| | |
|---|---|
| **Report Reference ID:** | 278614-5TRFWL |

| | |
|---|---|
| **Test specification:** | Title 47 – Telecommunication<br>Chapter I – Federal Communications Commission<br>Subchapter A – General<br>Part 24 – Personal Communication Services<br>Subpart E – Broadband PCS |

| | |
|---|---|
| **Applicant:** | TEKO Telecom Srl.<br>Via Meucci, 24/a<br>I-40024 Castel S. Pietro Terme (BO) (Italy) |
| **Apparatus:** | Remote Unit |
| **Model:** | TRL7S8SC8A19AW23AS |
| **FCC ID:** | XM2-EP23 |

| | |
|---|---|
| **Testing laboratory:** | **Nemko Italy Spa**<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:** | G. Curioni, Wireless/EMC Specialist | 2015-03-11 |
| **Reviewed by:** | P. Barbieri, Wireless/EMC Specialist | 2015-03-11 |

# Table of contents

# Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Spa.

## Test specification:
FCC Part 24 Subpart E, Broadband PCS

| | |
|---|---|
| Compliance status: | Complies |
| Exclusions: | None |
| Non-compliances: | None |
| Report release history: | Original release |
| Test location: | Nemko Spa<br>Via Del Carroccio, 4 – 20853 Biassono (MB) - Italy |
| Registration number: | 481407 (10 m Semi anechoic chamber) |

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.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

Nemko Spa authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko Spa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

# Section 2: Equipment under test

## 2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

| | |
|---|---|
| Type of equipment: | Remote Unit |
| Product marketing name: | Teko Telecom Srl |
| Model number: | TRL7S8SC8A19AW23AS |
| Serial number: | 140829001 |
| Nemko sample number: | ----- |
| FCC ID: | XM2-EP23 |
| Date of receipt: | 2015-03-09 |

## 2.2 Accessories and support equipment

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

No other FCC-ID equipment are used to exercise the EUT during testing

| Item # 1 | |
|---|---|
| Type of equipment: | Master Unit - Subrack |
| Brand name: | Teko Telecom srl |
| Model name or number: | SUB-TRX-PSU |
| Serial number: | 101083001 |
| Nemko sample number: | ---------- |
| Connection port: | ---------- |
| Cable length and type: | ---------- |
| Item # 2 | |
| Type of equipment: | Master Unit – Management Module |
| Brand name: | Teko Telecom srl |
| Model name or number: | TSPV-R |
| Serial number: | 081900043 |
| Nemko sample number: | ---------- |
| Connection port: | LAN port |
| Cable length and type: | ---------- |
| Item # 3 | |
| Type of equipment: | Master Unit – Optical Module |
| Brand name: | Teko Telecom srl |
| Model name or number: | TTRU4W-S-M |
| Serial number: | 110679007 |
| Nemko sample number: | ---------- |
| Connection port: | DL/UL RF connector (to connect to the base station)<br>Optical port (to connect to remote unit) |
| Cable length and type: | ---------- |
| Item # 4 | |
| Type of equipment: | Master Unit – Power Supply |
| Brand name: | Teko Telecom srl |
| Model name or number: | TPSU/AC |
| Serial number: | 100012286 |
| Nemko sample number: | ---------- |
| Connection port: | ---------- |
| Cable length and type: | ---------- |
| | |

Section 2: Equipment under test, continued

## 2.3 EUT description

See confidential block diagram and operational description

## 2.4 Technical specifications of the EUT

| | |
|---|---|
| Operating band: | Down Link 1930-1995 MHz; Up Link 1850-1915 MHz |
| Operating frequencies: | Wideband |
| Modulation type: | GSM, EDGE, CDMA, WCDMA, LTE (QAM and QPSK) |
| Occupied bandwidth: | GSM and EDGE: 200 kHz;<br>CDMA: 1,25 MHz,<br>WCDMA: 5 MHz<br>LTE: 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz |
| Channel spacing: | Standard |
| Emission designator: | GSM and EDGE: GXW;<br>CDMA, WCDMA: F9W,<br>LTE: D7W |
| RF Output | Down Link: 31dBm (1,25W)<br>Up Link: N.A. (The EUT does not transmit over the air in the up-link direction) |
| Gain | Down Link: 36dB<br>Up Link: N.A. (The EUT does not transmit over the air in the up-link direction) |
| Antenna data: | No antenna provided |
| Antenna type: | No antenna provided |
| | External Antenna<br>(Equipment that has an external 50 Ω RF connector) |
| Power source | 100-240 Vac |

Section 2: Equipment under test, continued

## 2.5 EUT setup diagram

In this system, Remote Unit is the EUT. Master Unit 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 connector of optical module in the Master Unit.

**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.

## 2.6 Operation of the EUT during testing

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

## 2.7 Modifications incorporated in the EUT

None

There were no modifications performed to the EUT during this assessment

# Section 3: Test conditions

## 3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

## 3.2 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 ±5 %, for which the equipment was designed. |

Section 3: Test conditions, continued

## 3.3 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.

## 3.4 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

# Section 4: Result summary

## 4.1 Test results

The apparatus was assessed against the following specifications:

FCC Part 2 Subpart J, Equipment Authorization Procedures
FCC Part 24 Subpart E, Broadband PCS

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

| | |
|---|---|
| N | No : not applicable / not relevant. |
| Y | Yes : Mandatory i.e. the apparatus shall conform to these tests. |
| N/T | Not Tested, mandatory but not assessed. (See report summary) |

| Part | Test method | Test description | Required | Result |
|---|---|---|---|---|
| §24.232(a) | 2.1046 | Power and antenna height limits | Y | Pass |
| – | 2.1049 | Occupied bandwidth | Y | Pass |
| §24.238(a) | 2.1051 | Spurious emissions at the antenna terminal | Y | Pass |
| §24.238(a) | 2.1053 | Field strength of spurious radiation | Y | Pass |
| §24.235 | 2.1055 | Frequency stability | N | N/A a) |
| § 935210 D02v02r01 (D.3)(l) | – | Out of band rejection | Y | Pass |

Notes:

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

# Appendix A: Test results

## Clause 24.232(a) Power and antenna height limits

(a) (1) Base stations with an emission bandwidth of 1 MHz or less are limited to 1640 watts equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(a) (2) Base stations with an emission bandwidth greater than 1 MHz are limited to 1640 watts/MHz equivalent isotropically radiated power (EIRP) with an antenna height up to 300 meters HAAT, except as described in paragraph (b) below.

(d) 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 (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. 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: 2015-03-09

Test results: Pass

### Special notes

Conducted measurement were performed:
- 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

Only conducted measurement at antenna connector was possible, no antenna provided by manufacturer

## Clause 24.232(a) Equivalent isotropically radiated power limits, continued

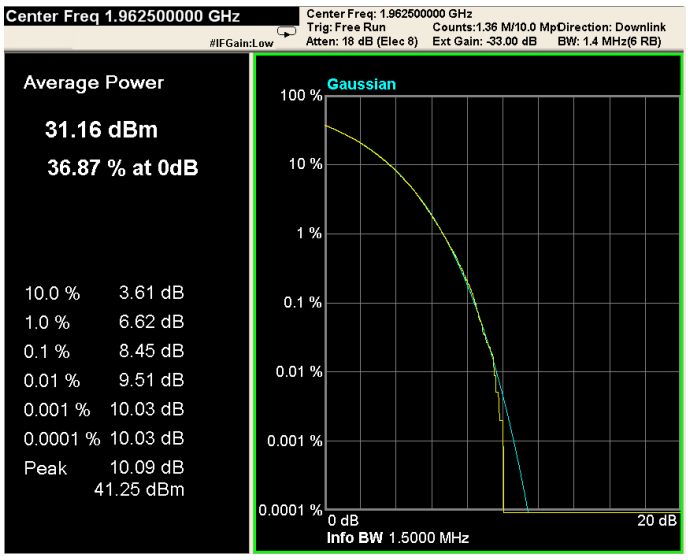
### Test data

**Conducted measurements**

### Test data

| Direction | Modulation | Frequency (MHz) | RF output channel Power (dBm) | RF output channel Power (W) | PAR (dB) |
|---|---|---|---|---|---|
| Down-link | GSM (200 kHz) | 1962.5 | 31.16 | 1.31 | 0,07 |
| Down-link | EDGE (200 kHz) | 1962.5 | 31.14 | 1.30 | 3,25 |
| Down-link | CDMA (1,25MHz) | 1962.5 | 31.12 | 1.29 | 9,07 |
| Down-link | WCDMA (5MHz) | 1962.5 | 31.12 | 1.29 | 10,62 |
| Down-link | LTE (QAM, 1,4MHz) | 1962.5 | 31.16 | 1.31 | 10,09 |
| Down-link | LTE (QPSK, 1,4MHz) | 1962.5 | 31.14 | 1.30 | 9,47 |
| Down-link | LTE (QAM, 3MHz) | 1962.5 | 31.19 | 1.32 | 10,29 |
| Down-link | LTE (QPSK, 3MHz) | 1962.5 | 31.10 | 1.29 | 10,48 |
| Down-link | LTE (QAM, 5MHz) | 1962.5 | 31.20 | 1.32 | 10,66 |
| Down-link | LTE (QPSK, 5MHz) | 1962.5 | 31.11 | 1.29 | 10,26 |
| Down-link | LTE (QAM, 10MHz) | 1962.5 | 31.18 | 1.31 | 10,93 |
| Down-link | LTE (QPSK, 10MHz) | 1962.5 | 31.15 | 1.30 | 10,60 |
| Down-link | LTE (QAM, 15MHz) | 1962.5 | 31.19 | 1.32 | 10,40 |
| Down-link | LTE (QPSK, 15MHz) | 1962.5 | 31.12 | 1.29 | 11,08 |
| Down-link | LTE (QAM, 20MHz) | 1962.5 | 31.15 | 1.30 | 10,23 |
| Down-link | LTE (QPSK, 20MHz) | 1962.5 | 31.19 | 1.32 | 10,54 |

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:

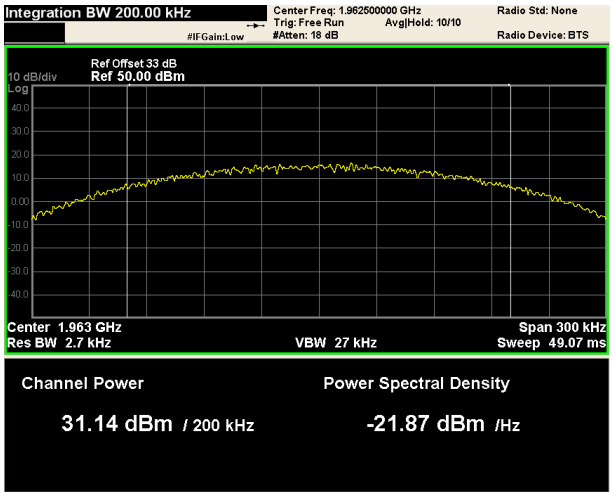



**PAR measure example (LTE 1,4MHz QAM)**

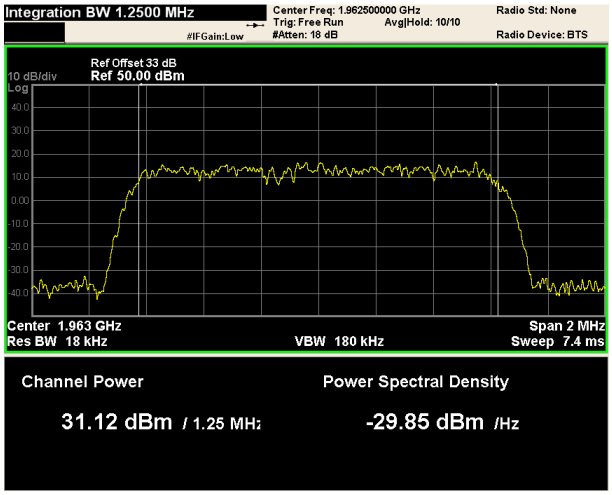
## Test data

### Mod. GSM

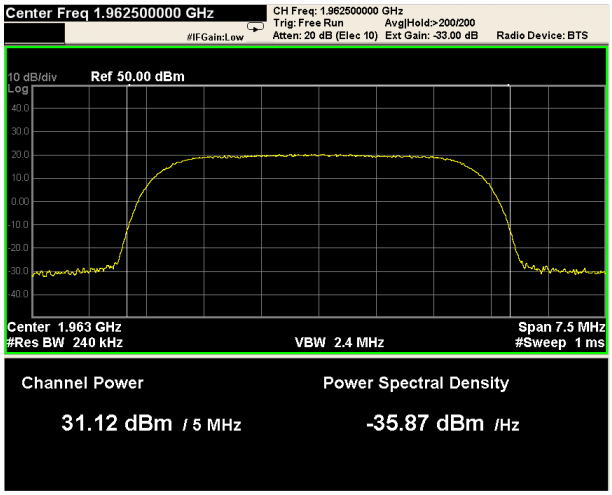

### Mod. EDGE



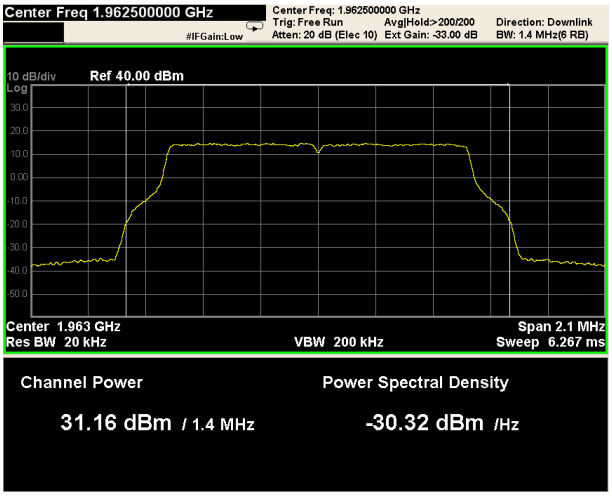

### Mod. CDMA



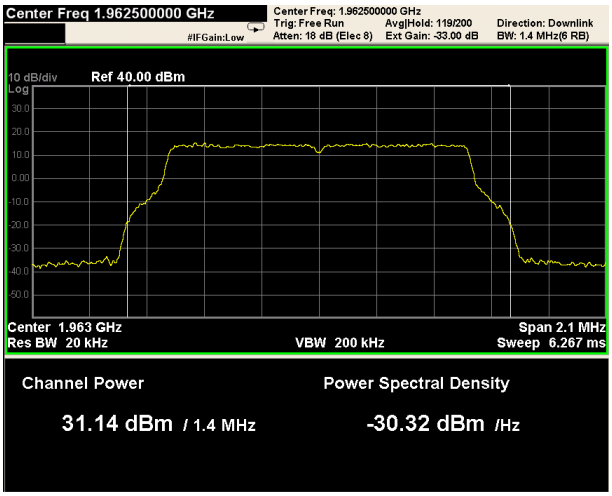

### Mod. WCDMA



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

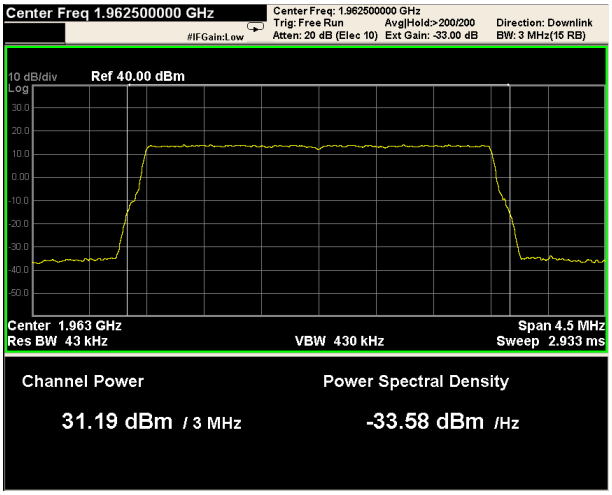



QAM

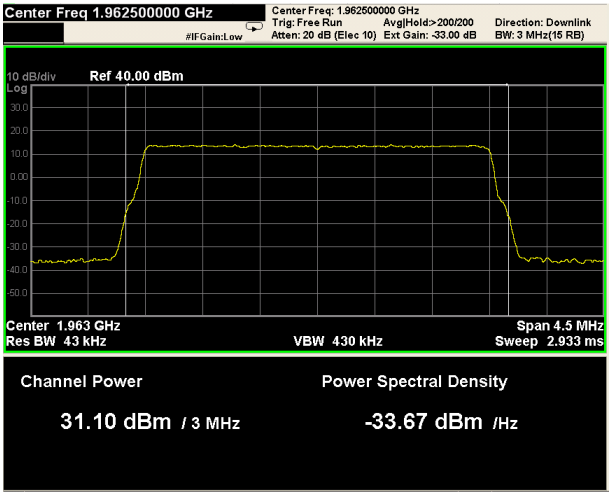



QPSK

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

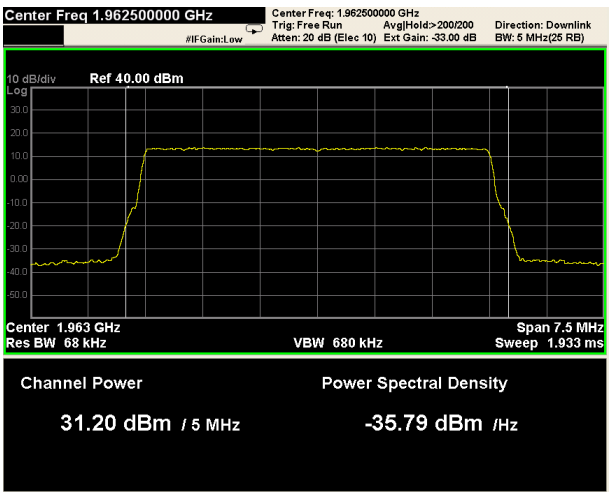



QAM

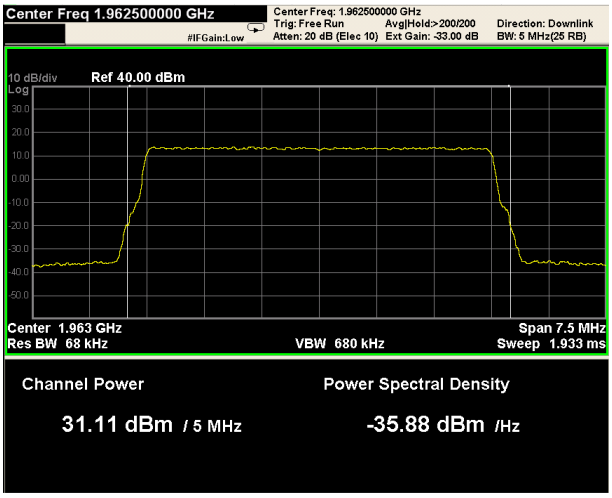



QPSK

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

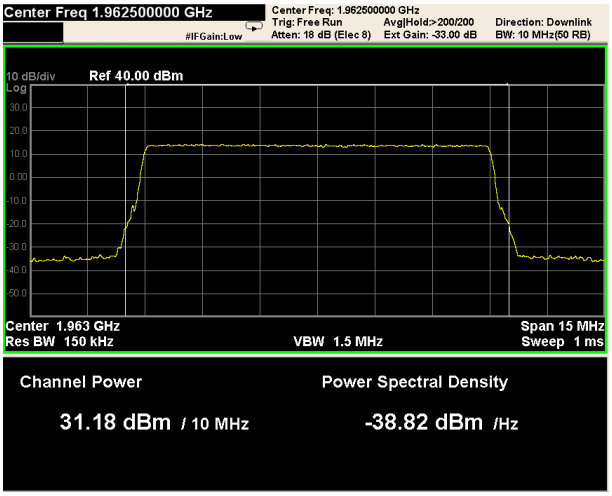



QAM

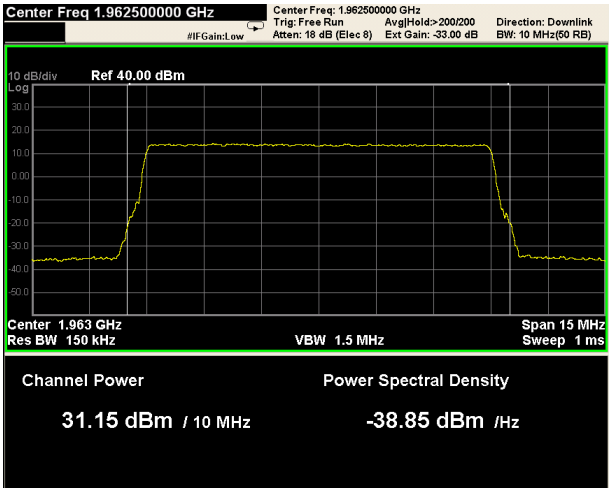



QPSK

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

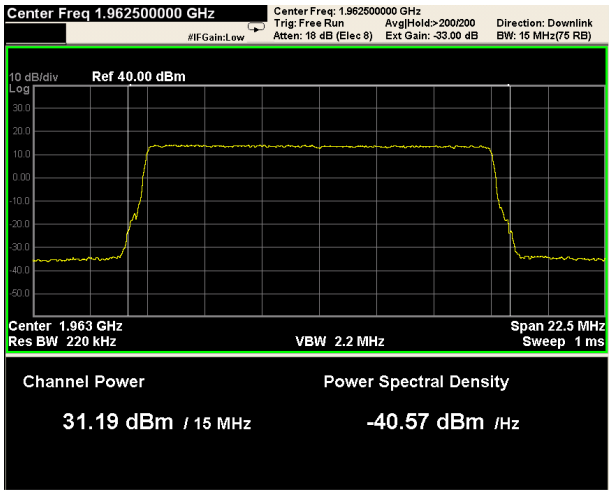



QAM

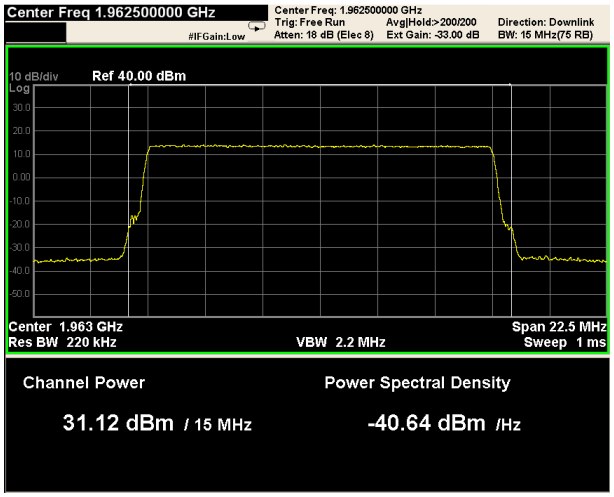



QPSK

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

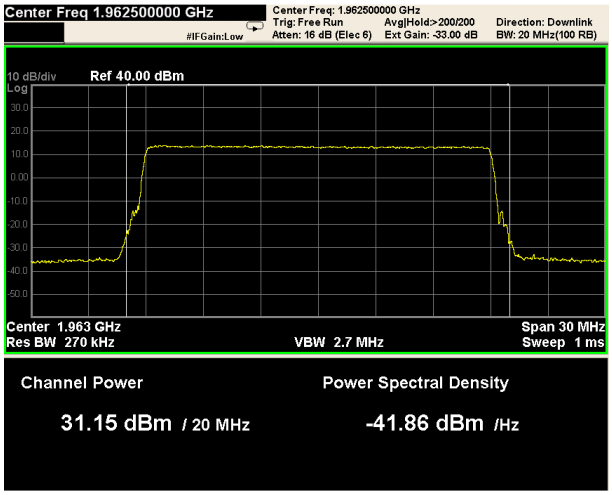



QAM

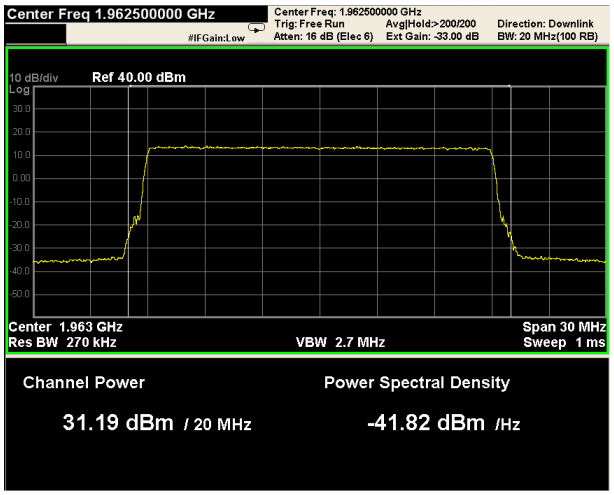



QPSK

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




QAM




QPSK

## Clause 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.

| Assigned frequency range, MHz | Occupied bandwidth, dBc |
|---|---|
| 1850–1910 | −26 |

Test date: 2015-03-09

Test results: Pass

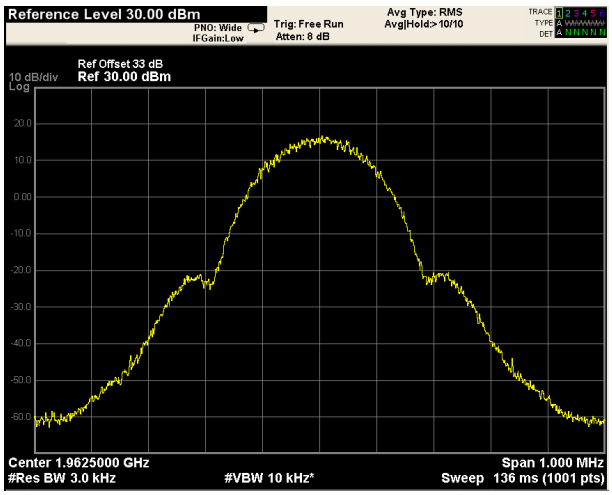
### Special notes

Resolution bandwidth was set wider or equal than occupied bandwidth.

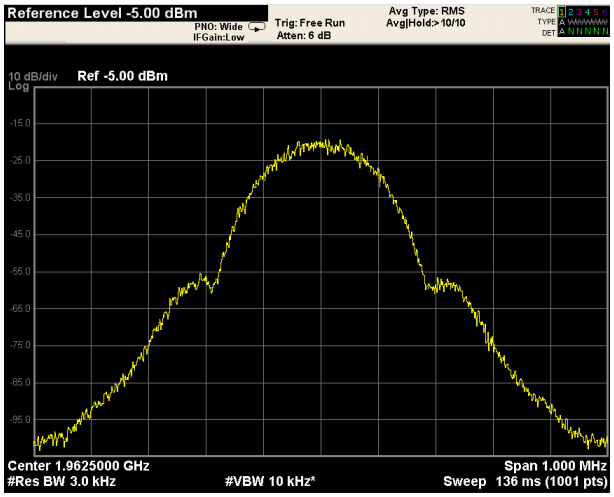
## Clause 2.1049 Occupied bandwidth, continued

## Test data

### Mod. GSM (Down-link)

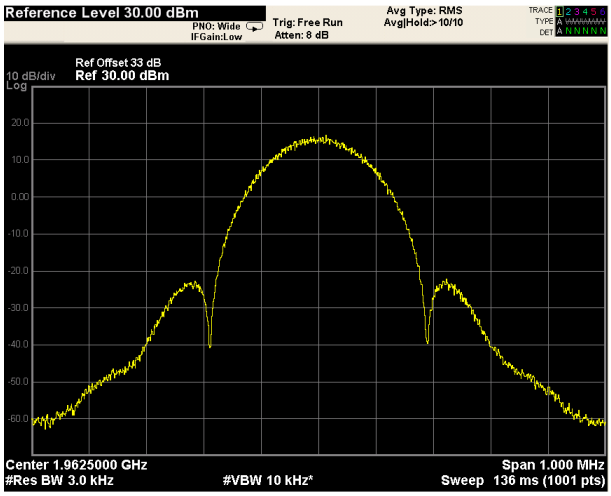



**Output**

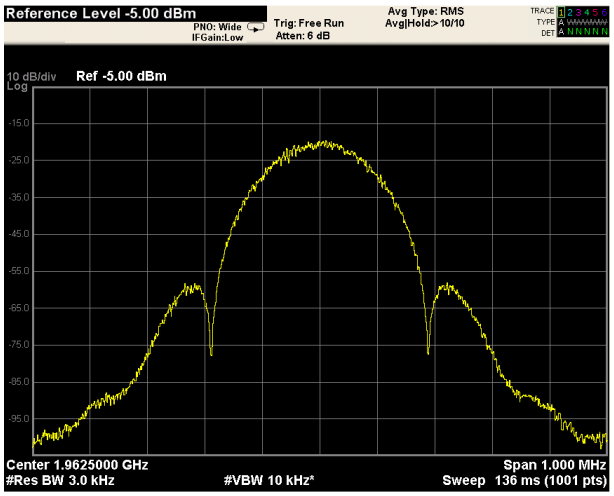



**Input**

### Mod. EDGE (Down-link)

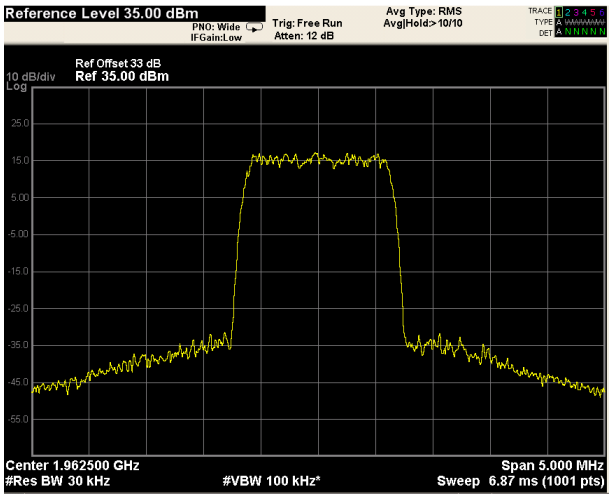



**Output**

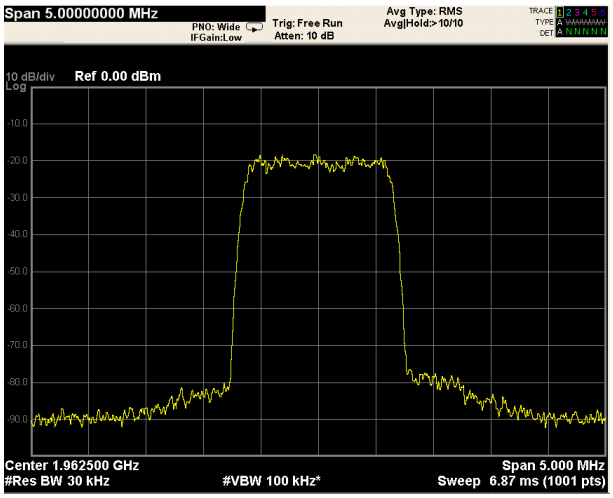



**Input**

## Mod. CDMA (Down-link)

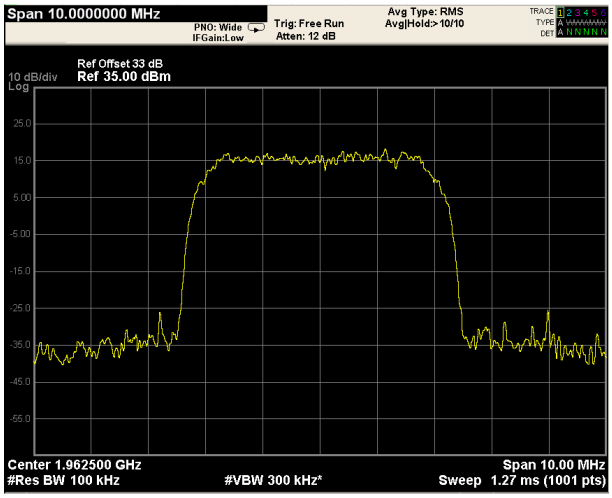



**Output**

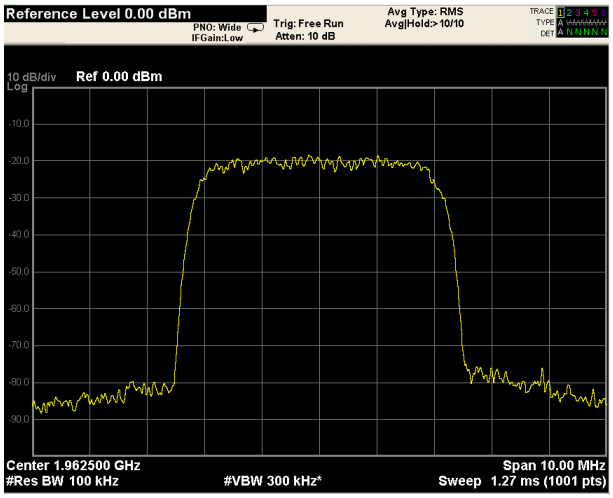



**Input**

## Mod. WCDMA (Down-link)

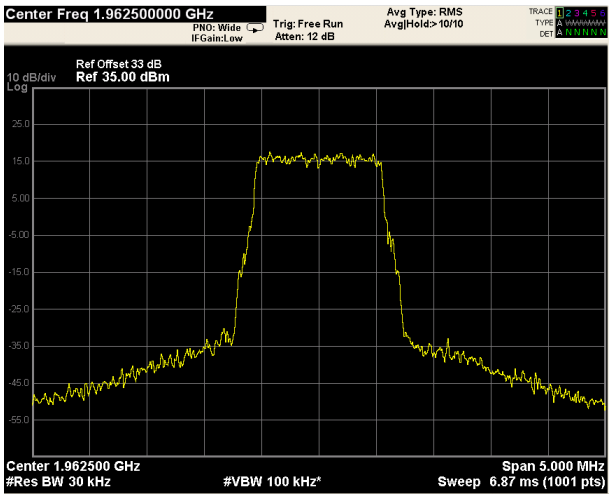



**Output**

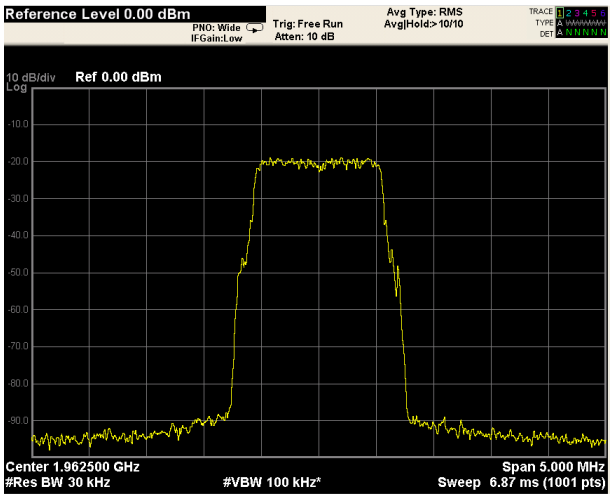



**Input**

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

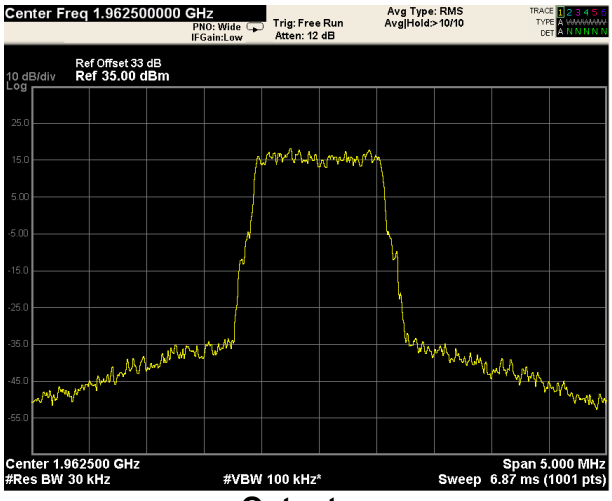



**Output**

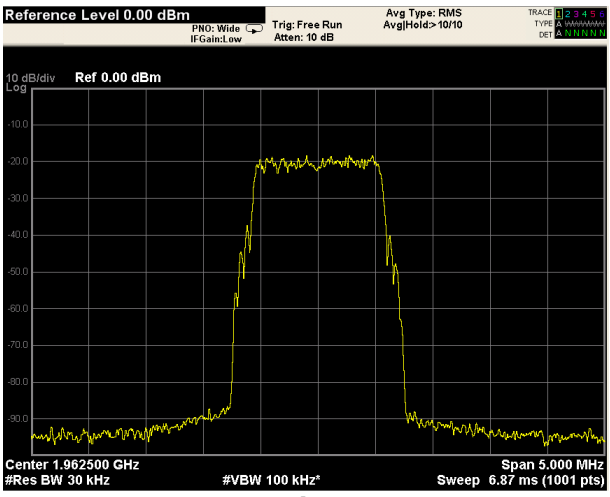



**Input**

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

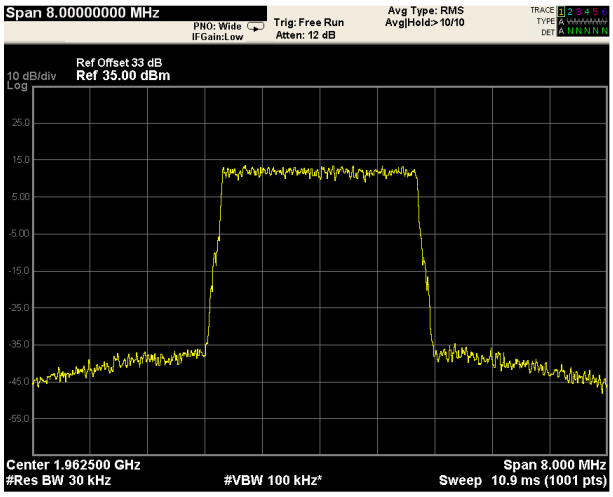



**Output**

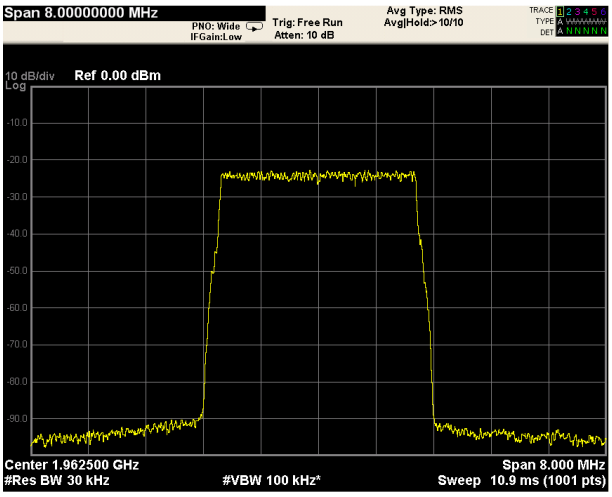



**Input**

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

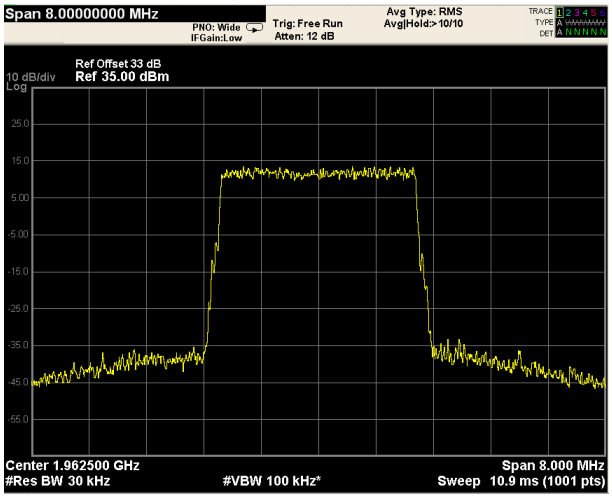



**Output**

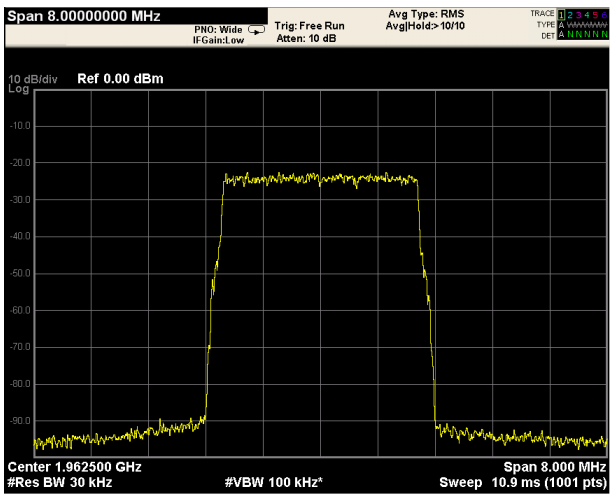



**Input**

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

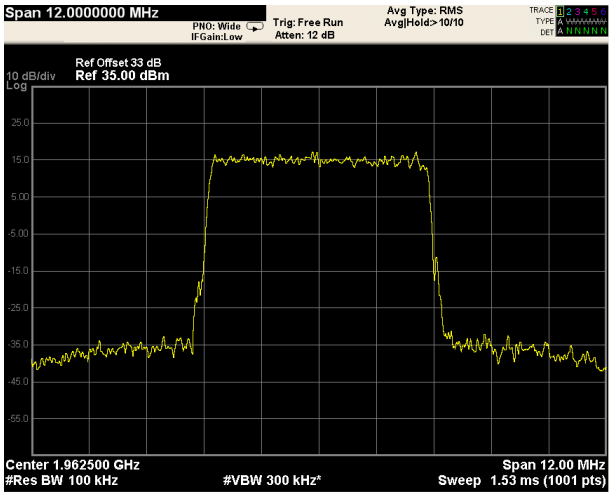



**Output**

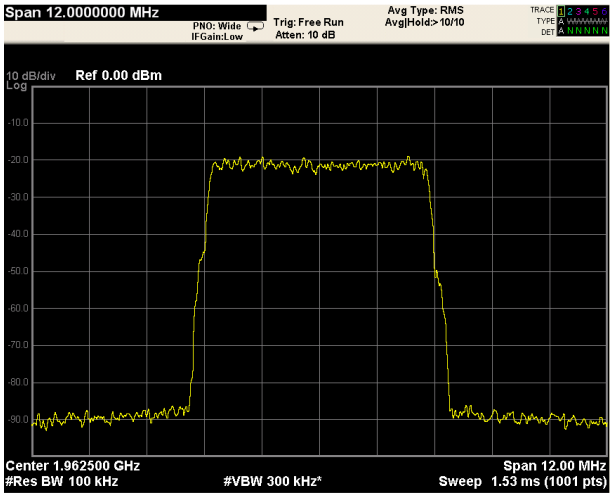



**Input**

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

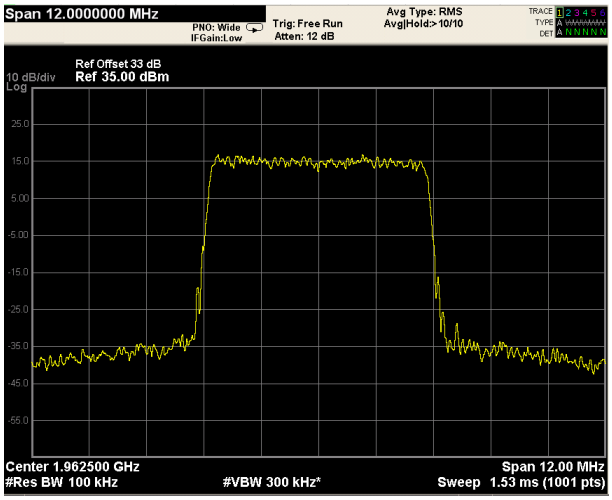



**Output**

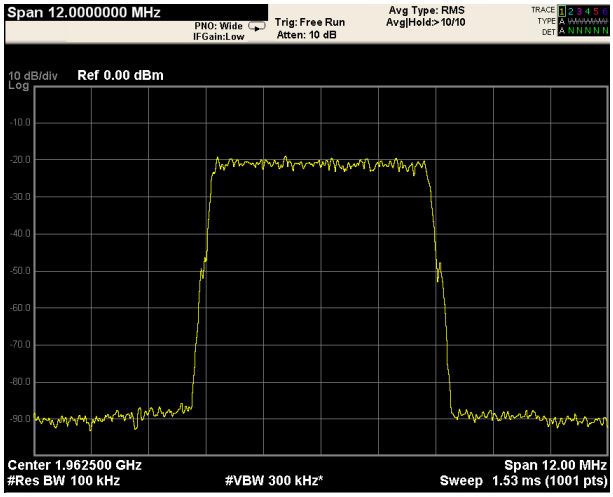



**Input**

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

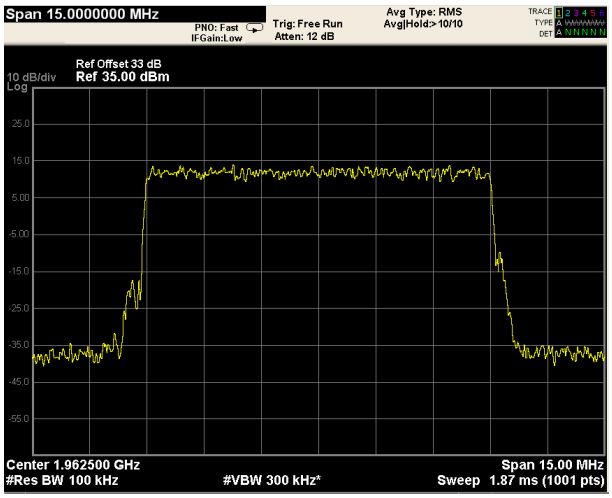



**Output**

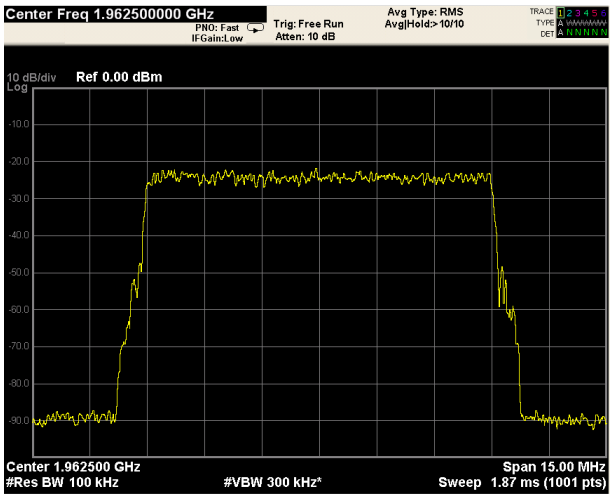



**Input**

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

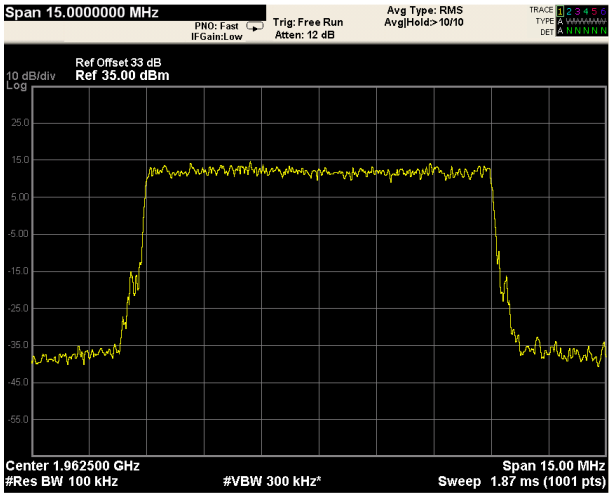



**Output**

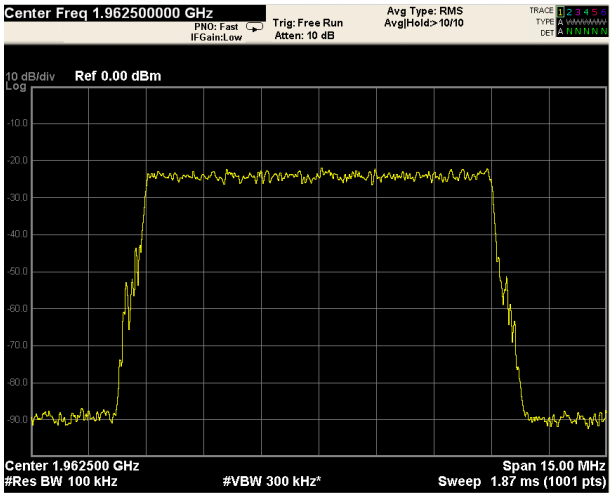



**Input**

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

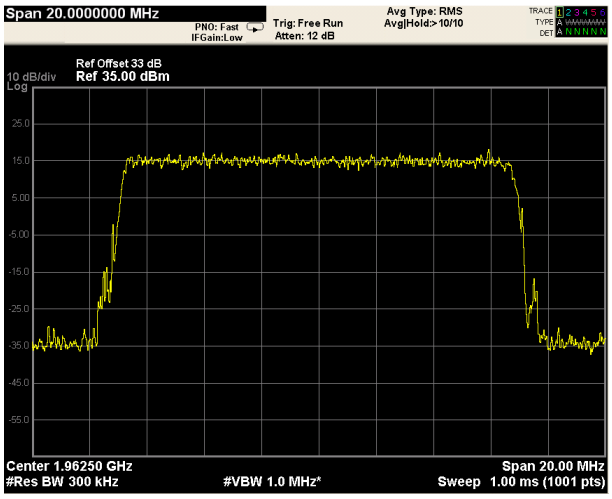



**Output**

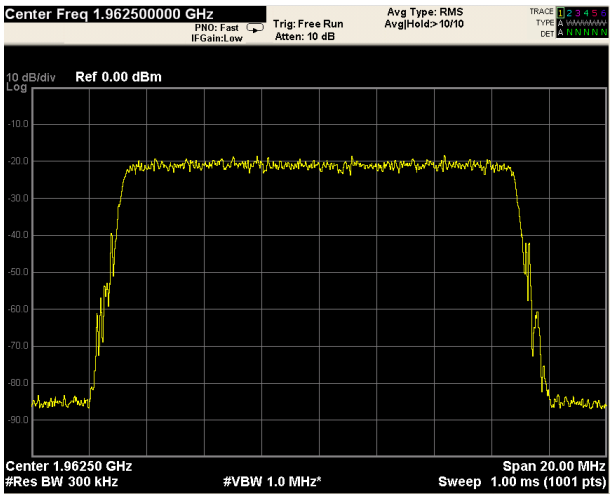



**Input**

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

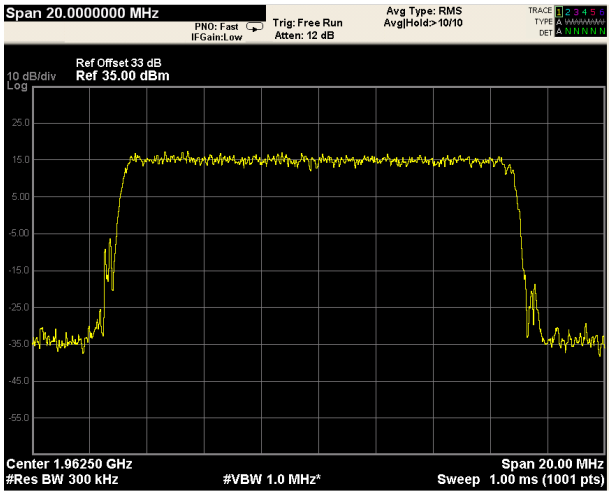



**Output**

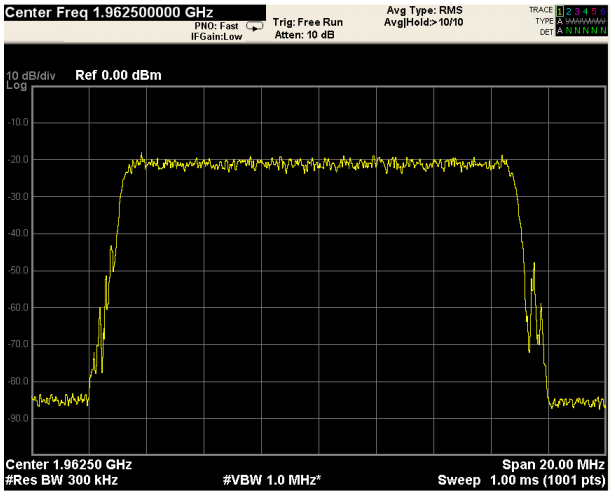



**Input**

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

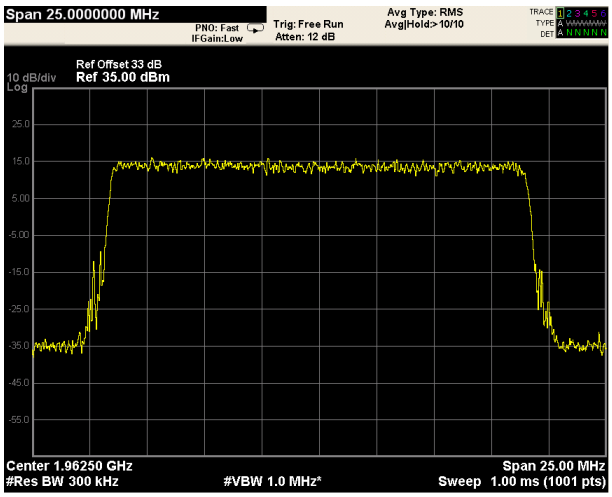



**Output**

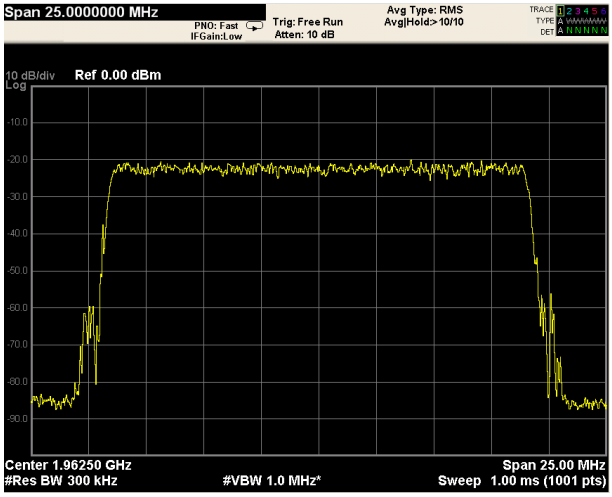



**Input**

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

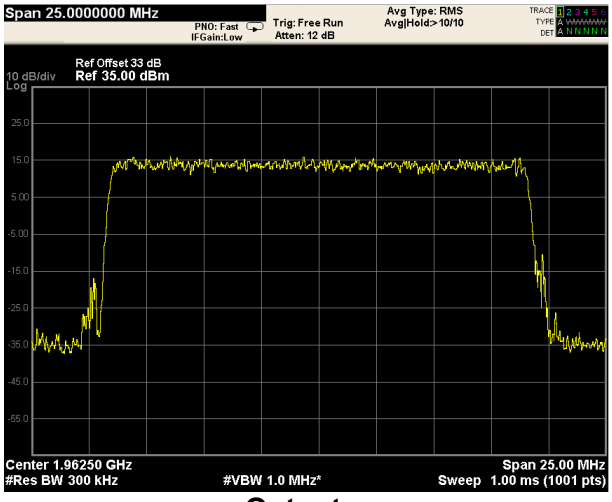



**Output**

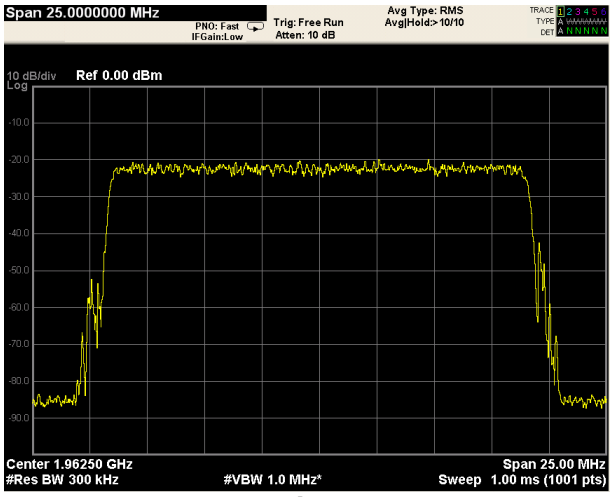



**Input**

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




**Output**




**Input**

## Clause 24.238(a) Spurious emissions at antenna terminal

a) Out of band emissions. 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.

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm |
|---|---|---|
| 30–10$^{th}$ harmonic | 43 + 10 Log(P) | -13 |

Test date: 2015-03-09

Test results: Pass

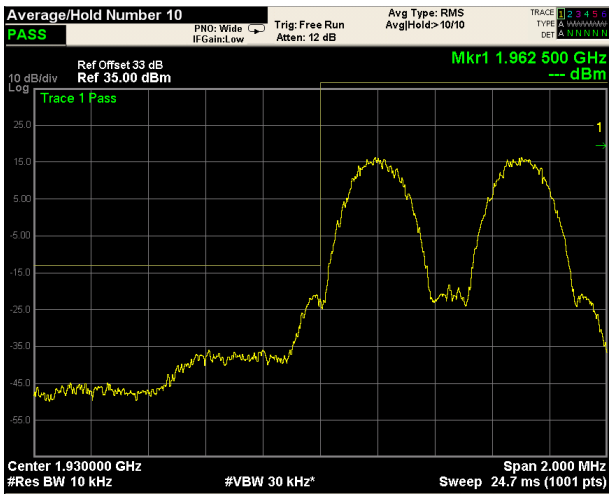
## Special notes

- The spectrum was searched from 30 MHz up to 10$^{th}$ harmonic
- Only the worst data presented in the test report.

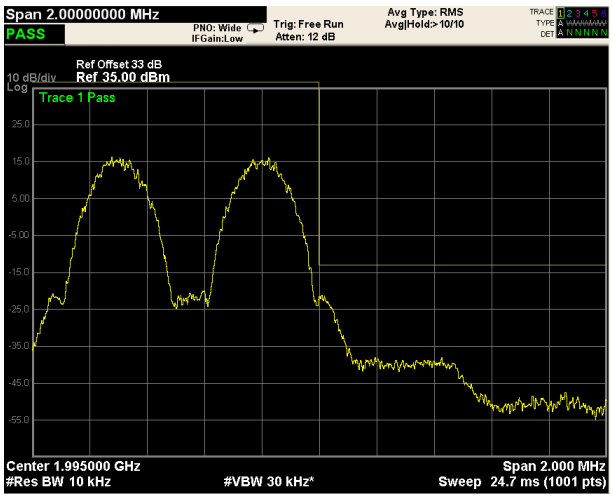
(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( *i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

## Clause 24.238(a), continued: band edges inter modulation

### Mod. GSM (Down-link)

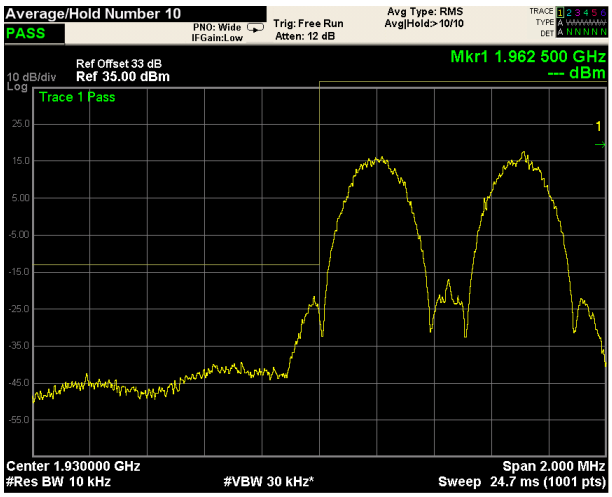



Low Band Edge

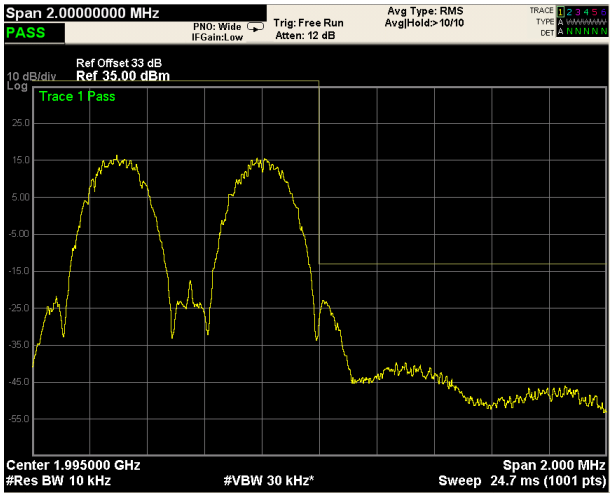



High Band Edge

### Mod. EDGE (Down-link)

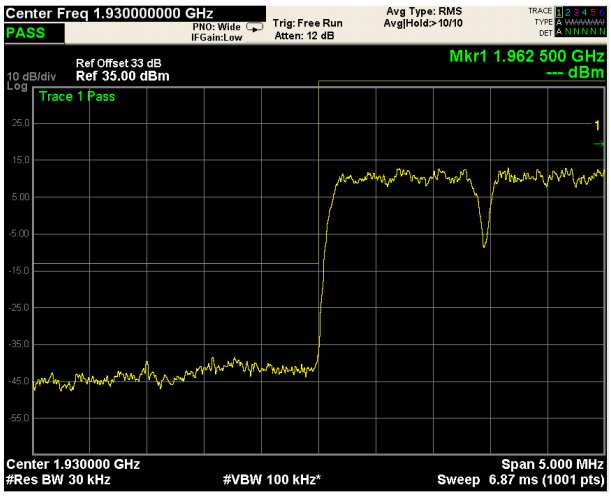



Low Band Edge

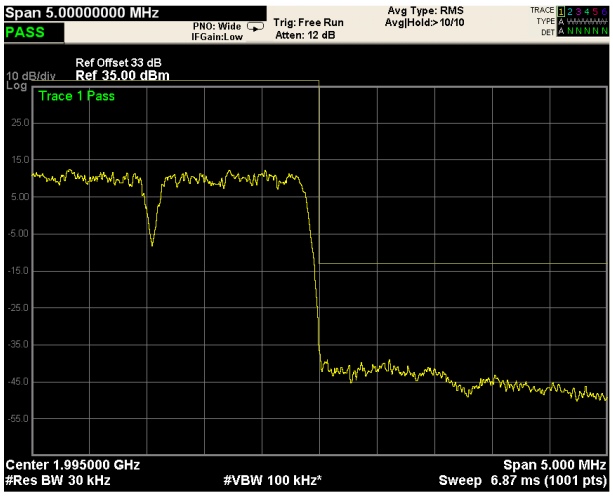



High Band Edge

## Mod. CDMA (Down-link)

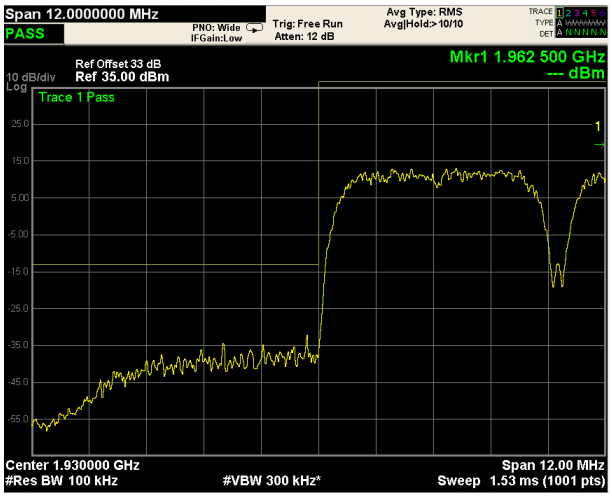



Low Band Edge

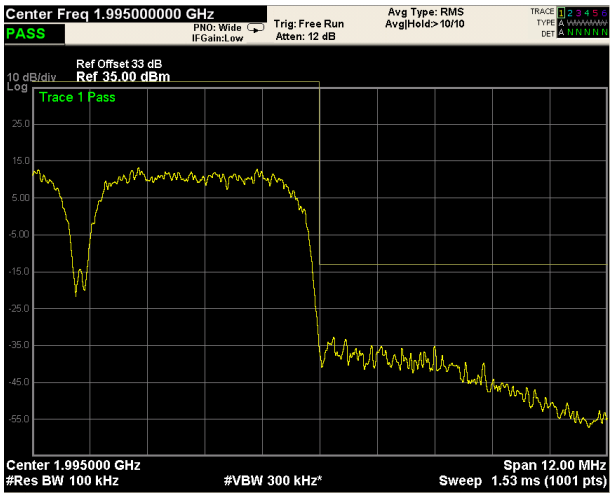



High Band Edge

## Mod. WCDMA (Down-link)

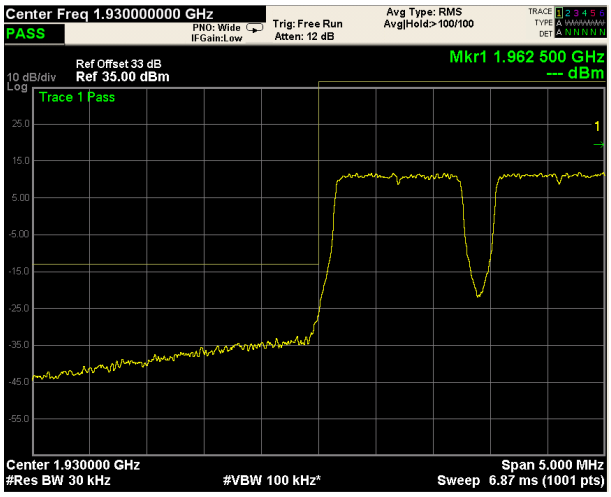



Low Band Edge

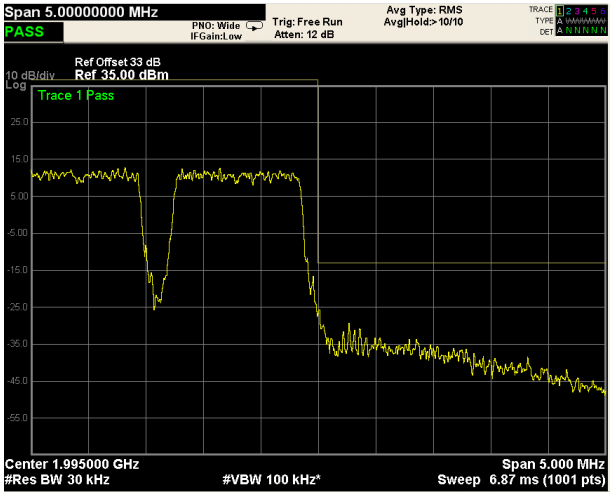



High Band Edge

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

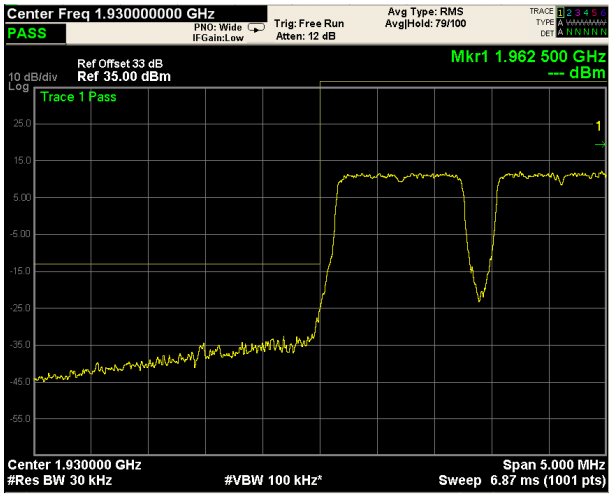



Low Band Edge

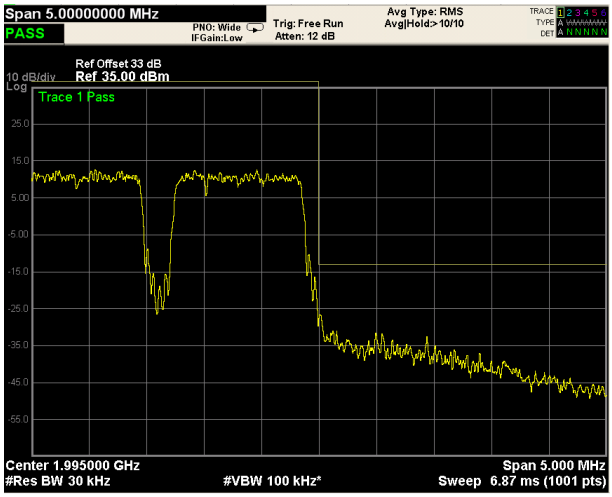



High Band Edge

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

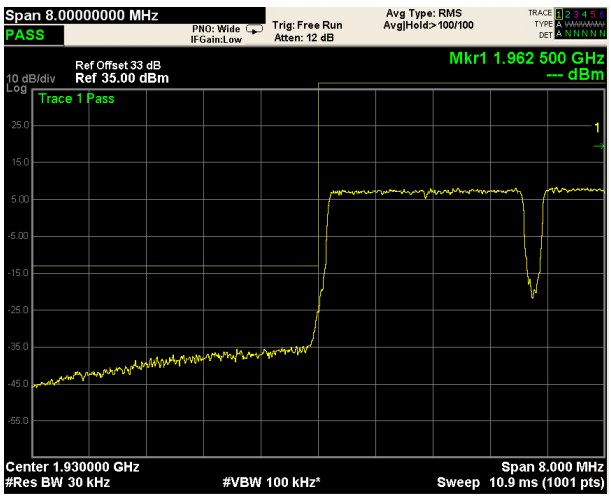



Low Band Edge

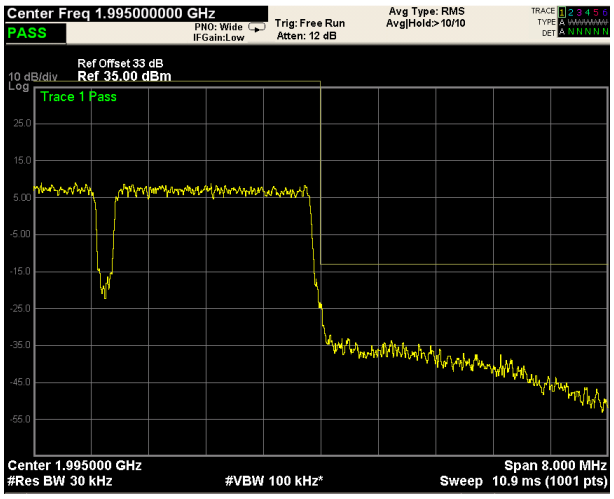



High Band Edge

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

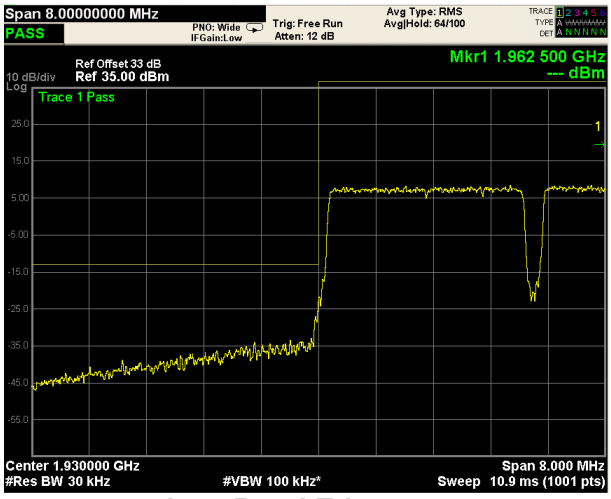



**Low Band Edge**

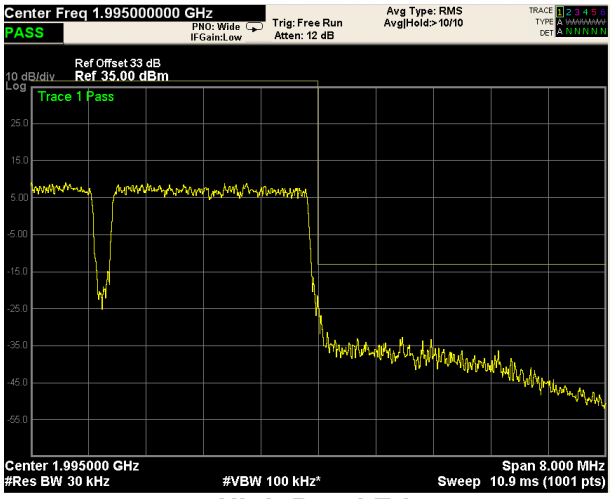



**High Band Edge**

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

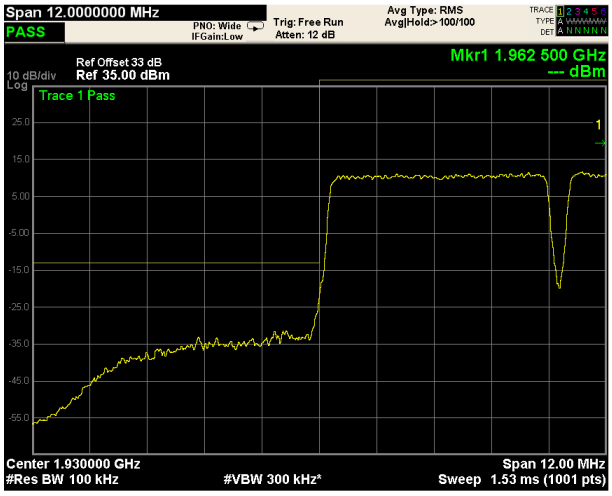



**Low Band Edge**

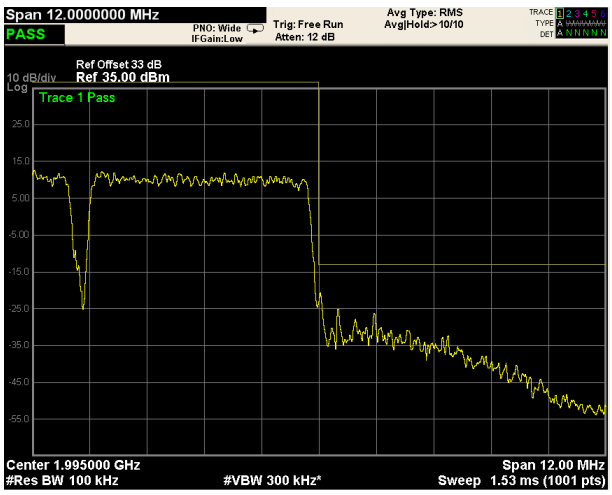



**High Band Edge**

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

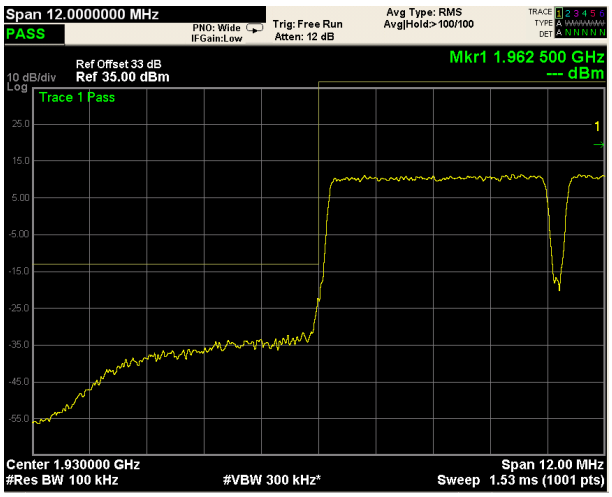



**Low Band Edge**

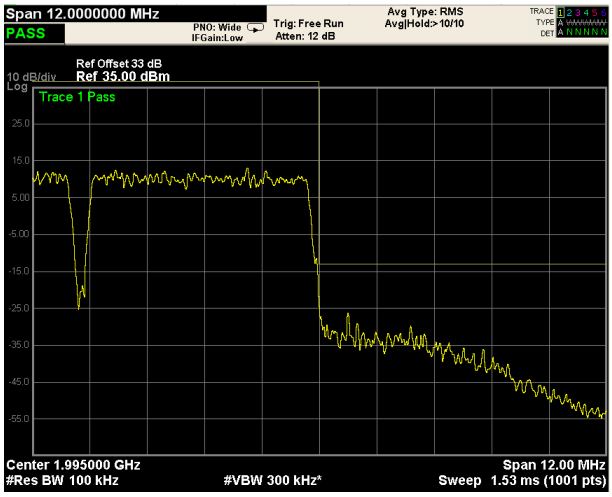



**High Band Edge**

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

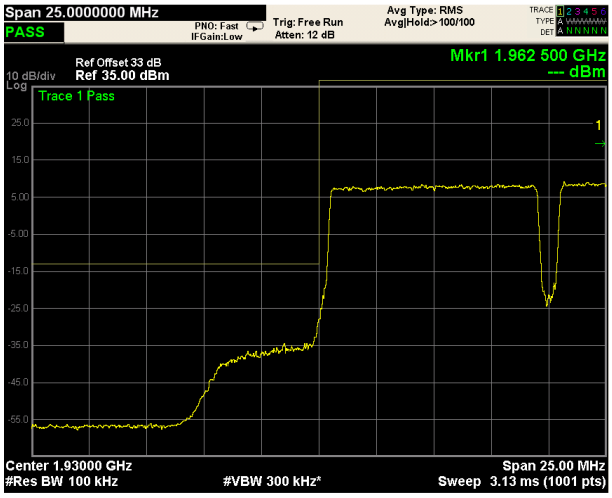



**Low Band Edge**

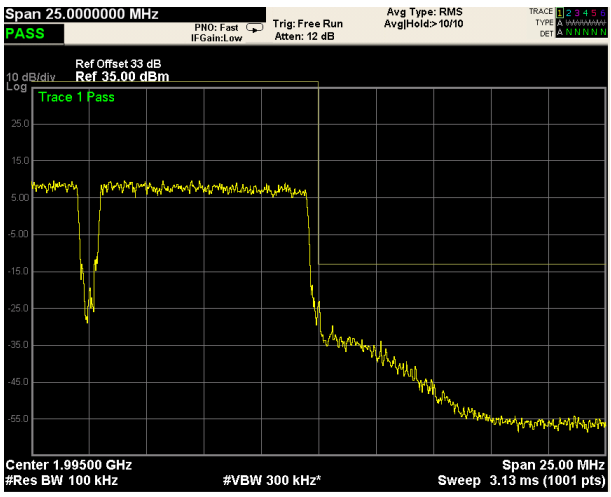



**High Band Edge**

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

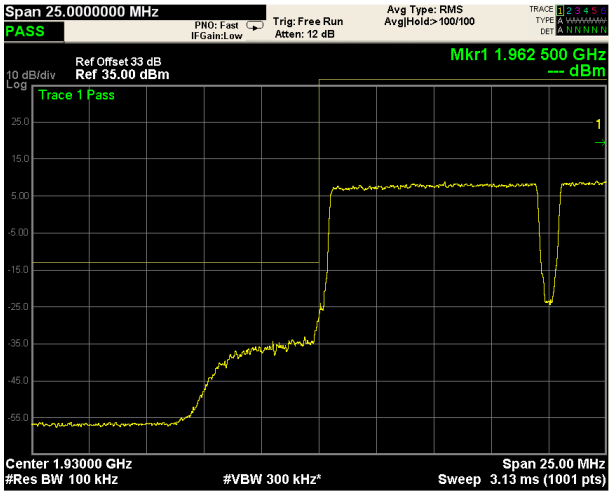



Low Band Edge

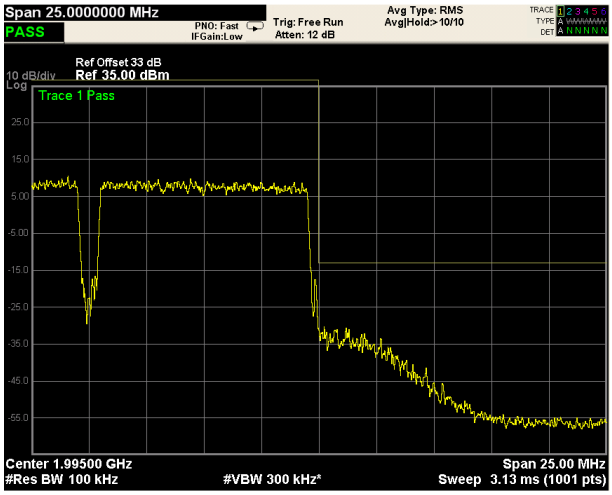



High Band Edge

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

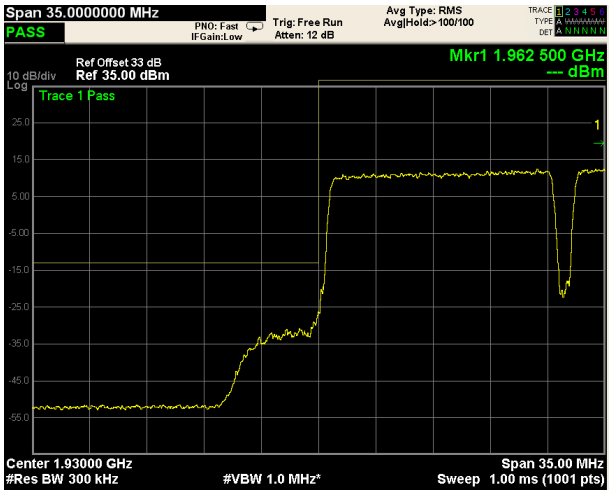



Low Band Edge

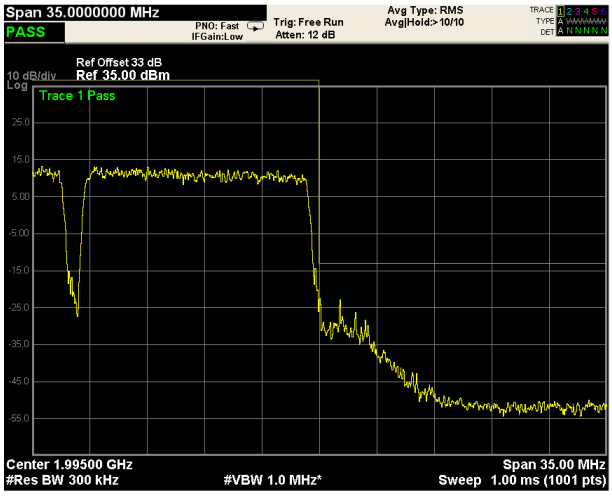



High Band Edge

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

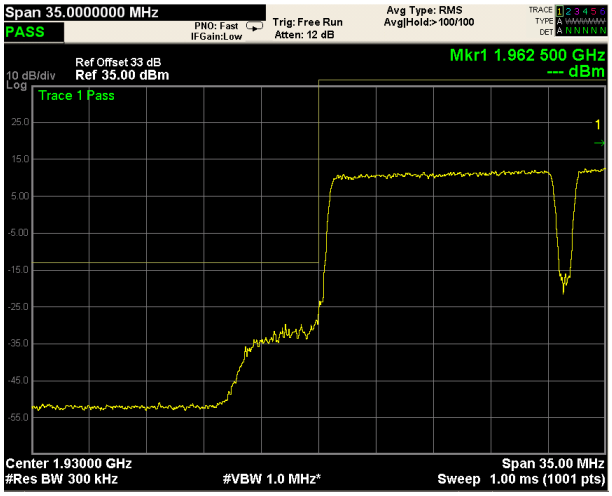



Low Band Edge

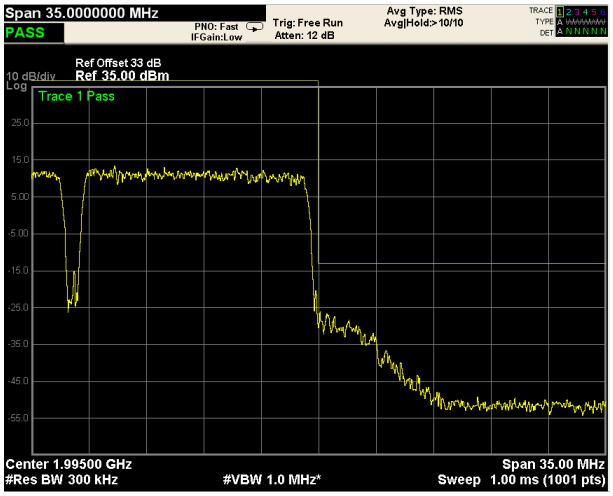



High Band Edge

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

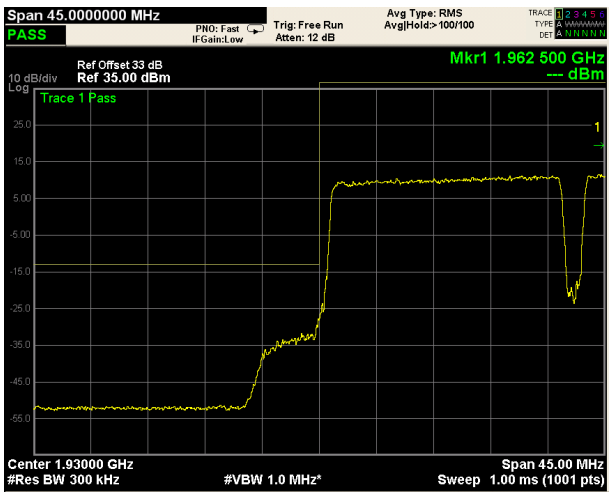



Low Band Edge

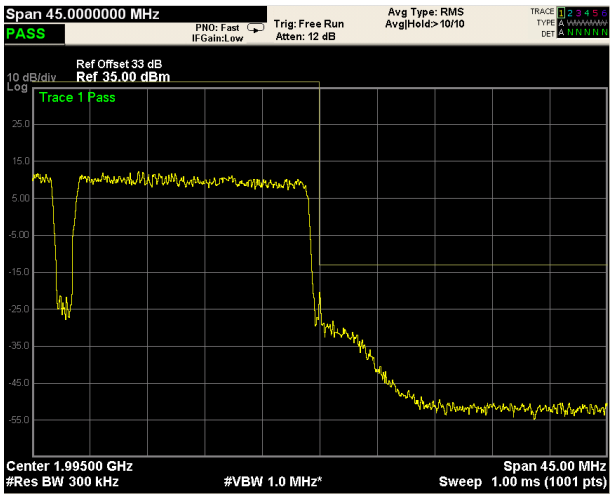



High Band Edge

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

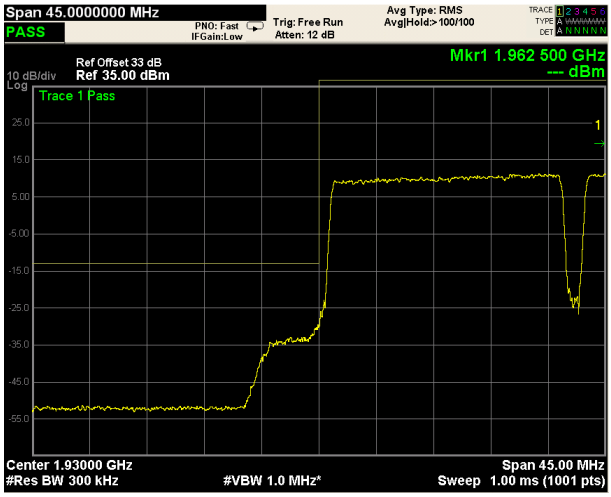



Low Band Edge

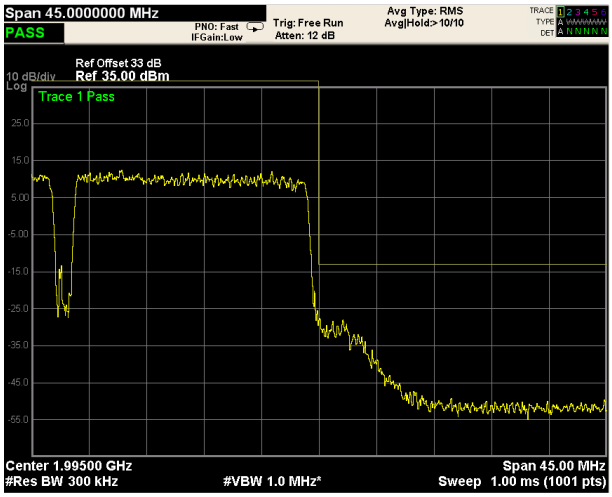



High Band Edge

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



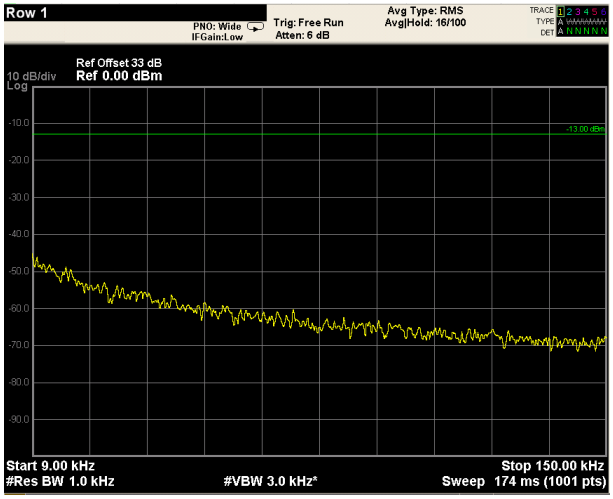

Low Band Edge



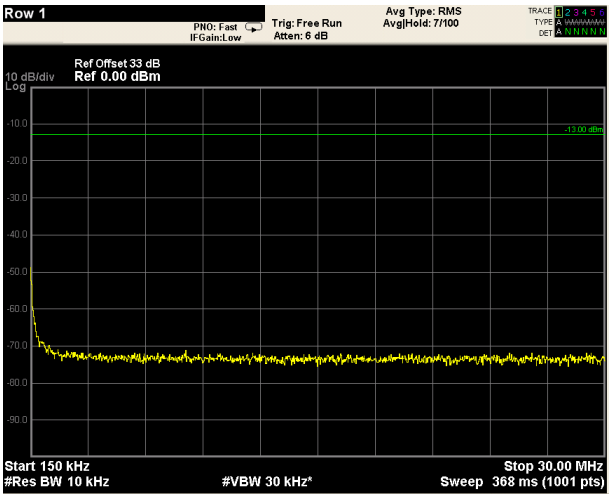

High Band Edge

## Clause 24.238(a), continued: spurious emissions at antenna terminal

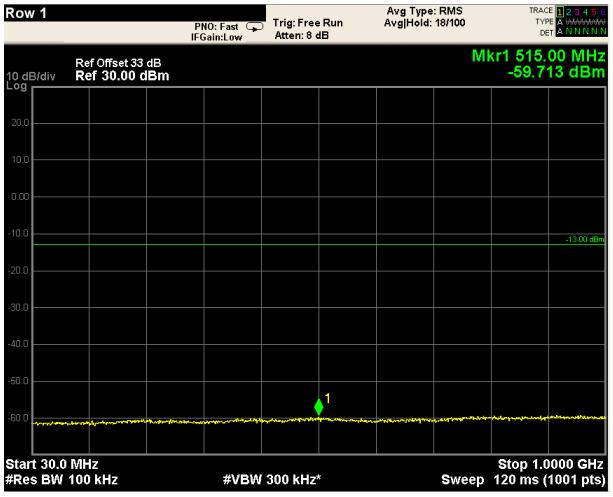
### Mod. GSM (Down-link)



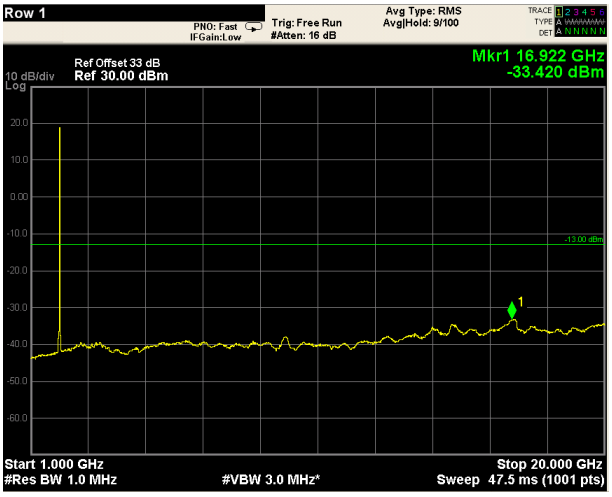

9kHz-150kHz




150kHz-30MHz

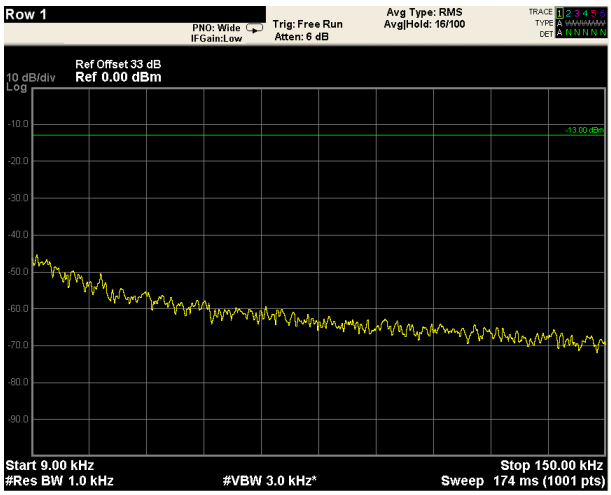



30MHz-1GHz

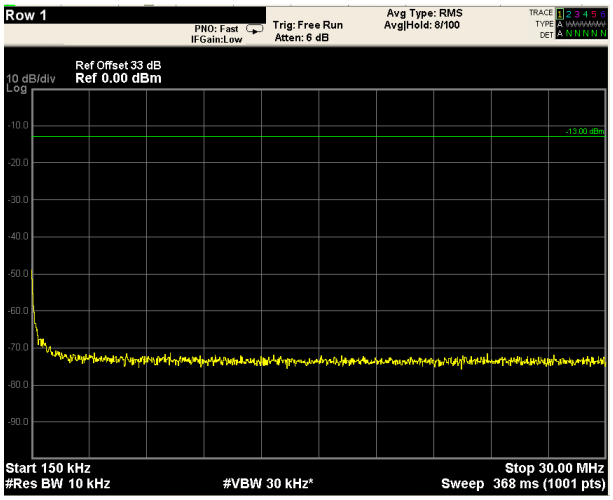



1GHz-20GHz

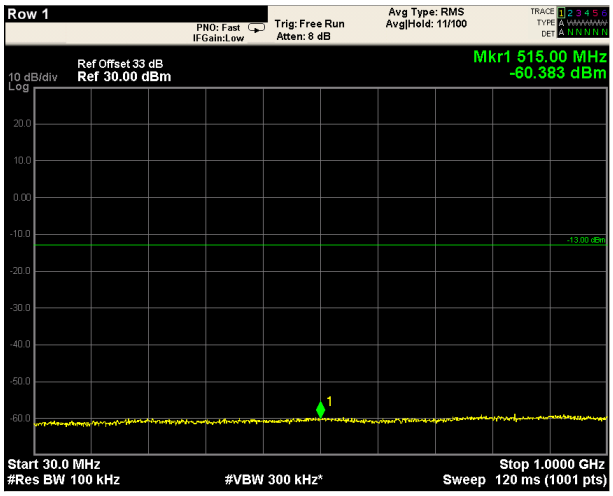
## Mod. EDGE (Down-link)



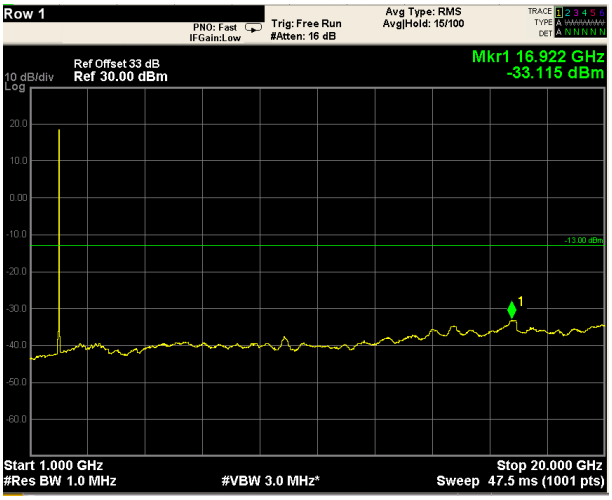

**9kHz-150kHz**




**150kHz-30MHz**

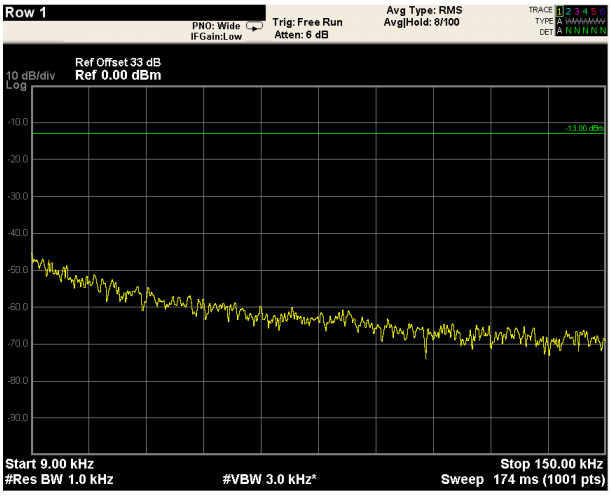



**30MHz-1GHz**

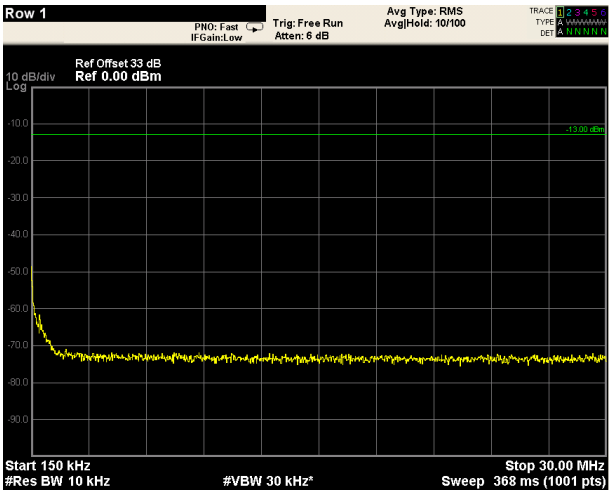



**1GHz-20GHz**

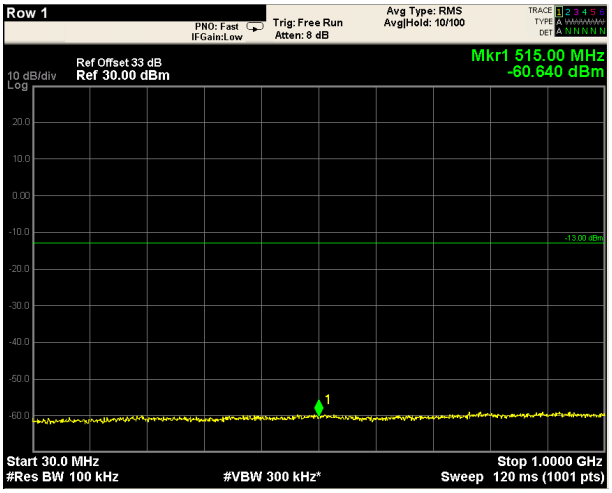
## Mod. CDMA (Down-link)



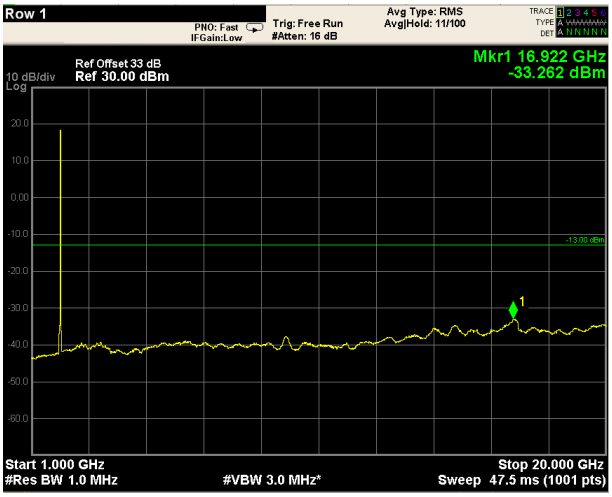

9kHz-150kHz




150kHz-30MHz

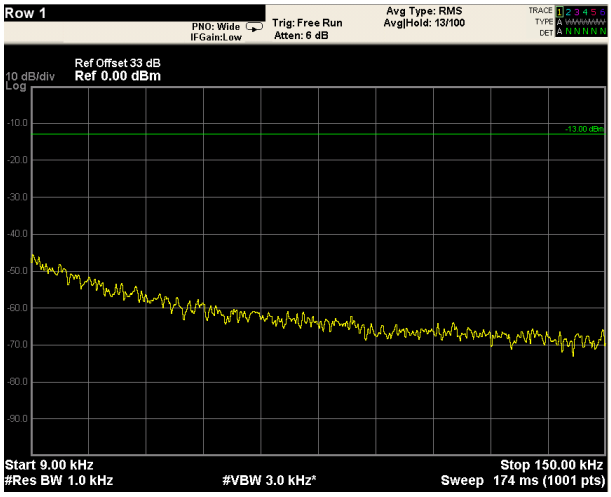



30MHz-1GHz

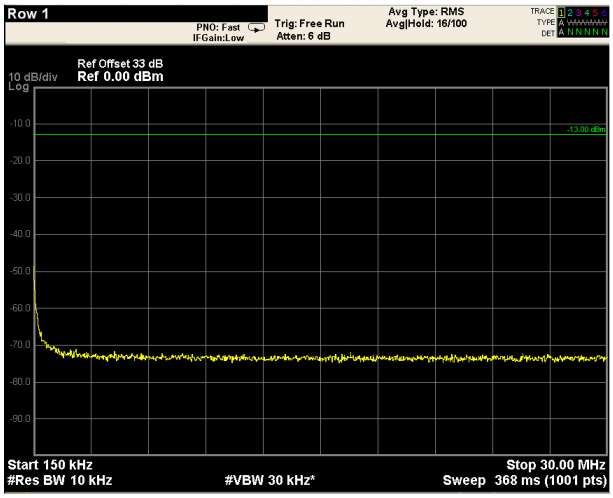



1GHz-20GHz

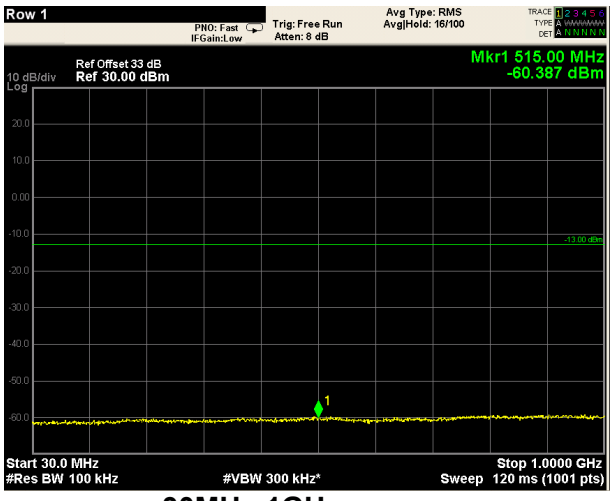
## Mod. WCDMA (Down-link)



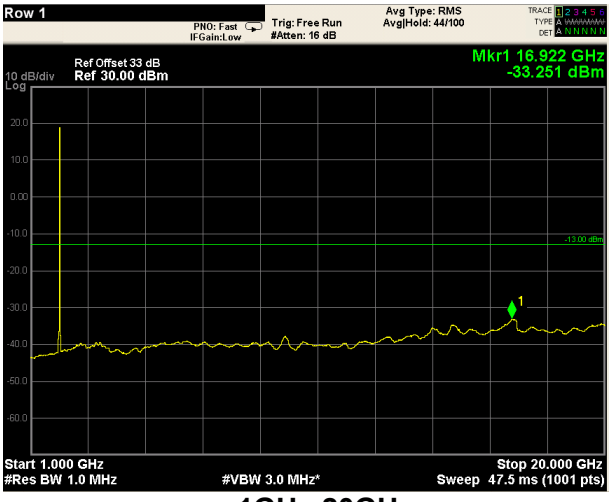

**9kHz-150kHz**




**150kHz-30MHz**

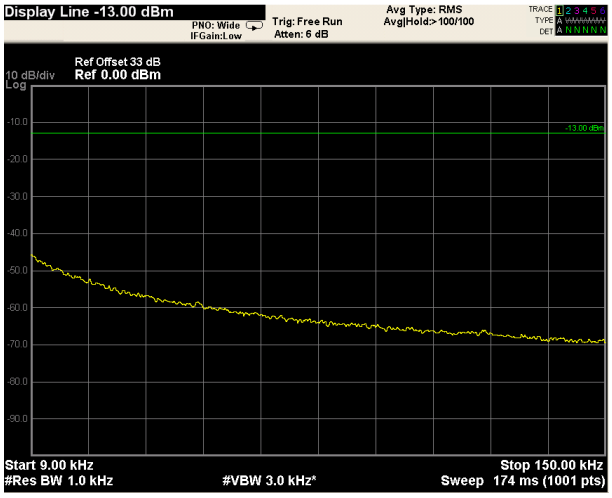



**30MHz-1GHz**

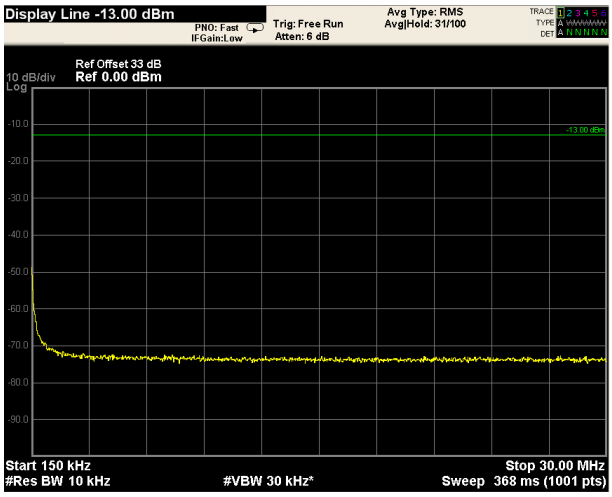



**1GHz-20GHz**

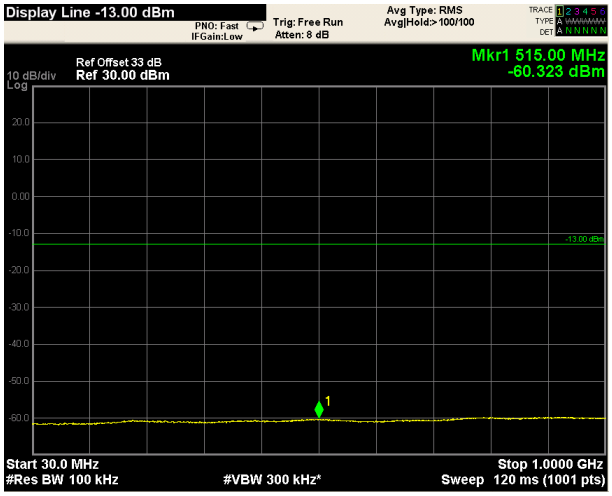
## Mod. LTE 1.4MHz (QAM) (Down-link)



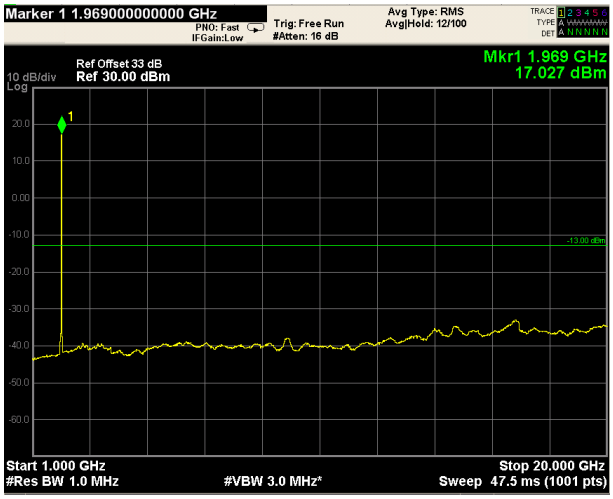

**9kHz-150kHz**




**150kHz-30MHz**

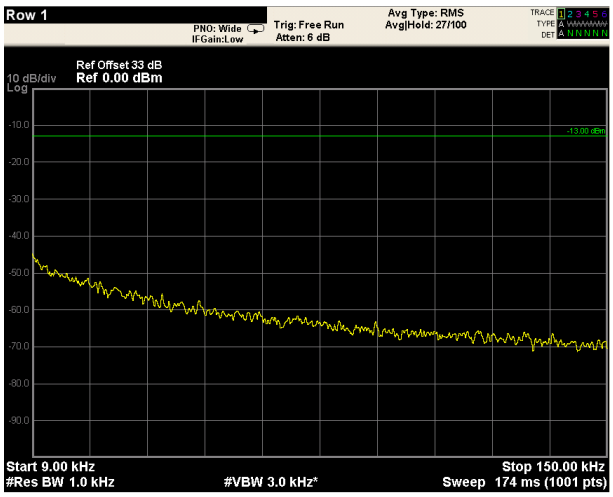



**30MHz-1GHz**

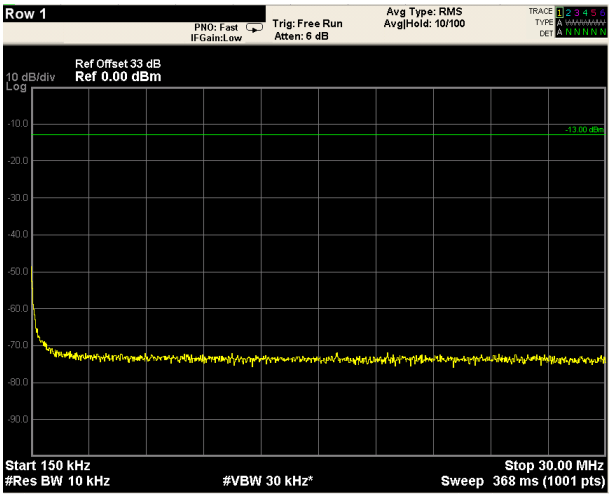



**1GHz-20GHz**

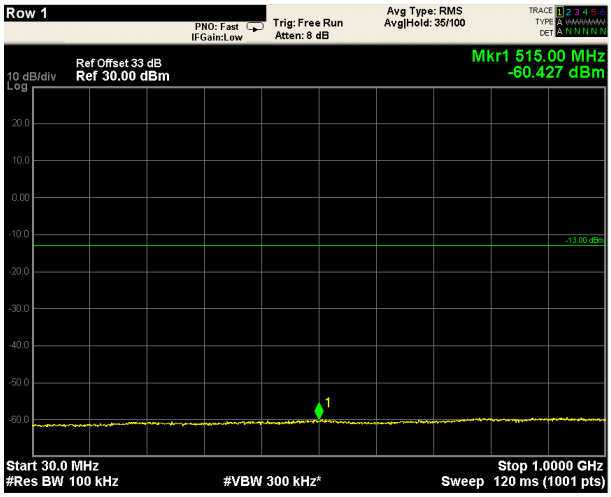
## Mod. LTE 1.4MHz (QPSK) (Down-link)



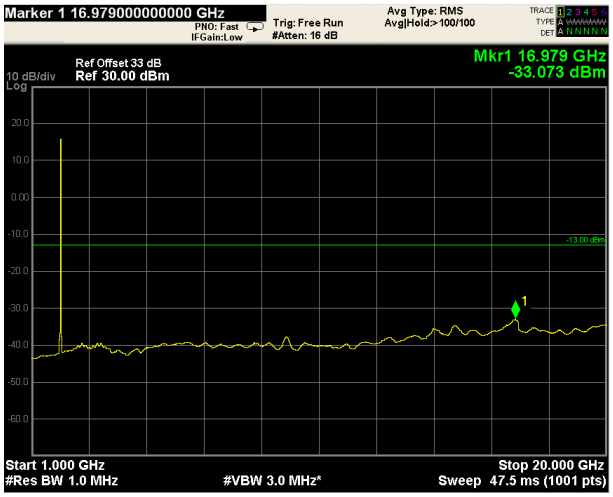

**9kHz-150kHz**




**150kHz-30MHz**

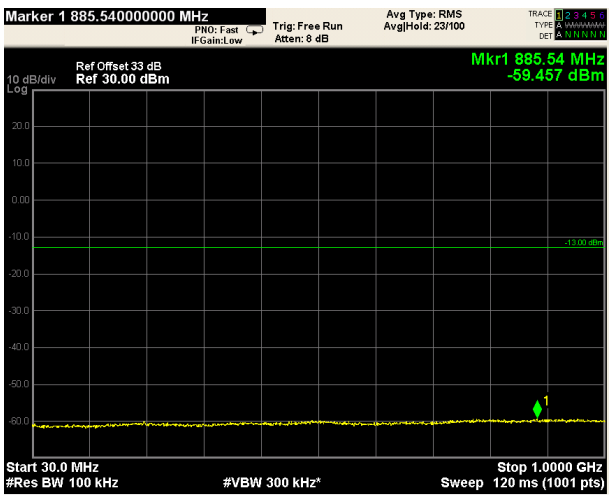



**30MHz-1GHz**

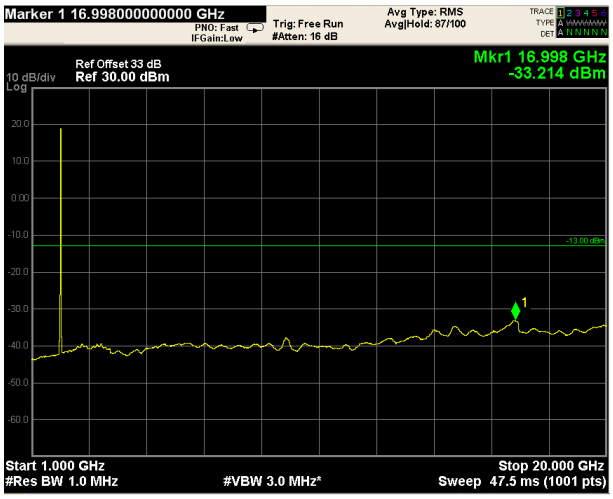



**1GHz-20GHz**

## Mod. LTE 3MHz, only 30M-20G plot (Down-link)

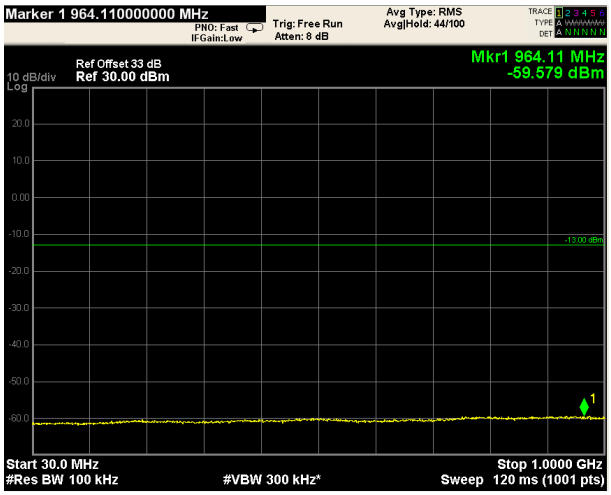



30MHz-1GHz

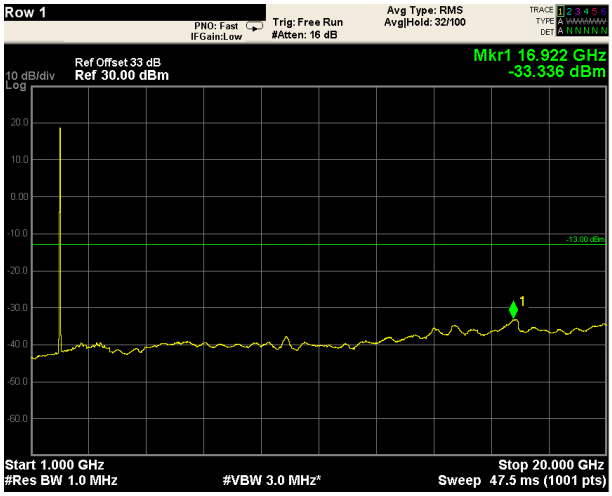



1GHz-20GHz

## Mod. LTE 5MHz, only 30M-20G plot (Down-link)

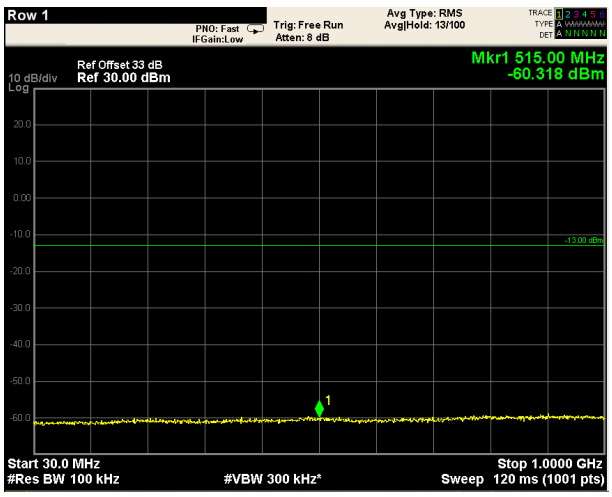



30MHz-1GHz

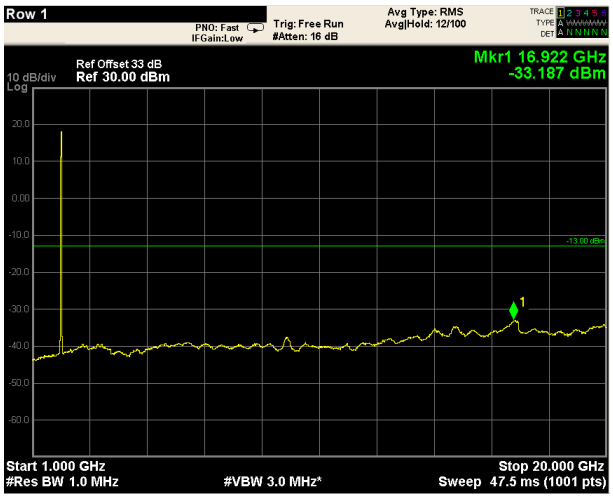



1GHz-20GHz

## Mod. LTE 10MHz, only 30M-20G plot (Down-link)

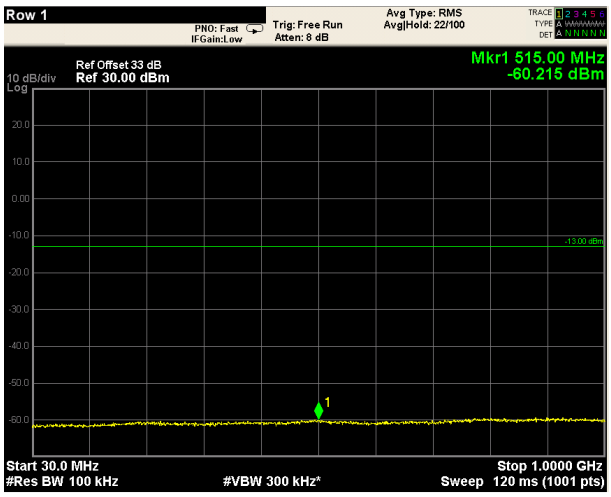



30MHz-1GHz

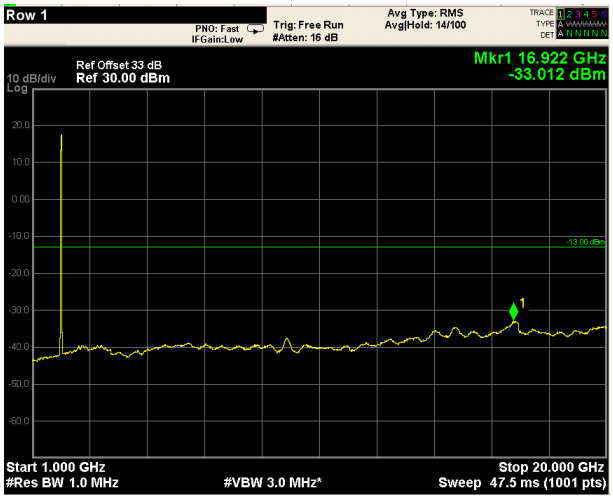



1GHz-20GHz

## Mod. LTE 15MHz, only 30M-20G plot (Down-link)

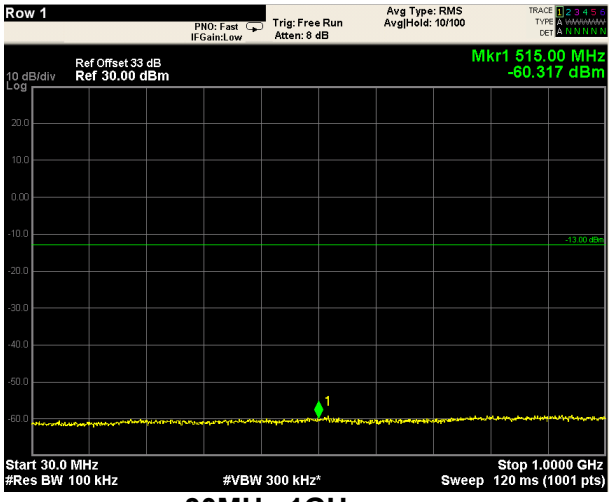



30MHz-1GHz

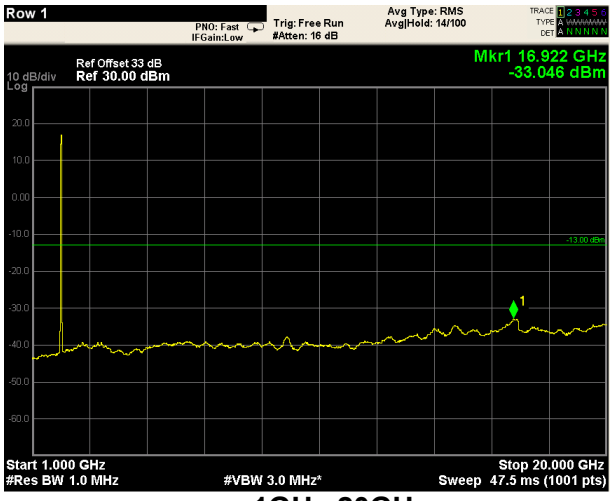



1GHz-20GHz

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




30MHz-1GHz




1GHz-20GHz

## Clause 24.238(a) Field strength of spurious radiation

a) Out of band emissions. 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.

| Frequency, MHz | Attenuation below carrier, dBc | ERP of spurious, dBm | Equivalent field strength limit* at 3 m, dBµV/m |
|---|---|---|---|
| 30–10$^{th}$ harmonic | 43 + 10 Log(P) | -13 | 84.4 |

* - Equivalent field strength limit was calculated from maximum allowed ERP of spurious as follows:

$E = \sqrt{\frac{30 \times P \times 1.64}{r}}$, where *P* is ERP in W, 1.64 is numeric gain of ideal dipole and *r* is antenna to EUT distance in m.

Test date: 2015-03-10

Test results: Pass

### Special notes

- The spectrum was searched from 30 MHz up to 10th harmonic
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- The EUT's antenna port was terminated with 50 Ω termination

(b) *Measurement procedure.* Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth ( *i.e.* 1 MHz or 1 percent of emission bandwidth, as specified).

### Test data

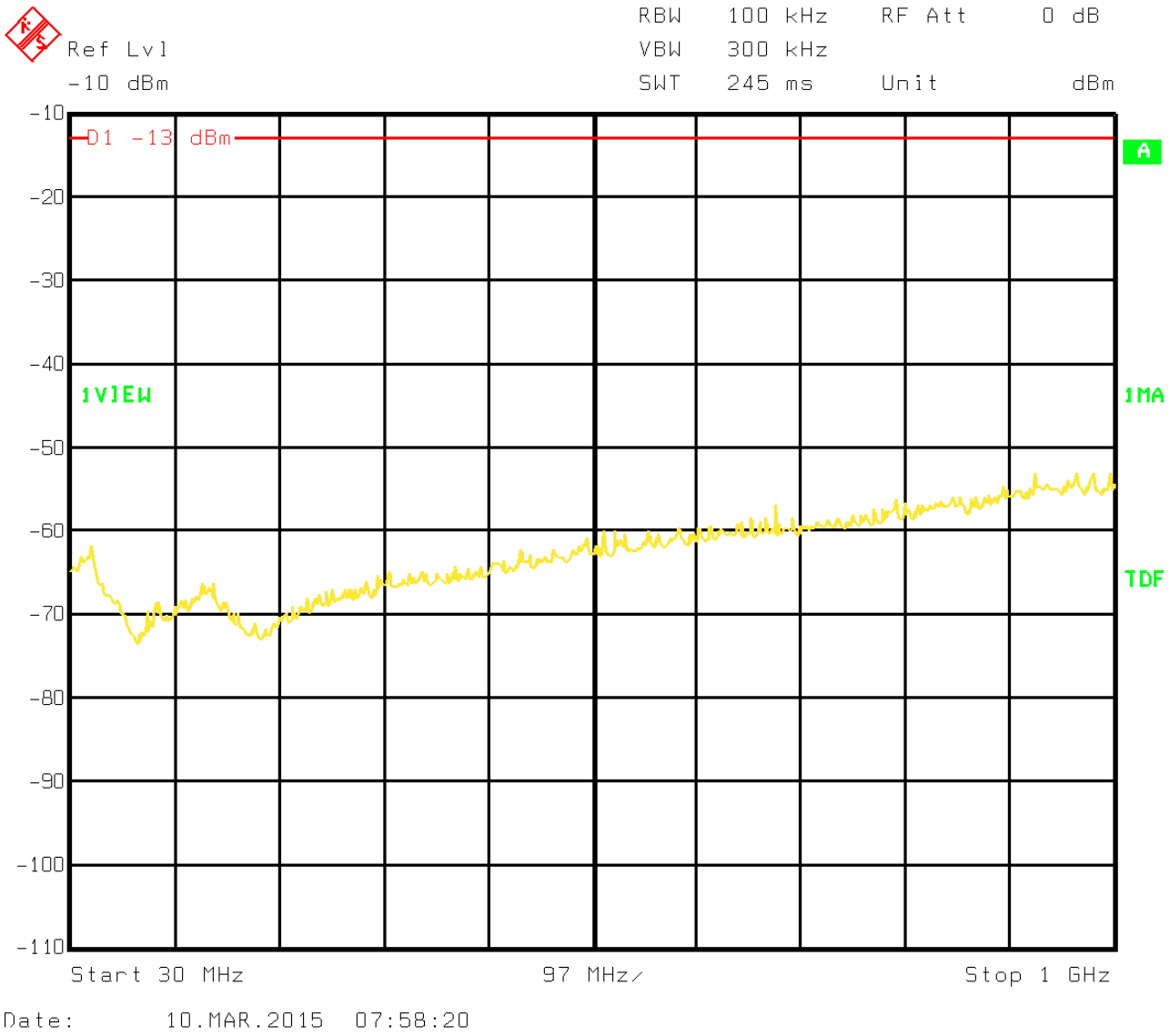
The D.U.T. was positioned according to the radiated emissions set-up

The D.U.T. antenna connector was terminated by a 50 Ω shielded dummy load.

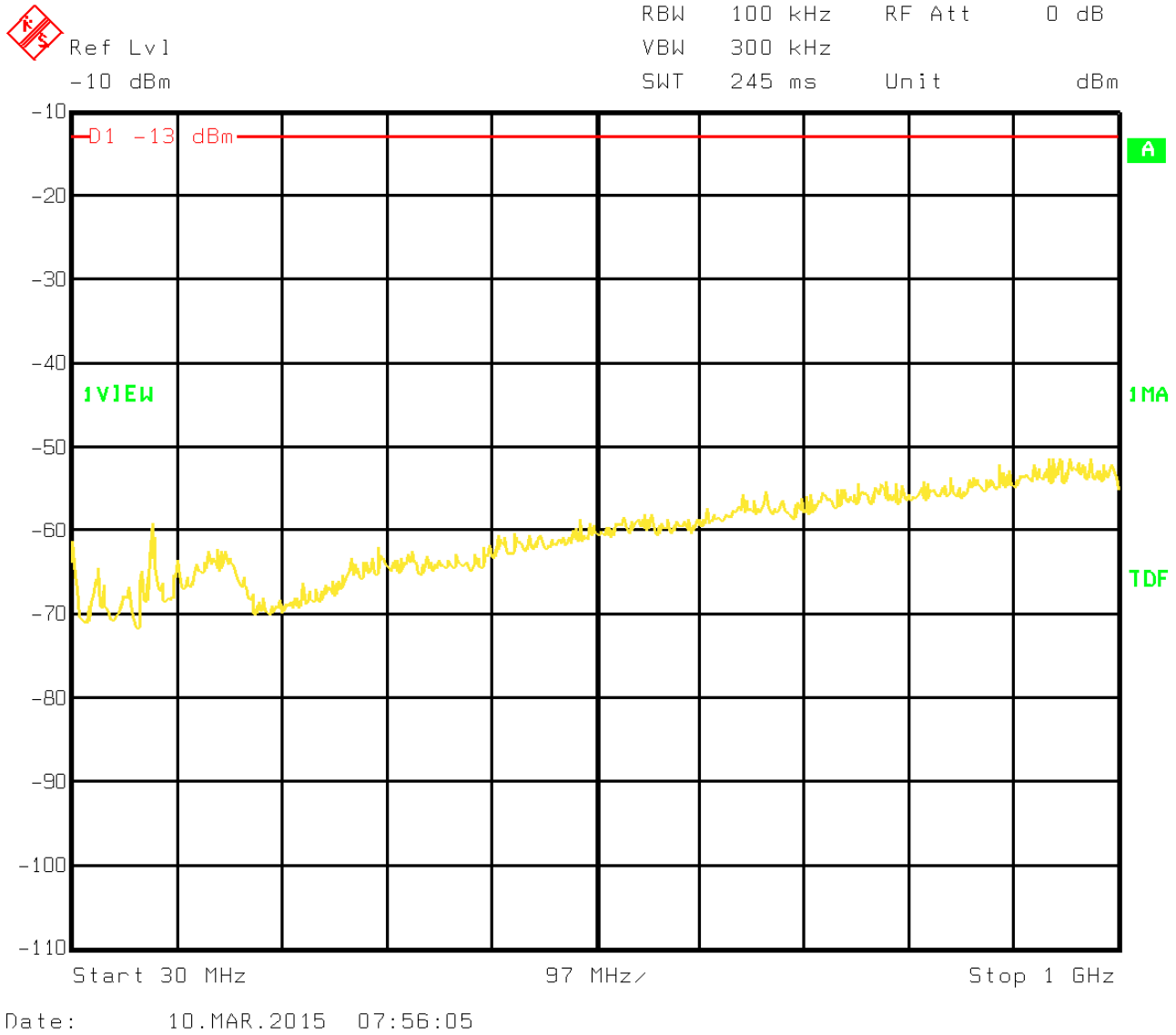
The spectrum was searched from 30 MHz to 1 GHz (RBW 100 kHz) & 1 GHz (RBW 1 MHz) to the tenth harmonic of the carrier.

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

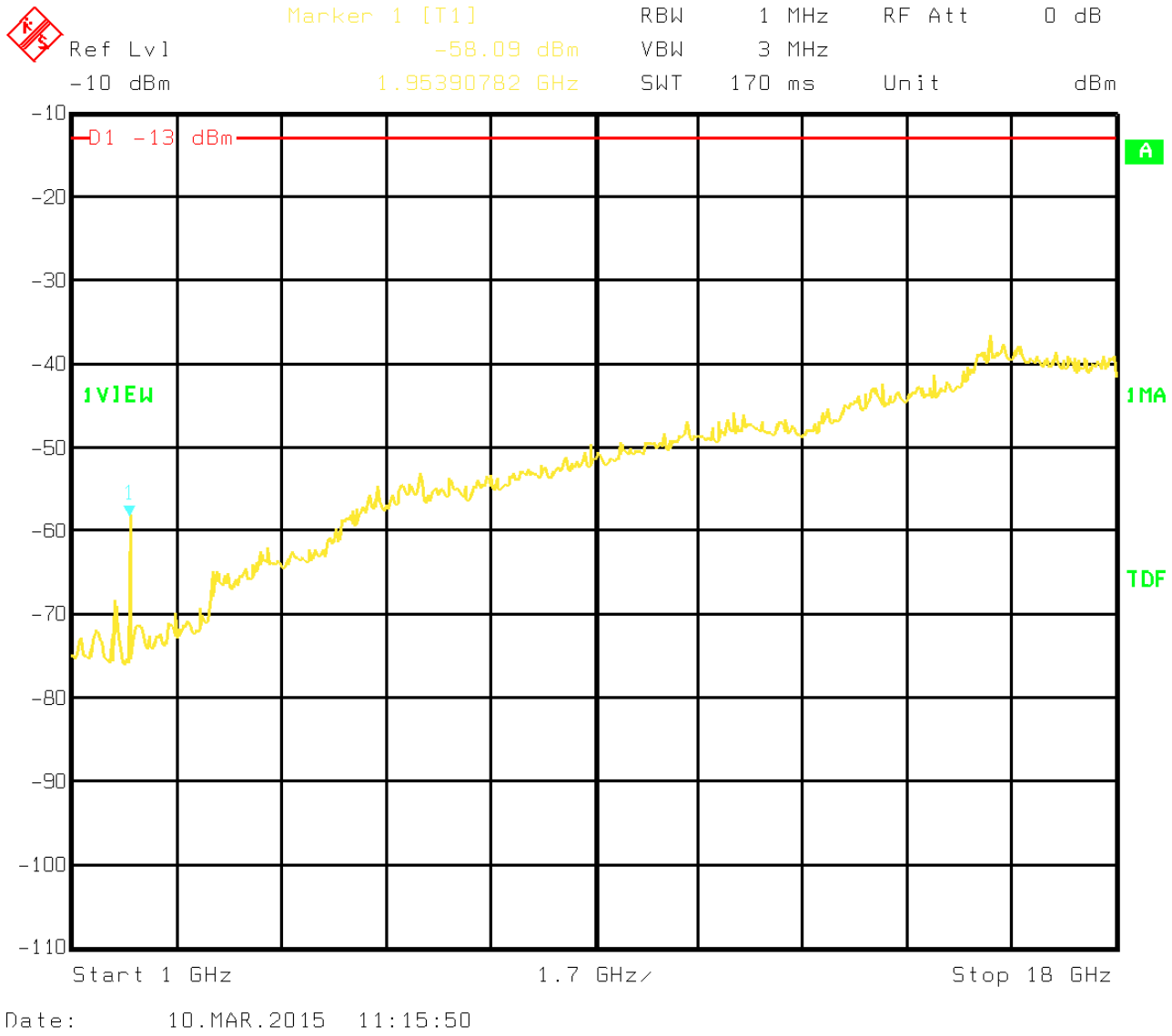
## Clause 24.238(a) Field strength of spurious radiation, continued



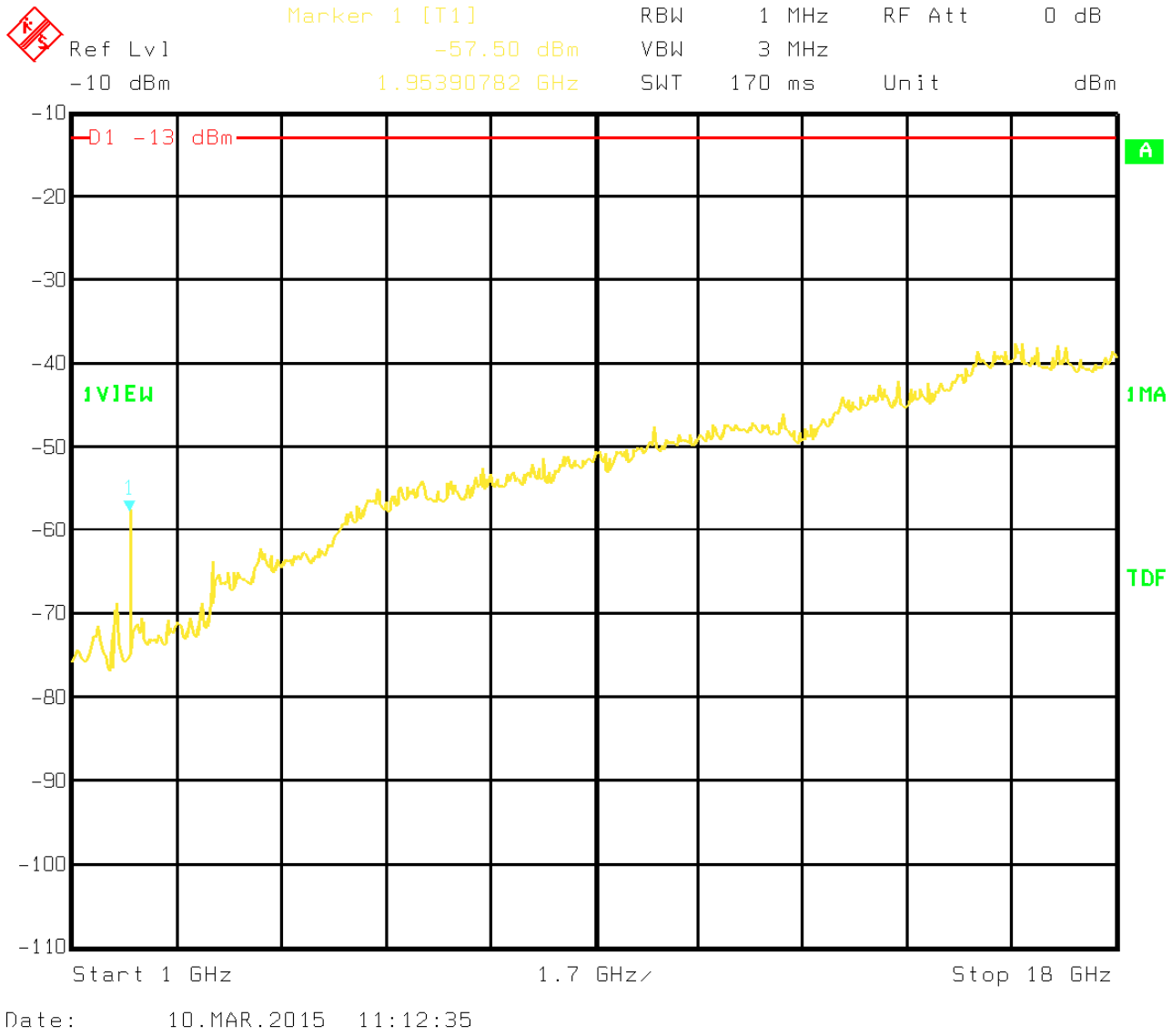

**30MHz-1GHz – H Pol**



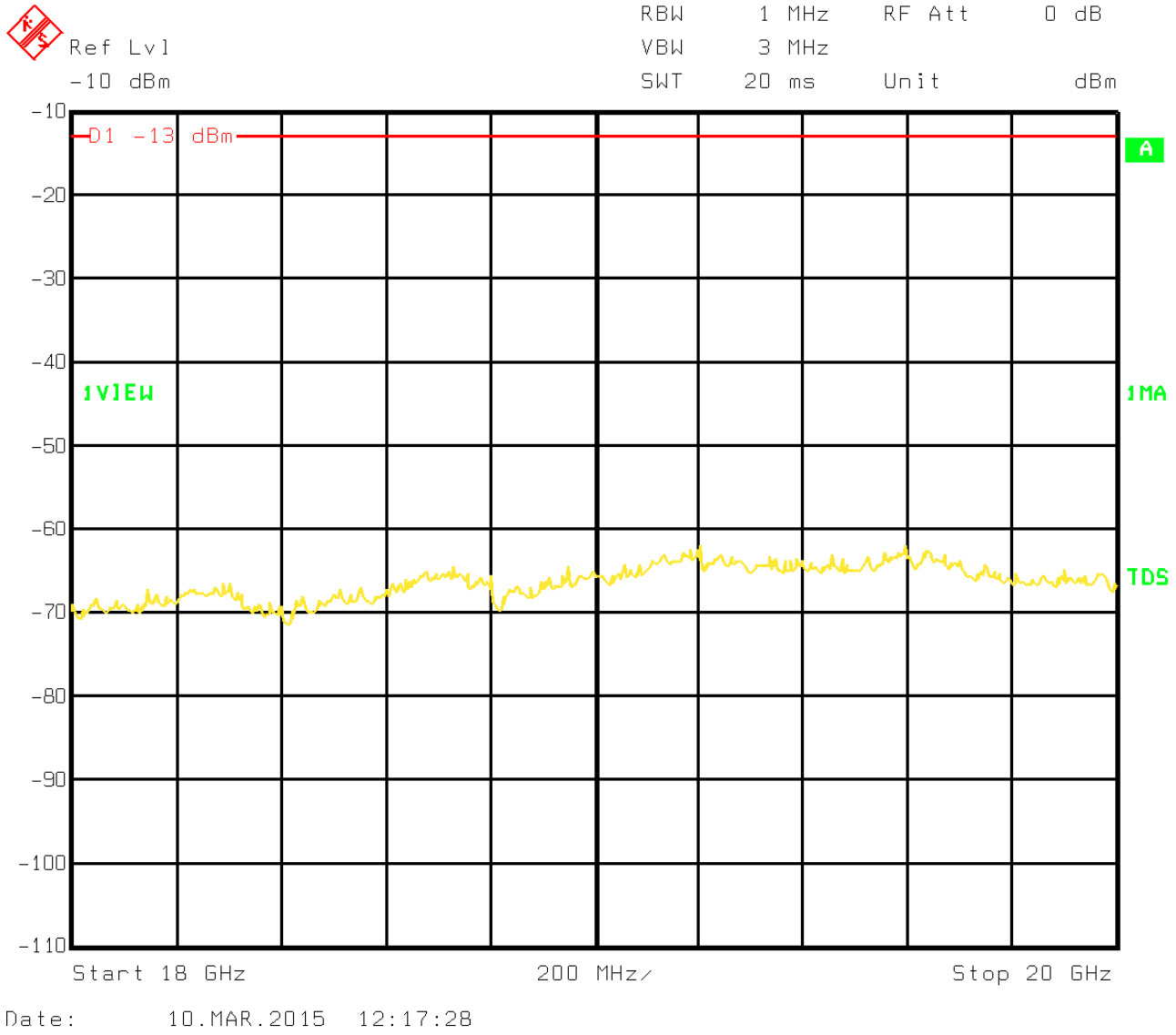

**30MHz-1GHz – V Pol**



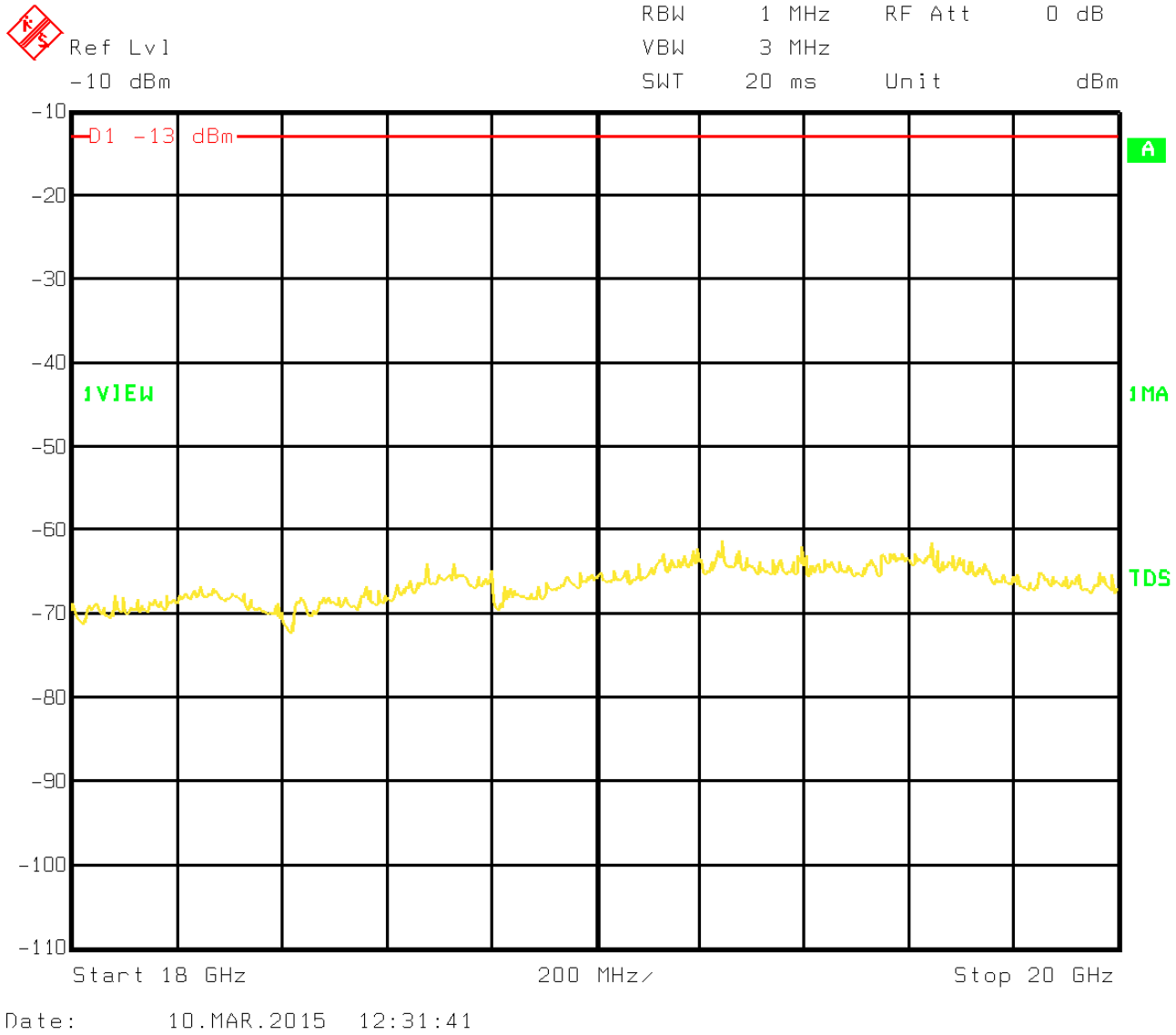

**1GHz-18GHz – H Pol**




**1GHz-18GHz – V Pol**




**18GHz-20GHz – H Pol**



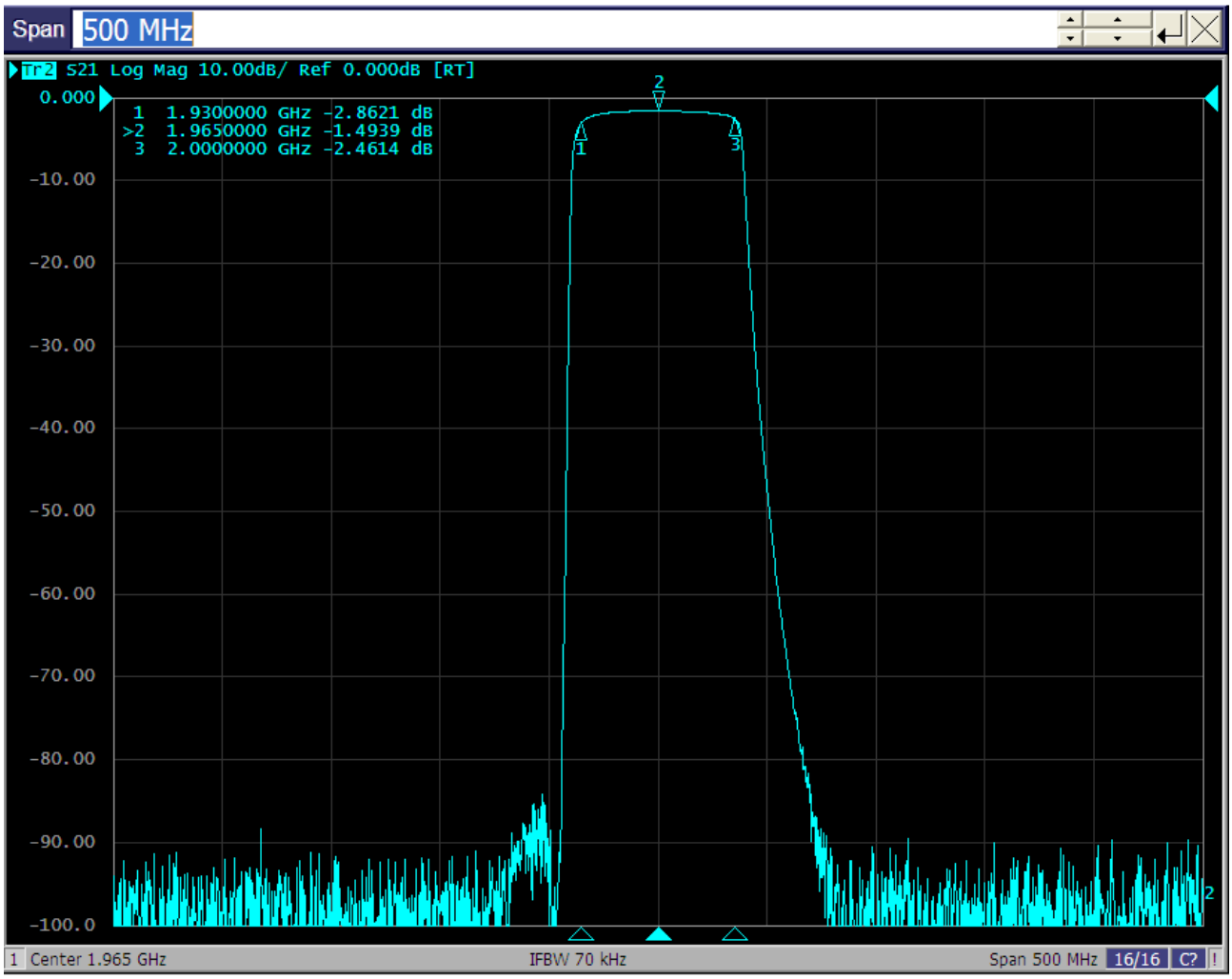

**18GHz-20GHz – V Pol**

## 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.

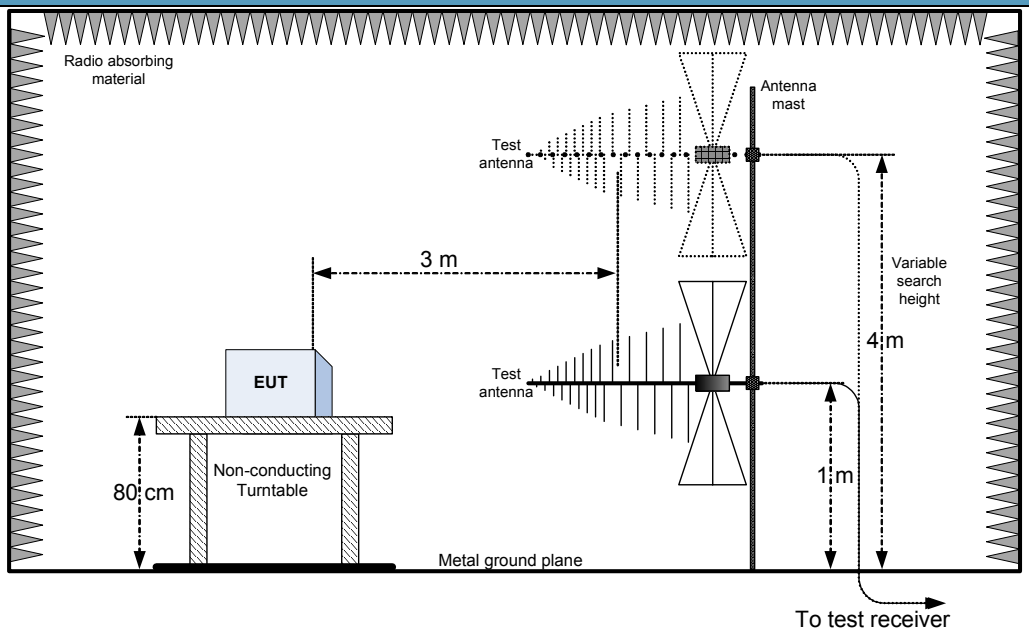
Test date: 2015-03-09

Test results: Pass

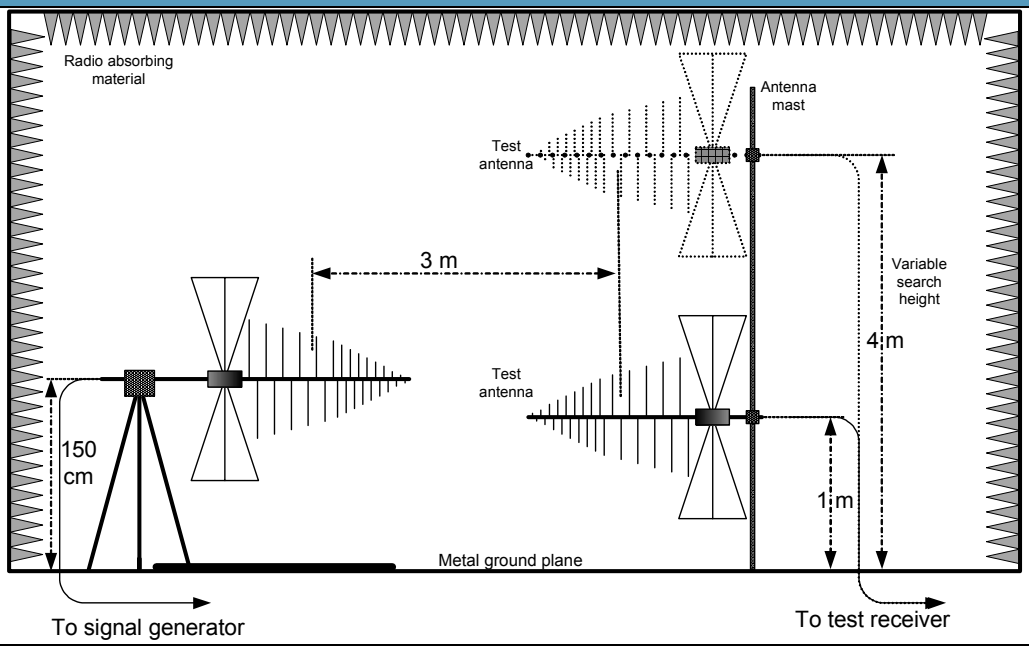


# Appendix B: Block diagrams of test set-ups

## Radiated emissions set-up

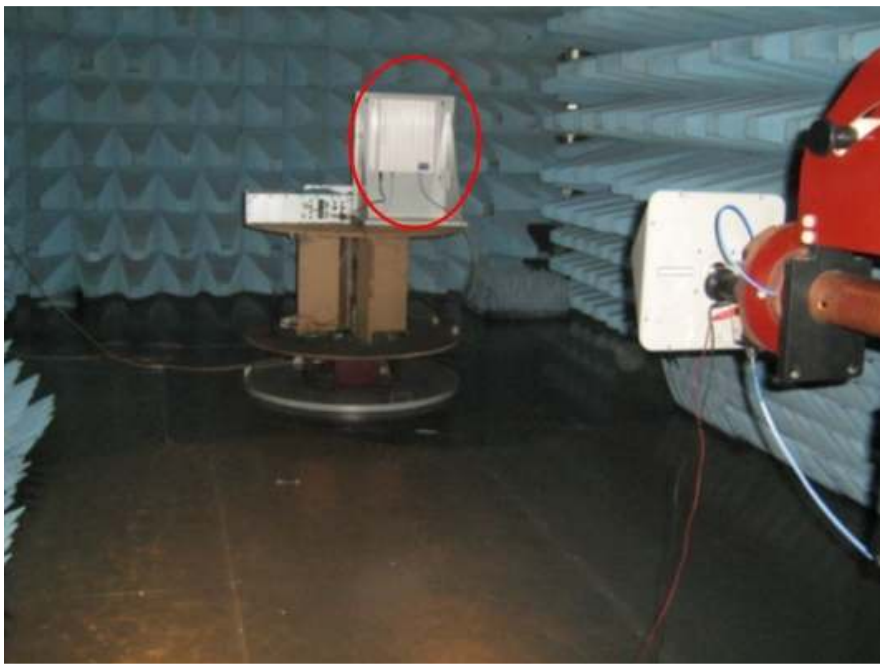



## Substitution method set-up



# Appendix C: EUT Photos

## Photo Set up



## Photo EUT