# TEST REPORT

## No. I21N04075-RF-LTE

for

**HMD Global Oy**

**Smart Phone**

**Model Name: TA-1471**

**FCC ID: 2AJOTTA-1471**

**with**

**Hardware Version: V01**

**Software Version: 00WW_0_031**

**Issued Date: 2022-03-21**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

**Test Laboratory:**

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# REPORT HISTORY

| Report Number | Revision | Description | Issue Date |
|---|---|---|---|
| I21N04075-RF-LTE | Rev.0 | 1st edition | 2022-03-21 |

# CONTENTS

# 1. SUMMARY OF TEST REPORT

## 1.1. Test Items

| | |
|---|---|
| Description | Smart Phone |
| Model Name | TA-1471 |
| Applicant's name | HMD Global Oy |
| Manufacturer's Name | HMD Global Oy |

## 1.2. Test Standards

| | |
|---|---|
| FCC Part 2/22/24/27 | 10-1-19 Edition |
| ANSI C63.26 | 2015 |
| KDB971168 D01 | v03r01 |

## 1.3. Test Result

All test items are passed. Please refer to "6 Summary of Test Results" for detail.

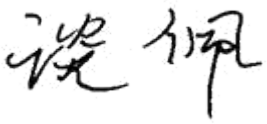
## 1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518000

## 1.5. Project Data

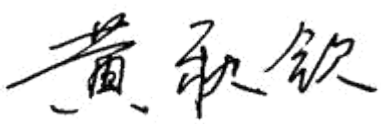
Testing Start Date: 2022-02-14 Testing End Date: 2022-03-21

## 1.6. Signature



**Tan Pei**

**(Prepared this test report)**



**Huang Qiuqin**

**(Reviewed this test report)**

**Zhang Hao**

**(Approved this test report)**

# 2. CLIENT INFORMATION

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | HMD Global Oy |
| Address /Post: | Bertel Jungin aukio 9, 02600 Espoo, Finland |
| Contact Person: | Reza Serafat |
| Contact Email | reza.serafat@hmdglobal.com |
| Telephone: | +393 31 6272922 |
| Fax: | / |

## 2.2. Manufacturer Information

| | |
|---|---|
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| Address /Post: | Bertel Jungin aukio 9, 02600 Espoo, Finland |
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# 3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)

## 3.1. About EUT

| | |
|---|---|
| Description | Smart Phone |
| Model Name | TA-1471 |
| FCC ID | 2AJOTTA-1471 |
| Frequency Bands | LTE Bands 2,4,5,7,12,13,17,66 |
| Antenna | Integrated |
| Extreme vol. Limits | 3.60V to 4.35V (nominal: 3.80V) |
| Condition of EUT as received | No abnormality in appearance |

## 3.2. Internal Identification of EUT used during the test

| EUT ID* | IMEI | HW Version | SW Version | Sample Arrival Date |
|---|---|---|---|---|
| UT03aa | 353906800005507 | V01 | 00WW_0_031 | 2022-02-14 |
| UT04aa | 353906800005721 | V01 | 00WW_0_031 | 2022-02-14 |

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

UT03aa is used for conduction test, UT04aa is used for radiation test.

## 3.3. Internal Identification of AE used during the test

| AE ID* | Description |
|---|---|
| AE1 | Battery |
| AE2 | RF Cable |

AE1

| | |
|---|---|
| Model | GH5781 |
| Manufacturer | Shenzhen Aerospace Electronic Co.,Ltd |
| Capacitance | 2400 mAh |
| Nominal Voltage | 3.80 V |

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

## 3.4. General Description

The Equipment Under Test (EUT) is a model Smart Phone with integrated antenna. It consists of normal options: lithium battery, charger. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

# 4. REFERENCE DOCUMENTS

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

| Reference | Title | Version |
|---|---|---|
| FCC Part 22 | PUBLIC MOBILE SERVICES | 10-1-19 Edition |
| FCC Part 2 | FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS | 10-1-19 Edition |
| FCC Part 24 | PERSONAL COMMUNICATIONS SERVICES | 10-1-19 Edition |
| FCC Part 27 | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES | 10-1-19 Edition |
| ANSI C63.26 | American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services | 2015 |
| KDB971168 D01 | Power Meas License Digital Systems | v03r01 |

# 5. LABORATORY ENVIRONMENT

**Shielded room** did not exceed following limits along the RF testing:

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz>60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | >2 MΩ |
| Ground system resistance | < 4 Ω |

**Fully-anechoic chamber** did not exceed following limits along the EMC testing

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB |
| Electrical insulation | > 2MΩ |
| Ground system resistance | < 4 Ω |
| Voltage Standing Wave Ratio （VSWR） | ≤ 6 dB, from 1 to 18 GHz，3 m distance |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 6000 MHz |

# 6. SUMMARY OF TEST RESULTS

| Abbreviations used in this clause: | | |
|---|---|---|
| Verdict Column | P | Pass |
| | F | Fail |
| | NA | Not applicable |
| | NM | Not measured |
| Location Column | A/B/C/D | The test is performed in test location A, B, C or D which are described in section 1.4 of this report |

NOTE: As the frequency band range of LTE Band 12(699-716MHz) overlaps the range of LTE Band 17(704-716MHz), LTE Band 66(1710-1780MHz) overlaps the range of LTE Band 4(1710-1755MHz), The channel bandwidth and other perating parameters for LTE Band 17 are fully supported by LTE Band 12, the channel bandwidth and other perating parameters for LTE Band 4 are fully supported by LTE Band 66, the miximum output power of LTE Band 12 is larger than the LTE Band 17, the miximum output power of LTE Band 66 is larger than the LTE Band 4, we just need to test all the cases of LTE Band 12, LTE Band 66.

**LTE Band 2**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/24.232 | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/24.238 | A.2 | P |
| 3 | Frequency Stability | 2.1055/24.235 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/24.238 | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/24.238 | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/24.238 | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/24.238 | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 24.232/ KDB971168 D01 | A.8 | P |

**LTE Band 5**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/22.913 | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/22.917 | A.2 | P |
| 3 | Frequency Stability | 2.1055/22.355 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/22.917 | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/22.917 | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/22.917 | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/22.917 | A.7 | P |
| 8 | Peak-to-Average Power Ratio | KDB971168 D01 | A.8 | P |

**LTE Band 7**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/27.50(h) | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/27.53(m) | A.2 | P |
| 3 | Frequency Stability | 2.1055/27.54 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/27.53(m) | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/27.53(m) | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/27.53(m) | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/27.53(m) | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 27.50(a)/ KDB971168 D01 | A.8 | P |

**LTE Band 12**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/27.50(c) | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/27.53(g) | A.2 | P |
| 3 | Frequency Stability | 2.1055/27.54 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/27.53(g) | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/27.53(g) | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/27.53(g) | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/27.53(g) | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 27.50(a)/ KDB971168 D01 | A.8 | P |

**LTE Band 13**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/27.50(b) | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/27.53(c) | A.2 | P |
| 3 | Frequency Stability | 2.1055/27.54 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/27.53(c) | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/27.53(c) | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/27.53(c) | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/27.53(c) | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 27.50(a)/ KDB971168 D01 | A.8 | P |

**LTE Band 66**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict |
|---|---|---|---|---|
| 1 | Output Power | 2.1046/27.50(d) | A.1 | P |
| 2 | Field Strength of Spurious Radiation | 2.1053/27.53(h) | A.2 | P |
| 3 | Frequency Stability | 2.1055/27.54 | A.3 | P |
| 4 | Occupied Bandwidth | 2.1049/27.53(h) | A.4 | P |
| 5 | Emission Bandwidth | 2.1049/27.53(h) | A.5 | P |
| 6 | Band Edge Compliance | 2.1051/27.53(h) | A.6 | P |
| 7 | Conducted Spurious Emission | 2.1051/27.53(h) | A.7 | P |
| 8 | Peak-to-Average Power Ratio | 27.50(a)/ KDB971168 D01 | A.8 | P |

## 7. STATEMENT

Since the information of samples in this report is provided by the client, the laboratory is not respo nsible for the authenticity of sample information.
This report takes measured values as criterion of test conclusion. The test conlusion meets the li mit requirements.

## 8. TEST EQUIPMENTS UTILIZED

| NO. | Description | TYPE | Manufacture | series number | CAL DUE DATE |
|---|---|---|---|---|---|
| 1 | Test Receiver | ESR7 | R&S | 101676 | 2022-11-24 |
| 2 | BiLog Antenna | 3142E | ETS-Lindgren | 0224831 | 2024-05-27 |
| 3 | Horn Antenna | 3117 | ETS-Lindgren | 00066577 | 2022-04-02 |
| 4 | Horn Antenna | QSH-SL-18 -26-S-20 | Q-par | 17013 | 2023-01-06 |
| 5 | Antenna | BBHA 9120D | Schwarzbeck | 1593 | 2022-12-05 |
| 6 | Antenna | VUBA 9117 | Schwarzbeck | 207 | 2023-07-15 |
| 7 | Antenna | QWH-SL-18 -40-K-SG | Q-par | 15979 | 2023-01-06 |
| 8 | preamplifier | 83017A | Agilent | MY39501110 | / |
| 9 | Signal Generator | SMB100A | R&S | 179725 | 2022-11-24 |
| 10 | Fully Anechoic Chamber | FACT3-2.0 | ETS-Lindgren | 1285 | 2023-05-29 |
| 11 | Spectrum Analyzer | FSV40 | R&S | 101192 | 2023-01-13 |
| 12 | Universal Radio Communication Tester | CMU200 | R&S | 114545 | 2023-01-13 |
| 13 | Universal Radio Communication Tester | CMW500 | R&S | 152499 | 2022-07-15 |
| 14 | Temperature Chamber | SH-241 | ESPEC | 92007516 | 2022-10-15 |
| 15 | DC Power Supply | U3606A | Agilent Technologies | MY50450012 | 2022-11-13 |
| 16 | Spectrum Analyzer | FSW26 | R&S | 102197 | 2022.11.24 |

**Test software**

| Item | Name | Vesion |
|---|---|---|
| Radiated | EMC32 | V10.50.40 |

# ANNEX A: MEASUREMENT RESULTS

## A.1 OUTPUT POWER

**Reference**

FCC: CFR Part 2.1046, 22.913, 24.232, 27.50

**A.1.1 Summary**

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/EIRP measurements for the EUT.

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 Measurement result**

**LTE band 2**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 1909.3 | 22.28 | 21.38 |
| | | 1880.0 | 22.29 | 21.47 |
| | | 1850.7 | 22.36 | 21.62 |
| | 1 RB low | 1909.3 | 22.28 | 21.42 |
| | | 1880.0 | 22.30 | 21.52 |
| | | 1850.7 | 22.35 | 21.64 |
| | 50% RB mid | 1909.3 | 22.40 | 21.37 |
| | | 1880.0 | 22.41 | 21.39 |
| | | 1850.7 | 22.47 | 21.47 |
| | 100% RB | 1909.3 | 21.35 | 20.39 |
| | | 1880.0 | 21.36 | 20.44 |
| | | 1850.7 | 21.48 | 20.49 |
| 3MHz | 1 RB high | 1908.5 | 22.51 | 21.52 |
| | | 1880.0 | 22.35 | 21.66 |
| | | 1851.5 | 22.38 | 21.61 |
| | 1 RB low | 1908.5 | 22.31 | 21.46 |
| | | 1880.0 | 22.34 | 21.69 |
| | | 1851.5 | 22.43 | 21.61 |
| | 50% RB mid | 1908.5 | 21.39 | 20.39 |
| | | 1880.0 | 21.39 | 20.44 |
| | | 1851.5 | 21.42 | 20.47 |

| | | | | |
|---|---|---|---|---|
| | 100% RB | 1908.5 | 21.39 | 20.32 |
| | | 1880.0 | 21.36 | 20.36 |
| | | 1851.5 | 21.42 | 20.40 |
| 5MHz | 1 RB high | 1907.5 | 22.62 | 21.45 |
| | | 1880.0 | 22.23 | 21.54 |
| | | 1852.5 | 22.26 | 21.50 |
| | 1 RB low | 1907.5 | 22.24 | 21.42 |
| | | 1880.0 | 22.26 | 21.56 |
| | | 1852.5 | 22.33 | 21.53 |
| | 50% RB mid | 1907.5 | 21.40 | 20.36 |
| | | 1880.0 | 21.37 | 20.40 |
| | | 1852.5 | 21.44 | 20.48 |
| | 100% RB | 1907.5 | 21.39 | 20.30 |
| | | 1880.0 | 21.39 | 20.31 |
| | | 1852.5 | 21.39 | 20.36 |
| 10MHz | 1 RB high | 1905.0 | 22.77 | 21.40 |
| | | 1880.0 | 22.33 | 21.54 |
| | | 1855.0 | 22.37 | 21.63 |
| | 1 RB low | 1905.0 | 22.31 | 21.44 |
| | | 1880.0 | 22.36 | 21.64 |
| | | 1855.0 | 22.44 | 21.67 |
| | 50% RB mid | 1905.0 | 21.36 | 20.36 |
| | | 1880.0 | 21.40 | 20.37 |
| | | 1855.0 | 21.48 | 20.42 |
| | 100% RB | 1905.0 | 21.47 | 20.43 |
| | | 1880.0 | 21.46 | 20.34 |
| | | 1855.0 | 21.41 | 20.35 |
| 15MHz | 1 RB high | 1902.5 | 22.67 | 21.43 |
| | | 1880.0 | 22.21 | 21.29 |
| | | 1857.5 | 22.29 | 21.50 |
| | 1 RB low | 1902.5 | 22.59 | 21.35 |
| | | 1880.0 | 22.38 | 21.45 |
| | | 1857.5 | 22.38 | 21.59 |
| | 50% RB mid | 1902.5 | 21.83 | 20.37 |
| | | 1880.0 | 21.47 | 20.38 |
| | | 1857.5 | 21.53 | 20.43 |
| | 100% RB | 1902.5 | 21.58 | 20.39 |
| | | 1880.0 | 21.65 | 20.29 |
| | | 1857.5 | 21.56 | 20.35 |

| | | | | |
|---|---|---|---|---|
| 20MHz | 1 RB high | 1900.0 | 22.54 | 21.75 |
| | | 1880.0 | 22.49 | 21.54 |
| | | 1860.0 | 22.56 | 21.62 |
| | 1 RB low | 1900.0 | 22.44 | 21.53 |
| | | 1880.0 | 22.64 | 21.57 |
| | | 1860.0 | 22.62 | 21.80 |
| | 50% RB mid | 1900.0 | 21.95 | 20.87 |
| | | 1880.0 | 21.91 | 20.92 |
| | | 1860.0 | 22.00 | 20.94 |
| | 100% RB | 1900.0 | 21.93 | 20.91 |
| | | 1880.0 | 21.91 | 20.87 |
| | | 1860.0 | 21.93 | 20.91 |

Note: Expanded measurement uncertainty is U = 0.49 dB, k = 1.96

**LTE band 5**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 848.3 | 22.60 | 21.72 |
| | | 836.5 | 22.39 | 21.61 |
| | | 824.7 | 22.45 | 21.74 |
| | 1 RB low | 848.3 | 22.41 | 21.74 |
| | | 836.5 | 22.40 | 21.62 |
| | | 824.7 | 22.47 | 21.72 |
| | 50% RB mid | 848.3 | 22.51 | 21.57 |
| | | 836.5 | 22.52 | 21.62 |
| | | 824.7 | 22.59 | 21.71 |
| | 100% RB | 848.3 | 21.52 | 20.56 |
| | | 836.5 | 21.52 | 20.56 |
| | | 824.7 | 21.64 | 20.72 |
| 3MHz | 1 RB high | 847.5 | 22.59 | 21.75 |
| | | 836.5 | 22.50 | 21.80 |
| | | 825.5 | 22.55 | 21.91 |
| | 1 RB low | 847.5 | 22.51 | 21.78 |
| | | 836.5 | 22.54 | 21.77 |
| | | 825.5 | 22.52 | 21.91 |
| | 50% RB mid | 847.5 | 21.59 | 20.64 |
| | | 836.5 | 21.58 | 20.64 |
| | | 825.5 | 21.66 | 20.64 |
| | 100% RB | 847.5 | 21.54 | 20.52 |
| | | 836.5 | 21.53 | 20.49 |
| | | 825.5 | 21.52 | 20.52 |
| 5MHz | 1 RB high | 846.5 | 22.37 | 21.78 |
| | | 836.5 | 22.39 | 21.72 |
| | | 826.5 | 22.41 | 21.69 |
| | 1 RB low | 846.5 | 22.43 | 21.71 |
| | | 836.5 | 22.41 | 21.76 |
| | | 826.5 | 22.43 | 21.69 |
| | 50% RB mid | 846.5 | 21.64 | 20.60 |
| | | 836.5 | 21.61 | 20.56 |
| | | 826.5 | 21.63 | 20.62 |
| | 100% RB | 846.5 | 21.57 | 20.58 |
| | | 836.5 | 21.58 | 20.53 |
| | | 826.5 | 21.59 | 20.54 |
| 10MHz | 1 RB high | 844.0 | 22.53 | 21.88 |

| | | | | |
|---|---|---|---|---|
| | | 836.5 | 22.55 | 21.86 |
| | | 829.0 | 22.56 | 21.91 |
| | 1 RB low | 844.0 | 22.48 | 21.82 |
| | | 836.5 | 22.49 | 21.79 |
| | | 829.0 | 22.56 | 21.84 |
| | 50% RB mid | 844.0 | 21.64 | 20.63 |
| | | 836.5 | 21.64 | 20.62 |
| | | 829.0 | 21.68 | 20.67 |
| | 100% RB | 844.0 | 21.66 | 20.62 |
| | | 836.5 | 21.60 | 20.56 |
| | | 829.0 | 21.68 | 20.66 |

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

**LTE band 7**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 5MHz | 1 RB high | 2567.5 | 21.18 | 20.52 |
| | | 2535.0 | 21.23 | 20.63 |
| | | 2502.5 | 21.15 | 20.46 |
| | 1 RB low | 2567.5 | 21.18 | 20.49 |
| | | 2535.0 | 21.22 | 20.60 |
| | | 2502.5 | 21.13 | 20.45 |
| | 50% RB mid | 2567.5 | 20.37 | 19.51 |
| | | 2535.0 | 20.35 | 19.46 |
| | | 2502.5 | 20.27 | 19.38 |
| | 100% RB | 2567.5 | 20.30 | 19.40 |
| | | 2535.0 | 20.36 | 19.42 |
| | | 2502.5 | 20.27 | 19.35 |
| 10MHz | 1 RB high | 2565.0 | 21.32 | 20.65 |
| | | 2535.0 | 21.28 | 20.56 |
| | | 2505.0 | 21.31 | 20.45 |
| | 1 RB low | 2565.0 | 21.26 | 20.60 |
| | | 2535.0 | 21.25 | 20.47 |
| | | 2505.0 | 21.18 | 20.35 |
| | 50% RB mid | 2565.0 | 20.34 | 19.35 |
| | | 2535.0 | 20.39 | 19.38 |
| | | 2505.0 | 20.29 | 19.38 |
| | 100% RB | 2565.0 | 20.33 | 19.40 |
| | | 2535.0 | 20.37 | 19.41 |
| | | 2505.0 | 20.33 | 19.38 |
| 15MHz | 1 RB high | 2562.5 | 21.30 | 20.55 |
| | | 2535.0 | 21.30 | 20.63 |
| | | 2507.5 | 21.28 | 20.60 |
| | 1 RB low | 2562.5 | 21.19 | 20.52 |
| | | 2535.0 | 21.18 | 20.51 |
| | | 2507.5 | 21.17 | 20.46 |
| | 50% RB mid | 2562.5 | 20.30 | 19.47 |
| | | 2535.0 | 20.34 | 19.48 |
| | | 2507.5 | 20.24 | 19.38 |
| | 100% RB | 2562.5 | 20.33 | 19.40 |
| | | 2535.0 | 20.38 | 19.46 |
| | | 2507.5 | 20.34 | 19.37 |

| | | | | |
|---|---|---|---|---|
| 20MHz | 1 RB high | 2560.0 | 21.09 | 20.41 |
| | | 2535.0 | 21.09 | 20.46 |
| | | 2510.0 | 21.15 | 20.49 |
| | 1 RB low | 2560.0 | 20.97 | 20.39 |
| | | 2535.0 | 20.91 | 20.30 |
| | | 2510.0 | 20.94 | 20.36 |
| | 50% RB mid | 2560.0 | 20.33 | 19.41 |
| | | 2535.0 | **20.37** | 19.42 |
| | | 2510.0 | 20.28 | 19.33 |
| | 100% RB | 2560.0 | 20.27 | 19.27 |
| | | 2535.0 | 20.31 | 19.41 |
| | | 2510.0 | 20.23 | 19.28 |

Note: Expanded measurement uncertainty is U = 0.49 dB, k = 1.96

**LTE band 12**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 715.3 | 22.89 | 21.79 |
| | | 707.5 | 22.54 | 21.87 |
| | | 699.7 | 22.53 | 21.79 |
| | 1 RB low | 715.3 | 22.50 | 21.79 |
| | | 707.5 | 22.53 | 21.74 |
| | | 699.7 | 22.52 | 21.76 |
| | 50% RB mid | 715.3 | 22.67 | 21.66 |
| | | 707.5 | 22.64 | 21.61 |
| | | 699.7 | 22.64 | 21.70 |
| | 100% RB | 715.3 | 21.68 | 20.66 |
| | | 707.5 | 21.65 | 20.72 |
| | | 699.7 | 21.57 | 20.74 |
| 3MHz | 1 RB high | 714.5 | 22.80 | 21.76 |
| | | 707.5 | 22.62 | 21.87 |
| | | 700.5 | 22.56 | 21.90 |
| | 1 RB low | 714.5 | 22.58 | 21.82 |
| | | 707.5 | 22.56 | 21.82 |
| | | 700.5 | 22.57 | 21.74 |
| | 50% RB mid | 714.5 | 21.68 | 20.68 |
| | | 707.5 | 21.63 | 20.68 |
| | | 700.5 | 21.61 | 20.73 |
| | 100% RB | 714.5 | 21.61 | 20.60 |
| | | 707.5 | 21.57 | 20.71 |
| | | 700.5 | 21.55 | 20.66 |
| 5MHz | 1 RB high | 713.5 | 22.53 | 21.75 |
| | | 707.5 | 22.52 | 21.81 |
| | | 701.5 | 22.54 | 21.80 |
| | 1 RB low | 713.5 | 22.52 | 21.71 |
| | | 707.5 | 22.48 | 21.76 |
| | | 701.5 | 22.45 | 21.72 |
| | 50% RB mid | 713.5 | 21.71 | 20.64 |
| | | 707.5 | 21.62 | 20.62 |
| | | 701.5 | 21.68 | 20.73 |
| | 100% RB | 713.5 | 21.61 | 20.61 |
| | | 707.5 | 21.60 | 20.51 |
| | | 701.5 | 21.62 | 20.66 |

| | | | | |
|---|---|---|---|---|
| 10MHz | 1 RB high | 711.0 | 22.68 | 21.88 |
| | | 707.5 | 22.67 | 21.98 |
| | | 704.0 | 22.66 | 21.98 |
| | 1 RB low | 711.0 | 22.53 | 21.77 |
| | | 707.5 | 22.53 | 21.82 |
| | | 704.0 | 22.54 | 21.81 |
| | 50% RB mid | 711.0 | 21.69 | 20.67 |
| | | 707.5 | 21.70 | 20.62 |
| | | 704.0 | 21.65 | 20.73 |
| | 100% RB | 711.0 | 21.74 | 20.72 |
| | | 707.5 | 21.66 | 20.61 |
| | | 704.0 | 21.63 | 20.64 |

Note: Expanded measurement uncertainty is U = 0.49 dB, k = 1.96

**LTE band 13**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 5MHz | 1 RB high | 784.5 | 22.47 | 21.75 |
| | | 782.0 | 22.51 | 21.68 |
| | | 779.5 | 22.55 | 21.84 |
| | 1 RB low | 784.5 | 22.53 | 21.70 |
| | | 782.0 | 22.51 | 21.72 |
| | | 779.5 | 22.53 | 21.82 |
| | 50% RB mid | 784.5 | 21.66 | 20.64 |
| | | 782.0 | 21.70 | 20.72 |
| | | 779.5 | 21.71 | 20.67 |
| | 100% RB | 784.5 | 21.65 | 20.59 |
| | | 782.0 | 21.69 | 20.63 |
| | | 779.5 | 21.67 | 20.58 |
| 10MHz | 1 RB high | 782.0 | 22.62 | 21.91 |
| | 1 RB low | 782.0 | 22.70 | 22.01 |
| | 50% RB mid | 782.0 | 21.73 | 20.71 |
| | 100% RB | 782.0 | 21.79 | 20.74 |

Note: Expanded measurement uncertainty is U = 0.49 dB, k = 1.96

**LTE band 66**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 1779.3 | 22.36 | 21.49 |
| | | 1745.0 | 22.24 | 21.45 |
| | | 1710.7 | 22.23 | 21.48 |
| | 1 RB low | 1779.3 | 22.33 | 21.47 |
| | | 1745.0 | 22.25 | 21.49 |
| | | 1710.7 | 22.24 | 21.44 |
| | 50% RB mid | 1779.3 | 22.50 | 21.41 |
| | | 1745.0 | 22.37 | 21.39 |
| | | 1710.7 | 22.30 | 21.35 |
| | 100% RB | 1779.3 | 21.43 | 20.47 |
| | | 1745.0 | 21.30 | 20.36 |
| | | 1710.7 | 21.29 | 20.31 |
| 3MHz | 1 RB high | 1778.5 | 22.36 | 21.64 |
| | | 1745.0 | 22.23 | 21.55 |
| | | 1711.5 | 22.28 | 21.50 |
| | 1 RB low | 1778.5 | 22.40 | 21.64 |
| | | 1745.0 | 22.28 | 21.55 |
| | | 1711.5 | 22.28 | 21.52 |
| | 50% RB mid | 1778.5 | 21.46 | 20.42 |
| | | 1745.0 | 21.33 | 20.30 |
| | | 1711.5 | 21.32 | 20.35 |
| | 100% RB | 1778.5 | 21.43 | 20.35 |
| | | 1745.0 | 21.28 | 20.28 |
| | | 1711.5 | 21.31 | 20.28 |
| 5MHz | 1 RB high | 1777.5 | 22.27 | 21.36 |
| | | 1745.0 | 22.12 | 21.35 |
| | | 1712.5 | 22.15 | 21.32 |
| | 1 RB low | 1777.5 | 22.25 | 21.38 |
| | | 1745.0 | 22.16 | 21.41 |
| | | 1712.5 | 22.13 | 21.37 |
| | 50% RB mid | 1777.5 | 21.45 | 20.45 |
| | | 1745.0 | 21.34 | 20.31 |
| | | 1712.5 | 21.32 | 20.30 |
| | 100% RB | 1777.5 | 21.43 | 20.40 |
| | | 1745.0 | 21.30 | 20.28 |
| | | 1712.5 | 21.30 | 20.22 |
| 10MHz | 1 RB high | 1775.0 | 22.37 | 21.58 |

| | | | | |
|---|---|---|---|---|
| | | 1745.0 | 22.23 | 21.45 |
| | | 1715.0 | 22.24 | 21.42 |
| | 1 RB low | 1775.0 | 22.35 | 21.52 |
| | | 1745.0 | 22.34 | 21.49 |
| | | 1715.0 | 22.27 | 21.46 |
| | 50% RB mid | 1775.0 | 21.44 | 20.38 |
| | | 1745.0 | 21.36 | 20.33 |
| | | 1715.0 | 21.34 | 20.30 |
| | 100% RB | 1775.0 | 21.44 | 20.38 |
| | | 1745.0 | 21.37 | 20.33 |
| | | 1715.0 | 21.37 | 20.30 |
| 15MHz | 1 RB high | 1772.5 | 22.23 | 21.55 |
| | | 1745.0 | 22.11 | 21.40 |
| | | 1717.5 | 22.13 | 21.45 |
| | 1 RB low | 1772.5 | 22.27 | 21.57 |
| | | 1745.0 | 22.20 | 21.49 |
| | | 1717.5 | 22.18 | 21.48 |
| | 50% RB mid | 1772.5 | 21.38 | 20.38 |
| | | 1745.0 | 21.30 | 20.32 |
| | | 1717.5 | 21.27 | 20.27 |
| | 100% RB | 1772.5 | 21.42 | 20.34 |
| | | 1745.0 | 21.36 | 20.29 |
| | | 1717.5 | 21.26 | 20.22 |
| 20MHz | 1 RB high | 1770.0 | 22.11 | 21.32 |
| | | 1745.0 | 21.96 | 21.18 |
| | | 1720.0 | 21.97 | 21.18 |
| | 1 RB low | 1770.0 | 22.11 | 21.32 |
| | | 1745.0 | 22.03 | 21.30 |
| | | 1720.0 | 22.07 | 21.29 |
| | 50% RB mid | 1770.0 | 21.35 | 20.36 |
| | | 1745.0 | 21.28 | 20.28 |
| | | 1720.0 | 21.26 | 20.21 |
| | 100% RB | 1770.0 | 21.33 | 20.28 |
| | | 1745.0 | 21.26 | 20.25 |
| | | 1720.0 | 21.21 | 20.20 |

Note: Expanded measurement uncertainty is U = 0.49dB, k = 1.96

### A.1.3 Radiated

#### A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 27.50(d) specifies “Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP”.

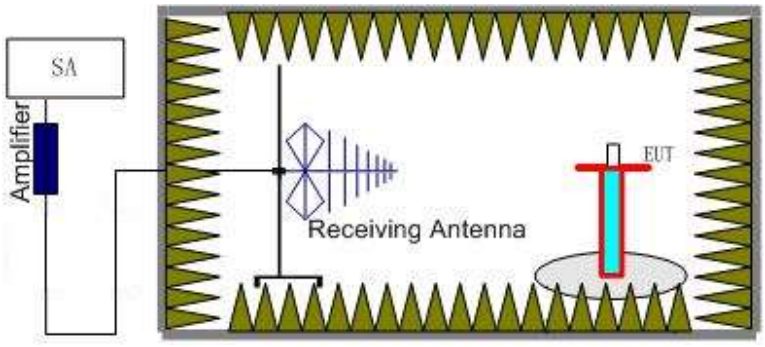
Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

Rule Part 27.50(c) specifies “Portable stations (hand-held de-vices) are limited to 3 watts ERP.”.

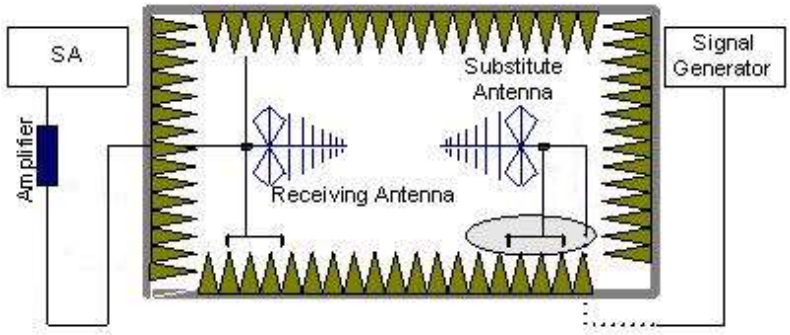
Rule Part 27.50(a)(3) specifies “For mobile and portable stations transmitting in the 2305–2315 MHz band or the 2350–2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth.”

#### A.1.3.2 Method of Measurement

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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 transmit frequencies in three channels (High, Middle, Low) 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 (Pr).
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 and adjusts 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. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
   The cable loss ($P_{cl}$), the substitution Antenna Gain(dBi) ($G_a$) and the amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power (EIRP) = $P_{Mea} - P_{Ag} - P_{cl} + G_a$
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 -2.15dB.

**A.1.3.3 Measurement result**

**LTE Band 2- EIRP Part 24. 232(b)**

**Limits:** ≤33dBm (2W)

**LTE Band 2_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1850.70 | -16.32 | -29.30 | 8.10 | 21.08 | 33.00 | H |
| 1880.00 | -16.04 | -29.40 | 8.10 | 21.46 | 33.00 | H |
| 1909.30 | -15.48 | -29.30 | 8.10 | 21.93 | 33.00 | H |

**LTE Band 2_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1851.50 | -16.38 | -29.30 | 8.10 | 21.02 | 33.00 | H |
| 1880.00 | -16.09 | -29.40 | 8.10 | 21.41 | 33.00 | H |
| 1908.50 | -15.57 | -29.30 | 8.10 | 21.83 | 33.00 | H |

**LTE Band 2_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1852.50 | -16.46 | -29.30 | 8.10 | 20.94 | 33.00 | H |
| 1880.00 | -16.13 | -29.40 | 8.10 | 21.37 | 33.00 | H |
| 1907.50 | -15.62 | -29.30 | 8.10 | 21.78 | 33.00 | H |

**LTE Band 2_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1855.00 | -16.50 | -29.30 | 8.10 | 20.90 | 33.00 | H |
| 1880.00 | -16.19 | -29.40 | 8.10 | 21.31 | 33.00 | H |
| 1905.00 | -15.66 | -29.30 | 8.10 | 21.74 | 33.00 | H |

**LTE Band 2_15MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1857.50 | -16.55 | -29.30 | 8.10 | 20.85 | 33.00 | H |
| 1880.00 | -16.24 | -29.40 | 8.10 | 21.26 | 33.00 | H |
| 1902.50 | -15.77 | -29.30 | 8.10 | 21.63 | 33.00 | H |

**LTE Band 2_20 MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1860.00 | -16.56 | -29.30 | 8.10 | 20.84 | 33.00 | H |
| 1880.00 | -16.30 | -29.40 | 8.10 | 21.20 | 33.00 | H |
| 1900.00 | -15.73 | -29.30 | 8.10 | 21.67 | 33.00 | H |

**LTE Band 2_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1850.70 | -16.37 | -29.30 | 8.10 | 21.03 | 33.00 | H |
| 1880.00 | -16.12 | -29.40 | 8.10 | 21.38 | 33.00 | H |
| **1909.30** | **-15.38** | **-29.30** | **8.10** | **22.03** | **33.00** | **H** |

**LTE Band 2_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1851.50 | -16.45 | -29.30 | 8.10 | 20.96 | 33.00 | H |
| 1880.00 | -16.17 | -29.40 | 8.10 | 21.33 | 33.00 | H |
| 1908.50 | -15.51 | -29.30 | 8.10 | 21.89 | 33.00 | H |

**LTE Band 2_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1852.50 | -16.54 | -29.30 | 8.10 | 20.87 | 33.00 | H |
| 1880.00 | -16.30 | -29.40 | 8.10 | 21.20 | 33.00 | H |
| 1907.50 | -15.60 | -29.30 | 8.10 | 21.80 | 33.00 | H |

**LTE Band 2_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1855.00 | -16.45 | -29.30 | 8.10 | 20.95 | 33.00 | H |
| 1880.00 | -16.23 | -29.40 | 8.10 | 21.27 | 33.00 | H |
| 1905.00 | -15.70 | -29.30 | 8.10 | 21.70 | 33.00 | H |

**LTE Band 2_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1857.50 | -16.51 | -29.30 | 8.10 | 20.90 | 33.00 | H |
| 1880.00 | -16.28 | -29.40 | 8.10 | 21.22 | 33.00 | H |
| 1902.50 | -15.78 | -29.30 | 8.10 | 21.63 | 33.00 | H |

**LTE Band 2_20 MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1860.00 | -16.55 | -29.30 | 8.10 | 20.86 | 33.00 | H |
| 1880.00 | -16.34 | -29.40 | 8.10 | 21.16 | 33.00 | H |
| 1900.00 | -15.90 | -29.30 | 8.10 | 21.50 | 33.00 | H |

Peak EIRP (dBm)=$P_{Mea}$(-15.38dBm)-($P_{cl}$+$P_{Ag}$)(-29.30dB)+$G_a$(8.10dB) =22.03dBm

**LTE Band 5- ERP Part 22.913(a)**

**Limits:** ≤38.45dBm (7W)

**LTE Band 5_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| **824.70** | **-9.19** | **-33.60** | **-0.79** | **2.15** | **21.47** | **38.45** | **V** |
| 836.50 | -9.29 | -33.50 | -0.74 | 2.15 | 21.33 | 38.45 | V |
| 848.30 | -9.30 | -33.50 | -0.73 | 2.15 | 21.32 | 38.45 | V |

**LTE Band 5_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 825.50 | -9.26 | -33.60 | -0.84 | 2.15 | 21.35 | 38.45 | V |
| 836.50 | -9.40 | -33.50 | -0.74 | 2.15 | 21.22 | 38.45 | V |
| 847.50 | -9.36 | -33.50 | -0.73 | 2.15 | 21.26 | 38.45 | V |

**LTE Band 5_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 826.50 | -9.27 | -33.60 | -0.84 | 2.15 | 21.34 | 38.45 | V |
| 836.50 | -9.35 | -33.50 | -0.74 | 2.15 | 21.27 | 38.45 | V |
| 846.50 | -9.32 | -33.50 | -0.73 | 2.15 | 21.30 | 38.45 | V |

**LTE Band 5_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 829.00 | -9.30 | -33.60 | -0.84 | 2.15 | 21.31 | 38.45 | V |
| 836.50 | -9.51 | -33.50 | -0.74 | 2.15 | 21.10 | 38.45 | V |
| 844.00 | -9.31 | -33.50 | -0.78 | 2.15 | 21.25 | 38.45 | V |

**LTE Band 5_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 824.70 | -9.31 | -33.60 | -0.79 | 2.15 | 21.35 | 38.45 | V |
| 836.50 | -9.44 | -33.50 | -0.74 | 2.15 | 21.17 | 38.45 | V |
| 848.30 | -9.60 | -33.50 | -0.73 | 2.15 | 21.01 | 38.45 | V |

**LTE Band 5_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 825.50 | -9.37 | -33.60 | -0.84 | 2.15 | 21.24 | 38.45 | V |
| 836.50 | -9.51 | -33.50 | -0.74 | 2.15 | 21.11 | 38.45 | V |
| 847.50 | -9.64 | -33.50 | -0.73 | 2.15 | 20.97 | 38.45 | V |

**LTE Band 5_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 826.50 | -9.44 | -33.60 | -0.84 | 2.15 | 21.17 | 38.45 | V |
| 836.50 | -9.59 | -33.50 | -0.74 | 2.15 | 21.02 | 38.45 | V |
| 846.50 | -9.75 | -33.50 | -0.73 | 2.15 | 20.87 | 38.45 | V |

**LTE Band 5_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 829.00 | -9.42 | -33.60 | -0.84 | 2.15 | 21.19 | 38.45 | V |
| 836.50 | -9.67 | -33.50 | -0.74 | 2.15 | 20.95 | 38.45 | V |
| 844.00 | -9.76 | -33.50 | -0.78 | 2.15 | 20.81 | 38.45 | V |

Peak ERP (dBm)=$P_{Mea}$(-9.19dBm)-($P_{cl}$+$P_{Ag}$)(-33.60dB)+$G_a$(-0.79dB) -2.15dB =21.47dBm

**LTE Band 7- EIRP Part 27.50(h)(2)**

**Limits:** ≤33 dBm (2W)

**LTE Band 7_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| **2502.50** | **-17.16** | **-28.70** | **10.70** | **22.24** | **33.00** | **H** |
| 2535.00 | -17.43 | -28.60 | 10.70 | 21.87 | 33.00 | H |
| 2567.50 | -17.25 | -28.60 | 10.70 | 22.05 | 33.00 | H |

**LTE Band 7_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2505.00 | -17.30 | -28.70 | 10.70 | 22.10 | 33.00 | H |
| 2535.00 | -17.50 | -28.60 | 10.70 | 21.80 | 33.00 | H |
| 2565.00 | -17.35 | -28.60 | 10.70 | 21.96 | 33.00 | H |

**LTE Band 7_15MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2507.50 | -17.37 | -28.70 | 10.70 | 22.03 | 33.00 | H |
| 2535.00 | -17.53 | -28.60 | 10.70 | 21.77 | 33.00 | H |
| 2562.50 | -17.33 | -28.60 | 10.70 | 21.98 | 33.00 | H |

**LTE Band 7_20MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2510.00 | -17.50 | -28.70 | 10.70 | 21.90 | 33.00 | H |
| 2535.00 | -17.61 | -28.60 | 10.70 | 21.69 | 33.00 | H |
| 2560.00 | -17.46 | -28.60 | 10.70 | 21.84 | 33.00 | H |

**LTE Band 7_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2502.50 | -17.32 | -28.70 | 10.70 | 22.08 | 33.00 | H |
| 2535.00 | -17.35 | -28.60 | 10.70 | 21.95 | 33.00 | H |
| 2567.50 | -17.41 | -28.60 | 10.70 | 21.89 | 33.00 | H |

**LTE Band 7_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2505.00 | -17.39 | -28.70 | 10.70 | 22.02 | 33.00 | H |
| 2535.00 | -17.41 | -28.60 | 10.70 | 21.89 | 33.00 | H |
| 2565.00 | -17.55 | -28.60 | 10.70 | 21.75 | 33.00 | H |

**LTE Band 7_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2507.50 | -17.45 | -28.70 | 10.70 | 21.95 | 33.00 | H |
| 2535.00 | -17.46 | -28.60 | 10.70 | 21.84 | 33.00 | H |
| 2562.50 | -17.54 | -28.60 | 10.70 | 21.76 | 33.00 | H |
| 2502.50 | -17.16 | -28.70 | 10.70 | 22.24 | 33.00 | H |

**LTE Band 7_20MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | $G_a$ Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 2510.00 | -17.51 | -28.70 | 10.70 | 21.90 | 33.00 | H |
| 2535.00 | -17.45 | -28.60 | 10.70 | 21.86 | 33.00 | H |
| 2560.00 | -17.47 | -28.60 | 10.70 | 21.83 | 33.00 | H |

Peak EIRP (dBm)=$P_{Mea}$(-17.16dBm)-($P_{cl}$+$P_{Ag}$)(-28.70dB)+$G_a$(10.70dB) =22.24dBm

**LTE Band 12 - ERP Part 27.50(c)(10)**

**Limits:** ≤34.77dBm (3W)

**LTE Band 12_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 699.70 | -11.89 | -34.80 | -0.93 | 2.15 | 19.83 | 34.77 | V |
| **707.50** | **-11.20** | **-34.70** | **-0.91** | **2.15** | **20.45** | **34.77** | **V** |
| 715.30 | -11.49 | -34.70 | -0.68 | 2.15 | 20.38 | 34.77 | V |

**LTE Band 12_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 700.50 | -11.94 | -34.80 | -0.97 | 2.15 | 19.75 | 34.77 | V |
| 707.50 | -11.30 | -34.70 | -0.91 | 2.15 | 20.35 | 34.77 | V |
| 714.50 | -11.62 | -34.70 | -0.64 | 2.15 | 20.29 | 34.77 | V |

**LTE Band 12_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 701.50 | -11.89 | -34.80 | -0.97 | 2.15 | 19.79 | 34.77 | V |
| 707.50 | -11.25 | -34.70 | -0.91 | 2.15 | 20.40 | 34.77 | V |
| 713.50 | -11.70 | -34.70 | -0.64 | 2.15 | 20.21 | 34.77 | V |

**LTE Band 12_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 704.00 | -11.99 | -34.80 | -0.97 | 2.15 | 19.69 | 34.77 | V |
| 707.50 | -11.39 | -34.70 | -0.91 | 2.15 | 20.25 | 34.77 | V |
| 711.00 | -11.72 | -34.70 | -0.64 | 2.15 | 20.18 | 34.77 | V |

**LTE Band 12_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 699.70 | -12.08 | -34.80 | -0.93 | 2.15 | 19.64 | 34.77 | V |
| 707.50 | -11.21 | -34.70 | -0.91 | 2.15 | 20.43 | 34.77 | V |
| 715.30 | -11.53 | -34.70 | -0.68 | 2.15 | 20.34 | 34.77 | V |

**LTE Band 12_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 700.50 | -11.98 | -34.80 | -0.97 | 2.15 | 19.70 | 34.77 | V |
| 707.50 | -11.29 | -34.70 | -0.91 | 2.15 | 20.36 | 34.77 | V |
| 714.50 | -11.65 | -34.70 | -0.64 | 2.15 | 20.25 | 34.77 | V |

**LTE Band 12_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 701.50 | -12.08 | -34.80 | -0.97 | 2.15 | 19.60 | 34.77 | V |
| 707.50 | -11.49 | -34.70 | -0.91 | 2.15 | 20.15 | 34.77 | V |
| 713.50 | -11.89 | -34.70 | -0.64 | 2.15 | 20.02 | 34.77 | V |

**LTE Band 12_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 704.00 | -12.09 | -34.80 | -0.97 | 2.15 | 19.59 | 34.77 | V |
| 707.50 | -11.40 | -34.70 | -0.91 | 2.15 | 20.24 | 34.77 | V |
| 711.00 | -11.79 | -34.70 | -0.64 | 2.15 | 20.11 | 34.77 | V |

Peak ERP (dBm)=$P_{Mea}$(-11.20Bm)-($P_{cl}$+$P_{Ag}$)(-34.70dB)+$G_a$(-0.91dB) -2.15dB =20.45dBm

**LTE Band 13- ERP Part 27.50(b)(10)**

**Limits:** ≤34.77dBm (3W)

**LTE Band 13_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 779.50 | -13.14 | -34.00 | -0.08 | 2.15 | 18.63 | 34.77 | V |
| 782.00 | -13.60 | -34.00 | -0.13 | 2.15 | 18.12 | 34.77 | V |
| **784.50** | **-12.82** | **-34.00** | **-0.13** | **2.15** | **18.90** | **34.77** | **V** |

**LTE Band 13_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 782.00 | -13.49 | -34.00 | -0.13 | 2.15 | 18.23 | 34.77 | V |

**LTE Band 13_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 779.50 | -13.42 | -34.00 | -0.08 | 2.15 | 18.35 | 34.77 | V |
| 782.00 | -13.71 | -34.00 | -0.13 | 2.15 | 18.01 | 34.77 | V |
| 784.50 | -13.16 | -34.00 | -0.13 | 2.15 | 18.56 | 34.77 | V |

**LTE Band 13_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | Correction (dB) | ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 782.00 | -13.62 | -34.00 | -0.13 | 2.15 | 18.10 | 34.77 | V |

Peak ERP (dBm)=$P_{Mea}$(-12.82dBm)-($P_{cl}$+$P_{Ag}$)(-34.00dB)+$G_a$(-0.13dB) -2.15dB =18.90dBm

**LTE Band 66- EIRP Part 27.50(d)**

**Limits:** ≤30dBm (1W)

**LTE Band 66_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1710.70 | -16.61 | -29.60 | 8.10 | 21.10 | 30.00 | H |
| **1745.00** | **-16.03** | **-29.50** | **8.10** | **21.57** | **30.00** | **H** |
| 1779.30 | -16.72 | -29.50 | 8.10 | 20.88 | 30.00 | H |

**LTE Band 66_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1711.50 | -16.70 | -29.60 | 8.10 | 21.00 | 30.00 | H |
| 1745.00 | -16.22 | -29.50 | 8.10 | 21.39 | 30.00 | H |
| 1778.50 | -16.81 | -29.50 | 8.10 | 20.79 | 30.00 | H |

**LTE Band 66_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1712.50 | -16.69 | -29.60 | 8.10 | 21.01 | 30.00 | H |
| 1745.00 | -16.15 | -29.50 | 8.10 | 21.45 | 30.00 | H |
| 1777.50 | -16.85 | -29.50 | 8.10 | 20.76 | 30.00 | H |

**LTE Band 66_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1715.00 | -16.80 | -29.60 | 8.10 | 20.90 | 30.00 | H |
| 1745.00 | -16.30 | -29.50 | 8.10 | 21.30 | 30.00 | H |
| 1775.00 | -16.78 | -29.50 | 8.10 | 20.82 | 30.00 | H |

**LTE Band 66_15MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1717.50 | -16.92 | -29.60 | 8.10 | 20.78 | 30.00 | H |
| 1745.00 | -16.24 | -29.50 | 8.10 | 21.36 | 30.00 | H |
| 1772.53 | -16.79 | -29.50 | 8.10 | 20.81 | 30.00 | H |

**LTE Band 66_20MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1720.00 | -16.96 | -29.60 | 8.10 | 20.74 | 30.00 | H |
| 1745.00 | -17.30 | -29.50 | 8.10 | 20.30 | 30.00 | H |
| 1770.00 | -16.88 | -29.50 | 8.10 | 20.72 | 30.00 | H |

**LTE Band 66_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1710.70 | -16.88 | -29.60 | 8.10 | 20.83 | 30.00 | H |
| 1745.00 | -16.13 | -29.50 | 8.10 | 21.48 | 30.00 | H |
| 1779.30 | -16.82 | -29.50 | 8.10 | 20.78 | 30.00 | H |

**LTE Band 66_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1711.50 | -16.99 | -29.60 | 8.10 | 20.71 | 30.00 | H |
| 1745.00 | -16.20 | -29.50 | 8.10 | 21.40 | 30.00 | H |
| 1778.50 | -16.86 | -29.50 | 8.10 | 20.74 | 30.00 | H |

**LTE Band 66_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1712.50 | -16.96 | -29.60 | 8.10 | 20.74 | 30.00 | H |
| 1745.00 | -16.18 | -29.50 | 8.10 | 21.42 | 30.00 | H |
| 1777.50 | -16.96 | -29.50 | 8.10 | 20.64 | 30.00 | H |

**LTE Band 66_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1715.00 | -17.05 | -29.60 | 8.10 | 20.65 | 30.00 | H |
| 1745.00 | -16.25 | -29.50 | 8.10 | 21.36 | 30.00 | H |
| 1775.00 | -17.03 | -29.50 | 8.10 | 20.57 | 30.00 | H |

**LTE Band 66_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1717.50 | -17.11 | -29.60 | 8.10 | 20.59 | 30.00 | H |
| 1745.00 | -16.20 | -29.50 | 8.10 | 21.40 | 30.00 | H |
| 1772.53 | -16.99 | -29.50 | 8.10 | 20.61 | 30.00 | H |

**LTE Band 66_20MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB)+ $P_{Ag}$(dB) | Ga Antenna Gain(dBi) | EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1720.00 | -17.04 | -29.60 | 8.10 | 20.66 | 30.00 | H |
| 1745.00 | -16.11 | -29.50 | 8.10 | 21.49 | 30.00 | H |
| 1770.00 | -16.89 | -29.50 | 8.10 | 20.71 | 30.00 | H |

Peak EIRP (dBm)=$P_{Mea}$(-16.03dBm)-($P_{cl}$+$P_{Ag}$)(-29.50dB)+$G_a$(8.10dB) =21.57dBm

**ANALYZER SETTINGS:**

RBW = VBW = 8MHz for occupied bandwidths equal to or less than 5MHz.

RBW = VBW = 20MHz for occupied bandwidths equal to or greater than 10MHz.

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**Note: Both of Vertical and Horizontal polarizations are evaluated, but only the worst case is recorded in this report.**

## 6A.2 FIELD STRENGTH OF SPURIOUS RADIATION

**Reference**

FCC: CFR 2.1053, 22.917, 24.238, 27.53

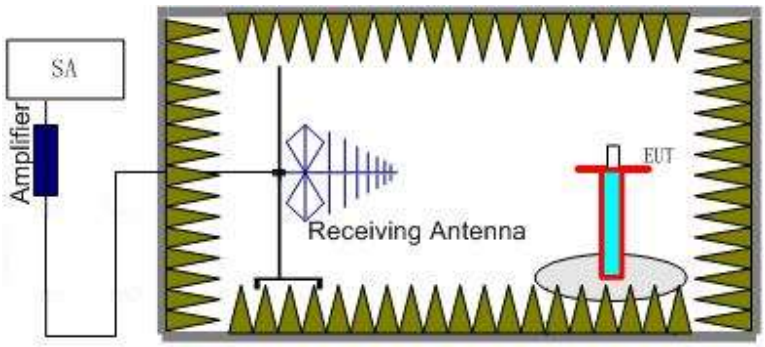
**A.2.1 Measurement Method**

This measurement is carried out in fully-anechoic chamber FAC-3.

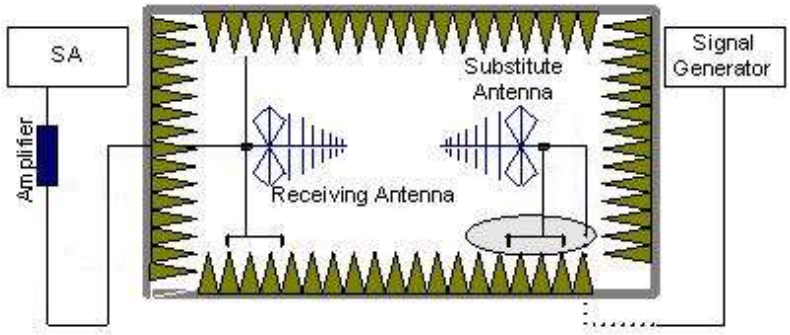
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 22.917, 24.238, 27.53(h). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the LTE Bands 2,4,5,7,12,13,17,66,

**The procedure of radiated spurious emissions is as follows:**

1. For radiated emissions measurements performed at frequencies less than or equal to 1 GHz, EUT was placed on a 80 cm high non-conductive stand at a 3 meter test distance from the receive antenna. For radiated measurements performed at frequencies above 1 GHz, EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. Receiving antenna was placed on the antenna mast 3 meters from the EUT. For emission measurements. The receiving antenna shall be varied from 1 m to 4 m in height above the reference ground in a search for the relative positioning that produces the maximum radiated signal level. 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 transmit frequencies in three channels (High, Middle, Low) 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 (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.




In the chamber, an 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 and adjusts 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(dBi) ($G_a$) 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:
   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 -2.15dB.

**A.2.2 Measurement Results**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2,4,5,7,12,13,17,66. 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 the LTE Bands 2,4,5,7,12,13,17,66. 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.
Only worst case result is given below.

**LTE Band 2, 1.4MHz, QPSK, Channel 18607**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12951.90 | -37.63 | 2.50 | 13.80 | -26.33 | -13.00 | H |
| 17000.00 | -42.39 | 2.90 | 14.50 | -30.79 | -13.00 | H |
| 17453.33 | -41.84 | 2.90 | 14.50 | -30.24 | -13.00 | H |
| 17576.67 | -39.43 | 3.30 | 12.80 | -29.93 | -13.00 | H |
| 17764.29 | -39.48 | 3.60 | 12.80 | -30.28 | -13.00 | H |
| 17989.52 | -37.74 | 3.20 | 12.80 | -28.14 | -13.00 | H |

**LTE Band 2, 1.4MHz, QPSK, Channel 18900**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 13157.14 | -38.25 | 2.30 | 13.30 | -27.25 | -13.00 | H |
| 17280.00 | -42.19 | 3.20 | 14.50 | -30.89 | -13.00 | H |
| 17465.24 | -40.98 | 2.90 | 14.50 | -29.38 | -13.00 | H |
| 17525.71 | -39.10 | 2.90 | 12.80 | -29.20 | -13.00 | H |
| 17814.76 | -39.05 | 3.60 | 12.80 | -29.85 | -13.00 | H |
| 17953.33 | -37.32 | 3.20 | 12.80 | -27.72 | -13.00 | H |

**LTE Band 2, 1.4MHz, QPSK, Channel 19193**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 11452.86 | -38.65 | 2.60 | 10.50 | -30.75 | -13.00 | H |
| 13362.38 | -41.94 | 2.30 | 13.30 | -30.94 | -13.00 | H |
| 17524.76 | -39.56 | 2.90 | 12.80 | -29.66 | -13.00 | H |
| 17605.24 | -39.27 | 3.30 | 12.80 | -29.77 | -13.00 | H |
| 17838.10 | -39.54 | 3.60 | 12.80 | -30.34 | -13.00 | H |
| 17980.95 | -37.59 | 3.20 | 12.80 | -27.99 | -13.00 | H |

**LTE Band 2, 1.4MHz, 16QAM, Channel 18607**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12951.90 | -37.92 | 2.50 | 13.80 | -26.62 | -13.00 | H |
| 17153.33 | -43.36 | 2.90 | 14.50 | -31.76 | -13.00 | H |
| 17503.81 | -39.62 | 2.90 | 12.80 | -29.72 | -13.00 | H |
| 17548.57 | -39.49 | 2.90 | 12.80 | -29.59 | -13.00 | H |
| 17819.05 | -40.33 | 3.60 | 12.80 | -31.13 | -13.00 | H |
| 17993.81 | -37.78 | 3.20 | 12.80 | -28.18 | -13.00 | H |

**LTE Band 2, 1.4MHz, 16QAM, Channel 18900**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 13157.14 | -40.21 | 2.30 | 13.30 | -29.21 | -13.00 | H |
| 17287.62 | -42.79 | 3.20 | 14.50 | -31.49 | -13.00 | H |
| 17517.14 | -40.58 | 2.90 | 12.80 | -30.68 | -13.00 | H |
| 17643.33 | -39.72 | 3.30 | 12.80 | -30.22 | -13.00 | H |
| 17836.67 | -40.57 | 3.60 | 12.80 | -31.37 | -13.00 | H |
| 17979.52 | -38.22 | 3.20 | 12.80 | -28.62 | -13.00 | H |

**LTE Band 2, 1.4MHz, 16QAM, Channel 19193**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 11452.86 | -38.54 | 2.60 | 10.50 | -30.64 | -13.00 | H |
| 13362.38 | -42.26 | 2.30 | 13.30 | -31.26 | -13.00 | H |
| 17442.86 | -41.98 | 2.90 | 14.50 | -30.38 | -13.00 | H |
| 17595.71 | -39.97 | 3.30 | 12.80 | -30.47 | -13.00 | H |
| 17840.00 | -39.64 | 3.60 | 12.80 | -30.44 | -13.00 | H |
| 17955.24 | -37.57 | 3.20 | 12.80 | -27.97 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**LTE Band 5, 1.4MHz, QPSK, Channel 20407**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8723.63 | -52.50 | 2.00 | 12.00 | -44.65 | -13.00 | H |
| 9101.13 | -51.25 | 2.20 | 11.60 | -44.00 | -13.00 | H |
| 9302.88 | -50.32 | 2.00 | 11.60 | -42.87 | -13.00 | H |
| 9472.25 | -50.04 | 2.10 | 11.60 | -42.69 | -13.00 | V |
| 9722.00 | -50.45 | 2.20 | 11.20 | -43.60 | -13.00 | H |
| 9788.25 | -51.11 | 2.30 | 11.20 | -44.36 | -13.00 | H |

**LTE Band 5, 1.4MHz, QPSK, Channel 20525**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8421.00 | -51.84 | 1.80 | 11.30 | -44.49 | -13.00 | H |
| 9093.38 | -51.87 | 2.20 | 11.60 | -44.62 | -13.00 | H |
| 9299.50 | -50.32 | 2.00 | 11.60 | -42.87 | -13.00 | H |
| 9472.25 | -50.69 | 2.10 | 11.60 | -43.34 | -13.00 | V |
| 9718.00 | -50.81 | 2.20 | 11.20 | -43.96 | -13.00 | H |
| 9781.75 | -50.29 | 2.30 | 11.20 | -43.54 | -13.00 | H |

**LTE Band 5, 1.4MHz, QPSK, Channel 20643**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 5087.63 | -48.89 | 1.20 | 12.50 | -39.74 | -13.00 | H |
| 8478.75 | -46.60 | 1.80 | 11.30 | -39.25 | -13.00 | H |
| 9109.50 | -51.10 | 2.10 | 11.60 | -43.75 | -13.00 | H |
| 9326.63 | -48.47 | 2.00 | 11.60 | -41.02 | -13.00 | H |
| 9476.88 | -51.20 | 2.10 | 11.60 | -43.85 | -13.00 | V |
| 9737.50 | -50.68 | 2.20 | 11.20 | -43.83 | -13.00 | H |

**LTE Band 5, 1.4MHz, 16QAM, Channel 20407**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 7321.13 | -52.90 | 1.70 | 12.00 | -44.75 | -13.00 | H |
| 9095.88 | -50.76 | 2.20 | 11.60 | -43.51 | -13.00 | H |
| 9296.13 | -50.59 | 2.00 | 11.60 | -43.14 | -13.00 | H |
| 9424.88 | -50.96 | 2.10 | 11.60 | -43.61 | -13.00 | H |
| 9726.00 | -51.06 | 2.20 | 11.20 | -44.21 | -13.00 | H |
| 9891.38 | -51.18 | 2.20 | 11.20 | -44.33 | -13.00 | H |

**LTE Band 5, 1.4MHz, 16QAM, Channel 20525**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8431.88 | -51.50 | 1.80 | 11.30 | -44.15 | -13.00 | H |
| 9093.75 | -51.36 | 2.20 | 11.60 | -44.11 | -13.00 | H |
| 9299.00 | -49.94 | 2.00 | 11.60 | -42.49 | -13.00 | H |
| 9474.88 | -50.41 | 2.10 | 11.60 | -43.06 | -13.00 | V |
| 9734.13 | -50.50 | 2.20 | 11.20 | -43.65 | -13.00 | H |
| 9788.63 | -50.73 | 2.30 | 11.20 | -43.98 | -13.00 | H |

**LTE Band 5, 1.4MHz, 16QAM, Channel 20643**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 5086.88 | -49.15 | 1.20 | 12.50 | -40.00 | -13.00 | H |
| 8478.38 | -47.03 | 1.80 | 11.30 | -39.68 | -13.00 | H |
| 9107.00 | -51.46 | 2.10 | 11.60 | -44.11 | -13.00 | H |
| 9326.50 | -48.50 | 2.00 | 11.60 | -41.05 | -13.00 | H |
| 9475.63 | -50.74 | 2.10 | 11.60 | -43.39 | -13.00 | V |
| 9734.75 | -50.11 | 2.20 | 11.20 | -43.26 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**LTE Band 7, 5 MHz, QPSK, Channel 20775**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16990.48 | -55.14 | 2.90 | 16.50 | -41.54 | -25.00 | H |
| 17277.62 | -53.08 | 3.20 | 14.50 | -41.78 | -25.00 | H |
| 17505.24 | -50.06 | 2.90 | 12.80 | -40.16 | -25.00 | H |
| 17572.86 | -49.69 | 3.30 | 12.80 | -40.19 | -25.00 | H |
| 17838.10 | -49.98 | 3.60 | 12.80 | -40.78 | -25.00 | H |
| 17980.95 | -47.86 | 3.20 | 12.80 | -38.26 | -25.00 | H |

**LTE Band 7, 5 MHz, QPSK, Channel 21100**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16985.24 | -55.00 | 2.90 | 16.50 | -41.40 | -25.00 | H |
| 17369.05 | -53.20 | 3.20 | 14.50 | -41.90 | -25.00 | H |
| 17502.86 | -50.18 | 2.90 | 12.80 | -40.28 | -25.00 | H |
| 17598.57 | -49.36 | 3.30 | 12.80 | -39.86 | -25.00 | H |
| 17777.14 | -49.99 | 3.60 | 12.80 | -40.79 | -25.00 | H |
| 17990.95 | -47.99 | 3.20 | 12.80 | -38.39 | -25.00 | H |

**LTE Band 7, 5 MHz, QPSK, Channel 21425**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16966.19 | -55.14 | 2.90 | 16.50 | -41.54 | -25.00 | H |
| 17122.86 | -53.69 | 2.90 | 14.50 | -42.09 | -25.00 | H |
| 17271.90 | -53.10 | 3.20 | 14.50 | -41.80 | -25.00 | H |
| 17449.05 | -51.76 | 2.90 | 14.50 | -40.16 | -25.00 | H |
| 17526.19 | -50.04 | 2.90 | 12.80 | -40.14 | -25.00 | H |
| 17836.67 | -50.08 | 3.60 | 12.80 | -40.88 | -25.00 | H |

**LTE Band 7, 5 MHz, 16QAM, Channel 20775**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16965.24 | -54.94 | 2.90 | 16.50 | -41.34 | -25.00 | H |
| 17288.10 | -53.00 | 3.20 | 14.50 | -41.70 | -25.00 | H |
| 17457.14 | -52.00 | 2.90 | 14.50 | -40.40 | -25.00 | H |
| 17596.67 | -49.40 | 3.30 | 12.80 | -39.90 | -25.00 | H |
| 17838.10 | -50.03 | 3.60 | 12.80 | -40.83 | -25.00 | H |
| 17934.76 | -47.81 | 3.20 | 12.80 | -38.21 | -25.00 | H |

**LTE Band 7, 5 MHz, 16QAM, Channel 21100**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16984.76 | -55.12 | 2.90 | 16.50 | -41.52 | -25.00 | H |
| 17284.29 | -53.09 | 3.20 | 14.50 | -41.79 | -25.00 | H |
| 17521.90 | -50.14 | 2.90 | 12.80 | -40.24 | -25.00 | H |
| 17532.86 | -49.72 | 2.90 | 12.80 | -39.82 | -25.00 | H |
| 17780.48 | -49.88 | 3.60 | 12.80 | -40.68 | -25.00 | H |
| 17993.81 | -47.71 | 3.20 | 12.80 | -38.11 | -25.00 | H |

**LTE Band 7, 5 MHz, 16QAM, Channel 21425**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 16995.71 | -54.89 | 2.90 | 16.50 | -41.29 | -25.00 | H |
| 17280.95 | -53.40 | 3.20 | 14.50 | -42.10 | -25.00 | H |
| 17484.29 | -51.77 | 2.90 | 14.50 | -40.17 | -25.00 | H |
| 17613.81 | -49.24 | 3.30 | 12.80 | -39.74 | -25.00 | H |
| 17820.95 | -50.01 | 3.60 | 12.80 | -40.81 | -25.00 | H |
| 17996.19 | -48.05 | 3.20 | 12.80 | -38.45 | -25.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**LTE Band 12, 1.4MHz, QPSK, Channel 23017**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8748.38 | -51.86 | 2.00 | 12.00 | -44.01 | -13.00 | H |
| 9118.88 | -52.19 | 2.10 | 11.60 | -44.84 | -13.00 | V |
| 9219.13 | -50.83 | 2.10 | 11.60 | -43.48 | -13.00 | H |
| 9471.88 | -50.72 | 2.10 | 11.60 | -43.37 | -13.00 | V |
| 9740.13 | -51.03 | 2.20 | 11.20 | -44.18 | -13.00 | H |
| 9789.50 | -49.85 | 2.30 | 11.20 | -43.10 | -13.00 | H |

**LTE Band 12, 1.4MHz, QPSK, Channel 23095**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 7281.38 | -52.67 | 1.90 | 12.00 | -44.72 | -13.00 | H |
| 9109.38 | -51.86 | 2.10 | 11.60 | -44.51 | -13.00 | H |
| 9225.50 | -49.51 | 2.10 | 11.60 | -42.16 | -13.00 | H |
| 9475.38 | -50.40 | 2.10 | 11.60 | -43.05 | -13.00 | V |
| 9736.63 | -50.91 | 2.20 | 11.20 | -44.06 | -13.00 | H |
| 9898.63 | -47.83 | 2.20 | 11.20 | -40.98 | -13.00 | H |

**LTE Band 12, 1.4MHz, QPSK, Channel 23173**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8578.88 | -50.77 | 2.00 | 12.00 | -42.92 | -13.00 | H |
| 9099.88 | -51.40 | 2.20 | 11.60 | -44.15 | -13.00 | H |
| 9300.38 | -50.10 | 2.00 | 11.60 | -42.65 | -13.00 | H |
| 9472.38 | -50.79 | 2.10 | 11.60 | -43.44 | -13.00 | V |
| 9759.75 | -51.04 | 2.20 | 11.20 | -44.19 | -13.00 | H |
| 9796.75 | -51.09 | 2.30 | 11.20 | -44.34 | -13.00 | H |

**LTE Band 12, 1.4MHz, 16QAM, Channel 23017**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8382.00 | -52.17 | 1.80 | 11.30 | -44.82 | -13.00 | H |
| 9103.50 | -51.49 | 2.20 | 11.60 | -44.24 | -13.00 | H |
| 9301.63 | -50.98 | 2.00 | 11.60 | -43.53 | -13.00 | H |
| 9473.75 | -51.18 | 2.10 | 11.60 | -43.83 | -13.00 | V |
| 9748.38 | -50.86 | 2.20 | 11.20 | -44.01 | -13.00 | H |
| 9789.50 | -49.54 | 2.30 | 11.20 | -42.79 | -13.00 | H |

**LTE Band 12, 1.4MHz 16QAM, Channel 23095**

| Frequency(MHz) | PMea(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 7221.00 | -52.86 | 1.80 | 12.00 | -44.81 | -13.00 | V |
| 9103.63 | -51.24 | 2.20 | 11.60 | -43.99 | -13.00 | H |
| 9295.38 | -50.48 | 2.00 | 11.60 | -43.03 | -13.00 | H |
| 9476.38 | -50.85 | 2.10 | 11.60 | -43.50 | -13.00 | V |
| 9764.00 | -50.10 | 2.30 | 11.20 | -43.35 | -13.00 | H |
| 9898.88 | -50.20 | 2.20 | 11.20 | -43.35 | -13.00 | H |

**LTE Band 12, 1.4MHz, 16QAM, Channel 23173**

| Frequency(MHz) | PMea(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 8578.50 | -50.95 | 2.10 | 12.00 | -43.20 | -13.00 | H |
| 9102.38 | -51.34 | 2.20 | 11.60 | -44.09 | -13.00 | H |
| 9305.88 | -49.66 | 2.00 | 11.60 | -42.21 | -13.00 | H |
| 9475.63 | -50.76 | 2.10 | 11.60 | -43.41 | -13.00 | V |
| 9742.13 | -50.28 | 2.20 | 11.20 | -43.43 | -13.00 | H |
| 9803.00 | -50.80 | 2.30 | 11.20 | -44.05 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**LTE Band 13, 5 MHz, QPSK, Channel 23205**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1561.00 | -59.08 | 0.70 | 8.10 | -53.83 | -40.00 | H |
| 8569.88 | -51.82 | 2.10 | 12.00 | -44.07 | -13.00 | H |
| 9301.13 | -50.05 | 2.00 | 11.60 | -42.60 | -13.00 | H |
| 9348.38 | -48.81 | 2.00 | 11.60 | -41.36 | -13.00 | H |
| 9716.50 | -50.07 | 2.20 | 11.20 | -43.22 | -13.00 | H |
| 9803.63 | -50.50 | 2.30 | 11.20 | -43.75 | -13.00 | H |

**LTE Band 13, 5 MHz, QPSK, Channel 23230**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1562.50 | -58.56 | 0.70 | 8.10 | -53.31 | -40.00 | V |
| 9098.63 | -51.39 | 2.20 | 11.60 | -44.14 | -13.00 | H |
| 9297.75 | -50.54 | 2.00 | 11.60 | -43.09 | -13.00 | H |
| 9378.25 | -50.31 | 2.00 | 11.60 | -42.86 | -13.00 | H |
| 9735.75 | -50.20 | 2.20 | 11.20 | -43.35 | -13.00 | H |
| 9804.38 | -50.41 | 2.30 | 11.20 | -43.66 | -13.00 | H |

**LTE Band 13, 5 MHz, QPSK, Channel 23255**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1568.00 | -58.42 | 0.70 | 8.10 | -53.17 | -40.00 | V |
| 9101.63 | -51.45 | 2.20 | 11.60 | -44.20 | -13.00 | H |
| 9295.25 | -50.22 | 2.00 | 11.60 | -42.77 | -13.00 | H |
| 9475.13 | -50.55 | 2.10 | 11.60 | -43.20 | -13.00 | V |
| 9743.38 | -50.76 | 2.20 | 11.20 | -43.91 | -13.00 | H |
| 9781.75 | -51.11 | 2.30 | 11.20 | -44.36 | -13.00 | H |

**LTE Band 13, 5 MHz, 16QAM, Channel 23205**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1572.00 | -58.34 | 0.70 | 8.10 | -53.09 | -40.00 | V |
| 8374.13 | -51.26 | 1.80 | 11.30 | -43.91 | -13.00 | H |
| 8569.88 | -51.02 | 2.10 | 12.00 | -43.27 | -13.00 | H |
| 9088.00 | -51.02 | 2.20 | 11.60 | -43.77 | -13.00 | H |
| 9310.88 | -50.13 | 2.00 | 11.60 | -42.68 | -13.00 | H |
| 9348.63 | -49.58 | 2.00 | 11.60 | -42.13 | -13.00 | H |

**LTE Band 13, 5 MHz, 16QAM, Channel 23230**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1565.50 | -59.23 | 0.70 | 8.10 | -53.98 | -40.00 | V |
| 8422.88 | -51.76 | 1.80 | 11.30 | -44.41 | -13.00 | H |
| 9101.63 | -51.62 | 2.20 | 11.60 | -44.37 | -13.00 | H |
| 9301.88 | -49.74 | 2.00 | 11.60 | -42.29 | -13.00 | H |
| 9474.63 | -50.52 | 2.10 | 11.60 | -43.17 | -13.00 | V |
| 9741.63 | -50.13 | 2.20 | 11.20 | -43.28 | -13.00 | H |

**LTE Band 13, 5 MHz, 16QAM, Channel 23255**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak ERP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1564.50 | -58.37 | 0.70 | 8.10 | -53.12 | -40.00 | V |
| 9102.00 | -50.81 | 2.20 | 11.60 | -43.56 | -13.00 | H |
| 9303.25 | -49.84 | 2.00 | 11.60 | -42.39 | -13.00 | H |
| 9479.50 | -50.19 | 2.10 | 11.60 | -42.84 | -13.00 | V |
| 9730.38 | -51.11 | 2.20 | 11.20 | -44.26 | -13.00 | H |
| 9800.63 | -49.70 | 2.30 | 11.20 | -42.95 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

**LTE Band 66, 1.4MHz QPSK, Channel 131979**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 11971.43 | -32.73 | 2.60 | 11.00 | -24.33 | -13.00 | H |
| 17351.90 | -41.84 | 3.20 | 14.50 | -30.54 | -13.00 | H |
| 17496.19 | -41.17 | 2.90 | 14.50 | -29.57 | -13.00 | H |
| 17571.43 | -38.53 | 3.30 | 12.80 | -29.03 | -13.00 | H |
| 17839.05 | -37.71 | 3.60 | 12.80 | -28.51 | -13.00 | H |
| 17998.10 | -36.42 | 3.20 | 12.80 | -26.82 | -13.00 | H |

**LTE Band 66, 1.4MHz, QPSK, Channel 132322**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12211.90 | -36.50 | 2.60 | 12.60 | -26.50 | -13.00 | H |
| 17241.90 | -42.01 | 3.20 | 14.50 | -30.71 | -13.00 | H |
| 17523.81 | -38.34 | 2.90 | 12.80 | -28.44 | -13.00 | H |
| 17609.52 | -39.21 | 3.30 | 12.80 | -29.71 | -13.00 | H |
| 17705.24 | -40.07 | 3.30 | 12.80 | -30.57 | -13.00 | H |
| 17997.62 | -38.08 | 3.20 | 12.80 | -28.48 | -13.00 | H |

**LTE Band 66, 1.4MHz, QPSK, Channel 132665**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12451.90 | -35.40 | 2.60 | 12.60 | -25.40 | -13.00 | H |
| 16947.62 | -44.52 | 2.90 | 16.50 | -30.92 | -13.00 | H |
| 17382.38 | -40.96 | 3.20 | 14.50 | -29.66 | -13.00 | H |
| 17585.71 | -38.18 | 3.30 | 12.80 | -28.68 | -13.00 | H |
| 17836.67 | -38.67 | 3.60 | 12.80 | -29.47 | -13.00 | H |
| 17991.43 | -36.14 | 3.20 | 12.80 | -26.54 | -13.00 | H |

**LTE Band 66, 1.4MHz, 16QAM, Channel 131979**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 11971.43 | -33.02 | 2.60 | 11.00 | -24.62 | -13.00 | H |
| 17290.95 | -42.60 | 3.20 | 14.50 | -31.30 | -13.00 | H |
| 17472.38 | -41.44 | 2.90 | 14.50 | -29.84 | -13.00 | H |
| 17590.95 | -40.15 | 3.30 | 12.80 | -30.65 | -13.00 | H |
| 17786.19 | -40.40 | 3.60 | 12.80 | -31.20 | -13.00 | H |
| 17948.57 | -38.08 | 3.20 | 12.80 | -28.48 | -13.00 | H |

**LTE Band 66, 1.4MHz, 16QAM, Channel 132322**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12211.90 | -37.32 | 2.60 | 12.60 | -27.32 | -13.00 | H |
| 17363.33 | -42.88 | 3.20 | 14.50 | -31.58 | -13.00 | H |
| 17507.62 | -39.40 | 2.90 | 12.80 | -29.50 | -13.00 | H |
| 17612.86 | -39.62 | 3.30 | 12.80 | -30.12 | -13.00 | H |
| 17802.86 | -39.46 | 3.60 | 12.80 | -30.26 | -13.00 | H |
| 17962.38 | -37.54 | 3.20 | 12.80 | -27.94 | -13.00 | H |

**LTE Band 66, 1.4MHz, 16QAM, Channel 132665**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain(dBi) | Peak EIRP(dBm) | Limit(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 12451.90 | -34.85 | 2.60 | 12.60 | -24.85 | -13.00 | H |
| 16937.62 | -44.03 | 2.90 | 16.50 | -30.43 | -13.00 | H |
| 17413.33 | -41.76 | 2.90 | 14.50 | -30.16 | -13.00 | H |
| 17558.57 | -39.81 | 2.90 | 12.80 | -29.91 | -13.00 | H |
| 17820.95 | -39.92 | 3.60 | 12.80 | -30.72 | -13.00 | H |
| 17985.71 | -37.37 | 3.20 | 12.80 | -27.77 | -13.00 | H |

Note: The maximum value of expanded measurement uncertainty for this test item is U = 2.87dB(30MHz-3GHz)/3.35dB(3GHz-18GHz)/2.68dB(18GHz-40GHz), k = 2

## A.3 FREQUENCY STABILITY

**Reference**

FCC: CFR Part 2.1055, 22.355, 24.235, 27.54.

**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 R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of PCS 1900 and GSM850, 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℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre 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℃ increments from -30℃ to +50℃. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

**A.3.2 Measurement Limit**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. 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 between 3.60V and 4.35V, with a nominal voltage of 3.80V. 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. These voltages represent a tolerance from -5.5 % and +12.6 %. For the purposes of measuring frequency stability these voltage limits are to be used.

### A.3.3 Measurement results

**LTE Band 2, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | 25 | 36 | 0.014 | 0.021 |
| 3.80 | 15 | 27 | 0.009 | 0.016 |
| 4.35 | 5 | 54 | 0.003 | 0.031 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | 24 | -20 | 0.014 | 0.012 |
| -20 | 14 | 40 | 0.008 | 0.023 |
| -10 | -14 | -3 | 0.008 | 0.002 |
| 0 | -20 | -6 | 0.012 | 0.003 |
| 10 | 33 | 6 | 0.019 | 0.003 |
| 20 | 48 | 51 | 0.028 | 0.029 |
| 30 | 36 | 19 | 0.021 | 0.011 |
| 40 | 47 | 27 | 0.027 | 0.016 |
| 50 | 20 | 28 | 0.012 | 0.016 |

Expanded measurement uncertainty is 10 Hz, $k$ = 2

**LTE Band 5, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | 1 | 29 | 0.001 | 0.017 |
| 3.80 | -14 | -12 | 0.008 | 0.007 |
| 4.35 | 26 | 48 | 0.015 | 0.028 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | 13 | 15 | 0.008 | 0.009 |
| -20 | -7 | 23 | 0.004 | 0.013 |
| -10 | 5 | 44 | 0.003 | 0.025 |
| 0 | 28 | 54 | 0.016 | 0.031 |
| 10 | 43 | 6 | 0.025 | 0.003 |
| 20 | 53 | 9 | 0.031 | 0.005 |
| 30 | -9 | 25 | 0.005 | 0.014 |
| 40 | 4 | 53 | 0.002 | 0.031 |
| 50 | 49 | 48 | 0.028 | 0.028 |

Expanded measurement uncertainty is 10Hz, $k$ = 2

**LTE Band 7, 5MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | -8 | 56 | 0.005 | 0.032 |
| 3.80 | 60 | 32 | 0.035 | 0.018 |
| 4.35 | -13 | -17 | 0.008 | 0.010 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | 42 | 37 | 0.024 | 0.021 |
| -20 | -9 | 58 | 0.005 | 0.033 |
| -10 | 32 | 0 | 0.018 | 0.000 |
| 0 | -19 | 16 | 0.011 | 0.009 |
| 10 | 56 | 57 | 0.032 | 0.033 |
| 20 | 3 | -12 | 0.002 | 0.007 |
| 30 | 10 | 27 | 0.006 | 0.016 |
| 40 | 48 | 58 | 0.028 | 0.033 |
| 50 | 60 | 24 | 0.035 | 0.014 |

Expanded measurement uncertainty is 10 Hz, *k* = 2

**LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | 23 | 50 | 0.013 | 0.029 |
| 3.80 | 8 | 42 | 0.005 | 0.024 |
| 4.35 | 7 | -7 | 0.004 | 0.004 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | 49 | 11 | 0.028 | 0.006 |
| -20 | 32 | 10 | 0.018 | 0.006 |
| -10 | 57 | 48 | 0.033 | 0.028 |
| 0 | 20 | 36 | 0.012 | 0.021 |
| 10 | 32 | -7 | 0.018 | 0.004 |
| 20 | -2 | 6 | 0.001 | 0.003 |
| 30 | -3 | 12 | 0.002 | 0.007 |
| 40 | 53 | 3 | 0.031 | 0.002 |
| 50 | -2 | -12 | 0.001 | 0.007 |

Expanded measurement uncertainty is 10Hz, k = 2

**LTE Band 13, 5MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | 29 | 60 | 0.017 | 0.035 |
| 3.80 | 25 | 53 | 0.014 | 0.031 |
| 4.35 | 23 | 29 | 0.013 | 0.017 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | -10 | -12 | 0.006 | 0.007 |
| -20 | 22 | 22 | 0.013 | 0.013 |
| -10 | 35 | -3 | 0.020 | 0.002 |
| 0 | 14 | -1 | 0.008 | 0.001 |
| 10 | 22 | 16 | 0.013 | 0.009 |
| 20 | 16 | 9 | 0.009 | 0.005 |
| 30 | 49 | 44 | 0.028 | 0.025 |
| 40 | 23 | 52 | 0.013 | 0.030 |
| 50 | 15 | 46 | 0.009 | 0.027 |

Expanded measurement uncertainty is 10Hz, k = 2

**LTE Band 66, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.60 | 3 | 31 | 0.002 | 0.018 |
| 3.80 | -12 | 5 | 0.007 | 0.003 |
| 4.35 | 33 | 22 | 0.019 | 0.013 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| -30 | 14 | 1 | 0.008 | 0.001 |
| -20 | -5 | 17 | 0.003 | 0.010 |
| -10 | 16 | 49 | 0.009 | 0.028 |
| 0 | 21 | 60 | 0.012 | 0.035 |
| 10 | 3 | 7 | 0.002 | 0.004 |
| 20 | 58 | 18 | 0.033 | 0.010 |
| 30 | 9 | 13 | 0.005 | 0.008 |
| 40 | 56 | 32 | 0.032 | 0.018 |
| 50 | -17 | 2 | 0.010 | 0.001 |

Expanded measurement uncertainty is 10Hz, k = 2

## A.4 OCCUPIED BANDWIDTH

**Reference**

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53.

**A.4.1 Occupied Bandwidth Results**

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

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 (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

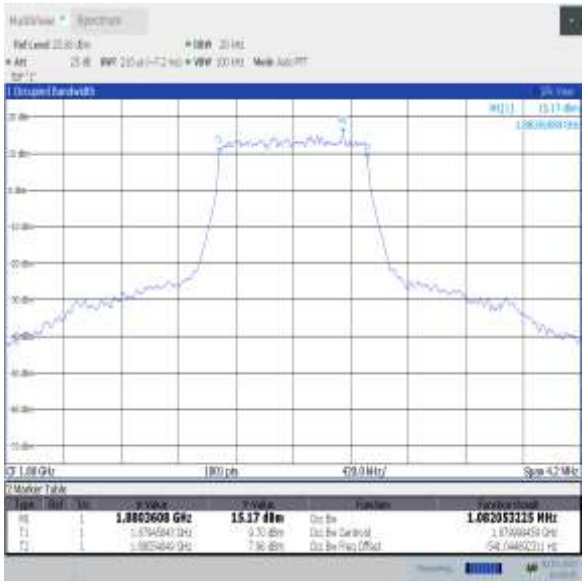
d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 99 % power bandwidth function of the spectrum analyzer and report the measured bandwidth.

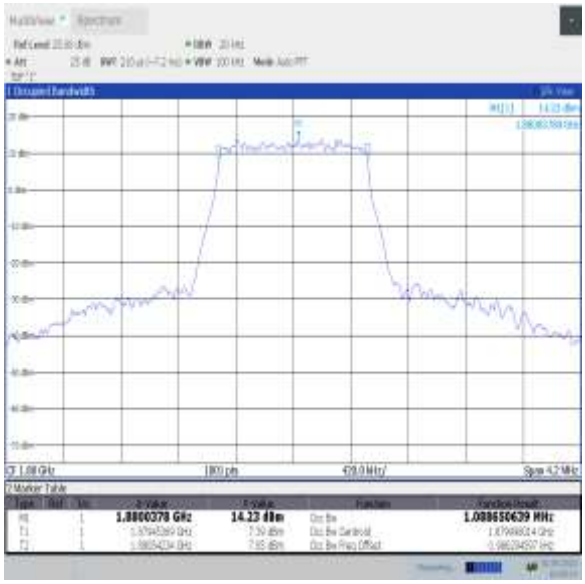
**LTE band 2,BW1.4MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 1.082 | 1.089 |

**LTE band 2 , BW1.4MHz Bandwidth,QPSK (99% BW)**



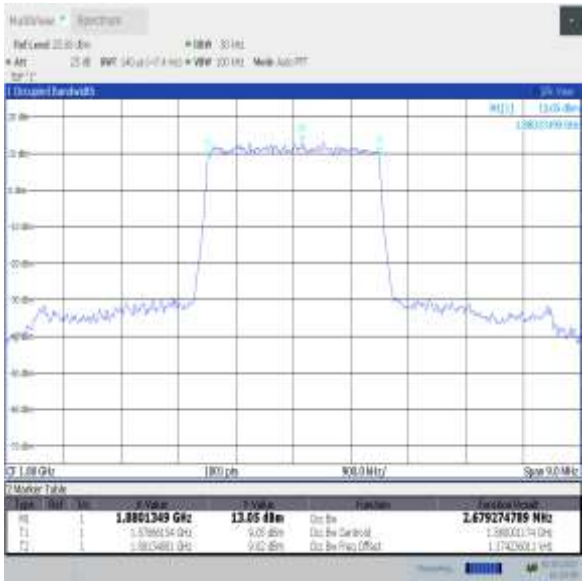

**LTE band 2 , BW1.4MHz Bandwidth,16QAM (99% BW)**



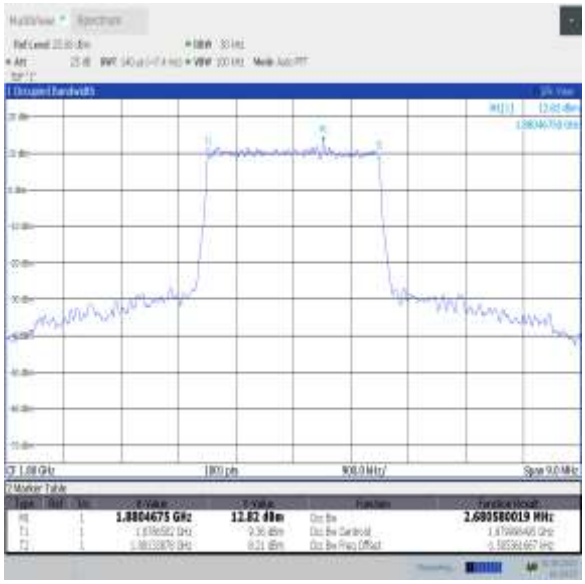
**LTE band 2,3MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 2.679 | 2.680 |

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



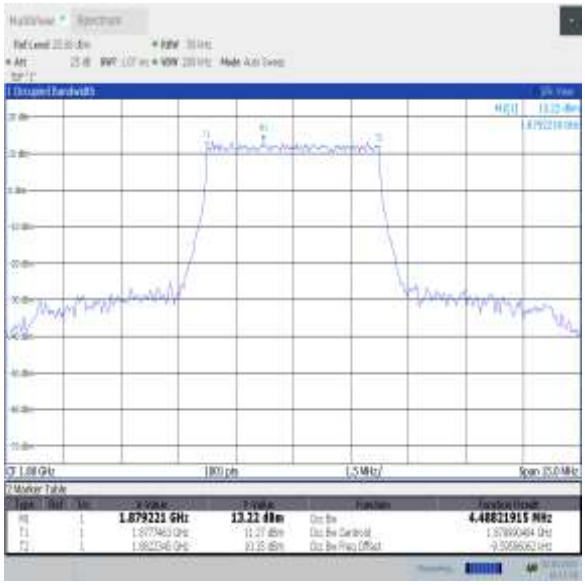

**LTE band 2 , 3MHz Bandwidth,16QAM (99% BW)**



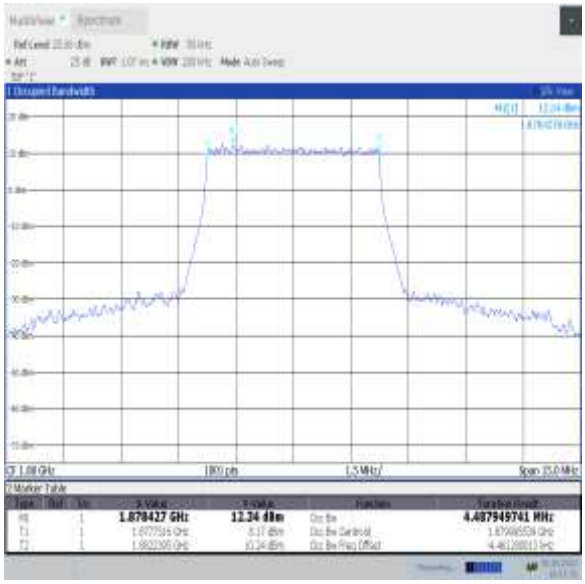
**LTE band 2,5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 4.488 | 4.488 |

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



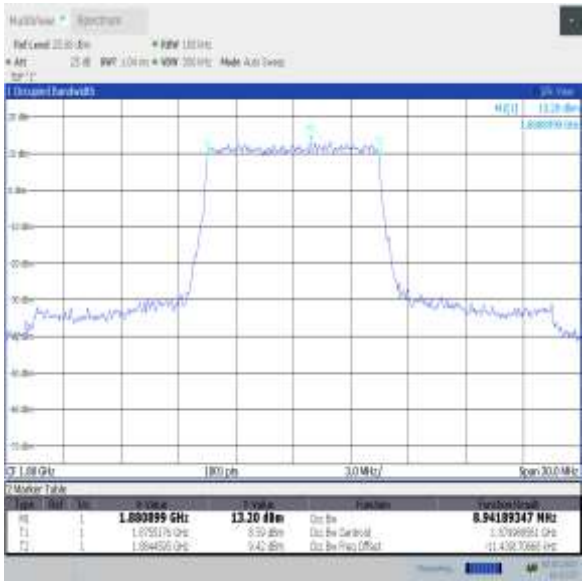

**LTE band 2 , 5MHz Bandwidth,16QAM (99% BW)**



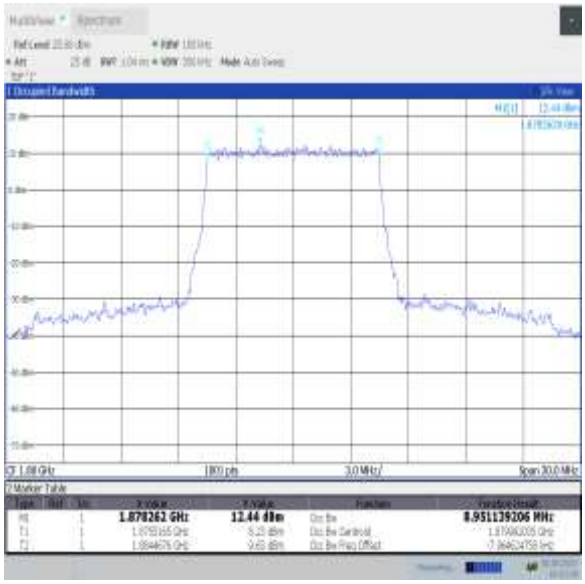
**LTE band 2,10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 8.941 | 8.951 |

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



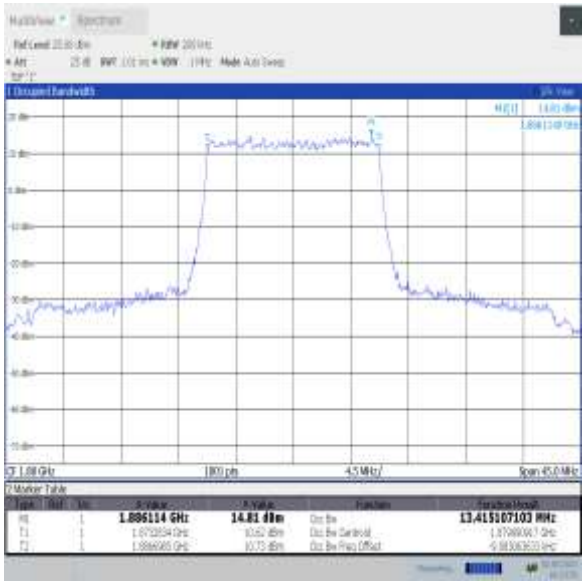

**LTE band 2 , 10MHz Bandwidth,16QAM (99% BW)**



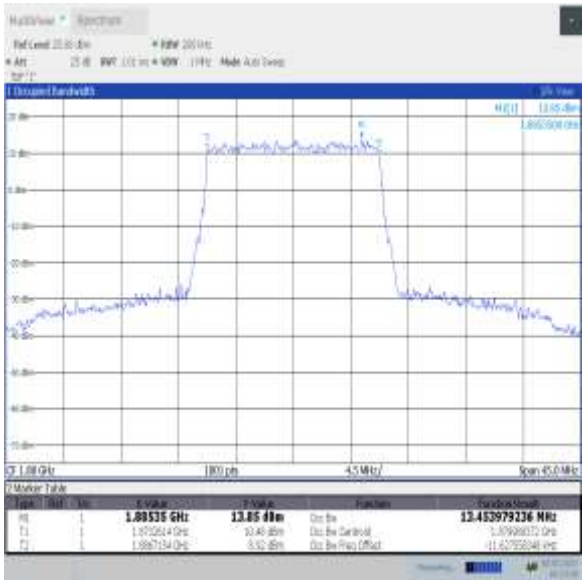
**LTE band 2,15MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 13.415 | 13.454 |

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



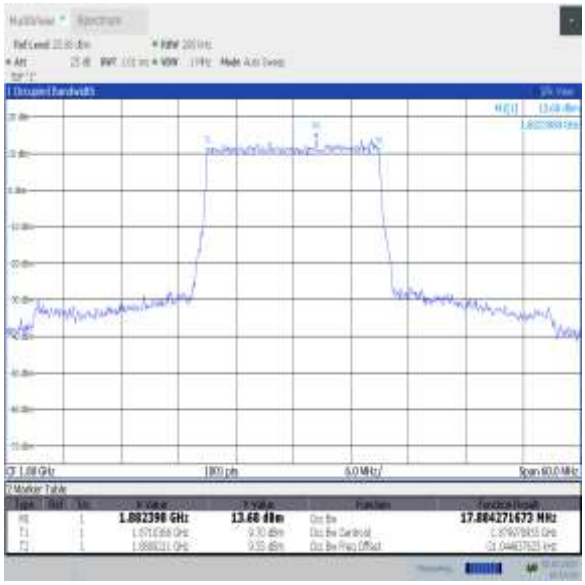

**LTE band 2 , 15MHz Bandwidth,16QAM (99% BW)**



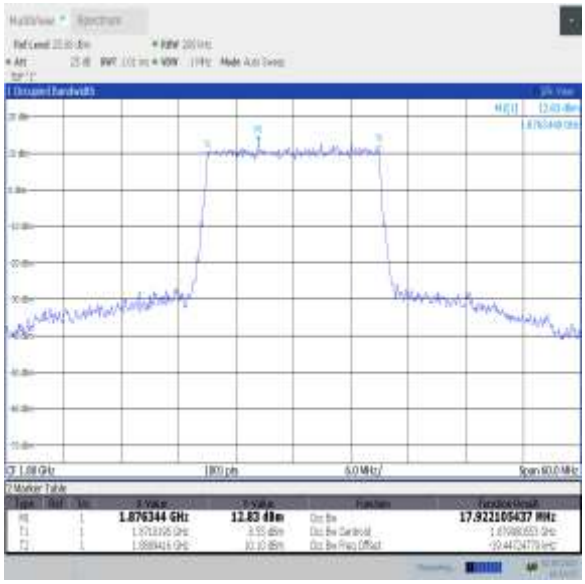
**LTE band 2,20MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 17.884 | 17.922 |

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



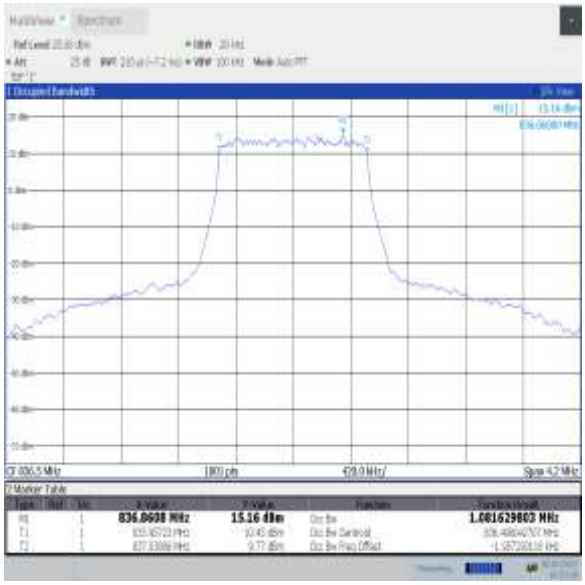

**LTE band 2 , 20MHz Bandwidth,16QAM (99% BW)**



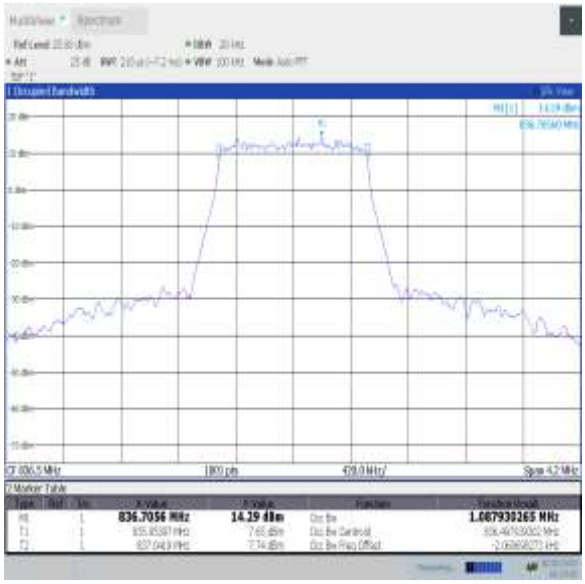
**LTE band 5, BW1.4MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 1.081 | 1.088 |

**LTE band 5 , BW1.4MHz Bandwidth, QPSK (99% BW)**



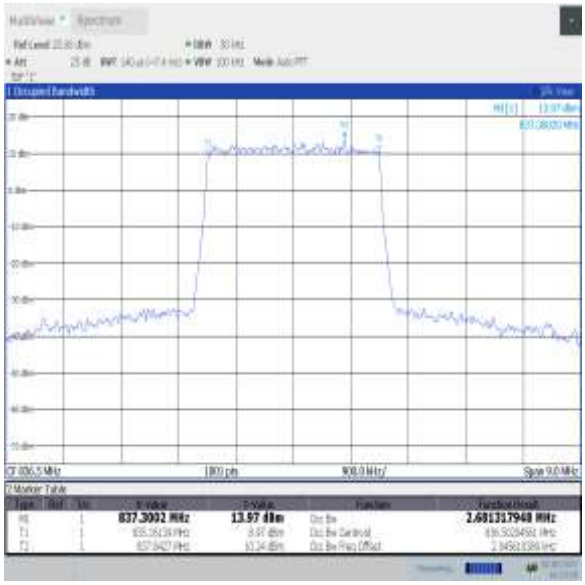

**LTE band 5 , BW1.4MHz Bandwidth,16QAM (99% BW)**



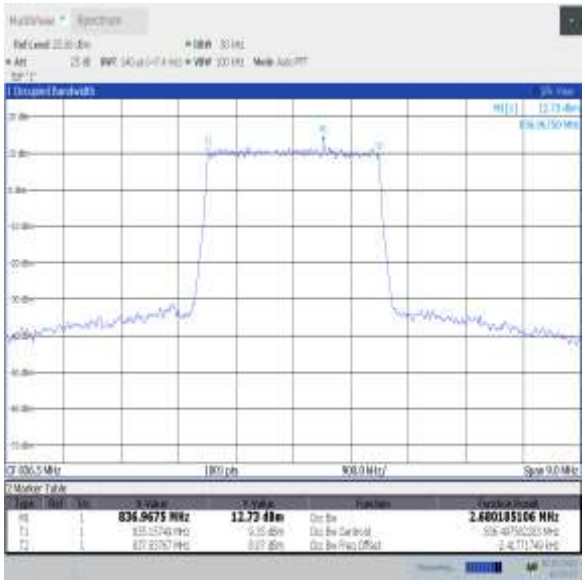
**LTE band 5 , 3MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 2.681 | 2.680 |

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



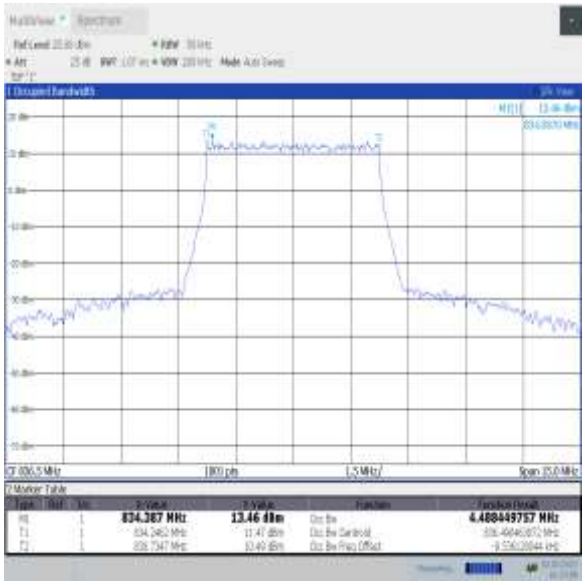

**LTE band 5 , 3MHz Bandwidth,16QAM (99% BW)**



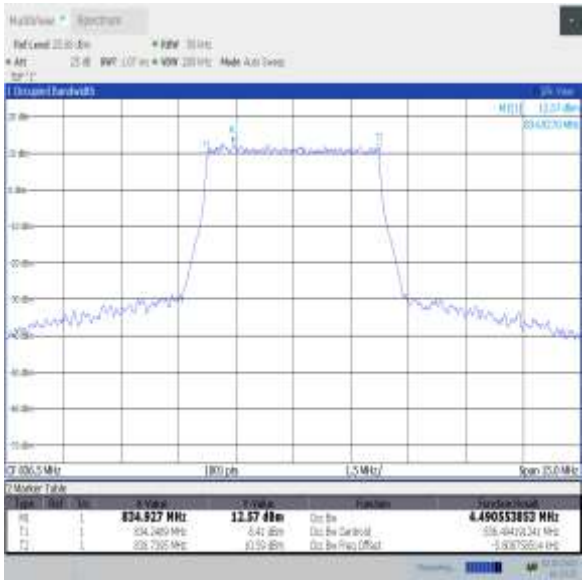
**LTE band 5 , 5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 4.488 | 4.490 |

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



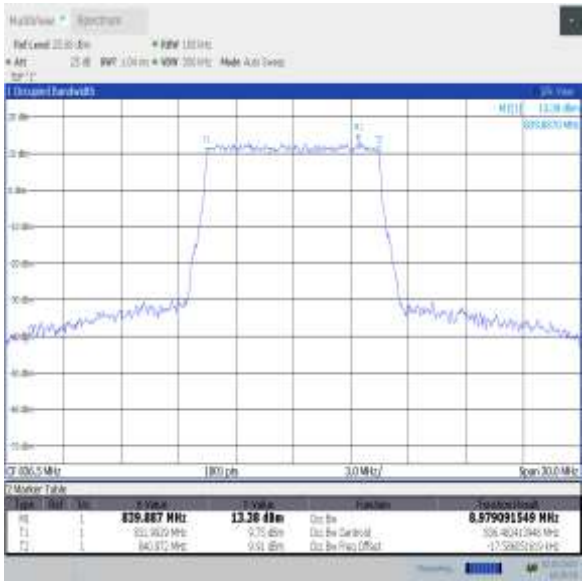

**LTE band 5 , 5MHz Bandwidth,16QAM (99% BW)**



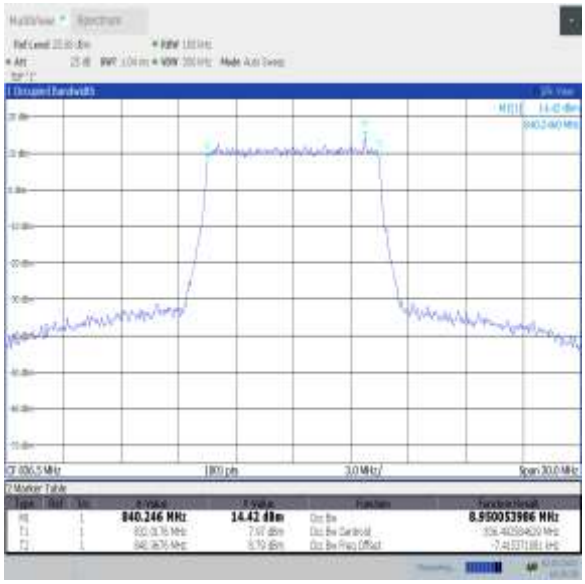
**LTE band 5 , 10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 8.979 | 8.950 |

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



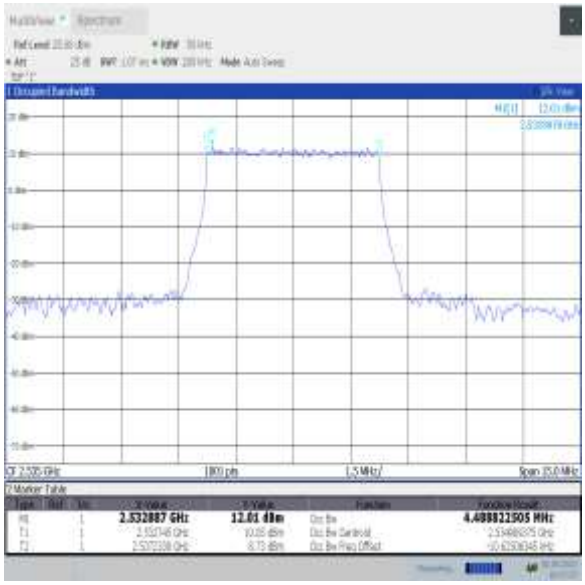

**LTE band 5 , 10MHz Bandwidth,16QAM (99% BW)**



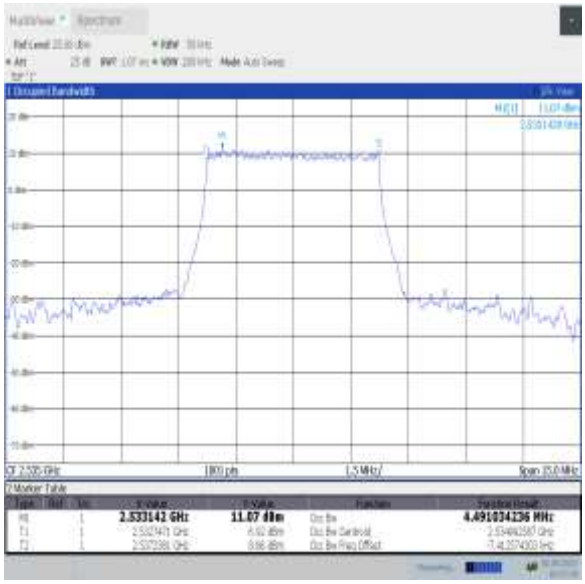
**LTE band 7 , 5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 4.489 | 4.491 |

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



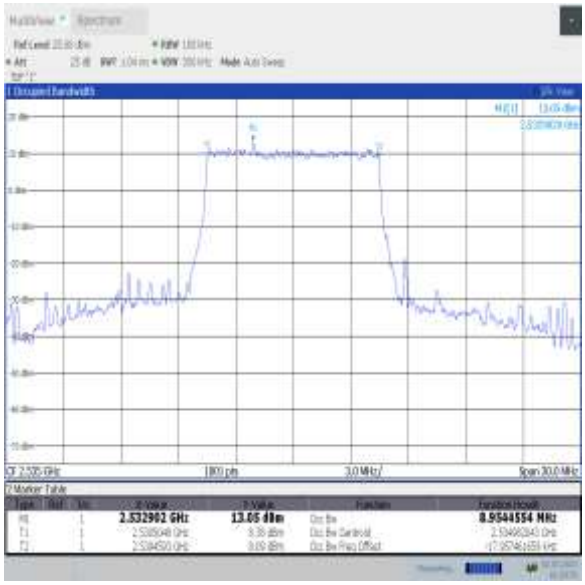
**LTE band 7 , 5MHz Bandwidth,16QAM (99% BW)**



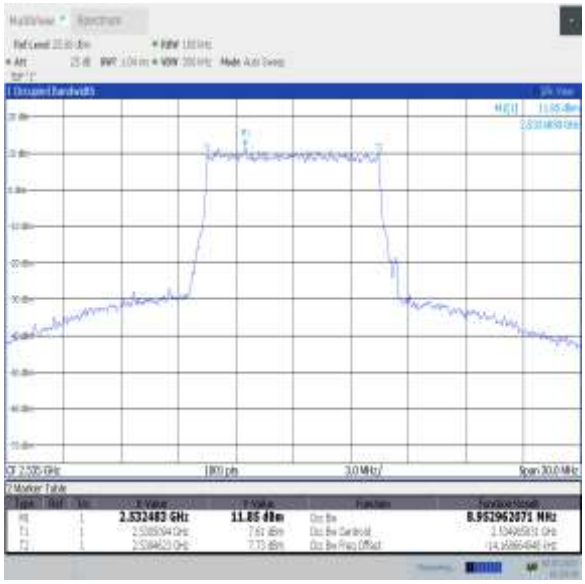
**LTE band 7 , 10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 8.954 | 8.953 |

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



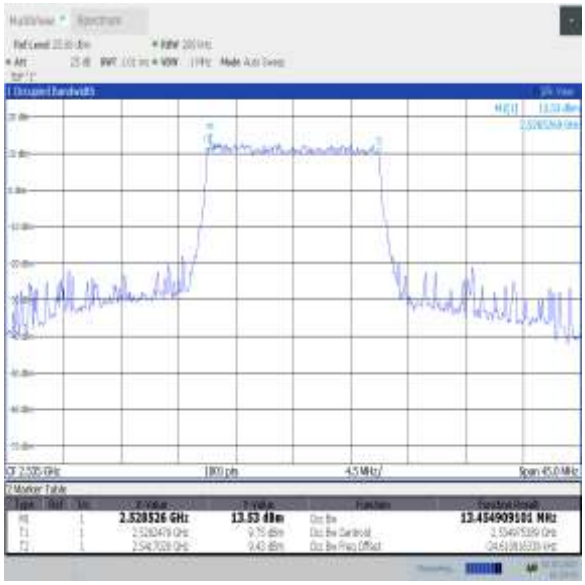

**LTE band 7 , 10MHz Bandwidth,16QAM (99% BW)**



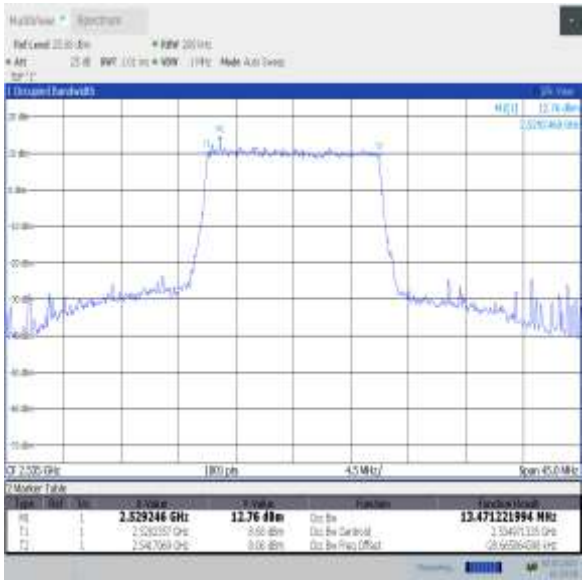
**LTE band 7 , 15MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 13.455 | 13.471 |

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



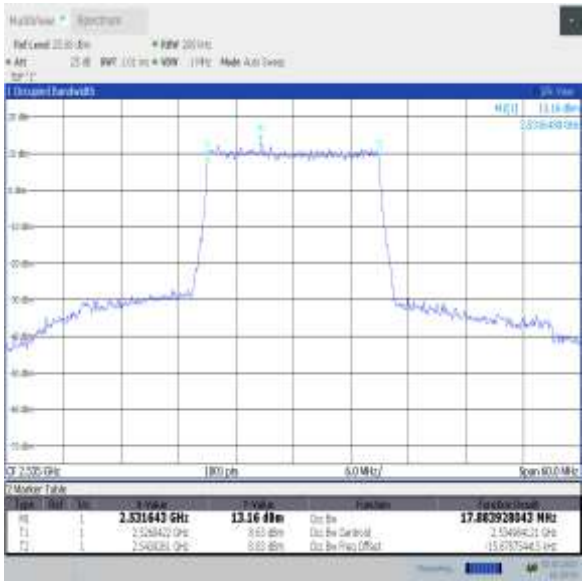

**LTE band 7 , 15MHz Bandwidth,16QAM (99% BW)**



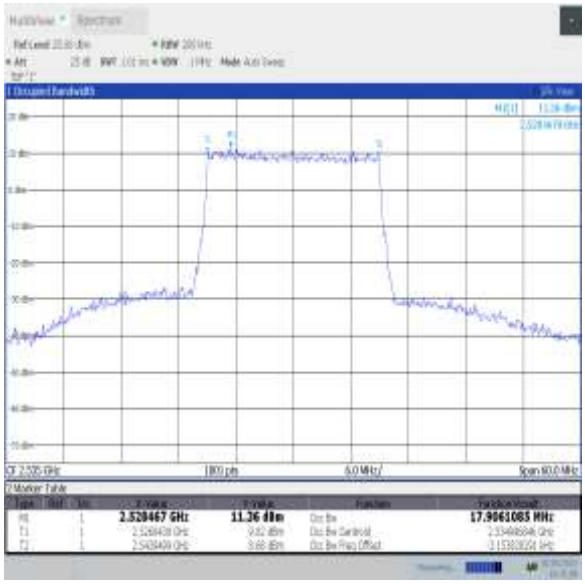
**LTE band 7 , 20MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 17.884 | 17.906 |

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



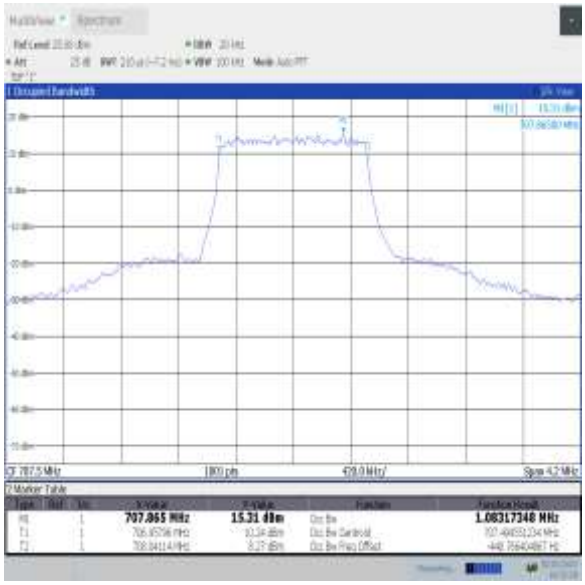

**LTE band 7 , 20MHz Bandwidth,16QAM (99% BW)**



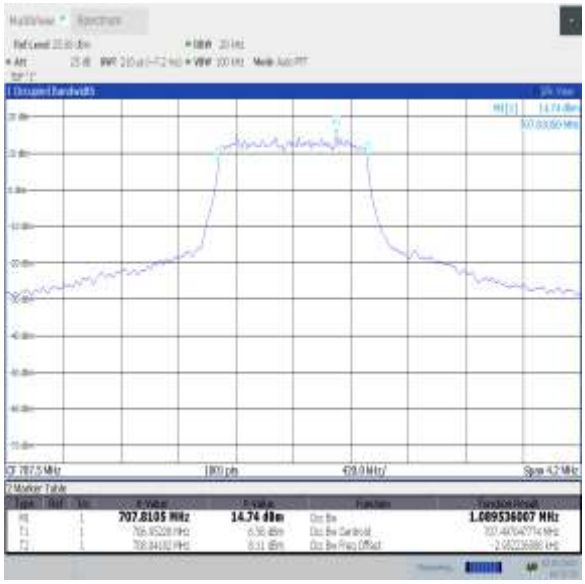
**LTE band 12 , BW1.4MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 1.083 | 1.089 |

**LTE band 12 , BW1.4MHz Bandwidth, QPSK (99% BW)**



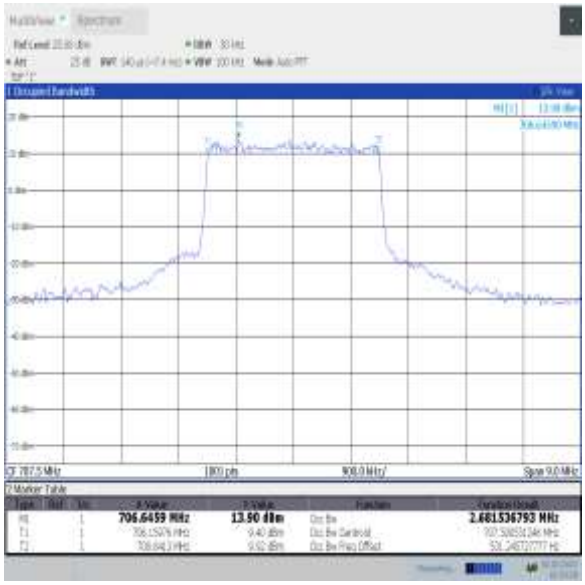

**LTE band 12 , BW1.4MHz Bandwidth,16QAM (99% BW)**



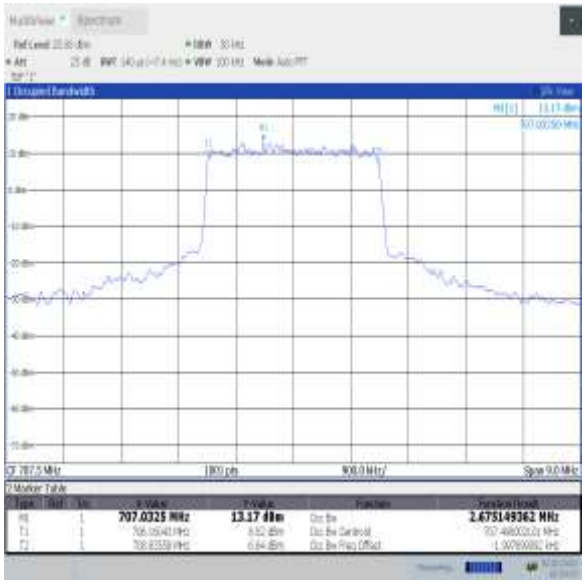
**LTE band 12 , 3MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 2.681 | 2.675 |

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



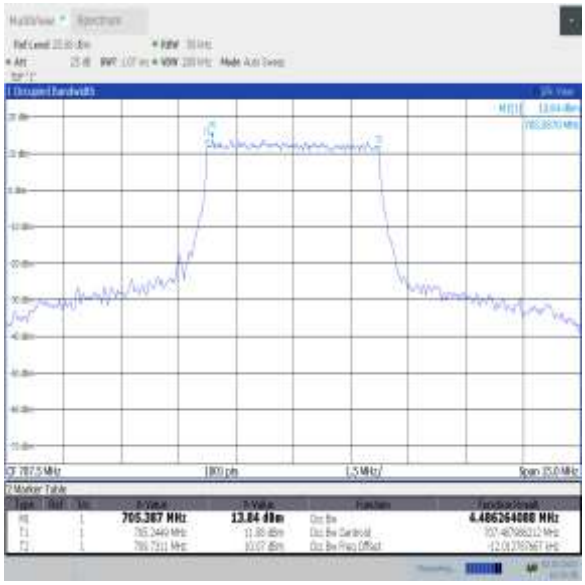

**LTE band 12 , 3MHz Bandwidth,16QAM (99% BW)**



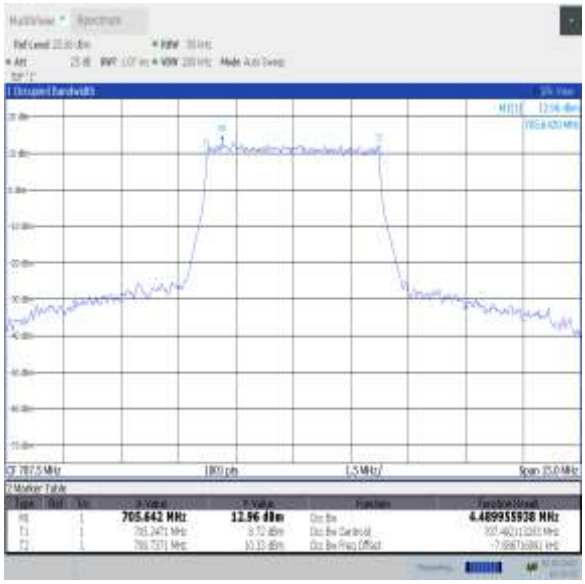
**LTE band 12 , 5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 4.486 | 4.490 |

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



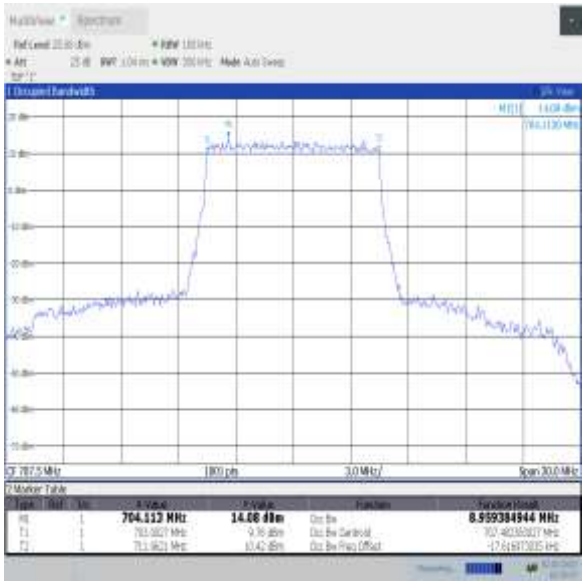

**LTE band 12 , 5MHz Bandwidth,16QAM (99% BW)**



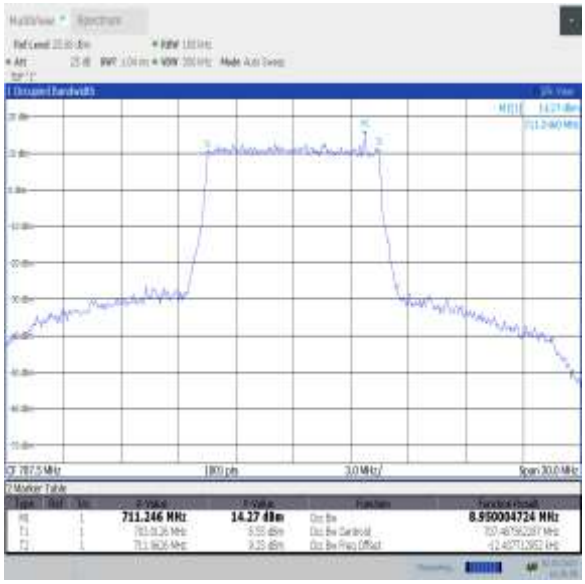
**LTE band 12 , 10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 8.959 | 8.950 |

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



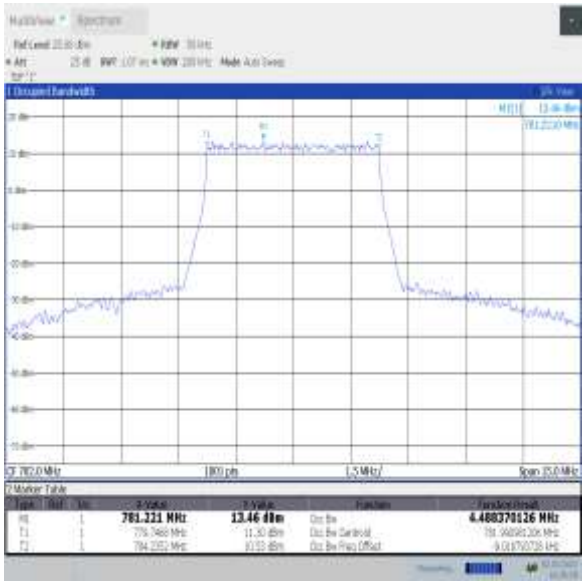

**LTE band 12 , 10MHz Bandwidth,16QAM (99% BW)**



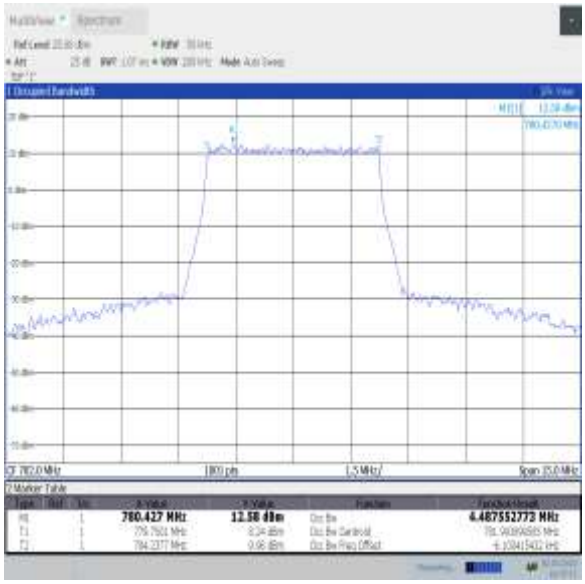
**LTE band 13 , 5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 782 | 4.488 | 4.488 |

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



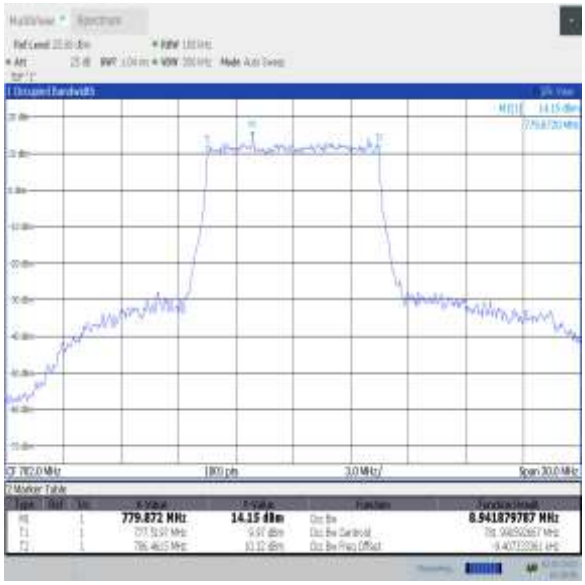

**LTE band 13 , 5MHz Bandwidth,16QAM (99% BW)**



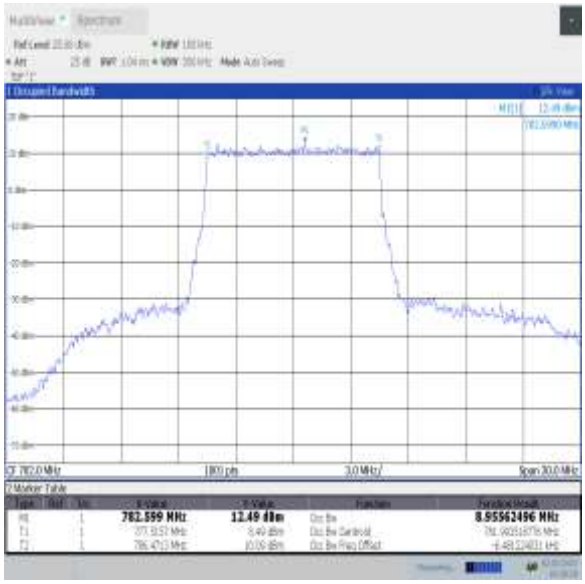
**LTE band 13 , 10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 782 | 8.942 | 8.956 |

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



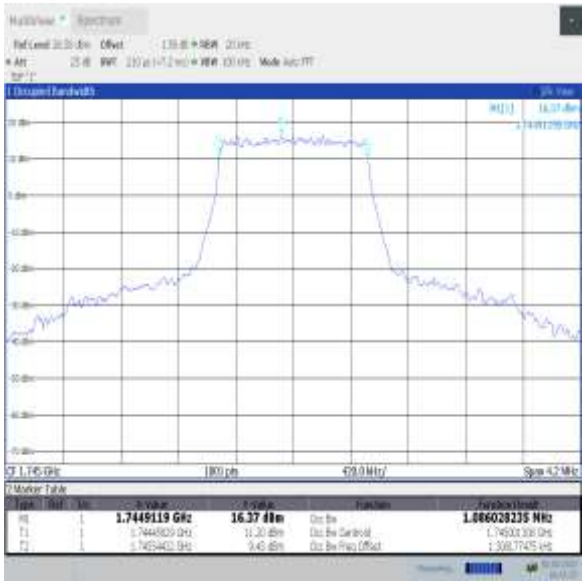

**LTE band 13 , 10MHz Bandwidth,16QAM (99% BW)**



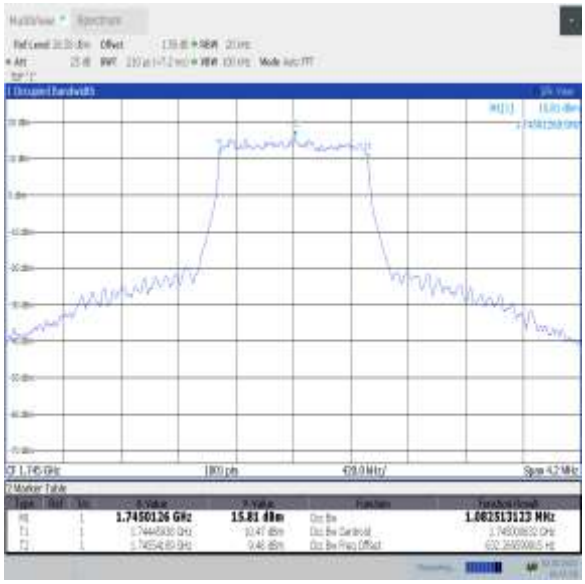
**LTE band 66 , BW1.4MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 1.086 | 1.082 |

**LTE band 66 , BW1.4MHz Bandwidth, QPSK (99% BW)**



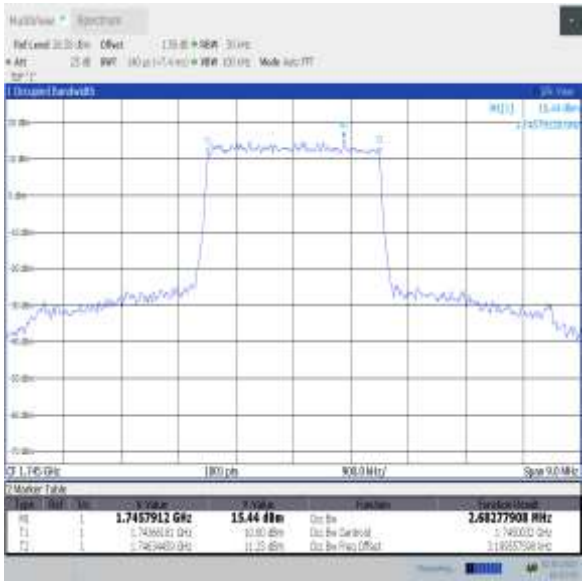

**LTE band 66 , BW1.4MHz Bandwidth,16QAM (99% BW)**



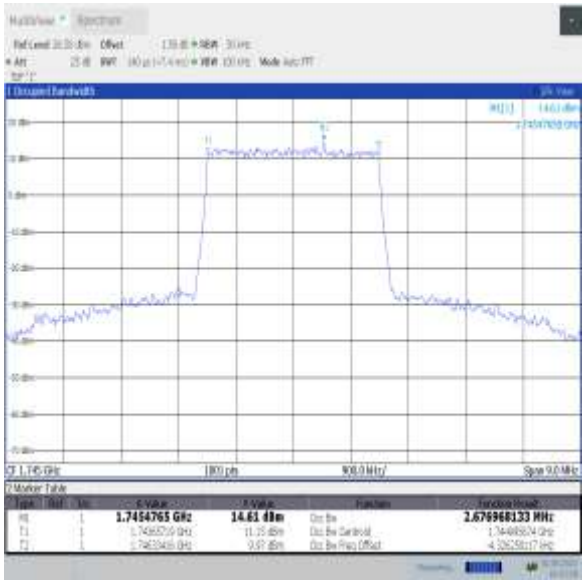
**LTE band 66 , 3MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 2.683 | 2.677 |

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



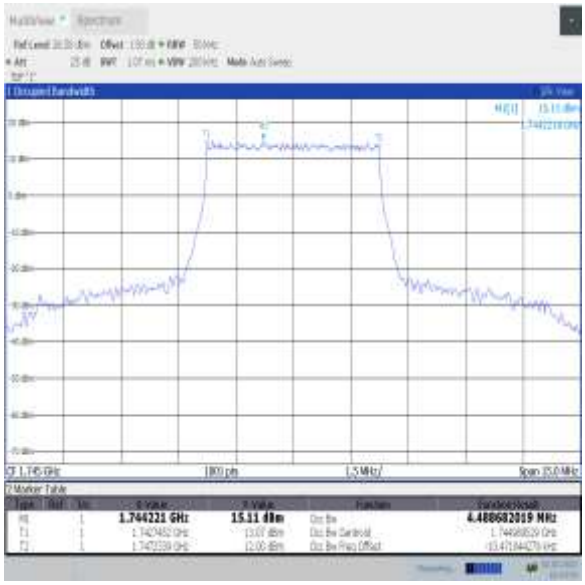

**LTE band 66 , 3MHz Bandwidth,16QAM (99% BW)**



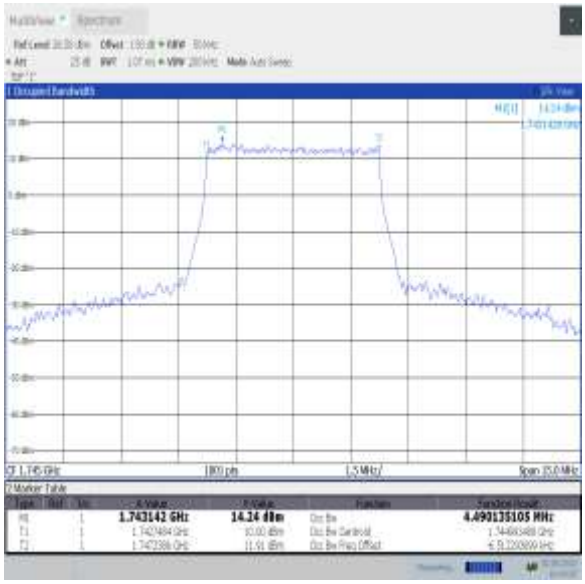
**LTE band 66 , 5MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 4.489 | 4.490 |

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



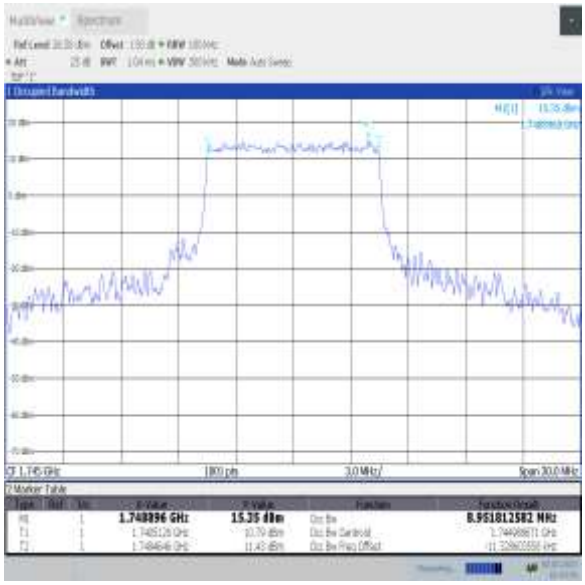

**LTE band 66 , 5MHz Bandwidth,16QAM (99% BW)**



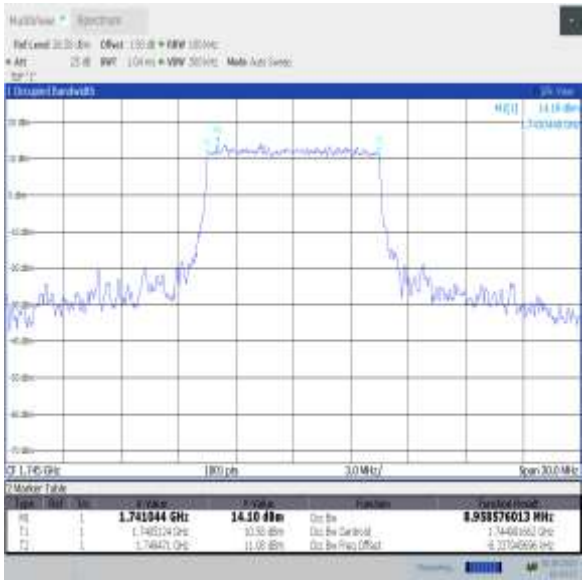
**LTE band 66 , 10MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 8.952 | 8.956 |

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



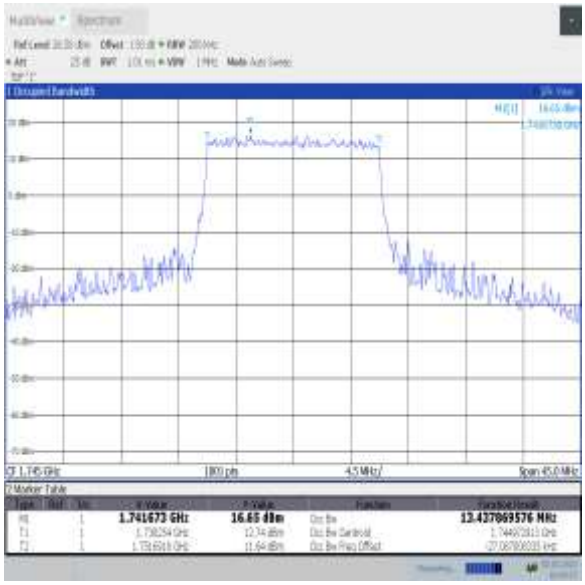

**LTE band 66 , 10MHz Bandwidth,16QAM (99% BW)**



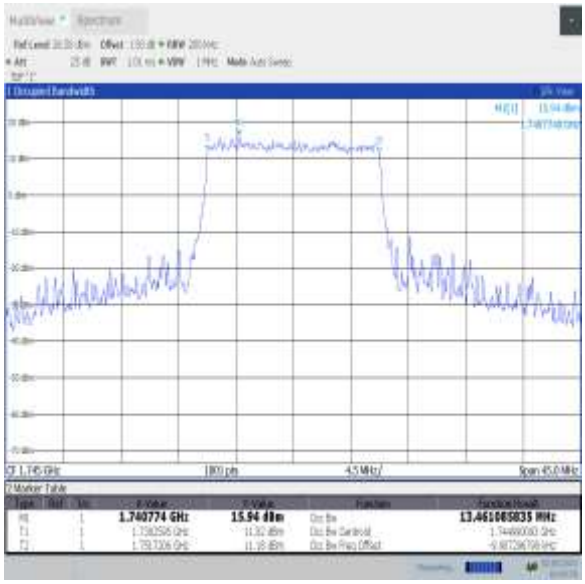
**LTE band 66 , 15MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 13.438 | 13.461 |

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



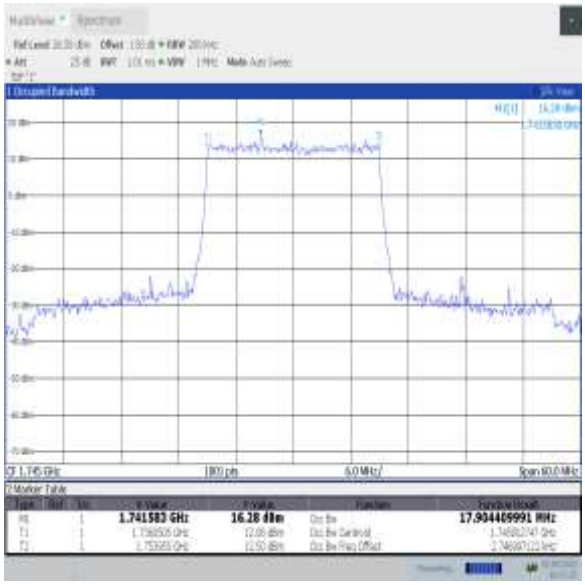

**LTE band 66 , 15MHz Bandwidth,16QAM (99% BW)**



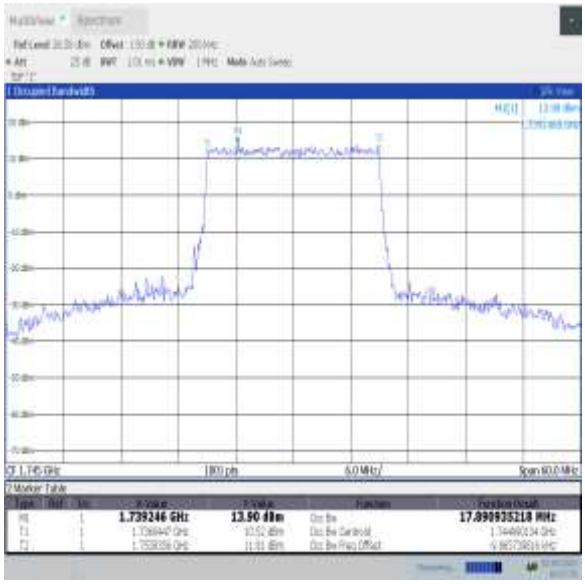
**LTE band 66 , 20MHz(99%)**

| Frequency (MHz) | Occupied Bandwidth (99%)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 17.904 | 17.891 |

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




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




Note: Expanded measurement uncertainty is U = 3428 Hz, k = 2

## A.5 EMISSION BANDWIDTH

**Reference**

FCC: CFR Part 2.1049, 22.917, 24.238, 27.53.

**A.5.1Emission Bandwidth Results**

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.

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 (i.e., two to five times the OBW).

b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1 to 5 % of the anticipated OBW, and the VBW shall be at least 3 times the RBW.

c) Set the reference level of the instrument as required to keep the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope must be at least 10log (OBW / RBW) below the reference level.

d) Set the detection mode to peak, and the trace mode to max hold.

e) Use the 26dB bandwidth function of the spectrum analyzer and report the measured bandwidth.

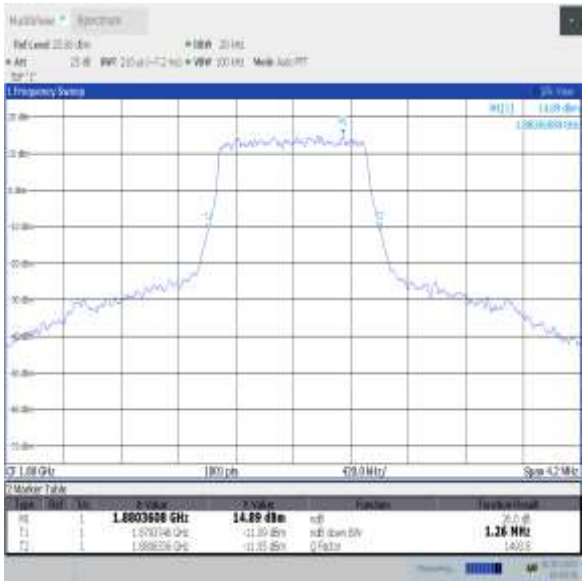
**A.5.2Emission Bandwidth Results**

Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

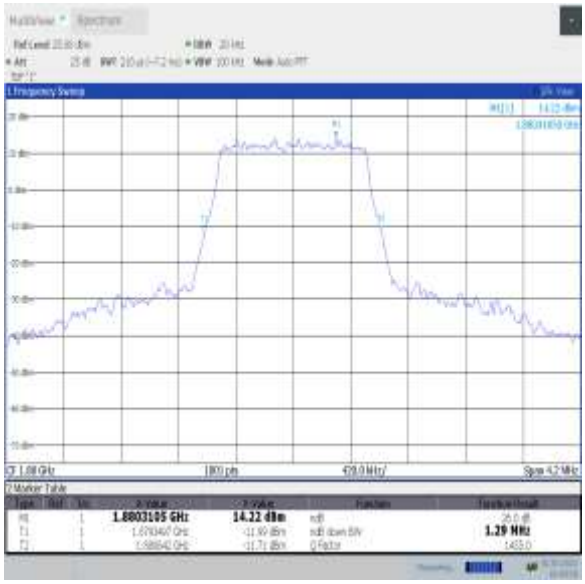
**LTE band 2,BW1.4MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 1.26 | 1.29 |

**LTE band 2 , BW1.4MHz Bandwidth, QPSK (-26dBc BW)**



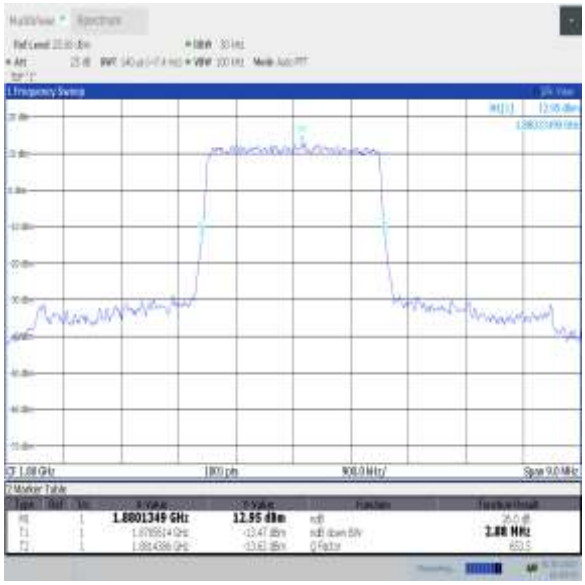

**LTE band 2 , BW1.4MHz Bandwidth,16QAM (-26dBc BW)**



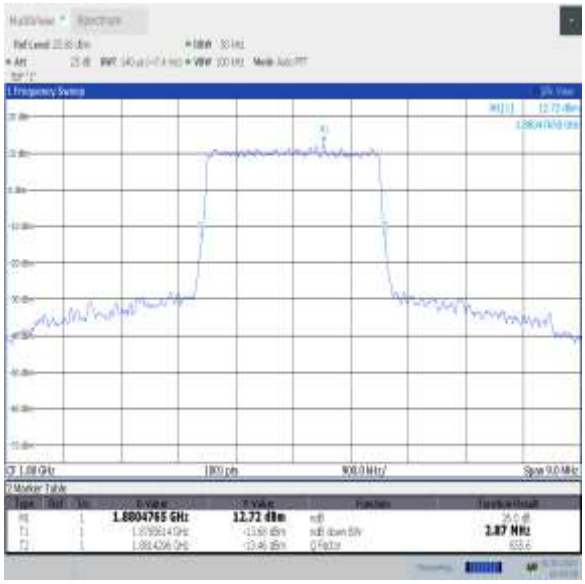
**LTE band 2 , 3MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 2.88 | 2.87 |

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



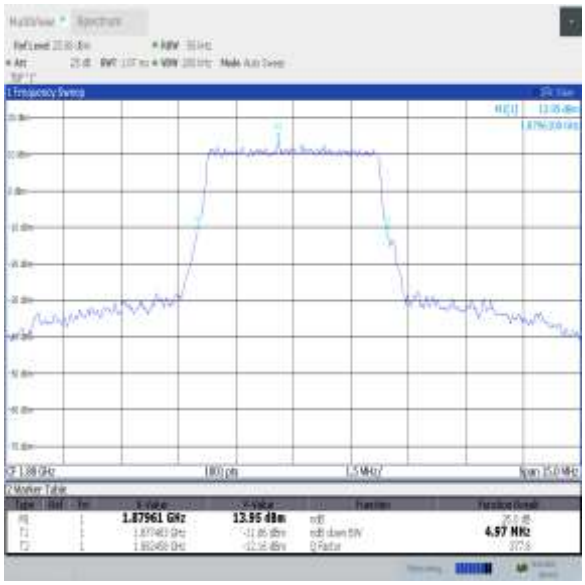

**LTE band 2 , 3MHz Bandwidth,16QAM (-26dBc BW)**



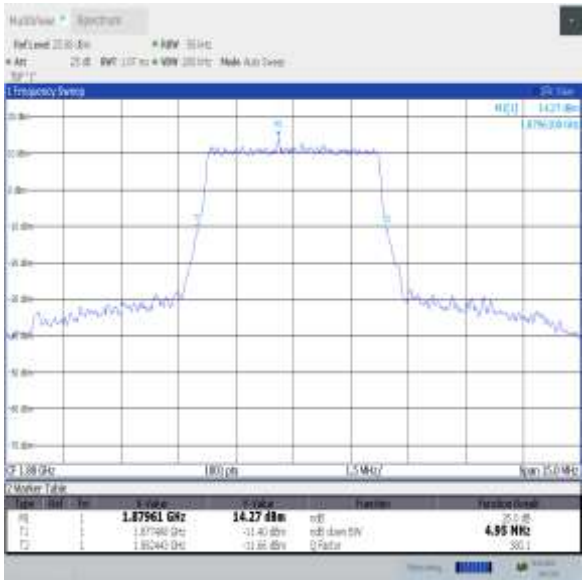
**LTE band 2,5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 4.97 | 4.95 |

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



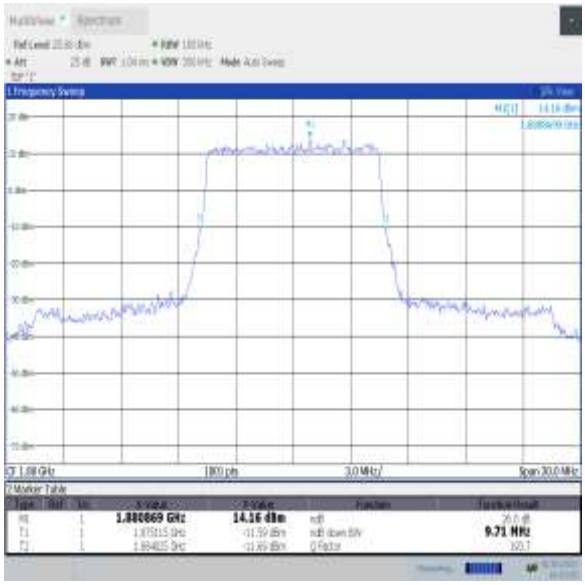

**LTE band 2 , 5MHz Bandwidth,16QAM (-26dBc BW)**



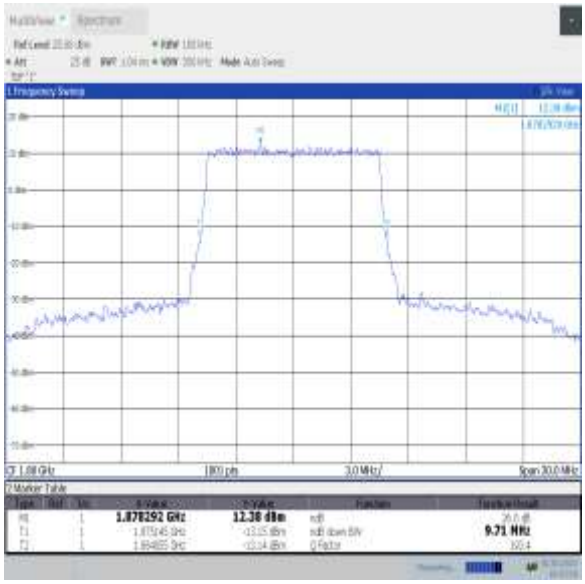
**LTE band 2,10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 9.71 | 9.71 |

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



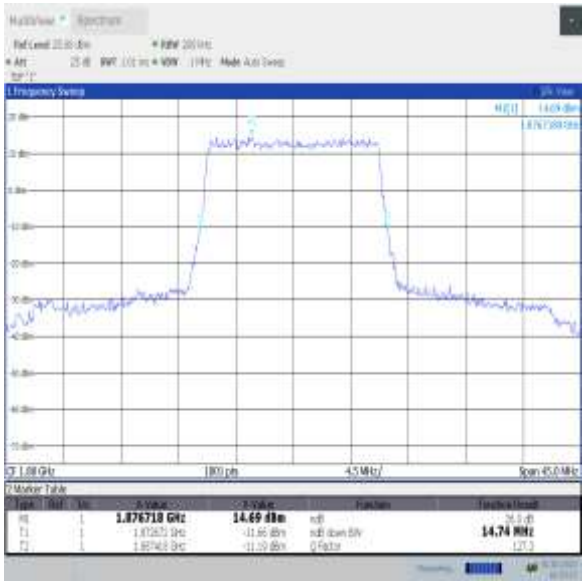

**LTE band 2 , 10MHz Bandwidth,16QAM (-26dBc BW)**



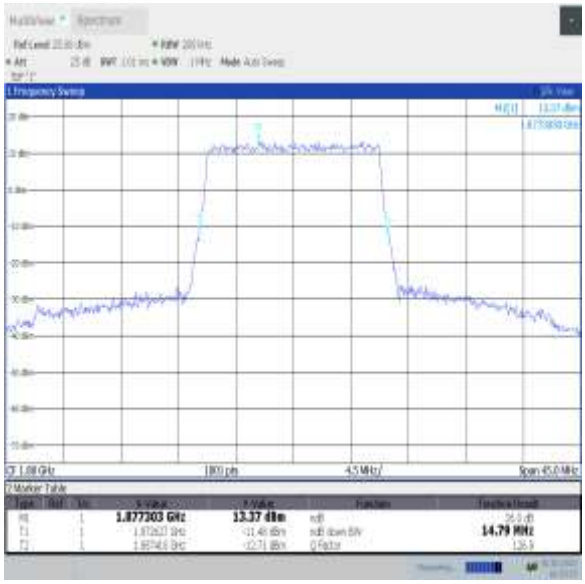
**LTE band 2,15MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 14.74 | 14.79 |

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



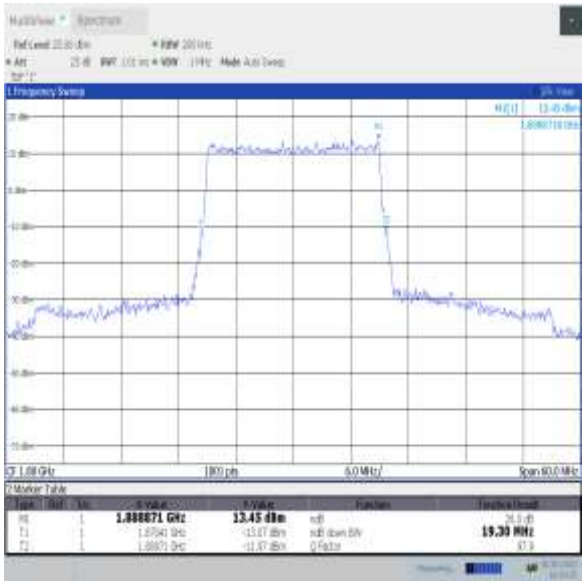

**LTE band 2 , 15MHz Bandwidth,16QAM (-26dBc BW)**



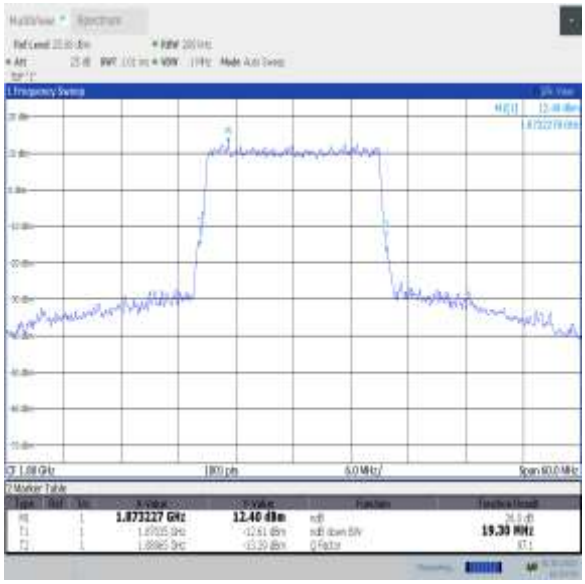
**LTE band 2,20MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1880 | 19.30 | 19.30 |

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



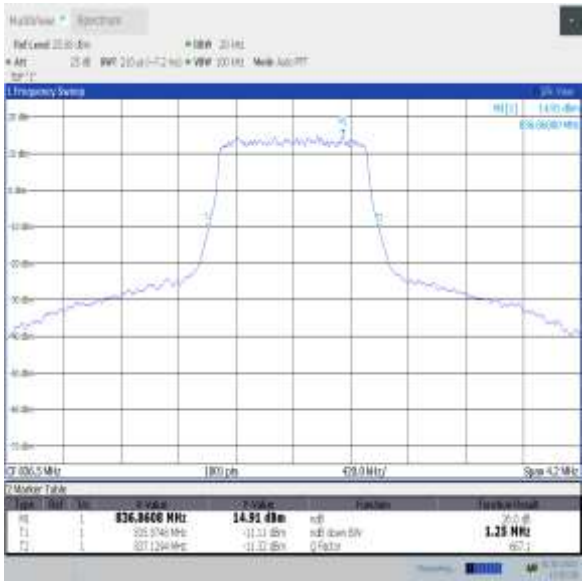

**LTE band 2 , 20MHz Bandwidth,16QAM (-26dBc BW)**



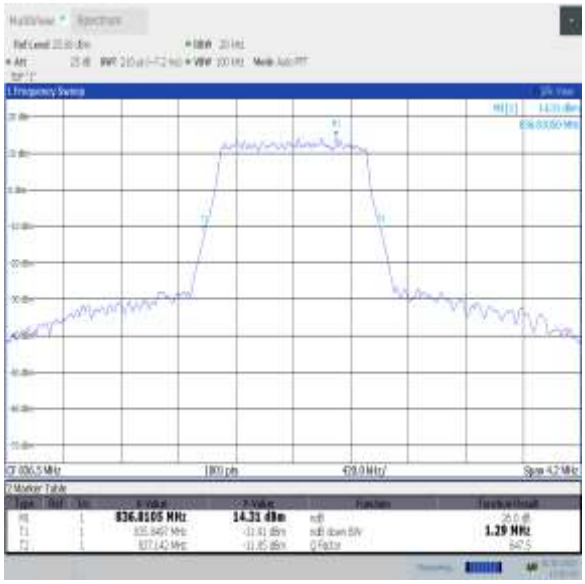
**LTE band 5, BW1.4MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 1.25 | 1.29 |

**LTE band 5 , BW1.4MHz Bandwidth, QPSK (-26dBc BW)**



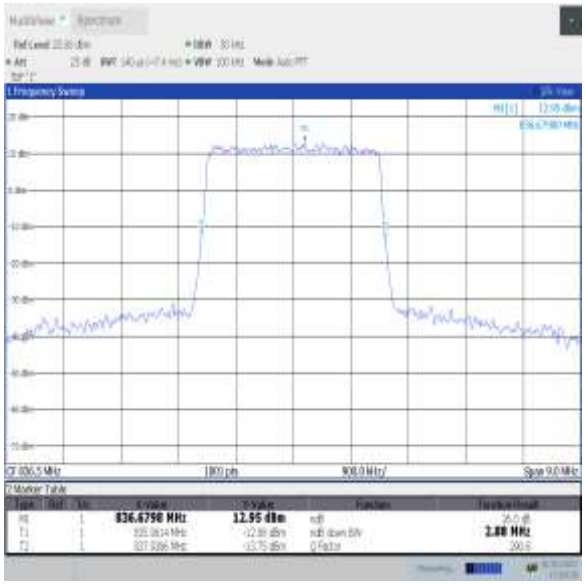

**LTE band 5 , BW1.4MHz Bandwidth,16QAM (-26dBc BW)**



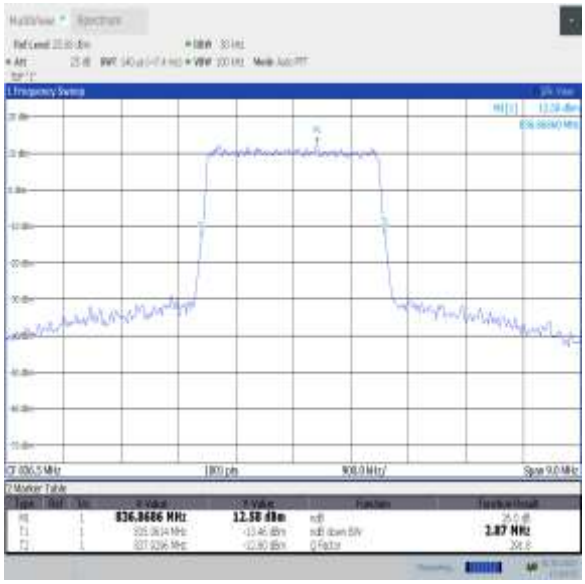
**LTE band 5 , 3MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 2.88 | 2.87 |

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



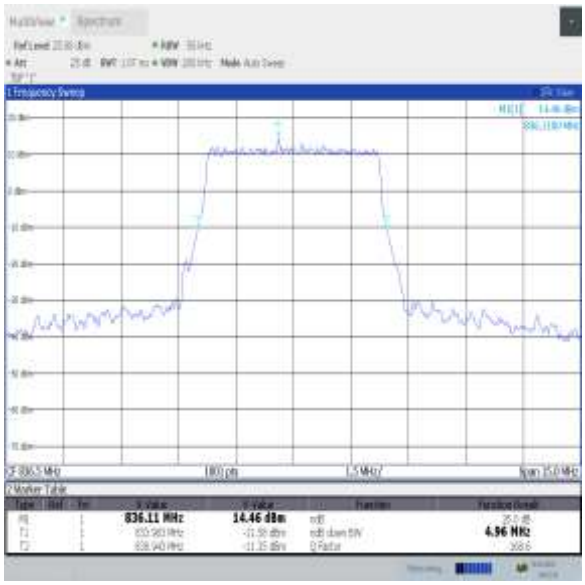

**LTE band 5 , 3MHz Bandwidth,16QAM (-26dBc BW)**



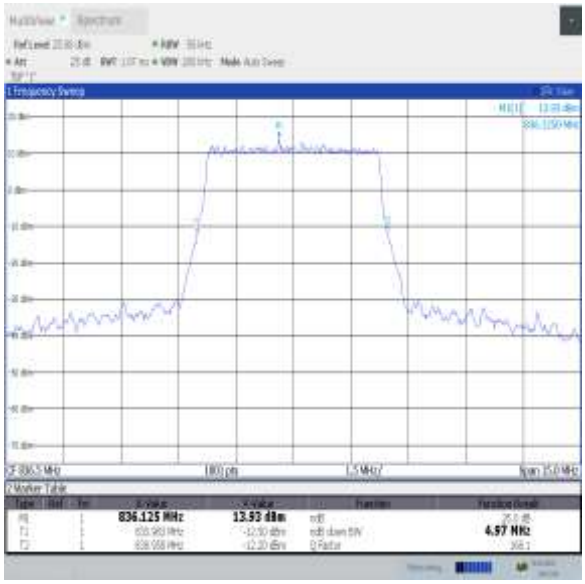
**LTE band 5 , 5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 4.96 | 4.97 |

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



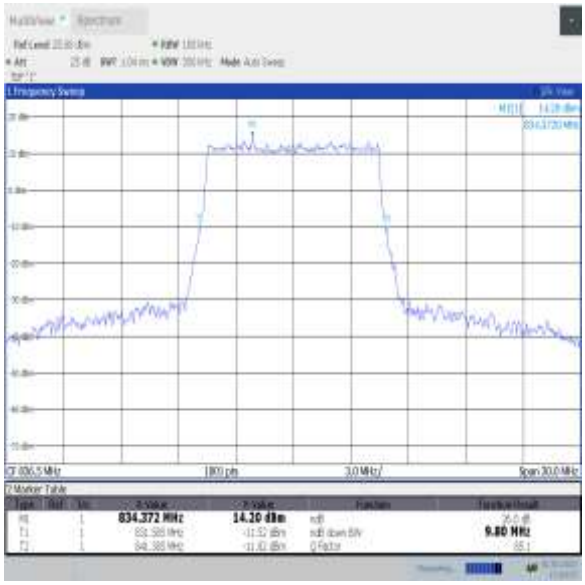

**LTE band 5 , 5MHz Bandwidth,16QAM (-26dBc BW)**



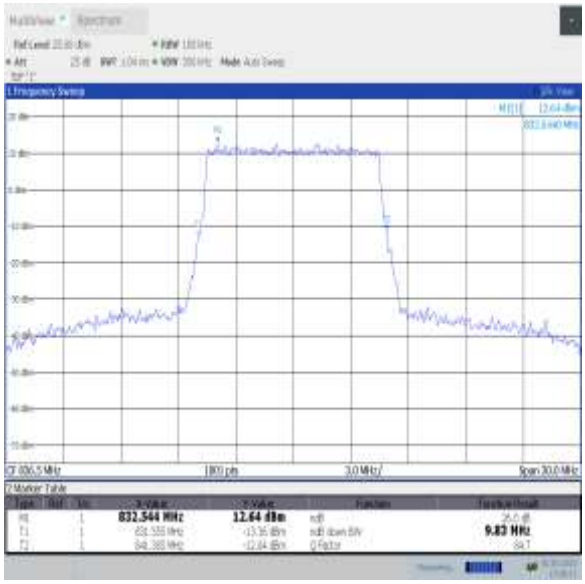
**LTE band 5 , 10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 836.5 | 9.80 | 9.83 |

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



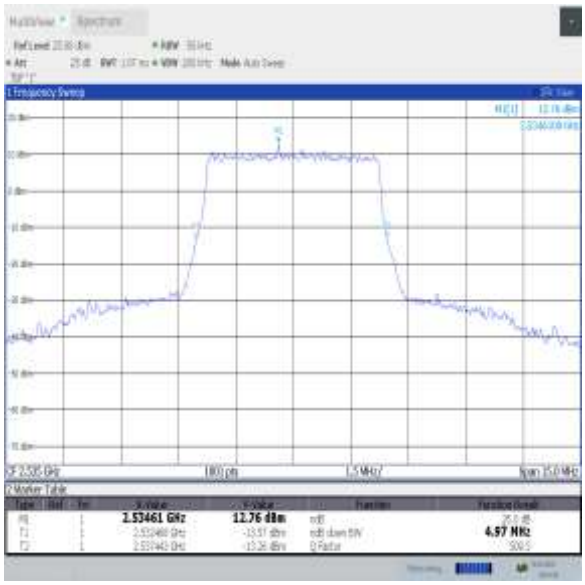

**LTE band 5 , 10MHz Bandwidth,16QAM (-26dBc BW)**



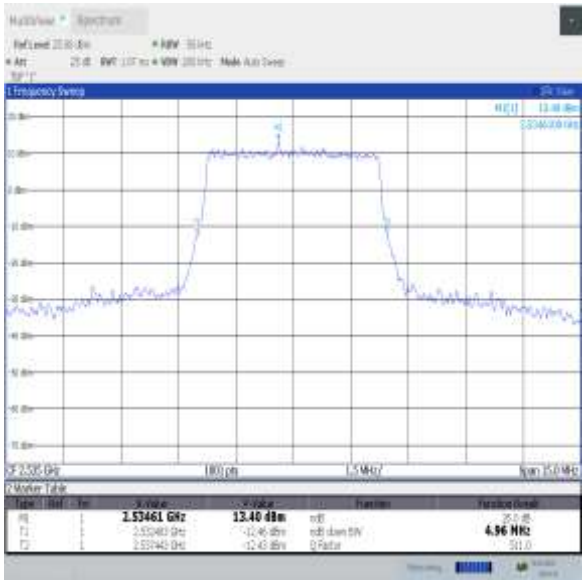
**LTE band 7 , 5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 4.97 | 4.96 |

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



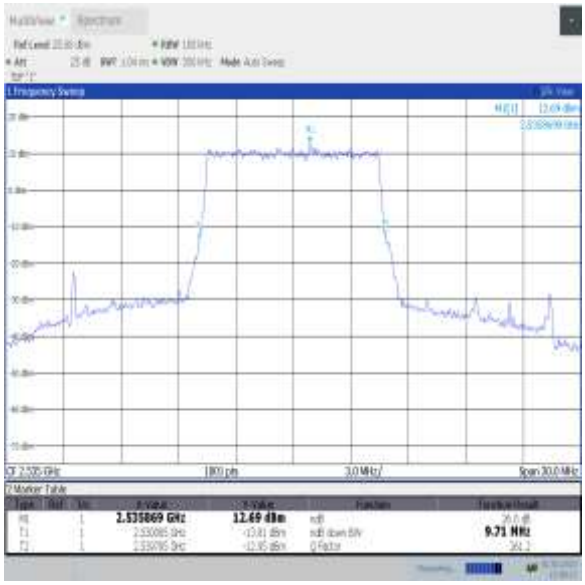

**LTE band 7 , 5MHz Bandwidth,16QAM (-26dBc BW)**



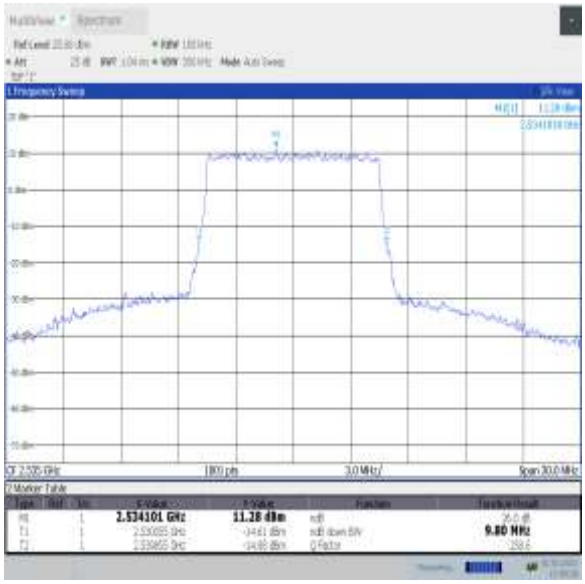
**LTE band 7 , 10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 9.71 | 9.80 |

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



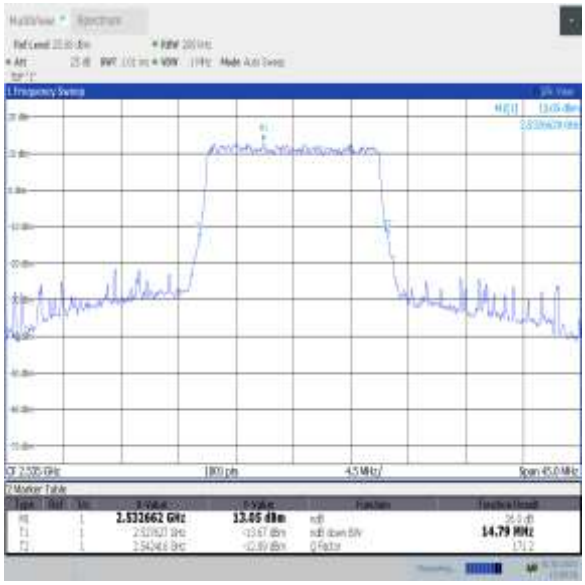

**LTE band 7 , 10MHz Bandwidth,16QAM (-26dBc BW)**



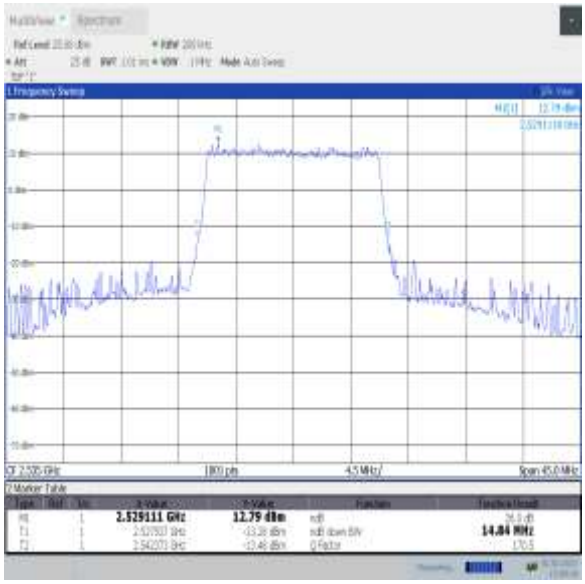
**LTE band 7 , 15MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 14.79 | 14.84 |

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



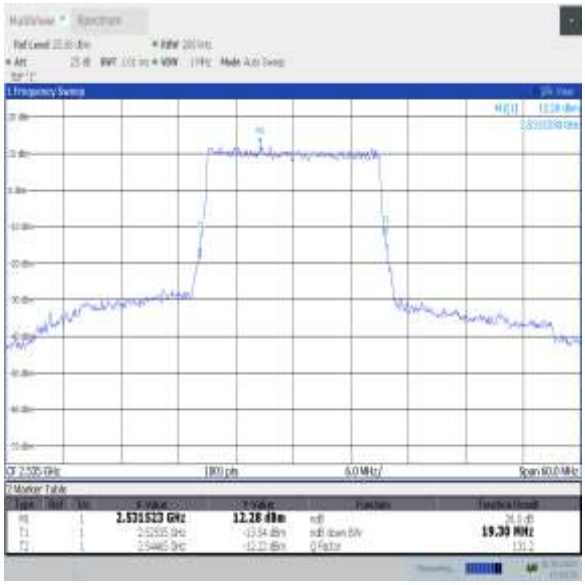

**LTE band 7 , 15MHz Bandwidth,16QAM (-26dBc BW)**



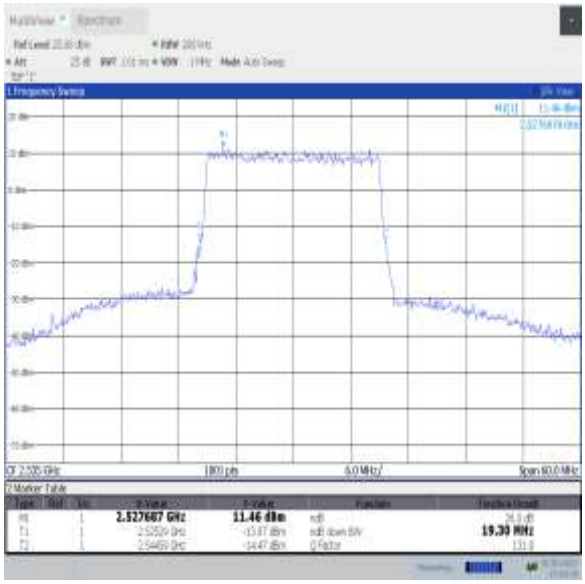
**LTE band 7 , 20MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 2535 | 19.30 | 19.30 |

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



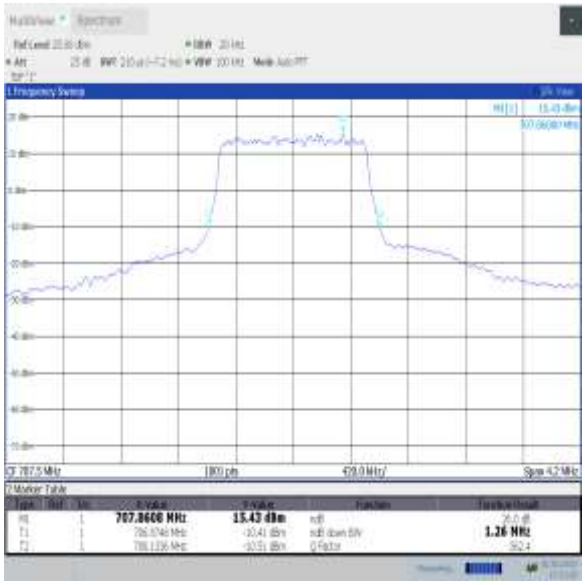

**LTE band 7 , 20MHz Bandwidth,16QAM (-26dBc BW)**



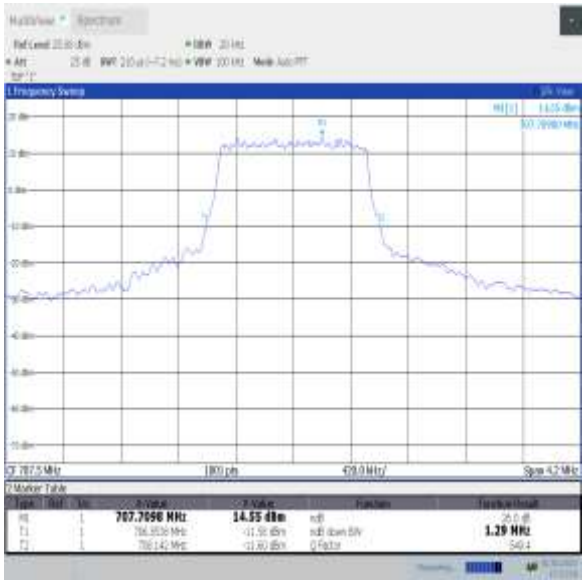
**LTE band 12 , BW1.4MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 1.26 | 1.29 |

**LTE band 12 , BW1.4MHz Bandwidth, QPSK (-26dBc BW)**



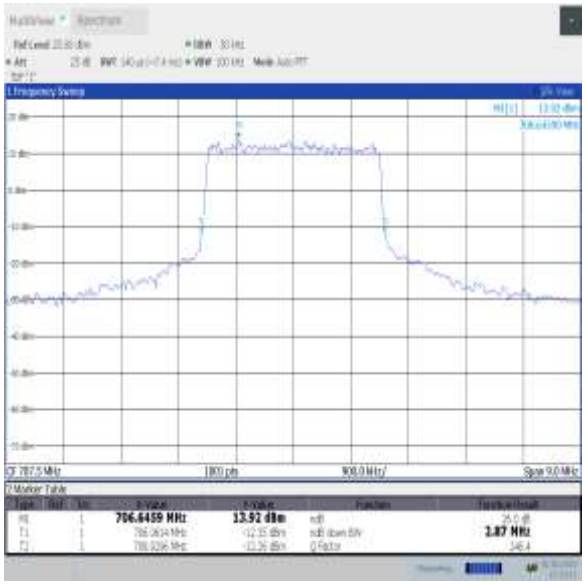

**LTE band 12 , BW1.4MHz Bandwidth,16QAM (-26dBc BW)**



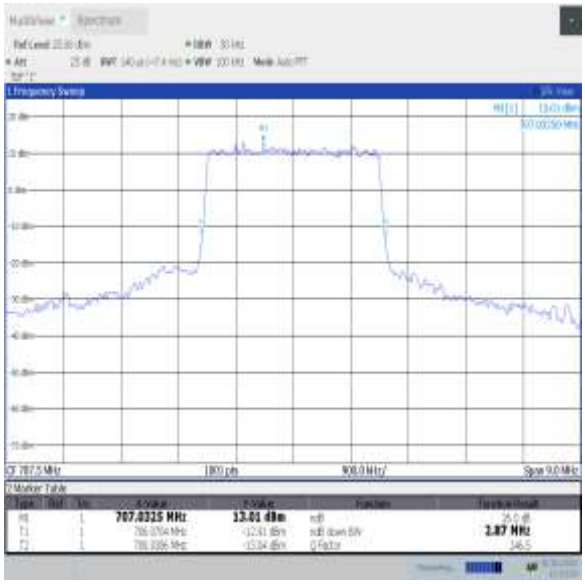
**LTE band 12 , 3MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 2.87 | 2.87 |

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



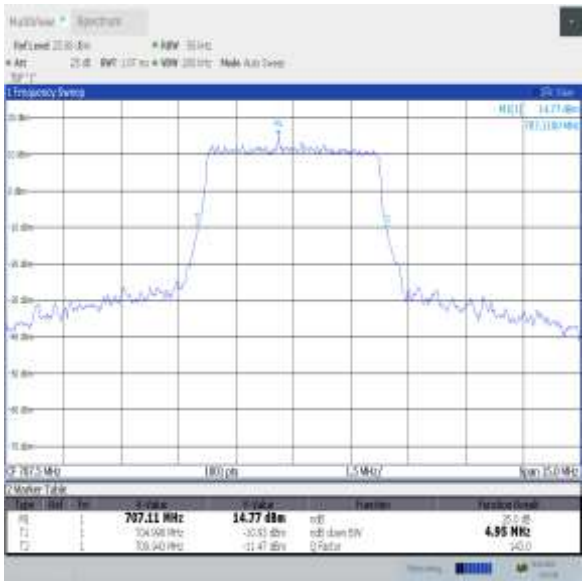

**LTE band 12 , 3MHz Bandwidth,16QAM (-26dBc BW)**



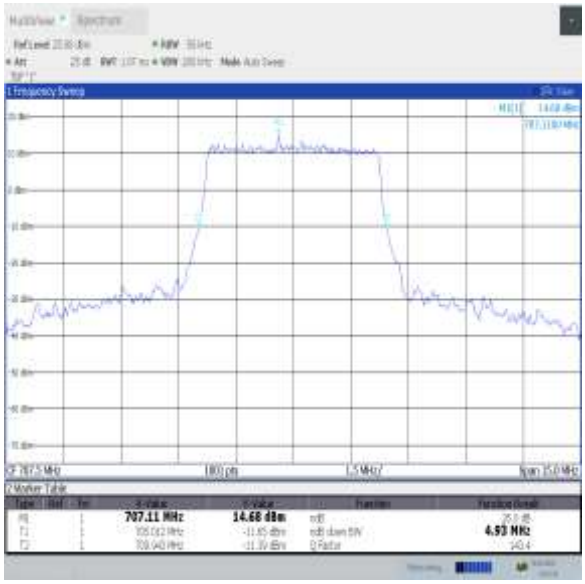
**LTE band 12 , 5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 4.95 | 4.95 |

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




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

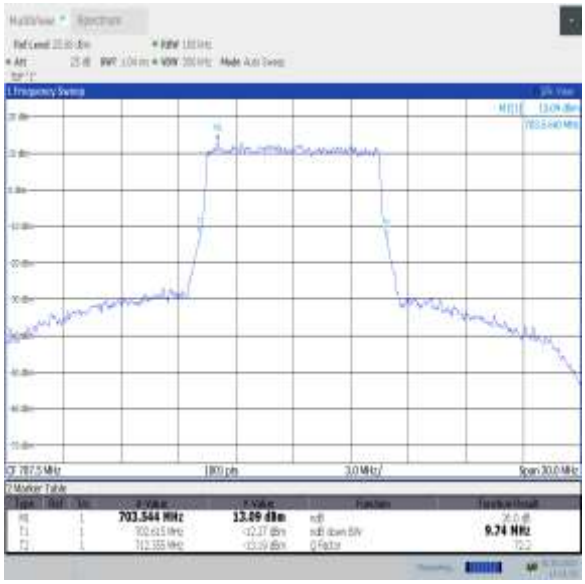


**LTE band 12 , 10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 707.5 | 9.92 | 9.74 |

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

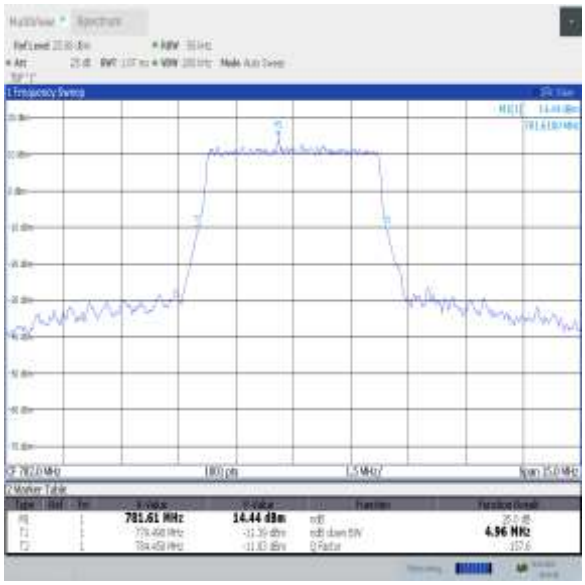

**LTE band 12 , 10MHz Bandwidth,16QAM (-26dBc BW)**



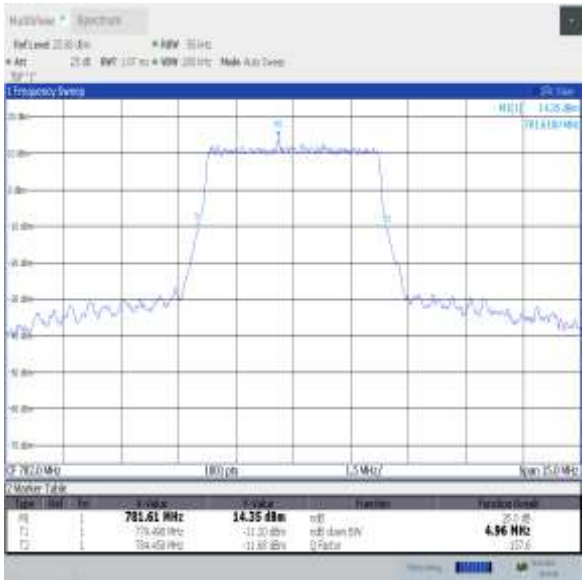
**LTE band 13 , 5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 782 | 4.96 | 4.96 |

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



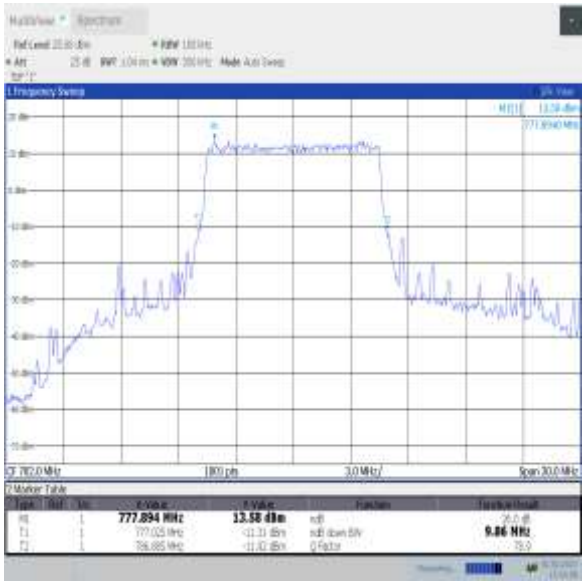

**LTE band 13 , 5MHz Bandwidth,16QAM (-26dBc BW)**



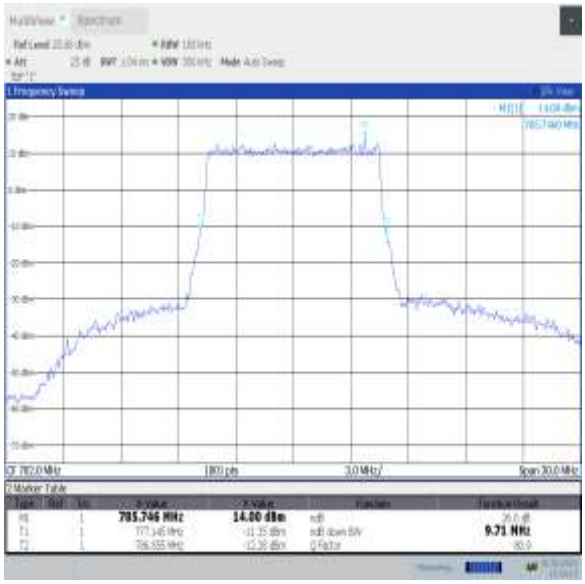
**LTE band 13 , 10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 782 | 9.86 | 9.71 |

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



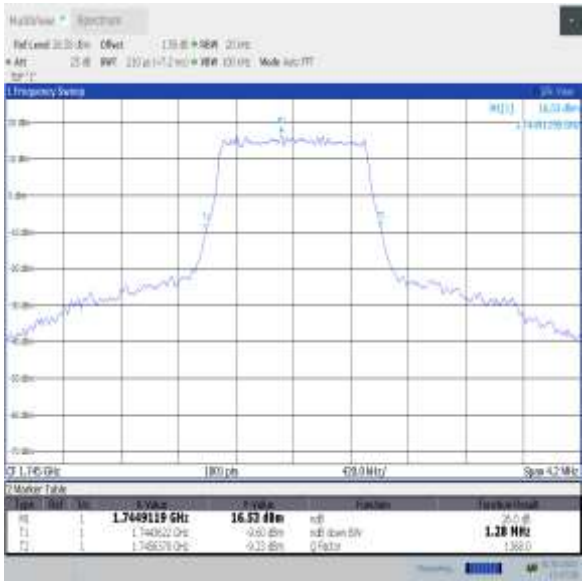

**LTE band 13 , 10MHz Bandwidth,16QAM (-26dBc BW)**



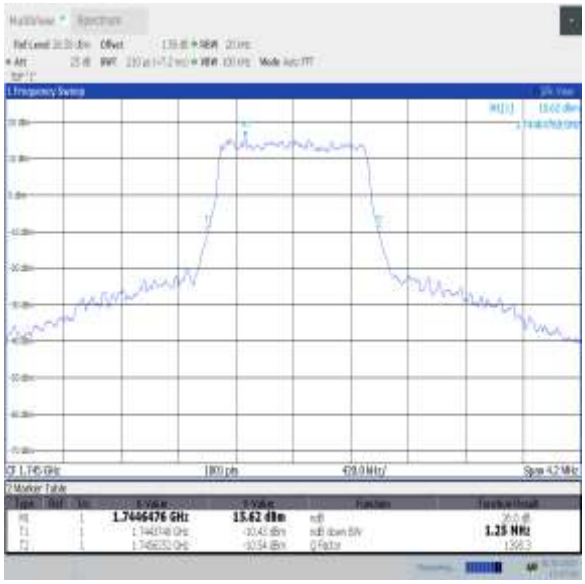
**LTE band 66 , BW1.4MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 1.28 | 1.25 |

**LTE band 66 , BW1.4MHz Bandwidth, QPSK (-26dBc BW)**



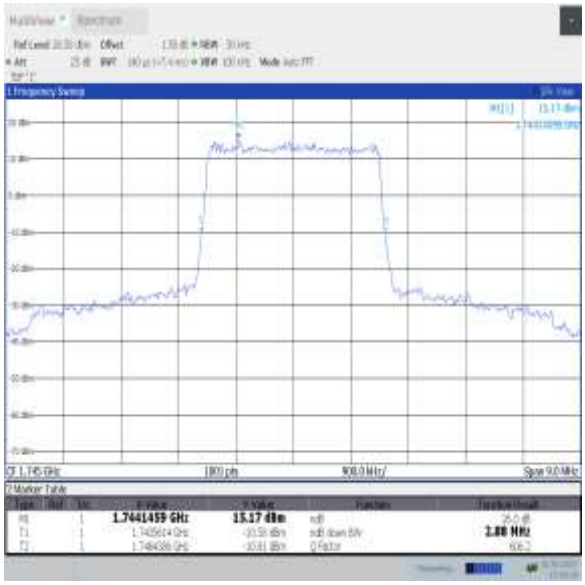
**LTE band 66 , BW1.4MHz Bandwidth,16QAM (-26dBc BW)**



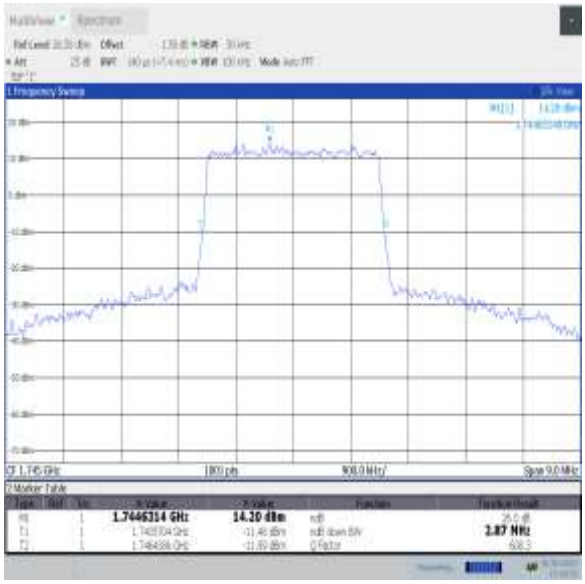
**LTE band 66 , 3MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 2.88 | 2.87 |

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



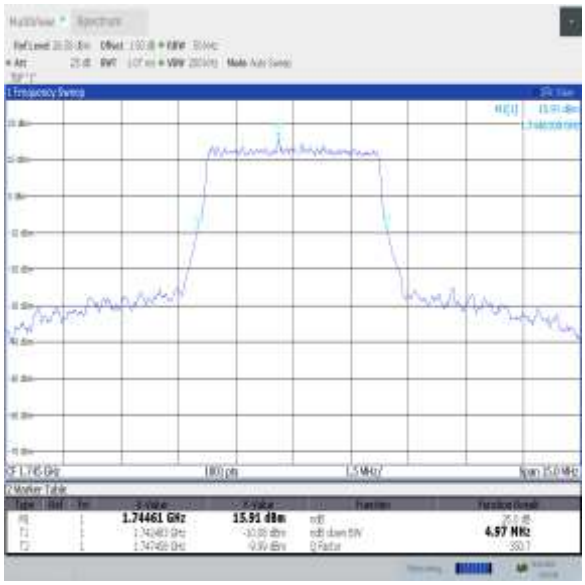

**LTE band 66 , 3MHz Bandwidth,16QAM (-26dBc BW)**



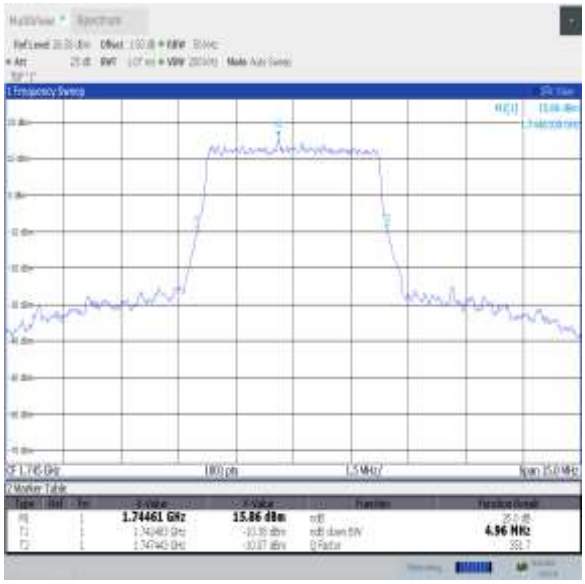
**LTE band 66 , 5MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 4.97 | 4.96 |

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



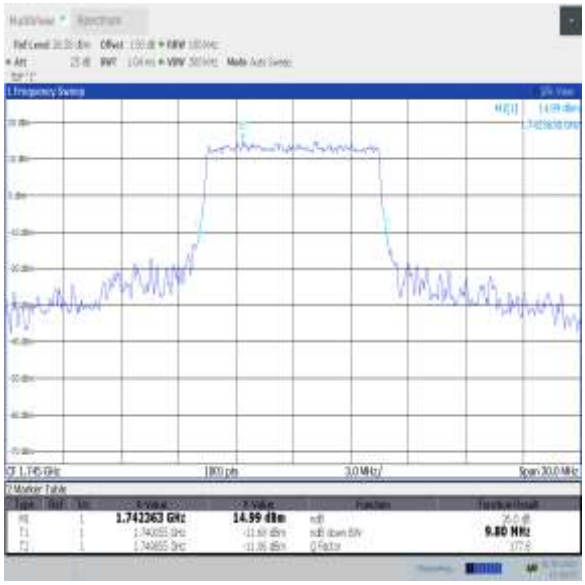

**LTE band 66 , 5MHz Bandwidth,16QAM (-26dBc BW)**



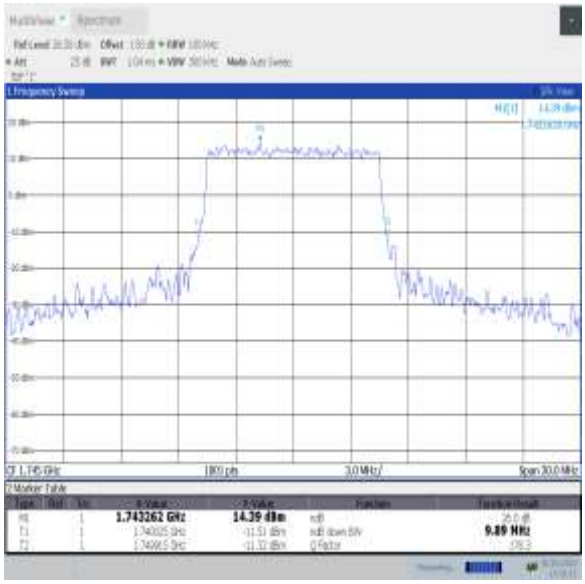
**LTE band 66 , 10MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 9.80 | 9.89 |

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



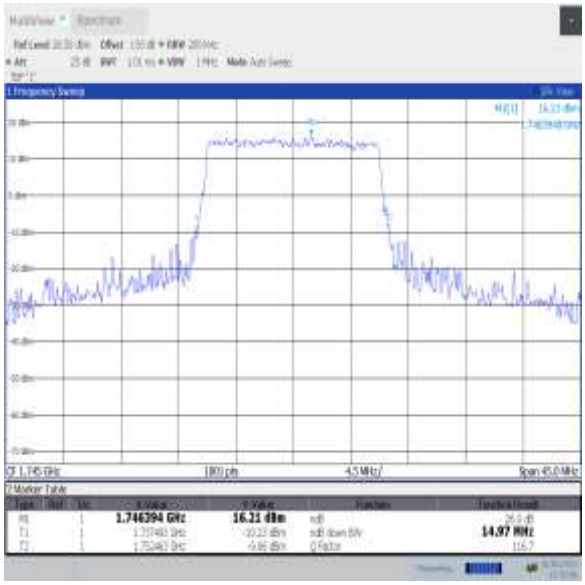

**LTE band 66 , 10MHz Bandwidth,16QAM (-26dBc BW)**



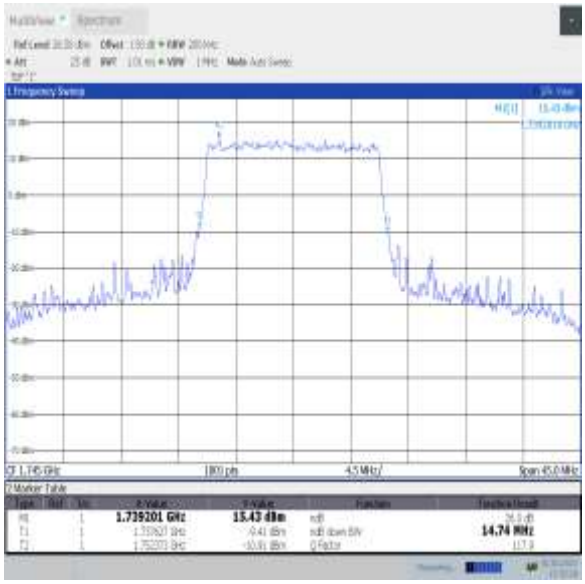
**LTE band 66 , 15MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 14.97 | 14.74 |

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



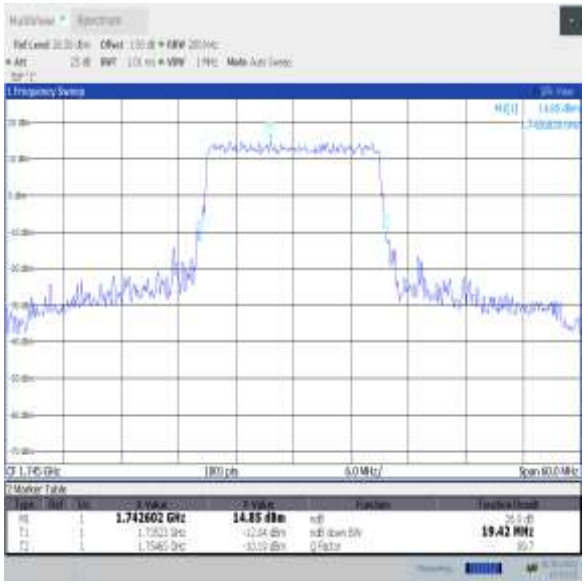

**LTE band 66 , 15MHz Bandwidth,16QAM (-26dBc BW)**



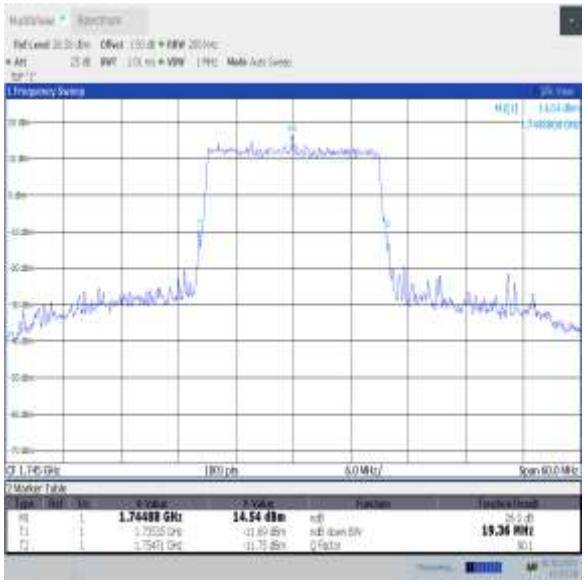
**LTE band 66 , 20MHz(-26dBc)**

| Frequency (MHz) | Emission Bandwidth (-26dBc)(MHz) | |
|---|---|---|
| | QPSK | 16QAM |
| 1745 | 19.42 | 19.36 |

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




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




Note: Expanded measurement uncertainty is $U$ = 3428 Hz, $k$ = 2

## A.6 BAND EDGE COMPLIANCE

**Reference**

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53.

**A.6.1 Measurement limit**

Part 22.917 For operations in the 824–849MHz band, the FCC limit is 43 +10 log (P)dB below the transmitter power(P) in a 100kHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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 that 43 + 10log (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.6.2Measurement Procedure**

The testing follows ANSI C63.26

a) The EUT was connected to spectrum analyzer and system simulator via a power divider.

b) The band edges of low and high channels for the highest RF powers were measured.

c) Set RBW >= 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

d) Set spectrum analyzer with RMS detector.

e) The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

f) Checked that all the results comply with the emission limit line.

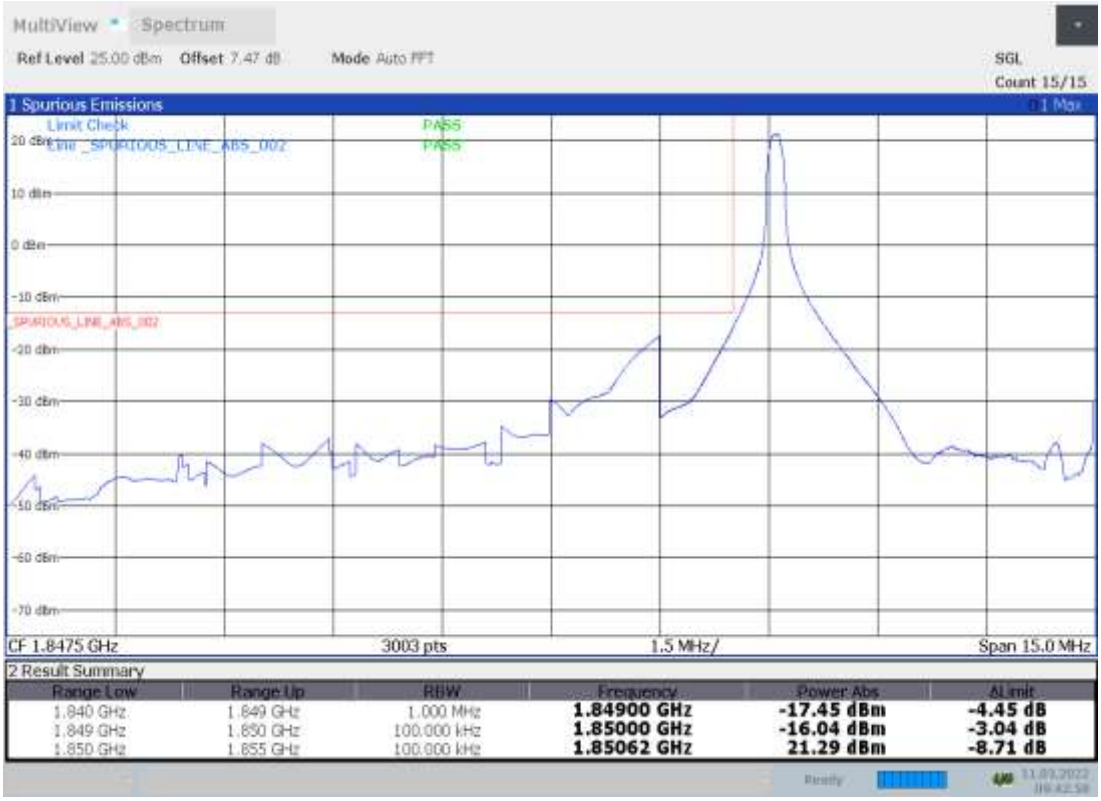
**A.6.3 Measurement result**

**Only worst case result is given below**

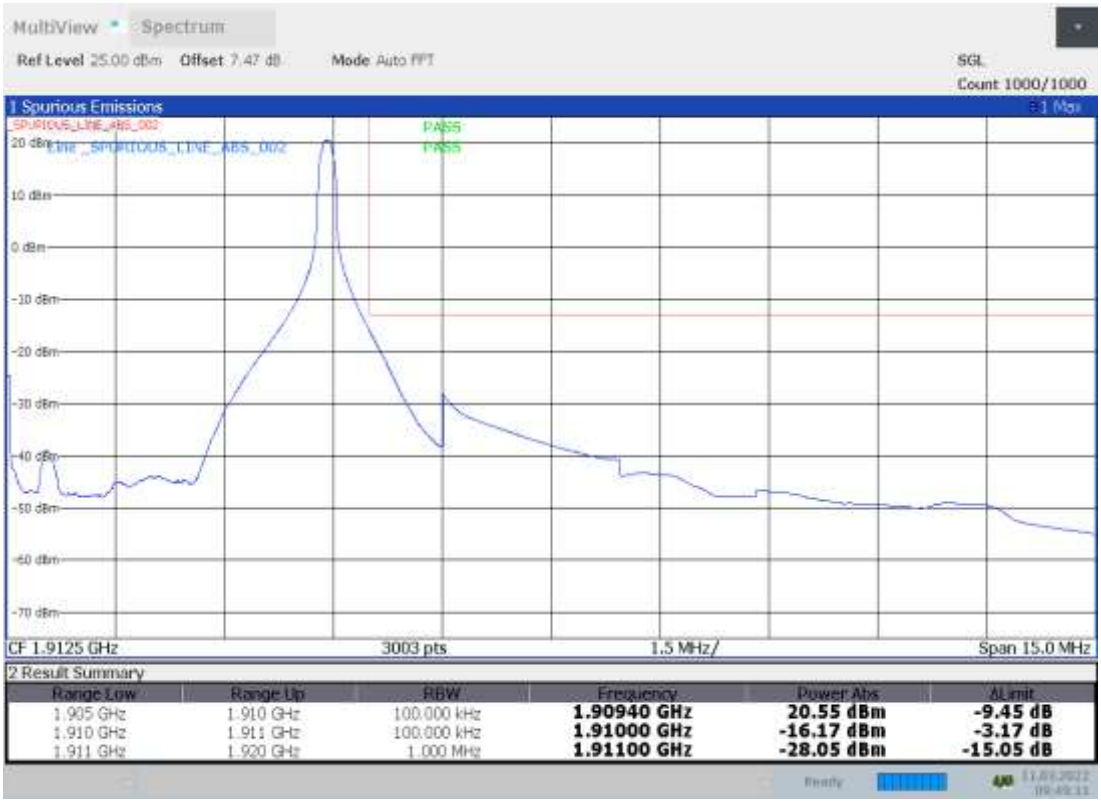
**LTE band 2**

**OBW: 1RB-low_offset**

**LOW BAND EDGE BLOCK-1RB-low_offset**




**HIGH BAND EDGE BLOCK-1RB-high_offset**



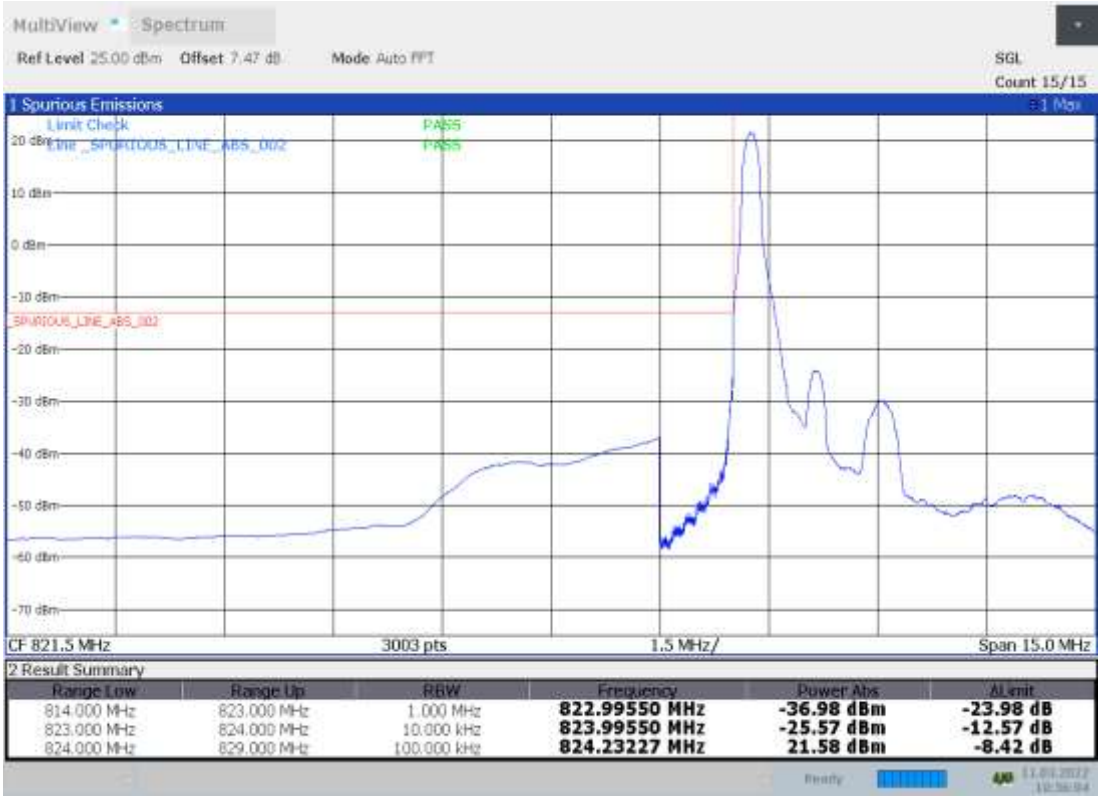
**LOW BAND EDGE BLOCK-20MHz-100%RB**


**HIGH BAND EDGE BLOCK-20MHz-100%RB**

**LTE band 5**

**OBW: 1RB-low_offset**

**LOW BAND EDGE BLOCK-1RB-low_offset**



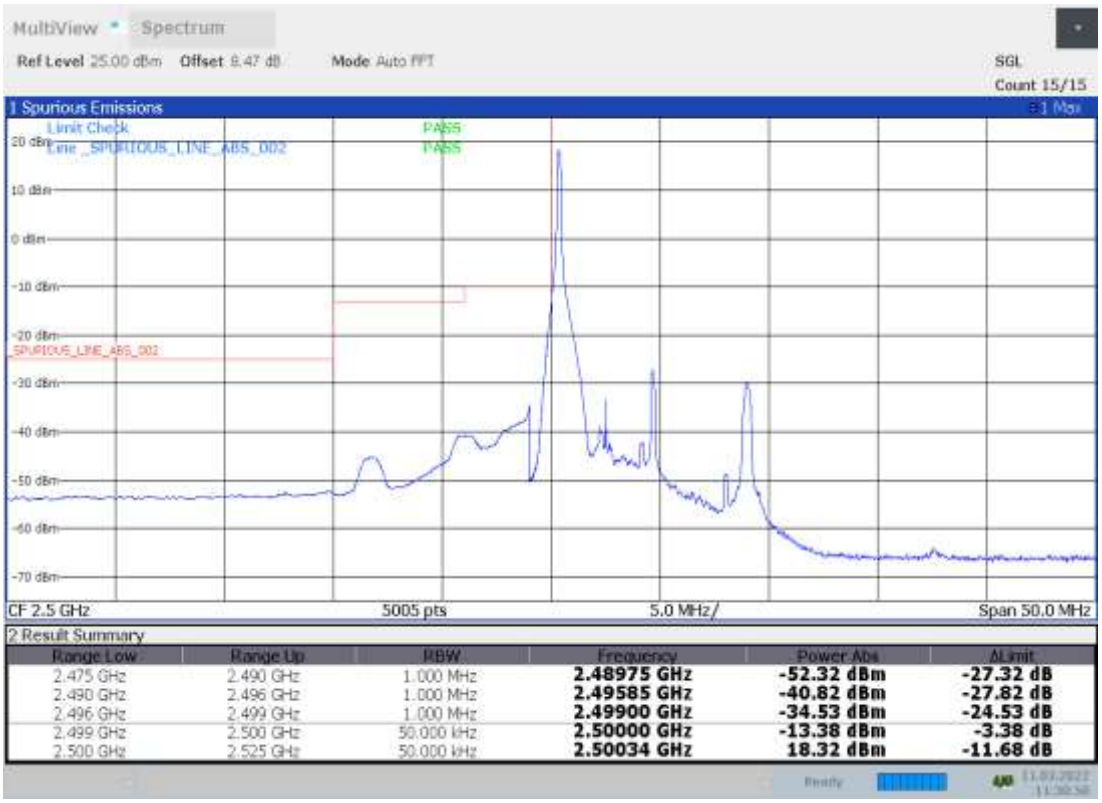

**HIGH BAND EDGE BLOCK-1RB-high_offset**

**LOW BAND EDGE BLOCK-10MHz-100%RB**

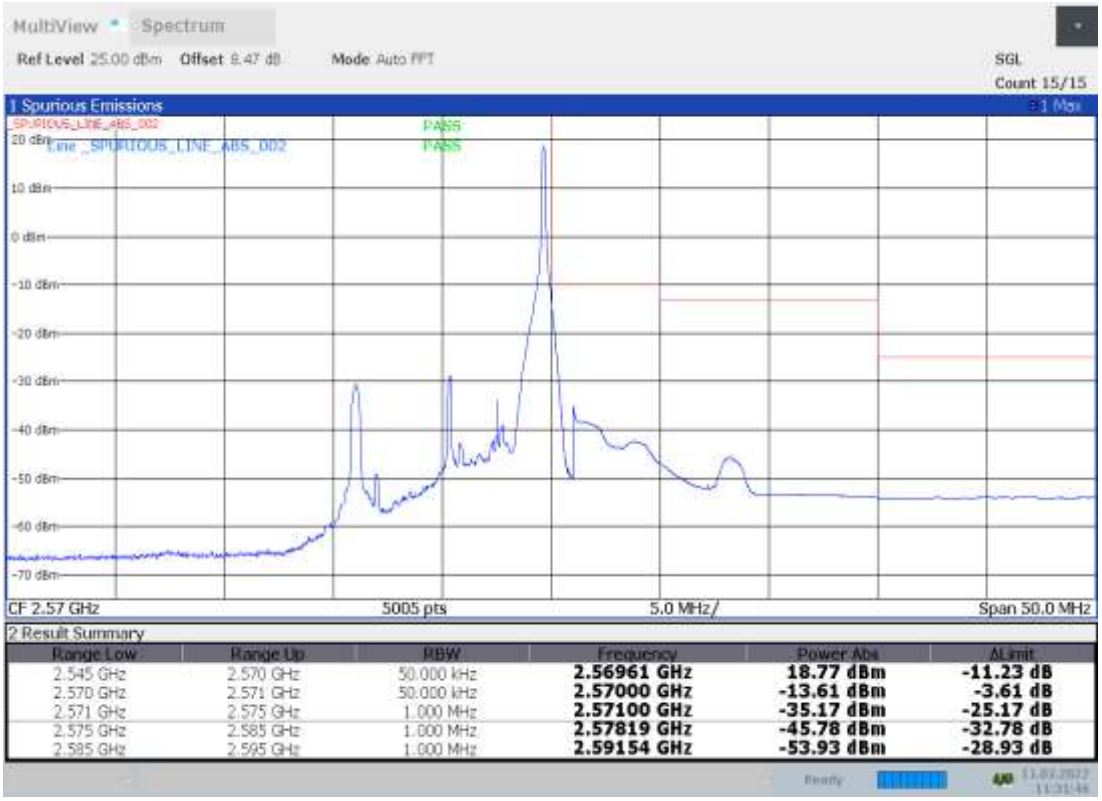

**HIGH BAND EDGE BLOCK-10MHz-100%RB**

**LTE band 7**

**LOW BAND EDGE BLOCK-1RB-low_offset**




**HIGH BAND EDGE BLOCK-1RB-high_offset**



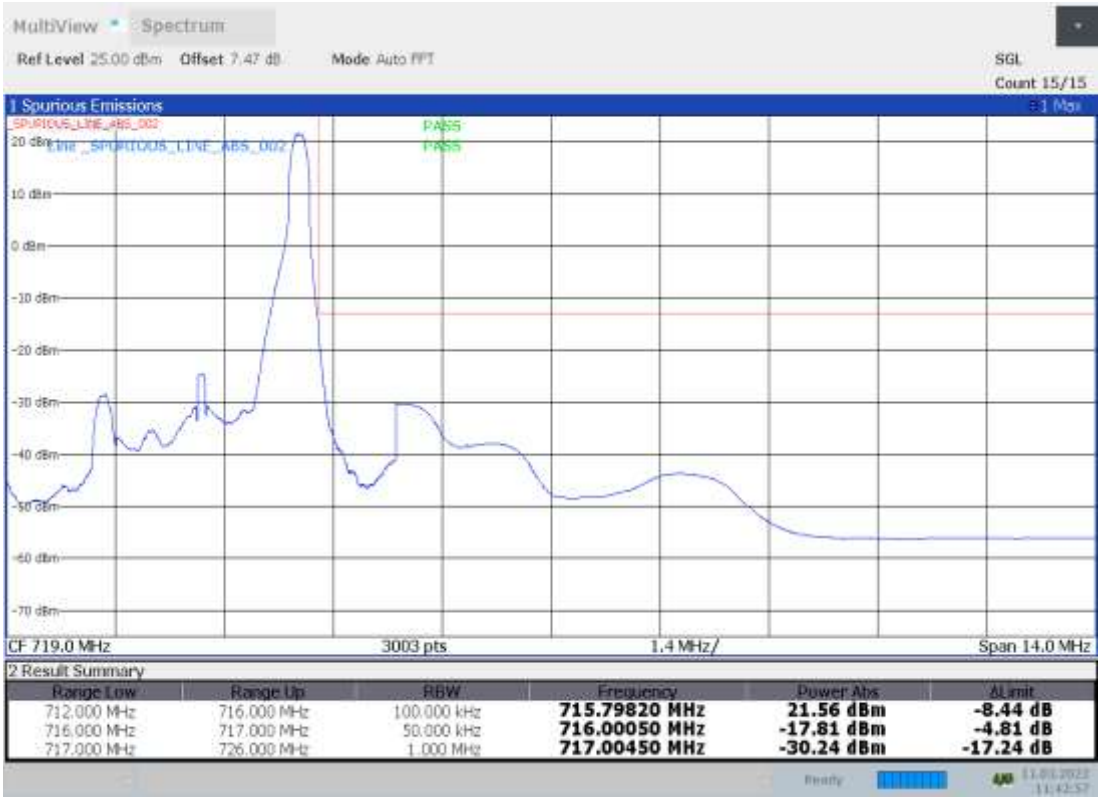
**LOW BAND EDGE BLOCK-20MHz-100%RB**


**HIGH BAND EDGE BLOCK-20MHz-100%RB**

**LTE band 12**

**LOW BAND EDGE BLOCK-1RB-low_offset**


**HIGH BAND EDGE BLOCK-1RB-high_offset**

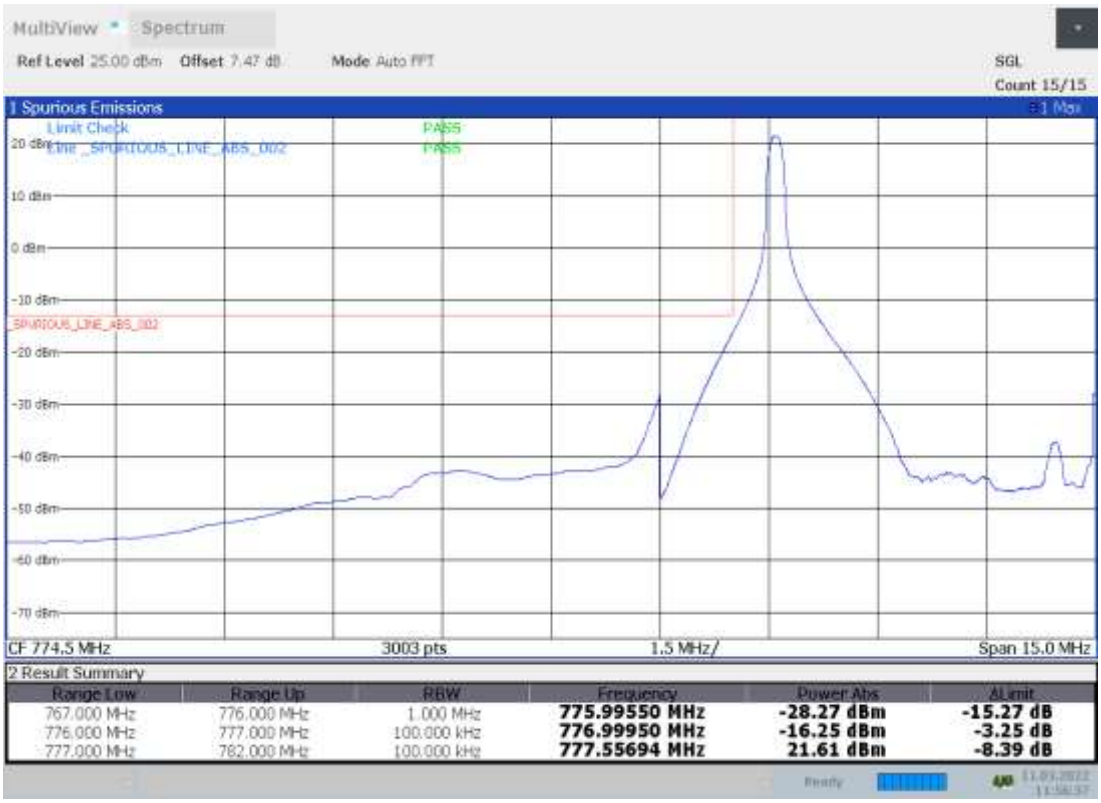


**LOW BAND EDGE BLOCK-10MHz-100%RB**

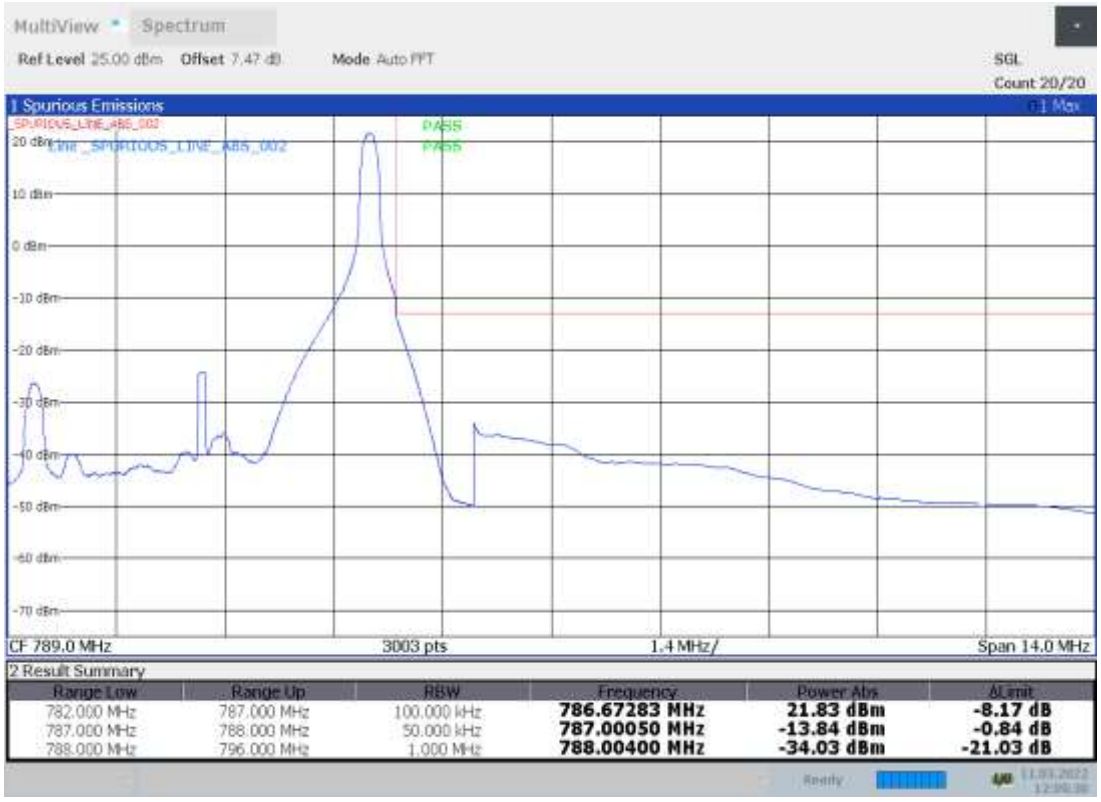

**HIGH BAND EDGE BLOCK-10MHz-100%RB**

**LTE band 13**

**LOW BAND EDGE BLOCK-1RB-low_offset**




**HIGH BAND EDGE BLOCK-1RB-high_offset**



**LOW BAND EDGE BLOCK-5MHz-100%RB**


**HIGH BAND EDGE BLOCK-5MHz-100%RB**

**LTE band 66**

**LOW BAND EDGE BLOCK-1RB-low_offset**


**HIGH BAND EDGE BLOCK-1RB-high_offset**

**LOW BAND EDGE BLOCK-20MHz-100%RB**


**HIGH BAND EDGE BLOCK-20MHz-100%RB**


Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96

## A.7 CONDUCTED SPURIOUS EMISSION

**Reference**

FCC: CFR Part 2.1051, 22.917, 24.238, 27.53.

**A.7.1 Measurement Method**

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

1. Determine frequency range for measurements: From CFR 2.1051 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the mobile station equipment tested, this equates to a frequency range of 13 MHz to 9 GHz, data taken from 10 MHz to 25 GHz.
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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Part 27.53(m)(4) 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 that 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(a) states for mobile and portable stations operating in the 2305–2315 MHz and 2350–2360 MHz bands: By a factor of not less than: 43 +10 log (P) dB on all frequencies between 2305 and 2320 MHz and on all frequencies between 2345 and 2360 MHz that are outside the licensed band(s) of operation, not less than 55 + 10 log (P) dB on all frequencies between 2320 and 2324 MHz and on all frequencies between 2341 and 2345 MHz, not less than 61 + 10 log (P) dB on all frequencies between 2324 and 2328 MHz and on all frequencies between 2337 and 2341 MHz, and not less than 67 + 10 log (P) dB onall frequencies between 2328 and 2337MHz;

By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2300 and 2305 MHz, 55 + 10 log (P) dB on all frequencies between 2296 and 2300MHz, 61 + 10 log (P) dB on all frequencies between 2292 and 2296 MHz, 67 + 10 log (P) dB on all frequencies between 2288 and 2292 MHz, and 70 + 10 log (P) dB below 2288 MHz; By a factor of not less than 43 + 10 log (P) dB on all frequencies between 2360 and 2365 MHz, and not less than 70 + 10 log (P) dB above 2365 MHz.

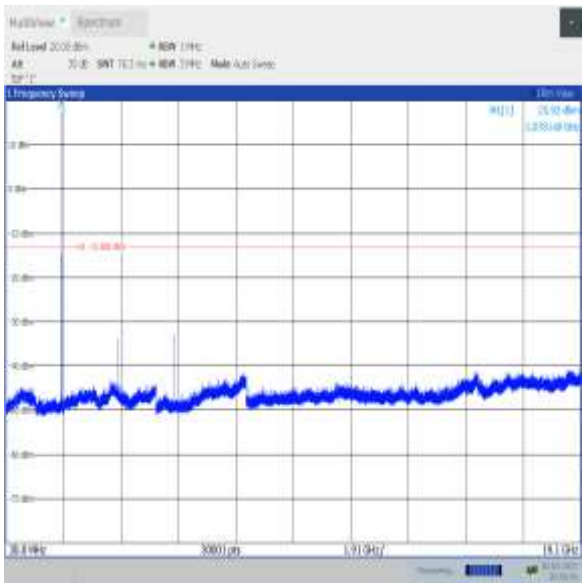
**A. 7.3 Measurement result**

**Only worst case result is given below**

**LTE band 2 : 30MHz – 19.1GHz**

Spurious emission limit –13dBm.

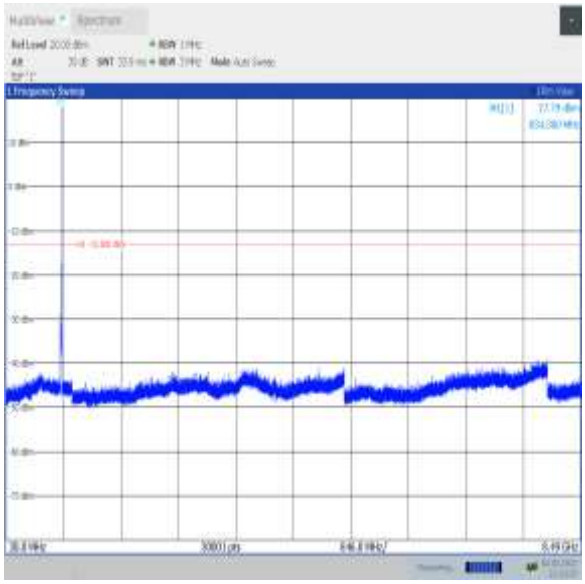
**NOTE: peak above the limit line is the carrier frequency.**



**LTE band 5 : 30MHz – 8.49GHz**

Spurious emission limit –13dBm.

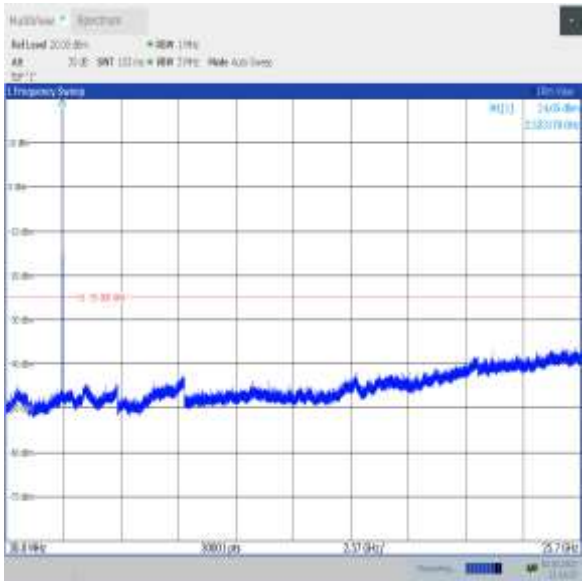
**NOTE: peak above the limit line is the carrier frequency.**



**LTE band 7: 30MHz – 25.7GHz**

Spurious emission limit –25dBm.

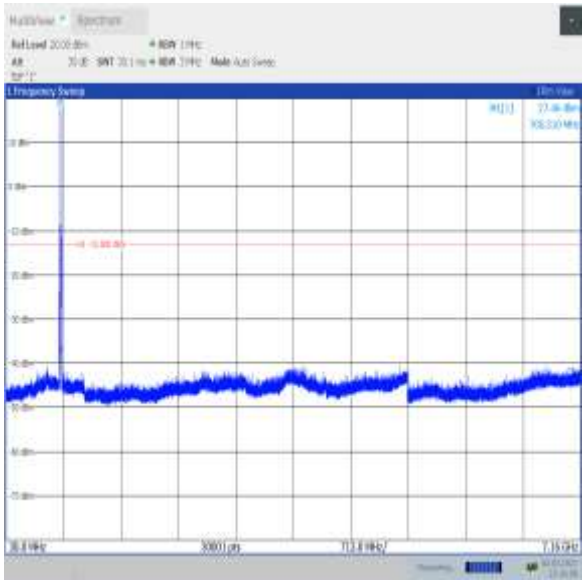
**NOTE: peak above the limit line is the carrier frequency.**



**LTE band 12: 30MHz – 7.16GHz**

Spurious emission limit –13dBm.

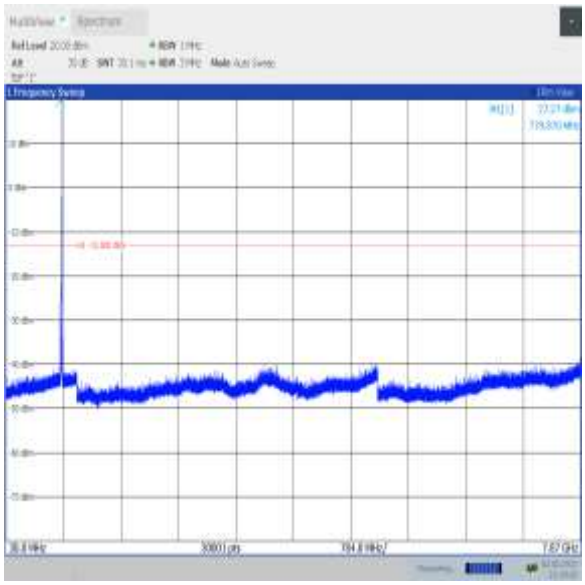
**NOTE: peak above the limit line is the carrier frequency.**



**LTE band 13: 30MHz – 7.87GHz**

Spurious emission limit –13dBm.

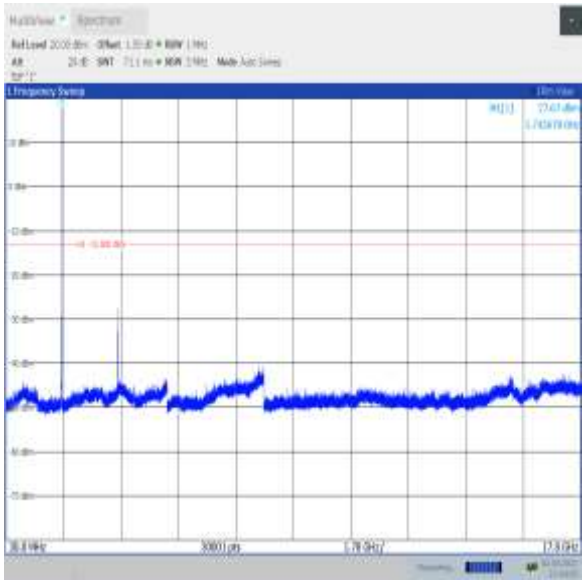
**NOTE: peak above the limit line is the carrier frequency.**



**LTE band 66: 30MHz – 17.8GHz**

Spurious emission limit –13dBm.

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



Note: Expanded measurement uncertainty is U = 0.49dB(100KHz-2GHz)/1.21dB(2GHz-26.5GHz), k = 1.96

## A.8 PEAK-TO-AVERAGE POWER RATIO

**Reference**

FCC: CFR Part 24.232, 27.50(d), KDB971168 D01(5.7).

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

a)Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;

b) Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;

c) Set the number of counts to a value that stabilizes the measured CCDF curve;

d) Set the measurement interval to 1 ms

e)Record the maximum PAPR level associated with a probability of 0.1%

**A.8.1 Measurement limit**

not exceed 13 dB

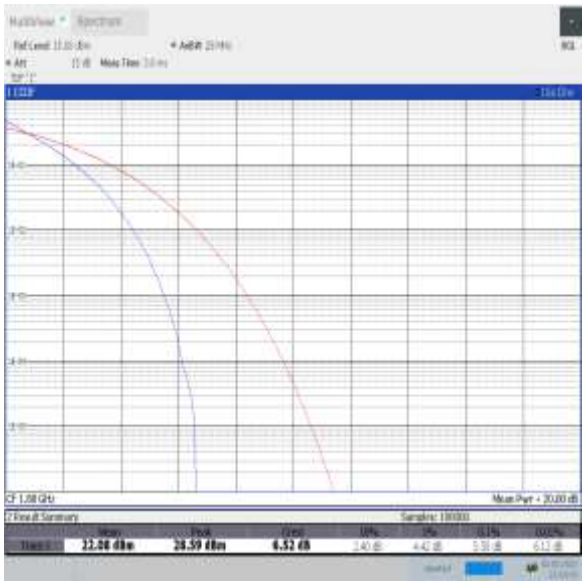
**A.8.2 Measurement results**

**Only worst case result is given below**

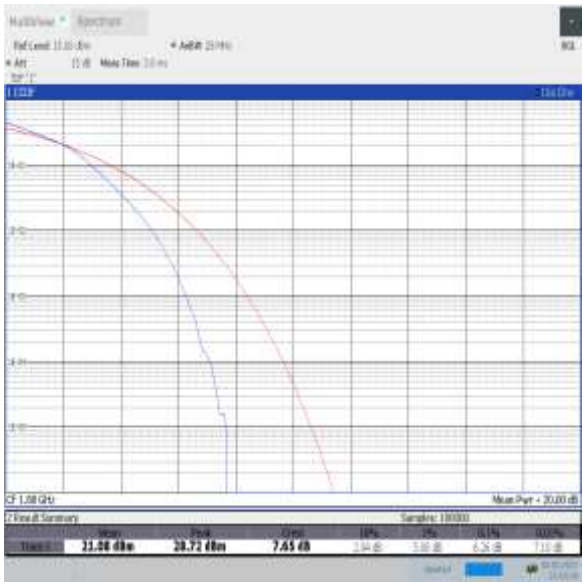
**LTE band 2**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 1880.0 | 20 | 5.50 | 6.26 |

**LTE band 2, 20MHz Bandwidth, QPSK (PAPR)**



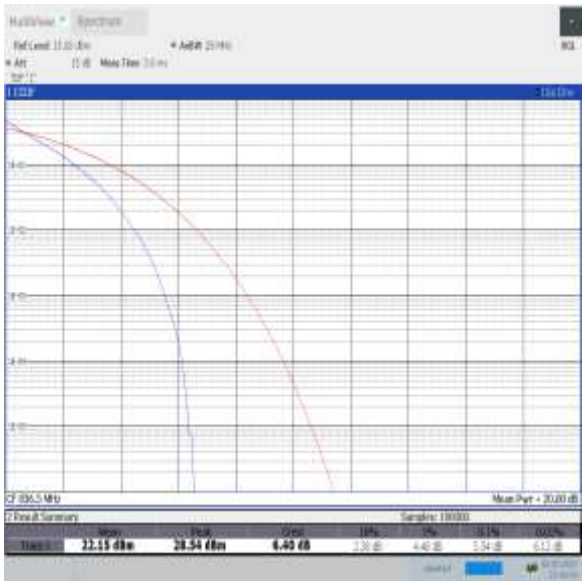
**LTE band 2, 20MHz Bandwidth, 16QAM (PAPR)**



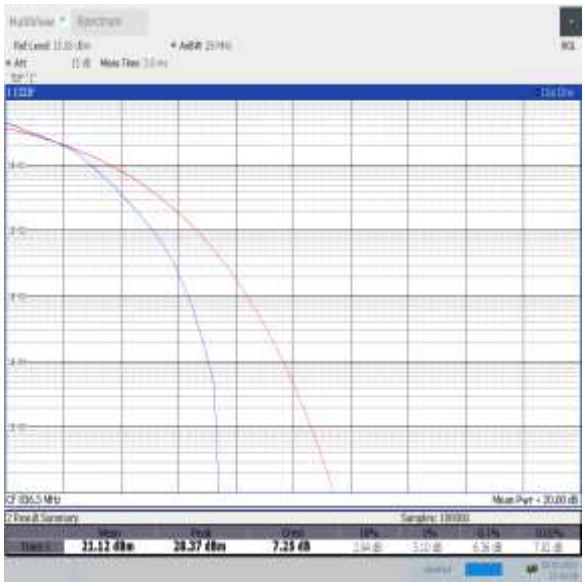
**LTE band 5**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 836.5 | 10 | 5.54 | 6.36 |

**LTE band 5, 10MHz Bandwidth, QPSK (PAPR)**



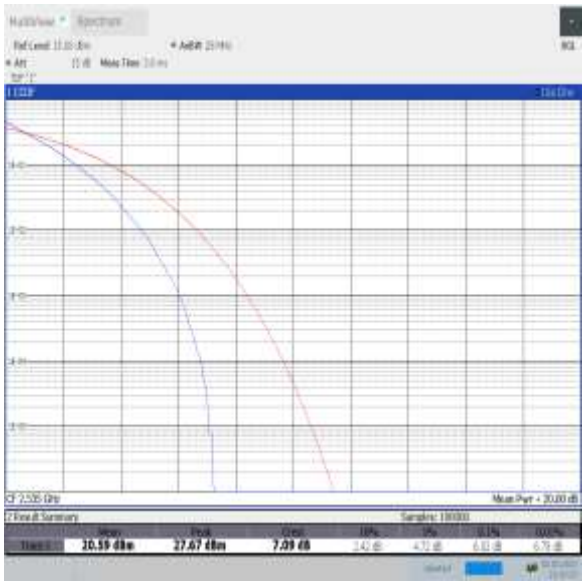
**LTE band 5, 10MHz Bandwidth, 16QAM (PAPR)**



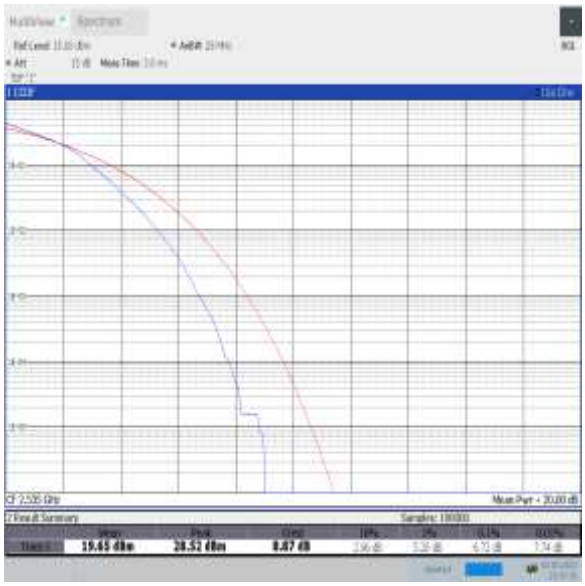
**LTE band 7**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 2535.0 | 20 | 6.02 | 6.72 |

**LTE band 7, 20MHz Bandwidth, QPSK (PAPR)**



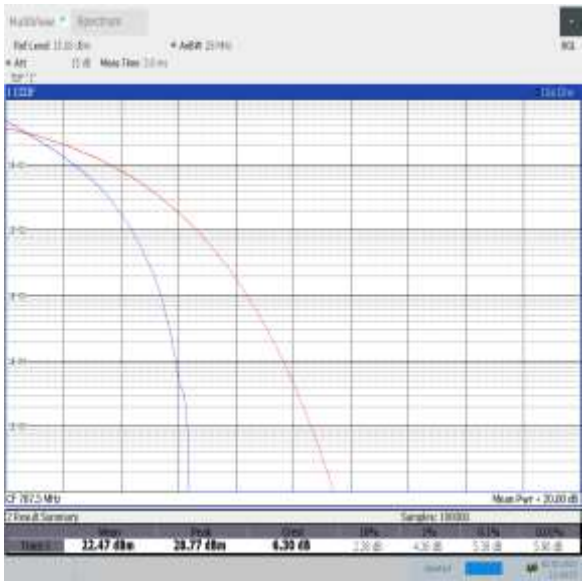
**LTE band 7, 20MHz Bandwidth, 16QAM (PAPR)**



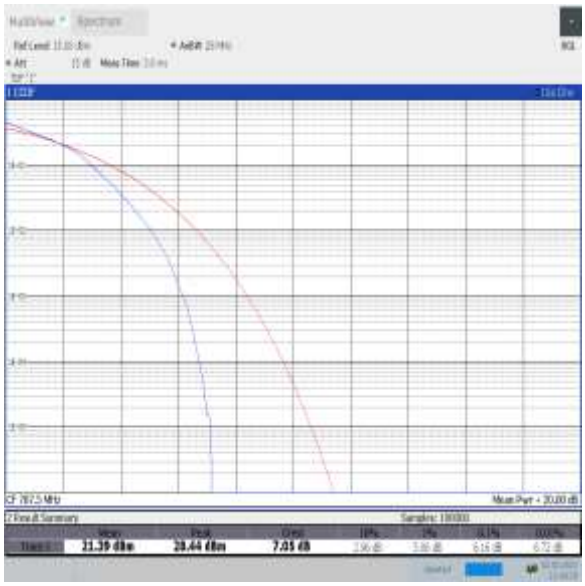
**LTE band 12**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 707.5 | 10 | 5.38 | 6.16 |

**LTE band 12, 10MHz Bandwidth, QPSK (PAPR)**



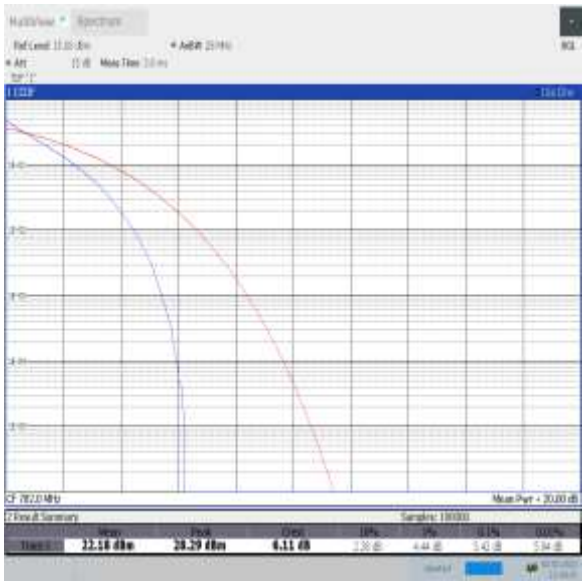
**LTE band 12, 10MHz Bandwidth, 16QAM (PAPR)**



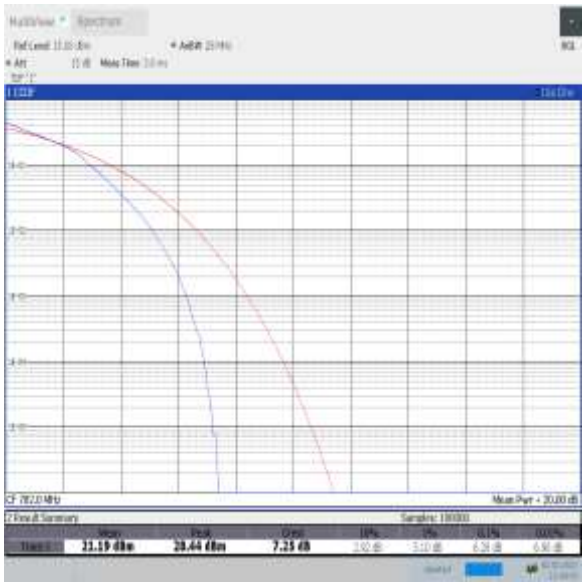
**LTE band 13**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 782.0 | 10 | 5.42 | 6.28 |

**LTE band 13, 10MHz Bandwidth, QPSK (PAPR)**



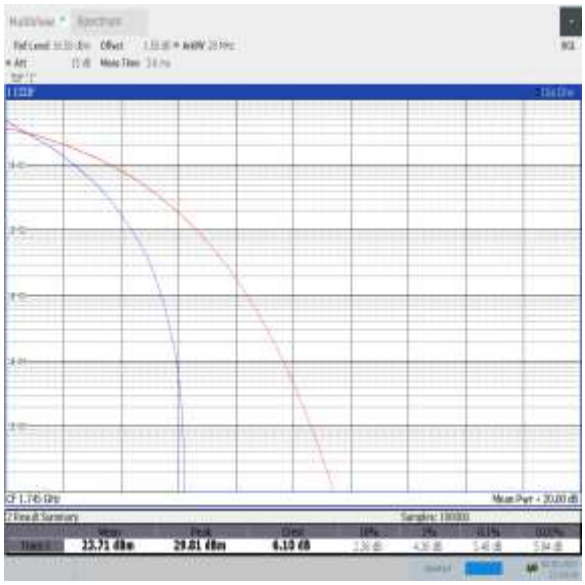
**LTE band 13, 10MHz Bandwidth, 16QAM (PAPR)**



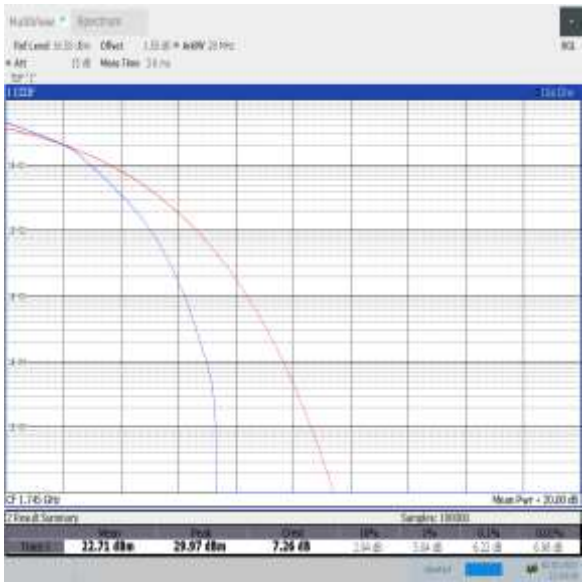
**LTE band 66**

| Frequency(MHz) | Bandwidth(MHz) | PAPR(dB) | |
|---|---|---|---|
| | | QPSK | 16QAM |
| 2593.0 | 20 | 5.40 | 6.22 |

**LTE band 66, 20MHz Bandwidth, QPSK (PAPR)**



**LTE band 66, 20MHz Bandwidth, 16QAM (PAPR)**



Note: Expanded measurement uncertainty is $U = 0.48$, $k = 2$

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