

# FCC TEST REPORT (PART 24)

|            |  |
|------------|--|
| Applicant: | Particle Industries, Inc                           |
| Address:   | 126 Post St,4th floor, San Francisco, CA 94108 USA |



|                          |  |
|--------------------------|--|
| Manufacturer or Supplier | Particle Industries, Inc                           |
| Address                  | 126 Post St,4th floor, San Francisco, CA 94108 USA |
| Product                  | E Series LTE                                       |
| Brand Name               | Particle   |
| Model Name               | E402, E404   |
| FCC ID                   | XPY2AGQN4NNN                                       |
| Date of tests            | Oct. 17, 2019 ~ Dec. 05, 2019                      |

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

- FCC PART 24, Subpart E**     **FCC PART 2**  
 **ANSI/TIA/EIA-603-D**         **ANSI/TIA/EIA-603-E**     **ANSI C63.26-2015**

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

**Remark:** This test report is for internal customer use only, not as a final certification test report.

|   |   |
|---|---|
| Prepared by Alex Chen<br>Engineer / Mobile Department                               | Approved by Luke Lu<br>Manager / Mobile Department                                    |
|  |  |
| Date: Dec. 23, 2020   | Date: Dec. 23, 2020   |

This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.



# TABLE OF CONTENTS

**RELEASE CONTROL RECORD ..... 4**

**1 SUMMARY OF TEST RESULTS ..... 5**

1.1 MEASUREMENT UNCERTAINTY ..... 5

1.2 TEST SITE AND INSTRUMENTS ..... 6

**2 GENERAL INFORMATION ..... 7**

2.1 GENERAL DESCRIPTION OF EUT ..... 7

2.2 CONFIGURATION OF SYSTEM UNDER TEST ..... 9

2.3 DESCRIPTION OF SUPPORT UNITS ..... 10

2.4 TEST ITEM AND TEST CONFIGURATION ..... 10

2.5 EUT OPERATING CONDITIONS ..... 13

2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS ..... 13

**3 TEST TYPES AND RESULTS ..... 14**

3.1 OUTPUT POWER MEASUREMENT ..... 14

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT ..... 14

3.1.2 TEST PROCEDURES ..... 14

3.1.3 TEST SETUP ..... 14

3.1.4 TEST RESULTS ..... 15

3.2 FREQUENCY STABILITY MEASUREMENT ..... 19

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT ..... 19

3.2.2 TEST PROCEDURE ..... 19

3.2.3 TEST SETUP ..... 19

3.2.4 TEST RESULTS ..... 20

3.3 OCCUPIED BANDWIDTH MEASUREMENT ..... 26

3.3.1 TEST PROCEDURES ..... 26

3.3.2 TEST SETUP ..... 26

3.3.3 TEST RESULTS ..... 27

3.4 BAND EDGE MEASUREMENT ..... 33

3.4.1 LIMITS OF BAND EDGE MEASUREMENT ..... 33

3.4.2 TEST SETUP ..... 33

3.4.3 TEST PROCEDURES ..... 34

3.4.4 TEST RESULTS ..... 35

3.5 CONDUCTED SPURIOUS EMISSIONS ..... 41

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT ..... 41

3.5.2 TEST PROCEDURE ..... 41

3.5.3 TEST SETUP ..... 41

3.5.4 TEST RESULTS ..... 42

3.6 RADIATED EMISSION MEASUREMENT ..... 48

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT ..... 48

3.6.2 TEST PROCEDURES ..... 48

3.6.3 DEVIATION FROM TEST STANDARD ..... 48

3.6.4 TEST SETUP ..... 49

3.6.5 TEST RESULTS ..... 50

3.7 PEAK TO AVERAGE RATIO ..... 68

3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT ..... 68

3.7.2 TEST SETUP ..... 68

3.7.3 TEST PROCEDURES ..... 68

3.7.4 TEST RESULTS ..... 69



Test Report No.: RFP20120028-2

**4 INFORMATION ON THE TESTING LABORATORIES..... 75**

**5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB ..... 76**



**BUREAU  
VERITAS**

Test Report No.: RFP20120028-2

## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE   | DATE ISSUED   |
|----------------|---|---------------|
| RF191017W005-2 | Original release, This test report is for internal customer use only, not as a final certification test report.                         | Dec. 06, 2019 |
| RFP20120028-2  | Based on the original product add one model name. In this report, All test data is copied from the original test report RF191017W005-2. | Dec. 23, 2020 |



# 1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| APPLIED STANDARD: FCC Part 24 & Part 2 |                                     |            |
|--|-------------------------------------|------------|
| STANDARD SECTION                       | TEST TYPE                           | RESULT     |
| 2.1046<br>24.232                       | Equivalent Isotropic Radiated Power | Compliance |
| 2.1055<br>24.235                       | Frequency Stability                 | Compliance |
| 2.1049<br>24.238(b)                    | Occupied Bandwidth                  | Compliance |
| 24.232(d)                              | Peak to average ratio               | Compliance |
| 24.238(b)                              | Band Edge Measurements              | Compliance |
| 2.1051<br>24.238                       | Conducted Spurious Emissions        | Compliance |
| 2.1053<br>24.238                       | Radiated Spurious Emissions         | Compliance |

## 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  | UNCERTAINTY |
|--|-------------|
| Frequency Stability                                | ± 76.97Hz   |
| Radiated emissions & Radiated Power (30MHz~1GMHz)  | ±4.98dB     |
| Radiated emissions & Radiated Power (1GMHz ~6GMHz) | ±4.70dB     |
| Radiated emissions (6GMHz ~18GMHz)                 | ±4.60dB     |
| Radiated emissions (18GMHz ~40GMHz)                | ±4.12dB     |
| Conducted emissions                                | ±4.01dB     |
| Occupied Channel Bandwidth                         | ±43.58KHz   |
| Conducted Output power                             | ±2.06dB     |
| Band Edge Measurements                             | ±4.70dB     |
| Peak to average ratio                              | ±0.76dB     |

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

| Equipment                             | Manufacturer | Model No.                   | Serial No.                  | Last Cal.   | Next Cal.   |
|---------------------------------------|--------------|-----------------------------|-----------------------------|-------------|-------------|
| MXE EMI Receiver                      | KEYSIGHT     | N9038A-544                  | MY54450026                  | Feb. 26,19  | Feb. 25,20  |
| EXA Signal Analyzer                   | KEYSIGHT     | N9010A-526                  | MY54510322                  | Feb. 26,19  | Feb. 25,20  |
| Bilog Antenna                         | ETS-LINDGREN | 3143B                       | 00161965                    | Feb. 26,19  | Feb. 25,20  |
| Horn Antenna (1GHz-18GHz)             | ETS-LINDGREN | 3117                        | 00168692                    | Nov. 24, 19 | Nov. 23, 20 |
| Horn Antenna (18GHz-40GHz)            | N/A          | QWH-SL-18-40-K-SG/QMS-00361 | 15433                       | Nov. 24, 19 | Nov. 23, 20 |
| Radio Communication Analyzer          | ANRITSU      | MT8820C                     | 6201465426                  | Feb. 26,19  | Feb. 25,20  |
| Signal Pre-Amplifier                  | EMSI         | EMC 9135                    | 980249                      | Jun. 24,19  | Jun. 23,20  |
| Signal Pre-Amplifier                  | EMSI         | EMC 012645B                 | 980257                      | Jun. 24,19  | Jun. 23,20  |
| Signal Pre-Amplifier                  | EMSI         | EMC 184045B                 | 980259                      | Jun. 24,19  | Jun. 23,20  |
| 3m Semi-anechoic Chamber              | ETS-LINDGREN | 9m*6m*6m                    | Euroshieldpn-CT0001143-1216 | Feb. 26,19  | Feb. 25,20  |
| 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                        | Jun. 24,19  | Jun. 23,20  |
| Power Meter                           | Anritsu      | ML2495A                     | 1506002                     | Feb. 26,19  | Feb. 25,20  |
| Power Sensor                          | Anritsu      | MA2411B                     | 1339352                     | Feb. 26,19  | Feb. 25,20  |
| Humid & Temp Programmable Tester      | Juyi         | ITH-120-45-CP-AR            | IAA1504-001                 | Jun. 24,19  | Jun. 23,20  |
| MXG Analog Microwave Signal Generator | KEYSIGHT     | N5183A                      | MY50143024                  | Feb. 26,19  | Feb. 25,20  |
| Power Divider                         | MCLI/USA     | PS2-15                      | 24880                       | Jul. 09,19  | Jul. 08,20  |

- 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 525120; The Designation No. is CN1171.



## 2 GENERAL INFORMATION

### 2.1 GENERAL DESCRIPTION OF EUT

|                            |  |                       |
|----------------------------|--|-----------------------|
| <b>PRODUCT</b>             | E Series LTE   |                       |
| <b>BRAND NAME</b>          | Particle   |                       |
| <b>MODEL NAME</b>          | E402, E404   |                       |
| <b>POWER SUPPLY</b>        | DC 5V from Host Uint or DC 3.7V from Li-ion battery<br>Vnor=3.7V, Vmin=3.145V, Vmax=4.255V |                       |
| <b>MODULATION TYPE</b>     | LTE: QPSK  |                       |
| <b>FREQUENCY RANGE</b>     | LTE Band 2<br>Channel Bandwidth: 1.4MHz  | 1850.7MHz ~ 1909.3MHz |
|                            | LTE Band 2<br>Channel Bandwidth: 3MHz  | 1851.5MHz ~ 1908.5MHz |
|                            | LTE Band 2<br>Channel Bandwidth: 5MHz  | 1852.5MHz ~ 1907.5MHz |
|                            | LTE Band 2<br>Channel Bandwidth: 10MHz   | 1855.0MHz ~ 1905.0MHz |
|                            | LTE Band 2<br>Channel Bandwidth: 15MHz   | 1857.5MHz ~ 1902.5MHz |
|                            | LTE Band 2<br>Channel Bandwidth: 20MHz   | 1860.0MHz ~ 1900.0MHz |
| <b>MAX. EIRP POWER</b>     | LTE Band 2<br>Channel Bandwidth: 1.4MHz  | 426mW                 |
|                            | LTE Band 2<br>Channel Bandwidth: 3MHz  | 429mW                 |
|                            | LTE Band 2<br>Channel Bandwidth: 5MHz  | 432mW                 |
|                            | LTE Band 2<br>Channel Bandwidth: 10MHz   | 434mW                 |
|                            | LTE Band 2<br>Channel Bandwidth: 15MHz   | 420mW                 |
|                            | LTE Band 2<br>Channel Bandwidth: 20MHz   | 442mW                 |
| <b>EMISSION DESIGNATOR</b> | LTE Band 2<br>Channel Bandwidth: 1.4MHz  | QPSK: 1M10G7D         |
|                            | LTE Band 2<br>Channel Bandwidth: 3MHz  | QPSK: 1M27G7D         |
|                            | LTE Band 2<br>Channel Bandwidth: 5MHz  | QPSK: 1M09G7D         |
|                            | LTE Band 2<br>Channel Bandwidth: 10MHz   | QPSK: 1M10G7D         |
|                            | LTE Band 2<br>Channel Bandwidth: 15MHz   | QPSK: 1M10G7D         |
|                            | LTE Band 2<br>Channel Bandwidth: 20MHz   | QPSK: 1M10G7D         |



|                     |  |
|---------------------|--|
| <b>ANTENNA TYPE</b> | Fixed External Antenna with 3.77dBi gain |
| <b>HW VERSION</b>   | V1.00                                    |
| <b>SW VERSION</b>   | V1.4.0                                   |
| <b>I/O PORTS</b>    | Refer to user's manual                   |

**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. The schematic and PCB of the E404 is completely the same with E402, and these two models of HW&SW is the same. Because changing the MVNO's E-SIM card (embedded SIM card) provider from Kore to Twilio, so we plan to use different model name to sell it in market. The differences are as follows:E402 uses eSIM of Kore.E404 uses eSIM of Twilio.
3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
4. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

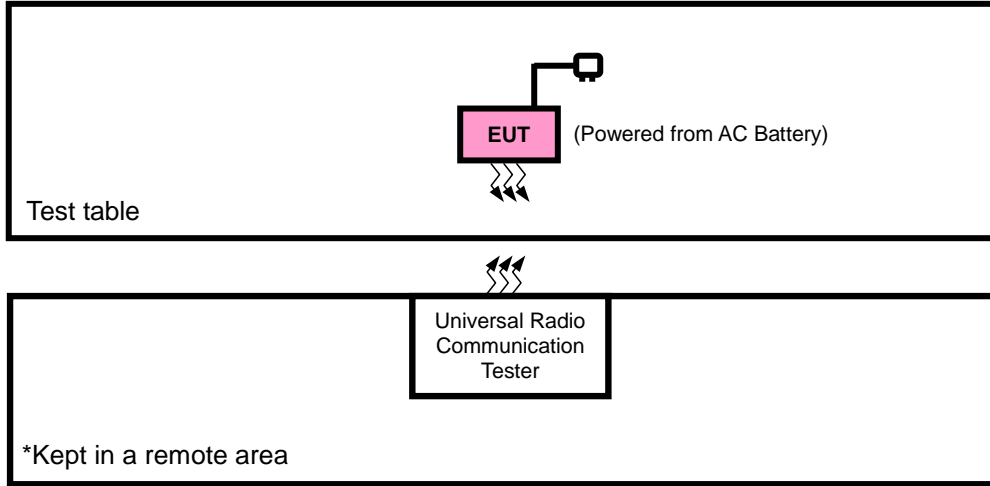
| <b>MODULATION MODE</b> | <b>TX FUNCTION</b> |
|------------------------|--------------------|
| <b>LTE</b>             | 1TX/1RX            |





## 2.2 CONFIGURATION OF SYSTEM UNDER TEST

### FOR RADIATION EMISSION 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   | Battery   | N/A      | N/A       | N/A        | N/A    |
| 2   | DC source | LONG WEI | PS-6403D  | 010934269  | N/A    |

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

### 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 in radiated emission was found when positioned on X-plane for LTE. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | DESCRIPTION                    |
|--------------------|--------------------------------|
| -                  | EUT + Battery with or LTE link |



**LTE BAND 2**

| TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION | MODE               |
|-----------------------|-------------------|---------------------|-------------------|------------|--------------------|
| EIRP                  | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK       | 1 RB / 0 RB Offset |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK       | 1 RB / 0 RB Offset |
| FREQUENCY STABILITY   | 18607 to 19193    | 18607, 19193        | 1.4MHz            | QPSK       | 1 RB / 0 RB Offset |
|                       | 18615 to 19185    | 18615, 19185        | 3MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18625 to 19175    | 18625, 19175        | 5MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18650 to 19150    | 18650, 19150        | 10MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18675 to 19125    | 18675, 19125        | 15MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18700 to 19100    | 18700, 19100        | 20MHz             | QPSK       | 1 RB / 0 RB Offset |
| OCCUPIED BANDWIDTH    | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK       | 6 RB / 0 RB Offset |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK       | 6 RB / 0 RB Offset |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK       | 6 RB / 0 RB Offset |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK       | 6 RB / 0 RB Offset |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK       | 6 RB / 0 RB Offset |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK       | 6 RB / 0 RB Offset |
| PEAK TO AVERAGE RATIO | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK       | 1 RB / 0 RB Offset |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK       | 1 RB / 0 RB Offset |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK       | 1 RB / 0 RB Offset |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK       | 1 RB / 0 RB Offset |



|                      |                |                     |        |                     |                     |
|----------------------|----------------|---------------------|--------|---------------------|---------------------|
| BAND EDGE            | 18607 to 19193 | 18607               | 1.4MHz | QPSK                | 1 RB / 0 RB Offset  |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      |                | 19193               | 1.4MHz | QPSK                | 1 RB / 5 RB Offset  |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      | 18615 to 19185 | 18615               | 3MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      |                | 19185               | 3MHz   | QPSK                | 1 RB / 14 RB Offset |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      | 18625 to 19175 | 18625               | 5MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      |                | 19175               | 5MHz   | QPSK                | 1 RB / 24 RB Offset |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      | 18650 to 19150 | 18650               | 10MHz  | QPSK                | 1 RB / 0 RB Offset  |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
|                      |                | 19150               | 10MHz  | QPSK                | 1 RB / 49 RB Offset |
|                      |                |                     |        |                     | 6 RB / 0 RB Offset  |
| 18675 to 19125       | 18675          | 15MHz               | QPSK   | 1 RB / 0 RB Offset  |                     |
|                      |                |                     |        | 6 RB / 0 RB Offset  |                     |
|                      | 19125          | 15MHz               | QPSK   | 1 RB / 74 RB Offset |                     |
|                      |                |                     |        | 6 RB / 0 RB Offset  |                     |
| 18700 to 19100       | 18700          | 20MHz               | QPSK   | 1 RB / 0 RB Offset  |                     |
|                      |                |                     |        | 6 RB / 0 RB Offset  |                     |
|                      | 19100          | 20MHz               | QPSK   | 1 RB / 99 RB Offset |                     |
|                      |                |                     |        | 6 RB / 0 RB Offset  |                     |
| CONDCUDETED EMISSION | 18607 to 19193 | 18607, 18900, 19193 | 1.4MHz | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18615 to 19185 | 18615, 18900, 19185 | 3MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18625 to 19175 | 18625, 18900, 19175 | 5MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18650 to 19150 | 18650, 18900, 19150 | 10MHz  | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18675 to 19125 | 18675, 18900, 19125 | 15MHz  | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18700 to 19100 | 18700, 18900, 19100 | 20MHz  | QPSK                | 1 RB / 0 RB Offset  |
| RADIATED EMISSION    | 18607 to 19193 | 18607, 18900, 19193 | 1.4MHz | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18615 to 19185 | 18900               | 3MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18625 to 19175 | 18900               | 5MHz   | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18650 to 19150 | 18900               | 10MHz  | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18675 to 19125 | 18900               | 15MHz  | QPSK                | 1 RB / 0 RB Offset  |
|                      | 18700 to 19100 | 18900               | 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 |
|-----------------------|--------------------------|----------------------------------|-----------|
| ERP                   | 23deg. C, 70%RH          | DC 3.7V by battery               | Jacky Liu |
| FREQUENCY STABILITY   | 23deg. C, 70%RH          | DC 3.7V/3.145/4.255 by DC source | Big Wang  |
| OCCUPIED BANDWIDTH    | 23deg. C, 70%RH          | DC 3.7V by battery               | Big Wang  |
| BAND EDGE             | 23deg. C, 70%RH          | DC 3.7V by battery               | Big Wang  |
| CONDCUDED EMISSION    | 23deg. C, 70%RH          | DC 3.7V by battery               | Big Wang  |
| PEAK TO AVERAGE RATIO | 23deg. C, 70%RH          | DC 3.7V by battery               | Big Wang  |
| RADIATED EMISSION     | 23deg. C, 70%RH          | DC 3.7V by battery               | Jacky Liu |

**2.5 EUT OPERATING CONDITIONS**

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

**2.6 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 24**

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

**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

Mobile and portable stations are limited to 2 watts EIRP.

##### 3.1.2 TEST PROCEDURES

###### EIRP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$ERP \text{ or } EIRP = P_{Meas} + G_T - L_C$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively

(expressed in the same units as  $P_{Meas}$ , typically dBW or dBm);

$P_{Meas}$  = measured transmitter output power or PSD, in dBm or dBW;

$G_T$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

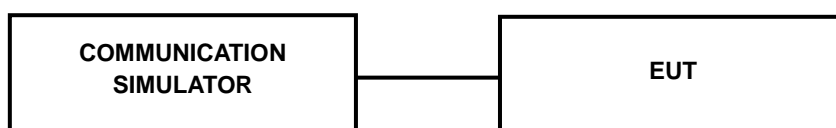
$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

###### CONDUCTED POWER MEASUREMENT:

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

##### 3.1.3 TEST SETUP

###### CONDUCTED POWER MEASUREMENT:





### 3.1.4 TEST RESULTS

#### CONDUCTED OUTPUT POWER (dBm)

##### LTE Band 2

| BW    | Modulation | RB Size | RB Offset | Low CH<br>18607         | Mid CH<br>18900       | High CH<br>19193        | 3GPP<br>MPR<br>(dB) |
|-------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
|       |            |         |           | Frequency<br>1850.7 MHz | Frequency<br>1880 MHz | Frequency<br>1909.3 MHz |                     |
| 2/1.4 | QPSK       | 1       | 0         | 22.30                   | 22.39                 | 22.45                   | 0                   |
|       |            | 1       | 5         | 22.32                   | 22.27                 | 22.47                   | 0                   |
|       |            | 3       | 0         | 22.27                   | 22.24                 | 22.37                   | 0                   |
|       |            | 3       | 3         | 22.29                   | 22.38                 | 22.44                   | 0                   |
|       |            | 6       | 0         | 22.31                   | 22.26                 | 22.46                   | 0                   |

| BW  | Modulation | RB Size | RB Offset | Low CH<br>18615         | Mid CH<br>18900       | High CH<br>19185        | 3GPP<br>MPR<br>(dB) |
|-----|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
|     |            |         |           | Frequency<br>1851.5 MHz | Frequency<br>1880 MHz | Frequency<br>1908.5 MHz |                     |
| 2/3 | QPSK       | 1       | 0         | 22.33                   | 22.42                 | 22.48                   | 0                   |
|     |            | 1       | 5         | 22.35                   | 22.30                 | 22.50                   | 0                   |
|     |            | 3       | 0         | 22.30                   | 22.27                 | 22.40                   | 0                   |
|     |            | 3       | 3         | 22.23                   | 22.15                 | 22.34                   | 1                   |
|     |            | 6       | 0         | 22.31                   | 22.32                 | 22.43                   | 1                   |

| BW  | Modulation | RB Size | RB Offset | Low CH<br>18625         | Mid CH<br>18900       | High CH<br>19175        | 3GPP<br>MPR<br>(dB) |
|-----|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
|     |            |         |           | Frequency<br>1852.5 MHz | Frequency<br>1880 MHz | Frequency<br>1907.5 MHz |                     |
| 2/5 | QPSK       | 1       | 0         | 22.36                   | 22.45                 | 22.51                   | 0                   |
|     |            | 1       | 5         | 22.38                   | 22.33                 | 22.53                   | 0                   |
|     |            | 3       | 0         | 22.33                   | 22.30                 | 22.43                   | 0                   |
|     |            | 3       | 3         | 22.26                   | 22.18                 | 22.37                   | 1                   |
|     |            | 6       | 0         | 22.34                   | 22.35                 | 22.46                   | 1                   |

| BW   | Modulation | RB Size | RB Offset | Low CH<br>18650       | Mid CH<br>18900       | High CH<br>19150      | 3GPP<br>MPR<br>(dB) |
|------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|---------------------|
|      |            |         |           | Frequency<br>1855 MHz | Frequency<br>1880 MHz | Frequency<br>1905 MHz |                     |
| 2/10 | QPSK       | 1       | 0         | 22.38                 | 22.47                 | 22.53                 | 0                   |
|      |            | 1       | 5         | 22.40                 | 22.35                 | 22.55                 | 0                   |
|      |            | 3       | 0         | 22.35                 | 22.32                 | 22.45                 | 0                   |
|      |            | 3       | 3         | 22.28                 | 22.20                 | 22.39                 | 1                   |
|      |            | 6       | 0         | 22.36                 | 22.37                 | 22.48                 | 1                   |



| BW   | Modulation | RB Size | RB Offset | Low CH<br>18675         | Mid CH<br>18900       | High CH<br>19125        | 3GPP<br>MPR<br>(dB) |
|------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|---------------------|
|      |            |         |           | Frequency<br>1857.5 MHz | Frequency<br>1880 MHz | Frequency<br>1902.5 MHz |                     |
| 2/15 | QPSK       | 1       | 0         | 22.41                   | 22.50                 | 22.56                   | 0                   |
|      |            | 1       | 5         | 22.43                   | 22.38                 | 22.58                   | 0                   |
|      |            | 3       | 0         | 22.38                   | 22.35                 | 22.48                   | 0                   |
|      |            | 3       | 3         | 22.31                   | 22.23                 | 22.42                   | 1                   |
|      |            | 6       | 0         | 22.39                   | 22.40                 | 22.51                   | 1                   |

| BW   | Modulation | RB Size | RB Offset | Low CH<br>18700       | Mid CH<br>18900       | High CH<br>19100      | 3GPP<br>MPR<br>(dB) |
|------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|---------------------|
|      |            |         |           | Frequency<br>1860 MHz | Frequency<br>1880 MHz | Frequency<br>1900 MHz |                     |
| 2/20 | QPSK       | 1       | 0         | 22.46                 | 22.55                 | 22.61                 | 0                   |
|      |            | 1       | 5         | 22.48                 | 22.43                 | <b>22.63</b>          | 0                   |
|      |            | 3       | 0         | 22.43                 | 22.40                 | 22.53                 | 0                   |
|      |            | 3       | 3         | 22.36                 | 22.28                 | 22.47                 | 1                   |
|      |            | 6       | 0         | 22.44                 | 22.45                 | 22.56                 | 1                   |





**EIRP POWER (dBm)**

**LTE BAND 2**

**CHANNEL BANDWIDTH: 1.4MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)    | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|--------------|-----------|
| 18607   | 1850.7          | 22.35                 | 3.77                                | 26.12      | 409.26       | 2         |
| 18900   | 1880.0          | 22.34                 | 3.77                                | 26.11      | 408.32       | 2         |
| 19193   | 1908.3          | 22.52                 | 3.77                                | 26.29      | <b>425.6</b> | 2         |

**CHANNEL BANDWIDTH: 3MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 18615   | 1851.5          | 22.38                 | 3.77                                | 26.15      | 412.1         | 2         |
| 18900   | 1880.0          | 22.38                 | 3.77                                | 26.15      | 412.1         | 2         |
| 19185   | 1908.5          | 22.55                 | 3.77                                | 26.32      | <b>428.55</b> | 2         |

**CHANNEL BANDWIDTH: 5MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 18625   | 1852.5          | 22.40                 | 3.77                                | 26.17      | 414           | 2         |
| 18900   | 1880.0          | 22.41                 | 3.77                                | 26.18      | 414.95        | 2         |
| 19175   | 1907.5          | 22.58                 | 3.77                                | 26.35      | <b>431.52</b> | 2         |

**CHANNEL BANDWIDTH: 10MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 18650   | 1855.0          | 22.43                 | 3.77                                | 26.20      | 416.87        | 2         |
| 18900   | 1880.0          | 22.42                 | 3.77                                | 26.19      | 415.91        | 2         |
| 19150   | 1905.0          | 22.60                 | 3.77                                | 26.37      | <b>433.51</b> | 2         |



**CHANNEL BANDWIDTH: 15MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 18675   | 1857.5          | 22.46                 | 3.77                                | 26.23      | <b>419.76</b> | 2         |
| 18900   | 1880.0          | 22.46                 | 3.77                                | 26.23      | 419.76        | 2         |
| 19125   | 1902.5          | 22.43                 | 3.77                                | 26.20      | 416.87        | 2         |

**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>c</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 18675   | 1857.5          | 22.51                 | 3.77                                | 26.28      | 424.62        | 2         |
| 18900   | 1880.0          | 22.51                 | 3.77                                | 26.28      | 424.62        | 2         |
| 19125   | 1902.5          | 22.68                 | 3.77                                | 26.45      | <b>441.57</b> | 2         |



### 3.2 FREQUENCY STABILITY MEASUREMENT

#### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

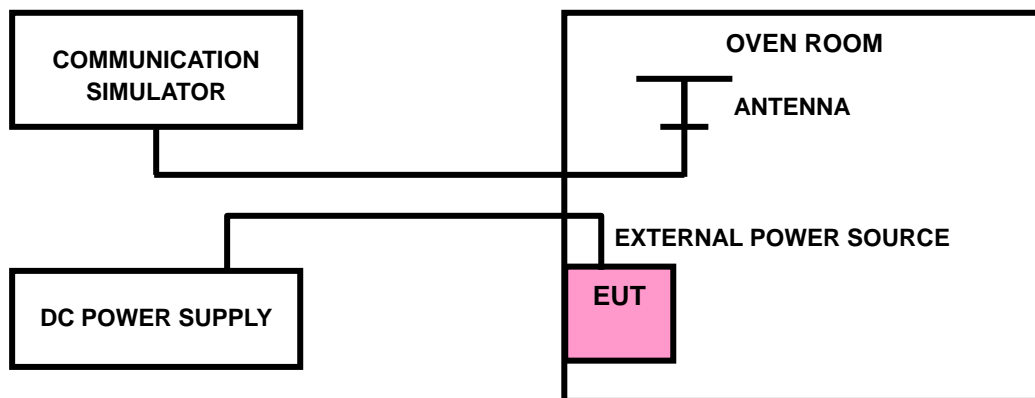
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### 3.2.2 TEST PROCEDURE

- a. 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.
- b. 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.
- c. 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 2

#### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | 1.4MHz                |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0022                | 0.0025       | 2.5         |
| $V_{min}$       | -0.0031               | -0.0030      | 2.5         |
| $V_{max}$       | 0.0021                | 0.0020       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is  $V_{min}$  to  $V_{max}$ .

#### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 1.4MHz                |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0118      | 2.5         |
| -20        | -0.0100               | -0.0100      | 2.5         |
| -10        | -0.0085               | -0.0080      | 2.5         |
| 0          | -0.0074               | -0.0075      | 2.5         |
| 10         | -0.0055               | -0.0045      | 2.5         |
| 20         | -0.0041               | -0.0041      | 2.5         |
| 30         | -0.0036               | -0.0040      | 2.5         |
| 40         | -0.0018               | -0.0017      | 2.5         |
| 50         | -0.0003               | -0.0002      | 2.5         |



**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts)  | 3MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0021                | 0.0021       | 2.5         |
| V <sub>min</sub> | -0.0021               | -0.0025      | 2.5         |
| V <sub>max</sub> | 0.0018                | 0.0018       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is V<sub>min</sub> to V<sub>max</sub>.

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 3MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0117               | -0.0115      | 2.5         |
| -20        | -0.0111               | -0.0104      | 2.5         |
| -10        | -0.0083               | -0.0080      | 2.5         |
| 0          | -0.0073               | -0.0073      | 2.5         |
| 10         | -0.0048               | -0.0045      | 2.5         |
| 20         | -0.0040               | -0.0042      | 2.5         |
| 30         | -0.0024               | -0.0041      | 2.5         |
| 40         | -0.0017               | -0.0017      | 2.5         |
| 50         | -0.0005               | -0.0004      | 2.5         |



**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts)  | 5MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0021                | 0.0024       | 2.5         |
| V <sub>min</sub> | -0.0023               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0022                | 0.0020       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is V<sub>min</sub> to V<sub>max</sub>.

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0119               | -0.0111      | 2.5         |
| -20        | -0.0113               | -0.0104      | 2.5         |
| -10        | -0.0086               | -0.0082      | 2.5         |
| 0          | -0.0076               | -0.0073      | 2.5         |
| 10         | -0.0056               | -0.0046      | 2.5         |
| 20         | -0.0043               | -0.0037      | 2.5         |
| 30         | -0.0034               | -0.0024      | 2.5         |
| 40         | -0.0018               | -0.0021      | 2.5         |
| 50         | -0.0005               | -0.0005      | 2.5         |



**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts)  | 10MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0024                | 0.0024       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0025                | 0.0026       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is V<sub>min</sub> to V<sub>max</sub>.

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0117               | -0.0113      | 2.5         |
| -20        | -0.0109               | -0.0097      | 2.5         |
| -10        | -0.0083               | -0.0081      | 2.5         |
| 0          | -0.0073               | -0.0073      | 2.5         |
| 10         | -0.0052               | -0.0055      | 2.5         |
| 20         | -0.0044               | -0.0041      | 2.5         |
| 30         | -0.0031               | -0.0025      | 2.5         |
| 40         | -0.0015               | -0.0015      | 2.5         |
| 50         | -0.0004               | -0.0003      | 2.5         |



**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts)  | 15MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0027                | 0.0024       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0025                | 0.0024       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is V<sub>min</sub> to V<sub>max</sub>.

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 15MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0111      | 2.5         |
| -20        | -0.0109               | -0.0108      | 2.5         |
| -10        | -0.0085               | -0.0081      | 2.5         |
| 0          | -0.0076               | -0.0074      | 2.5         |
| 10         | -0.0050               | -0.0053      | 2.5         |
| 20         | -0.0042               | -0.0043      | 2.5         |
| 30         | -0.0032               | -0.0029      | 2.5         |
| 40         | -0.0015               | -0.0015      | 2.5         |
| 50         | -0.0005               | -0.0002      | 2.5         |





**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts) | 20MHz                 |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | FREQUENCY ERROR (ppm) |              |             |
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0024                | 0.0026       | 2.5         |
| $V_{min}$       | -0.0031               | -0.0030      | 2.5         |
| $V_{max}$       | 0.0026                | 0.0025       | 2.5         |

**NOTE:** The applicant defined the normal working voltage of the battery is  $V_{min}$  to  $V_{max}$ .

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 20MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0113               | -0.0119      | 2.5         |
| -20        | -0.0110               | -0.0101      | 2.5         |
| -10        | -0.0086               | -0.0081      | 2.5         |
| 0          | -0.0076               | -0.0076      | 2.5         |
| 10         | -0.0050               | -0.0047      | 2.5         |
| 20         | -0.0043               | -0.0038      | 2.5         |
| 30         | -0.0027               | -0.0034      | 2.5         |
| 40         | -0.0022               | -0.0015      | 2.5         |
| 50         | -0.0004               | -0.0006      | 2.5         |

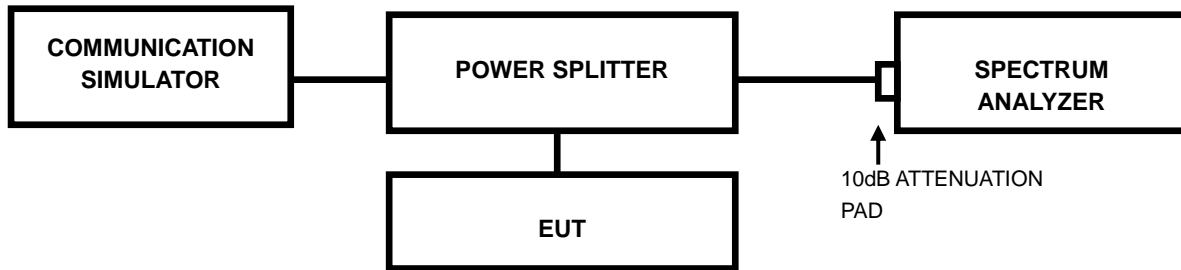


### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 3.3.1 TEST PROCEDURES

The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 3.3.2 TEST SETUP

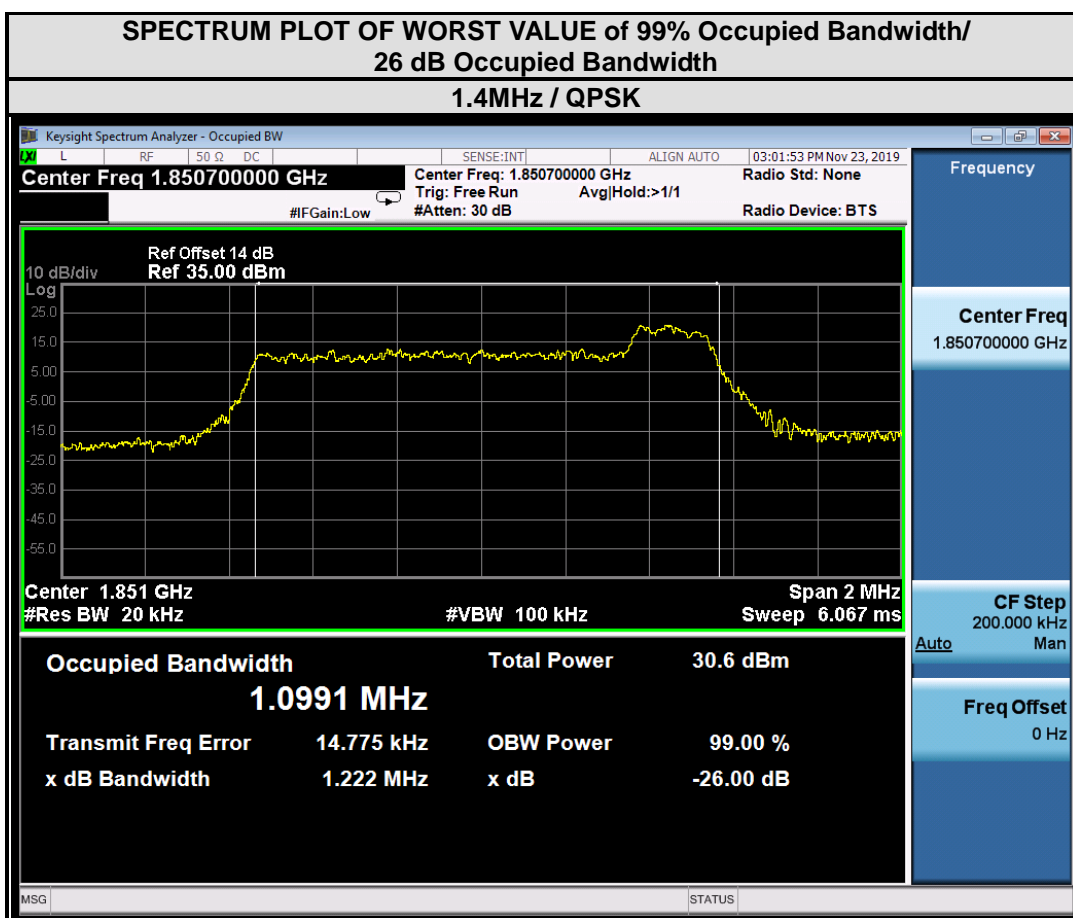




### 3.3.3 TEST RESULTS

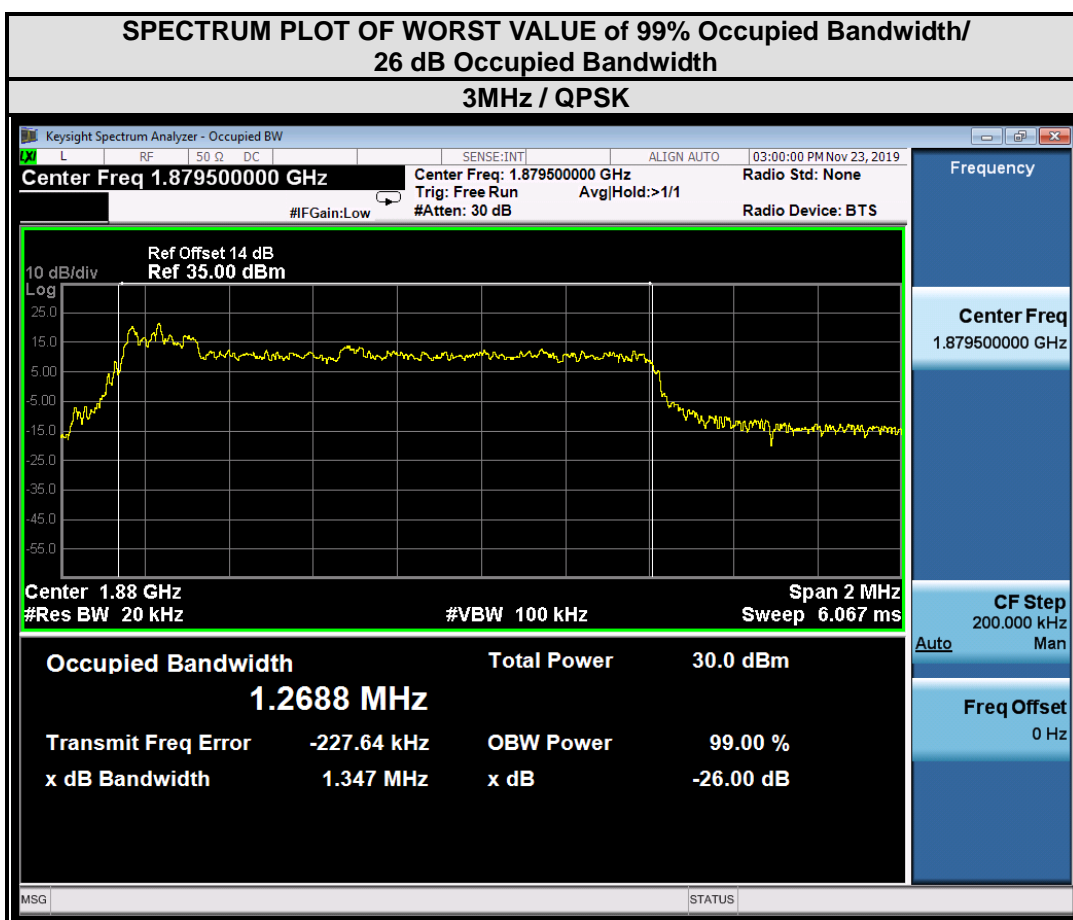
#### LTE BAND 2

| CHANNEL BANDWIDTH:1.4MHz |                 |                              |                       |
|--------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                  | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                          |                 | QPSK                         | QPSK                  |
| 18607                    | 1850.7          | 1.10                         | 1.22                  |
| 18900                    | 1880            | 1.10                         | 1.23                  |
| 19193                    | 1909.3          | 1.10                         | 1.21                  |



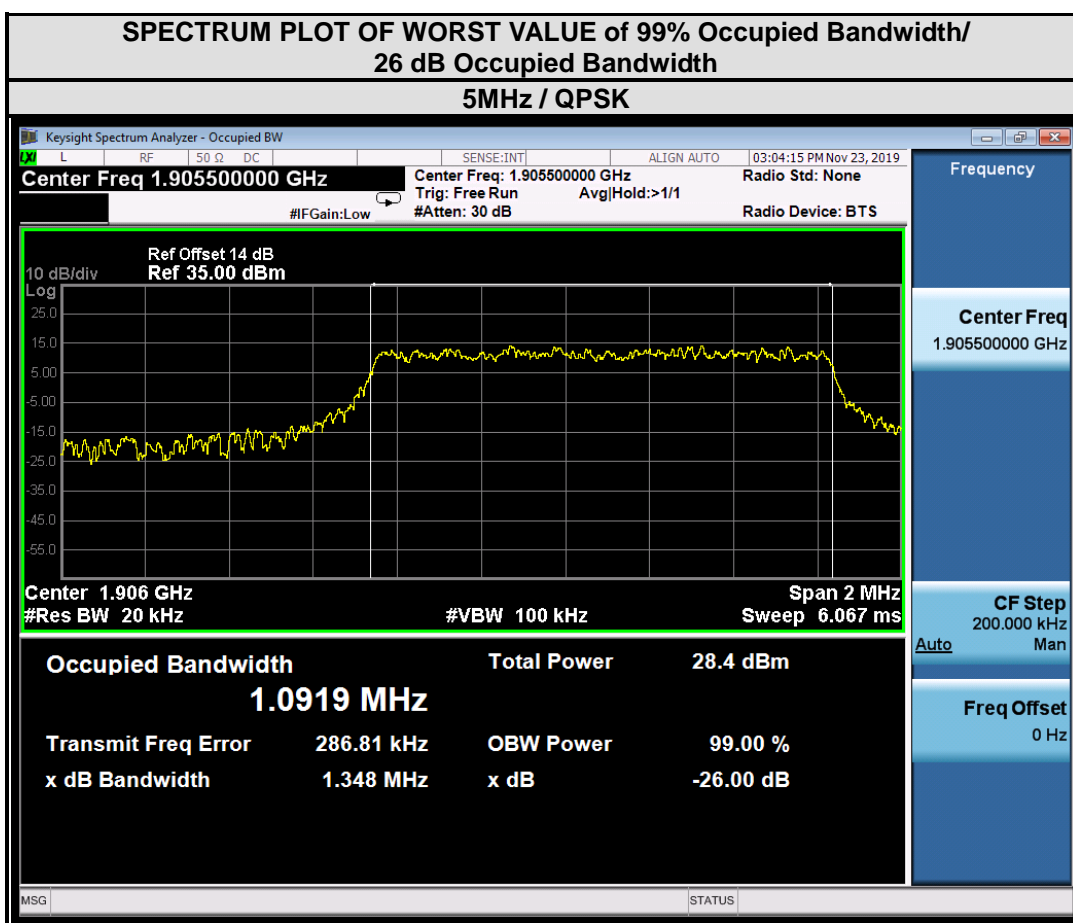


| CHANNEL BANDWIDTH:3MHz |                 |                              |                       |
|------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                        |                 | QPSK                         | QPSK                  |
| 18615                  | 1851.5          | 1.26                         | 1.43                  |
| 18900                  | 1880            | 1.27                         | 1.35                  |
| 19185                  | 1908.5          | 1.27                         | 1.41                  |



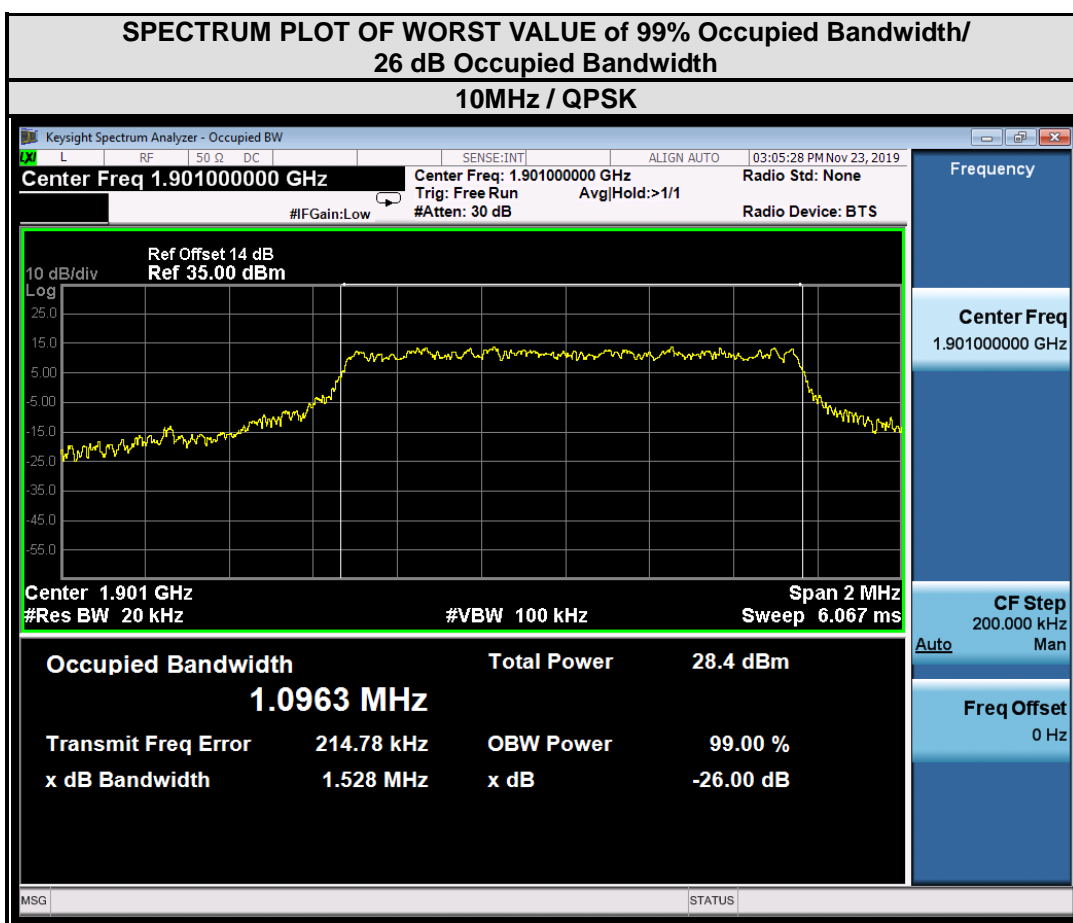


| CHANNEL BANDWIDTH:5MHz |                 |                              |                       |
|------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                        |                 | QPSK                         | QPSK                  |
| 18625                  | 1852.5          | 1.09                         | 1.36                  |
| 18900                  | 1880            | 1.09                         | 1.29                  |
| 19175                  | 1907.5          | 1.09                         | 1.35                  |



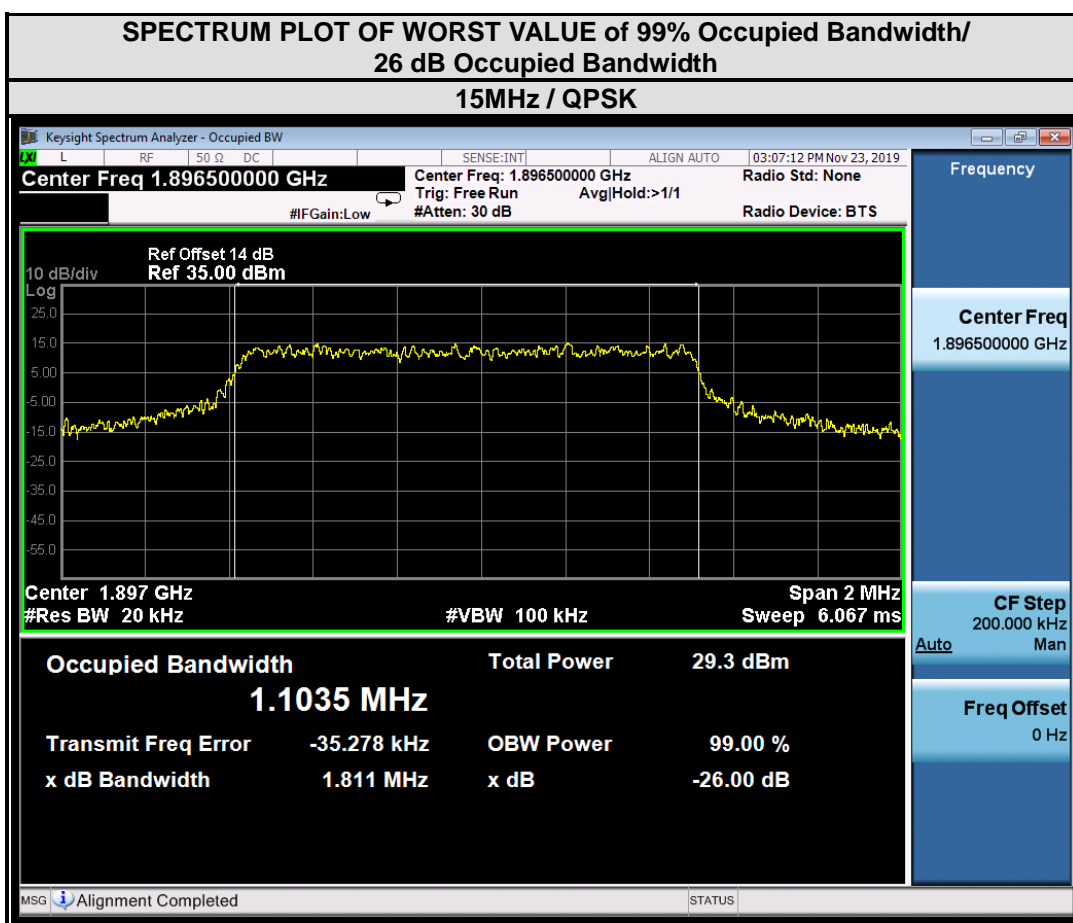


| CHANNEL BANDWIDTH:10MHz |                 |                              |                       |
|-------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                         |                 | QPSK                         | QPSK                  |
| 18650                   | 1855            | 1.09                         | 1.41                  |
| 18900                   | 1880            | 1.09                         | 1.41                  |
| 19150                   | 1905            | 1.10                         | 1.53                  |



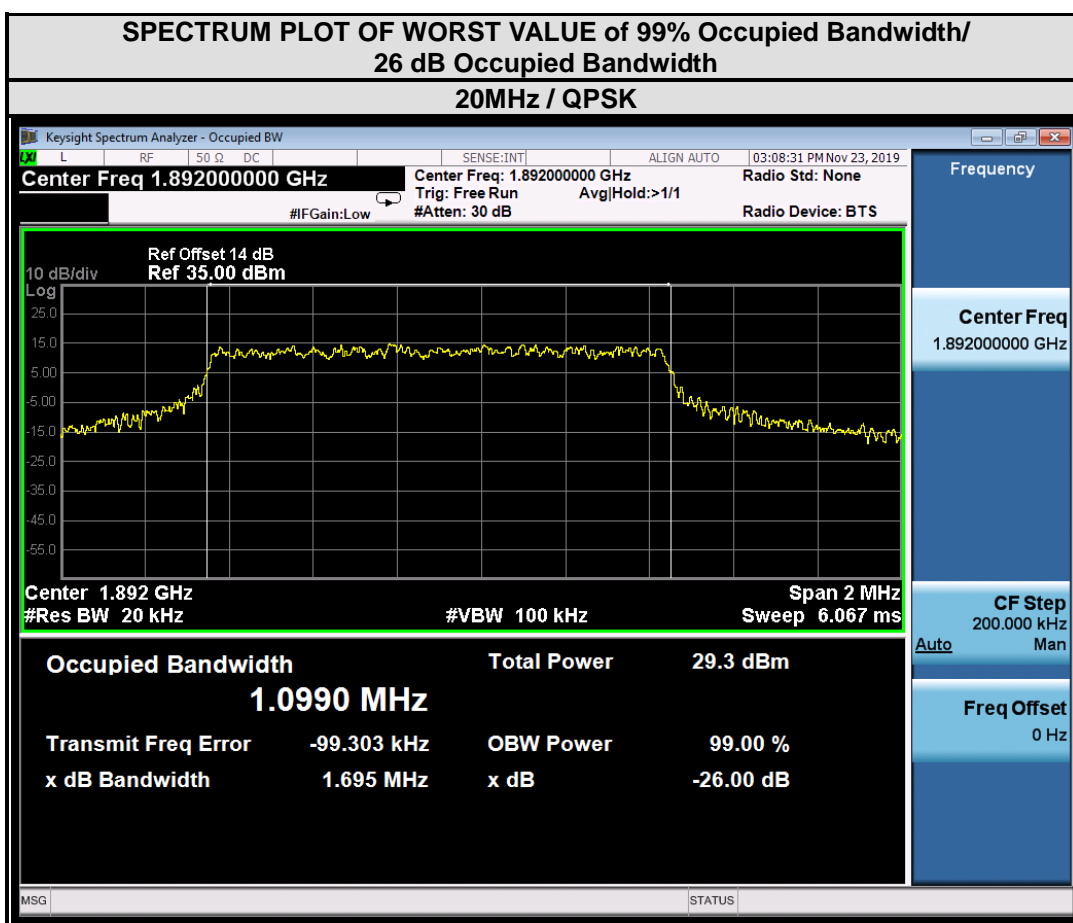


| CHANNEL BANDWIDTH:15MHz |                 |                              |                       |
|-------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                         |                 | QPSK                         | QPSK                  |
| 18675                   | 1857.5          | 1.10                         | 1.49                  |
| 18900                   | 1880            | 1.10                         | 1.57                  |
| 19125                   | 1902.5          | 1.10                         | 1.81                  |





| CHANNEL BANDWIDTH:20MHz |                 |                              |                       |
|-------------------------|-----------------|------------------------------|-----------------------|
| CHANNEL                 | Frequency (MHz) | 99% OCCUPIED Bandwidth (MHz) | 26 dB bandwidth (MHz) |
|                         |                 | QPSK                         | QPSK                  |
| 18700                   | 1860            | 1.09                         | 1.58                  |
| 18900                   | 1880            | 1.10                         | 1.48                  |
| 19100                   | 1900            | 1.10                         | 1.70                  |





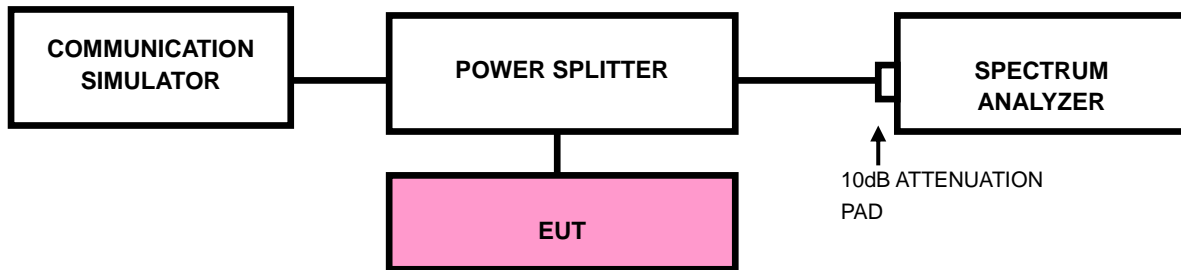


### 3.4 BAND EDGE MEASUREMENT

#### 3.4.1 LIMITS OF BAND EDGE MEASUREMENT

Power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

#### 3.4.2 TEST SETUP





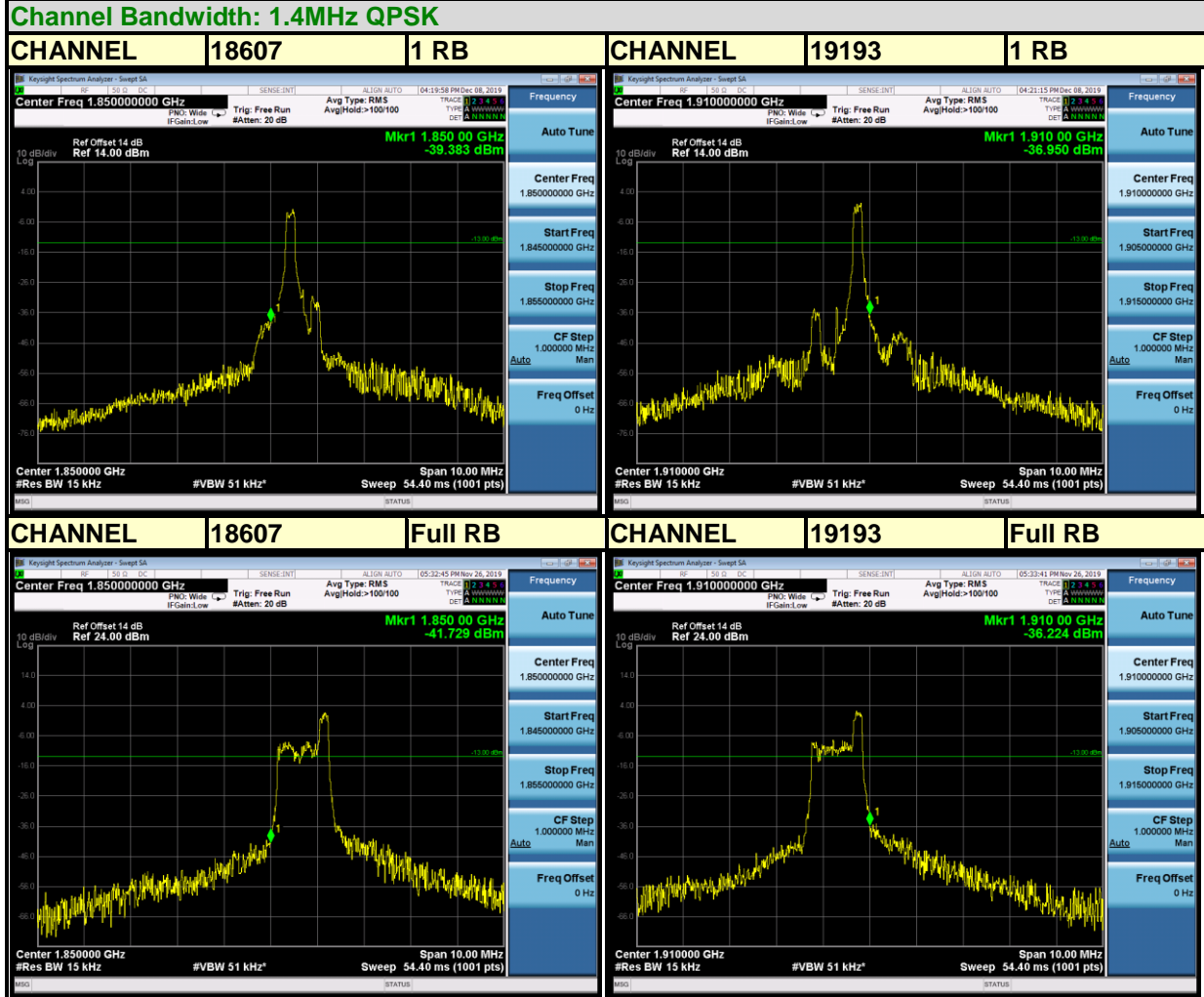
### 3.4.3 TEST PROCEDURES

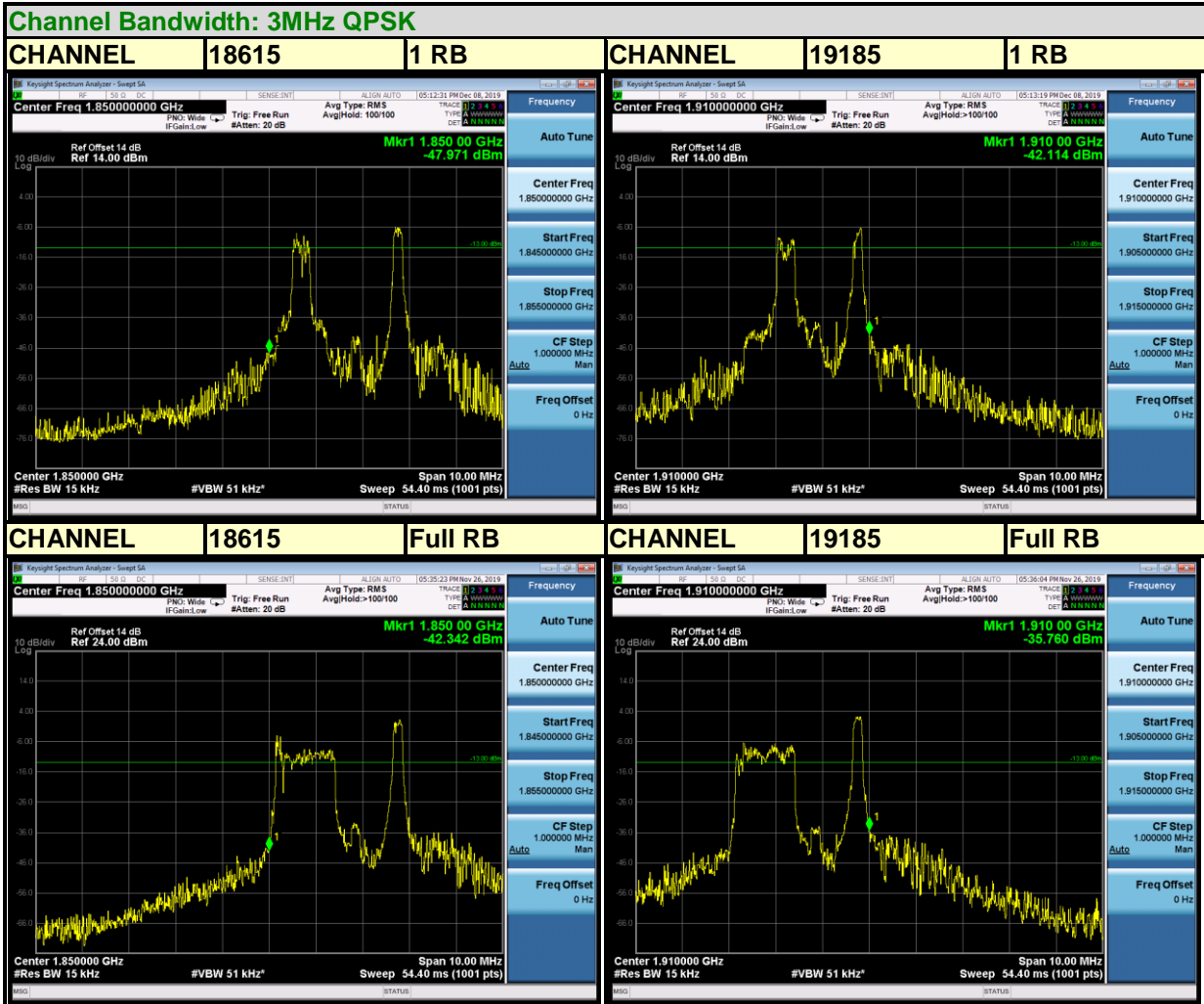
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE bandwidth 1.4MHz)
- c. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 30kHz and VBW of the spectrum is 100kHz. (LTE bandwidth 3MHz)
- d. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 50kHz and VBW of the spectrum is 200kHz. (LTE bandwidth 5MHz)
- e. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 100kHz and VBW of the spectrum is 300kHz. (LTE bandwidth 10MHz)
- f. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 15MHz)
- g. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 200kHz and VBW of the spectrum is 1MHz. (LTE bandwidth 20MHz)
- h. Record the max trace plot into the test report.

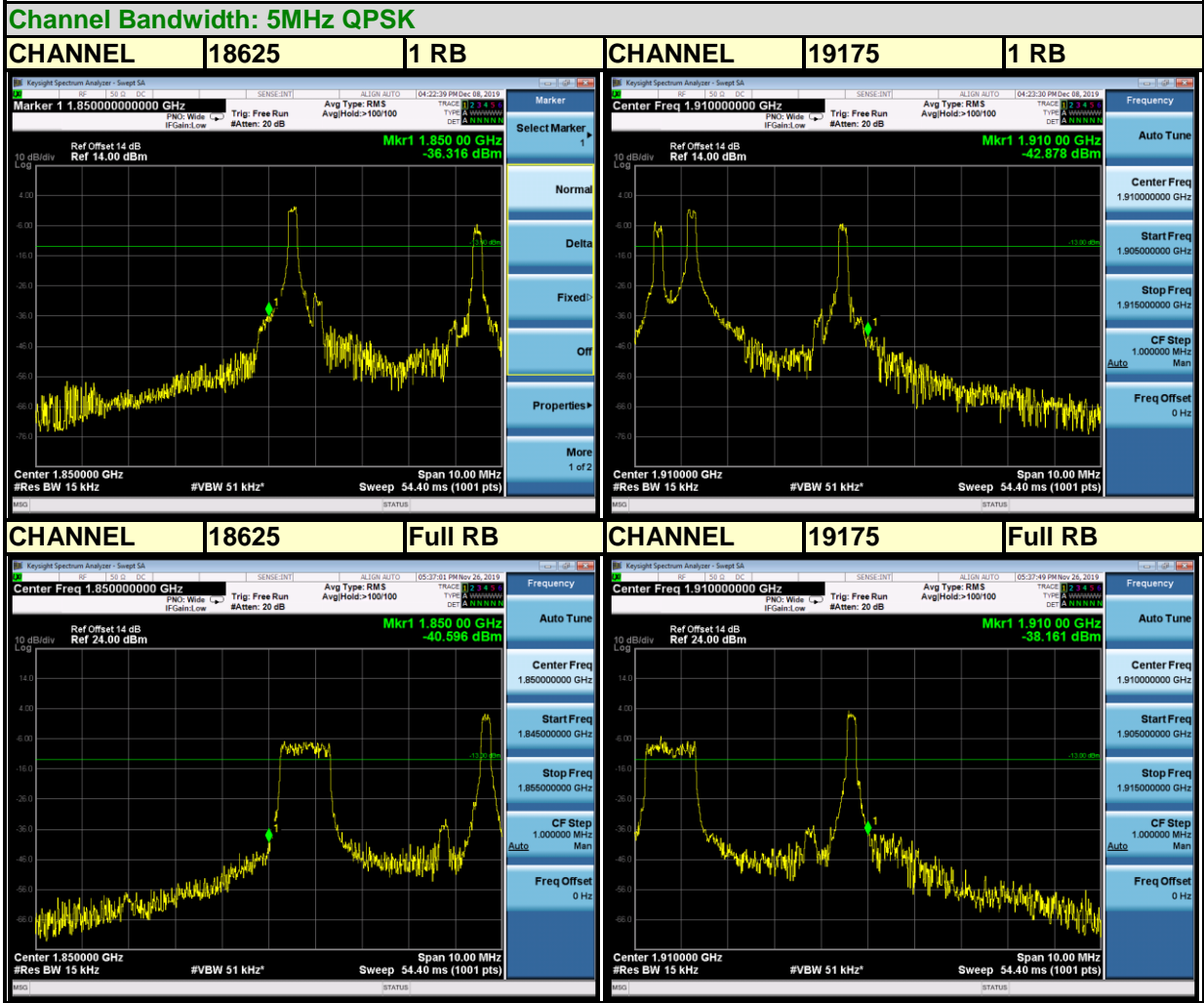


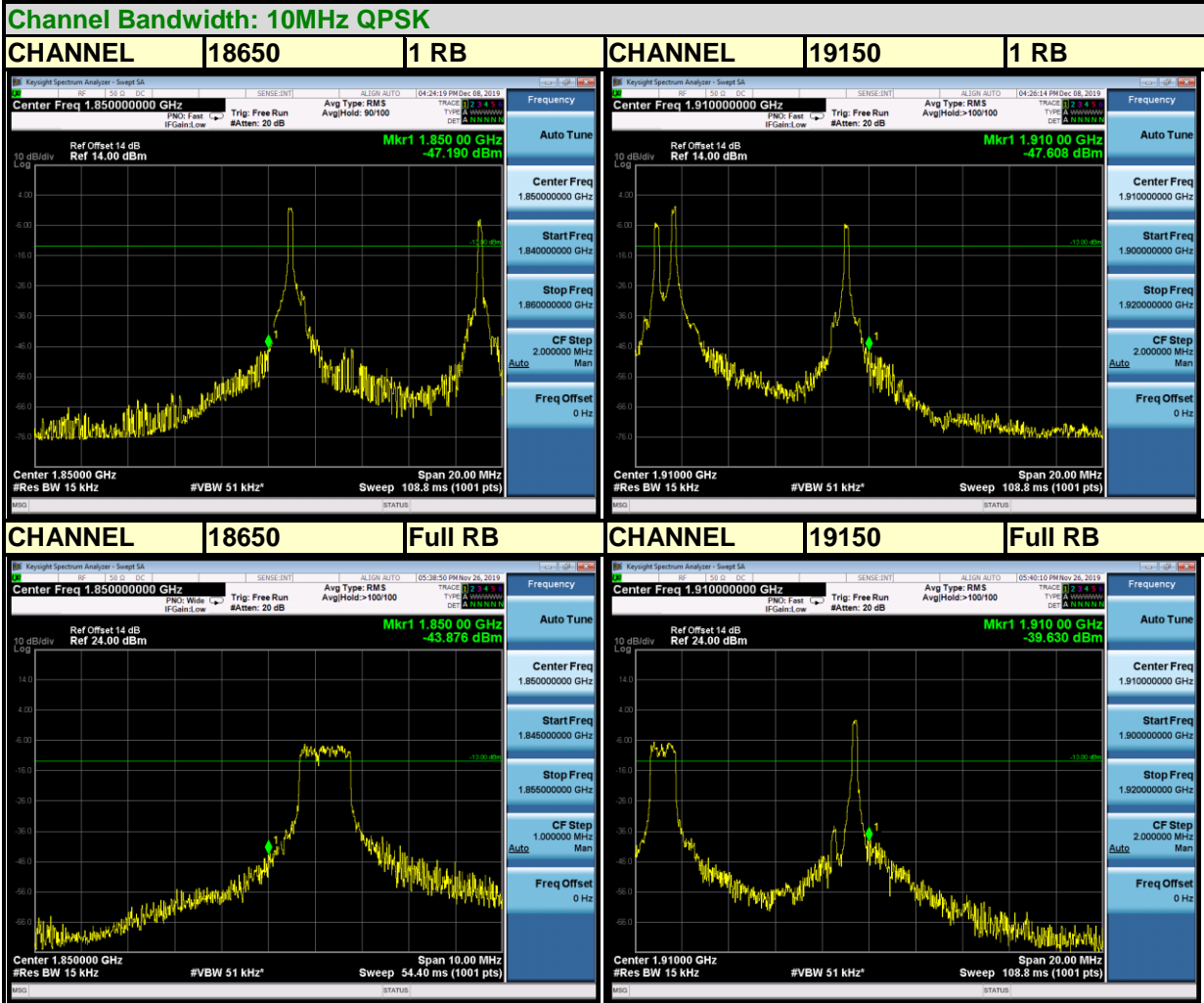
### 3.4.4. TEST RESULTS

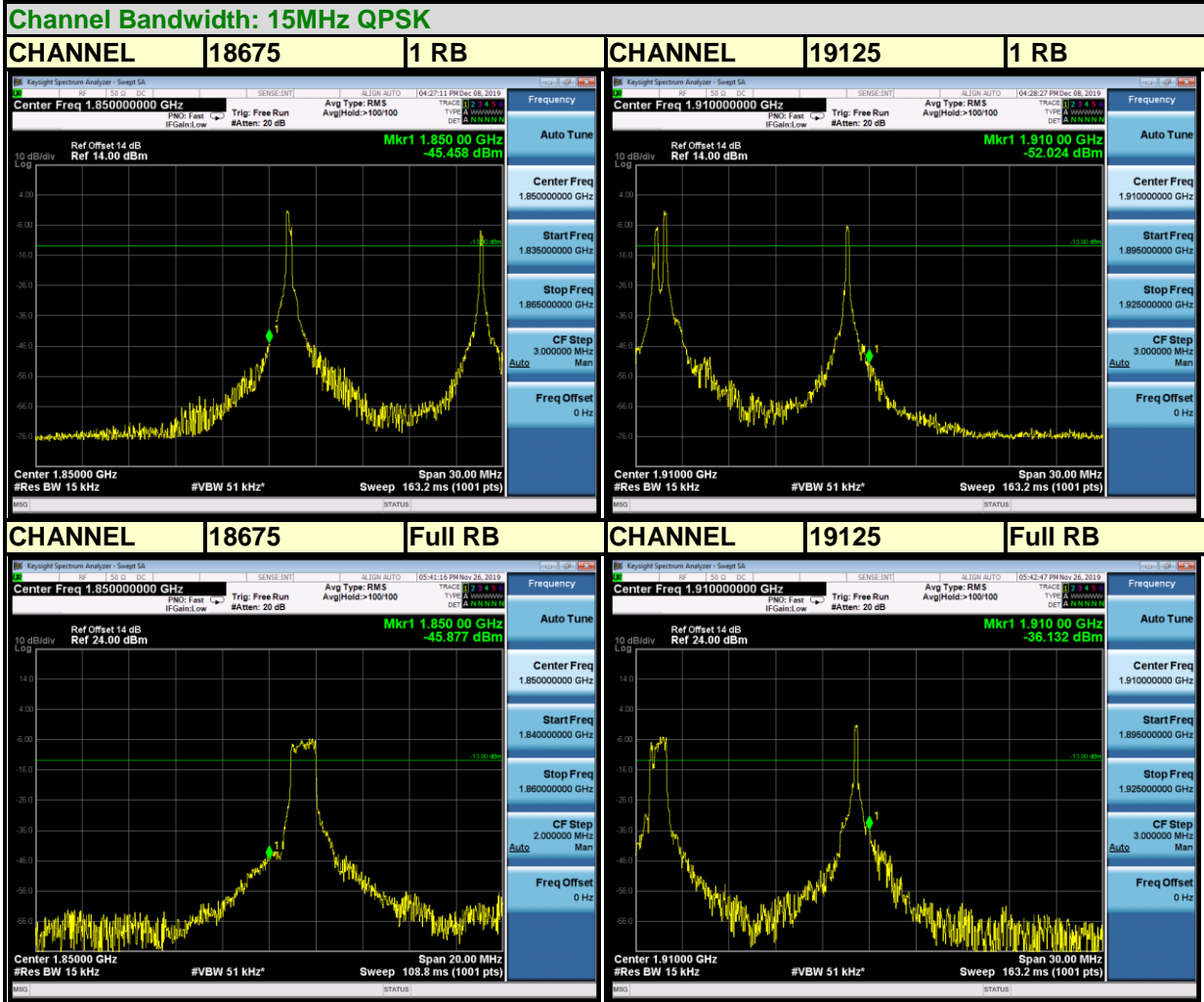
#### LTE BAND 2







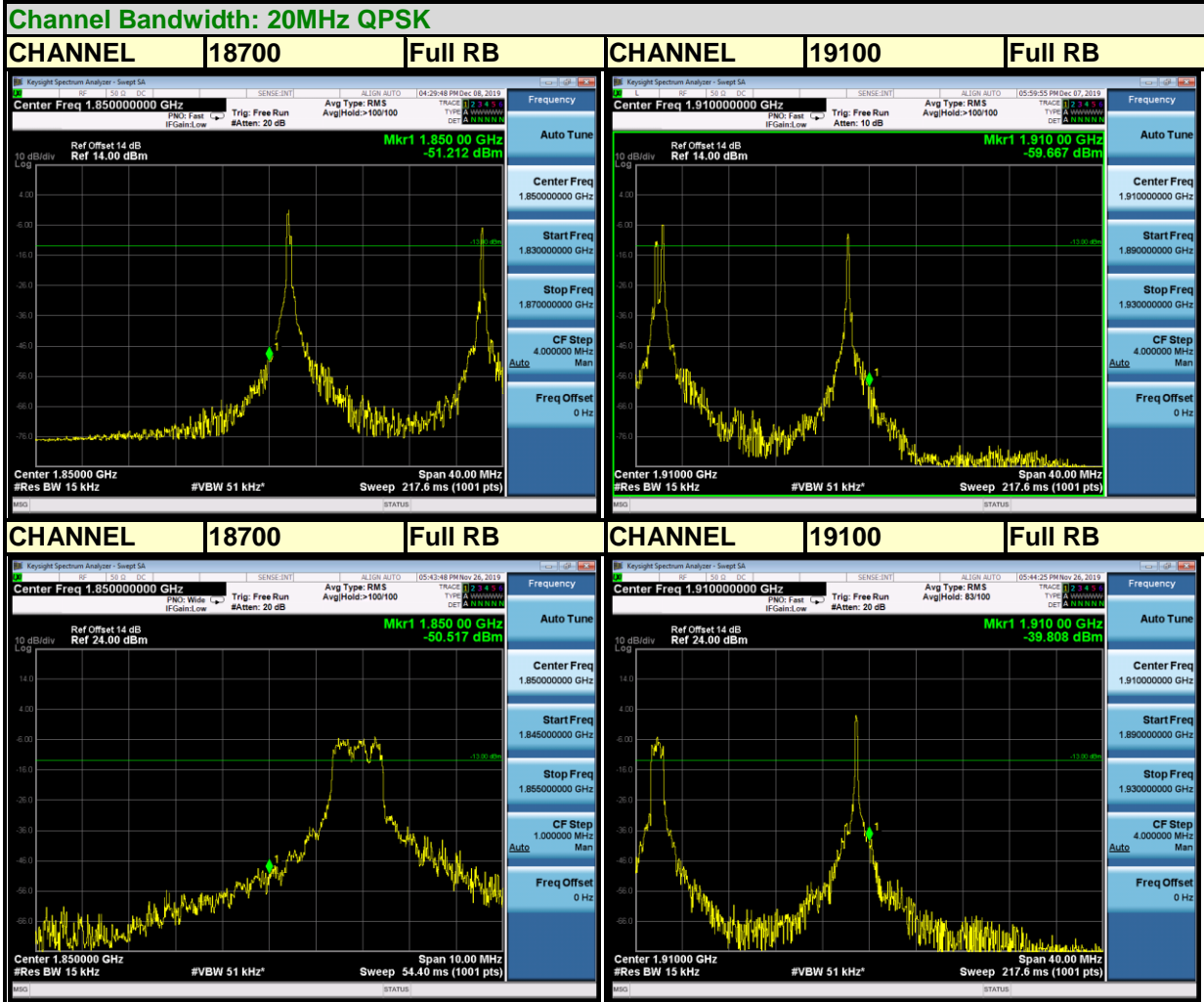






BUREAU VERITAS

Test Report No.: RFP20120028-2







### 3.5 CONDUCTED SPURIOUS EMISSIONS

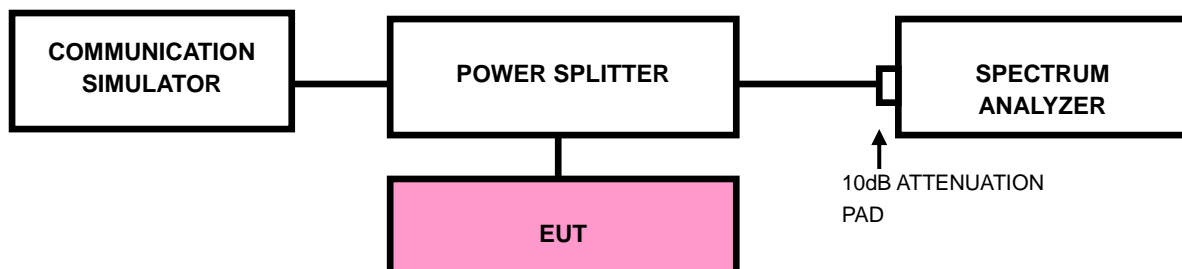
#### 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

#### 3.5.2 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 30 MHz to 19.1GHz. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

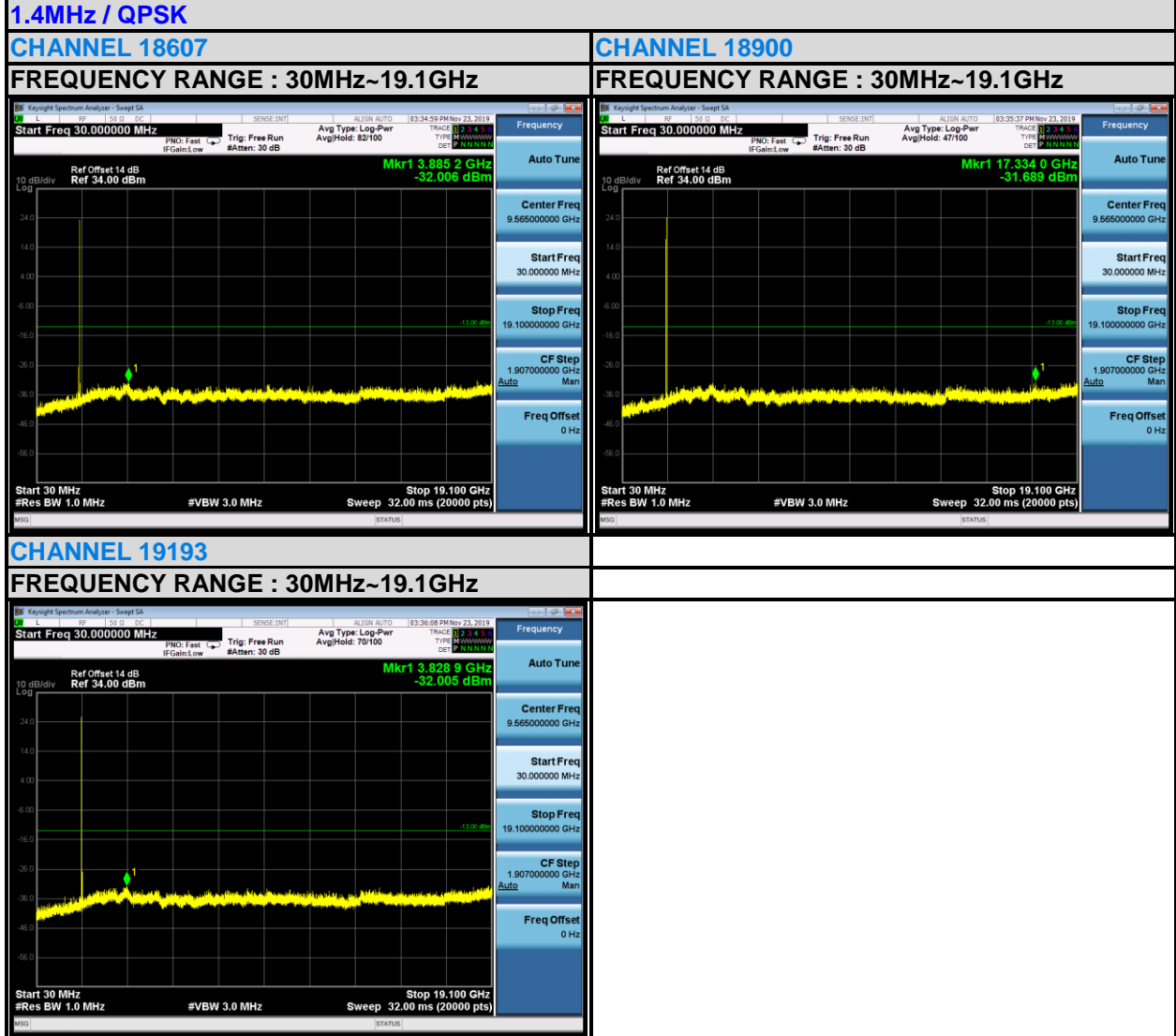
#### 3.5.3 TEST SETUP





### 3.5.4 TEST RESULTS

#### LTE BAND 2

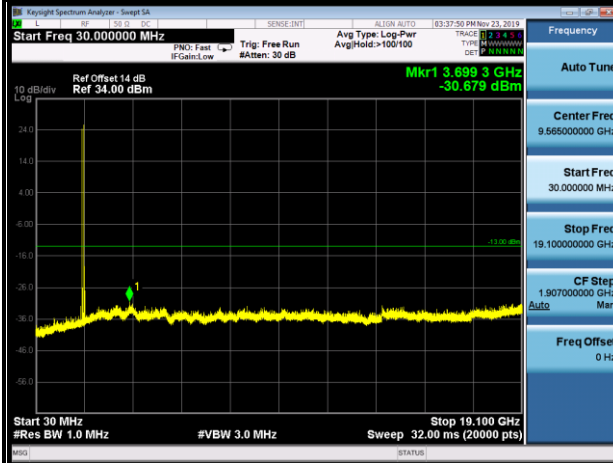




3MHz / QPSK

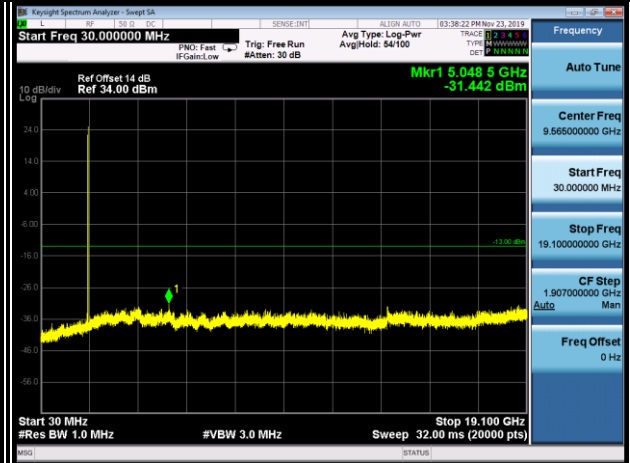
CHANNEL 18615

FREQUENCY RANGE : 30MHz~19.1GHz



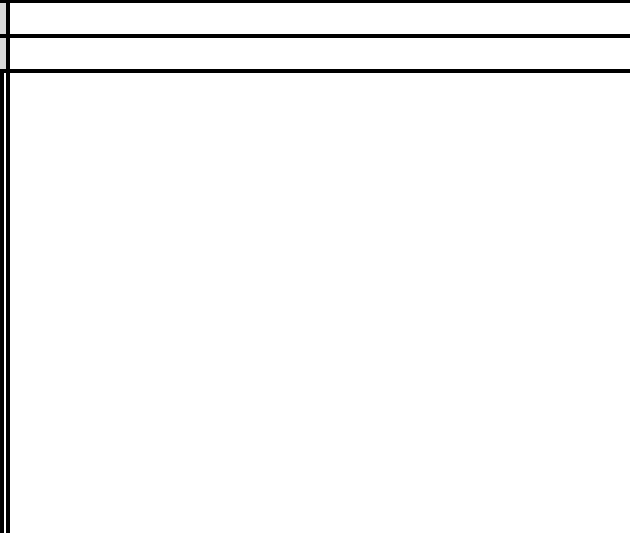
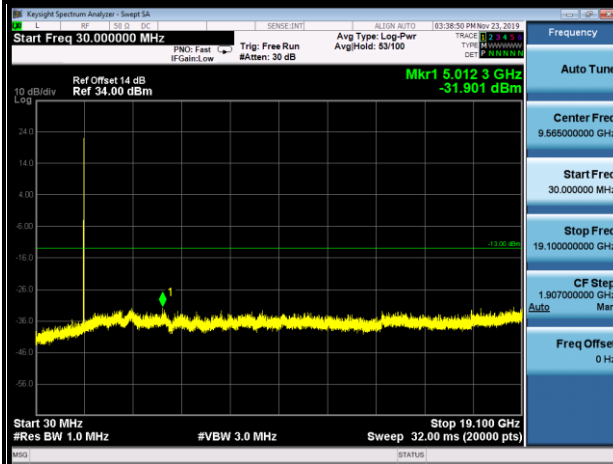
CHANNEL 18900

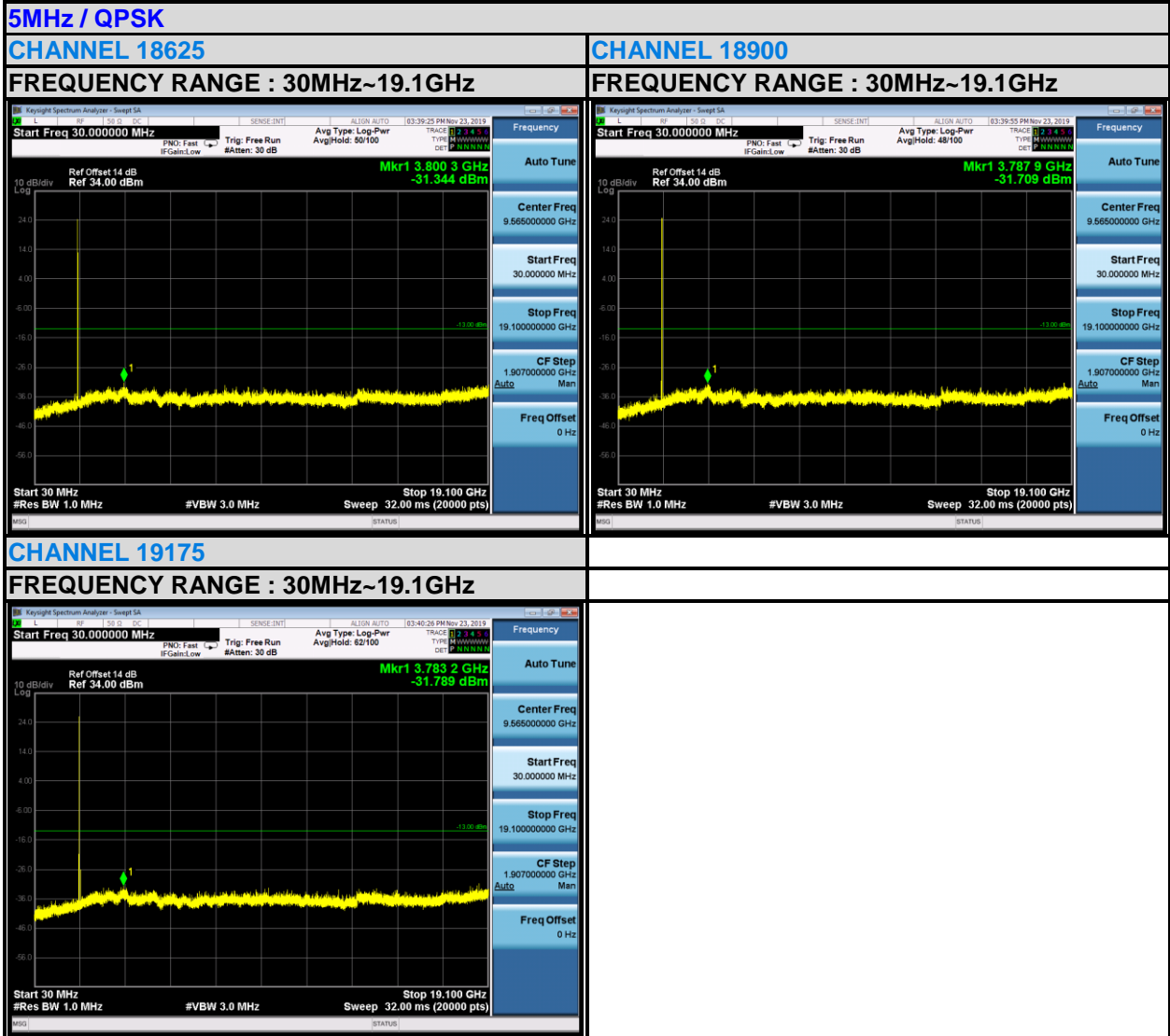
FREQUENCY RANGE : 30MHz~19.1GHz



CHANNEL 19185

FREQUENCY RANGE : 30MHz~19.1GHz







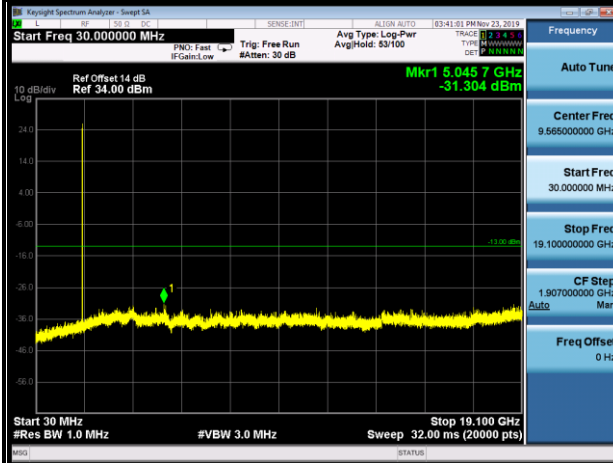
BUREAU VERITAS

Test Report No.: RFP20120028-2

10MHz / QPSK

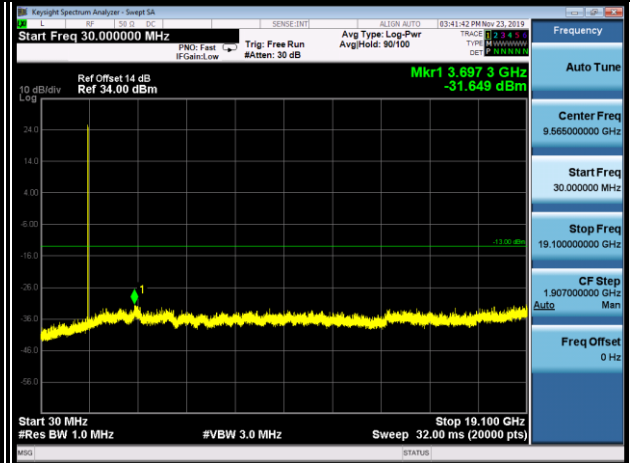
CHANNEL 18650

FREQUENCY RANGE : 30MHz~19.1GHz



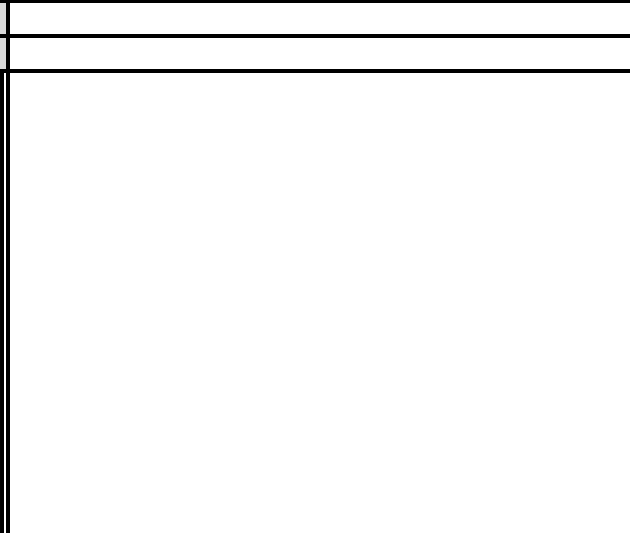
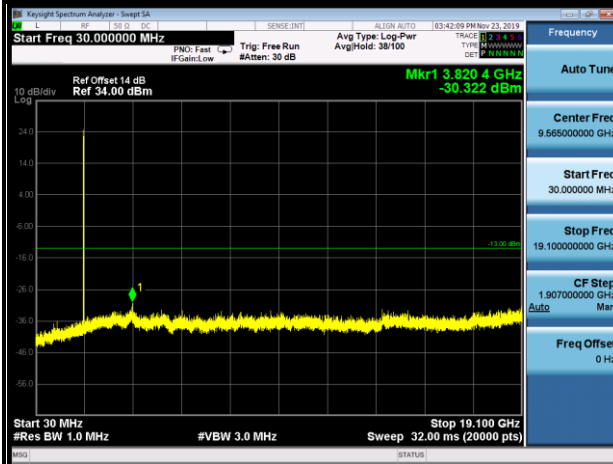
CHANNEL 18900

FREQUENCY RANGE : 30MHz~19.1GHz



CHANNEL 19150

FREQUENCY RANGE : 30MHz~19.1GHz





BUREAU VERITAS

Test Report No.: RFP20120028-2





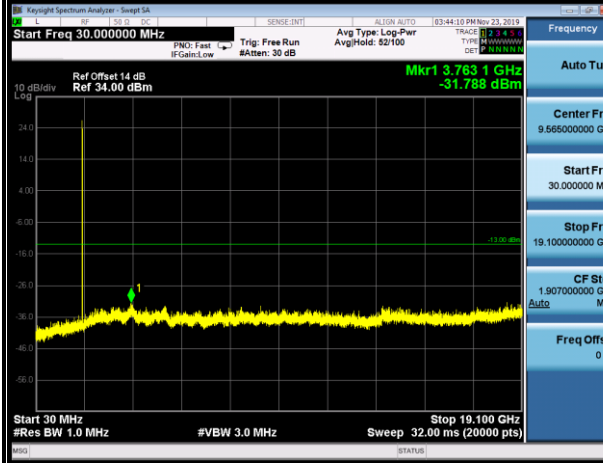
BUREAU VERITAS

Test Report No.: RFP20120028-2

20MHz / QPSK

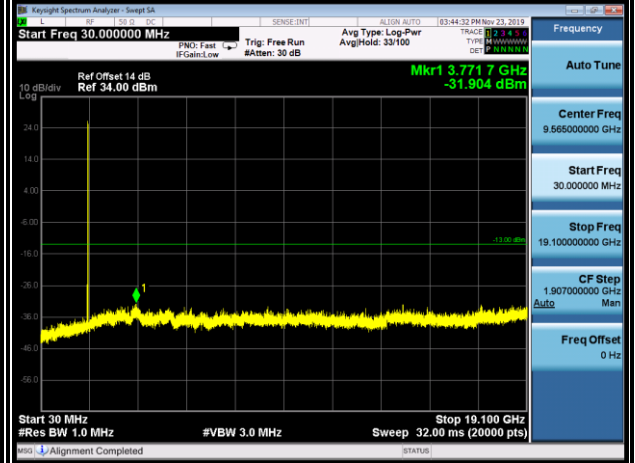
CHANNEL 18700

FREQUENCY RANGE : 30MHz~19.1GHz



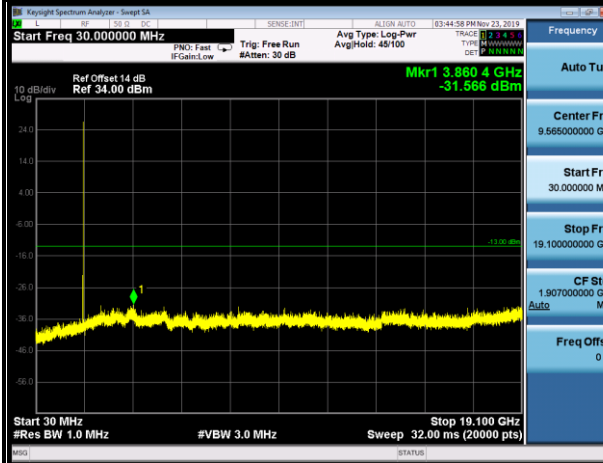
CHANNEL 18900

FREQUENCY RANGE : 30MHz~19.1GHz



CHANNEL 19100

FREQUENCY RANGE : 30MHz~19.1GHz





### 3.6 RADIATED EMISSION MEASUREMENT

#### 3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. The emission limit equal to  $-13\text{dBm}$ .

#### 3.6.2 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.  $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn.}$

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

#### 3.6.3 DEVIATION FROM TEST STANDARD

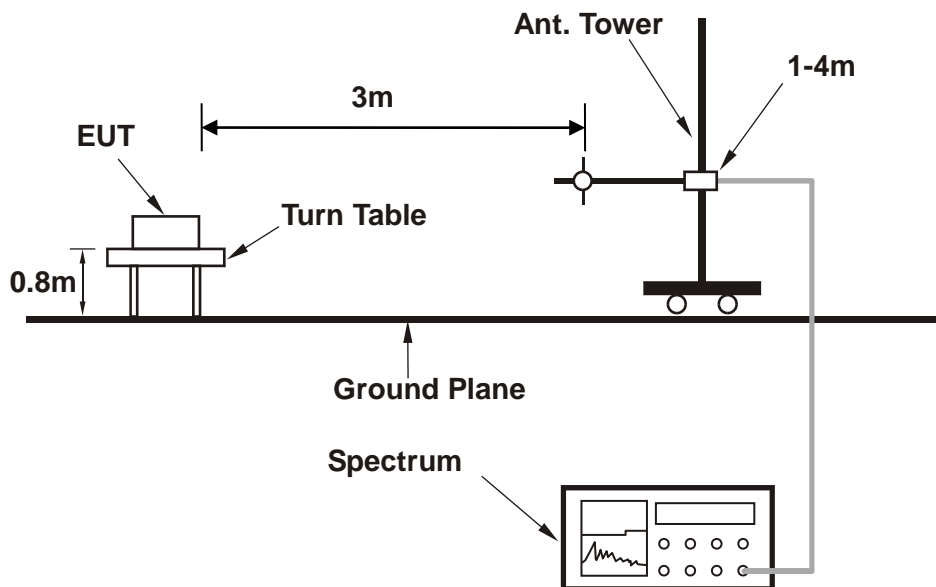
No deviation



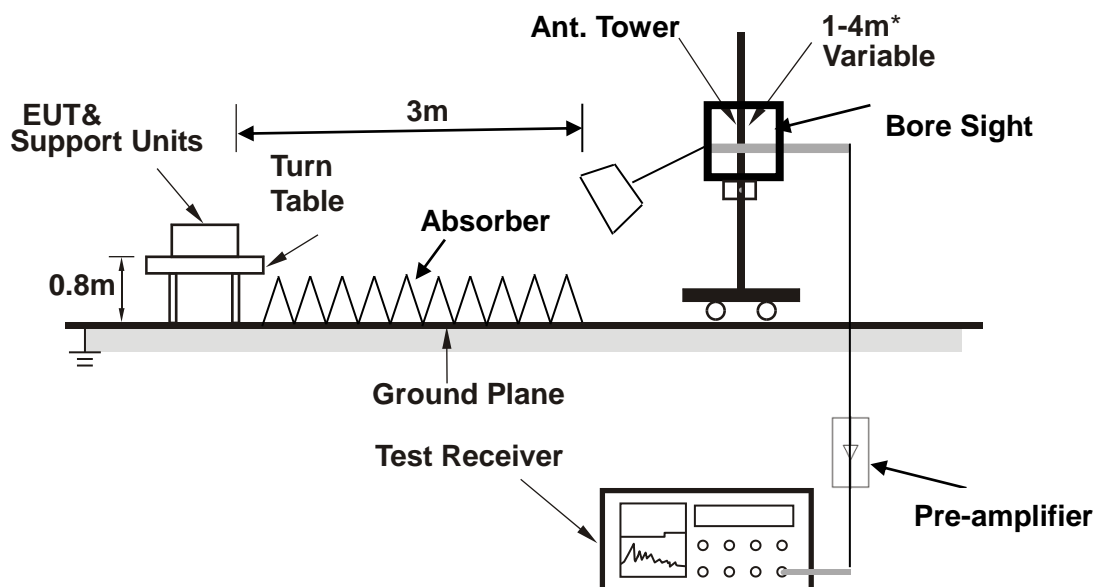


### 3.6.4 TEST SETUP

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



#### <Frequency Range above 1GHz>



**Note:** Above 1G is a directional antenna

depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

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



### 3.6.5 TEST RESULTS

#### BELOW 1GHz WORST-CASE DATA

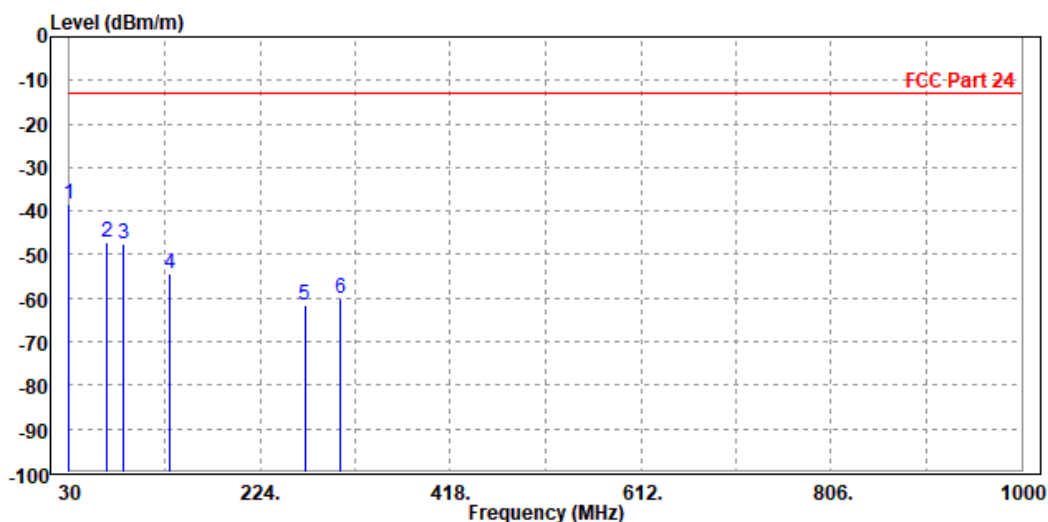
30 MHz – 1GHz data:

LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Below 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

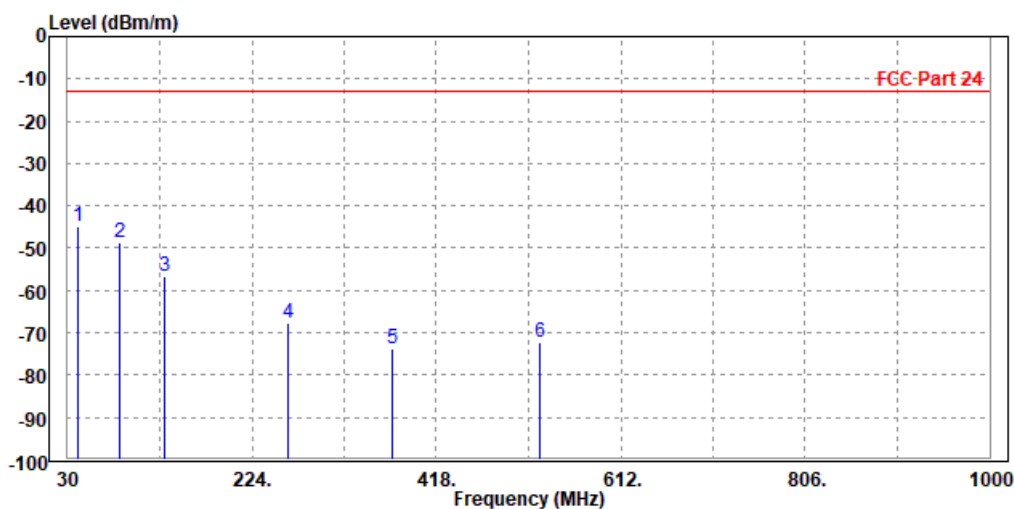
|   | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|---------|--------|------------|------------|------------|--------|--------|------------|
|   | MHz     | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | 30.000  | -38.50 | -57.84     | -13.00     | -25.50     | 19.34  | Peak   | Horizontal |
| 2 | 67.830  | -47.33 | -36.09     | -13.00     | -34.33     | -11.24 | Peak   | Horizontal |
| 3 | 85.290  | -47.72 | -39.34     | -13.00     | -34.72     | -8.38  | Peak   | Horizontal |
| 4 | 131.850 | -54.23 | -37.40     | -13.00     | -41.23     | -16.83 | Peak   | Horizontal |
| 5 | 269.590 | -61.57 | -46.26     | -13.00     | -48.57     | -15.31 | Peak   | Horizontal |
| 6 | 305.480 | -60.13 | -46.51     | -13.00     | -47.13     | -13.62 | Peak   | Horizontal |





|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18900 | FREQUENCY RANGE | Below 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|   | Freq | Level   | Read Level | Limit Line | Over Limit | Factor | Remark      | Pol/Phase |
|---|------|---------|------------|------------|------------|--------|-------------|-----------|
|   | MHz  | dBm/m   | dBm        | dBm/m      | dB         | dB/m   |             |           |
| 1 | PP   | 40.670  | -44.99     | -43.46     | -13.00     | -31.99 | -1.53 Peak  | Vertical  |
| 2 |      | 85.290  | -48.69     | -38.29     | -13.00     | -35.69 | -10.40 Peak | Vertical  |
| 3 |      | 132.820 | -56.61     | -44.12     | -13.00     | -43.61 | -12.49 Peak | Vertical  |
| 4 |      | 261.830 | -67.82     | -56.35     | -13.00     | -54.82 | -11.47 Peak | Vertical  |
| 5 |      | 371.440 | -73.88     | -62.84     | -13.00     | -60.88 | -11.04 Peak | Vertical  |
| 6 |      | 526.640 | -72.14     | -64.87     | -13.00     | -59.14 | -7.27 Peak  | Vertical  |





ABOVE 1GHz DATA

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

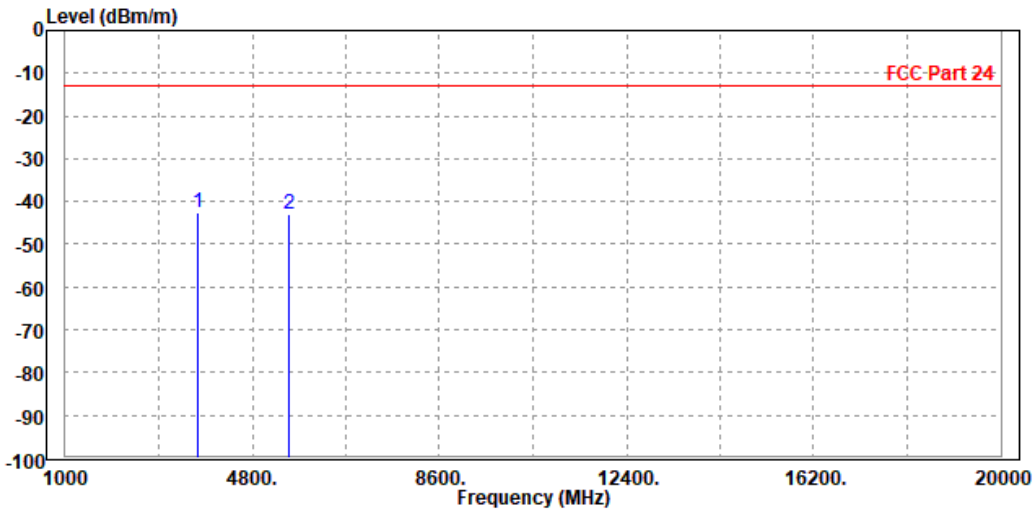
LTE Band 2

CHANNEL BANDWIDTH: 1.4MHz / QPSK

CH 18607

|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18607 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                       | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                 |                    |

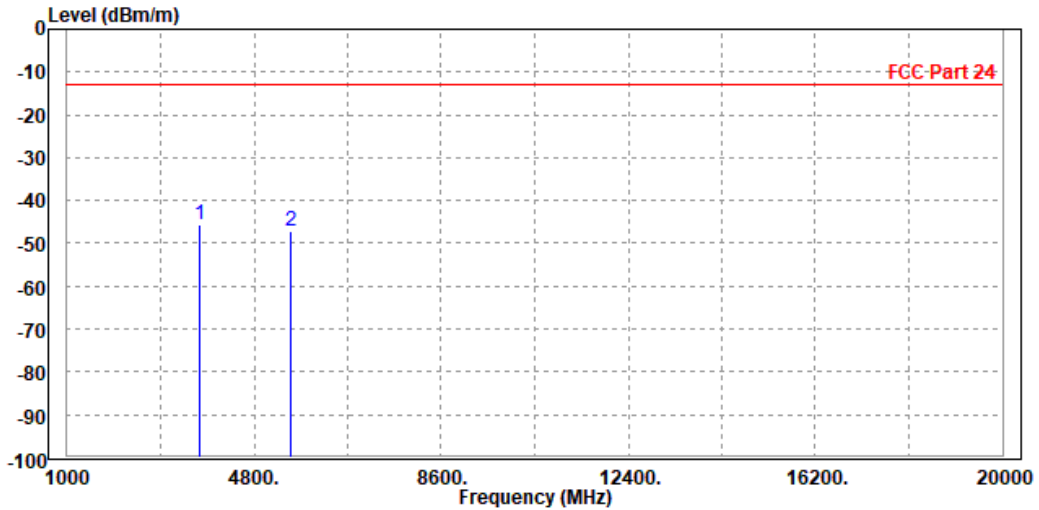
|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|-------------|--------|------------|------------|------------|--------|--------|------------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP 3698.000 | -42.67 | -51.45     | -13.00     | -29.67     | 8.78   | Peak   | Horizontal |
| 2 | 5552.100    | -43.03 | -53.22     | -13.00     | -30.03     | 10.19  | Peak   | Horizontal |





|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18607 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP 3698.000 | -45.65 | -54.90     | -13.00     | -32.65     | 9.25   | Peak   | Vertical  |
| 2 | 5552.100    | -46.97 | -56.88     | -13.00     | -33.97     | 9.91   | Peak   | Vertical  |

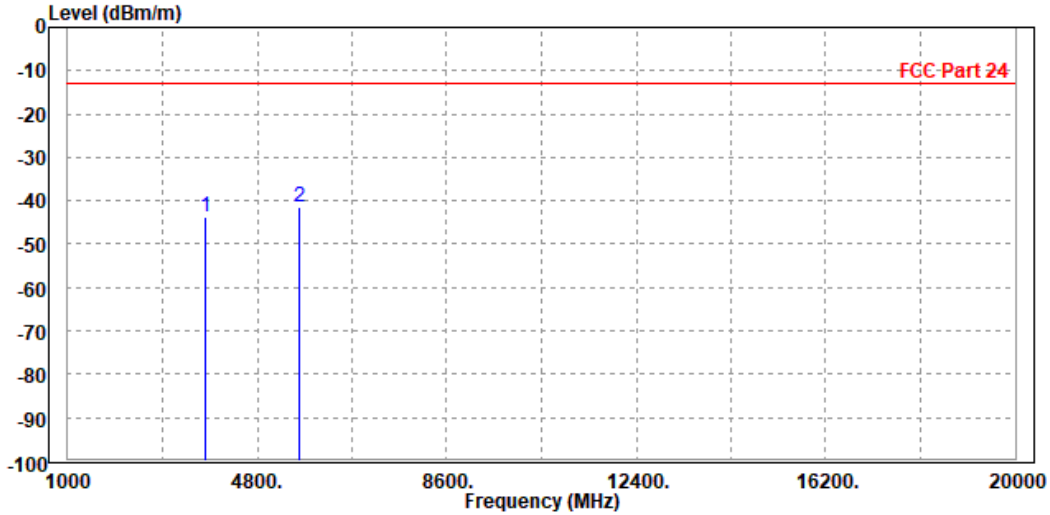




CH 18900

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

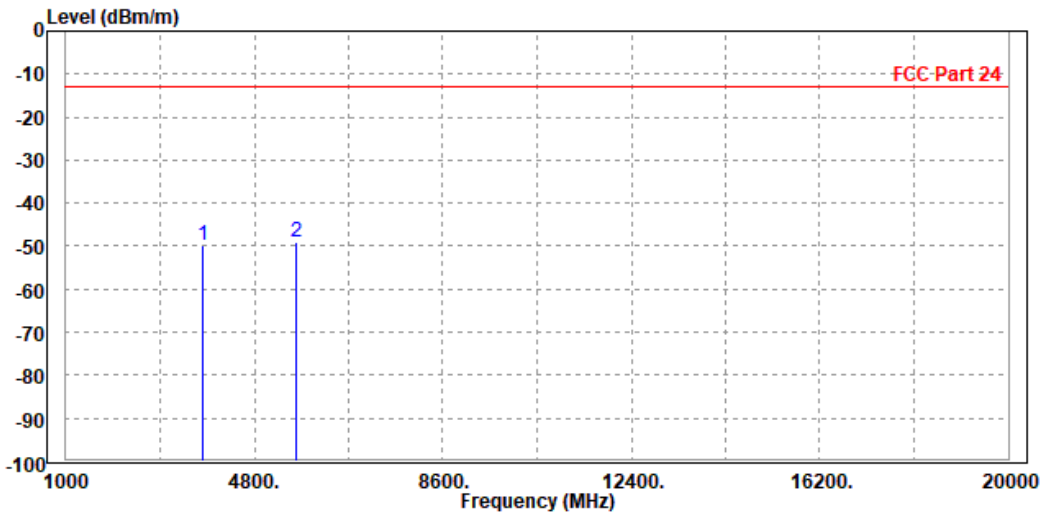
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 3755.000 | -43.60 | -52.45     | -13.00     | -30.60     | 8.85   | Peak   | Horizontal |
| 2 PP | 5640.000 | -41.37 | -51.85     | -13.00     | -28.37     | 10.48  | Peak   | Horizontal |





|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                              | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                        |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 3755.000 | -49.81 | -59.08     | -13.00     | -36.81     | 9.27   | Peak   | Vertical  |
| 2 PP | 5640.000 | -49.02 | -59.27     | -13.00     | -36.02     | 10.25  | Peak   | Vertical  |

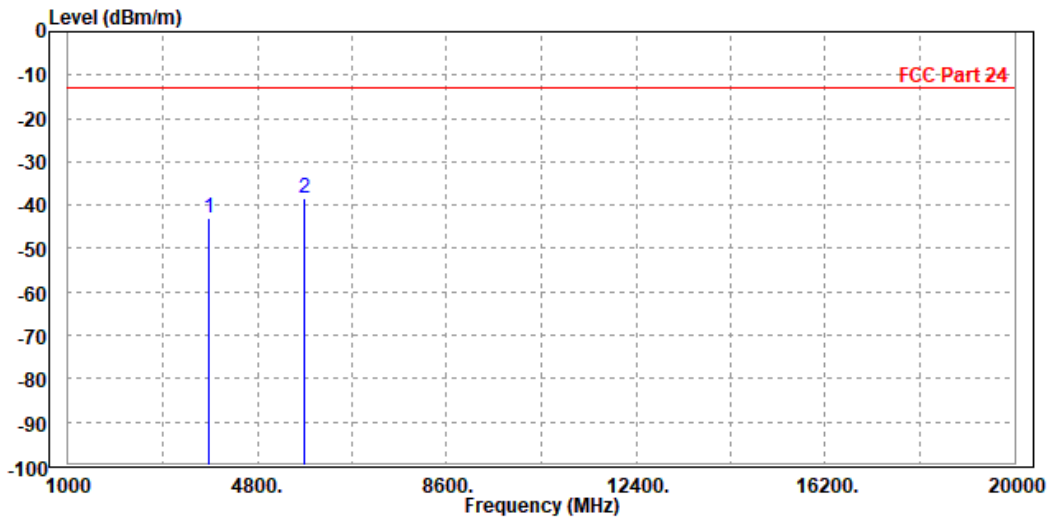




CH 19193

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 19193 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Po1/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 3812.000 | -42.82 | -51.73     | -13.00     | -29.82     | 8.91   | Peak   | Horizontal |
| 2 PP | 5727.900 | -38.56 | -49.33     | -13.00     | -25.56     | 10.77  | Peak   | Horizontal |

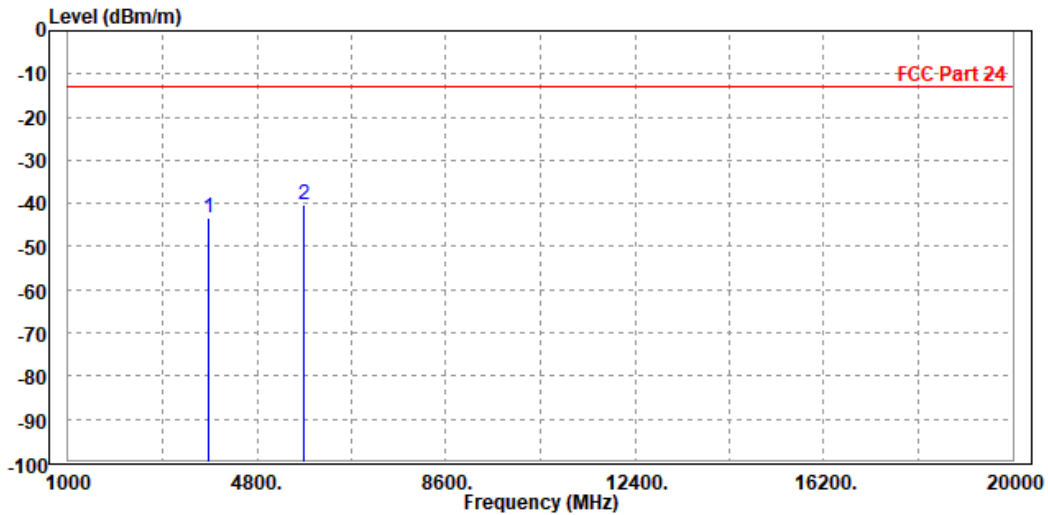






|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 19193 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 3812.000 | -43.44 | -52.73     | -13.00     | -30.44     | 9.29   | Peak   | Vertical  |
| 2 PP | 5727.900 | -40.49 | -51.08     | -13.00     | -27.49     | 10.59  | Peak   | Vertical  |

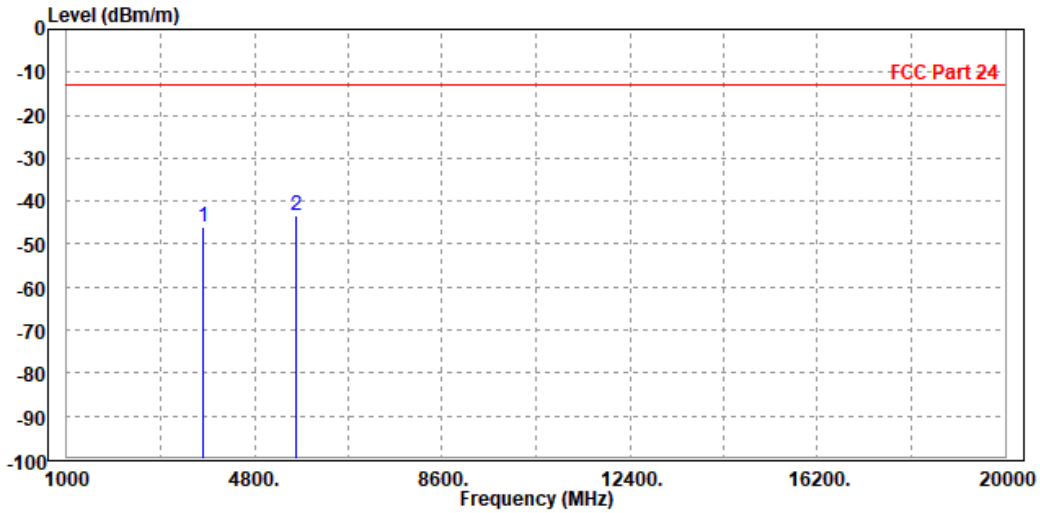




**CHANNEL BANDWIDTH: 3MHz / QPSK**

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

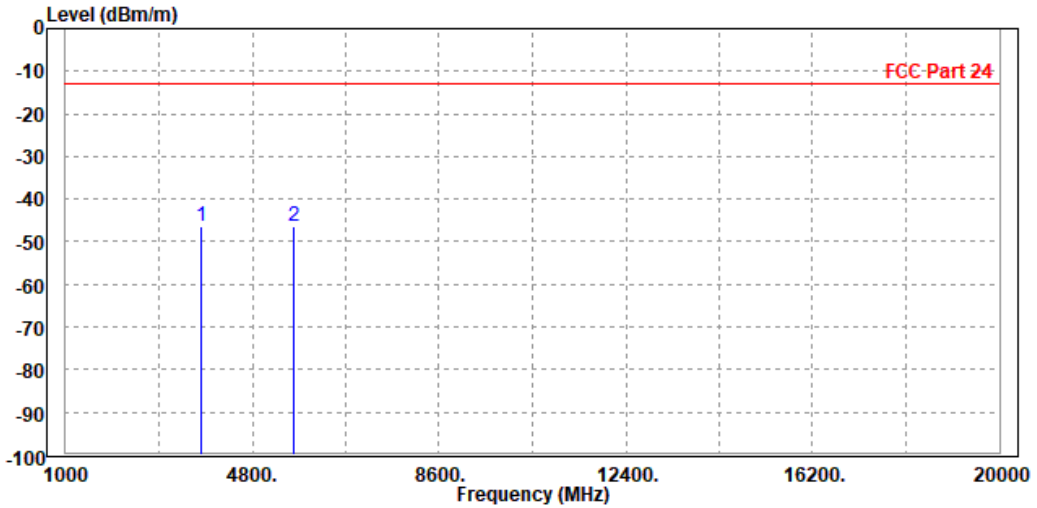
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 3755.000 | -46.08 | -54.93     | -13.00     | -33.08     | 8.85   | Peak   | Horizontal |
| 2 PP | 5640.000 | -43.33 | -53.81     | -13.00     | -30.33     | 10.48  | Peak   | Horizontal |





|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 3755.000 | -46.44 | -55.71     | -13.00     | -33.44     | 9.27   | Peak   | Vertical  |
| 2 PP | 5640.000 | -46.22 | -56.47     | -13.00     | -33.22     | 10.25  | Peak   | Vertical  |

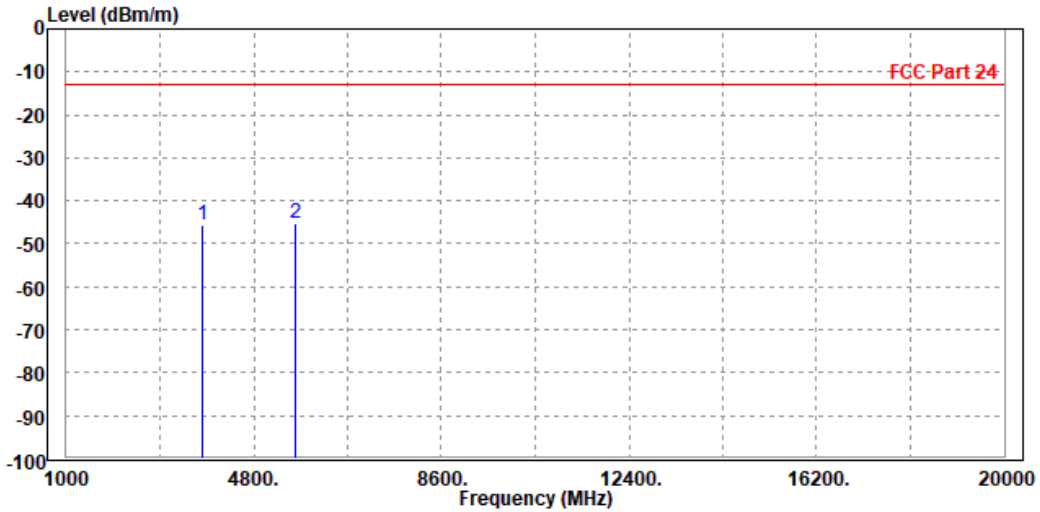




CHANNEL BANDWIDTH: 5MHz / QPSK

|   |                  |                 |                    |
|---|------------------|-----------------|--------------------|
| MODE  | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                            | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY   | Jacky Liu        |                 |                    |
| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M |                  |                 |                    |

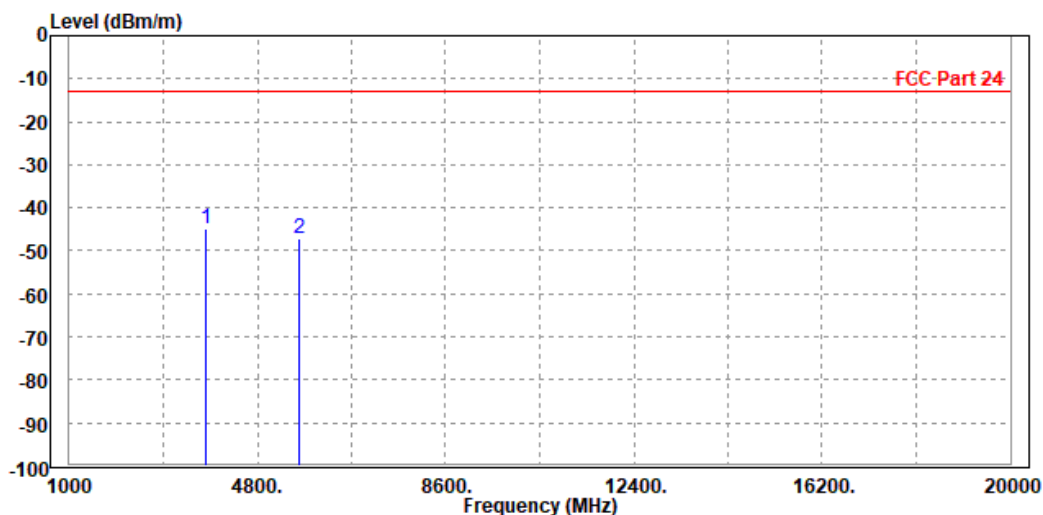
|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|-------------|--------|------------|------------|------------|--------|--------|------------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | 3755.000    | -45.81 | -54.66     | -13.00     | -32.81     | 8.85   | Peak   | Horizontal |
| 2 | PP 5640.000 | -45.11 | -55.59     | -13.00     | -32.11     | 10.48  | Peak   | Horizontal |





|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP 3755.000 | -44.72 | -53.99     | -13.00     | -31.72     | 9.27   | Peak   | Vertical  |
| 2 | 5640.000    | -47.17 | -57.42     | -13.00     | -34.17     | 10.25  | Peak   | Vertical  |





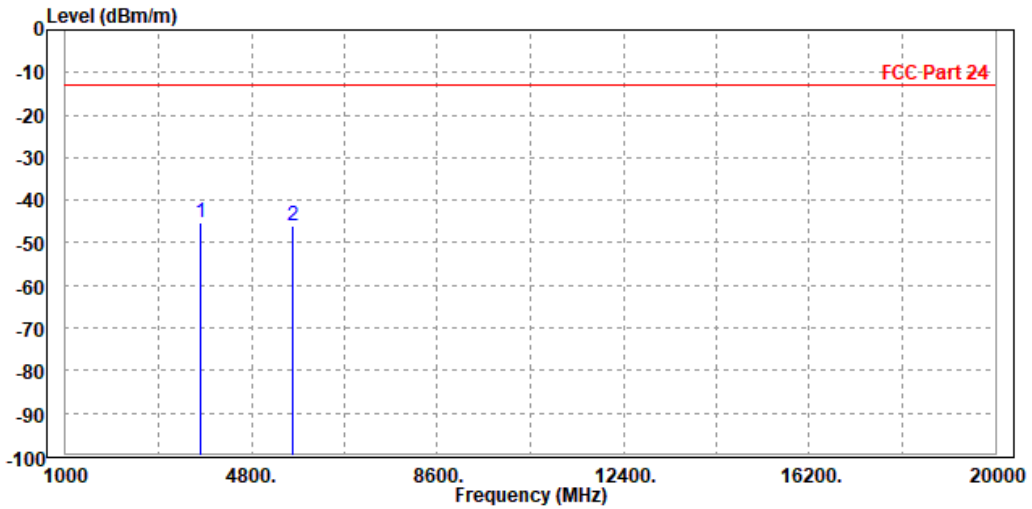
**BUREAU VERITAS**

Test Report No.: RFP20120028-2

**CHANNEL BANDWIDTH: 10MHz / QPSK**

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 PP | 3755.000 | -45.34 | -54.19     | -13.00     | -32.34     | 8.85   | Peak   | Horizontal |
| 2    | 5640.000 | -45.84 | -56.32     | -13.00     | -32.84     | 10.48  | Peak   | Horizontal |



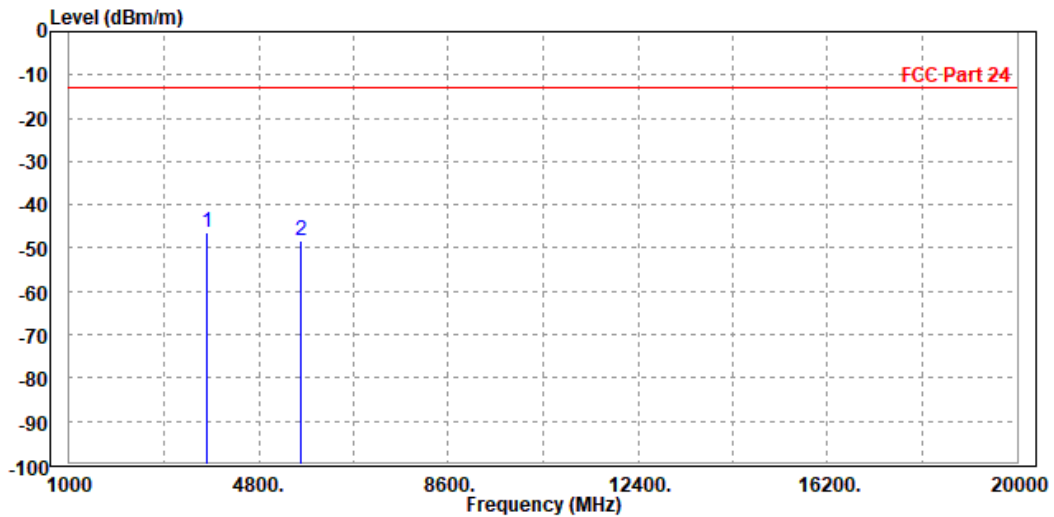


**BUREAU  
VERITAS**

Test Report No.: RFP20120028-2

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                              | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                        |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP 3755.000 | -46.29 | -55.56     | -13.00     | -33.29     | 9.27   | Peak   | Vertical  |
| 2 | 5640.000    | -48.30 | -58.55     | -13.00     | -35.30     | 10.25  | Peak   | Vertical  |





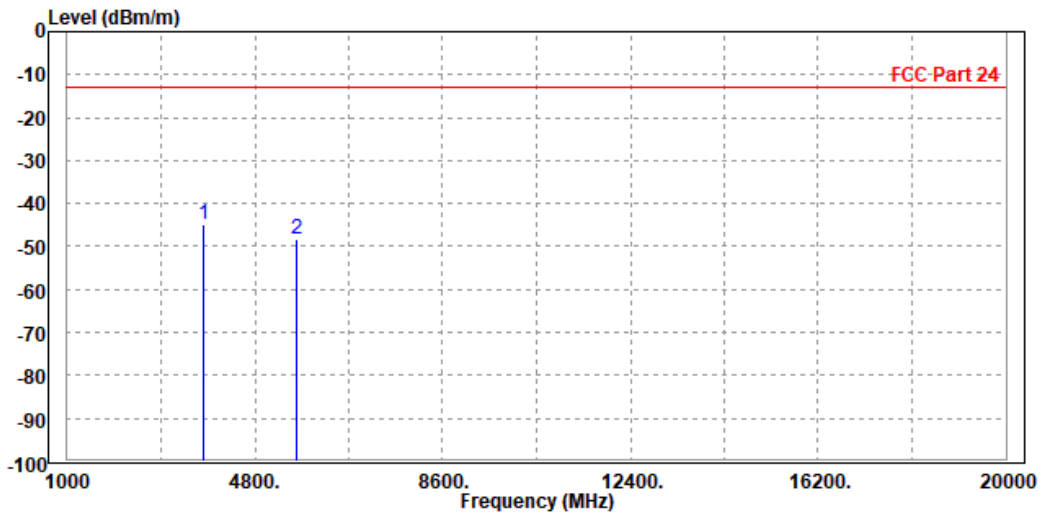
**BUREAU  
VERITAS**

Test Report No.: RFP20120028-2

**CHANNEL BANDWIDTH: 15MHz / QPSK**

|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                                | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                        |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|---|-------------|--------|------------|------------|------------|--------|--------|------------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1 | PP 3755.000 | -44.94 | -53.79     | -13.00     | -31.94     | 8.85   | Peak   | Horizontal |
| 2 | 5640.000    | -48.11 | -58.59     | -13.00     | -35.11     | 10.48  | Peak   | Horizontal |





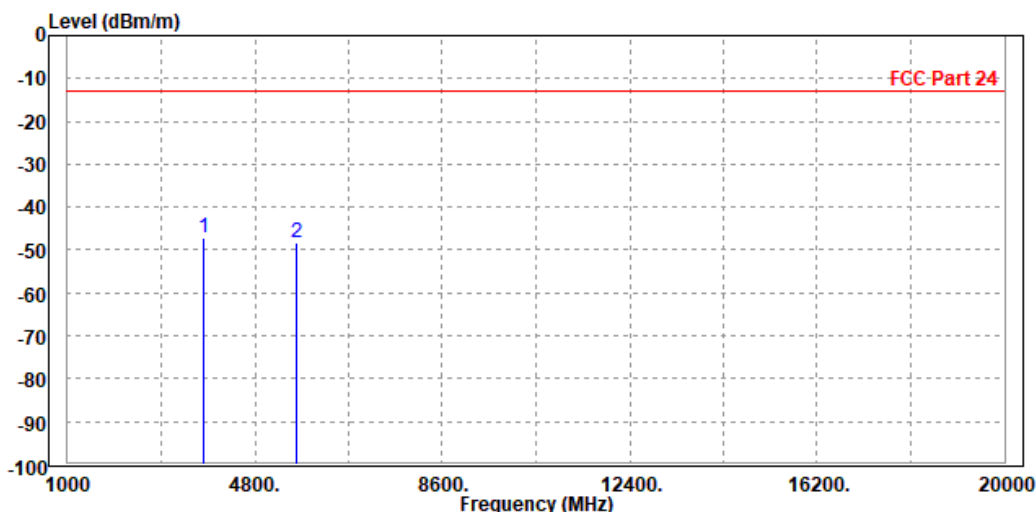


BUREAU VERITAS

Test Report No.: RFP20120028-2

|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                     | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                 |                    |

|   | Freq        | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|---|-------------|--------|------------|------------|------------|--------|--------|-----------|
|   | MHz         | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1 | PP 3755.000 | -46.99 | -56.26     | -13.00     | -33.99     | 9.27   | Peak   | Vertical  |
| 2 | 5640.000    | -48.21 | -58.46     | -13.00     | -35.21     | 10.25  | Peak   | Vertical  |

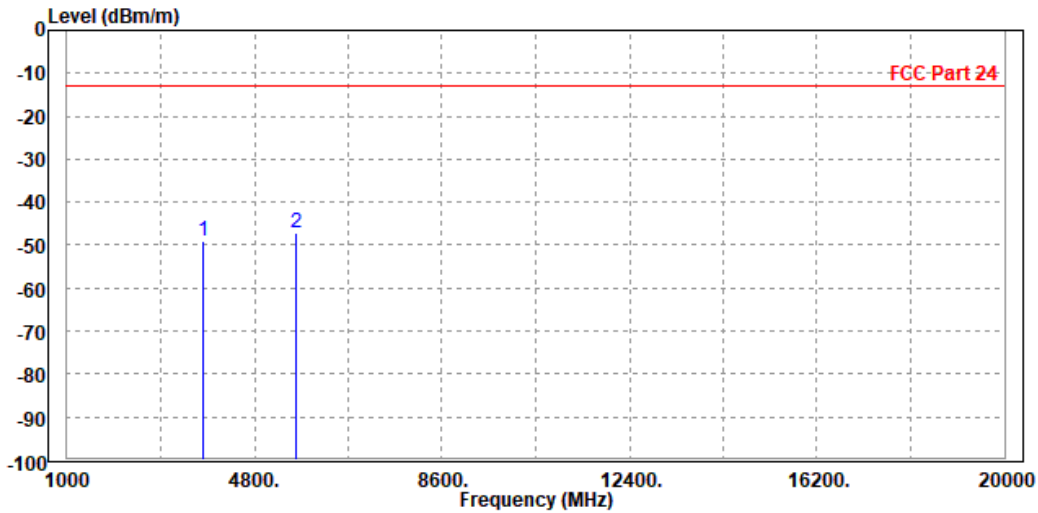




CHANNEL BANDWIDTH: 20MHz / QPSK

|  |                  |                 |                    |
|--|------------------|-----------------|--------------------|
| MODE   | TX channel 18900 | FREQUENCY RANGE | Above 1000MHz      |
| ENVIRONMENTAL CONDITIONS                                       | 23deg. C, 70%RH  | INPUT POWER     | DC 3.7V by battery |
| TESTED BY  | Jacky Liu        |                 |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                  |                 |                    |

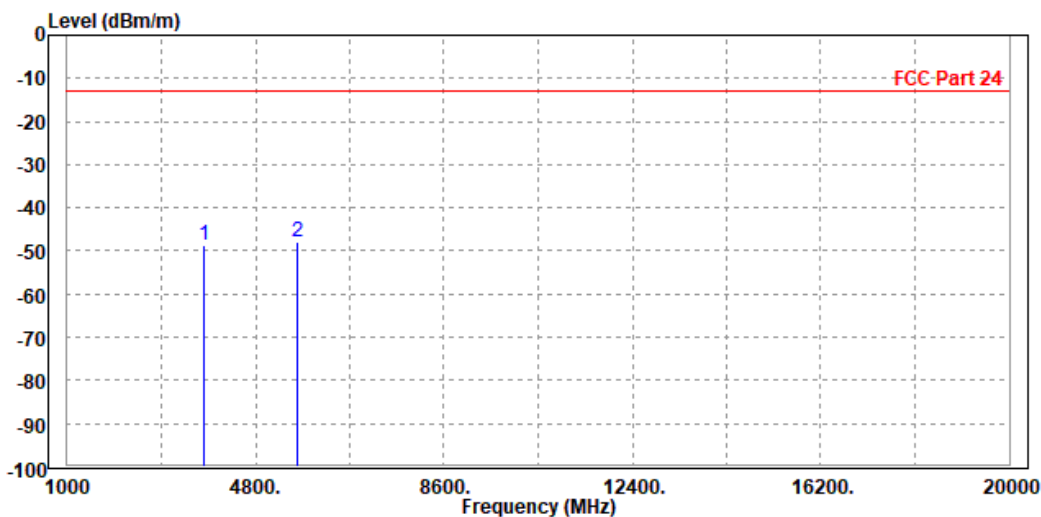
|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase  |
|------|----------|--------|------------|------------|------------|--------|--------|------------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |            |
| 1    | 3755.000 | -48.90 | -57.75     | -13.00     | -35.90     | 8.85   | Peak   | Horizontal |
| 2 PP | 5640.000 | -47.26 | -57.74     | -13.00     | -34.26     | 10.48  | Peak   | Horizontal |





|  |                  |                        |                    |
|--|------------------|------------------------|--------------------|
| <b>MODE</b>  | TX channel 18900 | <b>FREQUENCY RANGE</b> | Above 1000MHz      |
| <b>ENVIRONMENTAL CONDITIONS</b>                              | 23deg. C, 70%RH  | <b>INPUT POWER</b>     | DC 3.7V by battery |
| <b>TESTED BY</b>   | Jacky Liu        |                        |                    |
| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |                  |                        |                    |

|      | Freq     | Level  | Read Level | Limit Line | Over Limit | Factor | Remark | Pol/Phase |
|------|----------|--------|------------|------------|------------|--------|--------|-----------|
|      | MHz      | dBm/m  | dBm        | dBm/m      | dB         | dB/m   |        |           |
| 1    | 3755.000 | -48.82 | -58.09     | -13.00     | -35.82     | 9.27   | Peak   | Vertical  |
| 2 PP | 5640.000 | -48.00 | -58.25     | -13.00     | -35.00     | 10.25  | Peak   | Vertical  |



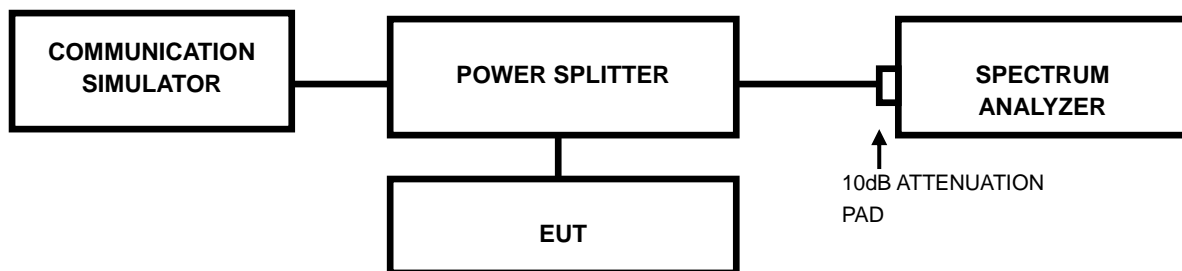


### 3.7 PEAK TO AVERAGE RATIO

#### 3.7.1 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

#### 3.7.2 TEST SETUP



#### 3.7.3 TEST PROCEDURES

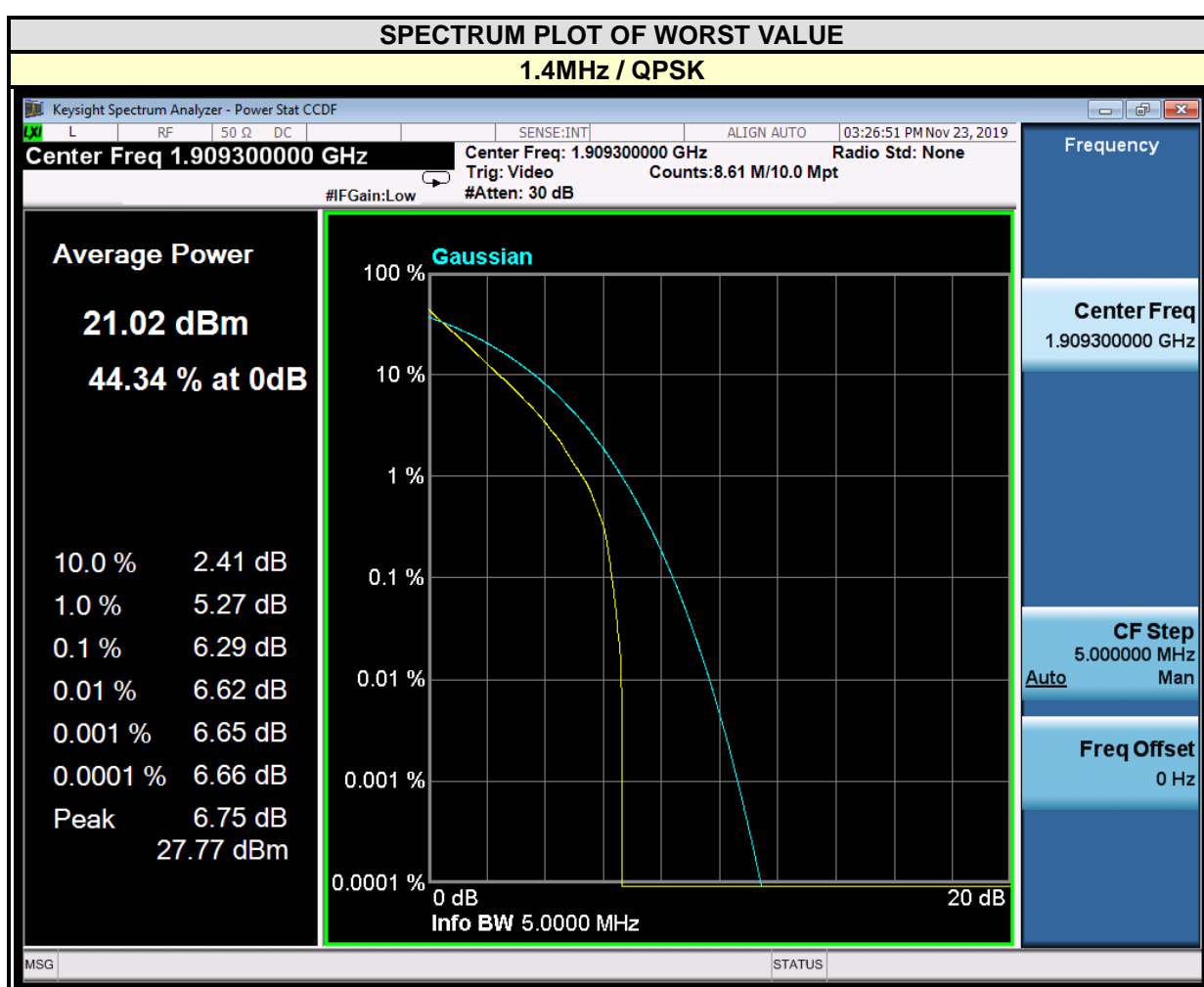
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.



### 3.7.4 TEST RESULTS

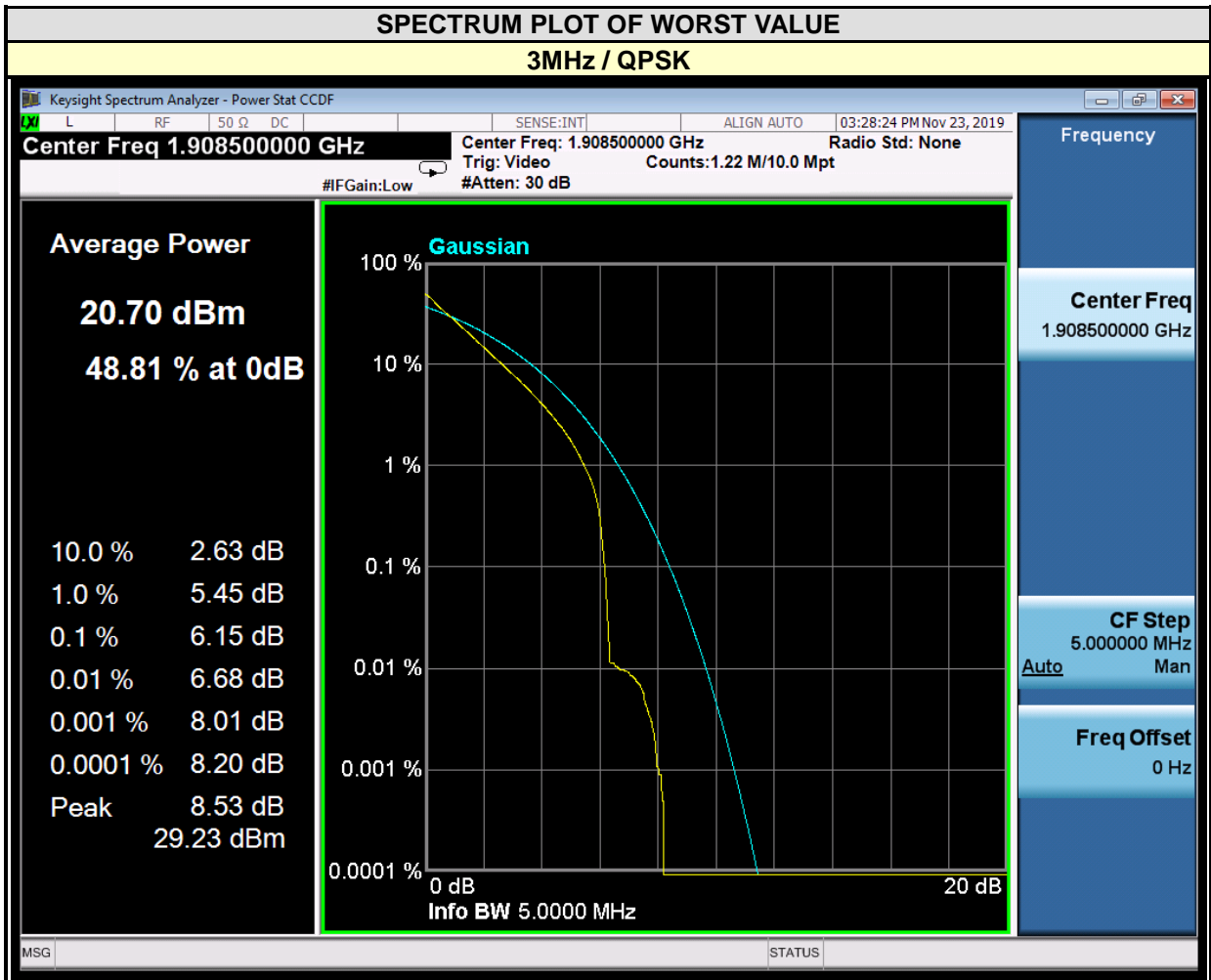
#### LTE BAND 2

| CHANNEL BANDWIDTH: 1.4MHz |                 |                            |
|---------------------------|-----------------|----------------------------|
| CHANNEL                   | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                           |                 | QPSK                       |
| 18607                     | 1850.7          | 4.15                       |
| 18900                     | 1880            | 6.06                       |
| 19193                     | 1909.3          | 6.29                       |



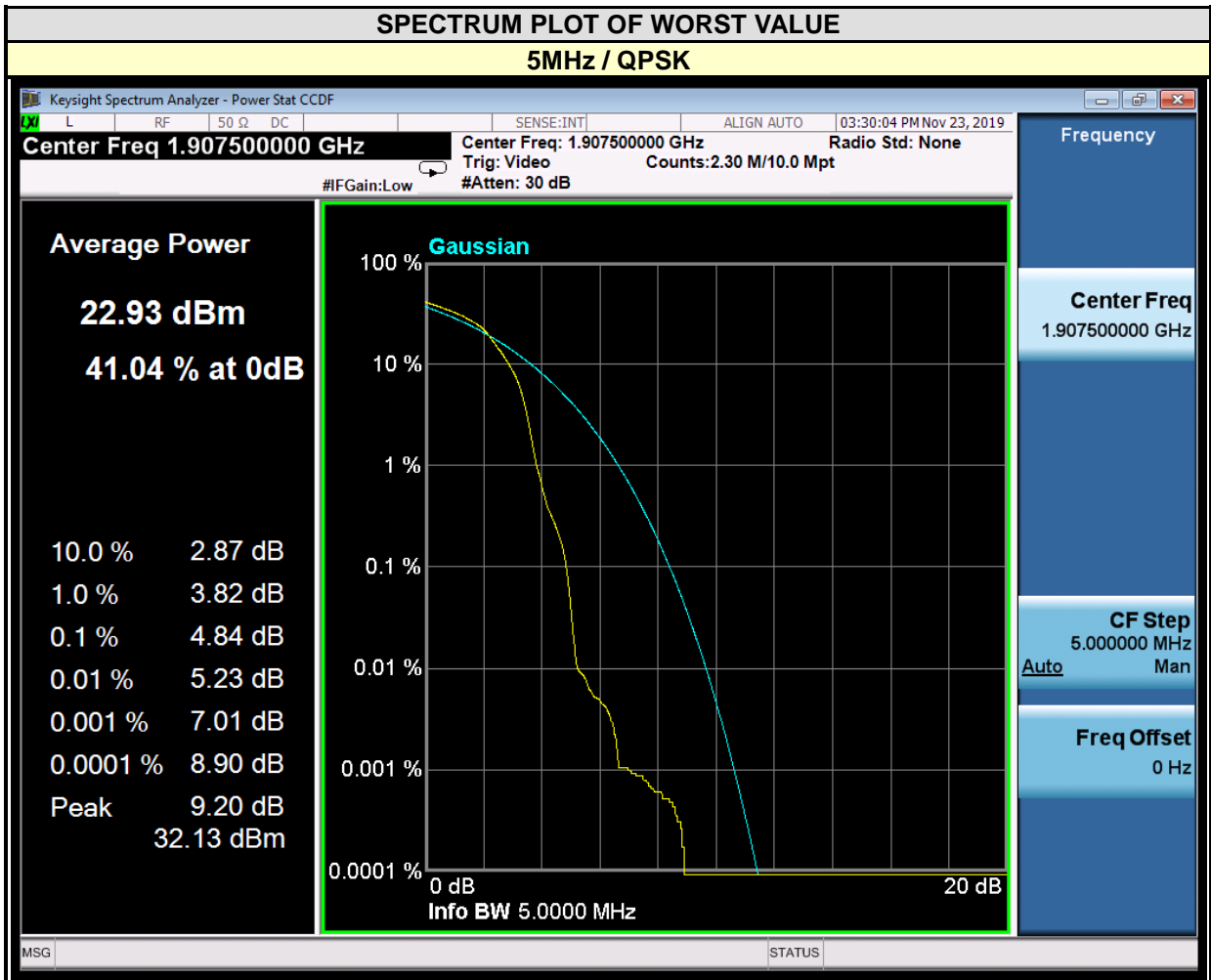


| CHANNEL BANDWIDTH: 3MHz |                 |                            |
|-------------------------|-----------------|----------------------------|
| CHANNEL                 | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                         |                 | QPSK                       |
| 18615                   | 1851.5          | 5.49                       |
| 18900                   | 1880            | 5.73                       |
| 19185                   | 1908.5          | 6.15                       |



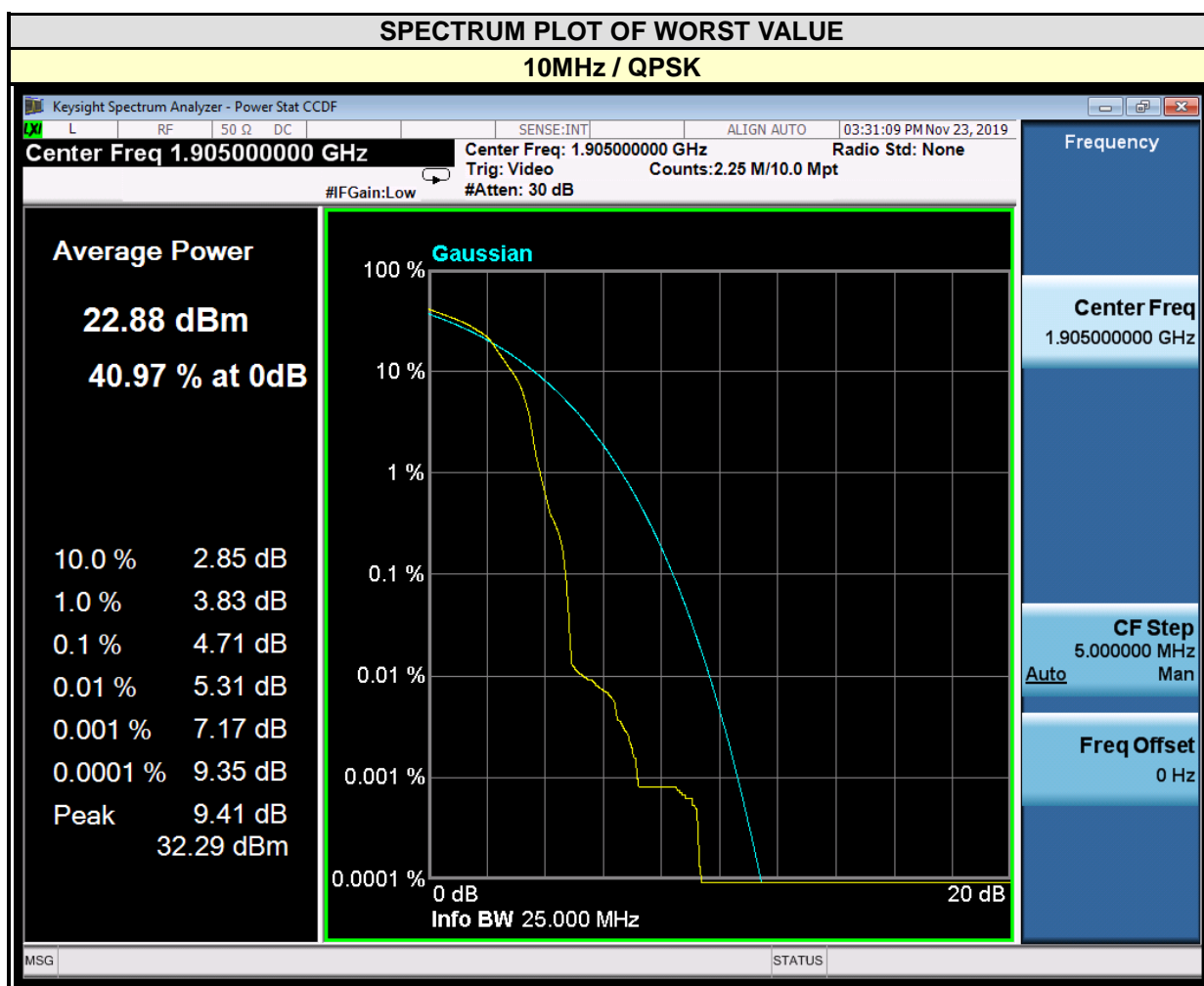


| CHANNEL BANDWIDTH: 5MHz |                 |                            |
|-------------------------|-----------------|----------------------------|
| CHANNEL                 | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                         |                 | QPSK                       |
| 18625                   | 1852.5          | 4.63                       |
| 18900                   | 1880            | 4.63                       |
| 19175                   | 1907.5          | 4.84                       |





| CHANNEL BANDWIDTH: 10MHz |                 |                            |
|--------------------------|-----------------|----------------------------|
| CHANNEL                  | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                          |                 | QPSK                       |
| 18650                    | 1855            | 4.52                       |
| 18900                    | 1880            | 4.67                       |
| 19150                    | 1905            | 4.71                       |



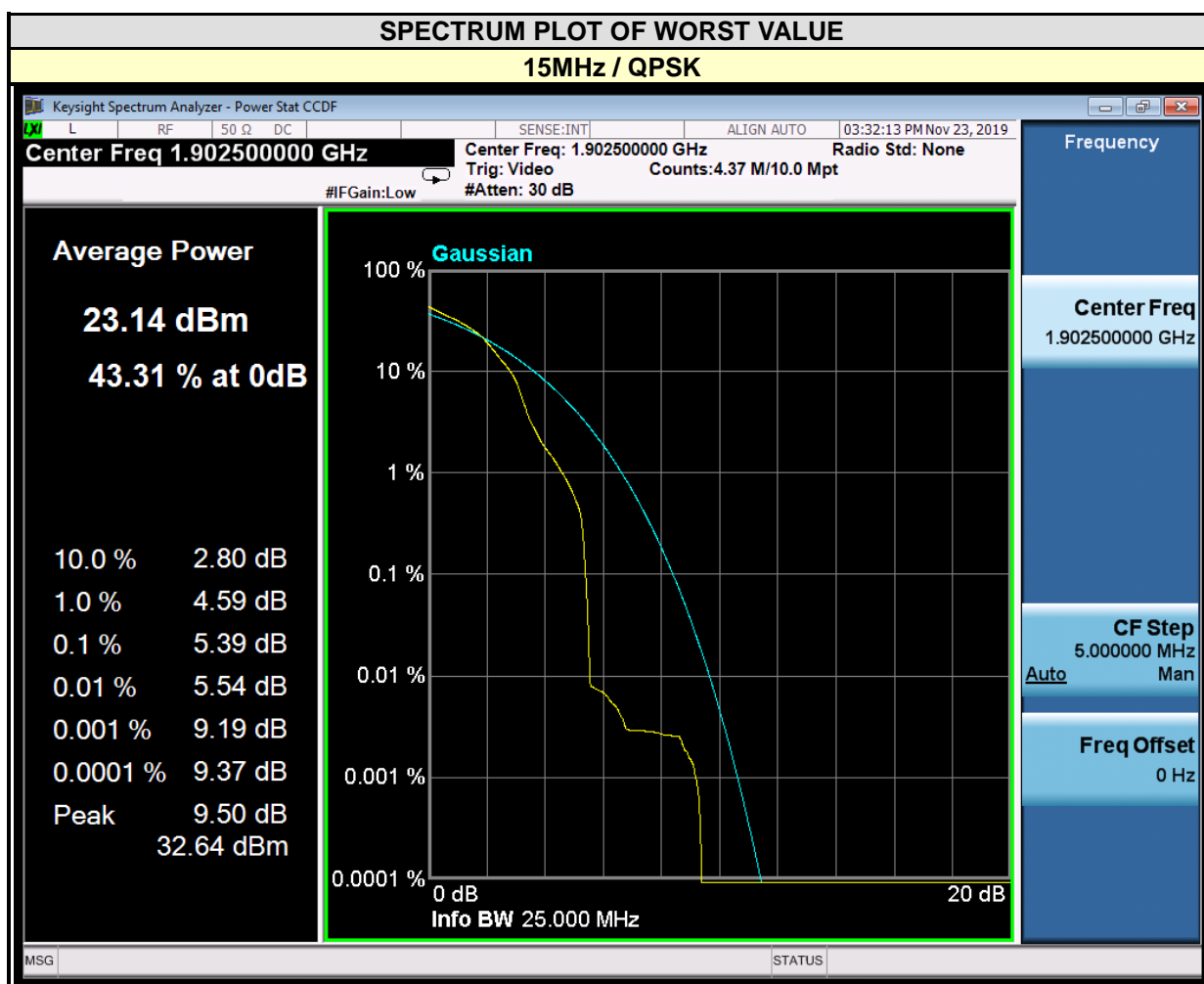




BUREAU VERITAS

Test Report No.: RFP20120028-2

| CHANNEL BANDWIDTH: 15MHz |                 |                            |
|--------------------------|-----------------|----------------------------|
| CHANNEL                  | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                          |                 | QPSK                       |
| 18675                    | 1857.5          | 5.30                       |
| 18900                    | 1880            | 5.39                       |
| 19125                    | 1902.5          | 5.39                       |





| CHANNEL BANDWIDTH: 20MHz |                 |                            |
|--------------------------|-----------------|----------------------------|
| CHANNEL                  | Frequency (MHz) | PEAK TO AVERAGE RATIO (dB) |
|                          |                 | QPSK                       |
| 18700                    | 1860            | 4.98                       |
| 18900                    | 1880            | 5.24                       |
| 19100                    | 1900            | 5.49                       |





**BUREAU VERITAS** Test Report No.: RFP20120028-2

## 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:

**Shenzhen EMC/RF Lab:**

Tel: +86-755-88696566

Fax: +86-755-88696577

**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.



**BUREAU** Test Report No.: RFP20120028-2  
**VERITAS**

## 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---