

## FCC Test Report

### (PART 27)

**Report No.:** RF190610D15-2

**FCC ID:** P27NA502S4G

**Test Model:** NA502S-4G

**Series Model:** NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose)

**Received Date:** Jun. 10, 2019

**Test Date:** Jun. 18, 2019 ~ Jun. 25, 2019

**Issued Date:** Jul. 09, 2019

**Applicant:** Sercomm Corp.

**Address:** 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)

**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

**Test Location (2):** B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan, R.O.C

**FCC Registration /  
Designation Number:** 427177 / TW0011



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### Release Control Record

| Issue No.     | Description      | Date Issued   |
|---------------|------------------|---------------|
| RF190610D15-2 | Original Release | Jul. 09, 2019 |

## 1 Certificate of Conformity

**Product:** Multiple RF Home Gateway

**Brand:** Sercomm, Scout

**Test Model:** NA502S-4G

**Series Model:** NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose)

**Sample Status:** Engineering Sample

**Applicant:** Sercomm Corp.

**Test Date:** Jun. 18, 2019 ~ Jun. 25, 2019

**Standards:** FCC Part 27, Subpart C, H, F, 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 :** Rona Chen, **Date:** Jul. 09, 2019  
Rona Chen / Specialist

**Approved by :** Dylan Chiou, **Date:** Jul. 09, 2019  
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.                                                        |
| 2.1047                                         | Modulation Characteristics   | Pass   | Meet the requirement.                                                                 |
| 2.1055<br>27.54                                | Frequency Stability          | Pass   | Meet the requirement of limit.                                                        |
| 2.1049                                         | 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 -20.75 dB at 6930.00 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.                                                        |
| 2.1047                                          | Modulation Characteristics   | Pass   | Meet the requirement.                                                                 |
| 2.1055<br>27.54                                 | Frequency Stability          | Pass   | Meet the requirement of limit.                                                        |
| 2.1049                                          | Occupied Bandwidth           | Pass   | Meet the requirement of limit.                                                        |
| ---                                             | 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 -24.16 dB at 1415.00 MHz. |

| Applied Standard: FCC Part 27 & Part 2 (LTE 13) |                              |        |                                                                                      |
|-------------------------------------------------|------------------------------|--------|--------------------------------------------------------------------------------------|
| FCC Clause                                      | Test Item                    | Result | Remarks                                                                              |
| 2.1046<br>27.50(b)(10)                          | Maximum Peak Output Power    | Pass   | Meet the requirement of limit.                                                       |
| 2.1047                                          | Modulation Characteristics   | Pass   | Meet the requirement.                                                                |
| 2.1055<br>27.54                                 | Frequency Stability          | Pass   | Meet the requirement of limit.                                                       |
| 2.1049                                          | Occupied Bandwidth           | Pass   | Meet the requirement of limit.                                                       |
| ---                                             | Peak to Average Ratio        | Pass   | Meet the requirement of limit.                                                       |
| 27.53(c)(2)(4)                                  | Band Edge Measurements       | Pass   | Meet the requirement of limit.                                                       |
| 2.1051<br>27.53(c)(2)&(f)                       | Conducted Spurious Emissions | Pass   | Meet the requirement of limit.                                                       |
| 2.1053<br>27.53(c)(2)&(f)                       | Radiated Spurious Emissions  | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -4.16 dB at 1564.00 MHz. |

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

## 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 (k=2) (±) |
|--------------------------------|--------------------|--------------------------------|
| Radiated Emissions up to 1 GHz | 9 kHz ~ 30 MHz     | 3.0400 dB                      |
|                                | 30 MHz ~ 200 MHz   | 2.0153 dB                      |
|                                | 200 MHz ~ 1000 MHz | 2.0224 dB                      |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz     | 1.0121 dB                      |
|                                | 18 GHz ~ 40 GHz    | 1.1508 dB                      |

## 2.2 Test Site and Instruments

| Description & Manufacturer                         | Model No.        | Serial No.                                                        | Date of Calibration | Due Date of Calibration |
|----------------------------------------------------|------------------|-------------------------------------------------------------------|---------------------|-------------------------|
| Test Receiver<br>Agilent Technologies              | N9038A           | MY52260177                                                        | Aug. 20, 2018       | Aug. 19, 2019           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ               | FSU43            | 101261                                                            | Apr. 15, 2019       | Apr. 14, 2020           |
| Spectrum Analyzer<br>ROHDE & SCHWARZ               | FSW26            | 102023                                                            | Oct. 11, 2018       | Oct. 10, 2019           |
| BILOG Antenna<br>SCHWARZBECK                       | VULB9168         | 9168-616                                                          | Nov. 27, 2018       | Nov. 26, 2019           |
| HORN Antenna<br>ETS-Lindgren                       | 3117             | 00143293                                                          | Nov. 25, 2018       | Nov. 24, 2019           |
| HORN Antenna<br>SCHWARZBECK                        | BBHA9170         | 9170-480                                                          | Nov. 25, 2018       | Nov. 24, 2019           |
| BILOG Antenna<br>SCHWARZBECK                       | VULB9168         | 9168-631                                                          | Nov. 26, 2018       | Nov. 25, 2019           |
| HORN Antenna<br>SCHWARZBECK                        | BBHA 9120D       | 9120D-969                                                         | Nov. 25, 2018       | Nov. 24, 2019           |
| Fixed Attenuator<br>Mini-Circuits                  | MDCS18N-10       | MDCS18N-10-01                                                     | Apr. 15, 2019       | Apr. 14, 2020           |
| MXG Vector signal<br>generator<br>Agilent          | N5182B           | MY53050430                                                        | Nov. 19, 2018       | Nov. 18, 2019           |
| Preamplifier<br>Agilent                            | 310N             | 187226                                                            | Jun. 18, 2019       | Jun. 17, 2020           |
| Preamplifier<br>Agilent                            | 83017A           | MY39501357                                                        | Jun. 18, 2019       | Jun. 17, 2020           |
| RF signal cable<br>ETS-LINDGREN                    | 5D-FB            | Cable-CH1-01(RFC<br>-SMS-100-SMS-12<br>0+RFC-SMS-100-S<br>MS-400) | Jun. 18, 2019       | Jun. 17, 2020           |
| RF signal cable<br>ETS-LINDGREN                    | 8D-FB            | Cable-CH1-02(RFC<br>-SMS-100-SMS-24)                              | Jun. 18, 2019       | Jun. 17, 2020           |
| Boresight Antenna Fixture                          | FBA-01           | FBA-SIP01                                                         | NA                  | NA                      |
| Software<br>BV ADT                                 | E3<br>8.130425b  | NA                                                                | NA                  | NA                      |
| Antenna Tower<br>MF                                | NA               | NA                                                                | NA                  | NA                      |
| Turn Table<br>MF                                   | NA               | NA                                                                | NA                  | NA                      |
| Antenna Tower & Turn<br>Table Controller<br>MF     | MF-7802          | NA                                                                | NA                  | NA                      |
| LTE Wireless<br>Communication Test Set<br>Keysight | E7515A           | MY57270629                                                        | Feb. 22, 2019       | Feb. 21, 2020           |
| Temperature & Humidity<br>Chamber                  | GTH-120-40-CP-AR | MAA1306-019                                                       | Sep. 05, 2018       | Sep. 04, 2019           |
| DC Power Supply<br>Topward                         | 33010D           | 807748                                                            | NA                  | NA                      |

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HsinTien Chamber 1.

### 3 General Information

#### 3.1 General Description of EUT

|                            |                                                                                                                                  |                     |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------|
| <b>Product</b>             | Multiple RF Home Gateway                                                                                                         |                     |
| <b>Brand</b>               | Sercomm, Scout                                                                                                                   |                     |
| <b>Test Model</b>          | NA502S-4G                                                                                                                        |                     |
| <b>Series Model</b>        | NA502S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "-", for marketing purpose) |                     |
| <b>Status of EUT</b>       | Engineering Sample                                                                                                               |                     |
| <b>Power Supply Rating</b> | 12.0 Vdc (Adapter)<br>7.5 Vdc (Li-ion battery)                                                                                   |                     |
| <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   |
|                            | LTE Band 13 (Channel Bandwidth: 5 MHz)                                                                                           | 779.5 ~ 784.5 MHz   |
|                            | LTE Band 13 (Channel Bandwidth: 10 MHz)                                                                                          | 782.0 MHz           |
| <b>Emission Designator</b> | LTE Band 4 (Channel Bandwidth: 1.4 MHz)                                                                                          | 1M09D7W             |
|                            | LTE Band 4 (Channel Bandwidth: 3 MHz)                                                                                            | 2M70G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 5 MHz)                                                                                            | 4M49D7W             |
|                            | LTE Band 4 (Channel Bandwidth: 10 MHz)                                                                                           | 8M97D7W             |
|                            | LTE Band 4 (Channel Bandwidth: 15 MHz)                                                                                           | 13M5G7D             |
|                            | LTE Band 4 (Channel Bandwidth: 20 MHz)                                                                                           | 18MOD7W             |
|                            | LTE Band 12 (Channel Bandwidth: 1.4 MHz)                                                                                         | 1M09D7W             |
|                            | LTE Band 12 (Channel Bandwidth: 3 MHz)                                                                                           | 2M70G7D             |
|                            | LTE Band 12 (Channel Bandwidth: 5 MHz)                                                                                           | 4M49D7W             |
|                            | LTE Band 12 (Channel Bandwidth: 10 MHz)                                                                                          | 8M98D7W             |
|                            | LTE Band 13 (Channel Bandwidth: 5 MHz)                                                                                           | 4M49D7W             |
|                            | LTE Band 13 (Channel Bandwidth: 10 MHz)                                                                                          | 8M98G7D             |
| <b>Max. ERP Power</b>      | LTE Band 12 (Channel Bandwidth: 1.4 MHz)                                                                                         | 126.74 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 3 MHz)                                                                                           | 127.91 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 5 MHz)                                                                                           | 129.09 mW           |
|                            | LTE Band 12 (Channel Bandwidth: 10 MHz)                                                                                          | 155.88 mW           |
|                            | LTE Band 13 (Channel Bandwidth: 5 MHz)                                                                                           | 101.18 mW           |
|                            | LTE Band 13 (Channel Bandwidth: 10 MHz)                                                                                          | 102.02 mW           |

|                            |                                         |           |
|----------------------------|-----------------------------------------|-----------|
| <b>Max. EIRP Power</b>     | LTE Band 4 (Channel Bandwidth: 1.4 MHz) | 233.88 mW |
|                            | LTE Band 4 (Channel Bandwidth: 3 MHz)   | 236.05 mW |
|                            | LTE Band 4 (Channel Bandwidth: 5 MHz)   | 238.23 mW |
|                            | LTE Band 4 (Channel Bandwidth: 10 MHz)  | 239.88 mW |
|                            | LTE Band 4 (Channel Bandwidth: 15 MHz)  | 242.10 mW |
|                            | LTE Band 4 (Channel Bandwidth: 20 MHz)  | 244.34 mW |
| <b>Antenna Type</b>        | PIFA Antenna                            |           |
| <b>Antenna Gain</b>        | LTE Band 4                              | 3.94 dBi  |
|                            | LTE Band 12                             | 2.12 dBi  |
|                            | LTE Band 13                             | 2.64 dBi  |
| <b>Accessory Device</b>    | Refer to Note as below                  |           |
| <b>Data Cable Supplied</b> | N/A                                     |           |

Note:

1. The EUT contains following accessory devices.

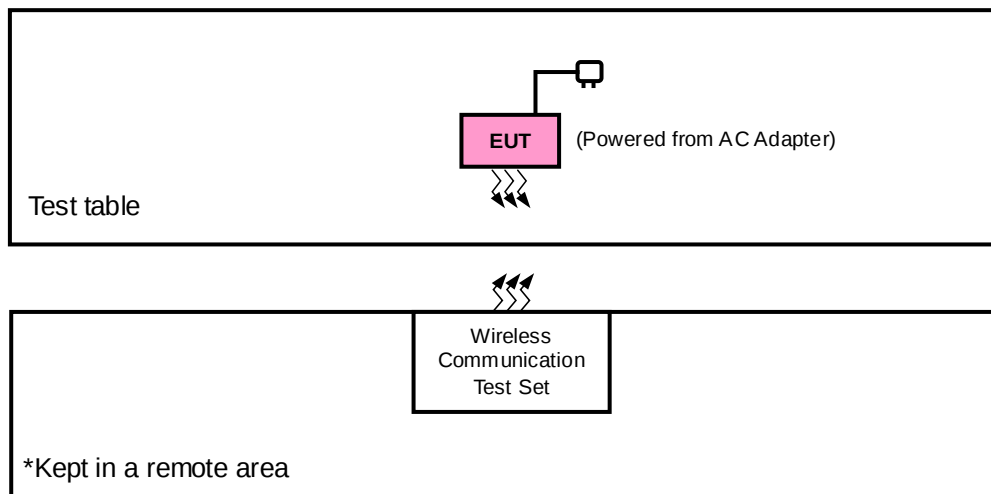
| Product   | Brand  | Model           | Description                                                                           |
|-----------|--------|-----------------|---------------------------------------------------------------------------------------|
| Adapter 1 | LEADER | MU24-Y120200-A1 | I/P: 100-240 Vac, 50-60 Hz, 0.7 A<br>O/P: 12.0 Vdc, 2 A<br>1.5m DC cable without core |
| Adapter 2 | APD    | WA-24Q12FU      | I/P: 100-240 Vac, 50-60 Hz, 0.7 A<br>O/P: 12.0 Vdc, 2 A<br>1.5m DC cable without core |
| Battery   | Simplo | NA50X           | Rating: 7.5 Vdc, 18 Wh<br>Capacity: 2500 mAh                                          |

\* We had pre-test on Adapter 1 and Adapter 2. The worst case was found on Adapter 1. Therefore, only Adapter 1 was as representative for final test.

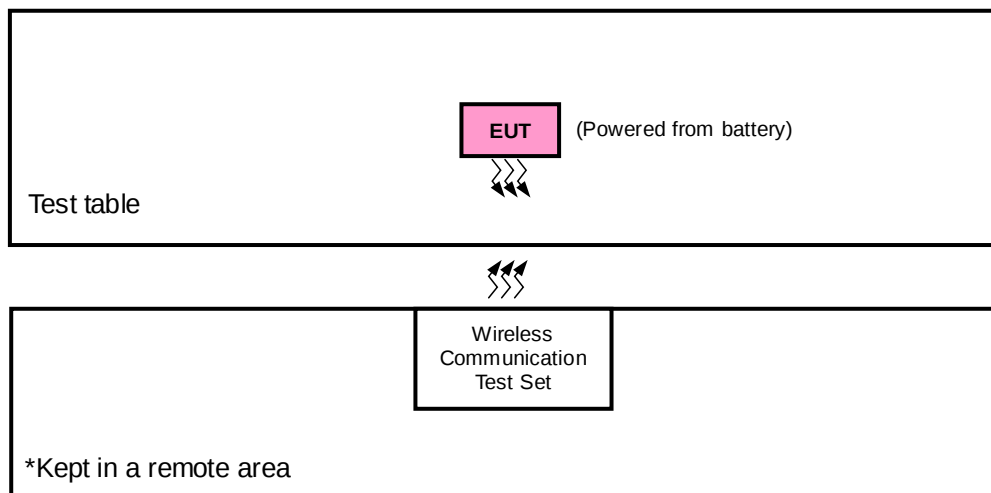
2. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

### 3.2 Configuration of System under Test

#### <Radiated Emission Test>



#### <E.R.P. / E.I.R.P. 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.

### 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, 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    | X- plane          |
| LTE Band 12 | X-plane    | X- plane          |
| LTE Band 13 | X-plane    | X- plane          |

#### 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, 16QAM | 1 RB / 0 RB Offset   |
|                    |                            | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                            | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
| -                  | Modulation Characteristics | 20050 to 20300    | 20175               | 20 MHz            | QPSK, 16QAM | 100 RB / 0 RB Offset |
| -                  | Frequency Stability        | 19957 to 20393    | 19957, 20393        | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset   |
|                    |                            | 19965 to 20385    | 19965, 20385        | 3 MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                            | 19975 to 20375    | 19975, 20375        | 5 MHz             | QPSK        | 1 RB / 0 RB Offset   |
|                    |                            | 20000 to 20350    | 20000, 20350        | 10 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                            | 20025 to 20325    | 20025, 20325        | 15 MHz            | QPSK        | 1 RB / 0 RB Offset   |
|                    |                            | 20050 to 20300    | 20050, 20300        | 20 MHz            | QPSK        | 1 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, 16QAM | 50 RB / 0 RB Offset  |
|                    |                            | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK, 16QAM | 75 RB / 0 RB Offset  |
|                    |                            | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK, 16QAM | 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, 16QAM | 1 RB / 0 RB Offset   |
|                    |                            | 20025 to 20325    | 20025, 20175, 20325 | 15 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset   |
|                    |                            | 20050 to 20300    | 20050, 20175, 20300 | 20 MHz            | QPSK, 16QAM | 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             | 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             | 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             | 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             | 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  |
| -                  | Conducted Emission | 20325             | 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             | 20300               | 20 MHz            | QPSK       | 1 RB / 99 RB Offset  |
|                    |                    |                   |                     |                   |            | 100 RB / 0 RB Offset |
| -                  | Radiated 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   |

**Note:**

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## 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, 16QAM | 1 RB / 0 RB Offset  |
| -                  | Modulation Characteristics | 23060 to 23130    | 23095               | 10 MHz            | QPSK, 16QAM | 50 RB / 0 RB Offset |
| -                  | Frequency Stability        | 23017 to 23173    | 23017, 23173        | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23025 to 23165    | 23025, 23165        | 3 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23035 to 23155    | 23035, 23155        | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23060 to 23130    | 23060, 23130        | 10 MHz            | QPSK        | 1 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, 16QAM | 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, 16QAM | 1 RB / 0 RB Offset  |
| -                  | Band Edge                  | 23017 to 23173    | 23017               | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            |                   | 23173               | 1.4 MHz           | QPSK        | 6 RB / 0 RB Offset  |
|                    |                            | 23025 to 23165    | 23025               | 3 MHz             | QPSK        | 1 RB / 5 RB Offset  |
|                    |                            |                   | 23165               | 3 MHz             | QPSK        | 6 RB / 0 RB Offset  |
|                    |                            | 23035 to 23155    | 23035               | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            |                   | 23155               | 5 MHz             | QPSK        | 15 RB / 0 RB Offset |
|                    |                            | 23060 to 23130    | 23060               | 10 MHz            | QPSK        | 1 RB / 14 RB Offset |
|                    |                            |                   | 23130               | 10 MHz            | QPSK        | 15 RB / 0 RB Offset |
|                    |                            | 23017 to 23173    | 23017               | 1.4 MHz           | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            |                   | 23173               | 1.4 MHz           | QPSK        | 25 RB / 0 RB Offset |
|                    |                            | 23025 to 23165    | 23025               | 3 MHz             | QPSK        | 1 RB / 24 RB Offset |
|                    |                            |                   | 23165               | 3 MHz             | QPSK        | 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:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

## LTE Band 13

| EUT Configure Mode | Test Item                  | Available Channel | Tested Channel      | Channel Bandwidth | Modulation  | Mode                |
|--------------------|----------------------------|-------------------|---------------------|-------------------|-------------|---------------------|
| -                  | ERP                        | 23205 to 23255    | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset  |
| -                  | Modulation Characteristics | 23230             | 23230               | 10 MHz            | QPSK, 16QAM | 50 RB / 0 RB Offset |
| -                  | Frequency Stability        | 23205 to 23255    | 23205, 23255        | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
| -                  | Occupied Bandwidth         | 23205 to 23255    | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM | 25 RB / 0 RB Offset |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK, 16QAM | 50 RB / 0 RB Offset |
| -                  | Peak to Average Ratio      | 23205 to 23255    | 23205, 23230, 23255 | 5 MHz             | QPSK, 16QAM | 1 RB / 0 RB Offset  |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK, 16QAM | 1 RB / 0 RB Offset  |
| -                  | Band Edge                  | 23205 to 23255    | 23205               | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            |                   |                     |                   |             | 25 RB / 0 RB Offset |
|                    |                            | 23255             | 23255               | 5 MHz             | QPSK        | 1 RB / 24 RB Offset |
|                    |                            |                   |                     |                   |             | 25 RB / 0 RB Offset |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            |                   |                     |                   |             | 50 RB / 0 RB Offset |
| -                  | Conducted Emission         | 23205 to 23255    | 23205, 23230, 23255 | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |
| -                  | Radiated Emission          | 23205 to 23255    | 23205, 23230, 23255 | 5 MHz             | QPSK        | 1 RB / 0 RB Offset  |
|                    |                            | 23230             | 23230               | 10 MHz            | QPSK        | 1 RB / 0 RB Offset  |

### Note:

1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.
2. For radiated emission above 1 GHz, according to 3GPP 36.521 Section 6.6.3.1.4, choose the lowest, 5 MHz & highest channel bandwidth for final test.

### Test Condition:

| Test Item                  | Environmental Conditions | Input Power    | Tested By               |
|----------------------------|--------------------------|----------------|-------------------------|
| ERP / EIRP                 | 25 deg. C, 65 % RH       | 7.5 Vdc        | Karl Lee                |
| Modulation Characteristics | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Frequency Stability        | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Occupied Bandwidth         | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Band Edge                  | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Peak to Average Ratio      | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Conducted Emission         | 25 deg. C, 65 % RH       | 7.5 Vdc        | Gavin Wu                |
| Radiated Emission          | 25 deg. C, 65 % RH       | 120 Vac, 60 Hz | Karl Lee, Charles Hsiao |

### **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 and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

Portable stations (hand-held devices) operating in the 746-757 MHz, 776-788 MHz and 805-806 MHz band are limited to 3 watts ERP

Portable stations (hand-held device) operating in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink 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,  $E.R.P \text{ power} = E.I.R.P \text{ power} - 2.15 \text{ dB}$ .

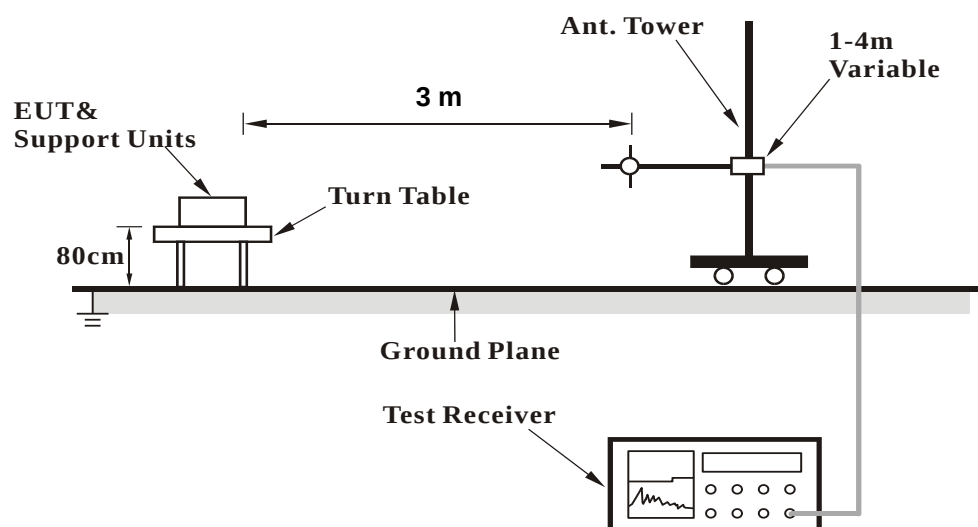
##### **Conducted Power Measurement:**

- 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.

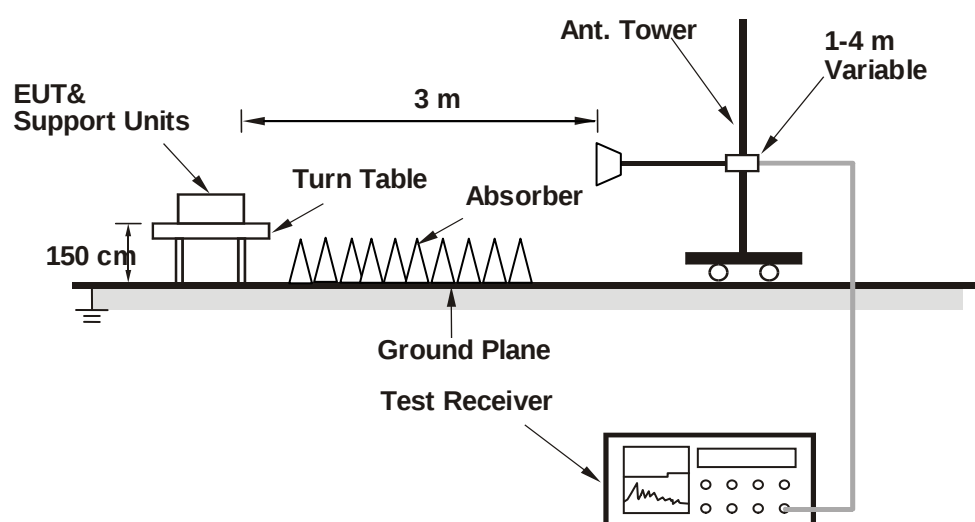
#### 4.1.3 Test Setup

##### EIRP / ERP Measurement:

<Radiated Emission below or equal 1 GHz>

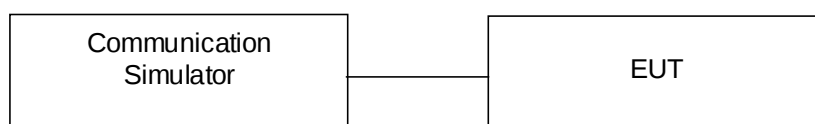


<Radiated Emission above 1 GHz>



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         | 22.42        | 22.35        | <b>22.54</b>  | 0             | 21.41        | 21.39        | <b>21.50</b>  | 1             |
|           | 1       | 2         | 22.35        | 22.31        | 22.47         | 0             | 21.29        | 21.29        | 21.37         | 1             |
|           | 1       | 5         | 22.28        | 22.24        | 22.44         | 0             | 21.32        | 21.23        | 21.39         | 1             |
|           | 3       | 0         | 22.21        | 22.20        | 22.38         | 0             | 21.22        | 21.23        | 21.24         | 1             |
|           | 3       | 1         | 22.17        | 22.13        | 22.32         | 0             | 21.20        | 21.16        | 21.24         | 1             |
|           | 3       | 3         | 22.13        | 22.08        | 22.27         | 0             | 21.11        | 21.06        | 21.20         | 1             |
|           | 6       | 0         | 21.28        | 21.25        | 21.38         | 1             | 20.22        | 20.15        | 20.28         | 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         | 22.53        | 22.41        | <b>22.61</b>  | 0             | 21.39        | 21.31        | <b>21.60</b>  | 1             |
|           | 1       | 7         | 22.37        | 22.29        | 22.48         | 0             | 21.29        | 21.24        | 21.44         | 1             |
|           | 1       | 14        | 22.26        | 22.00        | 22.40         | 0             | 21.10        | 21.07        | 21.19         | 1             |
|           | 8       | 0         | 21.26        | 21.28        | 21.47         | 1             | 20.31        | 20.13        | 20.33         | 2             |
|           | 8       | 3         | 21.10        | 21.13        | 21.21         | 1             | 20.10        | 20.05        | 20.29         | 2             |
|           | 8       | 7         | 21.11        | 21.05        | 21.28         | 1             | 20.17        | 19.85        | 20.08         | 2             |
|           | 15      | 0         | 21.34        | 21.25        | 21.42         | 1             | 20.30        | 20.24        | 20.31         | 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         | 22.47        | 22.41        | <b>22.73</b>  | 0             | 21.48        | 21.44        | <b>21.63</b>  | 1             |
|           | 1       | 12        | 22.41        | 22.35        | 22.60         | 0             | 21.44        | 21.25        | 21.44         | 1             |
|           | 1       | 24        | 22.17        | 22.27        | 22.41         | 0             | 21.27        | 21.02        | 21.38         | 1             |
|           | 12      | 0         | 21.41        | 21.32        | 21.44         | 1             | 20.32        | 20.21        | 20.35         | 2             |
|           | 12      | 6         | 21.17        | 21.15        | 21.36         | 1             | 20.21        | 20.01        | 20.27         | 2             |
|           | 12      | 13        | 21.10        | 21.08        | 21.28         | 1             | 20.13        | 20.01        | 20.14         | 2             |
|           | 25      | 0         | 21.46        | 21.33        | 21.63         | 1             | 20.34        | 20.18        | 20.50         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20000 | Mid Ch 20175 | High Ch 20350 |               | Low Ch 20000 | Mid Ch 20175 | High Ch 20350 |               |
|           |         |           | 1715.0 MHz   | 1732.5 MHz   | 1750.0 MHz    |               | 1715.0 MHz   | 1732.5 MHz   | 1750.0 MHz    |               |
| 4 / 10M   | 1       | 0         | 22.60        | 22.53        | <b>22.75</b>  | 0             | 21.52        | 21.46        | <b>21.65</b>  | 1             |
|           | 1       | 24        | 22.52        | 22.38        | 22.67         | 0             | 21.40        | 21.37        | 21.54         | 1             |
|           | 1       | 49        | 22.29        | 22.14        | 22.37         | 0             | 21.29        | 21.27        | 21.47         | 1             |
|           | 25      | 0         | 21.51        | 21.34        | 21.58         | 1             | 20.28        | 20.22        | 20.37         | 2             |
|           | 25      | 12        | 21.33        | 21.16        | 21.41         | 1             | 20.22        | 20.16        | 20.35         | 2             |
|           | 25      | 25        | 21.21        | 21.10        | 21.30         | 1             | 20.08        | 19.99        | 20.25         | 2             |
|           | 50      | 0         | 21.51        | 21.43        | 21.62         | 1             | 20.39        | 20.34        | 20.56         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20025 | Mid Ch 20175 | High Ch 20325 |               | Low Ch 20025 | Mid Ch 20175 | High Ch 20325 |               |
|           |         |           | 1717.5 MHz   | 1732.5 MHz   | 1747.5 MHz    |               | 1717.5 MHz   | 1732.5 MHz   | 1747.5 MHz    |               |
| 4 / 15M   | 1       | 0         | 22.64        | 22.59        | <b>22.75</b>  | 0             | 21.54        | 21.51        | <b>21.73</b>  | 1             |
|           | 1       | 37        | 22.50        | 22.48        | 22.63         | 0             | 21.51        | 21.47        | 21.56         | 1             |
|           | 1       | 74        | 22.41        | 22.32        | 22.44         | 0             | 21.27        | 21.25        | 21.40         | 1             |
|           | 36      | 0         | 21.53        | 21.44        | 21.65         | 1             | 20.54        | 20.35        | 20.43         | 2             |
|           | 36      | 19        | 21.32        | 21.22        | 21.43         | 1             | 20.28        | 20.18        | 20.27         | 2             |
|           | 36      | 39        | 21.17        | 21.09        | 21.31         | 1             | 20.22        | 20.08        | 20.28         | 2             |
|           | 75      | 0         | 21.45        | 21.41        | 21.64         | 1             | 20.39        | 20.43        | 20.54         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 20050 | Mid Ch 20175 | High Ch 20300 |               | Low Ch 20050 | Mid Ch 20175 | High Ch 20300 |               |
|           |         |           | 1720.0 MHz   | 1732.5 MHz   | 1745.0 MHz    |               | 1720.0 MHz   | 1732.5 MHz   | 1745.0 MHz    |               |
| 4 / 20M   | 1       | 0         | 22.71        | 22.62        | <b>22.82</b>  | 0             | 21.63        | 21.57        | <b>21.78</b>  | 1             |
|           | 1       | 50        | 22.58        | 22.50        | 22.68         | 0             | 21.53        | 21.45        | 21.67         | 1             |
|           | 1       | 99        | 22.39        | 22.24        | 22.59         | 0             | 21.39        | 21.32        | 21.52         | 1             |
|           | 50      | 0         | 21.62        | 21.46        | 21.72         | 1             | 20.40        | 20.46        | 20.58         | 2             |
|           | 50      | 25        | 21.43        | 21.24        | 21.55         | 1             | 20.40        | 20.25        | 20.45         | 2             |
|           | 50      | 50        | 21.36        | 21.13        | 21.40         | 1             | 20.20        | 20.22        | 20.32         | 2             |
|           | 100     | 0         | 21.58        | 21.52        | 21.66         | 1             | 20.41        | 20.51        | 20.54         | 2             |

| 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         | 22.95        | 22.83        | 22.89         | 0             | 21.94        | 21.73        | 21.84         | 1             |
|           | 1       | 2         | 22.89        | 22.79        | 22.82         | 0             | 21.92        | 21.74        | 21.76         | 1             |
|           | 1       | 5         | 22.86        | 22.72        | 22.77         | 0             | 21.91        | 21.60        | 21.69         | 1             |
|           | 3       | 0         | 22.83        | 22.64        | 22.73         | 0             | 21.78        | 21.59        | 21.64         | 1             |
|           | 3       | 1         | 22.75        | 22.59        | 22.66         | 0             | 21.73        | 21.54        | 21.61         | 1             |
|           | 3       | 3         | 22.69        | 22.55        | 22.58         | 0             | 21.68        | 21.44        | 21.53         | 1             |
|           | 6       | 0         | 21.77        | 21.62        | 21.77         | 1             | 20.70        | 20.55        | 20.59         | 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         | 23.05        | 22.85        | 22.90         | 0             | 21.95        | 21.76        | 21.74         | 1             |
|           | 1       | 7         | 22.87        | 22.72        | 22.76         | 0             | 21.91        | 21.65        | 21.61         | 1             |
|           | 1       | 14        | 22.77        | 22.54        | 22.53         | 0             | 21.66        | 21.47        | 21.47         | 1             |
|           | 8       | 0         | 21.83        | 21.67        | 21.74         | 1             | 20.79        | 20.50        | 20.67         | 2             |
|           | 8       | 3         | 21.62        | 21.55        | 21.60         | 1             | 20.65        | 20.51        | 20.59         | 2             |
|           | 8       | 7         | 21.66        | 21.41        | 21.58         | 1             | 20.51        | 20.38        | 20.44         | 2             |
|           | 15      | 0         | 21.79        | 21.67        | 21.76         | 1             | 20.80        | 20.54        | 20.56         | 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         | 23.11        | 23.00        | 23.02         | 0             | 22.11        | 21.88        | 21.98         | 1             |
|           | 1       | 12        | 22.99        | 22.83        | 22.92         | 0             | 21.92        | 21.79        | 21.81         | 1             |
|           | 1       | 24        | 22.77        | 22.55        | 22.79         | 0             | 21.67        | 21.63        | 21.65         | 1             |
|           | 12      | 0         | 22.08        | 21.81        | 21.92         | 1             | 20.95        | 20.71        | 20.81         | 2             |
|           | 12      | 6         | 21.84        | 21.57        | 21.66         | 1             | 20.72        | 20.53        | 20.54         | 2             |
|           | 12      | 13        | 21.75        | 21.45        | 21.56         | 1             | 20.69        | 20.42        | 20.51         | 2             |
|           | 25      | 0         | 21.98        | 21.76        | 21.78         | 1             | 20.94        | 20.86        | 20.69         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23060 | Mid Ch 23095 | High Ch 23130 |               | Low Ch 23060 | Mid Ch 23095 | High Ch 23130 |               |
|           |         |           | 704.0 MHz    | 707.5 MHz    | 711.0 MHz     |               | 704.0 MHz    | 707.5 MHz    | 711.0 MHz     |               |
| 12 / 10M  | 1       | 0         | 23.24        | 23.06        | 23.11         | 0             | 22.19        | 22.05        | 22.09         | 1             |
|           | 1       | 24        | 23.12        | 22.95        | 22.95         | 0             | 22.05        | 21.83        | 21.99         | 1             |
|           | 1       | 49        | 22.86        | 22.74        | 22.81         | 0             | 21.96        | 21.75        | 21.82         | 1             |
|           | 25      | 0         | 22.10        | 21.94        | 22.00         | 1             | 20.97        | 20.89        | 20.98         | 2             |
|           | 25      | 12        | 21.92        | 21.72        | 21.80         | 1             | 20.87        | 20.73        | 20.77         | 2             |
|           | 25      | 25        | 21.87        | 21.61        | 21.67         | 1             | 20.75        | 20.59        | 20.67         | 2             |
|           | 50      | 0         | 22.03        | 21.97        | 21.95         | 1             | 21.08        | 20.81        | 20.92         | 2             |

| Band / BW | RB Size | RB Offset | QPSK         |              |               | 3GPP MPR (dB) | 16QAM        |              |               | 3GPP MPR (dB) |
|-----------|---------|-----------|--------------|--------------|---------------|---------------|--------------|--------------|---------------|---------------|
|           |         |           | Low Ch 23205 | Mid Ch 23230 | High Ch 23255 |               | Low Ch 23205 | Mid Ch 23230 | High Ch 23255 |               |
|           |         |           | 779.5 MHz    | 782.0 MHz    | 784.5 MHz     |               | 779.5 MHz    | 782.0 MHz    | 784.5 MHz     |               |
| 13 / 5M   | 1       | 0         | 22.74        | <b>22.92</b> | 22.76         | 0             | 21.66        | <b>21.86</b> | 21.75         | 1             |
|           | 1       | 12        | 22.65        | 22.80        | 22.64         | 0             | 21.62        | 21.80        | 21.58         | 1             |
|           | 1       | 24        | 22.40        | 22.64        | 22.54         | 0             | 21.43        | 21.64        | 21.53         | 1             |
|           | 12      | 0         | 21.65        | 21.80        | 21.63         | 1             | 20.49        | 20.71        | 20.49         | 2             |
|           | 12      | 6         | 21.43        | 21.59        | 21.41         | 1             | 20.38        | 20.59        | 20.35         | 2             |
|           | 12      | 13        | 21.37        | 21.57        | 21.34         | 1             | 20.35        | 20.53        | 20.29         | 2             |
|           | 25      | 0         | 21.62        | 21.75        | 21.65         | 1             | 20.52        | 20.74        | 20.47         | 2             |

| Band /<br>BW | RB<br>Size | RB<br>Offset | QPSK            | 3GPP<br>MPR<br>(dB) | 16QAM           | 3GPP<br>MPR<br>(dB) |
|--------------|------------|--------------|-----------------|---------------------|-----------------|---------------------|
|              |            |              | Mid Ch<br>23230 |                     | Mid Ch<br>23230 |                     |
|              |            |              | 782.0<br>MHz    |                     | 782.0<br>MHz    |                     |
| 13 / 10M     | 1          | 0            | 22.52           | 0                   | 21.50           | 1                   |
|              | 1          | 24           | 22.40           | 0                   | 21.33           | 1                   |
|              | 1          | 49           | 22.24           | 0                   | 21.11           | 1                   |
|              | 25         | 0            | 21.36           | 1                   | 20.30           | 2                   |
|              | 25         | 12           | 21.19           | 1                   | 20.20           | 2                   |
|              | 25         | 25           | 21.05           | 1                   | 20.07           | 2                   |
|              | 50         | 0            | 21.40           | 1                   | 20.33           | 2                   |

# 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) |
| X                                  | 23017   | 699.7           | -9.54         | 32.719                 | 21.03     | 126.74   | H                  |
|                                    | 23095   | 707.5           | -9.69         | 32.736                 | 20.90     | 122.91   |                    |
|                                    | 23173   | 715.3           | -9.48         | 32.591                 | 20.96     | 124.77   |                    |
|                                    | 23017   | 699.7           | -14.56        | 32.69                  | 15.98     | 39.63    | V                  |
|                                    | 23095   | 707.5           | -14.79        | 32.81                  | 15.87     | 38.64    |                    |
|                                    | 23173   | 715.3           | -14.66        | 32.74                  | 15.93     | 39.17    |                    |
| Channel Bandwidth: 1.4 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| X                                  | 23017   | 699.7           | -10.55        | 32.719                 | 20.02     | 100.44   | H                  |
|                                    | 23095   | 707.5           | -10.70        | 32.736                 | 19.89     | 97.41    |                    |
|                                    | 23173   | 715.3           | -10.49        | 32.591                 | 19.95     | 98.88    |                    |
|                                    | 23017   | 699.7           | -15.56        | 32.69                  | 14.98     | 31.48    | V                  |
|                                    | 23095   | 707.5           | -15.79        | 32.81                  | 14.87     | 30.69    |                    |
|                                    | 23173   | 715.3           | -15.67        | 32.74                  | 14.92     | 31.05    |                    |

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) |
| X                                | 23025   | 700.5           | -9.50         | 32.719                 | 21.07     | 127.91   | H                  |
|                                  | 23095   | 707.5           | -9.64         | 32.736                 | 20.95     | 124.34   |                    |
|                                  | 23165   | 714.5           | -9.44         | 32.591                 | 21.00     | 125.92   |                    |
|                                  | 23025   | 700.5           | -14.52        | 32.69                  | 16.02     | 39.99    | V                  |
|                                  | 23095   | 707.5           | -14.75        | 32.81                  | 15.91     | 38.99    |                    |
|                                  | 23165   | 714.5           | -14.63        | 32.74                  | 15.96     | 39.45    |                    |
| Channel Bandwidth: 3 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| X                                | 23025   | 700.5           | -10.51        | 32.719                 | 20.06     | 101.37   | H                  |
|                                  | 23095   | 707.5           | -10.65        | 32.736                 | 19.94     | 98.54    |                    |
|                                  | 23165   | 714.5           | -10.45        | 32.591                 | 19.99     | 99.79    |                    |
|                                  | 23025   | 700.5           | -15.52        | 32.69                  | 15.02     | 31.77    | V                  |
|                                  | 23095   | 707.5           | -15.75        | 32.81                  | 14.91     | 30.97    |                    |
|                                  | 23165   | 714.5           | -15.63        | 32.74                  | 14.96     | 31.33    |                    |

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) |
| X                                | 23035   | 701.5           | -9.46         | 32.719                 | 21.11     | 129.09   | H                  |
|                                  | 23095   | 707.5           | -9.60         | 32.736                 | 20.99     | 125.49   |                    |
|                                  | 23155   | 713.5           | -9.40         | 32.591                 | 21.04     | 127.09   |                    |
|                                  | 23035   | 701.5           | -14.48        | 32.69                  | 16.06     | 40.36    | V                  |
|                                  | 23095   | 707.5           | -14.72        | 32.81                  | 15.94     | 39.26    |                    |
|                                  | 23155   | 713.5           | -14.59        | 32.74                  | 16.00     | 39.81    |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| X                                | 23035   | 701.5           | -10.46        | 32.719                 | 20.11     | 102.54   | H                  |
|                                  | 23095   | 707.5           | -10.61        | 32.736                 | 19.98     | 99.45    |                    |
|                                  | 23155   | 713.5           | -10.41        | 32.591                 | 20.03     | 100.72   |                    |
|                                  | 23035   | 701.5           | -15.49        | 32.69                  | 15.05     | 31.99    | V                  |
|                                  | 23095   | 707.5           | -15.72        | 32.81                  | 14.94     | 31.19    |                    |
|                                  | 23155   | 713.5           | -15.60        | 32.74                  | 14.99     | 31.55    |                    |

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) |
| X                                 | 23060   | 704.0           | -9.42         | 32.727                 | 21.16     | 130.53        | H                  |
|                                   | 23095   | 707.5           | -9.56         | 32.739                 | 21.03     | 126.74        |                    |
|                                   | 23130   | 711.0           | -8.65         | 32.728                 | 21.93     | <b>155.88</b> |                    |
|                                   | 23060   | 704.0           | -14.50        | 32.75                  | 16.10     | 40.74         | V                  |
|                                   | 23095   | 707.5           | -14.68        | 32.81                  | 15.98     | 39.63         |                    |
|                                   | 23130   | 711.0           | -14.65        | 32.84                  | 16.04     | 40.18         |                    |
| Channel Bandwidth: 10 MHz / 16QAM |         |                 |               |                        |           |               |                    |
| X                                 | 23060   | 704.0           | -10.43        | 32.727                 | 20.15     | 103.44        | H                  |
|                                   | 23095   | 707.5           | -10.57        | 32.739                 | 20.02     | 100.44        |                    |
|                                   | 23130   | 711.0           | -10.01        | 32.728                 | 20.57     | 113.97        |                    |
|                                   | 23060   | 704.0           | -15.50        | 32.75                  | 15.10     | 32.36         | V                  |
|                                   | 23095   | 707.5           | -15.69        | 32.81                  | 14.97     | 31.41         |                    |
|                                   | 23130   | 711.0           | -15.65        | 32.84                  | 15.04     | 31.92         |                    |

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

| LTE Band 13                      |         |                 |               |                        |           |          |                    |
|----------------------------------|---------|-----------------|---------------|------------------------|-----------|----------|--------------------|
| Channel Bandwidth: 5 MHz / QPSK  |         |                 |               |                        |           |          |                    |
| Plane                            | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW) | Polarization (H/V) |
| X                                | 23205   | 779.5           | -10.79        | 32.771                 | 19.83     | 96.18    | H                  |
|                                  | 23230   | 782.0           | -10.54        | 32.741                 | 20.05     | 101.18   |                    |
|                                  | 23255   | 784.5           | -10.84        | 32.854                 | 19.86     | 96.92    |                    |
|                                  | 23205   | 779.5           | -18.57        | 32.5                   | 11.78     | 15.07    | V                  |
|                                  | 23230   | 782.0           | -18.35        | 32.52                  | 12.02     | 15.92    |                    |
|                                  | 23255   | 784.5           | -18.65        | 32.62                  | 11.82     | 15.21    |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |               |                        |           |          |                    |
| X                                | 23205   | 779.5           | -11.80        | 32.771                 | 18.82     | 76.23    | H                  |
|                                  | 23230   | 782.0           | -11.54        | 32.741                 | 19.05     | 80.37    |                    |
|                                  | 23255   | 784.5           | -11.85        | 32.854                 | 18.85     | 76.81    |                    |
|                                  | 23205   | 779.5           | -19.57        | 32.5                   | 10.78     | 11.97    | V                  |
|                                  | 23230   | 782.0           | -19.36        | 32.52                  | 11.01     | 12.62    |                    |
|                                  | 23255   | 784.5           | -19.65        | 32.62                  | 10.82     | 12.08    |                    |

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

| LTE Band 13                       |         |                 |               |                        |           |               |                    |
|-----------------------------------|---------|-----------------|---------------|------------------------|-----------|---------------|--------------------|
| Channel Bandwidth: 10 MHz / QPSK  |         |                 |               |                        |           |               |                    |
| Plane                             | Channel | Frequency (MHz) | Reading (dBm) | Correction Factor (dB) | ERP (dBm) | ERP (mW)      | Polarization (H/V) |
| X                                 | 23230   | 782.0           | -10.50        | 32.737                 | 20.09     | <b>102.02</b> | H                  |
|                                   | 23230   | 782.0           | -18.32        | 32.52                  | 12.05     | 16.03         | V                  |
| Channel Bandwidth: 10 MHz / 16QAM |         |                 |               |                        |           |               |                    |
| X                                 | 23230   | 782.0           | -11.47        | 32.737                 | 19.12     | 81.60         | H                  |
|                                   | 23230   | 782.0           | -19.33        | 32.52                  | 11.04     | 12.71         | V                  |

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          | -18.89        | 42.49                  | 23.60      | 228.82        | H                  |
|                                    | 20175   | 1732.5          | -18.82        | 42.33                  | 23.51      | 224.23        |                    |
|                                    | 20393   | 1754.3          | -18.41        | 42.10                  | 23.69      | <b>233.88</b> |                    |
|                                    | 19957   | 1710.7          | -25.48        | 42.99                  | 17.51      | 56.36         | V                  |
|                                    | 20175   | 1732.5          | -25.26        | 42.74                  | 17.48      | 55.98         |                    |
|                                    | 20393   | 1754.3          | -24.57        | 42.21                  | 17.64      | 58.08         |                    |
| Channel Bandwidth: 1.4 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                  | 19957   | 1710.7          | -19.89        | 42.49                  | 22.60      | 181.76        | H                  |
|                                    | 20175   | 1732.5          | -19.82        | 42.33                  | 22.51      | 178.11        |                    |
|                                    | 20393   | 1754.3          | -19.41        | 42.10                  | 22.69      | 185.78        |                    |
|                                    | 19957   | 1710.7          | -26.48        | 42.99                  | 16.51      | 44.77         | V                  |
|                                    | 20175   | 1732.5          | -26.27        | 42.74                  | 16.47      | 44.36         |                    |
|                                    | 20393   | 1754.3          | -25.58        | 42.21                  | 16.63      | 46.03         |                    |

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          | -18.85        | 42.49                  | 23.64      | 230.94        | H                  |
|                                  | 20175   | 1732.5          | -18.78        | 42.33                  | 23.55      | 226.31        |                    |
|                                  | 20385   | 1753.5          | -18.37        | 42.10                  | 23.73      | <b>236.05</b> |                    |
|                                  | 19965   | 1711.5          | -25.44        | 42.99                  | 17.55      | 56.89         | V                  |
|                                  | 20175   | 1732.5          | -25.24        | 42.74                  | 17.50      | 56.23         |                    |
|                                  | 20385   | 1753.5          | -24.53        | 42.21                  | 17.68      | 58.61         |                    |
| Channel Bandwidth: 3 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                | 19965   | 1711.5          | -19.85        | 42.49                  | 22.64      | 183.44        | H                  |
|                                  | 20175   | 1732.5          | -19.79        | 42.33                  | 22.54      | 179.35        |                    |
|                                  | 20385   | 1753.5          | -19.38        | 42.10                  | 22.72      | 187.07        |                    |
|                                  | 19965   | 1711.5          | -26.44        | 42.99                  | 16.55      | 45.19         | V                  |
|                                  | 20175   | 1732.5          | -26.25        | 42.74                  | 16.49      | 44.57         |                    |
|                                  | 20385   | 1753.5          | -25.53        | 42.21                  | 16.68      | 46.56         |                    |

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          | -18.81        | 42.49                  | 23.68      | 233.08        | H                  |
|                                  | 20175   | 1732.5          | -18.74        | 42.33                  | 23.59      | 228.40        |                    |
|                                  | 20375   | 1752.5          | -18.33        | 42.10                  | 23.77      | <b>238.23</b> |                    |
|                                  | 19975   | 1712.5          | -25.40        | 42.99                  | 17.59      | 57.41         | V                  |
|                                  | 20175   | 1732.5          | -25.20        | 42.74                  | 17.54      | 56.75         |                    |
|                                  | 20375   | 1752.5          | -24.50        | 42.21                  | 17.71      | 59.02         |                    |
| Channel Bandwidth: 5 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                | 19975   | 1712.5          | -19.82        | 42.49                  | 22.67      | 184.71        | H                  |
|                                  | 20175   | 1732.5          | -19.75        | 42.33                  | 22.58      | 181.01        |                    |
|                                  | 20375   | 1752.5          | -19.34        | 42.10                  | 22.76      | 188.80        |                    |
|                                  | 19975   | 1712.5          | -26.40        | 42.99                  | 16.59      | 45.60         | V                  |
|                                  | 20175   | 1732.5          | -26.21        | 42.74                  | 16.53      | 44.98         |                    |
|                                  | 20375   | 1752.5          | -25.51        | 42.21                  | 16.70      | 46.77         |                    |

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          | -18.77        | 42.49                  | 23.72      | 235.23        | H                  |
|                                   | 20175   | 1732.5          | -18.70        | 42.33                  | 23.63      | 230.52        |                    |
|                                   | 20350   | 1750.0          | -18.30        | 42.10                  | 23.80      | <b>239.88</b> |                    |
|                                   | 20000   | 1715.0          | -25.36        | 42.99                  | 17.63      | 57.94         | V                  |
|                                   | 20175   | 1732.5          | -25.17        | 42.74                  | 17.57      | 57.15         |                    |
|                                   | 20350   | 1750.0          | -24.46        | 42.21                  | 17.75      | 59.57         |                    |
| Channel Bandwidth: 10 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                 | 20000   | 1715.0          | -19.78        | 42.49                  | 22.71      | 186.42        | H                  |
|                                   | 20175   | 1732.5          | -19.71        | 42.33                  | 22.62      | 182.68        |                    |
|                                   | 20350   | 1750.0          | -19.30        | 42.10                  | 22.80      | 190.55        |                    |
|                                   | 20000   | 1715.0          | -26.36        | 42.99                  | 16.63      | 46.03         | V                  |
|                                   | 20175   | 1732.5          | -26.18        | 42.74                  | 16.56      | 45.29         |                    |
|                                   | 20350   | 1750.0          | -25.46        | 42.21                  | 16.75      | 47.32         |                    |

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          | -18.73        | 42.49                  | 23.76      | 237.41        | H                  |
|                                   | 20175   | 1732.5          | -18.66        | 42.33                  | 23.67      | 232.65        |                    |
|                                   | 20325   | 1747.5          | -18.26        | 42.10                  | 23.84      | <b>242.10</b> |                    |
|                                   | 20025   | 1717.5          | -25.32        | 42.99                  | 17.67      | 58.48         | V                  |
|                                   | 20175   | 1732.5          | -25.13        | 42.74                  | 17.61      | 57.68         |                    |
|                                   | 20325   | 1747.5          | -24.42        | 42.21                  | 17.79      | 60.12         |                    |
| Channel Bandwidth: 15 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                 | 20025   | 1717.5          | -19.73        | 42.49                  | 22.76      | 188.58        | H                  |
|                                   | 20175   | 1732.5          | -19.67        | 42.33                  | 22.66      | 184.37        |                    |
|                                   | 20325   | 1747.5          | -19.26        | 42.10                  | 22.84      | 192.31        |                    |
|                                   | 20025   | 1717.5          | -26.32        | 42.99                  | 16.67      | 46.45         | V                  |
|                                   | 20175   | 1732.5          | -26.14        | 42.74                  | 16.60      | 45.71         |                    |
|                                   | 20325   | 1747.5          | -25.43        | 42.21                  | 16.78      | 47.64         |                    |

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          | -18.69        | 42.49                  | 23.80      | 239.61        | H                  |
|                                   | 20175   | 1732.5          | -18.62        | 42.33                  | 23.71      | 234.80        |                    |
|                                   | 20300   | 1745.0          | -18.22        | 42.10                  | 23.88      | <b>244.34</b> |                    |
|                                   | 20050   | 1720.0          | -25.28        | 42.99                  | 17.71      | 59.02         | V                  |
|                                   | 20175   | 1732.5          | -25.10        | 42.74                  | 17.64      | 58.08         |                    |
|                                   | 20300   | 1745.0          | -24.38        | 42.21                  | 17.83      | 60.67         |                    |
| Channel Bandwidth: 20 MHz / 16QAM |         |                 |               |                        |            |               |                    |
| X                                 | 20050   | 1720.0          | -19.70        | 42.49                  | 22.79      | 189.89        | H                  |
|                                   | 20175   | 1732.5          | -19.62        | 42.33                  | 22.71      | 186.51        |                    |
|                                   | 20300   | 1745.0          | -19.23        | 42.10                  | 22.87      | 193.64        |                    |
|                                   | 20050   | 1720.0          | -26.28        | 42.99                  | 16.71      | 46.88         | V                  |
|                                   | 20175   | 1732.5          | -26.11        | 42.74                  | 16.63      | 46.03         |                    |
|                                   | 20300   | 1745.0          | -25.38        | 42.21                  | 16.83      | 48.19         |                    |

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

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

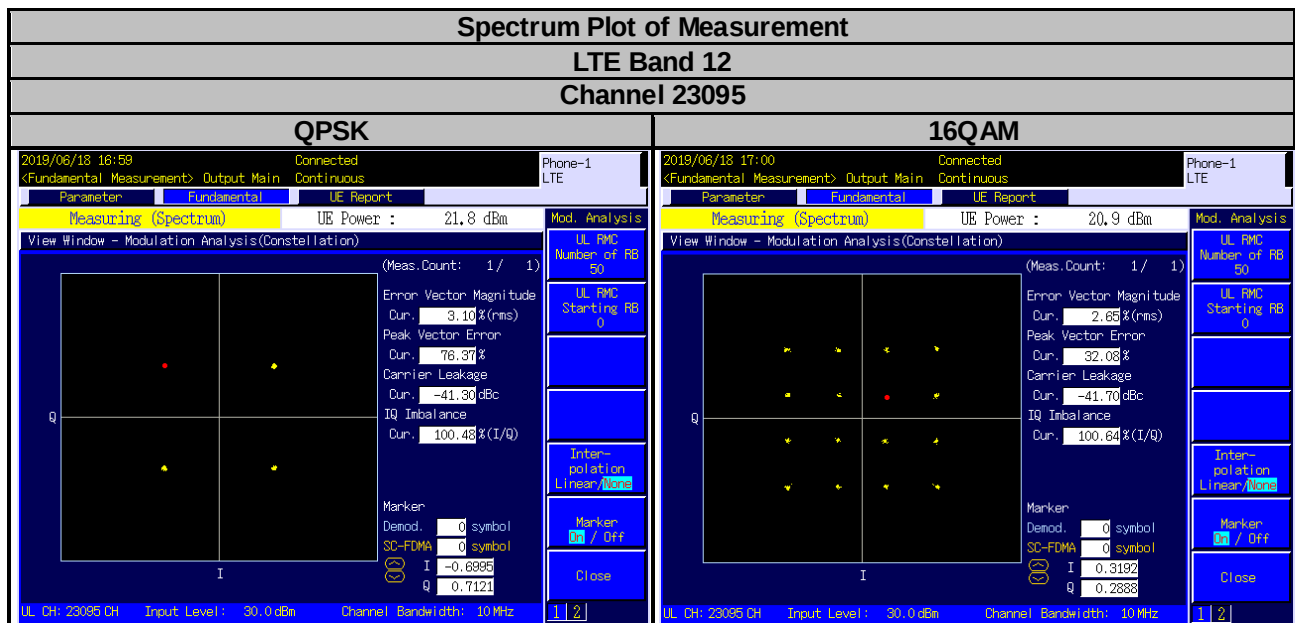
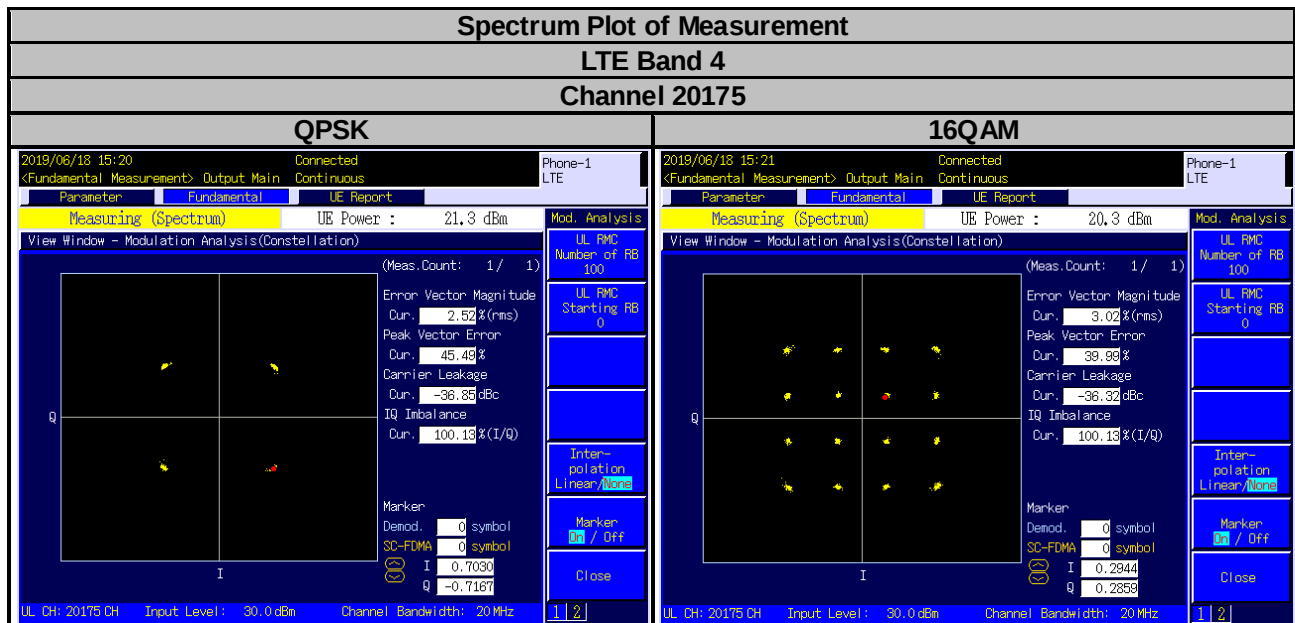
### 4.2.2 Test Setup



### 4.2.3 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector. The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

#### 4.2.4 Test Results



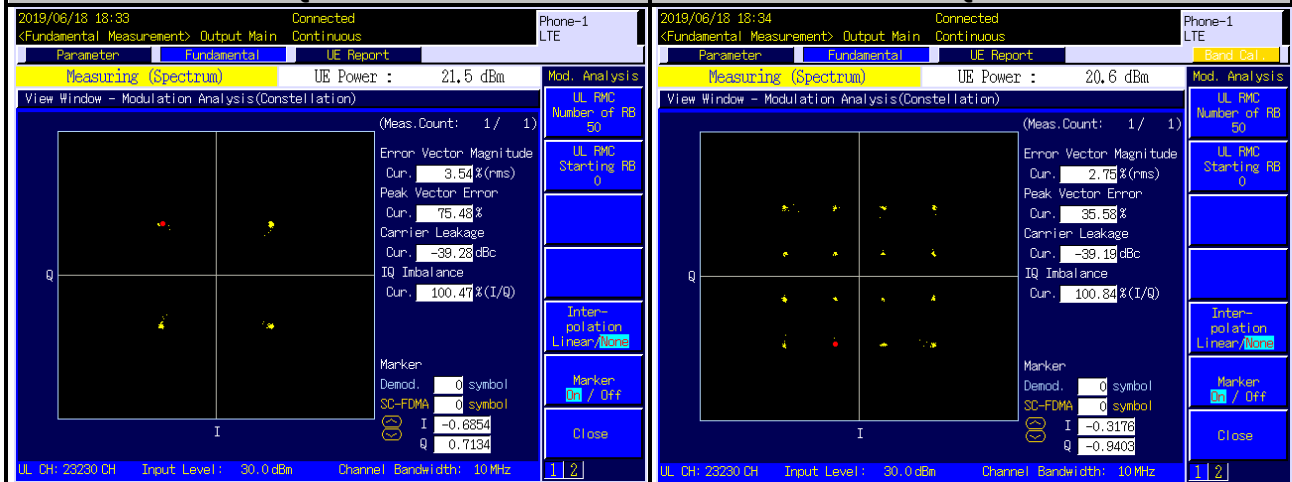
## Spectrum Plot of Measurement

LTE Band 13

Channel 23230

QPSK

16QAM



### 4.3 Frequency Stability Measurement

#### 4.3.1 Limits of Frequency Stability Measurement

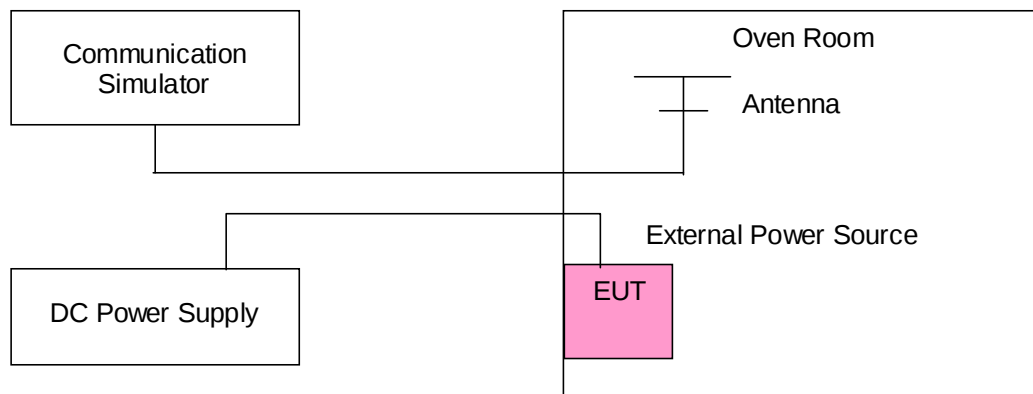
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

#### 4.3.2 Test Procedure

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

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

#### 4.3.3 Test Setup



#### 4.3.4 Test Results

##### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                 |                       |                 |                       |
|--------------------|----------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 1.4 MHz |                       |                 |                       |
|                    | Low Channel                |                       | High Channel    |                       |
|                    | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700003                | 0.002                 | 1754.300003     | 0.002                 |
| 6.375              | 1710.700004                | 0.002                 | 1754.300004     | 0.002                 |
| 8.63               | 1710.700003                | 0.002                 | 1754.300004     | 0.002                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

##### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                 |                       |                 |                       |
|------------|----------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 1.4 MHz |                       |                 |                       |
|            | Low Channel                |                       | High Channel    |                       |
|            | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700004                | 0.002                 | 1754.300002     | 0.001                 |
| 10         | 1710.700003                | 0.002                 | 1754.300004     | 0.002                 |
| 20         | 1710.699998                | -0.001                | 1754.299998     | -0.001                |
| 30         | 1710.699997                | -0.002                | 1754.299997     | -0.002                |
| 40         | 1710.699998                | -0.001                | 1754.299997     | -0.002                |

**Note:**

1. The applicant declared that the normal operating temperature of the EUT is from 0°C to 40°C.
2. The EUT would shut down automatically as below 0°C.

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4               |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 3 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700003              | 0.002                 | 1754.300004     | 0.002                 |
| 6.375              | 1710.700004              | 0.002                 | 1754.300002     | 0.001                 |
| 8.63               | 1710.700003              | 0.002                 | 1754.300004     | 0.002                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4               |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 3 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700004              | 0.002                 | 1754.300003     | 0.002                 |
| 10         | 1710.700004              | 0.002                 | 1754.300004     | 0.002                 |
| 20         | 1710.699998              | -0.001                | 1754.299998     | -0.001                |
| 30         | 1710.699998              | -0.001                | 1754.299998     | -0.001                |
| 40         | 1710.699996              | -0.002                | 1754.299998     | -0.001                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4               |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700002              | 0.001                 | 1754.300002     | 0.001                 |
| 6.375              | 1710.700004              | 0.002                 | 1754.300003     | 0.002                 |
| 8.63               | 1710.700004              | 0.002                 | 1754.300003     | 0.002                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4               |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700003              | 0.002                 | 1754.300002     | 0.001                 |
| 10         | 1710.700003              | 0.002                 | 1754.300002     | 0.001                 |
| 20         | 1710.699997              | -0.002                | 1754.299998     | -0.001                |
| 30         | 1710.699996              | -0.002                | 1754.299996     | -0.002                |
| 40         | 1710.699999              | -0.001                | 1754.299998     | -0.001                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 10 MHz |                       |                 |                       |
|                    | Low Channel               |                       | High Channel    |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700004               | 0.002                 | 1754.300004     | 0.002                 |
| 6.375              | 1710.700002               | 0.001                 | 1754.300003     | 0.001                 |
| 8.63               | 1710.700002               | 0.001                 | 1754.300001     | 0.001                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 10 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700002               | 0.001                 | 1754.300002     | 0.001                 |
| 10         | 1710.700004               | 0.002                 | 1754.300003     | 0.001                 |
| 20         | 1710.699999               | -0.001                | 1754.299998     | -0.001                |
| 30         | 1710.699998               | -0.001                | 1754.299998     | -0.001                |
| 40         | 1710.699997               | -0.002                | 1754.299997     | -0.002                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 15 MHz |                       |                 |                       |
|                    | Low Channel               |                       | High Channel    |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700001               | 0.001                 | 1754.300002     | 0.001                 |
| 6.375              | 1710.700001               | 0.001                 | 1754.300003     | 0.002                 |
| 8.63               | 1710.700004               | 0.002                 | 1754.300002     | 0.001                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 15 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700003               | 0.002                 | 1754.300004     | 0.002                 |
| 10         | 1710.700002               | 0.001                 | 1754.300002     | 0.001                 |
| 20         | 1710.699996               | -0.002                | 1754.299997     | -0.002                |
| 30         | 1710.699998               | -0.001                | 1754.299997     | -0.001                |
| 40         | 1710.699998               | -0.001                | 1754.299998     | -0.001                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 4                |                       |                 |                       |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 20 MHz |                       |                 |                       |
|                    | Low Channel               |                       | High Channel    |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 1710.700001               | 0.001                 | 1754.300001     | 0.001                 |
| 6.375              | 1710.700001               | 0.001                 | 1754.300002     | 0.001                 |
| 8.63               | 1710.700002               | 0.001                 | 1754.300003     | 0.001                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 4                |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 20 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 1710.700004               | 0.002                 | 1754.300004     | 0.002                 |
| 10         | 1710.700003               | 0.002                 | 1754.300001     | 0.001                 |
| 20         | 1710.699997               | -0.002                | 1754.299997     | -0.002                |
| 30         | 1710.699998               | -0.001                | 1754.299998     | -0.001                |
| 40         | 1710.699997               | -0.002                | 1754.299998     | -0.001                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12                |                       |                 |                       |
|--------------------|----------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 1.4 MHz |                       |                 |                       |
|                    | Low Channel                |                       | High Channel    |                       |
|                    | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 699.700002                 | 0.003                 | 715.300002      | 0.003                 |
| 6.375              | 699.700002                 | 0.003                 | 715.300003      | 0.004                 |
| 8.63               | 699.700002                 | 0.002                 | 715.300002      | 0.003                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12                |                       |                 |                       |
|------------|----------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 1.4 MHz |                       |                 |                       |
|            | Low Channel                |                       | High Channel    |                       |
|            | Frequency (MHz)            | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 699.700003                 | 0.005                 | 715.300002      | 0.002                 |
| 10         | 699.700001                 | 0.002                 | 715.300003      | 0.005                 |
| 20         | 699.699996                 | -0.006                | 715.299998      | -0.003                |
| 30         | 699.699999                 | -0.002                | 715.299997      | -0.004                |
| 40         | 699.699998                 | -0.002                | 715.299997      | -0.005                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12              |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 3 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 699.700002               | 0.003                 | 715.300003      | 0.004                 |
| 6.375              | 699.700003               | 0.004                 | 715.300003      | 0.005                 |
| 8.63               | 699.700003               | 0.005                 | 715.300003      | 0.004                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12              |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 3 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 699.700002               | 0.002                 | 715.300002      | 0.003                 |
| 10         | 699.700002               | 0.002                 | 715.300002      | 0.002                 |
| 20         | 699.699998               | -0.004                | 715.299997      | -0.004                |
| 30         | 699.699999               | -0.001                | 715.299998      | -0.003                |
| 40         | 699.699999               | -0.002                | 715.299998      | -0.003                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12              |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 699.700002               | 0.002                 | 715.300002      | 0.003                 |
| 6.375              | 699.700004               | 0.005                 | 715.300002      | 0.003                 |
| 8.63               | 699.700003               | 0.004                 | 715.300003      | 0.004                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12              |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 699.700004               | 0.006                 | 715.300001      | 0.001                 |
| 10         | 699.700002               | 0.003                 | 715.300001      | 0.002                 |
| 20         | 699.699998               | -0.003                | 715.299997      | -0.004                |
| 30         | 699.699999               | -0.002                | 715.299998      | -0.002                |
| 40         | 699.699998               | -0.003                | 715.299997      | -0.005                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 12               |                       |                 |                       |
|--------------------|---------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 10 MHz |                       |                 |                       |
|                    | Low Channel               |                       | High Channel    |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 699.700004                | 0.006                 | 715.300004      | 0.005                 |
| 6.375              | 699.700002                | 0.003                 | 715.300003      | 0.004                 |
| 8.63               | 699.700002                | 0.003                 | 715.300004      | 0.005                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 12               |                       |                 |                       |
|------------|---------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 10 MHz |                       |                 |                       |
|            | Low Channel               |                       | High Channel    |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 699.700004                | 0.005                 | 715.300004      | 0.005                 |
| 10         | 699.700001                | 0.002                 | 715.300002      | 0.002                 |
| 20         | 699.699996                | -0.005                | 715.299998      | -0.003                |
| 30         | 699.699996                | -0.005                | 715.299998      | -0.004                |
| 40         | 699.699996                | -0.005                | 715.299997      | -0.004                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 13              |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 7.5                | 779.500002               | 0.003                 | 784.500001      | 0.001                 |
| 6.375              | 779.500001               | 0.002                 | 784.500002      | 0.002                 |
| 8.63               | 779.500001               | 0.001                 | 784.500004      | 0.005                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 13              |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 0          | 779.500003               | 0.003                 | 784.500002      | 0.003                 |
| 10         | 779.500004               | 0.005                 | 784.500004      | 0.005                 |
| 20         | 779.499996               | -0.005                | 784.499996      | -0.005                |
| 30         | 779.499997               | -0.004                | 784.499997      | -0.004                |
| 40         | 779.499999               | -0.001                | 784.499998      | -0.002                |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 13               |                       |
|--------------------|---------------------------|-----------------------|
|                    | Channel Bandwidth: 10 MHz |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) |
| 7.5                | 779.500003                | 0.004                 |
| 6.375              | 779.500002                | 0.002                 |
| 8.63               | 779.500003                | 0.004                 |

**Note:** The applicant defined the normal working voltage of the battery is from 6.375 Vdc to 8.63 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 13               |                       |
|------------|---------------------------|-----------------------|
|            | Channel Bandwidth: 10 MHz |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) |
| 0          | 779.500002                | 0.002                 |
| 10         | 779.500001                | 0.002                 |
| 20         | 779.499998                | -0.003                |
| 30         | 779.499999                | -0.002                |
| 40         | 779.499997                | -0.004                |

#### 4.4 Occupied Bandwidth Measurement

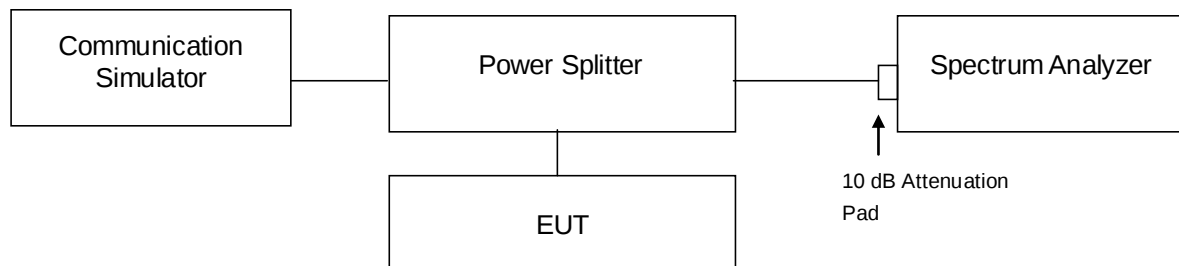
##### 4.4.1 Limits of Occupied Bandwidth Measurement

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.

##### 4.4.2 Test Procedure

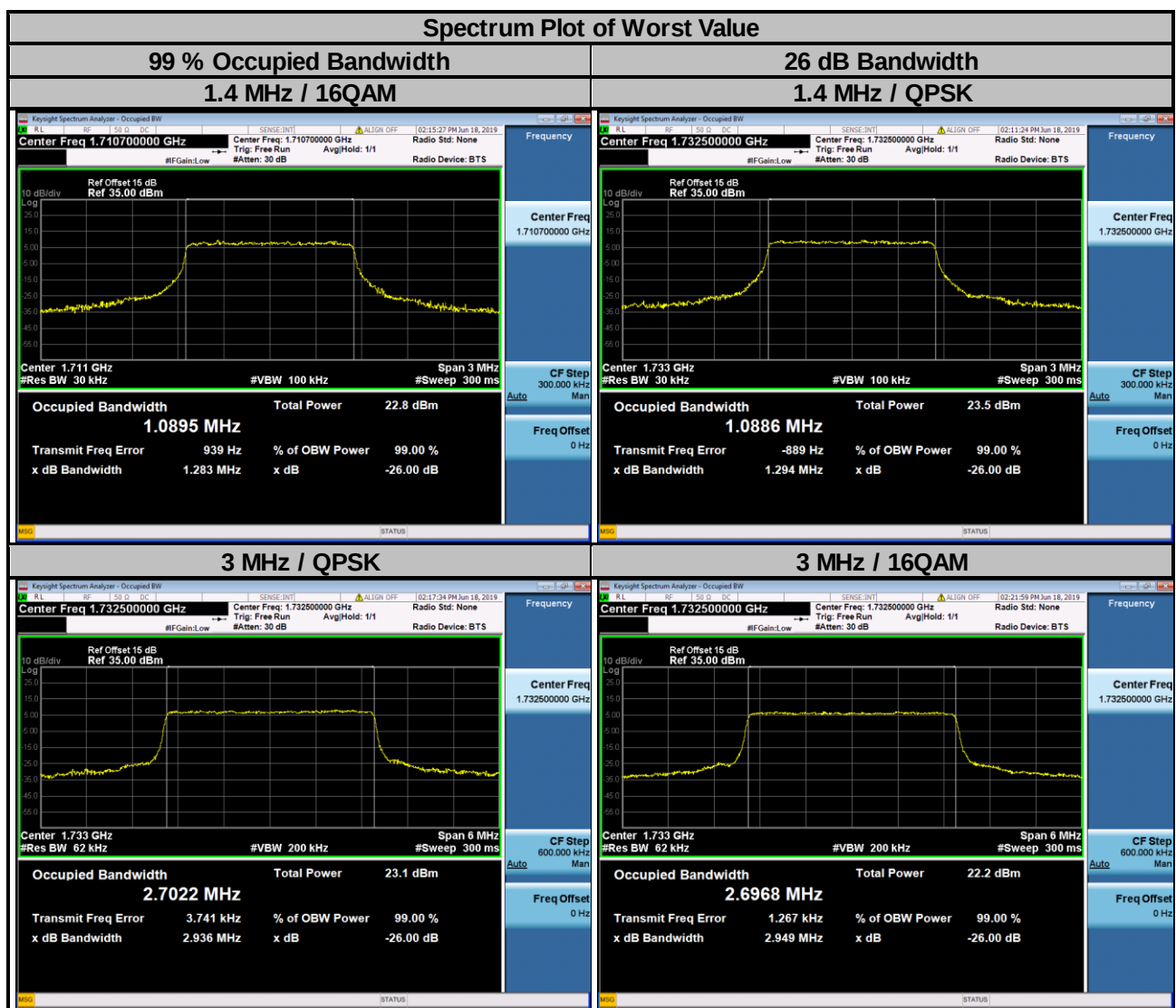
- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

##### 4.4.3 Test Setup

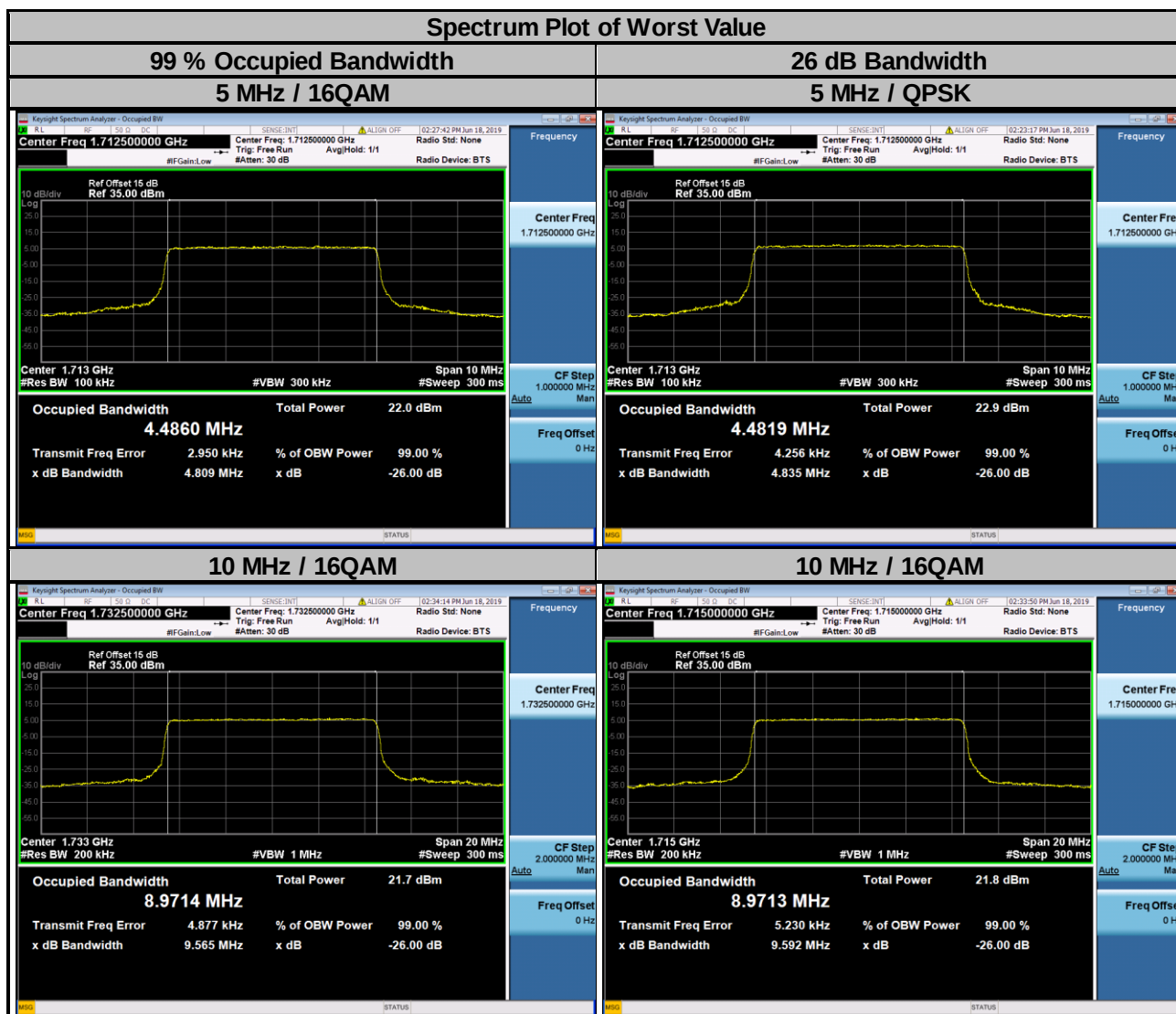


#### 4.4.4 Test Result

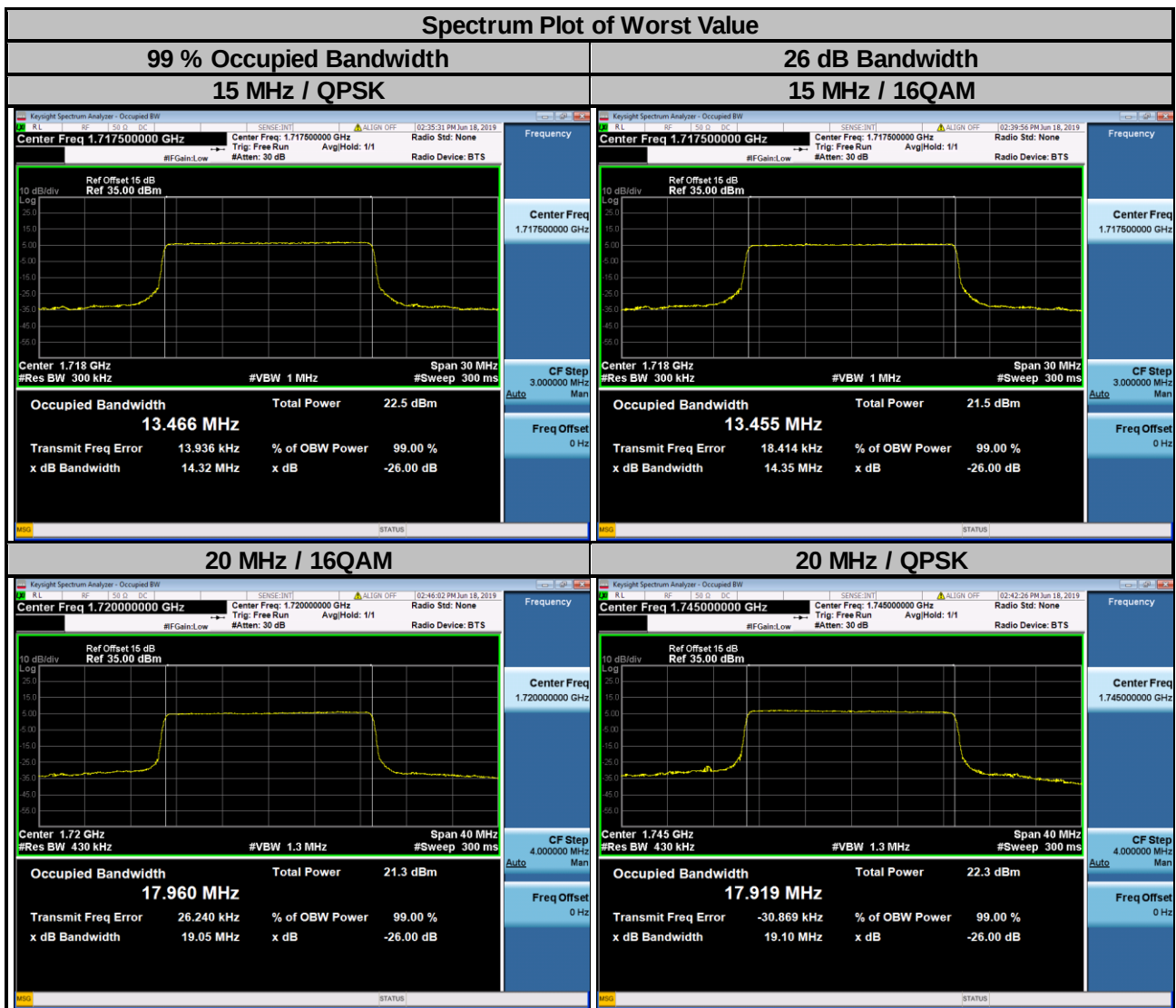
| LTE Band 4                 |                 |                               |        |                       |       |
|----------------------------|-----------------|-------------------------------|--------|-----------------------|-------|
| Channel Bandwidth: 1.4 MHz |                 |                               |        |                       |       |
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 19957                      | 1710.7          | 1.0883                        | 1.0895 | 1.287                 | 1.283 |
| 20175                      | 1732.5          | 1.0886                        | 1.0891 | 1.294                 | 1.281 |
| 20393                      | 1754.3          | 1.0881                        | 1.0873 | 1.286                 | 1.270 |
| Channel Bandwidth: 3 MHz   |                 |                               |        |                       |       |
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 19965                      | 1711.5          | 2.7019                        | 2.6967 | 2.923                 | 2.926 |
| 20175                      | 1732.5          | 2.7022                        | 2.6968 | 2.936                 | 2.949 |
| 20385                      | 1753.5          | 2.7013                        | 2.6959 | 2.926                 | 2.943 |



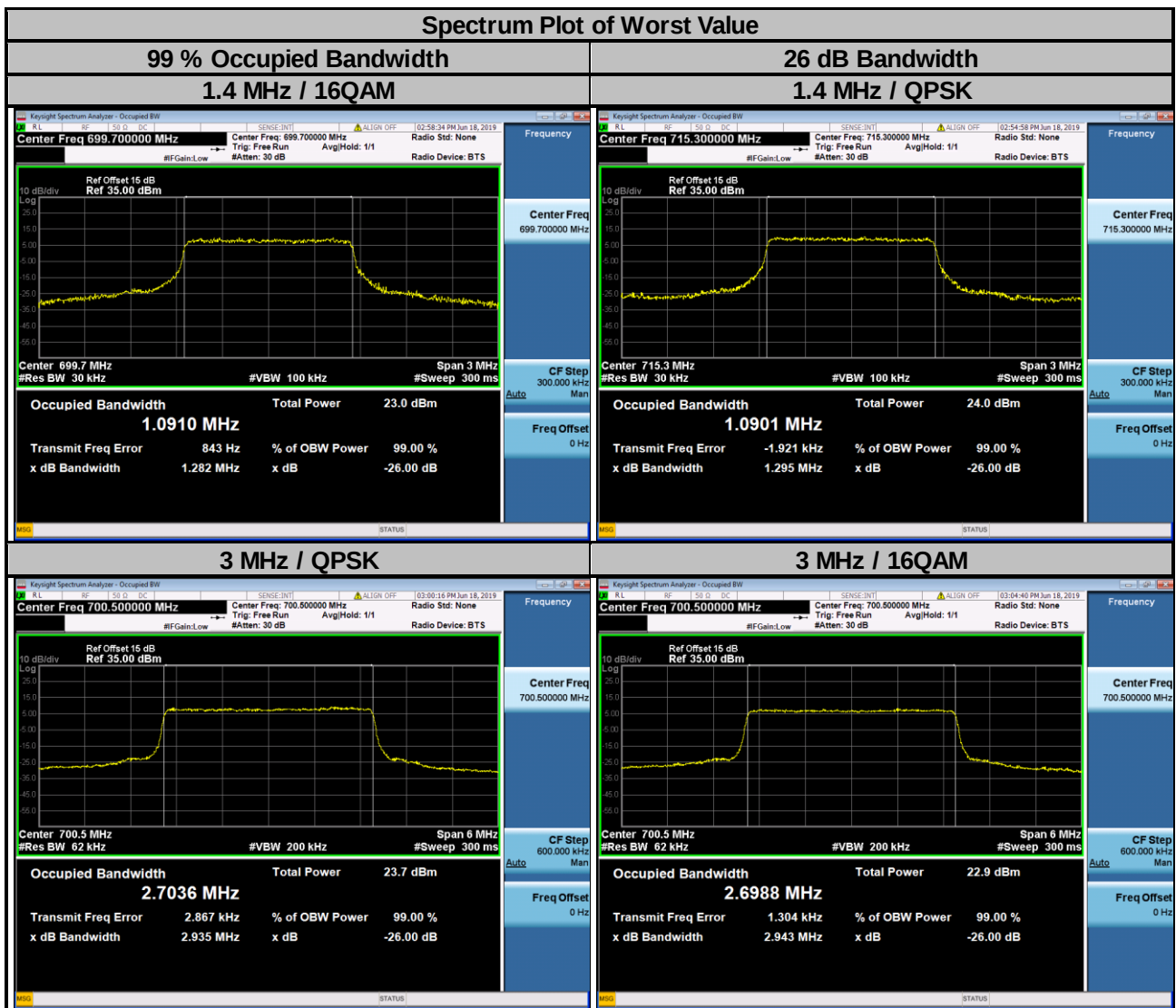
| LTE Band 4                |                 |                               |        |                       |       |
|---------------------------|-----------------|-------------------------------|--------|-----------------------|-------|
| Channel Bandwidth: 5 MHz  |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 19975                     | 1712.5          | 4.4819                        | 4.4860 | 4.835                 | 4.809 |
| 20175                     | 1732.5          | 4.4828                        | 4.4854 | 4.832                 | 4.810 |
| 20375                     | 1752.5          | 4.4831                        | 4.4846 | 4.809                 | 4.822 |
| Channel Bandwidth: 10 MHz |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 20000                     | 1715.0          | 8.9664                        | 8.9713 | 9.543                 | 9.592 |
| 20175                     | 1732.5          | 8.9666                        | 8.9714 | 9.553                 | 9.565 |
| 20350                     | 1750.0          | 8.9683                        | 8.9663 | 9.535                 | 9.561 |



| LTE Band 4                |                 |                               |        |                       |       |
|---------------------------|-----------------|-------------------------------|--------|-----------------------|-------|
| Channel Bandwidth: 15 MHz |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 20025                     | 1717.5          | 13.466                        | 13.455 | 14.32                 | 14.35 |
| 20175                     | 1732.5          | 13.465                        | 13.448 | 14.33                 | 14.35 |
| 20325                     | 1747.5          | 13.462                        | 13.446 | 14.32                 | 14.35 |
| Channel Bandwidth: 20 MHz |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 20050                     | 1720.0          | 17.942                        | 17.960 | 19.07                 | 19.05 |
| 20175                     | 1732.5          | 17.925                        | 17.939 | 19.09                 | 19.05 |
| 20300                     | 1745.0          | 17.919                        | 17.941 | 19.10                 | 19.05 |



| LTE Band 12                |                 |                               |        |                       |       |
|----------------------------|-----------------|-------------------------------|--------|-----------------------|-------|
| Channel Bandwidth: 1.4 MHz |                 |                               |        |                       |       |
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 23017                      | 699.7           | 1.0888                        | 1.0910 | 1.289                 | 1.282 |
| 23095                      | 707.5           | 1.0855                        | 1.0904 | 1.285                 | 1.286 |
| 23173                      | 715.3           | 1.0901                        | 1.0890 | 1.295                 | 1.286 |
| Channel Bandwidth: 3 MHz   |                 |                               |        |                       |       |
| Channel                    | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                            |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 23025                      | 700.5           | 2.7036                        | 2.6988 | 2.935                 | 2.943 |
| 23095                      | 707.5           | 2.7004                        | 2.6978 | 2.935                 | 2.931 |
| 23165                      | 714.5           | 2.6990                        | 2.6941 | 2.925                 | 2.934 |





| LTE Band 13               |                 |                               |        |                       |       |
|---------------------------|-----------------|-------------------------------|--------|-----------------------|-------|
| Channel Bandwidth: 5 MHz  |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 23205                     | 779.5           | 4.4887                        | 4.4898 | 4.831                 | 4.835 |
| 23230                     | 782.0           | 4.4870                        | 4.4872 | 4.823                 | 4.794 |
| 23255                     | 784.5           | 4.4714                        | 4.4780 | 4.776                 | 4.796 |
| Channel Bandwidth: 10 MHz |                 |                               |        |                       |       |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |        | 26 dB Bandwidth (MHz) |       |
|                           |                 | QPSK                          | 16QAM  | QPSK                  | 16QAM |
| 23230                     | 782.0           | 8.9793                        | 8.9774 | 9.546                 | 9.540 |



## 4.5 Band Edge Measurement

### 4.5.1 Limits of Band Edge Measurement

For operations in the 698-787 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.

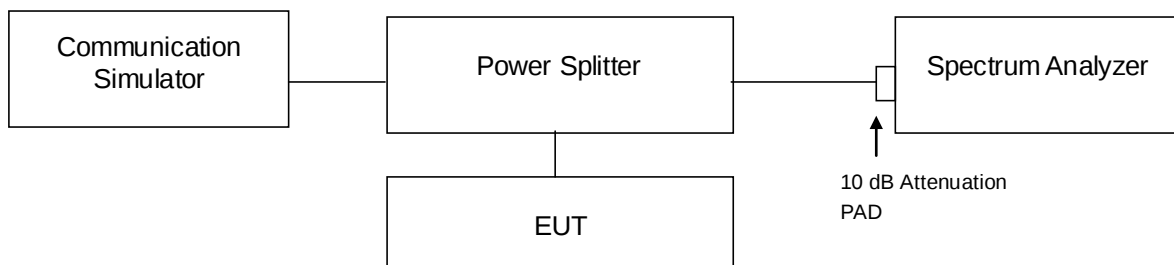
However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

For operations in the 746-758 MHz band and the 776-788 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.

On all frequencies between 763-775 MHz and 793-805 MHz, by a factor no less than  $65 + 10 \log (P)$  dB in a 6.25 kHz band segment, for mobile and portable stations.

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.

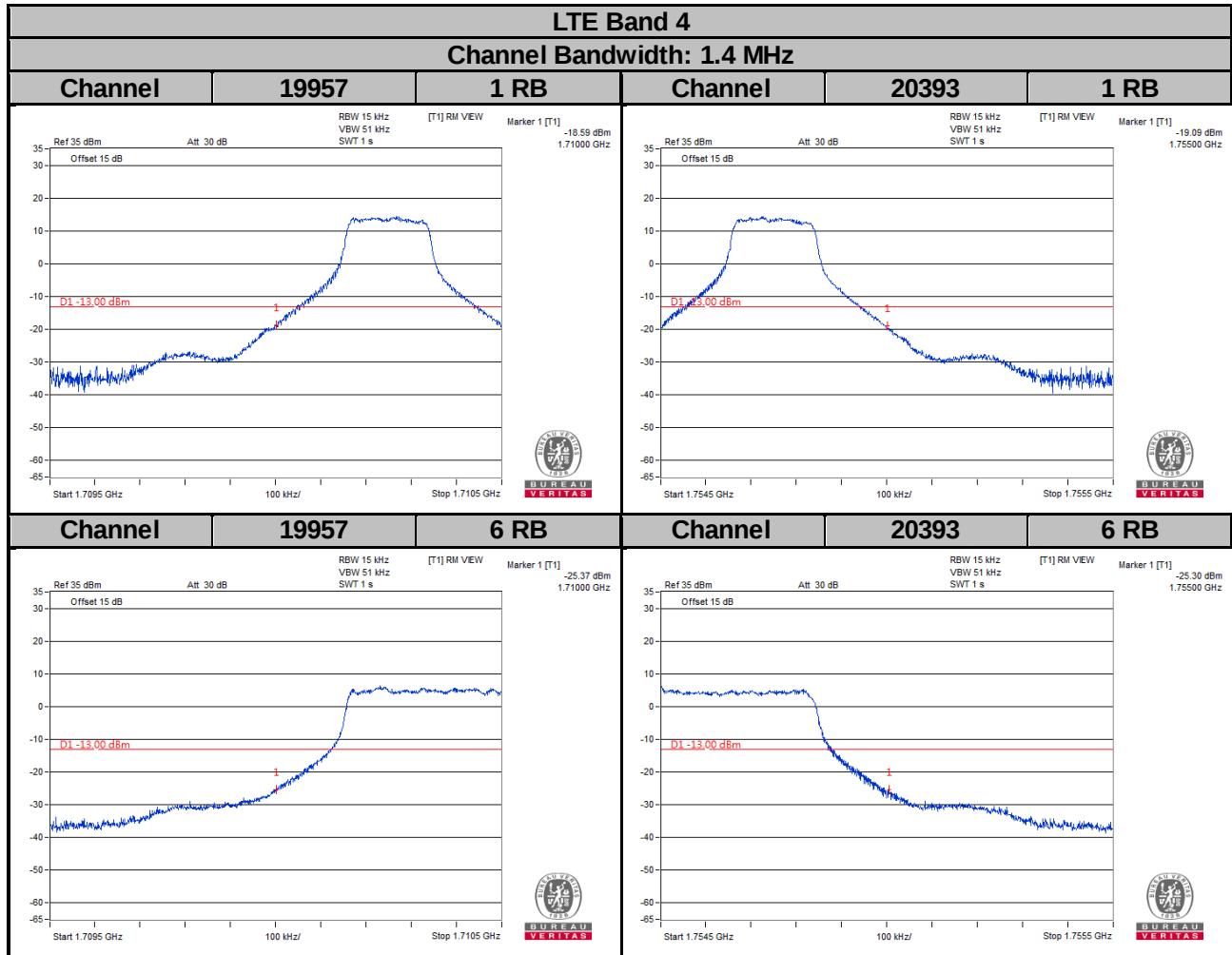
### 4.5.2 Test Setup

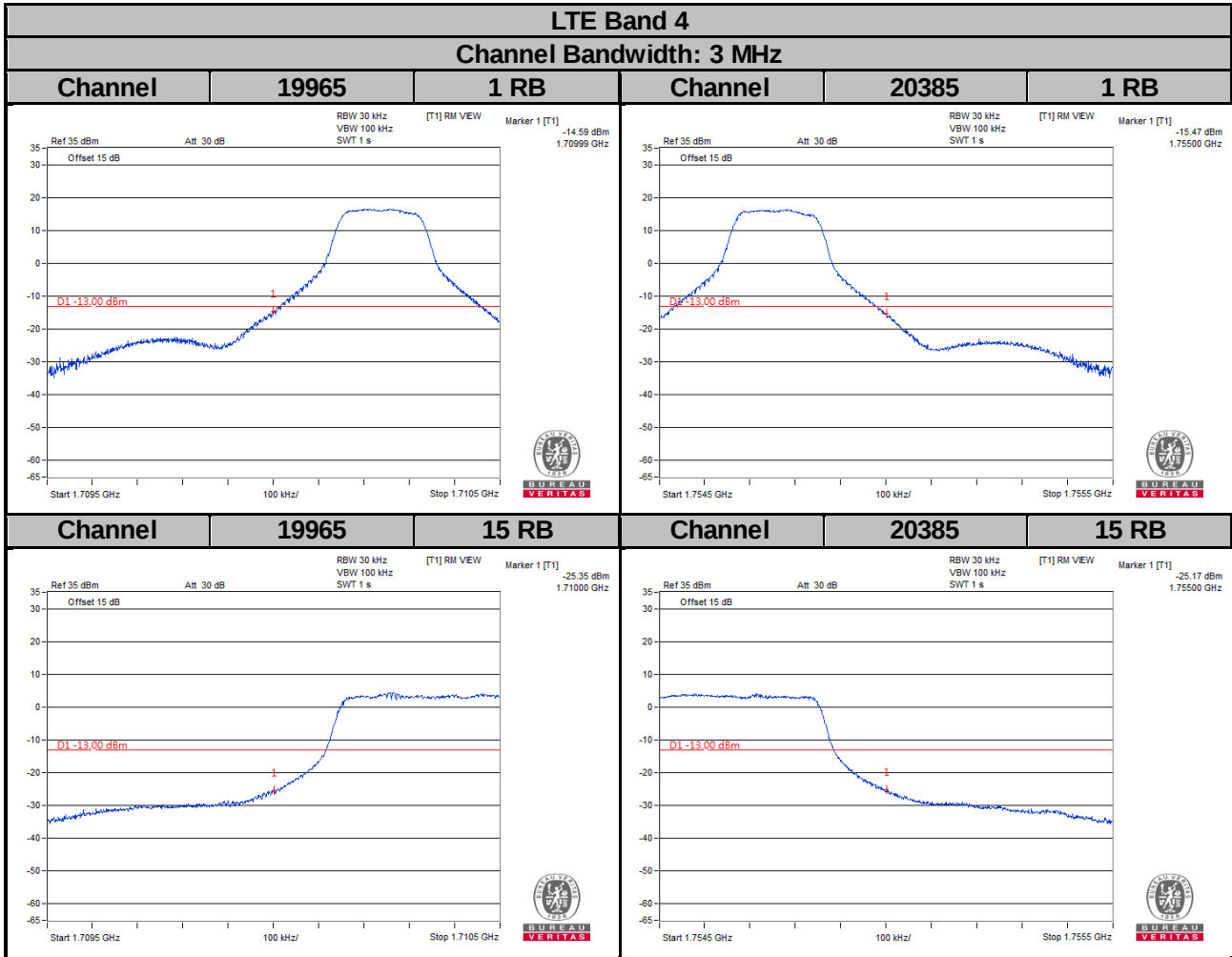


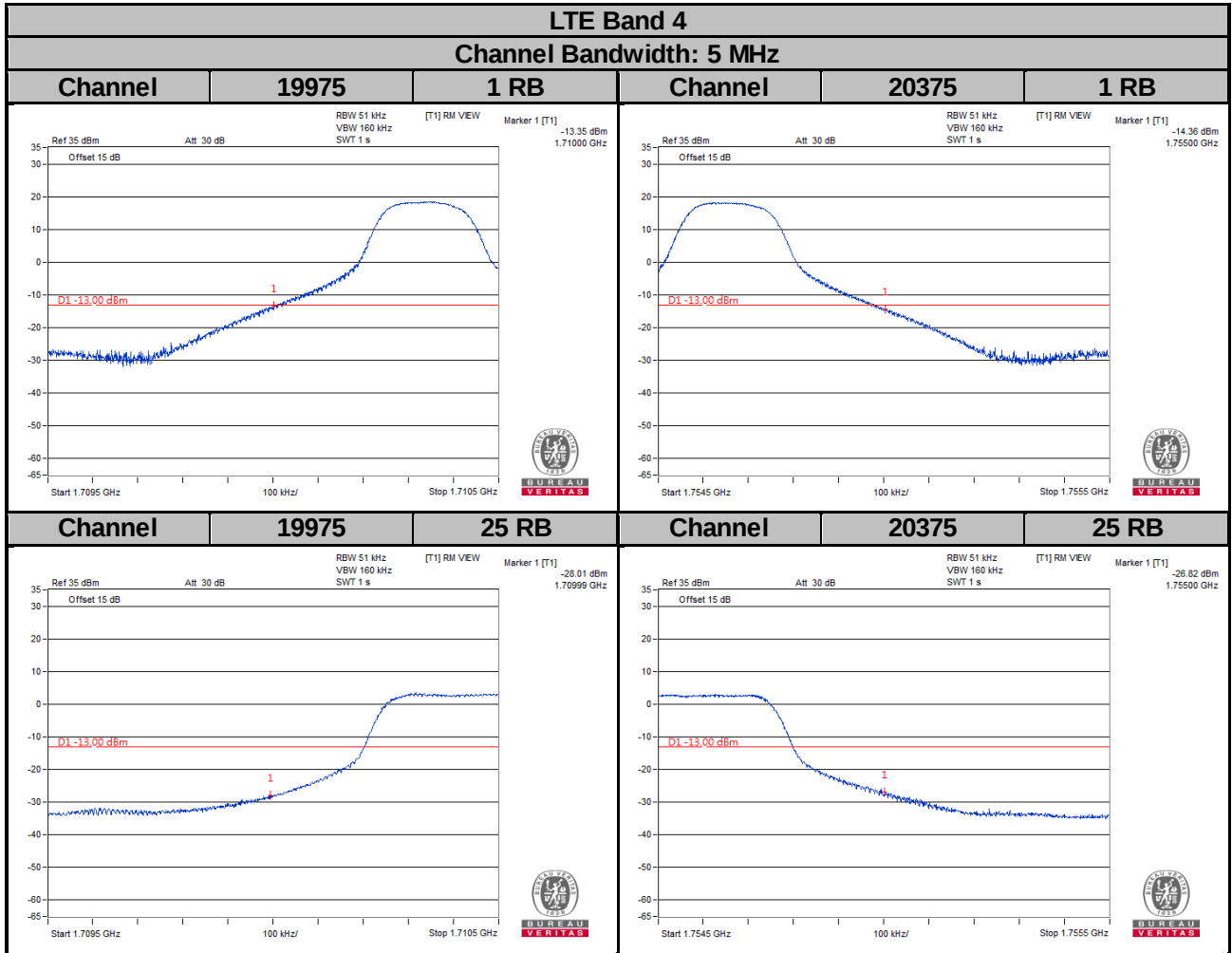
### 4.5.3 Test Procedures

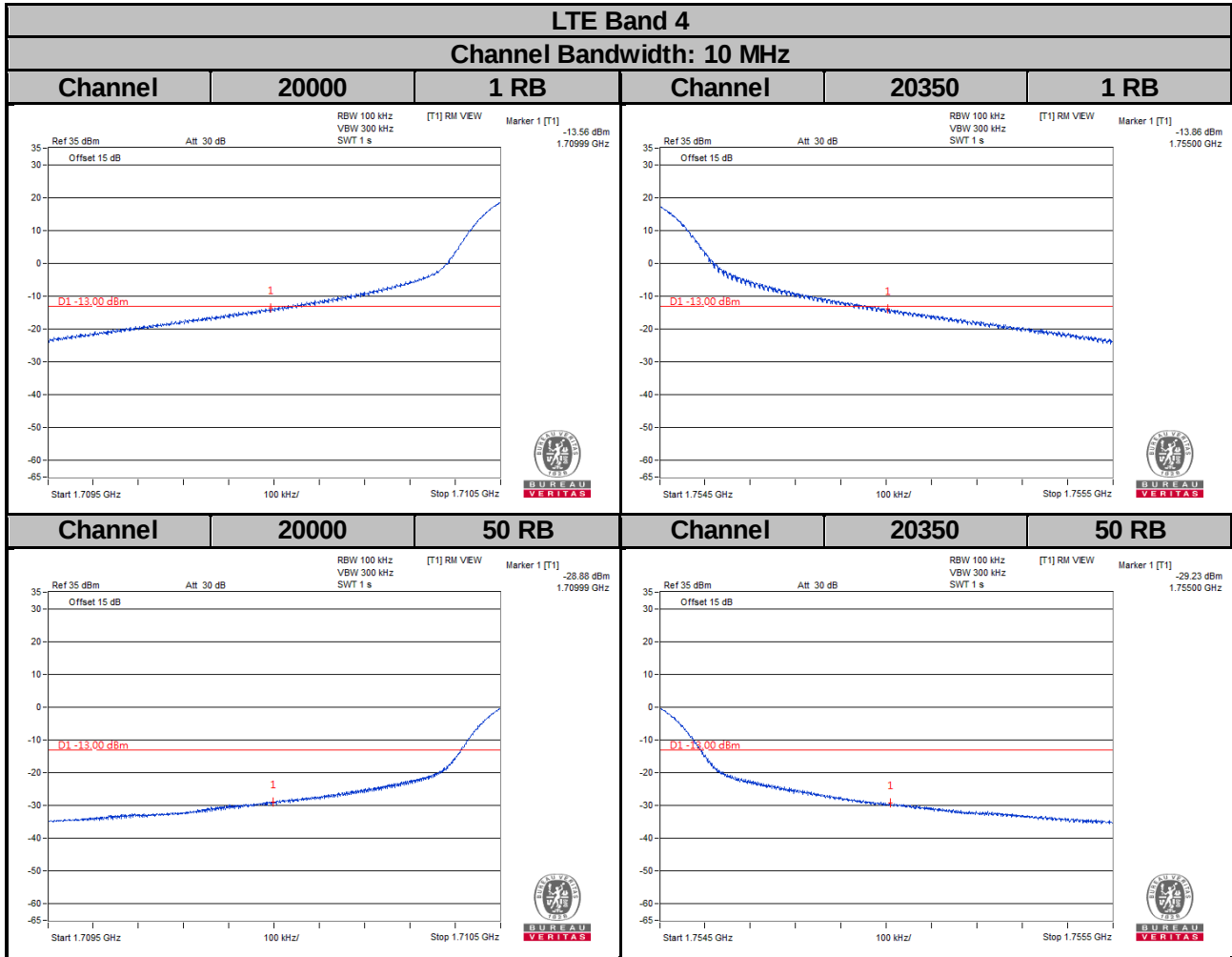
- All measurements were done at low and high operational frequency range.
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 15 kHz and VB of the spectrum is 51 kHz (LTE Bandwidth 1.4 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 30 kHz and VB of the spectrum is 100 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 51 kHz and VB of the spectrum is 160 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 100 kHz and VB of the spectrum is 300 kHz (LTE Bandwidth 10 MHz).
- The center frequency of spectrum is the band edge frequency and span is 1 MHz. RB of the spectrum is 150 kHz and VB of the spectrum is 470 kHz (LTE Bandwidth 15 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 20 MHz).
- Record the max. trace plot into the test report.

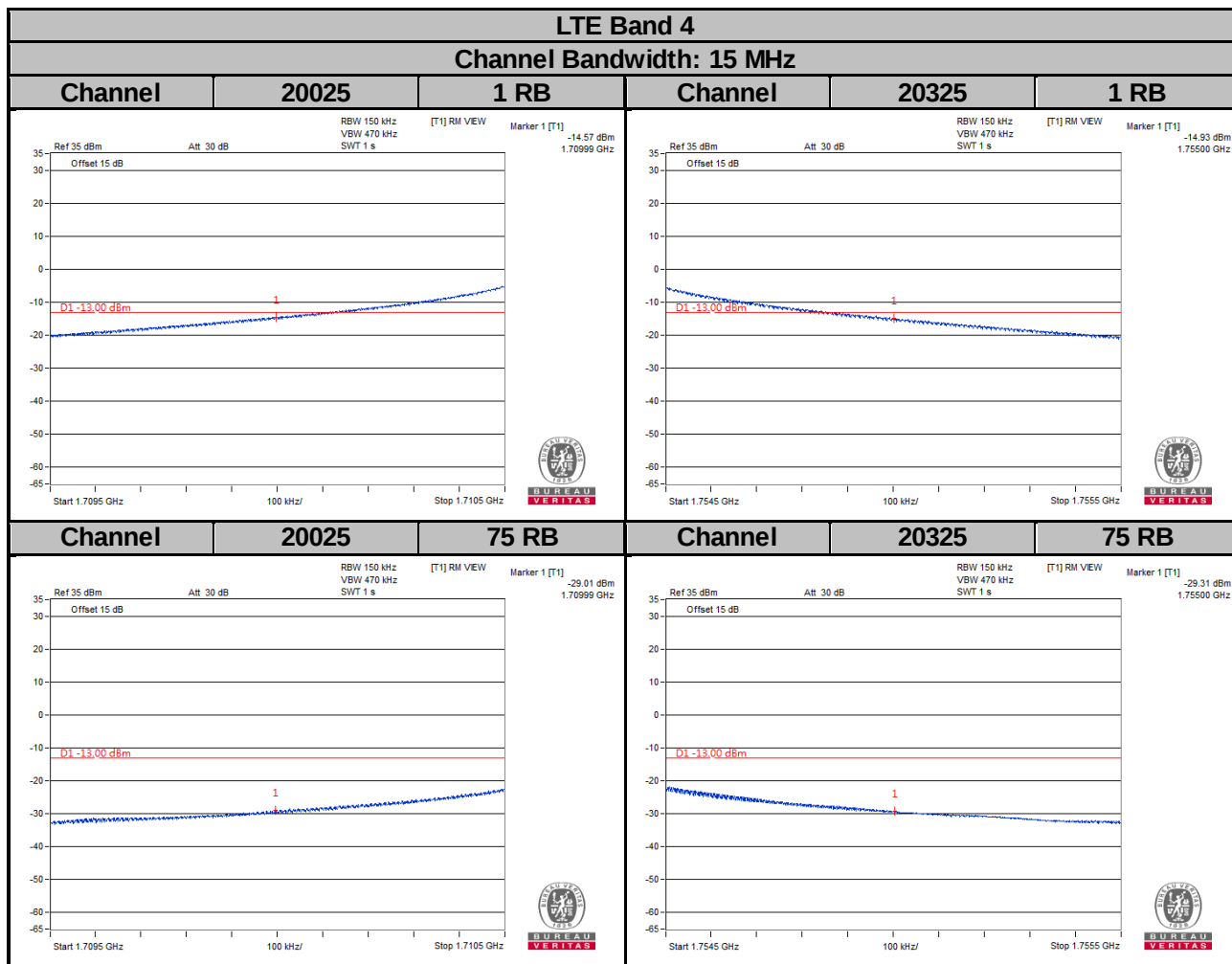
#### 4.5.4 Test Results

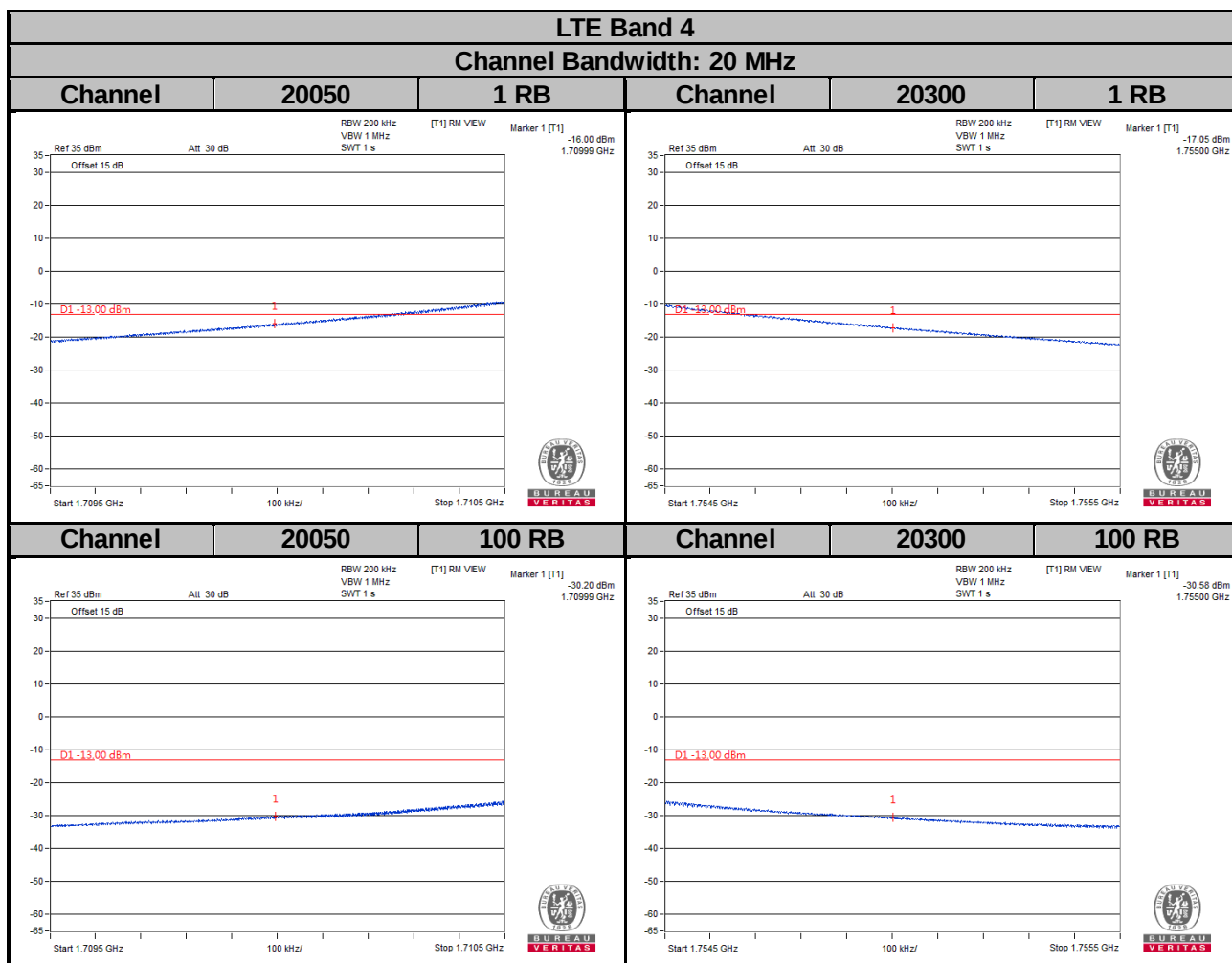






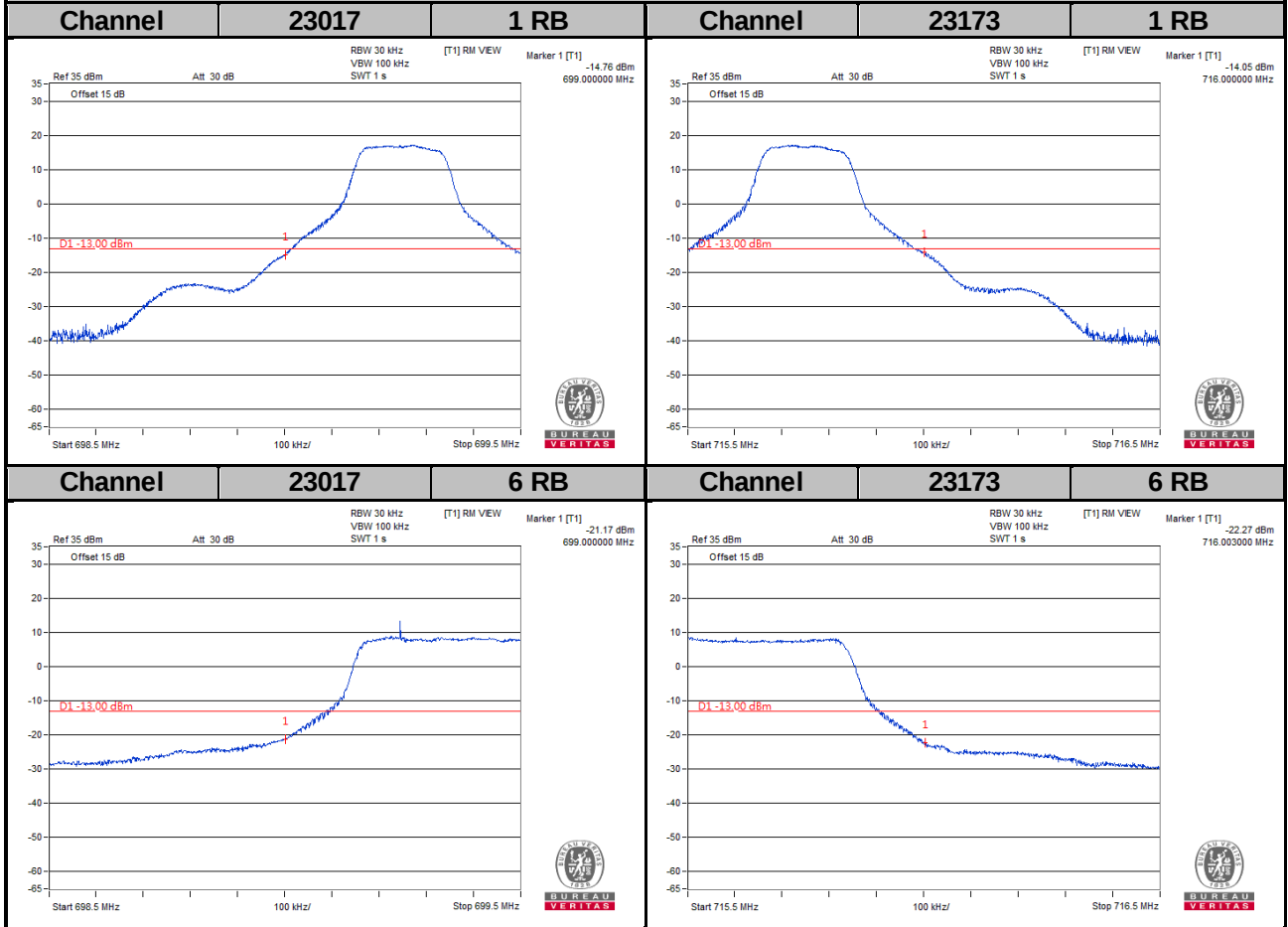






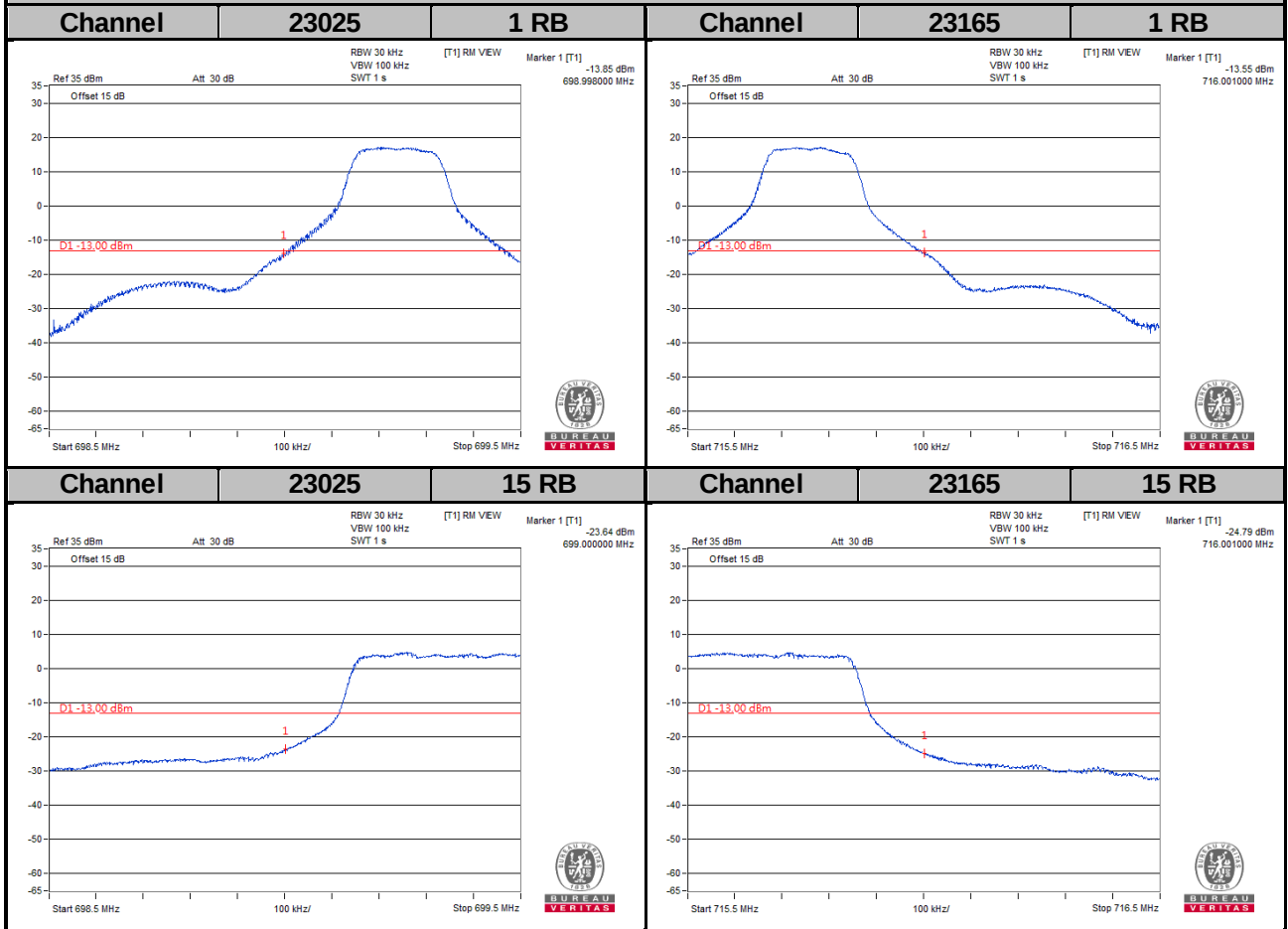
## LTE Band 12

Channel Bandwidth: 1.4 MHz



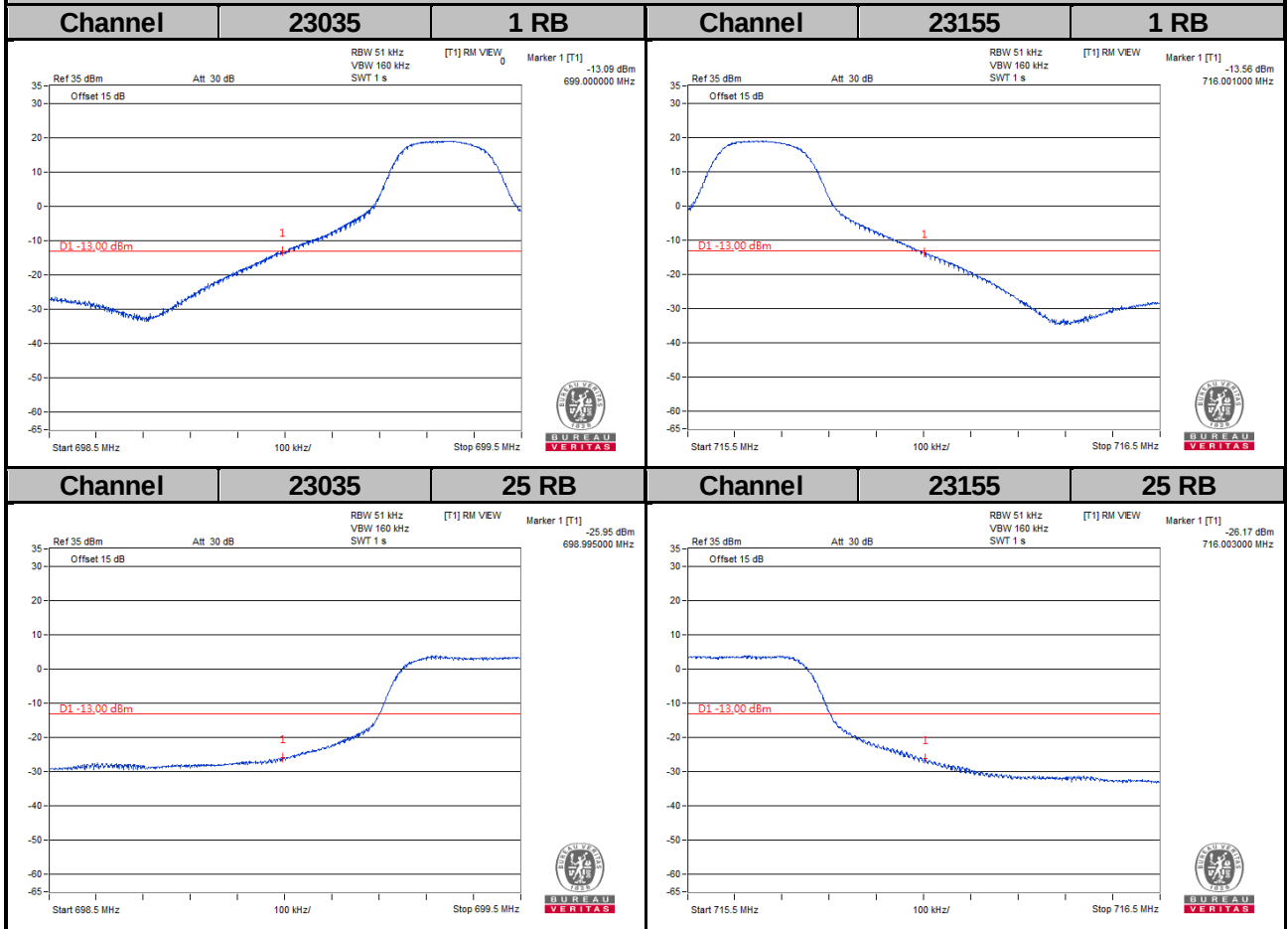
## LTE Band 12

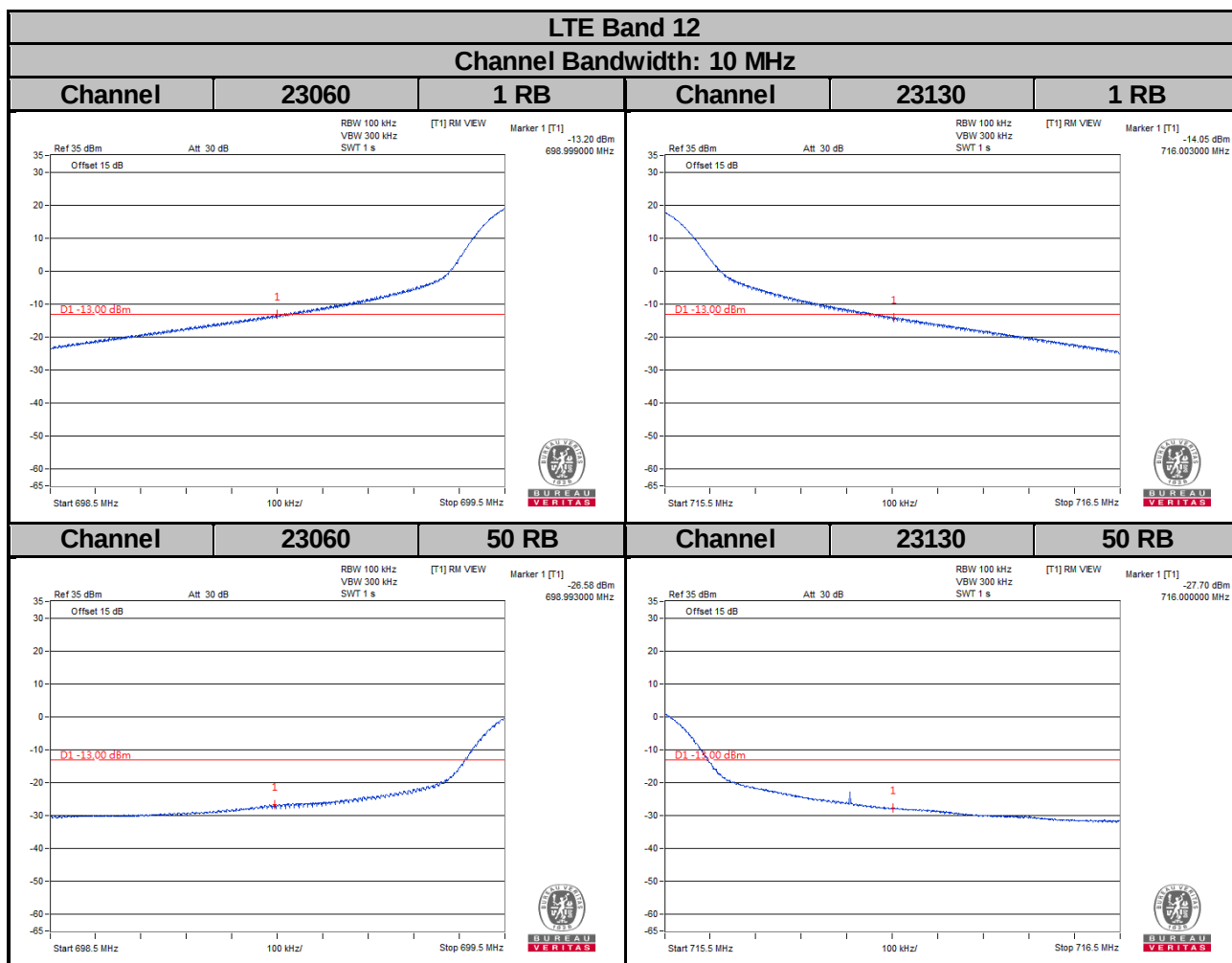
Channel Bandwidth: 3 MHz



## LTE Band 12

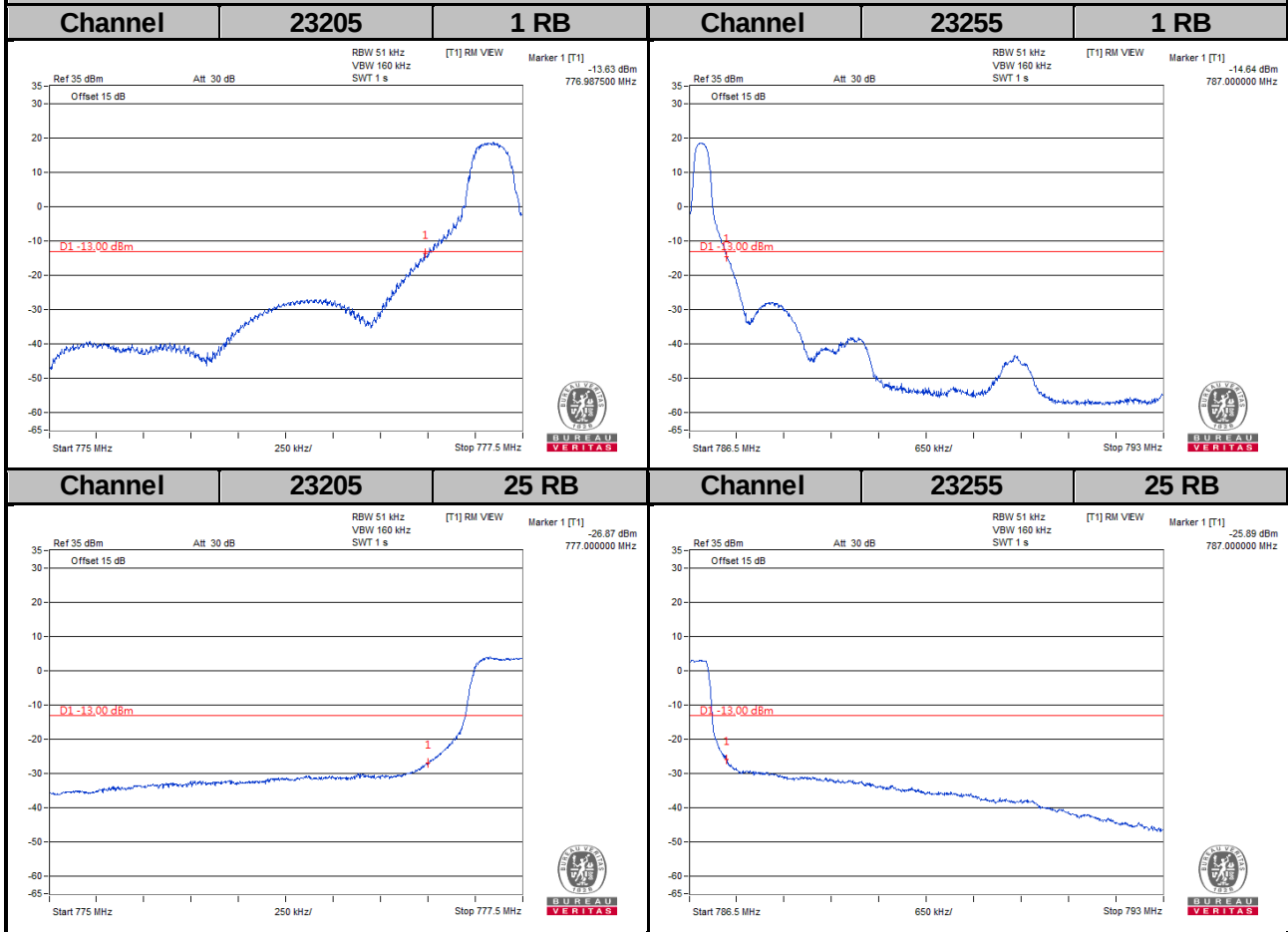
Channel Bandwidth: 5 MHz

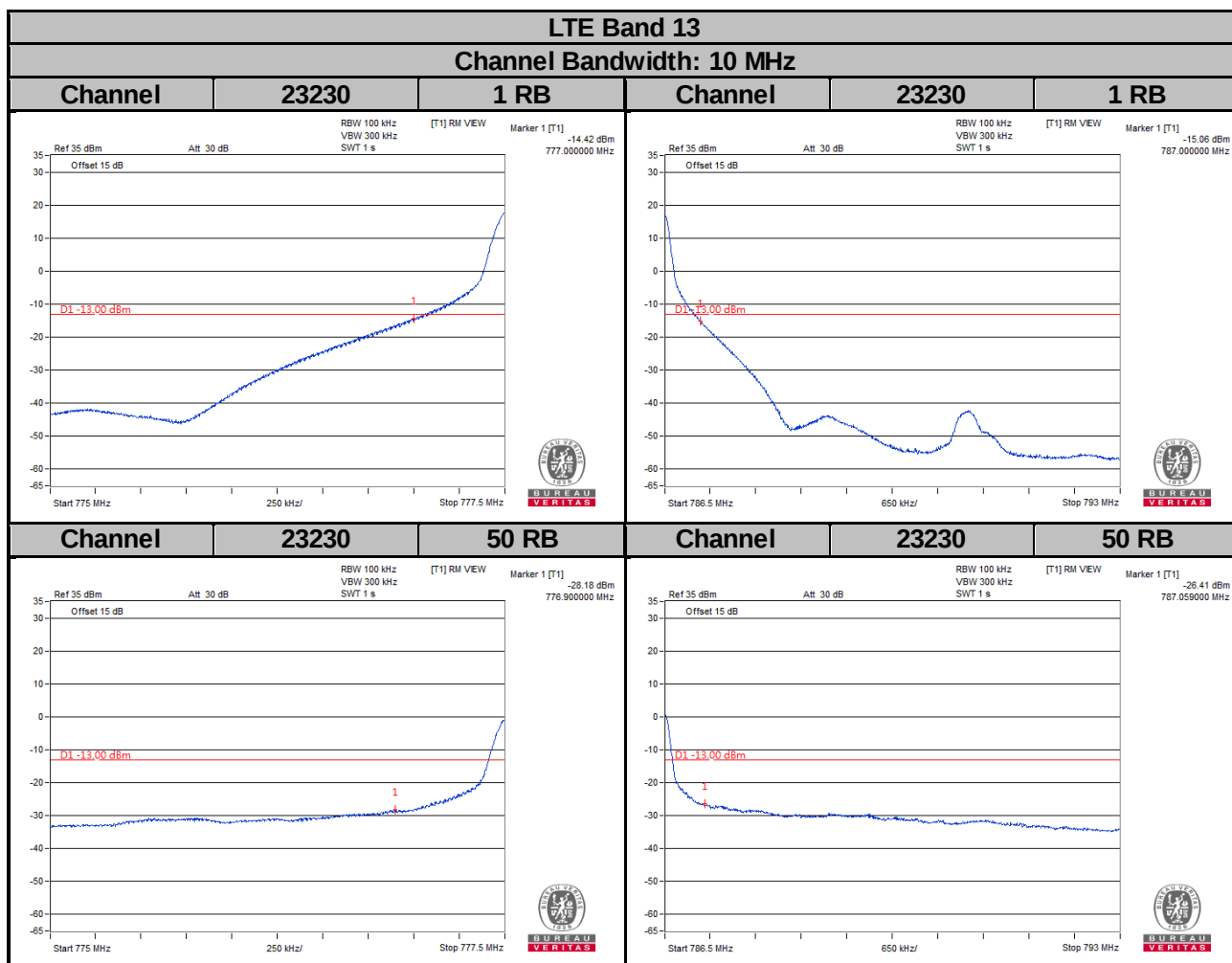




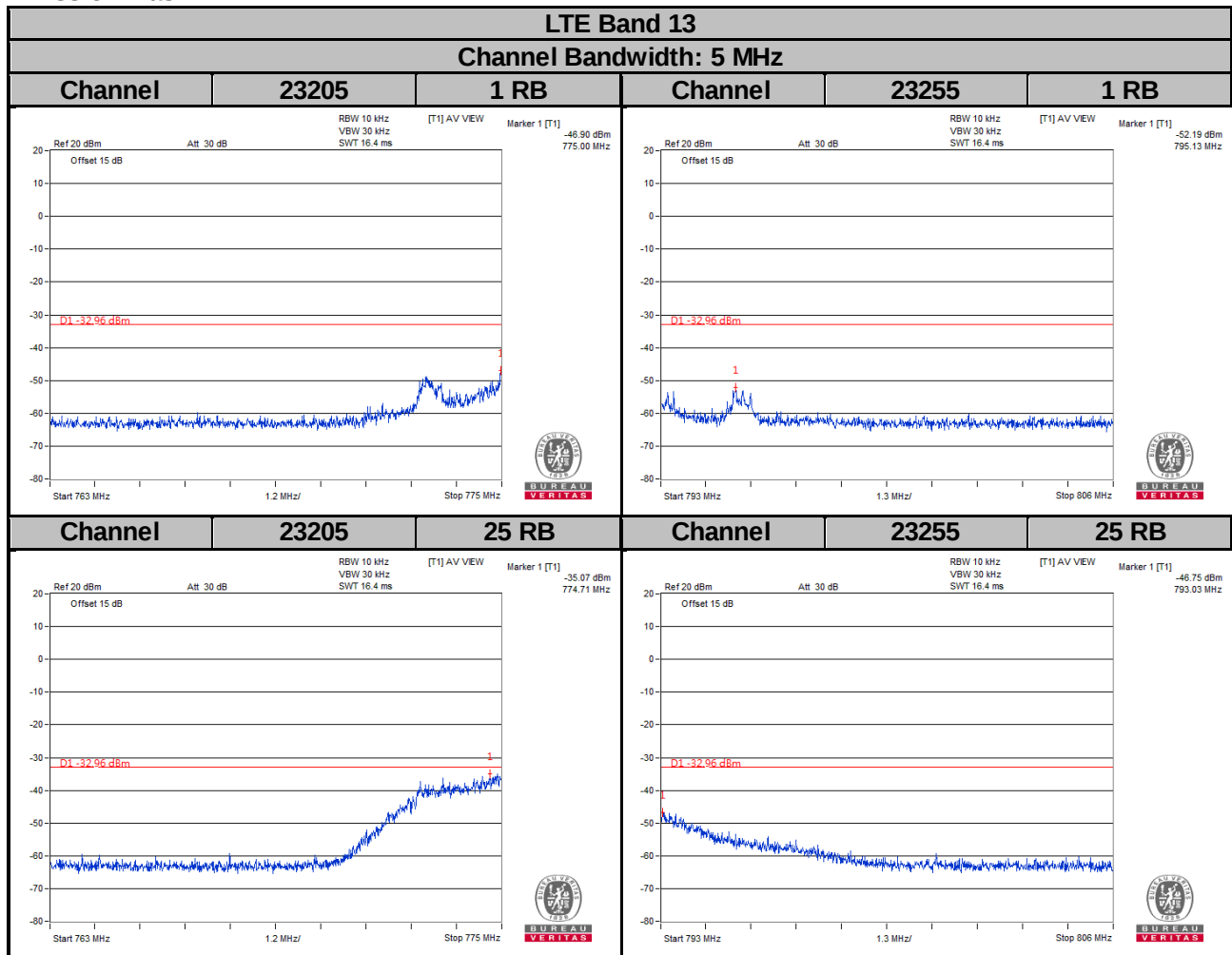
## LTE Band 13

**Channel Bandwidth: 5 MHz**





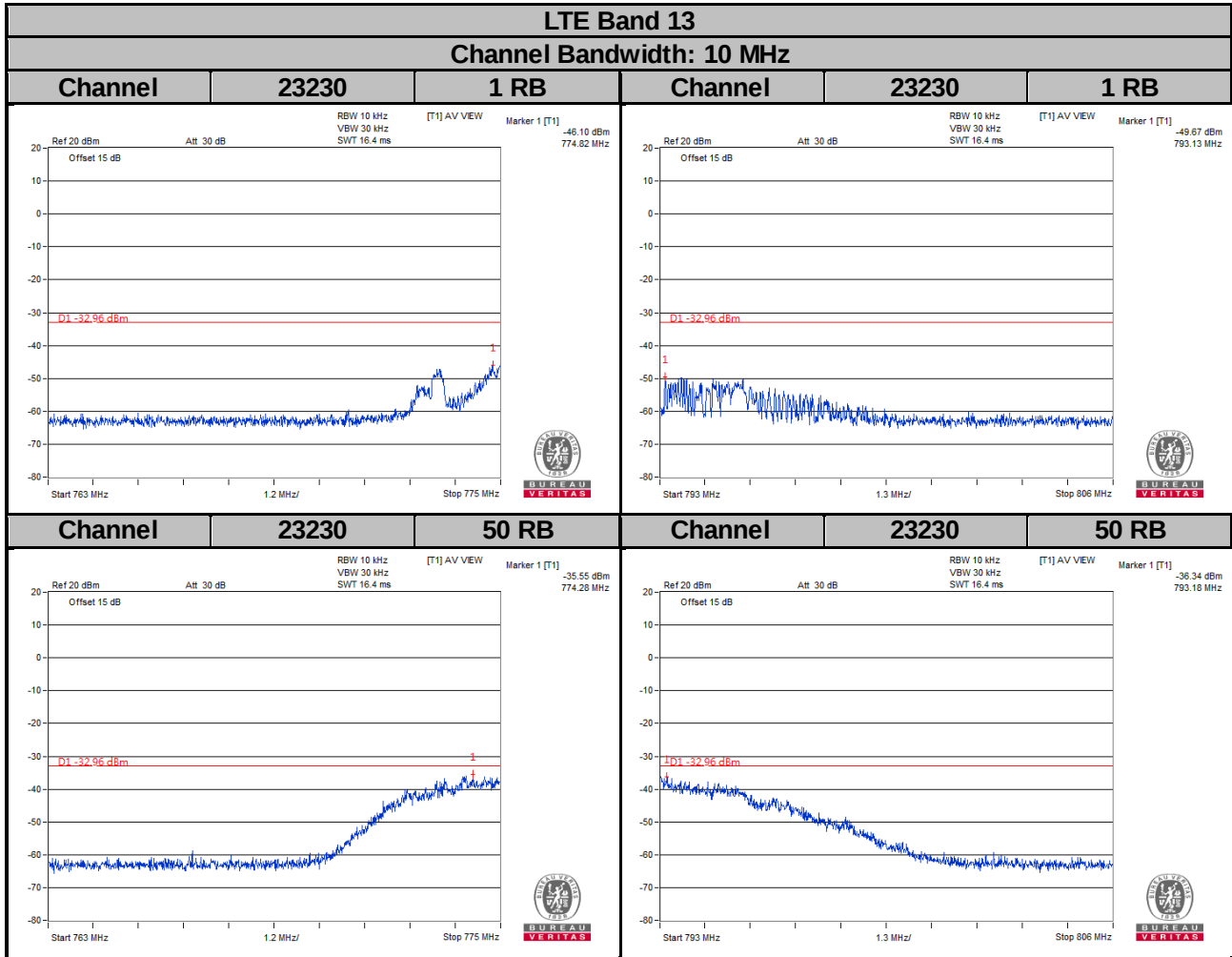
## Emission Mask



For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is  $65 + 10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$



For the 763 - 775 MHz and 793 - 805 MHz band, the FCC limit is  $65+10\log(P[\text{watt}])$  in a 6.25 kHz bandwidth. Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance. By using a 10 kHz bandwidth on the spectrum analyzer.

$$10\log(10\text{kHz}/6.25\text{kHz}) = 2.04 \text{ dB}$$

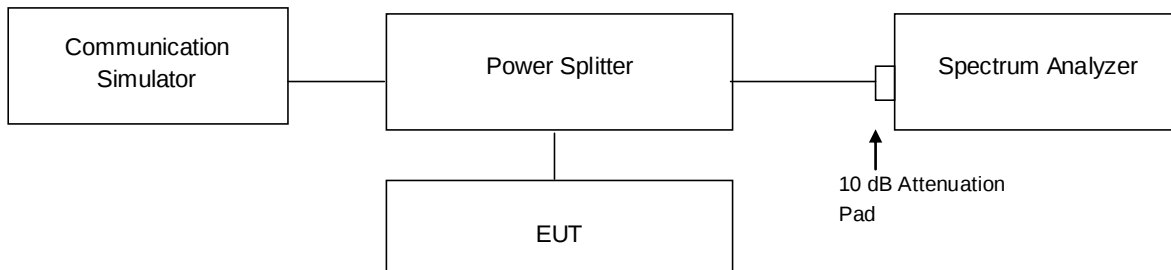
$$\text{Limit line} = -35 \text{ dBm} + 2.04 \text{ dB} = -32.96 \text{ dBm}$$

## 4.6 Peak to Average Ratio

### 4.6.1 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.

### 4.6.2 Test Setup

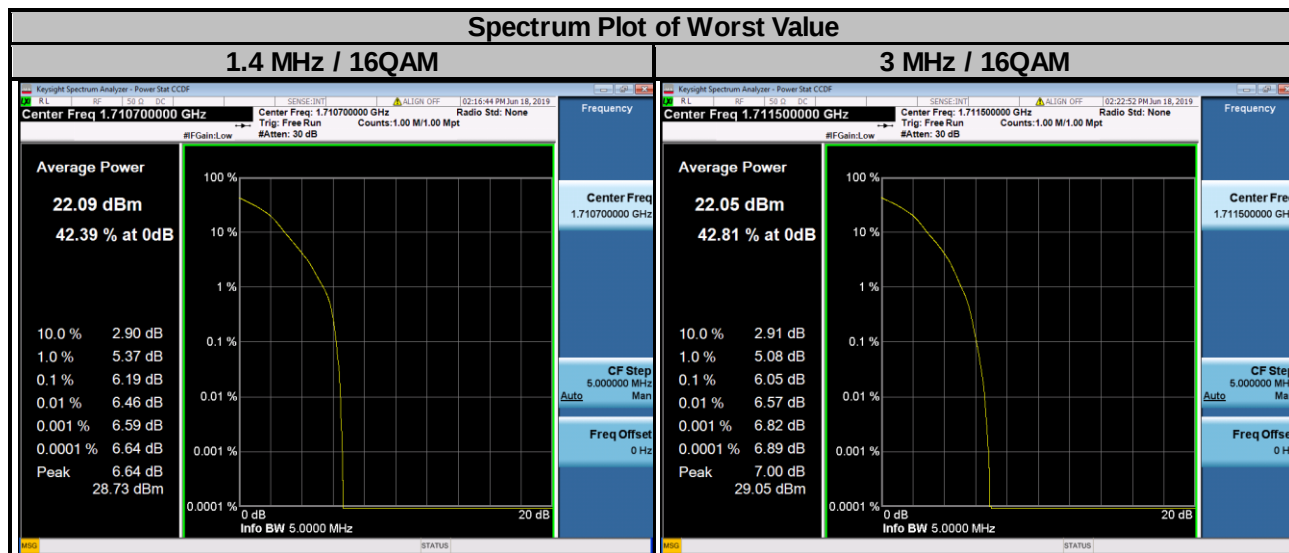


### 4.6.3 Test Procedures

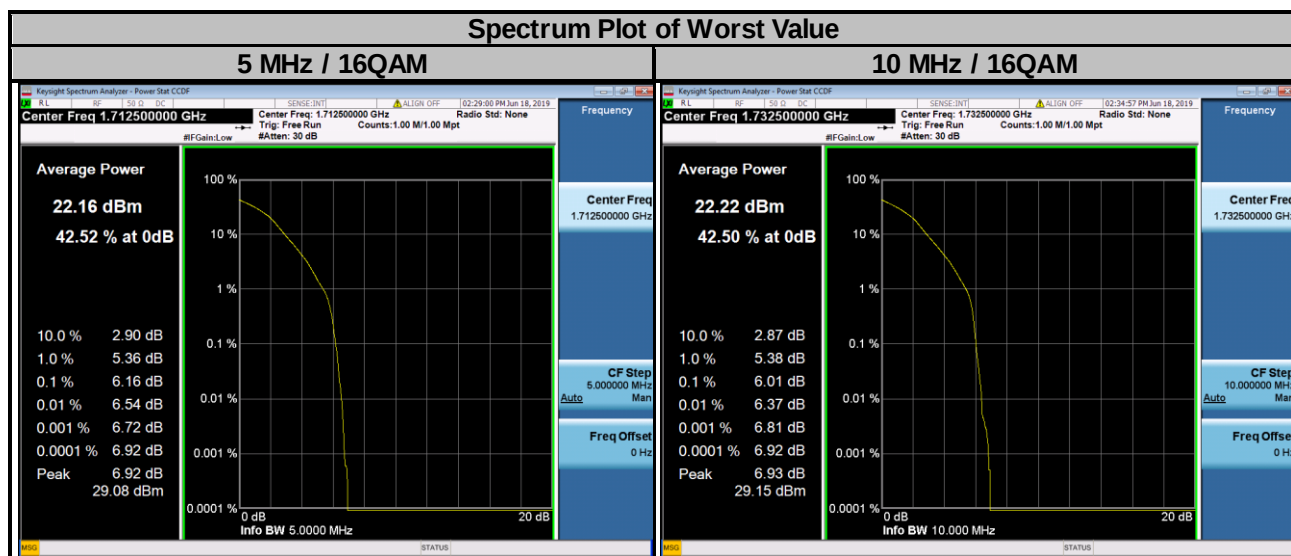
1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1 %.

#### 4.6.4 Test Results

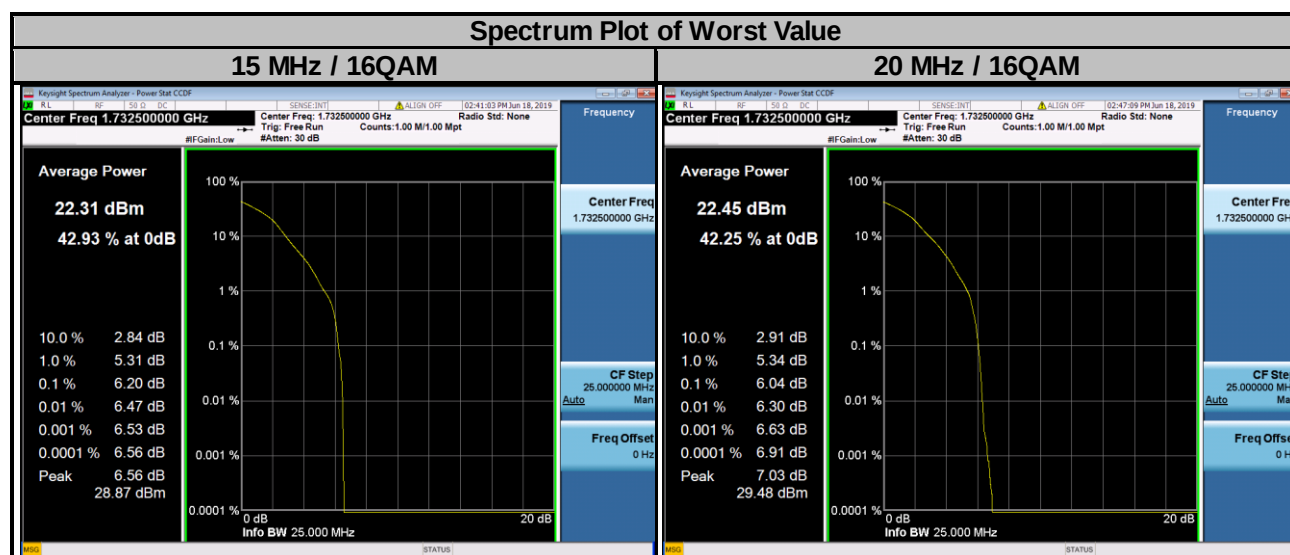
| LTE Band 4                 |                 |                            |       |                          |                 |                            |       |
|----------------------------|-----------------|----------------------------|-------|--------------------------|-----------------|----------------------------|-------|
| 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          | 5.35                       | 6.19  | 19965                    | 1711.5          | 5.21                       | 6.05  |
| 20175                      | 1732.5          | 5.16                       | 6.02  | 20175                    | 1732.5          | 5.12                       | 5.92  |
| 20393                      | 1754.3          | 5.07                       | 5.97  | 20385                    | 1753.5          | 4.96                       | 5.81  |



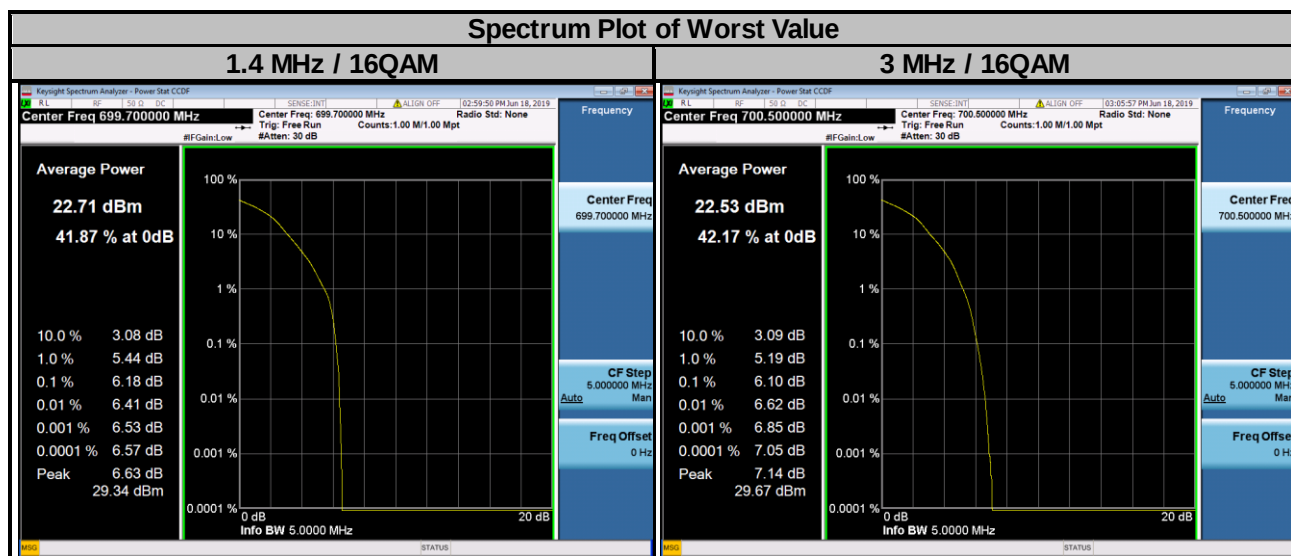
| LTE Band 4               |                 |                            |       |                           |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| 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          | 5.35                       | 6.16  | 20000                     | 1715.0          | 5.24                       | 5.93  |
| 20175                    | 1732.5          | 5.21                       | 6.15  | 20175                     | 1732.5          | 5.21                       | 6.01  |
| 20375                    | 1752.5          | 5.07                       | 5.90  | 20350                     | 1750.0          | 4.76                       | 5.63  |



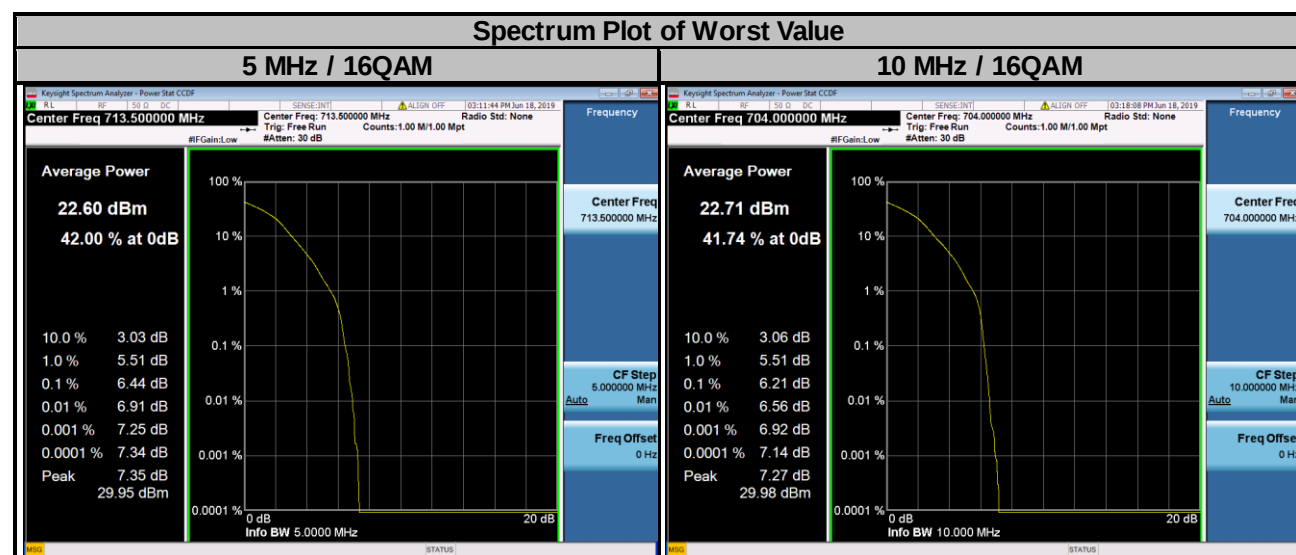
| LTE Band 4                |                 |                            |       |                           |                 |                            |       |
|---------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| 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          | 5.15                       | 5.96  | 20050                     | 1720.0          | 5.15                       | 5.81  |
| 20175                     | 1732.5          | 5.26                       | 6.20  | 20175                     | 1732.5          | 5.44                       | 6.04  |
| 20325                     | 1747.5          | 4.75                       | 5.66  | 20300                     | 1745.0          | 4.73                       | 5.58  |



| 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           | 5.28                       | 6.18  | 23025                    | 700.5           | 5.26                       | 6.10  |
| 23095                      | 707.5           | 4.92                       | 5.73  | 23095                    | 707.5           | 4.84                       | 5.68  |
| 23173                      | 715.3           | 4.23                       | 4.98  | 23165                    | 714.5           | 4.93                       | 5.72  |



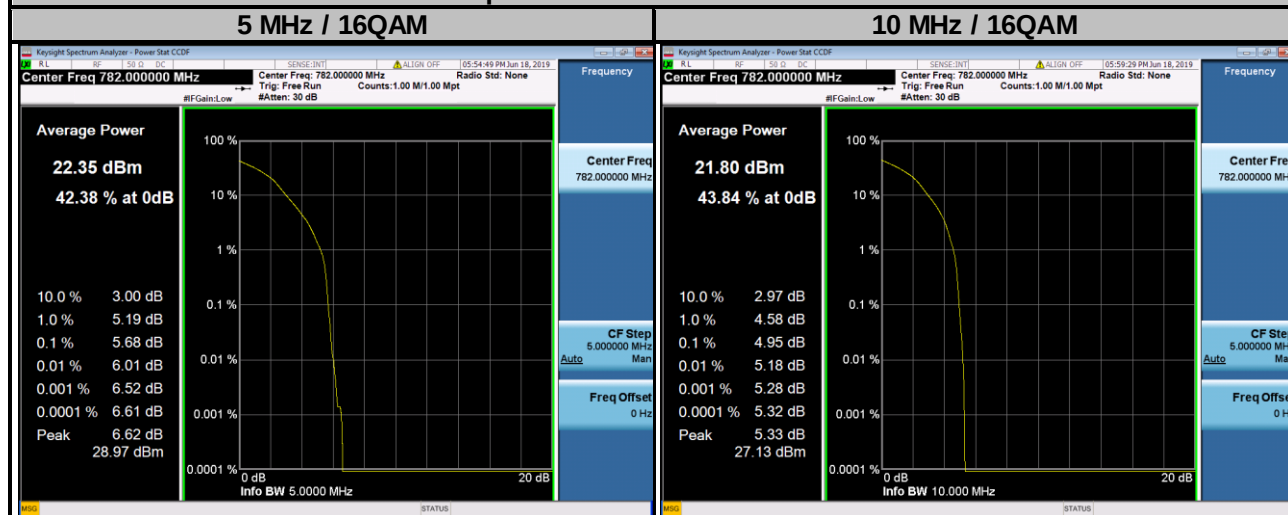
| LTE Band 12              |                 |                            |       |                           |                 |                            |       |
|--------------------------|-----------------|----------------------------|-------|---------------------------|-----------------|----------------------------|-------|
| 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           | 5.38                       | 6.21  | 23060                     | 704.0           | 5.40                       | 6.21  |
| 23095                    | 707.5           | 4.98                       | 5.77  | 23095                     | 707.5           | 5.20                       | 5.99  |
| 23155                    | 713.5           | 5.58                       | 6.44  | 23130                     | 711.0           | 4.88                       | 5.64  |



### LTE Band 13

| 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 |
| 23205                    | 779.5           | 3.99                       | 4.72  | 23230                     | 782.0           | 4.25                       | 4.95  |
| 23230                    | 782.0           | 4.91                       | 5.68  |                           |                 |                            |       |
| 23255                    | 784.5           | 4.89                       | 5.58  |                           |                 |                            |       |

### Spectrum Plot of Worst Value



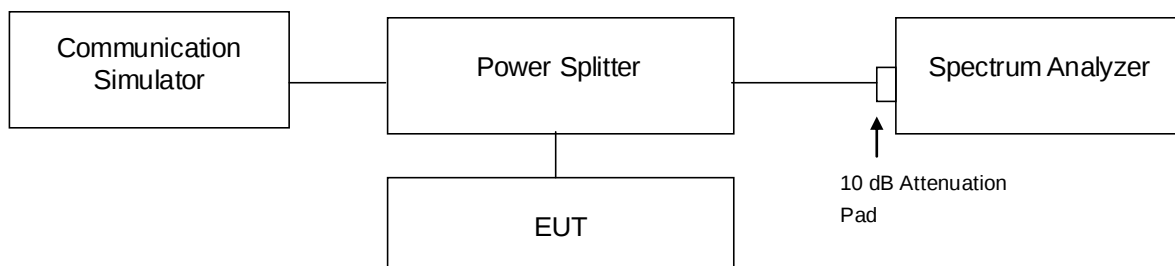
## 4.7 Conducted Spurious Emissions

### 4.7.1 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.

For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

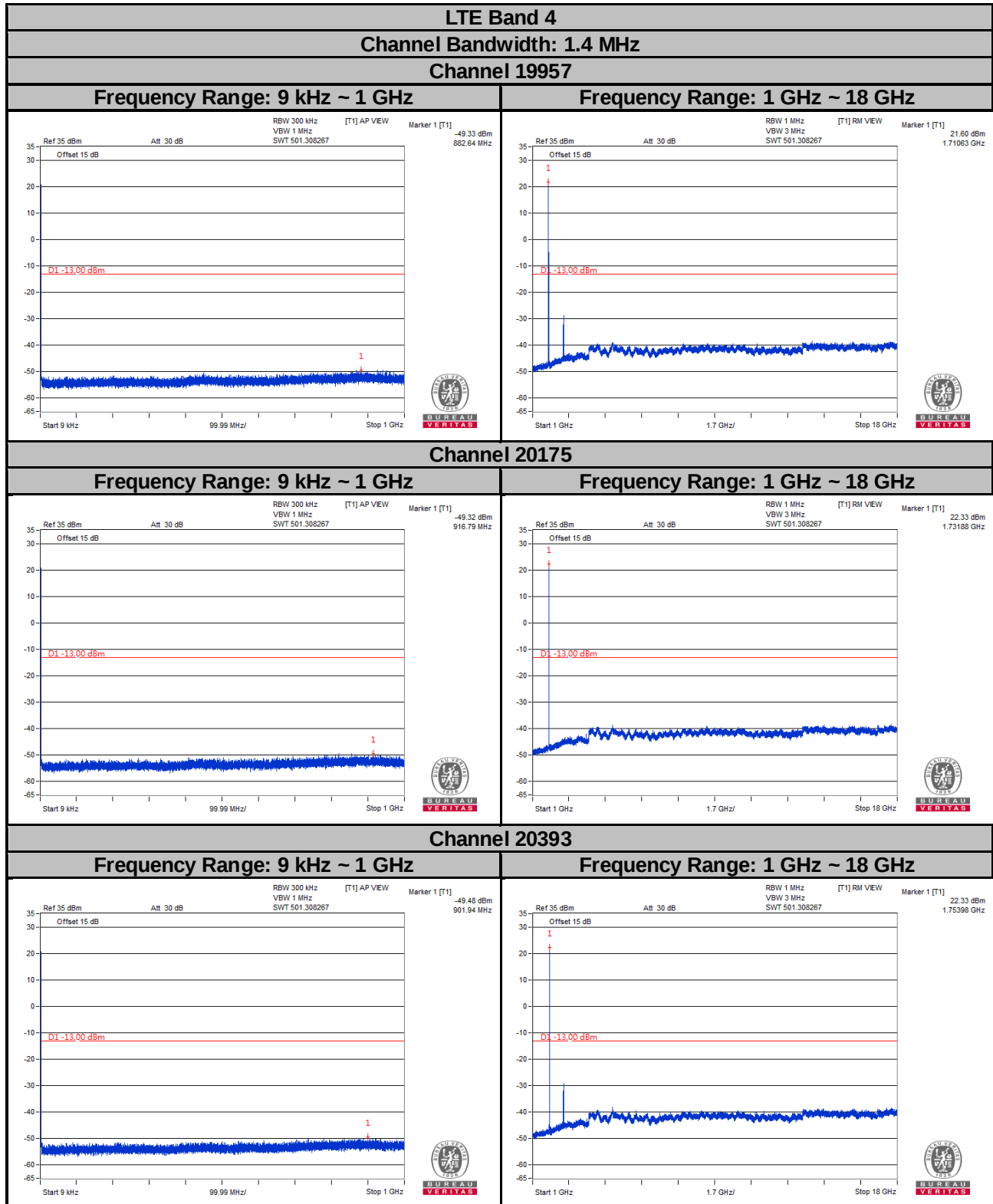
### 4.7.2 Test Setup



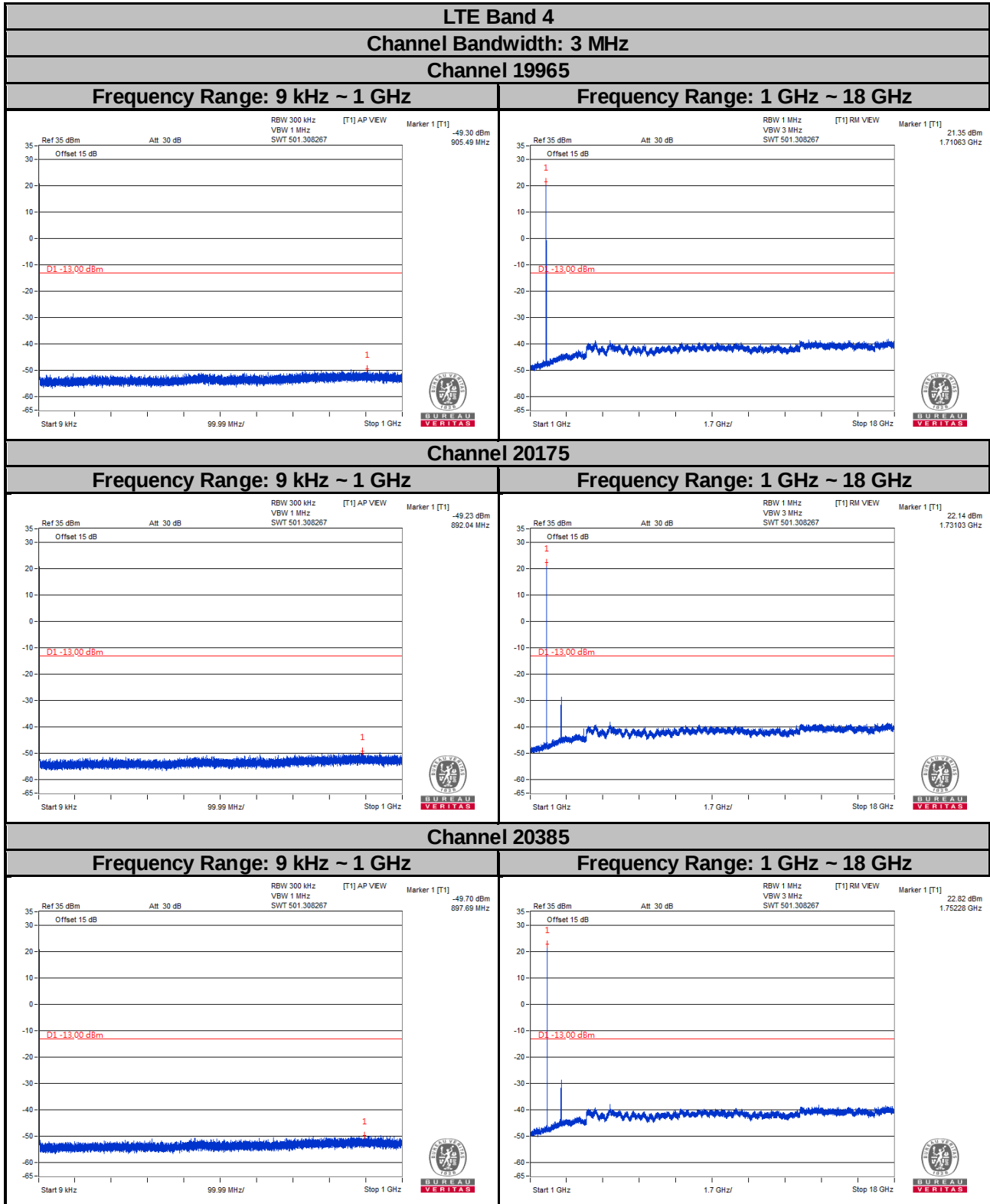
### 4.7.3 Test Procedure

- 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 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 300 kHz and VBW = 1 MHz is used for conducted emission measurement for LTE Band 4. RBW = 100 kHz and VBW = 300 kHz is used for conducted emission measurement for LTE Band 12, 13.
- Measuring frequency range is from 1 GHz to 8 GHz / 18 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz is used for conducted emission measurement.

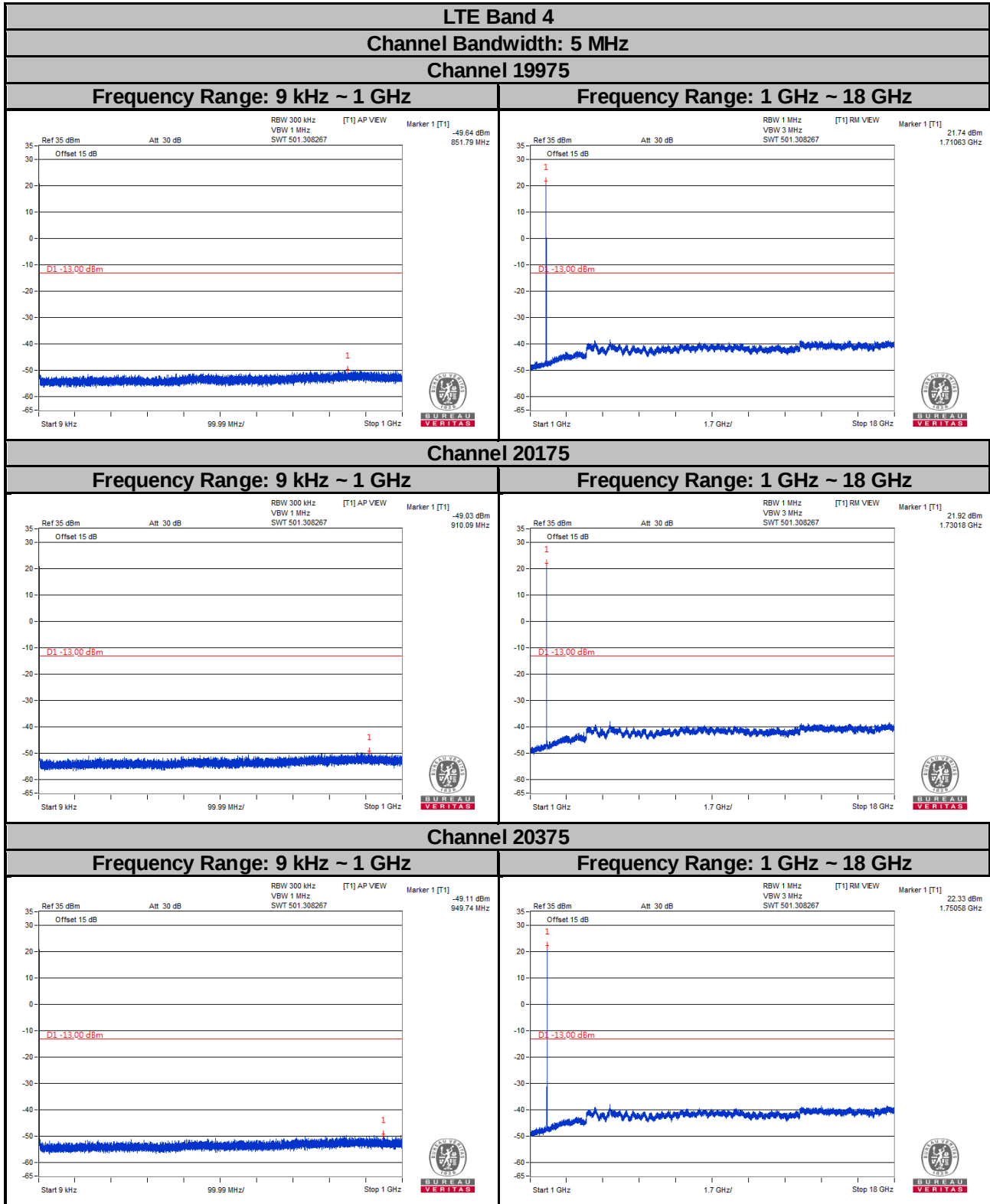
#### 4.7.4 Test Results



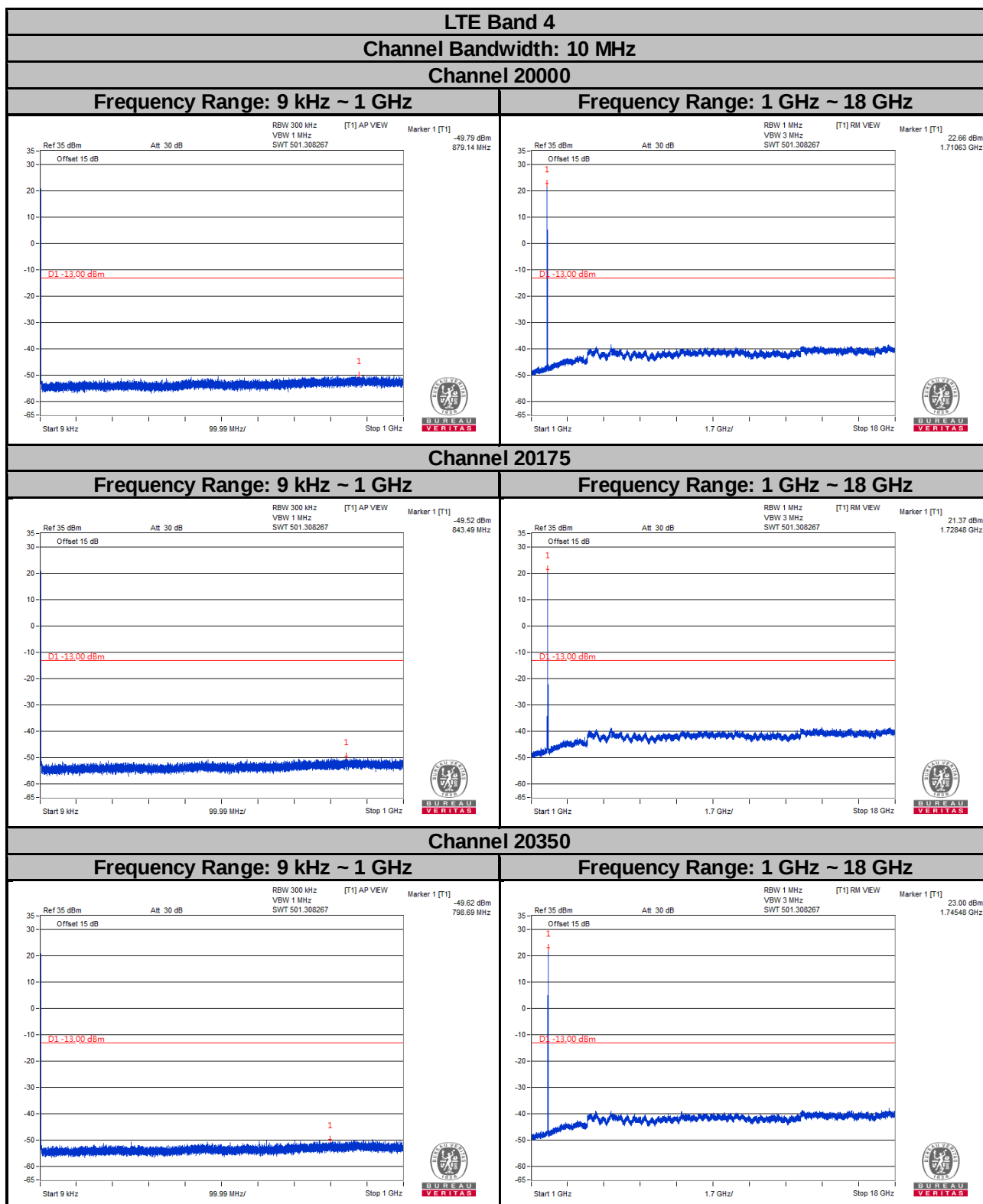
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



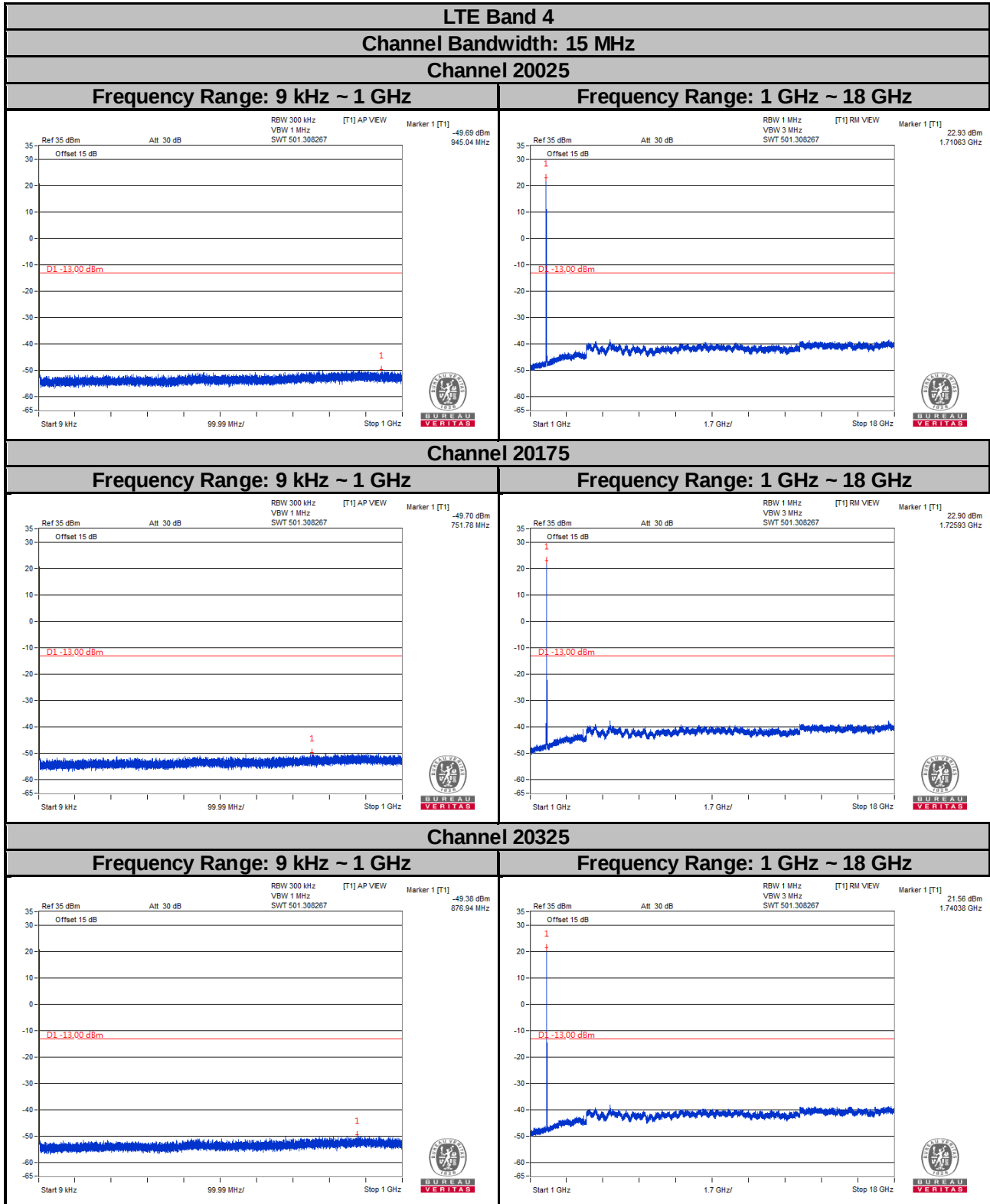
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



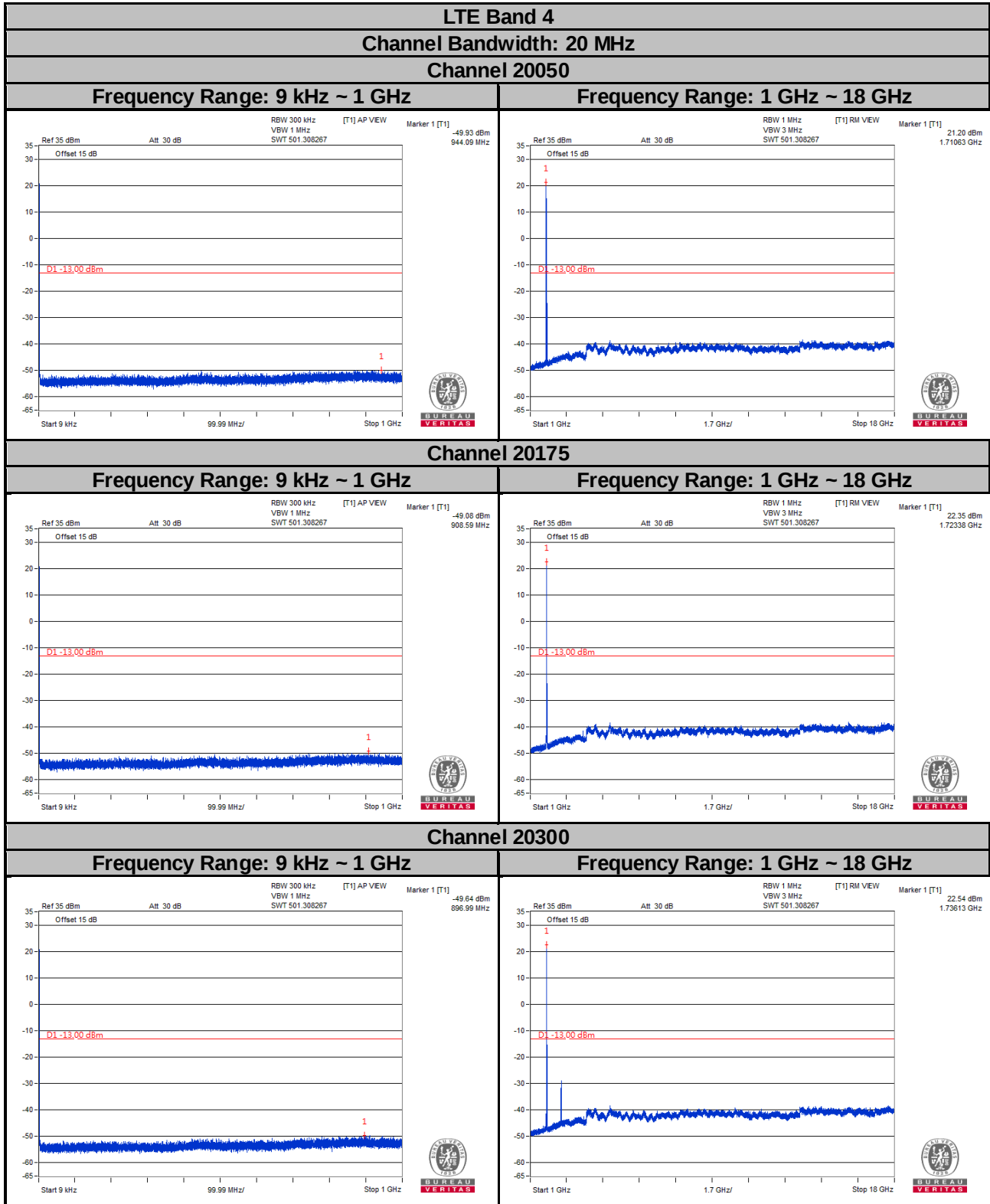
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



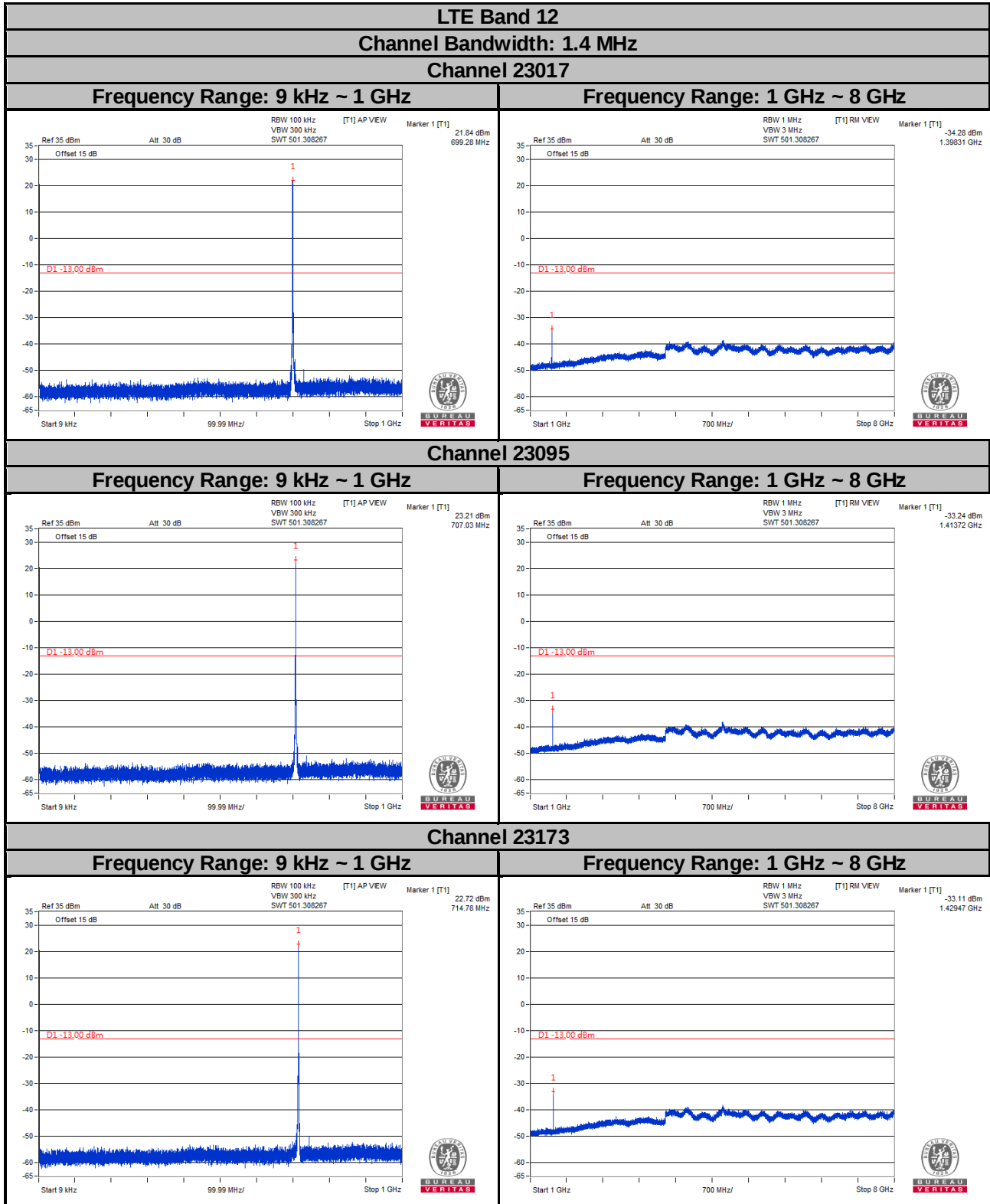
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



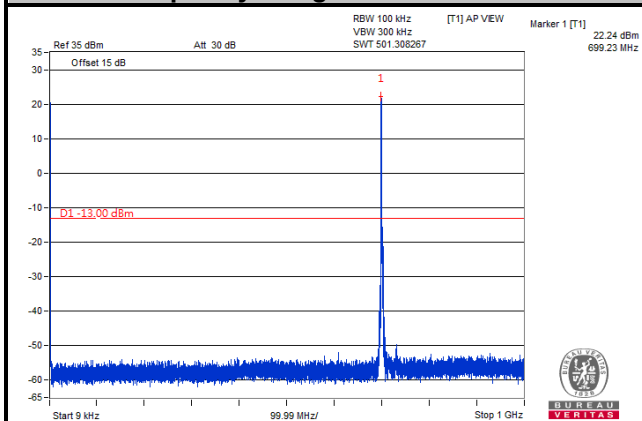
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

## LTE Band 12

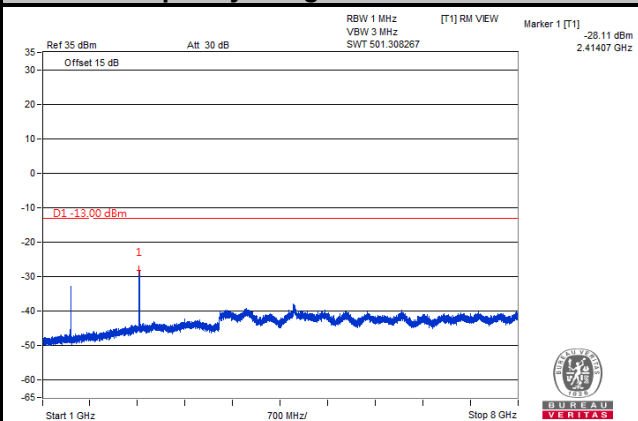
Channel Bandwidth: 3 MHz

Channel 23025

Frequency Range: 9 kHz ~ 1 GHz

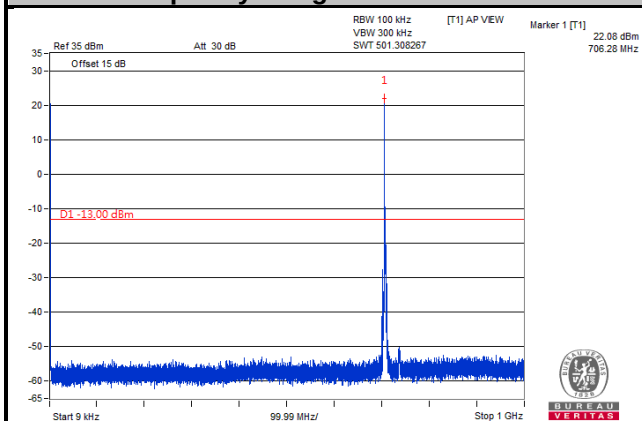


Frequency Range: 1 GHz ~ 8 GHz

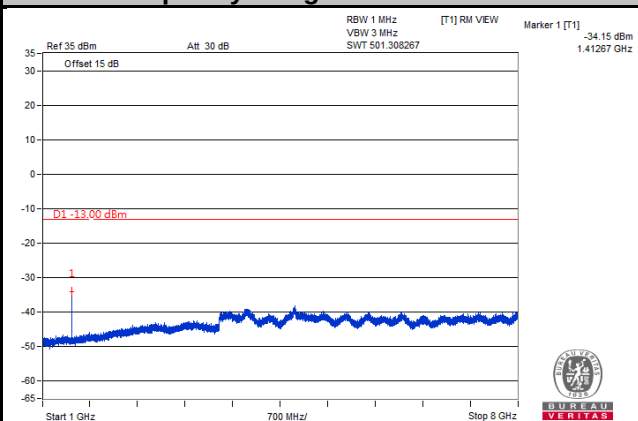


Channel 23095

Frequency Range: 9 kHz ~ 1 GHz

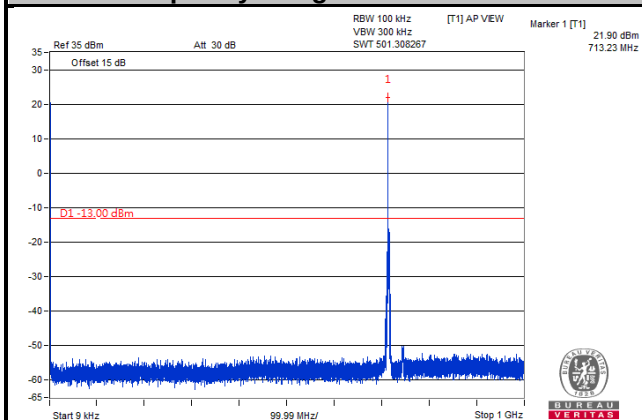


Frequency Range: 1 GHz ~ 8 GHz

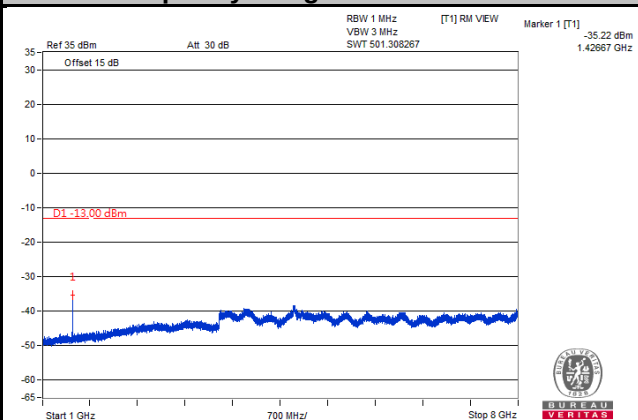


Channel 23165

Frequency Range: 9 kHz ~ 1 GHz



Frequency Range: 1 GHz ~ 8 GHz



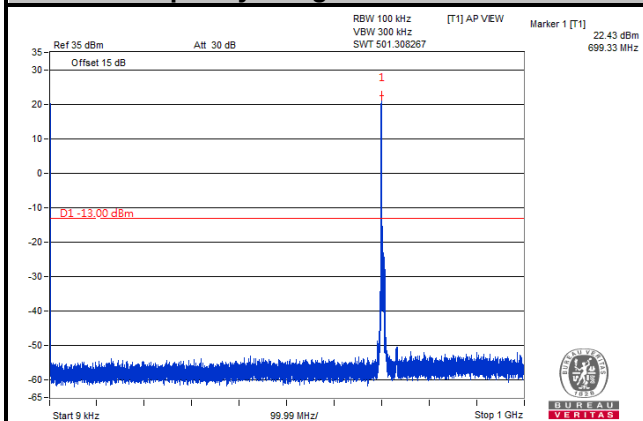
Note: The signal over the limit in 9 kHz is from spectrum analyzer.

## LTE Band 12

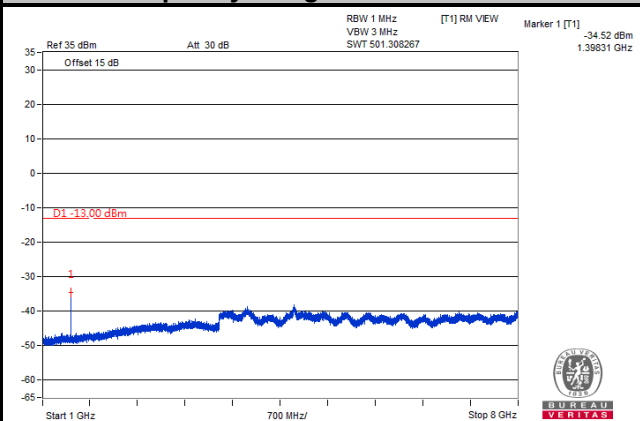
Channel Bandwidth: 5 MHz

Channel 23035

Frequency Range: 9 kHz ~ 1 GHz

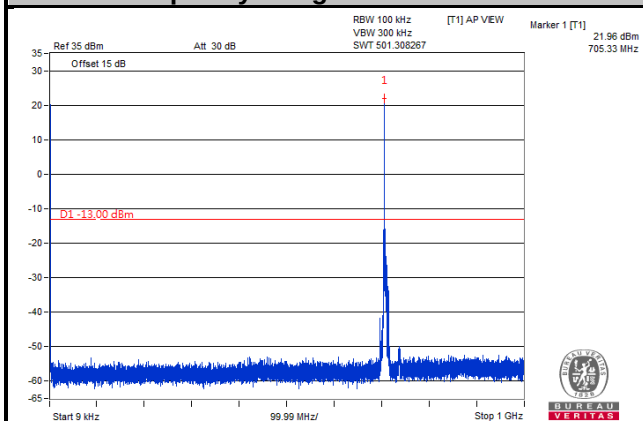


Frequency Range: 1 GHz ~ 8 GHz

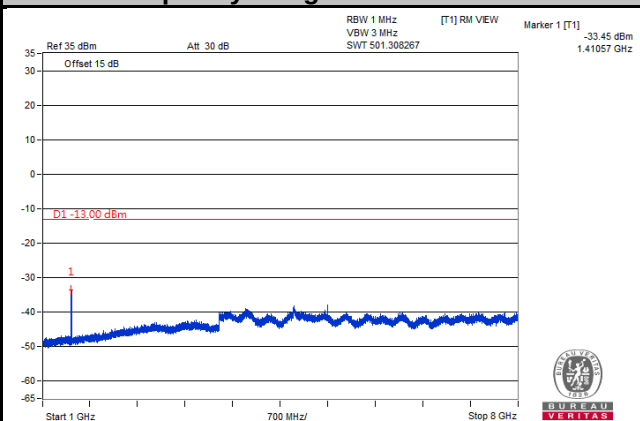


Channel 23095

Frequency Range: 9 kHz ~ 1 GHz

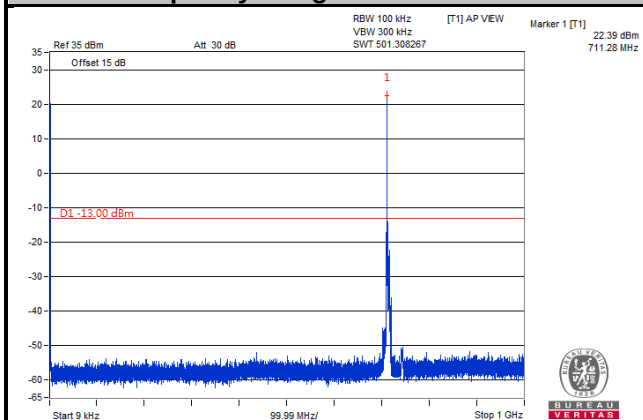


Frequency Range: 1 GHz ~ 8 GHz

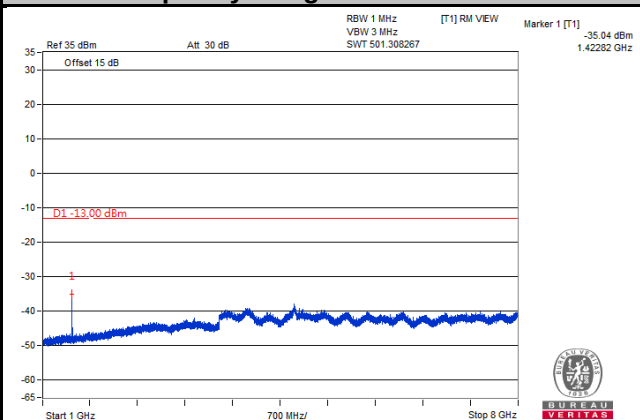


Channel 23155

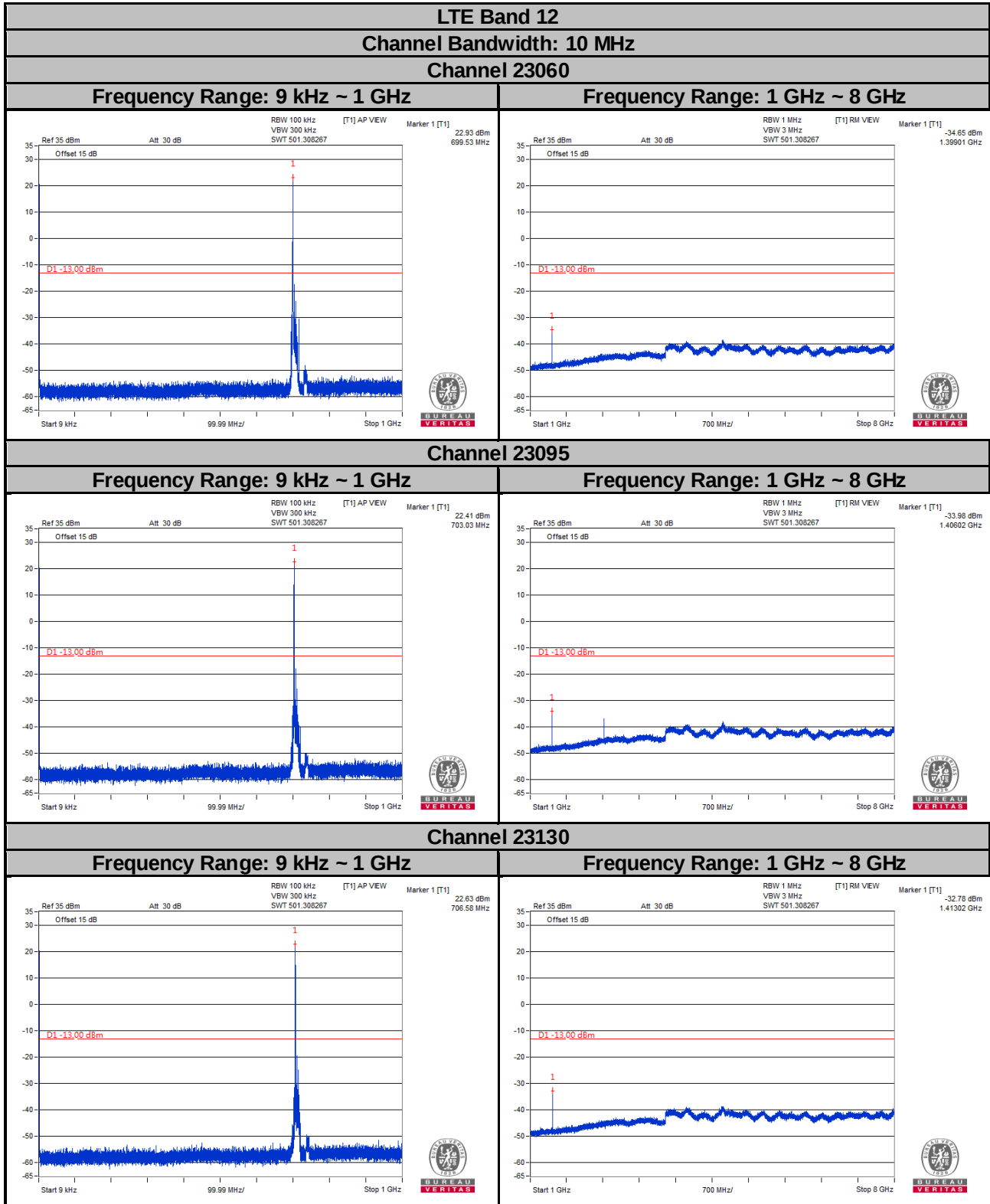
Frequency Range: 9 kHz ~ 1 GHz



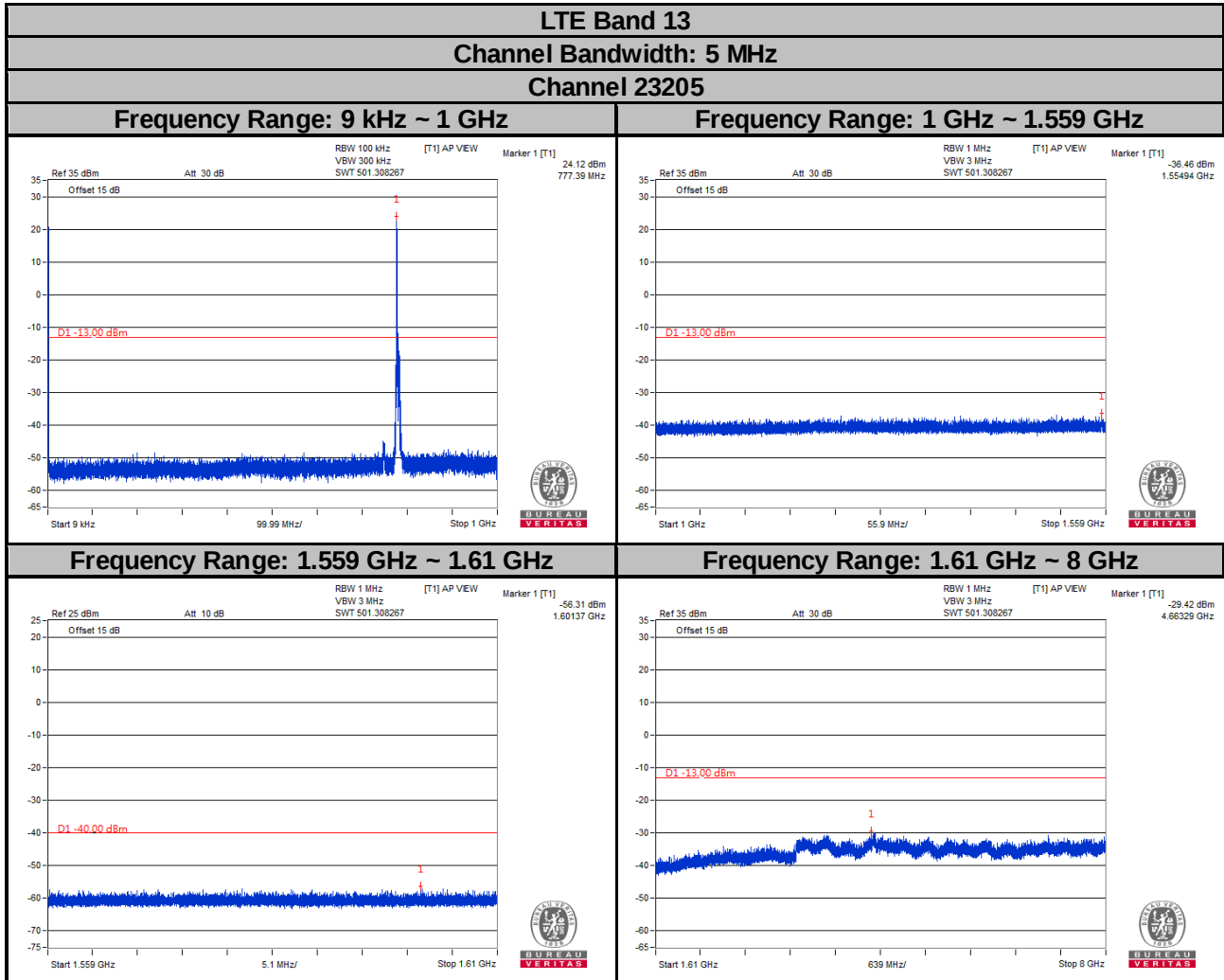
Frequency Range: 1 GHz ~ 8 GHz



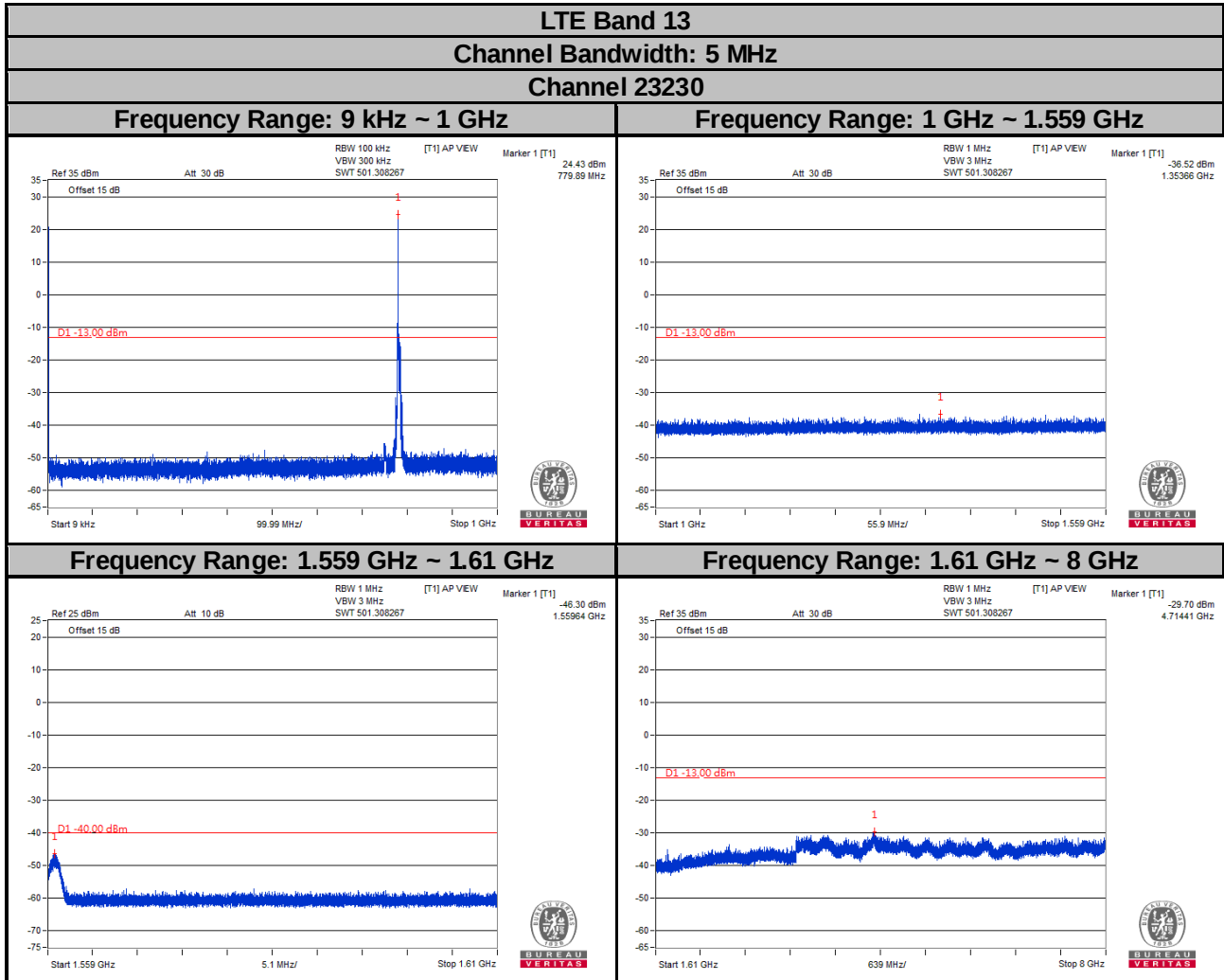
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



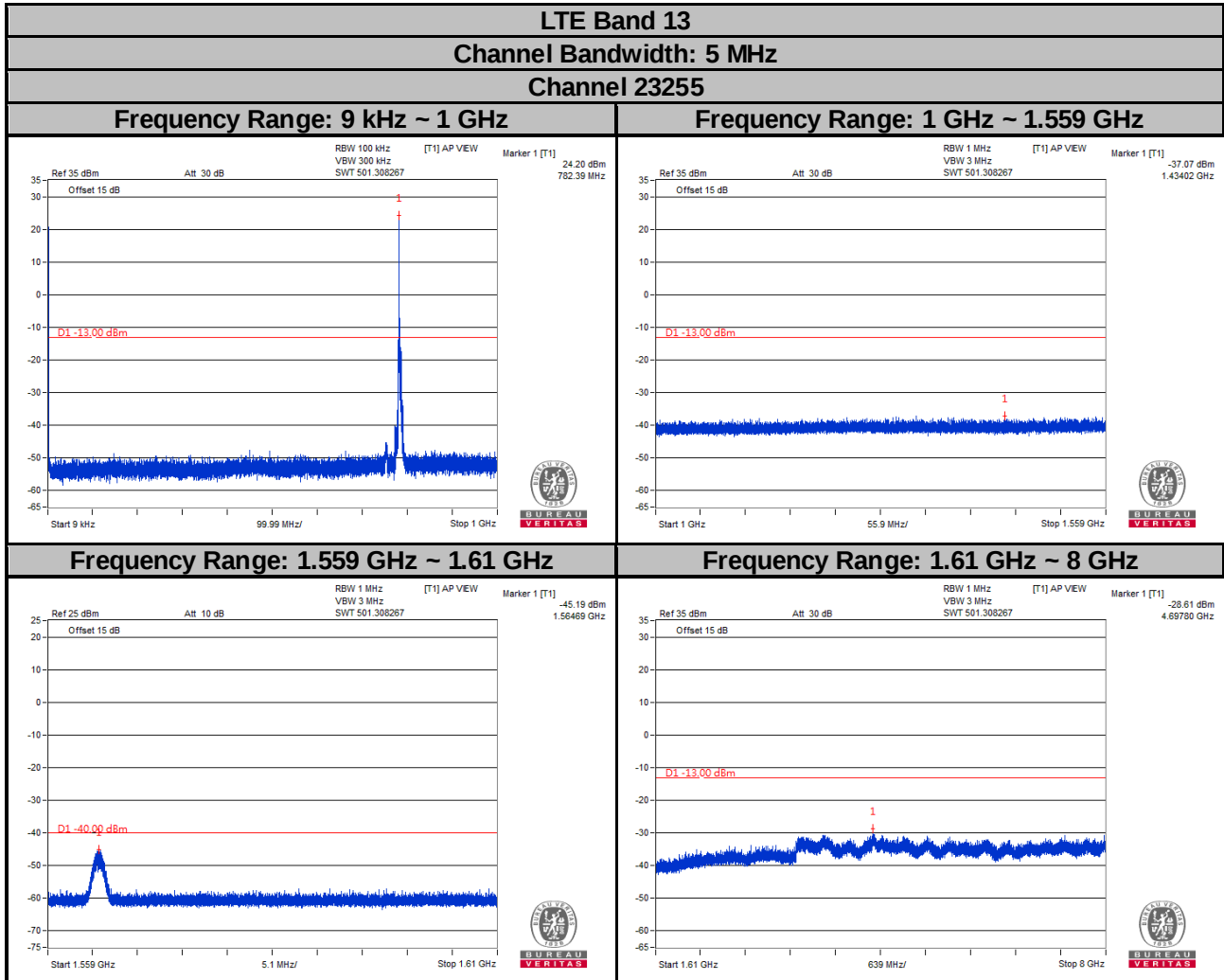
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



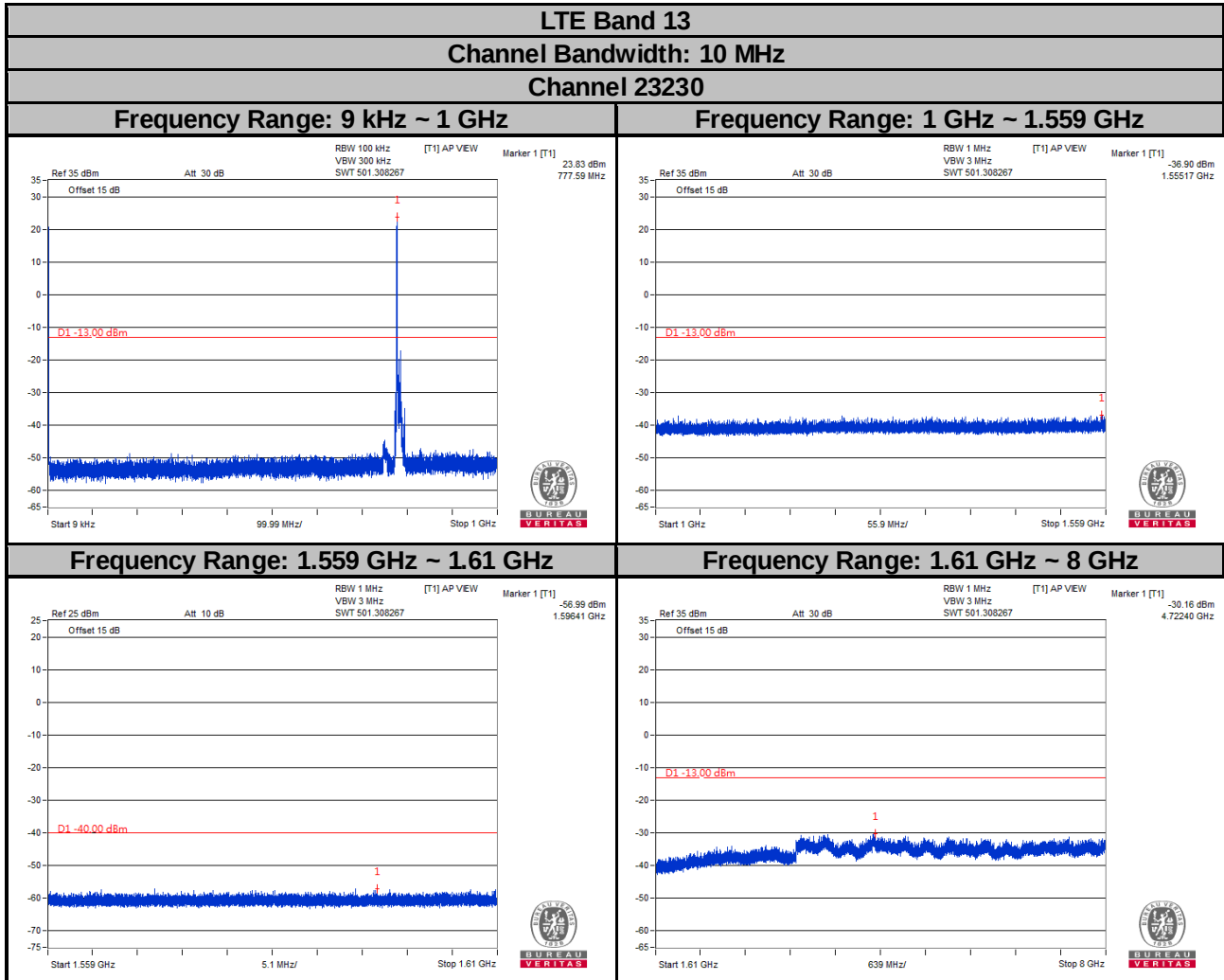
Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.



Note: The signal over the limit in 9 kHz is from spectrum analyzer.

## 4.8 Radiated Emission Measurement

### 4.8.1 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.
- b. For operations in the 775-788 MHz, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz. The limit of emissions is equal to -40 dBm.

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

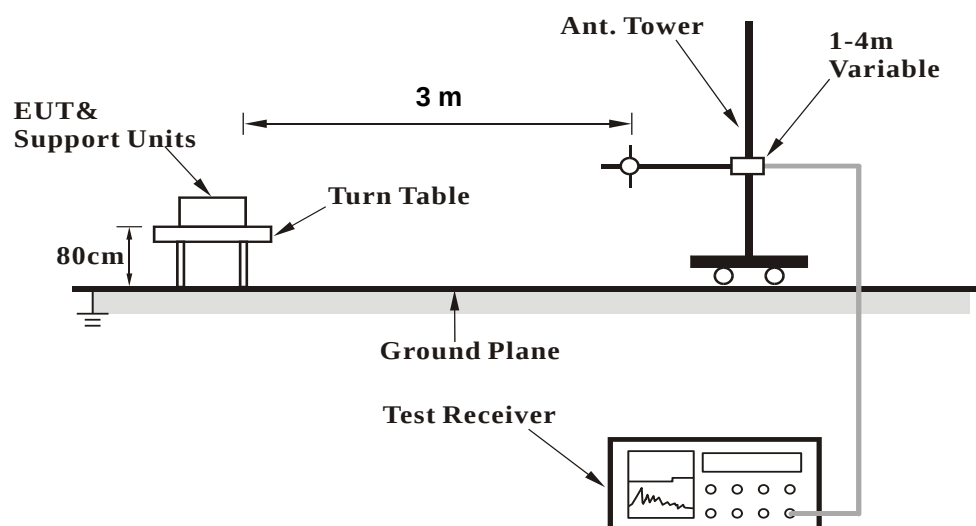
**Note:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 4.8.3 Deviation from Test Standard

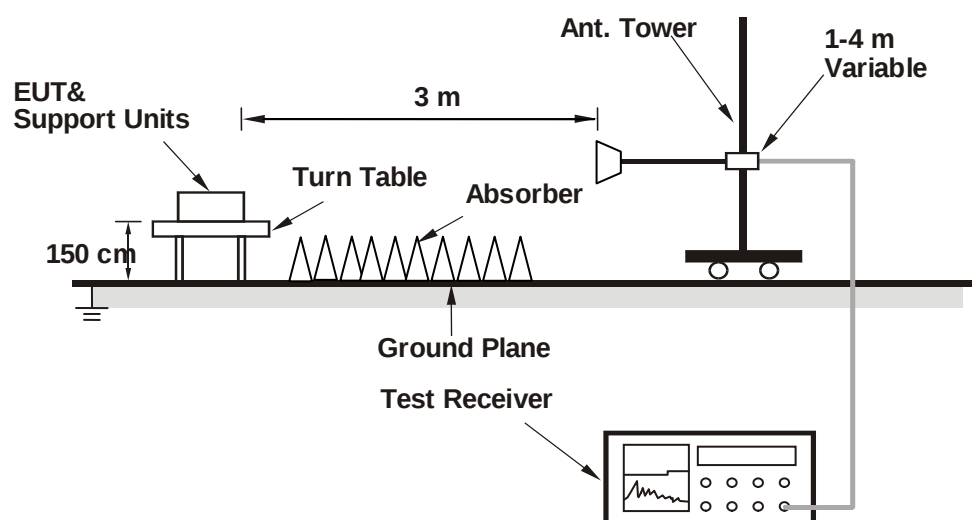
No deviation.

#### 4.8.4 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).

#### 4.8.5 Test Results

##### LTE Band 4

Channel Bandwidth: 1.4 MHz / QPSK

##### Low Channel

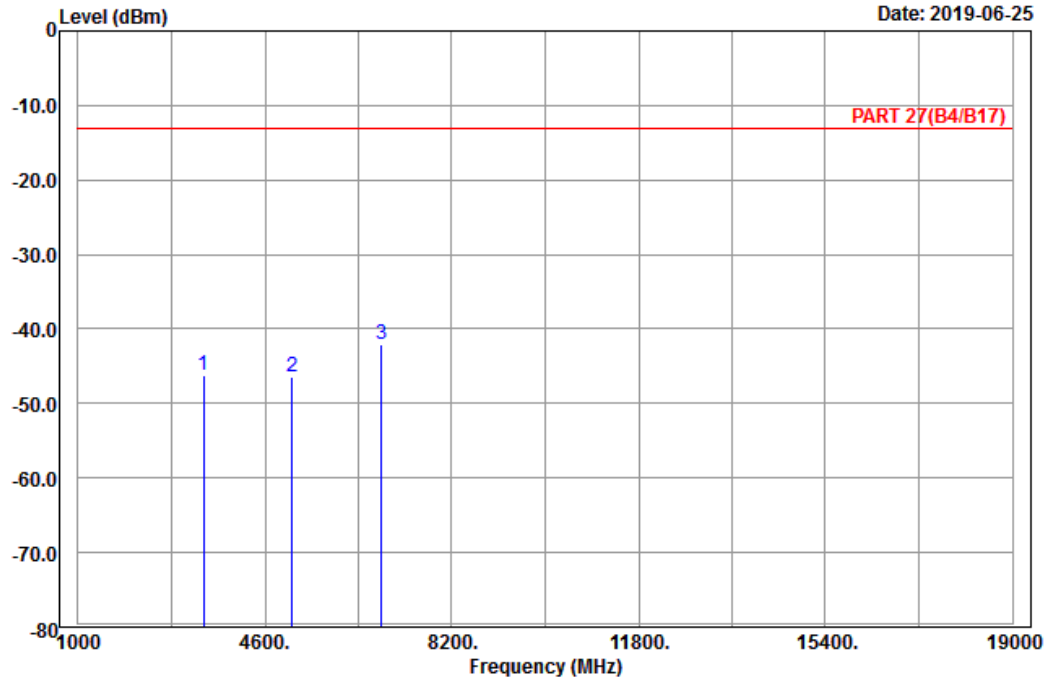


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-25



Site : 966 chamber 1

Condition: PART 27(B4/B17) Horizontal

Remark : LTE\_Band 4\_Link\_CH19957

Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3421.40 | -46.14 | -60.51     | 14.37  | -13.00     | -33.14     | Peak   |
| 2    | 5132.10 | -46.54 | -66.35     | 19.81  | -13.00     | -33.54     | Peak   |
| 3 pp | 6842.80 | -42.10 | -64.82     | 22.72  | -13.00     | -29.10     | Peak   |

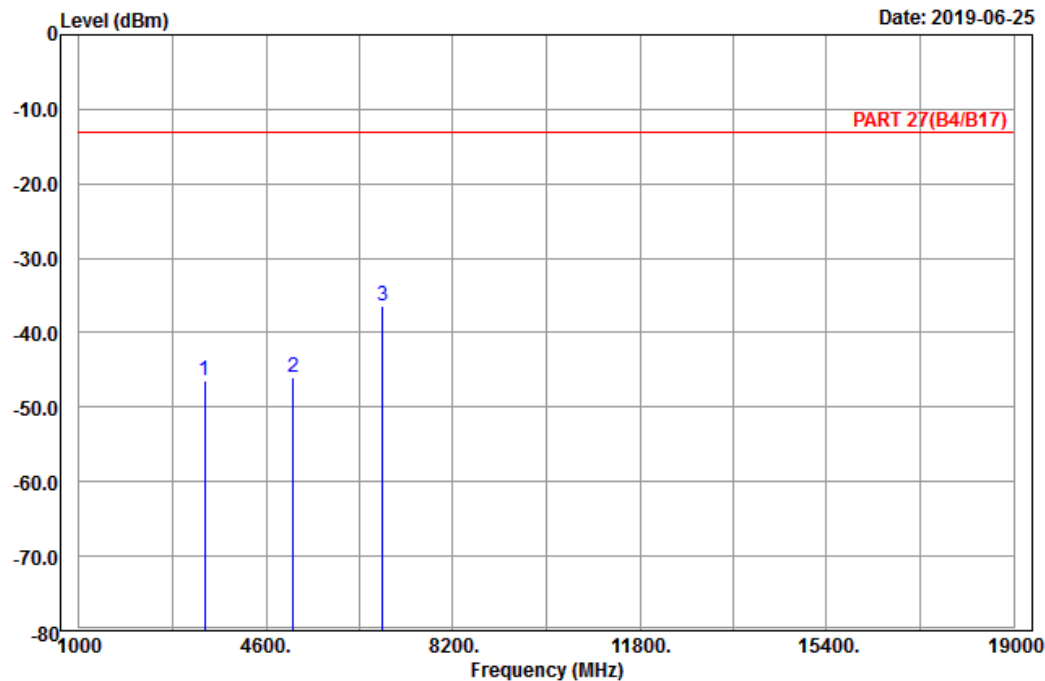


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A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH19957  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3421.40 | -46.34 | -60.71     | 14.37  | -13.00     | -33.34     | Peak   |
| 2    | 5132.10 | -46.10 | -65.91     | 19.81  | -13.00     | -33.10     | Peak   |
| 3 pp | 6842.80 | -36.34 | -59.06     | 22.72  | -13.00     | -23.34     | Peak   |

## Middle Channel

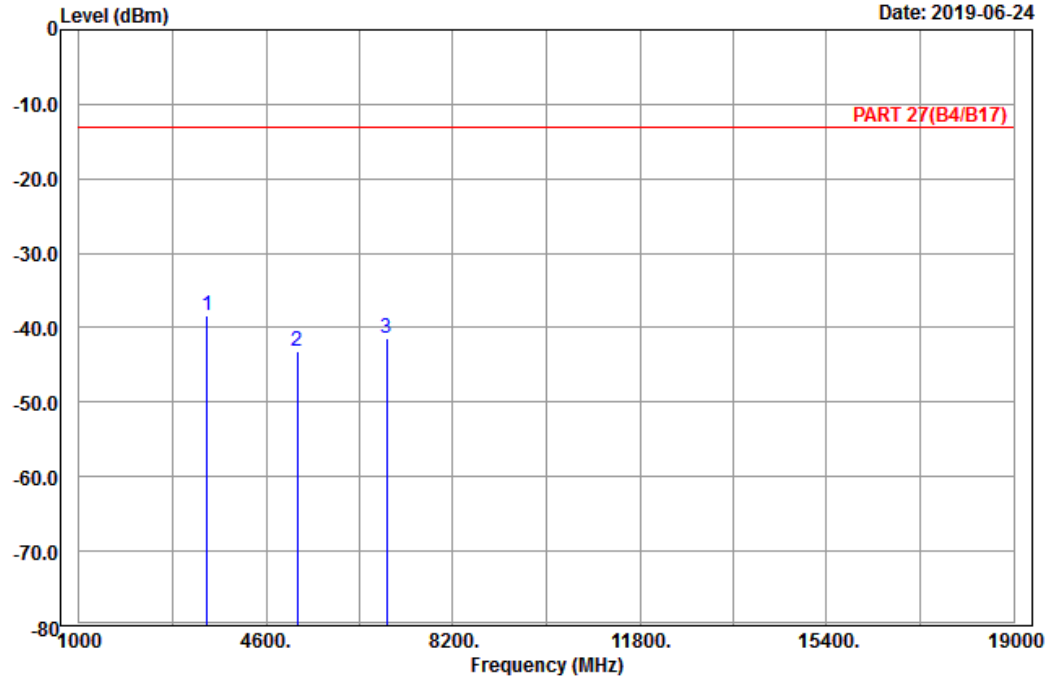


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-24



Site : 966 chamber 1  
 Condition: PART 27(B4/B17) Horizontal  
 Remark : LTE\_Band 4\_Link\_CH20175  
 Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1 pp | 3465.00 | -38.40 | -52.74     | 14.34  | -13.00     | -25.40     | Peak   |
| 2    | 5197.50 | -43.26 | -63.38     | 20.12  | -13.00     | -30.26     | Peak   |
| 3    | 6930.00 | -41.51 | -64.38     | 22.87  | -13.00     | -28.51     | Peak   |

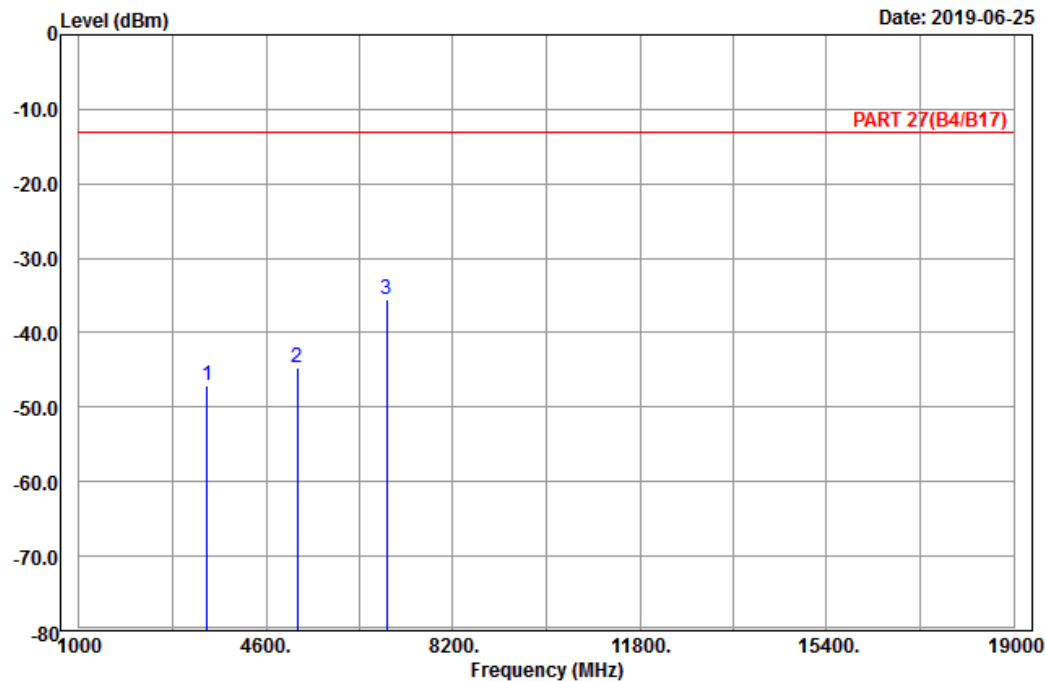


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20175  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3465.00 | -47.01 | -61.35     | 14.34  | -13.00     | -34.01     | Peak   |
| 2    | 5197.50 | -44.61 | -64.73     | 20.12  | -13.00     | -31.61     | Peak   |
| 3 pp | 6930.00 | -35.42 | -58.29     | 22.87  | -13.00     | -22.42     | Peak   |

## High Channel

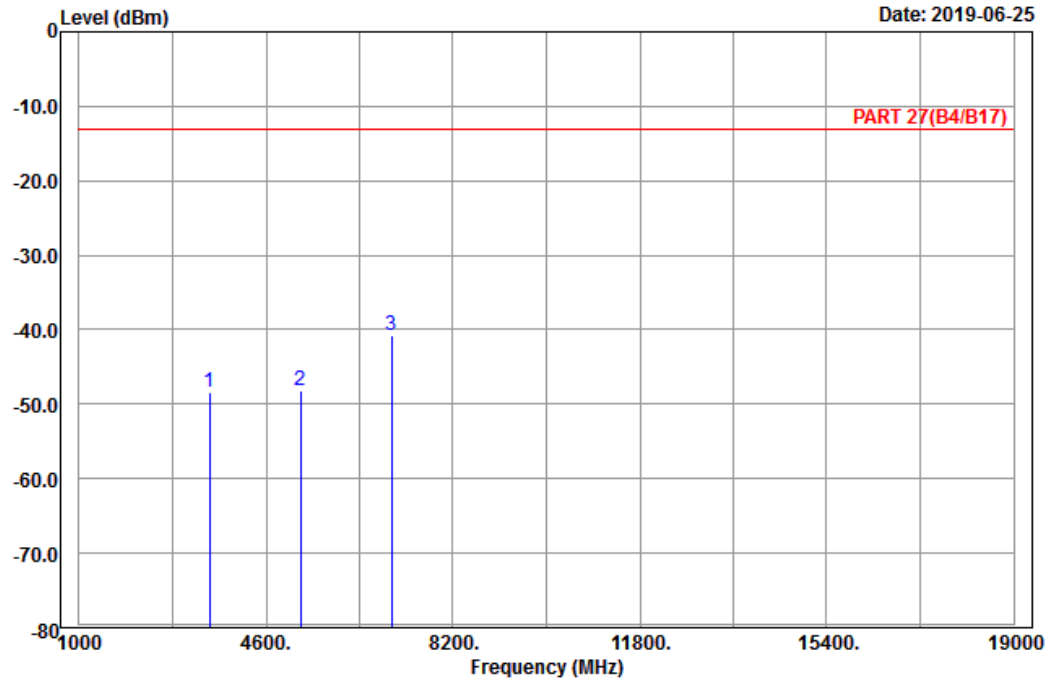


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A D T

Data: 9

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Horizontal  
Remark : LTE\_Band 4\_Link\_CH20393  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1    | 3508.60 | -48.46 | -62.74        | 14.28  | -13.00        | -35.46        | Peak   |
| 2    | 5262.90 | -48.19 | -68.39        | 20.20  | -13.00        | -35.19        | Peak   |
| 3 pp | 7017.20 | -40.82 | -63.43        | 22.61  | -13.00        | -27.82        | Peak   |

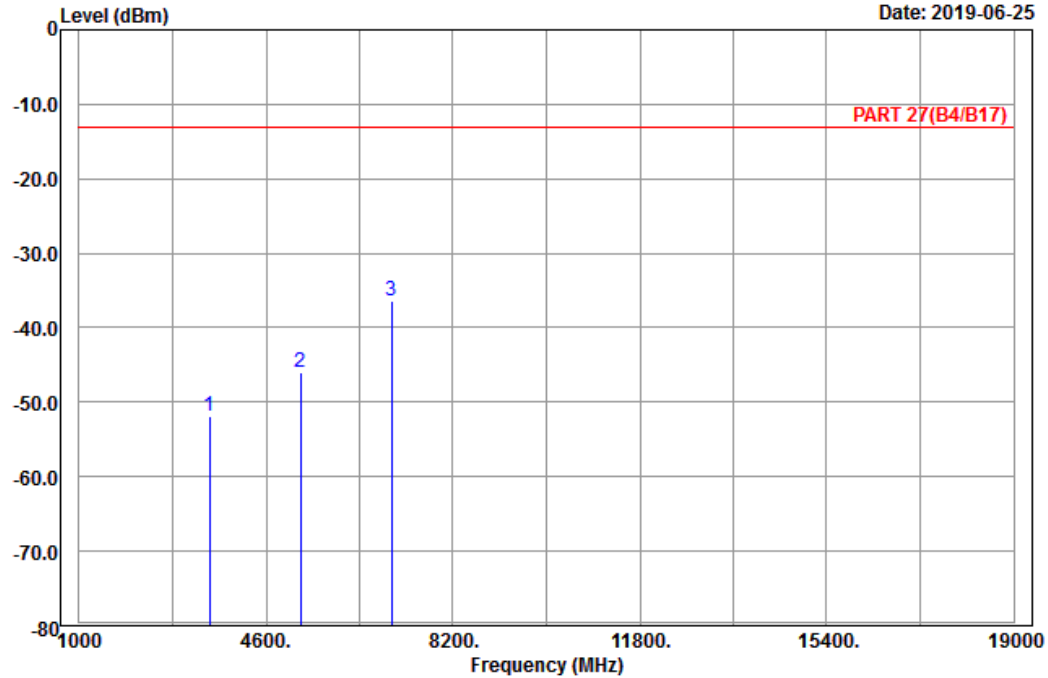


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20393  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1    | 3508.60 | -51.88 | -66.16        | 14.28  | -13.00        | -38.88        | Peak   |
| 2    | 5262.90 | -45.95 | -66.15        | 20.20  | -13.00        | -32.95        | Peak   |
| 3 pp | 7017.20 | -36.48 | -59.09        | 22.61  | -13.00        | -23.48        | Peak   |

Channel Bandwidth: 5 MHz / QPSK  
Low Channel

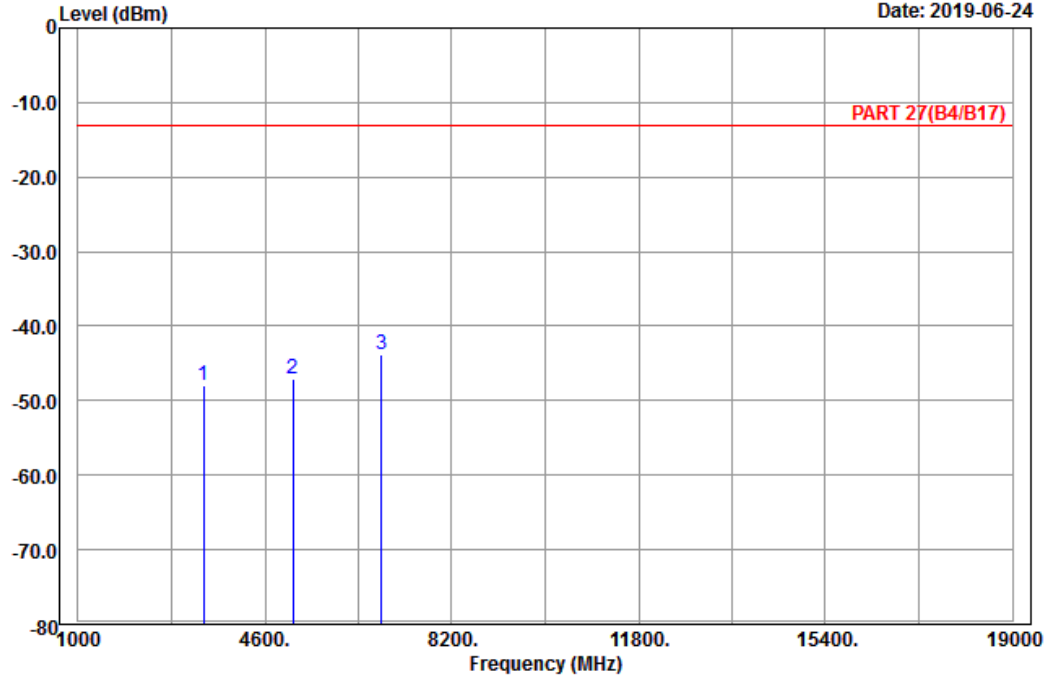


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A D T

Data: 9

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Horizontal  
Remark : LTE\_Band 4\_Link\_CH19975  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3425.00 | -47.88 | -62.25     | 14.37  | -13.00     | -34.88     | Peak   |
| 2    | 5137.50 | -47.16 | -66.97     | 19.81  | -13.00     | -34.16     | Peak   |
| 3 pp | 6850.00 | -43.76 | -66.48     | 22.72  | -13.00     | -30.76     | Peak   |

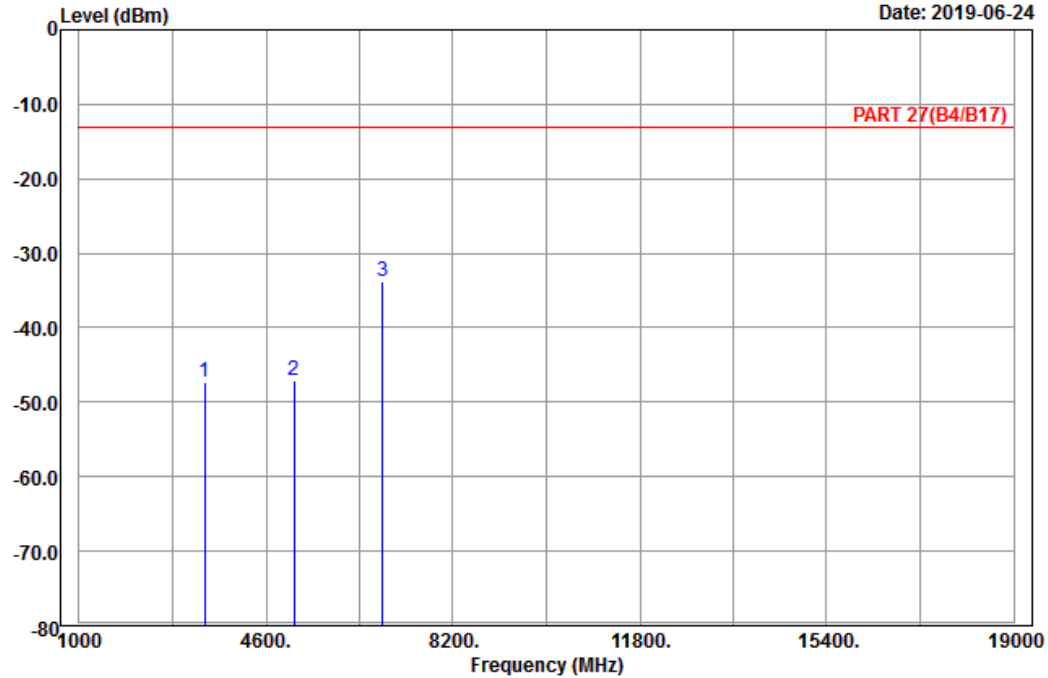


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH19975  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3425.00 | -47.40 | -61.77     | 14.37  | -13.00     | -34.40     | Peak   |
| 2    | 5137.50 | -47.02 | -66.83     | 19.81  | -13.00     | -34.02     | Peak   |
| 3 pp | 6850.00 | -33.89 | -56.61     | 22.72  | -13.00     | -20.89     | Peak   |

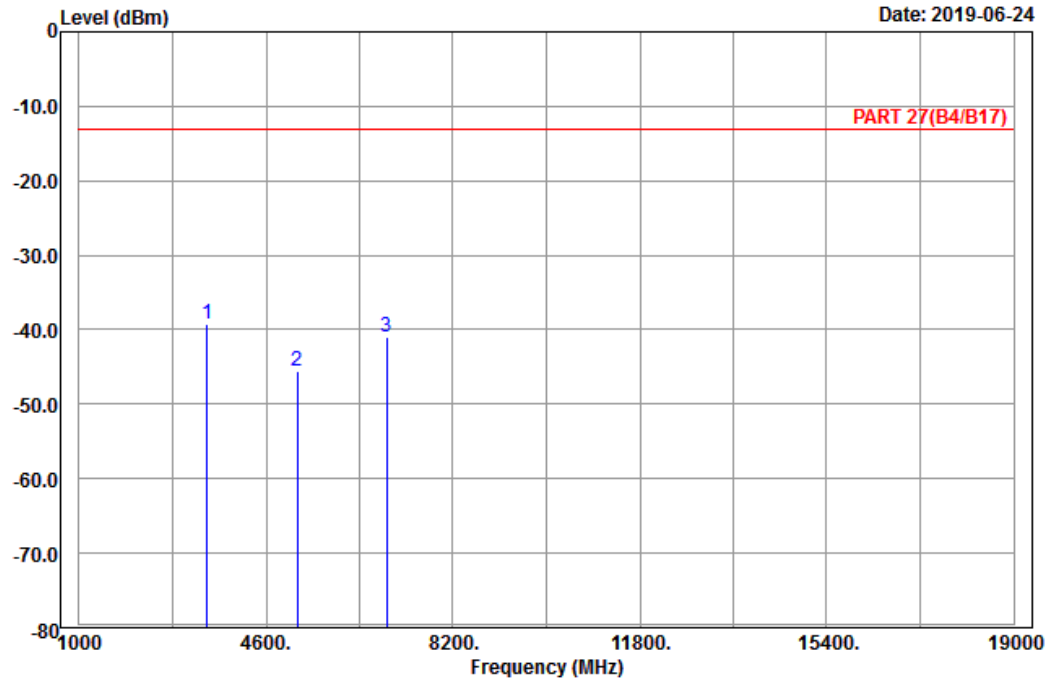
## Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1  
 Condition: PART 27(B4/B17) Horizontal  
 Remark : LTE\_Band 4\_Link\_CH20175  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 3465.00 | -39.28 | -53.62        | 14.34  | -13.00        | -26.28        | Peak   |
| 2    | 5197.50 | -45.63 | -65.75        | 20.12  | -13.00        | -32.63        | Peak   |
| 3    | 6930.00 | -40.97 | -63.84        | 22.87  | -13.00        | -27.97        | Peak   |

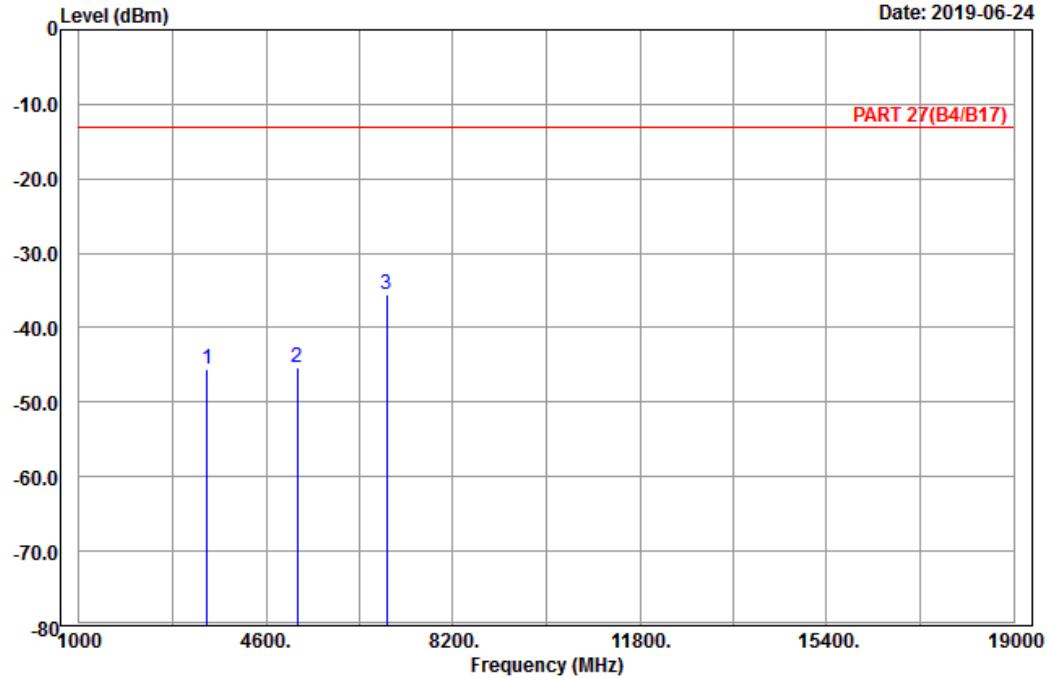


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20175  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3465.00 | -45.51 | -59.85     | 14.34  | -13.00     | -32.51     | Peak   |
| 2    | 5197.50 | -45.25 | -65.37     | 20.12  | -13.00     | -32.25     | Peak   |
| 3 pp | 6930.00 | -35.52 | -58.39     | 22.87  | -13.00     | -22.52     | Peak   |

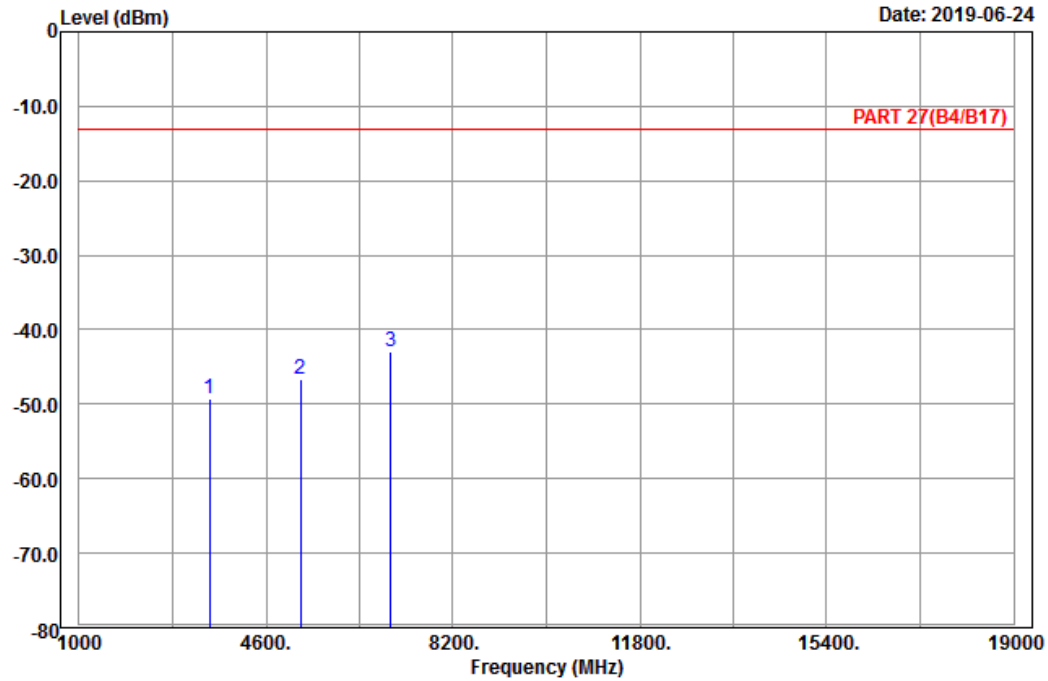
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Horizontal  
Remark : LTE\_Band 4\_Link\_CH20375  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3505.00 | -49.28 | -63.56     | 14.28  | -13.00     | -36.28     | Peak   |
| 2    | 5257.50 | -46.68 | -66.88     | 20.20  | -13.00     | -33.68     | Peak   |
| 3 pp | 7010.00 | -42.99 | -65.60     | 22.61  | -13.00     | -29.99     | Peak   |

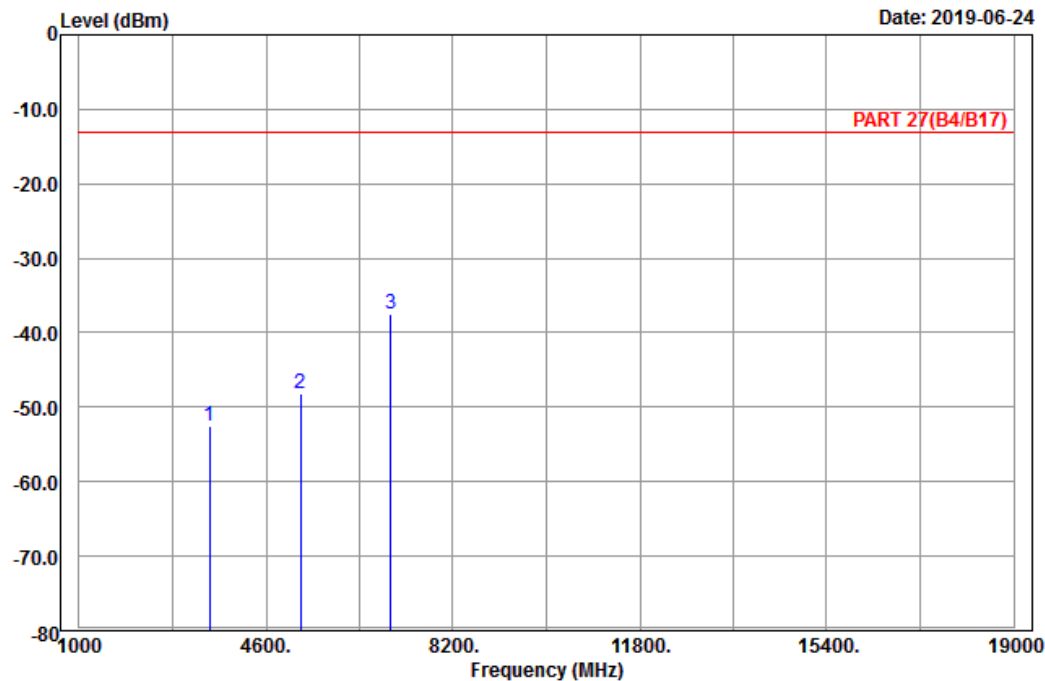


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20375  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3505.00 | -52.63 | -66.91     | 14.28  | -13.00     | -39.63     | Peak   |
| 2    | 5257.50 | -48.19 | -68.39     | 20.20  | -13.00     | -35.19     | Peak   |
| 3 pp | 7010.00 | -37.41 | -60.02     | 22.61  | -13.00     | -24.41     | Peak   |

Channel Bandwidth: 20 MHz / QPSK  
Low Channel

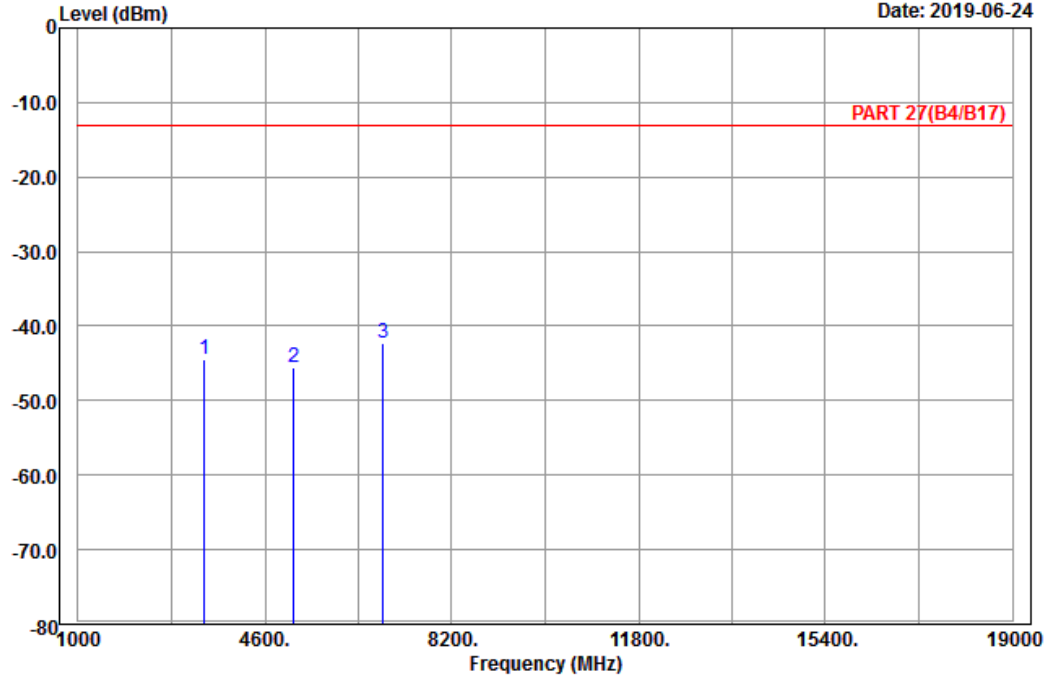


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Horizontal  
Remark : LTE\_Band 4\_Link\_CH20050  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3440.00 | -44.52 | -58.87     | 14.35  | -13.00     | -31.52     | Peak   |
| 2    | 5160.00 | -45.58 | -65.50     | 19.92  | -13.00     | -32.58     | Peak   |
| 3 pp | 6880.00 | -42.33 | -65.13     | 22.80  | -13.00     | -29.33     | Peak   |

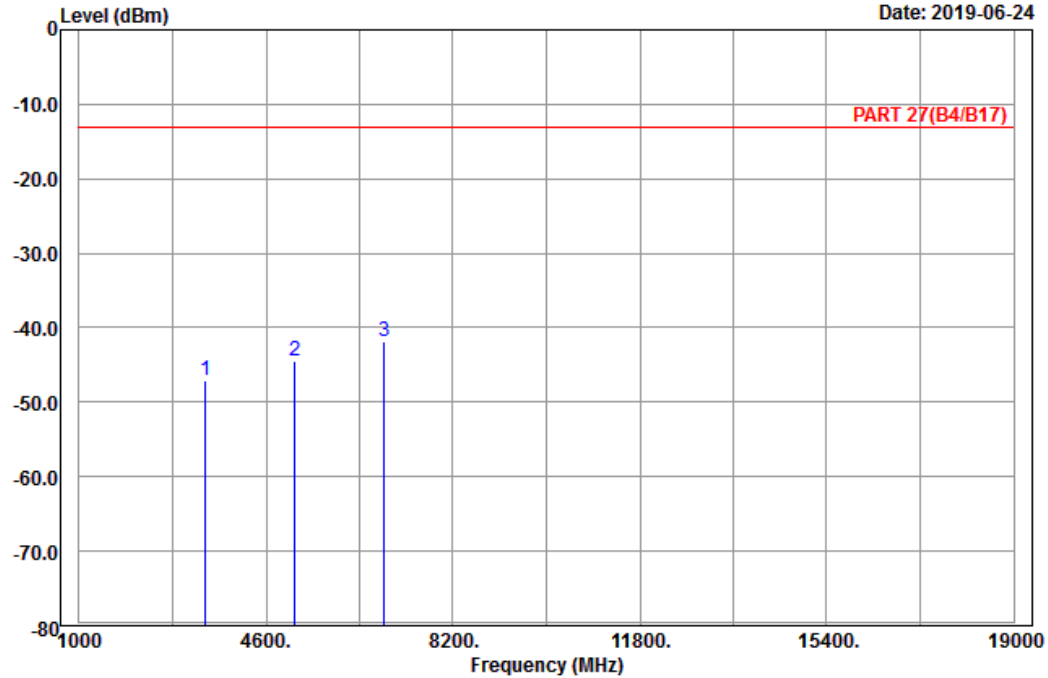


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20050  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3440.00 | -47.10 | -61.45     | 14.35  | -13.00     | -34.10     | Peak   |
| 2    | 5160.00 | -44.49 | -64.41     | 19.92  | -13.00     | -31.49     | Peak   |
| 3 pp | 6880.00 | -41.86 | -64.66     | 22.80  | -13.00     | -28.86     | Peak   |

## Middle Channel

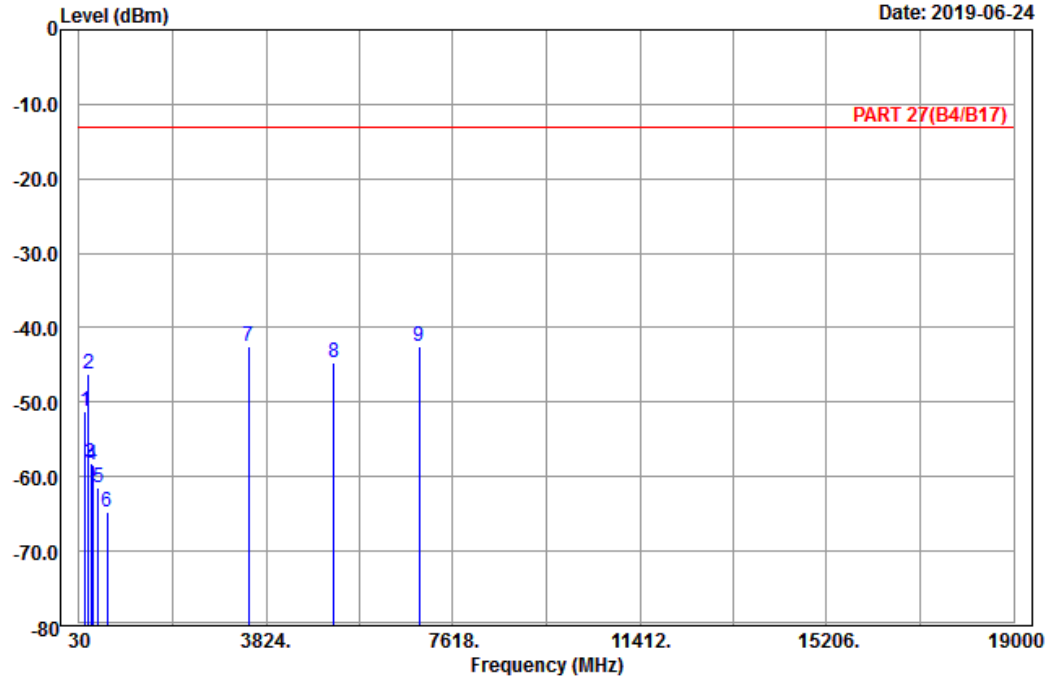


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 13

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Horizontal  
Remark : LTE\_Band 4\_Link\_CH20175  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 146.64  | -51.29 | -43.43     | -7.86  | -13.00     | -38.29     | Peak   |
| 2    | 222.24  | -46.13 | -40.25     | -5.88  | -13.00     | -33.13     | Peak   |
| 3    | 266.79  | -58.20 | -52.54     | -5.66  | -13.00     | -45.20     | Peak   |
| 4    | 302.10  | -58.35 | -52.42     | -5.93  | -13.00     | -45.35     | Peak   |
| 5    | 416.20  | -61.56 | -58.46     | -3.10  | -13.00     | -48.56     | Peak   |
| 6    | 599.60  | -64.84 | -65.23     | 0.39   | -13.00     | -51.84     | Peak   |
| 7 pp | 3465.00 | -42.43 | -56.77     | 14.34  | -13.00     | -29.43     | Peak   |
| 8    | 5197.50 | -44.64 | -64.76     | 20.12  | -13.00     | -31.64     | Peak   |
| 9    | 6930.00 | -42.54 | -65.41     | 22.87  | -13.00     | -29.54     | Peak   |

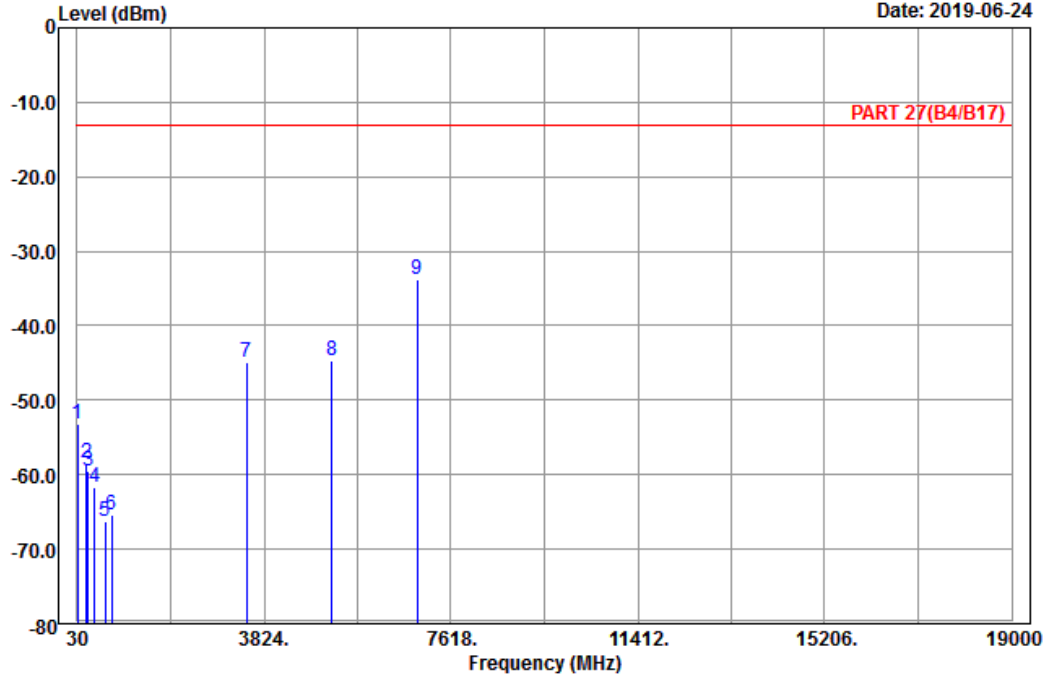


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 14

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20175  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 33.51   | -53.18 | -42.20     | -10.98 | -13.00     | -40.18     | Peak   |
| 2    | 225.21  | -58.48 | -52.63     | -5.85  | -13.00     | -45.48     | Peak   |
| 3    | 250.59  | -59.45 | -53.94     | -5.51  | -13.00     | -46.45     | Peak   |
| 4    | 389.60  | -61.76 | -58.50     | -3.26  | -13.00     | -48.76     | Peak   |
| 5    | 599.60  | -66.24 | -66.63     | 0.39   | -13.00     | -53.24     | Peak   |
| 6    | 729.80  | -65.50 | -64.57     | -0.93  | -13.00     | -52.50     | Peak   |
| 7    | 3465.00 | -45.00 | -59.34     | 14.34  | -13.00     | -32.00     | Peak   |
| 8    | 5197.50 | -44.70 | -64.82     | 20.12  | -13.00     | -31.70     | Peak   |
| 9 pp | 6930.00 | -33.75 | -56.62     | 22.87  | -13.00     | -20.75     | Peak   |

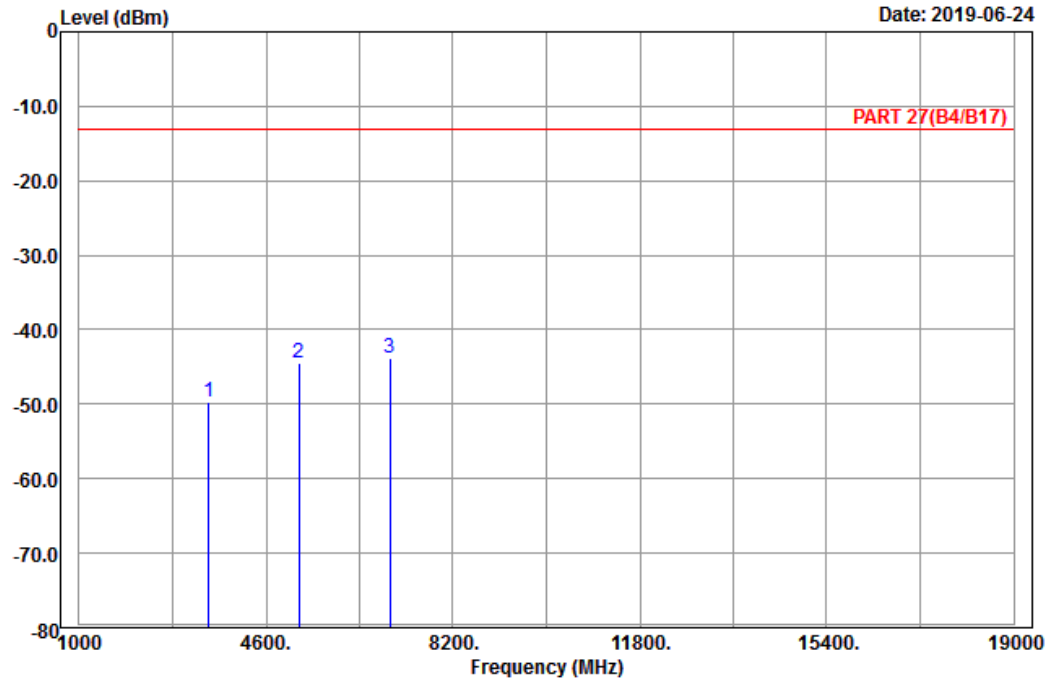
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9



Site : 966 chamber 1  
 Condition: PART 27(B4/B17) Horizontal  
 Remark : LTE\_Band 4\_Link\_CH20300  
 Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3490.00 | -49.70 | -64.01     | 14.31  | -13.00     | -36.70     | Peak   |
| 2    | 5235.00 | -44.42 | -64.58     | 20.16  | -13.00     | -31.42     | Peak   |
| 3 pp | 6980.00 | -43.92 | -66.61     | 22.69  | -13.00     | -30.92     | Peak   |

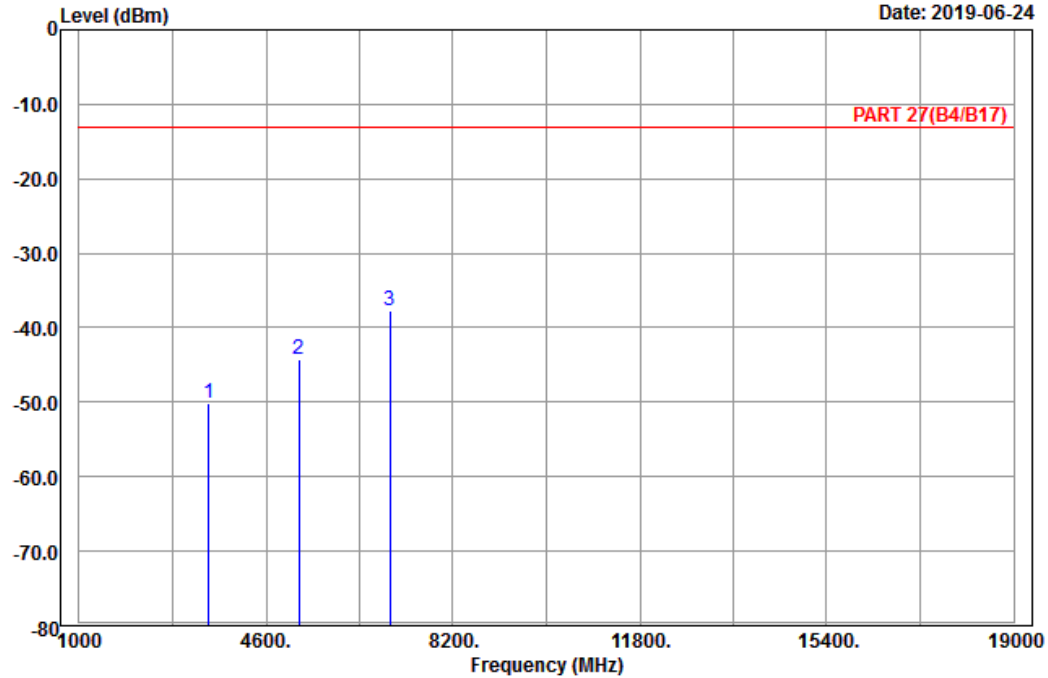


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-24



Site : 966 chamber 1  
Condition: PART 27(B4/B17) Vertical  
Remark : LTE\_Band 4\_Link\_CH20300  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 3490.00 | -50.18 | -64.49     | 14.31  | -13.00     | -37.18     | Peak   |
| 2    | 5235.00 | -44.16 | -64.32     | 20.16  | -13.00     | -31.16     | Peak   |
| 3 pp | 6980.00 | -37.80 | -60.49     | 22.69  | -13.00     | -24.80     | Peak   |

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

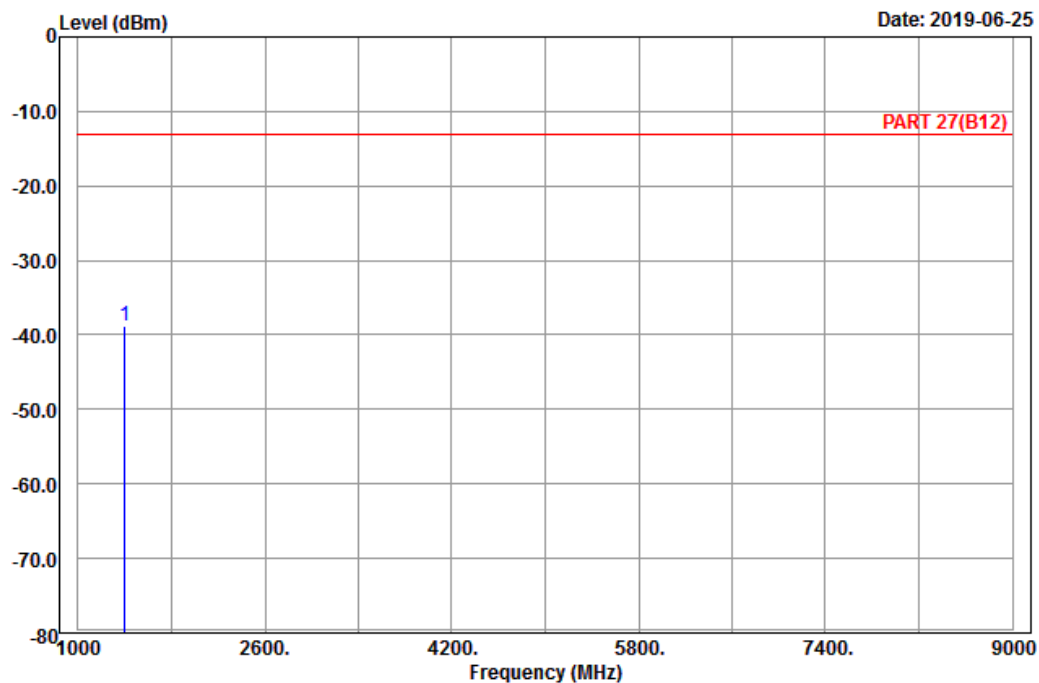


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Horizontal  
Remark : LTE\_Band 12\_Link\_CH23095  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1399.40 | -38.85 | -44.95        | 6.10   | -13.00        | -25.85        | Peak   |

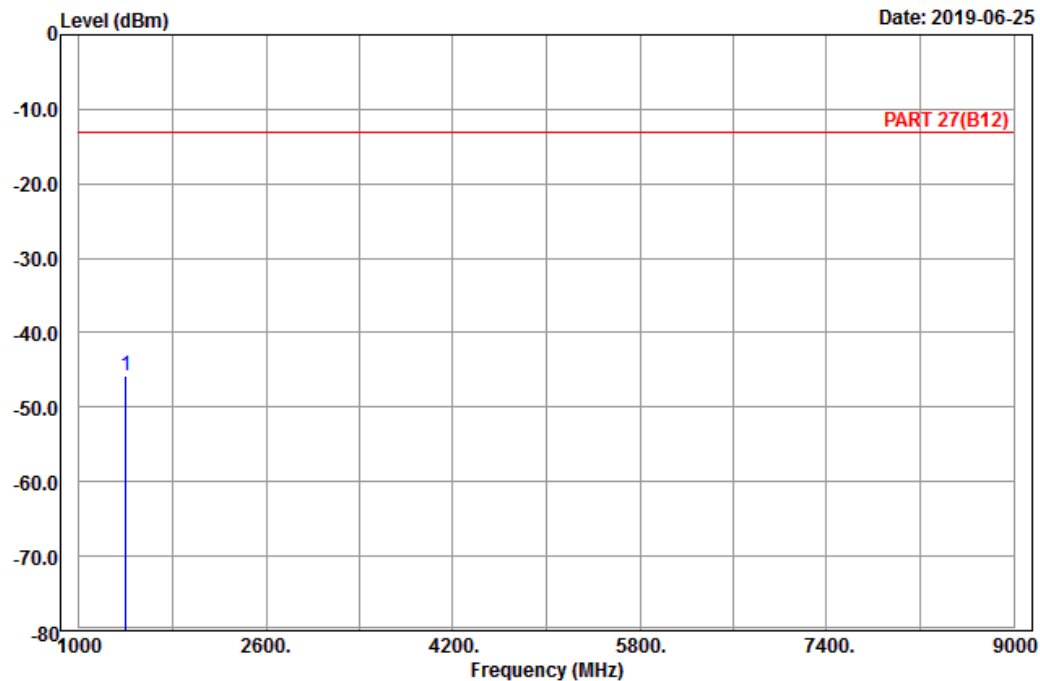


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
 Condition: PART 27(B12) Vertical  
 Remark : LTE\_Band 12\_Link\_CH23095  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1399.40 | -45.72 | -51.82        | 6.10   | -13.00        | -32.72        | Peak   |

## Middle Channel

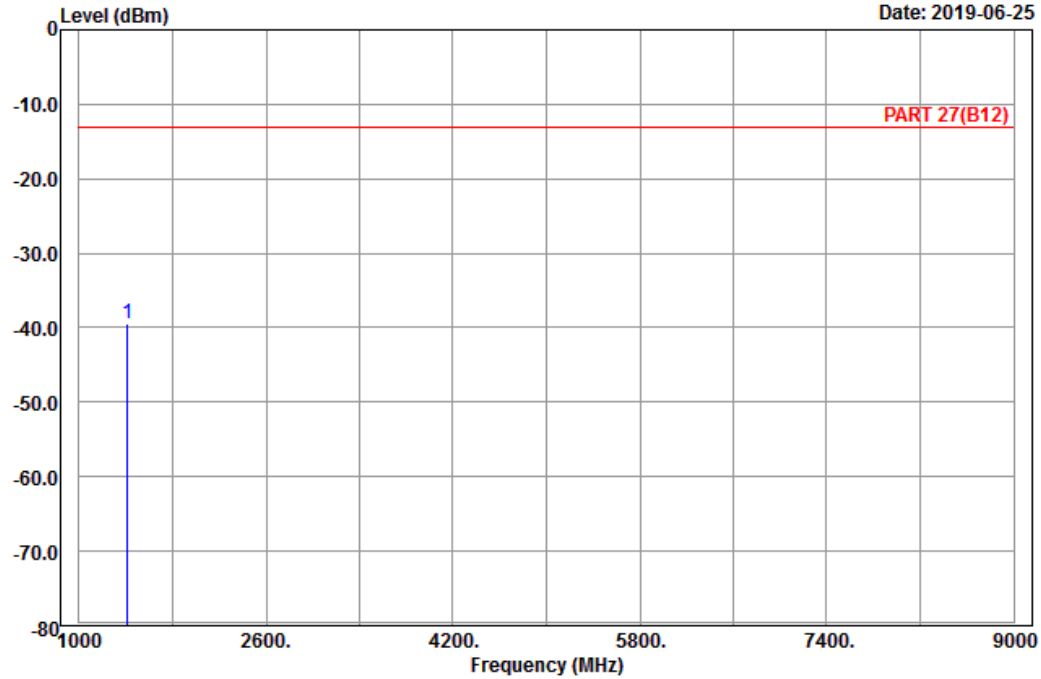


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Horizontal  
Remark : LTE\_Band 12\_Link\_CH23095  
Tested by: Karl Lee

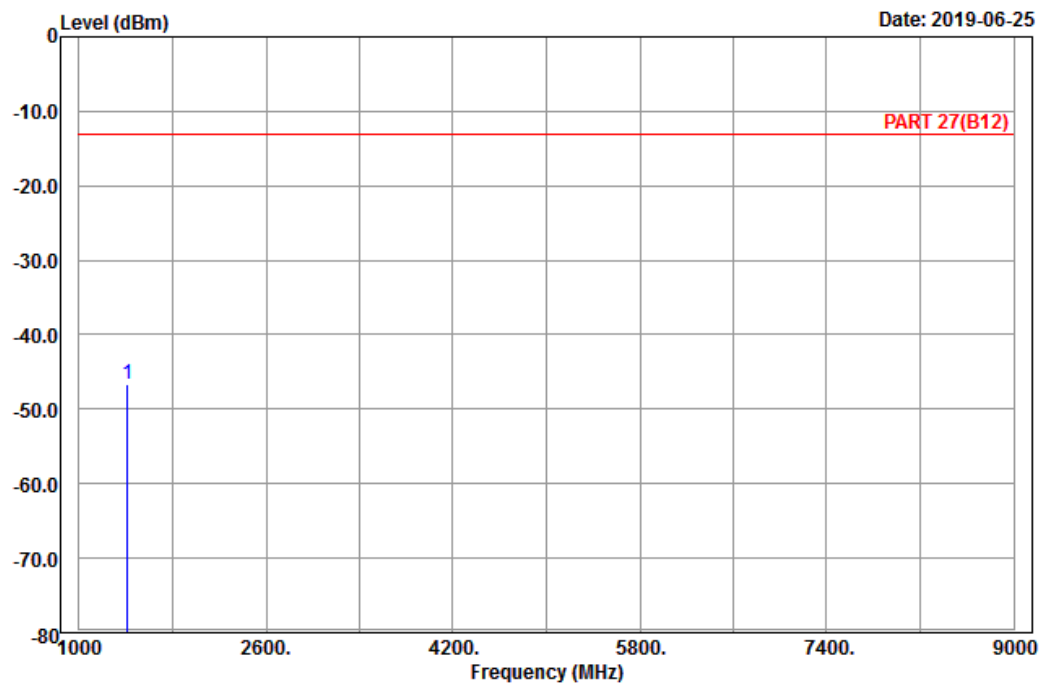
|              |        | Read   | Limit  | Over   |        |
|--------------|--------|--------|--------|--------|--------|
| Freq         | Level  | Level  | Factor | Line   | Limit  |
| MHz          | dBm    | dBm    | dB     | dBm    | dB     |
| 1 pp 1415.00 | -39.51 | -45.87 | 6.36   | -13.00 | -26.51 |
|              |        |        |        |        | Peak   |



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 chamber 1  
 Condition: PART 27(B12) Vertical  
 Remark : LTE\_Band 12\_Link\_CH23095  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1415.00 | -46.75 | -53.11        | 6.36   | -13.00        | -33.75        | Peak   |

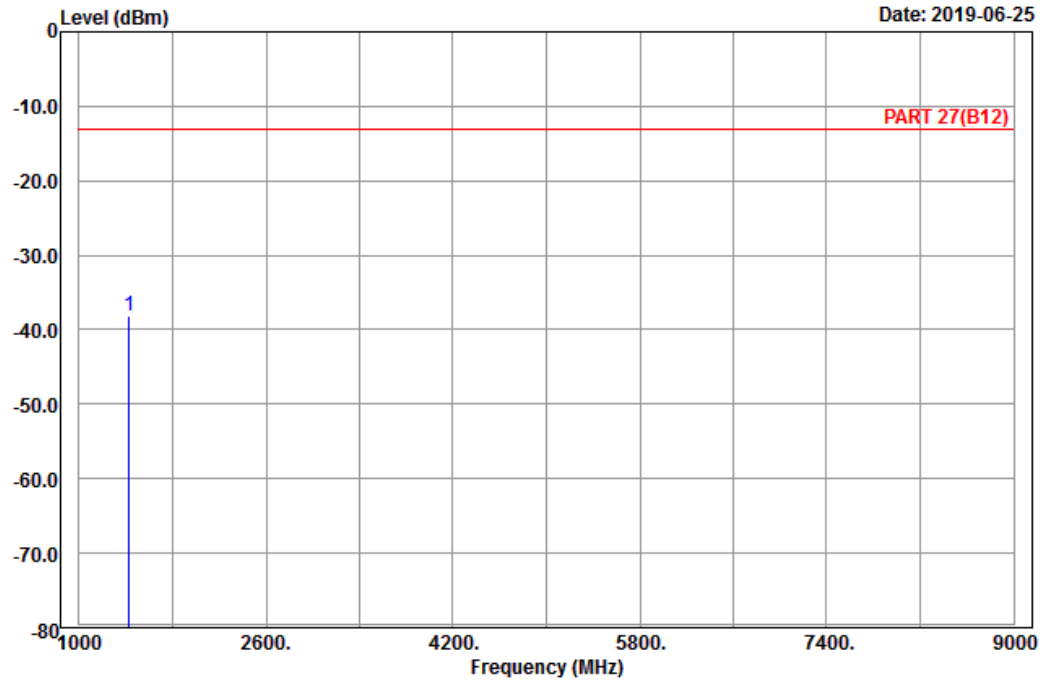
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
 Condition: PART 27(B12) Horizontal  
 Remark : LTE\_Band 12\_Link\_CH23095  
 Tested by: Karl Lee

|              |        | Read   | Limit  | Over   |              |
|--------------|--------|--------|--------|--------|--------------|
| Freq         | Level  | Level  | Factor | Line   | Limit Remark |
| MHz          | dBm    | dBm    | dB     | dBm    | dB           |
| 1 pp 1430.60 | -38.15 | -44.39 | 6.24   | -13.00 | -25.15 Peak  |

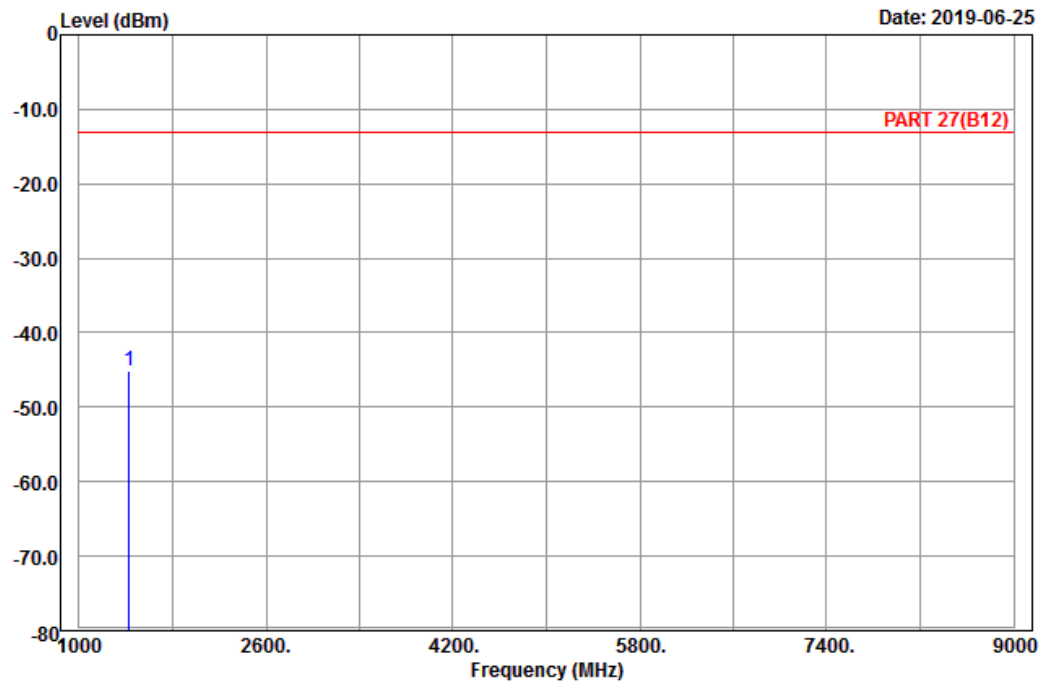


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
 Condition: PART 27(B12) Vertical  
 Remark : LTE\_Band 12\_Link\_CH23095  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1430.60 | -45.11 | -51.35        | 6.24   | -13.00        | -32.11        | Peak   |

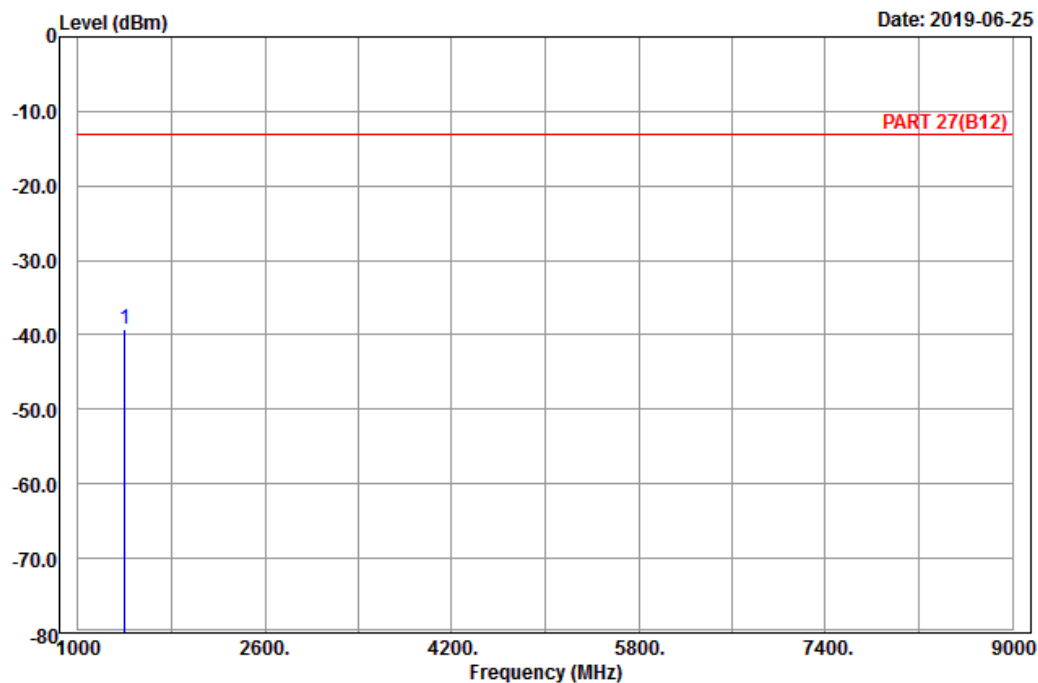
Channel Bandwidth: 5 MHz / QPSK  
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
Condition: PART 27(B12) Horizontal  
Remark : LTE\_Band 12\_Link\_CH23035  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1403.00 | -39.25 | -45.35        | 6.10   | -13.00        | -26.25        | Peak   |

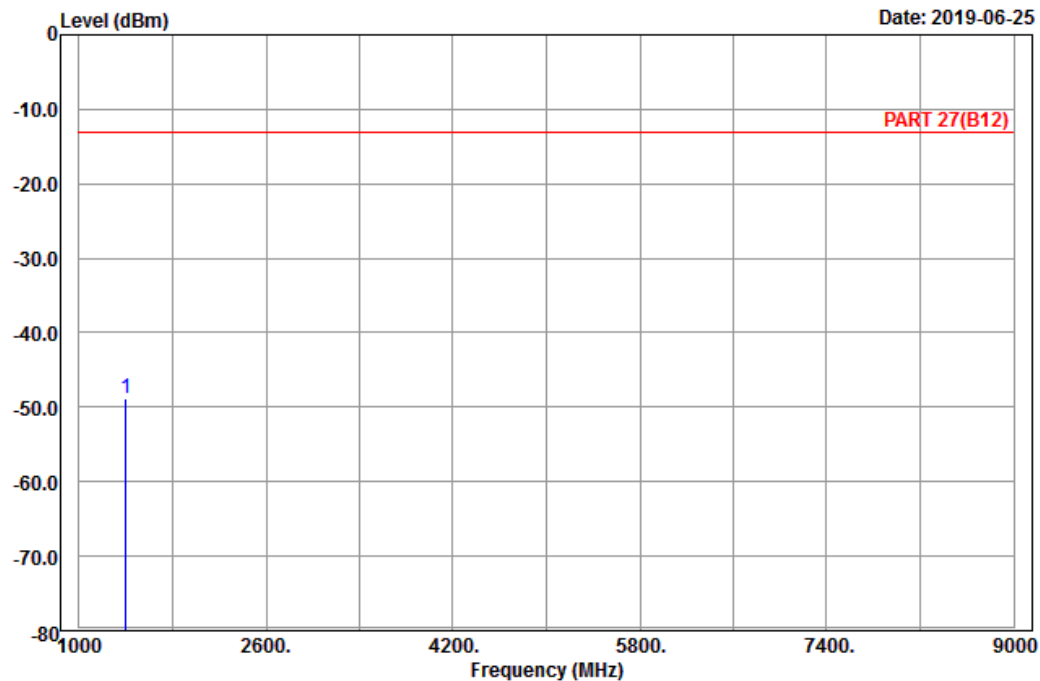


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
 Condition: PART 27(B12) Vertical  
 Remark : LTE\_Band 12\_Link\_CH23035  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1403.00 | -48.74 | -54.84        | 6.10   | -13.00        | -35.74        | Peak   |

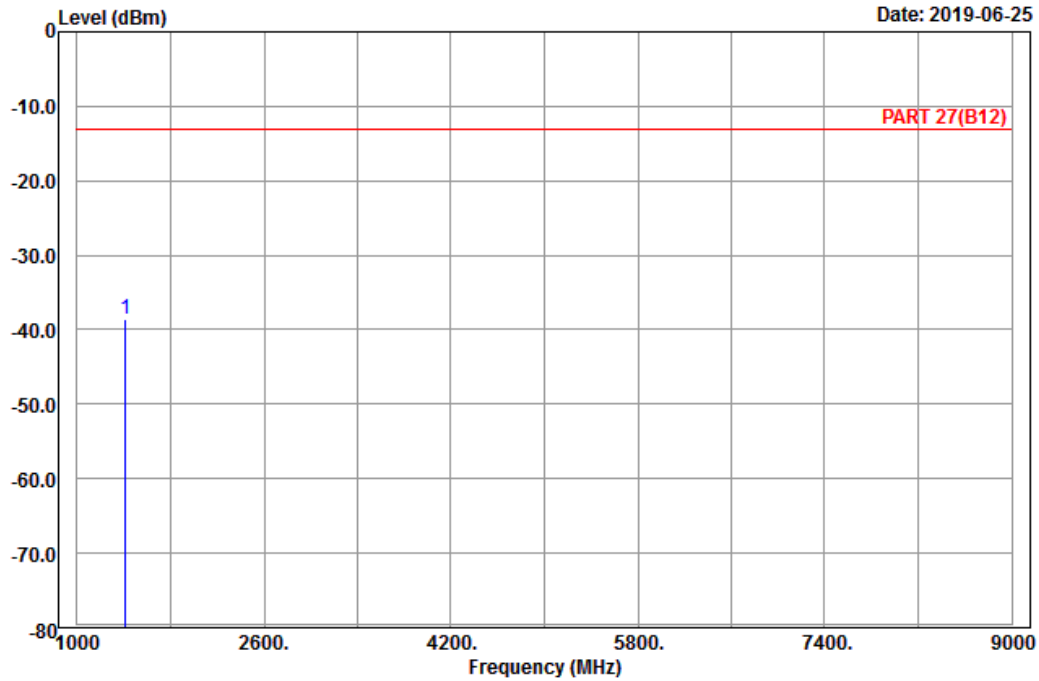
## Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
 Condition: PART 27(B12) Horizontal  
 Remark : LTE\_Band 12\_Link\_CH23095  
 Tested by: Karl Lee

|              |        | Read   | Limit  | Over   |        |
|--------------|--------|--------|--------|--------|--------|
| Freq         | Level  | Level  | Factor | Line   | Limit  |
| MHz          | dBm    | dBm    | dB     | dBm    | dB     |
| 1 pp 1415.00 | -38.63 | -44.99 | 6.36   | -13.00 | -25.63 |
|              |        |        |        |        | Peak   |

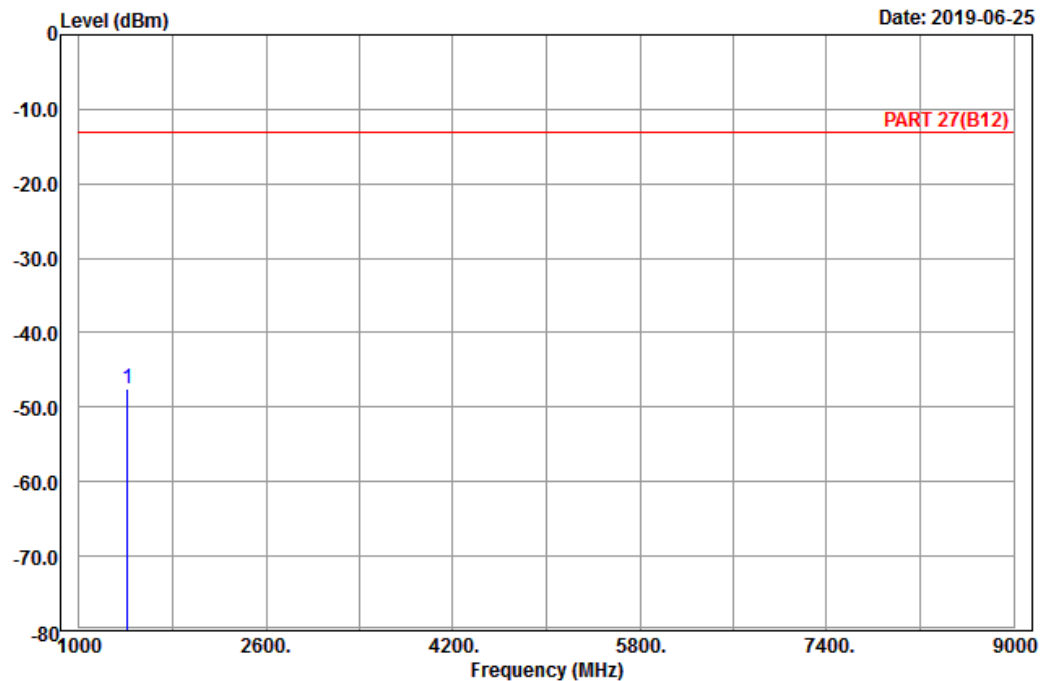


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Vertical  
Remark : LTE\_Band 12\_Link\_CH23095  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1415.00 | -47.46 | -53.82        | 6.36   | -13.00        | -34.46        | Peak   |

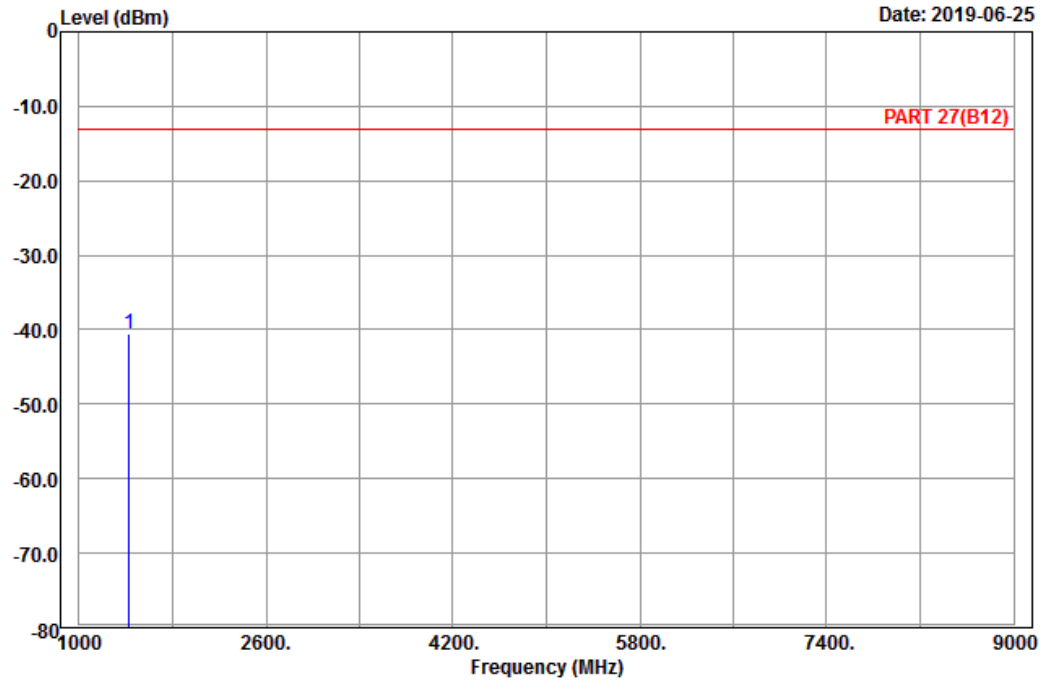
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
 Condition: PART 27(B12) Horizontal  
 Remark : LTE\_Band 12\_Link\_CH23135  
 Tested by: Karl Lee

|              |        | Read   | Limit  | Over   |              |
|--------------|--------|--------|--------|--------|--------------|
| Freq         | Level  | Level  | Factor | Line   | Limit Remark |
| MHz          | dBm    | dBm    | dB     | dBm    | dB           |
| 1 pp 1427.00 | -40.57 | -46.81 | 6.24   | -13.00 | -27.57 Peak  |

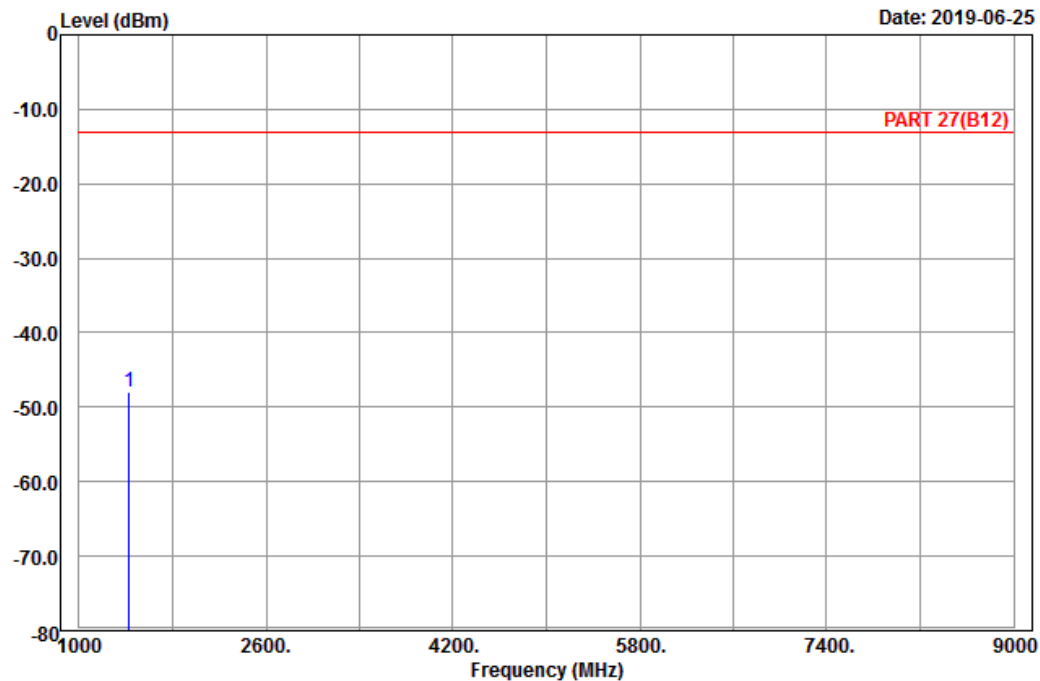


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Vertical  
Remark : LTE\_Band 12\_Link\_CH23135  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1427.00 | -47.94 | -54.18        | 6.24   | -13.00        | -34.94        | Peak   |

Channel Bandwidth: 10 MHz / QPSK

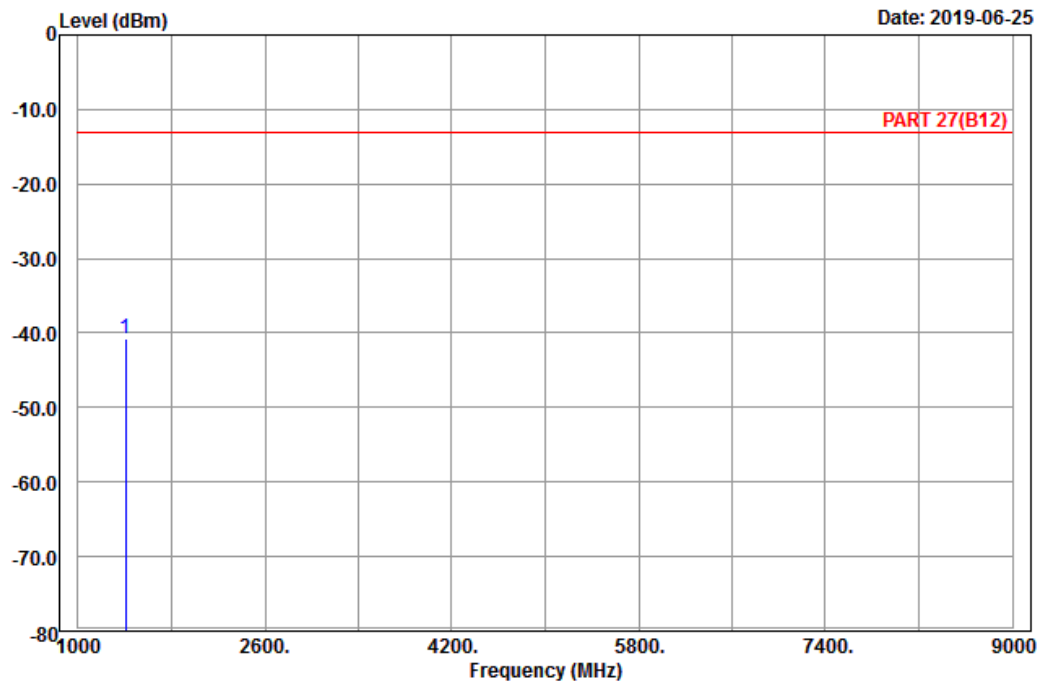
Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
Condition: PART 27(B12) Horizontal  
Remark : LTE\_Band 12\_Link\_CH23060  
Tested by: Karl Lee

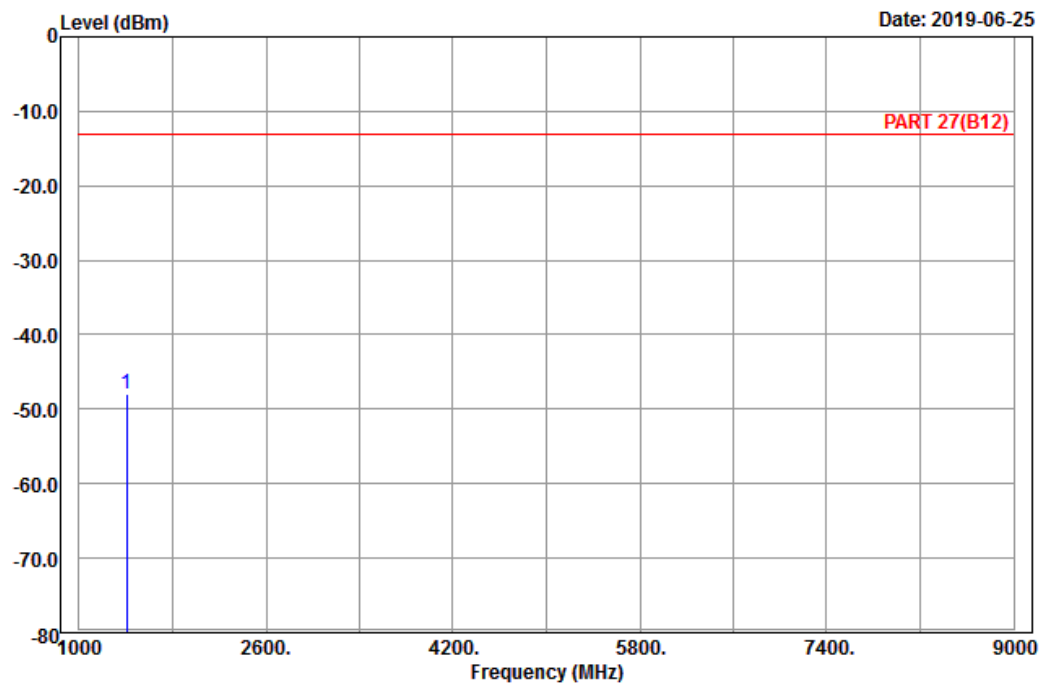
|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1408.00 | -40.71 | -47.07        | 6.36   | -13.00        | -27.71        | Peak   |



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6



Site : 966 chamber 1  
 Condition: PART 27(B12) Vertical  
 Remark : LTE\_Band 12\_Link\_CH23060  
 Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1408.00 | -47.92 | -54.28        | 6.36   | -13.00        | -34.92        | Peak   |

# Middle Channel

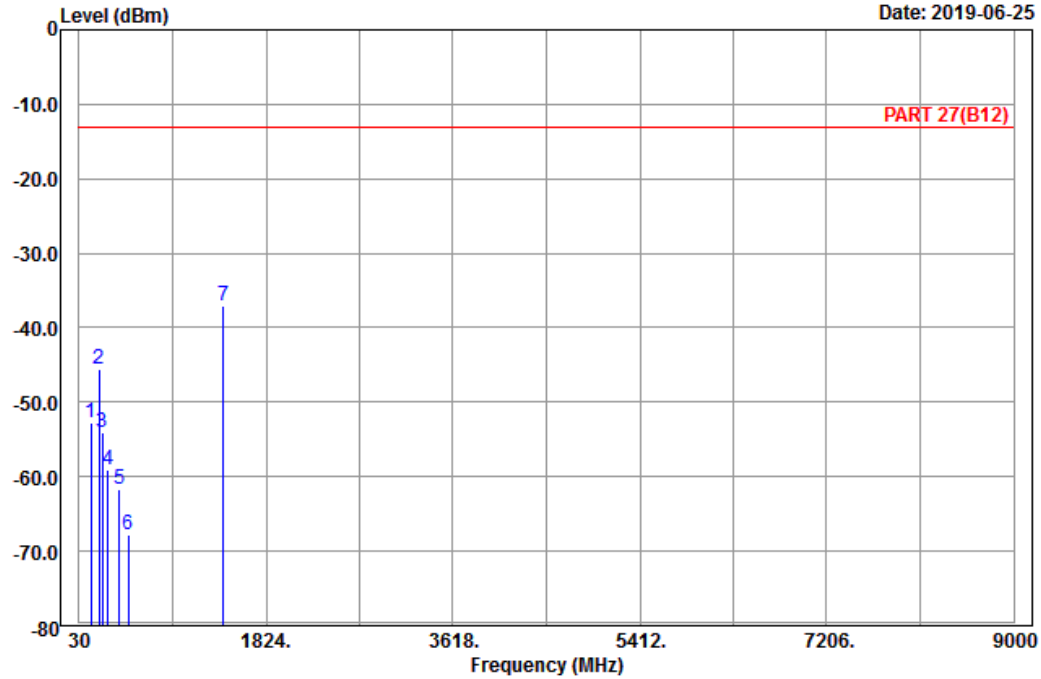


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Horizontal  
Remark : LTE\_Band 12\_Link\_CH23095  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 143.94  | -52.81 | -45.02     | -7.79  | -13.00     | -39.81     | Peak   |
| 2    | 219.00  | -45.58 | -39.66     | -5.92  | -13.00     | -32.58     | Peak   |
| 3    | 255.18  | -54.00 | -48.45     | -5.55  | -13.00     | -41.00     | Peak   |
| 4    | 306.30  | -59.16 | -53.28     | -5.88  | -13.00     | -46.16     | Peak   |
| 5    | 419.70  | -61.74 | -58.55     | -3.19  | -13.00     | -48.74     | Peak   |
| 6    | 499.50  | -67.71 | -62.45     | -5.26  | -13.00     | -54.71     | Peak   |
| 7 pp | 1415.00 | -37.16 | -43.52     | 6.36   | -13.00     | -24.16     | Peak   |

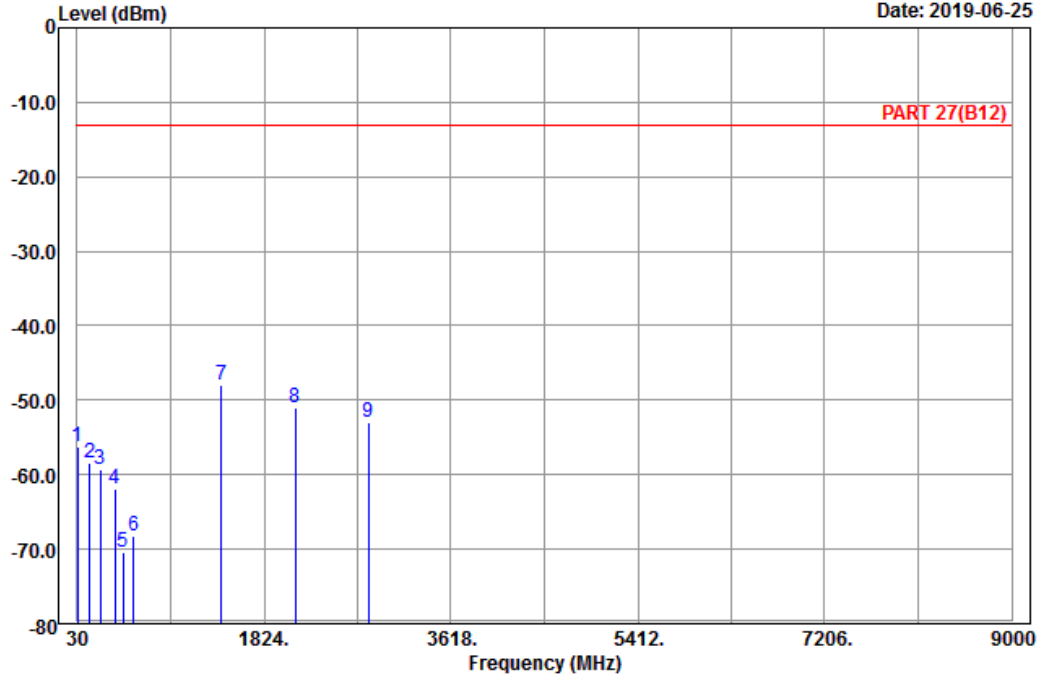


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Vertical  
Remark : LTE\_Band 12\_Link\_CH23095  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 35.13   | -56.29 | -45.19     | -11.10 | -13.00     | -43.29     | Peak   |
| 2    | 149.07  | -58.49 | -50.56     | -7.93  | -13.00     | -45.49     | Peak   |
| 3    | 250.05  | -59.31 | -53.80     | -5.51  | -13.00     | -46.31     | Peak   |
| 4    | 394.50  | -61.85 | -58.85     | -3.00  | -13.00     | -48.85     | Peak   |
| 5    | 470.80  | -70.31 | -65.88     | -4.43  | -13.00     | -57.31     | Peak   |
| 6    | 570.90  | -68.34 | -67.56     | -0.78  | -13.00     | -55.34     | Peak   |
| 7 pp | 1415.00 | -47.90 | -54.26     | 6.36   | -13.00     | -34.90     | Peak   |
| 8    | 2122.50 | -50.96 | -62.07     | 11.11  | -13.00     | -37.96     | Peak   |
| 9    | 2830.00 | -53.03 | -66.00     | 12.97  | -13.00     | -40.03     | Peak   |

## High Channel

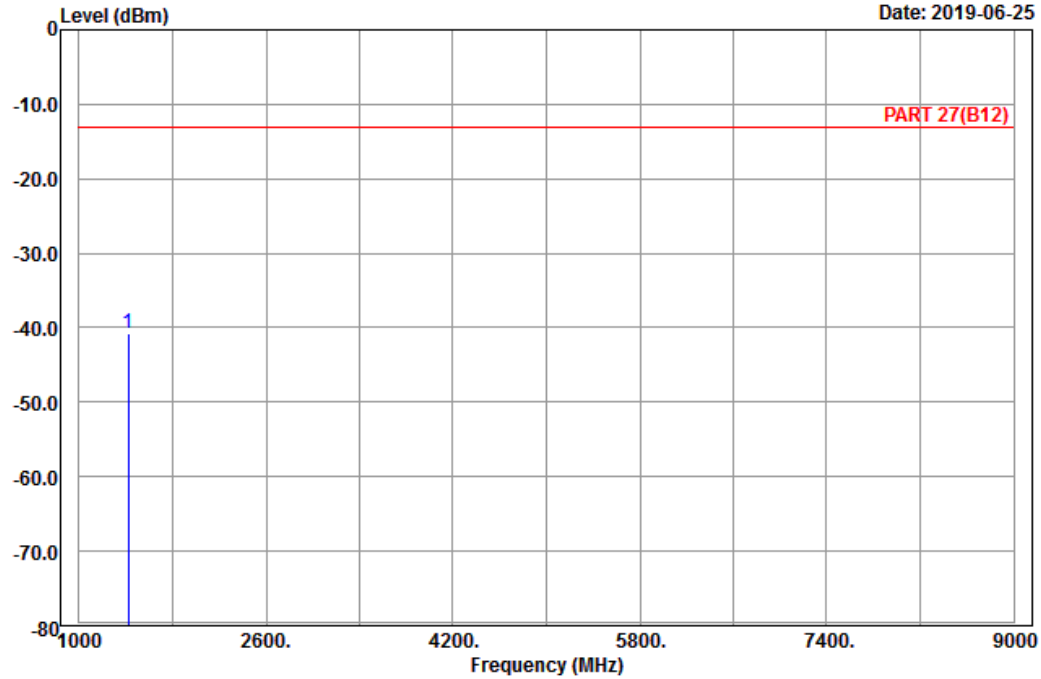


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2019-06-25



Site : 966 chamber 1  
 Condition: PART 27(B12) Horizontal  
 Remark : LTE\_Band 12\_Link\_CH23130  
 Tested by: Charles Hsiao

|              |        | Read   | Limit  | Over   |              |
|--------------|--------|--------|--------|--------|--------------|
| Freq         | Level  | Level  | Factor | Line   | Limit Remark |
| MHz          | dBm    | dBm    | dB     | dBm    | dB           |
| 1 pp 1422.00 | -40.70 | -47.06 | 6.36   | -13.00 | -27.70 Peak  |

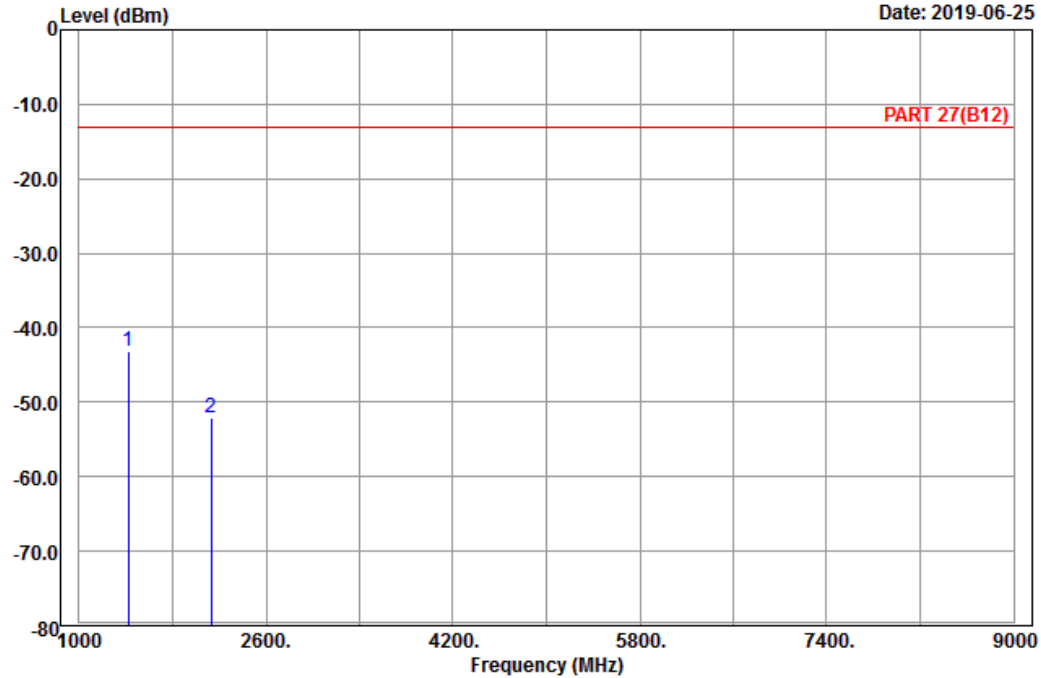


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B12) Vertical  
Remark : LTE\_Band 12\_Link\_CH23130  
Tested by: Charles Hsiao

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1 pp | 1422.00 | -43.26 | -49.62     | 6.36   | -13.00     | -30.26     | Peak   |
| 2    | 2133.00 | -52.20 | -63.48     | 11.28  | -13.00     | -39.20     | Peak   |

LTE Band 13  
Channel Bandwidth: 5 MHz / QPSK  
Low Channel

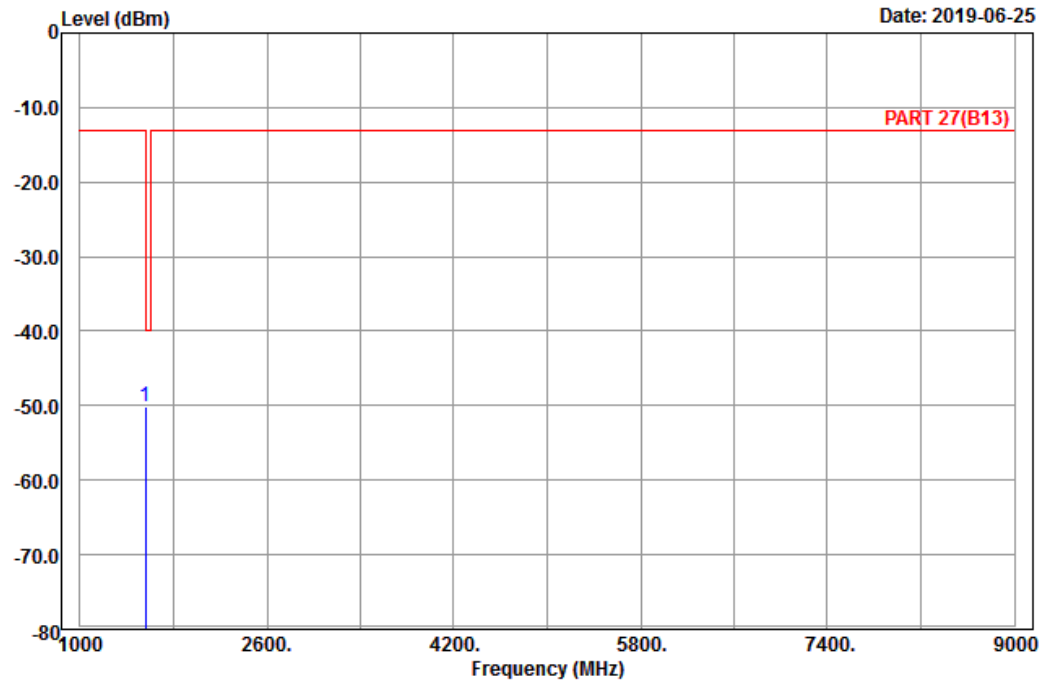


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Horizontal  
Remark : LTE\_Band 13\_Link\_CH23205  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1 pp | 1559.00 | -50.16 | -57.02     | 6.86   | -40.00     | -10.16     | Peak   |

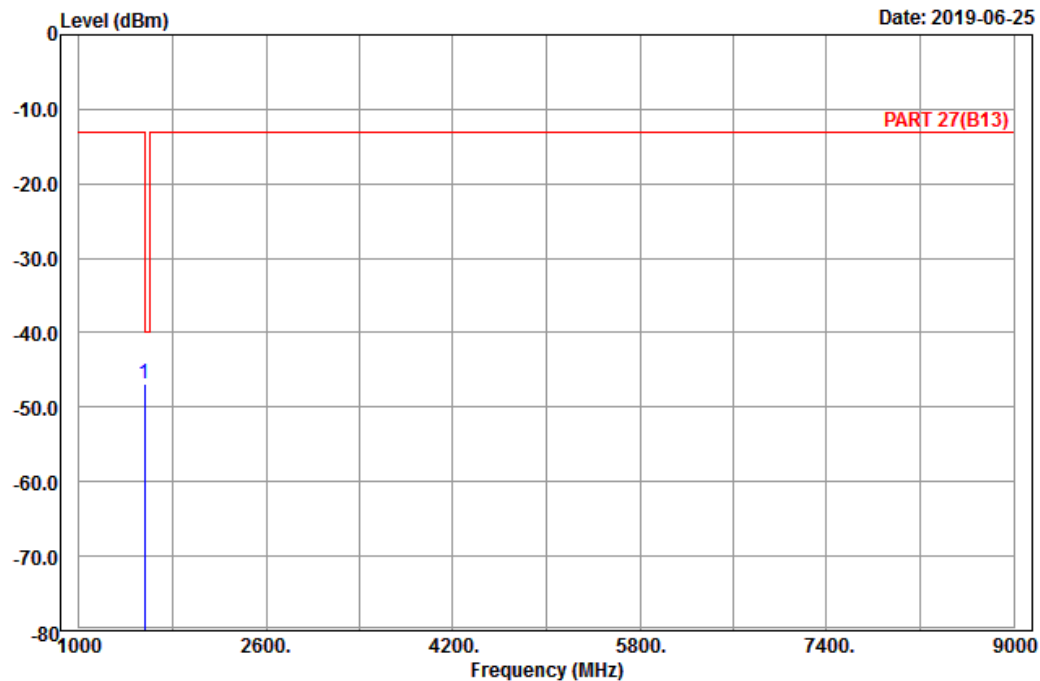


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Vertical  
Remark : LTE\_Band 13\_Link\_CH23205  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1559.00 | -46.90 | -53.76        | 6.86   | -40.00        | -6.90         | Peak   |

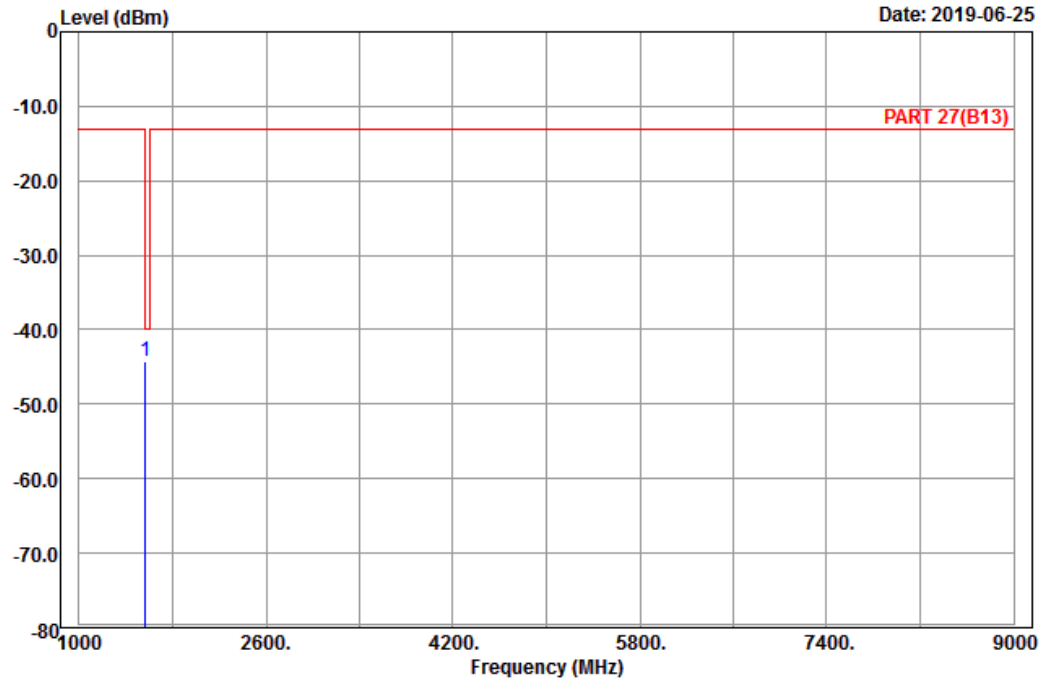
# Middle Channel



Bureau Veritas Consumer Products Services Ltd.,Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
Condition: PART 27(B13) Horizontal  
Remark : LTE\_Band 13\_Link\_CH23230  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1564.00 | -44.27 | -51.13        | 6.86   | -40.00        | -4.27         | Peak   |

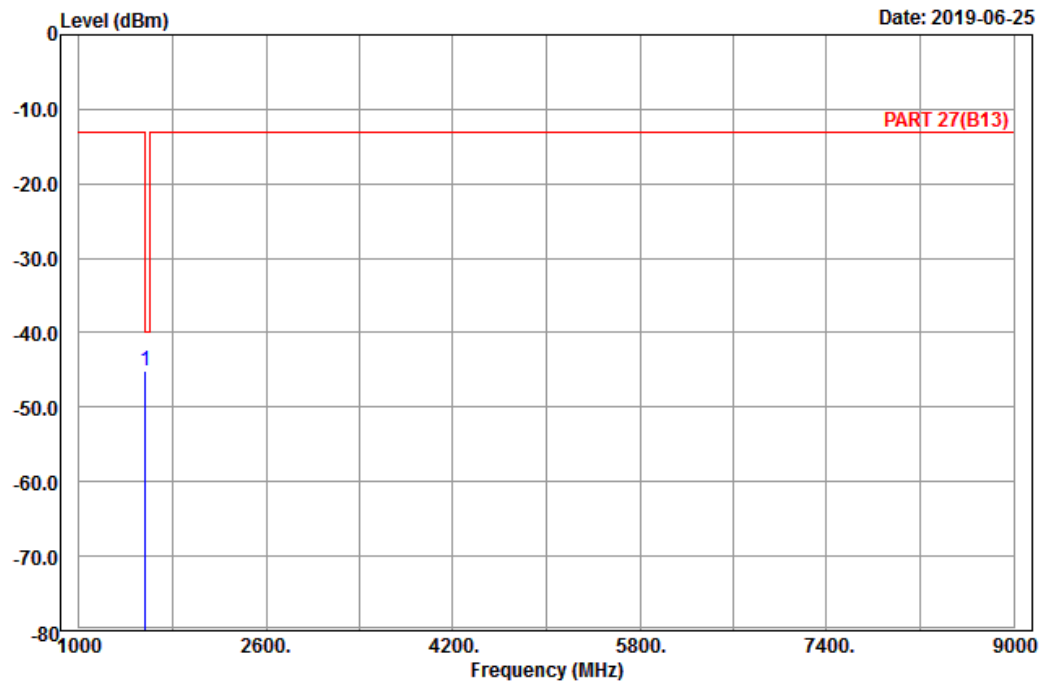


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Vertical  
Remark : LTE\_Band 13\_Link\_CH23230  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1564.00 | -45.06 | -51.92        | 6.86   | -40.00        | -5.06         | Peak   |

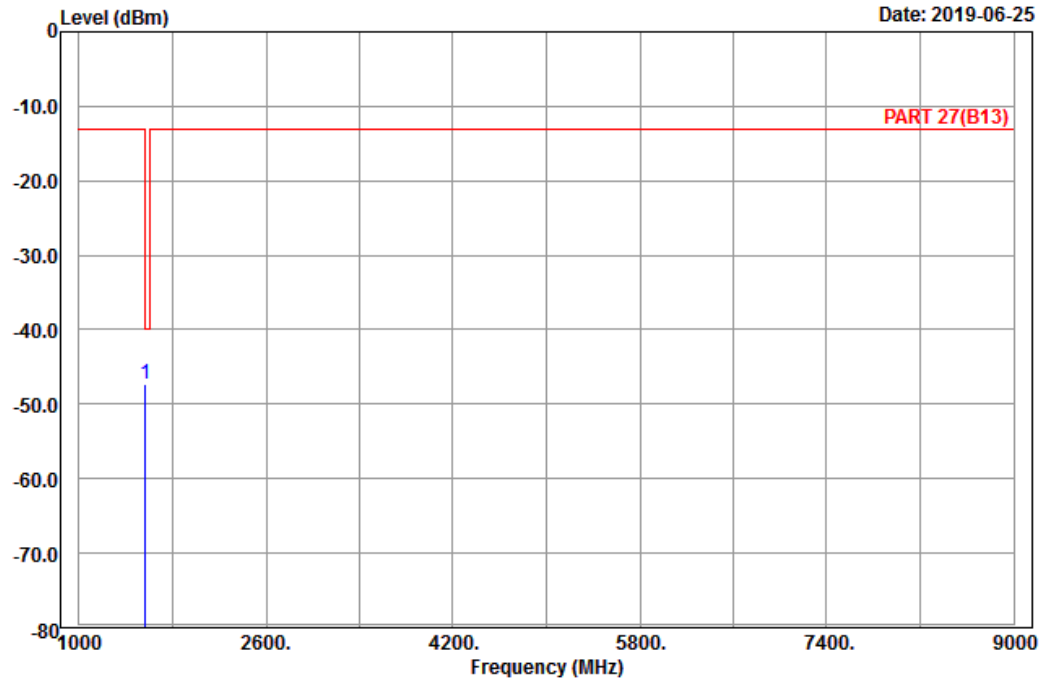
## High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 5



Site : 966 chamber 1  
 Condition: PART 27(B13) Horizontal  
 Remark : LTE\_Band 13\_Link\_CH23255  
 Tested by: Karl Lee

|              |        | Read   | Limit  | Over   |              |
|--------------|--------|--------|--------|--------|--------------|
| Freq         | Level  | Level  | Factor | Line   | Limit Remark |
| MHz          | dBm    | dBm    | dB     | dBm    | dB           |
| 1 pp 1569.00 | -47.30 | -54.34 | 7.04   | -40.00 | -7.30 Peak   |

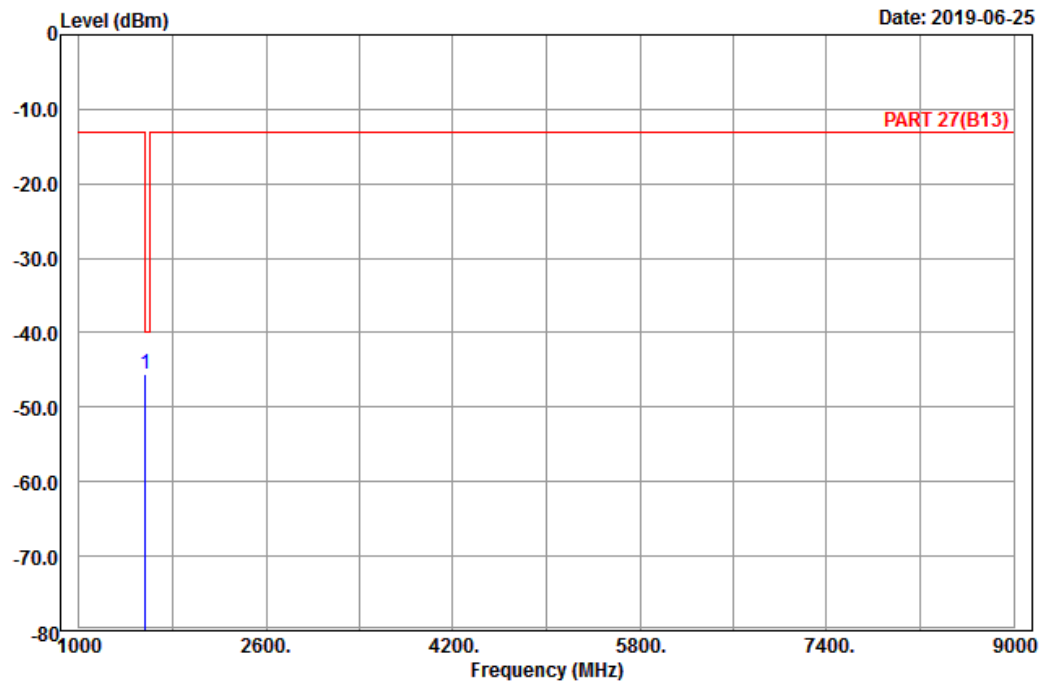


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 6

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Vertical  
Remark : LTE\_Band 13\_Link\_CH23255  
Tested by: Karl Lee

|      | Freq    | Level  | Read<br>Level | Factor | Limit<br>Line | Over<br>Limit | Remark |
|------|---------|--------|---------------|--------|---------------|---------------|--------|
|      | MHz     | dBm    | dBm           | dB     | dBm           | dB            |        |
| 1 pp | 1569.00 | -45.59 | -52.63        | 7.04   | -40.00        | -5.59         | Peak   |

Channel Bandwidth: 10 MHz / QPSK  
Middle Channel

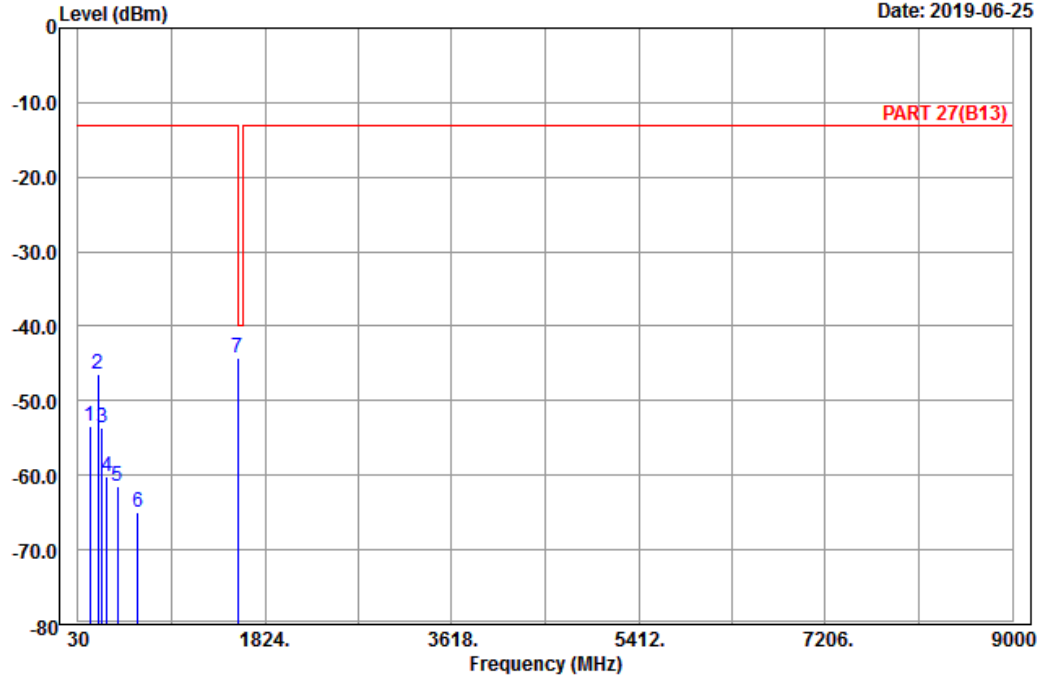


Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 9

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Horizontal  
Remark : LTE\_Band 13\_Link\_CH23230  
Tested by: Karl Lee

|      | Freq    | Level  | Read   | Limit | Over   |             |
|------|---------|--------|--------|-------|--------|-------------|
|      | MHz     | dBm    | Level  | Line  | Limit  | Remark      |
|      | MHz     | dBm    | dBm    | dB    | dBm    | dB          |
| 1    | 143.67  | -53.31 | -45.52 | -7.79 | -13.00 | -40.31 Peak |
| 2    | 224.94  | -46.40 | -40.55 | -5.85 | -13.00 | -33.40 Peak |
| 3    | 257.34  | -53.59 | -48.02 | -5.57 | -13.00 | -40.59 Peak |
| 4    | 305.60  | -60.09 | -54.20 | -5.89 | -13.00 | -47.09 Peak |
| 5    | 411.30  | -61.54 | -58.54 | -3.00 | -13.00 | -48.54 Peak |
| 6    | 599.60  | -64.96 | -65.35 | 0.39  | -13.00 | -51.96 Peak |
| 7 pp | 1564.00 | -44.16 | -51.02 | 6.86  | -40.00 | -4.16 Peak  |

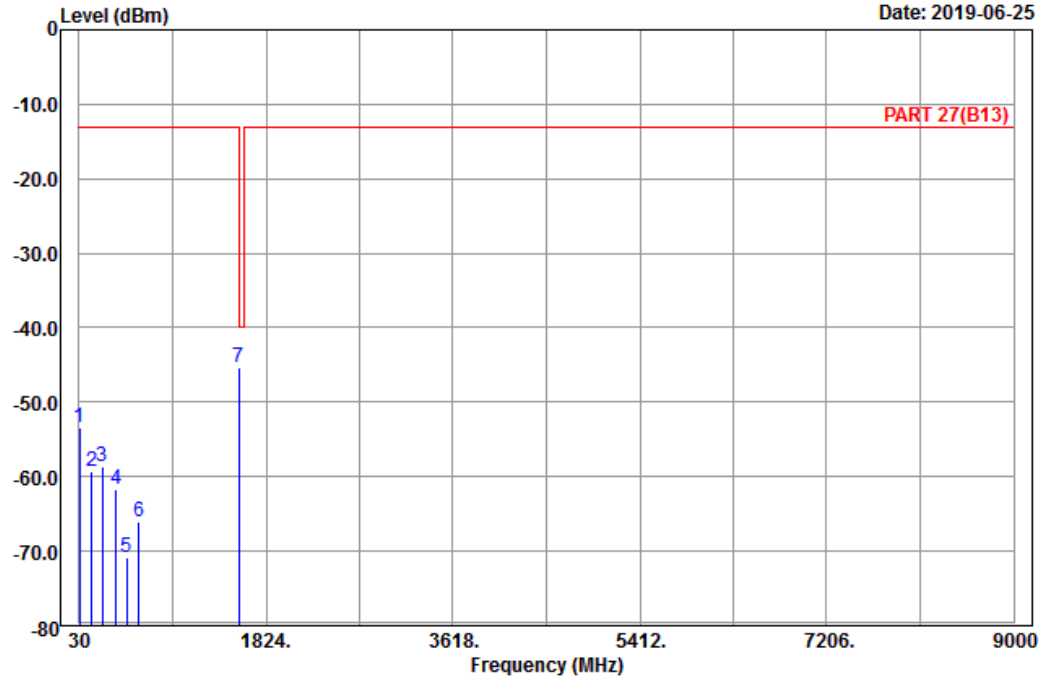


# Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch

A D T

Data: 10

Date: 2019-06-25



Site : 966 chamber 1  
Condition: PART 27(B13) Vertical  
Remark : LTE\_Band 13\_Link\_CH23230  
Tested by: Karl Lee

|      | Freq    | Level  | Read Level | Factor | Limit Line | Over Limit | Remark |
|------|---------|--------|------------|--------|------------|------------|--------|
|      | MHz     | dBm    | dBm        | dB     | dBm        | dB         |        |
| 1    | 32.70   | -53.30 | -42.43     | -10.87 | -13.00     | -40.30     | Peak   |
| 2    | 148.80  | -59.25 | -51.35     | -7.90  | -13.00     | -46.25     | Peak   |
| 3    | 250.86  | -58.70 | -53.18     | -5.52  | -13.00     | -45.70     | Peak   |
| 4    | 388.20  | -61.67 | -58.31     | -3.36  | -13.00     | -48.67     | Peak   |
| 5    | 486.90  | -70.86 | -65.96     | -4.90  | -13.00     | -57.86     | Peak   |
| 6    | 600.30  | -66.10 | -66.53     | 0.43   | -13.00     | -53.10     | Peak   |
| 7 pp | 1564.00 | -45.42 | -52.28     | 6.86   | -40.00     | -5.42      | Peak   |

## 5 Pictures of Test Arrangements

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

## Appendix – Information of 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:

**Lin Kou 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 Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**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.

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