



FCC REPORT

Report Reference No..... : **TRE1603015902** R/C.....: 19353

FCC ID..... : **PJ7-M54T**

Applicant's name..... : **shenzhen Neoway Technology Co.,Ltd**

Address..... : 4F-2,Lian Jian Science & Industry Park Huarong Road,Dalang, Baoan District,Shenzhen City, P.R.China

Manufacturer..... : JSR Limited

Address..... : Room 8, 12/F, Lucida Industrial Building, No.43-47 Wang Lung Street, Tsuen Wan, N.T, Hong Kong

Test item description : **Smartphone**

Trade Mark : innos

Model/Type reference..... : M54T

Listed Model(s) : -

Standard : **FCC Part 22: PUBLIC MOBILE SERVICES
FCC Part 24: PERSONAL COMMUNICATIONS SERVICES
FCC Part 27: MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES**

Date of receipt of test sample..... : Mar.22, 2016

Date of testing..... : Mar.23, 2016 ~ Apr.18, 2016

Date of issue..... : Apr.19, 2016

Result..... : **Pass**

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Approved by
(position+printed name+signature)... : Manager Hans Hu

Testing Laboratory Name : **Shenzhen Huatongwei International Inspection Co., Ltd**

Address..... : 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

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1. TEST STANDARDS AND TEST DESCRIPTION

1.1. Test Standards

The tests were performed according to following standards:

[FCC Part 22 \(10-1-13 Edition\)](#): PRIVATE LAND MOBILE RADIO SERVICES.

[FCC Part 24\(10-1-13 Edition\)](#): PUBLIC MOBILE SERVICES

[FCC Part 27](#): MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

[TIA/EIA 603 D June 2010](#): Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

[47 CFR FCC Part 15 Subpart B](#): - Unintentional Radiators

[FCC Part 2](#): FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS

[971168 D01 Power Meas License Digital Systems v02r02](#): provides a methodology for fully characterizing the fundamental power of wideband (> 1 MHz) digitally modulated RF signals acceptable to the FCC for demonstrating compliance for licensed transmitters.

[ANSI C63.10-2013](#): American National Standard for Testing Unlicensed Wireless Devices

1.2. Test Description

| Test Item | Section in CFR 47 | Result |
|--|--|--------|
| RF Output Power | Part 2.1046 Part 22.913 (a)(2) Part 24.232 (c) Part 27.50 (d) | Pass |
| Modulation Characteristics | Part 2.1047 | Pass |
| 99% & -26 dB Occupied Bandwidth | Part 2.1049 Part 22.917 Part 24.238 | Pass |
| Spurious Emissions at Antenna Terminal | Part 2.1051 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h) | Pass |
| Field Strength of Spurious Radiation | Part 2.1053 Part 22.917 (a) Part 24.238 (a) Part 27.53 (h) | Pass |
| Out of band emission, Band Edge | Part 22.917 (a) Part 24.238 (a) Part 27.53 (h) | Pass |
| Frequency stability vs. temperature | Part 2.1055(a)(1)(b) | Pass |
| Frequency stability vs. voltage | Part 2.1055(d)(1)(2) | Pass |
| Peak-Average Ratio | Part 24.232 (d) Part 27.50 (d) | Pass |

Remark: The measurement uncertainty is not included in the test result.

2. SUMMARY

2.1. Client Information

| | |
|---------------|---|
| Applicant: | shenzhen Neoway Technology Co.,Ltd |
| Address: | 4F-2,Lian Jian Science & Industry Park Huarong Road,Dalang, Baoan District,Shenzhen City, P.R.China |
| Manufacturer: | JSR Limited |
| Address: | Room 8, 12/F, Lucida Industrial Building, No.43-47 Wang Lung Street, Tsuen Wan, N.T, Hong Kong |

2.2. Product Description

| | |
|---|--|
| Name of EUT | Smartphone |
| Trade Mark: | innos |
| Model No.: | M54T |
| Listed Model(s): | - |
| IMEI 1: | 866572020076131 |
| IMEI 2: | 866572020076132 |
| Power supply: | DC 3.8V From internal battery |
| Adapter information: | Model:DGL-SFP0501000 Input:AC 110-240V 50/60Hz 0.2A Output: 5Vd.c., 1.0A |
| Hardware version: | M54T_JSR_Nord V1.0 |
| Software version: | M54T_MB_V2.2 |
| RF Technical Description | |
| <input checked="" type="checkbox"/> FDD Band 4 | |
| Operation Frequency: | Uplink:1710.7 MHz – 1754.3 MHz Downlink: 2110.7 MHz – 2154.3 MHz |
| Channel bandwidth: | <input checked="" type="checkbox"/> 1.4MHz <input checked="" type="checkbox"/> 3MHz <input checked="" type="checkbox"/> 5MHz <input checked="" type="checkbox"/> 10MHz <input checked="" type="checkbox"/> 15MHz <input checked="" type="checkbox"/> 20MHz |
| <input checked="" type="checkbox"/> FDD Band 7 | |
| Operation Frequency: | Uplink:2502.5 MHz – 2567.5 MHz Downlink: 2622.5 MHz – 2687.5 MHz |
| Channel bandwidth: | <input type="checkbox"/> 1.4MHz <input type="checkbox"/> 3MHz <input checked="" type="checkbox"/> 5MHz <input checked="" type="checkbox"/> 10MHz <input checked="" type="checkbox"/> 15MHz <input checked="" type="checkbox"/> 20MHz |
| <input checked="" type="checkbox"/> FDD Band 17 | |
| Operation Frequency: | Uplink:706.5 MHz – 713.5 MHz Downlink: 736.5MHz – 743.5 MHz |
| Channel bandwidth: | <input type="checkbox"/> 1.4MHz <input type="checkbox"/> 3MHz <input checked="" type="checkbox"/> 5MHz <input checked="" type="checkbox"/> 10MHz <input type="checkbox"/> 15MHz <input type="checkbox"/> 20MHz |
| Power Class: | <input type="checkbox"/> Class 1 <input type="checkbox"/> Class 2 <input checked="" type="checkbox"/> Class 3 <input type="checkbox"/> Class 4 |
| Modulation type: | <input checked="" type="checkbox"/> QPSK <input checked="" type="checkbox"/> 16QAM <input type="checkbox"/> 64QAM |
| Antenna type: | 1 * TRX, 1 * RX-only |
| Antenna gain: | Band 4: 0.0dBi;Band 7: 0.0dBi;Band 17: 0.0dBi |

Test Frequency:

FDD Band 4

| Test Frequency ID | Bandwidth [MHz] | N _{UL} | Frequency of Uplink [MHz] | N _{DL} | Frequency of Downlink [MHz] |
|-------------------|------------------|-----------------|---------------------------|-----------------|-----------------------------|
| Low Range | 1.4 | 19957 | 1710.7 | 1957 | 2110.7 |
| | 3 | 19965 | 1711.5 | 1965 | 2111.5 |
| | 5 | 19975 | 1712.5 | 1975 | 2112.5 |
| | 10 | 20000 | 1715 | 2000 | 2115 |
| | 15 | 20025 | 1717.5 | 2025 | 2117.5 |
| Mid Range | 20 | 20050 | 1720 | 2050 | 2120 |
| | 1.4/3/5/10/15/20 | 20175 | 1732.5 | 2175 | 2132.5 |
| High Range | 1.4 | 20393 | 1754.3 | 2393 | 2154.3 |
| | 3 | 20385 | 1753.5 | 2385 | 2153.5 |
| | 5 | 20375 | 1752.5 | 2375 | 2152.5 |
| | 10 | 20350 | 1750 | 2350 | 2150 |
| | 15 | 20325 | 1747.5 | 2325 | 2147.5 |
| | 20 | 20300 | 1745 | 2300 | 2145 |

FDD Band 7

| Test Frequency ID | Bandwidth [MHz] | N _{UL} | Frequency of Uplink [MHz] | N _{DL} | Frequency of Downlink [MHz] |
|-------------------|---------------------------|-----------------|---------------------------|-----------------|-----------------------------|
| Low Range | 5 | 20775 | 2502.5 | 2775 | 2622.5 |
| | 10 | 20800 | 2505 | 2800 | 2625 |
| | 15 | 20825 | 2507.5 | 2825 | 2627.5 |
| | 20 ^[1] | 20850 | 2510 | 2850 | 2630 |
| Mid Range | 5/10/15/20 ^[1] | 21100 | 2535 | 3100 | 2655 |
| High Range | 5 | 21425 | 2567.5 | 3425 | 2687.5 |
| | 10 | 21400 | 2565 | 3400 | 2685 |
| | 15 | 21375 | 2562.5 | 3375 | 2682.5 |
| | 20 ^[1] | 21350 | 2560 | 3350 | 2680 |

NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.

FDD Band 17

| Test Frequency ID | Bandwidth [MHz] | N _{UL} | Frequency of Uplink [MHz] | N _{DL} | Frequency of Downlink [MHz] |
|-------------------|-------------------------------------|-----------------|---------------------------|-----------------|-----------------------------|
| Low Range | 5 ^[1] | 23755 | 706.5 | 5755 | 736.5 |
| | 10 ^[1] | 23780 | 709 | 5780 | 739 |
| Mid Range | 5 ^[1] /10 ^[1] | 23790 | 710 | 5790 | 740 |
| High Range | 5 ^[1] | 23825 | 713.5 | 5825 | 743.5 |
| | 10 ^[1] | 23800 | 711 | 5800 | 741 |

NOTE 1: Bandwidth for which a relaxation of the specified UE receiver sensitivity requirement (TS 36.101 [27] Clause 7.3) is allowed.

2.3. EUT operation mode

1.The EUT has been tested under typical operating condition. The Applicant provides software to control the EUT for staying in continous transmitting and receiving mode for testing.

| Test Items | Band | Bandwidth (MHz) | | | | | | Modulation | | RB # | | | Test Channel | | |
|-----------------------------|--|-----------------|---|---|----|----|----|------------|-------|------|------|------|--------------|---|---|
| | | 1.4 | 3 | 5 | 10 | 15 | 20 | QPSK | 16QAM | 1 | Half | Full | L | M | H |
| Max Output Power | 4 | v | v | v | v | v | v | v | v | v | v | v | v | v | v |
| | 7 | - | - | v | v | v | v | v | v | v | v | v | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | v | v | v | v | v |
| 26dB and 99% Bandwidth | 4 | v | v | v | v | v | v | v | v | | | v | v | v | v |
| | 7 | - | - | v | v | v | v | v | v | | | v | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | | | v | v | v | v |
| Conducted Band Edge | 4 | v | v | v | v | v | v | v | v | v | | v | v | | v |
| | 7 | - | - | v | v | v | v | v | v | v | | v | v | | v |
| | 17 | - | - | v | v | - | - | v | v | v | | v | v | | v |
| Conducted Spurious Emission | 4 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 7 | - | - | v | v | v | v | v | v | v | | | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| E.R.P./ E.I.R.P. | 4 | v | v | v | v | v | v | v | v | v | | | v | v | v |
| | 7 | - | - | v | v | v | v | v | v | v | | | v | v | v |
| | 17 | - | - | v | v | - | - | v | v | v | | | v | v | v |
| Radiated Spurious Emission | 4 | v | v | v | v | v | v | v | | v | | | v | v | v |
| | 7 | - | - | v | v | v | v | v | | v | | | v | v | v |
| | 17 | - | - | v | v | - | - | v | | v | | | v | v | v |
| Frequency Stability | 4 | | | | | | v | v | | | | v | | v | |
| | 7 | | | | | | v | v | | | | v | | v | |
| | 17 | | | | v | | | v | | | | v | | v | |
| Peak-to-Average Ratio | 4 | | | | | | v | v | v | v | | v | v | v | v |
| | 7 | | | | | | v | v | v | v | | v | v | v | v |
| | 17 | | | | v | | | v | v | v | | v | v | v | v |
| Remark | 1. The mark "v " means that this configuration is chosen for testing 2. The mark "- " means that this bandwidth is not supported. 3. The device is investigated from 30MHz to 10 times of fundamental signal for radiated spurious emission test under different RB size/offset and modulations in exploratory test. Subsequently, only the worst case emissions are reported. | | | | | | | | | | | | | | |

2.4. EUT configuration

The following peripheral devices and interface cables were connected during the measurement:

● - supplied by the manufacturer

○ - supplied by the lab

| | | |
|--|----------------|---|
| | Length (m) : | / |
| | Shield : | / |
| | Detachable : | / |
| | Manufacturer : | / |
| | Model No. : | / |

2.5. Modifications

No modifications were implemented to meet testing criteria.

3. TEST ENVIRONMENT

3.1. Address of the test laboratory

Laboratory: Shenzhen Huatongwei International Inspection Co., Ltd.

Address: 1/F, Bldg 3, Hongfa Hi-tech Industrial Park, Genyu Road, Tianliao, Gongming, Shenzhen, China

Phone: 86-755-26748019 Fax: 86-755-26748089

3.2. Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd. has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories, Date of Registration: February 28, 2015. Valid time is until February 27, 2018.

A2LA-Lab Cert. No. 3902.01

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is until December 31, 2016.

FCC-Registration No.: 317478

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 317478, Renewal date Jul. 18, 2014, valid time is until Jul. 18, 2017.

IC-Registration No.: 5377A&5377B

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377A on Dec. 31, 2013, valid time is until Dec. 31, 2016.

Two 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377B on Dec.03, 2014, valid time is until Dec.03, 2017.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd. EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

VCCI

The 3m Semi-

anechoic chamber (12.2m×7.95m×6.7m) of Shenzhen Huatongwei International Inspection Co., Ltd.

has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 29, 2015.

Radiated disturbance above 1GHz measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-292. Date of Registration: Dec. 24, 2013. Valid time is until Dec. 23, 2016.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: Dec. 20, 2012. Valid time is until Dec. 19, 2015.

Telecommunication Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: T-1837. Date of Registration: May 07, 2013. Valid time is until May 06, 2016.

DNV

Shenzhen Huatongwei International Inspection Co., Ltd. has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025 (2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until Aug. 24, 2016.

3.3. Environmental conditions

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

| | |
|--------------------------|--------------|
| Normal Temperature/Tnor: | 15~35°C |
| Relative Humidity | 30~60 % |
| Air Pressure | 950-1050 hPa |

3.4. Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to TR-100028-01 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 1" and TR-100028-02 "Electromagnetic compatibility and Radio spectrum Matters (ERM); Uncertainties in the measurement of mobile radio equipment characteristics; Part 2" and is documented in the Shenzhen Huatongwei International Inspection Co., Ltd quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Huatongwei laboratory is reported:

| Test Items | Measurement Uncertainty | Notes |
|--|-------------------------|-------|
| Frequency stability | 25 Hz | (1) |
| Transmitter power conducted | 0.57 dB | (1) |
| Transmitter power Radiated | 2.20 dB | (1) |
| Conducted spurious emission 9KHz-12.75 GHz | 1.60 dB | (1) |
| Conducted Emission 9KHz-30MHz | 3.39 dB | (1) |
| Radiated Emission 30~1000MHz | 4.24 dB | (1) |
| Radiated Emission 1~18GHz | 5.16 dB | (1) |
| Radiated Emission 18-40GHz | 5.54 dB | (1) |
| Occupied Bandwidth | ----- | (1) |
| Emission Mask | ----- | (1) |
| Modulation Characteristic | ----- | (1) |
| Transmitter Frequency Behavior | ----- | (1) |

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=1.96$.

3.5. Equipments Used during the Test

| Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission | | | | | |
|---|-------------------------------|---------------|-----------|--------------|-----------|
| No. | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2015/11/2 |
| 2 | WIDEB.RADIO COMM.TESRER | Rohde&Schwarz | CMW500 | 1201.0002K50 | 2015/11/3 |
| 3 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201141 | 2015/11/2 |
| 4 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | 2015/11/2 |

| Frequency Stability | | | | | |
|----------------------------|-------------------------------|---------------|-----------|--------------|-----------|
| No. | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2015/11/2 |
| 2 | WIDEB.RADIO COMM.TESRER | Rohde&Schwarz | CMW500 | 1201.0002K50 | 2015/11/3 |
| 3 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201141 | 2015/11/2 |
| 4 | Climate Chamber | ESPEC | EL-10KA | 05107008 | 2015/11/2 |
| 5 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | 2015/11/2 |

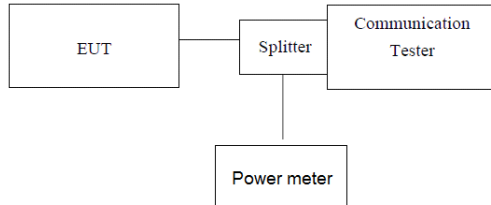
| Output Power (Radiated) & Radiated Spurious Emission | | | | | |
|---|-------------------------------|------------------------------|-----------|--------------|-----------|
| No. | Equipment | Manufacturer | Model No. | Serial No. | Last Cal. |
| 1 | UNIVERSAL RADIO COMMUNICATION | Rohde&Schwarz | CMU200 | 112012 | 2015/11/2 |
| 2 | Spectrum Analyzer | Rohde&Schwarz | FSU26 | 201141 | 2015/11/2 |
| 3 | HORN ANTENNA | ShwarzBeck | 9120D | 1012 | 2015/11/2 |
| 4 | HORN ANTENNA | ShwarzBeck | 9120D | 1011 | 2015/11/2 |
| 5 | Ultra-Broadband Antenna | ShwarzBeck | VULB9163 | 538 | 2015/11/2 |
| 6 | Ultra-Broadband Antenna | ShwarzBeck | VULB9163 | 539 | 2015/11/2 |
| 7 | TURNTABLE | MATURO | TT2.0 | ---- | N/A |
| 8 | ANTENNA MAST | MATURO | TAM-4.0-P | ---- | N/A |
| 9 | EMI Test Software | Audix | E3 | N/A | N/A |
| 10 | EMI Test Receiver | Rohde&Schwarz | ESIB 26 | 100009 | 2015/11/2 |
| 11 | RF Test Panel | Rohde&Schwarz | TS / RSP | 335015/ 0017 | 2015/11/2 |
| 12 | High pass filter | Compliance Direction systems | BSU-6 | 34202 | 2015/11/2 |
| 13 | Splitter | Mini-Circuit | ZAPD-4 | 400059 | 2015/11/2 |
| 14 | Horn Antenna | SCHWARZBECK | BBHA9170 | 25841 | 2015/11/2 |
| 15 | Horn Antenna | SCHWARZBECK | BBHA9170 | 25842 | 2015/11/2 |
| 16 | Preamplifier | ShwarzBeck | BBV 9718 | BBV 9718 | 2015/11/2 |
| 17 | Broadband Preamplifier | ShwarzBeck | BBV743 | 9743-0079 | 2015/11/2 |
| 18 | Signal Generator | Rohde&Schwarz | SMF100A | 101932 | 2015/11/2 |
| 19 | Amplifier | Compliance Direction systems | PAP1-4060 | 120 | 2015/11/2 |
| 20 | TURNTABLE | ETS | 2088 | 2149 | 2015/11/2 |
| 21 | ANTENNA MAST | ETS | 2075 | 2346 | 2015/11/2 |
| 22 | HORN ANTENNA | Rohde&Schwarz | HF906 | 100068 | 2015/11/2 |
| 23 | HORN ANTENNA | Rohde&Schwarz | HF906 | 100039 | 2015/11/2 |
| 24 | WIDEB.RADIO COMM.TESRER | R&S | CMW500 | 1201.0002K50 | 2015/11/3 |

The calibration interval was one year.

4. TEST CONDITIONS AND RESULTS

4.1. Conducted Output Power

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

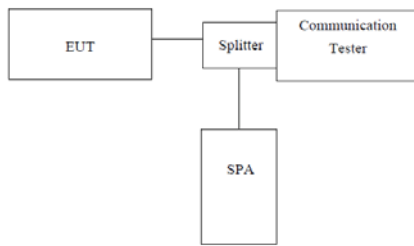
1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum burst average power.

TEST RESULTS

| EUT Mode | Frequency (MHz) | Max Avg.Power QPSK (dBm) | Max Avg.Power 16QAM (dBm) |
|-------------|-------------------|--------------------------|---------------------------|
| LTE Band 4 | 1710.70 – 1754.30 | 22.43 | 21.76 |
| LTE Band 7 | 2502.50 – 2567.50 | 22.36 | 21.88 |
| LTE Band 17 | 706.50 – 713.50 | 22.57 | 21.69 |

4.2. Occupy Bandwidth

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW= 3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

TEST RESULTS

| LTE Band 4 | | | | | |
|------------|---------|----------------------------|-------|-----------------------|-------|
| Bandwidth | Channel | 99% Occupy bandwidth (MHz) | | -26dB bandwidth (MHz) | |
| | | QPSK | 16QAM | QPSK | 16QAM |
| 1.4MHz | Low | 1.10 | 1.09 | 1.35 | 1.30 |
| | Mid | 1.10 | 1.10 | 1.31 | 1.32 |
| | High | 1.10 | 1.10 | 1.34 | 1.31 |
| 3MHz | Low | 2.69 | 2.69 | 2.93 | 2.96 |
| | Mid | 2.69 | 2.69 | 2.96 | 2.94 |
| | High | 2.69 | 2.69 | 2.97 | 2.97 |
| 5MHz | Low | 4.52 | 4.53 | 5.03 | 5.07 |
| | Mid | 4.51 | 4.53 | 5.05 | 5.07 |
| | High | 4.52 | 4.45 | 5.07 | 5.06 |
| 10MHz | Low | 8.95 | 8.97 | 9.83 | 9.83 |
| | Mid | 8.95 | 8.97 | 9.77 | 9.77 |
| | High | 8.97 | 8.95 | 9.85 | 9.71 |
| 15MHz | Low | 13.49 | 13.52 | 14.87 | 14.87 |
| | Mid | 13.52 | 13.52 | 14.94 | 14.85 |
| | High | 13.46 | 13.49 | 14.81 | 14.75 |
| 20MHz | Low | 17.98 | 17.98 | 19.54 | 19.42 |
| | Mid | 17.94 | 17.90 | 19.36 | 19.44 |
| | High | 17.90 | 17.90 | 19.41 | 19.61 |

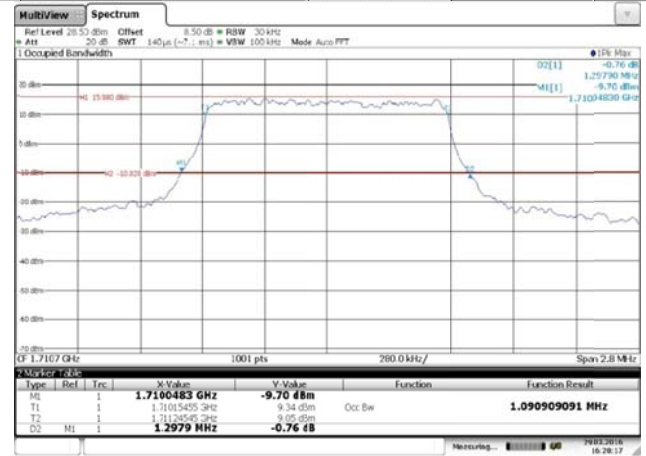
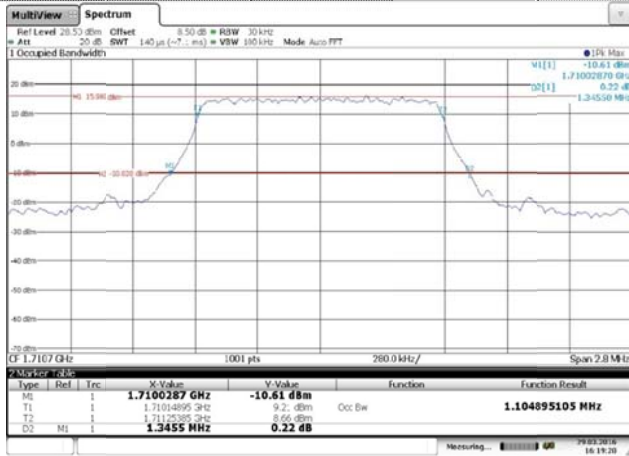
| LTE Band 7 | | | | | |
|------------|---------|----------------------------|-------|-----------------------|-------|
| Bandwidth | Channel | 99% Occupy bandwidth (MHz) | | -26dB bandwidth (MHz) | |
| | | QPSK | 16QAM | QPSK | 16QAM |
| 5MHz | Low | 4.51 | 4.54 | 5.06 | 5.06 |
| | Mid | 4.52 | 4.54 | 5.04 | 5.10 |
| | High | 4.55 | 4.52 | 5.08 | 5.10 |
| 10MHz | Low | 8.99 | 8.95 | 9.92 | 9.69 |
| | Mid | 8.95 | 8.97 | 9.89 | 9.83 |
| | High | 8.95 | 8.95 | 9.91 | 9.83 |
| 15MHz | Low | 13.55 | 13.52 | 14.92 | 14.87 |
| | Mid | 13.46 | 13.52 | 14.90 | 14.87 |
| | High | 13.55 | 13.55 | 14.93 | 14.96 |
| 20MHz | Low | 17.90 | 17.98 | 19.54 | 19.50 |
| | Mid | 18.02 | 17.94 | 19.70 | 19.58 |
| | High | 17.98 | 17.94 | 19.64 | 19.44 |

| LTE Band 17 | | | | | |
|-------------|---------|----------------------------|-------|-----------------------|-------|
| Bandwidth | Channel | 99% Occupy bandwidth (MHz) | | -26dB bandwidth (MHz) | |
| | | QPSK | 16QAM | QPSK | 16QAM |
| 5MHz | Low | 4.52 | 4.53 | 5.05 | 5.05 |
| | Mid | 4.51 | 4.53 | 5.02 | 5.10 |
| | High | 4.53 | 4.51 | 5.09 | 5.06 |
| 10MHz | Low | 8.99 | 8.95 | 9.91 | 9.75 |
| | Mid | 8.95 | 8.97 | 9.89 | 9.83 |
| | High | 8.95 | 8.95 | 9.89 | 9.77 |

LTE Band 4-1.4MHz

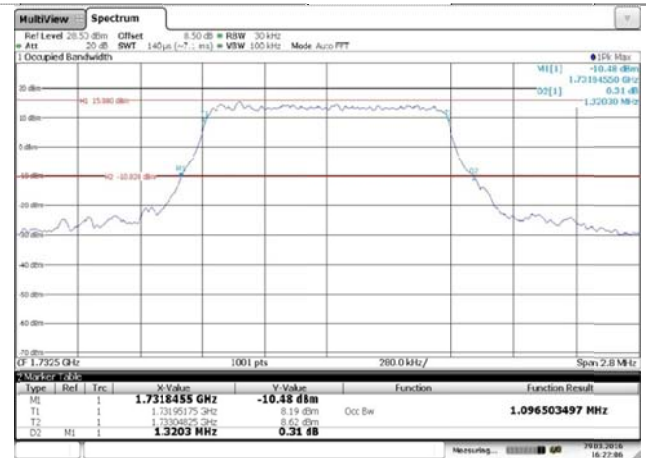
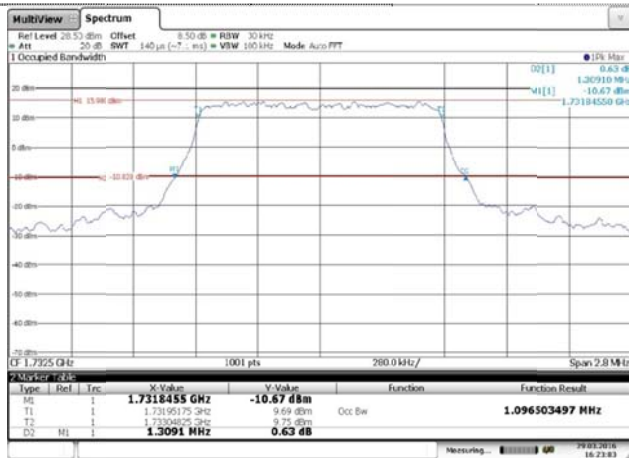
QPSK

16QAM



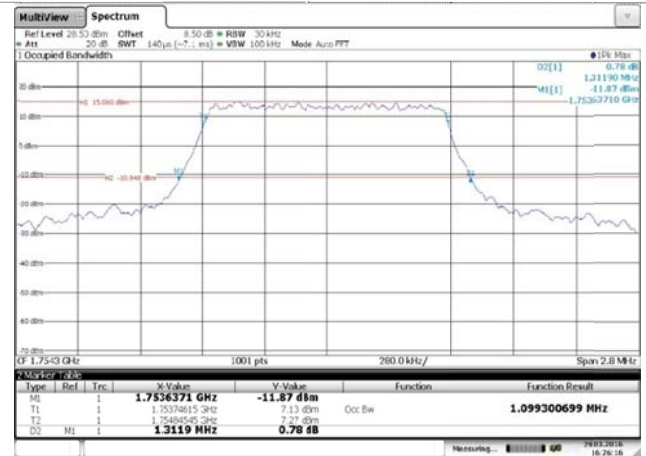
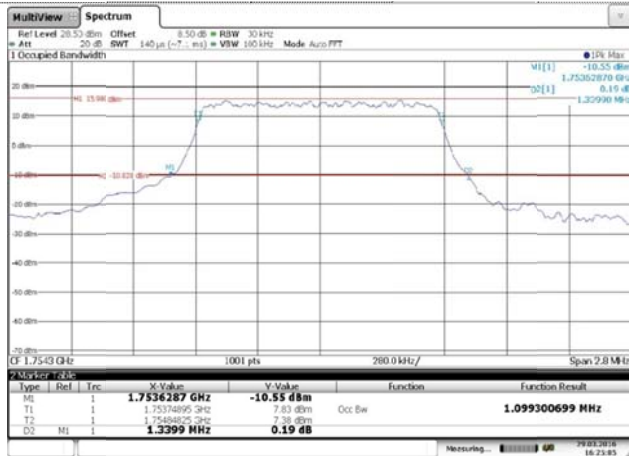
Channel Low

Channel Low



Channel Mid

Channel Mid

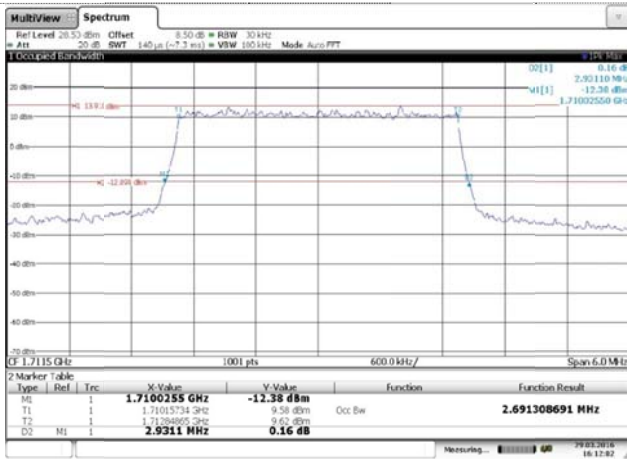


Channel High

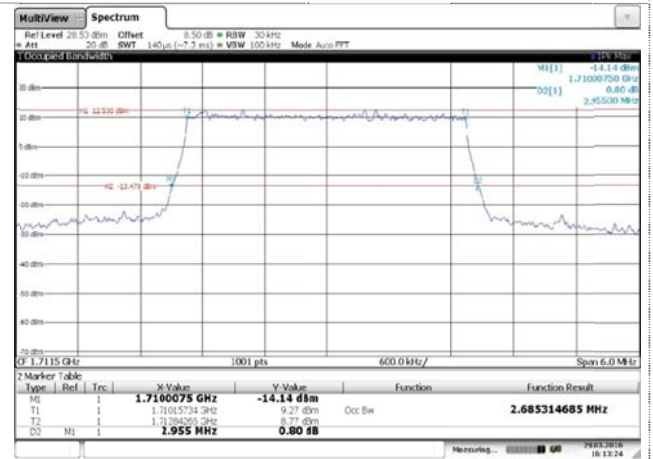
Channel High

LTE Band 4-3MHz

QPSK

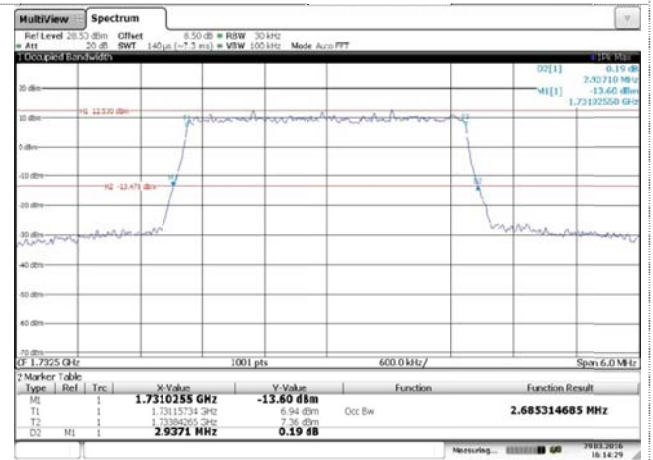
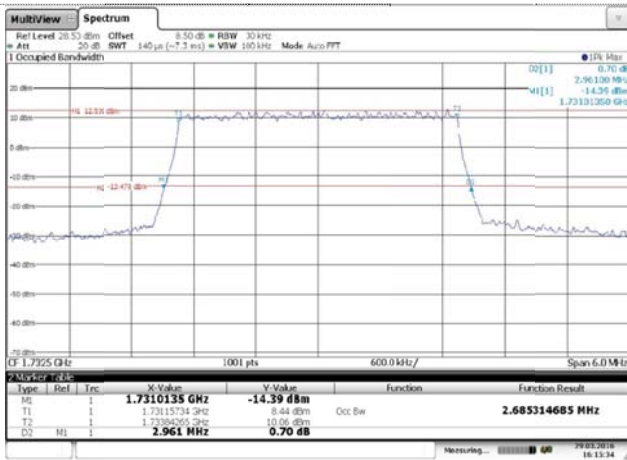


16QAM



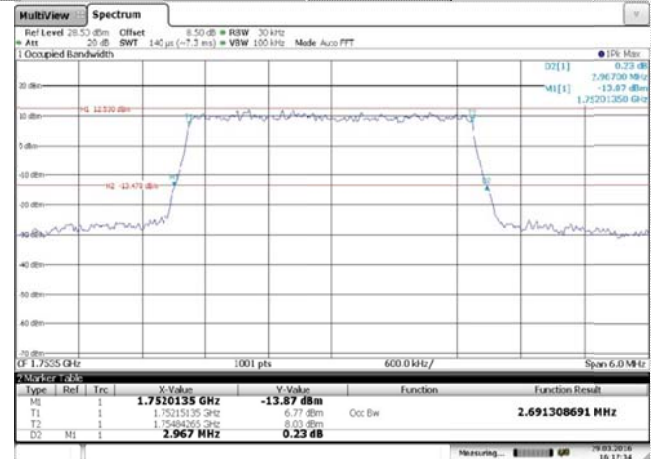
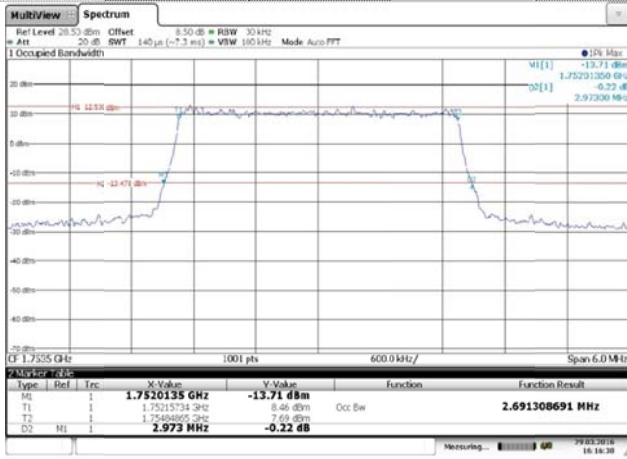
Channel Low

Channel Low



Channel Mid

Channel Mid



Channel High

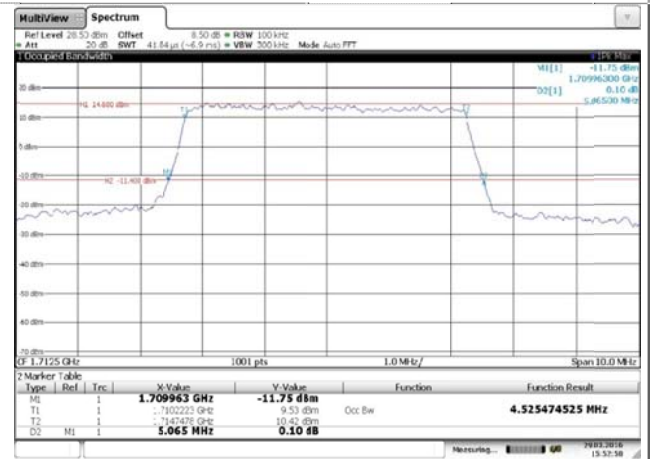
Channel High

LTE Band 4-5MHz

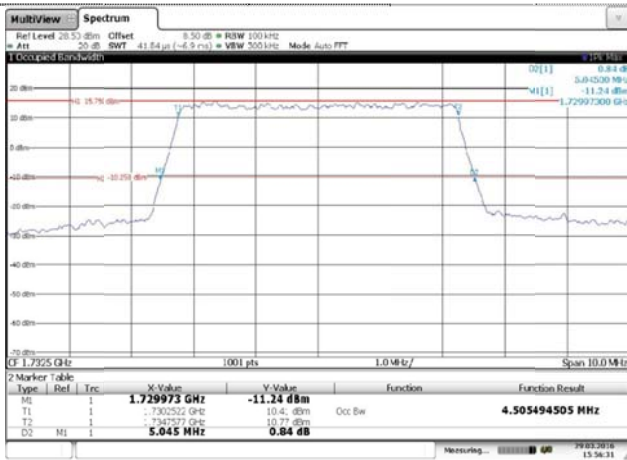
QPSK



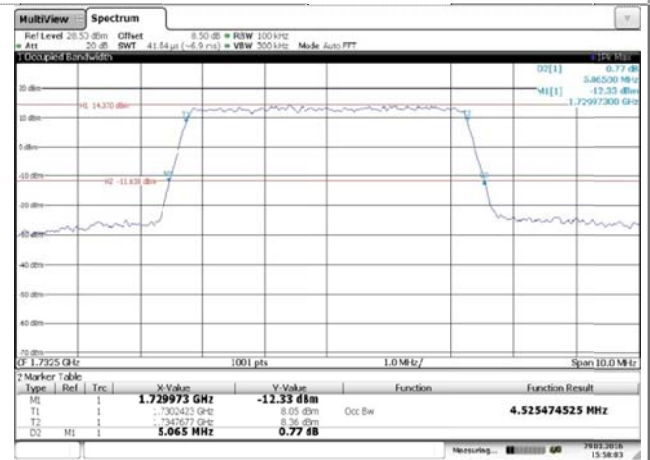
16QAM



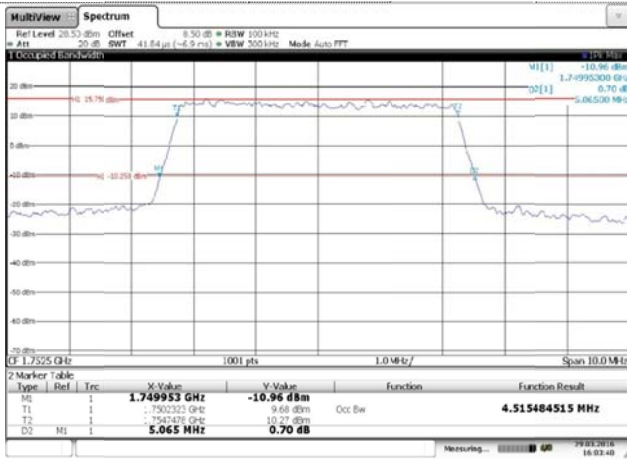
Channel Low



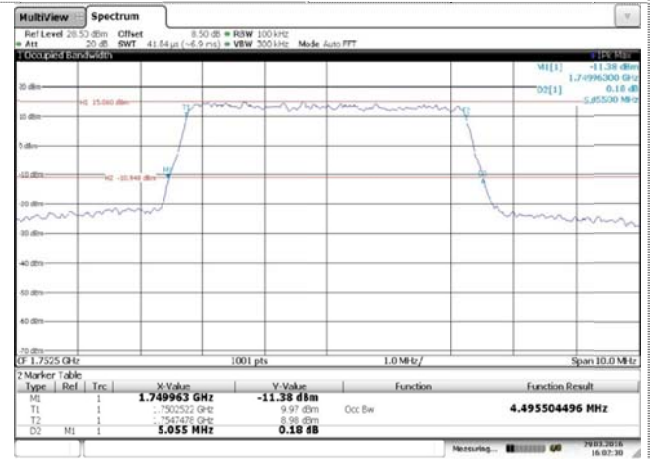
Channel Low



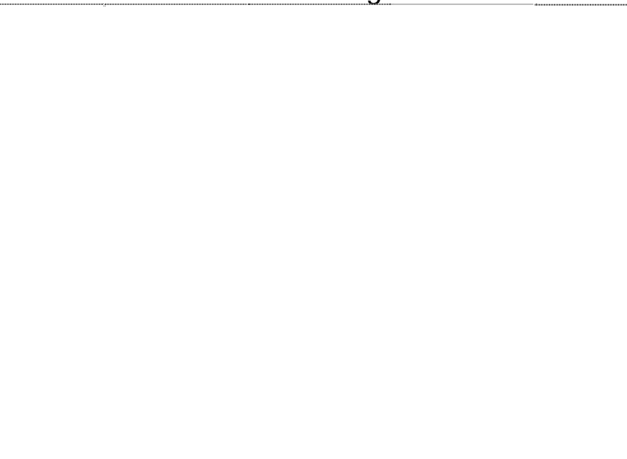
Channel Mid



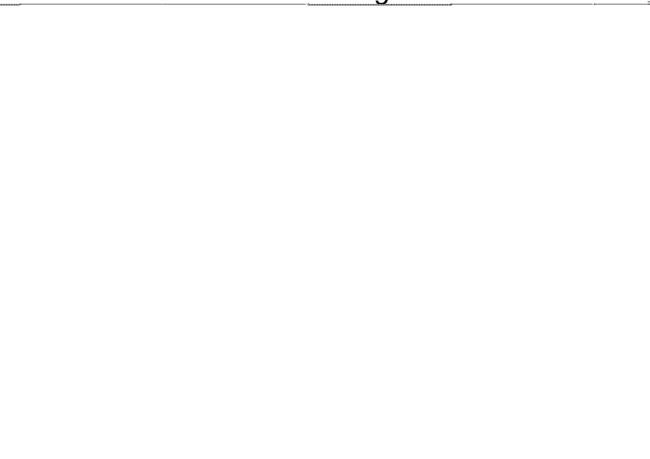
Channel Mid



Channel High



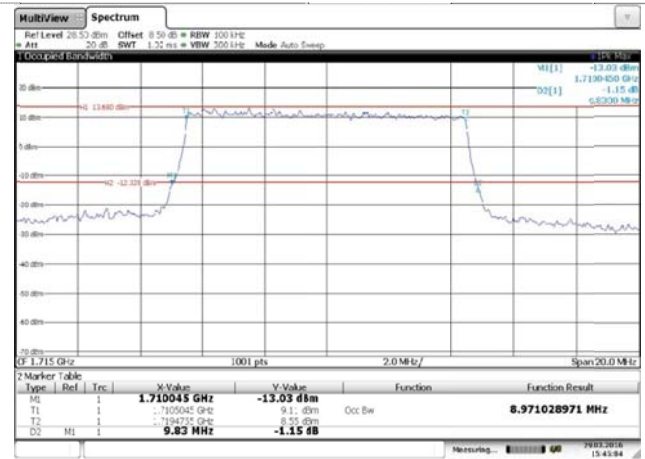
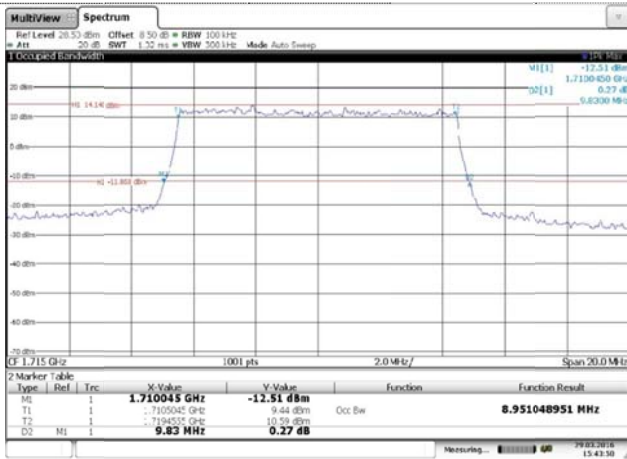
Channel High



LTE Band 4-10MHz

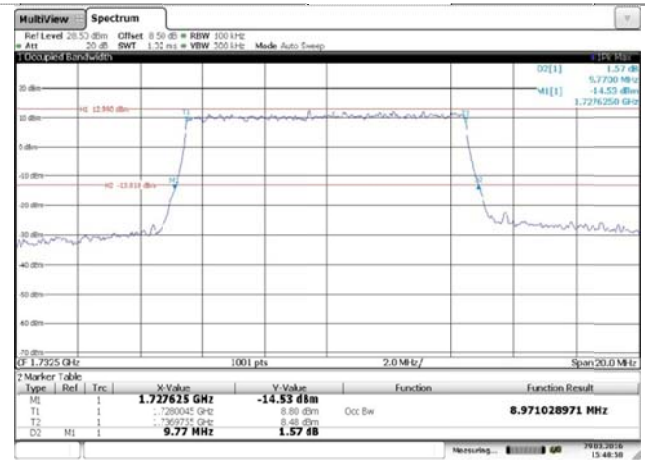
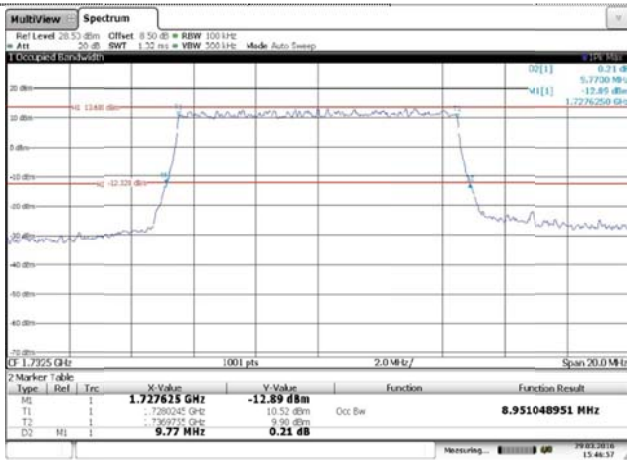
QPSK

16QAM



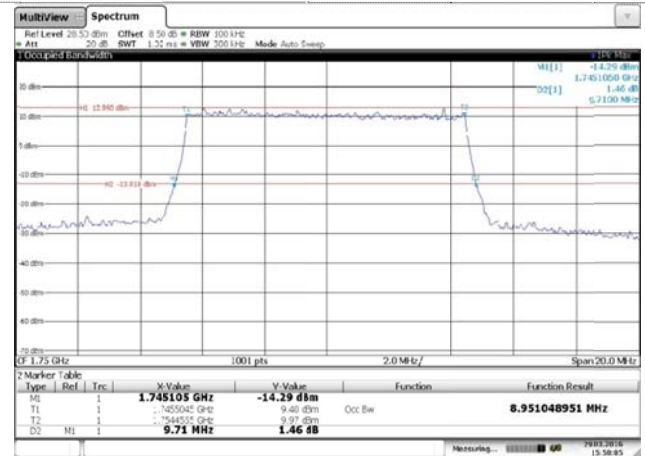
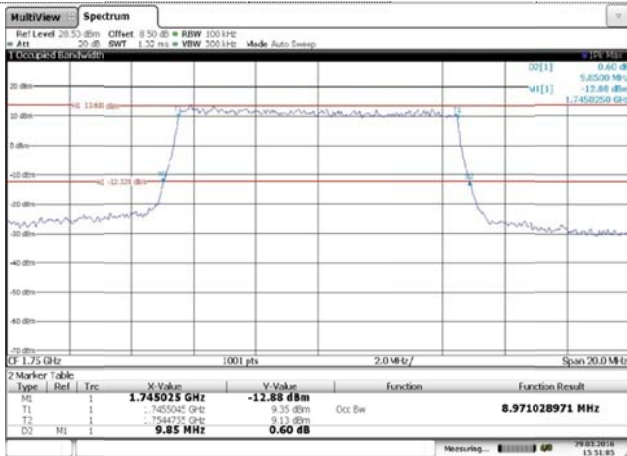
Channel Low

Channel Low



Channel Mid

Channel Mid



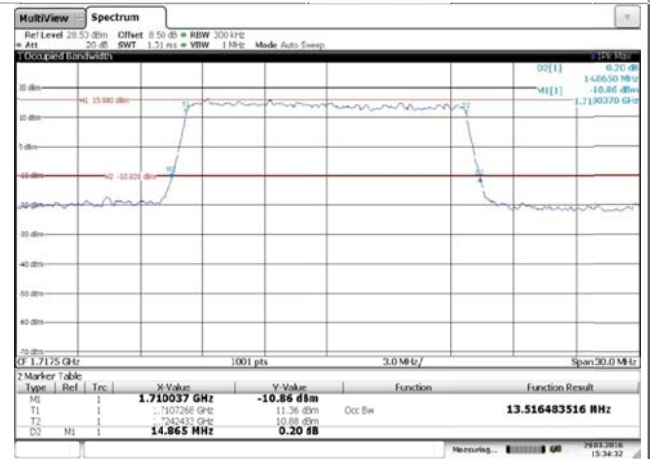
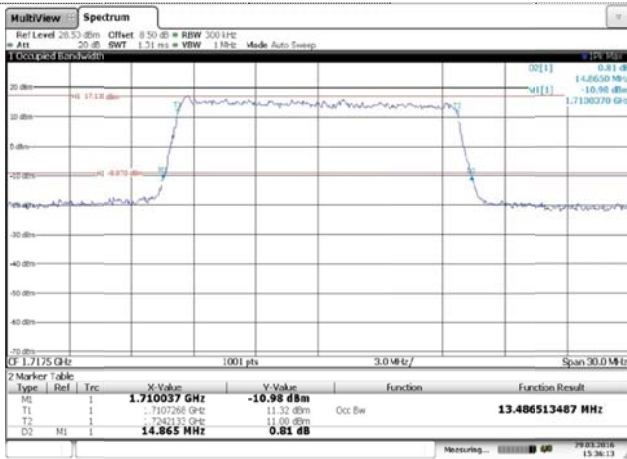
Channel High

Channel High

LTE Band 4-15MHz

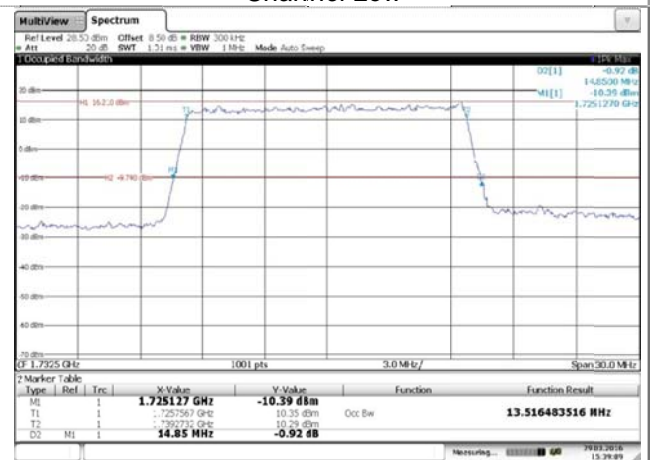
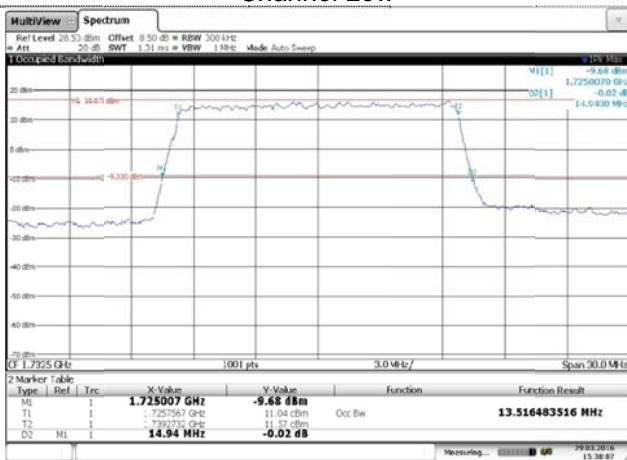
QPSK

16QAM



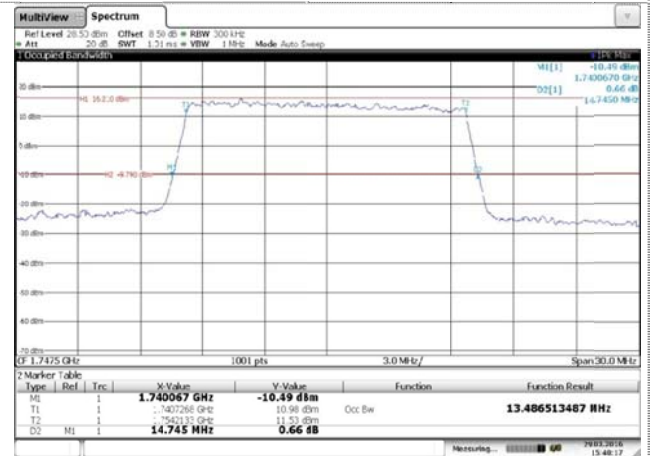
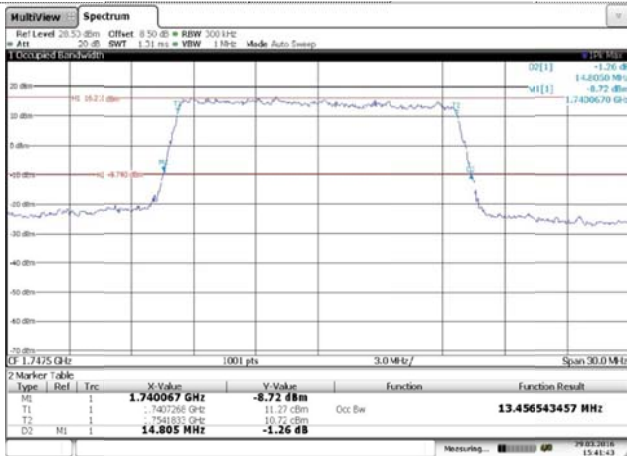
Channel Low

Channel Low



Channel Mid

Channel Mid



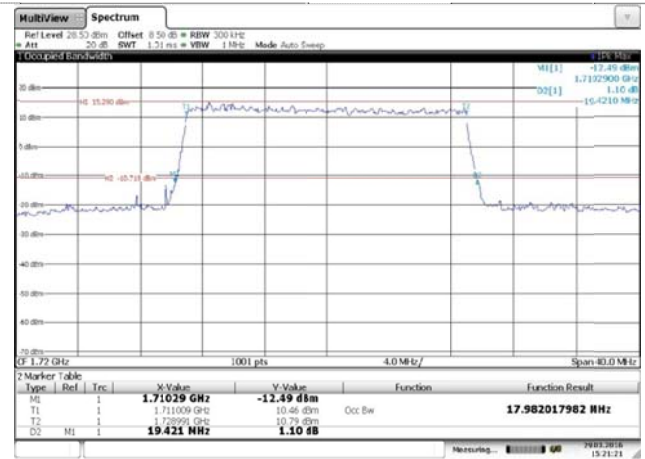
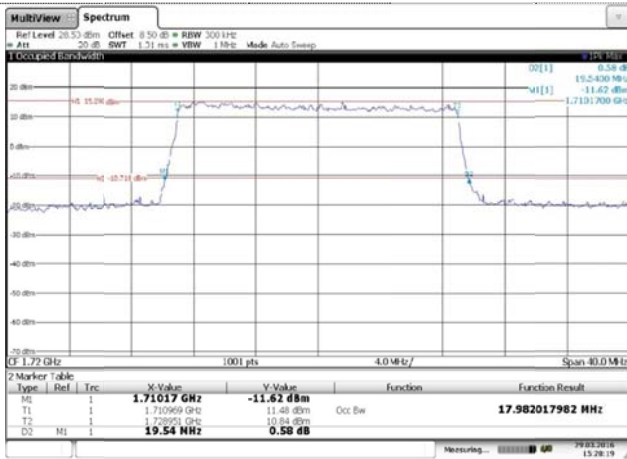
Channel High

Channel High

LTE Band 4-20MHz

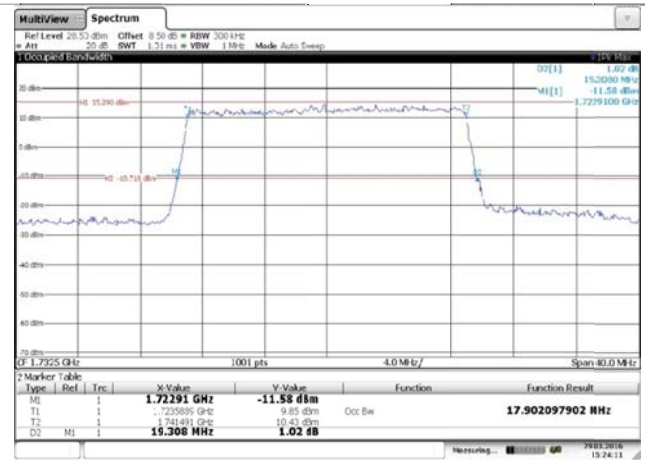
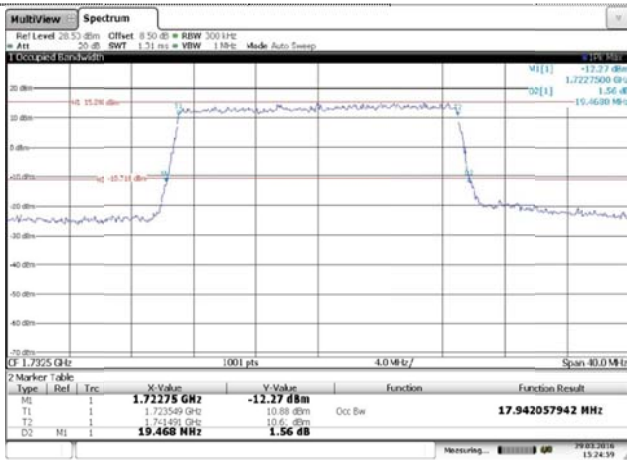
QPSK

16QAM



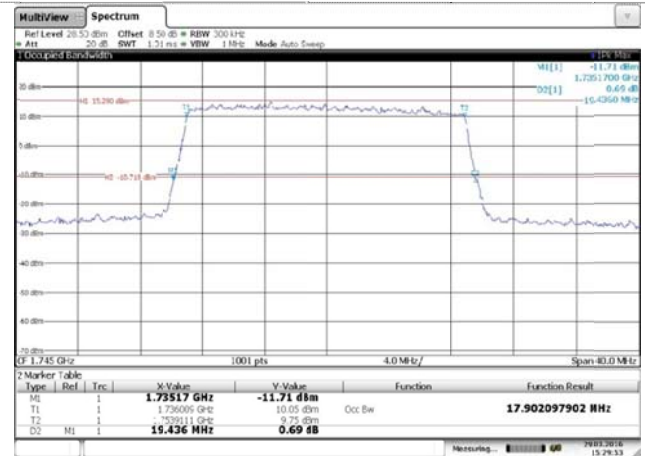
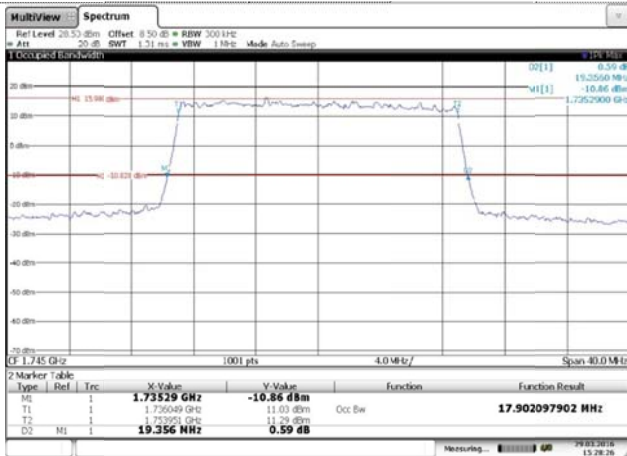
Channel Low

Channel Low



Channel Mid

Channel Mid

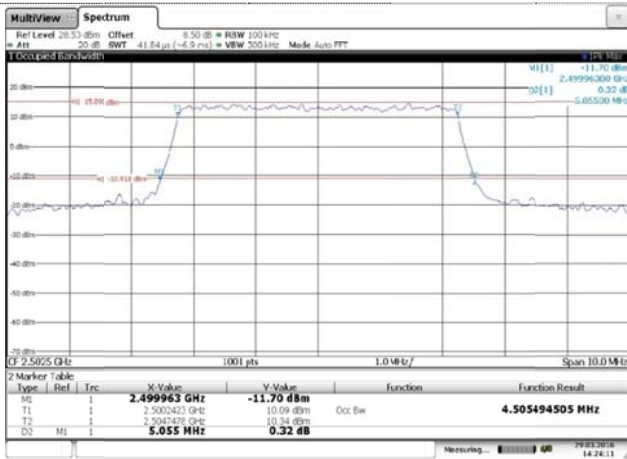


Channel High

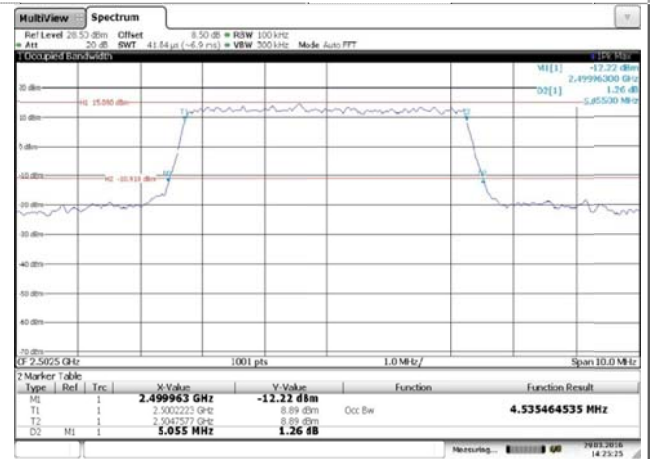
Channel High

LTE Band 7-5MHz

QPSK



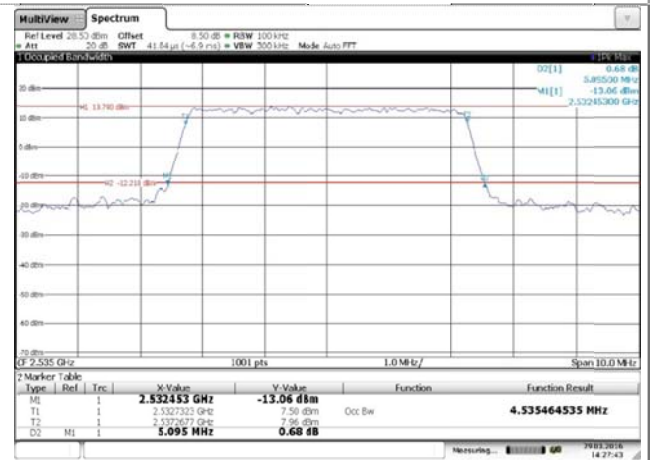
16QAM



Channel Low



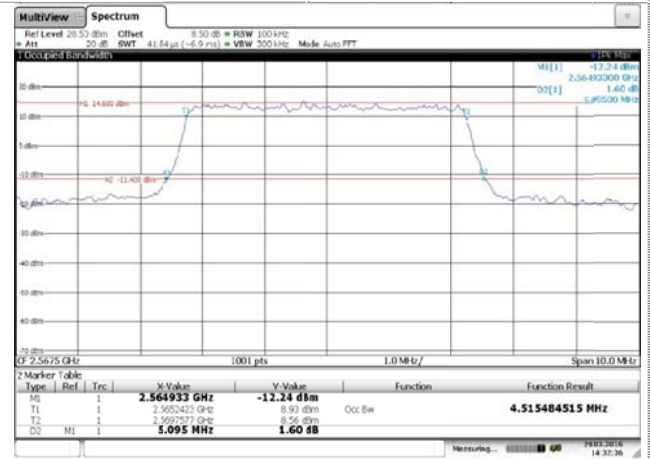
Channel Low



Channel Mid



Channel Mid



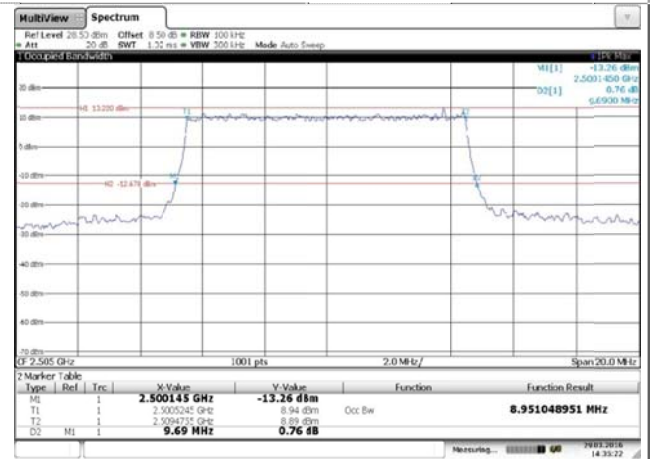
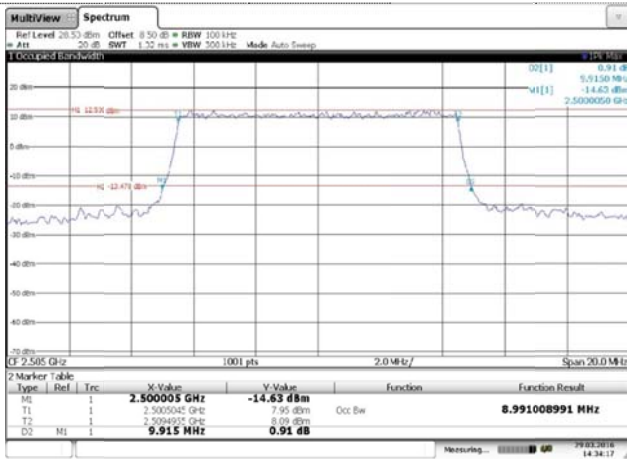
Channel High

Channel High

LTE Band 7-10MHz

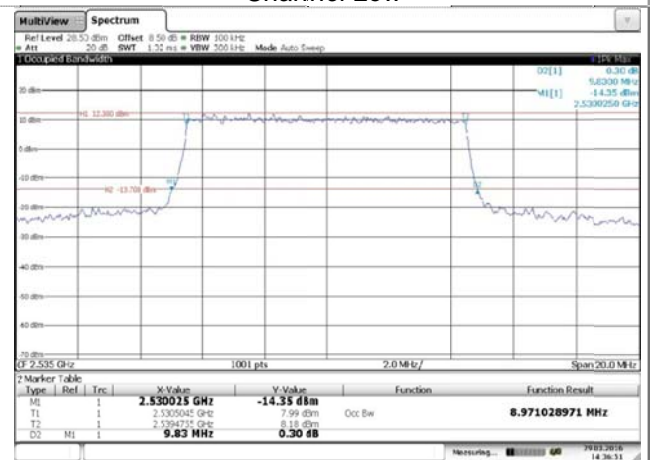
QPSK

16QAM



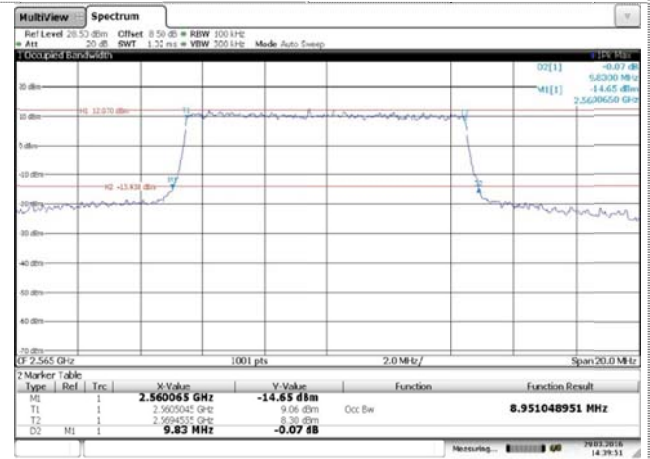
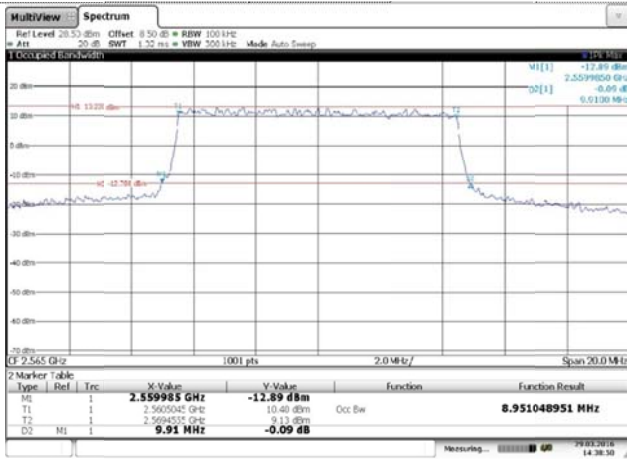
Channel Low

Channel Low



Channel Mid

Channel Mid



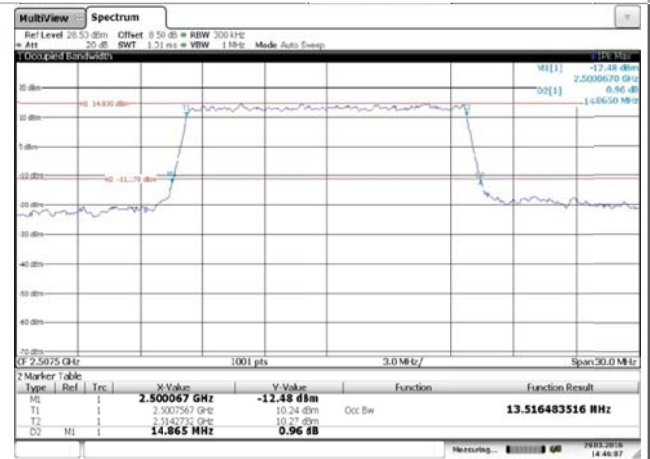
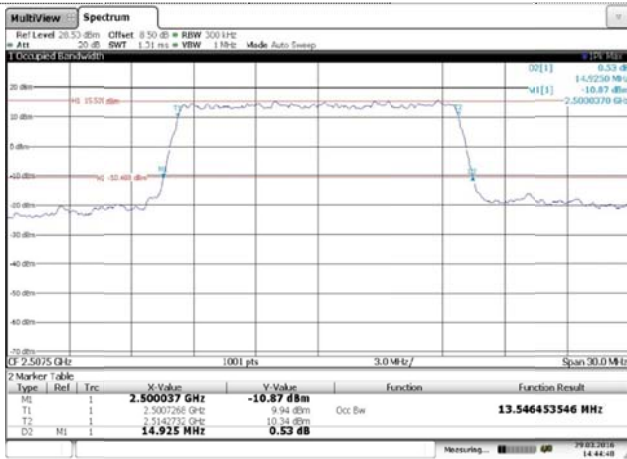
Channel High

Channel High

LTE Band 7-15MHz

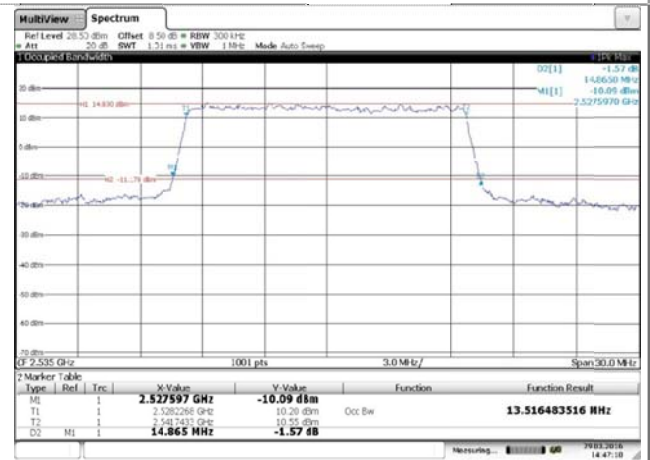
QPSK

16QAM



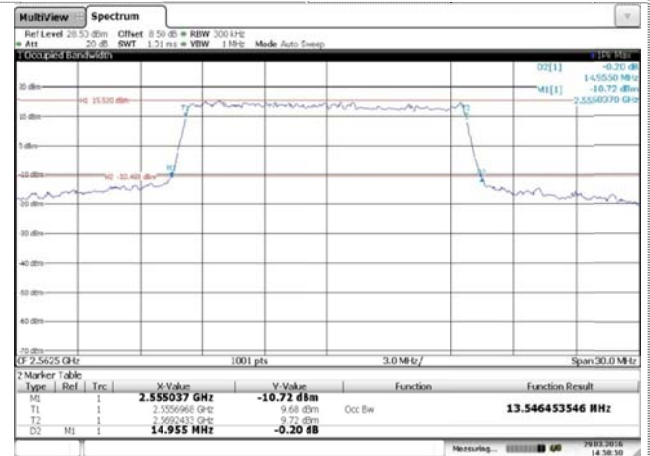
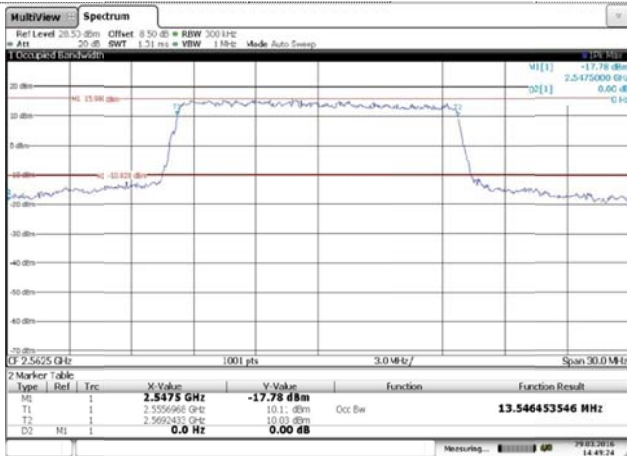
Channel Low

Channel Low



Channel Mid

Channel Mid



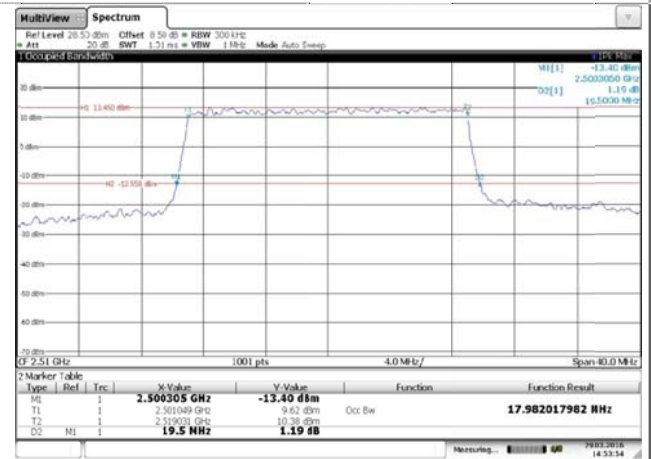
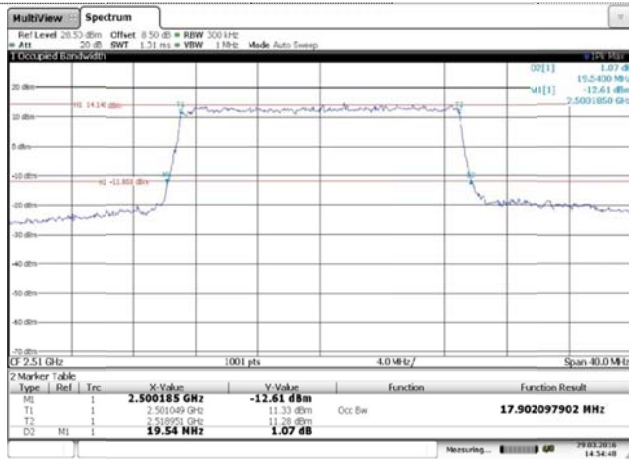
Channel High

Channel High

LTE Band 7-20MHz

QPSK

16QAM



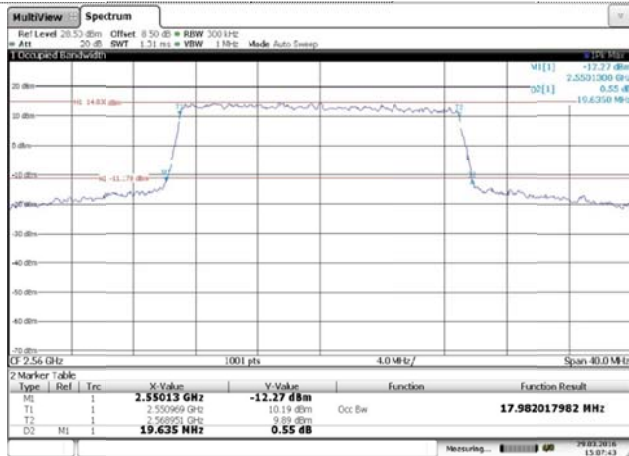
Channel Low

Channel Low



Channel Mid

Channel Mid

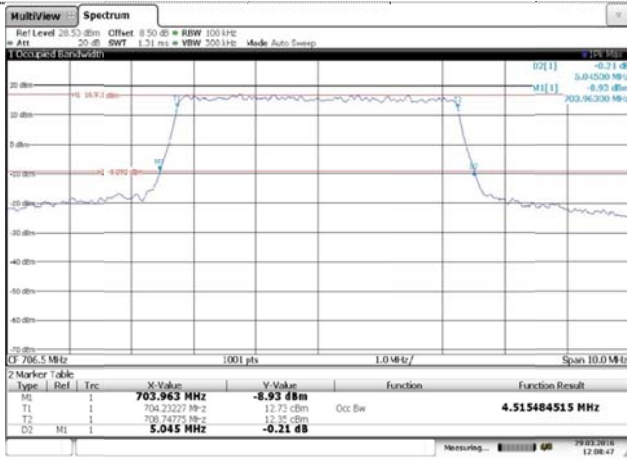


Channel High

Channel High

LTE Band 17-5MHz

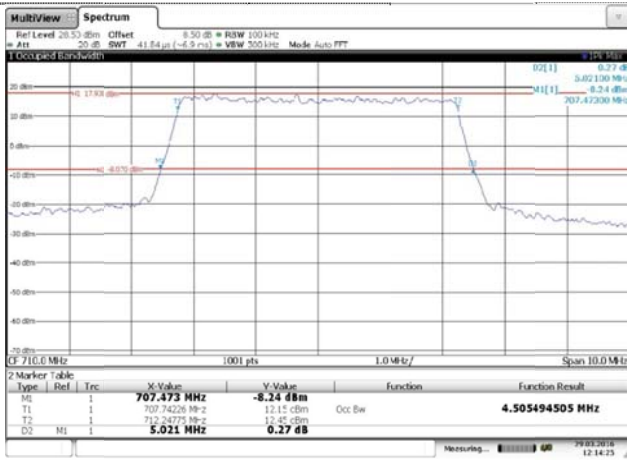
QPSK



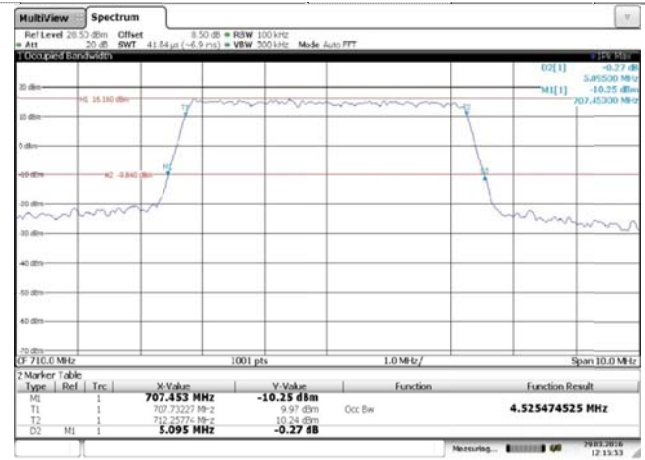
16QAM



Channel Low



Channel Low



Channel Mid



Channel Mid



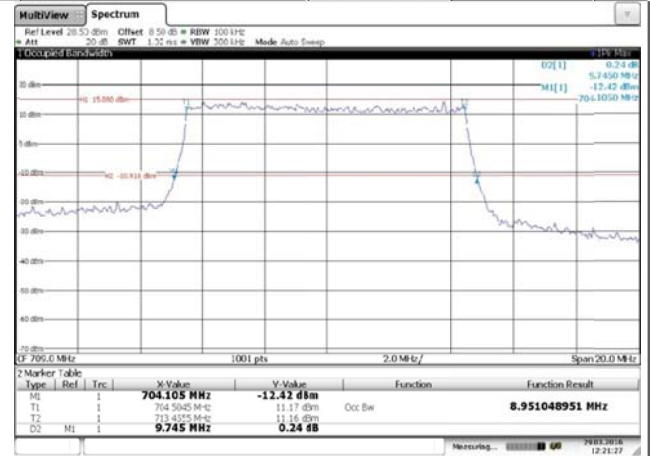
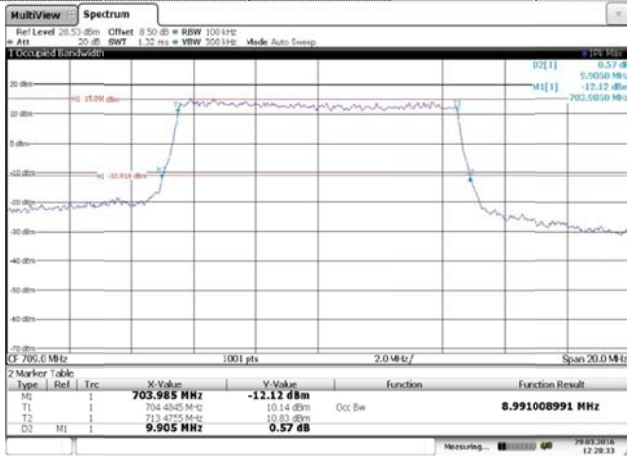
Channel High

Channel High

LTE Band 17-10MHz

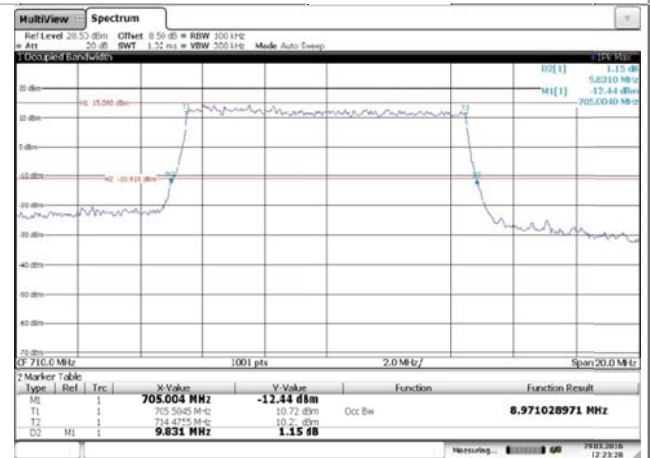
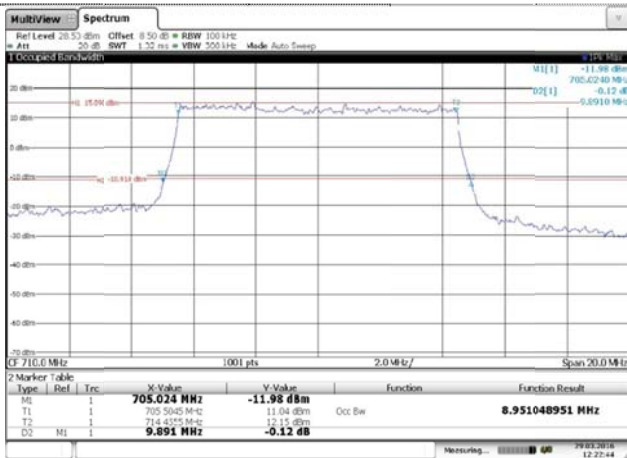
QPSK

16QAM



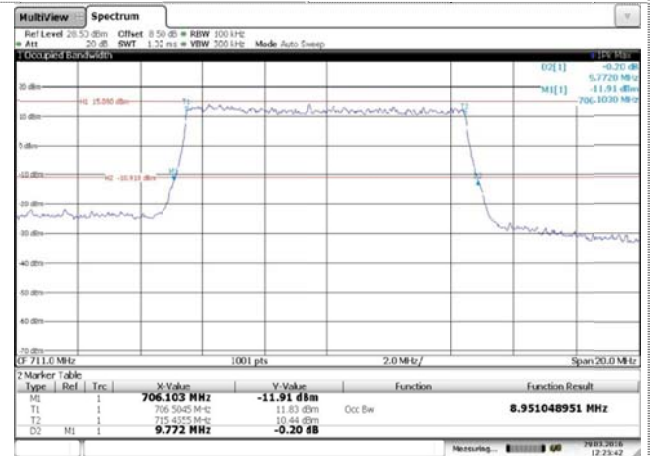
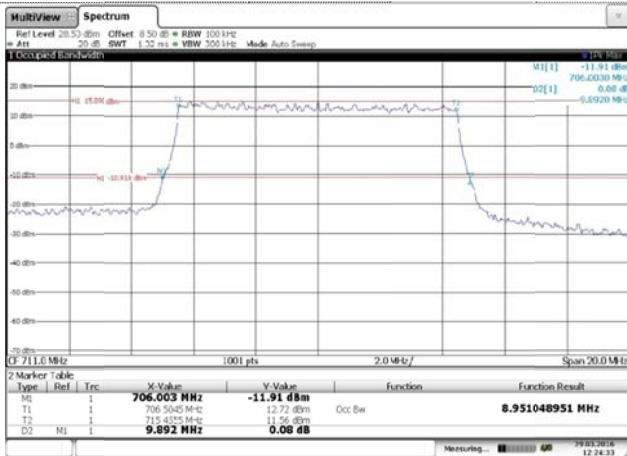
Channel Low

Channel Low



Channel Mid

Channel Mid



Channel High

Channel High

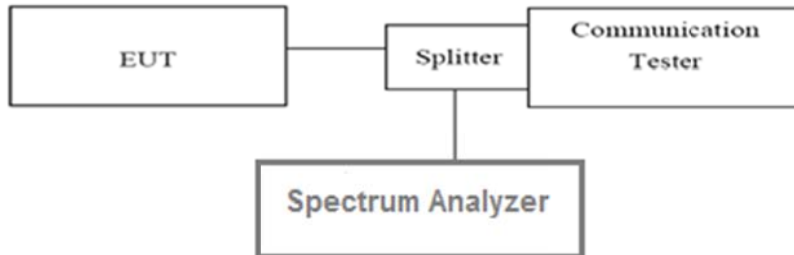
4.3. Out of band emission at antenna terminals

LIMIT

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

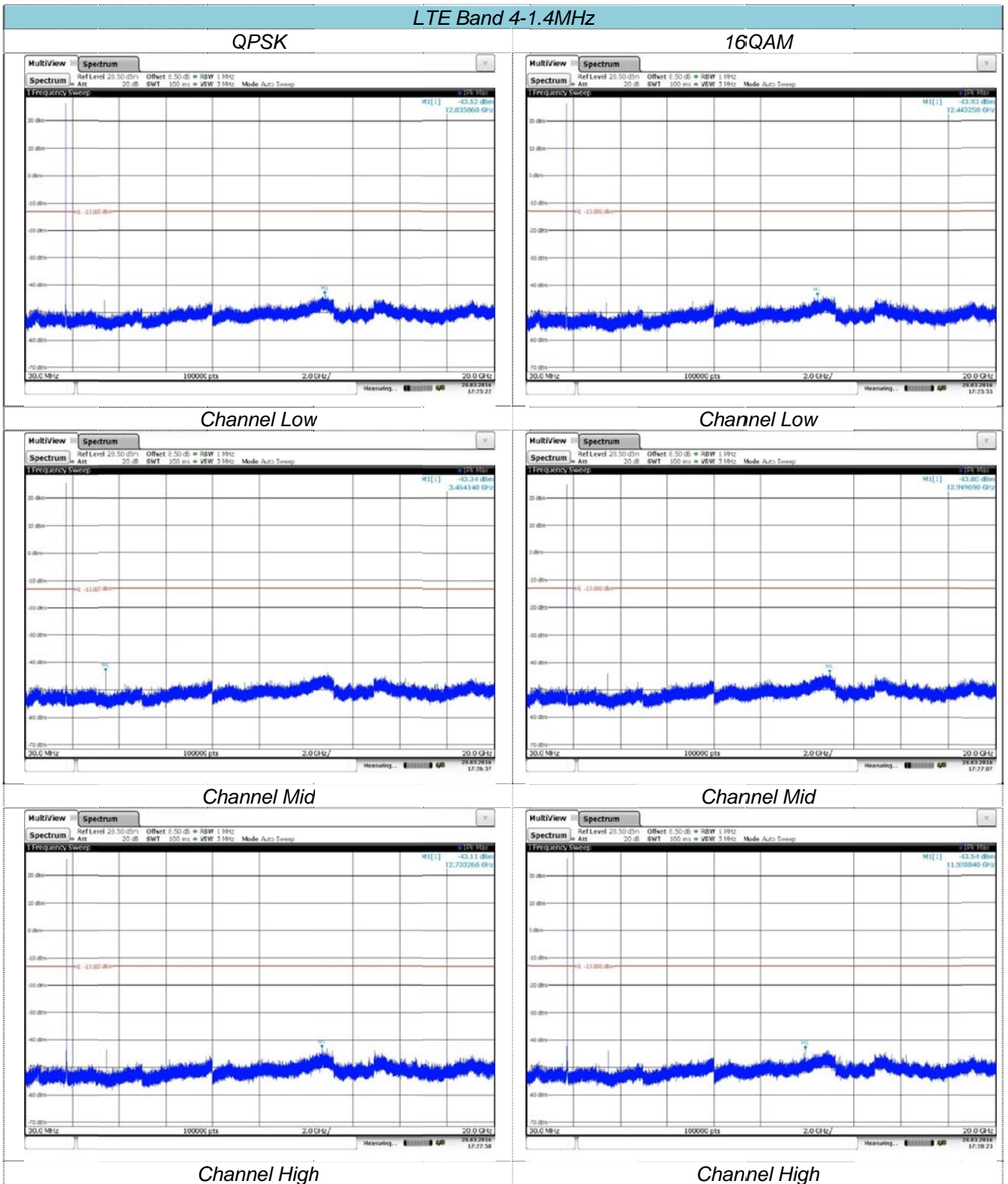
TEST CONFIGURATION



TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW= 1MHz, VBW = 3MHz, Start=30MHz, Stop= 10th harmonic.

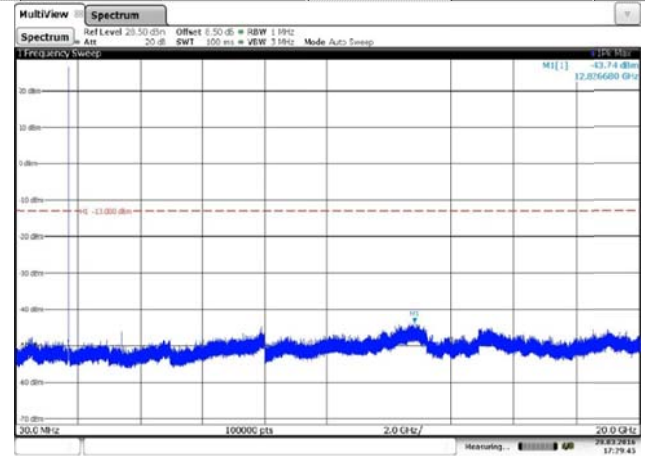
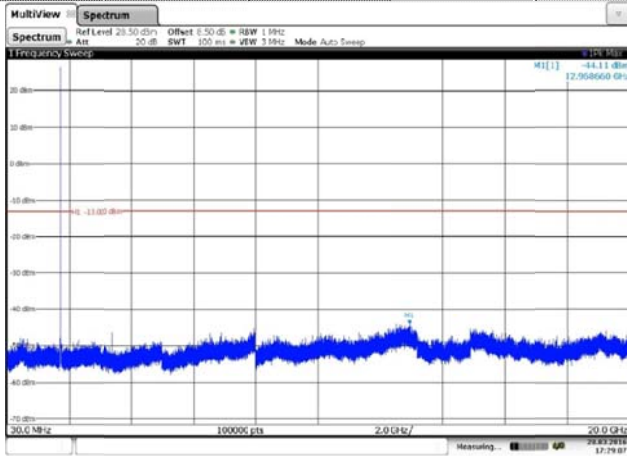
TEST RESULTS



LTE Band 4-3MHz

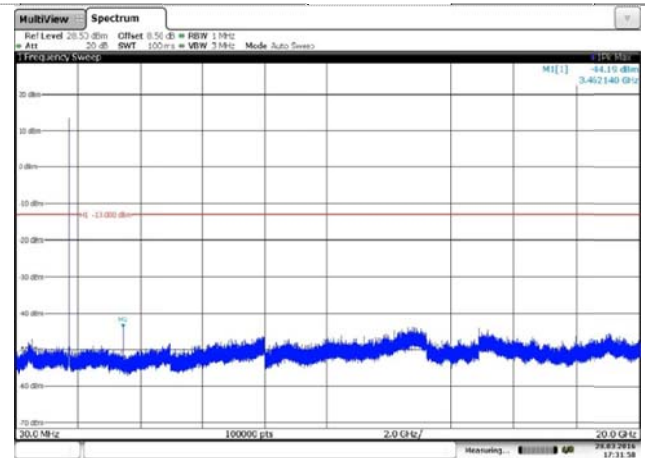
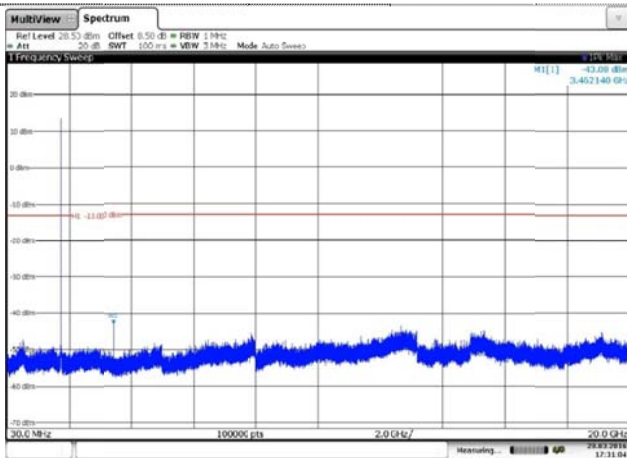
QPSK

16QAM



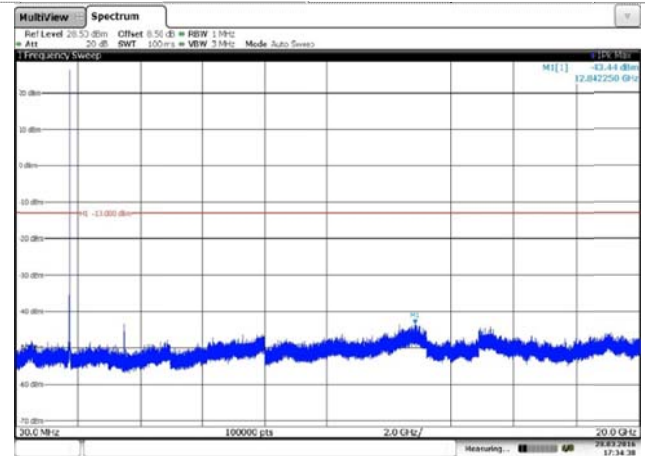
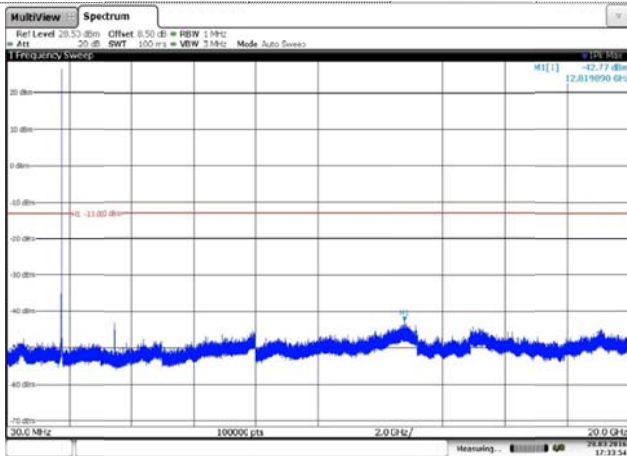
Channel Low

Channel Low



Channel Mid

Channel Mid



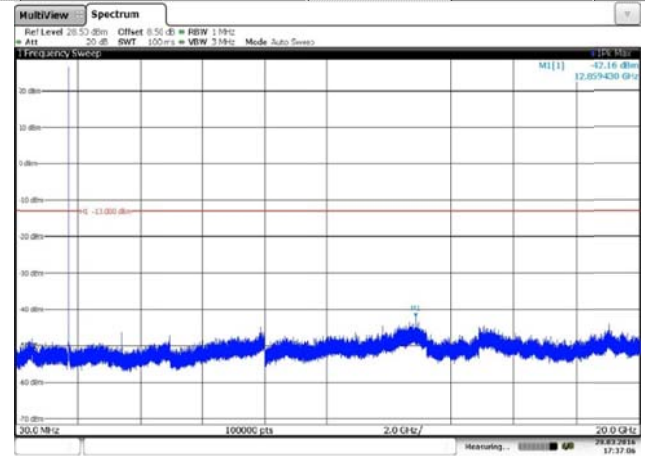
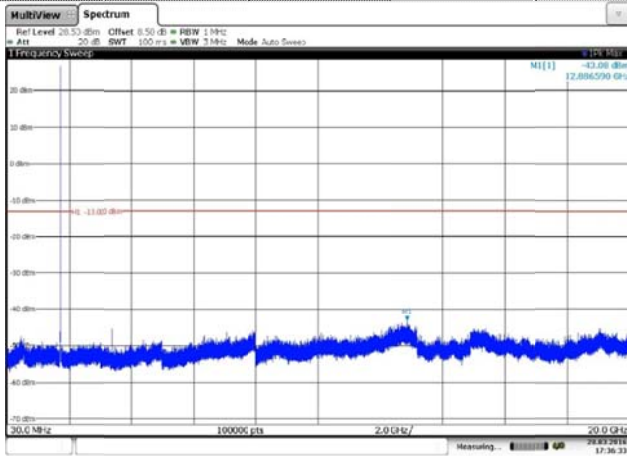
Channel High

Channel High

LTE Band 4-5MHz

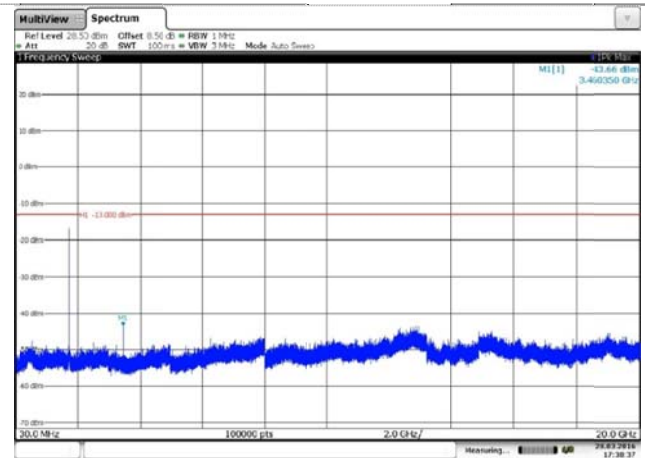
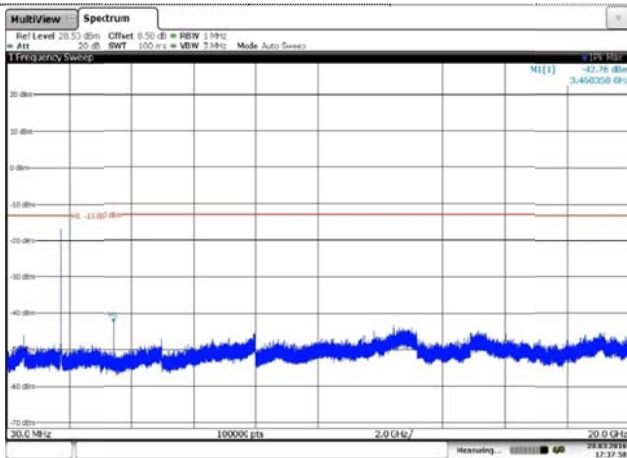
QPSK

16QAM



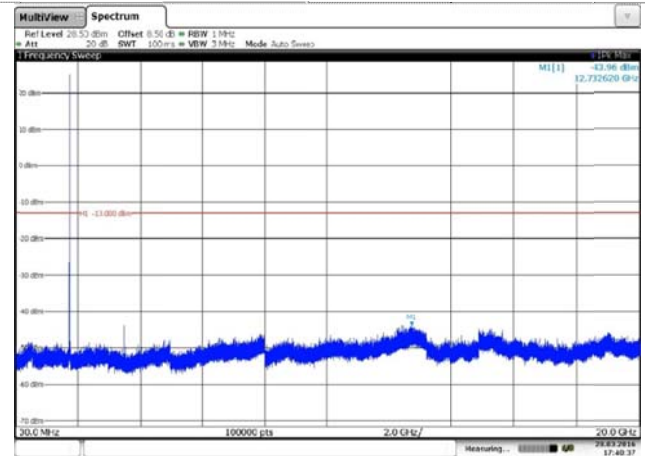
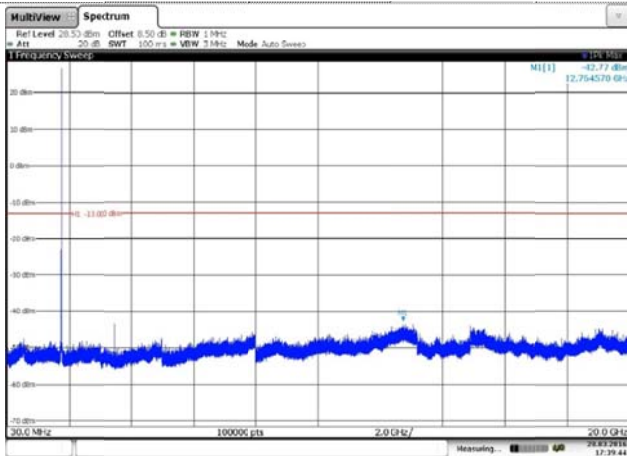
Channel Low

Channel Low



Channel Mid

Channel Mid



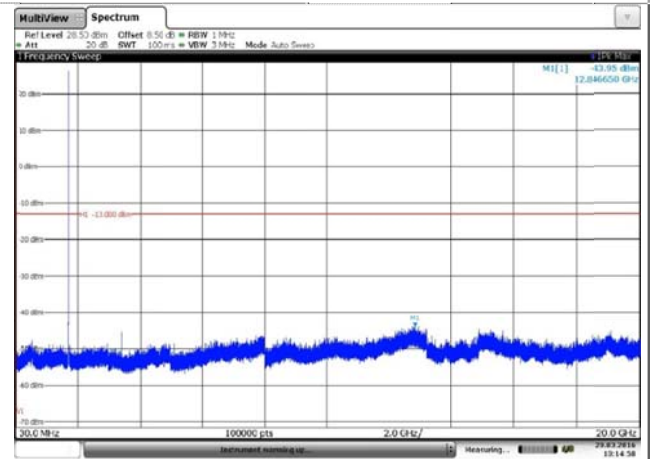
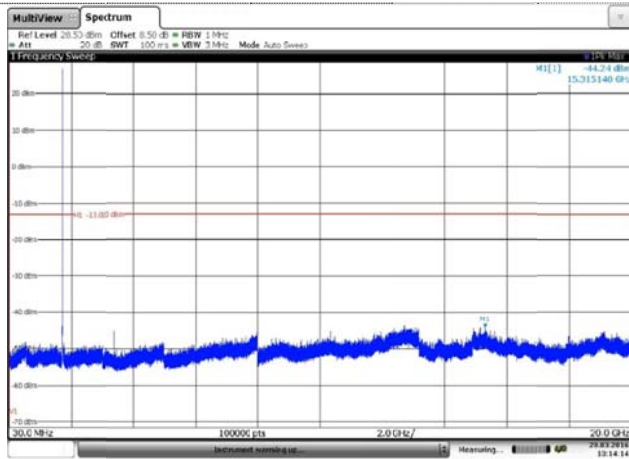
Channel High

Channel High

LTE Band 4-10MHz

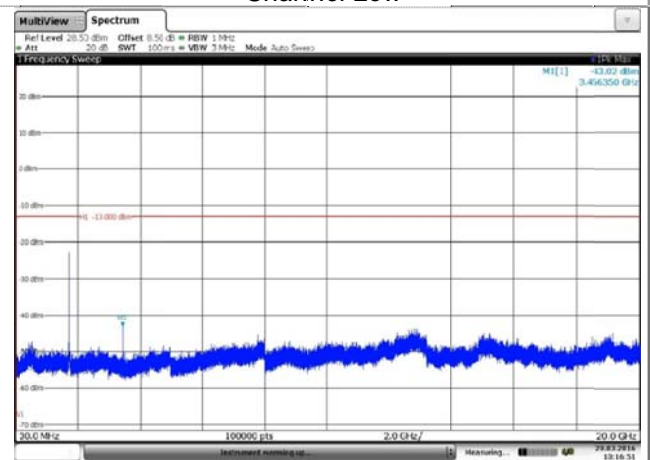
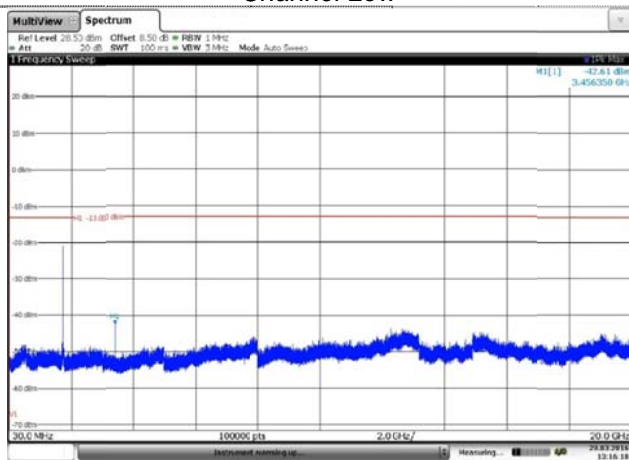
QPSK

16QAM



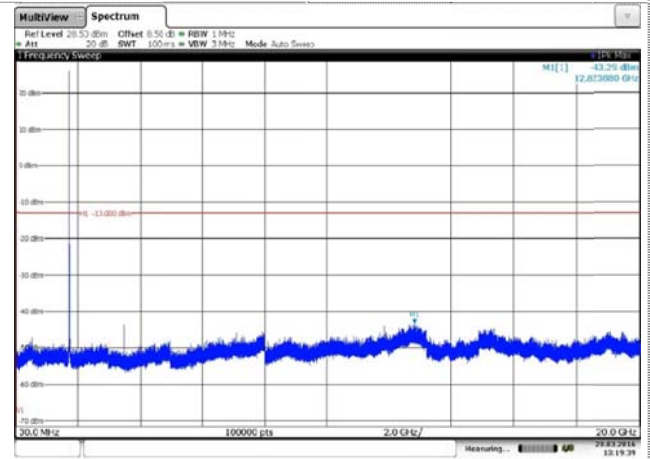
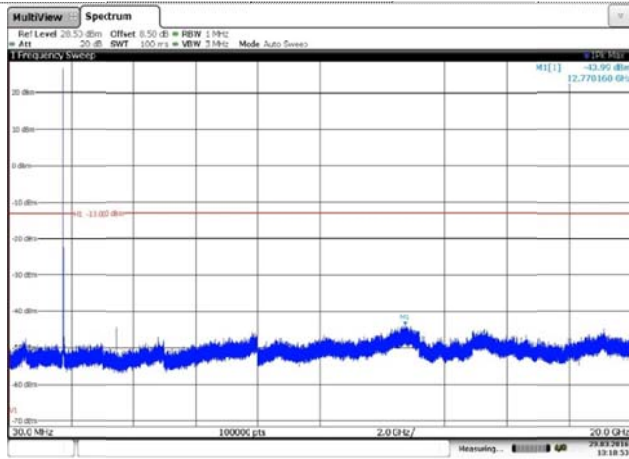
Channel Low

Channel Low



Channel Mid

Channel Mid



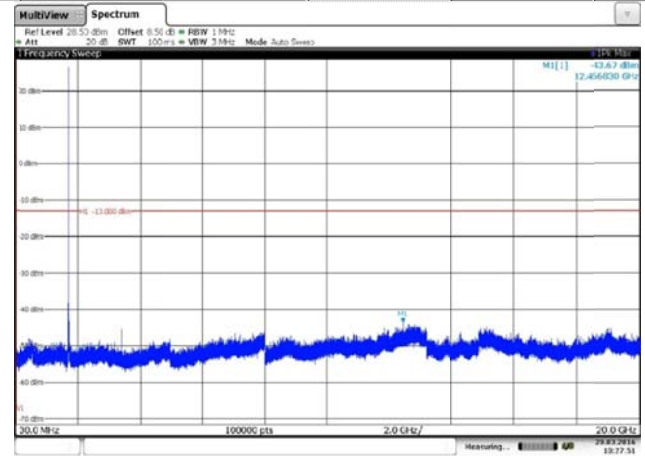
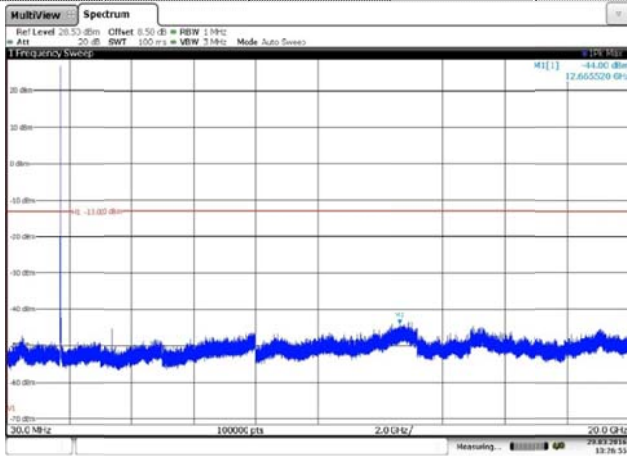
Channel High

Channel High

LTE Band 4-15MHz

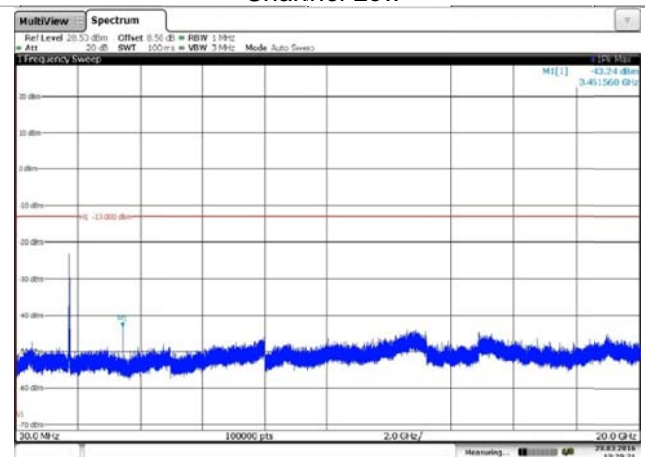
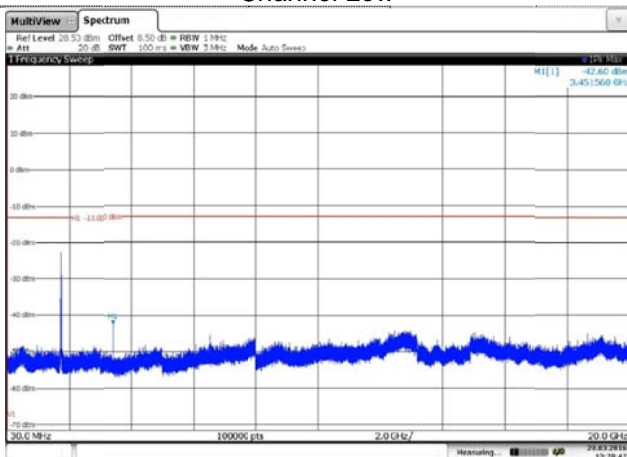
QPSK

16QAM



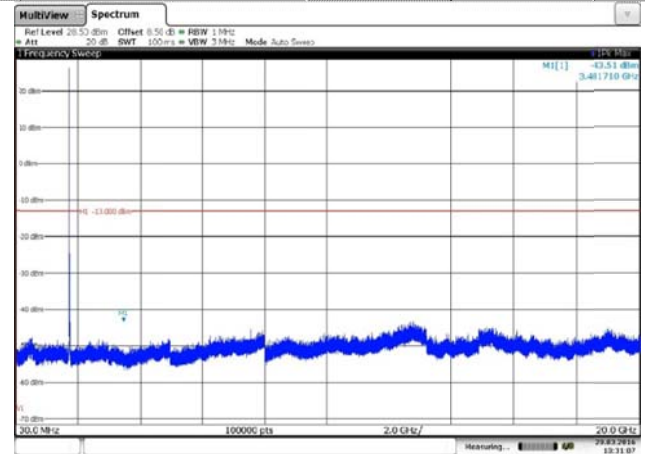
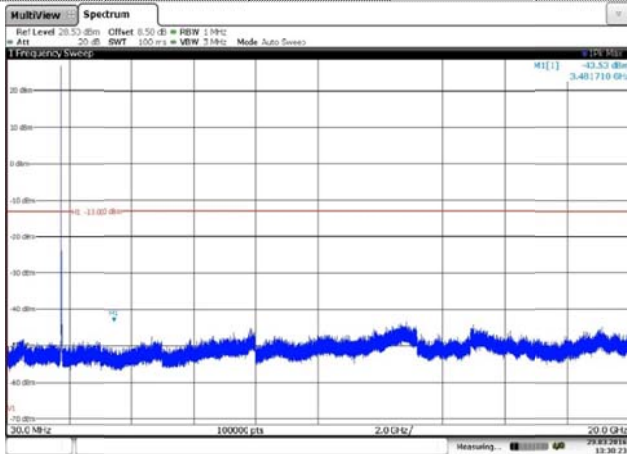
Channel Low

Channel Low



Channel Mid

Channel Mid



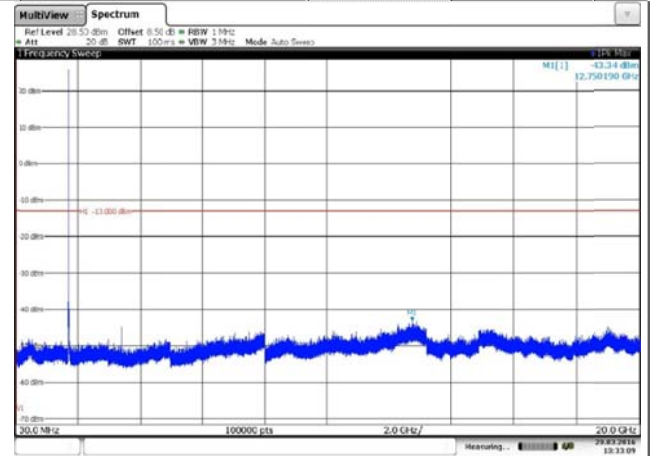
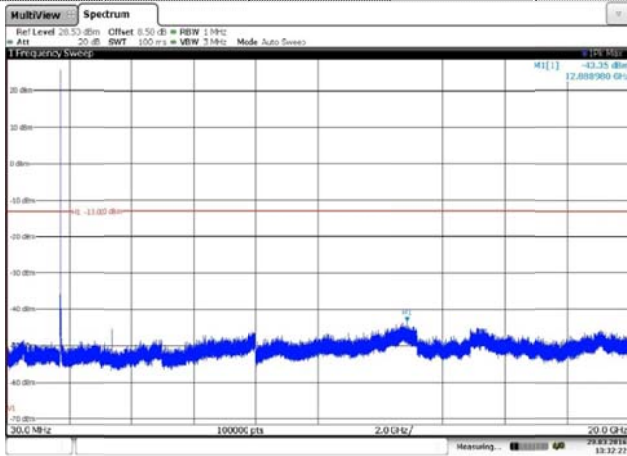
Channel High

Channel High

LTE Band 4-20MHz

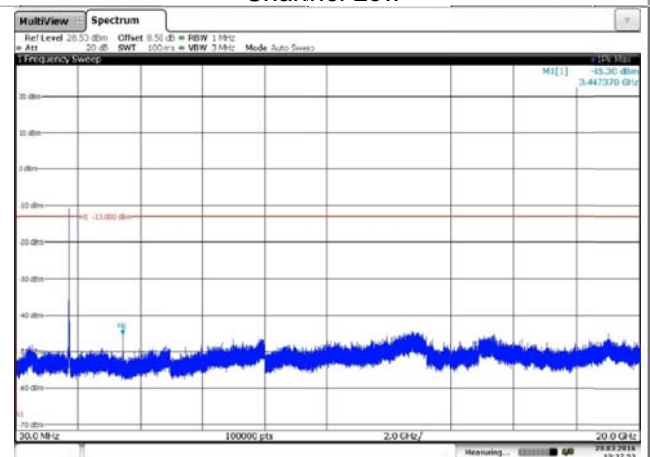
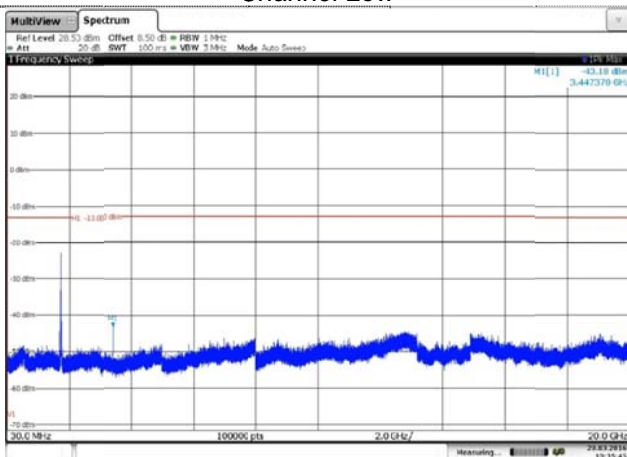
QPSK

16QAM



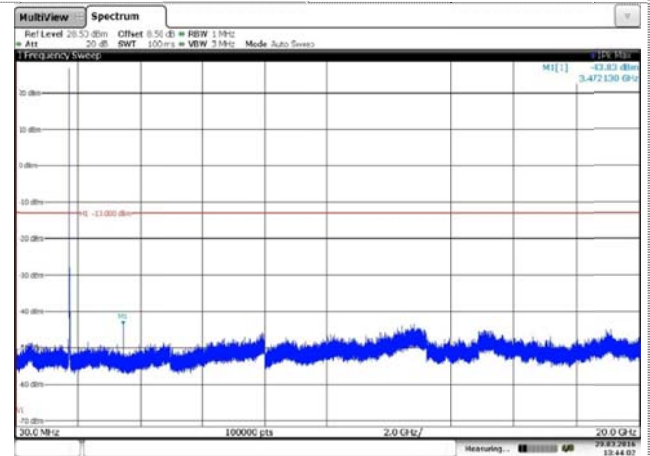
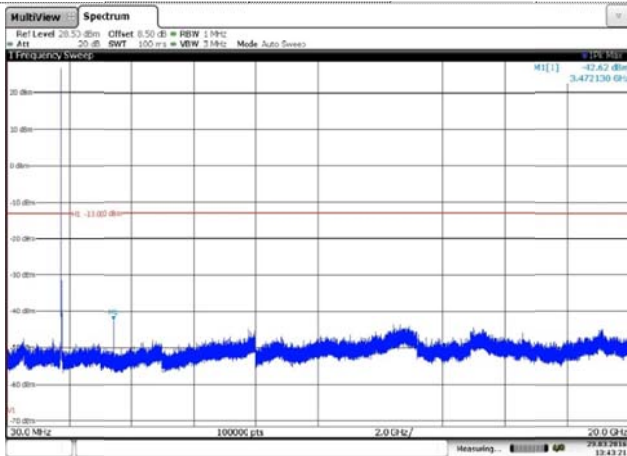
Channel Low

Channel Low



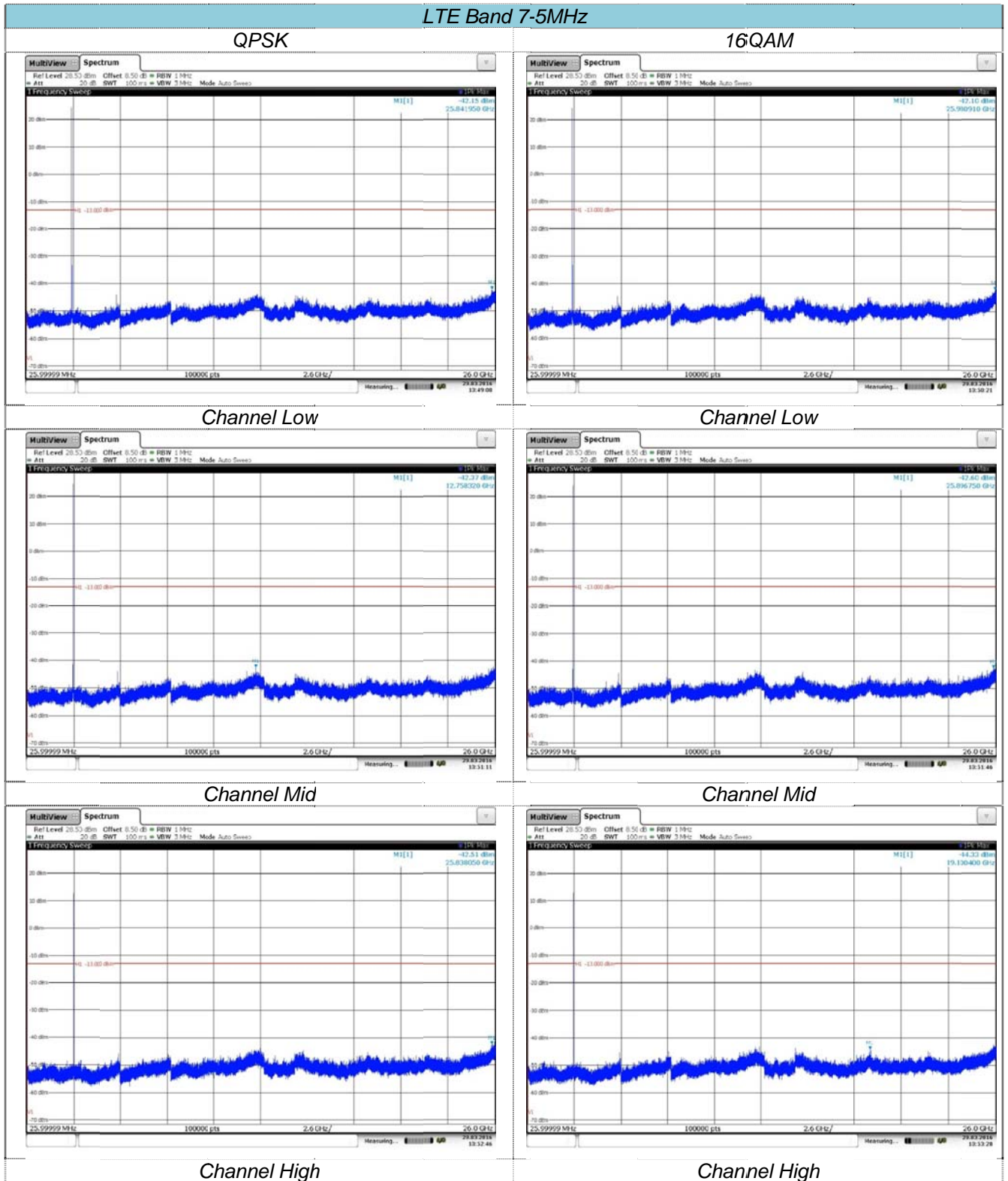
Channel Mid

Channel Mid



Channel High

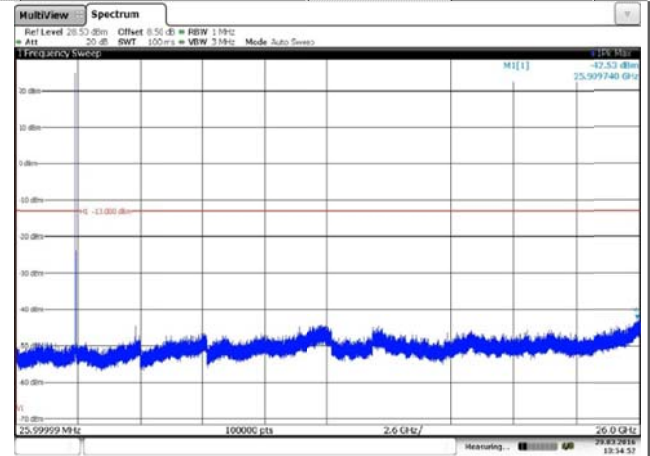
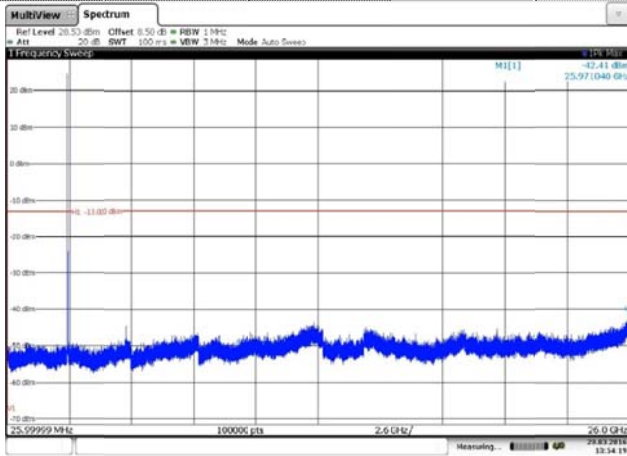
Channel High



LTE Band 7-10MHz

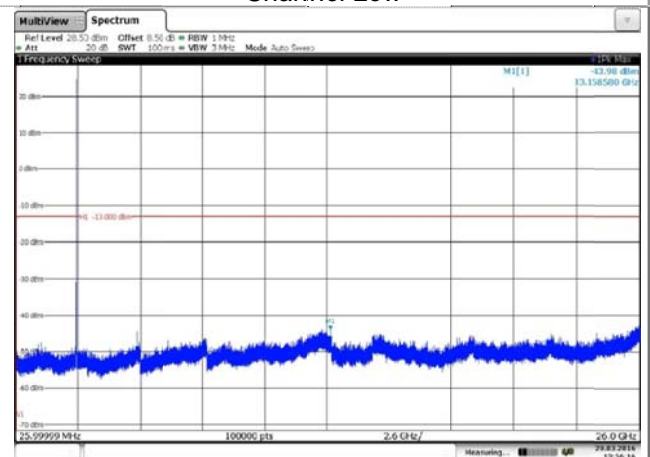
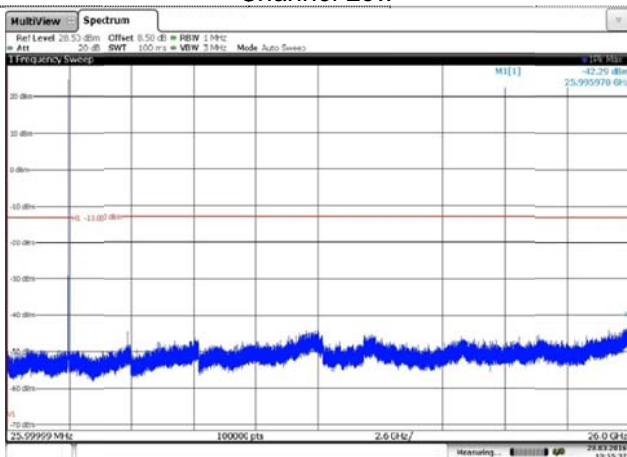
QPSK

16QAM



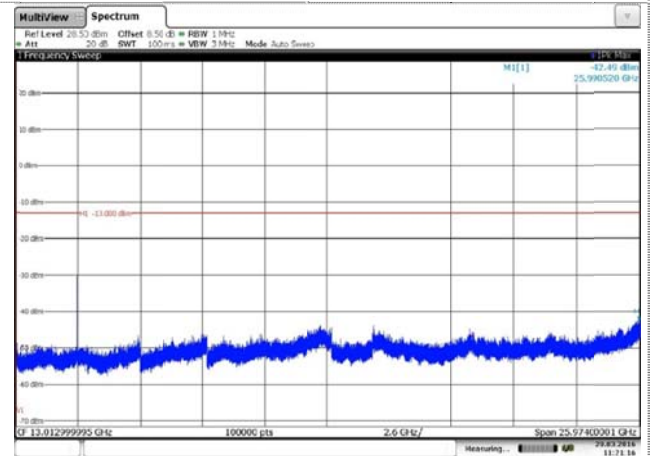
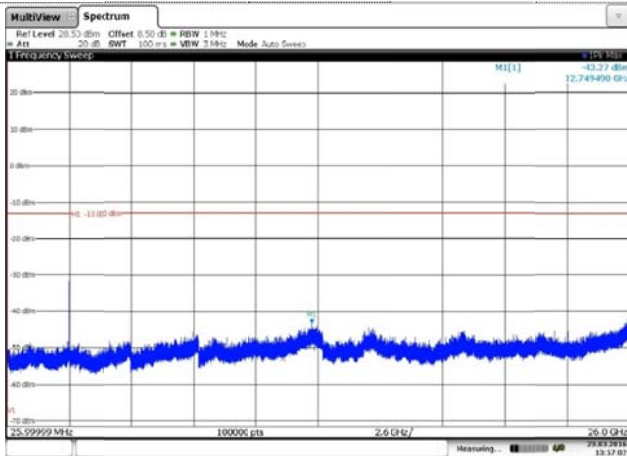
Channel Low

Channel Low



Channel Mid

Channel Mid



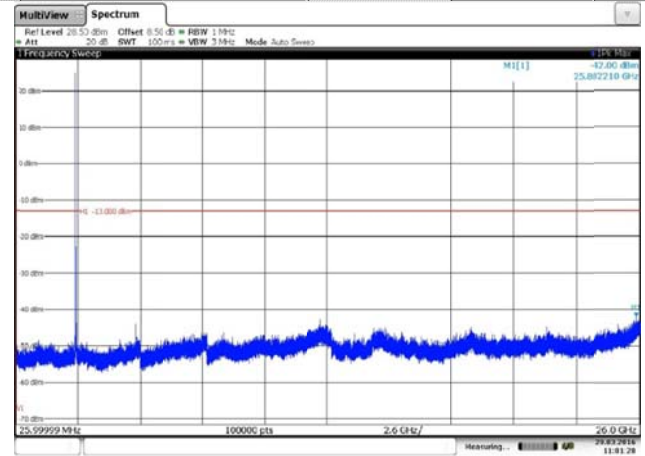
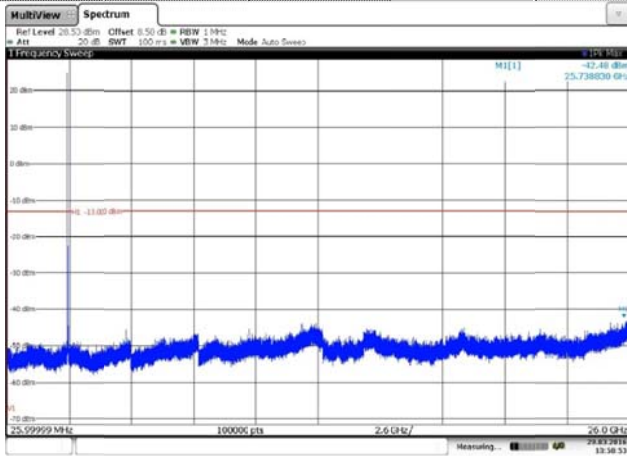
Channel High

Channel High

LTE Band 7-15MHz

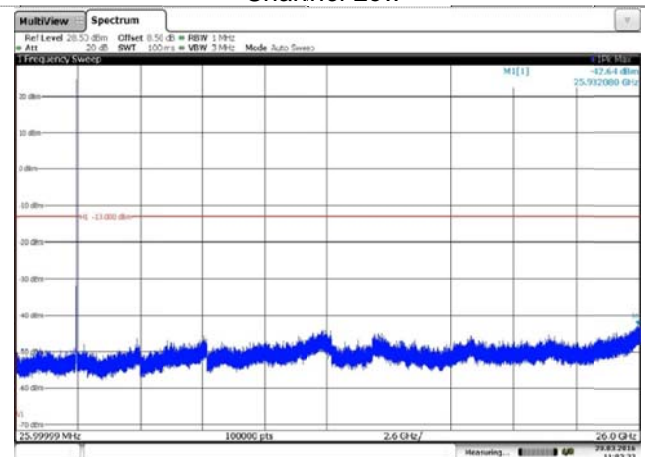
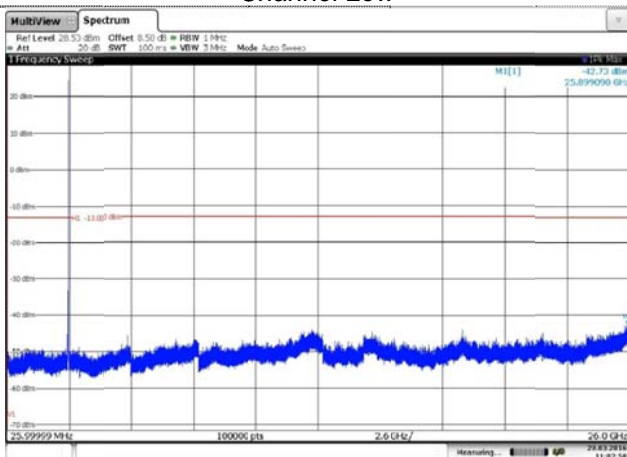
QPSK

16QAM



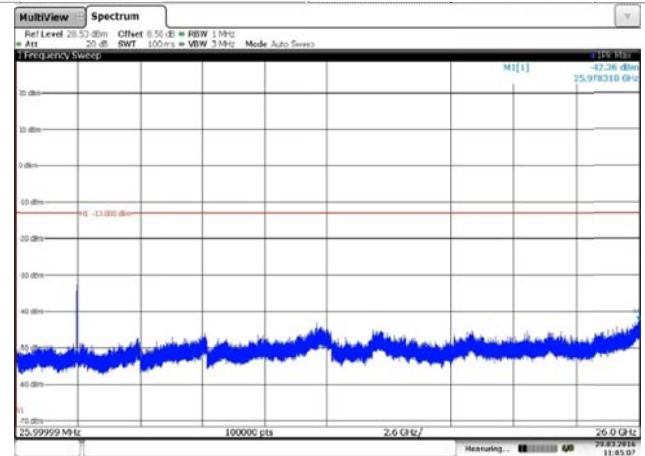
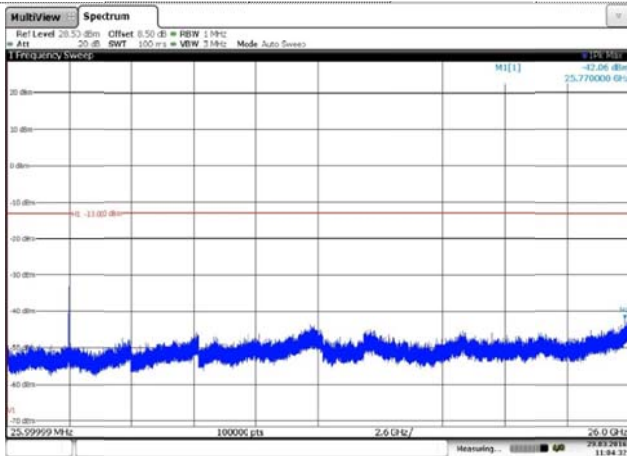
Channel Low

Channel Low



Channel Mid

Channel Mid



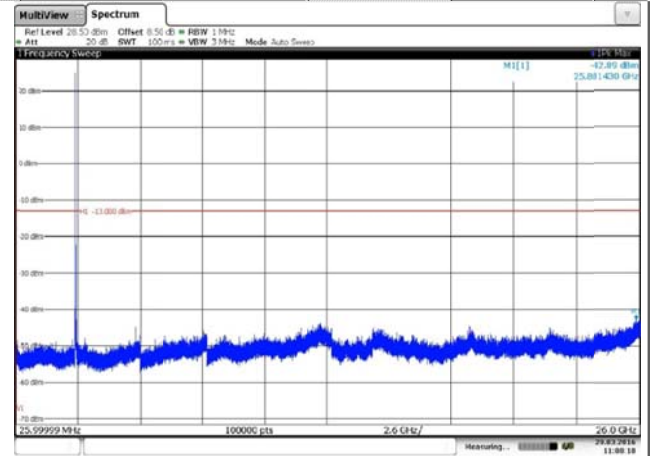
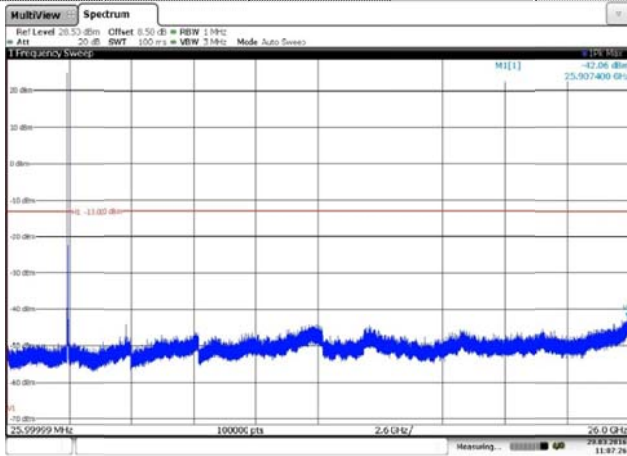
Channel High

Channel High

LTE Band 7-20MHz

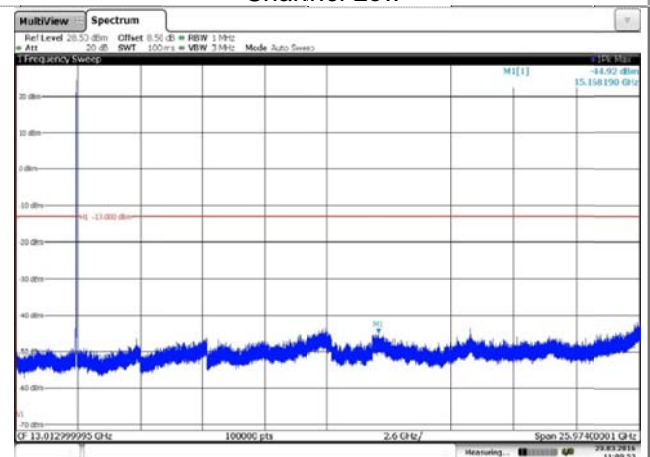
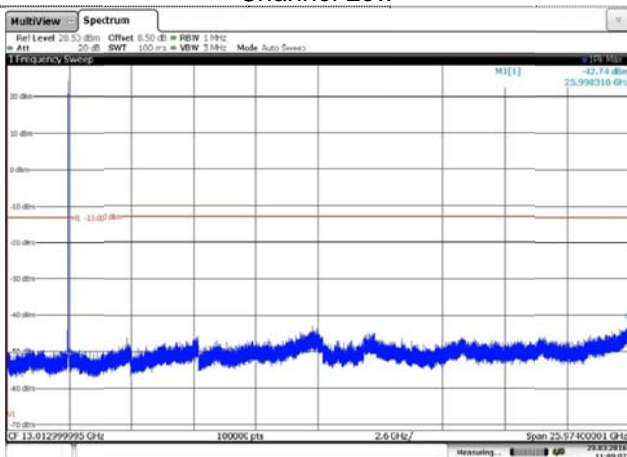
QPSK

16QAM



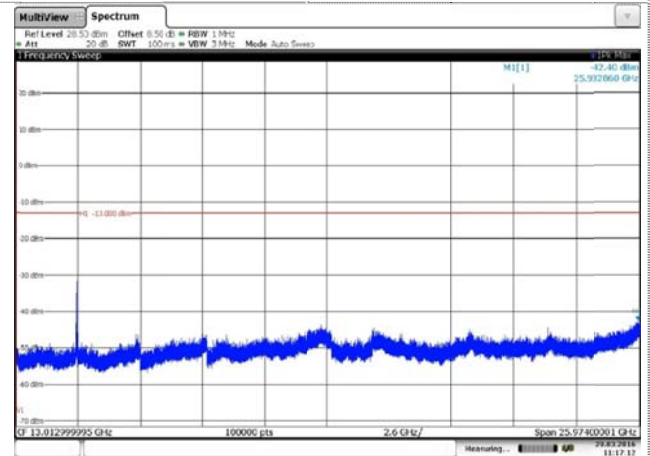
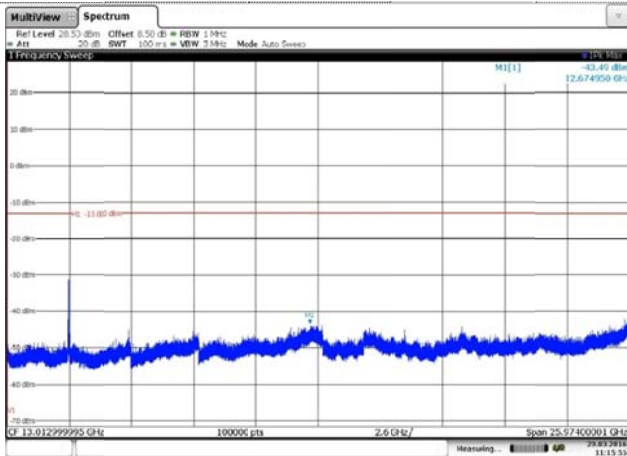
Channel Low

Channel Low



Channel Mid

Channel Mid



Channel High

Channel High

LTE Band 17-5MHz

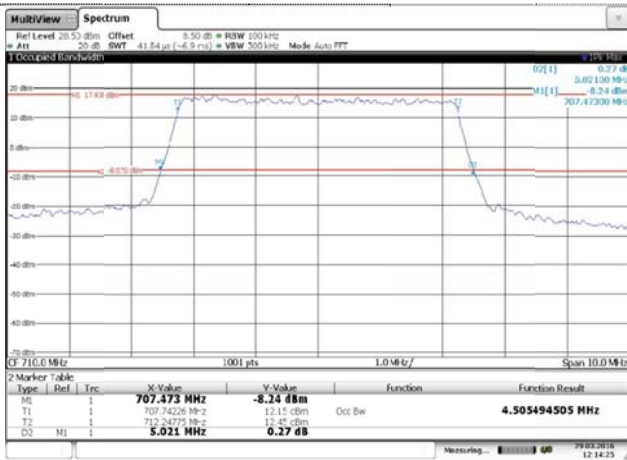
QPSK

16QAM



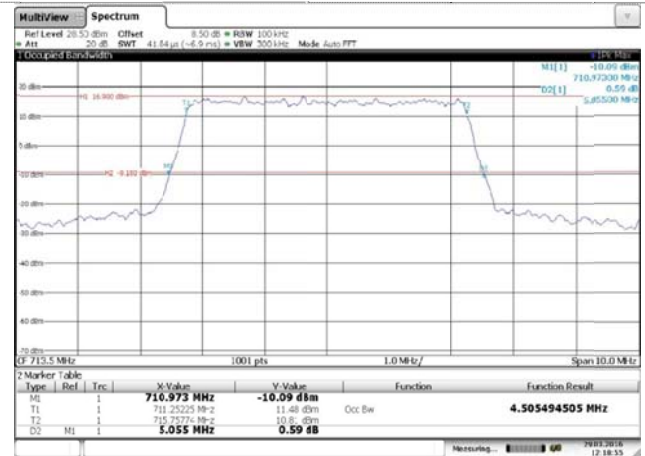
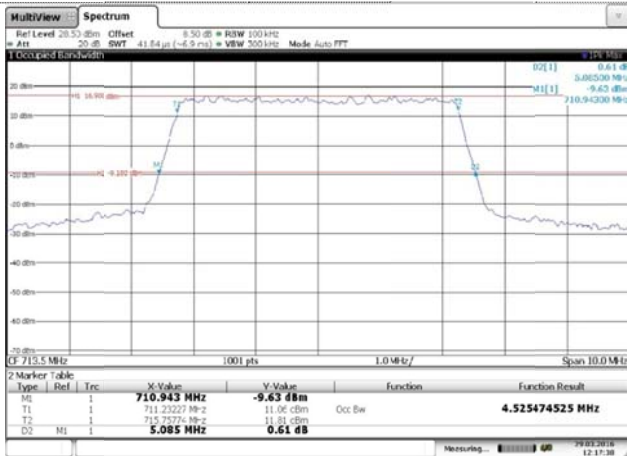
Channel Low

Channel Low



Channel Mid

Channel Mid



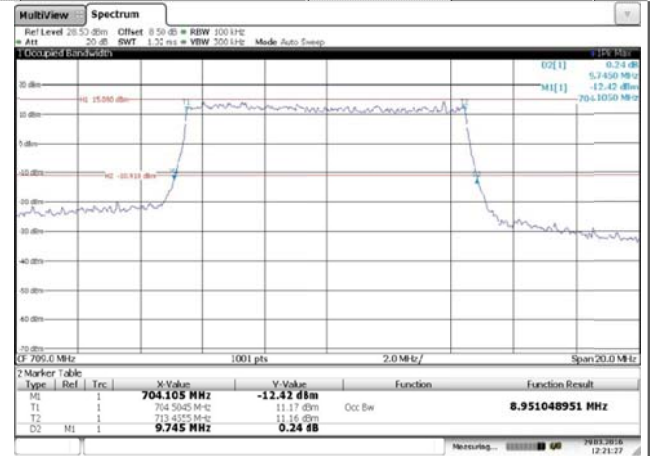
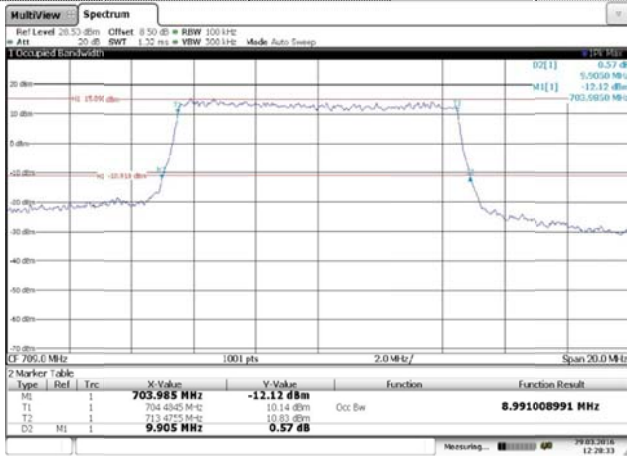
Channel High

Channel High

LTE Band 17-10MHz

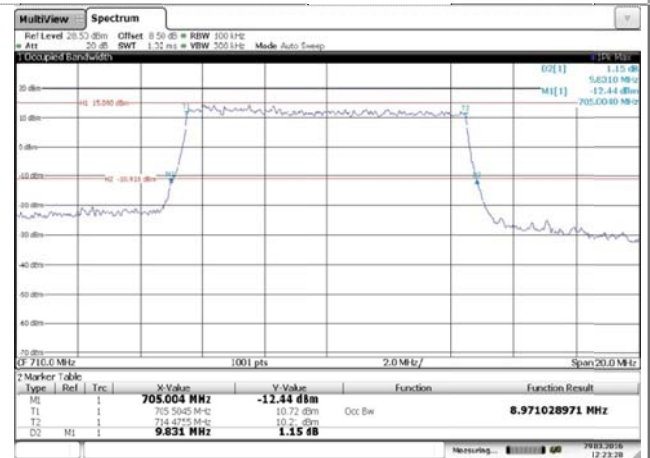
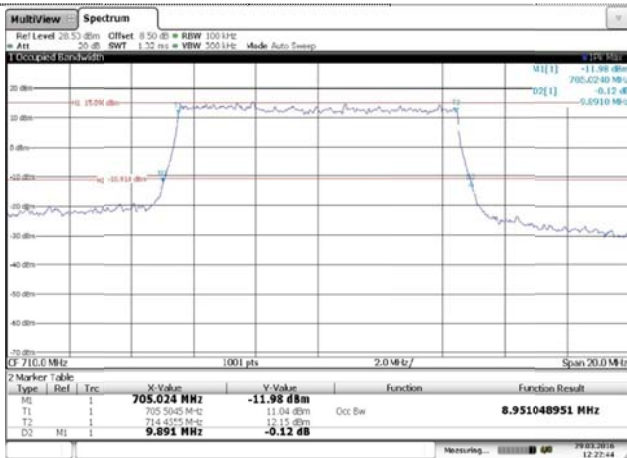
QPSK

16QAM



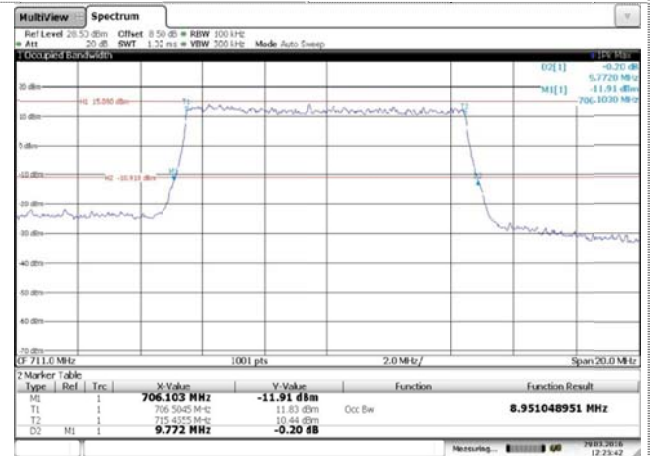
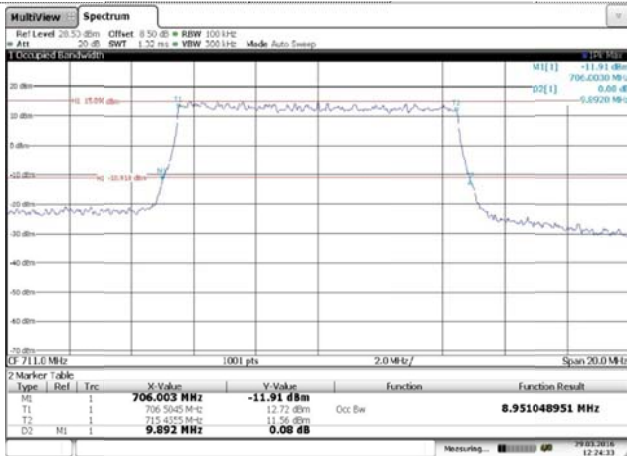
Channel Low

Channel Low



Channel Mid

Channel Mid



Channel High

Channel High

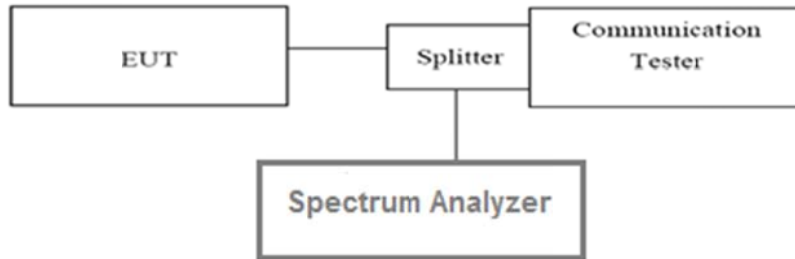
4.4. Band Edge compliance

LIMIT

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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

TEST CONFIGURATION

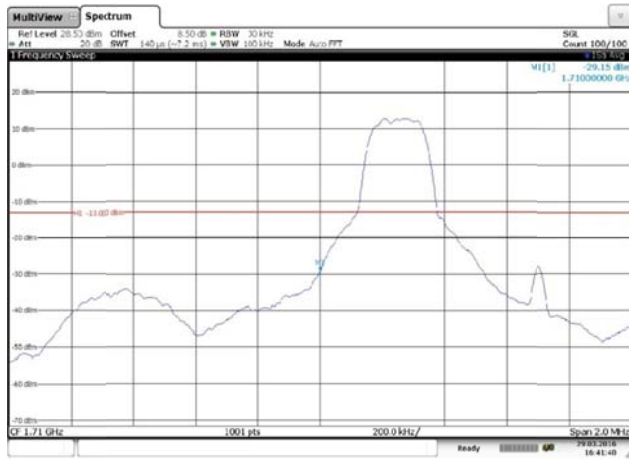


TEST PROCEDURE

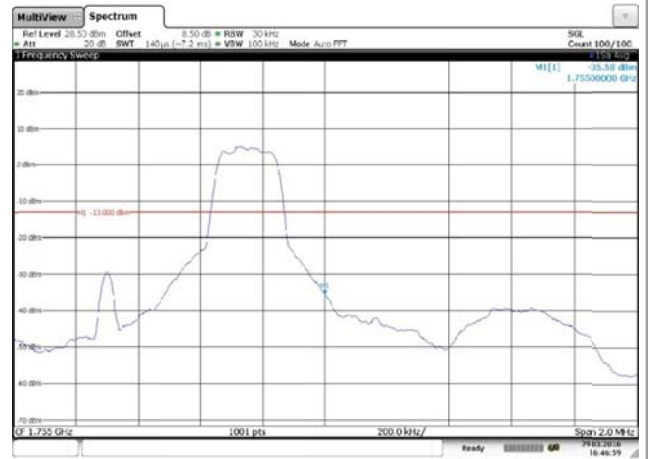
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The band edges of low and high channels for the highest RF powers were measured. Set RBW \geq 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.
3. Set spectrum analyzer with RMS detector.

TEST RESULTS

LTE Band 4-1.4MHz-QPSK



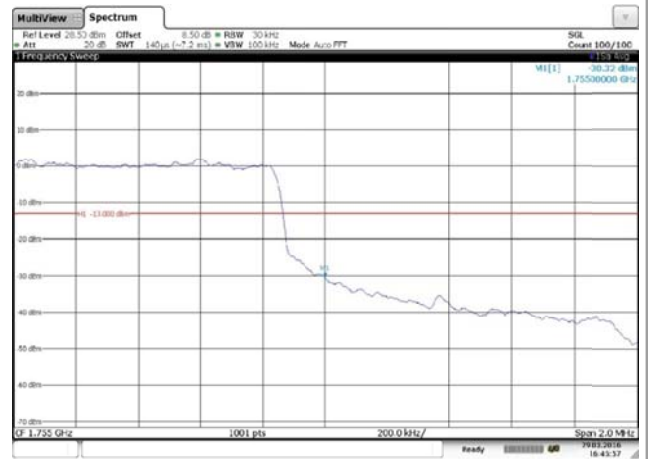
Channel Low-1RB#



Channel High-1RB#



Channel Low-Full RB#



Channel High-Full RB#