

## FCC Test Report

### (PART 27)

**Report No.:** RF180723C13-3

**FCC ID:** APV-3040LA

**Test Model:** LMU3040LA

**Received Date:** Apr. 16, 2018

**Test Date:** Apr. 16, 2018, 2018 ~ Aug. 14, 2018

**Issued Date:** Aug. 22, 2018

**Applicant:** CalAmp Corporation

**Address:** 2177 Salk Ave., Suite 200 Carlsbad, CA 92008

**Issued By:** Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

**Lab Address:** No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan  
( R.O.C )

**Test Location (1):** No. 19, Hwa Ya 2nd Rd, Wen Hwa Vil, Kwei Shan Dist., Taoyuan City  
33383, Taiwan (R.O.C)

**FCC Registration /**  
**Designation Number:** 788550 / TW0003



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF180723C13-3 | Original Release | Aug. 22, 2018 |

## 1 Certificate of Conformity

**Product:** OBD2 LTE/3G/GPS/BT tracker

**Brand:** CalAmp Corp.

**Test Model:** LMU3040LA

**Sample Status:** Production Unit

**Applicant:** CalAmp Corporation

**Test Date:** Apr. 16, 2018, 2018 ~ Aug. 14, 2018

**Standards:** FCC Part 27, Subpart C, H, L

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

**Prepared by :**



**Date:** Aug. 22, 2018

Ivonne Wu / Supervisor

**Approved by :**



**Date:** Aug. 22, 2018

Dylan Chiou / Project Engineer

## 2 Summary of Test Results

| Applied Standard: FCC Part 27 & Part 2 (LTE 4) |                              |        |                                                                                     |
|------------------------------------------------|------------------------------|--------|-------------------------------------------------------------------------------------|
| FCC Clause                                     | Test Item                    | Result | Remarks                                                                             |
| 2.1046<br>27.50(d)(4)                          | Maximum Peak Output Power    | Pass   | Meet the requirement of limit.                                                      |
| 2.1055<br>27.54                                | Frequency Stability          | Pass   | Meet the requirement of limit.                                                      |
| 2.1049<br>27.53(h)                             | Occupied Bandwidth           | Pass   | Meet the requirement of limit.                                                      |
| 27.50(d)(5)                                    | Peak to Average Ratio        | Pass   | Meet the requirement of limit.                                                      |
| 27.53(h)                                       | Band Edge Measurements       | Pass   | Meet the requirement of limit.                                                      |
| 2.1051<br>27.53(h)                             | Conducted Spurious Emissions | Pass   | Meet the requirement of limit.                                                      |
| 2.1053<br>27.53(h)                             | Radiated Spurious Emissions  | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -34.45 dB at 43.58 MHz. |

| Applied Standard: FCC Part 27 & Part 2 (LTE 12) |                              |        |                                                                                     |
|-------------------------------------------------|------------------------------|--------|-------------------------------------------------------------------------------------|
| FCC Clause                                      | Test Item                    | Result | Remarks                                                                             |
| 2.1046<br>27.50(c)(10)                          | Maximum Peak Output Power    | Pass   | Meet the requirement of limit.                                                      |
| 2.1055<br>27.54                                 | Frequency Stability          | Pass   | Meet the requirement of limit.                                                      |
| 2.1049<br>27.53(g)                              | Occupied Bandwidth           | Pass   | Meet the requirement of limit.                                                      |
| 27.50(d)(5)                                     | Peak to Average Ratio        | Pass   | Meet the requirement of limit.                                                      |
| 27.53(g)                                        | Band Edge Measurements       | Pass   | Meet the requirement of limit.                                                      |
| 2.1051<br>27.53(g)                              | Conducted Spurious Emissions | Pass   | Meet the requirement of limit.                                                      |
| 2.1053<br>27.53(g)                              | Radiated Spurious Emissions  | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -19.65 dB at 65.89 MHz. |

## 2.1 Measurement Uncertainty

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

| Measurement                    | Frequency          | Expanded Uncertainty<br>(k=2) ( $\pm$ ) |
|--------------------------------|--------------------|-----------------------------------------|
| Radiated Emissions up to 1 GHz | 30 MHz ~ 200 MHz   | 2.93 dB                                 |
|                                | 200 MHz ~ 1000 MHz | 2.95 dB                                 |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz     | 2.26 dB                                 |
|                                | 18 GHz ~ 40 GHz    | 1.94 dB                                 |

## 2.2 Test Site and Instruments

| Description & Manufacturer                     | Model No.                  | Serial No.                    | Date of Calibration | Due Date of Calibration |
|------------------------------------------------|----------------------------|-------------------------------|---------------------|-------------------------|
| Test Receiver<br>Agilent                       | N9038A                     | MY51210203                    | Mar. 16, 2018       | Mar. 15, 2019           |
| Spectrum Analyzer<br>Agilent                   | N9010A                     | MY52220314                    | Nov. 24, 2017       | Nov. 23, 2018           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ           | FSU43                      | 101261                        | Jan. 11, 2018       | Jan. 10, 2019           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9120D                 | 9120D-969                     | Nov. 12, 2017       | Nov. 11, 2018           |
| HORN Antenna<br>SCHWARZBECK                    | BBHA 9170                  | 148                           | Dec. 13, 2017       | Dec. 12, 2018           |
| BILOG Antenna<br>SCHWARZBECK                   | VULB 9168                  | 9168-472                      | Dec. 06, 2017       | Dec. 05, 2018           |
| MXG Vector signal<br>generator<br>Agilent      | N5182B                     | MY53050430                    | Oct. 24, 2017       | Oct. 23, 2018           |
| Loop Antenna                                   | EM-6879                    | 269                           | Aug. 11, 2017       | Aug. 10, 2018           |
|                                                | HLA 6121                   | 45745                         | Jun. 14, 2018       | Jun. 13, 2019           |
| Preamplifier<br>EMCI                           | EMC001340                  | 980201                        | Nov. 01, 2017       | Oct. 30, 2018           |
| Preamplifier<br>EMCI                           | EMC 012645                 | 980115                        | Oct. 20, 2017       | Oct. 19, 2018           |
| Preamplifier<br>EMCI                           | EMC 330H                   | 980112                        | Oct. 13, 2017       | Oct. 12, 2018           |
| Power Meter<br>Anritsu                         | ML2495A                    | 1012010                       | Aug. 15, 2017       | Aug. 14, 2018           |
| Power Sensor<br>Anritsu                        | MA2411B                    | 1315050                       | Aug. 15, 2017       | Aug. 14, 2018           |
| RF Coaxial Cable<br>HUBER+SUHNNER              | EMC104-SM-SM-800<br>0&3000 | 140811+170717                 | Oct. 20, 2017       | Oct. 19, 2018           |
| RF Coaxial Cable<br>HUBER+SUHNNER              | SUCOFLEX 104               | EMC104-SM-SM-<br>1000(140807) | Oct. 20, 2017       | Oct. 19, 2018           |
| RF Coaxial Cable<br>Worken                     | 8D-FB                      | Cable-Ch10-01                 | Oct. 20, 2017       | Oct. 19, 2018           |
| Boresight Antenna Fixture                      | FBA-01                     | FBA-SIP01                     | NA                  | NA                      |
| Software<br>BV ADT                             | E3<br>6.120103             | NA                            | NA                  | NA                      |
| Antenna Tower<br>MF                            | MFA-440H                   | NA                            | NA                  | NA                      |
| Turn Table<br>MF                               | MFT-201SS                  | NA                            | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF | MF-7802                    | NA                            | NA                  | NA                      |
| Radio Communication<br>Analyzer                | MT8820C                    | 6201300640                    | Aug. 16, 2017       | Aug. 15, 2019           |
| Temperature & Humidity<br>Chamber              | GTH-120-40-CP-AR           | MAA1306-019                   | Sep. 08, 2017       | Sep. 07, 2018           |
| DC Power Supply<br>Topward                     | 33010D                     | 807748                        | Oct. 25, 2016       | Oct. 24, 2018           |
| Digital Multimeter<br>Fluke                    | 87-III                     | 70360742                      | Jun. 30, 2017       | Jun. 29, 2018           |
|                                                |                            |                               | Jun. 29, 2018       | Jun. 28, 2019           |

- Note:
1. The calibration interval of the above test instruments is 12 / 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
  2. The test was performed in HwaYa Chamber 10.
  3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.
  4. The IC Site Registration No. is IC7450F-10.

### 3 General Information

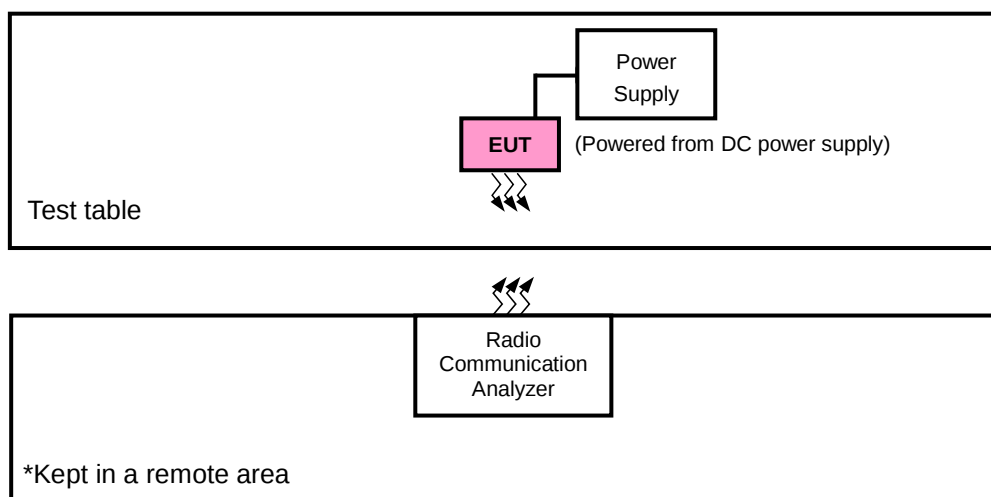
#### 3.1 General Description of EUT

|                            |                                          |                     |
|----------------------------|------------------------------------------|---------------------|
| <b>Product</b>             | OBD2 LTE/3G/GPS/BT tracker               |                     |
| <b>Brand</b>               | CalAmp Corp.                             |                     |
| <b>Test Model</b>          | LMU3040LA                                |                     |
| <b>Status of EUT</b>       | Production Unit                          |                     |
| <b>Power Supply Rating</b> | 5~30 Vdc                                 |                     |
| <b>Modulation Type</b>     | LTE                                      | QPSK, 16QAM         |
| <b>Frequency Range</b>     | LTE Band 4 (Channel Bandwidth: 1.4 MHz)  | 1710.7 ~ 1754.3 MHz |
|                            | LTE Band 4 (Channel Bandwidth: 3 MHz)    | 1711.5 ~ 1753.5 MHz |
|                            | LTE Band 4 (Channel Bandwidth: 5 MHz)    | 1712.5 ~ 1752.5 MHz |
|                            | LTE Band 4 (Channel Bandwidth: 10 MHz)   | 1715.0 ~ 1750.0 MHz |
|                            | LTE Band 4 (Channel Bandwidth: 15 MHz)   | 1717.5 ~ 1747.5 MHz |
|                            | LTE Band 4 (Channel Bandwidth: 20 MHz)   | 1720.0 ~ 1745.0 MHz |
|                            | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 699.7 ~ 715.3 MHz   |
|                            | LTE Band 12 (Channel Bandwidth: 3 MHz)   | 700.5 ~ 714.5 MHz   |
|                            | LTE Band 12 (Channel Bandwidth: 5 MHz)   | 701.5 ~ 713.5 MHz   |
|                            | LTE Band 12 (Channel Bandwidth: 10 MHz)  | 704.0 ~ 711.0 MHz   |
| <b>Emission Designator</b> | LTE Band 4 (Channel Bandwidth: 1.4 MHz)  | 1M09W7D             |
|                            | LTE Band 4 (Channel Bandwidth: 3 MHz)    | 2M70G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 5 MHz)    | 4M49G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 10 MHz)   | 8M96G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 15 MHz)   | 13M4G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 20 MHz)   | 17M9G7D             |
|                            | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 1M09W7D             |
|                            | LTE Band 12 (Channel Bandwidth: 3 MHz)   | 2M70G7D             |
|                            | LTE Band 12 (Channel Bandwidth: 5 MHz)   | 4M49W7D             |
|                            | LTE Band 12 (Channel Bandwidth: 10 MHz)  | 8M97G7D             |
| <b>Max. ERP Power</b>      | LTE Band 12 (Channel Bandwidth: 1.4 MHz) | 142.23 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 3 MHz)   | 149.97 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 5 MHz)   | 159.59 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 10 MHz)  | 169.04 mW           |
| <b>Max. EIRP Power</b>     | LTE Band 4 (Channel Bandwidth: 1.4 MHz)  | 287.74 mW           |
|                            | LTE Band 4 (Channel Bandwidth: 3 MHz)    | 304.09 mW           |
|                            | LTE Band 4 (Channel Bandwidth: 5 MHz)    | 322.85 mW           |
|                            | LTE Band 4 (Channel Bandwidth: 10 MHz)   | 339.63 mW           |
|                            | LTE Band 4 (Channel Bandwidth: 15 MHz)   | 356.45 mW           |
|                            | LTE Band 4 (Channel Bandwidth: 20 MHz)   | 375.84 mW           |
| <b>Antenna Type</b>        | Fixed Internal Antenna                   |                     |
| <b>Antenna Gain</b>        | LTE Band 4                               | 2.74 dBi            |
|                            | LTE Band 12                              | -0.33 dBi           |
| <b>Accessory Device</b>    | Refer to Note as below                   |                     |
| <b>Data Cable Supplied</b> | Refer to Note as below                   |                     |

Note:

1. The maximum bandwidth for 16QAM of the EUT is 5 MHz.
2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

### 3.2 Configuration of System under Test



#### 3.2.1 Description of Support Units

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

| No. | Product         | Brand   | Model No. | Serial No. | FCC ID |
|-----|-----------------|---------|-----------|------------|--------|
| 1.  | DC Power Supply | Topward | 33010D    | 807748     | N/A    |

| No. | Signal Cable Description Of The Above Support Units |
|-----|-----------------------------------------------------|
| 1.  | N/A                                                 |

Note:

1. All power cords of the above support units are non-shielded (1.8m).

### 3.3 Test Mode Applicability and Tested Channel Detail

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

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

| Band        | ERP / EIRP | Radiated Emission |
|-------------|------------|-------------------|
| LTE Band 4  | X-plane    | Y-axis            |
| LTE Band 12 | Y-plane    | Y-axis            |

#### LTE Band 4

| EUT Configure Mode | Test Item             | Available Channel | Tested Channel      | Channel Bandwidth | Modulation  | Mode                 |
|--------------------|-----------------------|-------------------|---------------------|-------------------|-------------|----------------------|
| -                  | EIRP                  | 19957 to 20393    | 19957, 20175, 20393 | 1.4 MHz           | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 19965 to 20385    | 19965, 20175, 20385 | 3 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 19975 to 20375    | 19975, 20175, 20375 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20000 to 20350    | 20000, 20175, 20350 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK        | 1 RB / 0 RB Offset   |
| -                  | Frequency Stability   | 19957 to 20393    | 19957, 20393        | 1.4 MHz           | QPSK        | 6 RB / 0 RB Offset   |
|                    |                       | 19965 to 20385    | 19965, 20385        | 3 MHz             | QPSK        | 15 RB / 0 RB Offset  |
|                    |                       | 19975 to 20375    | 19975, 20375        | 5 MHz             | QPSK        | 25 RB / 0 RB Offset  |
|                    |                       | 20000 to 20350    | 20000, 20350        | 10 MHz            | QPSK        | 50 RB / 0 RB Offset  |
|                    |                       | 20025 to 20325    | 20025, 20325        | 15 MHz            | QPSK        | 75 RB / 0 RB Offset  |
|                    |                       | 20050 to 20300    | 20050, 20300        | 20 MHz            | QPSK        | 100 RB / 0 RB Offset |
| -                  | Occupied Bandwidth    | 19957 to 20393    | 19957, 20175, 20393 | 1.4 MHz           | QPSK, 16QAM | 6 RB / 0 RB Offset   |
|                    |                       | 19965 to 20385    | 19965, 20175, 20385 | 3 MHz             | QPSK, 16QAM | 15 RB / 0 RB Offset  |
|                    |                       | 19975 to 20375    | 19975, 20175, 20375 | 5 MHz             | QPSK, 16QAM | 25 RB / 0 RB Offset  |
|                    |                       | 20000 to 20350    | 20000, 20175, 20350 | 10 MHz            | QPSK        | 50 RB / 0 RB Offset  |
|                    |                       | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK        | 75 RB / 0 RB Offset  |
|                    |                       | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK        | 100 RB / 0 RB Offset |
| -                  | Peak to Average Ratio | 19957 to 20393    | 19957, 20175, 20393 | 1.4 MHz           | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 19965 to 20385    | 19965, 20175, 20385 | 3 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 19975 to 20375    | 19975, 20175, 20375 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                       | 20000 to 20350    | 20000, 20175, 20350 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                       | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK        | 1 RB / 0 RB Offset   |

| EUT Configure Mode | Test Item          | Available Channel | Tested Channel      | Channel Bandwidth | Modulation | Mode                 |
|--------------------|--------------------|-------------------|---------------------|-------------------|------------|----------------------|
| -                  | Band Edge          | 19957 to 20393    | 19957               | 1.4 MHz           | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 6 RB / 0 RB Offset   |
|                    |                    |                   | 20393               | 1.4 MHz           | QPSK       | 1 RB / 5 RB Offset   |
|                    |                    |                   |                     |                   |            | 6 RB / 0 RB Offset   |
|                    |                    | 19965 to 20385    | 19965               | 3 MHz             | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 15 RB / 0 RB Offset  |
|                    |                    |                   | 20385               | 3 MHz             | QPSK       | 1 RB / 14 RB Offset  |
|                    |                    |                   |                     |                   |            | 15 RB / 0 RB Offset  |
|                    |                    | 19975 to 20375    | 19975               | 5 MHz             | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 25 RB / 0 RB Offset  |
|                    |                    |                   | 20375               | 5 MHz             | QPSK       | 1 RB / 24 RB Offset  |
|                    |                    |                   |                     |                   |            | 25 RB / 0 RB Offset  |
|                    |                    | 20000 to 20350    | 20000               | 10 MHz            | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 50 RB / 0 RB Offset  |
|                    |                    |                   | 20350               | 10 MHz            | QPSK       | 1 RB / 49 RB Offset  |
|                    |                    |                   |                     |                   |            | 50 RB / 0 RB Offset  |
|                    |                    | 20025 to 20325    | 20025               | 15 MHz            | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 75 RB / 0 RB Offset  |
|                    |                    |                   | 20325               | 15 MHz            | QPSK       | 1 RB / 74 RB Offset  |
|                    |                    |                   |                     |                   |            | 75 RB / 0 RB Offset  |
|                    |                    | 20050 to 20300    | 20050               | 20 MHz            | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    |                   |                     |                   |            | 100 RB / 0 RB Offset |
|                    |                    |                   | 20300               | 20 MHz            | QPSK       | 1 RB / 99 RB Offset  |
|                    |                    |                   |                     |                   |            | 100 RB / 0 RB Offset |
| -                  | Conducted Emission | 19957 to 20393    | 19957, 20175, 20393 | 1.4 MHz           | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 19965 to 20385    | 19965, 20175, 20385 | 3 MHz             | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 19975 to 20375    | 19975, 20175, 20375 | 5 MHz             | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 20000 to 20350    | 20000, 20175, 20350 | 10 MHz            | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK       | 1 RB / 0 RB Offset   |
| -                  | Radiated Emission  | 19957 to 20393    | 19957, 20175, 20393 | 1.4 MHz           | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 19975 to 20375    | 19975, 20175, 20375 | 5 MHz             | QPSK       | 1 RB / 0 RB Offset   |
|                    |                    | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK       | 1 RB / 0 RB Offset   |

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

## LTE Band 12

| EUT Configure Mode | Test Item             | Available Channel | Tested Channel      | Channel Bandwidth | Modulation  | Mode                |
|--------------------|-----------------------|-------------------|---------------------|-------------------|-------------|---------------------|
| -                  | ERP                   | 23017 to 23173    | 23017, 23095, 23173 | 1.4 MHz           | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025, 23095, 23165 | 3 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23035 to 23155    | 23035, 23095, 23155 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23060 to 23130    | 23060, 23095, 23130 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
| -                  | Frequency Stability   | 23017 to 23173    | 23017, 23173        | 1.4 MHz           | QPSK        | 6 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025, 23165        | 3 MHz             | QPSK        | 15 RB / 0 RB Offset |
|                    |                       | 23035 to 23155    | 23035, 23155        | 5 MHz             | QPSK        | 25 RB / 0 RB Offset |
|                    |                       | 23060 to 23130    | 23060, 23130        | 10 MHz            | QPSK        | 50 RB / 0 RB Offset |
| -                  | Occupied Bandwidth    | 23017 to 23173    | 23017, 23095, 23173 | 1.4 MHz           | QPSK, 16QAM | 6 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025, 23095, 23165 | 3 MHz             | QPSK, 16QAM | 15 RB / 0 RB Offset |
|                    |                       | 23035 to 23155    | 23035, 23095, 23155 | 5 MHz             | QPSK, 16QAM | 25 RB / 0 RB Offset |
|                    |                       | 23060 to 23130    | 23060, 23095, 23130 | 10 MHz            | QPSK        | 50 RB / 0 RB Offset |
| -                  | Peak to Average Ratio | 23017 to 23173    | 23017, 23095, 23173 | 1.4 MHz           | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025, 23095, 23165 | 3 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23035 to 23155    | 23035, 23095, 23155 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                       | 23060 to 23130    | 23060, 23095, 23130 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
| -                  | Band Edge             | 23017 to 23173    | 23017               | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       |                   |                     |                   |             | 6 RB / 0 RB Offset  |
|                    |                       |                   | 23173               | 1.4 MHz           | QPSK        | 1 RB / 5 RB Offset  |
|                    |                       |                   |                     |                   |             | 6 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025               | 3 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       |                   |                     |                   |             | 15 RB / 0 RB Offset |
|                    |                       |                   | 23165               | 3 MHz             | QPSK        | 1 RB / 14 RB Offset |
|                    |                       |                   |                     |                   |             | 15 RB / 0 RB Offset |
|                    |                       | 23035 to 23155    | 23035               | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       |                   |                     |                   |             | 25 RB / 0 RB Offset |
|                    |                       |                   | 23155               | 5 MHz             | QPSK        | 1 RB / 24 RB Offset |
|                    |                       |                   |                     |                   |             | 25 RB / 0 RB Offset |
| -                  | Conducted Emission    | 23017 to 23173    | 23017, 23095, 23173 | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       | 23025 to 23165    | 23025, 23095, 23165 | 3 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       | 23035 to 23155    | 23035, 23095, 23155 | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       | 23060 to 23130    | 23060, 23095, 23130 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
| -                  | Radiated Emission     | 23017 to 23173    | 23017, 23095, 23173 | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       | 23035 to 23155    | 23035, 23095, 23155 | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                       | 23060 to 23130    | 23060, 23095, 23130 | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |

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

### **Test Condition:**

| Test Item             | Environmental Conditions | Input Power | Tested By    |
|-----------------------|--------------------------|-------------|--------------|
| ERP / EIRP            | 25 deg. C, 65 % RH       | 12 Vdc      | Jisyong Wang |
| Frequency Stability   | 25 deg. C, 65 % RH       | 12 Vdc      | Han Wu       |
| Occupied Bandwidth    | 25 deg. C, 65 % RH       | 12 Vdc      | Han Wu       |
| Band Edge             | 25 deg. C, 65 % RH       | 12 Vdc      | Han Wu       |
| Peak to Average Ratio | 25 deg. C, 65 % RH       | 12 Vdc      | Han Wu       |
| Conducted Emission    | 25 deg. C, 65 % RH       | 12 Vdc      | Han Wu       |
| Radiated Emission     | 25 deg. C, 65 % RH       | 12 Vdc      | Jisyong Wang |

### **3.4 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

### **3.5 General Description of Applied Standards**

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

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 27**

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

**ANSI/TIA/EIA-603-E 2016**

**ANSI 63.26-2015**

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

## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 698-716 MHz band are limited to 3 watts ERP

#### 4.1.2 Test Procedures

##### **EIRP / ERP Measurement:**

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value” of step b. Record the power level of S.G.
- d.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$ . E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$ .

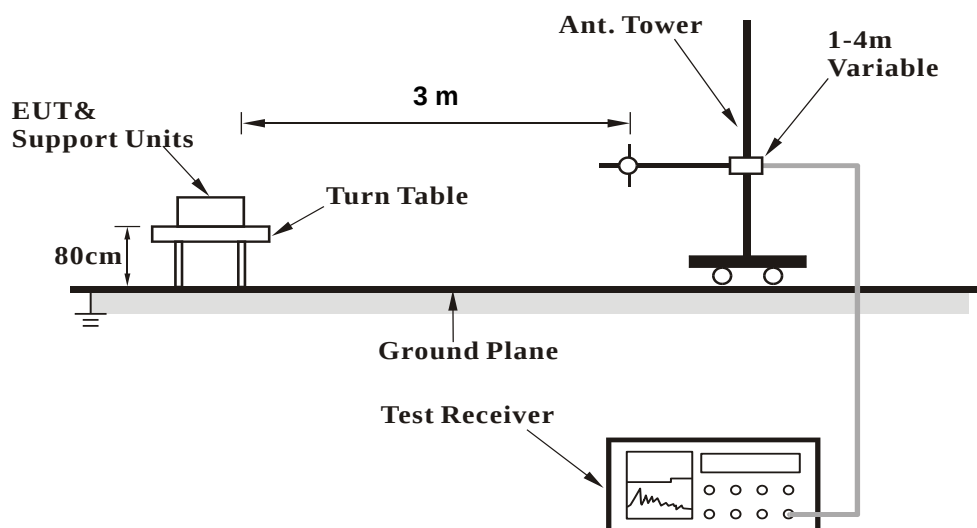
##### **Conducted Power Measurement:**

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

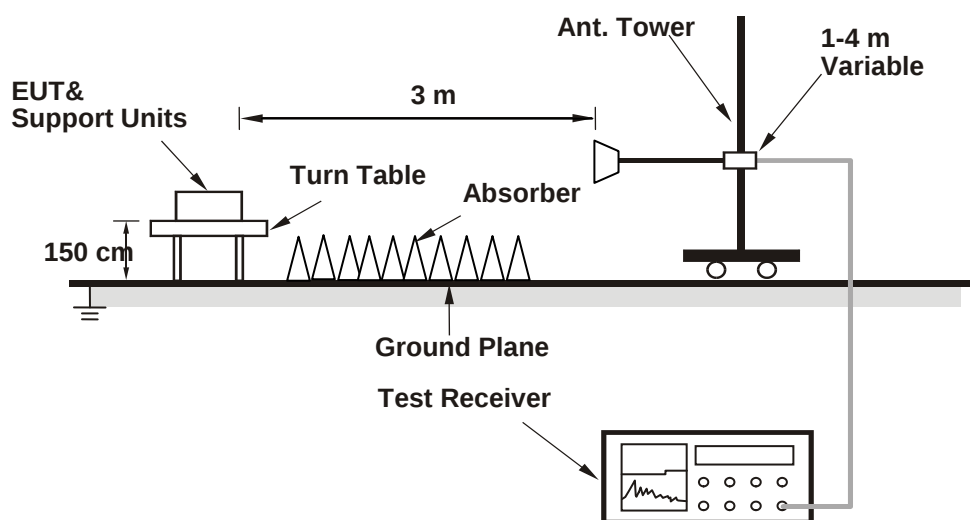
#### 4.1.3 Test Setup

##### EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

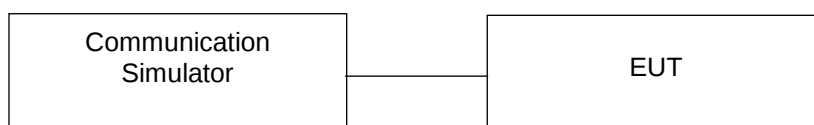


<Radiated Emission above 1 GHz>



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

##### Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 19957 | Mid Ch 20175 | High Ch 20393 |               | Low Ch 19957 | Mid Ch 20175 | High Ch 20393 |               |
|           |         |           | 1710.7 MHz   | 1732.5 MHz   | 1754.3 MHz    |               | 1710.7 MHz   | 1732.5 MHz   | 1754.3 MHz    |               |
| 4 / 1.4M  | 1       | 0         | 22.86        | 23.18        | 23.15         | 0             | 21.86        | 22.12        | 22.17         | 1             |
|           | 1       | 2         | 22.76        | 22.94        | 23.14         | 0             | 21.69        | 21.87        | 21.99         | 1             |
|           | 1       | 5         | 22.70        | 22.81        | 22.90         | 0             | 21.52        | 21.68        | 21.82         | 1             |
|           | 3       | 0         | 22.64        | 22.78        | 23.02         | 0             | 21.66        | 21.70        | 21.81         | 1             |
|           | 3       | 1         | 22.56        | 22.70        | 22.80         | 0             | 21.37        | 21.61        | 21.65         | 1             |
|           | 3       | 3         | 22.50        | 22.65        | 22.93         | 0             | 21.50        | 21.56        | 21.72         | 1             |
|           | 6       | 0         | 21.84        | 22.08        | 21.98         | 1             | 20.71        | 20.98        | 21.08         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 19965 | Mid Ch 20175 | High Ch 20385 |               | Low Ch 19965 | Mid Ch 20175 | High Ch 20385 |               |
|           |         |           | 1711.5 MHz   | 1732.5 MHz   | 1753.5 MHz    |               | 1711.5 MHz   | 1732.5 MHz   | 1753.5 MHz    |               |
| 4 / 3M    | 1       | 0         | 23.12        | 23.19        | 23.34         | 0             | 22.01        | 22.16        | 22.23         | 1             |
|           | 1       | 7         | 22.92        | 23.15        | 23.29         | 0             | 21.93        | 22.11        | 22.12         | 1             |
|           | 1       | 14        | 22.85        | 22.90        | 22.96         | 0             | 21.74        | 21.93        | 21.96         | 1             |
|           | 8       | 0         | 21.87        | 22.04        | 22.25         | 1             | 20.88        | 20.98        | 21.01         | 2             |
|           | 8       | 3         | 21.68        | 21.93        | 21.97         | 1             | 20.60        | 20.92        | 20.93         | 2             |
|           | 8       | 7         | 21.62        | 21.70        | 21.92         | 1             | 20.66        | 20.67        | 20.89         | 2             |
|           | 15      | 0         | 22.00        | 22.02        | 22.24         | 1             | 20.88        | 21.02        | 21.07         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 19975 | Mid Ch 20175 | High Ch 20375 |               | Low CH 19975 | Mid CH 20175 | High CH 20375 |               |
|           |         |           | 1712.5 MHz   | 1732.5 MHz   | 1752.5 MHz    |               | 1712.5 MHz   | 1732.5 MHz   | 1752.5 MHz    |               |
| 4 / 5M    | 1       | 0         | 23.14        | 23.34        | 23.46         | 0             | 22.22        | 22.28        | 22.42         | 1             |
|           | 1       | 12        | 23.01        | 23.12        | 23.31         | 0             | 21.97        | 22.08        | 22.31         | 1             |
|           | 1       | 24        | 22.93        | 23.19        | 23.26         | 0             | 21.74        | 22.06        | 22.14         | 1             |
|           | 12      | 0         | 22.12        | 22.20        | 22.23         | 1             | 20.90        | 21.07        | 21.27         | 2             |
|           | 12      | 6         | 21.95        | 21.95        | 22.06         | 1             | 20.85        | 20.91        | 21.14         | 2             |
|           | 12      | 13        | 21.78        | 21.87        | 22.00         | 1             | 20.68        | 20.77        | 21.00         | 2             |
|           | 25      | 0         | 21.93        | 22.19        | 22.25         | 1             | 20.99        | 21.10        | 21.29         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20000 | Mid Ch 20175 | High Ch 20350 |               |
|           |         |           | 1715.0 MHz   | 1732.5 MHz   | 1750.0 MHz    |               |
| 4 / 10M   | 1       | 0         | 23.33        | 23.47        | 23.54         | 0             |
|           | 1       | 24        | 23.23        | 23.36        | 23.44         | 0             |
|           | 1       | 49        | 23.03        | 23.15        | 23.37         | 0             |
|           | 25      | 0         | 22.22        | 22.37        | 22.41         | 1             |
|           | 25      | 12        | 22.02        | 22.08        | 22.29         | 1             |
|           | 25      | 25        | 21.99        | 22.10        | 22.12         | 1             |
|           | 50      | 0         | 22.22        | 22.27        | 22.42         | 1             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20025 | Mid Ch 20175 | High Ch 20325 |               |
|           |         |           | 1717.5 MHz   | 1732.5 MHz   | 1747.5 MHz    |               |
| 4 / 15M   | 1       | 0         | 23.45        | 23.58        | 23.73         | 0             |
|           | 1       | 37        | 23.36        | 23.45        | 23.61         | 0             |
|           | 1       | 74        | 23.05        | 23.29        | 23.42         | 0             |
|           | 36      | 0         | 22.30        | 22.49        | 22.56         | 1             |
|           | 36      | 19        | 22.12        | 22.30        | 22.41         | 1             |
|           | 36      | 39        | 22.01        | 22.16        | 22.27         | 1             |
|           | 75      | 0         | 22.30        | 22.53        | 22.57         | 1             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20050 | Mid Ch 20175 | High Ch 20300 |               |
|           |         |           | 1720.0 MHz   | 1732.5 MHz   | 1745.0 MHz    |               |
| 4 / 20M   | 1       | 0         | 23.56        | 23.71        | 23.82         | 0             |
|           | 1       | 50        | 23.43        | 23.57        | 23.66         | 0             |
|           | 1       | 99        | 23.31        | 23.41        | 23.54         | 0             |
|           | 50      | 0         | 22.43        | 22.58        | 22.70         | 1             |
|           | 50      | 25        | 22.21        | 22.38        | 22.49         | 1             |
|           | 50      | 50        | 22.14        | 22.34        | 22.44         | 1             |
|           | 100     | 0         | 22.33        | 22.45        | 22.49         | 1             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23017 | Mid Ch 23095 | High Ch 23173 |               | Low Ch 23017 | Mid Ch 23095 | High Ch 23173 |               |
|           |         |           | 699.7 MHz    | 707.5 MHz    | 715.3 MHz     |               | 699.7 MHz    | 707.5 MHz    | 715.3 MHz     |               |
| 12 / 1.4M | 1       | 0         | 22.88        | 22.83        | 22.85         | 0             | 21.66        | 21.74        | 21.66         | 1             |
|           | 1       | 2         | 22.66        | 22.67        | 22.58         | 0             | 21.74        | 21.71        | 21.50         | 1             |
|           | 1       | 5         | 22.38        | 22.31        | 22.37         | 0             | 21.40        | 21.46        | 21.38         | 1             |
|           | 3       | 0         | 22.50        | 22.53        | 22.43         | 0             | 21.57        | 21.58        | 21.35         | 1             |
|           | 3       | 1         | 22.25        | 22.15        | 22.25         | 0             | 21.29        | 21.38        | 21.30         | 1             |
|           | 3       | 3         | 22.39        | 22.38        | 22.32         | 0             | 21.52        | 21.54        | 21.30         | 1             |
|           | 6       | 0         | 21.81        | 21.67        | 21.71         | 1             | 20.53        | 20.59        | 20.52         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23025 | Mid Ch 23095 | High Ch 23165 |               | Low Ch 23025 | Mid Ch 23095 | High Ch 23165 |               |
|           |         |           | 700.5 MHz    | 707.5 MHz    | 714.5 MHz     |               | 700.5 MHz    | 707.5 MHz    | 714.5 MHz     |               |
| 12 / 3M   | 1       | 0         | 22.87        | 22.89        | 22.87         | 0             | 21.80        | 21.89        | 21.69         | 1             |
|           | 1       | 7         | 22.82        | 22.79        | 22.78         | 0             | 21.79        | 21.76        | 21.56         | 1             |
|           | 1       | 14        | 22.54        | 22.64        | 22.50         | 0             | 21.73        | 21.45        | 21.59         | 1             |
|           | 8       | 0         | 21.79        | 21.77        | 21.68         | 1             | 20.80        | 20.66        | 20.71         | 2             |
|           | 8       | 3         | 21.59        | 21.69        | 21.49         | 1             | 20.49        | 20.45        | 20.39         | 2             |
|           | 8       | 7         | 21.53        | 21.48        | 21.37         | 1             | 20.46        | 20.48        | 20.46         | 2             |
|           | 15      | 0         | 21.72        | 21.79        | 21.66         | 1             | 20.76        | 20.63        | 20.63         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23035 | Mid Ch 23095 | High Ch 23155 |               | Low Ch 23035 | Mid Ch 23095 | High Ch 23155 |               |
|           |         |           | 701.5 MHz    | 707.5 MHz    | 713.5 MHz     |               | 701.5 MHz    | 707.5 MHz    | 713.5 MHz     |               |
| 12 / 5M   | 1       | 0         | 23.08        | 23.12        | 23.10         | 0             | 22.10        | 22.06        | 21.99         | 1             |
|           | 1       | 12        | 23.06        | 23.07        | 22.99         | 0             | 21.98        | 21.94        | 21.88         | 1             |
|           | 1       | 24        | 22.72        | 22.94        | 22.72         | 0             | 21.83        | 21.92        | 21.66         | 1             |
|           | 12      | 0         | 22.07        | 22.06        | 21.98         | 1             | 20.97        | 20.96        | 20.79         | 2             |
|           | 12      | 6         | 21.84        | 21.91        | 21.79         | 1             | 20.80        | 20.87        | 20.64         | 2             |
|           | 12      | 13        | 21.72        | 21.69        | 21.69         | 1             | 20.67        | 20.79        | 20.53         | 2             |
|           | 25      | 0         | 21.97        | 22.06        | 21.99         | 1             | 20.88        | 20.91        | 20.86         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23060 | Mid Ch 23095 | High Ch 23130 |               |
|           |         |           | 704.0 MHz    | 707.5 MHz    | 711.0 MHz     |               |
| 12 / 10M  | 1       | 0         | 23.39        | 23.27        | 23.33         | 0             |
|           | 1       | 24        | 23.27        | 23.29        | 23.21         | 0             |
|           | 1       | 49        | 23.09        | 23.09        | 22.98         | 0             |
|           | 25      | 0         | 22.27        | 22.29        | 22.17         | 1             |
|           | 25      | 12        | 22.06        | 22.07        | 21.97         | 1             |
|           | 25      | 25        | 21.96        | 22.03        | 21.83         | 1             |
|           | 50      | 0         | 22.18        | 22.24        | 22.20         | 1             |

**ERP Power (dBm)**

| LTE Band 12                        |         |                 |               |                        |           |          |                    |
|------------------------------------|---------|-----------------|---------------|------------------------|-----------|----------|--------------------|
| Channel Bandwidth: 1.4 MHz / QPSK  |         |                 |               |                        |           |          |                    |
| Plane                              | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| Y                                  | 23017   | 699.7           | -6.68         | 30.36                  | 21.53     | 142.23   | H                  |
|                                    | 23095   | 707.5           | -6.72         | 30.17                  | 21.30     | 134.90   |                    |
|                                    | 23173   | 715.3           | -6.61         | 30.17                  | 21.41     | 138.36   |                    |
|                                    | 23017   | 699.7           | -13.34        | 32.03                  | 16.54     | 45.08    | V                  |
|                                    | 23095   | 707.5           | -13.60        | 31.98                  | 16.23     | 41.98    |                    |
|                                    | 23173   | 715.3           | -13.58        | 32.06                  | 16.33     | 42.95    |                    |
| Channel Bandwidth: 1.4 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| Y                                  | 23017   | 699.7           | -7.67         | 30.36                  | 20.54     | 113.24   | H                  |
|                                    | 23095   | 707.5           | -7.71         | 30.17                  | 20.31     | 107.40   |                    |
|                                    | 23173   | 715.3           | -7.60         | 30.17                  | 20.42     | 110.15   |                    |
|                                    | 23017   | 699.7           | -14.33        | 32.03                  | 15.55     | 35.89    | V                  |
|                                    | 23095   | 707.5           | -14.59        | 31.98                  | 15.24     | 33.42    |                    |
|                                    | 23173   | 715.3           | -14.57        | 32.06                  | 15.34     | 34.20    |                    |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12                      |         |                 |               |                        |           |          |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|-----------|----------|--------------------|
| Channel Bandwidth: 3 MHz / QPSK  |         |                 |               |                        |           |          |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| Y                                | 23025   | 700.5           | -6.26         | 30.17                  | 21.76     | 149.97   | H                  |
|                                  | 23095   | 707.5           | -6.49         | 30.17                  | 21.53     | 142.23   |                    |
|                                  | 23165   | 714.5           | -6.39         | 30.18                  | 21.64     | 145.88   |                    |
|                                  | 23025   | 700.5           | -13.04        | 31.96                  | 16.77     | 47.53    | V                  |
|                                  | 23095   | 707.5           | -13.37        | 31.98                  | 16.46     | 44.26    |                    |
|                                  | 23165   | 714.5           | -13.32        | 32.03                  | 16.56     | 45.29    |                    |
| Channel Bandwidth: 3 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| Y                                | 23025   | 700.5           | -7.28         | 30.17                  | 20.74     | 118.58   | H                  |
|                                  | 23095   | 707.5           | -7.51         | 30.17                  | 20.51     | 112.46   |                    |
|                                  | 23165   | 714.5           | -7.41         | 30.18                  | 20.62     | 115.35   |                    |
|                                  | 23025   | 700.5           | -14.06        | 31.96                  | 15.75     | 37.58    | V                  |
|                                  | 23095   | 707.5           | -14.39        | 31.98                  | 15.44     | 34.99    |                    |
|                                  | 23165   | 714.5           | -14.34        | 32.03                  | 15.54     | 35.81    |                    |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12                      |         |                 |               |                        |           |          |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|-----------|----------|--------------------|
| Channel Bandwidth: 5 MHz / QPSK  |         |                 |               |                        |           |          |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| Y                                | 23035   | 701.5           | -5.99         | 30.17                  | 22.03     | 159.59   | H                  |
|                                  | 23095   | 707.5           | -6.22         | 30.17                  | 21.80     | 151.36   |                    |
|                                  | 23155   | 713.5           | -6.12         | 30.18                  | 21.91     | 155.24   |                    |
|                                  | 23035   | 701.5           | -12.77        | 31.96                  | 17.04     | 50.58    | V                  |
|                                  | 23095   | 707.5           | -13.10        | 31.98                  | 16.73     | 47.10    |                    |
|                                  | 23155   | 713.5           | -13.05        | 32.03                  | 16.83     | 48.19    |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| Y                                | 23035   | 701.5           | -6.92         | 30.17                  | 21.10     | 128.82   | H                  |
|                                  | 23095   | 707.5           | -7.15         | 30.17                  | 20.87     | 122.18   |                    |
|                                  | 23155   | 713.5           | -7.05         | 30.18                  | 20.98     | 125.31   |                    |
|                                  | 23035   | 701.5           | -13.70        | 31.96                  | 16.11     | 40.83    | V                  |
|                                  | 23095   | 707.5           | -14.03        | 31.98                  | 15.80     | 38.02    |                    |
|                                  | 23155   | 713.5           | -13.98        | 32.03                  | 15.90     | 38.90    |                    |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

| LTE Band 12                      |         |                 |               |                        |           |          |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|-----------|----------|--------------------|
| Channel Bandwidth: 10 MHz / QPSK |         |                 |               |                        |           |          |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| Y                                | 23060   | 704.0           | -5.74         | 30.17                  | 22.28     | 169.04   | H                  |
|                                  | 23095   | 707.5           | -5.97         | 30.17                  | 22.05     | 160.32   |                    |
|                                  | 23130   | 711.0           | -5.87         | 30.18                  | 22.16     | 164.44   |                    |
|                                  | 23060   | 704.0           | -12.52        | 31.96                  | 17.29     | 53.58    | V                  |
|                                  | 23095   | 707.5           | -12.85        | 31.98                  | 16.98     | 49.89    |                    |
|                                  | 23130   | 711.0           | -12.80        | 32.03                  | 17.08     | 51.05    |                    |

Note: ERP (dBm) = Reading (dBm) + Correction Factor (dB) – 2.15

**EIRP Power (dBm)**

| LTE Band 4                         |         |                 |               |                        |            |           |                    |
|------------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 1.4 MHz / QPSK  |         |                 |               |                        |            |           |                    |
| Plane                              | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                  | 19957   | 1710.7          | -12.09        | 36.45                  | 24.36      | 272.90    | H                  |
|                                    | 20175   | 1732.5          | -12.27        | 36.80                  | 24.53      | 283.79    |                    |
|                                    | 20393   | 1754.3          | -12.35        | 36.94                  | 24.59      | 287.74    |                    |
|                                    | 19957   | 1710.7          | -18.43        | 37.28                  | 18.85      | 76.74     | V                  |
|                                    | 20175   | 1732.5          | -18.55        | 37.63                  | 19.08      | 80.91     |                    |
|                                    | 20393   | 1754.3          | -18.29        | 37.64                  | 19.35      | 86.10     |                    |
| Channel Bandwidth: 1.4 MHz / 16QAM |         |                 |               |                        |            |           |                    |
| X                                  | 19957   | 1710.7          | -13.20        | 36.45                  | 23.25      | 211.35    | H                  |
|                                    | 20175   | 1732.5          | -13.38        | 36.80                  | 23.42      | 219.79    |                    |
|                                    | 20393   | 1754.3          | -13.46        | 36.94                  | 23.48      | 222.84    |                    |
|                                    | 19957   | 1710.7          | -19.54        | 37.28                  | 17.74      | 59.43     | V                  |
|                                    | 20175   | 1732.5          | -19.66        | 37.63                  | 17.97      | 62.66     |                    |
|                                    | 20393   | 1754.3          | -19.40        | 37.64                  | 18.24      | 66.68     |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4                       |         |                 |               |                        |            |           |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 3 MHz / QPSK  |         |                 |               |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 19965   | 1711.5          | -11.85        | 36.45                  | 24.60      | 288.40    | H                  |
|                                  | 20175   | 1732.5          | -12.03        | 36.80                  | 24.77      | 299.92    |                    |
|                                  | 20385   | 1753.5          | -12.11        | 36.94                  | 24.83      | 304.09    |                    |
|                                  | 19965   | 1711.5          | -18.19        | 37.28                  | 19.09      | 81.10     | V                  |
|                                  | 20175   | 1732.5          | -18.31        | 37.63                  | 19.32      | 85.51     |                    |
|                                  | 20385   | 1753.5          | -18.05        | 37.64                  | 19.59      | 90.99     |                    |
| Channel Bandwidth: 3 MHz / 16QAM |         |                 |               |                        |            |           |                    |
| X                                | 19965   | 1711.5          | -13.08        | 36.45                  | 23.37      | 217.27    | H                  |
|                                  | 20175   | 1732.5          | -13.26        | 36.80                  | 23.54      | 225.94    |                    |
|                                  | 20385   | 1753.5          | -13.34        | 36.94                  | 23.60      | 229.09    |                    |
|                                  | 19965   | 1711.5          | -19.42        | 37.28                  | 17.86      | 61.09     | V                  |
|                                  | 20175   | 1732.5          | -19.54        | 37.63                  | 18.09      | 64.42     |                    |
|                                  | 20385   | 1753.5          | -19.28        | 37.64                  | 18.36      | 68.55     |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4                       |         |                 |               |                        |            |           |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 5 MHz / QPSK  |         |                 |               |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 19975   | 1712.5          | -11.59        | 36.45                  | 24.86      | 306.20    | H                  |
|                                  | 20175   | 1732.5          | -11.77        | 36.80                  | 25.03      | 318.42    |                    |
|                                  | 20375   | 1752.5          | -11.85        | 36.94                  | 25.09      | 322.85    |                    |
|                                  | 19975   | 1712.5          | -17.93        | 37.28                  | 19.35      | 86.10     | V                  |
|                                  | 20175   | 1732.5          | -18.05        | 37.63                  | 19.58      | 90.78     |                    |
|                                  | 20375   | 1752.5          | -17.79        | 37.64                  | 19.85      | 96.61     |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |               |                        |            |           |                    |
| X                                | 19975   | 1712.5          | -12.56        | 36.45                  | 23.89      | 244.91    | H                  |
|                                  | 20175   | 1732.5          | -12.74        | 36.80                  | 24.06      | 254.68    |                    |
|                                  | 20375   | 1752.5          | -12.82        | 36.94                  | 24.12      | 258.23    |                    |
|                                  | 19975   | 1712.5          | -18.90        | 37.28                  | 18.38      | 68.87     | V                  |
|                                  | 20175   | 1732.5          | -19.02        | 37.63                  | 18.61      | 72.61     |                    |
|                                  | 20375   | 1752.5          | -18.76        | 37.64                  | 18.88      | 77.27     |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4                       |         |                 |               |                        |            |           |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 10 MHz / QPSK |         |                 |               |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 20000   | 1715.0          | -11.56        | 36.64                  | 25.08      | 322.11    | H                  |
|                                  | 20175   | 1732.5          | -11.55        | 36.80                  | 25.25      | 334.97    |                    |
|                                  | 20350   | 1750.0          | -11.49        | 36.80                  | 25.31      | 339.63    |                    |
|                                  | 20000   | 1715.0          | -17.87        | 37.44                  | 19.57      | 90.57     | V                  |
|                                  | 20175   | 1732.5          | -17.83        | 37.63                  | 19.80      | 95.50     |                    |
|                                  | 20350   | 1750.0          | -17.57        | 37.64                  | 20.07      | 101.62    |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4                       |         |                 |               |                        |            |           |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 15 MHz / QPSK |         |                 |               |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 20025   | 1717.5          | -11.16        | 36.45                  | 25.29      | 338.06    | H                  |
|                                  | 20175   | 1732.5          | -11.34        | 36.80                  | 25.46      | 351.56    |                    |
|                                  | 20325   | 1747.5          | -11.42        | 36.94                  | 25.52      | 356.45    |                    |
|                                  | 20025   | 1717.5          | -17.50        | 37.28                  | 19.78      | 95.06     | V                  |
|                                  | 20175   | 1732.5          | -17.62        | 37.63                  | 20.01      | 100.23    |                    |
|                                  | 20325   | 1747.5          | -17.36        | 37.64                  | 20.28      | 106.66    |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

| LTE Band 4                       |         |                 |               |                        |            |           |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|------------|-----------|--------------------|
| Channel Bandwidth: 20 MHz / QPSK |         |                 |               |                        |            |           |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | EIRP (dBm) | EIRP (mW) | Polarization (H/V) |
| X                                | 20050   | 1720.0          | -10.93        | 36.45                  | 25.52      | 356.45    | H                  |
|                                  | 20175   | 1732.5          | -11.11        | 36.80                  | 25.69      | 370.68    |                    |
|                                  | 20300   | 1745.0          | -11.19        | 36.94                  | 25.75      | 375.84    |                    |
|                                  | 20050   | 1720.0          | -17.27        | 37.28                  | 20.01      | 100.23    | V                  |
|                                  | 20175   | 1732.5          | -17.39        | 37.63                  | 20.24      | 105.68    |                    |
|                                  | 20300   | 1745.0          | -17.13        | 37.64                  | 20.51      | 112.46    |                    |

Note: EIRP (dBm) = Reading (dBm) + Correction Factor (dB)

## 4.2 Frequency Stability Measurement

### 4.2.1 Limits of Frequency Stability Measurement

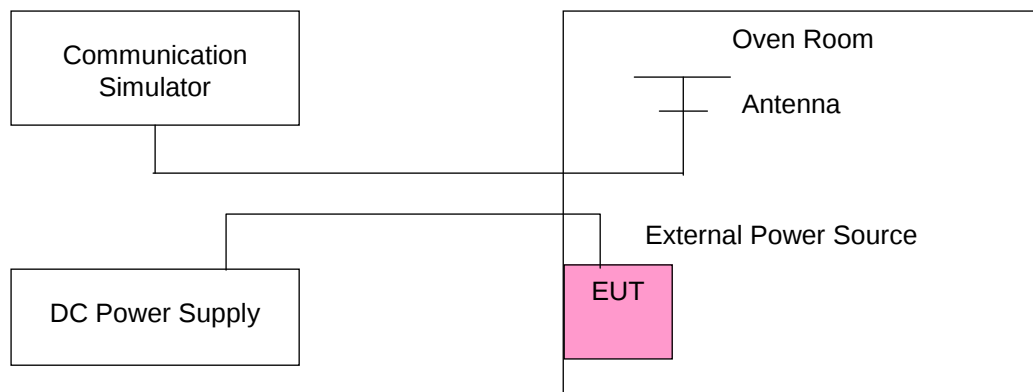
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

### 4.2.2 Test Procedure

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

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

### 4.2.3 Test Setup



#### 4.2.4 Test Results

##### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                 |                       |                 |                       | Limit (ppm) |
|--------------------|----------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 1.4 MHz |                       |                 |                       |             |
|                    | Low Channel                |                       | High Channel    |                       |             |
|                    | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1710.700002                | 0.001                 | 1754.300001     | 0.001                 | 2.5         |
| 10.2               | 1710.700002                | 0.001                 | 1754.300003     | 0.002                 | 2.5         |
| 13.8               | 1710.700002                | 0.001                 | 1754.300003     | 0.002                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

##### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                 |                       |                 |                       | Limit (ppm) |
|------------|----------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 1.4 MHz |                       |                 |                       |             |
|            | Low Channel                |                       | High Channel    |                       |             |
|            | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1710.700002                | 0.001                 | 1754.300002     | 0.001                 | 2.5         |
| -20        | 1710.700004                | 0.002                 | 1754.300004     | 0.002                 | 2.5         |
| -10        | 1710.700001                | 0.001                 | 1754.300003     | 0.001                 | 2.5         |
| 0          | 1710.700002                | 0.001                 | 1754.300004     | 0.002                 | 2.5         |
| 10         | 1710.700002                | 0.001                 | 1754.300004     | 0.002                 | 2.5         |
| 20         | 1710.699997                | -0.002                | 1754.299998     | -0.001                | 2.5         |
| 30         | 1710.699996                | -0.002                | 1754.299998     | -0.001                | 2.5         |
| 40         | 1710.699996                | -0.002                | 1754.299998     | -0.001                | 2.5         |
| 50         | 1710.699997                | -0.002                | 1754.299996     | -0.002                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4               |                       |                 |                       | Limit (ppm) |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 3 MHz |                       |                 |                       |             |
|                    | Low Channel              |                       | High Channel    |                       |             |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1711.500002              | 0.001                 | 1753.500004     | 0.002                 | 2.5         |
| 10.2               | 1711.500003              | 0.002                 | 1753.500002     | 0.001                 | 2.5         |
| 13.8               | 1711.500002              | 0.001                 | 1753.500004     | 0.002                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4               |                       |                 |                       | Limit (ppm) |
|------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 3 MHz |                       |                 |                       |             |
|            | Low Channel              |                       | High Channel    |                       |             |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1711.500004              | 0.002                 | 1753.500003     | 0.002                 | 2.5         |
| -20        | 1711.500003              | 0.002                 | 1753.500001     | 0.001                 | 2.5         |
| -10        | 1711.500002              | 0.001                 | 1753.500002     | 0.001                 | 2.5         |
| 0          | 1711.500002              | 0.001                 | 1753.500002     | 0.001                 | 2.5         |
| 10         | 1711.500001              | 0.001                 | 1753.500004     | 0.002                 | 2.5         |
| 20         | 1711.499998              | -0.001                | 1753.499997     | -0.002                | 2.5         |
| 30         | 1711.499999              | -0.001                | 1753.499998     | -0.001                | 2.5         |
| 40         | 1711.499999              | -0.001                | 1753.499999     | -0.001                | 2.5         |
| 50         | 1711.499999              | -0.001                | 1753.499999     | -0.001                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4               |                       |                 |                       | Limit (ppm) |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |             |
|                    | Low Channel              |                       | High Channel    |                       |             |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1712.500001              | 0.001                 | 1752.500003     | 0.002                 | 2.5         |
| 10.2               | 1712.500001              | 0.001                 | 1752.500001     | 0.001                 | 2.5         |
| 13.8               | 1712.500001              | 0.001                 | 1752.500001     | 0.001                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4               |                       |                 |                       | Limit (ppm) |
|------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |             |
|            | Low Channel              |                       | High Channel    |                       |             |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1712.500001              | 0.001                 | 1752.500001     | 0.001                 | 2.5         |
| -20        | 1712.500002              | 0.001                 | 1752.500002     | 0.001                 | 2.5         |
| -10        | 1712.500004              | 0.002                 | 1752.500002     | 0.001                 | 2.5         |
| 0          | 1712.500002              | 0.001                 | 1752.500004     | 0.002                 | 2.5         |
| 10         | 1712.500003              | 0.002                 | 1752.500004     | 0.002                 | 2.5         |
| 20         | 1712.499998              | -0.001                | 1752.499996     | -0.002                | 2.5         |
| 30         | 1712.499996              | -0.002                | 1752.499996     | -0.002                | 2.5         |
| 40         | 1712.499997              | -0.002                | 1752.499998     | -0.001                | 2.5         |
| 50         | 1712.499996              | -0.002                | 1752.499997     | -0.002                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 10 MHz |                       |                 |                       |             |
|                    | Low Channel               |                       | High Channel    |                       |             |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1715.000002               | 0.001                 | 1750.000004     | 0.002                 | 2.5         |
| 10.2               | 1715.000002               | 0.001                 | 1750.000002     | 0.001                 | 2.5         |
| 13.8               | 1715.000003               | 0.002                 | 1750.000002     | 0.001                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 10 MHz |                       |                 |                       |             |
|            | Low Channel               |                       | High Channel    |                       |             |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1715.000002               | 0.001                 | 1750.000002     | 0.001                 | 2.5         |
| -20        | 1715.000003               | 0.002                 | 1750.000002     | 0.001                 | 2.5         |
| -10        | 1715.000002               | 0.001                 | 1750.000002     | 0.001                 | 2.5         |
| 0          | 1715.000004               | 0.002                 | 1750.000002     | 0.001                 | 2.5         |
| 10         | 1715.000003               | 0.002                 | 1750.000003     | 0.002                 | 2.5         |
| 20         | 1714.999999               | -0.001                | 1749.999999     | -0.001                | 2.5         |
| 30         | 1714.999996               | -0.002                | 1749.999997     | -0.002                | 2.5         |
| 40         | 1714.999998               | -0.001                | 1749.999998     | -0.001                | 2.5         |
| 50         | 1714.999998               | -0.001                | 1749.999997     | -0.002                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 15 MHz |                       |                 |                       |             |
|                    | Low Channel               |                       | High Channel    |                       |             |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1717.500003               | 0.002                 | 1747.500003     | 0.002                 | 2.5         |
| 10.2               | 1717.500003               | 0.002                 | 1747.500001     | 0.001                 | 2.5         |
| 13.8               | 1717.500002               | 0.001                 | 1747.500002     | 0.001                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 15 MHz |                       |                 |                       |             |
|            | Low Channel               |                       | High Channel    |                       |             |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1717.500004               | 0.002                 | 1747.500002     | 0.001                 | 2.5         |
| -20        | 1717.500002               | 0.001                 | 1747.500001     | 0.001                 | 2.5         |
| -10        | 1717.500003               | 0.002                 | 1747.500002     | 0.001                 | 2.5         |
| 0          | 1717.500004               | 0.002                 | 1747.500003     | 0.002                 | 2.5         |
| 10         | 1717.500004               | 0.002                 | 1747.500003     | 0.002                 | 2.5         |
| 20         | 1717.499997               | -0.002                | 1747.499996     | -0.002                | 2.5         |
| 30         | 1717.499998               | -0.001                | 1747.499998     | -0.001                | 2.5         |
| 40         | 1717.499998               | -0.001                | 1747.499999     | -0.001                | 2.5         |
| 50         | 1717.499997               | -0.002                | 1747.499997     | -0.002                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 20 MHz |                       |                 |                       |             |
|                    | Low Channel               |                       | High Channel    |                       |             |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 1720.000002               | 0.001                 | 1745.000003     | 0.002                 | 2.5         |
| 10.2               | 1720.000003               | 0.002                 | 1745.000001     | 0.001                 | 2.5         |
| 13.8               | 1720.000003               | 0.002                 | 1745.000002     | 0.001                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       | Limit (ppm) |
|------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 20 MHz |                       |                 |                       |             |
|            | Low Channel               |                       | High Channel    |                       |             |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 1720.000003               | 0.002                 | 1745.000003     | 0.001                 | 2.5         |
| -20        | 1720.000003               | 0.002                 | 1745.000001     | 0.001                 | 2.5         |
| -10        | 1720.000003               | 0.002                 | 1745.000004     | 0.002                 | 2.5         |
| 0          | 1720.000004               | 0.002                 | 1745.000003     | 0.002                 | 2.5         |
| 10         | 1720.000004               | 0.002                 | 1745.000003     | 0.001                 | 2.5         |
| 20         | 1719.999997               | -0.002                | 1744.999998     | -0.001                | 2.5         |
| 30         | 1719.999996               | -0.002                | 1744.999998     | -0.001                | 2.5         |
| 40         | 1719.999996               | -0.002                | 1744.999999     | -0.001                | 2.5         |
| 50         | 1719.999997               | -0.002                | 1744.999998     | -0.001                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12                |                       |                 |                       | Limit (ppm) |
|--------------------|----------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 1.4 MHz |                       |                 |                       |             |
|                    | Low Channel                |                       | High Channel    |                       |             |
|                    | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 699.700004                 | 0.005                 | 715.300003      | 0.004                 | 2.5         |
| 10.2               | 699.700003                 | 0.004                 | 715.300003      | 0.003                 | 2.5         |
| 13.8               | 699.700004                 | 0.005                 | 715.300002      | 0.003                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12                |                       |                 |                       | Limit (ppm) |
|------------|----------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 1.4 MHz |                       |                 |                       |             |
|            | Low Channel                |                       | High Channel    |                       |             |
|            | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 699.700003                 | 0.005                 | 715.300001      | 0.001                 | 2.5         |
| -20        | 699.700004                 | 0.005                 | 715.300002      | 0.002                 | 2.5         |
| -10        | 699.700004                 | 0.006                 | 715.300003      | 0.004                 | 2.5         |
| 0          | 699.700001                 | 0.002                 | 715.300003      | 0.004                 | 2.5         |
| 10         | 699.700002                 | 0.002                 | 715.300003      | 0.004                 | 2.5         |
| 20         | 699.699999                 | -0.001                | 715.299998      | -0.003                | 2.5         |
| 30         | 699.699999                 | -0.002                | 715.299997      | -0.004                | 2.5         |
| 40         | 699.699999                 | -0.002                | 715.299997      | -0.004                | 2.5         |
| 50         | 699.699998                 | -0.003                | 715.299997      | -0.004                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12              |                       |                 |                       | Limit (ppm) |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 3 MHz |                       |                 |                       |             |
|                    | Low Channel              |                       | High Channel    |                       |             |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 700.500003               | 0.004                 | 714.500001      | 0.002                 | 2.5         |
| 10.2               | 700.500003               | 0.005                 | 714.500002      | 0.003                 | 2.5         |
| 13.8               | 700.500002               | 0.003                 | 714.500002      | 0.002                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12              |                       |                 |                       | Limit (ppm) |
|------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 3 MHz |                       |                 |                       |             |
|            | Low Channel              |                       | High Channel    |                       |             |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 700.500004               | 0.005                 | 714.500004      | 0.005                 | 2.5         |
| -20        | 700.500004               | 0.006                 | 714.500004      | 0.006                 | 2.5         |
| -10        | 700.500004               | 0.006                 | 714.500002      | 0.002                 | 2.5         |
| 0          | 700.500002               | 0.003                 | 714.500002      | 0.002                 | 2.5         |
| 10         | 700.500003               | 0.005                 | 714.500002      | 0.003                 | 2.5         |
| 20         | 700.499997               | -0.004                | 714.499997      | -0.004                | 2.5         |
| 30         | 700.499996               | -0.005                | 714.499998      | -0.003                | 2.5         |
| 40         | 700.499997               | -0.005                | 714.499999      | -0.002                | 2.5         |
| 50         | 700.499999               | -0.002                | 714.499997      | -0.004                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12              |                       |                 |                       | Limit (ppm) |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |             |
|                    | Low Channel              |                       | High Channel    |                       |             |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 701.500002               | 0.003                 | 713.500002      | 0.003                 | 2.5         |
| 10.2               | 701.500003               | 0.004                 | 713.500003      | 0.004                 | 2.5         |
| 13.8               | 701.500002               | 0.003                 | 713.500002      | 0.003                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12              |                       |                 |                       | Limit (ppm) |
|------------|--------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |             |
|            | Low Channel              |                       | High Channel    |                       |             |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 701.500003               | 0.004                 | 713.500002      | 0.003                 | 2.5         |
| -20        | 701.500002               | 0.003                 | 713.500002      | 0.003                 | 2.5         |
| -10        | 701.500002               | 0.003                 | 713.500001      | 0.002                 | 2.5         |
| 0          | 701.500004               | 0.005                 | 713.500003      | 0.004                 | 2.5         |
| 10         | 701.500002               | 0.002                 | 713.500002      | 0.002                 | 2.5         |
| 20         | 701.499997               | -0.004                | 713.499997      | -0.004                | 2.5         |
| 30         | 701.499998               | -0.003                | 713.499997      | -0.005                | 2.5         |
| 40         | 701.499999               | -0.002                | 713.499999      | -0.002                | 2.5         |
| 50         | 701.499997               | -0.005                | 713.499996      | -0.005                | 2.5         |

### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12               |                       |                 |                       | Limit (ppm) |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|                    | Channel Bandwidth: 10 MHz |                       |                 |                       |             |
|                    | Low Channel               |                       | High Channel    |                       |             |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| 12                 | 704.000003                | 0.005                 | 711.000002      | 0.002                 | 2.5         |
| 10.2               | 704.000002                | 0.003                 | 711.000003      | 0.005                 | 2.5         |
| 13.8               | 704.000001                | 0.002                 | 711.000001      | 0.002                 | 2.5         |

**Note:** The applicant defined the normal working voltage of the power supply is from 10.2 Vdc to 13.8 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12               |                       |                 |                       | Limit (ppm) |
|------------|---------------------------|-----------------------|-----------------|-----------------------|-------------|
|            | Channel Bandwidth: 10 MHz |                       |                 |                       |             |
|            | Low Channel               |                       | High Channel    |                       |             |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |             |
| -30        | 704.000001                | 0.002                 | 711.000002      | 0.003                 | 2.5         |
| -20        | 704.000003                | 0.005                 | 711.000003      | 0.004                 | 2.5         |
| -10        | 704.000001                | 0.002                 | 711.000004      | 0.005                 | 2.5         |
| 0          | 704.000002                | 0.002                 | 711.000003      | 0.004                 | 2.5         |
| 10         | 704.000003                | 0.004                 | 711.000003      | 0.004                 | 2.5         |
| 20         | 703.999996                | -0.005                | 710.999998      | -0.002                | 2.5         |
| 30         | 703.999997                | -0.004                | 710.999997      | -0.005                | 2.5         |
| 40         | 703.999998                | -0.002                | 710.999998      | -0.003                | 2.5         |
| 50         | 703.999996                | -0.005                | 710.999997      | -0.004                | 2.5         |

### 4.3 Occupied Bandwidth Measurement

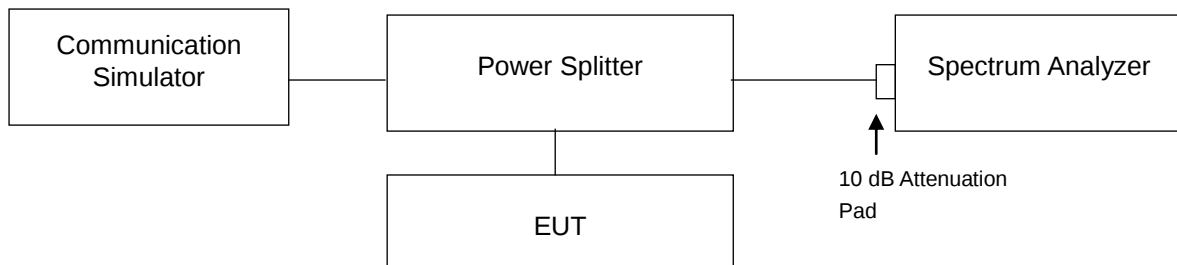
#### 4.3.1 Limits of Occupied Bandwidth Measurement

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

#### 4.3.2 Test Procedure

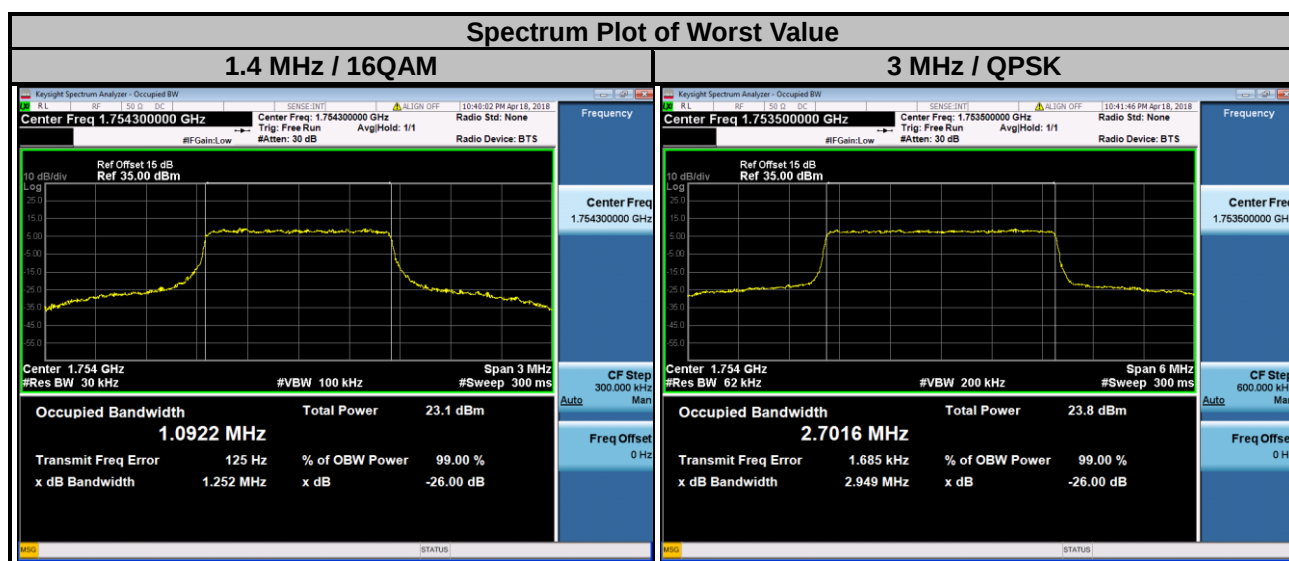
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

#### 4.3.3 Test Setup

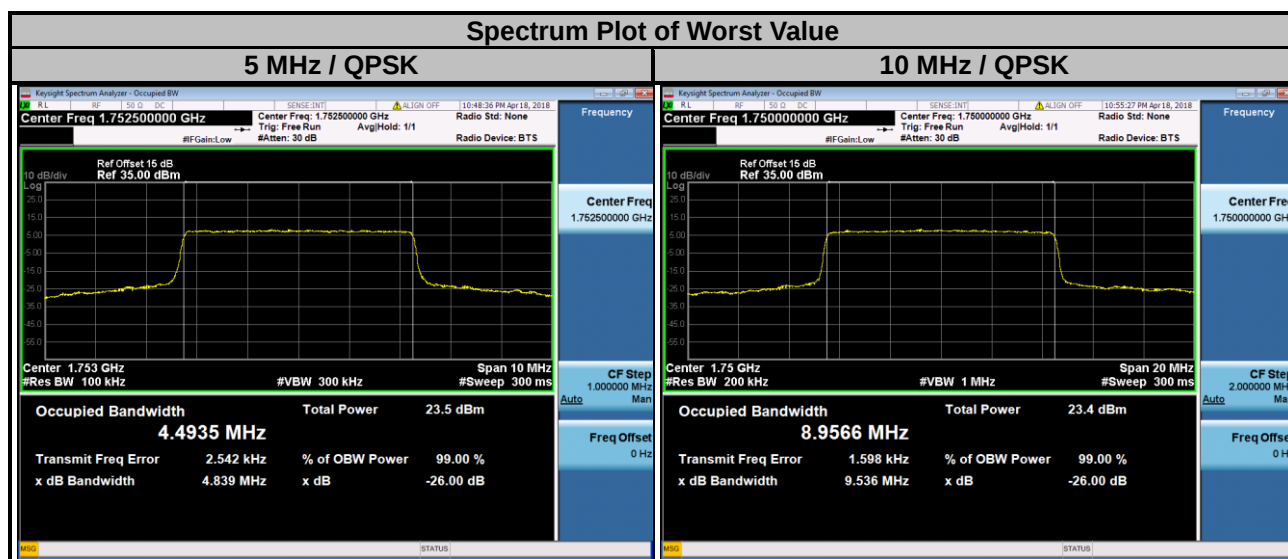


#### 4.3.4 Test Result

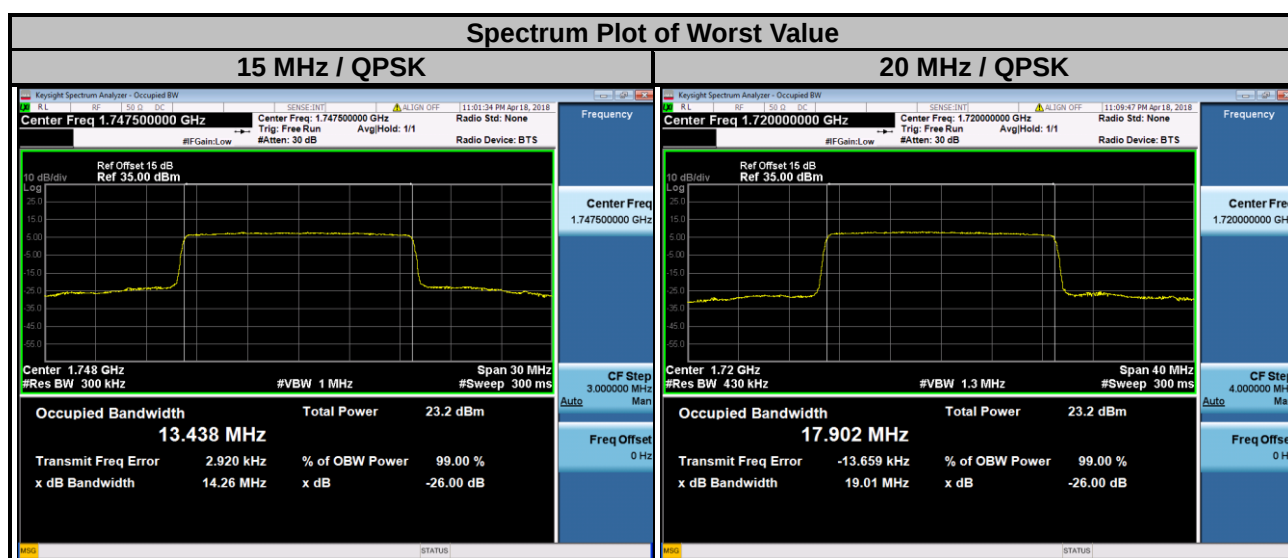
| LTE Band 4                 |                 |                               |       |                          |                 |                               |       |
|----------------------------|-----------------|-------------------------------|-------|--------------------------|-----------------|-------------------------------|-------|
| Channel Bandwidth: 1.4 MHz |                 |                               |       | Channel Bandwidth: 3 MHz |                 |                               |       |
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       | Channel                  | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM |                          |                 | QPSK                          | 16QAM |
| 19957                      | 1710.7          | 1.09                          | 1.09  | 19965                    | 1711.5          | 2.70                          | 2.70  |
| 20175                      | 1732.5          | 1.09                          | 1.09  | 20175                    | 1732.5          | 2.70                          | 2.70  |
| 20393                      | 1754.3          | 1.09                          | 1.09  | 20385                    | 1753.5          | 2.70                          | 2.70  |



| LTE Band 4               |                 |                               |       |                           |                 |                               |       |
|--------------------------|-----------------|-------------------------------|-------|---------------------------|-----------------|-------------------------------|-------|
| Channel Bandwidth: 5 MHz |                 |                               |       | Channel Bandwidth: 10 MHz |                 |                               |       |
| Channel                  | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       | Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |
|                          |                 | QPSK                          | 16QAM |                           |                 | QPSK                          | 16QAM |
| 19975                    | 1712.5          | 4.49                          | 4.49  | 20000                     | 1715.0          | 8.94                          | NA    |
| 20175                    | 1732.5          | 4.49                          | 4.49  | 20175                     | 1732.5          | 8.95                          | NA    |
| 20375                    | 1752.5          | 4.49                          | 4.49  | 20350                     | 1750.0          | 8.96                          | NA    |



| LTE Band 4                |                 |                               |       |                           |                 |                               |       |
|---------------------------|-----------------|-------------------------------|-------|---------------------------|-----------------|-------------------------------|-------|
| Channel Bandwidth: 15 MHz |                 |                               |       | Channel Bandwidth: 20 MHz |                 |                               |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       | Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM |                           |                 | QPSK                          | 16QAM |
| 20025                     | 1717.5          | 13.42                         | NA    | 20050                     | 1720.0          | 17.90                         | NA    |
| 20175                     | 1732.5          | 13.43                         | NA    | 20175                     | 1732.5          | 17.90                         | NA    |
| 20325                     | 1747.5          | 13.44                         | NA    | 20300                     | 1745.0          | 17.89                         | NA    |

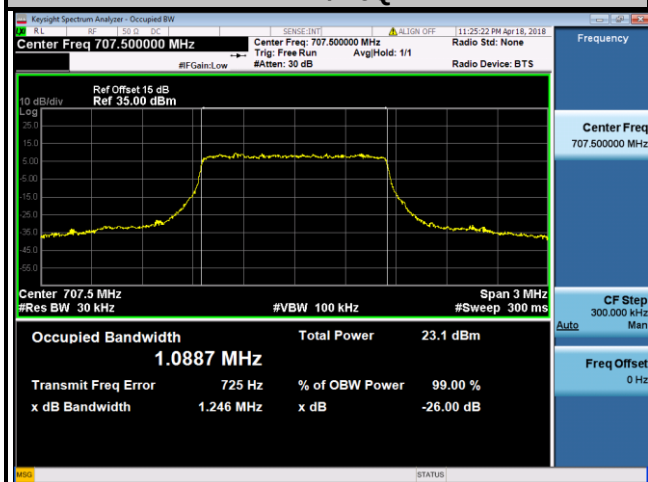


## LTE Band 12

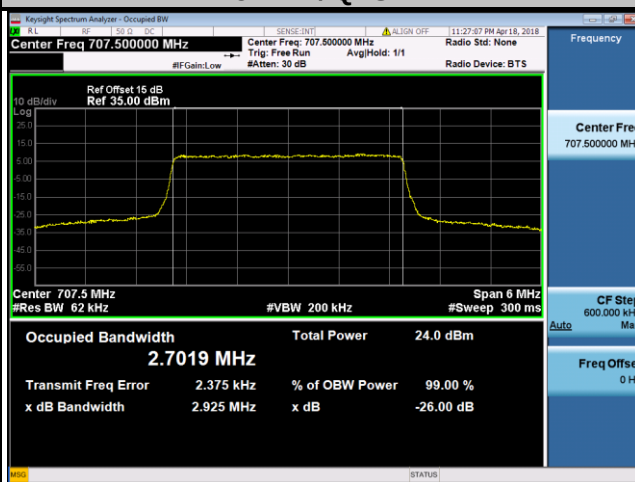
| Channel Bandwidth: 1.4 MHz |                 |                               |       | Channel Bandwidth: 3 MHz |                 |                               |       |
|----------------------------|-----------------|-------------------------------|-------|--------------------------|-----------------|-------------------------------|-------|
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       | Channel                  | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM |                          |                 | QPSK                          | 16QAM |
| 23017                      | 699.7           | 1.09                          | 1.09  | 23025                    | 700.5           | 2.70                          | 2.70  |
| 23095                      | 707.5           | 1.09                          | 1.09  | 23095                    | 707.5           | 2.70                          | 2.70  |
| 23173                      | 715.3           | 1.09                          | 1.09  | 23165                    | 714.5           | 2.70                          | 2.70  |

## Spectrum Plot of Worst Value

### 1.4 MHz / 16QAM



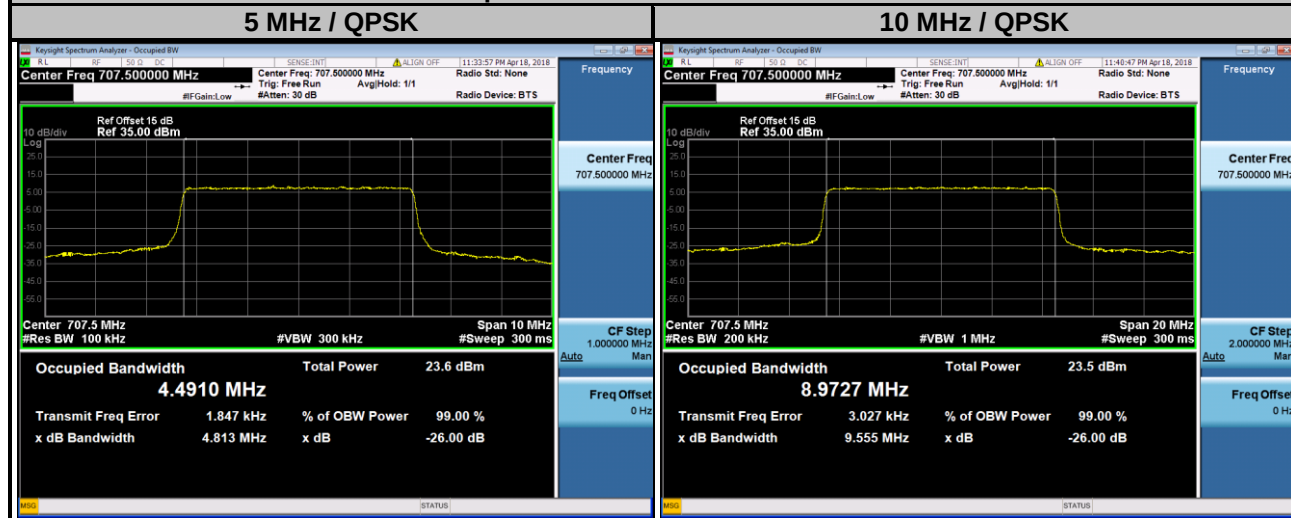
### 3 MHz / QPSK



### LTE Band 12

| Channel Bandwidth: 5 MHz |                 |                               |       | Channel Bandwidth: 10 MHz |                 |                               |       |
|--------------------------|-----------------|-------------------------------|-------|---------------------------|-----------------|-------------------------------|-------|
| Channel                  | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       | Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |
|                          |                 | QPSK                          | 16QAM |                           |                 | QPSK                          | 16QAM |
| 23035                    | 701.5           | 4.48                          | 4.49  | 23060                     | 704.0           | 8.94                          | NA    |
| 23095                    | 707.5           | 4.49                          | 4.49  | 23095                     | 707.5           | 8.97                          | NA    |
| 23155                    | 713.5           | 4.48                          | 4.49  | 23130                     | 711.0           | 8.95                          | NA    |

### Spectrum Plot of Worst Value



## 4.4 Band Edge Measurement

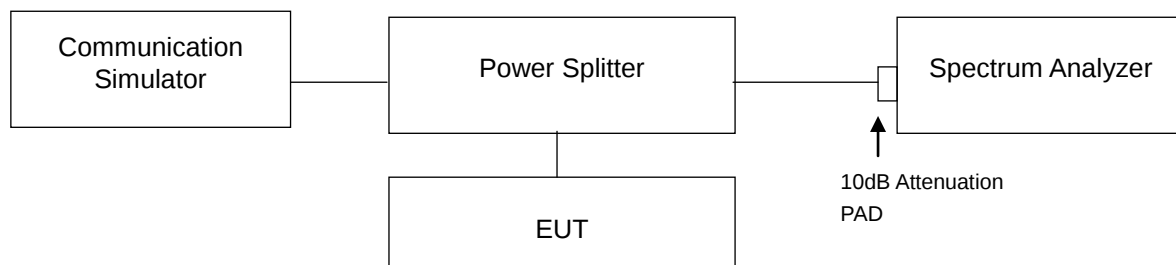
### 4.4.1 Limits of Band Edge Measurement

For operations in the 698-716 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least  $43 + 10 \log (P)$  dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For operations in the 1710–1755 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB.

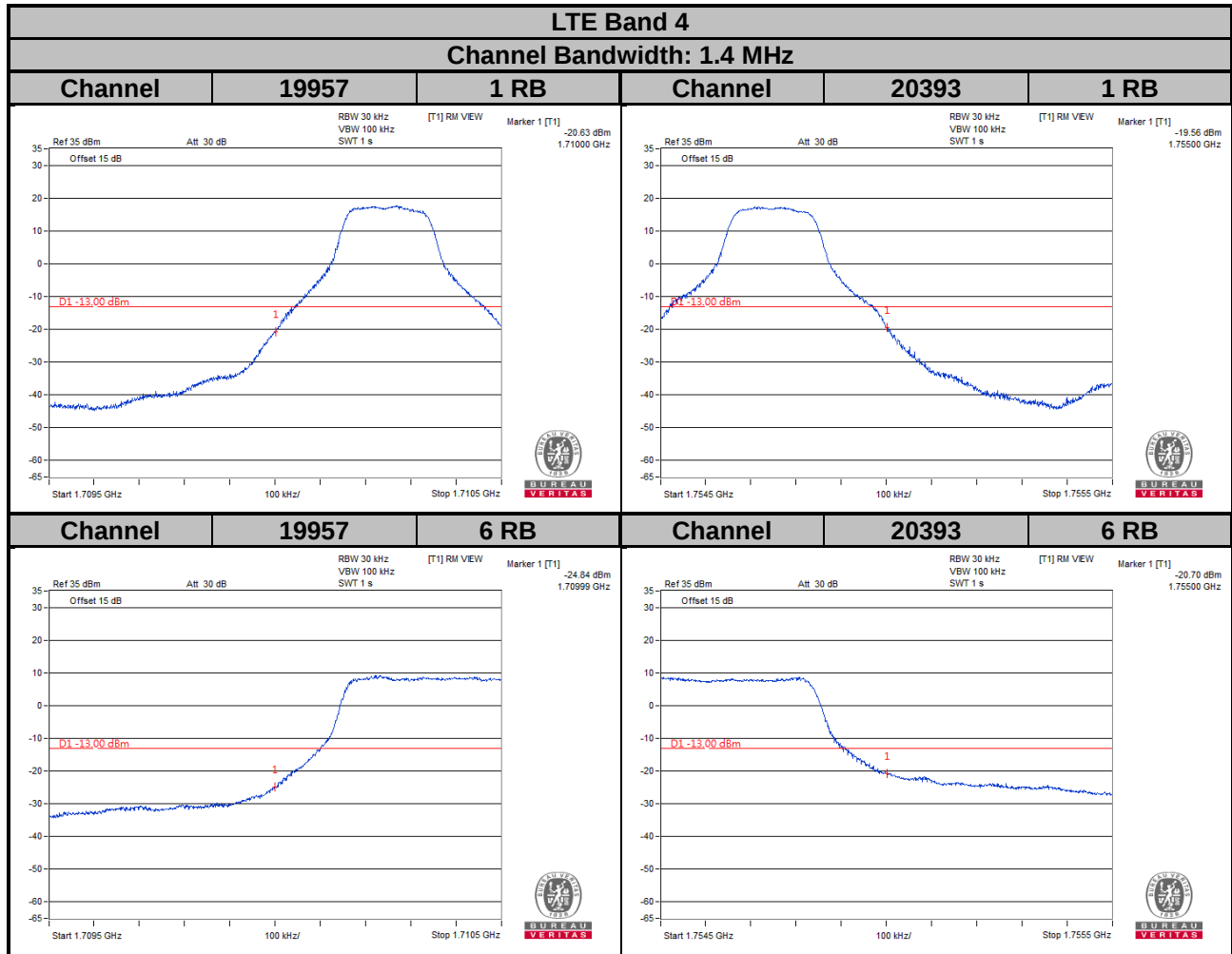
### 4.4.2 Test Setup

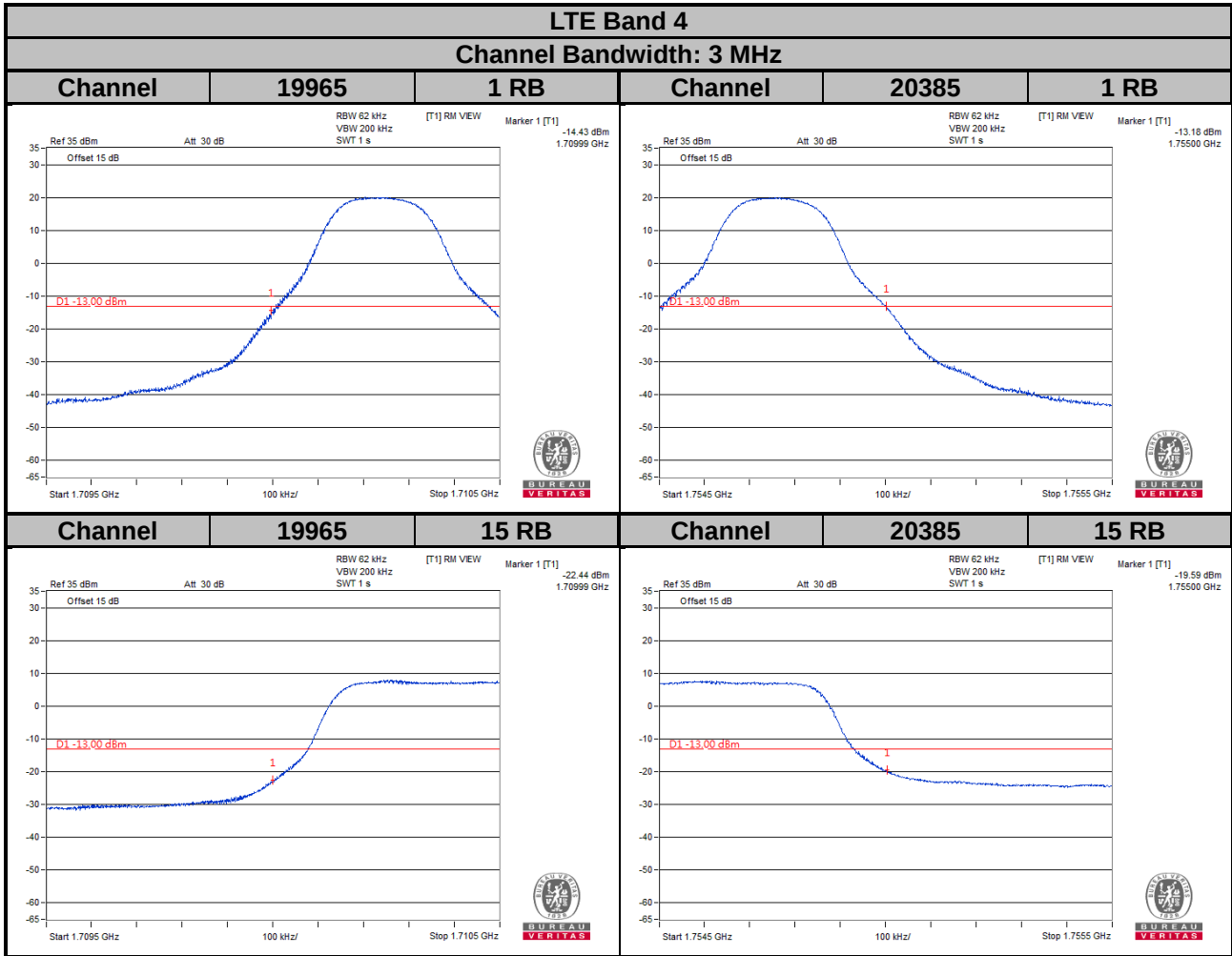


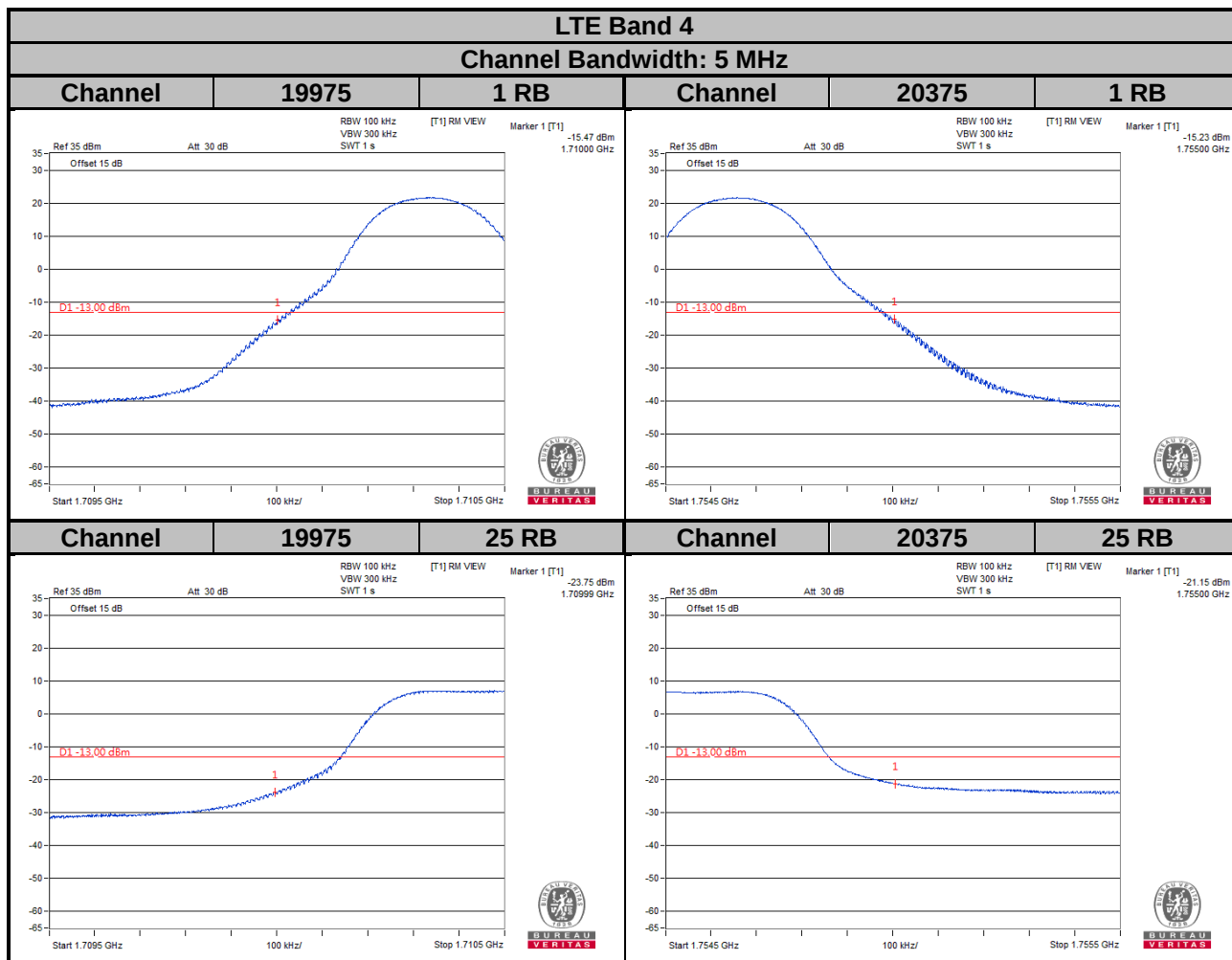
### 4.4.3 Test Procedures

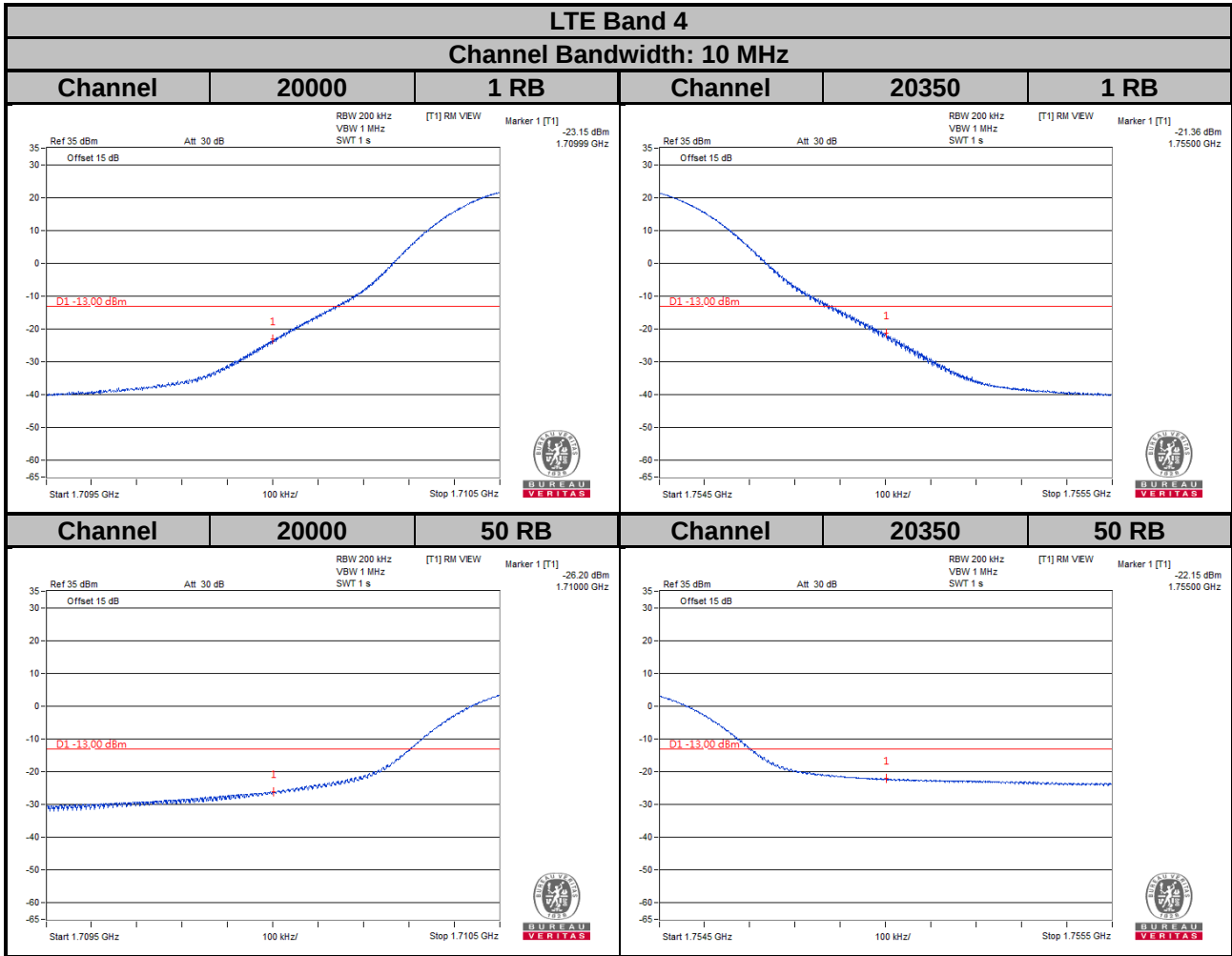
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 62 kHz and VB of the spectrum is 200 kHz (LTE Bandwidth 3 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 5 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 15 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 300 kHz and VB of the spectrum is 1 MHz (LTE Bandwidth 20 MHz).
- Record the max. trace plot into the test report.

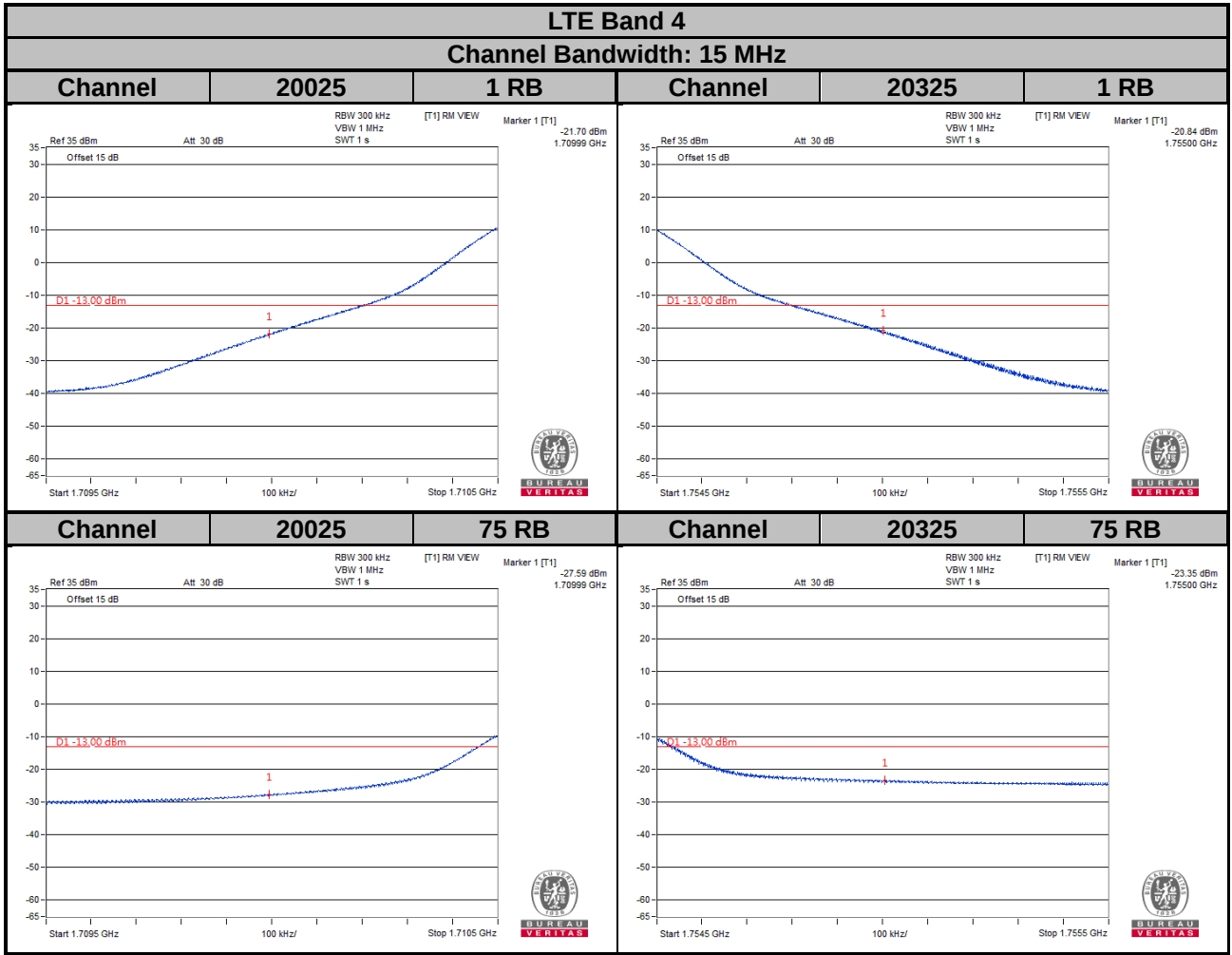
#### 4.4.4 Test Results

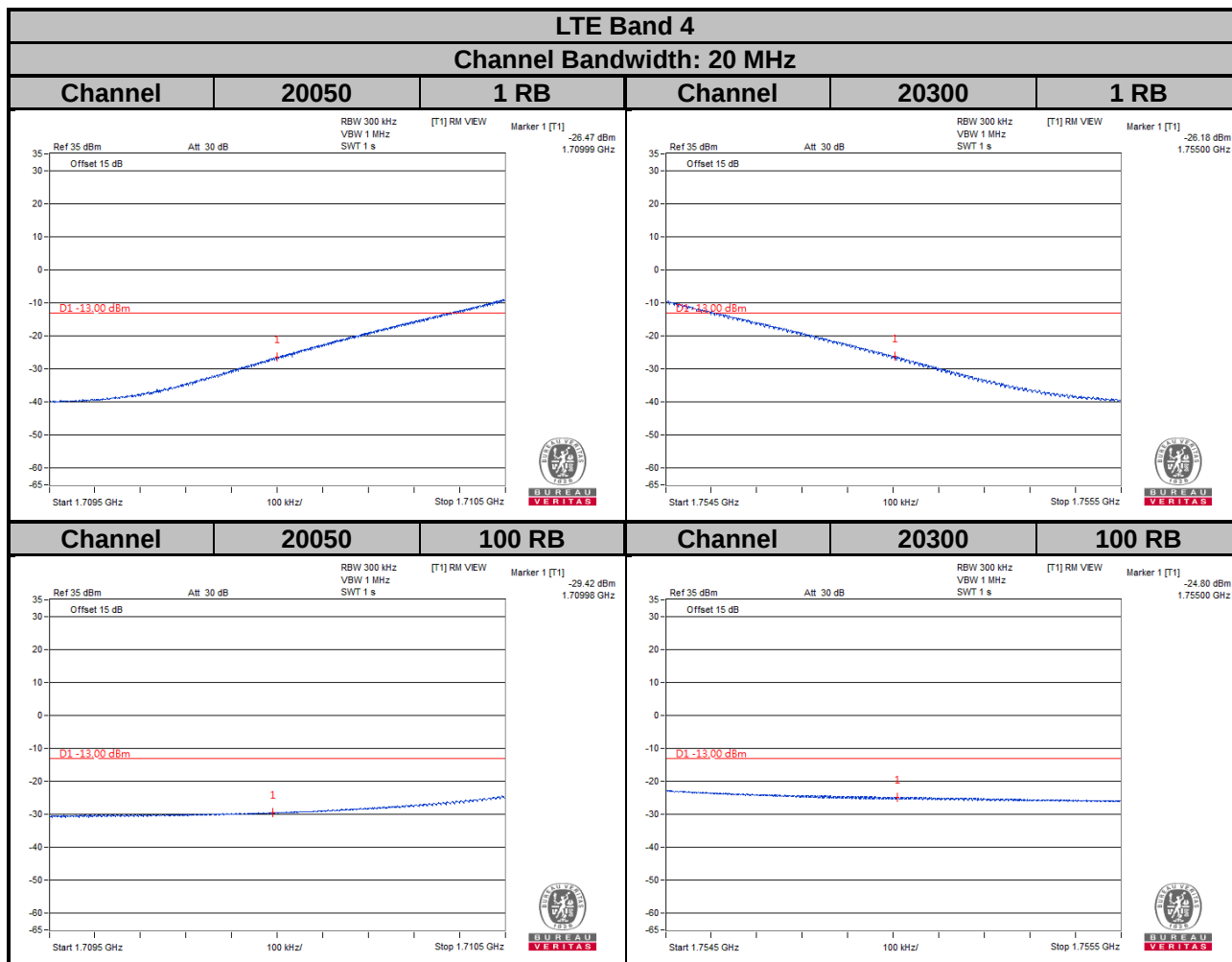






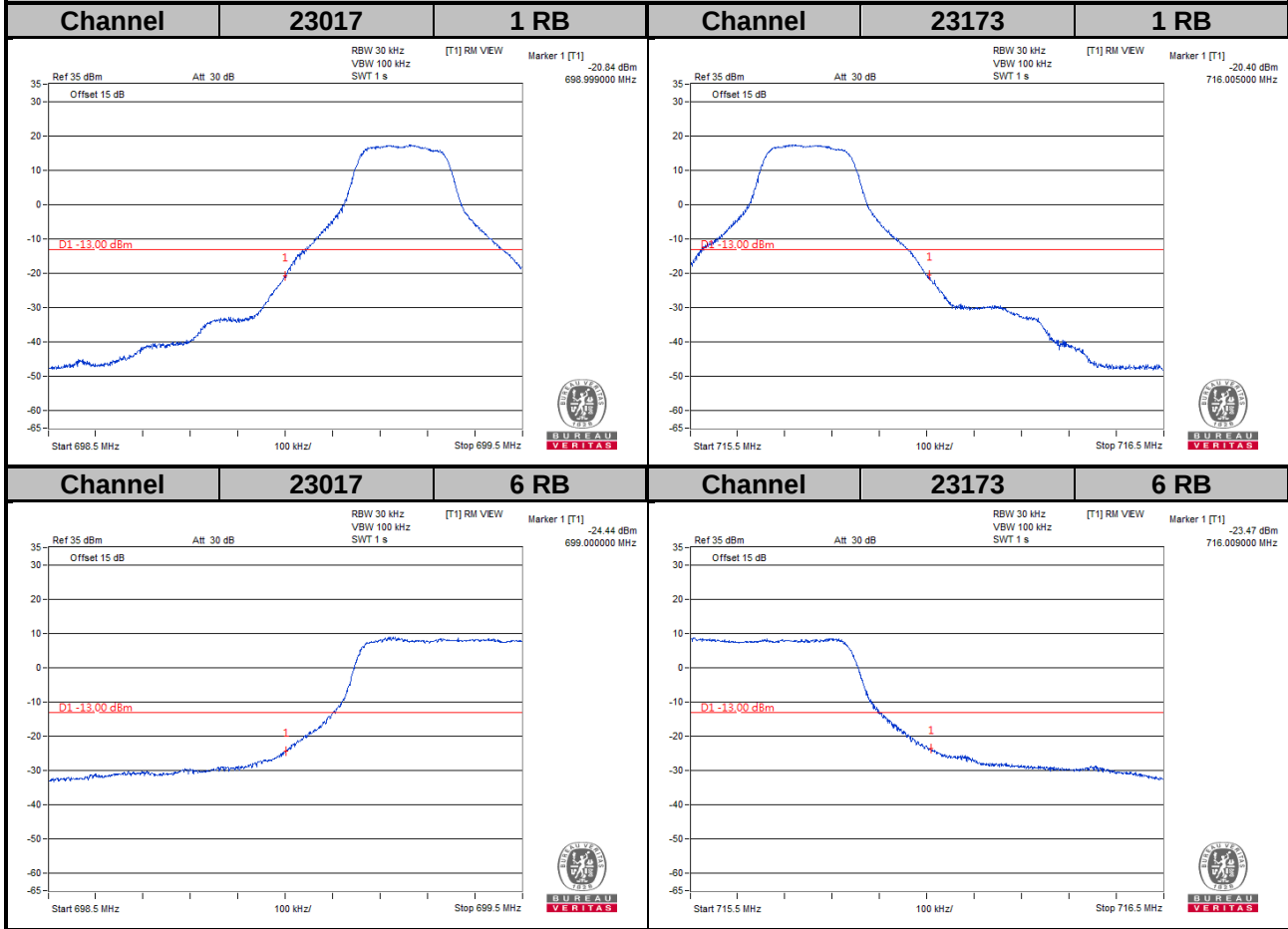






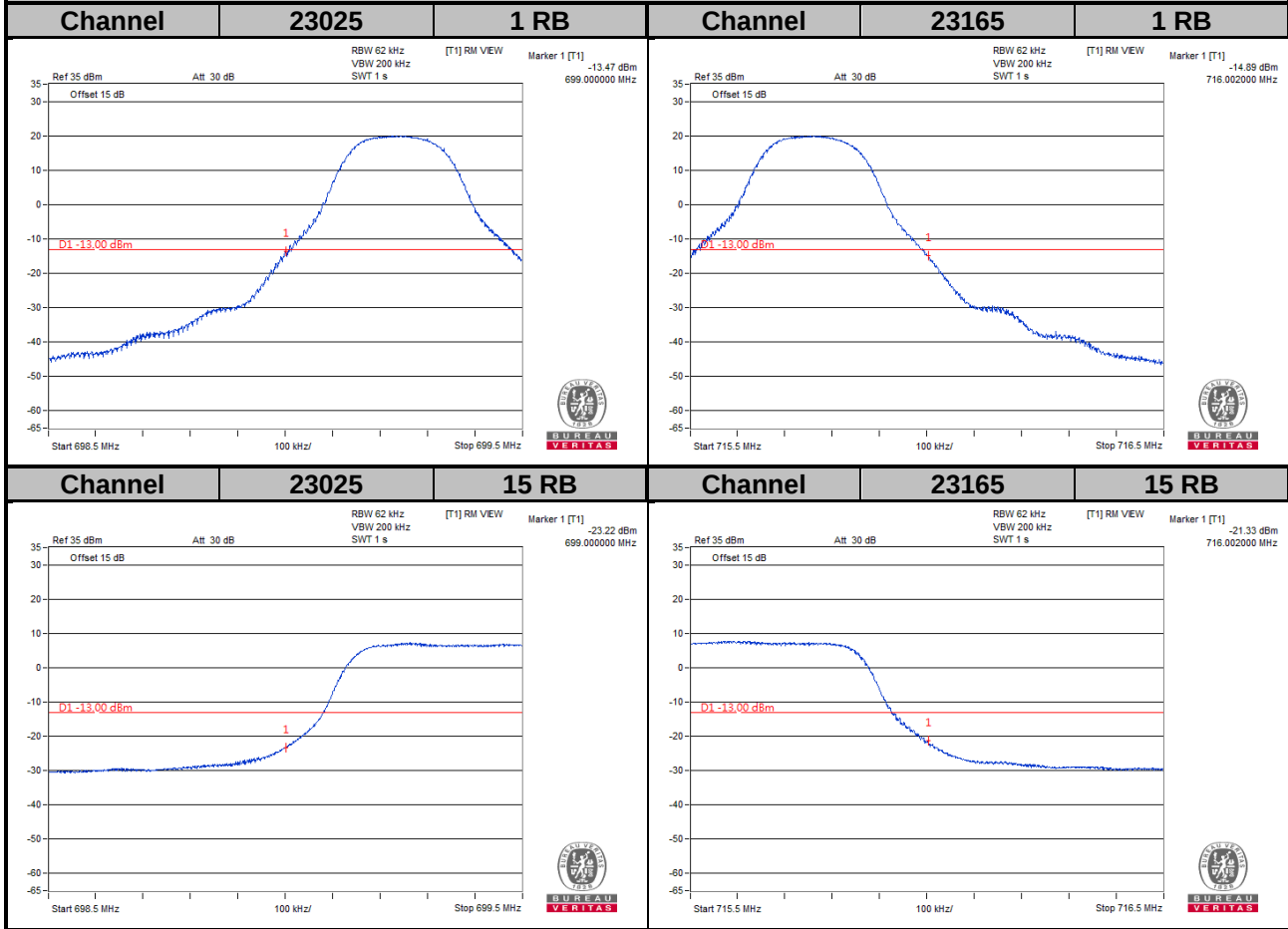
# LTE Band 12

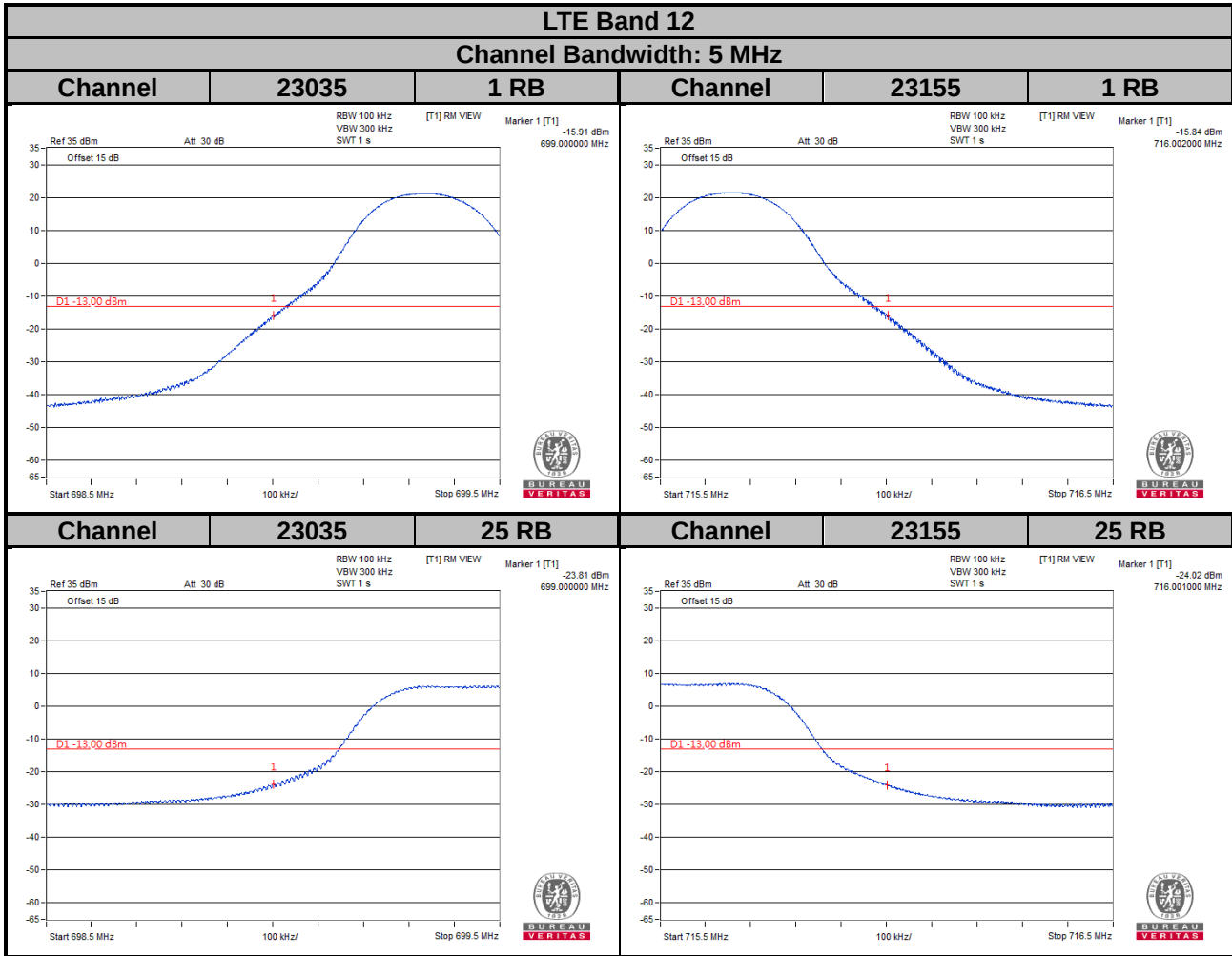
Channel Bandwidth: 1.4 MHz

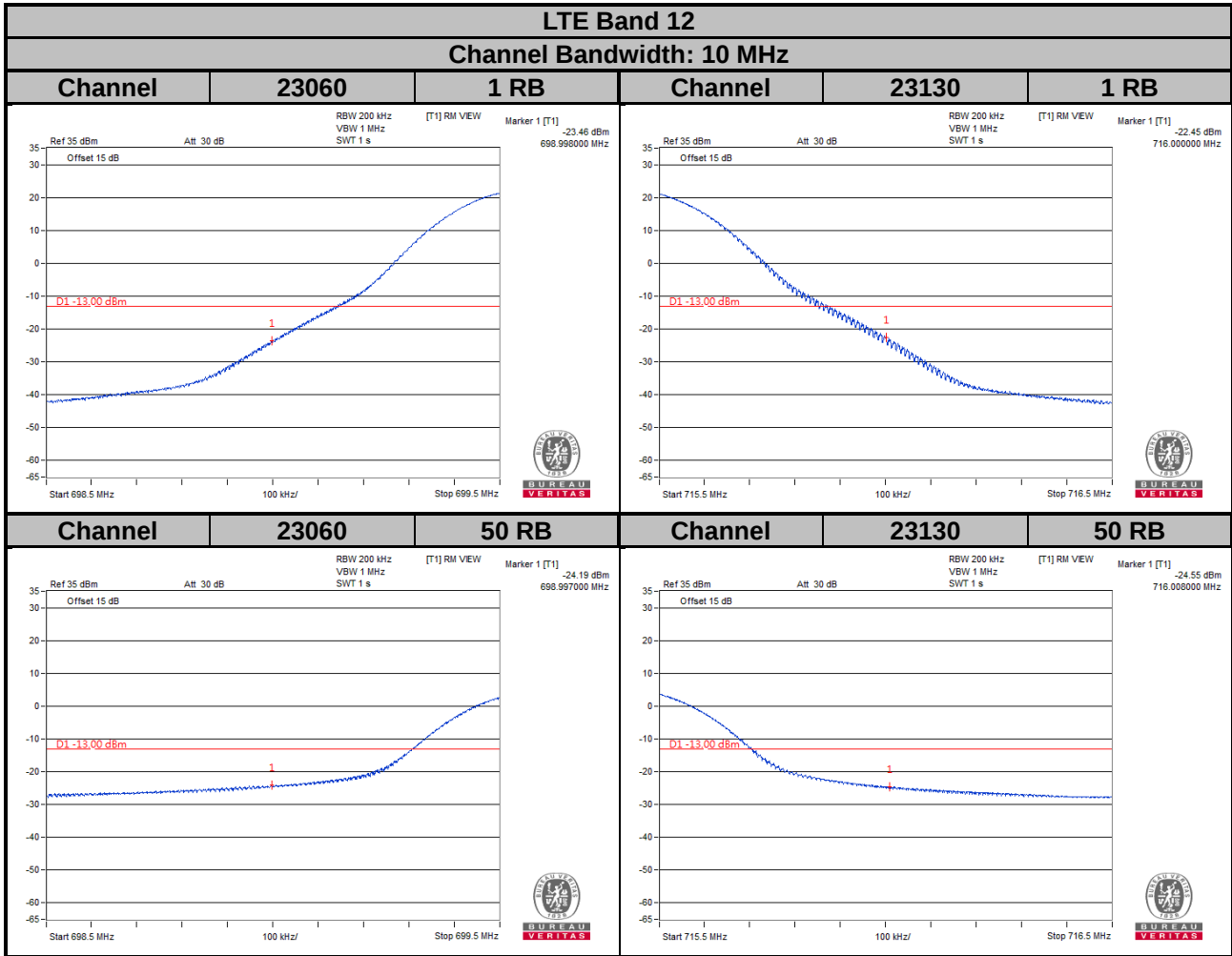


## LTE Band 12

Channel Bandwidth: 3 MHz





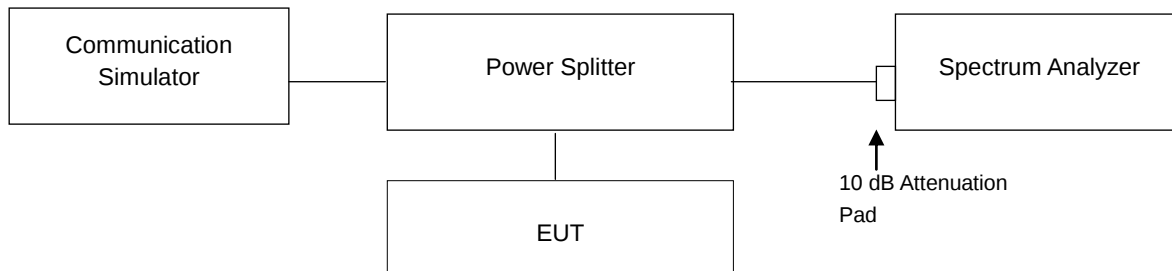


## 4.5 Peak to Average Ratio

### 4.5.1 Limits of Peak to Average Ratio Measurement

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

### 4.5.2 Test Setup

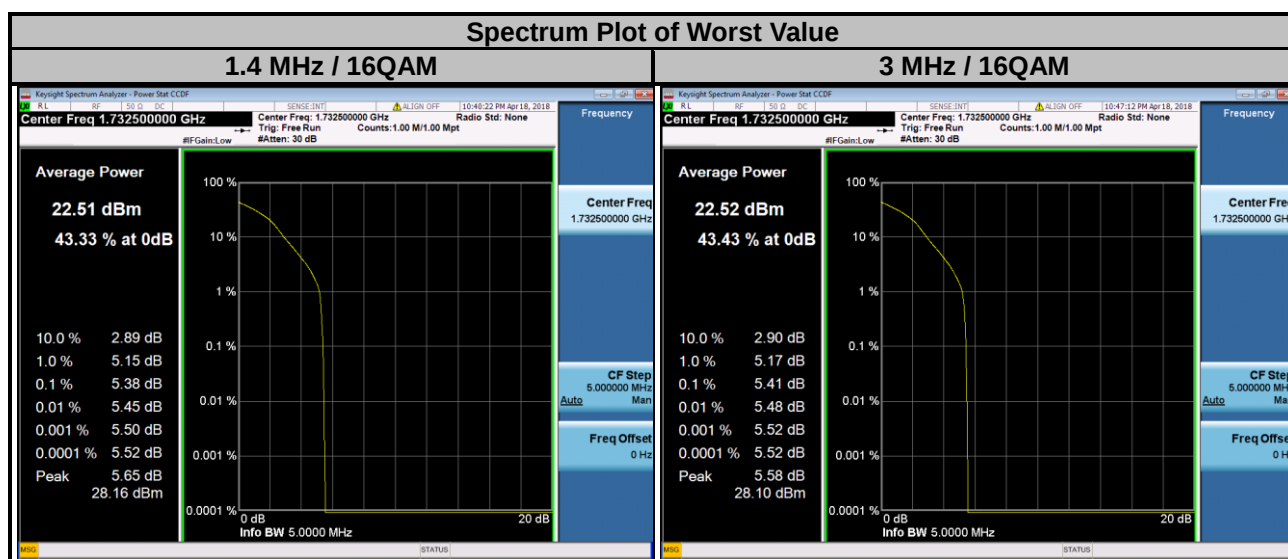


### 4.5.3 Test Procedures

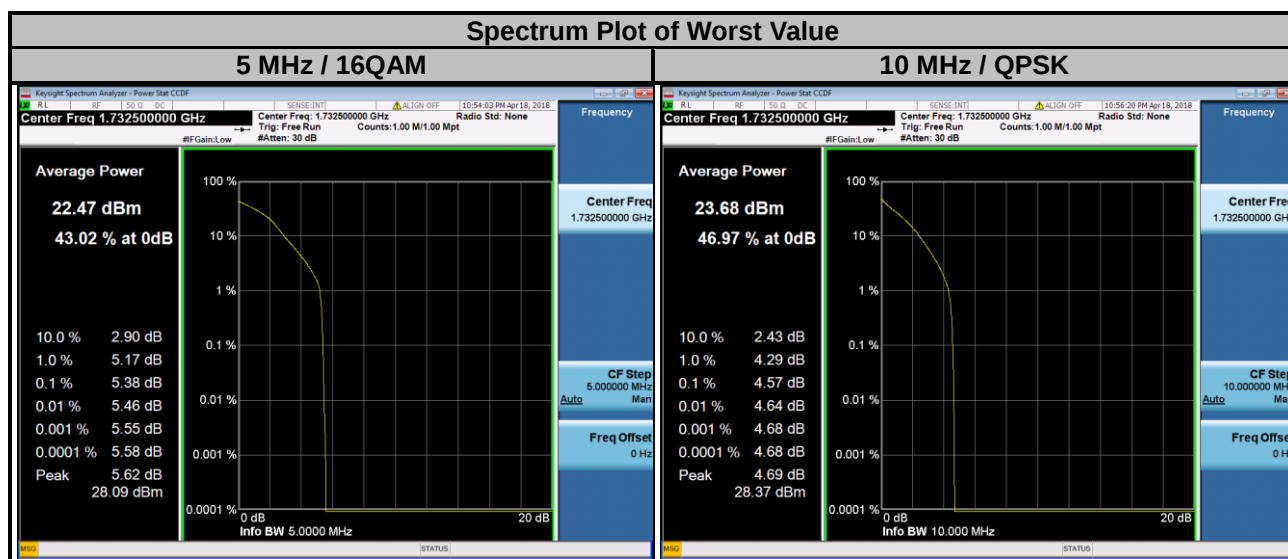
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

#### 4.5.4 Test Results

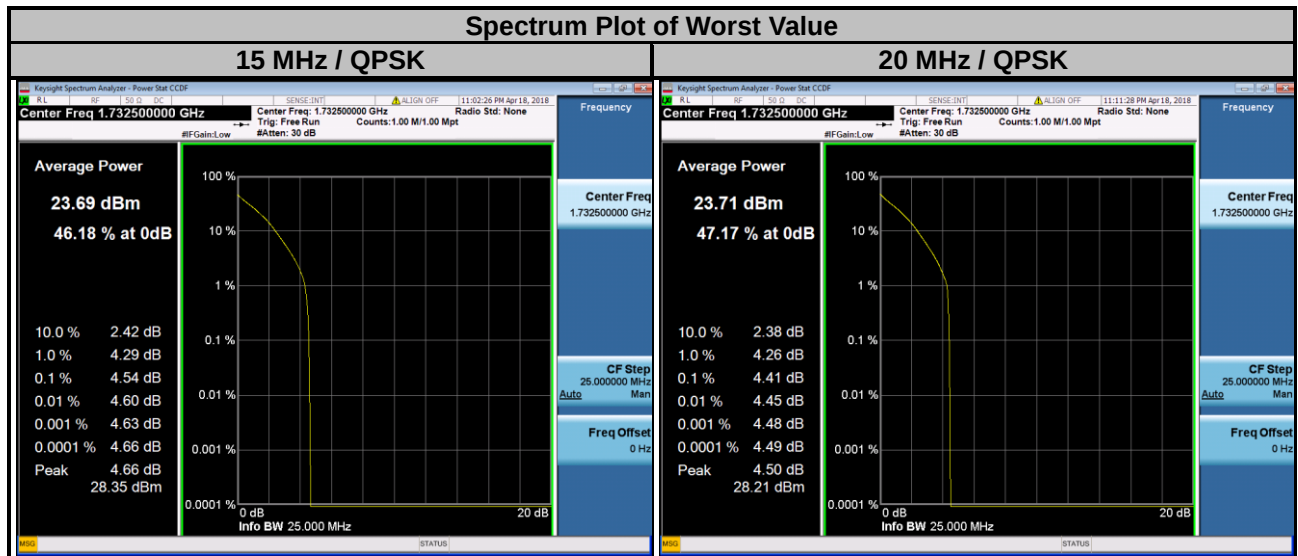
| LTE Band 4                 |                 |                            |       |                          |                 |                            |       |
|----------------------------|-----------------|----------------------------|-------|--------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 1.4 MHz |                 |                            |       | Channel Bandwidth: 3 MHz |                 |                            |       |
| Channel                    | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                  | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                            |                 | QPSK                       | 16QAM |                          |                 | QPSK                       | 16QAM |
| 19957                      | 1710.7          | 4.19                       | 5.07  | 19965                    | 1711.5          | 4.21                       | 5.07  |
| 20175                      | 1732.5          | 4.57                       | 5.38  | 20175                    | 1732.5          | 4.62                       | 5.41  |
| 20393                      | 1754.3          | 3.65                       | 4.50  | 20385                    | 1753.5          | 3.73                       | 4.64  |



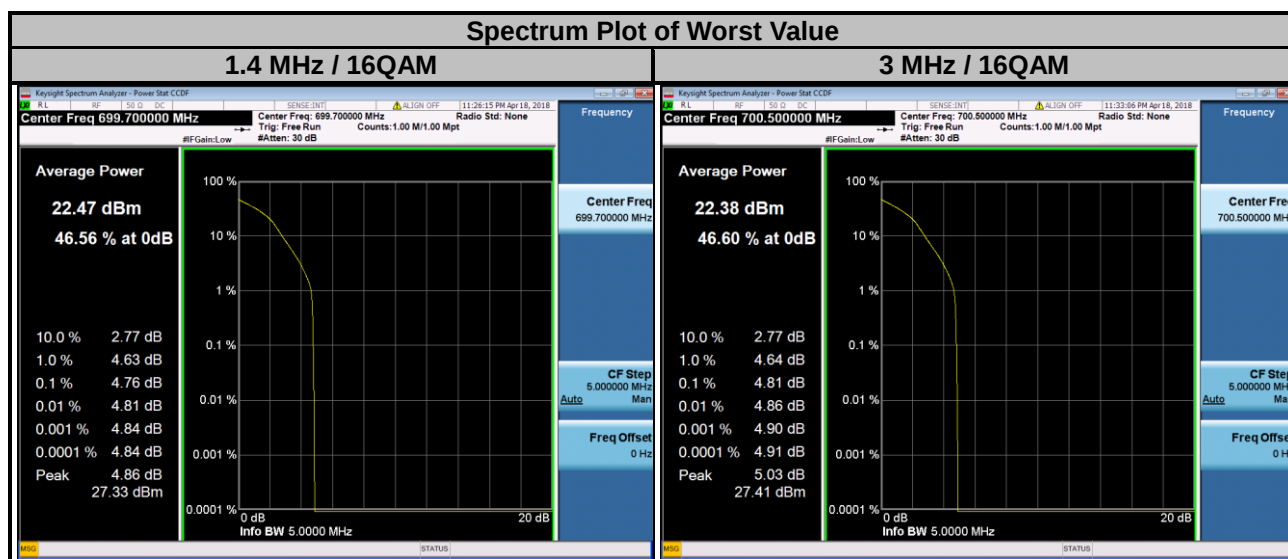
| LTE Band 4               |                 |                            |       |                           |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 5 MHz |                 |                            |       | Channel Bandwidth: 10 MHz |                 |                            |       |
| Channel                  | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                          |                 | QPSK                       | 16QAM |                           |                 | QPSK                       | 16QAM |
| 19975                    | 1712.5          | 4.25                       | 5.07  | 20000                     | 1715.0          | 4.17                       | NA    |
| 20175                    | 1732.5          | 4.60                       | 5.38  | 20175                     | 1732.5          | 4.57                       | NA    |
| 20375                    | 1752.5          | 3.79                       | 4.67  | 20350                     | 1750.0          | 3.92                       | NA    |



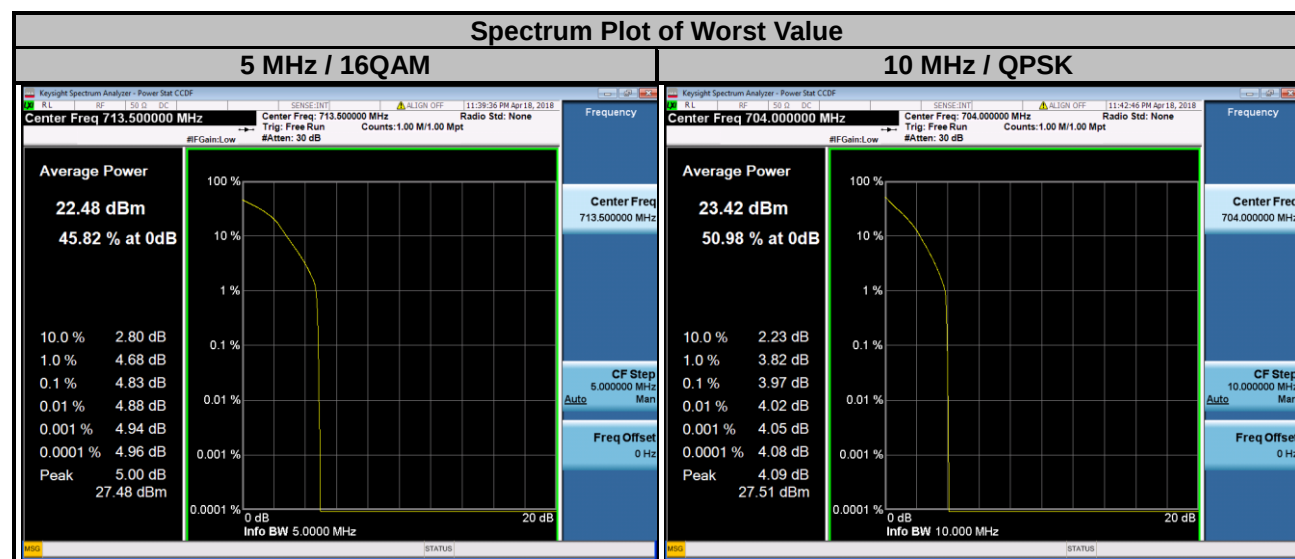
| LTE Band 4                |                 |                            |       |                           |                 |                            |       |
|---------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 15 MHz |                 |                            |       | Channel Bandwidth: 20 MHz |                 |                            |       |
| Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                           |                 | QPSK                       | 16QAM |                           |                 | QPSK                       | 16QAM |
| 20025                     | 1717.5          | 4.17                       | NA    | 20050                     | 1720.0          | 4.16                       | NA    |
| 20175                     | 1732.5          | 4.54                       | NA    | 20175                     | 1732.5          | 4.41                       | NA    |
| 20325                     | 1747.5          | 4.03                       | NA    | 20300                     | 1745.0          | 4.38                       | NA    |



| LTE Band 12                |                 |                            |       |                          |                 |                            |       |
|----------------------------|-----------------|----------------------------|-------|--------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 1.4 MHz |                 |                            |       | Channel Bandwidth: 3 MHz |                 |                            |       |
| Channel                    | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                  | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                            |                 | QPSK                       | 16QAM |                          |                 | QPSK                       | 16QAM |
| 23017                      | 699.7           | 4.00                       | 4.76  | 23025                    | 700.5           | 4.02                       | 4.81  |
| 23095                      | 707.5           | 3.84                       | 4.61  | 23095                    | 707.5           | 3.84                       | 4.60  |
| 23173                      | 715.3           | 3.81                       | 4.62  | 23165                    | 714.5           | 3.94                       | 4.69  |



| LTE Band 12              |                 |                            |       |                           |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| Channel Bandwidth: 5 MHz |                 |                            |       | Channel Bandwidth: 10 MHz |                 |                            |       |
| Channel                  | Frequency (MHz) | Peak to Average Ratio (dB) |       | Channel                   | Frequency (MHz) | Peak to Average Ratio (dB) |       |
|                          |                 | QPSK                       | 16QAM |                           |                 | QPSK                       | 16QAM |
| 23035                    | 701.5           | 4.02                       | 4.80  | 23060                     | 704.0           | 3.97                       | NA    |
| 23095                    | 707.5           | 3.92                       | 4.70  | 23095                     | 707.5           | 3.92                       | NA    |
| 23155                    | 713.5           | 4.02                       | 4.83  | 23130                     | 711.0           | 3.82                       | NA    |

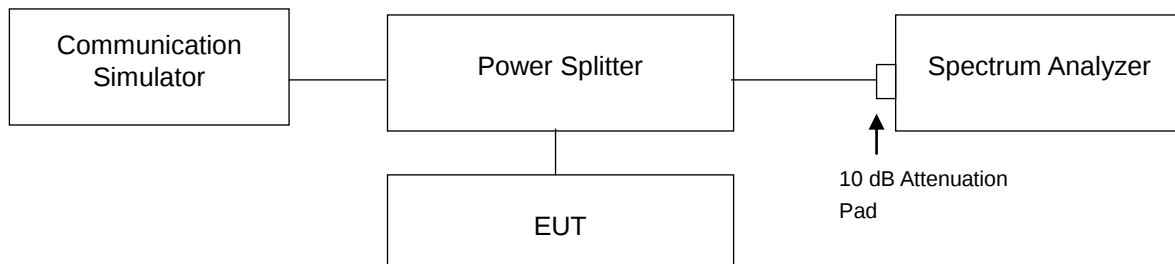


## 4.6 Conducted Spurious Emissions

### 4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The limit of emission is equal to -13 dBm.

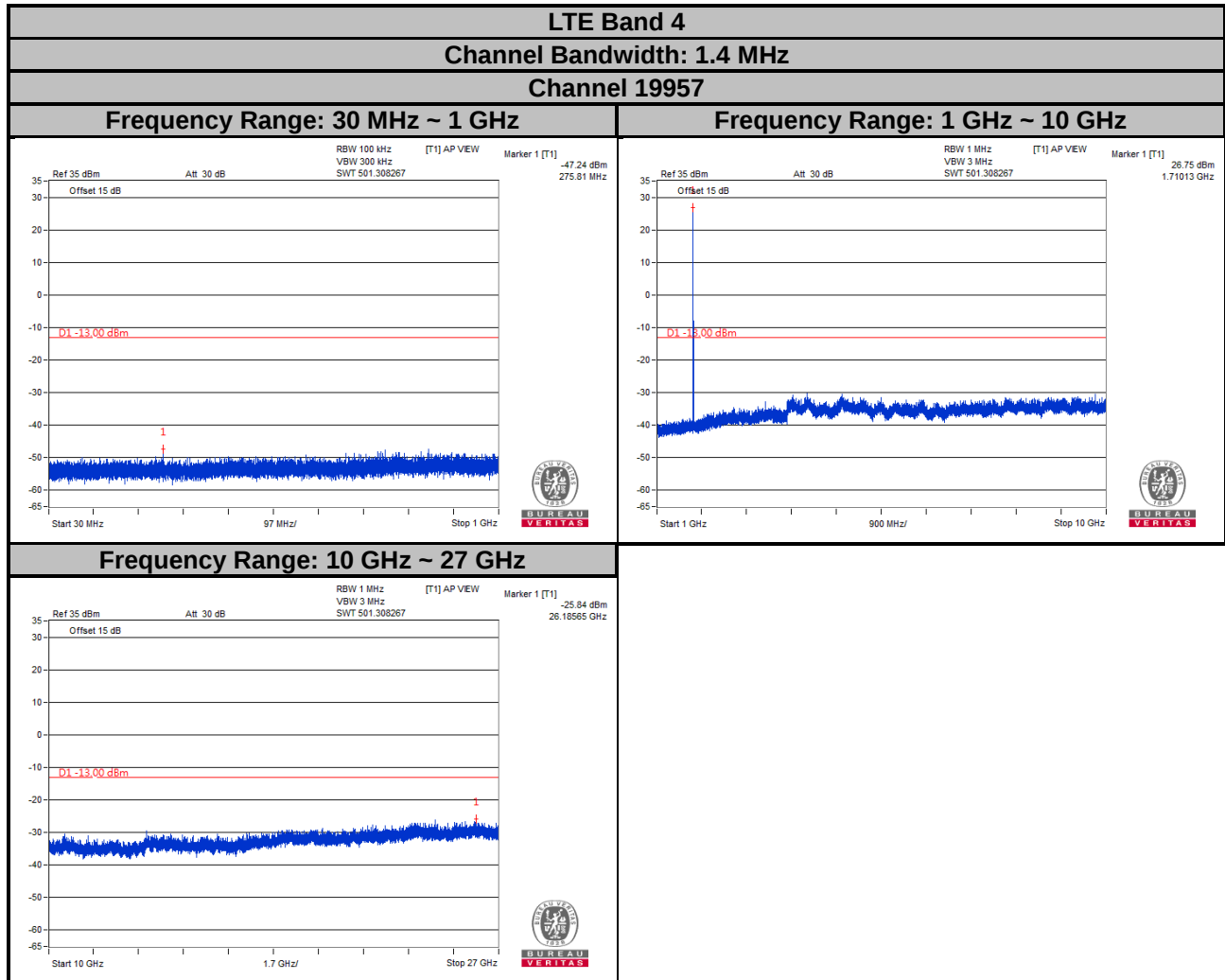
### 4.6.2 Test Setup



### 4.6.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 30 MHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 100 kHz and VBW = 300 kHz is used for conducted emission measurement.
- Measuring frequency range is from 1 GHz to 27 GHz (for LTE B4) & 1 GHz to 10 GHz (for LTE B12). 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

#### 4.6.4 Test Results

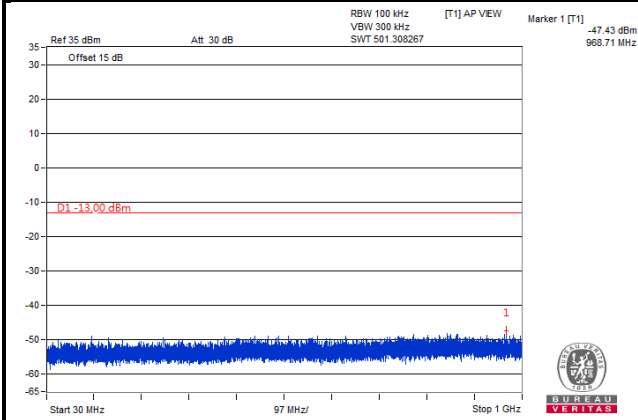


# LTE Band 4

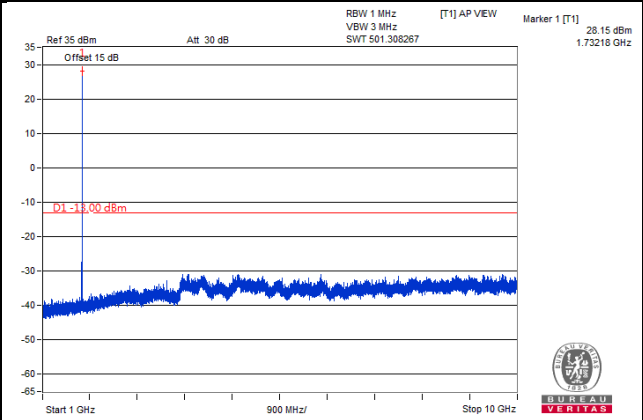
Channel Bandwidth: 1.4 MHz

Channel 20175

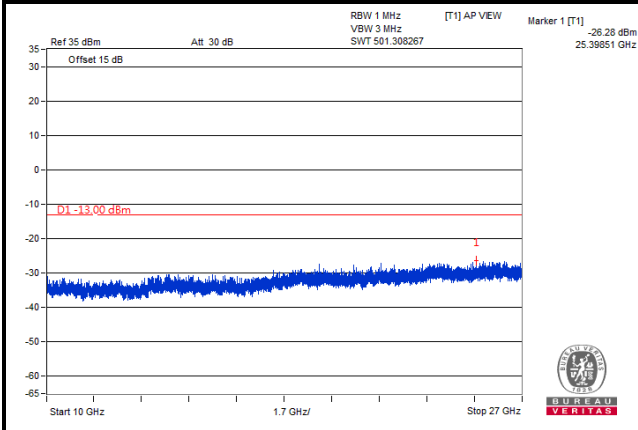
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

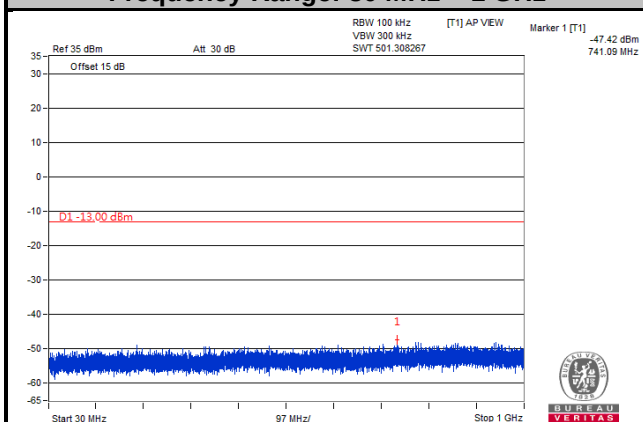


# LTE Band 4

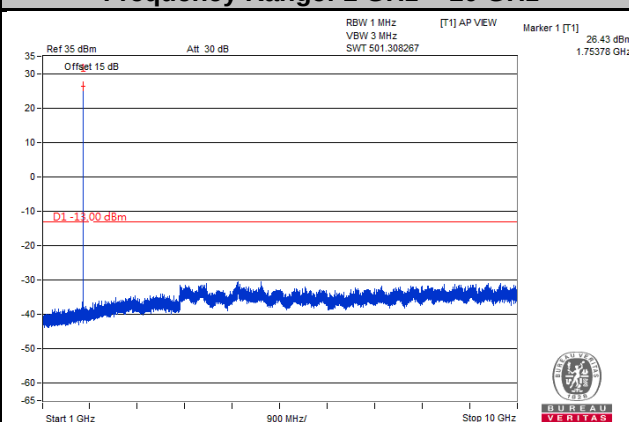
Channel Bandwidth: 1.4 MHz

Channel 20393

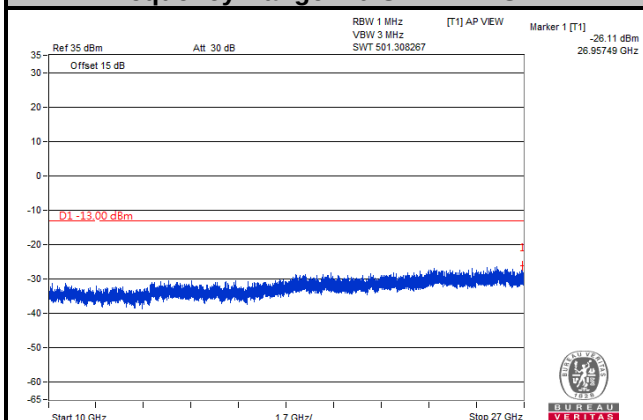
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

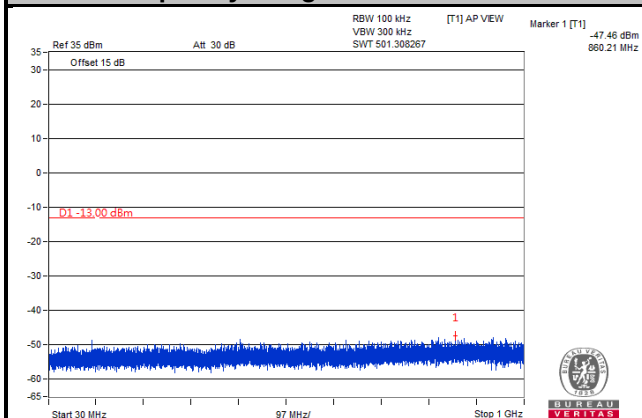


# LTE Band 4

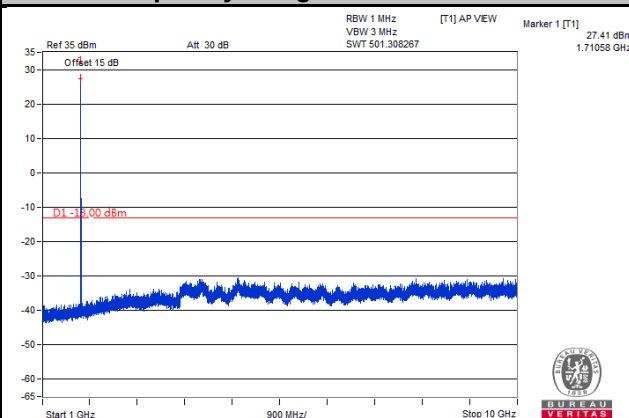
Channel Bandwidth: 3 MHz

Channel 19965

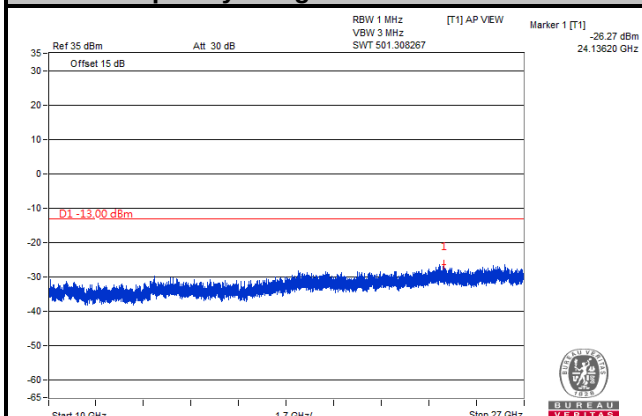
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

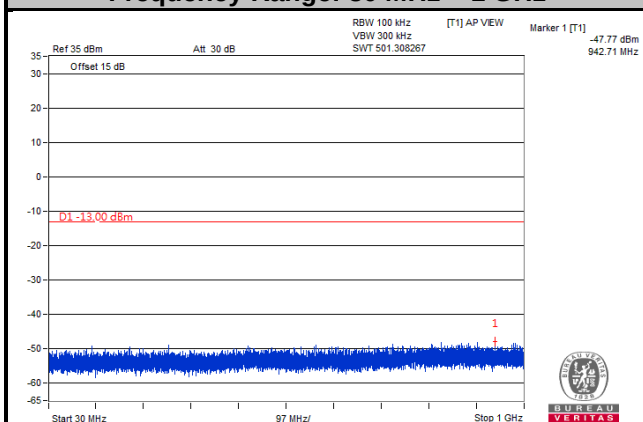


# LTE Band 4

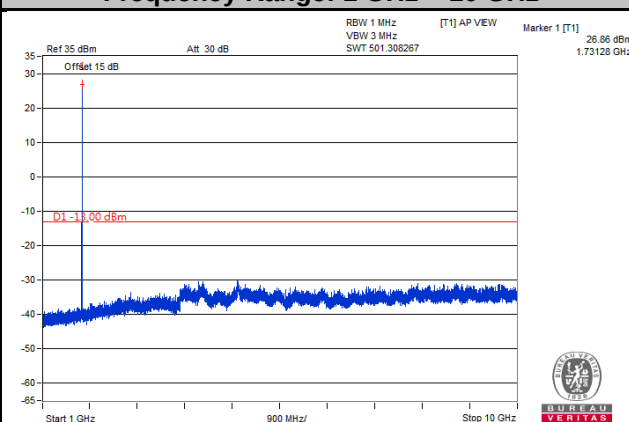
Channel Bandwidth: 3 MHz

Channel 20175

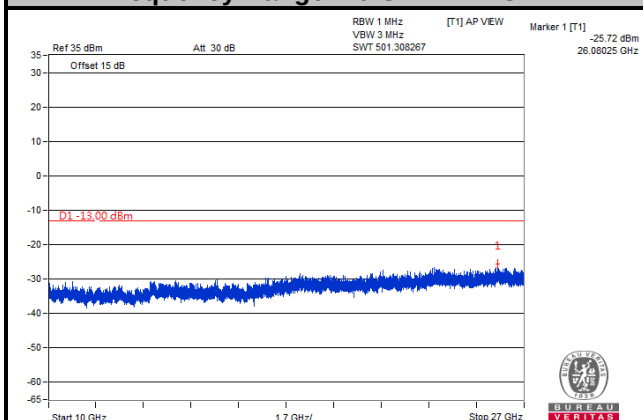
Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



Frequency Range: 10 GHz ~ 27 GHz

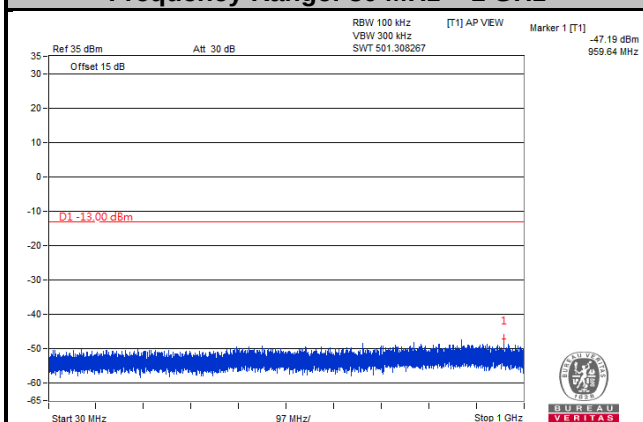


# LTE Band 4

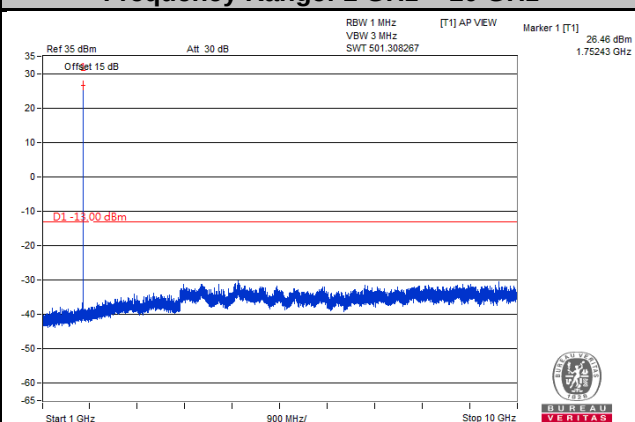
Channel Bandwidth: 3 MHz

Channel 20385

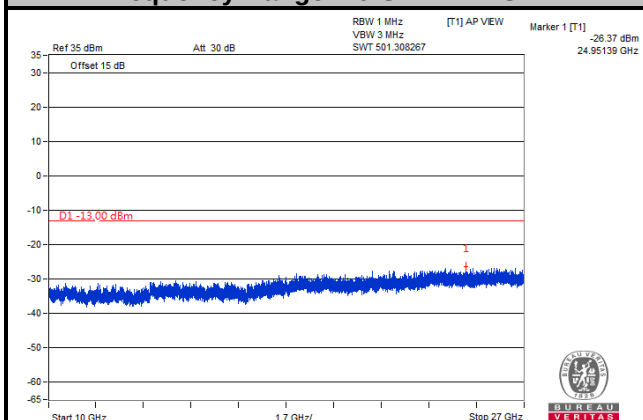
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

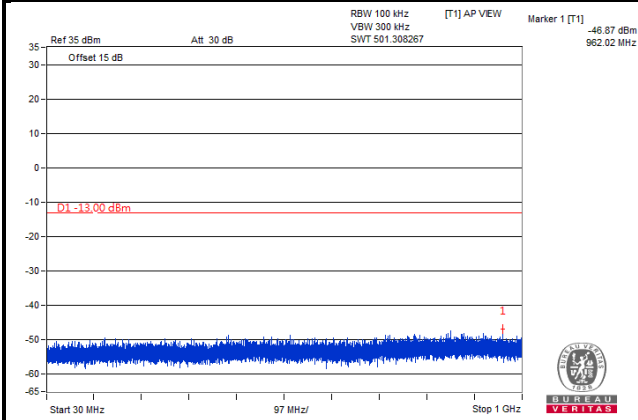


# LTE Band 4

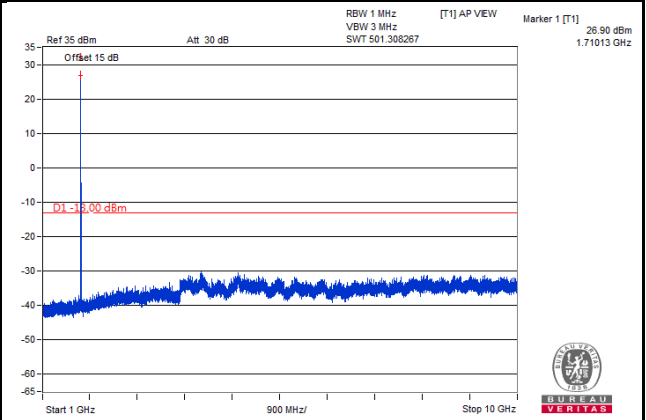
Channel Bandwidth: 5 MHz

Channel 19975

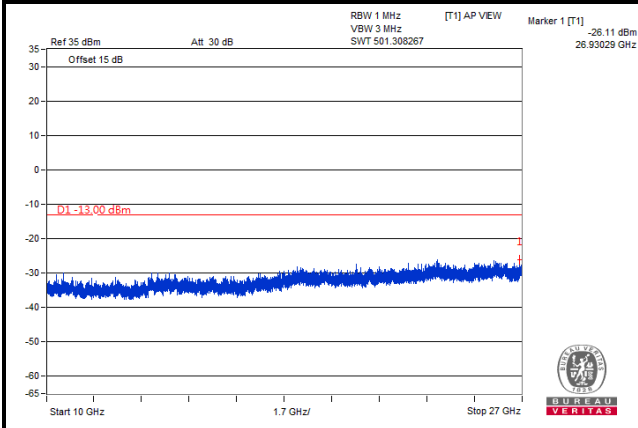
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

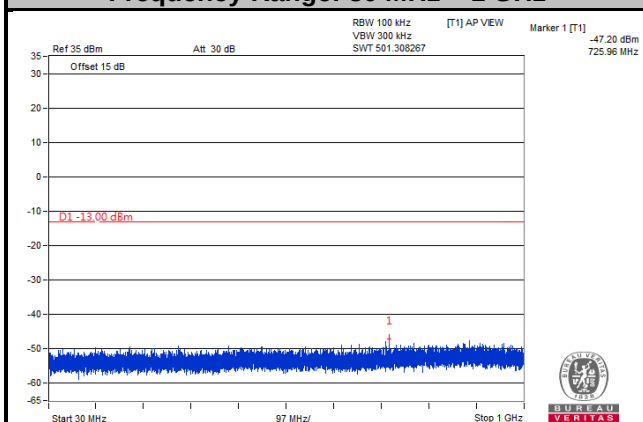


# LTE Band 4

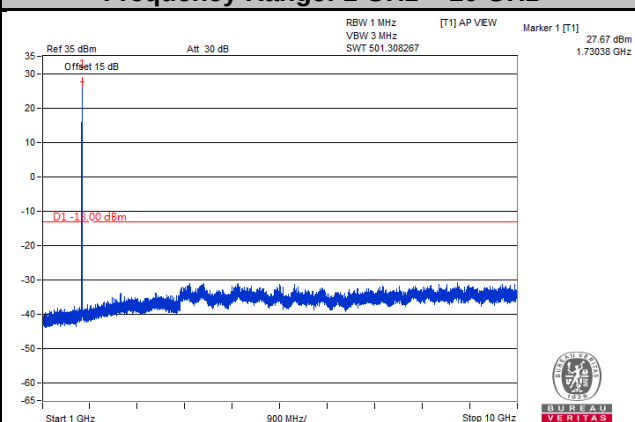
Channel Bandwidth: 5 MHz

Channel 20175

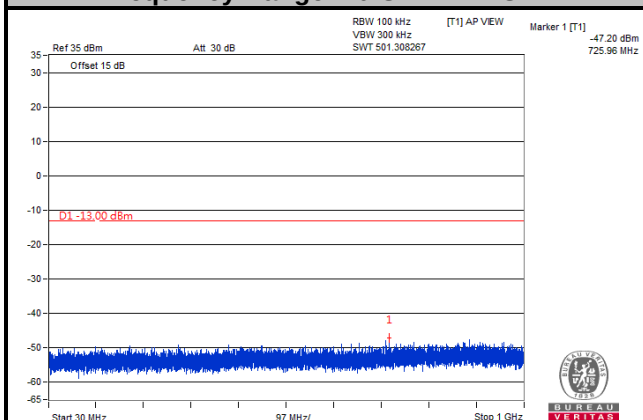
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

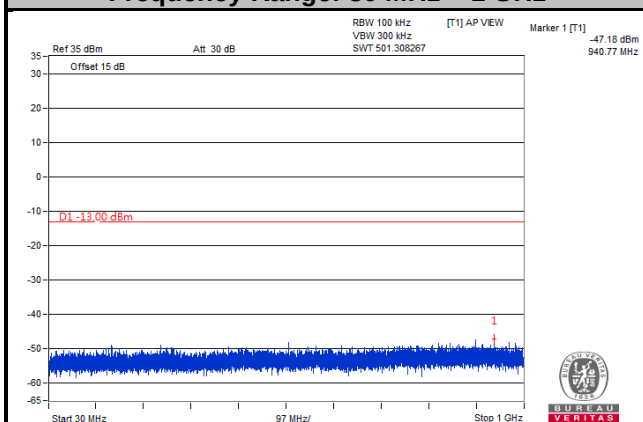


# LTE Band 4

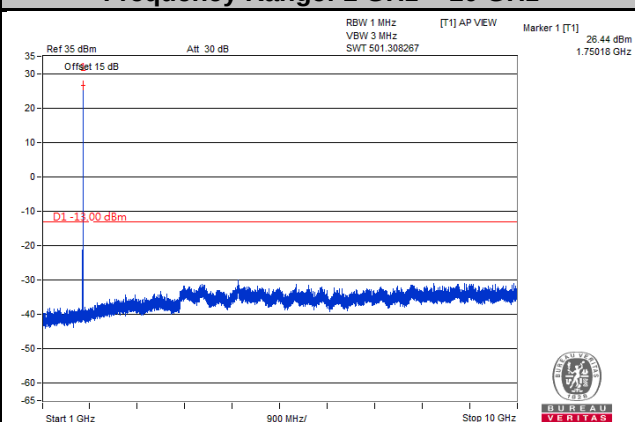
Channel Bandwidth: 5 MHz

Channel 20375

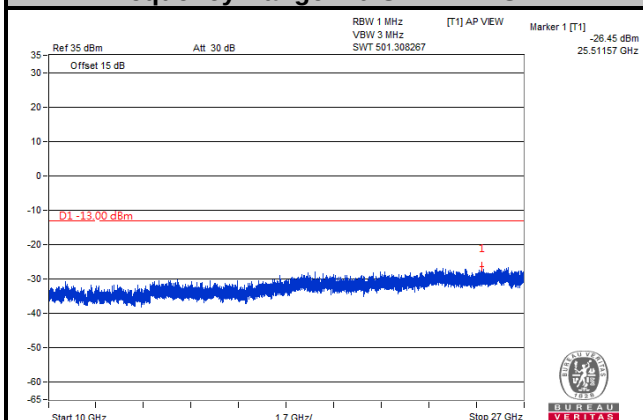
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

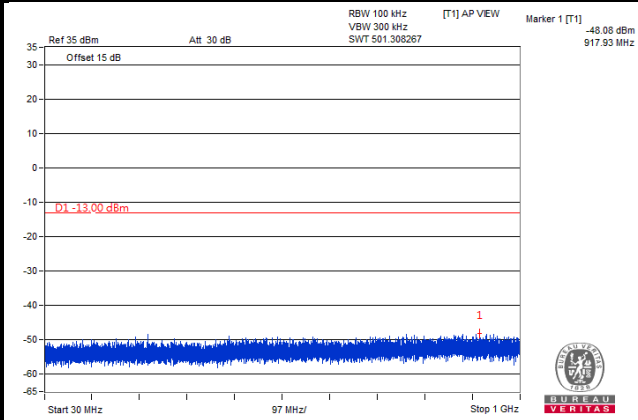


# LTE Band 4

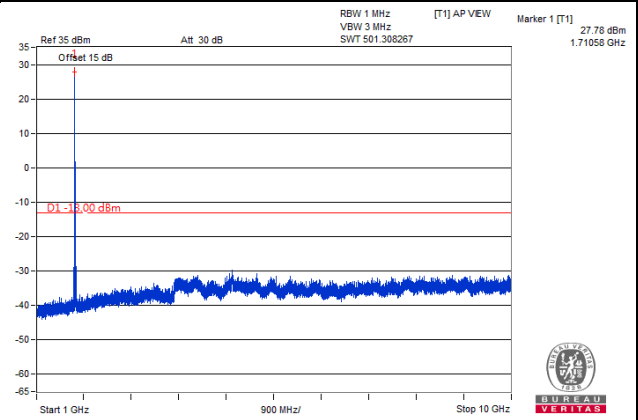
Channel Bandwidth: 10 MHz

Channel 20000

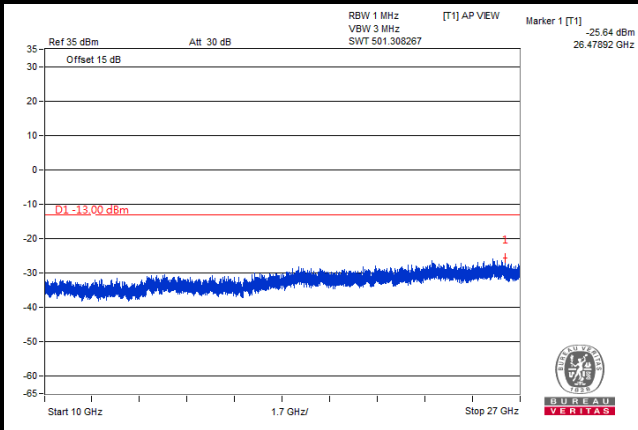
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

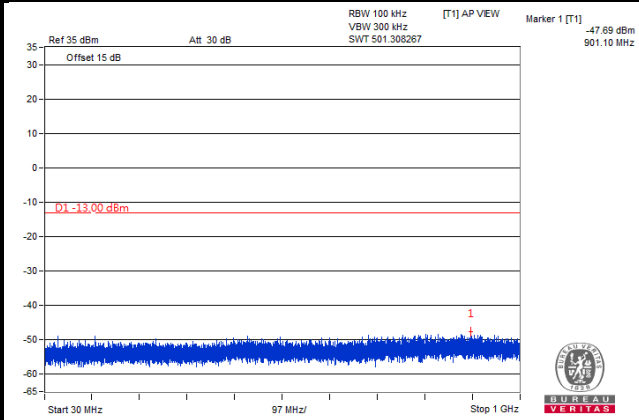


# LTE Band 4

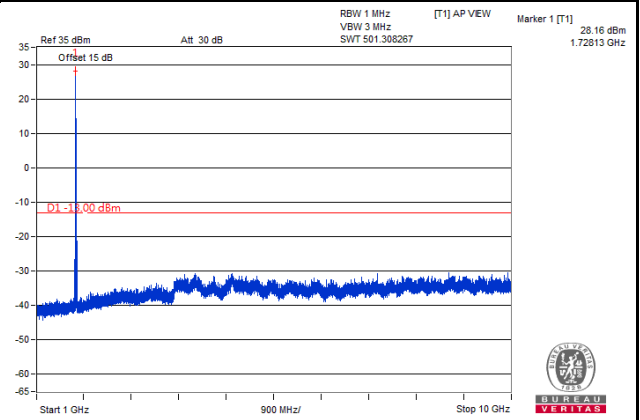
Channel Bandwidth: 10 MHz

Channel 20175

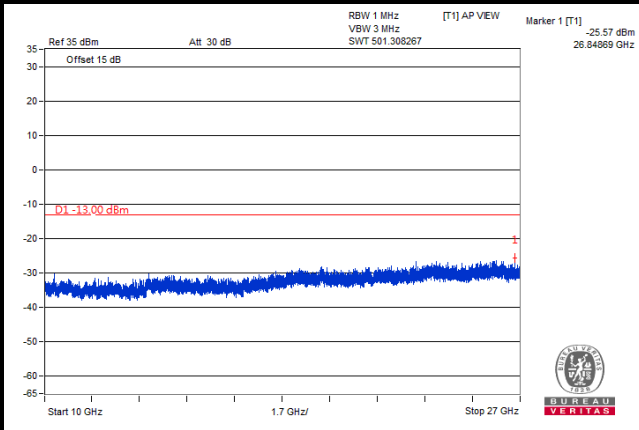
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

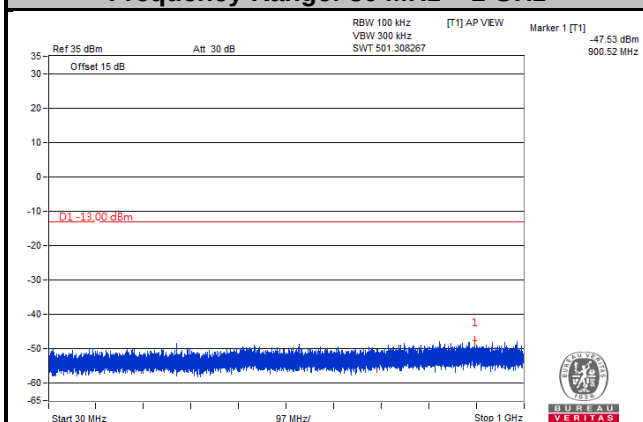


# LTE Band 4

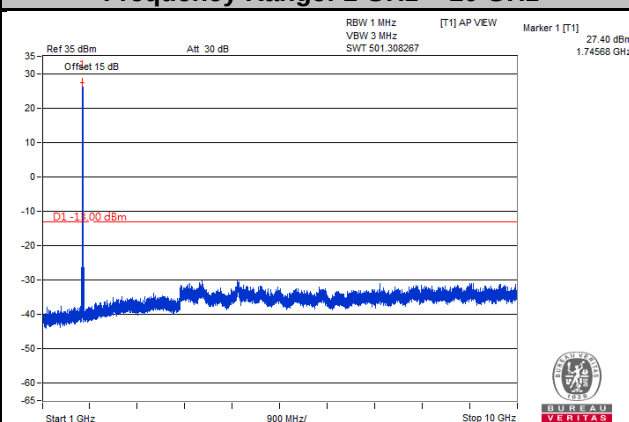
Channel Bandwidth: 10 MHz

Channel 20350

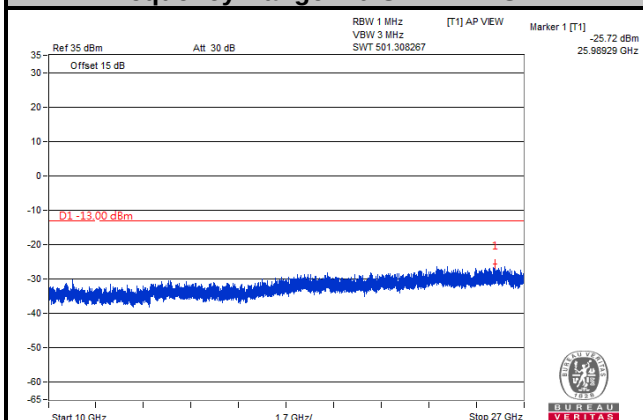
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

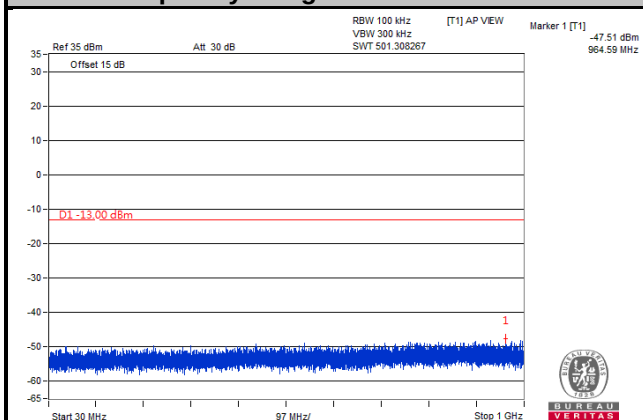


# LTE Band 4

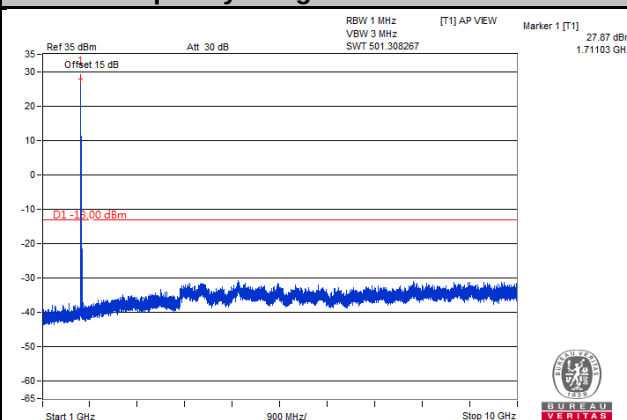
Channel Bandwidth: 15 MHz

Channel 20025

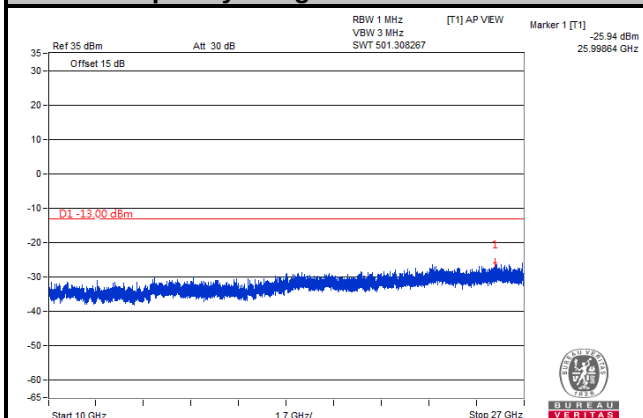
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

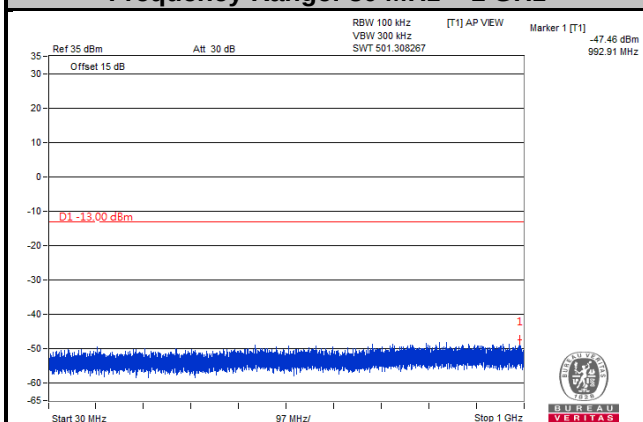


# LTE Band 4

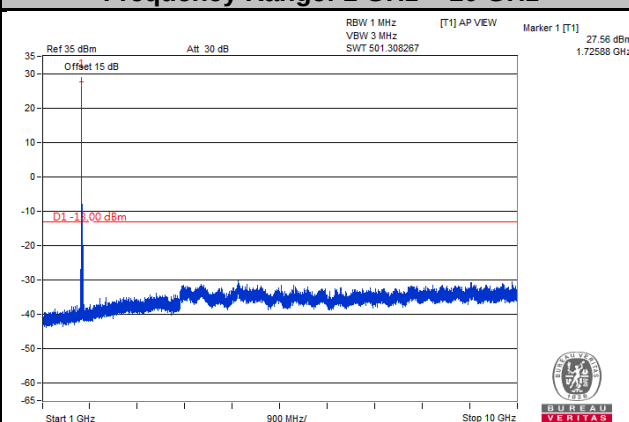
Channel Bandwidth: 15 MHz

Channel 20175

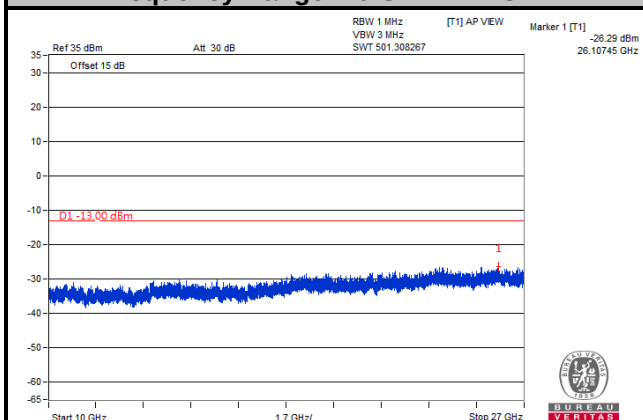
Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



Frequency Range: 10 GHz ~ 27 GHz

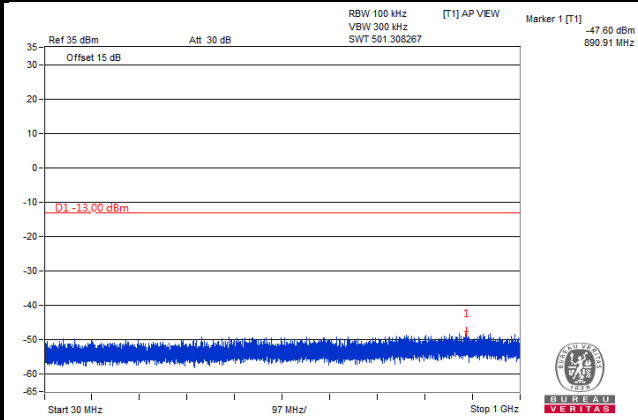


# LTE Band 4

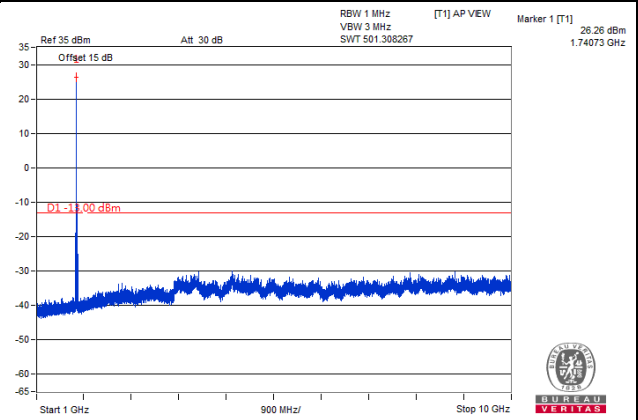
Channel Bandwidth: 15 MHz

Channel 20325

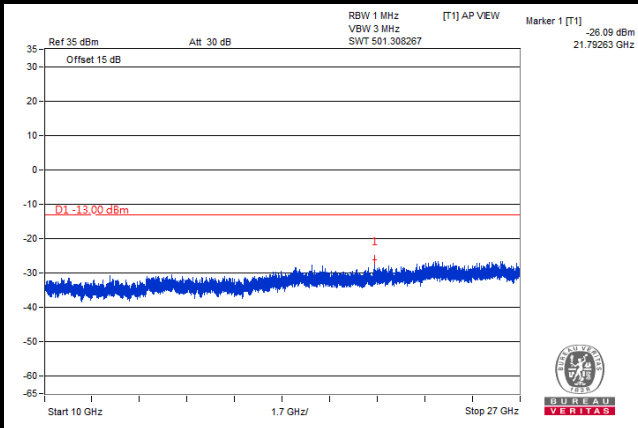
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

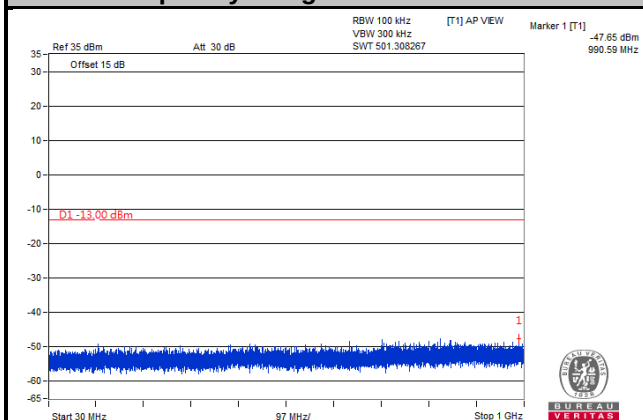


# LTE Band 4

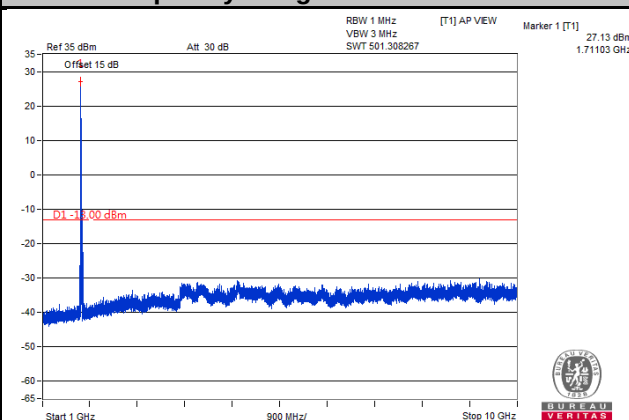
Channel Bandwidth: 20 MHz

Channel 20050

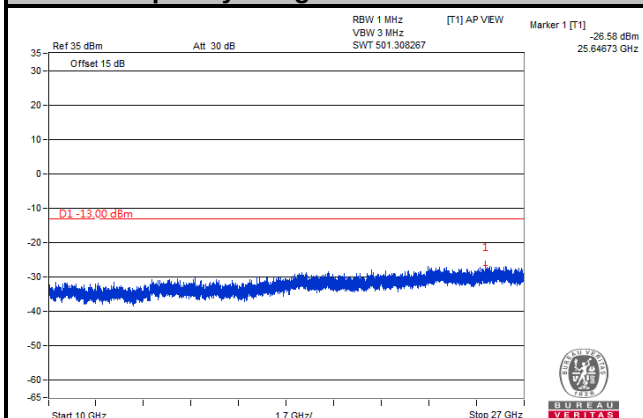
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

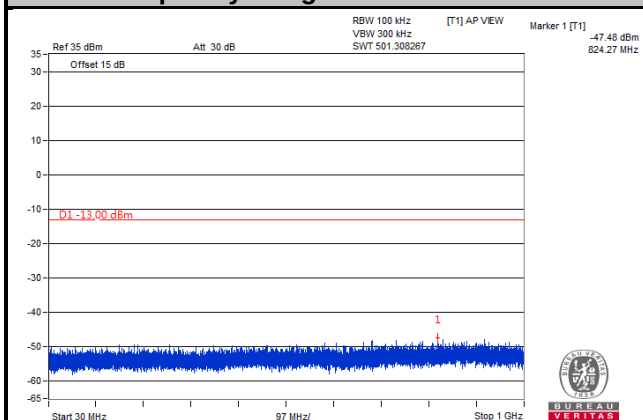


# LTE Band 4

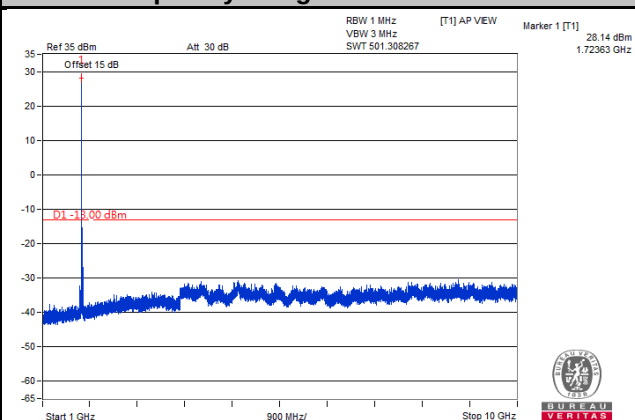
Channel Bandwidth: 20 MHz

Channel 20175

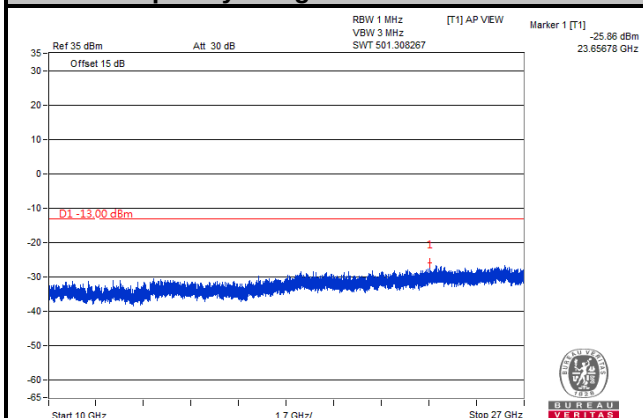
## Frequency Range: 30 MHz ~ 1 GHz



## Frequency Range: 1 GHz ~ 10 GHz



## Frequency Range: 10 GHz ~ 27 GHz

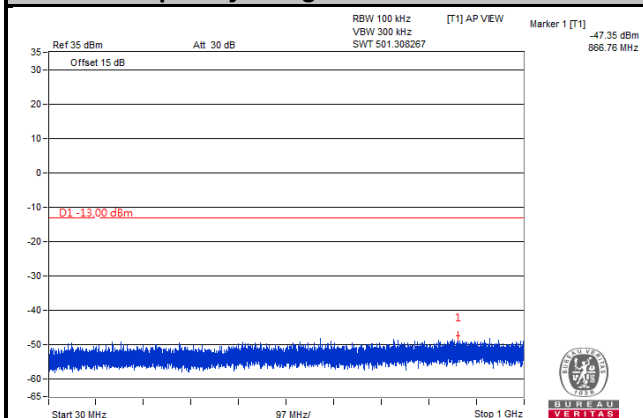


## LTE Band 4

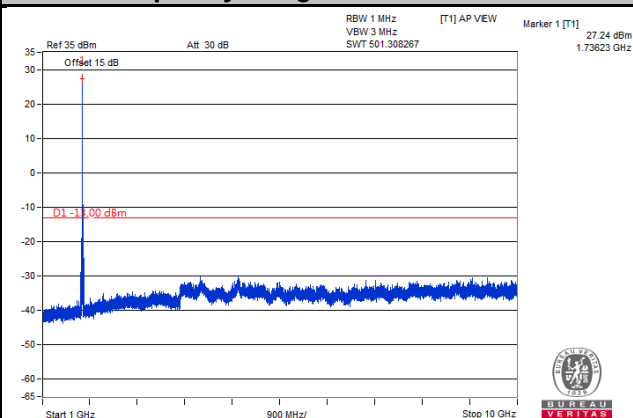
Channel Bandwidth: 20 MHz

Channel 20300

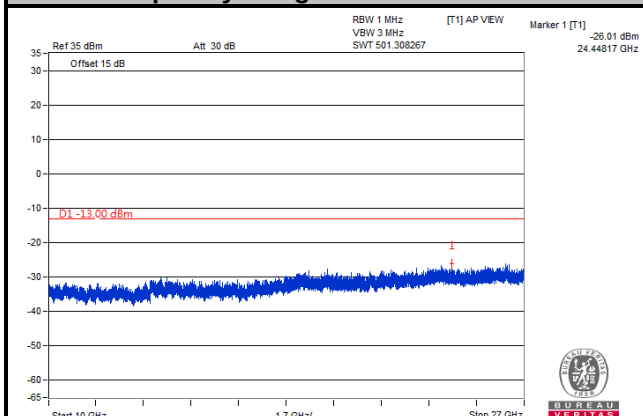
### Frequency Range: 30 MHz ~ 1 GHz



### Frequency Range: 1 GHz ~ 10 GHz



### Frequency Range: 10 GHz ~ 27 GHz

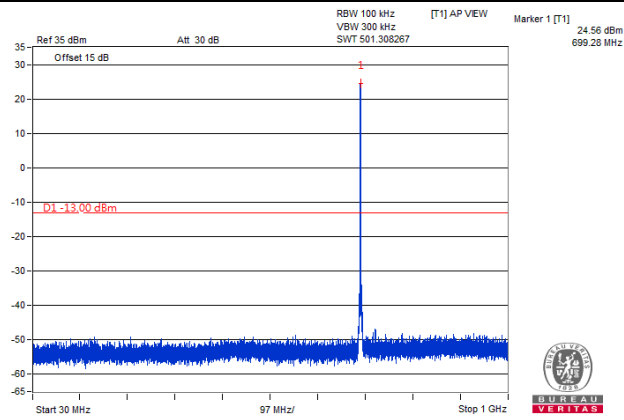


## LTE Band 12

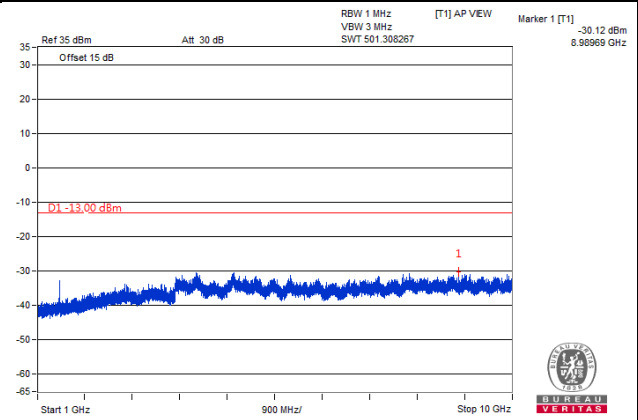
Channel Bandwidth: 1.4 MHz

Channel 23017

Frequency Range: 30 MHz ~ 1 GHz

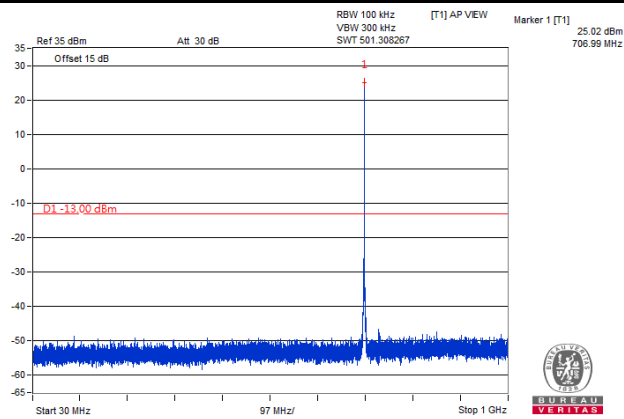


Frequency Range: 1 GHz ~ 10 GHz

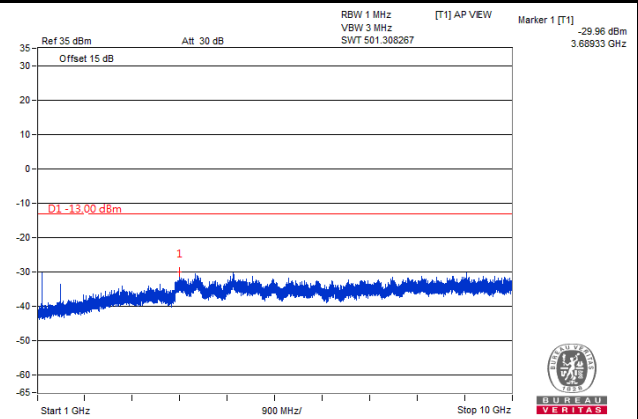


## Channel 23095

Frequency Range: 30 MHz ~ 1 GHz

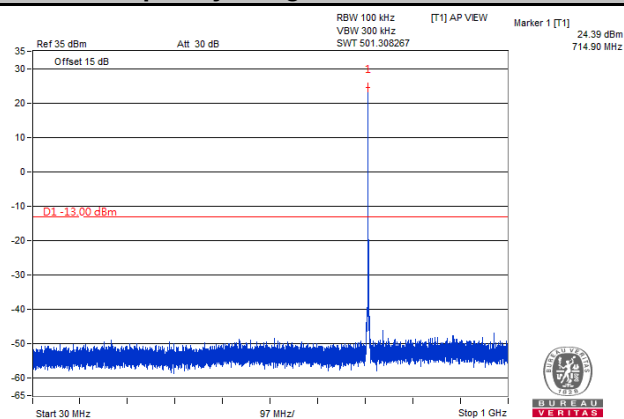


Frequency Range: 1 GHz ~ 10 GHz

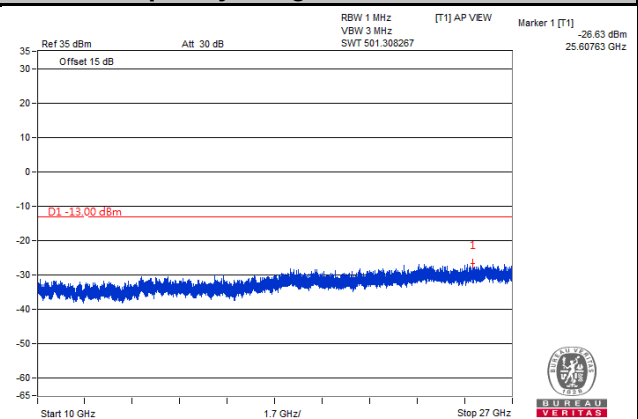


## Channel 23173

Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz

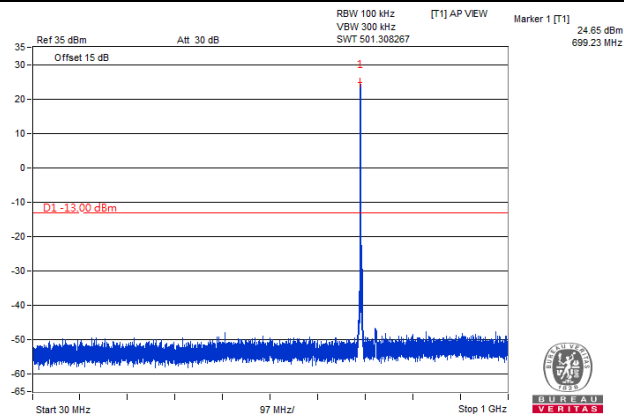


## LTE Band 12

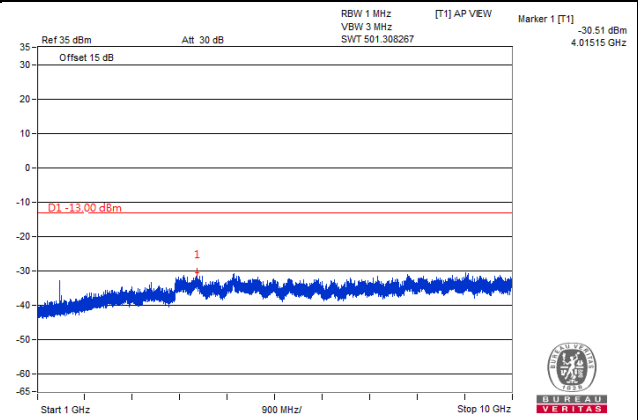
Channel Bandwidth: 3 MHz

Channel 23025

Frequency Range: 30 MHz ~ 1 GHz

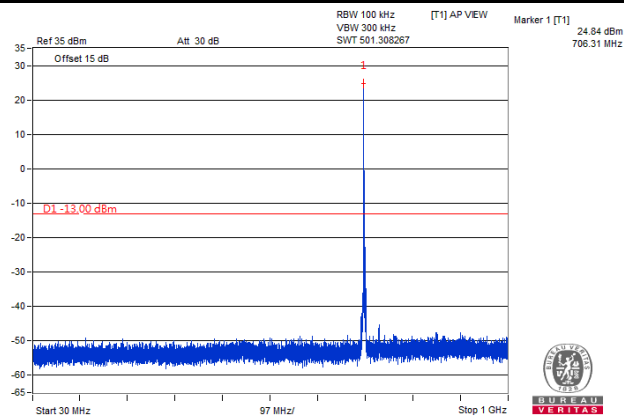


Frequency Range: 1 GHz ~ 10 GHz

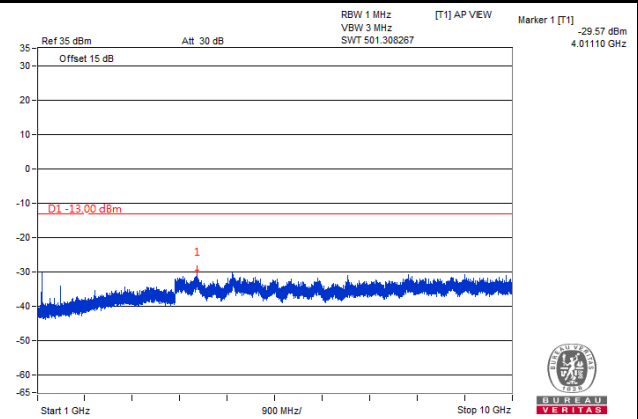


## Channel 23095

Frequency Range: 30 MHz ~ 1 GHz

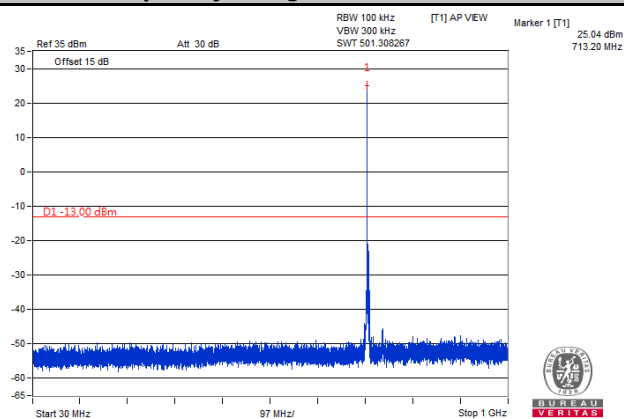


Frequency Range: 1 GHz ~ 10 GHz

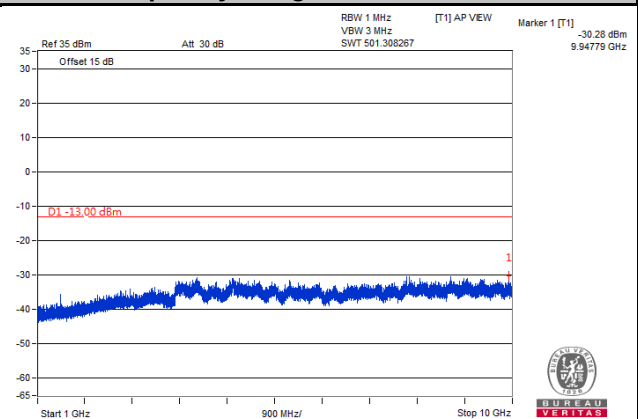


## Channel 23165

Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz

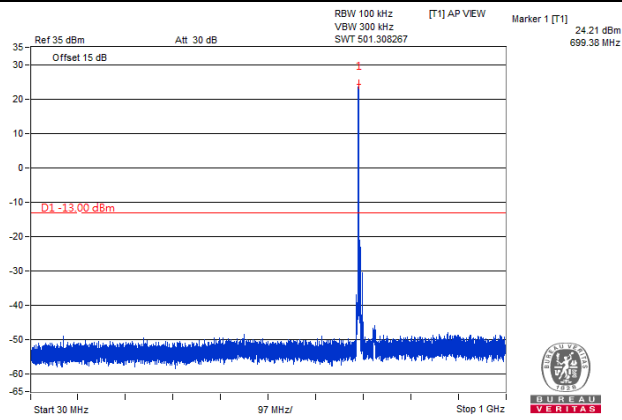


## LTE Band 12

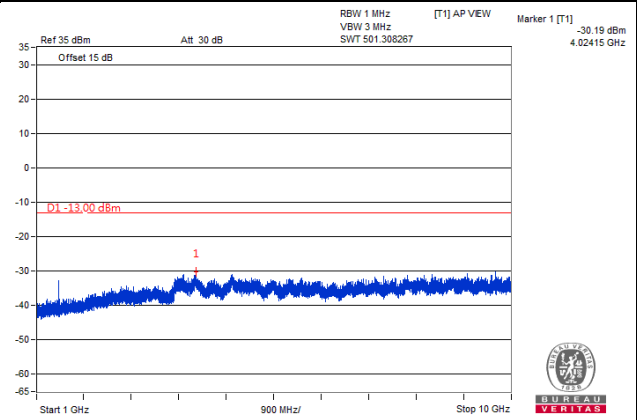
Channel Bandwidth: 5 MHz

Channel 23035

Frequency Range: 30 MHz ~ 1 GHz

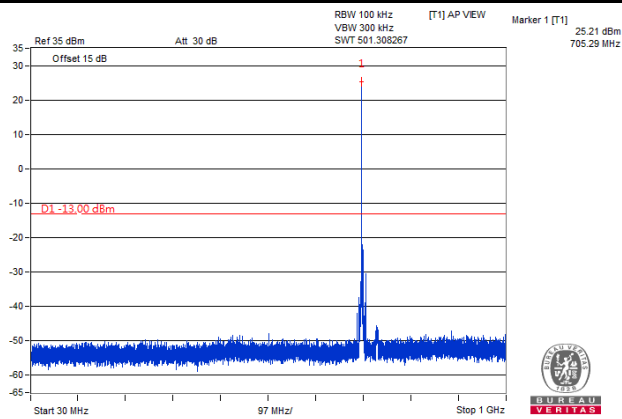


Frequency Range: 1 GHz ~ 10 GHz

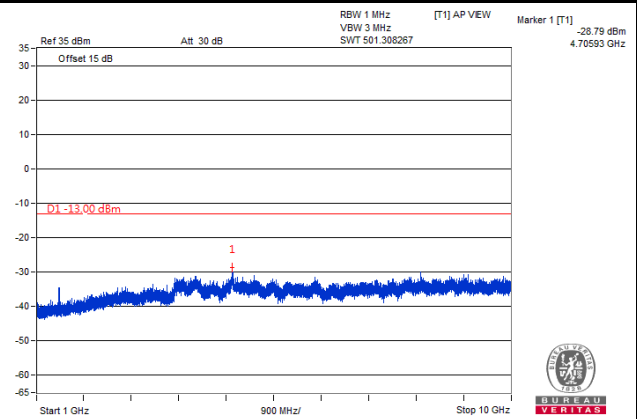


Channel 23095

Frequency Range: 30 MHz ~ 1 GHz

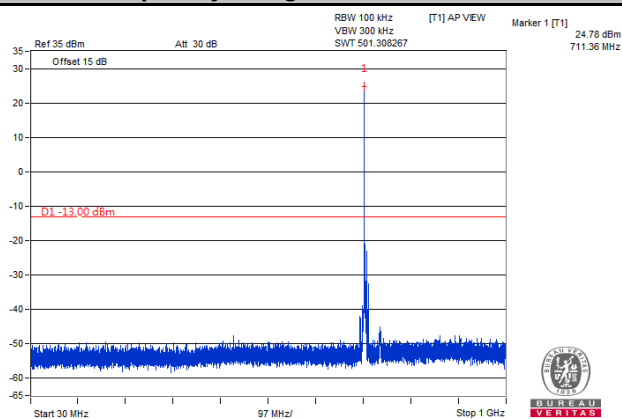


Frequency Range: 1 GHz ~ 10 GHz

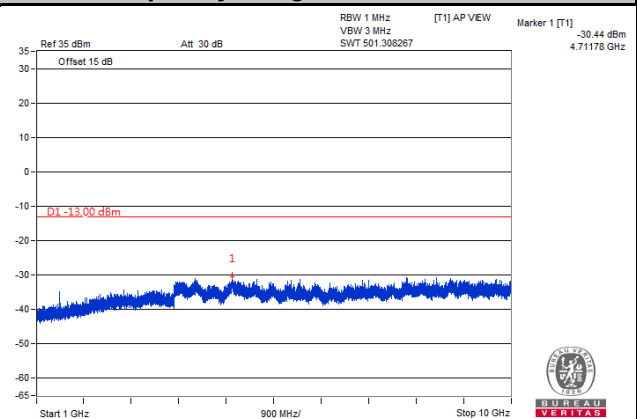


Channel 23155

Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz

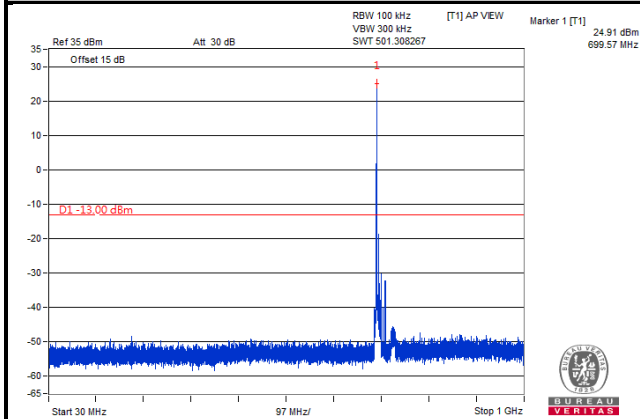


## LTE Band 12

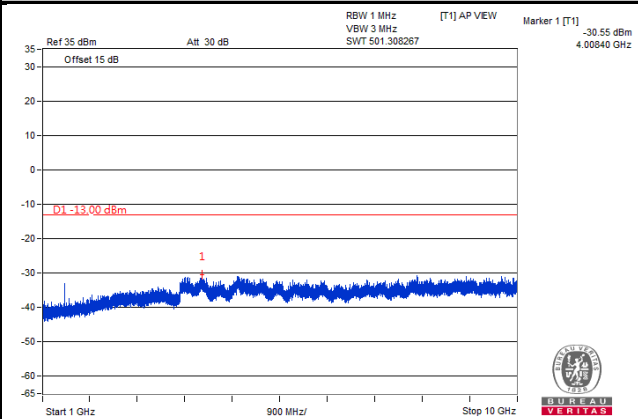
Channel Bandwidth: 10 MHz

Channel 23060

Frequency Range: 30 MHz ~ 1 GHz

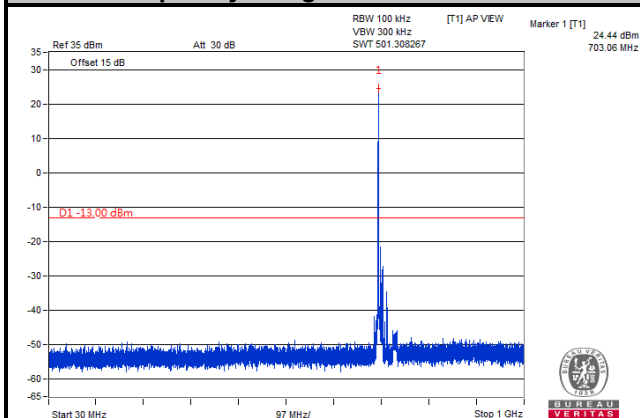


Frequency Range: 1 GHz ~ 10 GHz

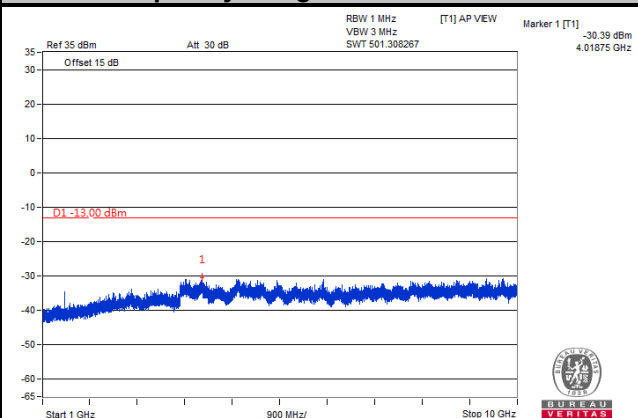


## Channel 23095

Frequency Range: 30 MHz ~ 1 GHz

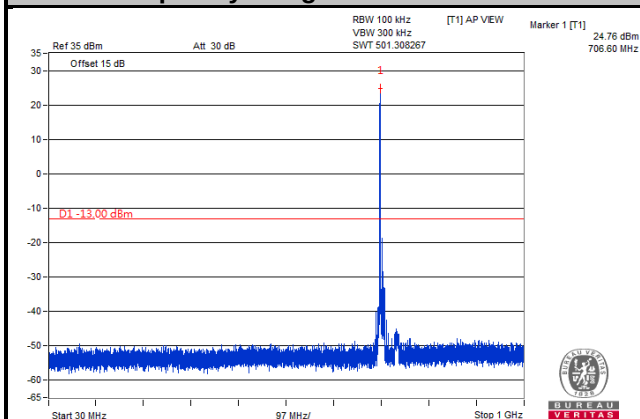


Frequency Range: 1 GHz ~ 10 GHz

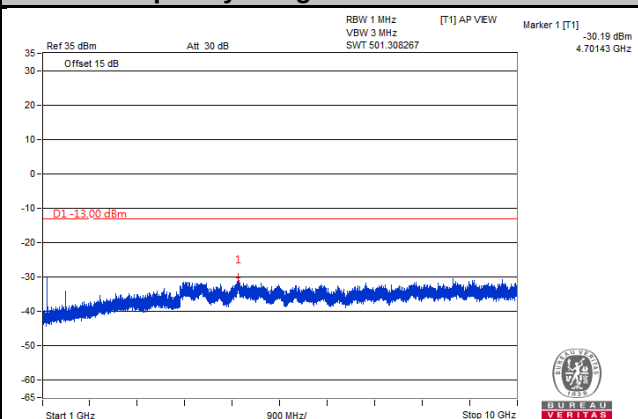


## Channel 23130

Frequency Range: 30 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 10 GHz



## 4.7 Radiated Emission Measurement

### 4.7.1 Limits of Radiated Emission Measurement

- a. The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The limit of emission is equal to -13 dBm.

### 4.7.2 Test Procedure

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m (below or equal 1 GHz) and/or 1.5 m (above 1 GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- c.  $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole,  $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}.$

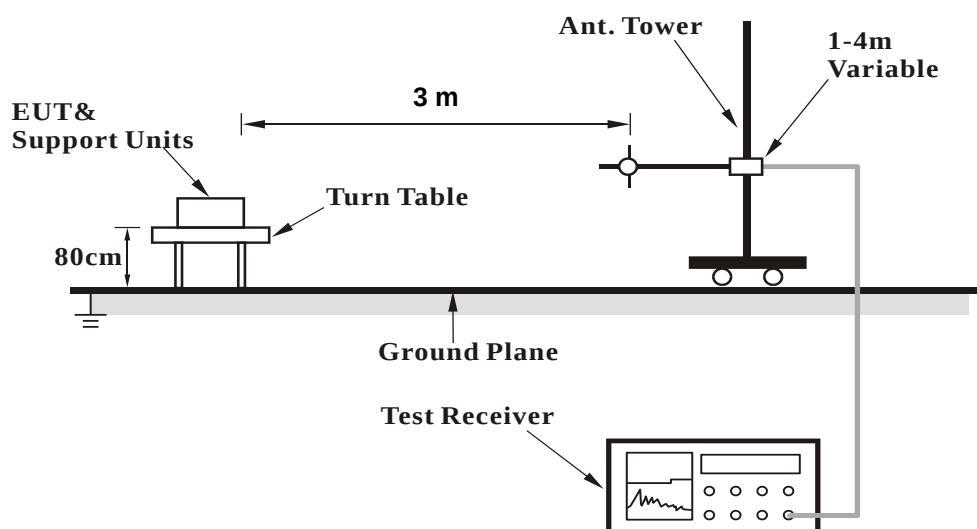
**Note:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 4.7.3 Deviation from Test Standard

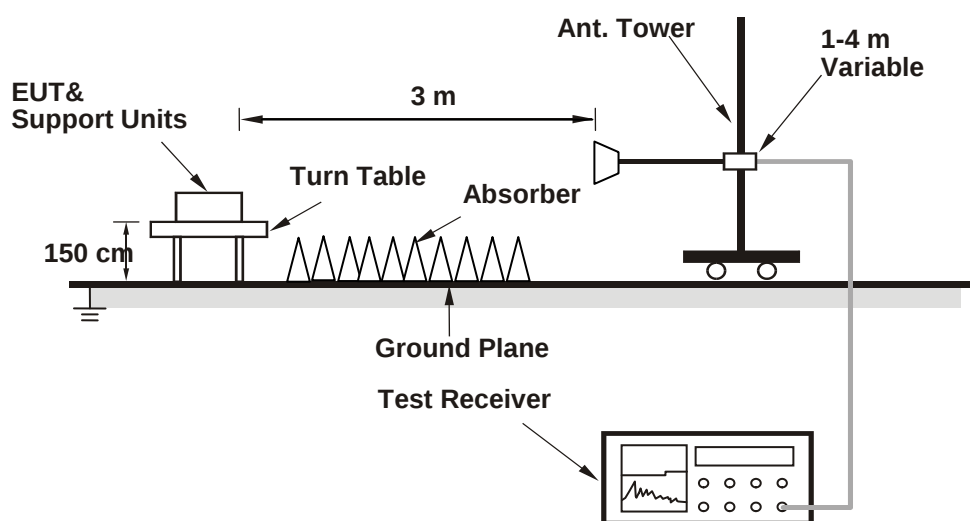
No deviation.

#### 4.7.4 Test Setup

##### <Radiated Emission below or equal 1 GHz>



##### <Radiated Emission above 1 GHz>



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

#### 4.7.5 Test Results

LTE Band 4

Channel Bandwidth: 1.4 MHz / QPSK

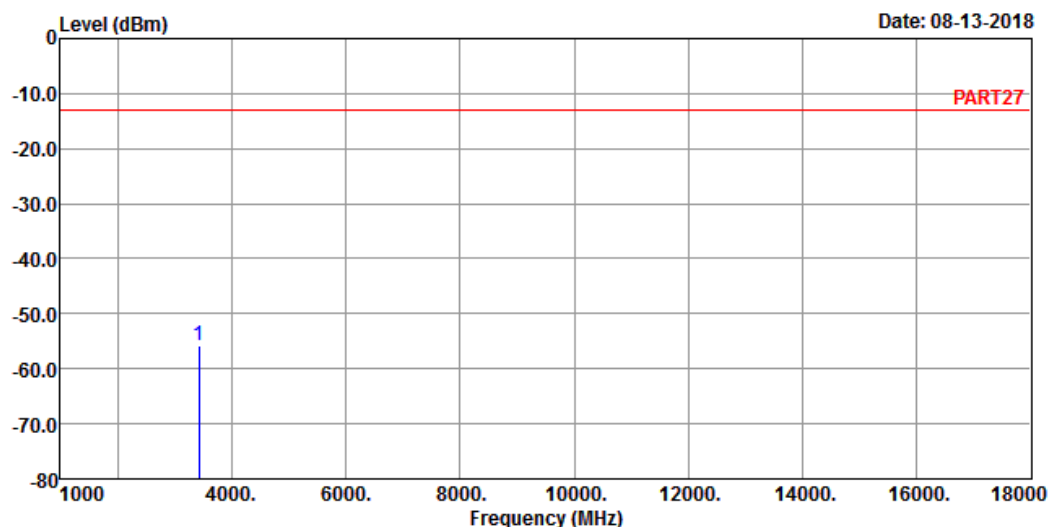
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : LTE Band 4 QPSK\_1.4M Link\_L-CH

Tested by: Jisyoung Wang

| Freq | Level | Read  | Limit | Over | Factor | Remark |
|------|-------|-------|-------|------|--------|--------|
|      |       | Level | Line  |      |        |        |
| MHz  | dBm   | dBm   | dBm   | dB   | dB     |        |

1 pp 3421.40 -55.85 -47.51 -13.00 -42.85 -8.34 Peak

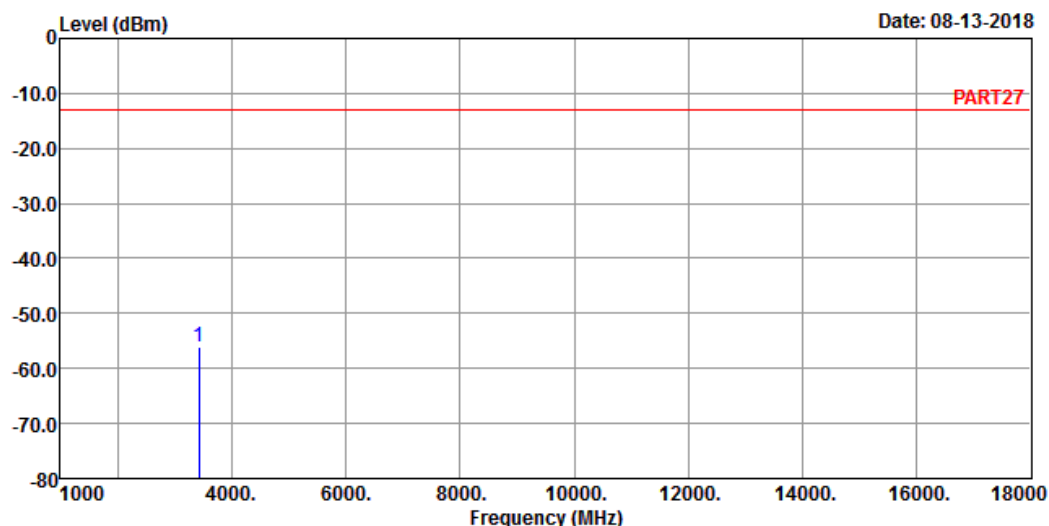


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_1.4M Link\_L-CH

Tested by: Jisyong Wang

| Freq         | Level  | Read   | Limit  | Over   | Factor | Remark |
|--------------|--------|--------|--------|--------|--------|--------|
|              |        | Level  | Line   | Limit  |        |        |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 3421.40 | -56.12 | -47.78 | -13.00 | -43.12 | -8.34  | Peak   |

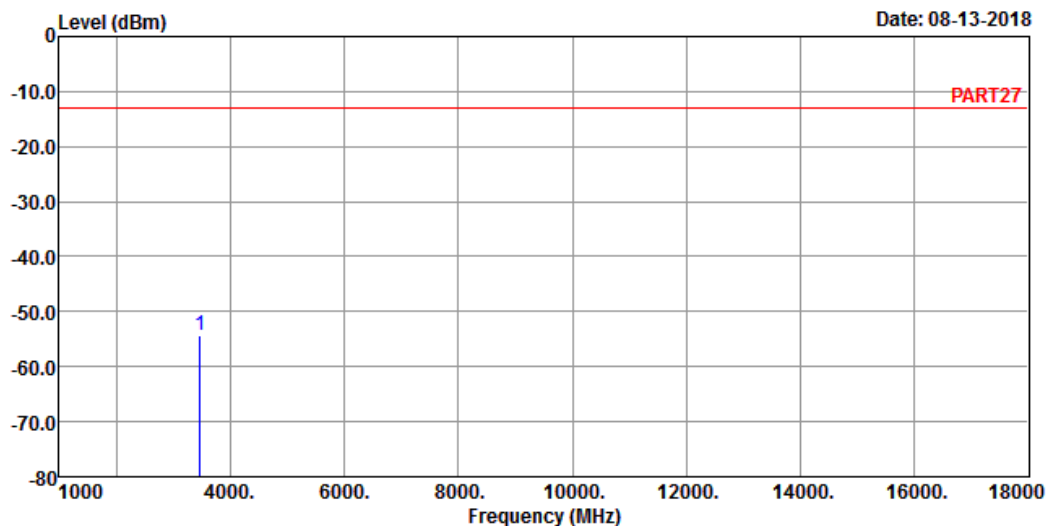
# Middle Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 4 QPSK\_1.4M Link\_M-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3465.00 -54.19 -46.31 -13.00 -41.19 -7.88 Peak

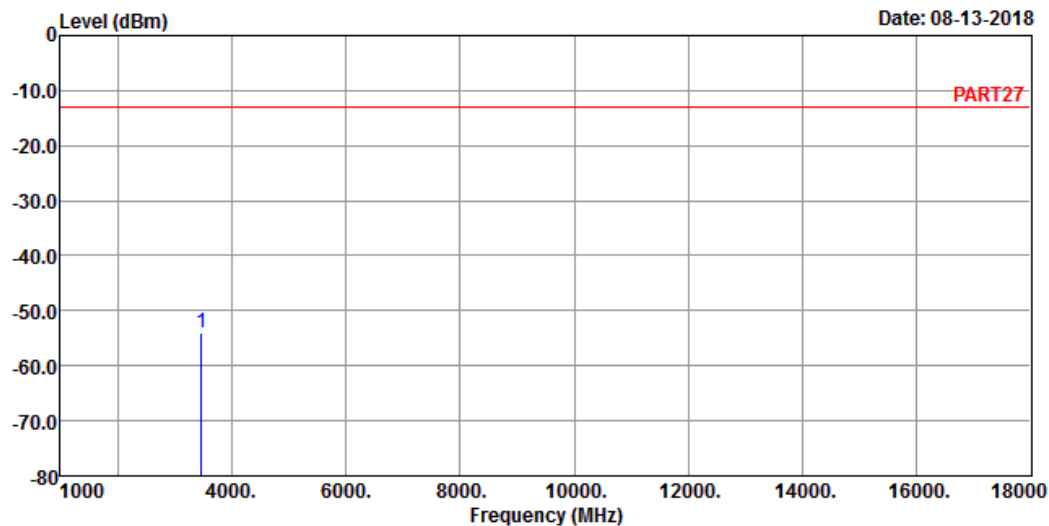


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 VERTICAL  
Remak : LTE Band 4 QPSK\_1.4M Link\_M-CH  
Tested by: Jisyong Wang

| Freq         | Level  | Read   | Limit  | Over   | Factor | Remark |
|--------------|--------|--------|--------|--------|--------|--------|
|              |        | Level  | Line   | Limit  |        |        |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 3465.00 | -53.97 | -46.09 | -13.00 | -40.97 | -7.88  | Peak   |

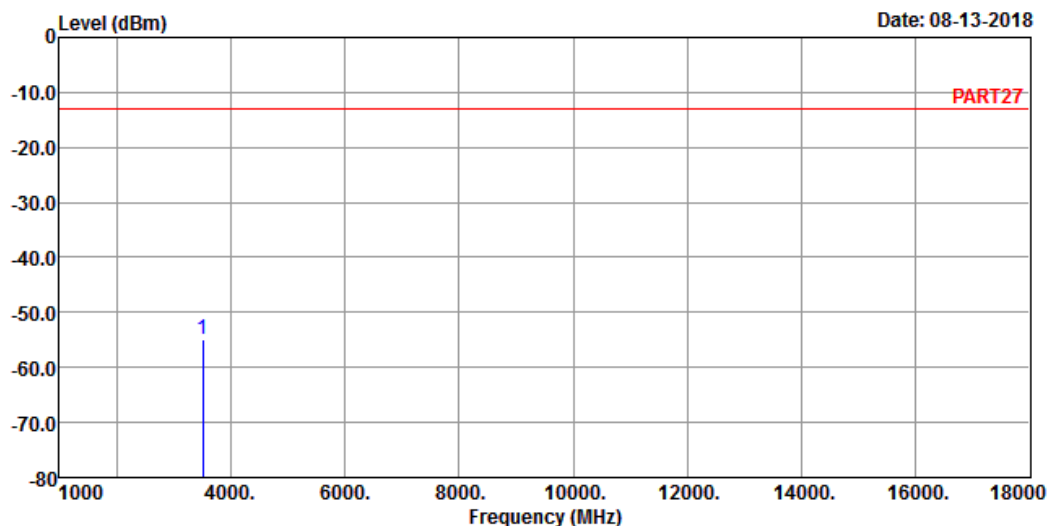
# High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 4 QPSK\_1.4M Link\_H-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3508.60 -54.85 -47.40 -13.00 -41.85 -7.45 Peak

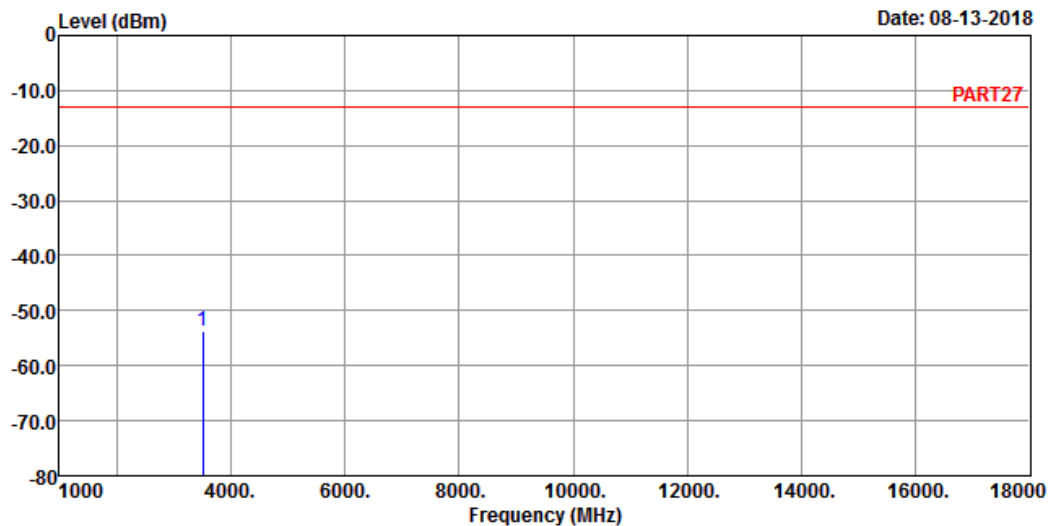


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 VERTICAL  
Remak : LTE Band 4 QPSK\_1.4M Link\_H-CH  
Tested by: Jisyong Wang

| Freq         | Level  | Read   | Limit  | Over   | Factor | Remark |
|--------------|--------|--------|--------|--------|--------|--------|
|              |        | Level  | Line   | Limit  |        |        |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 3508.60 | -53.62 | -46.17 | -13.00 | -40.62 | -7.45  | Peak   |

Channel Bandwidth: 5 MHz / QPSK  
Low Channel

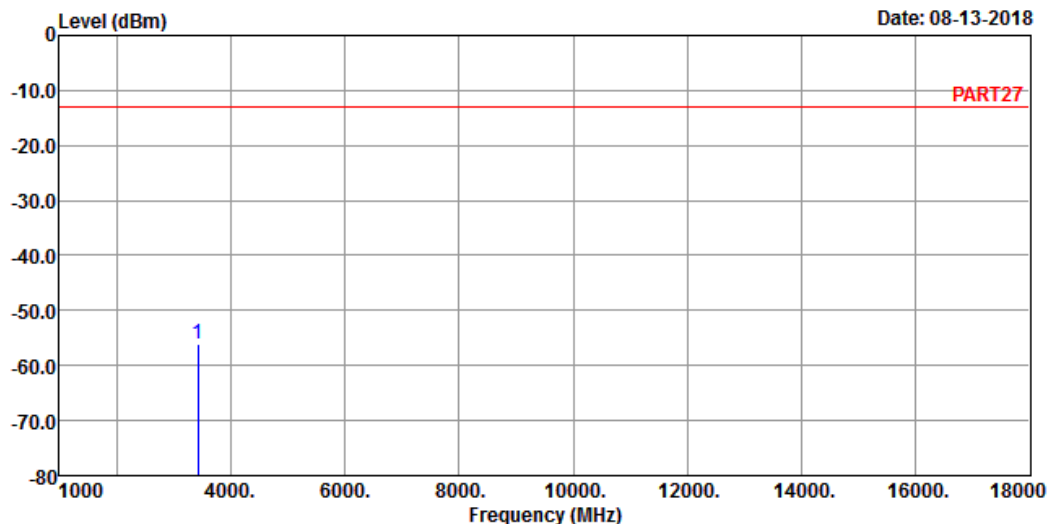


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 4 QPSK\_5M Link\_L-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3425.00 -55.99 -47.65 -13.00 -42.99 -8.34 Peak

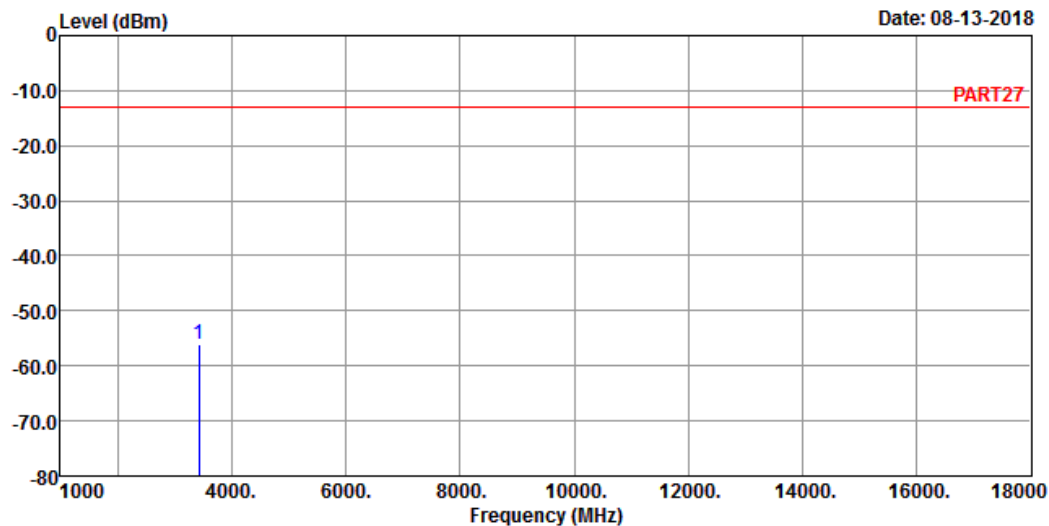


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_5M Link\_L-CH

Tested by: Jisyong Wang

| Freq | Level | Read  | Limit | Over  | Factor | Remark |
|------|-------|-------|-------|-------|--------|--------|
|      |       | Level | Line  | Limit |        |        |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3425.00 -56.01 -47.67 -13.00 -43.01 -8.34 Peak

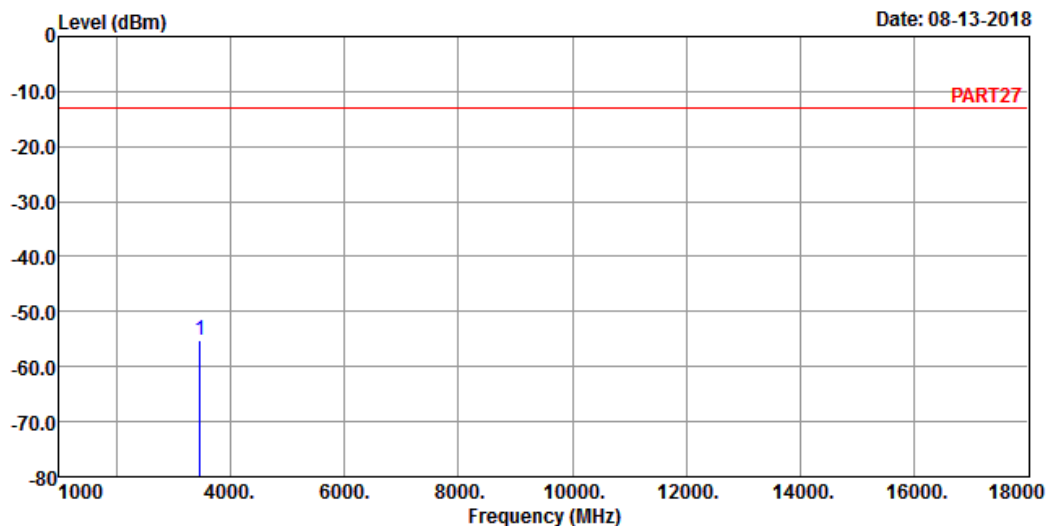
# Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : LTE Band 4 QPSK\_5M Link\_M-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3465.00 -55.12 -47.24 -13.00 -42.12 -7.88 Peak

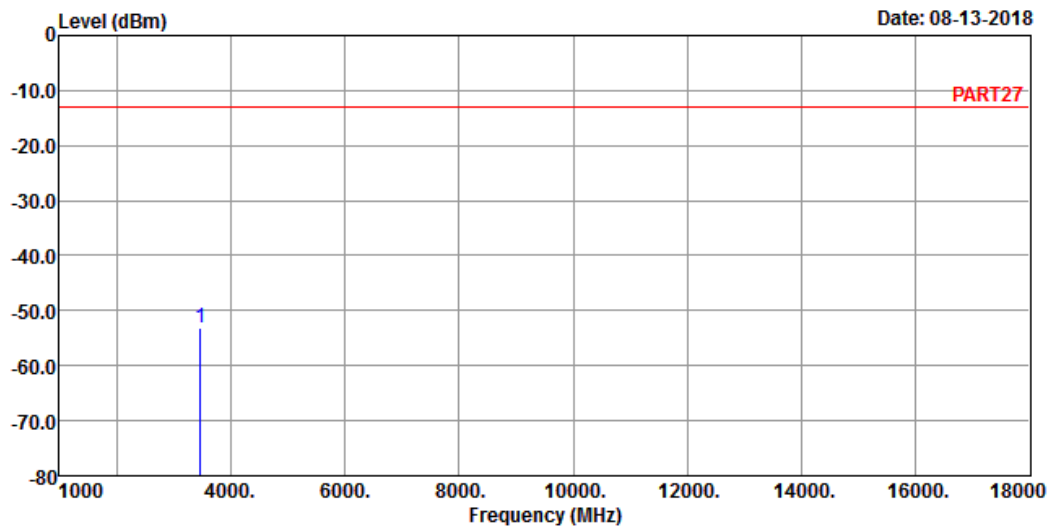


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_5M Link\_M-CH

Tested by: Jisyong Wang

| Freq | Level | Read  | Limit | Over  | Factor | Remark |
|------|-------|-------|-------|-------|--------|--------|
|      |       | Level | Line  | Limit |        |        |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3465.00 -53.14 -45.26 -13.00 -40.14 -7.88 Peak

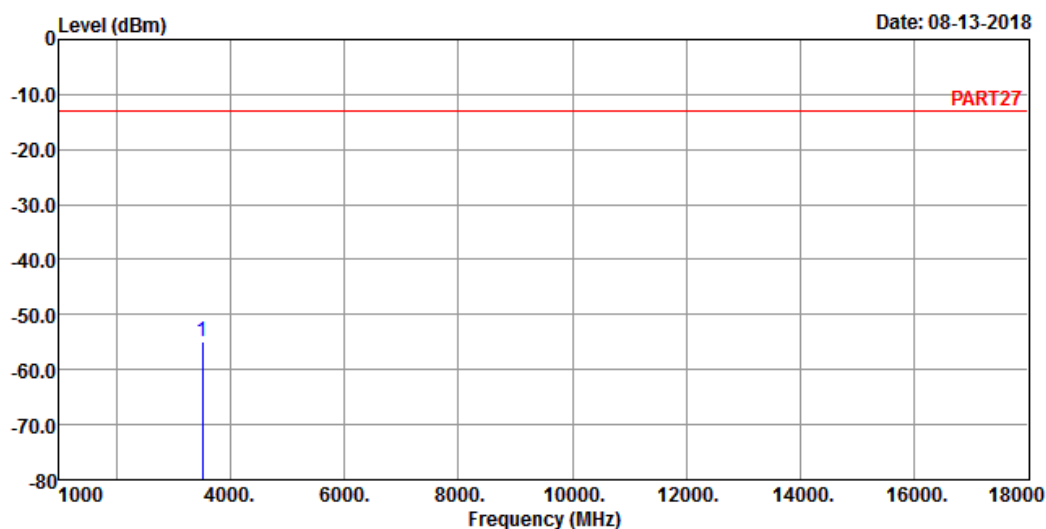
# High Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 4 QPSK\_5M Link\_H-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3505.00 -54.99 -47.54 -13.00 -41.99 -7.45 Peak

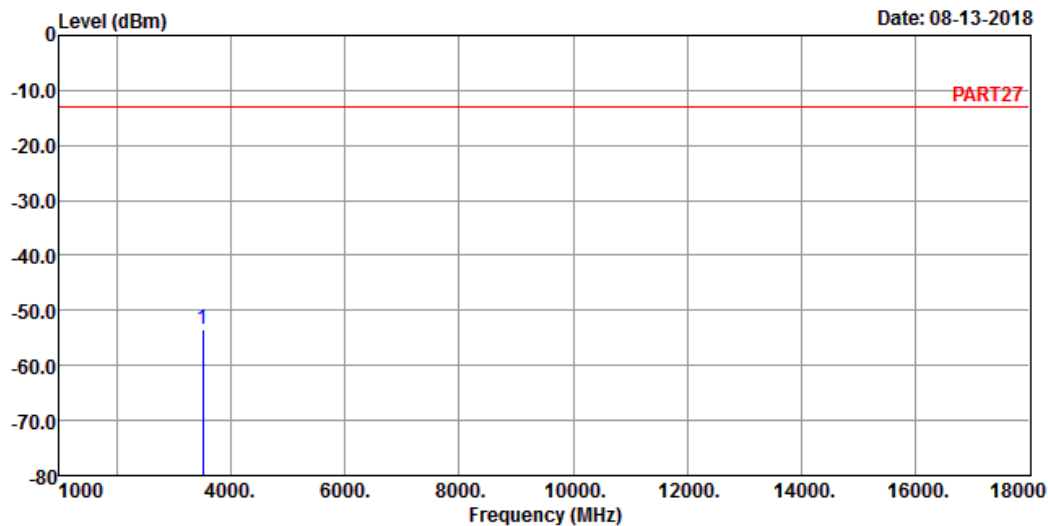


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_5M Link\_H-CH

Tested by: Jisyong Wang

|              |        | Read   | Limit  | Over   |        |        |
|--------------|--------|--------|--------|--------|--------|--------|
| Freq         | Level  | Level  | Line   | Limit  | Factor | Remark |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 3505.00 | -53.49 | -46.04 | -13.00 | -40.49 | -7.45  | Peak   |

Channel Bandwidth: 20 MHz / QPSK

Low Channel

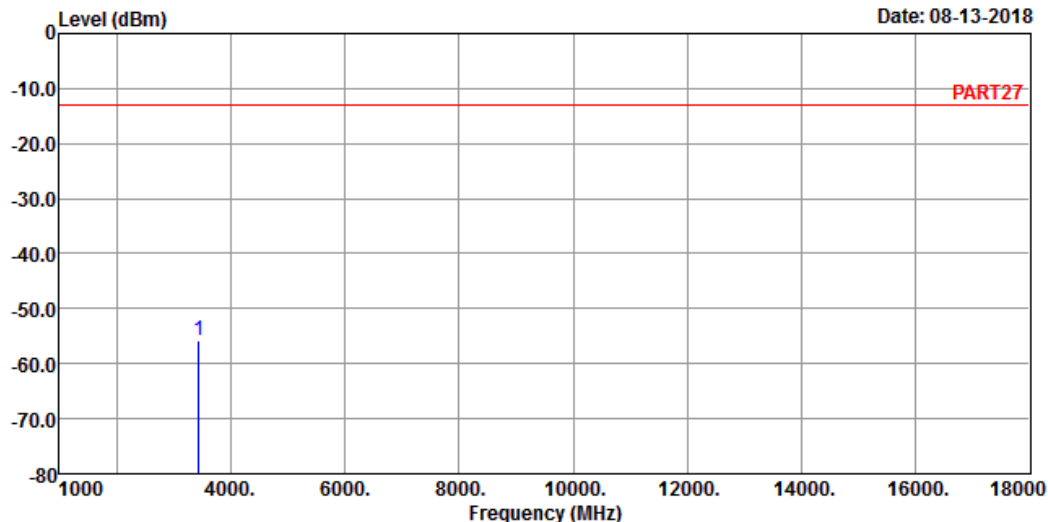


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : LTE Band 4 QPSK\_20M Link\_L-CH

Tested by: Jisyong Wang

| Freq | Level | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|-------|------------|------------|------------|--------|--------|
| MHz  | dBm   | dBm        | dBm        | dB         | dB     |        |

1 pp 3440.00 -55.88 -47.66 -13.00 -42.88 -8.22 Peak

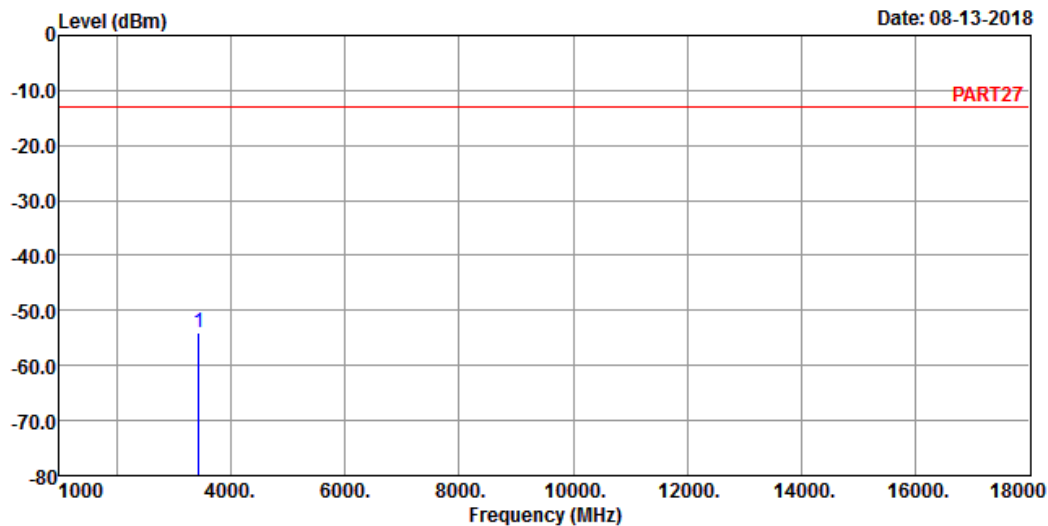


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_20M Link\_L-CH

Tested by: Jisyong Wang

| Freq         | Level  | Read   | Limit  | Over   | Factor | Remark |
|--------------|--------|--------|--------|--------|--------|--------|
|              |        | Level  | Line   | Limit  |        |        |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 3440.00 | -54.11 | -45.89 | -13.00 | -41.11 | -8.22  | Peak   |

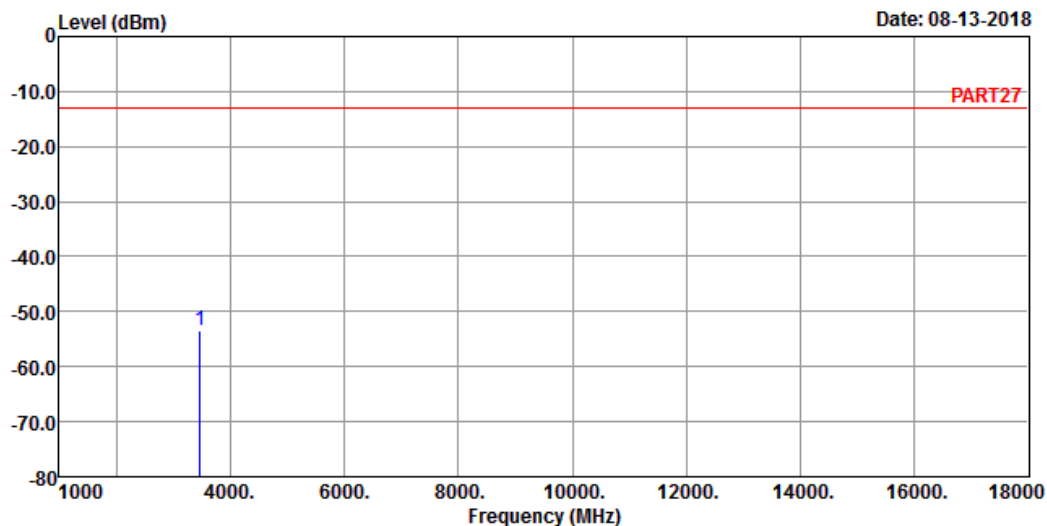
# Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5

Condition: PART27 HORIZONTAL

Remak : LTE Band 4 QPSK\_20M Link\_M-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3465.00 -53.44 -45.56 -13.00 -40.44 -7.88 Peak

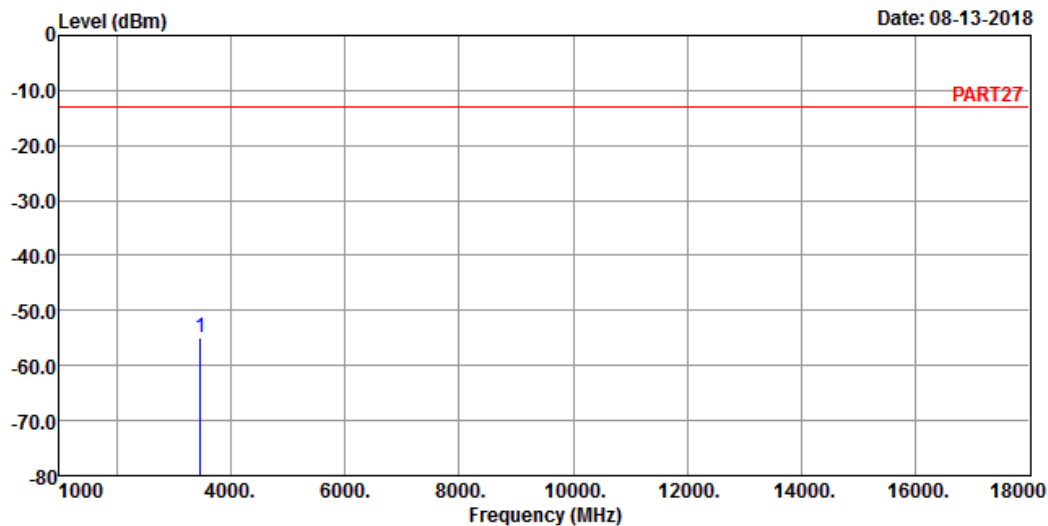


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_20M Link\_M-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 3465.00 -54.77 -46.89 -13.00 -41.77 -7.88 Peak

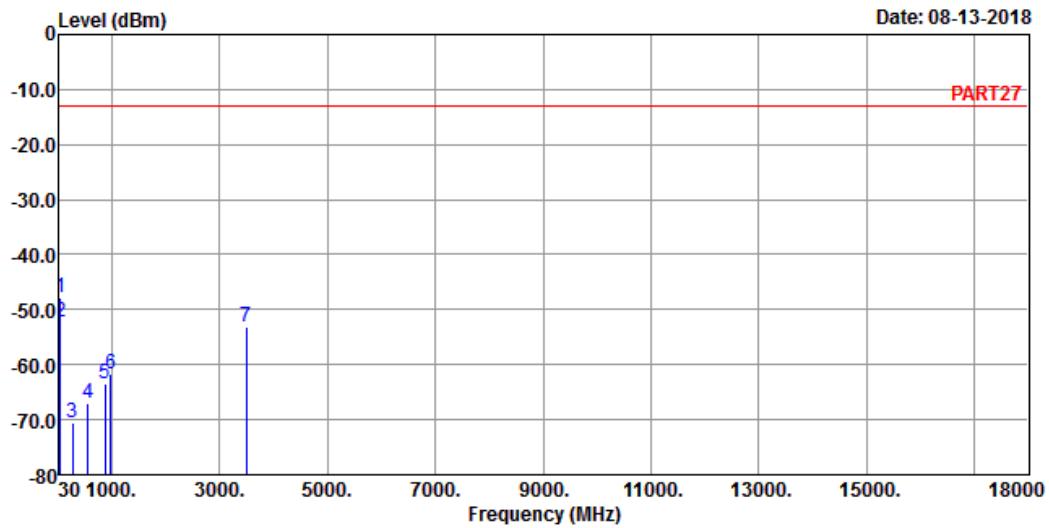
# High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 4 QPSK\_20M Link\_H-CH  
Tested by: Jisyong Wang

|      |         |        | Read   | Limit  | Over   |        |        |
|------|---------|--------|--------|--------|--------|--------|--------|
|      | Freq    | Level  | Level  | Line   | Limit  | Factor | Remark |
|      | MHz     | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp | 44.55   | -47.87 | -45.88 | -13.00 | -34.87 | -1.99  | Peak   |
| 2    | 53.28   | -52.17 | -46.36 | -13.00 | -39.17 | -5.81  | Peak   |
| 3    | 271.53  | -70.56 | -64.13 | -13.00 | -57.56 | -6.43  | Peak   |
| 4    | 556.71  | -66.88 | -64.31 | -13.00 | -53.88 | -2.57  | Peak   |
| 5    | 876.81  | -63.55 | -63.99 | -13.00 | -50.55 | 0.44   | Peak   |
| 6    | 979.63  | -61.82 | -64.68 | -13.00 | -48.82 | 2.86   | Peak   |
| 7    | 3490.00 | -53.11 | -45.46 | -13.00 | -40.11 | -7.65  | Peak   |

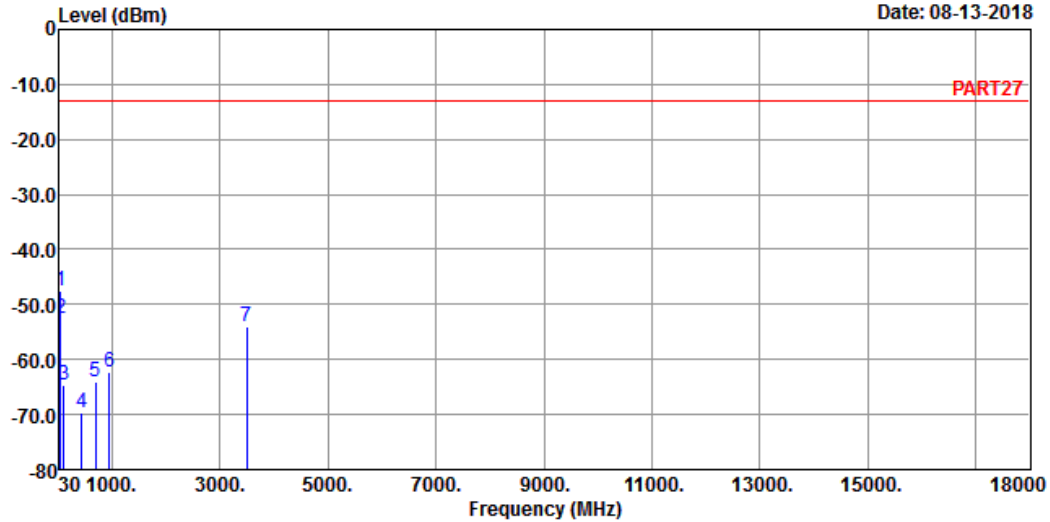


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 4 QPSK\_20M Link\_H-CH

Tested by: Jisyong Wang

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm    | dBm        | dBm        | dB         | dB     |        |
| 1 pp | 43.58   | -47.45 | -45.98     | -13.00     | -34.45     | -1.47  | Peak   |
| 2    | 53.28   | -52.47 | -46.66     | -13.00     | -39.47     | -5.81  | Peak   |
| 3    | 114.39  | -64.67 | -54.56     | -13.00     | -51.67     | -10.11 | Peak   |
| 4    | 442.25  | -69.62 | -64.01     | -13.00     | -56.62     | -5.61  | Peak   |
| 5    | 699.30  | -64.15 | -64.04     | -13.00     | -51.15     | -0.11  | Peak   |
| 6    | 946.65  | -62.14 | -63.87     | -13.00     | -49.14     | 1.73   | Peak   |
| 7    | 3490.00 | -54.01 | -46.36     | -13.00     | -41.01     | -7.65  | Peak   |

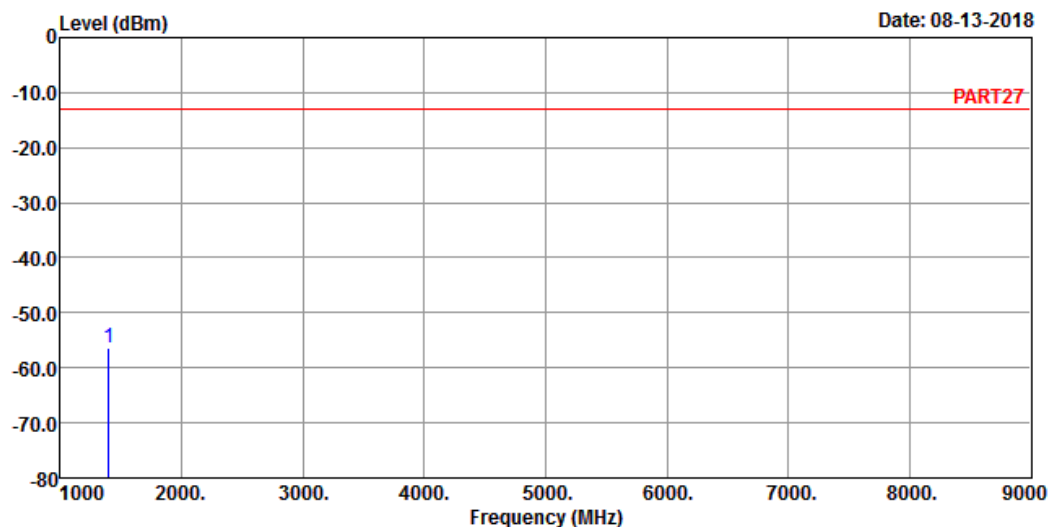
LTE Band 12  
Channel Bandwidth: 1.4 MHz / QPSK  
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_1.4M Link\_L-CH  
Tested by: Jisyong Wang

|              |        | Read   | Limit  | Over   |        |        |
|--------------|--------|--------|--------|--------|--------|--------|
| Freq         | Level  | Level  | Line   | Limit  | Factor | Remark |
| MHz          | dBm    | dBm    | dBm    | dB     | dB     |        |
| 1 pp 1399.40 | -56.41 | -44.56 | -13.00 | -43.41 | -11.85 | Peak   |

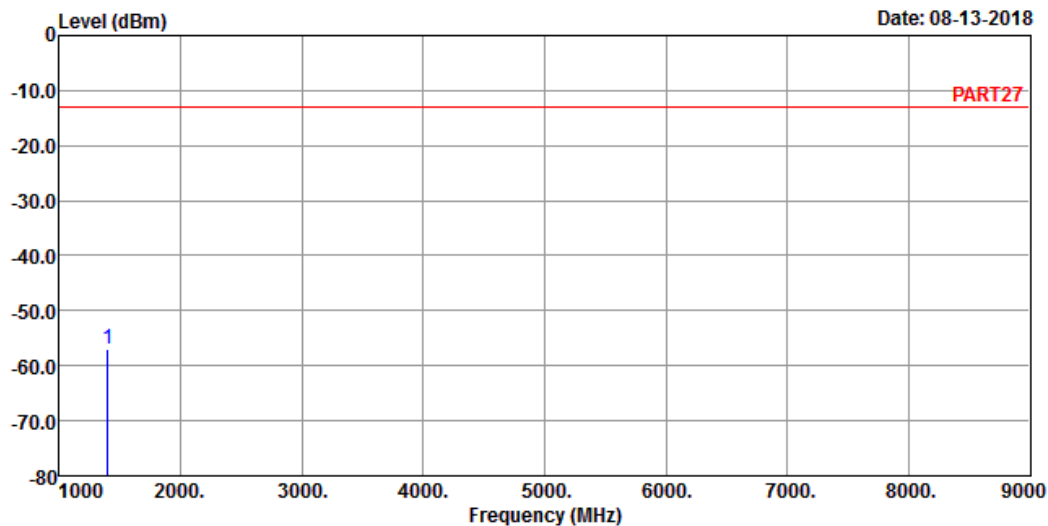


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_1.4M Link\_L-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1399.40 -56.85 -45.00 -13.00 -43.85 -11.85 Peak

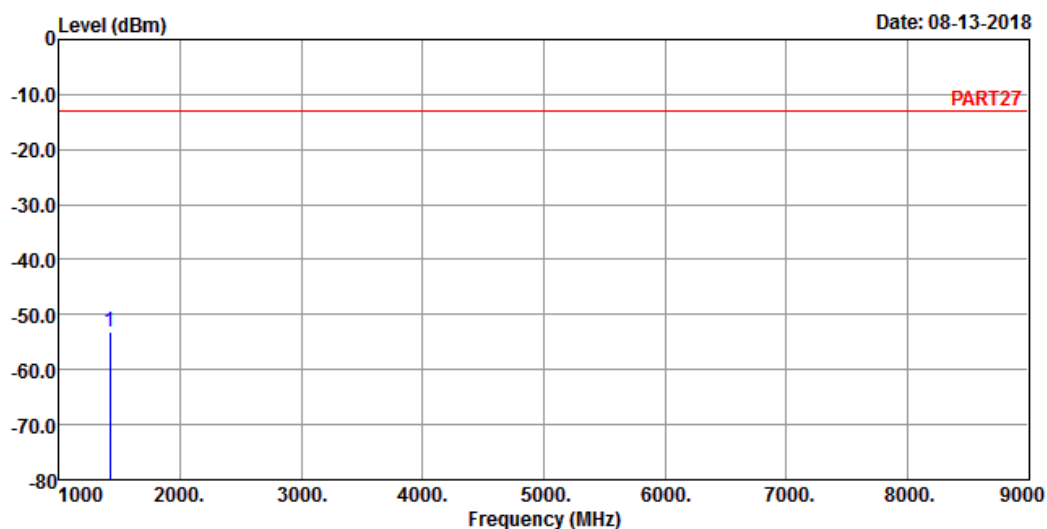
# Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
 Condition: PART27 HORIZONTAL  
 Remak : LTE Band 12 QPSK\_1.4M Link\_M-CH  
 Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -53.19 -41.11 -13.00 -40.19 -12.08 Peak

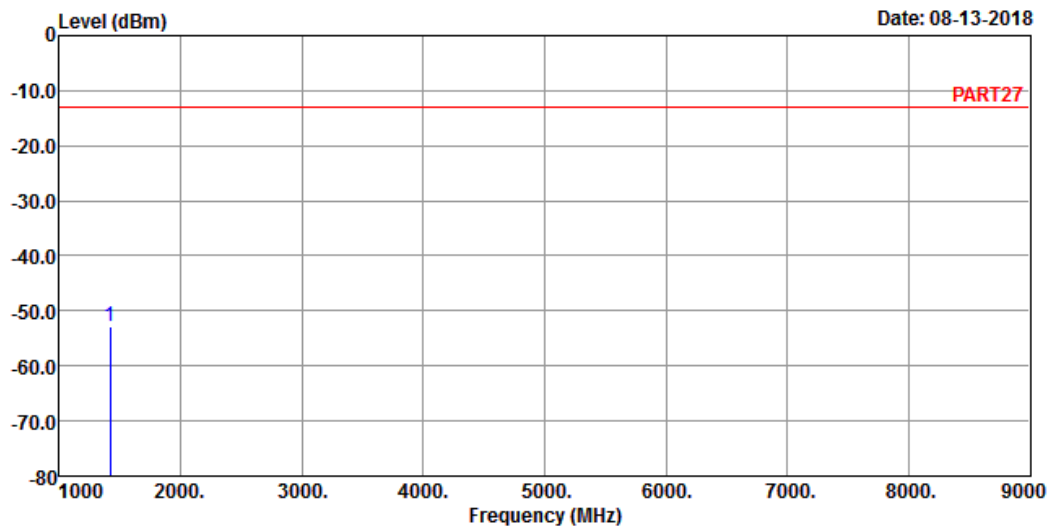


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_1.4M Link\_M-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -52.97 -40.89 -13.00 -39.97 -12.08 Peak

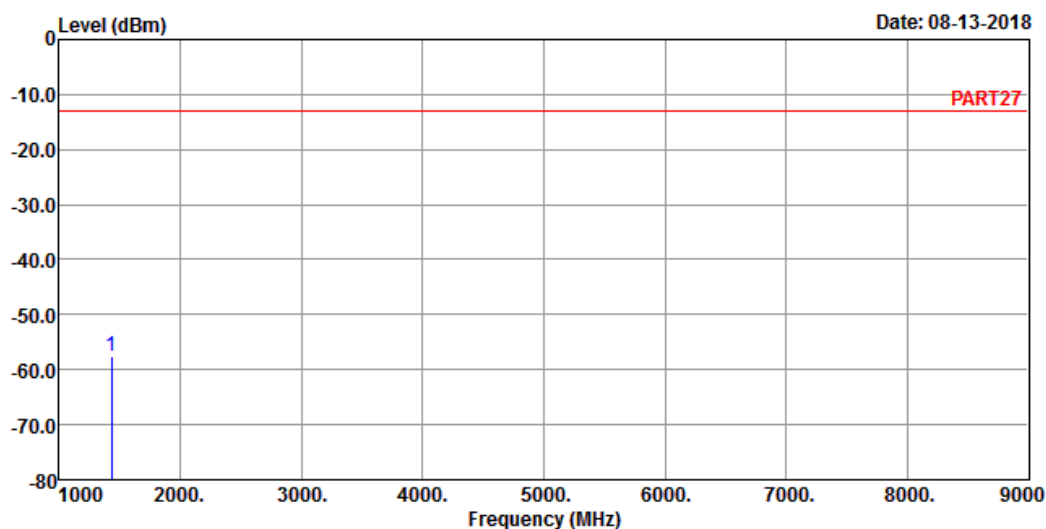
# High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_1.4M Link\_H-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1430.60 -57.68 -45.37 -13.00 -44.68 -12.31 Peak

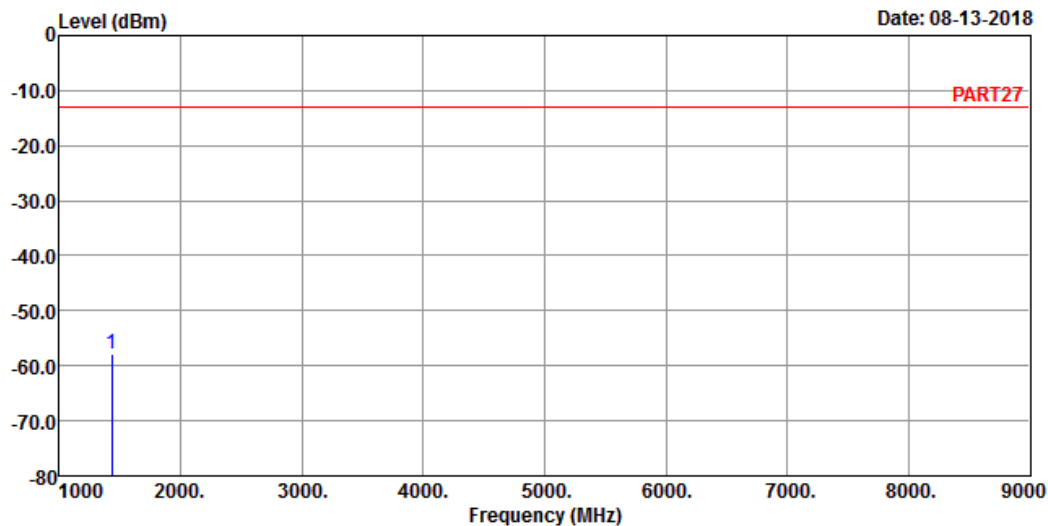


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_1.4M Link\_H-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1430.60 -57.99 -45.68 -13.00 -44.99 -12.31 Peak

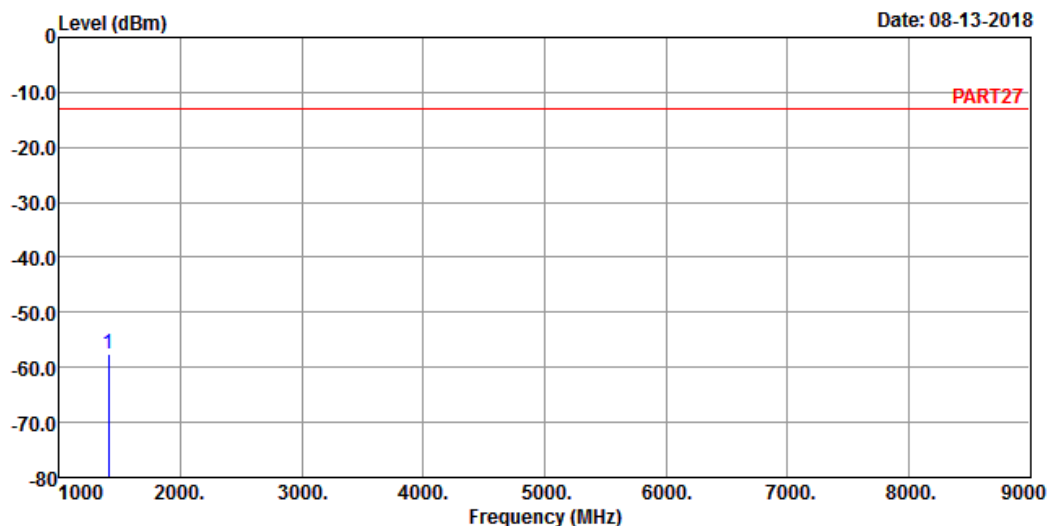
Channel Bandwidth: 5 MHz / QPSK  
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_5M Link\_L-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1403.00 -57.52 -45.61 -13.00 -44.52 -11.91 Peak

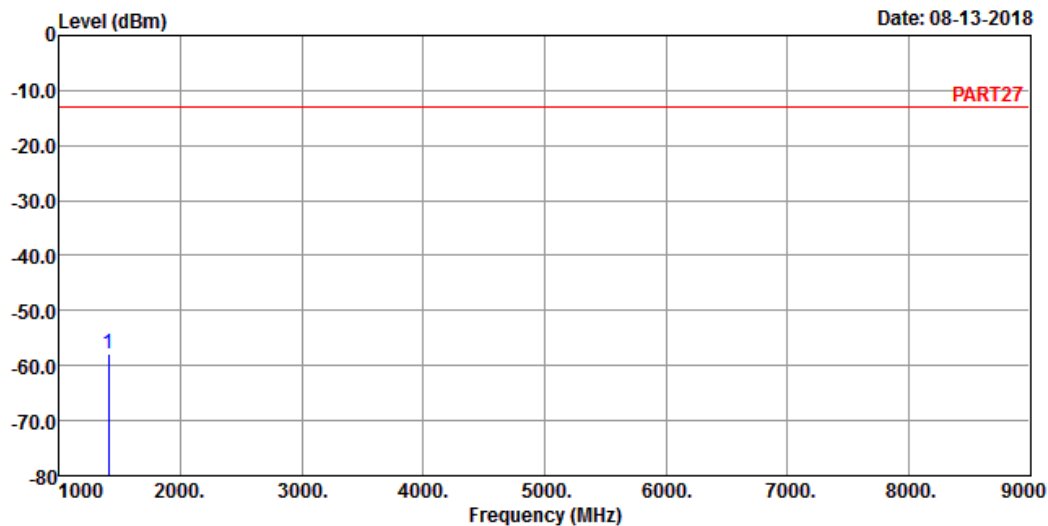


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_5M Link\_L-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1403.00 -57.99 -46.08 -13.00 -44.99 -11.91 Peak

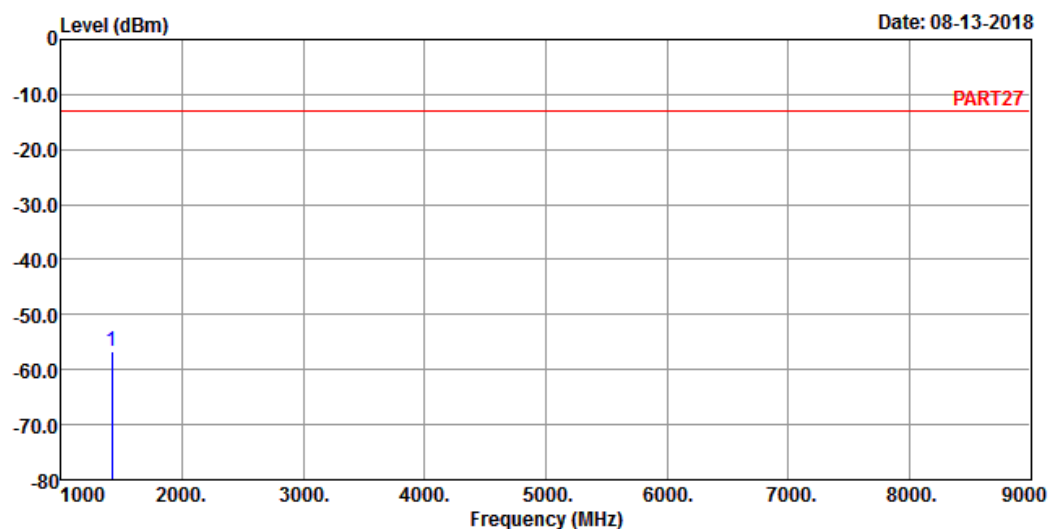
# Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_5M Link\_M-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -56.74 -44.66 -13.00 -43.74 -12.08 Peak

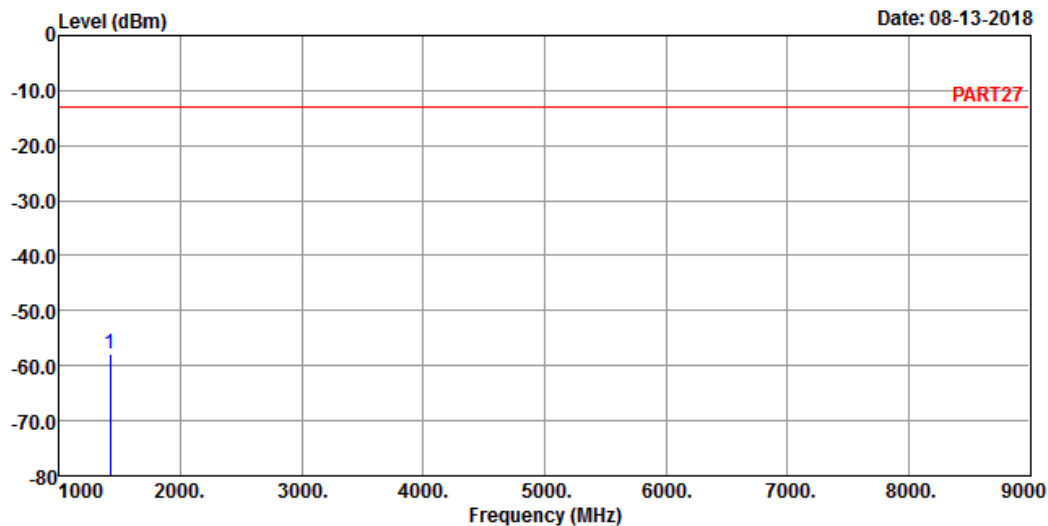


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_5M Link\_M-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -57.98 -45.90 -13.00 -44.98 -12.08 Peak

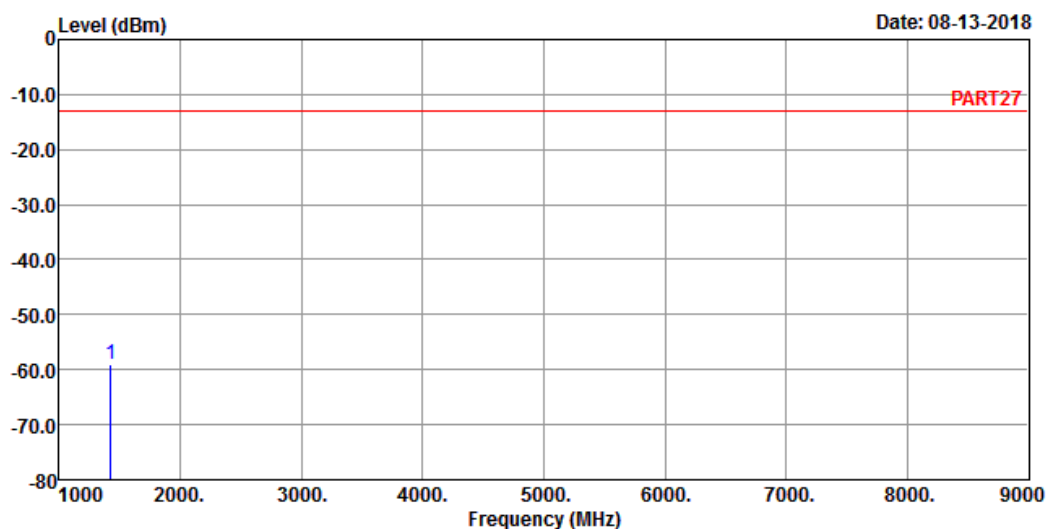
# High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_5M Link\_H-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1427.00 -58.97 -46.72 -13.00 -45.97 -12.25 Peak

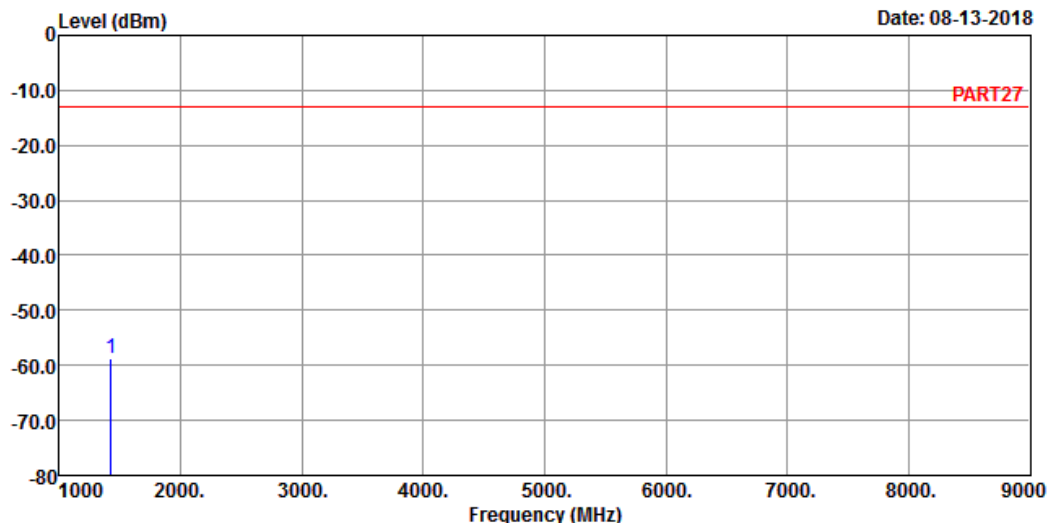


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_5M Link\_H-CH

Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1427.00 -58.65 -46.40 -13.00 -45.65 -12.25 Peak

Channel Bandwidth: 10 MHz / QPSK  
Low Channel

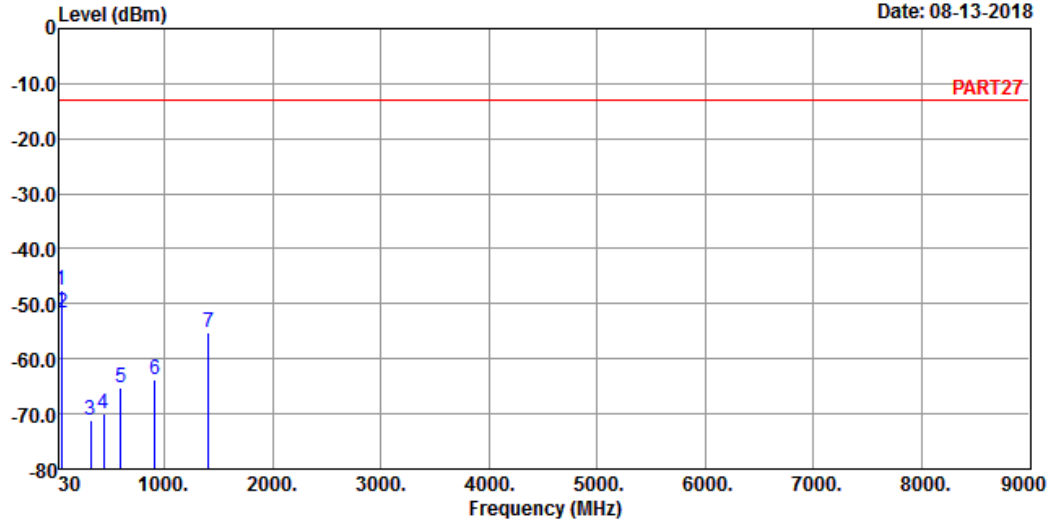


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_10M Link\_L-CH  
Tested by: Jisyong Wang

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm    | dBm        | dBm        | dB         | dB     |        |
| 1 pp | 44.55   | -47.62 | -45.63     | -13.00     | -34.62     | -1.99  | Peak   |
| 2    | 53.28   | -51.79 | -45.98     | -13.00     | -38.79     | -5.81  | Peak   |
| 3    | 316.15  | -71.23 | -64.47     | -13.00     | -58.23     | -6.76  | Peak   |
| 4    | 436.43  | -69.88 | -64.22     | -13.00     | -56.88     | -5.66  | Peak   |
| 5    | 598.42  | -65.34 | -64.51     | -13.00     | -52.34     | -0.83  | Peak   |
| 6    | 914.64  | -63.70 | -64.63     | -13.00     | -50.70     | 0.93   | Peak   |
| 7    | 1408.00 | -55.11 | -43.15     | -13.00     | -42.11     | -11.96 | Peak   |

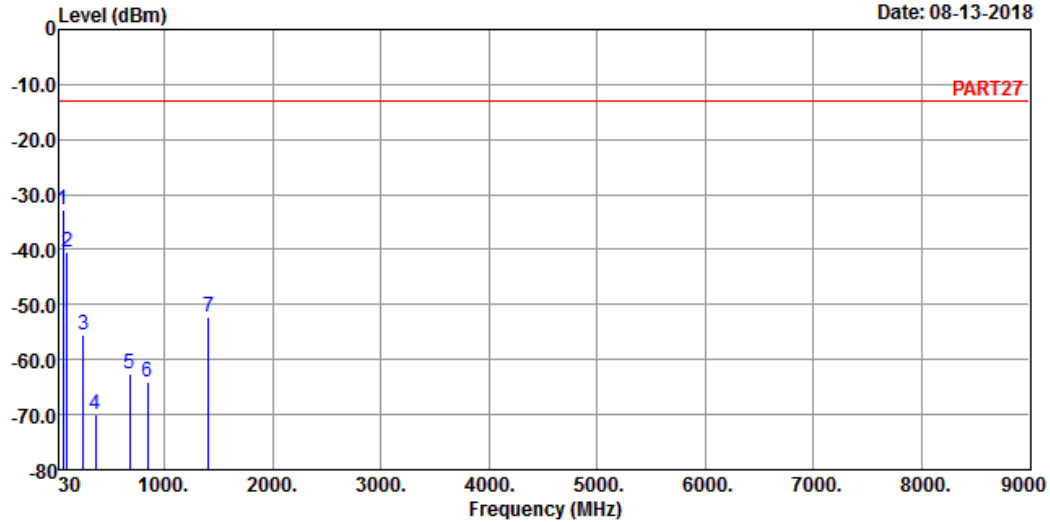


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 08-13-2018



Site : 966 Chamber 5

Condition: PART27 VERTICAL

Remak : LTE Band 12 QPSK\_10M Link\_L-CH

Tested by: Jisyong Wang

|      | Freq    | Level  | Read Level | Limit Line | Over Limit | Factor | Remark |
|------|---------|--------|------------|------------|------------|--------|--------|
|      | MHz     | dBm    | dBm        | dBm        | dB         | dB     |        |
| 1 pp | 65.89   | -32.65 | -24.55     | -13.00     | -19.65     | -8.10  | Peak   |
| 2    | 102.75  | -40.59 | -30.10     | -13.00     | -27.59     | -10.49 | Peak   |
| 3    | 248.25  | -55.37 | -49.30     | -13.00     | -42.37     | -6.07  | Peak   |
| 4    | 365.62  | -69.99 | -63.84     | -13.00     | -56.99     | -6.15  | Peak   |
| 5    | 676.02  | -62.69 | -62.21     | -13.00     | -49.69     | -0.48  | Peak   |
| 6    | 844.80  | -64.18 | -64.52     | -13.00     | -51.18     | 0.34   | Peak   |
| 7    | 1408.00 | -52.11 | -40.15     | -13.00     | -39.11     | -11.96 | Peak   |

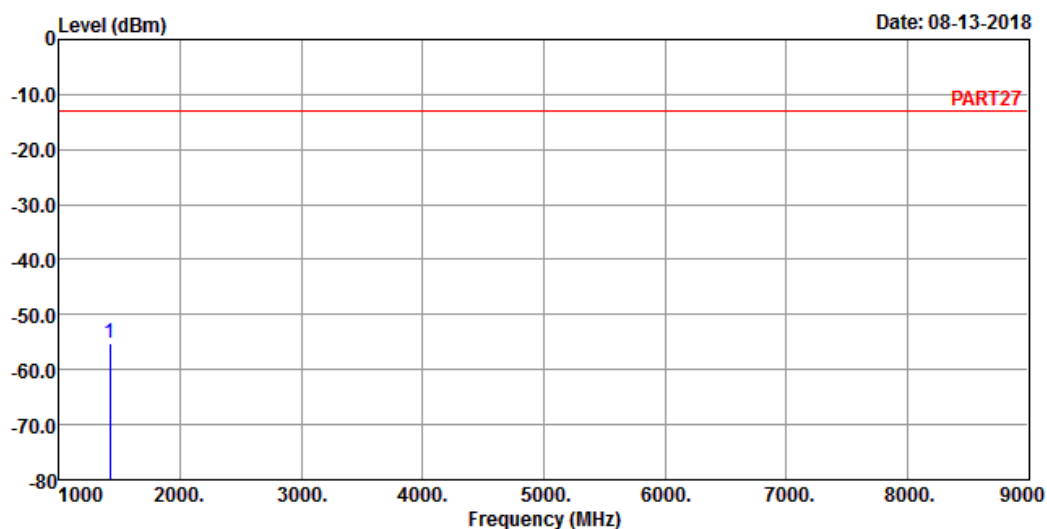
# Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
Condition: PART27 HORIZONTAL  
Remak : LTE Band 12 QPSK\_10M Link\_M-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -55.14 -43.06 -13.00 -42.14 -12.08 Peak

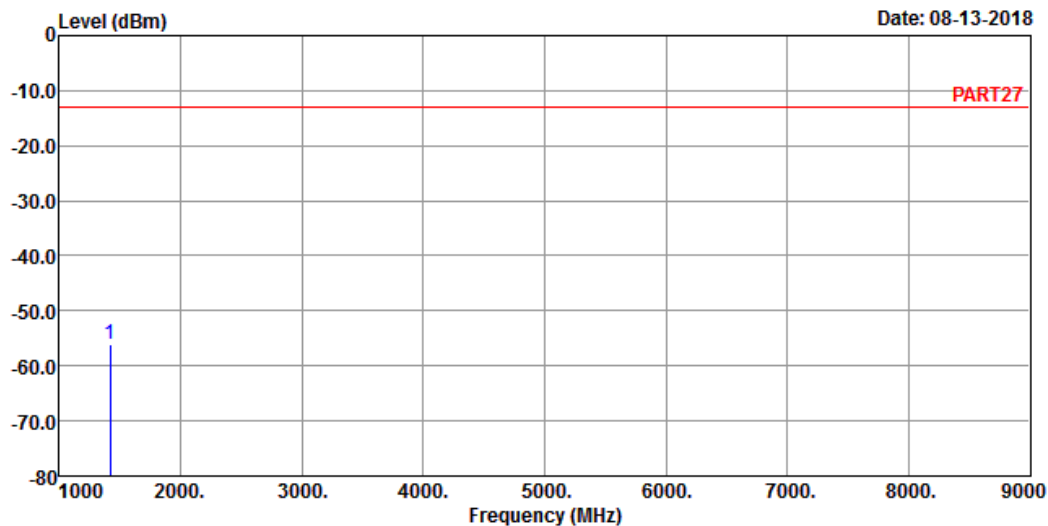


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 VERTICAL  
Remak : LTE Band 12 QPSK\_10M Link\_M-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1415.00 -56.12 -44.04 -13.00 -43.12 -12.08 Peak

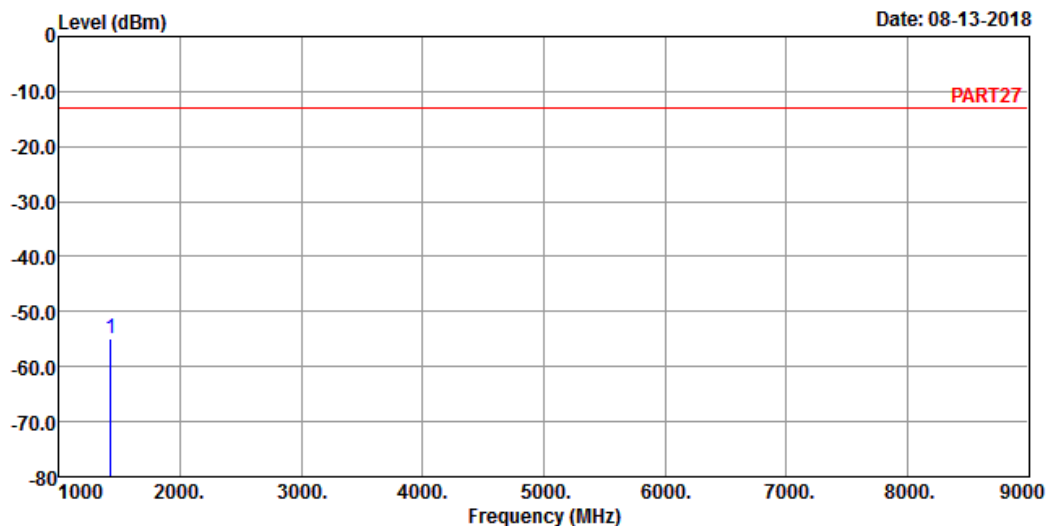
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 3



Site : 966 Chamber 5  
 Condition: PART27 HORIZONTAL  
 Remak : LTE Band 12 QPSK\_10M Link\_H-CH  
 Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1422.00 -54.99 -42.80 -13.00 -41.99 -12.19 Peak

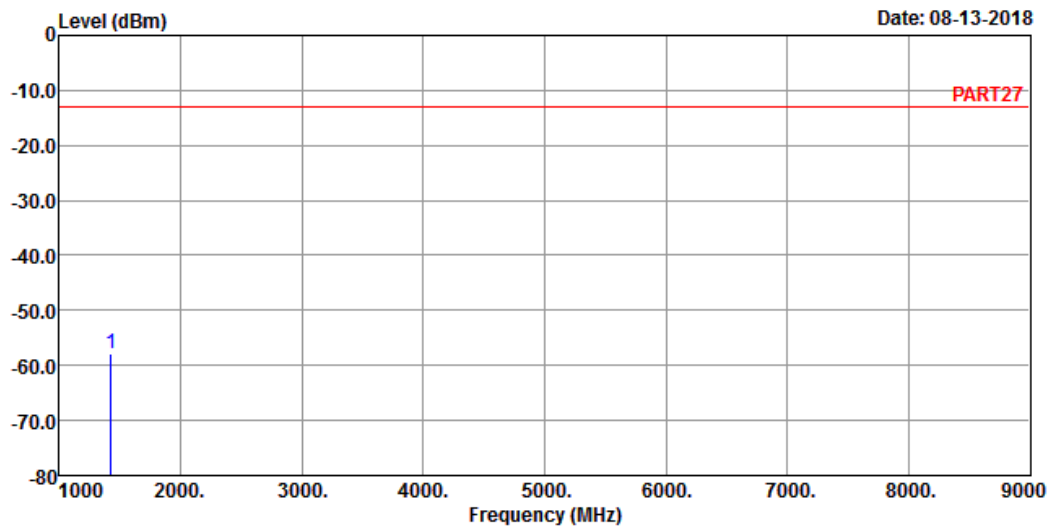


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 4

Date: 08-13-2018



Site : 966 Chamber 5  
Condition: PART27 VERTICAL  
Remak : LTE Band 12 QPSK\_10M Link\_H-CH  
Tested by: Jisyong Wang

|      |       | Read  | Limit | Over  |        |        |
|------|-------|-------|-------|-------|--------|--------|
| Freq | Level | Level | Line  | Limit | Factor | Remark |
| MHz  | dBm   | dBm   | dBm   | dB    | dB     |        |

1 pp 1422.00 -57.85 -45.66 -13.00 -44.85 -12.19 Peak

## 5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

## Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

**Linko EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety**

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

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

--- END ---