



# RF TEST REPORT

**Report No.:** SET2015-18386

**Product:** LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone

**FCC ID:** SRQ-BLADEA452

**Model No.:** ZTE Blade A452, Blade A452, BGH Joy X3

**Applicant:** ZTE Corporation

**Address:** ZTE Plaza, Keji Road South, Shenzhen, China

**Dates of Testing:** 12/01/2015 — 12/10/2015

**Issued by:** CCIC-SET

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District,  
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## Test Report

**Product** ..... : LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone

**Brand Name**..... : ZTE

**Trade Name** ..... : ZTE

**Applicant** ..... : ZTE Corporation

**Applicant Address** ..... : ZTE Plaza, Keji Road South, Shenzhen, China

**Manufacturer** ..... : ZTE Corporation

**Manufacturer Address** ..... : ZTE Plaza, Keji Road South, Shenzhen, China

**Test Standards** ..... : 47 CFR Part 2: Frequency Allocations and Radio Treaty  
Matters; General Rules and Regulations  
47 CFR Part 27(L) 27(M) 27(H): Miscellaneous wireless  
communications services

**Test Result**..... : PASS

**Tested by** ..... :

2015.12.10

Lu Lei, Test Engineer

**Reviewed by**..... :

2015.12.10

Zhu Qi, Senior EGINEER

**Approved by**..... :

2015.12.10

Wu Li'an, Manager



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| Change History |            |                   |
|----------------|------------|-------------------|
| Issue          | Date       | Reason for change |
| 1.0            | 2015-12-10 | First edition     |
|                |            |                   |
|                |            |                   |



## 1. GENERAL INFORMATION

### 1.1 EUT Description

|                                 |                                                                                                        |
|---------------------------------|--------------------------------------------------------------------------------------------------------|
| EUT Type                        | LTE/WCDMA/GSM(GPRS) Mutil-Mode Digital Mobile Phone                                                    |
| Hardware Version                | WXKMA1A1-1                                                                                             |
| Software Version                | DIS_LAR_P635F33V1.0.0B01                                                                               |
| EUT supports Radios application | GSM/GPRS/EDGE/WCDMA/HSPA/LTE<br>WLAN2.4GHz 802.11b/g/n (HT20)<br>Bluetooth V3.0+EDR / Bluetooth V4.0LE |
| Frequency Range                 | LTE Band 4<br>Tx: 1710.7MHz~1754.3MHz<br>Rx: 2110.7MHz~2154.3MHz                                       |
| Maximum Output Power to Antenna | LTE Band 4: 22.92dBm                                                                                   |
| Bandwidth                       | LTE Band 4: 1.4MHz/3MHz/5MHz/10MHz/15MHz/20MHz                                                         |
| Modulation Type                 | QPSK/16QAM                                                                                             |
| Antenna Type                    | Internal Antenna                                                                                       |

Note: The EUT is a Mobile Phone, it contains three models, they are ZTE Blade A452, Blade A452, and BGH Joy X3. They have the same size, appearance and internal structure, and the only difference is the model number.



## 1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

| FCC Rule | System     | Type of Modulation | BW (MHz) | Emission Designator | Frequency Tolerance (ppm) | Maximum ERP/EIRP(W) |
|----------|------------|--------------------|----------|---------------------|---------------------------|---------------------|
| Part 27  | LTE Band 4 | QPSK               | 1.4      | 1M10G7D             | —                         | 0.069               |
| Part 27  | LTE Band 4 | 16QAM              | 1.4      | 1M10W7D             | —                         | 0.047               |
| Part 27  | LTE Band 4 | QPSK               | 3        | 2M75G7D             | —                         | 0.069               |
| Part 27  | LTE Band 4 | 16QAM              | 3        | 2M75W7D             | —                         | 0.048               |
| Part 27  | LTE Band 4 | QPSK               | 5        | 4M54G7D             | —                         | 0.068               |
| Part 27  | LTE Band 4 | 16QAM              | 5        | 4M52W7D             | —                         | 0.048               |
| Part 27  | LTE Band 4 | QPSK               | 10       | 8M96G7D             | 0.03                      | 0.069               |
| Part 27  | LTE Band 4 | 16QAM              | 10       | 8M96W7D             | 0.03                      | 0.047               |
| Part 27  | LTE Band 4 | QPSK               | 15       | 13M5G7D             | —                         | 0.069               |
| Part 27  | LTE Band 4 | 16QAM              | 15       | 13M5W7D             | —                         | 0.048               |
| Part 27  | LTE Band 4 | QPSK               | 20       | 18M7G7D             | —                         | 0.070               |
| Part 27  | LTE Band 4 | 16QAM              | 20       | 18M6W7D             | —                         | 0.049               |



### 1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part27 for the EUT FCC ID Certification:

1.47 CFR Part 2, 27(L)

2. ANSI/TIA/EIA-603-D-2010

3. FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Test detailed items/section required by FCC rules and results are as below:

| No. | Section            | Description                             | Limit                | Result |
|-----|--------------------|-----------------------------------------|----------------------|--------|
| 1   | 2.1046             | Conducted RF Output Power               | Reporting Only       | PASS   |
| 2   | 27.50(d)           | Peak to Average Ratio                   | < 13dB               | PASS   |
| 3   | 27.50(d)           | Effective Radiated Power(Band 4)        | EIRP< 1Watt          | PASS   |
| 4   | 2.1049<br>27.53(g) | Occupied Bandwidth                      | Reporting Only       | PASS   |
| 5   | 2.1051<br>27.53(h) | Conducted Band Edge(Band 2/4/5)         | <43+10log10(P[watt]) | PASS   |
| 6   | 2.1051<br>27.53(h) | Conducted Spurious Emission<br>(Band 4) | <43+10log10(P[watt]) | PASS   |
| 7   | 2.1053<br>27.53(h) | Radiated Spurious Emission<br>(Band 4)  | <43+10log10(P[watt]) | PASS   |
| 8   | 2.1055,<br>27.54   | Frequency Stability                     | <2.5ppm              | PASS   |

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

## 1.4 Test Configuration of Equipment Under Test

### 1.4.1 Test Mode

Antenna port conducted and radiated test items listed below are performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements are performed by rotating the EUT in three different orthogonal test planes to find the maximum emission.

| Test Items                  | Band                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Bandwidth(MHz) |   |   |    |    |    | Modulation |       | RB# |      |      | Test Channel |   |   |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---|---|----|----|----|------------|-------|-----|------|------|--------------|---|---|
|                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.4            | 3 | 5 | 10 | 15 | 20 | QPSK       | 16QAM | 1   | Half | Full | L            | M | H |
| Max. Output Power           | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          | ✓     | ✓   | ✓    | ✓    | ✓            | ✓ | ✓ |
| Peak-to-Average Ratio       | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |   |   |    |    | ✓  |            | ✓     | ✓   |      | ✓    | ✓            | ✓ | ✓ |
| 26dB and 99% Bandwidth      | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          | ✓     |     |      | ✓    |              | ✓ |   |
| Conducted Band Edge         | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          | ✓     | ✓   |      | ✓    | ✓            |   | ✓ |
| Conducted Spurious Emission | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          | ✓     | ✓   |      |      | ✓            | ✓ | ✓ |
| Frequency Stability         | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                |   |   | ✓  |    |    | ✓          | ✓     |     |      | ✓    |              | ✓ |   |
| ERP/EIRP                    | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          | ✓     | ✓   |      |      | ✓            | ✓ | ✓ |
| Radiated Spurious Emission  | 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | ✓              | ✓ | ✓ | ✓  | ✓  | ✓  | ✓          |       | ✓   |      |      | ✓            | ✓ | ✓ |
| Note                        | <p>1. The mark “ ✓ ” means that this configuration is chosen for testing.</p> <p>2. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported.</p> <p>3. For E.R.P/E.I.R.P. measurement, the widest bandwidth and the bandwidth with the highest conducted power of each band is chosen for testing. Besides, the lowest bandwidth of each band is also measured for reporting only.</p> |                |   |   |    |    |    |            |       |     |      |      |              |   |   |

## 1.5 Measurement Results Explanation Example

### For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 7.5dB and 10dB attenuator.

Example:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)} \\ &= 7 + 10 = 17 \text{ (dB)}\end{aligned}$$

## 1.6 Facilities and Accreditations

### 1.6.1 Test Facilities

#### CNAS-Lab Code: L1659

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

#### FCC-Registration No.: 406086

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

#### IC-Registration No.: 11185A-1

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

### 1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

|                             |              |
|-----------------------------|--------------|
| Temperature (°C):           | 15°C - 35°C  |
| Relative Humidity (%):      | 30% -60%     |
| Atmospheric Pressure (kPa): | 86KPa-106KPa |

## 2. 47 CFR PART 2, PART 27H REQUIREMENTS

### 2.1 Conducted RF Output Power

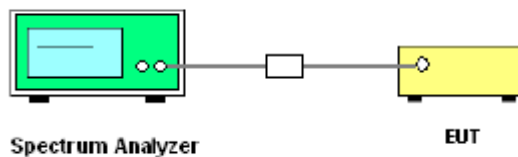
#### 2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

#### 2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

#### 2.1.3 Test Setup



#### 2.1.4 Test Procedures

1. The transmitter output port was connected to the system simulator.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure and record the power level from the system simulator.



## 2.1.5 Test Results

### 1. LTE Band 4 Conducted Power Test Verdict:

| BW(MHz)        | Modulation | RB Size | RB Offset | Power(dBm)<br>Low Ch./Freq. | Power(dBm)<br>Middle Ch./Freq. | Power(dBm)<br>High Ch./Freq. |
|----------------|------------|---------|-----------|-----------------------------|--------------------------------|------------------------------|
| Channel        |            |         |           | 20050                       | 20175                          | 20300                        |
| Frequency(MHz) |            |         |           | 1720                        | 1732.5                         | 1745                         |
| 20             | QPSK       | 1       | 0         | 22.29                       | 22.31                          | 22.26                        |
| 20             | QPSK       | 1       | 49        | 22.11                       | 22.16                          | 22.17                        |
| 20             | QPSK       | 1       | 99        | 22.11                       | 22.19                          | 22.05                        |
| 20             | QPSK       | 50      | 0         | 21.58                       | 21.63                          | 21.56                        |
| 20             | QPSK       | 50      | 24        | 21.78                       | 21.65                          | 21.72                        |
| 20             | QPSK       | 50      | 49        | 21.59                       | 21.61                          | 21.55                        |
| 20             | QPSK       | 100     | 0         | 21.53                       | 21.43                          | 21.53                        |
| 20             | 16QAM      | 1       | 0         | 21.85                       | 21.76                          | 21.62                        |
| 20             | 16QAM      | 1       | 49        | 21.83                       | 21.81                          | 21.73                        |
| 20             | 16QAM      | 1       | 99        | 21.65                       | 21.71                          | 21.75                        |
| 20             | 16QAM      | 50      | 0         | 20.63                       | 20.72                          | 20.63                        |
| 20             | 16QAM      | 50      | 24        | 20.25                       | 20.41                          | 20.48                        |
| 20             | 16QAM      | 50      | 49        | 20.52                       | 20.53                          | 20.52                        |
| 20             | 16QAM      | 100     | 0         | 20.65                       | 20.53                          | 20.61                        |
| Channel        |            |         |           | 20025                       | 20175                          | 20325                        |
| Frequency(MHz) |            |         |           | 1717.5                      | 1732.5                         | 1747.5                       |
| 15             | QPSK       | 1       | 0         | 22.21                       | 22.25                          | 22.13                        |
| 15             | QPSK       | 1       | 37        | 22.25                       | 22.22                          | 22.22                        |
| 15             | QPSK       | 1       | 74        | 22.12                       | 22.14                          | 22.16                        |
| 15             | QPSK       | 36      | 0         | 21.51                       | 21.52                          | 21.45                        |
| 15             | QPSK       | 36      | 18        | 21.52                       | 21.53                          | 21.50                        |
| 15             | QPSK       | 36      | 37        | 21.43                       | 21.48                          | 21.45                        |
| 15             | QPSK       | 75      | 0         | 21.65                       | 21.58                          | 21.59                        |
| 15             | 16QAM      | 1       | 0         | 21.42                       | 21.38                          | 21.34                        |
| 15             | 16QAM      | 1       | 37        | 21.36                       | 21.31                          | 21.44                        |
| 15             | 16QAM      | 1       | 74        | 21.58                       | 21.44                          | 21.43                        |
| 15             | 16QAM      | 36      | 0         | 20.63                       | 20.72                          | 20.75                        |
| 15             | 16QAM      | 36      | 18        | 20.57                       | 20.63                          | 20.63                        |
| 15             | 16QAM      | 36      | 37        | 20.63                       | 20.75                          | 20.61                        |
| 15             | 16QAM      | 75      | 0         | 20.71                       | 20.75                          | 20.74                        |



| BW(MHz)        | Modulation | RB Size | RB Offset | Power(dBm)<br>Low Ch./Freq. | Power(dBm)<br>Middle Ch./Freq. | Power(dBm)<br>High Ch./Freq. |
|----------------|------------|---------|-----------|-----------------------------|--------------------------------|------------------------------|
| Channel        |            |         |           | 20000                       | 20175                          | 20350                        |
| Frequency(MHz) |            |         |           | 1715                        | 1732.5                         | 1750                         |
| 10             | QPSK       | 1       | 0         | 22.25                       | 22.22                          | 22.21                        |
| 10             | QPSK       | 1       | 24        | 22.05                       | 22.13                          | 22.15                        |
| 10             | QPSK       | 1       | 49        | 22.01                       | 22.13                          | 22.25                        |
| 10             | QPSK       | 25      | 0         | 21.49                       | 21.48                          | 21.53                        |
| 10             | QPSK       | 25      | 12        | 21.45                       | 21.34                          | 21.33                        |
| 10             | QPSK       | 25      | 24        | 21.39                       | 21.48                          | 21.35                        |
| 10             | QPSK       | 50      | 0         | 21.44                       | 21.44                          | 21.46                        |
| 10             | 16QAM      | 1       | 0         | 21.49                       | 21.41                          | 21.42                        |
| 10             | 16QAM      | 1       | 24        | 21.25                       | 21.34                          | 21.35                        |
| 10             | 16QAM      | 1       | 49        | 21.33                       | 21.41                          | 21.47                        |
| 10             | 16QAM      | 25      | 0         | 20.70                       | 20.78                          | 20.83                        |
| 10             | 16QAM      | 25      | 12        | 20.61                       | 20.75                          | 20.78                        |
| 10             | 16QAM      | 25      | 24        | 20.63                       | 20.64                          | 20.51                        |
| 10             | 16QAM      | 50      | 0         | 20.84                       | 20.73                          | 20.75                        |
| Channel        |            |         |           | 19975                       | 20175                          | 20375                        |
| Frequency(MHz) |            |         |           | 1712.5                      | 1732.5                         | 1752.5                       |
| 5              | QPSK       | 1       | 0         | 22.11                       | 22.25                          | 22.23                        |
| 5              | QPSK       | 1       | 12        | 22.15                       | 22.14                          | 22.12                        |
| 5              | QPSK       | 1       | 24        | 22.02                       | 22.15                          | 22.05                        |
| 5              | QPSK       | 12      | 0         | 21.63                       | 21.52                          | 21.61                        |
| 5              | QPSK       | 12      | 6         | 21.47                       | 21.53                          | 21.58                        |
| 5              | QPSK       | 12      | 11        | 21.50                       | 21.52                          | 21.65                        |
| 5              | QPSK       | 25      | 0         | 21.45                       | 21.42                          | 21.57                        |
| 5              | 16QAM      | 1       | 0         | 21.42                       | 21.35                          | 21.31                        |
| 5              | 16QAM      | 1       | 12        | 21.55                       | 21.43                          | 21.31                        |
| 5              | 16QAM      | 1       | 24        | 21.21                       | 21.35                          | 21.35                        |
| 5              | 16QAM      | 12      | 0         | 20.43                       | 20.51                          | 20.41                        |
| 5              | 16QAM      | 12      | 6         | 20.45                       | 20.41                          | 20.52                        |
| 5              | 16QAM      | 12      | 11        | 20.43                       | 20.51                          | 20.45                        |
| 5              | 16QAM      | 25      | 0         | 20.63                       | 20.71                          | 20.72                        |



| BW(MHz)        | Modulation | RB Size | RB Offset | Power(dBm)<br>Low Ch./Freq. | Power(dBm)<br>Middle Ch./Freq. | Power(dBm)<br>High Ch./Freq. |
|----------------|------------|---------|-----------|-----------------------------|--------------------------------|------------------------------|
| Channel        |            |         |           | 19965                       | 20175                          | 20385                        |
| Frequency(MHz) |            |         |           | 1711.5                      | 1732.5                         | 1753.5                       |
| 3              | QPSK       | 1       | 0         | 22.11                       | 22.23                          | 22.15                        |
| 3              | QPSK       | 1       | 7         | 22.13                       | 22.14                          | 22.15                        |
| 3              | QPSK       | 1       | 14        | 22.11                       | 22.10                          | 22.08                        |
| 3              | QPSK       | 8       | 0         | 21.59                       | 21.63                          | 21.55                        |
| 3              | QPSK       | 8       | 4         | 21.65                       | 21.52                          | 21.43                        |
| 3              | QPSK       | 8       | 7         | 21.53                       | 21.51                          | 21.55                        |
| 3              | QPSK       | 15      | 0         | 21.34                       | 21.47                          | 21.42                        |
| 3              | 16QAM      | 1       | 0         | 21.52                       | 21.51                          | 21.45                        |
| 3              | 16QAM      | 1       | 7         | 21.53                       | 21.41                          | 21.52                        |
| 3              | 16QAM      | 1       | 14        | 21.52                       | 21.53                          | 21.59                        |
| 3              | 16QAM      | 8       | 0         | 20.55                       | 20.62                          | 20.68                        |
| 3              | 16QAM      | 8       | 4         | 20.66                       | 20.65                          | 20.73                        |
| 3              | 16QAM      | 8       | 7         | 20.52                       | 20.51                          | 20.53                        |
| 3              | 16QAM      | 15      | 0         | 20.73                       | 20.65                          | 20.75                        |
| Channel        |            |         |           | 19957                       | 20175                          | 20393                        |
| Frequency(MHz) |            |         |           | 1710.7                      | 1732.5                         | 1754.3                       |
| 1.4            | QPSK       | 1       | 0         | 22.22                       | 22.23                          | 22.11                        |
| 1.4            | QPSK       | 1       | 2         | 22.24                       | 22.14                          | 22.15                        |
| 1.4            | QPSK       | 1       | 5         | 22.13                       | 22.05                          | 22.11                        |
| 1.4            | QPSK       | 3       | 0         | 21.63                       | 21.54                          | 21.50                        |
| 1.4            | QPSK       | 3       | 1         | 21.52                       | 21.51                          | 21.42                        |
| 1.4            | QPSK       | 3       | 2         | 21.49                       | 21.58                          | 21.54                        |
| 1.4            | QPSK       | 6       | 0         | 21.57                       | 21.43                          | 21.52                        |
| 1.4            | 16QAM      | 1       | 0         | 21.35                       | 21.34                          | 21.33                        |
| 1.4            | 16QAM      | 1       | 2         | 21.41                       | 21.35                          | 21.42                        |
| 1.4            | 16QAM      | 1       | 5         | 21.33                       | 21.45                          | 21.31                        |
| 1.4            | 16QAM      | 3       | 0         | 20.78                       | 20.73                          | 20.71                        |
| 1.4            | 16QAM      | 3       | 1         | 20.55                       | 20.67                          | 20.63                        |
| 1.4            | 16QAM      | 3       | 2         | 20.51                       | 20.53                          | 20.55                        |
| 1.4            | 16QAM      | 6       | 0         | 20.65                       | 20.77                          | 20.65                        |

## 2.2 Peak to Average Ratio

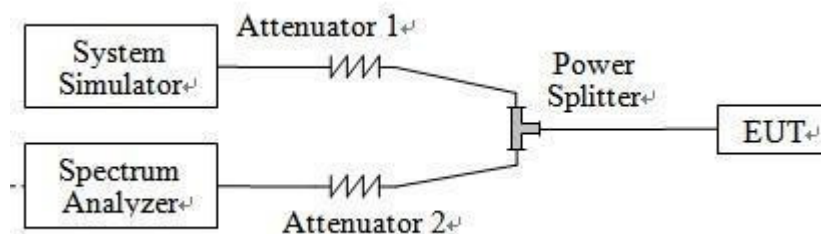
### 2.2.1 Definition

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level. Most contemporary measurement instrumentation include the capability to produce CCDF curves for an input signal provided that the instrument's resolution bandwidth can be set wide enough to accommodate the entire input signal bandwidth. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 2.2.3 Test Description



### 2.2.4 Test Procedures

1. The EUT was connected to spectrum and system simulator via a power divider.
2. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
3. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
4. Record the deviation as Peak to Average Ratio.

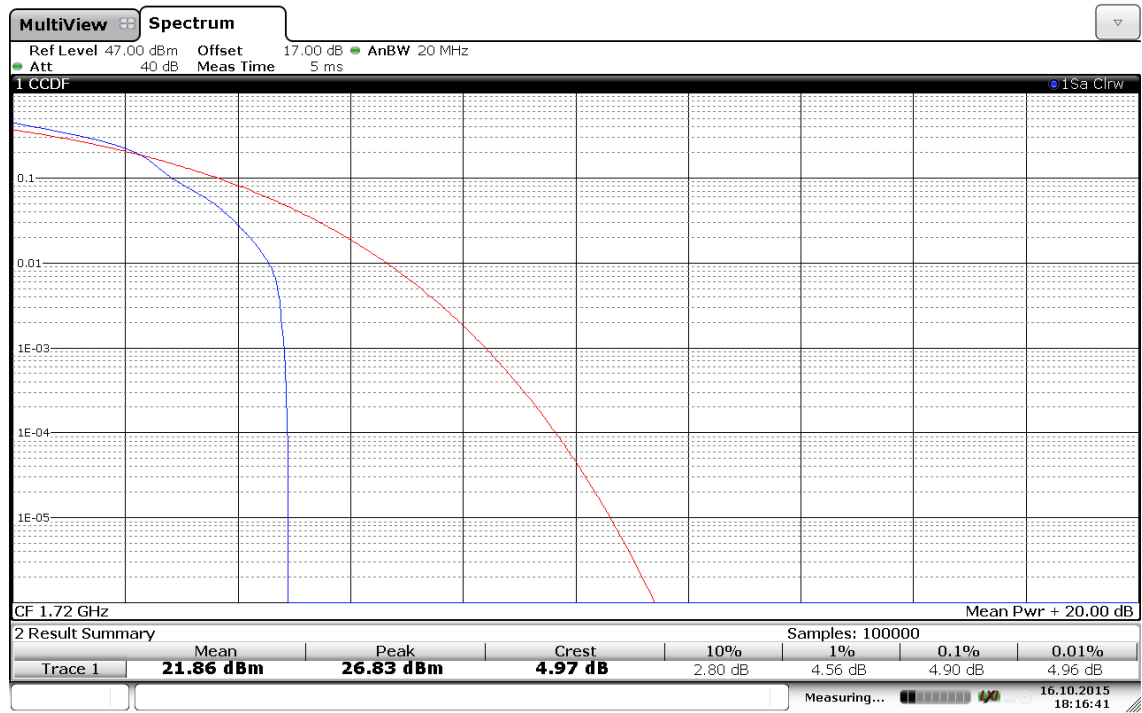
## 2.2.5 Test Results of Peak-to-Average Ratio

### 1. Test Result of LTE Band 4 Peak-to-Average Ratio:

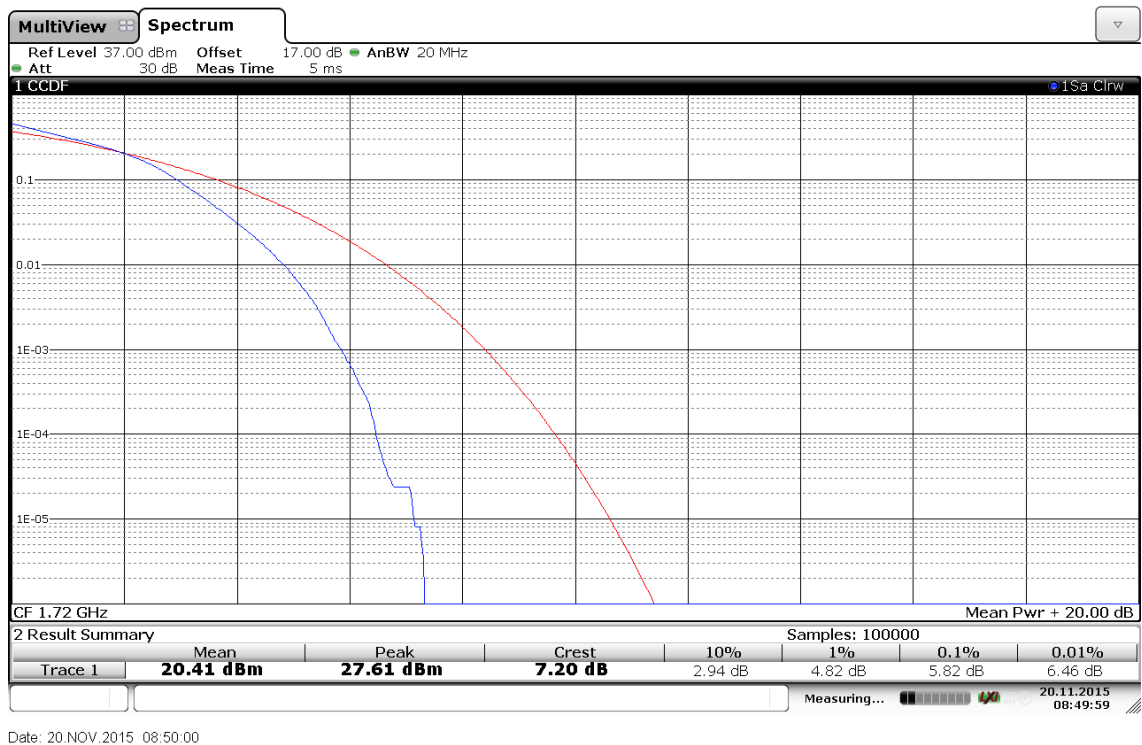
| BW<br>(MHz) | Modulation | Channel | Frequency<br>(MHz) | RB<br>Size | RB Offset | Peak to Average ratio |                  | Limit | Verdict |
|-------------|------------|---------|--------------------|------------|-----------|-----------------------|------------------|-------|---------|
|             |            |         |                    |            |           | dB                    | Refer to<br>Plot | dB    |         |
| 20          | 16QAM      | 20050   | 1720               | 1          | 0         | 4.90                  | Plot B1<br>to B6 | 13    | PASS    |
|             |            |         |                    | 100        | 0         | 5.82                  |                  |       |         |
|             | 16QAM      | 20175   | 1732.5             | 1          | 0         | 4.54                  |                  |       | PASS    |
|             |            |         |                    | 100        | 0         | 6.08                  |                  |       |         |
|             | 16QAM      | 20300   | 1745               | 1          | 0         | 4.88                  |                  |       | PASS    |
|             |            |         |                    | 100        | 0         | 6.06                  |                  |       |         |

Note: All of the modulations were tested, found 16QAM was the worst case mode, and the worst test results were reported.

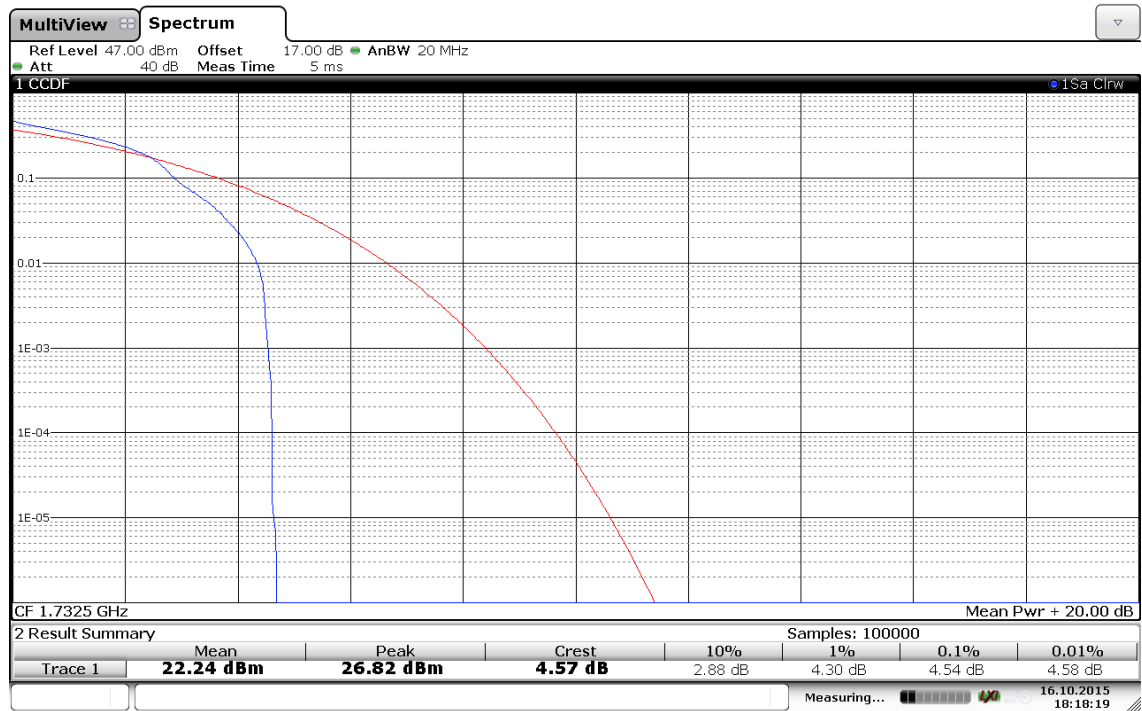
## 2.2.6 Test Results (Plots) of Peak-to-Average Ratio



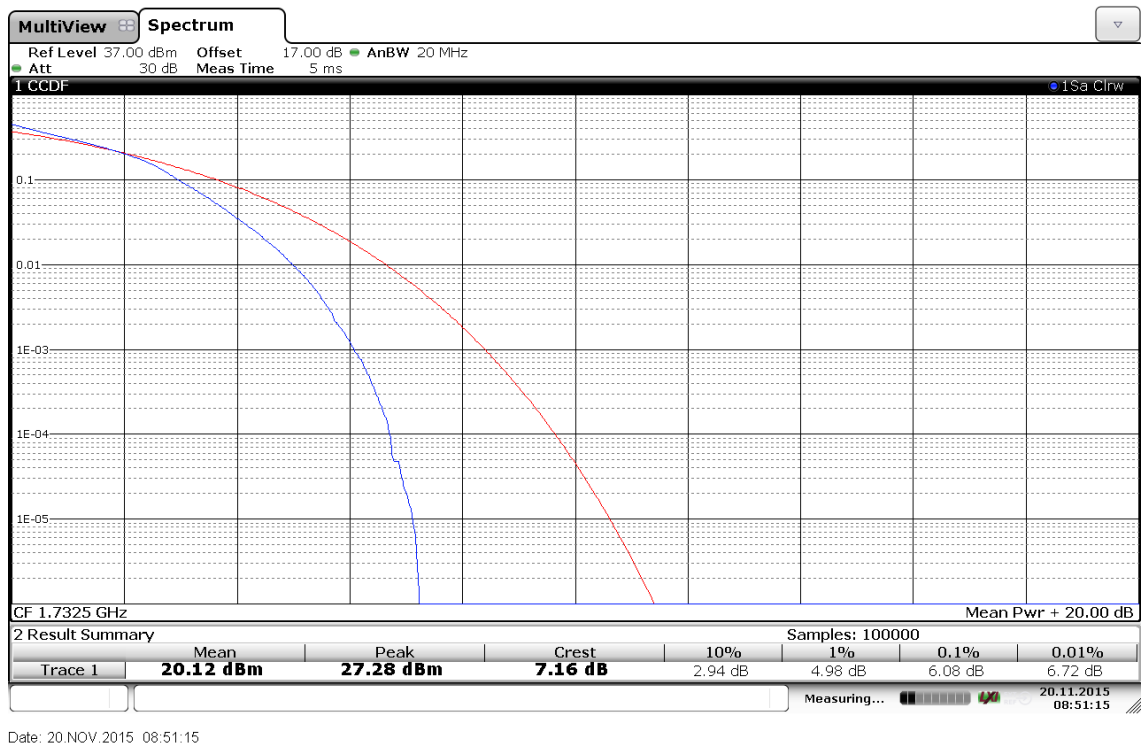
(Plot B1: Band 4/20MHz/16QAM in Ch.20050 1RB Size)



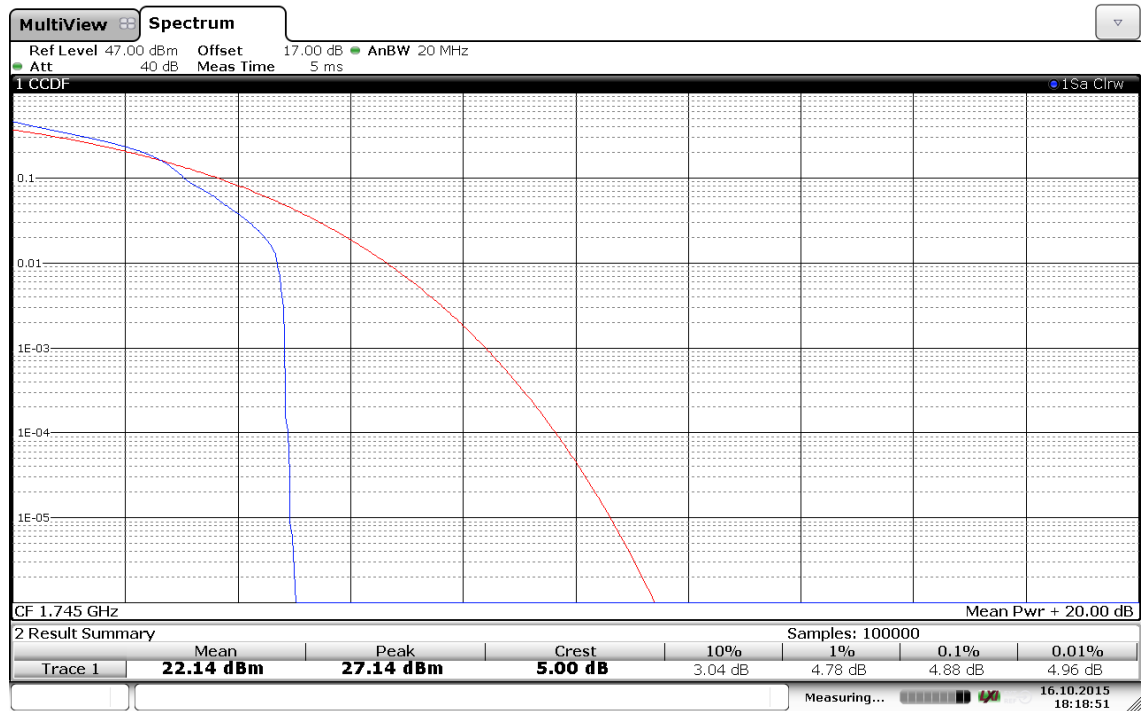
(Plot B2: Band 4/20MHz/16QAM in Ch.20050 100RB Size)



(Plot B3: Band 4/20MHz/16QAM in Ch.20175 1RB Size)

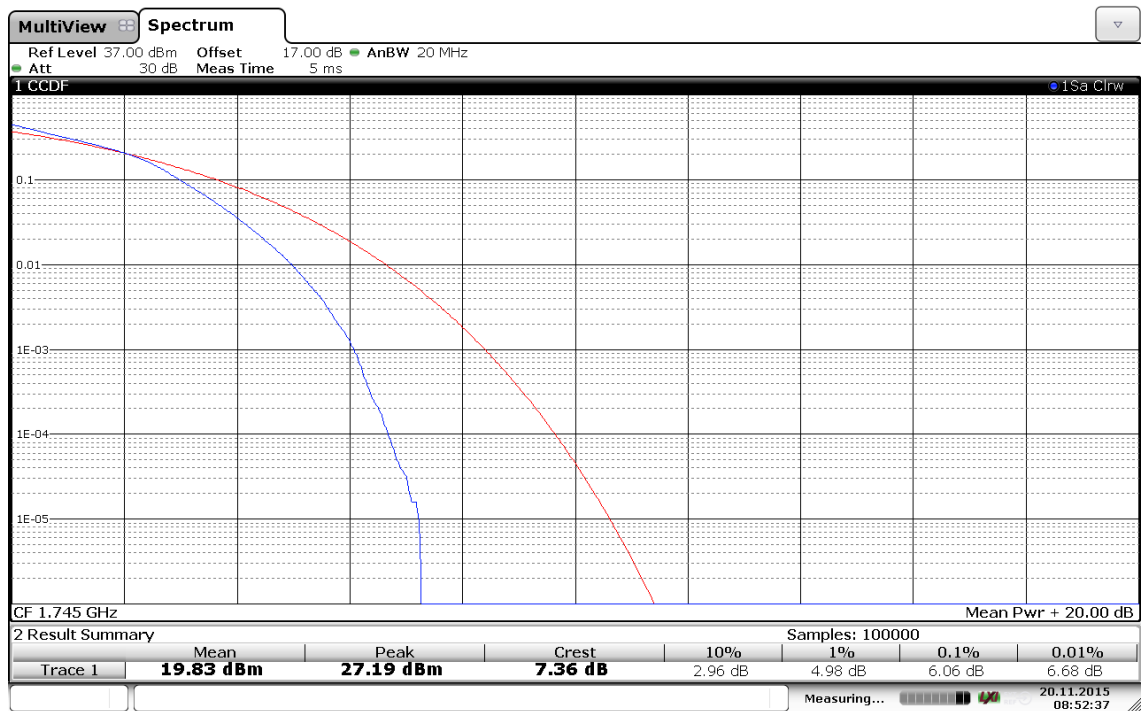


(Plot B4: Band 4/20MHz/16QAM in Ch.20175 100RB Size)



Date: 16.OCT.2015 18:18:50

(Plot B5: Band 4/20MHz/16QAM in Ch.20300 1RB Size)



Date: 20.NOV.2015 08:52:38

(Plot B6: Band 4/20MHz/16QAM in Ch.20300 100RB Size)

## 2.3 99% Occupied Bandwidth and 26dB Bandwidth

### 2.3.1 Definition

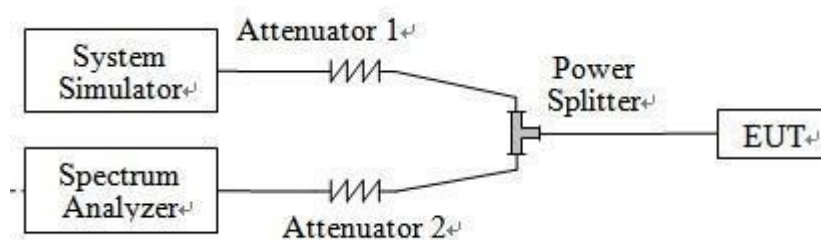
According to FCC section 2.1049, the occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The 26 dB emission bandwidth is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated 26 dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth equal to approximately 1.0% of the emission bandwidth.

### 2.3.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 2.3.3 Test Setup



### 2.3.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The 26dB and 99% occupied bandwidth (BW) of the middle channel for the highest RF power with full RB sizes were measured.

### 2.3.5 Test Result of 99% Occupied Bandwidth and 26dB Bandwidth

| LTE Band 4 |         |                 |       |                             |                     |               |
|------------|---------|-----------------|-------|-----------------------------|---------------------|---------------|
| BW (MHz)   | Channel | Frequency (MHz) | Mode  | 99% Occupied Bandwidth(MHz) | 26dBBandwidth (MHz) | Refer to Plot |
| 1.4        | 20175   | 1732.5          | QPSK  | 1.10                        | 1.28                | Plot A1 to A2 |
|            |         |                 | 16QAM | 1.10                        | 1.30                | Plot A3 to A4 |
| 3          | 20175   | 1732.5          | QPSK  | 2.75                        | 3.05                | Plot B1 to B2 |
|            |         |                 | 16QAM | 2.75                        | 3.02                | Plot B3 to B4 |
| 5          | 20175   | 1732.5          | QPSK  | 4.54                        | 5.02                | Plot C1 to C2 |
|            |         |                 | 16QAM | 4.52                        | 5.02                | Plot C3 to C4 |
| 10         | 20175   | 1732.5          | QPSK  | 8.96                        | 9.84                | Plot D1 to D2 |
|            |         |                 | 16QAM | 8.96                        | 9.68                | Plot D3 to D4 |
| 15         | 20175   | 1732.5          | QPSK  | 13.50                       | 15.00               | Plot E1 to E2 |
|            |         |                 | 16QAM | 13.50                       | 15.00               | Plot E3 to E4 |
| 20         | 20175   | 1732.5          | QPSK  | 18.72                       | 21.44               | Plot F1 to F2 |
|            |         |                 | 16QAM | 18.64                       | 21.28               | Plot F3 to F4 |

Note: The maximum RB configurations of the 99% Occupied Bandwidth and 26dB Bandwidth summary as below:

BW1.4MHz RB setting: RB Size 6,RB Offset 0

BW3MHz RB setting: RB Size 15,RB Offset 0

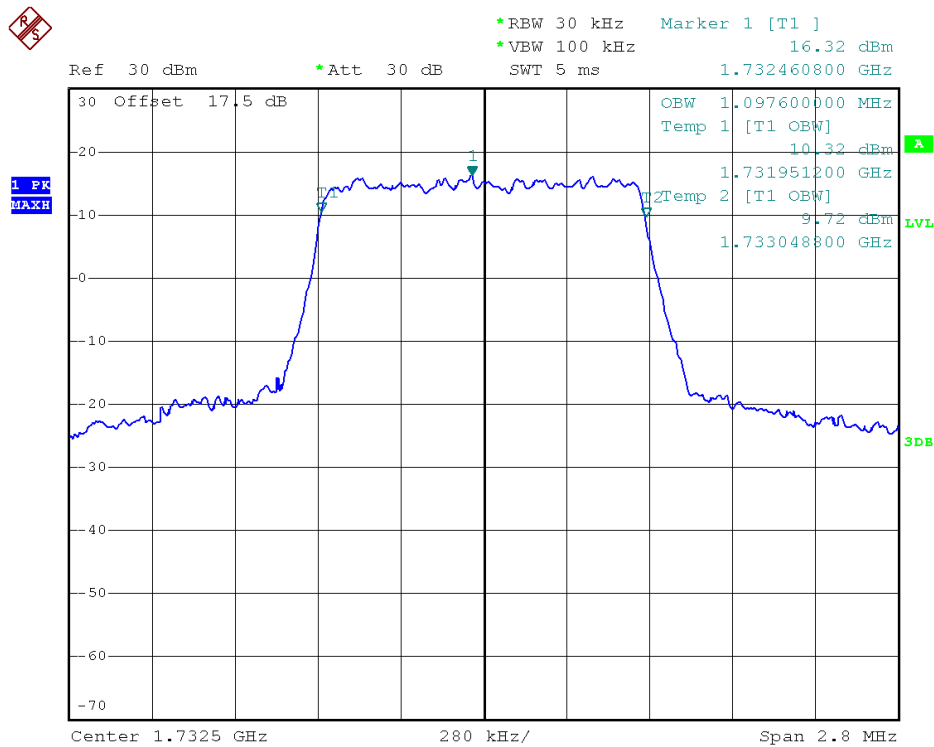
BW5MHz RB setting: RB Size 25,RB Offset 0

BW10MHz RB setting: RB Size 50,RB Offset 0

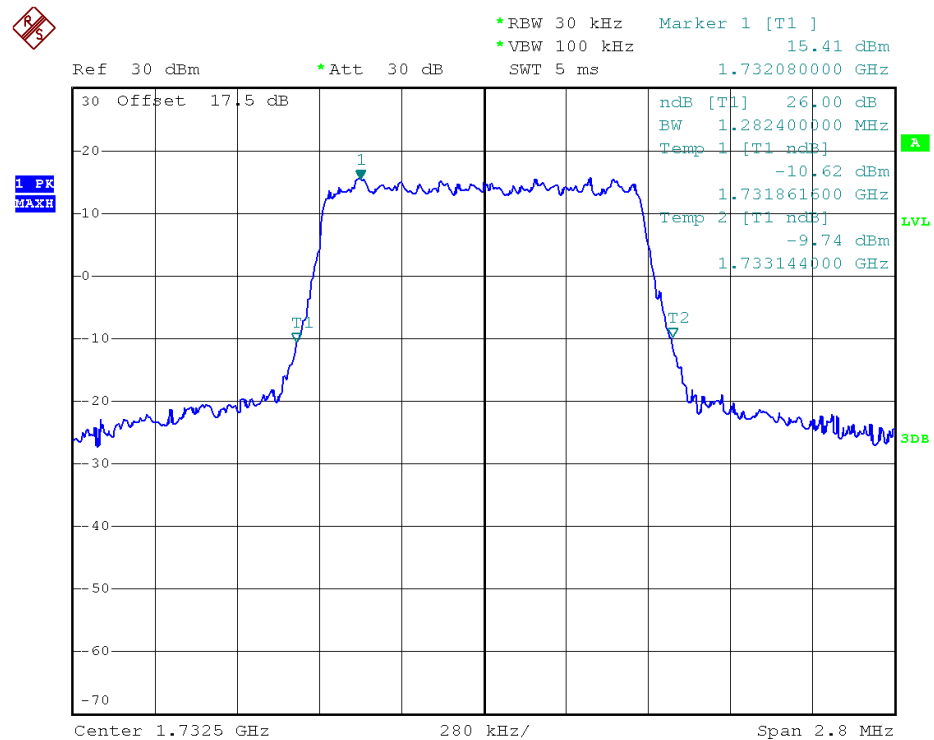
BW15MHz RB setting: RB Size 75,RB Offset 0

BW20MHz RB setting: RB Size 100,RB Offset 0

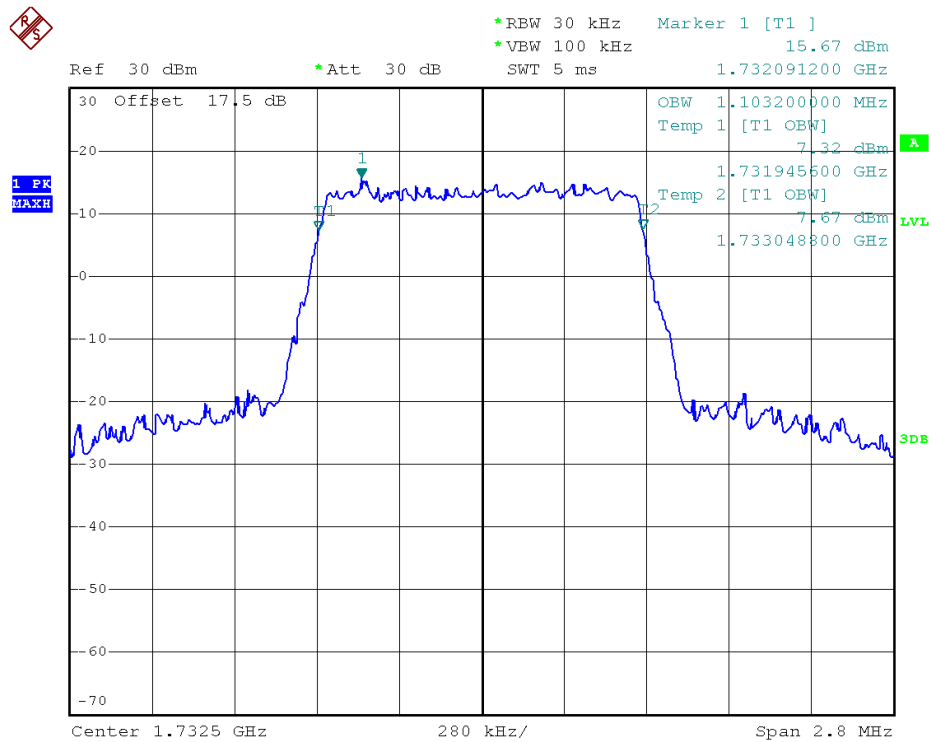
### 2.3.6 Test Result (Plots) of 99% Occupied Bandwidth and 26dB Bandwidth



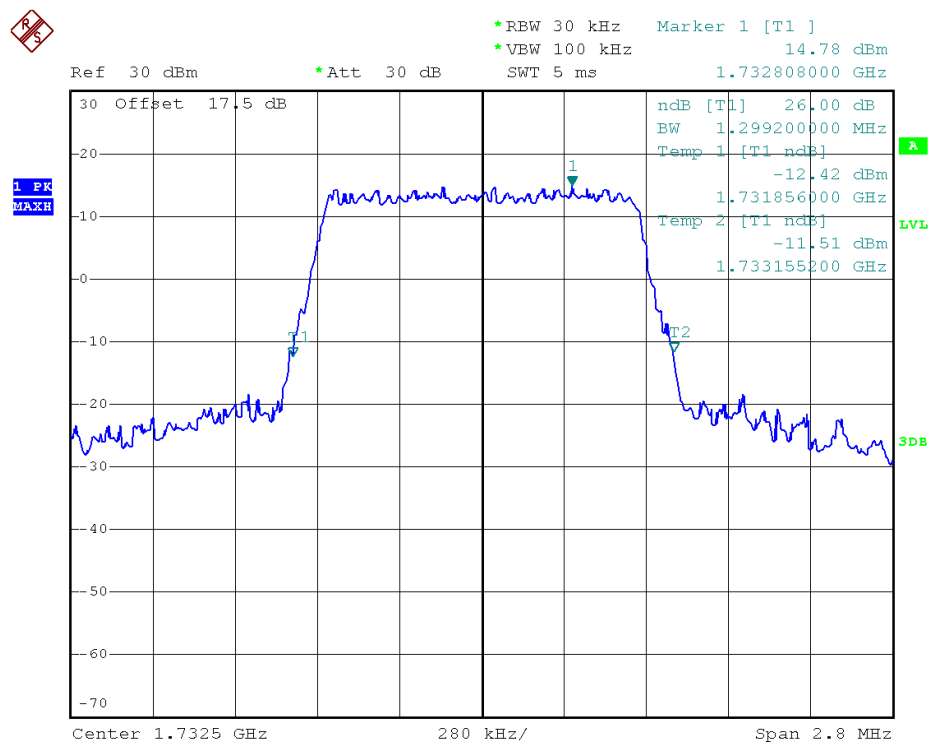
(Plot A1: 99% Occupied Bandwidth LTE Band 4 / 1.4MHz / QPSK)



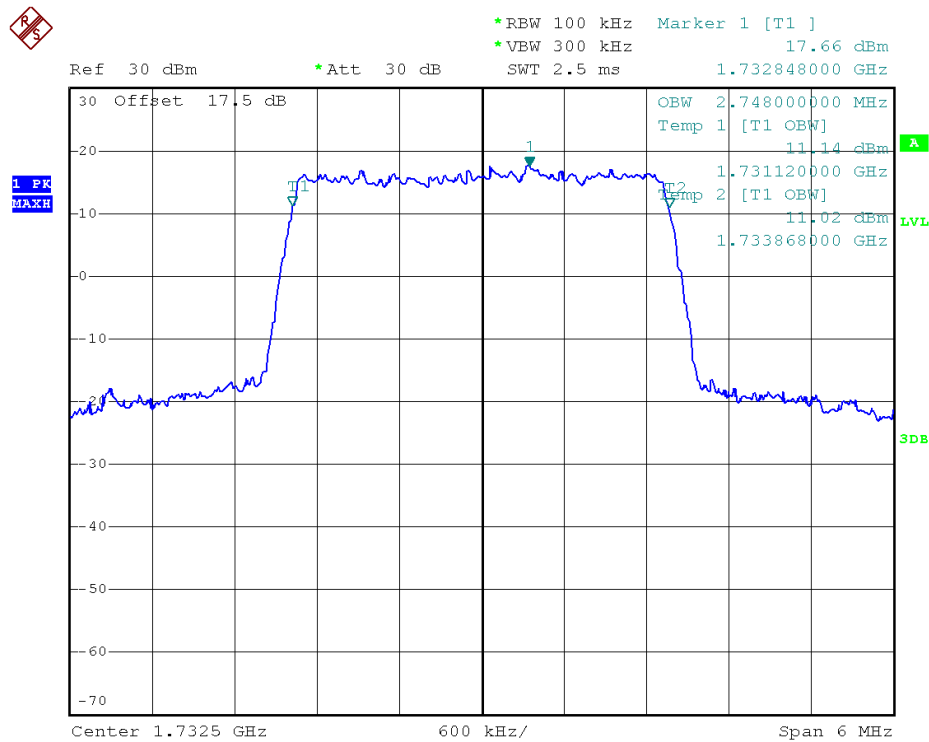
(Plot A2: 26dB Bandwidth LTE Band 4 / 1.4MHz / QPSK)



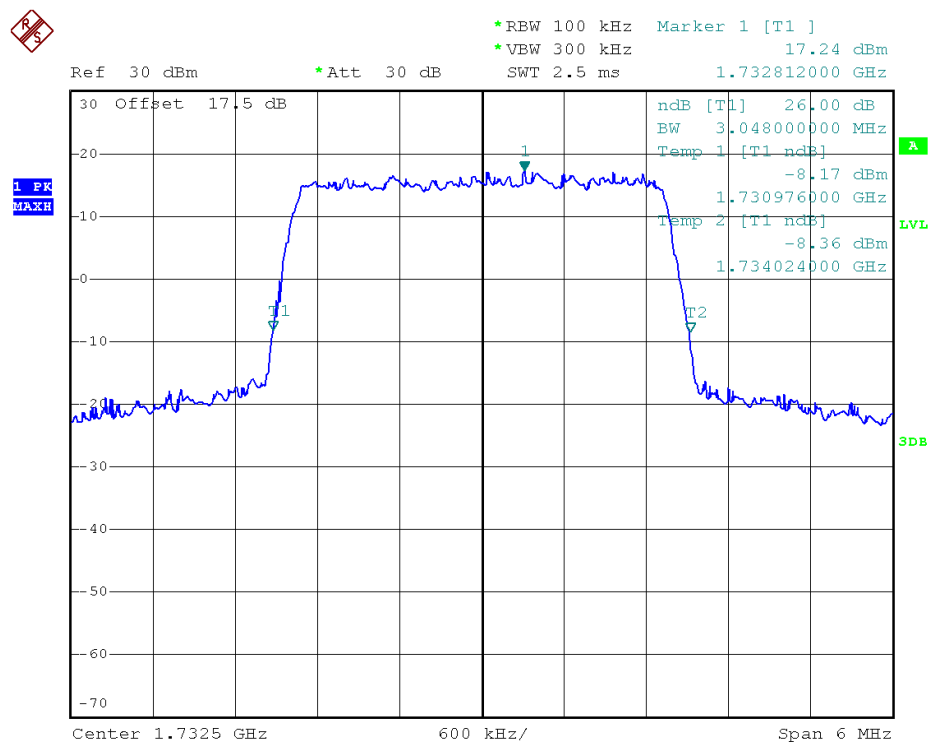
(Plot A3: 99% Occupied Bandwidth LTE Band 4 / 1.4MHz / 16QAM)



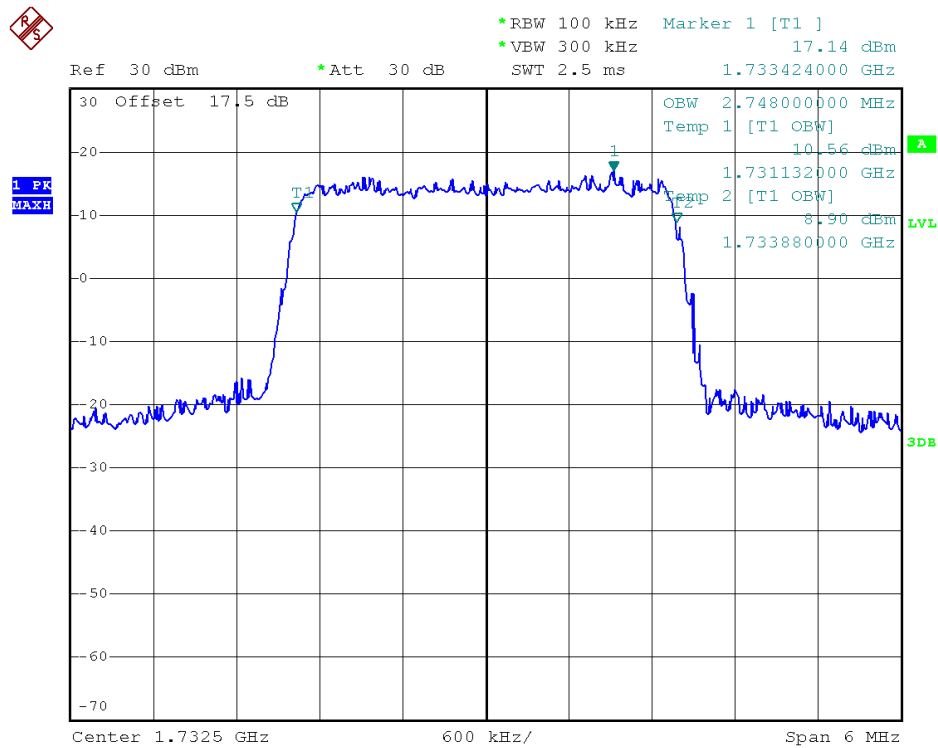
(Plot A4: 26dB Bandwidth LTE Band 4 / 1.4MHz / 16QAM)



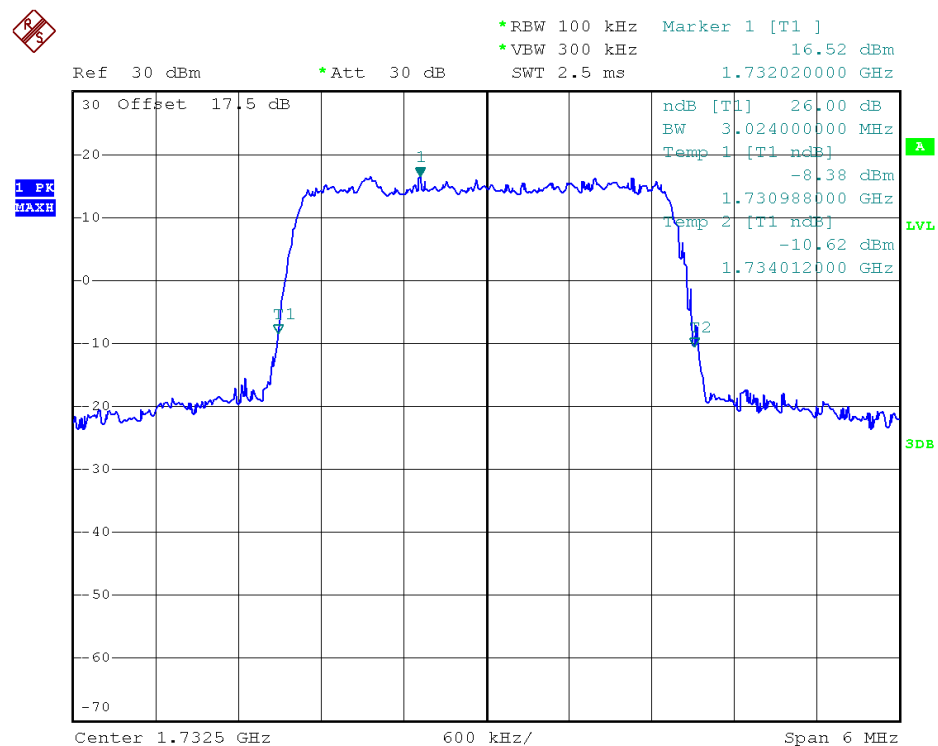
(Plot B1: 99% Occupied Bandwidth LTE Band 4 / 3MHz / QPSK)



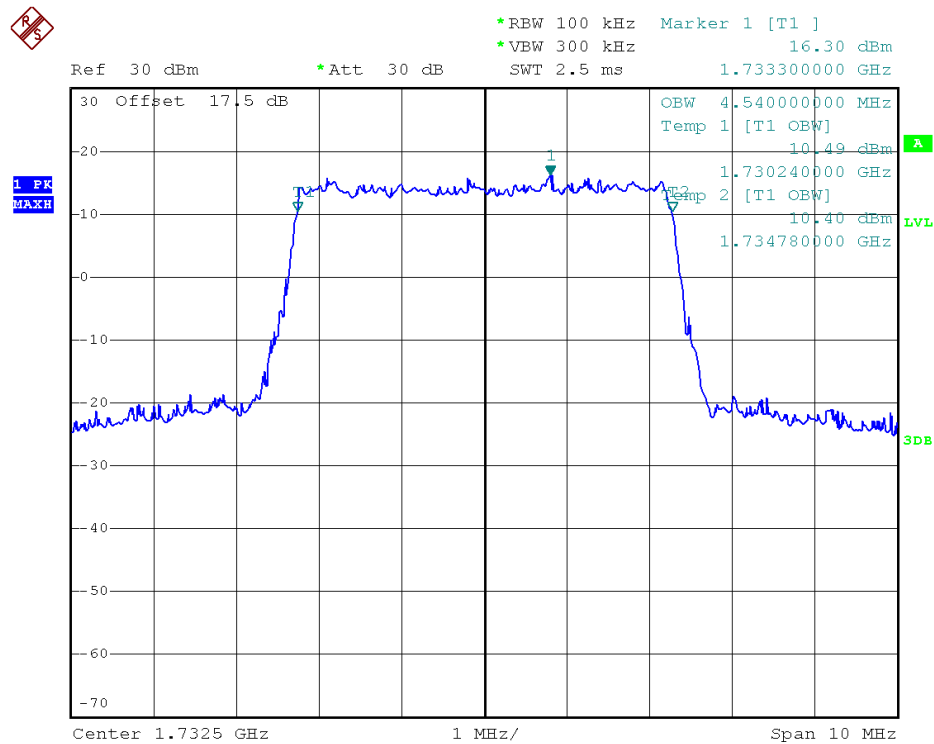
(Plot B2: 26dB Bandwidth LTE Band 4 / 3MHz / QPSK)



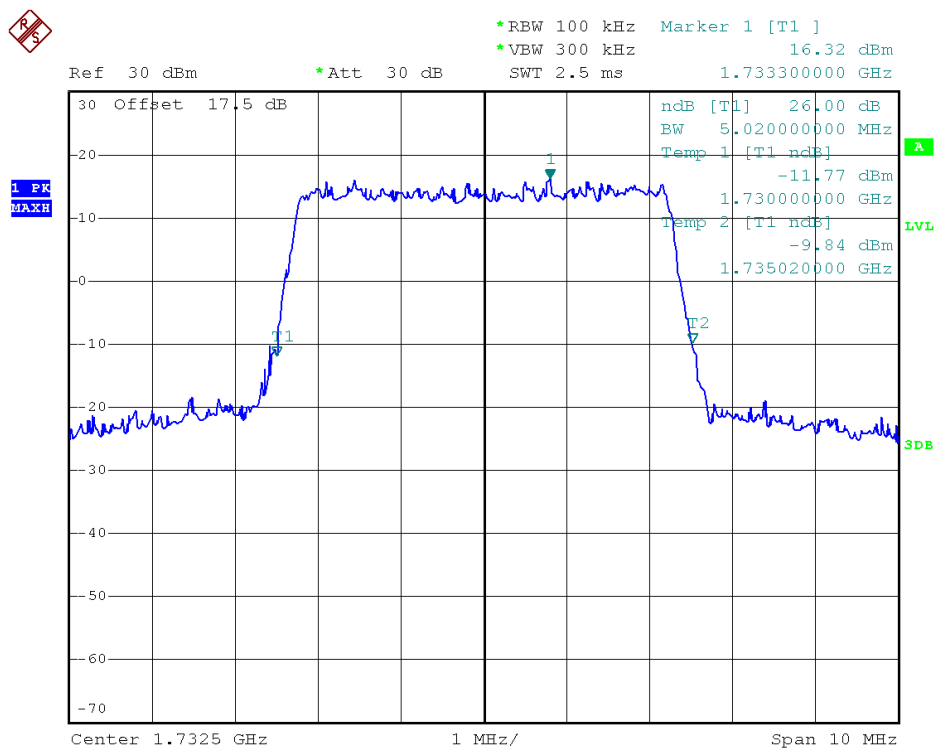
(Plot B3: 99% Occupied Bandwidth LTE Band 4 / 3MHz / 16QAM)



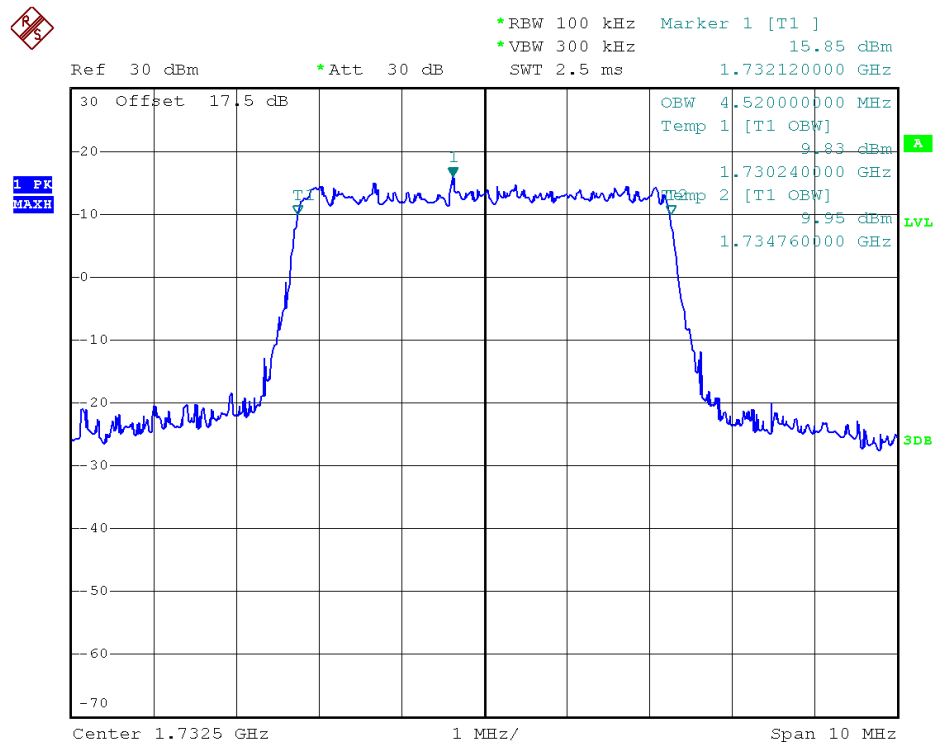
(Plot B4: 26dB Bandwidth LTE Band 4 / 3MHz / 16QAM)



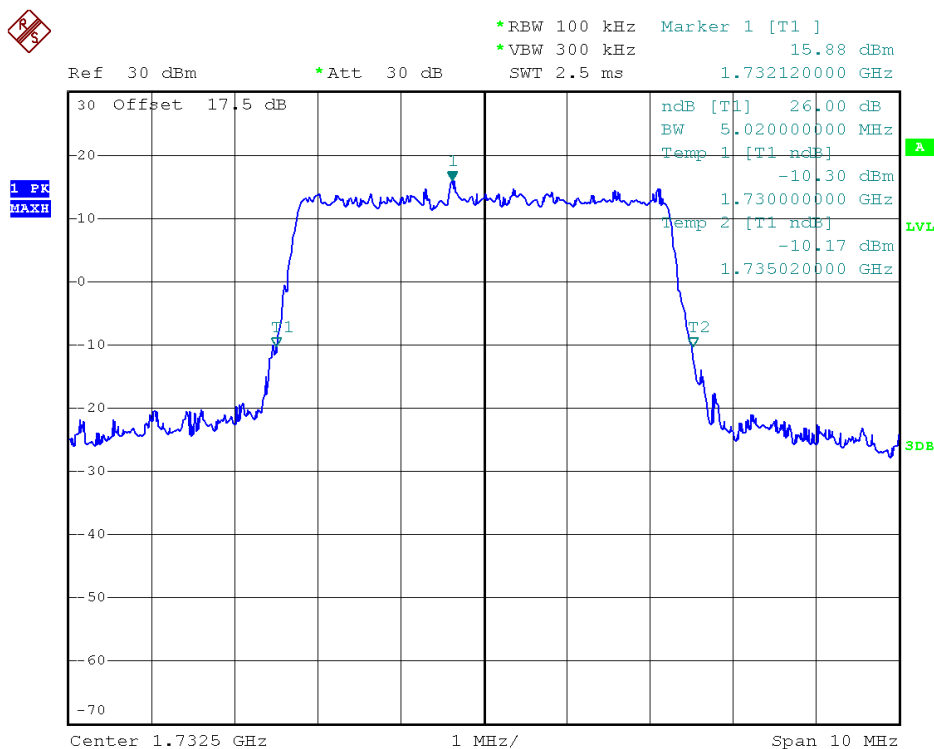
(Plot C1: 99% Occupied Bandwidth LTE Band 4 / 5MHz / QPSK)



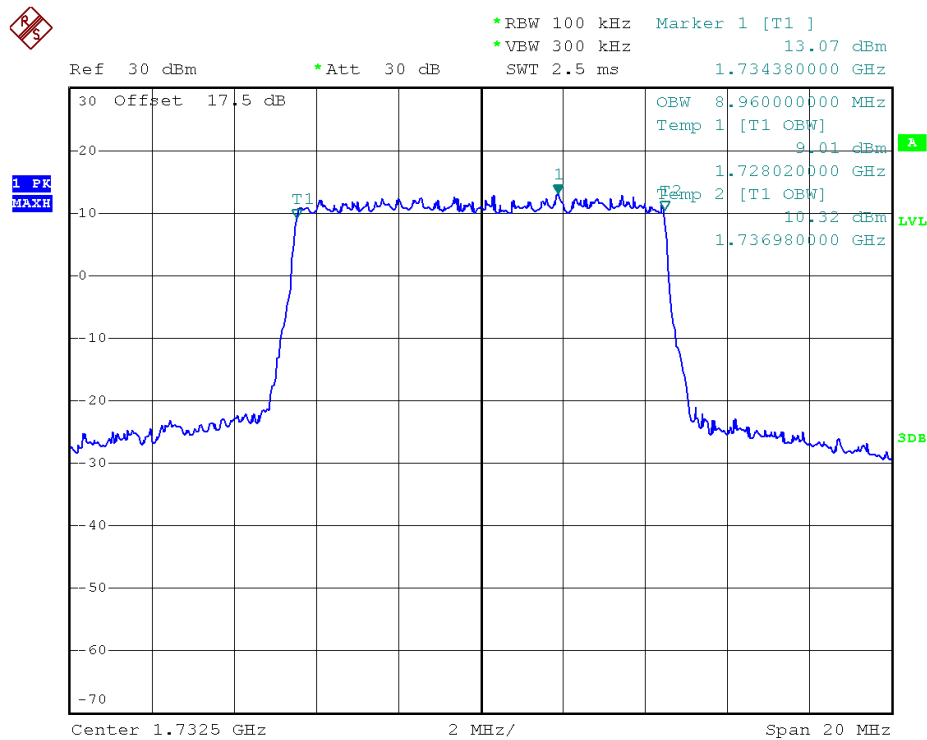
(Plot C2: 26dB Bandwidth LTE Band 4 / 5MHz / QPSK)



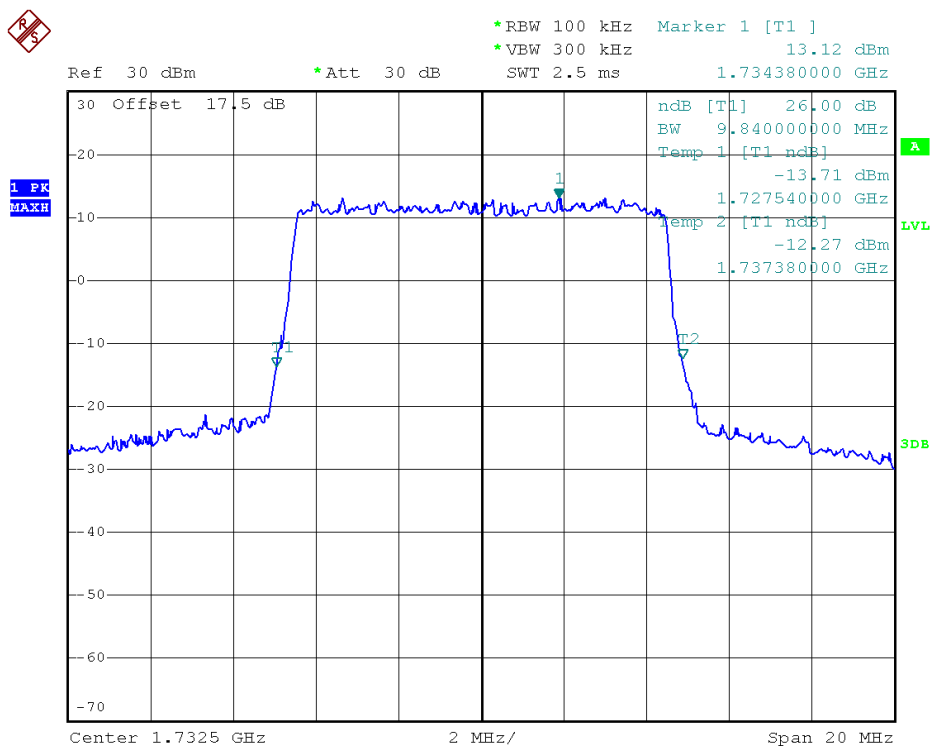
(Plot C3: 99% Occupied Bandwidth LTE Band 4 / 5MHz / 16QAM)



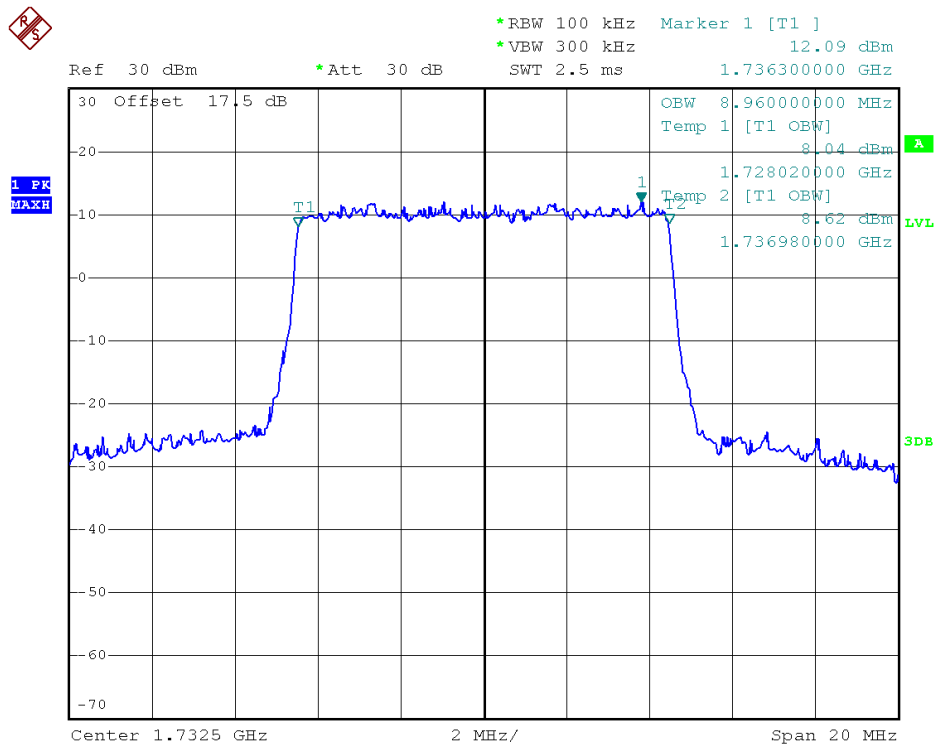
(Plot C4: 26dB Bandwidth LTE Band 4 / 5MHz / 16QAM)



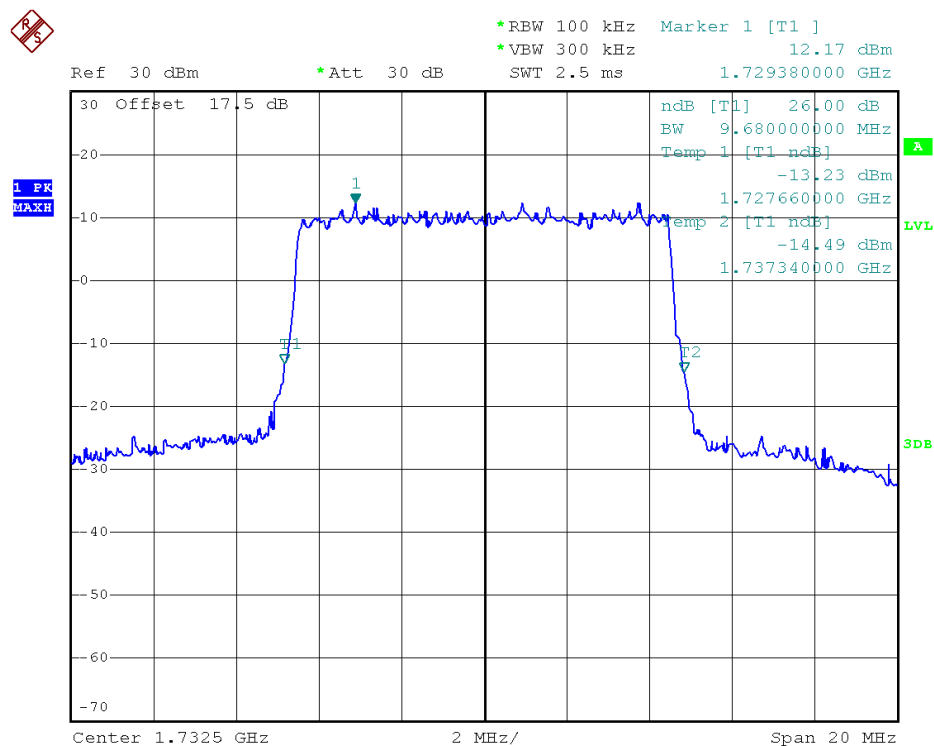
(Plot D1: 99% Occupied Bandwidth LTE Band 4 / 10MHz / QPSK)



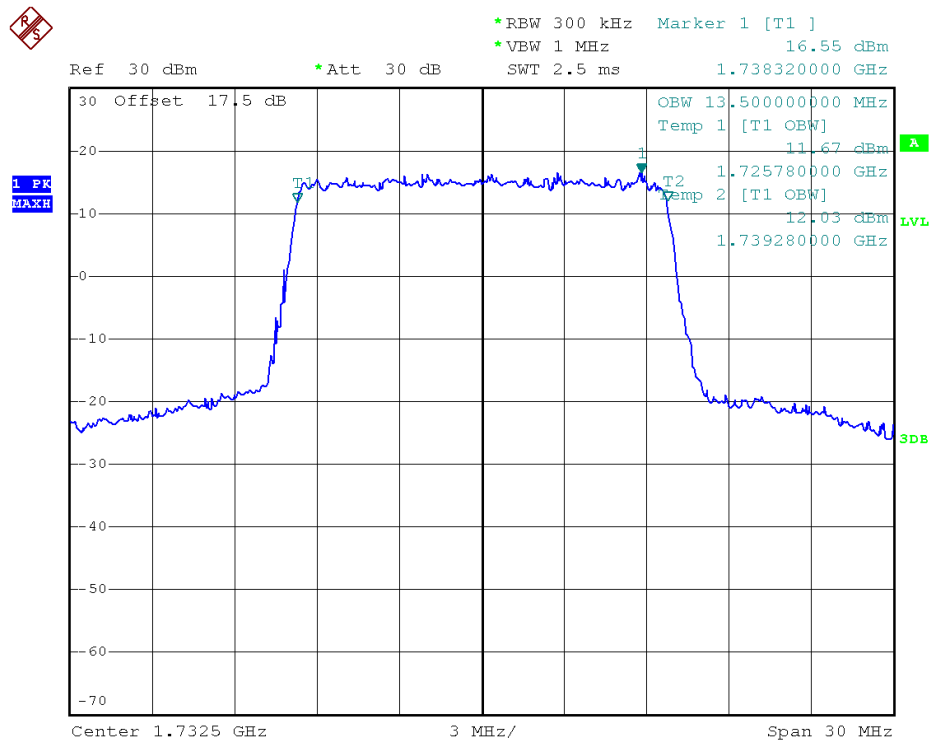
(Plot D2: 26dB Bandwidth LTE Band 4 / 10MHz / QPSK)



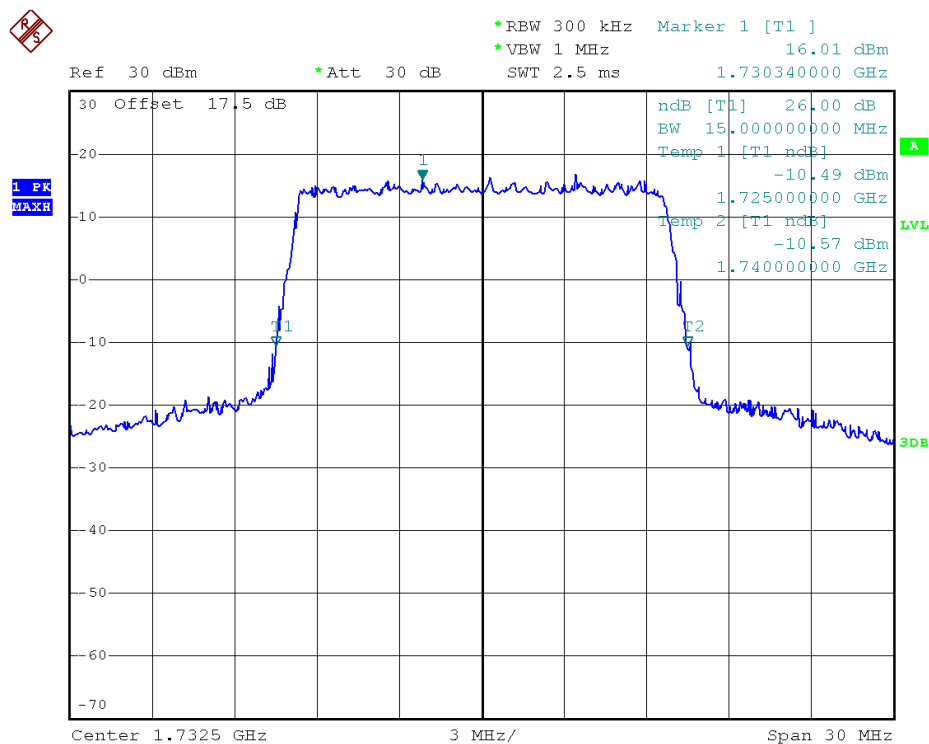
(Plot D3: 99% Occupied Bandwidth LTE Band 4 / 10MHz / 16QAM)



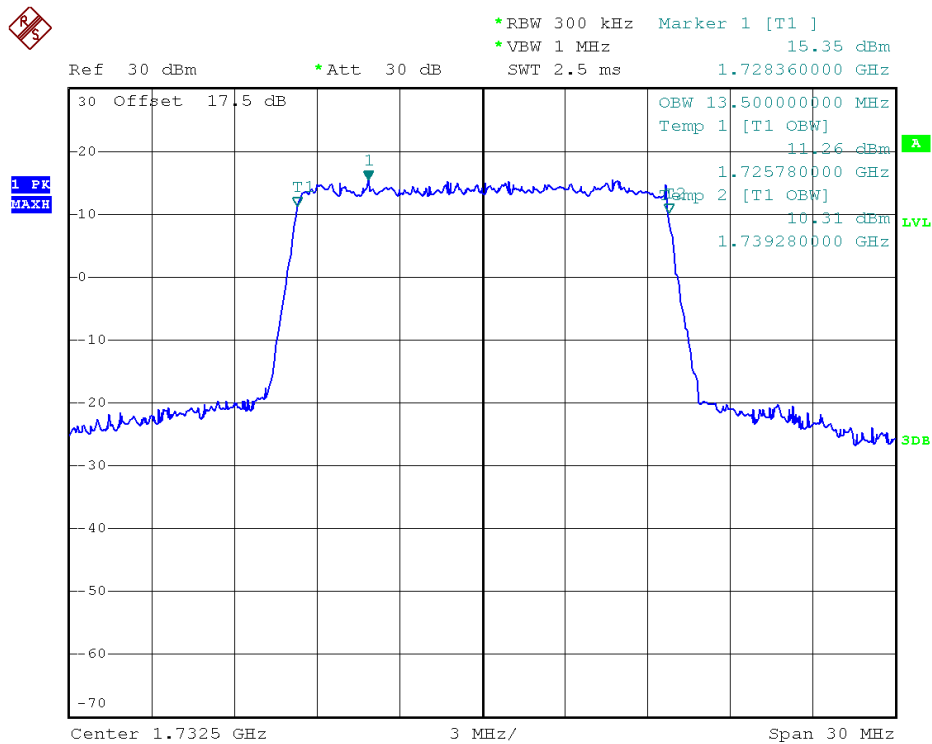
(Plot D4: 26dB Bandwidth LTE Band 4 / 10MHz / 16QAM)



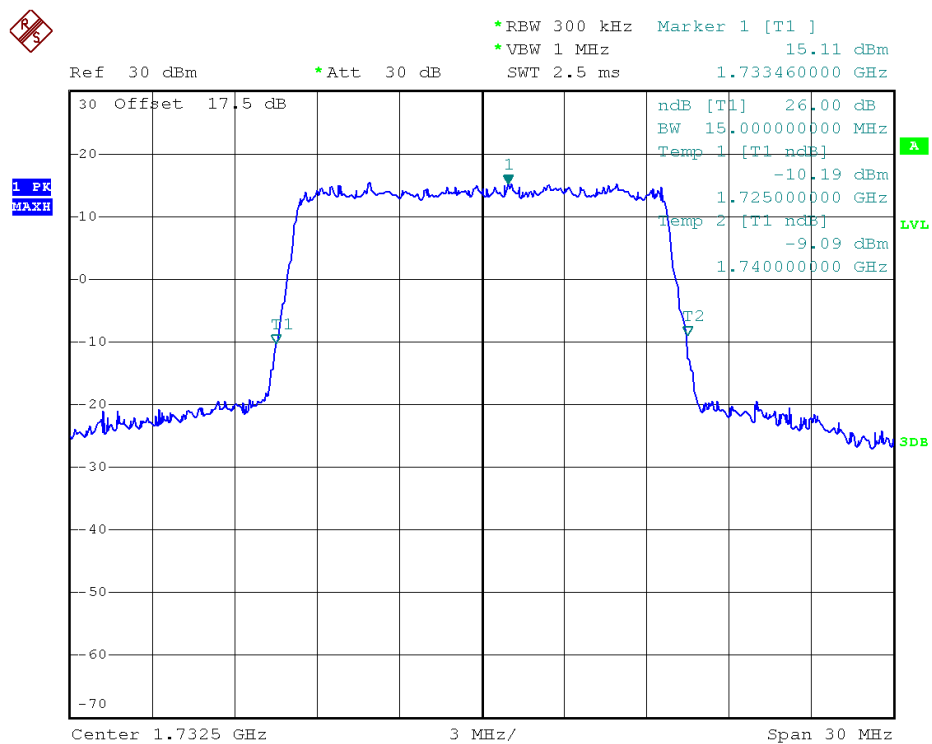
(Plot E1: 99% Occupied Bandwidth LTE Band 4 / 15MHz / QPSK)



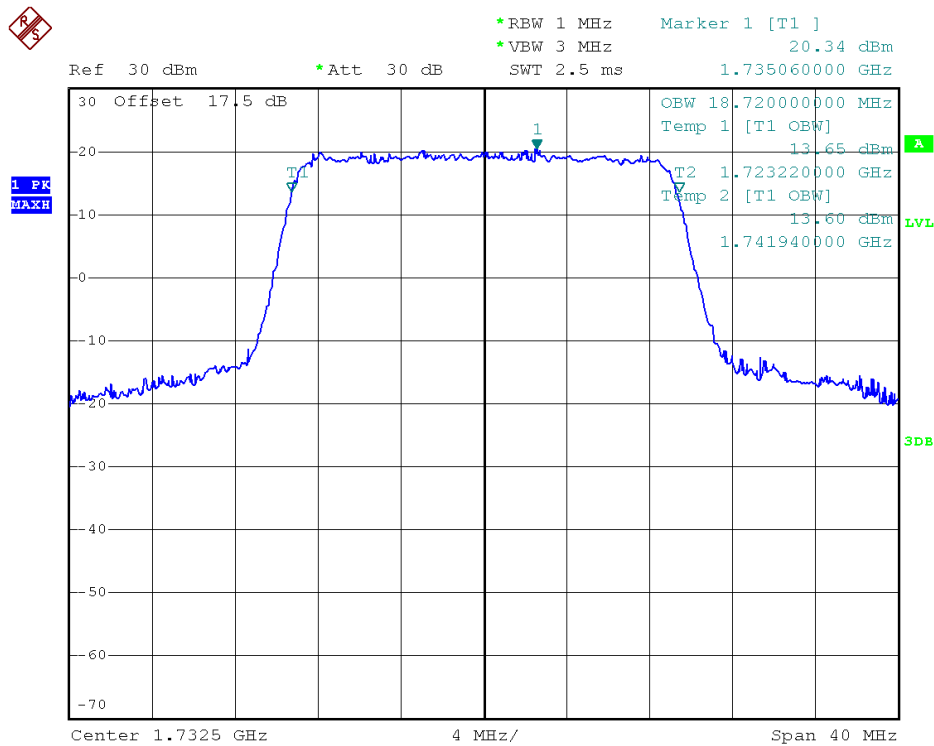
(Plot E2: 26dB Bandwidth LTE Band 4 / 15MHz / QPSK)



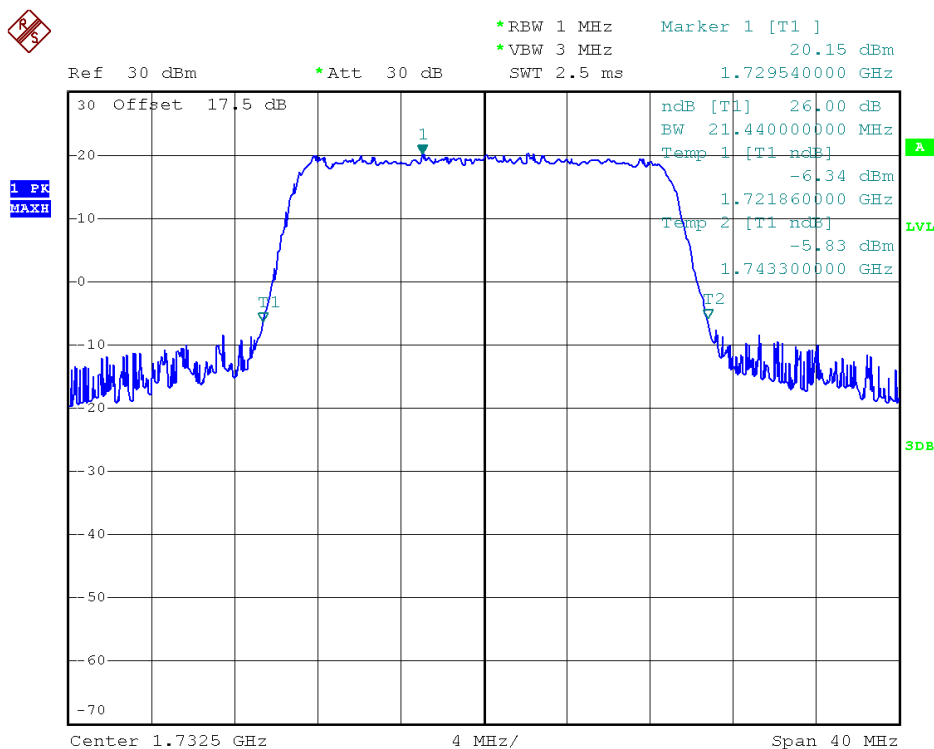
(Plot E3: 99% Occupied Bandwidth LTE Band 4 / 15MHz / 16QAM)



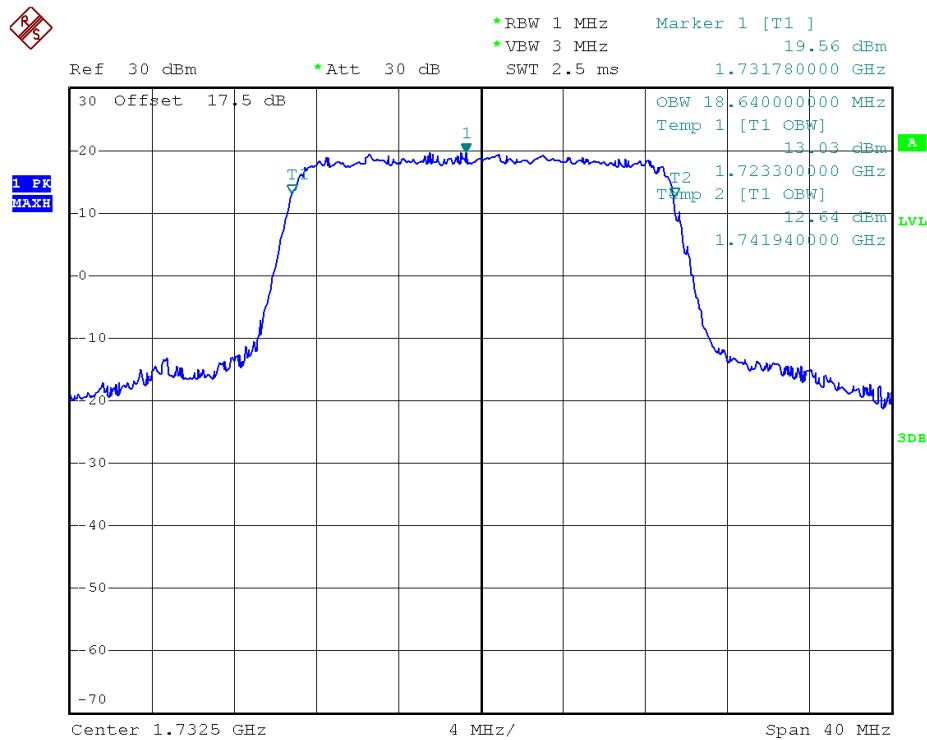
(Plot E4: 26dB Bandwidth LTE Band 4 / 15MHz / 16QAM)



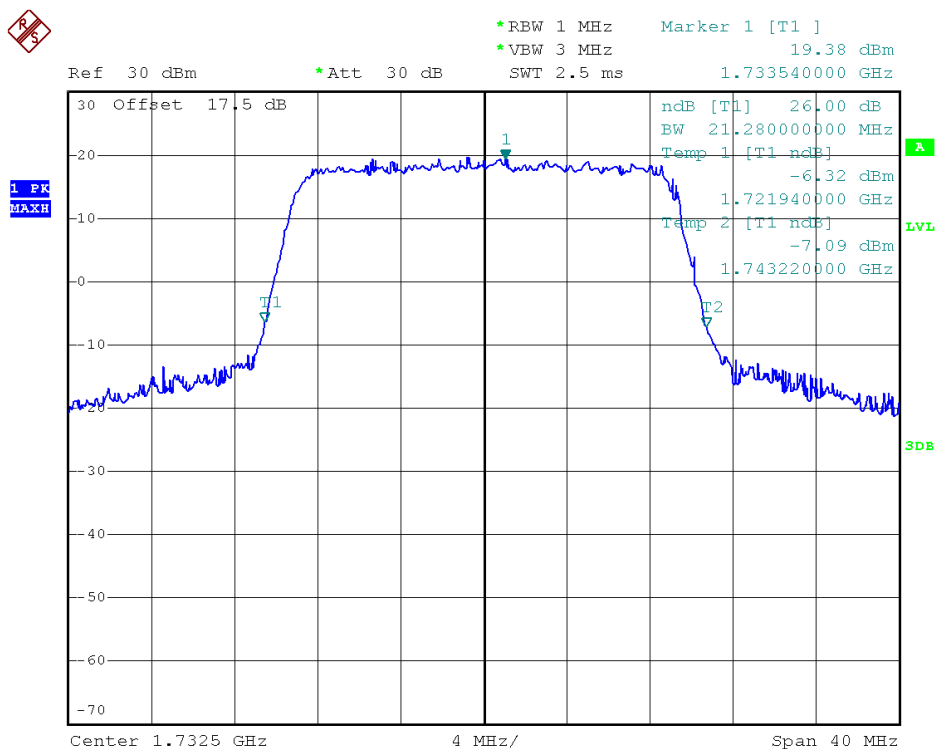
(Plot F1: 99% Occupied Bandwidth LTE Band 4 / 20MHz / QPSK)



(Plot F2: 26dB Bandwidth LTE Band 4 / 20MHz / QPSK)



(Plot F3: 99% Occupied Bandwidth LTE Band 4 / 20MHz / 16QAM)



(Plot F4: 26dB Bandwidth LTE Band 4 / 20MHz / 16QAM)

## 2.4 Frequency Stability

### 2.4.1 Requirement

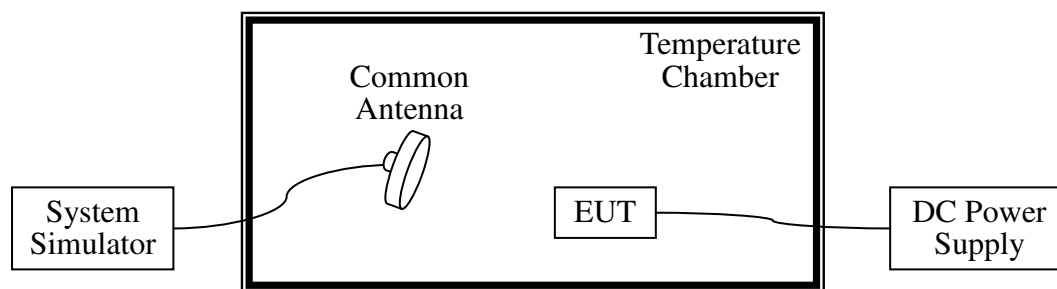
According to FCC section 27.54, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  at intervals of not more than  $10^{\circ}\text{C}$ .
- (b) For hand carried battery powered equipment, the primary supply voltage is reduced to the battery operating end point which shall be specified by the manufacture. The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

### 2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.4.3 Test Setup



### 2.4.4 Test Procedures

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized



before testing. Power was applied and the maximum change in frequency was recorded within one minute.

3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. The nominal, highest and lowest extreme voltages are separately 3.8VDC, 4.2VDC and 3.6VDC, which are specified by the applicant; the normal temperature here used is 25°C.
5. The variation in frequency was measured for the worst case.

## 2.4.5 Test Result of Frequency Stability

### 1. LTE Band 4, QPSK ,BW 10MHz

| Test Conditions |                     | Frequency Deviation<br>BW 10MHz<br>Middle Channel 1732.5MHz |                    |       |
|-----------------|---------------------|-------------------------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                                          | Frequency<br>Error | Limit |
|                 |                     | Hz                                                          | ppm                | ppm   |
| 3.7             | -30                 | 29                                                          | 0.02               | 2.5   |
|                 | -20                 | 48                                                          | 0.03               |       |
|                 | -10                 | 19                                                          | 0.01               |       |
|                 | 0                   | 36                                                          | 0.02               |       |
|                 | +10                 | 18                                                          | 0.01               |       |
|                 | +20                 | 19                                                          | 0.01               |       |
|                 | +30                 | 21                                                          | 0.01               |       |
|                 | +40                 | 53                                                          | 0.03               |       |
|                 | +55                 | 34                                                          | 0.02               |       |
| 4.2             | +25                 | 51                                                          | 0.03               | 2.5   |
| 3.5             | +25                 | 49                                                          | 0.03               |       |

### 2. LTE Band 4, 16QAM ,BW 10MHz

| Test Conditions |                     | Frequency Deviation<br>BW 10MHz<br>Middle Channel 1732.5MHz |                    |       |
|-----------------|---------------------|-------------------------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                                          | Frequency<br>Error | Limit |
|                 |                     | Hz                                                          | ppm                | ppm   |
| 3.7             | -30                 | 18                                                          | 0.01               | 2.5   |
|                 | -20                 | 55                                                          | 0.03               |       |
|                 | -10                 | 34                                                          | 0.02               |       |
|                 | 0                   | 29                                                          | 0.02               |       |
|                 | +10                 | 33                                                          | 0.02               |       |
|                 | +20                 | 17                                                          | 0.01               |       |
|                 | +30                 | 33                                                          | 0.02               |       |
|                 | +40                 | 23                                                          | 0.01               |       |
|                 | +55                 | 17                                                          | 0.01               |       |
| 4.2             | +25                 | 57                                                          | 0.03               | 2.5   |
| 3.5             | +25                 | 33                                                          | 0.02               |       |

## 2.5 Conducted Out of Band Emissions

### 2.5.1 Requirement

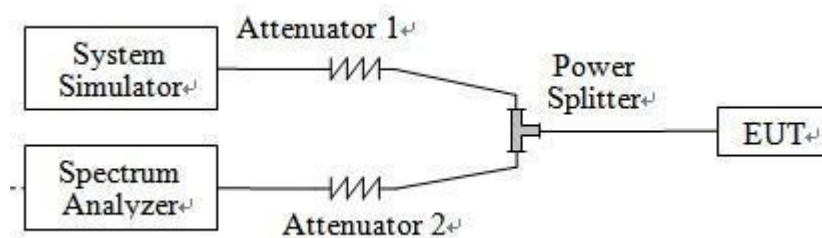
According to FCC section 27.53(h), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43+10*\log(P)$ dB. This calculated to be -13dBm.

It is measured by means of a calibrated spectrum analyzer and scanned from 30MHz up to a frequency including its 10th harmonic.

### 2.5.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

### 2.5.3 Test Setup



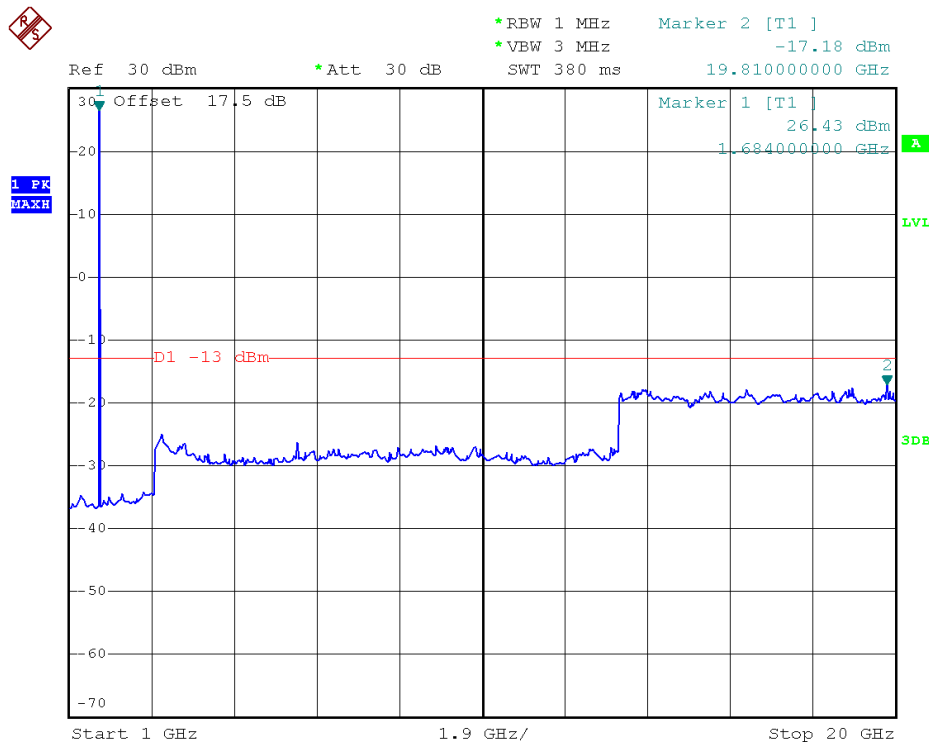
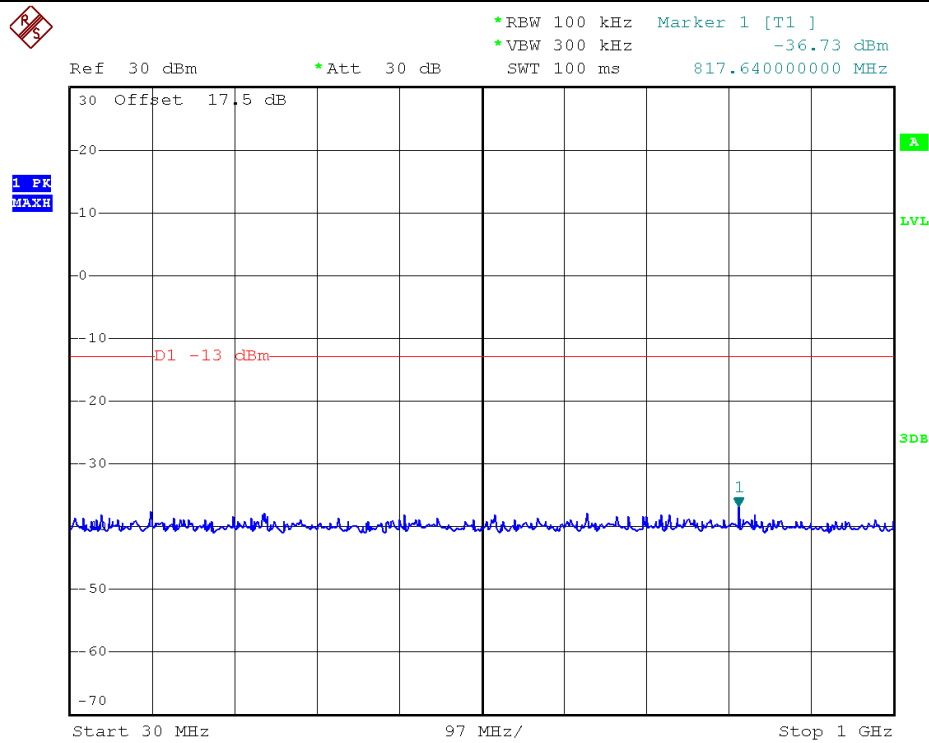
### 2.5.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
3. The middle channel for the highest RF power within the transmitting frequency was measured.
4. The conducted spurious emission for the whole frequency range was taken.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.

6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from  $43 + 10\log(P)\text{dB}$  below the transmitter power  $P(\text{Watts})$   
$$= P(\text{W}) - [43 + 10\log(P)] (\text{dB})$$
$$= [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB})$$
$$= -13\text{dBm}.$$
8. For 9 KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

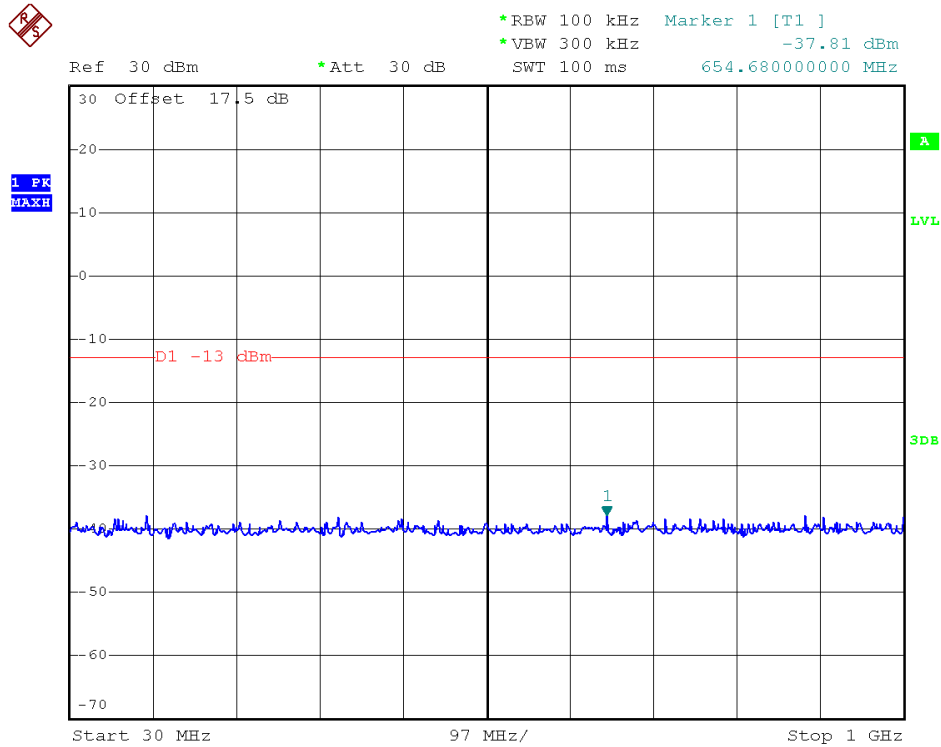
### 2.5.5 Test Result of Conducted Spurious Emission

|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 1.4MHz     | Modulation | QPSK |

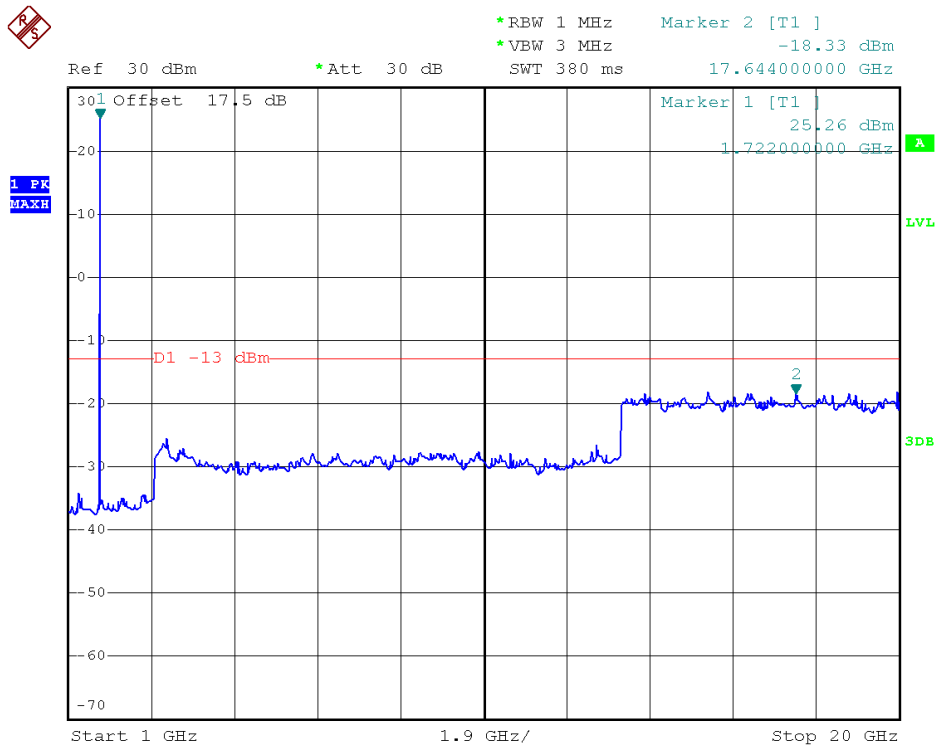




|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 1.4MHz     | Modulation | QPSK   |

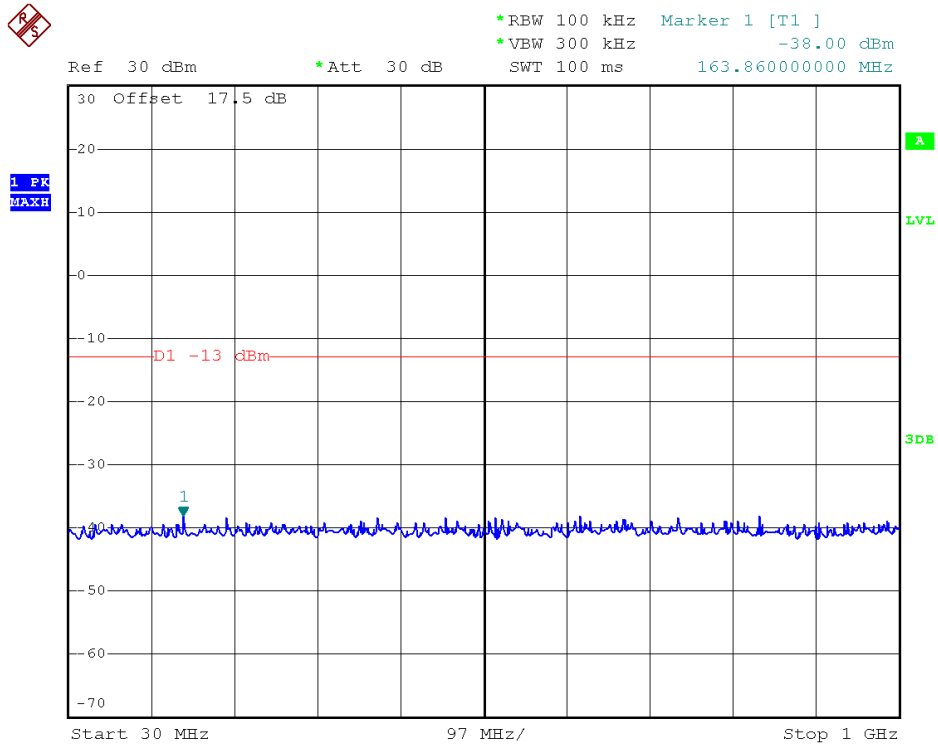


RB Size 1, RB Offset 0    30MHz to 1GHz

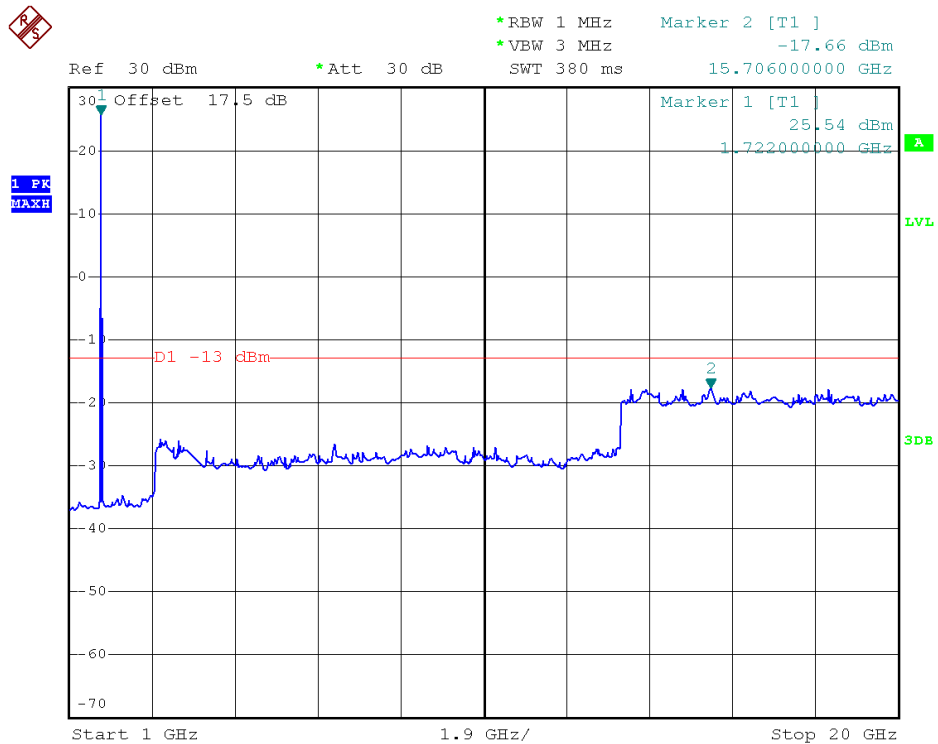


RB Size 1, RB Offset 0    1GHz to 20GHz

|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 1.4MHz     | Modulation | QPSK |

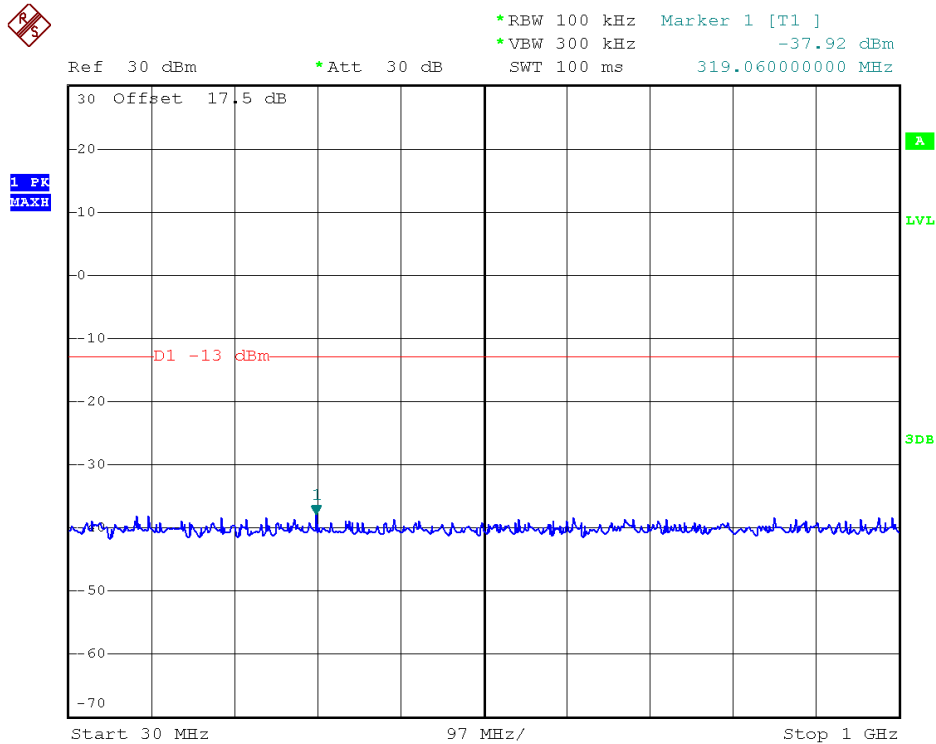


RB Size 1, RB Offset 0 30MHz to 1GHz

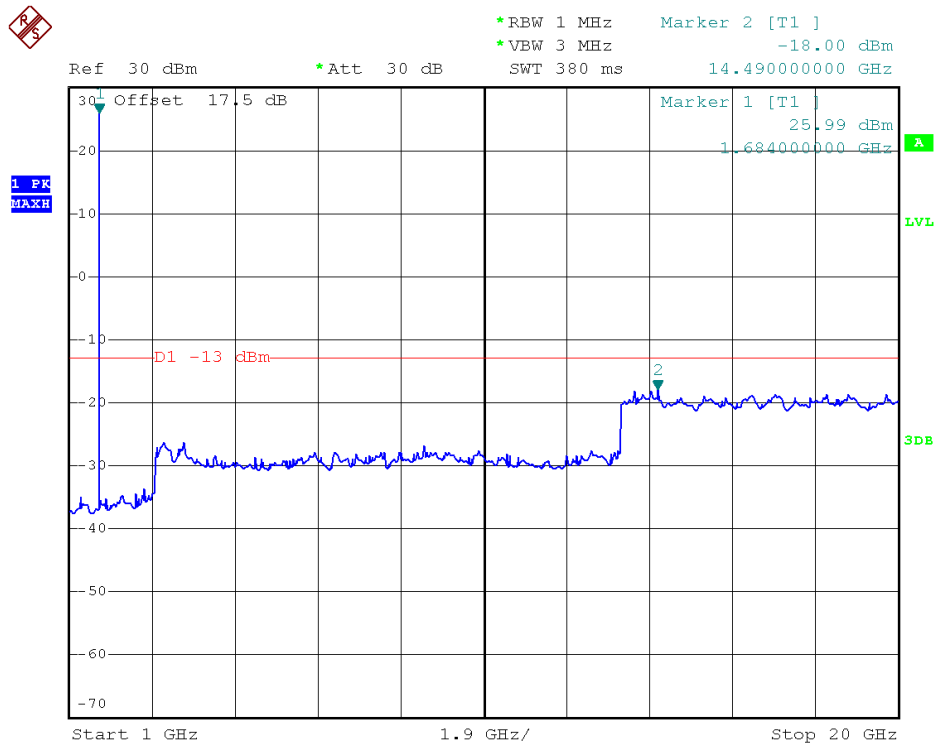


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 3MHz       | Modulation | QPSK |



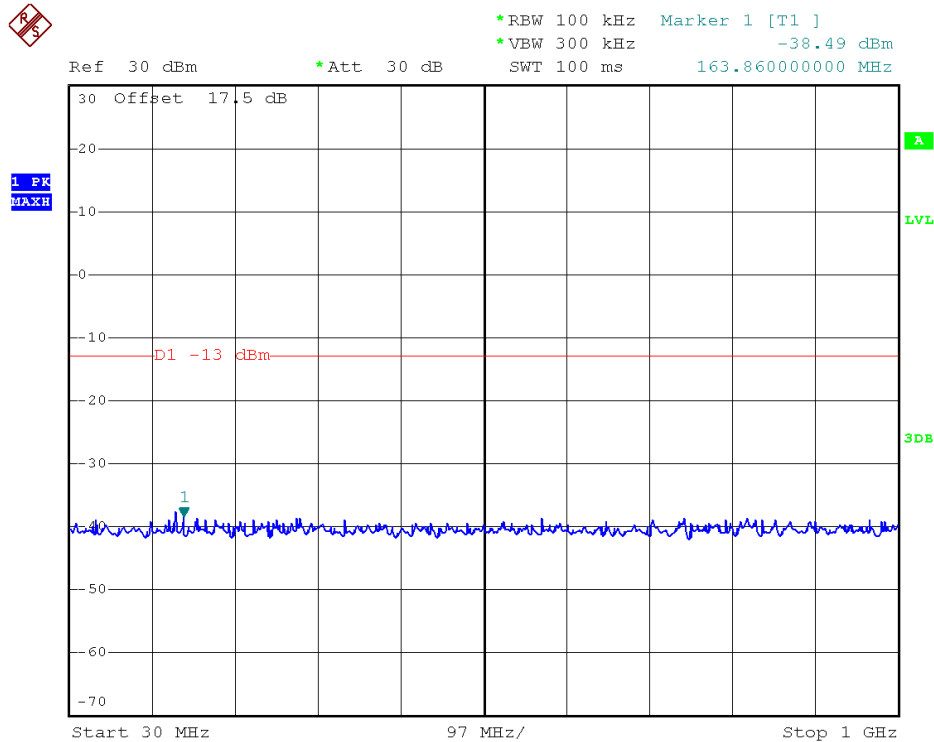
RB Size 1, RB Offset 0 30MHz to 1GHz



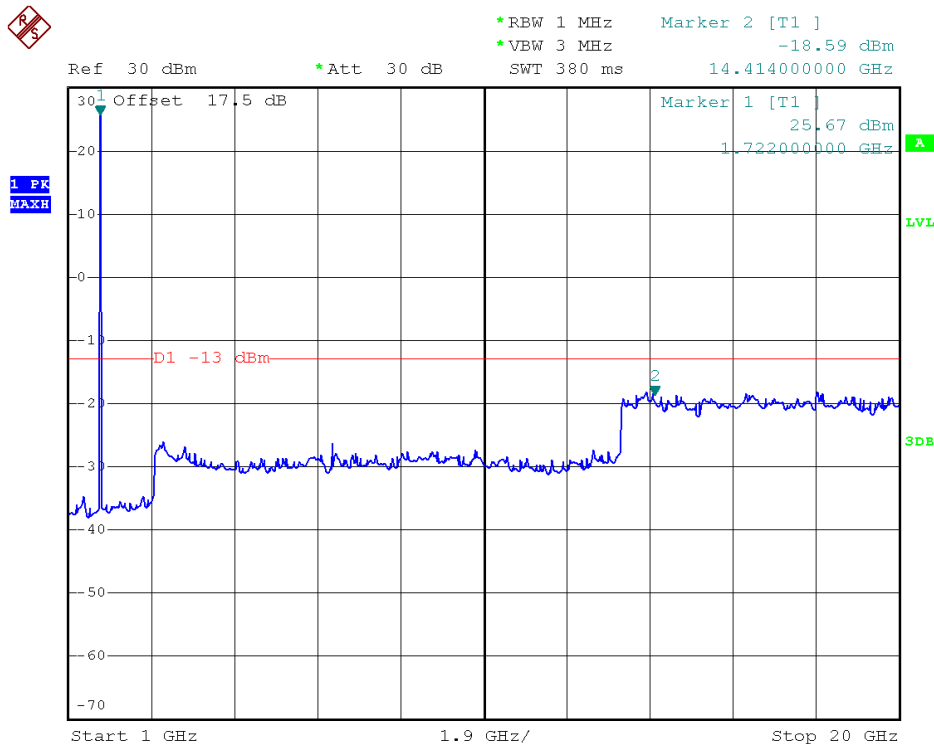
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 3MHz       | Modulation | QPSK   |



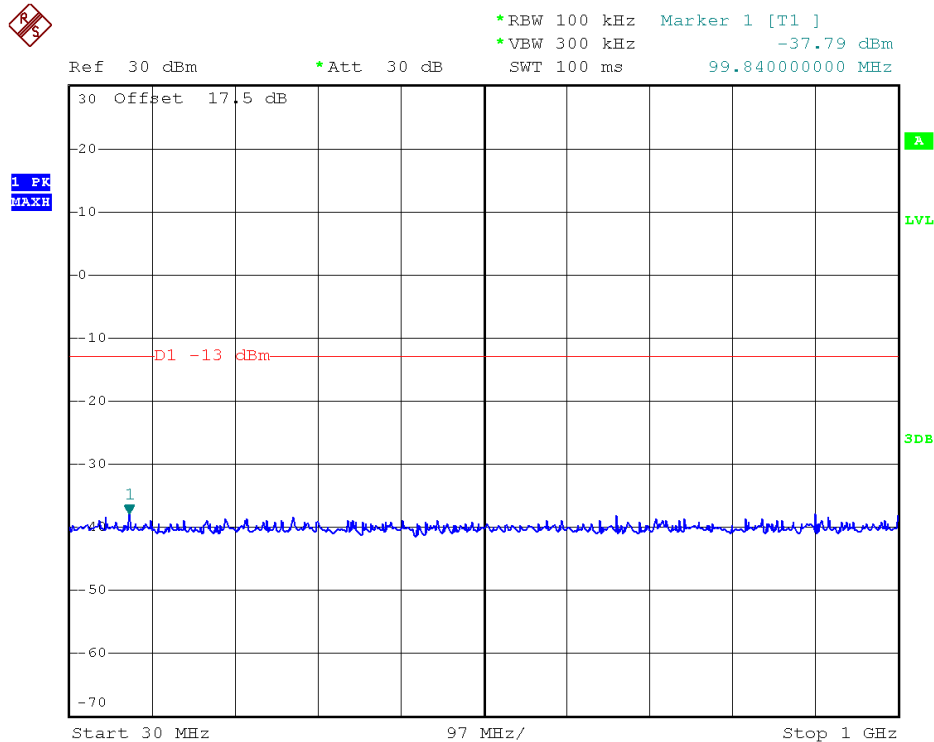
RB Size 1, RB Offset 0    30MHz to 1GHz



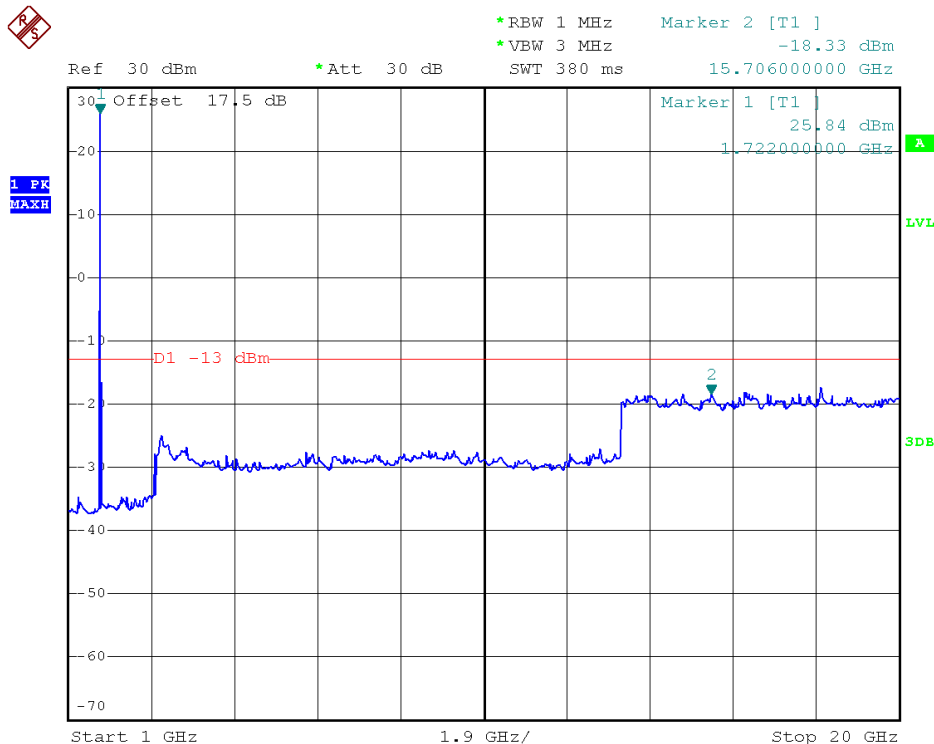
RB Size 1, RB Offset 0    1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 3MHz       | Modulation | QPSK |



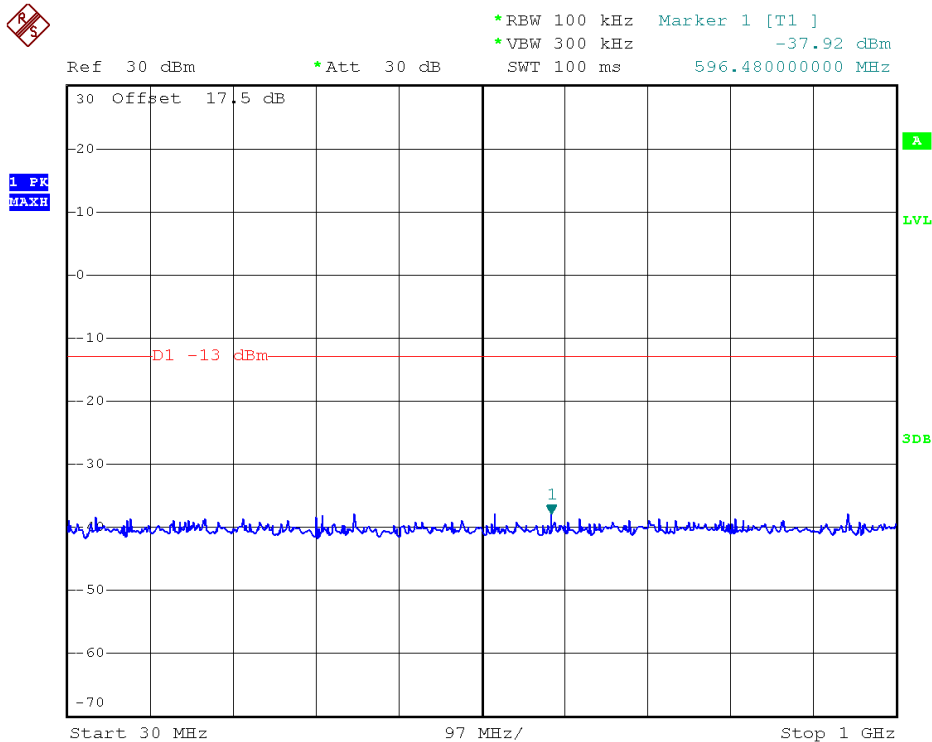
RB Size 1, RB Offset 0    30MHz to 1GHz



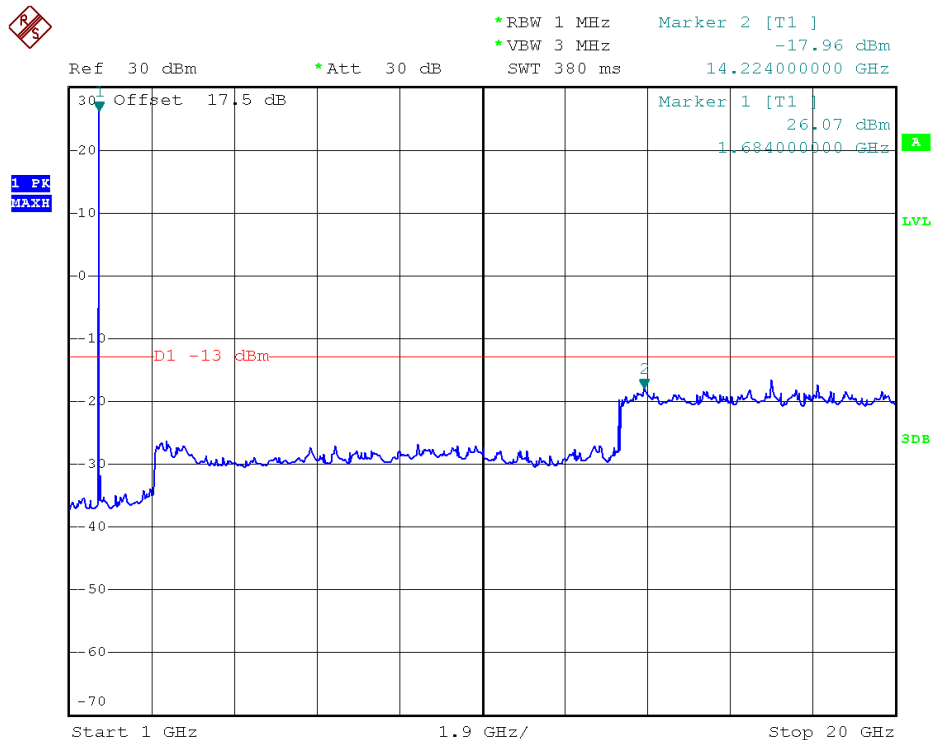
RB Size 1, RB Offset 0    1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 5MHz       | Modulation | QPSK |



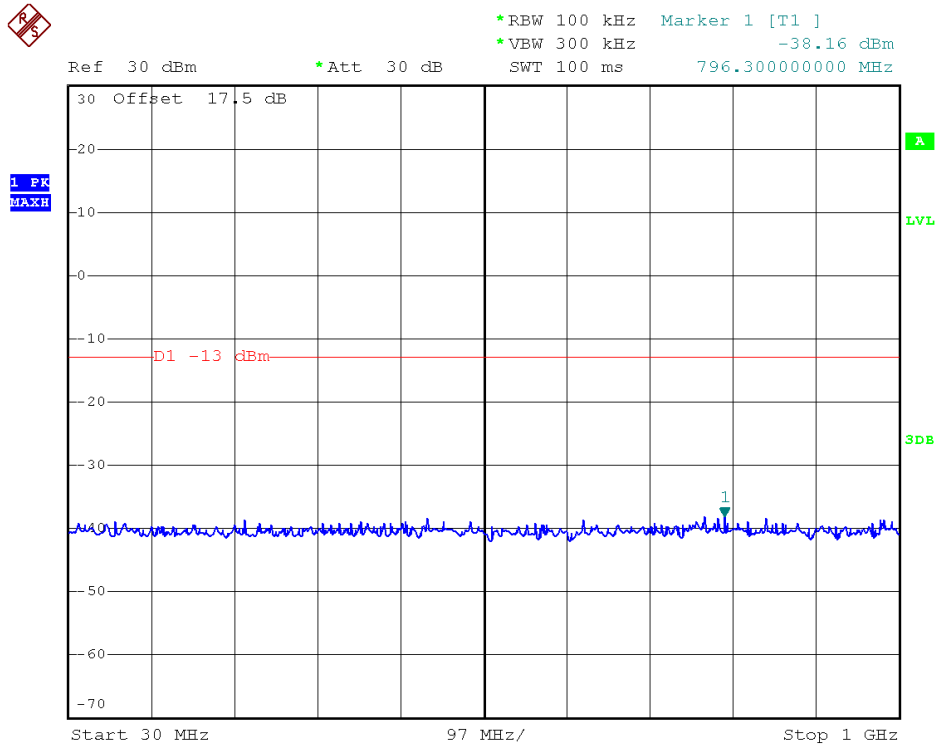
RB Size 1, RB Offset 0 30MHz to 1GHz



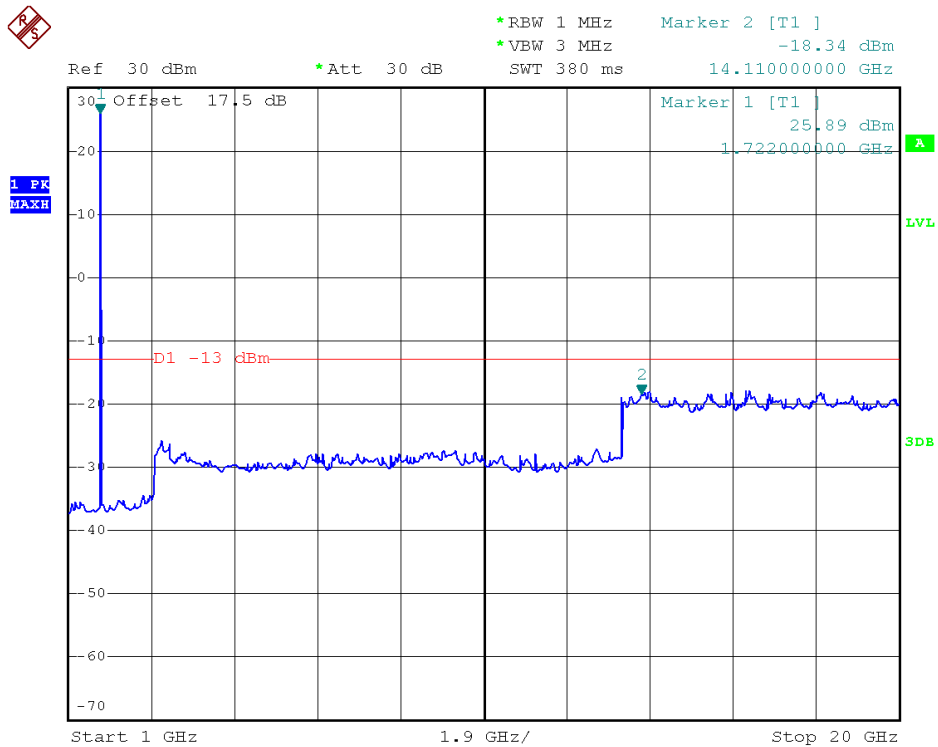
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 5MHz       | Modulation | QPSK   |



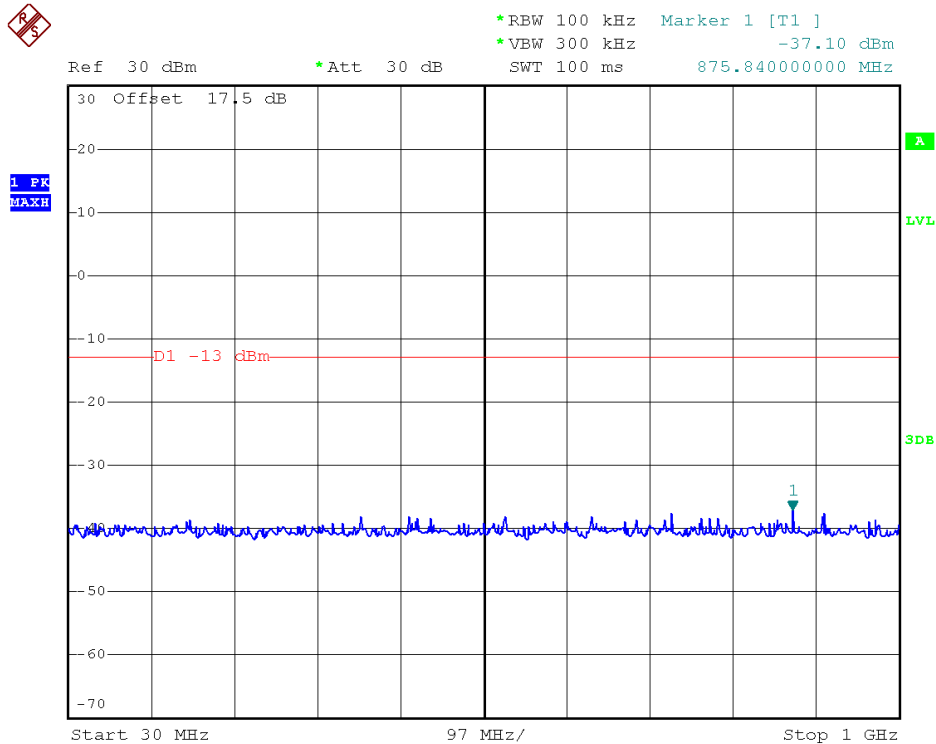
RB Size 1, RB Offset 0 30MHz to 1GHz



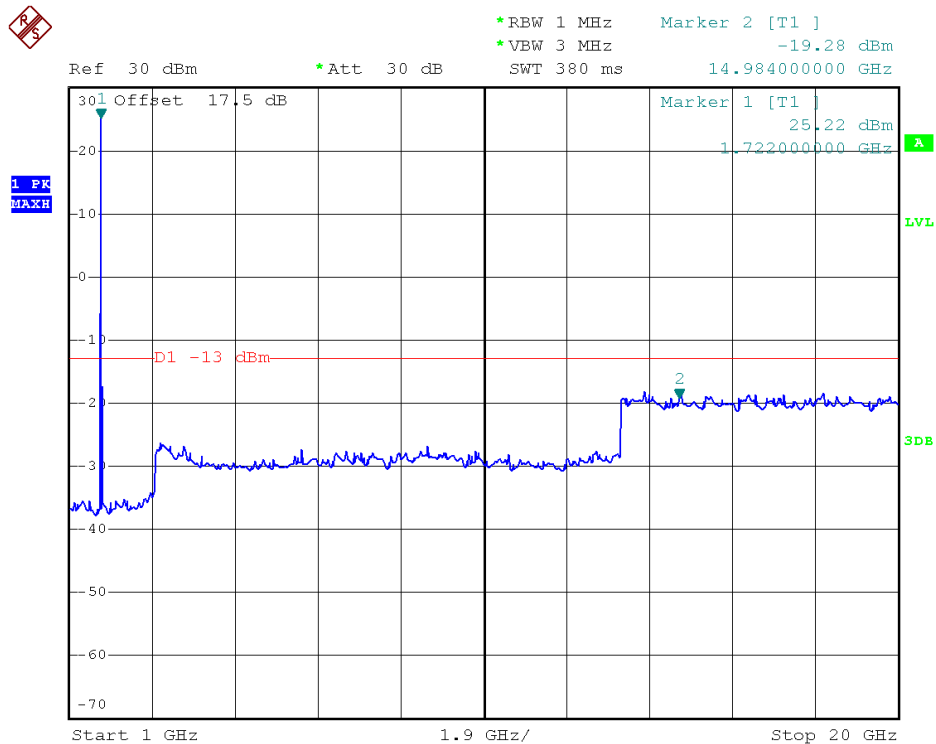
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 5MHz       | Modulation | QPSK |



RB Size 1, RB Offset 0 30MHz to 1GHz



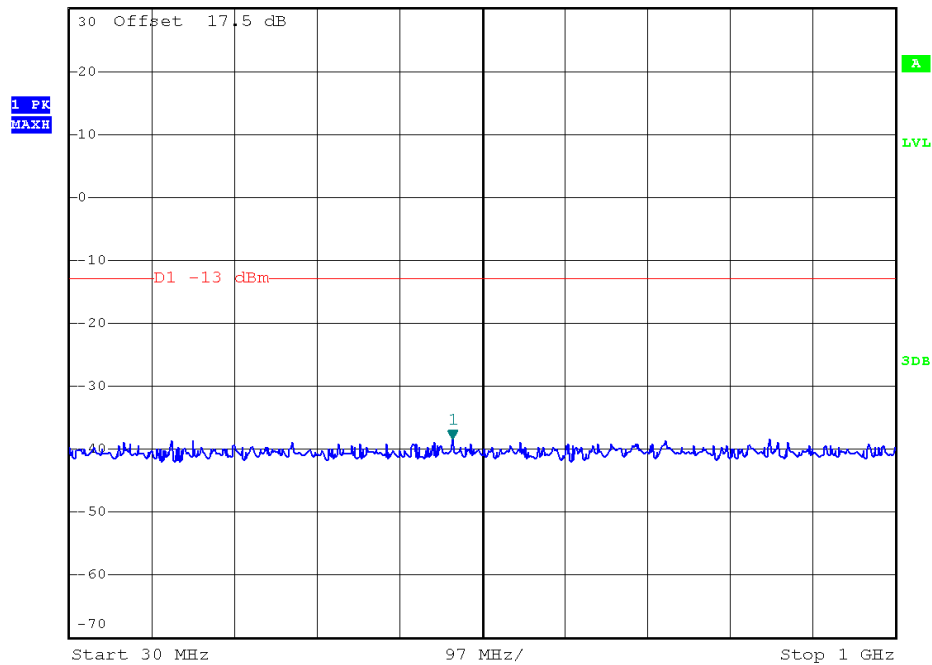
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 10MHz      | Modulation | QPSK |



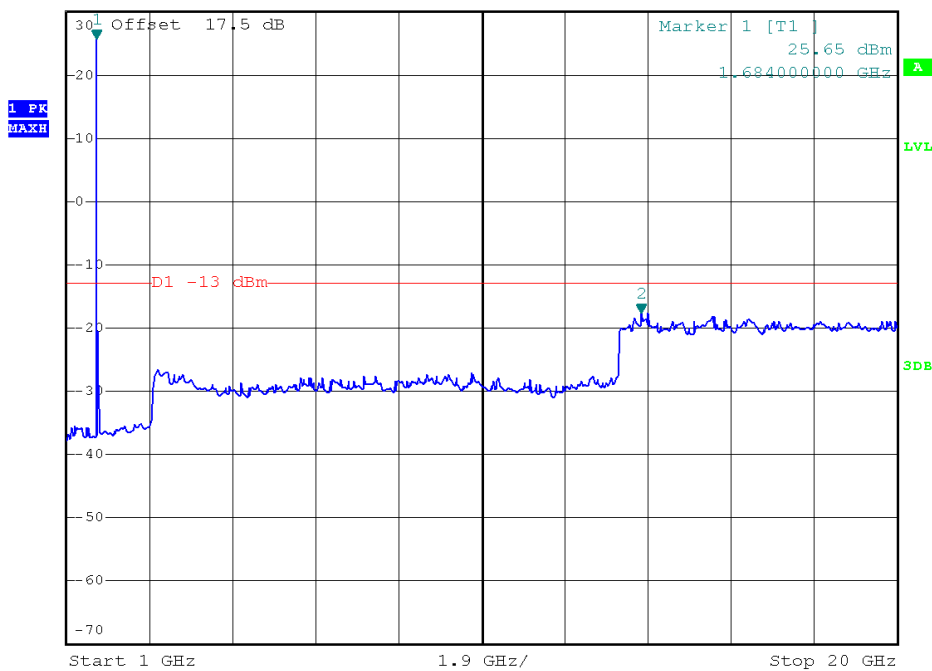
\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz -38.30 dBm  
Ref 30 dBm \*Att 30 dB SWT 100 ms 480.080000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz

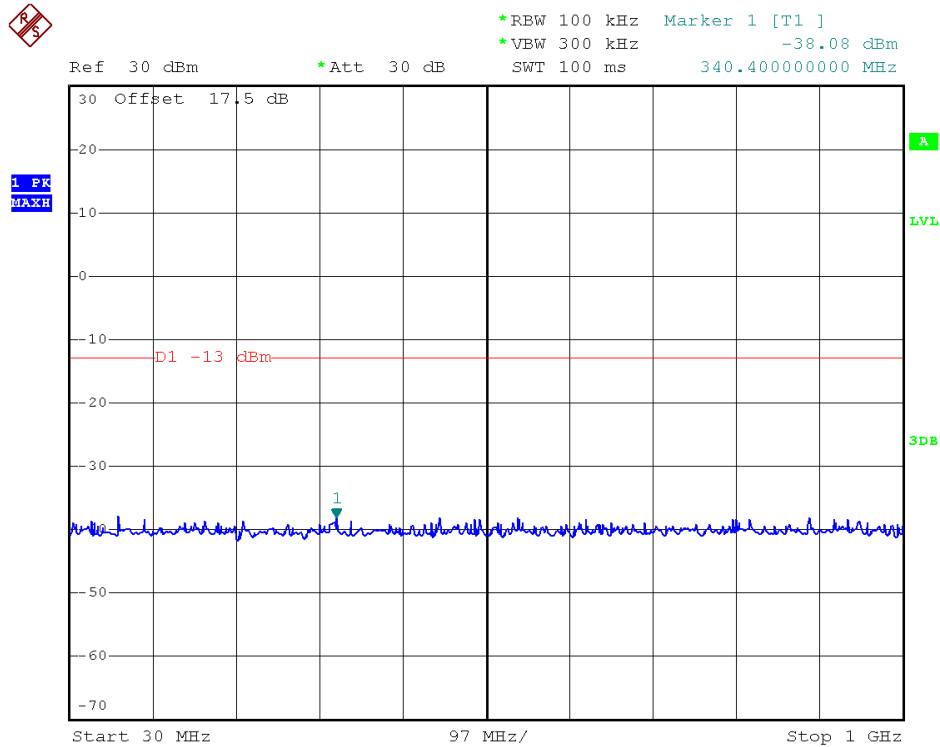


\*RBW 1 MHz Marker 2 [T1 ]  
\*VBW 3 MHz -17.72 dBm  
Ref 30 dBm \*Att 30 dB SWT 380 ms 14.148000000 GHz

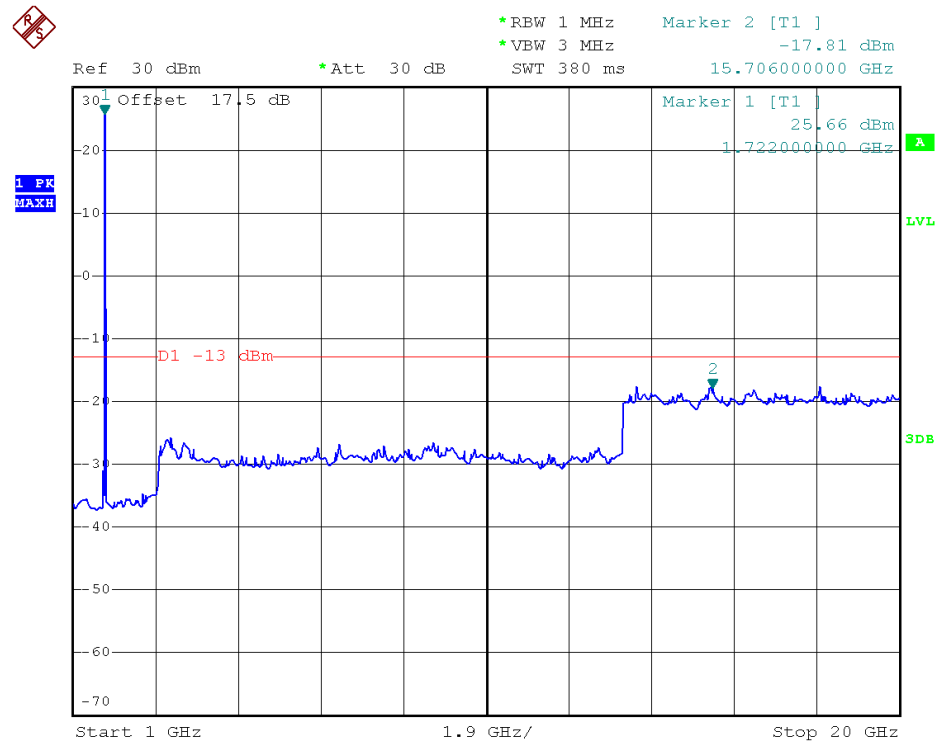


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 10MHz      | Modulation | QPSK   |



RB Size 1, RB Offset 0 30MHz to 1GHz



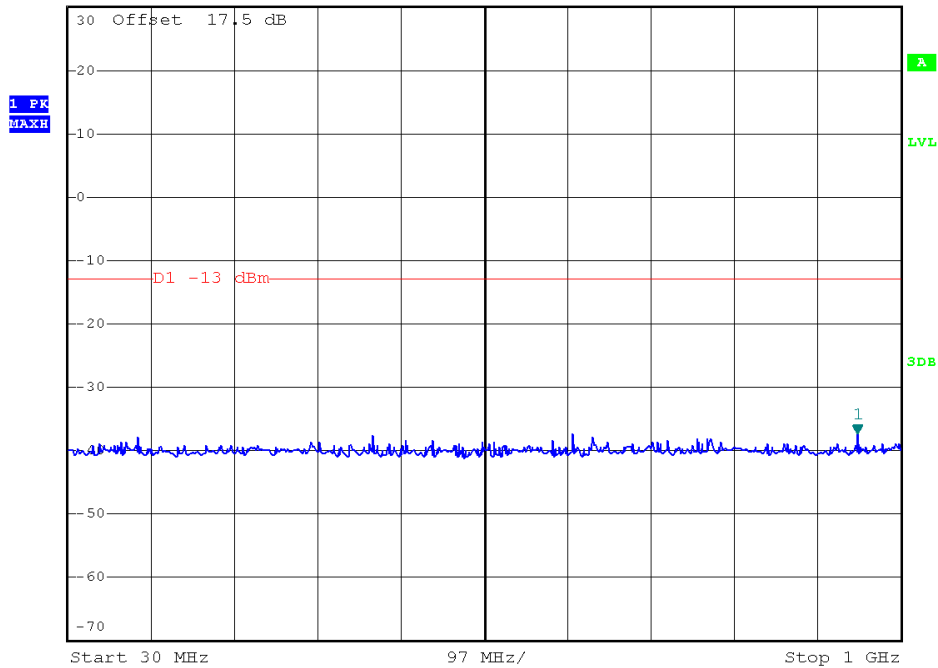
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 10MHz      | Modulation | QPSK |



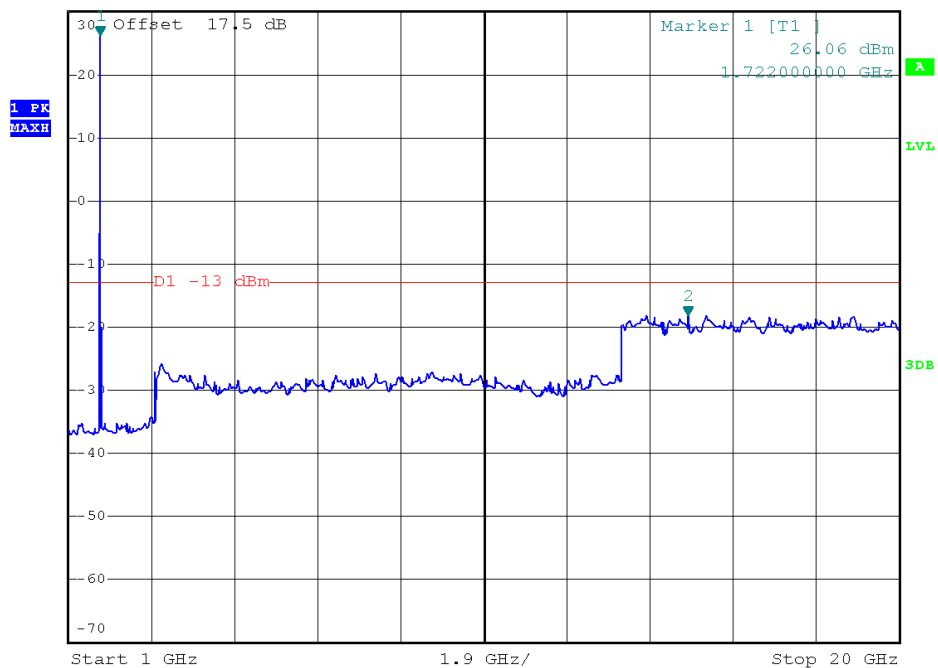
\*RBW 100 kHz    Marker 1 [T1 ]  
\*VBW 300 kHz    -37.45 dBm  
Ref 30 dBm    \*Att 30 dB    SWT 100 ms    949.560000000 MHz



RB Size 1, RB Offset 0    30MHz to 1GHz



\*RBW 1 MHz    Marker 2 [T1 ]  
\*VBW 3 MHz    -18.25 dBm  
Ref 30 dBm    \*Att 30 dB    SWT 380 ms    15.174000000 GHz



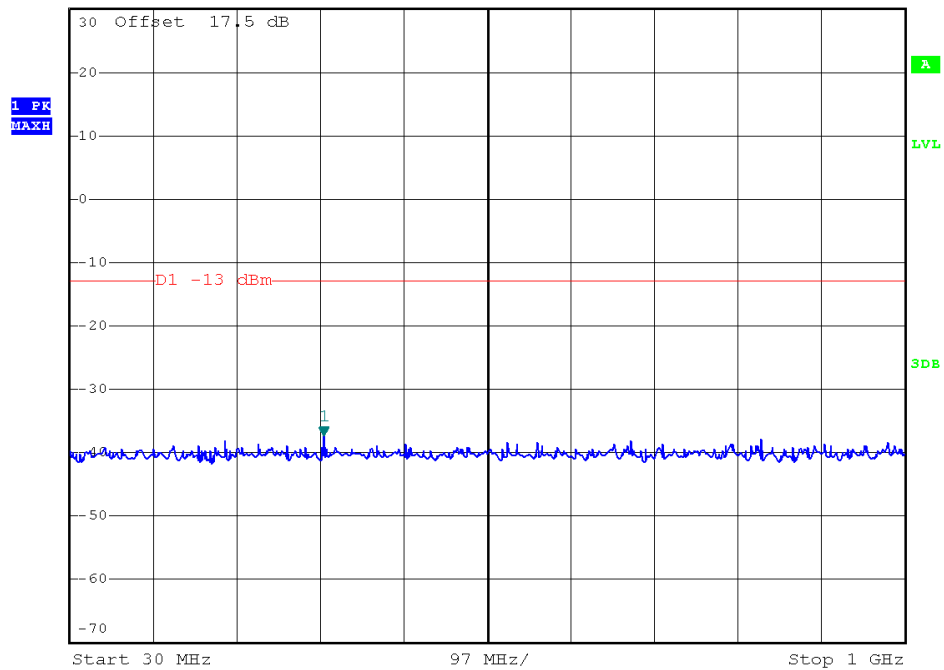
RB Size 1, RB Offset 0    1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 15MHz      | Modulation | QPSK |



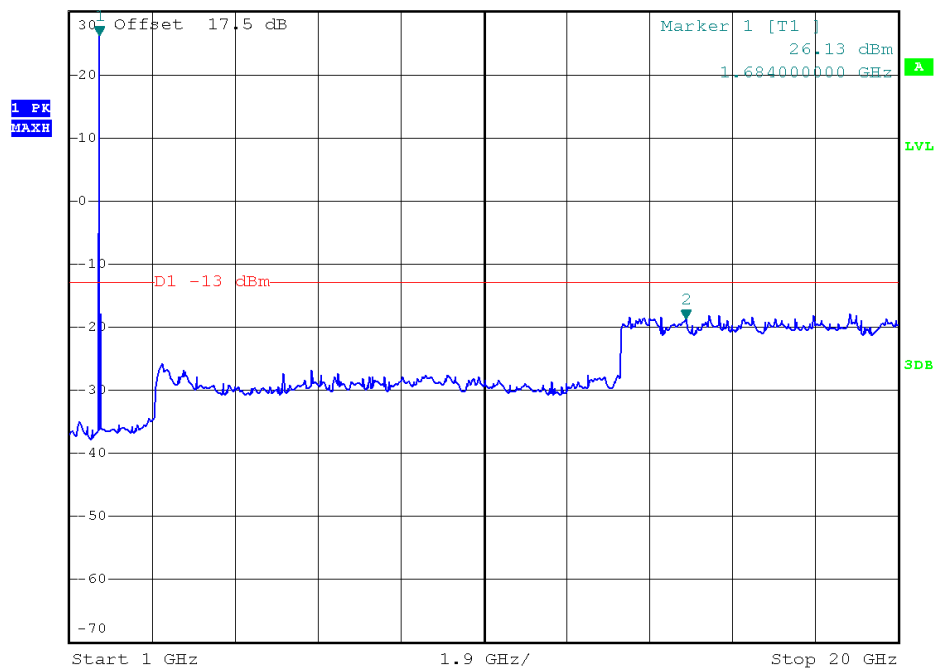
Ref 30 dBm \*Att 30 dB \*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz -37.37 dBm  
SWT 100 ms 324.880000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz

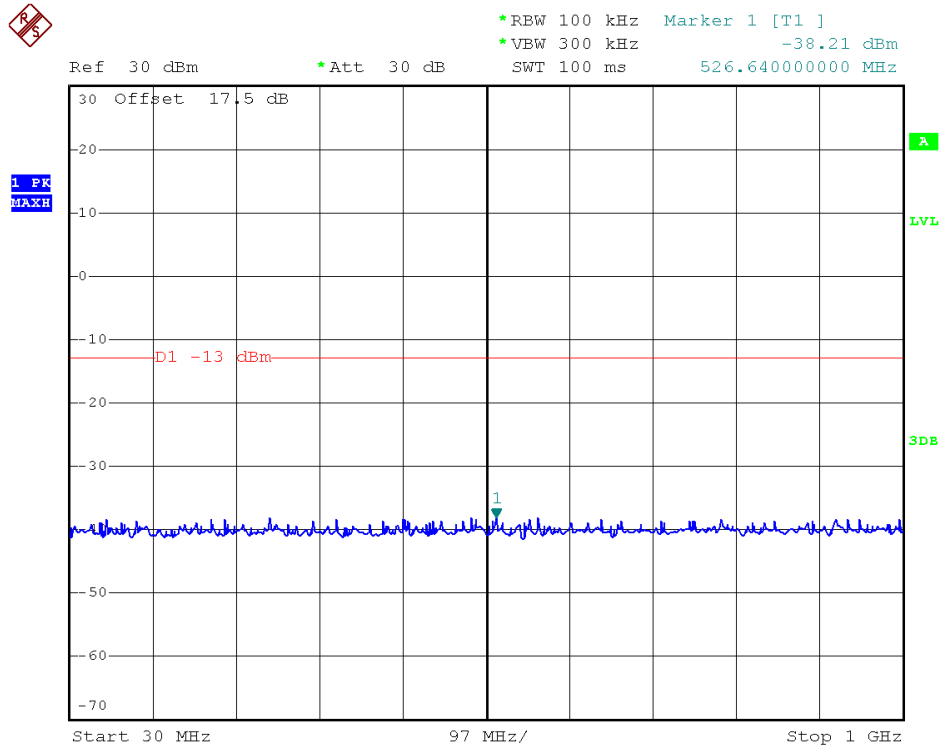


Ref 30 dBm \*Att 30 dB \*RBW 1 MHz Marker 2 [T1 ]  
\*VBW 3 MHz -18.71 dBm  
SWT 380 ms 15.136000000 GHz

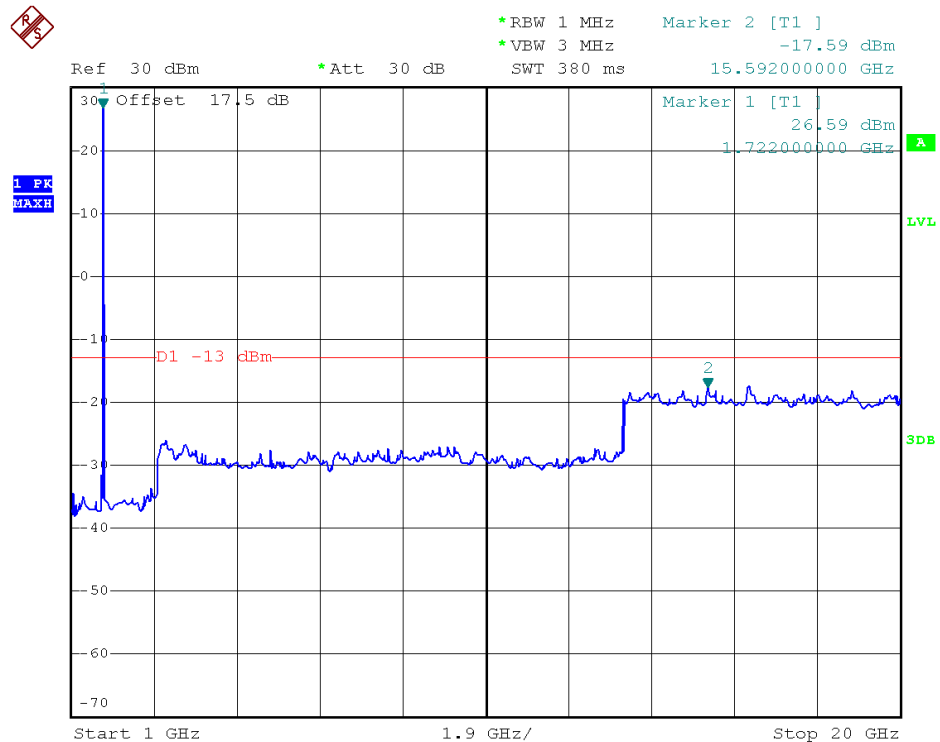


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 15MHz      | Modulation | QPSK   |



RB Size 1, RB Offset 0 30MHz to 1GHz



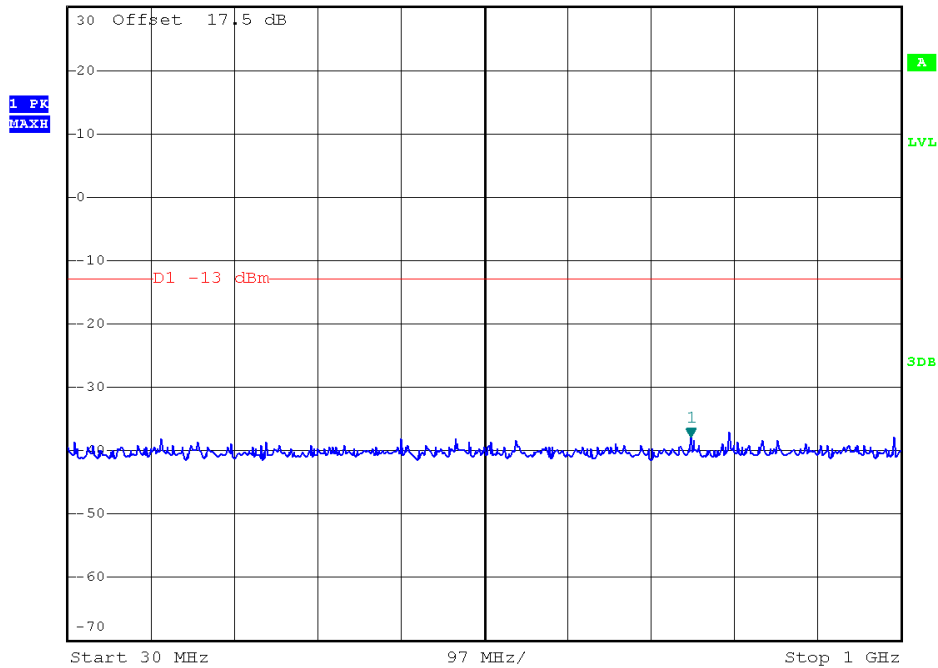
RB Size 1, RB Offset 0 1GHz to 20GHz



|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 15MHz      | Modulation | QPSK |



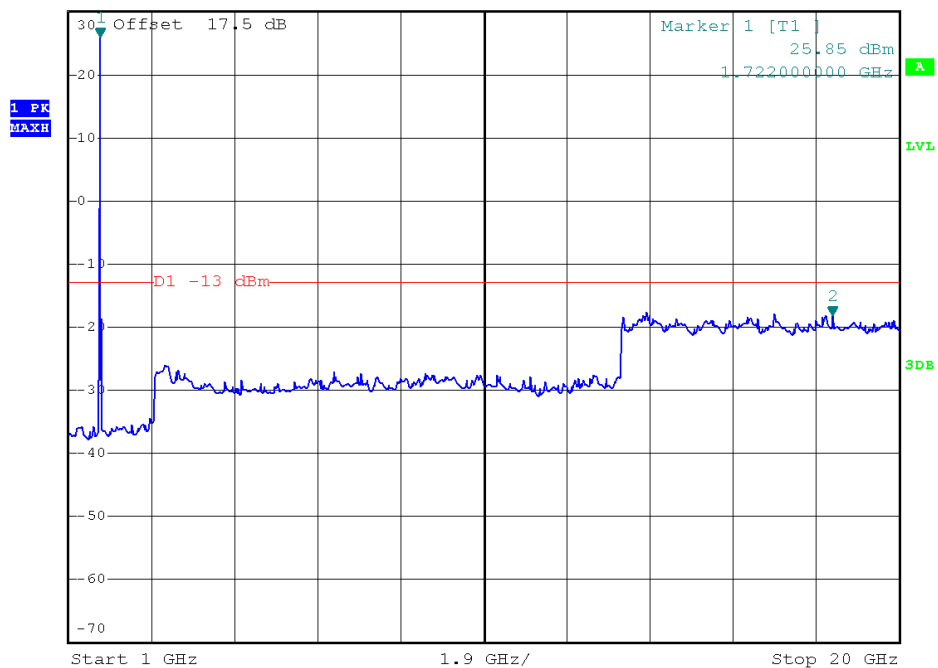
\*RBW 100 kHz Marker 1 [T1 ]  
\*VBW 300 kHz -37.83 dBm  
Ref 30 dBm \*Att 30 dB SWT 100 ms 755.56000000 MHz



RB Size 1, RB Offset 0 30MHz to 1GHz

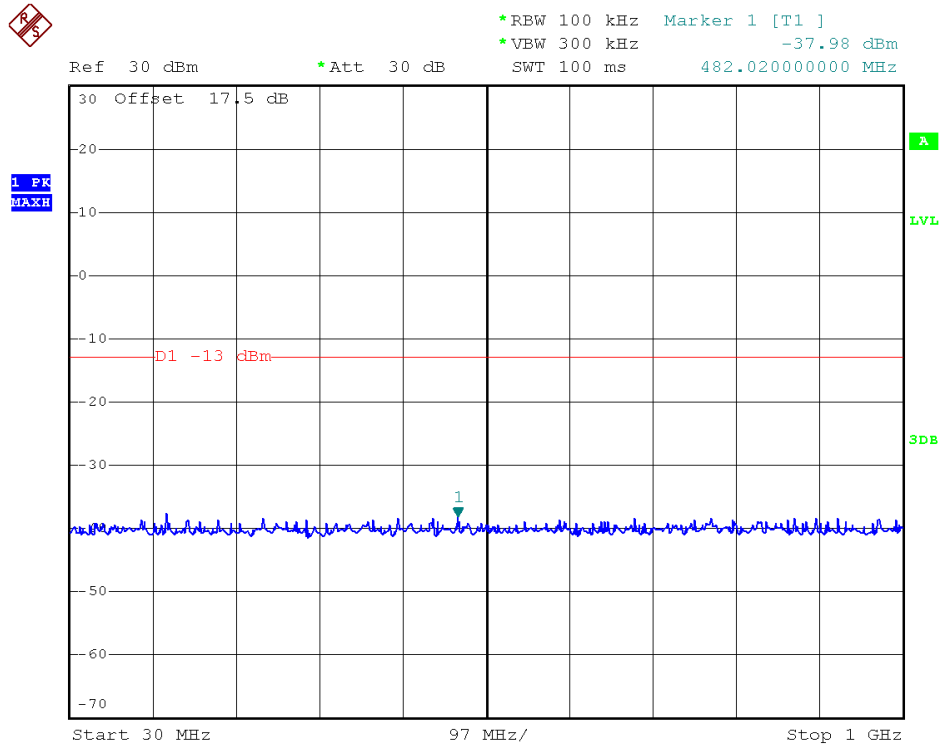


\*RBW 1 MHz Marker 2 [T1 ]  
\*VBW 3 MHz -18.28 dBm  
Ref 30 dBm \*Att 30 dB SWT 380 ms 18.48000000 GHz

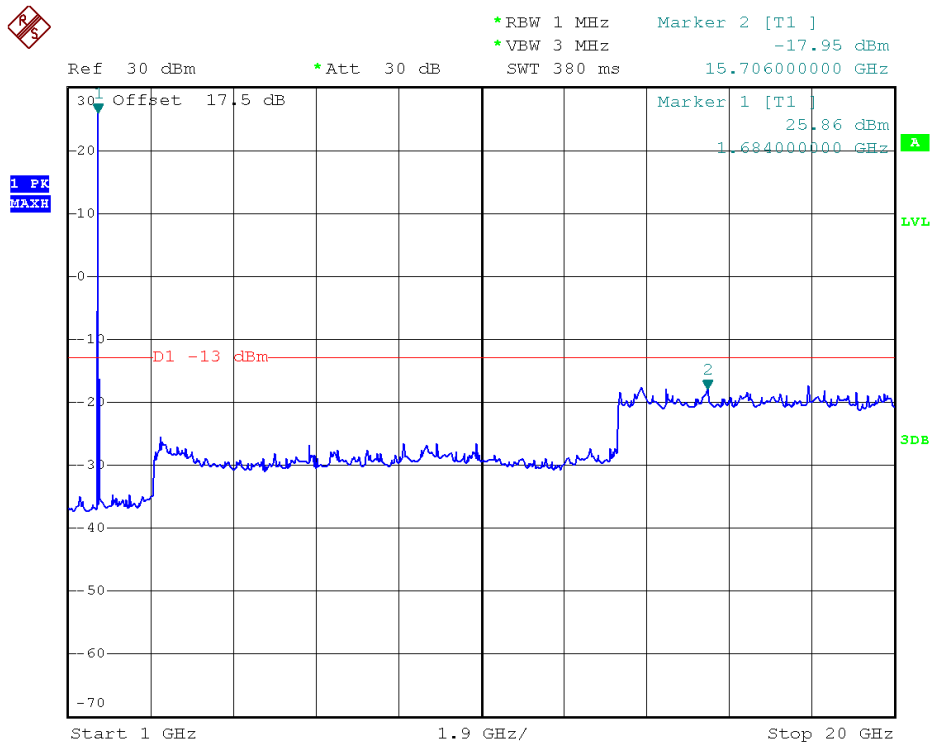


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | Low  |
| Bandwidth | 20MHz      | Modulation | QPSK |

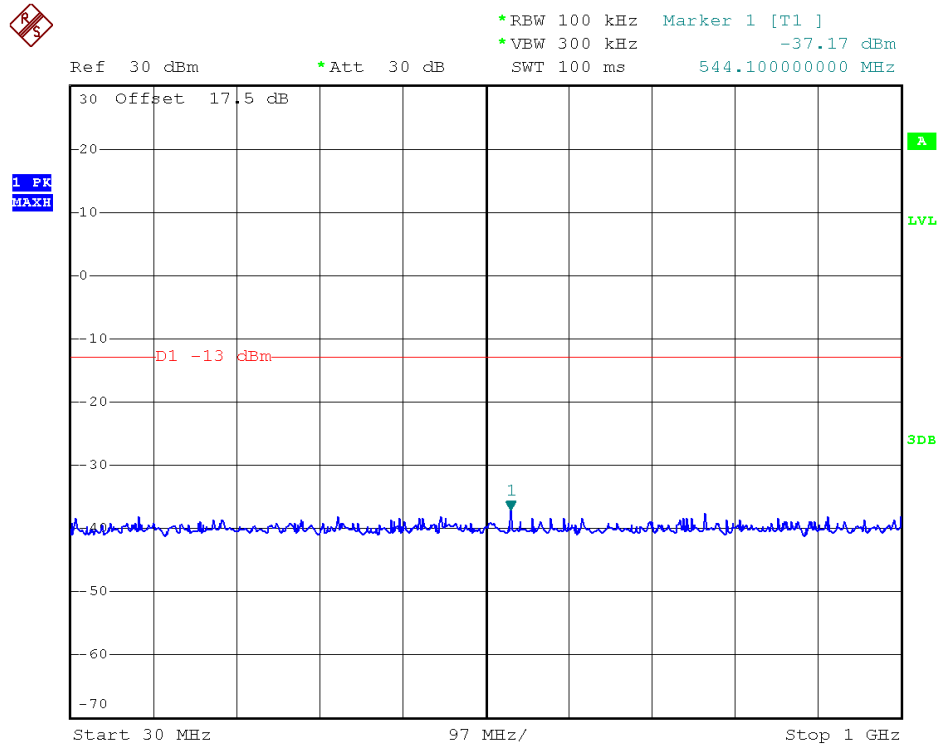


RB Size 1, RB Offset 0 30MHz to 1GHz

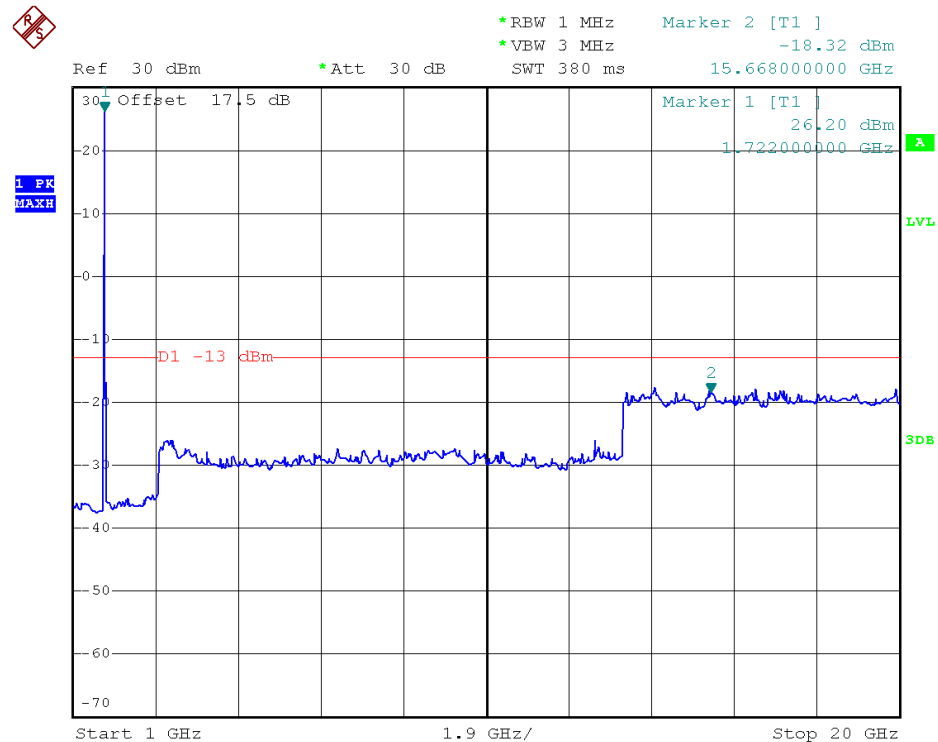


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |        |
|-----------|------------|------------|--------|
| Band      | LTE Band 4 | Channel    | Middle |
| Bandwidth | 20MHz      | Modulation | QPSK   |



RB Size 1, RB Offset 0 30MHz to 1GHz

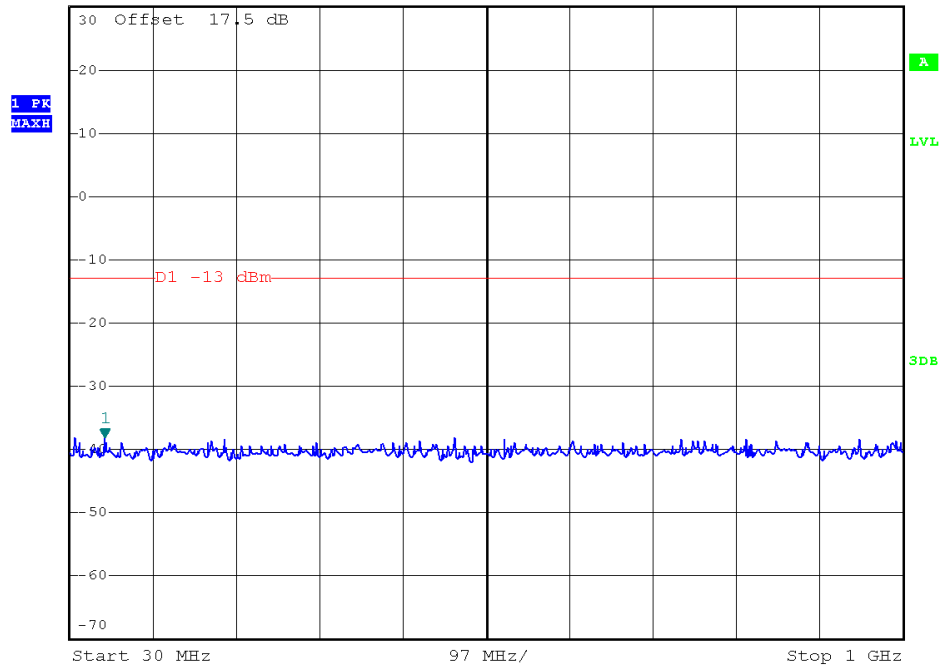


RB Size 1, RB Offset 0 1GHz to 20GHz

|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Channel    | High |
| Bandwidth | 20MHz      | Modulation | QPSK |



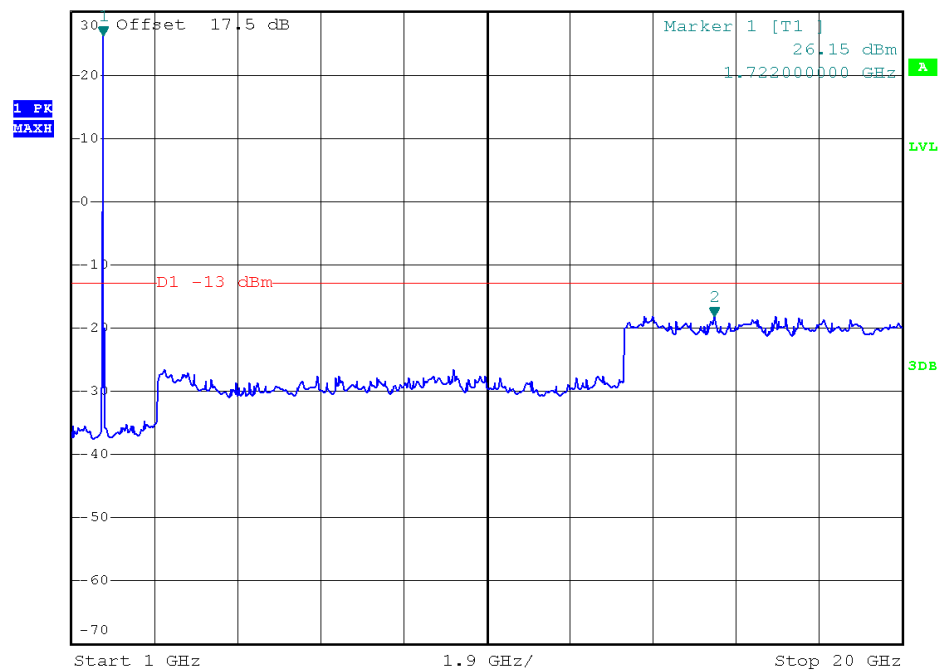
\*RBW 100 kHz    Marker 1 [T1 ]  
 \*VBW 300 kHz    -38.14 dBm  
 Ref 30 dBm    \*Att 30 dB    SWT 100 ms    70.74000000 MHz



RB Size 1, RB Offset 0    30MHz to 1GHz



\*RBW 1 MHz    Marker 2 [T1 ]  
 \*VBW 3 MHz    -18.23 dBm  
 Ref 30 dBm    \*Att 30 dB    SWT 380 ms    15.706000000 GHz



RB Size 1, RB Offset 0    1GHz to 20GHz

## **2.6 Conducted Band Edge**

### **2.6.1 Description of Conducted Band Edge Measurement**

24.238(a) for Band 2

For operations in the 1850 -1910 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 1MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

27.53(h) for Band 4

For operations in the 1710 – 1755 MHz band, the FCC limit is  $43 + 10\log_{10}(P[\text{Watts}])$  dB below the transmitter power  $P(\text{Watts})$  in a 1 MHz bandwidth. However, in the 1MHz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

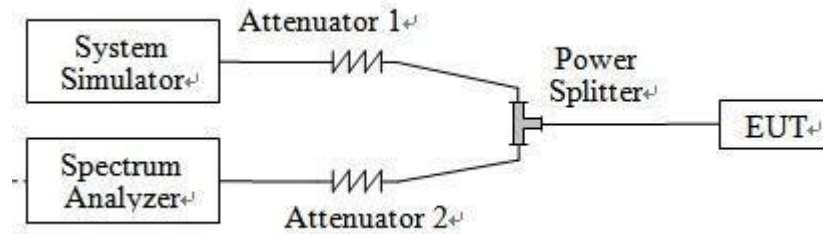
27.53 (m)(4) for Band 7

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

### **2.6.2 Measuring Instruments**

The measuring equipment is listed in the section 3 of this test report.

### 2.6.3 Test Setup



### 2.6.4 Test Procedures

1. The EUT was connected to spectrum analyzer and system simulator via a power divider.
2. The band edges of low and high channels for the highest RF powers were measured. Set  $RBW \geq 1\% \text{ EBW}$  in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.
4. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
5. The limit line is derived from  $43 + 10\log(P)\text{dB}$  below the transmitter power  $P(\text{Watts})$ 

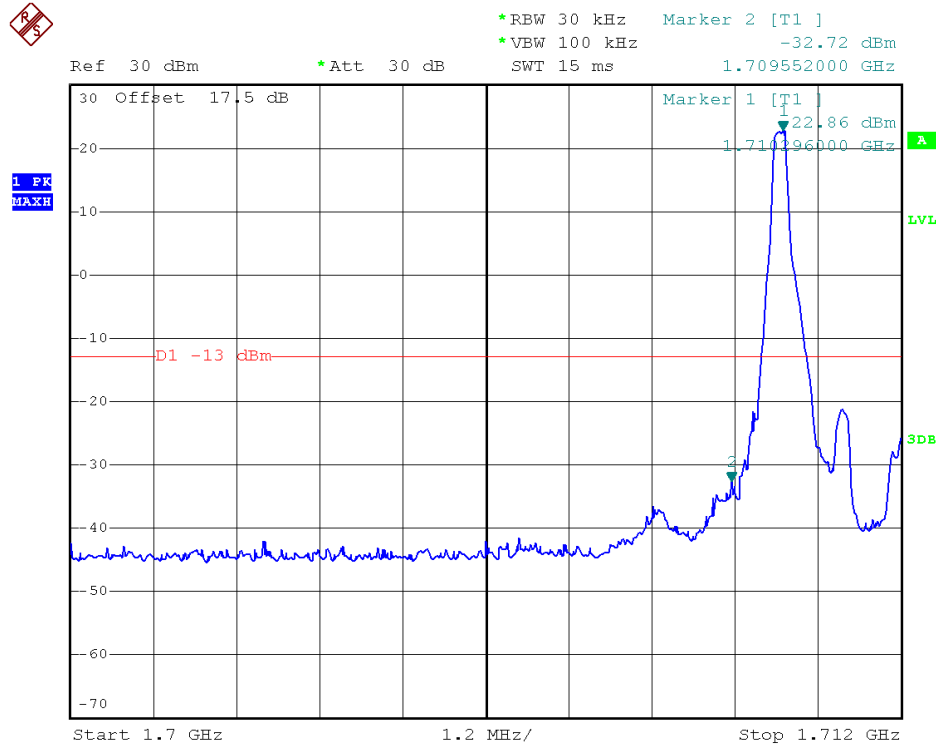
$$= P(\text{W}) - [43 + 10\log(P)] (\text{dB})$$

$$= [30 + 10\log(P)] (\text{dBm}) - [43 + 10\log(P)] (\text{dB})$$

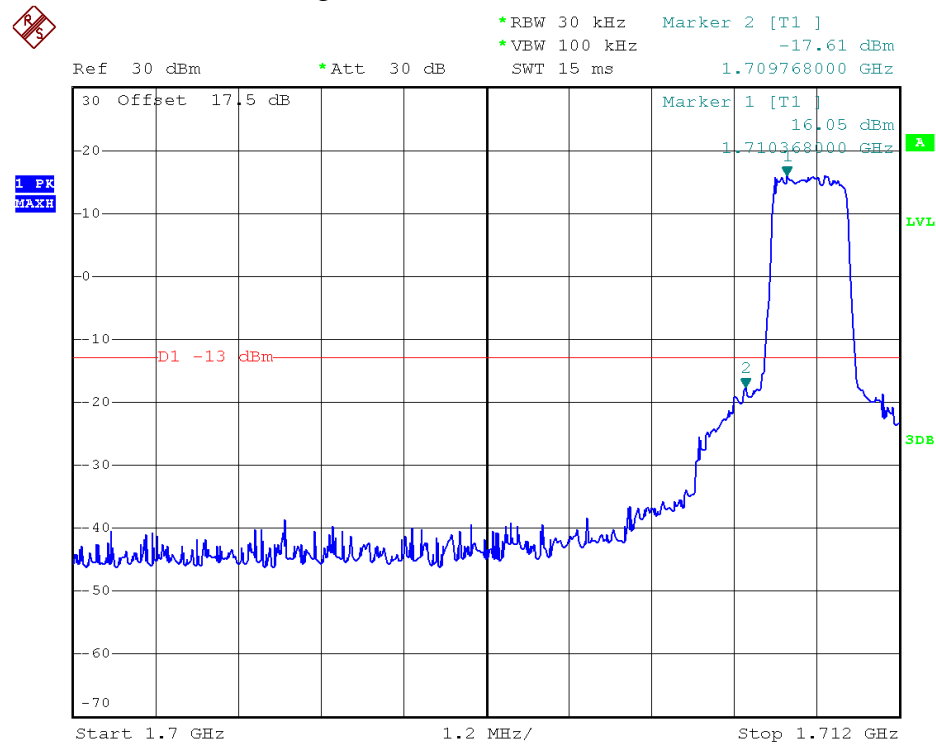
$$= -13\text{dBm}.$$

## 2.6.5 Test Result of Conducted Band Edge

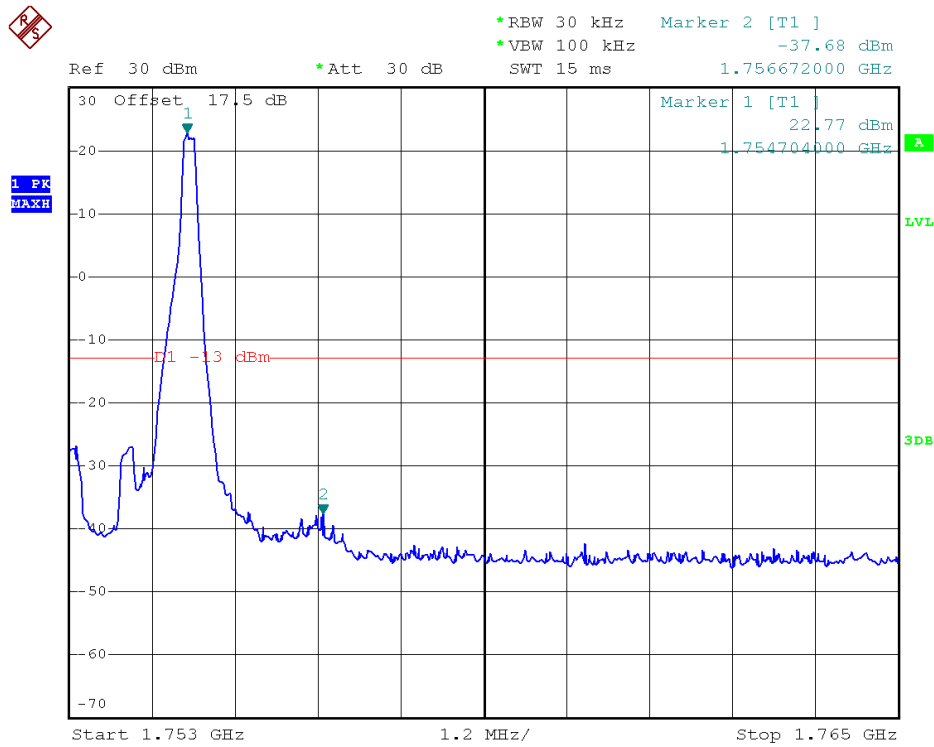
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 1.4MHz     |            |      |



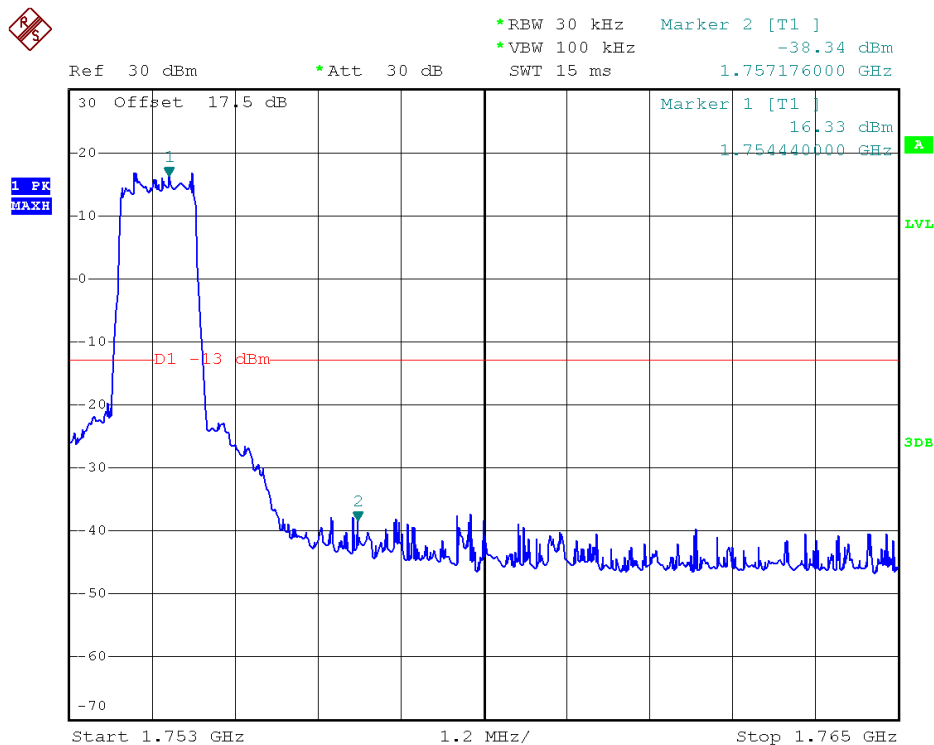
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 6, RB Offset 0

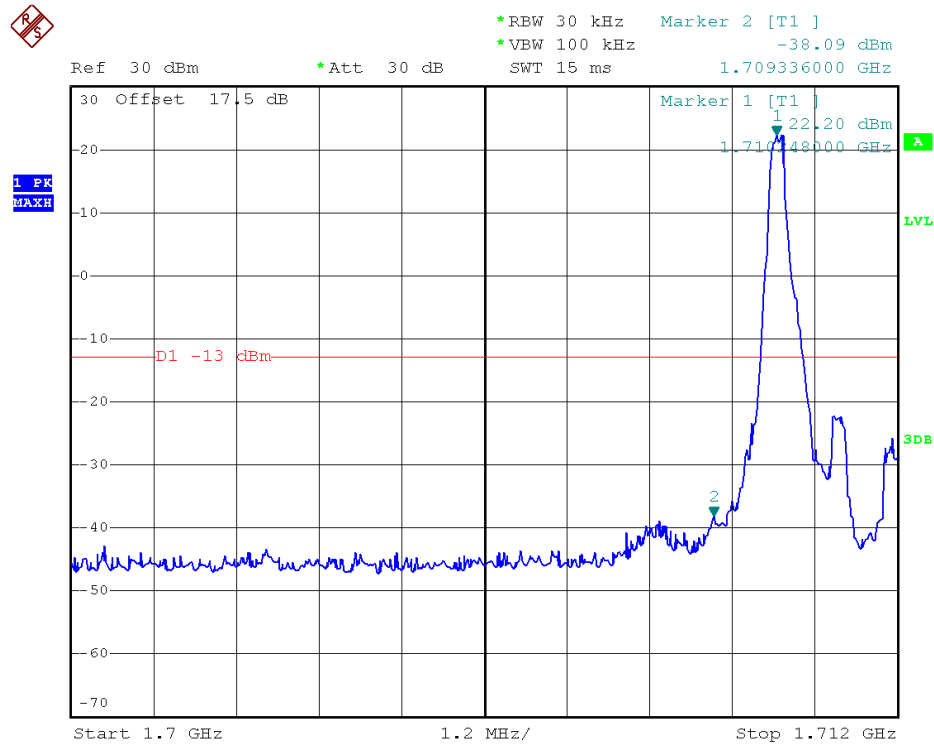


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 5

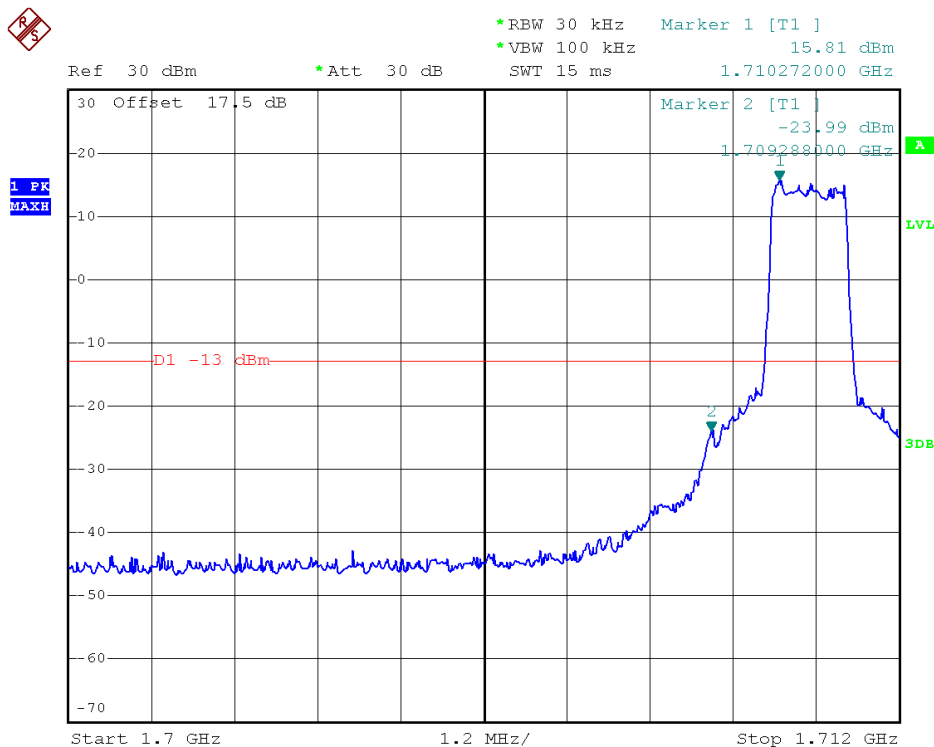


Higher Band Edge Plot for QPSK-RB Size 6, RB Offset 0

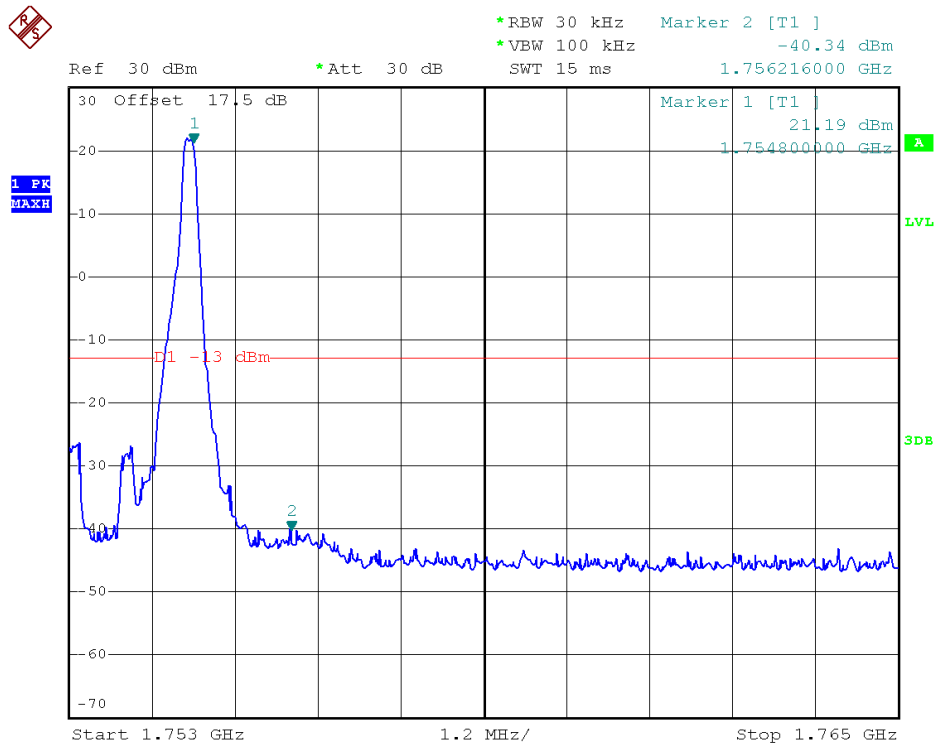
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 1.4MHz     |            |       |



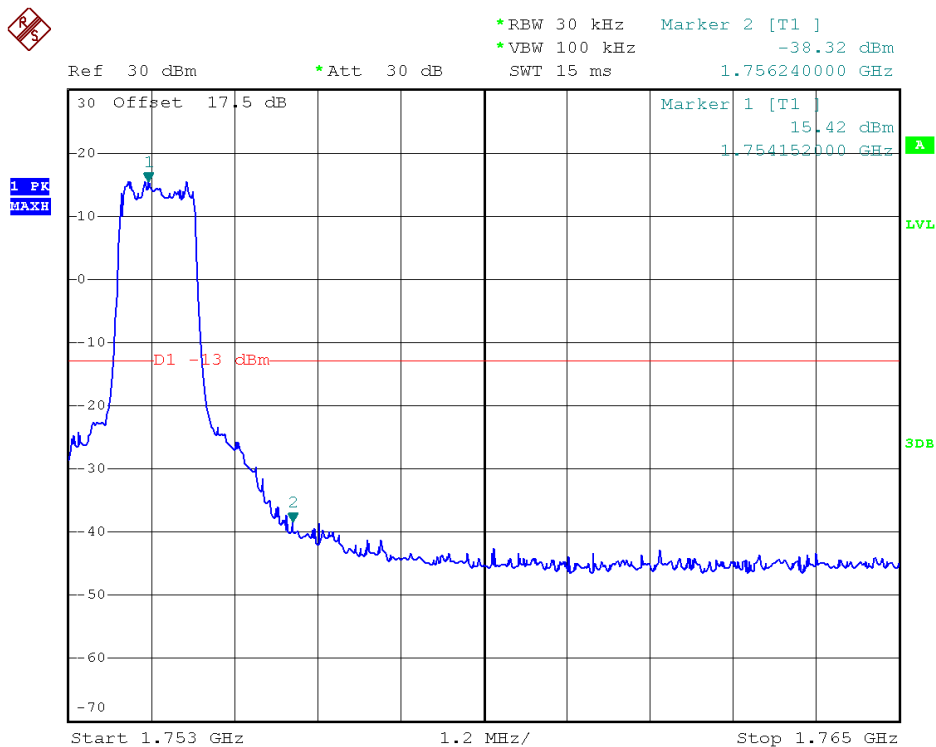
Lower Band Edge Plot for 16QAM-RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 6, RB Offset 0

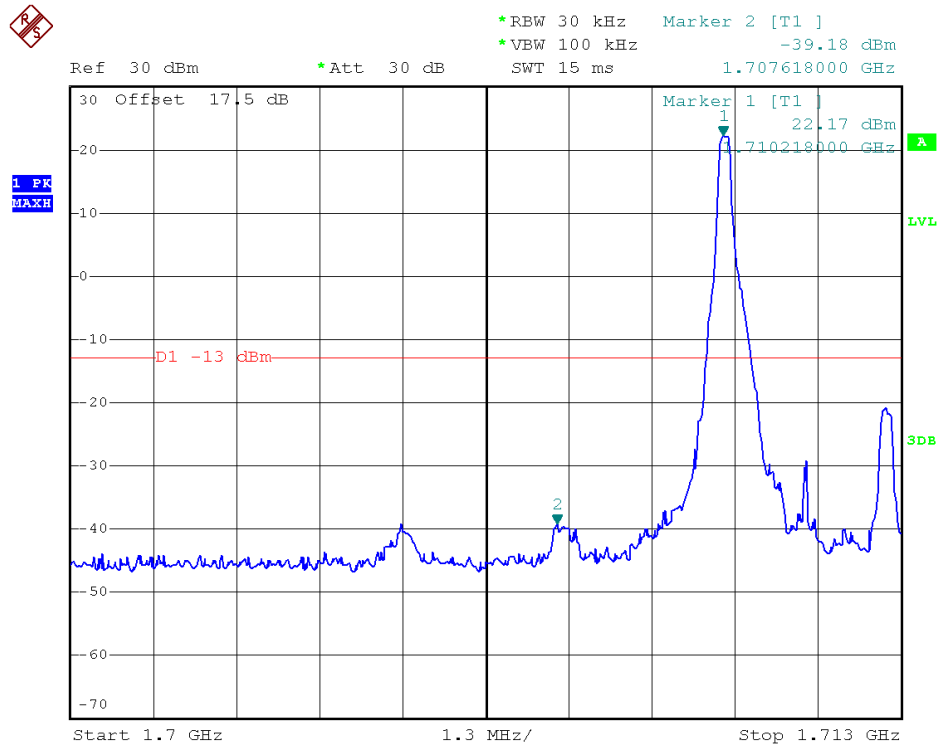


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 5

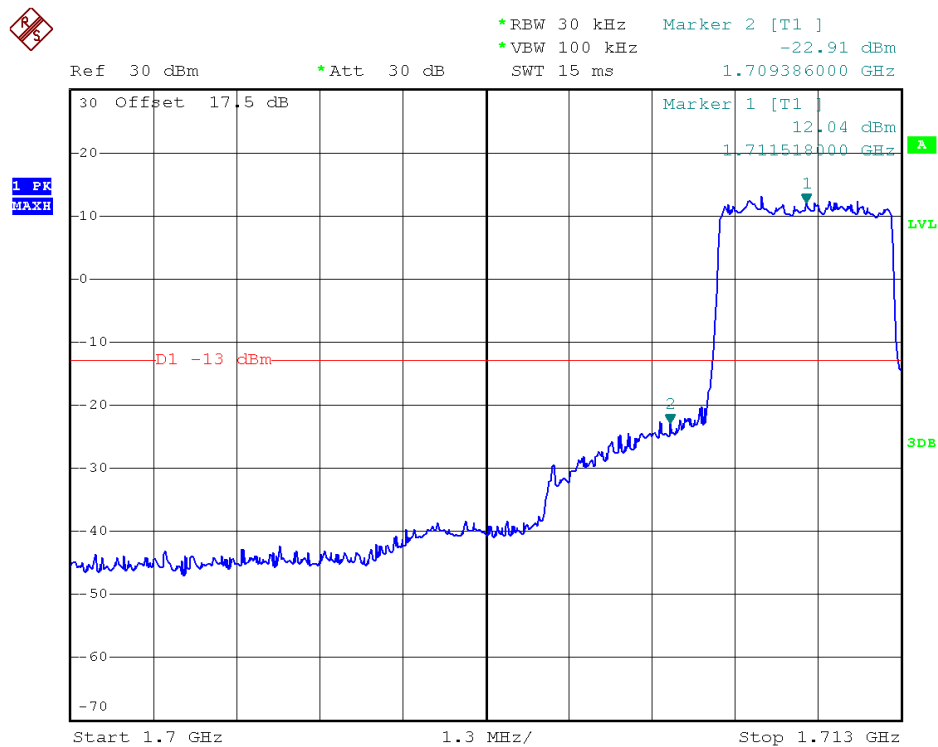


Higher Band Edge Plot for 16QAM -RB Size 6, RB Offset 0

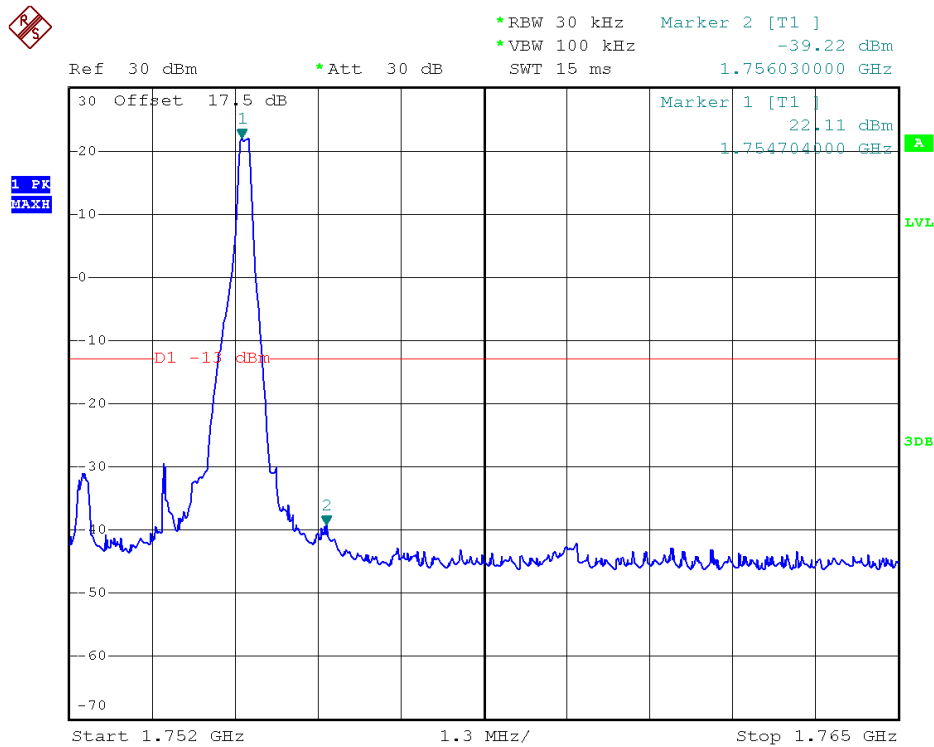
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 3MHz       |            |      |



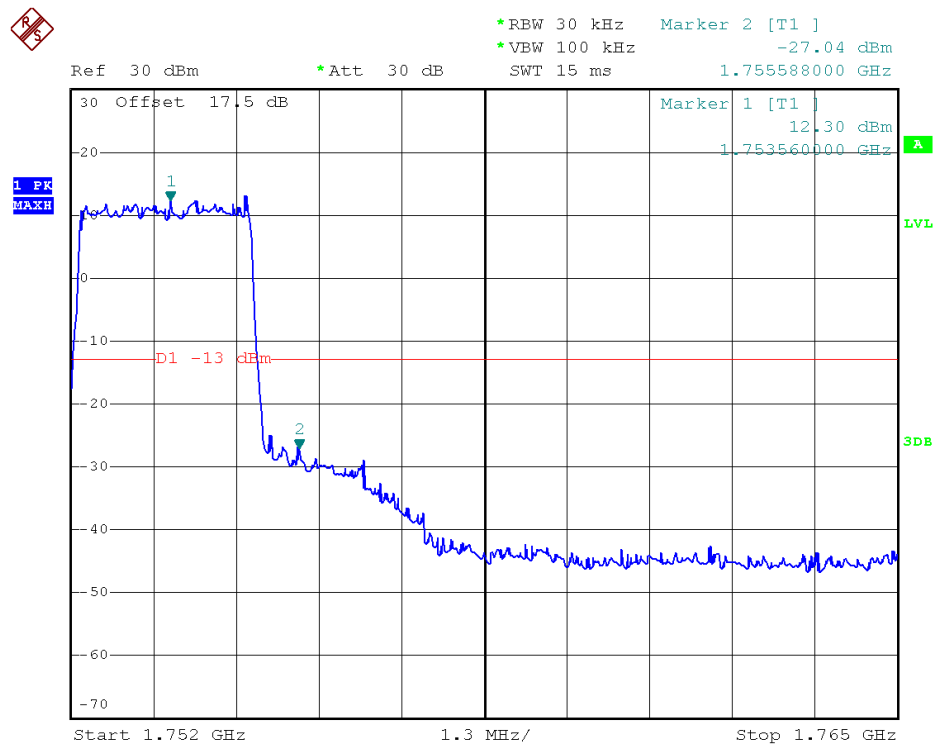
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 15, RB Offset 0

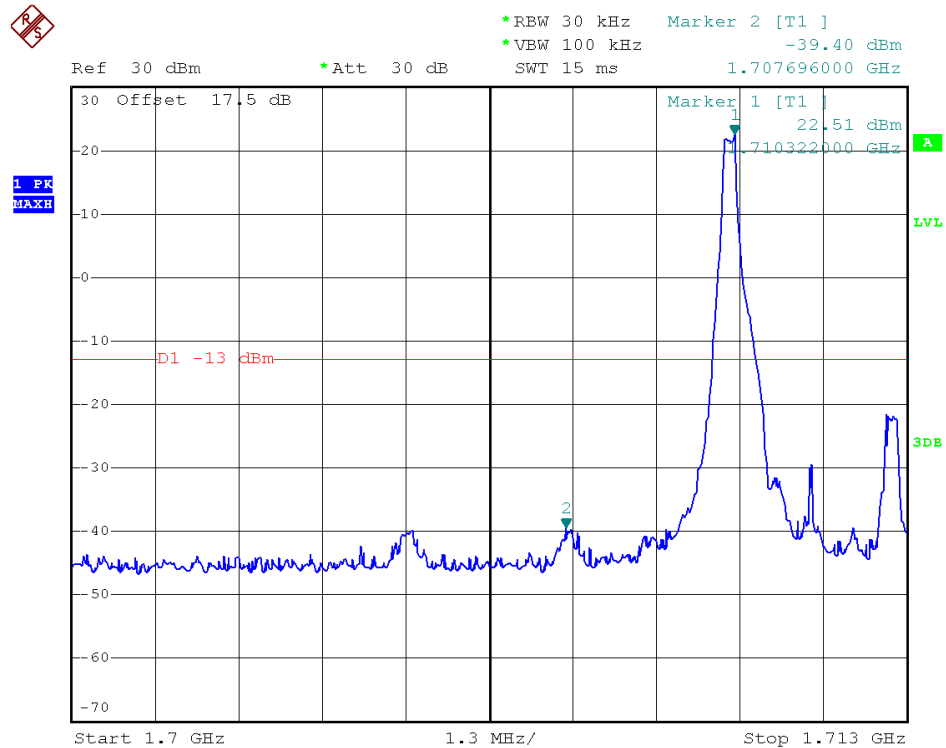


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 14

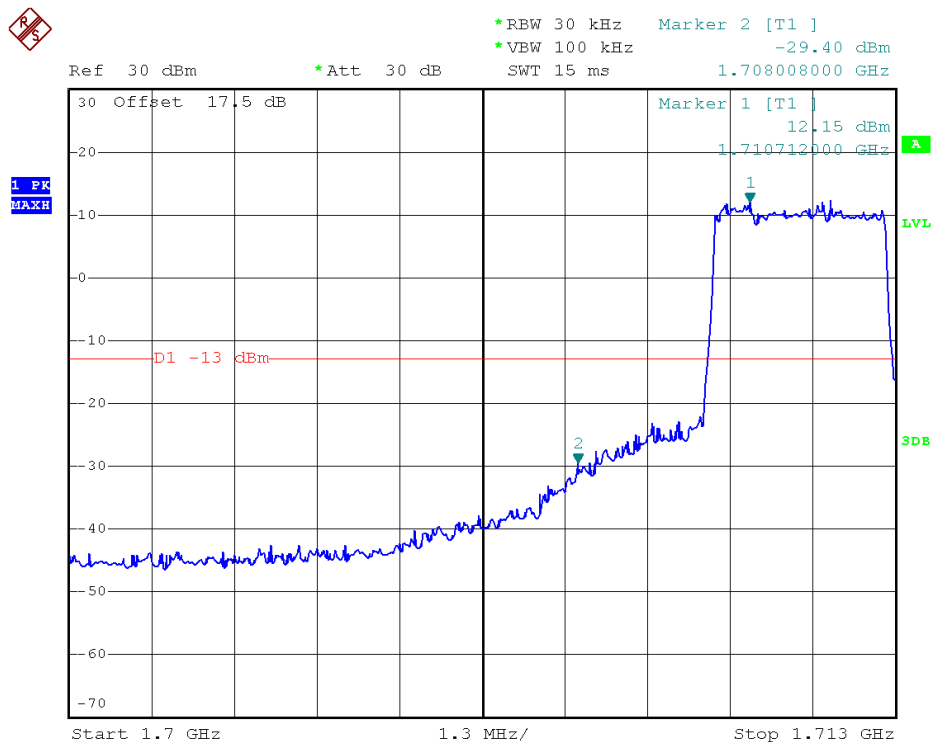


Higher Band Edge Plot for QPSK-RB Size 15, RB Offset 0

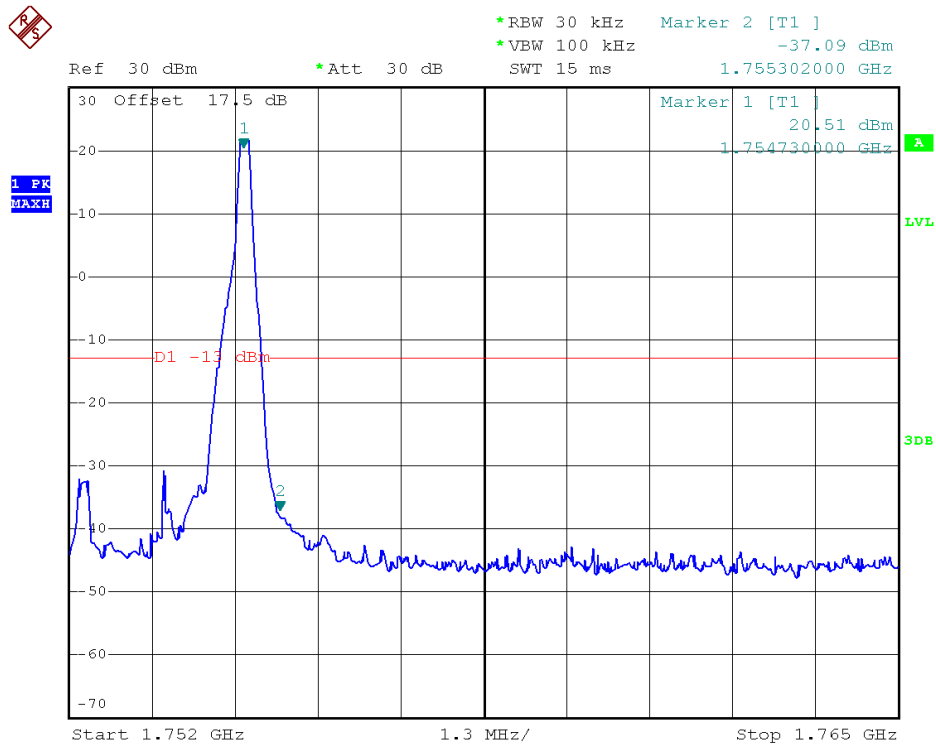
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 3MHz       |            |       |



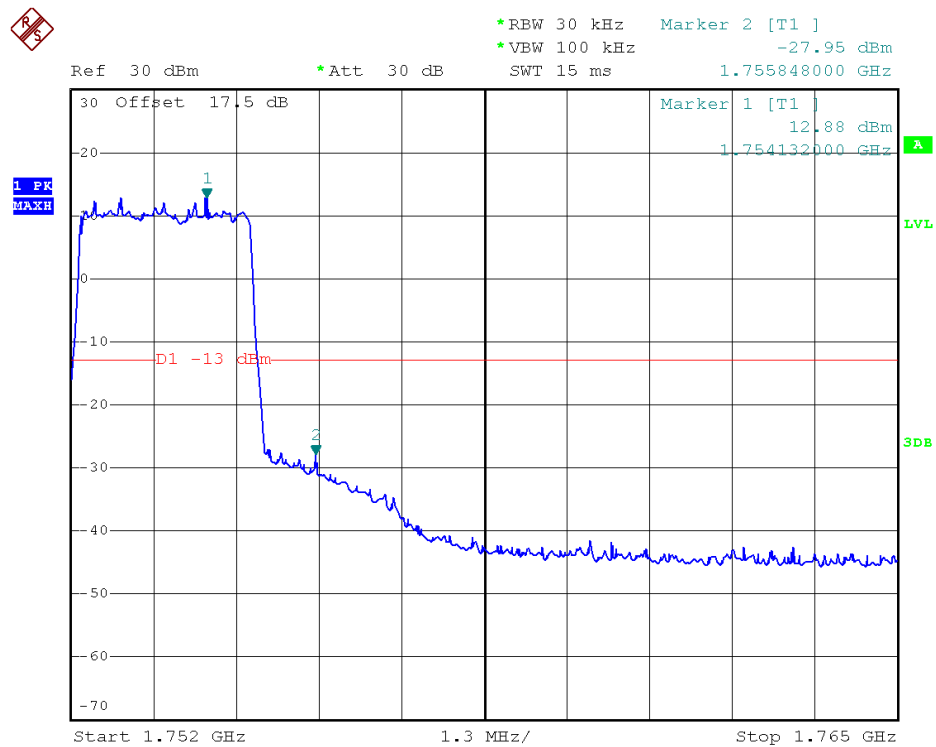
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 15, RB Offset 0

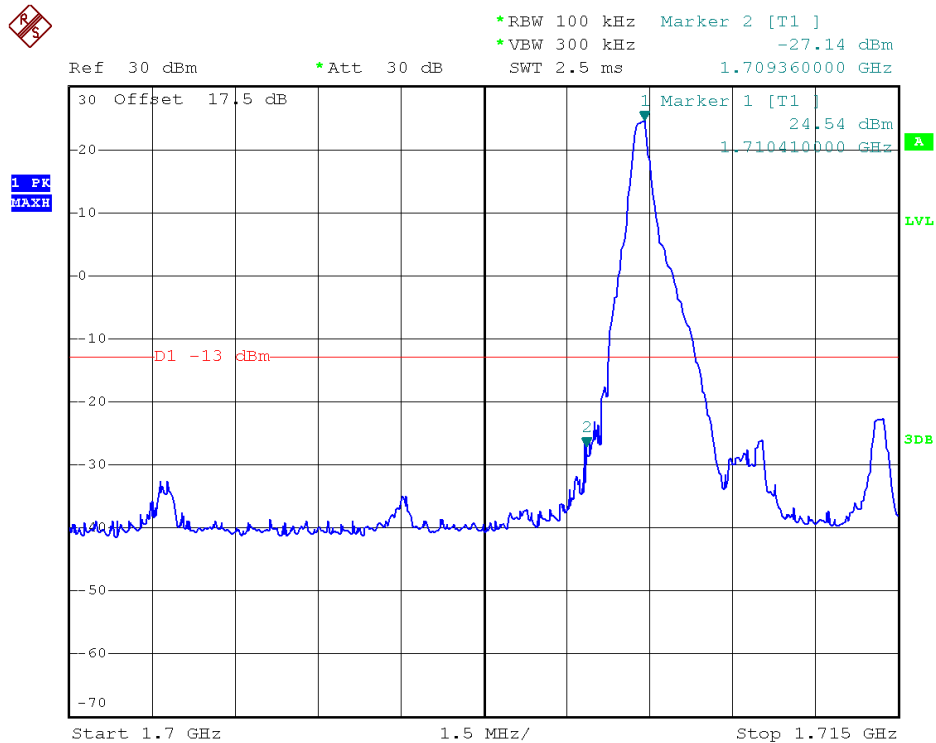


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 14

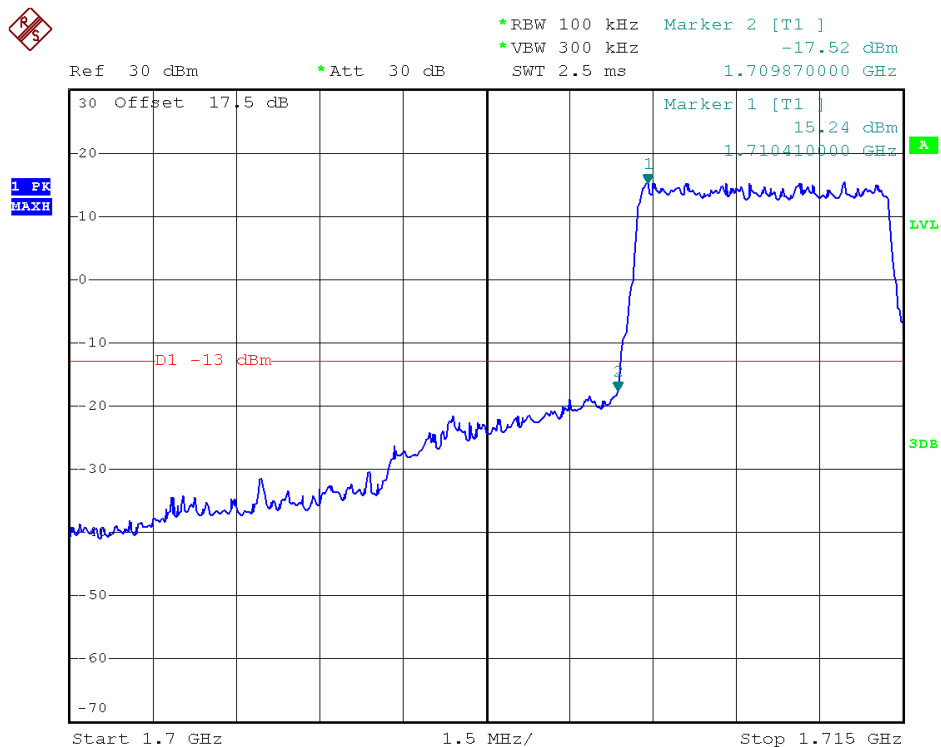


Higher Band Edge Plot for 16QAM -RB Size 15, RB Offset 0

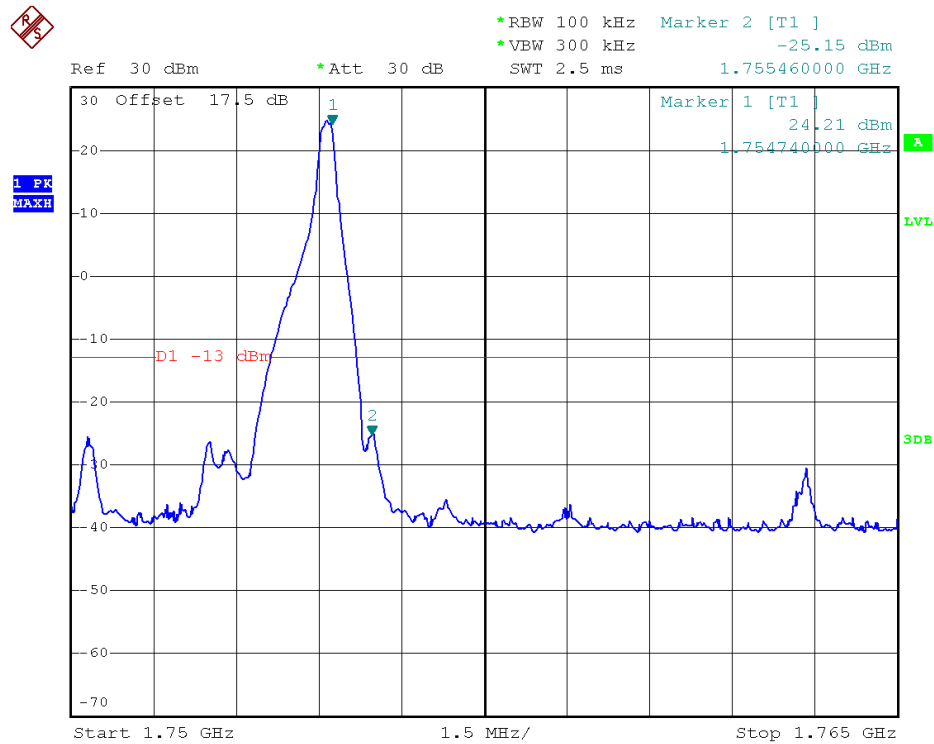
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 5MHz       |            |      |



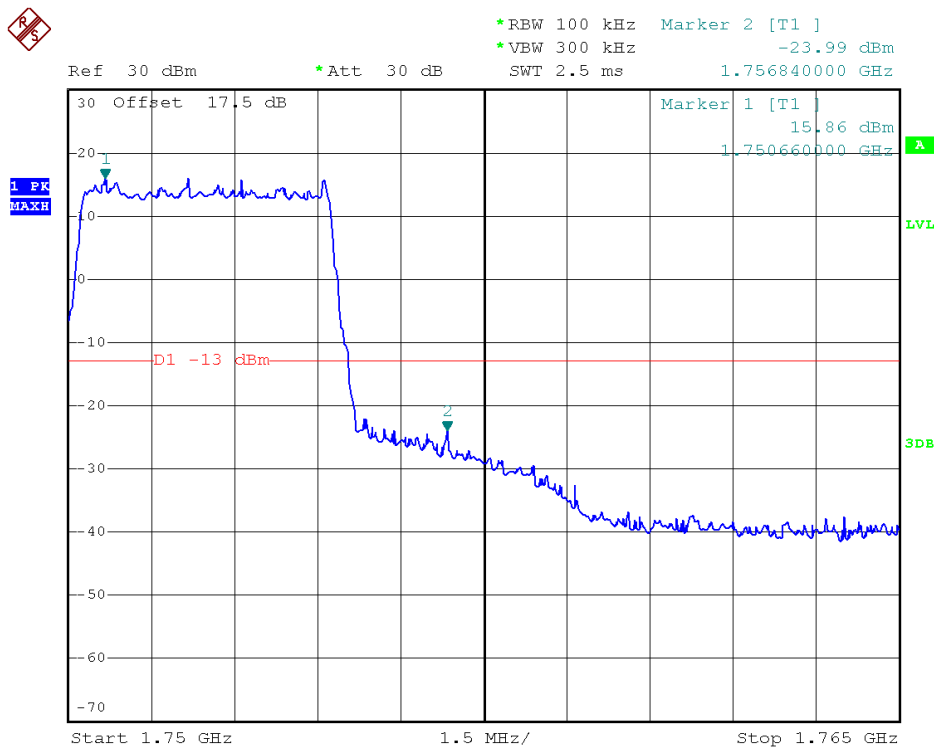
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 25, RB Offset 0

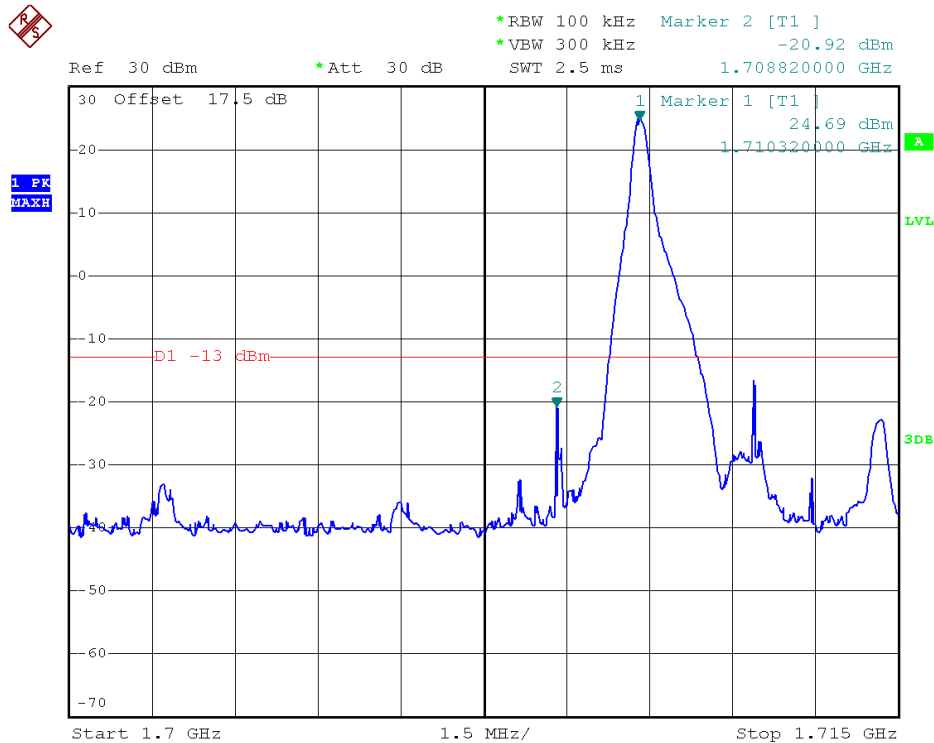


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 24

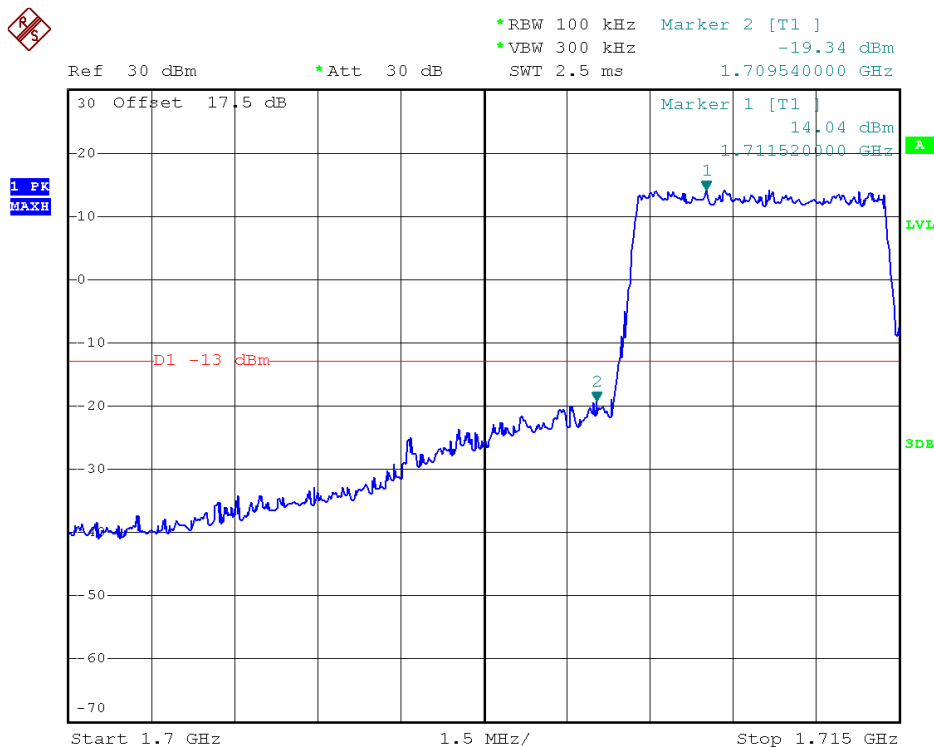


Higher Band Edge Plot for QPSK-RB Size 25, RB Offset 0

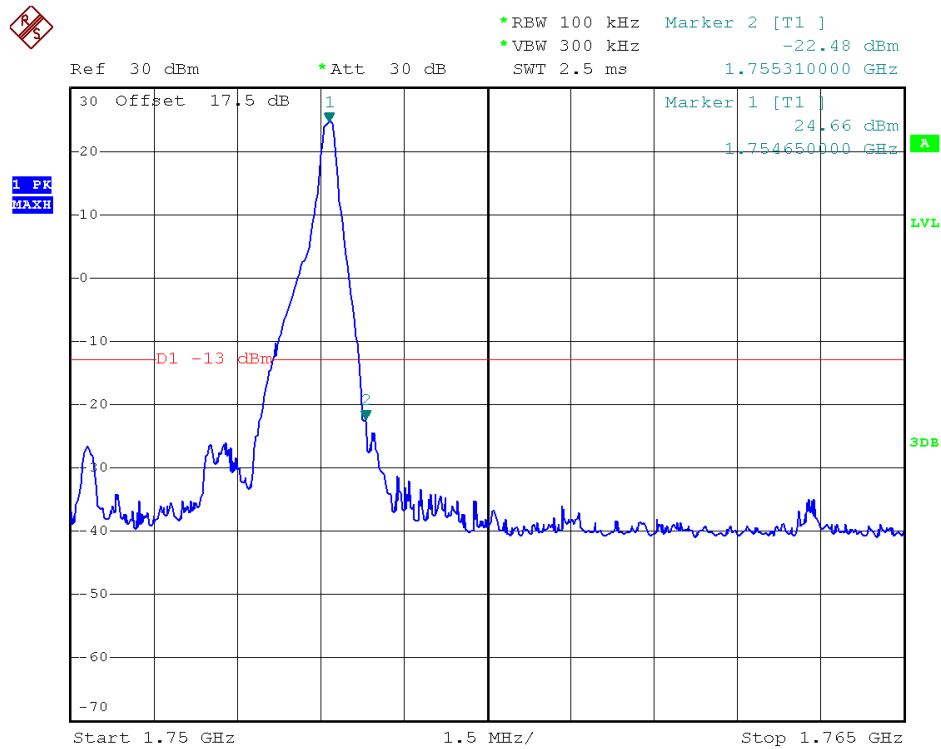
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 5MHz       |            |       |



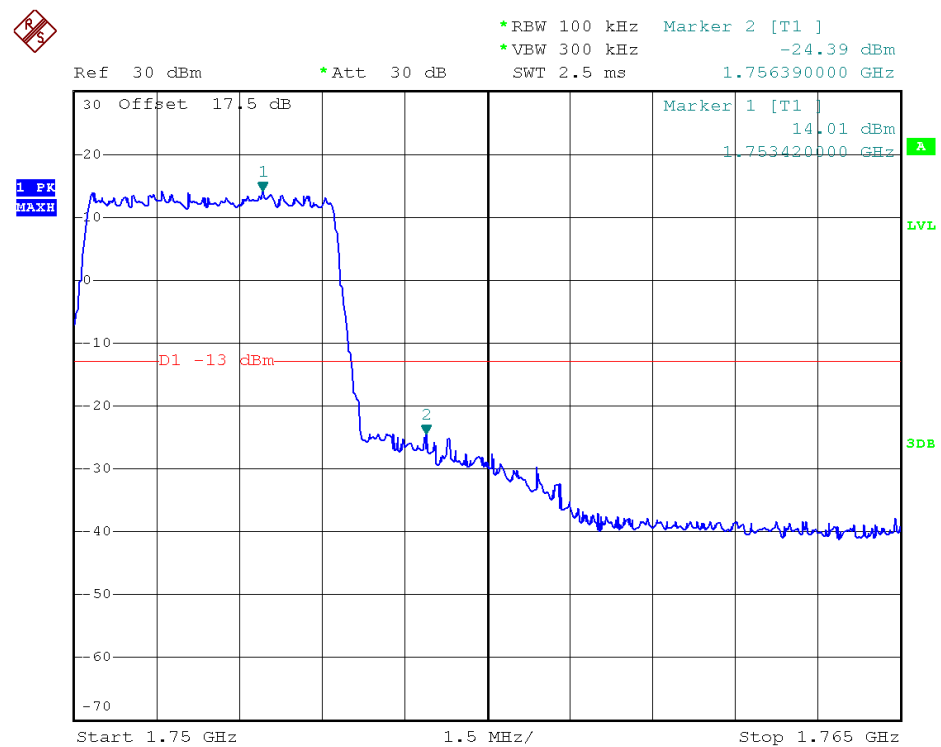
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

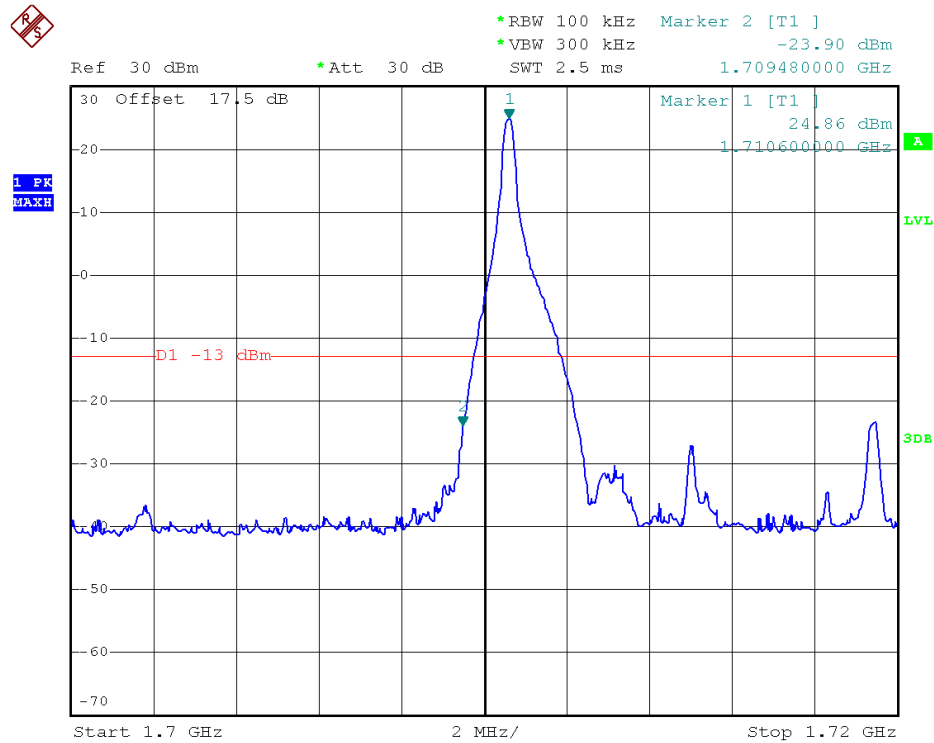


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 24

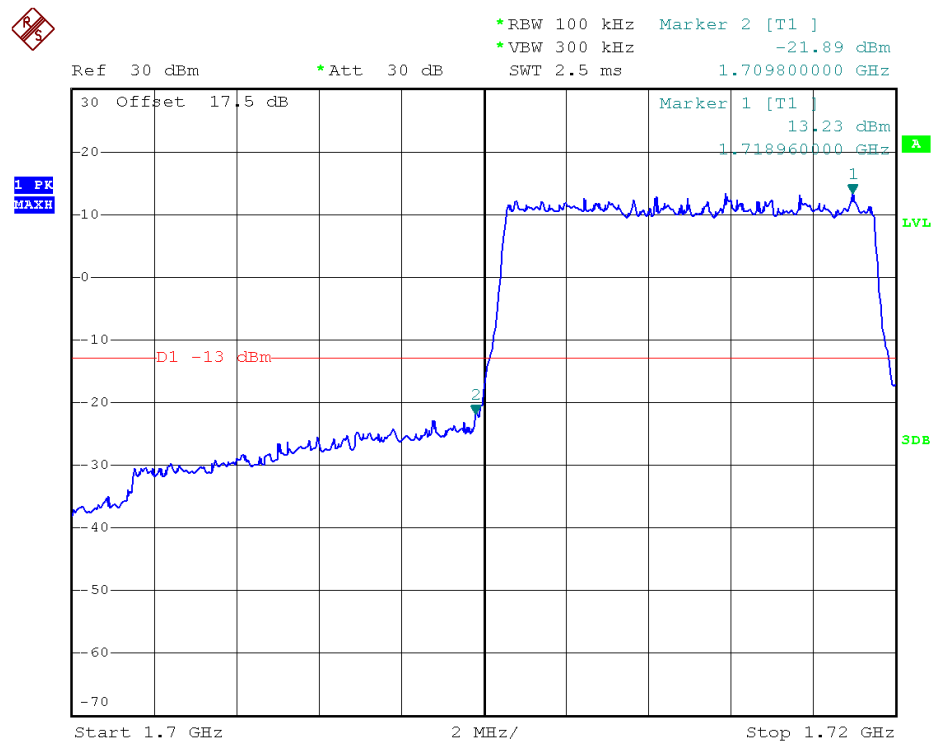


Higher Band Edge Plot for 16QAM -RB Size 25, RB Offset 0

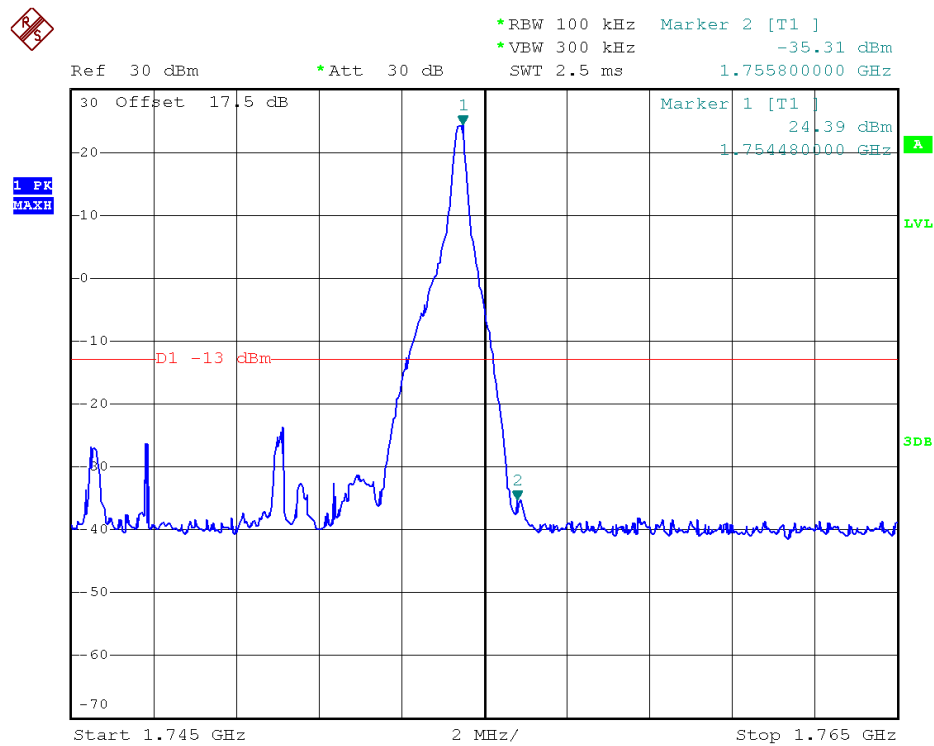
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 10MHz      |            |      |



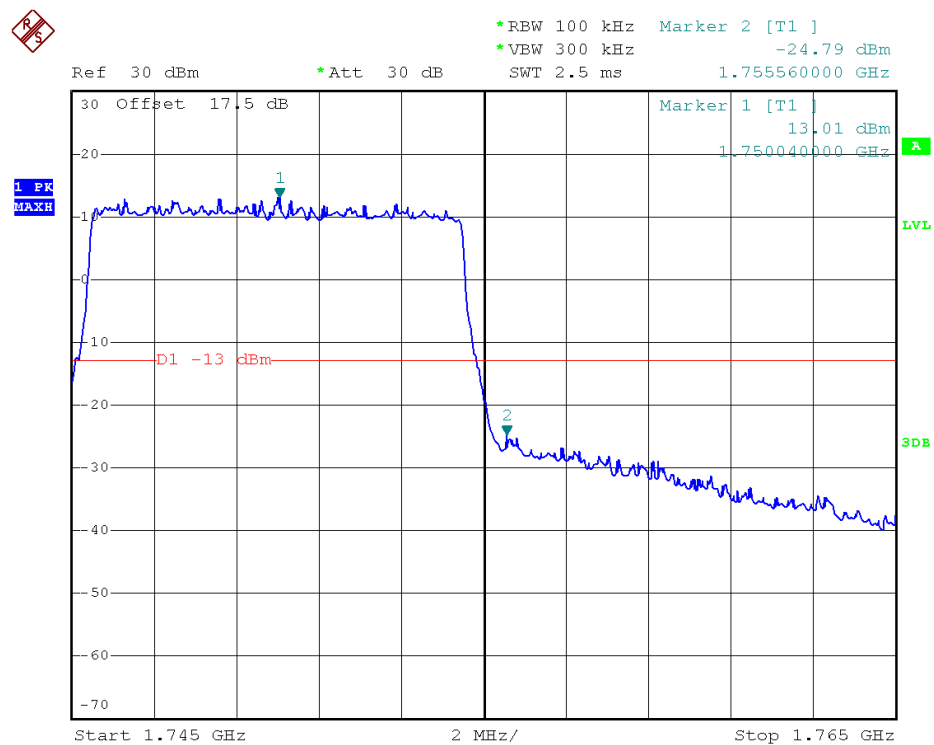
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 50, RB Offset 0

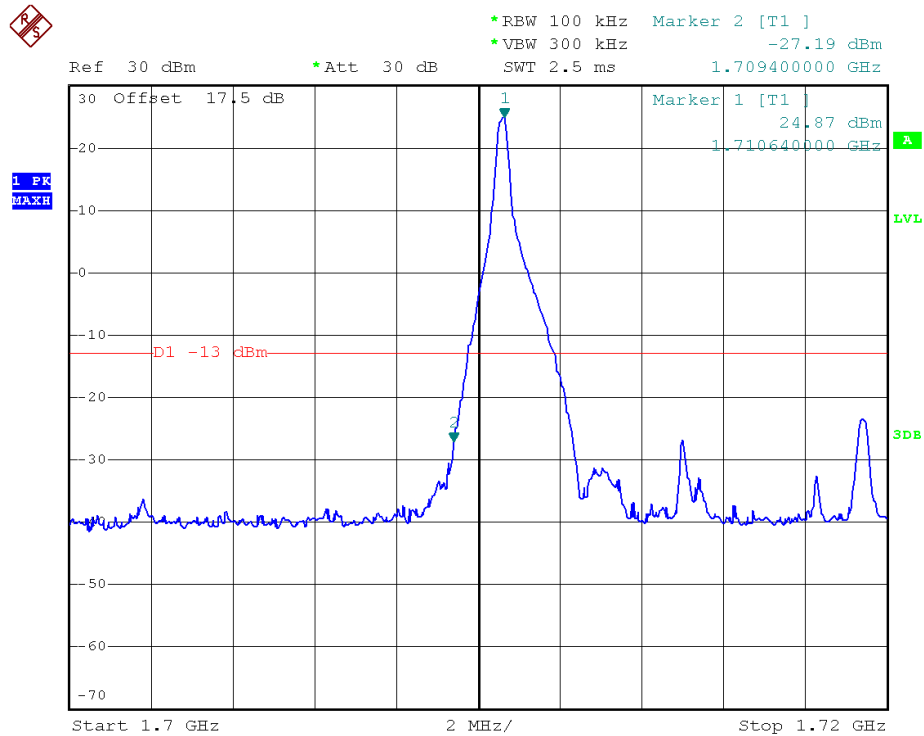


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 49

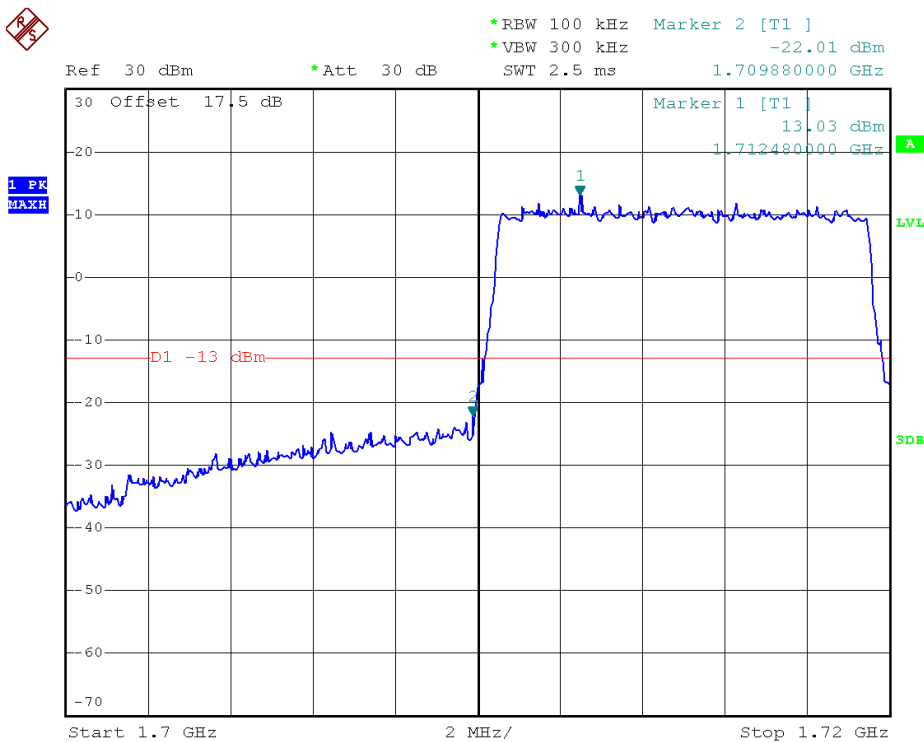


Higher Band Edge Plot for QPSK-RB Size 50, RB Offset 0

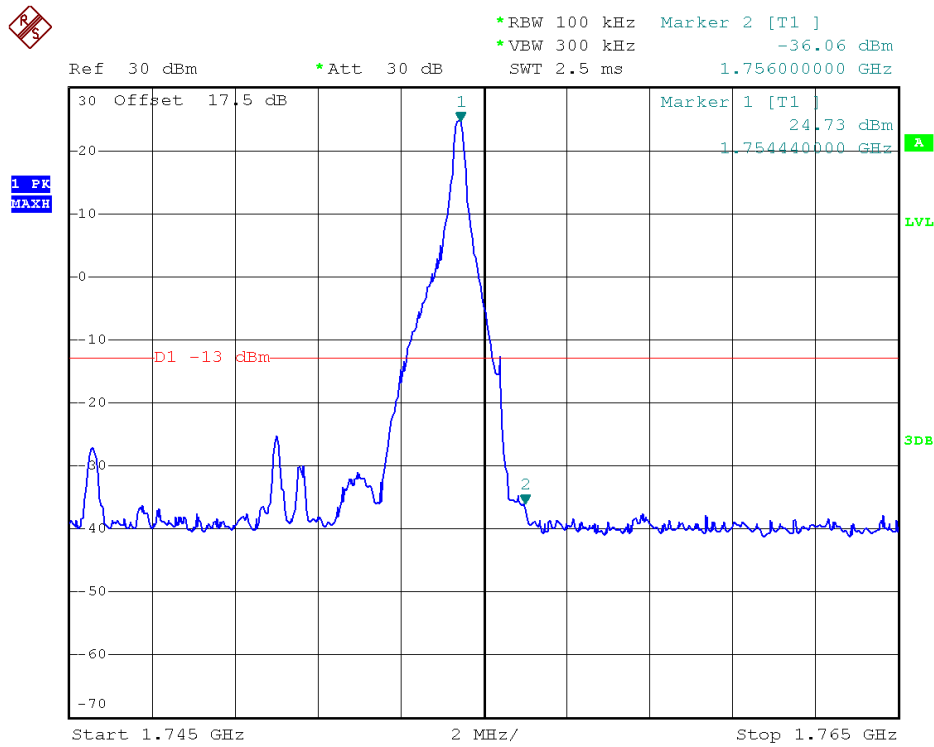
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 10MHz      |            |       |



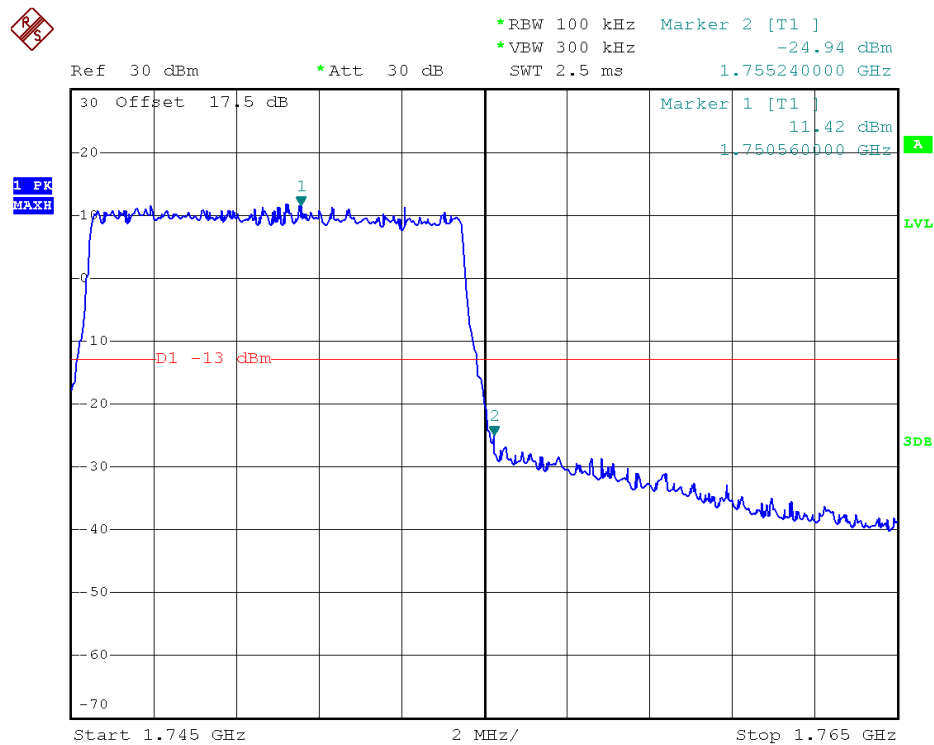
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

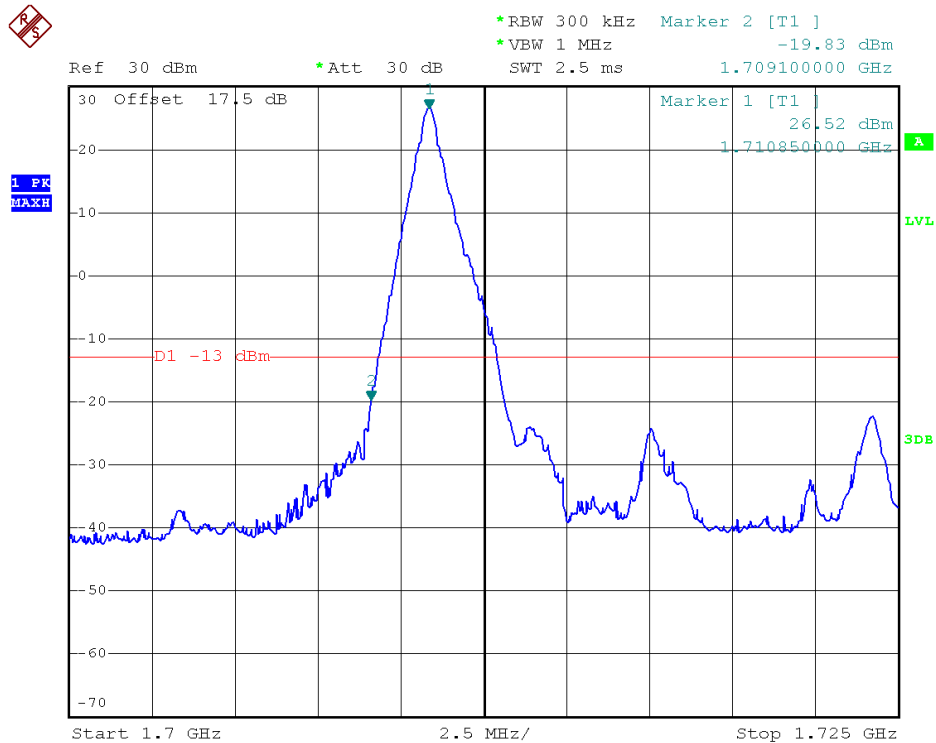


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 49

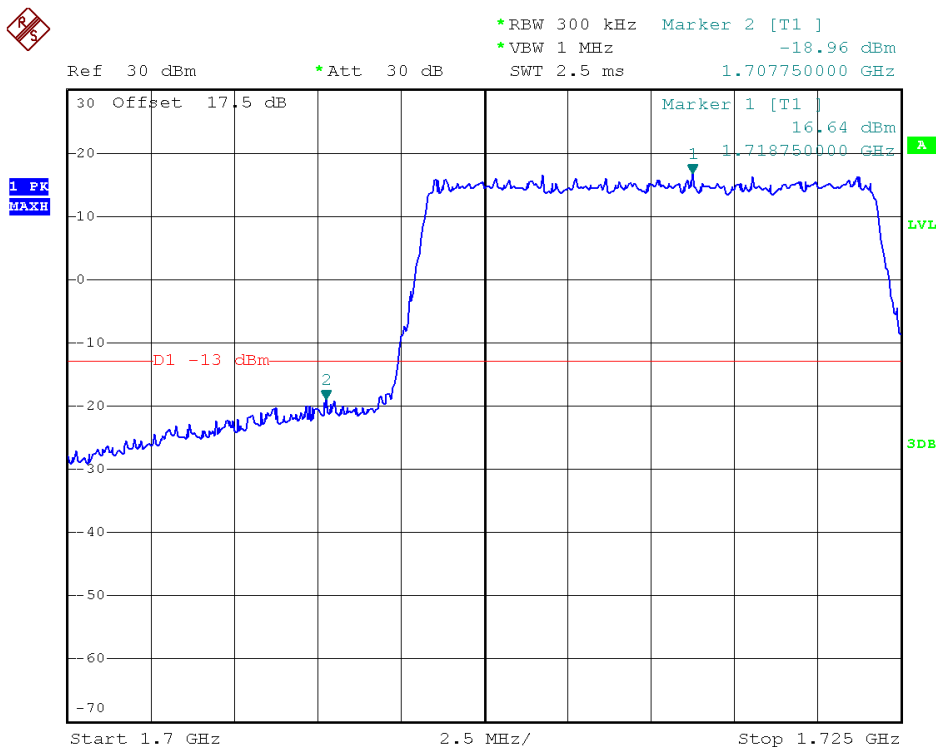


Higher Band Edge Plot for 16QAM -RB Size 50, RB Offset 0

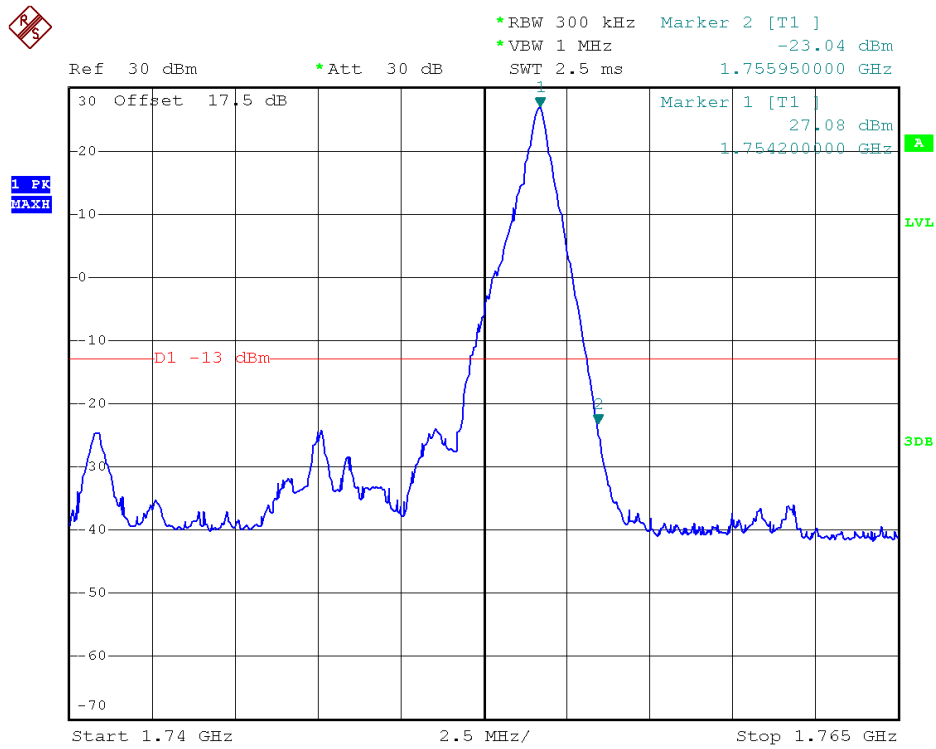
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 15MHz      |            |      |



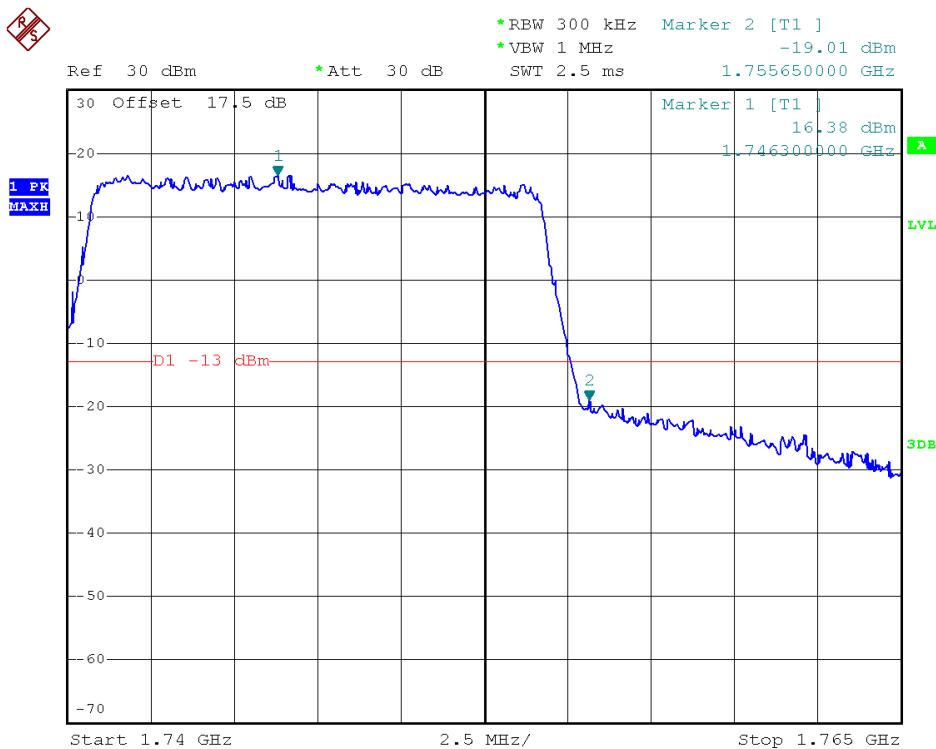
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 75, RB Offset 0

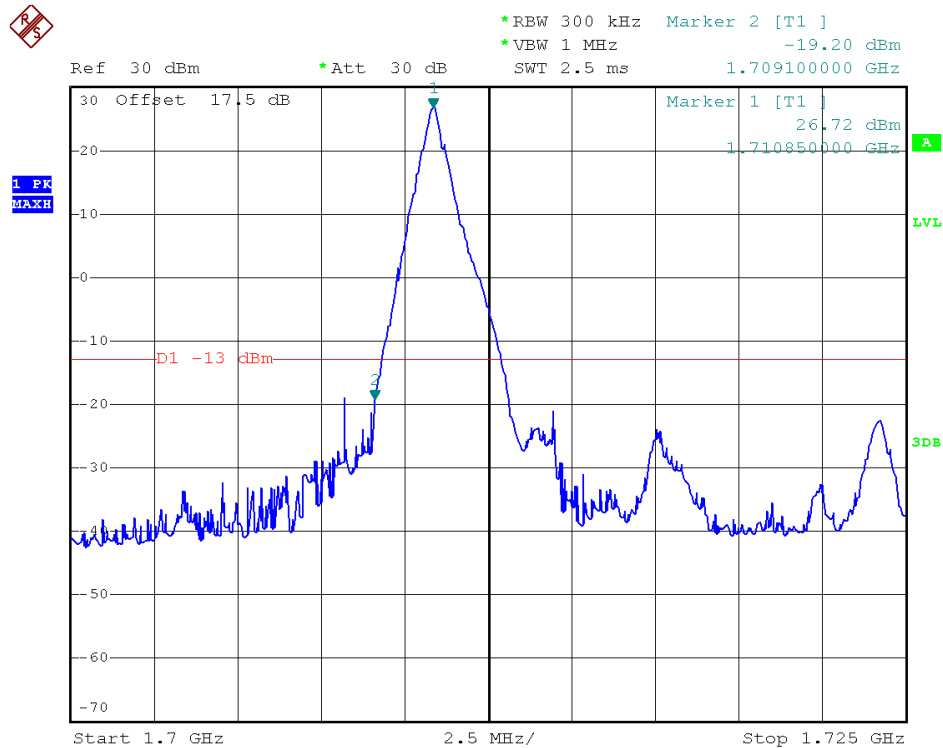


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 74

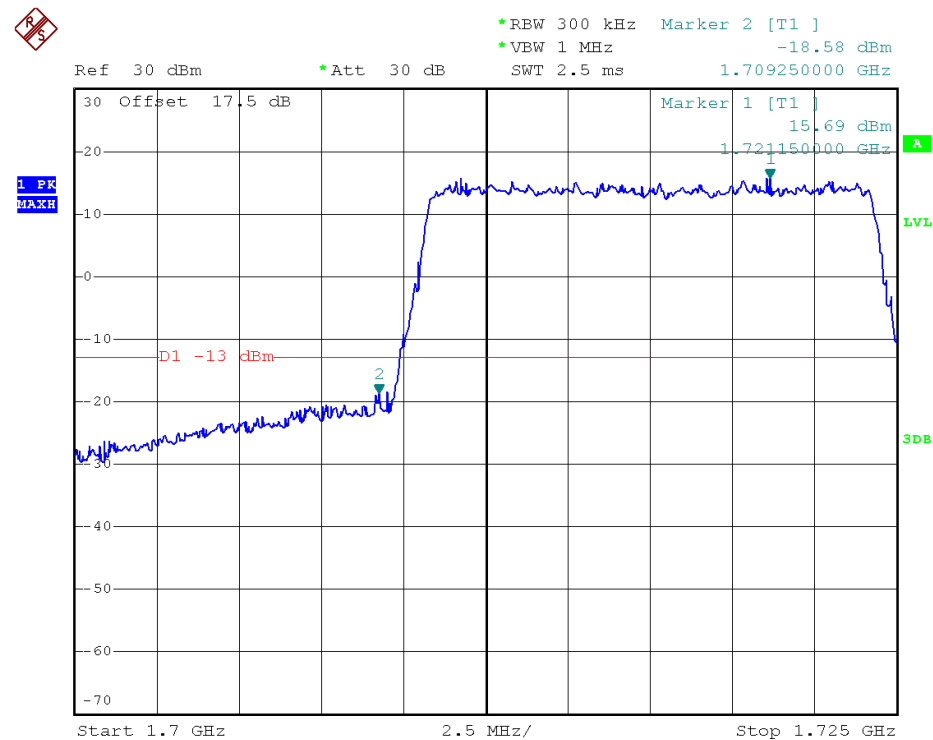


Higher Band Edge Plot for QPSK-RB Size 75, RB Offset 0

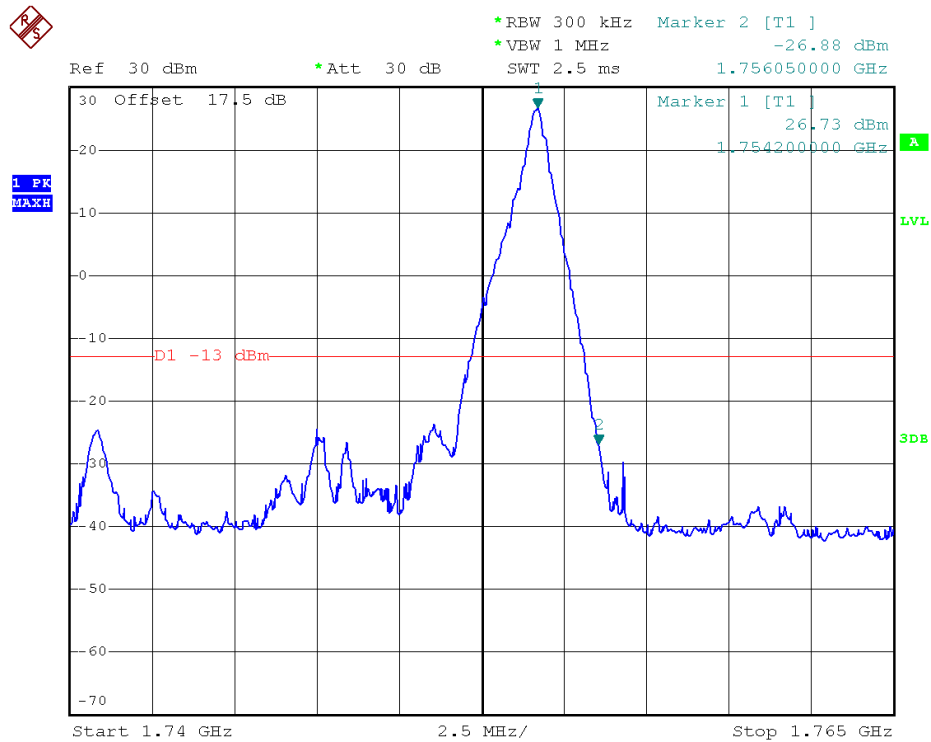
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 15MHz      |            |       |



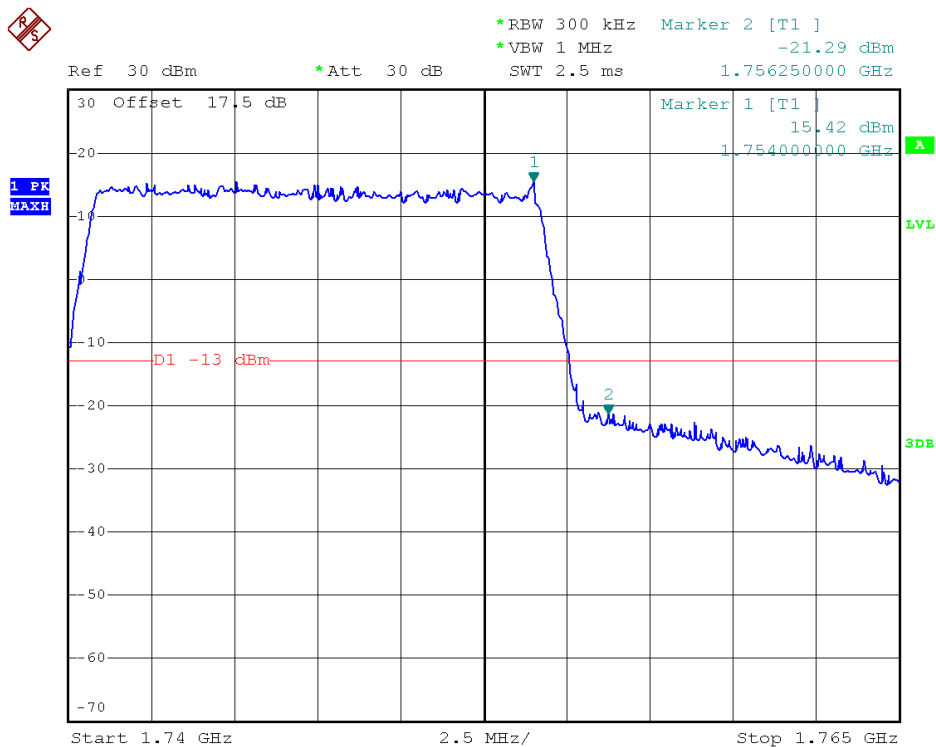
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 75, RB Offset 0

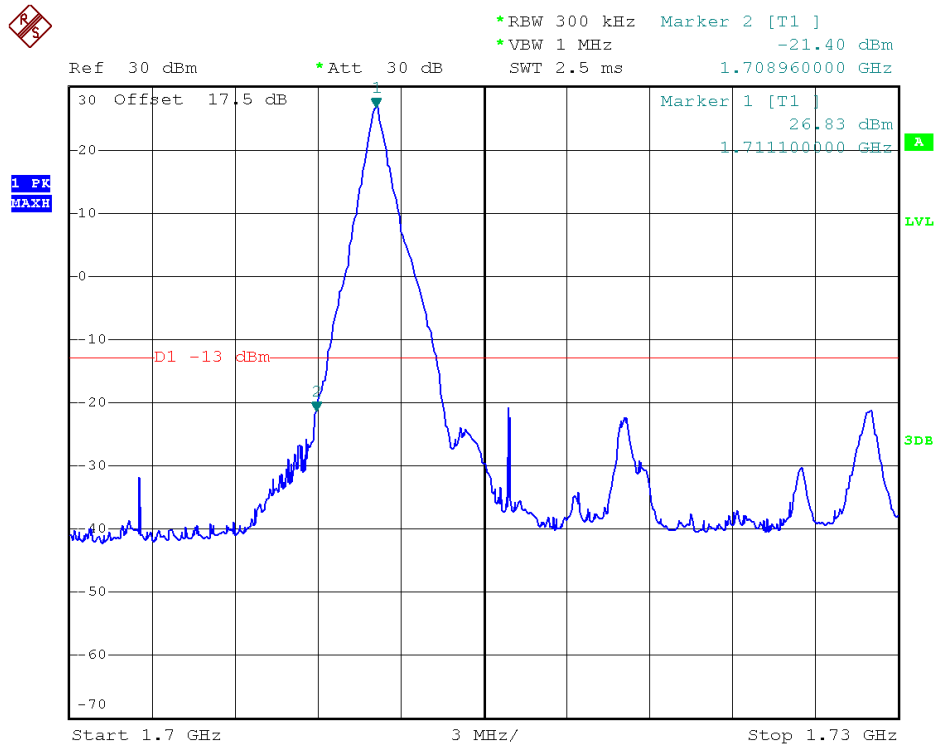


Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 74

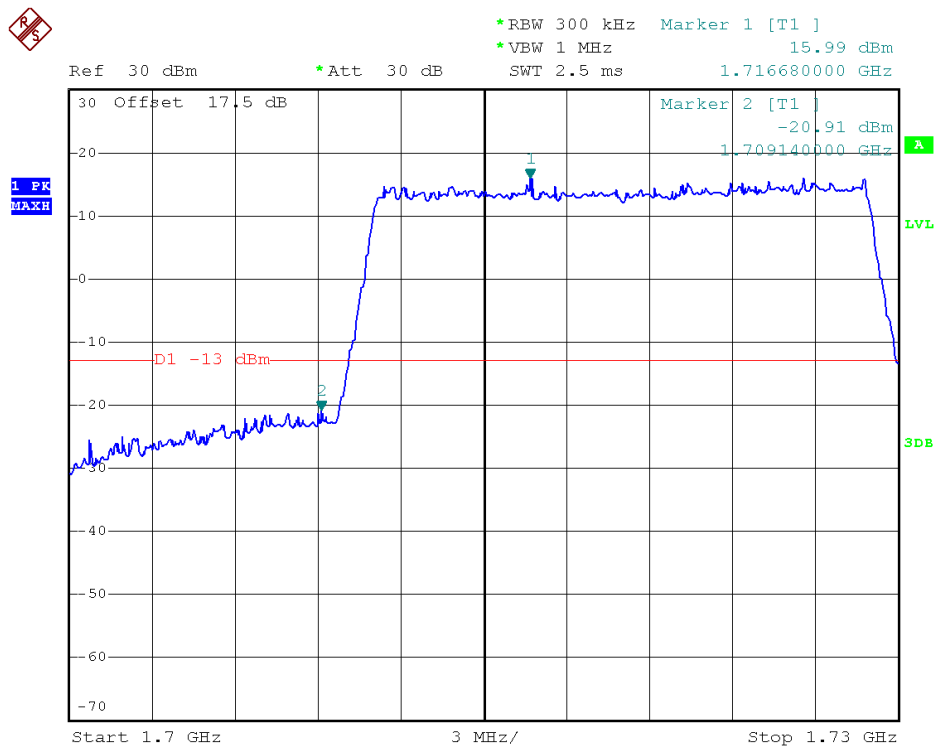


Higher Band Edge Plot for 16QAM -RB Size 75, RB Offset 0

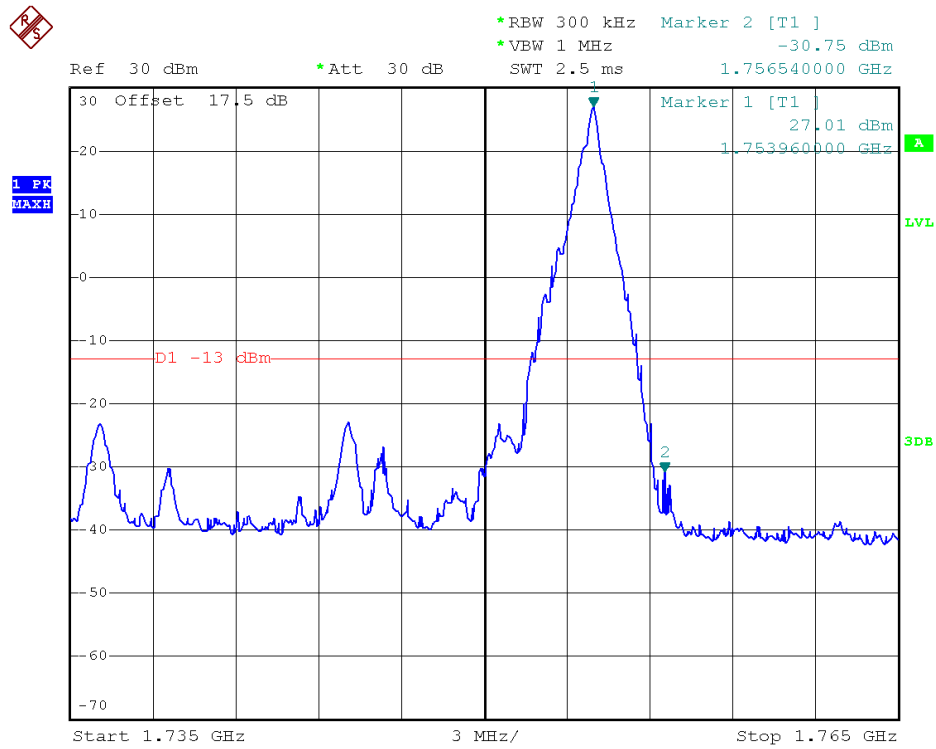
|           |            |            |      |
|-----------|------------|------------|------|
| Band      | LTE Band 4 | Modulation | QPSK |
| Bandwidth | 20MHz      |            |      |



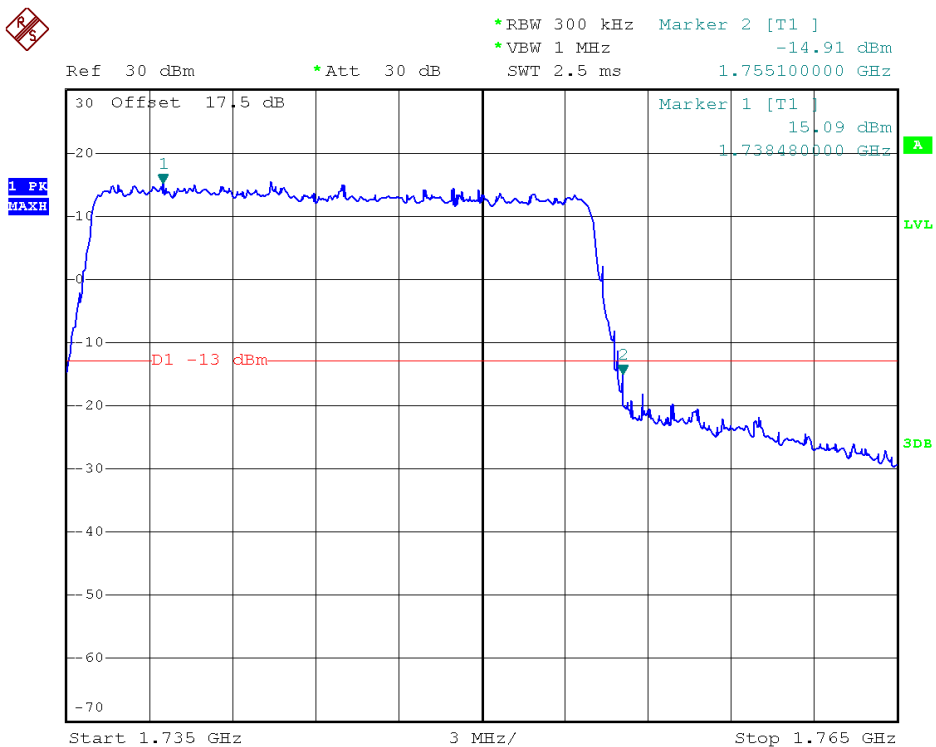
Lower Band Edge Plot for QPSK-RB Size 1, RB Offset 0



Lower Band Edge Plot for QPSK-RB Size 100, RB Offset 0

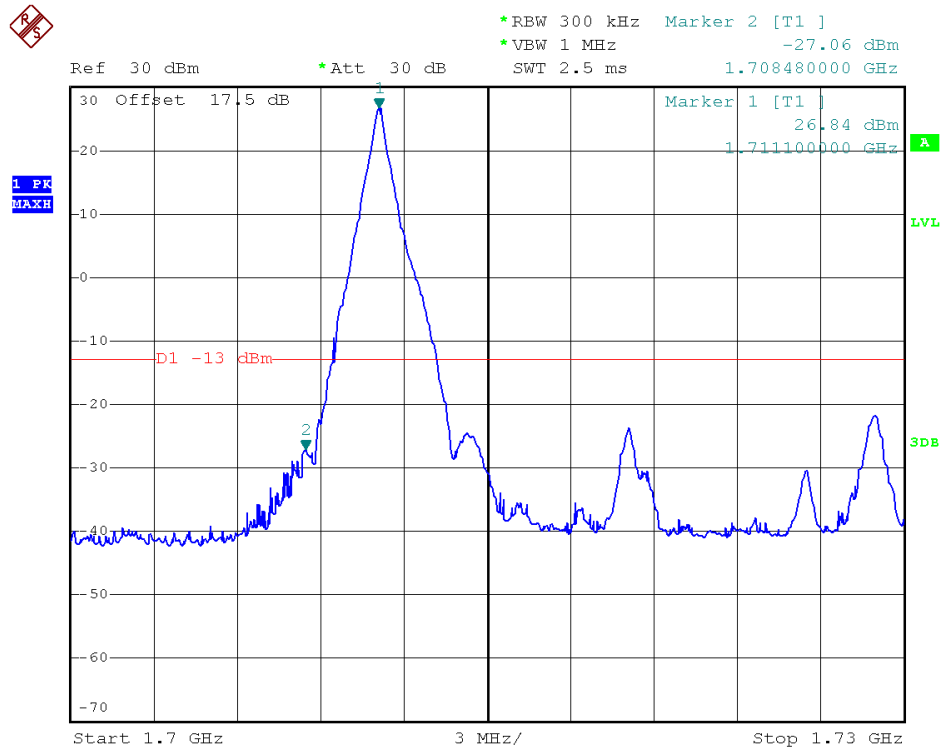


Higher Band Edge Plot for QPSK-RB Size 1, RB Offset 99

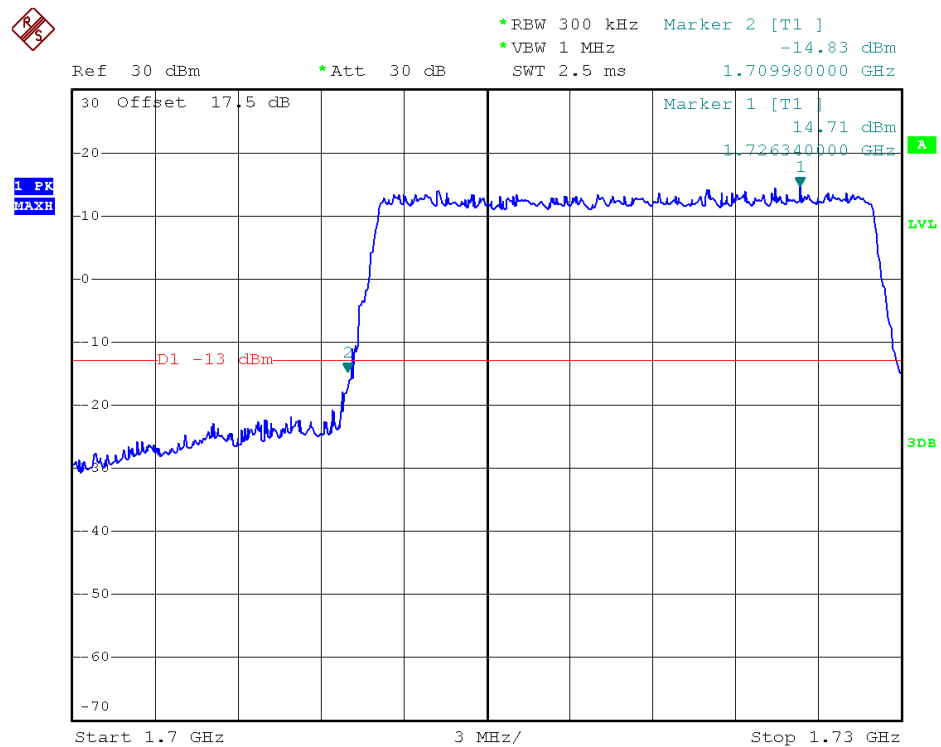


Higher Band Edge Plot for QPSK-RB Size 100, RB Offset 0

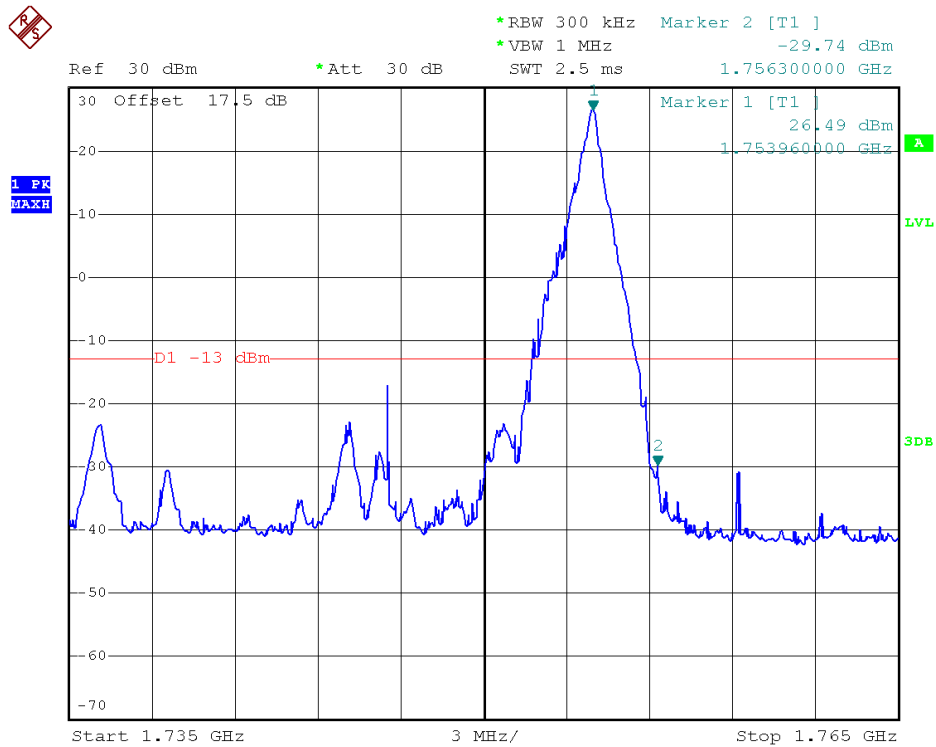
|           |            |            |       |
|-----------|------------|------------|-------|
| Band      | LTE Band 4 | Modulation | 16QAM |
| Bandwidth | 20MHz      |            |       |



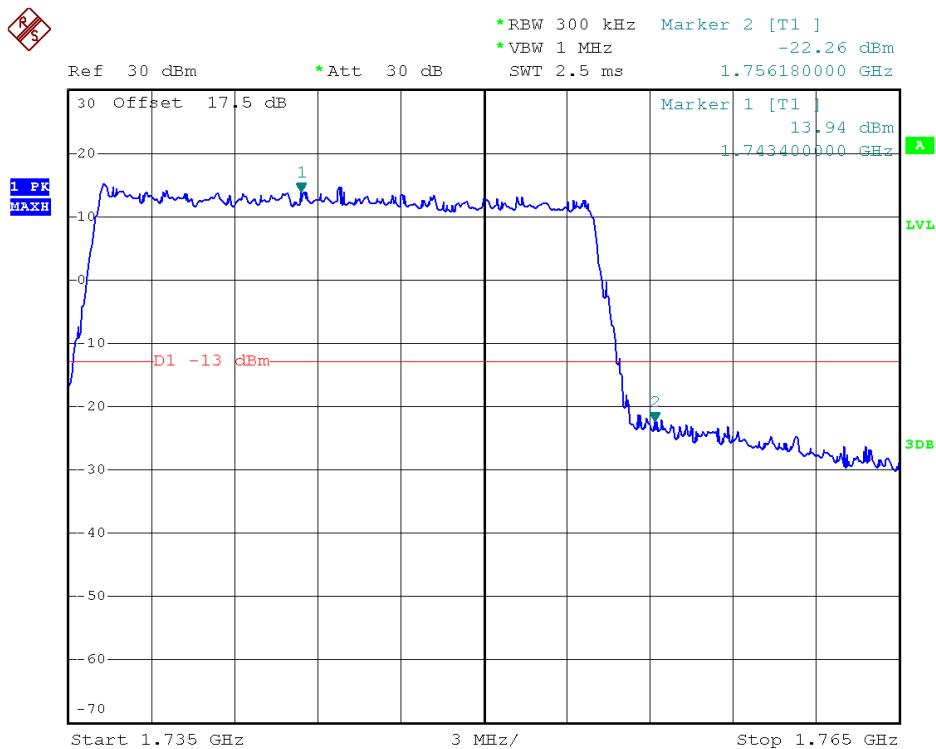
Lower Band Edge Plot for 16QAM -RB Size 1, RB Offset 0



Lower Band Edge Plot for 16QAM -RB Size 100, RB Offset 0



Higher Band Edge Plot for 16QAM -RB Size 1, RB Offset 99



Higher Band Edge Plot for 16QAM -RB Size 100, RB Offset 0

## 2.7 Transmitter Radiated Power (EIRP/ERP)

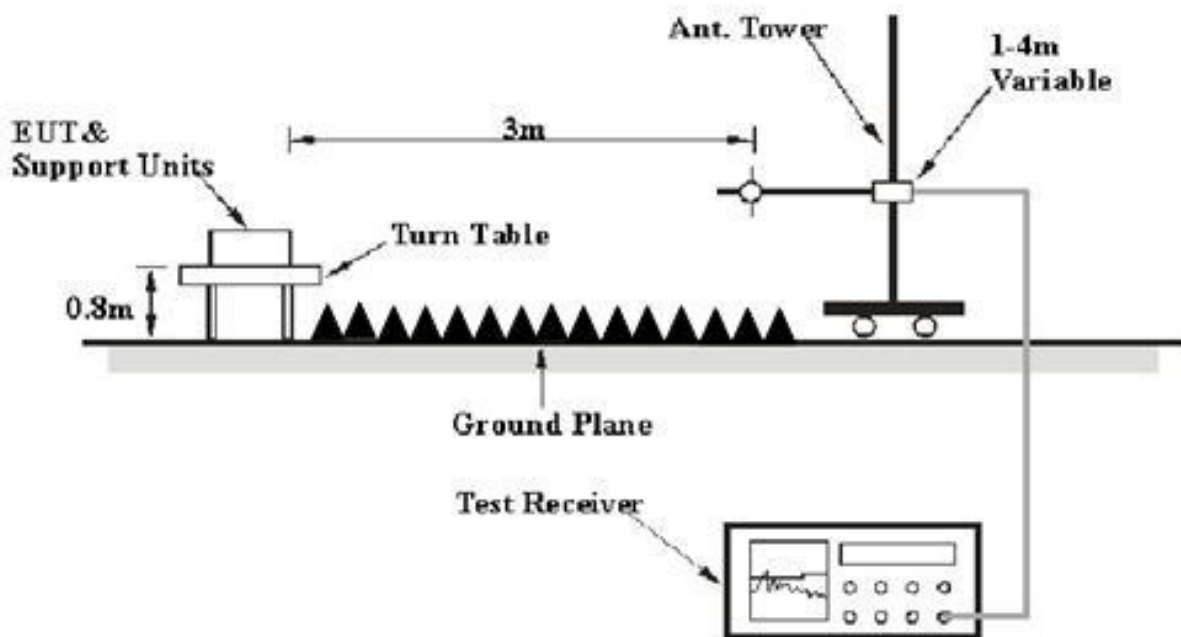
### 2.7.1 Requirement

Equivalent isotropic radiated power output measurements by substitution method according to ANSI /TIA / EIA-603-C-2004, and the spectrum analyzer configuration follows KDB 971168 D01 Power Meas. License Digital Systems v02r02. Mobile and portable (hand-held) stations operating are limited to average EIRP of 2 watts with LTE band 2 / 7 and 1 watt with LTE band 4.

### 2.7.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.7.3 Test Setup



### 2.7.4 Test Procedures

1. The EUT was placed on a turntable with 1.5 meter height in a fully anechoic chamber.
2. The EUT was set at 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and a spectrum analyzer which used a channel power option across EUT's signal

bandwidth per section 4.0 of KDB 971168 D01 v02r02.

4. The table was rotated 360 degrees to determine the position of the highest radiated power.
5. The height of the receiving antenna is adjusted to look for the maximum ERP/EIRP.
6. Taking the record of maximum ERP/EIRP.
7. A dipole antenna was substituted in place of the EUT and was driven by a signal generator.
8. The conducted power at the terminal of the dipole antenna is measured.
9. Repeat step 3 to step 5 to get the maximum ERP/EIRP of the substitution antenna.
10.  $ERP/EIRP = P_s + E_t - E_s + G_s = P_s + R_t - R_s + G_s$

$P_s$  (dBm): Input power to substitution antenna.

$G_s$  (dBi or dBd): Substitution antenna Gain.

$E_t = R_t + AF$

$E_s = R_s + AF$

$AF$  (dB/m): Receive antenna factor

$R_t$ : The highest received signal in spectrum analyzer for EUT.

$R_s$ : The highest received signal in spectrum analyzer for substitution antenna.

**2.7.5 Test Result of ERP/EIRP****1. LTE Band 4 Test Verdict:**

| LTE Band | BW (MHz) | Modulation | RB Configuration |           | Freq. (MHz) | EIRP (dBm)   | H/V | Verdict |
|----------|----------|------------|------------------|-----------|-------------|--------------|-----|---------|
|          |          |            | RB Size          | RB Offset |             |              |     |         |
| 4        | 1.4      | QPSK       | 3                | 0         | 1710.7      | <b>18.40</b> | H   | PASS    |
| 4        | 1.4      | QPSK       | 3                | 2         | 1732.5      | 18.32        | H   | PASS    |
| 4        | 1.4      | QPSK       | 1                | 2         | 1754.3      | 18.39        | H   | PASS    |
| 4        | 1.4      | QPSK       | 3                | 0         | 1710.7      | 17.86        | V   | PASS    |
| 4        | 1.4      | QPSK       | 3                | 2         | 1732.5      | 17.64        | V   | PASS    |
| 4        | 1.4      | QPSK       | 1                | 2         | 1754.3      | 17.69        | V   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1710.7      | <b>16.71</b> | H   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1732.5      | 16.80        | H   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1754.3      | 16.77        | H   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1710.7      | 15.97        | V   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1732.5      | 15.88        | V   | PASS    |
| 4        | 1.4      | 16QAM      | 3                | 2         | 1754.3      | 15.92        | V   | PASS    |
| 4        | 3        | QPSK       | 1                | 0         | 1711.5      | 18.40        | H   | PASS    |
| 4        | 3        | QPSK       | 1                | 0         | 1732.5      | <b>18.41</b> | H   | PASS    |
| 4        | 3        | QPSK       | 1                | 7         | 1753.5      | 18.36        | H   | PASS    |
| 4        | 3        | QPSK       | 1                | 0         | 1711.5      | 17.76        | V   | PASS    |
| 4        | 3        | QPSK       | 1                | 0         | 1732.5      | 17.74        | V   | PASS    |
| 4        | 3        | QPSK       | 1                | 7         | 1753.5      | 17.77        | V   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1711.5      | 16.79        | H   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1732.5      | <b>16.80</b> | H   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1753.5      | 16.77        | H   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1711.5      | 15.87        | V   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1732.5      | 15.92        | V   | PASS    |
| 4        | 3        | 16QAM      | 1                | 14        | 1753.5      | 15.89        | V   | PASS    |
| 4        | 5        | QPSK       | 1                | 12        | 1712.5      | <b>18.35</b> | H   | PASS    |
| 4        | 5        | QPSK       | 1                | 24        | 1732.5      | 18.34        | H   | PASS    |
| 4        | 5        | QPSK       | 1                | 24        | 1752.5      | 18.29        | H   | PASS    |
| 4        | 5        | QPSK       | 1                | 12        | 1712.5      | 17.75        | V   | PASS    |
| 4        | 5        | QPSK       | 1                | 24        | 1732.5      | 17.71        | V   | PASS    |
| 4        | 5        | QPSK       | 1                | 24        | 1752.5      | 17.69        | V   | PASS    |
| 4        | 5        | 16QAM      | 1                | 24        | 1712.5      | 16.79        | H   | PASS    |
| 4        | 5        | 16QAM      | 1                | 0         | 1732.5      | <b>16.83</b> | H   | PASS    |
| 4        | 5        | 16QAM      | 1                | 0         | 1752.5      | 16.81        | H   | PASS    |
| 4        | 5        | 16QAM      | 1                | 24        | 1712.5      | 15.87        | V   | PASS    |
| 4        | 5        | 16QAM      | 1                | 0         | 1732.5      | 15.78        | V   | PASS    |



| LTE Band | BW (MHz) | Modulation | RB Configuration |           | Freq. (MHz) | EIRP (dBm)   | H/V | Verdict |
|----------|----------|------------|------------------|-----------|-------------|--------------|-----|---------|
|          |          |            | RB Size          | RB Offset |             |              |     |         |
| 4        | 5        | 16QAM      | 1                | 0         | 1752.5      | 15.82        | V   | PASS    |
| 4        | 10       | QPSK       | 1                | 24        | 1715        | <b>18.37</b> | H   | PASS    |
| 4        | 10       | QPSK       | 1                | 0         | 1732.5      | 18.30        | H   | PASS    |
| 4        | 10       | QPSK       | 1                | 24        | 1750        | 18.29        | H   | PASS    |
| 4        | 10       | QPSK       | 1                | 24        | 1715        | 17.69        | V   | PASS    |
| 4        | 10       | QPSK       | 1                | 0         | 1732.5      | 17.68        | V   | PASS    |
| 4        | 10       | QPSK       | 1                | 24        | 1750        | 17.72        | V   | PASS    |
| 4        | 10       | 16QAM      | 1                | 24        | 1715        | 16.70        | H   | PASS    |
| 4        | 10       | 16QAM      | 1                | 0         | 1732.5      | <b>16.72</b> | H   | PASS    |
| 4        | 10       | 16QAM      | 1                | 24        | 1750        | 16.71        | H   | PASS    |
| 4        | 10       | 16QAM      | 1                | 24        | 1715        | 15.81        | V   | PASS    |
| 4        | 10       | 16QAM      | 1                | 0         | 1732.5      | 15.78        | V   | PASS    |
| 4        | 10       | 16QAM      | 1                | 24        | 1750        | 15.85        | V   | PASS    |
| 4        | 15       | QPSK       | 1                | 74        | 1717.5      | <b>18.40</b> | H   | PASS    |
| 4        | 15       | QPSK       | 1                | 74        | 1732.5      | 18.28        | H   | PASS    |
| 4        | 15       | QPSK       | 1                | 0         | 1747.5      | 18.31        | H   | PASS    |
| 4        | 15       | QPSK       | 1                | 74        | 1717.5      | 17.66        | V   | PASS    |
| 4        | 15       | QPSK       | 1                | 74        | 1732.5      | 17.69        | V   | PASS    |
| 4        | 15       | QPSK       | 1                | 0         | 1747.5      | 17.73        | V   | PASS    |
| 4        | 15       | 16QAM      | 1                | 74        | 1717.5      | 16.69        | H   | PASS    |
| 4        | 15       | 16QAM      | 1                | 0         | 1732.5      | <b>16.78</b> | H   | PASS    |
| 4        | 15       | 16QAM      | 1                | 0         | 1747.5      | 16.67        | H   | PASS    |
| 4        | 15       | 16QAM      | 1                | 74        | 1717.5      | 15.69        | V   | PASS    |
| 4        | 15       | 16QAM      | 1                | 0         | 1732.5      | 15.72        | V   | PASS    |
| 4        | 15       | 16QAM      | 1                | 0         | 1747.5      | 15.78        | V   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1720        | <b>18.45</b> | H   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1732.5      | 18.34        | H   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1745        | 18.43        | H   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1720        | 17.86        | V   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1732.5      | 17.82        | V   | PASS    |
| 4        | 20       | QPSK       | 1                | 0         | 1745        | 17.79        | V   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1720        | 16.79        | H   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1732.5      | <b>16.92</b> | H   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1745        | 16.87        | H   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1720        | 15.72        | V   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1732.5      | 15.78        | V   | PASS    |
| 4        | 20       | 16QAM      | 1                | 0         | 1745        | 15.75        | V   | PASS    |

## 2.8 Radiated Out of Band Emissions

### 2.8.1 Requirement

The radiated spurious emission was measured by substitution method according to ANSI / TIA /EIA-603-C-2004. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

For Band 7

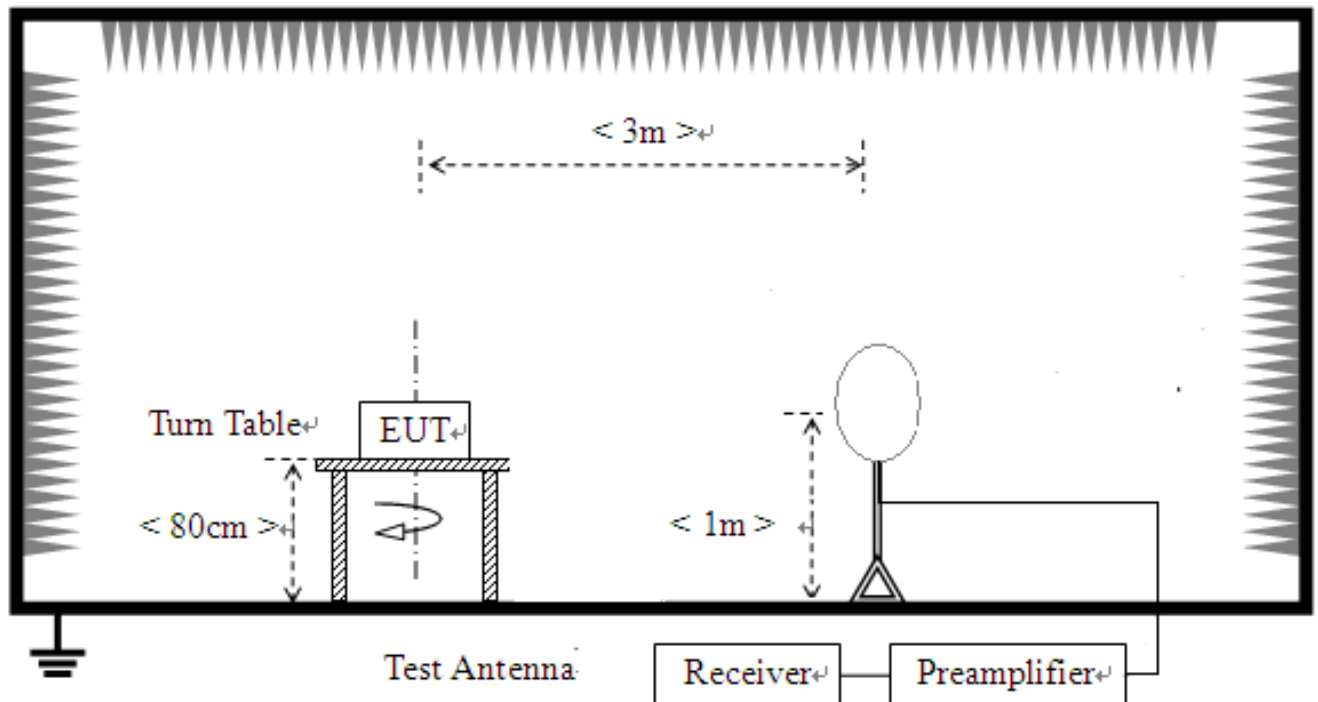
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least  $55 + 10 \log (P)$  dB.

### 2.8.2 Measuring Instruments

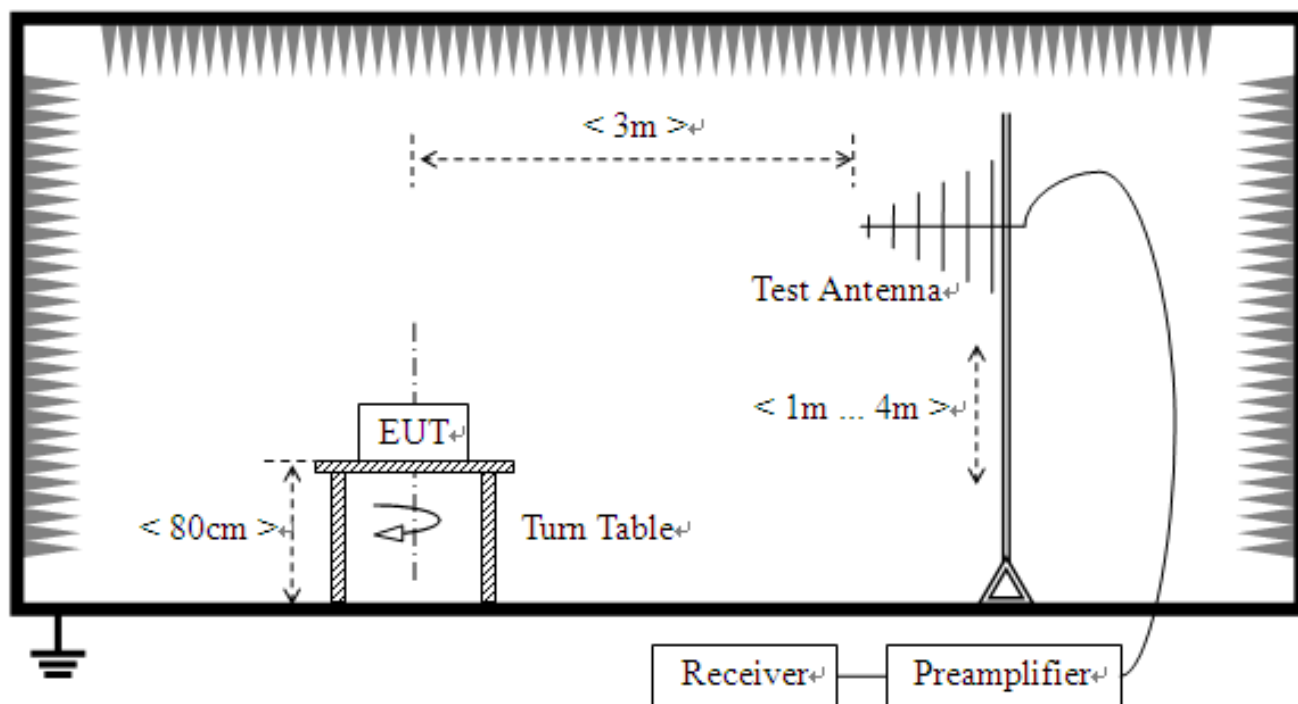
The measuring equipment is listed in the section 3 of this test report.

### 2.8.3 Test Setup

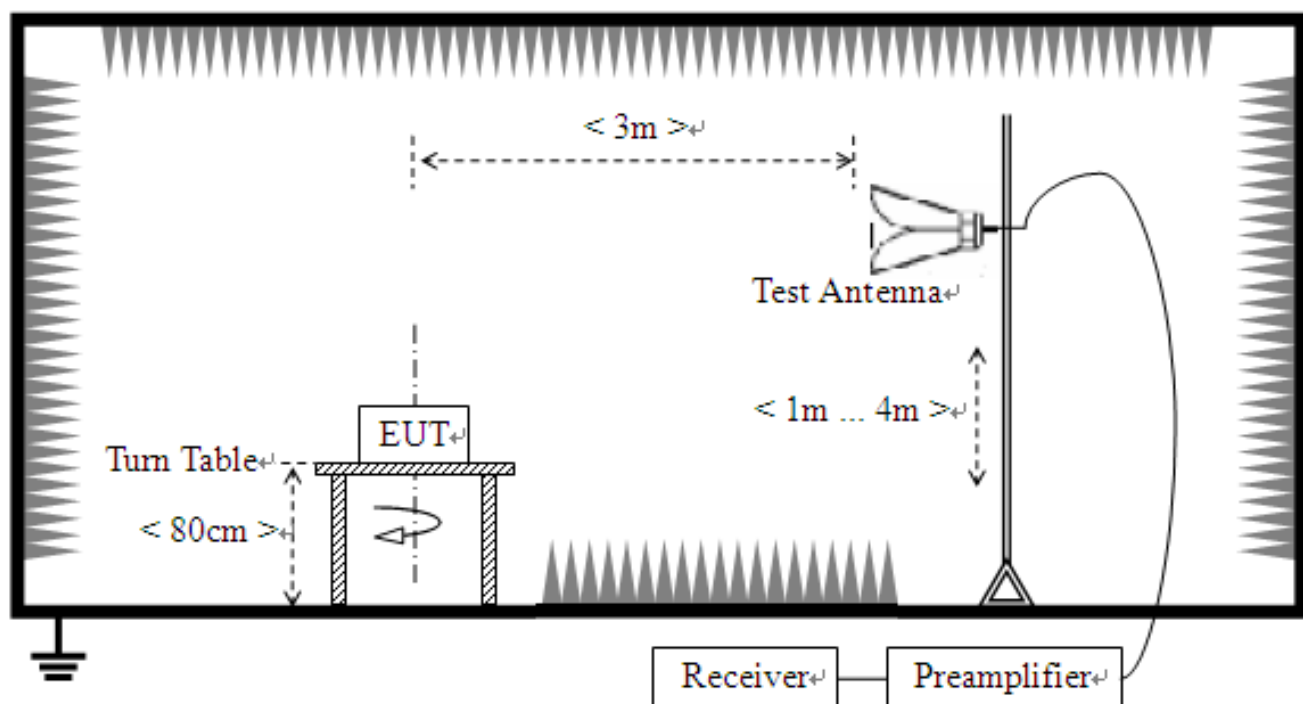
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



For radiated emissions above 1GHz



#### 2.8.4 Test Procedures

1. The EUT was placed on a rotatable wooden table with 0.8 meter above ground.
2. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search the maximum spurious emission for both horizontal and vertical polarizations.
5. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking the record of maximum spurious emission.
6. A horn antenna was substituted in place of the EUT and was driven by a signal generator.
7. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
8. Taking the record of output power at antenna port.
9. Repeat step 7 to step 8 for another polarization.
10. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.

The limit line is derived from  $43 + 10\log(P)$  dB below the transmitter power  $P$  (Watts)  
 $= P(W) - [43 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[43 + 10\log(P)]$  (dB)  
 $= -13$  dBm.

<For Band 7>

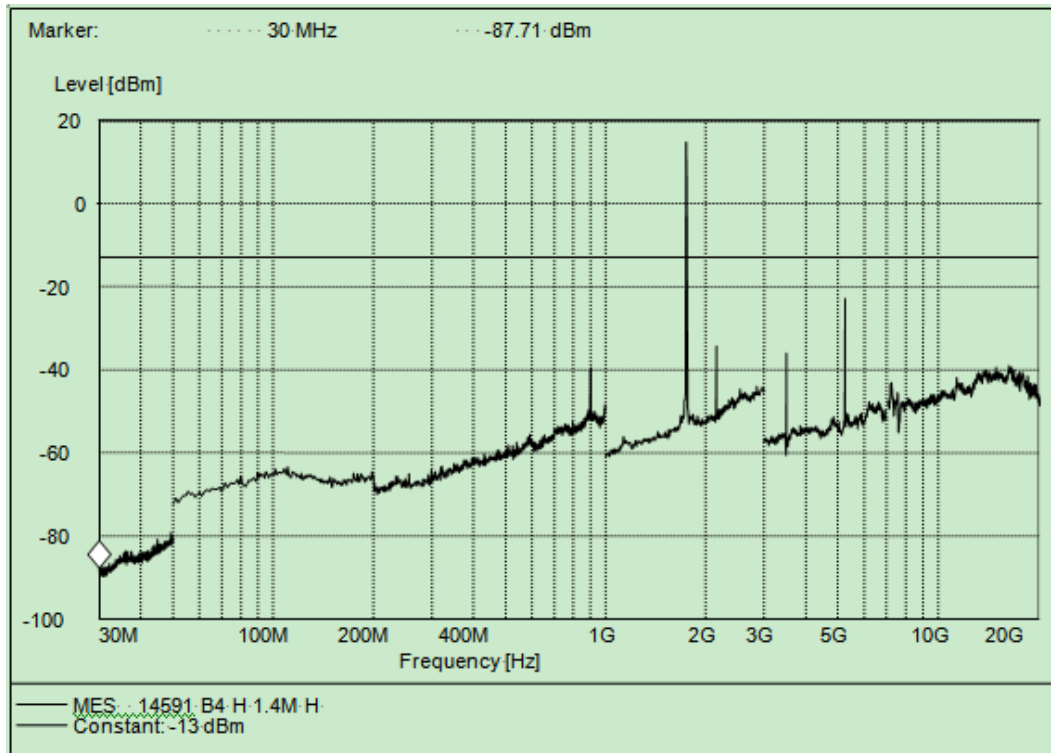
The limit line is derived from  $55 + 10\log(P)$  dB below the transmitter power  $P$  (Watts)  
 $= P(W) - [55 + 10\log(P)]$  (dB)  
 $= [30 + 10\log(P)]$  (dBm) -  $[55 + 10\log(P)]$  (dB)  
 $= -25$  dBm.

11. All Spurious Emission tests were performed in X, Y, Z axis direction and low, middle, high channel. And only the worst axis test condition was recorded in this test report.
12. The spectrum is measured from 9 KHz to the 10<sup>th</sup> harmonic of the fundamental frequency of the transmitter using CISPR quasi peak detector below 1GHz. The worst case emissions are reported however emissions whose levels were not within 20dB of the respective limits were not reported.

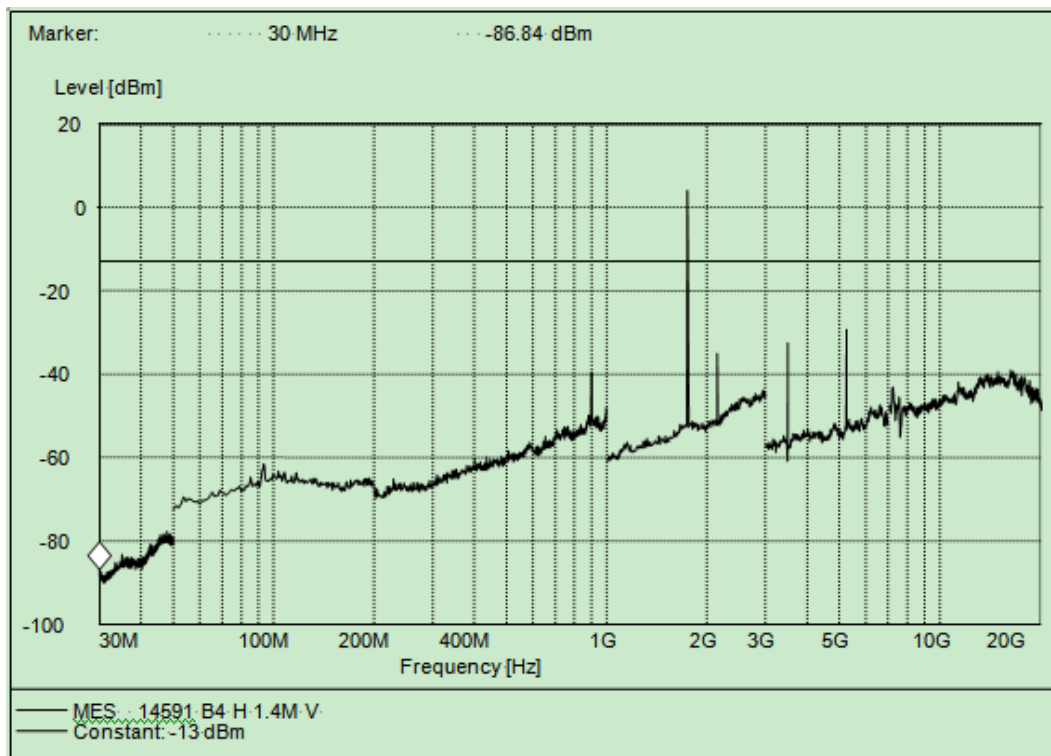


13. The maximum RB configurations of the Radiated Spurious Emissions as RB Size 1, RB Offset 0
14. For 9KHz to 30MHz: the amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported here.

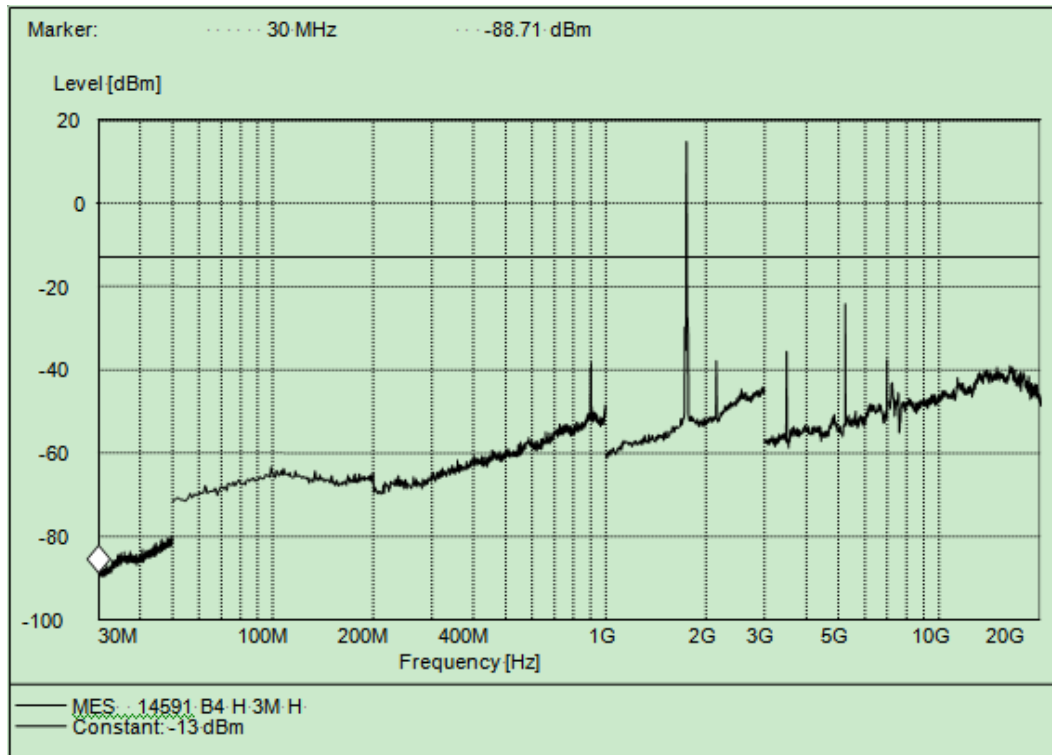
## 2.8.5 Test Result (Plots) of Radiated Spurious Emission



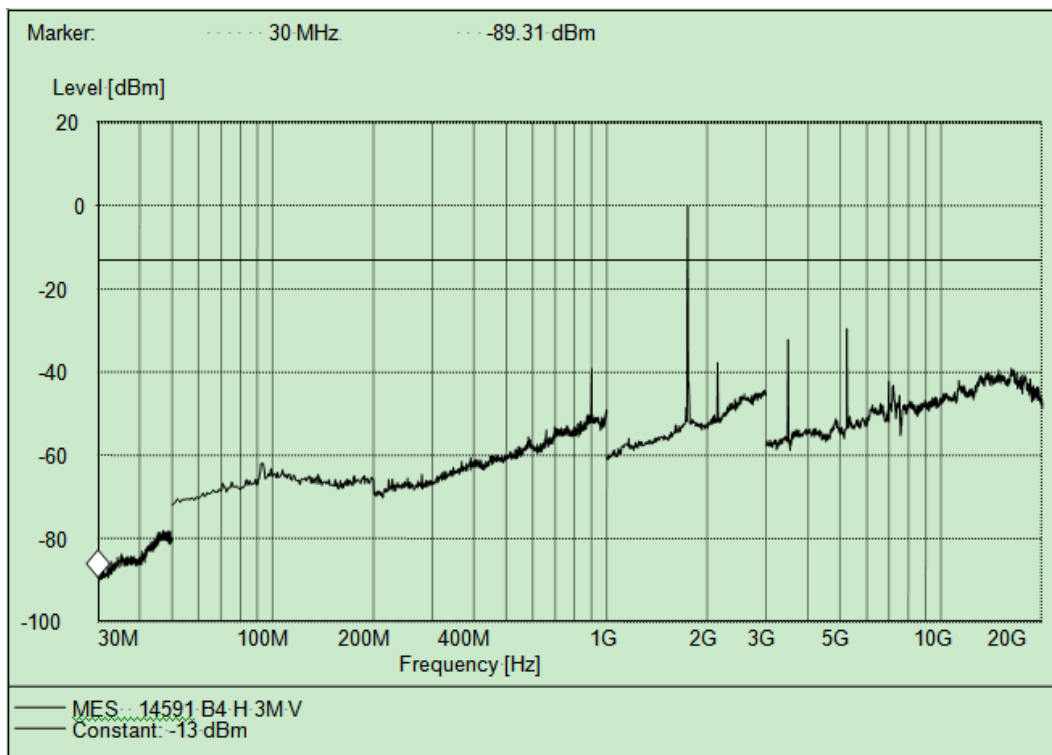
LTE Band 4 QPSK 1.4MHz BW Test Antenna Horizontal



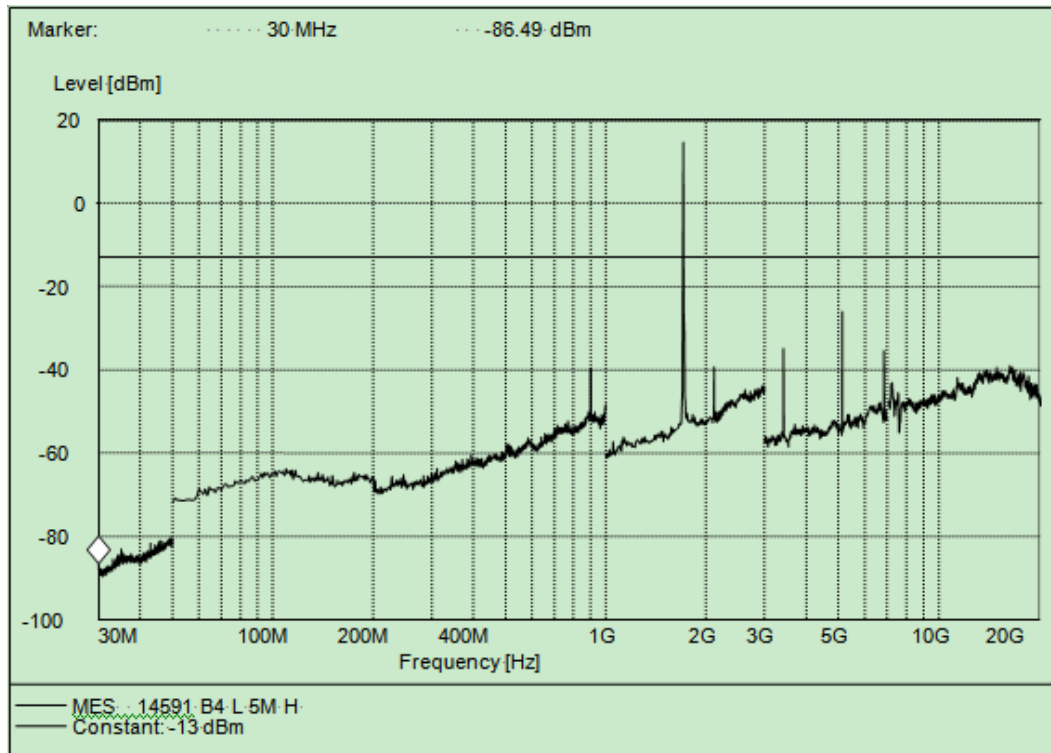
LTE Band 4 QPSK 1.4MHz BW Test Antenna Vertical



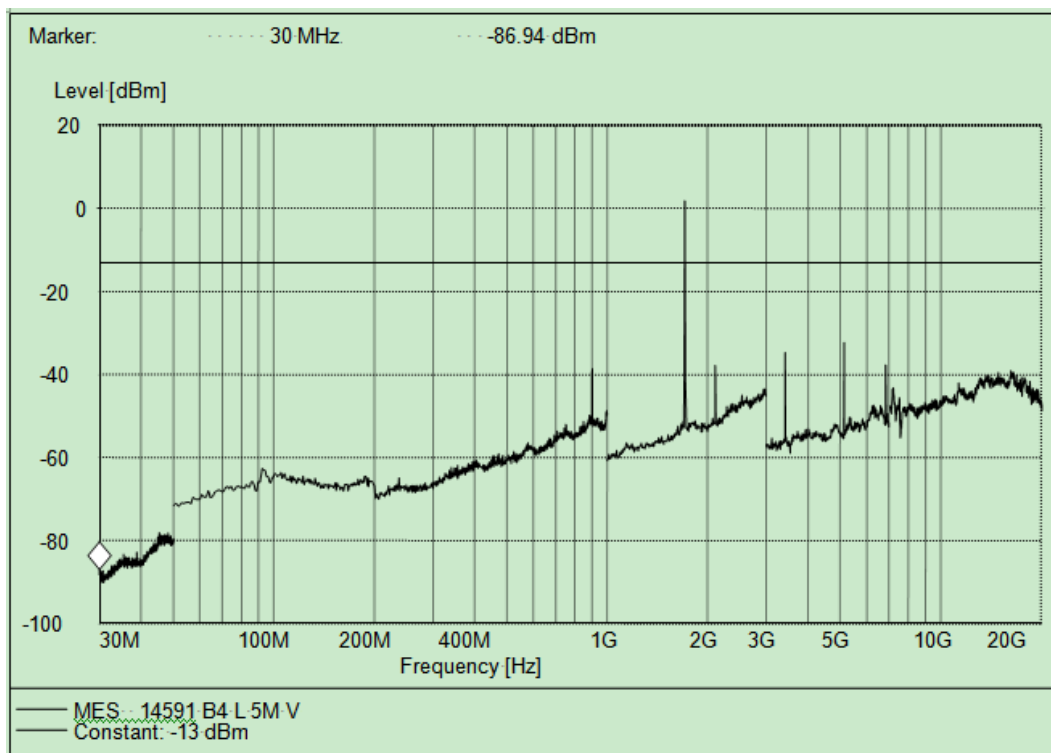
· LTE Band 4 QPSK 3MHz BW Test Antenna Horizontal



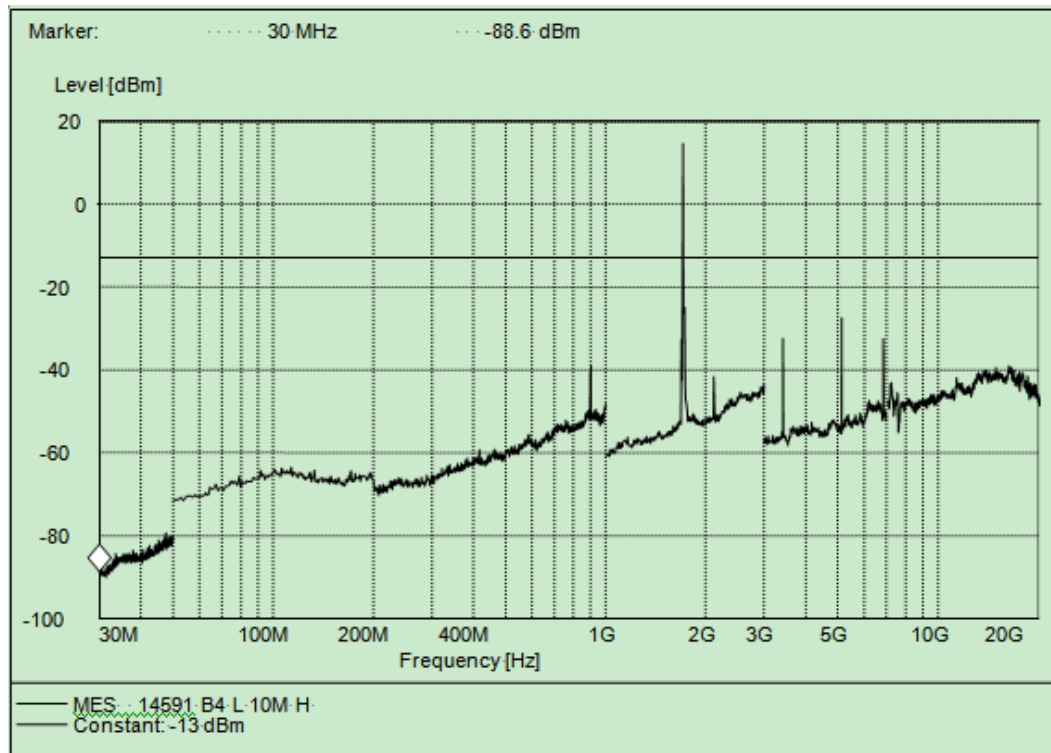
LTE Band 4 QPSK 3MHz BW Test Antenna Vertical



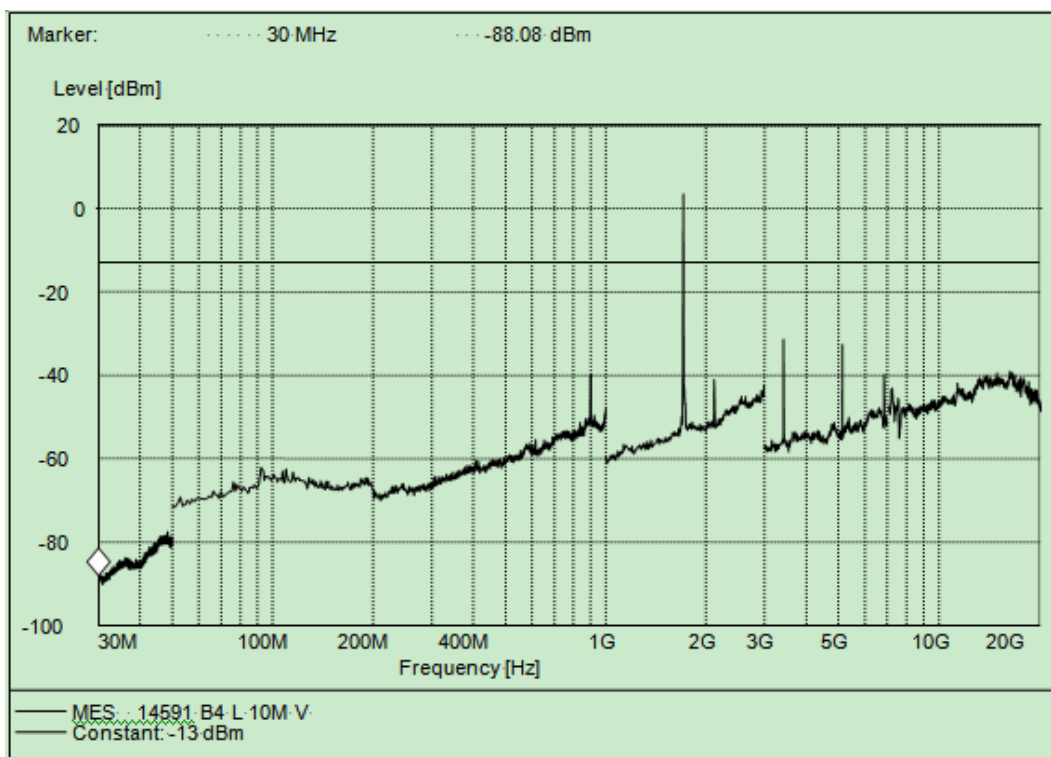
· LTE Band 4 QPSK 5MHz BW Test Antenna Horizontal



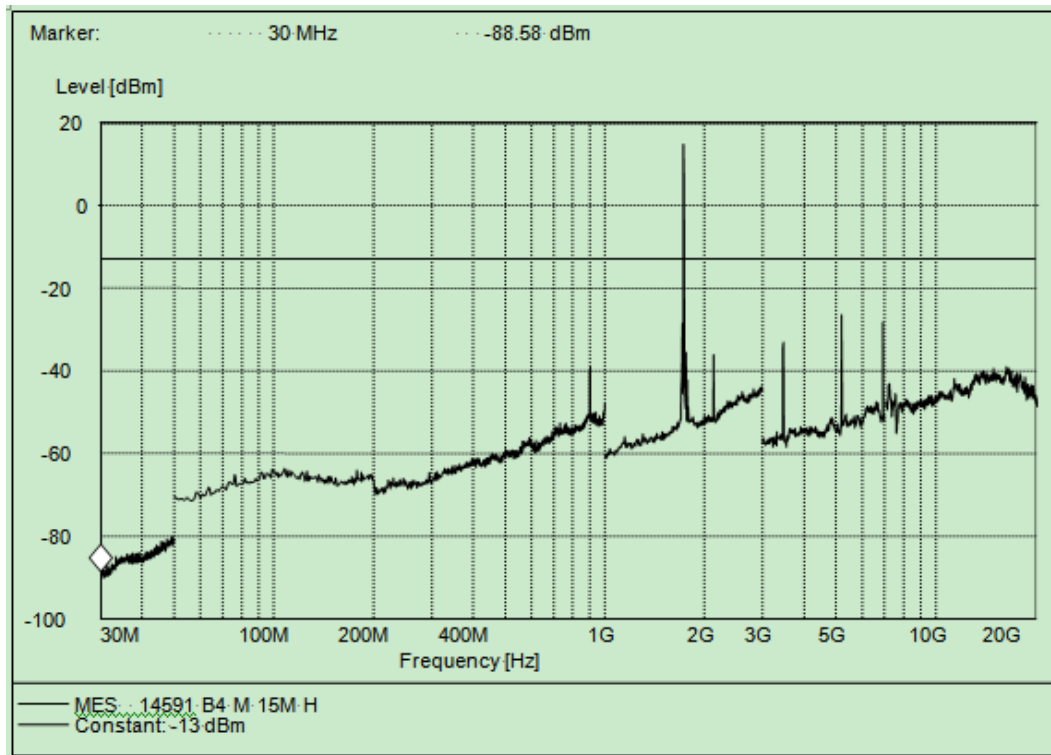
LTE Band 4 QPSK 5MHz BW Test Antenna Vertical



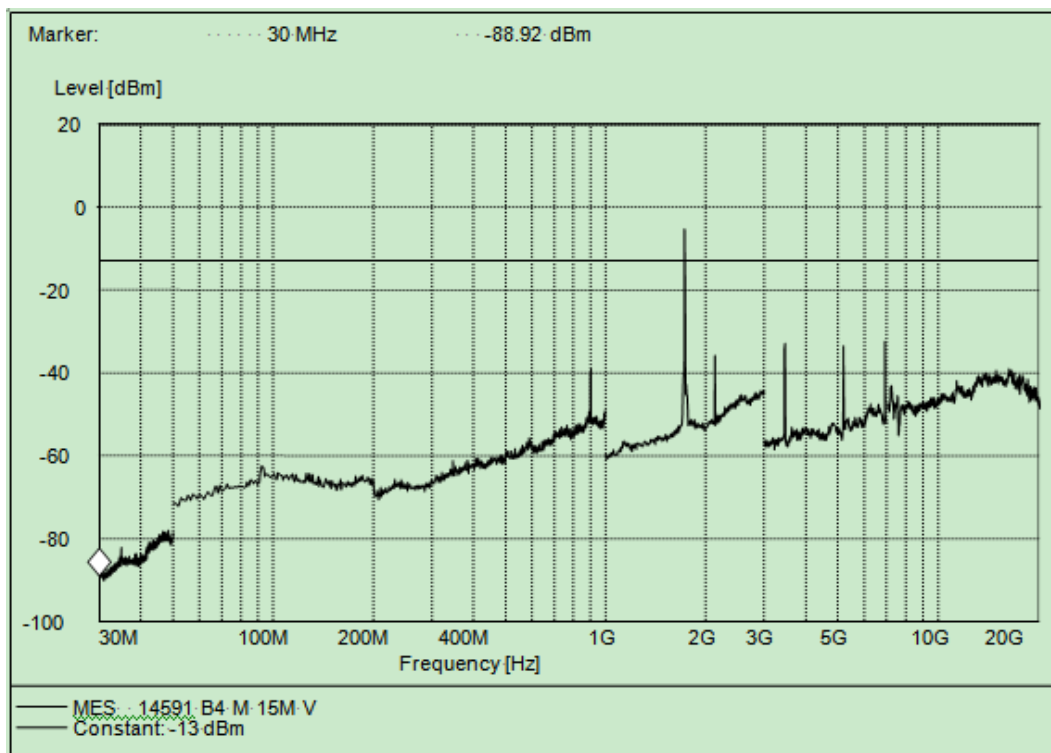
LTE Band 4 QPSK 10MHz BW Test Antenna Horizontal



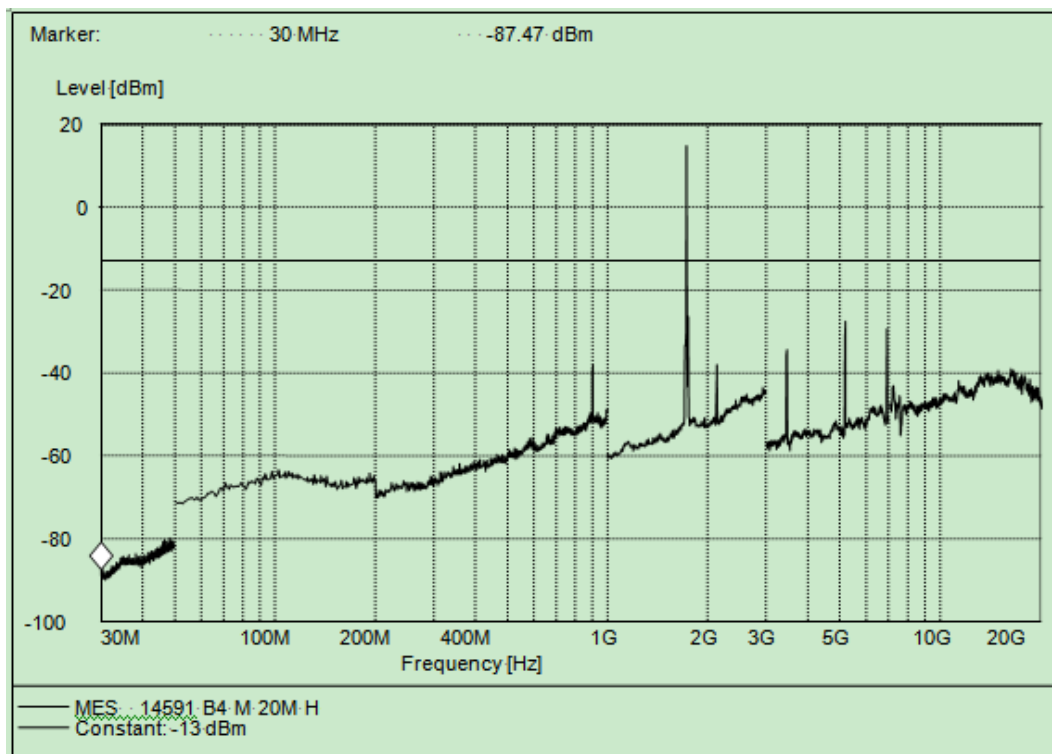
LTE Band 4 QPSK 10MHz BW Test Antenna Vertical



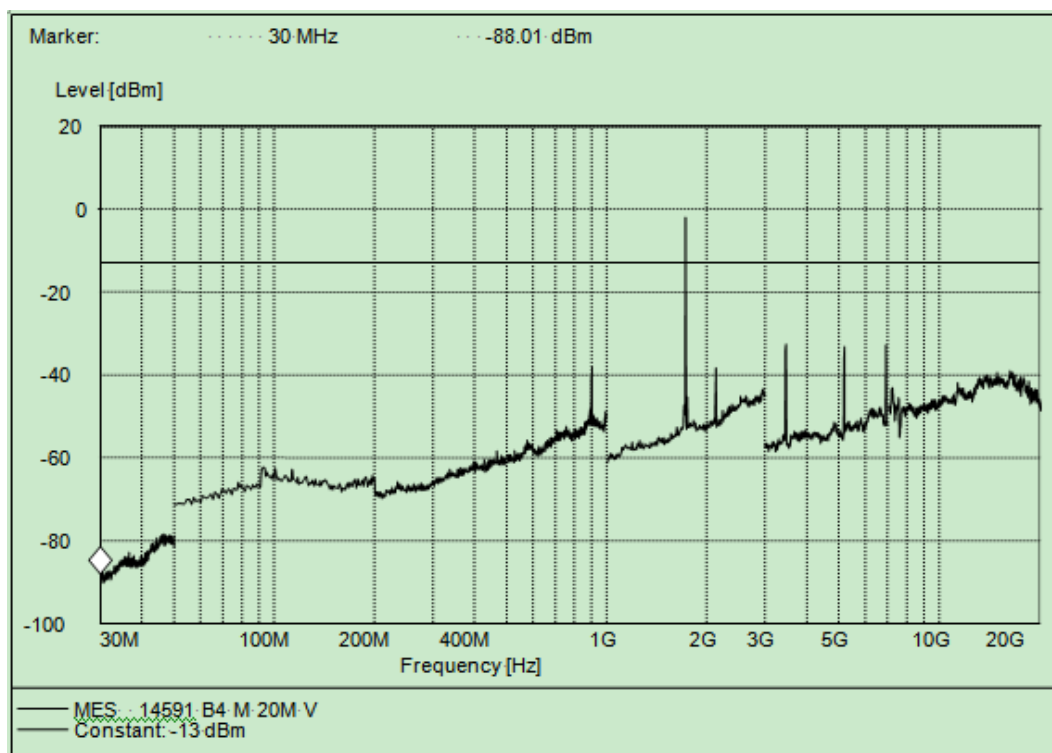
LTE Band 4 QPSK 15MHz BW Test Antenna Horizontal



LTE Band 4 QPSK 15MHz BW Test Antenna Vertical



LTE Band 4 QPSK 20MHz BW Test Antenna Horizontal



LTE Band 4 QPSK 20MHz BW Test Antenna Vertical



### 3. LIST OF MEASURING EQUIPMENT

| Description                         | Manufacturer      | Model                       | Serial No.        | Test Date  | Due Date   | Remark    |
|-------------------------------------|-------------------|-----------------------------|-------------------|------------|------------|-----------|
| EMI Test Receiver                   | R&S               | ESIB26                      | A0304218          | 2015.06.02 | 2016.06.01 | Radiation |
| Full-Anechoic Chamber               | Albatross         | 12.8m*6.8m*<br>6.4m         | A0412372          | 2015.01.05 | 2016.01.04 | Radiation |
| Loop Antenna                        | Schwarz beck      | HFH2-Z2                     | 100047            | 2015.06.02 | 2016.06.01 | Radiation |
| Bilog Antenna                       | Schwarz beck      | VULB 9163                   | 9163-274          | 2015.06.02 | 2016.06.01 | Radiation |
| Double ridge horn antenna           | R&S               | HF906                       | 100150            | 2015.06.02 | 2016.06.01 | Radiation |
| Ultra-wideband antenna              | R&S               | HL562                       | 100089            | 2015.06.02 | 2016.06.01 | Radiation |
| Test Antenna – Horn<br>(18-26.5GHz) | ETS               | 3160-09                     | A0902607          | 2015.06.02 | 2016.06.01 | Radiation |
| Amplifier<br>20M~3GHz               | R&S               | PAP-0203H                   | 22018             | 2015.06.02 | 2016.06.01 | Radiation |
| Ampilier<br>1G~18GHz                | R&S               | MITEQ<br>AFS42-00101<br>800 | 25-S-42           | 2015.06.02 | 2016.06.01 | Radiation |
| Ampilier<br>18G~40GHz               | R&S               | JS42-180026<br>00-28-5A     | 12111.0980.0<br>0 | 2015.06.02 | 2016.06.01 | Radiation |
| Spectrum Analyzer                   | R&S               | FSP40                       | 1164.4391.40      | 2015.07.07 | 2016.07.06 | Conducted |
| Power Meter                         | R&S               | NRVS                        | 1020.1809.02      | 2015.06.02 | 2016.06.01 | Conducted |
| Power Sensor                        | R&S               | NRV-Z4                      | 823.3618.03       | 2015.06.02 | 2016.06.01 | Conducted |
| LISN                                | ROHDE&SCH<br>WARZ | ESH2-Z5                     | A0304221          | 2015.06.02 | 2016.06.01 | Conducted |
| Test Receiver                       | R&S               | ESCS30                      | A0304260          | 2015.06.02 | 2016.06.01 | Conducted |
| Cable                               | SUNHNER           | SUCOFLEX<br>100             | /                 | 2015.06.02 | 2016.06.01 | Radiation |
| Cable                               | SUNHNER           | SUCOFLEX<br>104             | /                 | 2015.06.02 | 2016.06.01 | Radiation |

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