### 3.3.2 TEST SETUP



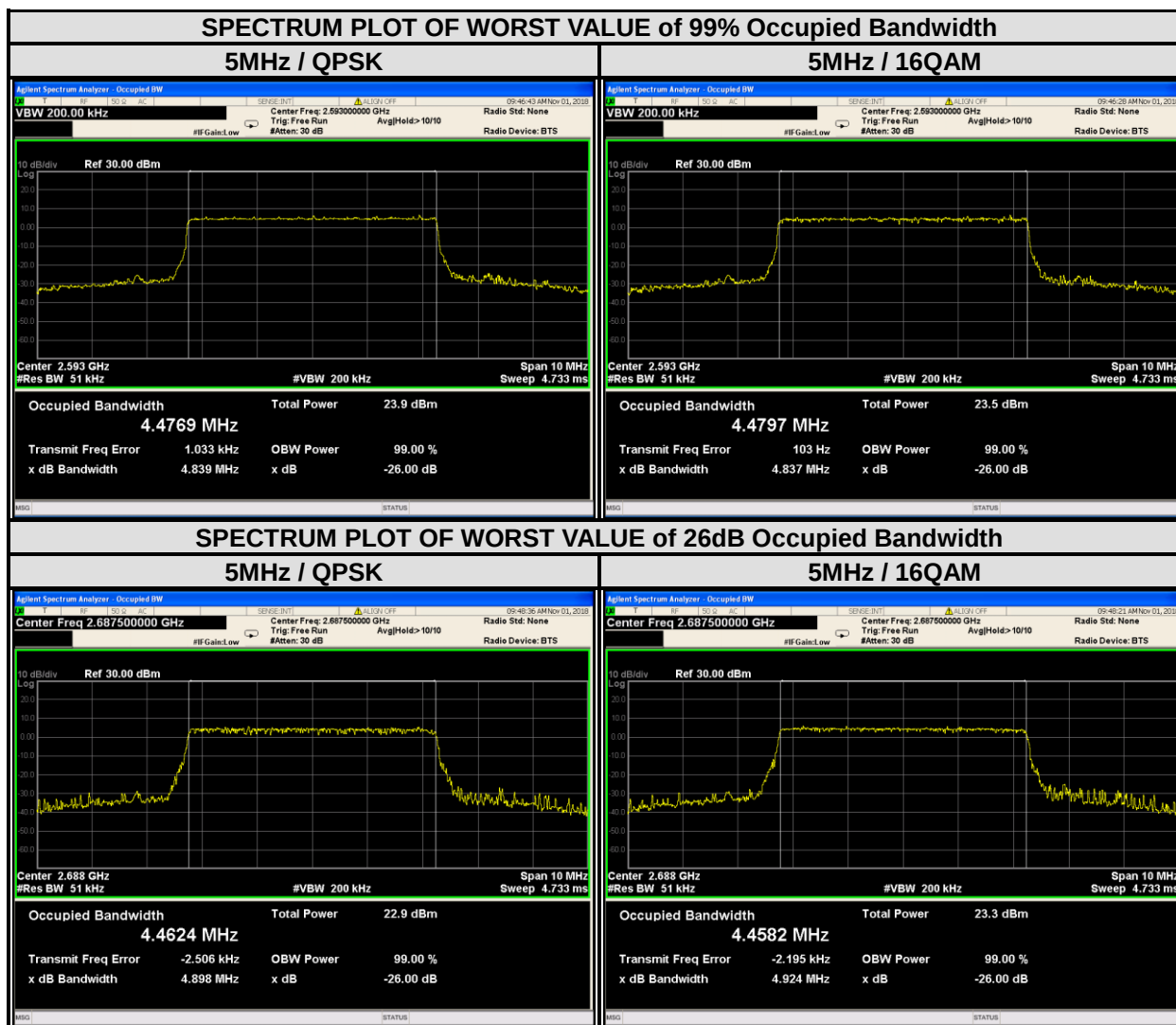
#### 3.3.3 TEST PROCEDURES

- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

### 3.3.4 TEST RESULTS

#### LTE BAND 41

| CHANNEL BANDWIDTH: 5MHz |                 |                              |        |         |                 |                      |       |
|-------------------------|-----------------|------------------------------|--------|---------|-----------------|----------------------|-------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (kHz) |        | CHANNEL | Frequency (MHz) | 26dB Bandwidth (kHz) |       |
|                         |                 | QPSK                         | 16QAM  |         |                 | QPSK                 | 16QAM |
| 39675                   | 2498.5          | 4.4608                       | 4.4580 | 39675   | 2498.5          | 4.849                | 4.841 |
| 40620                   | 2593.0          | 4.4769                       | 4.4797 | 40620   | 2593.0          | 4.839                | 4.837 |
| 41565                   | 2687.5          | 4.4624                       | 4.4582 | 41565   | 2687.5          | 4.898                | 4.924 |





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Test Report No.: RF181011N013-6

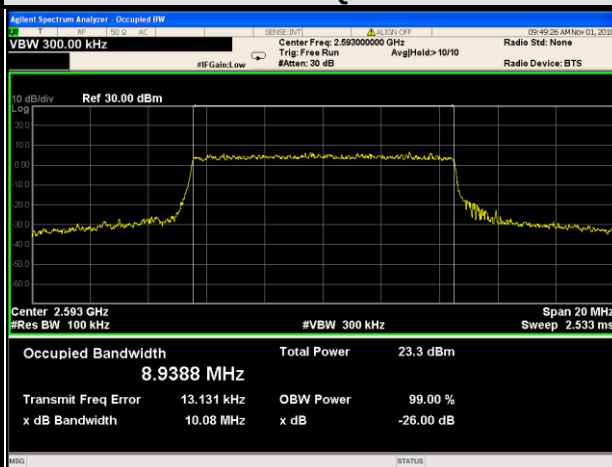
## LTE BAND 41

### CHANNEL BANDWIDTH: 10MHz

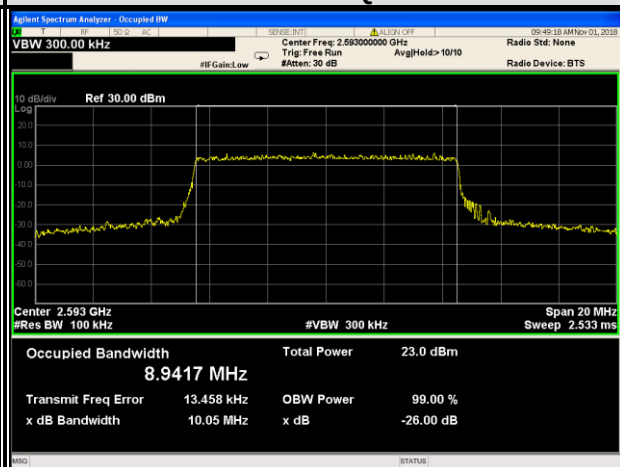
| CHANNEL | Frequency (MHz) | 99% OCCUPIED Bandwidth (kHz) |        | CHANNEL | Frequency (MHz) | 26dB Bandwidth (kHz) |       |
|---------|-----------------|------------------------------|--------|---------|-----------------|----------------------|-------|
|         |                 | QPSK                         | 16QAM  |         |                 | QPSK                 | 16QAM |
| 39700   | 2501.0          | 8.9293                       | 8.9258 | 39700   | 2501.0          | 9.694                | 9.617 |
| 40620   | 2593.0          | 8.9388                       | 8.9417 | 40620   | 2593.0          | 10.08                | 10.05 |
| 41540   | 2685.0          | 8.9304                       | 8.9254 | 41540   | 2685.0          | 9.573                | 9.536 |

### SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

#### 10MHz / QPSK

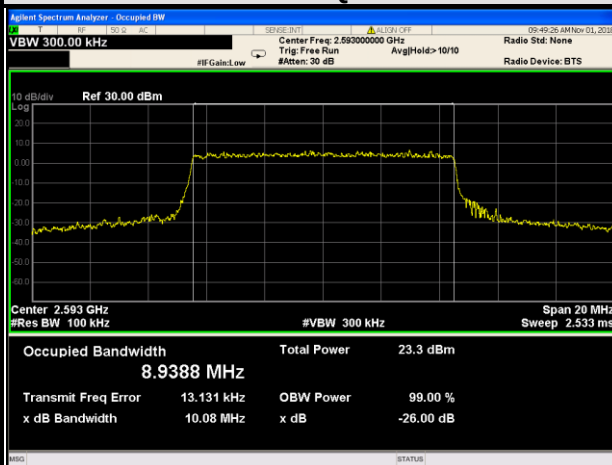


#### 10MHz / 16QAM

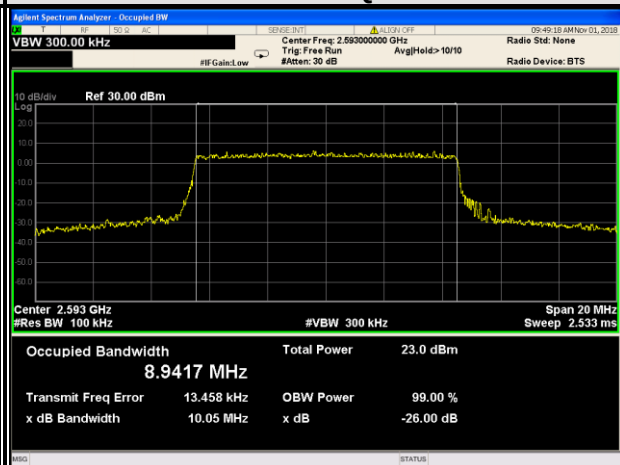


### SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

#### 10MHz / QPSK



#### 10MHz / 16QAM





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Test Report No.: RF181011N013-6

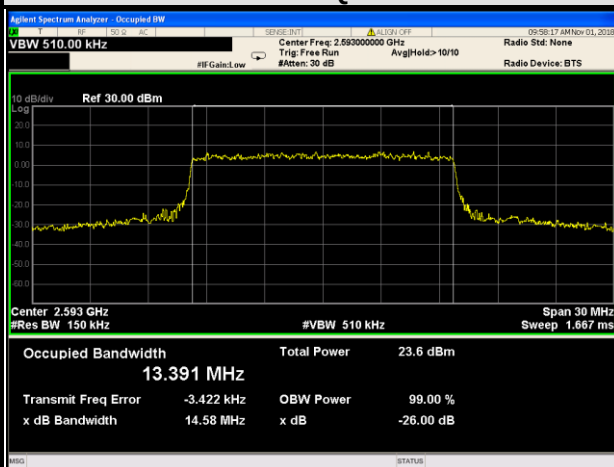
## LTE BAND 41

### CHANNEL BANDWIDTH: 15MHz

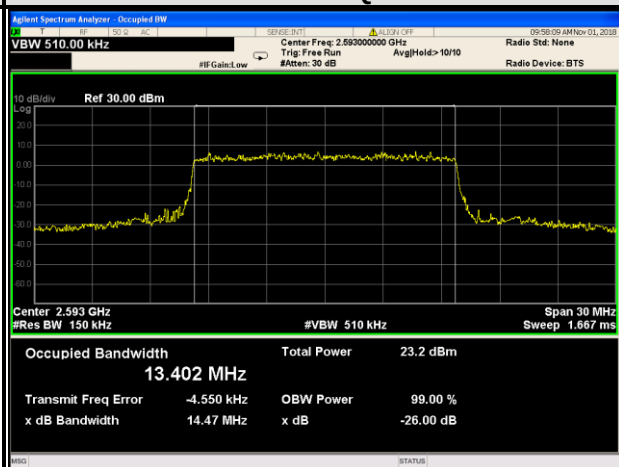
| CHANNEL | Frequency (MHz) | 99% OCCUPIED Bandwidth (kHz) |        | CHANNEL | Frequency (MHz) | 26dB Bandwidth (kHz) |       |
|---------|-----------------|------------------------------|--------|---------|-----------------|----------------------|-------|
|         |                 | QPSK                         | 16QAM  |         |                 | QPSK                 | 16QAM |
| 39725   | 2503.5          | 13.391                       | 13.388 | 39725   | 2503.5          | 14.30                | 14.24 |
| 40620   | 2593.0          | 13.391                       | 13.402 | 40620   | 2593.0          | 14.58                | 14.47 |
| 41515   | 2682.5          | 13.376                       | 13.385 | 41515   | 2682.5          | 14.37                | 14.48 |

### SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

#### 15MHz / QPSK

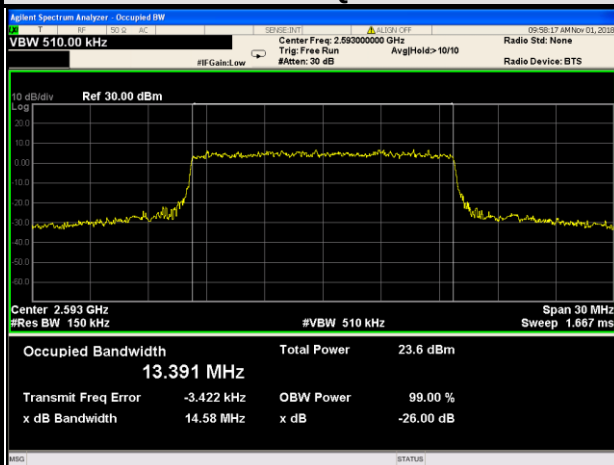


#### 15MHz / 16QAM

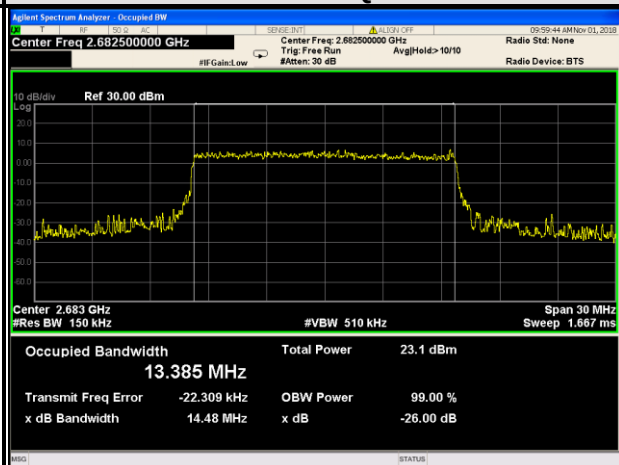


### SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

#### 15MHz / QPSK



#### 15MHz / 16QAM





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Test Report No.: RF181011N013-6

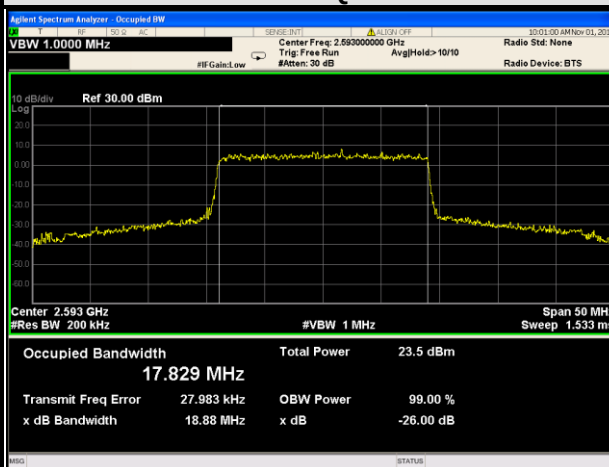
LTE BAND 41

CHANNEL BANDWIDTH: 20MHz

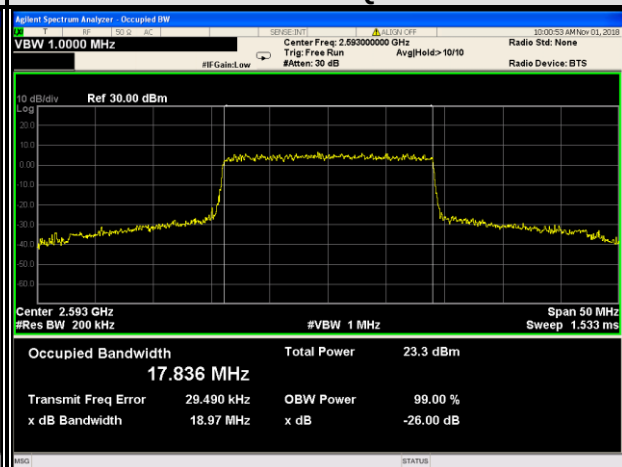
| CHANNEL | Frequency (MHz) | 99% OCCUPIED Bandwidth (kHz) |        | CHANNEL | Frequency (MHz) | 26dB Bandwidth (kHz) |       |
|---------|-----------------|------------------------------|--------|---------|-----------------|----------------------|-------|
|         |                 | QPSK                         | 16QAM  |         |                 | QPSK                 | 16QAM |
| 39750   | 2506.0          | 17.815                       | 17.802 | 39750   | 2506.0          | 18.96                | 18.97 |
| 40620   | 2593.0          | 17.829                       | 17.836 | 40620   | 2593.0          | 18.88                | 18.97 |
| 41490   | 2680.0          | 17.812                       | 17.786 | 41490   | 2680.0          | 18.99                | 18.93 |

SPECTRUM PLOT OF WORST VALUE of 99% Occupied Bandwidth

20MHz / QPSK

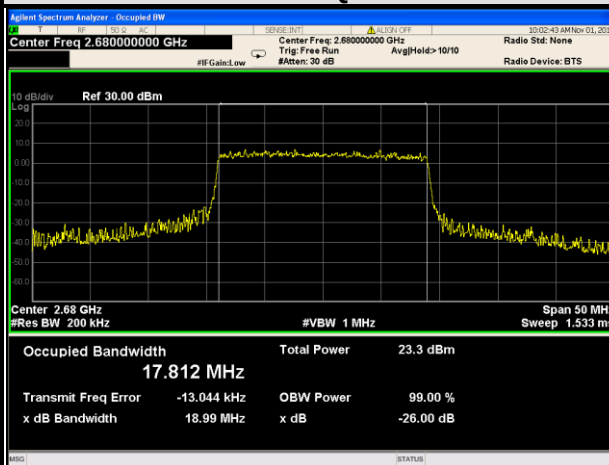


20MHz / 16QAM

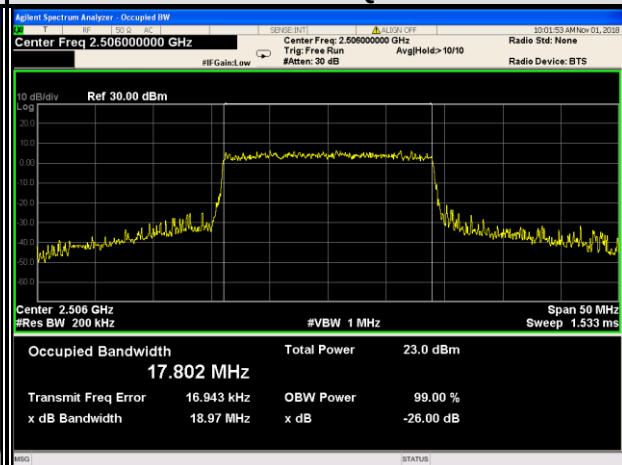


SPECTRUM PLOT OF WORST VALUE of 26dB Occupied Bandwidth

20MHz / QPSK



20MHz / 16QAM

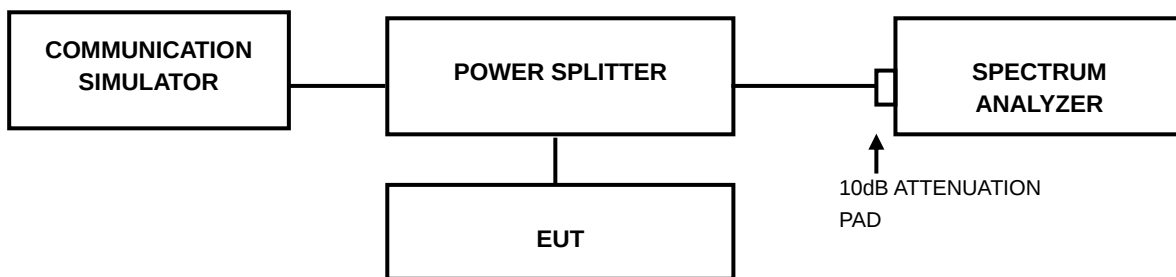


### 3.4 PEAK TO AVERAGE RATIO

#### 3.4.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

#### 3.4.2 TEST SETUP



#### 3.4.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

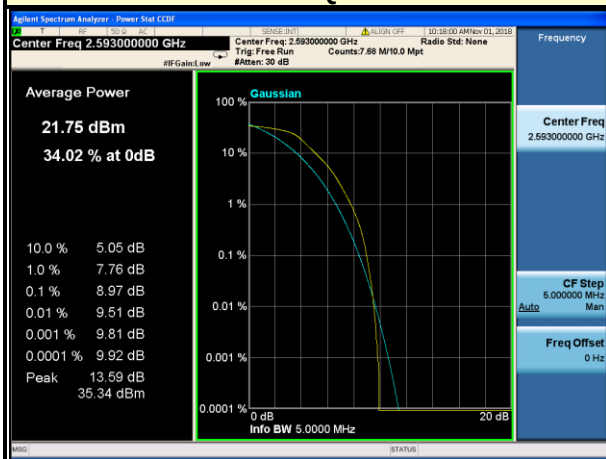
### 3.4.4 TEST RESULTS

#### LTE BAND 41

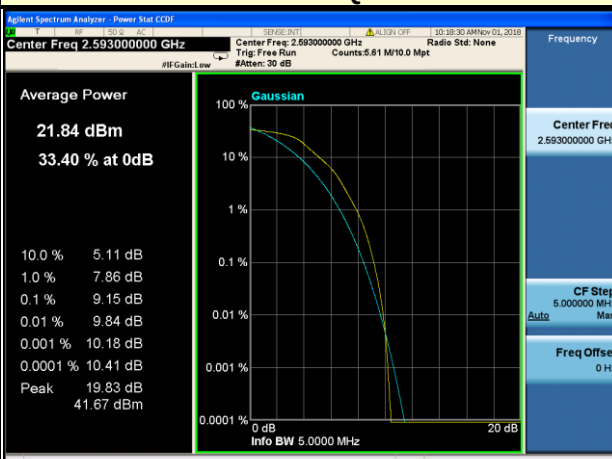
| CHANNEL BANDWIDTH: 5MHz |                 |                            |       | CHANNEL BANDWIDTH: 10MHz |                 |                            |       |
|-------------------------|-----------------|----------------------------|-------|--------------------------|-----------------|----------------------------|-------|
| CHANNEL                 | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |       | CHANNEL                  | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                         |                 | QPSK                       | 16QAM |                          |                 | QPSK                       | 16QAM |
| 39675                   | 2498.5          | 8.39                       | 8.85  | 39700                    | 2501.0          | 8.13                       | 8.74  |
| 40620                   | 2593.0          | 8.97                       | 9.15  | 40620                    | 2593.0          | 8.63                       | 9.53  |
| 41565                   | 2687.5          | 8.90                       | 8.83  | 41540                    | 2685.0          | 8.56                       | 9.00  |

#### SPECTRUM PLOT OF WORST VALUE

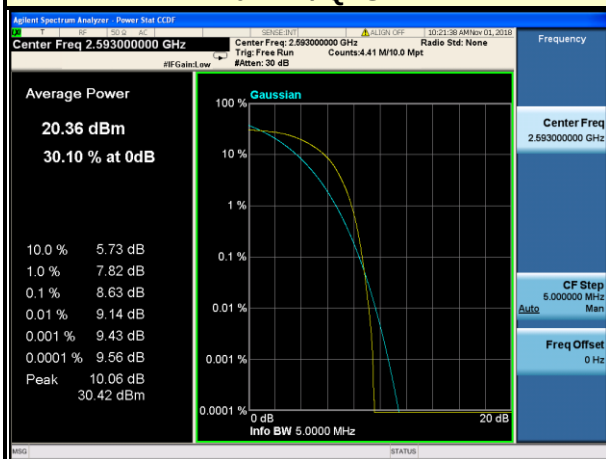
##### 5MHz / QPSK



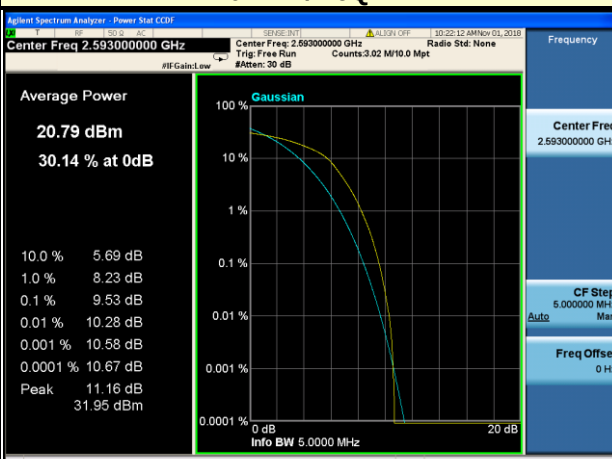
##### 5MHz / 16QAM



##### 10MHz / QPSK



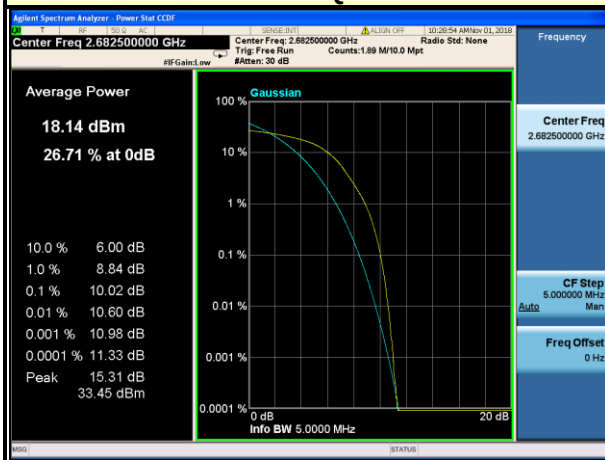
##### 10MHz / 16QAM



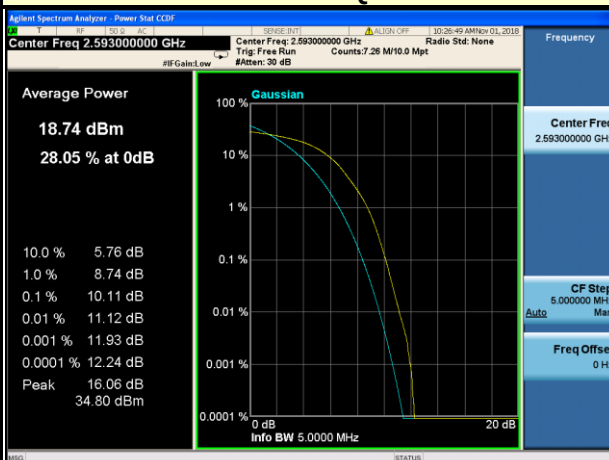
| CHANNEL BANDWIDTH: 15MHz |                 |                            |       | CHANNEL BANDWIDTH: 20MHz |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|--------------------------|-----------------|----------------------------|-------|
| CHANNEL                  | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |       | CHANNEL                  | FREQUENCY (MHz) | PEAK TO AVERAGE RATIO (dB) |       |
|                          |                 | QPSK                       | 16QAM |                          |                 | QPSK                       | 16QAM |
| 39725                    | 2503.5          | 9.53                       | 9.87  | 39725                    | 2503.5          | 9.80                       | 10.38 |
| 40620                    | 2593.0          | 9.54                       | 10.11 | 40620                    | 2593.0          | 10.17                      | 10.12 |
| 41515                    | 2682.5          | 10.02                      | 9.70  | 41515                    | 2682.5          | 9.74                       | 10.15 |

### SPECTRUM PLOT OF WORST VALUE

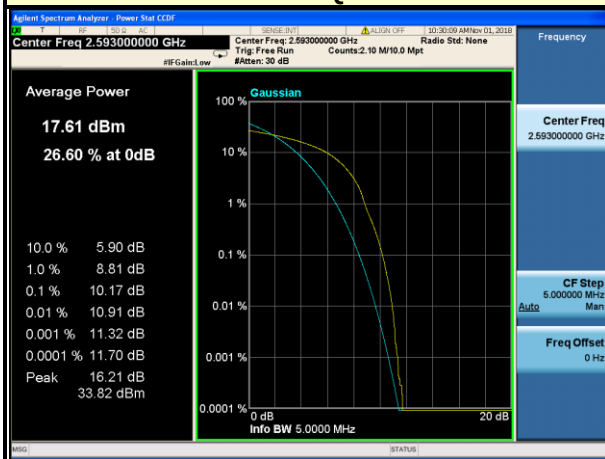
#### 15MHz / QPSK



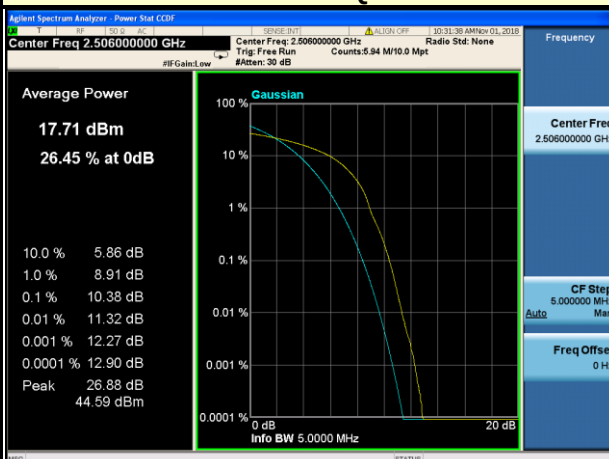
#### 15MHz / 16QAM



#### 20MHz / QPSK



#### 20MHz / 16QAM

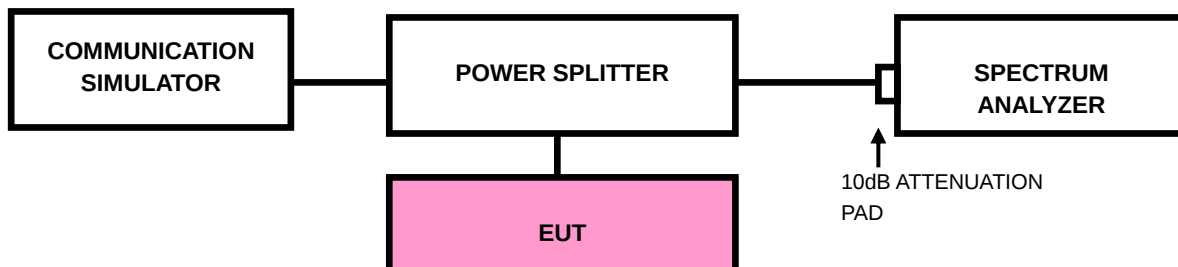


### 3.5 BAND EDGE MEASUREMENT

#### 3.5.1 LIMITS OF BAND EDGE MEASUREMENT

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

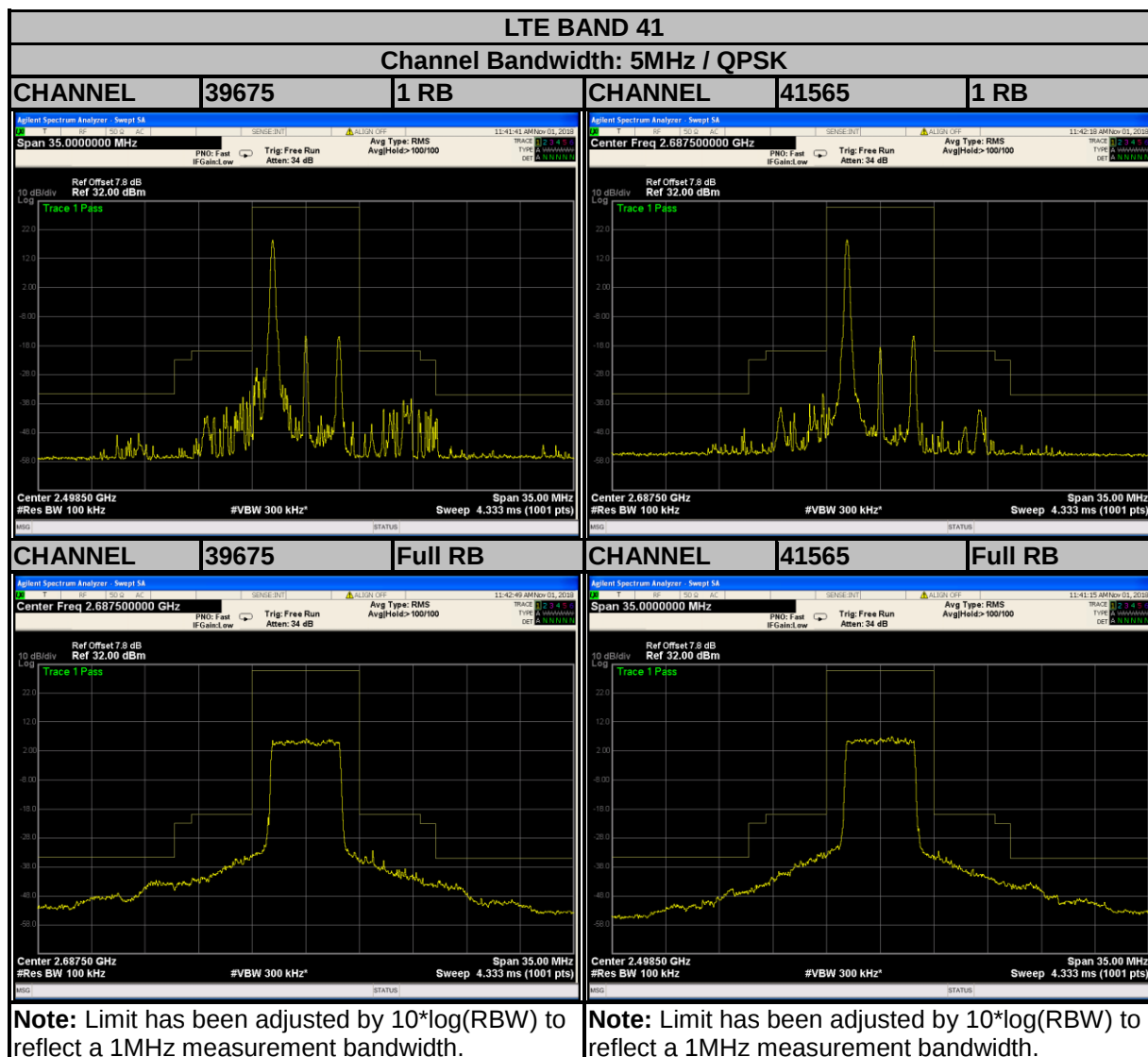
#### 3.5.2 TEST SETUP

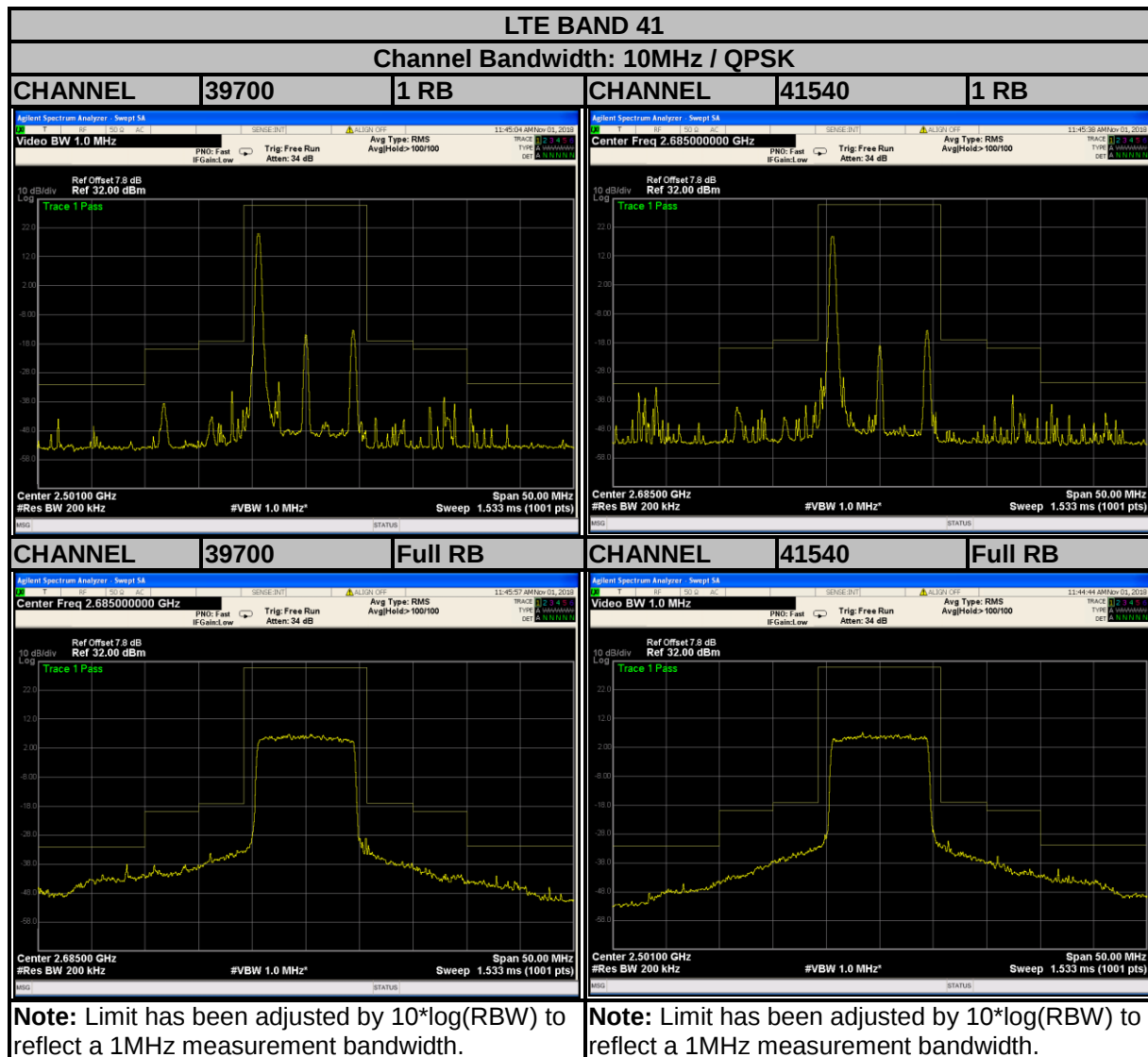


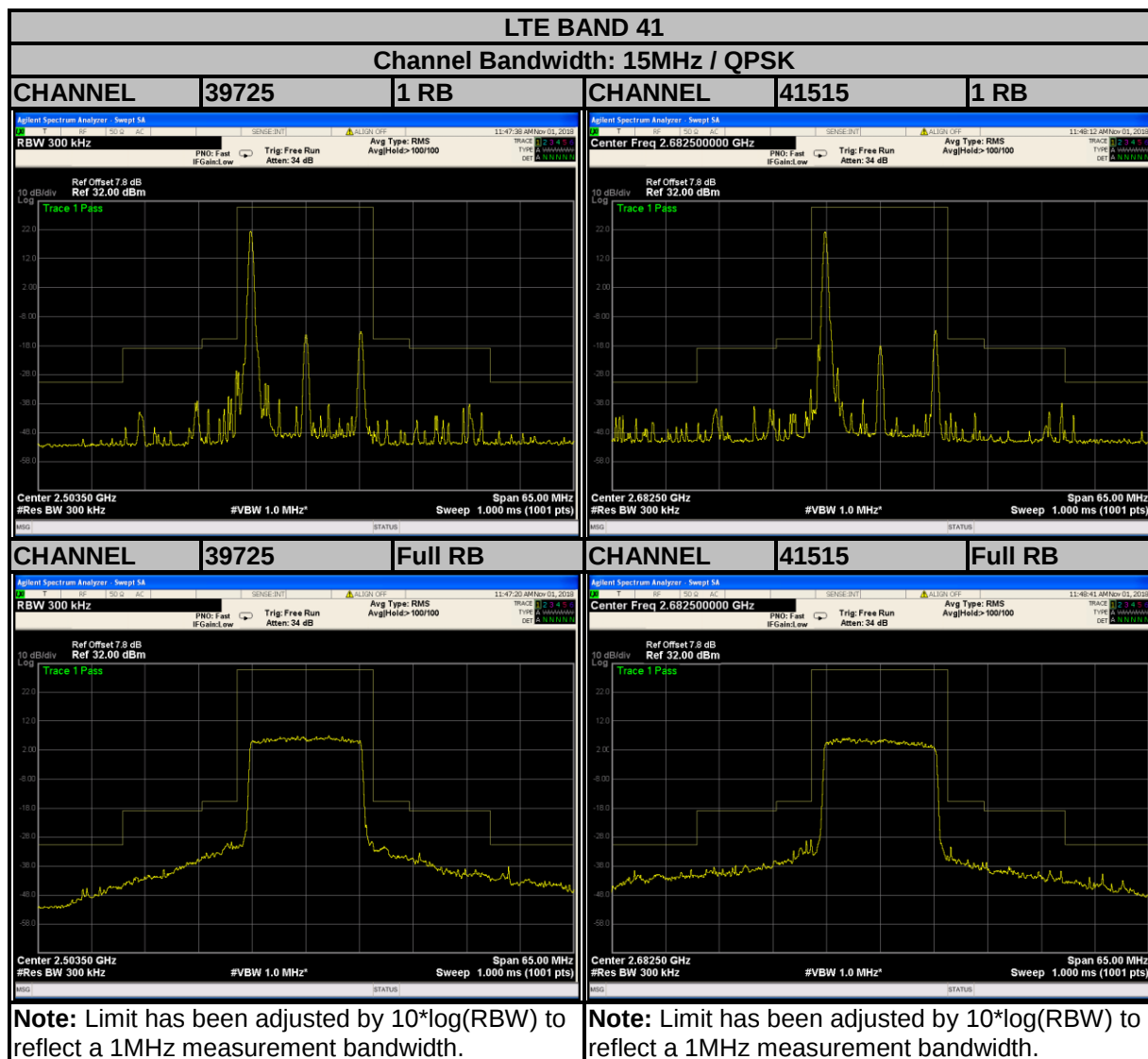
### 3.5.3 TEST PROCEDURES

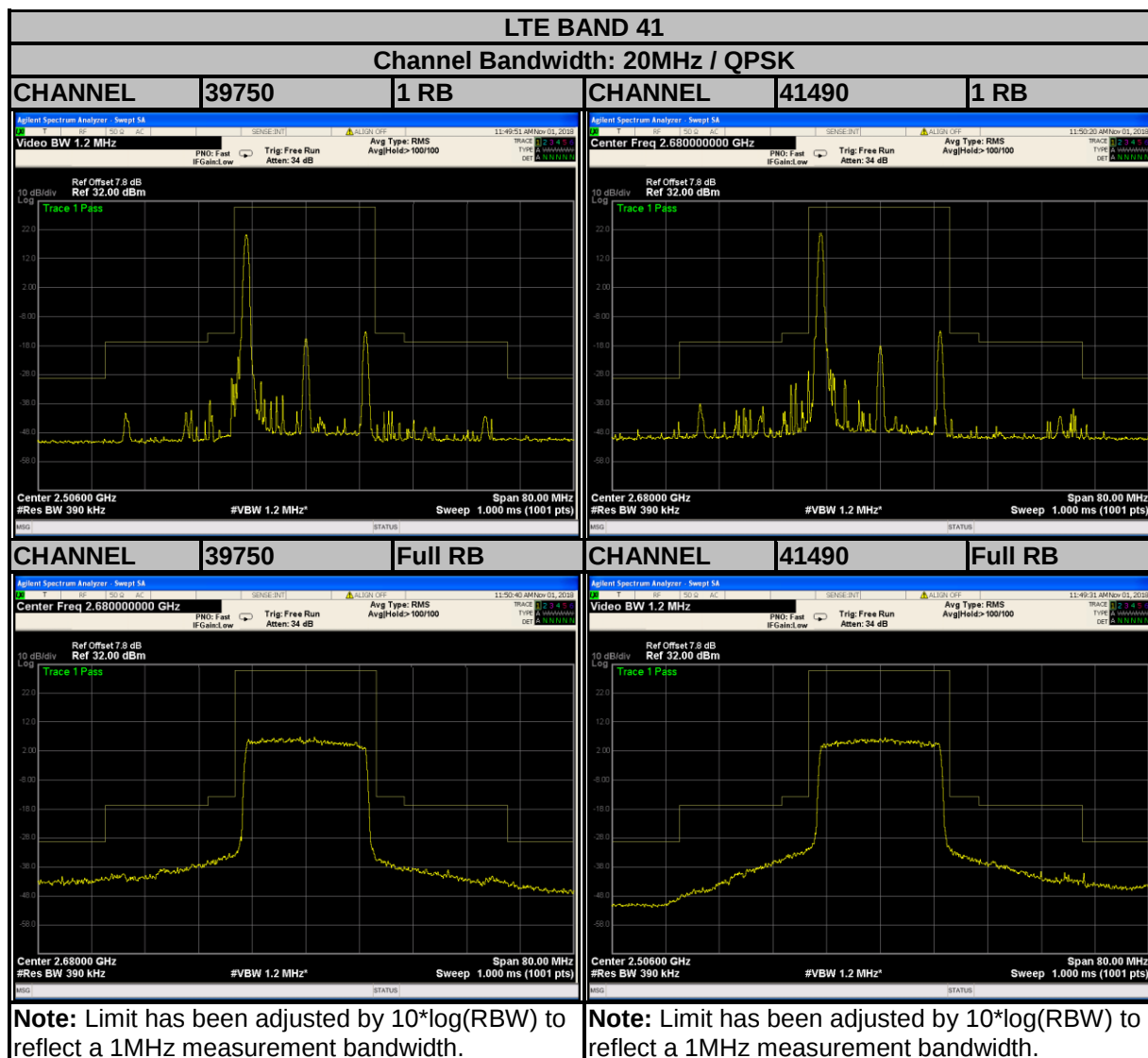
- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 35MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz (Channel bandwidth 5MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 50MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz (Channel bandwidth 10MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 60MHz. RBW of the spectrum is 300kHz and VBW of the spectrum is 1MHz (Channel bandwidth 15MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 80MHz. RBW of the spectrum is 500kHz and VBW of the spectrum is 2MHz (Channel bandwidth 20MHz).
- g. Record the max trace plot into the test report.

### 3.5.4 TEST RESULTS









### 3.6 CONDUCTED SPURIOUS EMISSIONS

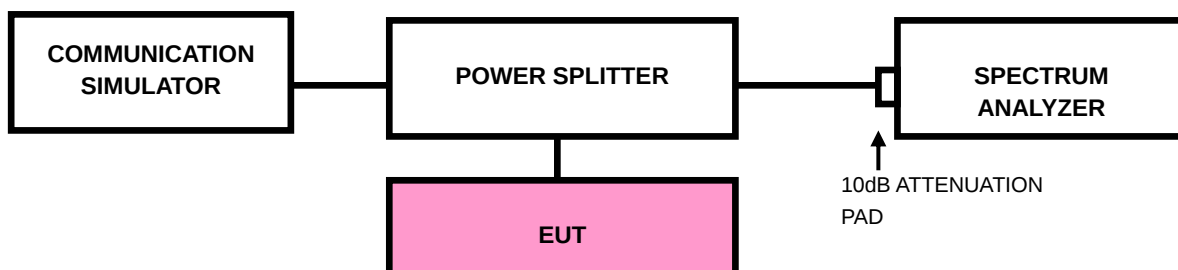
#### 3.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25dBm.

#### 3.6.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30MHz~27GHz for LTE Band 41. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

#### 3.6.3 TEST SETUP



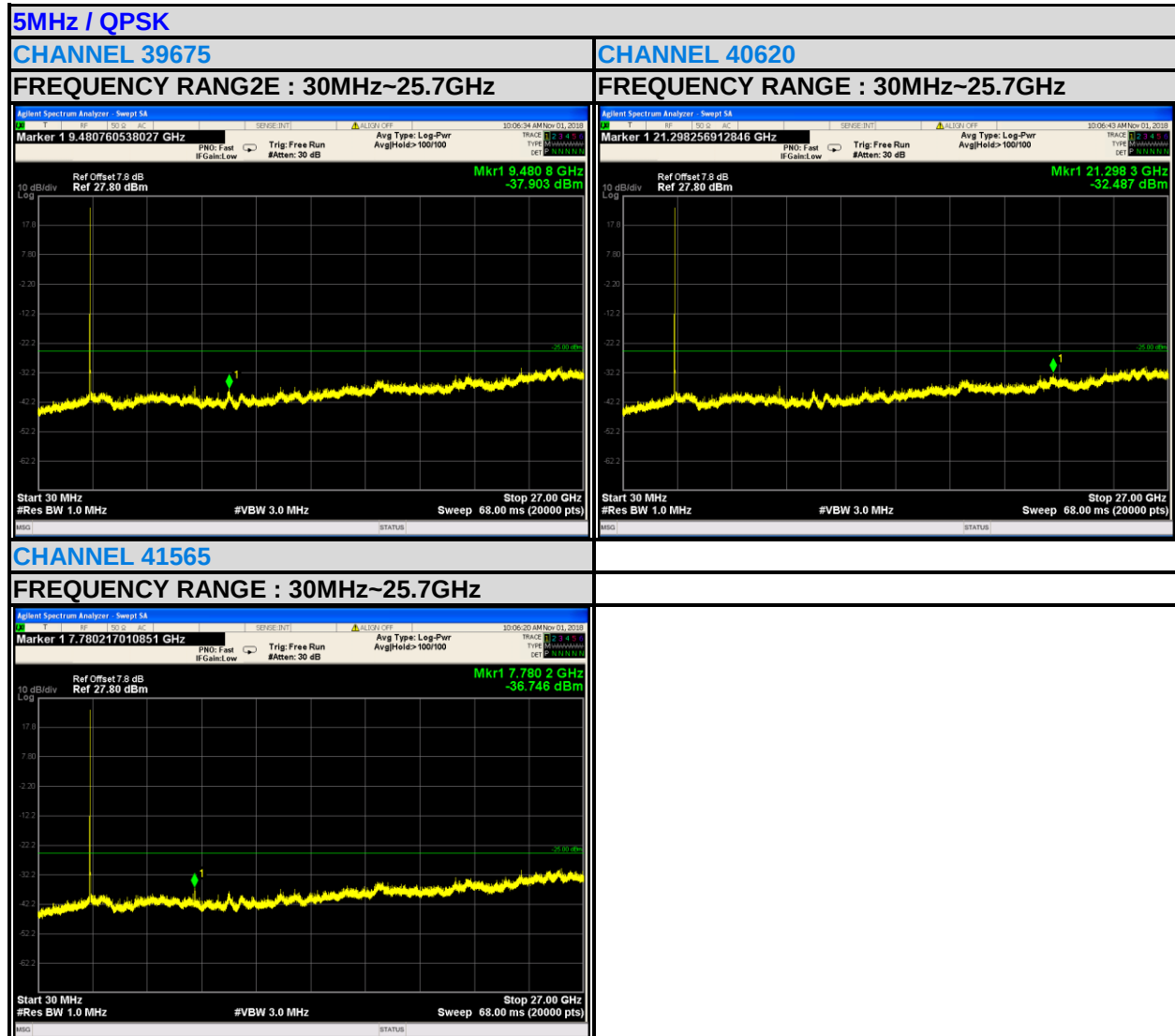


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Test Report No.: RF181011N013-6

### 3.6.4 TEST RESULTS

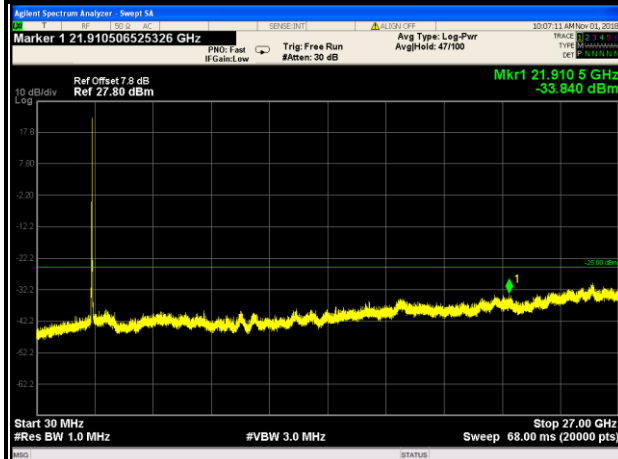
#### LTE BAND 41



### 10MHz / QPSK

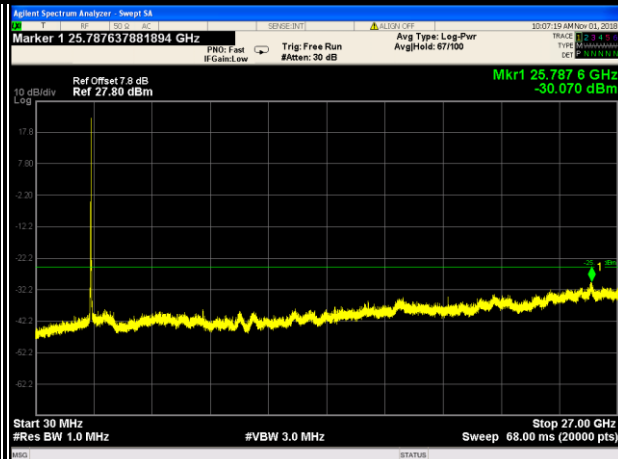
#### CHANNEL 39700

#### FREQUENCY RANG2E : 30MHz~25.7GHz



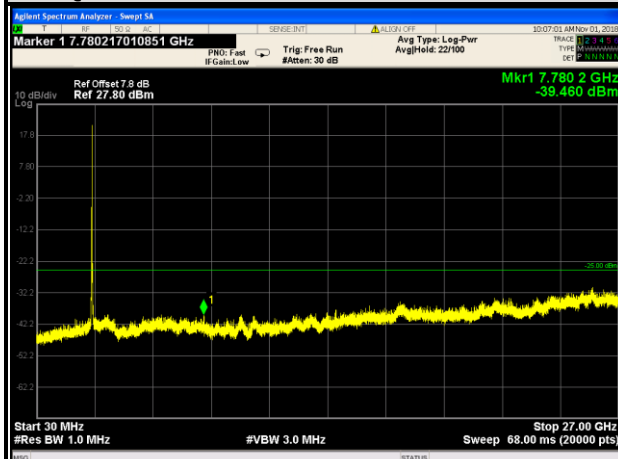
#### CHANNEL 40620

#### FREQUENCY RANGE : 30MHz~25.7GHz



#### CHANNEL 41540

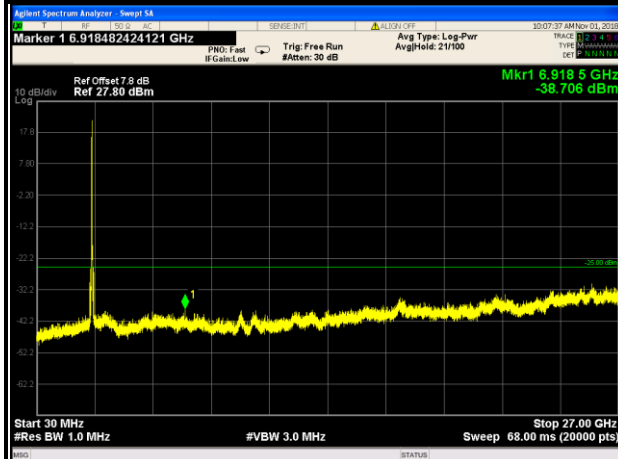
#### FREQUENCY RANGE : 30MHz~25.7GHz



**15MHz / QPSK**

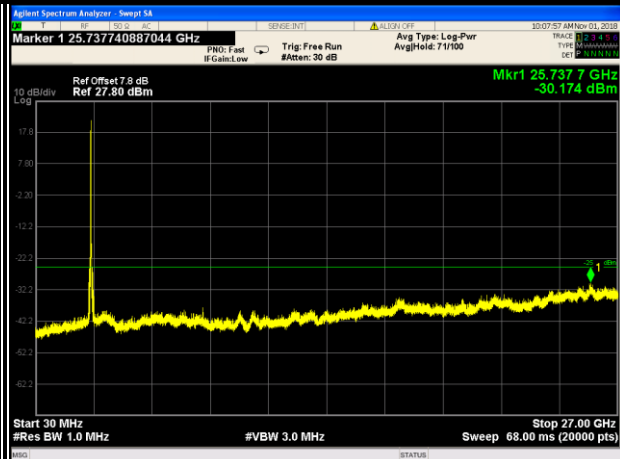
**CHANNEL 39725**

**FREQUENCY RANG2E : 30MHz~25.7GHz**



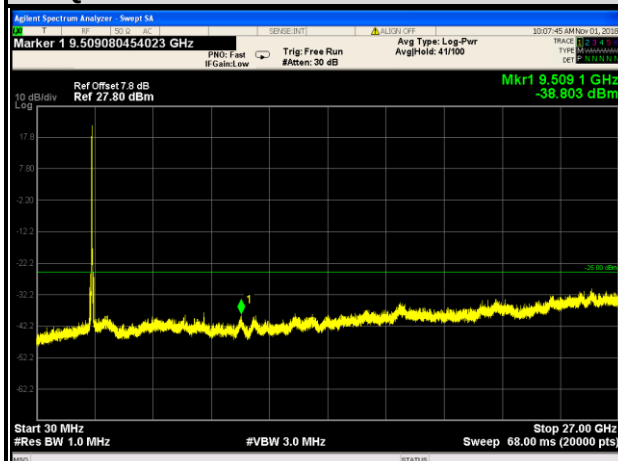
**CHANNEL 40620**

**FREQUENCY RANGE : 30MHz~25.7GHz**



**CHANNEL 41515**

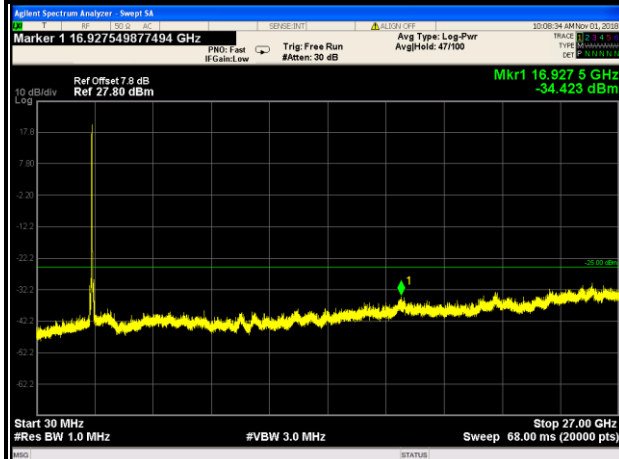
**FREQUENCY RANGE : 30MHz~25.7GHz**



**20MHz / QPSK**

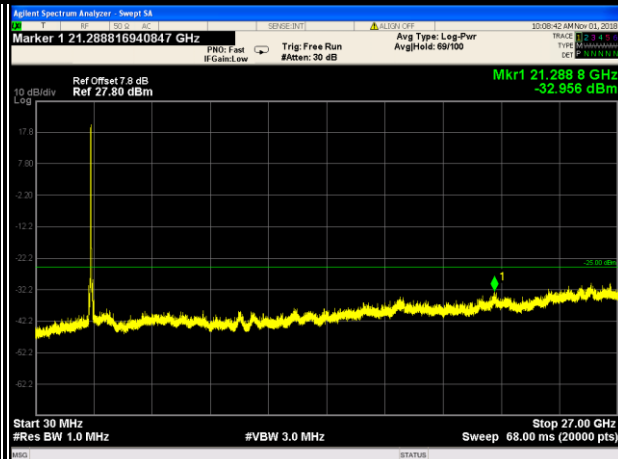
**CHANNEL 39750**

**FREQUENCY RANG2E : 30MHz~25.7GHz**



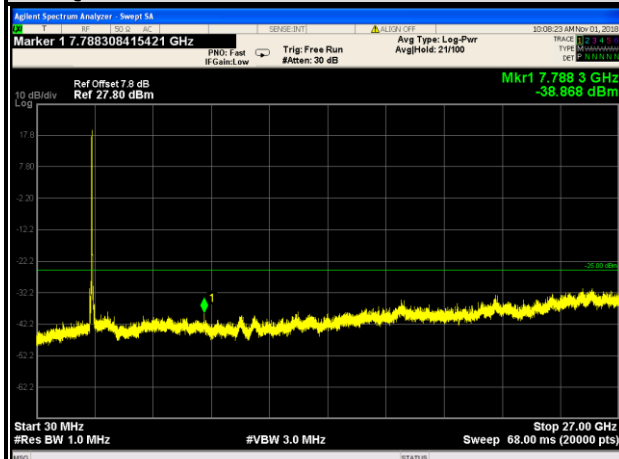
**CHANNEL 40620**

**FREQUENCY RANGE : 30MHz~25.7GHz**



**CHANNEL 41490**

**FREQUENCY RANGE : 30MHz~25.7GHz**



### 3.7 RADIATED EMISSION MEASUREMENT

#### 3.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $55 + 10 \log_{10}(P)$  dB. The limit of emission is equal to -25dBm.

#### 3.7.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, 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.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value " of step a. Record the power level of S.G.
- c.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ .
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  
 $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15dBi$ .

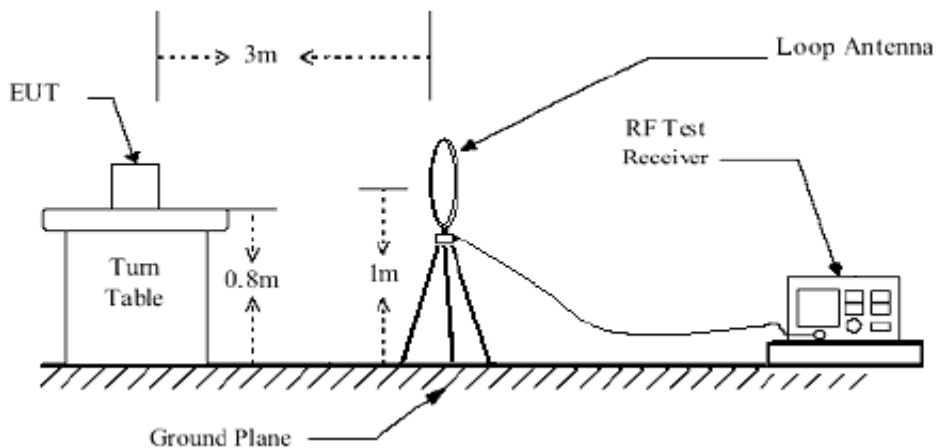
**NOTE:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

#### 3.7.3 DEVIATION FROM TEST STANDARD

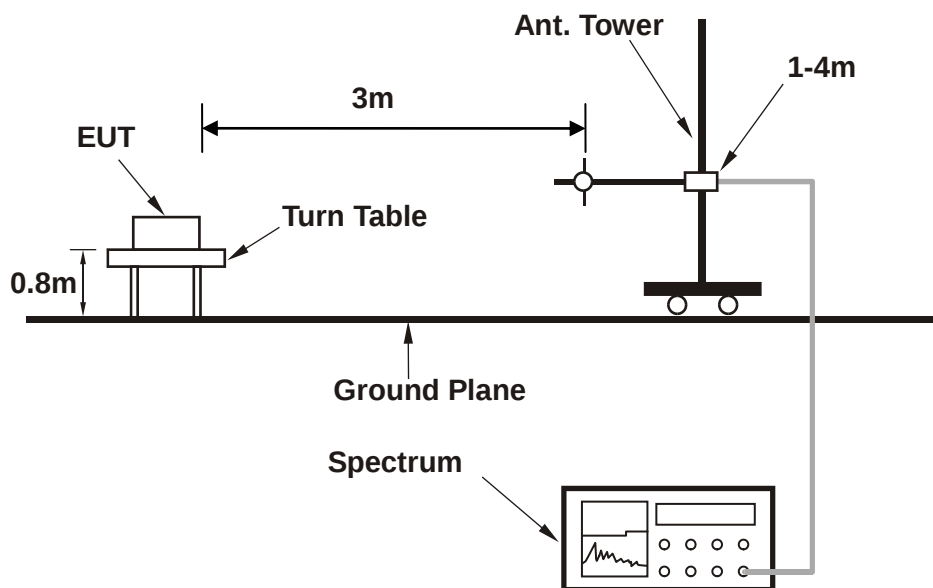
No deviation

### 3.7.4 TEST SETUP

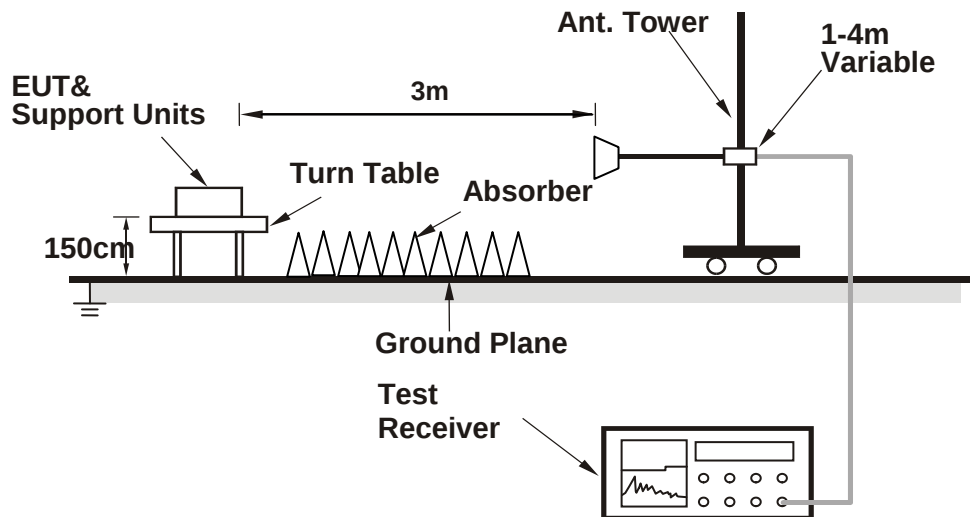
#### <Below 30MHz>



#### < Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



For the actual test configuration, please refer to the attached file (Test Setup Photo).

### 3.7.5 TEST RESULTS

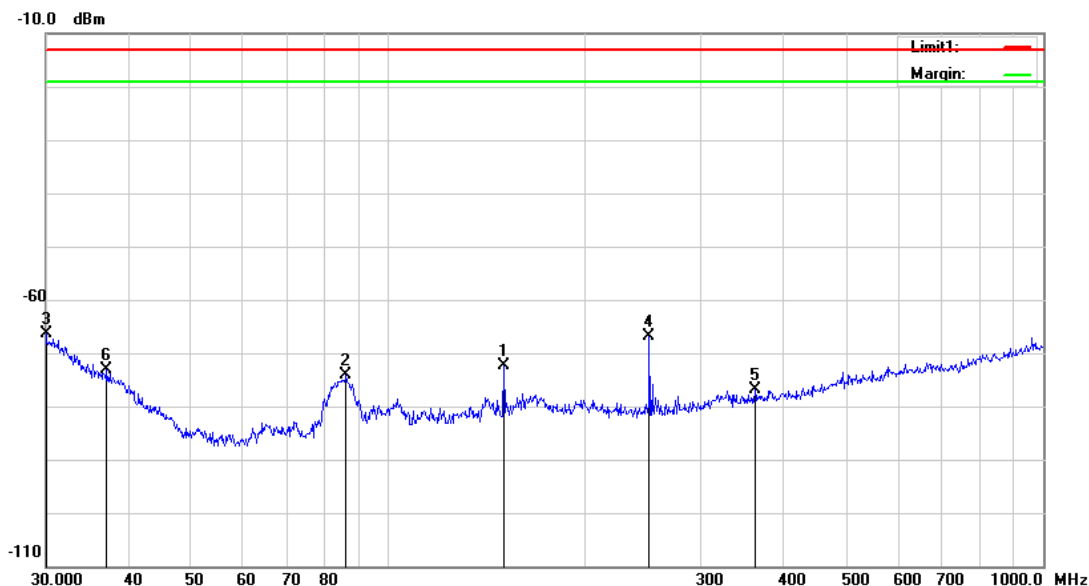
#### BELOW 1GHz WORST-CASE DATA

**9 KHz – 30 KHz data:** the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

**30 MHz – 1GHz data:**

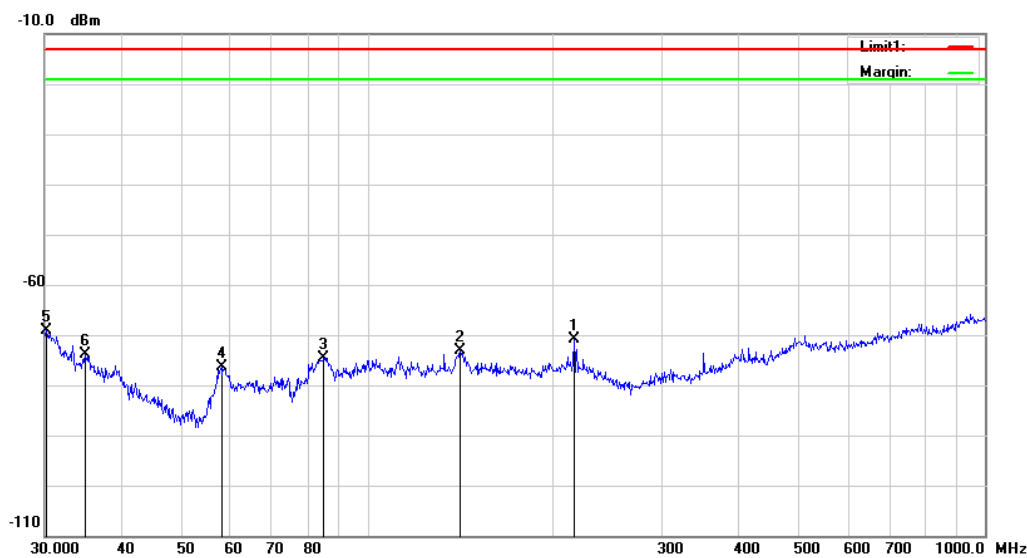
**LTE Band 41:**

|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 40620 | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 24deg. C, 57%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Simon Lin        |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |



| No. | Frequency<br>(MHz) | Reading<br>(dBm) | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-----|--------------------|------------------|-----------------|----------------|----------------|
| 1   | 150.0108           | -73.06           | -72.42          | -13.00         | -59.42         |
| 2   | 86.2001            | -70.79           | -74.02          | -13.00         | -61.02         |
| 3   | 30.0000            | -80.57           | -66.45          | -13.00         | -53.45         |
| 4   | 250.3012           | -67.88           | -66.94          | -13.00         | -53.94         |
| 5   | 362.9845           | -79.31           | -76.77          | -13.00         | -63.77         |
| 6   | 37.1550            | -80.75           | -73.16          | -13.00         | -60.16         |

|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 40620 | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 24deg. C, 57%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Simon Lin        |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |



| No. | Frequency<br>(MHz) | Reading<br>(dBm) | Result<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-----|--------------------|------------------|-----------------|----------------|----------------|
| 1   | 216.0240           | -73.64           | -70.80          | -13.00         | -57.80         |
| 2   | 141.3298           | -78.00           | -73.00          | -13.00         | -60.00         |
| 3   | 84.9995            | -76.22           | -74.53          | -13.00         | -61.53         |
| 4   | 57.9993            | -72.74           | -76.33          | -13.00         | -63.33         |
| 5   | 30.2111            | -75.86           | -69.19          | -13.00         | -56.19         |
| 6   | 34.8823            | -77.22           | -73.99          | -13.00         | -60.99         |

#### ABOVE 1GHz DATA

**Note:** For higher frequency, the emission is too low to be detected.

**LTE Band 41:**

**20M QPSK**

#### Low channel

| Frequency<br>(MHz) | Antenna<br>Polarization<br>(H/V) | Corrected<br>Reading<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|----------------------------------|-------------------------------|----------------|----------------|
| 5012               | V                                | -30.75                        | -13            | -17.75         |
| 5012               | H                                | -29.97                        | -13            | -16.97         |

#### Middle channel

| Frequency<br>(MHz) | Antenna<br>Polarization<br>(H/V) | Corrected<br>Reading<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|----------------------------------|-------------------------------|----------------|----------------|
| 5186               | V                                | -32.6                         | -13            | -19.6          |
| 5186               | H                                | -34.13                        | -13            | -21.13         |

High channel

| Frequency<br>(MHz) | Antenna<br>Polarization<br>(H/V) | Corrected<br>Reading<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|----------------------------------|-------------------------------|----------------|----------------|
| 5360               | V                                | -26.75                        | -13            | -13.75         |
| 5360               | H                                | -34.87                        | -13            | -21.87         |

**Note:**

- 1, The testing has been conformed to  $10 \times 2687.5 \text{ MHz} = 26,875 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 4, The radiated spurious test above 18GHz is subcontracted to Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch Laboratories and found 30dB below the limit at least.



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#### 4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.



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## 5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No any modifications are made to the EUT by the lab during the test.

---END---