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## Report On

Application for Grant of Equipment Authorization of the  
Nextivity Inc.

QUATRA 4000 Industrial Signal Booster

FCC CFR 47 Part 2, 27 and 90  
RSS-GEN and RSS-131

**Report No. 72154394C**

**December 2019**

FCC ID: NU: YETI441234CNU  
CU: YETI415ECU  
IC: NU: 9298A-I441234CNU  
CU: 9298A-I415ECU  
Report No. 72154394C



|                           |                                                                                                                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REPORT ON</b>          | Radio Testing of the<br>Nextivity Inc.<br>QUATRA 4000 Industrial Signal Booster                                                                                                                           |
| <b>TEST REPORT NUMBER</b> | 72154394C                                                                                                                                                                                                 |
| <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>(858) 485-9442<br>CLi@Nextivityinc.com                                                                                                                     |
| <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 19, 2019                                                                                                                                                                                         |

FCC ID: NU: YETI441234CNU  
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## Revision History

| 72154394C<br>Nextivity Inc.<br>QUATRA 4000 Industrial Signal Booster |              |                 |        |                   |                    |
|----------------------------------------------------------------------|--------------|-----------------|--------|-------------------|--------------------|
| DATE                                                                 | OLD REVISION | NEW REVISION    | REASON | PAGES<br>AFFECTED | APPROVED BY        |
| 12/19/2018                                                           | -            | Initial Release |        |                   | Ferdinand Custodio |
|                                                                      |              |                 |        |                   |                    |
|                                                                      |              |                 |        |                   |                    |
|                                                                      |              |                 |        |                   |                    |



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## **SECTION 1**

### **REPORT SUMMARY**

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

## 1.1 INTRODUCTION

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

- FCC CFR 47 Part 2, 27 and 90
- RSS-Gen Issue 5 April 2018
- RSS-199 Issue 3 December 2016
- RSS-131 Issue 3 January 2017

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| EUT                           | Industrial Signal Booster                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Product Marketing Name        | QUATRA 4000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Model Number(s)               | NU: I44-1234CNU<br>CU: I41-5ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| FCC ID Number                 | NU: YETI441234CNU<br>CU: YETI415ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| IC Number                     | NU: 9298A-I441234CNU<br>CU: 9298A-I415ECU                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Serial Number(s)              | 370920000139 (NU), 371929000156 (CU) and 443935000064 (CU)                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Number of Samples Tested      | 3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Test Specification/Issue/Date | <ul style="list-style-type: none"> <li>• FCC CFR 47 Part 2, 27 and 90 (October 1, 2018)</li> <li>• RSS-131 - Zone Enhancer (Issue 3, May 2017)</li> <li>• RSS-Gen - General Requirements for Compliance of Radio Apparatus (Issue 5, April 2018)</li> <li>• ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services</li> </ul>                                                                                                            |
| Start of Test                 | November 08, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Finish of Test                | December 05, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Name of Engineer(s)           | Xiaoying Zhang                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Related Document(s)           | <ul style="list-style-type: none"> <li>• KDB412172 D01 Determining ERP and EIRP v01r01 August 07, 2015: Guidelines for determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of an RF transmitting system</li> <li>• KDB971168 D01 Power Meas License Digital Systems v03r01: April 9 2018: Measurement guidance for certification of licensed digital transmitters</li> <li>• KDB 935210 D05 Indus Booster Basic Meas v01r03 (April 15, 2019)</li> </ul> |

## 1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2, 27 and 90 with cross-reference to the corresponding ISSED RSS standards is shown below.

| LTE Band 26 (814 – 814 / 859 – 869 MHz) |             |                                    |                |         |                                                                     |               |
|-----------------------------------------|-------------|------------------------------------|----------------|---------|---------------------------------------------------------------------|---------------|
| Section                                 | Spec Clause |                                    |                |         | Test Description                                                    | Result        |
|                                         | FCC Part 2  | FCC Part 90                        | KDB 935210 D05 | RSS-131 |                                                                     |               |
| 2.1                                     | 2.1046      | -                                  | -              | -       | Transmitter Conducted Output Power                                  | Compliant     |
| 2.2                                     | 2.1046      | 90.635(b)                          | -              | -       | Effective Radiated Power and Effective Isotropically Radiated Power | Compliant     |
| 2.3                                     | 2.1049      | 90.219(e)(4)(ii)                   | -              | -       | Occupied Bandwidth                                                  | Compliant     |
| 2.4                                     | -           | -                                  | -              | -       | Peak-Average Ratio                                                  | Compliant     |
| 2.5                                     | 2.1051      | 90.691(a)                          | -              | -       | Band Edge                                                           | Compliant     |
| 2.6                                     | 2.1051      | 90.691(a)                          | 4.7.3          | -       | Conducted Spurious Emissions                                        | Compliant     |
| 2.7                                     | 2.1053      | 90.691(a)                          | 4.9            | -       | Field Strength of Spurious Radiation                                | Compliant     |
| 2.8                                     | 2.1055      | 90.213                             | 4.8            | 5.2.4   | Frequency Stability                                                 | Compliant     |
| 2.9                                     | -           | -                                  | -              | -       | Power Line Conducted Emissions                                      | Compliant     |
| 2.10                                    | -           | -                                  | 4.2            | -       | ACG Threshold Level                                                 | Compliant     |
| 2.11                                    | -           | -                                  | 4.3            | 5.2.1   | Out of Band Rejection                                               | Compliant     |
| 2.12                                    | -           | 90.219 (e)(4)(ii)                  | 4.4            | 5.2.2   | Input-versus-output signal comparison                               | Compliant     |
| 2.13                                    | -           | 90.219 (e)(4)(ii) (iii),<br>90.210 | 4.4            | -       | Emission Mask                                                       | Justification |
| 2.14                                    | -           | 90.219(e)(1)                       | 4.5            | 5.2.3   | Input / Output Power and Amplifier / Booster Gain                   | Compliant     |
| 2.15                                    | -           | 90.219(e)(2)                       | 4.6            | -       | Noise Figure                                                        | Compliant     |
| 2.16                                    | 2.1051      | 90.691(a)                          | 4.7            | -       | Out-of-band/out-of-block (Intermodulation) and Spurious Emissions   | Compliant     |

| LTE Band 41 |             |                     |                |                 |         |                                                                     |                      |
|-------------|-------------|---------------------|----------------|-----------------|---------|---------------------------------------------------------------------|----------------------|
| Section     | Spec Clause |                     |                |                 |         | Test Description                                                    | Result               |
|             | FCC Part 2  | FCC Part 27         | KDB 935210 D05 | RSS-199 RSS-Gen | RSS-131 |                                                                     |                      |
| 2.1         | 2.1046      | -                   | -              | -               | -       | Transmitter Conducted Output Power                                  | Compliant            |
| 2.2         | 2.1046      | 27.50(h)(1)         | -              | 4.4             | -       | Effective Radiated Power and Effective Isotropically Radiated Power | Compliant            |
| 2.3         | 2.1049      | -                   | -              | RSS-Gen 6.7     | -       | Occupied Bandwidth                                                  | Compliant            |
| 2.4         | -           | -                   | -              | 4.4             | -       | Peak-Average Ratio                                                  | Compliant            |
| 2.5         | 2.1051      | 27.53(m)(2) and (4) | -              | 4.5             | -       | Band Edge                                                           | Compliant            |
| 2.6         | 2.1051      | 27.53(m)(2) and (4) | -              | 4.5             | -       | Conducted Spurious Emissions                                        | Compliant            |
| 2.7         | 2.1053      | 27.53(m)(2) and (4) | -              | 4.5             | -       | Field Strength of Spurious Radiation                                | Compliant            |
| 2.8         | 2.1055      | 27.54               | -              | 4.3             | 5.2.4   | Frequency Stability                                                 | Compliant            |
| -           | -           | -                   | -              | RSS-Gen 7.1     | -       | Receiver Spurious Emissions                                         | N/A                  |
| 2.9         | -           | -                   | -              | RSS-GEN 8.8     | -       | Power Line Conducted Emissions                                      | Compliant            |
| 2.10        | -           | -                   | 3.2            | -               | -       | ACG Threshold Level                                                 | Compliant            |
| 2.11        | -           | -                   | 3.3            | -               | 5.2.1   | Out of Band Rejection                                               | Compliant            |
| 2.13        | -           | -                   | -              | -               | -       | Emission Mask                                                       | For LTE Band 26 only |
| 2.12        | -           | -                   | 3.4            | -               | 5.2.2   | Input-versus-output signal comparison                               | Compliant            |
| 2.14        | -           | -                   | 3.5            | -               | 5.2.3   | Input / Output Power and Amplifier / Booster Gain                   | Compliant            |
| 2.15        | -           | -                   | -              | -               | -       | Noise Figure                                                        | For LTE Band 26 only |
| 2.16        | 2.1051      | 27.53(m)(2) and (4) | 3.6            | 4.5             | -       | Out-of-band/out-of-block (Intermodulation) and Spurious Emissions   | Compliant            |

N/A: Not applicable. EUT is not a Stand-Alone receiver.



### 1.3 PRODUCT INFORMATION

#### 1.3.1 EUT General Description

The Equipment Under Test (EUT) was a Nextivity Inc. QUATRA 4000 Industrial 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.

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 | L41    | L26 | L25 |
| Band Combination                     | √      |      | √  |     |    | √      |     | √  |     | √      | √   |    | √      | √   |     |
|                                      | √      |      |    | √   |    | √      |     |    | √   | √      |     | √  | √      |     | √   |
|                                      | √      |      |    |     | √  |        | √   | √  |     | -      | -   | -  |        | √   | √   |
|                                      |        | √    | √  |     |    |        | √   |    | √   | -      | -   | -  | -      | -   | -   |
|                                      |        | √    |    | √   |    |        |     | √  | √   | -      | -   | -  | -      | -   | -   |
|                                      |        | √    |    |     | √  | -      | -   | -  | -   | -      | -   | -  | -      | -   | -   |

The LTE Band 26 859-869/814-824 MHz and LTE Band 41 function of the EUT were verified in this test report.

### 1.3.2 Technical Description

EUT Description Industrial Signal Booster

Trade Name Cel-Fi™

Product Marketing Name QUATRA 4000

Model Number(s) NU: I44-1234CNU  
CU: I41-5ECU

Rated Voltage NU: 120 VAC 60Hz  
CU: 54V DC (powered from NU via 2 Ethernet cables)

Mode Verified FDD LTE Band 26 (814 – 824 MHz / 859 – 869 MHz)  
TDD LTE Band 41

Frequency Bands FDD LTE Band 26: Uplink: 814 – 824 MHz  
Downlink: 859 – 869 MHz  
TDD LTE Band 41: Uplink/Downlink: 2496 – 2690 MHz

#### Product Specifications

| Frequency Band        | Band 26     | Band 41           |
|-----------------------|-------------|-------------------|
| Technology            | FDD LTE     | TDD LTE           |
| Booster Bandwidth     | 5, 10 MHz   | 5, 10, 15, 20 MHz |
| Downlink Output Power | Max. 16 dBm | Max. 16 dBm       |
| Uplink Output Power   | Max. 22 dBm | Max. 22 dBm       |

Capability WCDMA (Band 5), LTE (Band 4, 12, 13, 25, 26, 30, 41 and 71)

Primary Unit (EUT) ☐ Production  
☒ Pre-Production  
☐ Engineering

Environment Fixed, Indoor

Manufacturer Declared Temperature Range 0°C to 40°C

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 26 | 6.35 dBi       | 0.4 dBi           |
| LTE Band 41 | 3.92 dBi       | 2.3 dBi           |

### 1.3.3 Transmit Frequency Table

| Mode                              | Channel Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | ERP                  |                    |
|-----------------------------------|-------------------------|--------------------|---------------------|----------------------|--------------------|
|                                   |                         |                    |                     | Max. Power Avg (dBm) | Max. Power Avg (W) |
| LTE Band 26 (859-869MHz) Downlink | 5                       | 859 - 869          | 4M44F9W             | 9.74                 | 0.01               |
|                                   | 10                      | 859 - 869          | 8M88F9W             | 12.36                | 0.02               |
| LTE Band 26 (814-824MHz) Uplink   | 5                       | 814 - 824          | 4M44F9W             | 27.92                | 0.62               |
|                                   | 10                      | 814 - 824          | 8M89F9W             | 27.90                | 0.62               |

| Mode                 | Channel Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | EIRP                 |                    |
|----------------------|-------------------------|--------------------|---------------------|----------------------|--------------------|
|                      |                         |                    |                     | Max. Power Avg (dBm) | Max. Power Avg (W) |
| LTE Band 41 Downlink | 5                       | 2496 - 2590        | 4M47F9W             | 11.36                | 0.01               |
|                      | 10                      | 2496 - 2590        | 8M97F9W             | 14.21                | 0.03               |
|                      | 15                      | 2496 - 2590        | 13M3F9W             | 15.93                | 0.04               |
|                      | 20                      | 2496 - 2590        | 17M9F9W             | 17.27                | 0.05               |
| LTE Band 41 Uplink   | 5                       | 2496 - 2590        | 4M45F9W             | 23.05                | 0.20               |
|                      | 10                      | 2496 - 2590        | 8M92F9W             | 23.21                | 0.21               |
|                      | 15                      | 2496 - 2590        | 13M3F9W             | 23.22                | 0.21               |
|                      | 20                      | 2496 - 2590        | 17M7F9W             | 23.77                | 0.24               |

## 1.4 EUT TEST CONFIGURATION

### 1.4.1 Test Configuration Description

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

### 1.4.2 EUT Exercise Software

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

### 1.4.3 Support Equipment and I/O cables

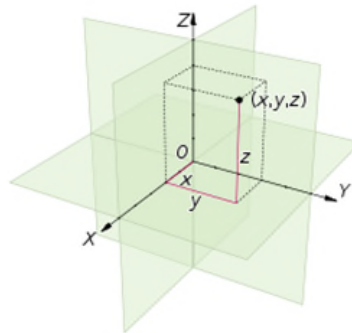
| Manufacturer | Equipment/Cable                 | Description                                           |
|--------------|---------------------------------|-------------------------------------------------------|
| Dell         | Support Laptop                  | M/N: Latitude D630 PP18L<br>S/N: 5SBJBG1              |
| Dell         | Support Laptop AC Adapter       | M/N: PA-1900-02D<br>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<br>S/N: MY49071335                        |
| Ramsey       | Support Shielded Test Enclosure | With custom USB cable                                 |

#### 1.4.4 Worst Case Configuration

Worst-case configuration used in this test report as per output power measurements:

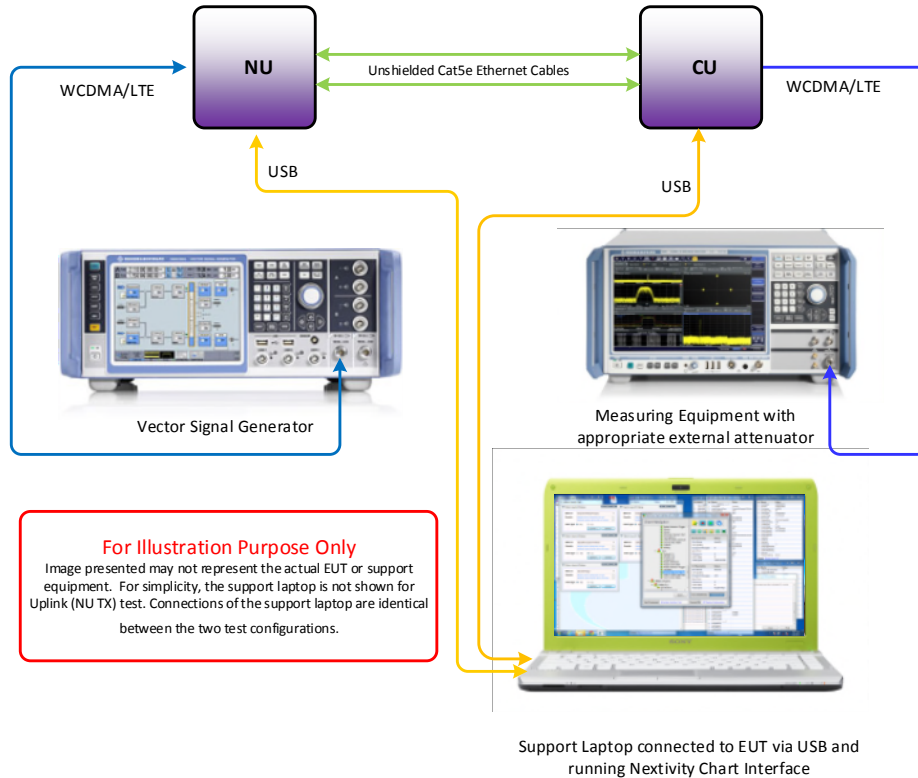
| Mode                                 | Bandwidth | Channel No.         | Frequency |
|--------------------------------------|-----------|---------------------|-----------|
| LTE Band 26<br>(859-869MHz) Downlink | 10MHz     | Middle Channel 8740 | 864.0MHz  |
| LTE Band 26<br>(814-824MHz) Uplink   | 5MHz      | Low Channel 26715   | 816.5MHz  |
| LTE Band 41                          | 20MHz     | High Channel 41490  | 2680MHz   |
| LTE Band 41                          | 20MHz     | High Channel 41490  | 2680MHz   |

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.



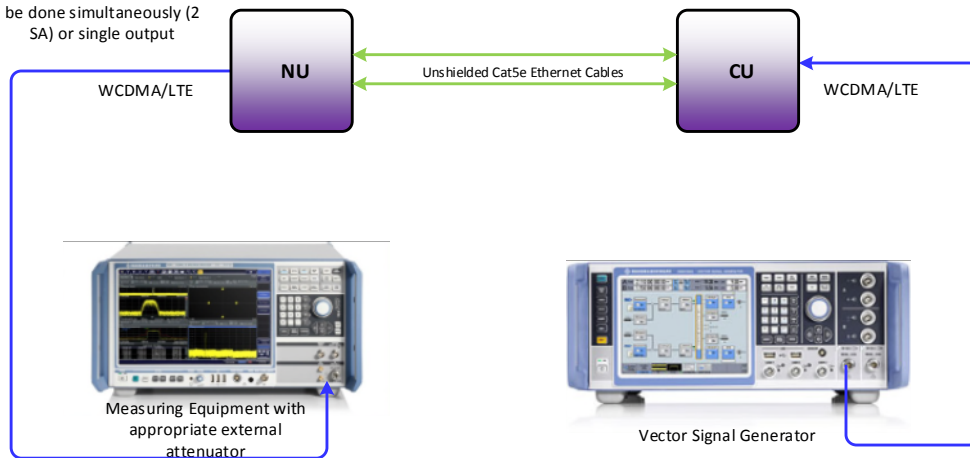
#### 1.4.5 Simplified Test Configuration Diagram

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

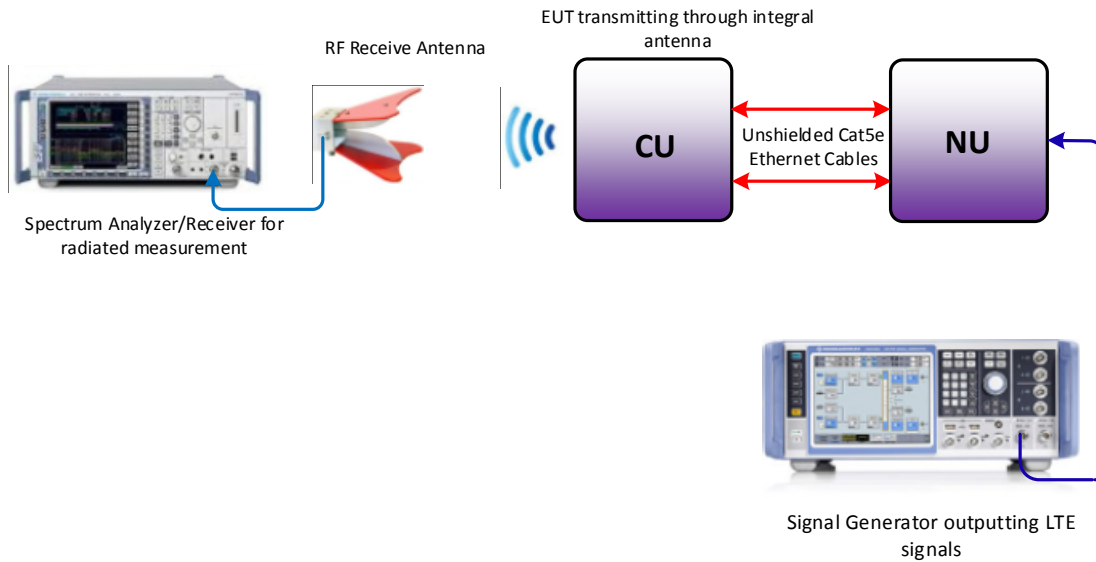


##### Uplink (NU Tx) Conducted Test

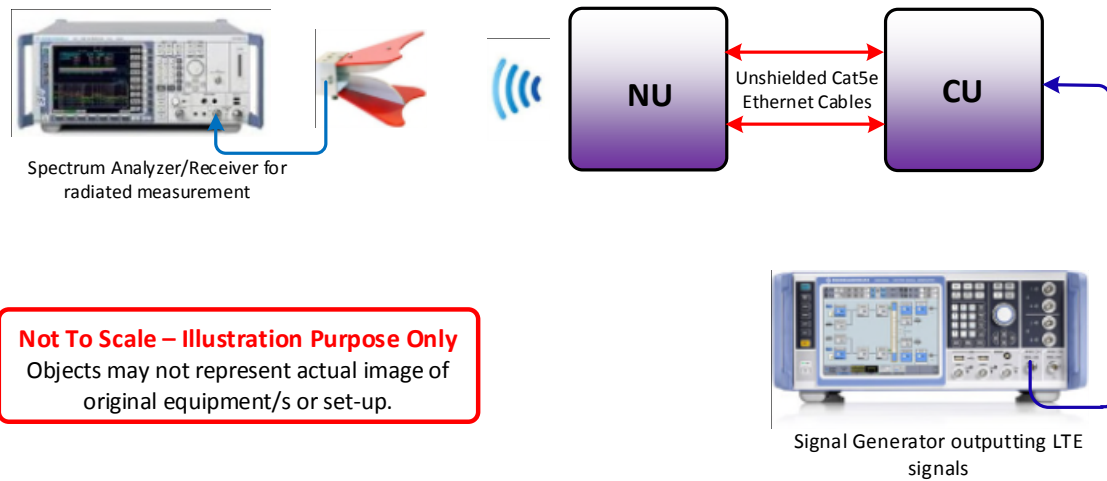
Monitoring the output can be done simultaneously (2 SA) or single output



## Radiated Testing (Downlink)



## Radiated Testing (Uplink)



## 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), 371929000156 (CU) and 443935000064 (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.

FCC ID: NU: YETI441234CNU  
 CU: YETI415ECU  
 IC: NU: 9298A-I441234CNU  
 CU: 9298A-I415ECU  
 Report No. 72154394C



## 1.10 SAMPLE CALCULATIONS

### 1.10.1 LTE Emission Designator (QPSK)

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 (db $\mu$ V) @ 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 (db $\mu$ V/m) @ 30MHz |                            |       | 11.8  |

FCC ID: NU: YETI441234CNU  
CU: YETI415ECU  
IC: NU: 9298A-I441234CNU  
CU: 9298A-I415ECU  
Report No. 72154394C



## **SECTION 2**

### **TEST DETAILS**

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



## **2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS**

### **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.

FCC 47 CFR 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, 443935000064 (CU) / Test Configuration A and B

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

November 08, 11, 18 and 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 - 26.1°C  |
| Relative Humidity   | 25.0 - 45.7%   |
| ATM Pressure        | 98.7 - 99.2kPa |

### 2.1.7 Additional Observations

- This is a conducted test using Power Meter.
- The path loss were 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

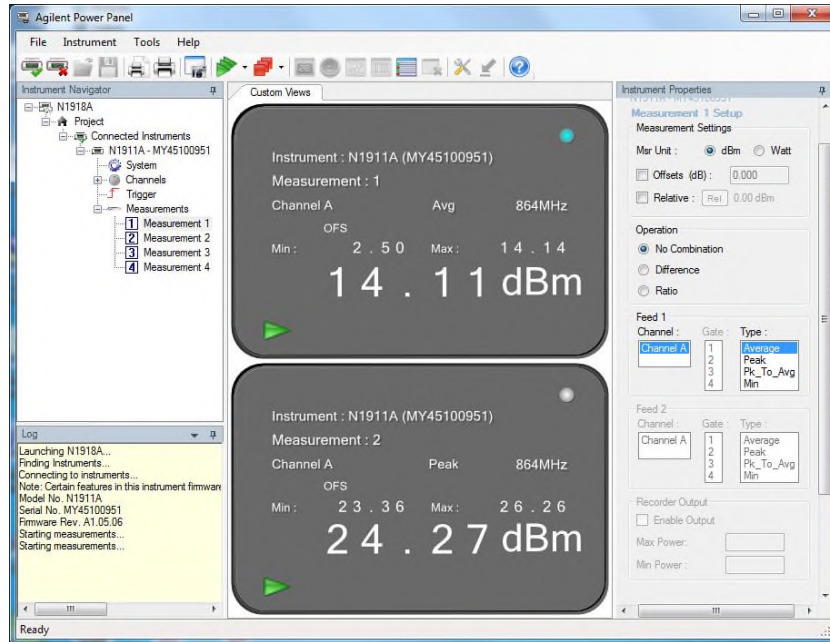
| LTE Band 26 (859 – 869 / 814 – 824 MHz) |                 |              |                 |               |             |          |      |
|-----------------------------------------|-----------------|--------------|-----------------|---------------|-------------|----------|------|
| Mode                                    | Bandwidth (MHz) | Channel      | Frequency (MHz) | Average Power |             | PK Power |      |
|                                         |                 |              |                 | (dBm)         | (W)         | (dBm)    | (W)  |
| Downlink                                | 5               | 8715         | 861.5           | 11.0          | 0.01        | 21.76    | 0.15 |
|                                         |                 | 8740         | 864             | 11.49         | 0.01        | 21.57    | 0.14 |
|                                         |                 | 8765         | 866.5           | 11.17         | 0.01        | 21.32    | 0.14 |
|                                         | 10              | <b>8740</b>  | <b>864</b>      | <b>14.11</b>  | <b>0.03</b> | 24.27    | 0.27 |
| Uplink                                  | 5               | <b>26715</b> | <b>816.5</b>    | <b>23.72</b>  | <b>0.24</b> | 32.91    | 1.95 |
|                                         |                 | 26740        | 819             | 23.53         | 0.23        | 34.0     | 2.51 |
|                                         |                 | 26765        | 821.5           | 23.70         | 0.23        | 32.98    | 1.99 |
|                                         | 10              | 26740        | 819             | 23.62         | 0.23        | 32.91    | 1.95 |

| LTE Band 41 |                 |         |                 |               |      |          |      |
|-------------|-----------------|---------|-----------------|---------------|------|----------|------|
| Mode        | Bandwidth (MHz) | Channel | Frequency (MHz) | Average Power |      | PK Power |      |
|             |                 |         |                 | (dBm)         | (W)  | (dBm)    | (W)  |
| Downlink    | 5               | 39675   | 2498.5          | 9.06          | 0.01 | 20.74    | 0.12 |
|             |                 | 40620   | 2593            | 8.78          | 0.01 | 20.65    | 0.12 |
|             |                 | 41565   | 2687.5          | 8.97          | 0.01 | 20.97    | 0.13 |
|             | 10              | 39700   | 2501            | 11.69         | 0.01 | 23.93    | 0.25 |
|             |                 | 40620   | 2593            | 11.70         | 0.01 | 23.31    | 0.21 |
|             |                 | 41540   | 2685            | 11.91         | 0.02 | 23.09    | 0.20 |
|             | 15              | 39725   | 2503.5          | 12.97         | 0.02 | 25.51    | 0.36 |
|             |                 | 40620   | 2593            | 13.47         | 0.02 | 24.78    | 0.30 |
|             |                 | 41515   | 2682.5          | 13.63         | 0.02 | 25.57    | 0.36 |
|             | 20              | 39750   | 2506            | 14.52         | 0.03 | 27.11    | 0.51 |
|             |                 | 40620   | 2593            | 14.81         | 0.03 | 27.99    | 0.63 |
|             |                 | 41490   | 2680            | 14.97         | 0.03 | 26.94    | 0.49 |
| Uplink      | 5               | 39675   | 2498.5          | 18.20         | 0.07 | 31.14    | 1.30 |
|             |                 | 40620   | 2593            | 17.85         | 0.06 | 30.67    | 1.17 |
|             |                 | 41565   | 2687.5          | 19.13         | 0.08 | 32.07    | 1.61 |
|             | 10              | 39700   | 2501            | 18.10         | 0.06 | 30.99    | 1.26 |
|             |                 | 40620   | 2593            | 17.87         | 0.06 | 31.10    | 1.29 |
|             |                 | 41540   | 2685            | 19.29         | 0.08 | 32.28    | 1.69 |
|             | 15              | 39725   | 2503.5          | 17.93         | 0.06 | 31.34    | 1.36 |
|             |                 | 40620   | 2593            | 18.05         | 0.06 | 30.76    | 1.19 |
|             |                 | 41515   | 2682.5          | 19.30         | 0.09 | 31.69    | 1.48 |
|             | 20              | 39750   | 2506            | 18.05         | 0.06 | 31.17    | 1.31 |
|             |                 | 40620   | 2593            | 18.01         | 0.06 | 30.67    | 1.17 |
|             |                 | 41490   | 2680            | 19.85         | 0.10 | 32.18    | 1.65 |

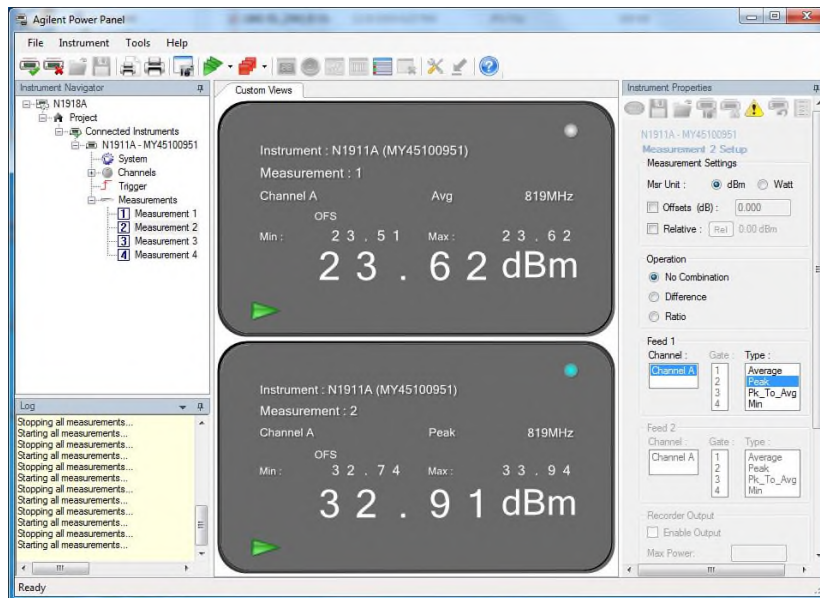
| 2 Bands/port worst case configuration Downlink |                                                                         |                         |                     |                |
|------------------------------------------------|-------------------------------------------------------------------------|-------------------------|---------------------|----------------|
| CU with Ant Port                               | Band & Bandwidth & Channel                                              | Frequency (MHz)         | Average Power (dBm) | PK Power (dBm) |
| D                                              | LTE Band 41 20MHz BW High Ch & LTE Band 26 (859-869MHz) 10MHz BW Mid Ch | 2680.0 MHz + 864.0 MHz  | 17.34               | 25.43          |
|                                                | LTE Band 41 20MHz BW High Ch & LTE Band 25 20MHz BW Mid Ch              | 2680.0 MHz + 1962.5 MHz | 17.42               | 26.89          |
|                                                | LTE Band 26 (859-869MHz) 10MHz BW Mid Ch & LTE Band 25 20MHz BW Mid Ch  | 864.0 MHz + 1962.5 MHz  | 18.11               | 26.20          |

| 2 Bands/port worst case configuration Uplink |                                                                        |                         |                     |                |
|----------------------------------------------|------------------------------------------------------------------------|-------------------------|---------------------|----------------|
| Ant Port                                     | Band & Bandwidth & Channel                                             | Frequency (MHz)         | Average Power (dBm) | PK Power (dBm) |
| D                                            | LTE Band 41 20MHz BW High Ch & LTE Band 26 (814-824MHz) 5MHz BW Low Ch | 2680.0 MHz + 816.5 MHz  | 23.29               | 33.34          |
|                                              | LTE Band 41 20MHz BW High Ch & LTE Band 25 20MHz BW High Ch            | 2680.0 MHz + 1905.0 MHz | 22.69               | 32.54          |
|                                              | LTE Band 26 (814-824MHz) 5MHz BW Low Ch & LTE Band 25 20MHz BW High Ch | 816.5 MHz + 1905.0 MHz  | 25.20               | 32.90          |

## 2.1.9 Sample Test Measurement Screen

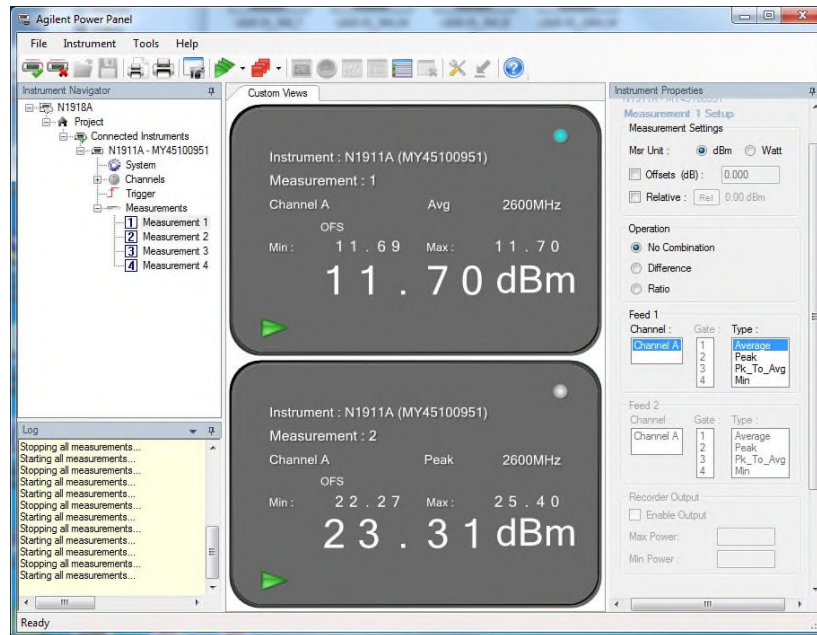


**LTE Band 26 859 – 869 MHz DL 10MHz Bandwidth Middle Channel**

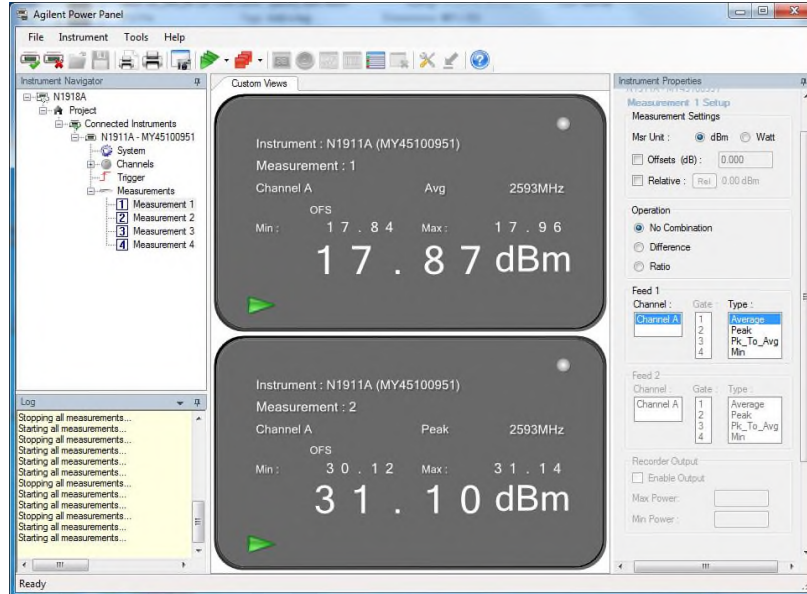


**LTE Band 26 814 – 824 MHz UL 10MHz Bandwidth Middle Channel**





LTE Band 41 DL 10MHz Bandwidth Middle Channel



LTE Band 41 UL 10MHz Bandwidth Middle Channel

## **2.2 EFFECTIVE RADIATED POWER AND EFFECTIVE ISOTROPICALLY RADIATED POWER**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
FCC 47 CFR Part 27, Clause 27.50(h)(1)  
FCC 47 CFR Part 90, Clause 90.635(b)  
RSS-199, Clause 4.4

### **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 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.

FCC 47 CFR Part 90, Clause 90.635(b):

The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw).

RSS-199, Clause 4.4:

The transmitter output power shall be measured in terms of average value.

For mobile subscriber equipment, the e.i.r.p shall not exceed 2W. For fixed subscriber equipment, the transmitter output power shall not exceed 2W and e.i.r.p shall be limited to 40W.

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

Serial No: 370920000139 (NU) and 371929000156, 443935000064 (CU) / Test Configuration (N/A, calculation only)

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

November 08, 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 Additional Observations

- ERP was calculated as per Section 1.2 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

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

Where:

$P_T$  = transmitter conducted output power dBm (Section 2.1 of this test report)  
 $G_T$  = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP) (dBd=dBi-2.15);  
 $L_c$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB (EUT configuration during verification is mounted on an interface board with short direct connection to the antenna port. The loss between the EUT and the antenna port is considered negligible).

## 2.2.7 Test Results

| LTE Band 26 (859 – 869 / 814 – 824 MHz) |                 |                 |                         |                    |              |             |
|-----------------------------------------|-----------------|-----------------|-------------------------|--------------------|--------------|-------------|
| Mode                                    | Bandwidth (MHz) | Frequency (MHz) | Max Power Average (dBm) | Antenna Gain (dBi) | ERP (dBm)    | Limit (dBm) |
| Downlink                                | 5               | 861.5           | 11.0                    | 0.4                | 9.25         | 50          |
|                                         |                 | 864             | 11.49                   | 0.4                | 9.74         | 50          |
|                                         |                 | 866.5           | 11.17                   | 0.4                | 9.42         | 50          |
|                                         | 10              | <b>864</b>      | <b>14.11</b>            | <b>0.4</b>         | <b>12.36</b> | <b>50</b>   |
| Uplink                                  | 5               | <b>816.5</b>    | <b>23.72</b>            | <b>6.35</b>        | <b>27.92</b> | <b>50</b>   |
|                                         |                 | 819             | 23.53                   | 6.35               | 27.73        | 50          |
|                                         |                 | 821.5           | 23.70                   | 6.35               | 27.90        | 50          |
|                                         | 10              | 819             | 23.62                   | 6.35               | 27.82        | 50          |



| LTE Band 41 |                 |                 |                         |                    |            |             |
|-------------|-----------------|-----------------|-------------------------|--------------------|------------|-------------|
| Mode        | Bandwidth (MHz) | Frequency (MHz) | Max Power Average (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) |
| Downlink    | 5               | 2498.5          | 9.06                    | 2.3                | 11.36      | 62.21       |
|             |                 | 2593            | 8.78                    | 2.3                | 11.08      | 62.21       |
|             |                 | 2687.5          | 8.97                    | 2.3                | 11.27      | 62.21       |
|             | 10              | 2501            | 11.69                   | 2.3                | 13.99      | 65.22       |
|             |                 | 2593            | 11.70                   | 2.3                | 14.0       | 65.22       |
|             |                 | 2685            | 11.91                   | 2.3                | 14.21      | 65.22       |
|             | 15              | 2503.5          | 12.97                   | 2.3                | 15.27      | 66.98       |
|             |                 | 2593            | 13.47                   | 2.3                | 15.77      | 66.98       |
|             |                 | 2682.5          | 13.63                   | 2.3                | 15.93      | 66.98       |
|             | 20              | 2506            | 14.52                   | 2.3                | 16.82      | 68.23       |
|             |                 | 2593            | 14.81                   | 2.3                | 17.11      | 68.23       |
|             |                 | 2680            | 14.97                   | 2.3                | 17.27      | 68.23       |
| Uplink      | 5               | 2498.5          | 18.20                   | 3.92               | 22.12      | 62.21       |
|             |                 | 2593            | 17.85                   | 3.92               | 21.77      | 62.21       |
|             |                 | 2687.5          | 19.13                   | 3.92               | 23.05      | 62.21       |
|             | 10              | 2501            | 18.10                   | 3.92               | 22.02      | 65.22       |
|             |                 | 2593            | 17.87                   | 3.92               | 21.79      | 65.22       |
|             |                 | 2685            | 19.29                   | 3.92               | 23.21      | 65.22       |
|             | 15              | 2503.5          | 17.93                   | 3.92               | 21.85      | 66.98       |
|             |                 | 2593            | 18.05                   | 3.92               | 21.97      | 66.98       |
|             |                 | 2682.5          | 19.30                   | 3.92               | 23.22      | 66.98       |
|             | 20              | 2506            | 18.05                   | 3.92               | 21.97      | 68.23       |
|             |                 | 2593            | 18.01                   | 3.92               | 21.93      | 68.23       |
|             |                 | 2680            | 19.85                   | 3.92               | 23.77      | 68.23       |

## **2.3 OCCUPIED BANDWIDTH**

### **2.3.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1049  
FCC 47 CFR Part 90, Clause 90.219 (e)(4)(ii)  
RSS-GEN 6.7

### **2.3.2 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.

FCC Part 90.219 (e)(4):

(ii) There is no change in the occupied bandwidth of the retransmitted signals.

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

Serial No: 370920000139 (NU) and 371929000156, 443935000064 (CU) / Test Configuration A and B

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

November 11 and 27, 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 | 23.4 - 24.8°C  |
| Relative Humidity   | 36.8 - 44.6%   |
| ATM Pressure        | 98.0 - 99.2kPa |

### 2.3.7 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 VBW is  $\geq 3 \times$  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.
- There is no change in the occupied bandwidth of the retransmitted signals.

### 2.3.8 Test Results

| LTE Band 26 (859 – 869 / 814 – 824 MHz) |                 |         |                 |           |                |
|-----------------------------------------|-----------------|---------|-----------------|-----------|----------------|
| Mode                                    | Bandwidth (MHz) | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| Downlink                                | 5               | 8715    | 861.5           | 4.44      | 4.81           |
|                                         |                 | 8740    | 864             | 4.44      | 4.76           |
|                                         |                 | 8765    | 866.5           | 4.46      | 4.79           |
|                                         | 10              | 8740    | 864             | 8.88      | 9.57           |
| Uplink                                  | 5               | 26715   | 816.5           | 4.44      | 4.76           |
|                                         |                 | 26740   | 819             | 4.44      | 4.75           |
|                                         |                 | 26765   | 821.5           | 4.44      | 4.75           |
|                                         | 10              | 26740   | 819             | 8.89      | 9.49           |

| LTE Band 41 |                 |         |                 |           |                |
|-------------|-----------------|---------|-----------------|-----------|----------------|
| Mode        | Bandwidth (MHz) | Channel | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| Downlink    | 5               | 39675   | 2498.5          | 4.47      | 4.79           |
|             |                 | 40620   | 2593            | 4.44      | 4.77           |
|             |                 | 41565   | 2687.5          | 4.46      | 4.81           |
|             | 10              | 39700   | 2501            | 8.97      | 9.68           |
|             |                 | 40620   | 2593            | 8.90      | 9.69           |
|             |                 | 41540   | 2685            | 8.92      | 9.66           |
|             | 15              | 39725   | 2503.5          | 13.34     | 14.36          |
|             |                 | 40620   | 2593            | 13.32     | 14.36          |
|             |                 | 41515   | 2682.5          | 13.34     | 14.24          |
|             | 20              | 39750   | 2506            | 17.91     | 19.32          |
|             |                 | 40620   | 2593            | 17.76     | 19.20          |
|             |                 | 41490   | 2680            | 17.72     | 19.26          |
| Uplink      | 5               | 39675   | 2498.5          | 4.44      | 4.75           |
|             |                 | 40620   | 2593            | 4.45      | 4.76           |
|             |                 | 41565   | 2687.5          | 4.44      | 4.88           |
|             | 10              | 39700   | 2501            | 8.92      | 9.66           |
|             |                 | 40620   | 2593            | 8.89      | 9.57           |
|             |                 | 41540   | 2685            | 8.88      | 9.48           |
|             | 15              | 39725   | 2503.5          | 13.33     | 14.31          |
|             |                 | 40620   | 2593            | 13.33     | 14.18          |
|             |                 | 41515   | 2682.5          | 13.30     | 14.22          |
|             | 20              | 39750   | 2506            | 17.74     | 19.04          |
|             |                 | 40620   | 2593            | 17.74     | 18.83          |
|             |                 | 41490   | 2680            | 17.68     | 18.84          |

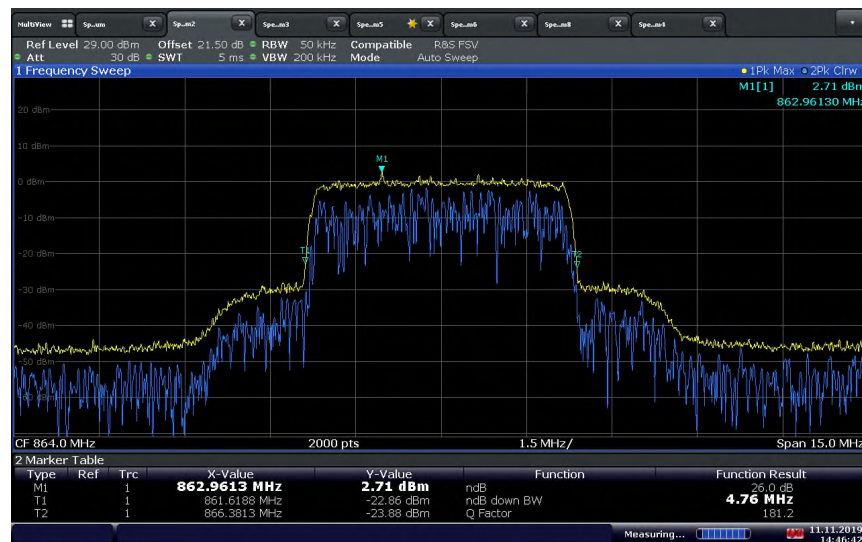
### 2.3.9 Example Test Plots

#### LTE Band 26 (859 – 869 MHz) Downlink 5MHz BW / Middle Channel 864 MHz / 99%OBW



14:45:34 11.11.2019

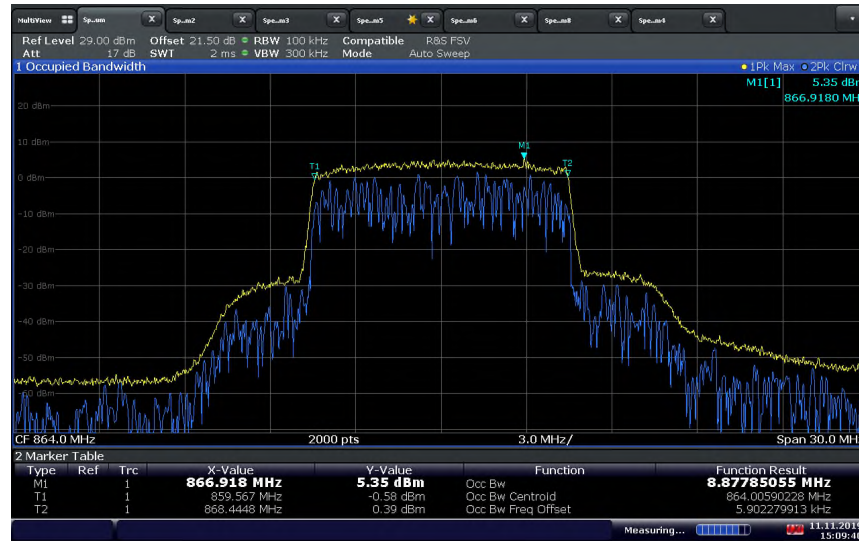
#### LTE Band 26 (859 – 869 MHz) Downlink 5MHz BW / Middle Channel 864 MHz / 26dB BW



14:46:42 11.11.2019

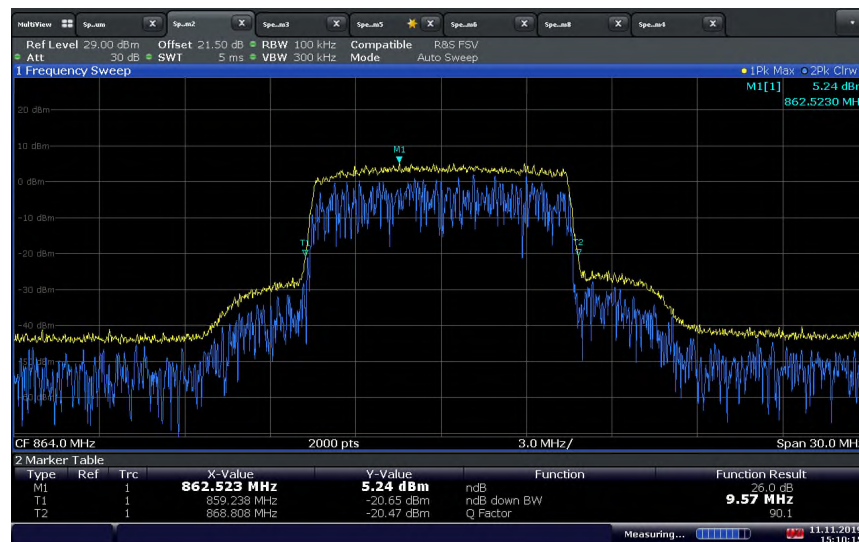


**LTE Band 26 (859 – 869 MHz) Downlink 10MHz BW / Middle Channel 864 MHz / 99%OBW**



15:09:40 11.11.2019

**LTE Band 26 (859 – 869 MHz) Downlink 10MHz BW / Middle Channel 864 MHz / 26dB BW**



15:10:16 11.11.2019

### LTE Band 26 (814 – 824 MHz) Uplink 5MHz BW / Middle Channel 819 MHz / 99%OBW



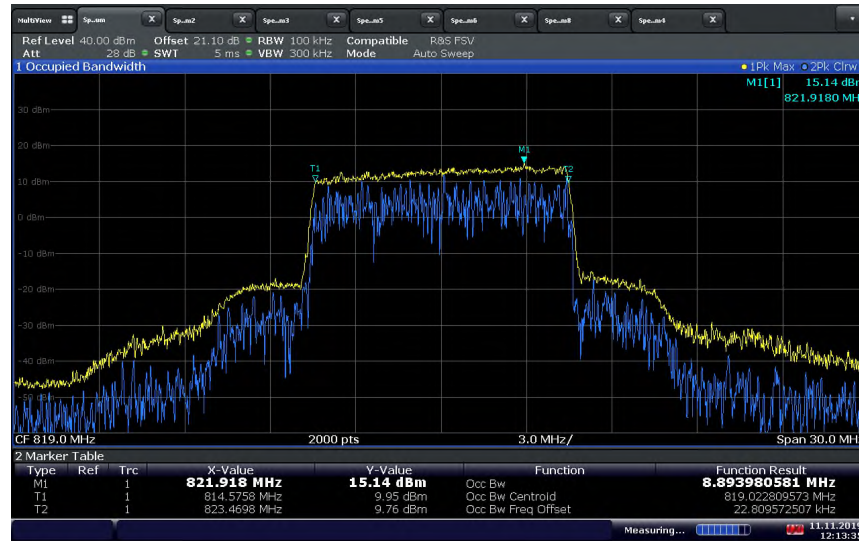
12:26:42 11.11.2019

### LTE Band 26 (814 – 824 MHz) Uplink 5MHz BW / Middle Channel 819 MHz / 26dB BW

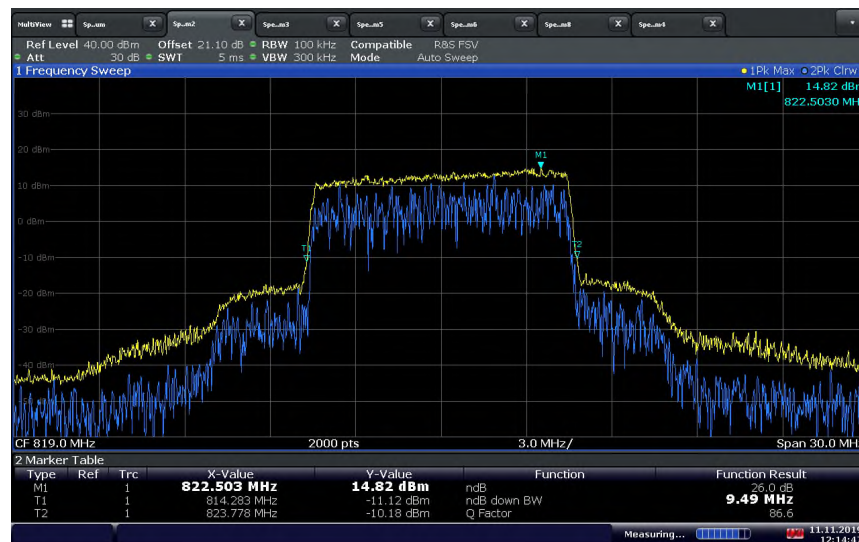


12:25:54 11.11.2019

### LTE Band 26 (814 – 824 MHz) Uplink 10MHz BW / Middle Channel 819 MHz / 99%OBW



### LTE Band 26 (814 – 824 MHz) Uplink 10MHz BW / Middle Channel 819 MHz / 26dB BW

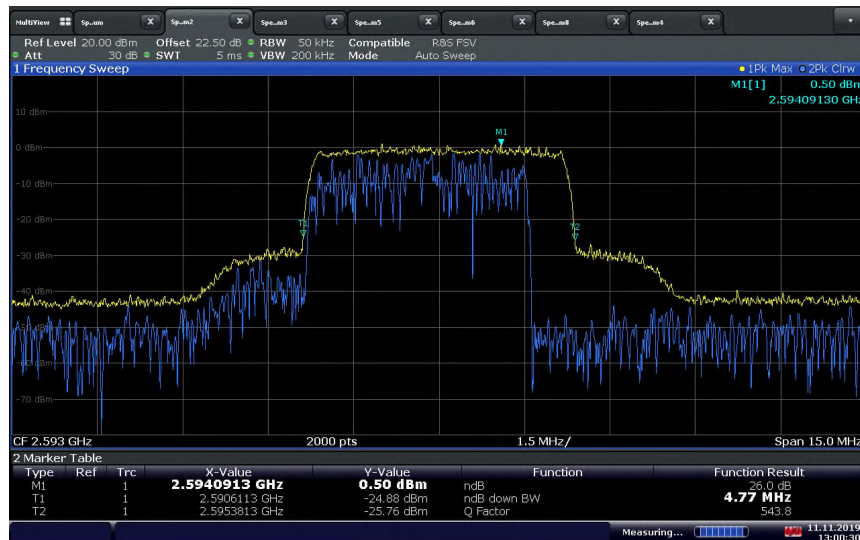


### LTE Band 41 Downlink 5MHz BW / Middle Channel 2593 MHz / 99%OBW



12:59:01 11.11.2019

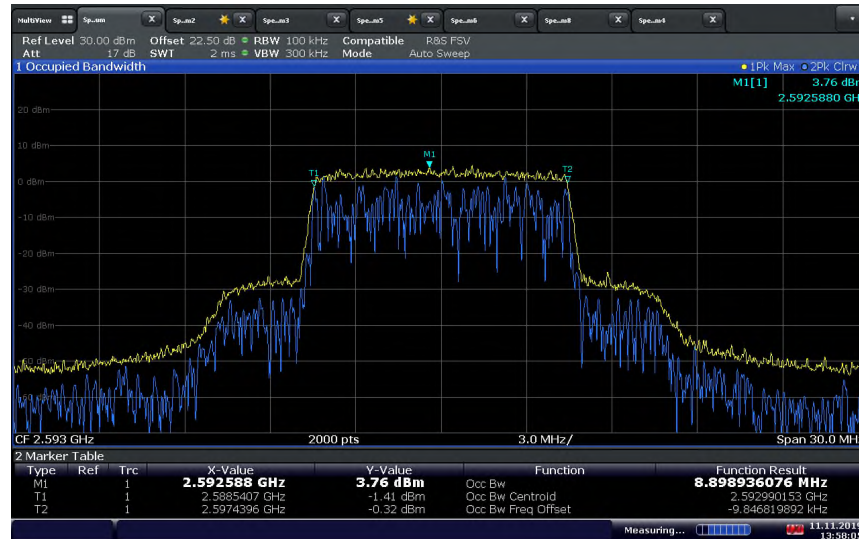
### LTE Band 41 Downlink 5MHz BW / Middle Channel 2593 MHz / 26dB BW



13:00:30 11.11.2019

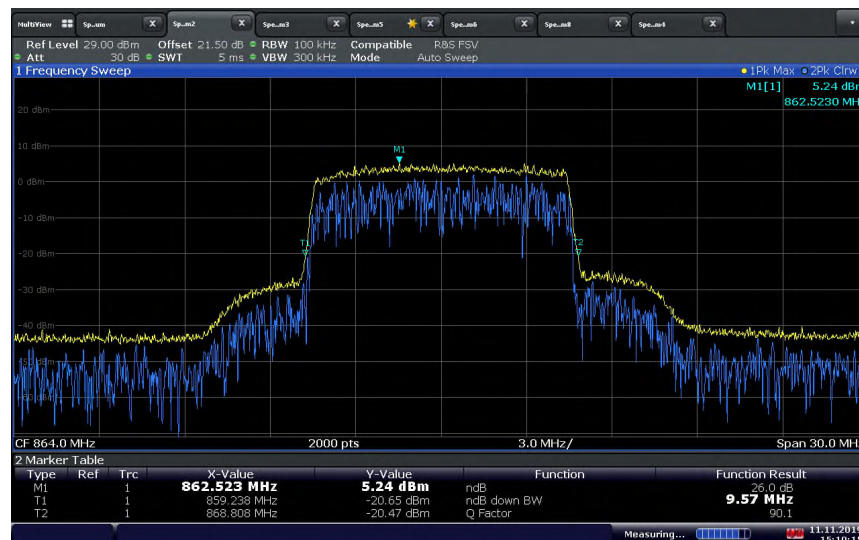


### LTE Band 41 Downlink 10MHz BW / Middle Channel 2593 MHz / 99%OBW



13:58:06 11.11.2019

### LTE Band 41 Downlink 10MHz BW / Middle Channel 2593 MHz / 26dB BW



15:10:16 11.11.2019

### LTE Band 41 Downlink 15MHz BW / Middle Channel 2593 MHz / 99%OBW



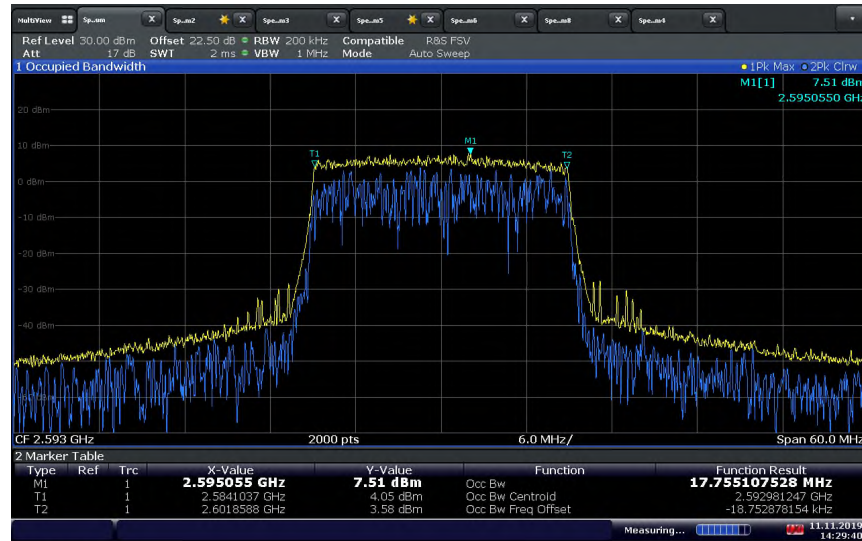
14:10:49 11.11.2019

### LTE Band 41 Downlink 15MHz BW / Middle Channel 2593 MHz / 26dB BW



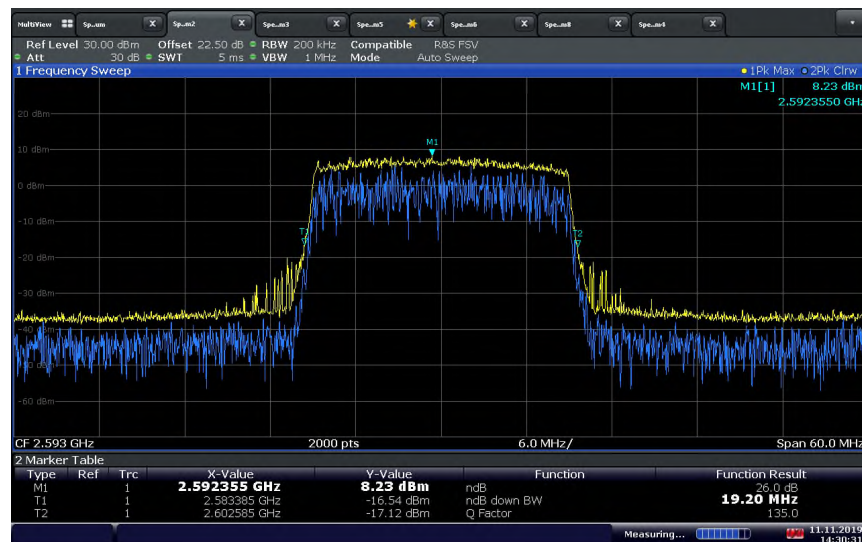
14:11:21 11.11.2019

### LTE Band 41 Downlink 20MHz BW / Middle Channel 2593 MHz / 99%OBW



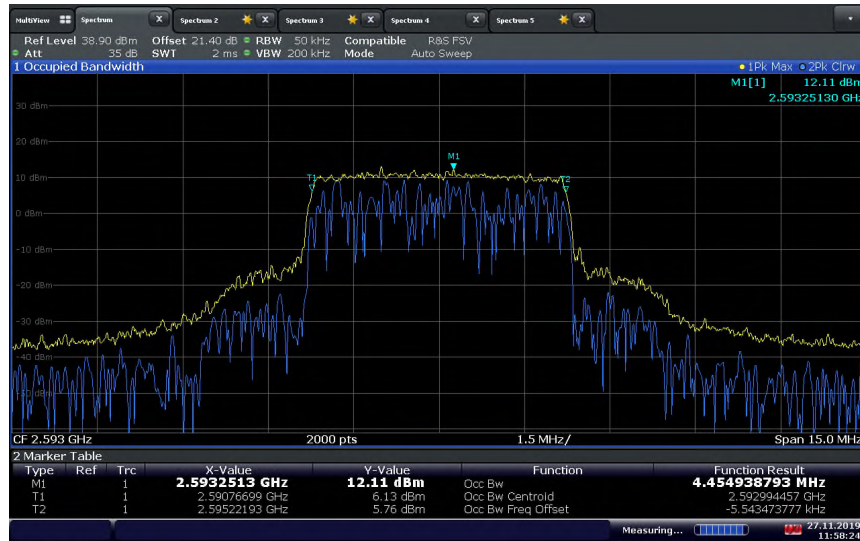
14:29:41 11.11.2019

### LTE Band 41 Downlink 20MHz BW / Middle Channel 2593 MHz / 26dB BW



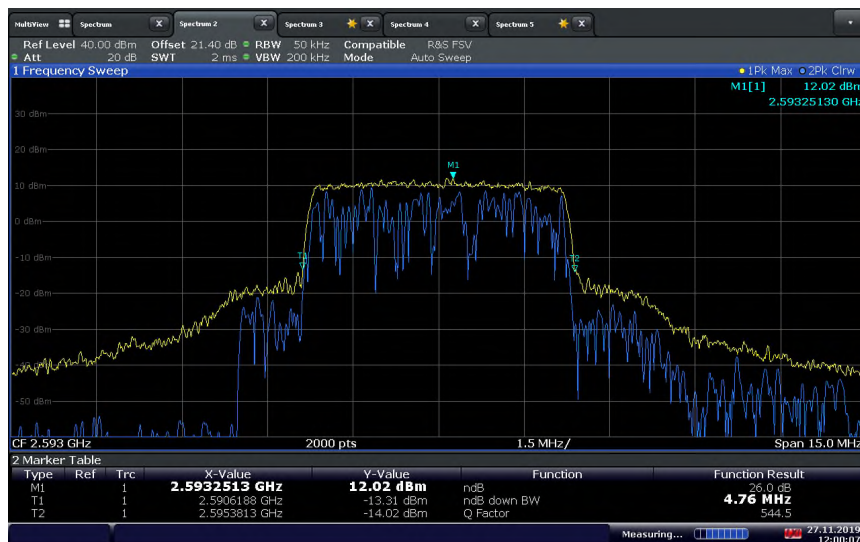
14:30:32 11.11.2019

### LTE Band 41 Uplink 5MHz BW / Middle Channel 2593 MHz / 99%OBW



11:58:25 27.11.2019

### LTE Band 41 Uplink 5MHz BW / Middle Channel 2593 MHz / 26dB BW



12:00:08 27.11.2019

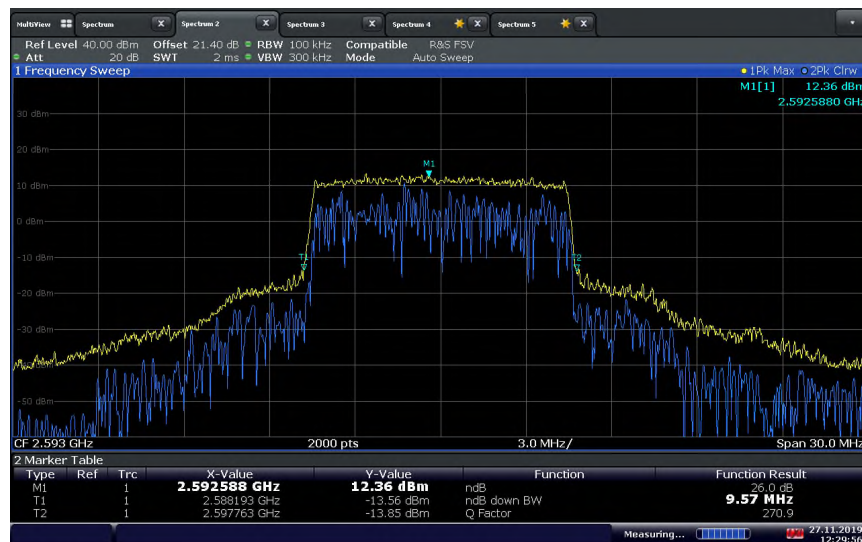


### LTE Band 41 Uplink 10MHz BW / Middle Channel 2593 MHz / 99%OBW



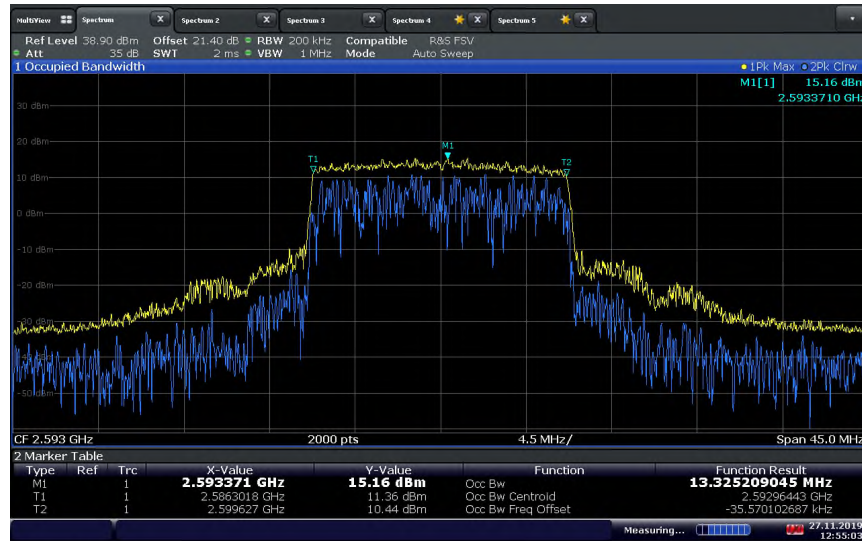
12:29:06 27.11.2019

### LTE Band 41 Uplink 10MHz BW / Middle Channel 2593 MHz / 26dB BW



12:29:57 27.11.2019

### LTE Band 41 Uplink 15MHz BW / Middle Channel 2593 MHz / 99%OBW



12:55:04 27.11.2019

### LTE Band 41 Uplink 15MHz BW / Middle Channel 2593 MHz / 26dB BW

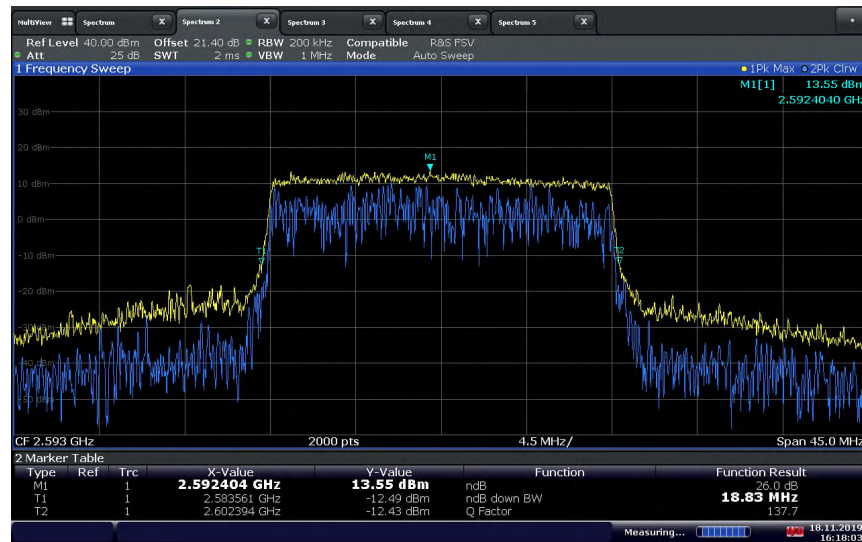


12:56:10 27.11.2019

### LTE Band 41 Uplink 20MHz BW / Middle Channel 2593 MHz / 99%OBW



### LTE Band 41 Uplink 20MHz BW / Middle Channel 2593 MHz / 26dB BW



## **2.4 PEAK-AVERAGE POWER RATIO**

### **2.4.1 Specification Reference**

RSS-199, Clause 4.4

### **2.4.2 Standard Applicable**

RSS-199, Clause 4.4:

The peak-to-average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

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

Serial No: 370920000139 (NU) and 371929000156, 443935000064 (CU) / Test Configuration A and B

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

November 11, 18 and 27, 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 | 23.4 - 26.1°C  |
| Relative Humidity   | 25.0 - 44.6%   |
| ATM Pressure        | 98.0 - 99.2kPa |

#### 2.4.7 Additional Observations

- This is a conducted test.
- As per FCC KDB 971168 D01 v03r01 clause 5.7, the PAPR was measured in accordance with ANSI C63.26 clause 5.2.3.4.
- Measurement was done using the Spectrum Analyzer's Complementary Cumulative Distribution Function (CCDF) measurement profile. The built-in function is used to determine the largest deviation between the average and the peak power of the EUT in a given bandwidth (crest factor or peak-to-average ratio) A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth.
- Low, Middle and High channels for all bandwidths were verified.
- RBW was set to maximum the SA can support.
- There are no measured PAR levels greater than 13dB.

#### 2.4.8 Test Results

| LTE Band 26 (859 – 869 / 814 – 824 MHz) PAR (for reference only) |                 |         |                 |          |
|------------------------------------------------------------------|-----------------|---------|-----------------|----------|
| Mode                                                             | Bandwidth (MHz) | Channel | Frequency (MHz) | PAR (dB) |
| Downlink                                                         | 5               | 8715    | 861.5           | 10.56    |
|                                                                  |                 | 8740    | 864             | 10.70    |
|                                                                  |                 | 8765    | 866.5           | 11.05    |
|                                                                  | 10              | 8740    | 864             | 11.04    |
| Uplink                                                           | 5               | 26715   | 816.5           | 9.87     |
|                                                                  |                 | 26740   | 819             | 10.63    |
|                                                                  |                 | 26765   | 821.5           | 9.61     |
|                                                                  | 10              | 26740   | 819             | 9.81     |

| LTE Band 41 PAR |                 |         |                 |          |
|-----------------|-----------------|---------|-----------------|----------|
| Mode            | Bandwidth (MHz) | Channel | Frequency (MHz) | PAR (dB) |
| Downlink        | 5               | 39675   | 2498.5          | 10.75    |
|                 |                 | 40620   | 2593            | 10.61    |
|                 |                 | 41565   | 2687.5          | 10.44    |
|                 | 10              | 39700   | 2501            | 10.37    |
|                 |                 | 40620   | 2593            | 11.0     |
|                 |                 | 41540   | 2685            | 10.66    |
|                 | 15              | 39725   | 2503.5          | 11.24    |
|                 |                 | 40620   | 2593            | 10.49    |
|                 |                 | 41515   | 2682.5          | 10.50    |
|                 | 20              | 39750   | 2506            | 10.83    |
|                 |                 | 40620   | 2593            | 11.10    |
|                 |                 | 41490   | 2680            | 10.73    |
| Uplink          | 5               | 39675   | 2498.5          | 8.80     |
|                 |                 | 40620   | 2593            | 10.93    |
|                 |                 | 41565   | 2687.5          | 10.71    |
|                 | 10              | 39700   | 2501            | 9.12     |
|                 |                 | 40620   | 2593            | 10.58    |
|                 |                 | 41540   | 2685            | 10.57    |
|                 | 15              | 39725   | 2503.5          | 8.63     |
|                 |                 | 40620   | 2593            | 10.94    |
|                 |                 | 41515   | 2682.5          | 10.38    |
|                 | 20              | 39750   | 2506            | 9.19     |
|                 |                 | 40620   | 2593            | 10.88    |
|                 |                 | 41490   | 2680            | 10.68    |



## 2.4.9 Example Test Plots

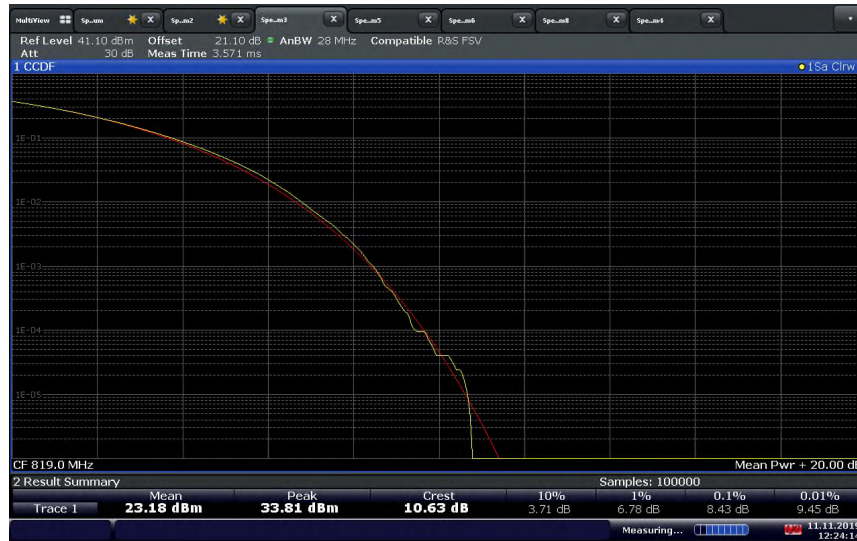
### LTE Band 26 (859 – 869 MHz) Downlink 5MHz BW / Middle Channel 864 MHz



### LTE Band 26 (859 – 869 MHz) Downlink 10MHz BW / Middle Channel 864 MHz



### LTE Band 26 (814 – 824 MHz) Uplink 5MHz BW / Middle Channel 819 MHz



12:24:14 11.11.2019

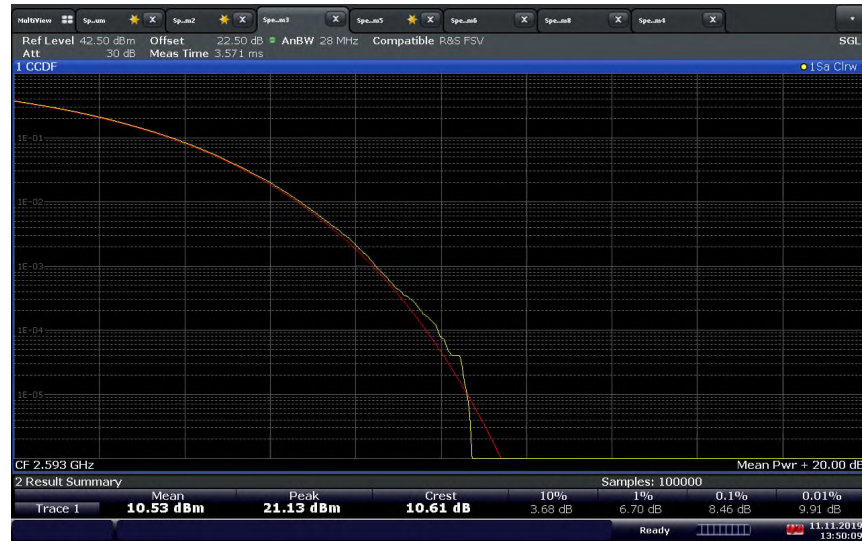
### LTE Band 26 (814 – 824 MHz) Uplink 10MHz BW / Middle Channel 819 MHz



12:15:21 11.11.2019



### LTE Band 41 Downlink 5MHz BW / Middle Channel 2593 MHz



13:50:09 11.11.2019

### LTE Band 41 Downlink 10MHz BW / Middle Channel 2593 MHz



13:57:26 11.11.2019

### LTE Band 41 Downlink 15MHz BW / Middle Channel 2593 MHz



14:12:14 11.11.2019

### LTE Band 41 Downlink 20MHz BW / Middle Channel 2593 MHz



14:27:42 11.11.2019

### LTE Band 41 Uplink 5MHz BW / Middle Channel 2593 MHz



12:04:02 27.11.2019

### LTE Band 41 Uplink 10MHz BW / Middle Channel 2593 MHz



12:26:47 27.11.2019



### LTE Band 41 Uplink 15MHz BW / Middle Channel 2593 MHz



12:51:39 27.11.2019

### LTE Band 41 Uplink 20MHz BW / Middle Channel 2593 MHz



16:15:14 18.11.2019

## 2.5 BAND EDGE

### 2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051  
FCC 47 CFR Part 27, Clause 27.53(m)(2)(v) and (4)  
FCC 47 CFR Part 90, Clause 90.691(a)  
RSS-199, Clause 4.5

### 2.5.2 Standard Applicable

FCC 47 CFR Part 27.53(m)(2):

(v) For all fixed digital user stations, the attenuation factor shall be not less than  $43 + 10 \log(P)$  dB at the channel edge.

(4) For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

FCC 47 CFR Part 90.691(a):

(1) For any frequency removed from the EA licensee's frequency block by up to and including 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $116 \log_{10}(f/6.1)$  decibels or  $50 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 12.5 kHz.

(2) For any frequency removed from the EA licensee's frequency block greater than 37.5 kHz, the power of any emission shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10}(P)$  decibels or 80 decibels, whichever is the lesser attenuation, where f is the frequency removed from the center of the outer channel in the block in kilohertz and where f is greater than 37.5 kHz.

RSS-199, Clause 4.5:

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at least 1% of the occupied bandwidth for base station and fixed subscriber equipment, and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full required measurement bandwidth of 1 MHz, or 1% or 2% of the occupied bandwidth, as applicable.

Equipment shall comply with the following unwanted emission limits:

(a) For base station and fixed subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least  $43 + 10 \log_{10} p$ .

(b) for mobile subscriber equipment, the power of any unwanted emissions measured as above shall be attenuated (in dB) below the transmitter power, P (dBW), by at least:

- (i)  $40 + 10 \log_{10} p$  from the channel edges to 5 MHz away
- (ii)  $43 + 10 \log_{10} p$  between 5 MHz and X MHz from the channel edges, and
- (iii)  $55 + 10 \log_{10} p$  at X MHz and beyond from the channel edges

In addition, the attenuation shall not be less than  $43 + 10 \log_{10} p$  on all frequencies between 2490.5 MHz and 2496 MHz, and  $55 + 10 \log_{10} p$  at or below 2490.5 MHz.

In (a) and (b),  $p$  is the transmitter power measured in watts and  $X$  is 6 MHz or the equipment occupied bandwidth, whichever is greater.

### 2.5.3 Equipment Under Test and Modification State

Serial No: 370920000139 (NU) and 371929000156, 443935000064 (CU) / Test Configuration A and B

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

November 12, 27 and December 02, 2019 / XYZ

### 2.5.5 Test Equipment Used

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

### 2.5.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

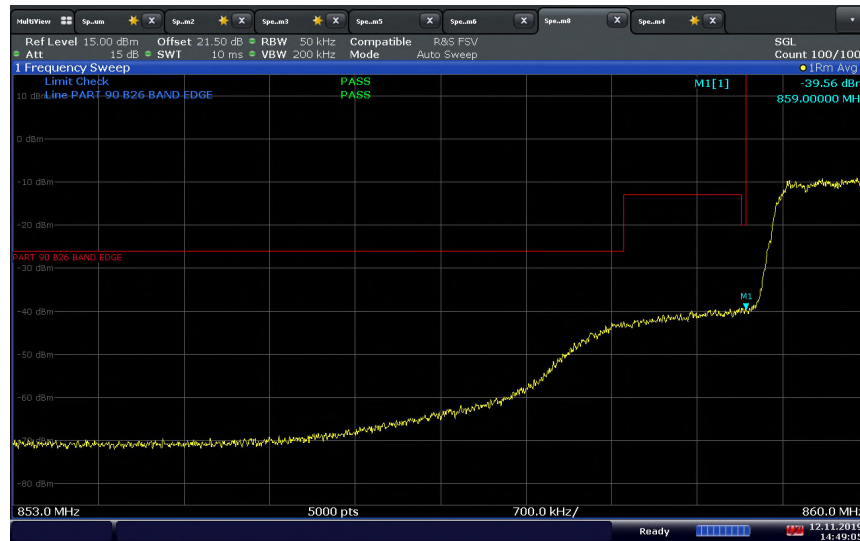
|                     |                |
|---------------------|----------------|
| Ambient Temperature | 23.4 - 24.8°C  |
| Relative Humidity   | 36.8 - 44.7%   |
| ATM Pressure        | 98.0 - 99.1kPa |

### 2.5.7 Additional Observations

- This is a conducted test. Test guidance is per Section 6.1 of KDB971168 (D01 Power Meas License Digital Systems v03r01).
- The path loss was measured and entered as a level offset.
- RBW is set to 1% of Occupied Bandwidth and VBW is set to  $\geq 3 \times \text{RBW}$ . For emissions 1 MHz outside and adjacent to the channel edge, the limits are adjusted with the factor  $10\lg(\text{RBW}_{\text{used}}/1\text{MHz})$ .

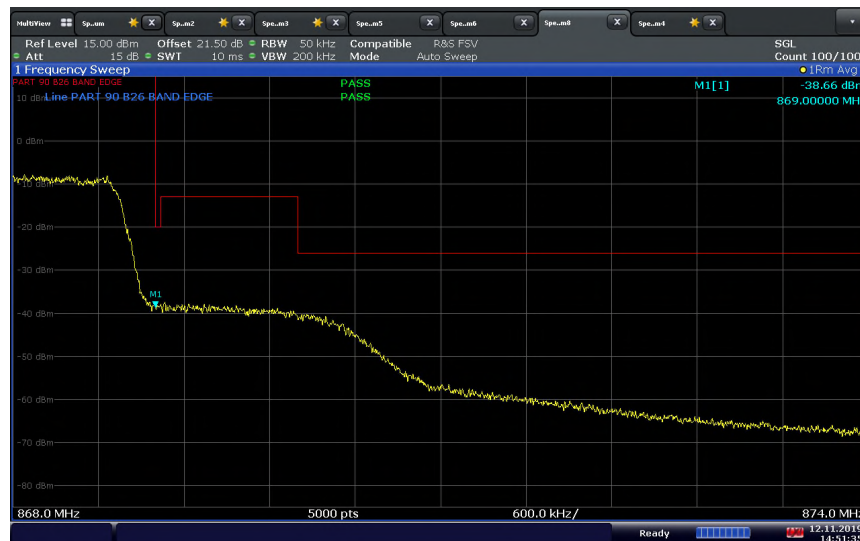
## 2.5.8 Test Results

### LTE Band 26 (859 – 869 MHz) Downlink 5 MHz BW / Low Channel 861.5 MHz Low Band Edge @859 MHz



14:49:05 12.11.2019

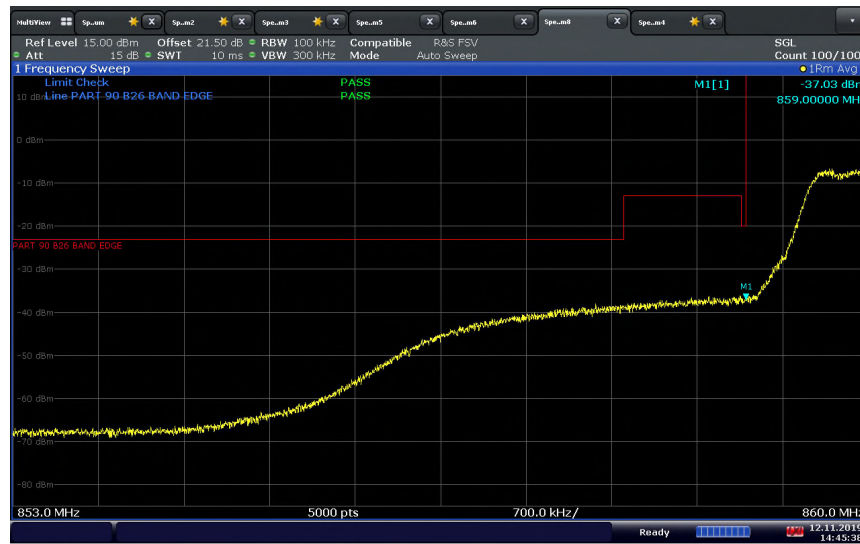
### LTE Band 26 (859 – 869 MHz) Downlink 5 MHz BW / High Channel 866.5 MHz High Band Edge @869 MHz



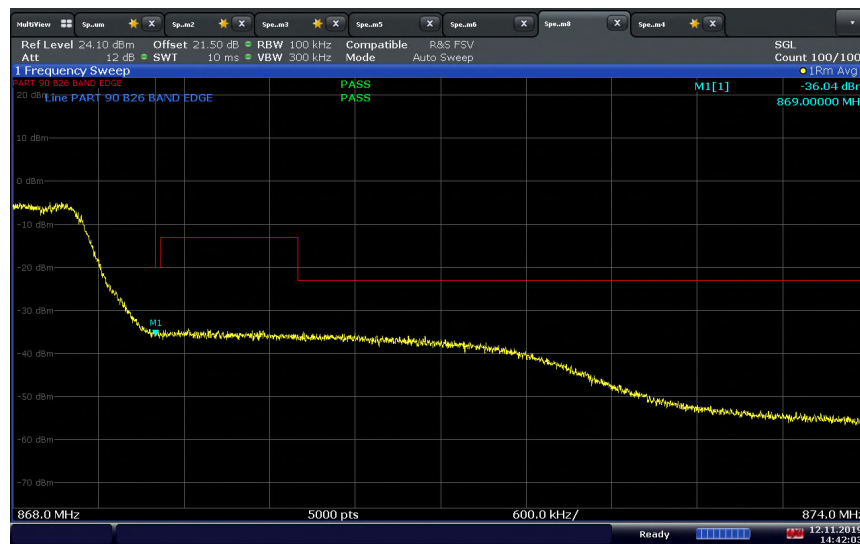
14:51:35 12.11.2019



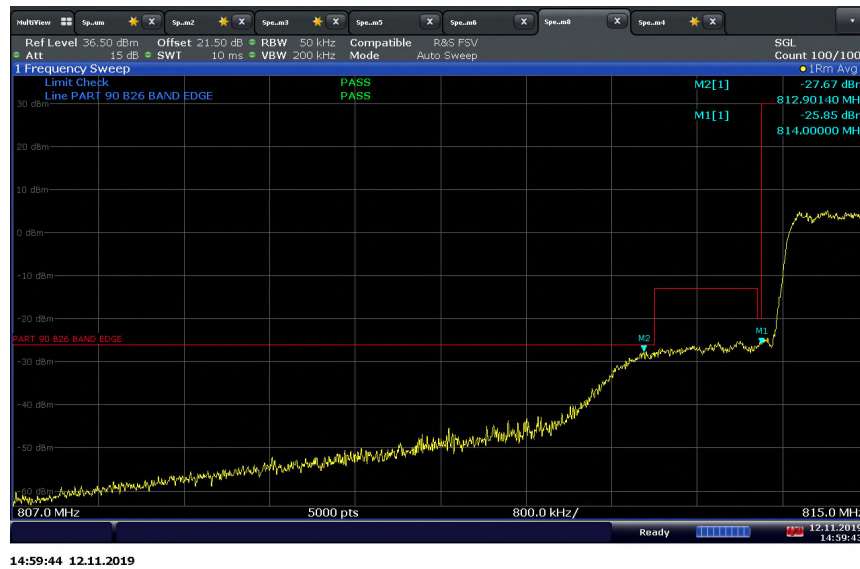
### LTE Band 26 (859 – 869 MHz) Downlink 10 MHz BW / Middle Channel 864 MHz Low Band Edge @859 MHz



### LTE Band 26 (859 – 869 MHz) Downlink 10 MHz BW / Middle Channel 864 MHz High Band Edge @869 MHz



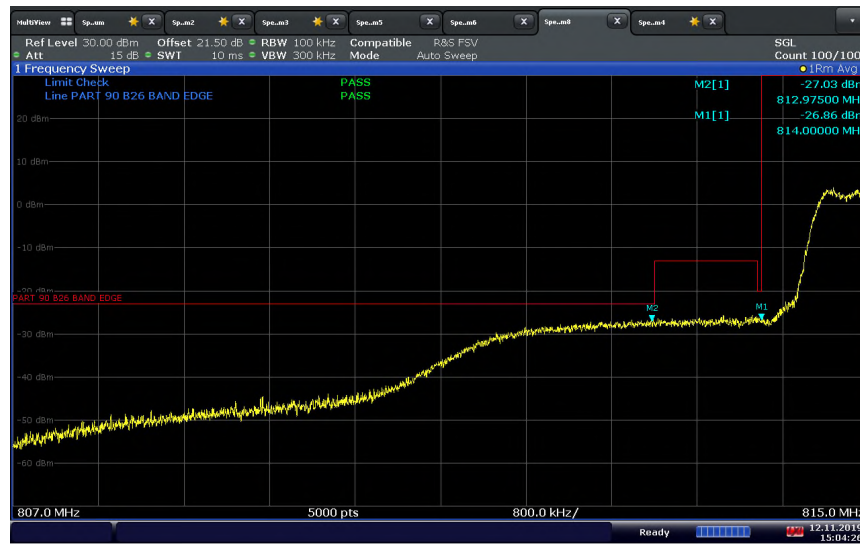
### LTE Band 26 (814 – 824 MHz) Uplink 5 MHz BW / Low Channel 816.5 MHz Low Band Edge @814 MHz



### LTE Band 26 (814 – 824 MHz) Uplink 5 MHz BW / Low Channel 821.5 MHz High Band Edge @869 MHz

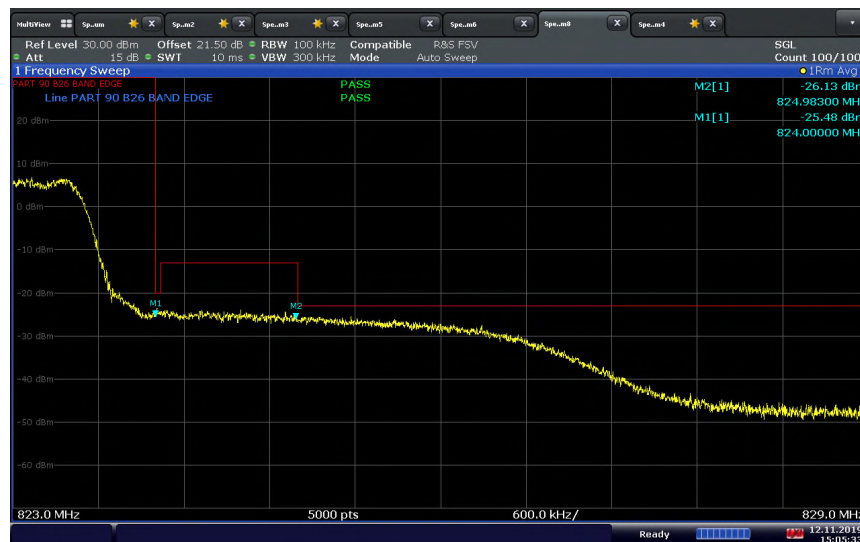


**LTE Band 26 (814 – 824 MHz) Uplink 10 MHz BW / Middle Channel 819 MHz Low Band Edge @814 MHz**



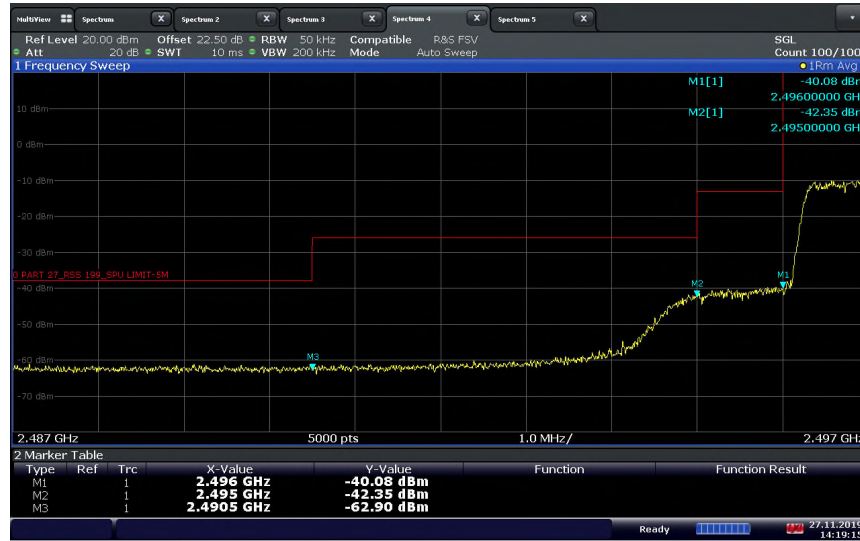
15:04:26 12.11.2019

**LTE Band 26 (814 – 824 MHz) Uplink 10 MHz BW / Middle Channel 819 MHz High Band Edge @824 MHz**



15:05:33 12.11.2019

### LTE Band 41 Downlink 5 MHz BW / Low Channel 2498.5 MHz Low Band Edge @2496 MHz



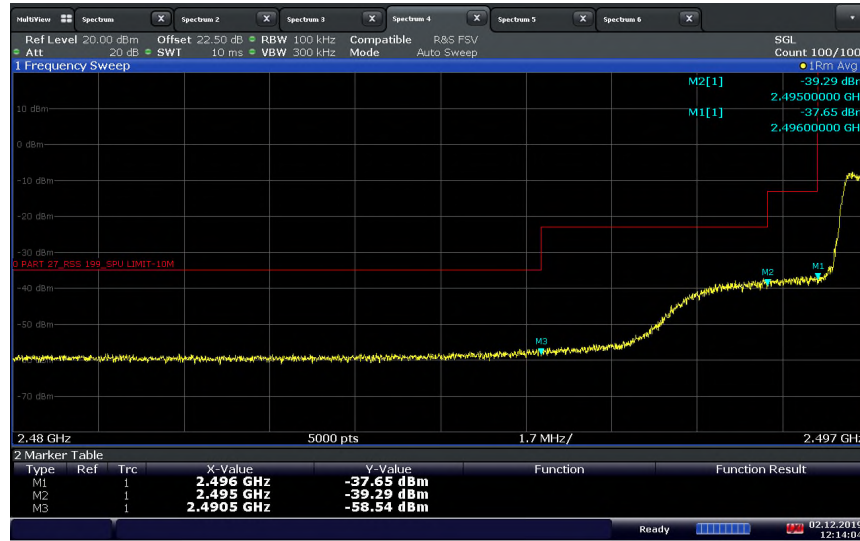
14:19:15 27.11.2019

### LTE Band 41 Downlink 5 MHz BW / High Channel 2687.5 MHz High Band Edge @2690 MHz



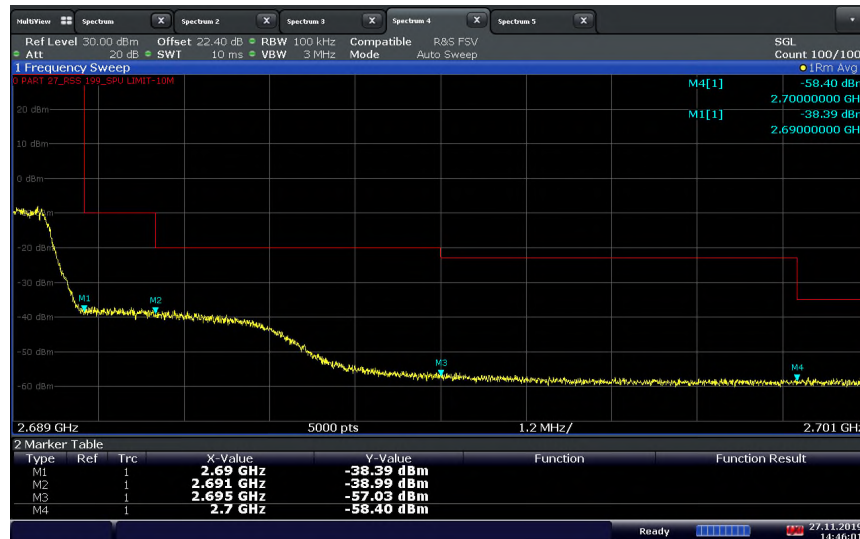
14:25:48 27.11.2019

### LTE Band 41 Downlink 10 MHz BW / Low Channel 2501 MHz Low Band Edge @2496 MHz



12:14:05 02.12.2019

### LTE Band 41 Downlink 10 MHz BW / High Channel 2685 MHz High Band Edge @2690 MHz



14:46:01 27.11.2019