



TEST REPORT

No. I20Z60705-WMD03

for

TCL Communication Ltd.

Tablet PC

Model Name: 9048S

FCC ID: 2ACCJB126

with

Hardware Version: 05

Software Version: 6F6A

Issued Date: 2020-07-10

Note:

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REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|----------------------|-----------------|--|-------------------|
| I20Z60705-WMD03 | Rev.0 | 1 st edition | 2020-06-24 |
| I20Z60705-WMD03 | Rev.1 | 2 nd edition Updated the results of Bands 12,13 in A.1. | 2020-07-09 |
| I20Z60705-WMD03 | Rev.2 | 3 rd edition Updated Frequency for Band 12 in A.1. | 2020-07-10 |

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

| | |
|---|------------|
| 1. TEST LABORATORY | 4 |
| 1.1. INTRODUCTION & ACCREDITATION | 4 |
| 1.2. TESTING LOCATION | 4 |
| 1.3. TESTING ENVIRONMENT | 5 |
| 1.4. PROJECT DATA..... | 5 |
| 1.5. SIGNATURE | 5 |
| 2. CLIENT INFORMATION | 6 |
| 2.1. APPLICANT INFORMATION..... | 6 |
| 2.2. MANUFACTURER INFORMATION..... | 6 |
| 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) | 7 |
| 3.1. ABOUT EUT | 7 |
| 3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST | 7 |
| 3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST..... | 7 |
| 4. REFERENCE DOCUMENTS | 8 |
| 5. LABORATORY ENVIRONMENT | 9 |
| 6. SUMMARY OF TEST RESULT | 10 |
| 7. TEST EQUIPMENT UTILIZED | 13 |
| ANNEX A: MEASUREMENT RESULTS | 14 |
| A.1 OUTPUT POWER | 14 |
| A.2 EMISSION LIMIT | 26 |
| A.3 FREQUENCY STABILITY | 34 |
| A.4 OCCUPIED BANDWIDTH | 38 |
| A.5 EMISSION BANDWIDTH | 65 |
| A.6 BAND EDGE COMPLIANCE | 92 |
| A.7 CONDUCTED SPURIOUS EMISSION | 114 |
| A.8 PEAK-TO-AVERAGE POWER RATIO | 120 |
| ANNEX B: ACCREDITATION CERTIFICATE | 121 |



1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0 and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (CN0066). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

Location 2: CTTL (Shouxiang)

Address: No. 51 Shouxiang Science Building, Xueyuan Road,
Haidian District, Beijing, P. R. China 100191

1.3. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.4. Project Data

Testing Start Date: 2020-05-11

Testing End Date: 2020-06-22

1.5. Signature



Dong Yuan
(Prepared this test report)



Zhou Yu
(Reviewed this test report)



Zhao Hui Lin
Deputy Director of the laboratory
(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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2.2. Manufacturer Information

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Contact: Gong Zhizhou
Email: zhizhou.gong@tcl.com
Telephone: 0086-755-36611722
Fax: 0086-755-36612000-81722

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

| | |
|-------------------------|--|
| Description | Tablet PC |
| Model Name | 9048S |
| FCC ID | 2ACCJB126 |
| Antenna | Embedded |
| Output power | 23.54 dBm maximum EIRP measured for LTE Band 2 |
| Extreme vol. Limits | 3.5VDC to 4.2VDC (nominal: 3.85VDC) |
| Extreme temp. Tolerance | -10°C to +55°C |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL.

3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Date of receipt |
|----------------|-----------------|-------------------|-------------------|------------------------|
| UT13a | 015759000002240 | 05 | 6F6A | 2020-05-06 |
| UT42a | 015759000002935 | 05 | 6F6A | 2020-05-06 |

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE used during the test

| AE ID* | Description |
|---------------|--------------------|
| AE1 | Battery |

AE1

| | |
|--------------|----------|
| Model | TLp053C1 |
| Manufacturer | BYD |
| Capacitance | 5500mAh |

*AE ID: is used to identify the test sample in the lab internally.

4. Reference Documents

The following documents listed in this section are referred for testing.

| Reference | Title | Version |
|------------------|---|--------------------|
| FCC Part 24 | PERSONAL COMMUNICATIONS SERVICES | 10-1-19 Edition |
| FCC Part 22 | PUBLIC MOBILE SERVICES | 10-1-19 Edition |
| FCC Part 27 | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES | 10-1-19 Edition |
| ANSI/TIA-603-E | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards | 2016 |
| ANSI C63.26 | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services | 2015 |
| KDB 971168 D01 | MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS | v03r01 |

5. Laboratory Environment

Semi-anechoic chamber 2 / Fully-anechoic chamber 3 (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 °C, Max. = 30 °C |
| Relative humidity | Min. = 35 %, Max. = 60 % |
| Shielding effectiveness | > 100 dB |
| Electrical insulation | >2 MΩ |
| Ground system resistance | < 0.5 Ω |
| Normalised site attenuation (NSA) | <±3.5 dB, 3 m distance |
| Site voltage standing-wave ratio (S_{VSWR}) | Between 0 and 6 dB, from 1GHz to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 3000 MHz |

6. Summary Of Test Result

LTE Band 2

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 24.232 | P |
| 2 | Emission Limit | 2.1051/24.238 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 24.238 | P |
| 6 | Band Edge Compliance | 24.238 | P |
| 7 | Conducted Spurious Emission | 24.238 | P |
| 8 | Peak-to-Average Power Ratio | 24.232 | P |

LTE Band 5

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 22.913 | P |
| 2 | Emission Limit | 2.1051/22.917 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 22.917 | P |
| 6 | Band Edge Compliance | 22.917 | P |
| 7 | Conducted Spurious Emission | 22.917 | P |

LTE Band 7

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 27.50 | P |
| 2 | Emission Limit | 2.1051/27.53 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 27.53 | P |
| 6 | Band Edge Compliance | 27.53 | P |
| 7 | Conducted Spurious Emission | 27.53 | P |
| 8 | Peak-to-Average Power Ratio | 27.50 | P |

LTE Band 12

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 27.50 | P |
| 2 | Emission Limit | 2.1051/27.53 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 27.53 | P |
| 6 | Band Edge Compliance | 27.53 | P |
| 7 | Conducted Spurious Emission | 27.53 | P |
| 8 | Peak-to-Average Power Ratio | 27.50 | P |

LTE Band 13

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 27.50 | P |
| 2 | Emission Limit | 2.1051/27.53 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 27.53 | P |
| 6 | Band Edge Compliance | 27.53 | P |
| 7 | Conducted Spurious Emission | 27.53 | P |
| 8 | Peak-to-Average Power Ratio | 27.50 | P |

LTE Band 66

| Items | Test Name | Clause in FCC rules | Verdict |
|-------|-----------------------------|---------------------|---------|
| 1 | Output Power | 27.50 | P |
| 2 | Emission Limit | 2.1051/27.53 | P |
| 3 | Frequency Stability | 2.1055 | P |
| 4 | Occupied Bandwidth | 2.1049 | P |
| 5 | Emission Bandwidth | 27.53 | P |
| 6 | Band Edge Compliance | 27.53 | P |
| 7 | Conducted Spurious Emission | 27.53 | P |
| 8 | Peak-to-Average Power Ratio | 27.50 | P |

Terms used in Verdict column

| | |
|----|--|
| P | Pass. The EUT complies with the essential requirements in the standard. |
| NP | Not Performed. The test was not performed by CTTL. |
| NA | Not Applicable. The test was not applicable. |
| BR | Re-use test data from basic model report. |
| F | Fail. The EUT does not comply with the essential requirements in the standard. |

Explanation of worst-case configuration

The worst-case scenario for all measurements is based on the conducted output power measurement investigation results. Output power was measured on QPSK, 16QAM modulations. It was found that QPSK was the worst case. All testing was performed using QPSK modulations to represent the worst case unless otherwise stated. The test results shown in the following sections represent the worst case emission.

7. Test Equipment Utilized

| NO. | Description | Type | Series Number | Manufacture | Cal Due Date | Calibration Interval |
|-----|--------------------------------------|----------|---------------|--------------|--------------|----------------------|
| 1 | Wideband Radio Communication Tester | CMW500 | 159082 | R&S | 2020-12-24 | 1 year |
| 2 | Spectrum Analyzer | FSU | 200030 | R&S | 2021-06-01 | 1 year |
| 3 | Climate Chamber | SH-242 | 93008556 | ESPEC | 2020-12-21 | 3 year |
| 4 | EMI Antenna | VULB9163 | 9163-235 | Schwarzbeck | 2020-11-24 | 1 year |
| 5 | EMI Antenna | 3117 | 00058889 | ETS-Lindgren | 2020-11-18 | 1 year |
| 6 | EMI Antenna | 3117 | 00119021 | ETS-Lindgren | 2021-01-14 | 1 year |
| 7 | Signal Generator | N5183A | MY49060052 | Agilent | 2020-06-24 | 1 year |
| 8 | Test Receiver | E4440A | MY48250642 | Agilent | 2021-03-12 | 1 year |
| 9 | Universal Radio Communication Tester | CMW500 | 143008 | R&S | 2020-11-26 | 1 year |

Annex A: Measurement Results

A.1 Output Power

A.1.1 Summary

During the process of testing, the EUT was controlled via communication tester to ensure max power transmission and proper modulation.

In all cases, output power is within the specified limits.

A.1.2 Conducted

A.1.2.1 Method of Measurements

The EUT was set up for the max output power with pseudo random data modulation.

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each bandwidth.

A.1.2.2 Description of ERP/EIRP Measurements

ERP and EIRP is determined from conducted RF output power measurements according to KDB 412172 D01 Power approach.

$ERP \text{ or } EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm;

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

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

The EIRP of mobile transmitters must not exceed 2 Watts for LTE Band 2, 7, 66;

The ERP of mobile transmitters must not exceed 3 Watts for LTE Band 12, 13,

The ERP of mobile transmitters must not exceed 7 Watts for LTE Band 5,

A.1.2.3 Measurement result

LTE Band 2

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) ($G_T - L_C = 0.17$) | |
|-----------|----------------|-----------------|-------------|-------|------------------------------------|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 1909.3 | 22.88 | 23.10 | 23.05 | 23.27 |
| | | 1880.0 | 22.82 | 22.86 | 22.99 | 23.03 |
| | | 1850.7 | 22.81 | 22.76 | 22.98 | 22.93 |
| | 1 RB low | 1909.3 | 22.87 | 23.13 | 23.04 | 23.30 |
| | | 1880.0 | 22.83 | 22.81 | 23.00 | 22.98 |
| | | 1850.7 | 22.81 | 22.78 | 22.98 | 22.95 |
| | 50% RB mid | 1909.3 | 22.91 | 22.96 | 23.08 | 23.13 |
| | | 1880.0 | 22.85 | 23.05 | 23.02 | 23.22 |
| | | 1850.7 | 22.76 | 22.81 | 22.93 | 22.98 |
| | 100% RB | 1909.3 | 22.94 | 22.82 | 23.11 | 22.99 |
| | | 1880.0 | 22.93 | 23.03 | 23.10 | 23.20 |
| | | 1850.7 | 22.80 | 22.89 | 22.97 | 23.06 |
| 3MHz | 1 RB high | 1908.5 | 22.74 | 23.17 | 22.91 | 23.34 |
| | | 1880.0 | 22.84 | 22.83 | 23.01 | 23.00 |
| | | 1851.5 | 22.72 | 22.56 | 22.89 | 22.73 |
| | 1 RB low | 1908.5 | 22.87 | 23.18 | 23.04 | 23.35 |
| | | 1880.0 | 22.90 | 22.91 | 23.07 | 23.08 |
| | | 1851.5 | 22.73 | 22.59 | 22.90 | 22.76 |
| | 50% RB mid | 1908.5 | 22.93 | 22.99 | 23.10 | 23.16 |
| | | 1880.0 | 22.88 | 22.99 | 23.05 | 23.16 |
| | | 1851.5 | 22.89 | 22.97 | 23.06 | 23.14 |
| | 100% RB | 1908.5 | 22.82 | 22.91 | 22.99 | 23.08 |
| | | 1880.0 | 22.88 | 22.86 | 23.05 | 23.03 |
| | | 1851.5 | 22.75 | 22.77 | 22.92 | 22.94 |
| 5MHz | 1 RB high | 1907.5 | 22.82 | 22.99 | 22.99 | 23.16 |
| | | 1880.0 | 22.90 | 23.33 | 23.07 | 23.5 |
| | | 1852.5 | 22.76 | 22.81 | 22.93 | 22.98 |
| | 1 RB low | 1907.5 | 22.87 | 23.02 | 23.04 | 23.19 |
| | | 1880.0 | 22.89 | 23.36 | 23.06 | 23.53 |
| | | 1852.5 | 22.80 | 22.84 | 22.97 | 23.01 |
| | 50% RB mid | 1907.5 | 22.92 | 22.96 | 23.09 | 23.13 |
| | | 1880.0 | 22.94 | 23.05 | 23.11 | 23.22 |
| | | 1852.5 | 22.84 | 22.85 | 23.01 | 23.02 |
| | 100% RB | 1907.5 | 22.89 | 22.87 | 23.06 | 23.04 |
| | | 1880.0 | 22.91 | 22.92 | 23.08 | 23.09 |
| | | 1852.5 | 22.77 | 22.70 | 22.94 | 22.87 |

| | | | | | | |
|-------|------------|--------|-------|-------|-------|-------|
| 10MHz | 1 RB high | 1905.0 | 22.95 | 23.14 | 23.12 | 23.31 |
| | | 1880.0 | 22.77 | 22.87 | 22.94 | 23.04 |
| | | 1855.0 | 22.62 | 22.70 | 22.79 | 22.87 |
| | 1 RB low | 1905.0 | 22.89 | 23.14 | 23.06 | 23.31 |
| | | 1880.0 | 22.72 | 23.02 | 22.89 | 23.19 |
| | | 1855.0 | 22.66 | 22.75 | 22.83 | 22.92 |
| | 50% RB mid | 1905.0 | 22.61 | 22.93 | 22.78 | 23.1 |
| | | 1880.0 | 22.63 | 22.99 | 22.80 | 23.16 |
| | | 1855.0 | 22.48 | 22.79 | 22.65 | 22.96 |
| | 100% RB | 1905.0 | 22.60 | 22.81 | 22.77 | 22.98 |
| | | 1880.0 | 22.59 | 22.92 | 22.76 | 23.09 |
| | | 1855.0 | 22.49 | 22.75 | 22.66 | 22.92 |
| 15MHz | 1 RB high | 1902.5 | 22.95 | 23.12 | 23.12 | 23.29 |
| | | 1880.0 | 22.86 | 23.08 | 23.03 | 23.25 |
| | | 1857.5 | 22.69 | 22.62 | 22.86 | 22.79 |
| | 1 RB low | 1902.5 | 22.83 | 23.15 | 23.00 | 23.32 |
| | | 1880.0 | 22.87 | 23.19 | 23.04 | 23.36 |
| | | 1857.5 | 22.75 | 22.59 | 22.92 | 22.76 |
| | 50% RB mid | 1902.5 | 22.82 | 22.99 | 22.99 | 23.16 |
| | | 1880.0 | 23.00 | 23.05 | 23.17 | 23.22 |
| | | 1857.5 | 22.85 | 22.94 | 23.02 | 23.11 |
| | 100% RB | 1902.5 | 22.83 | 22.96 | 23.00 | 23.13 |
| | | 1880.0 | 22.92 | 23.02 | 23.09 | 23.19 |
| | | 1857.5 | 22.79 | 22.88 | 22.96 | 23.05 |
| 20MHz | 1 RB high | 1900.0 | 23.10 | 23.24 | 23.27 | 23.41 |
| | | 1880.0 | 23.16 | 23.25 | 23.33 | 23.42 |
| | | 1860.0 | 23.10 | 23.34 | 23.27 | 23.51 |
| | 1 RB low | 1900.0 | 22.99 | 23.23 | 23.16 | 23.40 |
| | | 1880.0 | 23.16 | 23.37 | 23.33 | 23.54 |
| | | 1860.0 | 23.01 | 23.34 | 23.18 | 23.51 |
| | 50% RB mid | 1900.0 | 23.16 | 23.18 | 23.33 | 23.35 |
| | | 1880.0 | 23.28 | 23.22 | 23.45 | 23.39 |
| | | 1860.0 | 23.17 | 23.20 | 23.34 | 23.37 |
| | 100% RB | 1900.0 | 23.11 | 23.13 | 23.28 | 23.3 |
| | | 1880.0 | 23.22 | 23.24 | 23.39 | 23.41 |
| | | 1860.0 | 23.21 | 23.20 | 23.38 | 23.37 |

LTE Band 5

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) ($G_T - L_C = -1.12$) | |
|-----------|----------------|-----------------|-------------|-------|-------------------------------------|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 848.3 | 22.99 | 22.30 | 19.72 | 19.03 |
| | | 836.5 | 23.26 | 22.26 | 19.99 | 18.99 |
| | | 824.7 | 23.24 | 22.46 | 19.97 | 19.19 |
| | 1 RB low | 848.3 | 22.97 | 22.28 | 19.70 | 19.01 |
| | | 836.5 | 23.23 | 22.23 | 19.96 | 18.96 |
| | | 824.7 | 23.27 | 22.46 | 20.00 | 19.19 |
| | 50% RB mid | 848.3 | 23.00 | 22.18 | 19.73 | 18.91 |
| | | 836.5 | 23.31 | 22.47 | 20.04 | 19.20 |
| | | 824.7 | 23.31 | 22.42 | 20.04 | 19.15 |
| | 100% RB | 848.3 | 21.94 | 20.95 | 18.67 | 17.68 |
| | | 836.5 | 22.25 | 21.49 | 18.98 | 18.22 |
| | | 824.7 | 22.29 | 21.49 | 19.02 | 18.22 |
| 3MHz | 1 RB high | 847.5 | 23.07 | 22.38 | 19.80 | 19.11 |
| | | 836.5 | 23.27 | 22.26 | 20.00 | 18.99 |
| | | 825.5 | 23.21 | 22.28 | 19.94 | 19.01 |
| | 1 RB low | 847.5 | 23.11 | 22.38 | 19.84 | 19.11 |
| | | 836.5 | 23.38 | 22.34 | 20.11 | 19.07 |
| | | 825.5 | 23.45 | 22.32 | 20.18 | 19.05 |
| | 50% RB mid | 847.5 | 22.05 | 21.16 | 18.78 | 17.89 |
| | | 836.5 | 22.37 | 21.43 | 19.10 | 18.16 |
| | | 825.5 | 22.39 | 21.60 | 19.12 | 18.33 |
| | 100% RB | 847.5 | 22.05 | 21.13 | 18.78 | 17.86 |
| | | 836.5 | 22.32 | 21.34 | 19.05 | 18.07 |
| | | 825.5 | 22.34 | 21.45 | 19.07 | 18.18 |
| 5MHz | 1 RB high | 846.5 | 22.96 | 22.17 | 19.69 | 18.9 |
| | | 836.5 | 23.36 | 22.78 | 20.09 | 19.51 |
| | | 826.5 | 23.31 | 22.50 | 20.04 | 19.23 |
| | 1 RB low | 846.5 | 23.04 | 22.20 | 19.77 | 18.93 |
| | | 836.5 | 23.39 | 22.86 | 20.12 | 19.59 |
| | | 826.5 | 23.37 | 22.52 | 20.10 | 19.25 |
| | 50% RB mid | 846.5 | 22.09 | 21.16 | 18.82 | 17.89 |
| | | 836.5 | 22.36 | 21.55 | 19.09 | 18.28 |
| | | 826.5 | 22.43 | 21.52 | 19.16 | 18.25 |
| | 100% RB | 846.5 | 22.02 | 21.08 | 18.75 | 17.81 |
| | | 836.5 | 22.31 | 21.43 | 19.04 | 18.16 |
| | | 826.5 | 22.35 | 21.38 | 19.08 | 18.11 |
| 10MHz | 1 RB high | 844.0 | 23.02 | 22.34 | 19.75 | 19.07 |
| | | 836.5 | 22.98 | 21.93 | 19.71 | 18.66 |
| | | 829.0 | 23.08 | 21.96 | 19.81 | 18.69 |



| | | | | | | |
|--|------------|-------|-------|-------|-------|-------|
| | 1 RB low | 844.0 | 23.04 | 22.28 | 19.77 | 19.01 |
| | | 836.5 | 22.92 | 22.03 | 19.65 | 18.76 |
| | | 829.0 | 22.96 | 21.92 | 19.69 | 18.65 |
| | 50% RB mid | 844.0 | 22.07 | 21.15 | 18.80 | 17.88 |
| | | 836.5 | 22.07 | 21.18 | 18.80 | 17.91 |
| | | 829.0 | 22.11 | 21.18 | 18.84 | 17.91 |
| | 100% RB | 844.0 | 21.97 | 20.99 | 18.70 | 17.72 |
| | | 836.5 | 22.03 | 21.11 | 18.76 | 17.84 |
| | | 829.0 | 22.02 | 21.09 | 18.75 | 17.82 |

LTE Band 7

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) ($G_T - L_C = -0.32$) | |
|-----------|----------------|-----------------|-------------|-------|-------------------------------------|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 5MHz | 1 RB high | 2567.5 | 23.48 | 22.56 | 23.16 | 22.24 |
| | | 2535.0 | 23.37 | 22.55 | 23.05 | 22.23 |
| | | 2502.5 | 23.59 | 22.87 | 23.27 | 22.55 |
| | 1 RB low | 2567.5 | 23.42 | 22.52 | 23.10 | 22.2 |
| | | 2535.0 | 23.34 | 22.49 | 23.02 | 22.17 |
| | | 2502.5 | 23.53 | 22.94 | 23.21 | 22.62 |
| | 50% RB mid | 2567.5 | 22.53 | 21.65 | 22.21 | 21.33 |
| | | 2535.0 | 22.47 | 21.54 | 22.15 | 21.22 |
| | | 2502.5 | 22.57 | 21.73 | 22.25 | 21.41 |
| | 100% RB | 2567.5 | 22.46 | 21.52 | 22.14 | 21.2 |
| | | 2535.0 | 22.40 | 21.48 | 22.08 | 21.16 |
| | | 2502.5 | 22.50 | 21.65 | 22.18 | 21.33 |
| 10MHz | 1 RB high | 2565.0 | 23.51 | 22.85 | 23.19 | 22.53 |
| | | 2535.0 | 23.42 | 22.42 | 23.10 | 22.10 |
| | | 2505.0 | 23.51 | 22.39 | 23.19 | 22.07 |
| | 1 RB low | 2565.0 | 23.35 | 22.69 | 23.03 | 22.37 |
| | | 2535.0 | 23.35 | 22.39 | 23.03 | 22.07 |
| | | 2505.0 | 23.47 | 22.32 | 23.15 | 22.00 |
| | 50% RB mid | 2565.0 | 22.52 | 21.61 | 22.20 | 21.29 |
| | | 2535.0 | 22.43 | 21.59 | 22.11 | 21.27 |
| | | 2505.0 | 22.55 | 21.61 | 22.23 | 21.29 |
| | 100% RB | 2565.0 | 22.30 | 21.55 | 21.98 | 21.23 |
| | | 2535.0 | 22.45 | 21.50 | 22.13 | 21.18 |
| | | 2505.0 | 22.50 | 21.53 | 22.18 | 21.21 |
| 15MHz | 1 RB high | 2562.5 | 23.49 | 22.36 | 23.17 | 22.04 |
| | | 2535.0 | 23.47 | 22.77 | 23.15 | 22.45 |
| | | 2507.5 | 23.51 | 22.87 | 23.19 | 22.55 |
| | 1 RB low | 2562.5 | 23.29 | 22.27 | 22.97 | 21.95 |
| | | 2535.0 | 23.42 | 22.74 | 23.10 | 22.42 |
| | | 2507.5 | 23.52 | 22.77 | 23.20 | 22.45 |
| | 50% RB mid | 2562.5 | 22.46 | 21.54 | 22.14 | 21.22 |
| | | 2535.0 | 22.47 | 21.55 | 22.15 | 21.23 |
| | | 2507.5 | 22.54 | 21.58 | 22.22 | 21.26 |
| | 100% RB | 2562.5 | 22.45 | 21.58 | 22.13 | 21.26 |
| | | 2535.0 | 22.41 | 21.57 | 22.09 | 21.25 |
| | | 2507.5 | 22.55 | 21.60 | 22.23 | 21.28 |
| 20MHz | 1 RB high | 2560.0 | 23.32 | 22.63 | 23.00 | 22.31 |
| | | 2535.0 | 23.18 | 22.81 | 22.86 | 22.49 |
| | | 2510.0 | 23.28 | 22.81 | 22.96 | 22.49 |



| | | | | | | |
|--|------------|--------|-------|-------|-------|-------|
| | 1 RB low | 2560.0 | 23.14 | 22.64 | 22.82 | 22.32 |
| | | 2535.0 | 23.26 | 22.83 | 22.94 | 22.51 |
| | | 2510.0 | 23.31 | 22.66 | 22.99 | 22.34 |
| | 50% RB mid | 2560.0 | 22.42 | 21.45 | 22.10 | 21.13 |
| | | 2535.0 | 22.40 | 21.46 | 22.08 | 21.14 |
| | | 2510.0 | 22.47 | 21.55 | 22.15 | 21.23 |
| | 100% RB | 2560.0 | 22.33 | 21.40 | 22.01 | 21.08 |
| | | 2535.0 | 22.33 | 21.43 | 22.01 | 21.11 |
| | | 2510.0 | 22.34 | 21.42 | 22.02 | 21.10 |

LTE Band 12

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) (G _T - L _C = -1.8) | |
|-----------|----------------|-----------------|-------------|-------|--|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 715.3 | 22.88 | 23.10 | 18.93 | 19.15 |
| | | 707.5 | 22.82 | 22.86 | 18.87 | 18.91 |
| | | 699.7 | 22.81 | 22.76 | 18.86 | 18.81 |
| | 1 RB low | 715.3 | 22.87 | 23.13 | 18.92 | 19.18 |
| | | 707.5 | 22.83 | 22.81 | 18.88 | 18.86 |
| | | 699.7 | 22.81 | 22.78 | 18.86 | 18.83 |
| | 50% RB mid | 715.3 | 22.91 | 22.96 | 18.96 | 19.01 |
| | | 707.5 | 22.85 | 23.05 | 18.9 | 19.1 |
| | | 699.7 | 22.76 | 22.81 | 18.81 | 18.86 |
| | 100% RB | 715.3 | 22.94 | 22.82 | 18.99 | 18.87 |
| | | 707.5 | 22.93 | 23.03 | 18.98 | 19.08 |
| | | 699.7 | 22.80 | 22.89 | 18.85 | 18.94 |
| 3MHz | 1 RB high | 714.5 | 22.74 | 23.17 | 18.79 | 19.22 |
| | | 707.5 | 22.84 | 22.83 | 18.89 | 18.88 |
| | | 700.5 | 22.72 | 22.56 | 18.77 | 18.61 |
| | 1 RB low | 714.5 | 22.87 | 23.18 | 18.92 | 19.23 |
| | | 707.5 | 22.90 | 22.91 | 18.95 | 18.96 |
| | | 700.5 | 22.73 | 22.59 | 18.78 | 18.64 |
| | 50% RB mid | 714.5 | 22.93 | 22.99 | 18.98 | 19.04 |
| | | 707.5 | 22.88 | 22.99 | 18.93 | 19.04 |
| | | 700.5 | 22.89 | 22.97 | 18.94 | 19.02 |
| | 100% RB | 714.5 | 22.82 | 22.91 | 18.87 | 18.96 |
| | | 707.5 | 22.88 | 22.86 | 18.93 | 18.91 |
| | | 700.5 | 22.75 | 22.77 | 18.8 | 18.82 |
| 5MHz | 1 RB high | 713.5 | 22.82 | 22.99 | 18.87 | 19.04 |
| | | 707.5 | 22.90 | 23.33 | 18.95 | 19.38 |
| | | 701.5 | 22.76 | 22.81 | 18.81 | 18.86 |
| | 1 RB low | 713.5 | 22.87 | 23.02 | 18.92 | 19.07 |
| | | 707.5 | 22.89 | 23.36 | 18.94 | 19.41 |
| | | 701.5 | 22.80 | 22.84 | 18.85 | 18.89 |
| | 50% RB mid | 713.5 | 22.92 | 22.96 | 18.97 | 19.01 |
| | | 707.5 | 22.94 | 23.05 | 18.99 | 19.1 |
| | | 701.5 | 22.84 | 22.85 | 18.89 | 18.9 |
| | 100% RB | 713.5 | 22.89 | 22.87 | 18.94 | 18.92 |
| | | 707.5 | 22.91 | 22.92 | 18.96 | 18.97 |
| | | 701.5 | 22.77 | 22.70 | 18.82 | 18.75 |
| 10MHz | 1 RB high | 711.0 | 22.95 | 23.14 | 19 | 19.19 |
| | | 707.5 | 22.77 | 22.87 | 18.82 | 18.92 |
| | | 704.0 | 22.62 | 22.70 | 18.67 | 18.75 |



| | | | | | | |
|--|------------|-------|-------|-------|-------|-------|
| | 1 RB low | 711.0 | 22.89 | 23.14 | 18.94 | 19.19 |
| | | 707.5 | 22.72 | 23.02 | 18.77 | 19.07 |
| | | 704.0 | 22.66 | 22.75 | 18.71 | 18.8 |
| | 50% RB mid | 711.0 | 22.61 | 22.93 | 18.66 | 18.98 |
| | | 707.5 | 22.63 | 22.99 | 18.68 | 19.04 |
| | | 704.0 | 22.48 | 22.79 | 18.53 | 18.84 |
| | 100% RB | 711.0 | 22.60 | 22.81 | 18.65 | 18.86 |
| | | 707.5 | 22.59 | 22.92 | 18.64 | 18.97 |
| | | 704.0 | 22.49 | 22.75 | 18.54 | 18.8 |

LTE Band 13

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) ($G_T - L_C = -0.93$) | |
|-----------|----------------|-----------------|-------------|-------|-------------------------------------|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 5MHz | 1 RB high | 784.5 | 22.57 | 22.14 | 19.49 | 19.06 |
| | | 782.0 | 22.53 | 21.65 | 19.45 | 18.57 |
| | | 779.5 | 22.61 | 21.73 | 19.53 | 18.65 |
| | 1 RB low | 784.5 | 22.51 | 22.04 | 19.43 | 18.96 |
| | | 782.0 | 22.60 | 21.60 | 19.52 | 18.52 |
| | | 779.5 | 22.59 | 21.59 | 19.51 | 18.51 |
| | 50% RB mid | 784.5 | 21.56 | 20.74 | 18.48 | 17.66 |
| | | 782.0 | 21.57 | 20.67 | 18.49 | 17.59 |
| | | 779.5 | 21.62 | 20.74 | 18.54 | 17.66 |
| | 100% RB | 784.5 | 21.56 | 20.62 | 18.48 | 17.54 |
| | | 782.0 | 21.54 | 20.57 | 18.46 | 17.49 |
| | | 779.5 | 21.53 | 20.65 | 18.45 | 17.57 |
| 10MHz | 1 RB high | 782.0 | 22.60 | 22.47 | 19.52 | 19.39 |
| | 1 RB low | 782.0 | 22.47 | 22.37 | 19.39 | 19.29 |
| | 50% RB mid | 782.0 | 22.59 | 22.60 | 19.51 | 19.52 |
| | 100% RB | 782.0 | 22.55 | 22.54 | 19.47 | 19.46 |

LTE Band 66

| Bandwidth | RB size/offset | Frequency (MHz) | Power (dBm) | | ERP(dBm) (G _T – L _C = 0.08) | |
|-----------|----------------|-----------------|-------------|-------|--|-------|
| | | | QPSK | 16QAM | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 1779.3 | 23.11 | 23.11 | 23.19 | 23.19 |
| | | 1745.0 | 22.93 | 23.04 | 23.01 | 23.12 |
| | | 1710.7 | 22.86 | 23.17 | 22.94 | 23.25 |
| | 1 RB low | 1779.3 | 23.11 | 23.10 | 23.19 | 23.18 |
| | | 1745.0 | 22.94 | 23.01 | 23.02 | 23.09 |
| | | 1710.7 | 22.86 | 23.18 | 22.94 | 23.26 |
| | 50% RB mid | 1779.3 | 23.17 | 23.35 | 23.25 | 23.43 |
| | | 1745.0 | 22.96 | 23.09 | 23.04 | 23.17 |
| | | 1710.7 | 22.94 | 23.08 | 23.02 | 23.16 |
| | 100% RB | 1779.3 | 23.24 | 23.34 | 23.32 | 23.42 |
| | | 1745.0 | 22.93 | 23.10 | 23.01 | 23.18 |
| | | 1710.7 | 22.86 | 22.83 | 22.94 | 22.91 |
| 3MHz | 1 RB high | 1778.5 | 23.22 | 23.03 | 23.30 | 23.11 |
| | | 1745.0 | 22.93 | 23.32 | 23.01 | 23.40 |
| | | 1711.5 | 22.87 | 22.88 | 22.95 | 22.96 |
| | 1 RB low | 1778.5 | 23.18 | 23.08 | 23.26 | 23.16 |
| | | 1745.0 | 22.93 | 23.31 | 23.01 | 23.39 |
| | | 1711.5 | 22.89 | 22.91 | 22.97 | 22.99 |
| | 50% RB mid | 1778.5 | 23.25 | 23.36 | 23.33 | 23.44 |
| | | 1745.0 | 23.00 | 23.12 | 23.08 | 23.20 |
| | | 1711.5 | 22.97 | 23.04 | 23.05 | 23.12 |
| | 100% RB | 1778.5 | 23.23 | 23.21 | 23.31 | 23.29 |
| | | 1745.0 | 22.96 | 23.03 | 23.04 | 23.11 |
| | | 1711.5 | 22.92 | 22.90 | 23.00 | 22.98 |
| 5MHz | 1 RB high | 1777.5 | 23.26 | 23.32 | 23.34 | 23.4 |
| | | 1745.0 | 22.93 | 23.45 | 23.01 | 23.53 |
| | | 1712.5 | 22.91 | 23.02 | 22.99 | 23.10 |
| | 1 RB low | 1777.5 | 23.17 | 23.29 | 23.25 | 23.37 |
| | | 1745.0 | 22.98 | 23.45 | 23.06 | 23.53 |
| | | 1712.5 | 22.93 | 22.97 | 23.01 | 23.05 |
| | 50% RB mid | 1777.5 | 23.27 | 23.35 | 23.35 | 23.43 |
| | | 1745.0 | 23.05 | 23.19 | 23.13 | 23.27 |
| | | 1712.5 | 22.98 | 23.05 | 23.06 | 23.13 |
| | 100% RB | 1777.5 | 23.14 | 23.18 | 23.22 | 23.26 |
| | | 1745.0 | 22.98 | 23.08 | 23.06 | 23.16 |
| | | 1712.5 | 22.93 | 22.91 | 23.01 | 22.99 |
| 10MHz | 1 RB high | 1775.0 | 23.23 | 23.09 | 23.31 | 23.17 |
| | | 1745.0 | 23.05 | 23.40 | 23.13 | 23.48 |
| | | 1715.0 | 22.90 | 23.03 | 22.98 | 23.11 |

| | | | | | | |
|-------|------------|--------|-------|-------|-------|-------|
| | 1 RB low | 1775.0 | 23.09 | 23.03 | 23.17 | 23.11 |
| | | 1745.0 | 23.03 | 23.31 | 23.11 | 23.39 |
| | | 1715.0 | 22.88 | 22.88 | 22.96 | 22.96 |
| | 50% RB mid | 1775.0 | 23.16 | 23.22 | 23.24 | 23.30 |
| | | 1745.0 | 23.00 | 23.08 | 23.08 | 23.16 |
| | | 1715.0 | 22.95 | 23.12 | 23.03 | 23.20 |
| | 100% RB | 1775.0 | 23.14 | 23.17 | 23.22 | 23.25 |
| | | 1745.0 | 22.98 | 23.02 | 23.06 | 23.10 |
| | | 1715.0 | 23.02 | 23.12 | 23.10 | 23.20 |
| 15MHz | 1 RB high | 1772.5 | 23.16 | 23.45 | 23.24 | 23.53 |
| | | 1745.0 | 23.04 | 23.35 | 23.12 | 23.43 |
| | | 1717.5 | 22.89 | 22.87 | 22.97 | 22.95 |
| | 1 RB low | 1772.5 | 23.09 | 23.35 | 23.17 | 23.43 |
| | | 1745.0 | 23.00 | 23.25 | 23.08 | 23.33 |
| | | 1717.5 | 22.85 | 22.78 | 22.93 | 22.86 |
| | 50% RB mid | 1772.5 | 23.16 | 23.36 | 23.24 | 23.44 |
| | | 1745.0 | 22.99 | 23.07 | 23.07 | 23.15 |
| | | 1717.5 | 23.07 | 23.13 | 23.15 | 23.21 |
| | 100% RB | 1772.5 | 23.14 | 23.31 | 23.22 | 23.39 |
| | | 1745.0 | 23.01 | 23.09 | 23.09 | 23.17 |
| | | 1717.5 | 23.02 | 23.16 | 23.10 | 23.24 |
| 20MHz | 1 RB high | 1770.0 | 23.14 | 23.39 | 23.22 | 23.47 |
| | | 1745.0 | 22.99 | 23.29 | 23.07 | 23.37 |
| | | 1720.0 | 22.92 | 23.34 | 23.00 | 23.42 |
| | 1 RB low | 1770.0 | 23.07 | 23.26 | 23.15 | 23.34 |
| | | 1745.0 | 22.83 | 23.07 | 22.91 | 23.15 |
| | | 1720.0 | 22.86 | 23.25 | 22.94 | 23.33 |
| | 50% RB mid | 1770.0 | 23.07 | 23.14 | 23.15 | 23.22 |
| | | 1745.0 | 23.03 | 23.04 | 23.11 | 23.12 |
| | | 1720.0 | 23.10 | 23.19 | 23.18 | 23.27 |
| | 100% RB | 1770.0 | 23.05 | 23.03 | 23.13 | 23.11 |
| | | 1745.0 | 22.94 | 23.01 | 23.02 | 23.09 |
| | | 1720.0 | 22.99 | 23.09 | 23.07 | 23.17 |

A.2 Emission Limit

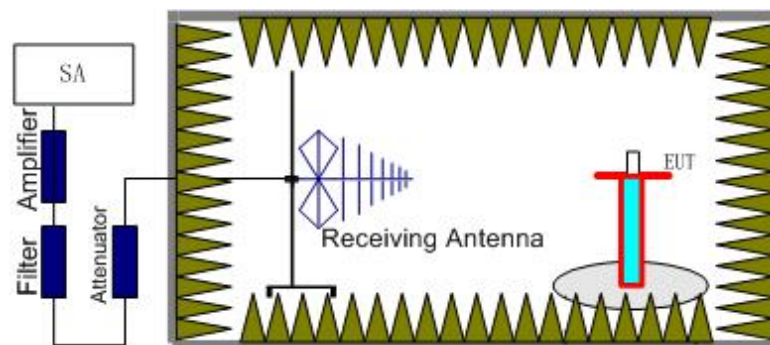
A.2.1 Measurement Method

The measurements procedures in TIA-603E-2016 are used. This measurement is carried out in fully anechoic chamber FAC-3.

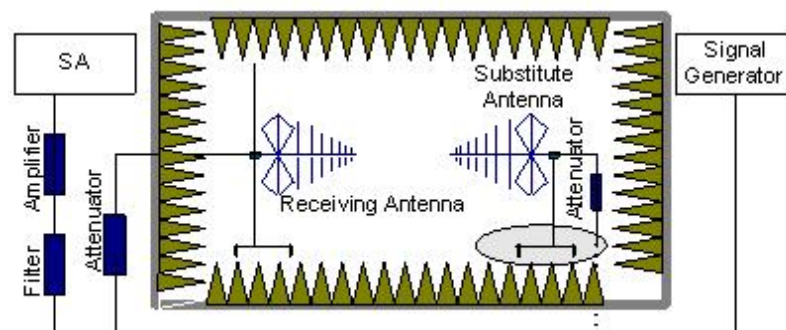
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of each LTE Band.

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5-meter-high non-conductive stand at a 3-meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360 and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (P_r).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the

substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dB}$.

A.2.2 Measurement Limit

Part 22.917, Part 24.238 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Part 27.53(m) specifies for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 27.53(g) states 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.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of each LTE Band. It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of each LTE Band into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this. The range of evaluated frequency is from 30MHz to 26GHz.

LTE Band 2, 1.4MHz, QPSK, Channel 18607

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3743.02 | -51.28 | 6.31 | 8.54 | -49.05 | -13.00 | 36.05 | V |
| 5543.02 | -53.55 | 7.17 | 10.59 | -50.13 | -13.00 | 37.13 | H |
| 7353.01 | -54.49 | 8.11 | 12.02 | -50.58 | -13.00 | 37.58 | V |
| 9230.01 | -53.61 | 9.00 | 13.24 | -49.37 | -13.00 | 36.37 | H |
| 11133.01 | -50.64 | 9.69 | 13.17 | -47.16 | -13.00 | 34.16 | V |
| 12932.01 | -48.68 | 10.49 | 13.46 | -45.71 | -13.00 | 32.71 | V |

LTE Band 2, 1.4MHz, QPSK, Channel 18900

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3745.02 | -49.34 | 6.31 | 8.54 | -47.11 | -13.00 | 34.11 | V |
| 5681.02 | -52.94 | 7.28 | 10.56 | -49.66 | -13.00 | 36.66 | H |
| 7524.01 | -51.25 | 8.29 | 12.22 | -47.32 | -13.00 | 34.32 | V |
| 9449.01 | -53.09 | 9.28 | 13.37 | -49.00 | -13.00 | 36.00 | V |
| 11284.01 | -49.70 | 9.90 | 13.14 | -46.46 | -13.00 | 33.46 | V |
| 13117.01 | -47.63 | 10.86 | 13.66 | -44.83 | -13.00 | 31.83 | H |

LTE Band 2, 1.4MHz, QPSK, Channel 19193

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3819.02 | -52.54 | 6.08 | 8.65 | -49.97 | -13.00 | 36.97 | H |
| 5698.02 | -54.92 | 7.29 | 10.56 | -51.65 | -13.00 | 38.65 | V |
| 7641.01 | -50.29 | 8.16 | 12.31 | -46.14 | -13.00 | 33.14 | V |
| 9549.01 | -53.06 | 9.36 | 13.35 | -49.07 | -13.00 | 36.07 | H |
| 11474.01 | -50.09 | 9.88 | 13.11 | -46.86 | -13.00 | 33.86 | V |
| 13382.01 | -48.01 | 10.57 | 14.03 | -44.55 | -13.00 | 31.55 | H |

LTE Band 5, 1.4MHz, QPSK, Channel 20407

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1649.01 | -59.38 | 3.56 | 5.23 | 2.15 | -59.86 | -13.00 | 46.86 | H |
| 2465.00 | -47.63 | 4.59 | 6.00 | 2.15 | -48.37 | -13.00 | 35.37 | H |
| 3307.02 | -55.11 | 5.29 | 7.74 | 2.15 | -54.81 | -13.00 | 41.81 | H |
| 4129.02 | -55.09 | 6.05 | 9.03 | 2.15 | -54.26 | -13.00 | 41.26 | H |
| 4945.01 | -54.18 | 6.70 | 9.85 | 2.15 | -53.18 | -13.00 | 40.18 | H |
| 5768.01 | -53.85 | 7.24 | 10.55 | 2.15 | -52.69 | -13.00 | 39.69 | V |

LTE Band 5, 1.4MHz, QPSK, Channel 20525

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1673.01 | -59.66 | 3.58 | 5.19 | 2.15 | -60.20 | -13.00 | 47.20 | H |
| 2510.00 | -52.94 | 4.63 | 6.12 | 2.15 | -53.60 | -13.00 | 40.60 | H |
| 3336.02 | -53.92 | 5.31 | 7.81 | 2.15 | -53.57 | -13.00 | 40.57 | V |
| 4186.02 | -54.01 | 6.17 | 9.09 | 2.15 | -53.24 | -13.00 | 40.24 | V |
| 5020.01 | -53.92 | 6.57 | 9.93 | 2.15 | -52.71 | -13.00 | 39.71 | V |
| 5844.01 | -53.72 | 7.22 | 10.53 | 2.15 | -52.56 | -13.00 | 39.56 | H |

LTE Band 5, 1.4MHz, QPSK, Channel 20643

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1697.01 | -59.28 | 3.60 | 5.15 | 2.15 | -59.88 | -13.00 | 46.88 | H |
| 2545.00 | -51.22 | 4.66 | 6.18 | 2.15 | -51.85 | -13.00 | 38.85 | V |
| 3389.02 | -54.88 | 5.35 | 7.93 | 2.15 | -54.45 | -13.00 | 41.45 | V |
| 4239.02 | -54.51 | 6.25 | 9.14 | 2.15 | -53.77 | -13.00 | 40.77 | H |
| 5091.01 | -53.98 | 6.75 | 10.03 | 2.15 | -52.85 | -13.00 | 39.85 | H |
| 5946.01 | -52.61 | 7.47 | 10.51 | 2.15 | -51.72 | -13.00 | 38.72 | H |

LTE Band 7, 5 MHz, QPSK, Channel 20775

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 5009.02 | -48.63 | 6.59 | 9.91 | -45.31 | -25.00 | 20.31 | H |
| 7511.01 | -46.10 | 8.35 | 12.21 | -42.24 | -25.00 | 17.24 | V |
| 9998.01 | -51.98 | 9.18 | 12.90 | -48.26 | -25.00 | 23.26 | V |
| 12513.01 | -48.57 | 10.21 | 13.21 | -45.57 | -25.00 | 20.57 | V |
| 15000.00 | -44.77 | 11.22 | 14.00 | -41.99 | -25.00 | 16.99 | H |
| 17517.00 | -44.70 | 12.79 | 14.92 | -42.57 | -25.00 | 17.57 | H |

LTE Band 7, 5 MHz, QPSK, Channel 21100

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 5073.02 | -52.96 | 6.70 | 10.00 | -49.66 | -25.00 | 24.66 | V |
| 7609.01 | -47.56 | 8.01 | 12.29 | -43.28 | -25.00 | 18.28 | H |
| 10157.01 | -51.27 | 9.37 | 12.96 | -47.68 | -25.00 | 22.68 | V |
| 12659.01 | -48.55 | 10.37 | 13.30 | -45.62 | -25.00 | 20.62 | V |
| 15226.00 | -45.82 | 11.37 | 13.86 | -43.33 | -25.00 | 18.33 | H |
| 17752.00 | -44.37 | 12.47 | 15.25 | -41.59 | -25.00 | 16.59 | H |

LTE Band 7, 5 MHz, QPSK, Channel 21425

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 5136.02 | -54.17 | 6.86 | 10.09 | -50.94 | -25.00 | 25.94 | V |
| 7707.01 | -48.38 | 8.42 | 12.37 | -44.43 | -25.00 | 19.43 | H |
| 10272.01 | -51.53 | 9.55 | 13.01 | -48.07 | -25.00 | 23.07 | V |
| 12832.01 | -48.54 | 10.68 | 13.40 | -45.82 | -25.00 | 20.82 | V |
| 15417.00 | -44.65 | 11.42 | 13.75 | -42.32 | -25.00 | 17.32 | H |
| 17989.00 | -44.28 | 12.90 | 15.58 | -41.60 | -25.00 | 16.60 | H |

LTE Band 12, 1.4MHz, QPSK, Channel 23017

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1401.01 | -50.91 | 3.24 | 4.99 | 2.15 | -51.31 | -13.00 | 38.31 | V |
| 2104.00 | -55.72 | 4.20 | 4.91 | 2.15 | -57.16 | -13.00 | 44.16 | H |
| 2791.00 | -52.23 | 4.90 | 6.62 | 2.15 | -52.66 | -13.00 | 39.66 | H |
| 3509.02 | -54.66 | 5.54 | 8.21 | 2.15 | -54.14 | -13.00 | 41.14 | H |
| 4193.02 | -53.30 | 6.19 | 9.09 | 2.15 | -52.55 | -13.00 | 39.55 | V |
| 4885.01 | -54.32 | 6.72 | 9.79 | 2.15 | -53.40 | -13.00 | 40.40 | H |

LTE Band 12, 1.4MHz, QPSK, Channel 23095

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1421.01 | -47.17 | 3.26 | 5.09 | 2.15 | -47.49 | -13.00 | 34.49 | H |
| 2115.00 | -55.32 | 4.21 | 4.95 | 2.15 | -56.73 | -13.00 | 43.73 | H |
| 2841.00 | -52.88 | 4.95 | 6.71 | 2.15 | -53.27 | -13.00 | 40.27 | H |
| 3541.02 | -53.75 | 5.73 | 8.26 | 2.15 | -53.37 | -13.00 | 40.37 | H |
| 4257.02 | -54.98 | 6.23 | 9.16 | 2.15 | -54.20 | -13.00 | 41.20 | H |
| 4964.01 | -53.69 | 6.67 | 9.86 | 2.15 | -52.65 | -13.00 | 39.65 | H |

LTE Band 12, 1.4MHz, QPSK, Channel 23173

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1445.01 | -56.51 | 3.30 | 5.21 | 2.15 | -56.75 | -13.00 | 43.75 | H |
| 2159.00 | -56.07 | 4.26 | 5.08 | 2.15 | -57.40 | -13.00 | 44.40 | H |
| 2855.00 | -52.40 | 4.96 | 6.74 | 2.15 | -52.77 | -13.00 | 39.77 | V |
| 3562.02 | -54.31 | 5.95 | 8.29 | 2.15 | -54.12 | -13.00 | 41.12 | V |
| 4281.02 | -54.78 | 6.21 | 9.18 | 2.15 | -53.96 | -13.00 | 40.96 | H |
| 5002.01 | -54.33 | 6.60 | 9.90 | 2.15 | -53.18 | -13.00 | 40.18 | V |

LTE Band 13, 5MHz, QPSK, Channel 23205

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1559.01 | -57.28 | 3.47 | 5.39 | 2.15 | -57.51 | -13.00 | 44.51 | H |
| 2343.00 | -54.73 | 4.45 | 5.63 | 2.15 | -55.70 | -13.00 | 42.70 | V |
| 3115.02 | -46.89 | 5.37 | 7.28 | 2.15 | -47.13 | -13.00 | 34.13 | V |
| 3890.02 | -53.94 | 6.10 | 8.75 | 2.15 | -53.44 | -13.00 | 40.44 | V |
| 4673.02 | -53.98 | 6.48 | 9.57 | 2.15 | -53.04 | -13.00 | 40.04 | V |
| 5457.01 | -54.85 | 6.90 | 10.54 | 2.15 | -53.36 | -13.00 | 40.36 | V |

LTE Band 13, 5MHz, QPSK, Channel 23230

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1565.01 | -55.86 | 3.48 | 5.38 | 2.15 | -56.11 | -13.00 | 43.11 | H |
| 2354.00 | -54.76 | 4.46 | 5.66 | 2.15 | -55.71 | -13.00 | 42.71 | V |
| 3138.02 | -53.11 | 5.39 | 7.33 | 2.15 | -53.32 | -13.00 | 40.32 | H |
| 3909.02 | -54.01 | 6.11 | 8.77 | 2.15 | -53.50 | -13.00 | 40.50 | V |
| 4684.02 | -54.07 | 6.49 | 9.58 | 2.15 | -53.13 | -13.00 | 40.13 | V |
| 5470.01 | -54.23 | 6.95 | 10.56 | 2.15 | -52.77 | -13.00 | 39.77 | V |

LTE Band 13, 5MHz, QPSK, Channel 23255

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Correction (dB) | Peak ERP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|----------------|-------------|-------------|--------------|
| 1569.01 | -58.23 | 3.48 | 5.38 | 2.15 | -58.48 | -13.00 | 45.48 | H |
| 2363.00 | -55.10 | 4.47 | 5.69 | 2.15 | -56.03 | -13.00 | 43.03 | V |
| 3141.02 | -52.55 | 5.38 | 7.34 | 2.15 | -52.74 | -13.00 | 39.74 | H |
| 3921.02 | -53.90 | 6.12 | 8.79 | 2.15 | -53.38 | -13.00 | 40.38 | H |
| 4698.02 | -54.05 | 6.50 | 9.60 | 2.15 | -53.10 | -13.00 | 40.10 | V |
| 5496.01 | -54.72 | 7.04 | 10.59 | 2.15 | -53.32 | -13.00 | 40.32 | V |

LTE Band 66, 1.4MHz QPSK, Channel 131979

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3422.02 | -61.43 | 5.38 | 8.01 | -58.80 | -13.00 | 45.80 | V |
| 5162.02 | -66.36 | 6.90 | 10.13 | -63.13 | -13.00 | 50.13 | V |
| 6846.01 | -64.48 | 7.83 | 11.42 | -60.89 | -13.00 | 47.89 | V |
| 8607.01 | -64.55 | 8.48 | 13.02 | -60.01 | -13.00 | 47.01 | V |
| 10308.01 | -61.96 | 9.66 | 13.02 | -58.60 | -13.00 | 45.60 | V |
| 12029.01 | -59.82 | 10.14 | 13.01 | -56.95 | -13.00 | 43.95 | V |

LTE Band 66, 1.4MHz, QPSK, Channel 132322

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3490.02 | -58.31 | 5.50 | 8.18 | -55.63 | -13.00 | 42.63 | H |
| 5281.02 | -66.51 | 6.99 | 10.29 | -63.21 | -13.00 | 50.21 | V |
| 6987.01 | -64.00 | 8.20 | 11.58 | -60.62 | -13.00 | 47.62 | V |
| 8753.01 | -64.53 | 8.52 | 13.05 | -60.00 | -13.00 | 47.00 | V |
| 10499.01 | -61.64 | 9.65 | 13.10 | -58.19 | -13.00 | 45.19 | V |
| 12179.01 | -59.60 | 10.12 | 13.07 | -56.65 | -13.00 | 43.65 | V |

LTE Band 66, 1.4MHz, QPSK, Channel 132665

| Frequency (MHz) | P _{Mea} (dBm) | Path Loss(dB) | Antenna Gain(dBi) | Peak EIRP (dBm) | Limit (dBm) | Margin (dB) | Polarization |
|-----------------|------------------------|---------------|-------------------|-----------------|-------------|-------------|--------------|
| 3559.02 | -59.42 | 5.92 | 8.28 | -57.06 | -13.00 | 44.06 | H |
| 5283.02 | -66.61 | 6.99 | 10.30 | -63.30 | -13.00 | 50.30 | V |
| 7153.01 | -64.83 | 8.18 | 11.78 | -61.23 | -13.00 | 48.23 | V |
| 8938.01 | -64.03 | 8.98 | 13.09 | -59.92 | -13.00 | 46.92 | V |
| 10682.01 | -61.55 | 9.30 | 13.14 | -57.71 | -13.00 | 44.71 | V |
| 12482.01 | -59.43 | 10.22 | 13.19 | -56.46 | -13.00 | 43.46 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is $U = 5.16$ dB, $k = 2$.

A.3 Frequency Stability

A.3.1 Method of Measurement

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a “call mode”. This is accomplished with the use of CMW500.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMW500, and in a simulated call on middle channel for each LTE band, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the center channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 °C increments from -30°C to +50°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of the lower, higher and nominal voltage. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress.

A.3.2 Measurement results

LTE Band 2, 20MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 1850.801 | 1909.199 | | |
| 50 | | | | 0.99 | 0.0005 |
| 40 | | | | -0.13 | 0.0001 |
| 30 | | | | 0.40 | 0.0002 |
| 10 | | | | 1.80 | 0.0010 |
| 0 | | | | 0.73 | 0.0004 |
| -10 | | | | 1.69 | 0.0009 |
| -20 | | | | 3.18 | 0.0017 |
| -30 | | | | -0.26 | 0.0001 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 1850.801 | 1909.199 | 1.17 | 0.0006 |
| 4.2 | | | | 2.09 | 0.0011 |

LTE Band 5, 10MHz bandwidth QPSK (worst case of all bandwidths)

Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 824.417 | 848.583 | | |
| 50 | | | | -0.92 | 0.0011 |
| 40 | | | | 1.20 | 0.0014 |
| 30 | | | | -0.53 | 0.0006 |
| 10 | | | | 0.30 | 0.0004 |
| 0 | | | | -0.33 | 0.0004 |
| -10 | | | | -0.67 | 0.0008 |
| -20 | | | | 0.17 | 0.0002 |
| -30 | | | | -0.10 | 0.0001 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 824.417 | 848.583 | -2.42 | 0.0029 |
| 4.2 | | | | -0.30 | 0.0004 |

LTE Band 7, 20MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 2500.865 | 2569.135 | | |
| 50 | | | | 2.36 | 0.0009 |
| 40 | | | | -23.72 | 0.0094 |
| 30 | | | | -0.33 | 0.0001 |
| 10 | | | | -21.11 | 0.0083 |
| 0 | | | | 0.37 | 0.0001 |
| -10 | | | | -1.13 | 0.0004 |
| -20 | | | | -21.69 | 0.0086 |
| -30 | | | | 0.96 | 0.0004 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 2500.865 | 2569.135 | 1.03 | 0.0004 |
| 4.2 | | | | 1.42 | 0.0006 |

LTE Band 12, 10MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 699.481 | 715.519 | | |
| 50 | | | | -7.52 | 0.0106 |
| 40 | | | | -1.42 | 0.0020 |
| 30 | | | | -2.95 | 0.0042 |
| 10 | | | | -3.69 | 0.0052 |
| 0 | | | | -4.16 | 0.0059 |
| -10 | | | | -3.71 | 0.0052 |
| -20 | | | | -3.25 | 0.0046 |
| -30 | | | | -4.51 | 0.0064 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 699.481 | 715.519 | -2.02 | 0.0029 |
| 4.2 | | | | -5.46 | 0.0077 |

LTE Band 13, 10MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 777.401 | 786.615 | | |
| 50 | | | | -0.43 | 0.0005 |
| 40 | | | | 1.95 | 0.0025 |
| 30 | | | | 4.81 | 0.0062 |
| 10 | | | | 12.40 | 0.0159 |
| 0 | | | | 3.56 | 0.0046 |
| -10 | | | | 0.49 | 0.0006 |
| -20 | | | | 5.04 | 0.0064 |
| -30 | | | | -1.56 | 0.0020 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 777.401 | 786.615 | 1.00 | 0.0013 |
| 4.2 | | | | 3.50 | 0.0045 |

LTE Band 66, 20MHz bandwidth QPSK (worst case of all bandwidths)
Frequency Error vs Temperature

| Temperature(°C) | Voltage(V) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|-----------------|------------|----------------------|----------------------|------------|----------------------|
| 20 | 3.85 | 1710.801 | 1779.231 | | |
| 50 | | | | -19.38 | 0.0111 |
| 40 | | | | -20.91 | 0.0120 |
| 30 | | | | -21.10 | 0.0121 |
| 10 | | | | -19.67 | 0.0113 |
| 0 | | | | 0.76 | 0.0004 |
| -10 | | | | -20.96 | 0.0120 |
| -20 | | | | -22.33 | 0.0128 |
| -30 | | | | -20.31 | 0.0116 |

Frequency Error vs Voltage

| Voltage(V) | Temperature(°C) | F _L (MHz) | F _H (MHz) | Offset(Hz) | Frequency error(ppm) |
|------------|-----------------|----------------------|----------------------|------------|----------------------|
| 3.5 | 20 | 1710.801 | 1779.231 | -21.84 | 0.0125 |
| 4.2 | | | | -4.73 | 0.0027 |

A.4 Occupied Bandwidth

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the mid frequencies frequency. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

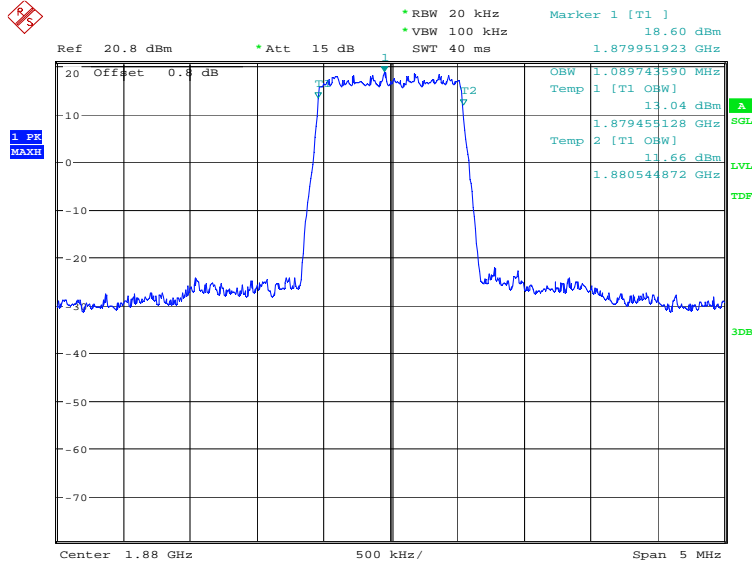
The measurement method is from ANSI C63.26:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts.
- b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
- d) Set the detection mode to peak, and the trace mode to max-hold.

LTE band 2, 1.4MHz (99%)

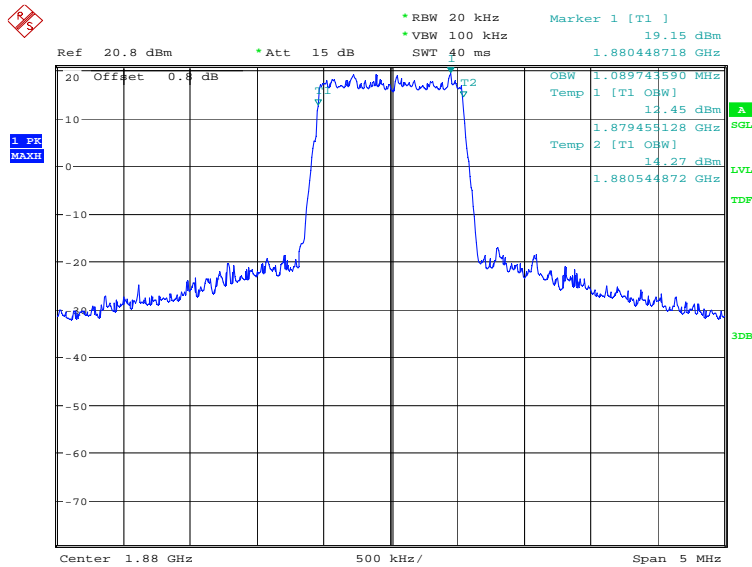
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 1089.74 | 1089.74 |

LTE band 2, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:53:50

LTE band 2, 1.4MHz Bandwidth, 16QAM (99% BW)

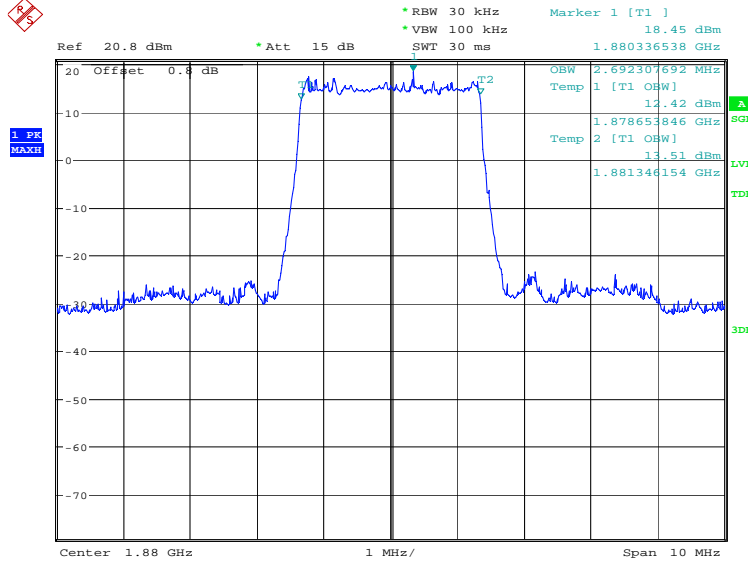


Date: 13.MAY.2020 09:54:29

LTE band 2, 3MHz (99%)

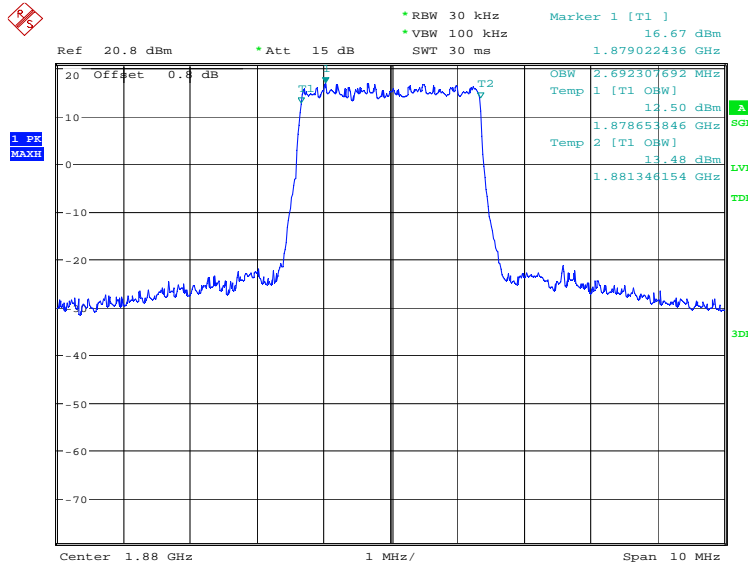
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 2692.31 | 2692.31 |

LTE band 2, 3MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:55:09

LTE band 2, 3MHz Bandwidth, 16QAM (99% BW)

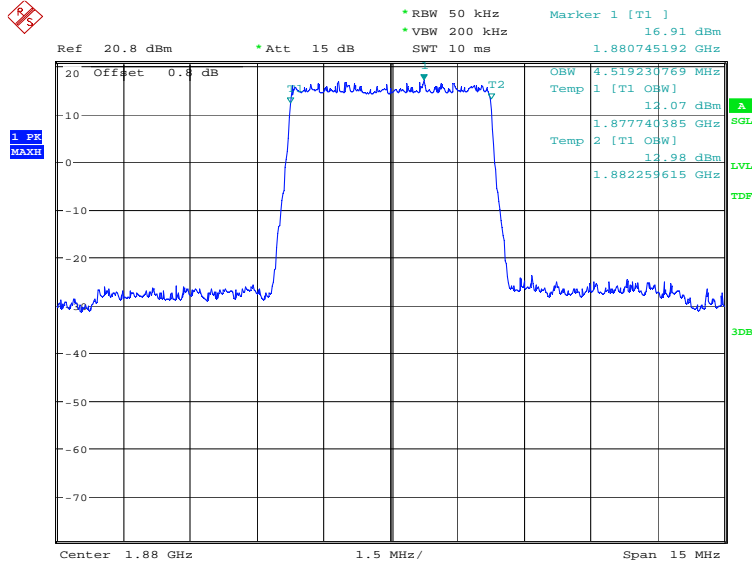


Date: 13.MAY.2020 09:55:47

LTE band 2, 5MHz (99%)

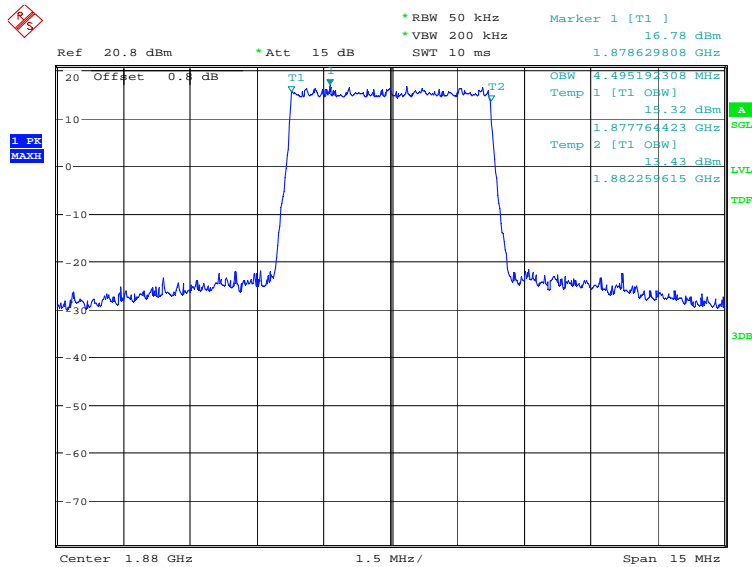
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 4519.23 | 4495.19 |

LTE band 2, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:56:27

LTE band 2, 5MHz Bandwidth, 16QAM (99% BW)

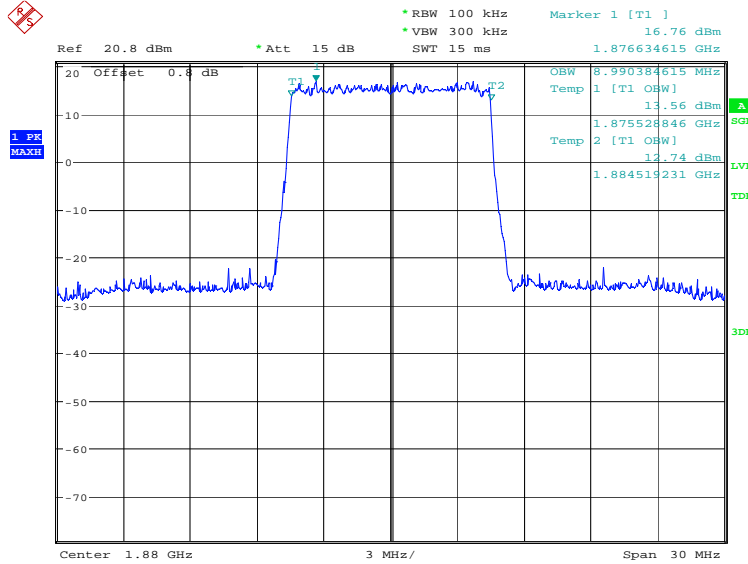


Date: 13.MAY.2020 09:57:05

LTE band 2, 10MHz (99%)

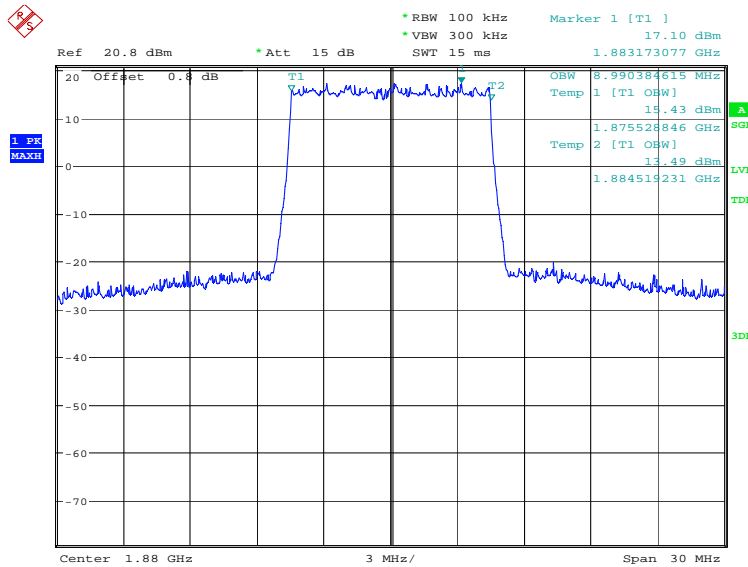
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 8990.38 | 8990.38 |

LTE band 2, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:57:45

LTE band 2, 10MHz Bandwidth, 16QAM (99% BW)

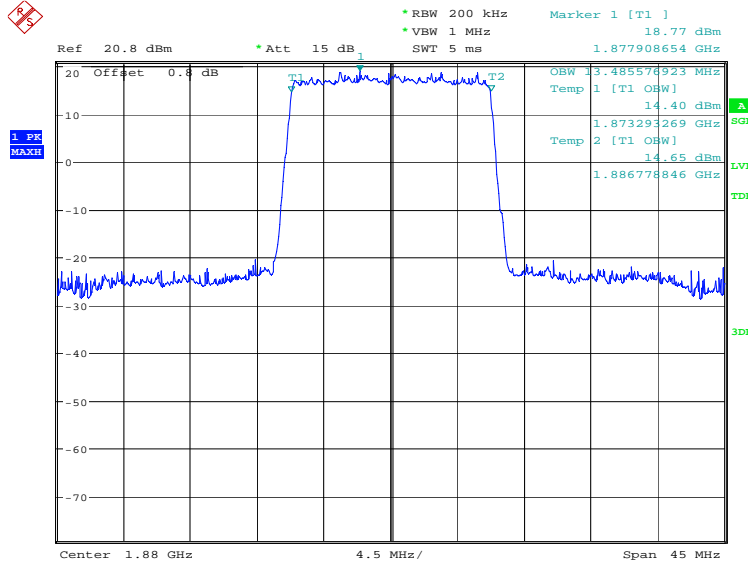


Date: 13.MAY.2020 09:58:24

LTE band 2, 15MHz (99%)

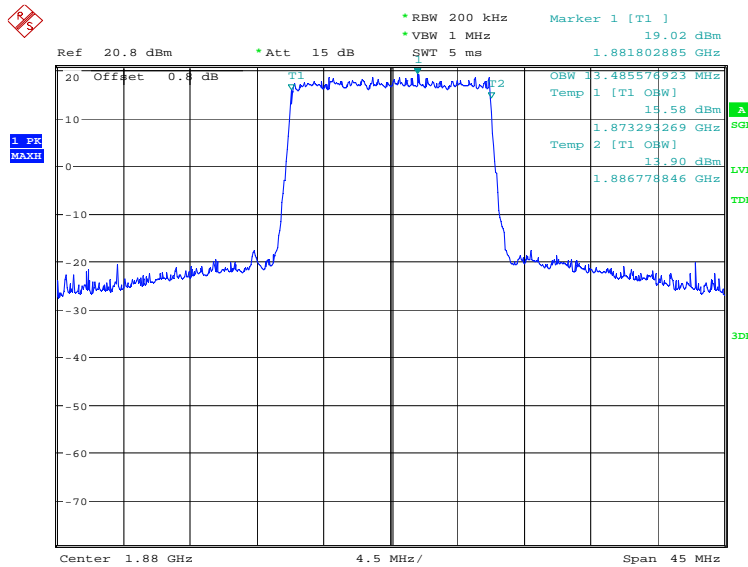
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 1880.0 | QPSK | 16QAM |
| | 13485.58 | 13485.58 |

LTE band 2, 15MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:59:04

LTE band 2, 15MHz Bandwidth, 16QAM (99% BW)

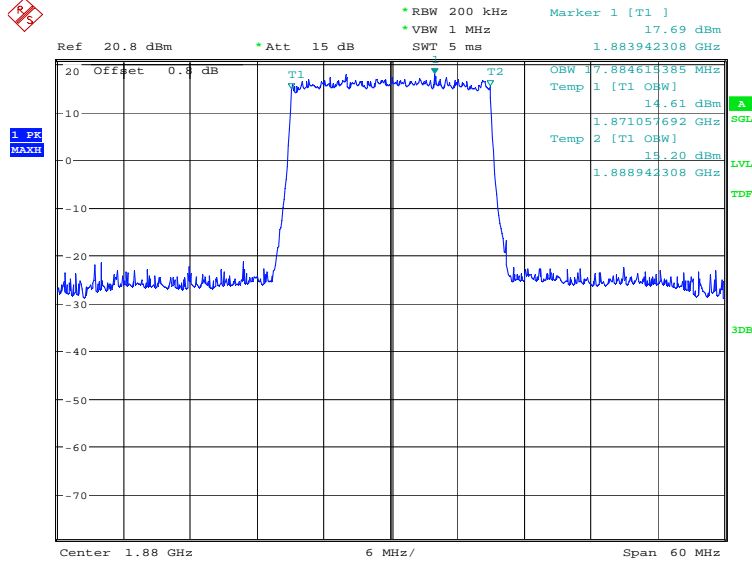


Date: 13.MAY.2020 09:59:42

LTE band 2, 20MHz (99%)

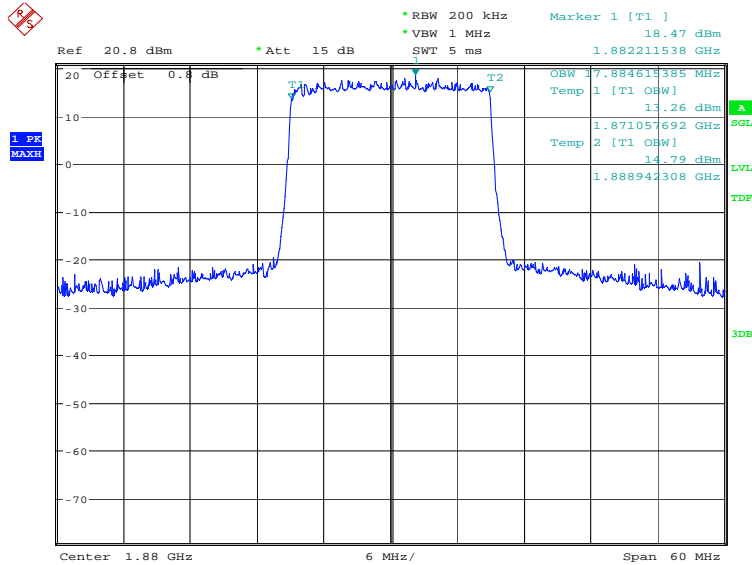
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 1880.0 | QPSK | 16QAM |
| | 17884.62 | 17884.62 |

LTE band 2, 20MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:00:22

LTE band 2, 20MHz Bandwidth, 16QAM (99% BW)

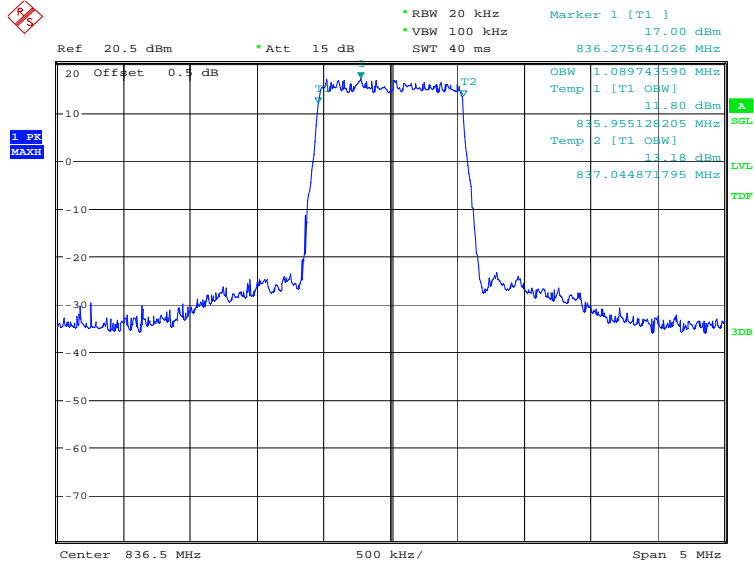


Date: 13.MAY.2020 10:01:00

LTE band 5, 1.4MHz (99%)

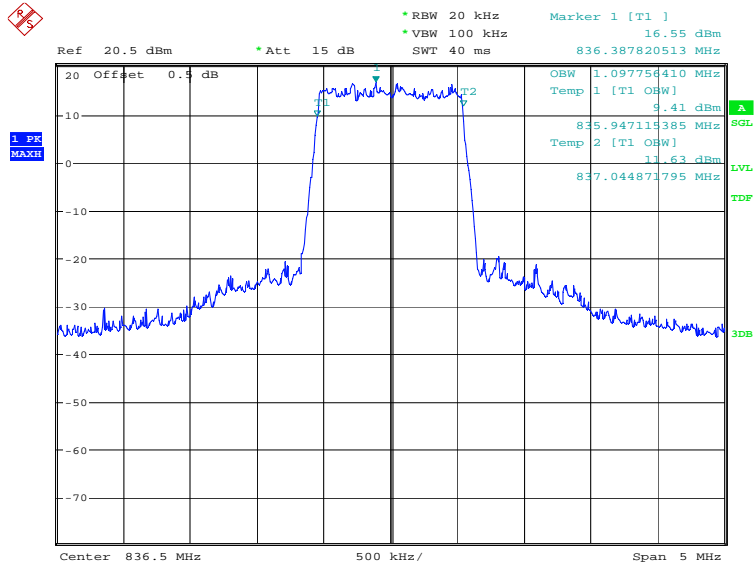
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 1089.74 | 1097.76 |

LTE band 5, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:02:29

LTE band 5, 1.4MHz Bandwidth, 16QAM (99% BW)

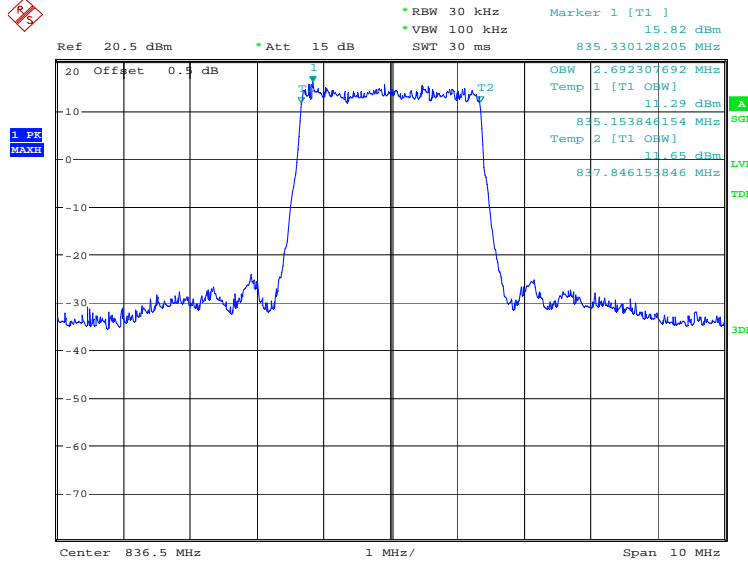


Date: 13.MAY.2020 10:03:07

LTE band 5, 3MHz (99%)

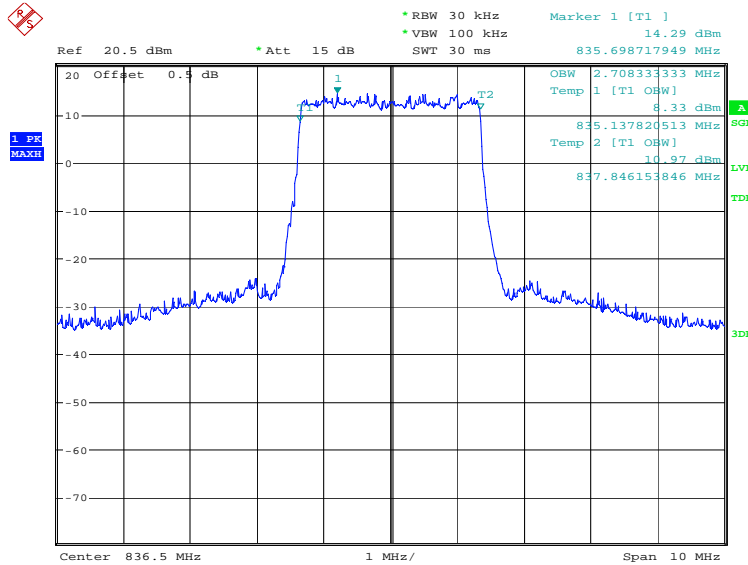
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 2692.31 | 2708.33 |

LTE band 5, 3MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:03:47

LTE band 5, 3MHz Bandwidth, 16QAM (99% BW)

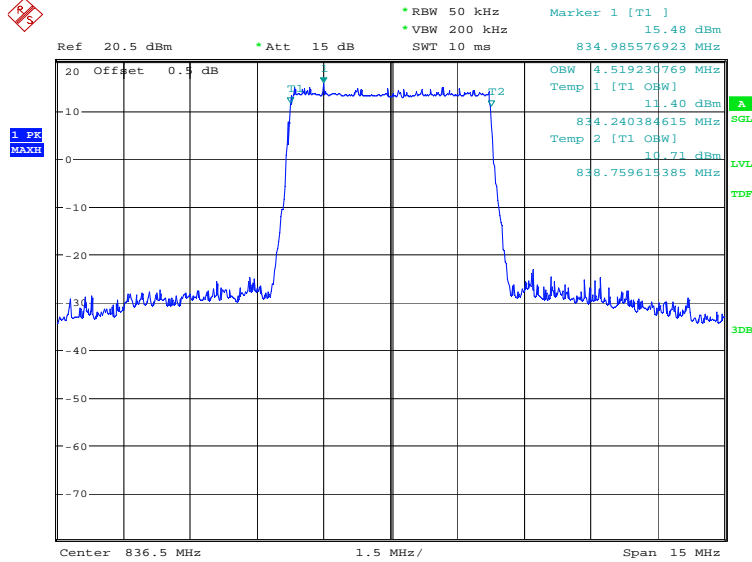


Date: 13.MAY.2020 10:04:25

LTE band 5, 5MHz (99%)

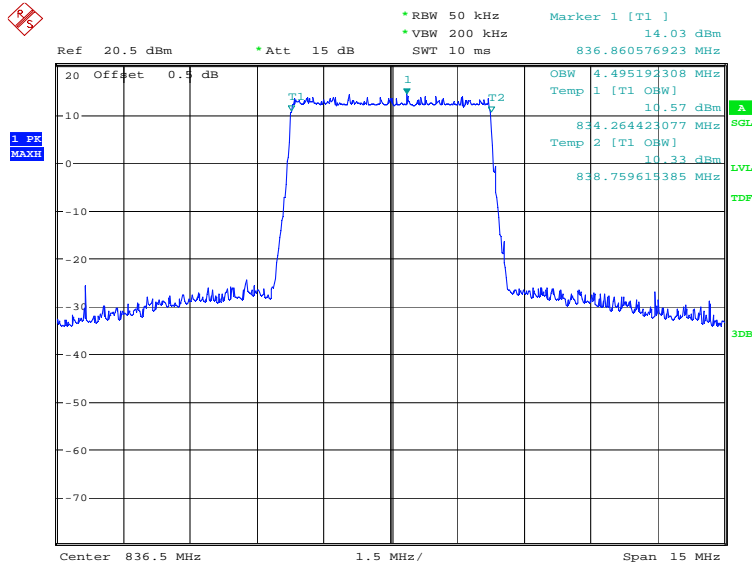
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 4519.23 | 4495.19 |

LTE band 5, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:05:05

LTE band 5, 5MHz Bandwidth, 16QAM (99% BW)

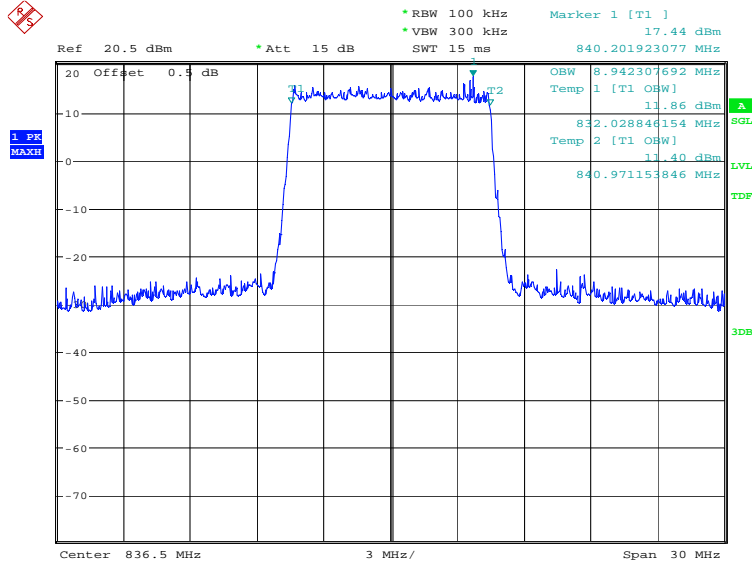


Date: 13.MAY.2020 10:05:44

LTE band 5, 10MHz (99%)

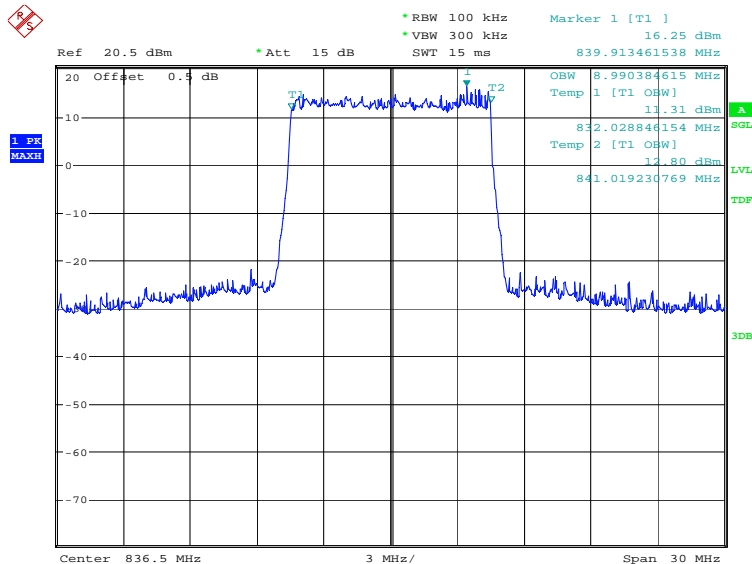
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 8942.31 | 8990.38 |

LTE band 5, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:06:24

LTE band 5, 10MHz Bandwidth, 16QAM (99% BW)

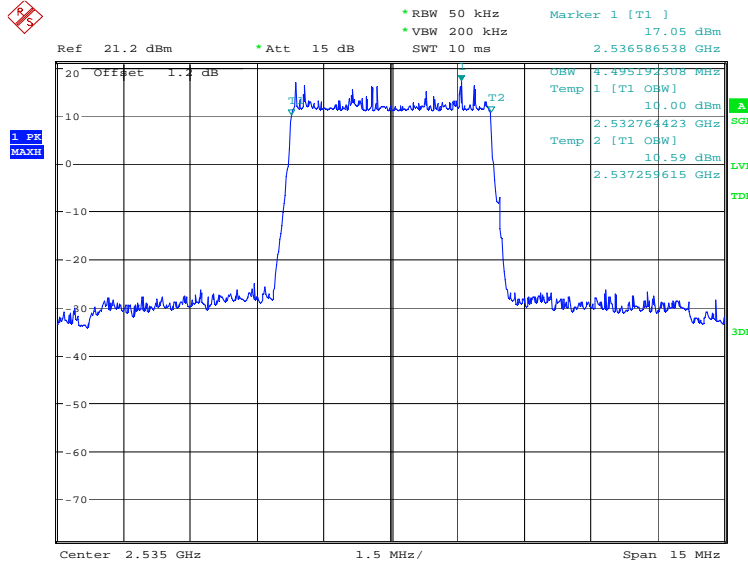


Date: 13.MAY.2020 10:07:02

LTE band 7, 5MHz (99%)

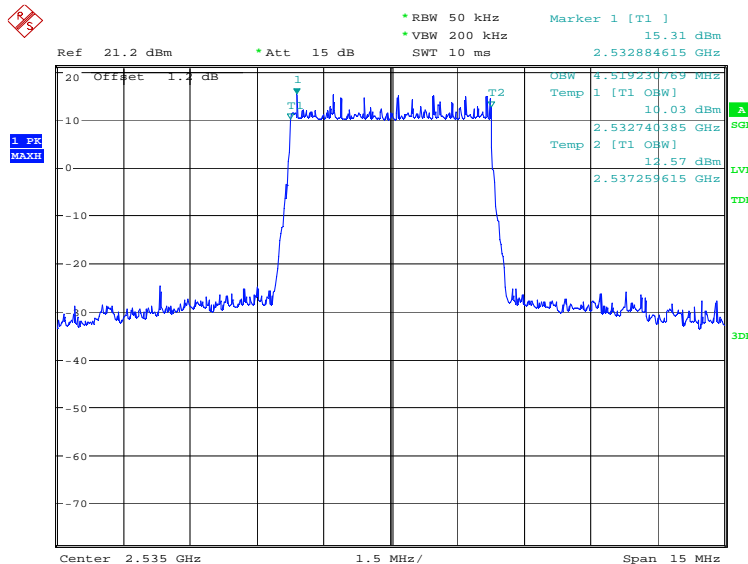
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 2535.0 | QPSK | 16QAM |
| | 4495.19 | 4519.23 |

LTE band 7, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:03:10

LTE band 7, 5MHz Bandwidth, 16QAM (99% BW)

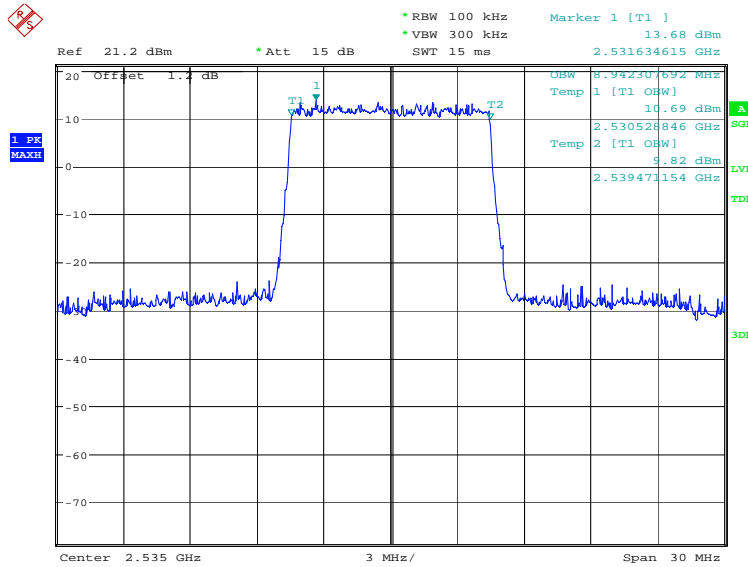


Date: 13.MAY.2020 09:03:48

LTE band 7, 10MHz (99%)

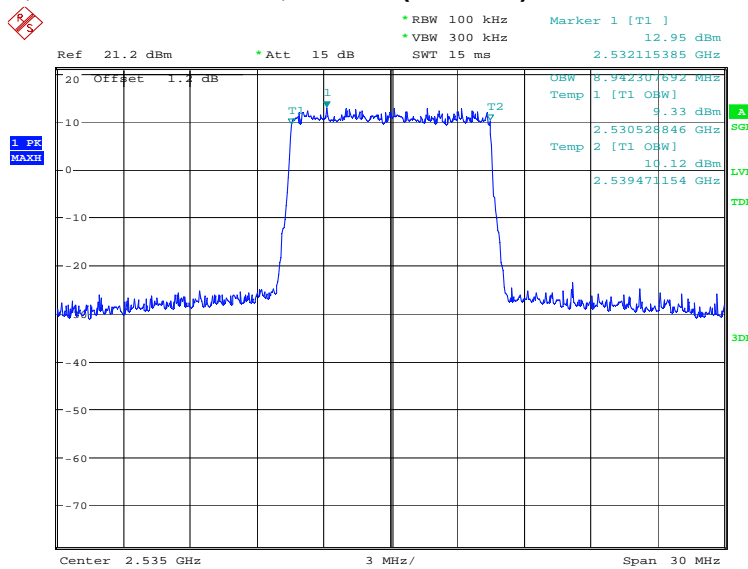
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 2535.0 | QPSK | 16QAM |
| | 8942.31 | 8942.31 |

LTE band 7, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:04:28

LTE band 7, 10MHz Bandwidth, 16QAM (99% BW)

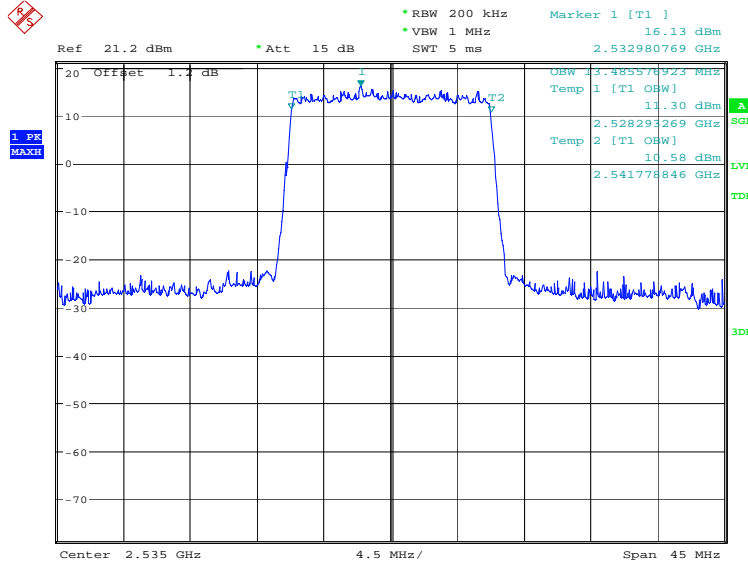


Date: 13.MAY.2020 09:05:06

LTE band 7, 15MHz (99%)

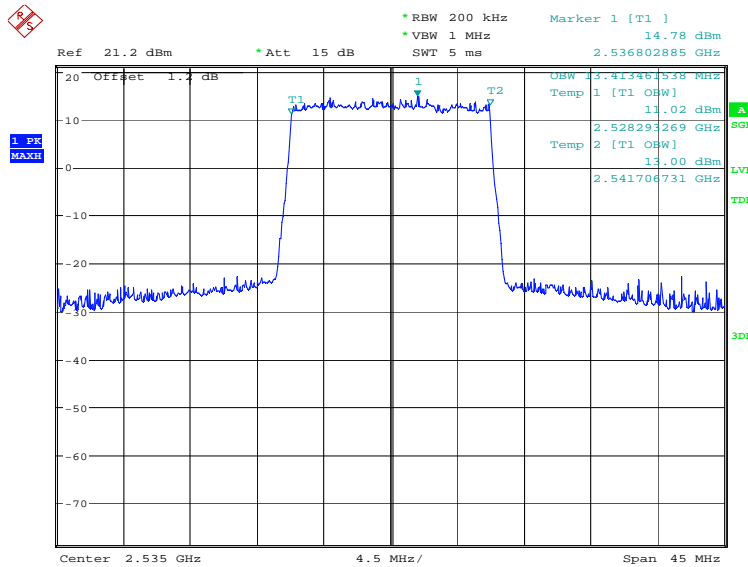
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 2535.0 | QPSK | 16QAM |
| | 13485.58 | 13413.46 |

LTE band 7, 15MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:05:46

LTE band 7, 15MHz Bandwidth, 16QAM (99% BW)

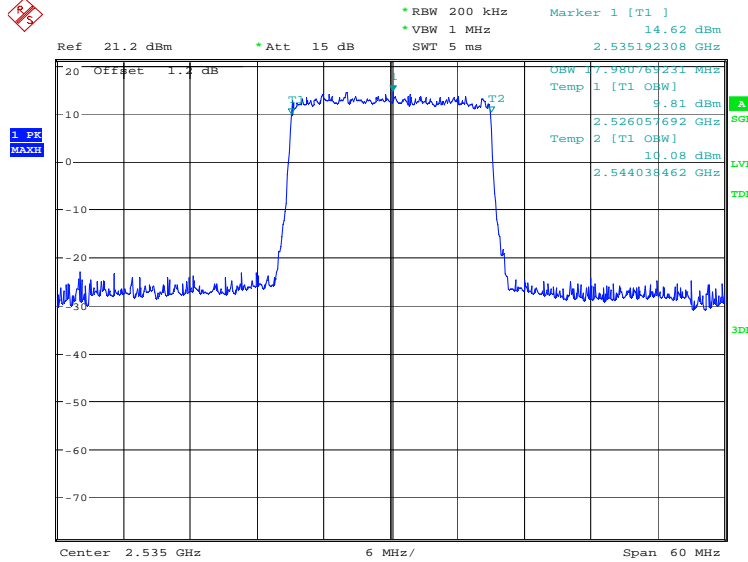


Date: 13.MAY.2020 09:06:25

LTE band 7, 20MHz (99%)

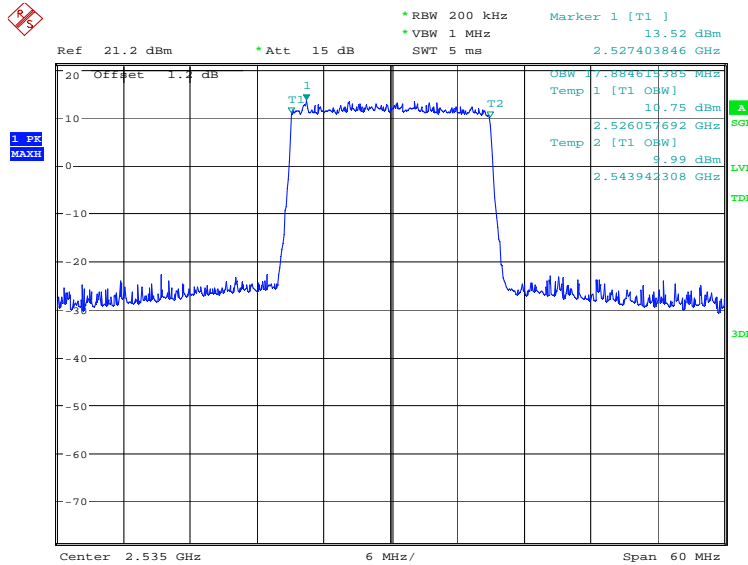
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 2535.0 | QPSK | 16QAM |
| | 17980.77 | 17884.62 |

LTE band 7, 20MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 09:07:04

LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)

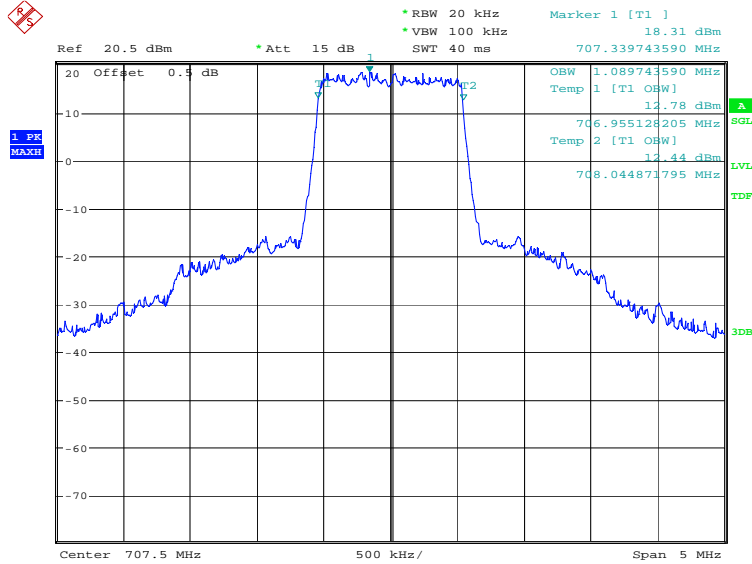


Date: 13.MAY.2020 09:07:43

LTE band 12, 1.4MHz (99%)

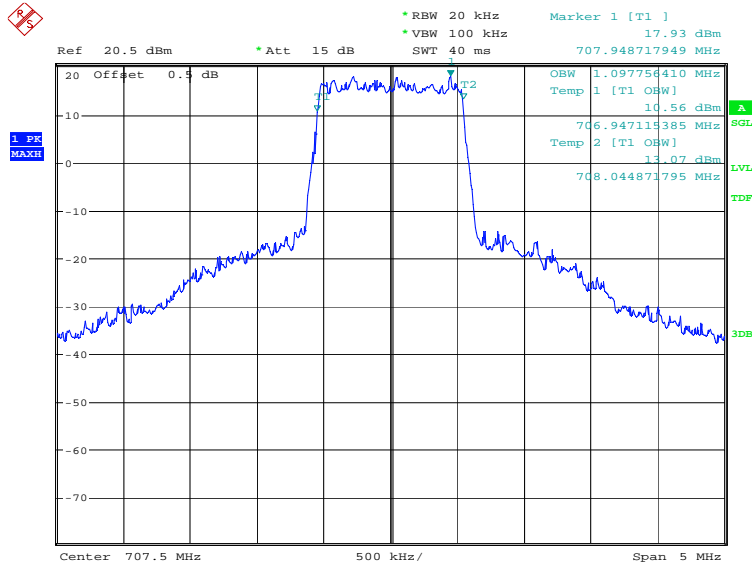
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 1089.74 | 1097.76 |

LTE band 12, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:07:47

LTE band 12, 1.4MHz Bandwidth, 16QAM (99% BW)

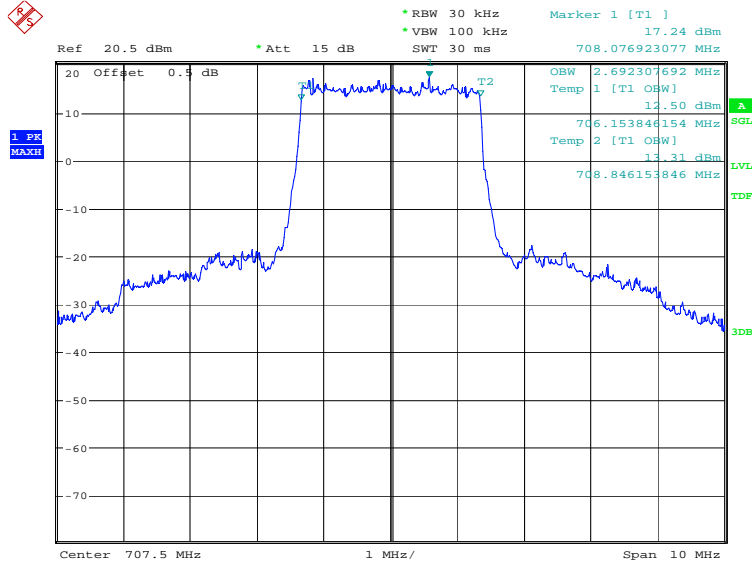


Date: 13.MAY.2020 10:08:25

LTE band 12, 3MHz (99%)

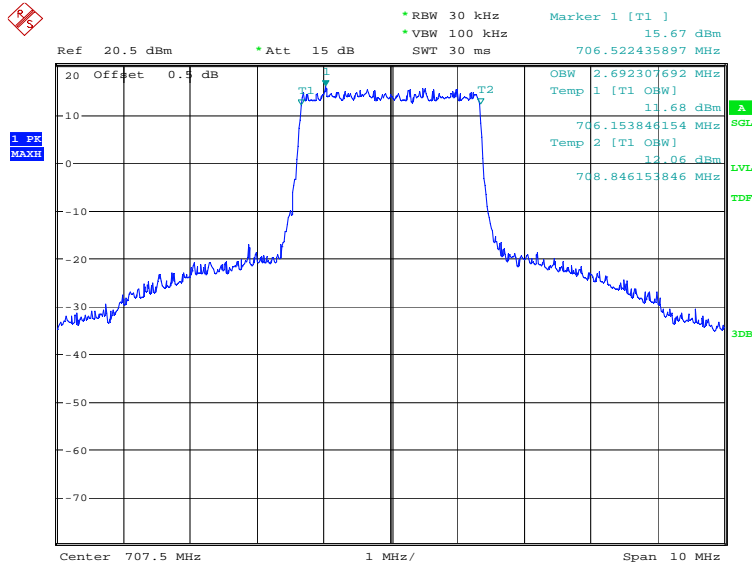
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 2692.31 | 2692.31 |

LTE band 12, 3MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:09:05

LTE band 12, 3MHz Bandwidth, 16QAM (99% BW)

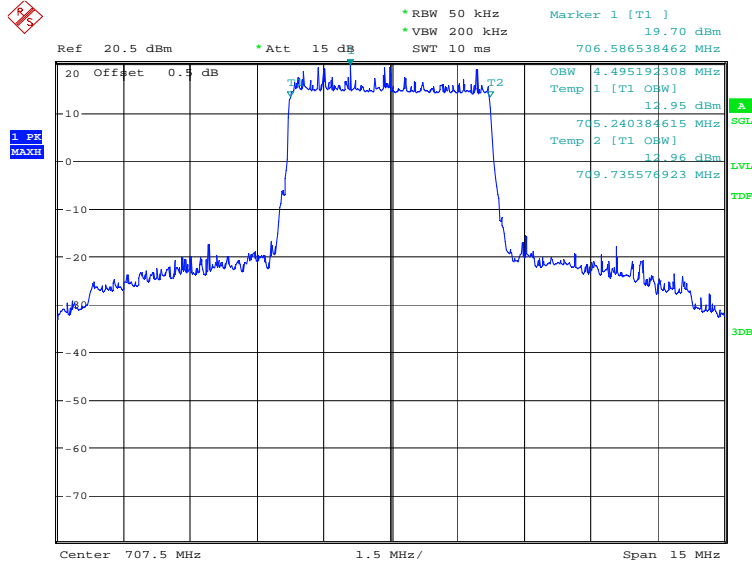


Date: 13.MAY.2020 10:09:44

LTE band 12, 5MHz (99%)

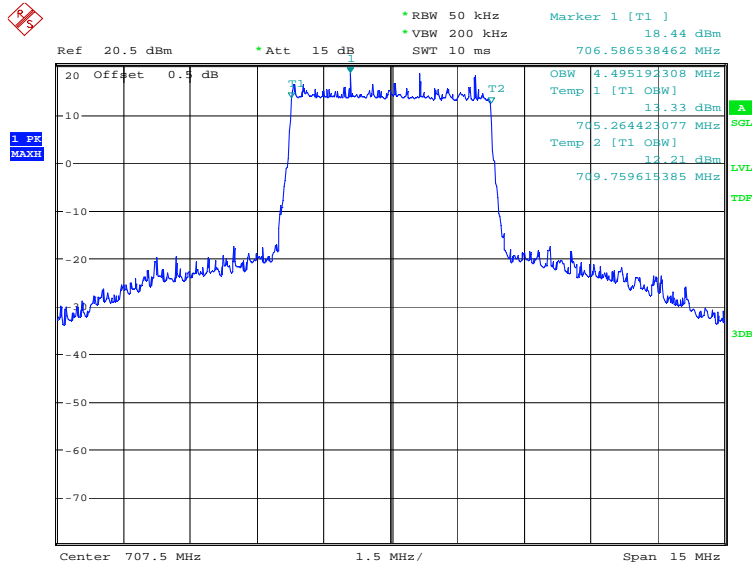
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 4495.19 | 4495.19 |

LTE band 12, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:10:24

LTE band 12, 5MHz Bandwidth, 16QAM (99% BW)

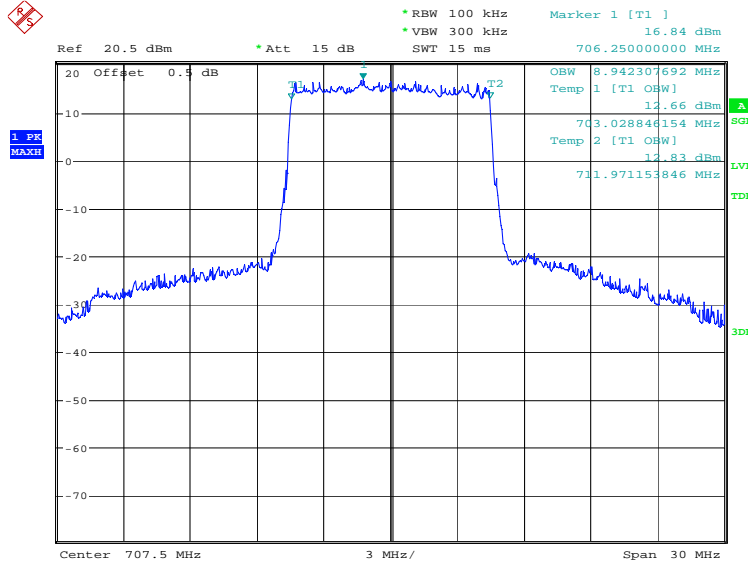


Date: 13.MAY.2020 10:11:02

LTE band 12, 10MHz (99%)

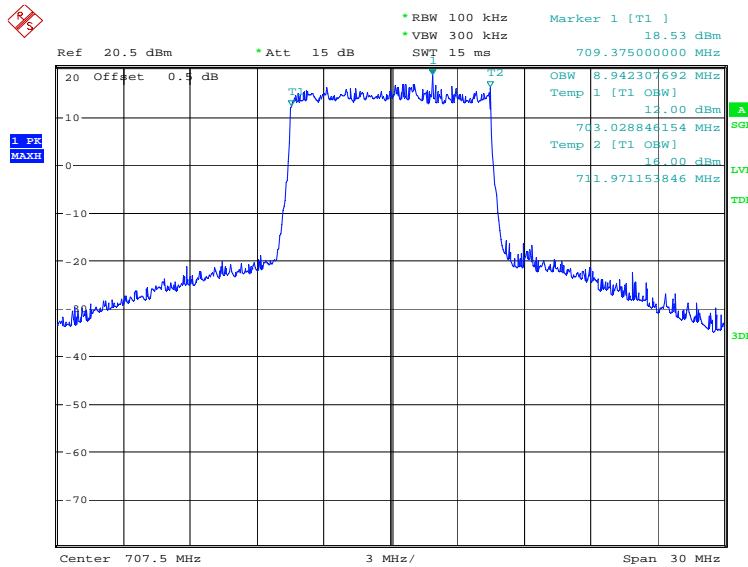
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 8942.31 | 8942.31 |

LTE band 12, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:11:42

LTE band 12, 10MHz Bandwidth, 16QAM (99% BW)

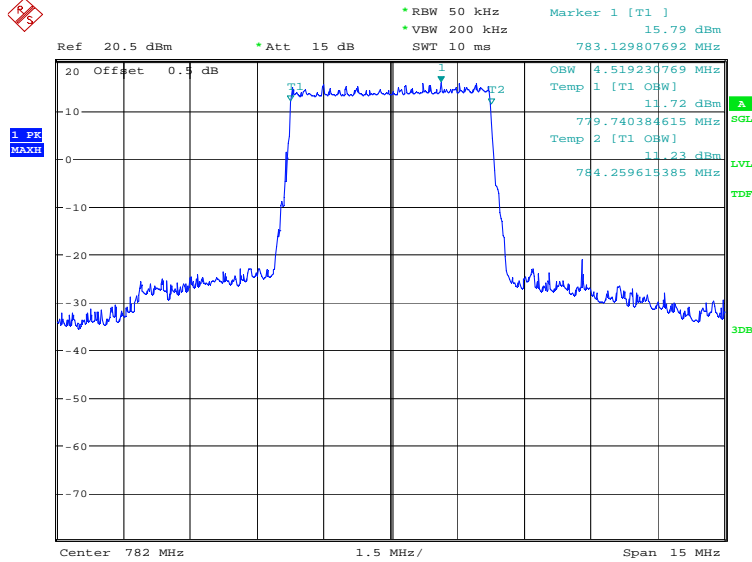


Date: 13.MAY.2020 10:12:20

LTE band 13, 5MHz (99%)

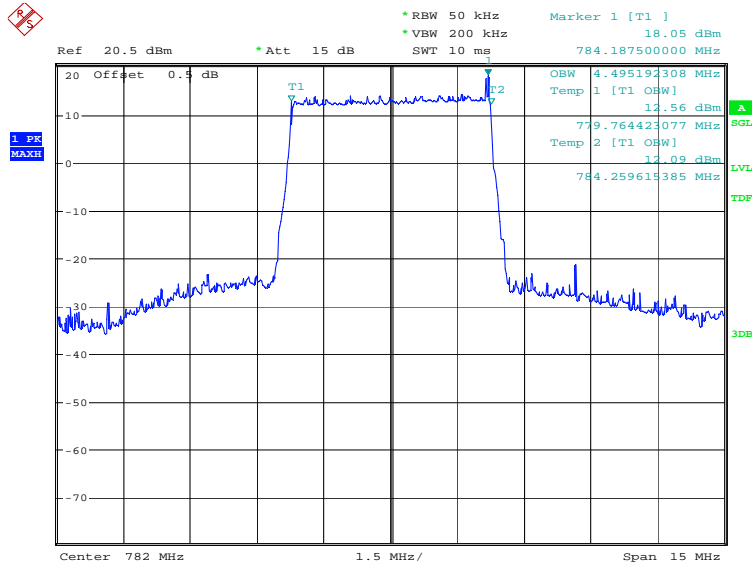
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 782.0 | QPSK | 16QAM |
| | 4519.23 | 4495.19 |

LTE band 13, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:13:02

LTE band 13, 5MHz Bandwidth, 16QAM (99% BW)

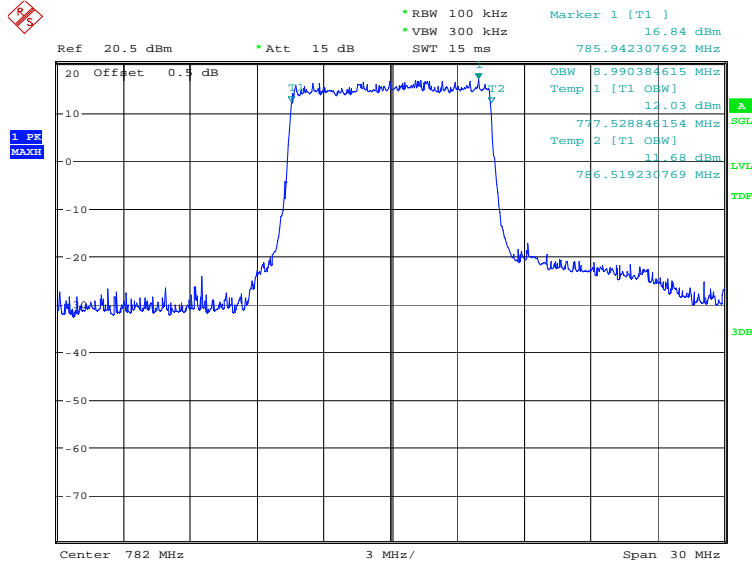


Date: 13.MAY.2020 10:13:40

LTE band 13, 10MHz (99%)

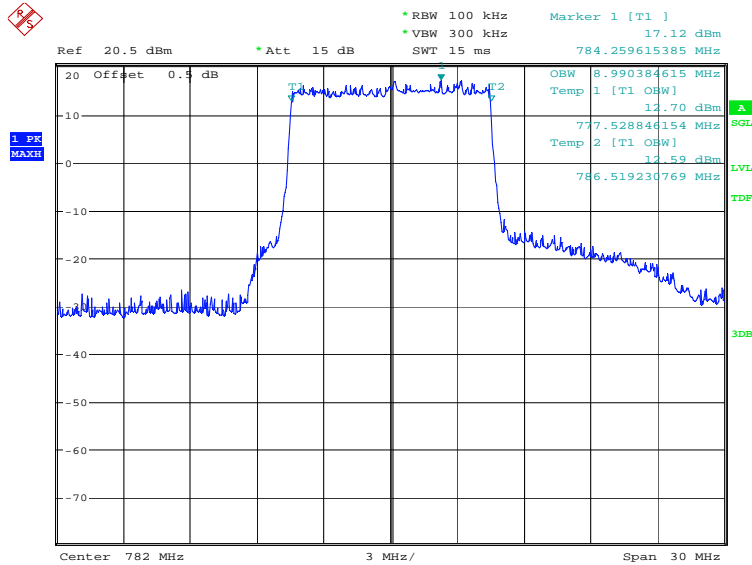
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 782.0 | QPSK | 16QAM |
| | 8990.38 | 8990.38 |

LTE band 13, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:14:20

LTE band 13, 10MHz Bandwidth,16QAM (99% BW)

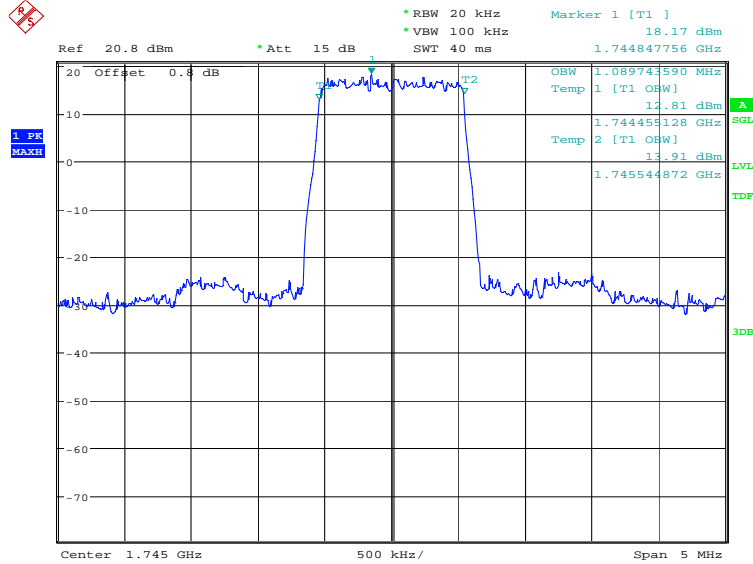


Date: 13.MAY.2020 10:14:58

LTE band 66, 1.4MHz (99%)

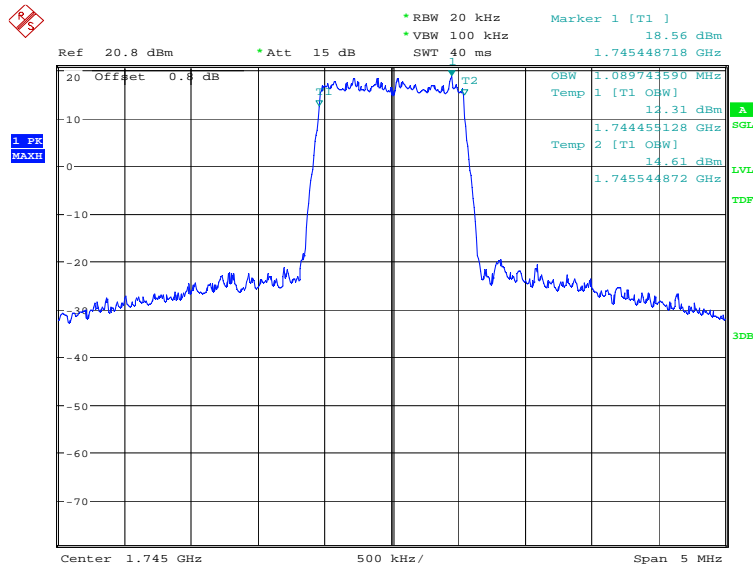
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1745.0 | QPSK | 16QAM |
| | 1089.74 | 1089.74 |

LTE band 66, 1.4MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:15:43

LTE band 66, 1.4MHz Bandwidth, 16QAM (99% BW)

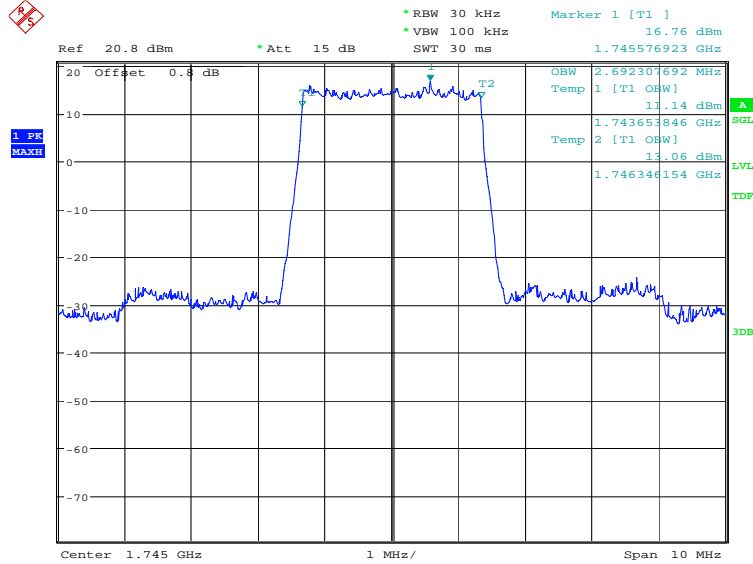


Date: 13.MAY.2020 10:16:21

LTE band 66, 3MHz (99%)

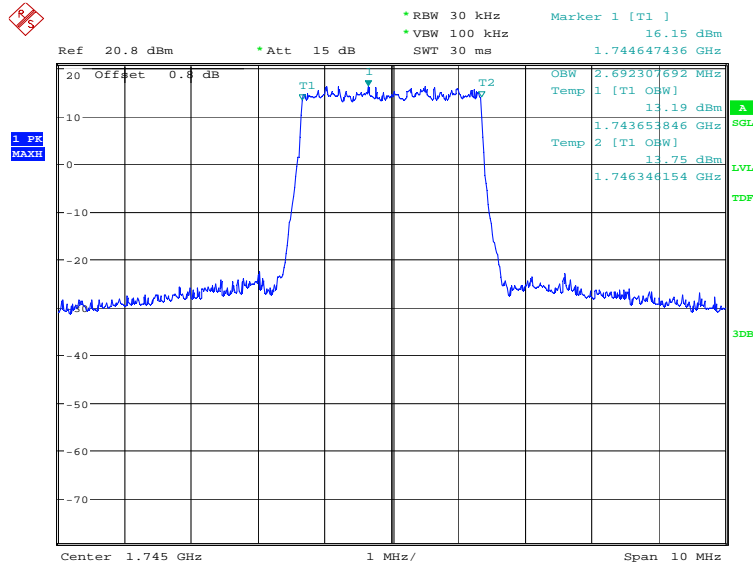
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1745.0 | QPSK | 16QAM |
| | 2692.31 | 2692.31 |

LTE band 66, 3MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:17:02

LTE band 66, 3MHz Bandwidth, 16QAM (99% BW)

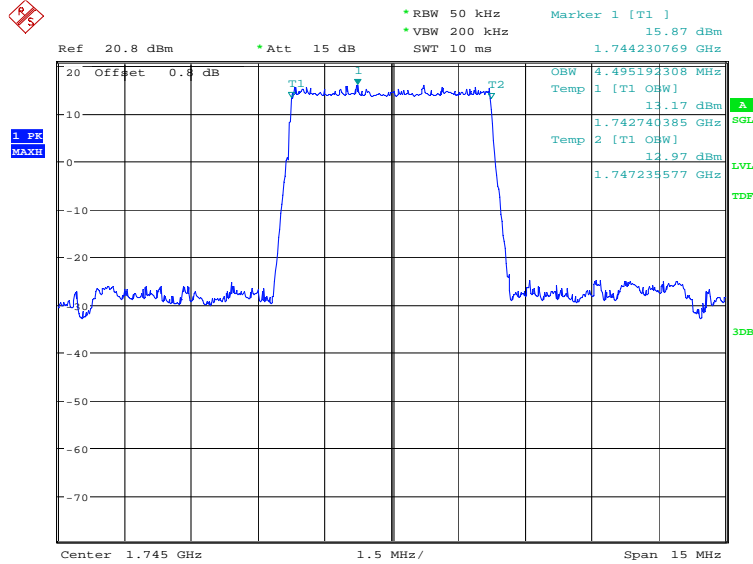


Date: 13.MAY.2020 10:17:40

LTE band 66, 5MHz (99%)

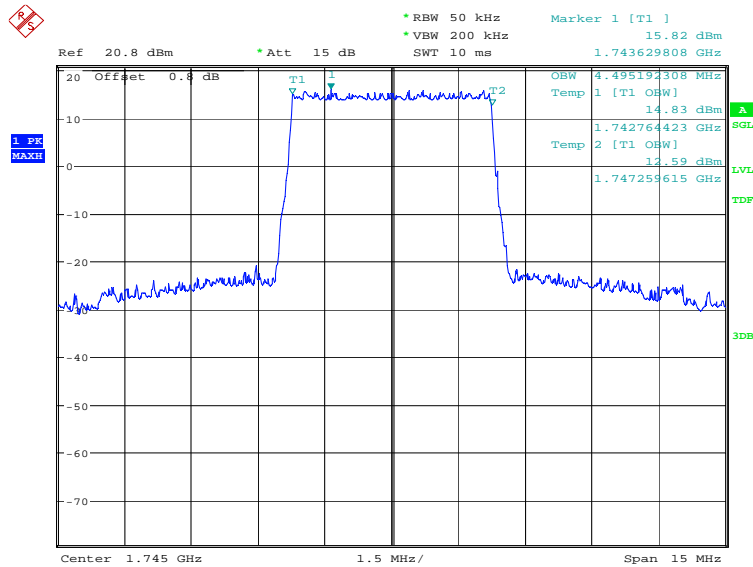
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1745.0 | QPSK | 16QAM |
| | 4495.19 | 4495.19 |

LTE band 66, 5MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:18:20

LTE band 66, 5MHz Bandwidth, 16QAM (99% BW)

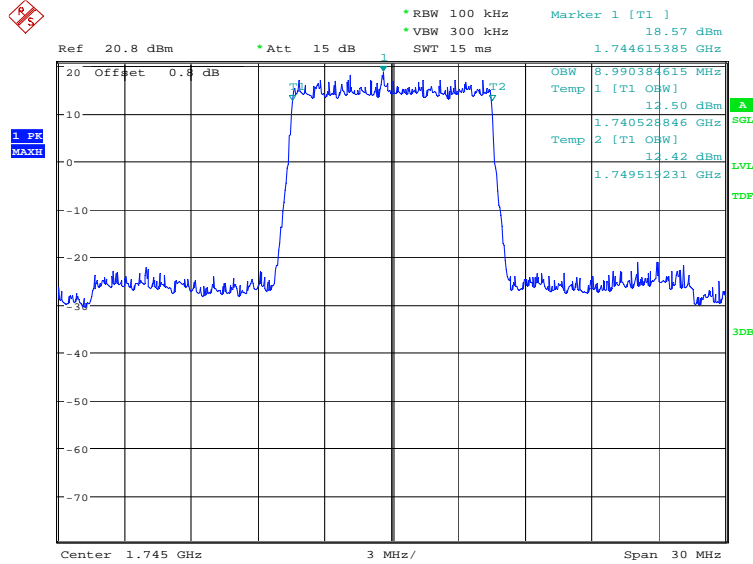


Date: 13.MAY.2020 10:18:58

LTE band 66, 10MHz (99%)

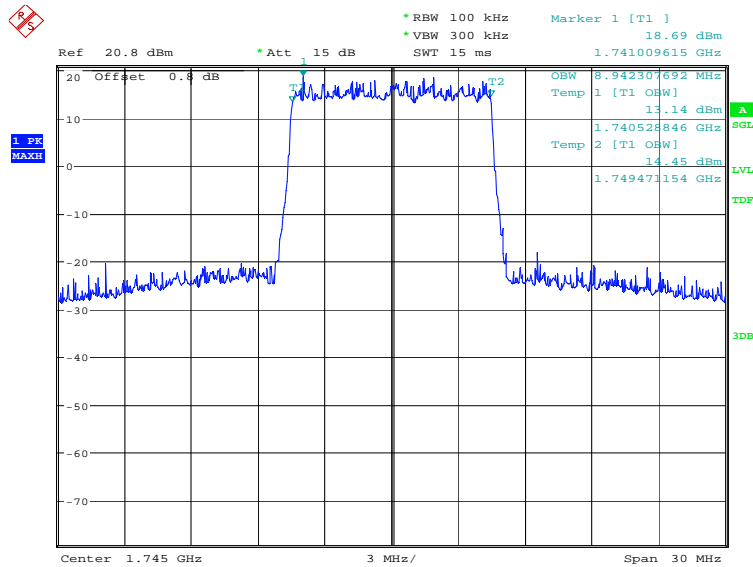
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|---------|
| 1745.0 | QPSK | 16QAM |
| | 8990.38 | 8942.31 |

LTE band 66, 10MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:19:38

LTE band 66, 10MHz Bandwidth, 16QAM (99% BW)

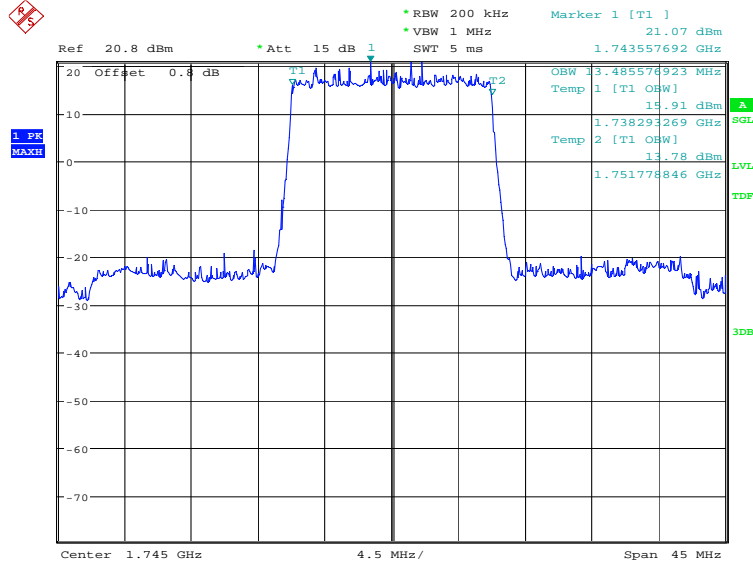


Date: 13.MAY.2020 10:20:17

LTE band 66, 15MHz (99%)

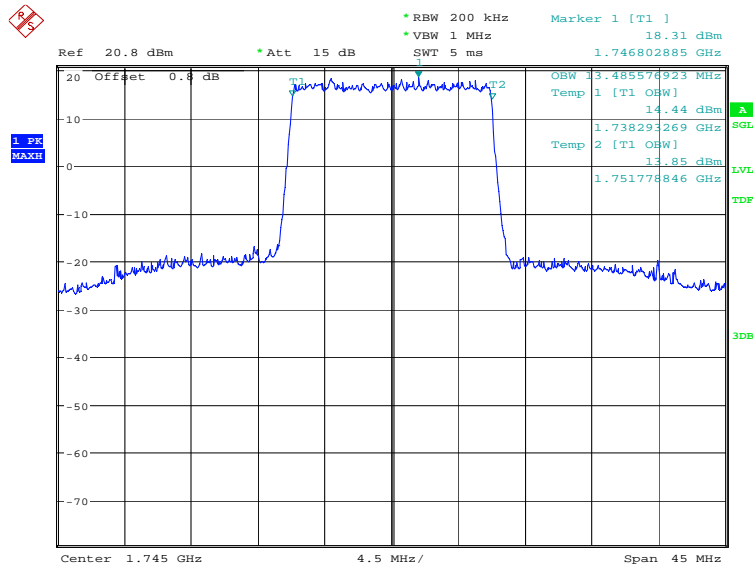
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 1745.0 | QPSK | 16QAM |
| | 13485.58 | 13485.58 |

LTE band 66, 15MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:20:57

LTE band 66, 15MHz Bandwidth, 16QAM (99% BW)

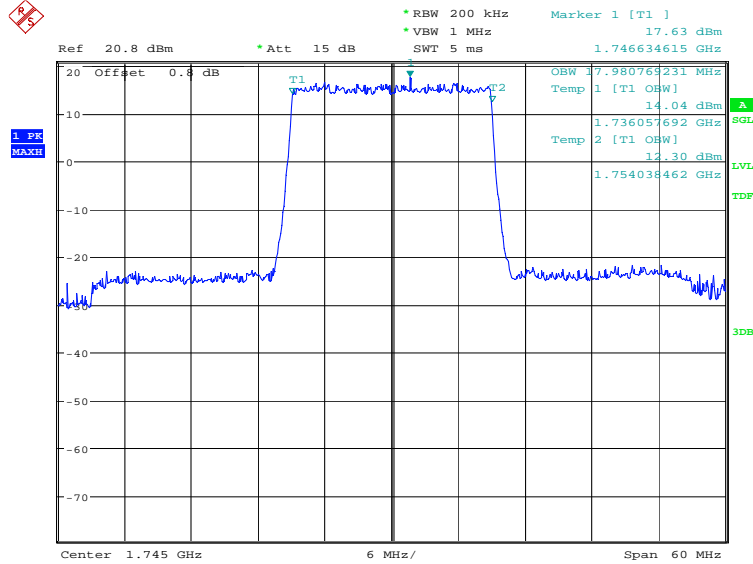


Date: 13.MAY.2020 10:21:35

LTE band 66, 20MHz (99%)

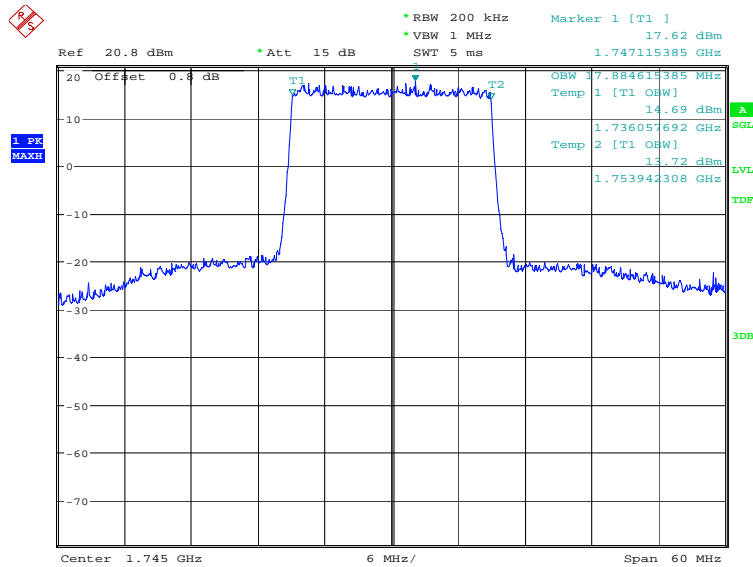
| Frequency(MHz) | Occupied Bandwidth (99%) (kHz) | |
|----------------|--------------------------------|----------|
| 1745.0 | QPSK | 16QAM |
| | 17980.77 | 17884.62 |

LTE band 66, 20MHz Bandwidth, QPSK (99% BW)



Date: 13.MAY.2020 10:22:15

LTE band 66, 20MHz Bandwidth, 16QAM (99% BW)



Date: 13.MAY.2020 10:22:54

A.5 Emission Bandwidth

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. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

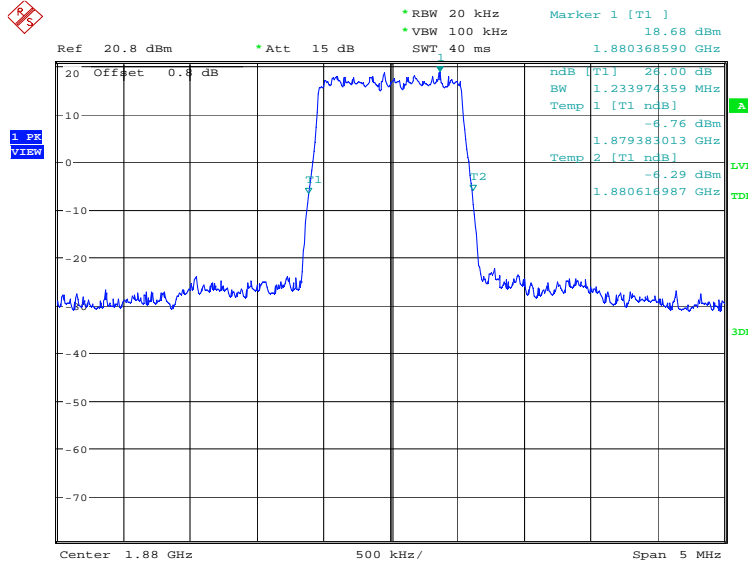
The measurement method is from ANSI C63.26:

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
- d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

LTE band 2, 1.4MHz (-26dBc)

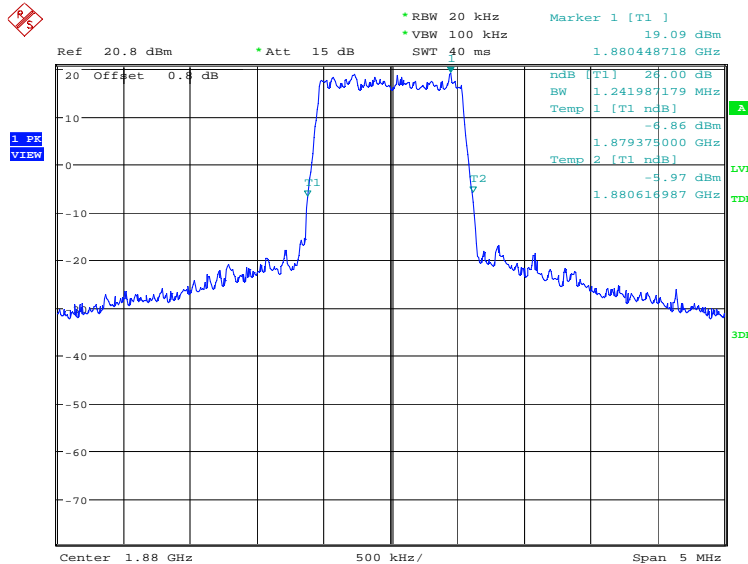
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 1233.97 | 1241.99 |

LTE band 2, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:24:07

LTE band 2, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

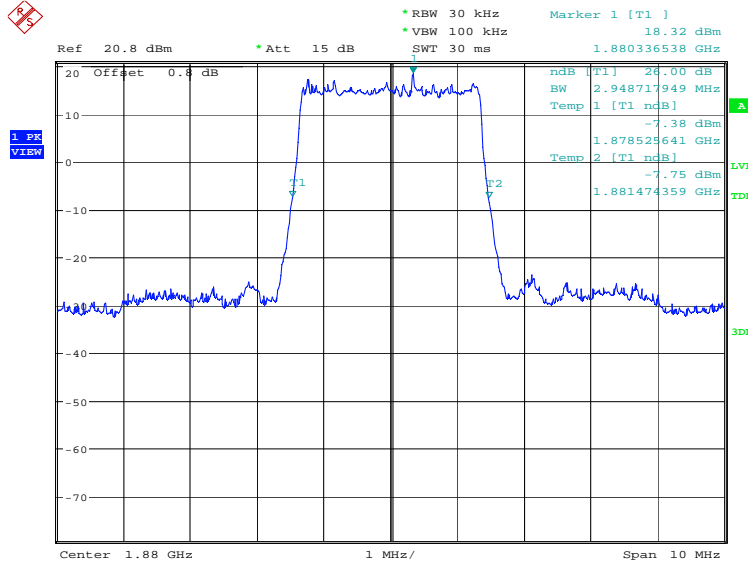


Date: 13.MAY.2020 10:24:46

LTE band 2, 3MHz (-26dBc)

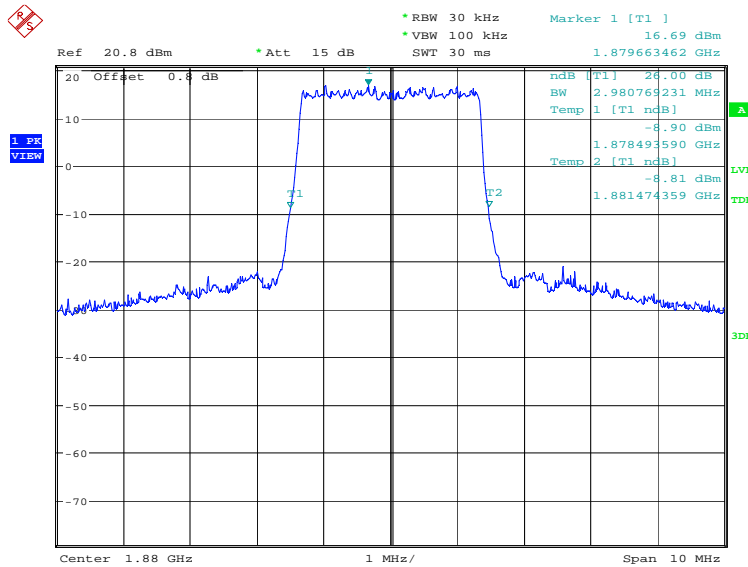
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 2948.72 | 2980.77 |

LTE band 2, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:25:27

LTE band 2, 3MHz Bandwidth, 16QAM (-26dBc BW)

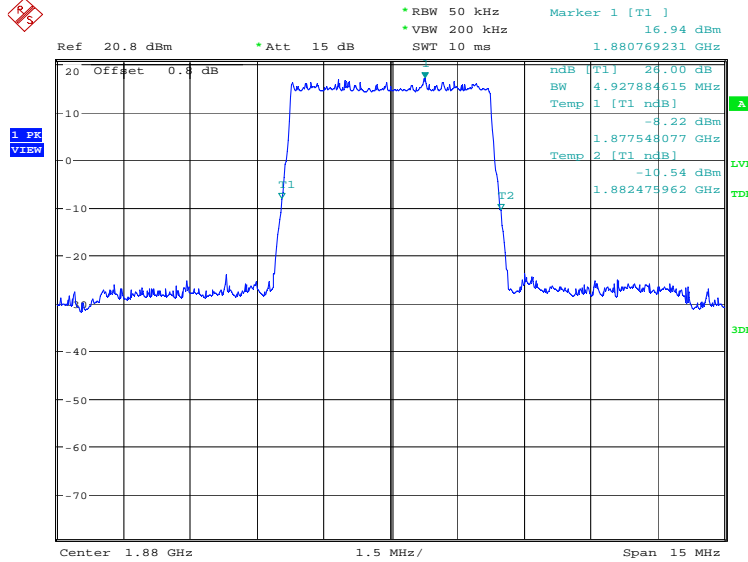


Date: 13.MAY.2020 10:26:06

LTE band 2, 5MHz (-26dBc)

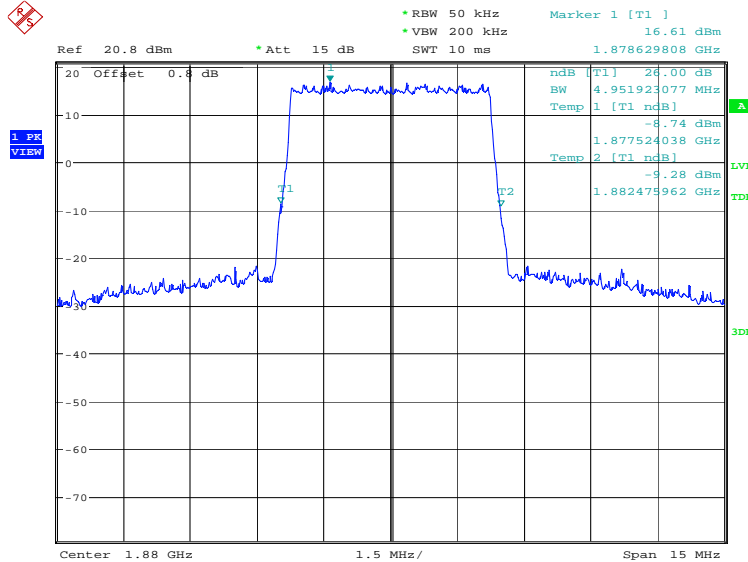
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 4927.88 | 4951.92 |

LTE band 2, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:26:46

LTE band 2, 5MHz Bandwidth, 16QAM (-26dBc BW)

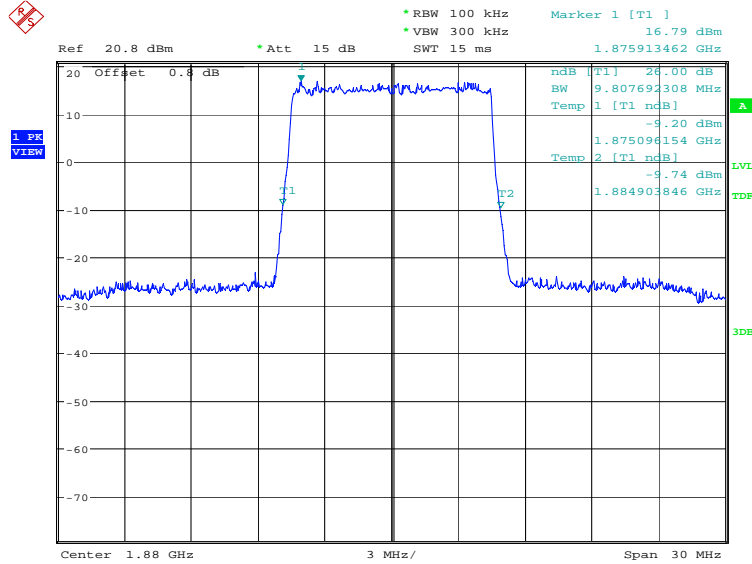


Date: 13.MAY.2020 10:27:25

LTE band 2, 10MHz (-26dBc)

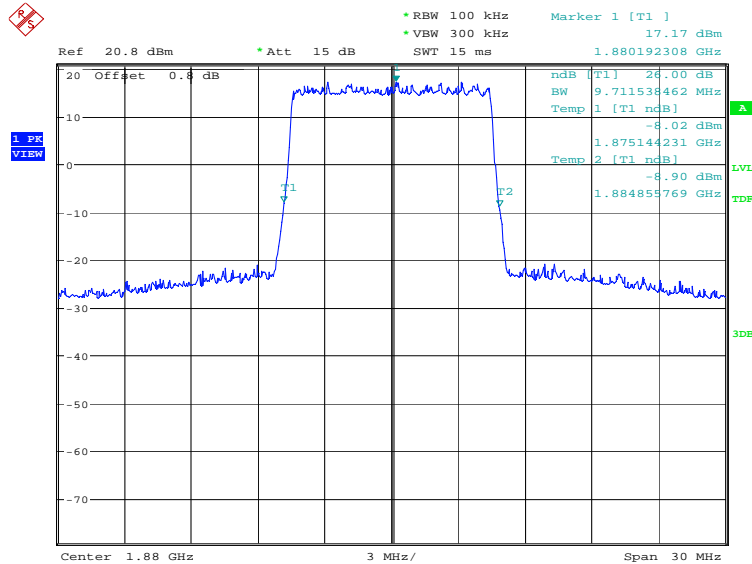
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 1880.0 | QPSK | 16QAM |
| | 9807.69 | 9711.54 |

LTE band 2, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:28:06

LTE band 2, 10MHz Bandwidth, 16QAM (-26dBc BW)

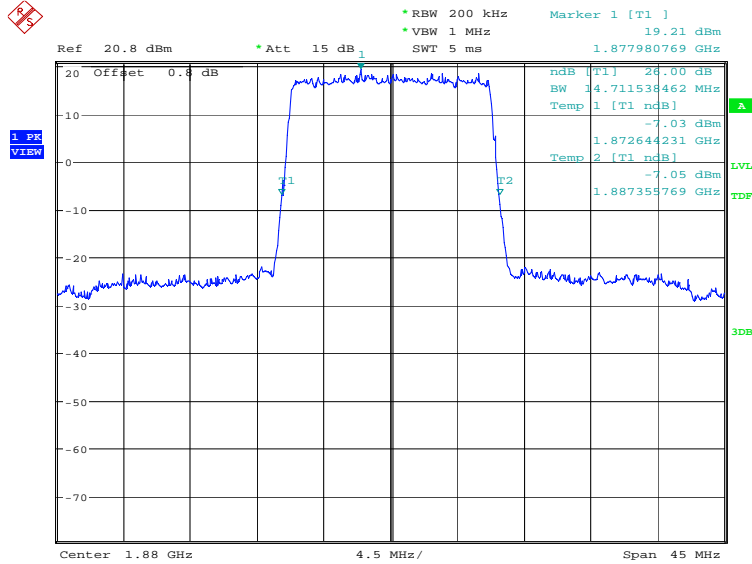


Date: 13.MAY.2020 10:28:45

LTE band 2, 15MHz (-26dBc)

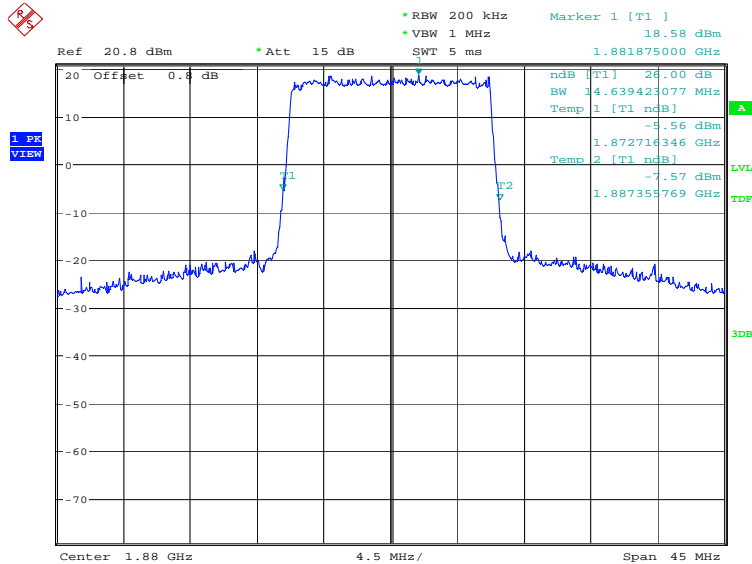
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| 1880.0 | QPSK | 16QAM |
| | 14711.54 | 14639.42 |

LTE band 2, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:29:25

LTE band 2, 15MHz Bandwidth, 16QAM (-26dBc BW)

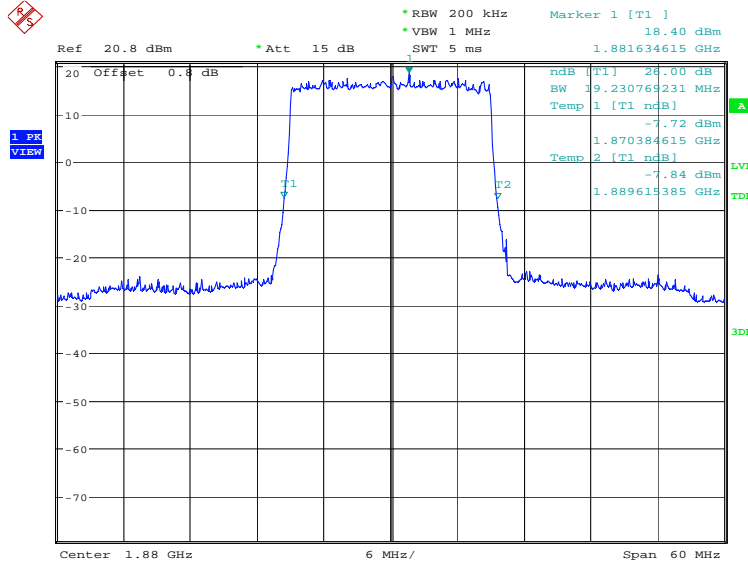


Date: 13.MAY.2020 10:30:04

LTE band 2, 20MHz (-26dBc)

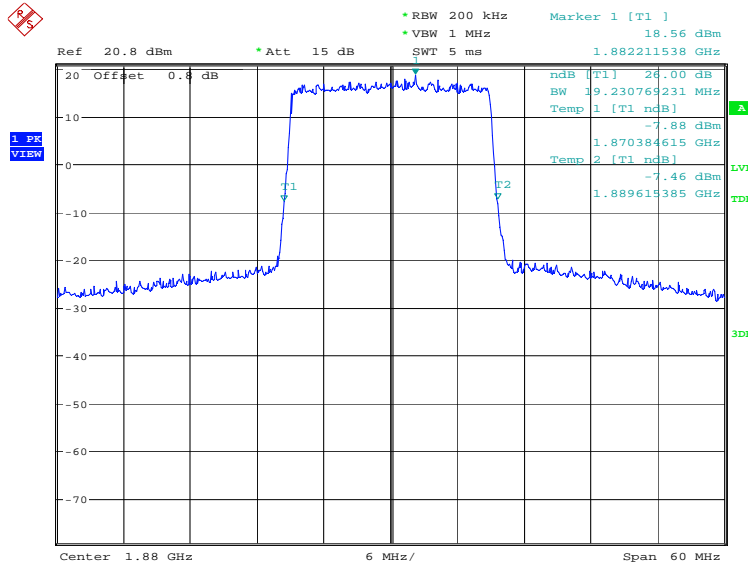
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| 1880.0 | QPSK | 16QAM |
| | 19230.77 | 19230.77 |

LTE band 2, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:30:45

LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)

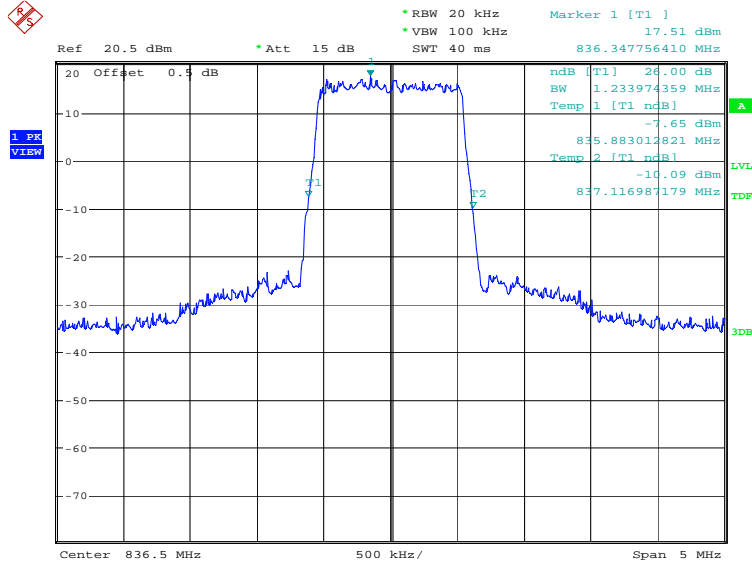


Date: 13.MAY.2020 10:31:24

LTE band 5, 1.4MHz (-26dBc)

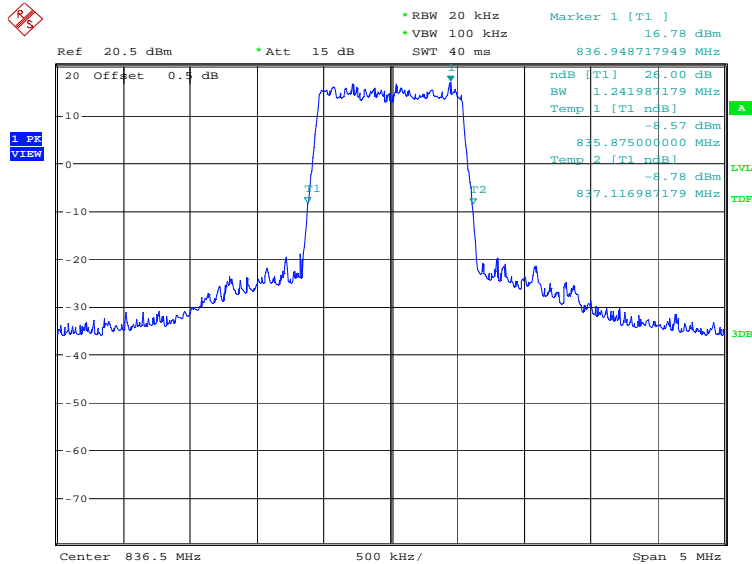
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| | 836.5 | QPSK |
| 1233.97 | | 1241.99 |

LTE band 5, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:32:52

LTE band 5, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

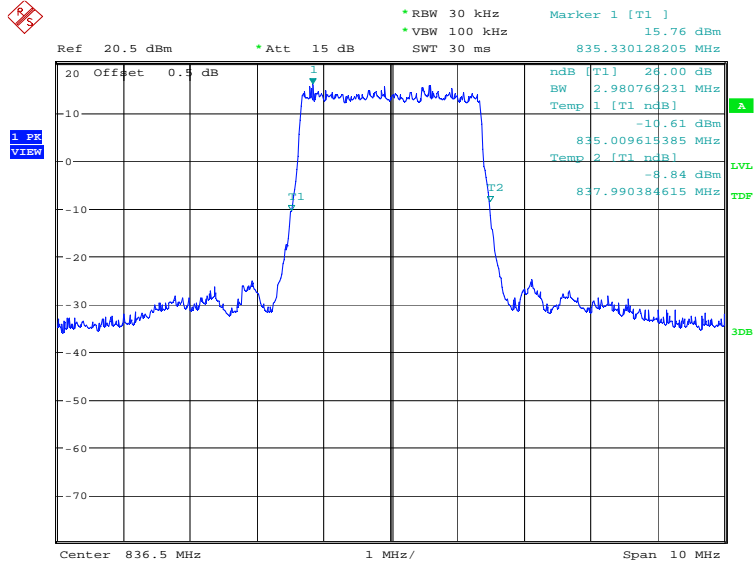


Date: 13.MAY.2020 10:33:31

LTE band 5, 3MHz (-26dBc)

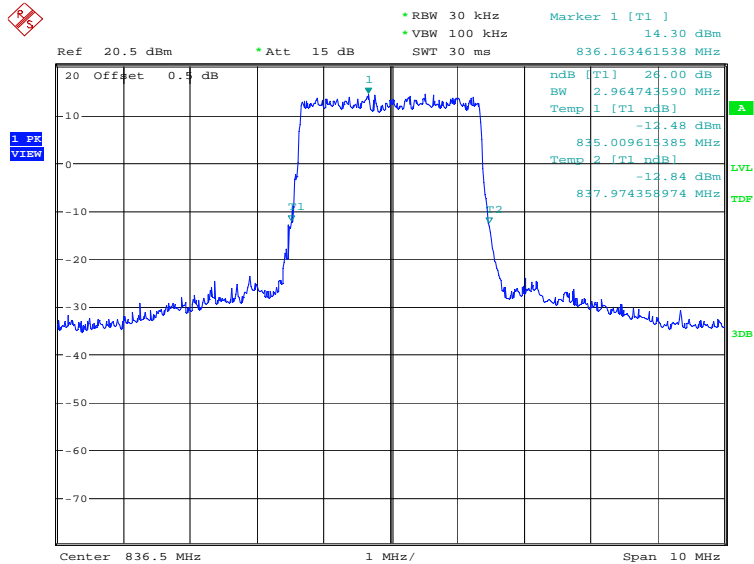
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 2980.77 | 2964.74 |

LTE band 5, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:34:12

LTE band 5, 3MHz Bandwidth, 16QAM (-26dBc BW)

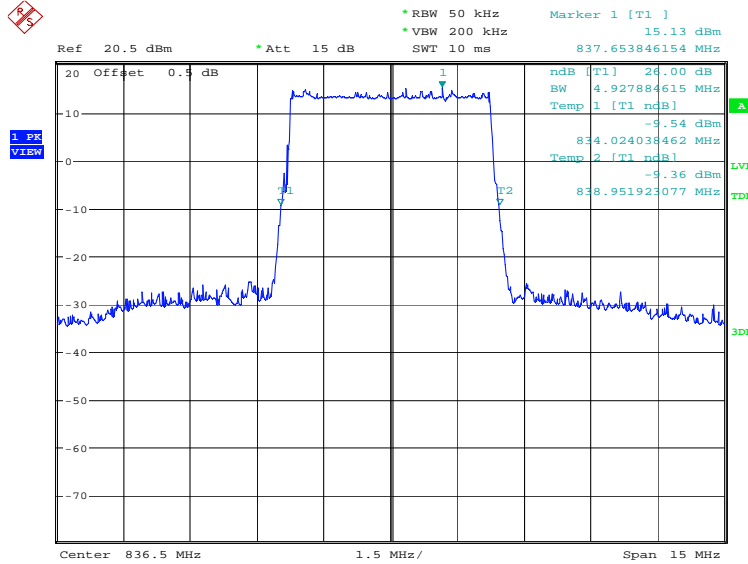


Date: 13.MAY.2020 10:34:51

LTE band 5, 5MHz (-26dBc)

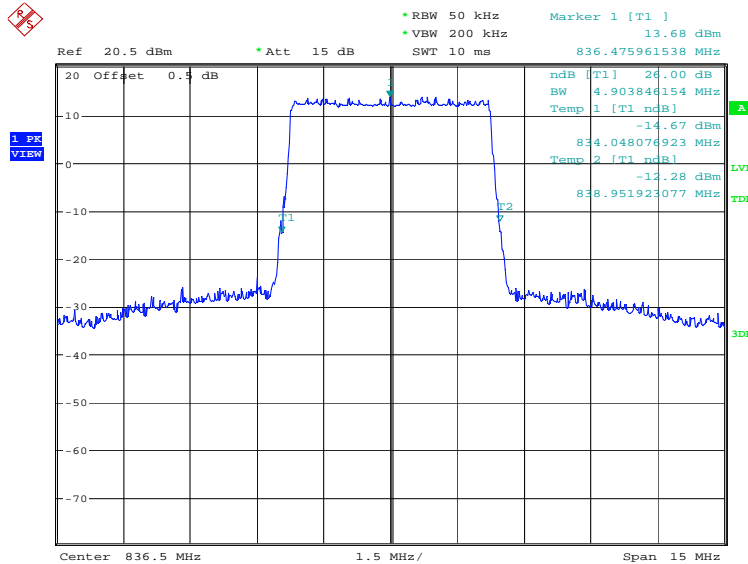
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 4927.88 | 4903.85 |

LTE band 5, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:35:31

LTE band 5, 5MHz Bandwidth, 16QAM (-26dBc BW)

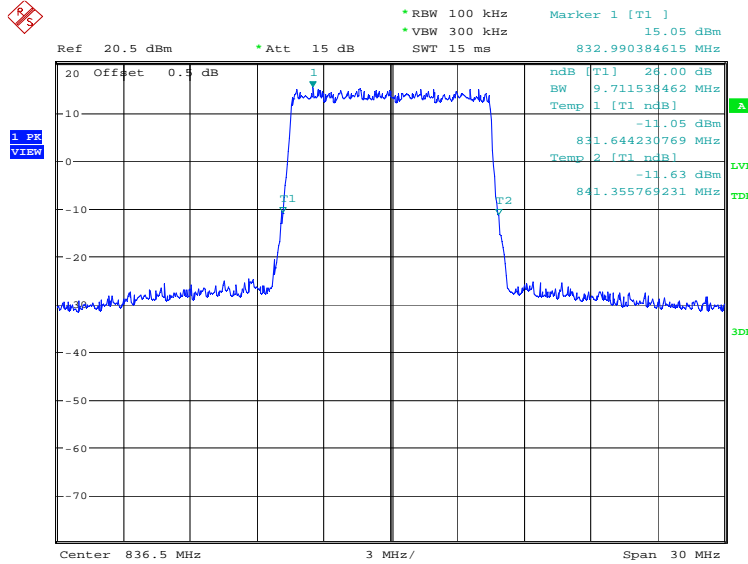


Date: 13.MAY.2020 10:36:10

LTE band 5, 10MHz (-26dBc)

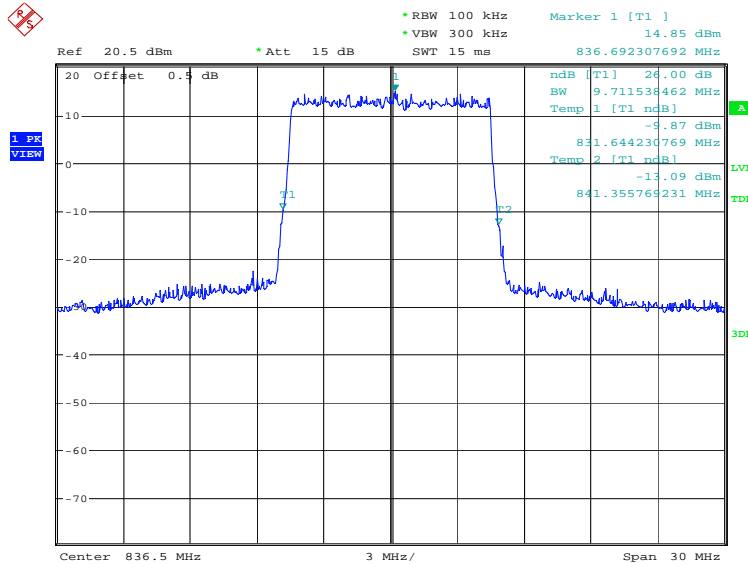
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 836.5 | QPSK | 16QAM |
| | 9711.54 | 9711.54 |

LTE band 5, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:36:51

LTE band 5, 10MHz Bandwidth, 16QAM (-26dBc BW)

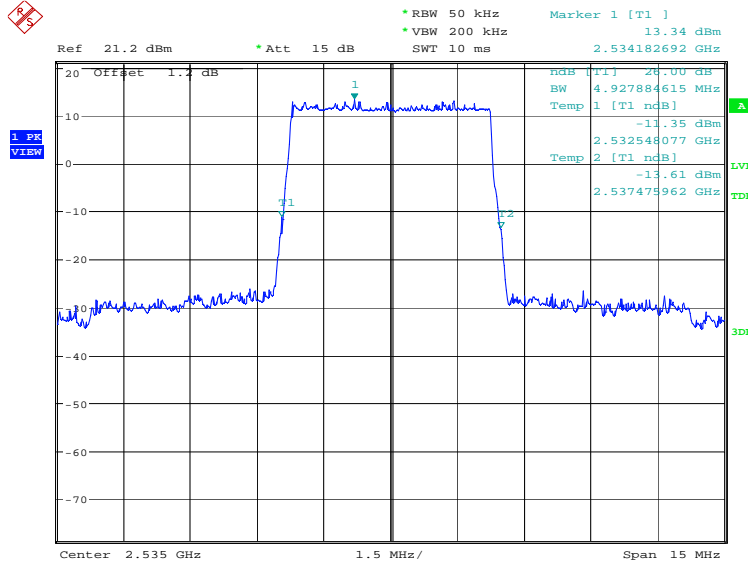


Date: 13.MAY.2020 10:37:30

LTE band 7, 5MHz (-26dBc)

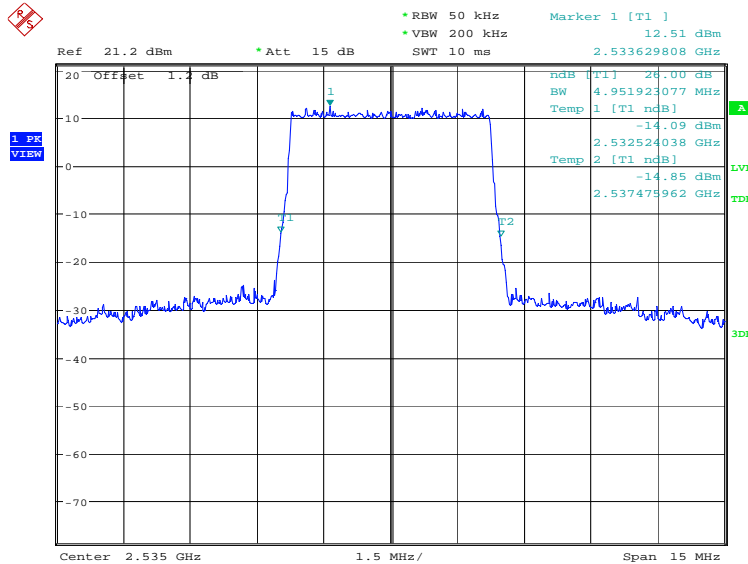
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 2535.0 | QPSK | 16QAM |
| | 4927.88 | 4951.92 |

LTE band 7, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 09:08:56

LTE band 7, 5MHz Bandwidth, 16QAM (-26dBc BW)

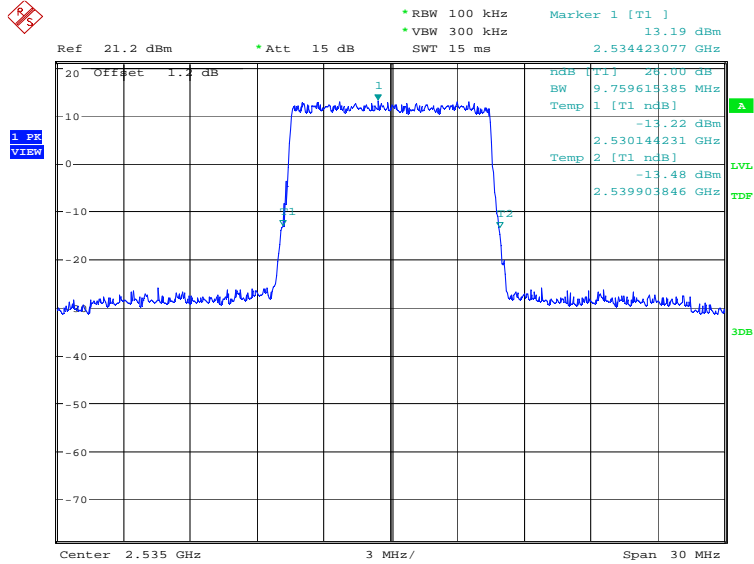


Date: 13.MAY.2020 09:09:35

LTE band 7, 10MHz (-26dBc)

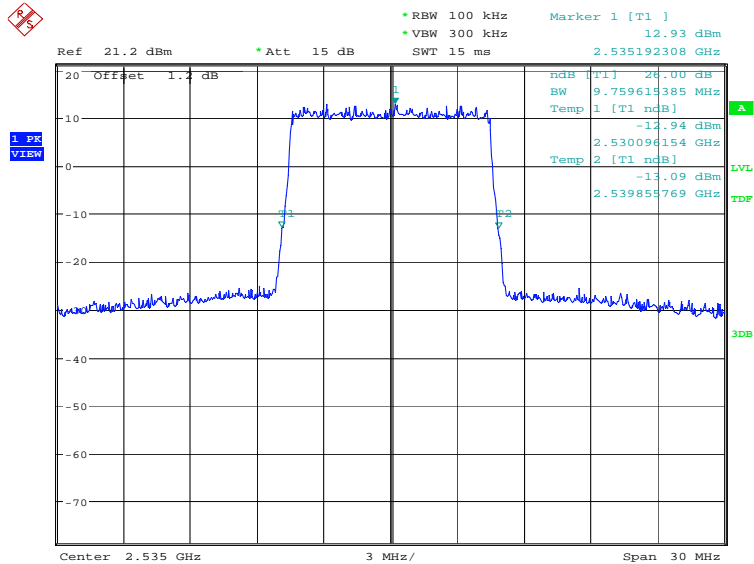
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 2535.0 | QPSK | 16QAM |
| | 9759.62 | 9759.62 |

LTE band 7, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 09:10:15

LTE band 7, 10MHz Bandwidth, 16QAM (-26dBc BW)

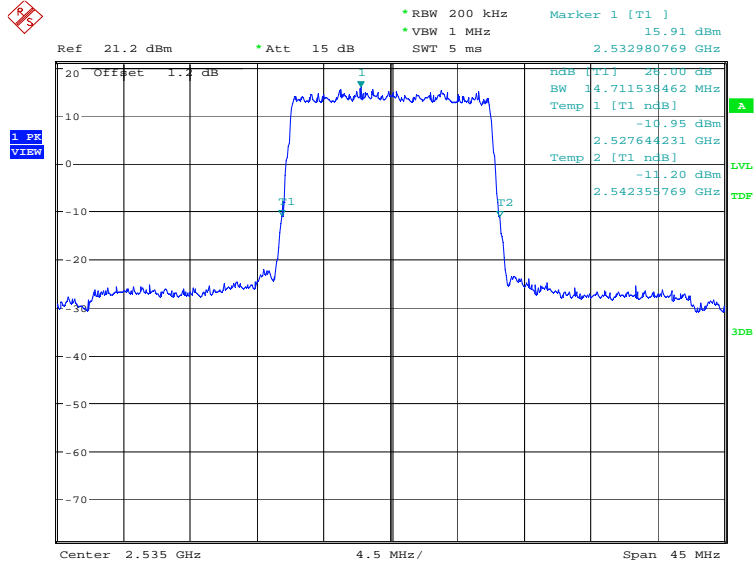


Date: 13.MAY.2020 09:10:54

LTE band 7, 15MHz (-26dBc)

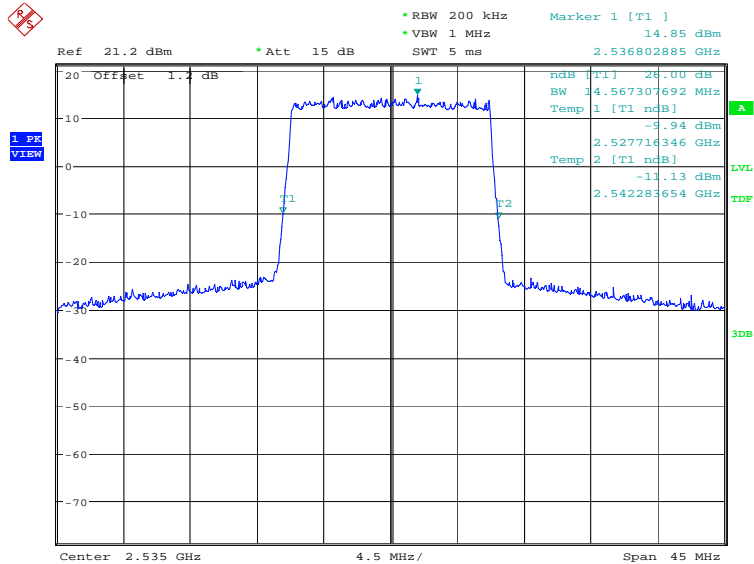
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| 2535.0 | QPSK | 16QAM |
| | 14711.54 | 14567.31 |

LTE band 7, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 09:11:34

LTE band 7, 15MHz Bandwidth, 16QAM (-26dBc BW)

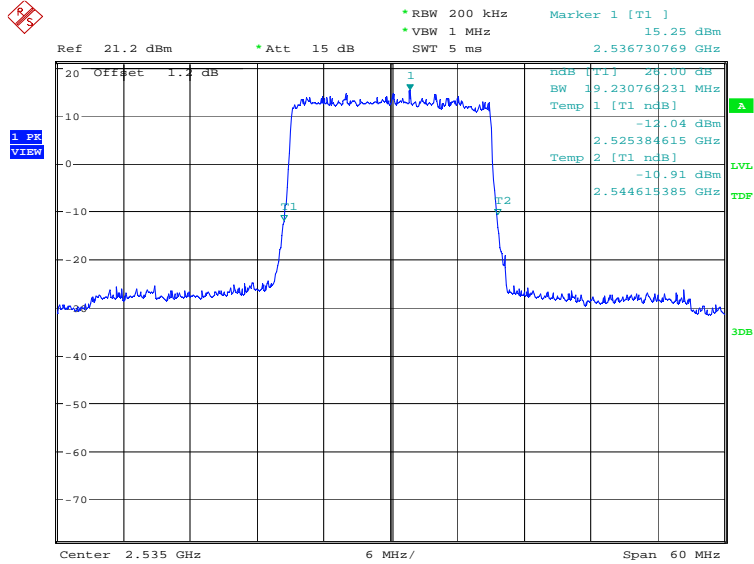


Date: 13.MAY.2020 09:12:13

LTE band 7, 20MHz (-26dBc)

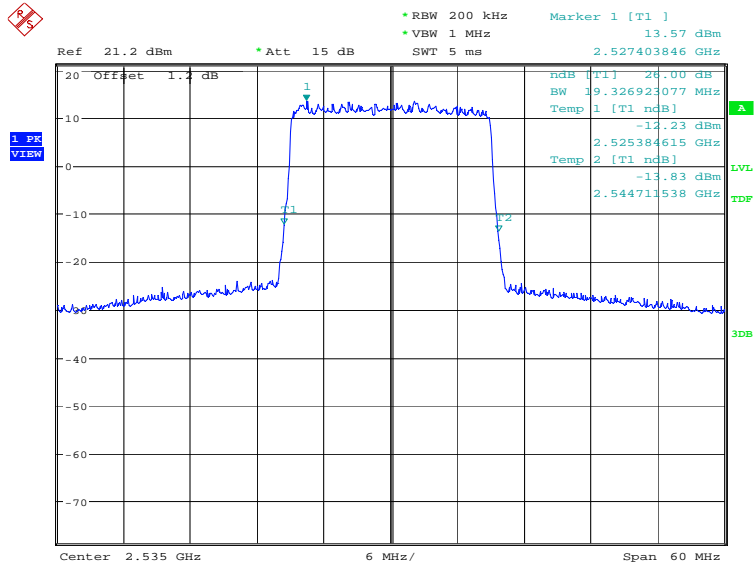
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| 2535.0 | QPSK | 16QAM |
| | 19230.77 | 19326.92 |

LTE band 7, 20MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 09:12:54

LTE band 7, 20MHz Bandwidth, 16QAM (-26dBc BW)

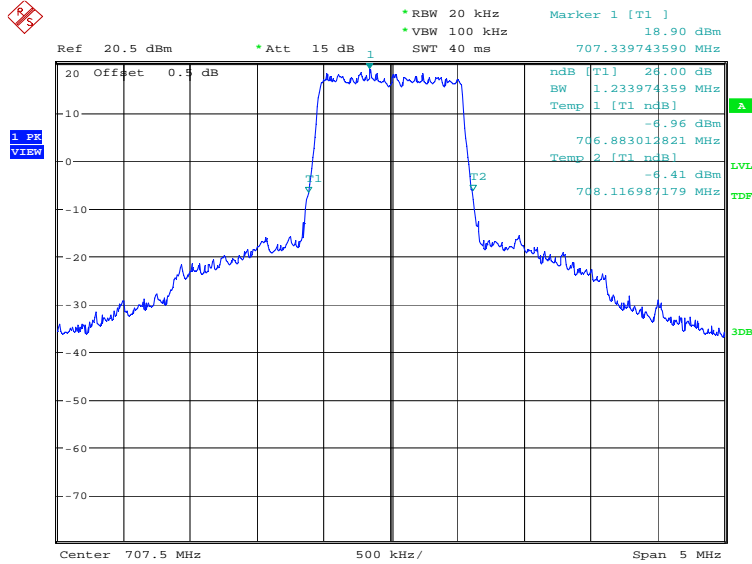


Date: 13.MAY.2020 09:13:33

LTE band 12, 1.4MHz (-26dBc)

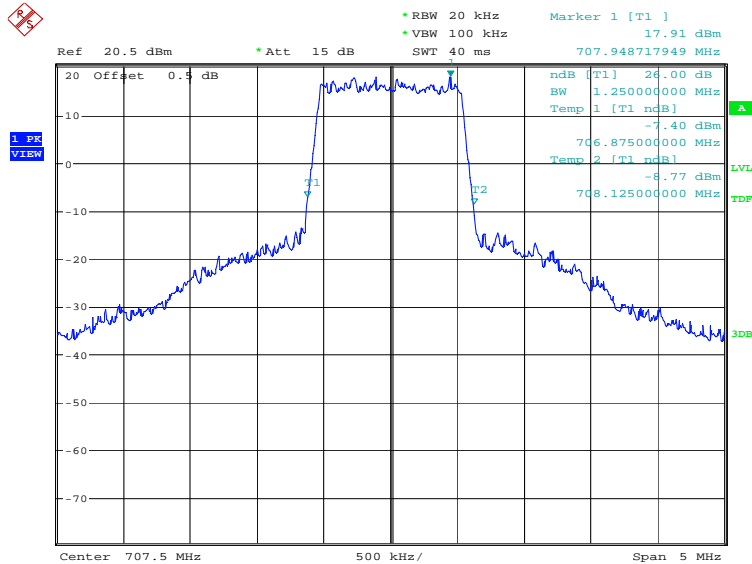
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 1233.97 | 1250.00 |

LTE band 12, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:38:15

LTE band 12, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

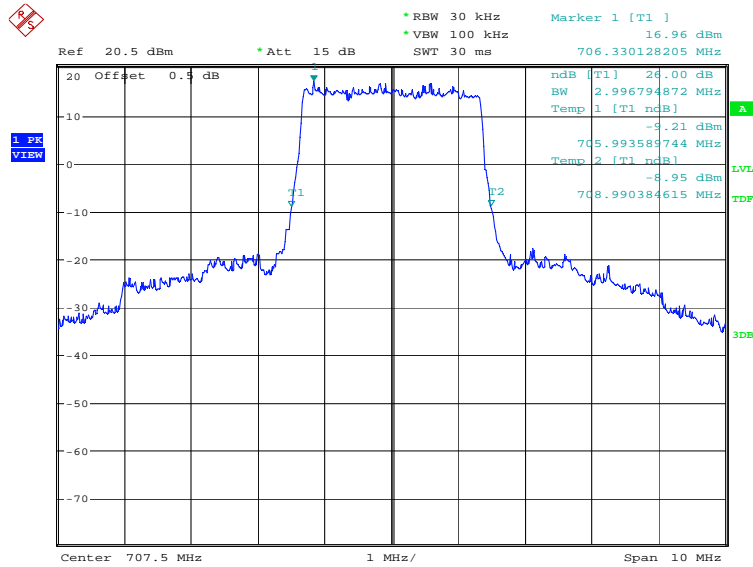


Date: 13.MAY.2020 10:38:54

LTE band 12, 3MHz (-26dBc)

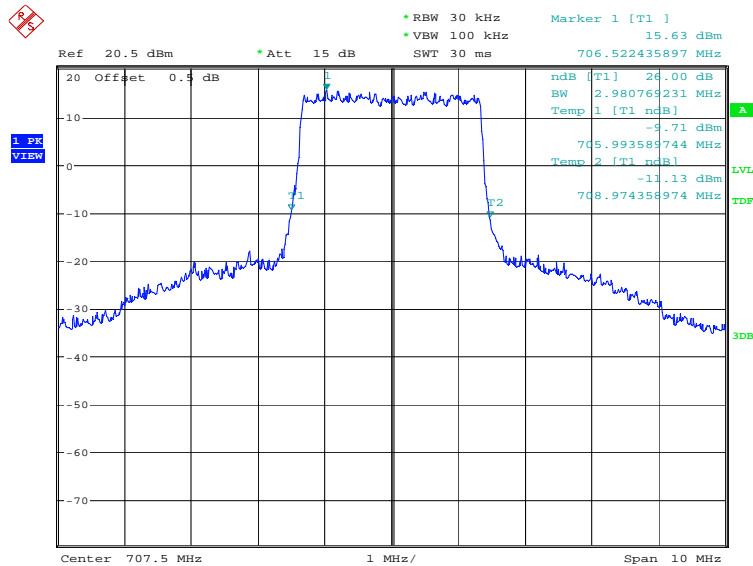
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 2996.79 | 2980.77 |

LTE band 12, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:39:34

LTE band 12, 3MHz Bandwidth, 16QAM (-26dBc BW)

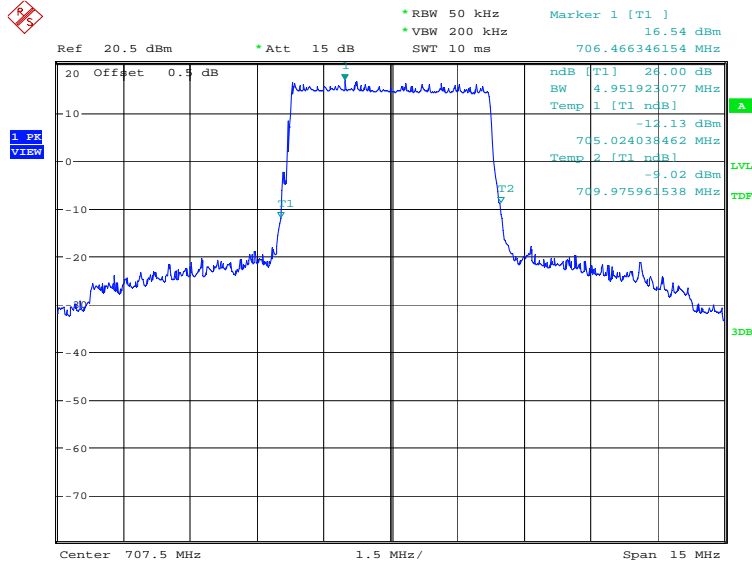


Date: 13.MAY.2020 10:40:13

LTE band 12, 5MHz (-26dBc)

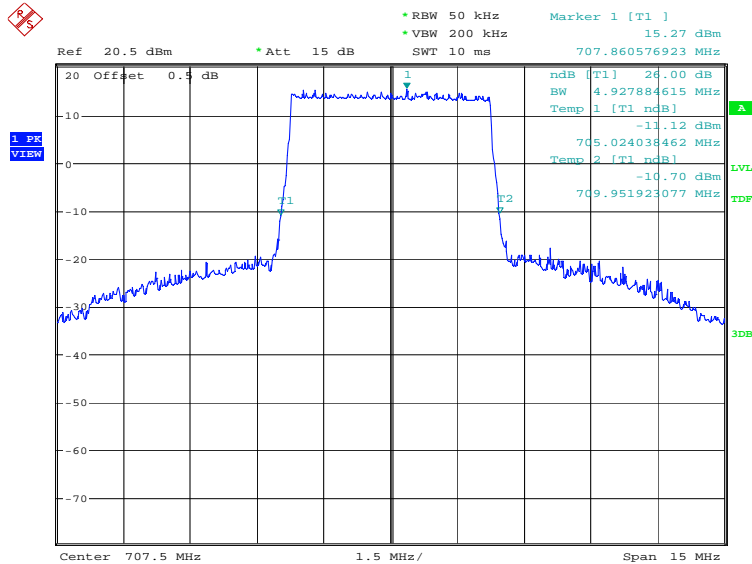
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 4951.92 | 4927.88 |

LTE band 12, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:40:54

LTE band 12, 5MHz Bandwidth, 16QAM (-26dBc BW)

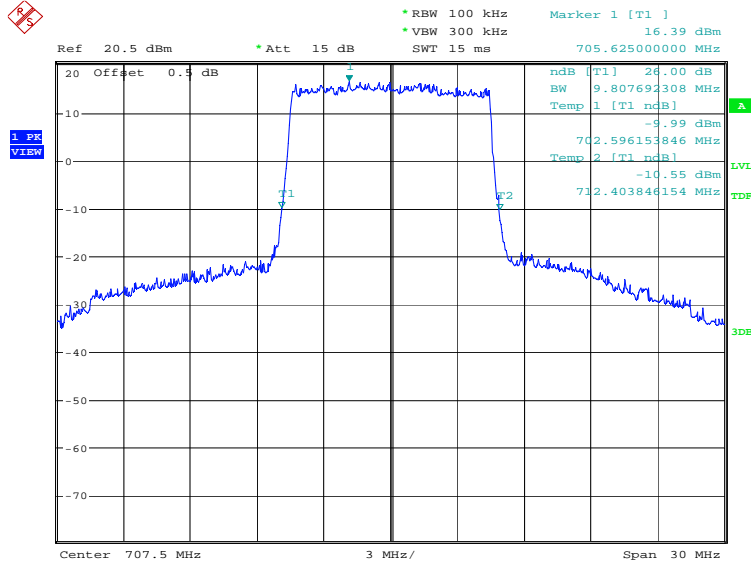


Date: 13.MAY.2020 10:41:33

LTE band 12, 10MHz (-26dBc)

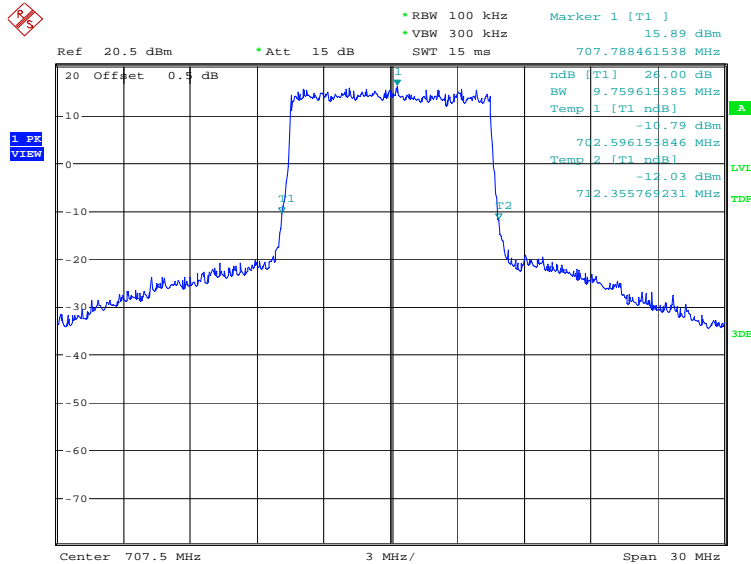
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 707.5 | QPSK | 16QAM |
| | 9807.69 | 9759.62 |

LTE band 12, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:42:14

LTE band 12, 10MHz Bandwidth, 16QAM (-26dBc BW)

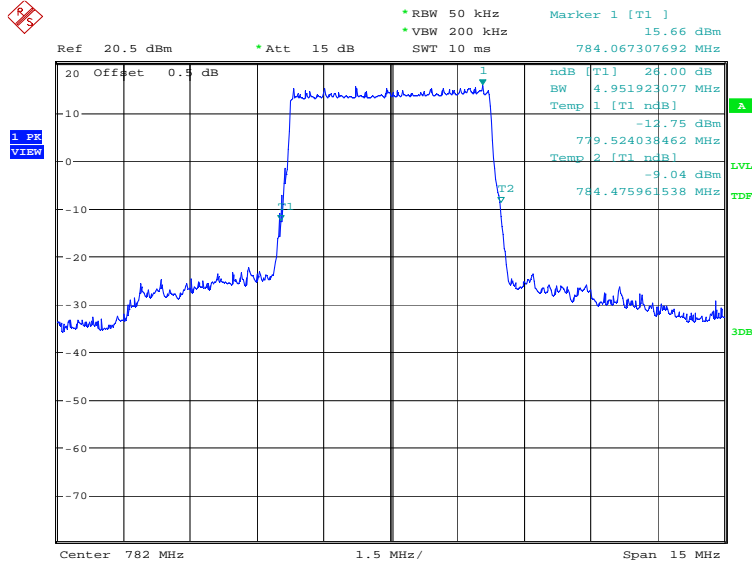


Date: 13.MAY.2020 10:42:53

LTE band 13, 5MHz (-26dBc)

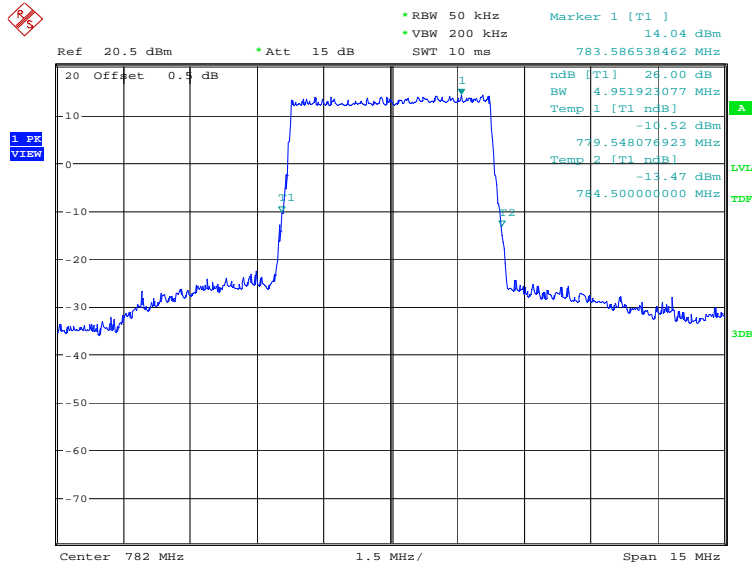
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 782.0 | QPSK | 16QAM |
| | 4951.92 | 4951.92 |

LTE band 13, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:43:35

LTE band 13, 5MHz Bandwidth, 16QAM (-26dBc BW)

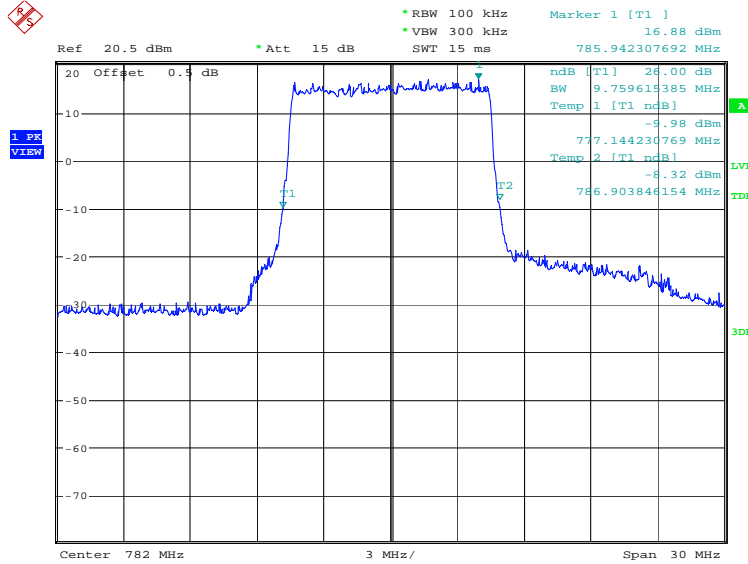


Date: 13.MAY.2020 10:44:14

LTE band 13, 10MHz (-26dBc)

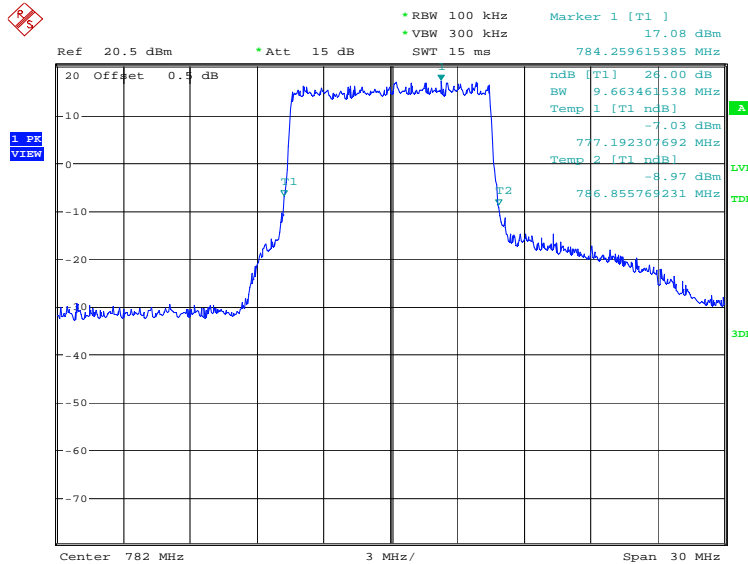
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 782.0 | QPSK | 16QAM |
| | 9759.62 | 9663.46 |

LTE band 13, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:44:54

LTE band 13, 10MHz Bandwidth, 16QAM (-26dBc BW)

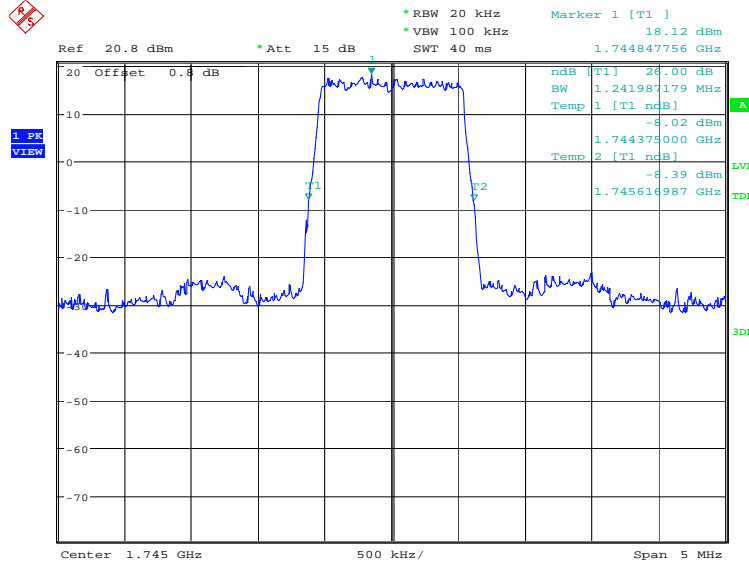


Date: 13.MAY.2020 10:45:34

LTE band 66, 1.4MHz (-26dBc)

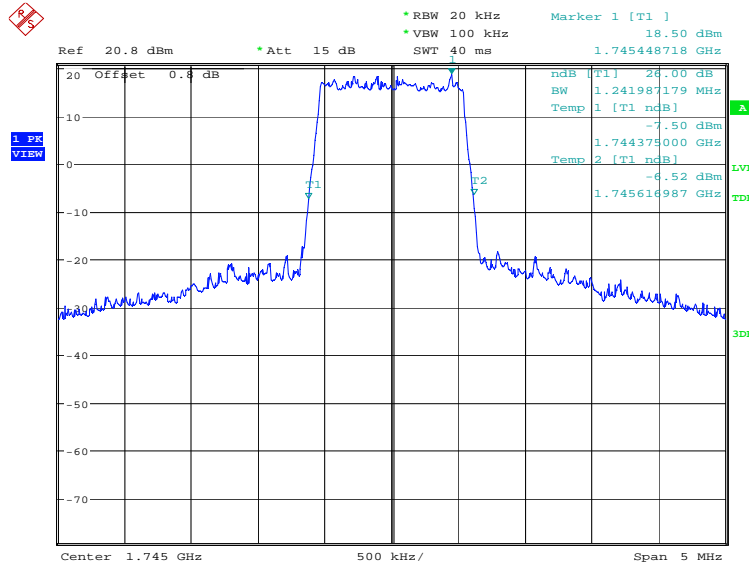
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| | 1745.0 | QPSK |
| 1241.99 | | 1241.99 |

LTE band 66, 1.4MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:46:16

LTE band 66, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

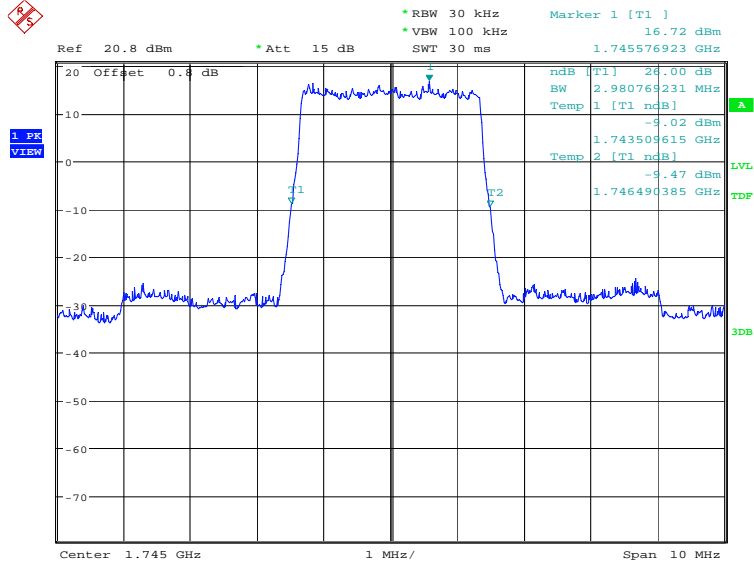


Date: 13.MAY.2020 10:46:55

LTE band 66, 3MHz (-26dBc)

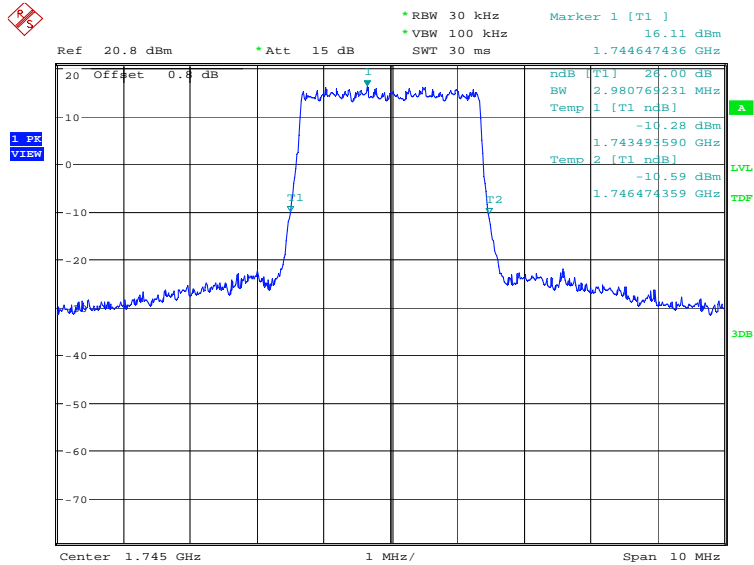
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| | 1745.0 | QPSK |
| 2980.77 | | 2980.77 |

LTE band 66, 3MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:47:36

LTE band 66, 3MHz Bandwidth, 16QAM (-26dBc BW)

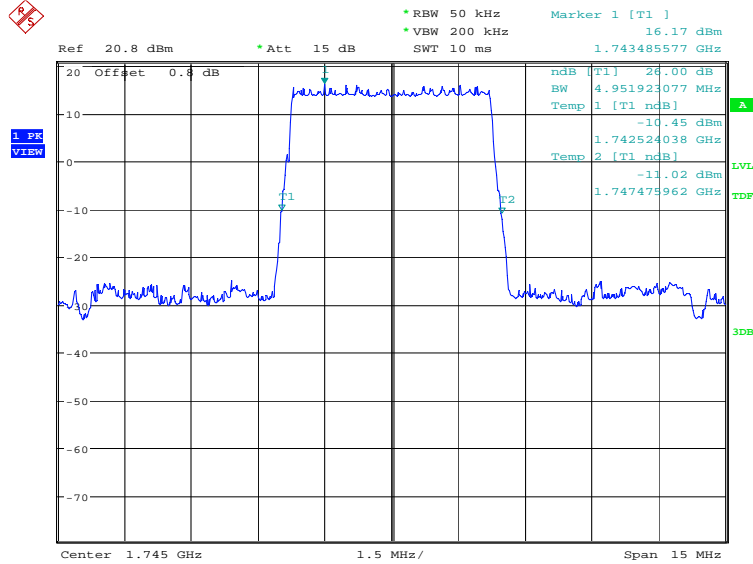


Date: 13.MAY.2020 10:48:15

LTE band 66, 5MHz (-26dBc)

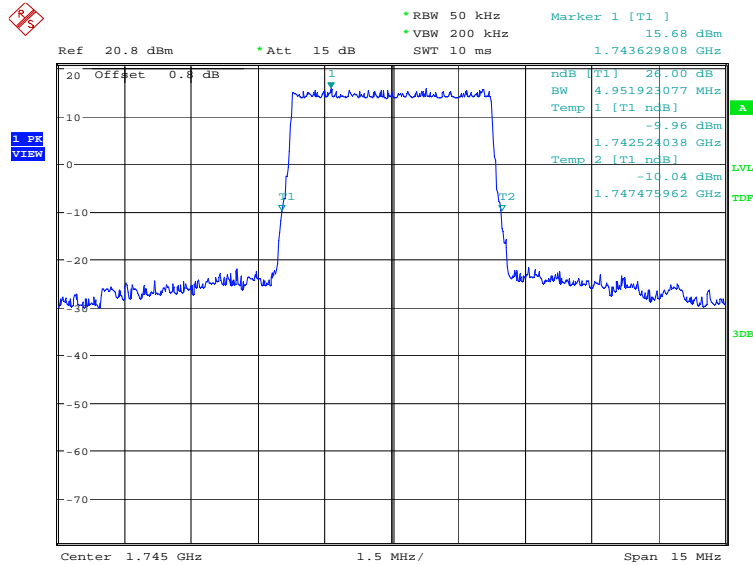
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| 1745.0 | QPSK | 16QAM |
| | 4951.92 | 4951.92 |

LTE band 66, 5MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:48:55

LTE band 66, 5MHz Bandwidth, 16QAM (-26dBc BW)

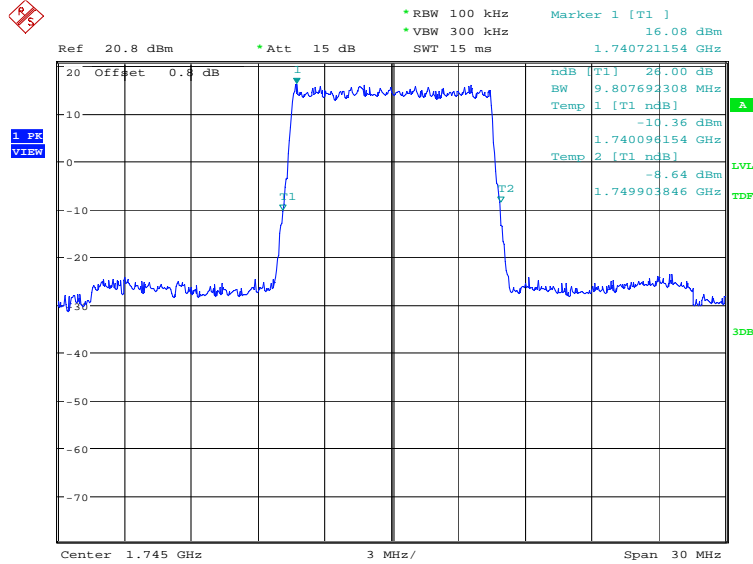


Date: 13.MAY.2020 10:49:34

LTE band 66, 10MHz (-26dBc)

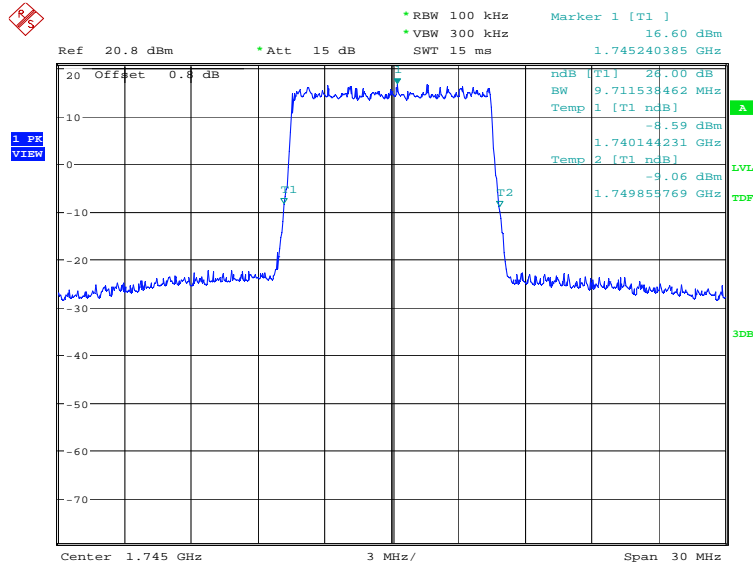
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|---------|
| | 1745.0 | QPSK |
| 9807.69 | | 9711.54 |

LTE band 66, 10MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:50:15

LTE band 66, 10MHz Bandwidth, 16QAM (-26dBc BW)

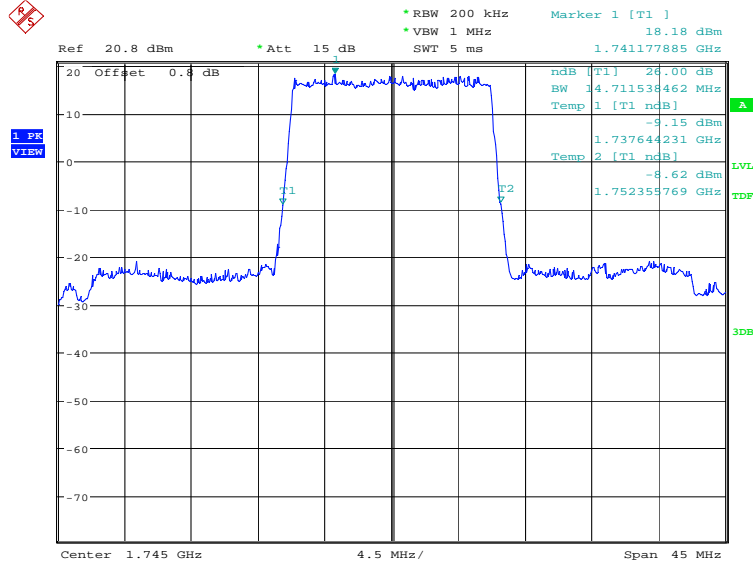


Date: 13.MAY.2020 10:50:54

LTE band 66, 15MHz (-26dBc)

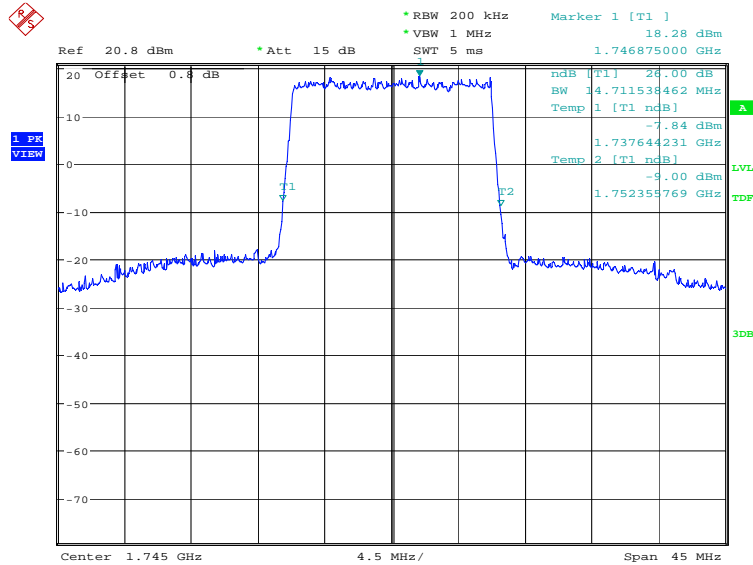
| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| | 1745.0 | QPSK |
| 14711.54 | | 14711.54 |

LTE band 66, 15MHz Bandwidth, QPSK (-26dBc BW)



Date: 13.MAY.2020 10:51:35

LTE band 66, 15MHz Bandwidth, 16QAM (-26dBc BW)

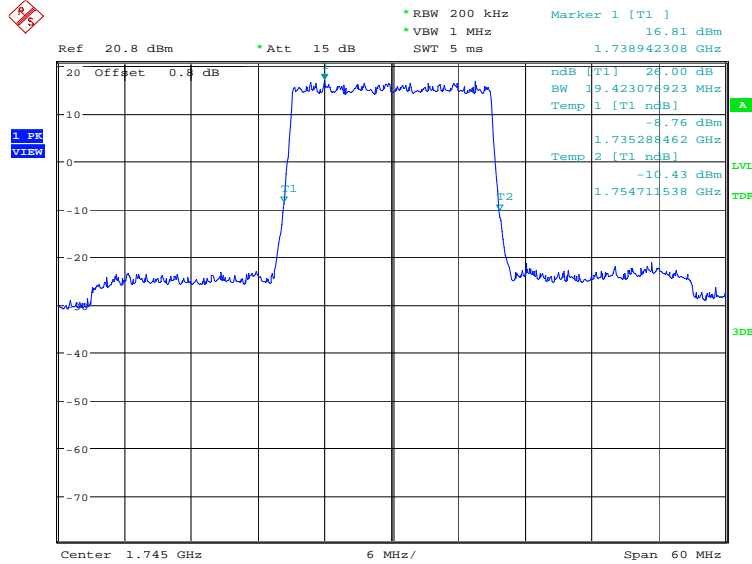


Date: 13.MAY.2020 10:52:14

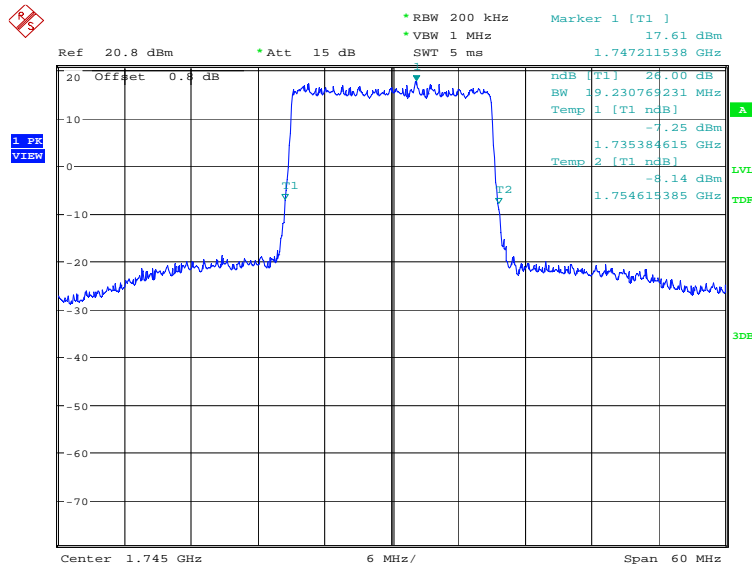
LTE band 66, 20MHz (-26dBc)

| Frequency(MHz) | Occupied Bandwidth (-26dBc) (kHz) | |
|----------------|-----------------------------------|----------|
| | 1745.0 | QPSK |
| 19423.08 | | 19230.77 |

LTE band 66, 20MHz Bandwidth, QPSK (-26dBc BW)



LTE band 66, 20MHz Bandwidth, 16QAM (-26dBc BW)



A.6 Band Edge Compliance

A.6.1 Measurement limit

Part 22.917, Part 24.238 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

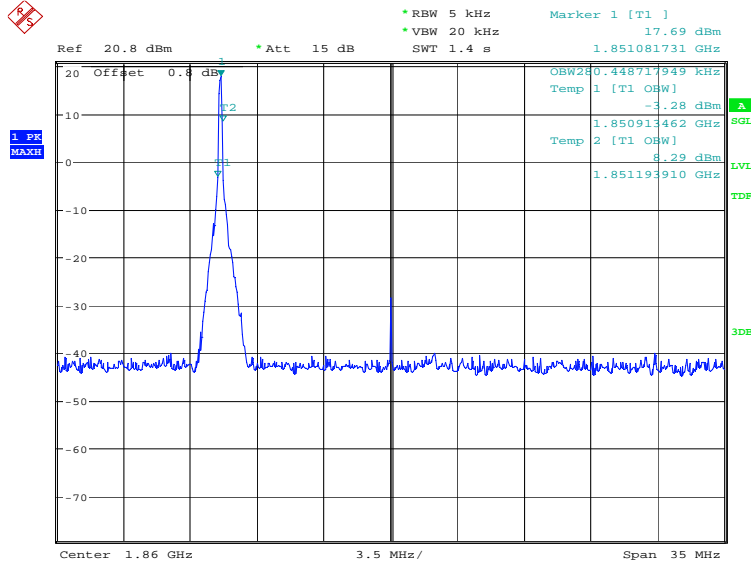
Part 27.53(m) specifies for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 27.53(c) states 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:(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;(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 $43 + 10 \log(P)$ dB;(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

Part 27.53(f) states for operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals.

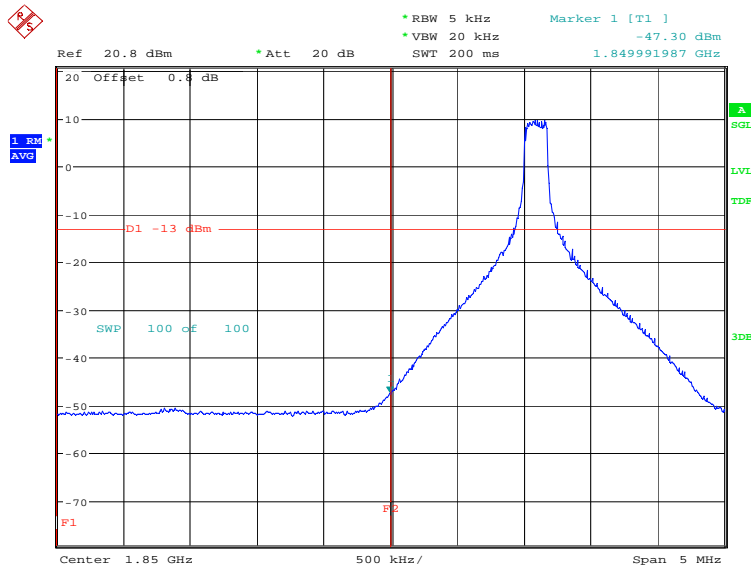
Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ 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.

A.6.2 Measurement result
Only the worst case result is given below
LTE band 2
OBW: 1RB-low_offset



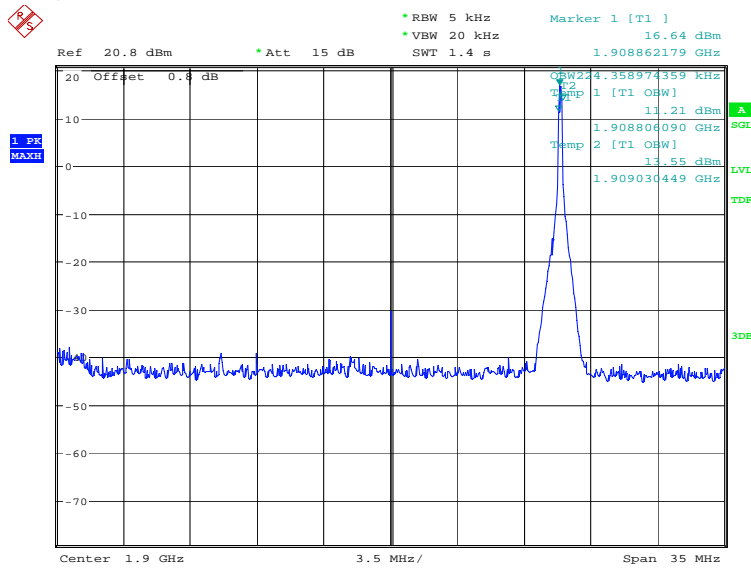
Date: 20.JUN.2020 14:03:25

LOW BAND EDGE BLOCK-1RB-low_offset



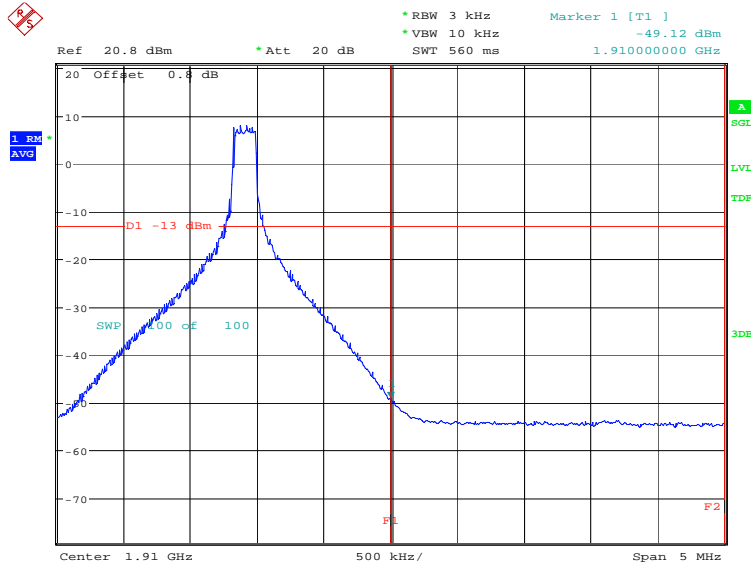
Date: 20.JUN.2020 14:04:38

OBW: 1RB-high_offset



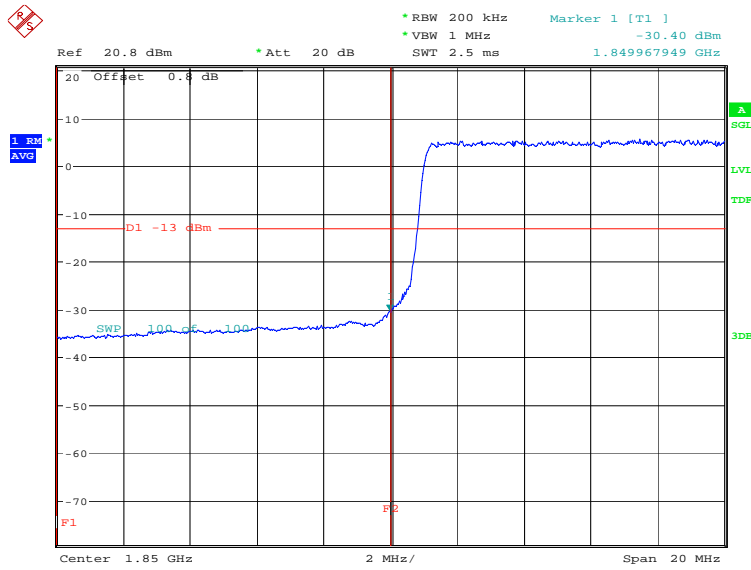
Date: 20.JUN.2020 14:05:12

HIGH BAND EDGE BLOCK-1RB-high_offset



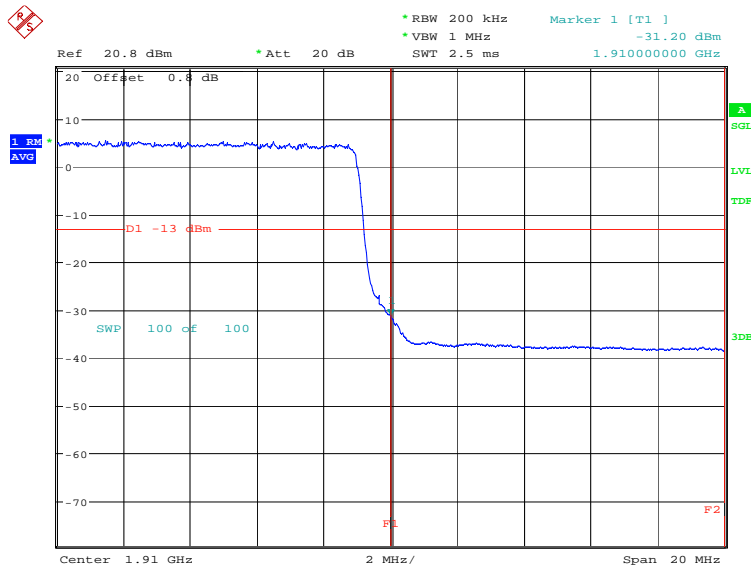
Date: 20.JUN.2020 14:06:25

LOW BAND EDGE BLOCK-20MHz-100%RB



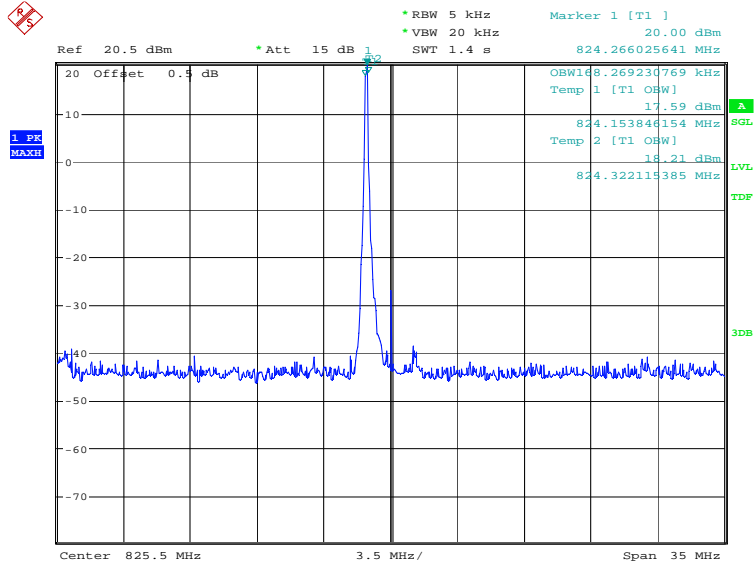
Date: 13.MAY.2020 10:54:38

HIGH BAND EDGE BLOCK-20MHz-100%RB



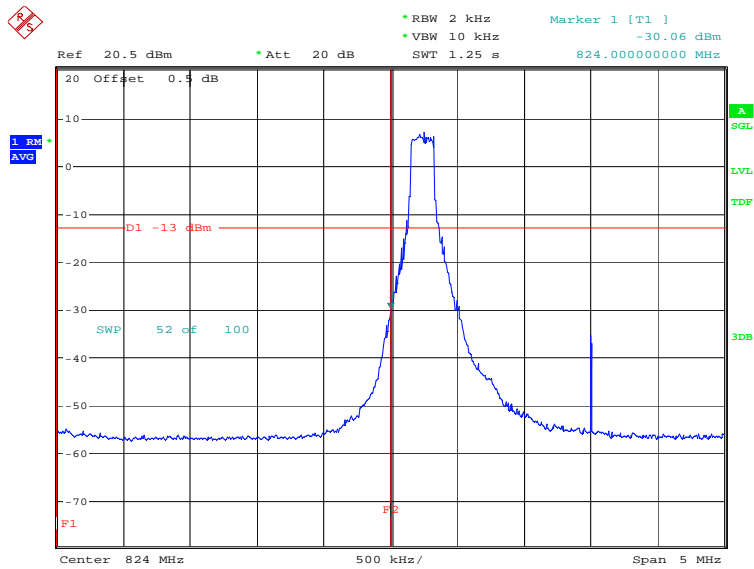
Date: 13.MAY.2020 10:55:58

LTE band 5
OBW: 1RB-low_offset



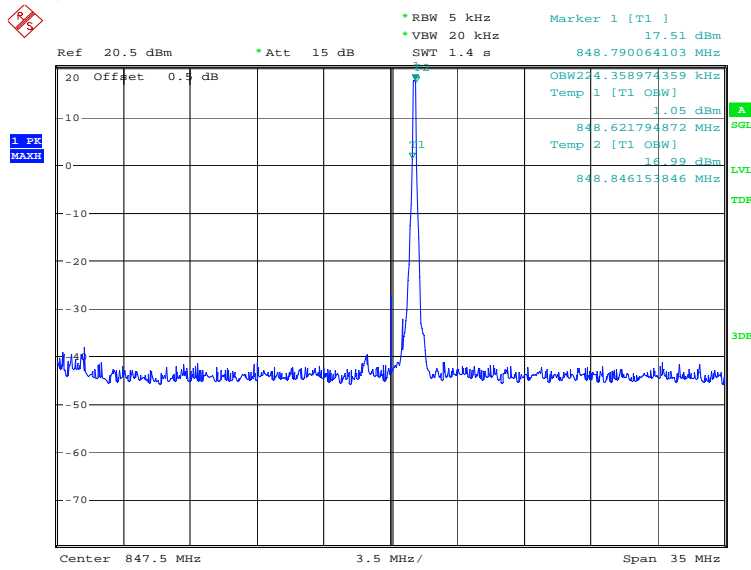
Date: 20.JUN.2020 14:13:54

LOW BAND EDGE BLOCK-1RB-low_offset



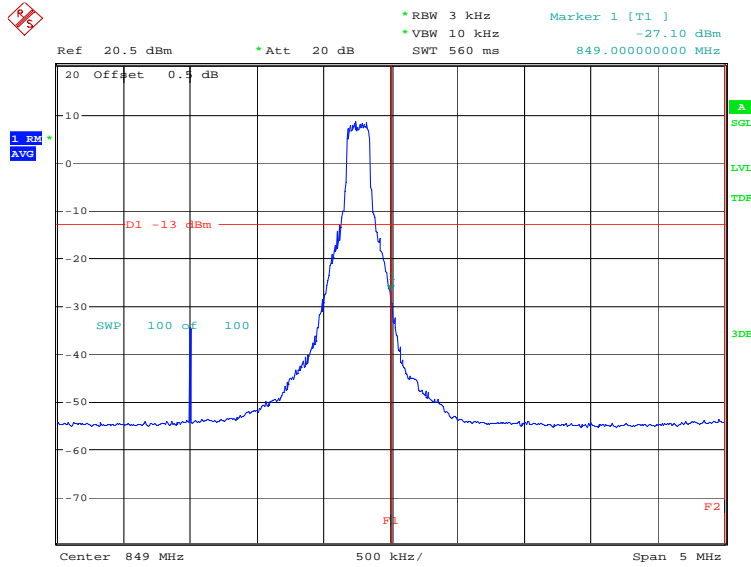
Date: 20.JUN.2020 14:15:07

OBW: 1RB-high_offset



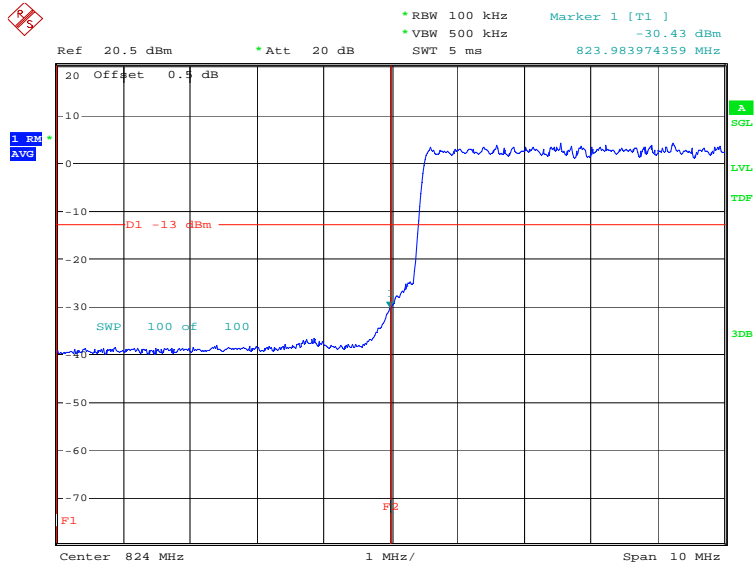
Date: 20.JUN.2020 14:15:41

HIGH BAND EDGE BLOCK-1RB-high_offset



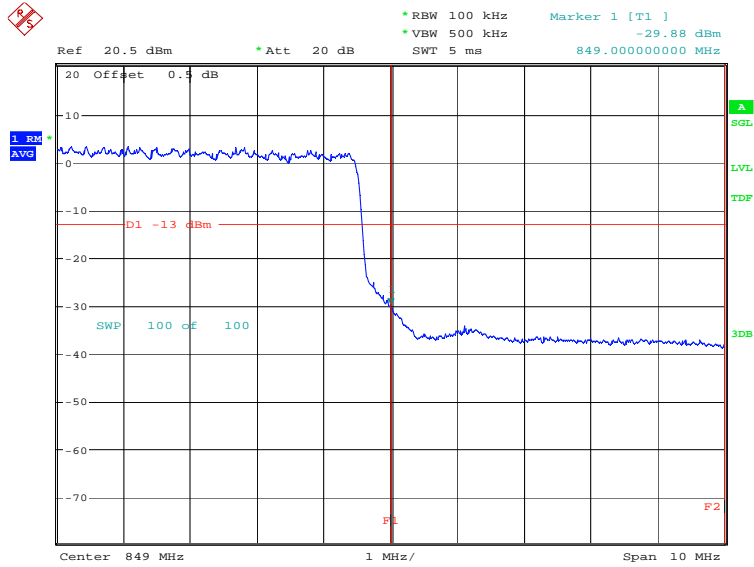
Date: 20.JUN.2020 14:16:54

LOW BAND EDGE BLOCK-10MHz-100%RB



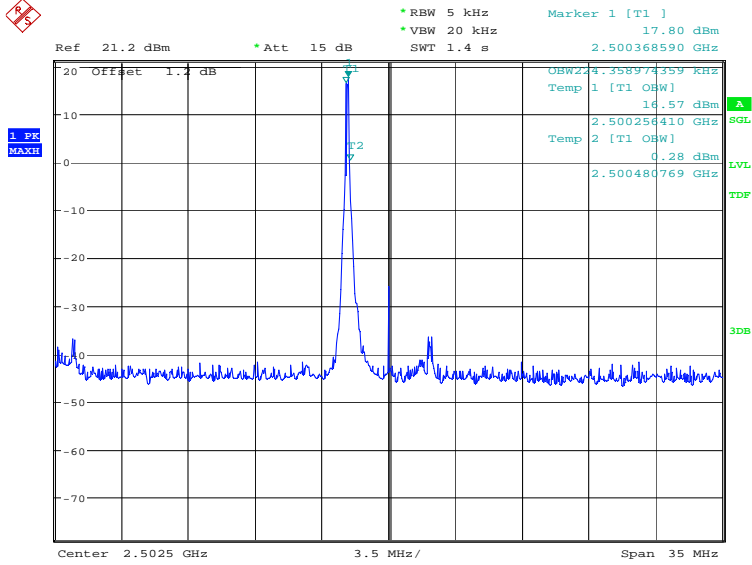
Date: 20.JUN.2020 17:28:11

HIGH BAND EDGE BLOCK-10MHz-100%RB



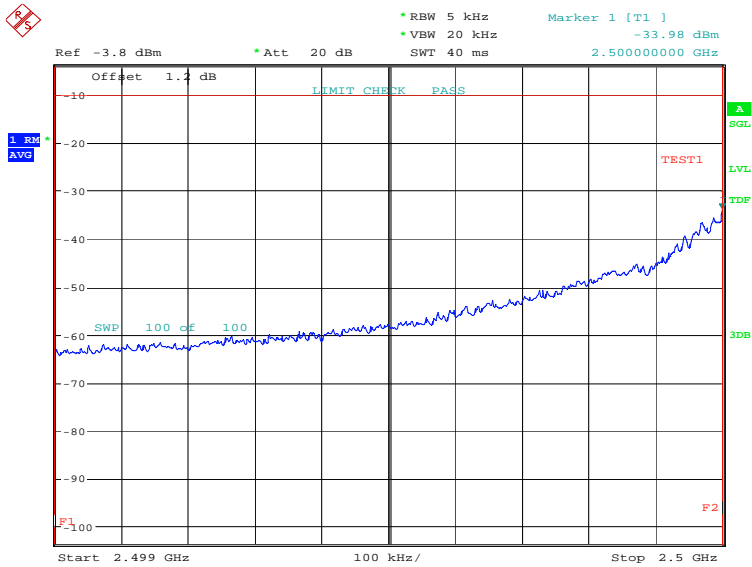
Date: 20.JUN.2020 17:29:30

LTE band 7
OBW: 1RB-low_offset

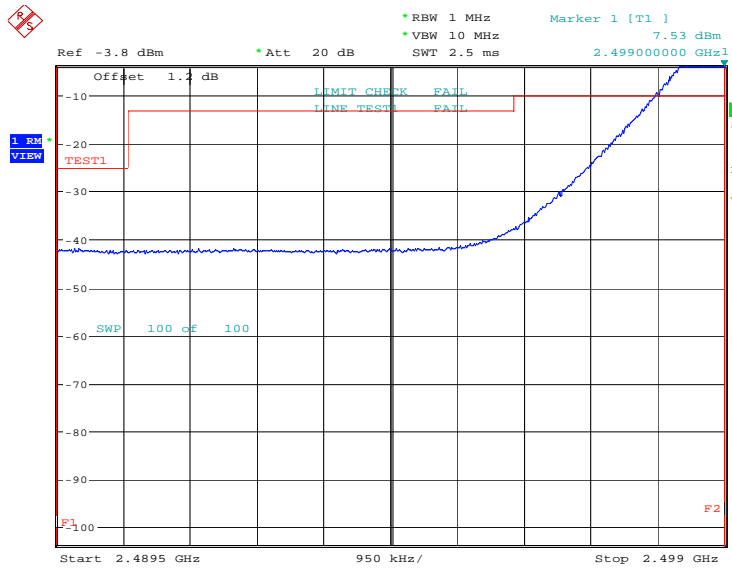


Date: 20.JUN.2020 15:42:36

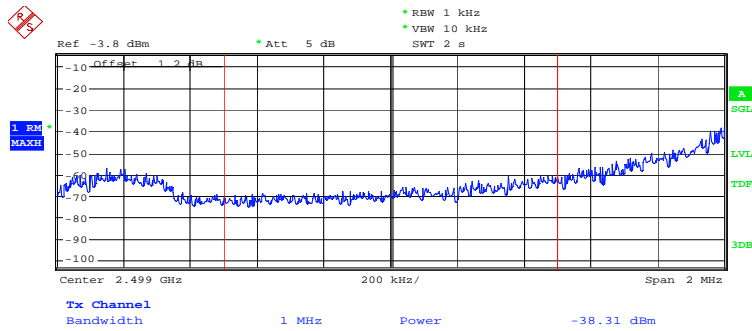
LOW BAND EDGE BLOCK-1RB-low_offset



Date: 20.JUN.2020 15:43:55

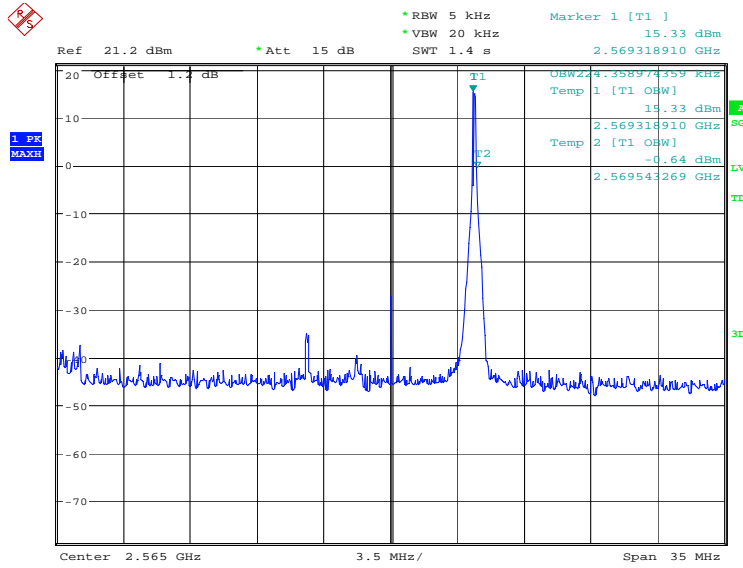


Date: 20.JUN.2020 15:44:12



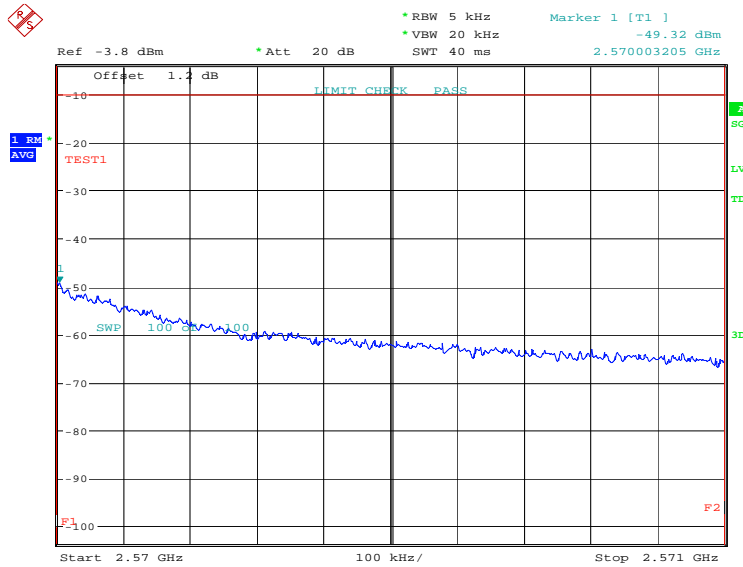
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OBW: 1RB-high_offset

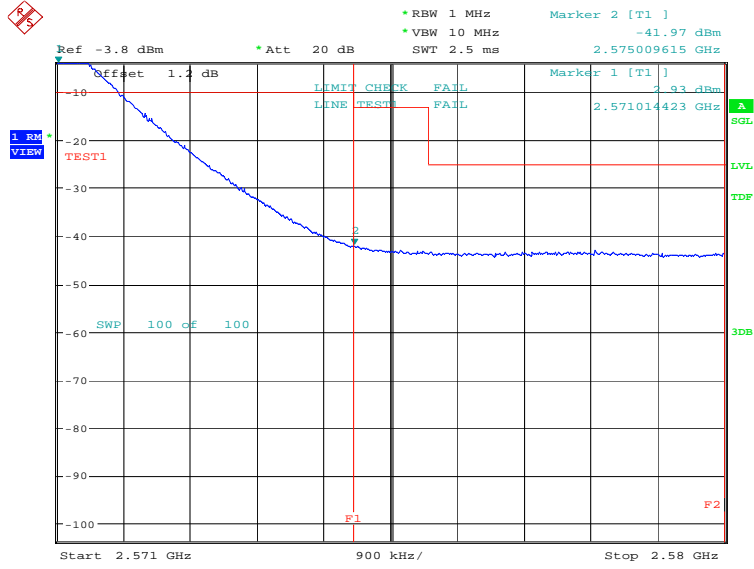


Date: 20.JUN.2020 15:44:58

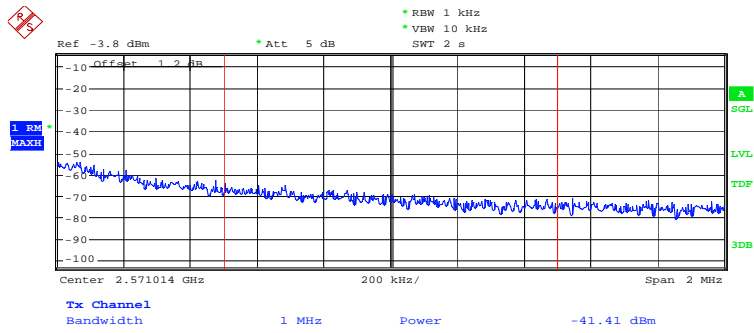
HIGH BAND EDGE BLOCK-1RB-high_offset



Date: 20.JUN.2020 15:46:18

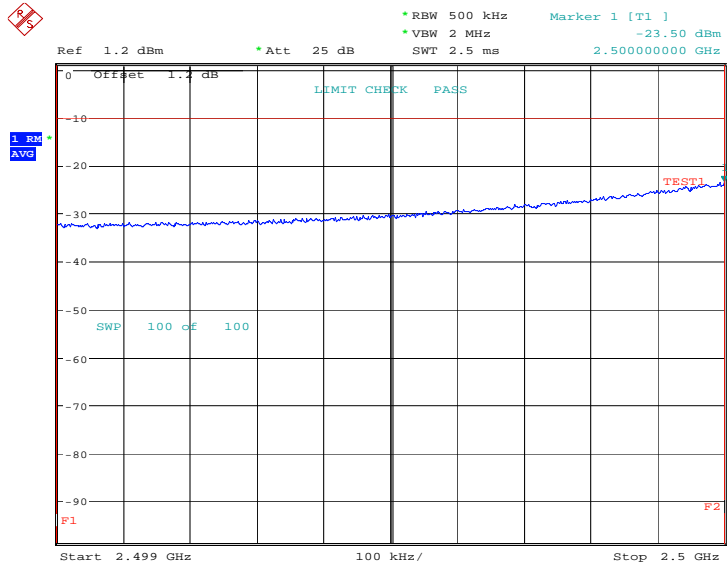


Date: 20.JUN.2020 15:46:37

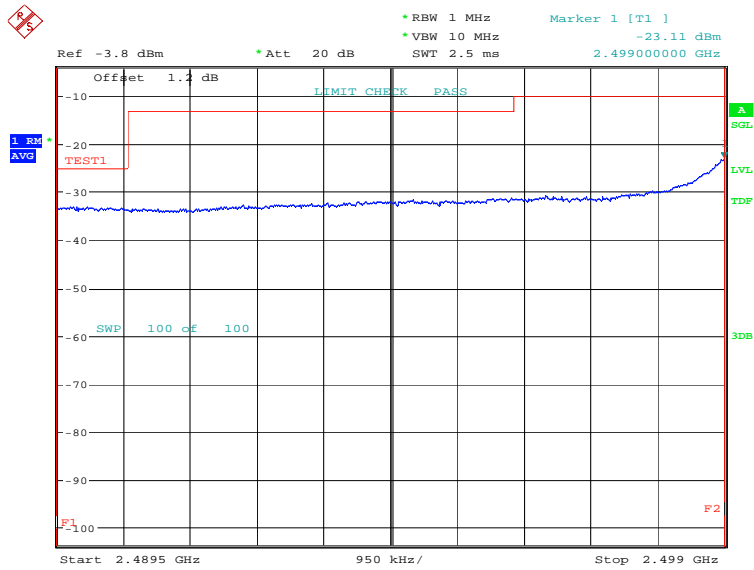


Date: 20.JUN.2020 15:46:48

LOW BAND EDGE BLOCK-20MHz-100%RB

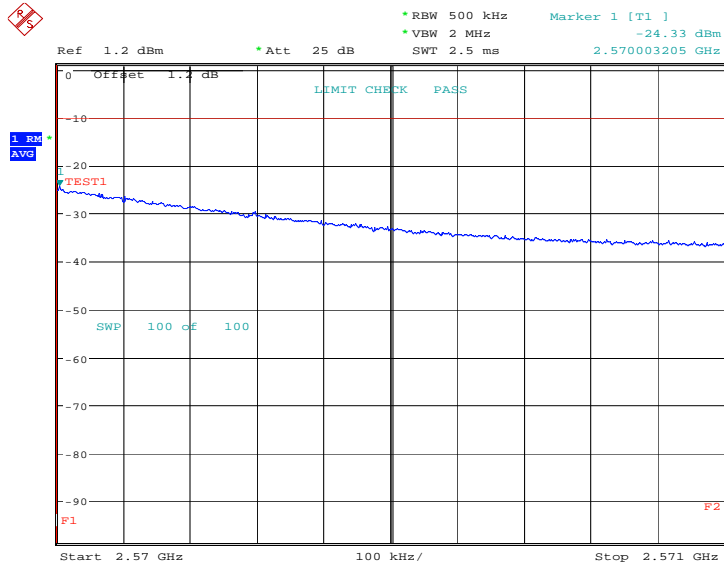


Date: 13.MAY.2020 09:14:37

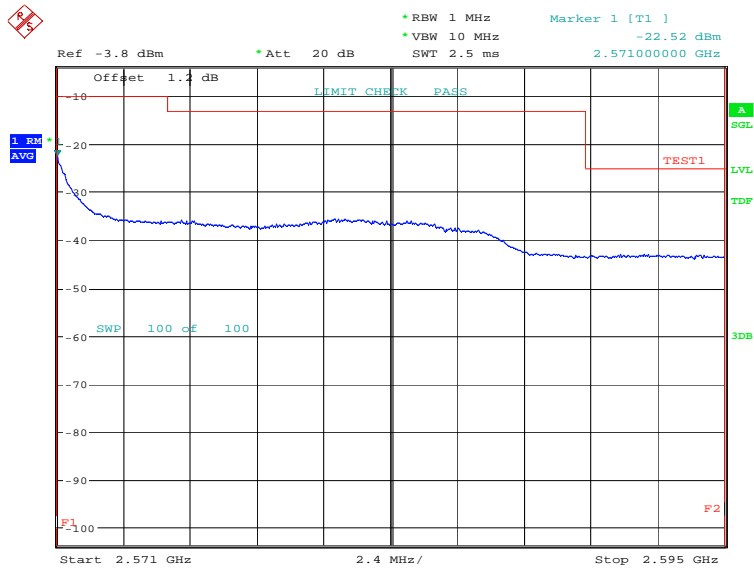


Date: 13.MAY.2020 09:14:51

HIGH BAND EDGE BLOCK-20MHz-100%RB

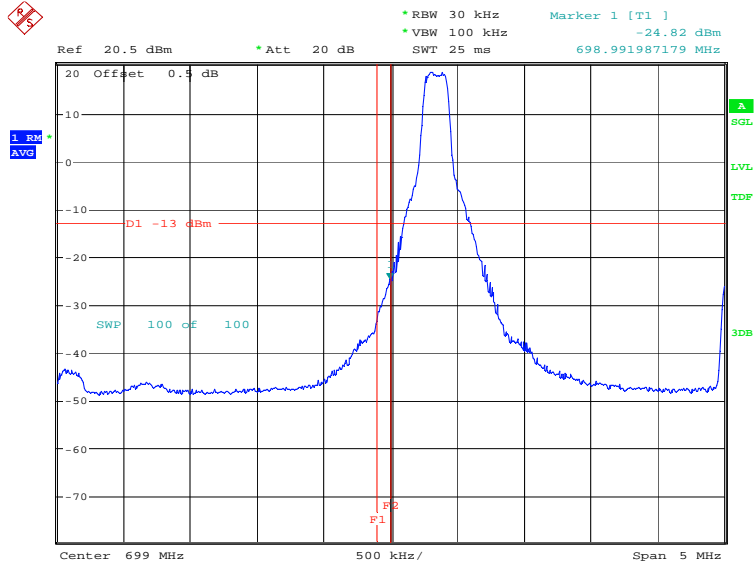


Date: 13.MAY.2020 09:16:16



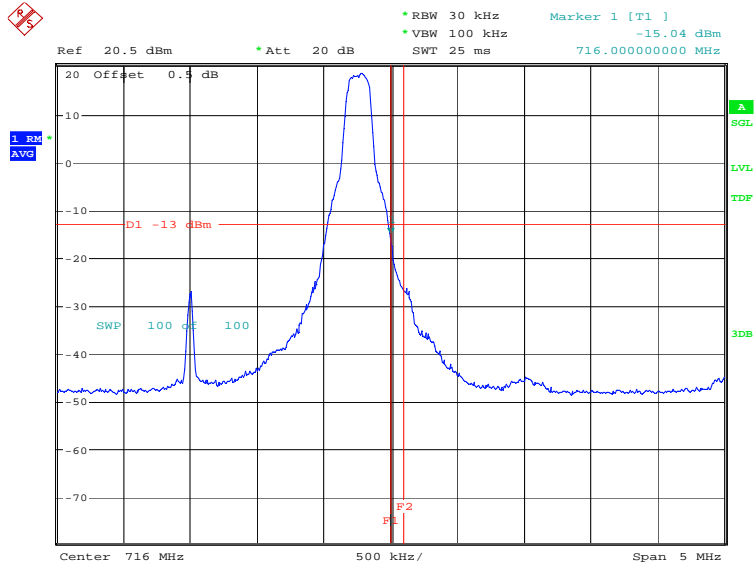
Date: 13.MAY.2020 09:16:29

LTE band 12
LOW BAND EDGE BLOCK-1RB-low_offset



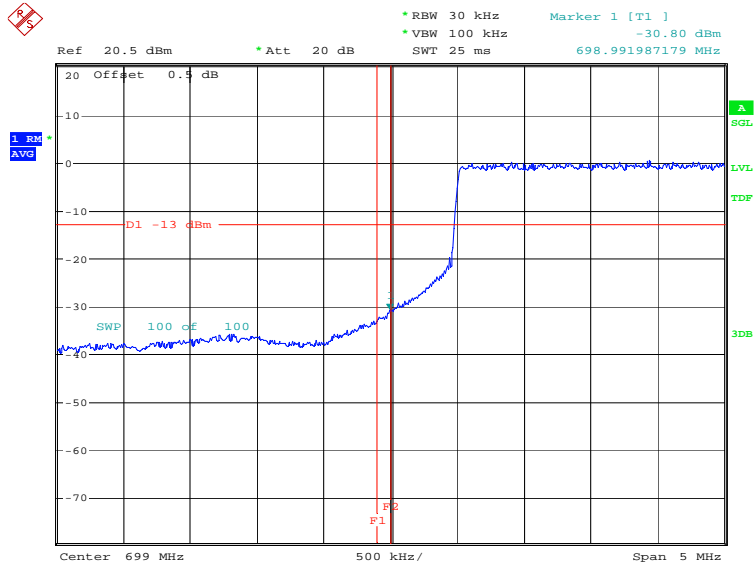
Date: 20.JUN.2020 14:17:44

HIGH BAND EDGE BLOCK-1RB-high_offset



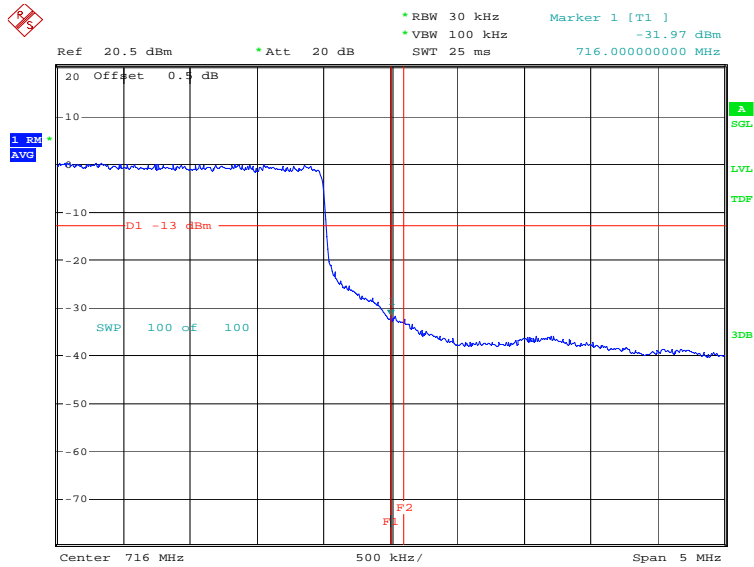
Date: 20.JUN.2020 14:22:06

LOW BAND EDGE BLOCK-10MHz-100%RB



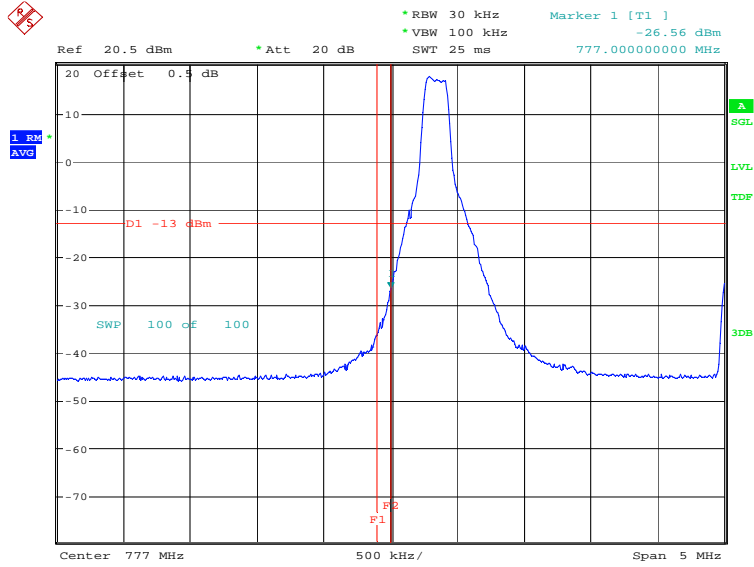
Date: 13.MAY.2020 11:03:08

HIGH BAND EDGE BLOCK-10MHz-100%RB

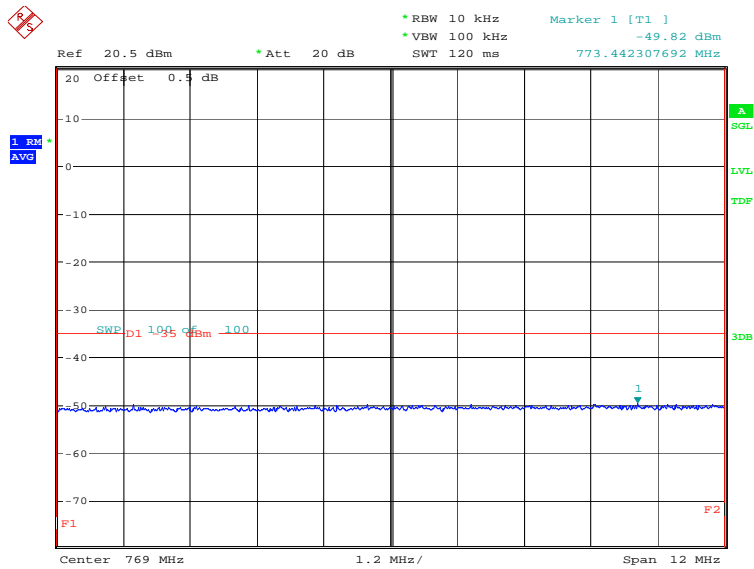


Date: 13.MAY.2020 11:04:28

LTE band 13
LOW BAND EDGE BLOCK-1RB-low_offset

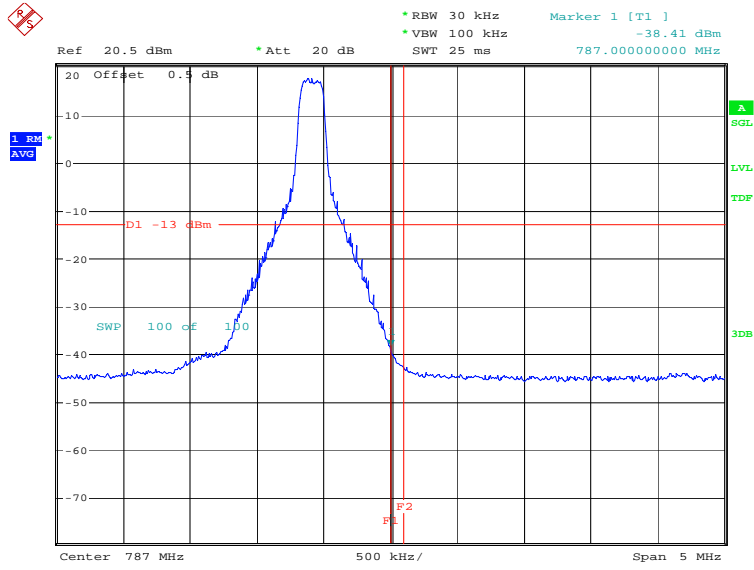


Date: 20.JUN.2020 14:55:33

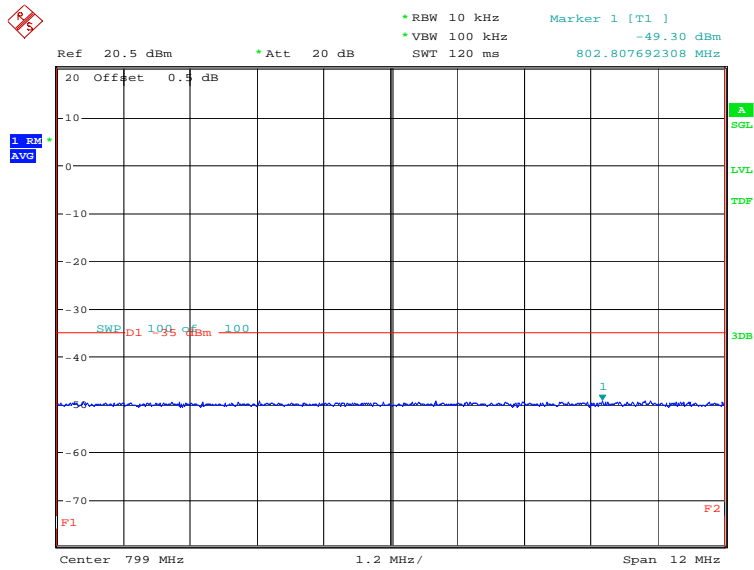


Date: 20.JUN.2020 14:56:00

HIGH BAND EDGE BLOCK-1RB-high_offset

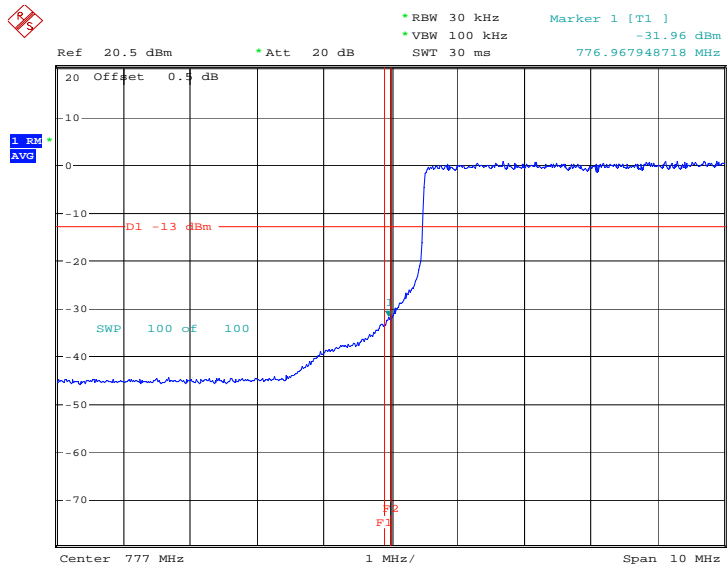


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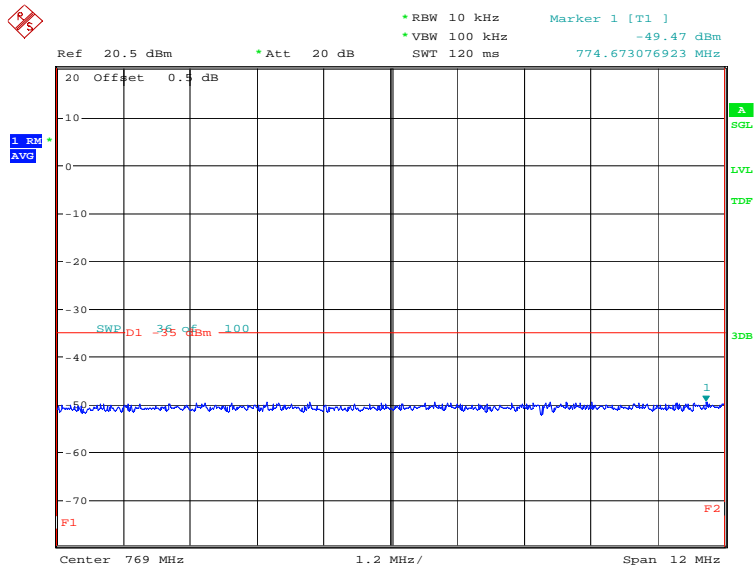


Date: 20.JUN.2020 14:57:34

LOW BAND EDGE BLOCK-10MHz-100%RB

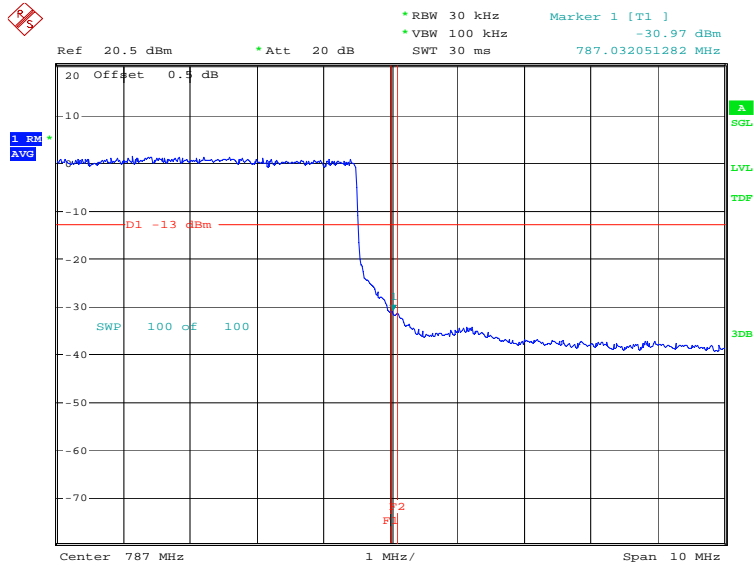


Date: 13.MAY.2020 11:05:48

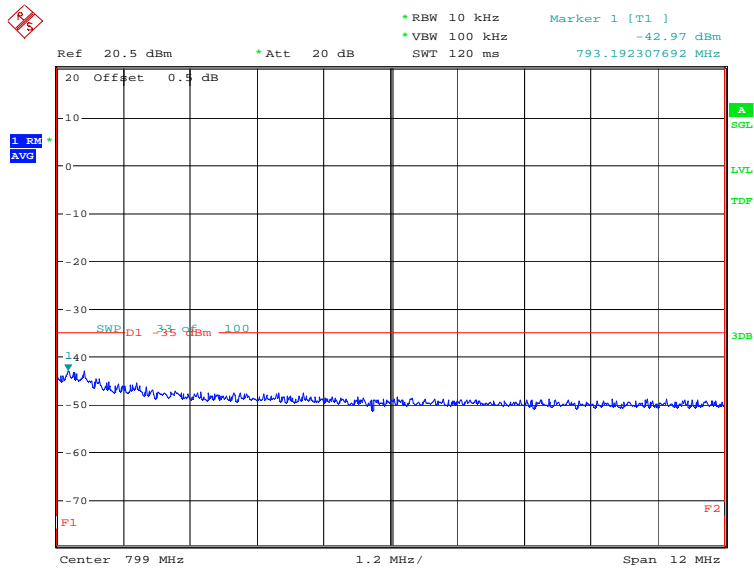


Date: 13.MAY.2020 11:06:01

HIGH BAND EDGE BLOCK-10MHz-100%RB

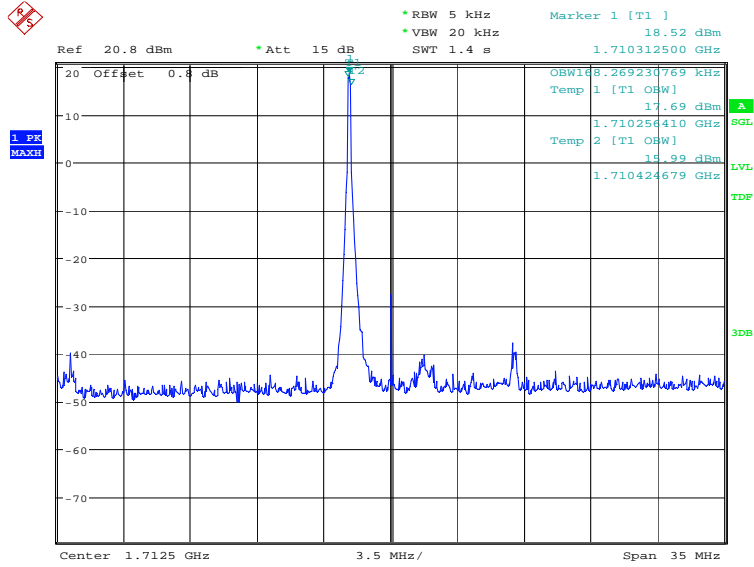


Date: 13.MAY.2020 11:07:20



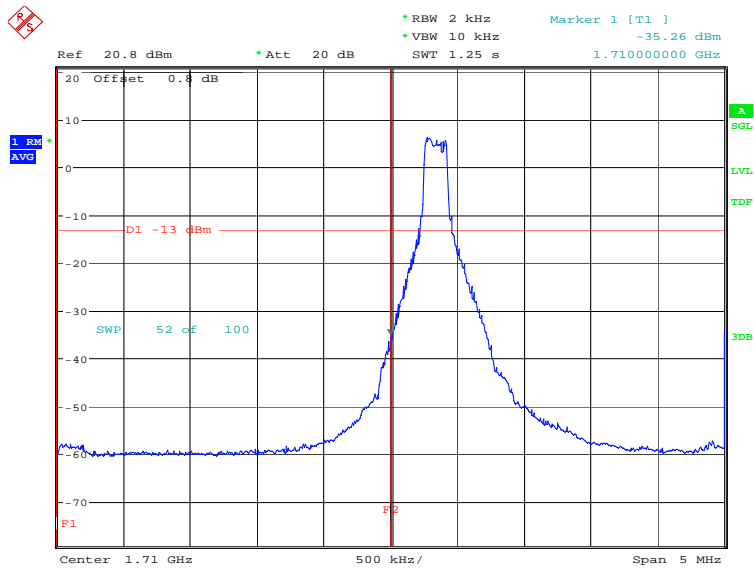
Date: 13.MAY.2020 11:07:33

LTE band 66
OBW: 1RB-low_offset



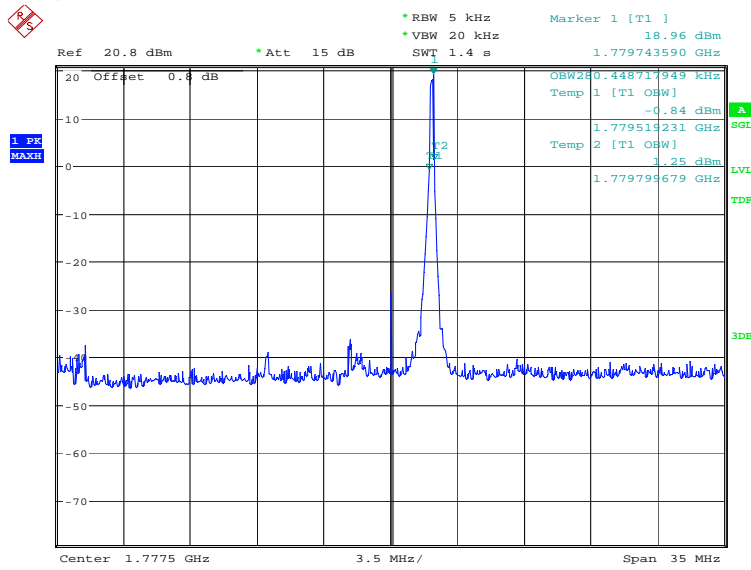
Date: 20.JUN.2020 14:27:36

LOW BAND EDGE BLOCK-1RB-low_offset



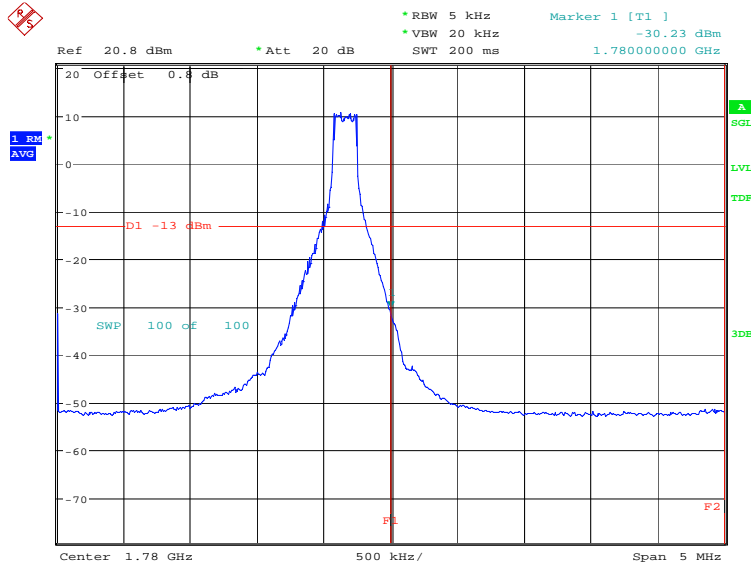
Date: 20.JUN.2020 14:28:49

OBW: 1RB-high_offset



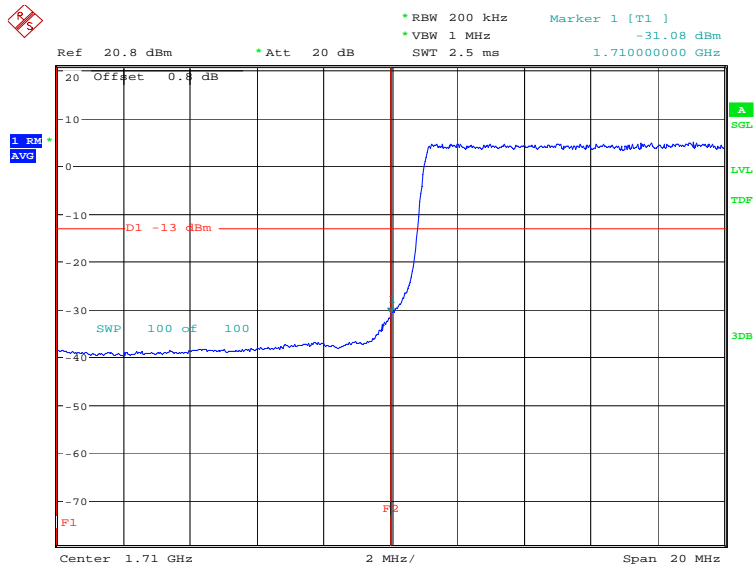
Date: 20.JUN.2020 14:29:23

HIGH BAND EDGE BLOCK-1RB-high_offset



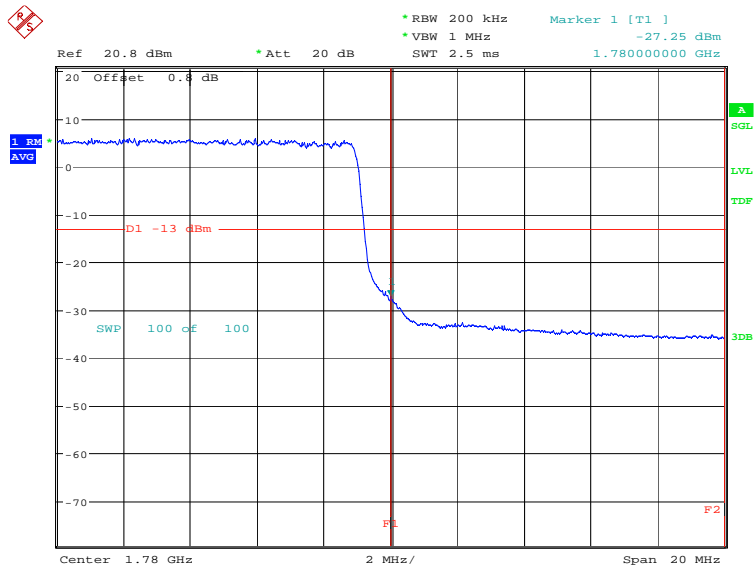
Date: 20.JUN.2020 14:30:36

LOW BAND EDGE BLOCK-20MHz-100%RB



Date: 13.MAY.2020 11:09:43

HIGH BAND EDGE BLOCK-20MHz-100%RB



Date: 13.MAY.2020 11:11:03

A.7 Conducted Spurious Emission

A.7.1 Measurement Method

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency given below:
 - (a) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
 - (b) If the equipment operates at or above 10 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.
3. The number of sweep points of spectrum analyzer is set to 30001 which is greater than span/RBW.

A. 7.2 Measurement Limit

Part 22.917, Part 24.238 and Part 27.53(h) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Part 27.53(m) specifies for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Part 27.53(c) states 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:(1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;(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 $43 + 10 \log(P)$ dB;(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations.

Part 27.53(f) states for operations in the 746–758 MHz, 775–788 MHz, and 805–806 MHz bands, emissions in the band 1559–1610 MHz shall be limited to -70dBW/MHz equivalent isotropically



radiated power (EIRP) for wideband signals.

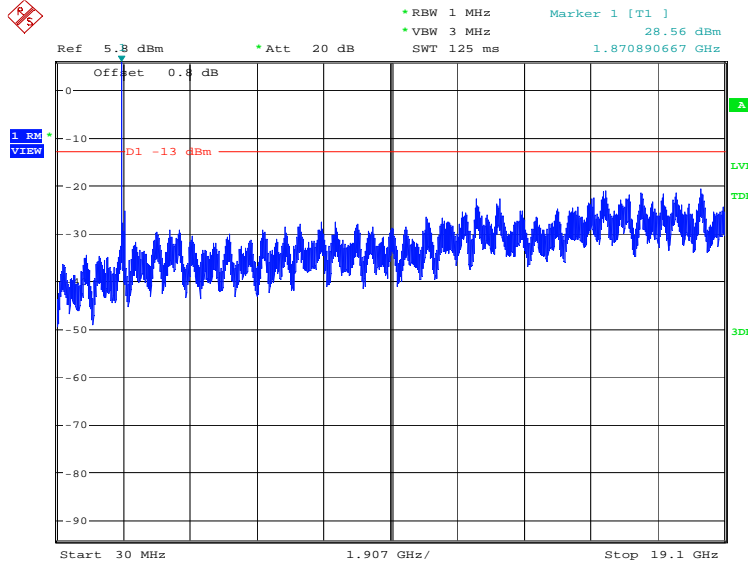
Part 27.53(g) states for operations in the 600 MHz band and the 698–746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ 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.

A. 7.3 Measurement result

Only the worst case result is given below

LTE band 2: 30MHz – 19.1GHz

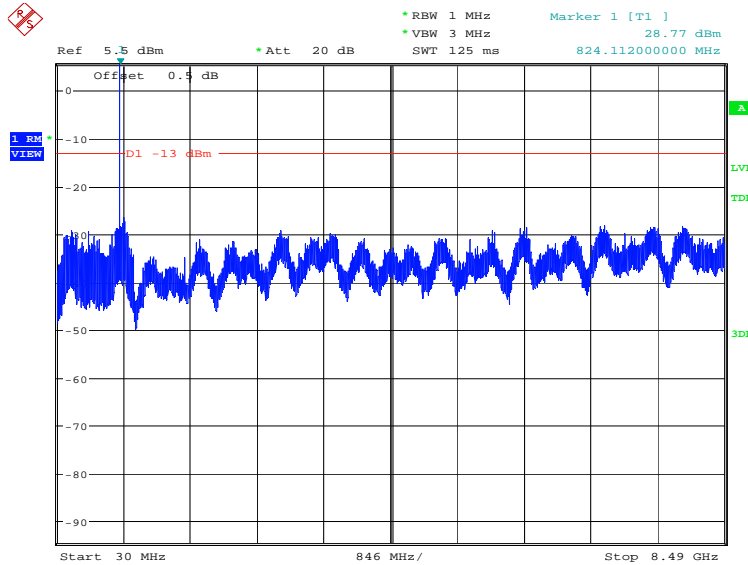
NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 14:33:37

LTE band 5: 30MHz – 8.49GHz

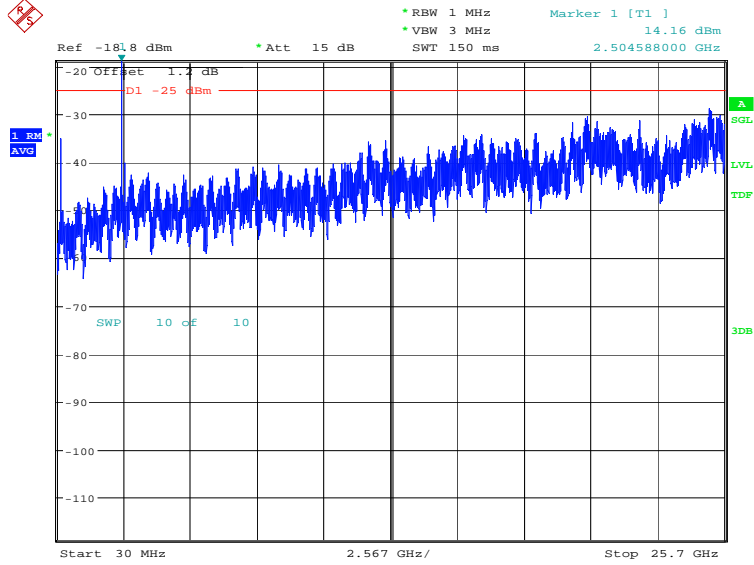
NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 14:38:42

LTE band 7: 30MHz – 25.7GHz

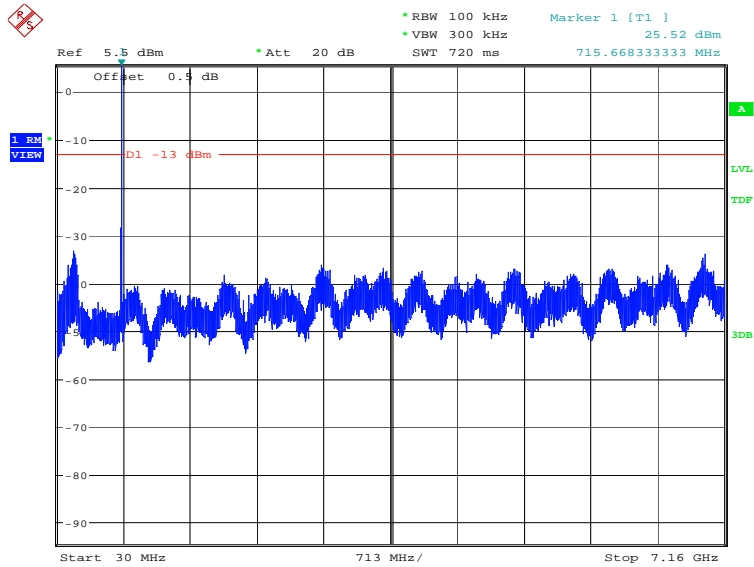
NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 15:49:01

LTE band 12: 30MHz – 7.16GHz

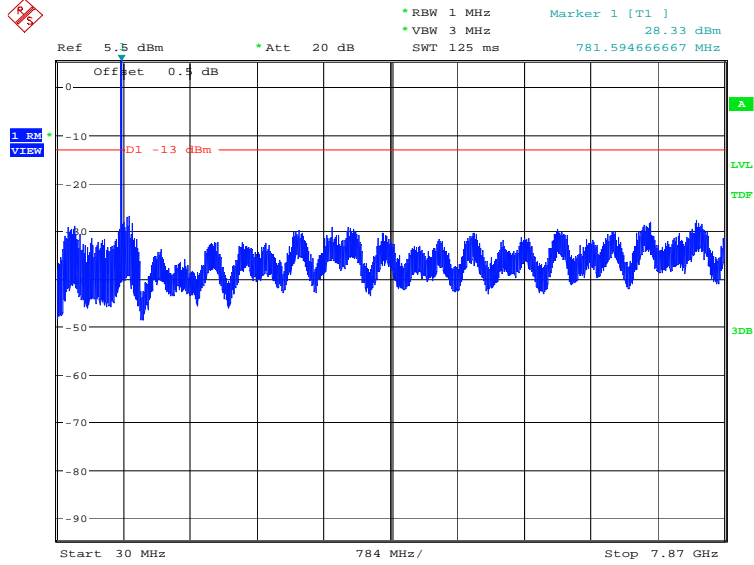
NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 14:39:23

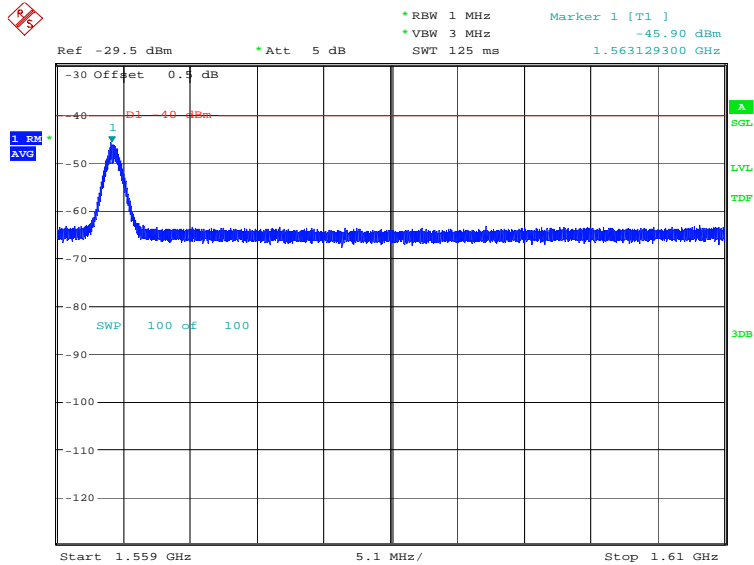
LTE band 13: 30MHz – 7.87GHz

NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 14:45:02

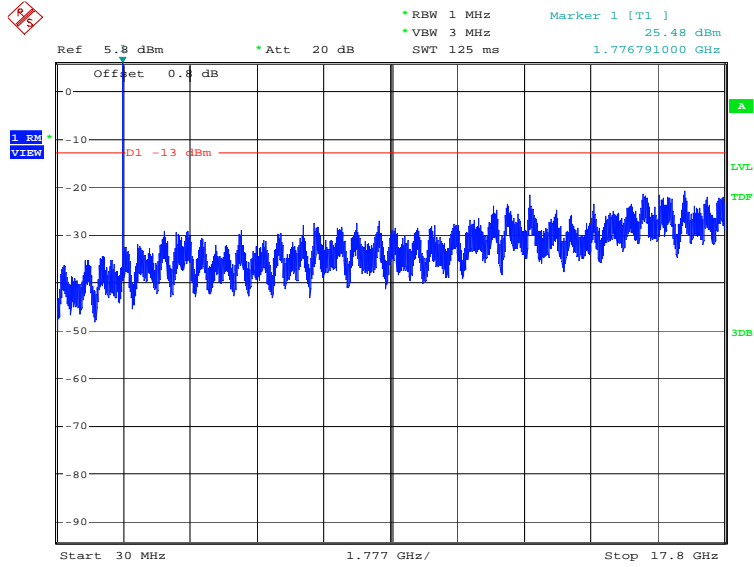
LTE band 13: 1559MHz – 1610MHz



Date: 20.JUN.2020 14:45:30

LTE band 66: 30MHz – 17.8GHz

NOTE: peak above the limit line is the carrier frequency.



Date: 20.JUN.2020 14:46:11

A.8 Peak-to-Average Power Ratio

The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB

- a) Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- b) Set resolution/measurement bandwidth \geq signal's occupied bandwidth;
- c) Set the number of counts to a value that stabilizes the measured CCDF curve;
- d) Record the maximum PAPR level associated with a probability of 0.1%.

LTE band 2, 20MHz

| Frequency (MHz) | PAPR (dB) | |
|-----------------|-----------|-------|
| 1880.0 | QPSK | 16QAM |
| | 6.63 | 7.31 |

LTE band 7, 20MHz

| Frequency (MHz) | PAPR (dB) | |
|-----------------|-----------|-------|
| 2535.0 | QPSK | 16QAM |
| | 6.79 | 7.40 |

LTE band 12, 10MHz

| Frequency (MHz) | PAPR (dB) | |
|-----------------|-----------|-------|
| 707.5 | QPSK | 16QAM |
| | 4.90 | 5.87 |

LTE band 13, 10MHz

| Frequency (MHz) | PAPR (dB) | |
|-----------------|-----------|-------|
| 782.0 | QPSK | 16QAM |
| | 4.94 | 5.64 |

LTE band 66, 20MHz

| Frequency (MHz) | PAPR (dB) | |
|-----------------|-----------|-------|
| 1745.0 | QPSK | 16QAM |
| | 6.67 | 7.24 |

Annex B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP[®]

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

*is accredited by the National Voluntary Laboratory Accreditation Program for specific services,
listed on the Scope of Accreditation, for:*

Electromagnetic Compatibility & Telecommunications

*This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005.
This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality
management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).*

2019-09-26 through 2020-09-30
Effective Dates


DEPARTMENT OF COMMERCE
UNITED STATES OF AMERICA


For the National Voluntary Laboratory Accreditation Program

*****END OF REPORT*****