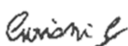


|                      |               |
|----------------------|---------------|
| Report Reference ID: | 278619-5TRFWL |
|----------------------|---------------|

|                     |                                                                                                                                                                                            |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test specification: | <b>Title 47 – Telecommunication</b><br>Chapter I – Federal Communications Commission<br>Subchapter B – Common carrier services<br>Part 27 – Miscellaneous wireless communications services |
|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|            |                                                                                      |
|------------|--------------------------------------------------------------------------------------|
| Applicant: | TEK0 Telecom Srl.<br>Via Meucci, 24/a<br>I-40024 Castel S. Pietro Terme (BO) (Italy) |
| Apparatus: | Very High Power Amplifier                                                            |
| Model:     | MVHPA0001AWS                                                                         |
| FCC ID:    | XM2-VHPA                                                                             |

|                     |                                                                                                                                           |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Testing laboratory: | <b>Nemko Italy Spa</b><br>Via del Carroccio, 4<br>20853 Biassono (MB) – Italy<br>Telephone: +39 039 2201201<br>Facsimile: +39 039 2201221 |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------|

|              | Name and title                                                                                                                    | Date       |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------|------------|
| Tested by:   | <br><hr/> G. Curioni, Wireless/EMC Specialist  | 2015-03-13 |
| Reviewed by: | <br><hr/> P. Barbieri, Wireless/EMC Specialist | 2015-03-13 |

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## Table of contents

|                                                                             |           |
|-----------------------------------------------------------------------------|-----------|
| <b>Section 1: Report summary .....</b>                                      | <b>4</b>  |
| 1.1 Test specification .....                                                | 4         |
| 1.2 Statement of compliance .....                                           | 4         |
| 1.3 Exclusions .....                                                        | 4         |
| 1.4 Registration number .....                                               | 4         |
| 1.5 Test report revision history .....                                      | 4         |
| 1.6 Limits of responsibility .....                                          | 4         |
| <b>Section 2: Summary of test results .....</b>                             | <b>5</b>  |
| 2.1 FCC Part 27, test results .....                                         | 5         |
| <b>Section 3: Equipment under test (EUT) and application details .....</b>  | <b>6</b>  |
| 3.1 Applicant details .....                                                 | 6         |
| 3.2 Modular equipment .....                                                 | 6         |
| 3.3 Product details .....                                                   | 6         |
| 3.4 Application purpose .....                                               | 6         |
| 3.5 Composite/related equipment .....                                       | 7         |
| 3.6 Sample information .....                                                | 7         |
| 3.7 EUT technical specifications .....                                      | 7         |
| 3.8 Accessories and support equipment .....                                 | 8         |
| 3.9 Operation of the EUT during testing .....                               | 9         |
| 3.10 EUT setup diagram .....                                                | 9         |
| <b>Section 4: Engineering considerations .....</b>                          | <b>10</b> |
| 4.1 Modifications incorporated in the EUT .....                             | 10        |
| 4.2 Deviations from laboratory tests procedures .....                       | 10        |
| 4.3 Technical judgment .....                                                | 10        |
| <b>Section 5: Test conditions .....</b>                                     | <b>11</b> |
| 5.1 Deviations from laboratory tests procedures .....                       | 11        |
| 5.2 Test conditions, power source and ambient temperatures .....            | 11        |
| 5.3 Measurement uncertainty .....                                           | 12        |
| 5.4 Test equipment .....                                                    | 12        |
| <b>Appendix A: Test results .....</b>                                       | <b>13</b> |
| Clause 27.50(d) Peak output power at RF antenna connector .....             | 13        |
| Clause 27.53(h) Spurious emissions at RF antenna connector, continued ..... | 19        |
| Clause 27.53(h) Radiated spurious emissions .....                           | 35        |
| Clause 2.1049 Occupied bandwidth .....                                      | 37        |
| Clause 935210 D02v02r01 (D.3)(I) Out of band rejection .....                | 45        |

|                                                  |    |
|--------------------------------------------------|----|
| Appendix B: Block diagrams of test set-ups ..... | 46 |
| Appendix C: EUT Photos.....                      | 47 |

## Section 1: Report summary

### 1.1 Test specification

|                       |                                                                 |
|-----------------------|-----------------------------------------------------------------|
| <b>Specifications</b> | <b>Part 27 – Miscellaneous wireless communications services</b> |
|-----------------------|-----------------------------------------------------------------|

### 1.2 Statement of compliance

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Compliance</b> | <p>In the configuration tested the EUT was found compliant</p> <p>Yes <input checked="" type="checkbox"/> No <input type="checkbox"/></p> <p>This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc. These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 27. Radiated tests were conducted in accordance with ANSI C63.4-2003.</p> |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 1.3 Exclusions

|                   |      |
|-------------------|------|
| <b>Exclusions</b> | None |
|-------------------|------|

### 1.4 Registration number

|                                |                                    |
|--------------------------------|------------------------------------|
| <b>Test site FCC ID number</b> | 176392 (3 m Semi anechoic chamber) |
|--------------------------------|------------------------------------|

### 1.5 Test report revision history

| Revision # | Details of changes made to test report |
|------------|----------------------------------------|
| TRF        | Original report issued                 |
| R1TRF      | ----                                   |

### 1.6 Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

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## Section 2: Summary of test results

### 2.1 FCC Part 27, test results

| Part                           | Test description                                      | Verdict |
|--------------------------------|-------------------------------------------------------|---------|
| §27.50(d)                      | Peak output power at RF antenna connector             | Pass    |
| §27.53(h)                      | Spurious emissions at RF antenna connector, continued | Pass    |
| §27.53(h)                      | Radiated spurious emissions                           | Pass    |
| §27.54                         | Frequency stability                                   | N/A a)  |
| §2.1049                        | Occupied bandwidth                                    | Pass    |
| § 935210<br>D02v02r01 (D.3)(I) | Out of band rejection                                 | Pass    |

Notes:

- a) NOT APPLICABLE: Modulation/frequency conversion circuitry not in use. No frequency change in EUT (input and output have same frequency)

## Section 3: Equipment under test (EUT) and application details

### 3.1 Applicant details

|                                         |                                    |                        |
|-----------------------------------------|------------------------------------|------------------------|
| <b>Applicant complete business name</b> | Name:                              | Teko Telecom Srl       |
|                                         | Federal Registration Number (FRN): | 0018963462             |
|                                         | Grantee code                       | XM2                    |
| <b>Mailing address</b>                  | Address:                           | Via Meucci, 24/a       |
|                                         | City:                              | Castel S. Pietro Terme |
|                                         | Province/State:                    | Bologna                |
|                                         | Post code:                         | 40024                  |
|                                         | Country:                           | Italy                  |

### 3.2 Modular equipment

|                                           |                                                                                                        |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------|
| <b>a) Single modular approval</b>         | Single modular approval<br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>         |
| <b>b) Limited single modular approval</b> | Limited single modular approval<br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> |

### 3.3 Product details

|                                                 |                           |              |
|-------------------------------------------------|---------------------------|--------------|
| <b>FCC ID</b>                                   | Grantee code:             | XM2          |
|                                                 | Product code:             | -VHPA        |
| <b>Equipment class</b>                          | B2I                       |              |
| <b>Description of product as it is marketed</b> | Very High Power Amplifier |              |
|                                                 | Model name/number:        | MVHPA0001AWS |
|                                                 | Serial number:            | na           |

### 3.4 Application purpose

|                            |                                                                                                                  |
|----------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Type of application</b> | <input type="checkbox"/> Original certification                                                                  |
|                            | <input type="checkbox"/> Change in identification of presently authorized equipment                              |
|                            | Original FCC ID: Grant date:                                                                                     |
|                            | <input checked="" type="checkbox"/> Class II permissive change or modification of presently authorized equipment |

## Section 3: Equipment under test

### 3.5 Composite/related equipment

|                               |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>a) Composite equipment</b> | The EUT is a composite device subject to an additional equipment authorization<br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                      |
| <b>b) Related equipment</b>   | The EUT is part of a system that operates with, or is marketed with, another device that requires an equipment authorization<br>Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>                                                                                                                                                                                                                        |
| <b>c) Related FCC ID</b>      | If either of the above is "yes":<br><input type="checkbox"/> has been granted under the FCC ID(s) listed below:<br><input type="checkbox"/> is in the process of being filled under the FCC ID(s) listed below:<br><input type="checkbox"/> is pending with the FCC ID(s) listed below:<br><input type="checkbox"/> has a mix of pending and granted statuses under the FCC ID(s) listed below:<br>i FCC ID:<br>ii FCC ID: |

### 3.6 Sample information

|                                |            |
|--------------------------------|------------|
| <b>Receipt date:</b>           | 2015-03-09 |
| <b>Nemko sample ID number:</b> | -----      |

### 3.7 EUT technical specifications

|                             |                                                                                                           |
|-----------------------------|-----------------------------------------------------------------------------------------------------------|
| <b>Operating band:</b>      | Down Link: 2110–2180 MHz, Up Link: 1710-1780 MHz                                                          |
| <b>Operating frequency:</b> | Wideband                                                                                                  |
| <b>Modulation type:</b>     | CDMA, WCDMA, LTE (QAM and QPSK)                                                                           |
| <b>Occupied bandwidth:</b>  | CDMA: 1,25 MHz,<br>WCDMA: 5 MHz<br>LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz                     |
| <b>Channel spacing:</b>     | standard                                                                                                  |
| <b>Emission designator:</b> | CDMA, WCDMA: F9W,<br>LTE: D7W                                                                             |
| <b>RF Output</b>            | Down Link: 43dBm (20W)<br>Up Link: N.A. (The EUT does not transmit over the air in the up-link direction) |
| <b>Gain</b>                 | Down Link: 48dB<br>Up Link: N.A. (The EUT does not transmit over the air in the up-link direction)        |
| <b>Antenna type:</b>        | External Antenna is not provided, equipment that has an external 50 $\Omega$ RF connector                 |
| <b>Power source:</b>        | 28-30 Vdc                                                                                                 |

## Section 3: Equipment under test

### 3.8 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

#### Item # 1

|                        |                     |
|------------------------|---------------------|
| Type of equipment:     | Power supply        |
| Brand name:            | Teko Telecom        |
| Model name or number:  | MPSURU28AC1K0001    |
| Serial number:         | na                  |
| Nemko sample number:   | na                  |
| Description:           | To supply amplifier |
| Cable length and type: | -----               |

#### Item # 2

|                        |                                   |
|------------------------|-----------------------------------|
| Type of equipment:     | Power supply                      |
| Brand name:            | DF                                |
| Model name or number:  | DF1731SB                          |
| Serial number:         | na                                |
| Nemko sample number:   | na                                |
| Description:           | To supply cooling fan of heatsink |
| Cable length and type: | -----                             |

#### Item # 3

|                        |  |
|------------------------|--|
| Type of equipment:     |  |
| Brand name:            |  |
| Model name or number:  |  |
| Serial number:         |  |
| Nemko sample number:   |  |
| Connection port:       |  |
| Cable length and type: |  |

#### Item # 4

|                        |  |
|------------------------|--|
| Type of equipment:     |  |
| Brand name:            |  |
| Model name or number:  |  |
| Serial number:         |  |
| Nemko sample number:   |  |
| Connection port:       |  |
| Cable length and type: |  |

### 3.9 Operation of the EUT during testing

**Details:**

In down-link direction, normal working at max gain with max RF power output

### 3.10 EUT setup diagram

In this system, Very High Power Amplifier is the EUT and it is intended for mounting in Remote Unit and Digital Service Front-End (optical system with Master Unit that includes only management module and optical module, to convert RF signal in optical signal in down link direction and viceversa optical signal in RF signal in up link direction). As described in “Operational description”, master unit is connected directly to base station, so the system doesn’t use another equipment (under another FCC ID) to exercise the EUT. Signal generator is linked directly to the RF input connector.

**Test setup for output power, occupied bandwidth, spurious emissions:**

**Procedure**

Connect the signal modulated generator to the input of the EUT, so that the EUT works at the max gain. Raise the input level to the EUT until reach the maximum output power. Connect the spectrum analyzer to the RF output connector of the EUT.

## Section 4: Engineering considerations

### 4.1 Modifications incorporated in the EUT

**Modifications**

Modifications performed to the EUT during this assessment  
None ☒ Yes ☐, performed by Client ☐ or Nemko ☐  
Details:

### 4.2 Deviations from laboratory tests procedures

**Deviations**

Deviations from laboratory test procedures  
None ☒ Yes ☐ - details are listed below:

### 4.3 Technical judgment

**Judgment**

None

## Section 5: Test conditions

### 5.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

### 5.2 Test conditions, power source and ambient temperatures

|                                                               |                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Normal temperature, humidity and air pressure test conditions | Temperature: 15–30 °C<br>Relative humidity: 20–75 %<br>Air pressure: 86–106 kPa<br><br>When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated. |
| Power supply range:                                           | The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5$ %, for which the equipment was designed.   |

## Section 5: Test conditions, continued

### 5.3 Measurement uncertainty

Nemko S.p.A. measurement uncertainty has been calculated using the standard CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements". All calculations can be found in Nemko S.p.A. document WML1002.

### 5.4 Test equipment

| Equipment                             | Manufacturer | Model No.                 | Asset/Serial No. | Next cal. |
|---------------------------------------|--------------|---------------------------|------------------|-----------|
| Vector Signal Generator               | Agilent      | N5172B EXG                | MY53050534       | Feb 2017  |
| Vector Signal Generator               | Agilent      | E4438C ESG                | MY45094485       | Ago 2016  |
| Spectrum Analyzer                     | Agilent      | N9030A PXA                | MY53120882       | Apr 2015  |
| Network Analyzer                      | Agilent      | E5071B ENA                | MY46418709       | Jan 2016  |
| EMI Receiver                          | R & S        | ESCI                      | 100888           | 08/2015   |
| V-network                             | R & S        | ESH2-Z5                   | 872 460/041      | 09/2015   |
| Trilog Broad Band Antenna 25-2000 MHz | Schwarzbeck  | VULB 9168                 | VULB 9168-242    | 02/2015   |
| Trilog Broad Band Antenna 25-8000 MHz | Schwarzbeck  | VULB 9162                 | VULB 9162-25     | 05/2015   |
| Antenna 1-18 GHz                      | Schwarzbeck  | STLP 9148                 | STPL 9148-123    | 02/2015   |
| Double ridge waveguide horn           | RFspin       | DRH40                     | 061106A40        | 08/2016   |
| Preamplifier 18-40 GHz                | Miteq        | JS44                      | 1648665          | 11/2015   |
| Broadband preamplifier 1-18 GHz       | Schwarzbeck  | BBV 9718                  | 9718-137         | 10/2015   |
| EMI receiver 20 Hz ÷ 8 GHz            | R&S          | ESU8                      | 100202           | 02/2015   |
| EMI receiver 20 Hz ÷ 3 GHz            | R&S          | ESCI                      | 100888           | 08/2015   |
| Hydraulic revolving platform          | Nemko        | RTPL 01                   | 4.233            | NCR       |
| Turning-table                         | R&S          | HCT                       | 835 803/03       | NCR       |
| Antenna mast                          | R&S          | HCM                       | 836 529/05       | NCR       |
| Controller                            | R&S          | HCC                       | 836 620/7        | NCR       |
| Spectrum Analyzer 9kHz ÷ 40GHz        | R&S          | FSEK                      | 848255/005       | 08/2015   |
| Semi-anechoic chamber                 | Nemko        | 10m semi-anechoic chamber | 530              | 09/2016   |
| Shielded room                         | Siemens      | 10m control room          | 1947             | NCR       |
| Semi-anechoic chamber                 | Nemko        | 10m semi-anechoic chamber | 70               | NCR       |
| Shielded Room                         | Siemens      | 3m semi-anechoic chamber  | 3                | NCR       |
| Motor controller                      | Emco         | 1051-25                   | 9012-1559        | NCR       |
| Motor controller                      | Emco         | 1061-1.521                | 9012-1508        | NCR       |
| Antenna Tower                         | Emco         | 2071-2                    | 9601-1940        | NCR       |
| Controller pole/table                 | Emco         | 2090                      | 9511-1099        | NCR       |
| V-Network                             | R & S        | ESH2-Z5                   | 872 460/041      | 09/2015   |
|                                       |              |                           |                  |           |

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use  
(\*) Equipment supplied by manufacturer's

## Appendix A: Test results

### Clause 27.50(d) Peak output power at RF antenna connector

**§ 27.50(d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands:**

- (2) The power of each fixed or base station transmitting in the 1995-2000 MHz, the 2110-2155 MHz 2155-2180 MHz band, or 2180-2200 MHz band and situated in any geographic location other than that described in paragraph (d)(1) of this section is limited to:
  - (i) An equivalent isotropically radiated power (EIRP) of 1640 watts when transmitting with an emission bandwidth of 1 MHz or less;
  - (ii) An EIRP of 1640 watts/MHz when transmitting with an emission bandwidth greater than 1 MHz.
- (5) Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test date: [2015-03-11](#)

Test results: [Pass](#)

### Special notes

The power was measured using spectrum analyzer with RMS detector / average power meter.

- In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13dB

### Clause 27.50(d) Peak output power at RF antenna connector

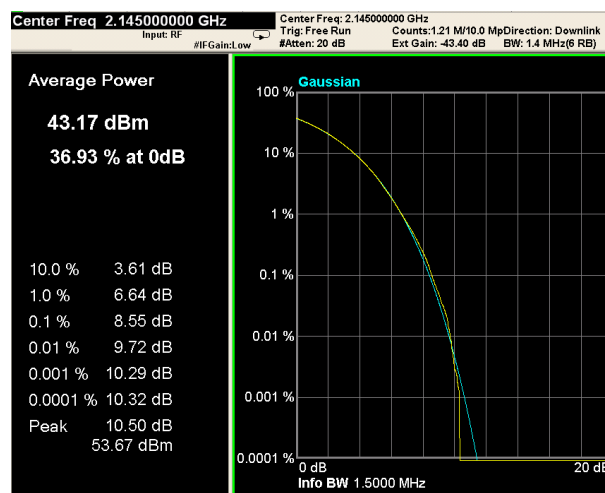
#### Test data

#### Conducted measurements

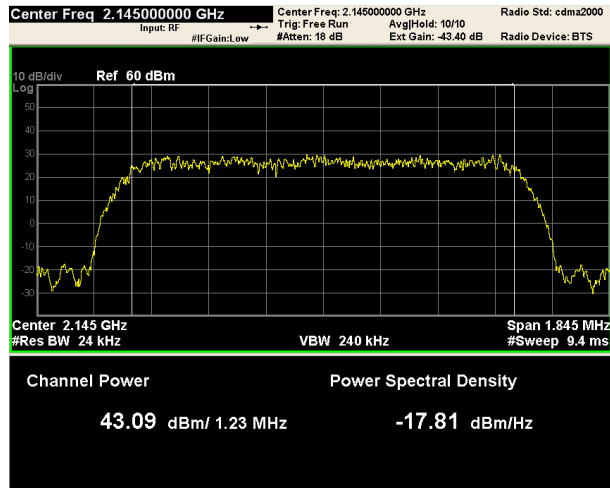
| Test data |                    |                 |                       |                             |                         |          |
|-----------|--------------------|-----------------|-----------------------|-----------------------------|-------------------------|----------|
| Direction | Modulation         | Frequency (MHz) | RF output Power (dBm) | RF output channel Power (W) | RF output Power (W/MHz) | PAR (dB) |
| Down-link | CDMA (1,25MHz)     | 2145.0          | 43.09                 | 20.37                       | 16.30                   | 6.91     |
| Down-link | WCDMA (5MHz)       | 2145.0          | 43.15                 | 20.65                       | 4.13                    | 11.06    |
| Down-link | LTE (QAM, 1,4MHz)  | 2145.0          | 43.17                 | 20.75                       | 14.82                   | 10.50    |
| Down-link | LTE (QPSK, 1,4MHz) | 2145.0          | 43.16                 | 20.70                       | 14.79                   | 9.77     |
| Down-link | LTE (QAM, 3MHz)    | 2145.0          | 43.12                 | 20.51                       | 6.84                    | 10.63    |
| Down-link | LTE (QPSK, 3MHz)   | 2145.0          | 43.12                 | 20.51                       | 6.84                    | 10.76    |
| Down-link | LTE (QAM, 5MHz)    | 2145.0          | 43.14                 | 20.60                       | 4.12                    | 10.92    |
| Down-link | LTE (QPSK, 5MHz)   | 2145.0          | 43.16                 | 20.70                       | 4.14                    | 10.53    |
| Down-link | LTE (QAM, 10MHz)   | 2145.0          | 43.21                 | 20.94                       | 2.09                    | 11.68    |
| Down-link | LTE (QPSK, 10MHz)  | 2145.0          | 43.19                 | 20.84                       | 2.08                    | 11.34    |
| Down-link | LTE (QAM, 15MHz)   | 2145.0          | 43.20                 | 20.89                       | 1.39                    | 10.86    |
| Down-link | LTE (QPSK, 15MHz)  | 2145.0          | 43.13                 | 20.56                       | 1.37                    | 11.27    |
| Down-link | LTE (QAM, 20MHz)   | 2145.0          | 43.10                 | 20.42                       | 1.02                    | 11.63    |
| Down-link | LTE (QPSK, 20MHz)  | 2145.0          | 43.14                 | 20.60                       | 1.03                    | 10.91    |

Transmitting these powers by a  $\lambda/2$  dipole tuned on the carriers' frequency we get: erp.

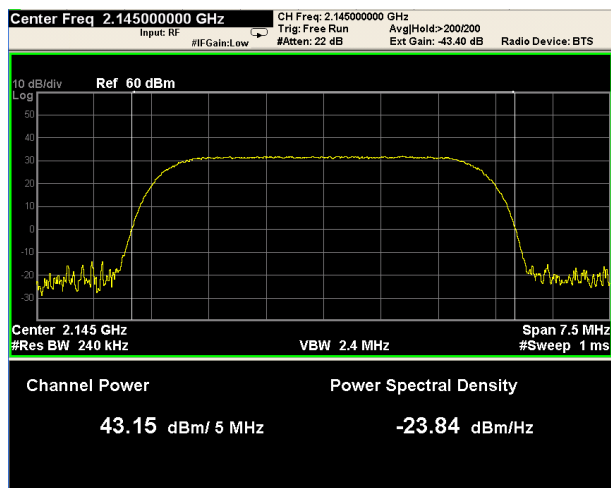
PAR measure is performed by the "CCDF" function installed on Spectrum analyzer that provides average power (the same measured with "Channel power" function), peak power and PAR. Below an example:



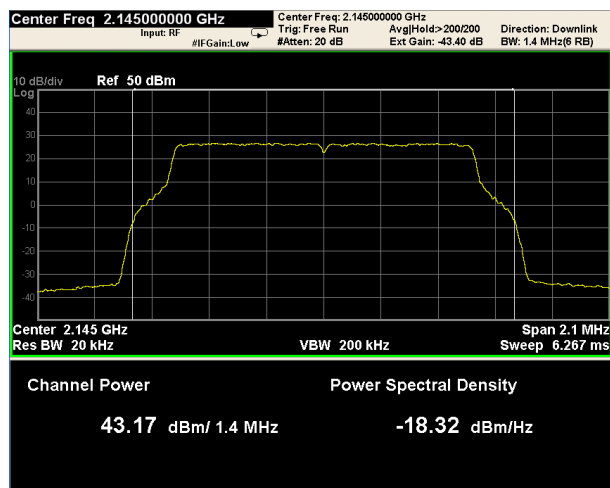
## Mod. CDMA



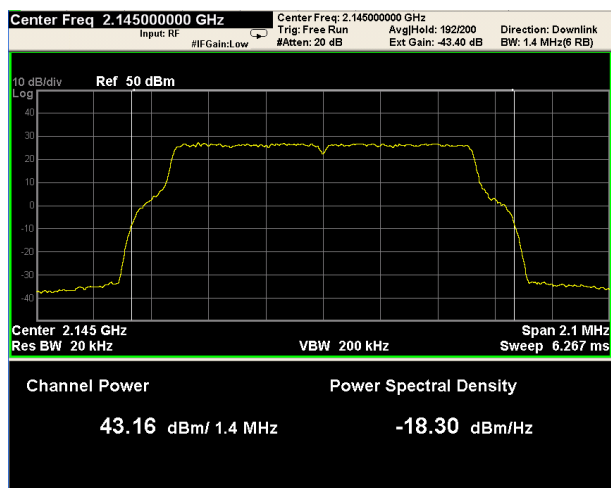
## Mod. WCDMA



## Mod. LTE 1,4MHz (Down-link)

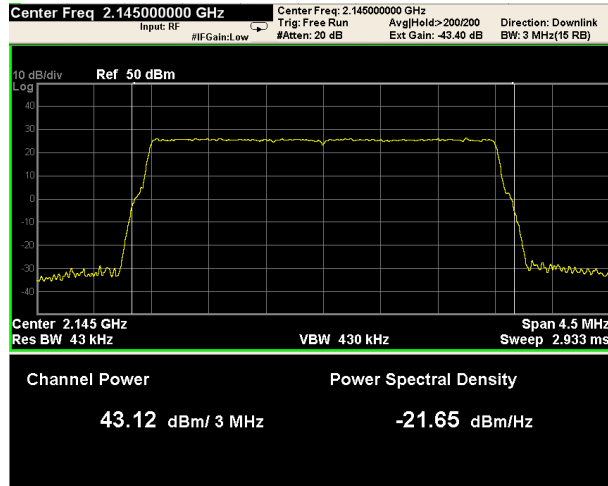


QAM

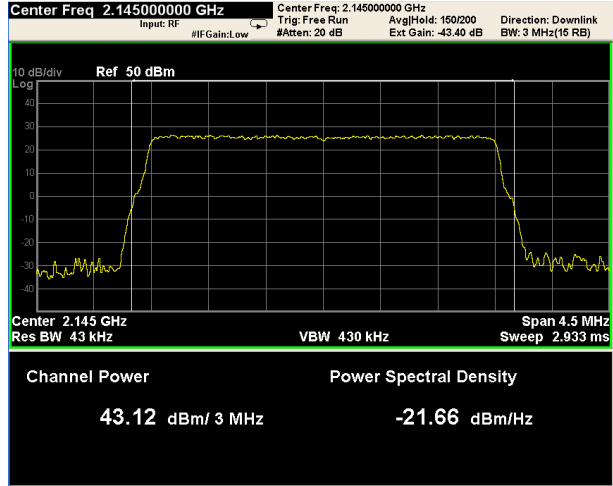


QPSK

### Mod. LTE 3MHz (Down-link)

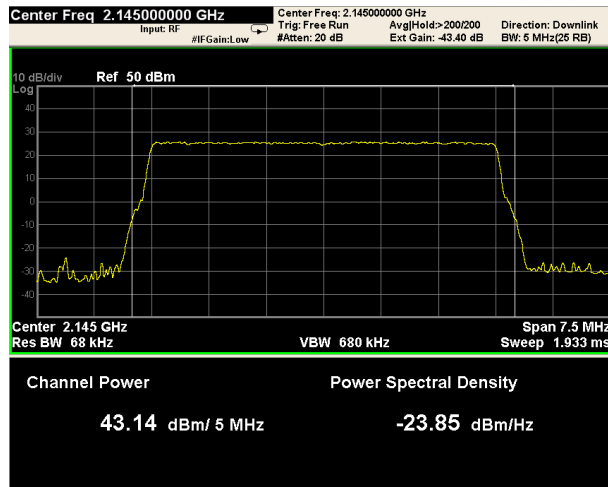


QAM

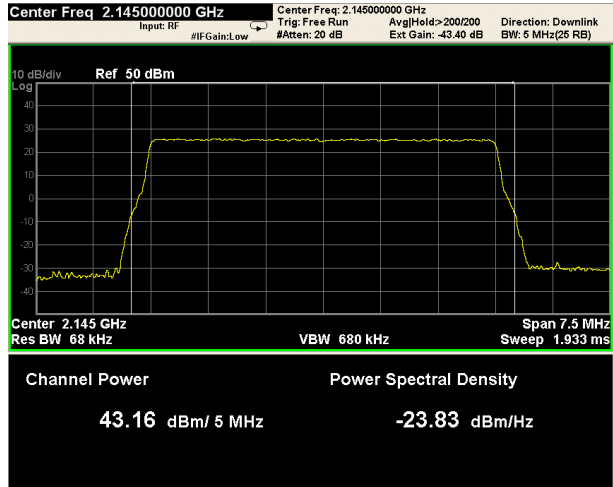


QPSK

### Mod. LTE 5MHz (Down-link)

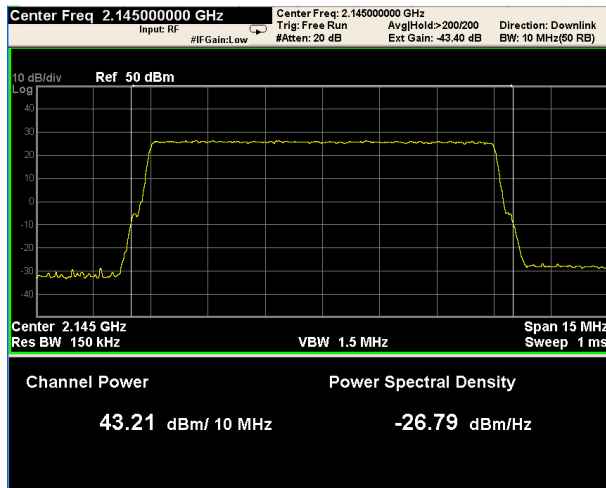


QAM

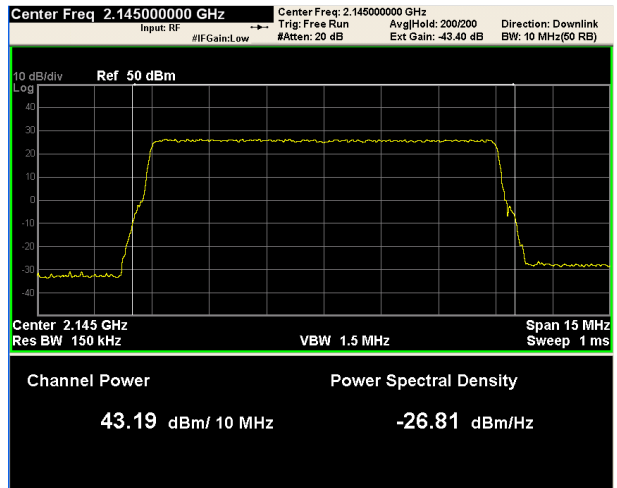


QPSK

## Mod. LTE 10MHz (Down-link)

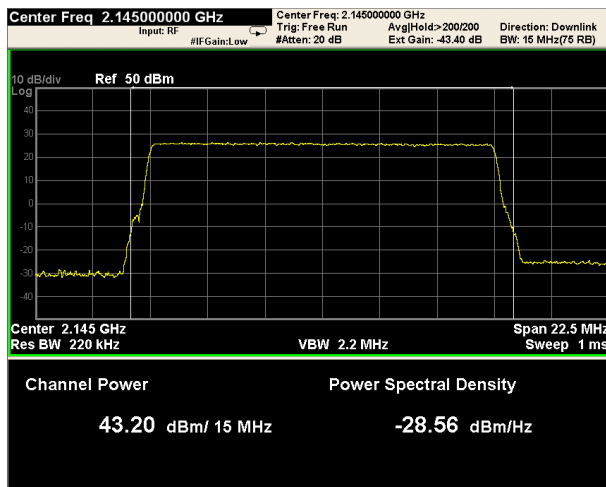


QAM

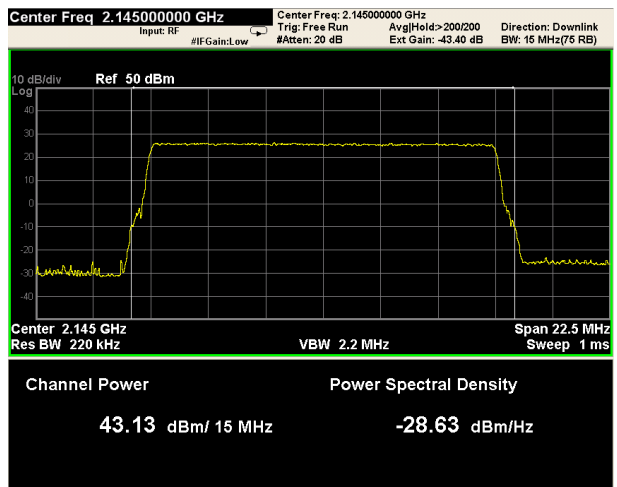


QPSK

## Mod. LTE 15MHz (Down-link)

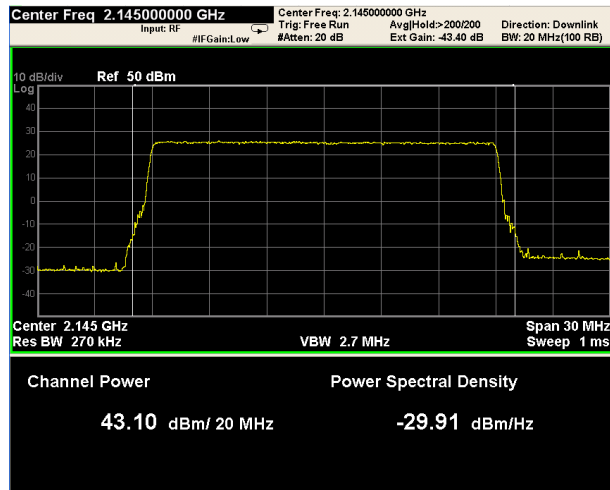


QAM

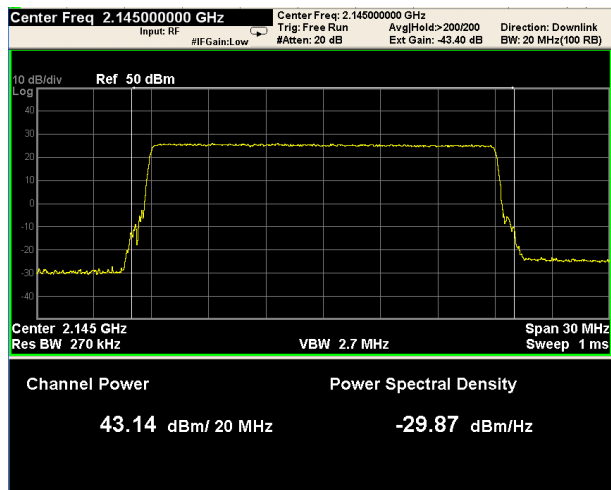


QPSK

## Mod. LTE 20MHz (Down-link)



QAM



QPSK

## Clause 27.53(h) Spurious emissions at RF antenna connector, continued

(h) AWS emission limits:

- (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least  $43 + 10 \log_{10} (P)$  dB.
- (3) Measurement procedure.
  - (i) Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz 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. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
  - (ii) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the licensee's frequency block edges, both upper and lower, as the design permits.
  - (iii) The measurements of emission power can be expressed in peak or average values, provided they are expressed in the same parameters as the transmitter power.

Test date: 2015-03-11

Test results: Pass

### Special notes

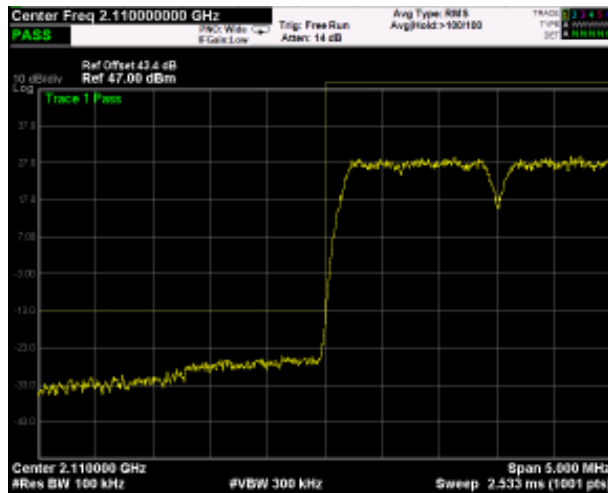
- The spectrum was searched from 30 MHz to the 10th harmonic.
- All measurements were performed using a peak detector.
- RBW within 30–1000 MHz was 100 kHz and 1 MHz above 1 GHz. VBW was wider than RBW.

## Clause 27.53 (h) Spurious emissions at RF antenna connector, continued

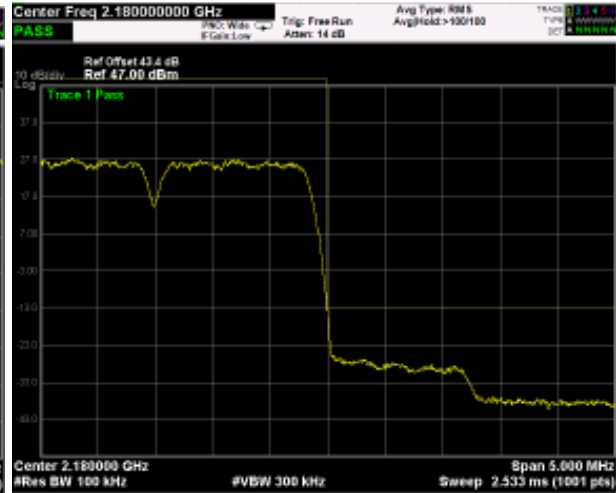
| Test data                               |                            |                |                |
|-----------------------------------------|----------------------------|----------------|----------------|
| <b>See Plots below</b>                  |                            |                |                |
| Spurious emissions measurement results: |                            |                |                |
| Frequency<br>(MHz)                      | Spurious emission<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
| Low channel                             |                            |                |                |
| First channel                           | Negligible                 | -13            |                |
|                                         |                            |                |                |
|                                         |                            |                |                |
| Mid channel                             |                            |                |                |
| 2145 MHz                                | Negligible                 | -13            |                |
|                                         |                            |                |                |
|                                         |                            |                |                |
| High channel                            |                            |                |                |
| Last channel                            | Negligible                 | -13            |                |
|                                         |                            |                |                |
|                                         |                            |                |                |

## Test data, continued: band edges Inter modulation:

## Mod. CDMA (Down-link)

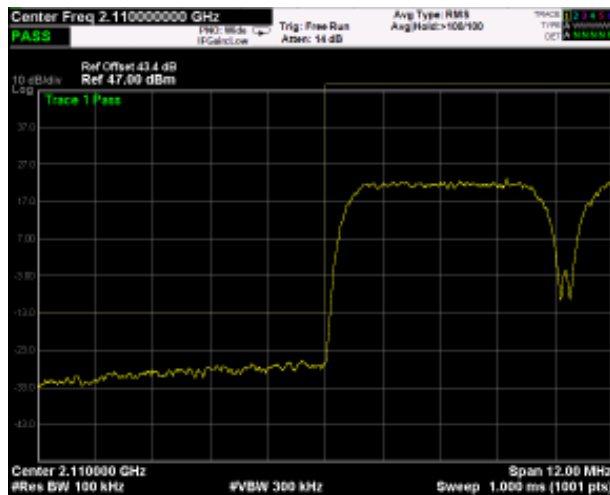


Low Band Edge

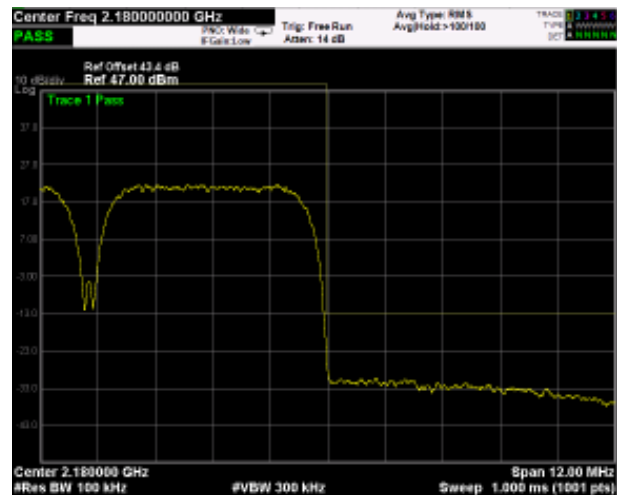


High Band Edge

## Mod. WCDMA (Down-link)

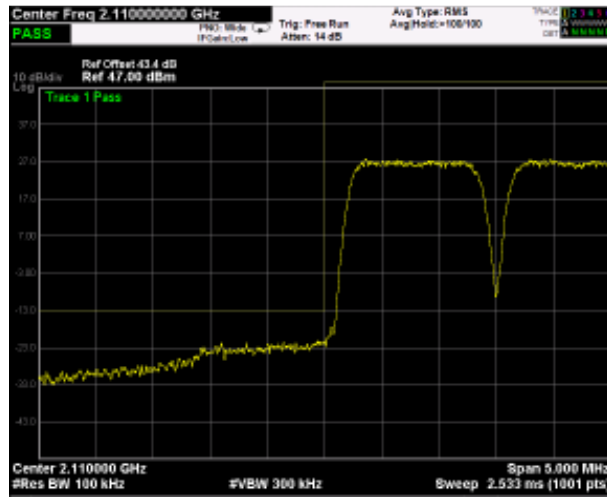


Low Band Edge

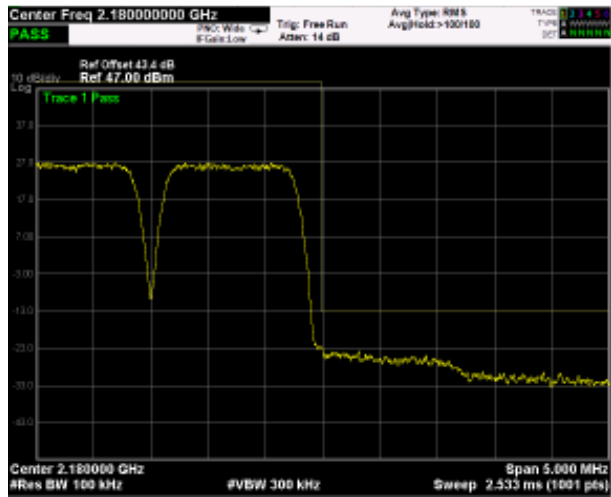


High Band Edge

### Mod. LTE 1.4MHz (QAM) (Down-link)

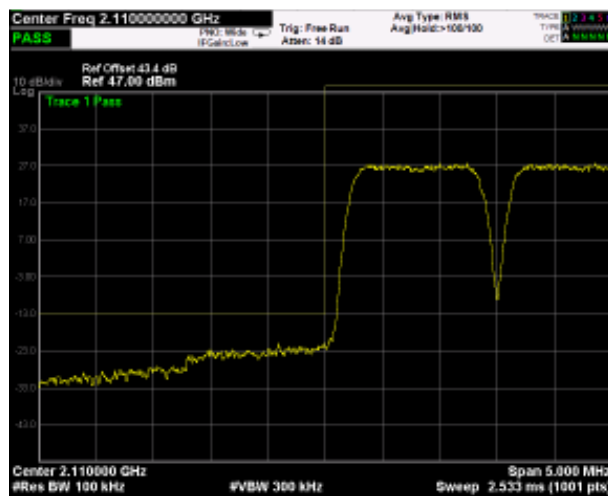


Low Band Edge

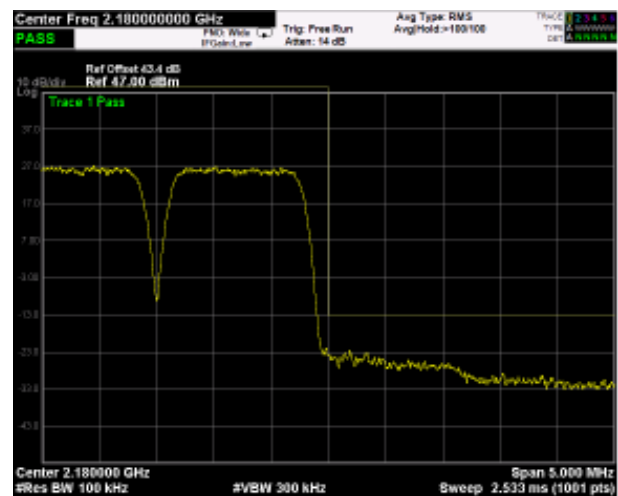


High Band Edge

### Mod. LTE 1.4MHz (QPSK) (Down-link)

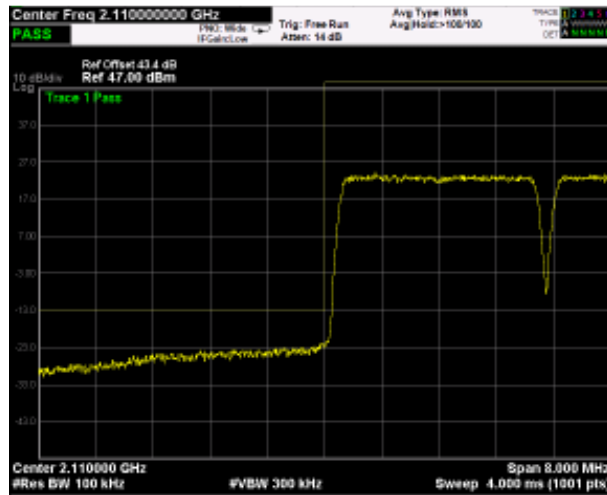


Low Band Edge

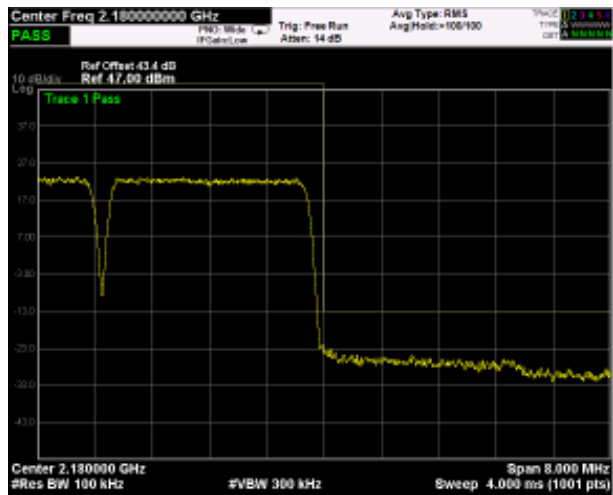


High Band Edge

### Mod. LTE 3MHz (QAM) (Down-link)

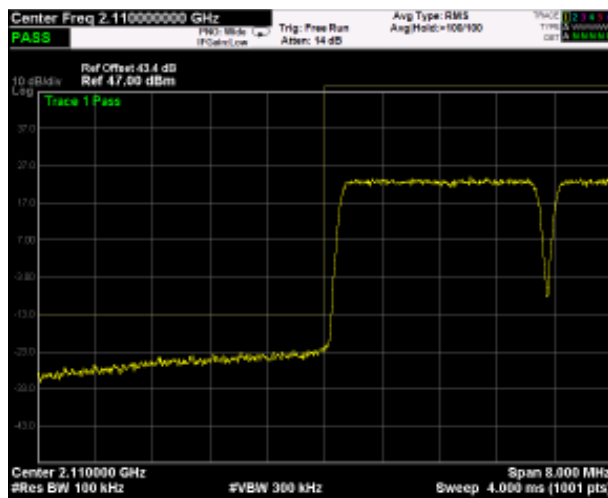


Low Band Edge

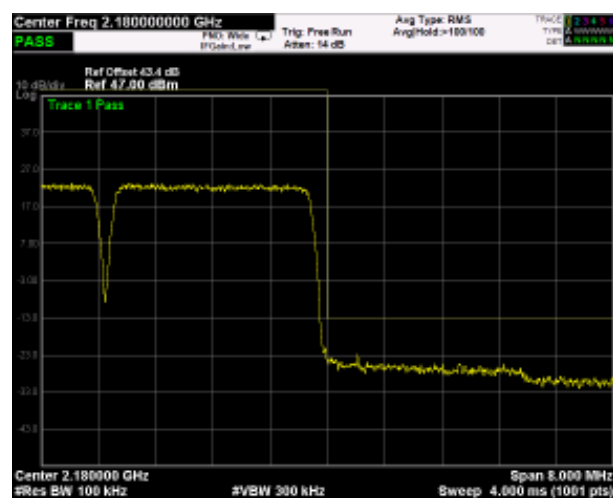


High Band Edge

### Mod. LTE 3MHz (QPSK) (Down-link)

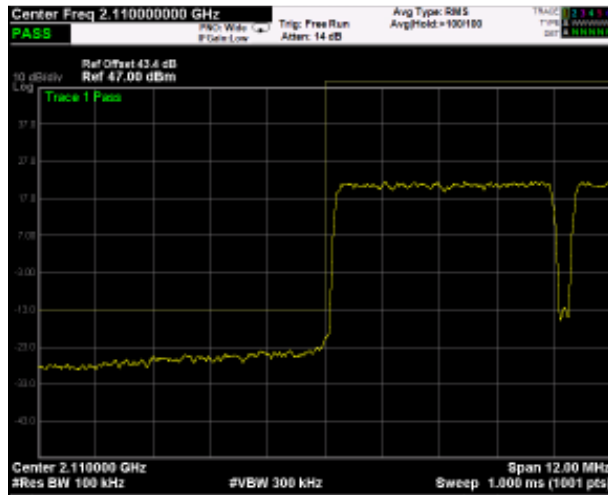


Low Band Edge

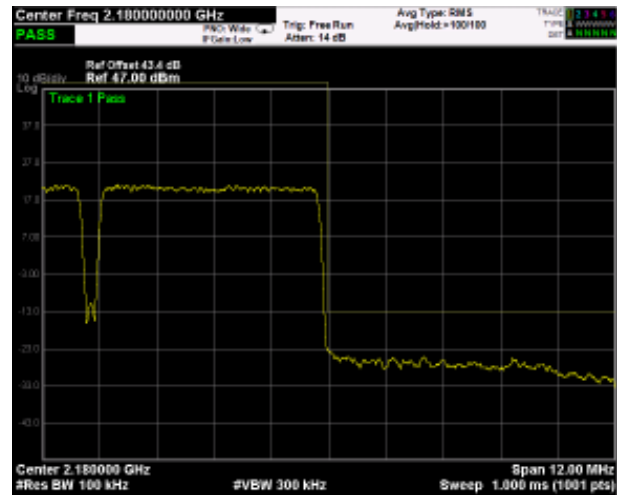


High Band Edge

### Mod. LTE 5MHz (QAM) (Down-link)

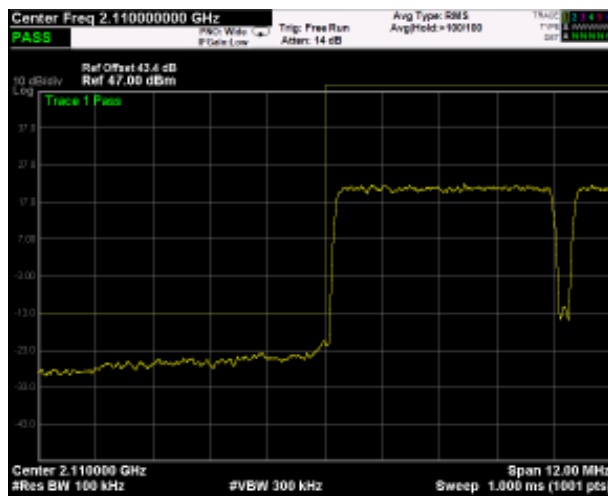


Low Band Edge

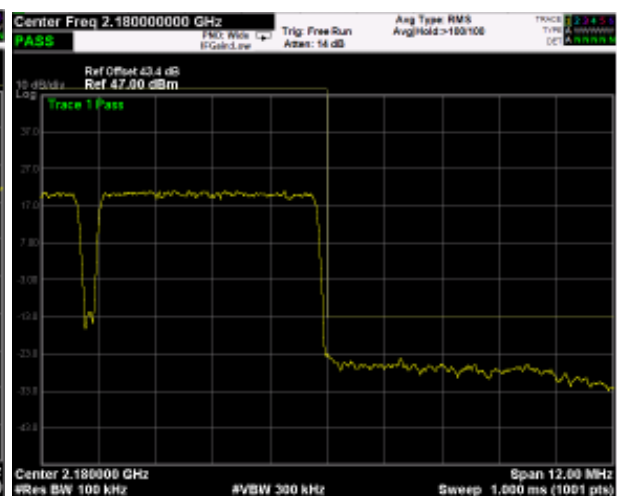


High Band Edge

### Mod. LTE 5MHz (QPSK) (Down-link)

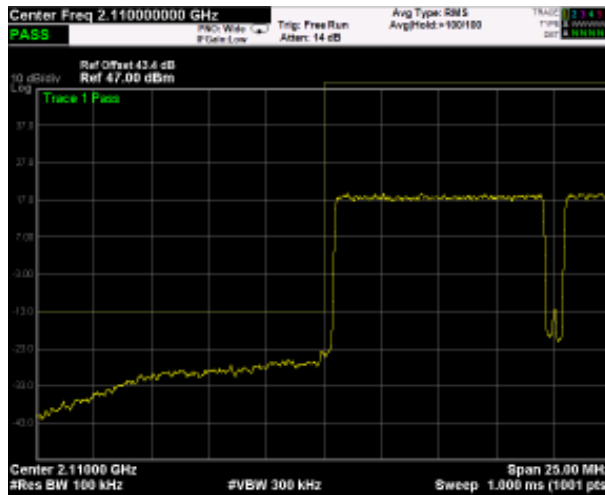


Low Band Edge

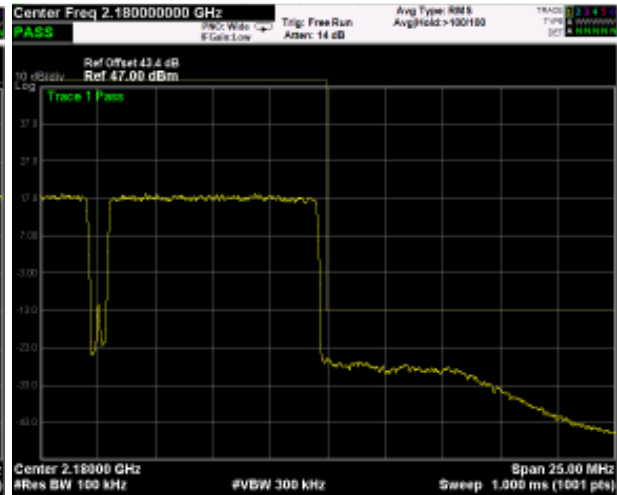


High Band Edge

### Mod. LTE 10MHz (QAM) (Down-link)

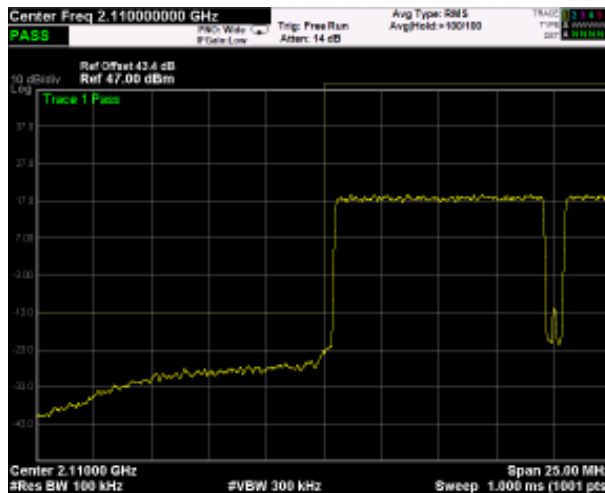


Low Band Edge

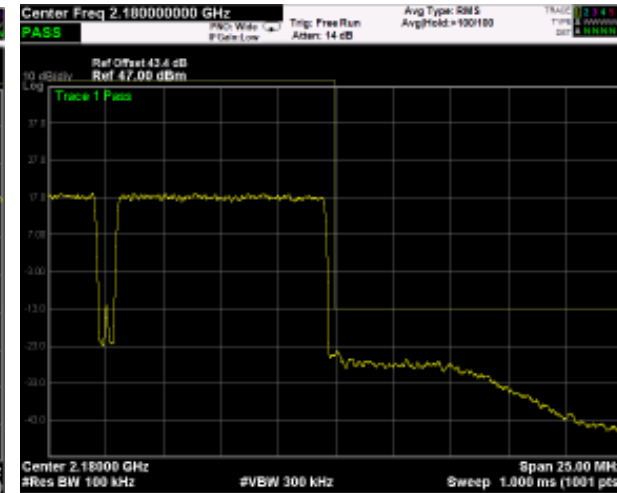


High Band Edge

### Mod. LTE 10MHz (QPSK) (Down-link)

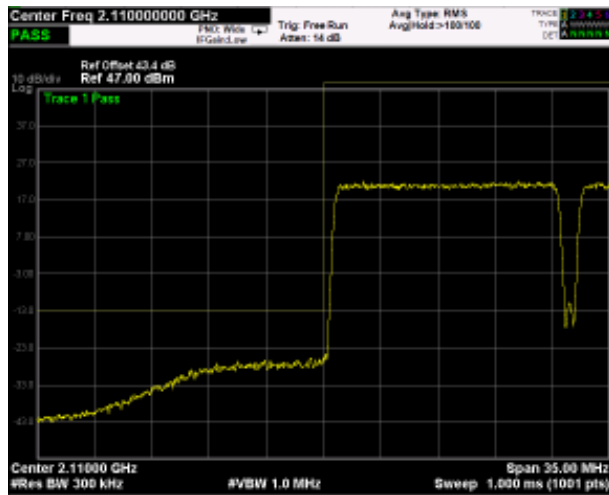


Low Band Edge

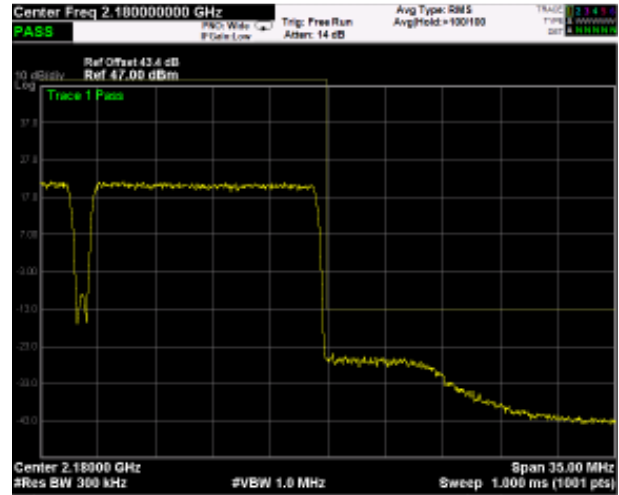


High Band Edge

### Mod. LTE 15MHz (QAM) (Down-link)

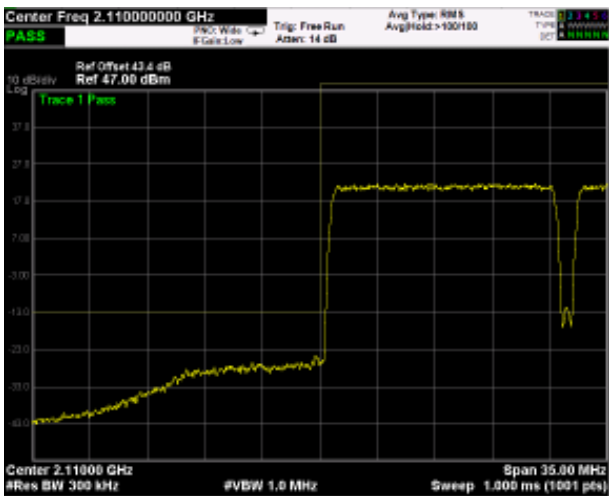


Low Band Edge

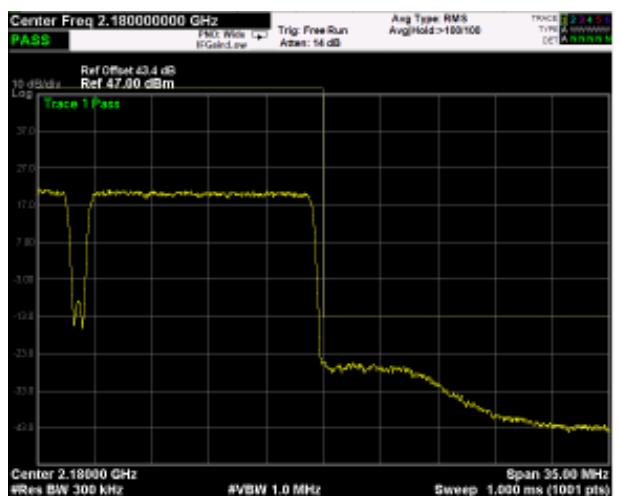


High Band Edge

### Mod. LTE 15MHz (QPSK) (Down-link)

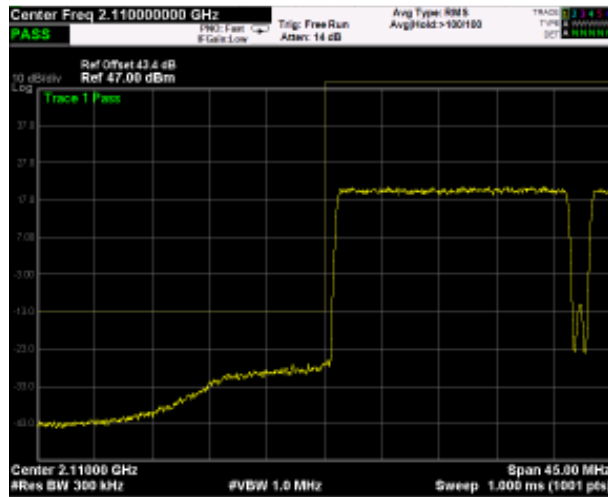


Low Band Edge

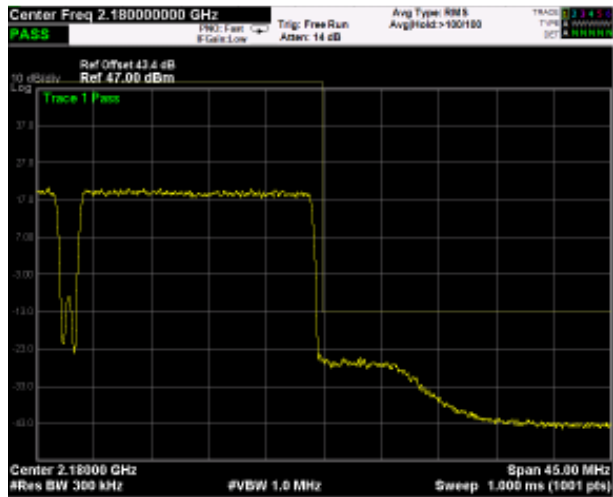


High Band Edge

### Mod. LTE 20MHz (QAM) (Down-link)

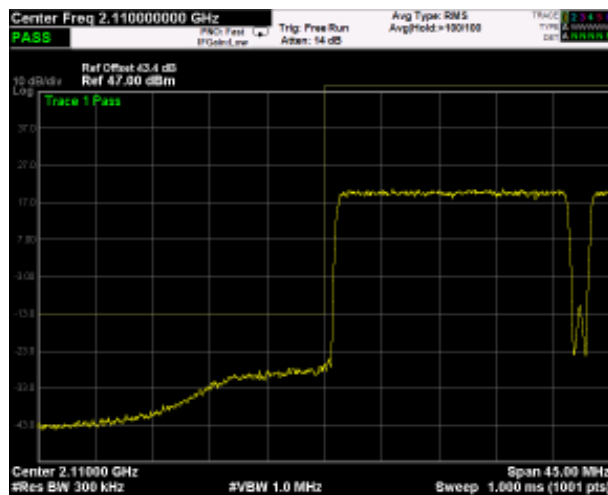


Low Band Edge

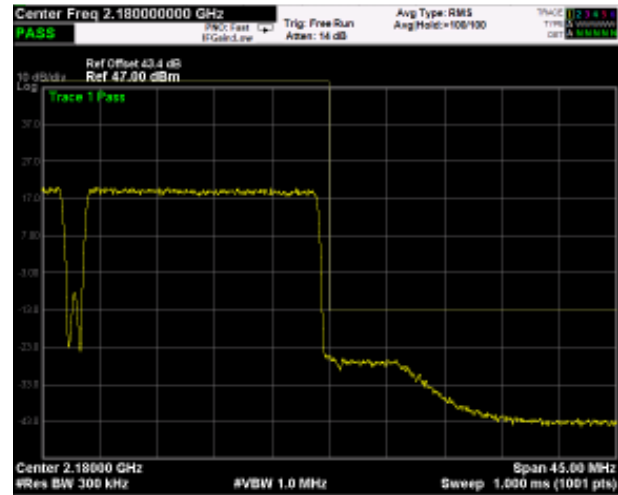


High Band Edge

### Mod. LTE 20MHz (QPSK) (Down-link)



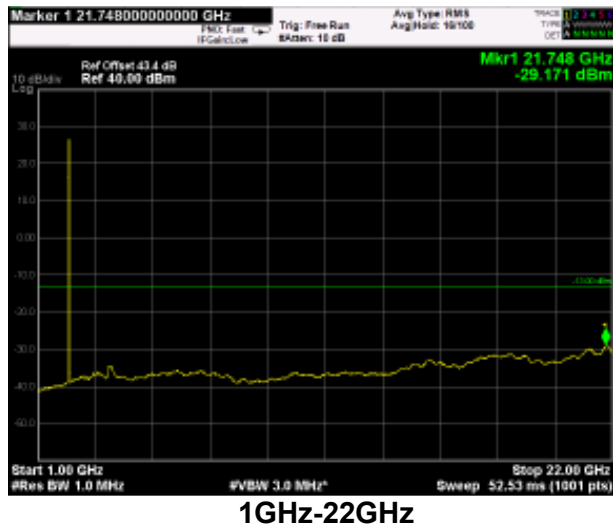
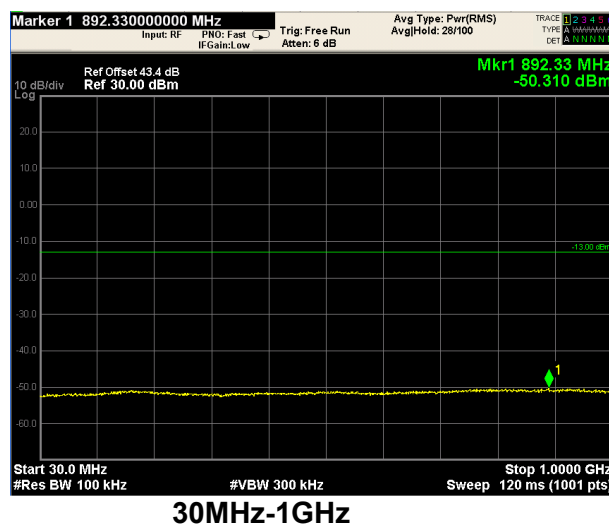
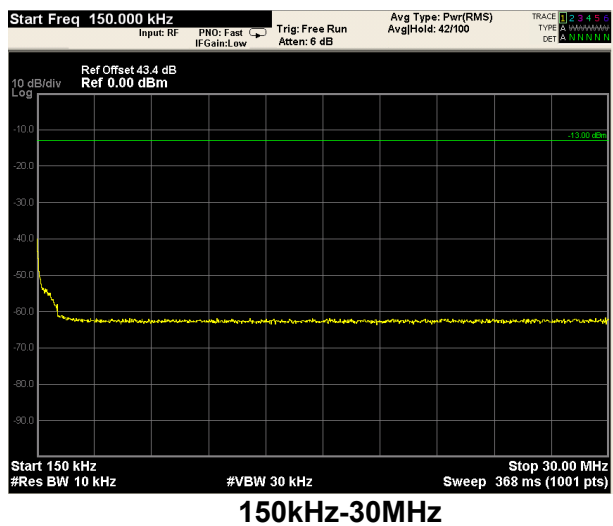
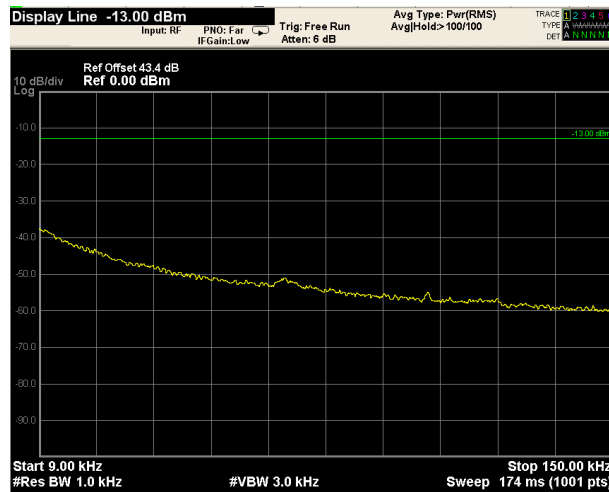
Low Band Edge



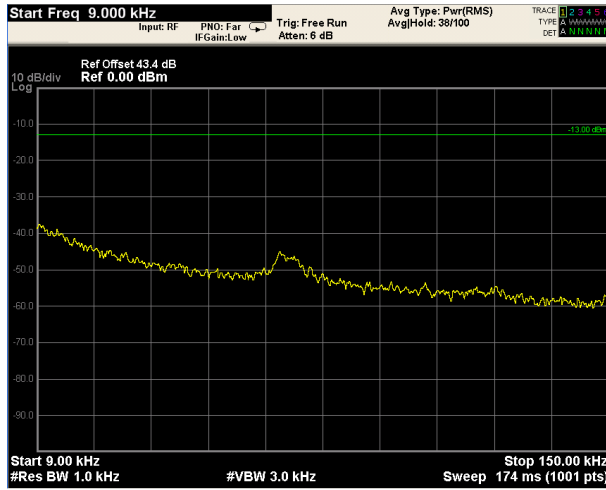
High Band Edge

## Test data, continued: spurious emissions at antenna terminal

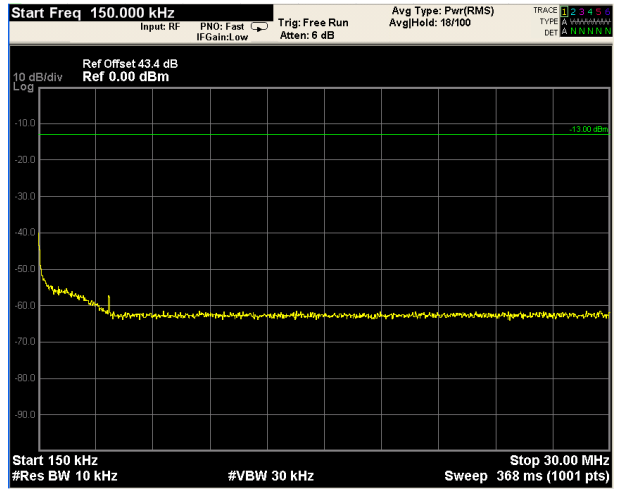
## Mod. CDMA (Down-link)



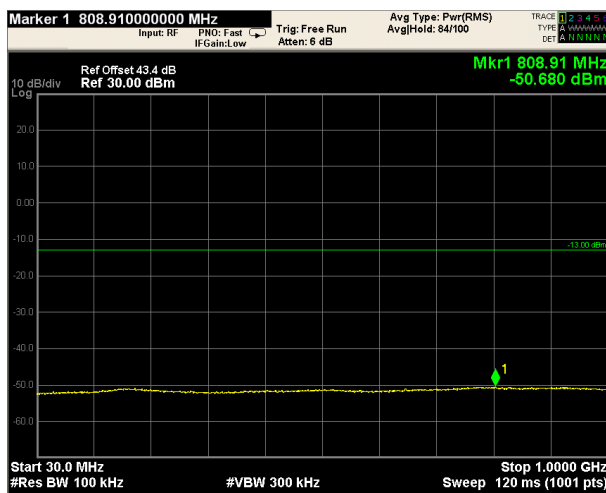
## Mod. WCDMA (Down-link)



9kHz-150kHz



150kHz-30MHz

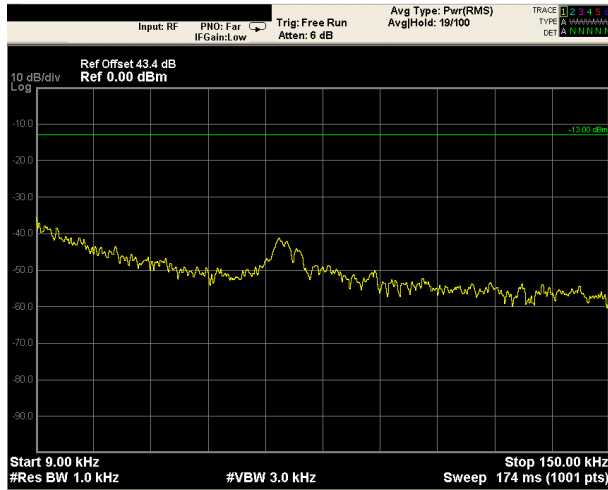


30MHz-1GHz

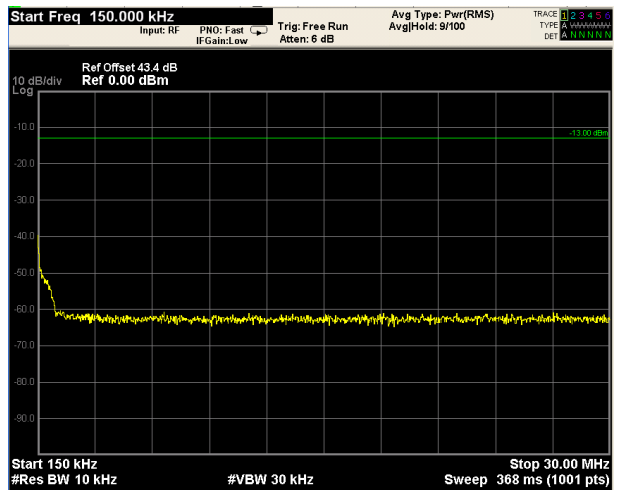


1GHz-22GHz

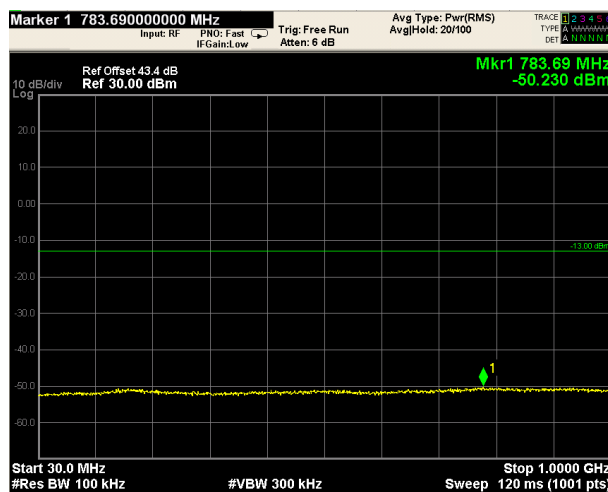
## Mod. LTE 1.4MHz (QAM) (Down-link)



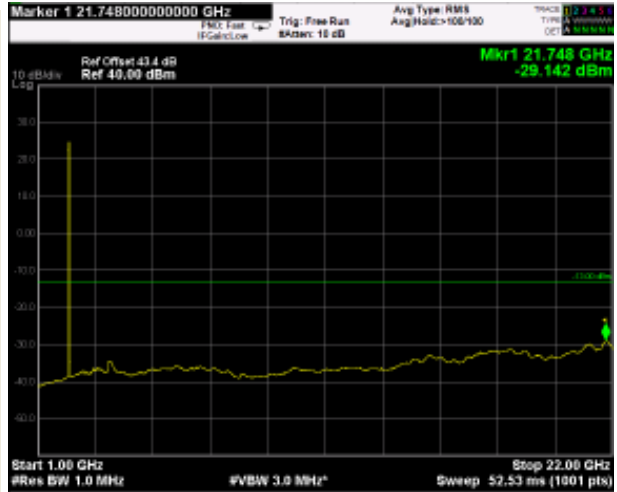
9kHz-150kHz



150kHz-30MHz

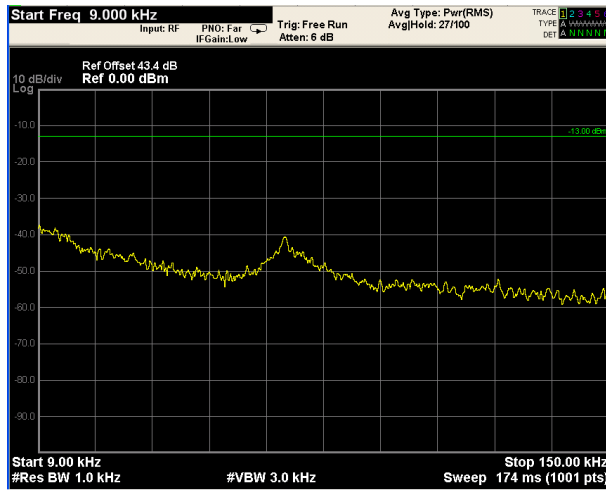


30MHz-1GHz

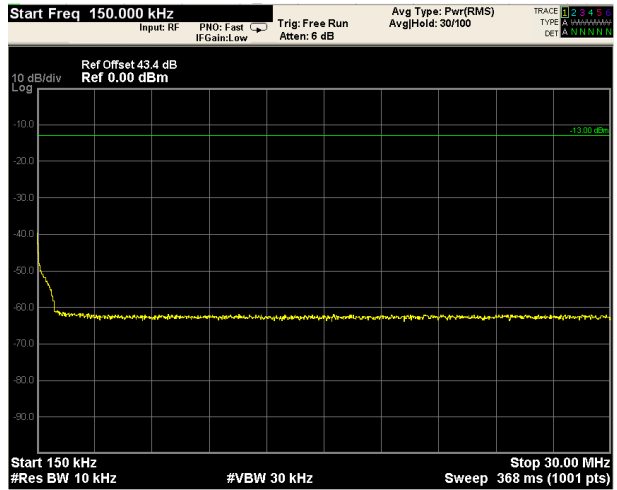


1GHz-22GHz

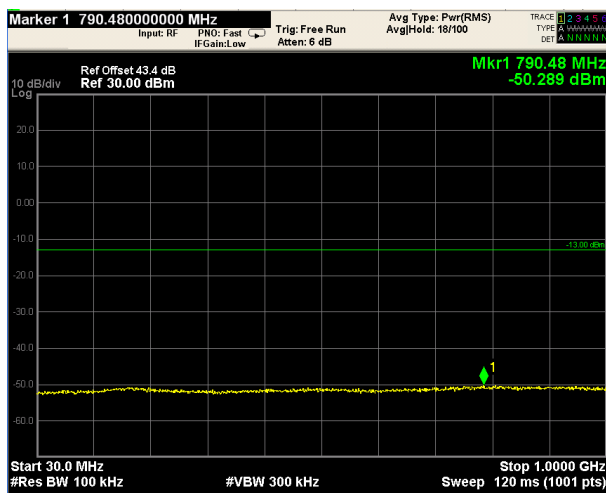
# Mod. LTE 1.4MHz (QPSK) (Down-link)



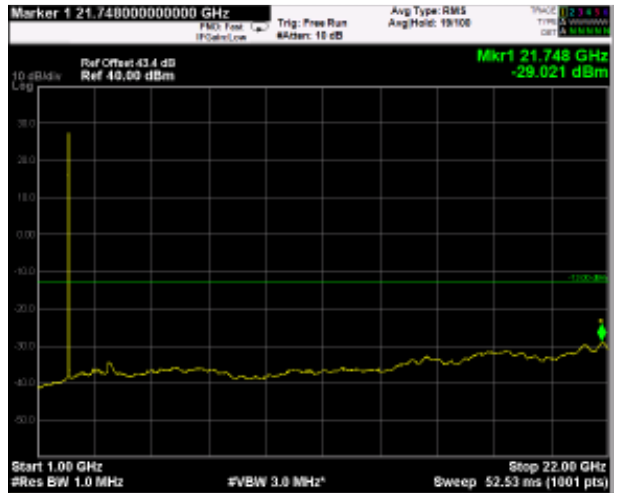
9kHz-150kHz



150kHz-30MHz

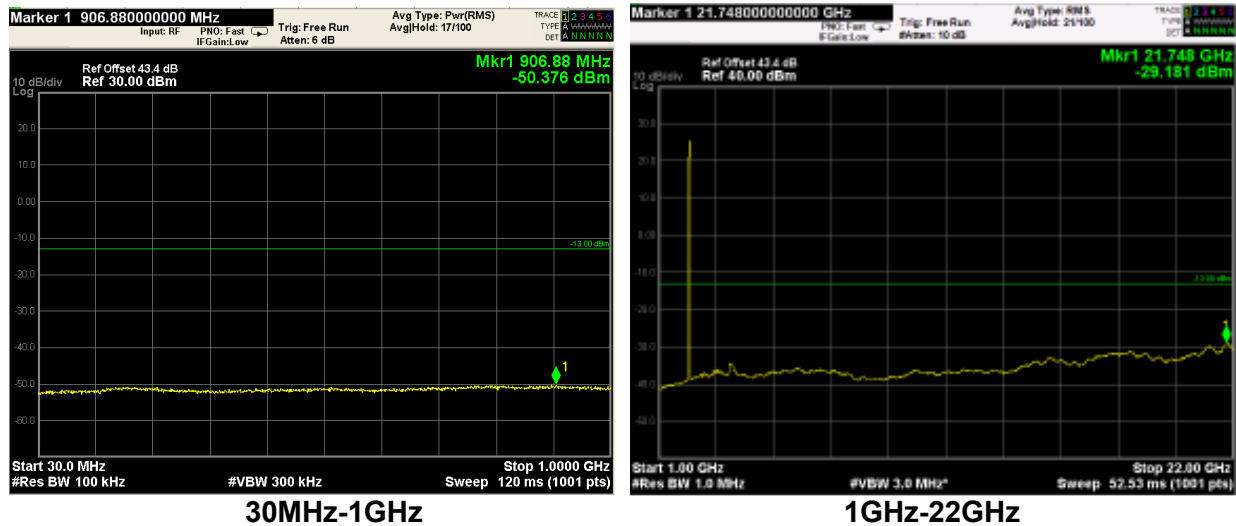


30MHz-1GHz

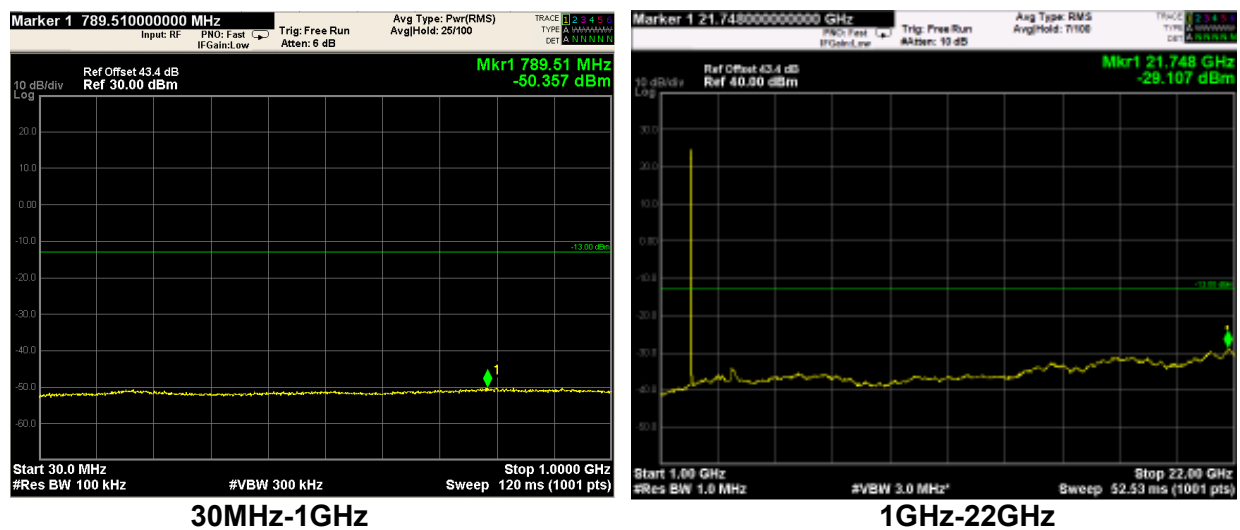


1GHz-22GHz

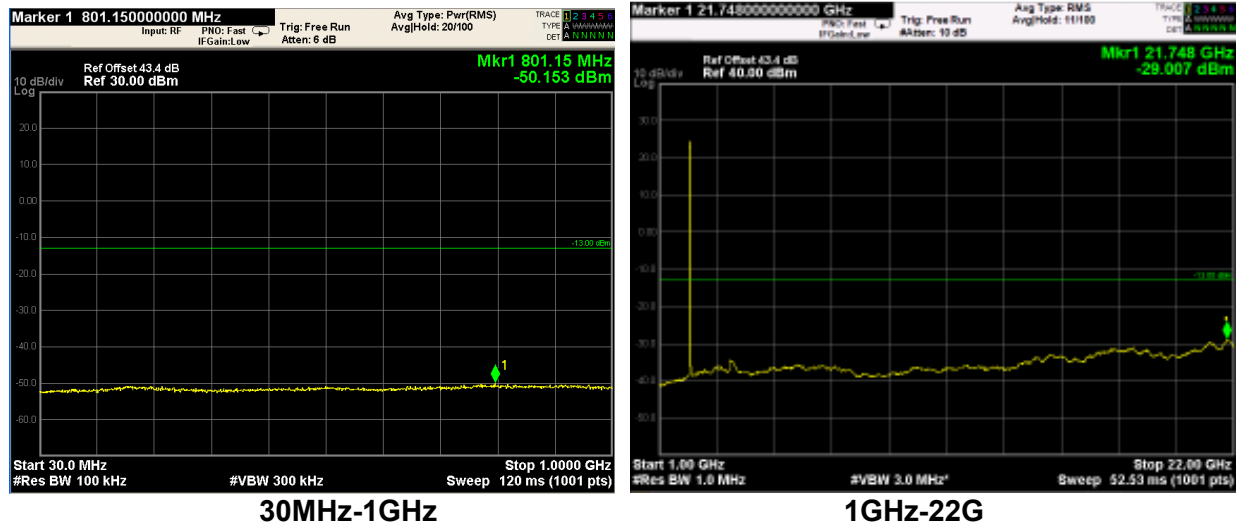
### Mod. LTE 3MHz, only 30M-22G plot (Down-link)



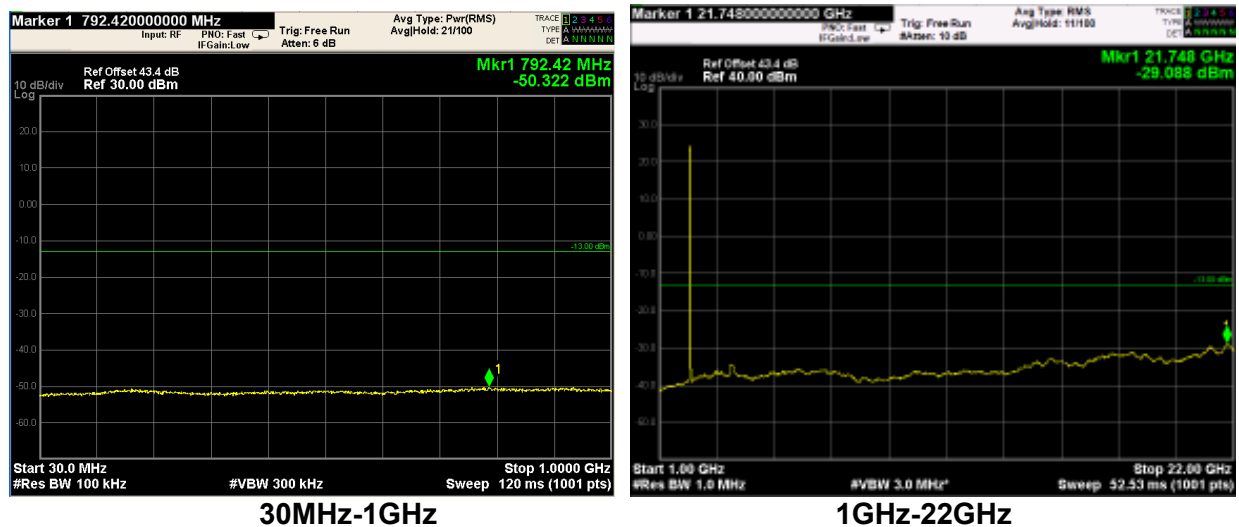
### Mod. LTE 5MHz, only 30M-22G plot (Down-link)



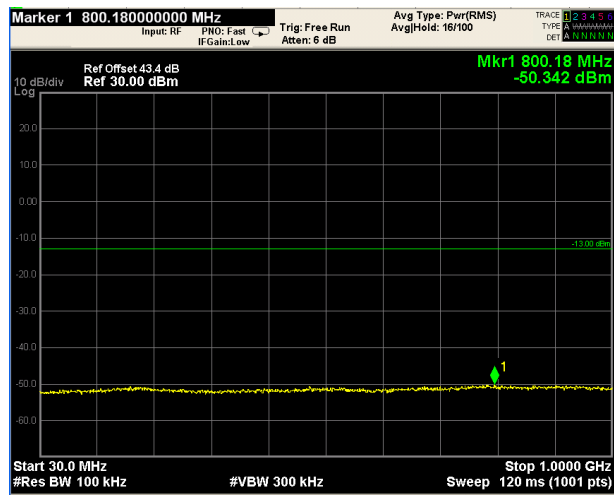
### Mod. LTE 10MHz, only 30M-22G plot (Down-link)



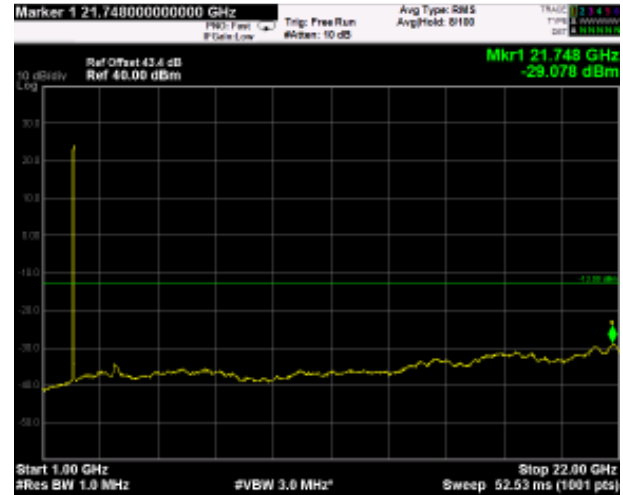
### Mod. LTE 15MHz, only 30M-22G plot (Down-link)



# Mod. LTE 20MHz, only 30M-22G plot (Down-link)



30MHz-1GHz



1GHz-22GHz

## Clause 27.53(h) Radiated spurious emissions

(h) AWS emission limits:

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

Test date: 2015-03-11

Test results: Pass

### Special notes

- The spectrum was searched from 30 MHz to the 10th harmonic.
- All measurements were performed using a peak detector.
- The measurements were performed at the distance of 3 m.
- RBW within 30–1000 MHz was 100 kHz and 1 MHz above 1 GHz. VBW was wider than RBW.

# Clause 27.53(h) Radiated spurious emissions, continued

## Test data

The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50  $\Omega$  shielded dummy load.

The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

**There were no emissions detected above the noise floor which was at least 20 dB below the specification limit.**

## Spurious emissions measurement results:

| Frequency (MHz) | Polarization. V/H | Field strength (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) |
|-----------------|-------------------|-------------------------------|----------------------|-------------|
| Low channel     |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |
| Mid channel     |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |
| High channel    |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |
|                 |                   |                               |                      |             |

Note: Field strength includes correction factor of antenna, cable loss, amplifier, and attenuators where applicable.

### Clause 2.1049 Occupied bandwidth

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

Test date: 2015-03-11

Test results: Pass

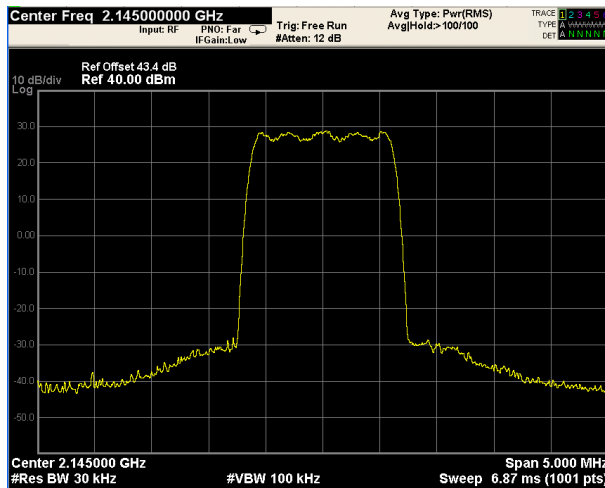
### Special notes

- 26 dBc points provided in terms of attenuation below unmodulated carrier.
- RBW was set to 1 % of emissions bandwidth.

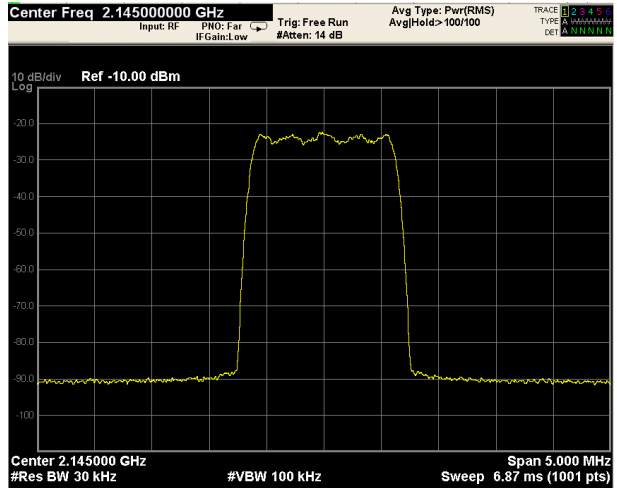
## Clause 2.1049 Occupied bandwidth, continued

### Test data

#### Mod. CDMA (Down-link)

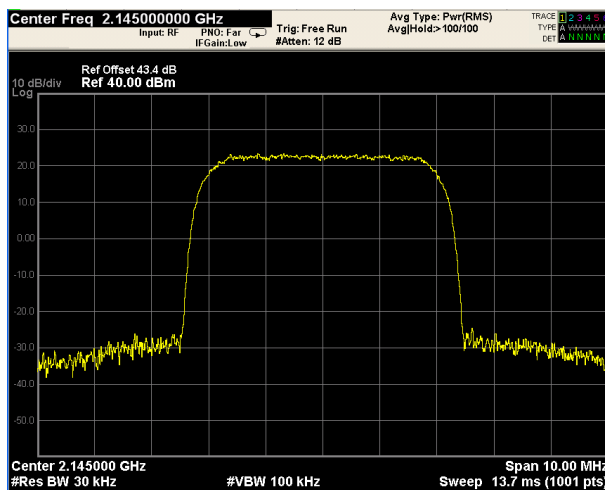


Output

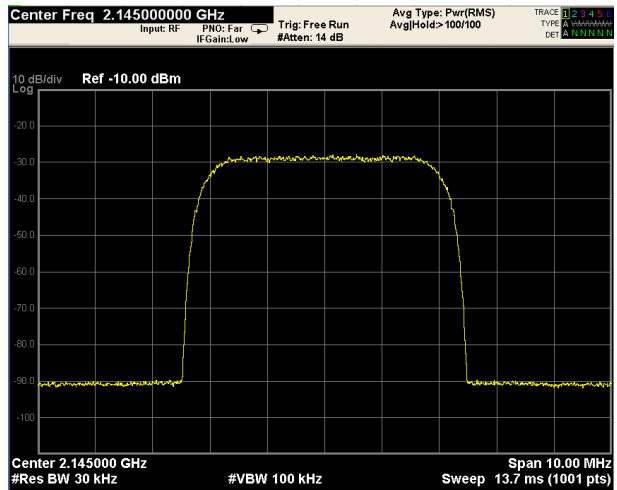


Input

#### Mod. WCDMA (Down-link)

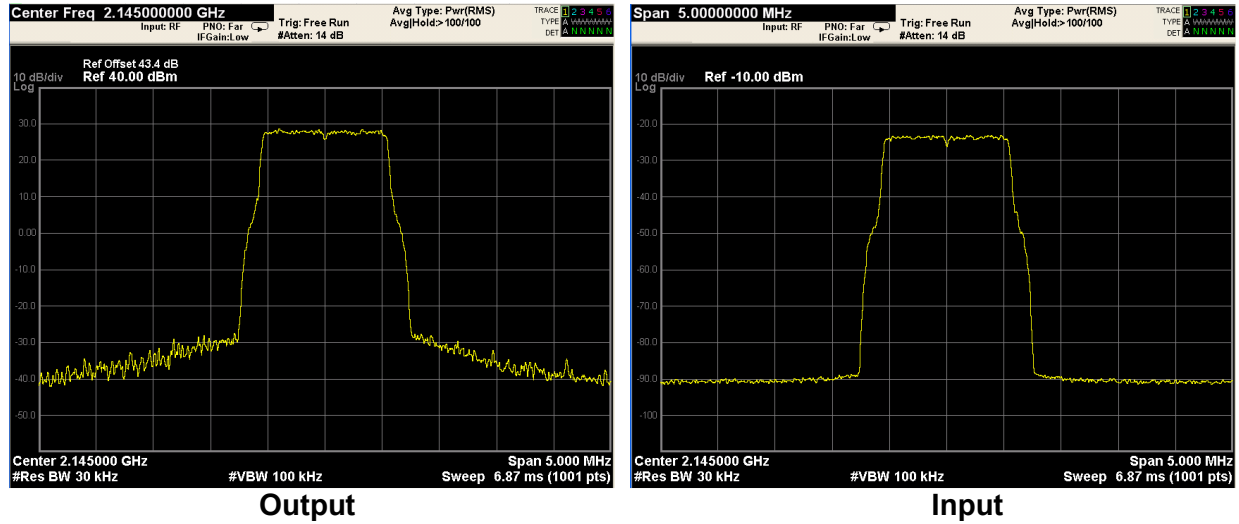


Output

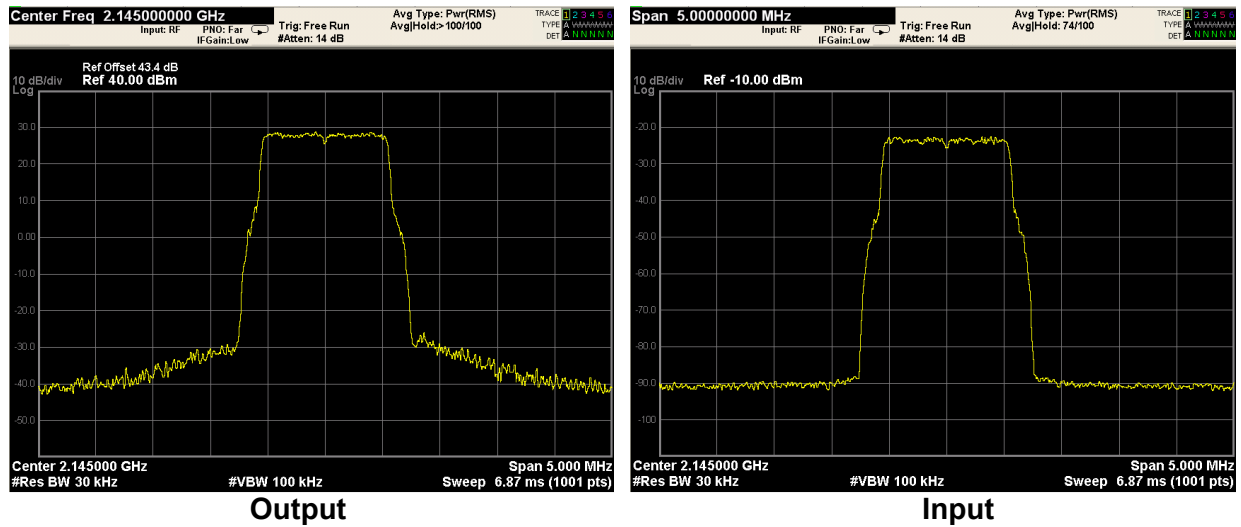


Input

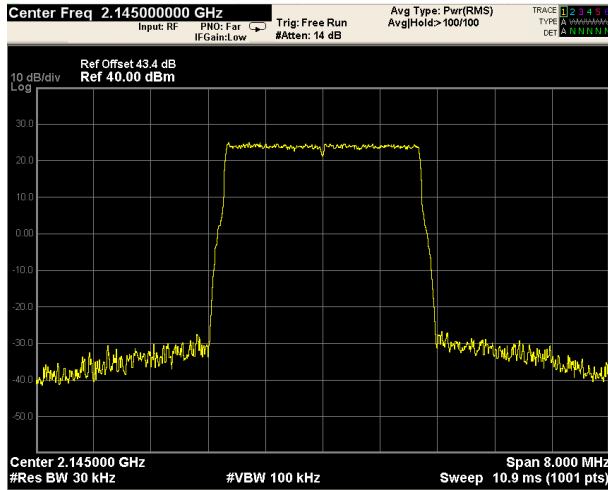
## Mod. LTE 1.4MHz (QAM) (Down-link)



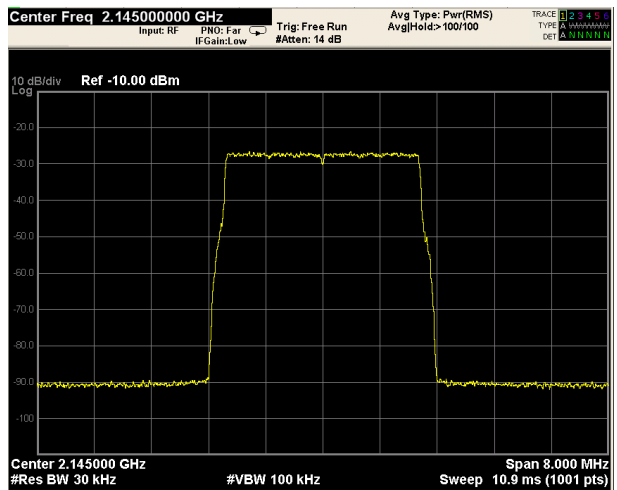
## Mod. LTE 1.4MHz (QPSK) (Down-link)



### Mod. LTE 3MHz (QAM) (Down-link)

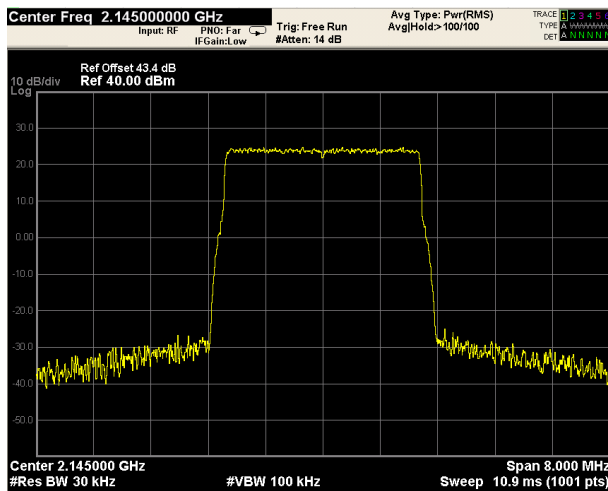


Output

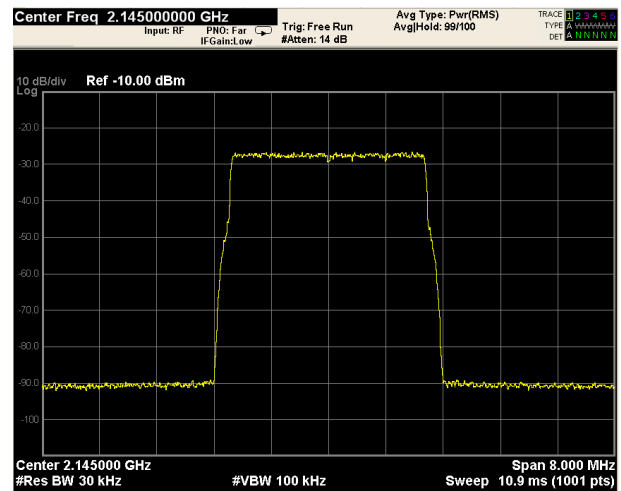


Input

### Mod. LTE 3MHz (QPSK) (Down-link)

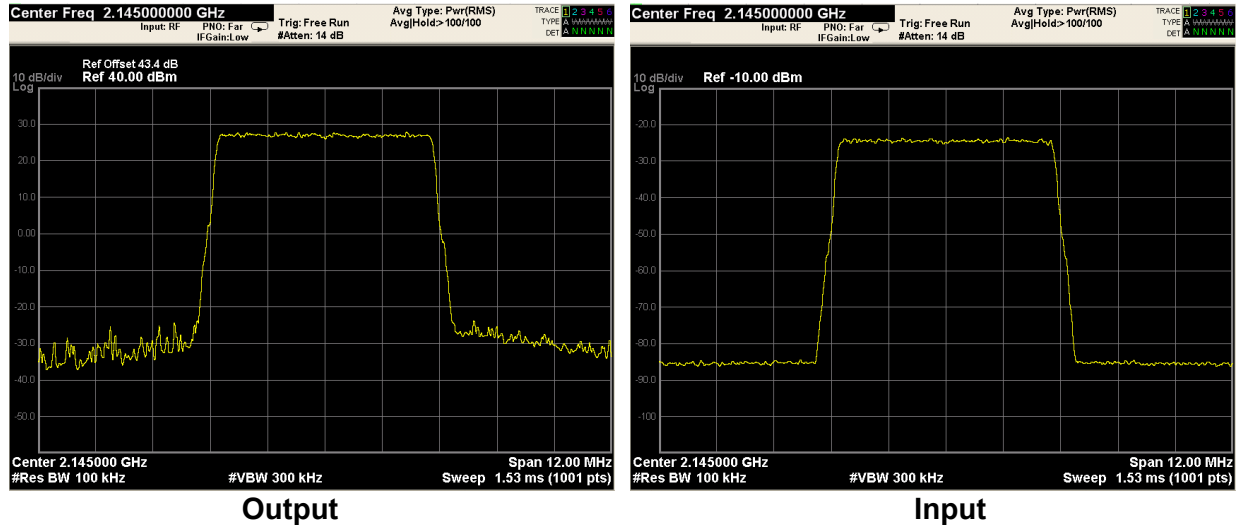


Output

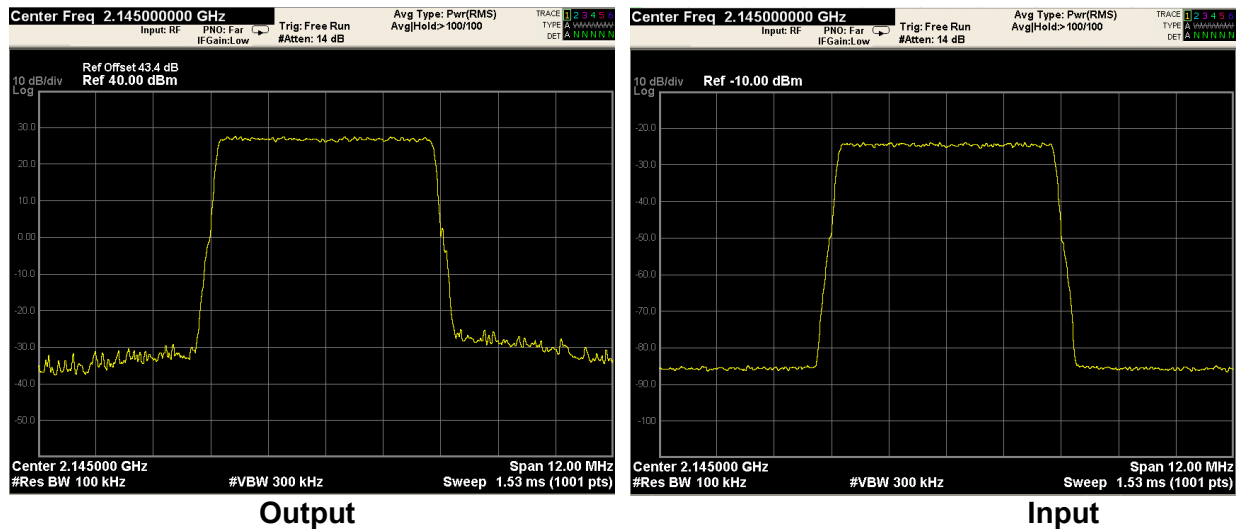


Input

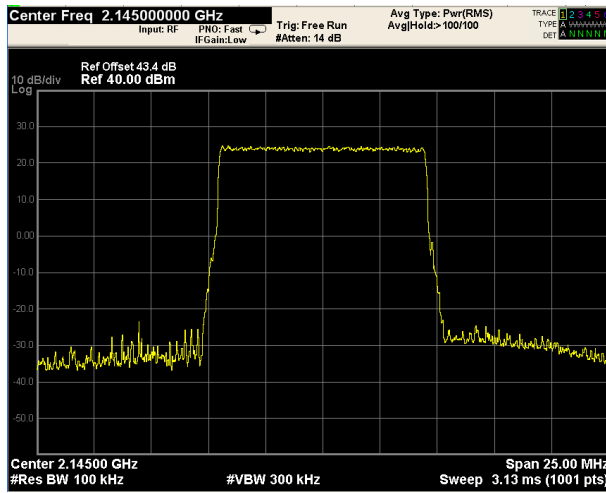
### Mod. LTE 5MHz (QAM) (Down-link)



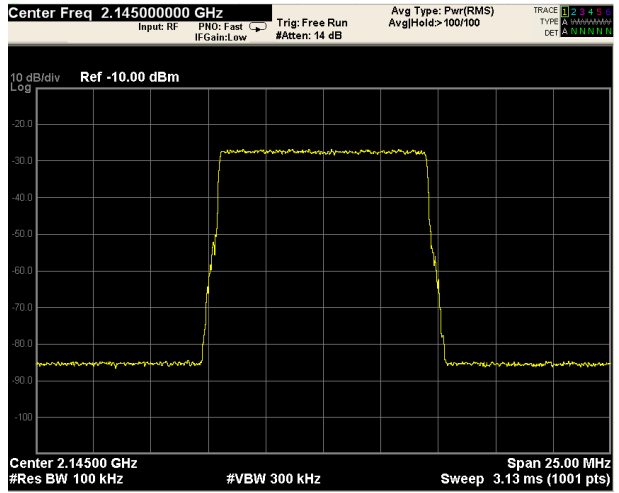
### Mod. LTE 5MHz (QPSK) (Down-link)



### Mod. LTE 10MHz (QAM) (Down-link)

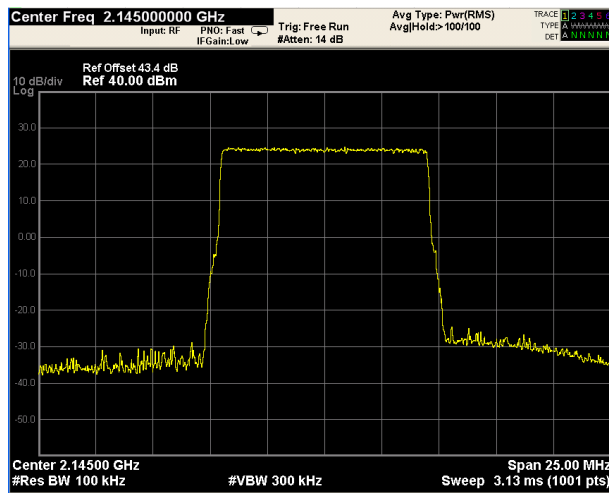


Output

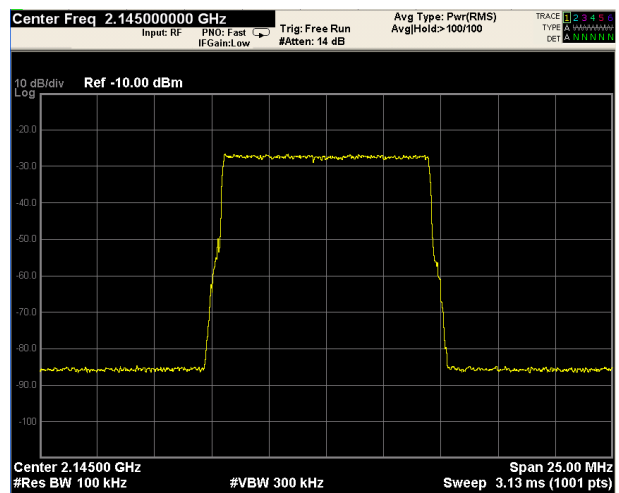


Input

### Mod. LTE 10MHz (QPSK) (Down-link)

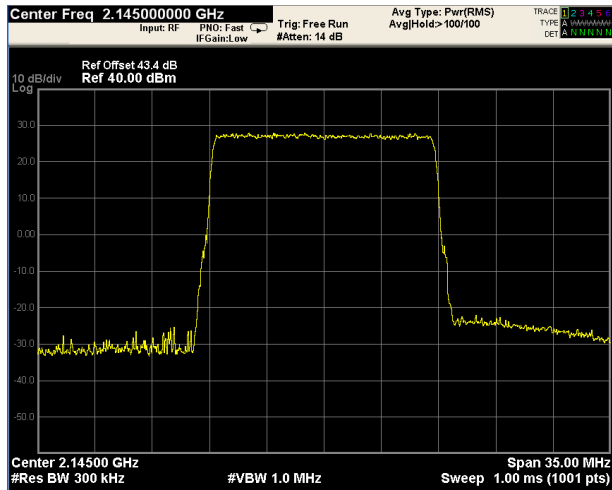


Output

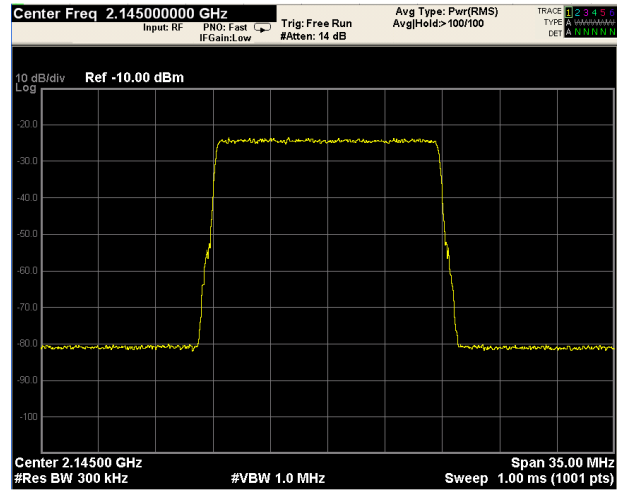


Input

### Mod. LTE 15MHz (QAM) (Down-link)

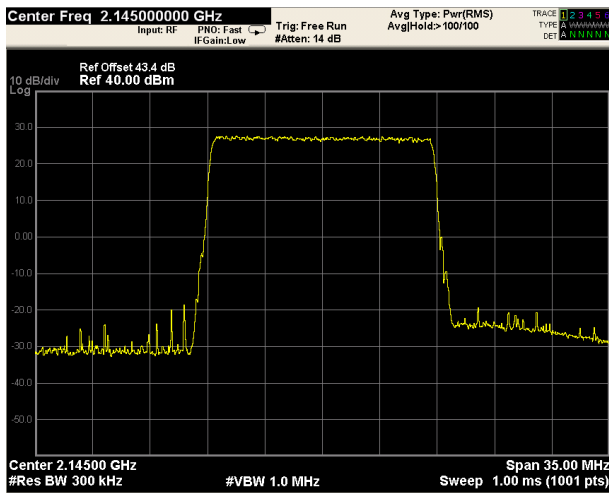


Output

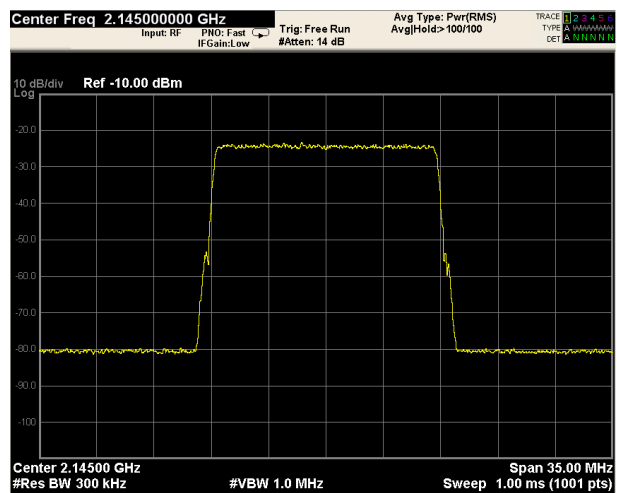


Input

### Mod. LTE 15MHz (QPSK) (Down-link)

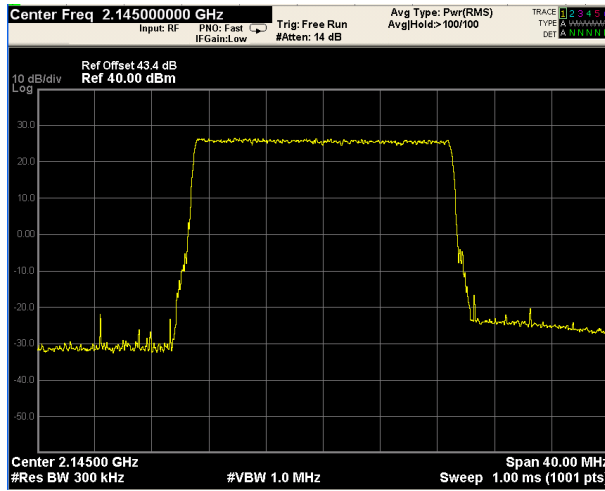


Output

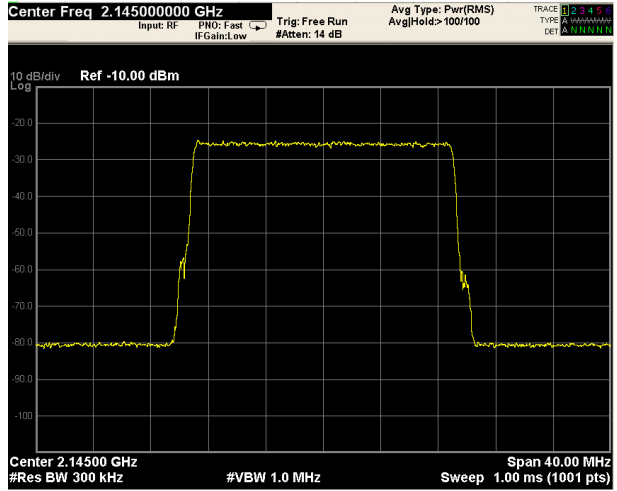


Input

### Mod. LTE 20MHz (QAM) (Down-link)

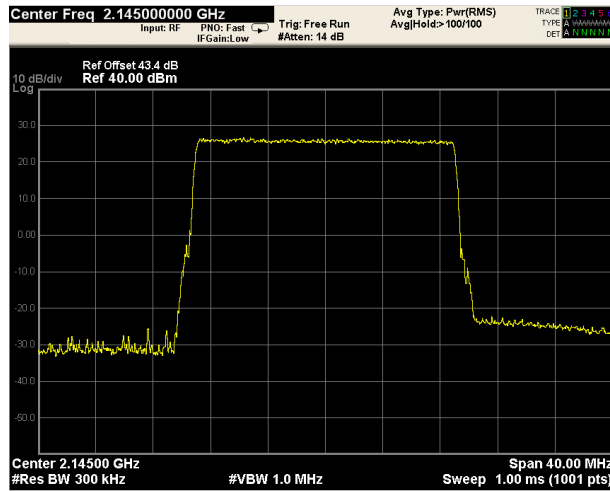


Output

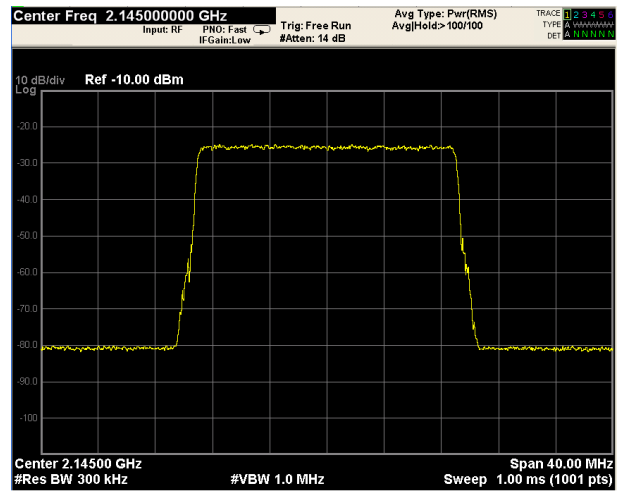


Input

### Mod. LTE 20MHz (QPSK) (Down-link)



Output



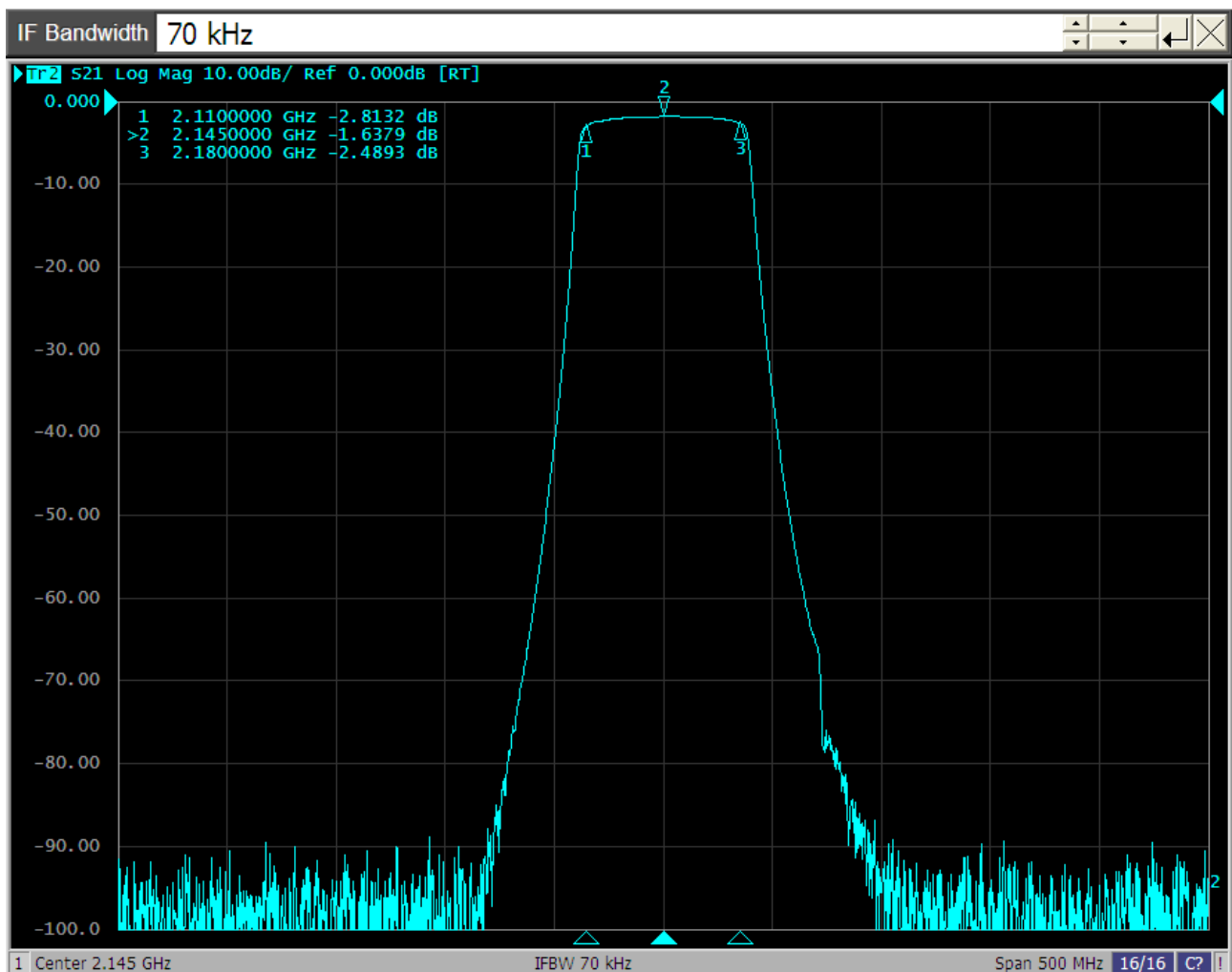
Input

## Clause 935210 D02v02r01 (D.3)(I) Out of band rejection

Out of Band Rejection – Test for rejection of out of band signals.  
Filter frequency response plots are acceptable.

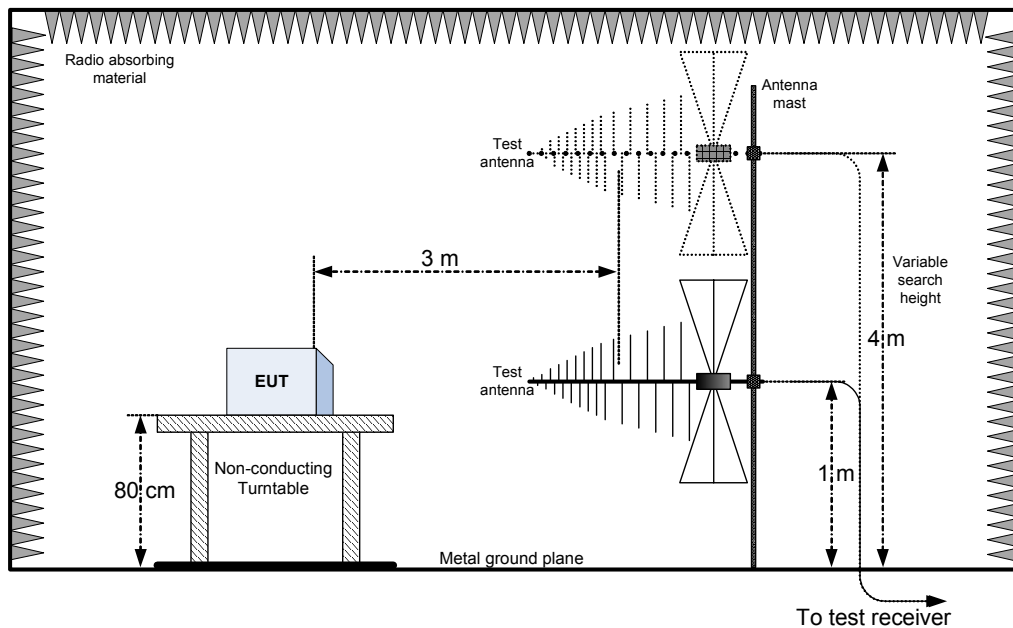
Test date: 2015-03-09

Test results: Pass

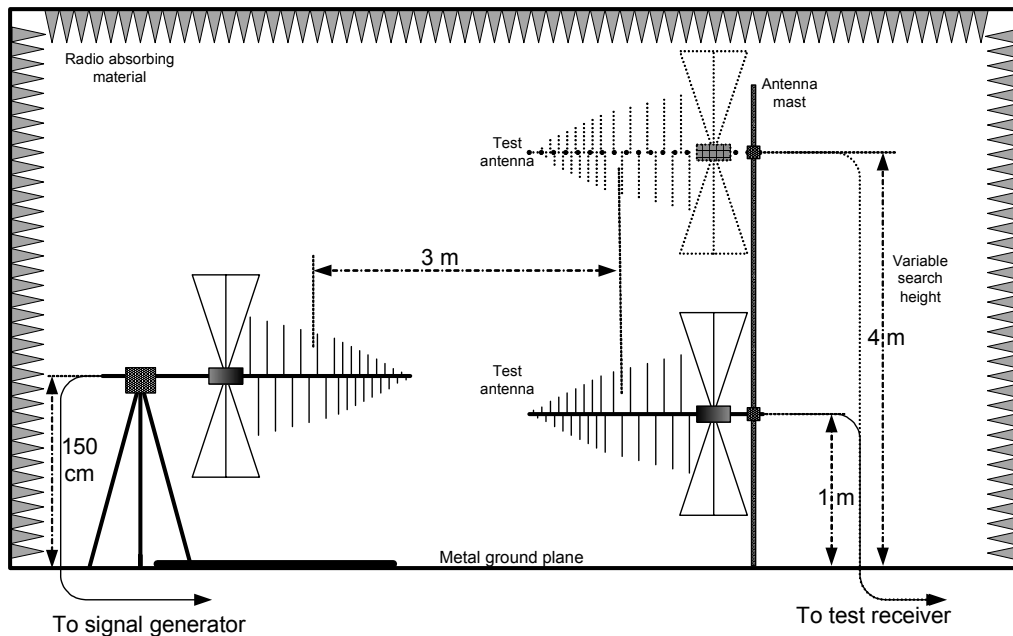


## Appendix B: Block diagrams of test set-ups

## Radiated emissions set-up



## Substitution method set-up



## Appendix C: EUT Photos

### Photo Set up

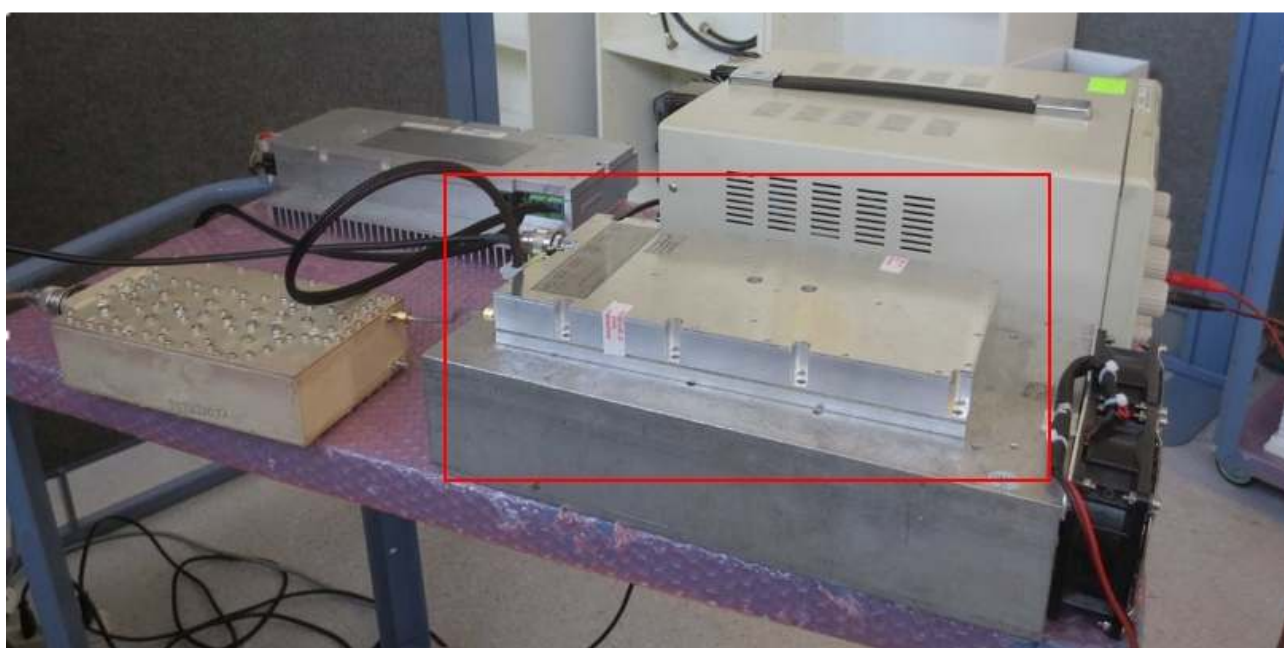




Photo EUT

