



Test Report No.: RF170118W004-6



# FCC TEST REPORT

## (PART 27)

**Product:** smartphone

**Model Name:** Ilium LT520

**FCC ID:** ZC4LT520

**Applicant:** Corporativo Lanix S.A. de C.V.

**Address:** Carretera Internacional Hermosillo-Nogales Km 8.5, Hermosillo  
Sonora, Mexico

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**Report No.:** RF170118W004-6

**Received Date:** Jan. 18, 2017

**Test Date:** Jan. 19, 2017 ~ Feb. 18, 2017

**Issued Date:** Feb. 20, 2017

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## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE | DATE ISSUED   |
|----------------|-------------------|---------------|
| RF170118W004-6 | Original release  | Feb. 20, 2017 |



Test Report No.: RF170118W004-6

## 1 CERTIFICATION

**PRODUCT:** smartphone  
**BRAND NAME:** LANIX  
**MODEL NAME:** Ilium LT520  
**APPLICANT:** Corporativo Lanix S.A. de C.V.  
**TESTED:** Jan. 19, 2017 ~ Feb. 18, 2017  
**TEST SAMPLE:** Identical Prototype  
**STANDARDS:** FCC Part 27, Subpart C, M  
FCC Part 2  
ANSI /TIA/EIA-603-D

The above equipment has been tested by **Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Harry, **DATE:** Feb. 20, 2017  
(Harry Li/ Engineer)

**APPROVED BY :** Sam Tung, **DATE:** Feb. 20, 2017  
( Sam Tung / Manager)

## 2 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 | PASS   | Meet the requirement of limit.                                                   |
| 2.1055<br>27.54                        | Frequency Stability                     | PASS   | Meet the requirement of limit.                                                   |
| 2.1049<br>27.53(m)(6)                  | Occupied Bandwidth                      | PASS   | Meet the requirement of limit.                                                   |
| 27.50(d)(5)                            | Peak to average ratio                   | PASS   | Meet the requirement of limit.                                                   |
| 2.1051<br>27.53(m)(4)(6)               | Band Edge Measurements                  | PASS   | Meet the requirement of limit.                                                   |
| 2.1051<br>27.53(m)(4)(6)               | Conducted Spurious Emissions            | PASS   | 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 -5.21dB at 38.73MHz. |

### 2.1 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    | 2.70dB      |
| Radiated emissions  | 9KHz ~ 30MHz  | 2.90dB      |
|                     | 30MHz ~ 1GMHz | 4.06dB      |
|                     | 1GHz ~ 18GHz  | 4.58dB      |
|                     | 18GHz ~ 40GHz | 1.94dB      |

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

## 2.2 TEST SITE AND INSTRUMENTS

| Equipment                        | Manufacturer  | Model No.                | Serial No.  | Last Cal.   | Next Cal.   |
|----------------------------------|---------------|--------------------------|-------------|-------------|-------------|
| EMI Test Receiver                | Rohde&Schwarz | ESR7                     | 101494      | Apr. 05,16  | Apr. 04,17  |
| Signal and Spectrum Analyzer     | Rohde&Schwarz | FSV7                     | 102331      | Nov. 04,16  | Nov. 03,17  |
| Signal and Spectrum Analyzer     | Rohde&Schwarz | FSV40                    | 101094      | Apr. 05,16  | Apr. 04,17  |
| Bilog Antenna 1                  | Teseq         | CBL 6111D                | 30643       | Jul. 14, 16 | Jul. 13, 17 |
| Bilog Antenna 2                  | Teseq         | CBL 6111D                | 27089       | Jul. 14, 16 | Jul. 13, 17 |
| Loop antenna                     | Daze          | ZN30900A                 | 0708        | Nov. 28, 16 | Nov. 27, 17 |
| Horn Antenna (1GHz -18GHz)       | ETS -Lindgren | 3117                     | 00062558    | May 18,16   | May 17,17   |
| Horn Antenna (1GHz -18GHz)       | ETS -Lindgren | 3117                     | 00062557    | May 18,16   | May 17,17   |
| 10m Semi-anechoic Chamber        | CHANGLING     | 21.4m*12.1m*8.8m         | NSEMC006    | Mar. 12,16  | Mar. 11,18  |
| Test Software                    | E3            | V 9.160323               | N/A         | N/A         | N/A         |
| Test Software                    | ADT           | ADT_Radiated_V7.6.15.9.2 | N/A         | N/A         | N/A         |
| 10dB Attenuator                  | JFW/USA       | 50HF-010-SM A            | 1505        | Jul. 27, 16 | Jul. 26, 17 |
| Horn Antenna (15GHz-40GHz)       | SCHWARZBECK   | BBHA 9170                | BBHA9170147 | Mar. 12,16  | Mar. 11,17  |
| Horn Antenna (15GHz-40GHz)       | SCHWARZBECK   | BBHA 9170                | BBHA9170242 | Mar. 12,16  | Mar. 11,17  |
| Amplifier                        | Burgeon       | BPA-530                  | 100220      | Apr. 05,16  | Apr. 04,17  |
| Amplifier (9kHz-1GHz)            | SONOMA        | 310D                     | 186955      | Mar. 04,16  | Mar. 03, 17 |
| Pre-Amplifier(1-18G)             | HP            | 8449B                    | 3008A00409  | Apr. 25,16  | Apr. 24,17  |
| Pre-Amplifier (18GHz-40GHz)      | EMCI          | EMC 184045               | 980102      | Nov. 04,16  | Nov. 03,17  |
| Humid & Temp Programmable Tester | Haida         | HD-2257                  | 110807201   | Sep.05,16   | Sep. 04,17  |
| Signal Generator                 | Agilent       | N5183A                   | MY50140980  | Nov. 04,16  | Nov. 03,17  |

- NOTE:**
1. The calibration interval of the above test instruments is 12 months or 24 months and the calibrations are traceable to CEPREI/CHINA, GREGT/CHINA and NIM/CHINA.
  2. The test was performed in 10m 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 502831.

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |                                                                                             |                       |
|------------------------------|---------------------------------------------------------------------------------------------|-----------------------|
| <b>PRODUCT</b>               | smartphone                                                                                  |                       |
| <b>MODEL NAME</b>            | Ilium LT520                                                                                 |                       |
| <b>POWER SUPPLY</b>          | 5.0Vdc (adapter or host equipment)<br>3.8Vdc (Li-ion, battery)                              |                       |
| <b>MODULATION TECHNOLOGY</b> | LTE Band 7                                                                                  | QPSK, 16QAM           |
| <b>FREQUENCY RANGE</b>       | LTE Band 7<br>Channel Bandwidth: 5MHz                                                       | 2502.5MHz ~ 2567.5MHz |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz                                                      | 2505MHz ~ 2565MHz     |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz                                                      | 2507.5MHz ~ 2562.5MHz |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz                                                      | 2510MHz ~ 2560MHz     |
| <b>EMISSION DESIGNATOR</b>   | LTE Band 7<br>Channel Bandwidth: 5MHz                                                       | QPSK: 4M48G7D         |
|                              |                                                                                             | 16QAM: 4M47W7D        |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz                                                      | QPSK: 8M93G7D         |
|                              |                                                                                             | 16QAM: 8M93W7D        |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz                                                      | QPSK: 13M4G7D         |
|                              |                                                                                             | 16QAM: 13M4W7D        |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz                                                      | QPSK: 17M9G7D         |
|                              |                                                                                             | 16QAM: 17M9W7D        |
| <b>MAX. EIRP POWER</b>       | LTE Band 7<br>Channel Bandwidth: 5MHz                                                       | 312mW                 |
|                              | LTE Band 7<br>Channel Bandwidth: 10MHz                                                      | 316mW                 |
|                              | LTE Band 7<br>Channel Bandwidth: 15MHz                                                      | 311mW                 |
|                              | LTE Band 7<br>Channel Bandwidth: 20MHz                                                      | 280mW                 |
| <b>ANTENNA TYPE</b>          | Fixed Internal Antenna with 1.1dBi                                                          |                       |
| <b>HW VERSION</b>            | V1                                                                                          |                       |
| <b>SW VERSION</b>            | Ilium LT520_TELCEL_SW_01                                                                    |                       |
| <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, 1.0m |                       |

**NOTE:**

- 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        |                    |
|----------------|--------------------|
| <b>BRAND:</b>  | Lanix              |
| <b>MODEL:</b>  | Ilium LT520        |
| <b>INPUT:</b>  | AC 100-240V, 120mA |
| <b>OUTPUT:</b> | DC 5V, 1000mA      |

3. The EUT matched the following USB cable and Earphone:

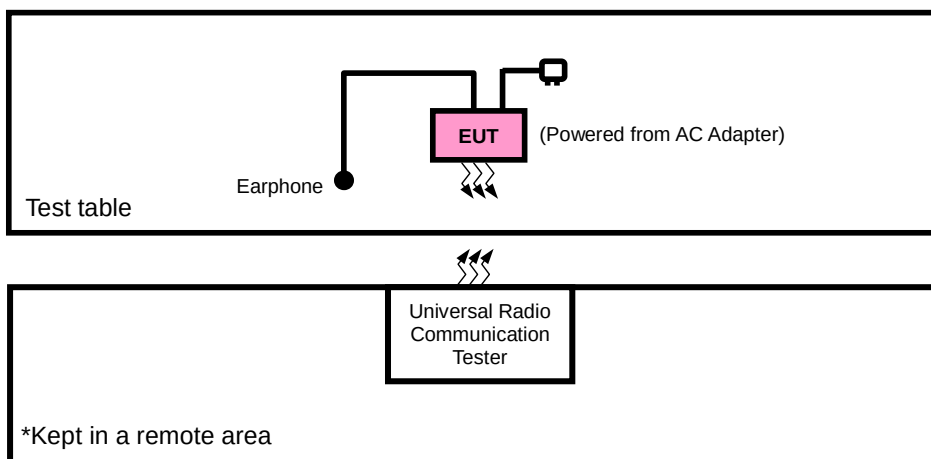
| USB CABLE           |             |
|---------------------|-------------|
| <b>BRAND:</b>       | LANIX       |
| <b>MODEL:</b>       | Ilium LT520 |
| <b>SIGNAL LINE:</b> | 1.0 METER   |

| EARPHONE            |             |
|---------------------|-------------|
| <b>BRAND:</b>       | LANIX       |
| <b>MODEL:</b>       | Ilium LT520 |
| <b>SIGNAL LINE:</b> | 1.0 METER   |

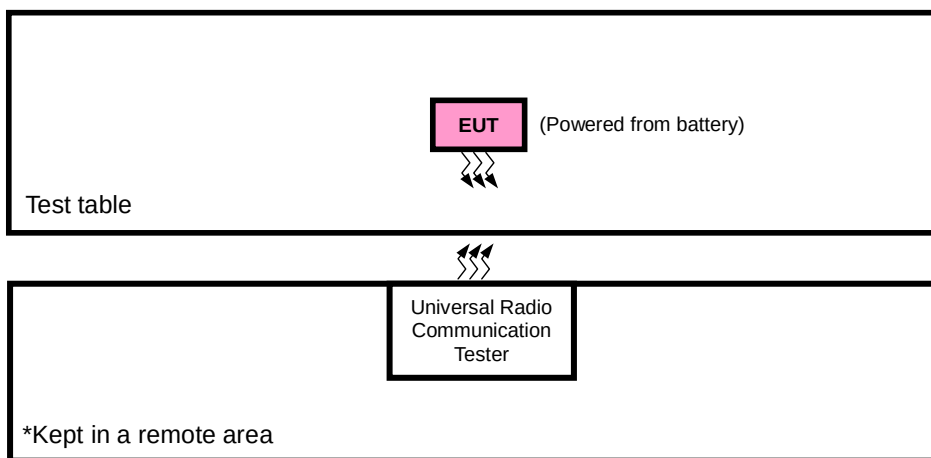
4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

### 3.2 CONFIGURATION OF SYSTEM UNDER TEST

#### FOR RADIATION EMISSION TEST



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



### 3.3 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   | DC source | LONG WEI | PS-6403D  | 010934269  | N/A    |
| 2   | PC        | HP       | A6608CN   | 3CR83825X3 | N/A    |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | DC Line: Unshielded, Detachable 1.0m                |
| 2   | AC Line: Unshielded, Detachable 1.5m                |

**NOTE:** All power cords of the above support units are non shielded (1.8m).

### 3.4 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 + USB Cable with LTE link |

LTE BAND 7

| EUT CONFIGURE MODE | TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION  | MODE                 |
|--------------------|-----------------------|-------------------|---------------------|-------------------|-------------|----------------------|
| B                  | EIRP                  | 20775 to 21425    | 20775, 21100, 21425 | 5MHz              | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10MHz             | QPSK, 16QAM | 1 RB / 0RB Offset    |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| B                  | FREQUENCY STABILITY   | 20775 to 21425    | 21100               | 5MHz              | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 21100               | 10MHz             | QPSK        | 1 RB / 0RB Offset    |
|                    |                       | 20825 to 21375    | 21100               | 15MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 21100               | 20MHz             | QPSK        | 1 RB / 0 RB Offset   |
| B                  | OCCUPIED BANDWIDTH    | 20775 to 21425    | 20775, 21100, 21425 | 5MHz              | QPSK, 16QAM | 25 RB / 0 RB Offset  |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10MHz             | QPSK, 16QAM | 50 RB / 0 RB Offset  |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15MHz             | QPSK, 16QAM | 75 RB / 0 RB Offset  |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20MHz             | QPSK, 16QAM | 100 RB / 0 RB Offset |
| B                  | PEAK TO AVERAGE RATIO | 20775 to 21425    | 20775, 21100, 21425 | 5MHz              | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 20800, 21100, 21400 | 10MHz             | QPSK, 16QAM | 1 RB / 0RB Offset    |
|                    |                       | 20825 to 21375    | 20825, 21100, 21375 | 15MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 20850, 21100 21350  | 20MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| B                  | BAND EDGE             | 20775 to 21425    | 20775               | 5MHz              | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       |                   | 21425               | 5MHz              | QPSK        | 25 RB / 0 RB Offset  |
|                    |                       | 20800 to 21400    | 20800               | 10MHz             | QPSK        | 1 RB / 24 RB Offset  |
|                    |                       |                   | 21400               | 10MHz             | QPSK        | 25 RB / 0 RB Offset  |
|                    |                       | 20825 to 21375    | 20825               | 15MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       |                   | 21375               | 15MHz             | QPSK        | 50 RB / 0 RB Offset  |
|                    |                       | 20850 to 21350    | 20850               | 20MHz             | QPSK        | 1 RB / 49 RB Offset  |
|                    |                       |                   | 21350               | 20MHz             | QPSK        | 75 RB / 0 RB Offset  |
|                    |                       | 20775 to 21425    | 20775               | 5MHz              | QPSK        | 1 RB / 74 RB Offset  |
|                    |                       |                   | 21425               | 5MHz              | QPSK        | 75 RB / 0 RB Offset  |
|                    |                       | 20800 to 21400    | 20800               | 10MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       |                   | 21400               | 10MHz             | QPSK        | 100 RB / 0 RB Offset |
| B                  | CONDCUDED EMISSION    | 20775 to 21425    | 21100               | 5MHz              | QPSK        | 1 RB / 99 RB Offset  |
|                    |                       | 20800 to 21400    | 21100               | 10MHz             | QPSK        | 100 RB / 0 RB Offset |
|                    |                       | 20825 to 21375    | 21100               | 15MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 21100               | 20MHz             | QPSK        | 1 RB / 0 RB Offset   |
| A                  | RADIATED EMISSION     | 20775 to 21425    | 21100               | 5MHz              | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20800 to 21400    | 21100               | 10MHz             | QPSK        | 1 RB / 0RB Offset    |
|                    |                       | 20825 to 21375    | 21100               | 15MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20850 to 21350    | 21100               | 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.



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**TEST CONDITION:**

| TEST ITEM             | ENVIRONMENTAL CONDITIONS | INPUT POWER         | TESTED BY   |
|-----------------------|--------------------------|---------------------|-------------|
| EIRP                  | 24deg. C, 60%RH          | 3.8Vdc from Battery | Wenliang Wu |
| FREQUENCY STABILITY   | 24deg. C, 61%RH          | 3.8Vdc from Battery | Wenliang Wu |
| OCCUPIED BANDWIDTH    | 24deg. C, 61%RH          | 3.8Vdc from Battery | Wenliang Wu |
| PEAK TO AVERAGE RATIO | 24deg. C, 61%RH          | 3.8Vdc from Battery | Moon Xiong  |
| BAND EDGE             | 24deg. C, 61%RH          | 3.8Vdc from Battery | Moon Xiong  |
| CONDUCTED EMISSION    | 24deg. C, 61%RH          | 3.8Vdc from Battery | Moon Xiong  |
| RADIATED EMISSION     | 24deg. C, 60%RH          | 5Vdc from adapter   | Tony Zou    |

### 3.5 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 v02r02**

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

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

## 4 TEST TYPES AND RESULTS

### 4.1 OUTPUT POWER MEASUREMENT

#### 4.1.1 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.”

#### 4.1.2 TEST PROCEDURES

##### EIRP MEASUREMENT:

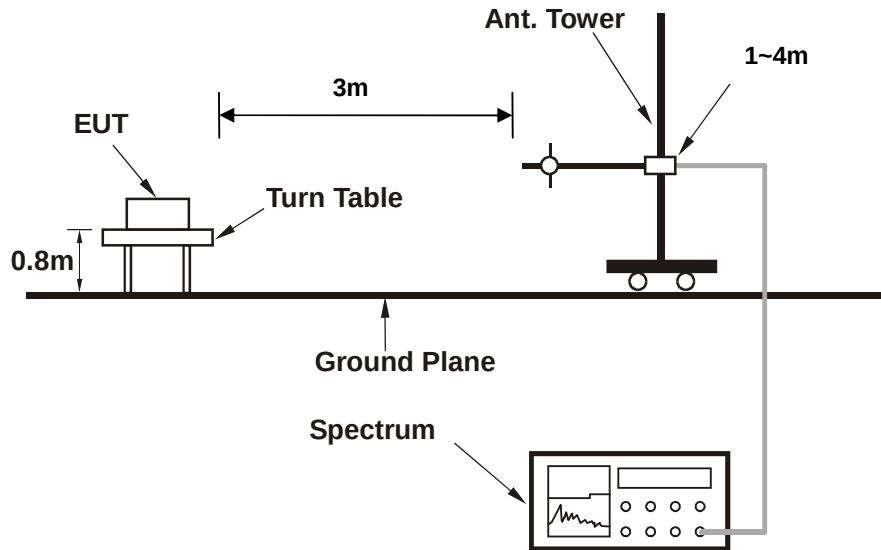
- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the 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.

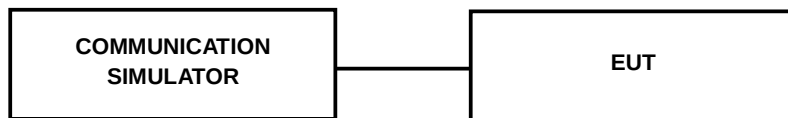
#### 4.1.3 TEST SETUP

##### 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).

#### 4.1.4 TEST RESULTS

##### AVERAGE CONDUCTED OUTPUT POWER (dBm)

| LTE Band 7 |            |         |           |                         |                       |                         |     |
|------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|-----|
| BW         | Modulation | RB Size | RB Offset | Low CH<br>20775         | Mid CH<br>21100       | High CH<br>21425        | MPR |
|            |            |         |           | Frequency<br>2502.5 MHz | Frequency<br>2535 MHz | Frequency<br>2567.5 MHz |     |
| 5 MHz      | QPSK       | 1       | 0         | 22.22                   | 22.08                 | 22.00                   | 0   |
|            |            | 1       | 12        | 22.18                   | 22.04                 | 21.96                   | 0   |
|            |            | 1       | 24        | 22.14                   | 22.00                 | 21.92                   | 0   |
|            |            | 12      | 0         | 21.33                   | 21.19                 | 21.11                   | 1   |
|            |            | 12      | 6         | 21.28                   | 21.14                 | 21.06                   | 1   |
|            |            | 12      | 13        | 21.25                   | 21.11                 | 21.03                   | 1   |
|            |            | 25      | 0         | 21.30                   | 21.16                 | 21.08                   | 1   |
|            | 16QAM      | 1       | 0         | 21.43                   | 21.29                 | 21.21                   | 1   |
|            |            | 1       | 12        | 21.38                   | 21.24                 | 21.16                   | 1   |
|            |            | 1       | 24        | 21.34                   | 21.20                 | 21.12                   | 1   |
|            |            | 12      | 0         | 20.33                   | 20.19                 | 20.11                   | 2   |
|            |            | 12      | 6         | 20.28                   | 20.14                 | 20.06                   | 2   |
|            |            | 12      | 13        | 20.23                   | 20.09                 | 20.01                   | 2   |
|            |            | 25      | 0         | 20.29                   | 20.15                 | 20.07                   | 2   |
| BW         | Modulation | RB Size | RB Offset | Low CH<br>20800         | Mid CH<br>21100       | High CH<br>21400        | MPR |
|            |            |         |           | Frequency<br>2505 MHz   | Frequency<br>2535 MHz | Frequency<br>2565 MHz   |     |
| 10 MHz     | QPSK       | 1       | 0         | 22.26                   | 22.12                 | 22.04                   | 0   |
|            |            | 1       | 24        | 22.22                   | 22.08                 | 22.00                   | 0   |
|            |            | 1       | 49        | 22.18                   | 22.04                 | 21.96                   | 0   |
|            |            | 25      | 0         | 21.37                   | 21.23                 | 21.15                   | 1   |
|            |            | 25      | 12        | 21.32                   | 21.18                 | 21.10                   | 1   |
|            |            | 25      | 25        | 21.29                   | 21.15                 | 21.07                   | 1   |
|            |            | 50      | 0         | 21.34                   | 21.20                 | 21.12                   | 1   |
|            | 16QAM      | 1       | 0         | 21.47                   | 21.33                 | 21.25                   | 1   |
|            |            | 1       | 24        | 21.42                   | 21.28                 | 21.20                   | 1   |
|            |            | 1       | 49        | 21.38                   | 21.24                 | 21.16                   | 1   |
|            |            | 25      | 0         | 20.37                   | 20.23                 | 20.15                   | 2   |
|            |            | 25      | 12        | 20.32                   | 20.18                 | 20.10                   | 2   |
|            |            | 25      | 25        | 20.27                   | 20.13                 | 20.05                   | 2   |
|            |            | 50      | 0         | 20.33                   | 20.19                 | 20.11                   | 2   |

| LTE Band 7 |            |         |           |                      |                    |                      |     |
|------------|------------|---------|-----------|----------------------|--------------------|----------------------|-----|
| BW         | Modulation | RB Size | RB Offset | Low CH 20825         | Mid CH 21100       | High CH 21375        | MPR |
|            |            |         |           | Frequency 2507.5 MHz | Frequency 2535 MHz | Frequency 2562.5 MHz |     |
| 15 MHz     | QPSK       | 1       | 0         | 22.32                | 22.18              | 22.10                | 0   |
|            |            | 1       | 37        | 22.28                | 22.14              | 22.06                | 0   |
|            |            | 1       | 74        | 22.24                | 22.10              | 22.02                | 0   |
|            |            | 36      | 0         | 21.43                | 21.29              | 21.21                | 1   |
|            |            | 36      | 19        | 21.38                | 21.24              | 21.16                | 1   |
|            |            | 36      | 39        | 21.35                | 21.21              | 21.13                | 1   |
|            |            | 75      | 0         | 21.40                | 21.26              | 21.18                | 1   |
|            | 16QAM      | 1       | 0         | 21.53                | 21.39              | 21.31                | 1   |
|            |            | 1       | 37        | 21.48                | 21.34              | 21.26                | 1   |
|            |            | 1       | 74        | 21.44                | 21.30              | 21.22                | 1   |
|            |            | 36      | 0         | 20.43                | 20.29              | 20.21                | 2   |
|            |            | 36      | 19        | 20.38                | 20.24              | 20.16                | 2   |
|            |            | 36      | 39        | 20.33                | 20.19              | 20.11                | 2   |
|            |            | 75      | 0         | 20.39                | 20.25              | 20.17                | 2   |
| BW         | Modulation | RB Size | RB Offset | Low CH 20850         | Mid CH 21100       | High CH 21350        | MPR |
|            |            |         |           | Frequency 2510 MHz   | Frequency 2535 MHz | Frequency 2560 MHz   |     |
| 20 MHz     | QPSK       | 1       | 0         | 22.35                | 22.21              | 22.13                | 0   |
|            |            | 1       | 50        | 22.31                | 22.17              | 22.09                | 0   |
|            |            | 1       | 99        | 22.27                | 22.13              | 22.05                | 0   |
|            |            | 50      | 0         | 21.46                | 21.32              | 21.24                | 1   |
|            |            | 50      | 25        | 21.41                | 21.27              | 21.19                | 1   |
|            |            | 50      | 50        | 21.38                | 21.24              | 21.16                | 1   |
|            |            | 100     | 0         | 21.43                | 21.29              | 21.21                | 1   |
|            | 16QAM      | 1       | 0         | 21.56                | 21.42              | 21.34                | 1   |
|            |            | 1       | 50        | 21.51                | 21.37              | 21.29                | 1   |
|            |            | 1       | 99        | 21.47                | 21.33              | 21.25                | 1   |
|            |            | 50      | 0         | 20.46                | 20.32              | 20.24                | 2   |
|            |            | 50      | 25        | 20.41                | 20.27              | 20.19                | 2   |
|            |            | 50      | 50        | 20.36                | 20.22              | 20.14                | 2   |
|            |            | 100     | 0         | 20.42                | 20.28              | 20.20                | 2   |

EIRP

LTE BAND 7

CHANNEL BANDWIDTH: 5MHz QPSK

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW)      | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|-----------|
| 20775   | 2502.5          | -21.75        | 45.65                 | 23.90     | 245.36        | H                  | 2         |
| 21100   | 2535.0          | -21.10        | 46.04                 | 24.94     | <b>311.53</b> | H                  | 2         |
| 21425   | 2567.5          | -21.90        | 45.87                 | 23.97     | 249.23        | H                  | 2         |
| 20775   | 2502.5          | -24.46        | 47.03                 | 22.57     | 180.63        | V                  | 2         |
| 21100   | 2535.0          | -23.99        | 46.57                 | 22.58     | 181.13        | V                  | 2         |
| 21425   | 2567.5          | -23.60        | 46.98                 | 23.38     | 217.77        | V                  | 2         |

CHANNEL BANDWIDTH: 5MHz 16QAM

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 20775   | 2502.5          | -22.58        | 45.65                 | 23.07     | 202.67   | H                  | 2         |
| 21100   | 2535.0          | -22.12        | 46.04                 | 23.92     | 246.32   | H                  | 2         |
| 21425   | 2567.5          | -23.00        | 45.87                 | 22.87     | 193.46   | H                  | 2         |
| 20775   | 2502.5          | -25.29        | 47.03                 | 21.74     | 149.21   | V                  | 2         |
| 21100   | 2535.0          | -25.01        | 46.57                 | 21.56     | 143.22   | V                  | 2         |
| 21425   | 2567.5          | -24.70        | 46.98                 | 22.28     | 169.04   | V                  | 2         |

CHANNEL BANDWIDTH: 10MHz QPSK

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW)      | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|-----------|
| 20800   | 2505.0          | -21.56        | 45.65                 | 24.09     | 256.39        | H                  | 2         |
| 21100   | 2535.0          | -21.04        | 46.04                 | 25.00     | <b>315.86</b> | H                  | 2         |
| 21400   | 2565.0          | -21.77        | 46.07                 | 24.30     | 268.84        | H                  | 2         |
| 20800   | 2505.0          | -24.27        | 47.18                 | 22.91     | 195.25        | V                  | 2         |
| 21100   | 2535.0          | -23.93        | 46.57                 | 22.64     | 183.65        | V                  | 2         |
| 21400   | 2565.0          | -23.47        | 47.06                 | 23.59     | 228.77        | V                  | 2         |

**CHANNEL BANDWIDTH: 10MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 20800   | 2505.0          | -22.71        | 45.65                 | 22.94     | 196.74   | H                  | 2         |
| 21100   | 2535.0          | -22.14        | 46.04                 | 23.90     | 245.19   | H                  | 2         |
| 21400   | 2565.0          | -22.93        | 46.07                 | 23.14     | 205.83   | H                  | 2         |
| 20800   | 2505.0          | -25.42        | 47.18                 | 21.76     | 149.83   | V                  | 2         |
| 21100   | 2535.0          | -25.03        | 46.57                 | 21.54     | 142.56   | V                  | 2         |
| 21400   | 2565.0          | -24.63        | 47.06                 | 22.43     | 175.15   | V                  | 2         |

**CHANNEL BANDWIDTH: 15MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW)      | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|-----------|
| 20825   | 2507.5          | -21.57        | 45.63                 | 24.06     | 254.86        | H                  | 2         |
| 21100   | 2535.0          | -21.11        | 46.04                 | 24.93     | <b>310.81</b> | H                  | 2         |
| 21375   | 2562.5          | -21.84        | 45.94                 | 24.10     | 256.92        | H                  | 2         |
| 20825   | 2507.5          | -24.28        | 47.39                 | 23.11     | 204.60        | V                  | 2         |
| 21100   | 2535.0          | -24.00        | 46.57                 | 22.57     | 180.72        | V                  | 2         |
| 21375   | 2562.5          | -23.54        | 47.00                 | 23.46     | 221.77        | V                  | 2         |

**CHANNEL BANDWIDTH: 15MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 20825   | 2507.5          | -22.43        | 45.63                 | 23.20     | 209.07   | H                  | 2         |
| 21100   | 2535.0          | -21.98        | 46.04                 | 24.06     | 254.39   | H                  | 2         |
| 21375   | 2562.5          | -22.69        | 45.94                 | 23.25     | 211.25   | H                  | 2         |
| 20825   | 2507.5          | -25.14        | 47.39                 | 22.25     | 167.84   | V                  | 2         |
| 21100   | 2535.0          | -24.87        | 46.57                 | 21.70     | 147.91   | V                  | 2         |
| 21375   | 2562.5          | -24.39        | 47.00                 | 22.61     | 182.35   | V                  | 2         |

**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW)      | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|---------------|--------------------|-----------|
| 20850   | 2510.0          | -22.15        | 45.80                 | 23.65     | 231.69        | H                  | 2         |
| 21100   | 2535.0          | -21.56        | 46.04                 | 24.48     | <b>280.22</b> | H                  | 2         |
| 21350   | 2560.0          | -22.42        | 45.83                 | 23.41     | 219.43        | H                  | 2         |
| 20850   | 2510.0          | -24.86        | 47.21                 | 22.35     | 171.79        | V                  | 2         |
| 21100   | 2535.0          | -24.45        | 46.57                 | 22.12     | 162.78        | V                  | 2         |
| 21350   | 2560.0          | -24.12        | 47.07                 | 22.95     | 197.20        | V                  | 2         |

**CHANNEL BANDWIDTH: 20MHz 16QAM**

| Channel | Frequency (MHz) | SPA LVL (dBm) | Correction Factor(dB) | EIRP(dBm) | EIRP(mW) | Polarization (H/V) | Limit (W) |
|---------|-----------------|---------------|-----------------------|-----------|----------|--------------------|-----------|
| 20850   | 2510.0          | -23.08        | 45.80                 | 22.72     | 187.03   | H                  | 2         |
| 21100   | 2535.0          | -22.63        | 46.04                 | 23.41     | 219.03   | H                  | 2         |
| 21350   | 2560.0          | -23.25        | 45.83                 | 22.58     | 181.26   | H                  | 2         |
| 20850   | 2510.0          | -25.79        | 47.21                 | 21.42     | 138.68   | V                  | 2         |
| 21100   | 2535.0          | -25.52        | 46.57                 | 21.05     | 127.23   | V                  | 2         |
| 21350   | 2560.0          | -24.95        | 47.07                 | 22.12     | 162.89   | 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

## 4.2 FREQUENCY STABILITY MEASUREMENT

### 4.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

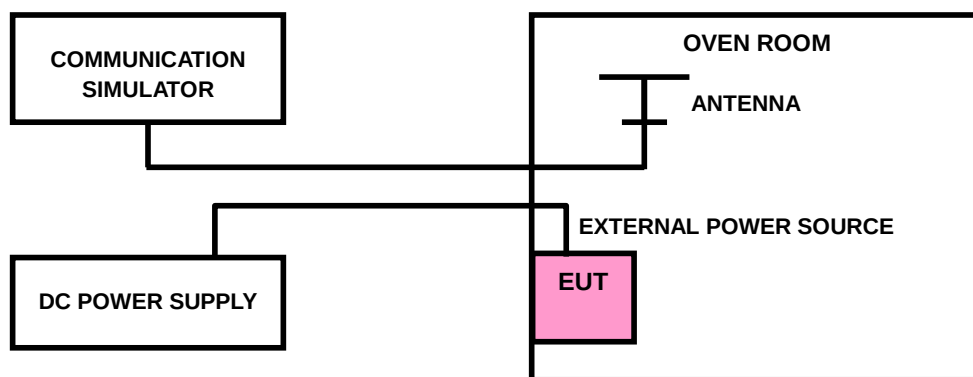
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.2.2 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.

### 4.2.3 TEST SETUP



#### 4.2.4 TEST RESULTS

##### LTE BAND 7

##### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 5MHz                  |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0009                | 0.0009       | 2.5         |
| 3.5             | -0.0010               | -0.0010      | 2.5         |
| 4.4             | 0.0008                | 0.0008       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.4Vdc.

##### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0045               | -0.0045      | 2.5         |
| -20        | -0.0040               | -0.0040      | 2.5         |
| -10        | -0.0036               | -0.0036      | 2.5         |
| 0          | -0.0031               | -0.0031      | 2.5         |
| 10         | -0.0026               | -0.0026      | 2.5         |
| 20         | -0.0021               | -0.0021      | 2.5         |
| 30         | -0.0017               | -0.0017      | 2.5         |
| 40         | -0.0012               | -0.0013      | 2.5         |
| 50         | -0.0008               | -0.0008      | 2.5         |
| 60         | -0.0002               | -0.0002      | 2.5         |

**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts) | 10MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0007                | 0.0007       | 2.5         |
| 3.5             | -0.0008               | -0.0009      | 2.5         |
| 4.4             | 0.0006                | 0.0007       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.4Vdc.

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0042               | -0.0043      | 2.5         |
| -20        | -0.0038               | -0.0038      | 2.5         |
| -10        | -0.0033               | -0.0033      | 2.5         |
| 0          | -0.0029               | -0.0029      | 2.5         |
| 10         | -0.0023               | -0.0024      | 2.5         |
| 20         | -0.0019               | -0.0019      | 2.5         |
| 30         | -0.0013               | -0.0013      | 2.5         |
| 40         | -0.0008               | -0.0008      | 2.5         |
| 50         | -0.0003               | -0.0003      | 2.5         |
| 60         | 0.0002                | 0.0002       | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 15MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0009                | 0.0009       | 2.5         |
| 3.5             | -0.0010               | -0.0010      | 2.5         |
| 4.4             | 0.0008                | 0.0008       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.4Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 15MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0039               | -0.0040      | 2.5         |
| -20        | -0.0035               | -0.0035      | 2.5         |
| -10        | -0.0030               | -0.0031      | 2.5         |
| 0          | -0.0025               | -0.0026      | 2.5         |
| 10         | -0.0021               | -0.0021      | 2.5         |
| 20         | -0.0016               | -0.0017      | 2.5         |
| 30         | -0.0012               | -0.0012      | 2.5         |
| 40         | -0.0006               | -0.0006      | 2.5         |
| 50         | -0.0001               | -0.0001      | 2.5         |
| 60         | 0.0004                | 0.0004       | 2.5         |

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 20MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| 3.8             | 0.0007                | 0.0008       | 2.5         |
| 3.5             | -0.0009               | -0.0009      | 2.5         |
| 4.4             | 0.0006                | 0.0007       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is from 3.5Vdc to 4.4Vdc.

#### FREQUENCY ERROR vs. TEMPERATURE.

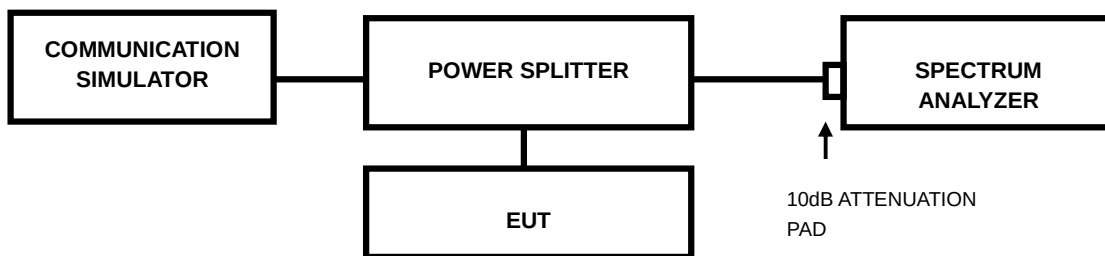
| TEMP. (°C) | 20MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0041               | -0.0042      | 2.5         |
| -20        | -0.0036               | -0.0037      | 2.5         |
| -10        | -0.0031               | -0.0031      | 2.5         |
| 0          | -0.0027               | -0.0027      | 2.5         |
| 10         | -0.0021               | -0.0021      | 2.5         |
| 20         | -0.0017               | -0.0017      | 2.5         |
| 30         | -0.0011               | -0.0012      | 2.5         |
| 40         | -0.0007               | -0.0007      | 2.5         |
| 50         | -0.0002               | -0.0002      | 2.5         |
| 60         | 0.0002                | 0.0002       | 2.5         |

### 4.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 4.3.1 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.

#### 4.3.2 TEST SETUP

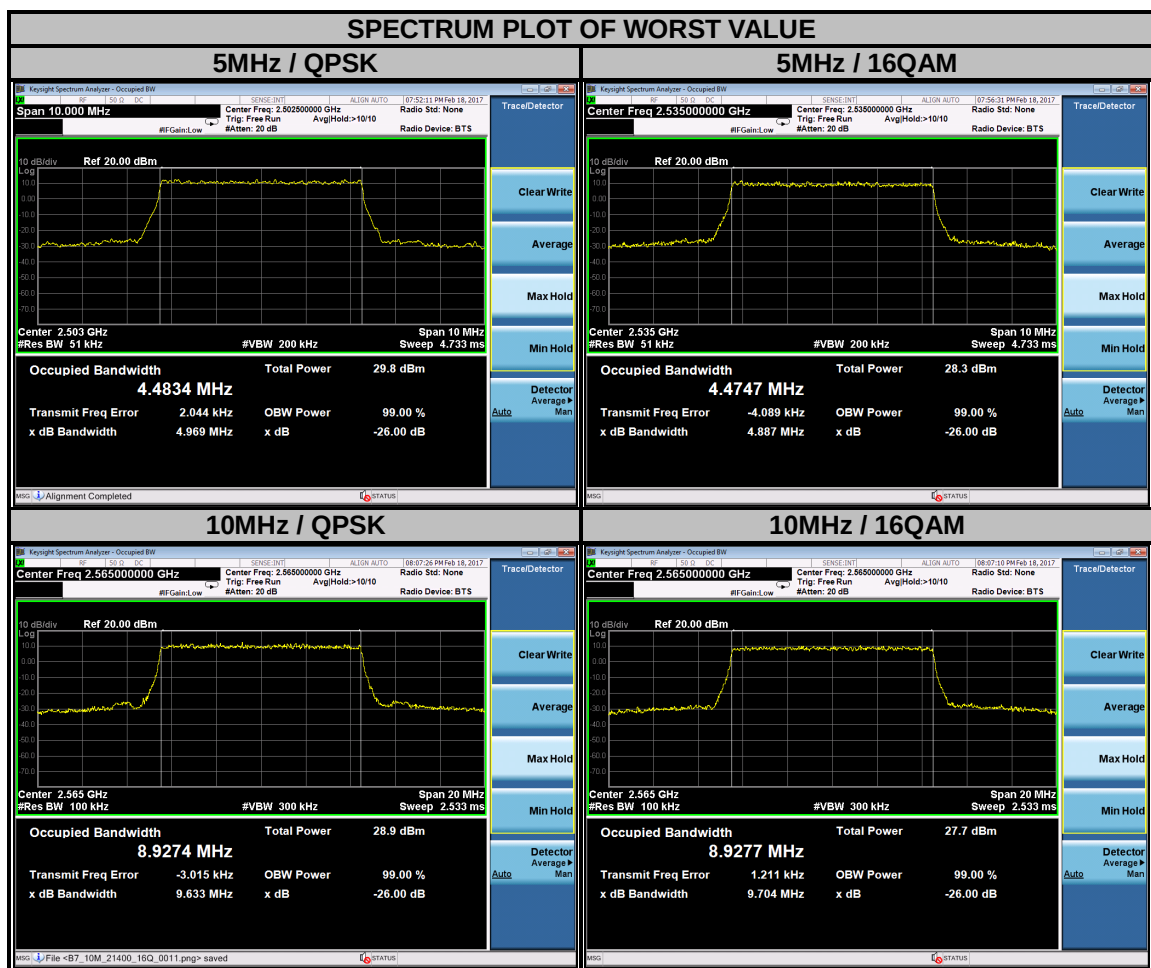


#### 4.3.3 TEST PROCEDURES

- 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.

### 4.3.4 TEST RESULTS

| LTE BAND 7              |                 |                              |       |                          |                 |                              |       |
|-------------------------|-----------------|------------------------------|-------|--------------------------|-----------------|------------------------------|-------|
| CHANNEL BANDWIDTH: 5MHz |                 |                              |       | CHANNEL BANDWIDTH: 10MHz |                 |                              |       |
| CHANNEL                 | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (MHz) |       | CHANNEL                  | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (MHz) |       |
|                         |                 | QPSK                         | 16QAM |                          |                 | QPSK                         | 16QAM |
| 20775                   | 2502.5          | 4.48                         | 4.47  | 20800                    | 2505            | 8.93                         | 8.91  |
| 21100                   | 2535            | 4.48                         | 4.47  | 21100                    | 2535            | 8.92                         | 8.92  |
| 21425                   | 2567.5          | 4.48                         | 4.47  | 21400                    | 2565            | 8.93                         | 8.93  |



| LTE BAND 7               |                 |                              |       |                          |                 |                              |       |
|--------------------------|-----------------|------------------------------|-------|--------------------------|-----------------|------------------------------|-------|
| CHANNEL BANDWIDTH: 15MHz |                 |                              |       | CHANNEL BANDWIDTH: 20MHz |                 |                              |       |
| CHANNEL                  | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (MHz) |       | CHANNEL                  | FREQUENCY (MHz) | 99% OCCUPIED BANDWIDTH (MHz) |       |
|                          |                 | QPSK                         | 16QAM |                          |                 | QPSK                         | 16QAM |
| 20825                    | 2507.5          | 13.42                        | 13.40 | 20850                    | 2510            | 17.92                        | 17.89 |
| 21100                    | 2535            | 13.38                        | 13.39 | 21100                    | 2535            | 17.81                        | 17.84 |
| 21375                    | 2562.5          | 13.38                        | 13.38 | 21350                    | 2560            | 17.88                        | 17.82 |

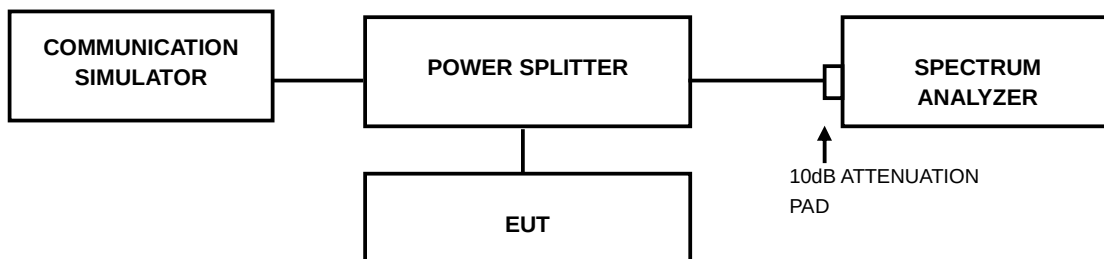


## 4.4 PEAK TO AVERAGE RATIO

### 4.4.1 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.

### 4.4.2 TEST SETUP



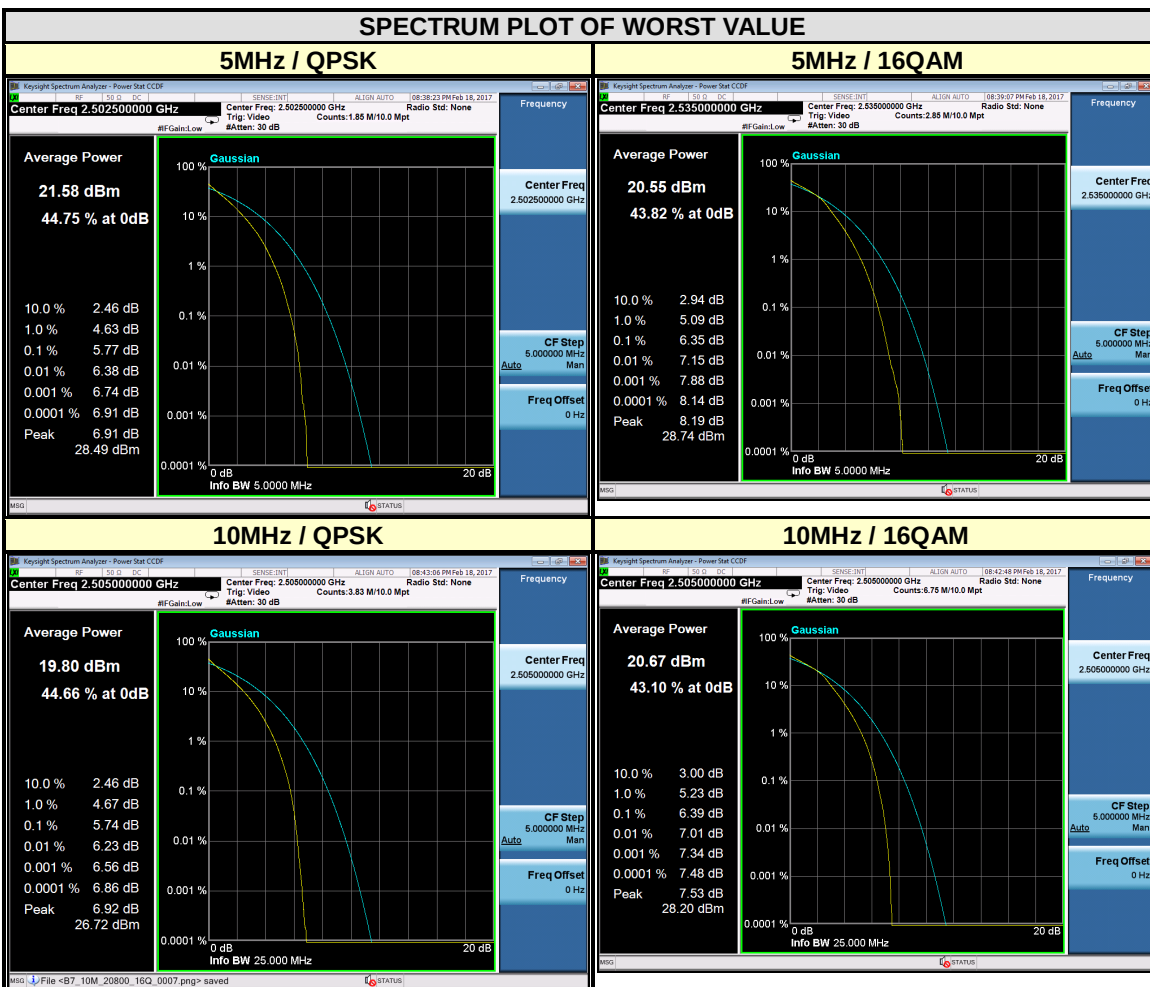
### 4.4.3 TEST PROCEDURES

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%.

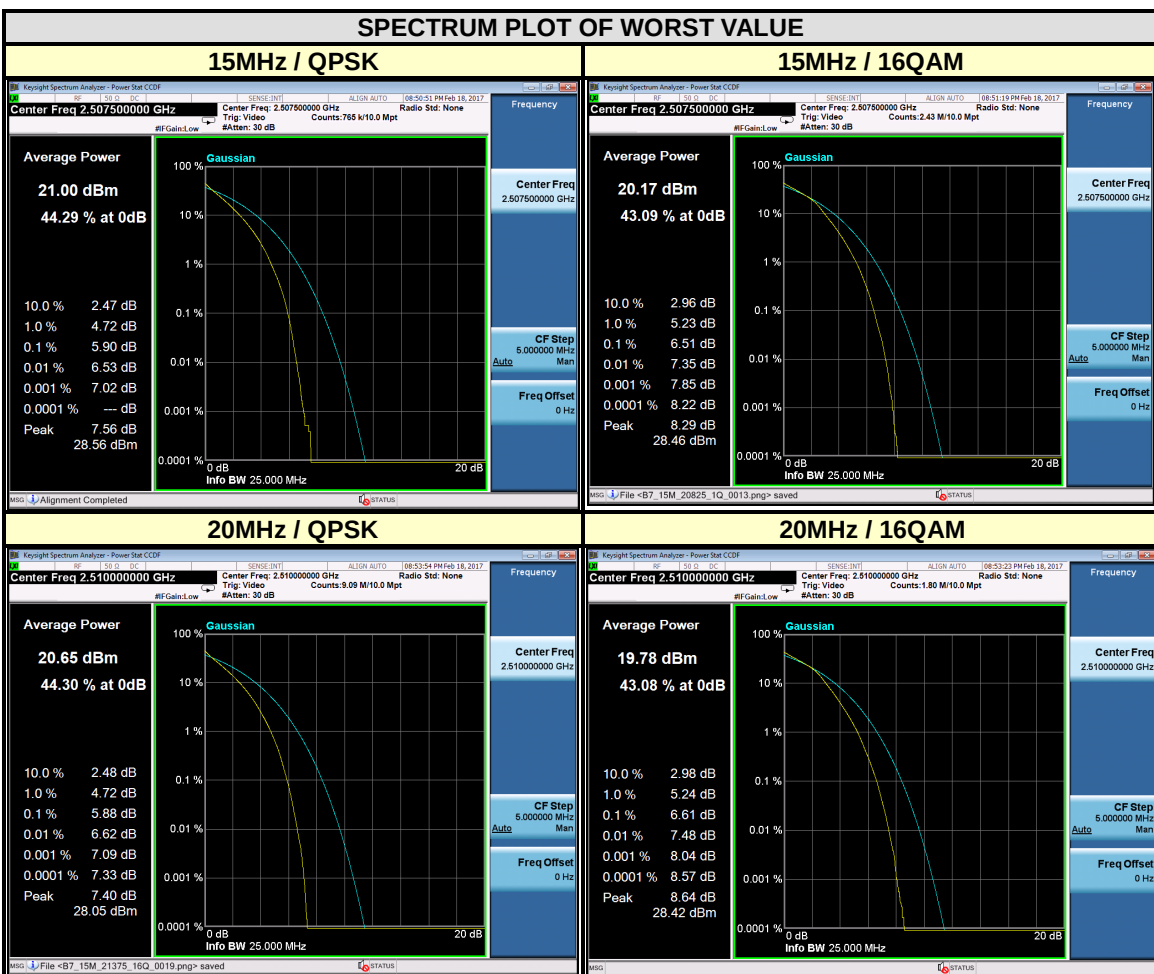
#### 4.4.4 TEST RESULTS

##### LTE BAND 7

| 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 |
| 20775                   | 2502.5          | 5.77                       | 6.34  | 20800                    | 2505            | 5.74                       | 6.39  |
| 21100                   | 2535            | 5.64                       | 6.35  | 21100                    | 2535            | 5.56                       | 6.27  |
| 21425                   | 2567.5          | 5.41                       | 6.09  | 21400                    | 2565            | 5.30                       | 6.04  |



| 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 |
| 20825                    | 2507.5          | 5.90                       | 6.51  | 20850                    | 2510            | 5.88                       | 6.61  |
| 21100                    | 2535            | 5.59                       | 6.29  | 21100                    | 2535            | 5.62                       | 6.35  |
| 21375                    | 2562.5          | 5.45                       | 6.18  | 21350                    | 2560            | 5.57                       | 6.30  |

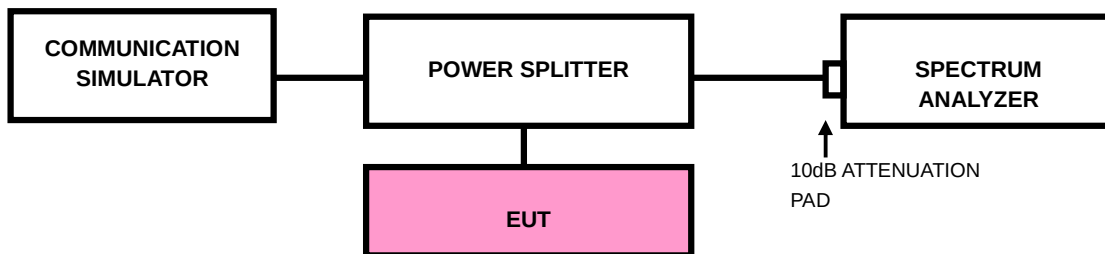


## 4.5 BAND EDGE MEASUREMENT

### 4.5.1 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.

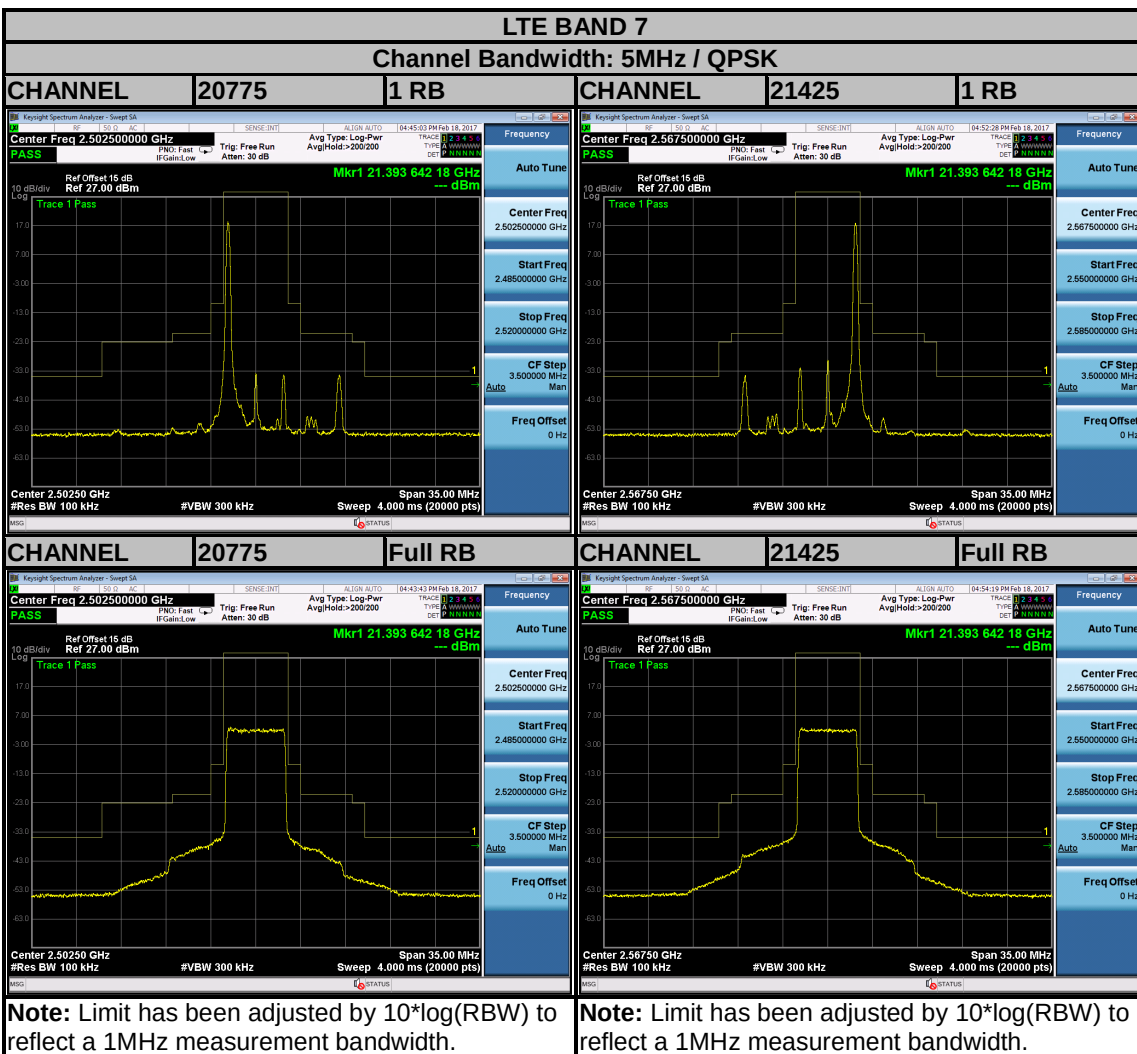
### 4.5.2 TEST SETUP



#### 4.5.3 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.

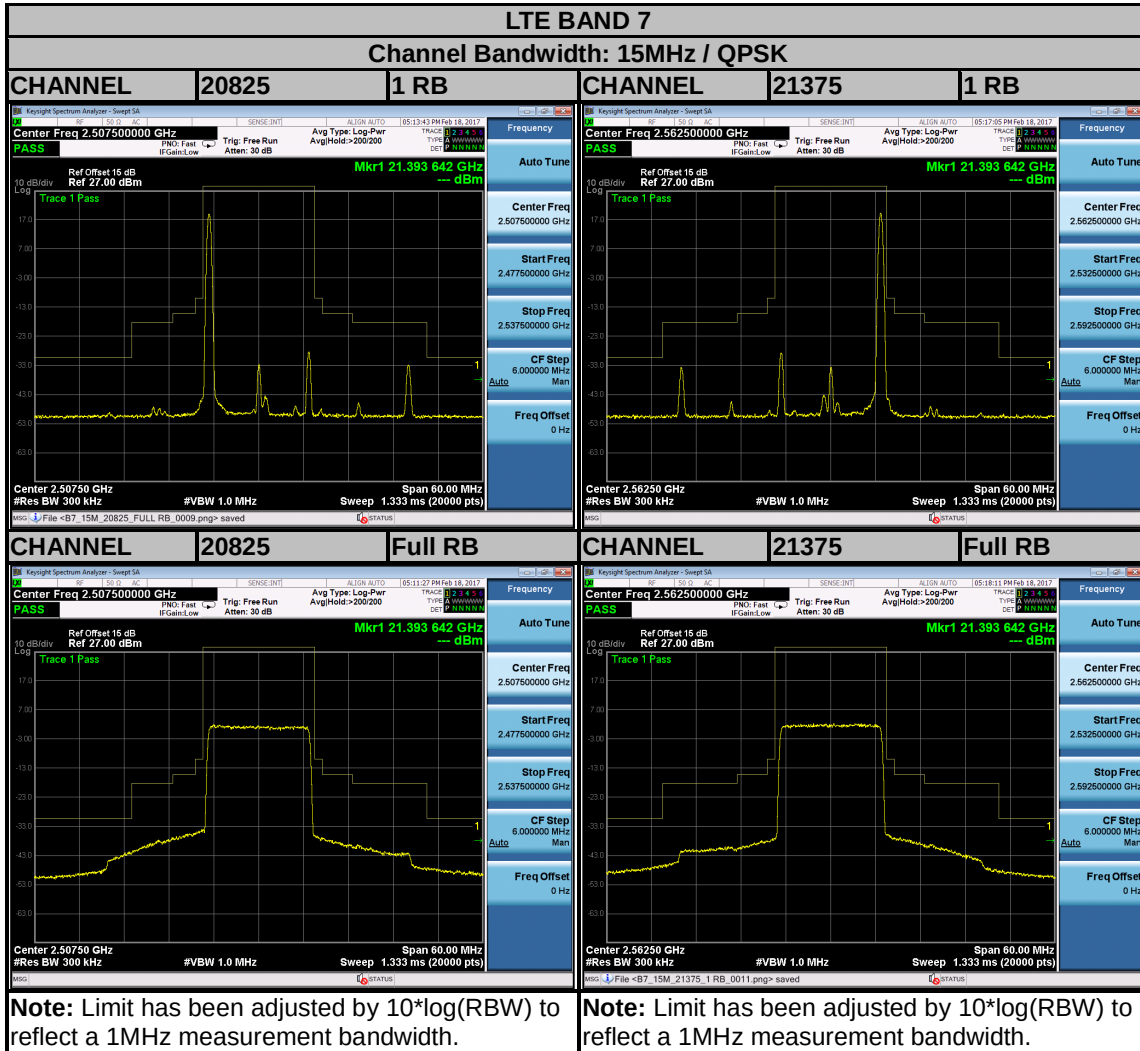
#### 4.5.4 TEST RESULTS





Test Report No.: RF170118W004-6







Test Report No.: RF170118W004-6



## 4.6 CONDUCTED SPURIOUS EMISSIONS

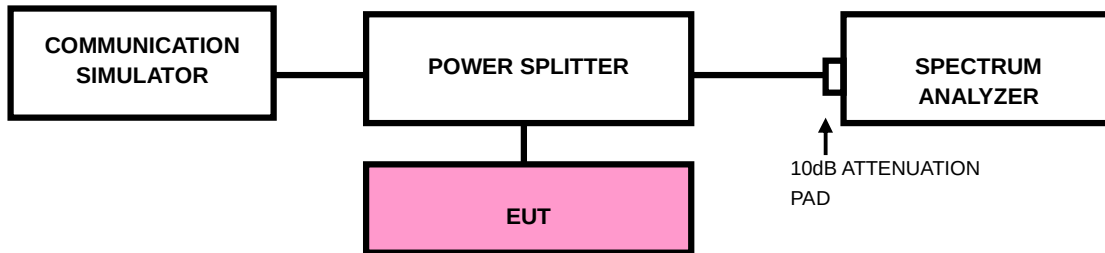
### 4.6.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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.

### 4.6.2 TEST PROCEDURE

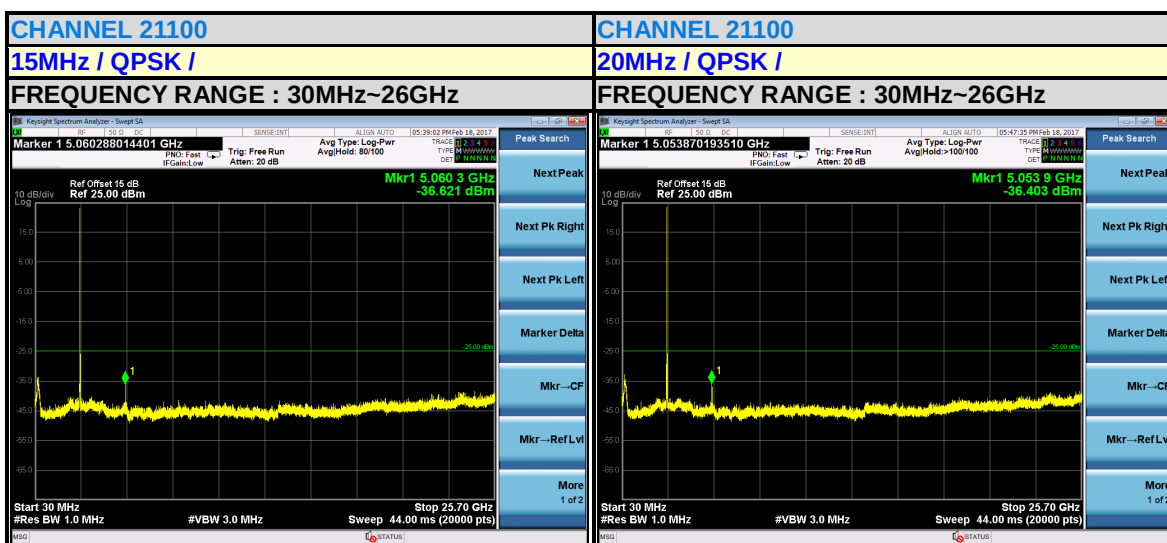
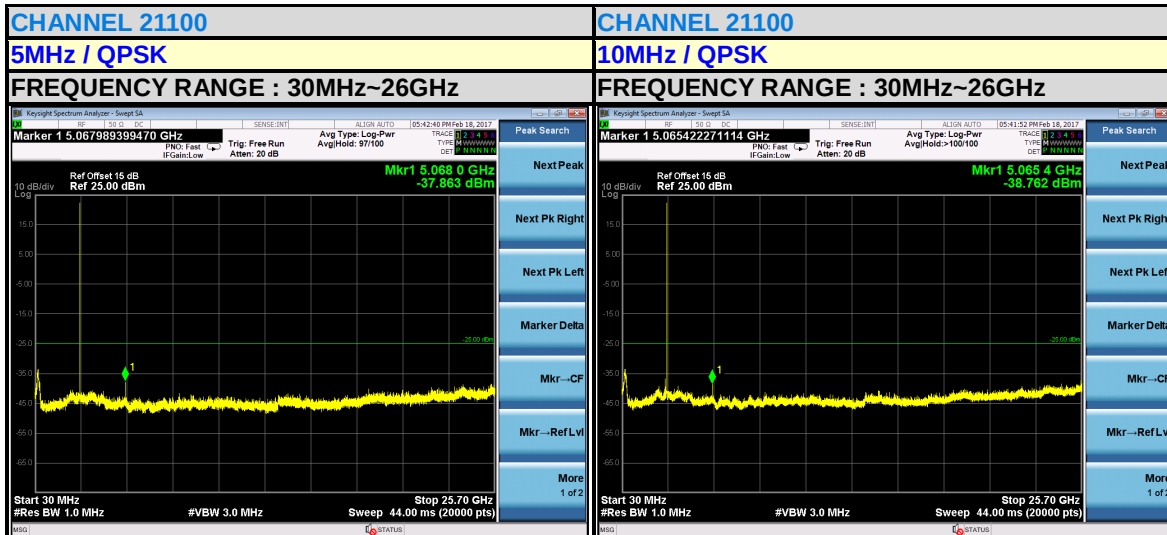
- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30MHz to 26GHz for LTE Band 7. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.

### 4.6.3 TEST SETUP



## 4.6.4 TEST RESULTS

### LTE BAND 7



## 4.7 RADIATED EMISSION MEASUREMENT

### 4.7.1 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.

### 4.7.2 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,  
 $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15\text{dBi}.$

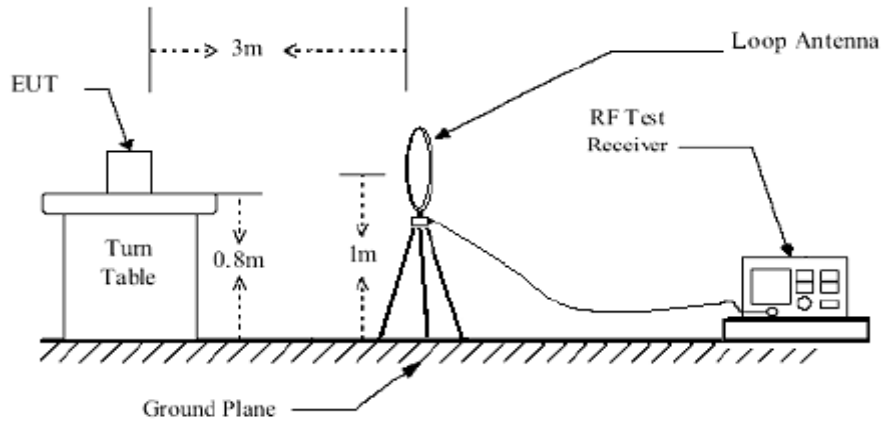
**NOTE:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 4.7.3 DEVIATION FROM TEST STANDARD

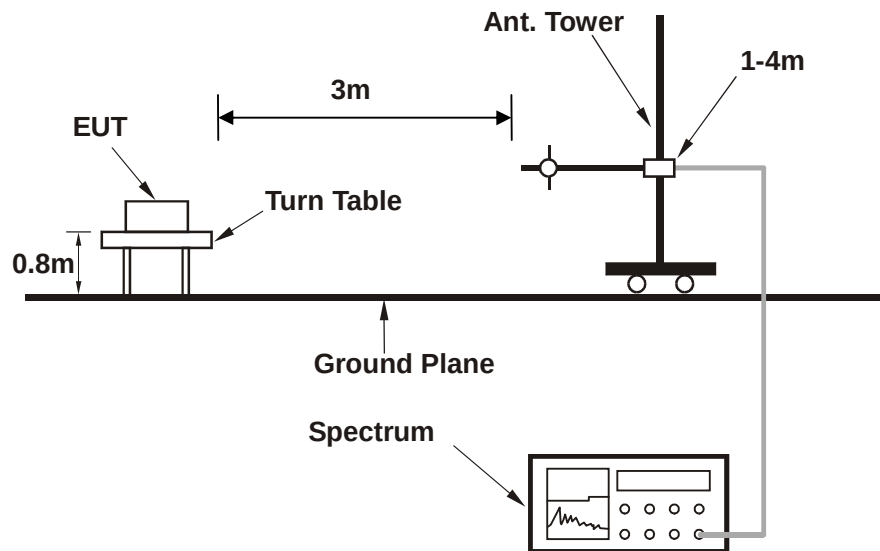
No deviation

#### 4.7.4 TEST SETUP

##### <Below 30MHz>



##### <Above 30MHz>



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

## 4.7.5 TEST RESULTS

### BELOW 1GHz WORST-CASE DATA

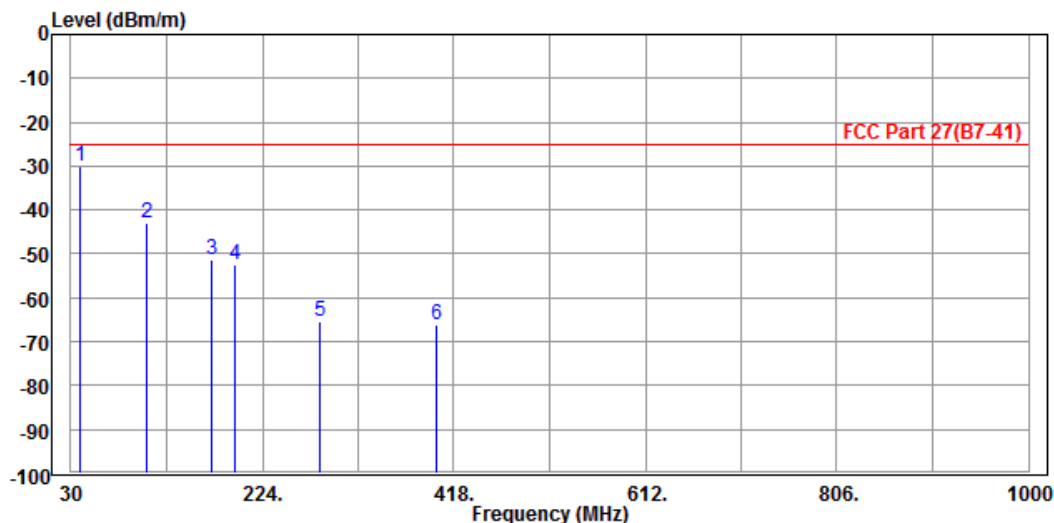
**9 KHz – 30 KHz data:** the amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

**30 MHz – 1GHz data:**

### LTE Band 7:

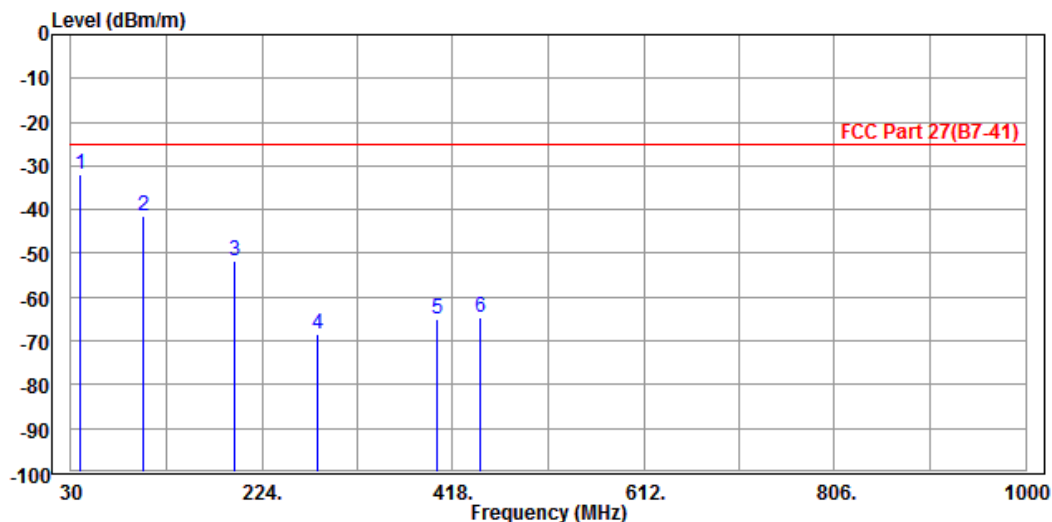
|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 21100 | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|   |    | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|----|---------|--------|------------|------------|------------|--------|--------|------------|
|   |    | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP | 38.730  | -30.21 | -42.37     | -25.00     | -5.21      | 12.16  | Peak   | Horizontal |
| 2 |    | 107.600 | -43.04 | -30.30     | -25.00     | -18.04     | -12.74 | Peak   | Horizontal |
| 3 |    | 172.590 | -51.38 | -33.36     | -25.00     | -26.38     | -18.02 | Peak   | Horizontal |
| 4 |    | 195.870 | -52.44 | -35.10     | -25.00     | -27.44     | -17.34 | Peak   | Horizontal |
| 5 |    | 282.200 | -65.39 | -50.70     | -25.00     | -40.39     | -14.69 | Peak   | Horizontal |
| 6 |    | 400.540 | -65.98 | -55.52     | -25.00     | -40.98     | -10.46 | Peak   | Horizontal |



|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 21100 | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|---------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 PP | 38.730  | -32.04 | -30.75     | -25.00     | -7.04      | -1.29  | Peak   | Vertical  |
| 2    | 103.720 | -41.42 | -30.26     | -25.00     | -16.42     | -11.16 | Peak   | Vertical  |
| 3    | 196.840 | -51.86 | -40.82     | -25.00     | -26.86     | -11.04 | Peak   | Vertical  |
| 4    | 280.260 | -68.29 | -56.91     | -25.00     | -43.29     | -11.38 | Peak   | Vertical  |
| 5    | 401.510 | -65.14 | -54.26     | -25.00     | -40.14     | -10.88 | Peak   | Vertical  |
| 6    | 446.130 | -64.66 | -55.43     | -25.00     | -39.66     | -9.23  | Peak   | Vertical  |





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# ABOVE 1GHz

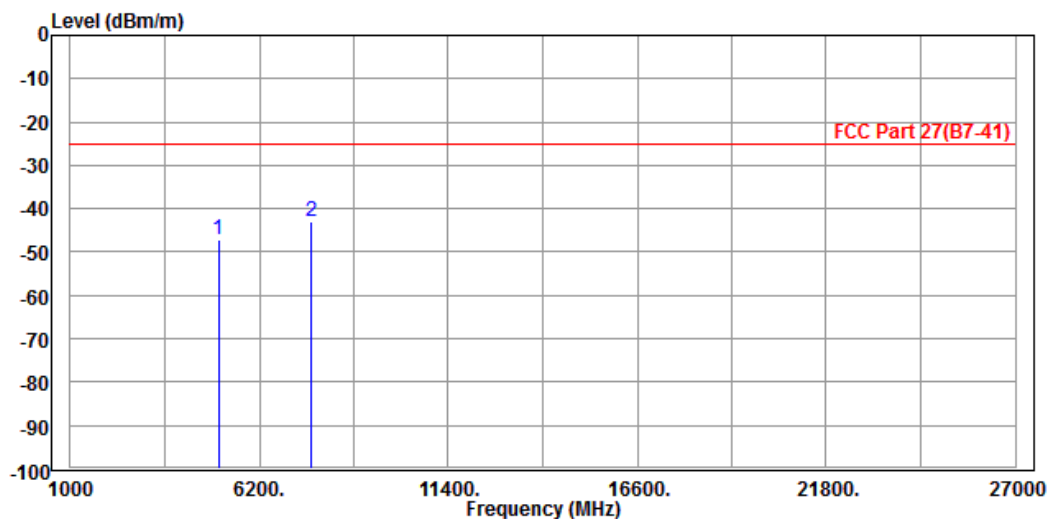
**Note:** For higher frequency, the emission is too low to be detected.

## LTE Band 7

CHANNEL BANDWIDTH: 5MHz / QPSK

|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 5070.000 | -47.04 | -55.50     | -25.00     | -22.04     | 8.46   | Peak   | Horizontal |
| 2 PP | 7605.000 | -42.94 | -56.42     | -25.00     | -17.94     | 13.48  | Peak   | Horizontal |

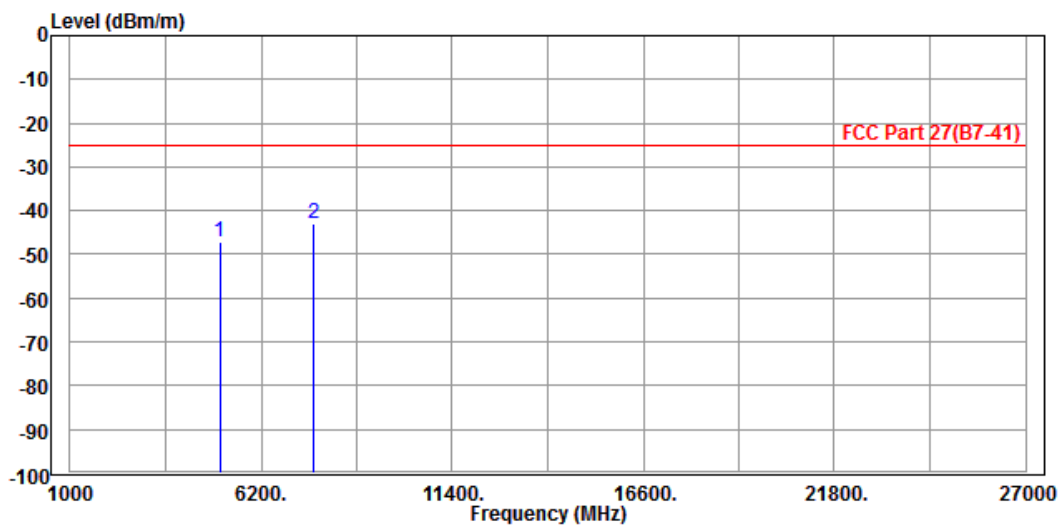




Test Report No.: RF170118W004-6

|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

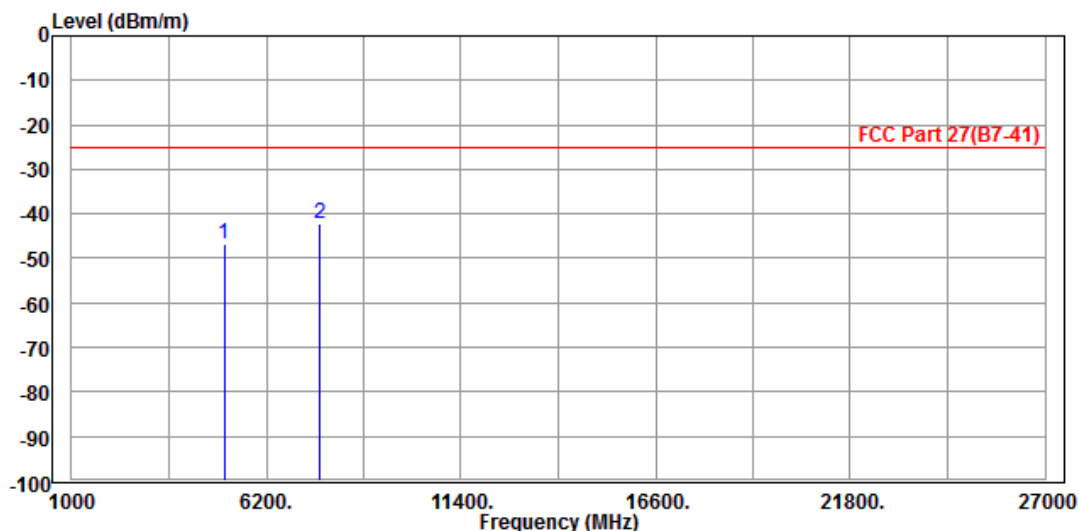
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 5070.000 | -47.24 | -55.23     | -25.00     | -22.24     | 7.99   | Peak   | Vertical  |
| 2 PP | 7605.000 | -42.93 | -55.92     | -25.00     | -17.93     | 12.99  | Peak   | Vertical  |



CHANNEL BANDWIDTH: 10MHz / QPSK

|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 5070.000 | -46.76 | -55.22     | -25.00     | -21.76     | 8.46   | Peak   | Horizontal |
| 2 PP | 7605.000 | -42.32 | -55.80     | -25.00     | -17.32     | 13.48  | Peak   | Horizontal |

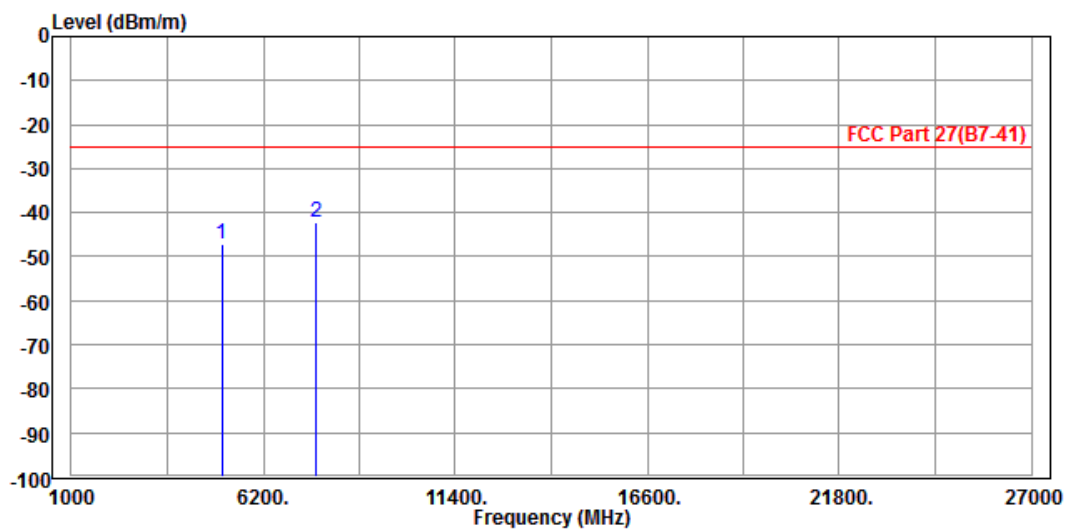




Test Report No.: RF170118W004-6

|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 5070.000 | -47.23 | -55.22     | -25.00     | -22.23     | 7.99   | Peak   | Vertical  |
| 2 PP | 7605.000 | -42.32 | -55.31     | -25.00     | -17.32     | 12.99  | Peak   | Vertical  |



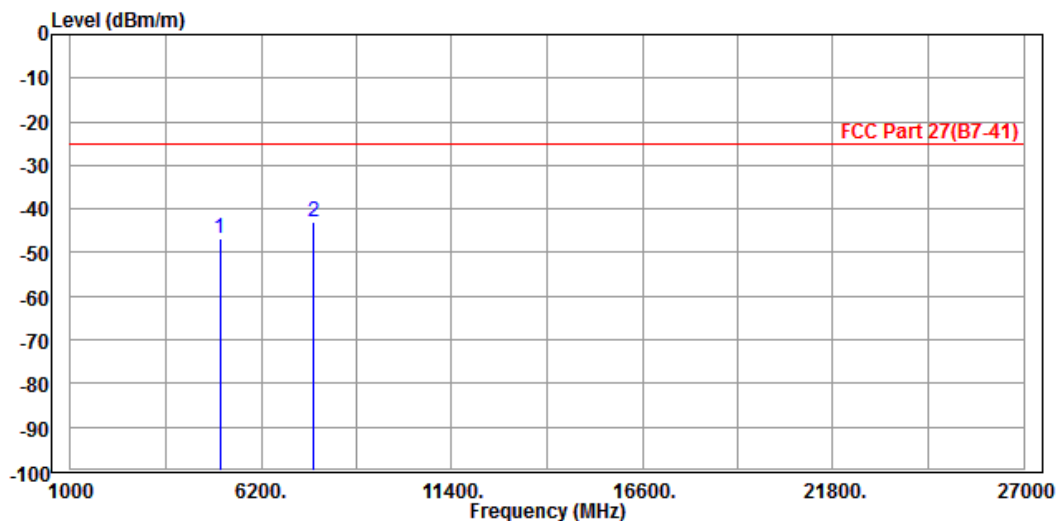


Test Report No.: RF170118W004-6

CHANNEL BANDWIDTH: 15MHz / QPSK

|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 5070.000 | -46.60 | -55.06     | -25.00     | -21.60     | 8.46   | Peak   | Horizontal |
| 2 PP | 7605.000 | -42.85 | -56.33     | -25.00     | -17.85     | 13.48  | Peak   | Horizontal |

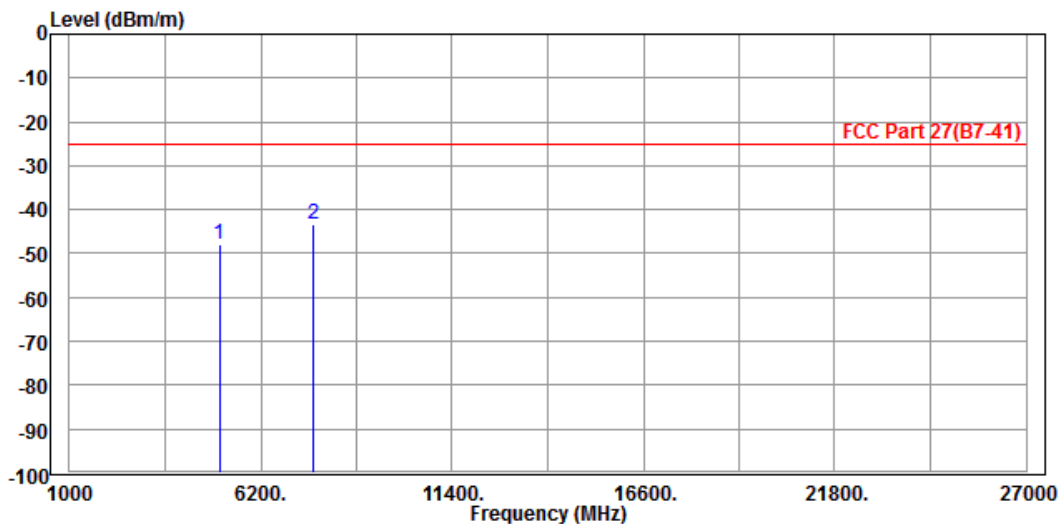




Test Report No.: RF170118W004-6

|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 5070.000 | -47.81 | -55.80     | -25.00     | -22.81     | 7.99   | Peak   | Vertical  |
| 2 PP | 7605.000 | -43.50 | -56.49     | -25.00     | -18.50     | 12.99  | Peak   | Vertical  |



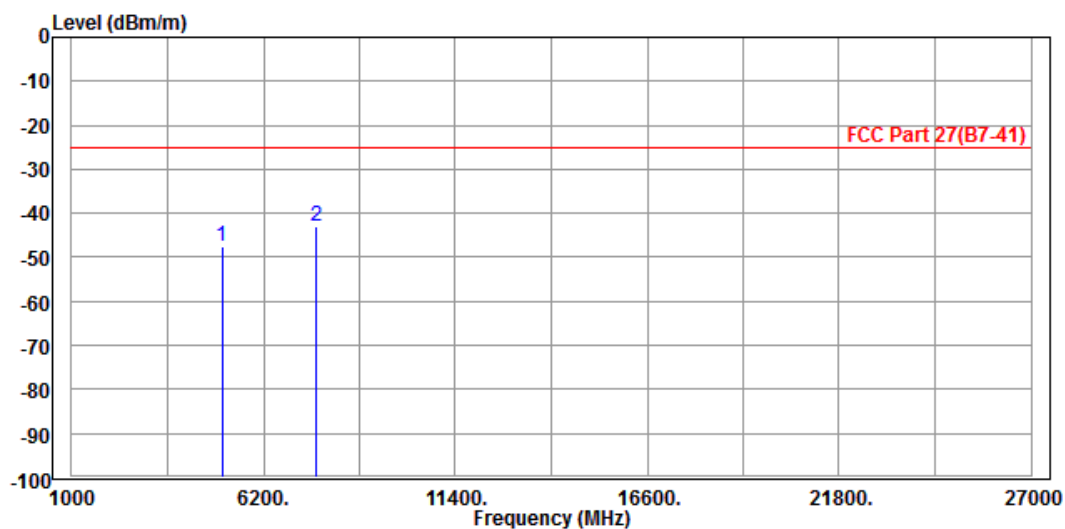


Test Report No.: RF170118W004-6

CHANNEL BANDWIDTH: 20MHz / QPSK

|                                                     |                  |                 |                    |
|-----------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                                | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                           | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 5070.000 | -47.41 | -55.87     | -25.00     | -22.41     | 8.46   | Peak   | Horizontal |
| 2 PP | 7605.000 | -43.04 | -56.52     | -25.00     | -18.04     | 13.48  | Peak   | Horizontal |

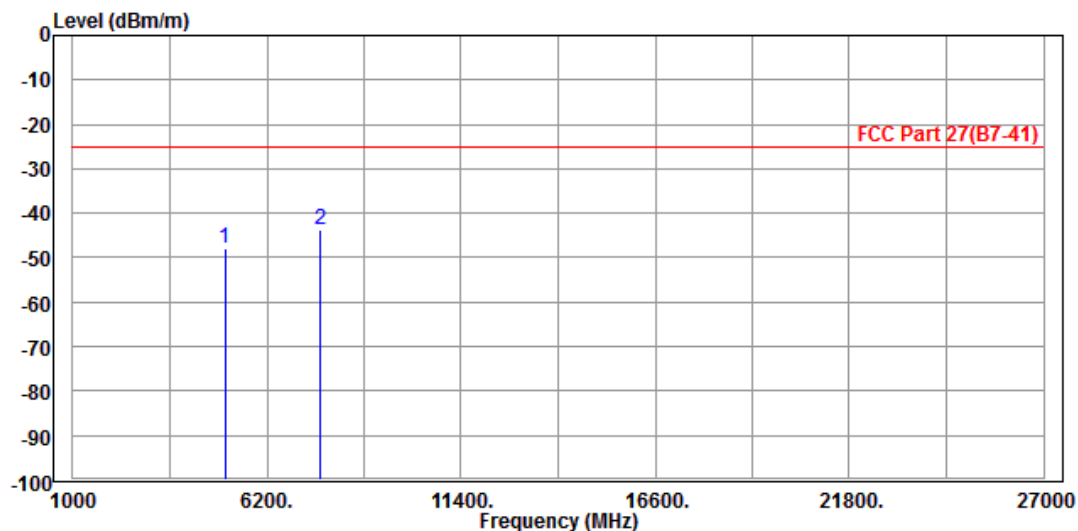




Test Report No.: RF170118W004-6

|                                                   |                  |                 |                    |
|---------------------------------------------------|------------------|-----------------|--------------------|
| MODE                                              | TX channel 21100 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                          | 26deg. C, 56%RH  | INPUT POWER     | DC 5V from adapter |
| TESTED BY                                         | Tony Zou         |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 5070.000 | -48.08 | -56.07     | -25.00     | -23.08     | 7.99   | Peak   | Vertical  |
| 2 PP | 7605.000 | -43.59 | -56.58     | -25.00     | -18.59     | 12.99  | Peak   | Vertical  |





Test Report No.: RF170118W004-6

## 5 INFORMATION ON THE TESTING LABORATORIES

We, Bureau Veritas Shenzhen Co., Ltd. Dongguan Branch, were founded in 2002 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:

**Dongguan EMC/RF Lab:**

Tel: +86-769-85935656

Fax: +86-769-85931080

**Email:** [customerservice.dg@cn.bureauveritas.com](mailto:customerservice.dg@cn.bureauveritas.com)

**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

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



Test Report No.: RF170118W004-6

## 6 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---