# TEST REPORT

## No. I14Z45902-GTE03

**for**

**TCT Mobile Limited**

**HSDPA/HSUPA/HSPA+/UMTS Quad bands / GSM Quad bands/LTE 5 bands mobile phone**

**Model Name: Rio-4G LATAM**

**Marketing Name: 5050A**

**FCC ID: RAD488**

**with**

**Hardware Version: PIO**

**Software Version: 9G1B**

**Issued Date: 2014-05-13**

**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 TMC Beijing.

**Test Laboratory:**

***FCC 2.948 Listed: No.733176***

***IC O.A.T.S listed: No.6629A-1***

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191.

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# 1. Test Laboratory

## 1.1. Testing Location

**Location A**

| | |
|---|---|
| Company Name: | TMC Beijing, Telecommunication Metrology Center of MIIT |
| Address: | No 52, Huayuan Bei Road, Haidian District, Beijing, P.R. China |
| Postal Code: | 100191 |

**Location B**

| | |
|---|---|
| Company Name: | TMC Beijing, Telecommunication Metrology Center of MIIT |
| Address: | Building Shouxiang, No.51, Xueyuan Road, Haidian District, Beijing, China |
| Postal Code: | 100191 |

## 1.2. Testing Environment

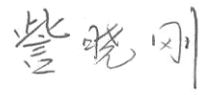
| | |
|---|---|
| Normal Temperature: | 15-35℃ |
| Relative Humidity: | 20-75% |
| Air pressure | 980 - 1040 hPa |

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

## 1.3. Project data

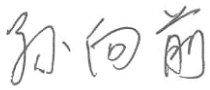
| | |
|---|---|
| Testing Start Date: | 2014-05-09 |
| Testing End Date: | 2014-05-12 |

## 1.4. Signature



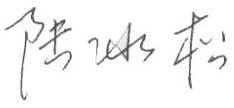
**Zi Xiaogang**

**(Prepared this test report)**



**Sun Xiangqian**

**(Reviewed this test report)**



**Lu Bingsong**

**Deputy Director of the laboratory**

**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | TCT Mobile Limited！ |
| Address /Post: | 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. |
| City: | Shanghai |
| Postal Code: | 201203 |
| Country: | China |
| Contact Person: | Gong Zhizhou |
| Contact Email | zhizhou.gong@jrdcom.com |
| Telephone: | 0086-21-61460890 |
| Fax: | 0086-21-61460602 |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | TCT Mobile Limited！！！！！ |
| Address /Post: | 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. |
| City: | Shanghai |
| Postal Code: | 201203 |
| Country: | China |
| Telephone: | 0086-21-61460890 |
| Fax: | 0086-21-61460602 |

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

## 3.1. About EUT

| | |
|---|---|
| Description | HSDPA/HSUPA/HSPA+/UMTS Quad bands / GSM Quad bands/LTE 5 bands mobile phone |
| Model Name | Rio-4G LATAM |
| Marketing Name | 5050A |
| FCC ID | RAD488 |
| Antenna | Integrated |
| Output power | 26.37dBm maximum EIRP measured for LTE Band 7 |
| Extreme vol. Limits | 3.5VDC to 4.2VDC (nominal: 3.9VDC) |
| Extreme temp. Tolerance | -30°C to +50°C |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.
Note: The EUT is a variant model of 6036A. Only RSE/EIRP and conducted result of LTE Band 2&7 had been tested. The other result is coming from the initial model.

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

| EUT ID* | IMEI | HW Version | SW Version |
|---|---|---|---|
| UT18a | 014035000002469 | PIO | 9G1B |
| UT17a | 014035000002071 | PIO | 9G1B |

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

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

| AE ID* | |
|---|---|
| AE1 | Battery |
| AE2 | Battery |
| AE3 | Travel charger |
| AE4 | Travel charger |
| AE5 | USB cable |
| AE6 | USB cable |
| AE7 | Battery |
| AE8 | Battery |

AE1, AE2, AE7, AE8

| | |
|---|---|
| Model | CAC2000003C3 |
| Manufacturer | SCUD |
| Capacitance | 2000 mAh |
| Nominal voltage | 3.8V |

AE3, AE4

| | |
|---|---|
| Model | CBA3000AG0C1 |
| Manufacturer | TEN PAO |
| Length of cable | / |

AE5, AE6

| | |
|---|---|
| Model | CDA3122002C2 |
| Manufacturer | / |
| Length of cable | 98cm |

*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 of HSDPA/HSUPA/HSPA+/UMTS Quad bands / GSM Quad bands/LTE 5 bands mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test.

# 4. Reference Documents

## 4.1. Reference Documents for testing

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

| Reference | Title | Version |
|---|---|---|
| FCC Part 24 | PERSONAL COMMUNICATIONS SERVICES | 10-1-13 Edition |
| FCC Part 27 | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES | 10-1-13 Edition |
| ANSI/TIA-603-C | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards | 2004 |
| ANSI C63.4 | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2009 |
| KDB 971168 D01 | Measurement Guidance for Certification of Licensed Digital Transmitters | v02r01 |

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber SAC-1** (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 35 ℃ |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4Ω |
| Normalised site attenuation (NSA) | < ± 4 dB, 3m/10m distance,<br>from 30 to 1000 MHz |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1GHz to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 3000 MHz |

**Fully-anechoic chamber FAC-3** (9 meters×6.5 meters×4 meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 35 ℃ |
| Relative humidity | Min. = 15 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1GHz to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 4000 MHz |

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

| | |
|---|---|
| Temperature | Min. = 15 ℃, Max. = 35 ℃ |
| Relative humidity | Min. = 20 %, Max. = 75 % |
| Shielding effectiveness | 0.014MHz - 1MHz, >60dB;<br>1MHz - 1000MHz, >90dB. |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 4 Ω |

# 6. SUMMARY OF TEST RESULTS

## 6.1. 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 1.1 of this report |

**LTE Band 2**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict | Test Location |
|---|---|---|---|---|---|
| 1 | Output Power | 24.232(c) | A.1 | P | B |
| 2 | Emission Limit | 24.238(a), 2.1051 | A.2 | P | B |
| 3 | Conducted Emission | 15.107/207 | A.3 | P | A |
| 4 | Frequency Stability | 24.235, 2.1055 | A.4 | P | B |
| 5 | Occupied Bandwidth | 2.1049(h)(i) | A.5 | P | B |
| 6 | Emission Bandwidth | 24.238(a) | A.6 | P | B |
| 7 | Band Edge Compliance | 24.238(a) | A.7 | P | B |
| 8 | Conducted Spurious Emission | 24.238, 2.1057 | A.8 | P | B |

**LTE Band 4**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict | Test Location |
|---|---|---|---|---|---|
| 1 | Output Power | 27.50(d)(4) | A.1 | P | B |
| 2 | Emission Limit | 27.53(h), 2.1051 | A.2 | P | B |
| 3 | Conducted Emission | 15.107/15.207 | A.3 | P | A |
| 4 | Frequency Stability | 27.54, 2.1055 | A.4 | P | B |
| 5 | Occupied Bandwidth | 2.1049(h)(i) | A.5 | P | B |
| 6 | Emission Bandwidth | 27.53(h) | A.6 | P | B |
| 7 | Band Edge Compliance | 27.53(h) | A.7 | P | B |
| 8 | Conducted Spurious Emission | 27.53(h), 2.1057 | A.8 | P | B |

**LTE Band 7**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict | Test Location |
|---|---|---|---|---|---|
| 1 | Output Power | 27.50(h)(2) | A.1 | P | B |
| 2 | Emission Limit | 27.53(m), 2.1051 | A.2 | P | B |
| 3 | Conducted Emission | 15.107/15.207 | A.3 | P | A |
| 4 | Frequency Stability | 27.54, 2.1055 | A.4 | P | B |
| 5 | Occupied Bandwidth | 2.1049(h)(i) | A.5 | P | B |
| 6 | Emission Bandwidth | 27.53(m) | A.6 | P | B |
| 7 | Band Edge Compliance | 27.53(m) | A.7 | P | B |
| 8 | Conducted Spurious Emission | 27.53(m), 2.1057 | A.8 | P | B |

**LTE Band 17**

| Items | Test Name | Clause in FCC rules | Section in this report | Verdict | Test Location |
|---|---|---|---|---|---|
| 1 | Output Power | 27.50(c)(10) | A.1 | P | B |
| 2 | Emission Limit | 27.53(g), 2.1051 | A.2 | P | B |
| 3 | Conducted Emission | 15.107/15.207 | A.3 | P | A |
| 4 | Frequency Stability | 27.54, 2.1055 | A.4 | P | B |
| 5 | Occupied Bandwidth | 2.1049(h)(i) | A.5 | P | B |
| 6 | Emission Bandwidth | 27.53(g) | A.6 | P | B |
| 7 | Band Edge Compliance | 27.53(g) | A.7 | P | B |
| 8 | Conducted Spurious Emission | 27.53(g), 2.1057 | A.8 | P | B |

## 6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the LTE functions among the features described in section 3.

## 7. Test Equipments Utilized

| NO. | Description | TYPE | SERIES NUMBER | MANUFACTURE | CAL DUE DATE |
|---|---|---|---|---|---|
| 1 | Test Receiver | ESCI | 100344 | R&S | 2015-03-03 |
| 2 | Test Receiver | ESU26 | 100376 | R&S | 2014-11-05 |
| 3 | EMI Antenna | VULB 9163 | 514 | Schwarzbeck | 2014-11-10 |
| 4 | EMI Antenna | 3117 | 00139065 | ETS-Lindgren | 2014-07-31 |
| 5 | LISN | NV216 | 101200 | R&S | 2014-07-11 |
| 6 | Universal Radio Communication Tester | CMW500 | 101675 | R&S | 2014-07-10 |
| 7 | Spectrum Analyzer | E4440A | MY48250642 | Agilent | 2015-02-27 |
| 8 | EMI Antenna | 9117 | 177 | Schwarzbeck | 2014-06-29 |
| 9 | EMI Antenna | VULB 9163 | 9163 175 | Schwarzbeck | 2014-07-13 |
| 10 | EMI Antenna | 3117 | 00119024 | ETS-Lindgren | 2016-01-20 |
| 11 | Signal Generator | N5183A | MY49060052 | Agilent | 2015-03-02 |
| 12 | Climate chamber | SH-241 | 92007454 | ESPEC | 2015-12-14 |
| 13 | Loop Antenna | HFH2-Z2 | 829324/007 | R&S | 2014-12-12 |

# ANNEX A: MEASUREMENT RESULTS

## A.1 OUTPUT POWER

**Reference**

FCC: 24.232(c), 27.50(d)(4), 27.50(h)(2), 27.50(c)(10).

### 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.
The power was measured with spectrum analyzer's RMS detector.
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 | 1850.7 | 23.37 | 22.46 |
| | | 1880.0 | 23.10 | 22.24 |
| | | 1909.3 | 23.20 | 22.32 |
| | 1 RB low | 1850.7 | 23.29 | 22.76 |
| | | 1880.0 | 23.07 | 22.24 |
| | | 1909.3 | 23.21 | 22.25 |
| | 50% RB mid | 1850.7 | 23.27 | 22.16 |
| | | 1880.0 | 23.09 | 22.03 |
| | | 1909.3 | 23.20 | 22.07 |
| | 100% RB | 1850.7 | 22.24 | 21.25 |
| | | 1880.0 | 22.15 | 21.14 |
| | | 1909.3 | 22.21 | 21.15 |

(continued)

| | | | | |
|---|---|---|---|---|
| 3MHz | 1 RB high | 1851.5 | 23.20 | 22.50 |
| | | 1880.0 | 23.06 | 22.45 |
| | | 1908.5 | 23.18 | 22.51 |
| | 1 RB low | 1851.5 | 23.02 | 22.49 |
| | | 1880.0 | 23.05 | 22.45 |
| | | 1908.5 | 23.16 | 22.55 |
| | 50% RB mid | 1851.5 | 22.16 | 21.13 |
| | | 1880.0 | 22.10 | 21.03 |
| | | 1908.5 | 22.20 | 21.11 |
| | 100% RB | 1851.5 | 22.18 | 21.17 |
| | | 1880.0 | 22.16 | 21.06 |
| | | 1908.5 | 22.16 | 21.11 |
| 5MHz | 1 RB high | 1852.5 | 23.34 | 22.31 |
| | | 1880.0 | 23.07 | 22.08 |
| | | 1907.5 | 23.17 | 22.16 |
| | 1 RB low | 1852.5 | 23.21 | 22.21 |
| | | 1880.0 | 23.01 | 22.06 |
| | | 1907.5 | 23.06 | 22.06 |
| | 50% RB mid | 1852.5 | 22.17 | 21.15 |
| | | 1880.0 | 22.18 | 21.06 |
| | | 1907.5 | 22.23 | 21.25 |
| | 100% RB | 1852.5 | 22.24 | 21.25 |
| | | 1880.0 | 22.12 | 21.19 |
| | | 1907.5 | 22.22 | 21.27 |
| 10MHz | 1 RB high | 1855.0 | 23.30 | 22.56 |
| | | 1880.0 | 23.17 | 22.52 |
| | | 1905.0 | 23.10 | 22.51 |
| | 1 RB low | 1855.0 | 23.07 | 22.48 |
| | | 1880.0 | 23.03 | 22.44 |
| | | 1905.0 | 23.00 | 22.42 |
| | 50% RB mid | 1855.0 | 22.33 | 21.28 |
| | | 1880.0 | 22.19 | 21.07 |
| | | 1905.0 | 22.28 | 21.25 |
| | 100% RB | 1855.0 | 22.30 | 21.34 |
| | | 1880.0 | 22.15 | 21.05 |
| | | 1905.0 | 22.23 | 21.18 |

(continued)

| | | | | |
|---|---|---|---|---|
| 15MHz | 1 RB high | 1857.5 | 23.42 | 22.62 |
| | | 1880.0 | 23.14 | 22.46 |
| | | 1902.5 | 23.18 | 22.57 |
| | 1 RB low | 1857.5 | 23.07 | 22.42 |
| | | 1880.0 | 22.97 | 22.36 |
| | | 1902.5 | 23.04 | 22.31 |
| | 50% RB mid | 1857.5 | 22.08 | 21.47 |
| | | 1880.0 | 22.02 | 21.26 |
| | | 1902.5 | 22.31 | 21.44 |
| | 100% RB | 1857.5 | 22.31 | 21.19 |
| | | 1880.0 | 22.19 | 21.13 |
| | | 1902.5 | 22.39 | 21.29 |
| 20MHz | 1 RB high | 1860.0 | 23.43 | 22.51 |
| | | 1880.0 | 23.26 | 22.30 |
| | | 1900.0 | 23.16 | 22.14 |
| | 1 RB low | 1860.0 | 23.19 | 22.14 |
| | | 1880.0 | 23.14 | 22.26 |
| | | 1900.0 | 23.14 | 22.15 |
| | 50% RB mid | 1860.0 | 22.26 | 21.25 |
| | | 1880.0 | 22.19 | 21.12 |
| | | 1900.0 | 22.29 | 21.28 |
| | 100% RB | 1860.0 | 22.24 | 21.24 |
| | | 1880.0 | 22.18 | 21.14 |
| | | 1900.0 | 22.20 | 21.27 |

**LTE band 4**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 1.4MHz | 1 RB high | 1754.3 | 23.67 | 22.81 |
| | | 1732.5 | 23.63 | 22.76 |
| | | 1710.7 | 23.65 | 22.80 |
| | 1 RB low | 1754.3 | 23.65 | 22.77 |
| | | 1732.5 | 23.58 | 22.75 |
| | | 1710.7 | 23.68 | 22.83 |
| | 50% RB mid | 1754.3 | 23.62 | 22.56 |
| | | 1732.5 | 23.55 | 22.50 |
| | | 1710.7 | 23.73 | 22.55 |
| | 100% RB | 1754.3 | 22.64 | 21.63 |
| | | 1732.5 | 22.59 | 21.64 |
| | | 1710.7 | 22.63 | 21.73 |
| 3MHz | 1 RB high | 1753.5 | 23.55 | 22.96 |
| | | 1732.5 | 23.49 | 22.87 |
| | | 1711.5 | 23.45 | 22.79 |
| | 1 RB low | 1753.5 | 23.62 | 23.02 |
| | | 1732.5 | 23.50 | 22.89 |
| | | 1711.5 | 23.61 | 22.89 |
| | 50% RB mid | 1753.5 | 22.51 | 21.51 |
| | | 1732.5 | 22.56 | 21.57 |
| | | 1711.5 | 22.44 | 21.54 |
| | 100% RB | 1753.5 | 22.59 | 21.54 |
| | | 1732.5 | 22.53 | 21.57 |
| | | 1711.5 | 22.51 | 21.53 |
| 5MHz | 1 RB high | 1752.5 | 23.51 | 22.49 |
| | | 1732.5 | 23.47 | 22.52 |
| | | 1712.5 | 23.45 | 22.47 |
| | 1 RB low | 1752.5 | 23.49 | 22.48 |
| | | 1732.5 | 23.39 | 22.40 |
| | | 1712.5 | 23.47 | 22.55 |
| | 50% RB mid | 1752.5 | 22.61 | 21.62 |
| | | 1732.5 | 22.53 | 21.53 |
| | | 1712.5 | 22.43 | 21.54 |
| | 100% RB | 1752.5 | 22.57 | 21.71 |
| | | 1732.5 | 22.49 | 21.61 |
| | | 1712.5 | 22.45 | 21.53 |

(continued)

| | | | | |
|---|---|---|---|---|
| 10MHz | 1 RB high | 1750 | 23.48 | 22.82 |
| | | 1732.5 | 23.43 | 22.88 |
| | | 1715 | 23.49 | 22.94 |
| | 1 RB low | 1750 | 23.41 | 22.81 |
| | | 1732.5 | 23.39 | 22.80 |
| | | 1715 | 23.43 | 22.76 |
| | 50% RB mid | 1750 | 22.59 | 21.51 |
| | | 1732.5 | 22.55 | 21.51 |
| | | 1715 | 22.47 | 21.44 |
| | 100% RB | 1750 | 22.61 | 21.60 |
| | | 1732.5 | 22.58 | 21.50 |
| | | 1715 | 22.48 | 21.48 |
| 15MHz | 1 RB high | 1747.5 | 23.54 | 22.78 |
| | | 1732.5 | 23.57 | 22.86 |
| | | 1717.5 | 23.57 | 22.95 |
| | 1 RB low | 1747.5 | 23.49 | 22.84 |
| | | 1732.5 | 23.46 | 22.88 |
| | | 1717.5 | 23.46 | 22.85 |
| | 50% RB mid | 1747.5 | 22.56 | 21.73 |
| | | 1732.5 | 22.53 | 21.71 |
| | | 1717.5 | 22.60 | 21.65 |
| | 100% RB | 1747.5 | 22.65 | 21.62 |
| | | 1732.5 | 22.62 | 21.56 |
| | | 1717.5 | 22.60 | 21.58 |
| 20MHz | 1 RB high | 1745 | 23.79 | 22.89 |
| | | 1732.5 | 23.81 | 22.78 |
| | | 1720 | 23.68 | 22.76 |
| | 1 RB low | 1745 | 23.61 | 22.72 |
| | | 1732.5 | 23.65 | 22.73 |
| | | 1720 | 23.59 | 22.60 |
| | 50% RB mid | 1745 | 22.70 | 21.70 |
| | | 1732.5 | 22.70 | 21.72 |
| | | 1720 | 22.69 | 21.72 |
| | 100% RB | 1745 | 22.77 | 21.82 |
| | | 1732.5 | 22.67 | 21.69 |
| | | 1720 | 22.67 | 21.72 |

**LTE band 7**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 5MHz | 1 RB high | 2502.5 | 23.04 | 21.97 |
| | | 2535 | 23.23 | 22.23 |
| | | 2567.5 | 23.28 | 22.27 |
| | 1 RB low | 2502.5 | 23.09 | 22.08 |
| | | 2535 | 23.10 | 22.11 |
| | | 2567.5 | 23.18 | 22.20 |
| | 50% RB mid | 2502.5 | 22.00 | 21.00 |
| | | 2535 | 22.20 | 21.18 |
| | | 2567.5 | 22.13 | 21.14 |
| | 100% RB | 2502.5 | 21.95 | 20.99 |
| | | 2535 | 22.23 | 21.22 |
| | | 2567.5 | 22.13 | 21.17 |
| 10MHz | 1 RB high | 2505 | 22.96 | 22.23 |
| | | 2535 | 23.22 | 22.54 |
| | | 2565 | 23.00 | 22.36 |
| | 1 RB low | 2505 | 23.11 | 22.45 |
| | | 2535 | 23.02 | 22.44 |
| | | 2565 | 22.98 | 22.34 |
| | 50% RB mid | 2505 | 22.11 | 21.07 |
| | | 2535 | 22.27 | 21.13 |
| | | 2565 | 22.18 | 21.08 |
| | 100% RB | 2505 | 22.09 | 21.04 |
| | | 2535 | 22.25 | 21.17 |
| | | 2565 | 22.14 | 21.08 |
| 15MHz | 1 RB high | 2507.5 | 22.82 | 22.21 |
| | | 2535 | 23.21 | 22.59 |
| | | 2562.5 | 23.16 | 22.35 |
| | 1 RB low | 2507.5 | 23.01 | 22.39 |
| | | 2535 | 23.06 | 22.46 |
| | | 2562.5 | 22.87 | 22.24 |
| | 50% RB mid | 2507.5 | 21.94 | 21.28 |
| | | 2535 | 21.99 | 21.37 |
| | | 2562.5 | 21.96 | 21.33 |
| | 100% RB | 2507.5 | 22.11 | 21.05 |
| | | 2535 | 22.24 | 21.14 |
| | | 2562.5 | 22.22 | 21.06 |

(Continued)

| | | | | |
|---|---|---|---|---|
| 20MHz | 1 RB high | 2510 | 23.10 | 22.09 |
| | | 2535 | 23.38 | 22.46 |
| | | 2560 | 23.11 | 22.20 |
| | 1 RB low | 2510 | 23.08 | 22.17 |
| | | 2535 | 23.18 | 22.28 |
| | | 2560 | 22.98 | 22.03 |
| | 50% RB mid | 2510 | 22.03 | 21.06 |
| | | 2535 | 22.19 | 21.18 |
| | | 2560 | 22.07 | 21.05 |
| | 100% RB | 2510 | 22.05 | 21.05 |
| | | 2535 | 22.19 | 21.15 |
| | | 2560 | 22.08 | 21.02 |

**LTE band 17**

| Bandwidth | RB size/offset | Frequency (MHz) | Power(dBm) | |
|---|---|---|---|---|
| | | | QPSK | 16QAM |
| 5MHz | 1 RB high | 706.5 | 23.28 | 22.29 |
| | | 710.0 | 23.15 | 22.28 |
| | | 713.5 | 23.35 | 22.39 |
| | 1 RB low | 706.5 | 23.16 | 22.17 |
| | | 710.0 | 23.26 | 22.23 |
| | | 713.5 | 23.22 | 22.25 |
| | 50% RB mid | 706.5 | 22.23 | 21.34 |
| | | 710.0 | 22.16 | 21.40 |
| | | 713.5 | 22.29 | 21.41 |
| | 100% RB | 706.5 | 22.24 | 21.41 |
| | | 710.0 | 22.29 | 21.31 |
| | | 713.5 | 22.33 | 21.51 |

(Continued)

| | | | | |
|---|---|---|---|---|
| 10MHz | 1 RB high | 709 | 23.31 | 22.61 |
| | | 710 | 23.29 | 22.63 |
| | | 711 | 23.20 | 22.48 |
| | 1 RB low | 709 | 23.19 | 22.55 |
| | | 710 | 23.25 | 22.53 |
| | | 711 | 23.12 | 22.39 |
| | 50% RB mid | 709 | 22.24 | 21.23 |
| | | 710 | 22.34 | 21.36 |
| | | 711 | 22.32 | 21.36 |
| | 100% RB | 709 | 22.32 | 21.38 |
| | | 710 | 22.31 | 21.49 |
| | | 711 | 22.33 | 21.35 |

Note: Expanded measurement uncertainty is $U$ = 0.83 dB, $k$ = 2.

### 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”.

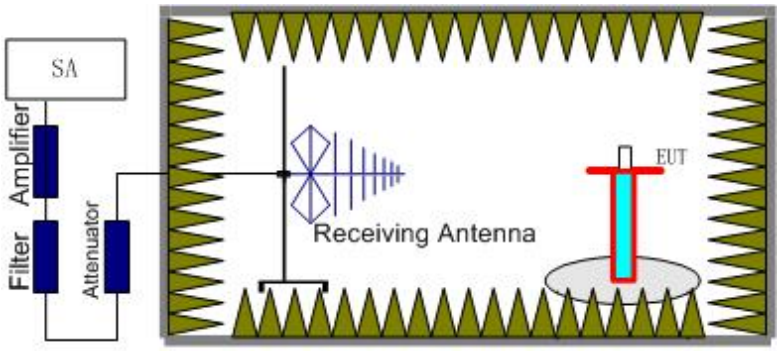
Rule Part 27.50(h)(2) specifies “Mobile stations are limited to 2.0 watts EIRP.”.

Rule Part 27.50(c)(10) specifies “Portable stations (hand-held devices) are limited to 3 watts ERP”.

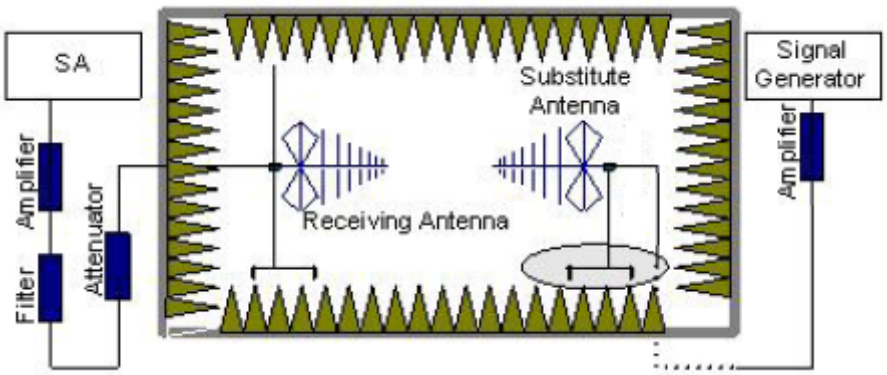
#### A.1.3.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all 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. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. 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 ($G_a$) 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 -2.15.

For test layout photo, please refer to Pic.1 in Annex B.

### A.1.3.3 Measurement result

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

**Limits:** ≤33dBm (2W)

**LTE Band 2_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1850.70 | -27.23 | 3.18 | -50.00 | -4.56 | 24.15 | 33.00 | 8.85 | H |
| 1880.00 | -26.00 | 3.11 | -50.00 | -4.43 | 25.32 | 33.00 | 7.68 | H |
| 1909.30 | -25.22 | 3.18 | -50.00 | -4.30 | **25.90** | 33.00 | 7.10 | H |

**LTE Band 2_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1851.50 | -27.29 | 3.18 | -50.00 | -4.55 | 24.08 | 33.00 | 8.92 | H |
| 1880.00 | -26.09 | 3.11 | -50.00 | -4.43 | 25.23 | 33.00 | 7.77 | H |
| 1908.50 | -25.12 | 3.18 | -50.00 | -4.30 | **26.00** | 33.00 | 7.00 | H |

**LTE Band 2_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1852.50 | -27.34 | 3.18 | -50.00 | -4.55 | 24.03 | 33.00 | 8.97 | H |
| 1880.00 | -25.83 | 3.11 | -50.00 | -4.43 | 25.49 | 33.00 | 7.51 | H |
| 1907.50 | -25.05 | 3.18 | -50.00 | -4.31 | **26.08** | 33.00 | 6.92 | H |

**LTE Band 2_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1855.00 | -27.25 | 3.16 | -50.00 | -4.54 | 24.13 | 33.00 | 8.87 | H |
| 1880.00 | -25.94 | 3.11 | -50.00 | -4.43 | 25.38 | 33.00 | 7.62 | H |
| 1905.00 | -25.09 | 3.17 | -50.00 | -4.32 | **26.06** | 33.00 | 6.94 | H |

**LTE Band 2_15MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1857.50 | -27.26 | 3.15 | -50.00 | -4.53 | 24.12 | 33.00 | 8.88 | H |
| 1880.00 | -26.01 | 3.11 | -50.00 | -4.43 | 25.31 | 33.00 | 7.69 | H |
| 1902.50 | -25.36 | 3.16 | -50.00 | -4.33 | **25.81** | 33.00 | 7.19 | H |

**LTE Band 2_20 MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1860.00 | -26.87 | 3.14 | -50.00 | -4.52 | 24.51 | 33.00 | 8.49 | H |
| 1880.00 | -25.95 | 3.11 | -50.00 | -4.43 | 25.37 | 33.00 | 7.63 | H |
| 1900.00 | -24.97 | 3.16 | -50.00 | -4.34 | **26.21** | 33.00 | 6.79 | H |

**LTE Band 2_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1850.70 | -28.26 | 3.18 | -50.00 | -4.56 | 23.12 | 33.00 | 9.88 | H |
| 1880.00 | -26.88 | 3.11 | -50.00 | -4.43 | 24.44 | 33.00 | 8.56 | H |
| 1909.30 | -26.16 | 3.18 | -50.00 | -4.30 | **24.96** | 33.00 | 8.04 | H |

**LTE Band 2_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1851.50 | -28.43 | 3.18 | -50.00 | -4.55 | 22.94 | 33.00 | 10.06 | H |
| 1880.00 | -26.94 | 3.11 | -50.00 | -4.43 | 24.38 | 33.00 | 8.62 | H |
| 1908.50 | -26.21 | 3.18 | -50.00 | -4.30 | **24.91** | 33.00 | 8.09 | H |

**LTE Band 2_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1852.50 | -28.34 | 3.18 | -50.00 | -4.55 | 23.03 | 33.00 | 9.97 | H |
| 1880.00 | -26.84 | 3.11 | -50.00 | -4.43 | 24.48 | 33.00 | 8.52 | H |
| 1907.50 | -26.12 | 3.18 | -50.00 | -4.31 | **25.01** | 33.00 | 7.99 | H |

**LTE Band 2_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1855.00 | -28.36 | 3.16 | -50.00 | -4.54 | 23.02 | 33.00 | 9.98 | H |
| 1880.00 | -26.95 | 3.11 | -50.00 | -4.43 | 24.37 | 33.00 | 8.63 | H |
| 1905.00 | -26.13 | 3.17 | -50.00 | -4.32 | **25.02** | 33.00 | 7.98 | H |

**LTE Band 2_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1857.50 | -28.14 | 3.15 | -50.00 | -4.53 | 23.24 | 33.00 | 9.76 | H |
| 1880.00 | -26.83 | 3.11 | -50.00 | -4.43 | 24.49 | 33.00 | 8.51 | H |
| 1902.50 | -26.24 | 3.16 | -50.00 | -4.33 | **24.93** | 33.00 | 8.07 | H |

**LTE Band 2_20 MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1860.00 | -27.83 | 3.14 | -50.00 | -4.52 | 23.55 | 33.00 | 9.45 | H |
| 1880.00 | -26.85 | 3.11 | -50.00 | -4.43 | 24.47 | 33.00 | 8.53 | H |
| 1900.00 | -26.10 | 3.16 | -50.00 | -4.34 | **25.08** | 33.00 | 7.92 | H |

Peak EIRP(dBm) = $P_{Mea}$(-24.97dBm) - $G_a$ (-4.34dBi) - $P_{Ag}$ (-50.00dB) - $P_{cl}$ (3.16dB) = 26.21dBm

**LTE Band 4- EIRP 27.50(d)**

**Limits:** ≤30dBm (1W)

**LTE Band 4_1.4MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1710.70 | -29.90 | 2.96 | -50.00 | -5.17 | 22.31 | 30.00 | 7.69 | H |
| 1732.50 | -28.24 | 2.99 | -50.00 | -5.08 | 23.85 | 30.00 | 6.15 | H |
| 1754.30 | -27.35 | 3.01 | -50.00 | -4.98 | **24.62** | 30.00 | 5.38 | H |

**LTE Band 4_3MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1711.50 | -29.75 | 2.96 | -50.00 | -5.17 | 22.46 | 30.00 | 7.54 | H |
| 1732.50 | -28.14 | 2.99 | -50.00 | -5.08 | 23.95 | 30.00 | 6.05 | H |
| 1753.50 | -27.48 | 3.01 | -50.00 | -4.98 | **24.49** | 30.00 | 5.51 | H |

**LTE Band 4_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1712.50 | -29.59 | 2.97 | -50.00 | -5.17 | 22.61 | 30.00 | 7.39 | H |
| 1732.50 | -28.31 | 2.99 | -50.00 | -5.08 | 23.78 | 30.00 | 6.22 | H |
| 1752.50 | -27.52 | 3.01 | -50.00 | -4.99 | **24.46** | 30.00 | 5.54 | H |

**LTE Band 4_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1715.00 | -29.22 | 2.97 | -50.00 | -5.15 | 22.96 | 30.00 | 7.04 | H |
| 1732.50 | -28.33 | 2.99 | -50.00 | -5.08 | 23.76 | 30.00 | 6.24 | H |
| 1750.00 | -28.04 | 3.00 | -50.00 | -5.00 | **23.96** | 30.00 | 6.04 | H |

**LTE Band 4_15MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1717.50 | -29.08 | 2.97 | -50.00 | -5.14 | 23.09 | 30.00 | 6.91 | H |
| 1732.50 | -28.50 | 2.99 | -50.00 | -5.08 | 23.59 | 30.00 | 6.41 | H |
| 1747.50 | -28.29 | 3.00 | -50.00 | -5.01 | **23.72** | 30.00 | 6.28 | H |

**LTE Band 4_20MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1720.00 | -28.91 | 2.97 | -50.00 | -5.13 | 23.25 | 30.00 | 6.75 | H |
| 1732.50 | -27.97 | 2.99 | -50.00 | -5.08 | **24.12** | 30.00 | 5.88 | H |
| 1745.00 | -28.06 | 3.00 | -50.00 | -5.02 | 23.96 | 30.00 | 6.04 | H |

**LTE Band 4_1.4MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1710.70 | -30.82 | 2.96 | -50.00 | -5.17 | 21.39 | 30.00 | 8.61 | H |
| 1732.50 | -28.84 | 2.99 | -50.00 | -5.08 | 23.25 | 30.00 | 6.75 | H |
| 1754.30 | -28.37 | 3.01 | -50.00 | -4.98 | **23.60** | 30.00 | 6.40 | H |

**LTE Band 4_3MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1711.50 | -30.76 | 2.96 | -50.00 | -5.17 | 21.45 | 30.00 | 8.55 | H |
| 1732.50 | -29.04 | 2.99 | -50.00 | -5.08 | 23.05 | 30.00 | 6.95 | H |
| 1753.50 | -28.41 | 3.01 | -50.00 | -4.98 | **23.56** | 30.00 | 6.44 | H |

**LTE Band 4_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1712.50 | -30.38 | 2.97 | -50.00 | -5.17 | 21.82 | 30.00 | 8.18 | H |
| 1732.50 | -29.01 | 2.99 | -50.00 | -5.08 | 23.08 | 30.00 | 6.92 | H |
| 1752.50 | -28.26 | 3.01 | -50.00 | -4.99 | **23.72** | 30.00 | 6.28 | H |

**LTE Band 4_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1715.00 | -29.93 | 2.97 | -50.00 | -5.15 | 22.25 | 30.00 | 7.75 | H |
| 1732.50 | -29.23 | 2.99 | -50.00 | -5.08 | 22.86 | 30.00 | 7.14 | H |
| 1750.00 | -28.94 | 3.00 | -50.00 | -5.00 | **23.06** | 30.00 | 6.94 | H |

**LTE Band 4_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1717.50 | -30.06 | 2.97 | -50.00 | -5.14 | 22.11 | 30.00 | 7.89 | H |
| 1732.50 | -29.24 | 2.99 | -50.00 | -5.08 | 22.85 | 30.00 | 7.15 | H |
| 1747.50 | -28.80 | 3.00 | -50.00 | -5.01 | **23.21** | 30.00 | 6.79 | H |

**LTE Band 4_20MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 1720.00 | -29.89 | 2.97 | -50.00 | -5.13 | 22.27 | 30.00 | 7.73 | H |
| 1732.50 | -28.78 | 2.99 | -50.00 | -5.08 | **23.31** | 30.00 | 6.69 | H |
| 1745.00 | -28.88 | 3.00 | -50.00 | -5.02 | 23.14 | 30.00 | 6.86 | H |

Peak EIRP(dBm) = $P_{Mea}$(-27.35dBm) - $G_a$ (-4.98dBi) - $P_{Ag}$ (-50.00dB) - $P_{cl}$ (3.01dB) = 24.62dBm

**LTE Band 7- EIRP 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(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2502.50 | -25.55 | 3.59 | -50.00 | -5.41 | **26.27** | 33.00 | 6.73 | V |
| 2535.00 | -26.69 | 3.62 | -50.00 | -5.49 | 25.18 | 33.00 | 7.82 | V |
| 2567.50 | -28.40 | 3.65 | -50.00 | -5.58 | 23.53 | 33.00 | 9.47 | V |

**LTE Band 7_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2505.00 | -25.64 | 3.59 | -50.00 | -5.41 | **26.18** | 33.00 | 6.82 | V |
| 2535.00 | -26.70 | 3.62 | -50.00 | -5.49 | 25.17 | 33.00 | 7.83 | V |
| 2565.00 | -28.03 | 3.65 | -50.00 | -5.57 | 23.89 | 33.00 | 9.11 | V |

**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) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2507.50 | -25.46 | 3.59 | -50.00 | -5.42 | **26.37** | 33.00 | 6.63 | V |
| 2535.00 | -26.89 | 3.62 | -50.00 | -5.49 | 24.98 | 33.00 | 8.02 | V |
| 2562.50 | -28.01 | 3.64 | -50.00 | -5.56 | 23.91 | 33.00 | 9.09 | V |

**LTE Band 7_20MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2510.00 | -25.61 | 3.59 | -50.00 | -5.43 | **26.23** | 33.00 | 6.77 | V |
| 2535.00 | -26.83 | 3.62 | -50.00 | -5.49 | 25.04 | 33.00 | 7.96 | V |
| 2560.00 | -28.12 | 3.64 | -50.00 | -5.56 | 23.80 | 33.00 | 9.20 | V |

**LTE Band 7_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2502.50 | -26.30 | 3.59 | -50.00 | -5.41 | 25.52 | 33.00 | 7.48 | V |
| 2535.00 | -27.61 | 3.62 | -50.00 | -5.49 | 24.26 | 33.00 | 8.74 | V |
| 2567.50 | -29.23 | 3.65 | -50.00 | -5.58 | 22.70 | 33.00 | 10.30 | V |

**LTE Band 7_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2505.00 | -26.41 | 3.59 | -50.00 | -5.41 | 25.41 | 33.00 | 7.59 | V |
| 2535.00 | -27.65 | 3.62 | -50.00 | -5.49 | 24.22 | 33.00 | 8.78 | V |
| 2565.00 | -28.87 | 3.65 | -50.00 | -5.57 | 23.05 | 33.00 | 9.95 | V |

**LTE Band 7_15MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2507.50 | -26.26 | 3.59 | -50.00 | -5.42 | 25.57 | 33.00 | 7.43 | V |
| 2535.00 | -27.73 | 3.62 | -50.00 | -5.49 | 24.14 | 33.00 | 8.86 | V |
| 2562.50 | -29.38 | 3.64 | -50.00 | -5.56 | 22.54 | 33.00 | 10.46 | V |

**LTE Band 7_20MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 2510.00 | -26.51 | 3.59 | -50.00 | -5.43 | 25.33 | 33.00 | 7.67 | V |
| 2535.00 | -27.85 | 3.62 | -50.00 | -5.49 | 24.02 | 33.00 | 8.98 | V |
| 2560.00 | -29.08 | 3.64 | -50.00 | -5.56 | 22.84 | 33.00 | 10.16 | V |

Peak EIRP(dBm) = $P_{Mea}$(-25.46dBm) - $G_a$ (-5.42dBi) - $P_{Ag}$ (-50.00dB) - $P_{cl}$ (3.59dB) = 26.37dBm

**LTE Band 17- ERP 27.50(c)(10)**

**Limits:** ≤34.77dBm (3W)

**LTE Band 17_5MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | ERP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 706.50 | -36.86 | 1.91 | -53.00 | 0.30 | 2.15 | 11.78 | 34.77 | 22.99 | H |
| 710.00 | -36.80 | 1.92 | -53.00 | 0.32 | 2.15 | 11.81 | 34.77 | 22.96 | H |
| 713.50 | -36.62 | 1.93 | -53.00 | 0.34 | 2.15 | **11.96** | 34.77 | 22.81 | H |

**LTE Band 17_10MHz_QPSK**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | ERP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 706.50 | -37.81 | 1.91 | -53.00 | 0.30 | 2.15 | 10.83 | 34.77 | 23.94 | H |
| 710.00 | -37.59 | 1.92 | -53.00 | 0.32 | 2.15 | 11.02 | 34.77 | 23.75 | H |
| 713.50 | -37.41 | 1.93 | -53.00 | 0.34 | 2.15 | **11.17** | 34.77 | 23.60 | H |

**LTE Band 17_5MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | ERP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 709.00 | -36.77 | 1.92 | -53.00 | 0.32 | 2.15 | **11.84** | 34.77 | 22.93 | H |
| 710.00 | -36.84 | 1.92 | -53.00 | 0.32 | 2.15 | 11.77 | 34.77 | 23.00 | H |
| 711.00 | -36.77 | 1.92 | -53.00 | 0.33 | 2.15 | 11.83 | 34.77 | 22.94 | H |

**LTE Band 17_10MHz_16QAM**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | ERP(dBm) | Limit(dBm) | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|---|
| 709.00 | -37.82 | 1.92 | -53.00 | 0.32 | 2.15 | 10.79 | 34.77 | 23.98 | H |
| 710.00 | -37.71 | 1.92 | -53.00 | 0.32 | 2.15 | 10.90 | 34.77 | 23.87 | H |
| 711.00 | -37.68 | 1.92 | -53.00 | 0.33 | 2.15 | **10.92** | 34.77 | 23.85 | H |

Peak ERP(dBm)=$P_{Mea}$(-36.62dBm)-$G_a$(0.34dBi)-$P_{Ag}$(-53.00dB)-$P_{cl}$ (1.93dB)-2.15dB = 11.96dBm

**ANALYZER SETTINGS:**

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

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

Note: Expanded measurement uncertainty is $U$ = 0.96 dB, $k$ = 2.

## A.2 EMISSION LIMIT

**Reference**

FCC: CFR 2.1051, 24.238(a), 27.53(h) , 27.53(m), 27.53(g).

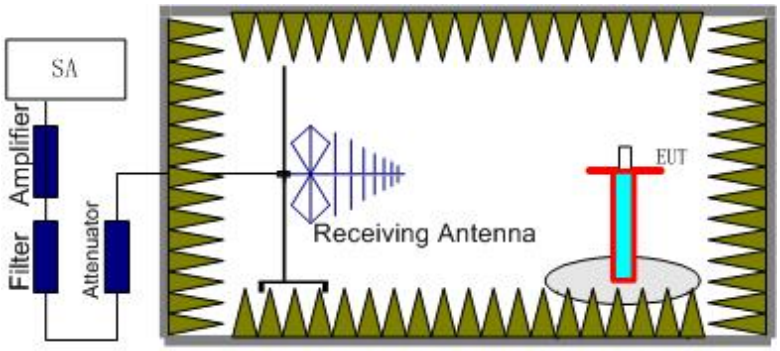
**A.2.1 Measurement Method**

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber FAC-3.

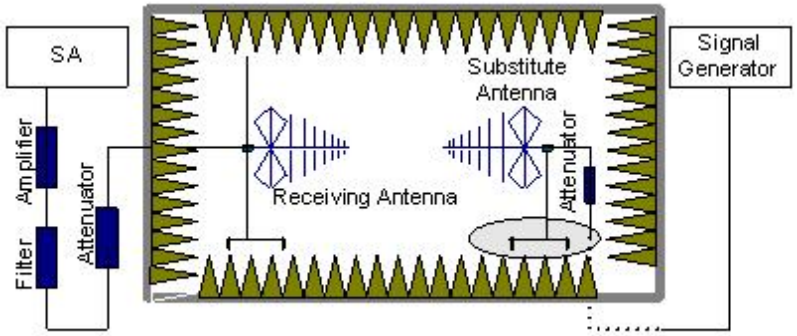
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier. The resolution bandwidth is set 1MHz as outlined in Part 24.238(a), Part 27.53(h), Part 27.53(m) and Part 27.53(g). The spectrum was scanned with the mobile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

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

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




2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (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. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded ($P_r$). The power of signal source ($P_{Mea}$) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss ($P_{pl}$) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain ($G_a$) should be recorded after test.
   An amplifier should be connected in for the test.
   The Path loss ($P_{pl}$) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   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 Limit**

Part 24.238(a), 27.53(h), 27.53(m) and 27.53(g) all 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.

**A.2.3 Measurement Results**

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the LTE Bands 2, 4, 7 and 17. 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, 7 and 17 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.

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3701.58 | -46.56 | 4.44 | -8.14 | -42.86 | -13.00 | 29.86 | V |
| 5552.28 | -45.50 | 5.45 | -10.02 | -40.93 | -13.00 | 27.93 | V |
| 7362.29 | -58.41 | 6.45 | -11.32 | -53.54 | -13.00 | 40.54 | V |
| 9253.88 | -56.65 | 7.66 | -12.60 | -51.71 | -13.00 | 38.71 | V |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11298.28 | -57.93 | 8.57 | -12.40 | -54.10 | -13.00 | 41.10 | V |
| 13324.92 | -52.65 | 8.99 | -13.62 | -48.02 | -13.00 | 35.02 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3760.02 | -44.70 | 4.52 | -8.21 | -41.01 | -13.00 | 28.01 | H |
| 5640.35 | -45.87 | 5.45 | -10.06 | -41.26 | -13.00 | 28.26 | V |
| 7416.19 | -59.91 | 6.40 | -11.35 | -54.96 | -13.00 | 41.96 | V |
| 9397.56 | -60.22 | 7.46 | -12.60 | -55.08 | -13.00 | 42.08 | V |
| 11484.80 | -56.30 | 8.53 | -12.40 | -52.43 | -13.00 | 39.43 | V |
| 13428.19 | -51.78 | 9.13 | -13.73 | -47.18 | -13.00 | 34.18 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3817.61 | -42.27 | 4.49 | -8.28 | -38.48 | -13.00 | 25.48 | V |
| 5726.57 | -44.12 | 5.54 | -10.09 | -39.57 | -13.00 | 26.57 | V |
| 7676.59 | -58.99 | 6.56 | -11.58 | -53.97 | -13.00 | 40.97 | V |
| 9546.12 | -58.24 | 7.78 | -12.58 | -53.44 | -13.00 | 40.44 | V |
| 11538.67 | -56.73 | 8.59 | -12.41 | -52.91 | -13.00 | 39.91 | H |
| 13621.26 | -51.28 | 9.17 | -13.85 | -46.60 | -13.00 | 33.60 | V |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3701.72 | -45.90 | 4.44 | -8.14 | -42.20 | -13.00 | 29.20 | V |
| 5552.54 | -44.72 | 5.45 | -10.02 | -40.15 | -13.00 | 27.15 | V |
| 7468.76 | -60.44 | 6.61 | -11.38 | -55.67 | -13.00 | 42.67 | V |
| 9254.25 | -54.04 | 7.66 | -12.60 | -49.10 | -13.00 | 36.10 | V |
| 11468.85 | -56.39 | 8.63 | -12.40 | -52.62 | -13.00 | 39.62 | H |
| 13330.17 | -51.79 | 8.95 | -13.63 | -47.11 | -13.00 | 34.11 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3760.19 | -44.39 | 4.52 | -8.21 | -40.70 | -13.00 | 27.70 | H |
| 5640.36 | -44.69 | 5.45 | -10.06 | -40.08 | -13.00 | 27.08 | V |
| 7559.68 | -58.78 | 6.80 | -11.46 | -54.12 | -13.00 | 41.12 | H |
| 9410.05 | -60.76 | 7.42 | -12.60 | -55.58 | -13.00 | 42.58 | H |
| 11325.23 | -57.81 | 8.51 | -12.40 | -53.92 | -13.00 | 40.92 | H |
| 13272.07 | -52.79 | 8.95 | -13.57 | -48.17 | -13.00 | 35.17 | V |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3817.53 | -42.36 | 4.49 | -8.28 | -38.57 | -13.00 | 25.57 | V |
| 5726.77 | -45.62 | 5.54 | -10.09 | -41.07 | -13.00 | 28.07 | V |
| 7629.76 | -57.40 | 6.87 | -11.53 | -52.74 | -13.00 | 39.74 | V |
| 9533.95 | -58.93 | 7.74 | -12.59 | -54.08 | -13.00 | 41.08 | V |
| 11372.83 | -57.64 | 8.65 | -12.40 | -53.89 | -13.00 | 40.89 | V |
| 13304.67 | -53.87 | 9.09 | -13.60 | -49.36 | -13.00 | 36.36 | H |

**LTE Band 4, 1.4MHz, QPSK, Channel 19957**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3421.40 | -59.28 | 4.19 | -7.71 | -55.76 | -13.00 | 42.76 | H |
| 5079.32 | -60.63 | 5.20 | -9.75 | -56.08 | -13.00 | 43.08 | V |
| 6819.54 | -59.96 | 6.17 | -10.92 | -55.21 | -13.00 | 42.21 | V |
| 8543.81 | -61.22 | 7.24 | -12.24 | -56.22 | -13.00 | 43.22 | V |
| 10212.10 | -58.45 | 7.61 | -12.44 | -53.62 | -13.00 | 40.62 | V |
| 12329.85 | -54.05 | 8.78 | -12.63 | -50.20 | -13.00 | 37.20 | H |

**LTE Band 4, 1.4MHz, QPSK, Channel 20175**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3464.97 | -58.26 | 4.24 | -7.82 | -54.68 | -13.00 | 41.68 | H |
| 5348.46 | -60.14 | 5.41 | -9.91 | -55.64 | -13.00 | 42.64 | H |
| 6930.28 | -56.35 | 6.06 | -11.03 | -51.38 | -13.00 | 38.38 | V |
| 8662.81 | -57.47 | 7.43 | -12.33 | -52.57 | -13.00 | 39.57 | H |
| 10323.02 | -59.22 | 7.87 | -12.46 | -54.63 | -13.00 | 41.63 | V |
| 12329.48 | -56.74 | 8.78 | -12.63 | -52.89 | -13.00 | 39.89 | H |

**LTE Band 4, 1.4MHz, QPSK, Channel 20393**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3464.47 | -62.21 | 4.24 | -7.81 | -58.64 | -13.00 | 45.64 | H |
| 5168.53 | -60.16 | 5.20 | -9.80 | -55.56 | -13.00 | 42.56 | V |
| 6870.88 | -59.49 | 6.07 | -10.97 | -54.59 | -13.00 | 41.59 | H |
| 8576.02 | -61.41 | 7.19 | -12.26 | -56.34 | -13.00 | 43.34 | H |
| 10331.25 | -58.45 | 7.95 | -12.47 | -53.93 | -13.00 | 40.93 | H |
| 12161.23 | -55.50 | 8.89 | -12.56 | -51.83 | -13.00 | 38.83 | V |

**LTE Band 4, 1.4MHz, 16QAM, Channel 19957**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3421.95 | -58.03 | 4.19 | -7.71 | -54.51 | -13.00 | 41.51 | H |
| 5123.00 | -61.13 | 5.24 | -9.77 | -56.60 | -13.00 | 43.60 | H |
| 6854.82 | -61.79 | 6.14 | -10.95 | -56.98 | -13.00 | 43.98 | V |
| 8666.48 | -61.65 | 7.40 | -12.33 | -56.72 | -13.00 | 43.72 | H |
| 10380.04 | -57.99 | 8.05 | -12.48 | -53.56 | -13.00 | 40.56 | H |
| 12123.60 | -55.12 | 8.81 | -12.55 | -51.38 | -13.00 | 38.38 | V |

**LTE Band 4, 1.4MHz, 16QAM, Channel 20175**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3465.49 | -57.98 | 4.24 | -7.82 | -54.40 | -13.00 | 41.40 | H |
| 5142.99 | -61.78 | 5.24 | -9.79 | -57.23 | -13.00 | 44.23 | H |
| 6930.49 | -55.39 | 6.06 | -11.03 | -50.42 | -13.00 | 37.42 | V |
| 8747.13 | -60.40 | 7.27 | -12.40 | -55.27 | -13.00 | 42.27 | V |
| 10358.52 | -55.83 | 8.02 | -12.47 | -51.38 | -13.00 | 38.38 | V |
| 12144.03 | -54.19 | 8.91 | -12.56 | -50.54 | -13.00 | 37.54 | H |

**LTE Band 4, 1.4MHz, 16QAM, Channel 20393**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 3458.67 | -60.76 | 4.24 | -7.80 | -57.20 | -13.00 | 44.20 | H |
| 5143.63 | -60.99 | 5.24 | -9.79 | -56.44 | -13.00 | 43.44 | V |
| 6933.03 | -59.88 | 6.07 | -11.03 | -54.92 | -13.00 | 41.92 | V |
| 8617.50 | -59.36 | 7.44 | -12.29 | -54.51 | -13.00 | 41.51 | V |
| 10484.95 | -58.83 | 8.06 | -12.50 | -54.39 | -13.00 | 41.39 | H |
| 12147.49 | -55.40 | 8.93 | -12.56 | -51.77 | -13.00 | 38.77 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5005.49 | -50.79 | 5.17 | -9.70 | -46.26 | -13.00 | 33.26 | H |
| 7523.14 | -58.59 | 6.87 | -11.42 | -54.04 | -13.00 | 41.04 | V |
| 10155.19 | -57.03 | 7.85 | -12.43 | -52.45 | -13.00 | 39.45 | V |
| 12490.18 | -55.71 | 8.76 | -12.70 | -51.77 | -13.00 | 38.77 | H |
| 15069.14 | -51.15 | 9.74 | -13.49 | -47.40 | -13.00 | 34.40 | V |
| 17413.81 | -48.43 | 10.94 | -13.14 | -46.23 | -13.00 | 33.23 | V |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5070.58 | -53.99 | 5.21 | -9.74 | -49.46 | -13.00 | 36.46 | H |
| 7591.68 | -59.92 | 6.98 | -11.49 | -55.41 | -13.00 | 42.41 | V |
| 10185.60 | -58.41 | 7.72 | -12.44 | -53.69 | -13.00 | 40.69 | H |
| 12646.86 | -56.82 | 8.74 | -12.88 | -52.68 | -13.00 | 39.68 | H |
| 15201.38 | -51.71 | 9.79 | -13.46 | -48.04 | -13.00 | 35.04 | H |
| 17511.30 | -49.65 | 11.03 | -13.31 | -47.37 | -13.00 | 34.37 | V |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5130.68 | -52.98 | 5.25 | -9.78 | -48.45 | -13.00 | 35.45 | V |
| 7655.04 | -61.18 | 6.55 | -11.56 | -56.17 | -13.00 | 43.17 | H |
| 10272.71 | -58.30 | 7.61 | -12.45 | -53.46 | -13.00 | 40.46 | V |
| 12541.06 | -53.67 | 8.97 | -12.75 | -49.89 | -13.00 | 36.89 | H |
| 15035.80 | -51.77 | 9.66 | -13.49 | -47.94 | -13.00 | 34.94 | V |
| 17672.68 | -48.77 | 10.62 | -13.40 | -45.99 | -13.00 | 32.99 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5005.32 | -49.63 | 5.17 | -9.70 | -45.10 | -13.00 | 32.10 | H |
| 7495.04 | -61.31 | 6.57 | -11.40 | -56.48 | -13.00 | 43.48 | H |
| 10132.62 | -58.10 | 7.96 | -12.43 | -53.63 | -13.00 | 40.63 | V |
| 12493.27 | -57.03 | 8.78 | -12.70 | -53.11 | -13.00 | 40.11 | H |
| 15100.93 | -51.66 | 9.75 | -13.48 | -47.93 | -13.00 | 34.93 | H |
| 17539.43 | -51.05 | 10.91 | -13.32 | -48.64 | -13.00 | 35.64 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5070.56 | -52.24 | 5.21 | -9.74 | -47.71 | -13.00 | 34.71 | V |
| 7563.64 | -60.04 | 6.84 | -11.46 | -55.42 | -13.00 | 42.42 | H |
| 10219.63 | -58.02 | 7.56 | -12.44 | -53.14 | -13.00 | 40.14 | H |
| 12626.11 | -52.78 | 8.80 | -12.85 | -48.73 | -13.00 | 35.73 | V |
| 15283.69 | -51.25 | 9.98 | -13.44 | -47.79 | -13.00 | 34.79 | V |
| 17600.55 | -48.53 | 10.67 | -13.36 | -45.84 | -13.00 | 32.84 | H |

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

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|
| 5135.33 | -52.75 | 5.24 | -9.78 | -48.21 | -13.00 | 35.21 | V |
| 7434.01 | -58.18 | 6.40 | -11.36 | -53.22 | -13.00 | 40.22 | V |
| 10303.41 | -58.22 | 7.71 | -12.46 | -53.47 | -13.00 | 40.47 | V |
| 12642.90 | -52.10 | 8.74 | -12.87 | -47.97 | -13.00 | 34.97 | V |
| 15091.47 | -52.81 | 9.80 | -13.48 | -49.13 | -13.00 | 36.13 | V |
| 17564.55 | -50.82 | 10.89 | -13.34 | -48.37 | -13.00 | 35.37 | H |

**LTE Band 17, 5MHz, QPSK, Channel 23755**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3533.51 | -49.90 | 4.32 | -7.94 | 2.15 | -48.43 | -13.00 | 35.43 | H |
| 4240.25 | -59.54 | 4.74 | -8.64 | 2.15 | -57.79 | -13.00 | 44.79 | H |
| 4975.30 | -60.37 | 5.12 | -9.66 | 2.15 | -57.98 | -13.00 | 44.98 | V |
| 5629.41 | -62.36 | 5.46 | -10.05 | 2.15 | -59.92 | -13.00 | 46.92 | H |
| 6362.99 | -58.16 | 5.83 | -10.49 | 2.15 | -55.65 | -13.00 | 42.65 | V |
| 7053.93 | -60.04 | 6.52 | -11.13 | 2.15 | -57.58 | -13.00 | 44.58 | H |

**LTE Band 17, 5MHz, QPSK, Channel 23790**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3550.95 | -46.14 | 4.31 | -7.96 | 2.15 | -44.64 | -13.00 | 31.64 | H |
| 4261.09 | -60.35 | 4.79 | -8.66 | 2.15 | -58.63 | -13.00 | 45.63 | H |
| 4966.37 | -60.94 | 5.11 | -9.64 | 2.15 | -58.56 | -13.00 | 45.56 | H |
| 5705.70 | -63.18 | 5.51 | -10.08 | 2.15 | -60.76 | -13.00 | 47.76 | H |
| 6462.45 | -60.94 | 5.89 | -10.57 | 2.15 | -58.41 | -13.00 | 45.41 | H |
| 7230.04 | -60.40 | 6.39 | -11.24 | 2.15 | -57.70 | -13.00 | 44.70 | H |

**LTE Band 17, 5MHz, QPSK, Channel 23825**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3568.50 | -41.98 | 4.34 | -7.98 | 2.15 | -40.49 | -13.00 | 27.49 | H |
| 4282.16 | -51.26 | 4.79 | -8.67 | 2.15 | -49.53 | -13.00 | 36.53 | H |
| 4996.11 | -59.99 | 5.17 | -9.69 | 2.15 | -57.62 | -13.00 | 44.62 | H |
| 5704.23 | -61.42 | 5.51 | -10.08 | 2.15 | -59.00 | -13.00 | 46.00 | H |
| 6420.38 | -61.17 | 5.83 | -10.54 | 2.15 | -58.61 | -13.00 | 45.61 | H |
| 7175.01 | -59.20 | 6.37 | -11.21 | 2.15 | -56.51 | -13.00 | 43.51 | V |

**LTE Band 17, 5MHz, 16QAM, Channel 23755**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3533.47 | -45.44 | 4.32 | -7.94 | 2.15 | -43.97 | -13.00 | 30.97 | H |
| 4240.07 | -55.72 | 4.73 | -8.64 | 2.15 | -53.96 | -13.00 | 40.96 | H |
| 4950.92 | -62.82 | 5.10 | -9.61 | 2.15 | -60.46 | -13.00 | 47.46 | H |
| 5666.66 | -61.71 | 5.47 | -10.07 | 2.15 | -59.26 | -13.00 | 46.26 | H |
| 6379.93 | -60.40 | 5.82 | -10.50 | 2.15 | -57.87 | -13.00 | 44.87 | H |
| 7117.75 | -56.56 | 6.39 | -11.17 | 2.15 | -53.93 | -13.00 | 40.93 | V |

**LTE Band 17, 5MHz, 16QAM, Channel 23790**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3550.79 | -46.14 | 4.31 | -7.96 | 2.15 | -44.64 | -13.00 | 31.64 | H |
| 4260.69 | -59.87 | 4.79 | -8.66 | 2.15 | -58.15 | -13.00 | 45.15 | H |
| 5007.71 | -60.75 | 5.17 | -9.70 | 2.15 | -58.37 | -13.00 | 45.37 | V |
| 5687.53 | -61.64 | 5.51 | -10.08 | 2.15 | -59.22 | -13.00 | 46.22 | H |
| 6423.22 | -60.02 | 5.83 | -10.54 | 2.15 | -57.46 | -13.00 | 44.46 | V |
| 7275.92 | -58.84 | 6.40 | -11.27 | 2.15 | -56.12 | -13.00 | 43.12 | V |

**LTE Band 17, 5MHz, 16QAM, Channel 23825**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Margin(dB) | Polarization |
|---|---|---|---|---|---|---|---|---|
| 3568.41 | -41.74 | 4.34 | -7.98 | 2.15 | -40.25 | -13.00 | 27.25 | H |
| 4282.20 | -51.15 | 4.79 | -8.67 | 2.15 | -49.42 | -13.00 | 36.42 | V |
| 4995.96 | -60.39 | 5.17 | -9.69 | 2.15 | -58.02 | -13.00 | 45.02 | H |
| 5782.07 | -61.25 | 5.67 | -10.11 | 2.15 | -58.96 | -13.00 | 45.96 | H |
| 6579.39 | -60.62 | 6.13 | -10.68 | 2.15 | -58.22 | -13.00 | 45.22 | V |
| 7215.25 | -60.19 | 6.37 | -11.23 | 2.15 | -57.48 | -13.00 | 44.48 | V |

Note: The maximum value of expanded measurement uncertainty for this test item is $U$ = 4.2 dB, $k$ = 2.

## A.3 CONDUCTED EMISSION

**Reference**

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2009 is used. Conducted emission is measured with travel charger. The EUT is working under LTE FDD bands 2/4/7/17 traffic mode which is the worst case of conducted emission measurement.

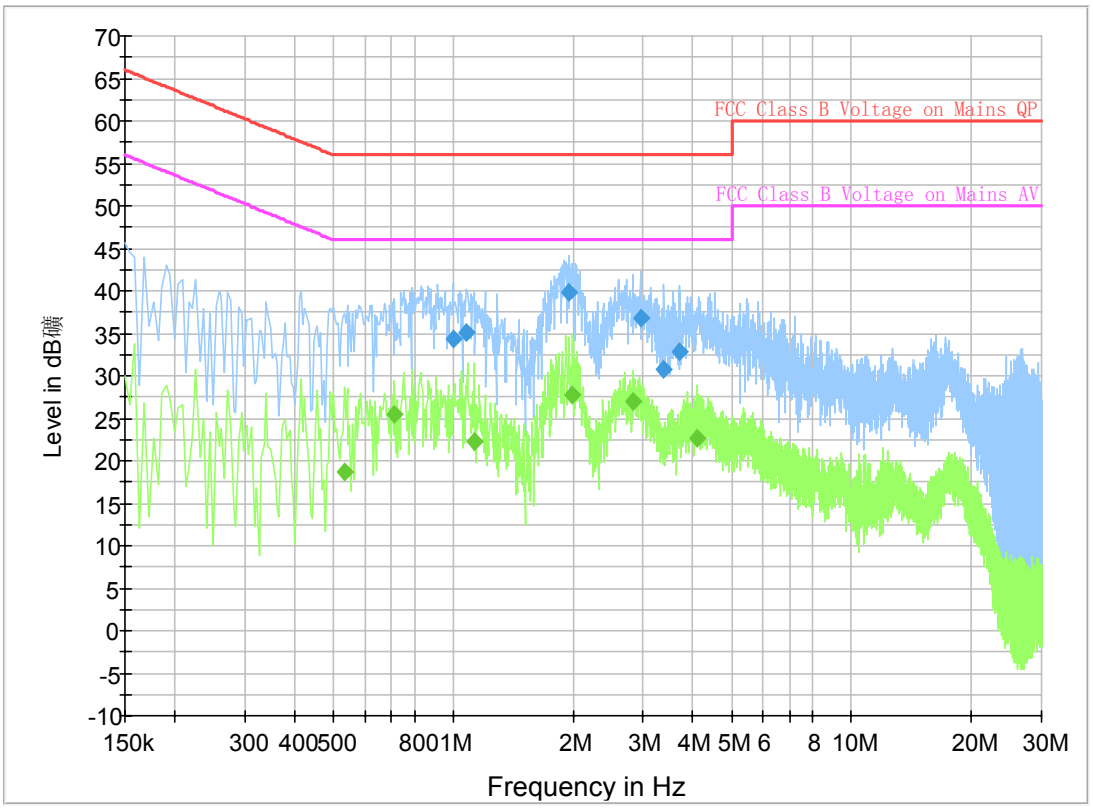
For test layout photo, please refer to Pic.2 in Annex B.

### A.3.1 Limit

| Frequency of Emission (MHz) | Conducted Limit (dBμV) | |
|---|---|---|
| | Quasi -Peak | Average |
| 0.15 – 0.5 | 66 to 56* | 56 to 46* |
| 0.5 – 5 | 56 | 46 |
| 5 – 30 | 60 | 50 |
| * Decreases with logarithm of the frequency | | |

### A.3.2 Measurement result

### LTE Band 2, 1.4 MHz bandwidth



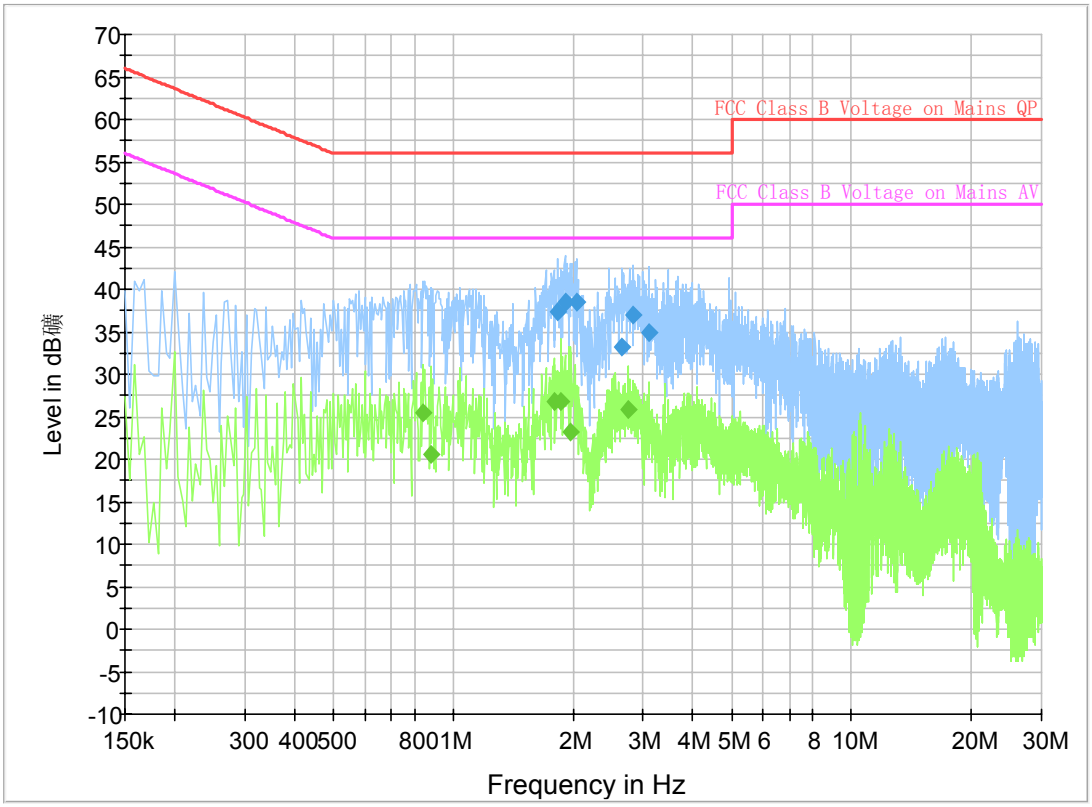

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.000500 | 34.4 | GND | L1 | 9.7 | 21.6 | 56.0 |
| 1.081500 | 35.1 | GND | L1 | 9.7 | 20.9 | 56.0 |
| 1.959000 | 39.9 | GND | L1 | 9.7 | 16.1 | 56.0 |
| 2.949000 | 36.8 | GND | L1 | 9.7 | 19.2 | 56.0 |
| 3.385500 | 30.7 | GND | L1 | 9.7 | 25.3 | 56.0 |
| 3.691500 | 32.9 | GND | L1 | 9.7 | 23.1 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.532500 | 18.7 | GND | L1 | 9.8 | 27.3 | 46.0 |
| 0.712500 | 25.5 | GND | L1 | 9.8 | 20.5 | 46.0 |
| 1.126500 | 22.2 | GND | L1 | 9.7 | 23.8 | 46.0 |
| 1.995000 | 27.8 | GND | L1 | 9.7 | 18.2 | 46.0 |
| 2.818500 | 27.0 | GND | L1 | 9.7 | 19.0 | 46.0 |
| 4.101000 | 22.7 | GND | L1 | 9.7 | 23.3 | 46.0 |

**LTE Band 4, 1.4 MHz bandwidth**



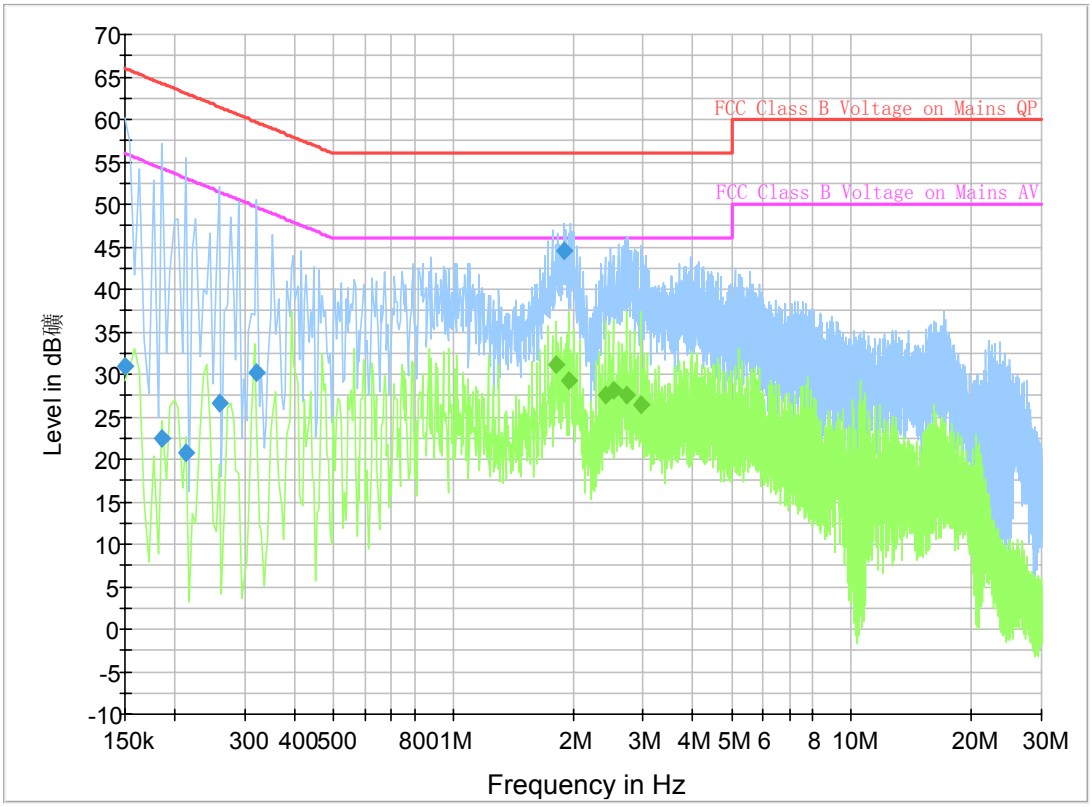

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.828500 | 37.4 | GND | L1 | 9.7 | 18.6 | 56.0 |
| 1.909500 | 38.6 | GND | L1 | 9.7 | 17.4 | 56.0 |
| 2.035500 | 38.5 | GND | L1 | 9.7 | 17.5 | 56.0 |
| 2.652000 | 33.2 | GND | L1 | 9.7 | 22.8 | 56.0 |
| 2.836500 | 36.9 | GND | L1 | 9.7 | 19.1 | 56.0 |
| 3.102000 | 34.9 | GND | L1 | 9.7 | 21.1 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.838500 | 25.6 | GND | L1 | 9.8 | 20.4 | 46.0 |
| 0.879000 | 20.6 | GND | L1 | 9.7 | 25.4 | 46.0 |
| 1.788000 | 26.8 | GND | L1 | 9.7 | 19.2 | 46.0 |
| 1.864500 | 26.7 | GND | L1 | 9.7 | 19.3 | 46.0 |
| 1.968000 | 23.1 | GND | L1 | 9.7 | 22.9 | 46.0 |
| 2.755500 | 25.8 | GND | L1 | 9.7 | 20.2 | 46.0 |

**LTE Band 7, 5 MHz bandwidth**



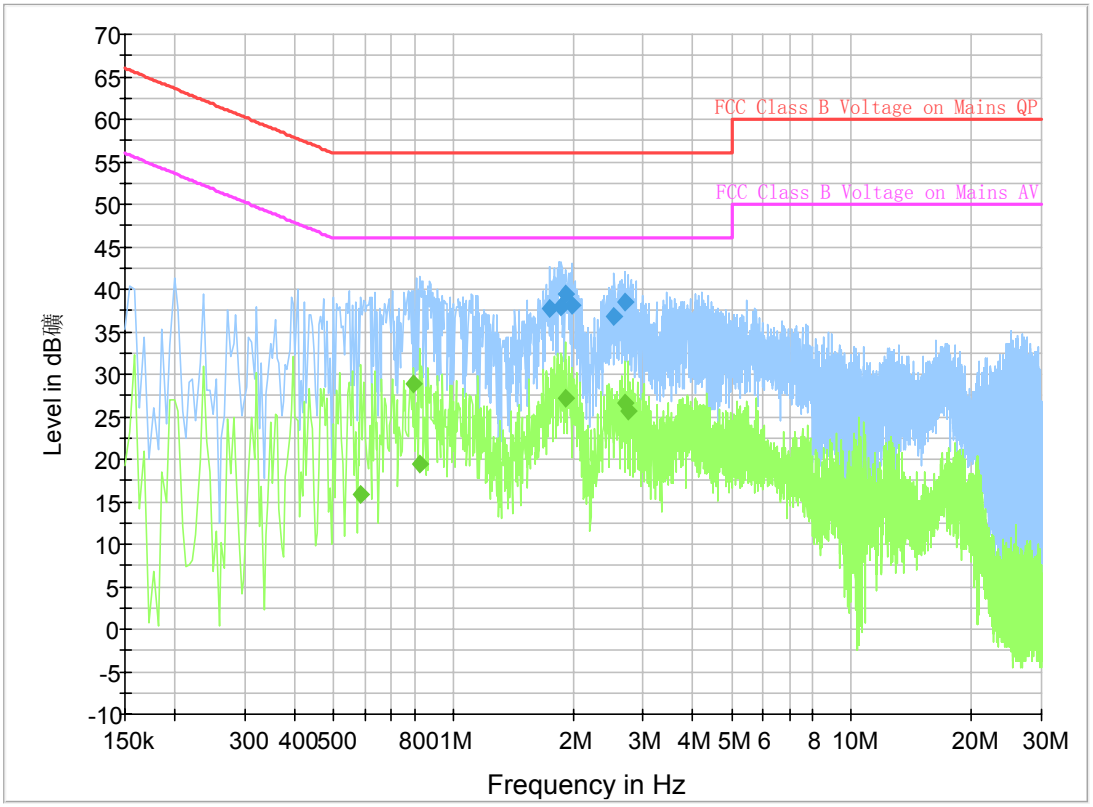

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.150000 | 31.0 | GND | N | 9.8 | 35.0 | 66.0 |
| 0.186000 | 22.4 | GND | N | 9.8 | 41.8 | 64.2 |
| 0.213000 | 20.8 | GND | N | 9.8 | 42.3 | 63.1 |
| 0.258000 | 26.6 | GND | N | 9.8 | 34.9 | 61.5 |
| 0.321000 | 30.2 | GND | N | 9.8 | 29.4 | 59.7 |
| 1.896000 | 44.5 | GND | L1 | 9.7 | 11.5 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.806000 | 31.1 | GND | L1 | 9.7 | 15.0 | 46.0 |
| 1.945500 | 29.2 | GND | L1 | 9.7 | 16.8 | 46.0 |
| 2.404500 | 27.6 | GND | L1 | 9.7 | 18.4 | 46.0 |
| 2.521500 | 28.2 | GND | L1 | 9.7 | 17.8 | 46.0 |
| 2.724000 | 27.5 | GND | L1 | 9.7 | 18.5 | 46.0 |
| 2.958000 | 26.4 | GND | L1 | 9.7 | 19.6 | 46.0 |

**LTE Band 17, 5 MHz bandwidth**



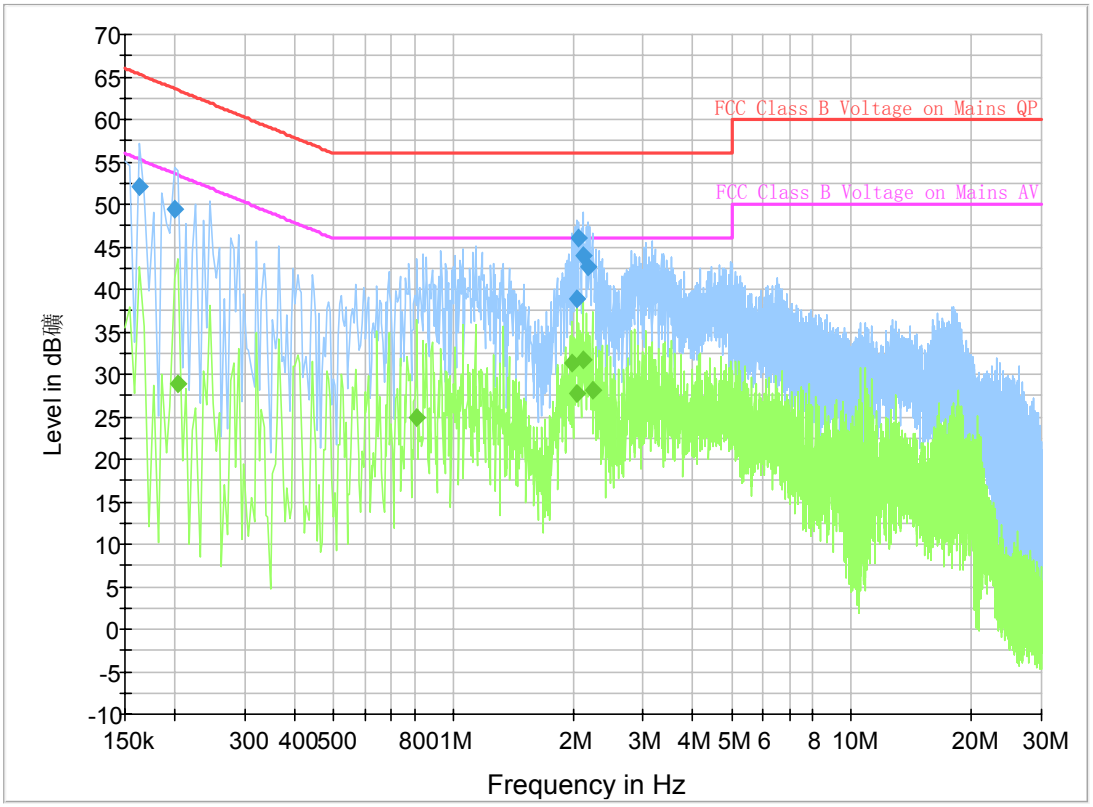

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.747500 | 37.8 | GND | L1 | 9.7 | 18.2 | 56.0 |
| 1.869000 | 37.9 | GND | L1 | 9.7 | 18.1 | 56.0 |
| 1.918500 | 39.4 | GND | L1 | 9.7 | 16.6 | 56.0 |
| 1.986000 | 38.0 | GND | L1 | 9.7 | 18.0 | 56.0 |
| 2.539500 | 36.8 | GND | L1 | 9.7 | 19.2 | 56.0 |
| 2.701500 | 38.4 | GND | L1 | 9.7 | 17.6 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.586500 | 15.9 | GND | L1 | 9.8 | 30.1 | 46.0 |
| 0.798000 | 28.8 | GND | L1 | 9.8 | 17.2 | 46.0 |
| 0.825000 | 19.4 | GND | L1 | 9.8 | 26.6 | 46.0 |
| 1.909500 | 27.2 | GND | L1 | 9.7 | 18.8 | 46.0 |
| 2.701500 | 26.6 | GND | L1 | 9.7 | 19.4 | 46.0 |
| 2.742000 | 25.7 | GND | L1 | 9.7 | 20.3 | 46.0 |

**MP3**



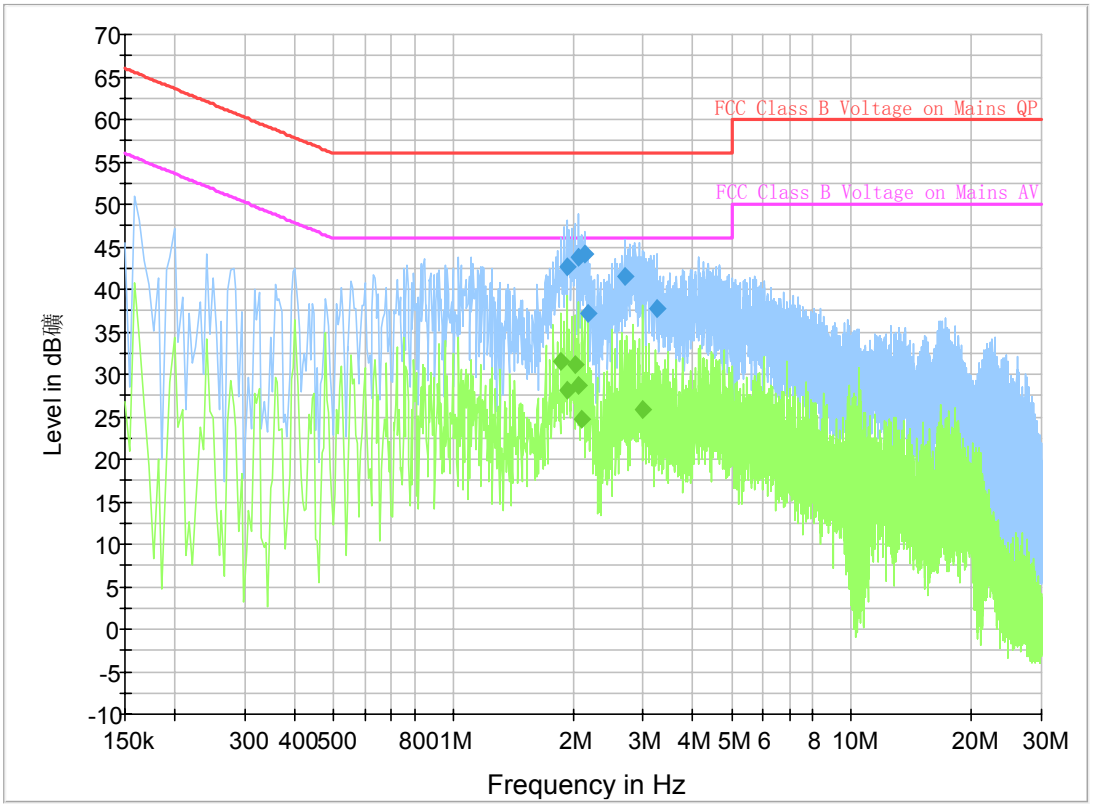

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.163500 | 52.0 | GND | L1 | 9.8 | 13.3 | 65.3 |
| 0.199500 | 49.5 | GND | L1 | 9.8 | 14.1 | 63.6 |
| 2.044500 | 38.9 | GND | L1 | 9.7 | 17.1 | 56.0 |
| 2.071500 | 46.1 | GND | L1 | 9.7 | 9.9 | 56.0 |
| 2.116500 | 44.0 | GND | L1 | 9.7 | 12.0 | 56.0 |
| 2.188500 | 42.6 | GND | L1 | 9.7 | 13.4 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.204000 | 28.8 | GND | L1 | 9.8 | 24.7 | 53.4 |
| 0.811500 | 25.0 | GND | L1 | 9.8 | 21.0 | 46.0 |
| 1.995000 | 31.3 | GND | L1 | 9.7 | 14.7 | 46.0 |
| 2.044500 | 27.7 | GND | L1 | 9.7 | 18.3 | 46.0 |
| 2.116500 | 31.6 | GND | L1 | 9.7 | 14.4 | 46.0 |
| 2.233500 | 28.1 | GND | L1 | 9.7 | 17.9 | 46.0 |

**CAMERA**




## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.936500 | 42.6 | GND | L1 | 9.7 | 13.4 | 56.0 |
| 2.062500 | 43.9 | GND | L1 | 9.7 | 12.1 | 56.0 |
| 2.134500 | 44.1 | GND | L1 | 9.7 | 11.9 | 56.0 |
| 2.179500 | 37.1 | GND | L1 | 9.7 | 18.9 | 56.0 |
| 2.688000 | 41.5 | GND | L1 | 9.7 | 14.5 | 56.0 |
| 3.255000 | 37.8 | GND | L1 | 9.7 | 18.2 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 1.860000 | 31.5 | GND | L1 | 9.7 | 14.5 | 46.0 |
| 1.936500 | 28.2 | GND | L1 | 9.7 | 17.8 | 46.0 |
| 2.017500 | 31.2 | GND | L1 | 9.7 | 14.8 | 46.0 |
| 2.062500 | 28.7 | GND | L1 | 9.7 | 17.4 | 46.0 |
| 2.107500 | 24.8 | GND | L1 | 9.7 | 21.2 | 46.0 |
| 2.980500 | 25.8 | GND | L1 | 9.7 | 20.2 | 46.0 |

## A.4 FREQUENCY STABILITY

**Reference**

FCC: CFR Part 2.1055, 24.235, 27.54.

### A.4.1 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 CMW500 and in a simulated call on middle channel for LTE band 2/4/5/7, 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 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 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 +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

### A.4.2 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 3.5VDC and 4.2VDC, with a nominal voltage of 3.9VDC. 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 -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

### A.4.3 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 |
| 3.5 | 3 | 18 | 0.002 | 0.010 |
| 3.9 | 3 | 15 | 0.002 | 0.008 |
| 4.2 | -3 | 14 | 0.001 | 0.008 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 50° | 0 | 17 | 0.000 | 0.009 |
| 40° | 3 | 13 | 0.001 | 0.007 |
| 30° | 0 | 17 | 0.000 | 0.009 |
| 20° | 1 | 19 | 0.000 | 0.010 |
| 10° | 2 | 16 | 0.001 | 0.009 |
| 0° | 1 | 16 | 0.001 | 0.009 |
| - 10° | -1 | 20 | 0.001 | 0.011 |
| - 20° | -1 | 15 | 0.000 | 0.008 |
| - 30° | 4 | 18 | 0.002 | 0.010 |

**LTE Band 4, 1.4MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.5 | 1 | 20 | 0.000 | 0.011 |
| 3.9 | 1 | 21 | 0.000 | 0.012 |
| 4.2 | 1 | 20 | 0.001 | 0.012 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 50° | 2 | 20 | 0.001 | 0.011 |
| 40° | 3 | 25 | 0.002 | 0.014 |
| 30° | 1 | 18 | 0.000 | 0.010 |
| 20° | 1 | 22 | 0.000 | 0.012 |
| 10° | 0 | 20 | 0.000 | 0.011 |
| 0° | 7 | 23 | 0.004 | 0.013 |
| - 10° | 0 | 19 | 0.000 | 0.011 |
| - 20° | 5 | 18 | 0.003 | 0.011 |
| - 30° | 1 | 21 | 0.000 | 0.012 |

**LTE Band 7, 20MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.5 | 3 | -10 | 0.001 | 0.004 |
| 3.9 | 4 | -10 | 0.002 | 0.004 |
| 4.2 | 11 | 3 | 0.004 | 0.001 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 50° | 5 | -11 | 0.002 | 0.004 |
| 40° | -2 | -6 | 0.001 | 0.002 |
| 30° | 6 | -9 | 0.002 | 0.004 |
| 20° | -10 | -1 | 0.004 | 0.000 |
| 10° | 8 | -8 | 0.003 | 0.003 |
| 0° | -6 | 0 | 0.002 | 0.000 |
| - 10° | -8 | -3 | 0.003 | 0.001 |
| - 20° | -4 | -17 | 0.001 | 0.007 |
| - 30° | -3 | -5 | 0.001 | 0.002 |

**LTE Band 17, 10MHz bandwidth (worst case of all bandwidths)**

**Frequency Error vs Voltage**

| Voltage (V) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 3.5 | 1 | -5 | 0.001 | 0.007 |
| 3.9 | -2 | -4 | 0.003 | 0.005 |
| 4.2 | 0 | -2 | 0.000 | 0.003 |

**Frequency Error vs Temperature**

| Temperature (℃) | Frequency error (Hz) | | Frequency error (ppm) | |
|---|---|---|---|---|
| | QPSK | 16QAM | QPSK | 16QAM |
| 50° | 0 | -2 | 0.000 | 0.003 |
| 40° | -2 | -5 | 0.003 | 0.007 |
| 30° | -1 | -3 | 0.001 | 0.005 |
| 20° | 0 | -7 | 0.000 | 0.010 |
| 10° | -2 | -5 | 0.003 | 0.007 |
| 0° | 1 | -4 | 0.001 | 0.006 |
| - 10° | -4 | -5 | 0.006 | 0.007 |
| - 20° | 1 | -4 | 0.001 | 0.006 |
| - 30° | 0 | -3 | 0.000 | 0.004 |

Expanded measurement uncertainty for this test item is 10 Hz, $k$ = 2.

## A.5 OCCUPIED BANDWIDTH

**Reference**

FCC: CFR Part 2.1049(h)(i)

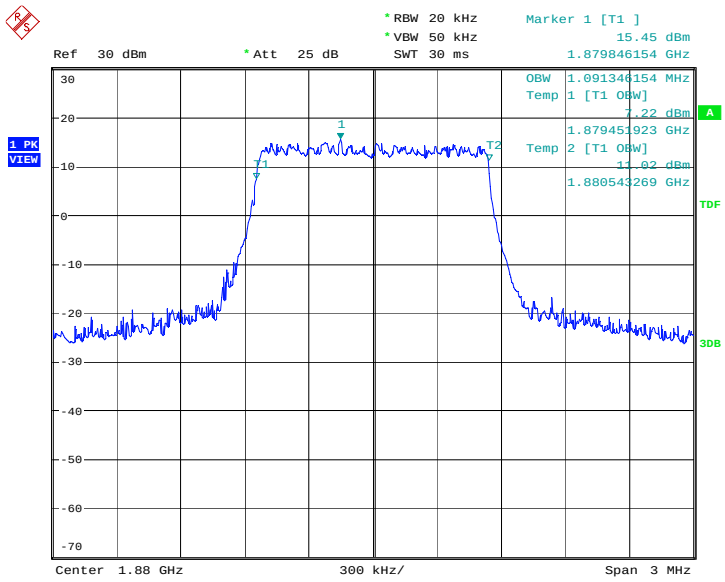
### A.5.1 Occupied Bandwidth Results

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.

**LTE band 2, 1.4MHz (99%)**

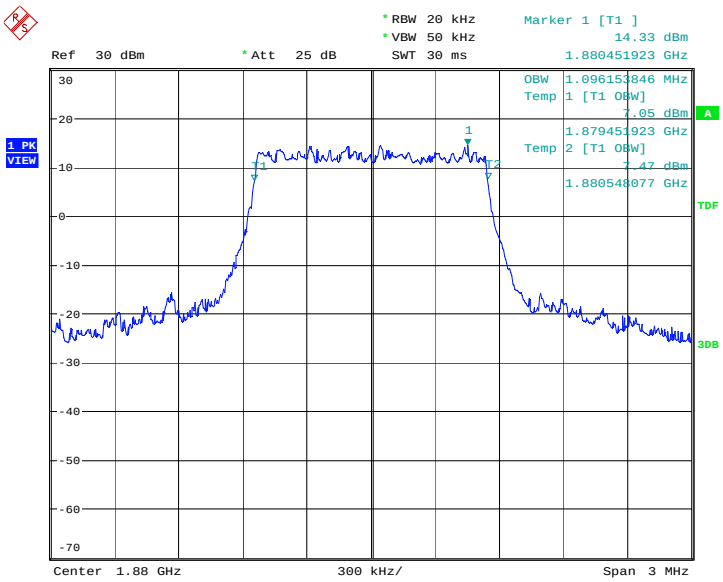
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 1091.35 | 1096.15 |

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




Date: 9.MAY.2014 10:20:28

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

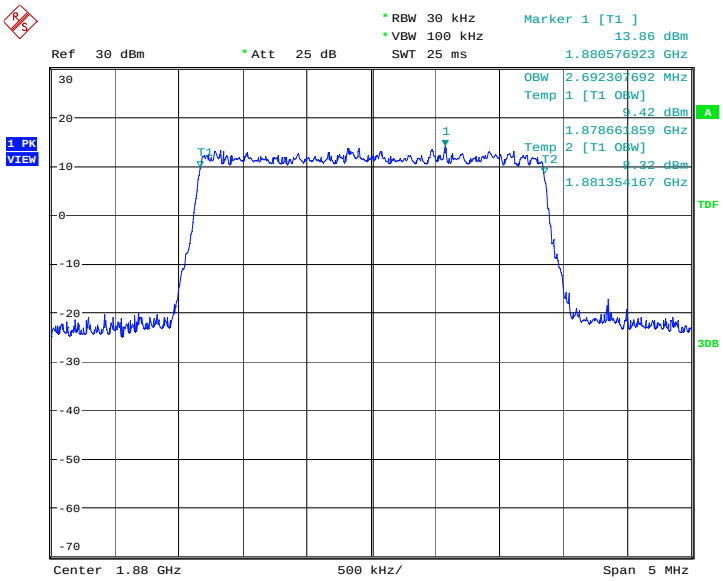



Date: 9.MAY.2014 10:20:42

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

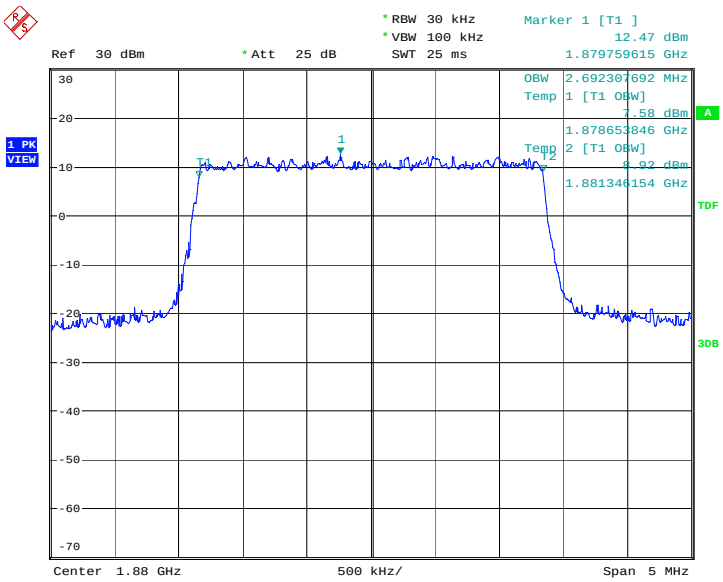
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 2692.31 | 2692.31 |

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




Date: 9.MAY.2014 10:28:41

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

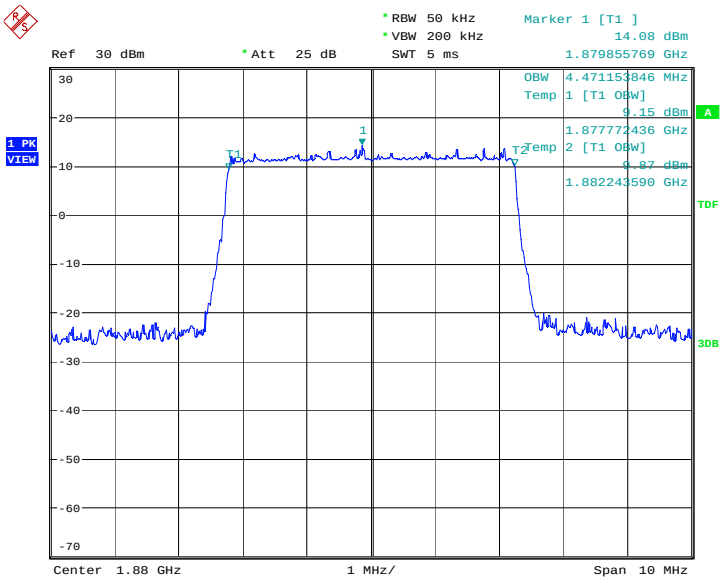



Date: 9.MAY.2014 10:28:55

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

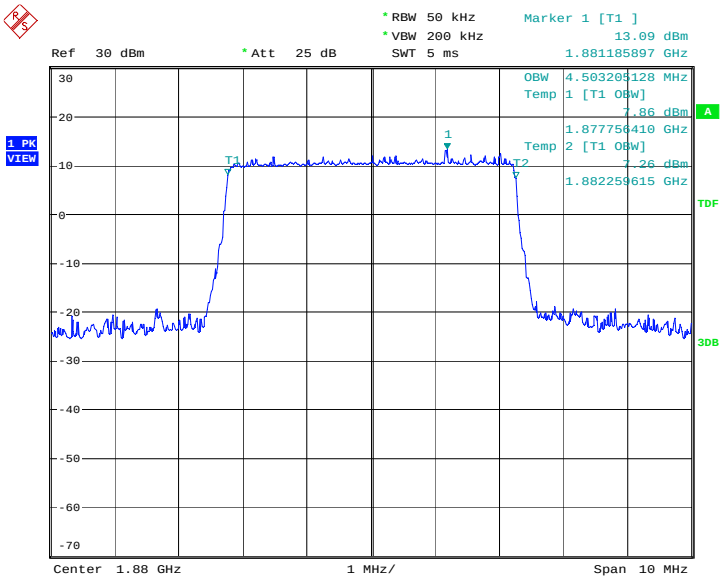
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 4471.15 | 4503.21 |

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




Date: 9.MAY.2014 10:37:55

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

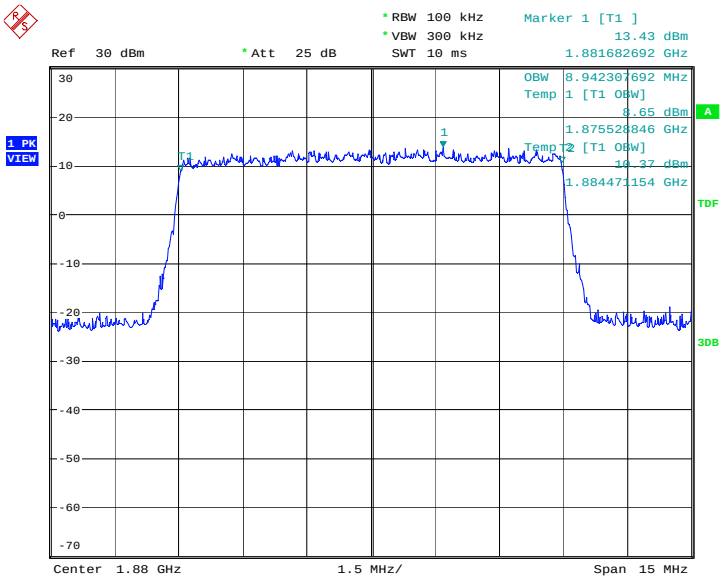



Date: 9.MAY.2014 10:38:08

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

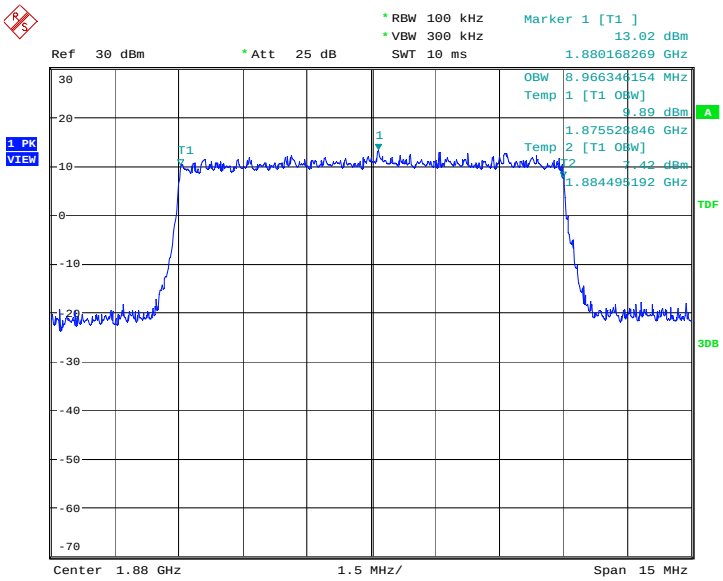
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 8942.31 | 8966.35 |

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




Date: 9.MAY.2014 10:45:37

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

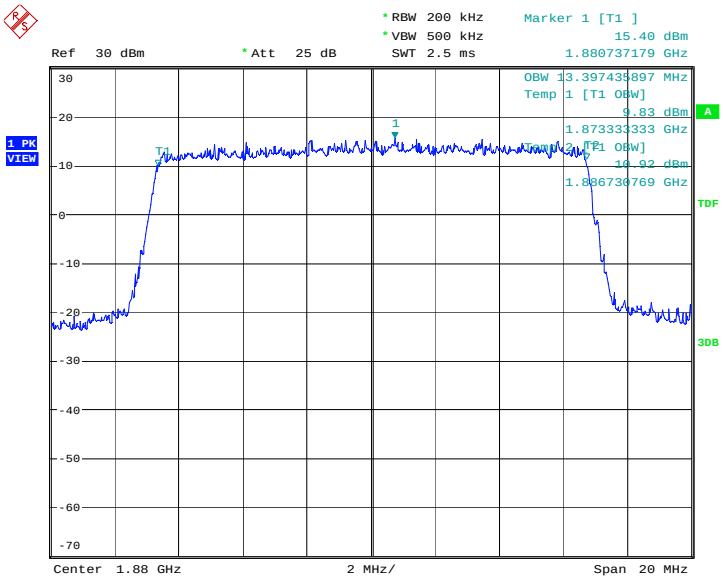



Date: 9.MAY.2014 10:45:51

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

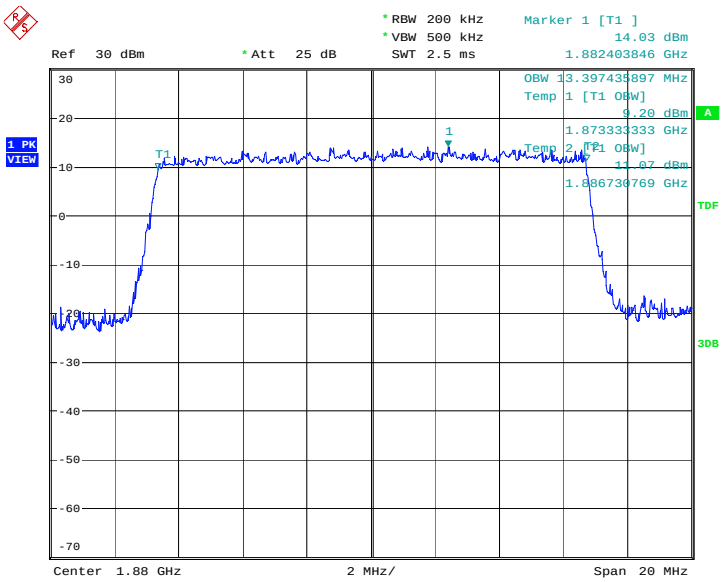
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 13397.44 | 13397.44 |

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




Date: 9.MAY.2014 10:54:57

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

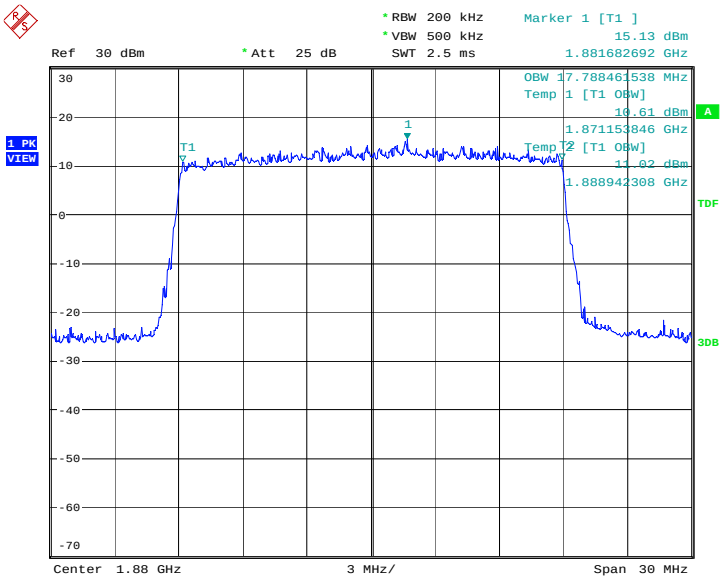



Date: 9.MAY.2014 10:55:11

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

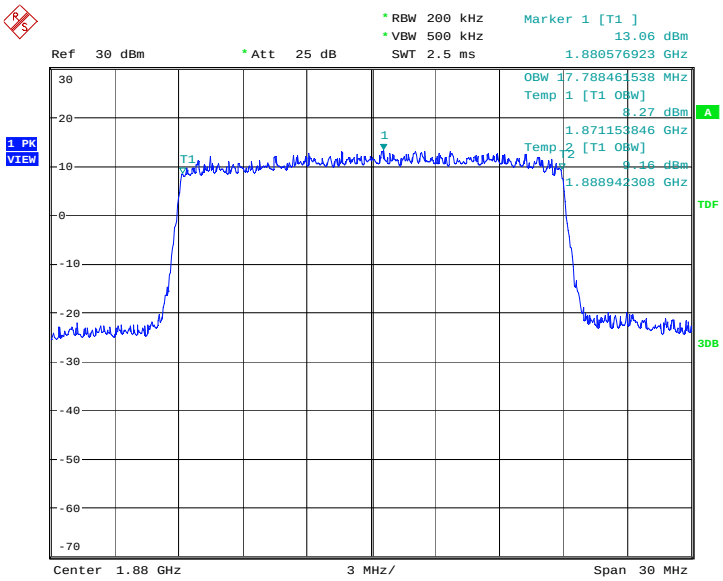
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 17788.46 | 17788.46 |

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




Date: 9.MAY.2014 11:11:57

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

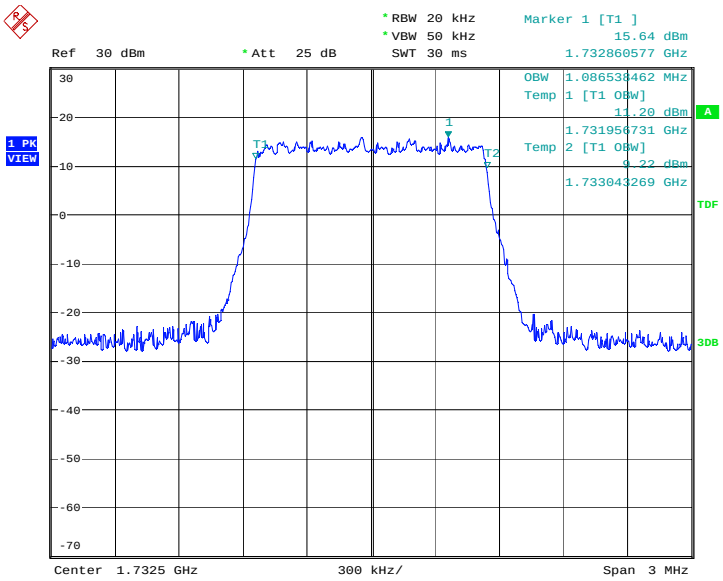



Date: 9.MAY.2014 11:12:11

**LTE band 4, 1.4MHz (99%)**

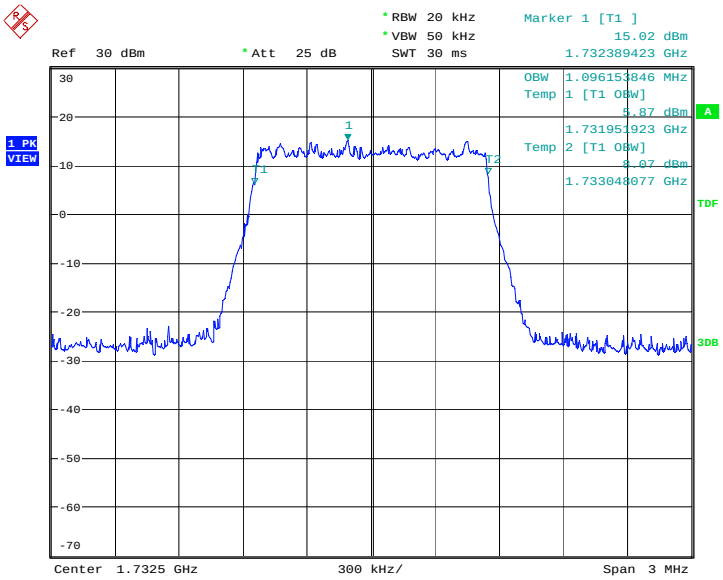
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 1086.538 | 1096.154 |

**LTE band 4, 1.4MHz Bandwidth, QPSK (99% BW)**




Date: 19.MAR.2014 09:16:20

**LTE band 4, 1.4MHz Bandwidth, 16QAM (99% BW)**

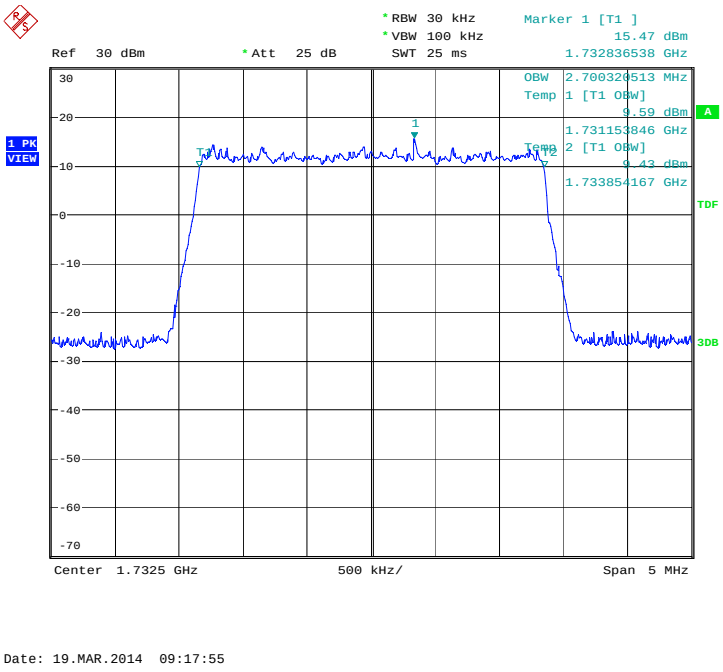



Date: 19.MAR.2014 09:16:33

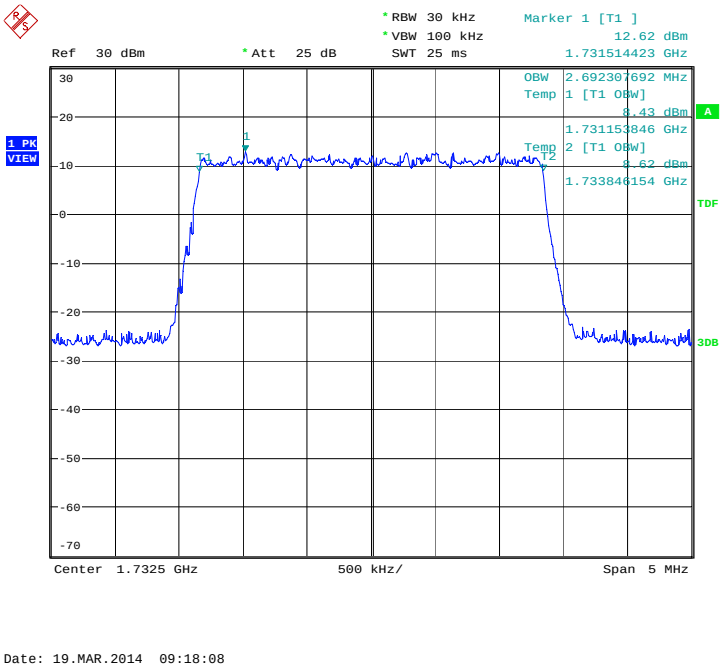
**LTE band 4, 3MHz (99%)**

| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 2700.321 | 2692.308 |

**LTE band 4, 3MHz Bandwidth, QPSK (99% BW)**



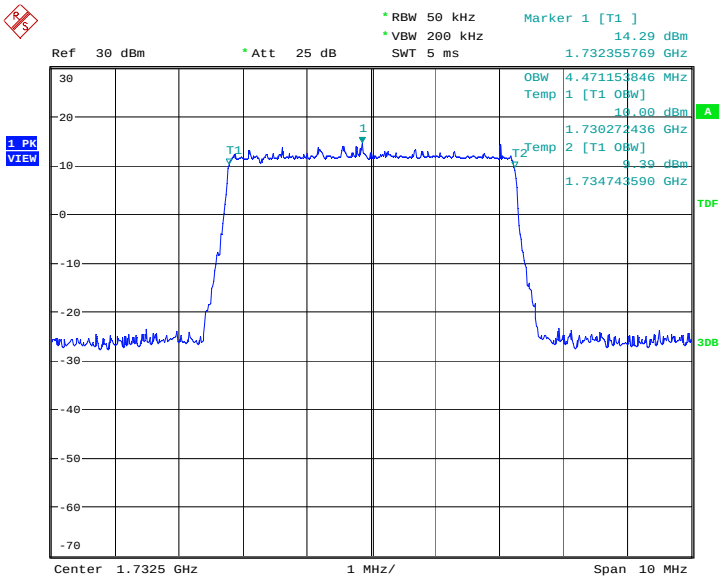

**LTE band 4, 3MHz Bandwidth, 16QAM (99% BW)**



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

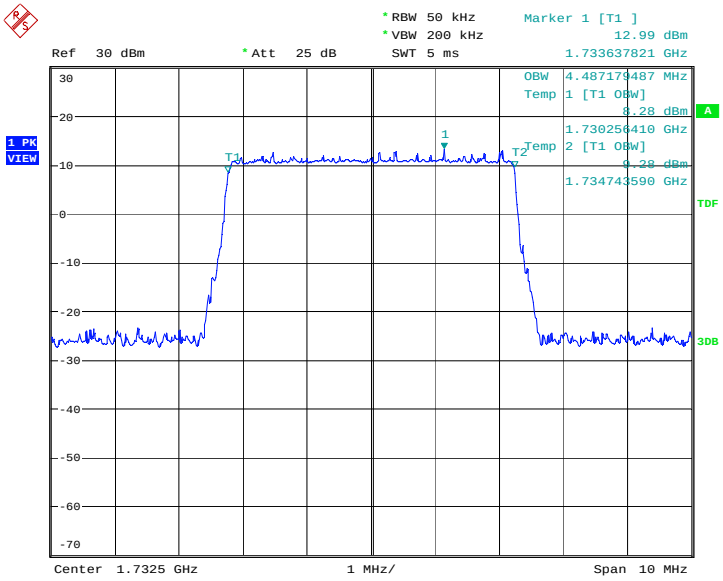
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 4471.154 | 4487.179 |

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




Date: 19.MAR.2014 09:20:01

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

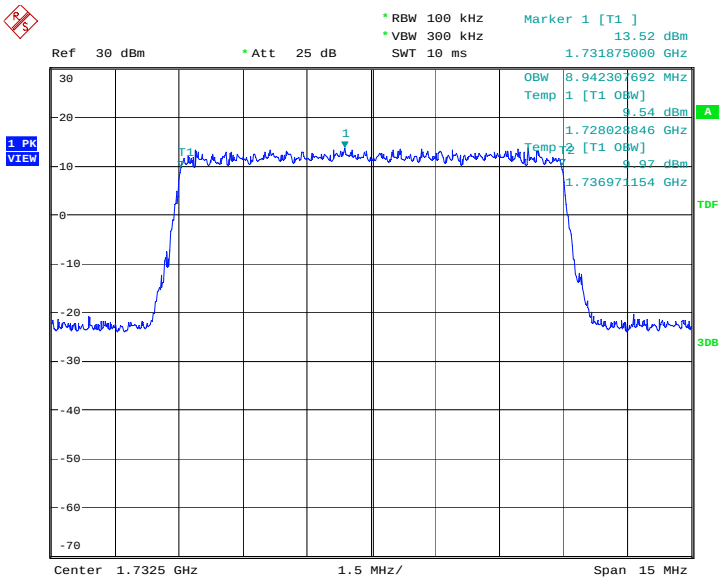



Date: 19.MAR.2014 09:20:14

**LTE band 4, 10MHz (99%)**

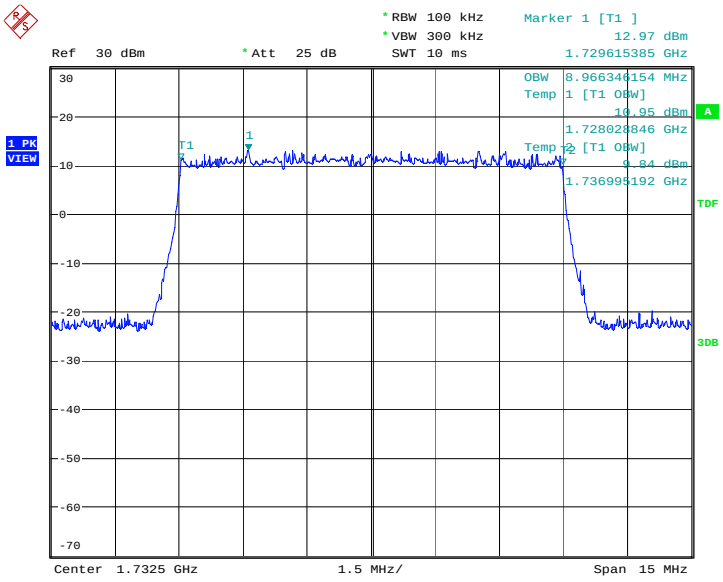
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 8942.308 | 8966.346 |

**LTE band 4, 10MHz Bandwidth, QPSK (99% BW)**




Date: 19.MAR.2014 09:21:06

**LTE band 4, 10MHz Bandwidth, 16QAM (99% BW)**

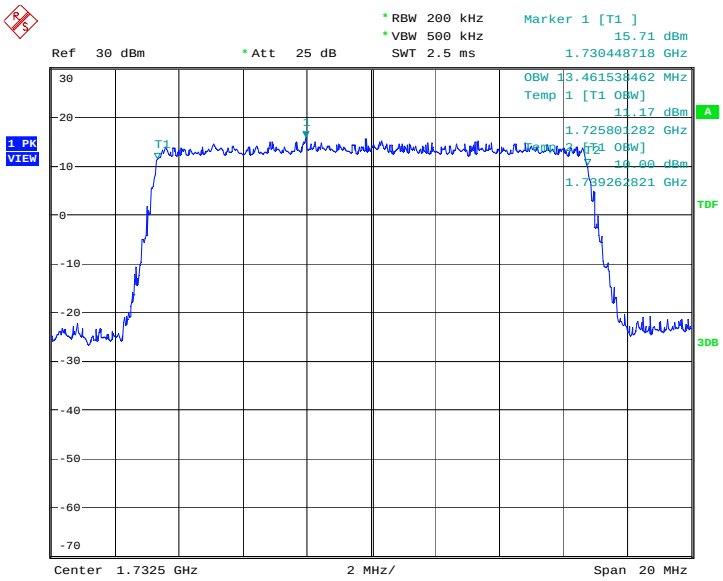



Date: 19.MAR.2014 09:21:19

**LTE band 4, 15MHz (99%)**

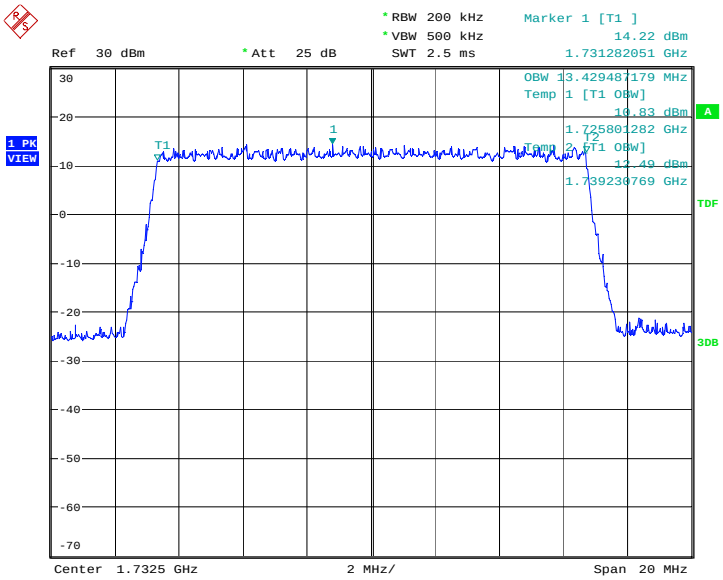
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 13461.54 | 13429.49 |

**LTE band 4, 15MHz Bandwidth, QPSK (99% BW)**




Date: 19.MAR.2014 09:22:10

**LTE band 4, 15MHz Bandwidth, 16QAM (99% BW)**

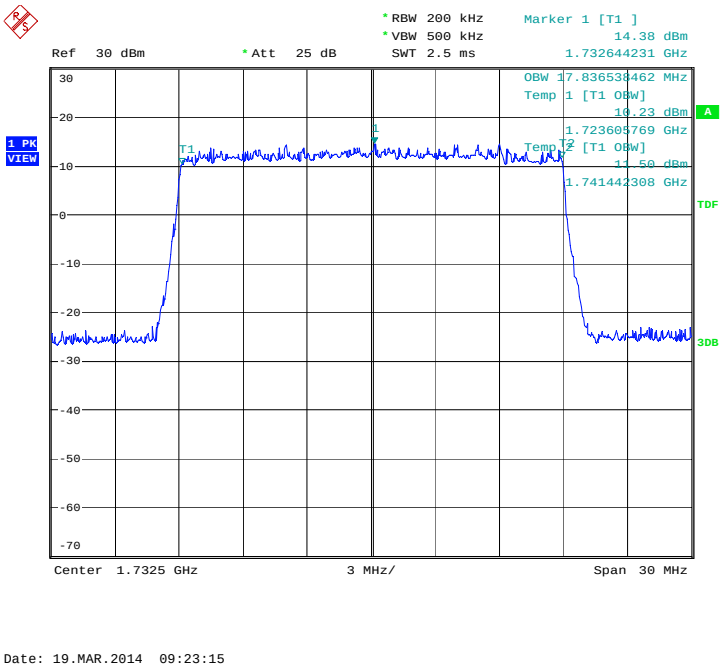



Date: 19.MAR.2014 09:22:24

### LTE band 4, 20MHz (99%)

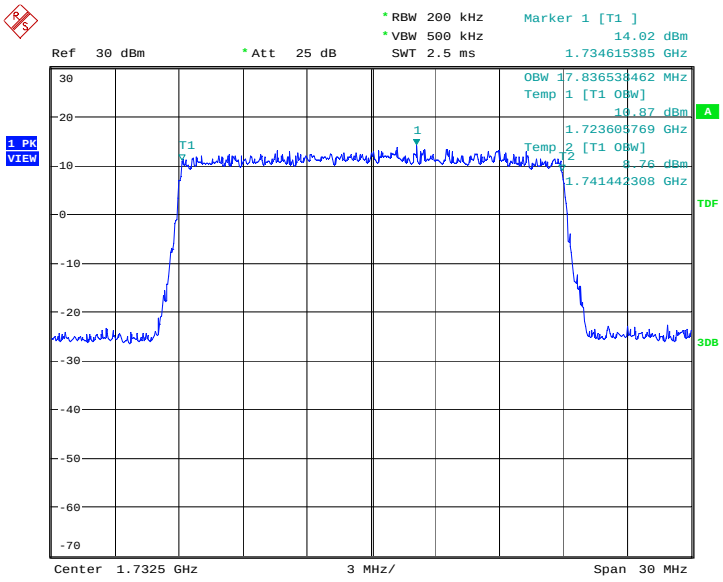
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 17836.54 | 17836.54 |

### LTE band 4, 20MHz Bandwidth, QPSK (99% BW)




Date: 19.MAR.2014 09:23:15

### LTE band 4, 20MHz Bandwidth, 16QAM (99% BW)

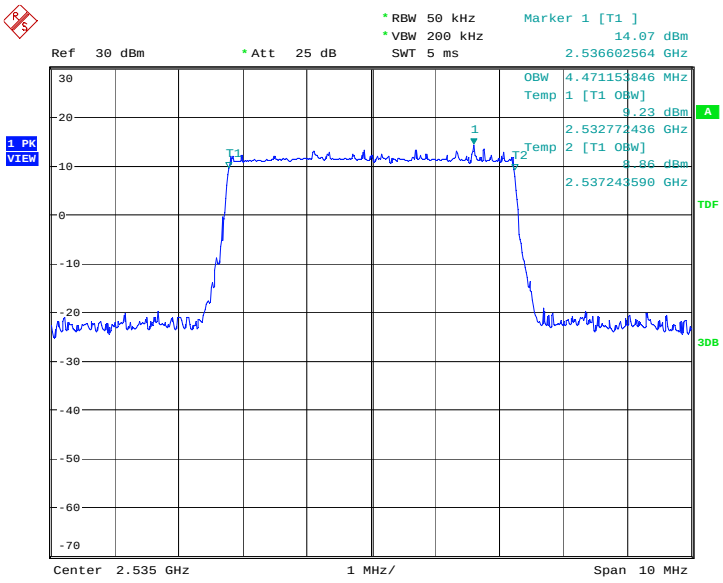



Date: 19.MAR.2014 09:23:29

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

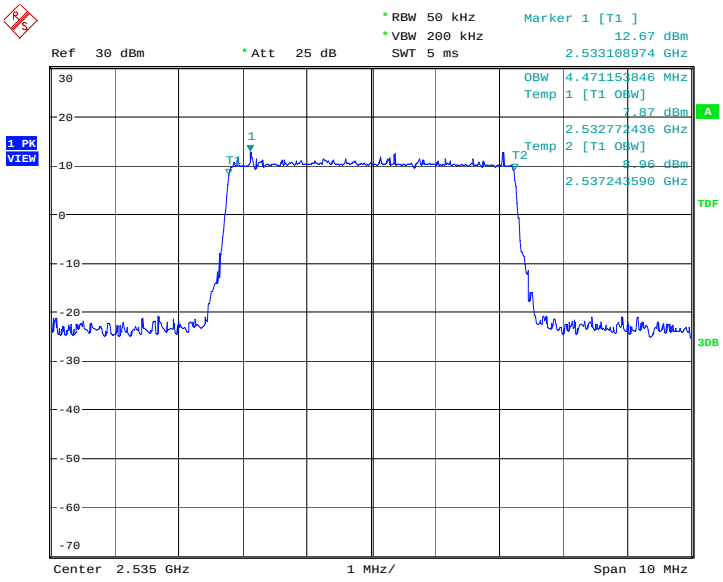
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 4471.15 | 4471.15 |

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




Date: 9.MAY.2014 11:19:28

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

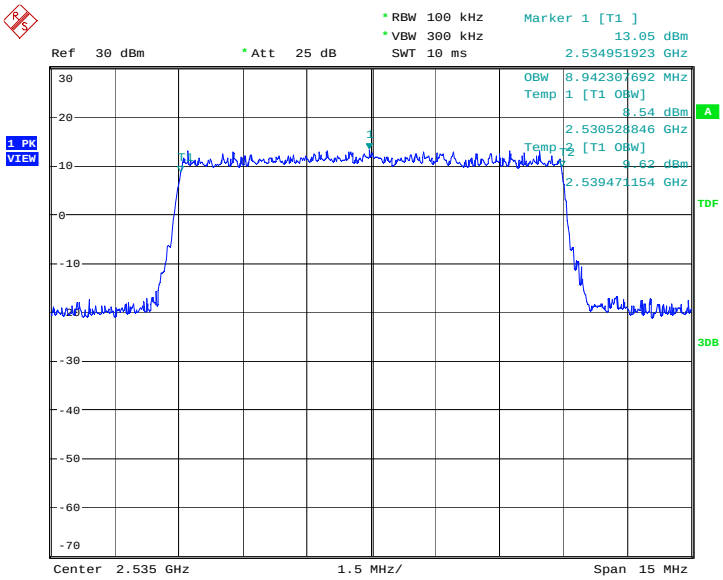



Date: 9.MAY.2014 11:19:42

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

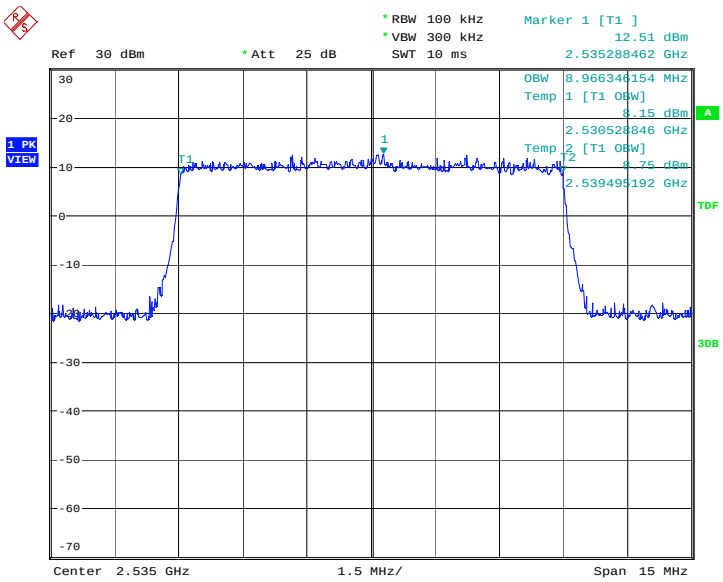
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 8942.31 | 8966.35 |

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




Date: 9.MAY.2014 11:29:11

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

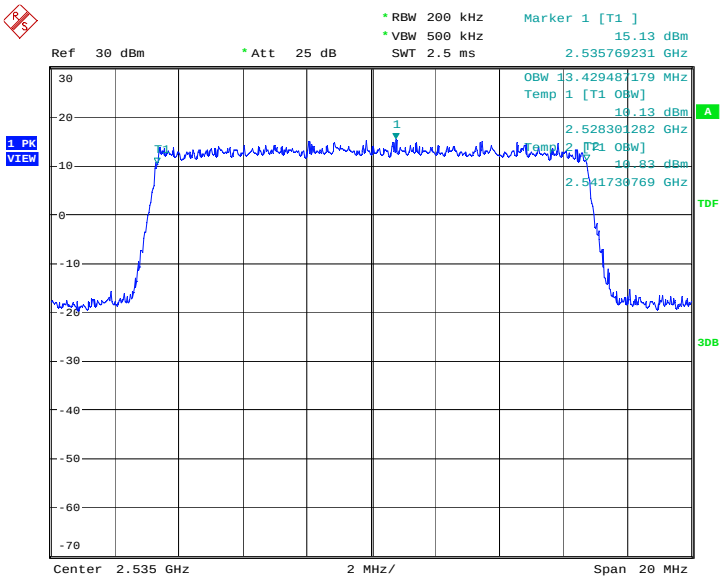



Date: 9.MAY.2014 11:29:25

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

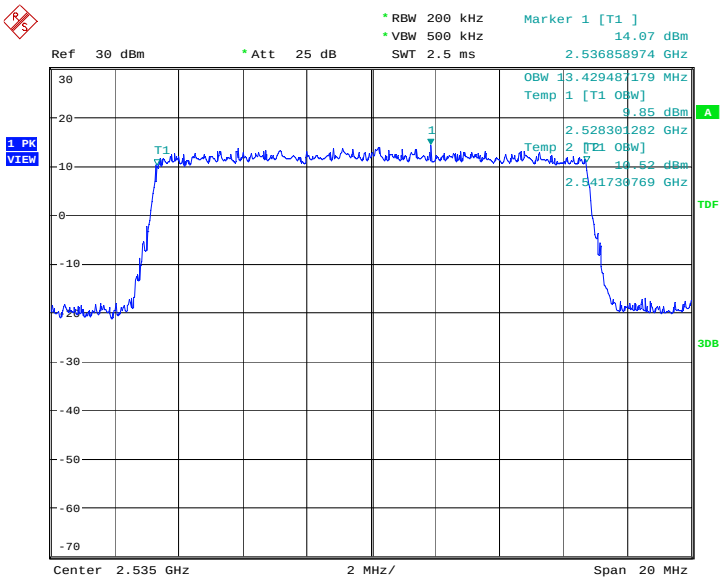
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 13429.49 | 13429.49 |

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




Date: 9.MAY.2014 11:39:29

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

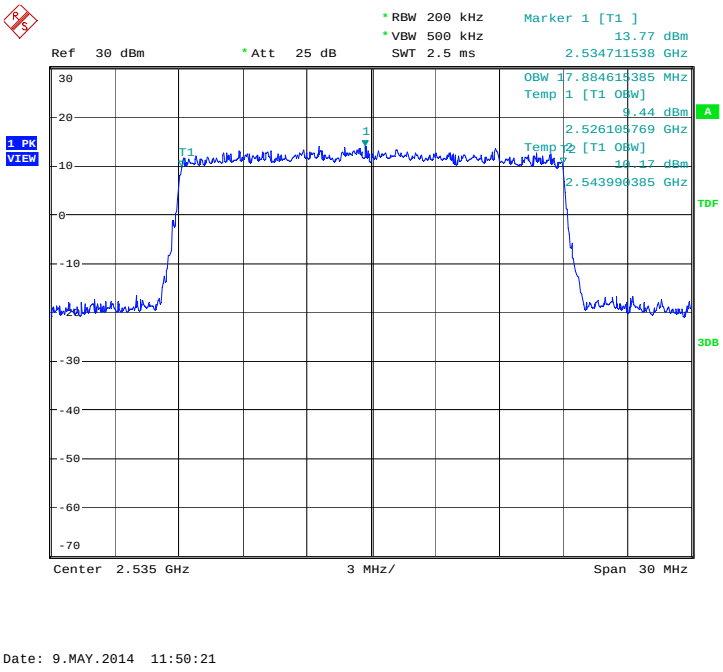



Date: 9.MAY.2014 11:39:43

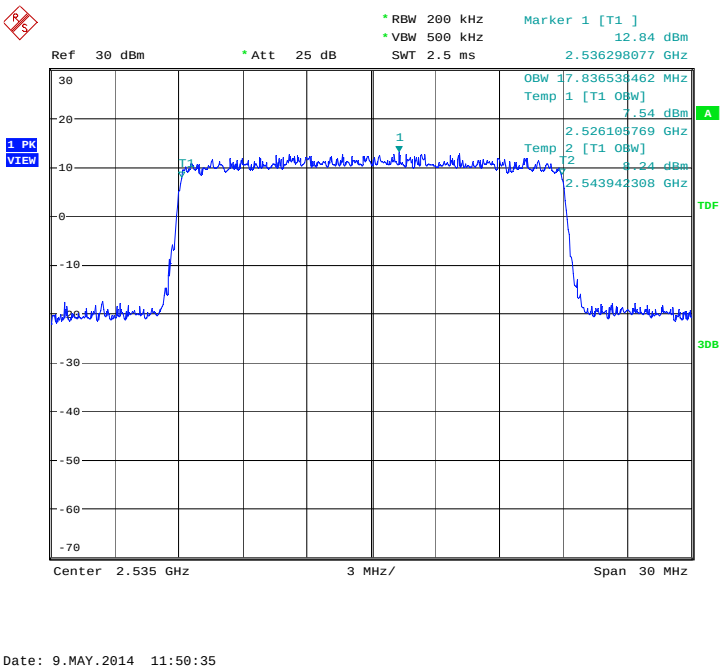
### LTE band 7, 20MHz (99%)

| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 17884.62 | 17836.54 |

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



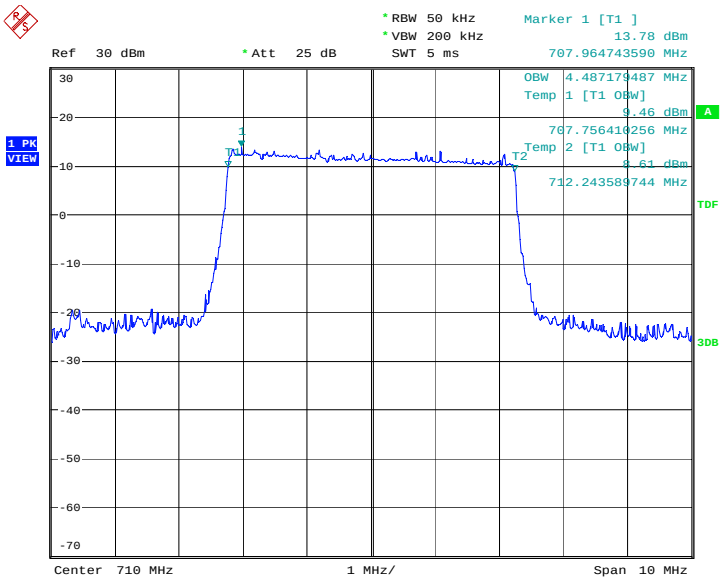

### LTE band 7, 20MHz Bandwidth, 16QAM (99% BW)



**LTE band 17, 5MHz (99%)**

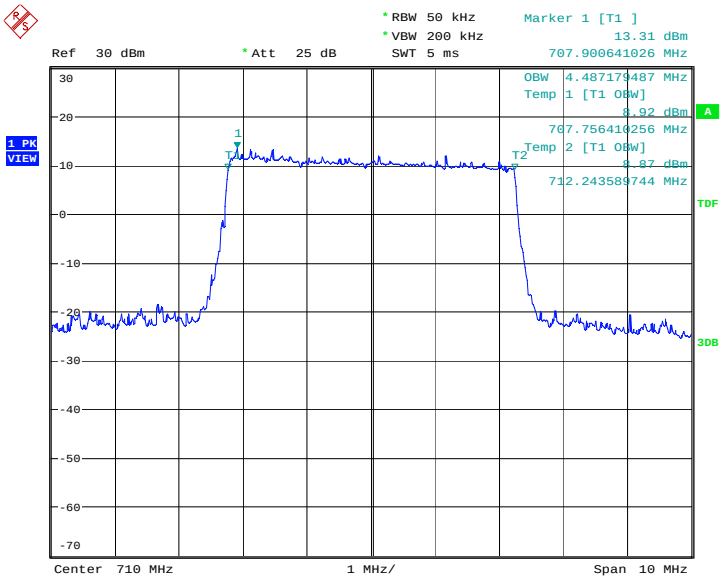
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 710.0 | QPSK | 16QAM |
| | 4487.179 | 4487.179 |

**LTE band 17, 5MHz Bandwidth, QPSK (99% BW)**




Date: 25.FEB.2014 16:39:43

**LTE band 17, 5MHz Bandwidth,16QAM (99% BW)**

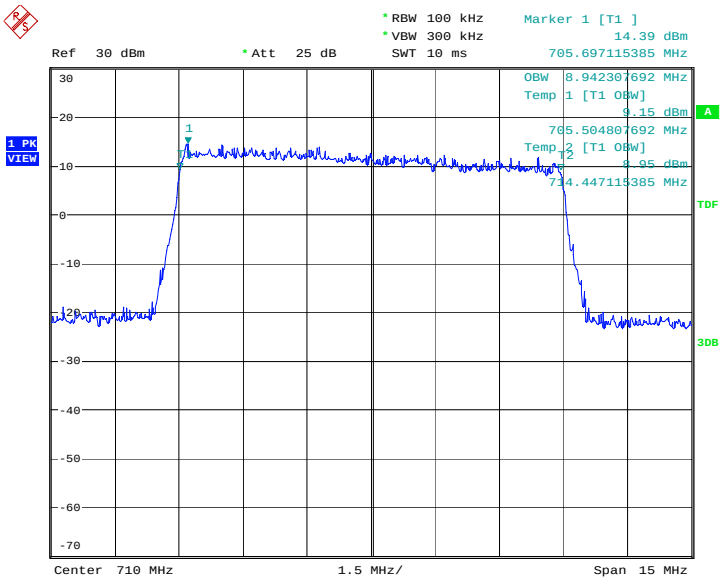



Date: 25.FEB.2014 16:39:57

### LTE band 17, 10MHz (99%)

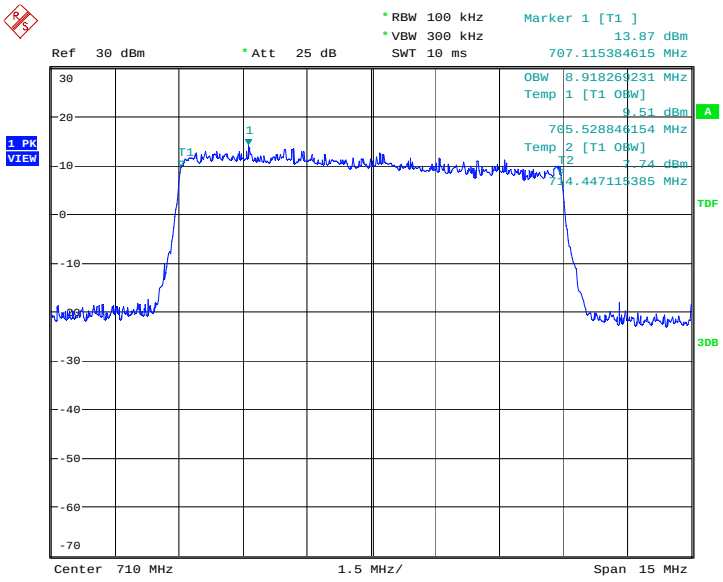
| Frequency(MHz) | Occupied Bandwidth (99%)( kHz) | |
|---|---|---|
| 710.0 | QPSK | 16QAM |
| | 8942.308 | 8918.269 |

### LTE band 17, 10MHz Bandwidth, QPSK (99% BW)




Date: 25.FEB.2014 16:49:30

### LTE band 17, 10MHz Bandwidth, 16QAM (99% BW)




Date: 25.FEB.2014 16:49:44

## A.6 EMISSION BANDWIDTH

**Reference**

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h)

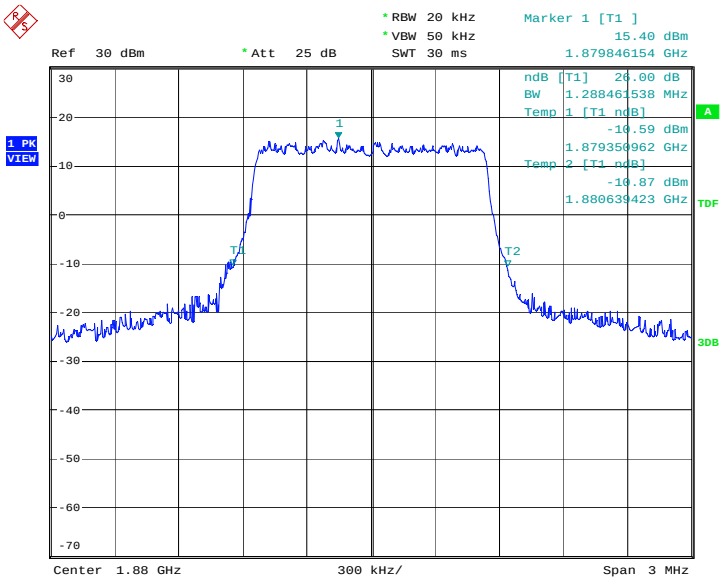
### A.6.1Emission Bandwidth Results

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

**LTE band 2, 1.4MHz (-26dBc)**

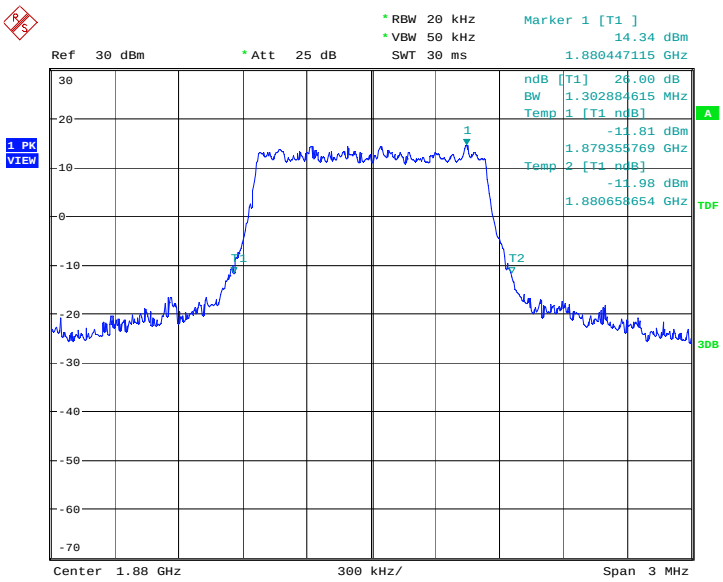
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 1288.46 | 1302.88 |

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




Date: 9.MAY.2014 10:22:36

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

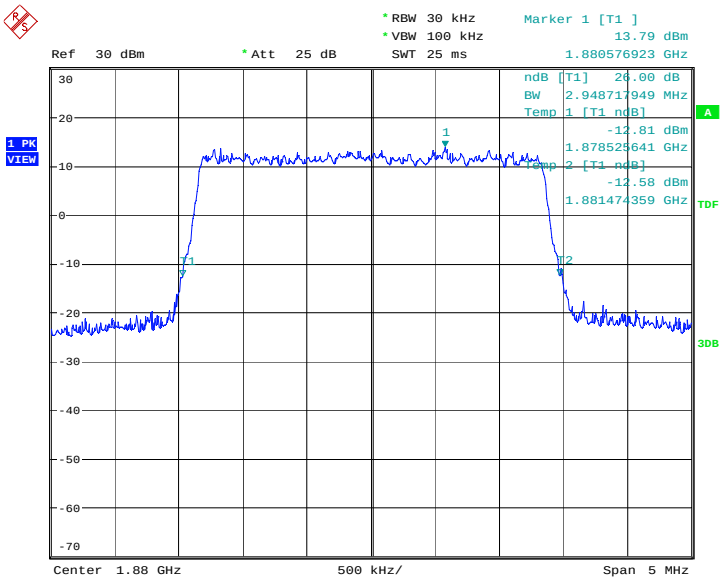



Date: 9.MAY.2014 10:22:52

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

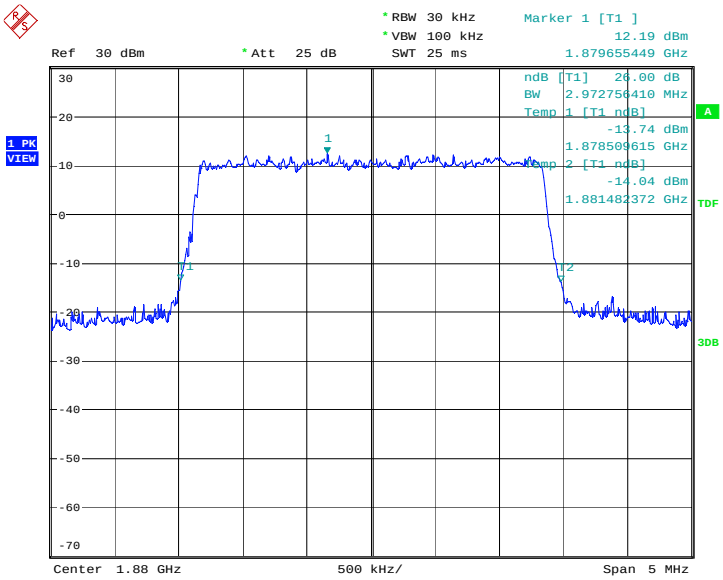
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 2948.72 | 2972.76 |

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




Date: 9.MAY.2014 10:31:20

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

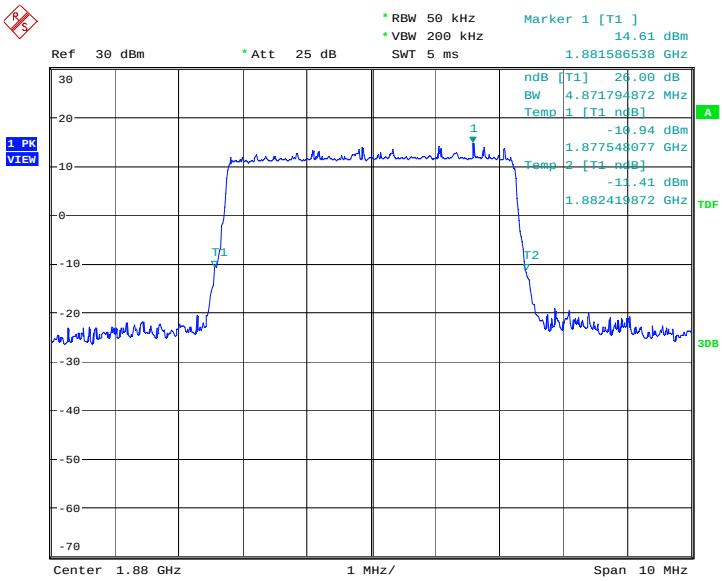



Date: 9.MAY.2014 10:31:36

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

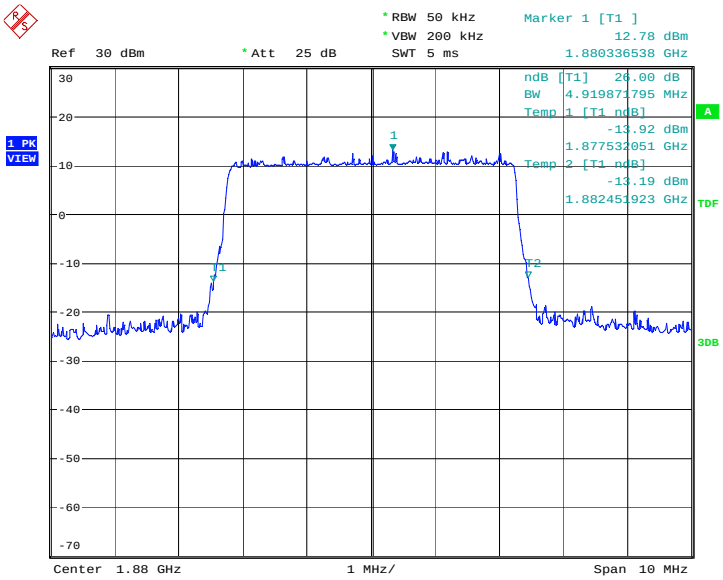
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 4871.79 | 4919.87 |

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




Date: 9.MAY.2014 10:41:03

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

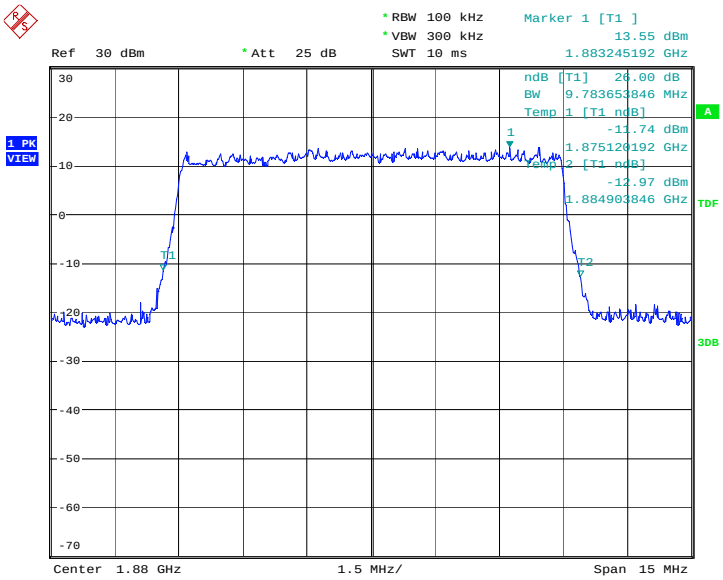



Date: 9.MAY.2014 10:41:19

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

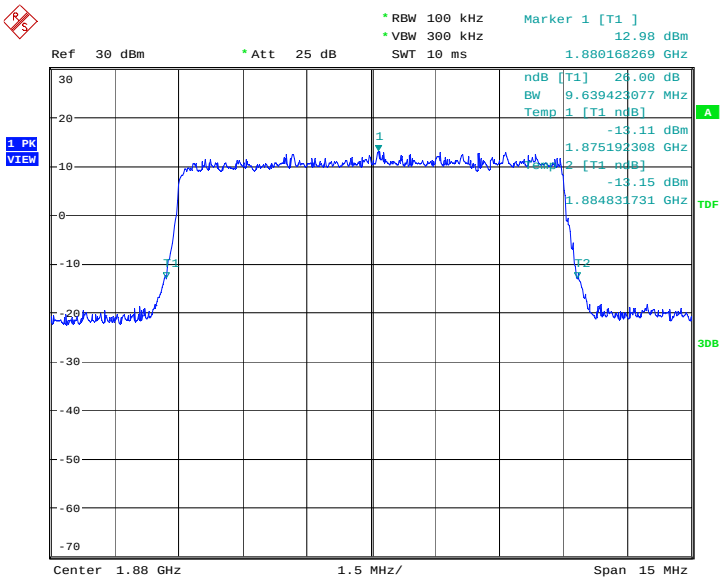
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 9783.65 | 9639.42 |

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




Date: 9.MAY.2014 10:46:44

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

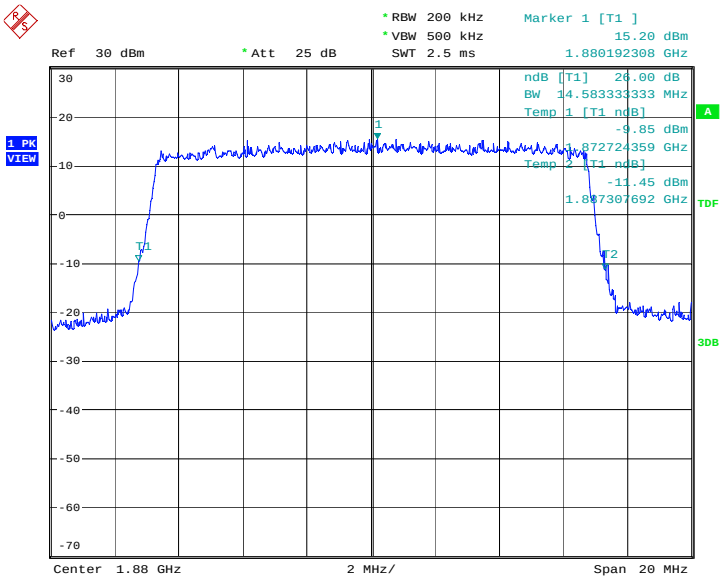



Date: 9.MAY.2014 10:46:59

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

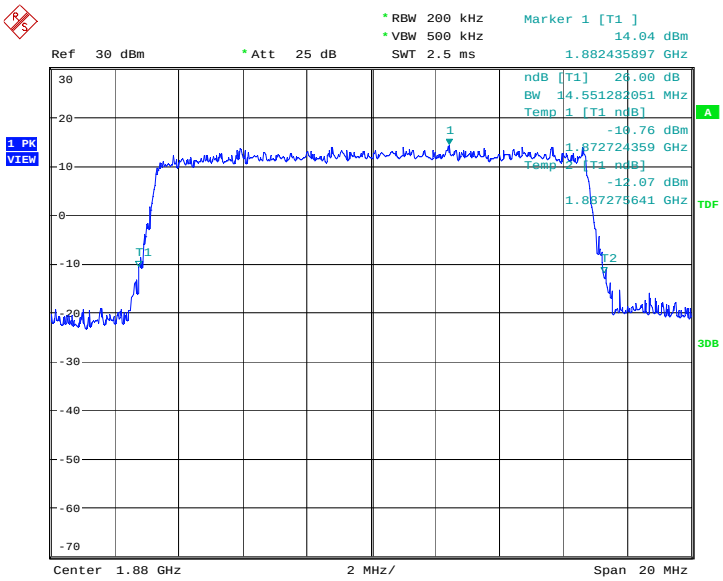
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 14583.33 | 14551.28 |

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




Date: 9.MAY.2014 10:58:05

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

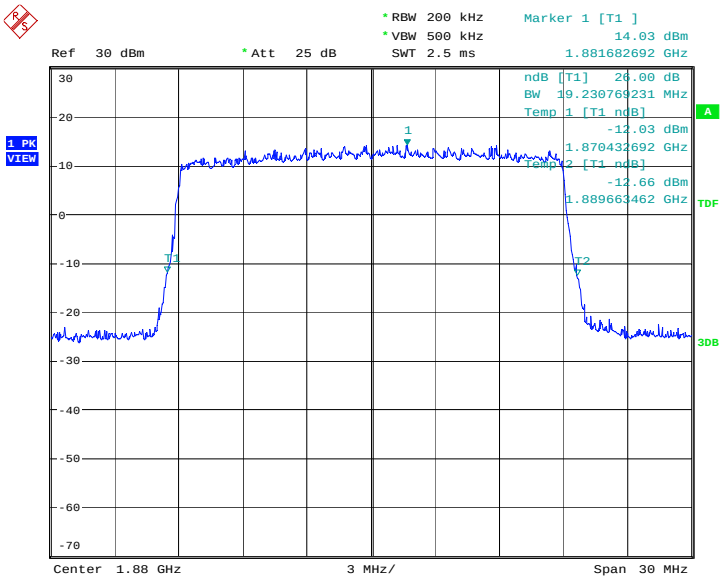



Date: 9.MAY.2014 10:58:21

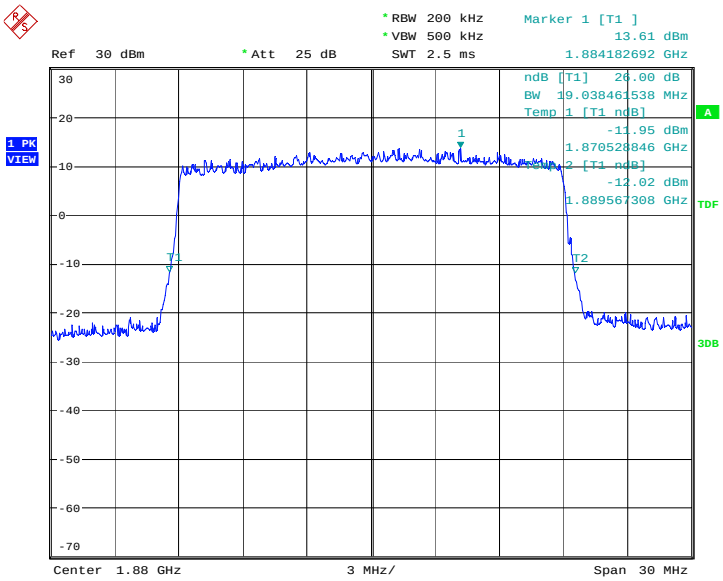
### LTE band 2, 20MHz (-26dBc)

| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1880.0 | QPSK | 16QAM |
| | 19230.77 | 19038.46 |

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



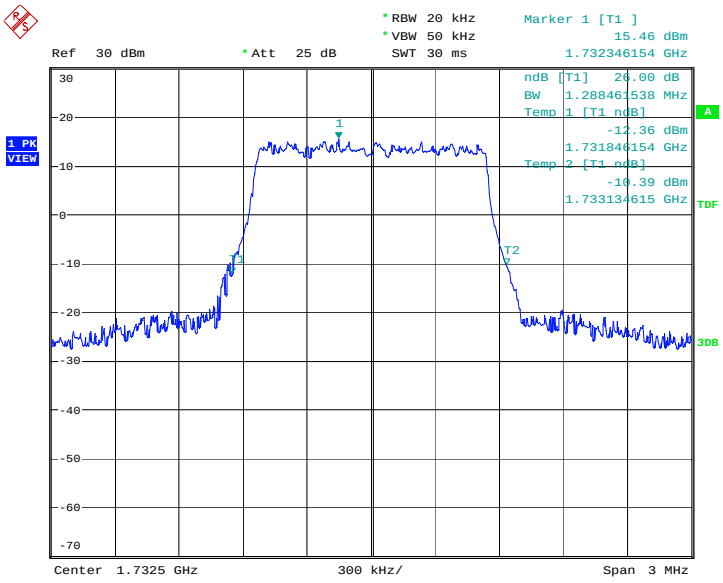

### LTE band 2, 20MHz Bandwidth, 16QAM (-26dBc BW)



### LTE band 4, 1.4MHz (-26dBc)

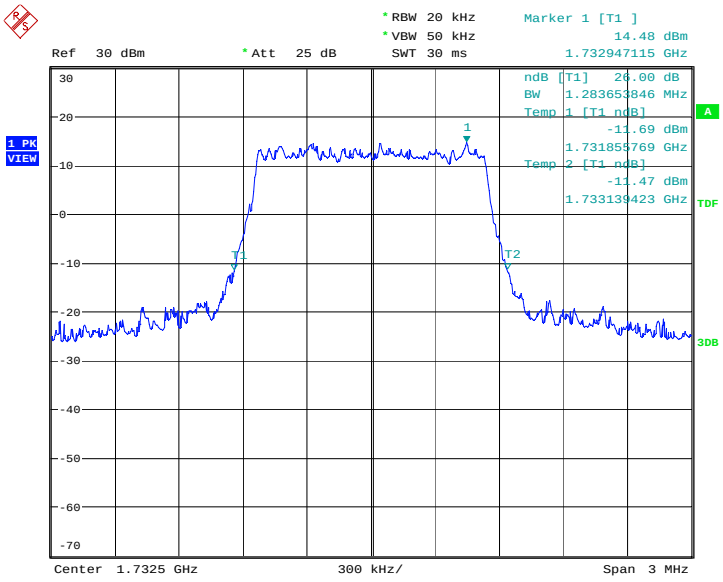
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 1288.462 | 1283.654 |

### LTE band 4, 1.4MHz Bandwidth, QPSK (-26dBc BW)




Date: 18.MAR.2014 14:43:29

### LTE band 4, 1.4MHz Bandwidth, 16QAM (-26dBc BW)

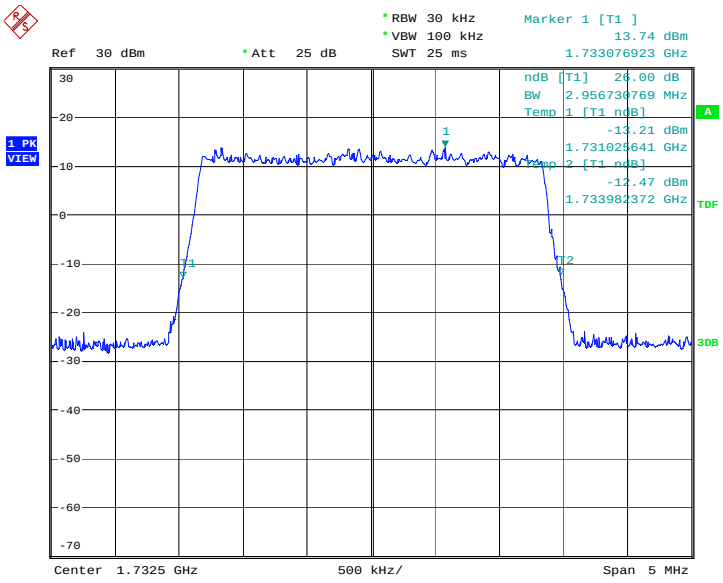



Date: 18.MAR.2014 14:43:45

### LTE band 4, 3MHz (-26dBc)

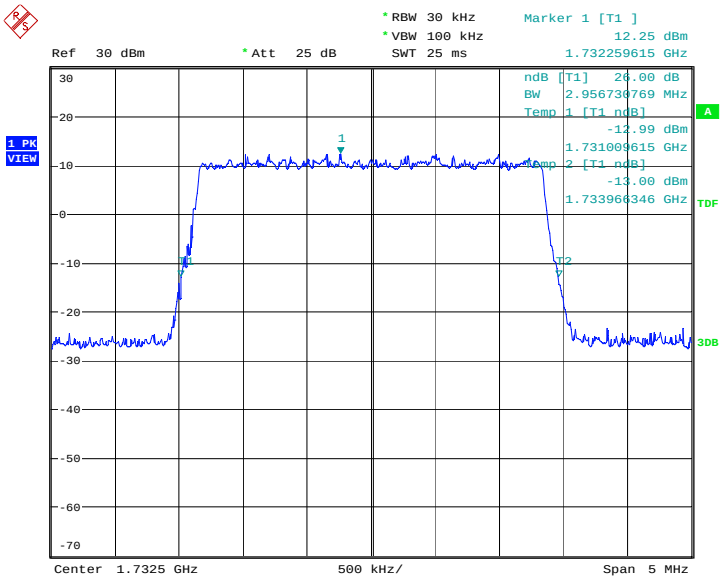
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 2956.731 | 2956.731 |

### LTE band 4, 3MHz Bandwidth, QPSK (-26dBc BW)




Date: 18.MAR.2014 15:36:01

### LTE band 4, 3MHz Bandwidth, 16QAM (-26dBc BW)

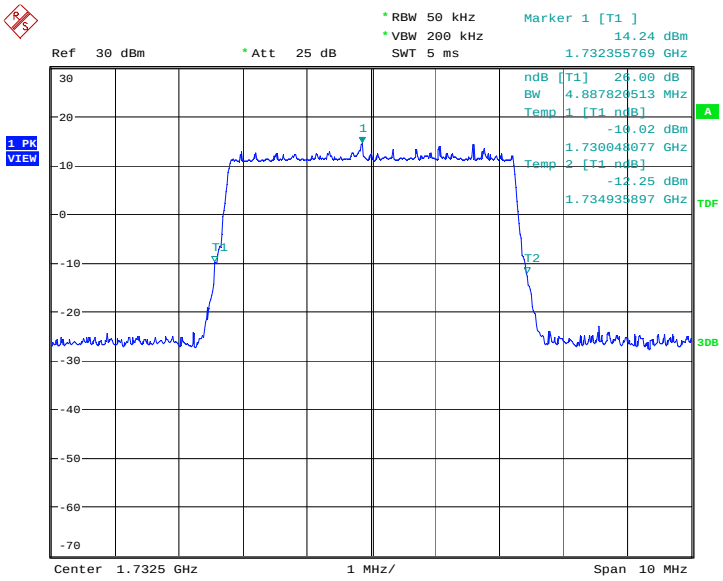



Date: 18.MAR.2014 15:36:17

### LTE band 4, 5MHz (-26dBc)

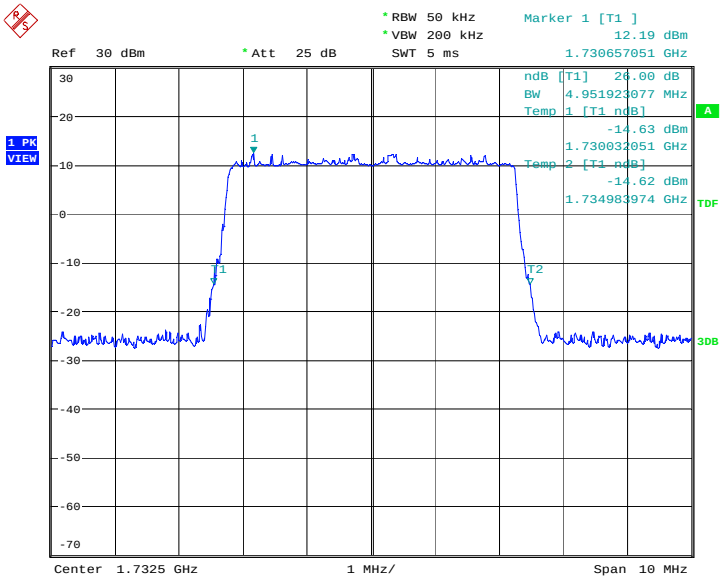
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 4887.821 | 4951.923 |

### LTE band 4, 5MHz Bandwidth, QPSK (-26dBc BW)




Date: 18.MAR.2014 15:41:30

### LTE band 4, 5MHz Bandwidth,16QAM (-26dBc BW)

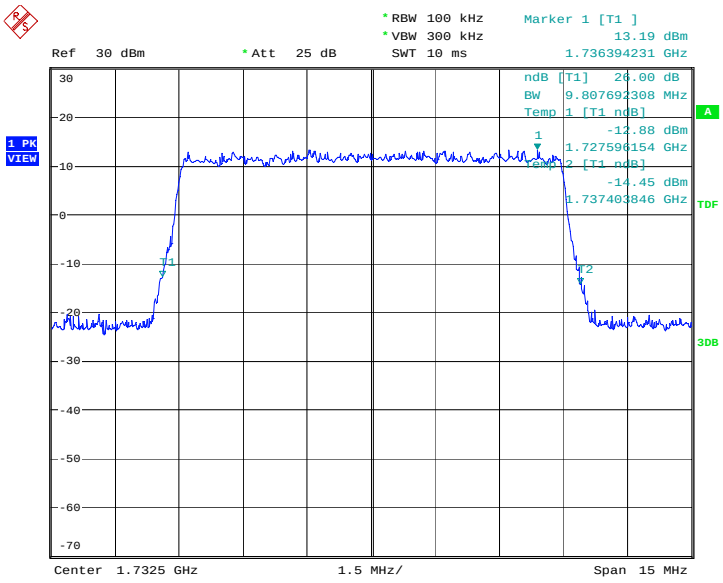



Date: 18.MAR.2014 15:41:46

**LTE band 4, 10MHz (-26dBc)**

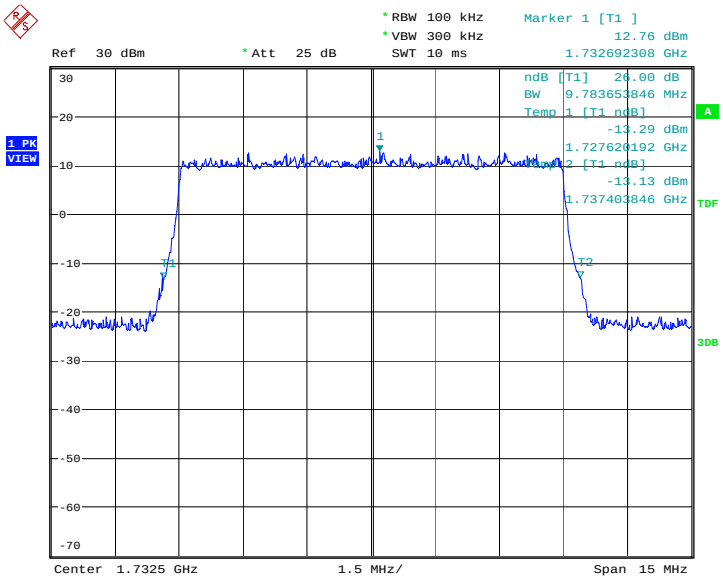
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 9807.692 | 9783.654 |

**LTE band 4, 10MHz Bandwidth, QPSK (-26dBc BW)**




Date: 18.MAR.2014 15:47:30

**LTE band 4, 10MHz Bandwidth, 16QAM (-26dBc BW)**

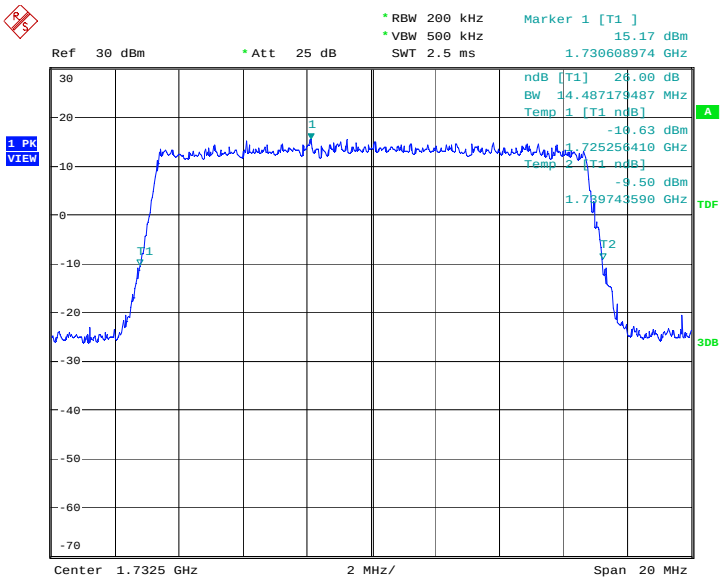



Date: 18.MAR.2014 15:47:46

### LTE band 4, 15MHz (-26dBc)

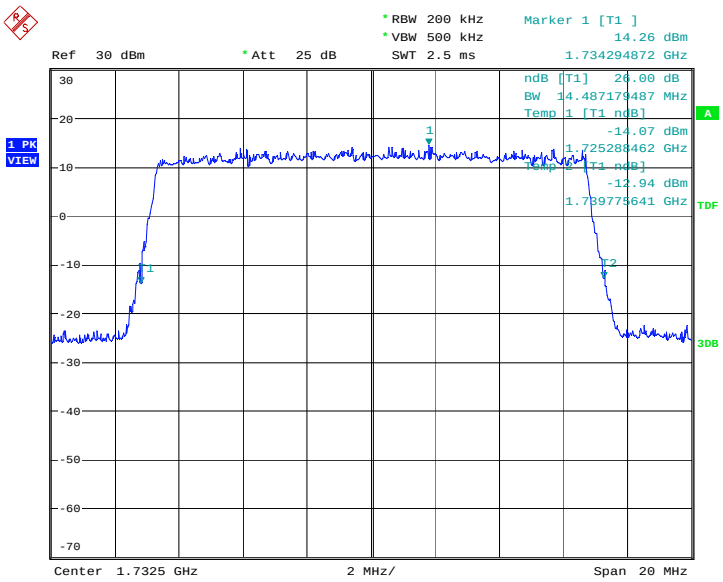
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 14487.18 | 14487.18 |

### LTE band 4, 15MHz Bandwidth, QPSK (-26dBc BW)




Date: 18.MAR.2014 15:53:30

### LTE band 4, 15MHz Bandwidth, 16QAM (-26dBc BW)

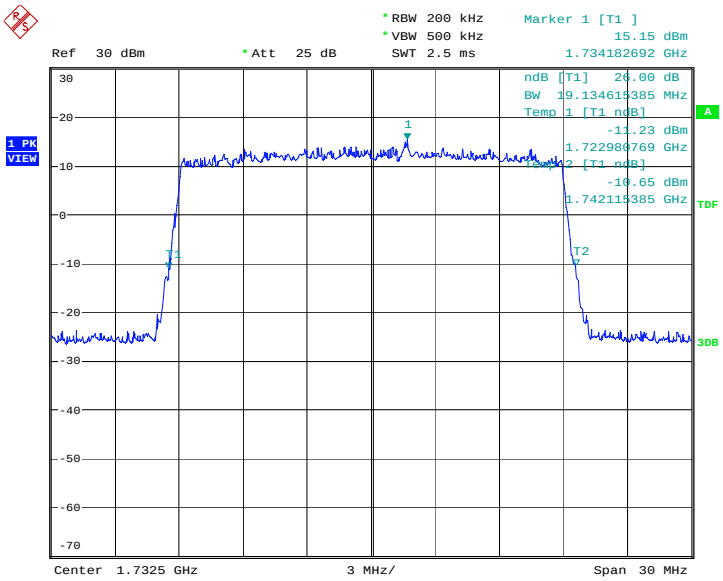



Date: 18.MAR.2014 15:53:46

### LTE band 4, 20MHz (-26dBc)

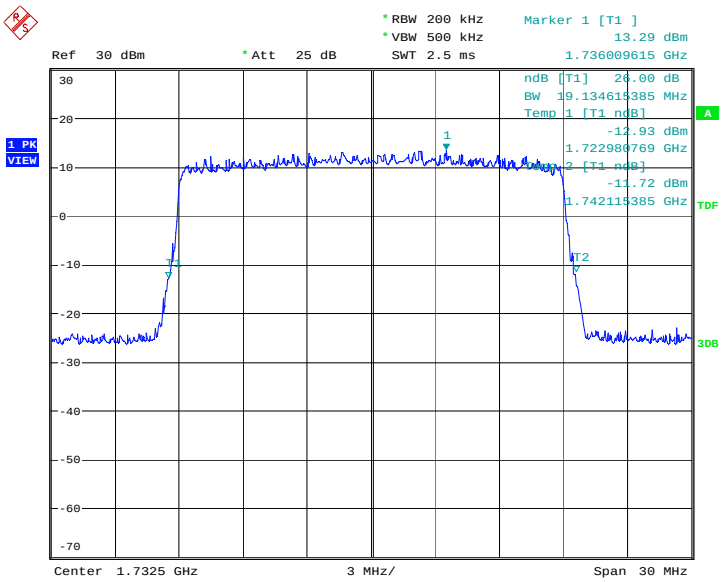
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 1732.5 | QPSK | 16QAM |
| | 19134.62 | 19134.62 |

### LTE band 4, 20MHz Bandwidth, QPSK (-26dBc BW)




Date: 18.MAR.2014 15:59:30

### LTE band 4, 20MHz Bandwidth, 16QAM (-26dBc BW)

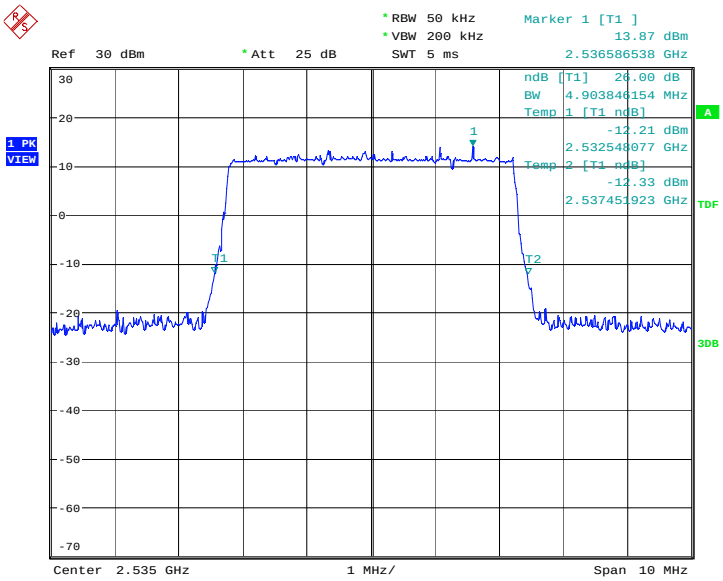



Date: 18.MAR.2014 15:59:46

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

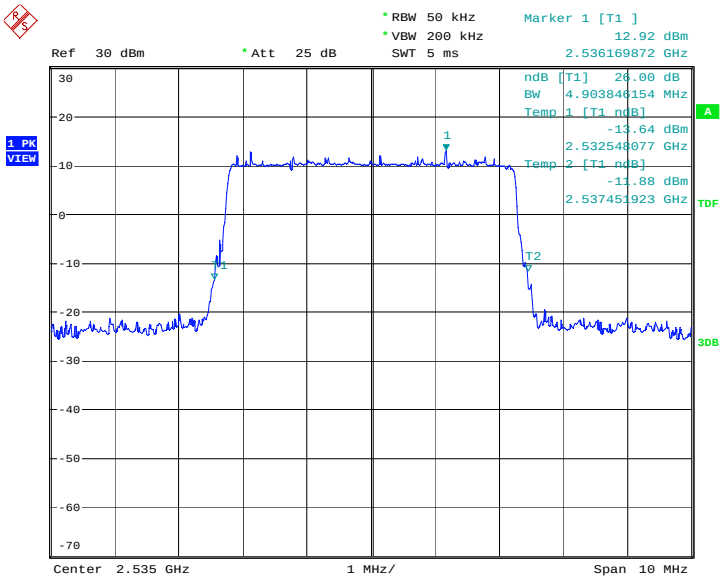
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 4903.85 | 4903.85 |

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




Date: 9.MAY.2014 11:21:05

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

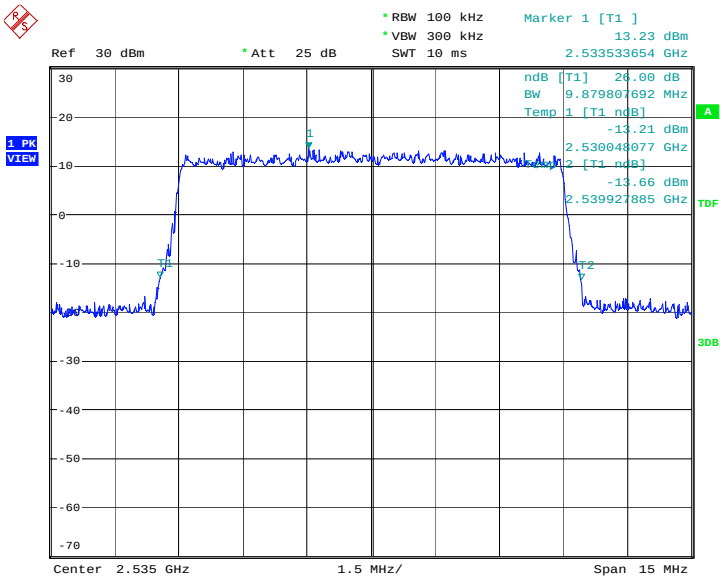



Date: 9.MAY.2014 11:21:21

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

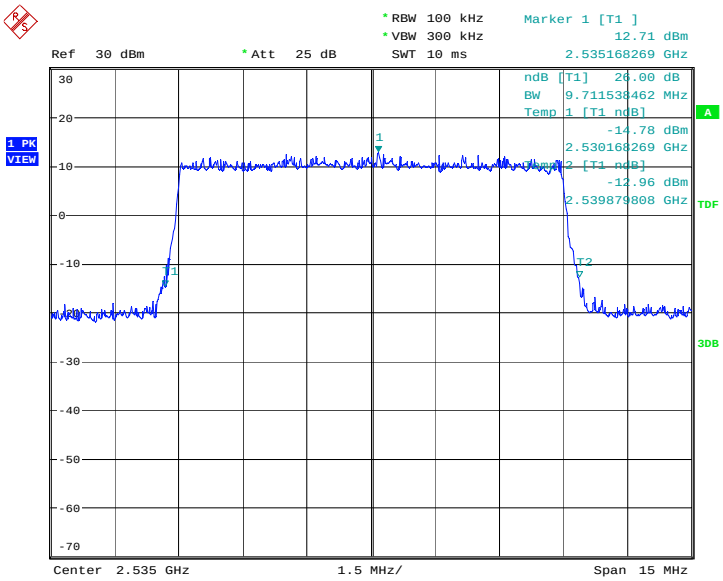
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 9879.81 | 9711.54 |

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




Date: 9.MAY.2014 11:32:49

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

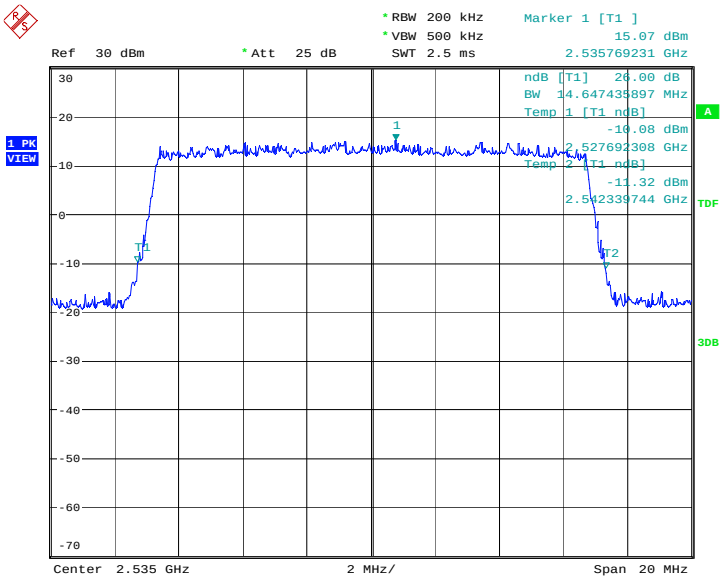



Date: 9.MAY.2014 11:33:05

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

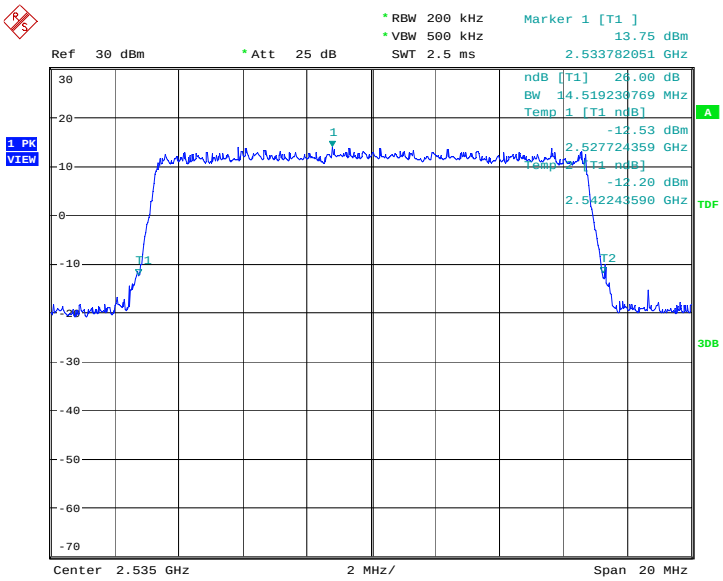
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 14647.44 | 14519.23 |

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




Date: 9.MAY.2014 11:42:07

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

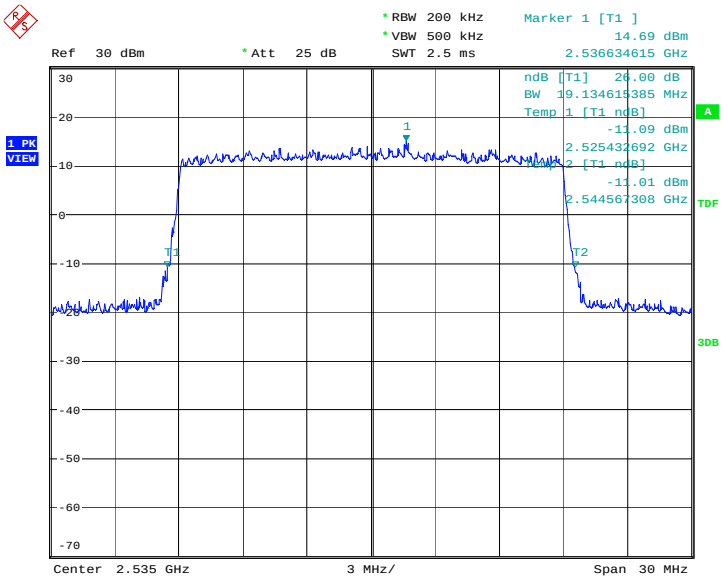



Date: 9.MAY.2014 11:42:23

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

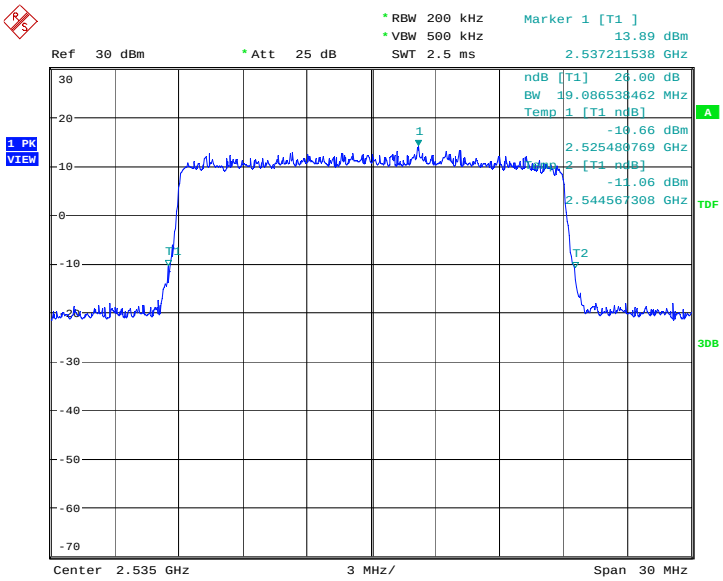
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 2535.0 | QPSK | 16QAM |
| | 19134.62 | 19086.54 |

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




Date: 9.MAY.2014 11:51:28

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

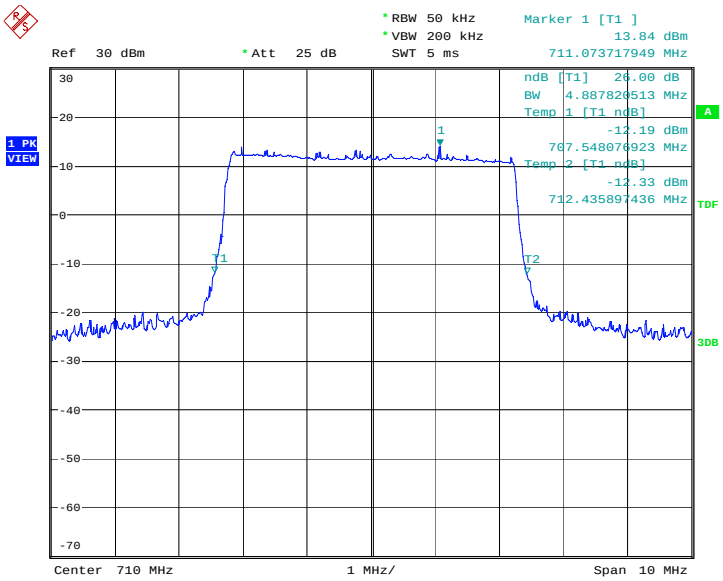



Date: 9.MAY.2014 11:51:44

### LTE band 17, 5MHz (-26dBc)

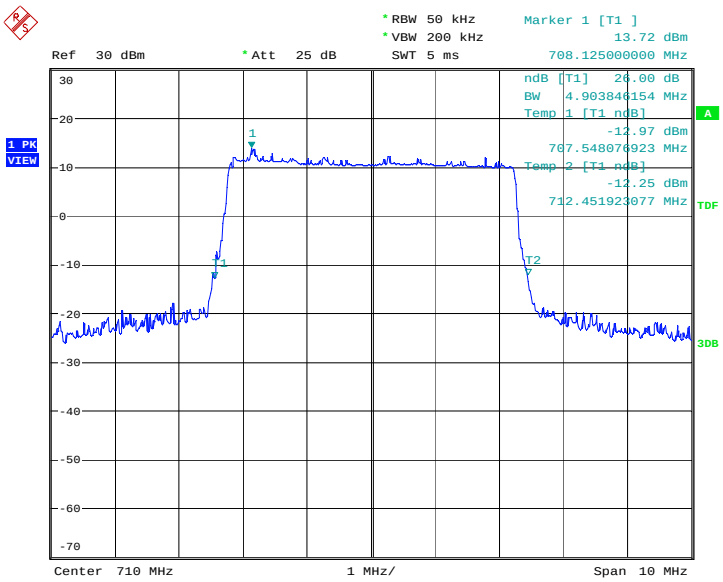
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 710.0 | QPSK | 16QAM |
| | 4887.821 | 4903.846 |

### LTE band 17, 5MHz Bandwidth, QPSK (-26dBc BW)




Date: 19.MAR.2014 09:29:34

### LTE band 17, 5MHz Bandwidth,16QAM (-26dBc BW)

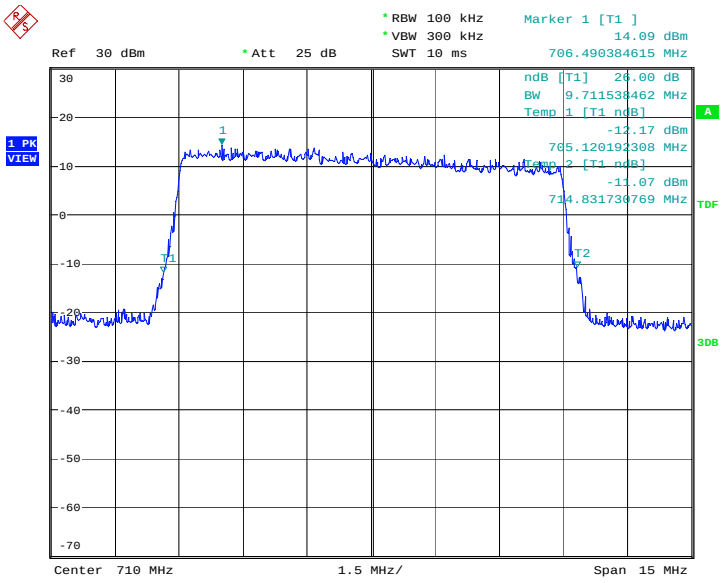



Date: 19.MAR.2014 09:29:50

### LTE band 17, 10MHz (-26dBc)

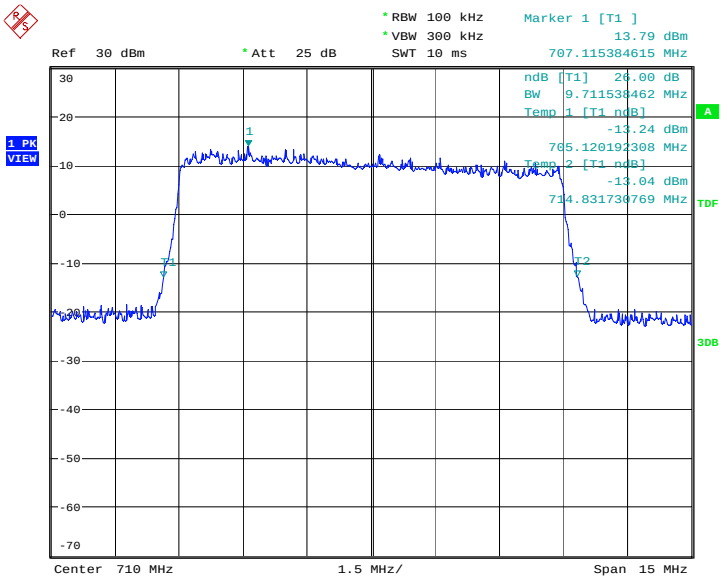
| Frequency(MHz) | Occupied Bandwidth (-26dBc)( kHz) | |
|---|---|---|
| 710.0 | QPSK | 16QAM |
| | 9711.538 | 9711.538 |

### LTE band 17, 10MHz Bandwidth, QPSK (-26dBc BW)




Date: 19.MAR.2014 13:16:13

### LTE band 17, 10MHz Bandwidth, 16QAM (-26dBc BW)




Date: 19.MAR.2014 13:16:28

## A.7 BAND EDGE COMPLIANCE

**Reference**

FCC: CFR Part 22.917(b), 24.238(a), 27.53(h).

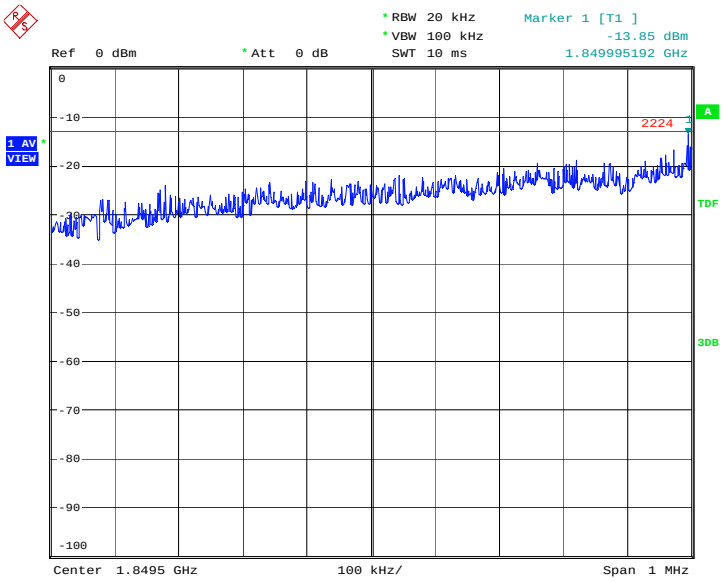
### A.7.1 Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least 43+10Log (P) dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

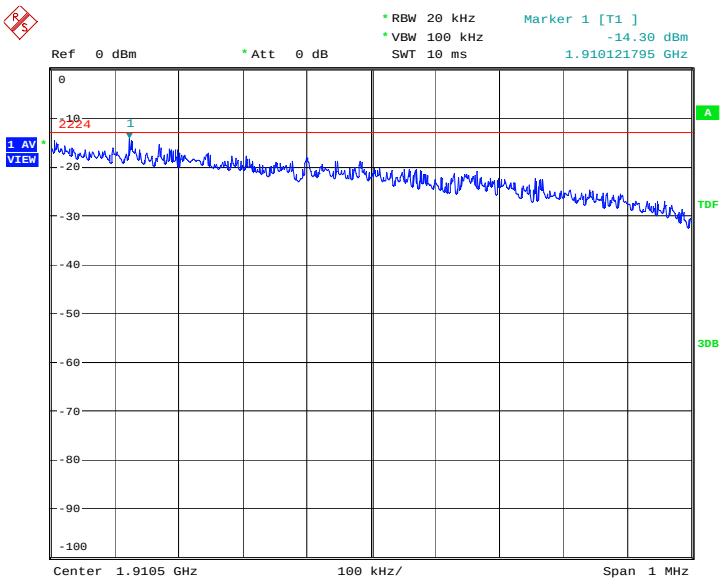
### A.7.2 Measurement result

**LTE band 2, 1.4MHz**

**LOW BAND EDGE BLOCK-QPSK**

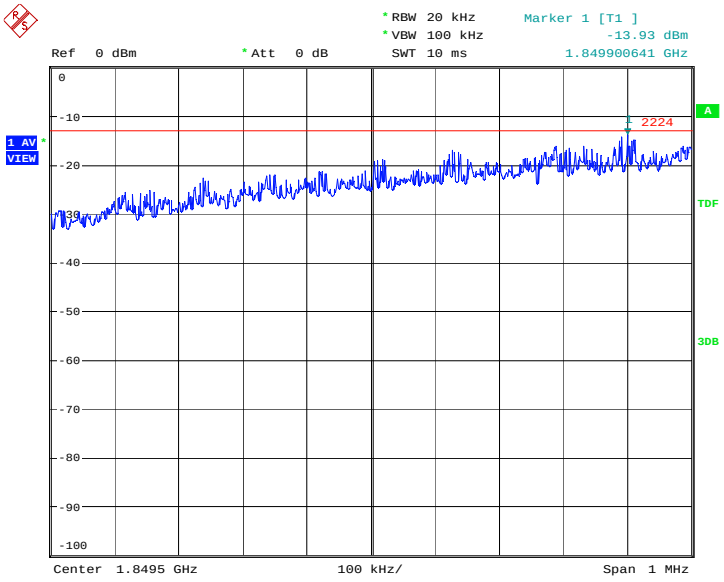


## HIGH BAND EDGE BLOCK-QPSK



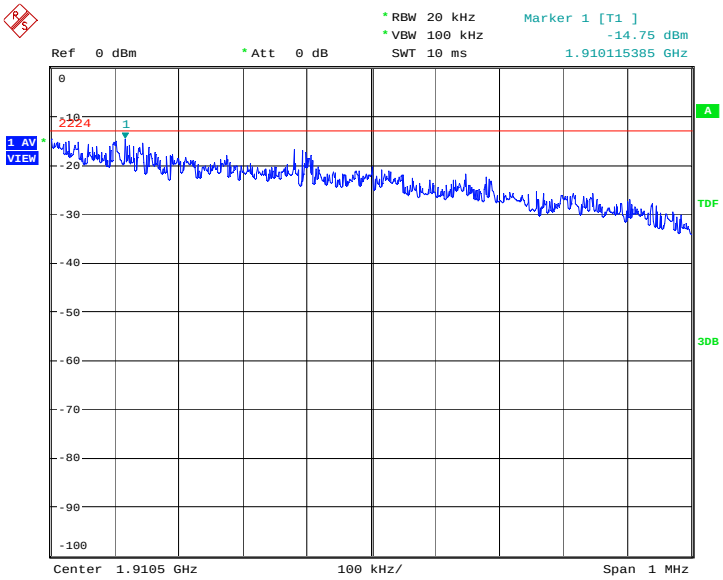

Date: 9.MAY.2014 12:01:30

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 11:54:27

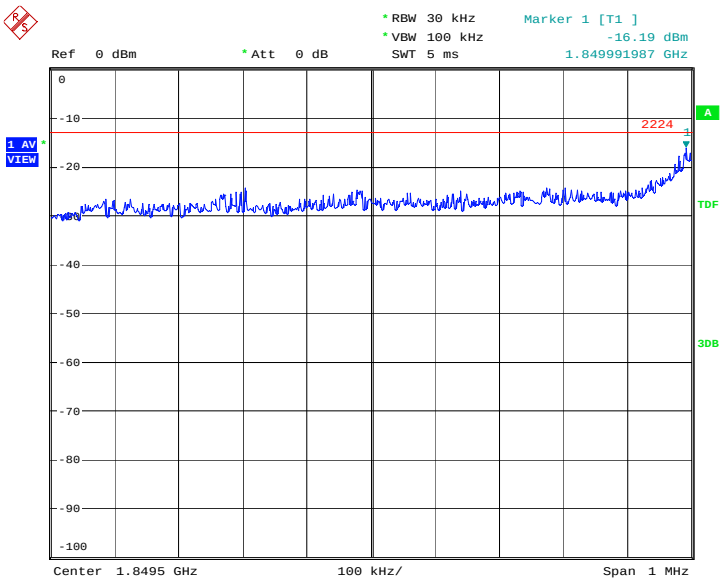
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:01:40

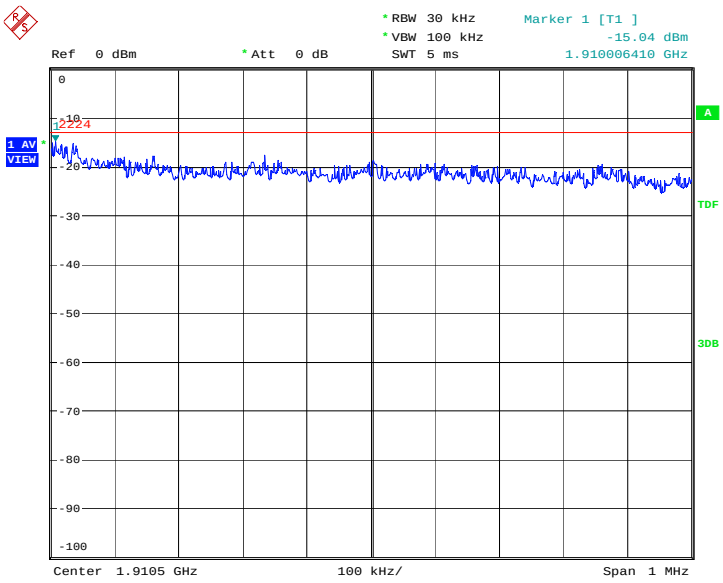
**LTE band 2, 3MHz**

**LOW BAND EDGE BLOCK-QPSK**



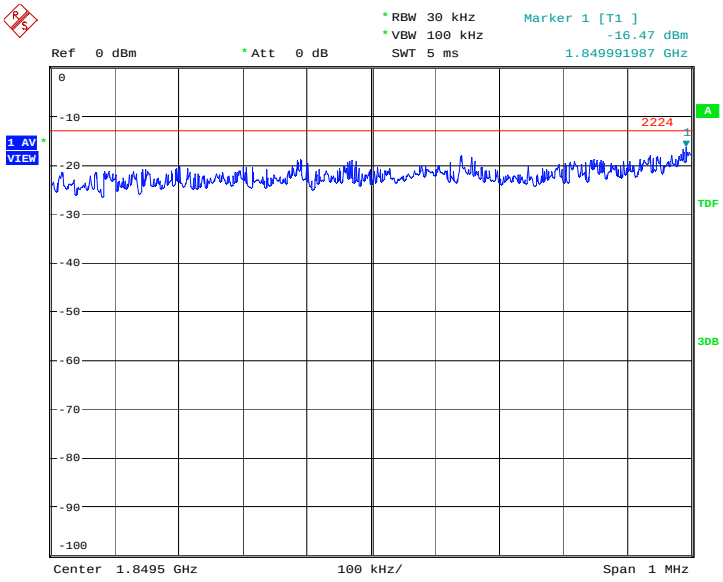

Date: 9.MAY.2014 12:03:40

## HIGH BAND EDGE BLOCK-QPSK



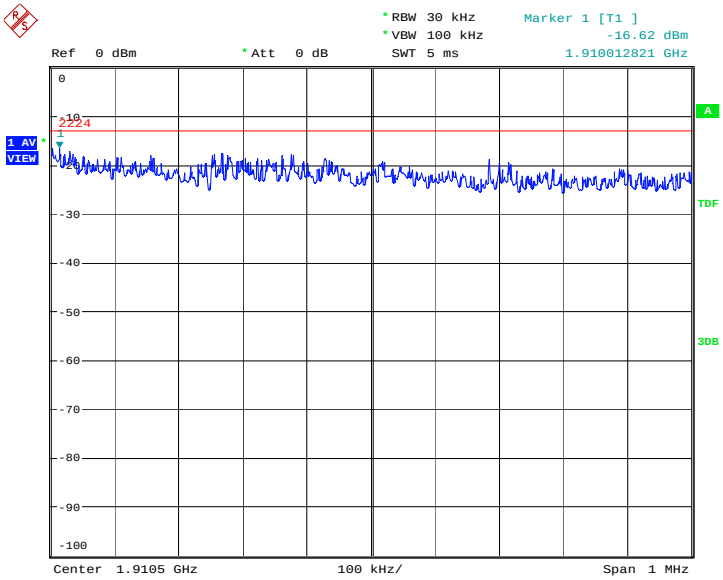

Date: 9.MAY.2014 12:08:20

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:03:50

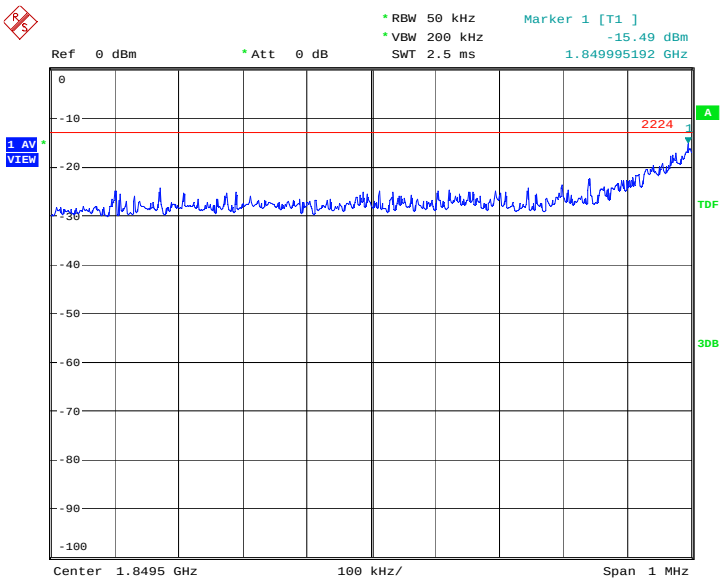
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:08:30

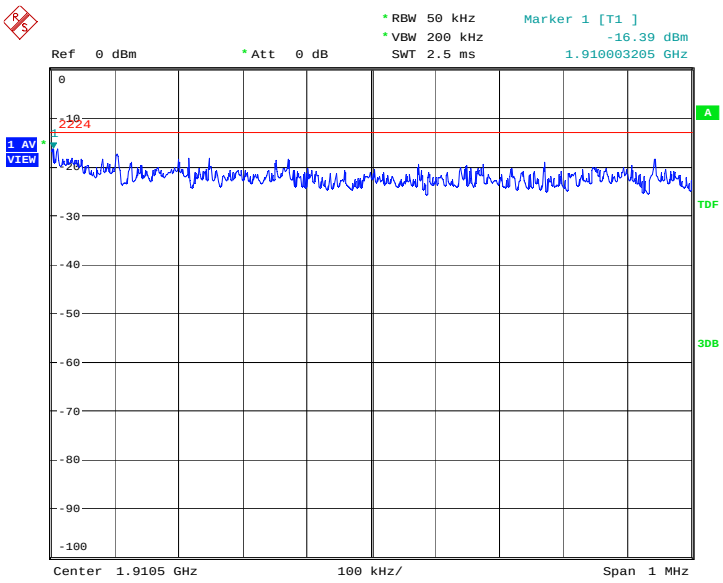
**LTE band 2, 5MHz**

**LOW BAND EDGE BLOCK-QPSK**



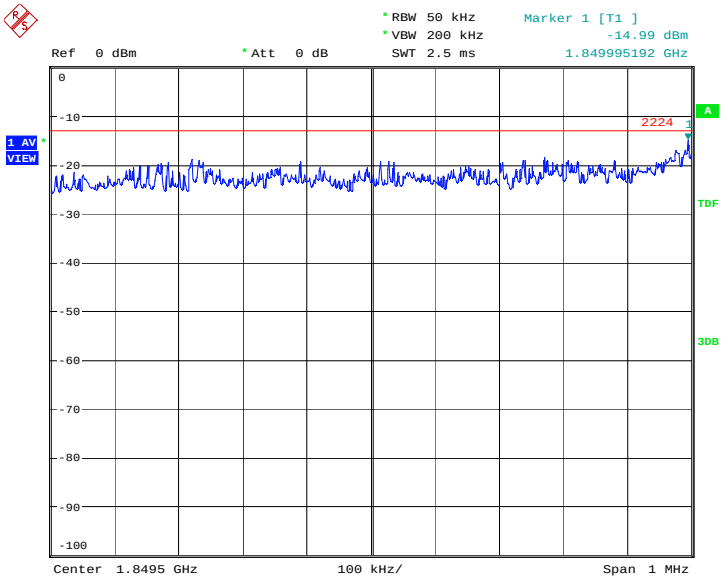

Date: 9.MAY.2014 12:11:32

## HIGH BAND EDGE BLOCK-QPSK



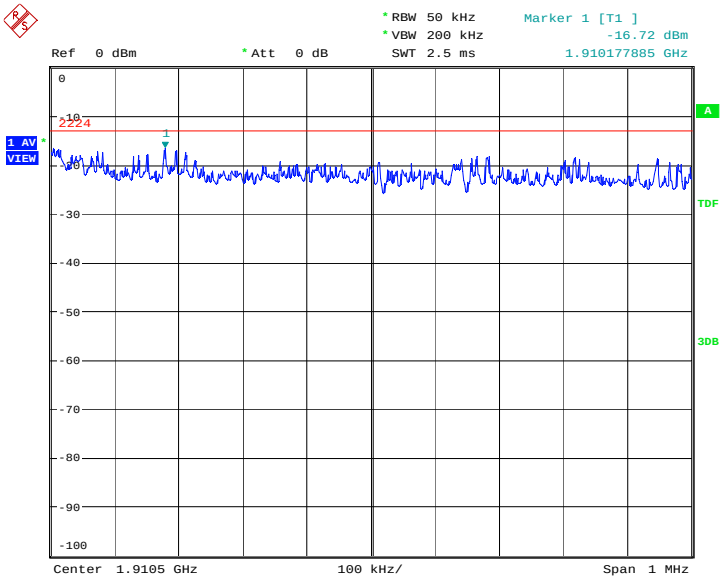

Date: 9.MAY.2014 12:13:41

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:11:42

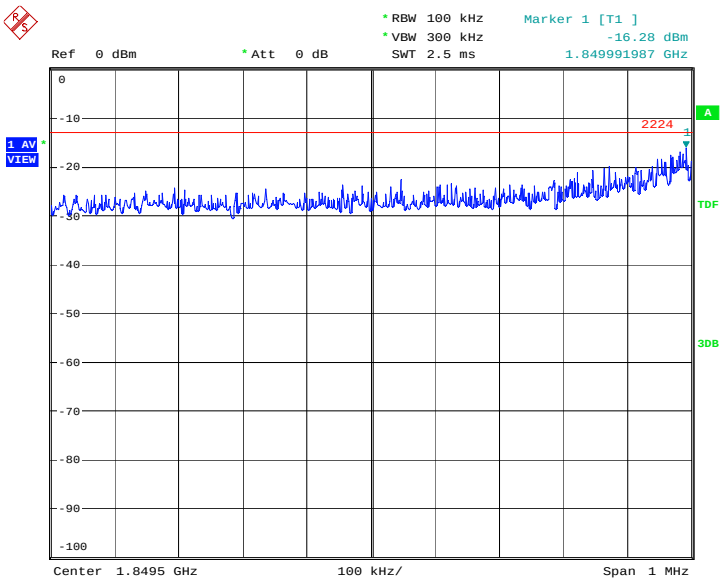
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:13:51

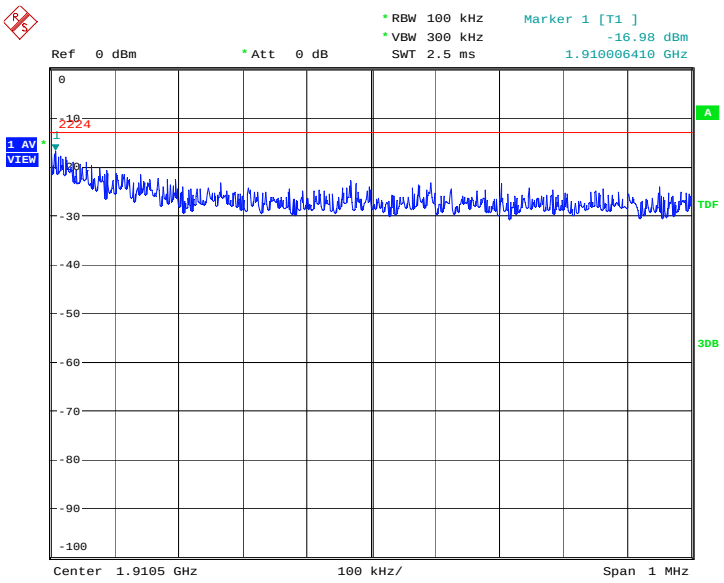
**LTE band 2, 10MHz**

**LOW BAND EDGE BLOCK-QPSK**



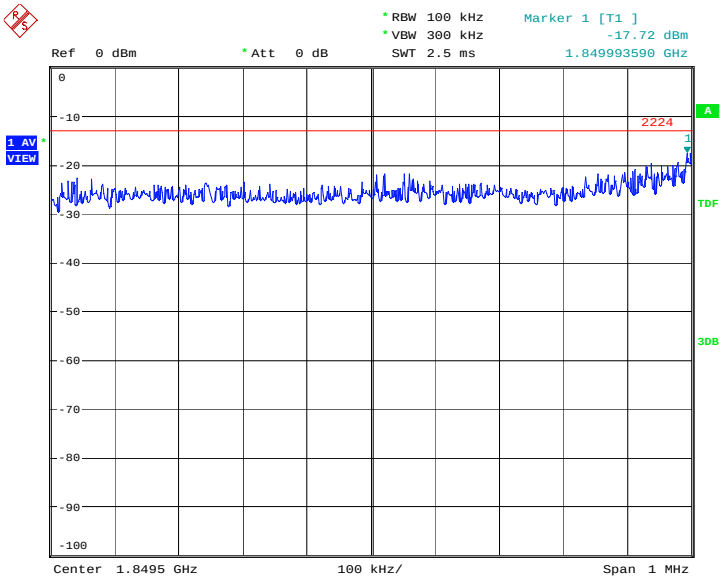

Date: 9.MAY.2014 12:57:06

## HIGH BAND EDGE BLOCK-QPSK



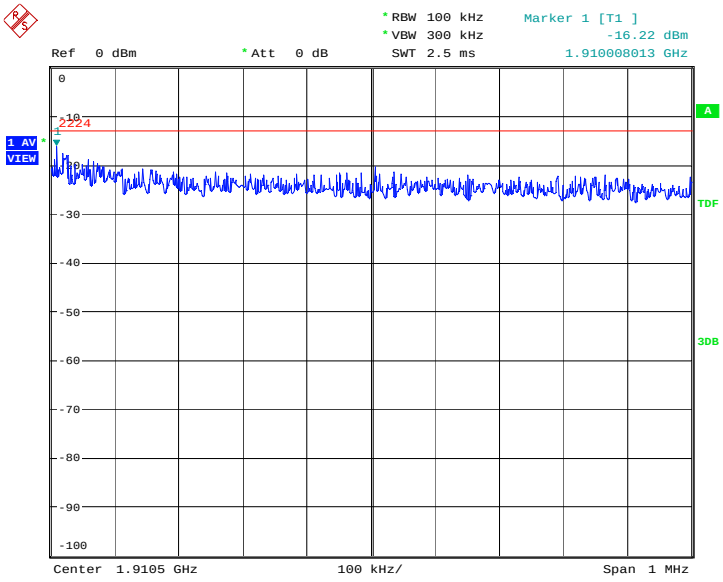

Date: 9.MAY.2014 13:06:53

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 12:57:16

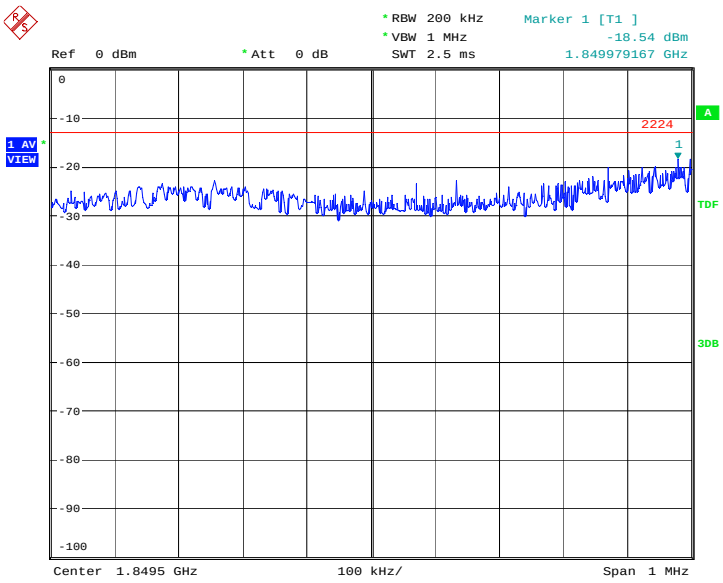
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 13:07:03

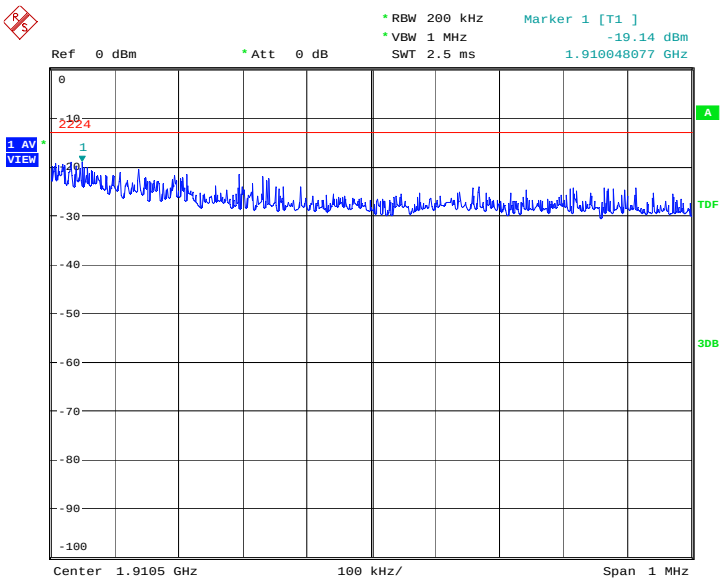
**LTE band 2, 15MHz**

**LOW BAND EDGE BLOCK-QPSK**



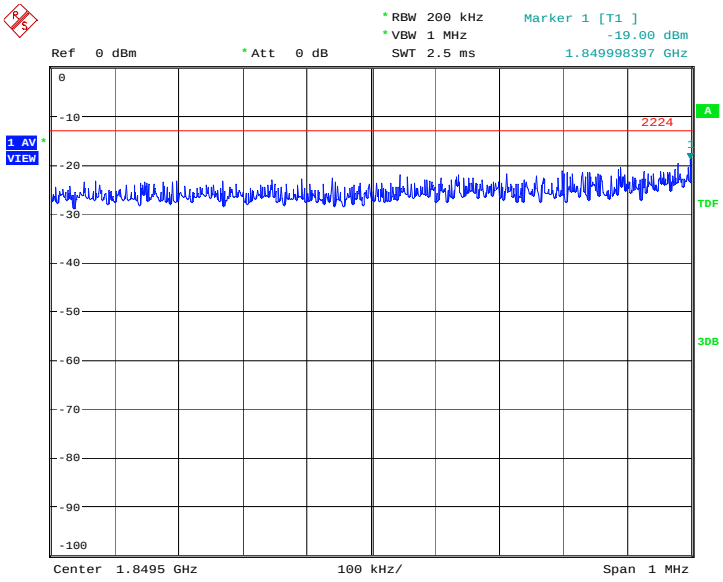

Date: 9.MAY.2014 14:07:46

## HIGH BAND EDGE BLOCK-QPSK



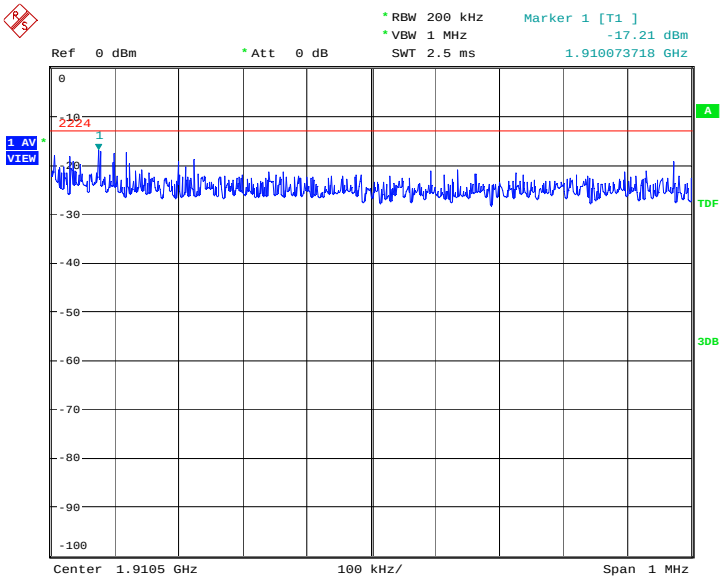

Date: 9.MAY.2014 14:40:05

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 14:07:57

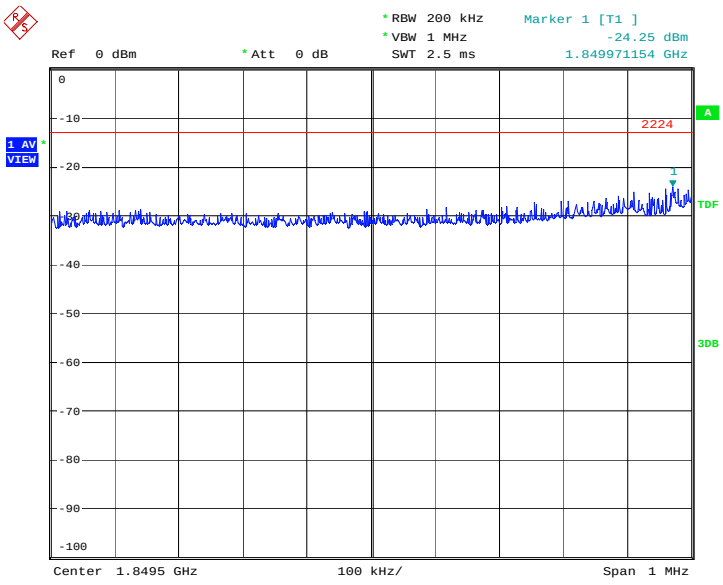
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 14:40:15

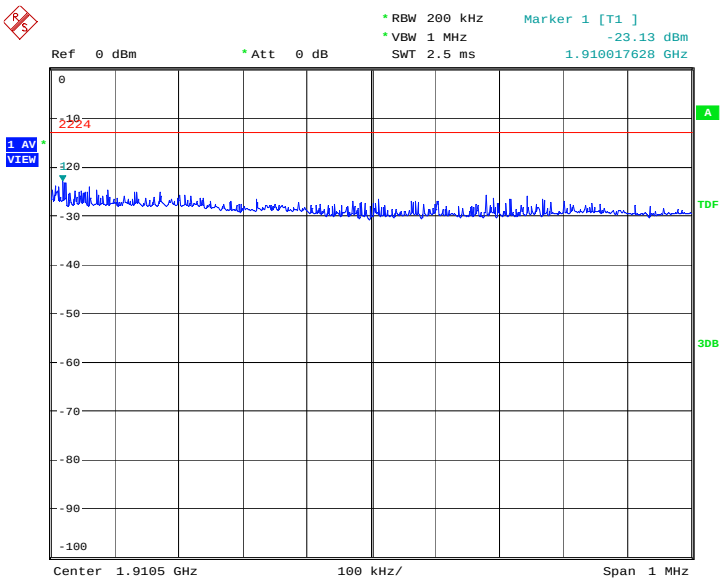
**LTE band 2, 20MHz**

**LOW BAND EDGE BLOCK-QPSK**



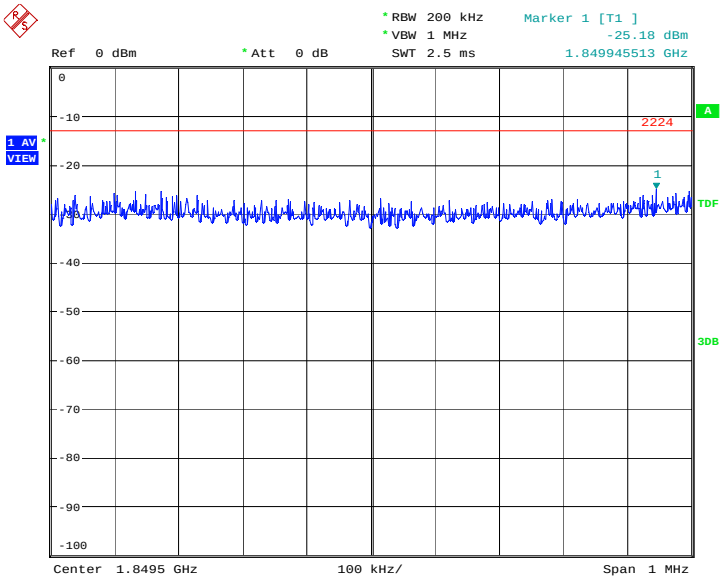

Date: 9.MAY.2014 14:49:52

## HIGH BAND EDGE BLOCK-QPSK



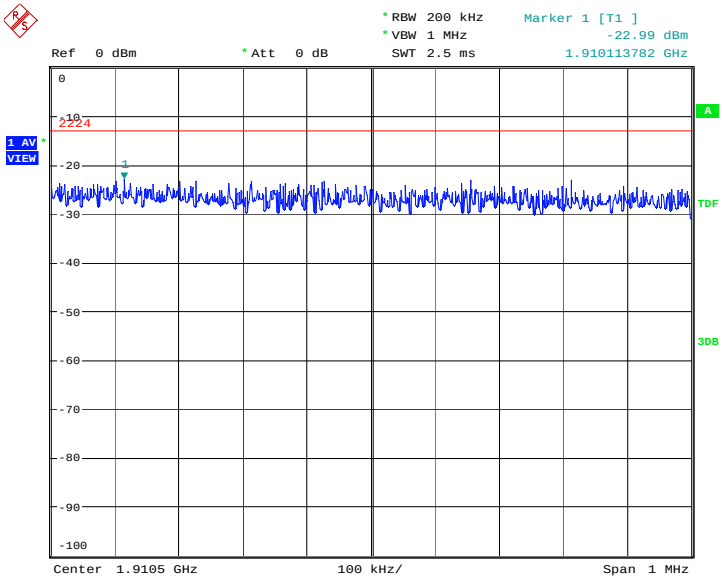

Date: 9.MAY.2014 14:54:03

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 14:50:03

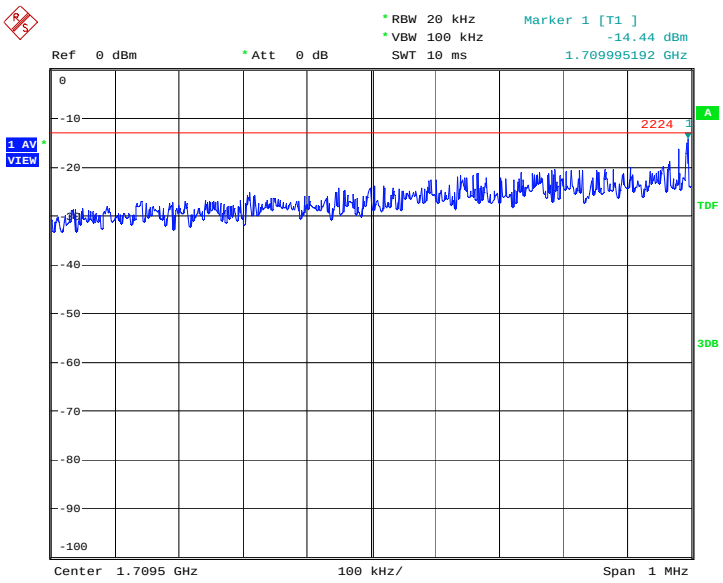
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 14:54:13

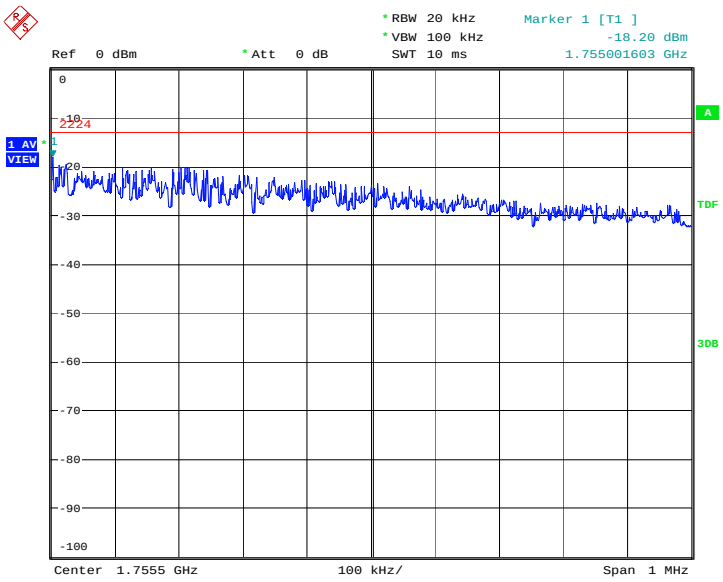
## LTE band 4, 1.4MHz

## LOW BAND EDGE BLOCK-QPSK



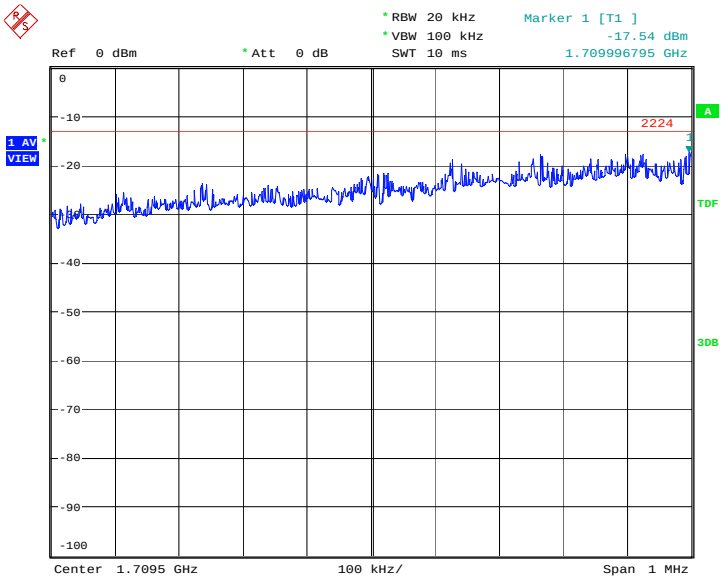

Date: 18.MAR.2014 14:40:53

## HIGH BAND EDGE BLOCK-QPSK



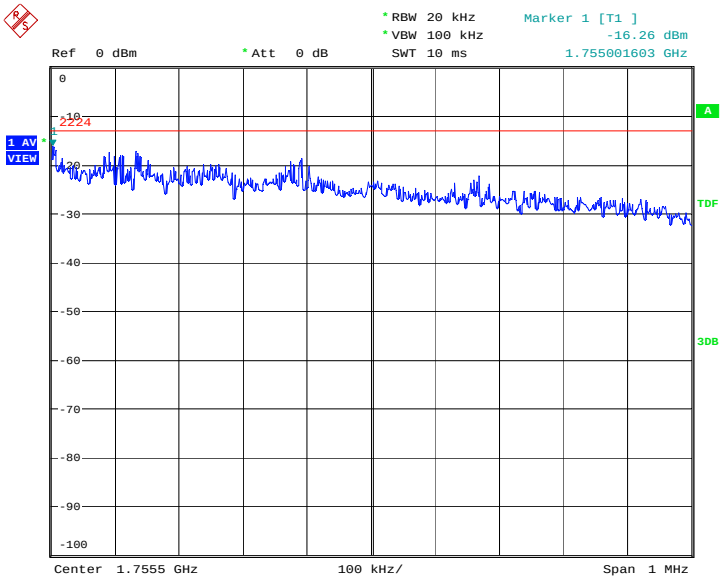

Date: 18.MAR.2014 14:49:44

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 14:41:03

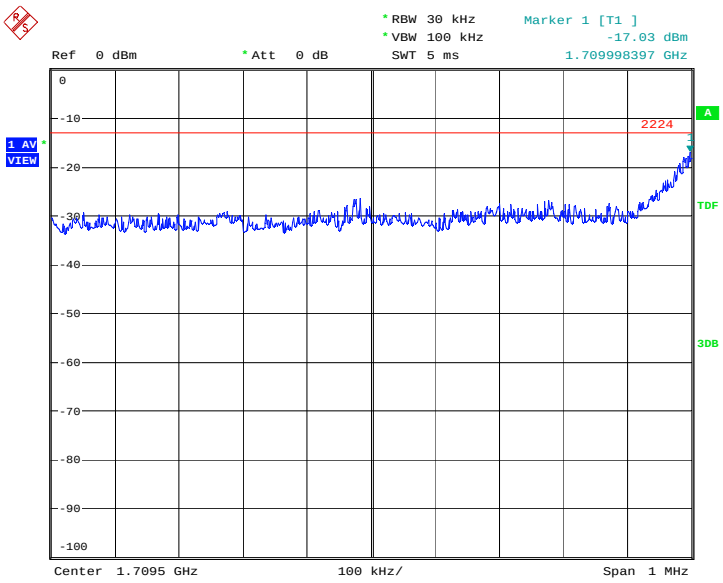
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 14:49:54

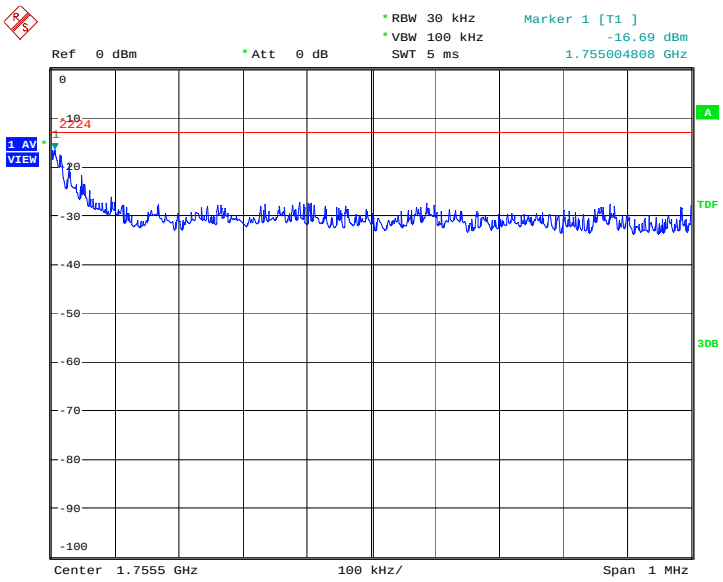
## LTE band 4, 3MHz

## LOW BAND EDGE BLOCK-QPSK



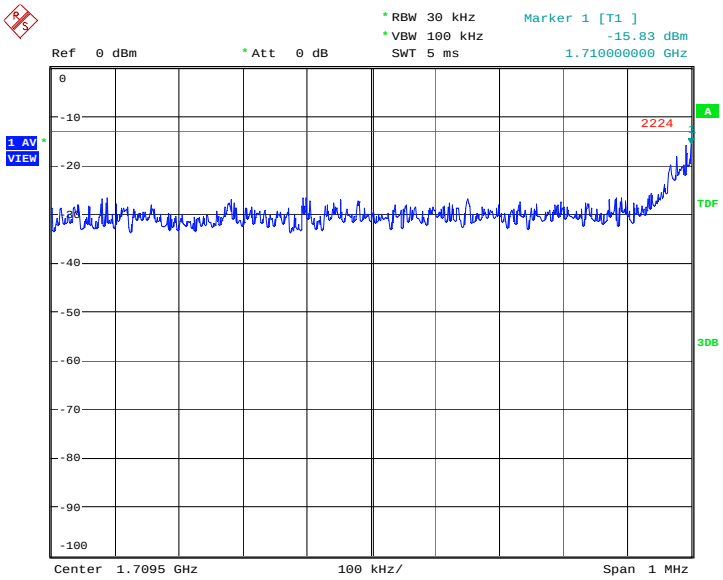

Date: 18.MAR.2014 15:33:54

## HIGH BAND EDGE BLOCK-QPSK



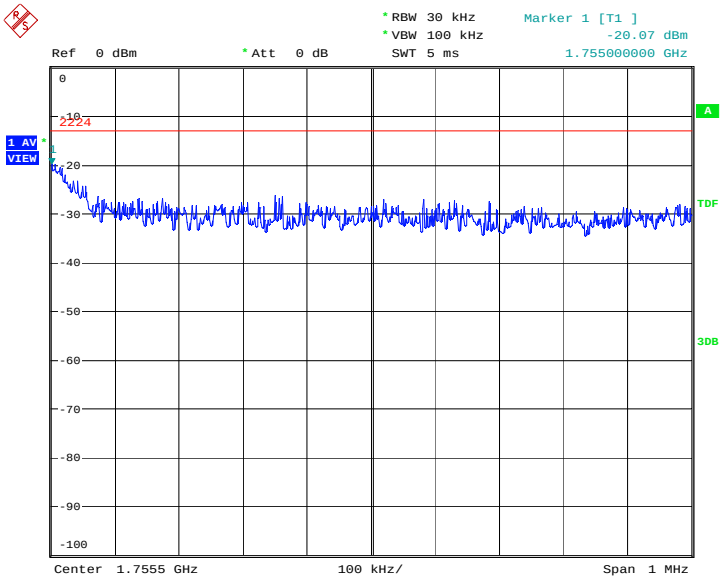

Date: 18.MAR.2014 15:38:16

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:34:04

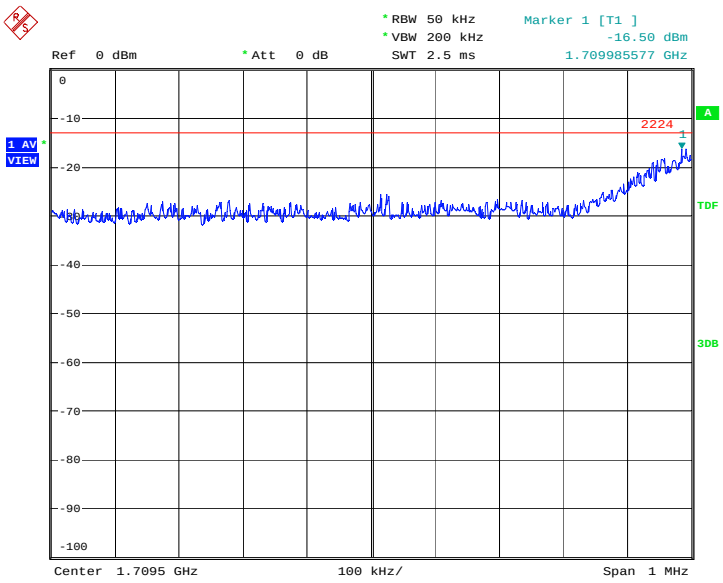
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:38:26

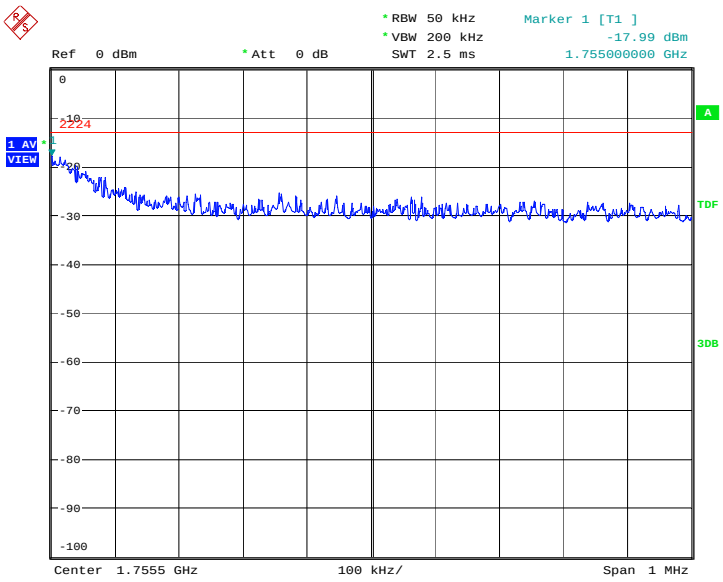
## LTE band 4, 5MHz

## LOW BAND EDGE BLOCK-QPSK



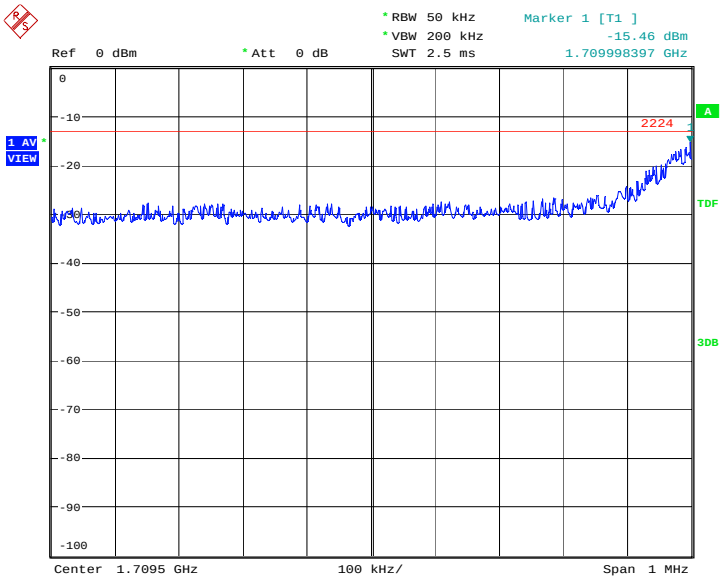

Date: 18.MAR.2014 15:40:25

## HIGH BAND EDGE BLOCK-QPSK



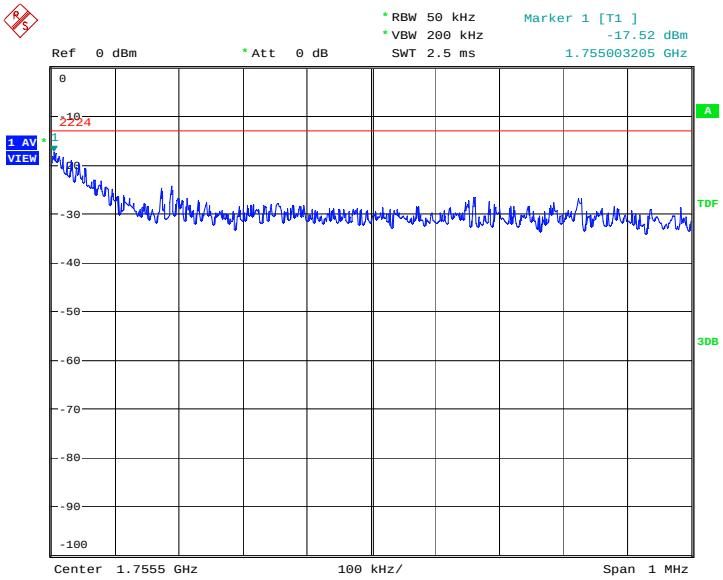

Date: 18.MAR.2014 15:43:45

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:40:35

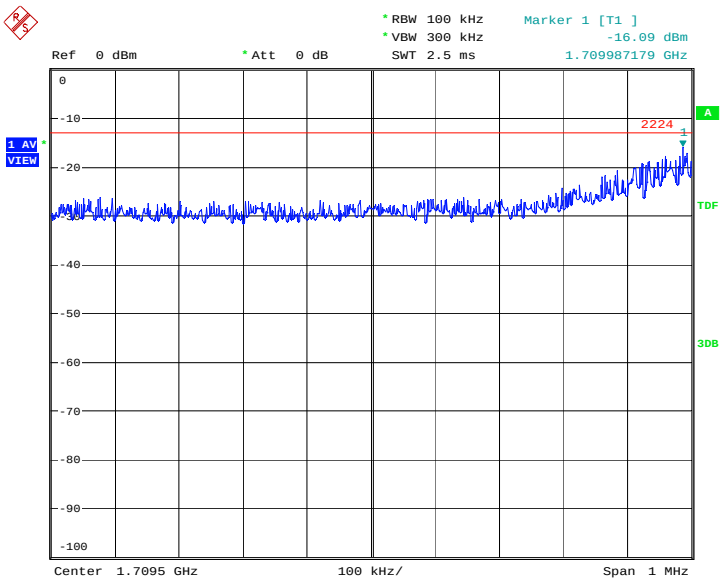
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:43:56

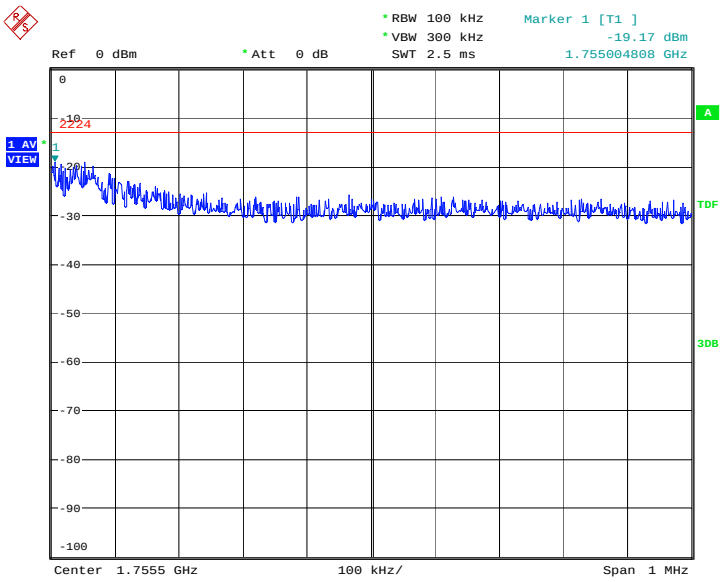
## LTE band 4, 10MHz

## LOW BAND EDGE BLOCK-QPSK



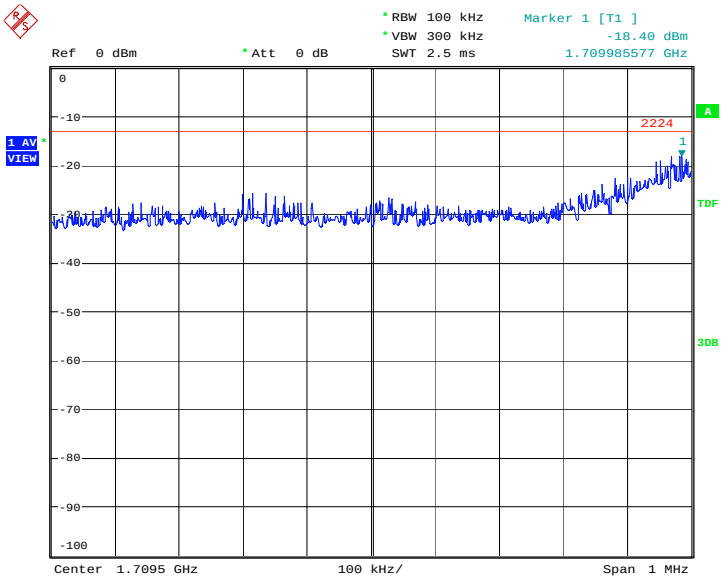

Date: 18.MAR.2014 15:46:25

## HIGH BAND EDGE BLOCK-QPSK



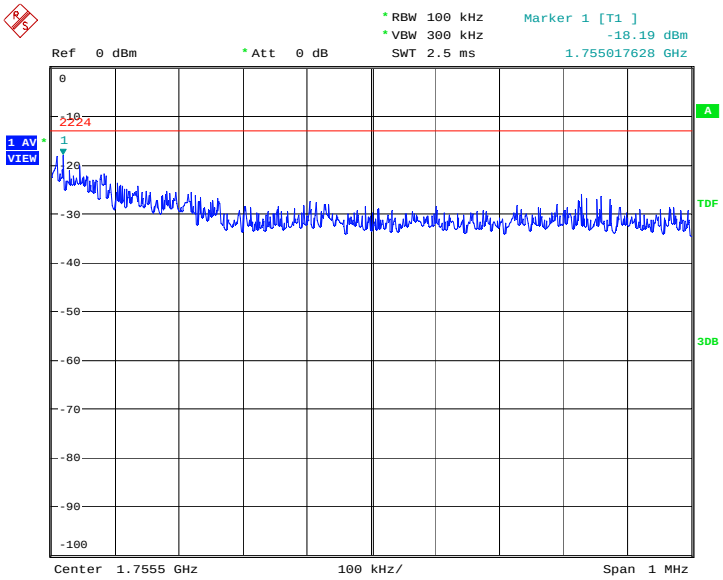

Date: 18.MAR.2014 15:49:45

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:46:35

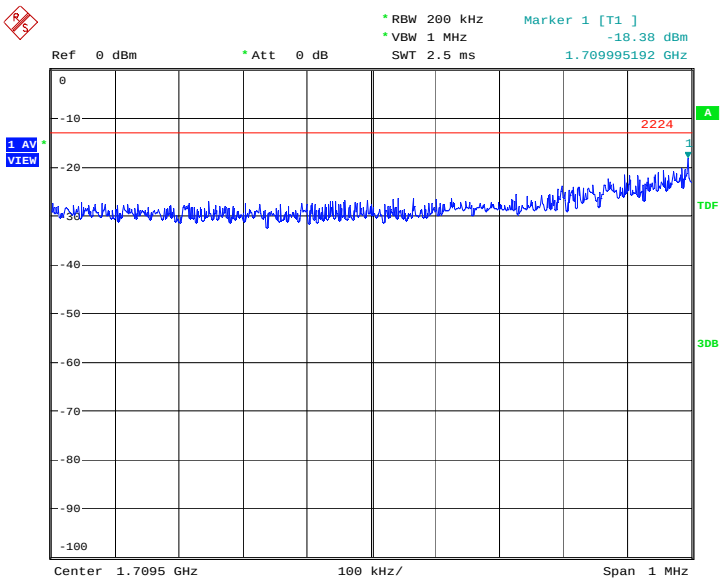
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:49:55

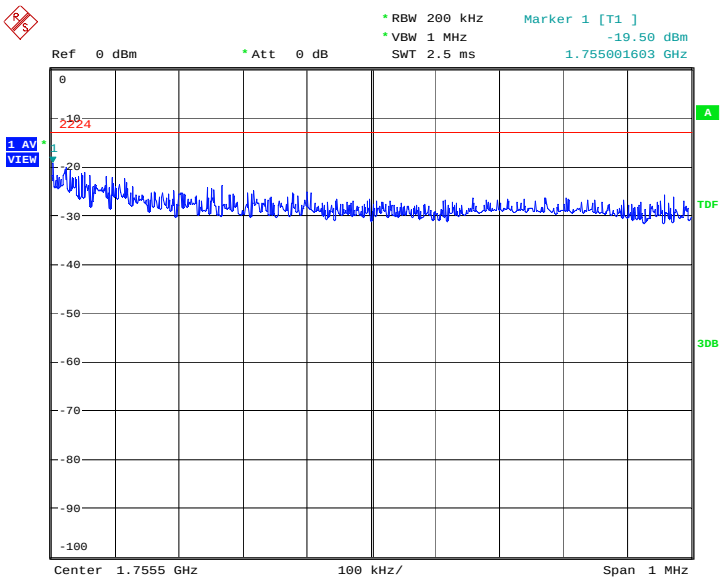
## LTE band 4, 15MHz

## LOW BAND EDGE BLOCK-QPSK



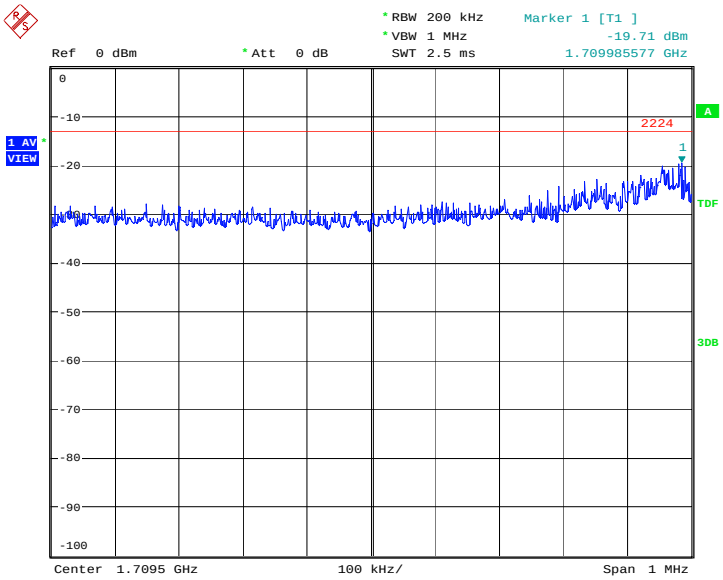

Date: 18.MAR.2014 15:52:25

## HIGH BAND EDGE BLOCK-QPSK



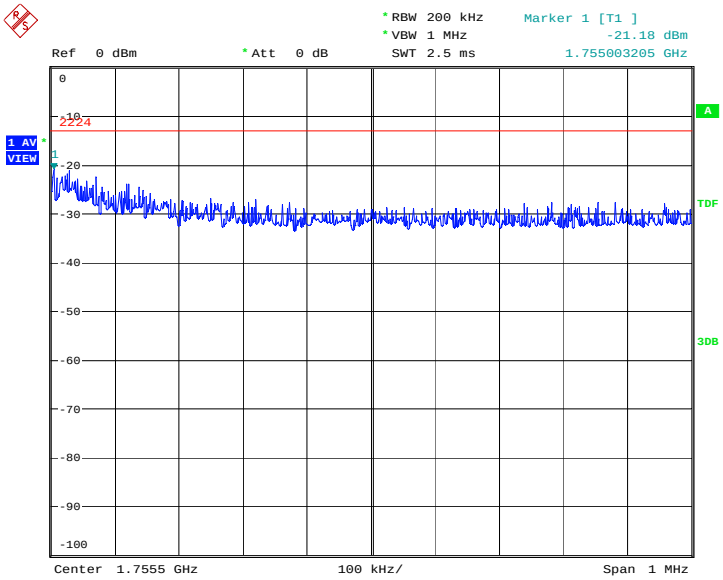

Date: 18.MAR.2014 15:55:45

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:52:35

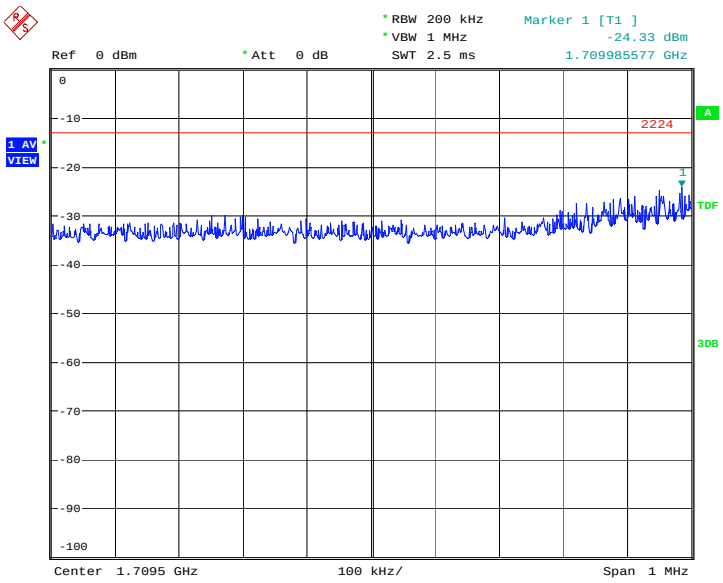
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:55:56

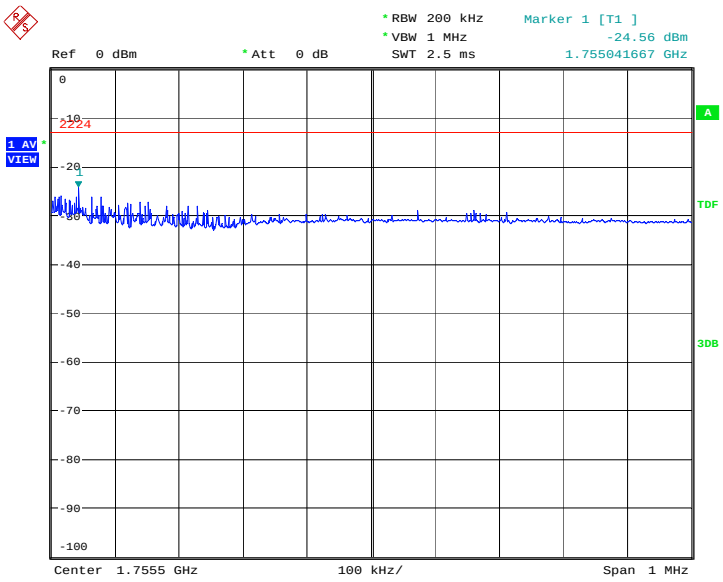
## LTE band 4, 20MHz

## LOW BAND EDGE BLOCK-QPSK



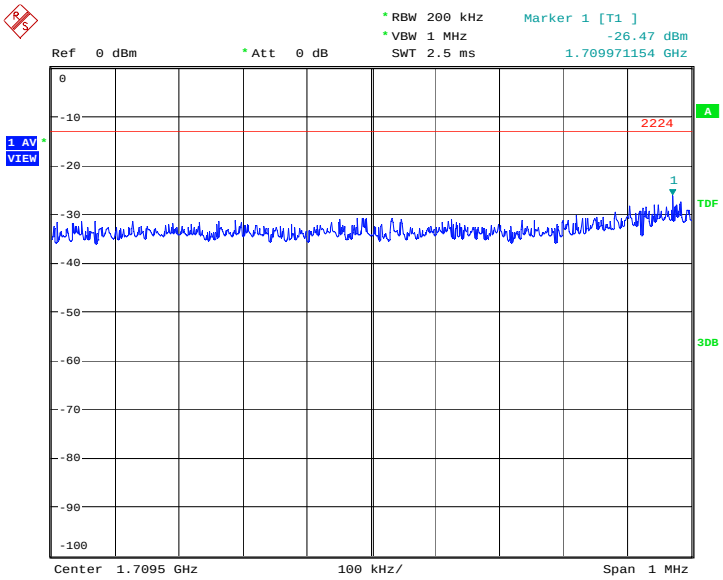

Date: 18.MAR.2014 15:57:55

## HIGH BAND EDGE BLOCK-QPSK



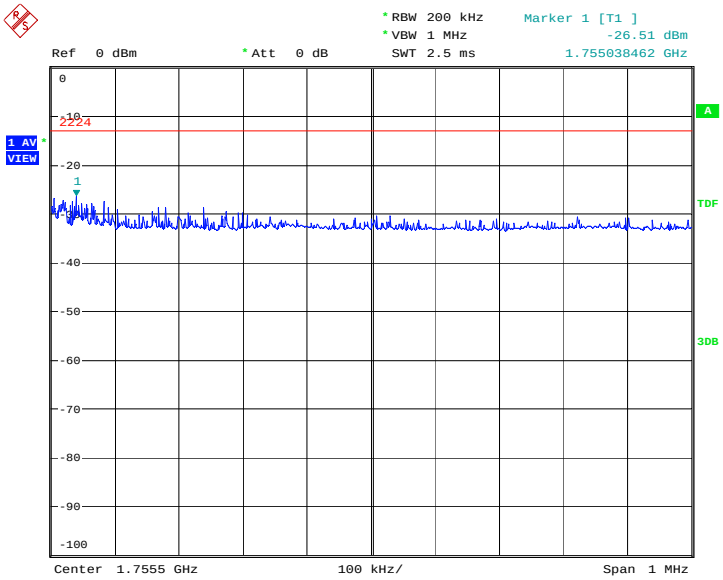

Date: 18.MAR.2014 16:01:46

## LOW BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 15:58:05

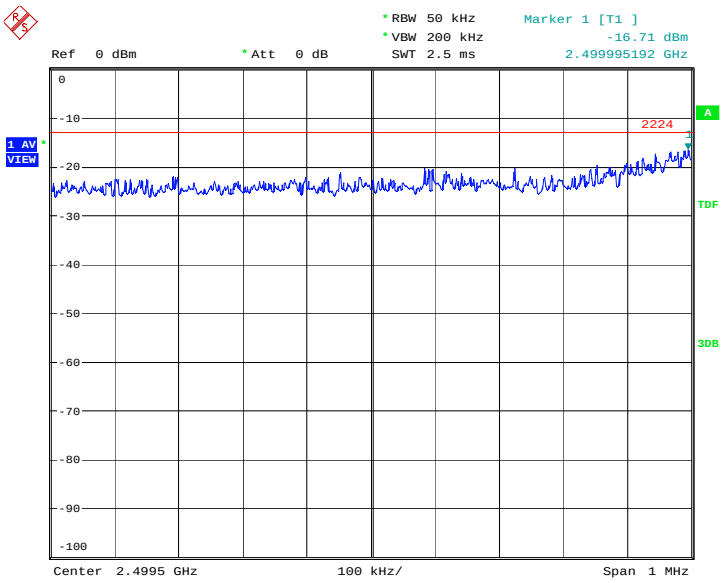
## HIGH BAND EDGE BLOCK-16QAM




Date: 18.MAR.2014 16:01:56

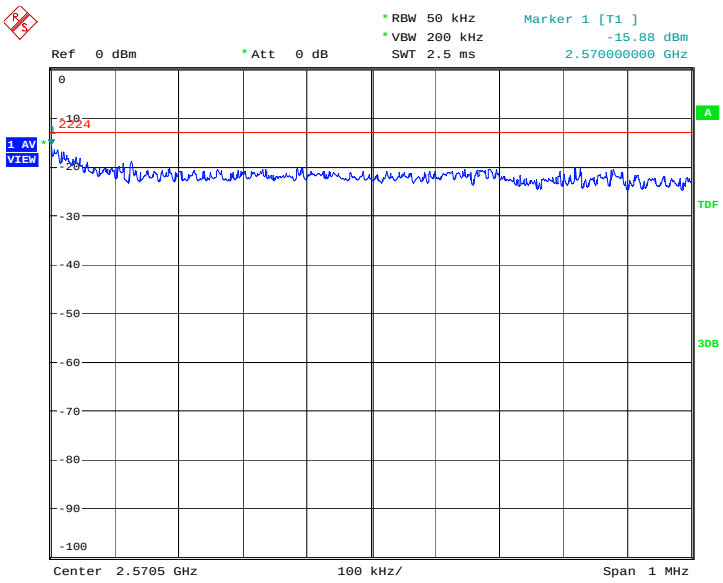
**LTE band 7, 5MHz**

**LOW BAND EDGE BLOCK-QPSK**



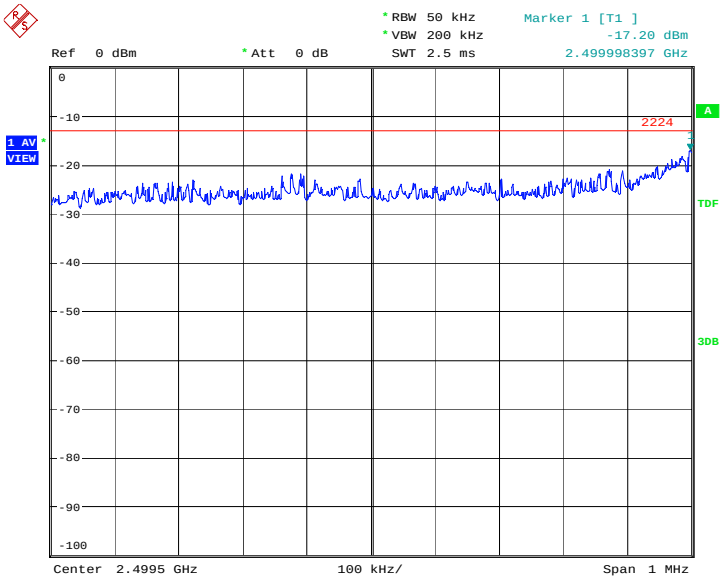

Date: 9.MAY.2014 14:59:33

## HIGH BAND EDGE BLOCK-QPSK



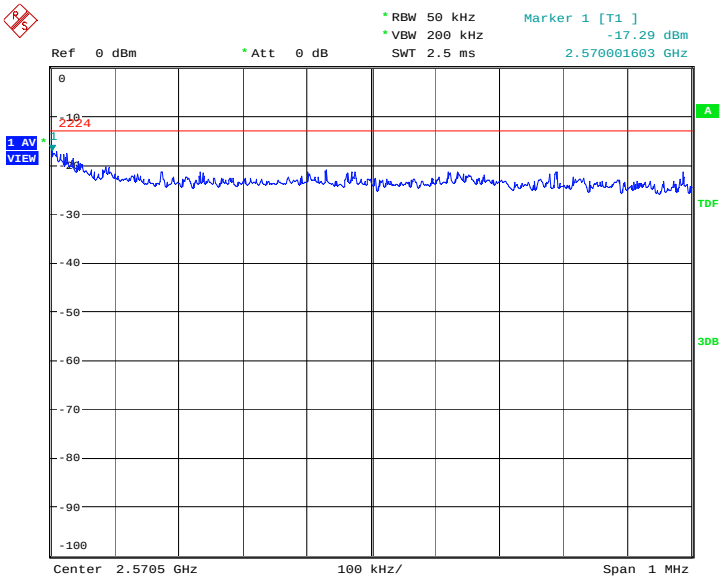

Date: 9.MAY.2014 15:04:14

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 14:59:43

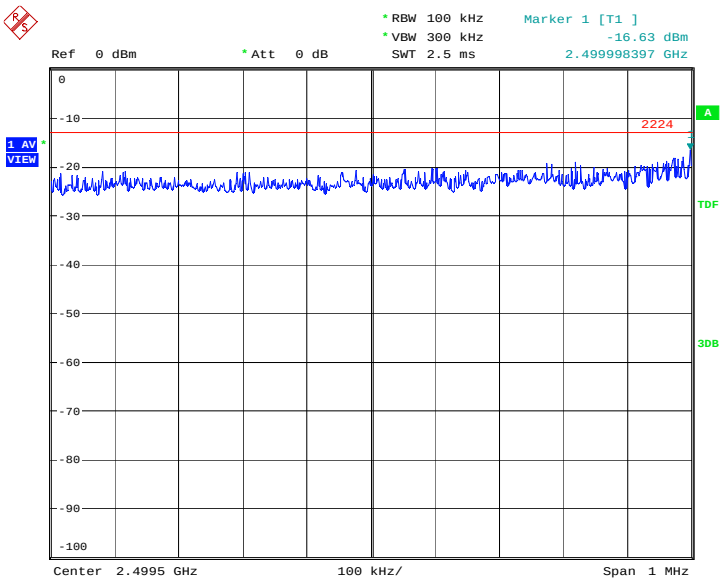
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 15:04:24

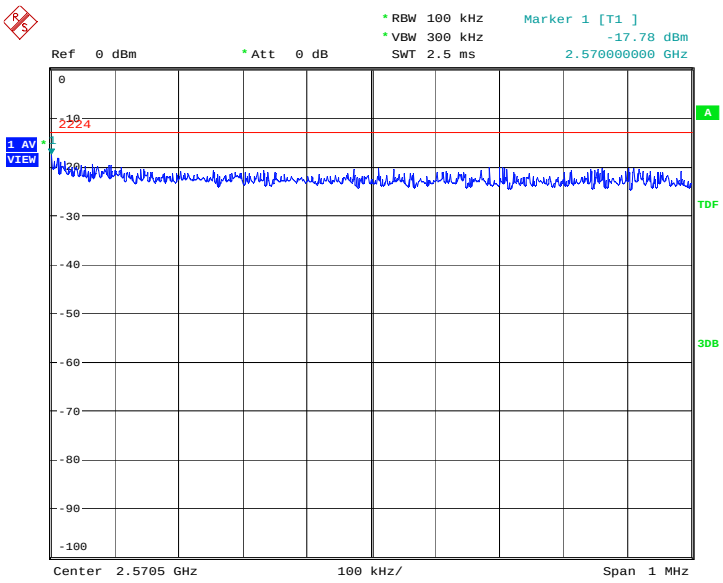
**LTE band 7, 10MHz**

**LOW BAND EDGE BLOCK-QPSK**



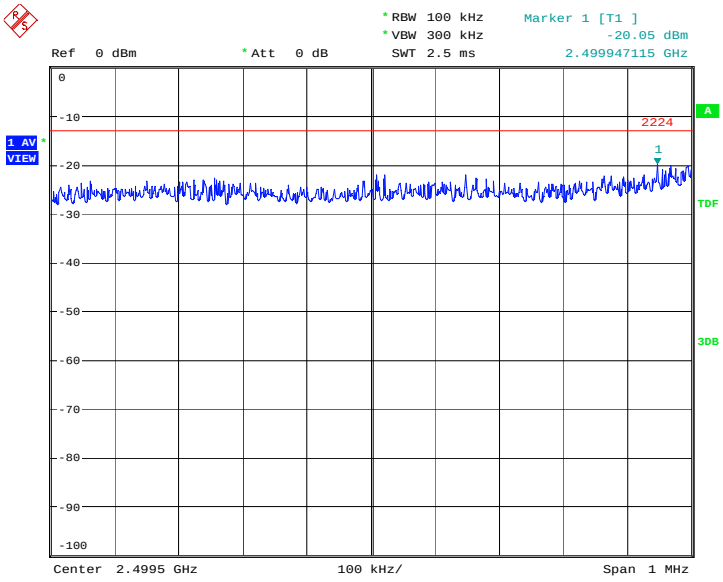

Date: 9.MAY.2014 15:06:23

## HIGH BAND EDGE BLOCK-QPSK



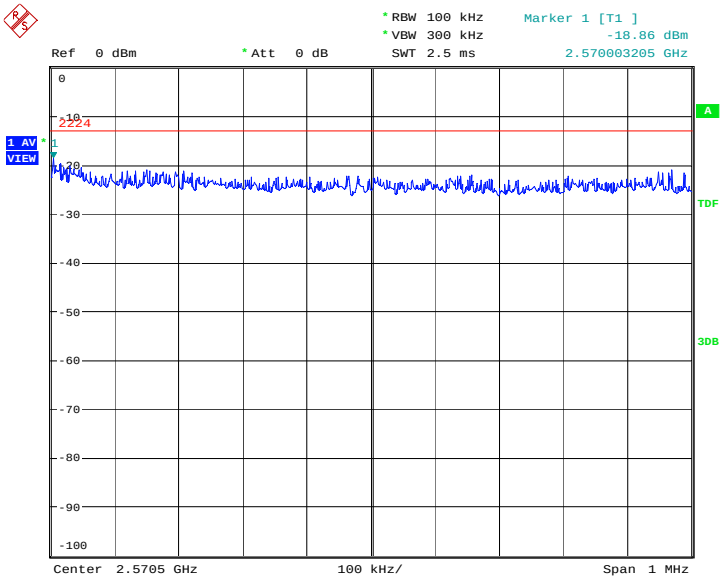

Date: 9.MAY.2014 15:08:32

## LOW BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 15:06:33

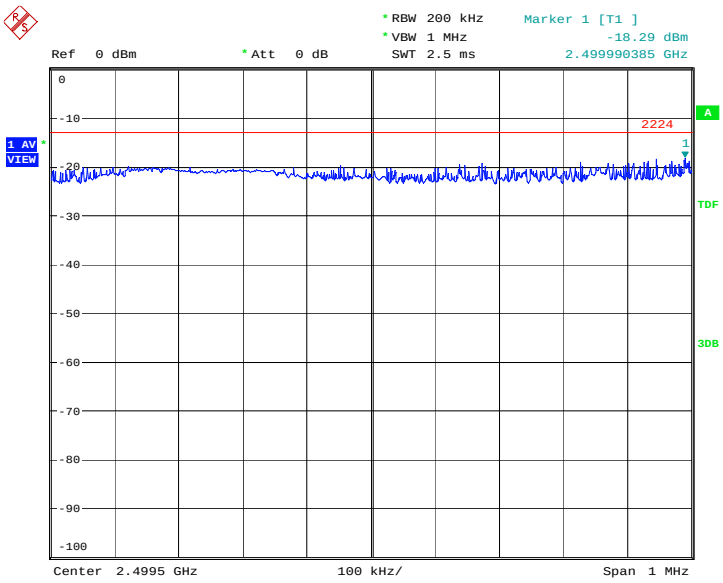
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 15:08:42

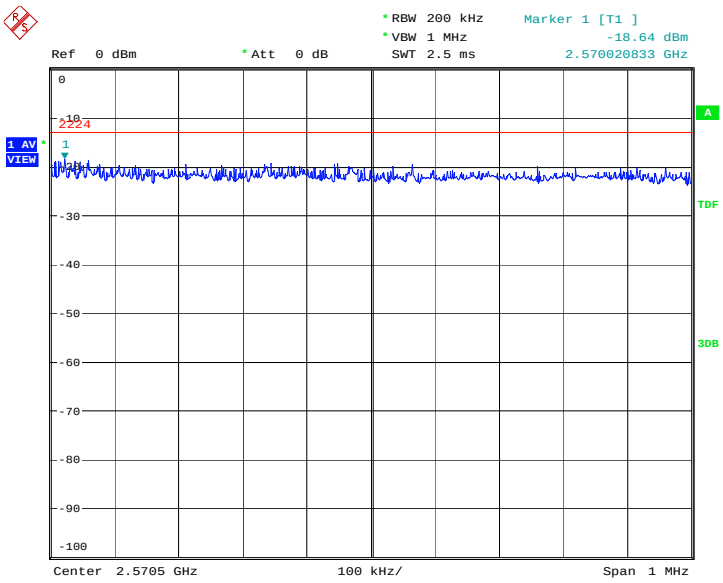
**LTE band 7, 15MHz**

**LOW BAND EDGE BLOCK-QPSK**



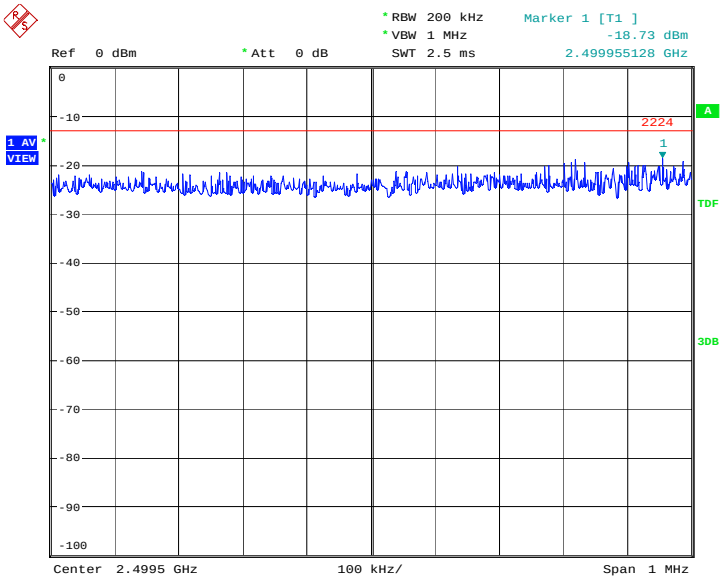

Date: 9.MAY.2014 15:12:44

## HIGH BAND EDGE BLOCK-QPSK




Date: 9.MAY.2014 15:18:28

## LOW BAND EDGE BLOCK-16QAM

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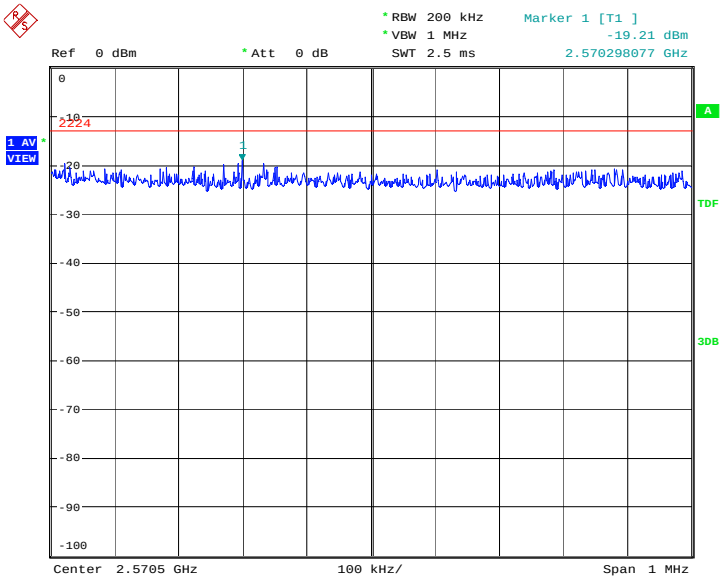
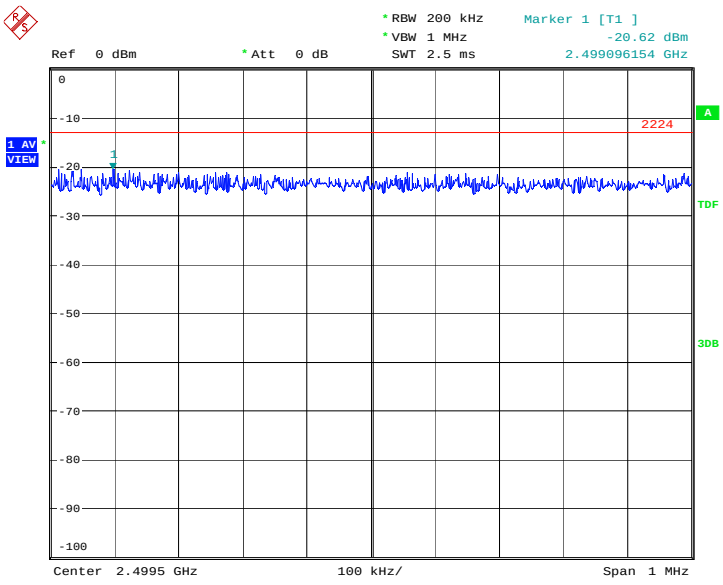
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 15:18:38

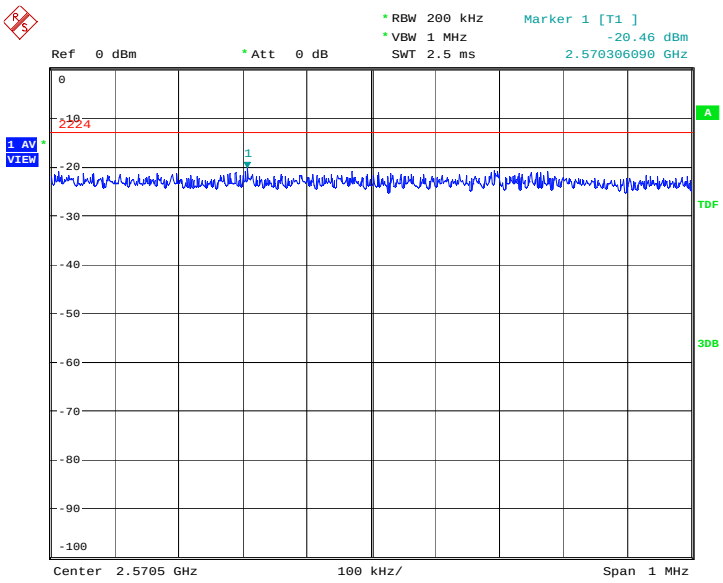
**LTE band 7, 20MHz**

**LOW BAND EDGE BLOCK-QPSK**



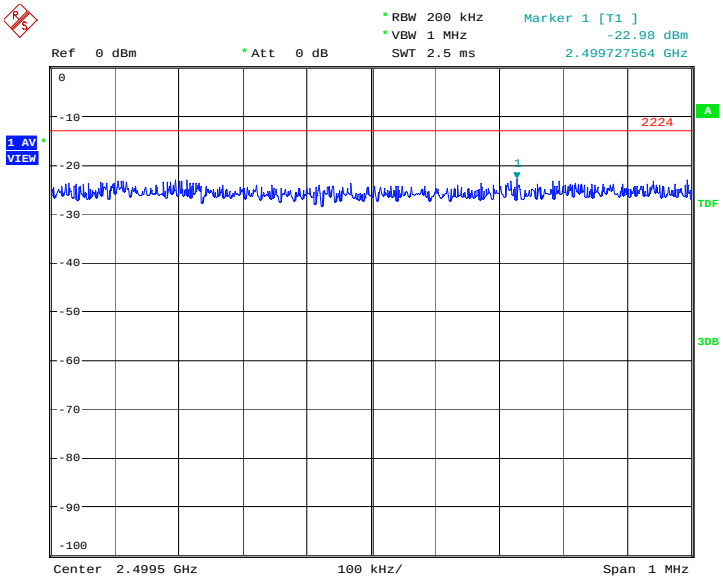

Date: 9.MAY.2014 15:24:08

## HIGH BAND EDGE BLOCK-QPSK




Date: 9.MAY.2014 15:29:20

## LOW BAND EDGE BLOCK-16QAM

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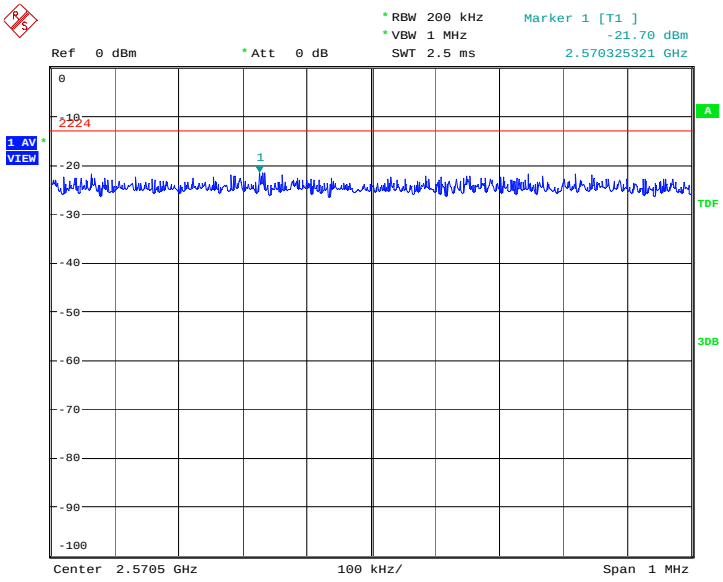
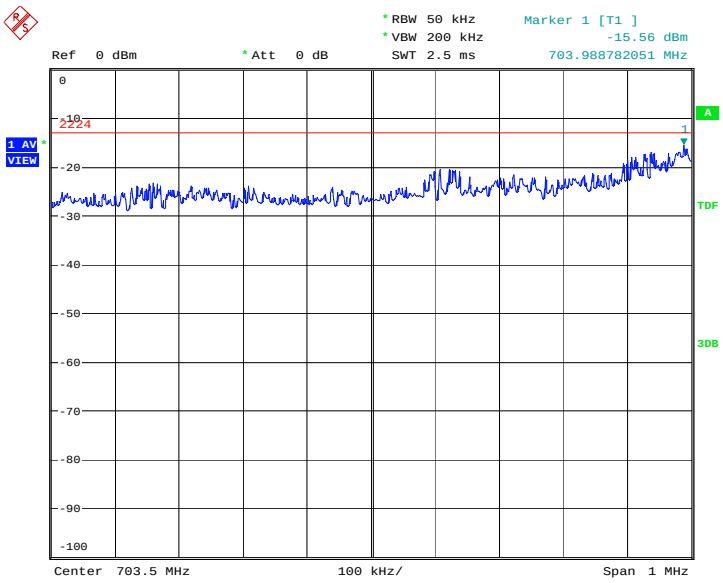
## HIGH BAND EDGE BLOCK-16QAM




Date: 9.MAY.2014 15:29:30

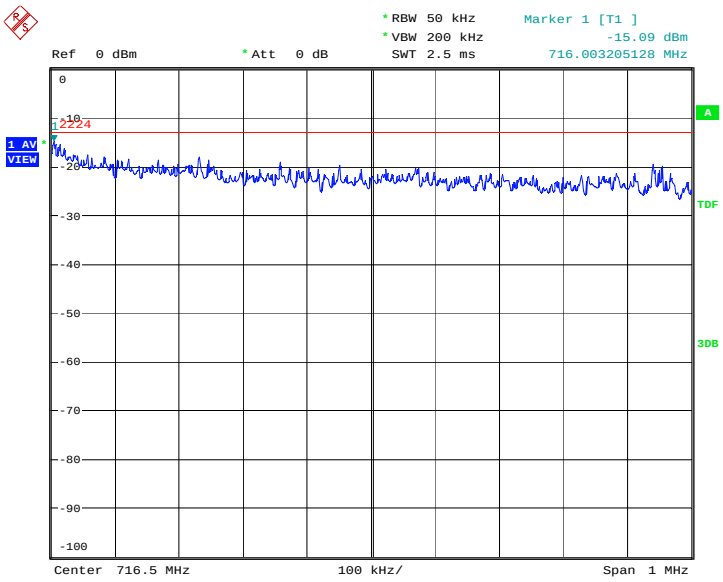
## LTE band 17, 5MHz

## LOW BAND EDGE BLOCK-QPSK




Date: 19.MAR.2014 09:28:29

## HIGH BAND EDGE BLOCK-QPSK




Date: 19.MAR.2014 09:31:49

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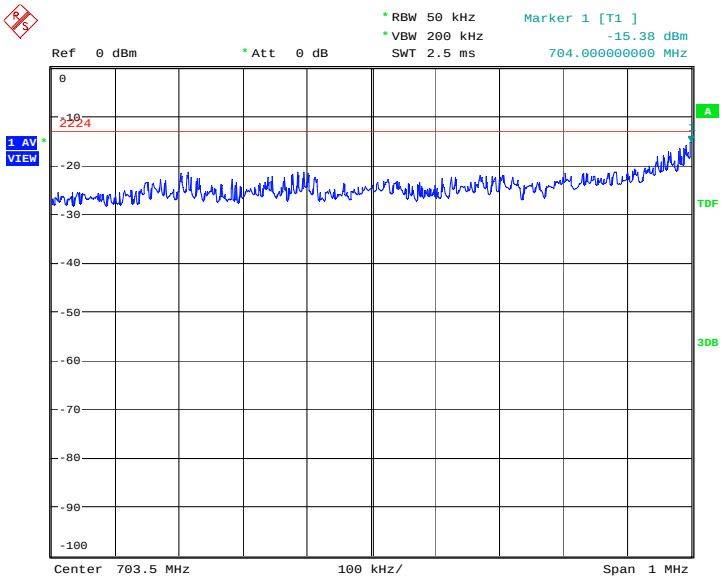
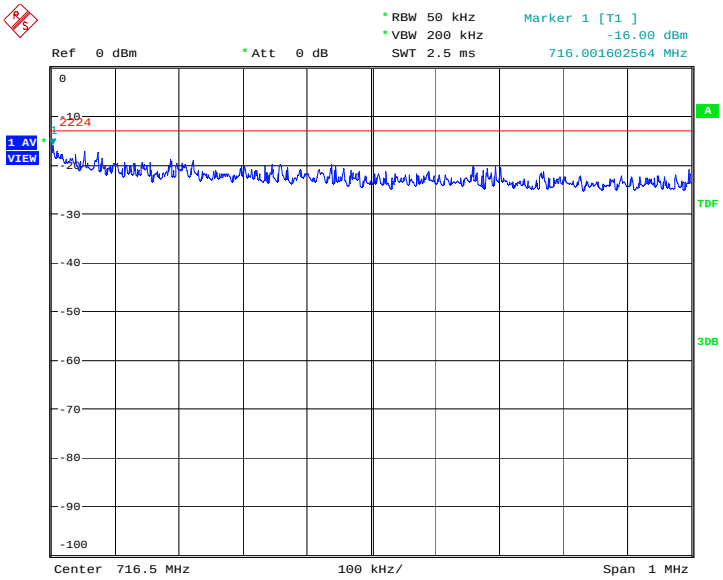



Date: 19.MAR.2014 09:28:39

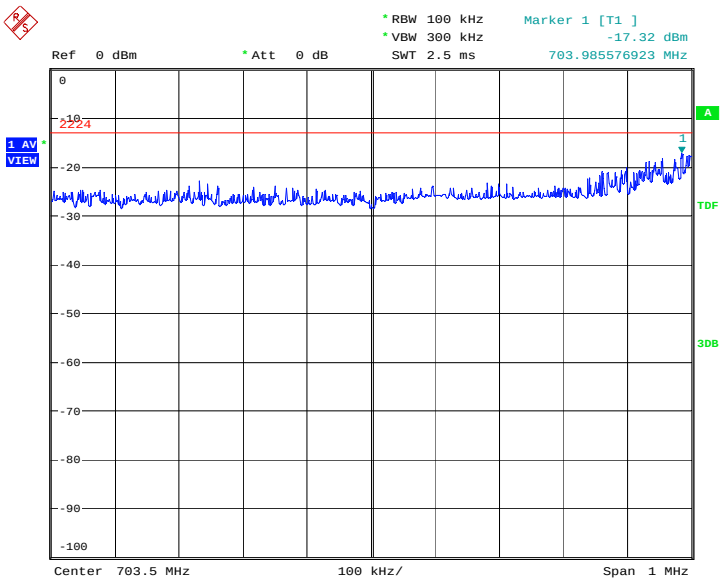
## HIGH BAND EDGE BLOCK-16QAM




Date: 19.MAR.2014 09:31:59

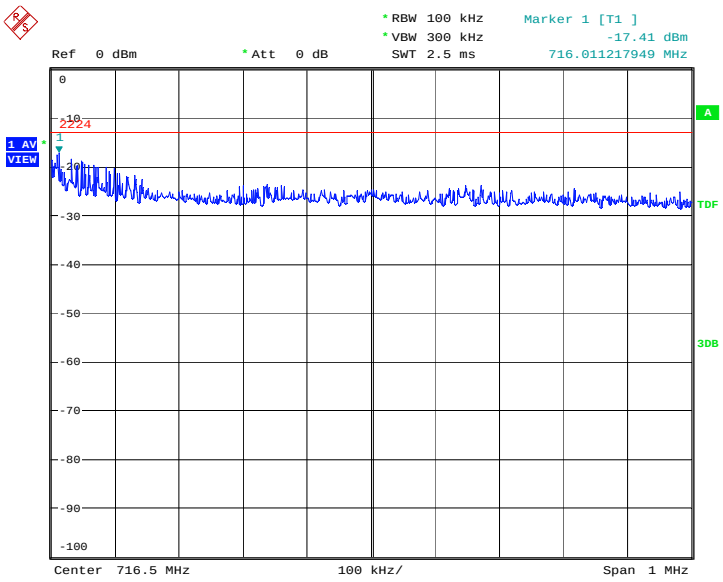
## LTE band 17, 10MHz

## LOW BAND EDGE BLOCK-QPSK



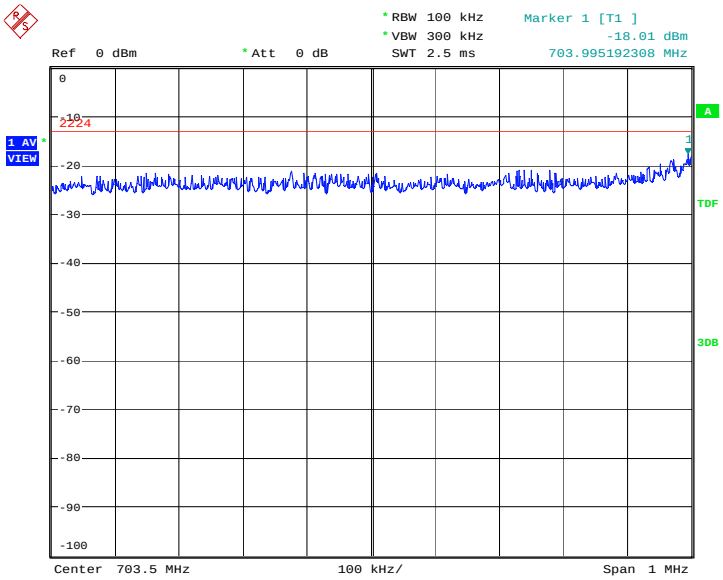

Date: 19.MAR.2014 13:15:08

## HIGH BAND EDGE BLOCK-QPSK



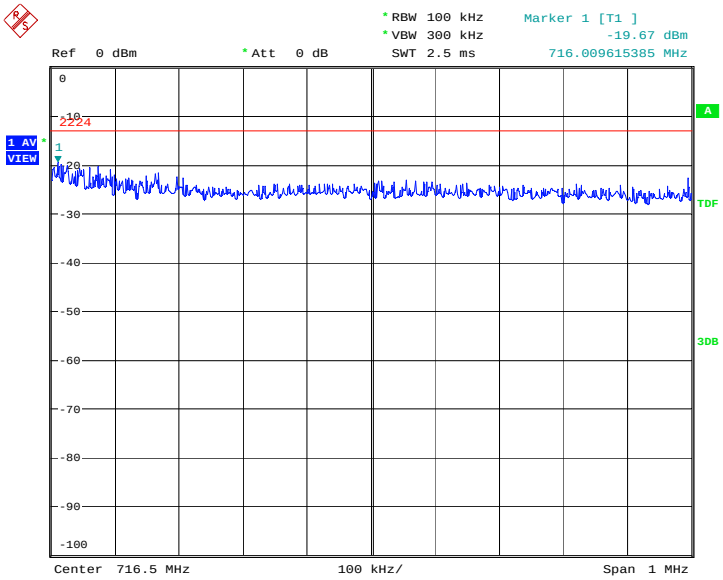

Date: 19.MAR.2014 13:18:28

## LOW BAND EDGE BLOCK-16QAM




Date: 19.MAR.2014 13:15:18

## HIGH BAND EDGE BLOCK-16QAM




Date: 19.MAR.2014 13:18:38

## A.8 CONDUCTED SPURIOUS EMISSION

**Reference**

FCC: CFR Part 2.1057, 22.917, 24.238, 27.53(h).

**A.8.1 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 2.1057 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.

**A. 8.2 Measurement Limit**

Part 22.917, Part 24.238 and Part 27.53 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.

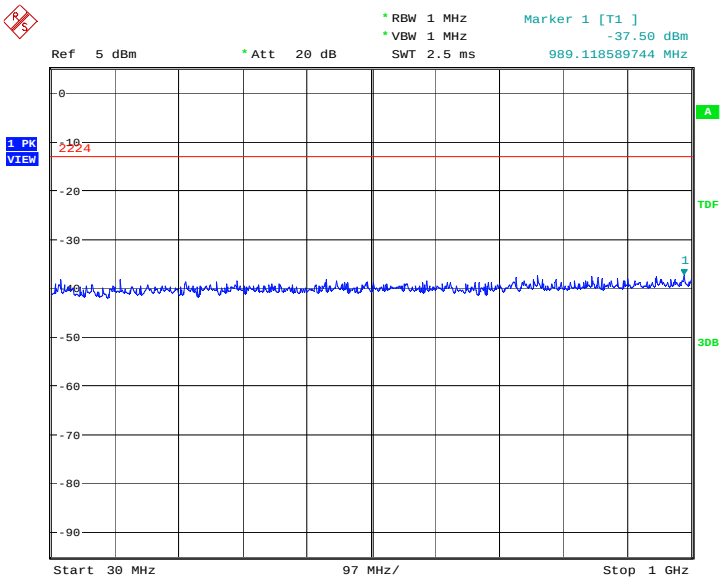
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. 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.

## A. 8.3 Measurement result

### LTE band 2, 1.4MHz bandwidth

### QPSK: 30MHz – 1GHz

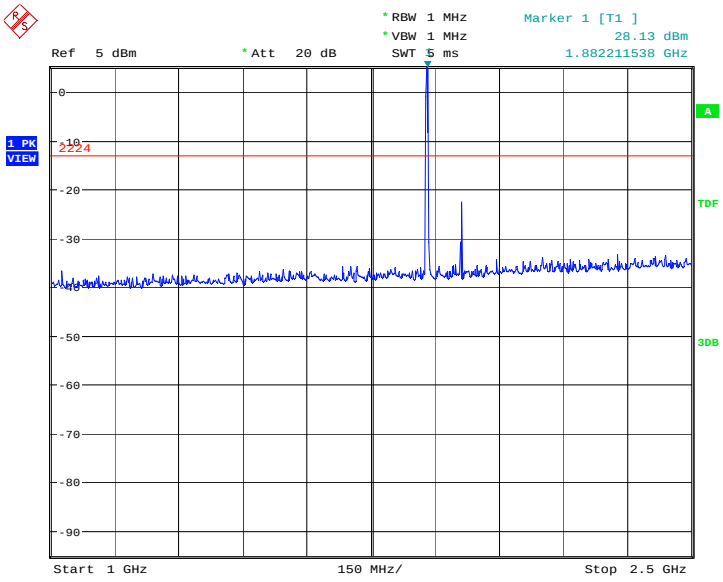
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:38:35

### QPSK: 1GHz – 2.5GHz

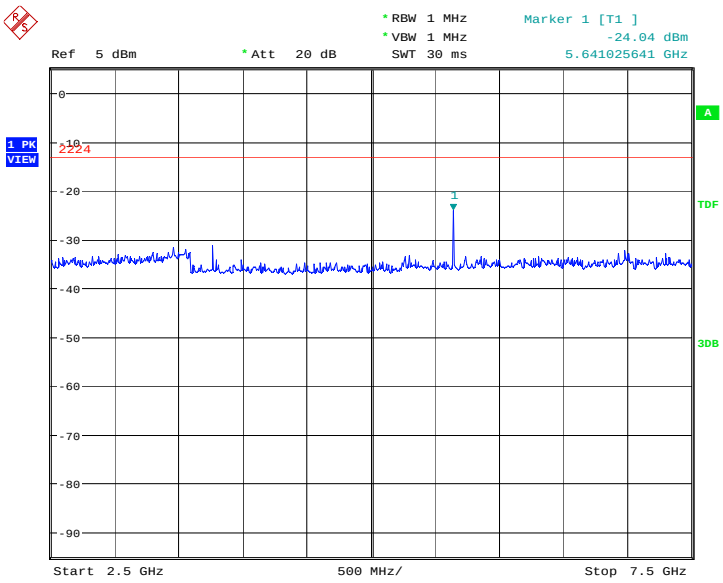
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:38:43

**QPSK: 2.5GHz – 7.5GHz**

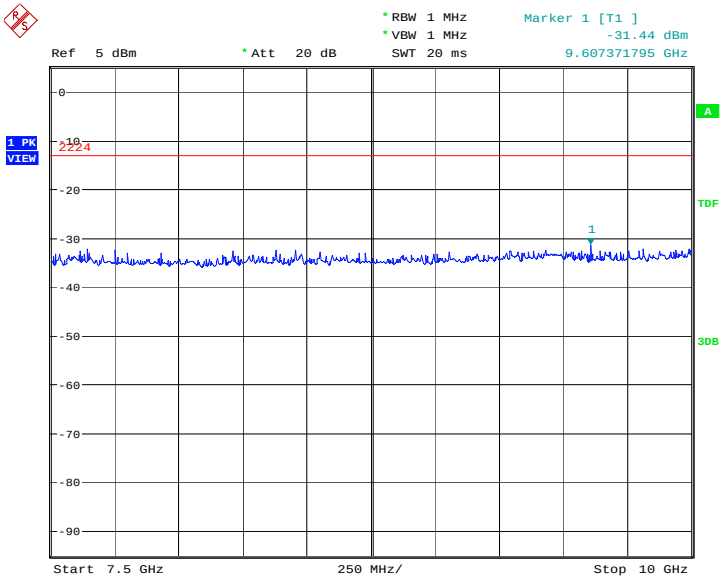
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:38:51

**QPSK: 7.5GHz –10GHz**

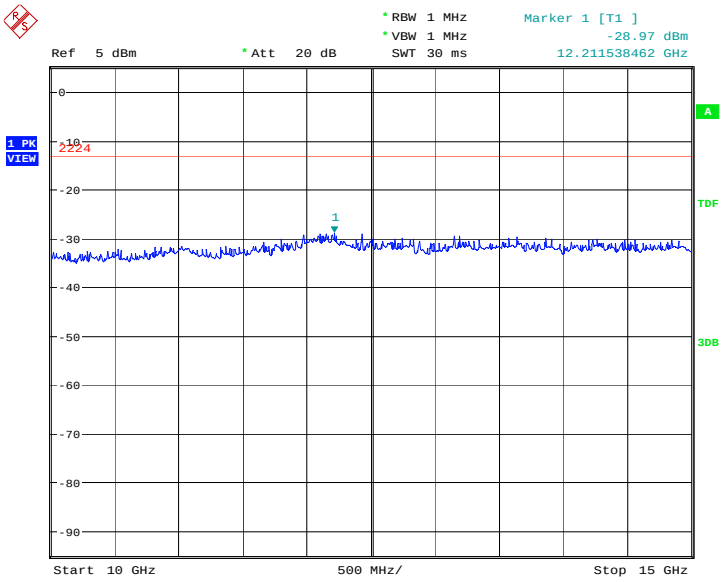
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:38:59

**QPSK: 10GHz –15GHz**

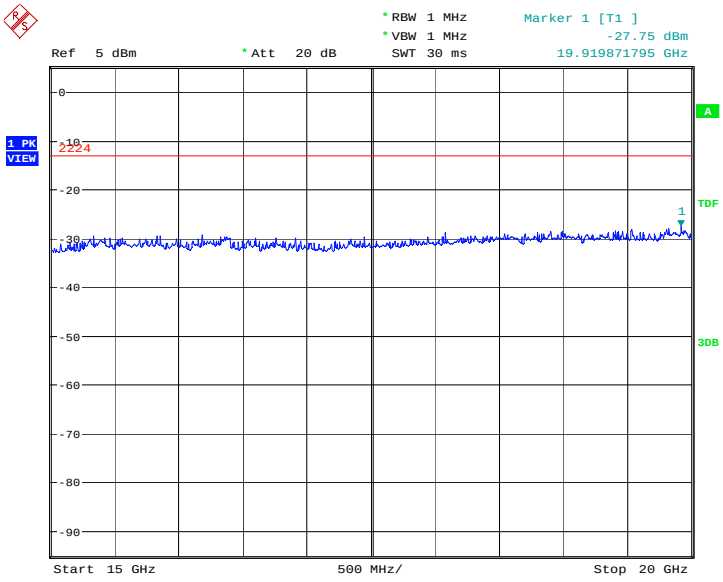
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:39:07

**QPSK: 15GHz –20GHz**

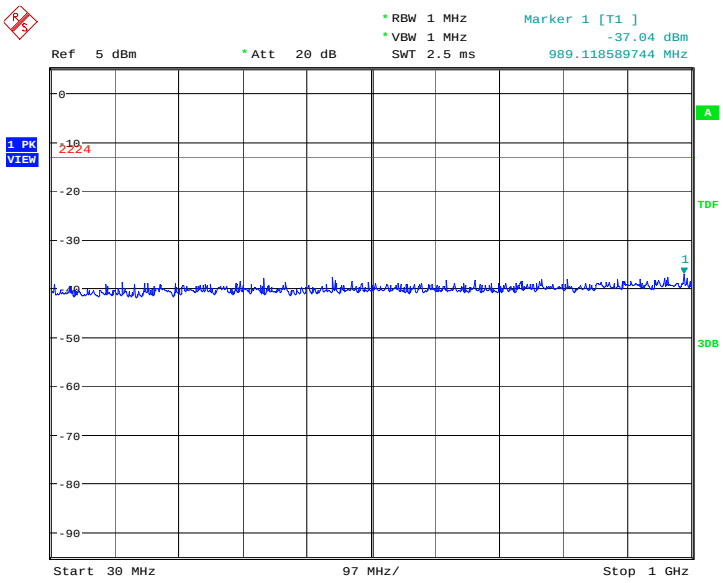
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:39:15

**16QAM: 30MHz – 1GHz**

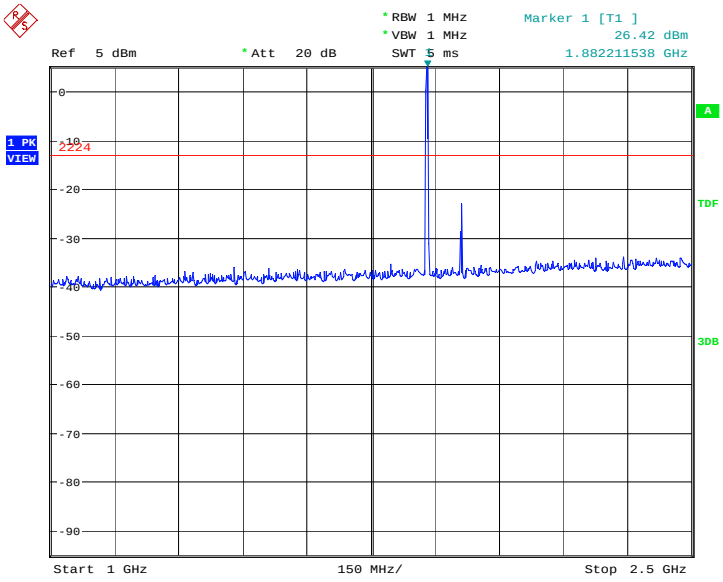
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:39:25

**16QAM: 1GHz – 2.5GHz**

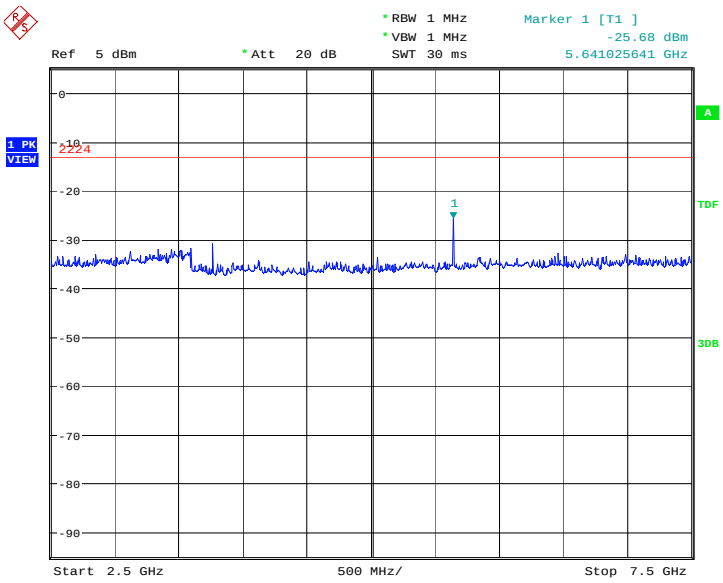
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:39:33

**16QAM: 2.5GHz – 7.5GHz**

Spurious emission limit –13dBm.

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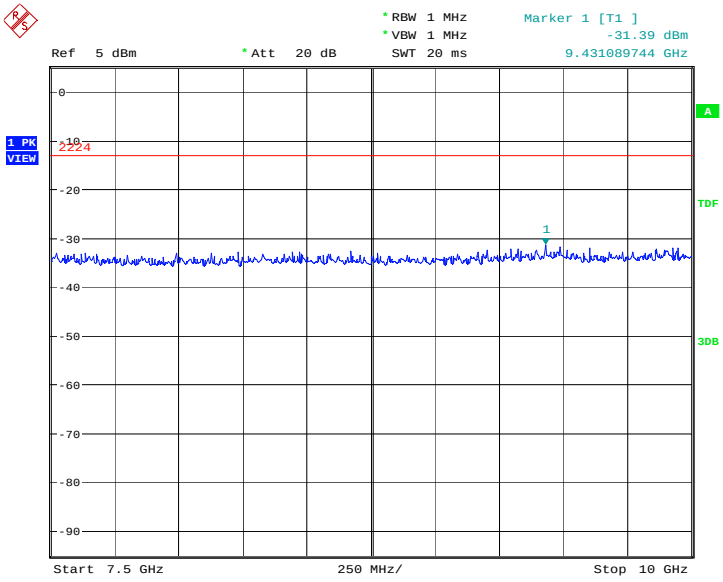
**16QAM: 7.5GHz –10GHz**

Spurious emission limit –13dBm.

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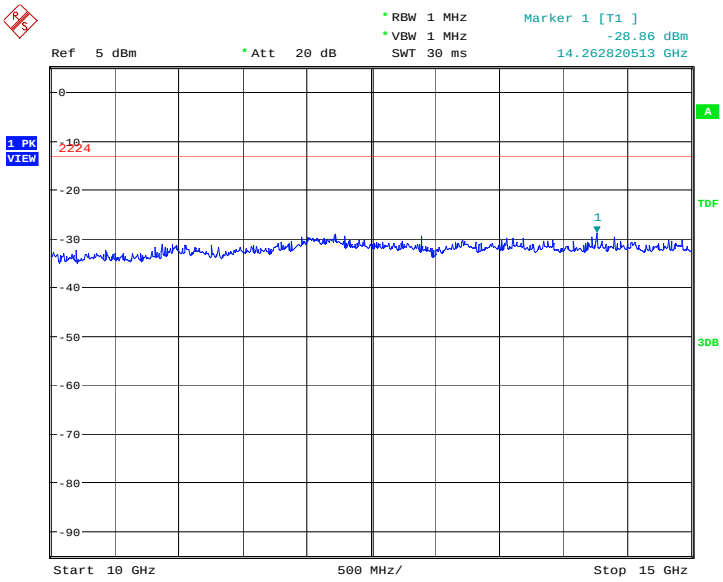
**16QAM: 10GHz –15GHz**

Spurious emission limit –13dBm.

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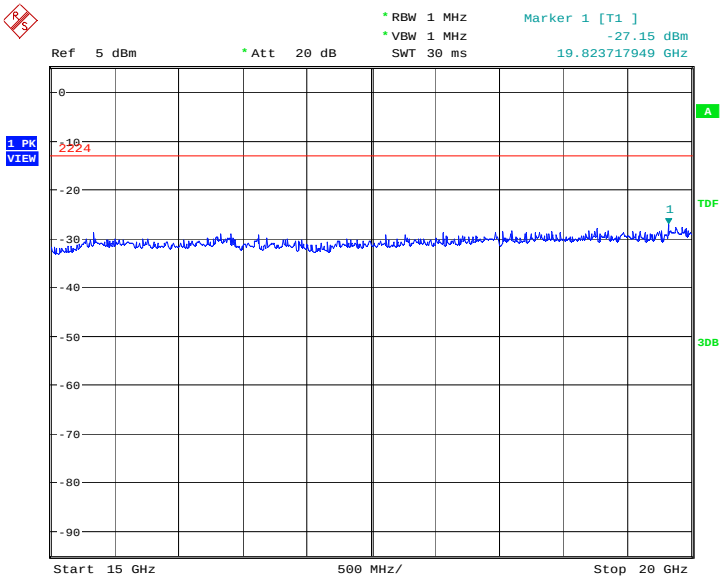
**16QAM: 15GHz –20GHz**

Spurious emission limit –13dBm.

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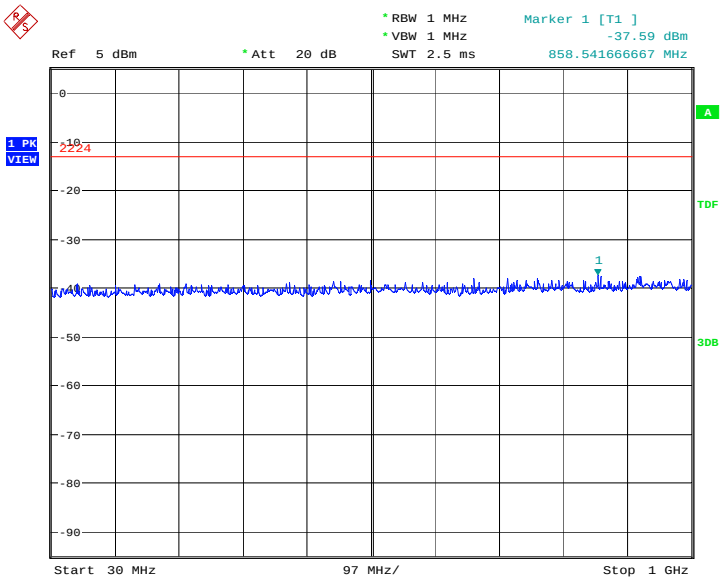
**LTE band 4, 1.4MHz bandwidth**

**QPSK: 30MHz – 1GHz**

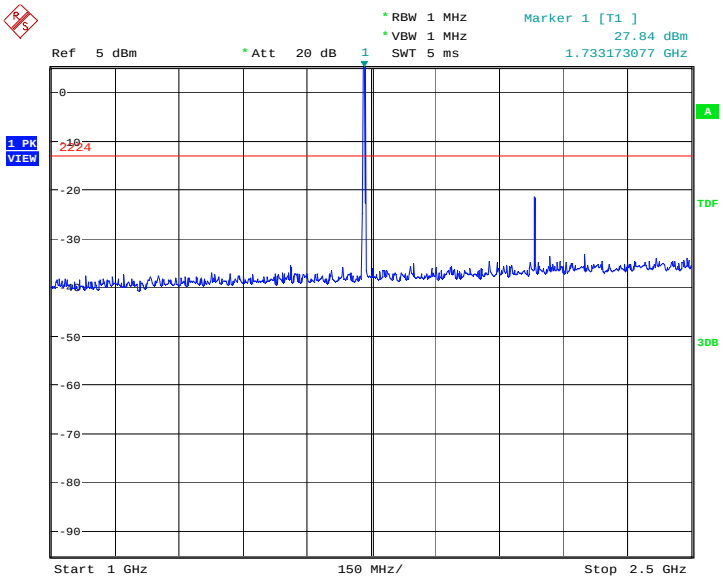
Spurious emission limit –13dBm.




Date: 19.MAR.2014 09:04:27

**QPSK: 1GHz – 2.5GHz**

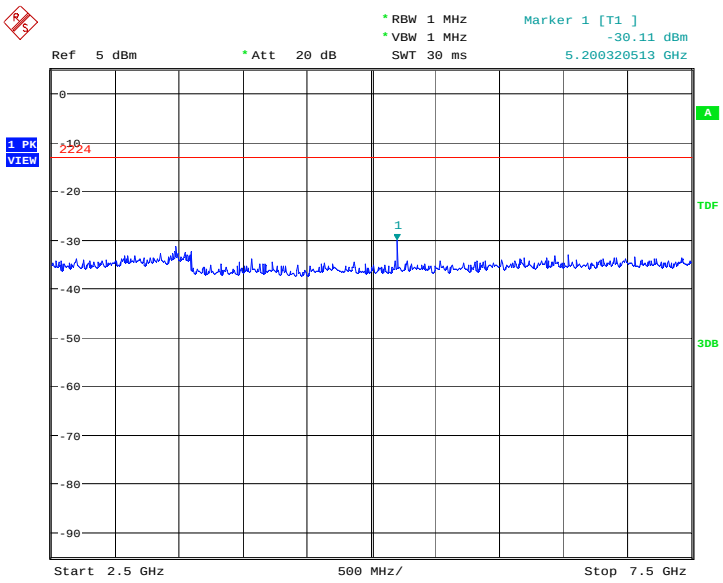
Spurious emission limit –13dBm.




Date: 19.MAR.2014 09:04:35

**QPSK: 2.5GHz – 7.5GHz**

Spurious emission limit –13dBm.

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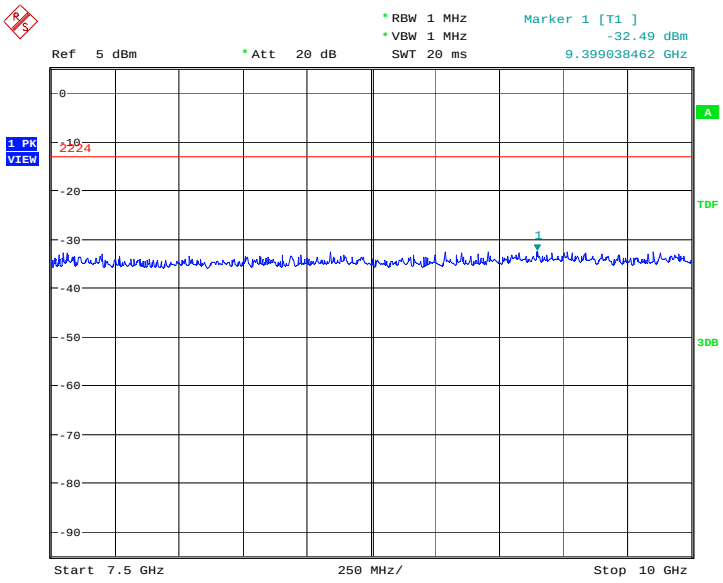
**QPSK: 7.5GHz –10GHz**

Spurious emission limit –13dBm.

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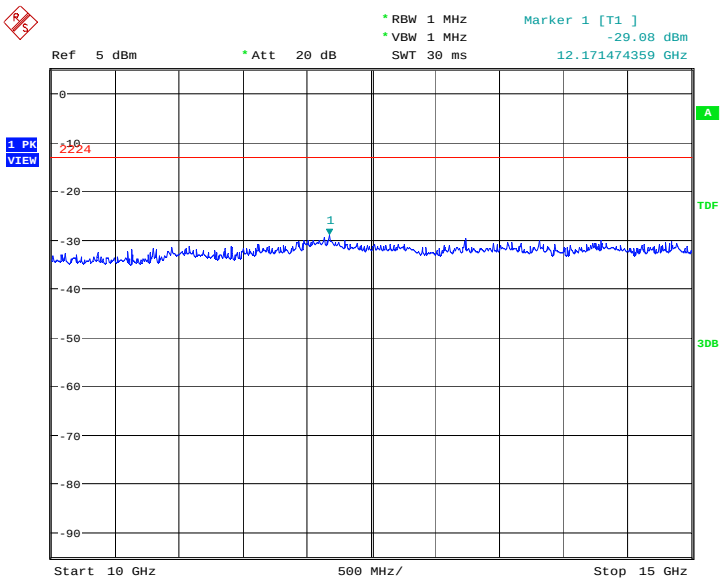
**QPSK: 10GHz –15GHz**

Spurious emission limit –13dBm.

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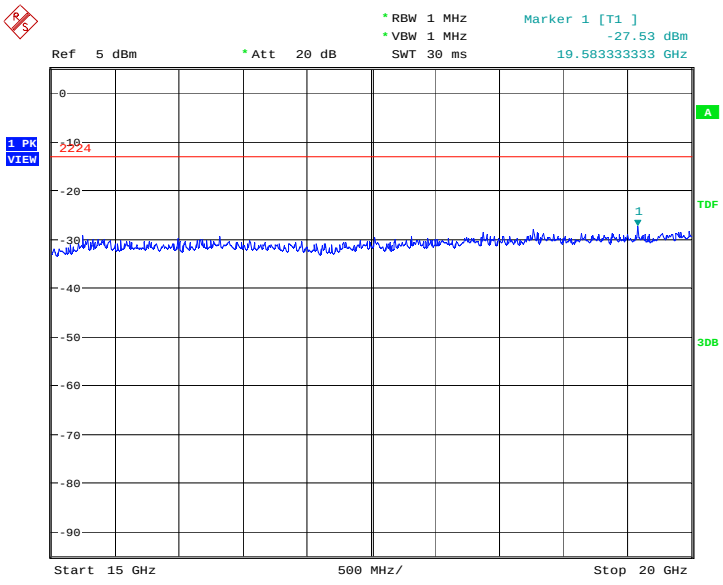
**QPSK: 15GHz –20GHz**

Spurious emission limit –13dBm.

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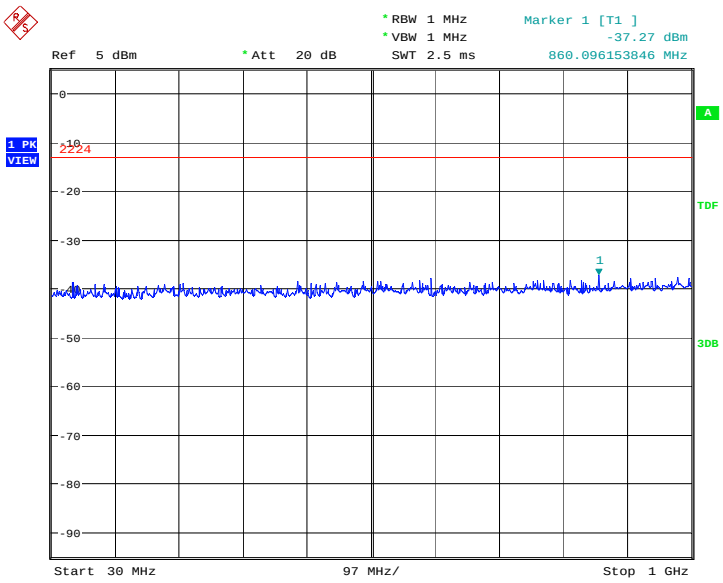
**16QAM: 30MHz – 1GHz**

Spurious emission limit –13dBm.

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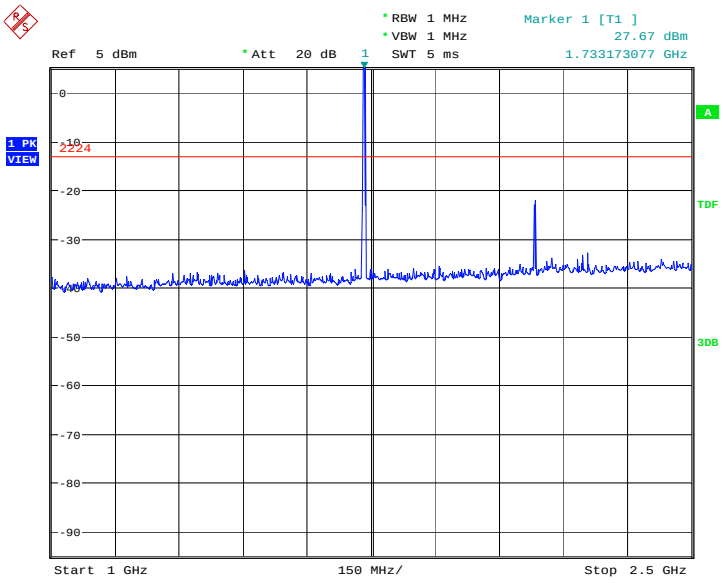
**16QAM: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.

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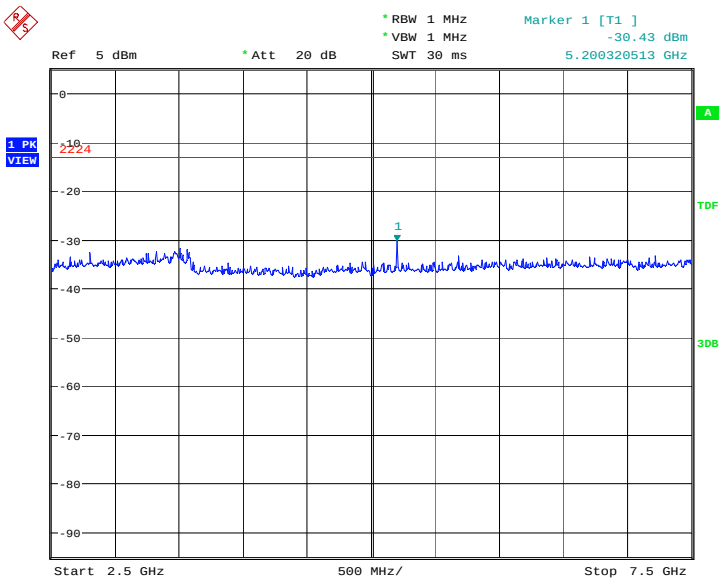
**16QAM: 2.5GHz – 7.5GHz**

Spurious emission limit –13dBm.

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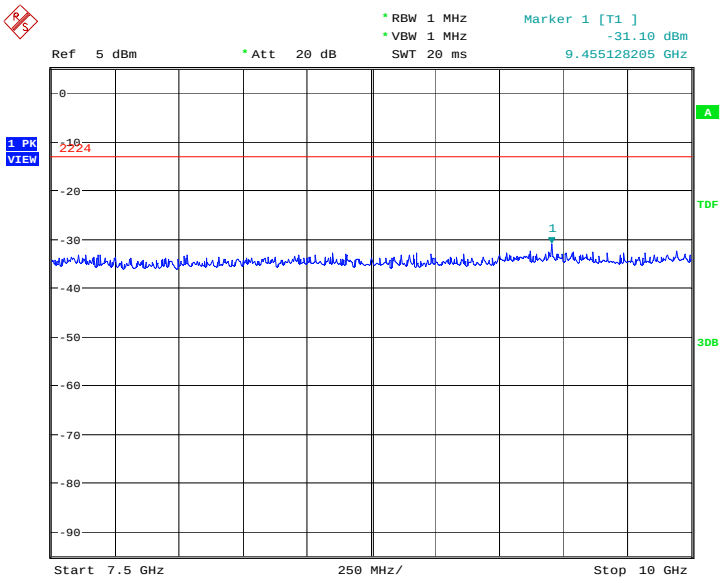
**16QAM: 7.5GHz –10GHz**

Spurious emission limit –13dBm.

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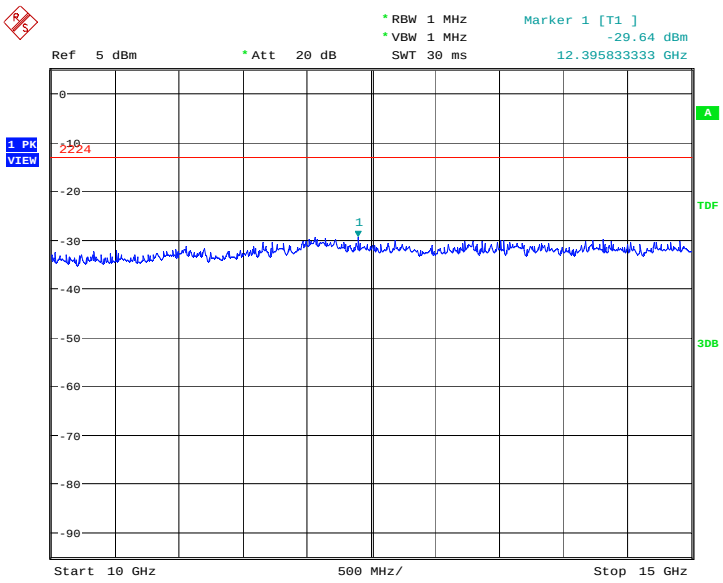
**16QAM: 10GHz –15GHz**

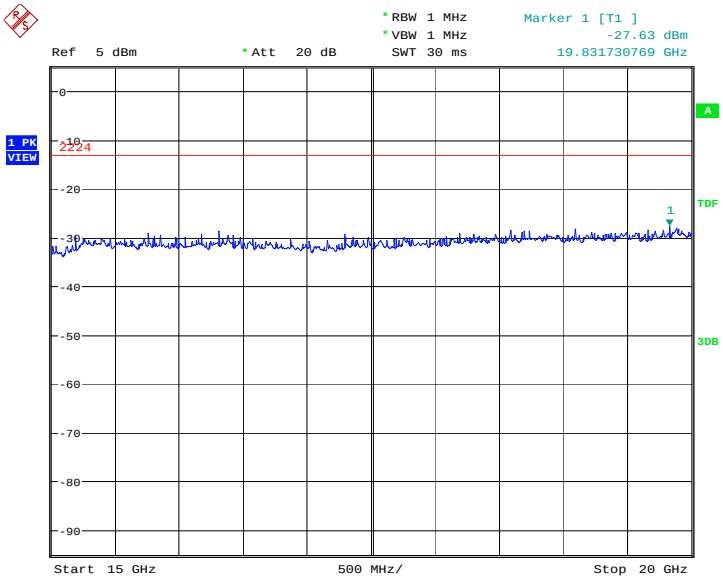
Spurious emission limit –13dBm.




Date: 19.MAR.2014 09:07:43

**16QAM: 15GHz –20GHz**

Spurious emission limit –13dBm.

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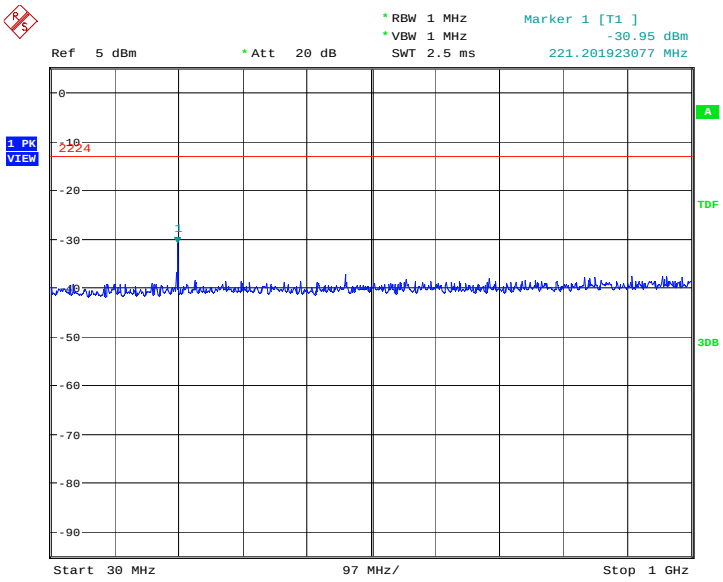
**LTE band 7, 5MHz bandwidth**

**QPSK: 30MHz – 1GHz**

Spurious emission limit –13dBm.

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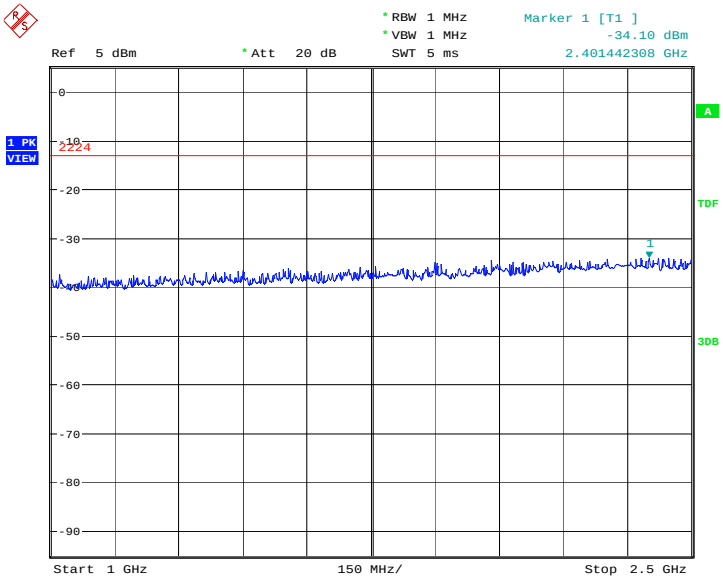
**QPSK: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.

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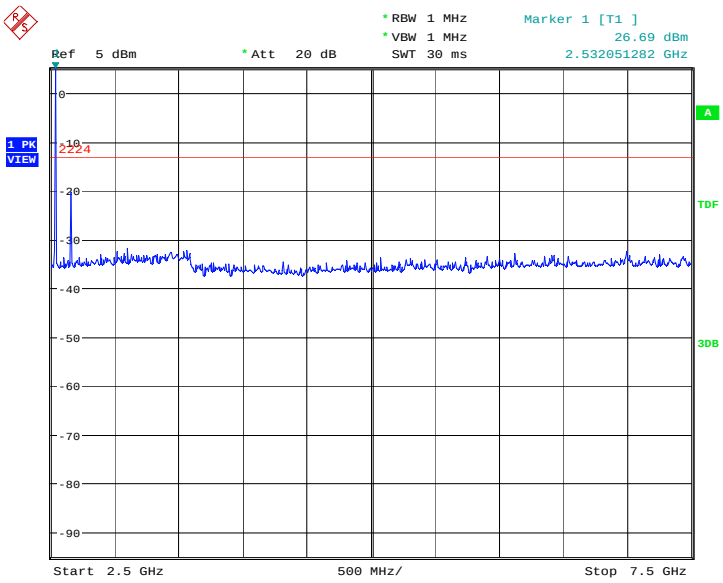
**QPSK: 2.5GHz – 7.5GHz**

Spurious emission limit –13dBm.

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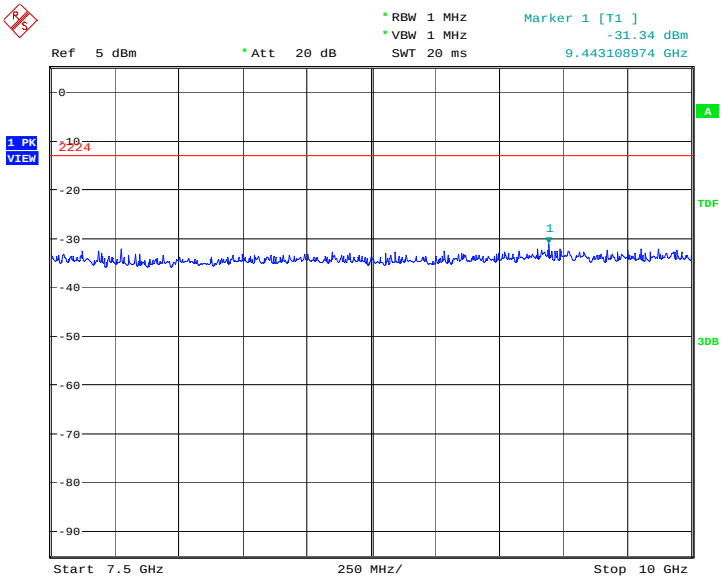
**QPSK: 7.5GHz –10GHz**

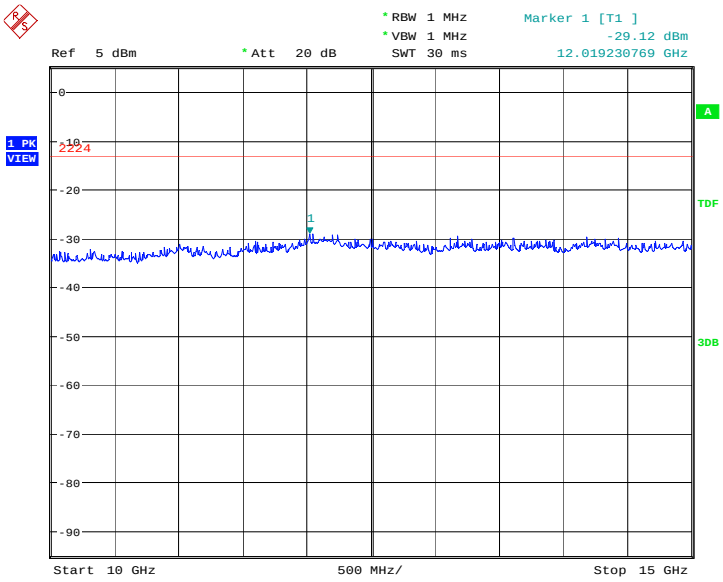
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:41:39

**QPSK: 10GHz –15GHz**

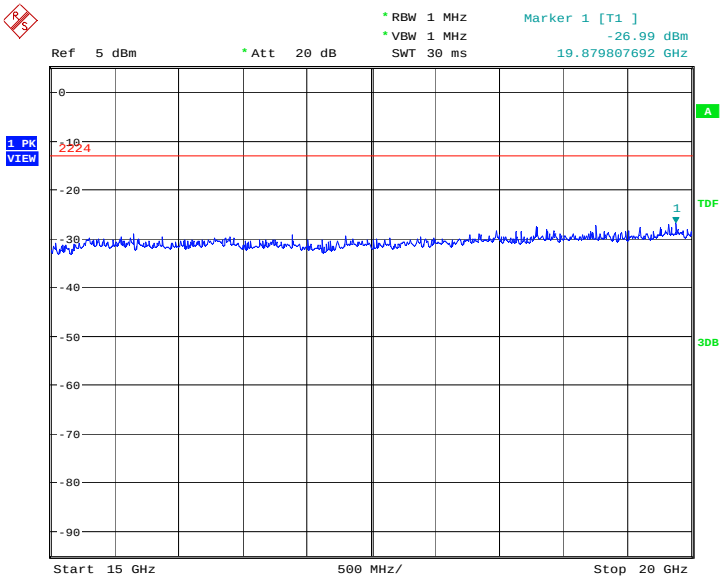
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:41:47

**QPSK: 15GHz –20GHz**

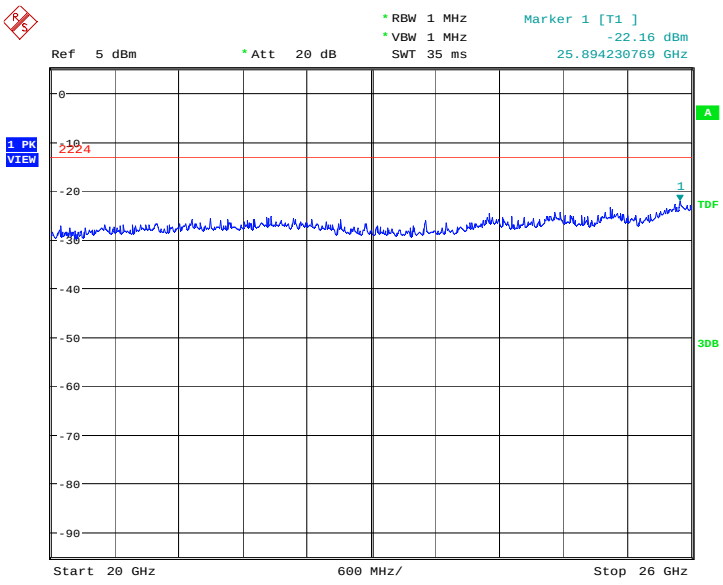
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:41:55

**QPSK: 20GHz –26GHz**

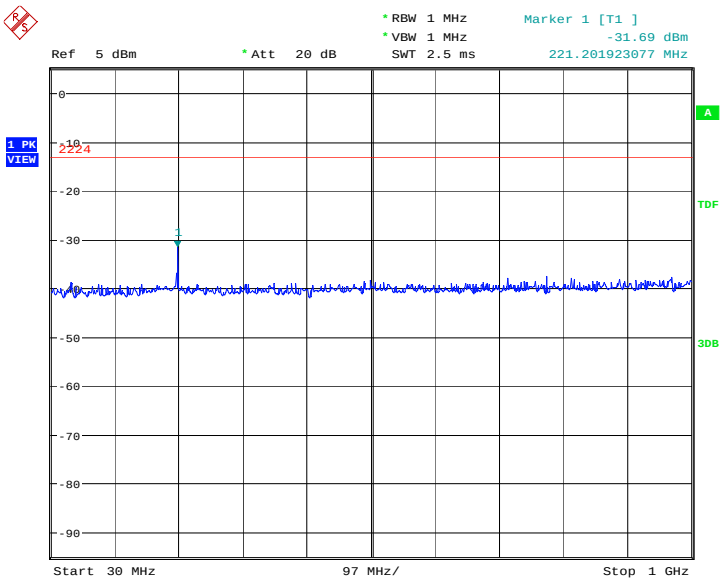
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:03

**16QAM: 30MHz – 1GHz**

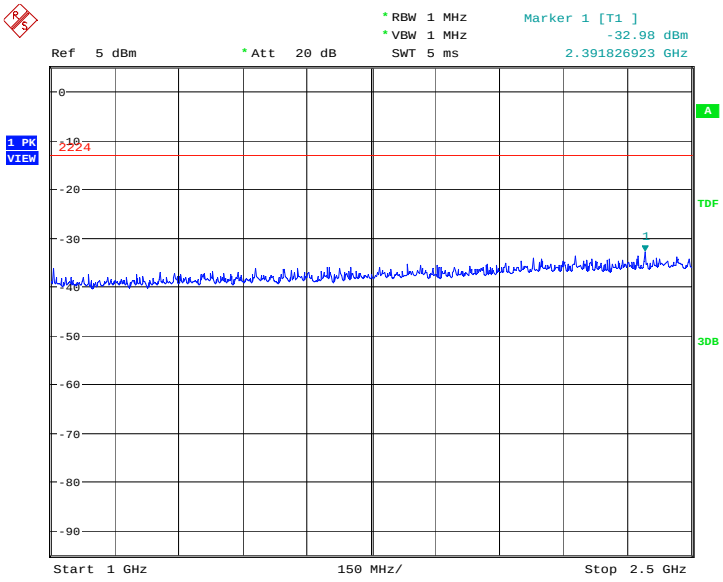
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:13

**16QAM: 1GHz – 2.5GHz**

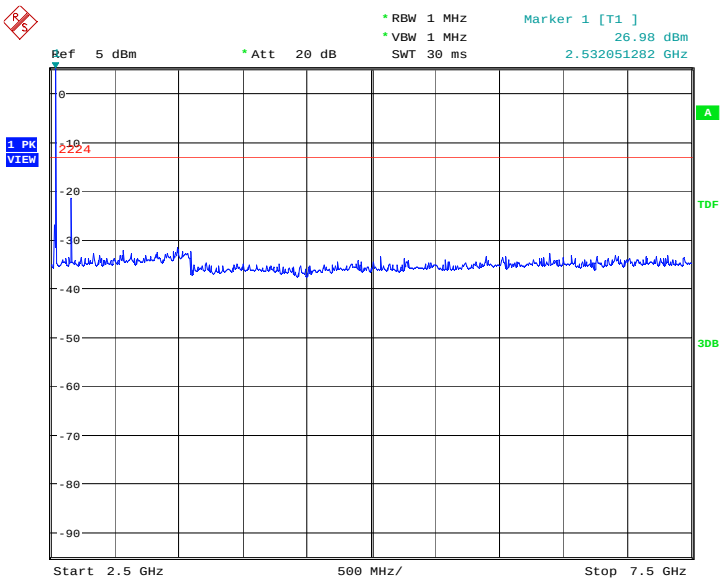
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:21

**16QAM: 2.5GHz – 7.5GHz**

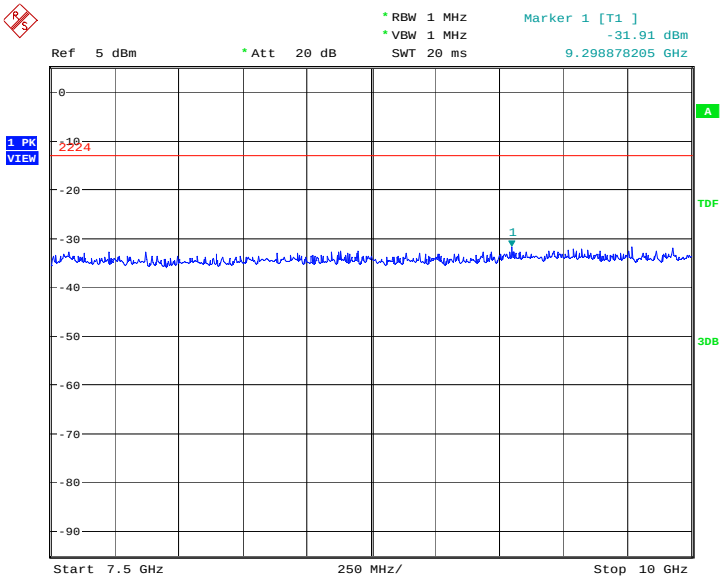
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:29

**16QAM: 7.5GHz –10GHz**

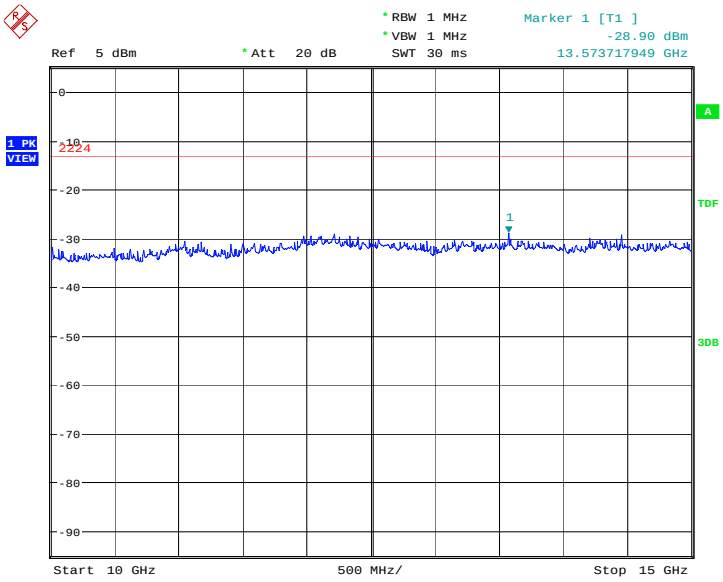
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:37

**16QAM: 10GHz –15GHz**

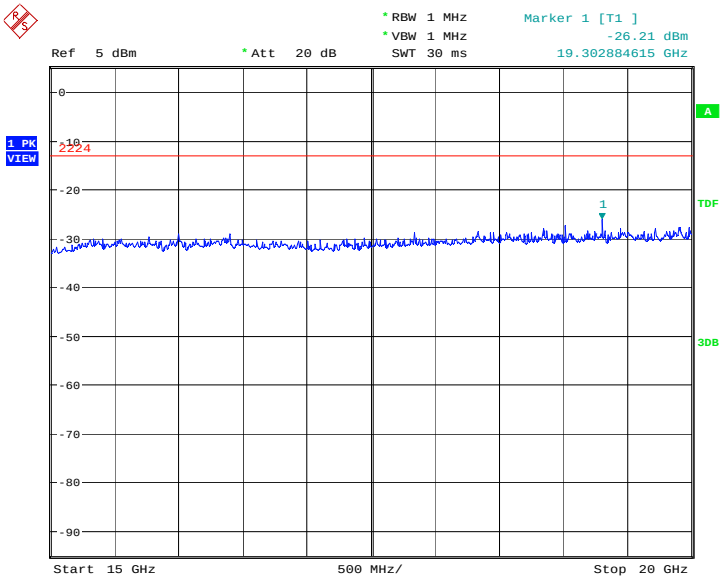
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:45

**16QAM: 15GHz –20GHz**

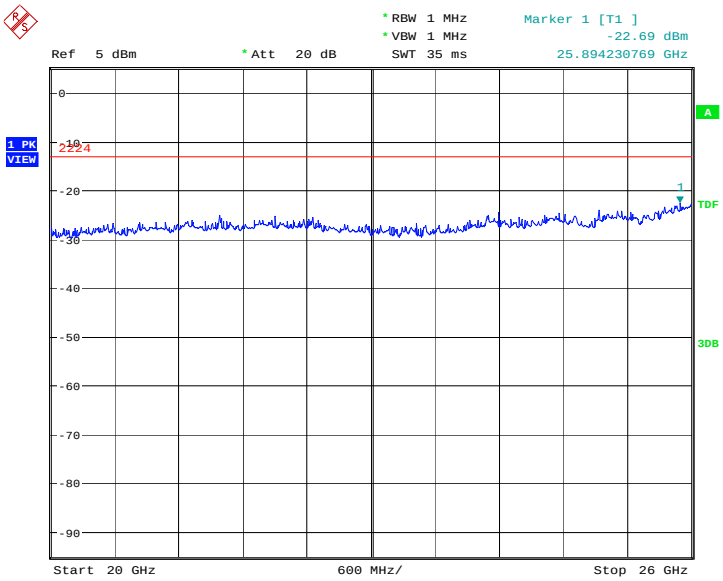
Spurious emission limit –13dBm.




Date: 9.MAY.2014 15:42:53

**16QAM: 20GHz –26GHz**

Spurious emission limit –13dBm.

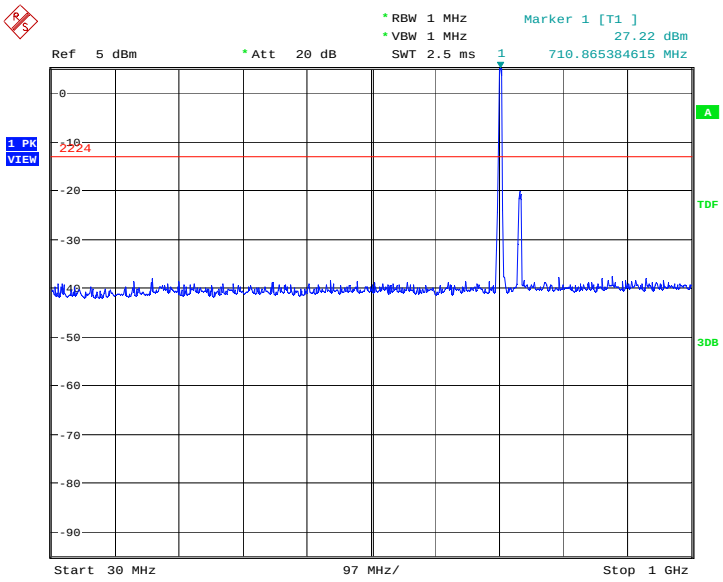



Date: 9.MAY.2014 15:43:01

**LTE band 17, 5MHz bandwidth**

**QPSK: 30MHz – 1GHz**

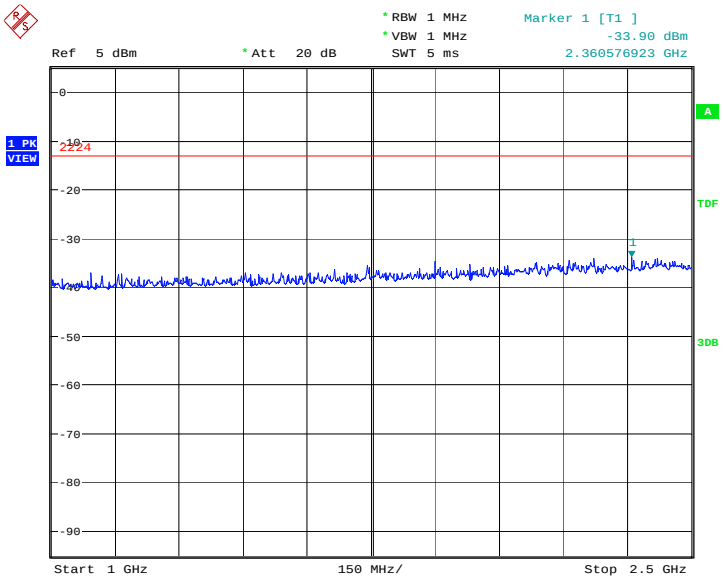
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:58:30

**QPSK: 1GHz – 2.5GHz**

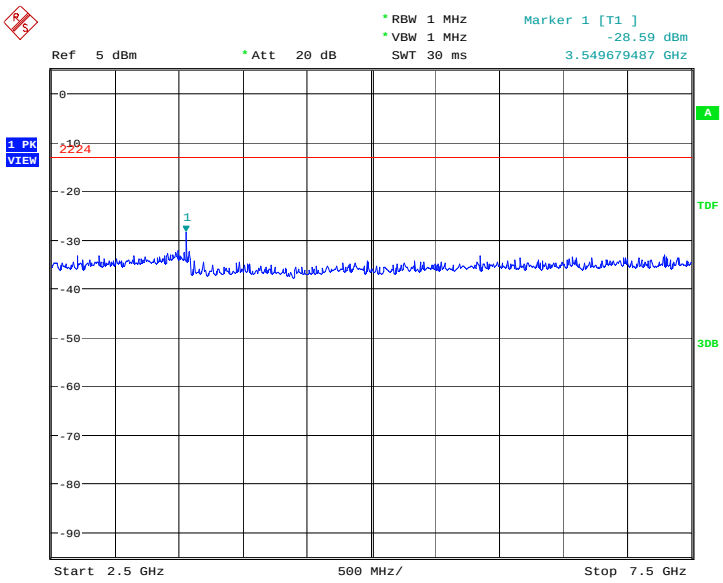
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:58:38

**QPSK: 2.5GHz – 7.5GHz**

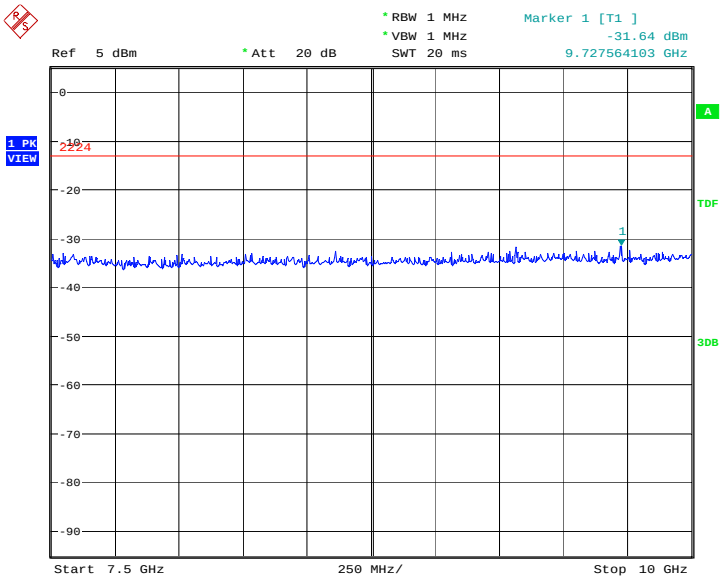
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:58:46

**QPSK: 7.5GHz –10GHz**

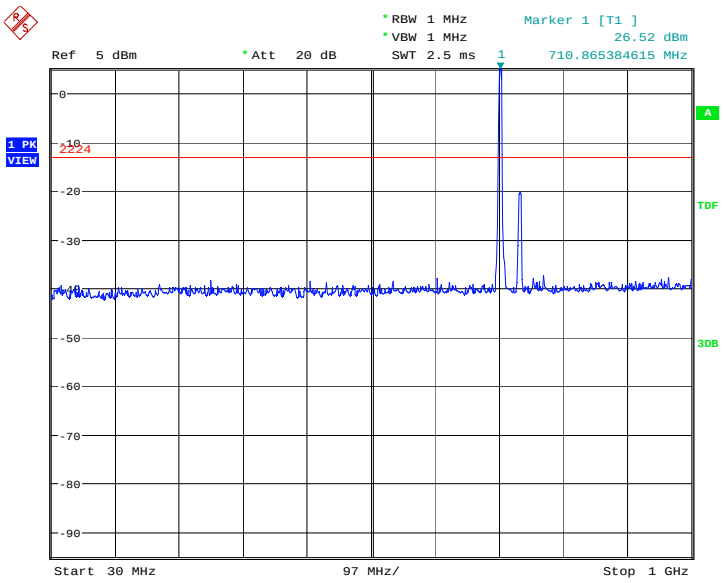
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:58:54

**16QAM: 30MHz – 1GHz**

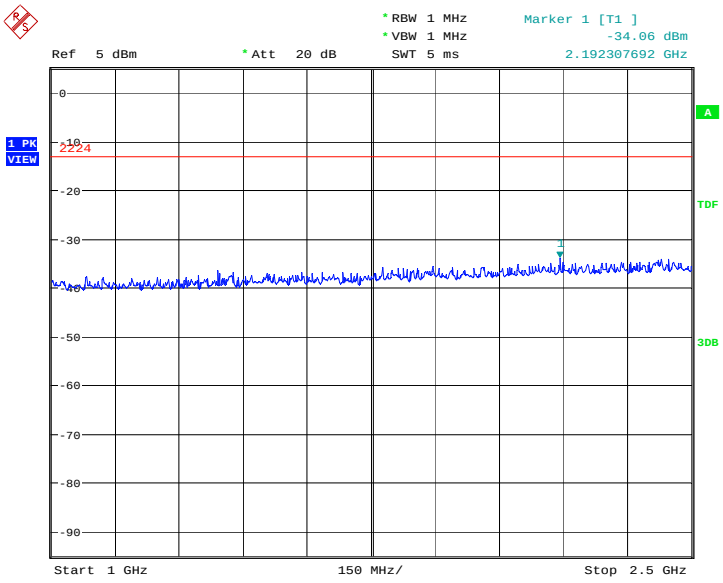
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:59:04

**16QAM: 1GHz – 2.5GHz**

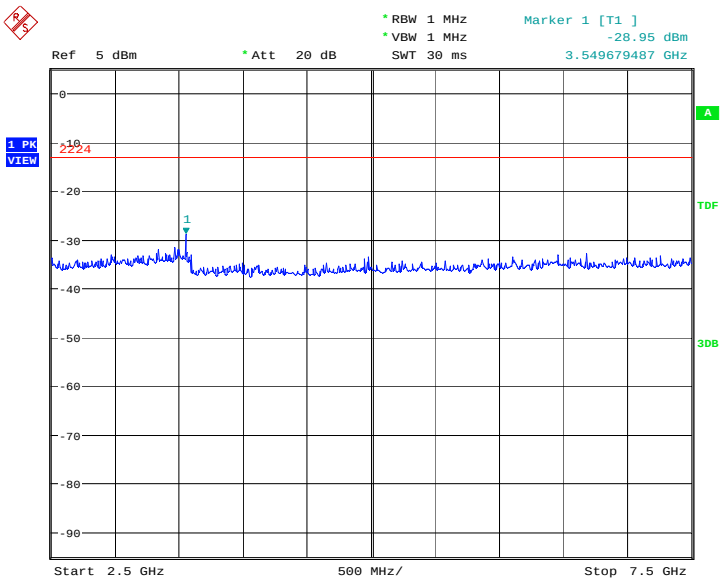
Spurious emission limit –13dBm.




Date: 19.MAR.2014 08:59:12

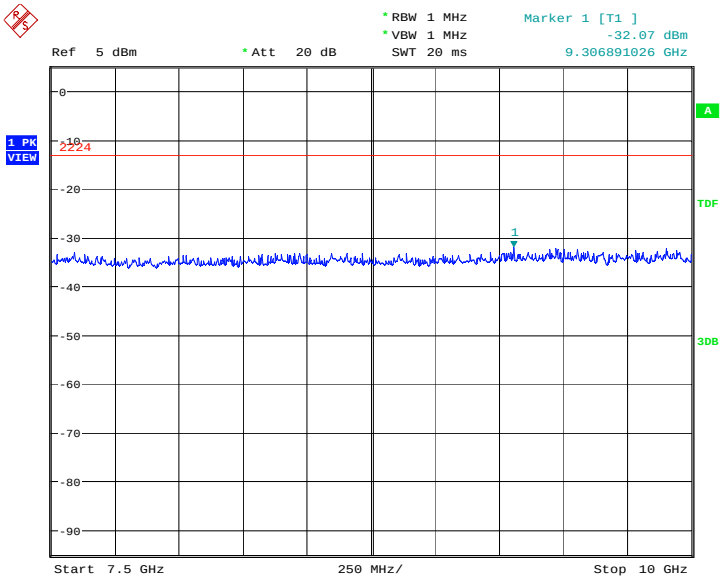
**16QAM: 2.5GHz – 7.5GHz**

Spurious emission limit –13dBm.




**16QAM: 7.5GHz –10GHz**

Spurious emission limit –13dBm.




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