

## FCC Test Report

### (PART 27)

**Report No.:** RFBFLF-WTW-P21070538F-3

**FCC ID:** MSQFM350GL

**Test Model:** FM350-GL

**Received Date:** Dec. 28, 2022

**Test Date:** Jan. 03 ~ Feb. 16, 2023

**Issued Date:** Mar. 08, 2023

**Applicant:** ASUSTeK COMPUTER INC.

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

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

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, Taiwan

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



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### Release Control Record

| Issue No.               | Description      | Date Issued   |
|-------------------------|------------------|---------------|
| RFBFLF-WTW-P21070538F-3 | Original Release | Mar. 08, 2023 |

## 1 Certificate of Conformity

**Product:** 5G Module

**Brand:** Fibocom Wireless Inc

**Test Model:** FM350-GL

**Sample Status:** Engineering Sample

**Applicant:** ASUSTeK COMPUTER INC.

**Test Date:** Jan. 03 ~ Feb. 16, 2023

**Standards:** FCC Part 27, Subpart C, D

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 : Lena Wang , Date: Mar. 08, 2023  
Lena Wang / Specialist

Approved by : Jeremy Lin , Date: Mar. 08, 2023  
Jeremy Lin / Project Engineer

## 2 Summary of Test Results

| Applied Standard: FCC Part 27 & Part 2 |                                         |        |                                                                                       |
|----------------------------------------|-----------------------------------------|--------|---------------------------------------------------------------------------------------|
| FCC Clause                             | Test Item                               | Result | Remarks                                                                               |
| 2.1046<br>27.50<br>(a)(3)              | Equivalent Isotropically radiated 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                                 | Emission Bandwidth                      | Pass   | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53<br>(a)(4)              | Out of Band Emission Measurements       | Pass   | Meet the requirement of limit.                                                        |
| 2.1051<br>27.53<br>(a)(4)              | Conducted Spurious Emissions            | Pass   | Meet the requirement of limit.                                                        |
| 2.1053<br>27.53<br>(a)(4)              | Radiated Spurious Emissions             | Pass   | Meet the requirement of limit.<br>Minimum passing margin is -10.19 dB at 4620.00 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     | 2.44 dB                        |
|                                | 30 MHz ~ 200 MHz   | 2.95 dB                        |
|                                | 200 MHz ~ 1000 MHz | 2.95 dB                        |
| Radiated Emissions above 1 GHz | 1 GHz ~ 18 GHz     | 2.26 dB                        |
|                                | 18 GHz ~ 40 GHz    | 1.94 dB                        |

## 2.2 Test Site And Instruments

| Description & Manufacturer              | Model No.                    | Serial No.                    | Date of Calibration | Due Date of Calibration |
|-----------------------------------------|------------------------------|-------------------------------|---------------------|-------------------------|
| Software<br>BV ADT                      | ADT_Radiated_<br>V7.6.15.9.5 | NA                            | NA                  | NA                      |
| Antenna Tower & Turn<br>Max-Full        | MFA-440H                     | AT93021705                    | NA                  | NA                      |
| Turn Table<br>Max-Full                  | MFT-201SS                    | NA                            | NA                  | NA                      |
| Turn Table Controller<br>Max-Full       | MG-7802                      | NA                            | NA                  | NA                      |
| Test Receiver<br>KEYSIGHT               | N9038A                       | MY55420137                    | Apr. 27, 2022       | Apr. 26, 2023           |
| Signal Analyzer<br>Agilent              | N9010A                       | MY52220207                    | Jan. 03, 2023       | Jan. 02, 2024           |
| Loop Antenna<br>TESEQ                   | HLA 6121                     | 45745                         | Jul. 27, 2022       | Jul. 26, 2023           |
| Loop Antenna<br>EMCI                    | EM-6879                      | 269                           | Sep. 19, 2022       | Sep. 18, 2023           |
| Pre-amplifier<br>EMCI                   | EMC001340                    | 980201                        | Sep. 23, 2022       | Sep. 22, 2023           |
| RF Coaxial Cable<br>EMCI                | 5D-NM-BM                     | 140903+140902                 | Jan. 15, 2022       | Jan. 14, 2023           |
|                                         |                              |                               | Jan. 07, 2023       | Jan. 06, 2024           |
| Pre-Amplifier<br>EMCI                   | EMC 330H                     | 980112                        | Oct. 01, 2022       | Sep. 30, 2023           |
| Bi_Log Antenna<br>Schwarzbeck           | VULB9168                     | 9168-472                      | Oct. 21, 2022       | Oct. 20, 2023           |
| RF Coaxial Cable<br>WORKEN              | 8D-FB                        | Cable-Ch10-01                 | Oct. 01, 2022       | Sep. 30, 2023           |
| Horn Antenna<br>Schwarzbeck             | BBHA 9120D                   | 9120D-969                     | Nov. 13, 2022       | Nov. 12, 2023           |
| Pre-Amplifier<br>EMCI                   | EMC 012645                   | 980115                        | Oct. 01, 2022       | Sep. 30, 2023           |
| RF Coaxial Cable<br>EMCI                | EMC104-SM-SM-<br>8000+3000   | 171005                        | Oct. 01, 2022       | Sep. 30, 2023           |
| RF Coaxial Cable<br>HUBER SUHNER        | SUCOFLEX 104                 | EMC104-SM-SM-<br>1000(140807) | Oct. 01, 2022       | Sep. 30, 2023           |
| RF FLITER<br>MICRO-TRONICS              | BRM50716                     | 060                           | Jan. 10, 2022       | Jan. 09, 2023           |
|                                         |                              |                               | Jan. 11, 2023       | Jan. 10, 2024           |
| RF FLITER<br>MICRO-TRONICS              | BRM17690                     | 004                           | Jan. 10, 2022       | Jan. 09, 2023           |
|                                         |                              |                               | Jan. 11, 2023       | Jan. 10, 2024           |
| Boresight antenna tower fixture<br>BV   | BAF-02                       | 7                             | NA                  | NA                      |
| Radio Communication Analyzer<br>Anritsu | MT8821C                      | 6201462755                    | Mar. 03, 2022       | Mar. 02, 2023           |
| Pre-Amplifier<br>EMCI                   | EMC 184045                   | 980116                        | Oct. 01, 2022       | Sep. 30, 2023           |
| Horn Antenna<br>Schwarzbeck             | BBHA 9170                    | 148                           | Nov. 13, 2022       | Nov. 12, 2023           |
| RF Coaxial Cable<br>EMCI                | EMC102-KM-KM-600             | 150928                        | Jul. 09, 2022       | Jul. 08, 2023           |
| RF Coaxial Cable<br>EMCI                | EMC102-KM-KM-3000            | 150929                        | Jul. 09, 2022       | Jul. 08, 2023           |

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 HY - 966 chamber 5.

### 3 General Information

#### 3.1 General Description of EUT

|                            |                                                               |                                          |
|----------------------------|---------------------------------------------------------------|------------------------------------------|
| <b>Product</b>             | 5G Module                                                     |                                          |
| <b>Brand</b>               | Fibocom Wireless Inc                                          |                                          |
| <b>Test Model</b>          | FM350-GL                                                      |                                          |
| <b>Status of EUT</b>       | Engineering Sample                                            |                                          |
| <b>Power Supply Rating</b> | 11.61 Vdc (Battery)<br>5 Vdc / 9Vdc / 15Vdc / 20Vdc (Adapter) |                                          |
| <b>Modulation Type</b>     | LTE                                                           | QPSK, 16QAM, 64QAM, 256QAM               |
|                            | 5GNR                                                          | $\pi/2$ BPSK, QPSK, 16QAM, 64QAM, 256QAM |
| <b>Frequency Range</b>     | LTE Band 30 (Channel Bandwidth: 5 MHz)                        | 2307.5 ~ 2312.5 MHz                      |
|                            | LTE Band 30 (Channel Bandwidth: 10 MHz)                       | 2310 MHz                                 |
|                            | n30 (Channel Bandwidth 5MHz)                                  | 2307.5MHz ~ 2312.5MHz                    |
|                            | n30 (Channel Bandwidth 10MHz)                                 | 2310.0MHz                                |
| <b>Max. EIRP Power</b>     | LTE Band 30 (Channel Bandwidth: 5 MHz)                        | 230.675 mW (23.63dBm)                    |
|                            | LTE Band 30 (Channel Bandwidth: 10 MHz)                       | 232.274 mW (23.66dBm)                    |
|                            | n30 (Channel Bandwidth 5MHz)                                  | 164.816 mW (22.17dBm)                    |
|                            | n30 (Channel Bandwidth 10MHz)                                 | 165.577 mW (22.19dBm)                    |
| <b>Emission Designator</b> | LTE Band 30 (Channel Bandwidth: 5 MHz)                        | 4M49G7D                                  |
|                            | LTE Band 30 (Channel Bandwidth: 10 MHz)                       | 8M97D7W                                  |
|                            | n30 (Channel Bandwidth 5MHz)                                  | 4M47G7D                                  |
|                            | n30 (Channel Bandwidth 10MHz)                                 | 8M92D7W                                  |
| <b>Antenna Type</b>        | Refer to Note as below                                        |                                          |

Note:

1. The EUT is authorized for use in specific End-product. Please refer to below for more details.

| Product Name              | Brand | Model     | Difference            |
|---------------------------|-------|-----------|-----------------------|
| Notebook<br>PC/Expertbook | ASUS  | B7402FB   | For marketing purpose |
|                           |       | B7402F    |                       |
|                           |       | B7402FV   |                       |
|                           |       | B7402FVA  |                       |
|                           |       | B7402FVAT |                       |

2. The antenna information is listed as below.

| WWAN Antenna                |                         |               |                  |               |                         |               |                  |               |
|-----------------------------|-------------------------|---------------|------------------|---------------|-------------------------|---------------|------------------|---------------|
| Ant. Type                   | Couple                  |               |                  |               |                         |               |                  |               |
| Band                        | NB                      |               |                  |               | Tablet                  |               |                  |               |
|                             | Antenna Peak Gain (dBi) |               |                  |               | Antenna Peak Gain (dBi) |               |                  |               |
|                             | Ant 0<br>(TX/RX)        | Ant 1<br>(RX) | Ant 2<br>(TX/RX) | Ant 3<br>(RX) | Ant 0<br>(TX/RX)        | Ant 1<br>(RX) | Ant 2<br>(TX/RX) | Ant 3<br>(RX) |
| WCDMA II / LTE 2 / 5G NR n2 | 1.96                    | 1.51          | 1.82             | 1.96          | -1.18                   | 1.92          | 0.93             | -1.73         |
| WCDMA IV / LTE 4            | 1.89                    | 1.57          | 1.84             | 1.87          | 1.22                    | 1.95          | 0.48             | -0.24         |
| WCDMA V / LTE 5 / 5G NR n5  | -0.42                   | -             | -                | -0.36         | -3.96                   | -             | -                | -2.49         |
| LTE 7 / 5G NR n7            | 1.97                    | 1.61          | 1.79             | 1.83          | 0.29                    | 1.94          | 1.99             | 0.79          |
| LTE 12                      | 0.88                    | -             | -                | -0.86         | -1.05                   | -             | -                | -4.13         |
| LTE 13                      | 1.95                    | -             | -                | 1.99          | 0.23                    | -             | -                | -1.81         |
| LTE 14                      | 1.90                    | -             | -                | 1.81          | -0.78                   | -             | -                | -1.95         |
| LTE 17                      | 0.88                    | -             | -                | -0.86         | -1.05                   | -             | -                | -4.13         |
| LTE 25 / 5G NR n25          | 1.93                    | 1.77          | 1.82             | 1.97          | -1.04                   | 1.92          | 0.93             | -1.69         |
| LTE 26                      | -0.03                   | -             | -                | -0.22         | -3.72                   | -             | -                | -2.49         |
| LTE 30 / 5G NR n30          | 1.80                    | 1.27          | 1.83             | 1.96          | 0.49                    | 1.33          | 0.71             | 1.63          |
| LTE 38 / 5G NR n38          | 1.31                    | 1.55          | 1.88             | 1.81          | 0.8                     | 1.96          | 1.94             | -0.46         |
| LTE 41 / 5G NR n41          | 1.97                    | 1.98          | 1.50             | 1.84          | 1.82                    | 1.84          | 1.86             | 1.96          |
| LTE 48                      | 1.90                    | 1.89          | 1.73             | 1.91          | 1.84                    | 1.77          | 1.82             | 1.83          |
| LTE 66 / 5G NR n66          | 1.94                    | 1.75          | 1.85             | 1.85          | 1.22                    | 1.99          | 0.51             | -0.44         |
| 5G NR n77                   | 1.98                    | 1.91          | 1.87             | 1.97          | 1.80                    | 1.89          | 1.92             | 1.90          |
| 5G NR n78                   | 1.98                    | 1.75          | 1.87             | 1.91          | 1.98                    | 1.89          | 1.82             | 1.93          |

\*The max antenna gain was chosen for final test.

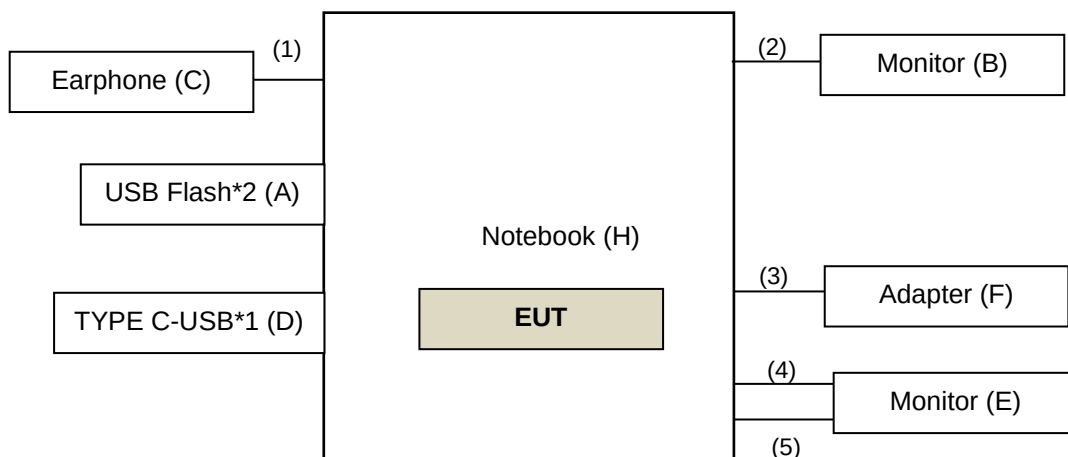
3. Detail antenna specification please refer to antenna datasheet.

4. 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.

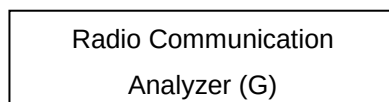


### 3.2 Configuration of System Under Test

#### <Radiated Emission Test> & <E.I.R.P. Test>



Under Table



Remote Site

#### 3.2.1 Description of Support Units

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

| ID | Product                      | Brand     | Model No.      | Serial No.               | FCC ID | Remarks              |
|----|------------------------------|-----------|----------------|--------------------------|--------|----------------------|
| A  | USB*2                        | TRANSCEND | USB3.0 32GB    | N/A                      | N/A    | Provided by Lab      |
| B  | Monitor                      | Dell      | A14S2421HSXmTW | CN-01KFWF-WSL00-24C-711B | N/A    | Provided by Lab      |
| C  | Earphone                     | HTC       | HTC_MAX320     | N/A                      | N/A    | Provided by Lab      |
| D  | TYPE C-USB*1                 | SanDisk   | SDDDC3-032G    | N/A                      | N/A    | Provided by Lab      |
| E  | Monitor                      | Dell      | A14S2421HSXmTW | CN-01KFWF-WSL00-24C-714B | N/A    | Provided by Lab      |
| F  | Adapter                      | CHICONY   | A19-065N3A     | N/A                      | N/A    | Accessory of the EUT |
| G  | Radio Communication Analyzer | Anritsu   | MT8821C        | 6201462755               | NA     | Provided by Lab      |
| H  | Notebook                     | ASUS      | B7402FV        | NA                       | NA     | Provided by client   |

| ID | Cable Descriptions       | Qty. | Length (m) | Shielding (Yes/No) | Cores (Qty.) | Remarks              |
|----|--------------------------|------|------------|--------------------|--------------|----------------------|
| 1. | Audio for Earphone Cable | 1    | 1.2        | N                  | 0            | Provided by Lab      |
| 2. | HDMI Cable               | 1    | 1.8        | Y                  | 0            | Provided by Lab      |
| 3. | Adapter Cable            | 1    | 1.6        | Y                  | 0            | Accessory of the EUT |
| 4. | Mini DP TO DP Cable      | 1    | 1.5        | Y                  | 0            | Provided by Lab      |
| 5. | Micro HDMI TO HDMI Cable | 1    | 1.5        | Y                  | 0            | Provided by Lab      |

### 3.3 Test Mode Applicability and Tested Channel Detail

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

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

#### LTE Band 30

| EUT Configure Mode | Test Item                  | Available Channel | Tested Channel      | Channel Bandwidth | Modulation                 | Mode                                                                                                                                                           |
|--------------------|----------------------------|-------------------|---------------------|-------------------|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -                  | EIRP                       | 27685 to 27735    | 27685, 27710, 27735 | 5 MHz             | QPSK, 16QAM, 64QAM, 256QAM | 1 RB / 0 RB Offset<br>1 RB / 12 RB Offset<br>1 RB / 24 RB Offset<br>12 RB / 0 RB Offset<br>12 RB / 6 RB Offset<br>12 RB / 13 RB Offset<br>25 RB / 0 RB Offset  |
|                    |                            | 27710             | 27710               | 10 MHz            | QPSK, 16QAM, 64QAM, 256QAM | 1 RB / 0 RB Offset<br>1 RB / 24 RB Offset<br>1 RB / 49 RB Offset<br>25 RB / 0 RB Offset<br>25 RB / 12 RB Offset<br>25 RB / 25 RB Offset<br>50 RB / 0 RB Offset |
| -                  | Modulation Characteristics | 27710             | 27710               | 5 MHz             | QPSK, 16QAM, 64QAM, 256QAM | 50 RB / 0 RB Offset                                                                                                                                            |
| -                  | Frequency Stability        | 27685 to 27735    | 27685, 27735        | 5 MHz             | QPSK                       | 25 RB / 0 RB Offset                                                                                                                                            |
|                    |                            | 27710             | 27710               | 10 MHz            | QPSK                       | 50 RB / 0 RB Offset                                                                                                                                            |
| -                  | Occupied Bandwidth         | 27685 to 27735    | 27685, 27710, 27735 | 5 MHz             | QPSK, 16QAM, 64QAM, 256QAM | 25 RB / 0 RB Offset                                                                                                                                            |
|                    |                            | 27710             | 27710               | 10 MHz            | QPSK, 16QAM, 64QAM, 256QAM | 50 RB / 0 RB Offset                                                                                                                                            |
| -                  | Band Edge                  | 27685 to 27735    | 27685, 27710, 27735 | 5 MHz             | QPSK, 16QAM                | 1 RB / 0 RB Offset<br>1 RB / 24 RB Offset<br>25 RB / 0 RB Offset                                                                                               |
|                    |                            | 27710             | 27710               | 10 MHz            | QPSK, 16QAM                | 1 RB / 0 RB Offset<br>1 RB / 49 RB Offset<br>50 RB / 0 RB Offset                                                                                               |
| -                  | Conducted Emission         | 27685 to 27735    | 27685, 27710, 27735 | 5 MHz             | QPSK                       | 1 RB / 0 RB Offset                                                                                                                                             |
|                    |                            | 27710             | 27710               | 10 MHz            | QPSK                       | 1 RB / 0 RB Offset                                                                                                                                             |
| -                  | Radiated Emission          | 27685 to 27735    | 27685, 27710, 27735 | 5 MHz             | QPSK                       | 1 RB / 0 RB Offset                                                                                                                                             |
|                    |                            | 27710             | 27710               | 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.

n30

| EUT Configure Mode | Test item                    | Available channel | Tested channel                                                   | Channel Bandwidth | Modulation                                            | Mode                                                                                                                                                           |
|--------------------|------------------------------|-------------------|------------------------------------------------------------------|-------------------|-------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| -                  | EIRP                         | 461500 to 462500  | 461500 (2307.5MHz),<br>462000 (2310.0MHz),<br>462500 (2312.5MHz) | 5MHz              | $\pi/2$ BPSK /<br>QPSK / 16QAM /<br>64QAM /<br>256QAM | 1 RB / 1 RB Offset<br>1 RB / 13 RB Offset<br>1 RB / 23 RB Offset<br>12 RB / 0 RB Offset<br>12 RB / 7 RB Offset<br>12 RB / 13 RB Offset<br>25 RB / 0 RB Offset  |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK /<br>QPSK / 16QAM /<br>64QAM /<br>256QAM | 1 RB / 1 RB Offset<br>1 RB / 26 RB Offset<br>1 RB / 50 RB Offset<br>25 RB / 0 RB Offset<br>25 RB / 14 RB Offset<br>25 RB / 27 RB Offset<br>50 RB / 0 RB Offset |
| -                  | Modulation characteristics   | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK /<br>QPSK / 16QAM /<br>64QAM /<br>256QAM | 52 RB / 0 RB Offset                                                                                                                                            |
| -                  | Frequency Stability          | 461500 to 462500  | 461500 (2307.5MHz),<br>462500 (2312.5MHz)                        | 5MHz              | $\pi/2$ BPSK                                          | 25 RB / 0 RB Offset                                                                                                                                            |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK                                          | 52 RB / 0 RB Offset                                                                                                                                            |
| -                  | Emission Bandwidth           | 461500 to 462500  | 461500 (2307.5MHz),<br>462000 (2310.0MHz),<br>462500 (2312.5MHz) | 5MHz              | $\pi/2$ BPSK /<br>QPSK / 16QAM /<br>64QAM /<br>256QAM | 25 RB / 0 RB Offset                                                                                                                                            |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK /<br>QPSK / 16QAM /<br>64QAM /<br>256QAM | 52 RB / 0 RB Offset                                                                                                                                            |
| -                  | Emission Mask                | 461500 to 462500  | 461500 (2307.5MHz),<br>462500 (2312.5MHz)                        | 5MHz              | $\pi/2$ BPSK                                          | 25 RB / 0 RB Offset                                                                                                                                            |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK                                          | 52 RB / 0 RB Offset                                                                                                                                            |
| -                  | Conducted Emission           | 461500 to 462500  | 461500 (2307.5MHz),<br>462000 (2310.0MHz),<br>462500 (2312.5MHz) | 5MHz              | $\pi/2$ BPSK                                          | 1 RB / 1 RB Offset                                                                                                                                             |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK                                          | 1 RB / 1 RB Offset                                                                                                                                             |
| -                  | Radiated Emission Below 1GHz | 461500 to 462500  | 461500 (2307.5MHz)                                               | 5MHz              | $\pi/2$ BPSK                                          | 1 RB / 1 RB Offset                                                                                                                                             |
| -                  | Radiated Emission Above 1GHz | 461500 to 462500  | 461500 (2307.5MHz),<br>462000 (2310.0MHz),<br>462500 (2312.5MHz) | 5MHz              | $\pi/2$ BPSK                                          | 1 RB / 1 RB Offset                                                                                                                                             |
|                    |                              | 462000            | 462000 (2310.0MHz)                                               | 10MHz             | $\pi/2$ BPSK                                          | 1 RB / 1 RB Offset                                                                                                                                             |

Note:

1. For radiated emission below 1GHz, select the worst radiated emission channel (above 1GHz) for final testing.
2. For radiated emission above 1GHz, according to 3GPP 38.521-1 Section 6.5.3.1.4, choose the lowest and highest channel bandwidth for final test.
3. Only output power, modulation characteristics, occupied bandwidth items had been tested under  $\pi/2$  BPSK, QPSK, 16QAM, 64QAM and 256QAM modes, the other test items were performed under worse mode according to the maximum output power.

#### **Test Condition:**

| Test Item                  | Environmental Conditions | Input Power    | Tested By    |
|----------------------------|--------------------------|----------------|--------------|
| EIRP                       | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Modulation Characteristics | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Frequency Stability        | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Occupied Bandwidth         | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Band Edge                  | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Conducted Emission         | 25 deg. C, 65 % RH       | 11.61 Vdc      | Willy Cheng  |
| Radiated Emission          | 21 deg. C, 67 % RH       | 120 Vac, 60 Hz | Thomas Cheng |

### **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 and references**

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

#### **Test Standard:**

**FCC 47 CFR Part 2**

**FCC 47 CFR Part 27**

**ANSI 63.26-2015**

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

#### **References Test Guidance:**

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

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

**NOTE:** All test items have been performed as a reference to the above KDB test guidance.

## 4 Test Types and Results

### 4.1 Output Power Measurement

#### 4.1.1 Limits of Output Power Measurement

For LTE Band 30 and 5G NR n30:

For mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.

#### 4.1.2 Test Procedures

##### Conducted Power Measurement:

For all test band except LTE band 30 and 5G NR n30:

The EUT was set up for the maximum power with LTE and 5GNR link data modulation and link up with simulator. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.

For LTE band 30 and 5G NR n30:

Measurement method refers to ANSI C63.26 section 5.2.4.4.

- Set span to  $2 \times$  to  $3 \times$  the OBW.
- Set RBW = 1% to 5% of the OBW.
- Set VBW  $\geq 3 \times$  RBW.
- Set number of measurement points in sweep  $\geq 2 \times$  span / RBW.
- Set Sweep time = auto-couple.
- Detector = power averaging (rms).
- Set sweep trigger to "free run."
- Trace average at least 100 traces in power averaging (rms) mode.
- Compute power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function with band/channel limits set equal to the OBW band edges.
- Add  $10 \log(1/\text{duty cycle})$  to the measured power level to compute the average power during continuous transmission.

##### Maximum EIRP / ERP

The relevant equation for determining the maximum ERP or EIRP from the measured RF output power is given in Equation as follows:

$$\text{EIRP} = P_{\text{Meas}} + G_T$$

$$\text{ERP} = P_{\text{Meas}} + G_T - 2.15$$

where

ERP or EIRP effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as  $P_{\text{Meas}}$ , e.g., dBm or dBW)

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

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

#### 4.1.3 Test Setup

##### Conducted Power Measurement:



#### 4.1.4 Test Results

##### Conducted Output Power (dBm)

| LTE Band 30 |           |                 |    |       |
|-------------|-----------|-----------------|----|-------|
| BW          | MCS Index | Channel         |    | 27710 |
|             |           | Frequency (MHz) |    | 2310  |
| 10M         | QPSK      | 1               | 0  | 21.83 |
|             |           | 1               | 24 | 21.77 |
|             |           | 1               | 49 | 21.69 |
|             |           | 25              | 0  | 20.64 |
|             |           | 25              | 12 | 20.60 |
|             |           | 25              | 25 | 20.49 |
|             |           | 50              | 0  | 20.60 |
|             | 16QAM     | 1               | 0  | 20.82 |
|             |           | 1               | 24 | 20.73 |
|             |           | 1               | 49 | 20.71 |
|             |           | 25              | 0  | 19.71 |
|             |           | 25              | 12 | 19.64 |
|             |           | 25              | 25 | 19.52 |
|             |           | 50              | 0  | 19.68 |
|             | 64QAM     | 1               | 0  | 19.84 |
|             |           | 1               | 24 | 19.78 |
|             |           | 1               | 49 | 19.76 |
|             |           | 25              | 0  | 18.74 |
|             |           | 25              | 12 | 18.66 |
|             |           | 25              | 25 | 18.59 |
|             |           | 50              | 0  | 18.66 |
|             | 256QAM    | 1               | 0  | 16.95 |
|             |           | 1               | 24 | 16.88 |
|             |           | 1               | 49 | 16.94 |
|             |           | 25              | 0  | 16.69 |
|             |           | 25              | 12 | 16.62 |
|             |           | 25              | 25 | 16.43 |
|             |           | 50              | 0  | 16.54 |

Note: LTE Band 30 measurement results are in dBm/5MHz.

| LTE Band 30 |           |                 |    |        |              |        |
|-------------|-----------|-----------------|----|--------|--------------|--------|
| BW          | MCS Index | Channel         |    | 27685  | 27710        | 27735  |
|             |           | Frequency (MHz) |    | 2307.5 | 2310         | 2312.5 |
| 5M          | QPSK      | 1               | 0  | 21.76  | <b>21.80</b> | 21.71  |
|             |           | 1               | 12 | 21.69  | 21.75        | 21.68  |
|             |           | 1               | 24 | 21.71  | 21.77        | 21.75  |
|             |           | 12              | 0  | 20.79  | 20.81        | 20.81  |
|             |           | 12              | 6  | 20.63  | 20.73        | 20.72  |
|             |           | 12              | 13 | 20.60  | 20.69        | 20.64  |
|             |           | 25              | 0  | 20.69  | 20.75        | 20.72  |
|             | 16QAM     | 1               | 0  | 20.91  | 21.01        | 20.97  |
|             |           | 1               | 12 | 20.99  | 20.98        | 20.93  |
|             |           | 1               | 24 | 20.76  | 20.73        | 20.74  |
|             |           | 12              | 0  | 19.84  | 19.81        | 19.71  |
|             |           | 12              | 6  | 19.78  | 19.81        | 19.73  |
|             |           | 12              | 13 | 19.71  | 19.70        | 19.64  |
|             |           | 25              | 0  | 19.75  | 19.82        | 19.78  |
|             | 64QAM     | 1               | 0  | 19.85  | 19.87        | 19.78  |
|             |           | 1               | 12 | 19.73  | 19.80        | 19.79  |
|             |           | 1               | 24 | 19.78  | 19.78        | 19.69  |
|             |           | 12              | 0  | 18.75  | 18.78        | 18.72  |
|             |           | 12              | 6  | 18.78  | 18.80        | 18.77  |
|             |           | 12              | 13 | 18.66  | 18.73        | 18.70  |
|             |           | 25              | 0  | 18.65  | 18.69        | 18.60  |
|             | 256QAM    | 1               | 0  | 16.84  | 16.89        | 16.86  |
|             |           | 1               | 12 | 16.92  | 16.95        | 16.92  |
|             |           | 1               | 24 | 16.93  | 16.97        | 16.96  |
|             |           | 12              | 0  | 16.70  | 16.71        | 16.63  |
|             |           | 12              | 6  | 16.48  | 16.58        | 16.49  |
|             |           | 12              | 13 | 16.51  | 16.48        | 16.41  |
|             |           | 25              | 0  | 16.51  | 16.55        | 16.47  |

Note: LTE Band 30 measurement results are in dBm/5MHz.

| NR Band 30 |                       |                 |           |              |
|------------|-----------------------|-----------------|-----------|--------------|
| BW         | MCS Index             | RB Size         | RB Offset | Mid          |
|            |                       | Channel         |           | 462000       |
|            |                       | Frequency (MHz) |           | 2310         |
| 10M        | DFT-S<br>$\pi/2$ BPSK | 1               | 1         | <b>22.51</b> |
|            |                       | 1               | 26        | 22.48        |
|            |                       | 1               | 50        | 22.41        |
|            |                       | 25              | 0         | 21.77        |
|            |                       | 25              | 14        | 22.37        |
|            |                       | 25              | 27        | 21.76        |
|            |                       | 50              | 0         | 21.86        |
| 10M        | DFT-S<br>QPSK         | 1               | 1         | 22.27        |
|            |                       | 1               | 26        | 22.24        |
|            |                       | 1               | 50        | 22.3         |
|            |                       | 25              | 0         | 21.16        |
|            |                       | 25              | 14        | 22.35        |
|            |                       | 25              | 27        | 21.19        |
|            |                       | 50              | 0         | 21.14        |
| 10M        | DFT-S<br>16QAM        | 1               | 1         | 20.83        |
| 10M        | DFT-S<br>64QAM        | 1               | 1         | 19.98        |
| 10M        | DFT-S<br>256QAM       | 1               | 1         | 17.87        |
| 10M        | CP<br>QPSK            | 1               | 1         | 20.76        |
| 10M        | CP<br>16QAM           | 1               | 1         | 20.24        |
| 10M        | CP<br>64QAM           | 1               | 1         | 18.76        |
| 10M        | CP<br>256QAM          | 1               | 1         | 16.07        |



| NR Band 30 |                       |                 |    |        |              |        |
|------------|-----------------------|-----------------|----|--------|--------------|--------|
| BW         | MCS Index             | Channel         |    | 461500 | 462000       | 462500 |
|            |                       | Frequency (MHz) |    | 2307.5 | 2310         | 2312.5 |
| 5M         | DFT-S<br>$\pi/2$ BPSK | 1               | 1  | 22.41  | 22.45        | 22.47  |
|            |                       | 1               | 13 | 22.38  | <b>22.49</b> | 22.43  |
|            |                       | 1               | 23 | 22.37  | 22.30        | 22.33  |
|            |                       | 12              | 0  | 21.73  | 21.71        | 21.64  |
|            |                       | 12              | 7  | 22.26  | 22.31        | 22.36  |
|            |                       | 12              | 13 | 21.77  | 21.75        | 21.76  |
|            |                       | 25              | 0  | 21.75  | 21.74        | 21.83  |
| 5M         | DFT-S<br>QPSK         | 1               | 1  | 22.17  | 22.20        | 22.28  |
|            |                       | 1               | 13 | 22.24  | 22.14        | 22.22  |
|            |                       | 1               | 23 | 22.22  | 22.19        | 22.22  |
|            |                       | 12              | 0  | 21.09  | 21.20        | 21.04  |
|            |                       | 12              | 7  | 22.27  | 22.27        | 22.28  |
|            |                       | 12              | 13 | 21.07  | 21.13        | 21.15  |
|            |                       | 25              | 0  | 21.05  | 21.09        | 21.01  |
| 5M         | DFT-S<br>16QAM        | 1               | 1  | 20.80  | 20.79        | 20.84  |
| 5M         | DFT-S<br>64QAM        | 1               | 1  | 19.89  | 19.97        | 19.91  |
| 5M         | DFT-S<br>256QAM       | 1               | 1  | 17.90  | 17.74        | 17.90  |
| 5M         | CP<br>QPSK            | 1               | 1  | 20.72  | 20.62        | 20.78  |
| 5M         | CP<br>16QAM           | 1               | 1  | 20.20  | 20.24        | 20.12  |
| 5M         | CP<br>64QAM           | 1               | 1  | 18.74  | 18.79        | 18.78  |
| 5M         | CP<br>256QAM          | 1               | 1  | 16.01  | 16.03        | 15.93  |

**EIRP Power**

| LTE Band 30 |           |                 |           |              |
|-------------|-----------|-----------------|-----------|--------------|
| BW          | MCS Index | RB Size         | RB Offset | Mid          |
|             |           | Channel         |           | 27710        |
|             |           | Frequency (MHz) |           | 2310         |
| 10M         | QPSK      | 1               | 0         | <b>23.66</b> |
|             |           | 1               | 24        | 23.60        |
|             |           | 1               | 49        | 23.52        |
|             |           | 25              | 0         | 22.47        |
|             |           | 25              | 12        | 22.43        |
|             |           | 25              | 25        | 22.32        |
|             |           | 50              | 0         | 22.43        |
| 10M         | 16QAM     | 1               | 0         | 22.65        |
|             |           | 1               | 24        | 22.56        |
|             |           | 1               | 49        | 22.54        |
|             |           | 25              | 0         | 21.54        |
|             |           | 25              | 12        | 21.47        |
|             |           | 25              | 25        | 21.35        |
|             |           | 50              | 0         | 21.51        |
| 10M         | 64QAM     | 1               | 0         | 21.67        |
|             |           | 1               | 24        | 21.61        |
|             |           | 1               | 49        | 21.59        |
|             |           | 25              | 0         | 20.57        |
|             |           | 25              | 12        | 20.49        |
|             |           | 25              | 25        | 20.42        |
|             |           | 50              | 0         | 20.49        |
| 10M         | 256QAM    | 1               | 0         | 18.78        |
|             |           | 1               | 24        | 18.71        |
|             |           | 1               | 49        | 18.77        |
|             |           | 25              | 0         | 18.52        |
|             |           | 25              | 12        | 18.45        |
|             |           | 25              | 25        | 18.26        |
|             |           | 50              | 0         | 18.37        |

\*EIRP = Conducted + antenna gain (1.83dBi)

| LTE Band 30 |           |                 |           |        |              |        |
|-------------|-----------|-----------------|-----------|--------|--------------|--------|
| BW          | MCS Index | RB Size         | RB Offset | Low    | Mid          | High   |
|             |           | Channel         |           | 27685  | 27710        | 27735  |
|             |           | Frequency (MHz) |           | 2307.5 | 2310         | 2312.5 |
| 5M          | QPSK      | 1               | 0         | 23.59  | <b>23.63</b> | 23.54  |
|             |           | 1               | 12        | 23.52  | 23.58        | 23.51  |
|             |           | 1               | 24        | 23.54  | 23.60        | 23.58  |
|             |           | 12              | 0         | 22.62  | 22.64        | 22.64  |
|             |           | 12              | 6         | 22.46  | 22.56        | 22.55  |
|             |           | 12              | 13        | 22.43  | 22.52        | 22.47  |
|             |           | 25              | 0         | 22.52  | 22.58        | 22.55  |
| 5M          | 16QAM     | 1               | 0         | 22.74  | 22.84        | 22.80  |
|             |           | 1               | 12        | 22.82  | 22.81        | 22.76  |
|             |           | 1               | 24        | 22.59  | 22.56        | 22.57  |
|             |           | 12              | 0         | 21.67  | 21.64        | 21.54  |
|             |           | 12              | 6         | 21.61  | 21.64        | 21.56  |
|             |           | 12              | 13        | 21.54  | 21.53        | 21.47  |
|             |           | 25              | 0         | 21.58  | 21.65        | 21.61  |
| 5M          | 64QAM     | 1               | 0         | 21.68  | 21.70        | 21.61  |
|             |           | 1               | 12        | 21.56  | 21.63        | 21.62  |
|             |           | 1               | 24        | 21.61  | 21.61        | 21.52  |
|             |           | 12              | 0         | 20.58  | 20.61        | 20.55  |
|             |           | 12              | 6         | 20.61  | 20.63        | 20.60  |
|             |           | 12              | 13        | 20.49  | 20.56        | 20.53  |
|             |           | 25              | 0         | 20.48  | 20.52        | 20.43  |
| 5M          | 256QAM    | 1               | 0         | 18.67  | 18.72        | 18.69  |
|             |           | 1               | 12        | 18.75  | 18.78        | 18.75  |
|             |           | 1               | 24        | 18.76  | 18.80        | 18.79  |
|             |           | 12              | 0         | 18.53  | 18.54        | 18.46  |
|             |           | 12              | 6         | 18.31  | 18.41        | 18.32  |
|             |           | 12              | 13        | 18.34  | 18.31        | 18.24  |
|             |           | 25              | 0         | 18.34  | 18.38        | 18.30  |

\*EIRP = Conducted + antenna gain (1.83dBi)

| NR Band 30 |                    |                 |           |              |
|------------|--------------------|-----------------|-----------|--------------|
| BW         | MCS Index          | RB Size         | RB Offset | Mid          |
|            |                    | Channel         |           | 462000       |
|            |                    | Frequency (MHz) |           | 2310         |
| 10M        | DFT-S $\pi/2$ BPSK | 1               | 1         | <b>22.19</b> |
|            |                    | 1               | 26        | 22.16        |
|            |                    | 1               | 50        | 22.09        |
|            |                    | 25              | 0         | 21.45        |
|            |                    | 25              | 14        | 22.05        |
|            |                    | 25              | 27        | 21.44        |
|            |                    | 50              | 0         | 21.54        |
| 10M        | DFT-S QPSK         | 1               | 1         | 21.95        |
|            |                    | 1               | 26        | 21.92        |
|            |                    | 1               | 50        | 21.98        |
|            |                    | 25              | 0         | 20.84        |
|            |                    | 25              | 14        | 22.03        |
|            |                    | 25              | 27        | 20.87        |
|            |                    | 50              | 0         | 20.82        |
| 10M        | DFT-S 16QAM        | 1               | 1         | 20.51        |
| 10M        | DFT-S 64QAM        | 1               | 1         | 19.66        |
| 10M        | DFT-S 256QAM       | 1               | 1         | 17.55        |
| 10M        | CP QPSK            | 1               | 1         | 20.44        |
| 10M        | CP 16QAM           | 1               | 1         | 19.92        |
| 10M        | CP 64QAM           | 1               | 1         | 18.44        |
| 10M        | CP 256QAM          | 1               | 1         | 15.75        |

\*EIRP = Conducted + antenna gain (1.83dBi)

| NR Band 30 |                       |                 |    |        |              |        |
|------------|-----------------------|-----------------|----|--------|--------------|--------|
| BW         | MCS Index             | Channel         |    | 461500 | 462000       | 462500 |
|            |                       | Frequency (MHz) |    | 2307.5 | 2310         | 2312.5 |
| 5M         | DFT-S<br>$\pi/2$ BPSK | 1               | 1  | 22.09  | 22.13        | 22.15  |
|            |                       | 1               | 13 | 22.06  | <b>22.17</b> | 22.11  |
|            |                       | 1               | 23 | 22.05  | 21.98        | 22.01  |
|            |                       | 12              | 0  | 21.41  | 21.39        | 21.32  |
|            |                       | 12              | 7  | 21.94  | 21.99        | 22.04  |
|            |                       | 12              | 13 | 21.45  | 21.43        | 21.44  |
|            |                       | 25              | 0  | 21.43  | 21.42        | 21.51  |
| 5M         | DFT-S<br>QPSK         | 1               | 1  | 21.85  | 21.88        | 21.96  |
|            |                       | 1               | 13 | 21.92  | 21.82        | 21.9   |
|            |                       | 1               | 23 | 21.9   | 21.87        | 21.9   |
|            |                       | 12              | 0  | 20.77  | 20.88        | 20.72  |
|            |                       | 12              | 7  | 21.95  | 21.95        | 21.96  |
|            |                       | 12              | 13 | 20.75  | 20.81        | 20.83  |
|            |                       | 25              | 0  | 20.73  | 20.77        | 20.69  |
| 5M         | DFT-S<br>16QAM        | 1               | 1  | 20.48  | 20.47        | 20.52  |
| 5M         | DFT-S<br>64QAM        | 1               | 1  | 19.57  | 19.65        | 19.59  |
| 5M         | DFT-S<br>256QAM       | 1               | 1  | 17.58  | 17.42        | 17.58  |
| 5M         | CP<br>QPSK            | 1               | 1  | 20.4   | 20.3         | 20.46  |
| 5M         | CP<br>16QAM           | 1               | 1  | 19.88  | 19.92        | 19.8   |
| 5M         | CP<br>64QAM           | 1               | 1  | 18.42  | 18.47        | 18.46  |
| 5M         | CP<br>256QAM          | 1               | 1  | 15.69  | 15.71        | 15.61  |

\*EIRP = Conducted + antenna gain (1.83dBi)

## 4.2 Modulation Characteristics Measurement

### 4.2.1 Limits of Modulation Characteristics

N/A

### 4.2.2 Test Setup

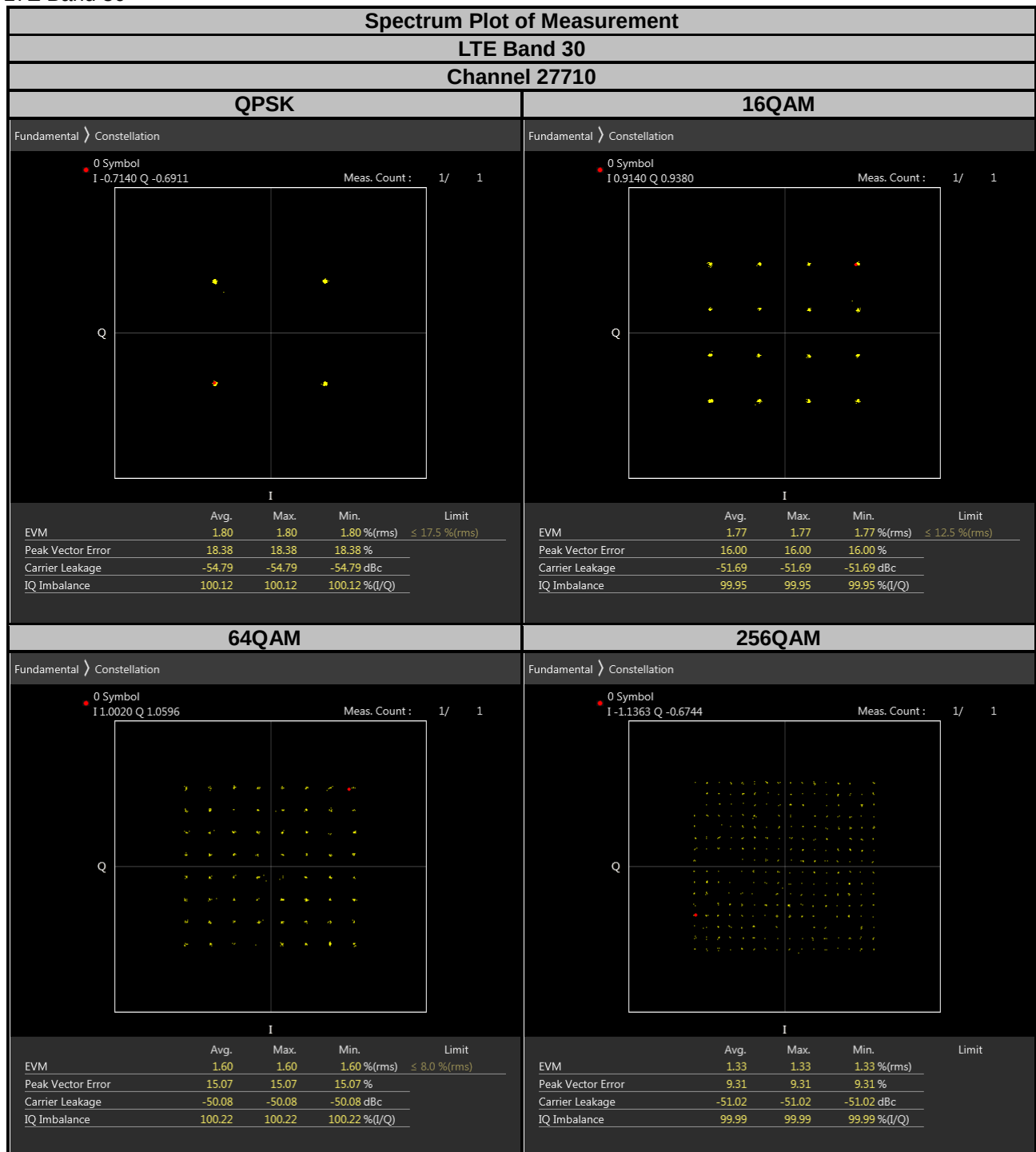


### 4.2.3 Test Procedure

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

##### LTE Band 30



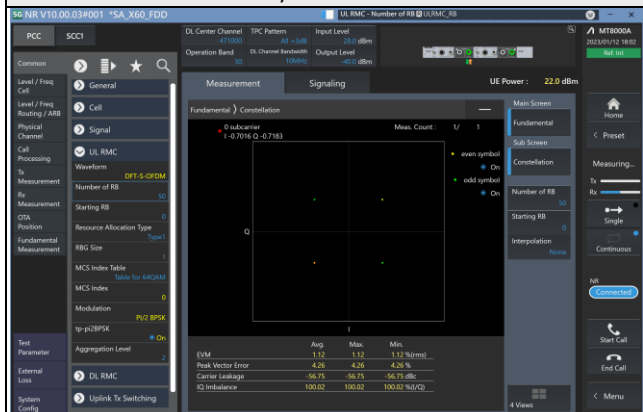
5G NR n30

n30

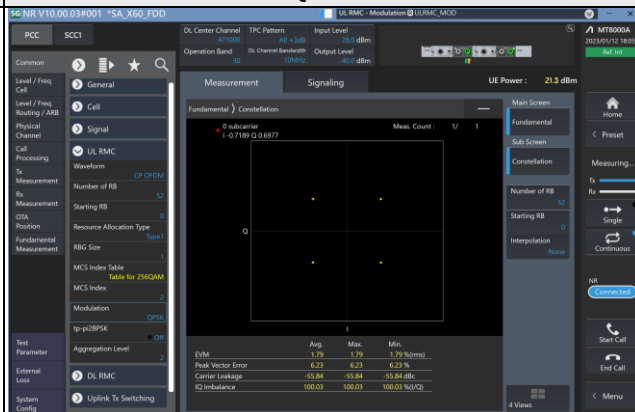
Spectrum Plot of Measurement Value

Channel: 462000 / Frequency (MHz): 2310.0MHz

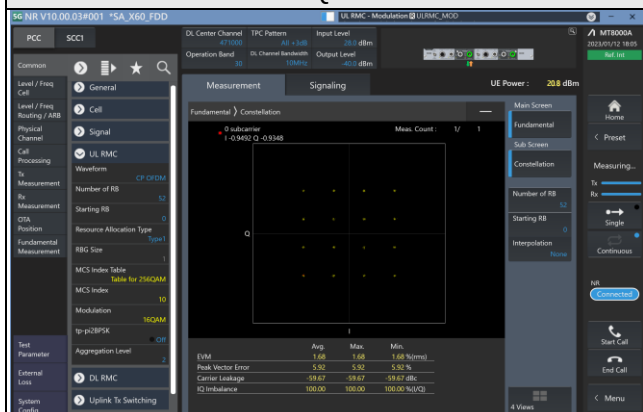
$\pi/2$  BPSK



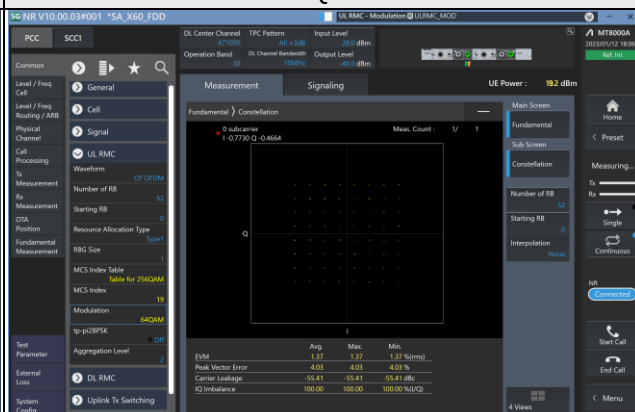
QPSK



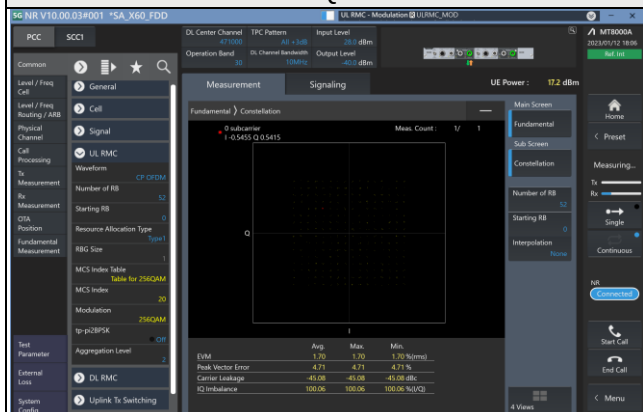
16QAM



64QAM



256QAM





### 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.

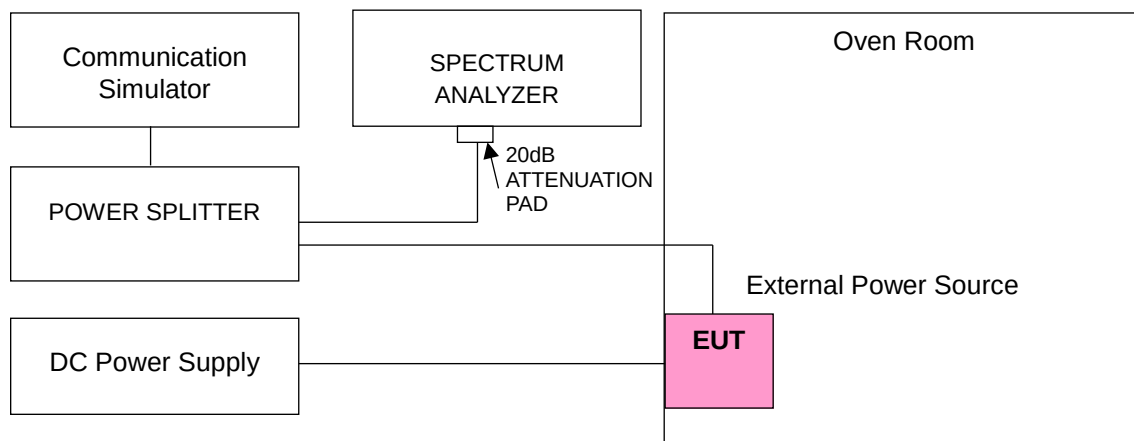
According to the FCC part 2.1055 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with specification of EUT  $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .

#### 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 30              |                       |                 |                       |
|--------------------|--------------------------|-----------------------|-----------------|-----------------------|
|                    | Channel Bandwidth: 5 MHz |                       |                 |                       |
|                    | Low Channel              |                       | High Channel    |                       |
|                    | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 9.86               | 2307.500001              | 0.000                 | 2312.499997     | -0.001                |
| 11.61              | 2307.499998              | -0.001                | 2312.499999     | 0.000                 |
| 13.35              | 2307.500002              | 0.001                 | 2312.500001     | 0.000                 |

**Note:** The applicant defined the normal working voltage of the battery is from 9.86 Vdc to 13.35 Vdc.

##### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 30              |                       |                 |                       |
|------------|--------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth: 5 MHz |                       |                 |                       |
|            | Low Channel              |                       | High Channel    |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 2307.499997              | -0.001                | 2312.500003     | 0.001                 |
| -20        | 2307.499996              | -0.002                | 2312.500002     | 0.001                 |
| -10        | 2307.500002              | 0.001                 | 2312.500003     | 0.001                 |
| 0          | 2307.500004              | 0.002                 | 2312.499998     | -0.001                |
| 10         | 2307.500002              | 0.001                 | 2312.499996     | -0.002                |
| 20         | 2307.500004              | 0.002                 | 2312.499997     | -0.001                |
| 30         | 2307.500003              | 0.001                 | 2312.500004     | 0.002                 |
| 40         | 2307.499997              | -0.001                | 2312.499999     | 0.000                 |
| 50         | 2307.500001              | 0.000                 | 2312.500002     | 0.001                 |

#### Frequency Error vs. Voltage

| Voltage<br>(Volts) | LTE Band 30               |                       |
|--------------------|---------------------------|-----------------------|
|                    | Channel Bandwidth: 10 MHz |                       |
|                    | Frequency (MHz)           | Frequency Error (ppm) |
| 9.86               | 2309.999996               | -0.002                |
| 11.61              | 2310.000001               | 0.000                 |
| 13.35              | 2309.999998               | -0.001                |

**Note:** The applicant defined the normal working voltage of the battery is from 9.86 Vdc to 13.35 Vdc.

#### Frequency Error vs. Temperature

| Temp. (°C) | LTE Band 30               |                       |
|------------|---------------------------|-----------------------|
|            | Channel Bandwidth: 10 MHz |                       |
|            | Frequency (MHz)           | Frequency Error (ppm) |
| -30        | 2309.999997               | -0.001                |
| -20        | 2309.999997               | -0.001                |
| -10        | 2310.000004               | 0.002                 |
| 0          | 2310.000001               | 0.000                 |
| 10         | 2309.999997               | -0.001                |
| 20         | 2309.999999               | 0.000                 |
| 30         | 2309.999998               | -0.001                |
| 40         | 2309.999998               | -0.001                |
| 50         | 2309.999997               | -0.001                |

### Frequency Error vs. Voltage

| Voltage<br>(Vdc) | n30                     |                       |                 |                       |
|------------------|-------------------------|-----------------------|-----------------|-----------------------|
|                  | Channel Bandwidth 5 MHz |                       |                 |                       |
|                  | Low Channel             |                       | High Channel    |                       |
|                  | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| 9.86             | 2307.500001             | 0.0004                | 2312.500003     | 0.0013                |
| 11.61            | 2307.499997             | -0.0013               | 2312.499996     | -0.0017               |
| 13.35            | 2307.500003             | 0.0013                | 2312.499999     | -0.0004               |

Note: The applicant defined the normal working voltage is from 9.86 Vdc to 13.35 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | n30                     |                       |                 |                       |
|------------|-------------------------|-----------------------|-----------------|-----------------------|
|            | Channel Bandwidth 5 MHz |                       |                 |                       |
|            | Low Channel             |                       | High Channel    |                       |
|            | Frequency (MHz)         | Frequency Error (ppm) | Frequency (MHz) | Frequency Error (ppm) |
| -30        | 2307.499998             | -0.0009               | 2312.500001     | 0.0004                |
| -20        | 2307.500004             | 0.0017                | 2312.499999     | -0.0004               |
| -10        | 2307.500004             | 0.0017                | 2312.500001     | 0.0004                |
| 0          | 2307.500002             | 0.0009                | 2312.499998     | -0.0009               |
| 10         | 2307.500003             | 0.0013                | 2312.500003     | 0.0013                |
| 20         | 2307.499997             | -0.0013               | 2312.499997     | -0.0013               |
| 30         | 2307.499999             | -0.0004               | 2312.499999     | -0.0004               |
| 40         | 2307.500003             | 0.0013                | 2312.499996     | -0.0017               |
| 50         | 2307.500002             | 0.0009                | 2312.499996     | -0.0017               |

### Frequency Error vs. Voltage

| Voltage<br>(Vdc) | n30                      |                       |
|------------------|--------------------------|-----------------------|
|                  | Channel Bandwidth 10 MHz |                       |
|                  | Frequency (MHz)          | Frequency Error (ppm) |
| 9.86             | 2310.000003              | 0.0013                |
| 11.61            | 2310.000001              | 0.0004                |
| 13.35            | 2309.999997              | -0.0013               |

Note: The applicant defined the normal working voltage is from 9.86 Vdc to 13.35 Vdc.

### Frequency Error vs. Temperature

| Temp. (°C) | n30                      |                       |
|------------|--------------------------|-----------------------|
|            | Channel Bandwidth 10 MHz |                       |
|            | Frequency (MHz)          | Frequency Error (ppm) |
| -30        | 2309.999996              | -0.0017               |
| -20        | 2309.999999              | -0.0004               |
| -10        | 2310.000004              | 0.0017                |
| 0          | 2309.999999              | -0.0004               |
| 10         | 2309.999999              | -0.0004               |
| 20         | 2309.999996              | -0.0017               |
| 30         | 2310.000004              | 0.0017                |
| 40         | 2309.999997              | -0.0013               |
| 50         | 2310.000001              | 0.0004                |

## 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

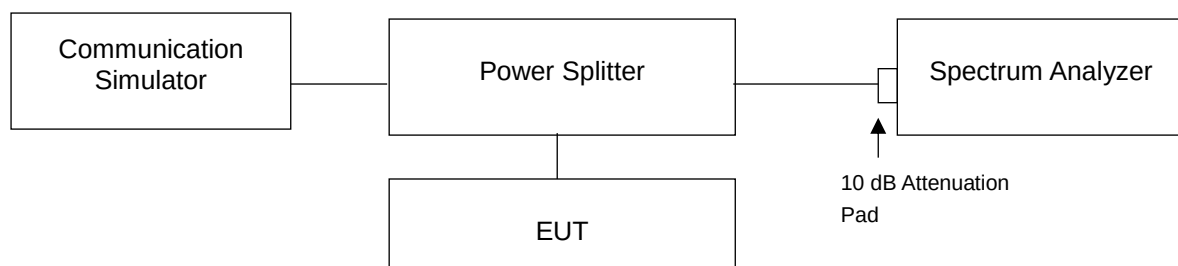
The EUT makes a call to the communication simulator. All measurements were done at low, middle and high operational frequency range. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency.

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

- The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set  $\geq 3 \times \text{RBW}$ .
- Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

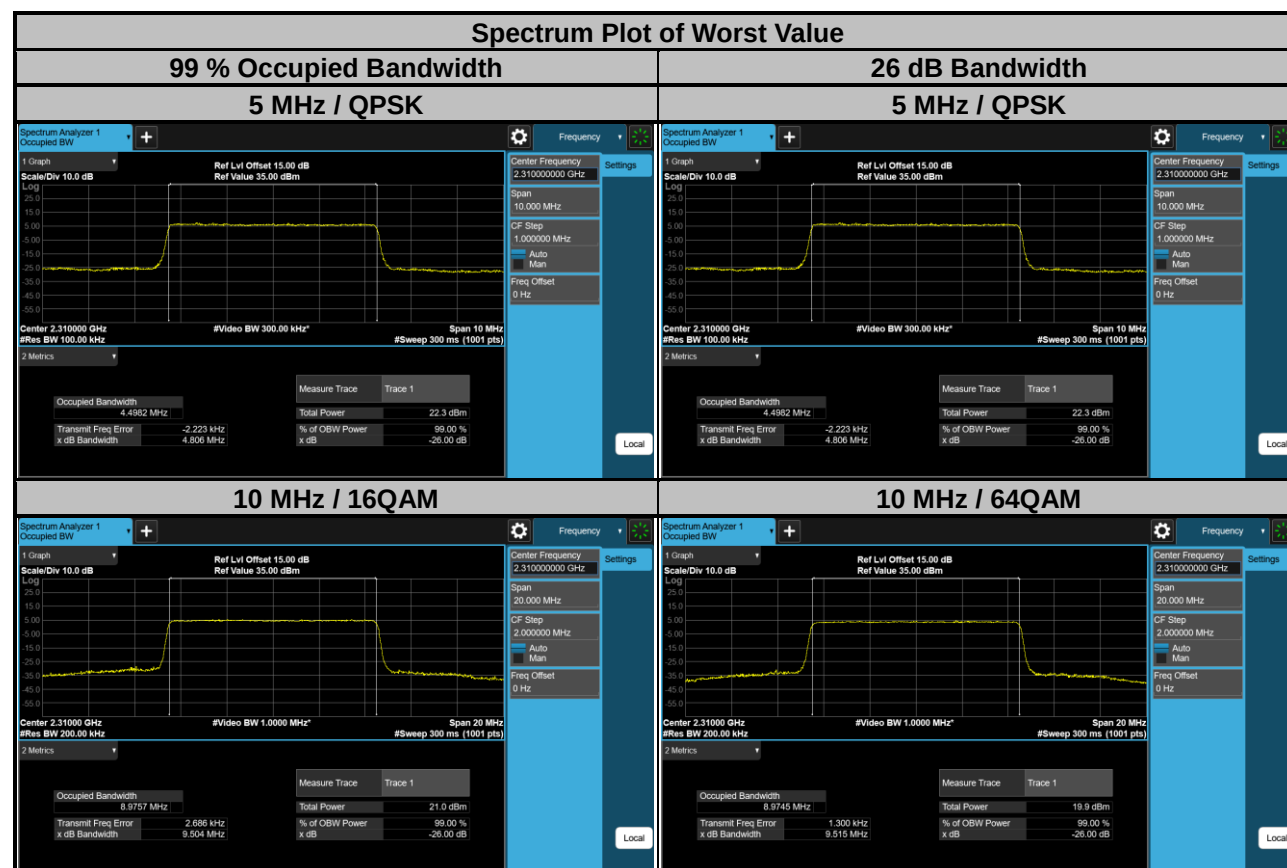
For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

### 4.4.3 Test Setup

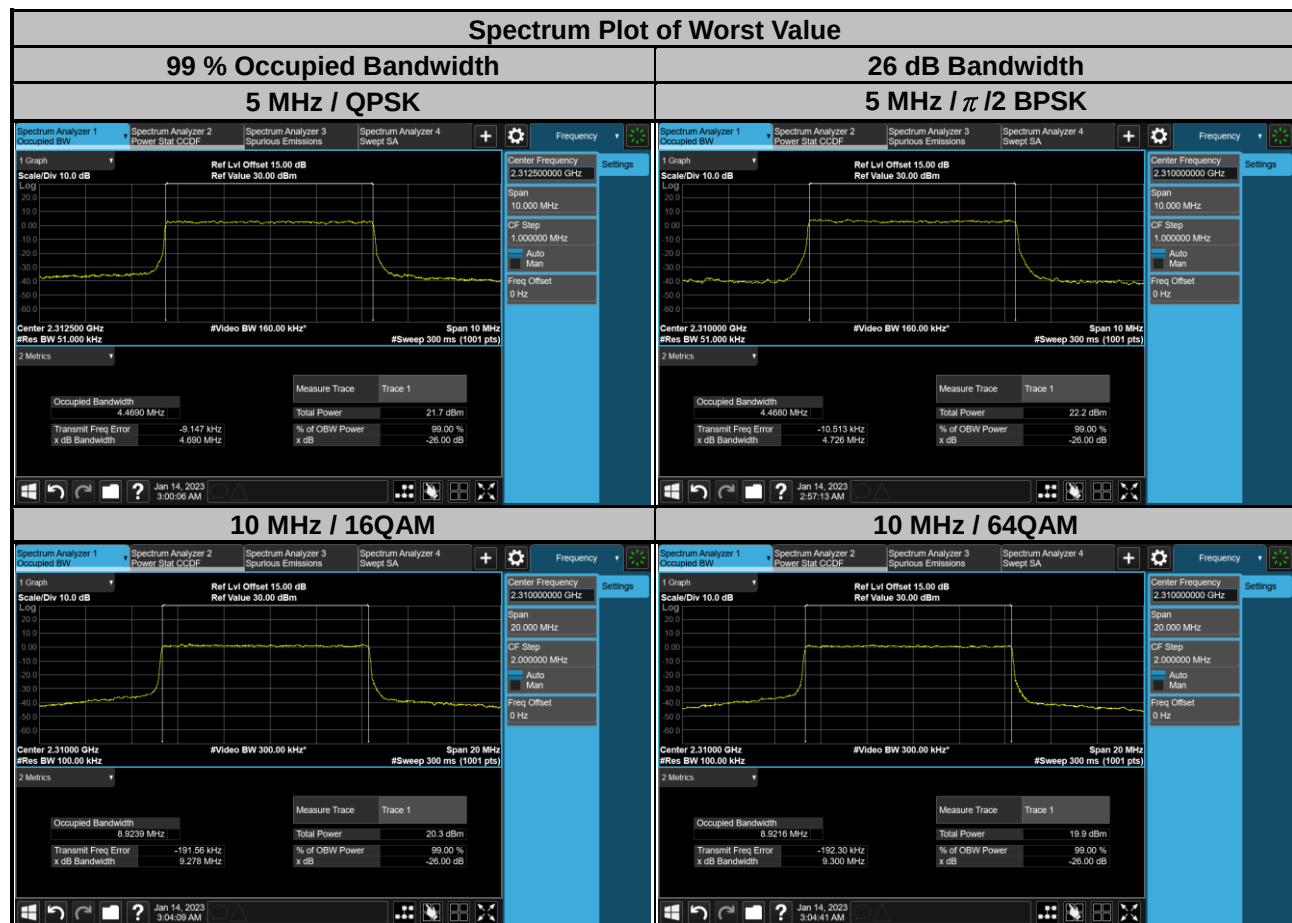


#### 4.4.4 Test Result

| LTE Band 30               |                 |                               |       |       |        |                       |       |       |        |
|---------------------------|-----------------|-------------------------------|-------|-------|--------|-----------------------|-------|-------|--------|
| Channel Bandwidth: 5 MHz  |                 |                               |       |       |        |                       |       |       |        |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |       |        | 26 dB Bandwidth (MHz) |       |       |        |
|                           |                 | QPSK                          | 16QAM | 64QAM | 256QAM | QPSK                  | 16QAM | 64QAM | 256QAM |
| 27685                     | 2307.5          | 4.48                          | 4.49  | 4.49  | 4.48   | 4.78                  | 4.78  | 4.78  | 4.78   |
| 27710                     | 2310.0          | 4.49                          | 4.49  | 4.49  | 4.48   | 4.80                  | 4.79  | 4.79  | 4.77   |
| 27735                     | 2312.5          | 4.49                          | 4.49  | 4.49  | 4.48   | 4.79                  | 4.78  | 4.80  | 4.77   |
| Channel Bandwidth: 10 MHz |                 |                               |       |       |        |                       |       |       |        |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |       |       |        | 26 dB Bandwidth (MHz) |       |       |        |
|                           |                 | QPSK                          | 16QAM | 64QAM | 256QAM | QPSK                  | 16QAM | 64QAM | 256QAM |
| 27710                     | 2310.0          | 8.97                          | 8.97  | 8.97  | 8.94   | 9.50                  | 9.50  | 9.50  | 9.48   |



| n30                       |                 |                               |      |       |       |        |                       |      |       |       |        |
|---------------------------|-----------------|-------------------------------|------|-------|-------|--------|-----------------------|------|-------|-------|--------|
| Channel Bandwidth: 5 MHz  |                 |                               |      |       |       |        |                       |      |       |       |        |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |      |       |       |        | 26 dB Bandwidth (MHz) |      |       |       |        |
|                           |                 | $\pi/2$ BPSK                  | QPSK | 16QAM | 64QAM | 256QAM | $\pi/2$ BPSK          | QPSK | 16QAM | 64QAM | 256QAM |
| 461500                    | 2307.5          | 4.46                          | 4.46 | 4.46  | 4.45  | 4.46   | 4.70                  | 4.68 | 4.71  | 4.68  | 4.71   |
| 462000                    | 2310.0          | 4.46                          | 4.47 | 4.45  | 4.45  | 4.47   | 4.72                  | 4.72 | 4.71  | 4.71  | 4.69   |
| 462500                    | 2312.5          | 4.46                          | 4.46 | 4.46  | 4.46  | 4.46   | 4.70                  | 4.69 | 4.71  | 4.71  | 4.71   |
| Channel Bandwidth: 10 MHz |                 |                               |      |       |       |        |                       |      |       |       |        |
| Channel                   | Frequency (MHz) | 99 % Occupied Bandwidth (MHz) |      |       |       |        | 26 dB Bandwidth (MHz) |      |       |       |        |
|                           |                 | $\pi/2$ BPSK                  | QPSK | 16QAM | 64QAM | 256QAM | $\pi/2$ BPSK          | QPSK | 16QAM | 64QAM | 256QAM |
| 462000                    | 2310.0          | 8.91                          | 8.91 | 8.92  | 8.92  | 8.92   | 9.28                  | 9.27 | 9.27  | 9.30  | 9.28   |





## 4.5 Band Edge Measurement

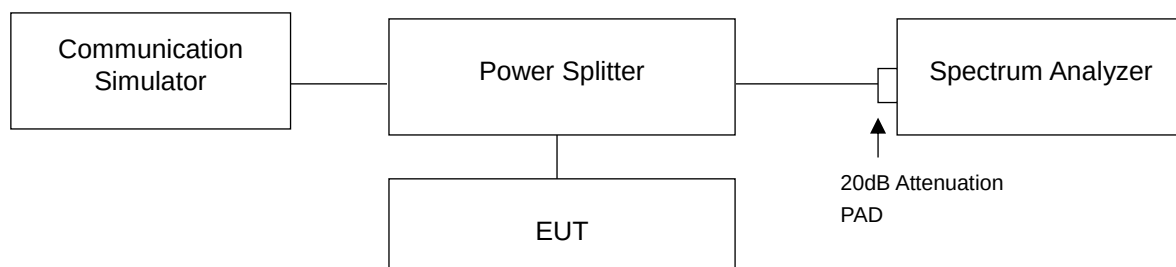
### 4.5.1 Limits of Band Edge Measurement

For LTE Band 30 and 5G NR n30:

According to FCC 27.53(a) (4), for mobile and portable stations operating in the 2305-2315MHz and 2350-2360 MHz bands:

- (i) By a factor of not less than:  $43 + 10 \log (P)$  dB on all frequencies between 2305 and 2320MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than  $55 + 10 \log (P)$  dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345MHz, not less than  $61 + 10 \log (P)$  dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than  $67 + 10 \log (P)$  dB on all frequencies between 2328 and 2337 MHz;
- (ii) By a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2300 and 2305MHz,  $55 + 10 \log (P)$  dB on all frequencies between 2296 and 2300 MHz,  $61 + 10 \log (P)$  dB on all frequencies between 2292 and 2296 MHz,  $67 + 10 \log (P)$  dB on all frequencies between 2288 and 2292 MHz, and  $70 + 10 \log (P)$  dB below 2288 MHz;
- (iii) By a factor of not less than  $43 + 10 \log (P)$  dB on all frequencies between 2360 and 2365MHz, and not less than  $70 + 10 \log (P)$  dB above 2365MHz.
- (iv) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the channel blocks at 2305, 2310, 2315, 2320, 2345, 2350, 2355, and 2360 MHz, a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed

### 4.5.2 Test Setup



### 4.5.3 Test Procedures

- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. Measuring frequency range is from 2200 MHz to 2395 MHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.
- d. Record the max trace plot into the test report.

#### 4.5.4 Test Results

##### Emission Mask



# LTE Band 30, Channel Bandwidth 10MHz



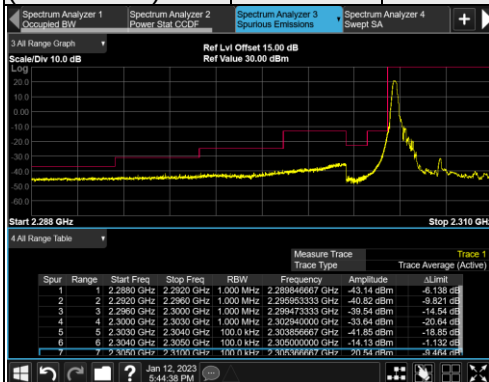
## Emission Mask

n30, Channel Bandwidth 5MHz

Channel 461500  
(2307.5MHz)

$\pi/2$  BPSK

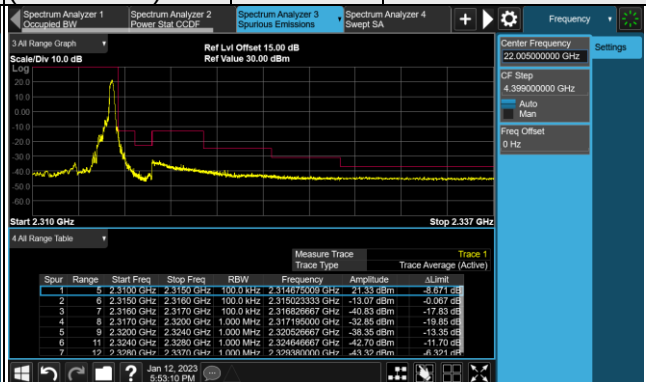
1 RB / 0 RB Offset



Channel 462500  
(2312.5MHz)

$\pi/2$  BPSK

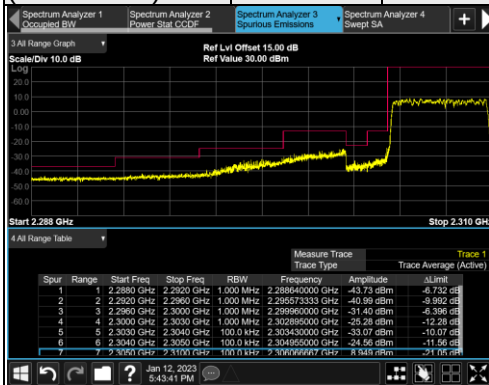
1 RB / 24 RB Offset



Channel 461500  
(2307.5MHz)

$\pi/2$  BPSK

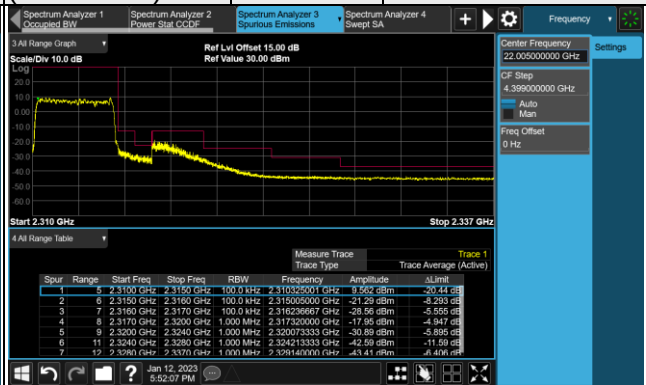
25 RB / 0 RB Offset



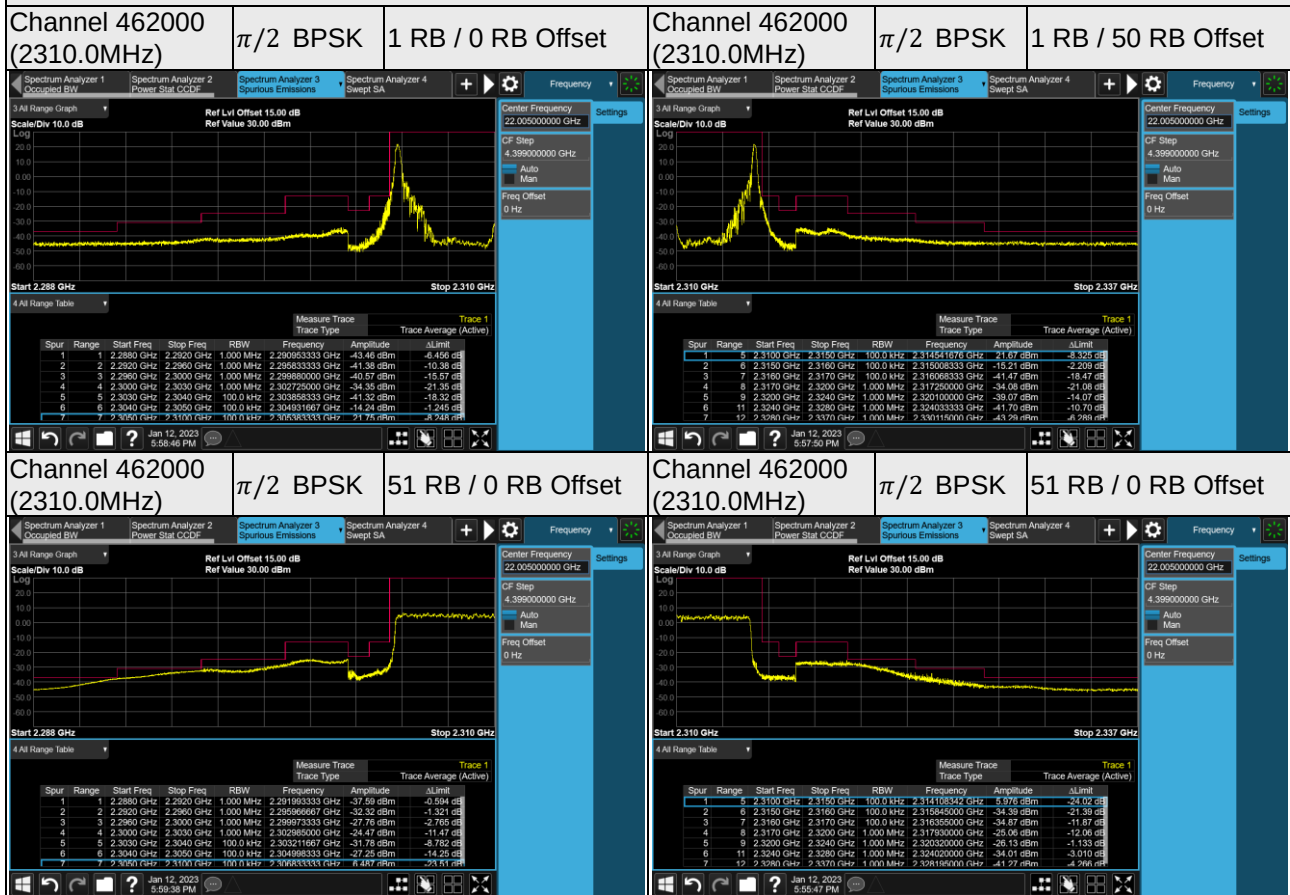
Channel 462500  
(2312.5MHz)

$\pi/2$  BPSK

25 RB / 0 RB Offset



n30, Channel Bandwidth 10MHz

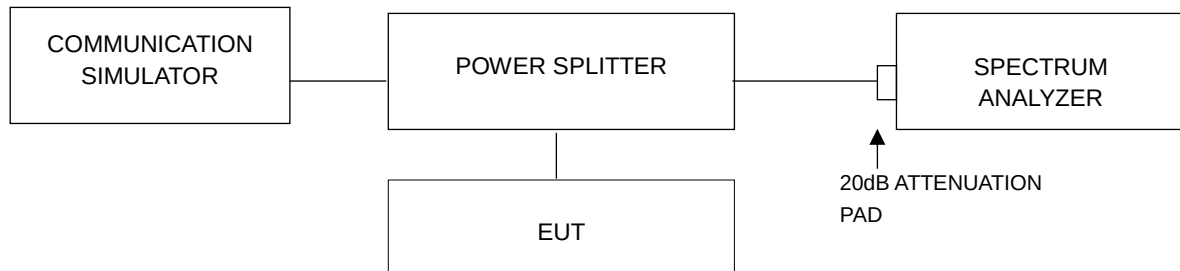


## 4.6 Conducted Spurious Emissions

### 4.6.1 Limits of Conducted Spurious Emissions Measurement

According to FCC 27.53(a)(4)(ii)(iii), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $70 + 10 \log (P)$  dB. The limit of emission is equal to -40 dBm.

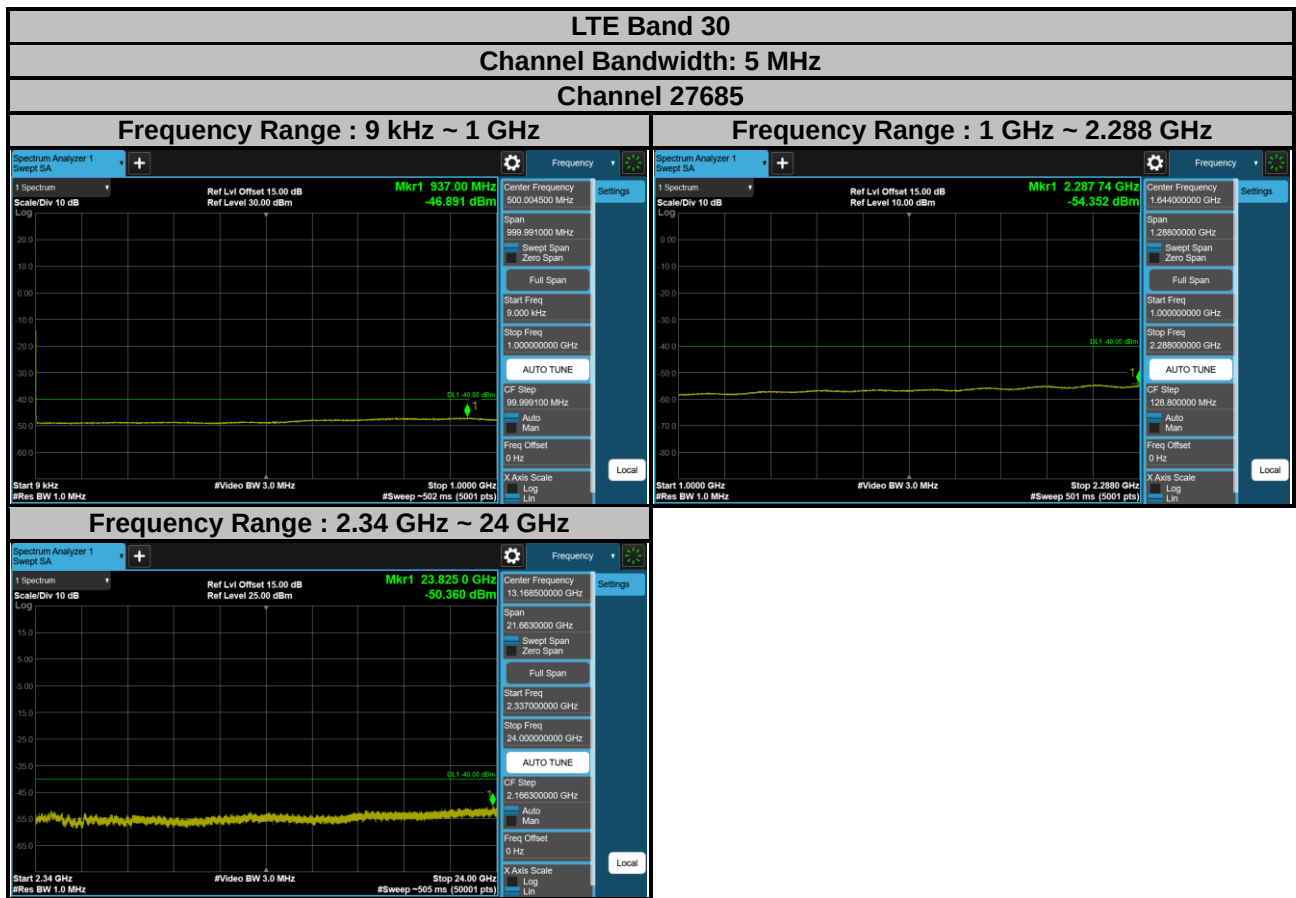
### 4.6.2 Test Setup



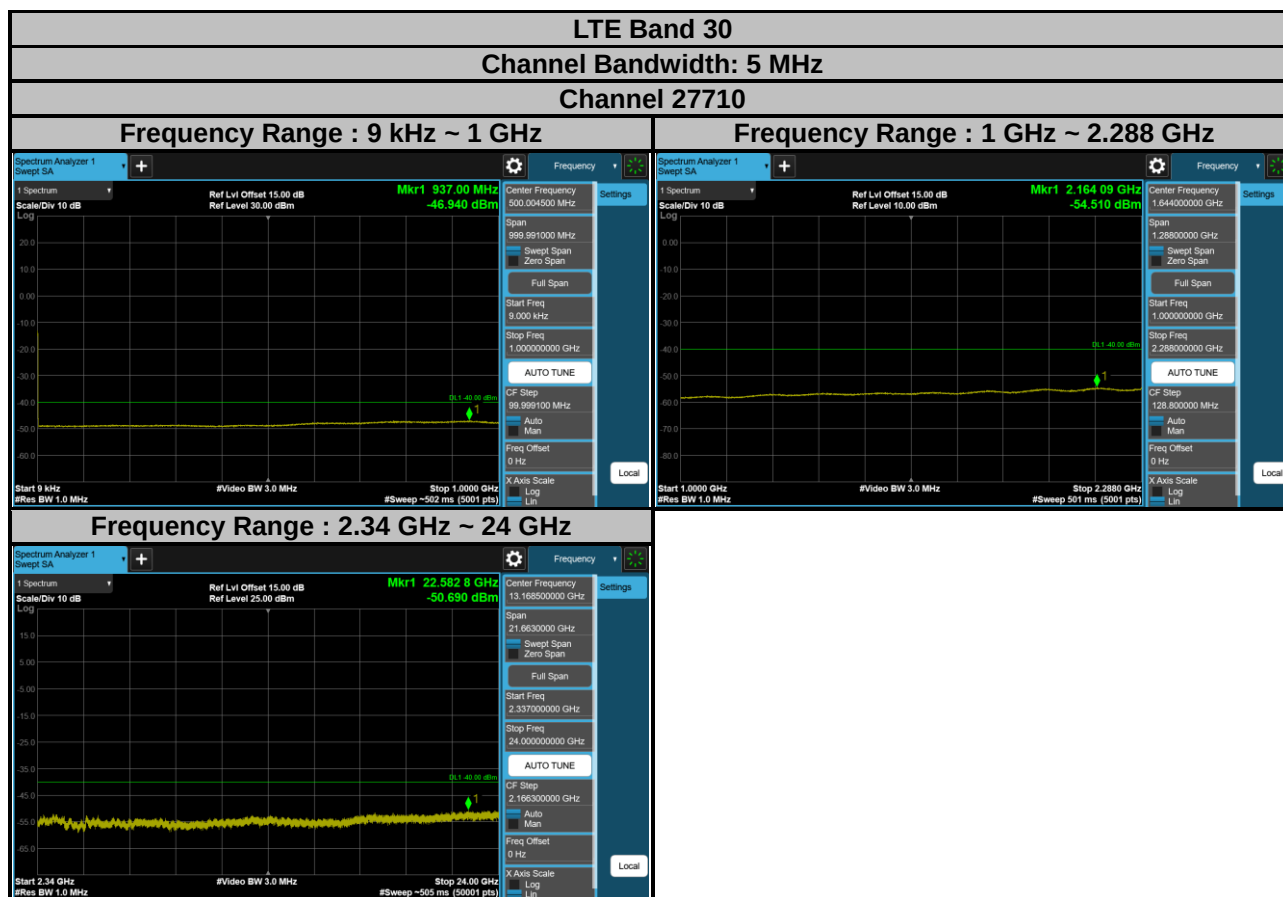
### 4.6.3 Test Procedure

- The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- Measuring frequency range is from 9 kHz to 1 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 300 kHz and VBW = 1 MHz are used for conducted emission measurement.
- Measuring frequency range is from 1 GHz to 24 GHz. 10 dB attenuation pad is connected with spectrum. RBW = 1 MHz and VBW = 3 MHz are used for conducted emission measurement.
- Spectrum RBW settings is referenced to ANSI 63.26 section 5.7.2.

#### 4.6.4 Test Results

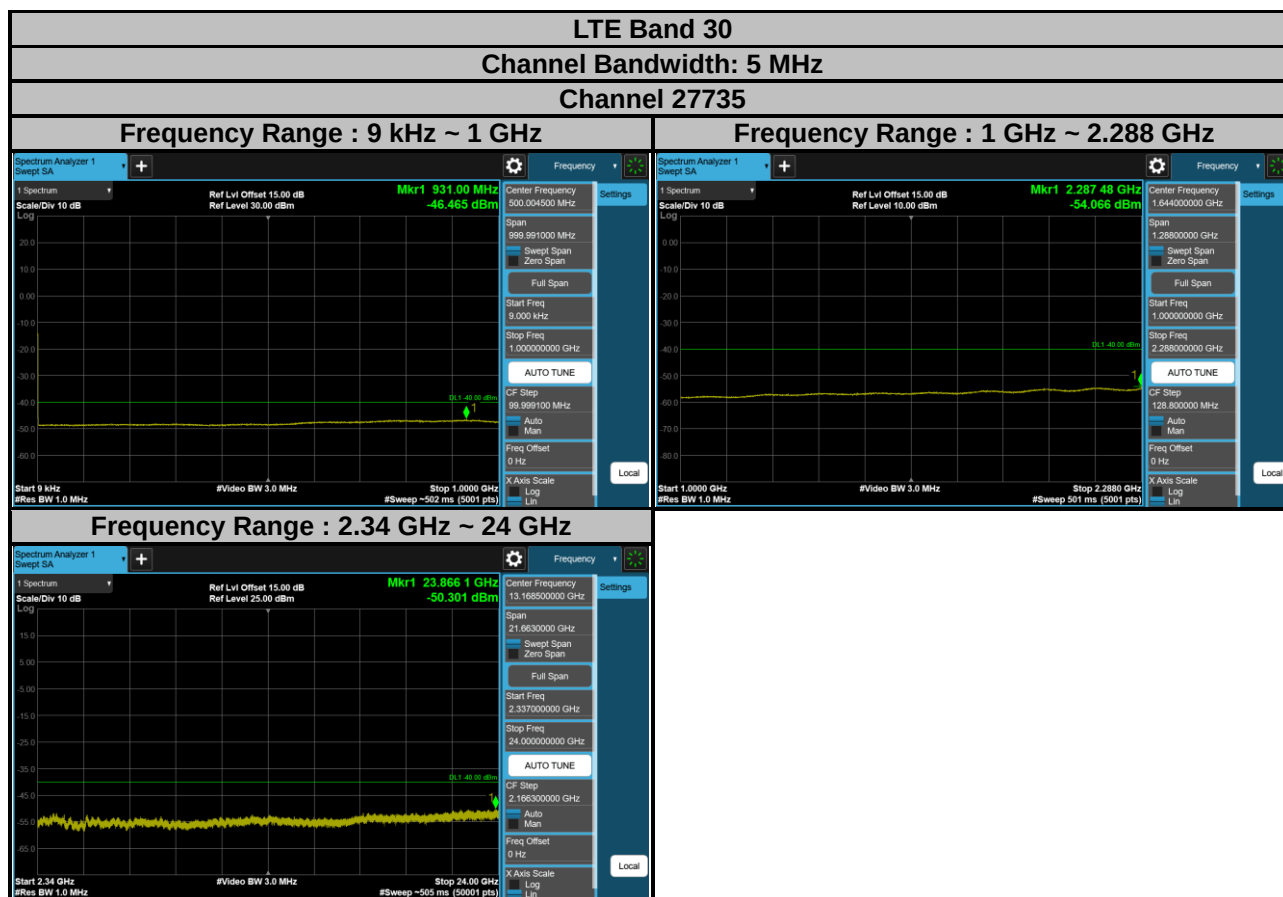


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

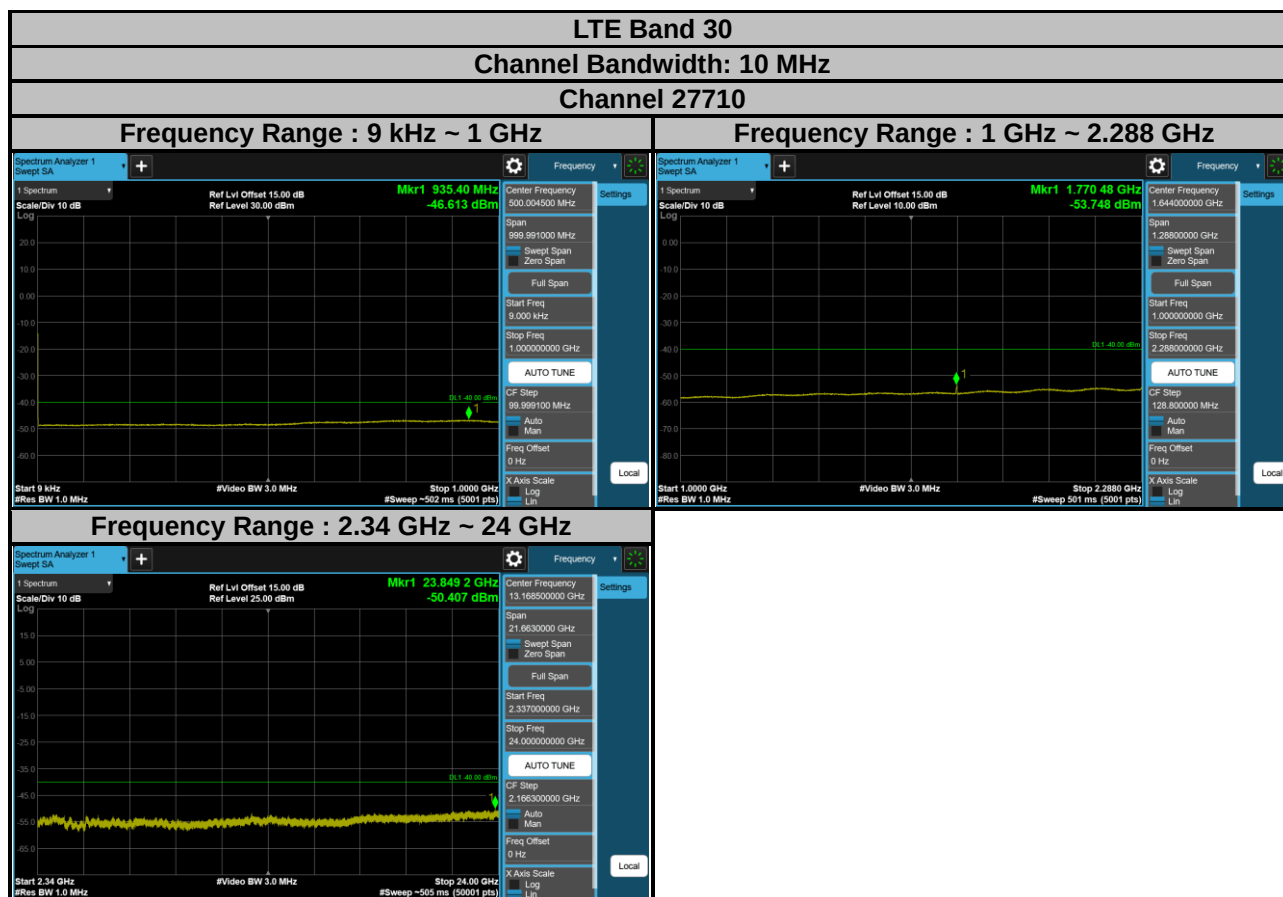


Note: The signal over the limit in 9 kHz is from spectrum analyzer.





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

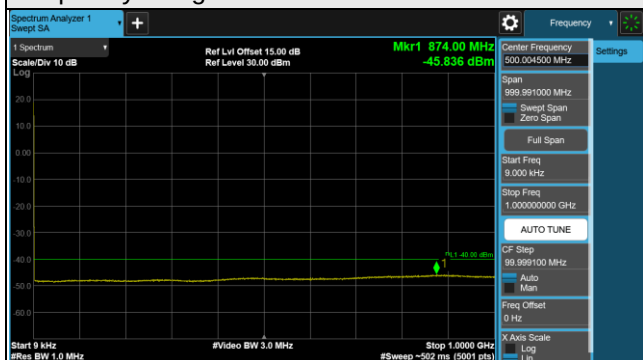


Note: The signal over the limit in 9 kHz is from spectrum analyzer.

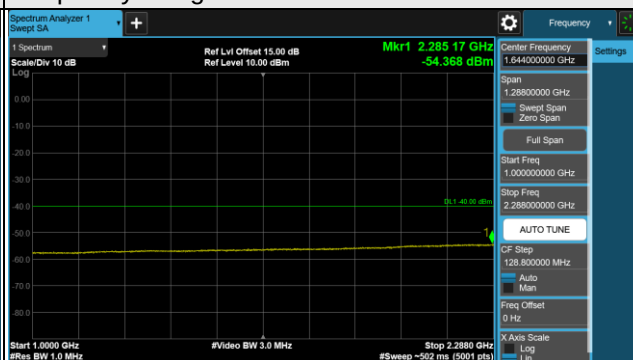
n30, Channel Bandwidth 5MHz

Channel 461500 (2307.5MHz)

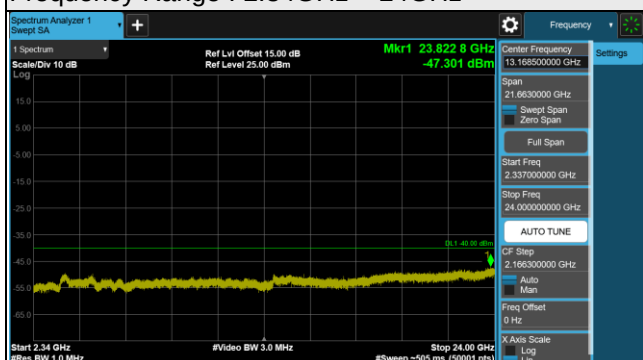
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 2.288GHz



Frequency Range : 2.34GHz ~ 24GHz

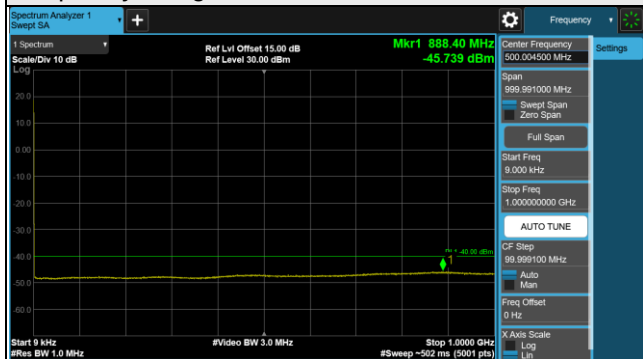


\*The 9kHz signal over the limit is from Spectrum.

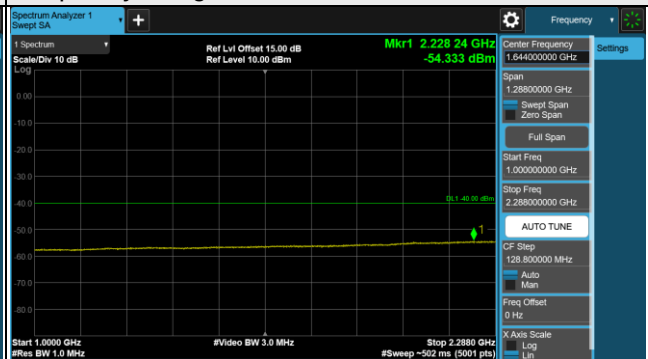
n30, Channel Bandwidth 5MHz

Channel 462000 (2310.0MHz)

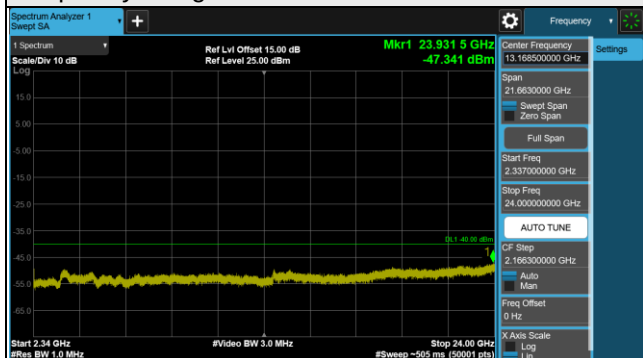
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 2.288GHz



Frequency Range : 2.34GHz ~ 24GHz

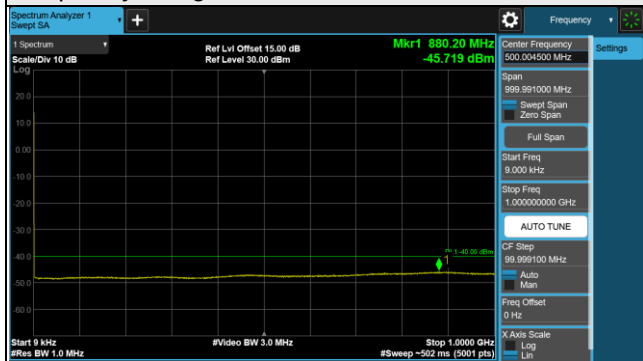


\*The 9kHz signal over the limit is from Spectrum.

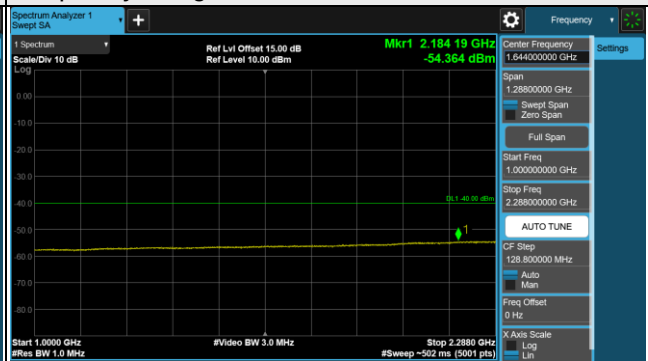
n30, Channel Bandwidth 5MHz

Channel 462500 (2312.5MHz)

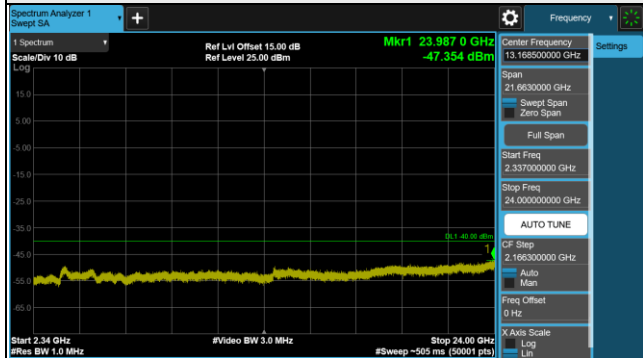
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 2.288GHz



Frequency Range : 2.34GHz ~ 24GHz

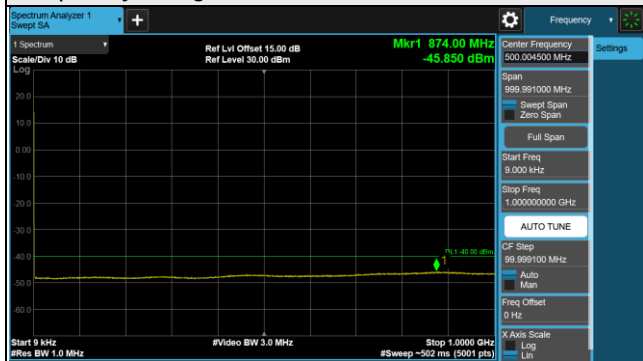


\*The 9kHz signal over the limit is from Spectrum.

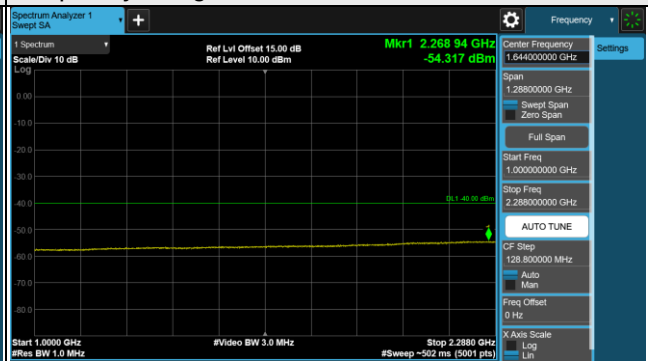
n30, Channel Bandwidth 10MHz

Channel 462000 (2310.0MHz)

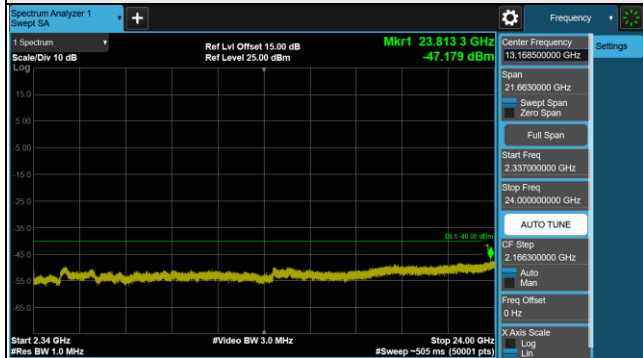
Frequency Range : 9kHz ~ 1GHz



Frequency Range : 1GHz ~ 2.288GHz



Frequency Range : 2.34GHz ~ 24GHz



\*The 9kHz signal over the limit is from Spectrum.

## 4.7 Radiated Emission Measurement

### 4.7.1 Limits of Radiated Emission Measurement

According to FCC 27.53(a)(4)(ii)(iii), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least  $70 + 10 \log(P)$  dB. The limit of emission is equal to -40 dBm.

### 4.7.2 Test Procedure

- a. In the semi-anechoic chamber, EUT placed on the 0.8m(below or equal 1GHz) and/or 1.5m(above 1GHz) height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- c. Perform a field strength measurement and record the worse read value, is the field strength value via a spectrum reading obtained corrected for antenna factor, cable loss and pre-amplifier factor and then mathematically convert the measured field strength level to EIRP/ERP level.
- d. Following C63.26 section 5.5 and 5.2.7  
 $EIRP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8$ ; where D is the measurement distance (in the far field region) in m.  
 $ERP \text{ (dBm)} = E \text{ (dB}\mu\text{V/m)} + 20\log(D) - 104.8 - 2.15$ ; where D is the measurement distance (in the far field region) in m.

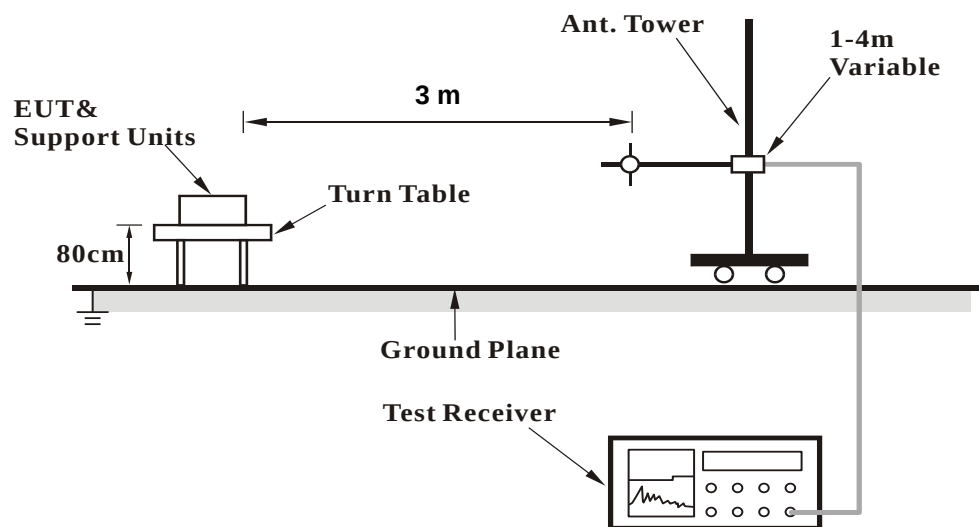
**Note:** The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

### 4.7.3 Deviation from Test Standard

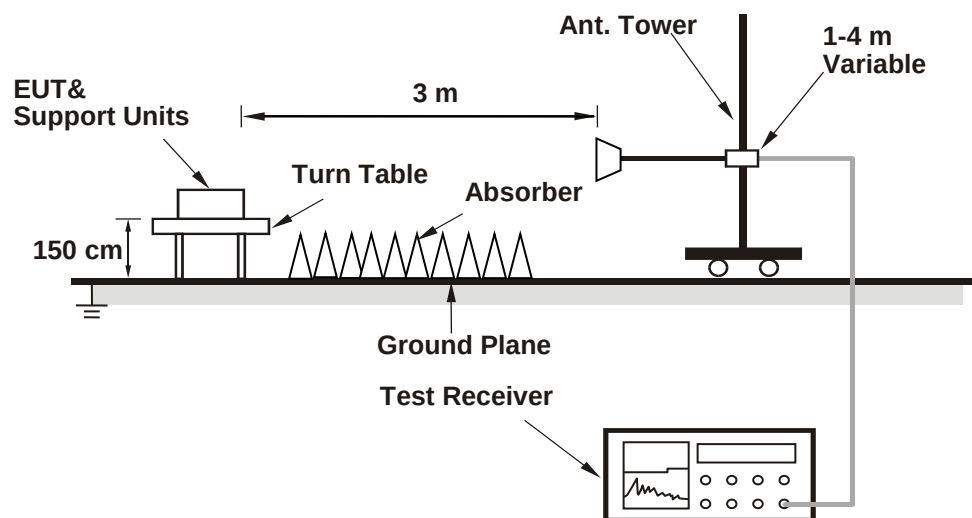
No deviation.

#### 4.7.4 Test Setup

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



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



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



#### 4.7.5 Test Results

Below 1GHz

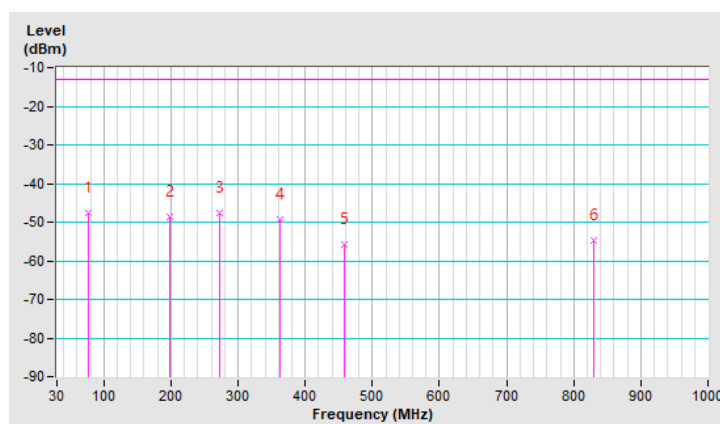
LTE Band 30

|                        |                       |                |                       |
|------------------------|-----------------------|----------------|-----------------------|
| <b>RF Mode</b>         | TX LTE Band XXX-10MHz | <b>Channel</b> | CH 27710 : 2310.0 MHz |
| <b>Frequency Range</b> | 30MHz ~ 1GHz          |                |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 77.53           | -47.57     | -13.00      | -34.57      | 1.79 H             | 149                  | 63.88            | -111.45                  |
| 2                                                    | 198.78          | -48.59     | -13.00      | -35.59      | 3.91 H             | 81                   | 62.29            | -110.88                  |
| 3                                                    | 273.47          | -47.64     | -13.00      | -34.64      | 1.80 H             | 151                  | 60.16            | -107.80                  |
| 4                                                    | 362.71          | -49.28     | -13.00      | -36.28      | 3.21 H             | 2                    | 56.39            | -105.67                  |
| 5                                                    | 458.74          | -55.70     | -13.00      | -42.70      | 2.71 H             | 249                  | 47.42            | -103.12                  |
| 6                                                    | 829.28          | -54.65     | -13.00      | -41.65      | 1.33 H             | 178                  | 42.13            | -96.78                   |

#### Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3. Margin value = EIRP – Limit value
4. The other EIRP levels were very low against the limit.

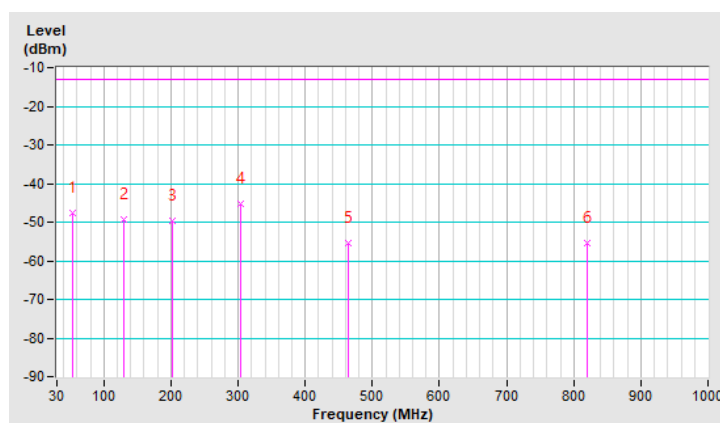


|                        |                       |                |                       |
|------------------------|-----------------------|----------------|-----------------------|
| <b>RF Mode</b>         | TX LTE Band XXX-10MHz | <b>Channel</b> | CH 27710 : 2310.0 MHz |
| <b>Frequency Range</b> | 30MHz ~ 1GHz          |                |                       |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |            |             |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 53.28           | -47.61     | -13.00      | -34.61      | 1.96 V             | 190                  | 60.04            | -107.65                  |
| 2                                                  | 129.91          | -49.24     | -13.00      | -36.24      | 3.73 V             | 11                   | 59.43            | -108.67                  |
| 3                                                  | 201.69          | -49.73     | -13.00      | -36.73      | 1.22 V             | 85                   | 61.18            | -110.91                  |
| 4                                                  | 304.51          | -45.33     | -13.00      | -32.33      | 2.03 V             | 174                  | 61.58            | -106.91                  |
| 5                                                  | 463.59          | -55.57     | -13.00      | -42.57      | 2.48 V             | 102                  | 47.45            | -103.02                  |
| 6                                                  | 819.58          | -55.26     | -13.00      | -42.26      | 3.06 V             | 238                  | 41.43            | -96.69                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.



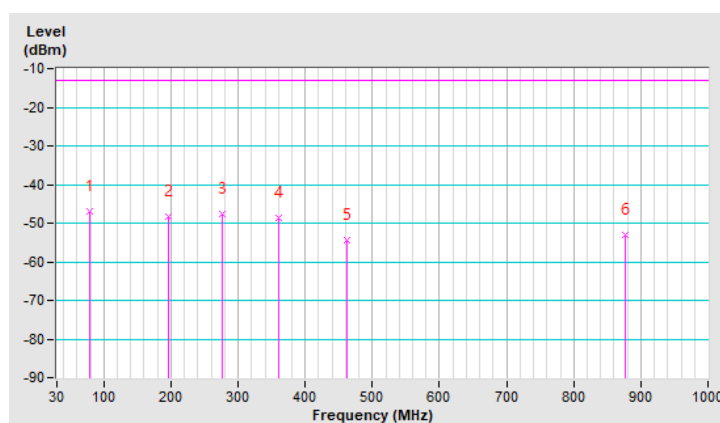
n30

|                        |                        |                |                      |
|------------------------|------------------------|----------------|----------------------|
| <b>RF Mode</b>         | TX 5GNR Band XXX-10MHz | <b>Channel</b> | CH 462500 :2312.5MHz |
| <b>Frequency Range</b> | 30MHz ~ 1GHz           |                |                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 78.50           | -46.95     | -13.00      | -33.95      | 1.51 H             | 103                  | 64.73            | -111.68                  |
| 2                                                    | 196.84          | -48.26     | -13.00      | -35.26      | 2.04 H             | 6                    | 62.55            | -110.81                  |
| 3                                                    | 276.38          | -47.73     | -13.00      | -34.73      | 1.97 H             | 148                  | 59.93            | -107.66                  |
| 4                                                    | 359.80          | -48.67     | -13.00      | -35.67      | 3.85 H             | 232                  | 57.09            | -105.76                  |
| 5                                                    | 461.65          | -54.44     | -13.00      | -41.44      | 2.16 H             | 270                  | 48.62            | -103.06                  |
| 6                                                    | 875.84          | -52.95     | -13.00      | -39.95      | 1.15 H             | 63                   | 43.65            | -96.60                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

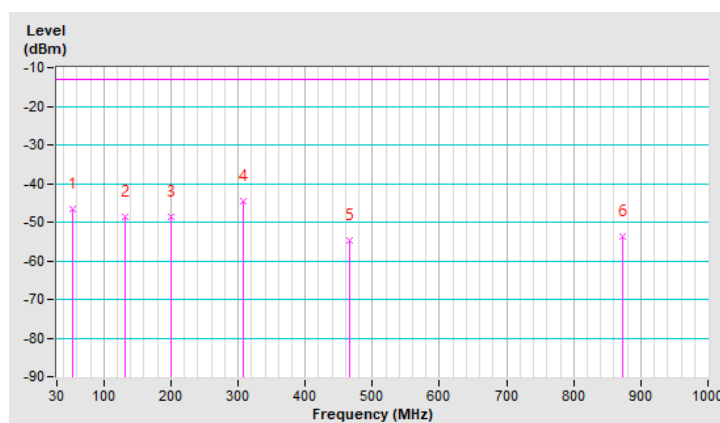


|                        |                        |                |                      |
|------------------------|------------------------|----------------|----------------------|
| <b>RF Mode</b>         | TX 5GNR Band XXX-10MHz | <b>Channel</b> | CH 462500 :2312.5MHz |
| <b>Frequency Range</b> | 30MHz ~ 1GHz           |                |                      |

| Antenna Polarity & Test Distance : Vertical at 3 m |                 |            |             |             |                    |                      |                  |                          |
|----------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                 | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                  | 53.28           | -46.58     | -13.00      | -33.58      | 2.55 V             | 15                   | 61.07            | -107.65                  |
| 2                                                  | 130.88          | -48.80     | -13.00      | -35.80      | 1.15 V             | 241                  | 59.86            | -108.66                  |
| 3                                                  | 199.75          | -48.49     | -13.00      | -35.49      | 1.77 V             | 67                   | 62.40            | -110.89                  |
| 4                                                  | 307.42          | -44.60     | -13.00      | -31.60      | 1.38 V             | 115                  | 62.25            | -106.85                  |
| 5                                                  | 465.53          | -54.68     | -13.00      | -41.68      | 3.21 V             | 96                   | 48.29            | -102.97                  |
| 6                                                  | 872.93          | -53.56     | -13.00      | -40.56      | 2.05 V             | 190                  | 43.08            | -96.64                   |

**Remarks:**

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.



Above 1GHz

LTE Band 30, Channel Bandwidth 5MHz

|                 |                      |         |                       |
|-----------------|----------------------|---------|-----------------------|
| RF Mode         | TX LTE Band XXX-5MHz | Channel | CH 27685 : 2307.5 MHz |
| Frequency Range | 1GHz ~ 25GHz         |         |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4615.00         | -50.77     | -40.00      | -10.77      | 2.35 H             | 169                  | 56.13            | -106.90                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4615.00         | -51.66     | -40.00      | -11.66      | 1.10 V             | 322                  | 55.24            | -106.90                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

|                 |                      |         |                       |
|-----------------|----------------------|---------|-----------------------|
| RF Mode         | TX LTE Band XXX-5MHz | Channel | CH 27710 : 2310.0 MHz |
| Frequency Range | 1GHz ~ 25GHz         |         |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -50.55     | -40.00      | -10.55      | 1.74 H             | 100                  | 56.32            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -51.46     | -40.00      | -11.46      | 3.24 V             | 111                  | 55.41            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

|                 |                      |         |                       |
|-----------------|----------------------|---------|-----------------------|
| RF Mode         | TX LTE Band XXX-5MHz | Channel | CH 27735 : 2312.5 MHz |
| Frequency Range | 1GHz ~ 25GHz         |         |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4625.00         | -50.55     | -40.00      | -10.55      | 2.22 H             | 105                  | 56.32            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4625.00         | -51.39     | -40.00      | -11.39      | 1.32 V             | 155                  | 55.48            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

LTE Band 30, Channel Bandwidth 10MHz

|                 |                       |         |                       |
|-----------------|-----------------------|---------|-----------------------|
| RF Mode         | TX LTE Band XXX-10MHz | Channel | CH 27710 : 2310.0 MHz |
| Frequency Range | 1GHz ~ 25GHz          |         |                       |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -50.19     | -40.00      | -10.19      | 3.38 H             | 170                  | 56.68            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -51.45     | -40.00      | -11.45      | 2.04 V             | 163                  | 55.42            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

n30

n30, Channel Bandwidth 5MHz

|                 |                       |         |                      |
|-----------------|-----------------------|---------|----------------------|
| RF Mode         | TX 5GNR Band XXX-5MHz | Channel | CH 461500 :2307.5MHz |
| Frequency Range | 1GHz ~ 25GHz          |         |                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4615.00         | -50.80     | -40.00      | -10.80      | 3.04 H             | 165                  | 56.10            | -106.90                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4615.00         | -51.16     | -40.00      | -11.16      | 1.52 V             | 142                  | 55.74            | -106.90                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

|                 |                       |         |                      |
|-----------------|-----------------------|---------|----------------------|
| RF Mode         | TX 5GNR Band XXX-5MHz | Channel | CH 462000 :2310.0MHz |
| Frequency Range | 1GHz ~ 25GHz          |         |                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -50.75     | -40.00      | -10.75      | 3.21 H             | 105                  | 56.12            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -51.24     | -40.00      | -11.24      | 2.32 V             | 154                  | 55.63            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

|                 |                       |         |                      |
|-----------------|-----------------------|---------|----------------------|
| RF Mode         | TX 5GNR Band XXX-5MHz | Channel | CH 462500 :2312.5MHz |
| Frequency Range | 1GHz ~ 25GHz          |         |                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4625.00         | -50.55     | -40.00      | -10.55      | 1.11 H             | 287                  | 56.32            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4625.00         | -51.45     | -40.00      | -11.45      | 1.04 V             | 151                  | 55.42            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.

n30, Channel Bandwidth 10MHz

|                 |                        |         |                      |
|-----------------|------------------------|---------|----------------------|
| RF Mode         | TX 5GNR Band XXX-10MHz | Channel | CH 462000 :2310.0MHz |
| Frequency Range | 1GHz ~ 25GHz           |         |                      |

| Antenna Polarity & Test Distance : Horizontal at 3 m |                 |            |             |             |                    |                      |                  |                          |
|------------------------------------------------------|-----------------|------------|-------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -50.63     | -40.00      | -10.63      | 2.08 H             | 156                  | 56.24            | -106.87                  |
| Antenna Polarity & Test Distance : Vertical at 3m    |                 |            |             |             |                    |                      |                  |                          |
| No                                                   | Frequency (MHz) | EIRP (dBm) | Limit (dBm) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1                                                    | 4620.00         | -51.09     | -40.00      | -11.09      | 1.26 V             | 232                  | 55.78            | -106.87                  |

Remarks:

1.  $EIRP(dBm) = Raw\ Value(dBuV) + Correction\ Factor(dB/m)$
2.  $Correction\ Factor(dB/m) = Antenna\ Factor(dB/m) + Cable\ Factor(dB) - Pre-Amplifier\ Factor(dB) + 20\log(D) - 104.8$
3.  $Margin\ value = EIRP - Limit\ value$
4. The other EIRP levels were very low against the limit.



## 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.

--- END ---