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Report On

Application for Grant of Equipment Authorization of the
Inseego Corp.

MIFI8000 Wireless Hotspot Modem

FCC CFR 47 Part 2 and 27: 2018

RSS-195 Issue 2: 2014

RSS-199 Issue 3: 2016

Report No. 72152860A

October 2019




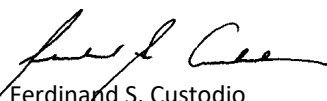
REPORT ON Radio Testing of the
Inseego Corp.
MIFI8000 Wireless Hotspot Modem

TEST REPORT NUMBER 72152860A

PREPARED FOR Inseego Corp.
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DATED October 23, 2019



Revision History

| 72152860A Inseego Corp. MIFI8000 Wireless Hotspot Modem | | | | | |
|---|--------------|-----------------|--------|----------------|--------------------|
| DATE | OLD REVISION | NEW REVISION | REASON | PAGES AFFECTED | APPROVED BY |
| 10/23/2019 | — | Initial Release | | | Ferdinand Custodio |
| | | | | | |
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SECTION 1

REPORT SUMMARY

Radio Testing of the
Inseego Corp.
MIFI8000 Wireless Hotspot Modem



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Inseego Corp. MIFI8000 Wireless Hotspot Modem to the requirements of the following:

- FCC CFR 47 Part 2 and 27: 2018
- RSS-195 Issue 2: 2014
- RSS-199 Issue 3: 2016

| | |
|-------------------------------|---|
| 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 | Inseego Corp. |
| Product Marketing Name | MiFi 8000 |
| Model Number(s) | MIFI8000 |
| FCC ID Number | PKRISGMIFI8000 |
| IC Number | 3229A-MIFI8000 |
| Serial Number(s) | FJ220819C00056 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | <ul style="list-style-type: none">• FCC CRF 47 Part 2 and 27 (October 1, 2018)• KDB412172 D01 Determining ERP and EIRP v01r01 August 07, 2015: Guidelines for determining the Effective Radiated Power (ERP) and Equivalent Isotropically Radiated Power (EIRP) of an RF transmitting system• KDB971168 D01 Power Meas License Digital Systems v03r01: April 9 2018: Measurement guidance for certification of licensed digital transmitters• RSS-195 Issue 2: April 2014 – Wireless Communication Service (WCS) Equipment Operating in the Bands 2305-2320 MHz and 2345-2360 MHz• RSS-199 Issue 3: December 2016 – Broadband Radio Service (BRS) Equipment Operating in the Band 2500-2690 MHz• RSS-Gen Issue 5 Amendment1: March 2019 - General Requirements for Compliance of Radio Apparatus• ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services |
| Start of Test | September 11, 2019 |
| Finish of Test | October 14, 2019 |
| Name of Engineer(s) | Alex Chang |
| Related Document(s) | <ul style="list-style-type: none">• Supporting documents for EUT certification are separate exhibits. |



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 2 and 27: 2018 with cross-reference to the corresponding ISSED RSS standard is shown below.

| Section | FCC Part Sections(s) | RSS Section(s) | Test Description | Result |
|---------|---|----------------------------------|--------------------------------------|-----------|
| 2.1 | 2.1046 | — | Transmitter Conducted Output Power | Compliant |
| 2.2 | 2.1046 27.50(a)(3) | RSS-195 (5.5) RSS-199 (4.4) | Equivalent Isotropic Radiated Power | Compliant |
| 2.3 | 2.1049 27.53(a)(4)(5) 27.53(m)(6) | RSS-Gen (6.7) RSS-199 (4.2) | Occupied Bandwidth | Compliant |
| 2.4 | 27.50 (a)(B) | RSS-195 (5.5.1) RSS-199 (4.4) | Peak-Average Ratio | Compliant |
| 2.5 | 2.1051 27.53(4)(i) 27.53(m)(4)(6) | RSS-195 (5.6) RSS-199 (4.5) | Band Edge | Compliant |
| 2.6 | 2.1051 27.53(4)(i) 27.53(m)(4)(6) | RSS-195 (5.6) RSS-199 (4.5) | Conducted Spurious Emissions | Compliant |
| 2.7 | 2.1051 27.53(4)(i) 27.53(m)(4)(6) | RSS-195 (5.6) RSS-199 (4.5) | Field Strength of Spurious Radiation | Compliant |



| Section | FCC Part Sections(s) | RSS Section(s) | Test Description | Result |
|---------|----------------------|--------------------------------|--------------------------------|-----------|
| 2.8 | 2.1055 27.54 | RSS-195 (5.4) RSS-199 (4.3) | Frequency Stability | Compliant |
| - | - | RSS-Gen 7.4 | Receiver Spurious Emissions | N/A* |
| - | - | RSS-GEN 8.8 | Power Line Conducted Emissions | *) |

N/A* Not Applicable. No stand-alone receiver.

*) Test was previously evaluated by TÜV SÜD America, report number 72142923B issued on May 16, 2019. The additional LTE Bands added on this test report does not affecting significant differences. No further evaluation considered necessary.



1.3 PRODUCT INFORMATION

1.3.1 EUT General Description

The Equipment Under Test (EUT) was an Inseego Corp. MIFI8000 Wireless Hotspot Modem. The EUT is a Wireless Hotspot Modem supporting 2G/3G/4G Technologies. The EUT comes with a USB Port.

1.3.2 Technical Description

| | |
|-------------------------------------|---|
| EUT Description | Wireless Hotspot Modem |
| Product Marketing Name | MiFi 8000 |
| Model Number(s) | MIFI8000 |
| Rated Voltage | 3.7V, 4400mAh (Rechargeable Li-Ion battery pack) Input 100-240VAC, Output 5V (External AC-DC Power Adapter) |
| Mode Verified | LTE Band 30: 2305-2315 MHz LTE Band 38: 2570-2620 MHz LTE Band 40: 2305-2315 and 2350-2360 MHz |
| Capability | WCDMA Band 2, 4, 5, LTE Band 2, 4, 5, 7, 12, 13, 14, 17, 25, 26, 30, 38, 40, 41, 42, 48, 66 and 802.11 a/b/g/n/ac |
| Primary Unit (EUT) | <input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering |
| Manufacturer Declared Voltage Range | 3.3 V – 4.3 VDC |



(Client declaration, max. antenna gain covered under this test report)

| Bands | Frequency(ies) | Antenna Gains |
|-------------|--------------------------------|---------------|
| LTE Band 30 | 2305-2315 MHz | 0.0 dBi |
| LTE Band 38 | 2570-2620 MHz | 1.5 dBi |
| LTE Band 40 | 2305-2315 MHz 2350-2360 MHz | 0.0 dBi |

1.3.3 Transmit Frequency Table

| Technology / Band | Modulation | Bandwidth (MHz) | Tx Frequency (MHz) | Emission Designator | EIRP | |
|-------------------|------------|-----------------|--------------------|---------------------|------------------|-----------------|
| | | | | | Max. Power (dBm) | Max. Power (mW) |
| LTE Band 30 | QPSK | 5 | 2305-2315 | 4M51G7D | 23.92 | 247 |
| | | 10 | 2305-2315 | 8M94G7D | 23.95 | 248 |
| | 16QAM | 5 | 2305-2315 | 4M53W7D | 23.47 | 222 |
| | | 10 | 2305-2315 | 8M94W7D | 23.32 | 215 |
| LTE Band 38 | QPSK | 5 | 2570-2620 | 4M51G7D | 19.59 | 91.0 |
| | | 10 | 2570-2620 | 8M98G7D | 19.49 | 88.9 |
| | | 15 | 2570-2620 | 13M4G7D | 19.78 | 95.1 |
| | | 20 | 2570-2620 | 17M9G7D | 19.90 | 97.7 |
| | 16QAM | 5 | 2570-2620 | 4M51W7D | 20.37 | 109 |
| | | 10 | 2570-2620 | 8M94W7D | 19.27 | 84.5 |
| | | 15 | 2570-2620 | 13M4W7D | 19.50 | 89.1 |
| | | 20 | 2570-2620 | 17M9W7D | 19.61 | 91.4 |
| LTE Band 40 | QPSK | 5 | 2305-2315 | 4M49G7D | 19.70 | 93.3 |
| | | 10 | 2305-2315 | 8M94G7D | 19.64 | 92.0 |
| | 16QAM | 5 | 2305-2315 | 4M52W7D | 18.85 | 76.7 |
| | | 10 | 2305-2315 | 8M94W7D | 18.78 | 75.5 |
| LTE Band 40 | QPSK | 5 | 2350-2360 | 4M51G7D | 19.54 | 89.9 |
| | | 10 | 2350-2360 | 8M94G7D | 19.60 | 91.2 |
| | 16QAM | 5 | 2350-2360 | 4M51W7D | 18.99 | 79.3 |
| | | 10 | 2350-2360 | 8M94W7D | 18.74 | 74.8 |

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

| Test Configuration | Description |
|--------------------|--|
| A | Conducted antenna port measurement. EUT Transmits at max power and is powered by the internal battery and/or USB via AC Adapter. |
| B | Radiated test setup / case spurious emissions. The EUT is connected to the call box in connect to the call box with antenna port terminated by the call box. |

1.4.2 EUT Exercise Software

EUT is controlled by a CMW 500 Wideband Radio Communication Tester. There is no other test software used during verification.

1.4.3 Support Equipment and I/O cables

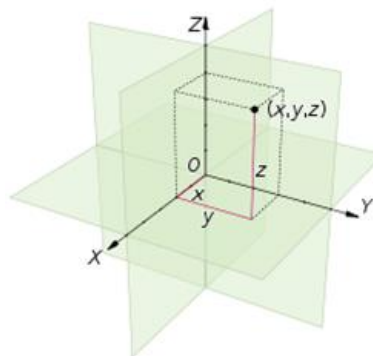
| Manufacturer | Equipment/Cable | Description |
|---------------|------------------------------|---|
| Inseego Corp. | USB Cable | Standard USB Type A to USB Type C |
| Inseego Corp. | External AC-DC Power Adapter | Model: SSW-2783, PN: 40123126.01 Input: 100-240VAC, 50/60Hz, 0.5A Output: 5VDC, max. 2A |

1.4.4 Worst Case Configuration

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

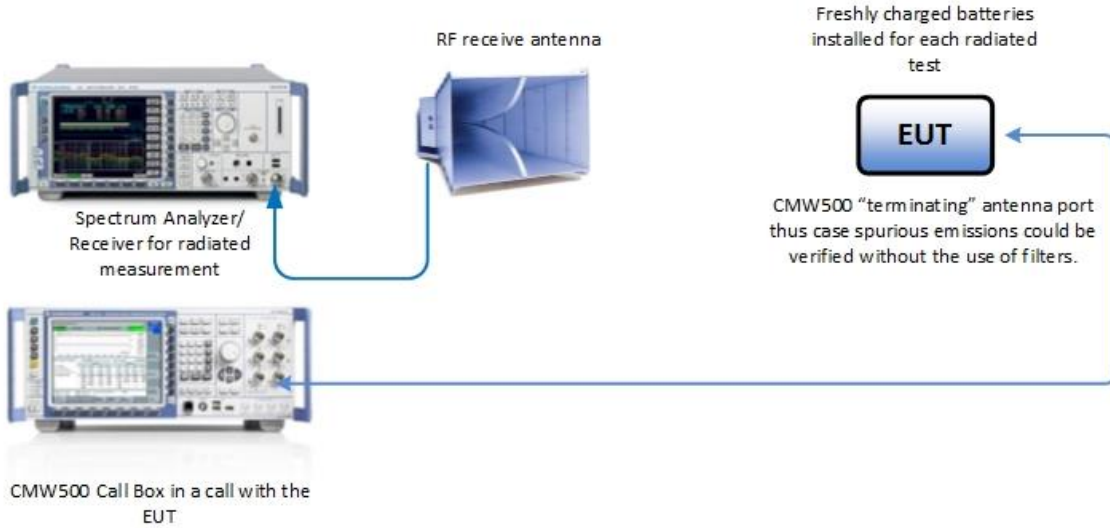
| Band | Channel BW | Modulation | RB Size/Offset |
|------------------------------------|------------|------------|----------------|
| LTE Band 30 | 5 MHz | QPSK | 1/13 |
| LTE Band 38 | 20 MHz | QPSK | 1/0 |
| LTE Band 40 (2305-2315MHz Band) | 5 MHz | QPSK | 1/13 |
| LTE Band 40 (2350-2360MHz Band) | 5 MHz | QPSK | 1/13 |

For radiated measurements X, Y, and Z orientations were verified. The verification was determined “Y” as worst-case configuration.

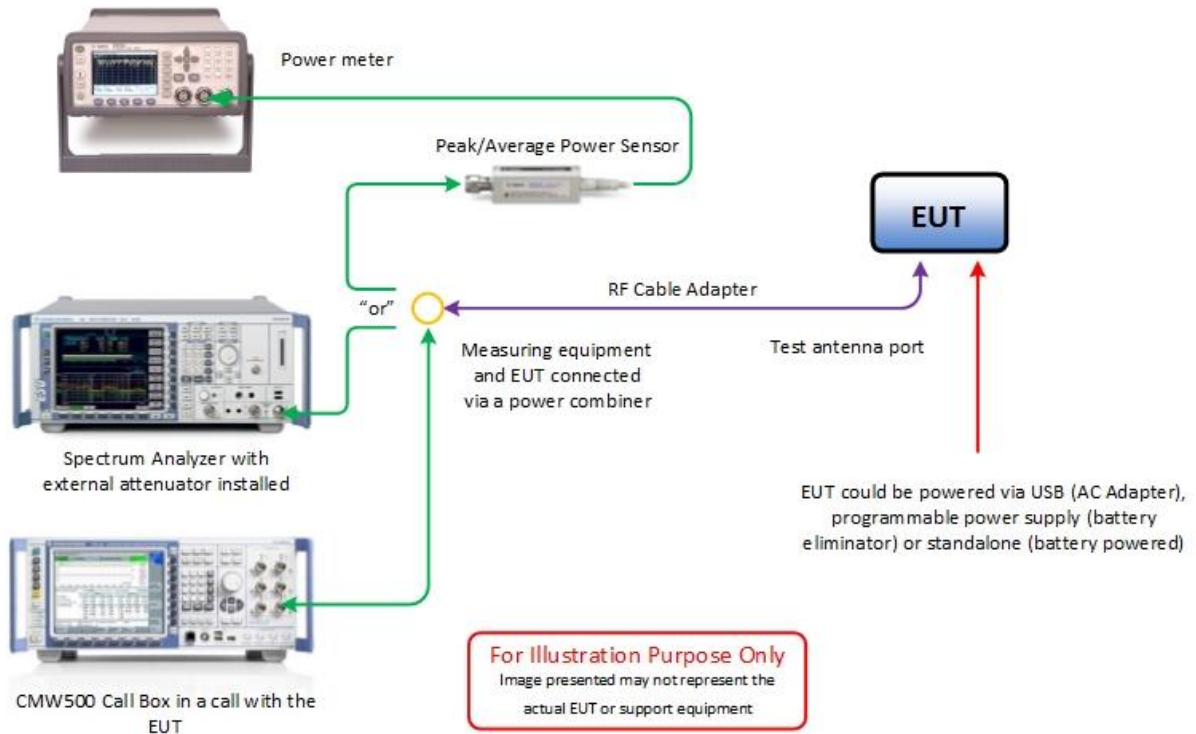


1.4.5 Simplified Test Configuration Diagram

Radiated Test Configuration



Conducted (Antenna Port) Test Configuration





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: FJ220819C00056 | | |
| 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 and radiated emissions, the equipment under test (EUT) was configured to measure its highest possible emission level. 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

TÜV SÜD 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 TÜV SÜD 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 TÜV SÜD 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)

TÜV 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)

TÜV SÜD 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

TÜV SÜD 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

TÜV SÜD 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

TÜV SÜD 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 (QPSK)

Emission Designator = 4M51G7D
 G = Phase Modulation
 7= Quantized/Digital Info
 D = Data Transmission, telemetry, telecommand

1.10.2 LTE Emission Designator (16QAM)

Emission Designator = 4M50W7D
 W = Frequency Modulation
 7= Quantized/Digital Info
 D = Data Transmission, telemetry, telecommand

1.10.3 Spurious Radiated Emission (below 1GHz)

| | | |
|---|----------------------------|-------|
| Measuring equipment raw measurement (dbµV) @ 30 MHz | | 24.4 |
| Correction Factor (dB) | Asset# 1066 (cable) | 0.3 |
| | 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 |

1.10.4 Spurious Radiated Emission – Substitution Method

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

The field strength reading of 84dBµV/m @ 1413 MHz (2nd 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:

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



SECTION 2

TEST DETAILS

Radio Testing of the
Inseego Corp.
MIFI8000 Wireless Hotspot Modem



2.1 TRANSMITTER CONDUCTED POWER MEASUREMENTS

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046

2.1.2 Standard Applicable

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

FCC 47 CFR Part 2.1046:

(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: FJ220819C00056 / Test Configuration A

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

September 13 and 16, 2019 / AC

2.1.5 Test Equipment Used

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

2.1.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|----------|
| Ambient Temperature | 25.7 °C |
| Relative Humidity | 41.7 % |
| ATM Pressure | 98.9 kPa |



2.1.7 Additional Observations

- This is a conducted test using Power Meter.
- The path loss was measured and entered as a level offset.
- Low, Middle and High channels for all bandwidths with different RB size and RB offset and modulations were verified and reported.

2.1.8 Test Results

| LTE Band 30 (Ant 2) | | | | | | | |
|---------------------|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 5 | 27685 | 2307.5 | QPSK | 1 | 13 | 23.92 | 26.76 |
| | 27710 | 2310 | | | | 23.84 | 26.74 |
| | 27735 | 2312.5 | | | | 23.70 | 26.62 |
| 10 | 27710 | 2310 | | 1 | 0 | 23.95 | 26.57 |
| 5 | 27685 | 2307.5 | 16QAM | 1 | 13 | 23.47 | 26.94 |
| | 27710 | 2310 | | | | 23.07 | 27.19 |
| | 27735 | 2312.5 | | | | 23.21 | 27.02 |
| 10 | 27710 | 2310 | | 1 | 25 | 23.32 | 27.23 |

| LTE Band 38 (Ant 2) | | | | | | | |
|---------------------|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 5 | 37775 | 2572.5 | QPSK | 1 | 13 | 19.59 | 27.21 |
| | 38000 | 2595 | | | | 19.08 | 26.65 |
| | 38225 | 2617.5 | | | | 19.16 | 26.71 |
| | 37775 | 2572.5 | 16QAM | 1 | 13 | 20.37 | 29.21 |
| | 38000 | 2595 | | | | 19.84 | 28.60 |
| | 38225 | 2617.5 | | | | 18.98 | 27.70 |

| LTE Band 38 (Ant 2) | | | | | | | |
|---------------------|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 10 | 37800 | 2575 | QPSK | 1 | 25 | 19.49 | 26.85 |
| | 38000 | 2595 | | | | 19.09 | 26.36 |
| | 38200 | 2615 | | | | 19.34 | 26.50 |
| | 37800 | 2575 | 16QAM | 1 | 0 | 19.27 | 28.18 |
| | 38000 | 2595 | | | | 18.74 | 27.61 |
| | 38200 | 2615 | | | | 18.90 | 27.69 |

| LTE Band 38 (Ant 2) | | | | | | | |
|---------------------|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 15 | 37825 | 2577.5 | QPSK | 1 | 0 | 19.78 | 27.07 |
| | 38000 | 2595 | | | | 19.35 | 26.67 |
| | 38175 | 2612.5 | | | | 19.29 | 26.40 |
| | 37825 | 2577.5 | 16QAM | 1 | 0 | 19.50 | 28.31 |
| | 38000 | 2595 | | | | 18.95 | 27.69 |
| | 38175 | 2612.5 | | | | 18.96 | 27.68 |

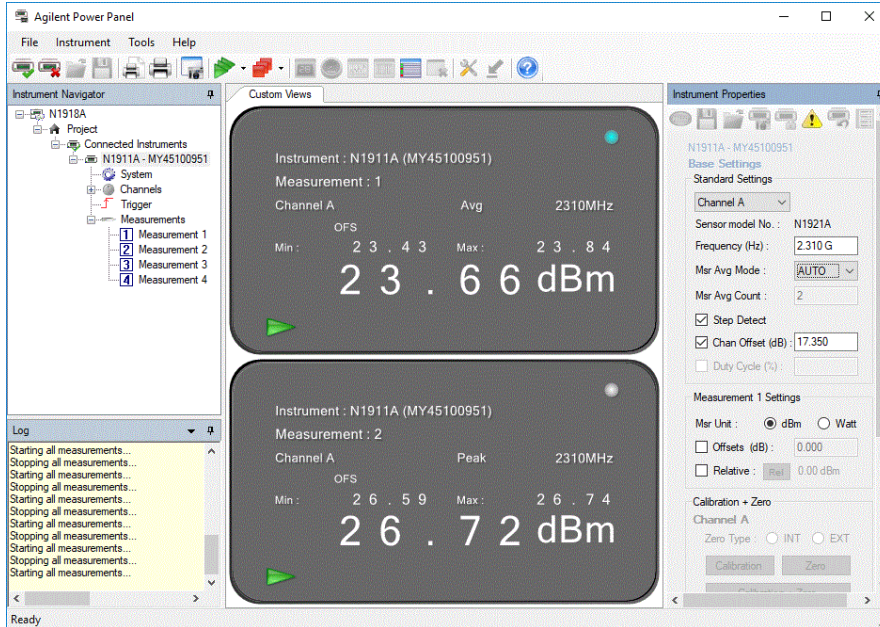


| LTE Band 38 (Ant 2) | | | | | | | |
|---------------------|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 20 | 37850 | 2580 | QPSK | 1 | 0 | 19.90 | 27.18 |
| | 38000 | 2595 | | | | 19.53 | 26.78 |
| | 38150 | 2610 | | | | 19.33 | 26.51 |
| | 37850 | 2580 | 16QAM | 1 | 0 | 19.61 | 28.30 |
| | 38000 | 2595 | | | | 18.98 | 27.83 |
| | 38150 | 2610 | | | | 18.79 | 27.61 |

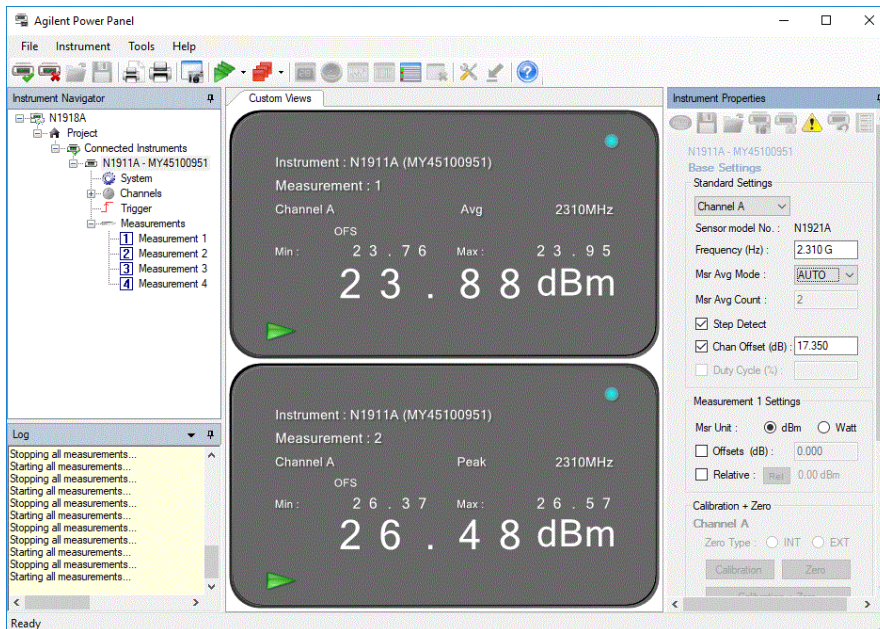
| LTE Band 40 (2305-2315MHz Band) (Ant 2) | | | | | | | |
|---|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 5 | 38725 | 2307.5 | QPSK | 1 | 13 | 19.70 | 27.31 |
| | 38750 | 2310 | | | | 19.68 | 28.05 |
| | 38775 | 2312.5 | | | | 19.62 | 27.21 |
| | 38725 | 2307.5 | 16QAM | 1 | 13 | 18.82 | 28.24 |
| | 38750 | 2310 | | | | 18.85 | 28.21 |
| | 38775 | 2312.5 | | | | 18.72 | 28.59 |
| 10 | 38750 | 2310 | QPSK | 1 | 25 | 19.64 | 27.55 |
| | 38750 | 2310 | 16QAM | 1 | 25 | 18.78 | 27.96 |

| LTE Band 40 (2350-2360MHz Band) (Ant 2) | | | | | | | |
|---|---------|-----------------|------------|--------|-----------|---------------------|------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | No. RB | RB Offset | Average Power (dBm) | Peak Power (dBm) |
| 5 | 39175 | 2352.5 | QPSK | 1 | 13 | 19.54 | 27.52 |
| | 39200 | 2355 | | | | 19.78 | 27.65 |
| | 39225 | 2357.5 | | | | 19.66 | 27.58 |
| | 39175 | 2352.5 | 16QAM | 1 | 13 | 18.99 | 28.32 |
| | 39200 | 2355 | | | | 18.97 | 28.62 |
| | 39225 | 2357.5 | | | | 18.89 | 28.52 |
| 10 | 39200 | 2355 | QPSK | 1 | 25 | 19.60 | 27.60 |
| | 39200 | 2355 | 16QAM | 1 | 25 | 18.74 | 28.37 |

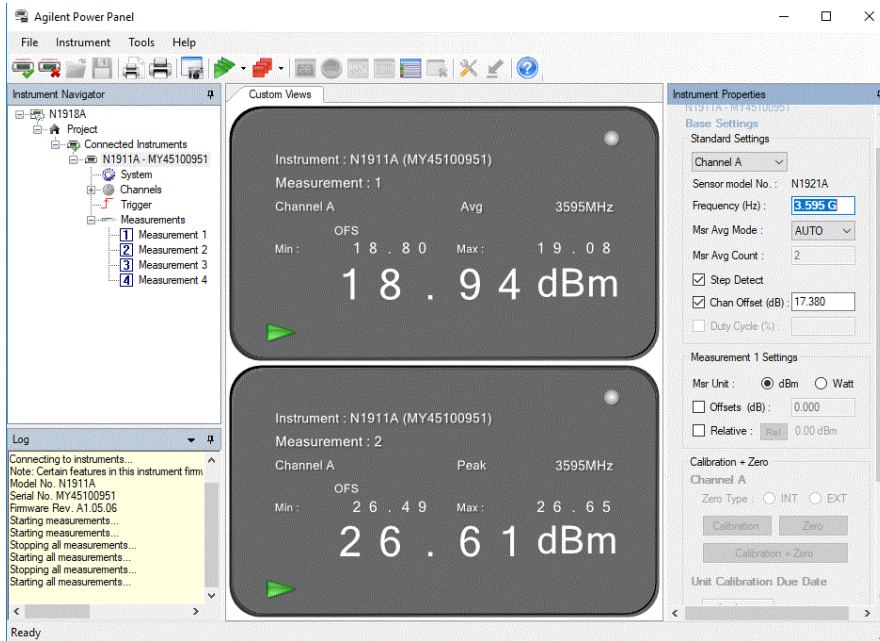
2.1.9 Sample Test Measurement Screen



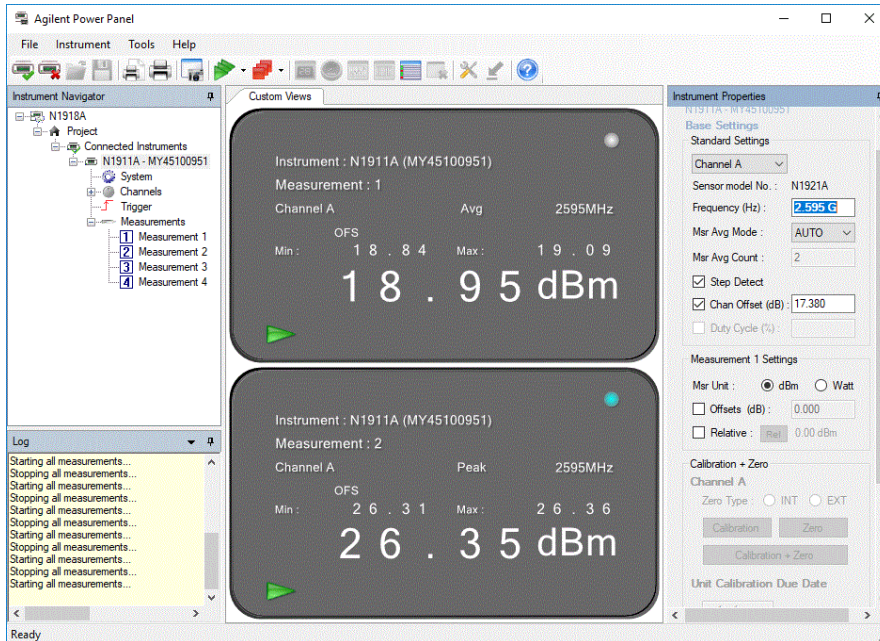
LTE Band 30_5 MHz Bandwidth Mid Chanel at 2310 MHz QPSK 1 RB 13 Offset



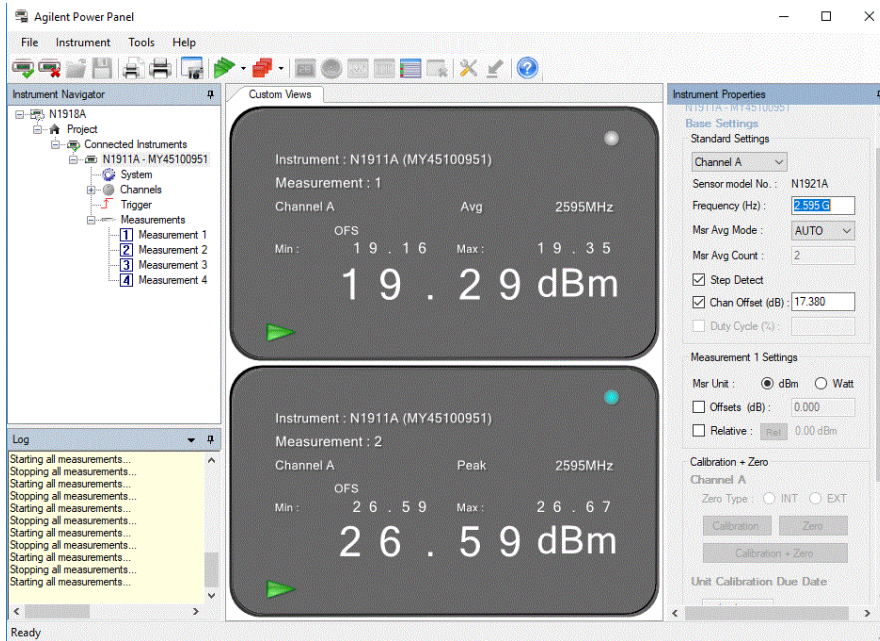
LTE Band 30_10 MHz Bandwidth Mid Chanel at 2310 MHz QPSK 1 RB 0 Offset



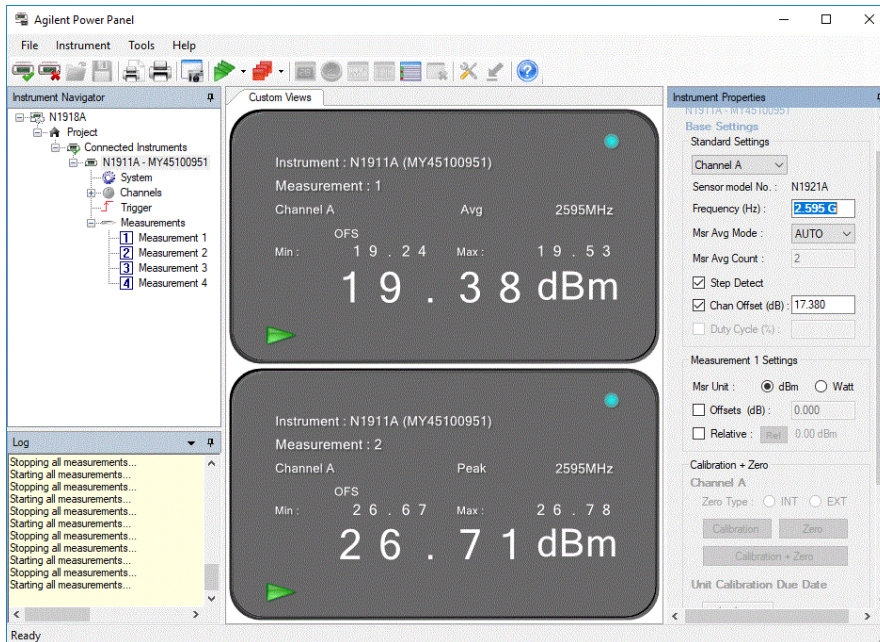
LTE Band 38_5 MHz Bandwidth Mid Chanel at 2595 MHz QPSK 1 RB 13 Offset



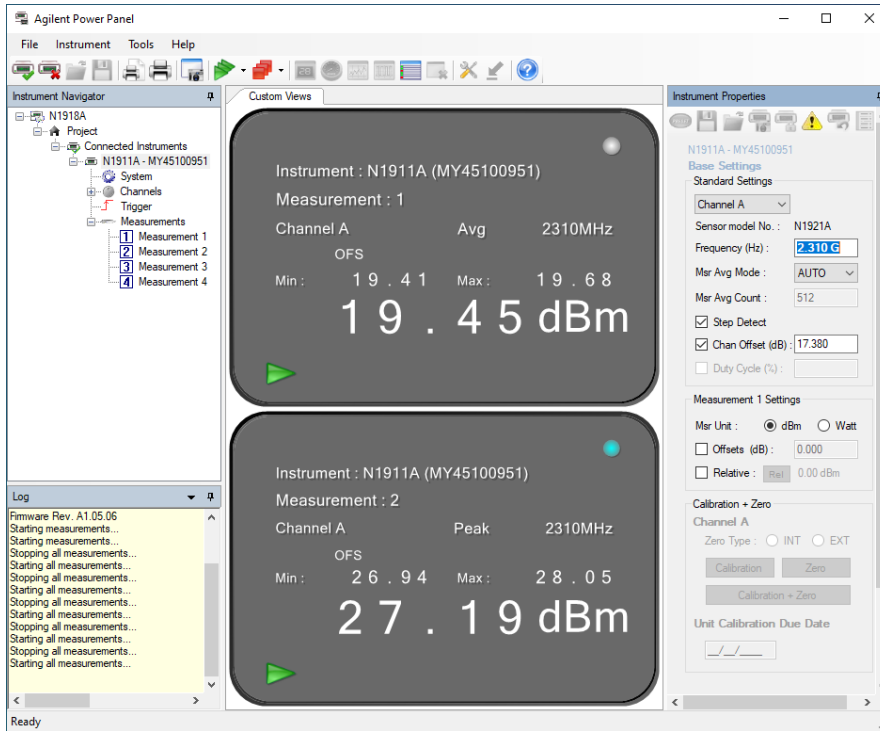
LTE Band 38_10 MHz Bandwidth Mid Chanel at 2595 MHz QPSK 1 RB 25 Offset



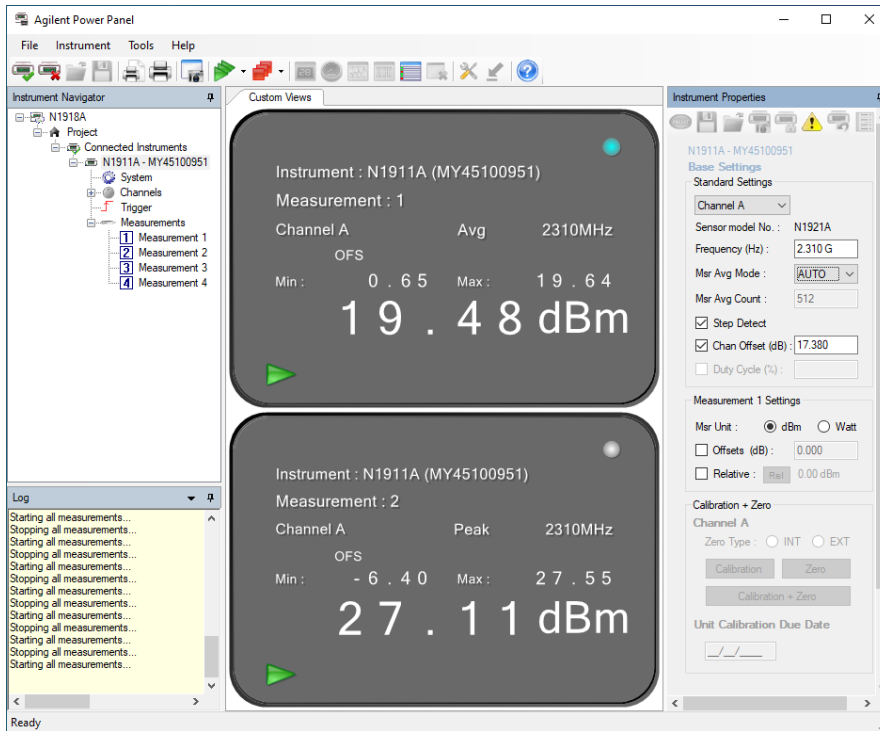
LTE Band 38_15 MHz Bandwidth Mid Channel at 2595 MHz QPSK 1 RB 0 Offset



LTE Band 38_20 MHz Bandwidth Mid Channel at 2595 MHz QPSK 1 RB 0 Offset



LTE Band 40_5 MHz Bandwidth Mid Chanel at 2310 MHz QPSK 1 RB 13 Offset on 2305-2315MHz Band



LTE Band 40_10 MHz Bandwidth Mid Chanel at 2310 MHz QPSK 1 RB 25 Offset on 2305-2315MHz Band



2.2 EQUIVALENT ISOTROPIC RADIATED POWER

2.2.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1046
FCC 47 CFR Part 27, Clause 27.50 (h)(2)
RSS-139, Clause 6.5
RSS-199, Clause 4.4

2.2.2 Standard Applicable

FCC 47 CFR Part 27.50(h)
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

RSS-139, Clause 6.5:

The equivalent isotropically radiated power (e.i.r.p.) for Mobile and portable transmitters shall not exceed one watt.

RSS-199, Clause 4.4:

For mobile subscriber equipment, the e.i.r.p. shall not exceed 2 W.

2.2.3 Equipment Under Test

Serial No: FJ220819C00056 Test Configuration (N/A, calculation only)

2.2.4 Date of Verification/Initial of test personnel who performed the calculation

October 22, 2019 / AC

2.2.5 Additional Observations

- EIRP was calculated as per Section 1.2 and 1.3 of KDB412172 D01 (Determining ERP and EIRP v01r01).
- Calculation formula in logarithmic terms:

$$EIRP = P_T + G_T - L_c$$

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 (Power measurement performed directly at the primary antenna port. The loss between the LTE module and the primary antenna port is considered negligible).

- For LTE Bands, only the worst-case RB size and RB offset presented.



2.2.6 Test Results

| LTE Band 30 (Ant 2) | | | | | | | | | |
|---------------------|-----------------|----------------|----------|-----------------|------------------------|--------------------|------------|-------------|--------------|
| Modulation | Bandwidth (MHz) | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dBm) |
| QPSK | 5 | 1 / 13 | 27685 | 2307.5 | 23.92 | 0.0 | 23.92 | 33 | 9.08 |
| | | 1 / 13 | 27710 | 2310 | 23.84 | 0.0 | 23.84 | 33 | 9.16 |
| | | 1 / 13 | 27735 | 2312.5 | 23.70 | 0.0 | 23.70 | 33 | 9.3 |
| | 10 | 1 / 0 | 27710 | 2310 | 23.95 | 0.0 | 23.95 | 33 | 9.05 |
| 16QAM | 5 | 1 / 13 | 27685 | 2307.5 | 23.47 | 0.0 | 23.47 | 33 | 9.53 |
| | | 1 / 13 | 27710 | 2310 | 23.07 | 0.0 | 23.07 | 33 | 9.93 |
| | | 1 / 13 | 27735 | 2312.5 | 23.21 | 0.0 | 23.21 | 33 | 9.79 |
| | 10 | 1 / 0 | 27710 | 2310 | 23.32 | 0.0 | 23.32 | 33 | 9.68 |



| LTE Band 38 (Ant 2) | | | | | | | | | |
|---------------------|------------|----------------|----------|-----------------|------------------------|--------------------|------------|-------------|--------------|
| Bandwidth (MHz) | Modulation | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dBm) |
| 5 | QPSK | 1 / 13 | 37775 | 2572.5 | 19.59 | 1.5 | 21.09 | 33 | 11.91 |
| | | 1 / 13 | 38000 | 2595 | 19.08 | 1.5 | 20.58 | 33 | 12.42 |
| | | 1 / 13 | 38225 | 2617.5 | 19.16 | 1.5 | 20.66 | 33 | 12.34 |
| | 16QAM | 1 / 13 | 37775 | 2572.5 | 20.37 | 1.5 | 21.87 | 33 | 11.13 |
| | | 1 / 13 | 38000 | 2595 | 19.84 | 1.5 | 21.34 | 33 | 11.66 |
| | | 1 / 13 | 38225 | 2617.5 | 18.98 | 1.5 | 20.48 | 33 | 12.52 |
| 10 | QPSK | 1 / 25 | 37800 | 2575 | 19.49 | 1.5 | 20.99 | 33 | 12.01 |
| | | 1 / 25 | 38000 | 2595 | 19.09 | 1.5 | 20.59 | 33 | 12.41 |
| | | 1 / 25 | 38200 | 2615 | 19.34 | 1.5 | 20.84 | 33 | 12.16 |
| | 16QAM | 1 / 0 | 37800 | 2575 | 19.27 | 1.5 | 20.77 | 33 | 12.23 |
| | | 1 / 0 | 38000 | 2595 | 18.74 | 1.5 | 20.24 | 33 | 12.76 |
| | | 1 / 0 | 38200 | 2615 | 18.90 | 1.5 | 20.4 | 33 | 12.6 |
| 15 | QPSK | 1 / 0 | 37825 | 2577.5 | 19.78 | 1.5 | 21.28 | 33 | 11.72 |
| | | 1 / 0 | 38000 | 2595 | 19.35 | 1.5 | 20.85 | 33 | 12.15 |
| | | 1 / 0 | 38175 | 2612.5 | 19.29 | 1.5 | 20.79 | 33 | 12.21 |
| | 16QAM | 1 / 0 | 37825 | 2577.5 | 19.50 | 1.5 | 21 | 33 | 12 |
| | | 1 / 0 | 38000 | 2595 | 18.95 | 1.5 | 20.45 | 33 | 12.55 |
| | | 1 / 0 | 38175 | 2612.5 | 18.96 | 1.5 | 20.46 | 33 | 12.54 |
| 20 | QPSK | 1 / 0 | 37850 | 2580 | 19.90 | 1.5 | 21.4 | 33 | 11.6 |
| | | 1 / 0 | 38000 | 2595 | 19.53 | 1.5 | 21.03 | 33 | 11.97 |
| | | 1 / 0 | 38150 | 2610 | 19.33 | 1.5 | 20.83 | 33 | 12.17 |
| | 16QAM | 1 / 0 | 37850 | 2580 | 19.61 | 1.5 | 21.11 | 33 | 11.89 |
| | | 1 / 0 | 38000 | 2595 | 18.98 | 1.5 | 20.48 | 33 | 12.52 |
| | | 1 / 0 | 38150 | 2610 | 18.79 | 1.5 | 20.29 | 33 | 12.71 |



| LTE Band 40 (2305-2315MHz Band) (Ant 2) | | | | | | | | | |
|---|------------|----------------|----------|-----------------|------------------------|--------------------|------------|-------------|--------------|
| Bandwidth (MHz) | Modulation | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dBm) |
| 5 | QPSK | 1 / 13 | 38725 | 2307.5 | 19.70 | 0.0 | 19.70 | 33 | 13.3 |
| | | 1 / 13 | 38750 | 2310 | 19.68 | 0.0 | 19.68 | 33 | 13.32 |
| | | 1 / 13 | 38775 | 2312.5 | 19.62 | 0.0 | 19.62 | 33 | 13.38 |
| | 16QAM | 1 / 13 | 38725 | 2307.5 | 18.82 | 0.0 | 18.82 | 33 | 14.18 |
| | | 1 / 13 | 38750 | 2310 | 18.85 | 0.0 | 18.85 | 33 | 14.15 |
| | | 1 / 13 | 38775 | 2312.5 | 18.72 | 0.0 | 18.72 | 33 | 14.28 |
| 10 | QPSK | 1 / 25 | 38750 | 2310 | 19.64 | 0.0 | 19.64 | 33 | 13.36 |
| | 16QAM | 1 / 25 | 38750 | 2310 | 18.78 | 0.0 | 18.78 | 33 | 14.22 |

| LTE Band 40 (2350-2360MHz Band) (Ant 2) | | | | | | | | | |
|---|------------|----------------|----------|-----------------|------------------------|--------------------|------------|-------------|--------------|
| Bandwidth (MHz) | Modulation | RB Size/Offset | Channels | Frequency (MHz) | Tx Average Power (dBm) | Antenna Gain (dBi) | EIRP (dBm) | Limit (dBm) | Margin (dBm) |
| 5 | QPSK | 1 / 13 | 39175 | 2352.5 | 19.54 | 0.0 | 19.54 | 33 | 13.46 |
| | | 1 / 13 | 39200 | 2355 | 19.78 | 0.0 | 19.78 | 33 | 13.22 |
| | | 1 / 13 | 39225 | 2357.5 | 19.66 | 0.0 | 19.66 | 33 | 13.34 |
| | 16QAM | 1 / 13 | 39175 | 2352.5 | 18.99 | 0.0 | 18.99 | 33 | 14.01 |
| | | 1 / 13 | 39200 | 2355 | 18.97 | 0.0 | 18.97 | 33 | 14.03 |
| | | 1 / 13 | 39225 | 2357.5 | 18.89 | 0.0 | 18.89 | 33 | 14.11 |
| 10 | QPSK | 1 / 25 | 39200 | 2355 | 19.60 | 0.0 | 19.60 | 33 | 13.4 |
| | 16QAM | 1 / 25 | 39200 | 2355 | 18.74 | 0.0 | 18.74 | 33 | 14.26 |



2.3 OCCUPIED BANDWIDTH

2.3.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049
FCC 47 CFR Part 27, Clause 27.53 (h)(3)
FCC 47 CFR Part 27, Clause 27.53 (m)(6)
RSS-GEN, Clause 6.7

2.3.2 Standard Applicable

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

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

2.3.3 Equipment Under Test and Modification State

Serial No: FJ220819C00056 / Test Configuration A

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

September 18, 2019 / AC

2.3.5 Test Equipment Used

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

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|----------|
| Ambient Temperature | 21.2 °C |
| Relative Humidity | 35.0 % |
| ATM Pressure | 99.0 kPa |

2.3.7 Additional Observations

- This is a conducted test. Both 26dB bandwidth and 99% bandwidth presented.
- Using the occupied bandwidth measurement function in the spectrum analyzer, the 99% occupied bandwidth was measured.
- The 26dB bandwidth was measured in accordance with ANSI C63.26 clause 5.4.3 using the n dB measurement function in the spectrum analyzer.
- The transmitter shall be operated at its maximum carrier power measured under normal test conditions.



- The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
- The resolution bandwidth (RBW) shall be in the range of 1% of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be at least 3x RBW.
- Low, Middle and High channels for all bandwidths and modulations were verified. Test results of Middle channel were presented as representative.

2.3.8 Test Results

| LTE Band 30 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 5 | 27685 | 2307.5 | QPSK | 4.51 | 5.01 |
| | 27710 | 2310 | | 4.51 | 5.03 |
| | 27735 | 2312.5 | | 4.51 | 4.99 |
| 10 | 27710 | 2310 | | 8.94 | 9.70 |
| 5 | 27685 | 2307.5 | 16QAM | 4.51 | 4.99 |
| | 27710 | 2310 | | 4.53 | 4.97 |
| | 27735 | 2312.5 | | 4.51 | 4.99 |
| 10 | 27710 | 2310 | | 8.94 | 9.66 |



| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 5 | 37775 | 2572.5 | QPSK | 4.51 | 4.97 |
| | 38000 | 2595 | | 4.51 | 4.93 |
| | 38225 | 2617.5 | | 4.51 | 4.93 |
| | 37775 | 2572.5 | 16QAM | 4.51 | 4.95 |
| | 38000 | 2595 | | 4.51 | 4.93 |
| | 38225 | 2617.5 | | 4.49 | 4.97 |

| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 10 | 37800 | 2575 | QPSK | 8.94 | 9.66 |
| | 38000 | 2595 | | 8.94 | 9.62 |
| | 38200 | 2615 | | 8.98 | 9.58 |
| | 37800 | 2575 | 16QAM | 8.94 | 9.50 |
| | 38000 | 2595 | | 8.94 | 9.62 |
| | 38200 | 2615 | | 8.94 | 9.54 |

| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 15 | 37825 | 2577.5 | QPSK | 13.41 | 14.57 |
| | 38000 | 2595 | | 13.41 | 14.57 |
| | 38175 | 2612.5 | | 13.37 | 14.61 |
| | 37825 | 2577.5 | 16QAM | 13.41 | 14.37 |
| | 38000 | 2595 | | 13.41 | 14.65 |
| | 38175 | 2612.5 | | 13.41 | 14.41 |

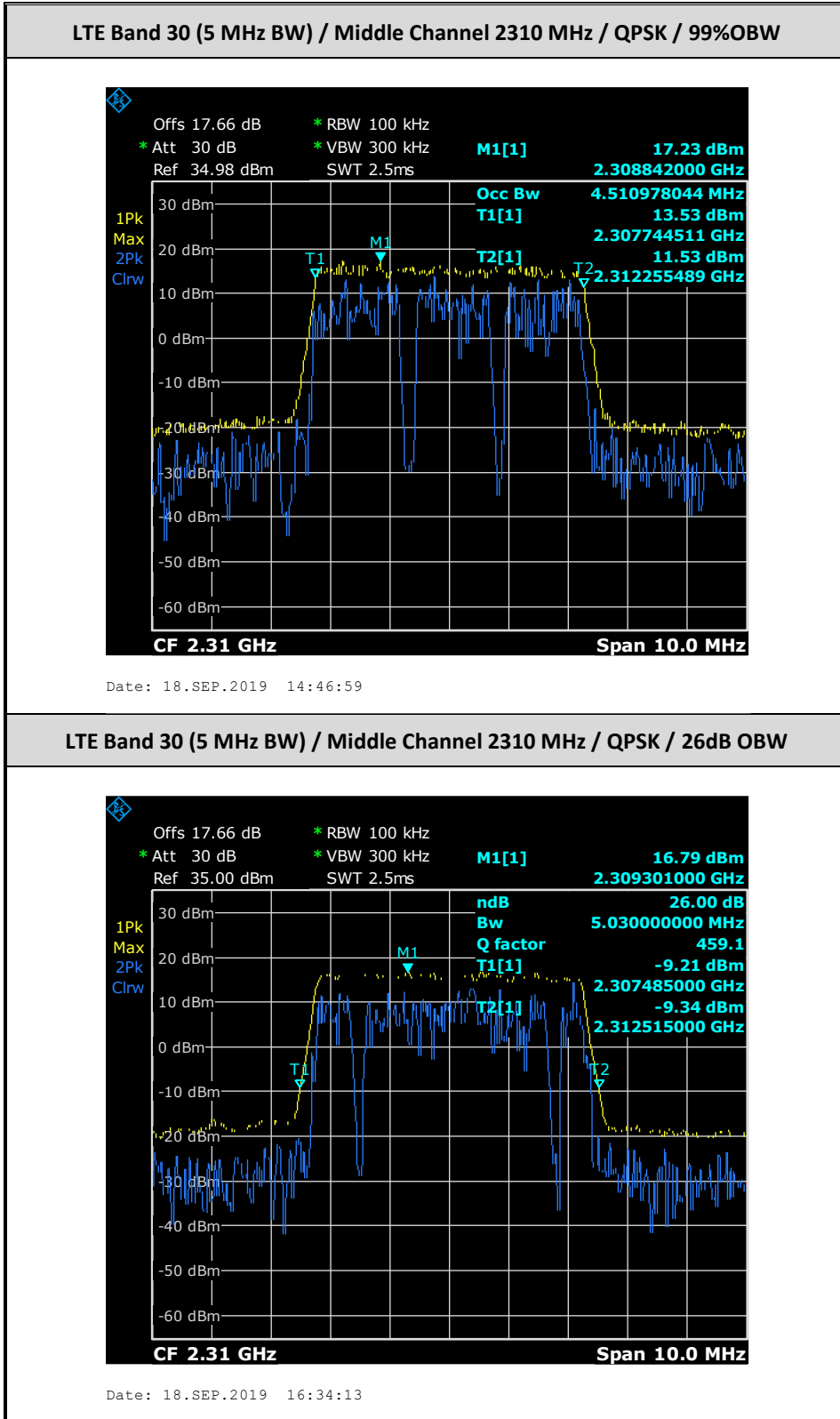
| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 20 | 37850 | 2580 | QPSK | 17.96 | 19.36 |
| | 38000 | 2595 | | 17.86 | 19.16 |
| | 38150 | 2610 | | 17.96 | 19.26 |
| | 37850 | 2580 | 16QAM | 17.96 | 19.16 |
| | 38000 | 2595 | | 17.96 | 19.26 |
| | 38150 | 2610 | | 17.96 | 19.16 |



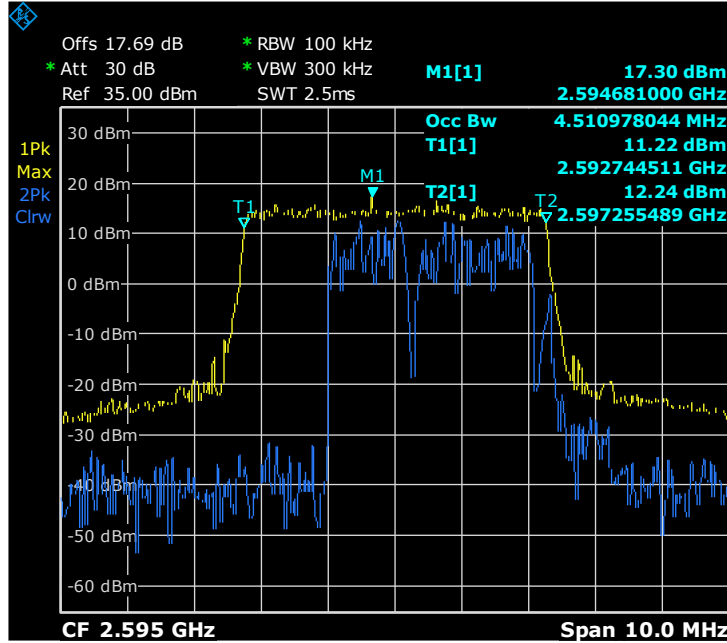
| LTE Band 40 (2305-2315MHz Band) (Ant 2) | | | | | |
|---|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 5 | 38725 | 2307.5 | QPSK | 4.49 | 4.97 |
| | 38750 | 2310 | | 4.49 | 4.95 |
| | 38775 | 2312.5 | | 4.49 | 4.99 |
| 10 | 38750 | 2310 | | 8.94 | 9.62 |
| 5 | 38725 | 2307.5 | 16QAM | 4.52 | 4.95 |
| | 38750 | 2310 | | 4.49 | 4.93 |
| | 38775 | 2312.5 | | 4.49 | 4.97 |
| 10 | 38750 | 2310 | | 8.94 | 9.58 |

| LTE Band 40 (2350-2360MHz Band) (Ant 2) | | | | | |
|---|---------|-----------------|------------|---------------|---------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | 99% OBW (MHz) | 26dB BW (MHz) |
| 5 | 39175 | 2352.5 | QPSK | 4.51 | 4.91 |
| | 39200 | 2355 | | 4.49 | 4.87 |
| | 39225 | 2357.5 | | 4.51 | 4.91 |
| 10 | 39200 | 2355 | | 8.94 | 9.66 |
| 5 | 39175 | 2352.5 | 16QAM | 4.49 | 4.95 |
| | 39200 | 2355 | | 4.51 | 4.91 |
| | 39225 | 2357.5 | | 4.51 | 4.95 |
| 10 | 39200 | 2355 | | 8.94 | 9.54 |

2.3.9 Example Test Plots

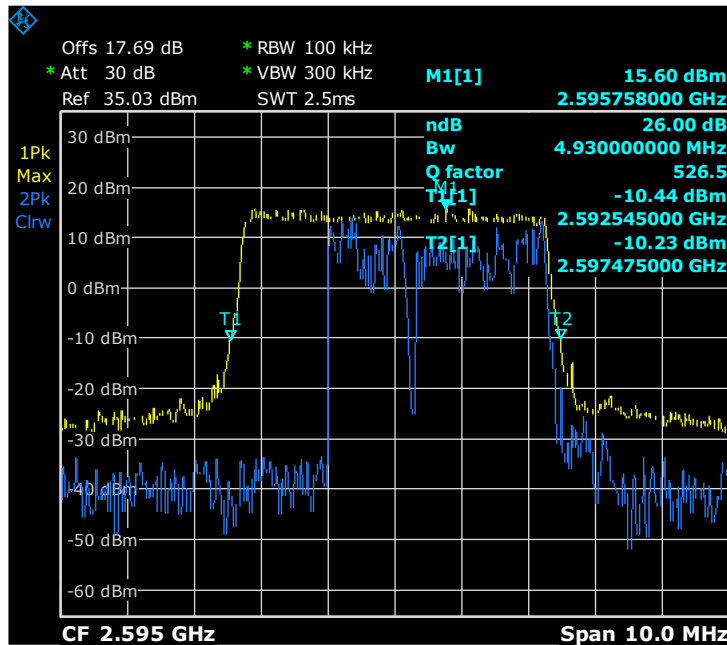


LTE Band 38 (5 MHz BW) / Middle Channel 2595 MHz / QPSK / 99%OBW



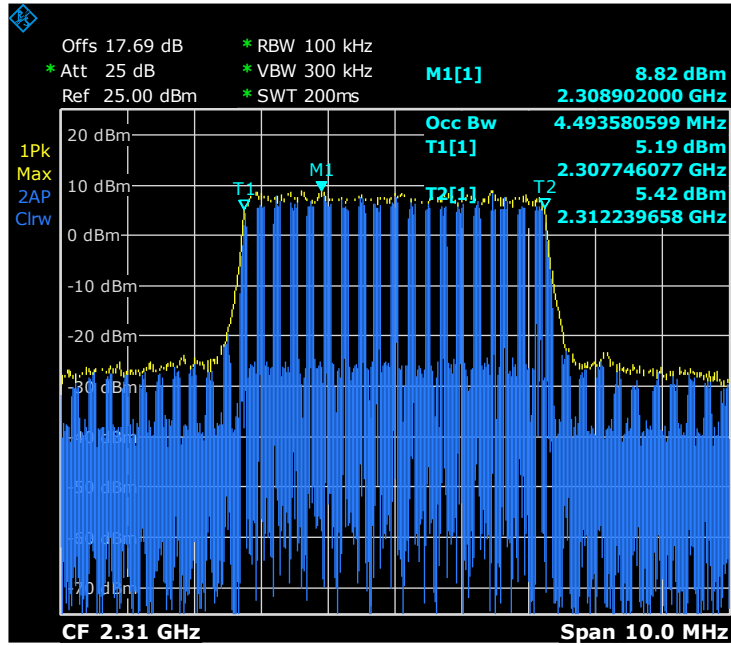
Date: 19.SEP.2019 13:27:36

LTE Band 38 (5 MHz BW) / Middle Channel 2595 MHz / QPSK / 26dB OBW



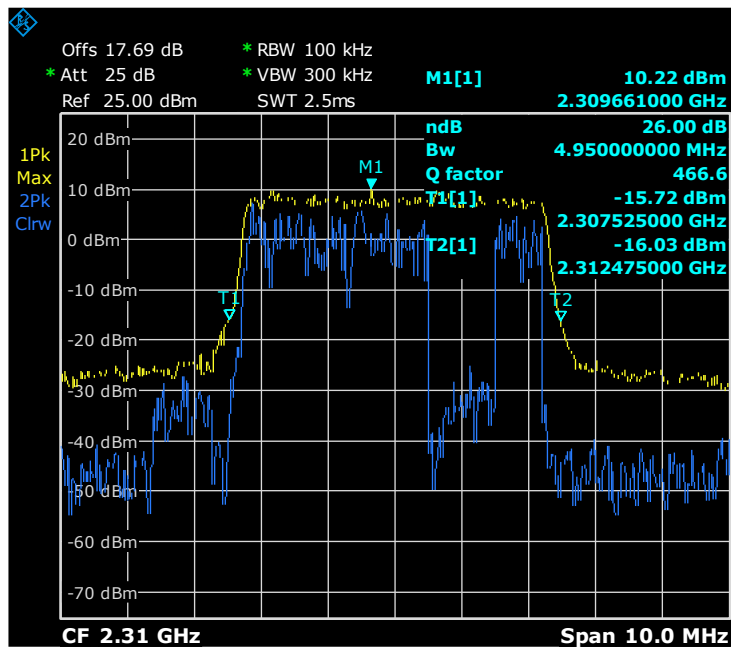
Date: 18.SEP.2019 16:44:37

LTE Band 40 (2310-2315MHz Band) (5 MHz BW) / Middle Channel 2310 MHz / QPSK / 99%OBW



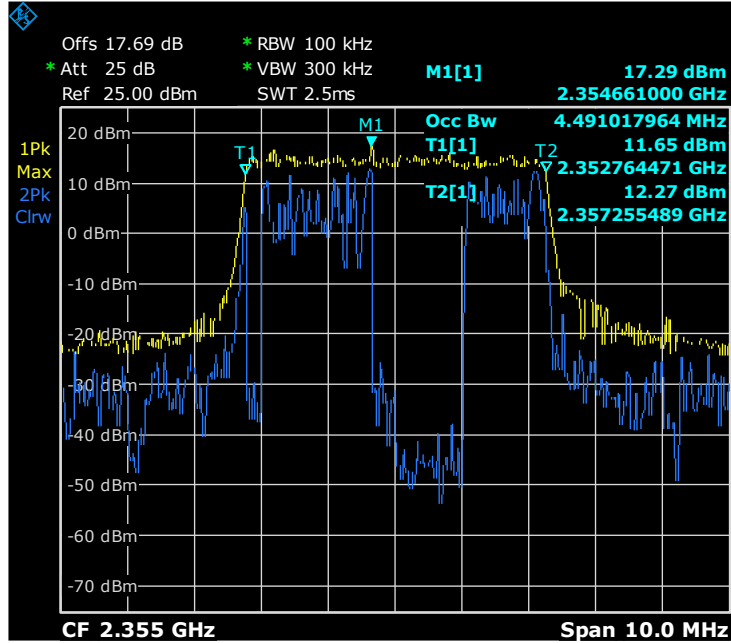
Date: 8.OCT.2019 19:09:45

LTE Band 40 (2310-2315MHz Band) (5 MHz BW) / Middle Channel 2310 MHz / QPSK / 26dB OBW



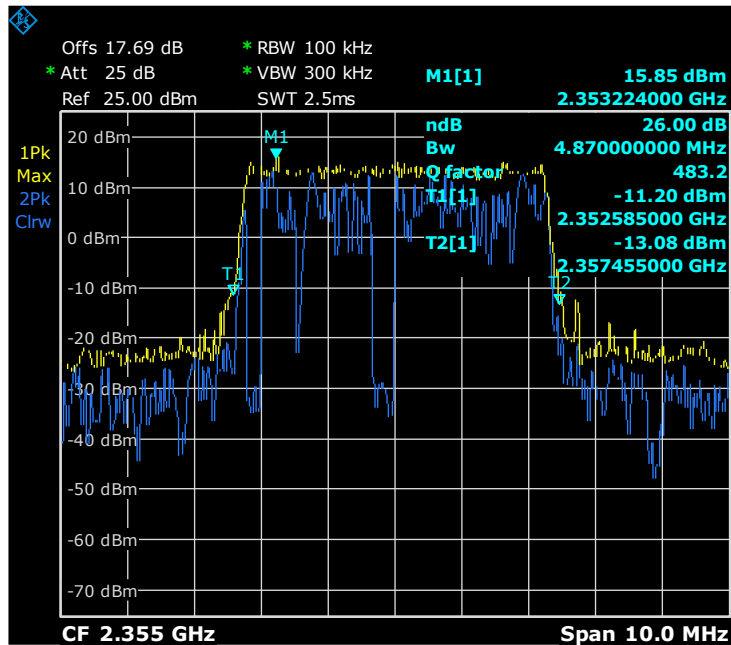
Date: 9.OCT.2019 10:14:31

LTE Band 40 (2350-2360MHz Band) (5 MHz BW) / Middle Channel 2355 MHz / QPSK / 99%OBW



Date: 9.OCT.2019 09:59:04

LTE Band 40 (2350-2360MHz Band) (5 MHz BW) / Middle Channel 2355 MHz / QPSK / 26dB OBW



Date: 9.OCT.2019 10:19:50



2.4 PEAK-AVERAGE POWER RATIO

2.4.1 Specification Reference

FCC 47 CFR Part 27, Clause 27.50 (d)(5)
RSS-139, Clause 6.5
RSS-130, Clause 4.6.1
RSS-199, Clause 4.4

2.4.2 Standard Applicable

FCC 47 CFR Part 27.50(d):

(5) 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 (d)(6) of this section. 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-130, RSS-139, and RSS-199:

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.

2.4.3 Equipment Under Test and Modification State

Serial No: FJ220819C00056 / Test Configuration A

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

September 23 and October 09, 2019 / AC

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 Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|----------------|
| Ambient Temperature | 21.2 - 26.2°C |
| Relative Humidity | 35.0 - 54.2% |
| ATM Pressure | 98.5 - 99.6kPa |



2.4.7 Additional Observations

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

2.4.8 Test Results

| LTE Band 30 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 5 | 27685 | 2307.5 | QPSK | 4.35 | 13 |
| | 27710 | 2310 | | 4.62 | 13 |
| | 27735 | 2312.5 | | 4.51 | 13 |
| 10 | 27710 | 2310 | | 4.64 | 13 |
| 5 | 27685 | 2307.5 | 16QAM | 5.40 | 13 |
| | 27710 | 2310 | | 5.49 | 13 |
| | 27735 | 2312.5 | | 5.76 | 13 |
| 10 | 27710 | 2310 | | 5.68 | 13 |



| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 5 | 37775 | 2572.5 | QPSK | 7.53 | 13 |
| | 38000 | 2595 | | 7.53 | 13 |
| | 38225 | 2617.5 | | 6.97 | 13 |
| | 37775 | 2572.5 | 16QAM | 8.54 | 13 |
| | 38000 | 2595 | | 8.24 | 13 |
| | 38225 | 2617.5 | | 8.27 | 13 |

| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 10 | 37800 | 2575 | QPSK | 7.32 | 13 |
| | 38000 | 2595 | | 7.54 | 13 |
| | 38200 | 2615 | | 7.30 | 13 |
| | 37800 | 2575 | 16QAM | 8.75 | 13 |
| | 38000 | 2595 | | 8.64 | 13 |
| | 38200 | 2615 | | 8.89 | 13 |

| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 15 | 37825 | 2577.5 | QPSK | 7.57 | 13 |
| | 38000 | 2595 | | 7.20 | 13 |
| | 38175 | 2612.5 | | 7.25 | 13 |
| | 37825 | 2577.5 | 16QAM | 8.71 | 13 |
| | 38000 | 2595 | | 8.90 | 13 |
| | 38175 | 2612.5 | | 8.61 | 13 |

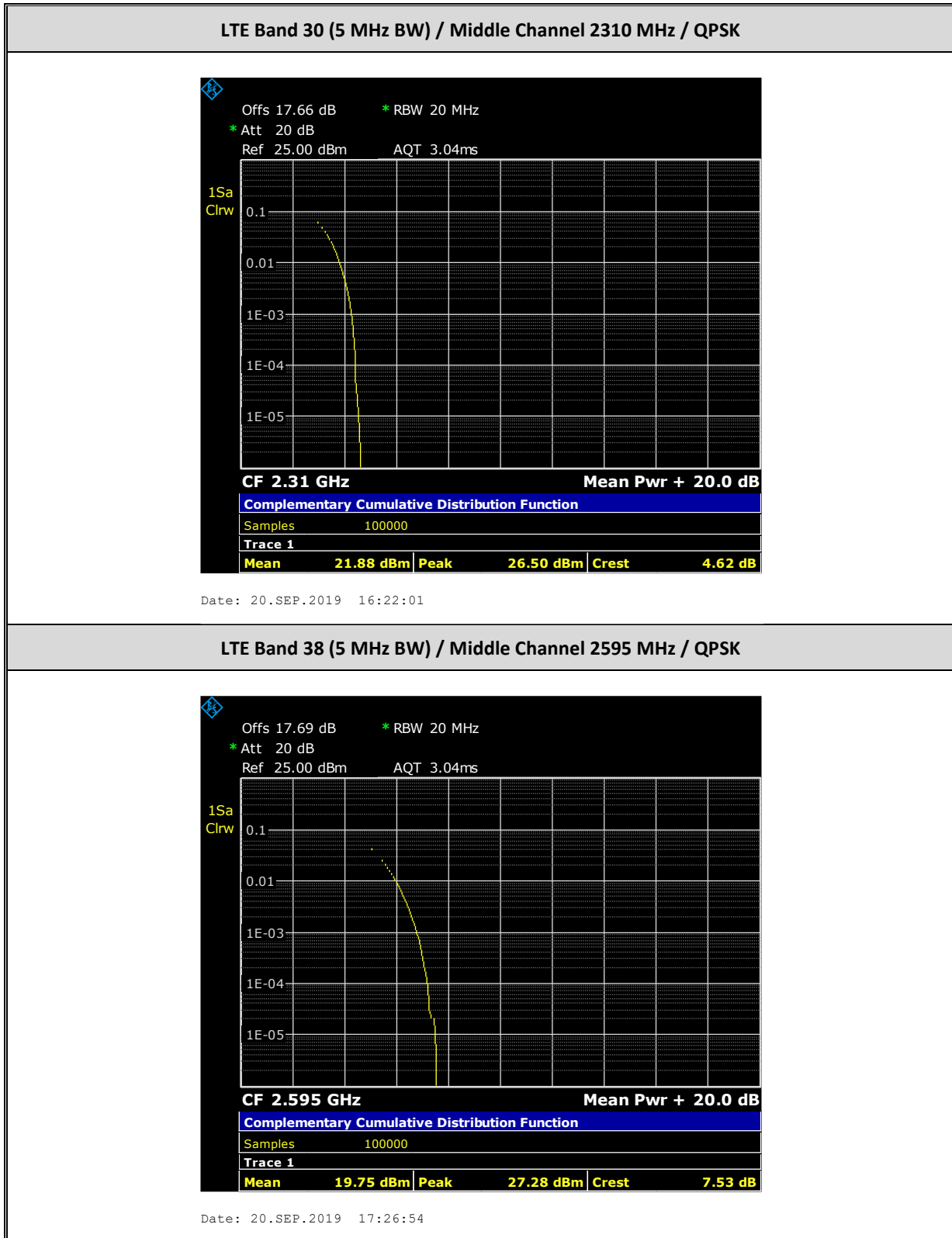
| LTE Band 38 (Ant 2) | | | | | |
|---------------------|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 20 | 37850 | 2580 | QPSK | 7.51 | 13 |
| | 38000 | 2595 | | 7.31 | 13 |
| | 38150 | 2610 | | 7.38 | 13 |
| | 37850 | 2580 | 16QAM | 8.89 | 13 |
| | 38000 | 2595 | | 8.69 | 13 |
| | 38150 | 2610 | | 8.72 | 13 |



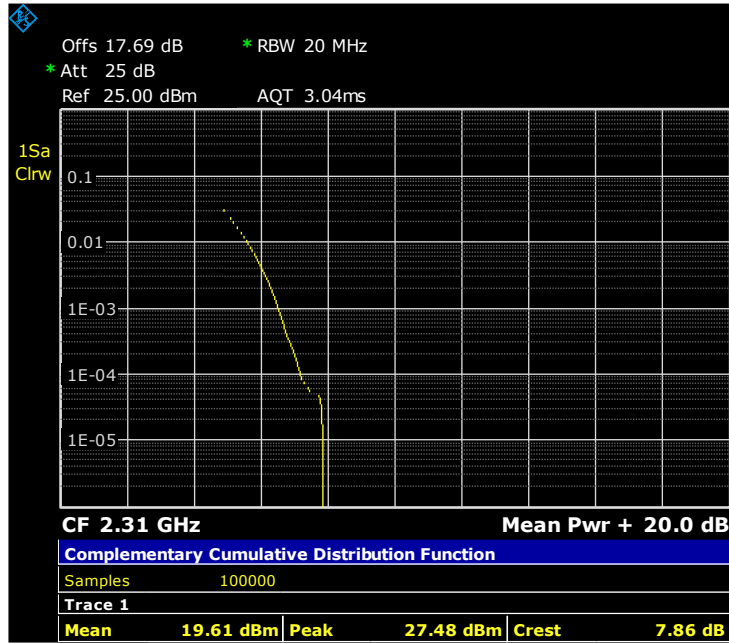
| LTE Band 40 (2310-2315MHz Band) (Ant 2) | | | | | |
|---|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 5 | 38725 | 2307.5 | QPSK | 7.90 | 13 |
| | 38750 | 2310 | | 7.86 | 13 |
| | 38775 | 2312.5 | | 7.93 | 13 |
| 10 | 38750 | 2310 | | 8.07 | 13 |
| 5 | 38725 | 2307.5 | 16QAM | 9.15 | 13 |
| | 38750 | 2310 | | 8.93 | 13 |
| | 38775 | 2312.5 | | 9.35 | 13 |
| 10 | 38750 | 2310 | | 9.20 | 13 |

| LTE Band 40 (2350-2360MHz Band) (Ant 2) | | | | | |
|---|---------|-----------------|------------|----------|--------------------|
| Bandwidth (MHz) | Channel | Frequency (MHz) | Modulation | PAR (dB) | Limit for PAR (dB) |
| 5 | 39175 | 2352.5 | QPSK | 8.18 | 13 |
| | 39200 | 2355 | | 8.31 | 13 |
| | 39225 | 2357.5 | | 8.05 | 13 |
| 10 | 39200 | 2355 | | 9.09 | 13 |
| 5 | 39175 | 2352.5 | 16QAM | 9.90 | 13 |
| | 39200 | 2355 | | 9.10 | 13 |
| | 39225 | 2357.5 | | 9.41 | 13 |
| 10 | 39200 | 2355 | | 9.54 | 13 |

2.4.9 Example Test Plots

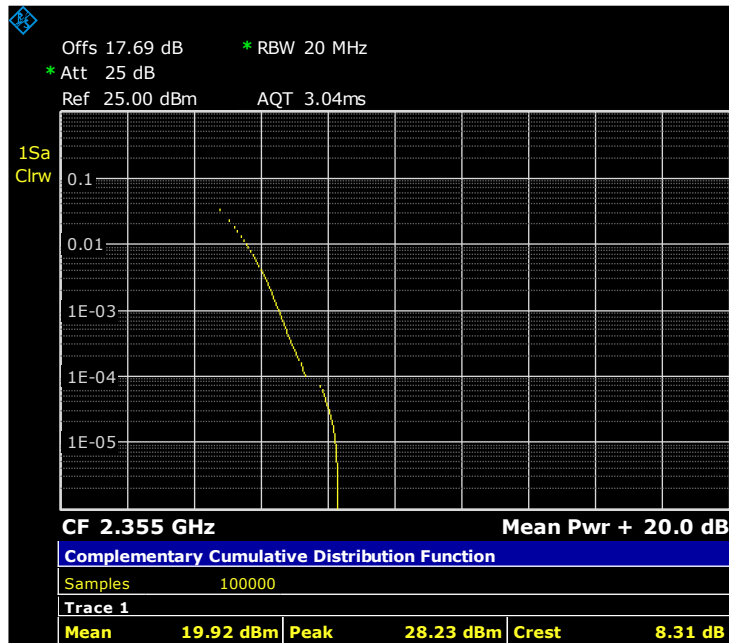


LTE Band 40 (2305-2315MHz Band) (5 MHz BW) / Middle Channel 2310 MHz / QPSK



Date: 9.OCT.2019 10:33:44

LTE Band 40 (2350-2360MHz Band) (5 MHz BW) / Middle Channel 2355 MHz / QPSK



Date: 9.OCT.2019 10:38:50



2.5 SPURIOUS EMISSION AT BAND EDGE

2.5.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1051
FCC 47 CFR Part 27, Clause 27.53(h)(1)(3)
FCC 47 CFR Part 27, Clause 27.53(g)
FCC 47 CFR Part 27, Clause 27.53(c)(2)
RSS-139, Clause 6.6
RSS-130, Clause 4.7.1
RSS-199, Clause 4.5

2.5.2 Standard Applicable

FCC 47 CFR Part 27.53

(h) AWS emission limits – (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 MHz bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

(g) For operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

(c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

(2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log_{10}(P)$ dB.

RSS-139, Clause 6.6:

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (dBW), by at least $43 + 10 \log_{10} p$ (watts) dB.

RSS-130:

4.7.1 The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least $43 + 10 \log_{10} p$ (watts), dB. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.



RSS-199, Clause 4.5:

In the 1 MHz band immediately outside and adjacent to the channel edge, the unwanted emission power shall be measured with a resolution bandwidth of at 1% of the occupied bandwidth for base station and fixed subscriber equipment, and 2% for mobile subscriber equipment. Beyond the 1 MHz band, a resolution bandwidth of 1 MHz shall be used.

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

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

Note: X is 6 MHz or the equipment occupied bandwidth, whichever is greater

2.5.3 Equipment Under Test and Modification State

Serial No: FJ220819C00056 / Test Configuration A

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

October 11 and 12, 2019 / AC

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions/ Test Location

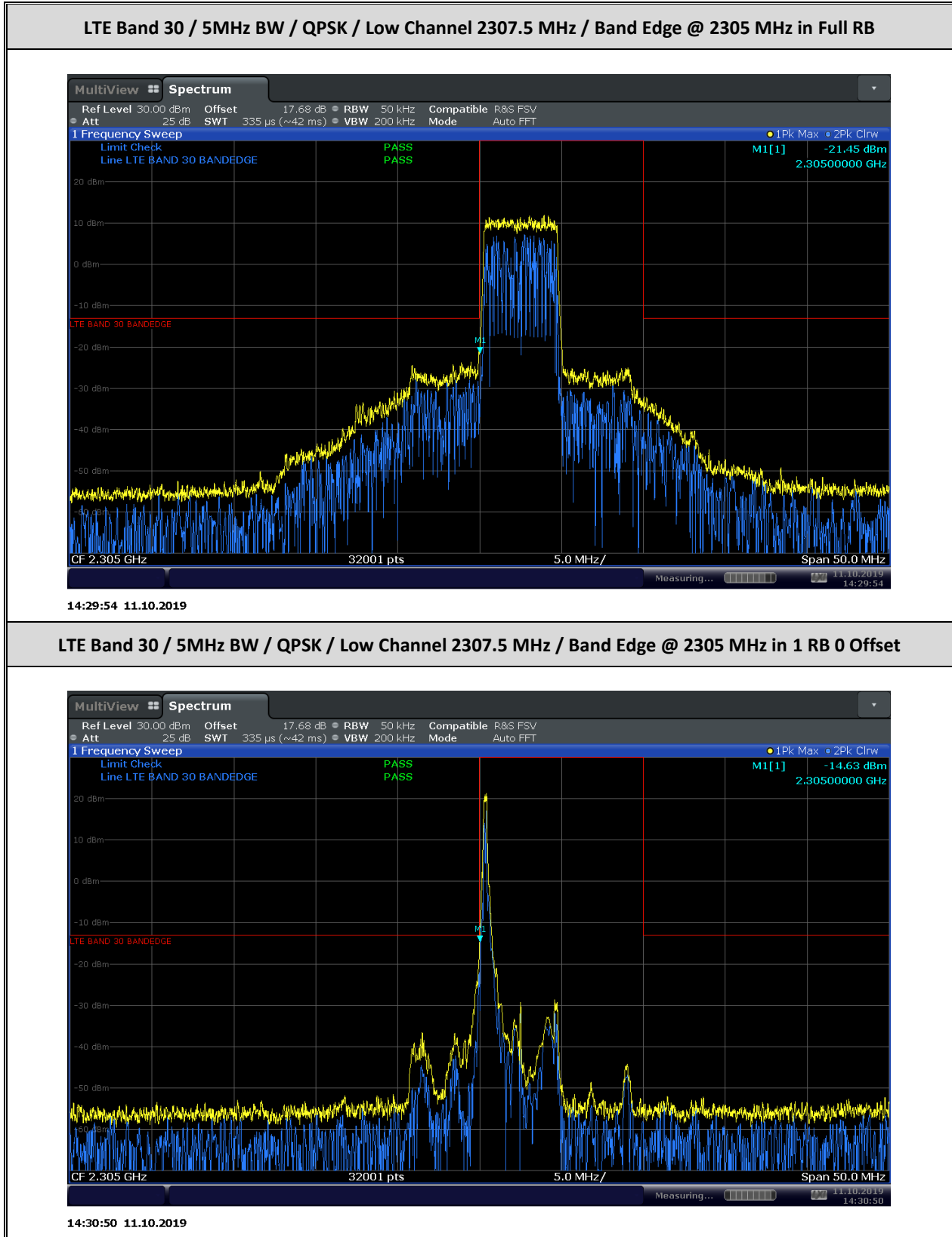
Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

| | |
|---------------------|----------------|
| Ambient Temperature | 21.2 - 26.4°C |
| Relative Humidity | 35.0 - 56.4% |
| ATM Pressure | 98.9 - 99.6kPa |

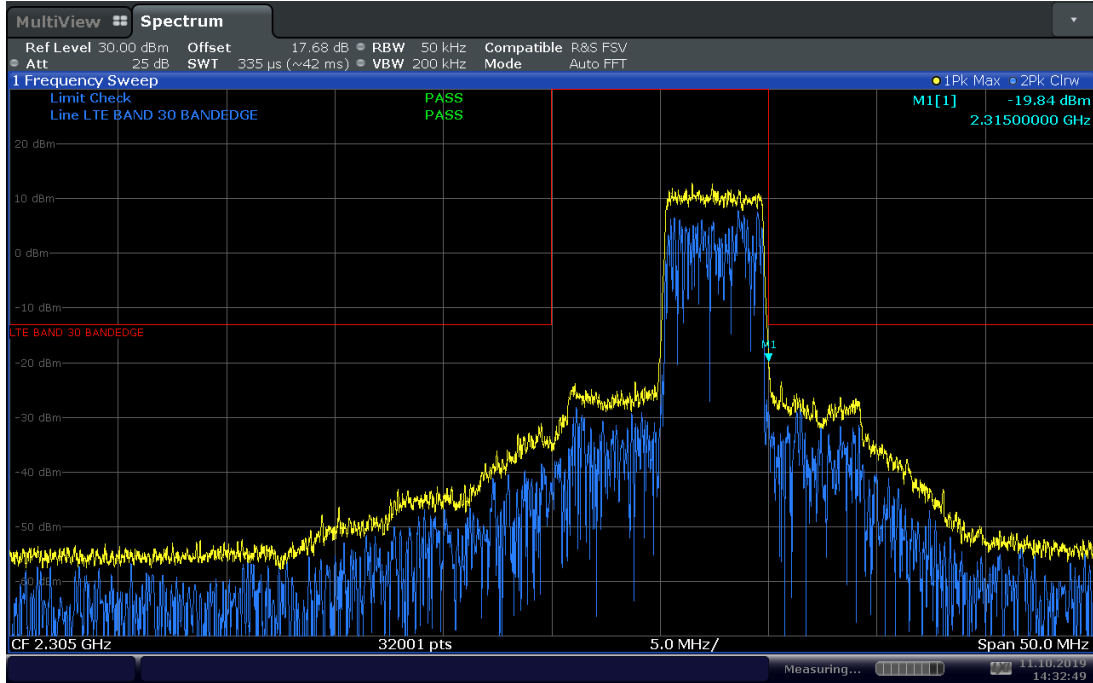
2.5.7 Additional Observations

- This is a conducted test.
- The path loss were measured and entered as a level offset.
- Only worst case configuration for all technologies presented in this test report.

2.5.8 Test Results

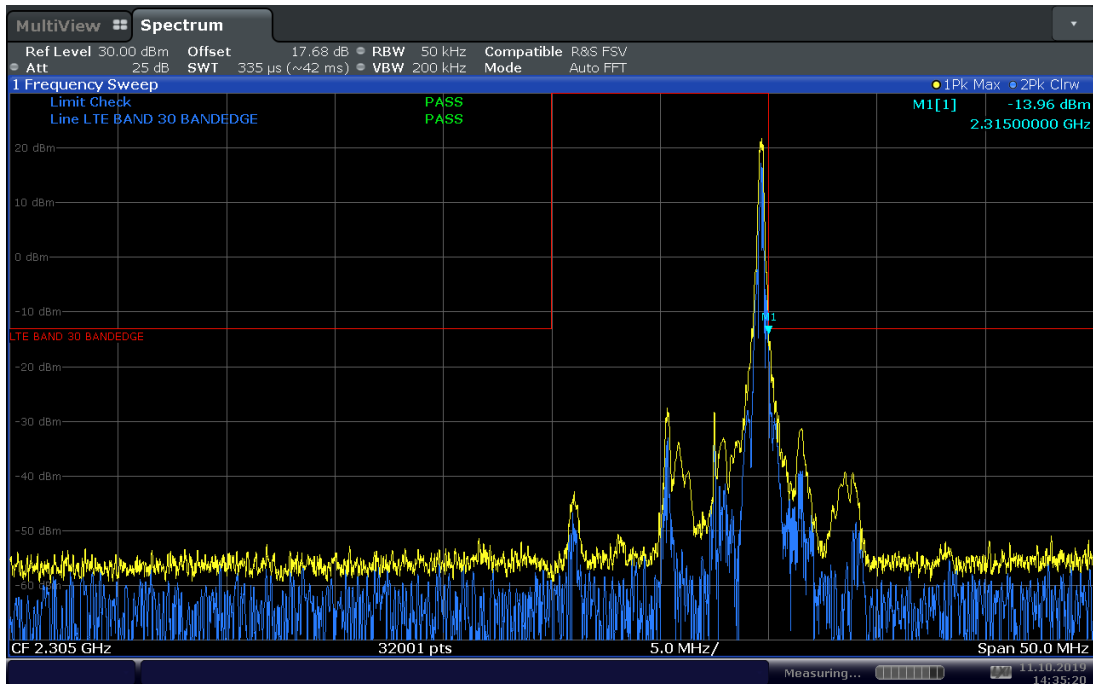


LTE Band 30 / 5MHz BW / QPSK / High Channel 2312.5 MHz / Band Edge @ 2315 MHz in Full RB



14:32:50 11.10.2019

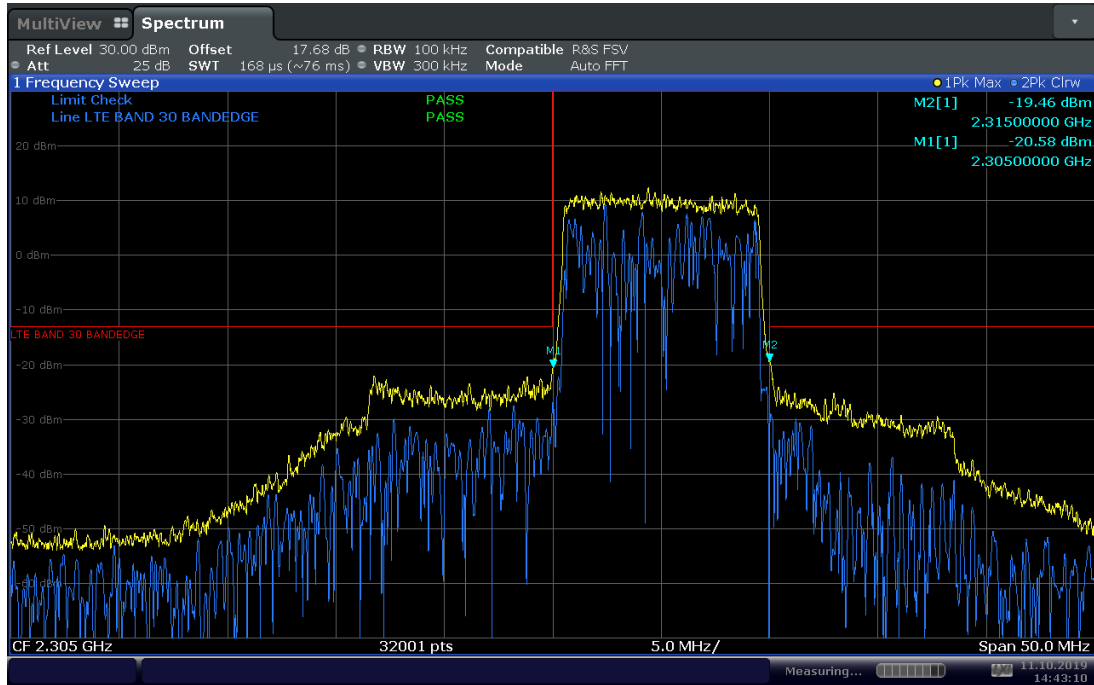
LTE Band 30 / 5MHz BW / QPSK / High Channel 2312.5 MHz / Band Edge @ 2315 MHz in 1 RB 24 Offset



14:35:21 11.10.2019

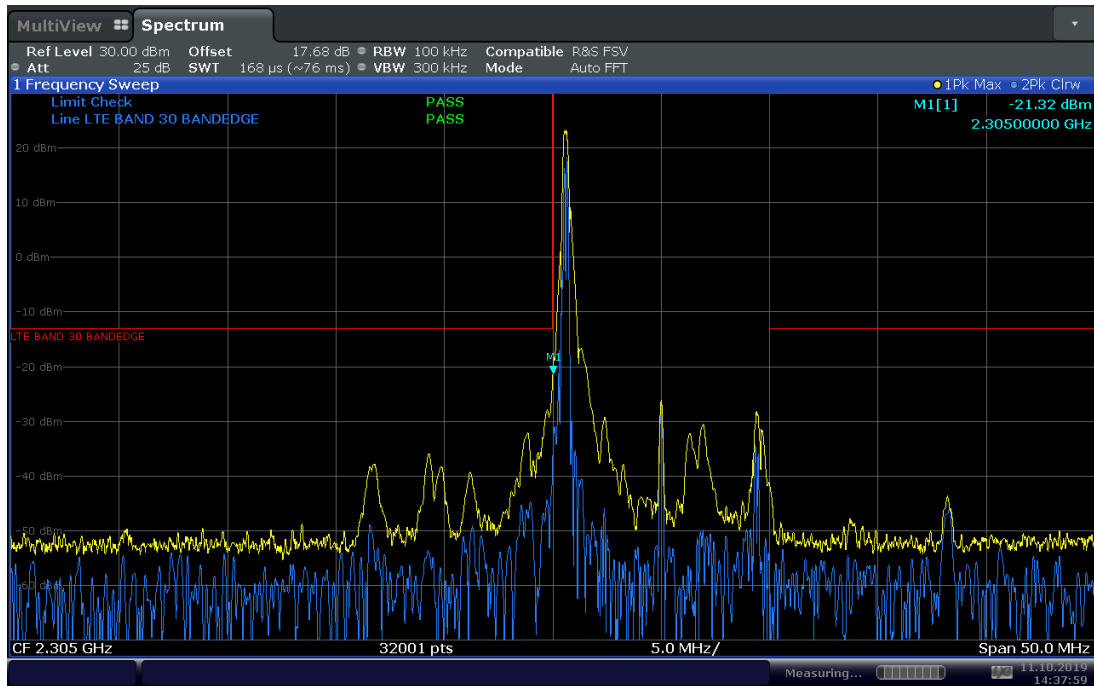


LTE Band 30 / 10MHz BW / QPSK / Mid Channel 2310 MHz / Band Edge @ 2305 and 2315 MHz in Full RB



14:43:11 11.10.2019

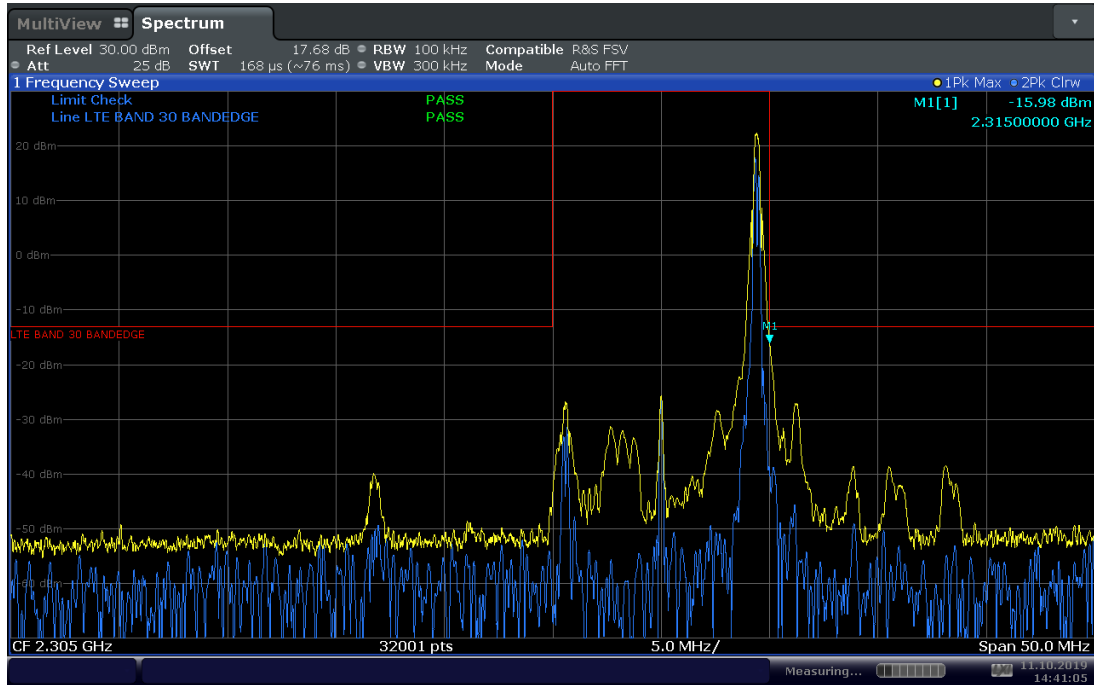
LTE Band 30 / 10MHz BW / QPSK / Mid Channel 2310 MHz / Band Edge @ 2305 MHz in 1 RB 0 Offset



14:37:59 11.10.2019



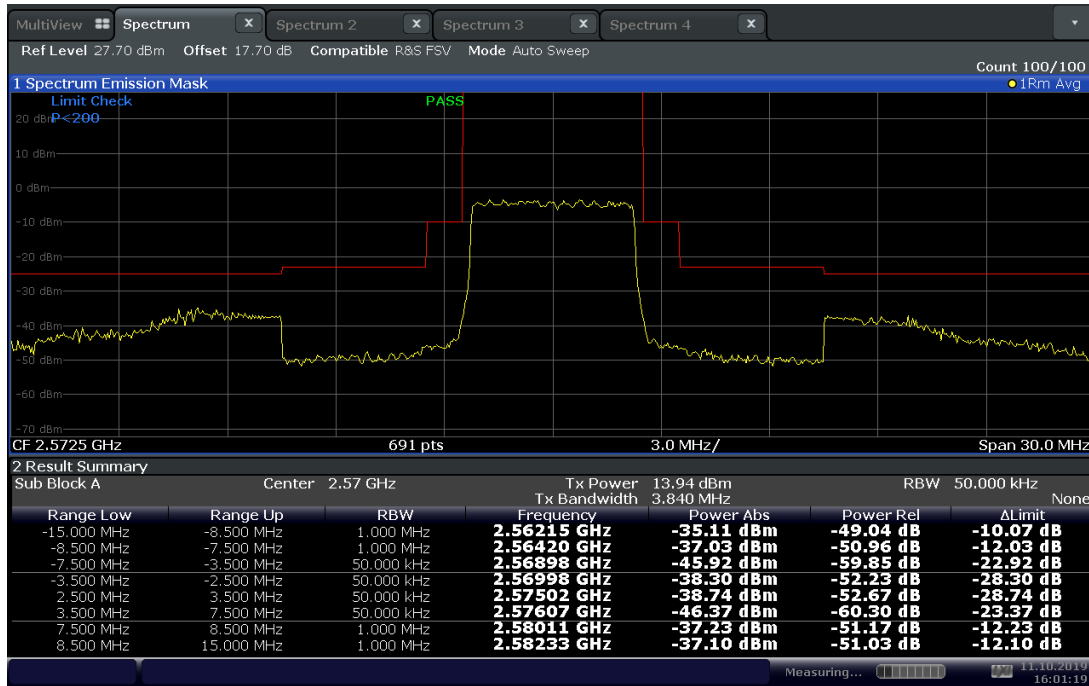
LTE Band 30 / 10MHz BW / QPSK / Mid Channel 2310 MHz / Band Edge @ 2315 MHz in 1 RB 49 Offset



14:41:06 11.10.2019

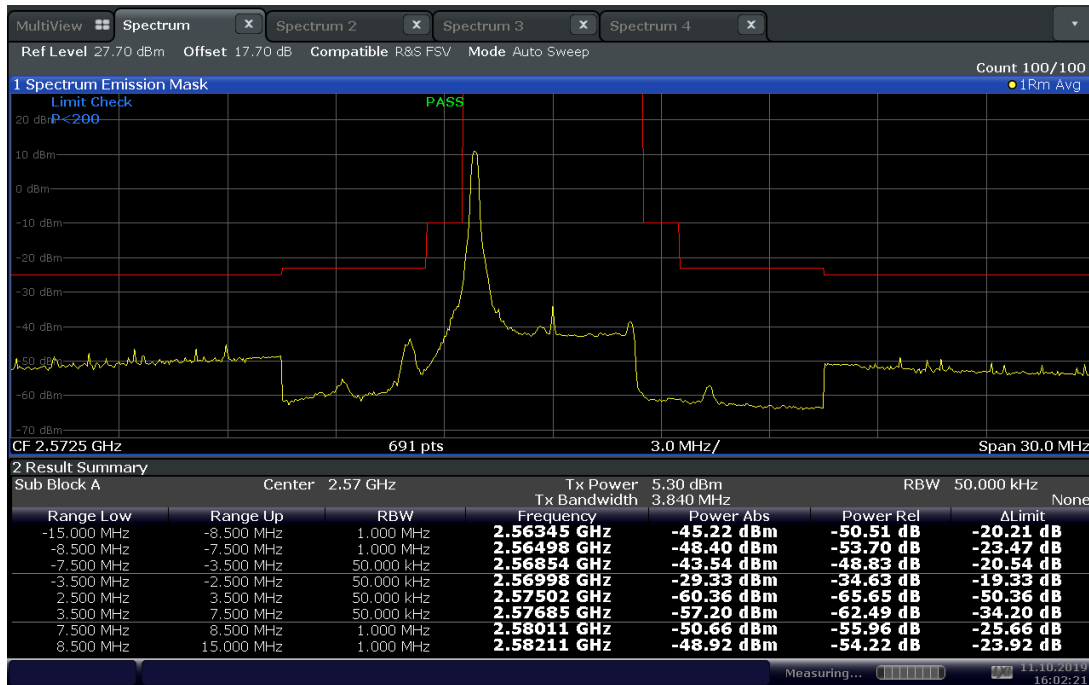


LTE Band 38 / 5MHz BW / QPSK / Low Channel 2572.5 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



16:01:20 11.10.2019

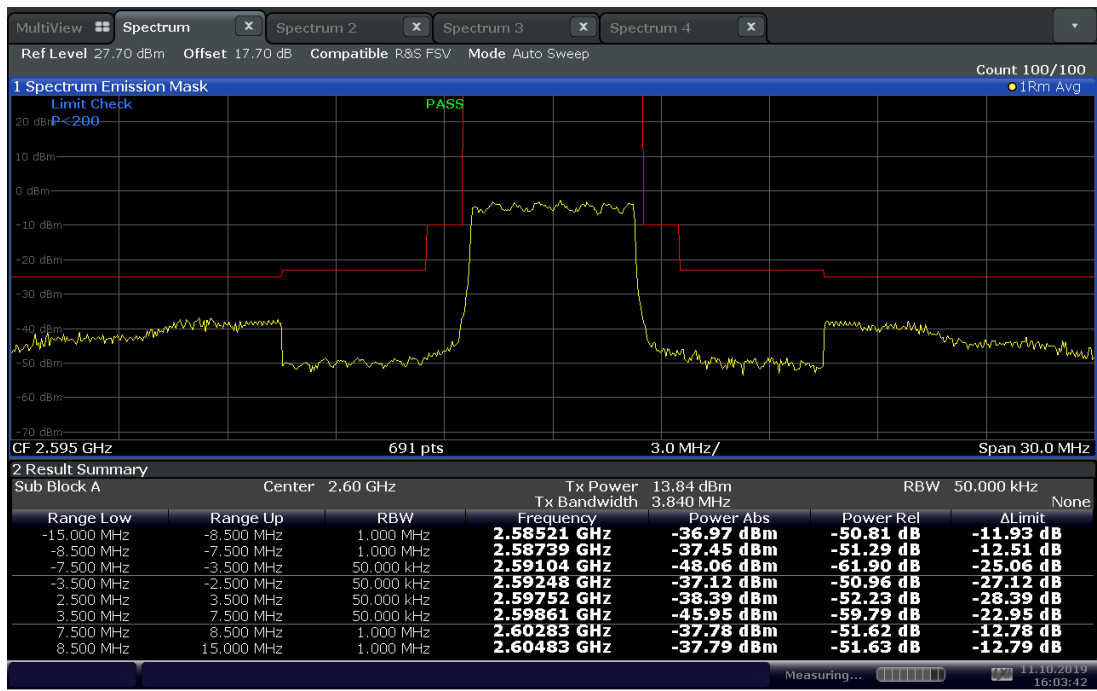
LTE Band 38 / 5MHz BW / QPSK / Low Channel 2572.5 MHz / Mask Band Edge @ 2570 MHz in 1 RB 0 Offset



16:02:22 11.10.2019



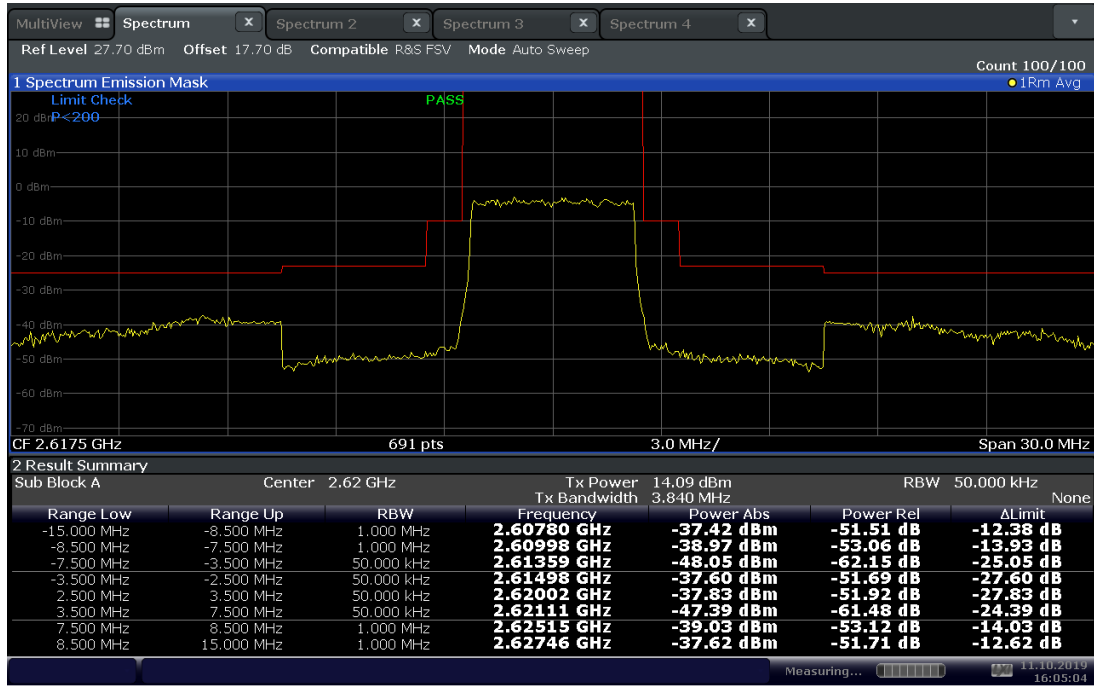
LTE Band 38 / 5MHz BW / QPSK / Mid Channel 2595 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



16:03:42 11.10.2019

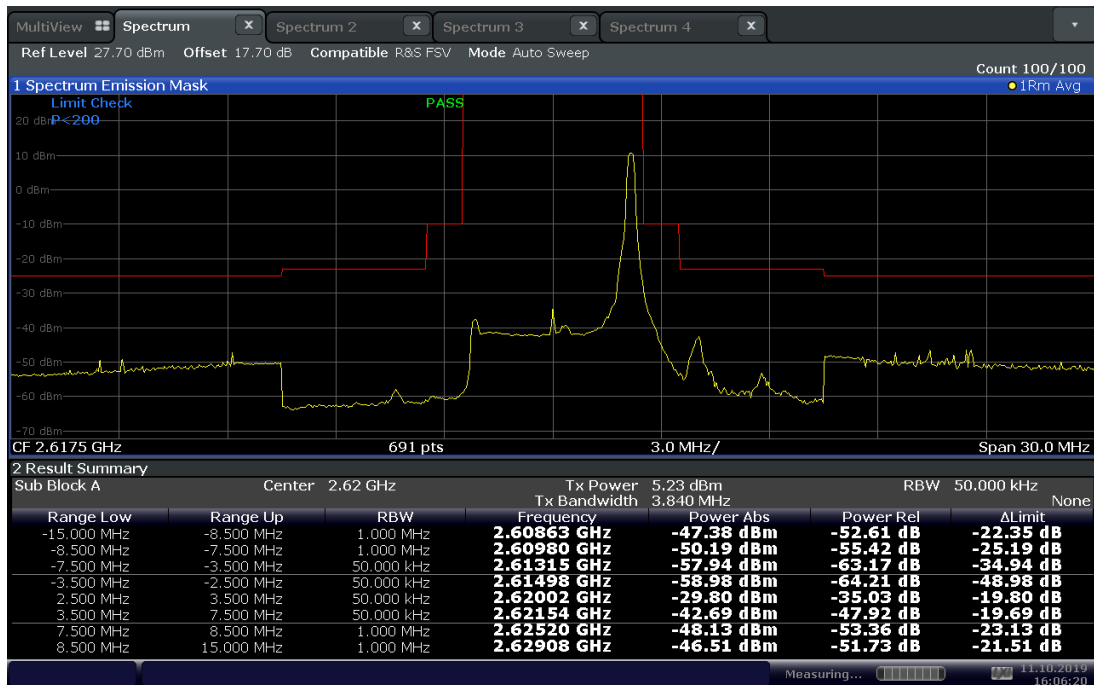


LTE Band 38 / 5MHz BW / QPSK / High Channel 2617.5 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



16:05:04 11.10.2019

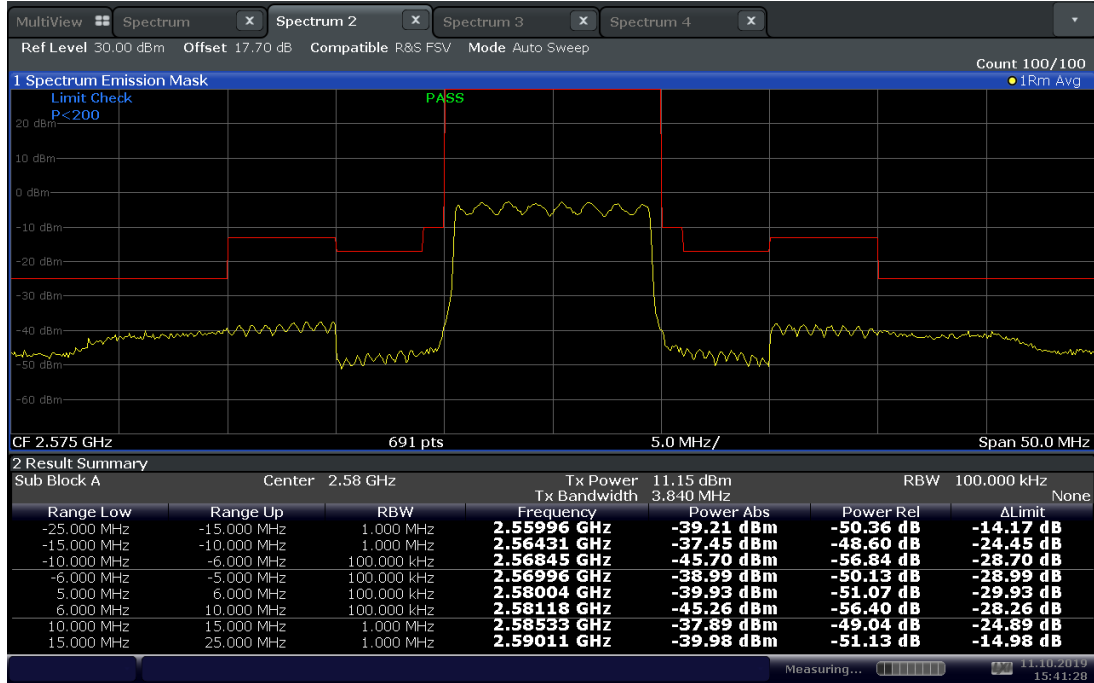
LTE Band 38 / 5MHz BW / QPSK / High Channel 2617.5 MHz / Mask Band Edge @ 2620 MHz in 1 RB 24 Offset



16:06:20 11.10.2019

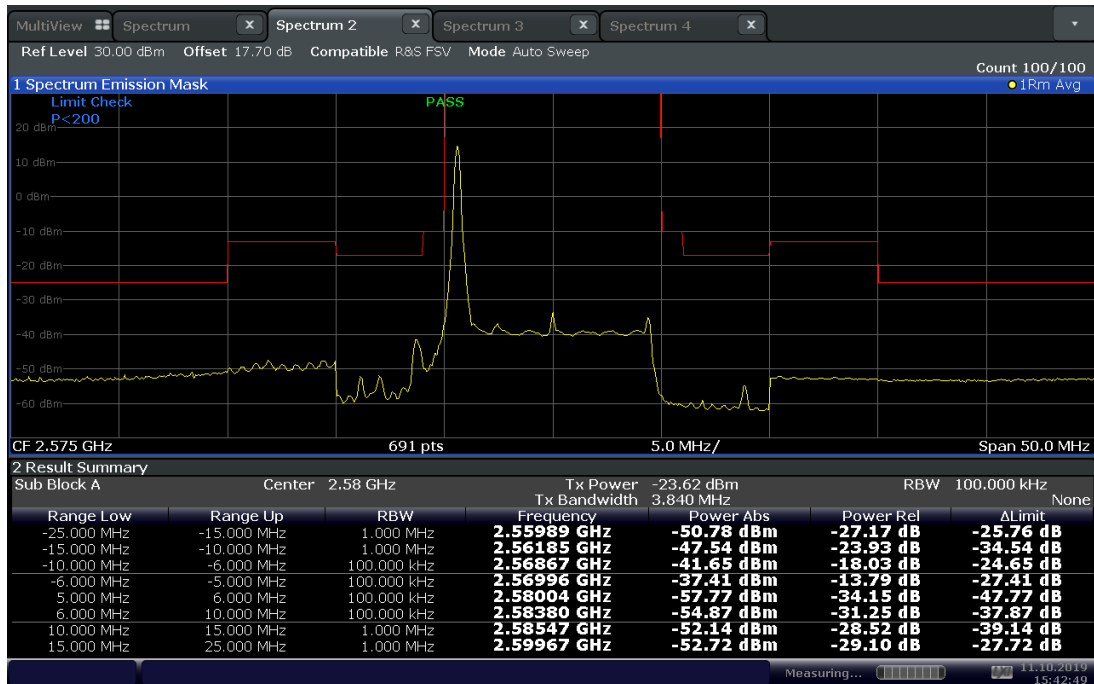


LTE Band 38 / 10MHz BW / QPSK / Low Channel 2575 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



15:41:29 11.10.2019

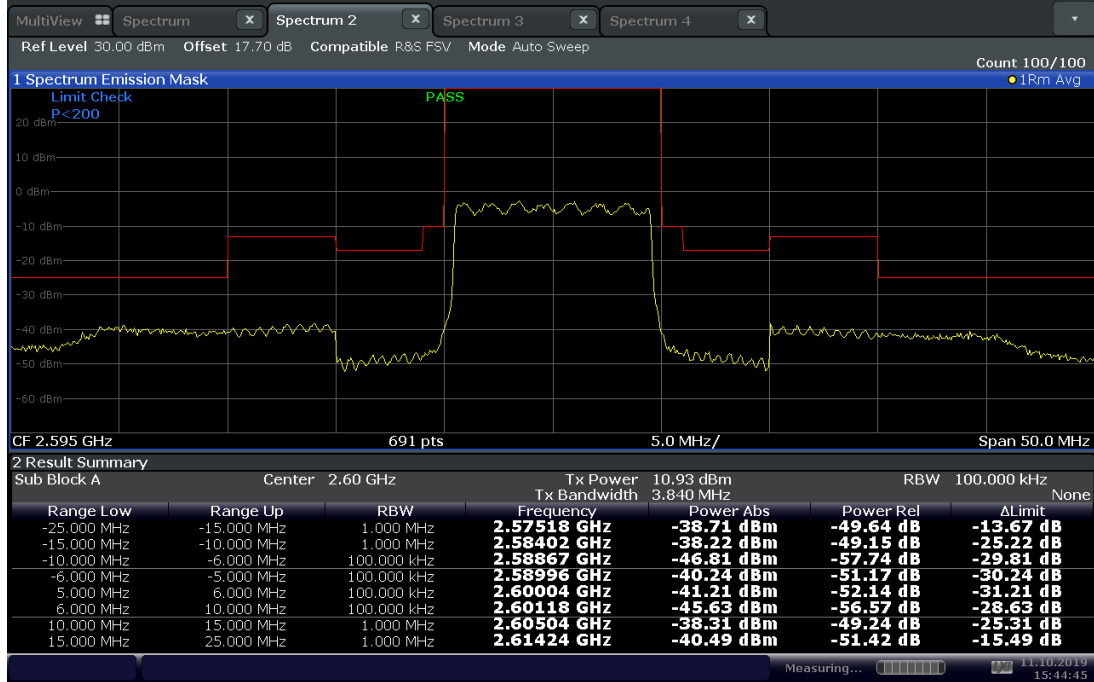
LTE Band 38 / 10MHz BW / QPSK / Low Channel 2575 MHz / Mask Band Edge @ 2570 MHz in 1 RB 0 Offset



15:42:50 11.10.2019



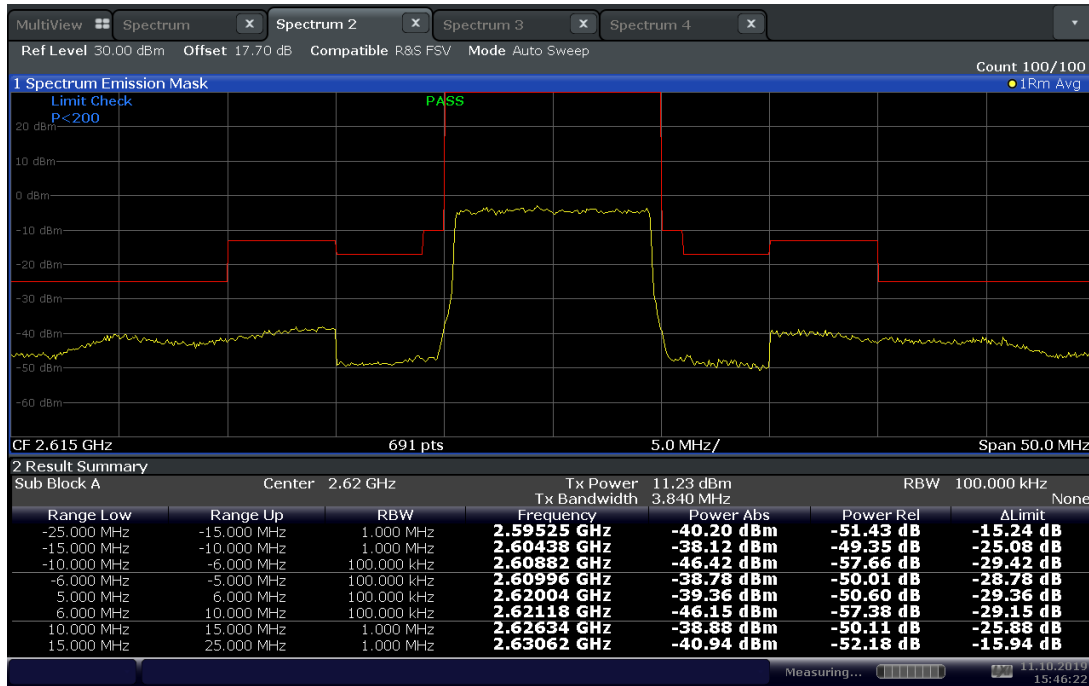
LTE Band 38 / 10MHz BW / QPSK / Mid Channel 2595 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



15:44:45 11.10.2019

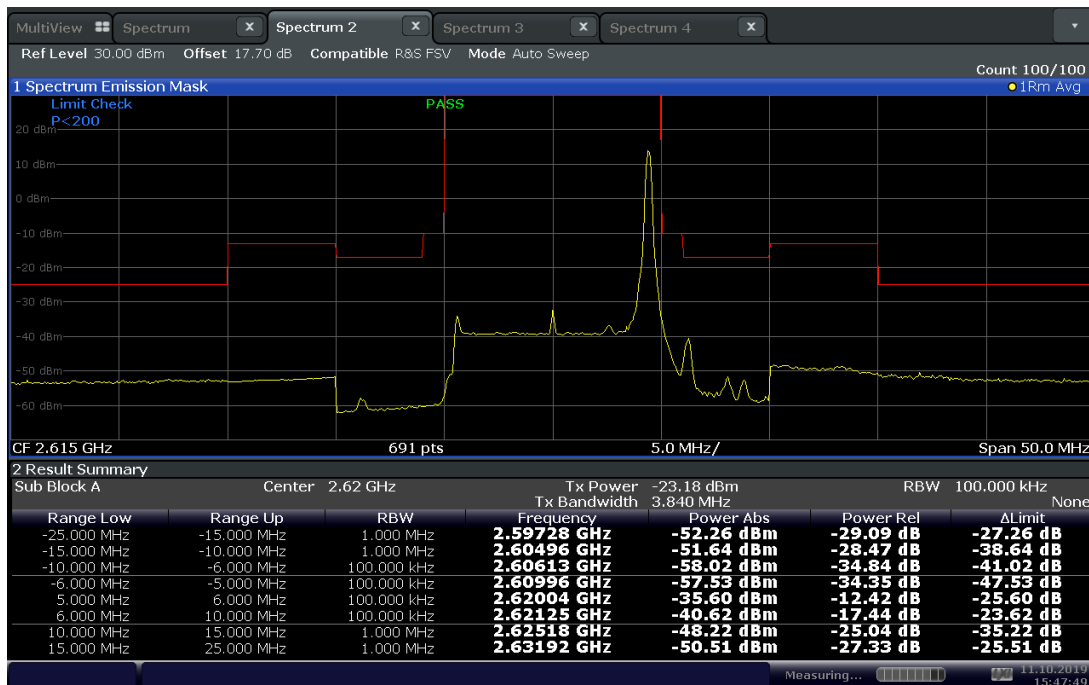


LTE Band 38 / 10MHz BW / QPSK / High Channel 3615 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



15:46:23 11.10.2019

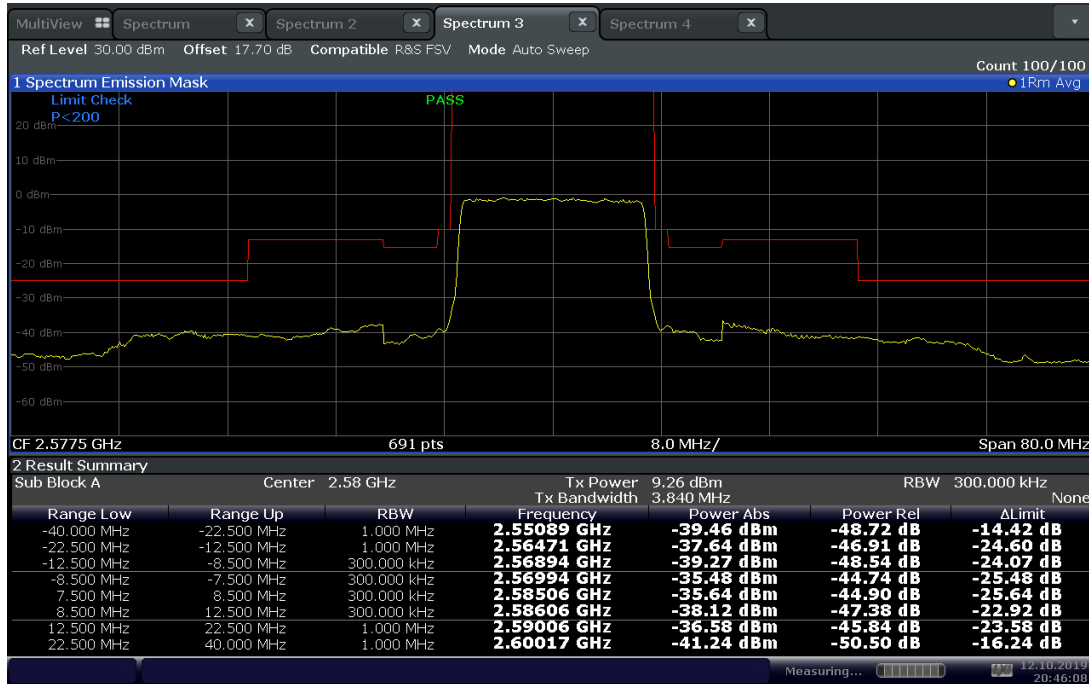
LTE Band 38 / 10MHz BW / QPSK / High Channel 3615 MHz / Mask Band Edge @ 2620 MHz in 1 RB 49 Offset



15:47:50 11.10.2019

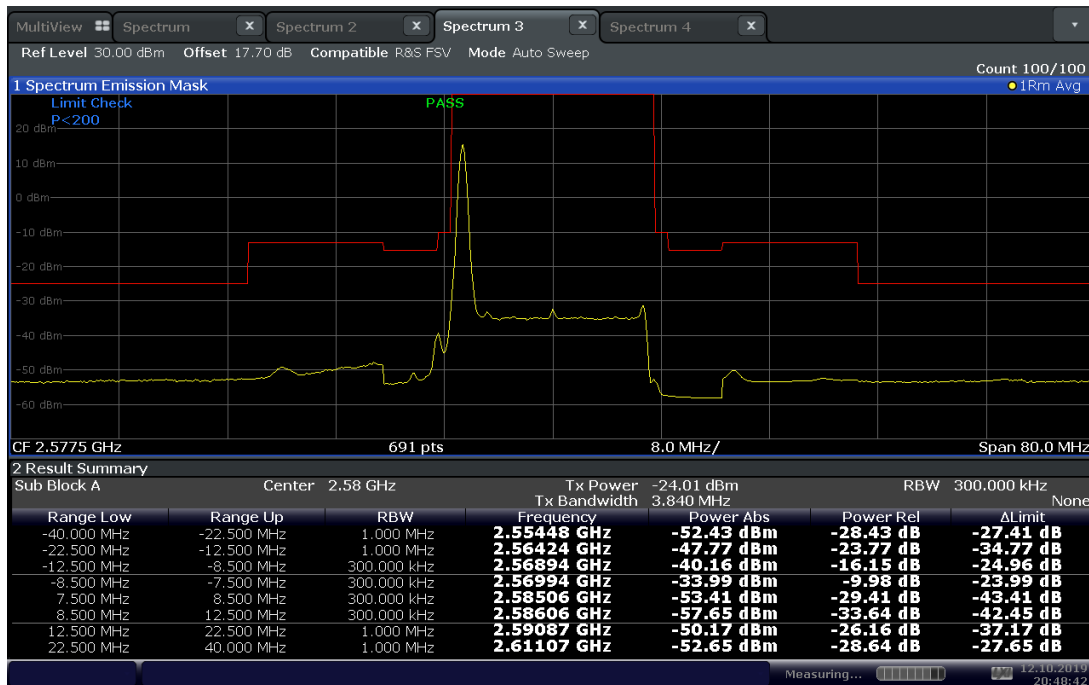


LTE Band 38 / 15MHz BW / QPSK / Low Channel 2577.5 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



20:46:08 12.10.2019

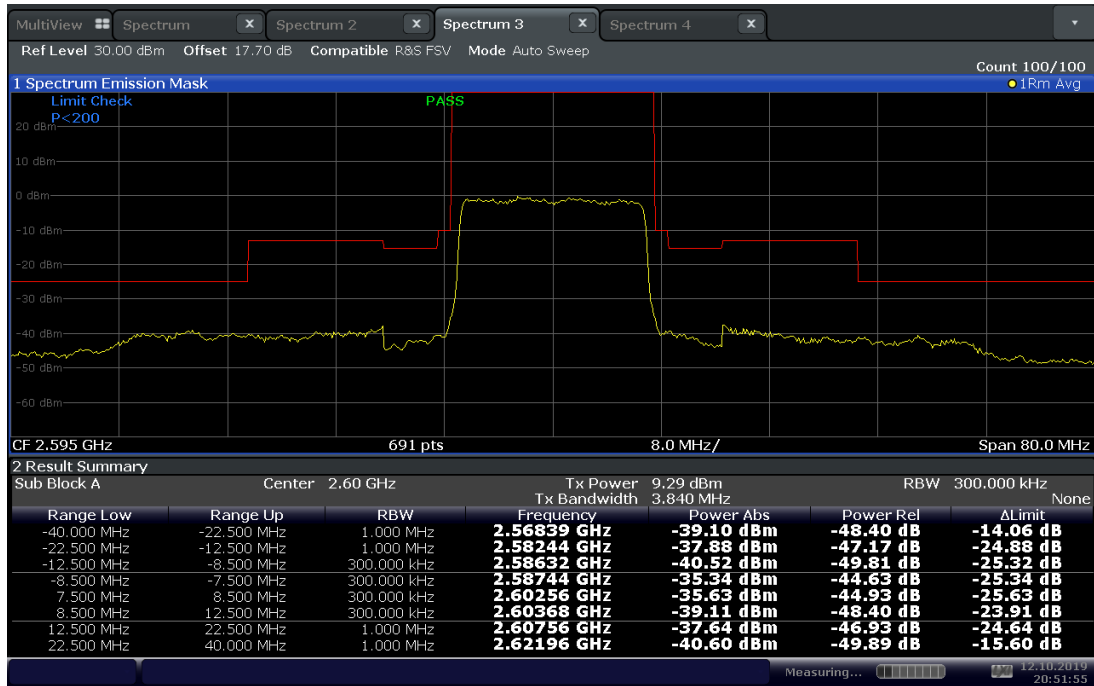
LTE Band 38 / 15MHz BW / QPSK / Low Channel 2577.5 MHz / Mask Band Edge @ 2570 MHz in 1 RB 0 Offset



20:48:42 12.10.2019



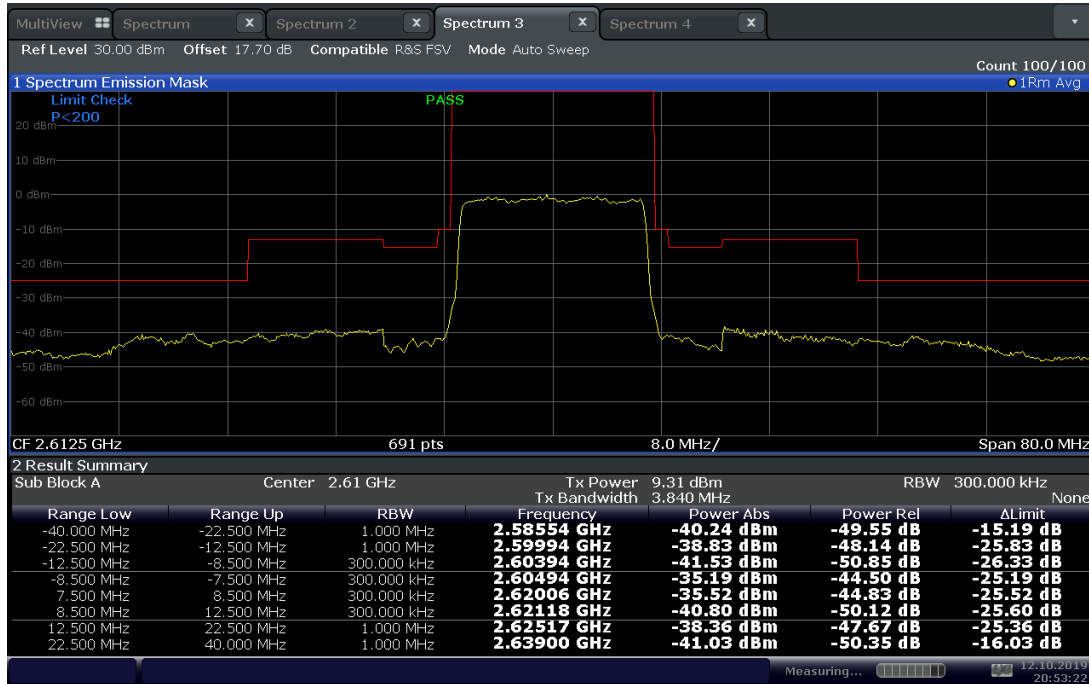
LTE Band 38 / 15MHz BW / QPSK / Mid Channel 2595 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



20:51:55 12.10.2019

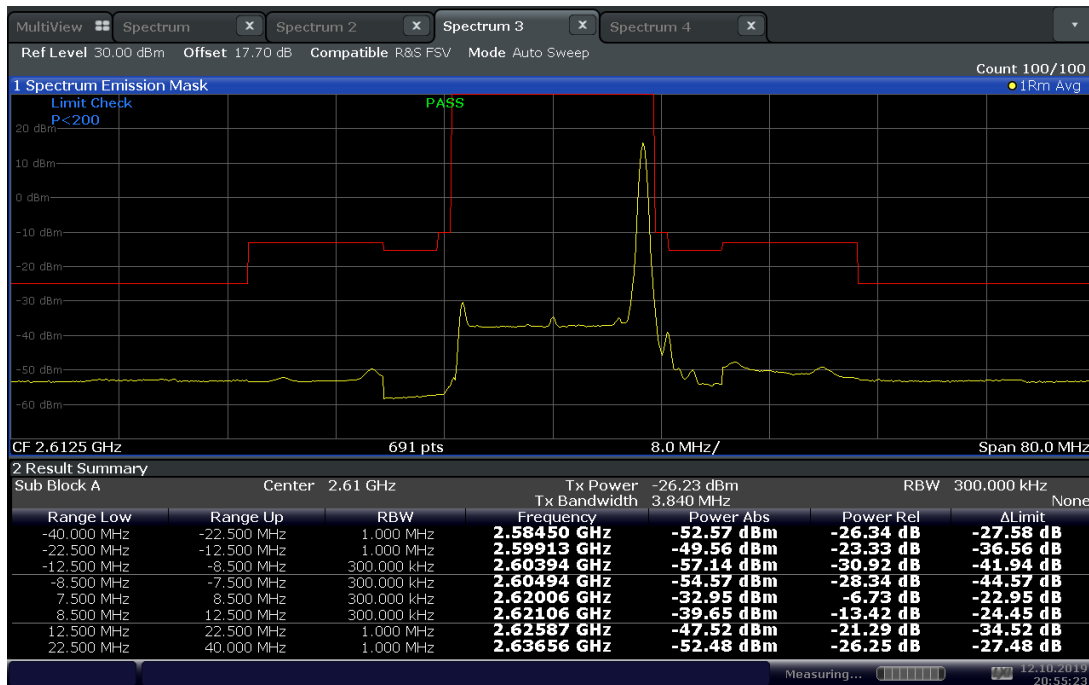


LTE Band 38 / 15MHz BW / QPSK / High Channel 2612.5 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



20:53:22 12.10.2019

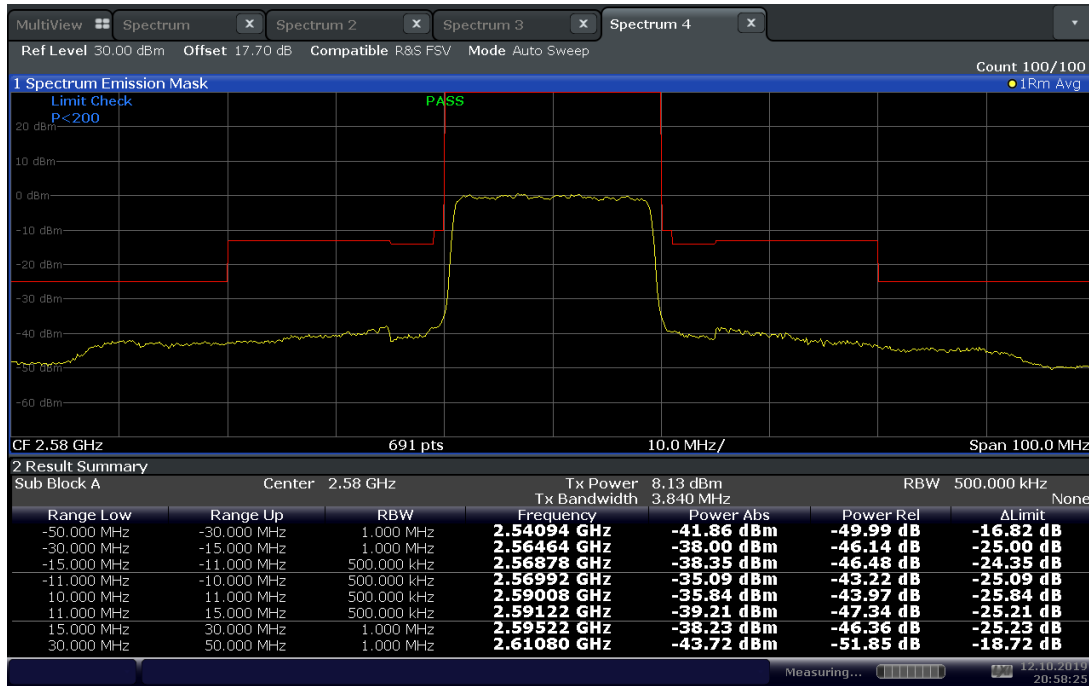
LTE Band 38 / 15MHz BW / QPSK / High Channel 2612.5 MHz / Mask Band Edge @ 2620 MHz in 1 RB 74 Offset



20:55:24 12.10.2019

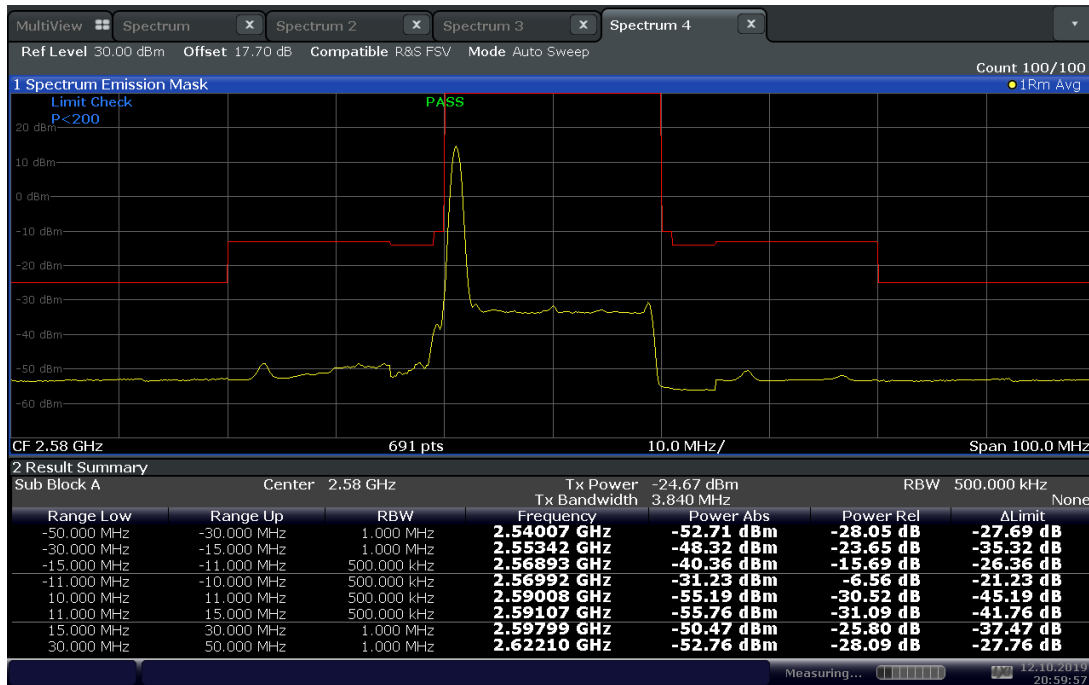


LTE Band 38 / 20MHz BW / QPSK / Low Channel 2580 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



20:58:25 12.10.2019

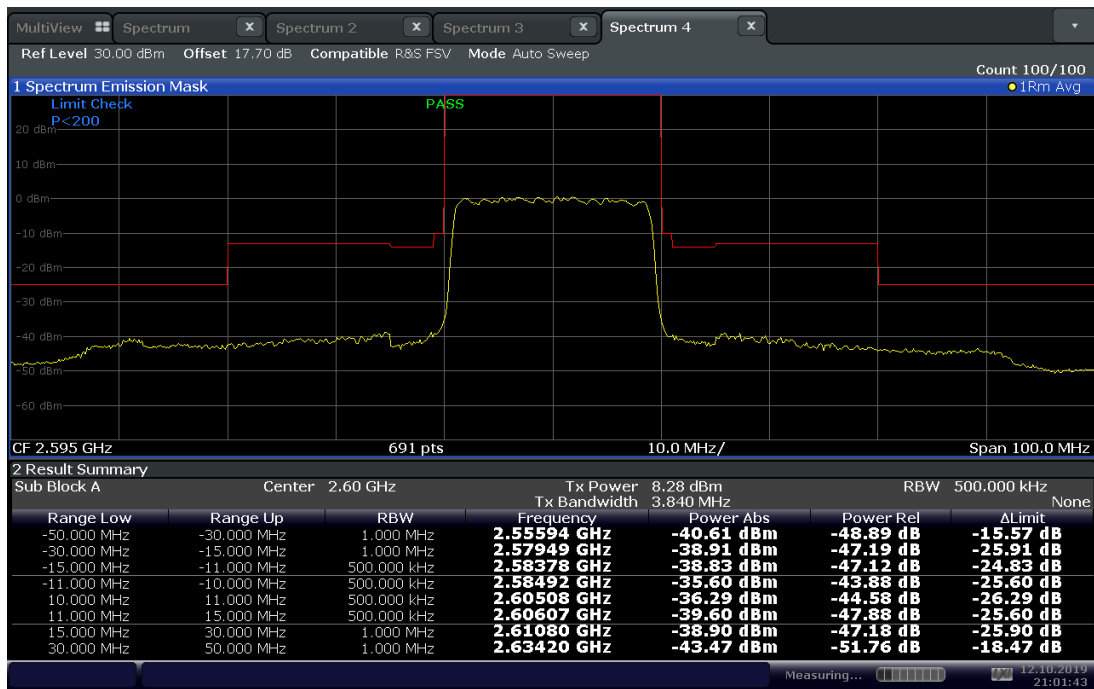
LTE Band 38 / 20MHz BW / QPSK / Low Channel 2580 MHz / Mask Band Edge @ 2570 MHz in 1 RB 0 Offset



20:59:58 12.10.2019



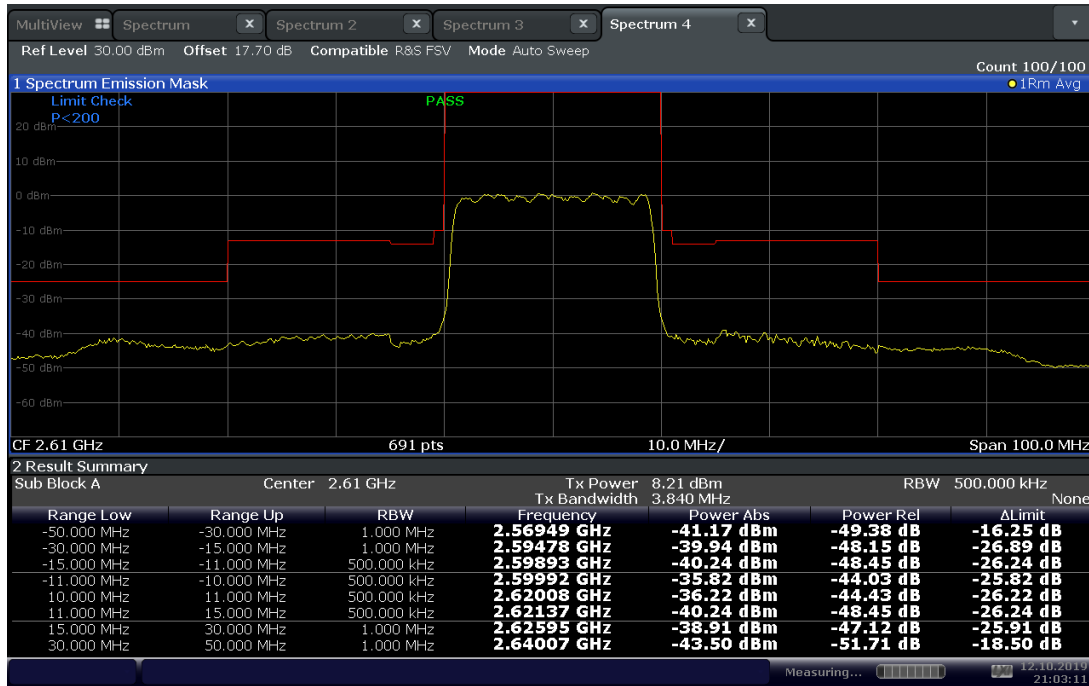
LTE Band 38 / 20MHz BW / QPSK / Mid Channel 2595 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



21:01:44 12.10.2019

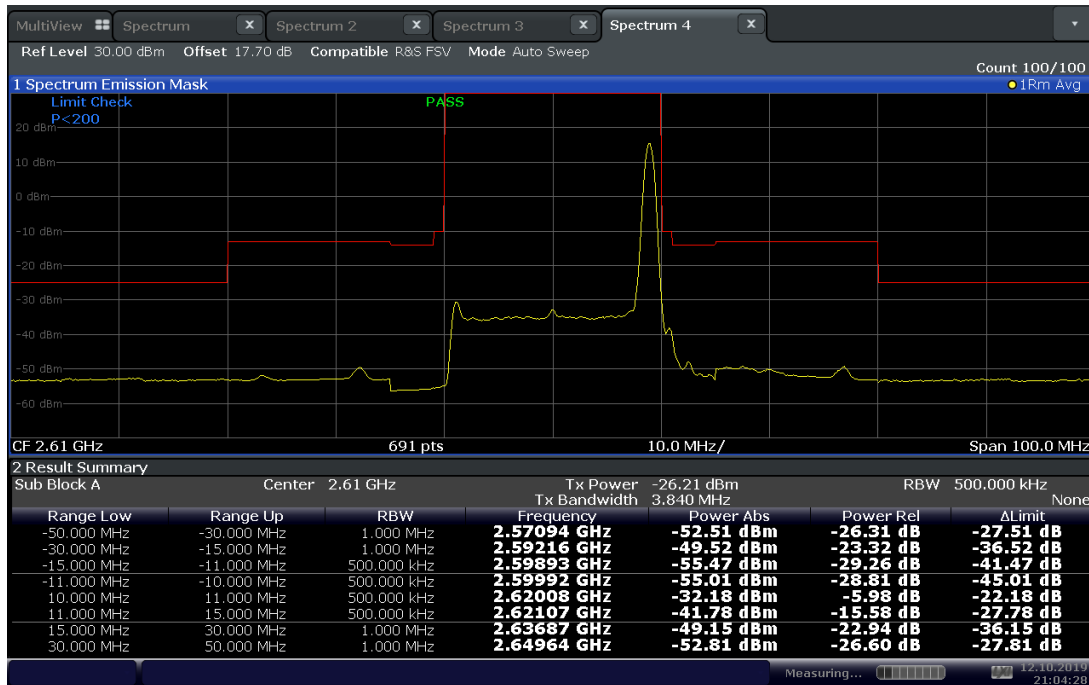


LTE Band 38 / 20MHz BW / QPSK / High Channel 2610 MHz / Mask Band Edge @ 2570 and 2620 MHz in Full RB



21:03:11 12.10.2019

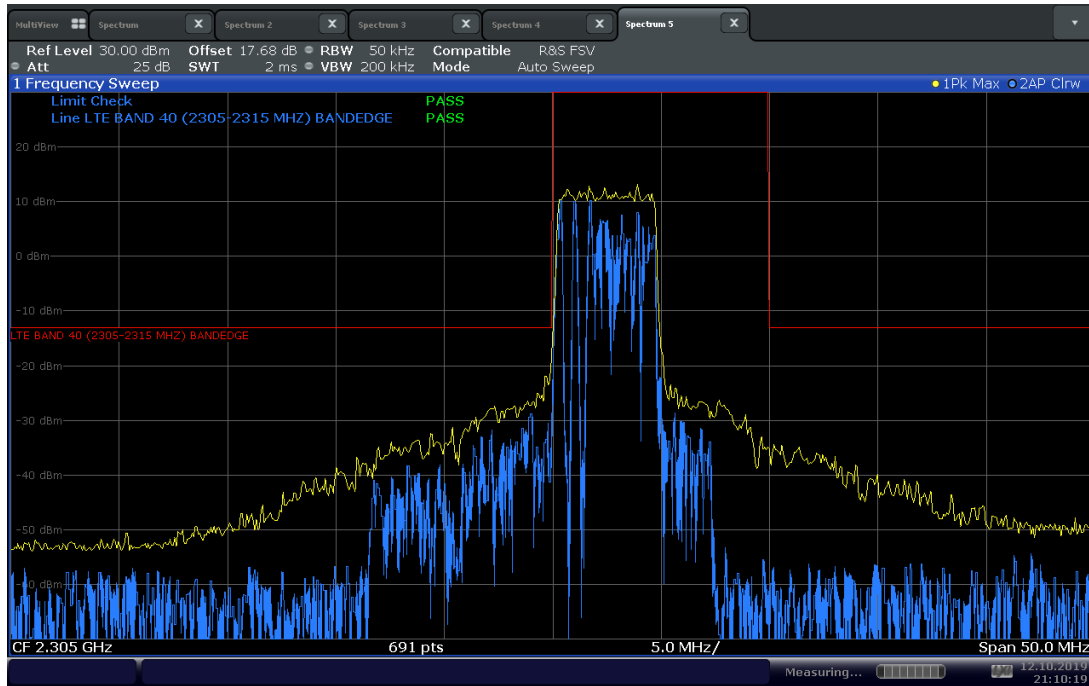
LTE Band 38 / 20MHz BW / QPSK / High Channel 2610 MHz / Mask Band Edge @ 2620 MHz in 1 RB 99 Offset



21:04:29 12.10.2019

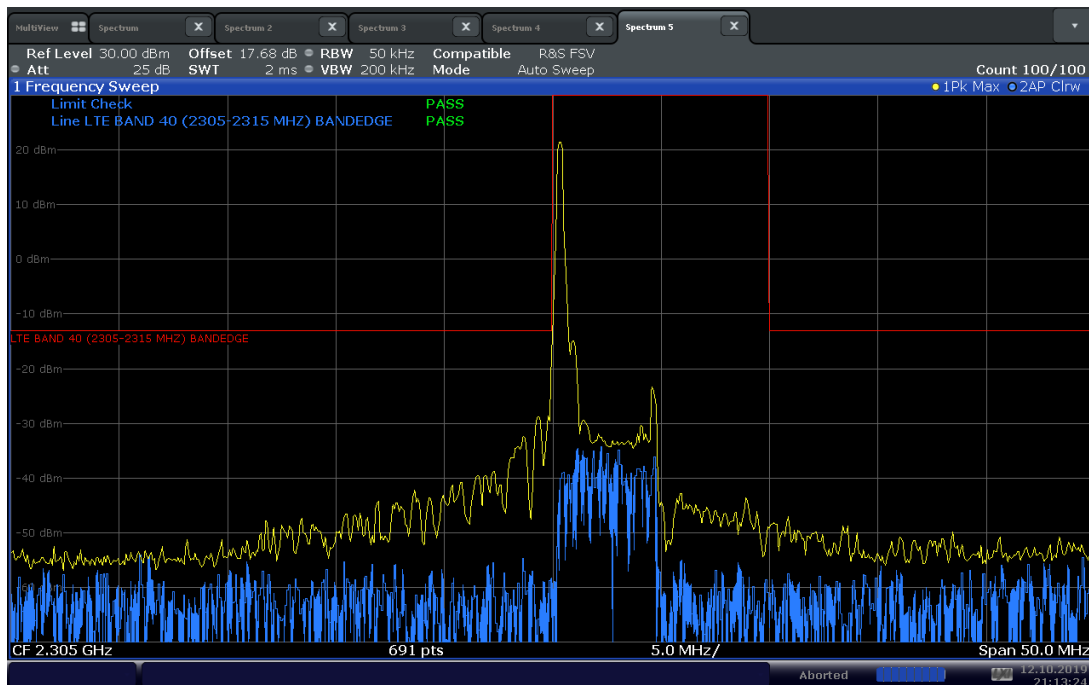


LTE Band 40 / 5MHz BW / QPSK / Low Channel 2307.5 MHz / Band Edge @ 2305 MHz in Full RB



21:10:19 12.10.2019

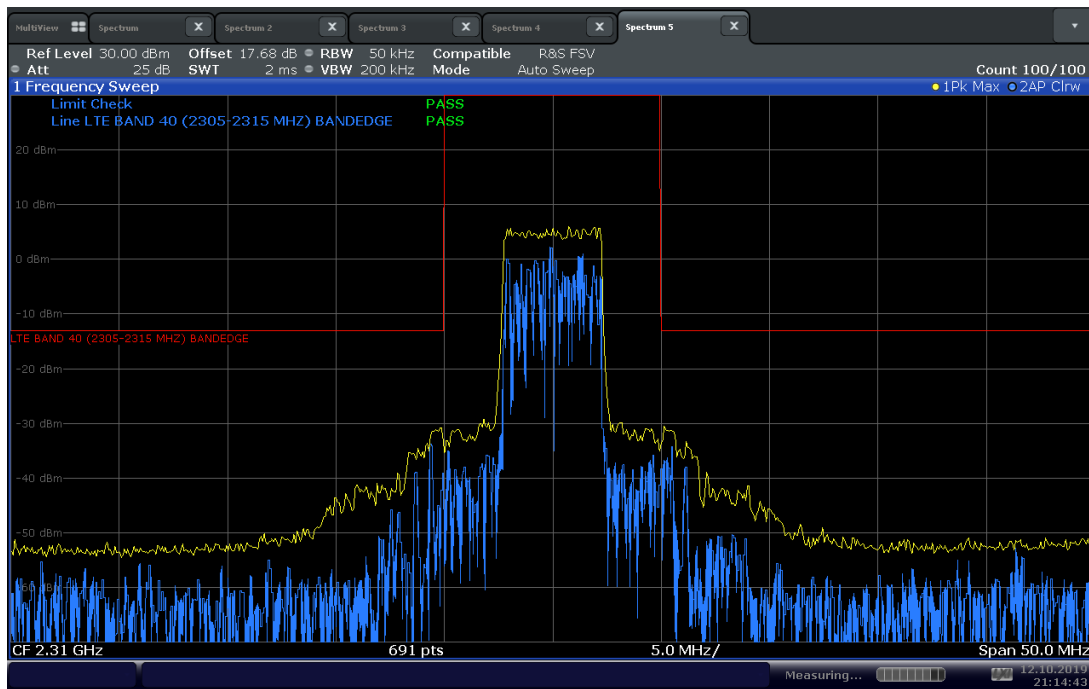
LTE Band 40 / 5MHz BW / QPSK / Low Channel 2307.5 MHz / Band Edge @ 2305 MHz in 1 RB 0 Offset



21:13:25 12.10.2019



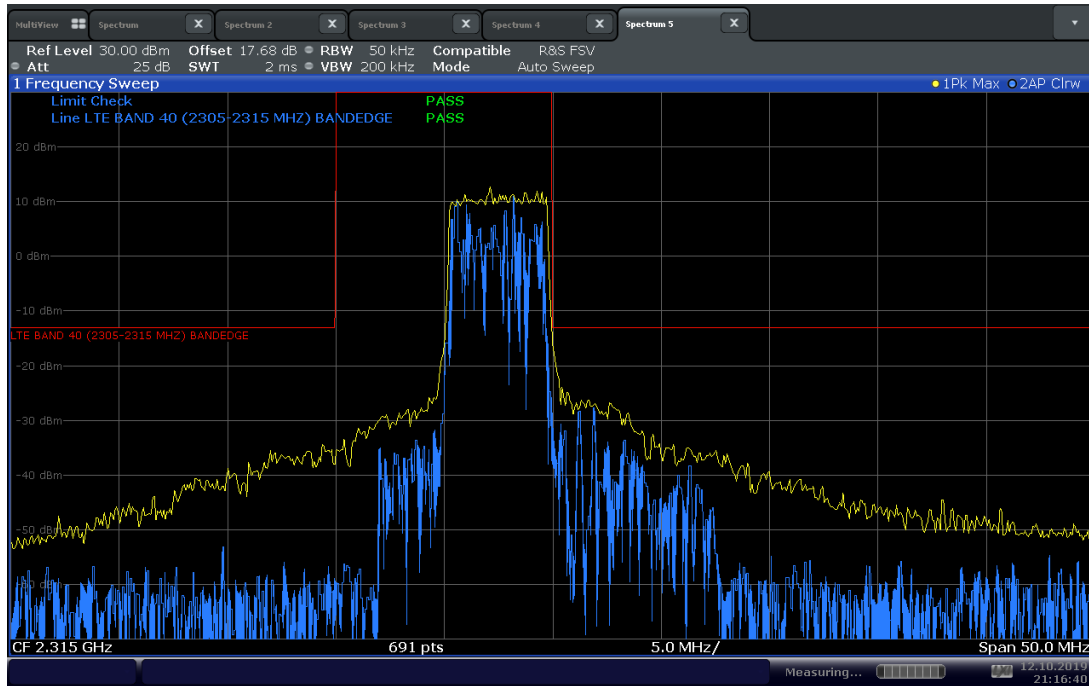
LTE Band 40 / 5MHz BW / QPSK / Mid Channel 2310 MHz / Band Edge @ 2305 and 2315 MHz in Full RB



21:14:44 12.10.2019

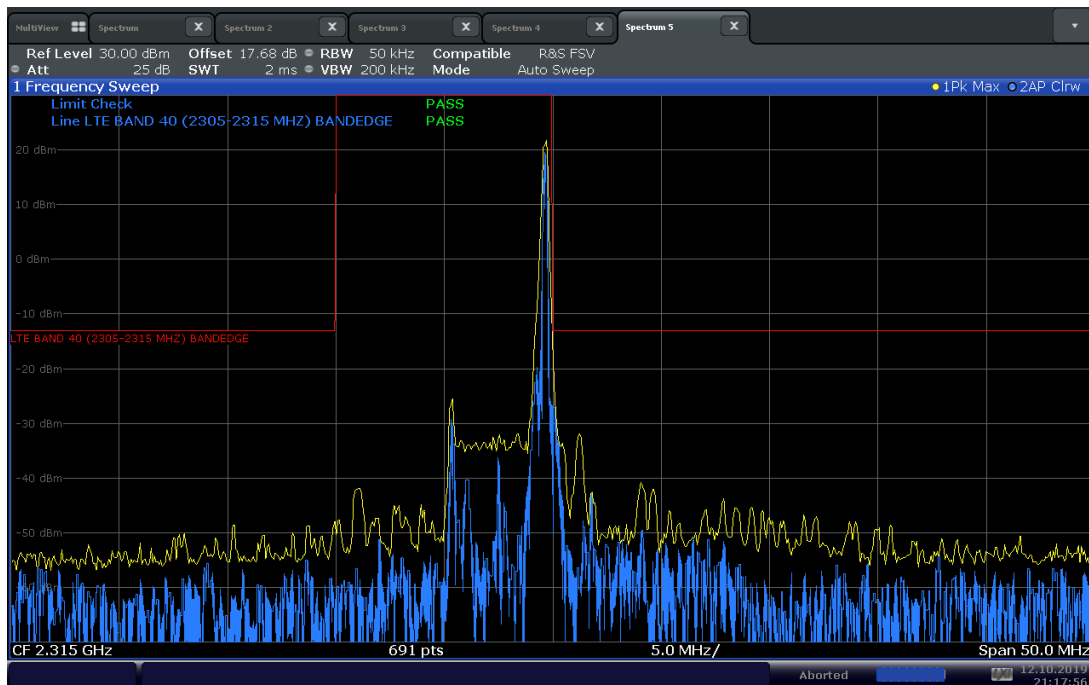


LTE Band 40 / 5MHz BW / QPSK / High Channel 2312.5 MHz / Band Edge @ 2315 MHz in Full RB



21:16:41 12.10.2019

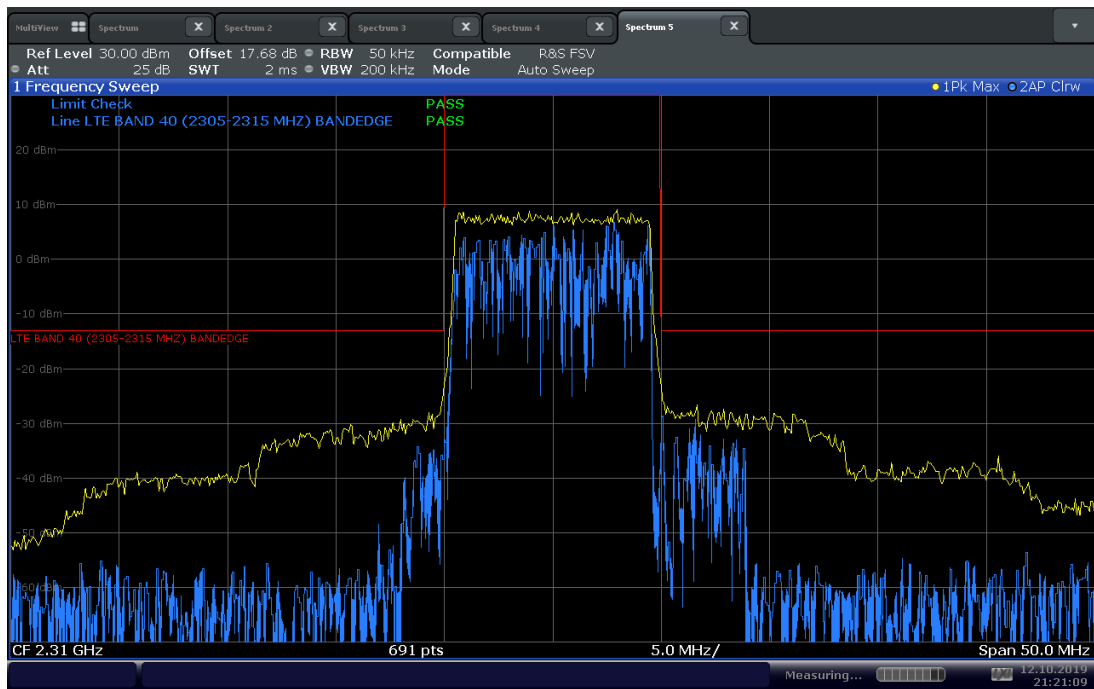
LTE Band 40 / 5MHz BW / QPSK / High Channel 2312.5 MHz / Band Edge @ 2315 MHz in 1 RB 24 Offset



21:17:56 12.10.2019



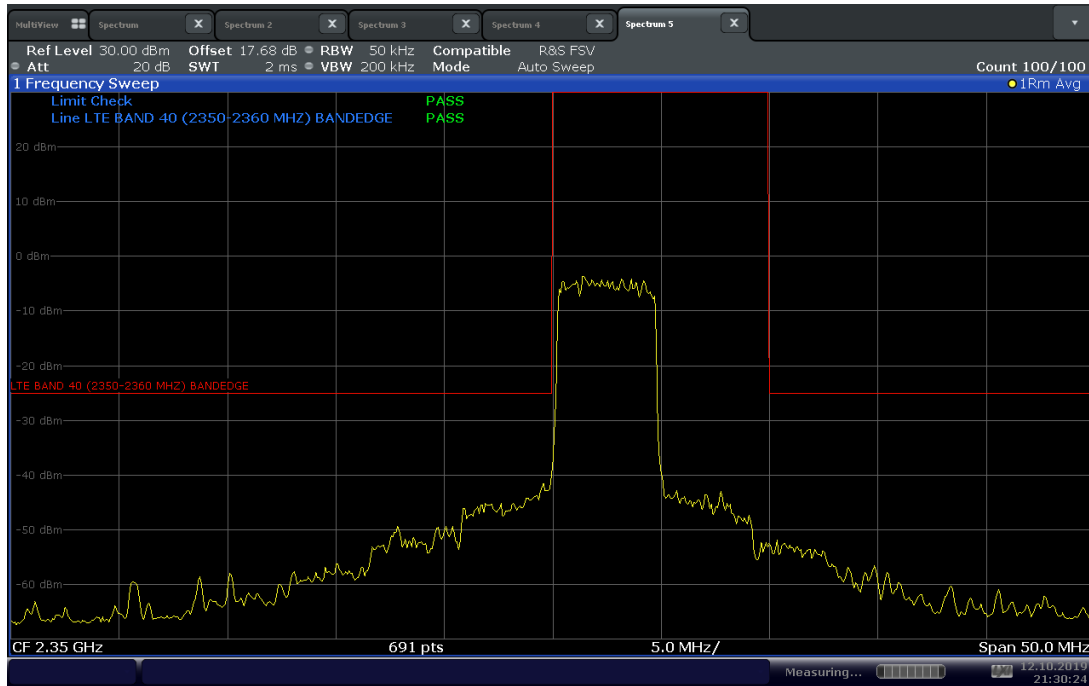
LTE Band 40 / 5MHz BW / QPSK / Mid Channel 2310 MHz / Band Edge @ 2305 and 2315 MHz in Full RB



21:21:10 12.10.2019

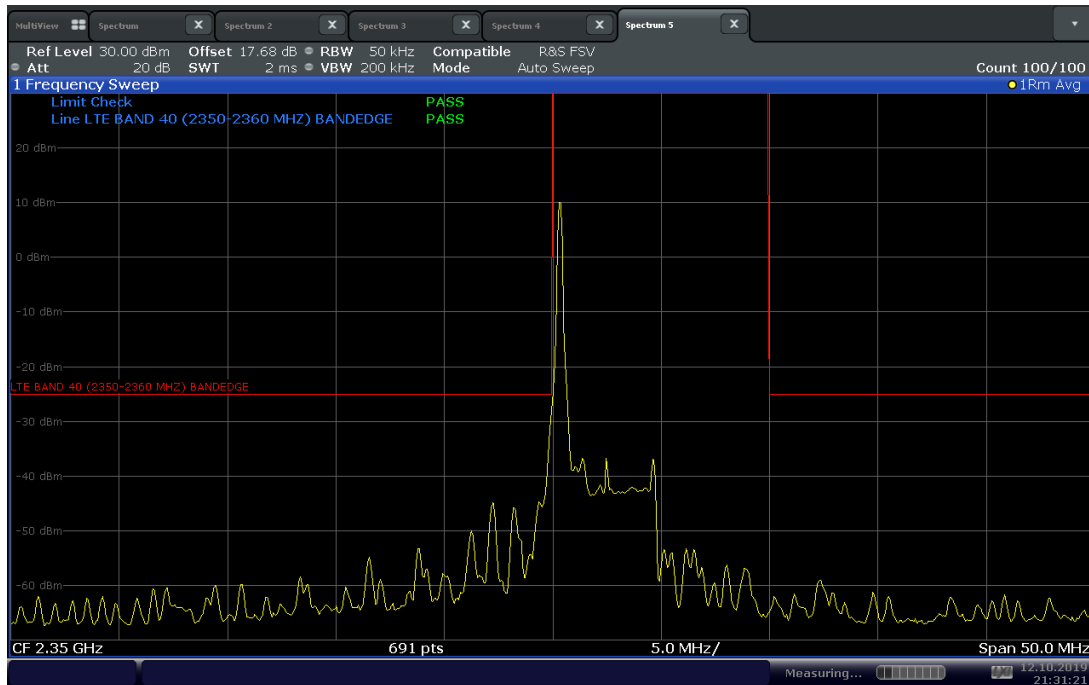


LTE Band 40 / 5MHz BW / QPSK / Low Channel 2352.5 MHz / Band Edge @ 2350 MHz in Full RB



21:30:25 12.10.2019

LTE Band 40 / 5MHz BW / QPSK / Low Channel 2352.5 MHz / Band Edge @ 2350 MHz in 1 RB 0 Offset

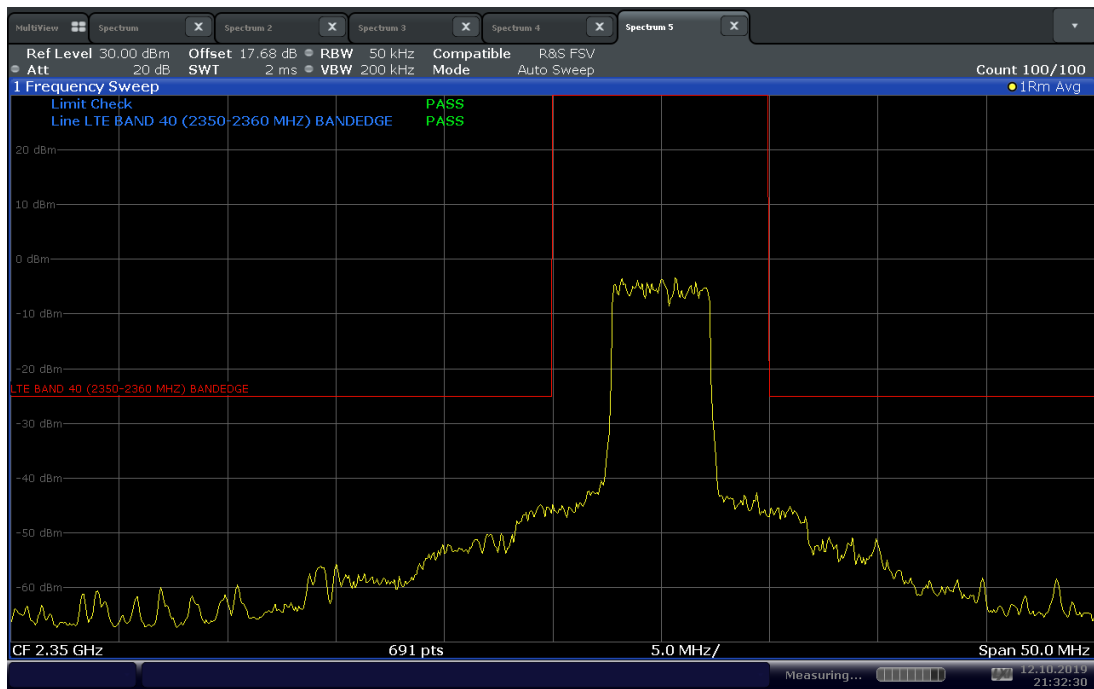


21:31:21 12.10.2019



America

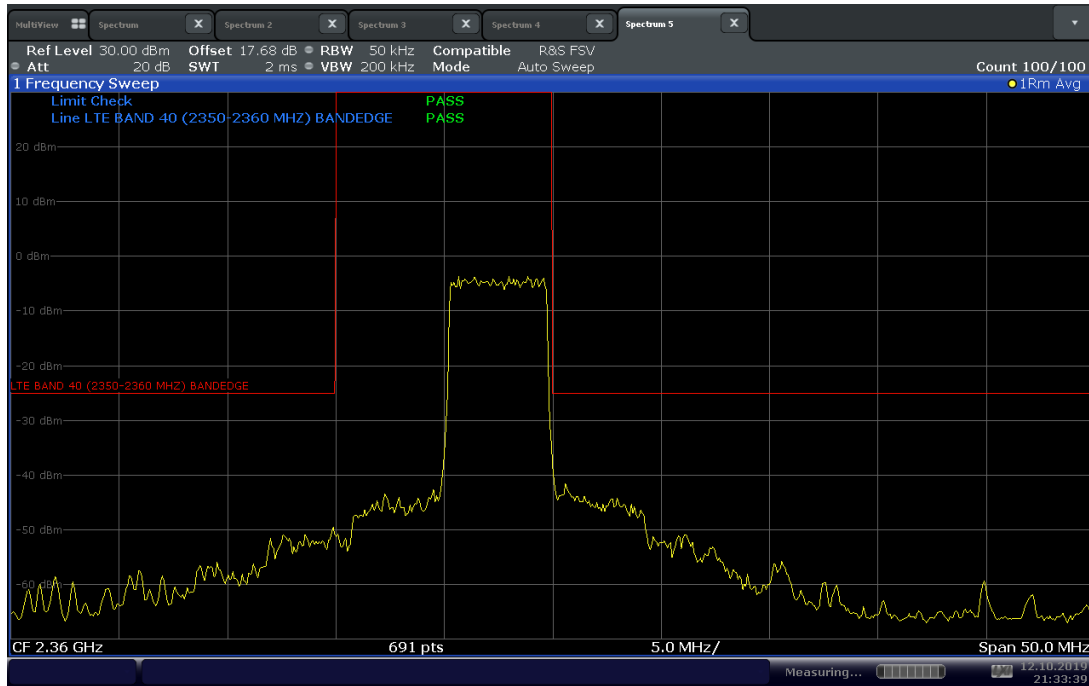
LTE Band 40 / 5MHz BW / QPSK / Mid Channel 2355 MHz / Band Edge @ 2350 and 2360 MHz in Full RB



21:32:31 12.10.2019

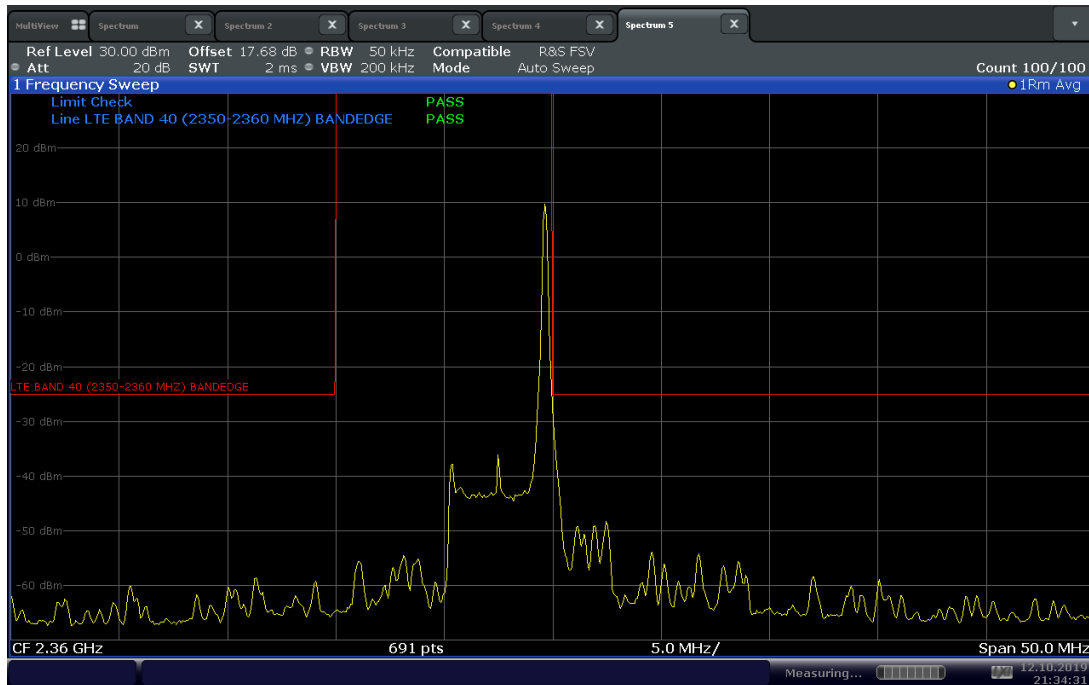


LTE Band 40 / 5MHz BW / QPSK / High Channel 2357.5 MHz / Band Edge @ 2360 MHz in Full RB



21:33:39 12.10.2019

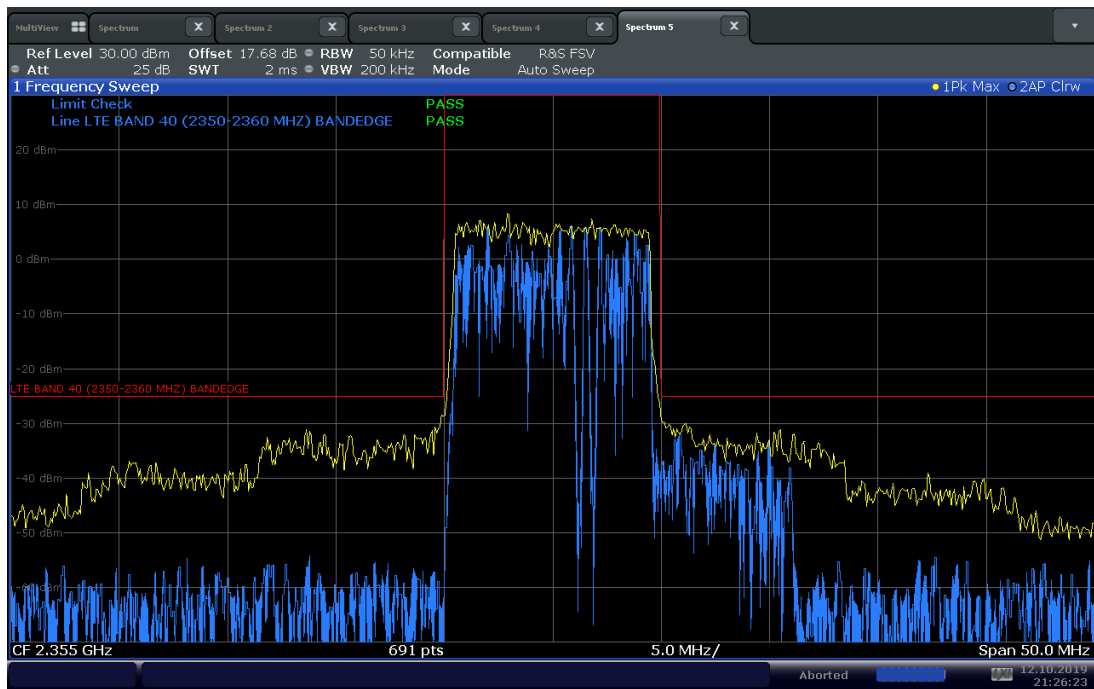
LTE Band 40 / 5MHz BW / QPSK / High Channel 2357.5 MHz / Band Edge @ 2360 MHz in 1 RB 24 Offset



21:34:31 12.10.2019



LTE Band 40 / 10MHz BW / QPSK / Mid Channel 2355 MHz / Band Edge @ 2350 and 2360 MHz in Full RB



21:26:24 12.10.2019