

# FCC TEST REPORT

## (PART 24)

|            |                                                                                                                           |
|------------|---------------------------------------------------------------------------------------------------------------------------|
| Applicant: | Shenzhen Neoway Technology Co.,Ltd.                                                                                       |
| Address:   | 4F-2#,Lianjian Science&Industry Park, Huarong Road, Dalang,Longhua District, Shenzhen City, Guangdong Province, P.R.China |

|                          |                                                                                                                           |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Manufacturer or Supplier | Shenzhen Neoway Technology Co.,Ltd.                                                                                       |
| Address                  | 4F-2#,Lianjian Science&Industry Park, Huarong Road, Dalang,Longhua District, Shenzhen City, Guangdong Province, P.R.China |
| Product                  | Cat.M1 Module                                                                                                             |
| Brand Name               | neoway                                                                                                                    |
| Model Name               | N27-W3                                                                                                                    |
| FCC ID                   | PJ7-N27-W3                                                                                                                |
| Date of tests            | Nov. 23, 2019 ~ Jan. 09, 2020                                                                                             |

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

|                                                                                     |                                                                                       |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Prepared by Alex Chen<br>Engineer / Mobile Department                               | Approved by Luke Lu<br>Manager / Mobile Department                                    |
|  |  |
| Date: Jan. 14, 2020                                                                 | Date: Jan. 14, 2020                                                                   |

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## TABLE OF CONTENTS

|                                                                |           |
|----------------------------------------------------------------|-----------|
| <b>RELEASE CONTROL RECORD .....</b>                            | <b>4</b>  |
| <b>1 SUMMARY OF TEST RESULTS .....</b>                         | <b>5</b>  |
| 1.1 MEASUREMENT UNCERTAINTY .....                              | 5         |
| 1.2 TEST SITE AND INSTRUMENTS .....                            | 6         |
| <b>2 GENERAL INFORMATION .....</b>                             | <b>7</b>  |
| 2.1 GENERAL DESCRIPTION OF EUT .....                           | 7         |
| 2.2 CONFIGURATION OF SYSTEM UNDER TEST .....                   | 11        |
| 2.3 DESCRIPTION OF SUPPORT UNITS .....                         | 12        |
| 2.4 TEST ITEM AND TEST CONFIGURATION .....                     | 12        |
| 2.5 EUT OPERATING CONDITIONS .....                             | 17        |
| 2.6 GENERAL DESCRIPTION OF APPLIED STANDARDS .....             | 17        |
| <b>3 TEST TYPES AND RESULTS .....</b>                          | <b>18</b> |
| 3.1 OUTPUT POWER MEASUREMENT .....                             | 18        |
| 3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT .....                 | 18        |
| 3.1.2 TEST PROCEDURES .....                                    | 18        |
| 3.1.3 TEST SETUP .....                                         | 18        |
| 3.1.4 TEST RESULTS .....                                       | 19        |
| 3.2 FREQUENCY STABILITY MEASUREMENT .....                      | 33        |
| 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT .....          | 33        |
| 3.2.2 TEST PROCEDURE .....                                     | 33        |
| 3.2.3 TEST SETUP .....                                         | 33        |
| 3.2.4 TEST RESULTS .....                                       | 34        |
| 3.3 OCCUPIED BANDWIDTH MEASUREMENT .....                       | 48        |
| 3.3.1 TEST PROCEDURES .....                                    | 48        |
| 3.3.2 TEST SETUP .....                                         | 48        |
| 3.3.3 TEST RESULTS .....                                       | 49        |
| 3.4 BAND EDGE MEASUREMENT .....                                | 62        |
| 3.4.1 LIMITS OF BAND EDGE MEASUREMENT .....                    | 62        |
| 3.4.2 TEST SETUP .....                                         | 62        |
| 3.4.3 TEST PROCEDURES .....                                    | 63        |
| 3.4.4 TEST RESULTS .....                                       | 64        |
| 3.5 CONDUCTED SPURIOUS EMISSIONS .....                         | 89        |
| 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT ..... | 89        |
| 3.5.2 TEST PROCEDURE .....                                     | 89        |
| 3.5.3 TEST SETUP .....                                         | 89        |
| 3.5.4 TEST RESULTS .....                                       | 90        |
| 3.6 RADIATED EMISSION MEASUREMENT .....                        | 104       |
| 3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT .....            | 104       |
| 3.6.2 TEST PROCEDURES .....                                    | 104       |
| 3.6.3 DEVIATION FROM TEST STANDARD .....                       | 104       |
| 3.6.4 TEST SETUP .....                                         | 105       |
| 3.6.5 TEST RESULTS .....                                       | 106       |
| 3.7 PEAK TO AVERAGE RATIO .....                                | 152       |
| 3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT .....        | 152       |
| 3.7.2 TEST SETUP .....                                         | 152       |
| 3.7.3 TEST PROCEDURES .....                                    | 152       |
| 3.7.4 TEST RESULTS .....                                       | 153       |



Test Report No.: RF191122W002-2

4 INFORMATION ON THE TESTING LABORATORIES..... 171

5 APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT  
BY THE LAB ..... 172



Test Report No.: RF191122W002-2

## RELEASE CONTROL RECORD

| ISSUE NO.      | REASON FOR CHANGE | DATE ISSUED   |
|----------------|-------------------|---------------|
| RF191122W002-2 | Original release  | Jan. 14, 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                                | $\pm 76.97\text{Hz}$  |
| Radiated emissions & Radiated Power (30MHz~1GMHz)  | $\pm 4.98\text{dB}$   |
| Radiated emissions & Radiated Power (1GMHz ~6GMHz) | $\pm 4.70\text{dB}$   |
| Radiated emissions (6GMHz ~18GMHz)                 | $\pm 4.60\text{dB}$   |
| Radiated emissions (18GMHz ~40GMHz)                | $\pm 4.12\text{dB}$   |
| Conducted emissions                                | $\pm 4.01\text{dB}$   |
| Occupied Channel Bandwidth                         | $\pm 43.58\text{KHz}$ |
| Conducted Output power                             | $\pm 2.06\text{dB}$   |
| Band Edge Measurements                             | $\pm 4.70\text{dB}$   |
| Peak to average ratio                              | $\pm 0.76\text{dB}$   |

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 1                             | ETS-LINDGREN | 3143B                               | 00161964                        | Feb. 26,19  | Feb. 25,20  |
| Bilog Antenna 2                             | ETS-LINDGREN | 3143B                               | 00161965                        | Feb. 26,19  | Feb. 25,20  |
| Horn Antenna 1                              | ETS-LINDGREN | 3117                                | 00168728                        | Feb. 26,19  | Feb. 25,20  |
| Horn Antenna 2                              | ETS-LINDGREN | 3117                                | 00168692                        | Nov. 24, 19 | Nov. 23, 20 |
| Horn Antenna<br>(18GHz-40GHz)               | N/A          | QWH-SL-18-40<br>-K-SG/QMS-00<br>361 | 15433                           | Nov. 24, 19 | Nov. 23, 20 |
| Radio<br>Communication<br>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<br>Chamber                 | ETS-LINDGREN | 9m*6m*6m                            | Euroshieldpn-<br>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<br>V7.6.15.9.2         | N/A                             | N/A         | N/A         |
| 10dB Attenuator                             | JFW/USA      | 50HF-010-SM<br>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<br>Programmable Tester         | Juyi         | ITH-120-45-CP<br>-AR                | IAA1504-001                     | Jun. 24,19  | Jun. 23,20  |
| MXG Analog<br>Microwave<br>Signal Generator | KEYSIGHT     | N5183A                              | MY50143024                      | Feb. 26,19  | Feb. 25,20  |

**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>         | Cat.M1 Module                                                                             |                       |
| <b>BRAND NAME</b>      | neoway                                                                                    |                       |
| <b>MODEL NAME</b>      | N27-W3                                                                                    |                       |
| <b>POWER SUPPLY</b>    | $V_{\min}=3.1\text{Vdc}$ , $V_{\text{nor}}=3.6\text{Vdc}$ , $V_{\max}=4.3\text{Vdc}$      |                       |
| <b>MODULATION TYPE</b> | <b>GSM, GPRS:</b> GMSK, 8PSK<br><b>EDGE:</b> GMSK, 8PSK<br><b>LTE CAT-M1:</b> QPSK, 16QAM |                       |
| <b>FREQUENCY RANGE</b> | <b>GSM, GPRS, EDGE</b>                                                                    | 1850.2MHz ~ 1909.8MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 1.4MHz</b>                              | 1850.7MHz ~ 1909.3MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 3MHz</b>                                | 1851.5MHz ~ 1908.5MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 5MHz</b>                                | 1852.5MHz ~ 1907.5MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 10MHz</b>                               | 1855.0MHz ~ 1905.0MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 15MHz</b>                               | 1857.5MHz ~ 1902.5MHz |
|                        | <b>LTE CAT-M1 Band 2</b><br><b>Channel Bandwidth: 20MHz</b>                               | 1860.0MHz ~ 1900.0MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 1.4MHz</b>                             | 1850.7MHz ~ 1914.3MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 3MHz</b>                               | 1851.5MHz ~ 1913.5MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 5MHz</b>                               | 1852.5MHz ~ 1912.5MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 10MHz</b>                              | 1855.0MHz ~ 1910.0MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 15MHz</b>                              | 1857.5MHz ~ 1907.5MHz |
|                        | <b>LTE CAT-M1 Band 25</b><br><b>Channel Bandwidth: 20MHz</b>                              | 1860.0MHz ~ 1905.0MHz |



|                        |                                                         |        |
|------------------------|---------------------------------------------------------|--------|
| <b>MAX. EIRP POWER</b> | <b>GSM</b>                                              | 1312mW |
|                        | <b>EDGE</b>                                             | 457mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 1.4MHz</b>  | 318mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 3MHz</b>    | 320mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 5MHz</b>    | 319mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 10MHz</b>   | 324mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 15MHz</b>   | 326mW  |
|                        | <b>LTE CAT-M1 Band 2<br/>Channel Bandwidth: 20MHz</b>   | 330mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 1.4MHz</b> | 288mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 3MHz</b>   | 287mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 5MHz</b>   | 292mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 10MHz</b>  | 288mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 15MHz</b>  | 296mW  |
|                        | <b>LTE CAT-M1 Band 25<br/>Channel Bandwidth: 20MHz</b>  | 297mW  |



|                            |                                                                                                                                                                 |                |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| <b>EMISSION DESIGNATOR</b> | <b>GSM</b>                                                                                                                                                      | 243KGXW        |
|                            | <b>EDGE</b>                                                                                                                                                     | 242KG7W        |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M10G7D  |
|                            | <b>Channel Bandwidth: 1.4MHz</b>                                                                                                                                | 16QAM: 1M10W7D |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M26G7D  |
|                            | <b>Channel Bandwidth: 3MHz</b>                                                                                                                                  | 16QAM: 1M11W7D |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M09G7D  |
|                            | <b>Channel Bandwidth: 5MHz</b>                                                                                                                                  | 16QAM: 910KW7D |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M08G7D  |
|                            | <b>Channel Bandwidth: 10MHz</b>                                                                                                                                 | 16QAM: 910KW7D |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M09G7D  |
|                            | <b>Channel Bandwidth: 15MHz</b>                                                                                                                                 | 16QAM: 913KW7D |
|                            | <b>LTE CAT-M1 Band 2</b>                                                                                                                                        | QPSK: 1M08G7D  |
|                            | <b>Channel Bandwidth: 20MHz</b>                                                                                                                                 | 16QAM: 915KW7D |
|                            | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M10G7D  |
|                            | <b>Channel Bandwidth: 1.4MHz</b>                                                                                                                                | 16QAM: 1M10W7D |
|                            | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M26G7D  |
|                            | <b>Channel Bandwidth: 3MHz</b>                                                                                                                                  | 16QAM: 1M09W7D |
| <b>ANTENNA TYPE</b>        | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M08G7D  |
|                            | <b>Channel Bandwidth: 5MHz</b>                                                                                                                                  | 16QAM: 907KW7D |
|                            | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M08G7D  |
|                            | <b>Channel Bandwidth: 10MHz</b>                                                                                                                                 | 16QAM: 908KW7D |
|                            | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M09G7D  |
|                            | <b>Channel Bandwidth: 15MHz</b>                                                                                                                                 | 16QAM: 908KW7D |
|                            | <b>LTE CAT-M1 Band 25</b>                                                                                                                                       | QPSK: 1M09G7D  |
|                            | <b>Channel Bandwidth: 20MHz</b>                                                                                                                                 | 16QAM: 911KW7D |
| <b>ANTENNA TYPE</b>        | Monopole antenna with 2dBi gain for GSM 1900<br>Monopole antenna with 2dBi gain for LTE CAT-M1 Band 2<br>Monopole antenna with 2dBi gain for LTE CAT-M1 Band 25 |                |
| <b>HW VERSION</b>          | V1.1                                                                                                                                                            |                |
| <b>SW VERSION</b>          | N27-Q01-STDBZ-01B                                                                                                                                               |                |
| <b>I/O PORTS</b>           | Refer to user's manual                                                                                                                                          |                |



## Test Report No.: RF191122W002-2

### NOTE:

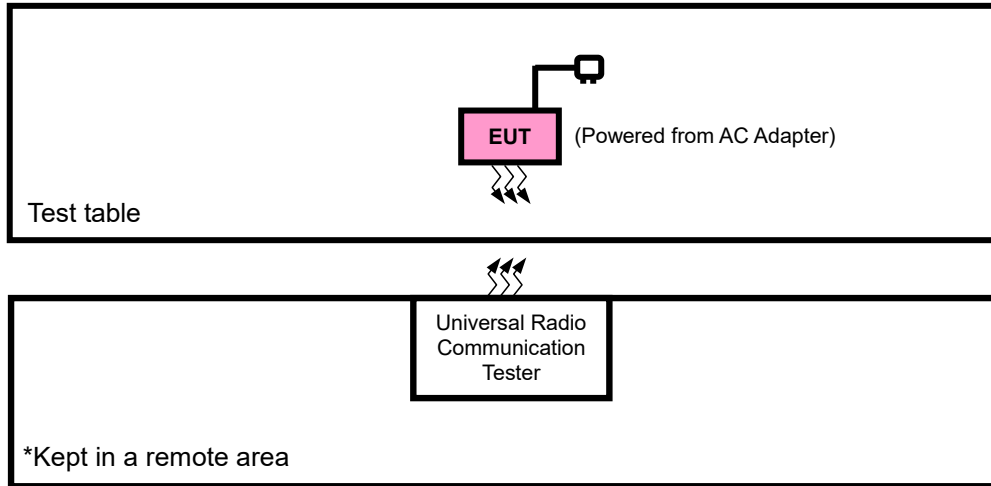
1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
3. The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

| MODULATION MODE | TX FUNCTION |
|-----------------|-------------|
| GSM/GPRS/EDGE   | 1TX/1RX     |
| LTE CAT-M1      | 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   | Adapter   | JINGSAI  | CLS-050200 | N/A        | N/A    |
| 2   | DC source | LONG WEI | PS-6403D   | 010934269  | N/A    |

| NO. | SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS |
|-----|-----------------------------------------------------|
| 1   | Unshielded, Detachable 1.8m                         |
| 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 GSM/EDGE / LTE. Following channel(s) was (were) selected for the final test as listed below:

| EUT CONFIGURE MODE | DESCRIPTION                               |
|--------------------|-------------------------------------------|
| -                  | EUT + Adapter with GSM or LTE CAT-M1 link |



Test Report No.: RF191122W002-2

## GSM MODE

| TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL | MODE      |
|-----------------------|-------------------|----------------|-----------|
| EIRP                  | 512 to 810        | 512, 661, 810  | GSM, EDGE |
| FREQUENCY STABILITY   | 512 to 810        | 512, 810       | GSM, EDGE |
| OCCUPIED BANDWIDTH    | 512 to 810        | 512, 661, 810  | GSM, EDGE |
| PEAK TO AVERAGE RATIO | 512 to 810        | 512, 661, 810  | GSM, EDGE |
| BAND EDGE             | 512 to 810        | 512, 810       | GSM, EDGE |
| CONDCUDED EMISSION    | 512 to 810        | 512, 661, 810  | GSM, EDGE |
| RADIATED EMISSION     | 512 to 810        | 512, 661, 810  | GSM, EDGE |

## LTE CAT-M1 BAND 2

| TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION | MODE                                     |
|-----------------------|-------------------|---------------------|-------------------|------------|------------------------------------------|
| EIRP                  | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
| FREQUENCY STABILITY   | 18607 to 19193    | 18607, 19193        | 1.4MHz            | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 18615 to 19185    | 18615, 19185        | 3MHz              | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 18625 to 19175    | 18625, 19175        | 5MHz              | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 18650 to 19150    | 18650, 19150        | 10MHz             | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 18675 to 19125    | 18675, 19125        | 15MHz             | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 18700 to 19100    | 18700, 19100        | 20MHz             | QPSK       | 2 RB / 0 RB Offset                       |
| OCCUPIED BANDWIDTH    | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
| PEAK TO AVERAGE RATIO | 18607 to 19193    | 18607, 18900, 19193 | 1.4MHz            | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18615 to 19185    | 18615, 18900, 19185 | 3MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18625 to 19175    | 18625, 18900, 19175 | 5MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18650 to 19150    | 18650, 18900, 19150 | 10MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18675 to 19125    | 18675, 18900, 19125 | 15MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 18700 to 19100    | 18700, 18900, 19100 | 20MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |



|                    |                |                     |        |            |                    |
|--------------------|----------------|---------------------|--------|------------|--------------------|
| BAND EDGE          | 18607 to 19193 | 18607               | 1.4MHz | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19193               | 1.4MHz | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 18615 to 19185 | 18615               | 3MHz   | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19185               | 3MHz   | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    |                | 19185               | 3MHz   | QPSK,16QAM | 5 RB / 0 RB Offset |
|                    | 18625 to 19175 | 18625               | 5MHz   | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19175               | 5MHz   | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    |                | 19175               | 5MHz   | QPSK,16QAM | 5 RB / 0 RB Offset |
|                    | 18650 to 19150 | 18650               | 10MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19150               | 10MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    |                | 19150               | 10MHz  | QPSK,16QAM | 5 RB / 0 RB Offset |
|                    | 18675 to 19125 | 18675               | 15MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19125               | 15MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    |                | 19125               | 15MHz  | QPSK,16QAM | 5 RB / 0 RB Offset |
|                    | 18700 to 19100 | 18700               | 20MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 19100               | 20MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    |                | 19100               | 20MHz  | QPSK,16QAM | 5 RB / 0 RB Offset |
| CONDCUDED EMISSION | 18607 to 19193 | 18607, 18900, 19193 | 1.4MHz | QPSK       | 2 RB / 0 RB Offset |
|                    | 18615 to 19185 | 18615, 18900, 19185 | 3MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 18625 to 19175 | 18625, 18900, 19175 | 5MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 18650 to 19150 | 18650, 18900, 19150 | 10MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 18675 to 19125 | 18675, 18900, 19125 | 15MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 18700 to 19100 | 18700, 18900, 19100 | 20MHz  | QPSK       | 2 RB / 0 RB Offset |
| RADIATED EMISSION  | 18607 to 19193 | 18900               | 1.4MHz | QPSK       | 2 RB / 0 RB Offset |
|                    | 18615 to 19185 | 18900               | 3MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 18625 to 19175 | 18900               | 5MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 18650 to 19150 | 18650, 18900, 19150 | 10MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 18675 to 19125 | 18900               | 15MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 18700 to 19100 | 18900               | 20MHz  | QPSK       | 2 RB / 0 RB Offset |



**LTE CAT-M1 BAND 25**

| TEST ITEM             | AVAILABLE CHANNEL | TESTED CHANNEL      | CHANNEL BANDWIDTH | MODULATION | MODE                                     |
|-----------------------|-------------------|---------------------|-------------------|------------|------------------------------------------|
| EIRP                  | 26047 to 26683    | 26047, 26365, 26683 | 1.4MHz            | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26055 to 26675    | 26055, 26365, 26675 | 3MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26065 to 26665    | 26065, 26365, 26665 | 5MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26090 to 26640    | 26090, 26365, 26640 | 10MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26115 to 26615    | 26115, 26365, 26615 | 15MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26140 to 26590    | 26140, 26365, 26590 | 20MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
| FREQUENCY STABILITY   | 26047 to 26683    | 26047, 26683        | 1.4MHz            | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 26055 to 26675    | 26055, 26675        | 3MHz              | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 26065 to 26665    | 26065, 26665        | 5MHz              | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 26090 to 26640    | 26090, 26640        | 10MHz             | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 26115 to 26615    | 26115, 26615        | 15MHz             | QPSK       | 2 RB / 0 RB Offset                       |
|                       | 26140 to 26590    | 26140, 26590        | 20MHz             | QPSK       | 2 RB / 0 RB Offset                       |
| OCCUPIED BANDWIDTH    | 26047 to 26683    | 26047, 26365, 26683 | 1.4MHz            | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 26055 to 26675    | 26055, 26365, 26675 | 3MHz              | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 26065 to 26665    | 26065, 26365, 26665 | 5MHz              | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 26090 to 26640    | 26090, 26365, 26640 | 10MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 26115 to 26615    | 26115, 26365, 26615 | 15MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
|                       | 26140 to 26590    | 26140, 26365, 26590 | 20MHz             | QPSK,16QAM | 6 RB / 0 RB Offset<br>5 RB / 0 RB Offset |
| PEAK TO AVERAGE RATIO | 26047 to 26683    | 26047, 26365, 26683 | 1.4MHz            | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26055 to 26675    | 26055, 26365, 26675 | 3MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26065 to 26665    | 26065, 26365, 26665 | 5MHz              | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26090 to 26640    | 26090, 26365, 26640 | 10MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26115 to 26615    | 26115, 26365, 26615 | 15MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |
|                       | 26140 to 26590    | 26140, 26365, 26590 | 20MHz             | QPSK,16QAM | 2 RB / 0 RB Offset                       |



|                    |                |                     |        |            |                    |
|--------------------|----------------|---------------------|--------|------------|--------------------|
| BAND EDGE          | 26047 to 26683 | 26047               | 1.4MHz | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26683               | 1.4MHz | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 26055 to 26675 | 26055               | 3MHz   | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26675               | 3MHz   | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 26065 to 26665 | 26065               | 5MHz   | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26665               | 5MHz   | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 26090 to 26640 | 26090               | 10MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26640               | 10MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 26115 to 26615 | 26115               | 15MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26615               | 15MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
|                    | 26140 to 26590 | 26140               | 20MHz  | QPSK,16QAM | 2 RB / 0 RB Offset |
|                    |                | 26590               | 20MHz  | QPSK,16QAM | 6 RB / 0 RB Offset |
| CONDCUDED EMISSION | 26047 to 26683 | 26047, 26365, 26683 | 1.4MHz | QPSK       | 2 RB / 0 RB Offset |
|                    | 26055 to 26675 | 26055, 26365, 26675 | 3MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 26065 to 26665 | 26065, 26365, 26665 | 5MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 26090 to 26640 | 26090, 26365, 26640 | 10MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 26115 to 26615 | 26115, 26365, 26615 | 15MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 26140 to 26590 | 26140, 26365, 26590 | 20MHz  | QPSK       | 2 RB / 0 RB Offset |
| RADIATED EMISSION  | 26047 to 26683 | 26365               | 1.4MHz | QPSK       | 2 RB / 0 RB Offset |
|                    | 26055 to 26675 | 26365               | 3MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 26065 to 26665 | 26365               | 5MHz   | QPSK       | 2 RB / 0 RB Offset |
|                    | 26090 to 26640 | 26365               | 10MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 26115 to 26615 | 26115, 26365, 26615 | 15MHz  | QPSK       | 2 RB / 0 RB Offset |
|                    | 26140 to 26590 | 26365               | 20MHz  | QPSK       | 2 RB / 0 RB Offset |

**TEST CONDITION:**

| TEST ITEM             | ENVIRONMENTAL CONDITIONS | INPUT POWER       | TESTED BY   |
|-----------------------|--------------------------|-------------------|-------------|
| ERP                   | 23deg. C, 70%RH          | 5Vdc from adapter | Tony Xiong  |
| FREQUENCY STABILITY   | 23deg. C, 70%RH          | DC 3.1V/3.6V/4.3  | Kevin Zhang |
| OCCUPIED BANDWIDTH    | 23deg. C, 70%RH          | 5Vdc from adapter | Kevin Zhang |
| BAND EDGE             | 23deg. C, 70%RH          | 5Vdc from adapter | Kevin Zhang |
| CONDCUDED EMISSION    | 23deg. C, 70%RH          | 5Vdc from adapter | Kevin Zhang |
| RADIATED EMISSION     | 23deg. C, 70%RH          | 5Vdc from adapter | Tony Xiong  |
| PEAK TO AVERAGE RATIO | 23deg. C, 70%RH          | 5Vdc from adapter | Kevin Zhang |

## 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:

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

Where:

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

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

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

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

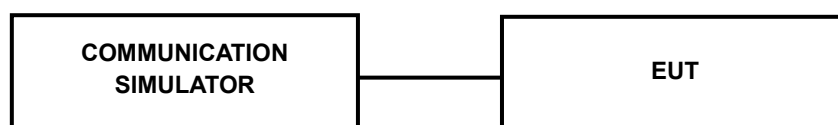
$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

###### 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)

| Band                  | GSM1900 |       |        |
|-----------------------|---------|-------|--------|
| Channel               | 512     | 661   | 810    |
| Frequency             | 1850.2  | 1880  | 1909.8 |
| GPRS (GMSK, 1Tx-slot) | 28.65   | 29.18 | 28.73  |
| GPRS (GMSK, 2Tx-slot) | 28.46   | 28.99 | 28.54  |
| GPRS (GMSK, 3Tx-slot) | 28.22   | 28.75 | 28.30  |
| GPRS (GMSK, 4Tx-slot) | 28.00   | 28.53 | 28.08  |
| EDGE (8PSK, 1Tx-slot) | 24.07   | 24.60 | 24.15  |
| EDGE (8PSK, 2Tx-slot) | 23.90   | 24.43 | 23.98  |
| EDGE (8PSK, 3Tx-slot) | 23.68   | 24.21 | 23.76  |
| EDGE (8PSK, 4Tx-slot) | 23.49   | 24.02 | 23.57  |



| LTE CAT-M1 Band 2 |            |         |           |                         |                       |                         |
|-------------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18607         | Mid CH<br>18900       | High CH<br>19193        |
|                   |            |         |           | Frequency<br>1850.7 MHz | Frequency<br>1880 MHz | Frequency<br>1909.3 MHz |
| 1.4MHz            | QPSK       | 2       | 0         | 23.52                   | 23.57                 | 23.84                   |
|                   |            | 2       | 4         | 23.57                   | 23.62                 | 23.85                   |
|                   |            | 5       | 0         | 23.57                   | 23.55                 | 23.82                   |
|                   |            | 5       | 1         | 23.50                   | 23.51                 | 23.79                   |
|                   |            | 6       | 0         | 22.96                   | 23.02                 | 23.31                   |
|                   | 16QAM      | 2       | 0         | 23.52                   | 23.59                 | 23.83                   |
|                   |            | 2       | 4         | 23.58                   | 23.63                 | 23.90                   |
|                   |            | 5       | 0         | 23.53                   | 23.57                 | 23.88                   |
|                   |            | 5       | 1         | 23.58                   | 23.57                 | 23.83                   |

| LTE CAT-M1 Band 2 |            |         |           |                         |                       |                         |
|-------------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18615         | Mid CH<br>18900       | High CH<br>19185        |
|                   |            |         |           | Frequency<br>1851.5 MHz | Frequency<br>1880 MHz | Frequency<br>1908.5 MHz |
| 3MHz              | QPSK       | 2       | 0         | 23.56                   | 23.57                 | 23.87                   |
|                   |            | 2       | 4         | 23.55                   | 23.62                 | 23.89                   |
|                   |            | 5       | 0         | 23.52                   | 23.59                 | 23.83                   |
|                   |            | 5       | 1         | 23.51                   | 23.52                 | 23.80                   |
|                   |            | 6       | 0         | 22.94                   | 22.97                 | 23.28                   |
|                   | 16QAM      | 2       | 0         | 23.58                   | 23.56                 | 23.87                   |
|                   |            | 2       | 4         | 23.61                   | 23.61                 | 23.94                   |
|                   |            | 5       | 0         | 23.55                   | 23.56                 | 23.82                   |
|                   |            | 5       | 1         | 23.55                   | 23.57                 | 23.84                   |



| LTE CAT-M1 Band 2 |            |         |           |                         |                       |                         |
|-------------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18625         | Mid CH<br>18900       | High CH<br>19175        |
|                   |            |         |           | Frequency<br>1852.5 MHz | Frequency<br>1880 MHz | Frequency<br>1907.5 MHz |
| 5MHz              | QPSK       | 2       | 0         | 23.54                   | 23.57                 | 23.82                   |
|                   |            | 2       | 4         | 23.55                   | 23.60                 | 23.84                   |
|                   |            | 5       | 0         | 23.59                   | 23.56                 | 23.84                   |
|                   |            | 5       | 1         | 23.48                   | 23.56                 | 23.85                   |
|                   |            | 6       | 0         | 22.98                   | 23.03                 | 23.29                   |
|                   | 16QAM      | 2       | 0         | 23.53                   | 23.58                 | 23.87                   |
|                   |            | 2       | 4         | 23.61                   | 23.65                 | 23.89                   |
|                   |            | 5       | 0         | 23.59                   | 23.56                 | 23.88                   |
|                   |            | 5       | 1         | 23.57                   | 23.56                 | 23.82                   |

| LTE CAT-M1 Band 2 |            |         |           |                       |                       |                       |
|-------------------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18650       | Mid CH<br>18900       | High CH<br>19150      |
|                   |            |         |           | Frequency<br>1855 MHz | Frequency<br>1880 MHz | Frequency<br>1905 MHz |
| 10MHz             | QPSK       | 2       | 0         | 23.51                 | 23.54                 | 23.87                 |
|                   |            | 2       | 4         | 23.59                 | 23.62                 | 23.88                 |
|                   |            | 5       | 0         | 23.53                 | 23.61                 | 23.86                 |
|                   |            | 5       | 1         | 23.48                 | 23.56                 | 23.83                 |
|                   |            | 6       | 0         | 22.97                 | 22.97                 | 23.29                 |
|                   | 16QAM      | 2       | 0         | 23.52                 | 23.57                 | 23.87                 |
|                   |            | 2       | 4         | 23.61                 | 23.59                 | 23.94                 |
|                   |            | 5       | 0         | 23.58                 | 23.55                 | 23.86                 |
|                   |            | 5       | 1         | 23.51                 | 23.59                 | 23.82                 |



| LTE CAT-M1 Band 2 |            |         |           |                         |                       |                         |
|-------------------|------------|---------|-----------|-------------------------|-----------------------|-------------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18675         | Mid CH<br>18900       | High CH<br>19125        |
|                   |            |         |           | Frequency<br>1857.5 MHz | Frequency<br>1880 MHz | Frequency<br>1902.5 MHz |
| 15MHz             | QPSK       | 2       | 0         | 23.55                   | 23.60                 | 23.87                   |
|                   |            | 2       | 4         | 23.56                   | 23.57                 | 23.89                   |
|                   |            | 5       | 0         | 23.54                   | 23.60                 | 23.83                   |
|                   |            | 5       | 1         | 23.50                   | 23.52                 | 23.80                   |
|                   |            | 6       | 0         | 22.96                   | 23.03                 | 23.30                   |
|                   | 16QAM      | 2       | 0         | 23.53                   | 23.60                 | 23.87                   |
|                   |            | 2       | 4         | 23.59                   | 23.60                 | 23.89                   |
|                   |            | 5       | 0         | 23.55                   | 23.59                 | 23.87                   |
|                   |            | 5       | 1         | 23.53                   | 23.55                 | 23.87                   |

| LTE CAT-M1 Band 2 |            |         |           |                       |                       |                       |
|-------------------|------------|---------|-----------|-----------------------|-----------------------|-----------------------|
| BW                | Modulation | RB Size | RB Offset | Low CH<br>18700       | Mid CH<br>18900       | High CH<br>19100      |
|                   |            |         |           | Frequency<br>1860 MHz | Frequency<br>1880 MHz | Frequency<br>1900 MHz |
| 20MHz             | QPSK       | 2       | 0         | 23.59                 | 23.61                 | 23.89                 |
|                   |            | 2       | 4         | 23.61                 | 23.63                 | <b>23.91</b>          |
|                   |            | 5       | 0         | 23.60                 | 23.62                 | 23.90                 |
|                   |            | 5       | 1         | 23.56                 | 23.58                 | 23.86                 |
|                   |            | 6       | 0         | 23.02                 | 23.04                 | 23.32                 |
|                   | 16QAM      | 2       | 0         | 23.59                 | 23.61                 | 23.89                 |
|                   |            | 2       | 4         | 23.65                 | 23.67                 | 23.95                 |
|                   |            | 5       | 0         | 23.60                 | 23.62                 | 23.90                 |
|                   |            | 5       | 1         | 23.59                 | 23.61                 | 23.89                 |



| LTE CAT-M1 Band 25 |            |         |           |                         |                         |                         |
|--------------------|------------|---------|-----------|-------------------------|-------------------------|-------------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26047         | Mid CH<br>26365         | High CH<br>26683        |
|                    |            |         |           | Frequency<br>1850.7 MHz | Frequency<br>1882.5 MHz | Frequency<br>1914.3 MHz |
| 1.4MHz             | QPSK       | 2       | 0         | 22.29                   | 22.48                   | 22.49                   |
|                    |            | 2       | 4         | 22.20                   | 22.49                   | 22.53                   |
|                    |            | 5       | 0         | 22.26                   | 22.48                   | 22.51                   |
|                    |            | 5       | 1         | 22.27                   | 22.43                   | 22.41                   |
|                    |            | 6       | 0         | 22.10                   | 22.34                   | 22.24                   |
|                    | 16QAM      | 2       | 0         | 22.30                   | 22.55                   | 22.49                   |
|                    |            | 2       | 4         | 22.32                   | 22.55                   | 22.58                   |
|                    |            | 5       | 0         | 22.36                   | 22.58                   | 22.58                   |
|                    |            | 5       | 1         | 22.36                   | 22.54                   | 22.59                   |

| LTE CAT-M1 Band 25 |            |         |           |                         |                         |                         |
|--------------------|------------|---------|-----------|-------------------------|-------------------------|-------------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26055         | Mid CH<br>26365         | High CH<br>26675        |
|                    |            |         |           | Frequency<br>1851.5 MHz | Frequency<br>1882.5 MHz | Frequency<br>1913.5 MHz |
| 3MHz               | QPSK       | 2       | 0         | 22.17                   | 22.55                   | 22.45                   |
|                    |            | 2       | 4         | 22.19                   | 22.50                   | 22.49                   |
|                    |            | 5       | 0         | 22.26                   | 22.46                   | 22.39                   |
|                    |            | 5       | 1         | 22.25                   | 22.41                   | 22.43                   |
|                    |            | 6       | 0         | 22.06                   | 22.25                   | 22.32                   |
|                    | 16QAM      | 2       | 0         | 22.35                   | 22.53                   | 22.52                   |
|                    |            | 2       | 4         | 22.33                   | 22.58                   | 22.56                   |
|                    |            | 5       | 0         | 22.32                   | 22.58                   | 22.56                   |
|                    |            | 5       | 1         | 22.35                   | 22.56                   | 22.55                   |



| LTE CAT-M1 Band 25 |            |         |           |                         |                         |                         |
|--------------------|------------|---------|-----------|-------------------------|-------------------------|-------------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26065         | Mid CH<br>26365         | High CH<br>26665        |
|                    |            |         |           | Frequency<br>1852.5 MHz | Frequency<br>1882.5 MHz | Frequency<br>1912.5 MHz |
| 5MHz               | QPSK       | 2       | 0         | 22.25                   | 22.47                   | 22.48                   |
|                    |            | 2       | 4         | 22.20                   | 22.46                   | 22.52                   |
|                    |            | 5       | 0         | 22.24                   | 22.45                   | 22.45                   |
|                    |            | 5       | 1         | 22.24                   | 22.41                   | 22.48                   |
|                    |            | 6       | 0         | 22.04                   | 22.29                   | 22.27                   |
|                    | 16QAM      | 2       | 0         | 22.23                   | 22.52                   | 22.47                   |
|                    |            | 2       | 4         | 22.36                   | 22.58                   | 22.59                   |
|                    |            | 5       | 0         | 22.39                   | 22.66                   | 22.60                   |
|                    |            | 5       | 1         | 22.27                   | 22.58                   | 22.53                   |

| LTE CAT-M1 Band 25 |            |         |           |                       |                         |                       |
|--------------------|------------|---------|-----------|-----------------------|-------------------------|-----------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26090       | Mid CH<br>26365         | High CH<br>26640      |
|                    |            |         |           | Frequency<br>1855 MHz | Frequency<br>1882.5 MHz | Frequency<br>1910 MHz |
| 10MHz              | QPSK       | 2       | 0         | 22.29                 | 22.55                   | 22.53                 |
|                    |            | 2       | 4         | 22.25                 | 22.52                   | 22.57                 |
|                    |            | 5       | 0         | 22.31                 | 22.53                   | 22.49                 |
|                    |            | 5       | 1         | 22.30                 | 22.49                   | 22.54                 |
|                    |            | 6       | 0         | 22.10                 | 22.35                   | 22.33                 |
|                    | 16QAM      | 2       | 0         | 22.30                 | 22.58                   | 22.53                 |
|                    |            | 2       | 4         | 22.41                 | 22.65                   | 22.62                 |
|                    |            | 5       | 0         | 22.41                 | 22.70                   | 22.66                 |
|                    |            | 5       | 1         | 22.34                 | 22.60                   | 22.55                 |



| LTE CAT-M1 Band 25 |            |         |           |                         |                         |                         |
|--------------------|------------|---------|-----------|-------------------------|-------------------------|-------------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26115         | Mid CH<br>26365         | High CH<br>26615        |
|                    |            |         |           | Frequency<br>1857.5 MHz | Frequency<br>1882.5 MHz | Frequency<br>1907.5 MHz |
| 15MHz              | QPSK       | 2       | 0         | 22.34                   | 22.57                   | 22.57                   |
|                    |            | 2       | 4         | 22.33                   | 22.58                   | 22.58                   |
|                    |            | 5       | 0         | 22.32                   | 22.59                   | 22.52                   |
|                    |            | 5       | 1         | 22.32                   | 22.55                   | 22.56                   |
|                    |            | 6       | 0         | 22.16                   | 22.37                   | 22.36                   |
|                    | 16QAM      | 2       | 0         | 22.38                   | 22.64                   | 22.58                   |
|                    |            | 2       | 4         | 22.46                   | 22.70                   | 22.66                   |
|                    |            | 5       | 0         | 22.42                   | 22.72                   | 22.68                   |
|                    |            | 5       | 1         | 22.42                   | 22.65                   | 22.61                   |

| LTE CAT-M1 Band 25 |            |         |           |                       |                         |                       |
|--------------------|------------|---------|-----------|-----------------------|-------------------------|-----------------------|
| BW                 | Modulation | RB Size | RB Offset | Low CH<br>26140       | Mid CH<br>26365         | High CH<br>26590      |
|                    |            |         |           | Frequency<br>1860 MHz | Frequency<br>1882.5 MHz | Frequency<br>1905 MHz |
| 20MHz              | QPSK       | 2       | 0         | 22.40                 | 22.64                   | 22.61                 |
|                    |            | 2       | 4         | 22.39                 | 22.63                   | 22.60                 |
|                    |            | 5       | 0         | 22.38                 | 22.62                   | 22.59                 |
|                    |            | 5       | 1         | 22.37                 | 22.61                   | 22.58                 |
|                    |            | 6       | 0         | 22.18                 | 22.42                   | 22.39                 |
|                    | 16QAM      | 2       | 0         | 22.45                 | 22.69                   | 22.66                 |
|                    |            | 2       | 4         | 22.48                 | 22.72                   | 22.69                 |
|                    |            | 5       | 0         | 22.49                 | 22.73                   | 22.70                 |
|                    |            | 5       | 1         | 22.47                 | 22.71                   | 22.68                 |



## EIRP POWER (dBm)

## GSM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>c</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 512     | 1850.2             | 28.65                       | 2.00                                   | 30.65         | 1161.45       | 2            |
| 661     | 1880.0             | 29.18                       | 2.00                                   | 31.18         | <b>1312.2</b> | 2            |
| 810     | 1909.8             | 28.73                       | 2.00                                   | 30.73         | 1183.04       | 2            |

## EDGE

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>c</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 512     | 1850.2             | 24.07                       | 2.00                                   | 26.07         | 404.58        | 2            |
| 661     | 1880.0             | 24.60                       | 2.00                                   | 26.60         | <b>457.09</b> | 2            |
| 810     | 1909.8             | 24.15                       | 2.00                                   | 26.15         | 412.1         | 2            |

## LTE CAT-M1 BAND 2

## CHANNEL BANDWIDTH: 1.4MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>c</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 18607   | 1850.7             | 23.02                       | 2.00                                   | 25.02         | <b>317.69</b> | 2            |
| 18900   | 1880.0             | 22.91                       | 2.00                                   | 24.91         | 309.74        | 2            |
| 19193   | 1908.3             | 22.94                       | 2.00                                   | 24.94         | 311.89        | 2            |

## CHANNEL BANDWIDTH: 1.4MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>c</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 18607   | 1850.7             | 22.86                       | 2.00                                   | 24.86         | 306.2        | 2            |
| 18900   | 1880.0             | 22.75                       | 2.00                                   | 24.75         | 298.54       | 2            |
| 19193   | 1908.3             | 22.78                       | 2.00                                   | 24.78         | 300.61       | 2            |



## CHANNEL BANDWIDTH: 3MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 18615   | 1851.5             | 23.05                       | 2.00                                   | 25.05         | <b>319.89</b> | 2            |
| 18900   | 1880.0             | 22.94                       | 2.00                                   | 24.94         | 311.89        | 2            |
| 19185   | 1908.5             | 22.97                       | 2.00                                   | 24.97         | 314.05        | 2            |

## CHANNEL BANDWIDTH: 3MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 18615   | 1851.5             | 23.01                       | 2.00                                   | 25.01         | 316.96       | 2            |
| 18900   | 1880.0             | 22.90                       | 2.00                                   | 24.90         | 309.03       | 2            |
| 19185   | 1908.5             | 22.93                       | 2.00                                   | 24.93         | 311.17       | 2            |

## CHANNEL BANDWIDTH: 5MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 18625   | 1852.5             | 23.04                       | 2.00                                   | 25.04         | <b>319.15</b> | 2            |
| 18900   | 1880.0             | 22.93                       | 2.00                                   | 24.93         | 311.17        | 2            |
| 19175   | 1907.5             | 22.96                       | 2.00                                   | 24.96         | 313.33        | 2            |

## CHANNEL BANDWIDTH: 5MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 18625   | 1852.5             | 23.04                       | 2.00                                   | 25.04         | 319.15       | 2            |
| 18900   | 1880.0             | 22.93                       | 2.00                                   | 24.93         | 311.17       | 2            |
| 19175   | 1907.5             | 22.96                       | 2.00                                   | 24.96         | 313.33       | 2            |



## CHANNEL BANDWIDTH: 10MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 18650   | 1855.0             | 23.10                       | 2.00                                   | 25.10         | <b>323.59</b> | 2            |
| 18900   | 1880.0             | 22.99                       | 2.00                                   | 24.99         | 315.5         | 2            |
| 19150   | 1905.0             | 23.02                       | 2.00                                   | 25.02         | 317.69        | 2            |

## CHANNEL BANDWIDTH: 10MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 18650   | 1855.0             | 23.06                       | 2.00                                   | 25.06         | 320.63       | 2            |
| 18900   | 1880.0             | 22.95                       | 2.00                                   | 24.95         | 312.61       | 2            |
| 19150   | 1905.0             | 22.98                       | 2.00                                   | 24.98         | 314.77       | 2            |

## CHANNEL BANDWIDTH: 15MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 18675   | 1857.5             | 23.13                       | 2.00                                   | 25.13         | <b>325.84</b> | 2            |
| 18900   | 1880.0             | 23.02                       | 2.00                                   | 25.02         | 317.69        | 2            |
| 19125   | 1902.5             | 23.05                       | 2.00                                   | 25.05         | 319.89        | 2            |

## CHANNEL BANDWIDTH: 15MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 18675   | 1857.5             | 23.09                       | 2.00                                   | 25.09         | 322.85       | 2            |
| 18900   | 1880.0             | 22.98                       | 2.00                                   | 24.98         | 314.77       | 2            |
| 19125   | 1902.5             | 23.01                       | 2.00                                   | 25.01         | 316.96       | 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          | 23.18                 | 2.00                                | 25.18      | <b>329.61</b> | 2         |
| 18900   | 1880.0          | 23.07                 | 2.00                                | 25.07      | 321.37        | 2         |
| 19125   | 1902.5          | 23.10                 | 2.00                                | 25.10      | 323.59        | 2         |

## CHANNEL BANDWIDTH: 20MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW) | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 18675   | 1857.5          | 23.14                 | 2.00                                | 25.14      | 326.59    | 2         |
| 18900   | 1880.0          | 23.03                 | 2.00                                | 25.03      | 318.42    | 2         |
| 19125   | 1902.5          | 23.06                 | 2.00                                | 25.06      | 320.63    | 2         |

## LTE CAT-M1 BAND 25

## 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) |
|---------|-----------------|-----------------------|-------------------------------------|------------|-----------|-----------|
| 26047   | 1850.7          | 22.29                 | 2.00                                | 24.29      | 268.53    | 2         |
| 26340   | 1880.0          | 22.49                 | 2.00                                | 24.49      | 281.19    | 2         |
| 26683   | 1914.3          | 22.53                 | 2.00                                | 24.53      | 283.79    | 2         |

## CHANNEL BANDWIDTH: 1.4MHz 16QAM

| Channel | Frequency (MHz) | Conducted Power (dBm) | G <sub>T</sub> -L <sub>C</sub> (dB) | EIRP (dBm) | EIRP (mW)     | Limit (W) |
|---------|-----------------|-----------------------|-------------------------------------|------------|---------------|-----------|
| 26047   | 1850.7          | 22.36                 | 2.00                                | 24.36      | 272.9         | 2         |
| 26340   | 1880.0          | 22.58                 | 2.00                                | 24.58      | 287.08        | 2         |
| 26683   | 1914.3          | 22.59                 | 2.00                                | 24.59      | <b>287.74</b> | 2         |



## CHANNEL BANDWIDTH: 3MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 26055   | 1851.5             | 22.26                       | 2.00                                   | 24.26         | 266.69       | 2            |
| 26340   | 1880.0             | 22.55                       | 2.00                                   | 24.55         | 285.10       | 2            |
| 26675   | 1913.5             | 22.49                       | 2.00                                   | 24.49         | 281.19       | 2            |

## CHANNEL BANDWIDTH: 3MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 26055   | 1851.5             | 22.35                       | 2.00                                   | 24.35         | 272.27        | 2            |
| 26340   | 1880.0             | 22.58                       | 2.00                                   | 24.58         | <b>287.08</b> | 2            |
| 26675   | 1913.5             | 22.56                       | 2.00                                   | 24.56         | 285.76        | 2            |

## CHANNEL BANDWIDTH: 5MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 26065   | 1852.5             | 22.25                       | 2.00                                   | 24.25         | 266.07       | 2            |
| 26340   | 1880.0             | 22.47                       | 2.00                                   | 24.47         | 279.9        | 2            |
| 26665   | 1912.5             | 22.48                       | 2.00                                   | 24.48         | 280.54       | 2            |

## CHANNEL BANDWIDTH: 5MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 26065   | 1852.5             | 22.39                       | 2.00                                   | 24.39         | 274.79        | 2            |
| 26340   | 1880.0             | 22.66                       | 2.00                                   | 24.66         | <b>292.42</b> | 2            |
| 26665   | 1912.5             | 22.60                       | 2.00                                   | 24.60         | 288.4         | 2            |



## CHANNEL BANDWIDTH: 10MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 26090   | 1855.0             | 22.31                       | 2.00                                   | 24.31         | 269.77        | 2            |
| 26340   | 1880.0             | 22.57                       | 2.00                                   | 24.57         | 286.42        | 2            |
| 26640   | 1910.0             | 22.59                       | 2.00                                   | 24.59         | <b>287.74</b> | 2            |

## CHANNEL BANDWIDTH: 10MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 26090   | 1855.0             | 22.34                       | 2.00                                   | 24.34         | 271.64       | 2            |
| 26340   | 1880.0             | 22.59                       | 2.00                                   | 24.59         | 287.74       | 2            |
| 26640   | 1910.0             | 22.58                       | 2.00                                   | 24.58         | 287.08       | 2            |

## CHANNEL BANDWIDTH: 15MHz QPSK

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 26115   | 1857.5             | 22.34                       | 2.00                                   | 24.34         | 271.64       | 2            |
| 26340   | 1880.0             | 22.59                       | 2.00                                   | 24.59         | 287.74       | 2            |
| 26615   | 1907.5             | 22.58                       | 2.00                                   | 24.58         | 287.08       | 2            |

## CHANNEL BANDWIDTH: 15MHz 16QAM

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 26115   | 1857.5             | 22.42                       | 2.00                                   | 24.42         | 276.69        | 2            |
| 26340   | 1880.0             | 22.72                       | 2.00                                   | 24.72         | <b>296.48</b> | 2            |
| 26615   | 1907.5             | 22.68                       | 2.00                                   | 24.68         | 293.76        | 2            |



**CHANNEL BANDWIDTH: 20MHz QPSK**

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW) | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|--------------|--------------|
| 26140   | 1860.0             | 22.40                       | 2.00                                   | 24.40         | 275.42       | 2            |
| 26340   | 1880.0             | 22.64                       | 2.00                                   | 24.64         | 291.07       | 2            |
| 26590   | 1905.0             | 22.61                       | 2.00                                   | 24.61         | 289.07       | 2            |

**CHANNEL BANDWIDTH: 20MHz 16QAM**

| Channel | Frequency<br>(MHz) | Conducted<br>Power<br>(dBm) | G <sub>T</sub> -L <sub>C</sub><br>(dB) | EIRP<br>(dBm) | EIRP<br>(mW)  | Limit<br>(W) |
|---------|--------------------|-----------------------------|----------------------------------------|---------------|---------------|--------------|
| 26140   | 1860.0             | 22.49                       | 2.00                                   | 24.49         | 281.19        | 2            |
| 26340   | 1880.0             | 22.73                       | 2.00                                   | 24.73         | <b>297.17</b> | 2            |
| 26590   | 1905.0             | 22.70                       | 2.00                                   | 24.70         | 295.12        | 2            |

## 3.2 FREQUENCY STABILITY MEASUREMENT

### 3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

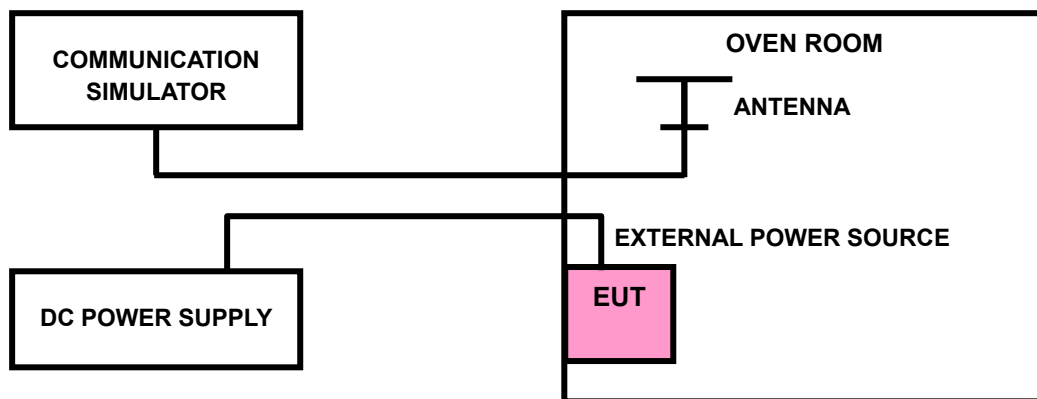
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

### 3.2.2 TEST PROCEDURE

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

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

### 3.2.3 TEST SETUP





### 3.2.4 TEST RESULTS

#### GSM1900

##### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0009                | 0.0012       | 2.5         |
| $V_{min}$       | -0.0012               | -0.0012      | 2.5         |
| $V_{max}$       | 0.0009                | 0.0011       | 2.5         |

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

##### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | Low Channel           | High Channel |             |
| -30        | -0.0055               | -0.0053      | 2.5         |
| -20        | -0.0051               | -0.0048      | 2.5         |
| -10        | -0.0046               | -0.0043      | 2.5         |
| 0          | -0.0037               | -0.0035      | 2.5         |
| 10         | -0.0030               | -0.0028      | 2.5         |
| 20         | -0.0022               | -0.0020      | 2.5         |
| 30         | -0.0017               | -0.0015      | 2.5         |
| 40         | -0.0014               | -0.0012      | 2.5         |
| 50         | -0.0005               | -0.0003      | 2.5         |



## EDGE 1900

## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|-----------------|-----------------------|--------------|-------------|
|                 | Low Channel           | High Channel |             |
| $V_{nor}$       | 0.0012                | 0.0011       | 2.5         |
| $V_{min}$       | -0.0013               | -0.0012      | 2.5         |
| $V_{max}$       | 0.0010                | 0.0009       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | FREQUENCY ERROR (ppm) |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | Low Channel           | High Channel |             |
| -30        | -0.0057               | -0.0053      | 2.5         |
| -20        | -0.0050               | -0.0047      | 2.5         |
| -10        | -0.0045               | -0.0043      | 2.5         |
| 0          | -0.0038               | -0.0036      | 2.5         |
| 10         | -0.0029               | -0.0027      | 2.5         |
| 20         | -0.0024               | -0.0022      | 2.5         |
| 30         | -0.0017               | -0.0016      | 2.5         |
| 40         | -0.0012               | -0.0011      | 2.5         |
| 50         | -0.0005               | -0.0004      | 2.5         |



## LTE CAT-M1 BAND 2

### FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 1.4MHz                |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0020                | 0.0024       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0022                | 0.0021       | 2.5         |

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

### FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 1.4MHz                |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0121               | -0.0117      | 2.5         |
| -20        | -0.0105               | -0.0110      | 2.5         |
| -10        | -0.0084               | -0.0081      | 2.5         |
| 0          | -0.0074               | -0.0074      | 2.5         |
| 10         | -0.0051               | -0.0052      | 2.5         |
| 20         | -0.0045               | -0.0039      | 2.5         |
| 30         | -0.0040               | -0.0041      | 2.5         |
| 40         | -0.0015               | -0.0022      | 2.5         |
| 50         | -0.0004               | -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 from  $V_{min}$  to  $V_{max}$ .

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 3MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0112      | 2.5         |
| -20        | -0.0108               | -0.0099      | 2.5         |
| -10        | -0.0083               | -0.0084      | 2.5         |
| 0          | -0.0075               | -0.0072      | 2.5         |
| 10         | -0.0052               | -0.0050      | 2.5         |
| 20         | -0.0044               | -0.0042      | 2.5         |
| 30         | -0.0032               | -0.0027      | 2.5         |
| 40         | -0.0017               | -0.0015      | 2.5         |
| 50         | -0.0005               | -0.0002      | 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> | 0.0021                | 0.0021       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0113      | 2.5         |
| -20        | -0.0109               | -0.0101      | 2.5         |
| -10        | -0.0086               | -0.0080      | 2.5         |
| 0          | -0.0077               | -0.0072      | 2.5         |
| 10         | -0.0051               | -0.0051      | 2.5         |
| 20         | -0.0044               | -0.0042      | 2.5         |
| 30         | -0.0040               | -0.0039      | 2.5         |
| 40         | -0.0019               | -0.0015      | 2.5         |
| 50         | -0.0004               | -0.0003      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

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

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0112      | 2.5         |
| -20        | -0.0109               | -0.0096      | 2.5         |
| -10        | -0.0084               | -0.0080      | 2.5         |
| 0          | -0.0075               | -0.0076      | 2.5         |
| 10         | -0.0050               | -0.0046      | 2.5         |
| 20         | -0.0041               | -0.0043      | 2.5         |
| 30         | -0.0038               | -0.0027      | 2.5         |
| 40         | -0.0023               | -0.0021      | 2.5         |
| 50         | -0.0005               | -0.0002      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 15MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0024                | 0.0025       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0024                | 0.0026       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 15MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0120               | -0.0119      | 2.5         |
| -20        | -0.0102               | -0.0108      | 2.5         |
| -10        | -0.0082               | -0.0084      | 2.5         |
| 0          | -0.0078               | -0.0075      | 2.5         |
| 10         | -0.0052               | -0.0055      | 2.5         |
| 20         | -0.0044               | -0.0043      | 2.5         |
| 30         | -0.0030               | -0.0040      | 2.5         |
| 40         | -0.0023               | -0.0023      | 2.5         |
| 50         | -0.0003               | -0.0003      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 20MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0026                | 0.0026       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0024                | 0.0025       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 20MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0111      | 2.5         |
| -20        | -0.0098               | -0.0100      | 2.5         |
| -10        | -0.0085               | -0.0082      | 2.5         |
| 0          | -0.0076               | -0.0074      | 2.5         |
| 10         | -0.0049               | -0.0053      | 2.5         |
| 20         | -0.0044               | -0.0039      | 2.5         |
| 30         | -0.0037               | -0.0032      | 2.5         |
| 40         | -0.0022               | -0.0018      | 2.5         |
| 50         | -0.0004               | -0.0002      | 2.5         |



**LTE CAT-M1 BAND 25**

**FREQUENCY ERROR VS. VOLTAGE**

| VOLTAGE (Volts)  | 1.4MHz                |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0022                | 0.0023       | 2.5         |
| V <sub>min</sub> | -0.0031               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0021                | 0.0021       | 2.5         |

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

**FREQUENCY ERROR vs. TEMPERATURE.**

| TEMP. (°C) | 1.4MHz                |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0122               | -0.0114      | 2.5         |
| -20        | -0.0113               | -0.0109      | 2.5         |
| -10        | -0.0084               | -0.0079      | 2.5         |
| 0          | -0.0074               | -0.0073      | 2.5         |
| 10         | -0.0055               | -0.0049      | 2.5         |
| 20         | -0.0044               | -0.0042      | 2.5         |
| 30         | -0.0041               | -0.0040      | 2.5         |
| 40         | -0.0022               | -0.0018      | 2.5         |
| 50         | -0.0002               | -0.0005      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 3MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0022                | 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 from  $V_{min}$  to  $V_{max}$ .

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 3MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0112      | 2.5         |
| -20        | -0.0100               | -0.0110      | 2.5         |
| -10        | -0.0084               | -0.0084      | 2.5         |
| 0          | -0.0074               | -0.0075      | 2.5         |
| 10         | -0.0051               | -0.0044      | 2.5         |
| 20         | -0.0039               | -0.0041      | 2.5         |
| 30         | -0.0027               | -0.0038      | 2.5         |
| 40         | -0.0019               | -0.0019      | 2.5         |
| 50         | -0.0002               | -0.0005      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 5MHz                  |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0022                | 0.0025       | 2.5         |
| V <sub>min</sub> | -0.0023               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0022                | 0.0021       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 5MHz                  |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0119               | -0.0117      | 2.5         |
| -20        | -0.0108               | -0.0103      | 2.5         |
| -10        | -0.0084               | -0.0084      | 2.5         |
| 0          | -0.0073               | -0.0072      | 2.5         |
| 10         | -0.0053               | -0.0049      | 2.5         |
| 20         | -0.0042               | -0.0037      | 2.5         |
| 30         | -0.0037               | -0.0035      | 2.5         |
| 40         | -0.0019               | -0.0019      | 2.5         |
| 50         | -0.0002               | -0.0004      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

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

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 10MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0116               | -0.0120      | 2.5         |
| -20        | -0.0109               | -0.0097      | 2.5         |
| -10        | -0.0086               | -0.0082      | 2.5         |
| 0          | -0.0077               | -0.0072      | 2.5         |
| 10         | -0.0051               | -0.0044      | 2.5         |
| 20         | -0.0039               | -0.0042      | 2.5         |
| 30         | -0.0036               | -0.0032      | 2.5         |
| 40         | -0.0018               | -0.0020      | 2.5         |
| 50         | -0.0002               | -0.0005      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 15MHz                 |              | 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> | 0.0024                | 0.0024       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 15MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0115               | -0.0121      | 2.5         |
| -20        | -0.0104               | -0.0108      | 2.5         |
| -10        | -0.0081               | -0.0084      | 2.5         |
| 0          | -0.0076               | -0.0074      | 2.5         |
| 10         | -0.0053               | -0.0045      | 2.5         |
| 20         | -0.0042               | -0.0039      | 2.5         |
| 30         | -0.0033               | -0.0028      | 2.5         |
| 40         | -0.0023               | -0.0016      | 2.5         |
| 50         | -0.0002               | -0.0004      | 2.5         |



## FREQUENCY ERROR VS. VOLTAGE

| VOLTAGE (Volts)  | 20MHz                 |              | LIMIT (ppm) |
|------------------|-----------------------|--------------|-------------|
|                  | FREQUENCY ERROR (ppm) |              |             |
|                  | Low Channel           | High Channel |             |
| V <sub>nor</sub> | 0.0026                | 0.0025       | 2.5         |
| V <sub>min</sub> | -0.0030               | -0.0030      | 2.5         |
| V <sub>max</sub> | 0.0025                | 0.0023       | 2.5         |

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

## FREQUENCY ERROR vs. TEMPERATURE.

| TEMP. (°C) | 20MHz                 |              | LIMIT (ppm) |
|------------|-----------------------|--------------|-------------|
|            | FREQUENCY ERROR (ppm) |              |             |
|            | Low Channel           | High Channel |             |
| -30        | -0.0115               | -0.0120      | 2.5         |
| -20        | -0.0099               | -0.0107      | 2.5         |
| -10        | -0.0082               | -0.0083      | 2.5         |
| 0          | -0.0077               | -0.0075      | 2.5         |
| 10         | -0.0055               | -0.0044      | 2.5         |
| 20         | -0.0039               | -0.0037      | 2.5         |
| 30         | -0.0026               | -0.0031      | 2.5         |
| 40         | -0.0018               | -0.0020      | 2.5         |
| 50         | -0.0003               | -0.0005      | 2.5         |

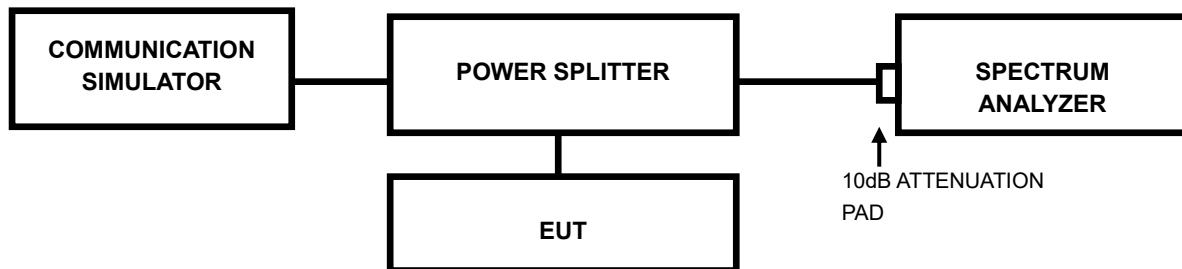


### 3.3 OCCUPIED BANDWIDTH MEASUREMENT

#### 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



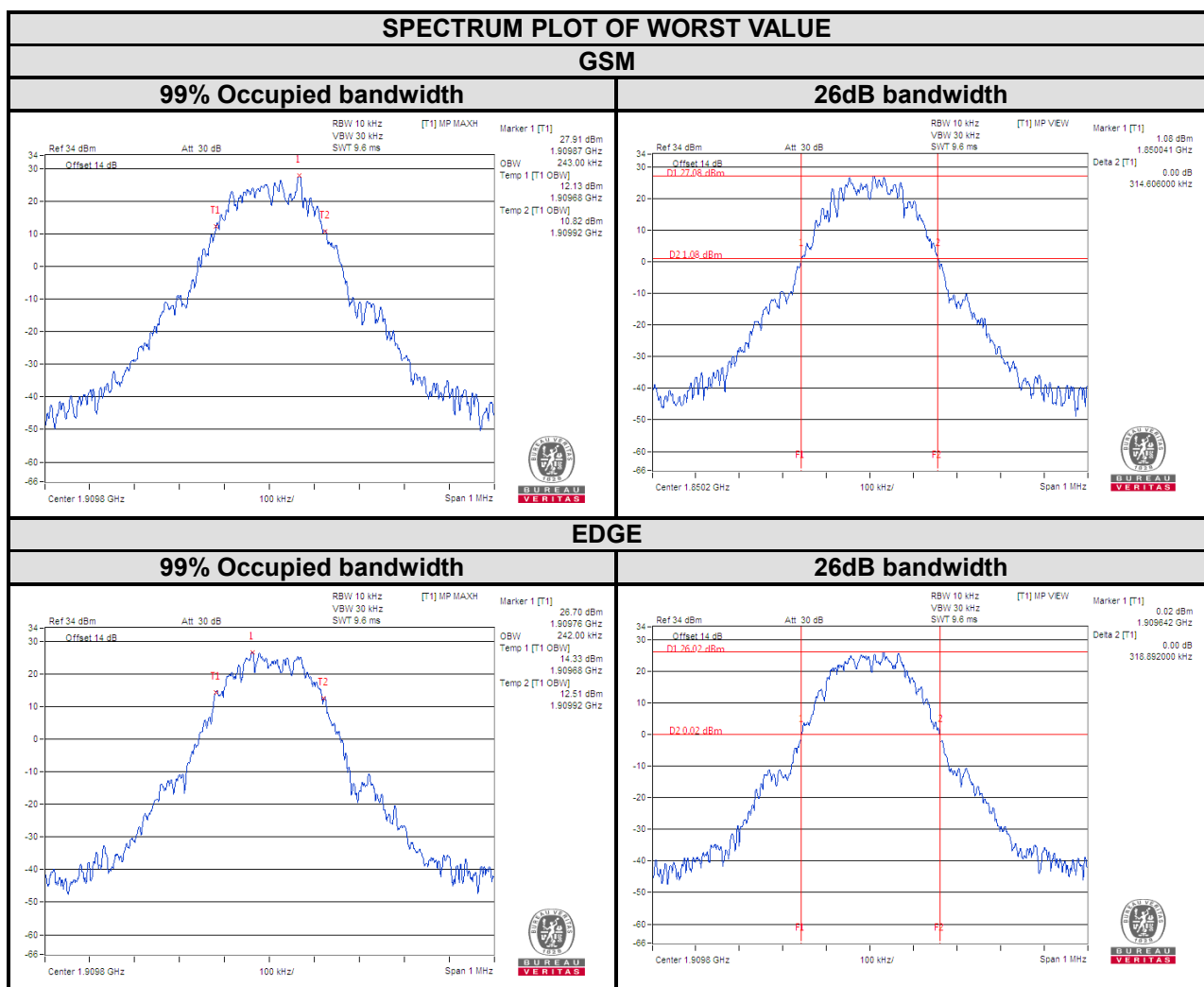


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Test Report No.: RF191122W002-2

### 3.3.3 TEST RESULTS

| Channel | Frequency (MHz) | 99% Occupied bandwidth (MHz) |        | 26dB bandwidth (MHz) |        |
|---------|-----------------|------------------------------|--------|----------------------|--------|
|         |                 | GSM                          | EDGE   | GSM                  | EDGE   |
| 512     | 1850.2          | 238.00                       | 241.00 | 314.61               | 318.27 |
| 661     | 1880            | 234.00                       | 239.00 | 312.59               | 313.17 |
| 810     | 1909.8          | 243.00                       | 242.00 | 310.21               | 318.89 |

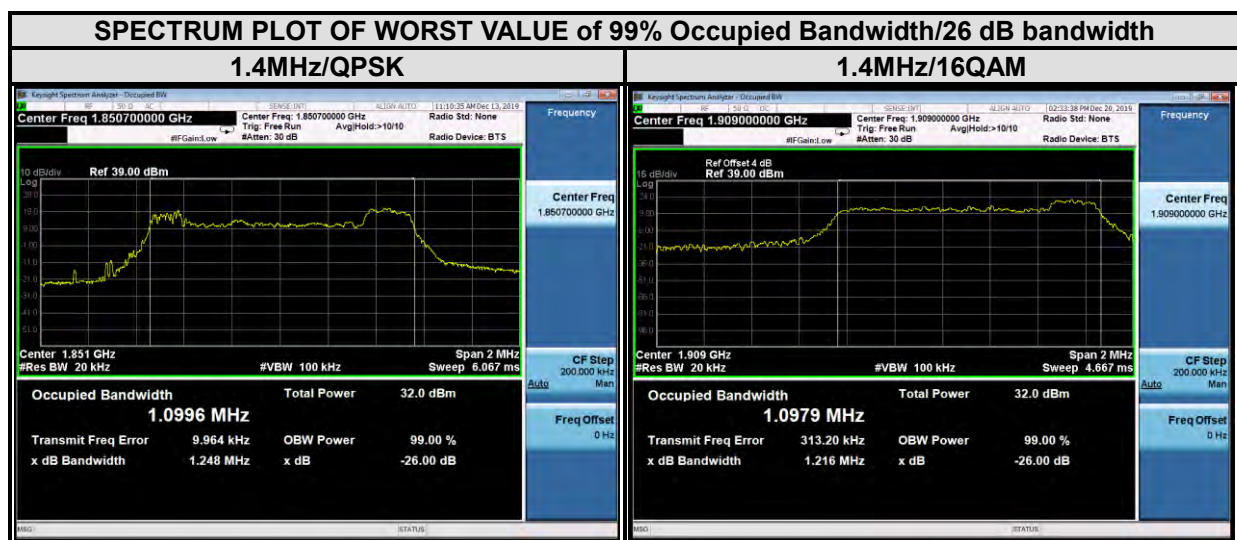




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 2          |                 |                              |       |                       |       |
|----------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 1.4MHz |                 |                              |       |                       |       |
| Channel                    | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                            |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18607                      | 1850.7          | 1.10                         | 1.10  | 1.25                  | 1.25  |
| 18900                      | 1880            | 1.10                         | 1.10  | 1.22                  | 1.26  |
| 19193                      | 1909.3          | 1.09                         | 1.10  | 1.22                  | 1.22  |

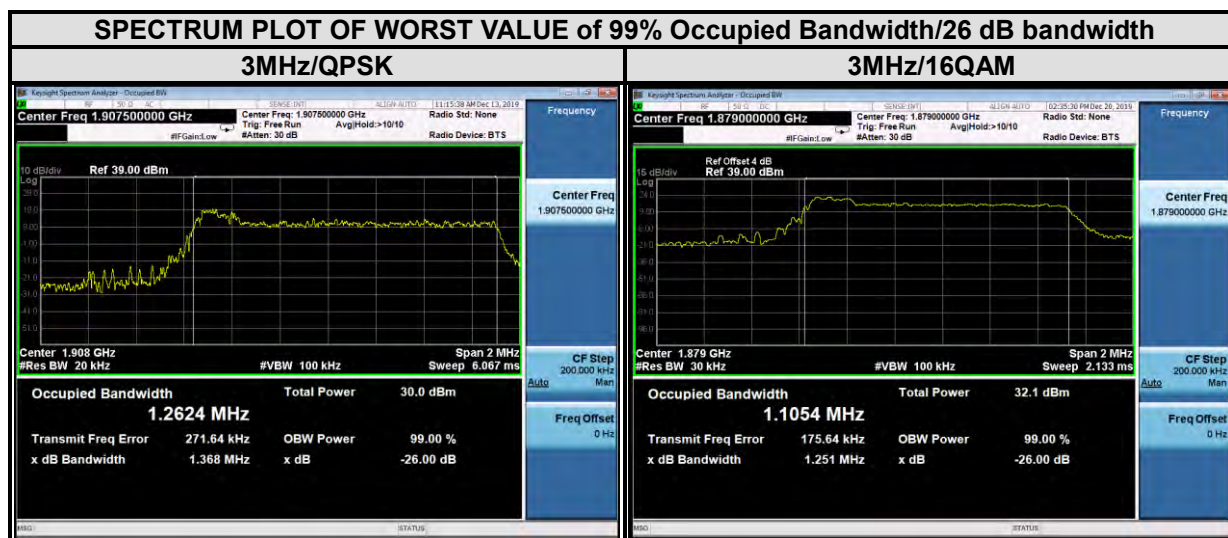




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 2        |                 |                              |       |                       |       |
|--------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 3MHz |                 |                              |       |                       |       |
| Channel                  | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                          |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18615                    | 1851.5          | 1.26                         | 1.10  | 1.38                  | 1.23  |
| 18900                    | 1880            | 1.26                         | 1.11  | 1.37                  | 1.25  |
| 19185                    | 1908.5          | 1.26                         | 1.10  | 1.37                  | 1.24  |

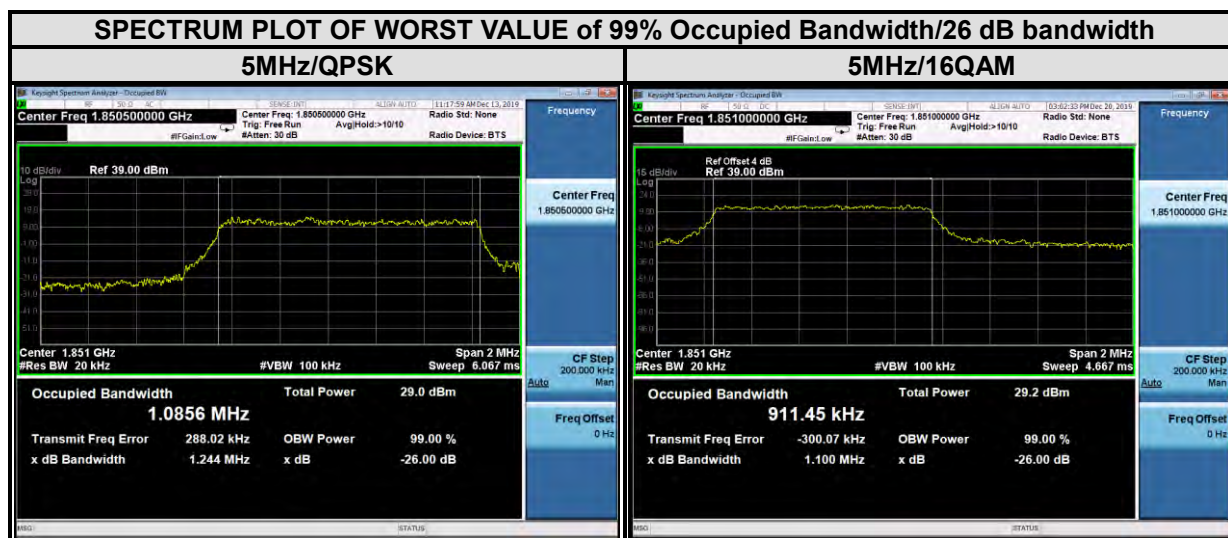




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 2        |                 |                              |       |                       |       |
|--------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 5MHz |                 |                              |       |                       |       |
| Channel                  | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                          |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18625                    | 1852.5          | 1.09                         | 0.910 | 1.24                  | 1.10  |
| 18900                    | 1880            | 1.08                         | 0.910 | 1.28                  | 1.10  |
| 19175                    | 1907.5          | 1.08                         | 0.910 | 1.23                  | 1.12  |

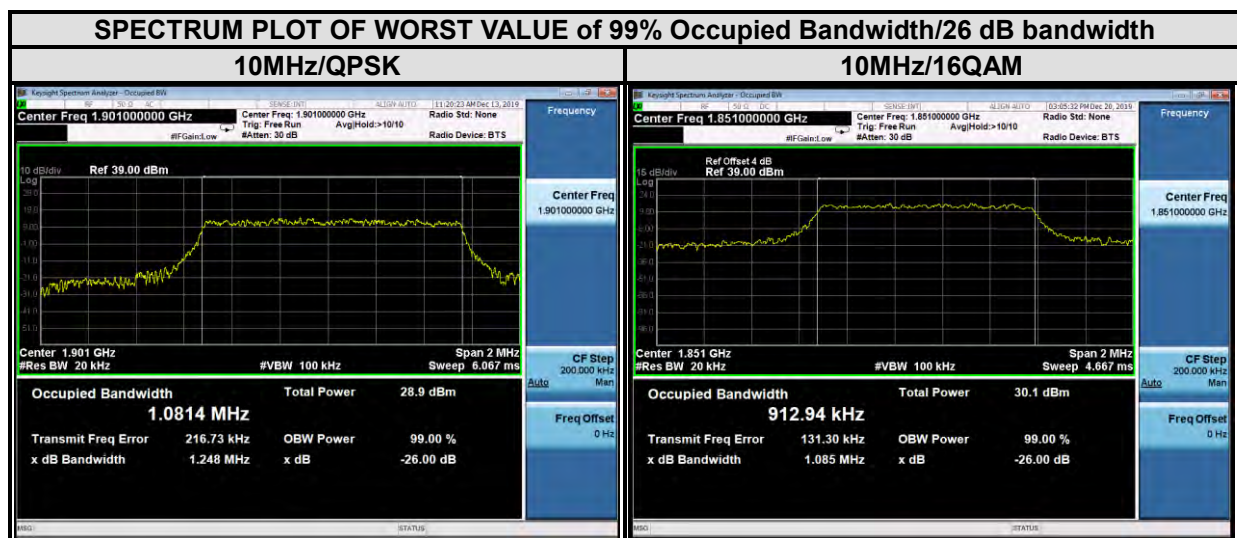




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 2         |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 10MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18650                     | 1855            | 1.08                         | 0.910 | 1.27                  | 1.09  |
| 18900                     | 1880            | 1.08                         | 0.910 | 1.29                  | 1.10  |
| 19150                     | 1905            | 1.08                         | 0.910 | 1.25                  | 1.14  |





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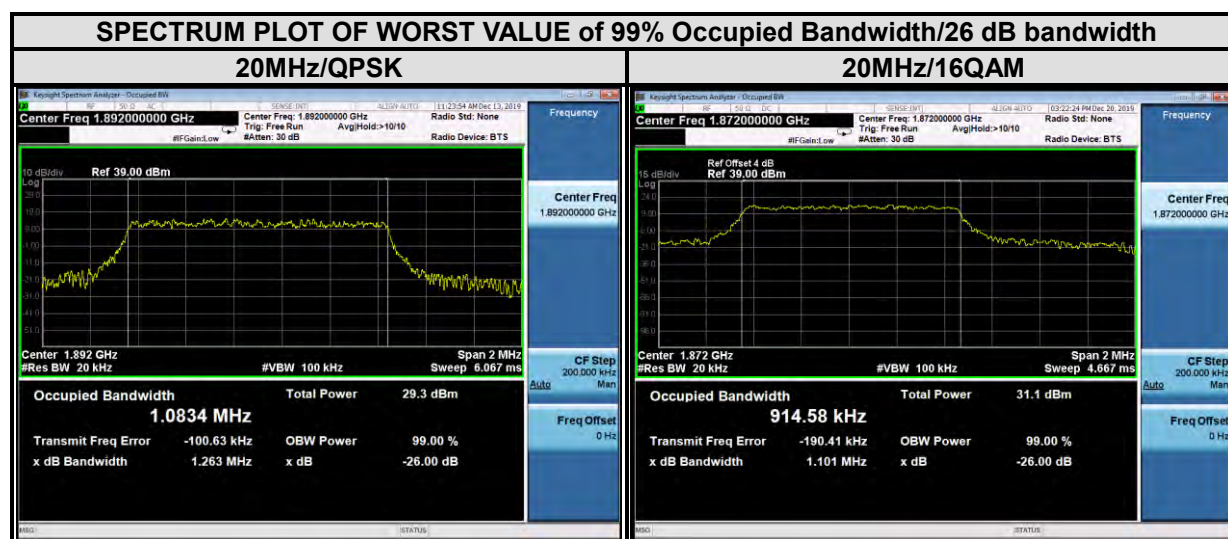
Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 2         |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 15MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18675                     | 1857.5          | 1.09                         | 0.908 | 1.29                  | 1.07  |
| 18900                     | 1880            | 1.09                         | 0.907 | 1.27                  | 1.06  |
| 19125                     | 1902.5          | 1.09                         | 0.913 | 1.27                  | 1.16  |





| LTE CAT-M1 Band 2         |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 20MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 18700                     | 1860            | 1.08                         | 0.909 | 1.28                  | 1.15  |
| 18900                     | 1880            | 1.08                         | 0.915 | 1.27                  | 1.10  |
| 19100                     | 1900            | 1.08                         | 0.908 | 1.26                  | 1.12  |

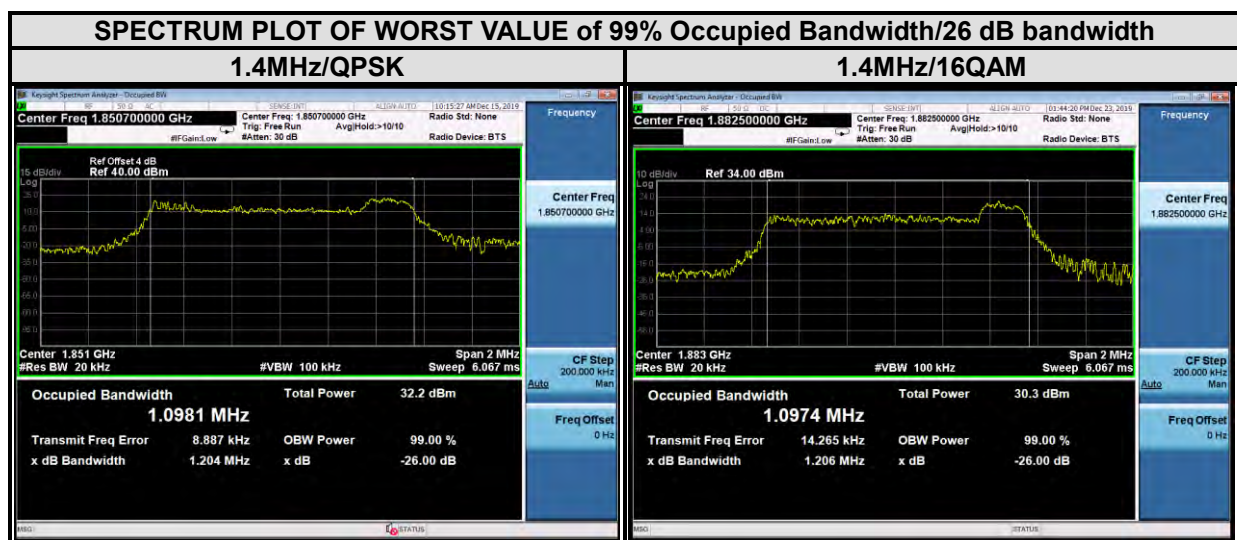




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 25         |                 |                              |       |                       |       |
|----------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 1.4MHz |                 |                              |       |                       |       |
| Channel                    | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                            |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26047                      | 1850.7          | 1.10                         | 1.09  | 1.20                  | 1.21  |
| 26365                      | 1882.5          | 1.09                         | 1.10  | 1.21                  | 1.21  |
| 26683                      | 1914.3          | 1.09                         | 1.10  | 1.22                  | 1.24  |

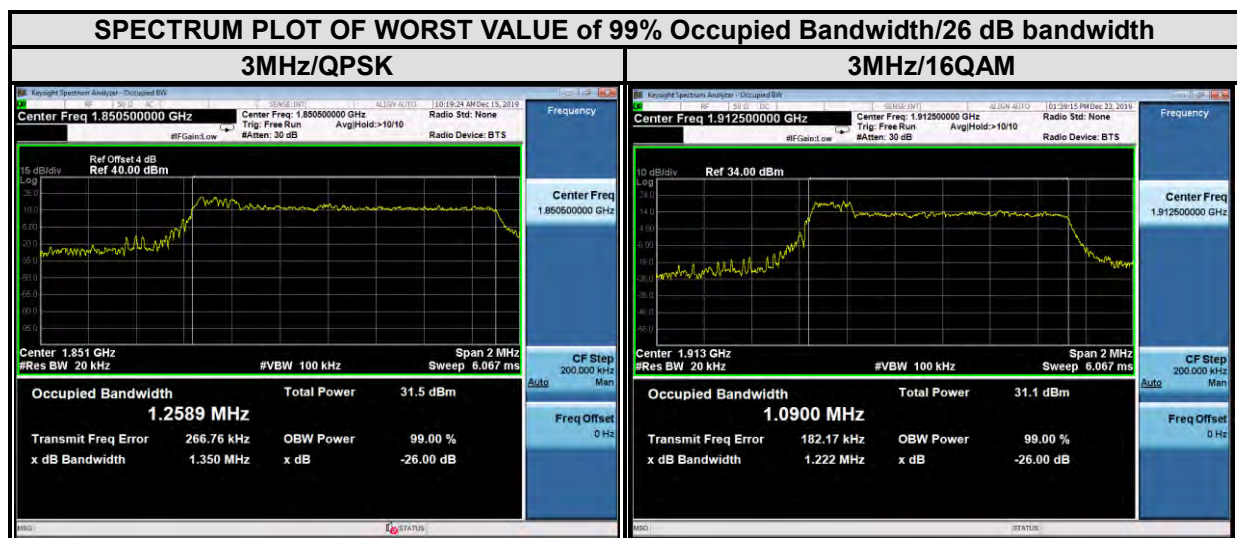




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 25       |                 |                              |       |                       |       |
|--------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 3MHz |                 |                              |       |                       |       |
| Channel                  | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                          |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26055                    | 1851.5          | 1.26                         | 1.09  | 1.35                  | 1.22  |
| 26365                    | 1882.5          | 1.26                         | 1.09  | 1.39                  | 1.21  |
| 26675                    | 1913.5          | 1.26                         | 1.09  | 1.38                  | 1.22  |

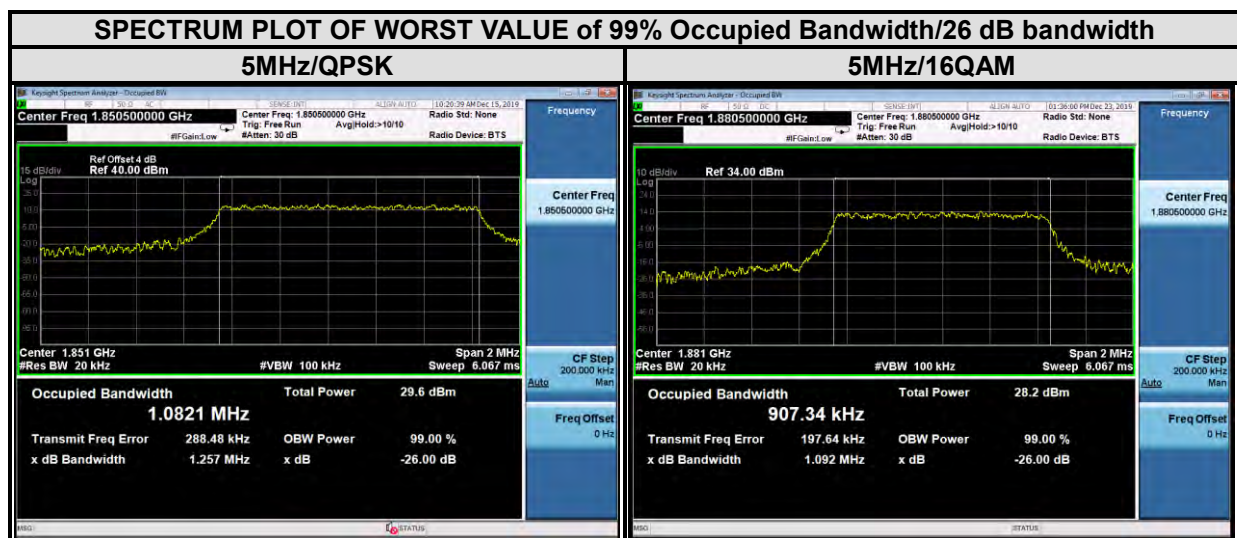




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 25       |                 |                              |       |                       |       |
|--------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 5MHz |                 |                              |       |                       |       |
| Channel                  | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                          |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26065                    | 1852.5          | 1.08                         | 0.905 | 1.26                  | 1.08  |
| 26365                    | 1882.5          | 1.08                         | 0.907 | 1.22                  | 1.09  |
| 26665                    | 1912.5          | 1.08                         | 0.907 | 1.25                  | 1.13  |

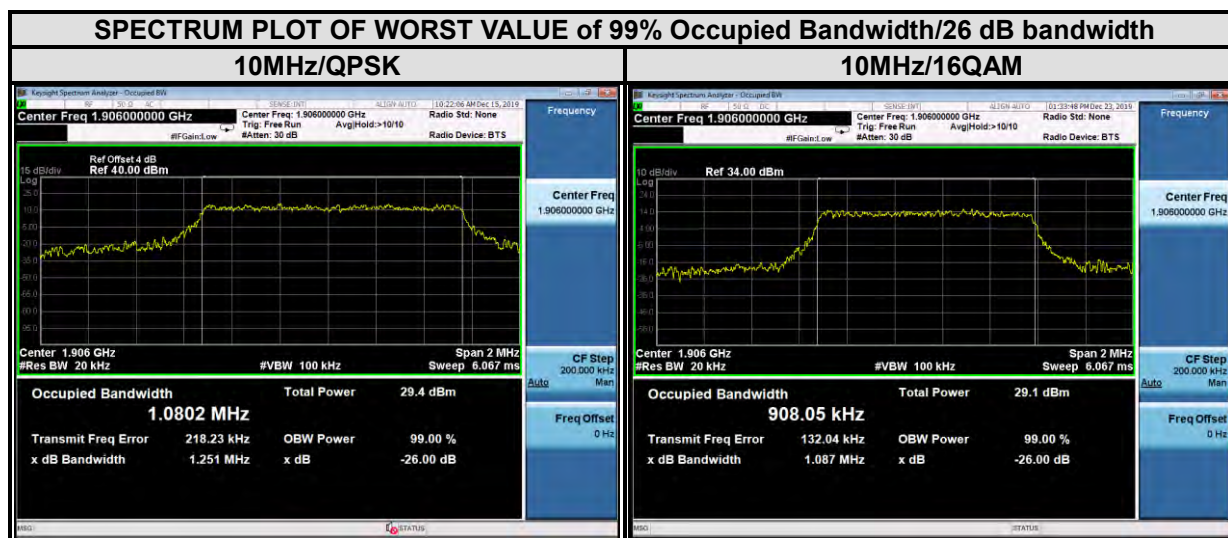




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Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 25        |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 10MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26090                     | 1855            | 1.07                         | 0.907 | 1.22                  | 1.16  |
| 26365                     | 1882.5          | 1.08                         | 0.904 | 1.24                  | 1.16  |
| 26640                     | 1910            | 1.08                         | 0.908 | 1.25                  | 1.09  |

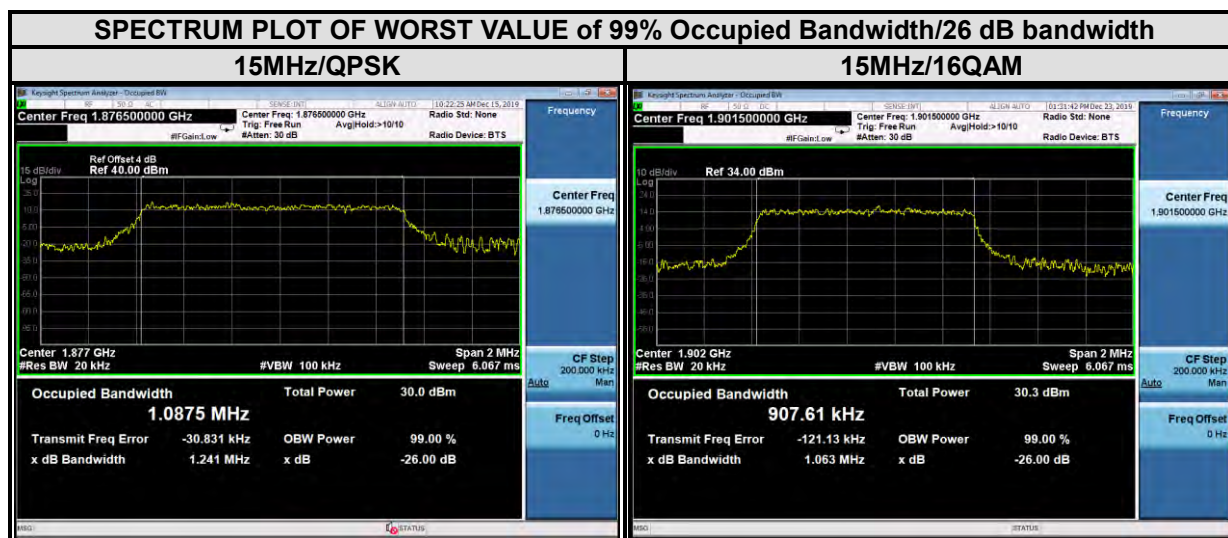




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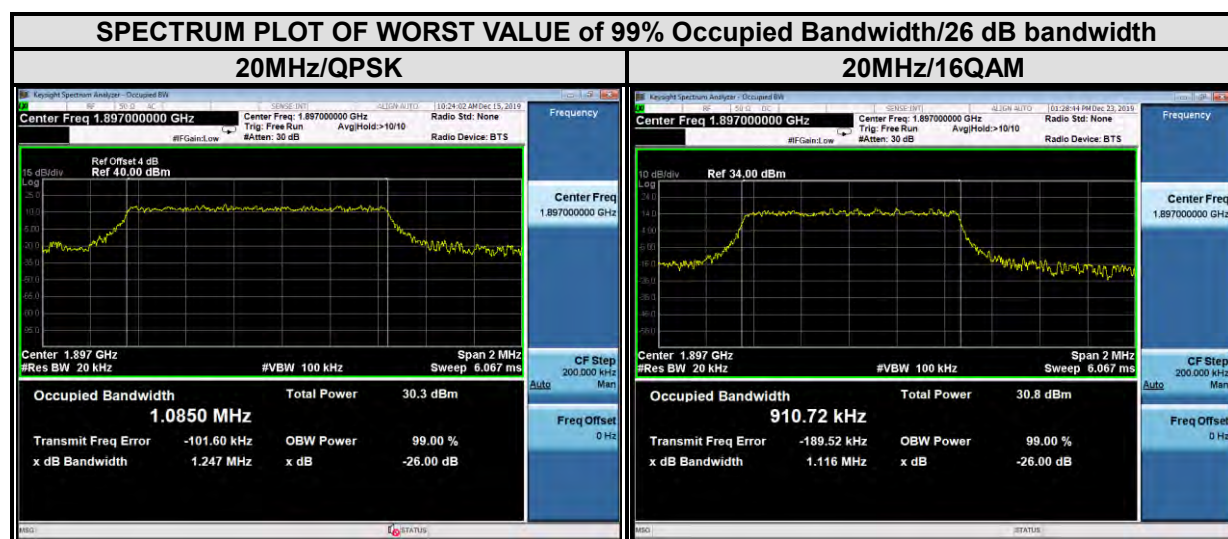
Test Report No.: RF191122W002-2

| LTE CAT-M1 Band 25        |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 15MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26115                     | 1857.5          | 1.09                         | 0.906 | 1.23                  | 1.14  |
| 26365                     | 1882.5          | 1.09                         | 0.904 | 1.24                  | 1.07  |
| 26615                     | 1907.5          | 1.09                         | 0.908 | 1.26                  | 1.06  |





| LTE CAT-M1 Band 25        |                 |                              |       |                       |       |
|---------------------------|-----------------|------------------------------|-------|-----------------------|-------|
| Channel Bandwidth : 20MHz |                 |                              |       |                       |       |
| Channel                   | Frequency (MHz) | 99% Occupied bandwidth (MHz) |       | 26 dB bandwidth (MHz) |       |
|                           |                 | QPSK                         | 16QAM | QPSK                  | 16QAM |
| 26140                     | 1860            | 1.07                         | 0.909 | 1.26                  | 1.09  |
| 26365                     | 1882.5          | 1.08                         | 0.908 | 1.22                  | 1.09  |
| 26590                     | 1905            | 1.09                         | 0.911 | 1.25                  | 1.12  |



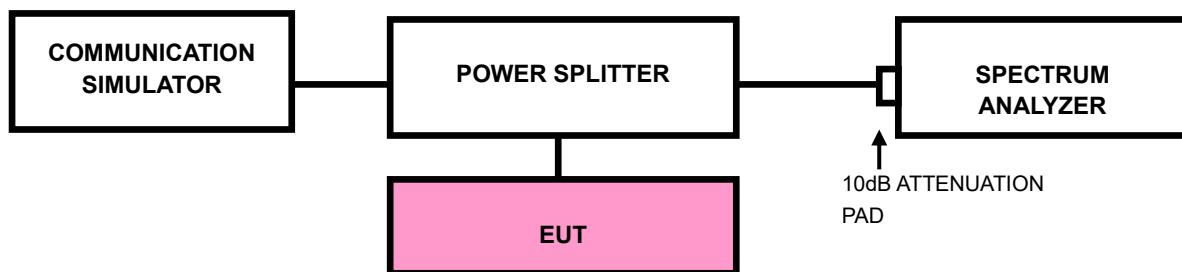


### 3.4 BAND EDGE MEASUREMENT

#### 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

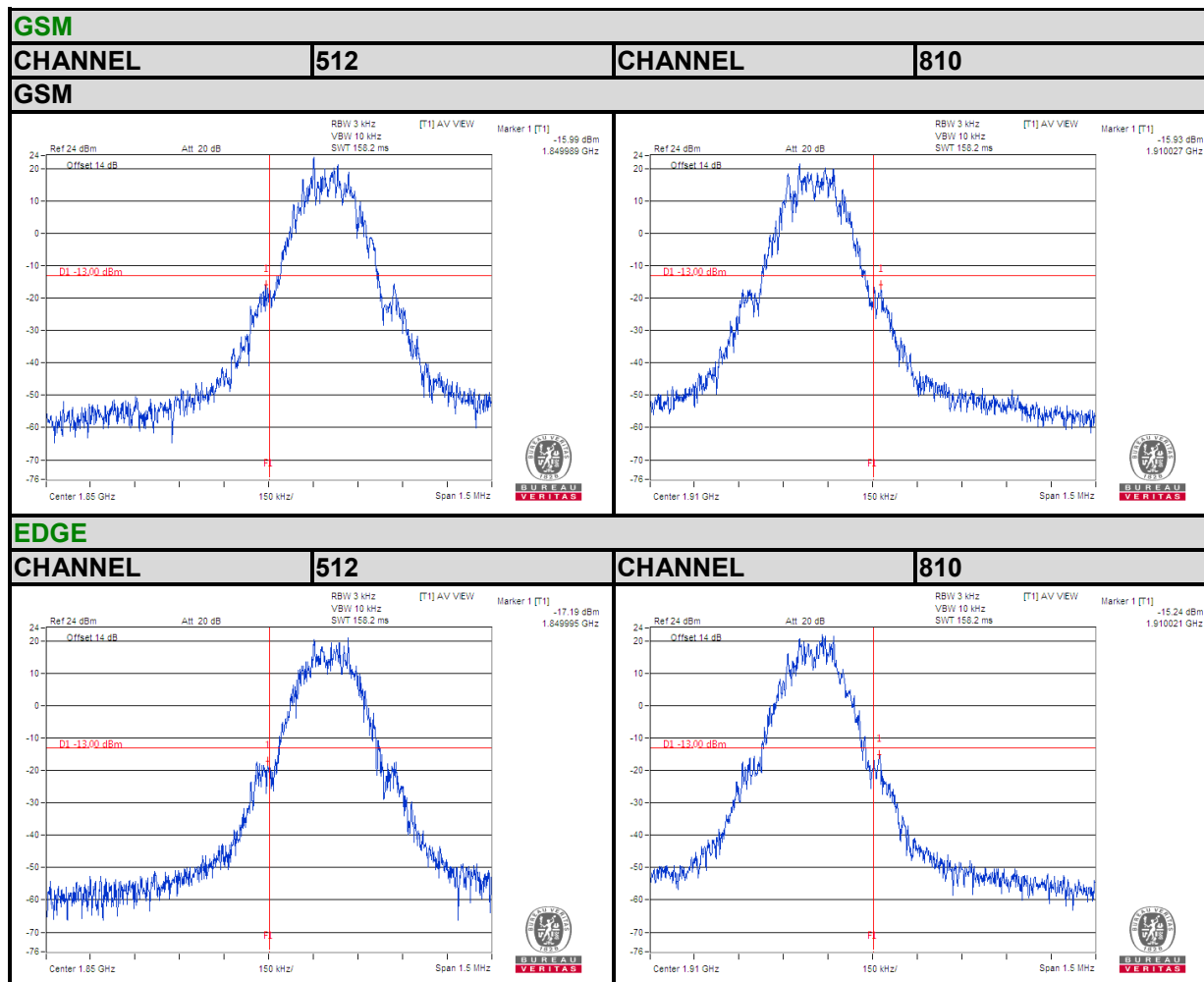
- a. All measurements were done at low and high operational frequency range.
- b. The center frequency of spectrum is the band edge frequency and span is 1.5 MHz. RBW of the spectrum is 10kHz and VBW of the spectrum is 30kHz (GSM/GPRS/ EDGE).
- c. The center frequency of spectrum is the band edge frequency and span is 1~5 MHz. RBW of the spectrum is 20kHz and VBW of the spectrum is 100 kHz. (LTE CAT-M1 Bandwidth 1.4MHz)
- d. 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)
- e. 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)
- f. 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)
- 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 15MHz)
- h. 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)
- i. Record the max trace plot into the test report.



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### 3.4.4. TEST RESULTS



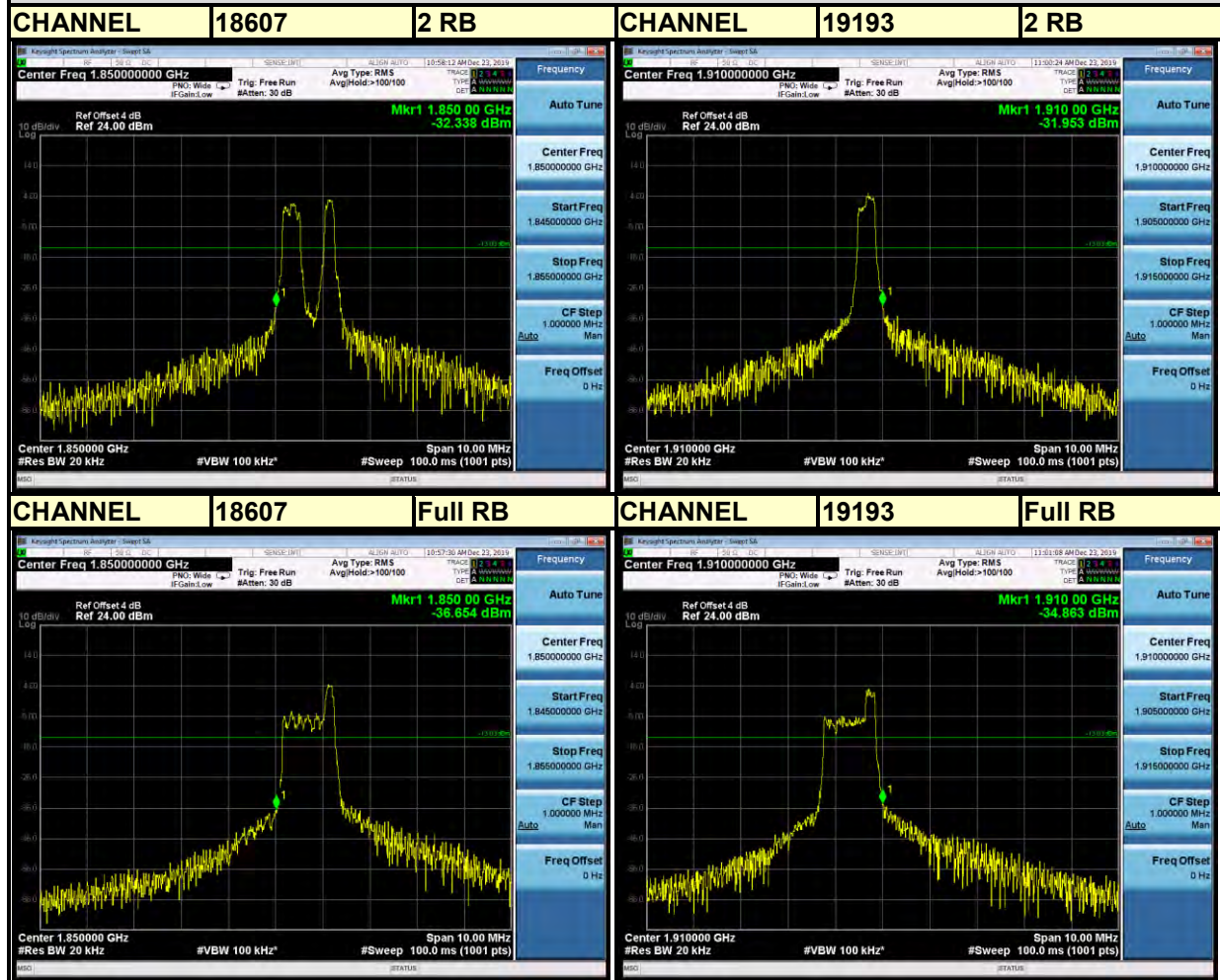


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

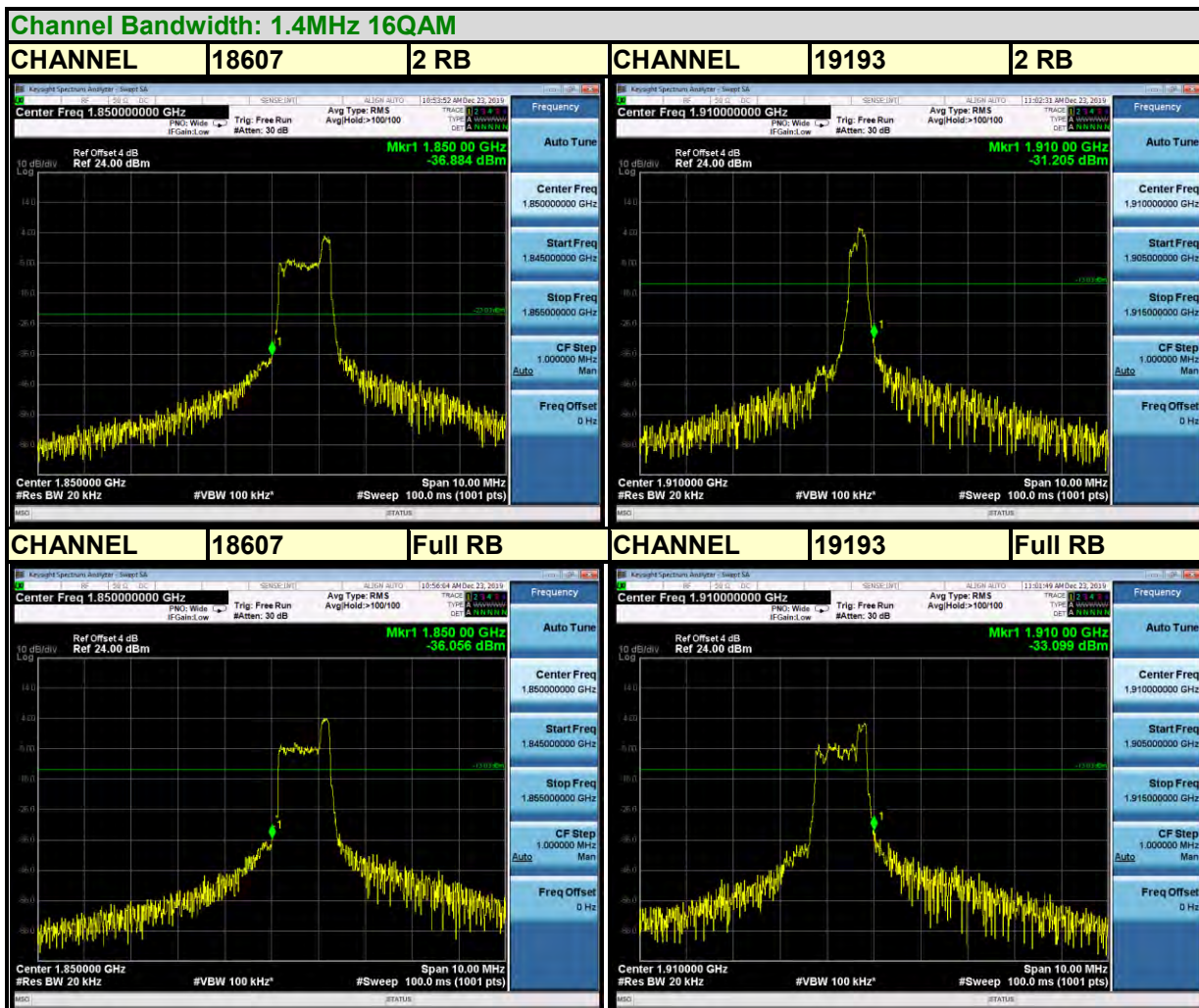
Channel Bandwidth: 1.4MHz QPSK





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Test Report No.: RF191122W002-2



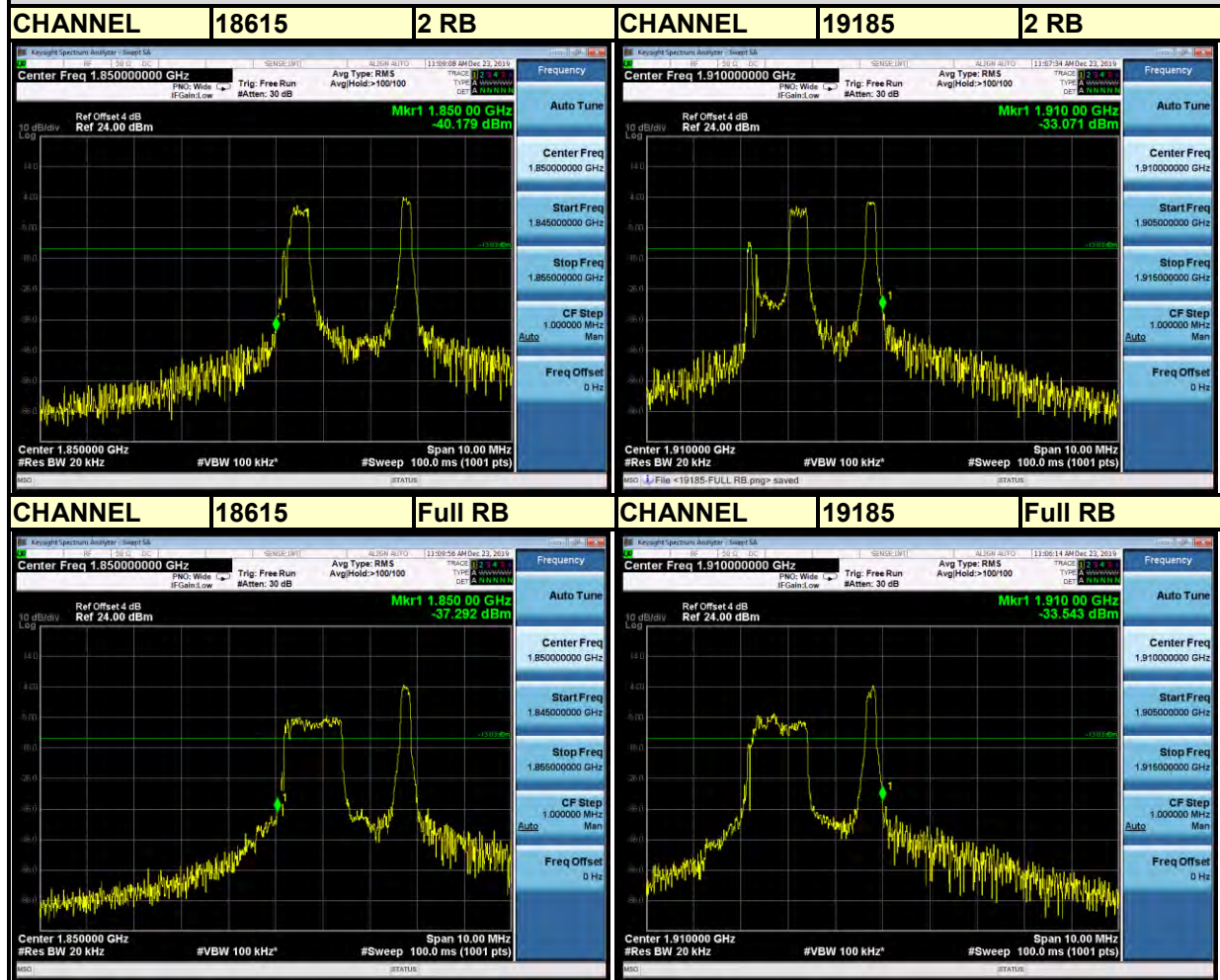


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

Channel Bandwidth: 3MHz QPSK

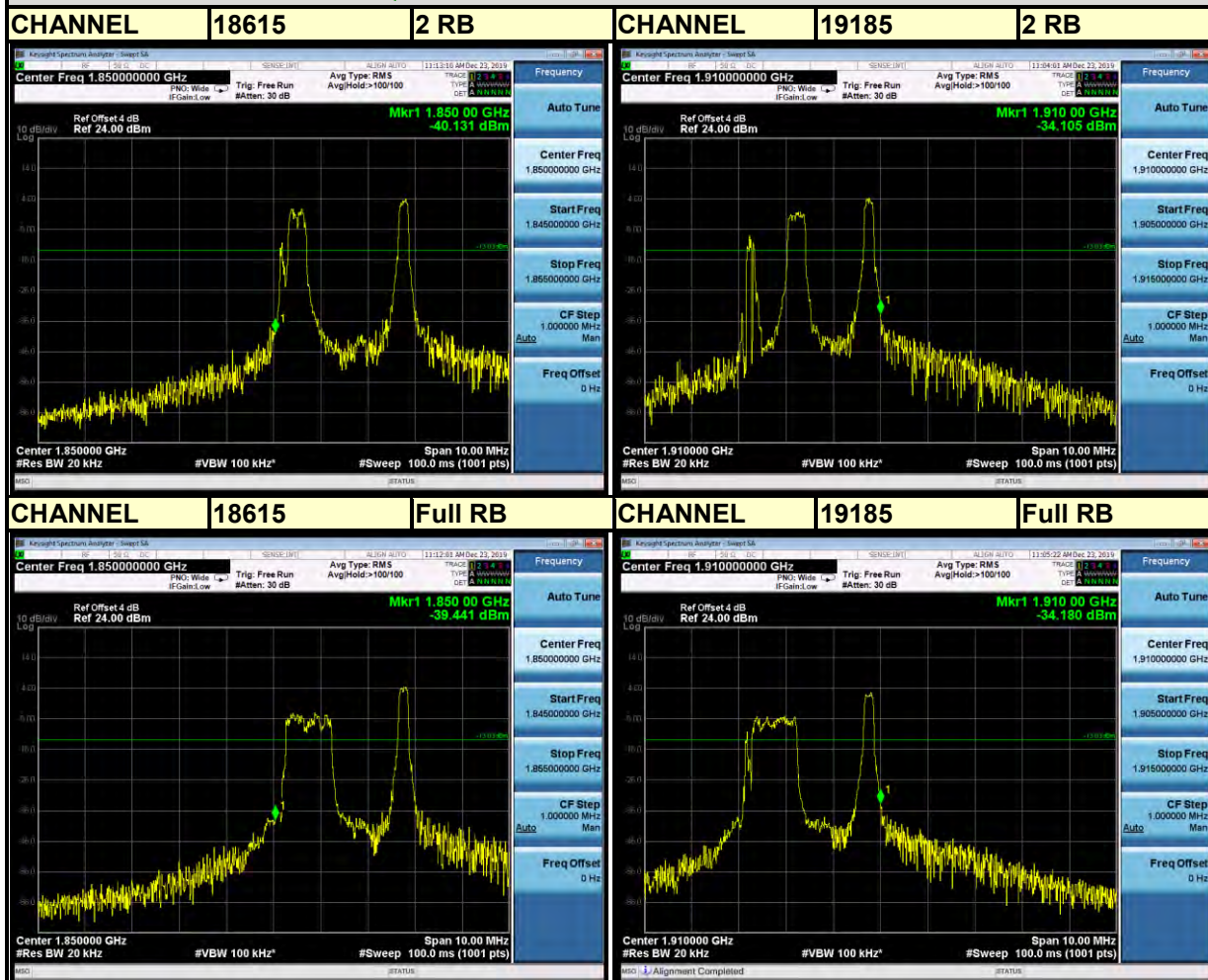




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Test Report No.: RF191122W002-2

Channel Bandwidth: 3MHz 16QAM



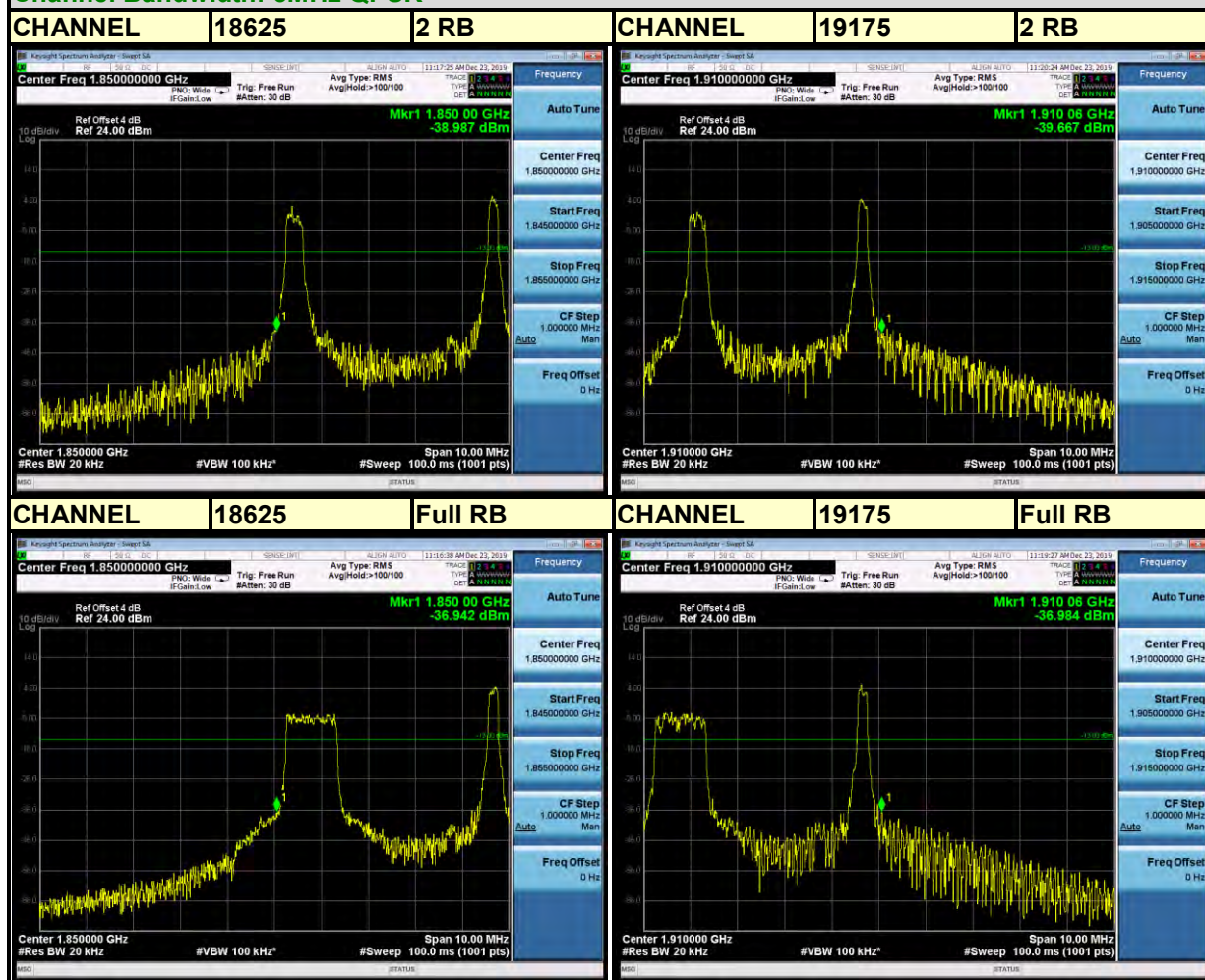


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

Channel Bandwidth: 5MHz QPSK

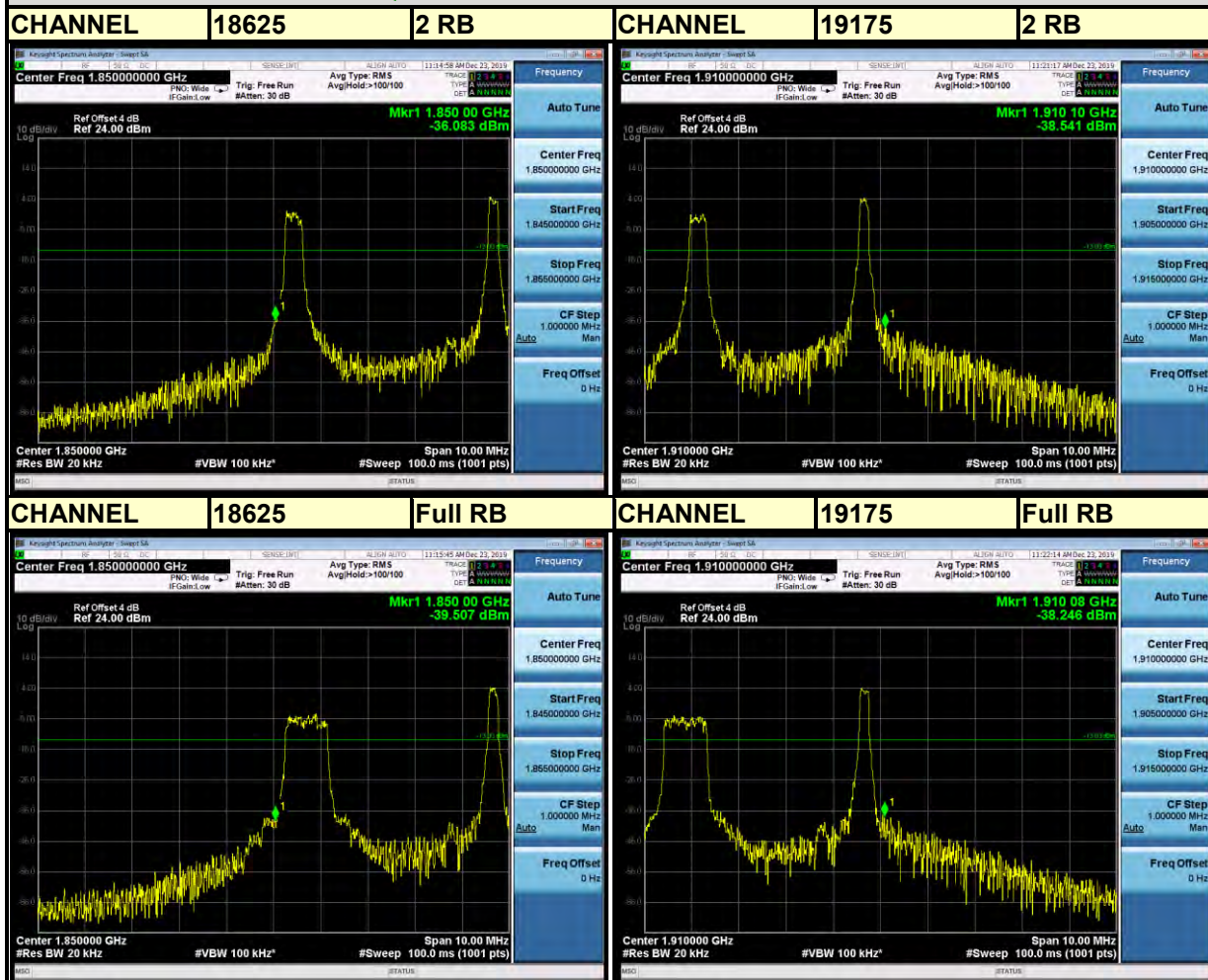




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Test Report No.: RF191122W002-2

Channel Bandwidth: 5MHz 16QAM



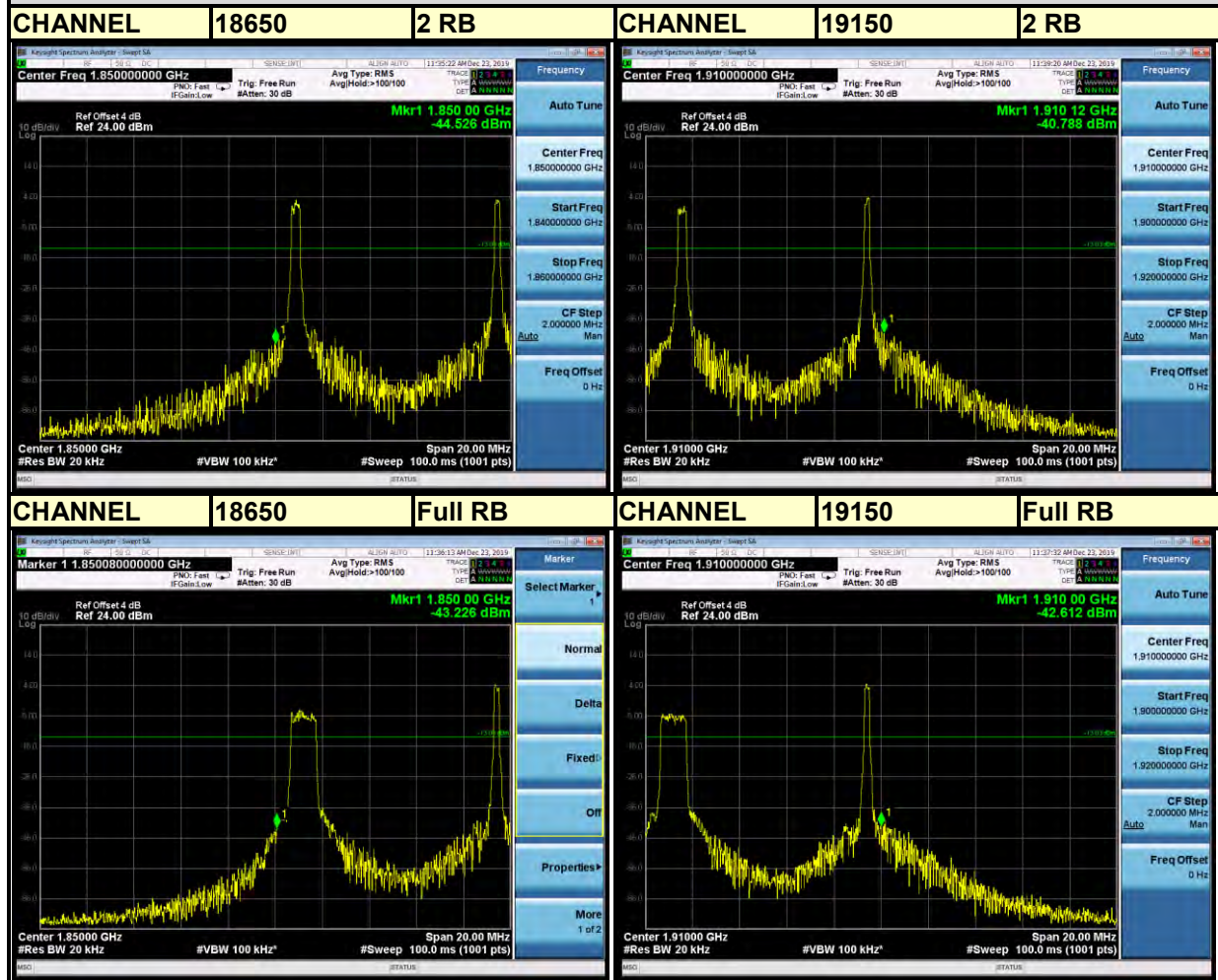


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

Channel Bandwidth: 10MHz QPSK

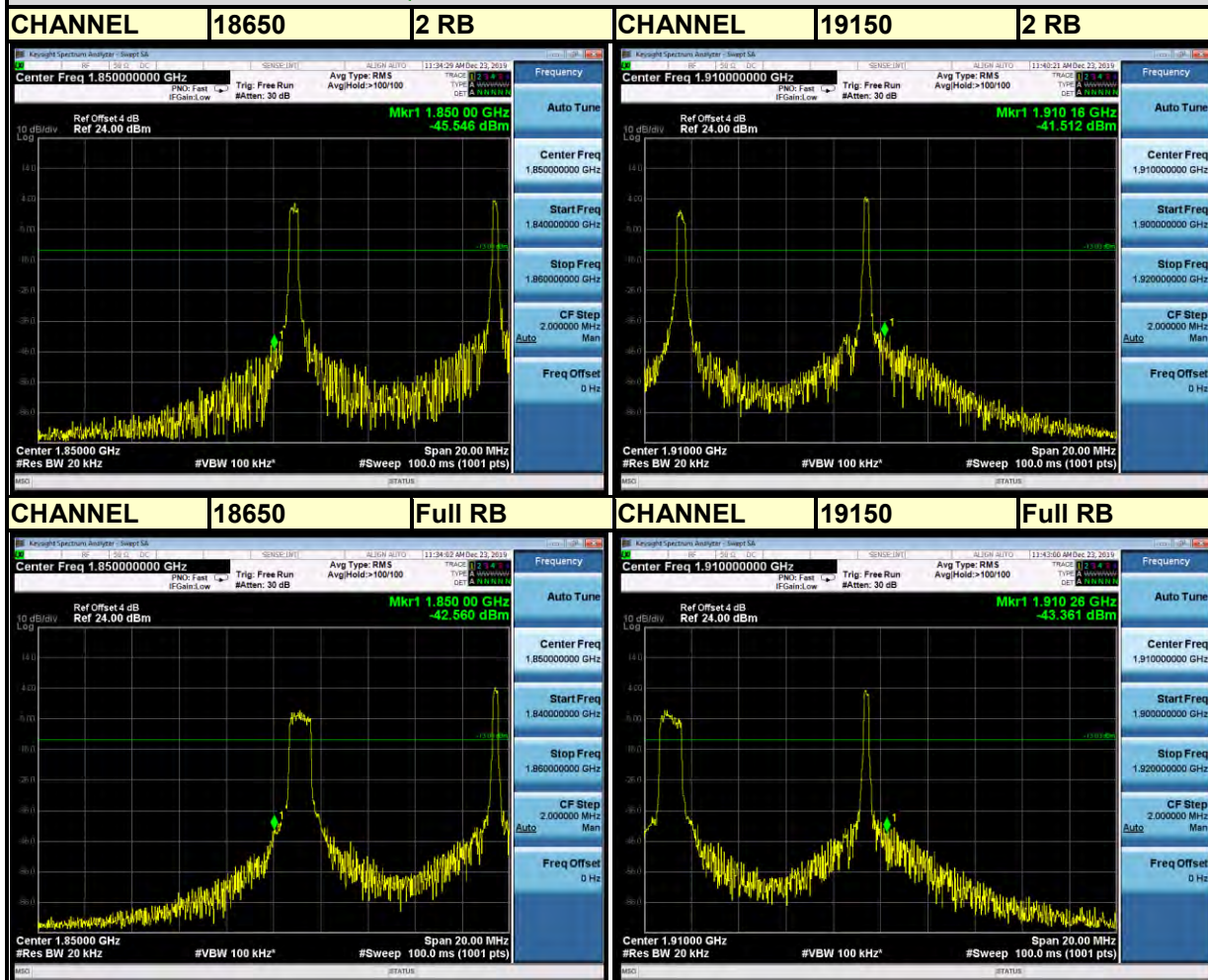




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Test Report No.: RF191122W002-2

Channel Bandwidth: 10MHz 16QAM



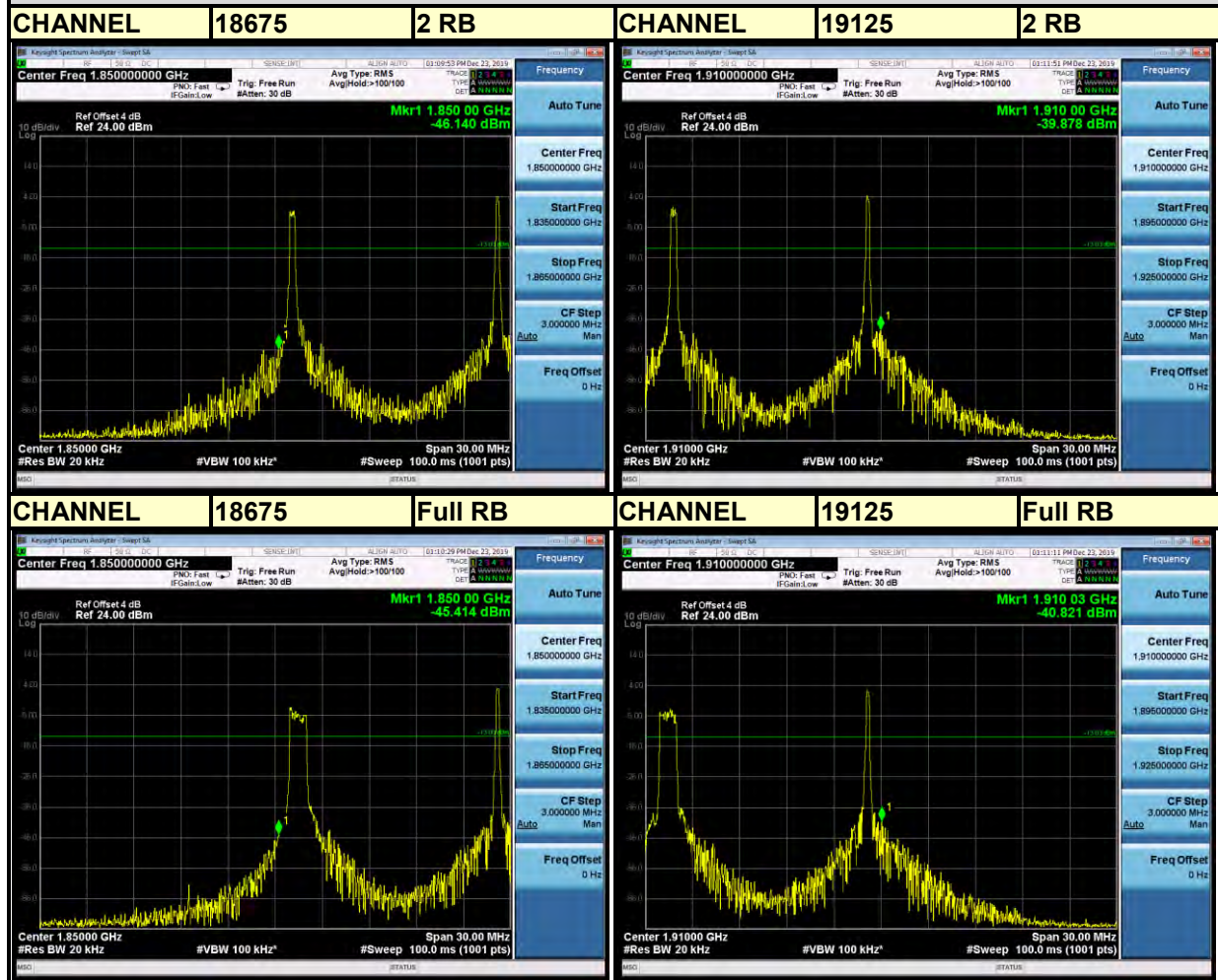


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

Channel Bandwidth: 15MHz QPSK

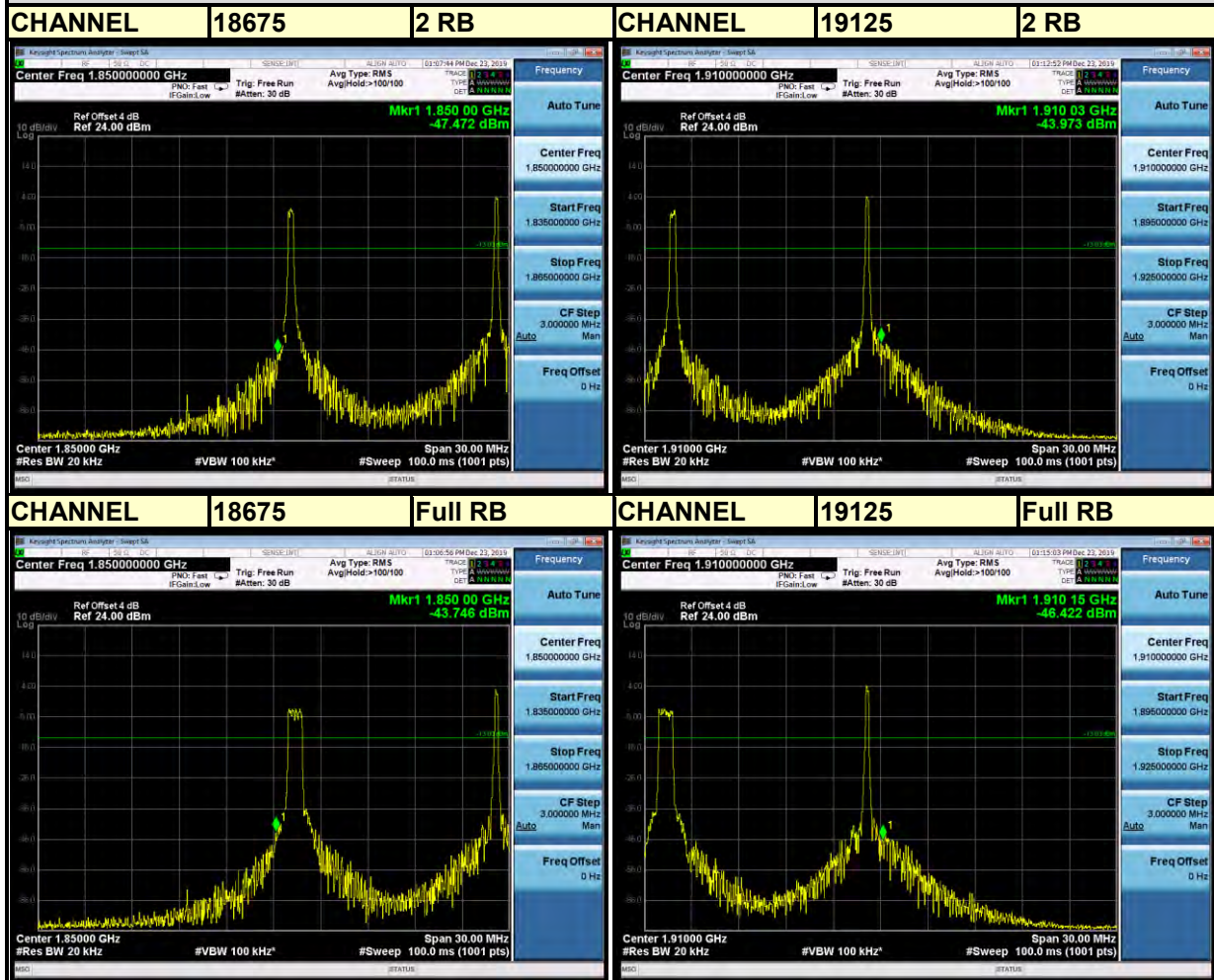




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Test Report No.: RF191122W002-2

Channel Bandwidth: 15MHz 16QAM



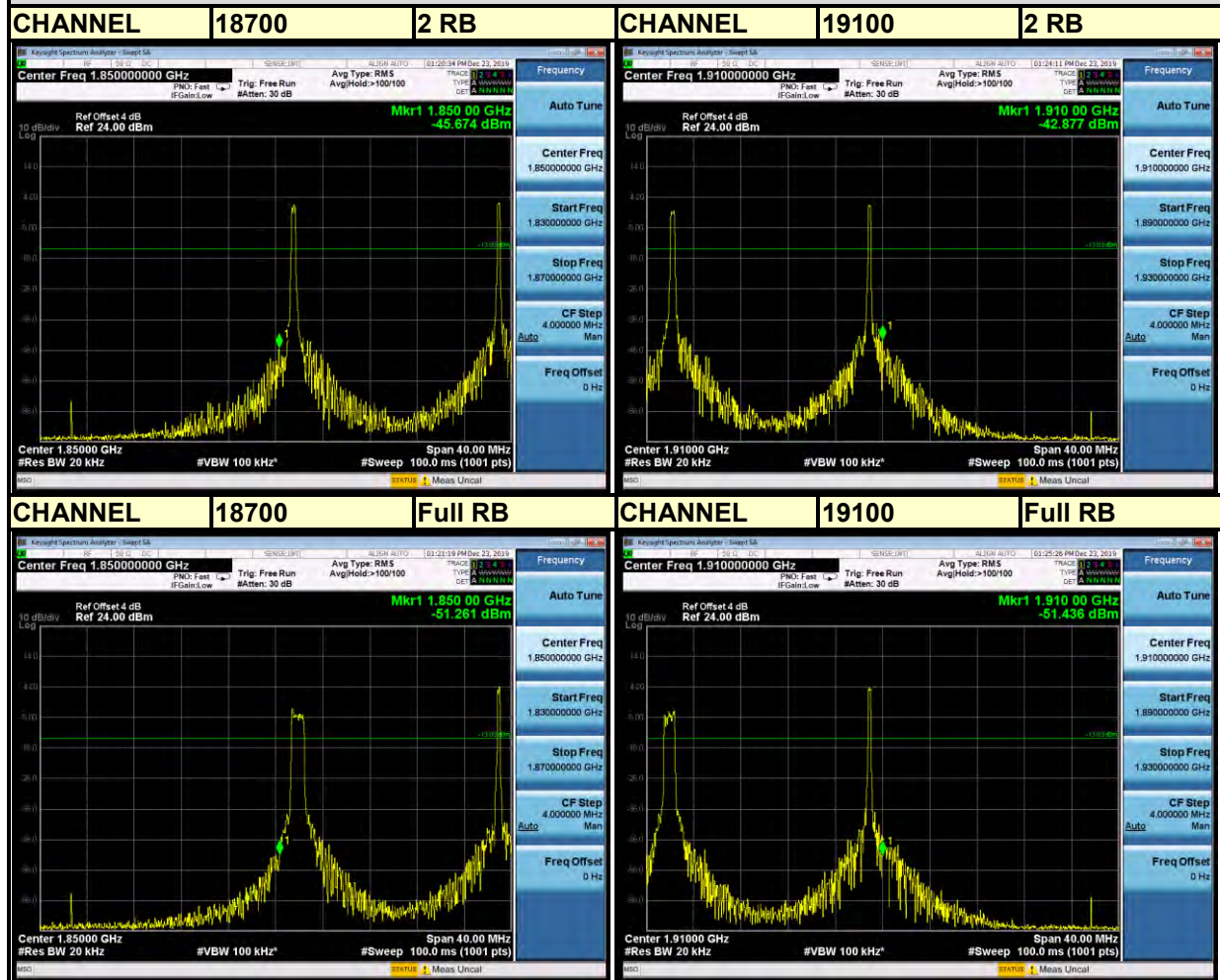


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

Channel Bandwidth: 20MHz QPSK

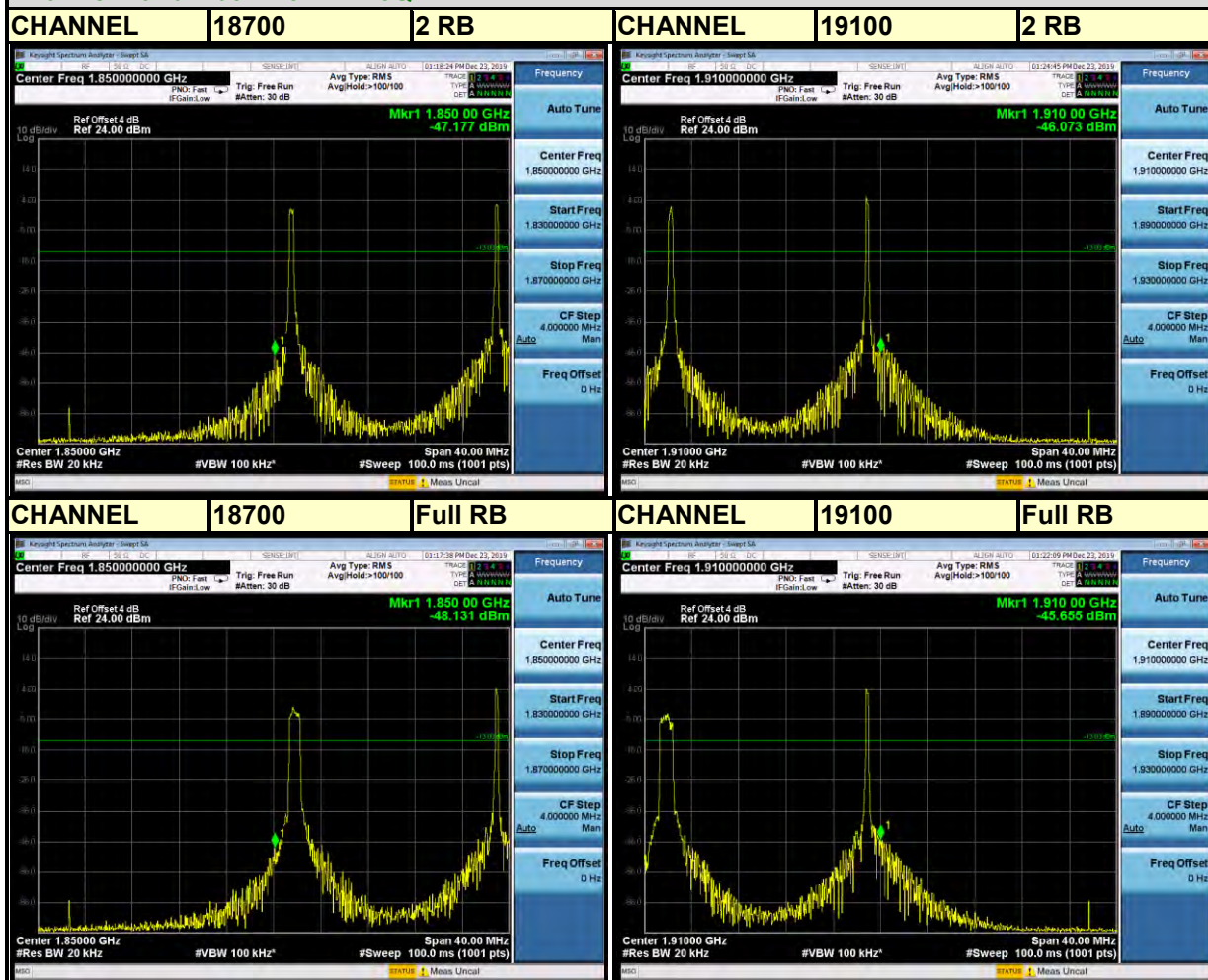




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Test Report No.: RF191122W002-2

Channel Bandwidth: 20MHz 16QAM



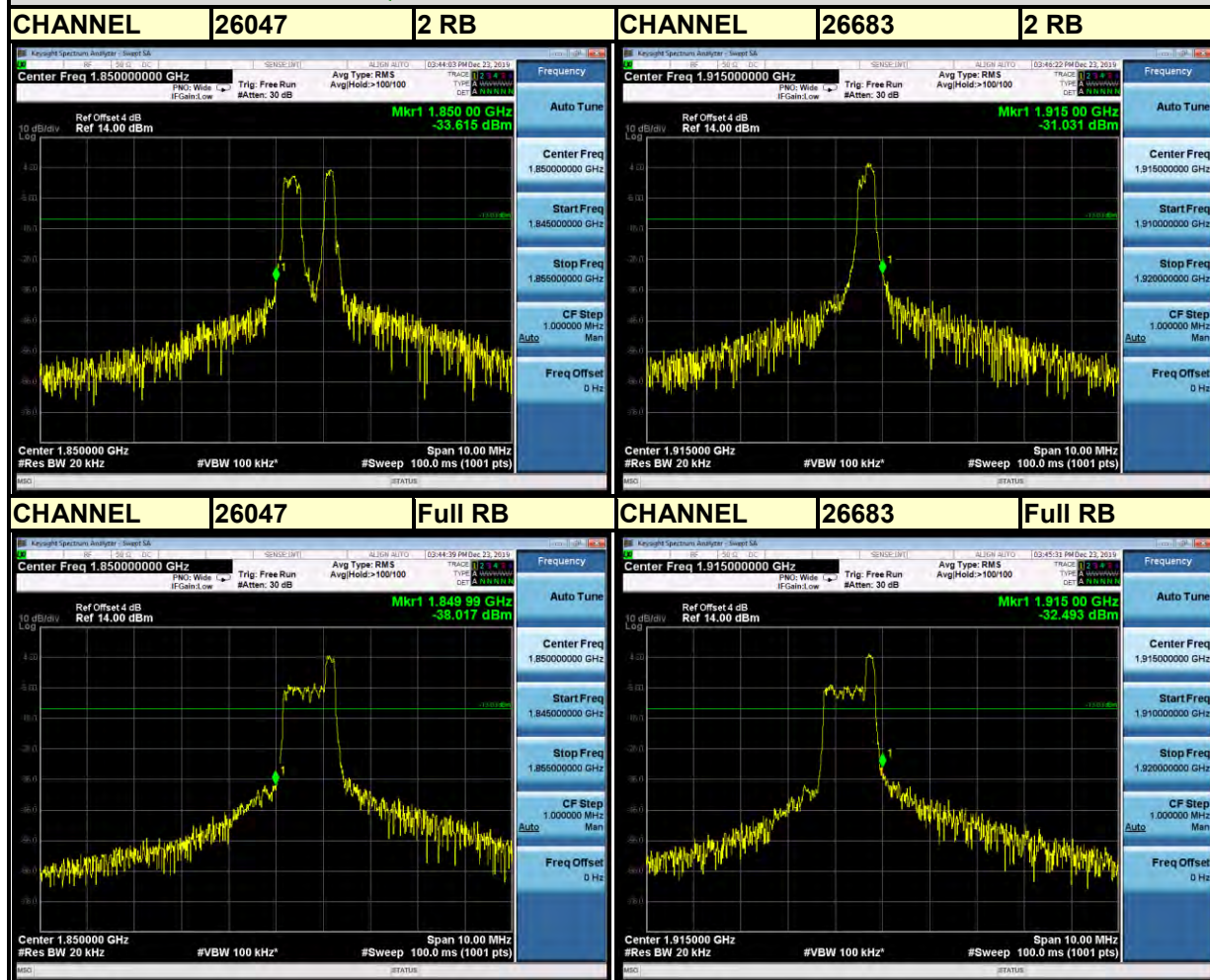


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 25

Channel Bandwidth: 1.4MHz QPSK

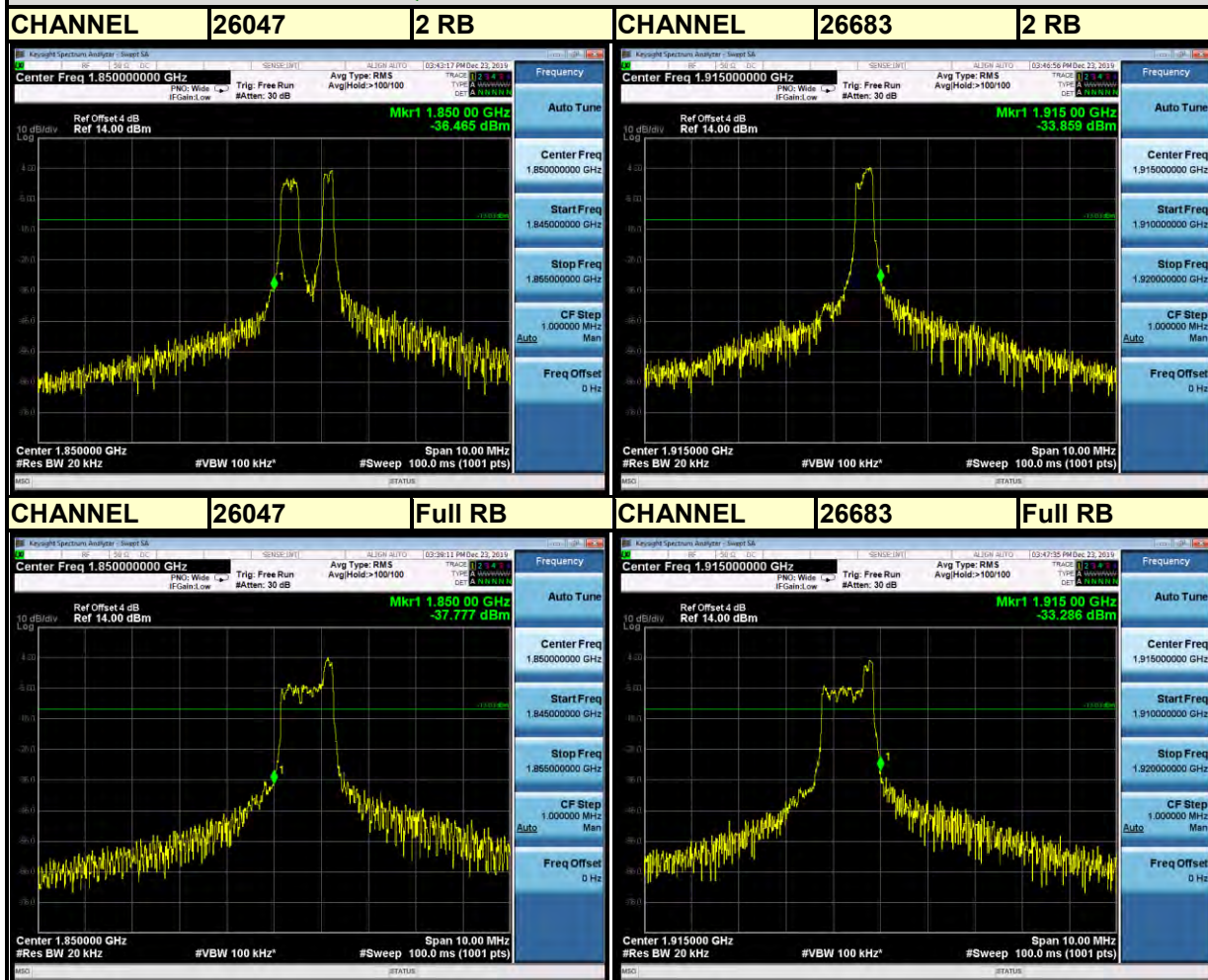




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Test Report No.: RF191122W002-2

Channel Bandwidth: 1.4MHz 16QAM



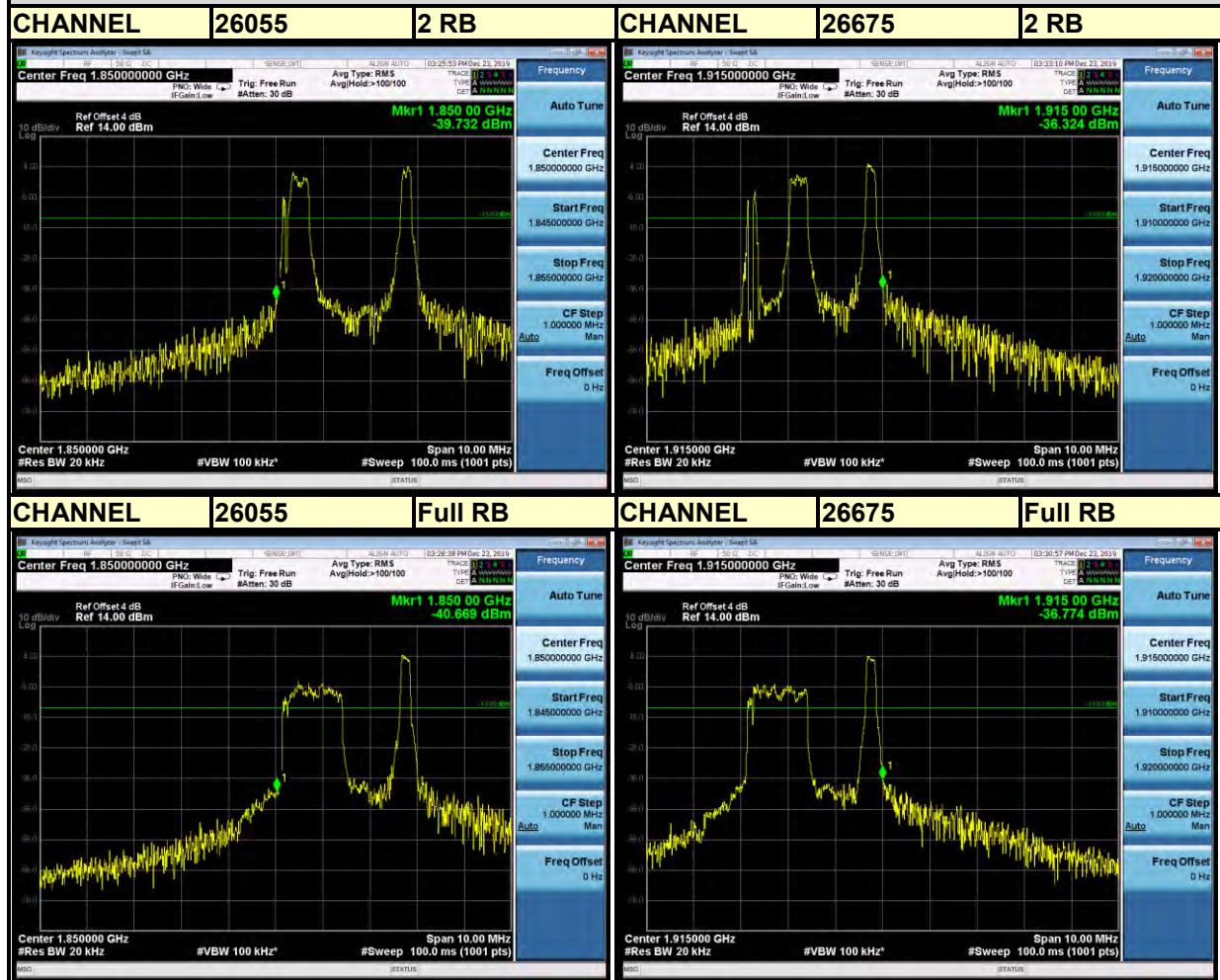


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 25

Channel Bandwidth: 3MHz QPSK

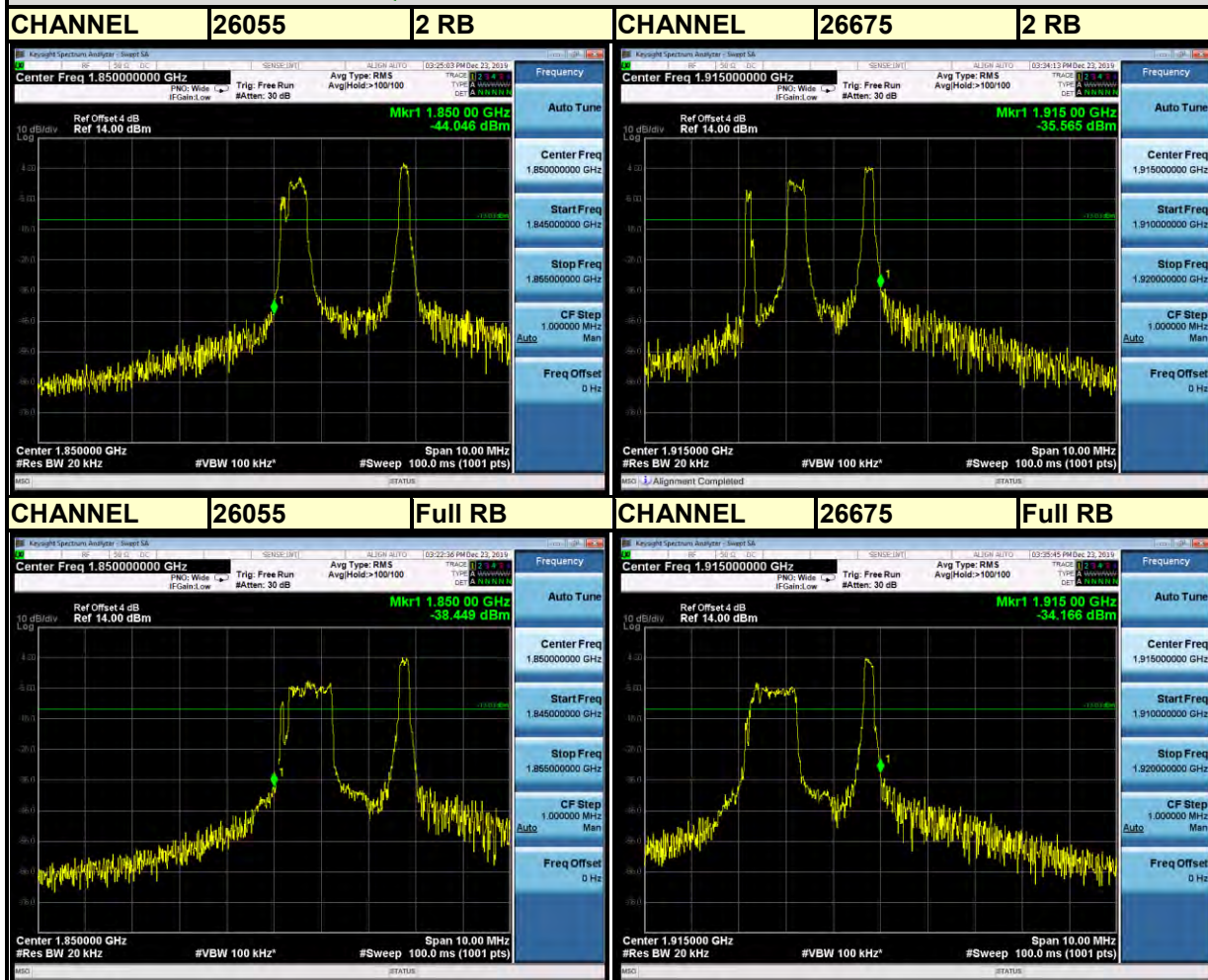




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Test Report No.: RF191122W002-2

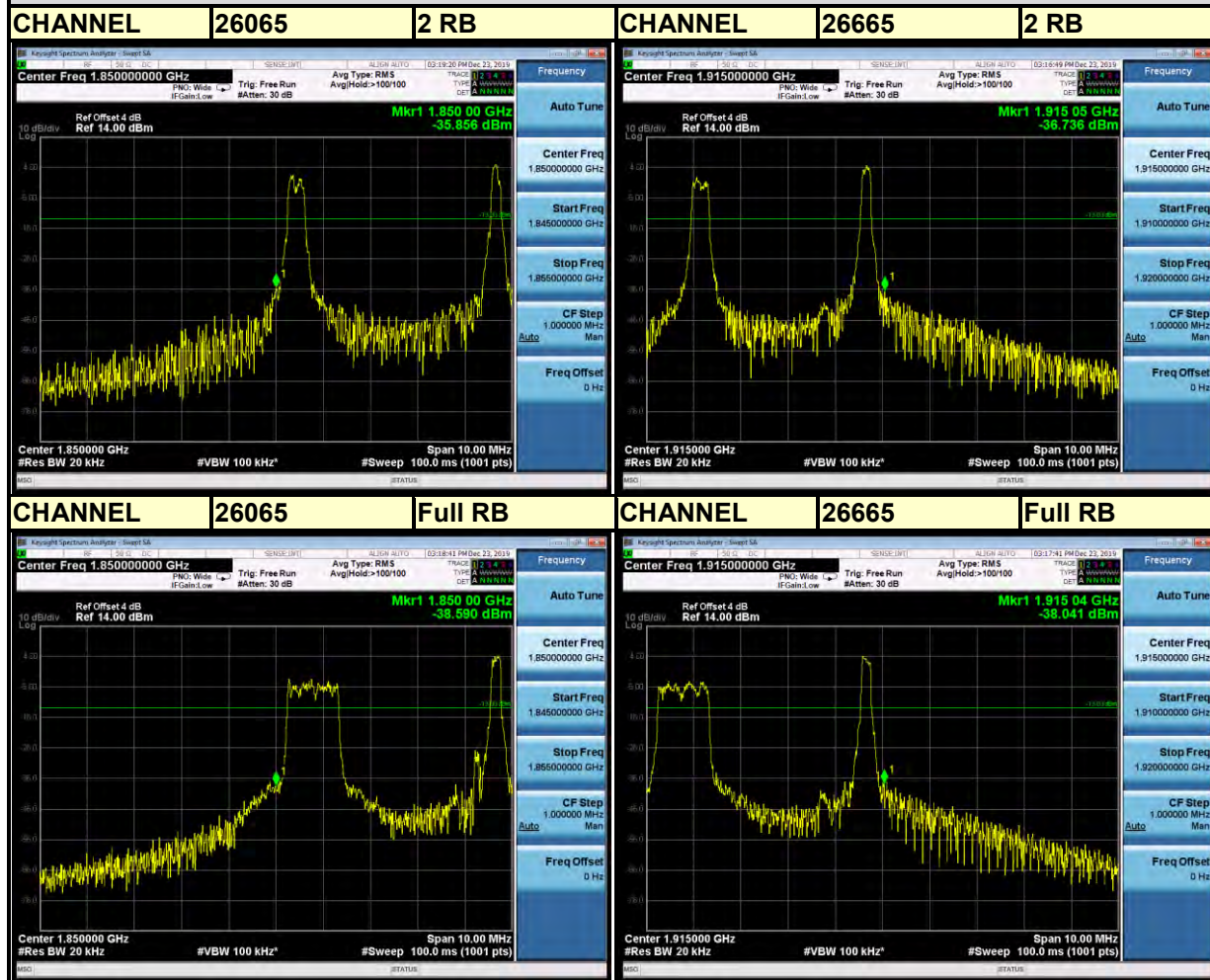
Channel Bandwidth: 3MHz 16QAM





**LTE CAT-M1 BAND 25**

**Channel Bandwidth: 5MHz QPSK**

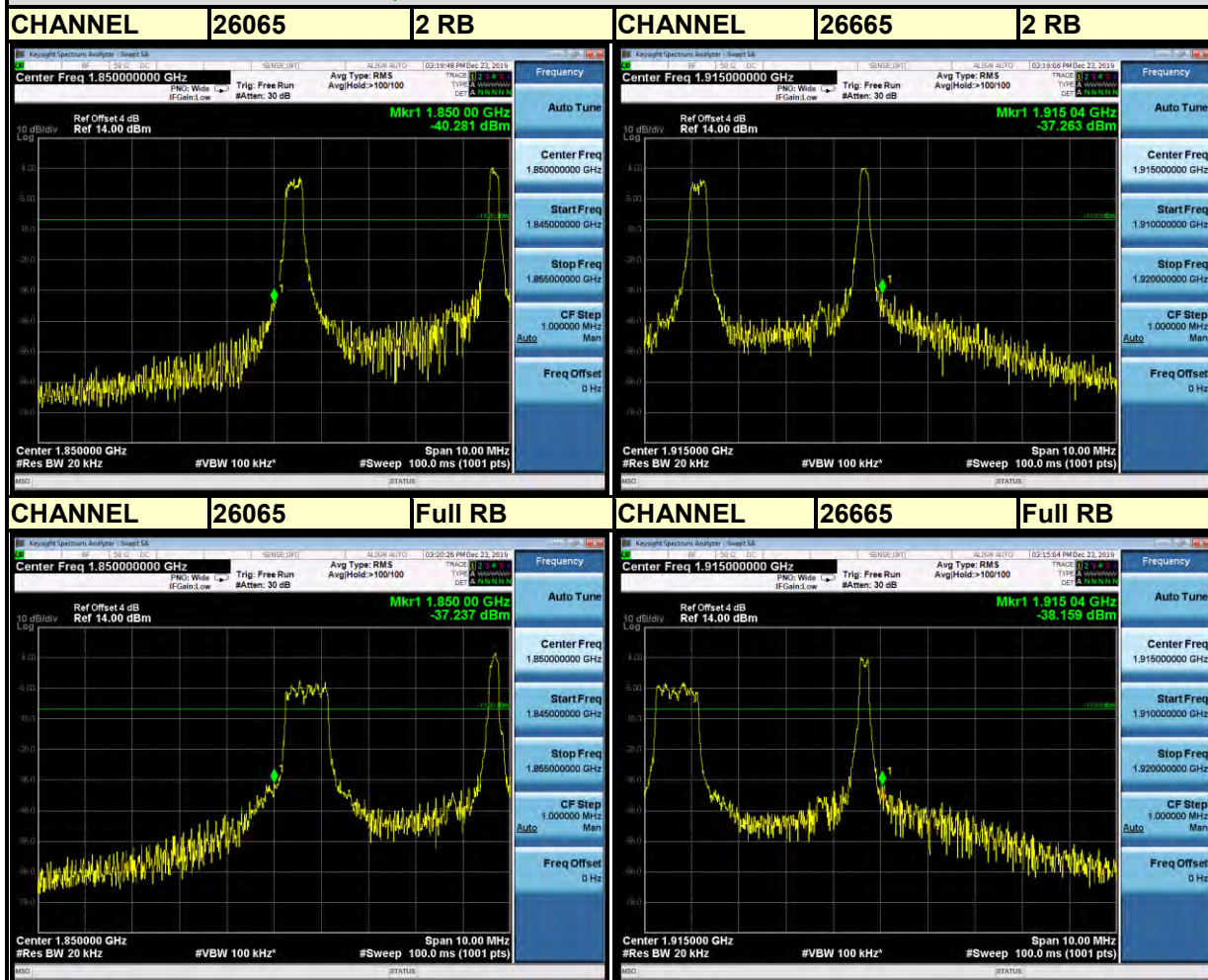




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Test Report No.: RF191122W002-2

Channel Bandwidth: 5MHz 16QAM



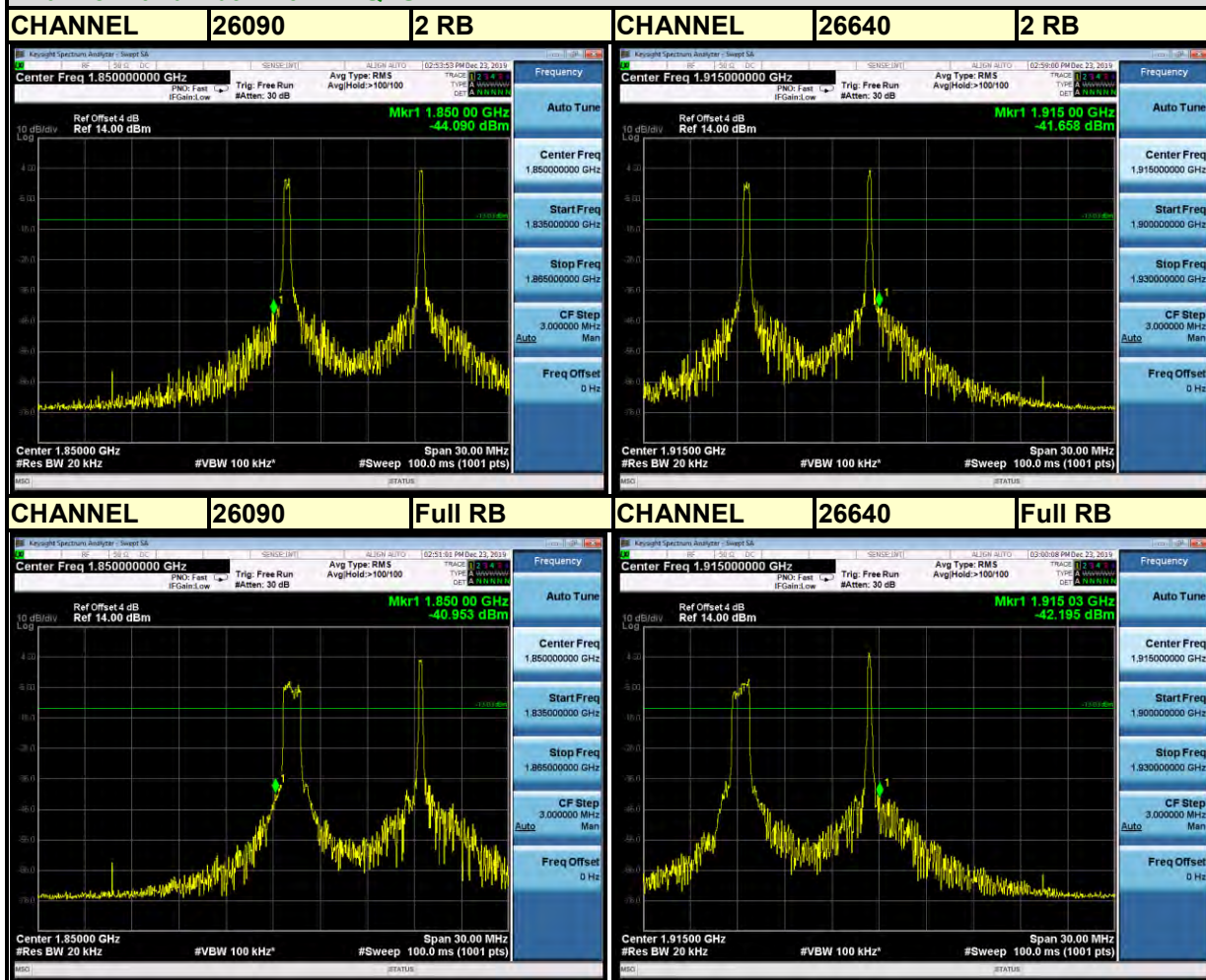


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VERITAS

Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 25

Channel Bandwidth: 10MHz QPSK

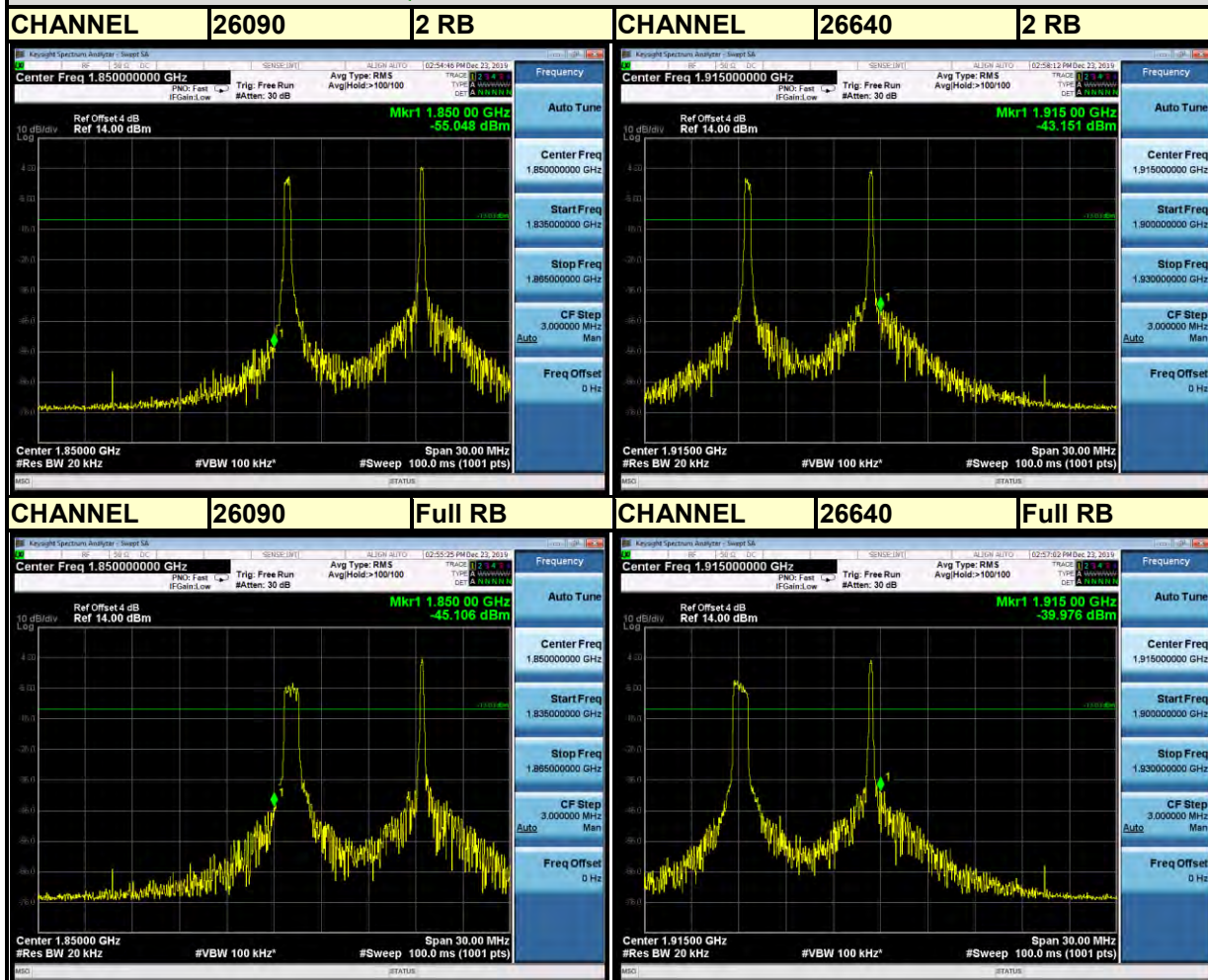




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Test Report No.: RF191122W002-2

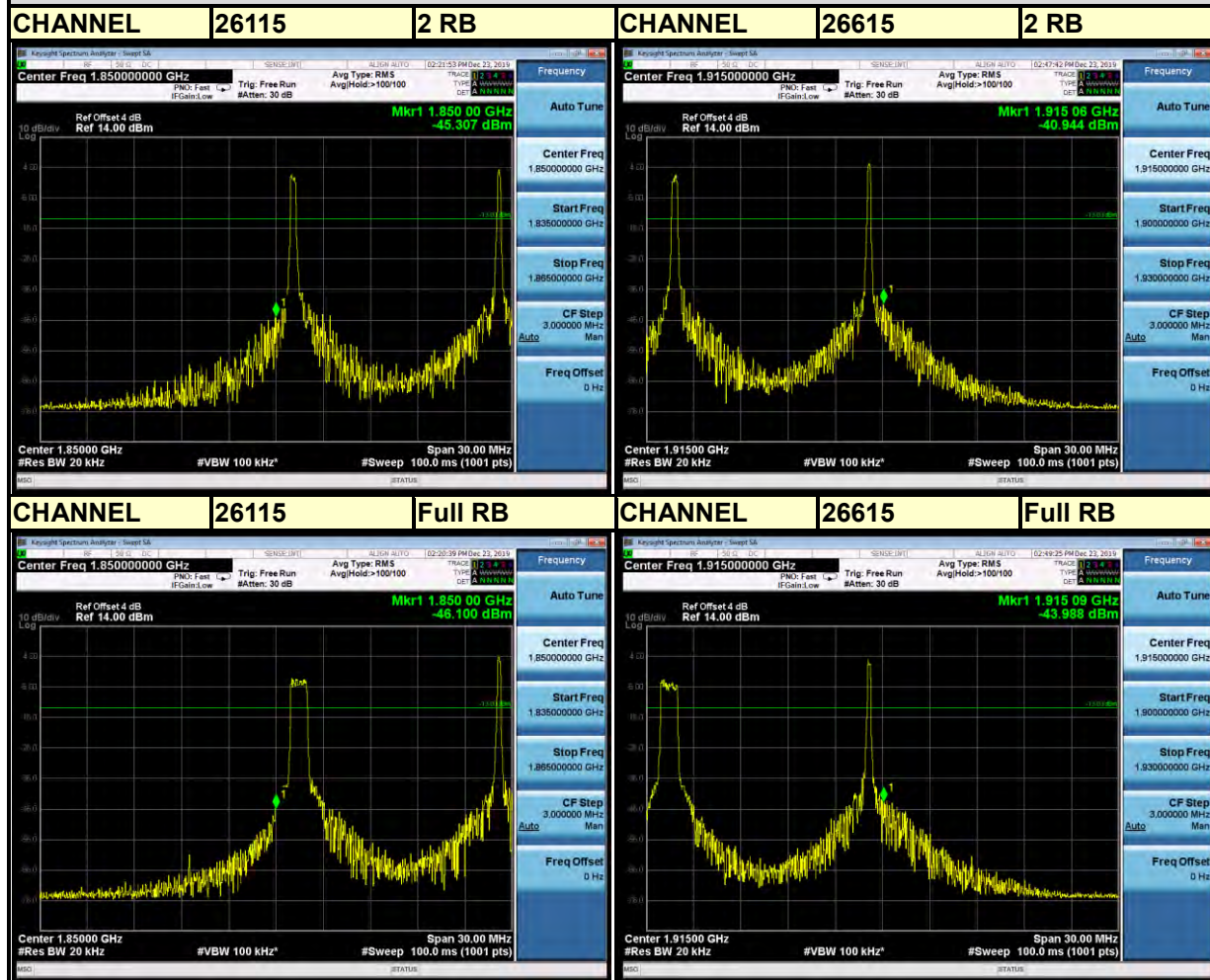
Channel Bandwidth: 10MHz 16QAM





**LTE CAT-M1 BAND 25**

**Channel Bandwidth: 15MHz QPSK**

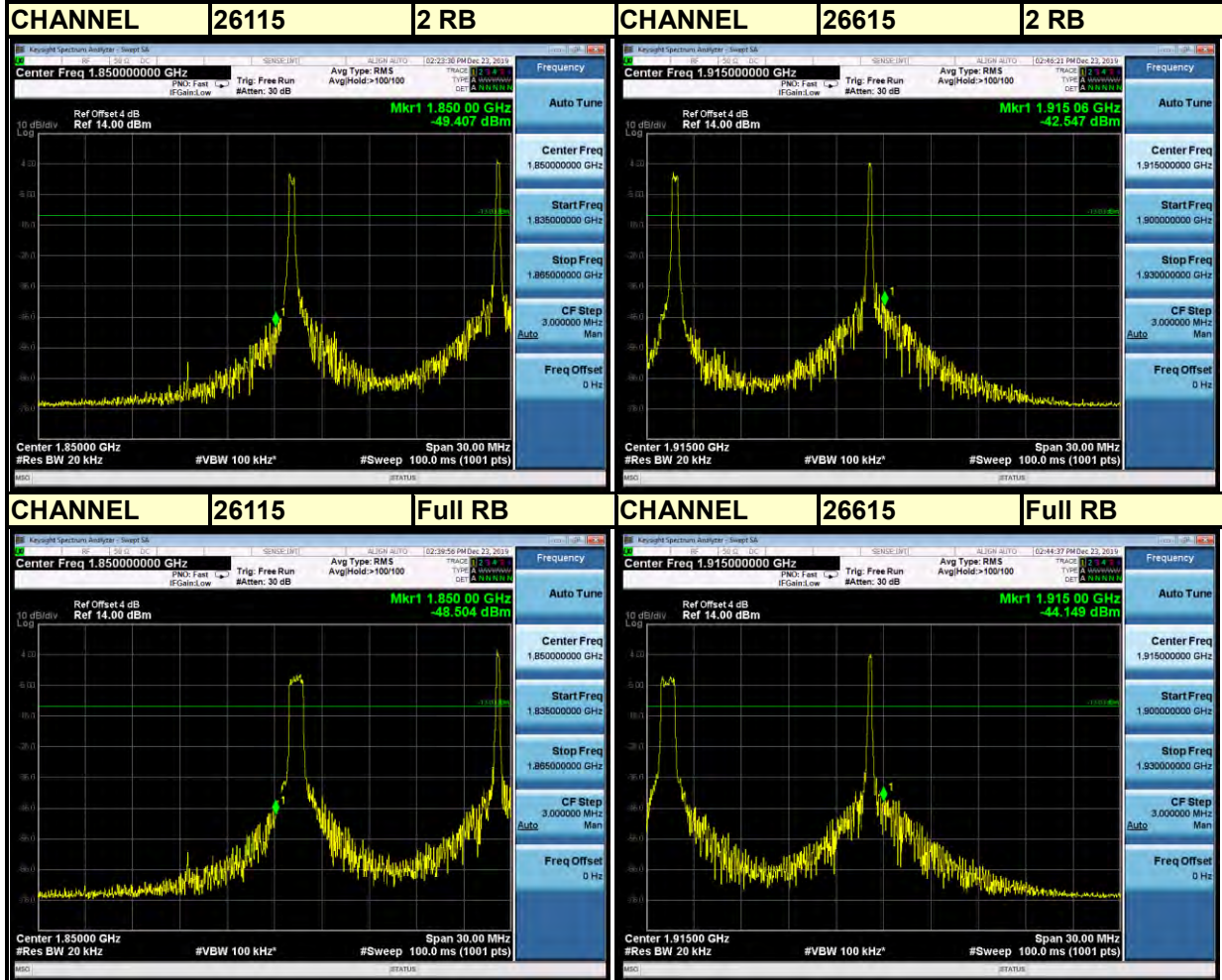




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VERITAS

Test Report No.: RF191122W002-2

Channel Bandwidth: 15MHz 16QAM



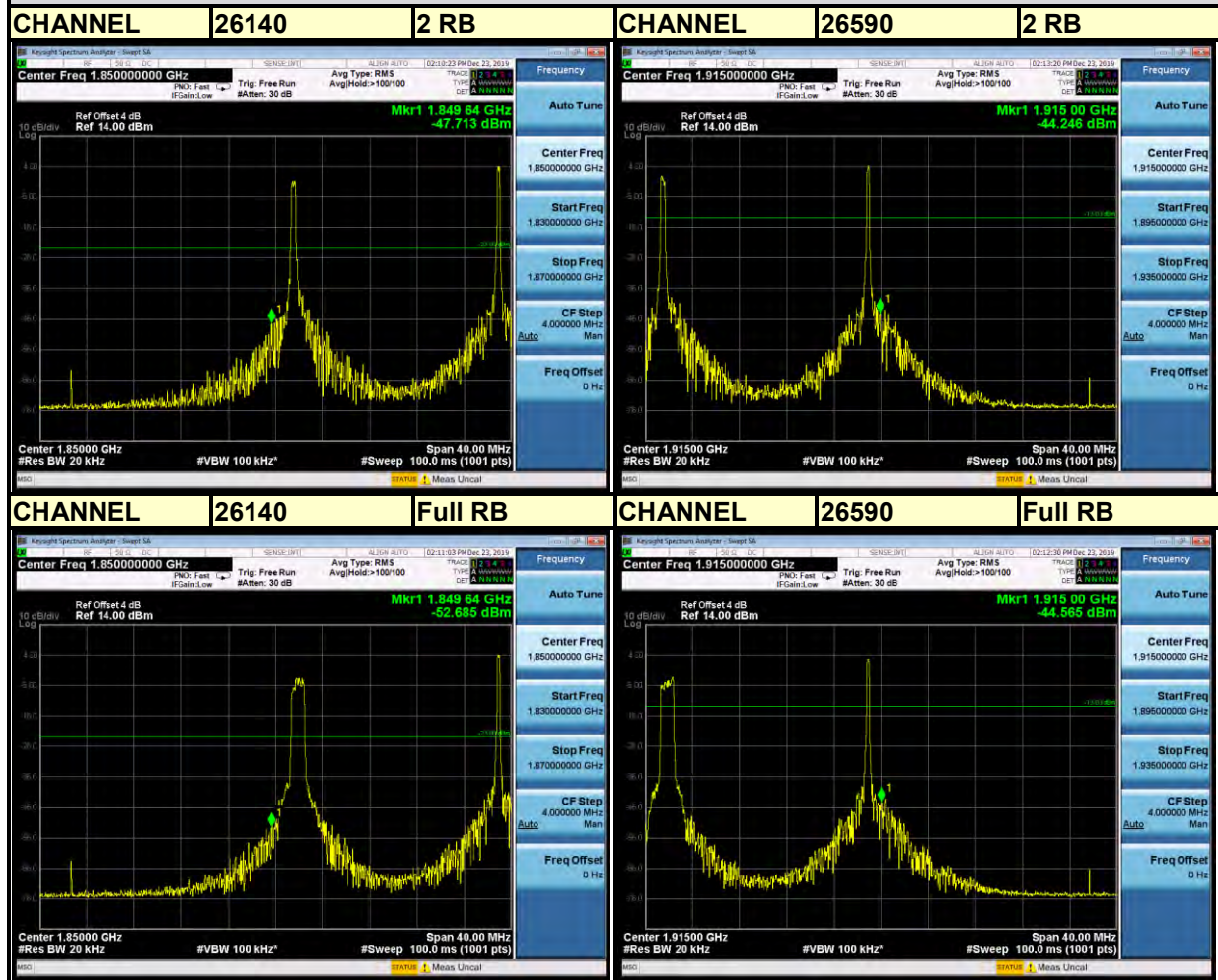


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Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 25

Channel Bandwidth: 20MHz QPSK

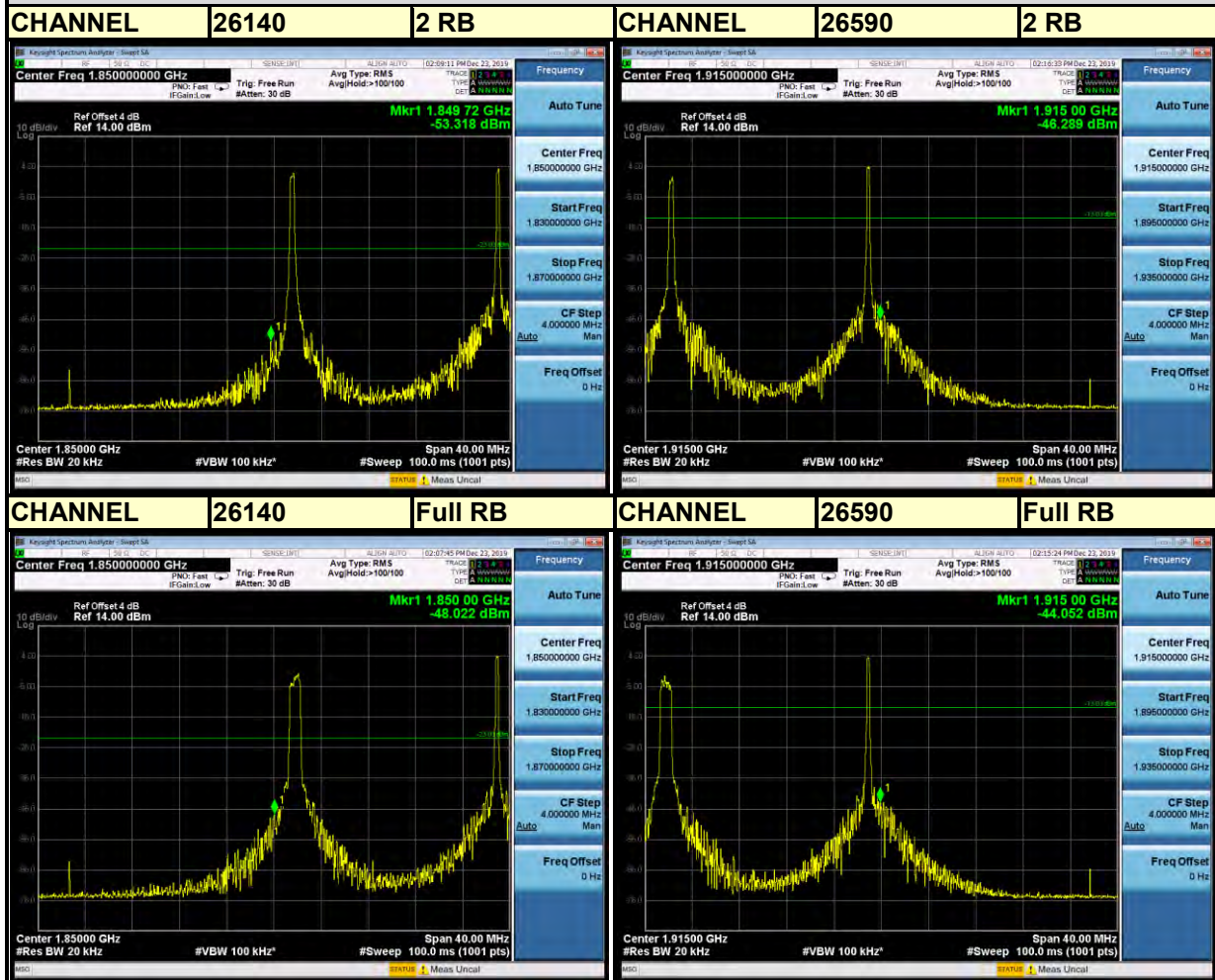




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Test Report No.: RF191122W002-2

Channel Bandwidth: 20MHz 16QAM





### 3.5 CONDUCTED SPURIOUS EMISSIONS

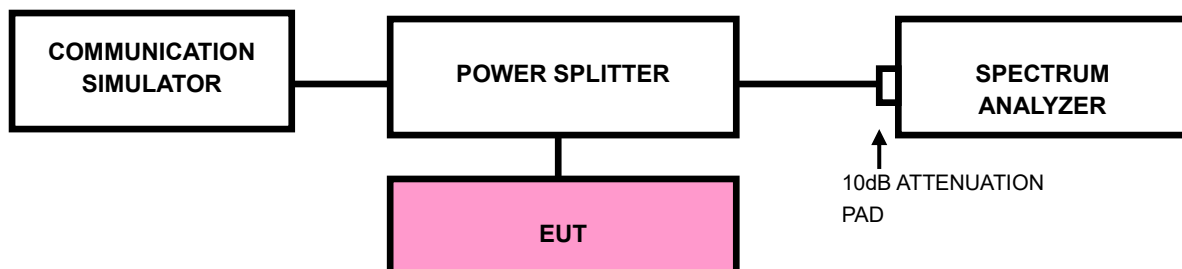
#### 3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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

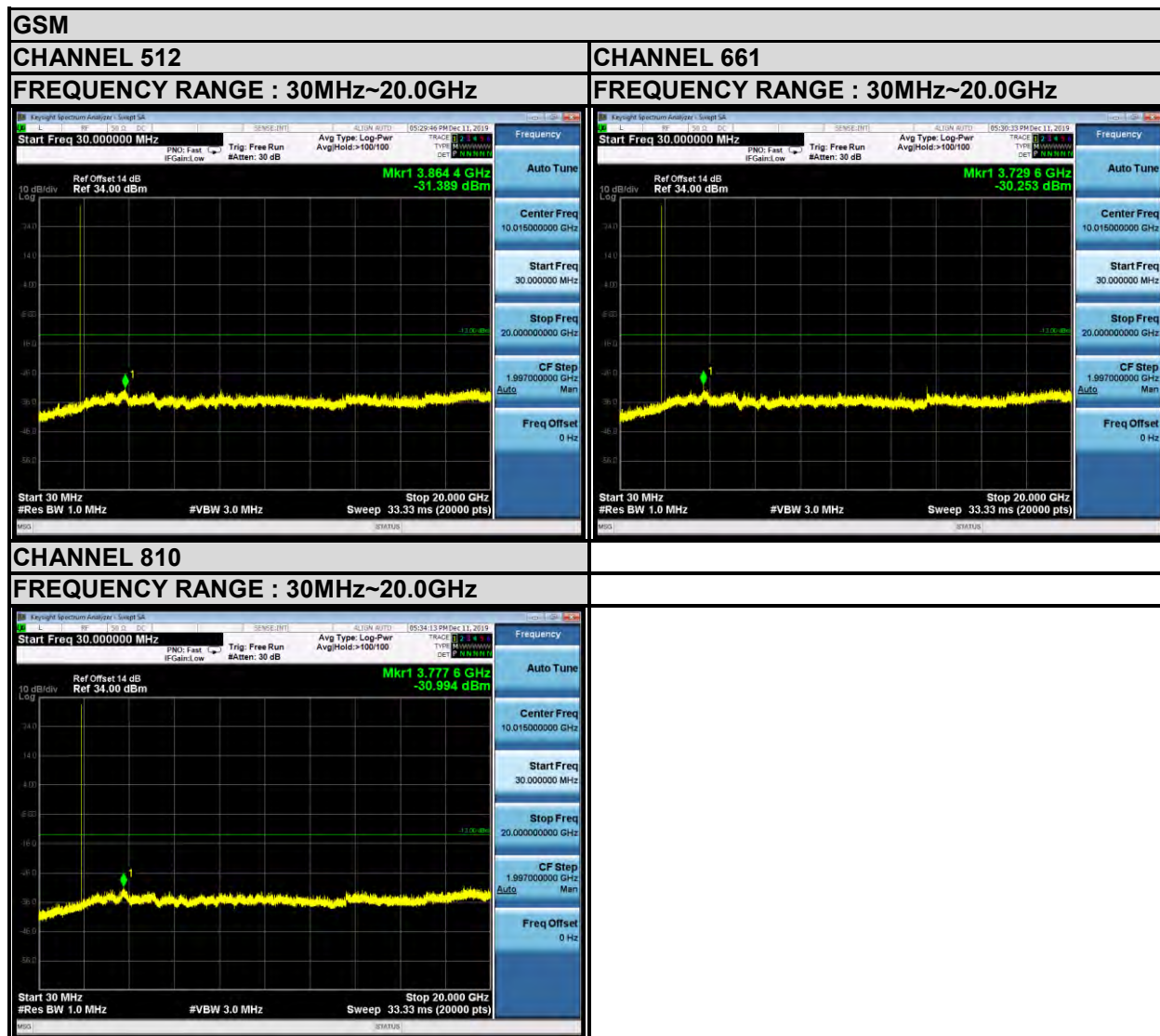




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Test Report No.: RF191122W002-2

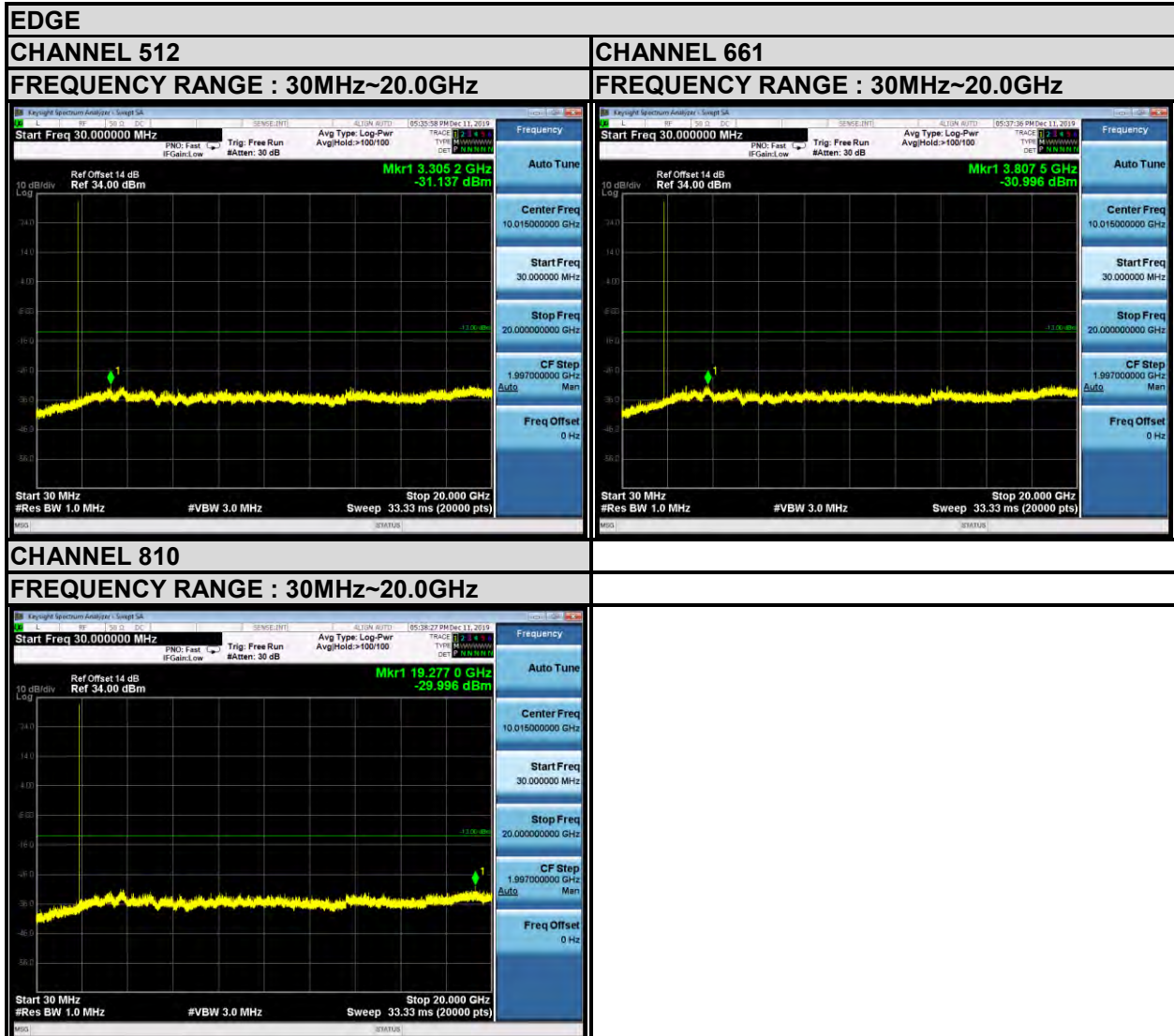
### 3.5.4 TEST RESULTS





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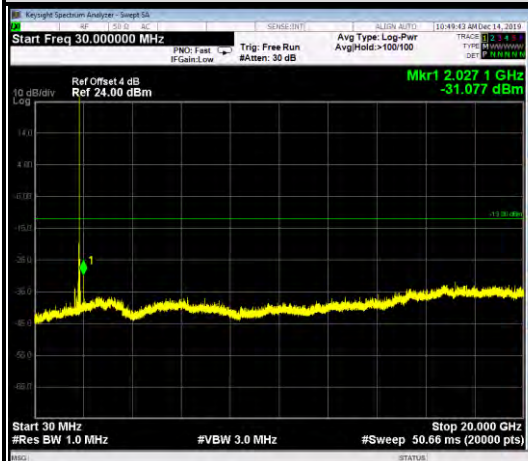
Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 2

### 1.4MHz / QPSK

#### CHANNEL 18607

FREQUENCY RANGE : 30MHz~20.0GHz



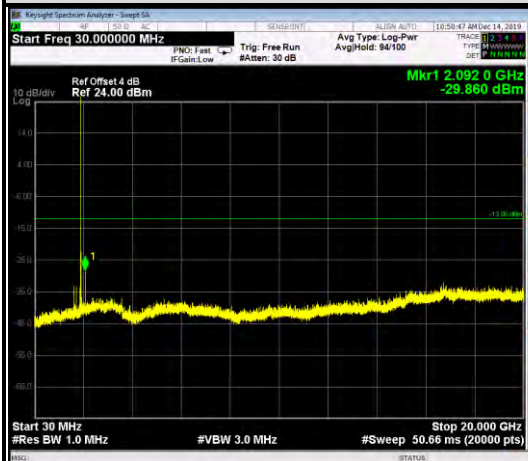
#### CHANNEL 18900

FREQUENCY RANGE : 30MHz~20.0GHz



#### CHANNEL 19193

FREQUENCY RANGE : 30MHz~20.0GHz





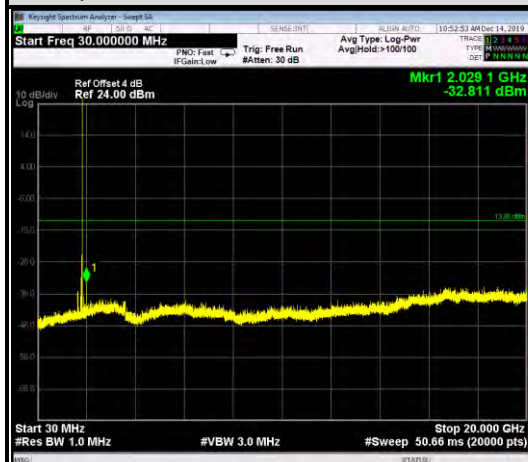
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Test Report No.: RF191122W002-2

### 3MHz / QPSK

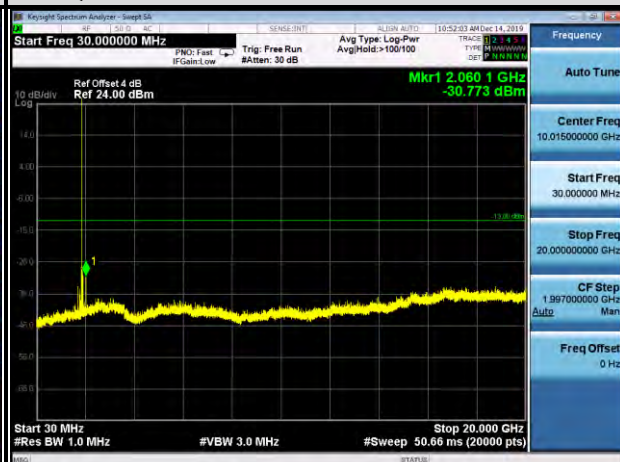
#### CHANNEL 18615

FREQUENCY RANGE : 30MHz~20.0GHz



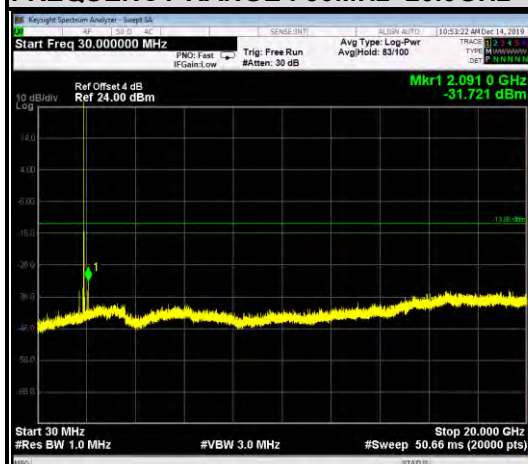
#### CHANNEL 18900

FREQUENCY RANGE : 30MHz~20.0GHz



#### CHANNEL 19185

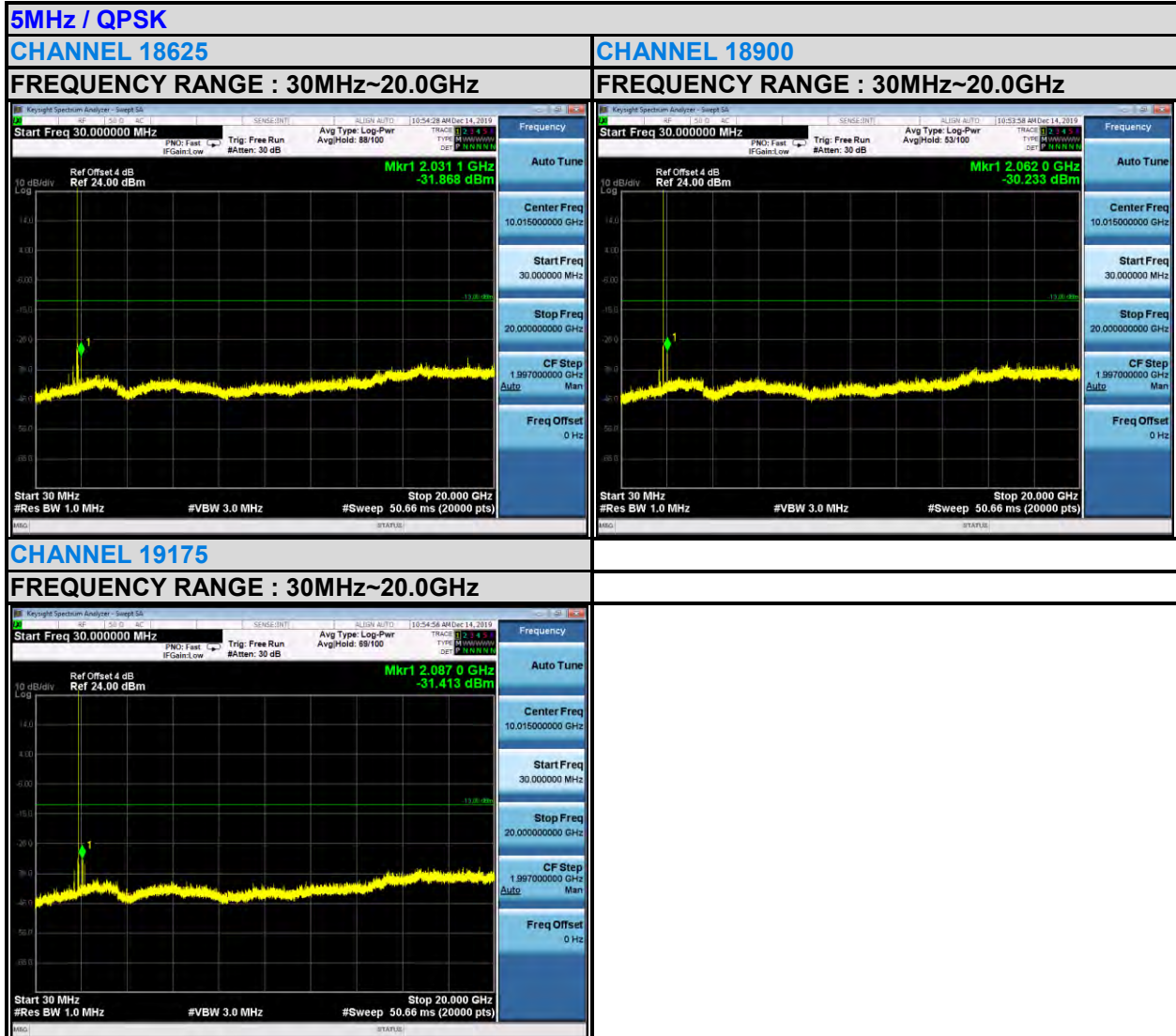
FREQUENCY RANGE : 30MHz~20.0GHz





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Test Report No.: RF191122W002-2





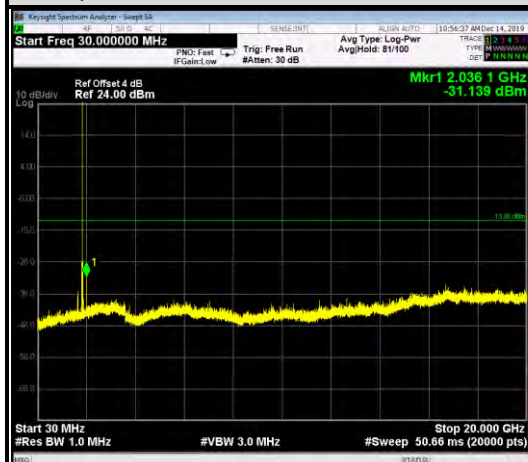
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Test Report No.: RF191122W002-2

10MHz / QPSK

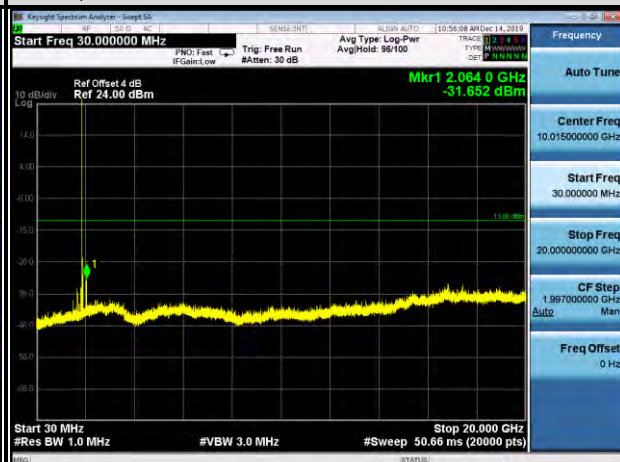
CHANNEL 18650

FREQUENCY RANGE : 30MHz~20.0GHz



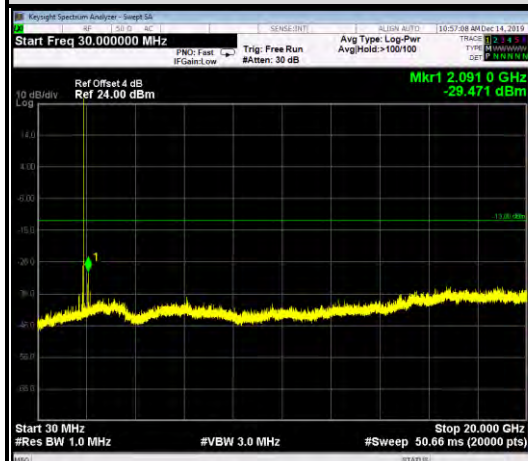
CHANNEL 18900

FREQUENCY RANGE : 30MHz~20.0GHz



CHANNEL 19150

FREQUENCY RANGE : 30MHz~20.0GHz





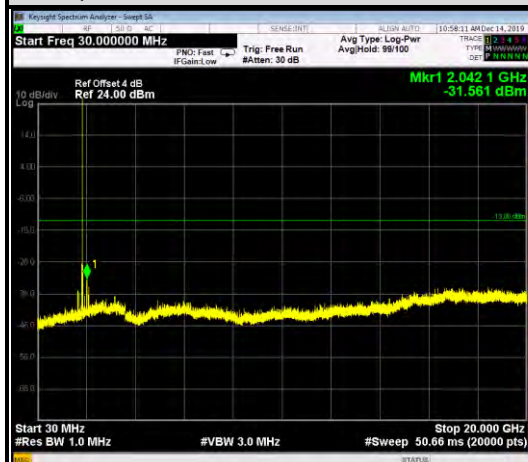
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Test Report No.: RF191122W002-2

15MHz / QPSK

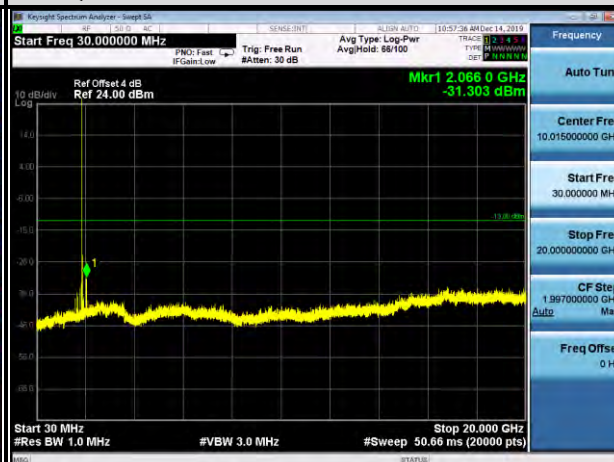
CHANNEL 18675

FREQUENCY RANGE : 30MHz~20.0GHz



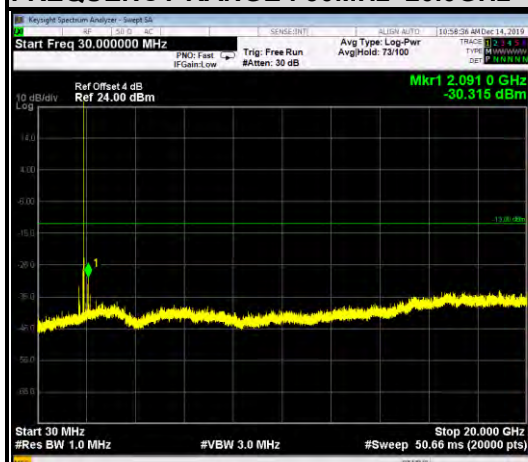
CHANNEL 18900

FREQUENCY RANGE : 30MHz~20.0GHz



CHANNEL 19125

FREQUENCY RANGE : 30MHz~20.0GHz





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Test Report No.: RF191122W002-2

## 20MHz / QPSK

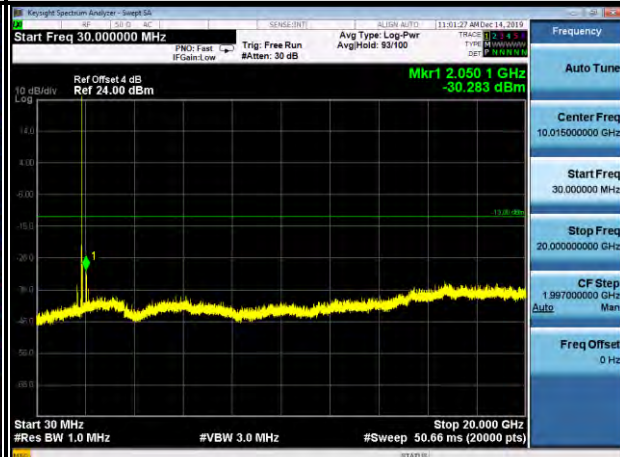
### CHANNEL 18700

FREQUENCY RANGE : 30MHz~20.0GHz



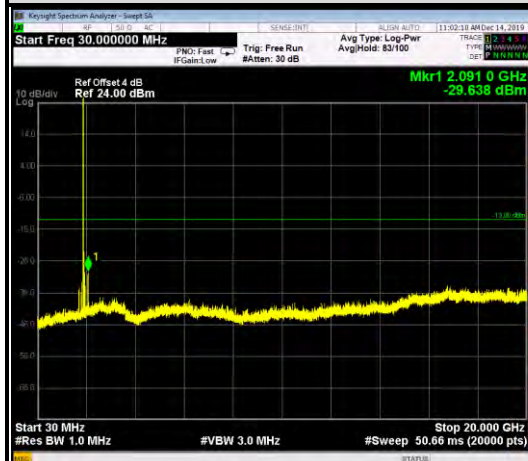
### CHANNEL 18900

FREQUENCY RANGE : 30MHz~20.0GHz



### CHANNEL 19100

FREQUENCY RANGE : 30MHz~20.0GHz





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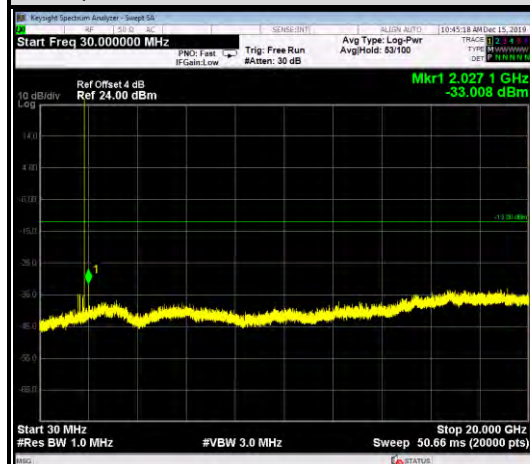
Test Report No.: RF191122W002-2

## LTE CAT-M1 BAND 25

### 1.4MHz / QPSK

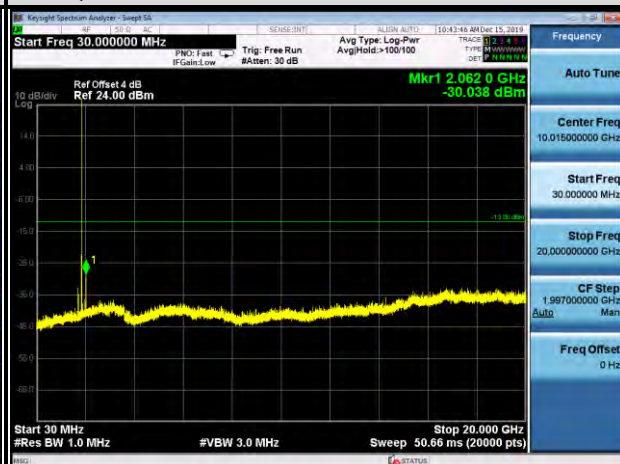
#### CHANNEL 26047

FREQUENCY RANGE : 30MHz~20.0GHz



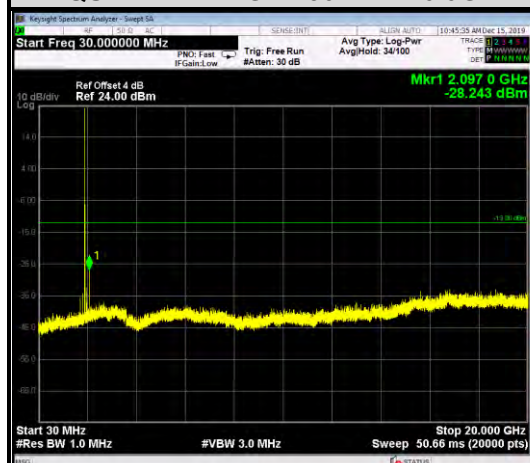
#### CHANNEL 26365

FREQUENCY RANGE : 30MHz~20.0GHz



#### CHANNEL 26683

FREQUENCY RANGE : 30MHz~20.0GHz





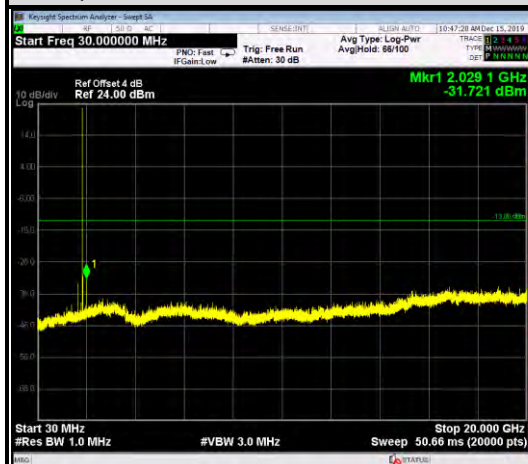
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Test Report No.: RF191122W002-2

### 3MHz / QPSK

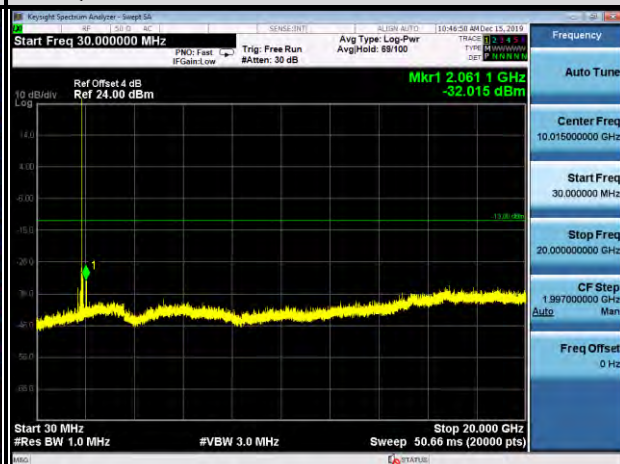
#### CHANNEL 26055

FREQUENCY RANGE : 30MHz~20.0GHz



#### CHANNEL 26365

FREQUENCY RANGE : 30MHz~20.0GHz



#### CHANNEL 26675

FREQUENCY RANGE : 30MHz~20.0GHz

