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# Report On

Application for Grant of Equipment Authorization of the  
Nextivity Inc.

QUATRA 4000 Cellphone Signal Booster

FCC CFR 47 Part 2 and 27

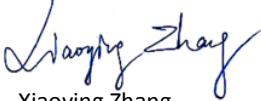
RSS-Gen, RSS-139, RSS-130 and RSS-195

**Report No. 72146075B**

**December 2019**

FCC ID: NU: YETQ44-1234CNU  
CU: YETQ41-5ECU  
IC: NU: 9298A-Q441234CNU  
CU: 9298A-Q415ECU  
Report No. 72146075B



|                           |                                                                                                                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REPORT ON</b>          | Radio Testing of the<br>Nextivity Inc.<br>QUATRA 4000 Cellphone Signal Booster                                                                                                                            |
| <b>TEST REPORT NUMBER</b> | 72146075B                                                                                                                                                                                                 |
| <b>PREPARED FOR</b>       | Nextivity Inc.<br>16550 West Bernardo Drive, Bldg 5, Suite 550,<br>San Diego, CA 92127, USA                                                                                                               |
| <b>CONTACT PERSON</b>     | CK Li<br>Sr. Principal Engineer, Regulatory<br>CLi@NextivityInc.com<br>(858) 485-9442                                                                                                                     |
| <b>PREPARED BY</b>        | <br>Xiaoying Zhang<br><b>Name</b><br>Authorized Signatory<br>Title: EMC/Wireless Test Engineer                           |
| <b>APPROVED BY</b>        | <br>Ferdinand S. Custodio<br><b>Name</b><br>Authorized Signatory<br>Title: Senior EMC Test Engineer/Wireless Team Lead |
| <b>DATED</b>              | December 09, 2019                                                                                                                                                                                         |

FCC ID: NU: YETQ44-1234CNU  
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## Revision History

| 72146075B<br>Nextivity Inc.<br>QUATRA 4000 Cellphone Signal Booster |              |                 |        |                   |                       |
|---------------------------------------------------------------------|--------------|-----------------|--------|-------------------|-----------------------|
| DATE                                                                | OLD REVISION | NEW REVISION    | REASON | PAGES<br>AFFECTED | APPROVED BY           |
| 12/09/19                                                            | -            | Initial Release |        |                   | Ferdinand S. Custodio |
|                                                                     |              |                 |        |                   |                       |
|                                                                     |              |                 |        |                   |                       |
|                                                                     |              |                 |        |                   |                       |
|                                                                     |              |                 |        |                   |                       |

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## **SECTION 1**

### **REPORT SUMMARY**

Radio Testing of the  
Nextivity Inc.  
QUATRA 4000 Cellphone Signal Booster



## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Nextivity Inc. QUATRA 4000 Cellphone Signal Booster to the requirements of the following:

- FCC CFR 47 Part 2 and 27
- RSS-Gen, RSS-139, RSS-130 and RSS-195

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective                     | To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Manufacturer                  | Nextivity Inc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Trade Name                    | Cel-Fi™                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Model Name                    | QUATRA 4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Model Number(s)               | NU: Q44-1234CNU<br>CU: Q41-5ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| FCC ID                        | NU: YETQ44-1234CNU<br>CU: YETQ41-5ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| IC Number                     | NU: 9298A-Q441234CNU<br>CU: 9298A-Q415ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Serial Number(s)              | 370920000139 (NU) and 371929000156 (CU)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Number of Samples Tested      | 2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Test Specification/Issue/Date | <ul style="list-style-type: none"> <li>• FCC CFR 47 Part 2 and 27 (October 1, 2018).</li> <li>• RSS-139 - Advanced Wireless Services (AWS) Equipment Operating in the bands 1710-1780 MHz and 2110-2180 MHz (Issue 3, July 2015).</li> <li>• SRSP-513 - Technical Requirements for Advanced Wireless Services (AWS) in the Bands 1710-1780 MHz and 2110-2180 MHz (Issue 3, July 2015).</li> <li>• RSS-130 - Equipment Operating in the Frequency Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz (Issue 2, February 2019).</li> <li>• SRSP-518 - Technical Requirements in the Bands 617-652 MHz, 663-698 MHz, 698-756 MHz and 777-787 MHz (Issue 2, February 2019).</li> <li>• RSS-195 - Wireless Communication Service (WCS) Equipment Operating in the Bands 2305-2320 MHz and 2345-2360 MHz (Issue 2, April 2014).</li> <li>• SRSP-516 - Technical Requirements for Wireless Communication Service (WCS) Operating in the Bands 2305-2320 MHz and 2345-2360 MHz (Issue 1, April 2014).</li> <li>• RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 5, November 2019 Amendment 1).</li> <li>• ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services</li> </ul> |

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|                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Start of Test       | August 02, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Finish of Test      | September 07, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Name of Engineer(s) | Xiaoying Zhang                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Related Document(s) | <ul style="list-style-type: none"><li>• KDB971168 D01 Power Meas License Digital Systems v03r01 (Measurement Guidance For Certification of Licensed Digital Transmitters)</li><li>• KDB412172 D01 Determining ERP and EIRP v01r01 (Guidelines for Determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of a RF Transmitting System)</li><li>• Supporting documents for EUT certification are separate exhibits.</li></ul> |

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 27 and 20.21(c) with cross-reference to the corresponding ISSED RSS standards is shown below.

| Section | Spec Clause |                                                                                  |             |         |         | Test Description                     | Result    |
|---------|-------------|----------------------------------------------------------------------------------|-------------|---------|---------|--------------------------------------|-----------|
|         | FCC Part 2  | FCC Part 27                                                                      | RSS-139     | RSS-130 | RSS-195 |                                      |           |
| 2.1     | 2.1046      | -                                                                                | -           | -       | -       | Transmitter Conducted Output Power   | Compliant |
| 2.2     | -           | 27.50 (h)(1)<br>27.50 (a)(1)                                                     | 6.5         | -       | 5.5     | Equivalent Isotropic Radiated Power  | Compliant |
| 2.3     | -           | 27.50 (c)(3)<br>27.50 (b)(4)                                                     | -           | 4.6.3   | -       | Equivalent Radiated Power            | Compliant |
| 2.4     | 2.1049      | -                                                                                | RSS-Gen 6.7 |         |         | Occupied Bandwidth                   | Compliant |
| 2.5     | -           | 27.50 (d)(5)                                                                     | 6.5         | 4.6.1   | 5.5.1   | Peak-Average Ratio                   | Compliant |
| 2.6     | 2.1051      | 27.53 (h)(1),(3)<br>27.53 (g)<br>27.53 (c)(1),(2),(5)                            | 6.6         | 4.7     | 5.6.1   | Band Edge                            | Compliant |
| 2.7     | 2.1051      | 27.53 (h)(1),(3)<br>27.53 (g)<br>27.53<br>(c)(1),(2),(3),<br>(4),(5) (6) and (f) | 6.6         | 4.7     | 5.6.1   | Conducted Spurious Emissions         | Compliant |
| 2.8     | 2.1053      | 27.53 (h)(1)<br>27.53 (g)<br>27.53 (c)(1),(2),<br>(5)                            | 6.6         | 4.7     | 5.6.1   | Field Strength of Spurious Radiation | Compliant |
| 2.9     | 2.1055      | 27.54                                                                            | 6.4         | 4.5     | 5.4     | Frequency Stability                  | Compliant |
| -       | -           | -                                                                                | RSS-Gen 7.1 |         |         | Receiver Spurious Emissions          | N/A       |
| 2.10    | 15.207 (a)  | -                                                                                | RSS-Gen 8.8 |         |         | Power Line Conducted Emission        | Compliant |

N/A: Not required as per RSS-GEN 5.3. EUT is not a Stand-Alone receiver.

### 1.3 PRODUCT INFORMATION

#### 1.3.1 Technical Description

The Equipment Under Test (EUT) is a Nextivity Inc. QUATRA 4000 Cellphone Signal Booster. The EUT is a WCDMA/LTE Signal Booster to improve voice and data cellular performance in large enterprise environments. Quatra 4000 is capable to support up to four carriers (via separate donor antenna ports). Quatra 4000 consists of two separate units: the Network Unit (NU), and the Coverage Unit (CU). The NU comprises a transmitter and receiver which communicate with the cell tower and the CU. CU comprises a transmitter and receiver which communicate with the User Equipment (e.g. Cell Phone) and the NU.

Users place the NU in an area with the strongest signal from the carrier networks. The CUs are then either placed in the center of the home or office, or in the area where the best signal quality is most needed. The NU and CU are placed at varying distance apart and are communicated via Ethernet cables.

One NU can connect up to six CUs via Ethernet Cat 5 cables. The NU transmits and receives Cellular signals from the base station and operates similar to a cellular handset. The CU transmits and receives signals with the cellular handset and operates on frequencies similar to the cellular base station.

One NU can connect up to six CUs via Ethernet Cat 5 cables. The NU transmits and receives Cellular signals from the base station and operates similar to a cellular handset. The CU transmits and receives signals with the cellular handset and operates on frequencies similar to the cellular base station.

NU has four antenna ports. Each antenna port is assigned to support one operator, separated donor antennas. Up to two bands can be transmitted simultaneously at each antenna port from yellow group to another colored group (eg. Carrier B: LTE Band 71 + Band 4, Band 71 + Band 25, Band 12 + Band 4, Band 12 + Band 25).

| Up to two bands on each antenna port |        |      |    |     |    |        |     |    |     |        |     |    |        |     |
|--------------------------------------|--------|------|----|-----|----|--------|-----|----|-----|--------|-----|----|--------|-----|
| Ant Port                             | 1      |      |    |     |    | 2      |     |    |     | 3      |     |    | 4      |     |
| Operator #                           | A      |      |    |     |    | B      |     |    |     | C      |     |    | D      |     |
| Max Support BW                       | 30 MHz |      |    |     |    | 40 MHz |     |    |     | 30 MHz |     |    | 40 MHz |     |
| Band                                 | LB12   | LB30 | W5 | L25 | L4 | L71    | L12 | L4 | L25 | L13    | L25 | L4 | L5     | L25 |
| Band Combination                     | √      |      | √  |     |    | √      |     | √  |     | √      | √   |    | √      | √   |
|                                      | √      |      |    | √   |    | √      |     |    | √   | √      |     | √  | -      | -   |
|                                      | √      |      |    |     | √  |        | √   | √  |     | -      | -   | -  | -      | -   |
|                                      |        | √    | √  |     |    |        | √   |    | √   | -      | -   | -  | -      | -   |
|                                      |        | √    |    | √   |    |        |     | √  | √   | -      | -   | -  | -      | -   |
|                                      |        | √    |    |     | √  | -      | -   | -  | -   | -      | -   | -  | -      | -   |

The LTE Band 4, Band 12, Band 13, Band 30 and Band 71 function of the EUT was verified in this test report.

### 1.3.2 EUT General Description

| EUT Description                         | Cellphone Signal Booster                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|-----------------|------------------|-----------------|--|---------|---------|---------|---------|---|---------|----|---------|------------------|----|--------------|----|-----|--|----|-----|--|
| Trade Name                              | Cel-Fi™                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Model Name                              | QUATRA 4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Model Number(s)                         | NU: Q44-1234CNU<br>CU: Q41-5ECU                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Rated Voltage                           | NU: 120 VAC 60Hz<br>CU: 54V DC (powered from NU via Ethernet cables)                                                                                                                                                                                                                                                                                                                                                                                                        |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Mode Verified                           | LTE Band 4, 12, 13, 30 and 71<br><b><i>(Note: LTE Band 30 and 71 Test Data are for reference only. These two bands are disabled by software on the final product)</i></b>                                                                                                                                                                                                                                                                                                   |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Frequency Bands                         | LTE Band 4: Uplink: 1710 - 1755 MHz<br>Downlink: 2110 - 2155 MHz<br>LTE Band 12: Uplink: 699 - 716 MHz<br>Downlink: 729 - 746 MHz<br>LTE Band 13: Uplink: 777 - 782 MHz<br>Downlink: 746 - 756 MHz<br>LTE Band 30: Uplink: 2305 - 2315 MHz<br>Downlink: 2350 - 2360 MHz<br>LTE Band 71: Uplink: 663 - 698 MHz<br>Downlink: 617 - 652 MHz                                                                                                                                    |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Product Specifications                  | <table><tr><th rowspan="2">Signal Bandwidth (MHz)</th><th colspan="2">Band 4, 71</th><th colspan="2">Band 12, 13, 30</th></tr><tr><th>DL (dB)</th><th>UL (dB)</th><th>DL (dB)</th><th>UL (dB)</th></tr><tr><td>5</td><td rowspan="4">Max. 16</td><td rowspan="4">22</td><td rowspan="2">Max. 16</td><td>22 (Band 12, 13)</td></tr><tr><td>10</td><td>19 (Band 30)</td></tr><tr><td>15</td><td colspan="2">N/A</td></tr><tr><td>20</td><td colspan="2">N/A</td></tr></table> | Signal Bandwidth (MHz) | Band 4, 71      |                  | Band 12, 13, 30 |  | DL (dB) | UL (dB) | DL (dB) | UL (dB) | 5 | Max. 16 | 22 | Max. 16 | 22 (Band 12, 13) | 10 | 19 (Band 30) | 15 | N/A |  | 20 | N/A |  |
| Signal Bandwidth (MHz)                  | Band 4, 71                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                        | Band 12, 13, 30 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
|                                         | DL (dB)                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | UL (dB)                | DL (dB)         | UL (dB)          |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| 5                                       | Max. 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | 22                     | Max. 16         | 22 (Band 12, 13) |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| 10                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        |                 | 19 (Band 30)     |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| 15                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        | N/A             |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| 20                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                        | N/A             |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Capability                              | WCDMA (Band 5), LTE (Band 4, 5, 12, 13 and 25)                                                                                                                                                                                                                                                                                                                                                                                                                              |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Primary Unit (EUT)                      | <input type="checkbox"/> Production<br><input checked="" type="checkbox"/> Pre-Production<br><input type="checkbox"/> Engineering                                                                                                                                                                                                                                                                                                                                           |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |
| Manufacturer Declared Temperature Range | 0°C to 40°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                        |                 |                  |                 |  |         |         |         |         |   |         |    |         |                  |    |              |    |     |  |    |     |  |

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Antenna Type

External Antenna

Manufacturer

Refer to the Antenna information supplied by the manufacture

Antenna Model

Refer to the Antenna information supplied by the manufacture

Maximum Antenna System  
(Antenna + Cable) Gain

| Radio       | Uplink (Donor) | Downlink (Server) |
|-------------|----------------|-------------------|
| LTE Band 4  | 5.72 dBi       | 2.6 dBi           |
| LTE Band 12 | 6.77 dBi       | 0.4 dBi           |
| LTE Band 13 | 6.48 dBi       | 0.4 dBi           |
| LTE Band 30 | 3.91 dBi       | 2.3 dBi           |
| LTE Band 71 | 6.91 dBi       | 0.4 dBi           |

### 1.3.3 Transmit Frequency Table

| Mode                 | Channel Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | EIRP                 |                    | ERP                  |                    |
|----------------------|-------------------------|--------------------|---------------------|----------------------|--------------------|----------------------|--------------------|
|                      |                         |                    |                     | Max. Power Avg (dBm) | Max. Power Avg (W) | Max. Power Avg (dBm) | Max. Power Avg (W) |
| LTE Band 4 Downlink  | 5                       | 2110 - 2155        | 4M50F9W             | 13.25                | 0.02               | -                    | -                  |
|                      | 10                      | 2110 - 2155        | 8M99F9W             | 15.82                | 0.04               | -                    | -                  |
|                      | 15                      | 2110 - 2155        | 13M5F9W             | 16.96                | 0.05               | -                    | -                  |
|                      | 20                      | 2110 - 2155        | 17M9F9W             | 18.95                | 0.08               | -                    | -                  |
| LTE Band 4 Uplink    | 5                       | 1710 - 1755        | 4M44F9W             | 28.94                | 0.78               | -                    | -                  |
|                      | 10                      | 1710 - 1755        | 8M91F9W             | 28.91                | 0.78               | -                    | -                  |
|                      | 15                      | 1710 - 1755        | 13M7F9W             | 29.13                | 0.82               | -                    | -                  |
|                      | 20                      | 1710 - 1755        | 17M8F9W             | 28.98                | 0.79               | -                    | -                  |
| LTE Band 12 Downlink | 5                       | 699 - 716          | 4M47F9W             | -                    | -                  | 9.10                 | 0.01               |
|                      | 10                      | 699 - 716          | 8M88F9W             | -                    | -                  | 12.52                | 0.02               |
| LTE Band 12 Uplink   | 5                       | 729 - 746          | 4M44F9W             | -                    | -                  | 28.19                | 0.66               |
|                      | 10                      | 729 - 746          | 8M87F9W             | -                    | -                  | 28.41                | 0.69               |
| LTE Band 13 Downlink | 5                       | 777 - 787          | 4M58F9W             | -                    | -                  | 8.90                 | 0.01               |
|                      | 10                      | 777 - 787          | 8M98F9W             | -                    | -                  | 11.63                | 0.01               |
| LTE Band 13 Uplink   | 5                       | 746 - 756          | 4M64F9W             | -                    | -                  | 27.68                | 0.59               |
|                      | 10                      | 746 - 756          | 8M52F9W             | -                    | -                  | 27.71                | 0.59               |
| LTE Band 30 Downlink | 5                       | 2350 - 2360        | 4M43F9W             | 13.52                | 0.02               | -                    | -                  |
|                      | 10                      | 2350 - 2360        | 8M83F9W             | 16.18                | 0.04               | -                    | -                  |
| LTE Band 30 Uplink   | 5                       | 2305 - 2315        | 4M45F9W             | 26.43                | 0.44               | -                    | -                  |
|                      | 10                      | 2305 - 2315        | 8M87F9W             | 26.02                | 0.40               | -                    | -                  |
| LTE Band 71 Downlink | 5                       | 617 - 652          | 4M45F9W             | -                    | -                  | 8.82                 | 0.01               |
|                      | 10                      | 617 - 652          | 8M91F9W             | -                    | -                  | 11.98                | 0.02               |
|                      | 15                      | 617 - 652          | 13M3F9W             | -                    | -                  | 13.72                | 0.02               |
|                      | 20                      | 617 - 652          | 17M8F9W             | -                    | -                  | 14.89                | 0.03               |
| LTE Band 71 Uplink   | 5                       | 663 - 698          | 4M44F9W             | -                    | -                  | 27.70                | 0.59               |
|                      | 10                      | 663 - 698          | 8M88F9W             | -                    | -                  | 27.80                | 0.60               |
|                      | 15                      | 663 - 698          | 13M3F9W             | -                    | -                  | 27.73                | 0.59               |
|                      | 20                      | 663 - 698          | 17M8F9W             | -                    | -                  | 27.65                | 0.58               |

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

| Test Configuration | Description                                                                                                                                                                  |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A                  | Downlink. Input signal is applied to the antenna port of Donor (NU). Output is monitored from the antenna port of Server (CU).                                               |
| B                  | Uplink. Input signal is applied to the antenna port of Server (CU). Output is monitored from the antenna port of Donor (NU).                                                 |
| C                  | Radiated test setup. Downlink. Input signal is applied to the antenna port of Donor (NU). The antenna port of Server (CU) is terminated with a 50Ω load or Signal Generator. |
| D                  | Radiated test setup. Uplink. Input signal is applied to the antenna port of Server (CU). The antenna port of Donor (NU) is terminated with a 50Ω load or Signal Generator.   |

### 1.4.2 EUT Exercise Software

Manufacturer provided Nextivity Chart Interface v2.0.0.16 running from a support laptop where both NU and CU are connected via USB.

### 1.4.3 Support Equipment and I/O cables

| Manufacturer                | Equipment/Cable                      | Description                                           |
|-----------------------------|--------------------------------------|-------------------------------------------------------|
| Dell                        | Support Laptop                       | M/N: Latitude D630 PP18L, S/N 5SBJBG1                 |
| Dell                        | Support Laptop AC Adapter            | M/N: PA-1900-02D S/N 5SBJBG1                          |
| Nextivity                   | Support USB cable x 2                | Custom 1.0 meter shielded USB Type A to Type A cable  |
| Nextivity                   | Support USB cable x 2                | Custom 1.0 meter shielded USB Type A to Micro B cable |
| Nextivity                   | USB / Interface Box x 2              | Unshielded with "Tag-Connect" interface               |
| Agilent                     | ESG Vector Signal Generator          | M/N: E4438C, S/N MY49071335                           |
| Agilent                     | ESG Vector Signal Generator          | M/N: E4438C, S/N: MY47271206                          |
| Agilent                     | ESG Vector Signal Generator          | M/N: E4438C, S/N: MY45093445                          |
| Agilent                     | ESG Vector Signal Generator          | M/N: E4438C, S/N: MY47271033                          |
| Agilent                     | ESG Vector Signal Generator          | M/N: E4438C, S/N: MY42080338                          |
| Rhode & Schwarz             | Wideband Radio Communication Tester  | M/N: CMW 500, S/N: 145913                             |
| Rhode & Schwarz             | Universal Radio Communication Tester | M/N: CMU 200, S/N: 114536                             |
| INSTOCK Wireless Componentr | DIVIDER/COMBINER                     | M/N: PD2160                                           |

FCC ID: NU: YETQ44-1234CNU  
CU: YETQ41-5ECU  
IC: NU: 9298A-Q441234CNU  
CU: 9298A-Q415ECU  
Report No. 72146075B



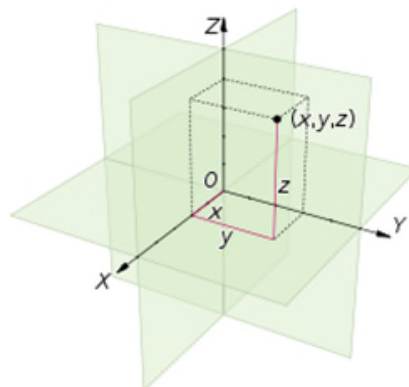
|                              |                |                                        |
|------------------------------|----------------|----------------------------------------|
| Mini Circuits                | Power Splitter | M/N: ZN2PD2-50-S+<br>S/N: S UU27701207 |
| Mini Circuits                | Power Splitter | M/N: ZN2PD-63-S+<br>S/N: S UU74001429  |
| Weinschel                    | Power Splitter | M/N: 1506A, S/N: RR002                 |
| RF Precision Cables,<br>Inc. | 2-Way Pwr Dvdr | M/N: PDX2130                           |

#### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report per Transmitter Conducted Output Power (Section 2.1 of this test report). This is for single channel verification, otherwise all three channels (Low, Mid and High) are verified:

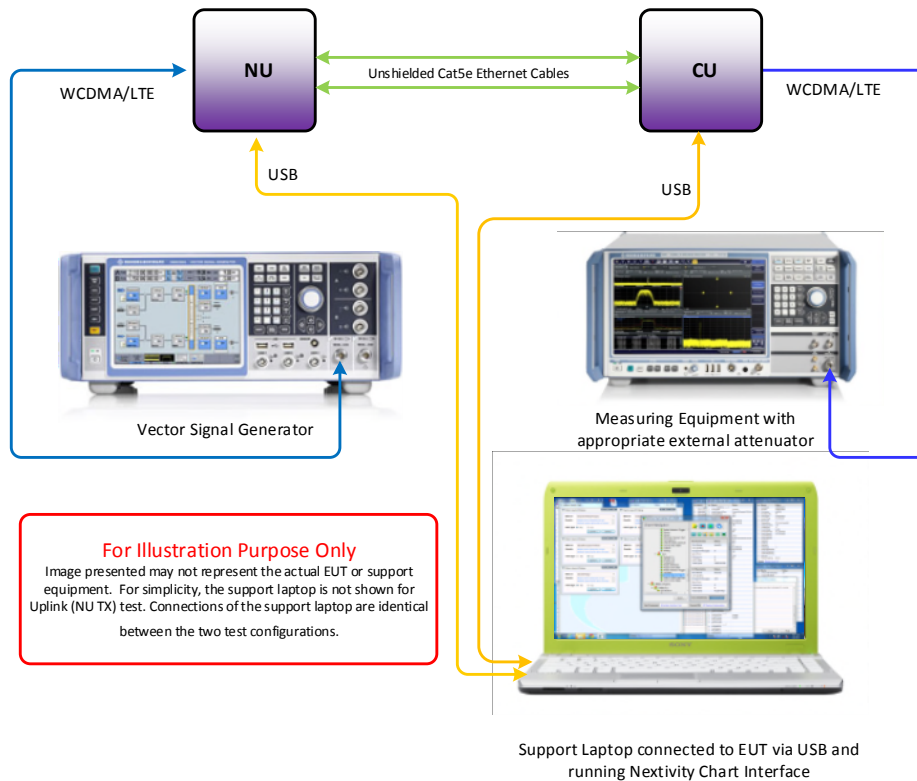
| Mode                 | Bandwidth | Channel No.           | Frequency |
|----------------------|-----------|-----------------------|-----------|
| LTE Band 4 Downlink  | 20MHz     | High Channel 2300     | 2145.0MHz |
| LTE Band 4 Uplink    | 15MHz     | Low Channel 20025     | 1717.5MHz |
| LTE Band 12 Downlink | 10MHz     | High Channel 5130     | 741.0MHz  |
| LTE Band 12 Uplink   | 10MHz     | Low Channel 23060     | 704.0MHz  |
| LTE Band 13 Downlink | 10MHz     | Middle Channel 5230   | 751.0MHz  |
| LTE Band 13 Uplink   | 10MHz     | Middle Channel 23230  | 782.0MHz  |
| LTE Band 30 Downlink | 10MHz     | Middle Channel 9820   | 2355.0MHz |
| LTE Band 30 Uplink   | 5MHz      | High Channel 27735    | 2312.5MHz |
| LTE Band 71 Downlink | 20MHz     | Low Channel 68686     | 627.0MHz  |
| LTE Band 71 Uplink   | 10MHz     | Middle Channel 133297 | 680.5MHz  |

EUT is a mobile device. Final installation position is unknown at the time of verification. For radiated measurements X and Z orientations were verified since the EUT won't work on Y orientation. No major variation in emissions observed between the three (3) orientations. Verifications performed using "X" configuration.



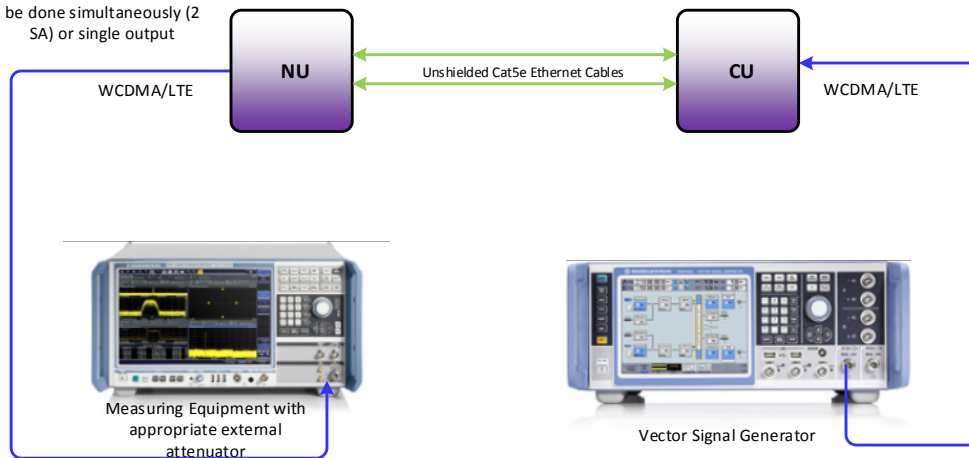
#### 1.4.5 Simplified Test Configuration Diagram

##### Downlink (CU Tx) Conducted Test

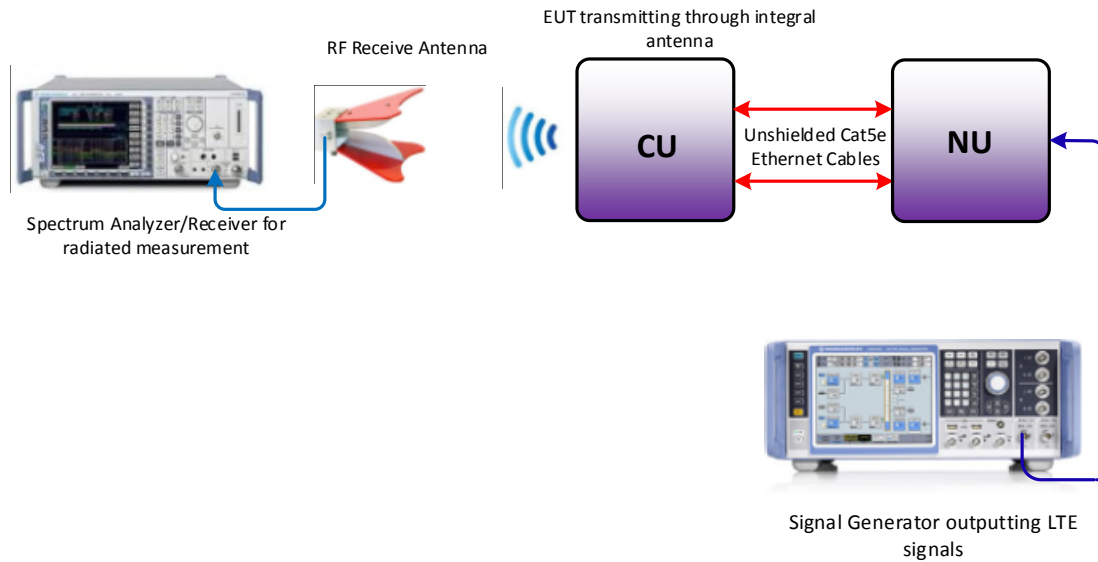


##### Uplink (NU Tx) Conducted Test

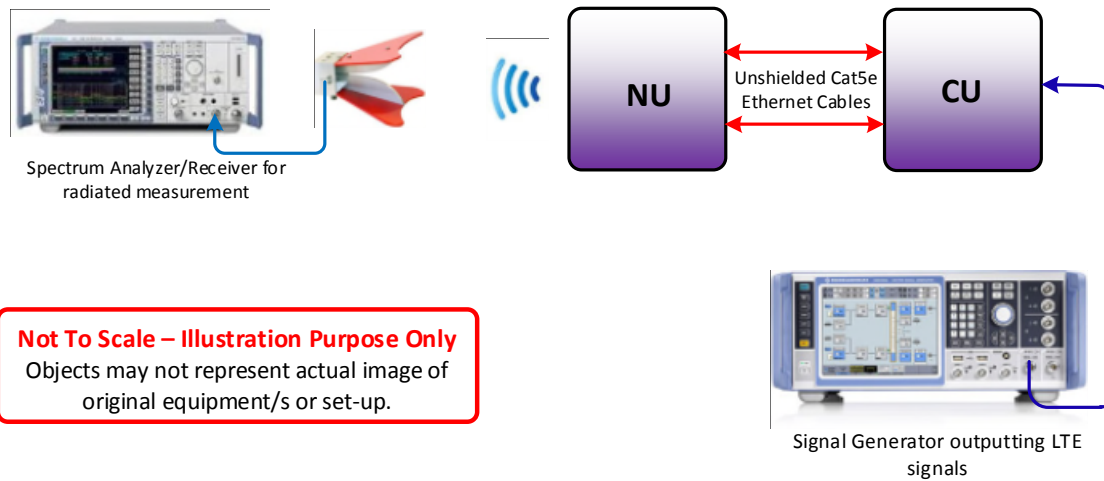
Monitoring the output can be done simultaneously (2 SA) or single output



## Radiated Testing (Downlink)



## Radiated Testing (Uplink)



**Not To Scale – Illustration Purpose Only**  
 Objects may not represent actual image of original equipment/s or set-up.

## 1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

## 1.6 MODIFICATION RECORD

| Description of Modification                            | Modification Fitted By | Date Modification Fitted |
|--------------------------------------------------------|------------------------|--------------------------|
| Serial Number: 370920000139 (NU) and 371929000156 (CU) |                        |                          |
| None                                                   | —                      | —                        |

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

## 1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.26 2015, American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

For conducted (if applicable) and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.26-2015. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

## 1.8 TEST FACILITY LOCATION

### 1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

### 1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Del Campo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: (858) 678-1400 Fax: (858) 546-0364.

## 1.9 TEST FACILITY REGISTRATION

### 1.9.1 FCC – Designation No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.948 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Designation is US1146.



**1.9.2 Innovation, Science and Economic Development Canada (ISED) Registration No.: 3067A-1 & 22806-1**

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Rancho Bernardo) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A-1.

The 3m Semi-anechoic chamber of TUV SUD America Inc. (San Diego Mira Mesa) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 22806-1.

**1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)**

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

**1.9.4 NCC (National Communications Commission - US0102)**

TUV SUD America Inc. (San Diego) is listed as a Foreign Recognized Telecommunication Equipment Testing Laboratory and is accredited to ISO/IEC 17025 (A2LA Certificate No.2955.13) which under APEC TEL MRA Phase 1 was designated as a Conformity Assessment Body competent to perform testing of equipment subject to the Technical Regulations covered under its scope of accreditation including RTTE01, PLMN01 and PLMN08 for TTE type of testing and LP002 for Low-Power RF Device type of testing.

**1.9.5 VCCI – Registration No. A-0280 and A-0281**

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

**1.9.6 RRA – Identification No. US0102**

TUV SUD America Inc. (San Diego) is National Radio Research Agency (RRA) recognized laboratory under Phase I of the APEC Tel MRA.

**1.9.7 OFCA – U.S. Identification No. US0102**

TUV SUD America Inc. (San Diego) is recognized by Office of the Communications Authority (OFCA) under Appendix B, Phase I of the APEC Tel MRA.

## 1.10 SAMPLE CALCULATIONS

### 1.10.1 LTE Emission Designator

Emission Designator = 1M30F9W  
 F = Frequency Modulation  
 9= Composite Digital Info  
 W = Combination (Audio/Data)

### 1.10.2 Spurious Radiated Emission (below 1GHz)

| Measuring equipment raw measurement (dBμV/m) @ 30 MHz |                            |       | 24.4  |
|-------------------------------------------------------|----------------------------|-------|-------|
| Correction Factor (dB)                                | Asset# 1066 (cable)        | 0.3   | -12.6 |
|                                                       | Asset# 1172 (cable)        | 0.3   |       |
|                                                       | Asset# 1016 (preamplifier) | -30.7 |       |
|                                                       | Asset# 1175(cable)         | 0.3   |       |
|                                                       | Asset# 1002 (antenna)      | 17.2  |       |
| Reported QuasiPeak Final Measurement (dBμV/m) @ 30MHz |                            |       | 11.8  |

### 1.10.3 Spurious Radiated Emission – Substitution Method

Example = 84dBμV/m @ 1413 MHz (numerical sample only)

The field strength reading of 84dBμV/m @ 1413 MHz (2<sup>nd</sup> Harmonic of 706.5 MHz) is the maximized measurement when the EUT is on the turntable measured at 3 meters. The gain of the substituted antenna is 7.8dBi while the transmit cable loss is 1.0 dB (cable between signal generator and the substituted antenna). The signal generator level is adjusted until the 84dBμV/m level at the receiving end is replicated (identical test setup, i.e. same antenna, cable/s and preamp). If the adjusted signal generator level is -18dBm, then we have the following for both EIRP and ERP as required:

$$\begin{aligned}
 P_{\text{EIRP}} &= -18 \text{ dBm} + 7.8 \text{ dBi} - 1 \text{ dB} \\
 &= 11.2 \text{ dBm} \\
 P_{\text{ERP}} &= P_{\text{EIRP}} - 2.15 \text{ dB} \\
 &= 11.2 \text{ dBm} - 2.15 \text{ dB} \\
 &= 9.05 \text{ dBm}
 \end{aligned}$$

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CU: YETQ41-5ECU  
IC: NU: 9298A-Q441234CNU  
CU: 9298A-Q415ECU  
Report No. 72146075B



## **SECTION 2**

### **TEST DETAILS**

Radio Testing of the  
Nextivity Inc.  
QUATRA 4000 Cellphone Signal Booster

## **2.1 TRANSMITTER CONDUCTED OUTPUT POWER**

### **2.1.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046

### **2.1.2 Standard Applicable**

The conducted power measurements were made in accordance to FCC Part 2 Clause 2.1046:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in §2.1033(c)(8). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

(c) For measurements conducted pursuant to paragraphs (a) and (b) of this section, all calculations and methods used by the applicant for determining carrier power or peak envelope power, as appropriate, on the basis of measured power in the radio frequency load attached to the transmitter output terminals shall be shown. Under the test conditions specified, no components of the emission spectrum shall exceed the limits specified in the applicable rule parts as necessary for meeting occupied bandwidth or emission limitations.

### **2.1.3 Equipment Under Test and Modification State**

Serial No: 370920000139 (NU) and 371929000156 (CU) / Test Configuration A and B

### **2.1.4 Date of Test/Initial of test personnel who performed the test**

August 08, 09, 15, November 21, 2019 / XYZ

### **2.1.5 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.1.6 Environmental Conditions/ Test Location**

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 23.9 - 26.0°C  |
| Relative Humidity   | 45.7 - 52.3%   |
| ATM Pressure        | 98.7 - 98.9kPa |

### **2.1.7 Additional Observations**

- This is a conducted test using power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.
- Low, Middle and High channels for all bandwidths were verified and reported.

## 2.1.8 Test Results

| LTE Band 4 Downlink |             |                 |                     |                |
|---------------------|-------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)     | Channel     | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                   | 1975        | 2112.5          | 9.79                | 18.22          |
|                     | 2175        | 2132.5          | 9.78                | 19.54          |
|                     | 2375        | 2152.5          | 10.65               | 19.90          |
| 10                  | 2000        | 2115.0          | 12.33               | 22.29          |
|                     | 2175        | 2132.5          | 13.06               | 23.36          |
|                     | 2350        | 2150.0          | 13.22               | 22.92          |
| 15                  | 2025        | 2117.5          | 14.25               | 25.19          |
|                     | 2175        | 2132.5          | 14.26               | 25.41          |
|                     | 2325        | 2147.5          | 14.36               | 25.70          |
| 20                  | 2050        | 2120.0          | 16.04               | 25.01          |
|                     | 2175        | 2132.5          | 16.03               | 25.98          |
|                     | <b>2300</b> | <b>2145.0</b>   | <b>16.35</b>        | 26.81          |

| LTE Band 4 Uplink |              |                 |                     |                |
|-------------------|--------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)   | Channel      | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                 | 19975        | 1712.5          | 23.22               | 31.08          |
|                   | 20175        | 1732.5          | 22.67               | 31.47          |
|                   | 20375        | 1752.5          | 22.80               | 31.01          |
| 10                | 20000        | 1715.0          | 23.19               | 31.02          |
|                   | 20175        | 1732.5          | 22.54               | 31.61          |
|                   | 20350        | 1750.0          | 22.81               | 31.33          |
| 15                | <b>20025</b> | <b>1717.5</b>   | <b>23.41</b>        | 31.77          |
|                   | 20175        | 1732.5          | 22.57               | 31.69          |
|                   | 20325        | 1747.5          | 22.91               | 31.62          |
| 20                | 20050        | 1720.0          | 23.26               | 30.25          |
|                   | 20175        | 1732.5          | 22.65               | 30.28          |
|                   | 20300        | 1745.0          | 22.94               | 30.09          |

| LTE Band 12 Downlink |             |                 |                     |                |
|----------------------|-------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)      | Channel     | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                    | 5035        | 731.5           | 10.85               | 18.24          |
|                      | 5095        | 737.5           | 10.79               | 18.44          |
|                      | 5155        | 743.5           | 10.83               | 18.03          |
| 10                   | 5060        | 734.0           | 14.09               | 21.81          |
|                      | 5095        | 737.5           | 13.58               | 22.03          |
|                      | <b>5130</b> | <b>741.0</b>    | <b>14.27</b>        | 22.33          |

| LTE Band 12 Uplink |              |                 |                     |                |
|--------------------|--------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)    | Channel      | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                  | 23035        | 701.5           | 22.91               | 32.54          |
|                    | 23095        | 707.5           | 23.57               | 32.68          |
|                    | 23155        | 713.5           | 23.43               | 33.17          |
| 10                 | <b>23060</b> | <b>704.0</b>    | <b>23.79</b>        | 33.03          |
|                    | 23095        | 707.5           | 23.59               | 32.92          |
|                    | 23130        | 711.0           | 23.36               | 33.07          |

| LTE Band 13 Downlink |             |                 |                     |                |
|----------------------|-------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)      | Channel     | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                    | 5205        | 748.5           | 10.32               | 19.62          |
|                      | 5230        | 751.0           | 10.65               | 19.76          |
|                      | 5255        | 753.5           | 10.44               | 18.95          |
| 10                   | -           | -               | -                   | -              |
|                      | <b>5230</b> | <b>751.0</b>    | <b>13.38</b>        | 22.15          |
|                      | -           | -               | -                   | -              |

| LTE Band 13 Uplink |              |                 |                     |                |
|--------------------|--------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)    | Channel      | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                  | 23205        | 779.5           | 23.19               | 33.92          |
|                    | 23230        | 782.0           | 23.35               | 32.98          |
|                    | 23255        | 784.5           | 23.17               | 33.37          |
| 10                 | -            | -               | -                   | -              |
|                    | <b>23230</b> | <b>782.0</b>    | <b>23.38</b>        | 33.38          |
|                    | -            | -               | -                   | -              |

| LTE Band 30 Downlink |             |                 |                     |                |
|----------------------|-------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)      | Channel     | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                    | 9795        | 2352.5          | 11.22               | 18.79          |
|                      | 9820        | 2355.0          | 11.07               | 18.57          |
|                      | 9845        | 2357.5          | 10.82               | 18.56          |
| 10                   | -           | -               | -                   | -              |
|                      | <b>9820</b> | <b>2355.0</b>   | <b>13.88</b>        | 21.88          |
|                      | -           | -               | -                   | -              |

| LTE Band 30 Uplink |              |                 |                     |                |
|--------------------|--------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)    | Channel      | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                  | 27685        | 2307.5          | 18.46               | 28.48          |
|                    | 27710        | 2310.0          | 18.31               | 28.10          |
|                    | <b>27735</b> | <b>2312.5</b>   | <b>18.52</b>        | 28.32          |
| 10                 | -            | -               | -                   | -              |
|                    | 27710        | 2310.0          | 18.40               | 29.38          |
|                    | -            | -               | -                   | -              |

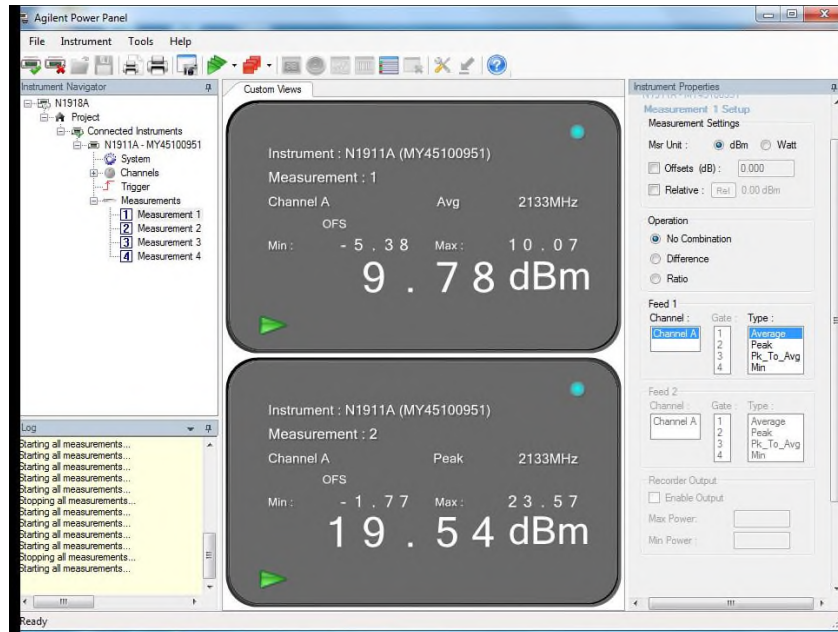
| LTE Band 71 Downlink |              |                 |                     |                |
|----------------------|--------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)      | Channel      | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                    | 68611        | 619.5           | 10.49               | 20.25          |
|                      | 68761        | 634.5           | 10.54               | 20.65          |
|                      | 68911        | 649.5           | 10.57               | 20.38          |
| 10                   | 68636        | 622.0           | 13.72               | 24.16          |
|                      | 68761        | 634.5           | 13.47               | 23.29          |
|                      | 68886        | 647.0           | 13.73               | 24.11          |
| 15                   | 68661        | 624.5           | 15.47               | 26.17          |
|                      | 68761        | 634.5           | 15.05               | 25.54          |
|                      | 68861        | 644.5           | 15.27               | 25.64          |
| 20                   | <b>68686</b> | <b>627.0</b>    | <b>16.64</b>        | 27.55          |
|                      | 68761        | 634.5           | 16.16               | 26.63          |
|                      | 68836        | 642.0           | 16.43               | 28.08          |

| LTE Band 71 Uplink |               |                 |                     |                |
|--------------------|---------------|-----------------|---------------------|----------------|
| Bandwidth (MHz)    | Channel       | Frequency (MHz) | Average Power (dBm) | PK Power (dBm) |
| 5                  | 133147        | 665.5           | 21.73               | 33.35          |
|                    | 133297        | 680.5           | 22.94               | 33.87          |
|                    | 133447        | 695.5           | 21.37               | 31.01          |
| 10                 | 133172        | 668.0           | 21.70               | 32.19          |
|                    | <b>133297</b> | <b>680.5</b>    | <b>23.04</b>        | 33.02          |
|                    | 133422        | 693.0           | 21.81               | 32.71          |
| 15                 | 133197        | 670.5           | 22.35               | 32.45          |
|                    | 133297        | 680.5           | 22.97               | 32.44          |
|                    | 133397        | 690.5           | 22.36               | 32.70          |
| 20                 | 133222        | 673.0           | 22.89               | 33.11          |
|                    | 133297        | 680.5           | 21.48               | 31.15          |
|                    | 133372        | 688.0           | 22.87               | 32.86          |

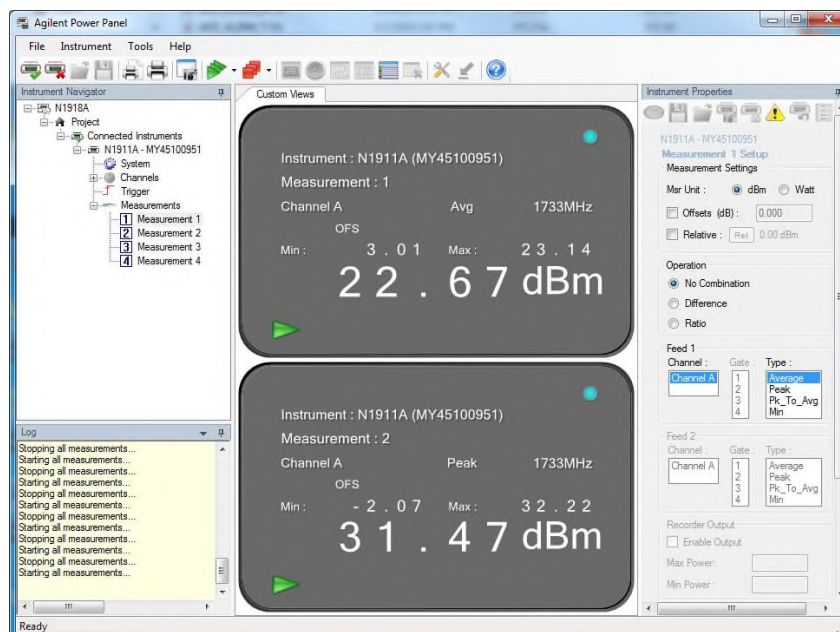
| 2 Bands/port worst case configuration Downlink |                                                             |                                             |                     |                |
|------------------------------------------------|-------------------------------------------------------------|---------------------------------------------|---------------------|----------------|
| Ant Port                                       | Band & Bandwidth & Channel                                  | Frequency (MHz)                             | Average Power (dBm) | PK Power (dBm) |
| A                                              | LTE Band 4 20MHz BW High Ch & LTE Band 12 10MHz BW High Ch  | 2145.0 MHz + 741.0 MHz                      | 18.70               | 27.71          |
|                                                | LTE Band 4 20MHz BW High Ch & LTE Band 30 10MHz BW Mid Ch   | 2145.0 MHz + 2355.0 MHz                     | 18.35               | 26.76          |
|                                                | LTE Band 25 20MHz BW Mid Ch & LTE Band 12 10MHz BW High Ch  | 1962.5 MHz + 741.0 MHz                      | 18.93               | 27.71          |
|                                                | LTE Band 25 20MHz BW Mid Ch & LTE Band 30 10MHz BW Mid Ch   | 1962.5 MHz + 2355.0 MHz                     | 18.64               | 29.92          |
|                                                | WCDMA Band 5 15MHz BW Low Ch & LTE Band 12 10MHz BW High Ch | 871.4MHz & 876.4MHz & 881.4MHz + 741.0 MHz  | 17.65               | 27.58          |
|                                                | WCDMA Band 5 15MHz BW Low Ch & LTE Band 30 10MHz BW Mid Ch  | 871.4MHz & 876.4MHz & 881.4MHz + 2355.0 MHz | 17.84               | 26.24          |
| B                                              | LTE Band 4 20MHz BW High Ch & LTE Band 71 20MHz BW Low Ch   | 2145.0 MHz + 627.0.0 MHz                    | 19.61               | 29.21          |
|                                                | LTE Band 25 20MHz BW Mid Ch & LTE Band 71 20MHz BW Low Ch   | 1962.5 MHz + 627.0 MHz                      | 20.11               | 28.60          |
|                                                | LTE Band 4 20MHz BW High Ch & LTE Band 25 20MHz BW Mid Ch   | 2145.0 MHz + 1962.5 MHz                     | 18.40               | 27.37          |
| C                                              | LTE Band 4 20MHz BW High Ch & LTE Band 13 10MHz BW Mid Ch   | 2145.0 MHz + 751.0 MHz                      | 18.67               | 27.28          |
|                                                | LTE Band 25 20MHz BW Mid Ch & LTE Band 13 10MHz BW Mid Ch   | 1962.5 MHz + 751.0 MHz                      | 18.91               | 27.27          |

| 2 Bands/port worst case configuration Uplink |                                                              |                         |                     |                |
|----------------------------------------------|--------------------------------------------------------------|-------------------------|---------------------|----------------|
| Ant Port                                     | Band & Bandwidth & Channel                                   | Frequency (MHz)         | Average Power (dBm) | PK Power (dBm) |
| A                                            | LTE Band 4 15MHz BW Low Ch & LTE Band 12 10MHz BW Low Ch     | 1717.5 MHz + 704.0 MHz  | 24.20               | 32.24          |
|                                              | LTE Band 4 15MHz BW Low Ch & LTE Band 30 5MHz BW High Ch     | 1717.5 MHz + 2312.5 MHz | 24.16               | 31.40          |
|                                              | LTE Band 25 20MHz BW High Ch & LTE Band 12 10MHz BW Low Ch   | 1905.0 MHz + 704 MHz    | 23.88               | 31.86          |
|                                              | LTE Band 25 20MHz BW High Ch & LTE Band 30 5MHz BW High Ch   | 1905.0 MHz + 2312.5 MHz | 24.29               | 32.38          |
|                                              | WCDMA Band 5 5MHz BW Mid Ch & LTE Band 12 10MHz BW Low Ch    | 836.6 MHz + 704 MHz     | 23.63               | 31.40          |
|                                              | WCDMA Band 5 5MHz BW Mid Ch & LTE Band 30 5MHz BW High Ch    | 836.6 MHz + 2312.5 MHz  | 23.19               | 31.21          |
| B                                            | LTE Band 4 15MHz BW Low Ch & LTE Band 71 10MHz BW Mid Ch     | 1717.5 MHz + 680.5 MHz  | 25.83               | 33.0           |
|                                              | LTE Band 25 20MHz BW High Ch & LTE Band 71 10MHz BW Mid Ch   | 1905.0 MHz + 680.5 MHz  | 26.11               | 34.08          |
|                                              | LTE Band 4 15MHz BW Low Ch & LTE Band 25 20MHz BW High Ch    | 1717.5 MHz + 1905.0 MHz | 25.24               | 32.02          |
| C                                            | LTE Band 4 15MHz BW Low Ch & LTE Band 13 10MHz BW Mid Ch     | 1717.5 MHz + 782.0 MHz  | 25.32               | 34.42          |
|                                              | LTE Band 25 20MHz BW High Ch & LTE Band 13 10MHz BW Mid Ch   | 1905.0 MHz + 782.0 MHz  | 25.88               | 34.98          |
| D                                            | LTE Band 5/26 15MHz BW Low Ch & LTE Band 25 20MHz BW High Ch | 831.5 MHz + 1905.0 MHz  | 23.75               | 32.39          |

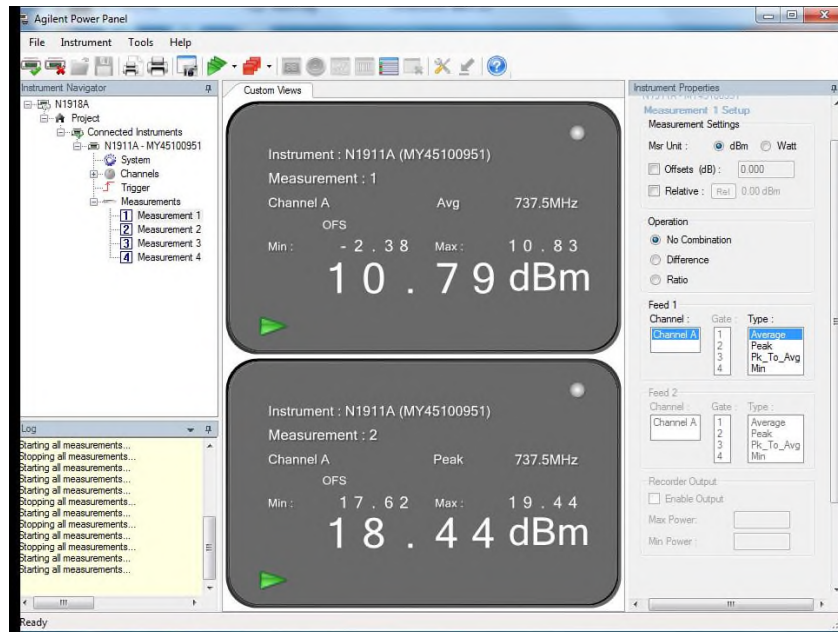
## 2.1.9 Sample Test Plot



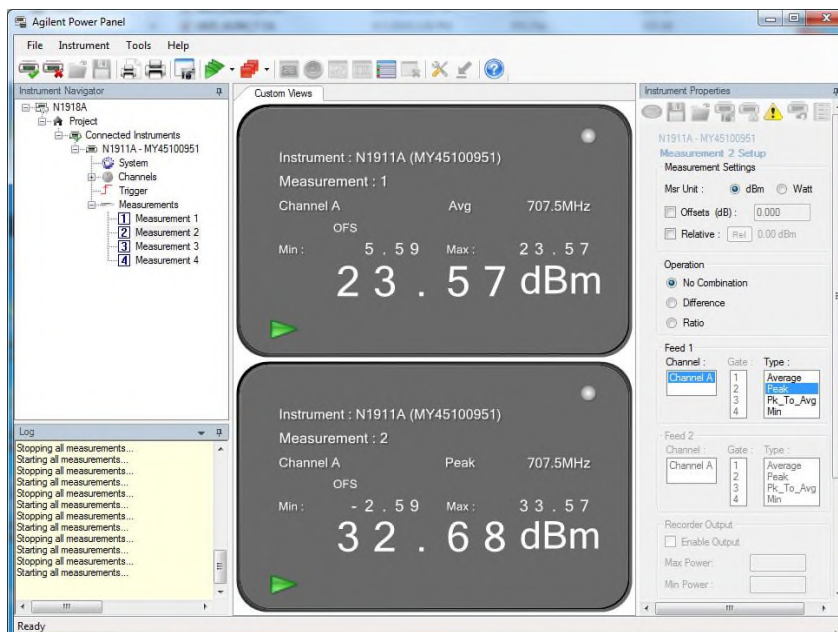
LTE Band 4 DL 5 MHz Bandwidth Middle Channel



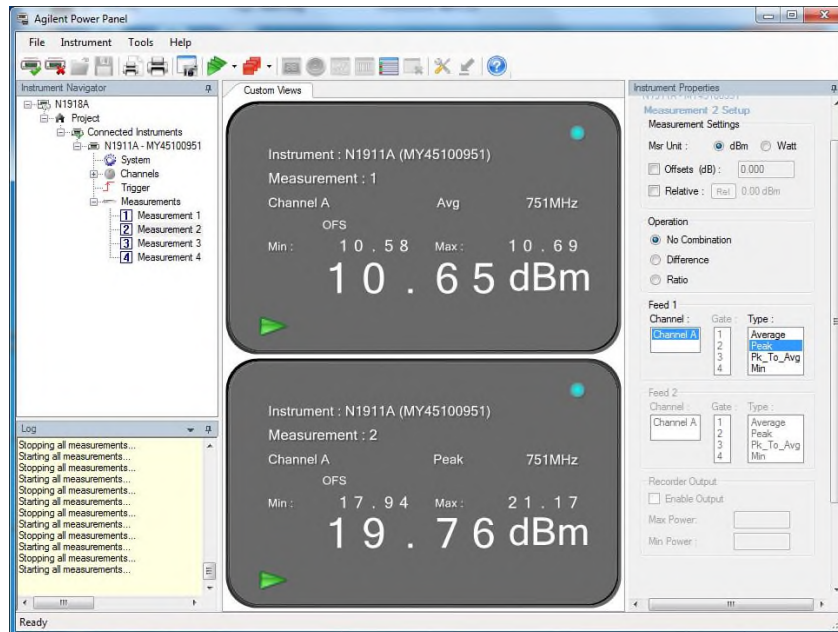
LTE Band 4 UL 5 MHz Bandwidth Middle Channel



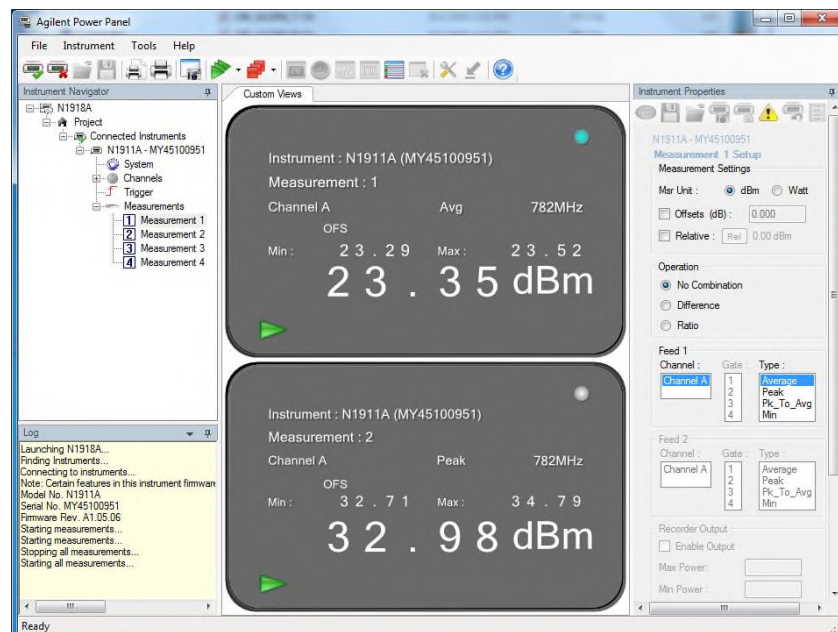
**LTE Band 12 DL 5 MHz Bandwidth Middle Channel**



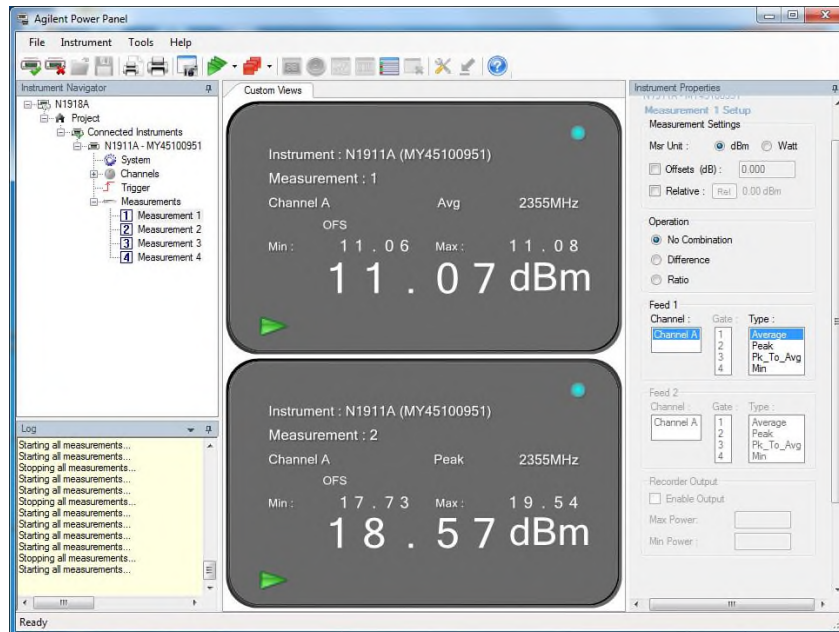
**LTE Band 12 UL 5 MHz Bandwidth Middle Channel**



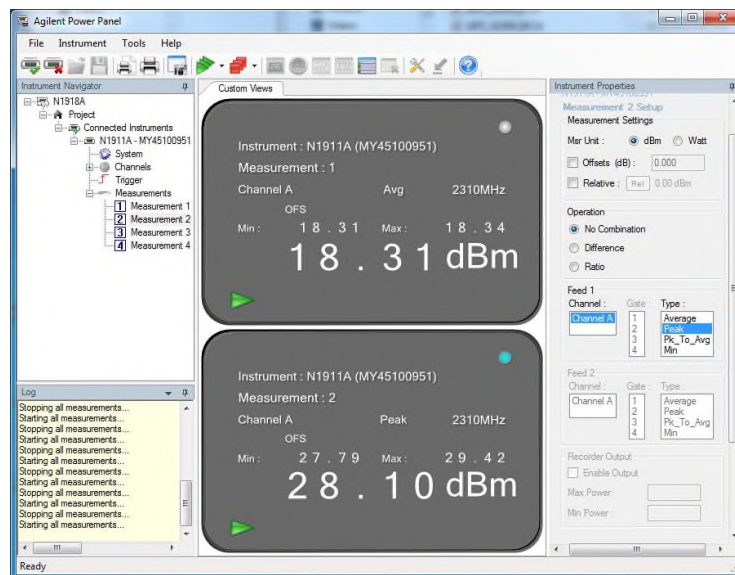
**LTE Band 13 DL 5 MHz Bandwidth Middle Channel**



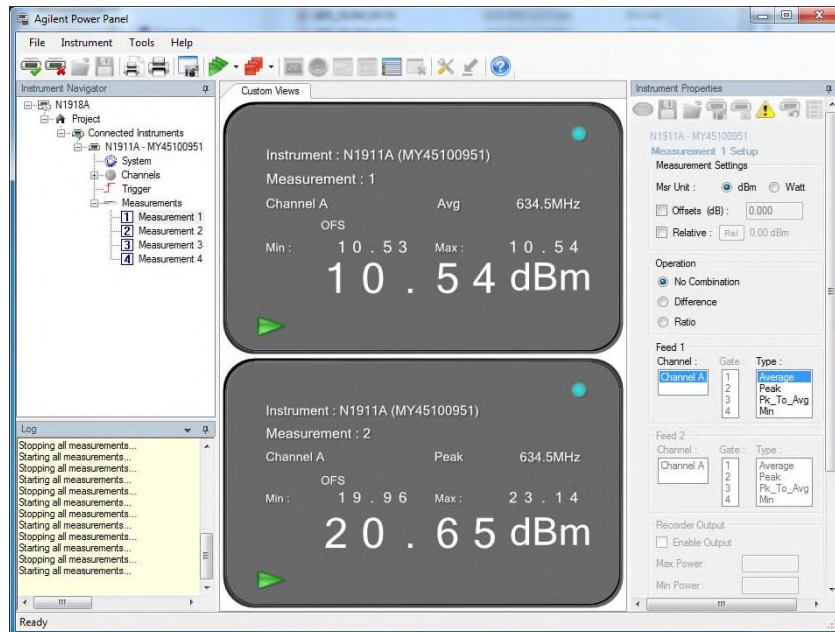
**LTE Band 13 UL 5 MHz Bandwidth Middle Channel**



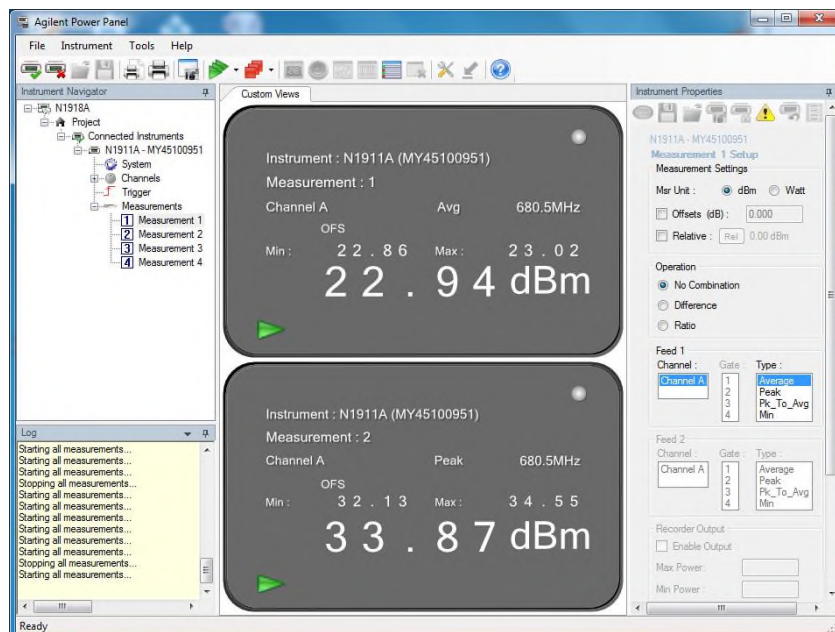
**LTE Band 30 DL 5 MHz Bandwidth Middle Channel**



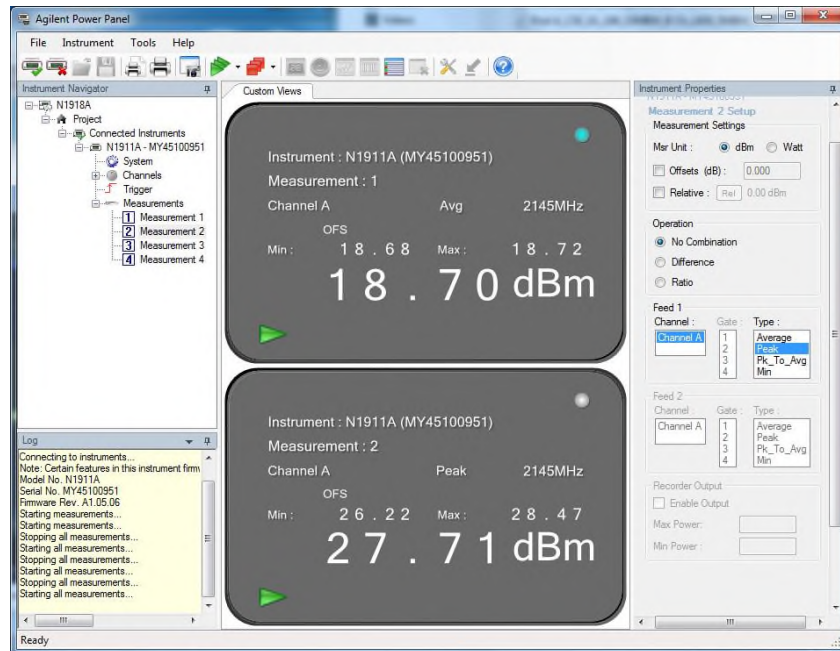
**LTE Band 30 UL 5 MHz Bandwidth Middle Channel**



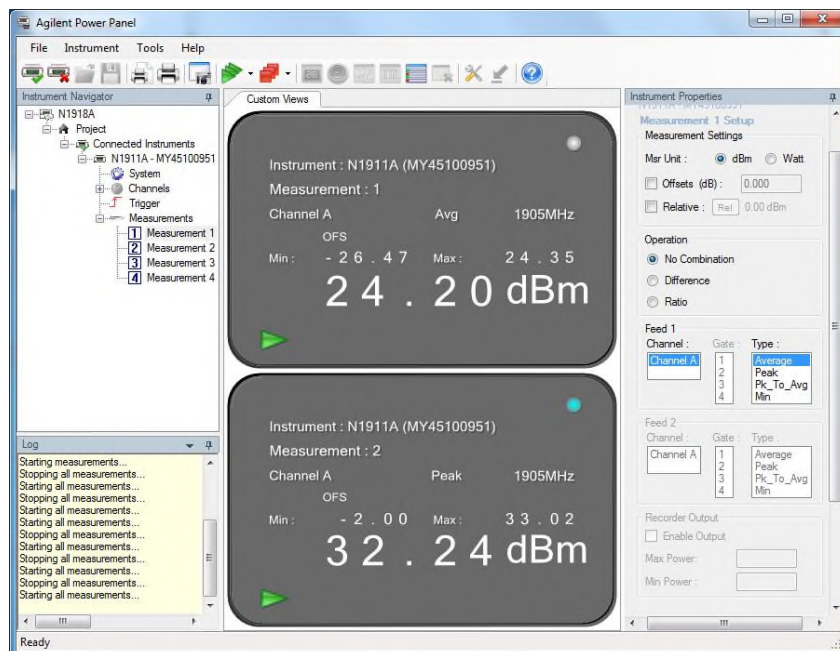
LTE Band 71 DL 5 MHz Bandwidth Middle Channel



LTE Band 71 UL 5 MHz Bandwidth Middle Channel



**Downlink: LTE Band 4 20MHz BW High Ch & LTE Band 12 10MHz BW High Ch**



**Uplink: LTE Band 4 15MHz BW Low Ch & LTE Band 12 10MHz BW Low Ch**

## 2.2 EFFECTIVE ISOTROPIC RADIATED POWER

### 2.2.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (h)(1)  
FCC 47 CFR Part 27, Clause 27.50 (a)(1)  
RSS-139, Clause 6.5  
RSS-195, Clause 5.5

### 2.2.2 Standard Applicable

FCC 47 CFR Part 27, Clause 27.50 (h):

(1) Main, booster and base stations. (i) The maximum EIRP of a main, booster or base station shall not exceed  $33 \text{ dBW} + 10 \log(X/Y) \text{ dBW}$ , where X is the actual channel width in MHz and Y is either 6 MHz if prior to transition or the station is in the MBS following transition or 5.5 MHz if the station is in the LBS and UBS following transition, except as provided in paragraph (h)(1)(ii) of this section.

(ii) If a main or booster station sectorizes or otherwise uses one or more transmitting antennas with a non-omnidirectional horizontal plane radiation pattern, the maximum EIRP in dBW in a given direction shall be determined by the following formula:  $\text{EIRP} = 33 \text{ dBW} + 10 \log(X/Y) \text{ dBW} + 10 \log(360/\text{beamwidth}) \text{ dBW}$ , where X is the actual channel width in MHz, Y is either (i) 6 MHz if prior to transition or the station is in the MBS following transition or (ii) 5.5 MHz if the station is in the LBS and UBS following transition, and beamwidth is the total horizontal plane beamwidth of the individual transmitting antenna for the station or any sector measured at the half-power points.

RSS-139, Clause 6.5:

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710 - 1780 MHz shall not exceed one watt.

Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110 – 2180 MHz.

FCC 47 CFR Part 27, Clause 27.50 (a):

The following power limits and related requirements apply to stations transmitting in the 2305–2320 MHz band or the 2345–2360 MHz band.

(1) Base and fixed stations. (i) For base and fixed stations transmitting in the 2305–2315 MHz band or the 2350–2360MHz band:

(A) The average equivalent isotropically radiated power (EIRP) must not exceed 2,000 watts within any 5megahertz of authorized bandwidth and must not exceed 400 watts within any 1 megahertz of authorized bandwidth.

RSS-195, Clause 5.5:

The equivalent isotropically radiated power (e.i.r.p.) for base and fixed station equipment shall comply with the e.i.r.p. limit in SRSP-516.

The e.i.r.p. of fixed subscriber equipment shall not exceed 20 W/5MHz.

### 2.2.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU) and 371929000156 (CU) (Calculation only)

### 2.2.4 Date of Test/Initial of test personnel who performed the test

August 08, 09 and 15, 2019 / XYZ

### 2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

### 2.2.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 24.8 - 26.0°C  |
| Relative Humidity   | 51.1 - 52.3%   |
| ATM Pressure        | 98.8 - 98.9kPa |

### 2.2.7 Additional Observations

- EIRP was calculated as per Section 1.3.2 of KDB412172 D01 (Determining ERP and EIRP v01).
- Calculation formula in logarithmic terms:

$$\text{EIRP} = P_T + G_T - L_c$$

Where:

$P_T$  = transmitter conducted output power dBm (Section 2.1 of this test report)

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

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

### 2.2.8 Sample Computation

$$\begin{aligned}\text{EIRP} &= P_T + G_T - L_c \\ &= 29.87 \text{ (Peak)} + 0.13 \text{ (max. gain)} - 3.84 \text{ (cable loss)} \\ &= 26.16 \text{ dBm}\end{aligned}$$

## 2.2.9 Test Results

| LTE Band 4 Downlink |                 |                         |                           |              |             |
|---------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)     | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                   | 2112.5          | 9.79                    | 2.6                       | 12.39        | 62.2        |
|                     | 2132.5          | 9.78                    | 2.6                       | 12.38        | 62.2        |
|                     | 2152.5          | 10.65                   | 2.6                       | 13.25        | 62.2        |
| 10                  | 2115.0          | 12.33                   | 2.6                       | 14.93        | 65.2        |
|                     | 2132.5          | 13.06                   | 2.6                       | 15.66        | 65.2        |
|                     | 2150.0          | 13.22                   | 2.6                       | 15.82        | 65.2        |
| 15                  | 2117.5          | 14.25                   | 2.6                       | 16.85        | 66.9        |
|                     | 2132.5          | 14.26                   | 2.6                       | 16.86        | 66.9        |
|                     | 2147.5          | 14.36                   | 2.6                       | 16.96        | 66.9        |
| 20                  | 2120.0          | 16.04                   | 2.6                       | 18.64        | 68.2        |
|                     | 2132.5          | 16.03                   | 2.6                       | 18.63        | 68.2        |
|                     | <b>2145.0</b>   | <b>16.35</b>            | <b>2.6</b>                | <b>18.95</b> | <b>68.2</b> |

| LTE Band 4 Uplink |                 |                         |                           |              |             |
|-------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)   | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                 | 1712.5          | 23.22                   | 5.72                      | 28.94        | 30          |
|                   | 1732.5          | 22.67                   | 5.72                      | 28.39        | 30          |
|                   | 1752.5          | 22.80                   | 5.72                      | 28.52        | 30          |
| 10                | 1715.0          | 23.19                   | 5.72                      | 28.91        | 30          |
|                   | 1732.5          | 22.54                   | 5.72                      | 28.26        | 30          |
|                   | 1750.0          | 22.81                   | 5.72                      | 28.53        | 30          |
| 15                | <b>1717.5</b>   | <b>23.41</b>            | <b>5.72</b>               | <b>29.13</b> | <b>30</b>   |
|                   | 1732.5          | 22.57                   | 5.72                      | 28.29        | 30          |
|                   | 1747.5          | 22.91                   | 5.72                      | 28.63        | 30          |
| 20                | 1720.0          | 23.26                   | 5.72                      | 28.98        | 30          |
|                   | 1732.5          | 22.65                   | 5.72                      | 28.37        | 30          |
|                   | 1745.0          | 22.94                   | 5.72                      | 28.66        | 30          |

| LTE Band 30 Downlink |                 |                         |                           |              |                 |
|----------------------|-----------------|-------------------------|---------------------------|--------------|-----------------|
| Bandwidth (MHz)      | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm/MHz) |
| 5                    | 2352.5          | 11.22                   | 2.3                       | 13.52        | 56.0            |
|                      | 2355.0          | 11.07                   | 2.3                       | 13.37        | 56.0            |
|                      | 2357.5          | 10.82                   | 2.3                       | 13.12        | 56.0            |
| 10                   | -               | -                       | -                         | -            | -               |
|                      | <b>2355.0</b>   | <b>13.88</b>            | <b>2.3</b>                | <b>16.18</b> | <b>56.0</b>     |
|                      | -               | -                       | -                         | -            | -               |

| LTE Band 30 Uplink |                 |                         |                           |              |             |
|--------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)    | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                  | 2307.5          | 22.06                   | 3.91                      | 25.97        | 56.0        |
|                    | 2310.0          | 22.24                   | 3.91                      | 26.15        | 56.0        |
|                    | <b>2312.5</b>   | <b>22.52</b>            | <b>3.91</b>               | <b>26.43</b> | <b>56.0</b> |
| 10                 | -               | -                       | -                         | -            | -           |
|                    | 2310.0          | 22.11                   | 3.91                      | 26.02        | 56.0        |
|                    | -               | -                       | -                         | -            | -           |

## 2.3 EFFECTIVE RADIATED POWER

### 2.3.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (c)(3)  
 FCC 47 CFR Part 27, Clause 27.50 (b)(4)  
 RSS-130, Clause 4.6.2, and 4.6.3

### 2.3.2 Standard Applicable

FCC 47 CFR Part 27, Clause 27.50 (c):

(3) Fixed and base stations transmitting a signal within an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna height greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

**TABLE 3 TO § 27.50—PERMISSIBLE POWER AND ANTENNA HEIGHTS FOR BASE AND FIXED STATIONS IN THE 600 MHz, 698–757 MHz, 758–763 MHz, 776–787 MHz AND 788–793 MHz BANDS TRANSMITTING A SIGNAL WITH AN EMISSION BANDWIDTH GREATER THAN 1 MHz**

| Antenna height (AAT) in<br>meters<br>(feet) | Effective radi-<br>ated power<br>(ERP) per<br>MHz<br>(watts/MHz) |
|---------------------------------------------|------------------------------------------------------------------|
| Above 1372 (4500) .....                     | 65                                                               |
| Above 1220 (4000) To 1372 (4500) .....      | 70                                                               |
| Above 1067 (3500) To 1220 (4000) .....      | 75                                                               |
| Above 915 (3000) To 1067 (3500) .....       | 100                                                              |
| Above 763 (2500) To 915 (3000) .....        | 140                                                              |
| Above 610 (2000) To 763 (2500) .....        | 200                                                              |
| Above 458 (1500) To 610 (2000) .....        | 350                                                              |
| Above 305 (1000) To 458 (1500) .....        | 600                                                              |
| Up to 305 (1000) .....                      | 1000                                                             |

FCC 47 CFR Part 27, Clause 27.50 (b):

(4) Fixed and base stations transmitting a signal in the 746–757 MHz and 776–787 MHz bands with an emission bandwidth greater than 1 MHz must not exceed an ERP of 1000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 1000 watts/MHz ERP in accordance with Table 3 of this section.

RSS-130 Clause 4.6.2 Frequency bands 617-652 MHz and 663-698 MHz

The e.r.p. shall not exceed 3 watts for mobile equipment, fixed subscriber equipment and portable equipment.

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.



Clause 4.6.3 Frequency bands 698-756 MHz and 777-787 MHz

The e.r.p. shall not exceed 30 watts for mobile equipment and outdoor fixed subscriber equipment. The e.r.p. shall not exceed 3 watts for portable equipment and indoor fixed subscriber equipment.

For base and fixed equipment other than fixed subscriber equipment, refer to SRSP-518 for the e.i.r.p. limits.

### **2.3.3 Equipment Under Test and Modification State**

Serial No: 370920000139 (NU) and 371929000156 (CU) (Calculation only)

### **2.3.4 Date of Test/Initial of test personnel who performed the test**

August 08, 09 and 15, 2019 / XYZ

### **2.3.5 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

### **2.3.6 Environmental Conditions/ Test Location**

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 24.8 - 26.0°C  |
| Relative Humidity   | 51.1 - 52.3%   |
| ATM Pressure        | 98.8 - 98.9kPa |

### **2.3.7 Additional Observations**

- ERP and EIRP were calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01).
- Calculation formula in logarithmic terms:

$$\text{ERP or EIRP} = P_T + G_T - L_c$$

Where:

$P_T$  = transmitter output power, expressed in dBm (Section 2.1 of this test report)

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

$$G_T(\text{dBd}) = G_T(\text{dBi}) - 2.15 \text{ dB}$$

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

### 2.3.8 Sample Computation

$$\begin{aligned} \text{ERP} &= P_T + G_T - L_C - 2.15\text{dB} \\ &= 29.87 \text{ (Peak)} + 0.13 \text{ (max. gain)} - 3.84 \text{ (cable loss)} - 2.15 \\ &= 24.01 \text{ dBm} \end{aligned}$$

### 2.3.9 Test Results

| LTE Band 12 Downlink |                 |                         |                           |              |              |
|----------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)      | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                    | 731.5           | 10.85                   | 0.4                       | 9.10         | 44.77        |
|                      | 737.5           | 10.79                   | 0.4                       | 9.04         | 44.77        |
|                      | 743.5           | 10.83                   | 0.4                       | 9.08         | 44.77        |
| 10                   | 734.0           | 14.09                   | 0.4                       | 12.34        | 44.77        |
|                      | 737.5           | 13.58                   | 0.4                       | 11.83        | 44.77        |
|                      | <b>741.0</b>    | <b>14.27</b>            | <b>0.4</b>                | <b>12.52</b> | <b>44.77</b> |

| LTE Band 12 Uplink |                 |                         |                           |              |              |
|--------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)    | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                  | 701.5           | 22.91                   | 6.77                      | 27.53        | 44.77        |
|                    | 707.5           | 23.57                   | 6.77                      | 28.19        | 44.77        |
|                    | 713.5           | 23.43                   | 6.77                      | 28.05        | 44.77        |
| 10                 | <b>704.0</b>    | <b>23.79</b>            | <b>6.77</b>               | <b>28.41</b> | <b>44.77</b> |
|                    | 707.5           | 23.59                   | 6.77                      | 28.21        | 44.77        |
|                    | 711.0           | 23.36                   | 6.77                      | 27.98        | 44.77        |

| LTE Band 13 Downlink |                 |                         |                           |              |              |
|----------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)      | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                    | 748.5           | 10.32                   | 0.4                       | 8.57         | 44.77        |
|                      | 751.0           | 10.65                   | 0.4                       | 8.90         | 44.77        |
|                      | 753.5           | 10.44                   | 0.4                       | 8.69         | 44.77        |
| 10                   | -               | -                       | -                         | -            | -            |
|                      | <b>751.0</b>    | <b>13.38</b>            | <b>0.4</b>                | <b>11.63</b> | <b>44.77</b> |
|                      | -               | -                       | -                         | -            | -            |

| LTE Band 13 Uplink |                 |                         |                           |              |              |
|--------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)    | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                  | 779.5           | 23.19                   | 6.48                      | 27.52        | 44.77        |
|                    | 782.0           | 23.35                   | 6.48                      | 27.68        | 44.77        |
|                    | 784.5           | 23.17                   | 6.48                      | 27.50        | 44.77        |
| 10                 | -               | -                       | -                         | -            | -            |
|                    | <b>782.0</b>    | <b>23.38</b>            | <b>6.48</b>               | <b>27.71</b> | <b>44.77</b> |
|                    | -               | -                       | -                         | -            | -            |

| LTE Band 71 Downlink |                 |                         |                           |              |              |
|----------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)      | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                    | 619.5           | 10.49                   | 0.4                       | 8.74         | 34.77        |
|                      | 634.5           | 10.54                   | 0.4                       | 8.79         | 34.77        |
|                      | 649.5           | 10.57                   | 0.4                       | 8.82         | 34.77        |
| 10                   | 622.0           | 13.72                   | 0.4                       | 11.97        | 34.77        |
|                      | 634.5           | 13.47                   | 0.4                       | 11.72        | 34.77        |
|                      | 647.5           | 13.73                   | 0.4                       | 11.98        | 34.77        |
| 15                   | 624.5           | 15.47                   | 0.4                       | 13.72        | 34.77        |
|                      | 634.5           | 15.05                   | 0.4                       | 13.30        | 34.77        |
|                      | 644.5           | 15.27                   | 0.4                       | 13.52        | 34.77        |
| 20                   | <b>627.0</b>    | <b>16.64</b>            | <b>0.4</b>                | <b>14.89</b> | <b>34.77</b> |
|                      | 634.5           | 16.16                   | 0.4                       | 14.41        | 34.77        |
|                      | 642.0           | 16.43                   | 0.4                       | 14.68        | 34.77        |

| LTE Band 71 Uplink |                 |                         |                           |              |              |
|--------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)    | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                  | 665.5           | 21.73                   | 6.91                      | 26.49        | 34.77        |
|                    | 680.5           | 22.94                   | 6.91                      | 27.70        | 34.77        |
|                    | 695.5           | 21.37                   | 6.91                      | 26.13        | 34.77        |
| 10                 | 668.0           | 21.70                   | 6.91                      | 26.46        | 34.77        |
|                    | <b>680.5</b>    | <b>23.04</b>            | <b>6.91</b>               | <b>27.80</b> | <b>34.77</b> |
|                    | 693.5           | 21.81                   | 6.91                      | 26.57        | 34.77        |
| 15                 | 670.5           | 22.35                   | 6.91                      | 27.11        | 34.77        |
|                    | 680.5           | 22.97                   | 6.91                      | 27.73        | 34.77        |
|                    | 690.5           | 22.36                   | 6.91                      | 27.12        | 34.77        |
| 20                 | 673.0           | 22.89                   | 6.91                      | 27.65        | 34.77        |
|                    | 680.5           | 21.48                   | 6.91                      | 26.24        | 34.77        |
|                    | 688.0           | 22.87                   | 6.91                      | 27.63        | 34.77        |

## **2.4 OCCUPIED BANDWIDTH**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 2. Clause 2.1049  
RSS-GEN Issue 5, Clause 6.7

### **2.4.2 Standard Applicable**

The transmitted signal bandwidth shall be reported as the 99% emission bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

26dB Bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated by at least 26 dB below the transmitter power.

Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.

In addition, the 26dB bandwidth was measured in accordance with FCC KDB 971168 D01 V0202 Clause 4.1 using the ndB measurement function in the spectrum analyzer.

- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% to 5% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.

### **2.4.3 Equipment Under Test and Modification State**

Serial No: 370920000139 (NU) and 371929000156 (CU) / Test Configuration A and B

### **2.4.4 Date of Test/Initial of test personnel who performed the test**

August 09 to 16, 2019/XYZ

### **2.4.5 Test Equipment Used**

The major items of test equipment used for the above tests are identified in Section 3.1.

#### 2.4.6 Environmental Conditions

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility.

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 25.2 - 26.3°C  |
| Relative Humidity   | 46.4 - 53.3%   |
| ATM Pressure        | 98.8 - 99.0kPa |

#### 2.4.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.
- The 26dB bandwidth was measured in accordance with ANSI C63.26 clause 5.4.3 using the ndB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The RBW is set to 1% of the OBW while the VBW is  $\geq 3X$  RBW.
- The detector is peak and the trace mode is max hold.
- All low, middle and high channels were verified. Only test plots for middle channel presented in this test report as the representative configuration.

## 2.4.8 Test Results and Sample Test Plot

| LTE Band 4 Downlink |         |                 |           |                |
|---------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)     | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                   | 1975    | 2112.5          | 4.50      | 4.82           |
|                     | 2175    | 2132.5          | 4.45      | 4.77           |
|                     | 2375    | 2152.5          | 4.50      | 4.84           |
| 10                  | 2000    | 2115.0          | 8.94      | 9.66           |
|                     | 2175    | 2132.5          | 8.99      | 9.66           |
|                     | 2350    | 2150.0          | 8.93      | 9.60           |
| 15                  | 2025    | 2117.5          | 13.24     | 14.11          |
|                     | 2175    | 2132.5          | 13.47     | 14.47          |
|                     | 2325    | 2147.5          | 13.31     | 14.11          |
| 20                  | 2050    | 2120.0          | 17.89     | 18.81          |
|                     | 2175    | 2132.5          | 17.76     | 19.26          |
|                     | 2300    | 2145.0          | 17.86     | 19.26          |

| LTE Band 4 Uplink |         |                 |           |                |
|-------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)   | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                 | 19975   | 1712.5          | 4.44      | 4.75           |
|                   | 20175   | 1732.5          | 4.44      | 4.76           |
|                   | 20375   | 1752.5          | 4.44      | 4.75           |
| 10                | 20000   | 1715.0          | 8.91      | 9.55           |
|                   | 20175   | 1732.5          | 8.88      | 9.49           |
|                   | 20350   | 1750.0          | 8.87      | 9.54           |
| 15                | 20025   | 1717.5          | 13.66     | 14.74          |
|                   | 20175   | 1732.5          | 13.62     | 14.46          |
|                   | 20325   | 1747.5          | 13.64     | 14.76          |
| 20                | 20050   | 1720.0          | 17.77     | 18.99          |
|                   | 20175   | 1732.5          | 17.73     | 18.96          |
|                   | 20300   | 1745.0          | 17.77     | 19.11          |

| LTE Band 12 Downlink |         |                 |           |                |
|----------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)      | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                    | 5035    | 731.5           | 4.42      | 4.74           |
|                      | 5095    | 737.5           | 4.47      | 4.84           |
|                      | 5155    | 743.5           | 4.43      | 4.75           |
| 10                   | 5060    | 734.0           | 8.88      | 9.55           |
|                      | 5095    | 737.5           | 8.84      | 9.54           |
|                      | 5130    | 741.0           | 8.88      | 9.57           |

| LTE Band 12 Uplink |         |                 |           |                |
|--------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)    | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                  | 23035   | 701.5           | 4.43      | 4.75           |
|                    | 23095   | 707.5           | 4.44      | 4.76           |
|                    | 23155   | 713.5           | 4.43      | 4.75           |
| 10                 | 23060   | 704.0           | 8.85      | 9.48           |
|                    | 23095   | 707.5           | 8.87      | 9.60           |
|                    | 23130   | 711.0           | 8.87      | 9.51           |

| LTE Band 13 Downlink |         |                 |           |                |
|----------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)      | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                    | 5205    | 748.5           | 4.45      | 4.77           |
|                      | 5230    | 751.0           | 4.58      | 4.92           |
|                      | 5255    | 753.5           | 4.45      | 4.85           |
| 10                   | -       | -               | -         | -              |
|                      | 5230    | 751.0           | 8.98      | 9.44           |
|                      | -       | -               | -         | -              |

| LTE Band 13 Uplink |         |                 |           |                |
|--------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)    | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                  | 23205   | 779.5           | 4.64      | 4.95           |
|                    | 23230   | 782.0           | 4.63      | 4.94           |
|                    | 23255   | 784.5           | 4.63      | 4.95           |
| 10                 | -       | -               | -         | -              |
|                    | 23230   | 782.0           | 8.52      | 9.42           |
|                    | -       | -               | -         | -              |

| LTE Band 30 Downlink |         |                 |           |                |
|----------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)      | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                    | 9795    | 2352.5          | 4.41      | 4.75           |
|                      | 9820    | 2355.0          | 4.43      | 4.77           |
|                      | 9845    | 2357.5          | 4.42      | 4.75           |
| 10                   | -       | -               | -         | -              |
|                      | 9820    | 2355.0          | 8.83      | 9.42           |
|                      | -       | -               | -         | -              |

| LTE Band 30 Uplink |         |                 |           |                |
|--------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)    | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                  | 27685   | 2307.5          | 4.44      | 4.76           |
|                    | 27710   | 2310.0          | 4.43      | 4.76           |
|                    | 27735   | 2312.5          | 4.45      | 4.75           |
| 10                 | -       | -               | -         | -              |
|                    | 27710   | 2310.0          | 8.87      | 9.53           |
|                    | -       | -               | -         | -              |

| LTE Band 71 Downlink |         |                 |           |                |
|----------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)      | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                    | 68611   | 619.5           | 4.44      | 4.78           |
|                      | 68761   | 634.5           | 4.45      | 4.76           |
|                      | 68911   | 649.5           | 4.44      | 4.77           |
| 10                   | 68636   | 622.0           | 8.88      | 9.59           |
|                      | 68761   | 634.5           | 8.91      | 9.59           |
|                      | 68886   | 647.0           | 8.90      | 9.55           |
| 15                   | 68661   | 624.5           | 13.28     | 14.24          |
|                      | 68761   | 634.5           | 13.32     | 14.29          |
|                      | 68861   | 644.5           | 13.24     | 14.27          |
| 20                   | 68686   | 627.0           | 17.71     | 19.20          |
|                      | 68761   | 634.5           | 17.78     | 19.17          |
|                      | 68836   | 642.0           | 17.64     | 19.02          |

| LTE Band 71 Uplink |         |                 |           |                |
|--------------------|---------|-----------------|-----------|----------------|
| Bandwidth (MHz)    | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5                  | 133147  | 665.5           | 4.41      | 4.73           |
|                    | 133297  | 680.5           | 4.44      | 4.77           |
|                    | 133447  | 695.5           | 4.43      | 4.75           |
| 10                 | 133172  | 668.0           | 8.83      | 9.49           |
|                    | 133297  | 680.5           | 8.88      | 9.57           |
|                    | 133422  | 693.0           | 8.88      | 9.49           |
| 15                 | 133197  | 670.5           | 13.25     | 14.20          |
|                    | 133297  | 680.5           | 13.29     | 14.18          |
|                    | 133397  | 690.5           | 13.29     | 14.20          |
| 20                 | 133222  | 673.0           | 17.65     | 18.96          |
|                    | 133297  | 680.5           | 17.79     | 18.93          |
|                    | 133372  | 688.0           | 17.76     | 19.02          |

### LTE Band 4 Downlink (5 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 99%OBW



### LTE Band 4 Downlink (5 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 26dB BW



### LTE Band 4 Downlink (10 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 99%OBW



12:24:14 12.08.2019

### LTE Band 4 Downlink (10 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 26dB BW



12:24:58 12.08.2019

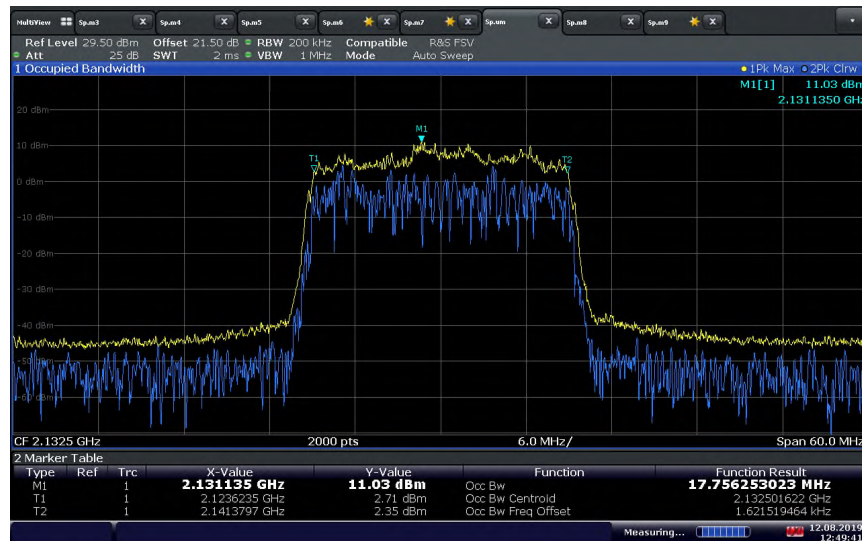
### LTE Band 4 Downlink (15 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 99%OBW



### LTE Band 4 Downlink (15 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 26dB BW

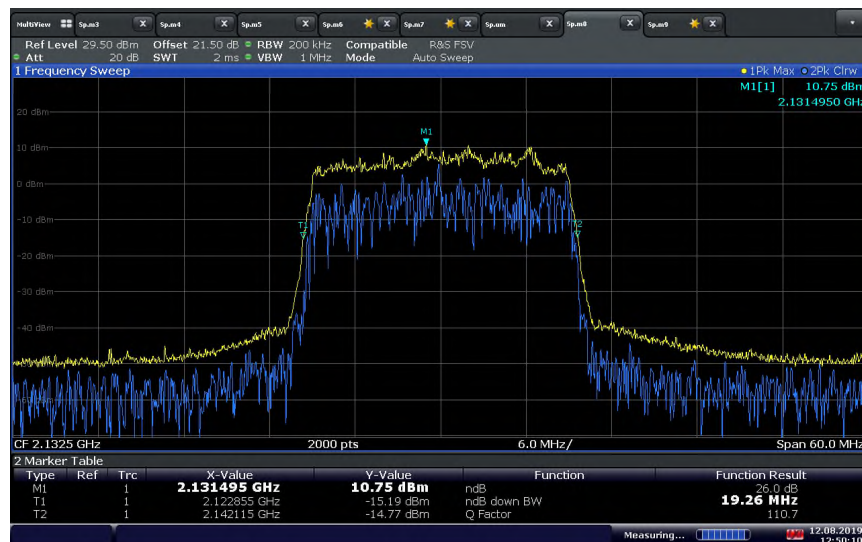


**LTE Band 4 Downlink (20 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 99%OBW**



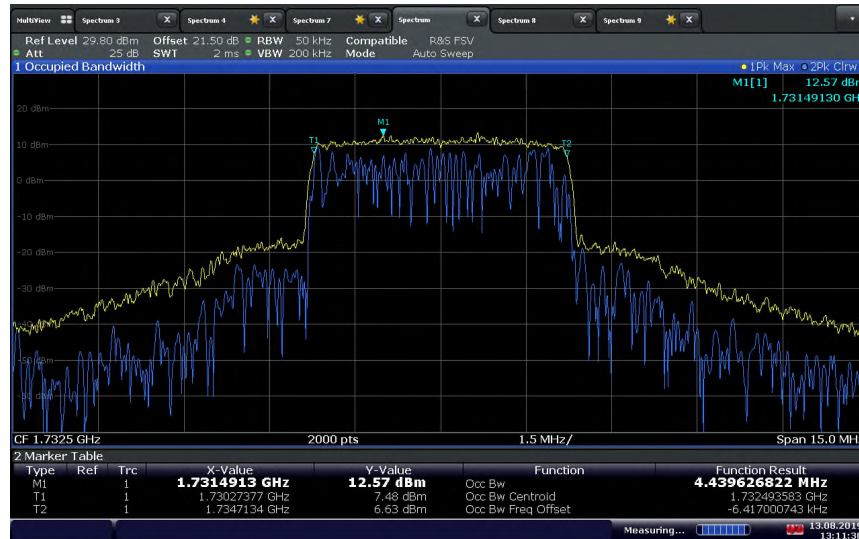
12:49:41 12.08.2019

**LTE Band 4 Downlink (20 MHz BW) / Middle Channel Middle Channel 2132.5 MHz / 26dB BW**

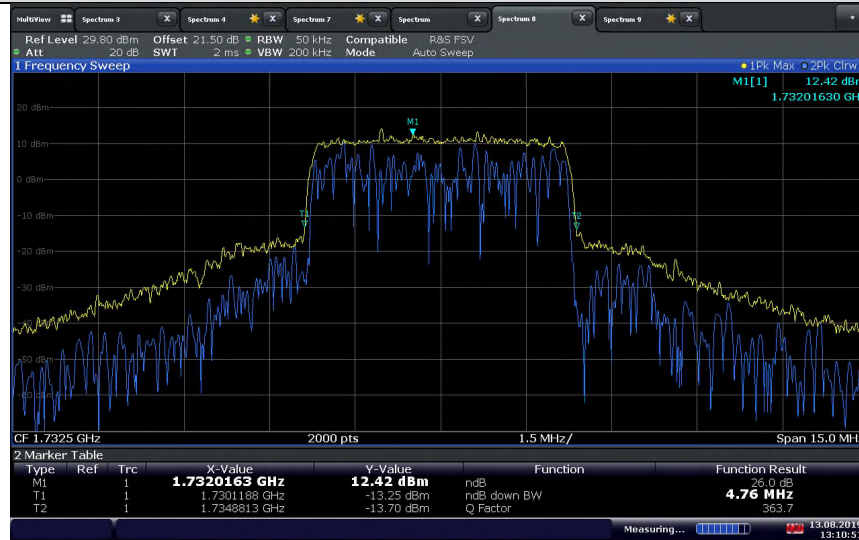


12:50:11 12.08.2019

### LTE Band 4 Uplink (5 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 99%OBW



### LTE Band 4 Uplink (5 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 26dB BW

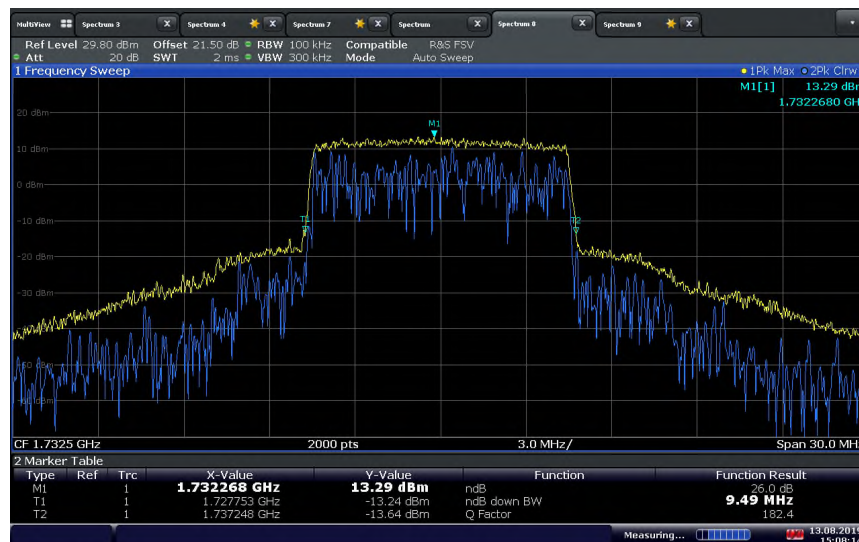


**LTE Band 4 Uplink (10 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 99%OBW**



15:07:42 13.08.2019

**LTE Band 4 Uplink (10 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 26dB BW**



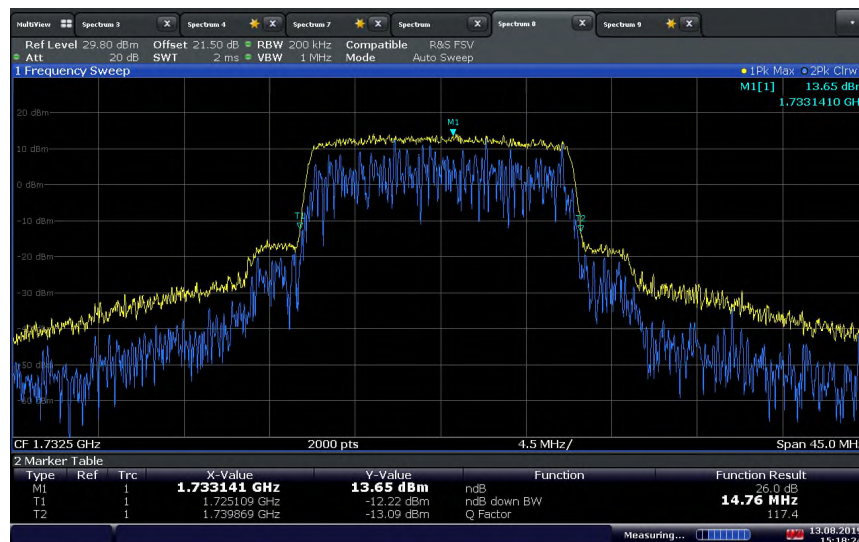
15:08:15 13.08.2019

**LTE Band 4 Uplink (15 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 99%OBW**



15:17:49 13.08.2019

**LTE Band 4 Uplink (15 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 26dB BW**



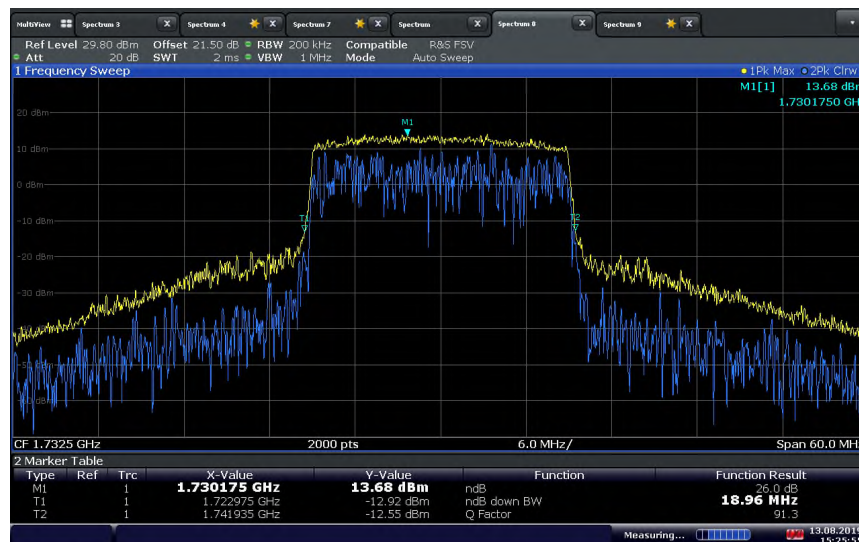
15:18:24 13.08.2019

### LTE Band 4 Uplink (20 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 99%OBW



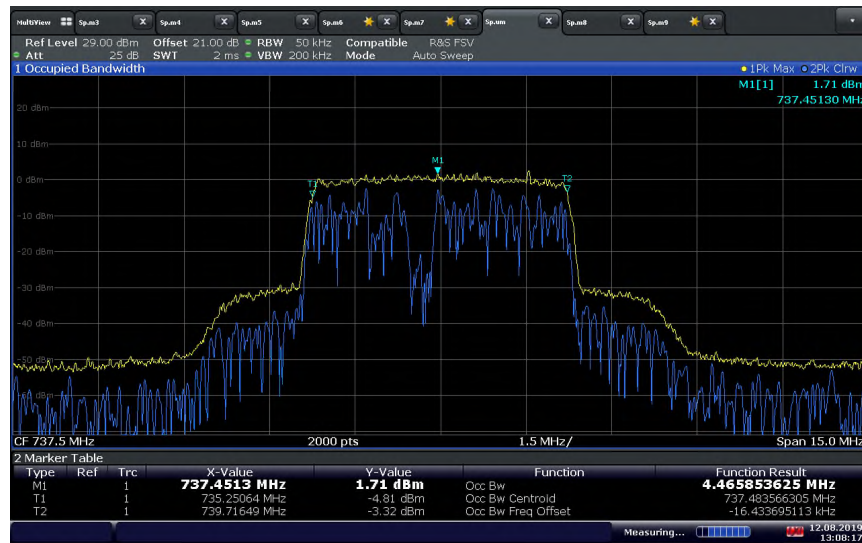
15:26:35 13.08.2019

### LTE Band 4 Uplink (20 MHz BW) / Middle Channel Middle Channel 1732.5 MHz / 26dB BW

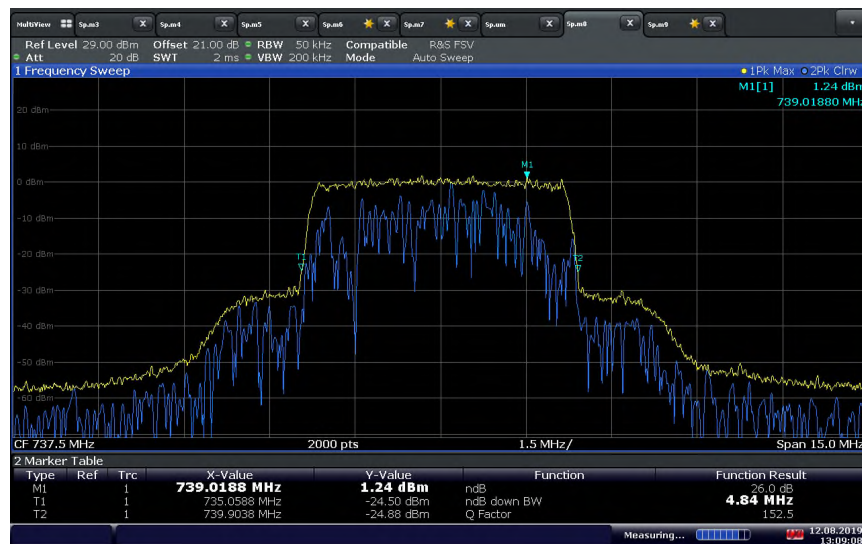


15:25:55 13.08.2019

### LTE Band 12 Downlink (5 MHz BW) / Middle Channel Middle Channel 737.5 MHz / 99%OBW



### LTE Band 12 Downlink (5 MHz BW) / Middle Channel Middle Channel 737.5 MHz / 26dB BW



### LTE Band 12 Downlink (10 MHz BW) / Middle Channel Middle Channel 737.5 MHz / 99%OBW



13:19:24 12.08.2019

### LTE Band 12 Downlink (10 MHz BW) / Middle Channel Middle Channel 737.5 MHz / 26dB BW



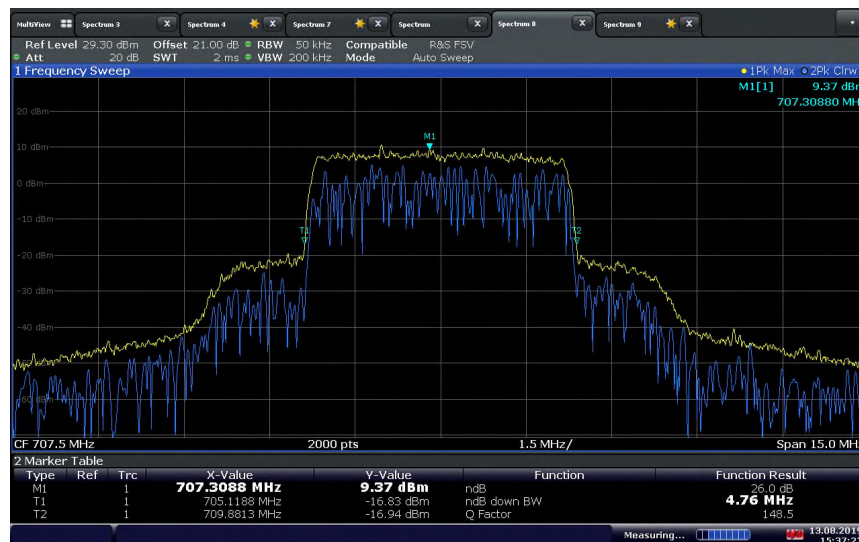
13:18:45 12.08.2019

**LTE Band 12 Uplink (5 MHz BW) / Middle Channel Middle Channel 707.5 MHz / 99%OBW**



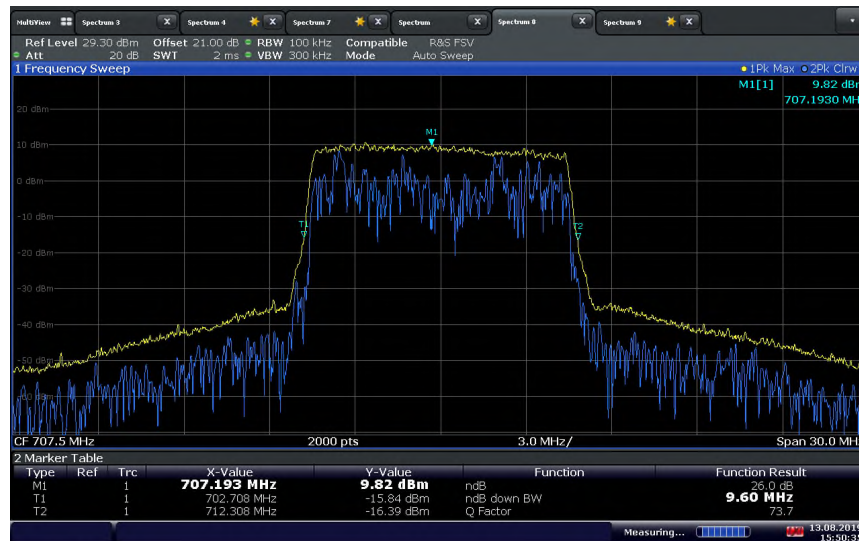
15:36:44 13.08.2019

**LTE Band 12 Uplink (5 MHz BW) / Middle Channel Middle Channel 707.5 MHz / 26dB BW**



15:37:23 13.08.2019

### LTE Band 12 Uplink (10 MHz BW) / Middle Channel Middle Channel 707.5 MHz / 99%OBW



15:50:36 13.08.2019

### LTE Band 12 Uplink (10 MHz BW) / Middle Channel Middle Channel 707.5 MHz / 26dB BW



15:52:34 13.08.2019

### LTE Band 13 Downlink (5 MHz BW) / Middle Channel Middle Channel 751.0 MHz / 99%OBW



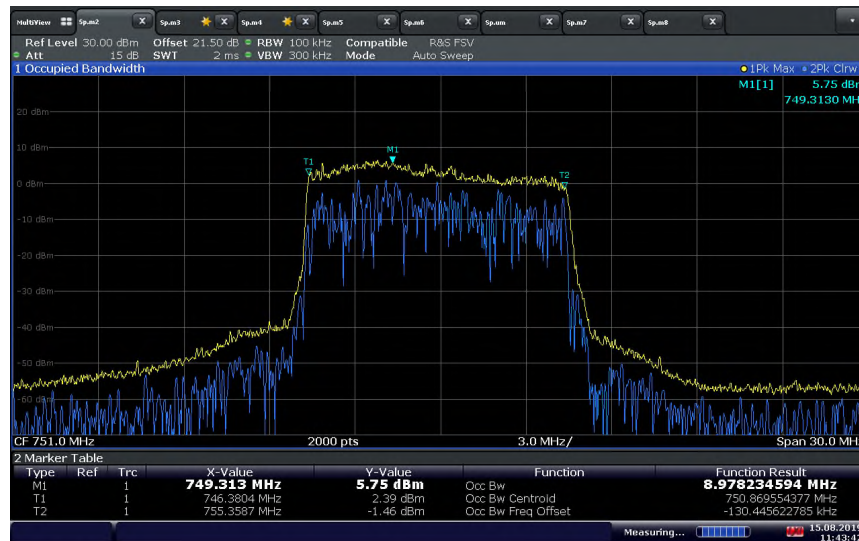
11:14:06 15.08.2019

### LTE Band 13 Downlink (5 MHz BW) / Middle Channel Middle Channel 751.0 MHz / 26dB BW



11:14:52 15.08.2019

### LTE Band 13 Downlink (10 MHz BW) / Middle Channel Middle Channel 751.0 MHz / 99%OBW



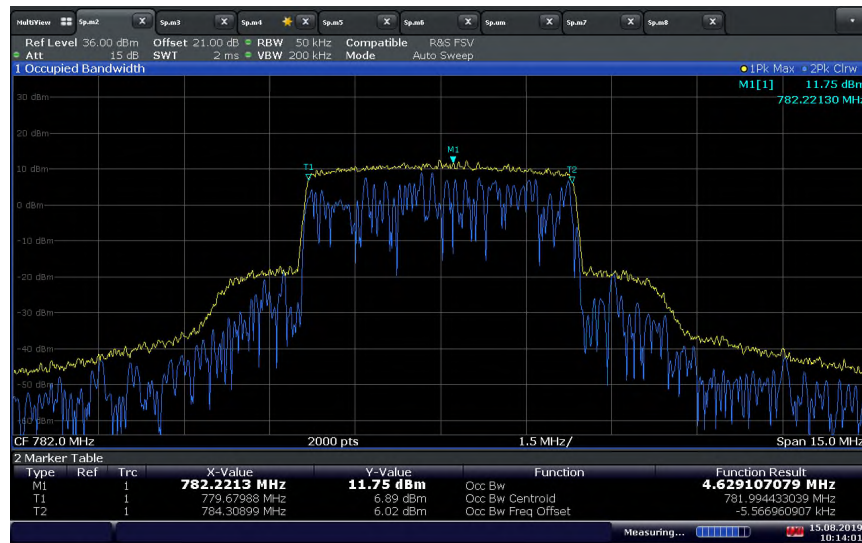
11:43:42 15.08.2019

### LTE Band 13 Downlink (10 MHz BW) / Middle Channel Middle Channel 751.0 MHz / 26dB BW



11:44:42 15.08.2019

**LTE Band 13 Uplink (5 MHz BW) / Middle Channel Middle Channel 782.0 MHz / 99%OBW**



10:14:01 15.08.2019

**LTE Band 13 Uplink (5 MHz BW) / Middle Channel Middle Channel 782.0 MHz / 26dB BW**



10:14:01 15.08.2019

**LTE Band 13 Uplink (10 MHz BW) / Middle Channel Middle Channel 782.0 MHz / 99%OBW**



09:58:56 15.08.2019

**LTE Band 13 Uplink (10 MHz BW) / Middle Channel Middle Channel 782.0 MHz / 26dB BW**



09:59:33 15.08.2019

**LTE Band 30 Downlink (5 MHz BW) / Middle Channel Middle Channel 2355.0 MHz / 99%OBW**



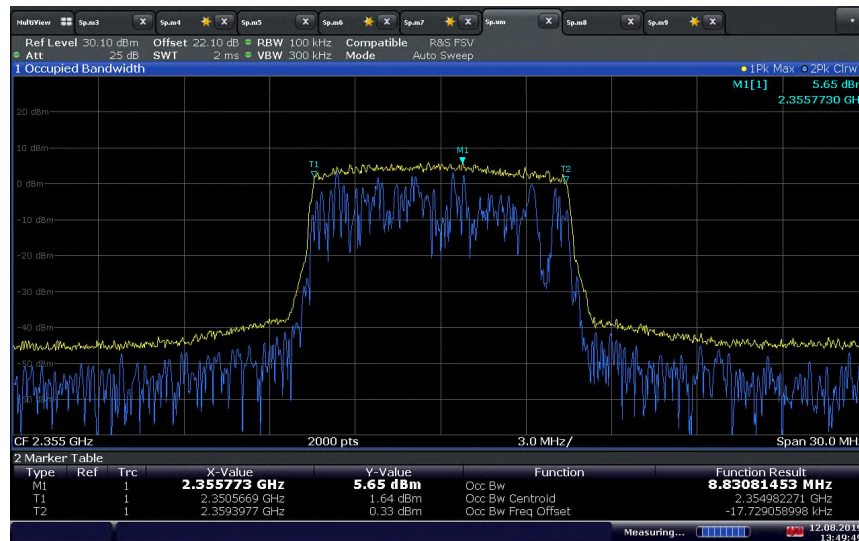
13:40:29 12.08.2019

**LTE Band 30 Downlink (5 MHz BW) / Middle Channel Middle Channel 2355.0 MHz / 26dB BW**



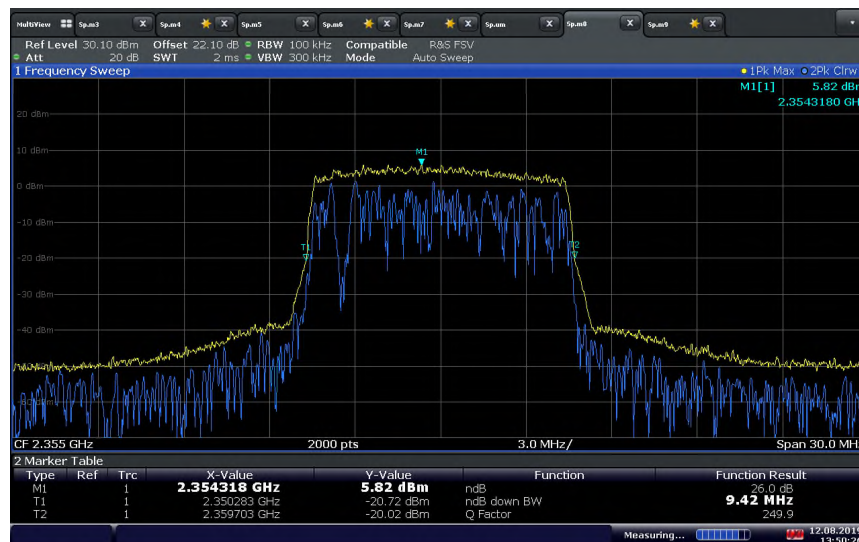
13:39:33 12.08.2019

### LTE Band 30 Downlink (10 MHz BW) / Middle Channel Middle Channel 2355.0 MHz / 99%OBW



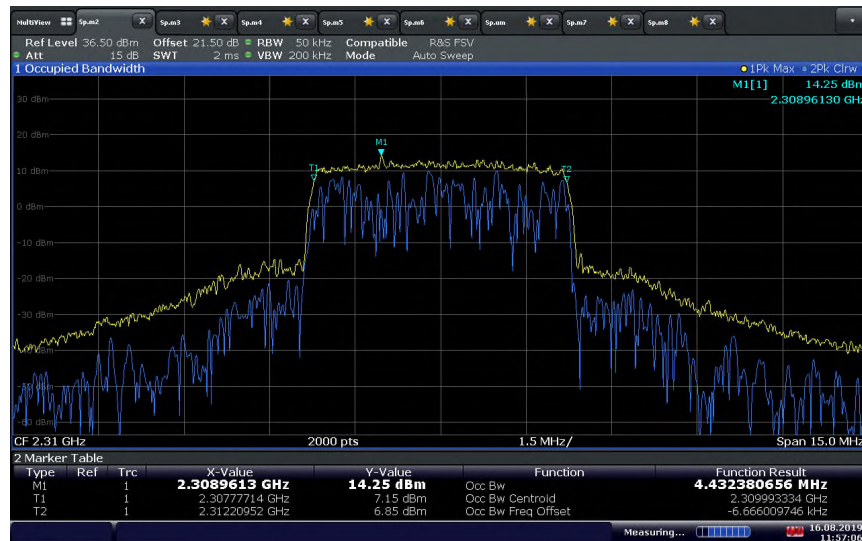
13:49:49 12.08.2019

### LTE Band 30 Downlink (10 MHz BW) / Middle Channel Middle Channel 2355.0 MHz / 26dB BW



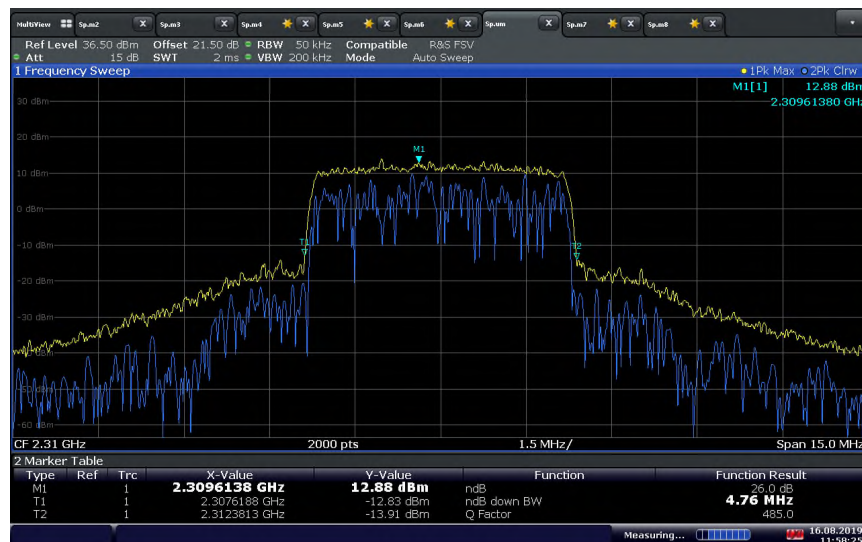
13:50:27 12.08.2019

**LTE Band 30 Uplink (5 MHz BW) / Middle Channel Middle Channel 2310.0 MHz / 99%OBW**



11:57:07 16.08.2019

**LTE Band 30 Uplink (5 MHz BW) / Middle Channel Middle Channel 2310.0 MHz / 26dB BW**



11:58:26 16.08.2019

### LTE Band 30 Uplink (10 MHz BW) / Middle Channel Middle Channel 2310.0 MHz / 99%OBW



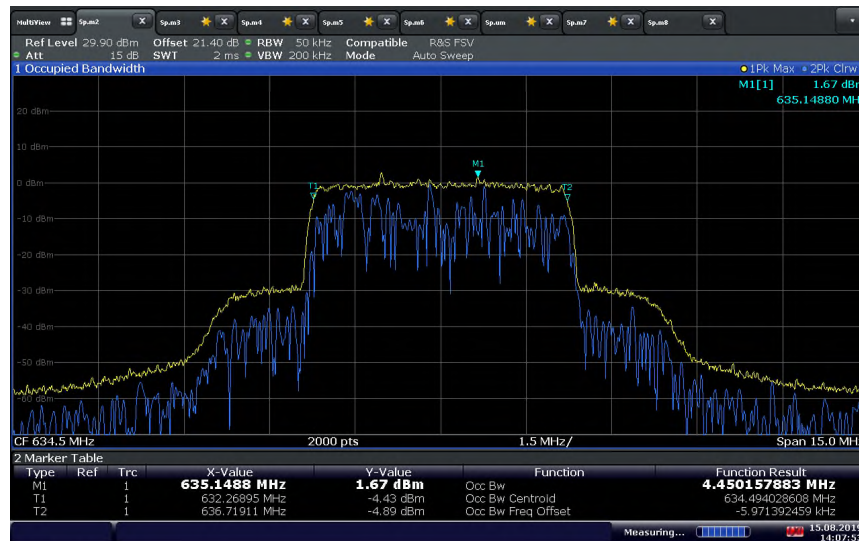
11:53:16 16.08.2019

### LTE Band 30 Uplink (10 MHz BW) / Middle Channel Middle Channel 2310.0 MHz / 26dB BW



11:52:05 16.08.2019

**LTE Band 71 Downlink (5 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 99%OBW**



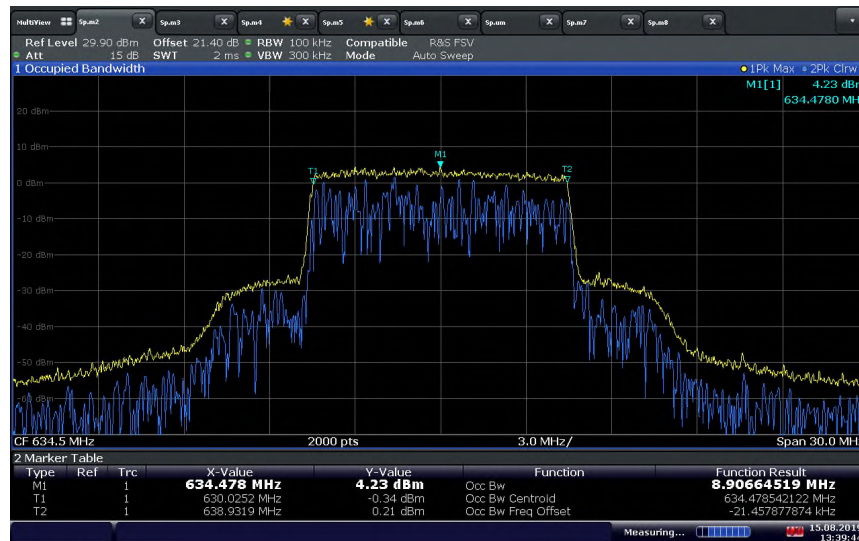
14:07:54 15.08.2019

**LTE Band 71 Downlink (5 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 26dB BW**

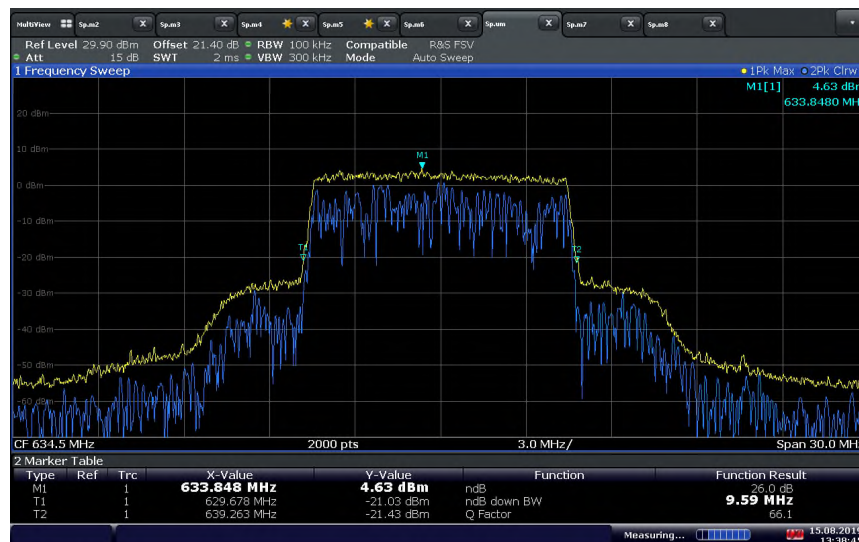


14:09:27 15.08.2019

### LTE Band 71 Downlink (10 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 99%OBW



### LTE Band 71 Downlink (10 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 26dB BW



### LTE Band 71 Downlink (15 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 99%OBW



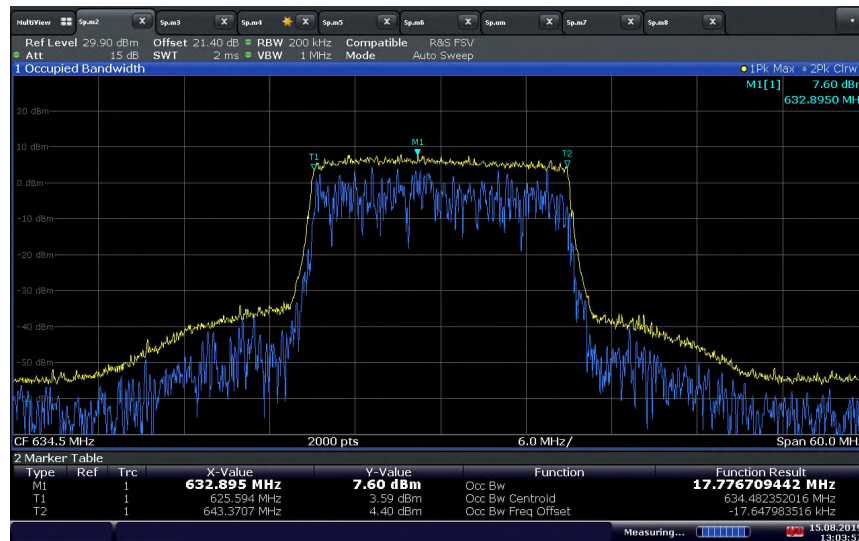
13:27:16 15.08.2019

### LTE Band 71 Downlink (15 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 26dB BW



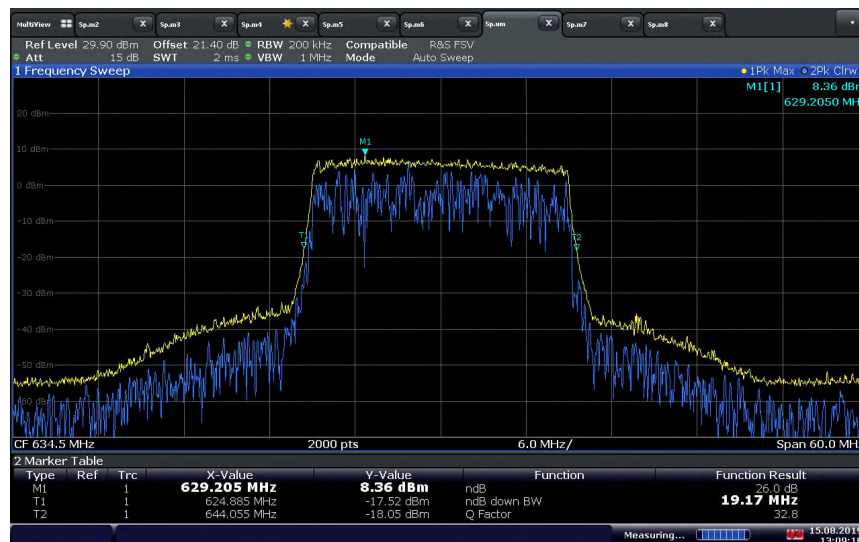
13:28:16 15.08.2019

### LTE Band 71 Downlink (20 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 99%OBW



13:03:58 15.08.2019

### LTE Band 71 Downlink (20 MHz BW) / Middle Channel Middle Channel 634.5 MHz / 26dB BW

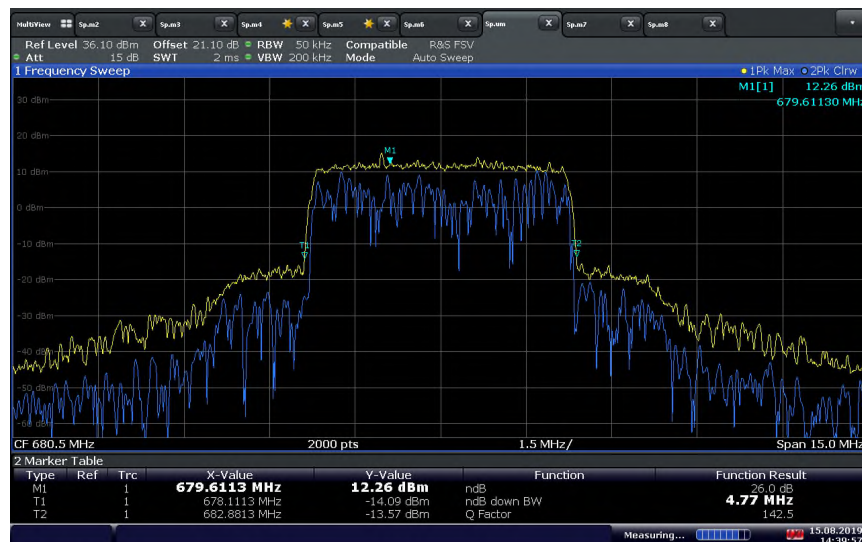


13:09:18 15.08.2019

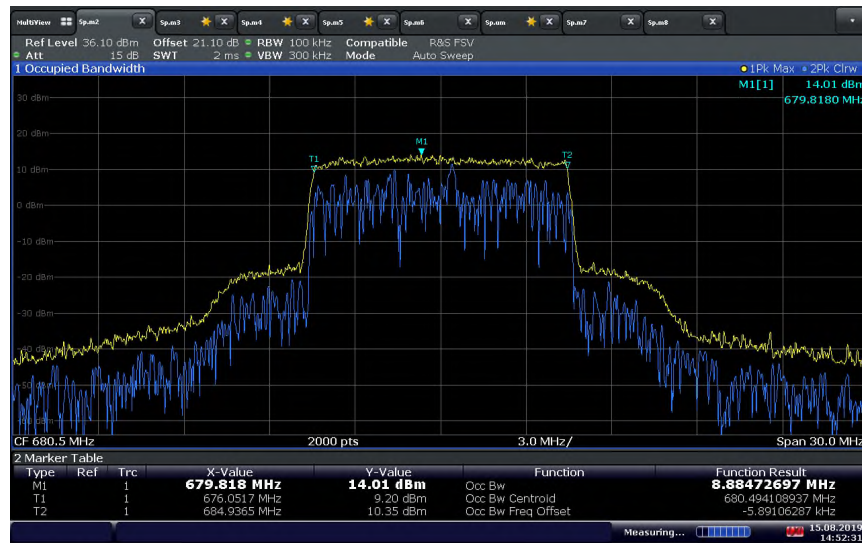
**LTE Band 71 Uplink (5 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 99%OBW**



**LTE Band 71 Uplink (5 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 26dB BW**

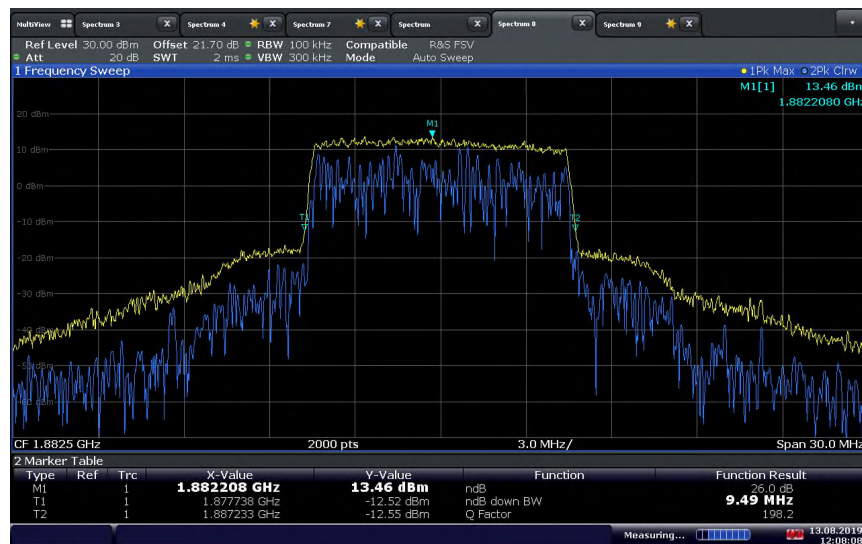


### LTE Band 71 Uplink (10 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 99%OBW



14:52:32 15.08.2019

### LTE Band 71 Uplink (10 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 26dB BW



12:08:09 13.08.2019

**LTE Band 71 Uplink (15 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 99%OBW**



15:04:45 15.08.2019

**LTE Band 71 Uplink (15 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 26dB BW**



15:03:56 15.08.2019

### LTE Band 71 Uplink (20 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 99%OBW



### LTE Band 71 Uplink (20 MHz BW) / Middle Channel Middle Channel 680.5 MHz / 26dB BW

