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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, Part 22 and Part 24  
RSS-Gen, RSS-132 and RSS-133

**Report No. 72146075A**

**December 2019**

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



|                           |                                                                                                                                                                                                    |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>REPORT ON</b>          | Radio Testing of the<br>Nextivity Inc.<br>QUATRA 4000 Cellphone Signal Booster                                                                                                                     |
| <b>TEST REPORT NUMBER</b> | 72146075A                                                                                                                                                                                          |
| <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: EMC Test Engineer/Wireless Team Lead |
| <b>DATED</b>              | December 09, 2019                                                                                                                                                                                  |

FCC ID: NU: YETQ44-1234CNU  
CU: YETQ41-5ECU  
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## Revision History

| 72146075A<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, Part 22 and Part 24
- RSS-Gen, RSS-132 and RSS-133.

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 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, Part 22 and Part 24 (October 1, 2018).</li> <li>• RSS-132 – Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894MHz (Issue 3, January 2013).</li> <li>• RSS-133 – 2 GHz Personal Communications Services (Issue 6, January 2018 Amendment).</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> |
| Start of Test                 | August 02, 2019                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Finish of Test                | October 27, 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, Part 22 and Part 24 with cross-reference to the corresponding ISSED RSS standard is shown below.

| Section | Spec Clause |             |             |             |         | Test Description                     | Result    |
|---------|-------------|-------------|-------------|-------------|---------|--------------------------------------|-----------|
|         | FCC Part 2  | FCC Part 22 | FCC Part 24 | RSS-132     | RSS-133 |                                      |           |
| 2.1     | 2.1046      | -           | -           | -           | -       | Transmitter Conducted Output Power   | Compliant |
| 2.2     | 2.1046      | 22.913 (a)  | -           | -           | -       | Effective Radiated Power             | Compliant |
| 2.3     | 2.1046      | -           | 24.232 (c)  | 5.4         | 6.4     | Equivalent Isotropic Radiated Power  | Compliant |
| 2.4     | 2.1049      | 22.917 (b)  | 24.238 (b)  | RSS-Gen 6.7 |         | Occupied Bandwidth                   | Compliant |
| 2.5     | -           | -           | 24.232 (d)  | 5.4         | 6.4     | Peak-Average Ratio                   | Compliant |
| 2.6     | 2.1051      | 22.917 (a)  | 24.238 (a)  | 5.5         | 6.5     | Band Edge                            | Compliant |
| 2.7     | 2.1051      | 22.917 (a)  | 24.238 (a)  | 5.5         | 6.5     | Conducted Spurious Emissions         | Compliant |
| 2.8     | 2.1053      | 22.917 (a)  | 24.238 (a)  | 5.5         | 6.5     | Field Strength of Spurious Radiation | Compliant |
| 2.9     | 2.1055      | 22.355      | 24.235      | 5.3         | 6.3     | Frequency Stability                  | Compliant |
| -       | -           | -           | -           | 5.6         | 6.6     | Receiver Spurious Emissions          | N/A       |
| 2.10    | -           | -           | -           | RSS-Gen 8.8 |         | Power Line Conducted Emission        | Compliant |

N/A - Not applicable. EUT has no Stand-alone receiver port

### 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.

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 WCDMA/LTE Band 5, LTE Band 26 869-894/824-849MHz and LTE 25 function of the EUT were 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 2 Ethernet cables)                                                            |
| Mode Verified   | WCDMA Band 5, LTE Band 5/26 (869-894/824-849MHz) and 25                                                                           |
| Frequency Bands | WCDMA/LTE B5 and 26: Uplink: 824 - 849MHz<br>Downlink: 869 - 894MHz<br>LTE B25: Uplink: 1850 - 1915MHz<br>Downlink: 1930 -1995MHz |

Rated Power

| Signal Bandwidth (MHz) | WCDMA/LTE Band 5, 26 |                     | LTE Band 25 |         |
|------------------------|----------------------|---------------------|-------------|---------|
|                        | DL (dB)              | UL (dB)             | DL (dB)     | UL (dB) |
| 5                      | (WCDMA) 13 (LTE) 16  | (WCDMA) 22 (LTE) 20 | Max. 16     | 22      |
| 10                     |                      |                     |             |         |
| 15                     |                      |                     |             |         |
| 20                     | N/A                  |                     |             |         |

Capability WCDMA (Band 5), LTE (Band 4, 5/26 869-894/824-849MHz, 12, 13 and 25)

Primary Unit (EUT)

- ☐ Production  
☒ Pre-Production  
☐ 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) |
|----------------|----------------|-------------------|
| WCDMA Band 5   | 6.07 dBi       | 0.4 dBi           |
| LTE Band 5, 26 | 7.55 dBi       | 0.4 dBi           |
| LTE Band 25    | 7.26 dBi       | 2.6 dBi           |

### 1.3.3 Transmit Frequency Table

| Mode                   | Signal Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | ERP (Part 22)        |                    | EIRP (Part 24, RSS-132, RSS-133) |                    |
|------------------------|------------------------|--------------------|---------------------|----------------------|--------------------|----------------------------------|--------------------|
|                        |                        |                    |                     | Max. Power Avg (dBm) | Max. Power Avg (W) | Max. Power Avg (dBm)             | Max. Power Avg (W) |
| WCDMA Band 5 Downlink  | 5                      | 871.4 – 891.6      | 3M86F9W             | 9.17                 | 0.01               | 11.32                            | 0.01               |
|                        | 5 (3 Carriers)         | 871.4 – 891.6      |                     | 13.10                | 0.02               | 15.25                            | 0.03               |
| WCDMA Band 5 Uplink    | 5                      | 826.4 – 846.6      | 3M86F9W             | 26.84                | 0.48               | 28.99                            | 0.79               |
|                        | 5 (3 Carriers)         | 826.4 – 846.6      |                     | 25.83                | 0.38               | 27.98                            | 0.63               |
| LTE Band 5/26 Downlink | 5                      | 871.5 – 891.5      | 4M45F9W             | 9.45                 | 0.01               | 11.60                            | 0.01               |
|                        | 10                     | 874 - 889          | 8M90F9W             | 12.51                | 0.02               | 14.66                            | 0.03               |
|                        | 15                     | 876.5 – 886.5      | 13M3F9W             | 13.96                | 0.02               | 16.11                            | 0.04               |
| LTE Band 5/26 Uplink   | 5                      | 826.5 – 846.5      | 4M44F9W             | 26.86                | 0.49               | 29.01                            | 0.80               |
|                        | 10                     | 829 – 844          | 8M90F9W             | 26.73                | 0.47               | 28.88                            | 0.77               |
|                        | 15                     | 831.5 – 841.5      | 13M4F9W             | 27.06                | 0.51               | 29.21                            | 0.83               |
| LTE Band 25 Downlink   | 5                      | 1932.5 – 1992.5    | 4M46F9W             | -                    | -                  | 13.25                            | 0.02               |
|                        | 10                     | 1935 – 1990        | 8M94F9W             | -                    | -                  | 16.31                            | 0.04               |
|                        | 15                     | 1937.5 – 1987.5    | 13M4F9W             | -                    | -                  | 17.87                            | 0.06               |
|                        | 20                     | 1940 – 1985        | 17M8F9W             | -                    | -                  | 19.17                            | 0.08               |
| LTE Band 25 Uplink     | 5                      | 1852.5 – 1912.5    | 4M45F9W             | -                    | -                  | 30.02                            | 1.0                |
|                        | 10                     | 1855 – 1910        | 8M89F9W             | -                    | -                  | 30.48                            | 1.12               |
|                        | 15                     | 1857.5 – 1907.5    | 13M3F9W             | -                    | -                  | 29.70                            | 0.93               |
|                        | 20                     | 1860 – 1905        | 17M7F9W             | -                    | -                  | 30.43                            | 1.10               |

## 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 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

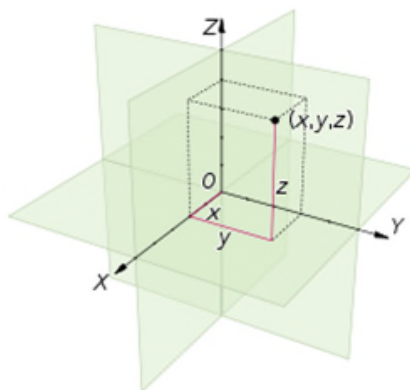
| Manufacturer | Equipment/Cable             | Description                                           |
|--------------|-----------------------------|-------------------------------------------------------|
| Dell         | Support Laptop              | M/N: Latitude D630 PP18L<br>S/N: 5SBJBG1              |
| 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                        |

#### 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:

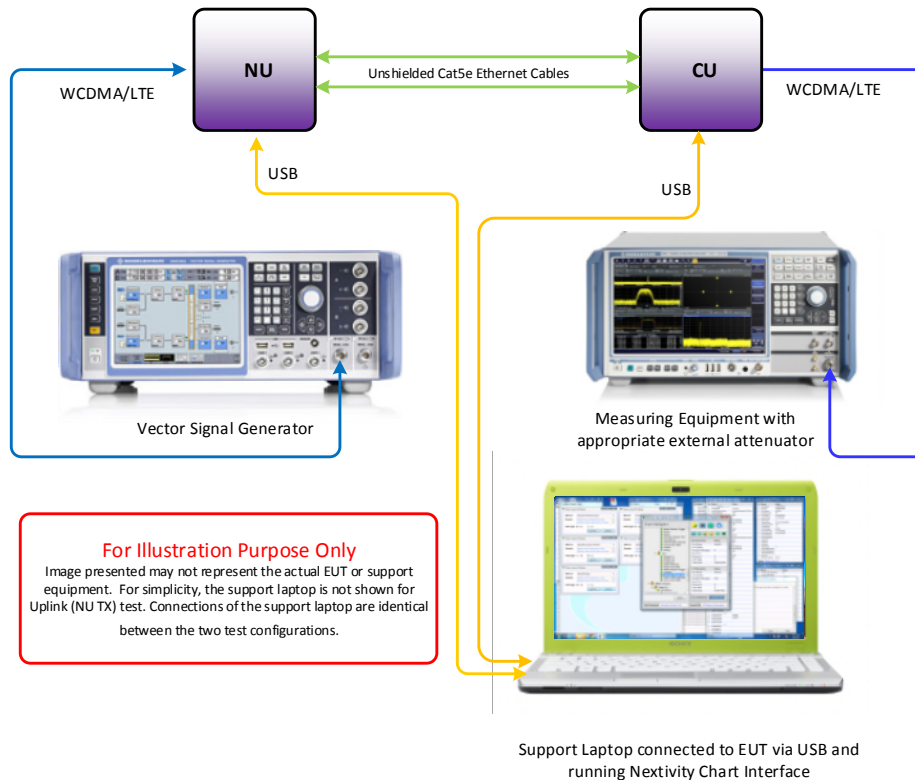
| Mode                   | Signal Bandwidth | Channel No.                | Frequency                   |
|------------------------|------------------|----------------------------|-----------------------------|
| WCDMA Band 5 Downlink  | 15MHz            | Low Channel 4357+4382+4407 | 871.4MHz+876.4MHz +881.4MHz |
| WCDMA Band 5 Uplink    | 5MHz             | Mid Channel 4183           | 836.6MHz                    |
| LTE Band 5/26 Downlink | 15MHz            | Low Channel 2475           | 876.5MHz                    |
| LTE Band 5/26 Uplink   | 15MHz            | Low Channel 20475          | 831.5MHz                    |
| LTE Band 25 Downlink   | 20MHz            | Mid Channel 8365           | 1962.5MHz                   |
| LTE Band 25 Uplink     | 20MHz            | High Channel 26590         | 1905MHz                     |

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.



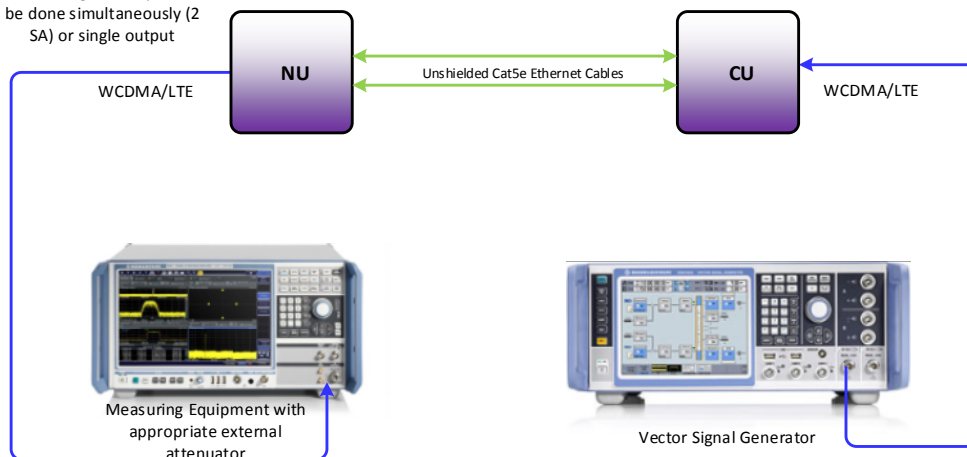
#### 1.4.5 Simplified Test Configuration Diagram

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

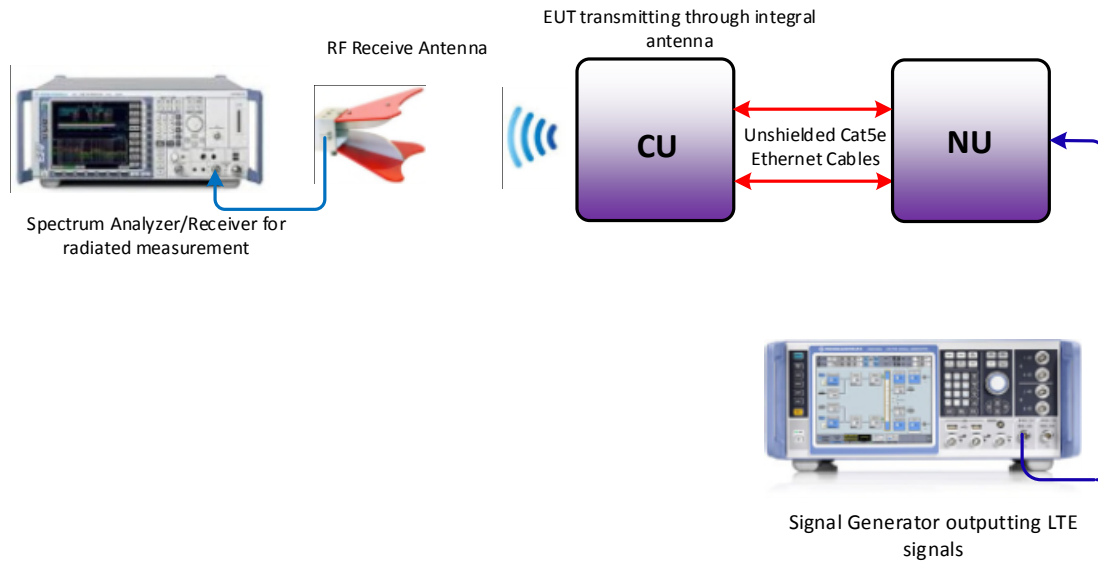


##### Uplink (NU Tx) Conducted Test

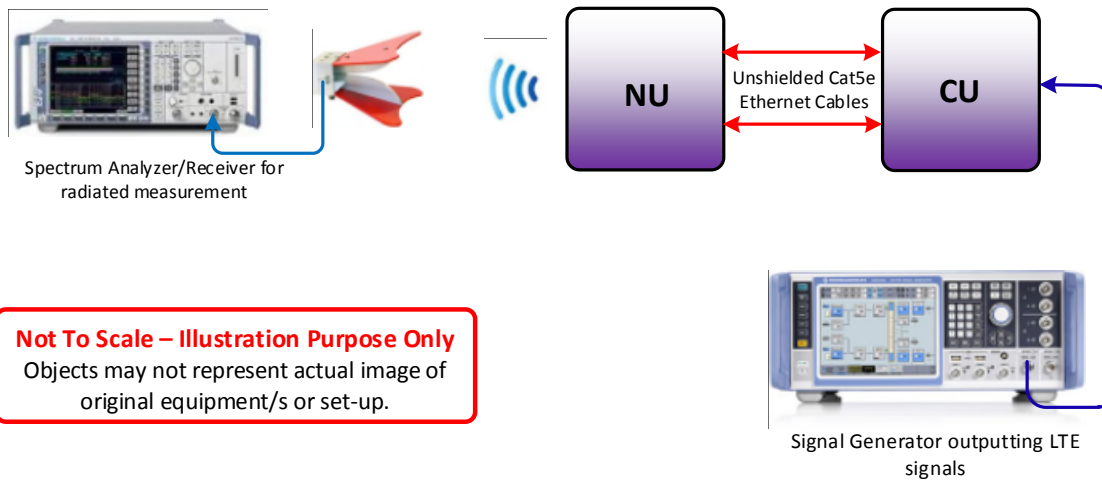
Monitoring the output can be done simultaneously (2 SA) or single output



## 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:

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

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



## **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.

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 (CU) / Test Configuration A and B

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

August 02, 05, 08 and October 15, 16, 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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 24.5 - 27.0°C  |
| Relative Humidity   | 39.1 - 51.5%   |
| ATM Pressure        | 98.5 - 99.0kPa |

## 2.1.7 Additional Observations

- This is a conducted test using an average power meter.
- The path loss was measured and entered as a level offset.
- Both Peak and Average measurements presented.

## 2.1.8 Test Results

| WCDMA Band 5 Downlink |                       |                          |                     |                  |
|-----------------------|-----------------------|--------------------------|---------------------|------------------|
| Bandwidth (MHz)       | Channels              | Frequency (MHz)          | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz                 | 4357                  | 871.4                    | 10.92               | 19.52            |
|                       | 4408                  | 881.6                    | 10.90               | 19.66            |
|                       | 4458                  | 891.6                    | 10.86               | 19.75            |
| 15 MHz                | <b>4357+4382+4407</b> | <b>871.4+876.4+881.4</b> | <b>14.85</b>        | 25.51            |
|                       | 4383+4408+4433        | 876.6+881.6+886.6        | 14.69               | 27.04            |
|                       | 4408+4433+4458        | 881.6+886.6+891.6        | 14.57               | 24.97            |

| WCDMA Band 5 Uplink |                |                   |                     |                  |
|---------------------|----------------|-------------------|---------------------|------------------|
| Bandwidth (MHz)     | Channels       | Frequency (MHz)   | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz               | 4132           | 826.4             | 22.78               | 30.80            |
|                     | <b>4183</b>    | <b>836.6</b>      | <b>22.92</b>        | 30.83            |
|                     | 4233           | 846.6             | 22.88               | 31.00            |
| 15 MHz              | 4132+4157+4182 | 826.4+831.4+836.4 | 21.90               | 31.81            |
|                     | 4158+4183+4208 | 831.6+836.6+841.6 | 20.98               | 31.43            |
|                     | 4183+4208+4233 | 836.6+841.6+846.6 | 21.91               | 31.89            |

| LTE Band 5 and Band 26 869-894 MHz Downlink |             |                 |                     |                  |
|---------------------------------------------|-------------|-----------------|---------------------|------------------|
| Bandwidth (MHz)                             | Channels    | Frequency (MHz) | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz                                       | 2425        | 871.5           | 11.20               | 21.21            |
|                                             | 2525        | 881.5           | 10.94               | 22.81            |
|                                             | 2625        | 891.5           | 10.98               | 21.79            |
| 10 MHz                                      | 2450        | 874             | 14.26               | 24.65            |
|                                             | 2525        | 881.5           | 13.86               | 23.94            |
|                                             | 2600        | 889             | 13.79               | 23.97            |
| 15 MHz                                      | <b>2475</b> | <b>876.5</b>    | <b>15.71</b>        | 26.10            |
|                                             | 2525        | 881.5           | 15.51               | 25.84            |
|                                             | 2575        | 886.5           | 15.32               | 25.27            |

| LTE Band 5 and Band 26 824-849 Uplink |              |                 |                     |                  |
|---------------------------------------|--------------|-----------------|---------------------|------------------|
| Bandwidth (MHz)                       | Channels     | Frequency (MHz) | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz                                 | 20425        | 826.5           | 21.46               | 31.31            |
|                                       | 20525        | 836.5           | 20.82               | 30.94            |
|                                       | 20625        | 846.5           | 21.18               | 31.66            |
| 10 MHz                                | 20450        | 829             | 21.33               | 30.84            |
|                                       | 20525        | 836.5           | 20.93               | 32.44            |
|                                       | 20600        | 844             | 21.33               | 31.45            |
| 15 MHz                                | <b>20475</b> | <b>831.5</b>    | <b>21.66</b>        | 31.34            |
|                                       | 20525        | 836.5           | 21.12               | 31.81            |
|                                       | 20575        | 841.5           | 21.48               | 31.14            |

| LTE Band 25 Downlink |             |                 |                     |                  |
|----------------------|-------------|-----------------|---------------------|------------------|
| Bandwidth (MHz)      | Channels    | Frequency (MHz) | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz                | 8065        | 1932.5          | 9.75                | 21.55            |
|                      | 8365        | 1962.5          | 10.65               | 22.06            |
|                      | 8665        | 1992.5          | 9.51                | 20.21            |
| 10 MHz               | 8090        | 1935.0          | 13.71               | 24.42            |
|                      | 8365        | 1962.5          | 13.43               | 24.04            |
|                      | 8640        | 1990.0          | 13.12               | 24.05            |
| 15 MHz               | 8115        | 1937.5          | 15.26               | 27.16            |
|                      | 8365        | 1962.5          | 15.27               | 25.99            |
|                      | 8615        | 1987.5          | 14.47               | 25.18            |
| 20 MHz               | 8140        | 1940.0          | 16.12               | 28.73            |
|                      | <b>8365</b> | <b>1962.5</b>   | <b>16.57</b>        | 27.19            |
|                      | 8590        | 1985.0          | 16.03               | 26.07            |

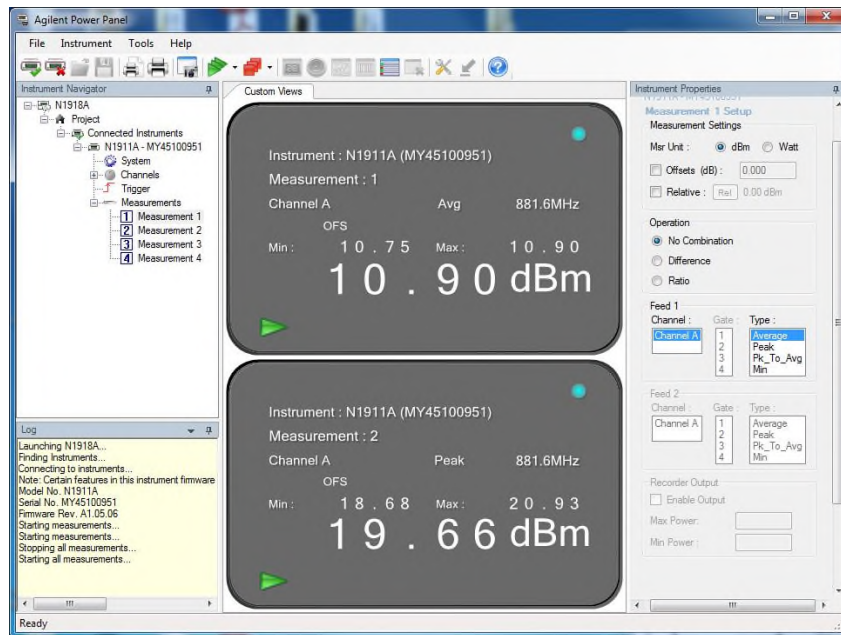
| LTE Band 25 Uplink |              |                 |                     |                  |
|--------------------|--------------|-----------------|---------------------|------------------|
| Bandwidth (MHz)    | Channels     | Frequency (MHz) | Average Power (dBm) | Peak Power (dBm) |
| 5 MHz              | 26065        | 1852.5          | 22.54               | 30.93            |
|                    | 26365        | 1882.5          | 22.48               | 31.01            |
|                    | 26665        | 1912.5          | 22.76               | 31.01            |
| 10 MHz             | 26090        | 1855.0          | 22.66               | 29.27            |
|                    | 26365        | 1882.5          | 22.51               | 29.29            |
|                    | 26640        | 1910.0          | 23.22               | 29.64            |
| 15 MHz             | 26115        | 1857.5          | 21.16               | 30.80            |
|                    | 26365        | 1882.5          | 21.68               | 31.60            |
|                    | 26615        | 1907.5          | 22.44               | 31.42            |
| 20 MHz             | 26140        | 1860.0          | 22.69               | 30.27            |
|                    | 26365        | 1882.5          | 22.64               | 29.88            |
|                    | <b>26590</b> | <b>1905.0</b>   | <b>23.17</b>        | 30.28            |

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

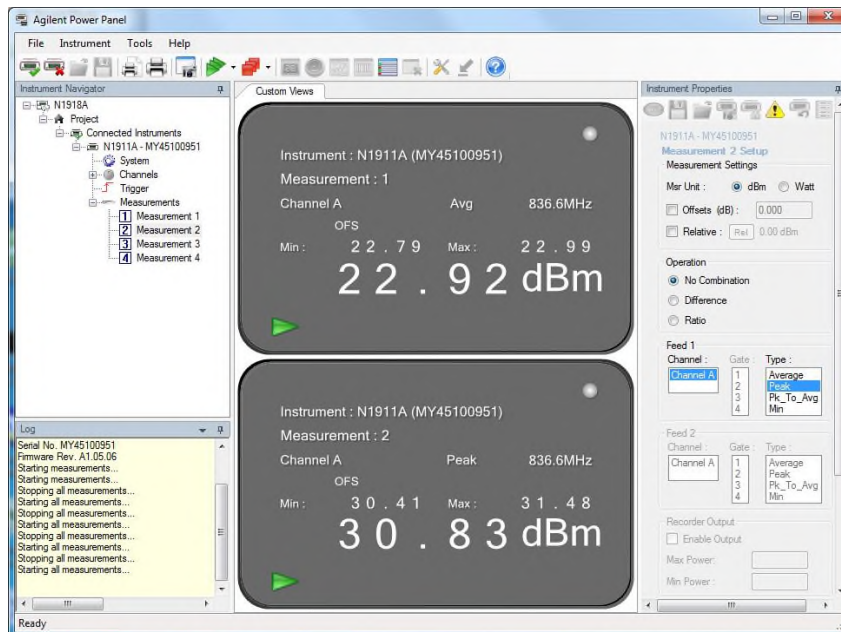


| 2 Bands/port worst case configuration |                                                                                                     |                        |                     |                |
|---------------------------------------|-----------------------------------------------------------------------------------------------------|------------------------|---------------------|----------------|
| Ant Port                              | Band & Bandwidth & Channel                                                                          | Frequency (MHz)        | Average Power (dBm) | PK Power (dBm) |
| D                                     | Downlink:<br>LTE Band 25 20MHz BW Mid Ch &<br>LTE Band 5 and Band 26 869-894<br>MHz 15MHz BW Low Ch | 1962.5 MHz + 876.5 MHz | 19.08               | 28.71          |
|                                       | Uplink:<br>LTE Band 25 and Band 26 824-849<br>MHz 20MHz BW High Ch & LTE<br>Band 5 15MHz BW Low Ch  | 1905 MHz + 831.5 MHz   | 23.75               | 32.39          |

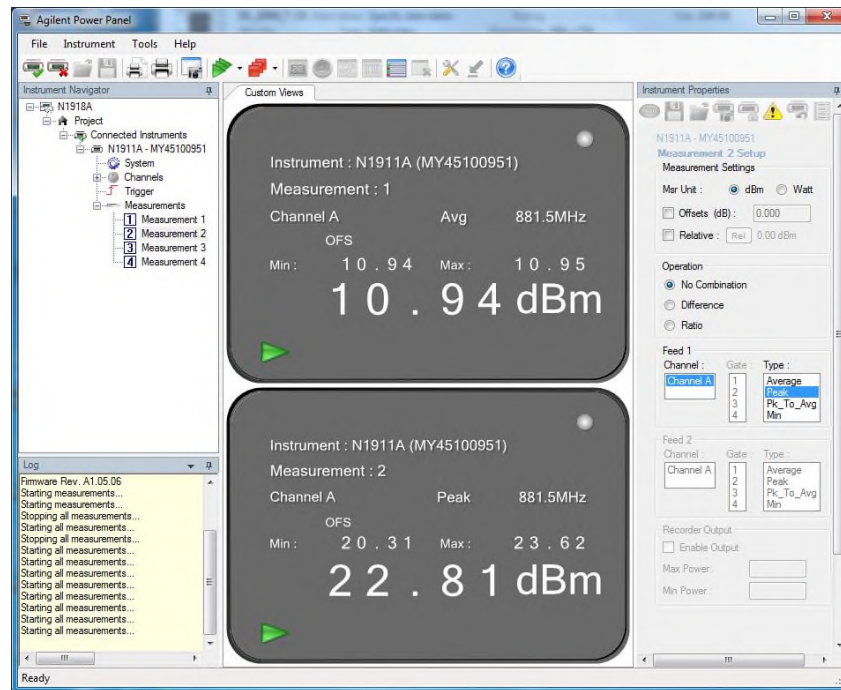
## 2.1.9 Sample Test Plot



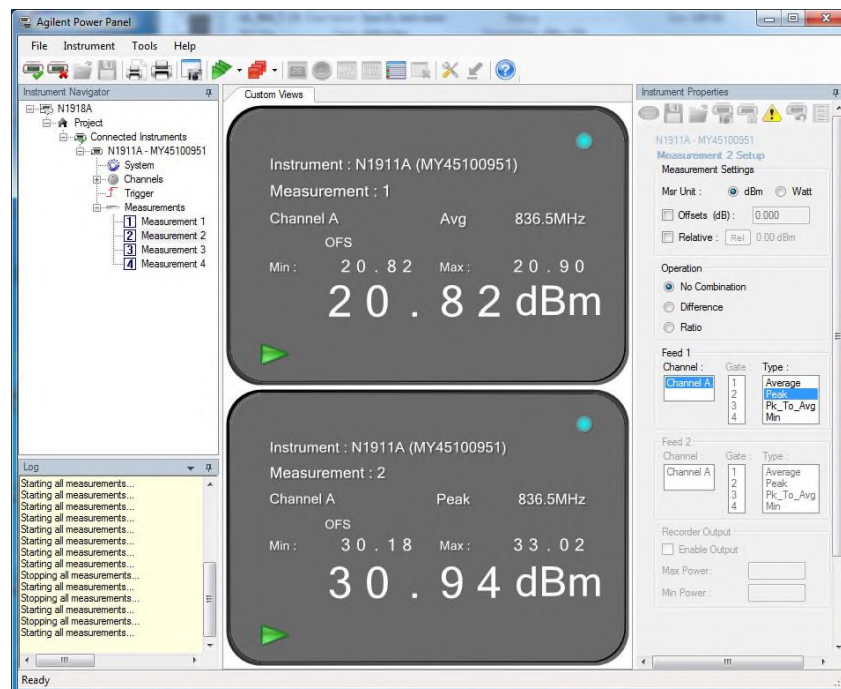
WCDMA Band 5\_DownLink\_5MHz Bandwidth\_Mid Channel



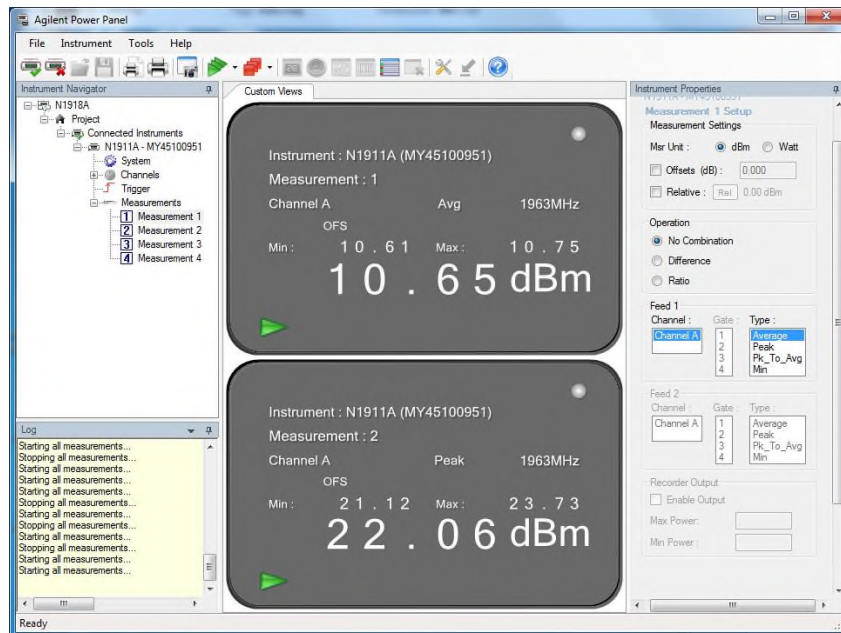
WCDMA Band 5\_UpLink\_5MHz Bandwidth\_Mid Channel



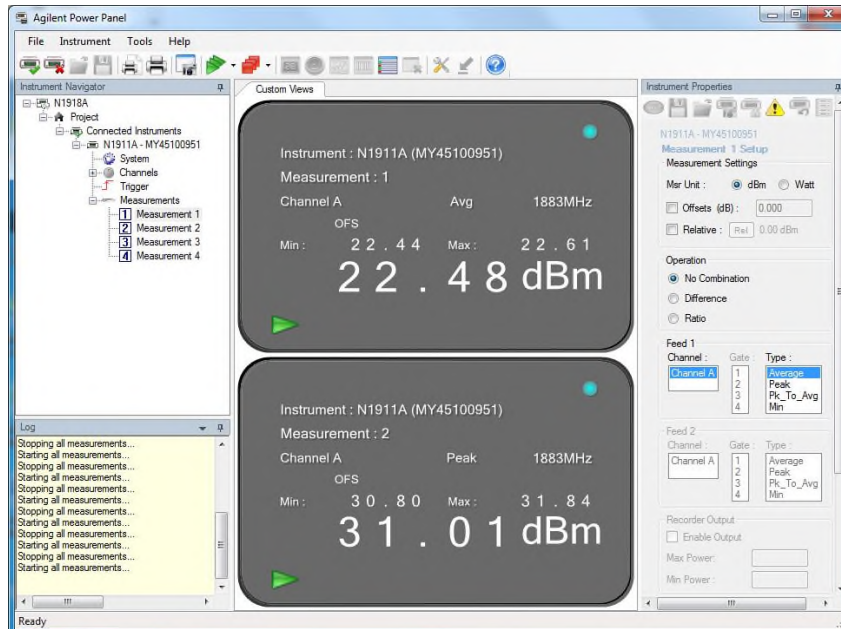
**LTE Band 5 and Band 26 869-894 MHz\_Downlink\_5MHz Bandwidth\_Mid Channel**



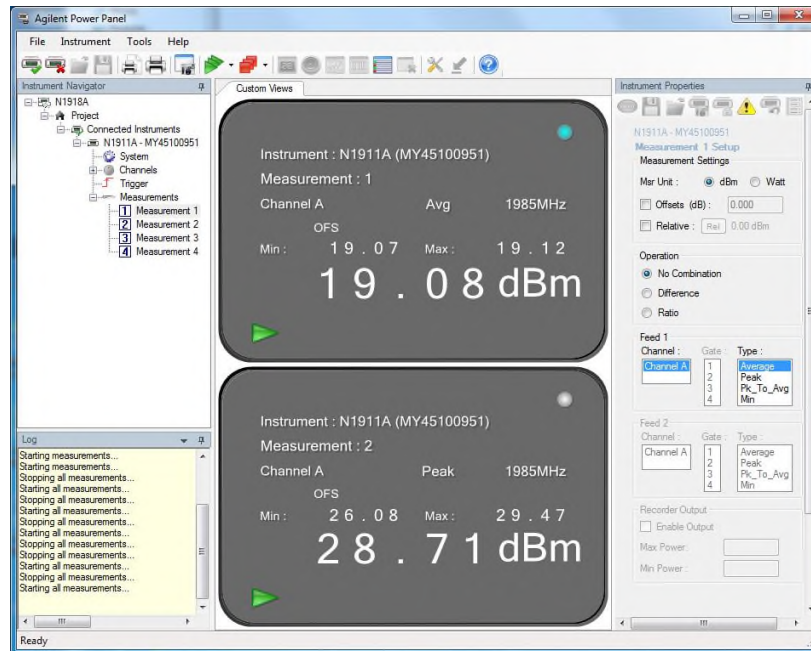
**LTE Band 5 and Band 26 824-849 MHz\_Uplink\_5MHz Bandwidth\_Mid Channel**



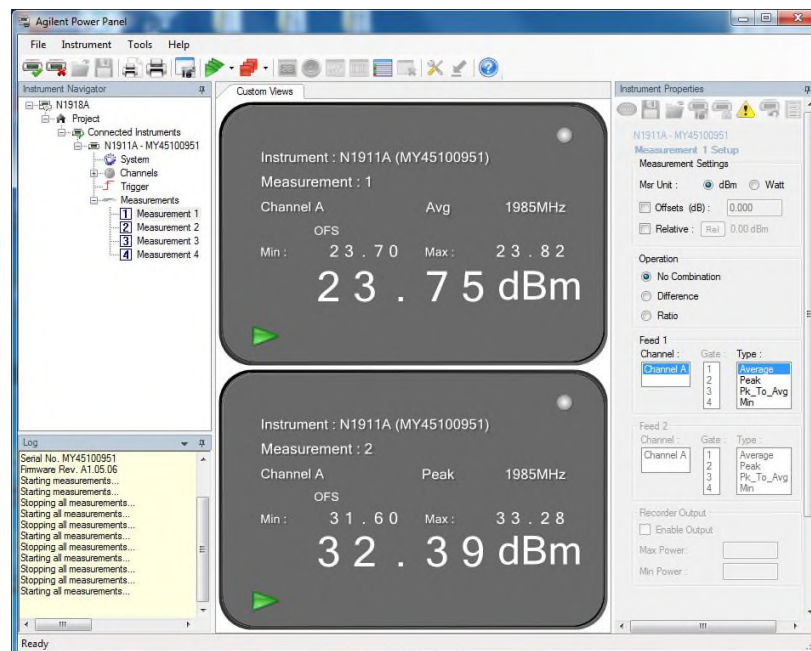
**LTE Band 25\_Downlink\_5MHz Bandwidth\_Mid Channel**



**LTE Band 25\_Uplink\_5MHz Bandwidth\_Mid Channel**



**Downlink: LTE Band 25 20MHz BW Mid Ch & LTE Band 5 and Band 26 869-894 MHz 15MHz BW Low Ch**



**Uplink: LTE Band 25 20MHz BW High Ch & LTE Band 5 and Band 26 824-849 MHz 15MHz BW Low Ch**

## **2.2 EFFECTIVE RADIATED POWER**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
FCC 47 CFR Part 22, Clause 22.913(a)

### **2.2.2 Standard Applicable**

FCC Part 22.913 (a) Maximum ERP. The ERP of transmitters in the cellular Radiotelephone Service must not exceed the limits in this section.

- (1) Except as described in paragraphs (a)(2), (3) and (4) of this section, the ERP of base stations and repeaters must not exceed
- (i) 500 watts per emissions; or
  - (ii) 400 watts/MHz (PSD) per sector.

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

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

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

August 02, 05, 08 and October 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 Additional Observations**

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

$$\text{ERP} = P_T + G_T - L_c - 2.15\text{dB}$$

Where:

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

$G_T$  = gain of the transmitting antenna, in dBi (the -2.15 in the formula is to convert EIRP to ERP);

$L_c$  = 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

| WCDMA Band 5 Downlink |                          |                         |                           |              |              |
|-----------------------|--------------------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)       | Frequency (MHz)          | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                     | 871.4                    | 10.92                   | 0.4                       | 9.17         | 56.02        |
|                       | 881.6                    | 10.90                   | 0.4                       | 9.15         | 56.02        |
|                       | 891.6                    | 10.86                   | 0.4                       | 9.11         | 56.02        |
| 15                    | <b>871.4+876.4+881.4</b> | <b>14.85</b>            | <b>0.4</b>                | <b>13.10</b> | <b>56.02</b> |
|                       | 876.6+881.6+886.6        | 14.69                   | 0.4                       | 12.94        | 56.02        |
|                       | 881.6+886.6+891.6        | 14.57                   | 0.4                       | 12.82        | 56.02        |

| WCDMA Band 5 Uplink |                   |                         |                           |              |              |
|---------------------|-------------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)     | Frequency (MHz)   | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                   | 826.4             | 22.78                   | 6.07                      | 26.70        | 56.02        |
|                     | <b>836.6</b>      | <b>22.92</b>            | <b>6.07</b>               | <b>26.84</b> | <b>56.02</b> |
|                     | 846.6             | 22.88                   | 6.07                      | 26.80        | 56.02        |
| 15                  | 826.4+831.4+836.4 | 21.90                   | 6.07                      | 25.82        | 56.02        |
|                     | 831.6+836.6+841.6 | 20.98                   | 6.07                      | 24.90        | 56.02        |
|                     | 836.6+841.6+846.6 | 21.91                   | 6.07                      | 25.83        | 56.02        |



| LTE Band 5 and Band 26 869-894 MHz Downlink |                 |                         |                           |              |              |
|---------------------------------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)                             | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                                           | 871.5           | 11.20                   | 0.4                       | 9.45         | 56.02        |
|                                             | 881.5           | 10.94                   | 0.4                       | 9.19         | 56.02        |
|                                             | 891.5           | 10.98                   | 0.4                       | 9.23         | 56.02        |
| 10                                          | 874             | 14.26                   | 0.4                       | 12.51        | 56.02        |
|                                             | 881.5           | 13.86                   | 0.4                       | 12.11        | 56.02        |
|                                             | 889             | 13.79                   | 0.4                       | 12.04        | 56.02        |
| 15                                          | <b>876.5</b>    | <b>15.71</b>            | <b>0.4</b>                | <b>13.96</b> | <b>56.02</b> |
|                                             | 881.5           | 15.51                   | 0.4                       | 13.76        | 56.02        |
|                                             | 886.5           | 15.32                   | 0.4                       | 13.57        | 56.02        |

| LTE Band 5 and Band 26 824-849 MHz Uplink |                 |                         |                           |              |              |
|-------------------------------------------|-----------------|-------------------------|---------------------------|--------------|--------------|
| Bandwidth (MHz)                           | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | ERP (dBm)    | Limit (dBm)  |
| 5                                         | 826.5           | 21.46                   | 7.55                      | 26.86        | 56.02        |
|                                           | 836.5           | 20.82                   | 7.55                      | 26.22        | 56.02        |
|                                           | 846.5           | 21.18                   | 7.55                      | 26.58        | 56.02        |
| 10                                        | 829             | 21.33                   | 7.55                      | 26.73        | 56.02        |
|                                           | 836.5           | 20.93                   | 7.55                      | 26.33        | 56.02        |
|                                           | 844             | 21.33                   | 7.55                      | 26.73        | 56.02        |
| 15                                        | <b>831.5</b>    | <b>21.66</b>            | <b>7.55</b>               | <b>27.06</b> | <b>56.02</b> |
|                                           | 836.5           | 21.12                   | 7.55                      | 26.52        | 56.02        |
|                                           | 841.5           | 21.48                   | 7.55                      | 26.88        | 56.02        |

## **2.3 EQUIVALENT ISOTROPIC RADIATED POWER**

### **2.3.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1046  
RSS-132, Clause 5.4  
FCC 47 CFR Part 24, Clause 24.232 (c)  
RSS-133, Clause 6.4

### **2.3.2 Standard Applicable**

RSS-132:  
The EIRP for mobile equipment shall not exceed 11.5 watts

FCC Part 24:  
Mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

RSS-133:  
The equivalent isotropically radiated power (e.i.r.p.) for Mobile stations and hand-held portables are limited to 2 watts maximum e.i.r.p.

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

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

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

August 02, 05, 08 and October 15, 2019 /XYZ

### **2.3.5 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.

### **2.3.6 Sample Computation**

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

### 2.3.7 Test Results

| WCDMA Band 5 Downlink |                          |                         |                           |              |             |
|-----------------------|--------------------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)       | Frequency (MHz)          | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                     | 871.4                    | 10.92                   | 0.4                       | 11.32        | 40.6        |
|                       | 881.6                    | 10.90                   | 0.4                       | 11.30        | 40.6        |
|                       | 891.6                    | 10.86                   | 0.4                       | 11.26        | 40.6        |
| 15                    | <b>871.4+876.4+881.4</b> | <b>14.85</b>            | <b>0.4</b>                | <b>15.25</b> | <b>40.6</b> |
|                       | 876.6+881.6+886.6        | 14.69                   | 0.4                       | 15.09        | 40.6        |
|                       | 881.6+886.6+891.6        | 14.57                   | 0.4                       | 14.97        | 40.6        |

| WCDMA Band 5 Uplink |                   |                         |                           |              |             |
|---------------------|-------------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)     | Frequency (MHz)   | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                   | 826.4             | 22.78                   | 6.07                      | 28.85        | 40.6        |
|                     | <b>836.6</b>      | <b>22.92</b>            | <b>6.07</b>               | <b>28.99</b> | <b>40.6</b> |
|                     | 846.6             | 22.88                   | 6.07                      | 28.95        | 40.6        |
| 15                  | 826.4+831.4+836.4 | 21.90                   | 6.07                      | 27.97        | 40.6        |
|                     | 831.6+836.6+841.6 | 20.98                   | 6.07                      | 27.05        | 40.6        |
|                     | 836.6+841.6+846.6 | 21.91                   | 6.07                      | 27.98        | 40.6        |

| LTE Band 5 and Band 26 869-894 MHz Downlink |                 |                         |                           |              |             |
|---------------------------------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)                             | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                                           | 871.5           | 11.20                   | 0.4                       | 11.60        | 40.6        |
|                                             | 881.5           | 10.94                   | 0.4                       | 11.34        | 40.6        |
|                                             | 891.5           | 10.98                   | 0.4                       | 11.38        | 40.6        |
| 10                                          | 874             | 14.26                   | 0.4                       | 14.66        | 40.6        |
|                                             | 881.5           | 13.86                   | 0.4                       | 14.26        | 40.6        |
|                                             | 889             | 13.79                   | 0.4                       | 14.19        | 40.6        |
| 15                                          | <b>876.5</b>    | <b>15.71</b>            | <b>0.4</b>                | <b>16.11</b> | <b>40.6</b> |
|                                             | 881.5           | 15.51                   | 0.4                       | 15.91        | 40.6        |
|                                             | 886.5           | 15.32                   | 0.4                       | 15.72        | 40.6        |

| LTE Band 5 and Band 26 824-849 MHz Uplink |                 |                         |                           |              |             |
|-------------------------------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)                           | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                                         | 826.5           | 21.46                   | 7.55                      | 29.01        | 40.6        |
|                                           | 836.5           | 20.82                   | 7.55                      | 28.37        | 40.6        |
|                                           | 846.5           | 21.18                   | 7.55                      | 28.73        | 40.6        |
| 10                                        | 829             | 21.33                   | 7.55                      | 28.88        | 40.6        |
|                                           | 836.5           | 20.93                   | 7.55                      | 28.48        | 40.6        |
|                                           | 844             | 21.33                   | 7.55                      | 28.88        | 40.6        |
| 15                                        | <b>831.5</b>    | <b>21.66</b>            | <b>7.55</b>               | <b>29.21</b> | <b>40.6</b> |
|                                           | 836.5           | 21.12                   | 7.55                      | 28.67        | 40.6        |
|                                           | 841.5           | 21.48                   | 7.55                      | 29.03        | 40.6        |



| LTE Band 25 Downlink |                 |                         |                           |              |             |
|----------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)      | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                    | 1932.5          | 9.75                    | 2.6                       | 12.35        | 33          |
|                      | 1962.5          | 10.65                   | 2.6                       | 13.25        | 33          |
|                      | 1992.5          | 9.51                    | 2.6                       | 12.11        | 33          |
| 10                   | 1935.0          | 13.71                   | 2.6                       | 16.31        | 33          |
|                      | 1962.5          | 13.43                   | 2.6                       | 16.03        | 33          |
|                      | 1990.0          | 13.12                   | 2.6                       | 15.72        | 33          |
| 15                   | 1937.5          | 15.26                   | 2.6                       | 17.86        | 33          |
|                      | 1962.5          | 15.27                   | 2.6                       | 17.87        | 33          |
|                      | 1987.5          | 14.47                   | 2.6                       | 17.07        | 33          |
| 20                   | 1940.0          | 16.12                   | 2.6                       | 18.72        | 33          |
|                      | <b>1962.5</b>   | <b>16.57</b>            | <b>2.6</b>                | <b>19.17</b> | <b>33</b>   |
|                      | 1985.0          | 16.03                   | 2.6                       | 18.63        | 33          |

| LTE Band 25 Uplink |                 |                         |                           |              |             |
|--------------------|-----------------|-------------------------|---------------------------|--------------|-------------|
| Bandwidth (MHz)    | Frequency (MHz) | Max Power Average (dBm) | Antenna System Gain (dBi) | EIRP (dBm)   | Limit (dBm) |
| 5                  | 1852.5          | 22.54                   | 7.26                      | 29.80        | 33          |
|                    | 1882.5          | 22.48                   | 7.26                      | 29.74        | 33          |
|                    | 1912.5          | 22.76                   | 7.26                      | 30.02        | 33          |
| 10                 | 1855.0          | 22.66                   | 7.26                      | 29.92        | 33          |
|                    | 1882.5          | 22.51                   | 7.26                      | 29.77        | 33          |
|                    | 1910.0          | 23.22                   | 7.26                      | 30.48        | 33          |
| 15                 | 1857.5          | 21.16                   | 7.26                      | 28.42        | 33          |
|                    | 1882.5          | 21.68                   | 7.26                      | 28.94        | 33          |
|                    | 1907.5          | 22.44                   | 7.26                      | 29.70        | 33          |
| 20                 | 1860.0          | 22.69                   | 7.26                      | 29.95        | 33          |
|                    | 1882.5          | 22.64                   | 7.26                      | 29.90        | 33          |
|                    | <b>1905.0</b>   | <b>23.17</b>            | <b>7.26</b>               | <b>30.43</b> | <b>33</b>   |

## **2.4 OCCUPIED BANDWIDTH**

### **2.4.1 Specification Reference**

FCC 47 CFR Part 2, Clause 2.1049  
FCC 47 CFR Part 22, Clause 22.917(b)  
FCC 47 CFR Part 24, Clause 24.238(b)  
RSS-Gen, Clause 6.6

### **2.4.2 Standard Applicable**

The emission 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 at least 26 dB below the transmitter power.

### **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, 12, 13, September 04 and October 15, 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 | 24.5 - 26.3°C  |
| Relative Humidity   | 45.0 - 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

| WCDMA Band 5 Downlink |                 |           |                |
|-----------------------|-----------------|-----------|----------------|
| Channel               | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 4357                  | 871.4           | 3.86      | 4.35           |
| 4408                  | 881.6           | 3.85      | 4.37           |
| 4458                  | 891.6           | 3.86      | 4.37           |

| WCDMA Band 5 Uplink |                 |           |                |
|---------------------|-----------------|-----------|----------------|
| Channel             | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 4132                | 826.4           | 3.85      | 4.33           |
| 4183                | 836.6           | 3.86      | 4.37           |
| 4233                | 846.6           | 3.85      | 4.37           |

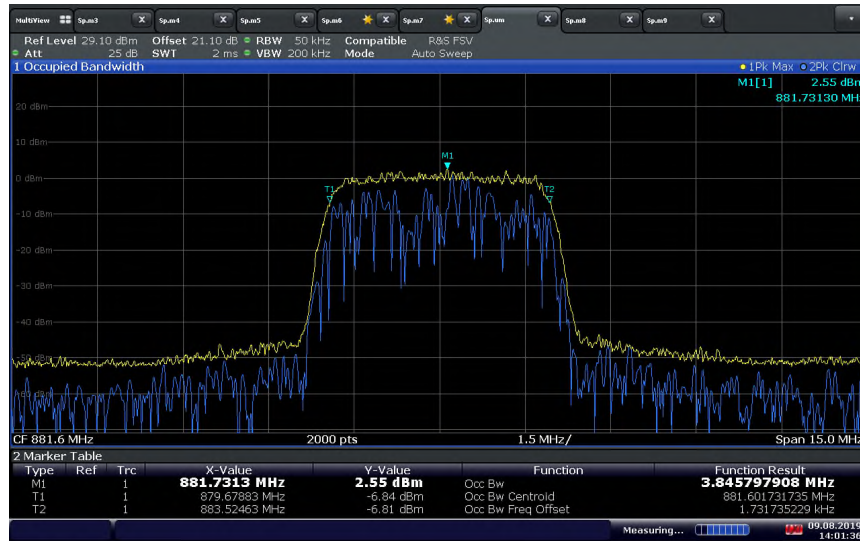
| LTE Band 5 and Band 26 869-894 MHz Downlink |          |                 |           |                |
|---------------------------------------------|----------|-----------------|-----------|----------------|
| Bandwidth (MHz)                             | Channels | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5 MHz                                       | 2425     | 871.5           | 4.45      | 4.76           |
|                                             | 2525     | 881.5           | 4.45      | 4.78           |
|                                             | 2625     | 891.5           | 4.44      | 4.79           |
| 10 MHz                                      | 2450     | 874             | 8.88      | 9.54           |
|                                             | 2525     | 881.5           | 8.90      | 9.64           |
|                                             | 2600     | 889             | 8.87      | 9.57           |
| 15 MHz                                      | 2475     | 876.5           | 13.30     | 14.22          |
|                                             | 2525     | 881.5           | 13.30     | 14.20          |
|                                             | 2575     | 886.5           | 13.23     | 14.13          |

| LTE Band 5 and Band 26 824-849 MHz Uplink |          |                 |           |                |
|-------------------------------------------|----------|-----------------|-----------|----------------|
| Bandwidth (MHz)                           | Channels | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5 MHz                                     | 20425    | 826.5           | 4.43      | 4.76           |
|                                           | 20525    | 836.5           | 4.44      | 4.76           |
|                                           | 20625    | 846.5           | 4.43      | 4.76           |
| 10 MHz                                    | 20450    | 829             | 8.88      | 9.46           |
|                                           | 20525    | 836.5           | 8.90      | 9.51           |
|                                           | 20600    | 844             | 8.86      | 9.48           |
| 15 MHz                                    | 20475    | 831.5           | 13.36     | 14.22          |
|                                           | 20525    | 836.5           | 13.36     | 14.13          |
|                                           | 20575    | 841.5           | 13.28     | 14.13          |

| LTE Band 25 Downlink |          |                 |           |                |
|----------------------|----------|-----------------|-----------|----------------|
| Bandwidth (MHz)      | Channels | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5 MHz                | 8065     | 1932.5          | 4.46      | 4.82           |
|                      | 8365     | 1962.5          | 4.42      | 4.76           |
|                      | 8665     | 1992.5          | 4.33      | 4.76           |
| 10 MHz               | 8090     | 1935.0          | 8.92      | 9.57           |
|                      | 8365     | 1962.5          | 8.88      | 9.59           |
|                      | 8640     | 1990.0          | 8.94      | 9.39           |
| 15 MHz               | 8115     | 1937.5          | 13.38     | 14.29          |
|                      | 8365     | 1962.5          | 13.28     | 14.22          |
|                      | 8615     | 1987.5          | 13.28     | 14.20          |
| 20 MHz               | 8140     | 1940.0          | 17.66     | 18.81          |
|                      | 8365     | 1962.5          | 17.72     | 18.96          |
|                      | 8590     | 1985.0          | 17.80     | 19.11          |

| LTE Band 25 Uplink |          |                 |           |                |
|--------------------|----------|-----------------|-----------|----------------|
| Bandwidth (MHz)    | Channels | Frequency (MHz) | OBW (MHz) | -26dB BW (MHz) |
| 5 MHz              | 26065    | 1852.5          | 4.45      | 4.78           |
|                    | 26365    | 1882.5          | 4.43      | 4.77           |
|                    | 26665    | 1912.5          | 4.44      | 4.75           |
| 10 MHz             | 26090    | 1855.0          | 8.88      | 9.53           |
|                    | 26365    | 1882.5          | 8.89      | 9.49           |
|                    | 26640    | 1910.0          | 8.88      | 9.49           |
| 15 MHz             | 26115    | 1857.5          | 13.32     | 14.15          |
|                    | 26365    | 1882.5          | 13.31     | 14.15          |
|                    | 26615    | 1907.5          | 13.26     | 14.20          |
| 20 MHz             | 26140    | 1860.0          | 17.74     | 18.93          |
|                    | 26365    | 1882.5          | 17.73     | 19.08          |
|                    | 26590    | 1905.0          | 17.70     | 18.96          |

### WCDMA Band 5 Downlink Mid Channel 99% OBW



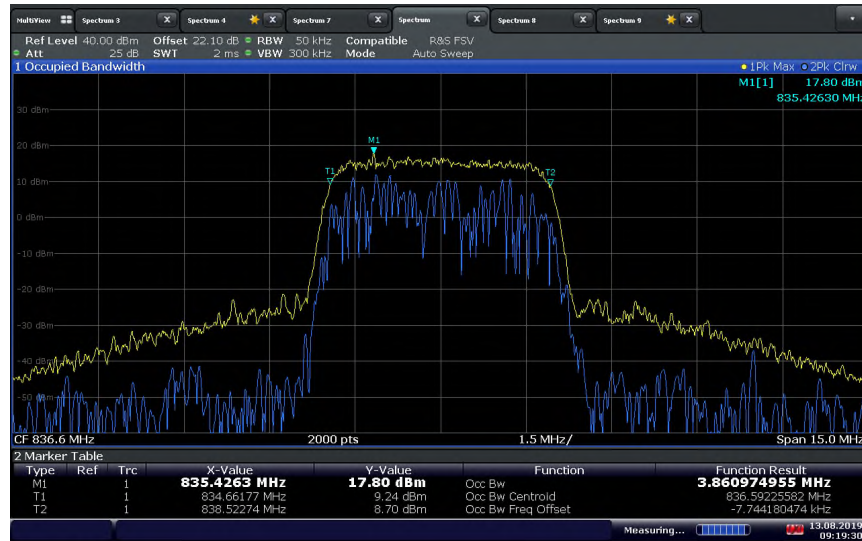
14:01:37 09.08.2019

### WCDMA Band 5 Downlink Mid Channel -26dB BW



14:00:26 09.08.2019

### WCDMA Band 5 Uplink Mid Channel 99% OBW



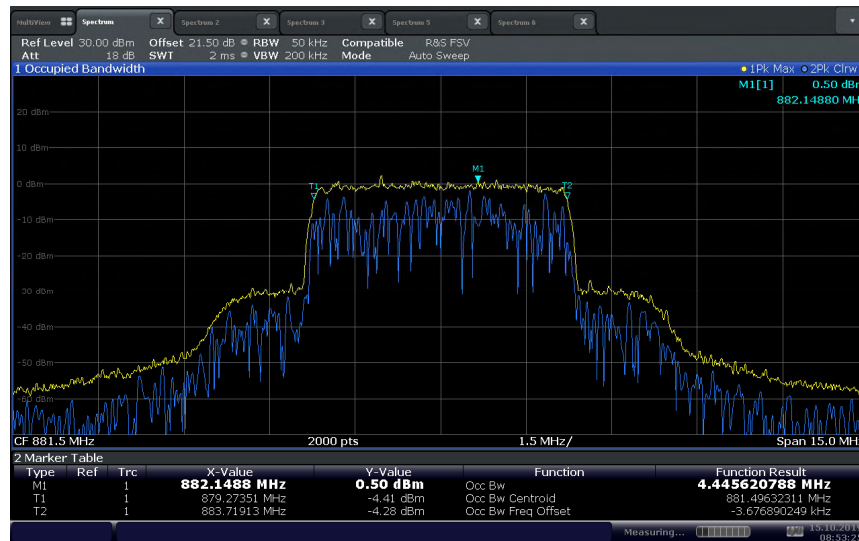
09:19:31 13.08.2019

### WCDMA Band 5 Uplink Mid Channel -26dB BW



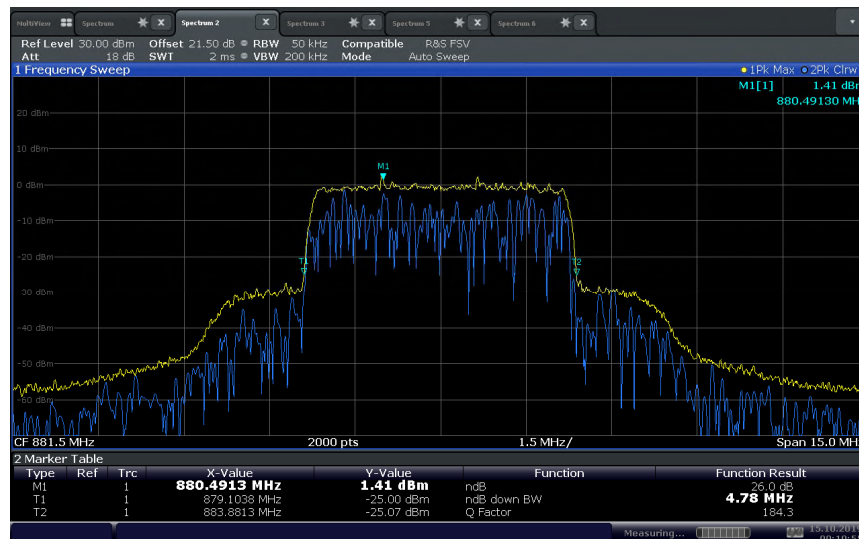
09:20:38 13.08.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_5 MHz BW\_Mid Channel 99% OBW



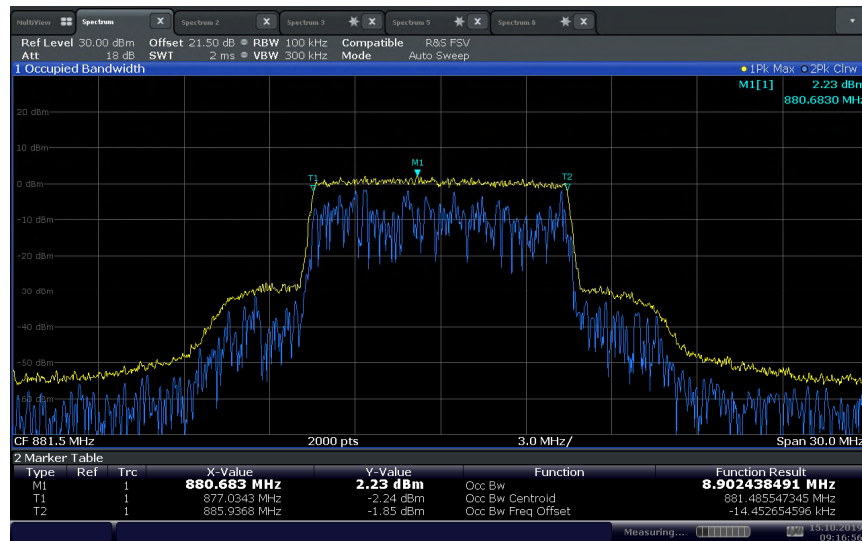
08:53:26 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_5 MHz BW\_Mid Channel -26dB BW



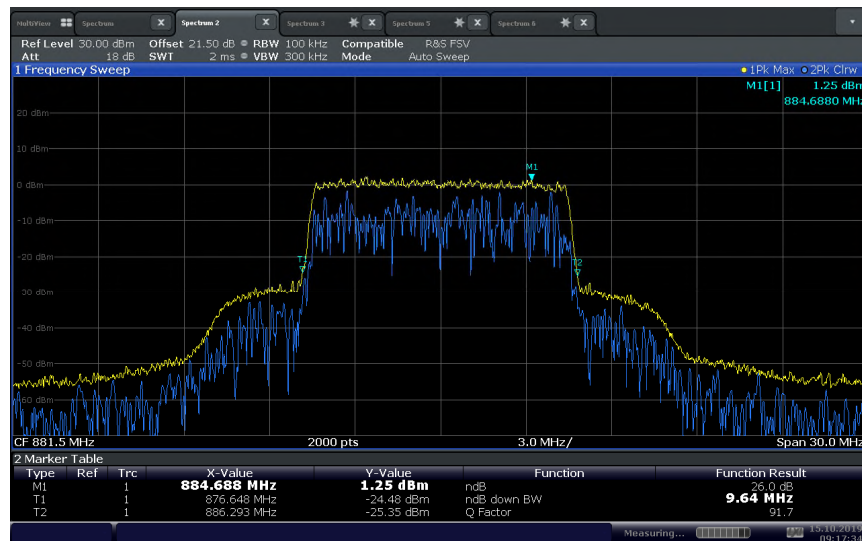
09:10:55 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_10 MHz BW\_Mid Channel 99% OBW



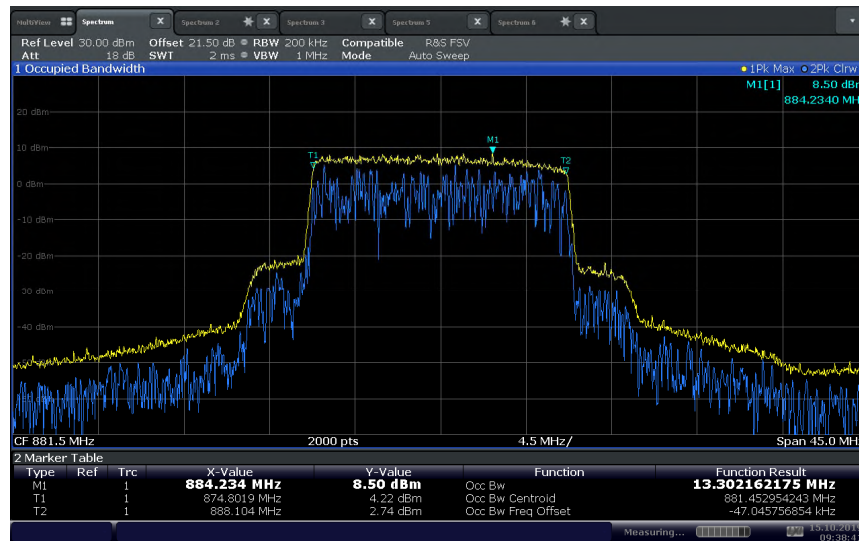
09:16:56 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_10 MHz BW\_Mid Channel -26dB BW

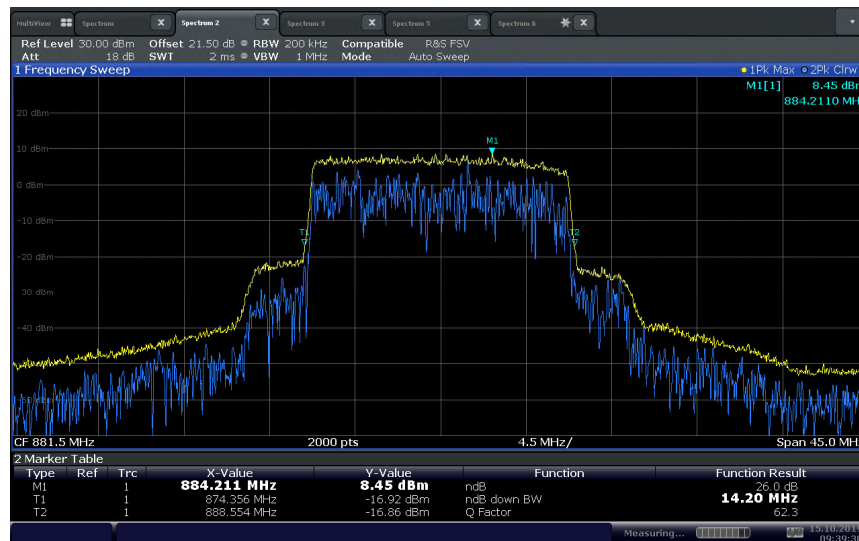


09:17:35 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_15 MHz BW\_Mid Channel 99% OBW



### LTE Band 5 and Band 26 869-894 MHz Downlink\_15 MHz BW\_Mid Channel -26dB BW

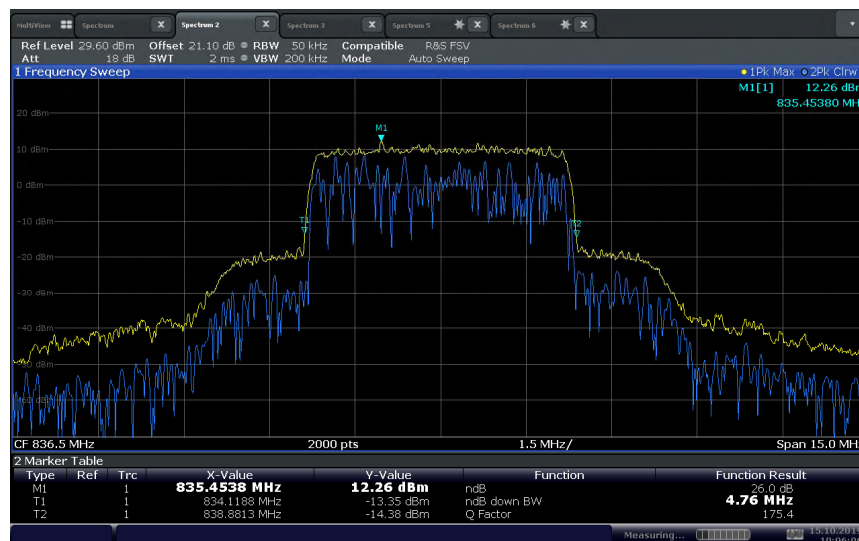


### LTE Band 5 and Band 26 824-849 MHz Uplink\_5 MHz BW\_Mid Channel 99% OBW



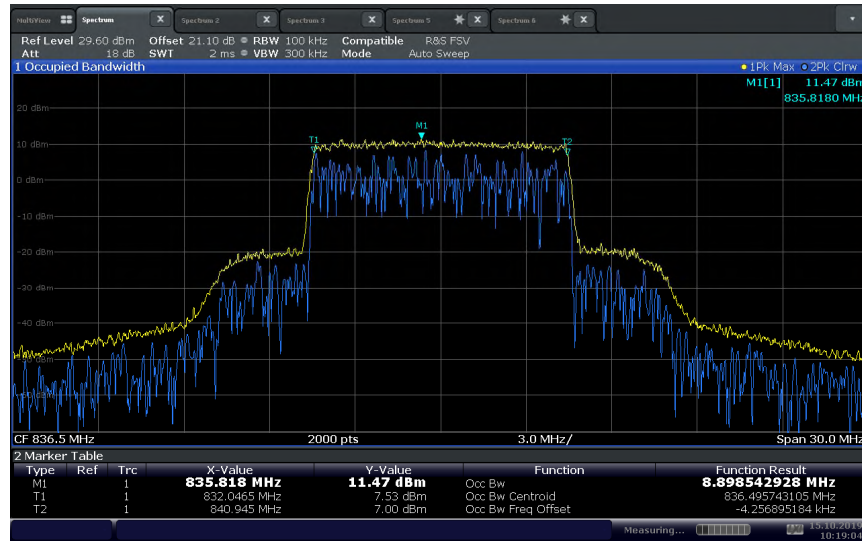
10:04:42 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_5 MHz BW\_Mid Channel -26dB BW



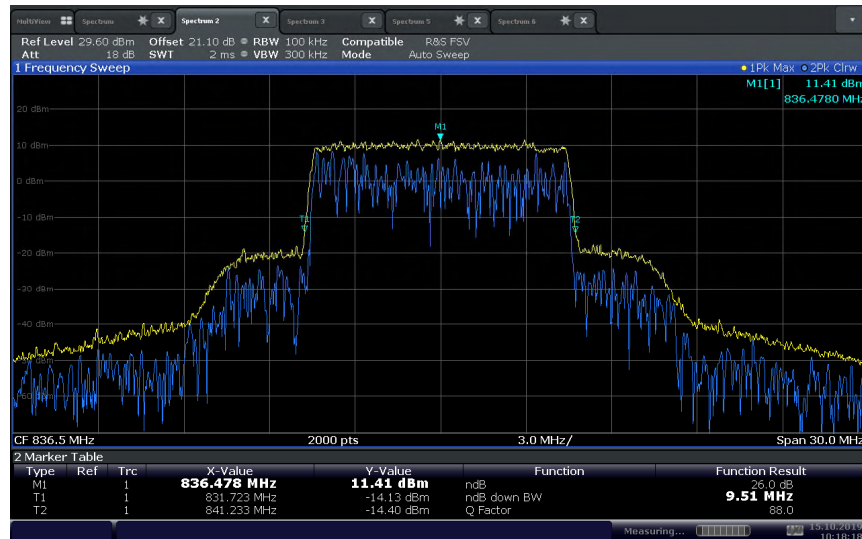
10:06:06 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_10 MHz BW\_Mid Channel 99% OBW



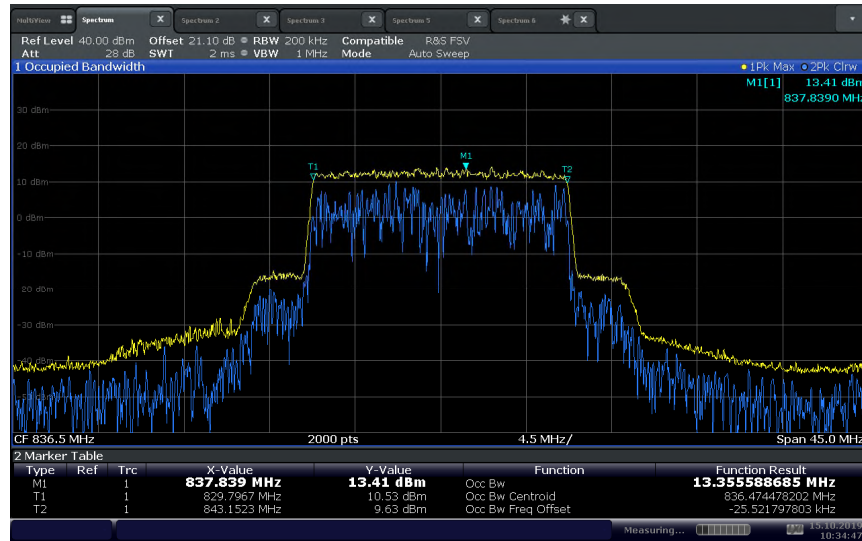
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### LTE Band 5 and Band 26 824-849 MHz Uplink\_10 MHz BW\_Mid Channel -26dB BW



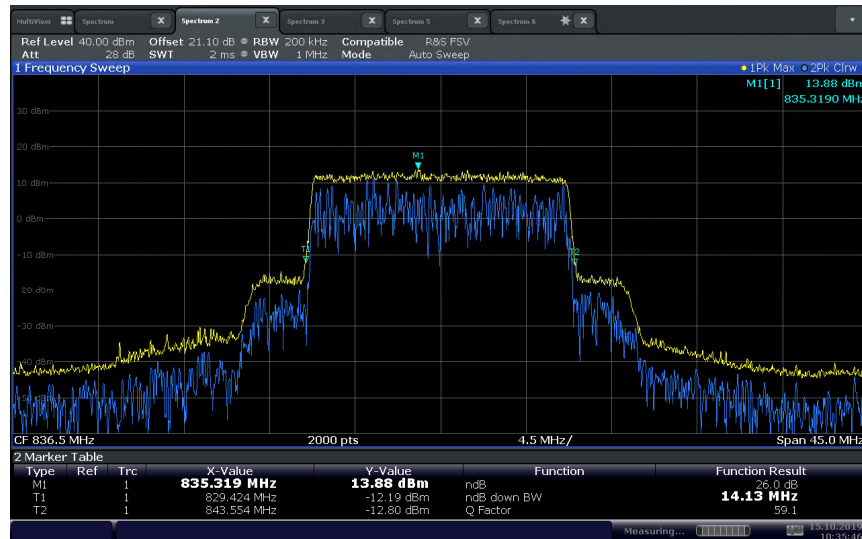
10:18:19 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_15 MHz BW\_Mid Channel 99% OBW



10:34:48 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_15 MHz BW\_Mid Channel -26dB BW



10:35:47 15.10.2019

### LTE Band 25 Downlink\_5 MHz BW\_Mid Channel 99% OBW



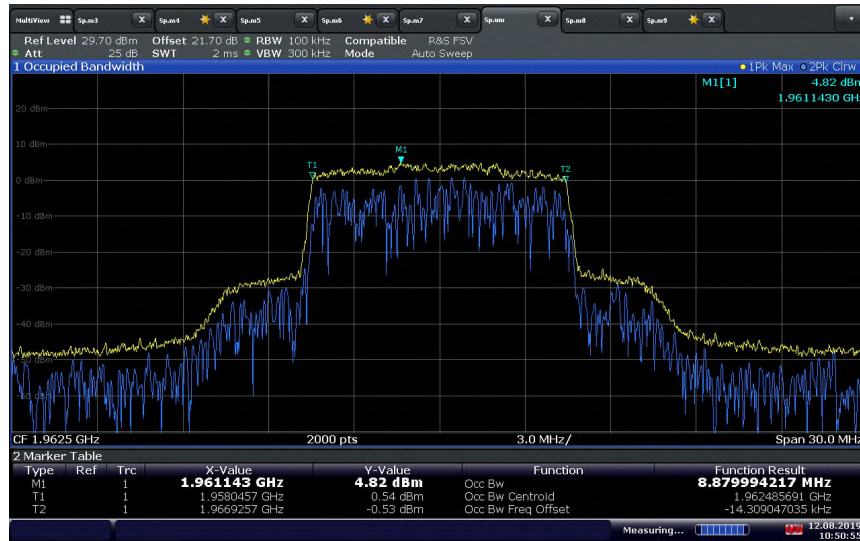
10:42:52 12.08.2019

### LTE Band 25 Downlink\_5 MHz BW\_Mid Channel -26dB BW



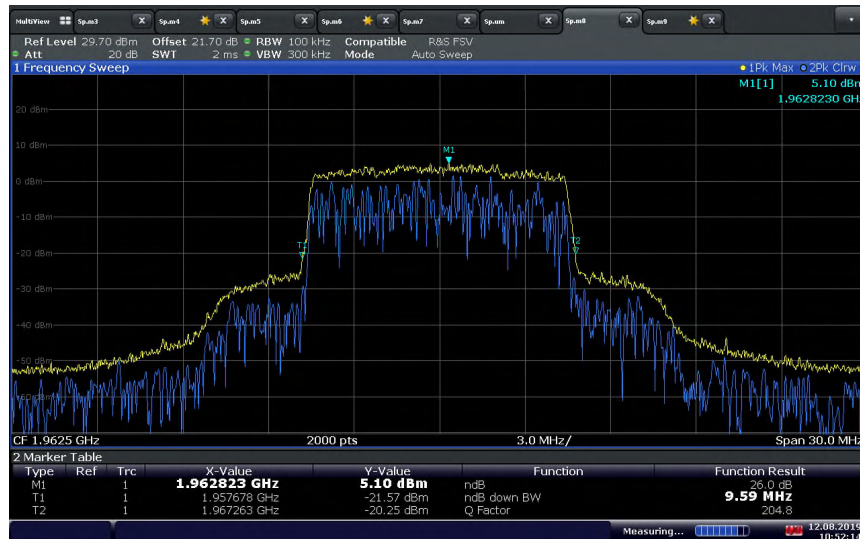
10:43:45 12.08.2019

### LTE Band 25 Downlink\_10 MHz BW\_Mid Channel 99% OBW



10:50:56 12.08.2019

### LTE Band 25 Downlink\_10 MHz BW\_Mid Channel -26dB BW



10:52:14 12.08.2019

### LTE Band 25 Downlink\_15 MHz BW\_Mid Channel 99% OBW



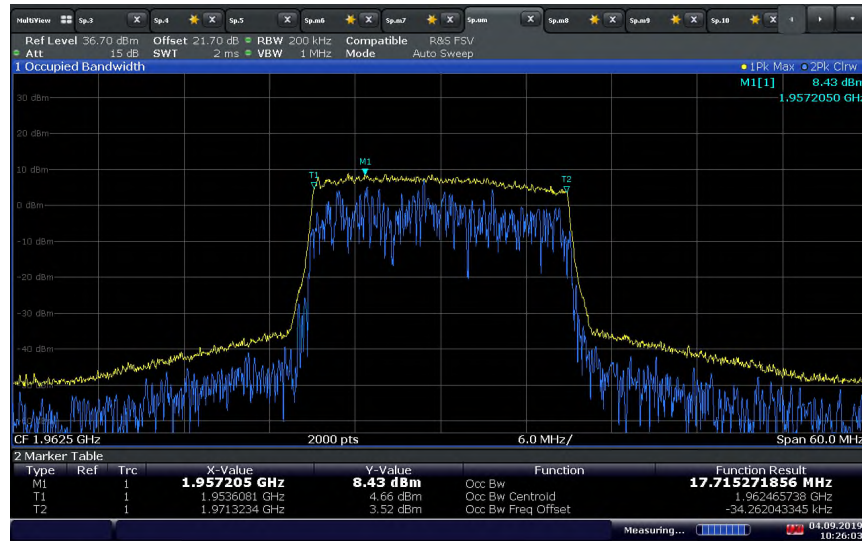
10:59:07 12.08.2019

### LTE Band 25 Downlink\_15MHz BW\_Mid Channel -26dB BW



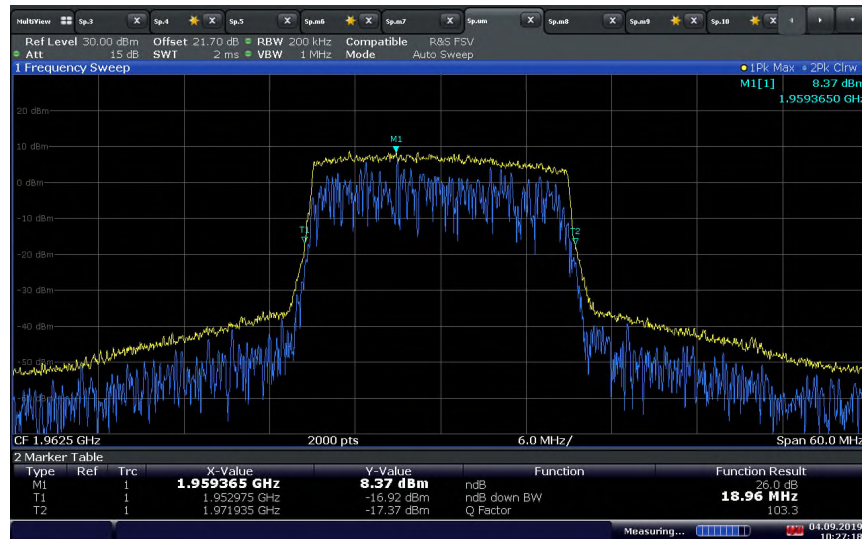
10:57:43 12.08.2019

### LTE Band 25 Downlink\_20 MHz BW\_Mid Channel 99% OBW



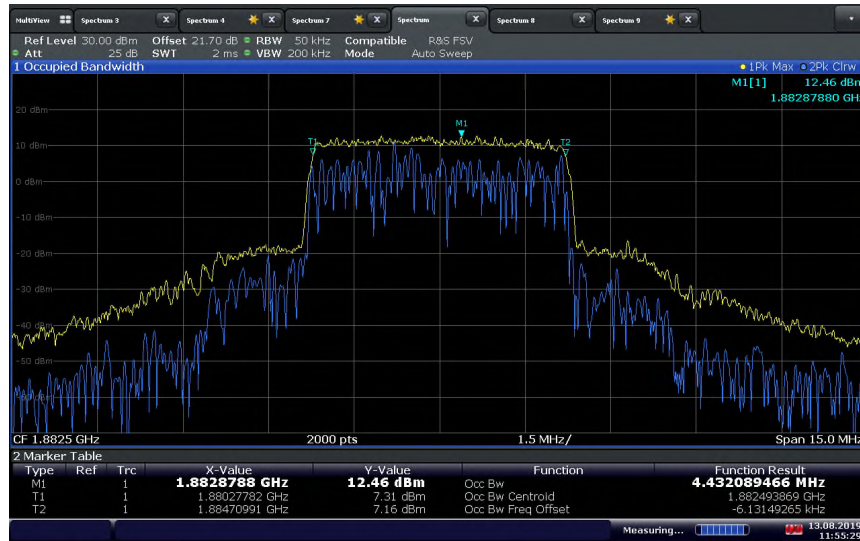
10:26:04 04.09.2019

### LTE Band 25 Downlink\_20 MHz BW\_Mid Channel -26dB BW



10:27:19 04.09.2019

### LTE Band 25 Uplink\_5 MHz BW\_Mid Channel 99% OBW



11:55:30 13.08.2019

### LTE Band 25 Uplink\_5 MHz BW\_Mid Channel -26dB BW



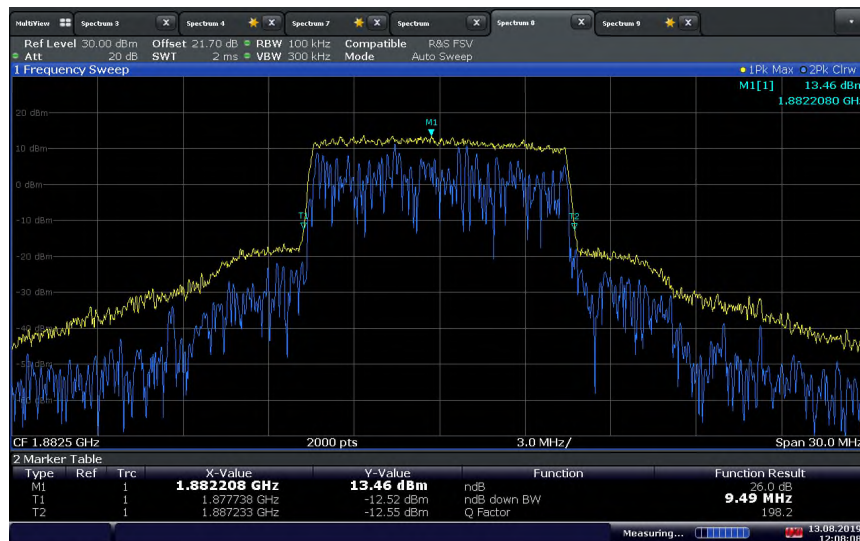
11:54:06 13.08.2019

### LTE Band 25 Uplink\_10 MHz BW\_Mid Channel 99% OBW



12:07:17 13.08.2019

### LTE Band 25 Uplink\_10 MHz BW\_Mid Channel -26dB BW



12:08:09 13.08.2019

### LTE Band 25 Uplink\_15 MHz BW\_Mid Channel 99% OBW



12:22:09 13.08.2019

### LTE Band 25 Uplink\_15 MHz BW\_Mid Channel -26dB BW



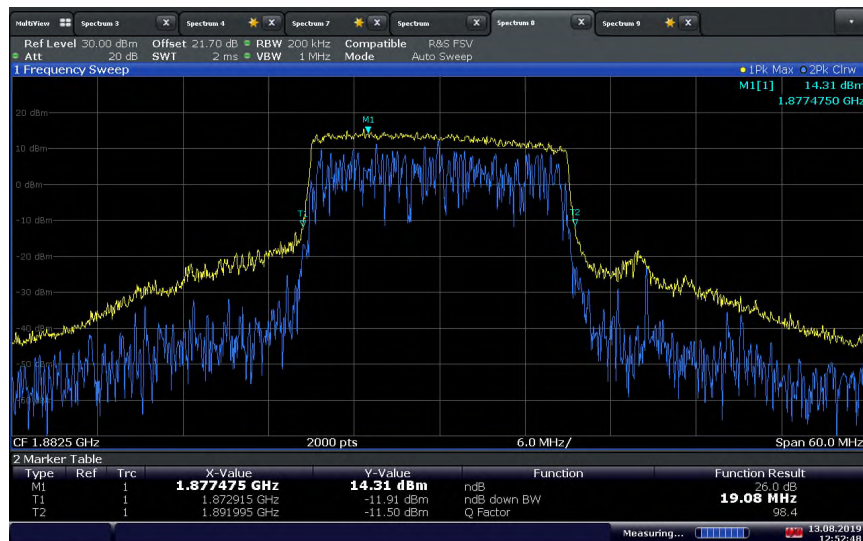
12:23:10 13.08.2019

### LTE Band 25 Uplink\_20 MHz BW\_Mid Channel 99% OBW



12:53:43 13.08.2019

### LTE Band 25 Uplink\_20 MHz BW\_Mid Channel -26dB BW



12:52:49 13.08.2019

## **2.5 PEAK-AVERAGE RATIO**

### **2.5.1 Specification Reference**

FCC 47 CFR Part 24, Clause 24.232 (d)  
RSS-132, Clause 5.4  
RSS-133, Clause 6.4

### **2.5.2 Standard Applicable**

FCC Part 24:

Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB

RSS-132 and RSS-133:

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

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

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

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

August 09, 13, 15 and October 15, 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 performed at TÜV SÜD America Inc. Rancho Bernardo facility.

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 25.8 - 26.0°C  |
| Relative Humidity   | 51.1 - 53.3%   |
| ATM Pressure        | 98.8 - 99.0kPa |

## 2.5.7 Additional Observations

- This is a conducted test.
- Test procedure is 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) The CCDF curve shows how much time the peak waveform spends at or above a given average power level. The percent of time the signals spends at or above the level defines the probability for that particular power level.
- RBW was set to maximum the SA can support.
- There are no measured PAR levels greater than 13dB. EUT complies.
- Low, Middle and High channels for all bandwidths were verified.
- Only test plots for middle channel were presented as the representative configuration.

## 2.5.8 Test Results

| WCDMA Band 5 Downlink |                |                   |          |
|-----------------------|----------------|-------------------|----------|
| Bandwidth (MHz)       | Channel        | Frequency (MHz)   | PAR (dB) |
| 5                     | 4357           | 871.4             | 9.54     |
|                       | 4408           | 881.6             | 8.96     |
|                       | 4458           | 891.6             | 9.50     |
| 15                    | 4357+4382+4407 | 871.4+876.4+881.4 | 11.15    |
|                       | 4383+4408+4433 | 876.6+881.6+886.6 | 11.02    |
|                       | 4408+4433+4458 | 881.6+886.6+891.6 | 10.88    |

| WCDMA Band 5 Uplink |                |                   |          |
|---------------------|----------------|-------------------|----------|
| Bandwidth (MHz)     | Channel        | Frequency (MHz)   | PAR (dB) |
| 5                   | 4132           | 826.4             | 7.92     |
|                     | 4183           | 836.6             | 7.87     |
|                     | 4233           | 846.6             | 8.34     |
| 15                  | 4132+4157+4182 | 826.4+831.4+836.4 | 10.04    |
|                     | 4158+4183+4208 | 831.6+836.6+841.6 | 9.81     |
|                     | 4183+4208+4233 | 836.6+841.6+846.6 | 9.74     |

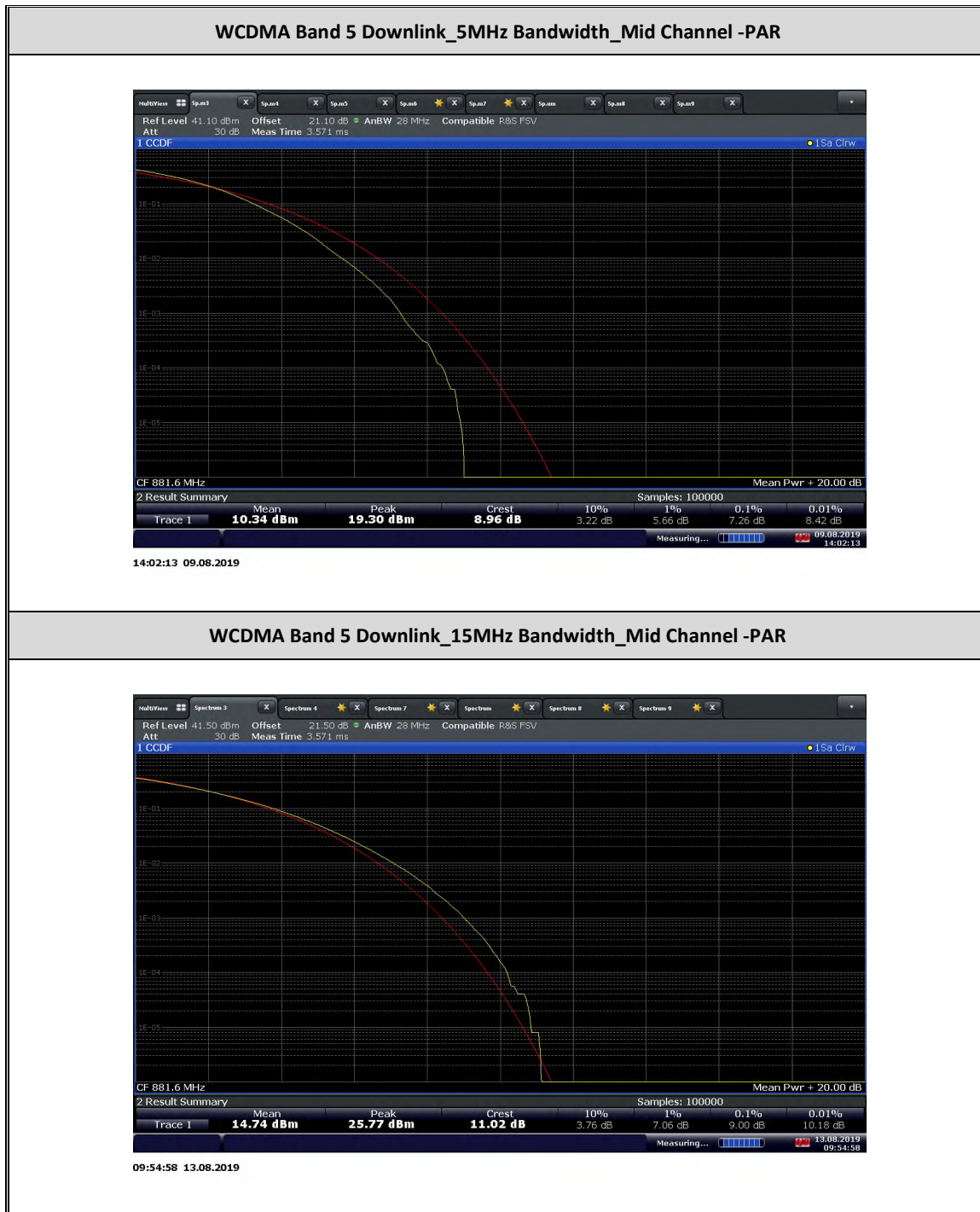
| LTE Band 5 and Band 26 869-894 MHz Downlink |          |                 |          |
|---------------------------------------------|----------|-----------------|----------|
| Bandwidth (MHz)                             | Channels | Frequency (MHz) | PAR (dB) |
| 5 MHz                                       | 2425     | 871.5           | 10.80    |
|                                             | 2525     | 881.5           | 10.85    |
|                                             | 2625     | 891.5           | 10.60    |
| 10 MHz                                      | 2450     | 874             | 10.59    |
|                                             | 2525     | 881.5           | 10.69    |
|                                             | 2600     | 889             | 11.0     |
| 15 MHz                                      | 2475     | 876.5           | 10.86    |
|                                             | 2525     | 881.5           | 11.27    |
|                                             | 2575     | 886.5           | 10.68    |

| LTE Band 5 and Band 26 824-849 Uplink |          |                 |          |
|---------------------------------------|----------|-----------------|----------|
| Bandwidth (MHz)                       | Channels | Frequency (MHz) | PAR (dB) |
| 5 MHz                                 | 20425    | 826.5           | 10.48    |
|                                       | 20525    | 836.5           | 10.79    |
|                                       | 20625    | 846.5           | 10.85    |
| 10 MHz                                | 20450    | 829             | 10.70    |
|                                       | 20525    | 836.5           | 10.54    |
|                                       | 20600    | 844             | 10.78    |
| 15 MHz                                | 20475    | 831.5           | 10.39    |
|                                       | 20525    | 836.5           | 10.82    |
|                                       | 20575    | 841.5           | 10.45    |

| LTE Band 25 Downlink |          |                 |          |
|----------------------|----------|-----------------|----------|
| Bandwidth (MHz)      | Channels | Frequency (MHz) | PAR (dB) |
| 5 MHz                | 8065     | 1932.5          | 10.35    |
|                      | 8365     | 1962.5          | 11.45    |
|                      | 8665     | 1992.5          | 10.28    |
| 10 MHz               | 8090     | 1935.0          | 11.25    |
|                      | 8365     | 1962.5          | 11.56    |
|                      | 8640     | 1990.0          | 9.93     |
| 15 MHz               | 8115     | 1937.5          | 10.39    |
|                      | 8365     | 1962.5          | 11.76    |
|                      | 8615     | 1987.5          | 10.42    |
| 20 MHz               | 8140     | 1940.0          | 11.74    |
|                      | 8365     | 1962.5          | 10.29    |
|                      | 8590     | 1985.0          | 11.28    |

| LTE Band 25 Uplink |          |                 |          |
|--------------------|----------|-----------------|----------|
| Bandwidth (MHz)    | Channels | Frequency (MHz) | PAR (dB) |
| 5 MHz              | 26065    | 1852.5          | 9.50     |
|                    | 26365    | 1882.5          | 9.34     |
|                    | 26665    | 1912.5          | 8.36     |
| 10 MHz             | 26090    | 1855.0          | 8.92     |
|                    | 26365    | 1882.5          | 9.44     |
|                    | 26640    | 1910.0          | 8.65     |
| 15 MHz             | 26115    | 1857.5          | 9.37     |
|                    | 26365    | 1882.5          | 9.43     |
|                    | 26615    | 1907.5          | 8.54     |
| 20 MHz             | 26140    | 1860.0          | 9.33     |
|                    | 26365    | 1882.5          | 9.45     |
|                    | 26590    | 1905.0          | 8.77     |

## 2.5.9 Sample Test Plot



### WCDMA Band 5 Uplink\_5MHz Bandwidth\_Mid Channel -PAR



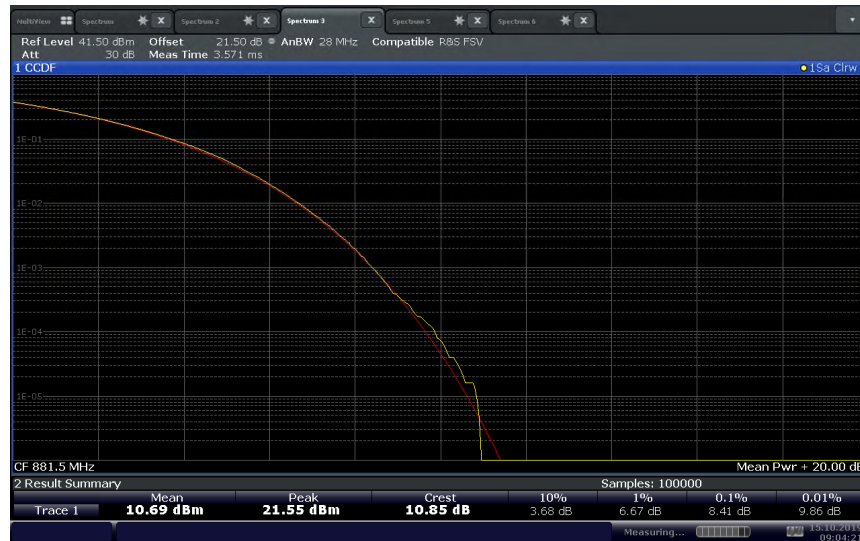
09:22:37 13.08.2019

### WCDMA Band 5 Uplink\_15MHz Bandwidth\_Mid Channel -PAR



09:39:03 13.08.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_5MHz Bandwidth\_Mid Channel -PAR



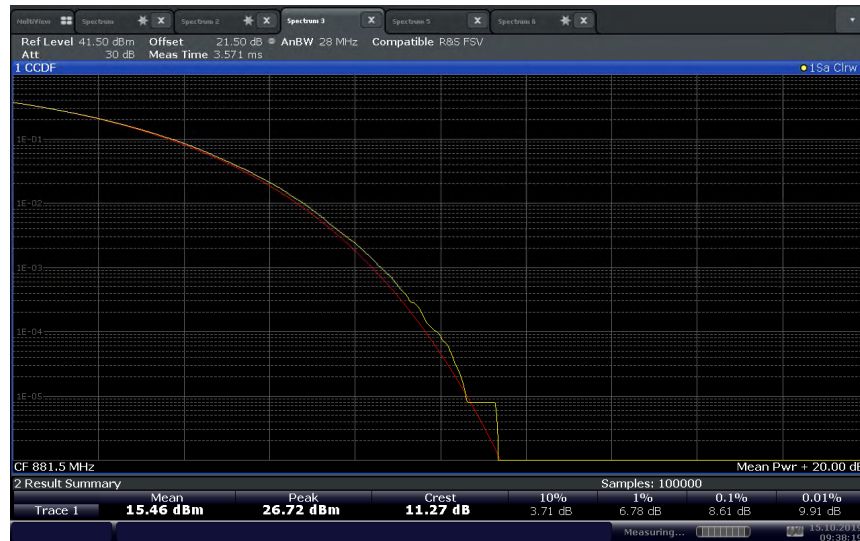
09:04:21 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_10MHz Bandwidth\_Mid Channel -PAR



09:18:55 15.10.2019

### LTE Band 5 and Band 26 869-894 MHz Downlink\_15MHz Bandwidth\_Mid Channel -PAR



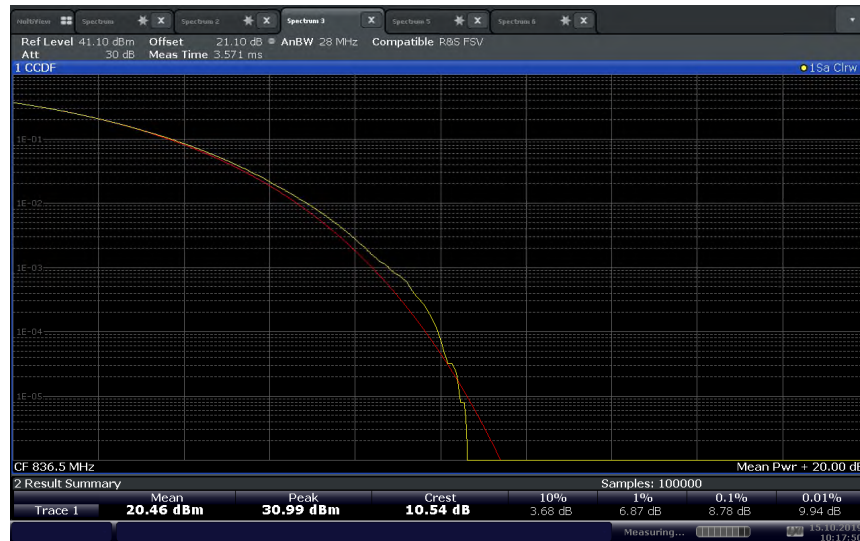
09:38:19 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_5MHz Bandwidth\_Mid Channel -PAR



10:07:24 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_10MHz Bandwidth\_Mid Channel -PAR



10:17:51 15.10.2019

### LTE Band 5 and Band 26 824-849 MHz Uplink\_15MHz Bandwidth\_Mid Channel -PAR



10:36:32 15.10.2019

### LTE Band 25 Downlink\_5MHz Bandwidth\_Mid Channel -PAR



14:27:43 09.08.2019

### LTE Band 25 Downlink\_10MHz Bandwidth\_Mid Channel -PAR



14:48:47 09.08.2019

### LTE Band 25 Downlink\_15MHz Bandwidth\_Mid Channel -PAR



15:00:31 09.08.2019

### LTE Band 25 Downlink\_20MHz Bandwidth\_Mid Channel -PAR



15:32:27 09.08.2019

### LTE Band 25 Uplink\_5MHz Bandwidth\_Mid Channel -PAR



11:56:17 13.08.2019

### LTE Band 25 Uplink\_10MHz Bandwidth\_Mid Channel -PAR



12:08:36 13.08.2019

### LTE Band 25 Uplink\_15MHz Bandwidth\_Mid Channel -PAR



12:21:23 13.08.2019

### LTE Band 25 Uplink\_20MHz Bandwidth\_Mid Channel -PAR



12:54:17 13.08.2019