# FCC PART 22H, PART 24E

# FCC PART 27

# MEASUREMENT AND TEST REPORT

For

## Shenzhen KVD Communication Equipment

Lenovo R&D Center 2F-B, South First Road, High-tech Park, Nanshan District, Shenzhen China

**FCC ID: 2ADTE-X20L**

| **Report Type:** | **Product Type:** |
|---|---|
| Original Report | Mobile phone |

| | |
|---|---|
| **Report Number:** | RDG171130004-00D |
| **Report Date:** | 2017-12-20 |
| **Reviewed By:** | Jerry Zhang<br>EMC Manager |
| **Test Laboratory:** | Bay Area Compliance Laboratories Corp. (Dongguan)<br>No.69 Pulongcun, Puxinhu Industry Area,<br>Tangxia, Dongguan, Guangdong, China<br>Tel: +86-769-86858888<br>Fax: +86-769-86858891<br>www.baclcorp.com.cn |

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# GENERAL INFORMATION

## Product Description for Equipment under Test (EUT)

The ***Shenzhen KVD Communication Equipment***'s product, model number: ***X20L (FCC ID: 2ADTE-X20L)*** (the "EUT") in this report was a ***Mobile phone,*** which was measured approximately: 145.5mm (L) x 71.9mm (W) x 8.8mm (H), rated input voltage:DC 3.8V from battery or DC 5V from adapter.

*Adapter Information:*
*Model:HJ-0501000E1-US*
*Input: AC100-240V~50/60Hz 0.2A*
*Output: DC5V, 1000mA*

**All measurement and test data in this report was gathered from production sample serial number: 171130004 (Assigned by BACL,Dongguan). The EUT was received on 2017-11-25.*

## Objective

This report is prepared on behalf of *Shenzhen KVD Communication Equipment* in accordance with: Part 2-Subpart J, Part 22-Subpart H, and Part 24-Subpart E of the Federal Communications Commission's rules. Part 2, Part 27 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Rules for output power, modulation characteristic, occupied bandwidth, spurious emissions at antenna terminal, spurious radiated emission, frequency stability and band edge.

## Related Submittal(s)/Grant(s)

FCC Part 15C DTS submissions with FCC ID: 2ADTE-X20L.
FCC Part 15C DSS submissions with FCC ID: 2ADTE-X20L.
FCC Part 15B JBP submissions with FCC ID: 2ADTE-X20L.

## Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D-2010.

All radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp.(Dongguan).

## Measurement Uncertainty

| Parameter | Measurement Uncertainty |
|---|---|
| Occupied Channel Bandwidth | ±5 % |
| RF output power, conducted | ±0.61dB |
| Unwanted Emissions, radiated | 30MHz ~ 1GHz:5.85 dB<br>1G~26.5GHz: 5.23 dB |
| Unwanted Emissions, conducted | ±1.5 dB |
| Temperature | ±1℃ |
| Humidity | ±5% |
| DC and low frequency voltages | ±0.4% |
| Duty Cycle | 1% |

## Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Dongguan) to collect test data is located on the No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China

Bay Area Compliance Laboratories Corp. (Dongguan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L5662). And accredited to ISO/IEC 17025 by NVLAP(Test Laboratory Accreditation Certificate Number 500069-0), the FCC Designation No. CN5002 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 273710. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Dongguan) was registered with ISED Canada under ISED Canada Registration Number 3062D.

# SYSTEM TEST CONFIGURATION

## Justification

The EUT was configured for testing according to TIA/EIA-603-D 2010.

The test items were performed with the EUT operating at testing mode.

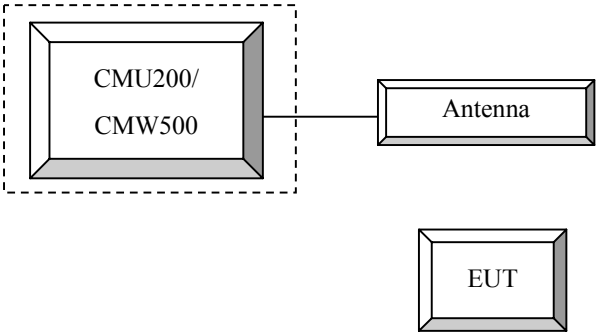
## Equipment Modifications

No modification was made to the EUT.

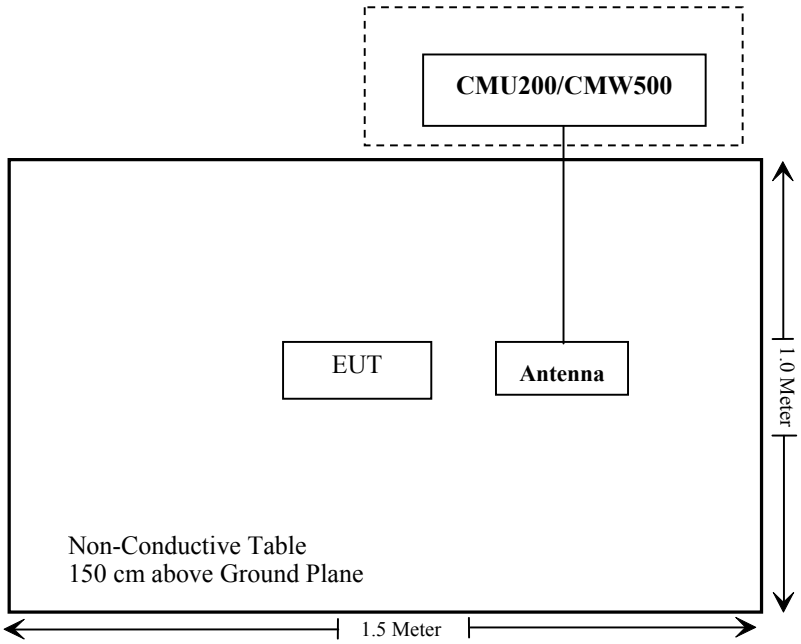
## Support Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|---|---|---|---|
| R&S | Universial Radio Communication Tester | CMU200 | 109038 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 |
| N/A | ANTENNA | N/A | N/A |

## Configuration of Test Setup



**Block Diagram of Test Setup**



# SUMMARY OF TEST RESULTS

| FCC Rules | Description of Test | Result |
|---|---|---|
| §1.1310, §2.1093 | RF Exposure | Compliance |
| §2.1046;<br>§ 22.913 (a); § 24.232 (c);<br>§27.50 | RF Output Power | Compliance |
| § 2.1047 | Modulation Characteristics | Not Applicable |
| § 2.1049; § 22.905<br>§ 22.917; § 24.238; §27.53 | Occupied Bandwidth | Compliance |
| § 2.1051,<br>§ 22.917 (a); § 24.238 (a);<br>§27.53 | Spurious Emissions at Antenna Terminal | Compliance |
| § 2.1053<br>§ 22.917 (a); § 24.238 (a);<br>§27.53 | Field Strength of Spurious Radiation | Compliance |
| § 22.917 (a); § 24.238 (a);<br>§27.53 | Out of band emission, Band Edge | Compliance |
| § 2.1055<br>§ 22.355; § 24.235; §27.54 | Frequency stability vs. temperature<br>Frequency stability vs. voltage | Compliance |

# FCC §1.1310 & §2.1093- RF EXPOSURE

## Applicable Standard

FCC§1.1310 and §2.1093.

## Test Result

Compliant, please refer to the SAR report: RDG171130004-20.

# FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E, Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

# FCC § 2.1046, § 22.913 (a) & § 24.232 (c) & § 27.50 - RF OUTPUT POWER

## Applicable Standard

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §24.232 (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.

According to §27.50

(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

(c) (10) Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

(d), (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP. Fixed stations operating in the 1710-1755 MHz band are limited to a maximum antenna height of 10 meters above ground. Mobile and portable stations operating in these bands must employ a means for limiting power to the minimum necessary for successful communications.

(h),(2) Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

## Test Procedure

GSM/GPRS/EGPRS

Function: Menu select > GSM Mobile Station > GSM 850/1900
Press Connection control to choose the different menus
Press RESET > choose all the reset all settings
Connection Press Signal Off to turn off the signal and change settings
Network Support > GSM + GPRS or GSM + EGSM
Main Service > Packet Data
Service selection > Test Mode A – Auto Slot Config. off
MS Signal Press Slot Config Bottom on the right twice to select and change the number of time slots and power setting
> Slot configuration > Uplink/Gamma
> 33 dBm for GPRS 850
> 30 dBm for GPRS 1900
> 27 dBm for EGPRS 850
> 26 dBm for EGPRS 1900
BS Signal Enter the same channel number for TCH channel (test channel) and BCCH channel
Frequency Offset > + 0 Hz
Mode > BCCH and TCH
BCCH Level > -85 dBm (May need to adjust if link is not stable)
BCCH Channel > choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]

Channel Type > Off
P0 > 4 dB
Slot Config > Unchanged (if already set under MS signal)
TCH > choose desired test channel
Hopping > Off
Main Timeslot > 3
Network Coding Scheme > CS4 (GPRS) and MCS5 (EGPRS)

Bit Stream > 2E9-1 PSR Bit Stream
AF/RF Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input
Connection Press Signal on to turn on the signal and change settings

**WCDMA-Release 99**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification. The EUT has a nominal maximum output power of 24dBm (+1.7/-3.7).

| | | |
|---|---|---|
| **WCDMA General Settings** | Loopback Mode | Test Mode 1 |
| | Rel99 RMC | 12.2kbps RMC |
| | Power Control Algorithm | Algorithm2 |
| | **βc / βd** | 8/15 |

**WCDMA HSDPA**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

| | Mode | HSDPA | HSDPA | HSDPA | HSDPA |
|---|---|---|---|---|---|
| | Subset | 1 | 2 | 3 | 4 |
| WCDMA General Settings | Loopback Mode | Test Mode 1 | | | |
| | Rel99 RMC | 12.2kbps RMC | | | |
| | HSDPA FRC | H-Set1 | | | |
| | Power Control Algorithm | Algorithm2 | | | |
| | βc | 2/15 | 12/15 | 15/15 | 15/15 |
| | βd | 15/15 | 15/15 | 8/15 | 4/15 |
| | βd (SF) | 64 | | | |
| | βc/ βd | 2/15 | 12/15 | 15/8 | 15/4 |
| | βhs | 4/15 | 24/15 | 30/15 | 30/15 |
| | MPR(dB) | 0 | 0 | 0.5 | 0.5 |
| HSDPA Specific Settings | DACK | 8 | | | |
| | DNAK | 8 | | | |
| | DCQI | 8 | | | |
| | Ack-Nack repetition factor | 3 | | | |
| | CQI Feedback | 4ms | | | |
| | CQI Repetition Factor | 2 | | | |
| | Ahs=βhs/ βc | 30/15 | | | |

**WCDMA HSUPA**

The following tests were conducted according to the test requirements outlines in section 5.2 of the 3GPP TS34.121-1 specification.

| | Mode | HSUPA | HSUPA | HSUPA | HSUPA | HSUPA |
|---|---|---|---|---|---|---|
| | **Subset** | **1** | **2** | **3** | **4** | **5** |
| **WCDMA General Settings** | Loopback Mode | Test Mode 1 | | | | |
| | Rel99 RMC | 12.2kbps RMC | | | | |
| | HSDPA FRC | H-Set1 | | | | |
| | HSUPA Test | HSUPA Loopback | | | | |
| | Power Control Algorithm | Algorithm2 | | | | |
| | βc | 11/15 | 6/15 | 15/15 | 2/15 | 15/15 |
| | βd | 15/15 | 15/15 | 9/15 | 15/15 | 0 |
| | βec | 209/225 | 12/15 | 30/15 | 2/15 | 5/15 |
| | βc/ βd | 11/15 | 6/15 | 15/9 | 2/15 | - |
| | βhs | 22/15 | 12/15 | 30/15 | 4/15 | 5/15 |
| | CM(dB) | 1.0 | 3.0 | 2.0 | 3.0 | 1.0 |
| | MPR(dB) | 0 | 2 | 1 | 2 | 0 |
| **HSDPA Specific Settings** | DACK | 8 | | | | |
| | DNAK | 8 | | | | |
| | DCQI | 8 | | | | |
| | Ack-Nack repetition factor | 3 | | | | |
| | CQI Feedback | 4ms | | | | |
| | CQI Repetition Factor | 2 | | | | |
| | Ahs=βhs/ βc | 30/15 | | | | |
| **HSUPA Specific Settings** | DE-DPCCH | 6 | 8 | 8 | 5 | 7 |
| | DHARQ | 0 | 0 | 0 | 0 | 0 |
| | AG Index | 20 | 12 | 15 | 17 | 21 |
| | ETFCI | 75 | 67 | 92 | 71 | 81 |
| | Associated Max UL Data Rate kbps | 242.1 | 174.9 | 482.8 | 205.8 | 308.9 |
| | Reference E_FCIs | E-TFCI 11 E<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO23<br>E-TFCI 75<br>E-TFCI PO26<br>E-TFCI 81<br>E-TFCI PO 27 | | E-TFCI 11<br>E-TFCI PO4<br>E-TFCI 92<br>E-TFCI PO 18 | E-TFCI 11 E<br>E-TFCI PO 4<br>E-TFCI 67<br>E-TFCI PO 18<br>E-TFCI 71<br>E-TFCI PO23<br>E-TFCI 75<br>E-TFCI PO26<br>E-TFCI 81<br>E-TFCI PO 27 | |

**HSPA+**

The following tests were conducted according to the test requirements in Table C.11.1.4 of 3GPP TS 34.121-1

| Sub-test | $\beta_c$ (Note3) | $\beta_d$ | $\beta_{HS}$ (Note1) | $\beta_{ec}$ | $\beta_{ed}$ (2xSF2) (Note 4) | $\beta_{ed}$ (2xSF4) (Note 4) | CM (dB) (Note 2) | MPR (dB) (Note 2) | AG Index (Note 4) | E-TFCI (Note 5) | E-TFCI (boost) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0 | 30/15 | 30/15 | $\beta_{ed}$1: 30/15<br>$\beta_{ed}$2: 30/15 | $\beta_{ed}$3: 24/15<br>$\beta_{ed}$4: 24/15 | 3.5 | 2.5 | 14 | 105 | 105 |

Note 1: $\Delta_{ACK}$, $\Delta_{NACK}$ and $\Delta_{CQI}$ = 30/15 with $\beta_{hs}$ = 30/15 * $\beta_c$ .

Note 2: CM = 3.5 and the MPR is based on the relative CM difference, MPR = MAX(CM-1,0).

Note 3: DPDCH is not configured, therefore the $\beta_c$ is set to 1 and $\beta_d$ = 0 by default.

Note 4: $\beta_{ed}$ can not be set directly; it is set by Absolute Grant Value.

Note 5: All the sub-tests require the UE to transmit 2SF2+2SF4 16QAM EDCH and they apply for UE using E-DPDCH category 7. E-DCH TTI is set to 2ms TTI and E-DCH table index = 2. To support these E-DCH configurations DPDCH is not allocated. The UE is signalled to use the extrapolation algorithm.

**DC-HSDPA**

The following tests were conducted according to the test requirements in Table C.8.1.12 of 3GPP TS 34.121-1

**Table C.8.1.12: Fixed Reference Channel H-Set 12**

| Parameter | Unit | Value |
|---|---|---|
| Nominal Avg. Inf. Bit Rate | kbps | 60 |
| Inter-TTI Distance | TTI's | 1 |
| Number of HARQ Processes | Processes | 6 |
| Information Bit Payload ( $N_{INF}$ ) | Bits | 120 |
| Number Code Blocks | Blocks | 1 |
| Binary Channel Bits Per TTI | Bits | 960 |
| Total Available SML's in UE | SML's | 19200 |
| Number of SML's per HARQ Proc. | SML's | 3200 |
| Coding Rate | | 0.15 |
| Number of Physical Channel Codes | Codes | 1 |
| Modulation | | QPSK |

Note 1: The RMC is intended to be used for DC-HSDPA mode and both cells shall transmit with identical parameters as listed in the table.

Note 2: Maximum number of transmission is limited to 1, i.e., retransmission is not allowed. The redundancy and constellation version 0 shall be used.

**LTE (FDD):**

The following tests were conducted according to the test requirements in 3GPP TS36.101

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS36.101.

**Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 3**

| Modulation | Channel bandwidth / Transmission bandwidth (RB) | | | | | | MPR (dB) |
|---|---|---|---|---|---|---|---|
| | 1.4 MHz | 3.0 MHz | 5 MHz | 10 MHz | 15 MHz | 20 MHz | |
| QPSK | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 1 |
| 16 QAM | ≤ 5 | ≤ 4 | ≤ 8 | ≤ 12 | ≤ 16 | ≤ 18 | ≤ 1 |
| 16 QAM | > 5 | > 4 | > 8 | > 12 | > 16 | > 18 | ≤ 2 |

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

**Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)**

| Network Signalling value | Requirements (sub-clause) | E-UTRA Band | Channel bandwidth (MHz) | Resources Blocks ($N_{RB}$) | A-MPR (dB) |
|---|---|---|---|---|---|
| NS_01 | 6.6.2.1.1 | Table 5.5-1 | 1.4, 3, 5, 10, 15, 20 | Table 5.6-1 | NA |
| NS_03 | 6.6.2.2.1 | 2, 4,10, 23, 25, 35, 36 | 3 | >5 | ≤ 1 |
| | | | 5 | >6 | ≤ 1 |
| | | | 10 | >6 | ≤ 1 |
| | | | 15 | >8 | ≤ 1 |
| | | | 20 | >10 | ≤ 1 |
| NS_04 | 6.6.2.2.2 | 41 | 5 | >6 | ≤ 1 |
| | | | 10, 15, 20 | See Table 6.2.4-4 | |
| NS_05 | 6.6.3.3.1 | 1 | 10,15,20 | ≥ 50 | ≤ 1 |
| NS_06 | 6.6.2.2.3 | 12, 13, 14, 17 | 1.4, 3, 5, 10 | Table 5.6-1 | n/a |
| NS_07 | 6.6.2.2.3<br>6.6.3.3.2 | 13 | 10 | Table 6.2.4-2 | Table 6.2.4-2 |
| NS_08 | 6.6.3.3.3 | 19 | 10, 15 | > 44 | ≤ 3 |
| NS_09 | 6.6.3.3.4 | 21 | 10, 15 | > 40 | ≤ 1 |
| | | | | > 55 | ≤ 2 |
| NS_10 | | 20 | 15, 20 | Table 6.2.4-3 | Table 6.2.4-3 |
| NS_11 | 6.6.2.2.1 | 23[1] | 1.4, 3, 5, 10 | Table 6.2.4-5 | Table 6.2.4-5 |
| .. | | | | | |
| NS_32 | - | - | - | - | - |

Note 1: Applies to the lower block of Band 23, i.e. a carrier placed in the 2000-2010 MHz region.

*Radiated method:*

ANSI/TIA-603-D section 2.2.17

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-09-01 | 2018-09-01 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| R&S | Spectrum Analyzer | FSIQ 26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| ETS LINDGREN | Horn Antenna | 3115 | 000 527 35 | 2016-01-05 | 2019-01-04 |
| HP | Signal Generator | 1026 | 320408 | 2016-12-08 | 2017-12-08 |
| HP | Signal Generator | 1026 | 320408 | 2017-12-08 | 2018-12-08 |
| EMCO | Adjustable Dipole Antenna | 3121C | 9109-753 | N/A | N/A |
| TDK RF | Horn Antenna | HRN-0118 | 130 084 | 2016-01-05 | 2019-01-04 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |
| Unknown | RF Attenuator | 6dB | 6dB-1 | Each Time | / |
| R&S | Universal Radio Communication Tester | CMU200 | 109 038 | 2017-07-18 | 2018-07-18 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 | 2017-08-31 | 2018-08-31 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27.9~29°C |
| **Relative Humidity:** | 48~52 % |
| **ATM Pressure:** | 100.2~100.4 kPa |

** The testing was performed by Blake Yang & Steven Zuo from 2017-11-28 to 2017-12-14.*

**Conducted Output Power**

**Cellular Band & PCS Band**

| Band | Channel No. | Conducted Peak Output Power (dBm) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | GSM | GPRS 1 TX Slot | GPRS 2 TX Slot | GPRS 3 TX Slot | GPRS 4 TX Slot | EDGE 1 TX Slot | EDGE 2 TX Slot | EDGE 3 TX Slot | EDGE 4 TX Slot |
| Cellular | 128 | 32.34 | 32.31 | 31.61 | 30.03 | 29.03 | 26.09 | 25.23 | 24.19 | 23.15 |
| | 190 | 32.47 | 32.47 | 31.74 | 30.21 | 29.11 | 26.17 | 25.35 | 24.22 | 23.20 |
| | 251 | 32.30 | 32.32 | 31.60 | 30.02 | 29.04 | 26.23 | 25.39 | 24.23 | 23.17 |
| PCS | 512 | 29.71 | 29.90 | 29.11 | 27.35 | 26.23 | 25.63 | 24.24 | 23.37 | 22.29 |
| | 661 | 29.47 | 29.50 | 28.84 | 27.12 | 26.11 | 25.58 | 24.22 | 23.25 | 22.31 |
| | 810 | 29 | 29.02 | 28.38 | 26.64 | 25.59 | 25.35 | 24.07 | 23.19 | 22.08 |

**WCDMA Band Ⅱ**

| Mode | 3GPP Sub Test | Low Channel | | Middle Channel | | High Channel | |
|---|---|---|---|---|---|---|---|
| | | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) |
| Rel 99 | 1 | 22.69 | 2.75 | 22.51 | 3.18 | 22.42 | 2.88 |
| HSDPA | 1 | 22.50 | 2.77 | 22.36 | 3.19 | 22.15 | 2.78 |
| | 2 | 22.43 | 2.69 | 22.43 | 3.21 | 22.06 | 2.96 |
| | 3 | 22.52 | 2.73 | 22.30 | 3.14 | 22.11 | 2.93 |
| | 4 | 22.55 | 2.73 | 22.25 | 3.08 | 22.17 | 2.79 |
| HSUPA | 1 | 22.53 | 2.80 | 22.27 | 3.21 | 22.13 | 2.92 |
| | 2 | 22.57 | 2.79 | 22.33 | 3.17 | 22.15 | 2.89 |
| | 3 | 22.46 | 2.65 | 22.44 | 3.07 | 22.17 | 2.80 |
| | 4 | 22.61 | 2.66 | 22.35 | 3.14 | 22.13 | 2.96 |
| | 5 | 22.57 | 2.74 | 22.37 | 3.17 | 22.19 | 2.81 |
| DC-HSDPA | 1 | 22.44 | 2.70 | 22.36 | 3.24 | 22.18 | 2.89 |
| | 2 | 22.51 | 2.71 | 22.30 | 3.13 | 22.17 | 2.80 |
| | 3 | 22.50 | 2.66 | 22.30 | 3.15 | 22.02 | 2.92 |
| | 4 | 22.48 | 2.81 | 22.28 | 3.17 | 22.03 | 2.94 |
| HSPA+ | 1 | 22.46 | 2.77 | 22.34 | 3.14 | 22.09 | 2.91 |

**WCDMA Band IV**

| Mode | 3GPP Sub Test | Low Channel | | Middle Channel | | High Channel | |
|---|---|---|---|---|---|---|---|
| | | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) |
| Rel 99 | 1 | 22.86 | 2.87 | 22.79 | 3.36 | 22.76 | 3.26 |
| HSDPA | 1 | 22.65 | 2.83 | 22.68 | 3.35 | 22.64 | 3.21 |
| | 2 | 22.75 | 2.85 | 22.70 | 3.34 | 22.54 | 3.28 |
| | 3 | 22.77 | 2.93 | 22.70 | 3.26 | 22.69 | 3.20 |
| | 4 | 22.62 | 2.82 | 22.61 | 3.41 | 22.62 | 3.23 |
| HSUPA | 1 | 22.60 | 2.85 | 22.72 | 3.30 | 22.67 | 3.29 |
| | 2 | 22.68 | 2.91 | 22.58 | 3.25 | 22.68 | 3.34 |
| | 3 | 22.60 | 2.87 | 22.70 | 3.42 | 22.51 | 3.28 |
| | 4 | 22.65 | 2.90 | 22.62 | 3.39 | 22.64 | 3.33 |
| | 5 | 22.72 | 2.86 | 22.69 | 3.25 | 22.68 | 3.25 |
| DC-HSDPA | 1 | 22.79 | 2.80 | 22.56 | 3.29 | 22.62 | 3.16 |
| | 2 | 22.65 | 2.83 | 22.55 | 3.37 | 22.66 | 3.23 |
| | 3 | 22.65 | 2.90 | 22.63 | 3.37 | 22.65 | 3.18 |
| | 4 | 22.66 | 2.83 | 22.64 | 3.40 | 22.62 | 3.31 |
| HSPA+ | 1 | 22.62 | 2.90 | 22.71 | 3.39 | 22.67 | 3.32 |

**WCDMA Band V**

| Mode | 3GPP Sub Test | Low Channel | | Middle Channel | | High Channel | |
|---|---|---|---|---|---|---|---|
| | | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) | Ave. Power (dBm) | PAR (dB) |
| Rel 99 | 1 | 22.41 | 2.95 | 22.21 | 2.90 | 22.48 | 3.06 |
| HSDPA | 1 | 22.19 | 2.96 | 22.07 | 2.79 | 22.25 | 3.07 |
| | 2 | 22.18 | 2.89 | 22.12 | 2.97 | 22.35 | 3.03 |
| | 3 | 22.28 | 2.89 | 22.12 | 2.94 | 22.29 | 3.11 |
| | 4 | 22.26 | 2.90 | 22.05 | 2.81 | 22.42 | 2.96 |
| HSUPA | 1 | 22.22 | 2.87 | 22.10 | 2.93 | 22.28 | 2.99 |
| | 2 | 22.21 | 2.99 | 21.98 | 2.95 | 22.22 | 3.09 |
| | 3 | 22.21 | 2.95 | 21.97 | 2.82 | 22.23 | 3.10 |
| | 4 | 22.28 | 2.87 | 22.07 | 2.85 | 22.35 | 3.11 |
| | 5 | 22.16 | 3.02 | 21.96 | 2.87 | 22.39 | 3.03 |
| DC-HSDPA | 1 | 22.21 | 2.90 | 22.12 | 2.89 | 22.38 | 3.08 |
| | 2 | 22.24 | 2.94 | 22.11 | 2.93 | 22.36 | 3.03 |
| | 3 | 22.20 | 2.99 | 22.13 | 2.93 | 22.40 | 2.99 |
| | 4 | 22.22 | 2.85 | 22.12 | 2.86 | 22.34 | 3.12 |
| HSPA+ | 1 | 22.24 | 3.00 | 22.12 | 2.78 | 22.28 | 3.06 |

**LTE Band 2 (PART 24)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4MHz | QPSK | 1#0 | 22.96 | 22.13 | 21.83 |
| | | 1#3 | 22.95 | 22.15 | 21.77 |
| | | 1#5 | 23.13 | 22.16 | 21.74 |
| | | 3#0 | 22.77 | 22.30 | 21.65 |
| | | 3#1 | 22.52 | 22.10 | 21.69 |
| | | 3#3 | 22.92 | 22.29 | 21.61 |
| | | 6#0 | 21.84 | 21.22 | 20.93 |
| | 16QAM | 1#0 | 21.87 | 21.67 | 21.73 |
| | | 1#3 | 21.96 | 21.75 | 21.73 |
| | | 1#5 | 22.18 | 21.76 | 21.79 |
| | | 3#0 | 21.67 | 21.63 | 21.80 |
| | | 3#1 | 21.62 | 21.74 | 21.61 |
| | | 3#3 | 21.63 | 21.76 | 21.63 |
| | | 6#0 | 20.89 | 20.50 | 20.41 |
| 3MHz | QPSK | 1#0 | 22.70 | 22.23 | 21.55 |
| | | 1#8 | 22.70 | 22.12 | 21.44 |
| | | 1#14 | 22.96 | 22.20 | 21.42 |
| | | 8#0 | 22.79 | 22.17 | 21.58 |
| | | 8#4 | 22.66 | 22.11 | 21.45 |
| | | 8#7 | 22.70 | 22.19 | 21.42 |
| | | 15#0 | 21.46 | 21.26 | 21.58 |
| | 16QAM | 1#0 | 21.51 | 21.53 | 21.50 |
| | | 1#7 | 21.45 | 21.50 | 21.49 |
| | | 1#14 | 21.56 | 21.56 | 21.56 |
| | | 8#0 | 21.43 | 21.44 | 21.46 |
| | | 8#4 | 21.52 | 21.43 | 21.59 |
| | | 8#7 | 21.49 | 21.51 | 21.43 |
| | | 15#0 | 20.83 | 20.56 | 20.42 |
| 5MHz | QPSK | 1#0 | 22.16 | 21.73 | 21.00 |
| | | 1#12 | 21.70 | 21.70 | 21.05 |
| | | 1#24 | 22.03 | 21.71 | 21.19 |
| | | 12#0 | 22.12 | 21.70 | 21.06 |
| | | 12#6 | 22.01 | 21.76 | 21.17 |
| | | 12#11 | 22.01 | 21.67 | 21.05 |
| | | 25#0 | 20.81 | 20.74 | 20.39 |
| | 16QAM | 1#0 | 21.13 | 21.05 | 21.15 |
| | | 1#12 | 21.12 | 21.09 | 21.13 |
| | | 1#24 | 21.20 | 21.08 | 21.10 |
| | | 12#0 | 21.08 | 21.04 | 21.04 |
| | | 12#6 | 21.10 | 21.17 | 21.05 |
| | | 12#11 | 21.07 | 21.10 | 21.06 |
| | | 25#0 | 20.79 | 20.64 | 20.49 |

| | | | | | |
|---|---|---|---|---|---|
| 10MHz | QPSK | 1#0 | 21.84 | 21.78 | 21.97 |
| | | 1#24 | 21.68 | 21.77 | 21.68 |
| | | 1#49 | 21.48 | 21.61 | 21.71 |
| | | 25#0 | 20.90 | 20.87 | 20.96 |
| | | 25#12 | 20.91 | 20.87 | 20.86 |
| | | 25#24 | 20.87 | 20.83 | 20.84 |
| | | 50#0 | 20.63 | 20.71 | 20.66 |
| | 16QAM | 1#0 | 21.76 | 21.71 | 21.69 |
| | | 1#24 | 21.62 | 21.70 | 21.74 |
| | | 1#49 | 21.62 | 21.73 | 21.73 |
| | | 25#0 | 20.74 | 20.61 | 20.64 |
| | | 25#12 | 20.80 | 20.68 | 20.63 |
| | | 25#24 | 20.63 | 20.73 | 20.71 |
| | | 50#0 | 20.62 | 20.67 | 20.62 |
| 15MHz | QPSK | 1#0 | 21.68 | 21.73 | 21.62 |
| | | 1#37 | 21.80 | 21.68 | 21.69 |
| | | 1#74 | 21.66 | 21.66 | 21.60 |
| | | 36#0 | 20.83 | 20.91 | 20.94 |
| | | 36#17 | 20.83 | 20.84 | 20.99 |
| | | 36#35 | 20.96 | 20.94 | 20.97 |
| | | 75#0 | 20.57 | 20.63 | 20.60 |
| | 16QAM | 1#0 | 21.74 | 21.76 | 21.78 |
| | | 1#37 | 21.77 | 21.78 | 21.74 |
| | | 1#74 | 21.74 | 21.66 | 21.73 |
| | | 36#0 | 20.97 | 20.77 | 20.79 |
| | | 36#17 | 20.85 | 20.88 | 20.61 |
| | | 36#35 | 20.93 | 20.84 | 20.70 |
| | | 75#0 | 20.50 | 20.68 | 20.65 |
| 20MHz | QPSK | 1#0 | 22.96 | 22.11 | 21.74 |
| | | 1#49 | 22.82 | 22.30 | 21.67 |
| | | 1#99 | 22.83 | 22.14 | 21.76 |
| | | 50#0 | 22.85 | 22.25 | 21.65 |
| | | 50#24 | 22.75 | 22.19 | 21.61 |
| | | 50#49 | 22.80 | 22.27 | 21.76 |
| | | 100#0 | 21.60 | 21.75 | 21.79 |
| | 16QAM | 1#0 | 21.79 | 21.45 | 21.17 |
| | | 1#49 | 21.76 | 21.35 | 21.28 |
| | | 1#99 | 21.62 | 21.40 | 21.21 |
| | | 50#0 | 21.76 | 21.46 | 21.18 |
| | | 50#24 | 21.70 | 21.48 | 21.27 |
| | | 50#49 | 21.72 | 21.34 | 21.19 |
| | | 100#0 | 20.65 | 20.66 | 20.36 |

**LTE Band 4 (PART 27)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4MHz | QPSK | 1#0 | 22.85 | 22.73 | 21.50 |
| | | 1#3 | 22.93 | 22.79 | 21.45 |
| | | 1#5 | 22.89 | 22.75 | 21.49 |
| | | 3#0 | 22.97 | 22.81 | 21.56 |
| | | 3#1 | 22.96 | 22.74 | 21.59 |
| | | 3#3 | 22.95 | 22.87 | 21.42 |
| | | 6#0 | 21.91 | 21.53 | 21.30 |
| | 16QAM | 1#0 | 21.87 | 21.52 | 20.70 |
| | | 1#3 | 21.91 | 21.45 | 20.73 |
| | | 1#5 | 21.87 | 21.44 | 20.78 |
| | | 3#0 | 21.88 | 21.54 | 20.86 |
| | | 3#1 | 21.77 | 21.45 | 20.77 |
| | | 3#3 | 21.81 | 21.45 | 20.73 |
| | | 6#0 | 20.89 | 20.44 | 20.34 |
| 3MHz | QPSK | 1#0 | 22.84 | 22.48 | 21.46 |
| | | 1#7 | 22.81 | 22.41 | 21.44 |
| | | 1#14 | 22.72 | 22.47 | 21.52 |
| | | 8#0 | 22.80 | 22.32 | 21.40 |
| | | 8#4 | 22.80 | 22.45 | 21.44 |
| | | 8#7 | 22.79 | 22.39 | 22.48 |
| | | 15#0 | 21.20 | 21.38 | 21.37 |
| | 16QAM | 1#0 | 22.33 | 22.21 | 20.76 |
| | | 1#7 | 22.47 | 22.17 | 20.88 |
| | | 1#14 | 22.52 | 22.20 | 20.74 |
| | | 8#0 | 22.56 | 22.23 | 20.70 |
| | | 8#4 | 22.47 | 22.14 | 20.84 |
| | | 8#7 | 22.52 | 22.30 | 20.89 |
| | | 15#0 | 20.41 | 20.33 | 20.29 |
| 5MHz | QPSK | 1#0 | 22.82 | 22.53 | 21.59 |
| | | 1#12 | 22.85 | 22.61 | 21.63 |
| | | 1#24 | 22.74 | 22.59 | 21.69 |
| | | 12#0 | 22.83 | 22.64 | 21.56 |
| | | 12#6 | 22.82 | 22.51 | 21.69 |
| | | 12#11 | 22.74 | 22.63 | 21.57 |
| | | 25#0 | 21.37 | 21.40 | 21.48 |
| | 16QAM | 1#0 | 21.69 | 21.69 | 20.80 |
| | | 1#12 | 21.60 | 21.53 | 20.73 |
| | | 1#24 | 21.68 | 21.59 | 20.78 |
| | | 12#0 | 21.71 | 21.62 | 20.81 |
| | | 12#6 | 21.75 | 21.57 | 20.74 |
| | | 12#11 | 21.75 | 21.54 | 20.89 |
| | | 25#0 | 20.54 | 20.62 | 20.45 |

| | | | | | |
|---|---|---|---|---|---|
| 10MHz | QPSK | 1#0 | 22.98 | 22.87 | 21.57 |
| | | 1#24 | 22.92 | 22.77 | 21.50 |
| | | 1#49 | 22.89 | 22.81 | 21.58 |
| | | 25#0 | 22.87 | 22.70 | 21.50 |
| | | 25#12 | 22.94 | 22.84 | 21.45 |
| | | 25#24 | 22.82 | 22.74 | 21.42 |
| | | 50#0 | 21.43 | 21.31 | 21.33 |
| | 16QAM | 1#0 | 22.14 | 22.00 | 20.79 |
| | | 1#24 | 22.18 | 22.19 | 20.73 |
| | | 1#49 | 22.10 | 22.11 | 20.75 |
| | | 25#0 | 22.20 | 22.14 | 20.79 |
| | | 25#12 | 22.16 | 22.13 | 20.72 |
| | | 25#24 | 22.13 | 22.08 | 20.75 |
| | | 50#0 | 20.48 | 20.41 | 20.56 |
| 15MHz | QPSK | 1#0 | 23.06 | 22.82 | 21.80 |
| | | 1#37 | 22.98 | 22.71 | 21.60 |
| | | 1#74 | 23.10 | 22.87 | 21.70 |
| | | 36#0 | 23.06 | 22.77 | 21.79 |
| | | 36#17 | 23.09 | 22.87 | 21.69 |
| | | 36#35 | 23.01 | 22.76 | 21.76 |
| | | 75#0 | 21.52 | 21.50 | 21.57 |
| | 16QAM | 1#0 | 22.16 | 22.16 | 20.72 |
| | | 1#37 | 22.24 | 22.11 | 20.82 |
| | | 1#74 | 22.12 | 22.08 | 20.78 |
| | | 36#0 | 22.12 | 22.07 | 20.85 |
| | | 36#17 | 22.19 | 22.08 | 20.89 |
| | | 36#35 | 22.22 | 22.00 | 20.91 |
| | | 75#0 | 20.24 | 20.22 | 20.21 |
| 20MHz | QPSK | 1#0 | 22.94 | 22.91 | 21.51 |
| | | 1#49 | 22.89 | 22.69 | 21.52 |
| | | 1#99 | 22.91 | 22.67 | 21.55 |
| | | 50#0 | 23.00 | 22.64 | 21.54 |
| | | 50#24 | 22.96 | 22.63 | 21.55 |
| | | 50#49 | 22.98 | 22.73 | 21.66 |
| | | 100#0 | 21.31 | 21.44 | 21.42 |
| | 16QAM | 1#0 | 22.03 | 22.02 | 20.89 |
| | | 1#49 | 22.17 | 22.05 | 20.93 |
| | | 1#99 | 22.26 | 22.04 | 20.83 |
| | | 50#0 | 22.12 | 22.01 | 20.92 |
| | | 50#24 | 22.17 | 22.09 | 20.86 |
| | | 50#49 | 22.18 | 21.96 | 20.97 |
| | | 100#0 | 20.47 | 20.36 | 20.48 |

**LTE Band 5 (PART 22)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4MHz | QPSK | 1#0 | 23.01 | 22.91 | 22.93 |
| | | 1#3 | 23.06 | 22.92 | 22.96 |
| | | 1#5 | 23.03 | 22.97 | 22.87 |
| | | 3#0 | 23.08 | 22.99 | 22.86 |
| | | 3#1 | 23.10 | 22.99 | 22.80 |
| | | 3#3 | 23.06 | 22.81 | 22.85 |
| | | 6#0 | 22.01 | 21.98 | 22.00 |
| | 16QAM | 1#0 | 22.11 | 22.01 | 21.83 |
| | | 1#3 | 22.17 | 22.04 | 21.96 |
| | | 1#5 | 22.09 | 22.03 | 21.84 |
| | | 3#0 | 22.20 | 21.99 | 21.96 |
| | | 3#1 | 22.01 | 21.97 | 21.91 |
| | | 3#3 | 22.11 | 22.05 | 21.82 |
| | | 6#0 | 21.61 | 21.79 | 21.70 |
| 3MHz | QPSK | 1#0 | 22.93 | 22.78 | 22.70 |
| | | 1#7 | 22.90 | 22.71 | 22.74 |
| | | 1#14 | 22.85 | 22.76 | 22.78 |
| | | 8#0 | 22.83 | 22.82 | 22.72 |
| | | 8#4 | 22.99 | 22.84 | 22.66 |
| | | 8#7 | 22.85 | 22.78 | 22.73 |
| | | 15#0 | 22.34 | 22.41 | 22.32 |
| | 16QAM | 1#0 | 22.07 | 21.92 | 21.89 |
| | | 1#7 | 22.04 | 22.02 | 21.92 |
| | | 1#14 | 22.20 | 22.05 | 21.87 |
| | | 8#0 | 22.07 | 22.09 | 21.96 |
| | | 8#4 | 22.14 | 21.96 | 21.95 |
| | | 8#7 | 22.08 | 21.96 | 21.89 |
| | | 15#0 | 21.49 | 21.46 | 21.31 |
| 5MHz | QPSK | 1#0 | 23.08 | 22.92 | 22.74 |
| | | 1#12 | 23.02 | 22.83 | 22.80 |
| | | 1#24 | 23.02 | 22.87 | 22.70 |
| | | 12#0 | 23.03 | 22.96 | 22.87 |
| | | 12#6 | 22.96 | 22.83 | 22.83 |
| | | 12#11 | 23.05 | 22.97 | 22.70 |
| | | 25#0 | 22.00 | 21.87 | 21.99 |
| | 16QAM | 1#0 | 22.24 | 22.14 | 21.73 |
| | | 1#12 | 22.40 | 22.23 | 21.89 |
| | | 1#24 | 22.34 | 22.29 | 21.85 |
| | | 12#0 | 22.31 | 22.13 | 21.89 |
| | | 12#6 | 22.28 | 22.20 | 21.74 |
| | | 12#11 | 22.27 | 22.24 | 21.83 |
| | | 25#0 | 21.07 | 21.05 | 20.90 |

| | | | | | |
|---|---|---|---|---|---|
| 10MHz | QPSK | 1#0 | 23.04 | 22.70 | 22.67 |
| | | 1#24 | 22.99 | 22.86 | 22.61 |
| | | 1#49 | 23.09 | 22.74 | 22.69 |
| | | 25#0 | 23.02 | 22.80 | 22.56 |
| | | 25#12 | 22.95 | 22.86 | 22.62 |
| | | 25#24 | 23.06 | 22.86 | 22.51 |
| | | 50#0 | 22.25 | 22.24 | 22.25 |
| | 16QAM | 1#0 | 22.35 | 22.27 | 22.09 |
| | | 1#24 | 22.42 | 22.20 | 21.94 |
| | | 1#49 | 22.33 | 22.17 | 21.93 |
| | | 25#0 | 22.49 | 22.15 | 22.05 |
| | | 25#12 | 22.40 | 22.21 | 22.07 |
| | | 25#24 | 22.32 | 22.12 | 21.94 |
| | | 50#0 | 21.02 | 20.91 | 21.04 |

**LTE Band 7 (PART 27)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 5MHz | QPSK | 1#0 | 22.74 | 22.94 | 21.88 |
| | | 1#12 | 22.46 | 22.89 | 21.79 |
| | | 1#24 | 22.53 | 22.93 | 21.73 |
| | | 12#0 | 21.60 | 21.57 | 21.40 |
| | | 12#6 | 21.33 | 21.51 | 21.49 |
| | | 12#11 | 21.53 | 21.52 | 21.48 |
| | | 25#0 | 21.80 | 21.80 | 21.60 |
| | 16QAM | 1#0 | 22.42 | 22.35 | 21.93 |
| | | 1#12 | 22.29 | 22.33 | 21.83 |
| | | 1#24 | 22.57 | 22.38 | 21.98 |
| | | 12#0 | 21.85 | 21.63 | 21.07 |
| | | 12#6 | 21.69 | 21.73 | 21.07 |
| | | 12#11 | 21.91 | 21.71 | 20.94 |
| | | 25#0 | 20.77 | 20.75 | 20.67 |
| 10MHz | QPSK | 1#0 | 22.90 | 22.85 | 21.80 |
| | | 1#24 | 22.92 | 22.98 | 21.82 |
| | | 1#49 | 22.85 | 22.80 | 21.77 |
| | | 25#0 | 21.70 | 21.55 | 21.31 |
| | | 25#12 | 21.59 | 21.54 | 21.35 |
| | | 25#24 | 21.63 | 21.51 | 21.33 |
| | | 50#0 | 20.70 | 20.65 | 20.78 |
| | 16QAM | 1#0 | 21.76 | 21.75 | 21.38 |
| | | 1#24 | 21.71 | 21.73 | 21.39 |
| | | 1#49 | 21.71 | 21.85 | 21.34 |
| | | 25#0 | 21.23 | 21.26 | 20.68 |
| | | 25#12 | 21.38 | 21.27 | 20.66 |
| | | 25#24 | 21.38 | 21.40 | 20.79 |
| | | 50#0 | 20.59 | 20.60 | 20.43 |
| 15MHz | QPSK | 1#0 | 22.33 | 22.39 | 22.06 |
| | | 1#37 | 22.30 | 22.32 | 22.04 |
| | | 1#74 | 22.32 | 22.22 | 22.05 |
| | | 36#0 | 21.47 | 21.55 | 20.78 |
| | | 36#17 | 21.54 | 21.52 | 20.71 |
| | | 36#35 | 21.42 | 21.52 | 20.76 |
| | | 75#0 | 20.41 | 20.39 | 20.46 |
| | 16QAM | 1#0 | 22.01 | 22.07 | 21.47 |
| | | 1#37 | 22.07 | 22.08 | 21.41 |
| | | 1#74 | 21.92 | 21.91 | 21.41 |
| | | 36#0 | 21.07 | 21.00 | 20.65 |
| | | 36#17 | 21.06 | 21.03 | 20.68 |
| | | 36#35 | 21.12 | 21.03 | 20.67 |
| | | 75#0 | 20.36 | 20.40 | 20.36 |

| | | | | | |
|---|---|---|---|---|---|
| 20MHz | QPSK | 1#0 | 22.14 | 22.03 | 21.61 |
| | | 1#49 | 22.03 | 22.15 | 21.75 |
| | | 1#99 | 22.11 | 22.01 | 21.70 |
| | | 50#0 | 21.67 | 21.56 | 20.64 |
| | | 50#24 | 21.52 | 21.66 | 20.70 |
| | | 50#49 | 21.61 | 21.55 | 20.66 |
| | | 100#0 | 20.58 | 20.57 | 20.66 |
| | 16QAM | 1#0 | 21.81 | 21.74 | 20.84 |
| | | 1#49 | 21.72 | 21.81 | 20.86 |
| | | 1#99 | 21.82 | 21.81 | 20.82 |
| | | 50#0 | 20.96 | 20.84 | 20.36 |
| | | 50#24 | 20.86 | 20.82 | 20.30 |
| | | 50#49 | 20.94 | 20.77 | 20.27 |
| | | 100#0 | 20.20 | 20.16 | 20.11 |

**LTE Band 12 (PART 27)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 1.4MHz | QPSK | 1#0 | 23.19 | 23.27 | 23.20 |
| | | 1#3 | 23.26 | 23.03 | 23.15 |
| | | 1#5 | 23.21 | 23.11 | 23.05 |
| | | 3#0 | 23.23 | 23.18 | 23.18 |
| | | 3#1 | 23.24 | 23.01 | 23.11 |
| | | 3#3 | 23.17 | 23.15 | 23.14 |
| | | 6#0 | 22.21 | 22.13 | 22.15 |
| | 16QAM | 1#0 | 21.15 | 21.16 | 21.10 |
| | | 1#3 | 21.09 | 21.08 | 21.16 |
| | | 1#5 | 21.06 | 21.13 | 21.11 |
| | | 3#0 | 21.17 | 21.03 | 21.06 |
| | | 3#1 | 21.11 | 21.02 | 21.06 |
| | | 3#3 | 21.17 | 21.01 | 21.16 |
| | | 6#0 | 20.77 | 20.71 | 20.72 |
| 3MHz | QPSK | 1#0 | 23.18 | 23.01 | 22.99 |
| | | 1#7 | 23.06 | 22.98 | 22.95 |
| | | 1#14 | 23.05 | 23.05 | 22.89 |
| | | 8#0 | 23.06 | 22.93 | 22.94 |
| | | 8#4 | 23.06 | 23.08 | 22.98 |
| | | 8#7 | 23.09 | 23.01 | 22.85 |
| | | 15#0 | 21.97 | 21.87 | 21.89 |
| | 16QAM | 1#0 | 22.34 | 22.13 | 22.05 |
| | | 1#7 | 22.17 | 22.26 | 22.10 |
| | | 1#14 | 22.21 | 22.19 | 21.94 |
| | | 8#0 | 22.28 | 22.23 | 22.02 |
| | | 8#4 | 22.27 | 22.12 | 22.05 |
| | | 8#7 | 22.23 | 22.27 | 21.90 |
| | | 15#0 | 20.92 | 20.97 | 20.88 |
| 5MHz | QPSK | 1#0 | 23.33 | 23.03 | 22.82 |
| | | 1#12 | 23.14 | 23.01 | 22.82 |
| | | 1#24 | 23.24 | 22.96 | 22.89 |
| | | 12#0 | 23.12 | 23.04 | 22.76 |
| | | 12#6 | 23.25 | 23.01 | 22.76 |
| | | 12#11 | 23.12 | 23.00 | 22.80 |
| | | 25#0 | 21.94 | 21.96 | 21.91 |
| | 16QAM | 1#0 | 22.63 | 22.57 | 22.11 |
| | | 1#12 | 22.57 | 22.58 | 22.24 |
| | | 1#24 | 22.57 | 22.58 | 22.18 |
| | | 12#0 | 22.66 | 22.45 | 22.28 |
| | | 12#6 | 22.58 | 22.58 | 22.20 |
| | | 12#11 | 22.64 | 22.53 | 22.15 |
| | | 25#0 | 20.96 | 20.96 | 20.98 |

| | | | | | |
|---|---|---|---|---|---|
| 10MHz | QPSK | 1#0 | 20.79 | 20.86 | 20.73 |
| | | 1#24 | 20.90 | 20.86 | 20.78 |
| | | 1#49 | 20.84 | 20.84 | 20.77 |
| | | 25#0 | 20.78 | 20.79 | 20.80 |
| | | 25#12 | 20.73 | 20.81 | 20.81 |
| | | 25#24 | 20.75 | 20.80 | 20.71 |
| | | 50#0 | 20.10 | 20.00 | 20.09 |
| | 16QAM | 1#0 | 20.05 | 20.05 | 20.01 |
| | | 1#24 | 20.14 | 20.13 | 20.02 |
| | | 1#49 | 20.16 | 20.17 | 20.20 |
| | | 25#0 | 20.19 | 20.10 | 20.17 |
| | | 25#12 | 20.04 | 20.00 | 20.13 |
| | | 25#24 | 20.19 | 20.11 | 20.12 |
| | | 50#0 | 20.03 | 19.95 | 19.91 |

**LTE Band 17(PART 27)**

| Channel Bandwidth | Modulation | Resource Block & RB offset | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|---|---|---|---|---|---|
| 5MHz | QPSK | 1#0 | 23.43 | 23.30 | 23.35 |
| | | 1#12 | 23.36 | 23.16 | 23.13 |
| | | 1#24 | 23.36 | 23.15 | 23.30 |
| | | 12#0 | 23.26 | 23.21 | 23.22 |
| | | 12#6 | 23.33 | 23.16 | 23.27 |
| | | 12#11 | 23.40 | 23.28 | 23.21 |
| | | 25#0 | 22.23 | 22.27 | 22.24 |
| | 16QAM | 1#0 | 22.49 | 22.44 | 22.34 |
| | | 1#12 | 22.38 | 22.44 | 22.47 |
| | | 1#24 | 22.47 | 22.38 | 22.35 |
| | | 12#0 | 22.45 | 22.39 | 22.30 |
| | | 12#6 | 22.36 | 22.34 | 22.45 |
| | | 12#11 | 22.37 | 22.43 | 22.35 |
| | | 25#0 | 21.50 | 21.43 | 21.44 |
| 10MHz | QPSK | 1#0 | 23.40 | 23.30 | 23.35 |
| | | 1#24 | 23.28 | 23.37 | 23.13 |
| | | 1#49 | 23.37 | 23.33 | 23.01 |
| | | 25#0 | 23.27 | 23.30 | 23.06 |
| | | 25#12 | 23.39 | 23.24 | 23.19 |
| | | 25#24 | 23.35 | 23.22 | 23.07 |
| | | 50#0 | 22.33 | 22.37 | 22.22 |
| | 16QAM | 1#0 | 22.31 | 22.20 | 22.28 |
| | | 1#24 | 22.21 | 22.37 | 22.36 |
| | | 1#49 | 22.22 | 22.31 | 22.37 |
| | | 25#0 | 22.30 | 22.36 | 22.20 |
| | | 25#12 | 22.32 | 22.38 | 22.40 |
| | | 25#24 | 22.24 | 22.34 | 22.36 |
| | | 50#0 | 21.13 | 21.10 | 21.25 |

**PAR, Band 2**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 20 MHz | 4.14 | 4.37 | 3.14 | 13 |
| | 100 RB | | 7.40 | 7.33 | 7.28 | 13 |
| 16QAM | 1 RB | 20 MHz | 5.08 | 5.58 | 4.14 | 13 |
| | 100 RB | | 8.84 | 8.21 | 8.19 | 13 |

**PAR, Band 4**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 20 MHz | 4.94 | 3.90 | 3.99 | 13 |
| | 100 RB | | 7.41 | 7.55 | 7.51 | 13 |
| 16QAM | 1 RB | 20 MHz | 6.21 | 4.45 | 4.86 | 13 |
| | 100 RB | | 8.70 | 8.73 | 7.95 | 13 |

**PAR, Band 5**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 10 MHz | 3.39 | 3.92 | 3.61 | 13 |
| | 50 RB | | 6.03 | 6.49 | 6.08 | 13 |
| 16QAM | 1 RB | 10 MHz | 4.24 | 4.97 | 4.59 | 13 |
| | 50 RB | | 6.73 | 7.87 | 7.48 | 13 |

**PAR, Band 7**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 20 MHz | 3.19 | 2.63 | 2.16 | 13 |
| | 100 RB | | 7.85 | 7.73 | 7.24 | 13 |
| 16QAM | 1 RB | 20 MHz | 3.99 | 3.73 | 3.04 | 13 |
| | 100 RB | | 8.52 | 8.53 | 8.08 | 13 |

**PAR, Band 12**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 10 MHz | 3.87 | 3.78 | 3.67 | 13 |
| | 50 RB | | 6.31 | 6.92 | 6.26 | 13 |
| 16QAM | 1 RB | 10 MHz | 4.89 | 5.12 | 4.57 | 13 |
| | 50 RB | | 7.69 | 8.16 | 7.01 | 13 |

**PAR, Band 17**

| Test Modulation | | Channel Bandwidth | Low Channel PAR (dB) | Middle Channel PAR (dB) | High Channel PAR (dB) | Limit (dB) |
|---|---|---|---|---|---|---|
| QPSK | 1 RB | 10 MHz | 3.55 | 3.42 | 3.53 | 13 |
| | 50 RB | | 6.16 | 6.31 | 6.14 | 13 |
| 16QAM | 1 RB | 10 MHz | 4.29 | 4.21 | 4.35 | 13 |
| | 50 RB | | 7.31 | 7.46 | 7.07 | 13 |

Note: peak-to-average ratio (PAR) <13 dB.

ERP & EIRP

**Part 22H**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **GSM 850 Middle Channel** | | | | | | | | |
| 836.600 | H | 94.73 | 19.8 | 0.0 | 1 | 18.8 | 38.5 | 19.7 |
| 836.600 | V | 102.10 | 30.3 | 0.0 | 1 | 29.3 | 38.5 | 9.2 |
| **EDGE 850 Middle Channel** | | | | | | | | |
| 836.600 | H | 88.86 | 13.9 | 0.0 | 1 | 12.9 | 38.5 | 25.6 |
| 836.600 | V | 96.86 | 25.1 | 0.0 | 1 | 24.1 | 38.5 | 14.4 |
| **WCDMA Band V Middle Channel** | | | | | | | | |
| 836.600 | H | 86.21 | 11.3 | 0.0 | 1 | 10.3 | 38.5 | 28.2 |
| 836.600 | V | 95.76 | 24 | 0.0 | 1 | 23.0 | 38.5 | 15.5 |

**Part 24E**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **PCS 1900 Middle Channel** | | | | | | | | |
| 1880.000 | H | 90.75 | 18.1 | 11.7 | 2.7 | 27.1 | 33.0 | 5.9 |
| 1880.000 | V | 89.26 | 16.8 | 11.7 | 2.7 | 25.8 | 33.0 | 7.2 |
| **EDGE 1900 Middle Channel** | | | | | | | | |
| 1880.000 | H | 86.61 | 14 | 11.7 | 2.7 | 23.0 | 33.0 | 10.0 |
| 1880.000 | V | 85.02 | 12.6 | 11.7 | 2.7 | 21.6 | 33.0 | 11.4 |
| **WCDMA Band II Middle Channel** | | | | | | | | |
| 1880.000 | H | 84.85 | 12.2 | 11.7 | 2.7 | 21.2 | 33.0 | 11.8 |
| 1880.000 | V | 84.56 | 12.1 | 11.7 | 2.7 | 21.1 | 33.0 | 11.9 |

**Part 27**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| **WCDMA Band IV Middle Channel** | | | | | | | | |
| 1732.600 | H | 87.62 | 13.6 | 10.9 | 2.5 | 22.0 | 30.0 | 8.0 |
| 1732.600 | V | 87.36 | 13 | 10.9 | 2.5 | 21.4 | 30.0 | 8.6 |

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

**LTE Band 2**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 1.4 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 87.15 | 14.5 | 11.7 | 2.7 | 23.5 | 33.0 | 9.5 |
| 1880.000 | V | 87.76 | 15.3 | 11.7 | 2.7 | 24.3 | 33.0 | 8.7 |
| 16QAM 1.4 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.64 | 14 | 11.7 | 2.7 | 23.0 | 33.0 | 10.0 |
| 1880.000 | V | 87.43 | 15 | 11.7 | 2.7 | 24.0 | 33.0 | 9.0 |
| QPSK 3 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.77 | 14.2 | 11.7 | 2.7 | 23.2 | 33.0 | 9.8 |
| 1880.000 | V | 87.16 | 14.7 | 11.7 | 2.7 | 23.7 | 33.0 | 9.3 |
| 16QAM 3 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.49 | 13.9 | 11.7 | 2.7 | 22.9 | 33.0 | 10.1 |
| 1880.000 | V | 87.86 | 15.4 | 11.7 | 2.7 | 24.4 | 33.0 | 8.6 |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 87.52 | 14.9 | 11.7 | 2.7 | 23.9 | 33.0 | 9.1 |
| 1880.000 | V | 87.98 | 15.5 | 11.7 | 2.7 | 24.5 | 33.0 | 8.5 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 87.36 | 14.8 | 11.7 | 2.7 | 23.8 | 33.0 | 9.2 |
| 1880.000 | V | 87.75 | 15.3 | 11.7 | 2.7 | 24.3 | 33.0 | 8.7 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.49 | 13.9 | 11.7 | 2.7 | 22.9 | 33.0 | 10.1 |
| 1880.000 | V | 86.65 | 14.2 | 11.7 | 2.7 | 23.2 | 33.0 | 9.8 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.32 | 13.7 | 11.7 | 2.7 | 22.7 | 33.0 | 10.3 |
| 1880.000 | V | 86.34 | 13.9 | 11.7 | 2.7 | 22.9 | 33.0 | 10.1 |
| QPSK 15 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 86.27 | 13.7 | 11.7 | 2.7 | 22.7 | 33.0 | 10.3 |
| 1880.000 | V | 86.68 | 14.2 | 11.7 | 2.7 | 23.2 | 33.0 | 9.8 |
| 16QAM 15 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 85.79 | 13.2 | 11.7 | 2.7 | 22.2 | 33.0 | 10.8 |
| 1880.000 | V | 86.16 | 13.7 | 11.7 | 2.7 | 22.7 | 33.0 | 10.3 |
| QPSK 20 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 85.46 | 12.9 | 11.7 | 2.7 | 21.9 | 33.0 | 11.1 |
| 1880.000 | V | 85.83 | 13.4 | 11.7 | 2.7 | 22.4 | 33.0 | 10.6 |
| 16QAM 20 MHz Middle Channel | | | | | | | | |
| 1880.000 | H | 85.27 | 12.7 | 11.7 | 2.7 | 21.7 | 33.0 | 11.3 |
| 1880.000 | V | 85.66 | 13.2 | 11.7 | 2.7 | 22.2 | 33.0 | 10.8 |

**LTE Band 4**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 1.4 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 88.46 | 14.4 | 10.9 | 2.5 | 22.8 | 30.0 | 7.2 |
| 1732.500 | V | 89.85 | 15.5 | 10.9 | 2.5 | 23.9 | 30.0 | 6.1 |
| 16QAM 1.4 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 88.16 | 14.1 | 10.9 | 2.5 | 22.5 | 30.0 | 7.5 |
| 1732.500 | V | 89.32 | 15 | 10.9 | 2.5 | 23.4 | 30.0 | 6.6 |
| QPSK 3 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 88.37 | 14.3 | 10.9 | 2.5 | 22.7 | 30.0 | 7.3 |
| 1732.500 | V | 88.64 | 14.3 | 10.9 | 2.5 | 22.7 | 30.0 | 7.3 |
| 16QAM 3 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 88.18 | 14.1 | 10.9 | 2.5 | 22.5 | 30.0 | 7.5 |
| 1732.500 | V | 88.43 | 14.1 | 10.9 | 2.5 | 22.5 | 30.0 | 7.5 |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 88.12 | 14.1 | 10.9 | 2.5 | 22.5 | 30.0 | 7.5 |
| 1732.500 | V | 88.34 | 14 | 10.9 | 2.5 | 22.4 | 30.0 | 7.6 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 87.75 | 13.7 | 10.9 | 2.5 | 22.1 | 30.0 | 7.9 |
| 1732.500 | V | 87.97 | 13.6 | 10.9 | 2.5 | 22.0 | 30.0 | 8.0 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 87.38 | 13.3 | 10.9 | 2.5 | 21.7 | 30.0 | 8.3 |
| 1732.500 | V | 87.96 | 13.6 | 10.9 | 2.5 | 22.0 | 30.0 | 8.0 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 87.09 | 13 | 10.9 | 2.5 | 21.4 | 30.0 | 8.6 |
| 1732.500 | V | 87.27 | 12.9 | 10.9 | 2.5 | 21.3 | 30.0 | 8.7 |
| QPSK 15 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 86.53 | 12.5 | 10.9 | 2.5 | 20.9 | 30.0 | 9.1 |
| 1732.500 | V | 86.96 | 12.6 | 10.9 | 2.5 | 21.0 | 30.0 | 9.0 |
| 16QAM 15 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 86.17 | 12.1 | 10.9 | 2.5 | 20.5 | 30.0 | 9.5 |
| 1732.500 | V | 86.48 | 12.1 | 10.9 | 2.5 | 20.5 | 30.0 | 9.5 |
| QPSK 20 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 86.57 | 12.5 | 10.9 | 2.5 | 20.9 | 30.0 | 9.1 |
| 1732.500 | V | 86.94 | 12.6 | 10.9 | 2.5 | 21.0 | 30.0 | 9.0 |
| 16QAM 20 MHz Middle Channel | | | | | | | | |
| 1732.500 | H | 86.46 | 12.4 | 10.9 | 2.5 | 20.8 | 30.0 | 9.2 |
| 1732.500 | V | 86.69 | 12.3 | 10.9 | 2.5 | 20.7 | 30.0 | 9.3 |

**LTE Band 5**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | S.G. Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 1.4 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 85.83 | 10.9 | 0.0 | 1 | 9.9 | 38.5 | 28.6 |
| 836.500 | V | 96.28 | 24.5 | 0.0 | 1 | 23.5 | 38.5 | 15.0 |
| 16QAM 1.4 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 85.63 | 10.7 | 0.0 | 1 | 9.7 | 38.5 | 28.8 |
| 836.500 | V | 96.03 | 24.2 | 0.0 | 1 | 23.2 | 38.5 | 15.3 |
| QPSK 3 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 85.24 | 10.3 | 0.0 | 1 | 9.3 | 38.5 | 29.2 |
| 836.500 | V | 96.82 | 25 | 0.0 | 1 | 24.0 | 38.5 | 14.5 |
| 16QAM 3 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 85.04 | 10.1 | 0.0 | 1 | 9.1 | 38.5 | 29.4 |
| 836.500 | V | 96.61 | 24.8 | 0.0 | 1 | 23.8 | 38.5 | 14.7 |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 84.96 | 10 | 0.0 | 1 | 9.0 | 38.5 | 29.5 |
| 836.500 | V | 96.34 | 24.5 | 0.0 | 1 | 23.5 | 38.5 | 15.0 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 84.75 | 9.8 | 0.0 | 1 | 8.8 | 38.5 | 29.7 |
| 836.500 | V | 96.05 | 24.3 | 0.0 | 1 | 23.3 | 38.5 | 15.2 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 84.37 | 9.4 | 0.0 | 1 | 8.4 | 38.5 | 30.1 |
| 836.500 | V | 95.75 | 24 | 0.0 | 1 | 23.0 | 38.5 | 15.5 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 836.500 | H | 84.26 | 9.3 | 0.0 | 1 | 8.3 | 38.5 | 30.2 |
| 836.500 | V | 95.46 | 23.7 | 0.0 | 1 | 22.7 | 38.5 | 15.8 |

**LTE Band 7**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 80.93 | 8.3 | 13.1 | 3.1 | 18.3 | 33.0 | 14.7 |
| 2535.000 | V | 83.27 | 12.1 | 13.1 | 3.1 | 22.1 | 33.0 | 10.9 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 80.49 | 7.9 | 13.1 | 3.1 | 17.9 | 33.0 | 15.1 |
| 2535.000 | V | 82.67 | 11.5 | 13.1 | 3.1 | 21.5 | 33.0 | 11.5 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 80.18 | 7.6 | 13.1 | 3.1 | 17.6 | 33.0 | 15.4 |
| 2535.000 | V | 82.72 | 11.6 | 13.1 | 3.1 | 21.6 | 33.0 | 11.4 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 80.05 | 7.4 | 13.1 | 3.1 | 17.4 | 33.0 | 15.6 |
| 2535.000 | V | 82.53 | 11.4 | 13.1 | 3.1 | 21.4 | 33.0 | 11.6 |
| QPSK 15 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 79.85 | 7.2 | 13.1 | 3.1 | 17.2 | 33.0 | 15.8 |
| 2535.000 | V | 81.49 | 10.3 | 13.1 | 3.1 | 20.3 | 33.0 | 12.7 |
| 16QAM 15 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 79.45 | 6.8 | 13.1 | 3.1 | 16.8 | 33.0 | 16.2 |
| 2535.000 | V | 81.17 | 10 | 13.1 | 3.1 | 20.0 | 33.0 | 13.0 |
| QPSK 20 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 79.68 | 7.1 | 13.1 | 3.1 | 17.1 | 33.0 | 15.9 |
| 2535.000 | V | 81.73 | 10.6 | 13.1 | 3.1 | 20.6 | 33.0 | 12.4 |
| 16QAM 20 MHz Middle Channel | | | | | | | | |
| 2535.000 | H | 79.52 | 6.9 | 13.1 | 3.1 | 16.9 | 33.0 | 16.1 |
| 2535.000 | V | 81.45 | 10.3 | 13.1 | 3.1 | 20.3 | 33.0 | 12.7 |

**LTE Band 12**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 1.4 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 83.12 | 6.3 | 0.0 | 0.9 | 5.4 | 34.8 | 29.4 |
| 707.500 | V | 95.02 | 20.6 | 0.0 | 0.9 | 19.7 | 34.8 | 15.1 |
| 16QAM 1.4 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 82.95 | 6.1 | 0.0 | 0.9 | 5.2 | 34.8 | 29.6 |
| 707.500 | V | 94.86 | 20.4 | 0.0 | 0.9 | 19.5 | 34.8 | 15.3 |
| QPSK 3 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 82.67 | 5.8 | 0.0 | 0.9 | 4.9 | 34.8 | 29.9 |
| 707.500 | V | 94.58 | 20.2 | 0.0 | 0.9 | 19.3 | 34.8 | 15.5 |
| 16QAM 3 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 82.52 | 5.7 | 0.0 | 0.9 | 4.8 | 34.8 | 30.0 |
| 707.500 | V | 94.37 | 20 | 0.0 | 0.9 | 19.1 | 34.8 | 15.7 |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 82.21 | 5.4 | 0.0 | 0.9 | 4.5 | 34.8 | 30.3 |
| 707.500 | V | 94.16 | 19.7 | 0.0 | 0.9 | 18.8 | 34.8 | 16.0 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 82.18 | 5.3 | 0.0 | 0.9 | 4.4 | 34.8 | 30.4 |
| 707.500 | V | 94.06 | 19.6 | 0.0 | 0.9 | 18.7 | 34.8 | 16.1 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 81.87 | 5 | 0.0 | 0.9 | 4.1 | 34.8 | 30.7 |
| 707.500 | V | 94.02 | 19.6 | 0.0 | 0.9 | 18.7 | 34.8 | 16.1 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 707.500 | H | 81.66 | 4.8 | 0.0 | 0.9 | 3.9 | 34.8 | 30.9 |
| 707.500 | V | 93.87 | 19.5 | 0.0 | 0.9 | 18.6 | 34.8 | 16.2 |

**LTE Band 17**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK 5 MHz Middle Channel | | | | | | | | |
| 710.000 | H | 82.32 | 5.5 | 0.0 | 0.9 | 4.6 | 34.8 | 30.2 |
| 710.000 | V | 94.86 | 20.5 | 0.0 | 0.9 | 19.6 | 34.8 | 15.2 |
| 16QAM 5 MHz Middle Channel | | | | | | | | |
| 710.000 | H | 82.65 | 5.8 | 0.0 | 0.9 | 4.9 | 34.8 | 29.9 |
| 710.000 | V | 94.54 | 20.2 | 0.0 | 0.9 | 19.3 | 34.8 | 15.5 |
| QPSK 10 MHz Middle Channel | | | | | | | | |
| 710.000 | H | 82.41 | 5.6 | 0.0 | 0.9 | 4.7 | 34.8 | 30.1 |
| 710.000 | V | 94.05 | 19.7 | 0.0 | 0.9 | 18.8 | 34.8 | 16.0 |
| 16QAM 10 MHz Middle Channel | | | | | | | | |
| 710.000 | H | 81.05 | 4.2 | 0.0 | 0.9 | 3.3 | 34.8 | 31.5 |
| 710.000 | V | 93.58 | 19.2 | 0.0 | 0.9 | 18.3 | 34.8 | 16.5 |

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

# FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53- OCCUPIED BANDWIDTH

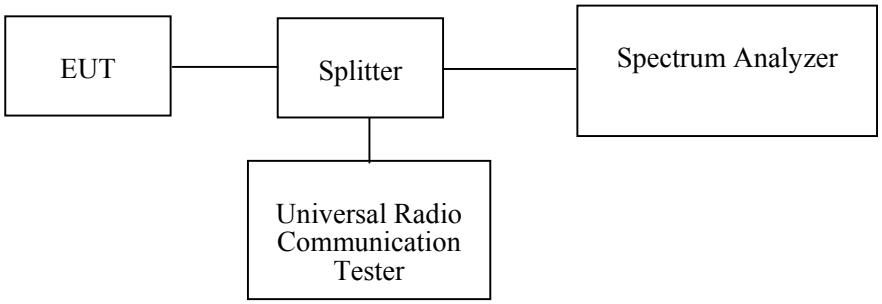
## Applicable Standard

FCC §2.1049, §22.917, §22.905, §24.238 and §27.53.

## Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The 26 dB & 99% bandwidth was recorded.




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | Spectrum Analyzer | FSIQ 26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| R&S | Universal Radio Communication Tester | CMU200 | 109 038 | 2017-07-18 | 2018-07-18 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 | 2017-08-31 | 2018-08-31 |
| Unknown | RF Attenuator | 10dB | 10dB-1 | Each Time | / |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |
| Pasternack | RF Coaxial Cable | 0.5m | C-5 | Each Time | / |
| E-Microwave | Two-way Spliter | ODP-1-6-2S | OE0120142 | Each Time | / |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23.5~24.6°C |
| **Relative Humidity:** | 42~50 % |
| **ATM Pressure:** | 101.4~101.5 kPa |

*The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-04.*

*Test Mode: Transmitting*

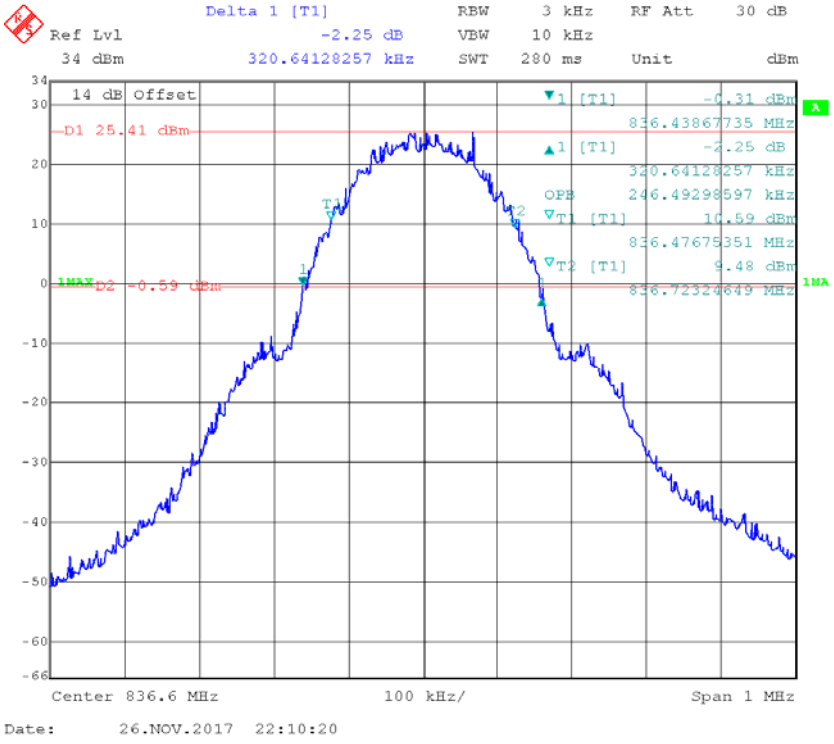
*Test Result: Compliant. Please refer to the following table and plots.*

| Band | Test Channel | Mode | 99% Occupied Bandwidth (MHz) | 26 dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|
| Cellular | M | GSM | 0.246 | 0.321 |
| | | EDGE | 0.251 | 0.325 |
| PCS | | PCS | 0.246 | 0.321 |
| | | EDGE | 0.255 | 0.317 |
| WCDMA Band Ⅱ | | Rel 99 | 4.228 | 4.910 |
| | | HSDPA | 4.228 | 4.890 |
| | | HSUPA | 4.208 | 4.910 |
| WCDMA Band IV | | Rel 99 | 4.208 | 4.899 |
| | | HSDPA | 4.208 | 4.910 |
| | | HSUPA | 4.228 | 4.910 |
| WCDMA Band V | | Rel 99 | 4.248 | 4.93 |
| | | HSDPA | 4.248 | 4.91 |
| | | HSUPA | 4.228 | 4.891 |

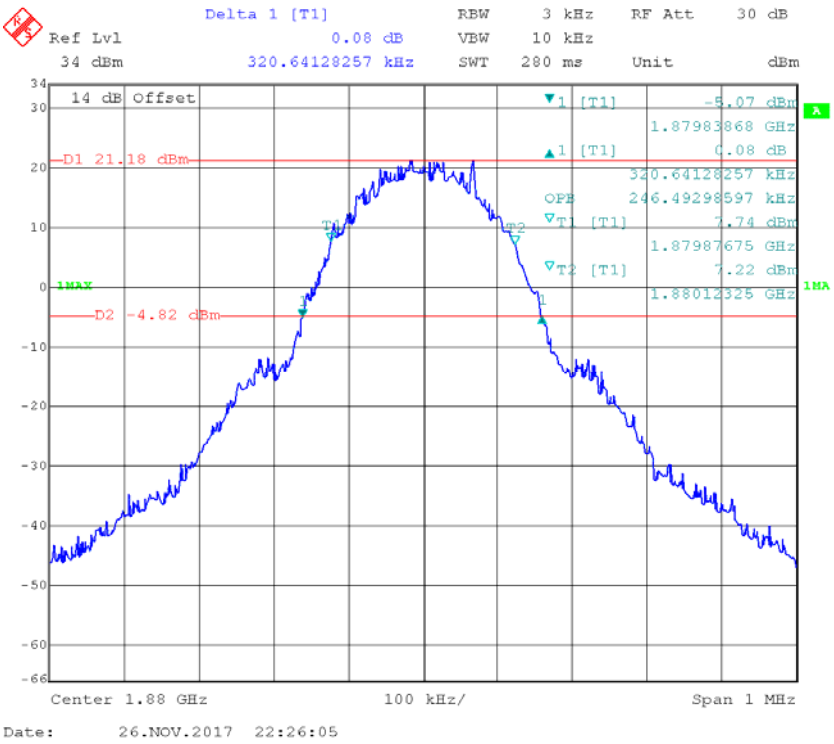
| Band | Test Modulation | Test Bandwidth (MHz) | Test Channel | 99% Occupied Bandwidth (MHz) | 26 dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|
| LTE Band 2 | QPSK | 1.4 | M | 1.106 | 1.287 |
| | | 3 | | 2.693 | 2.922 |
| | | 5 | | 4.549 | 5.094 |
| | | 10 | | 8.978 | 9.897 |
| | | 15 | | 13.587 | 15.077 |
| | | 20 | | 17.956 | 19.596 |
| | 16QAM | 1.4 | M | 1.106 | 1.293 |
| | | 3 | | 2.693 | 2.958 |
| | | 5 | | 4.549 | 5.130 |
| | | 10 | | 9.018 | 9.817 |
| | | 15 | | 13.587 | 15.017 |
| | | 20 | | 18.036 | 19.076 |

| Band | Test Modulation | Test Bandwidth (MHz) | Test Channel | 99% Occupied Bandwidth (MHz) | 26 dB Occupied Bandwidth (MHz) |
|---|---|---|---|---|---|
| LTE Band 4 | QPSK | 1.4 | M | 1.100 | 1.293 |
| | | 3 | | 2.705 | 2.937 |
| | | 5 | | 4.549 | 5.097 |
| | | 10 | | 8.978 | 9.780 |
| | | 15 | | 13.587 | 14.140 |
| | | 20 | | 18.036 | 19.419 |
| | 16QAM | 1.4 | M | 1.112 | 1.305 |
| | | 3 | | 2.705 | 2.961 |
| | | 5 | | 4.549 | 5.137 |
| | | 10 | | 8.978 | 9.780 |
| | | 15 | | 13.527 | 14.960 |
| | | 20 | | 17.956 | 19.579 |
| LTE Band 5 | QPSK | 1.4 | M | 1.100 | 1.281 |
| | | 3 | | 2.693 | 2.925 |
| | | 5 | | 4.549 | 5.077 |
| | | 10 | | 9.058 | 9.937 |
| | 16QAM | 1.4 | M | 1.106 | 1.287 |
| | | 3 | | 2.693 | 2.961 |
| | | 5 | | 4.549 | 5.117 |
| | | 10 | | 9.018 | 9.857 |
| LTE Band 7 | QPSK | 5 | M | 4.549 | 5.110 |
| | | 10 | | 8.978 | 9.910 |
| | | 15 | | 13.647 | 15.291 |
| | | 20 | | 18.036 | 19.770 |
| | 16QAM | 5 | M | 4.549 | 5.150 |
| | | 10 | | 8.978 | 9.830 |
| | | 15 | | 13.647 | 145.230 |
| | | 20 | | 18.116 | 19.609 |
| LTE Band 12 | QPSK | 1.4 | M | 1.106 | 1.281 |
| | | 3 | | 2.693 | 2.901 |
| | | 5 | | 4.549 | 5.081 |
| | | 10 | | 9.018 | 9.961 |
| | 16QAM | 1.4 | M | 1.106 | 1.287 |
| | | 3 | | 2.693 | 2.925 |
| | | 5 | | 4.549 | 5.081 |
| | | 10 | | 8.978 | 9.761 |
| LTE Band 17 | QPSK | 5 | M | 4.549 | 5.086 |
| | | 10 | | 8.978 | 9.986 |
| | 16QAM | 5 | M | 4.549 | 5.126 |
| | | 10 | | 9.018 | 9.786 |

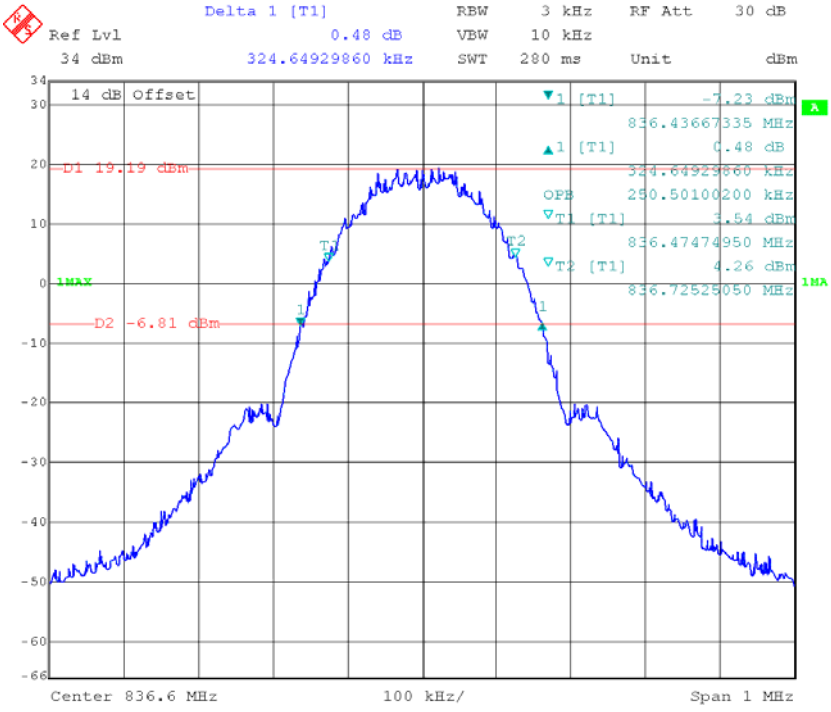
**GSM 850 Cellular Band**



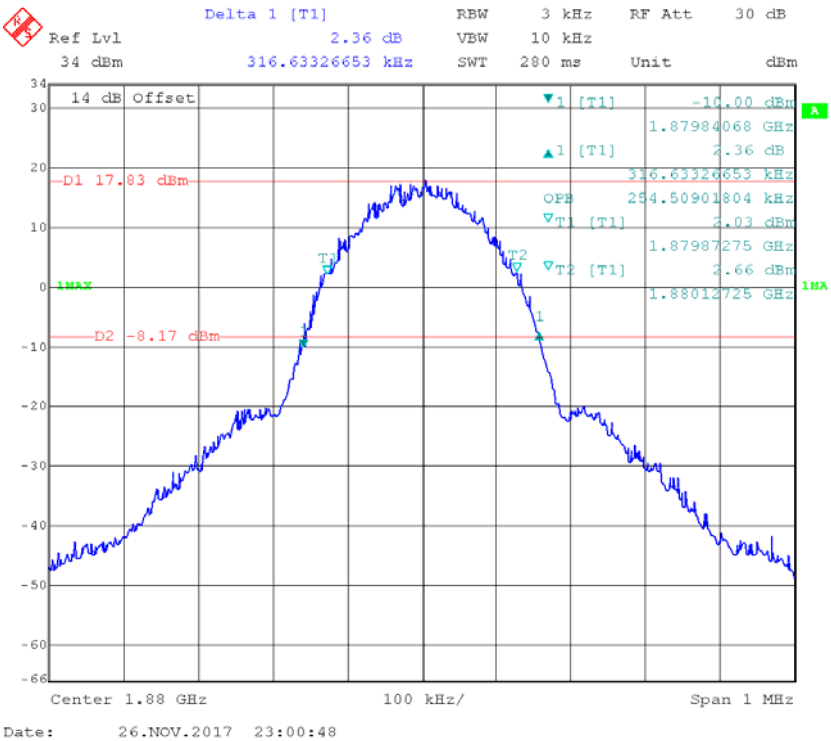

**GSM PCS1900 Cellular Band**



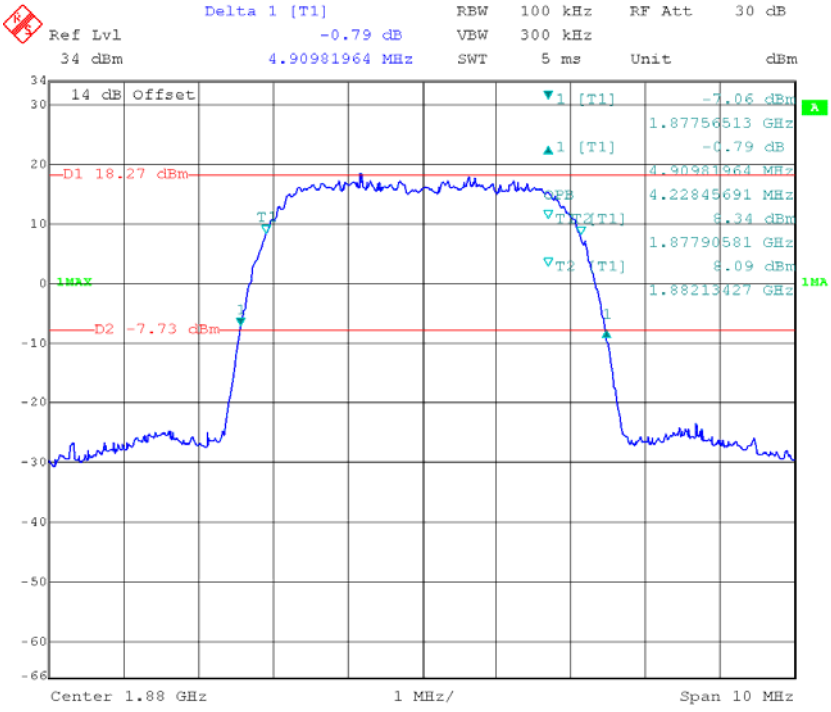
**EDGE 850 Cellular Band**



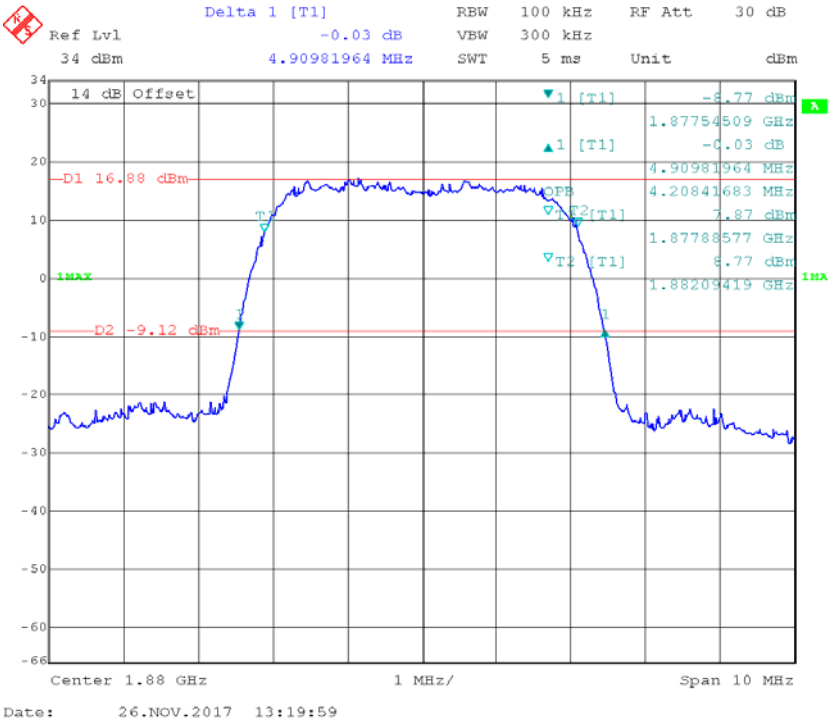

**EDGE PCS1900 Cellular Band**



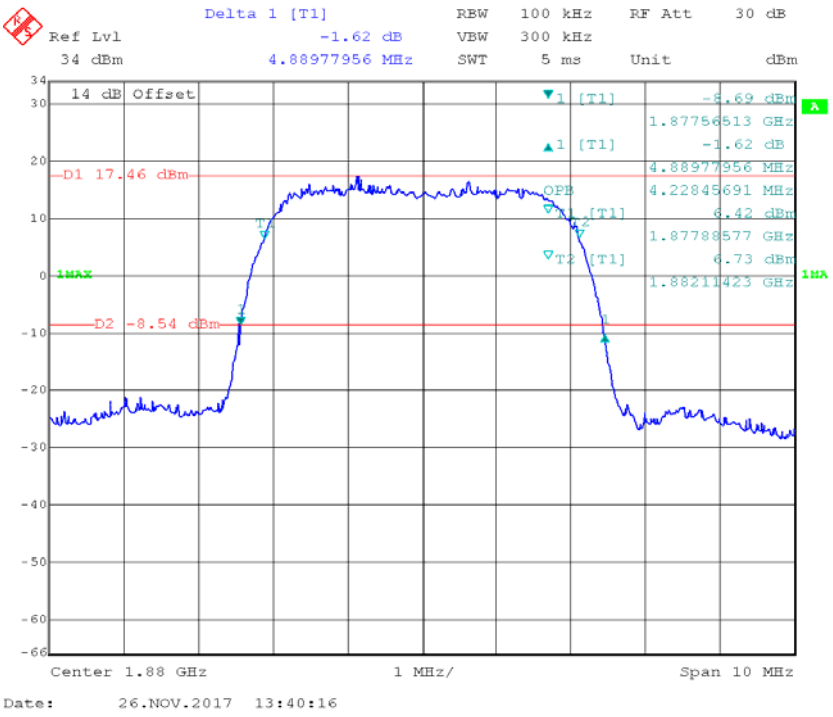
**WCDMA Band II, Rel 99**



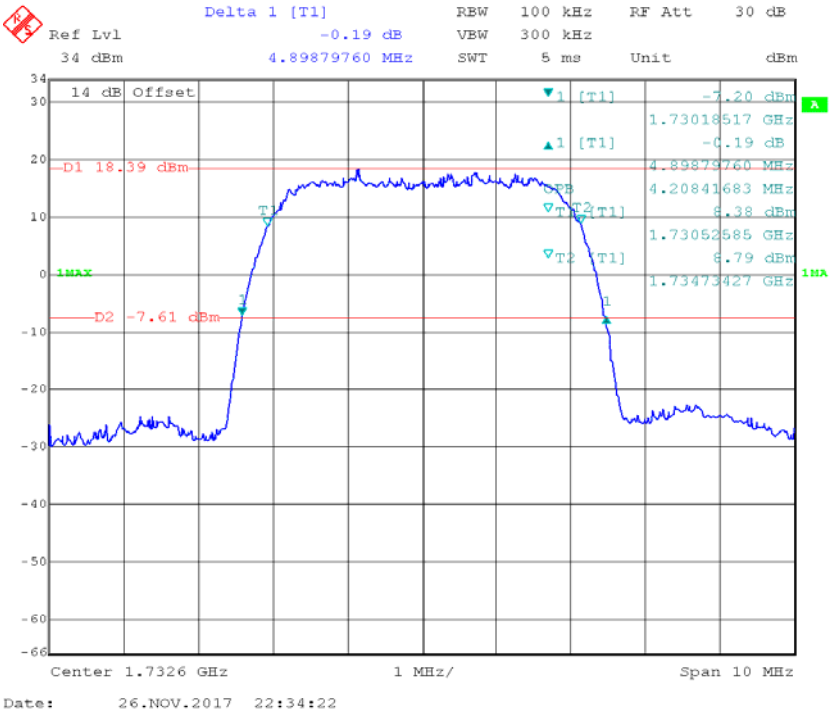

**WCDMA Band II, HSUPA**



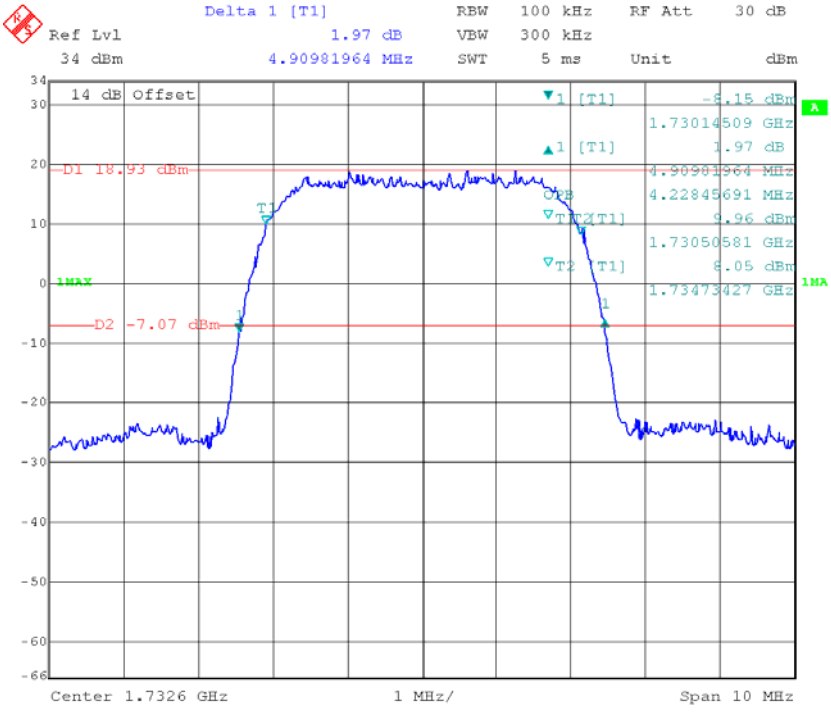
**WCDMA Band II, HSDPA**



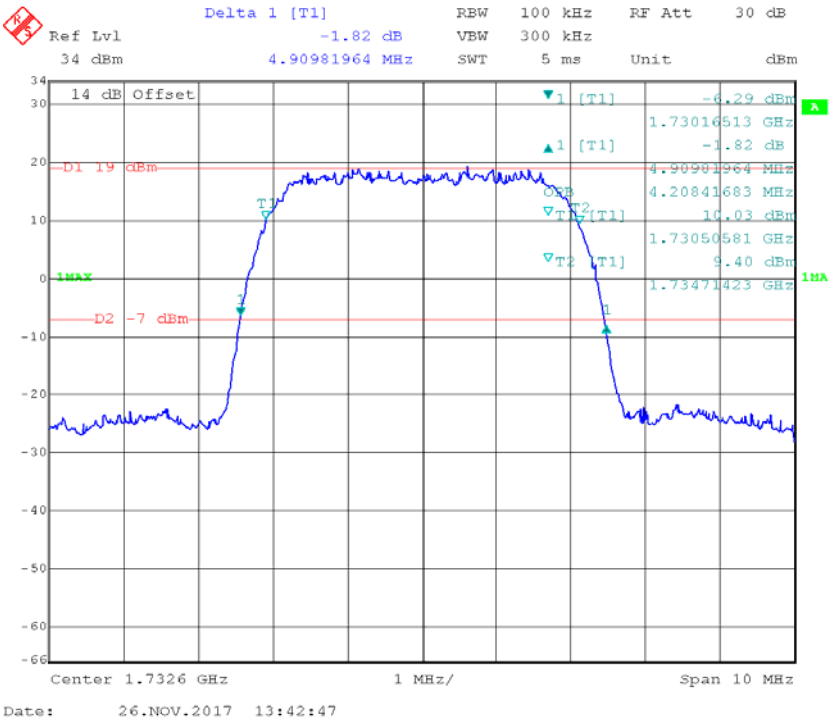

**WCDMA Band IV, Rel 99**



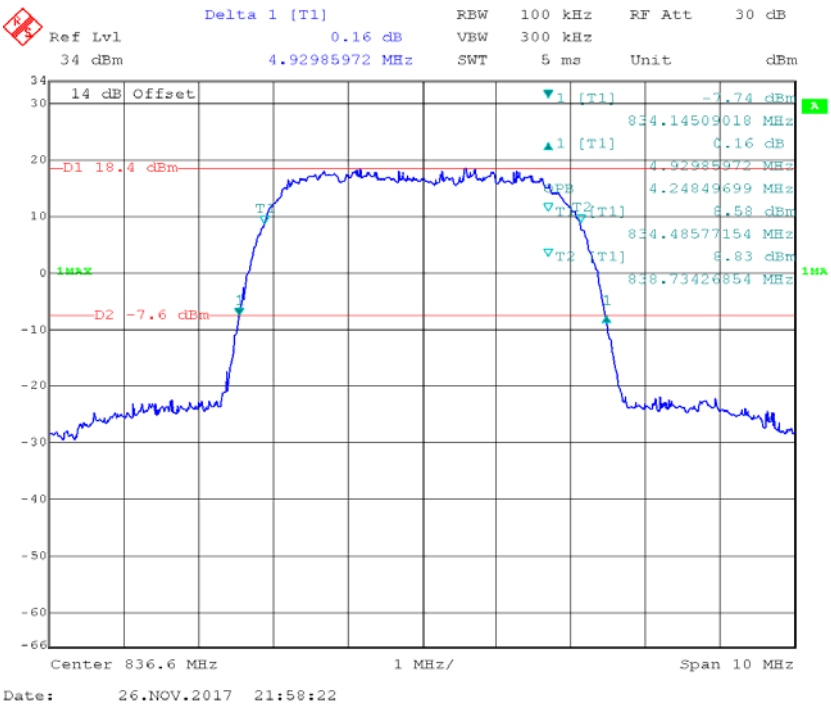
**WCDMA Band IV, HSUPA**



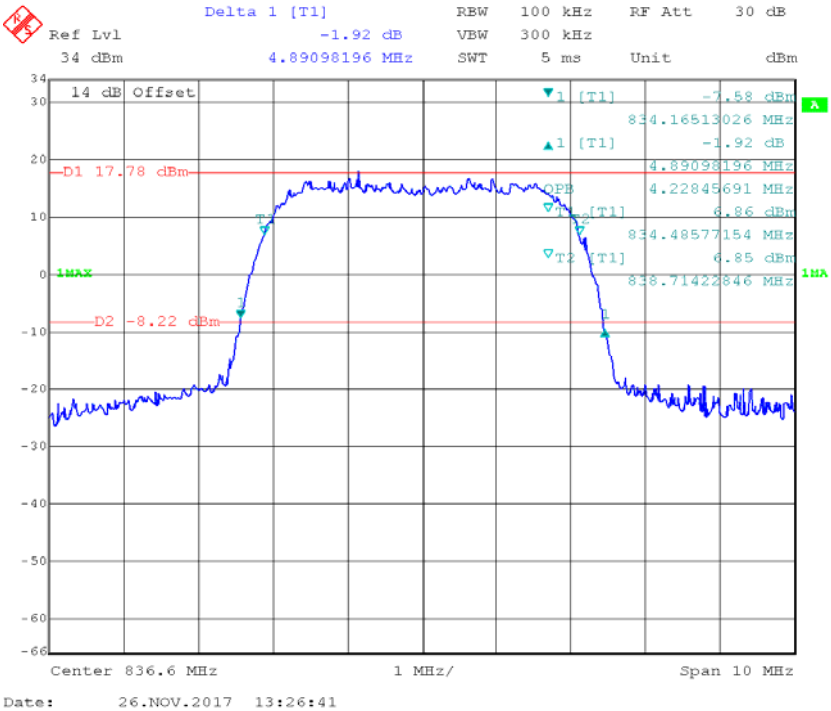

**WCDMA Band IV, HSDPA**



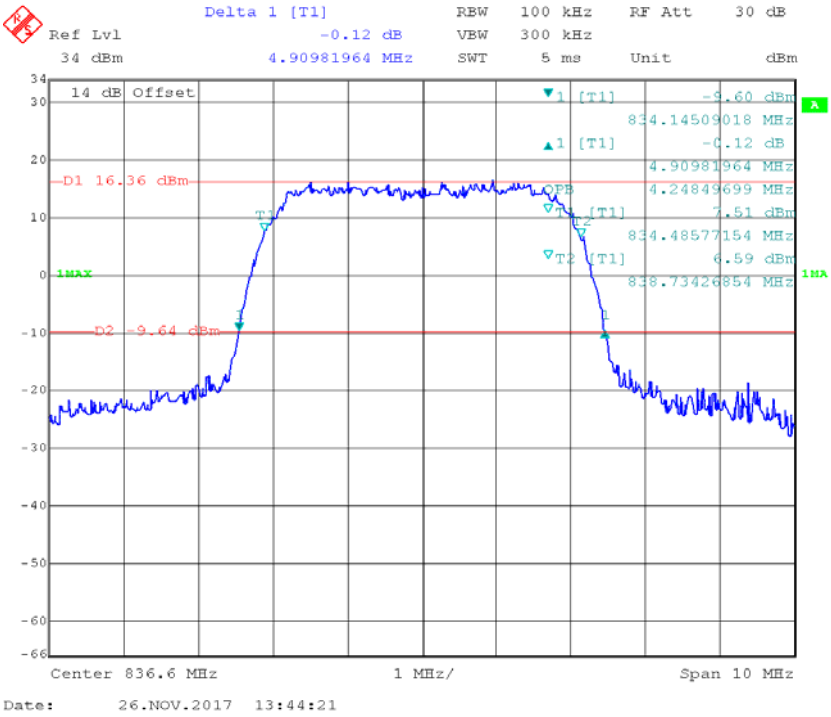
**WCDMA Band V, Rel 99**




**WCDMA Band V, HSUPA**

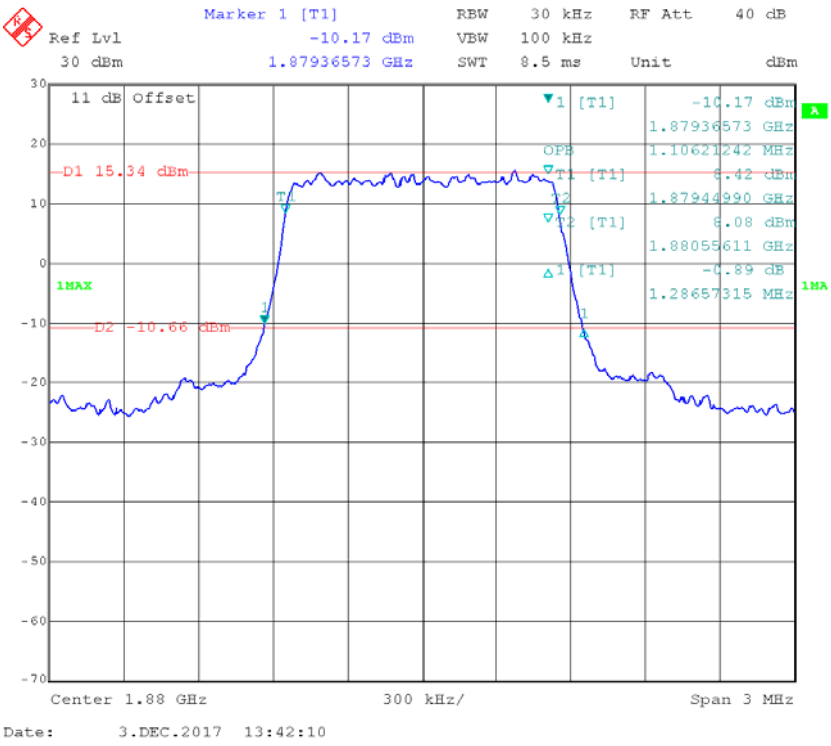


**WCDMA Band V, HSDPA**

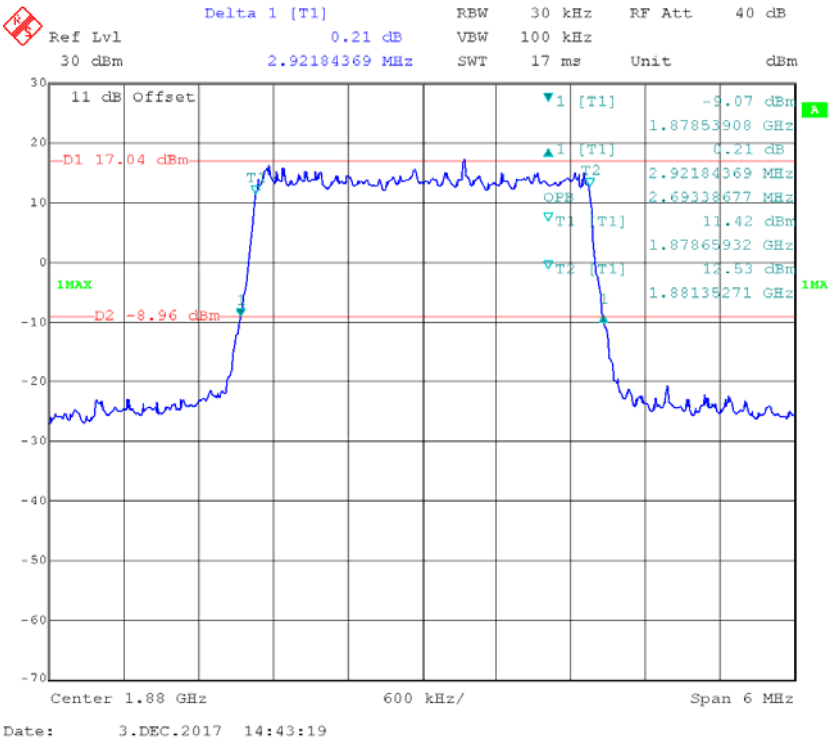


**LTE Band 2**

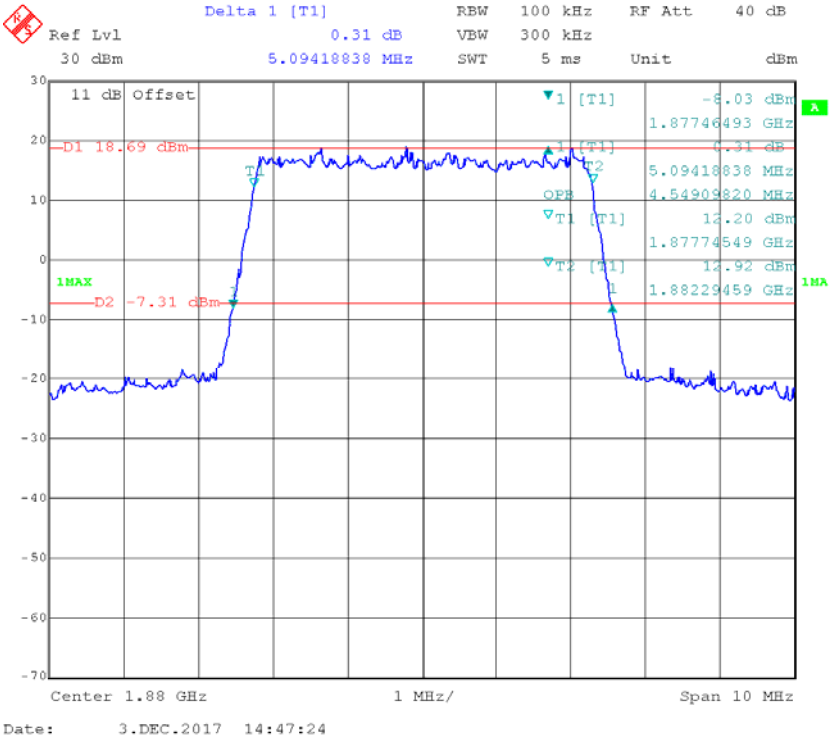
**QPSK_1.4 MHz**



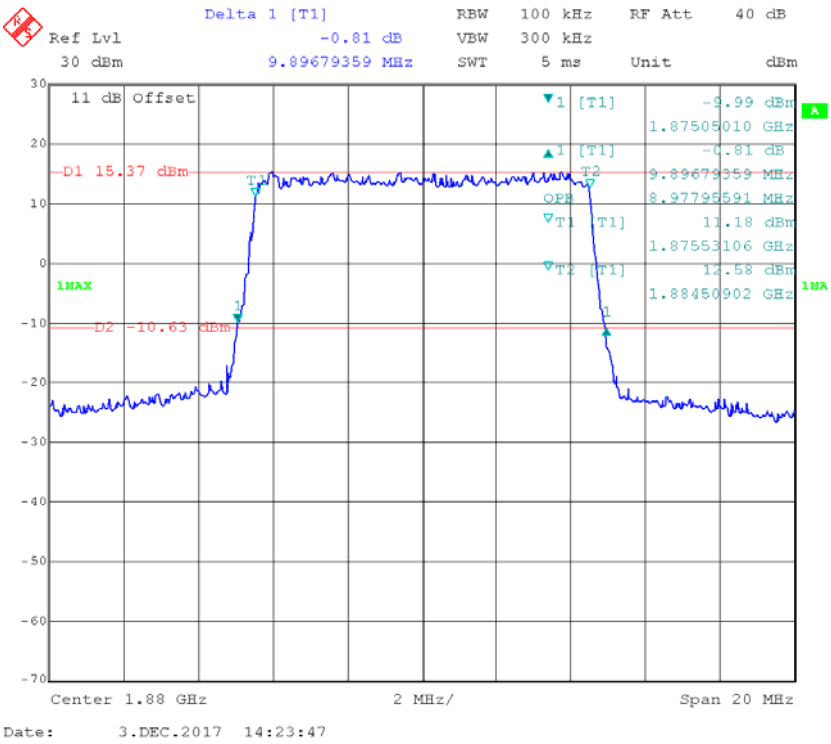

**QPSK_3 MHz**



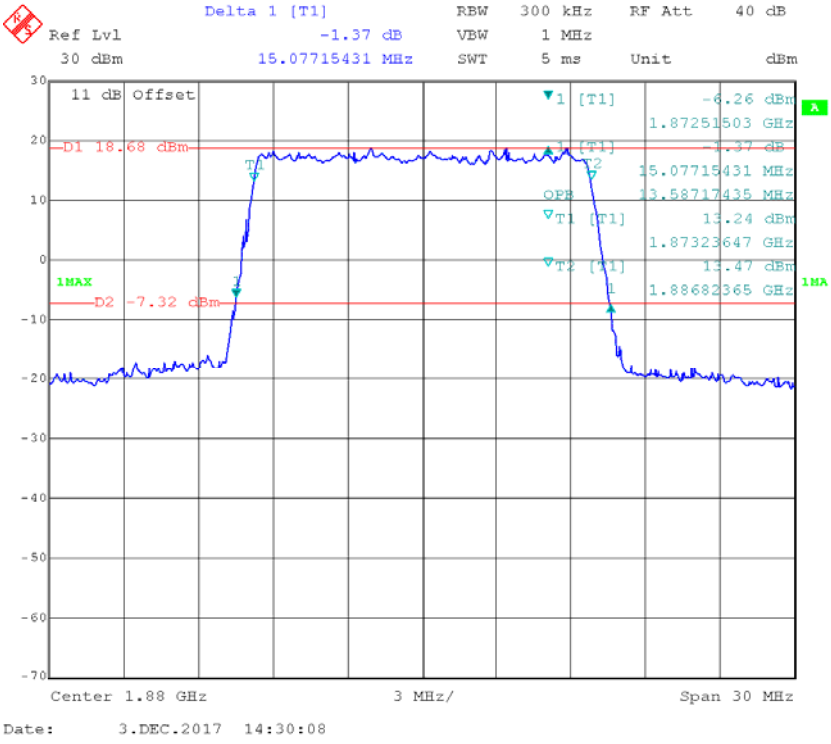
**QPSK_5 MHz**



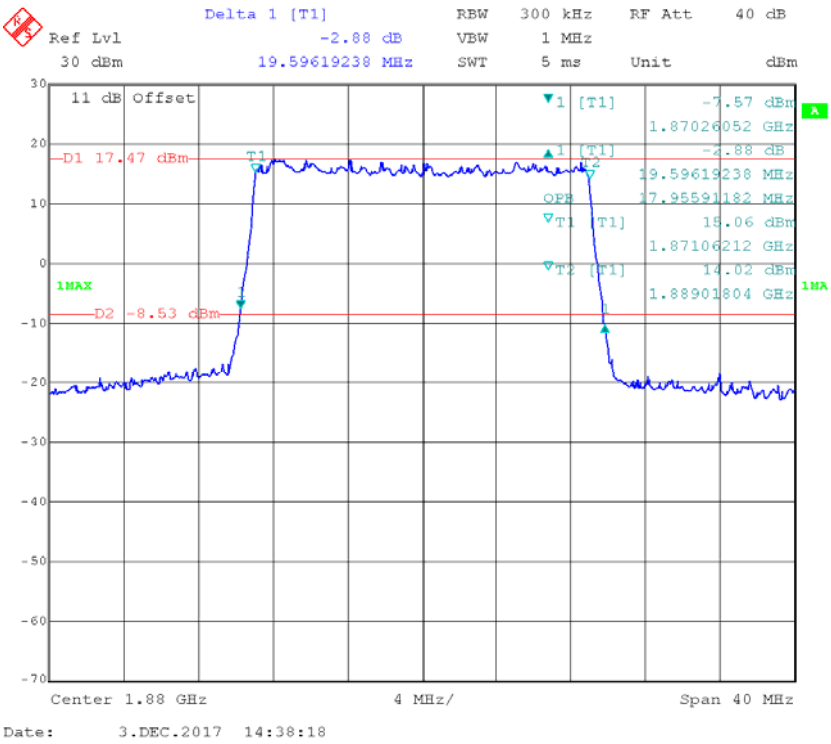

**QPSK_10 MHz**



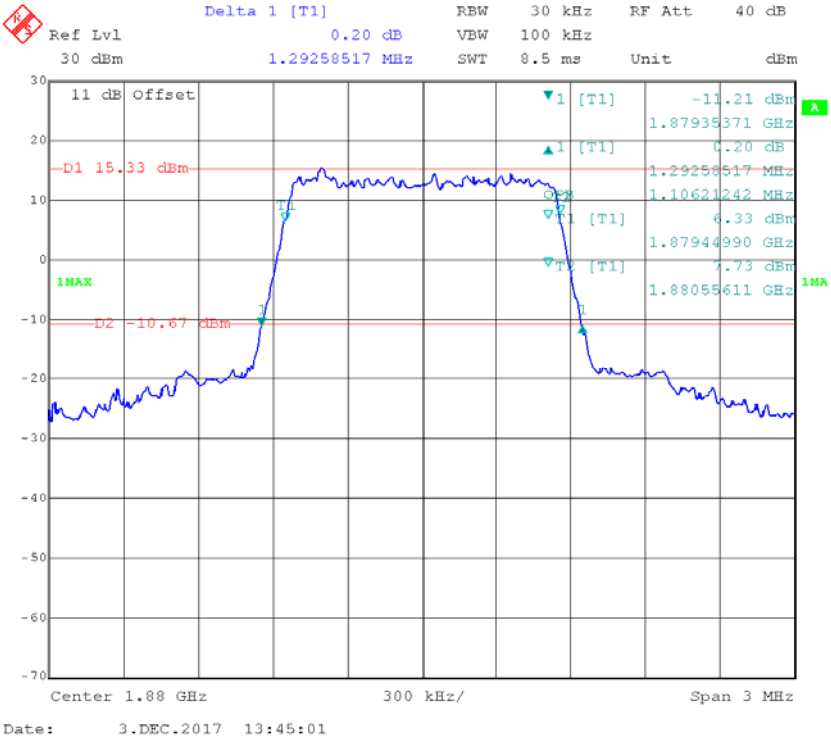
**QPSK_15 MHz**



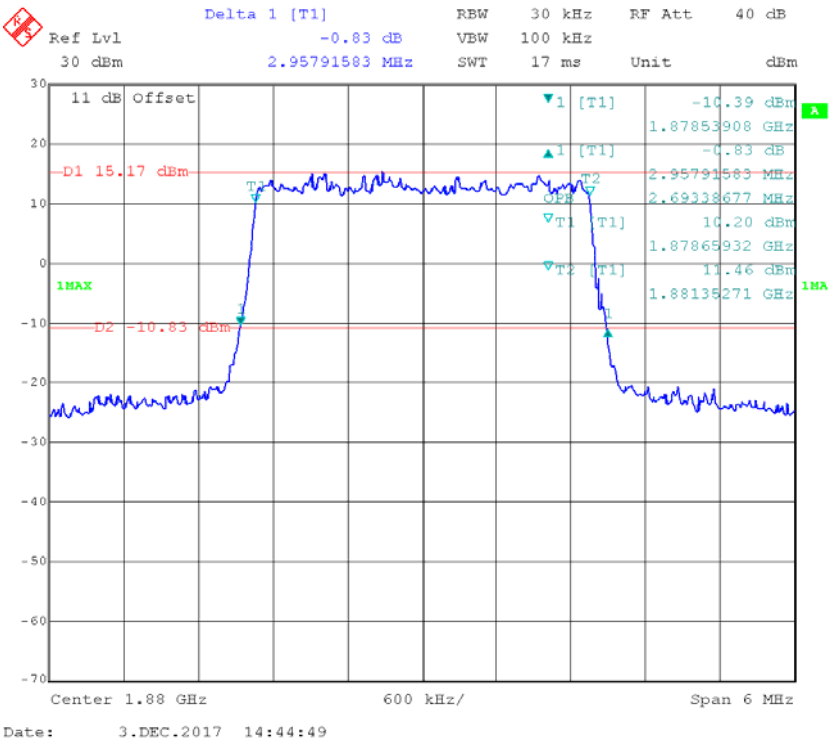

**QPSK_20 MHz**



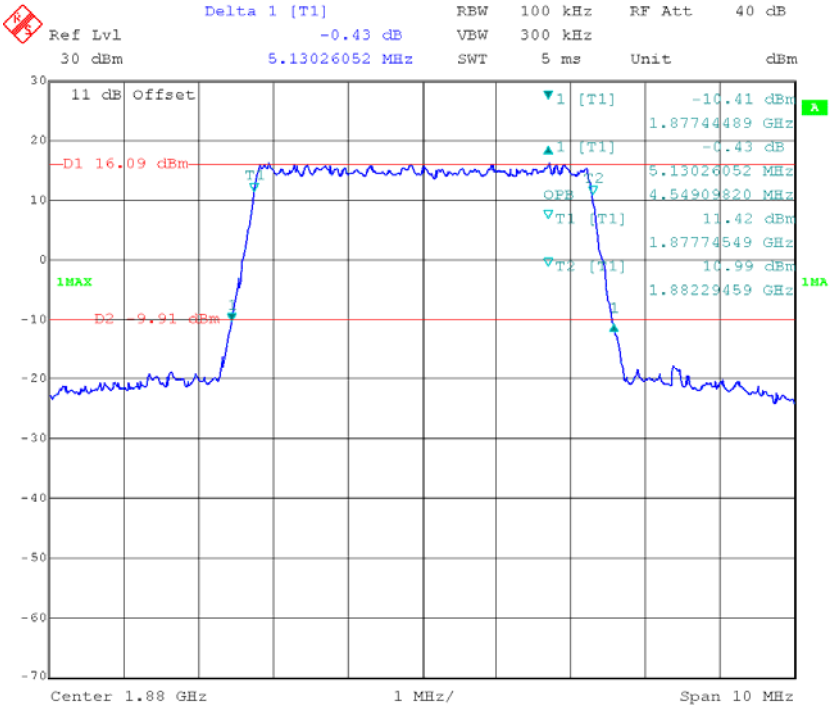
**16QAM_1.4 MHz**



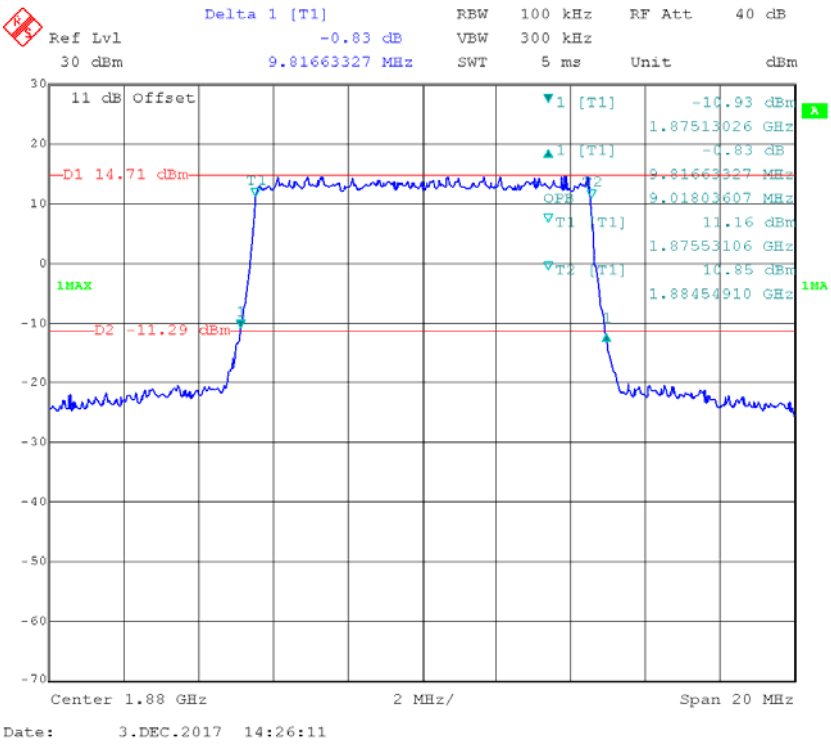

**16QAM_3 MHz**



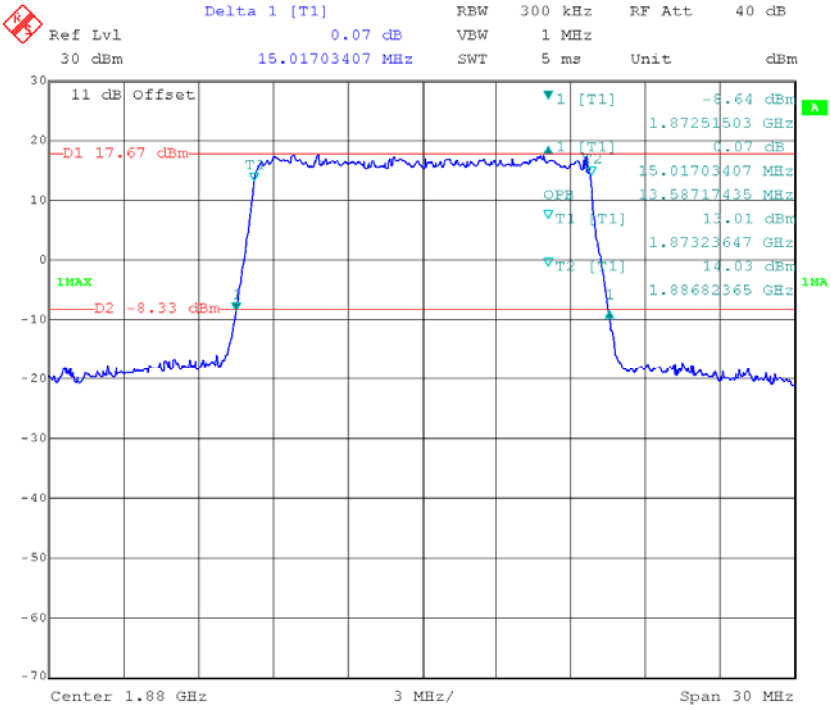
**16QAM_5 MHz**



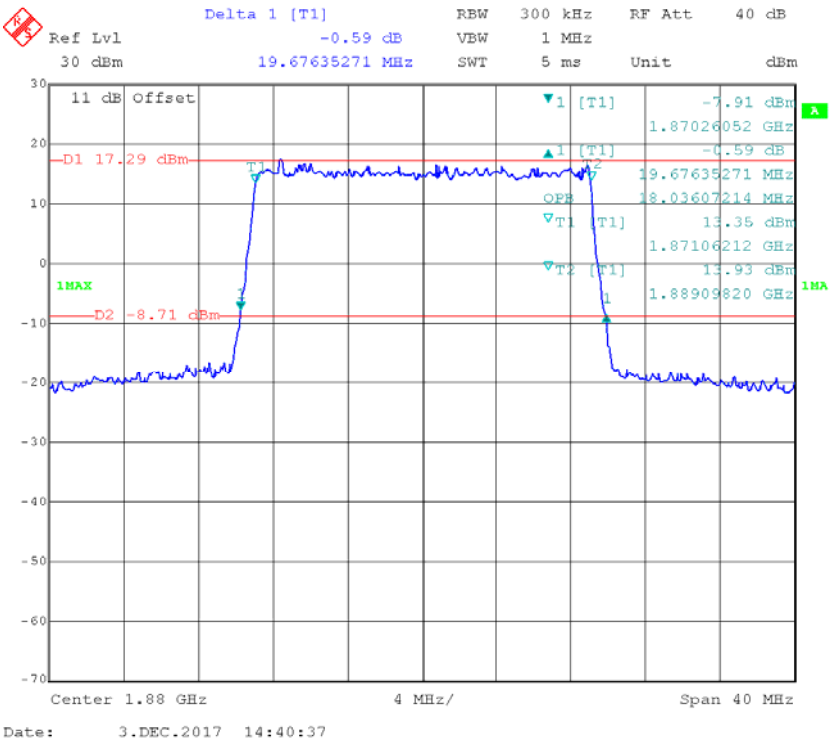

**16QAM_10 MHz**



**16QAM_15 MHz**

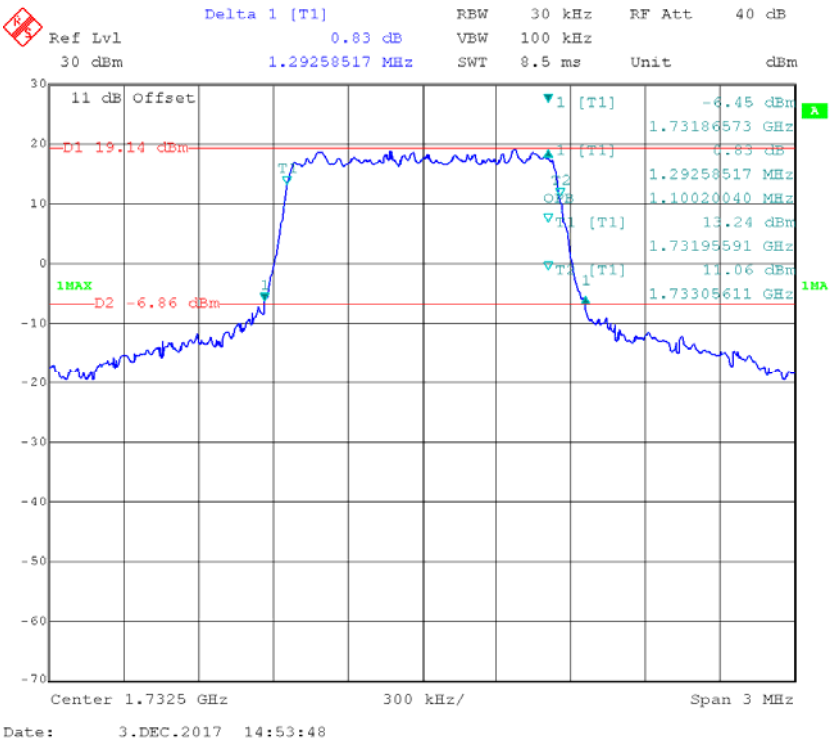



**16QAM_20 MHz**

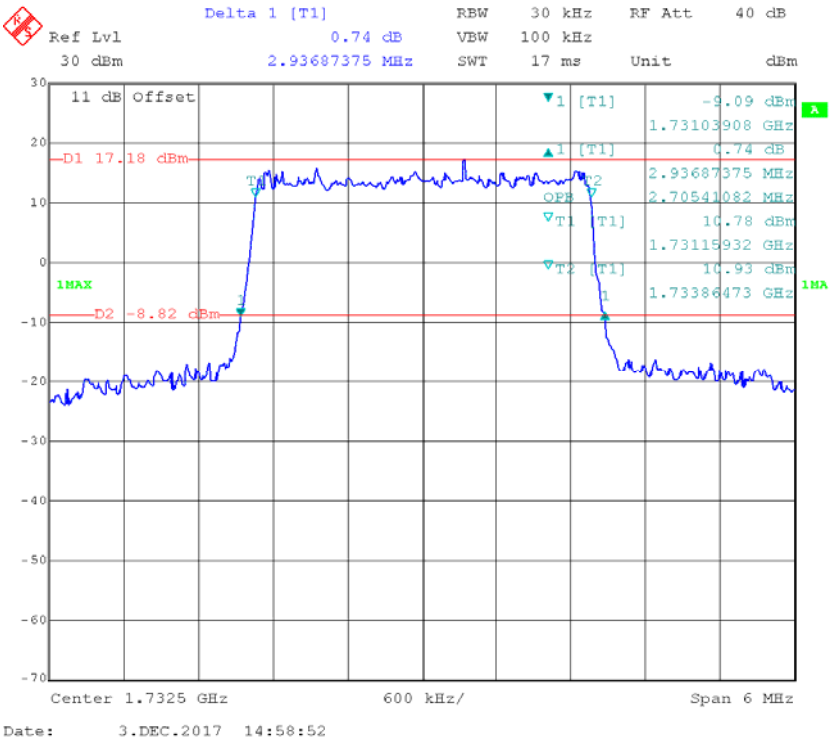


**LTE Band 4:**

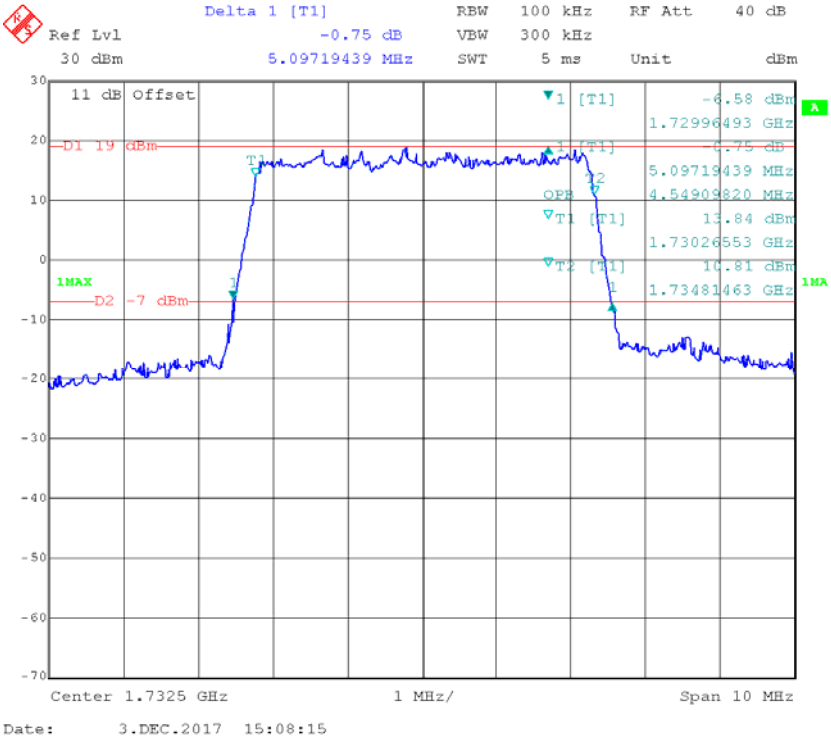
**QPSK_1.4 MHz**



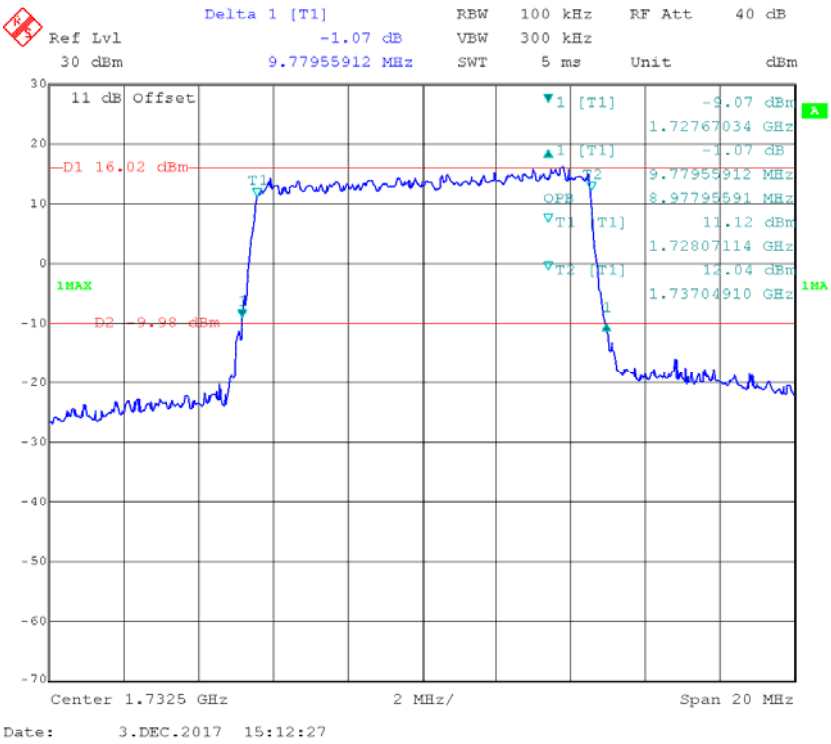

**QPSK_3 MHz**



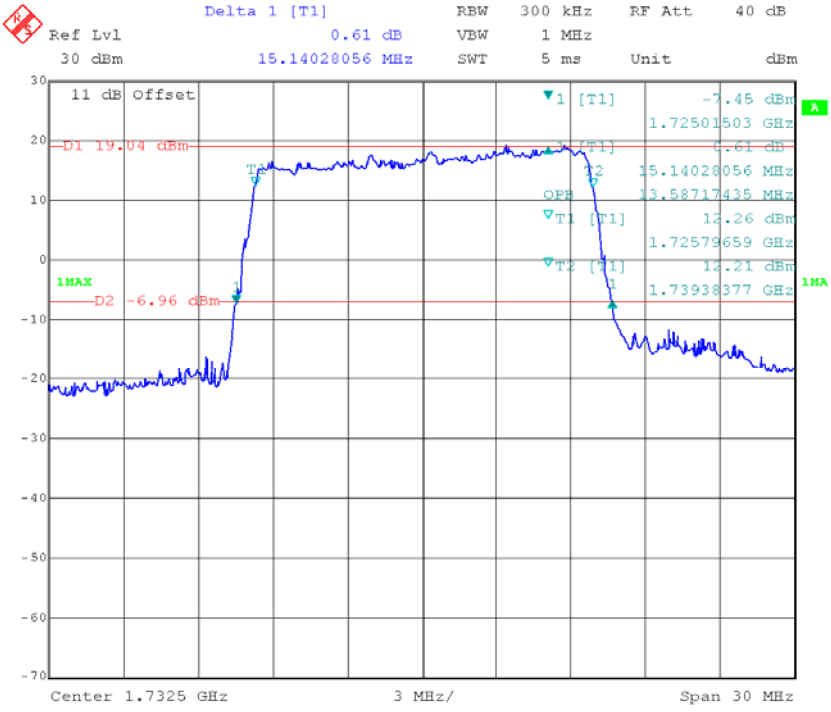
**QPSK_5 MHz**



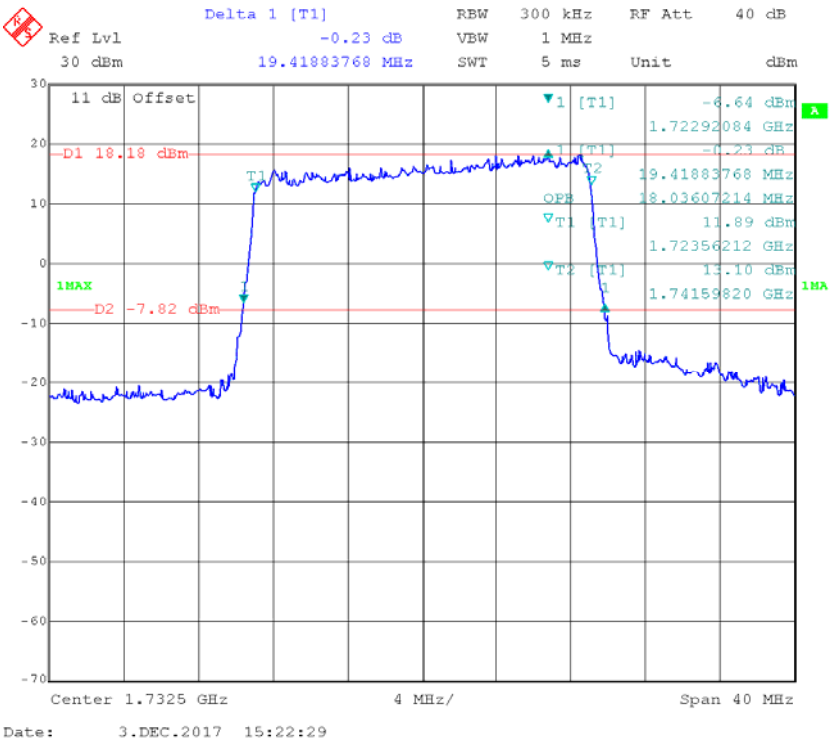

**QPSK_10 MHz**



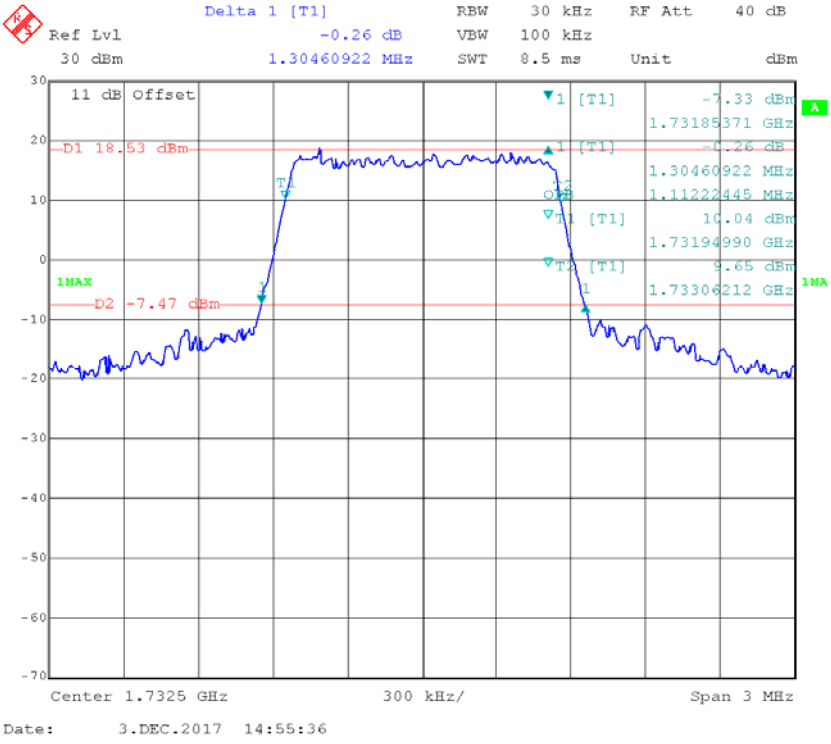
**QPSK_15 MHz**



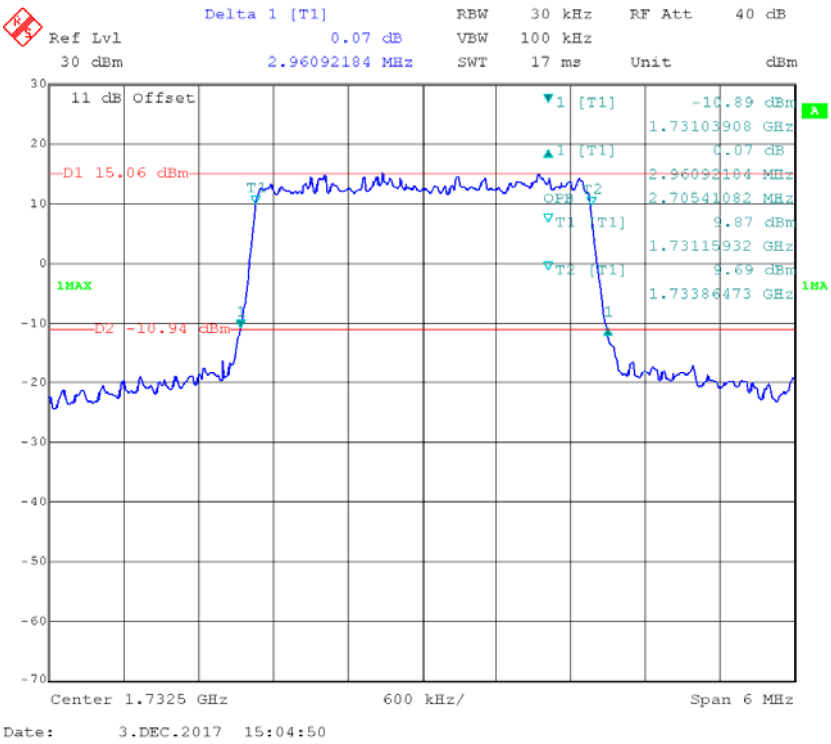

**QPSK_20 MHz**



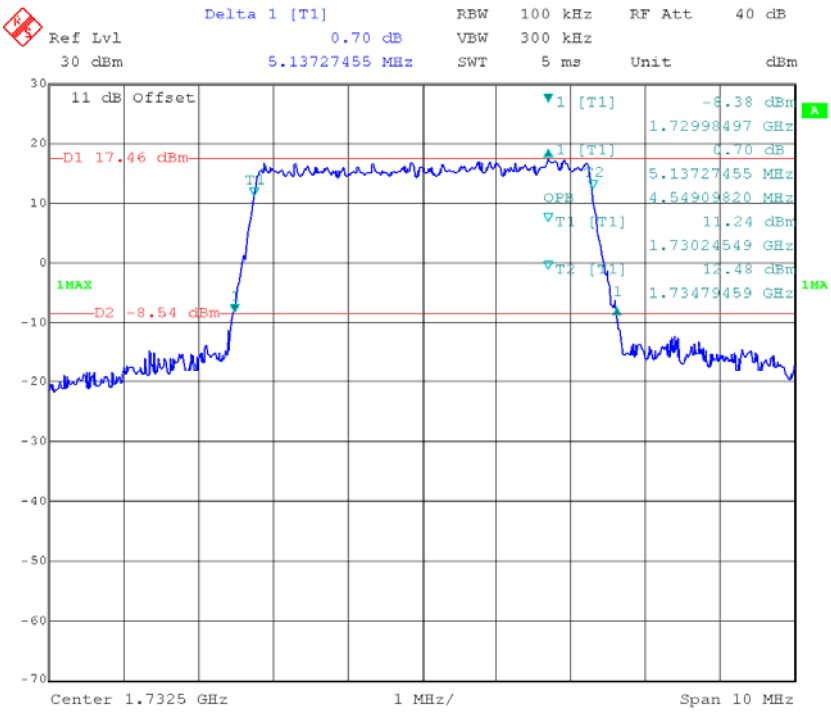
**16QAM_1.4 MHz**



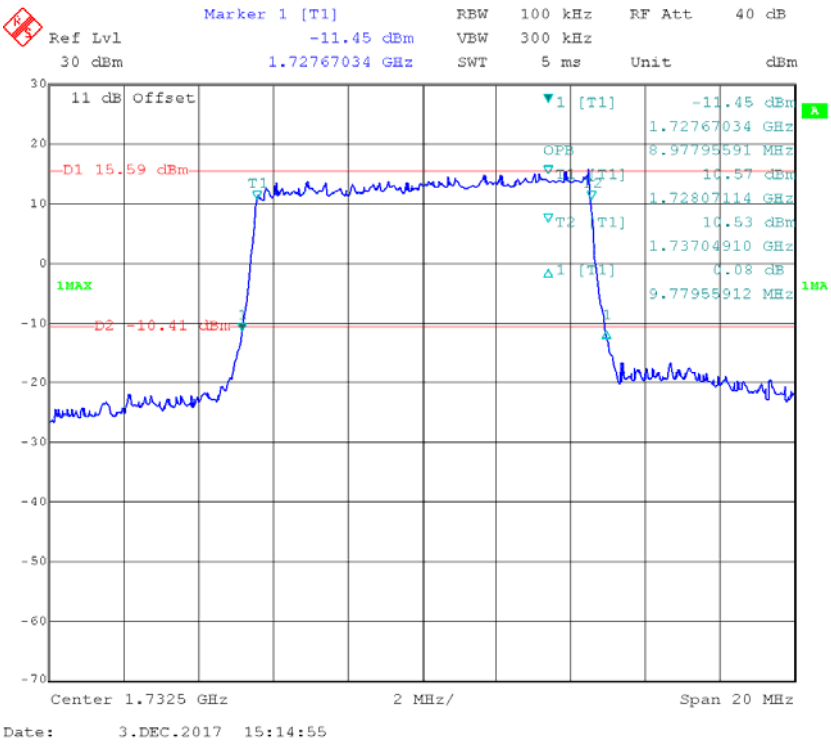

**16QAM_3 MHz**



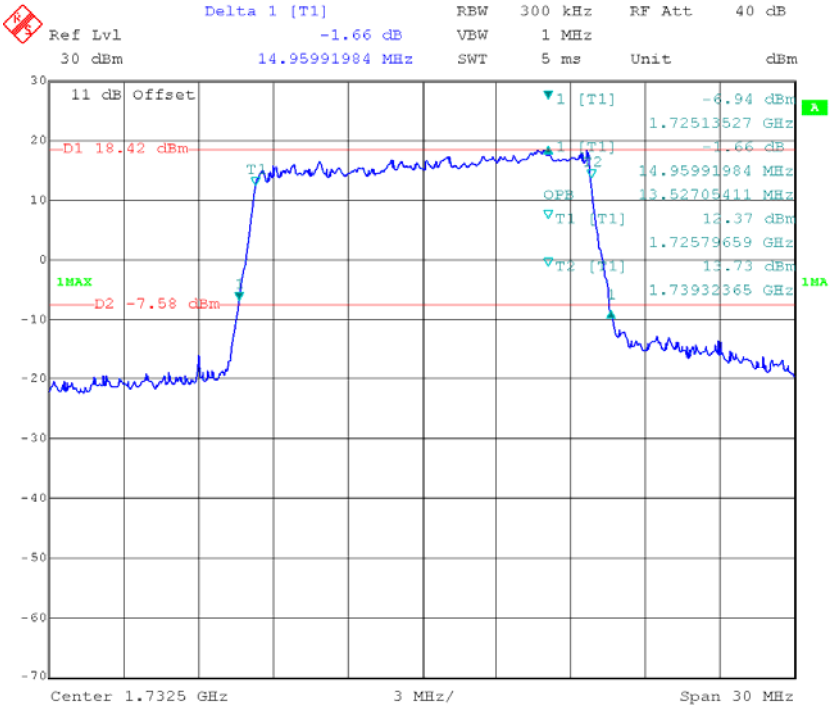
**16QAM_5 MHz**



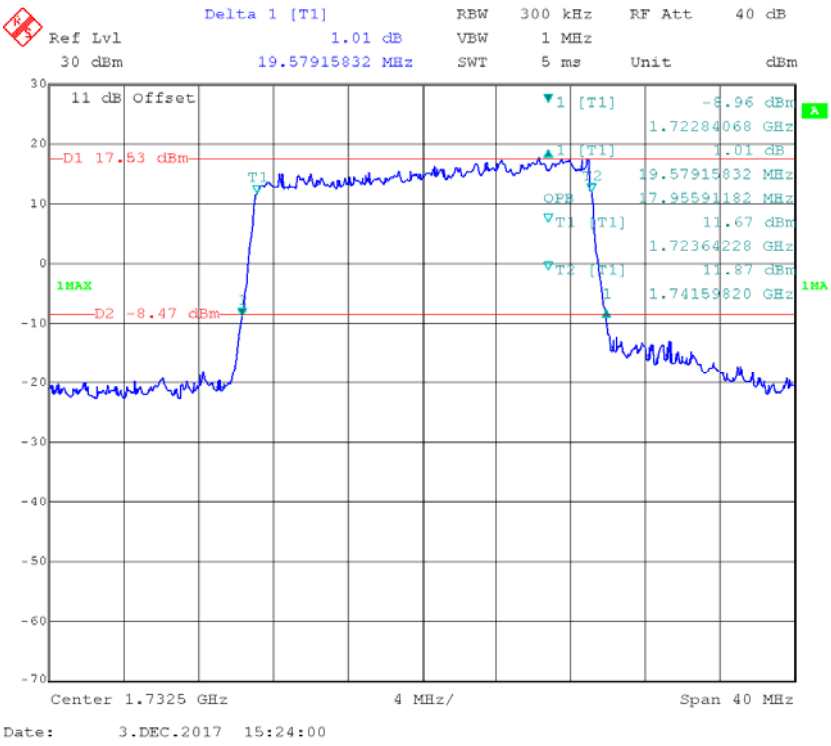

**16QAM_10 MHz**



**16QAM_15 MHz**

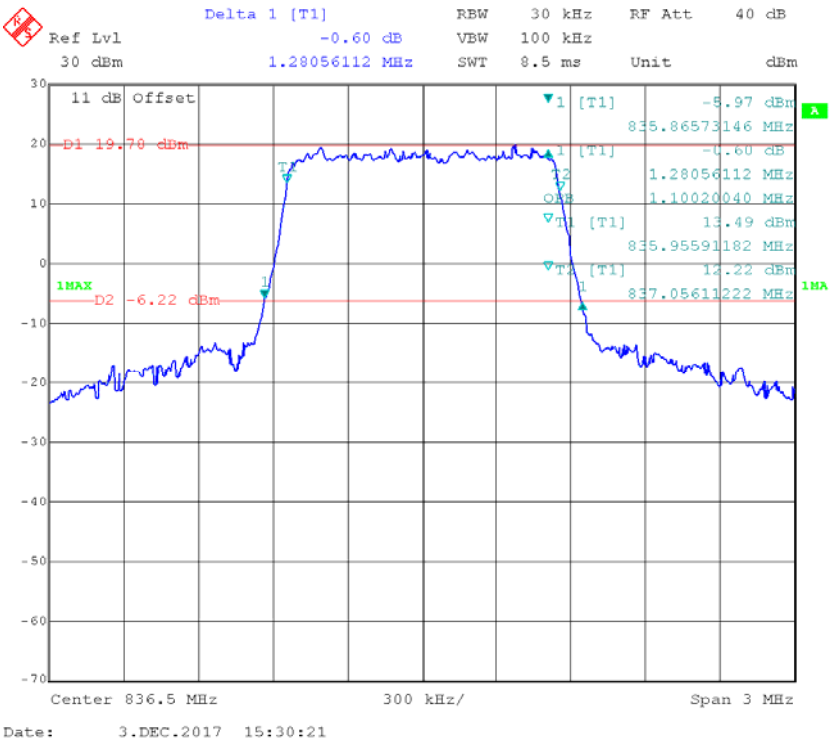



**16QAM_20 MHz**

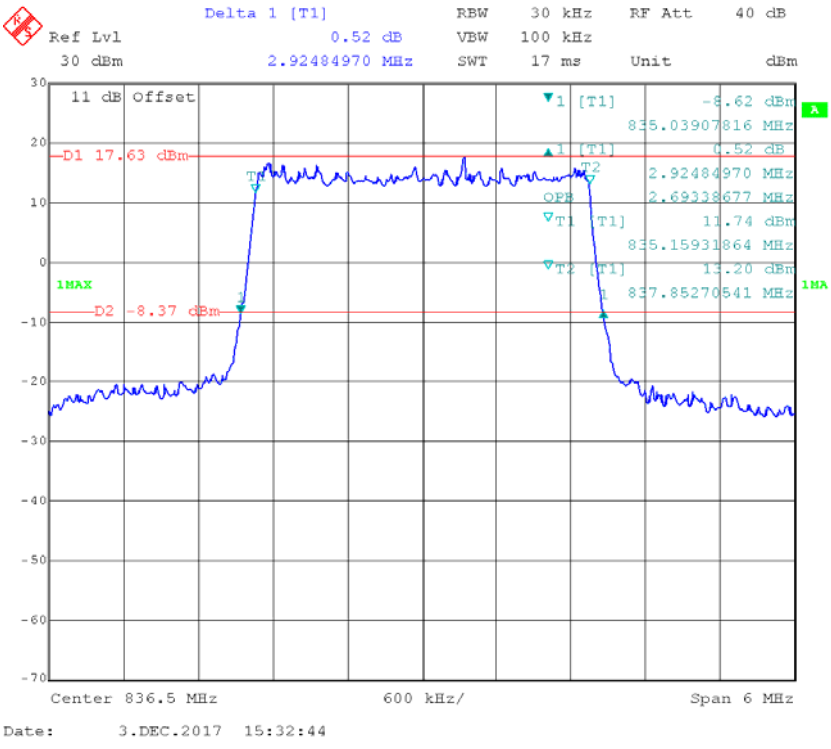


**LTE Band 5:**

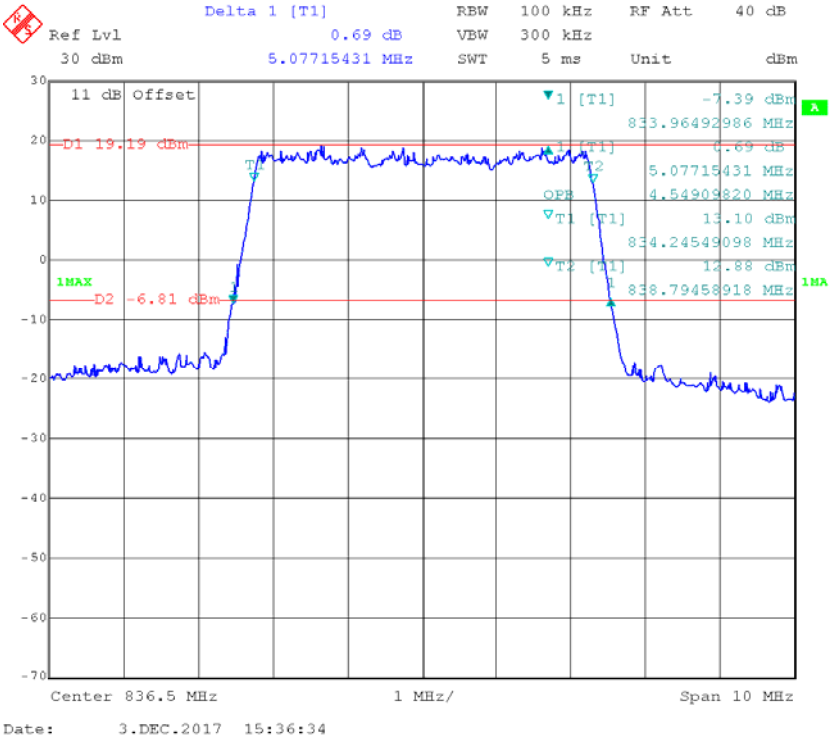
**QPSK_1.4 MHz**



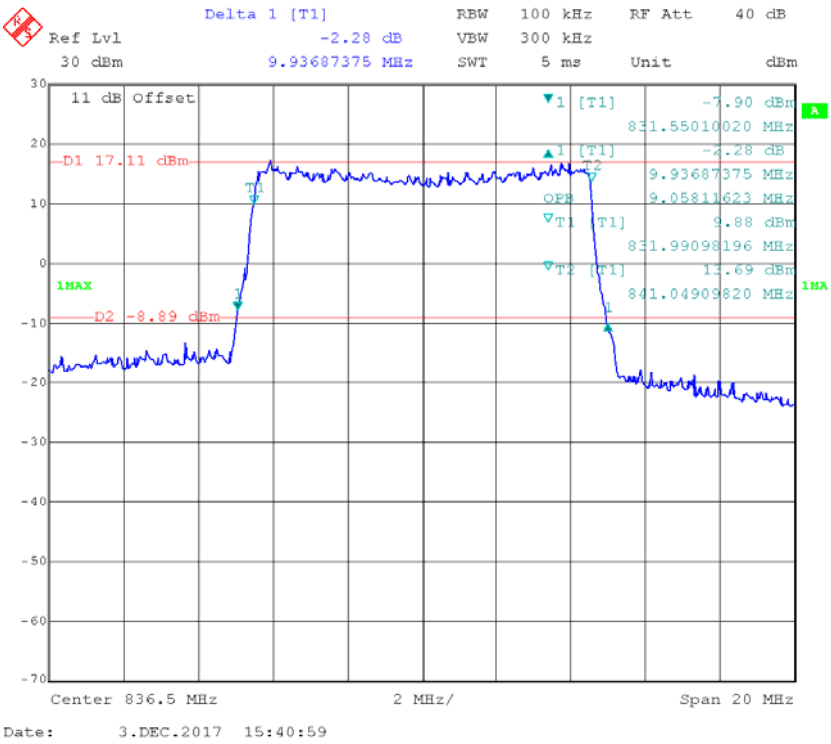

**QPSK_3 MHz**



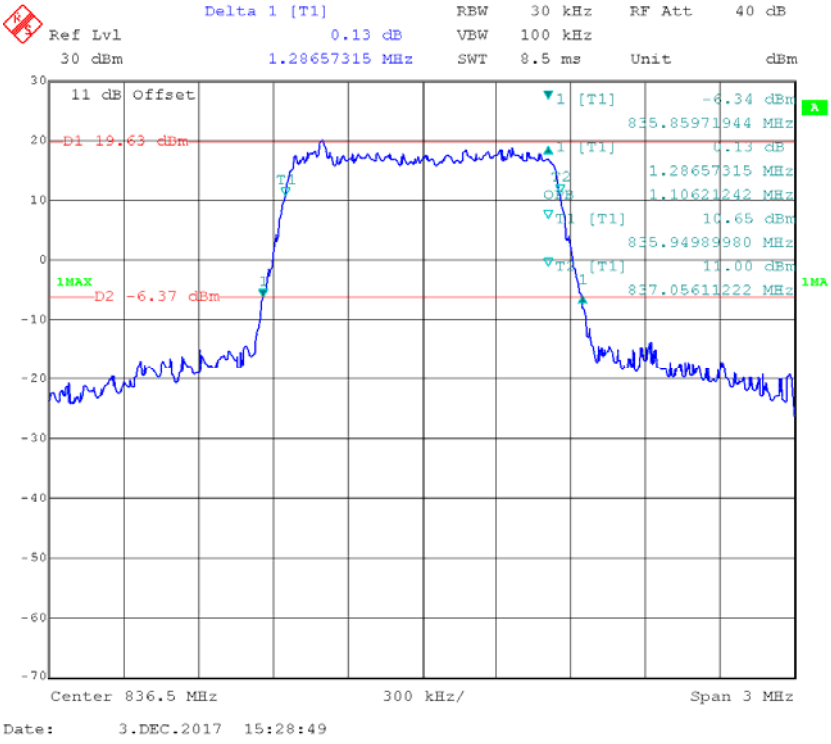
**QPSK_5 MHz**



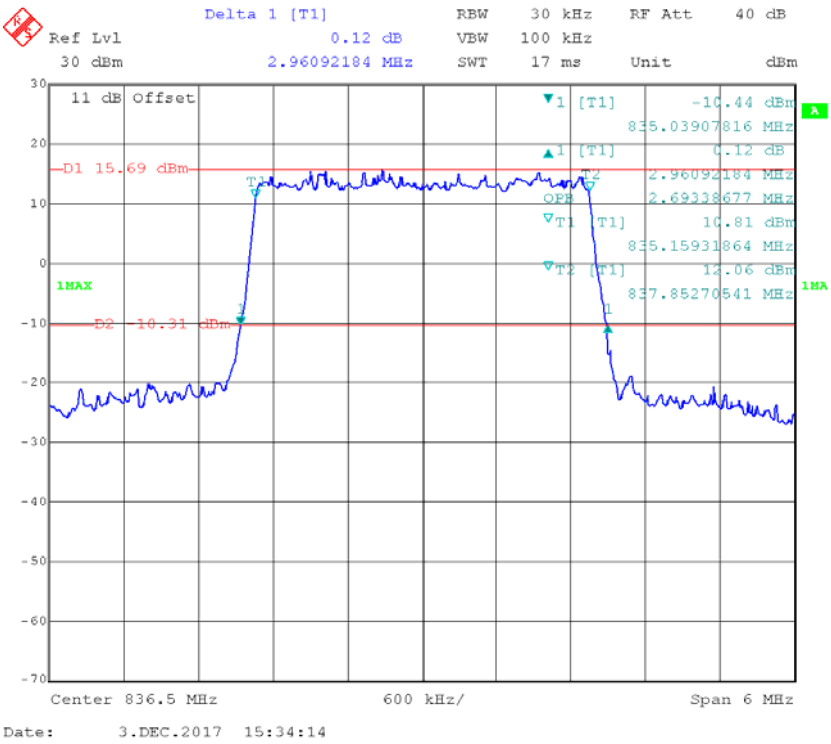

**QPSK_10 MHz**



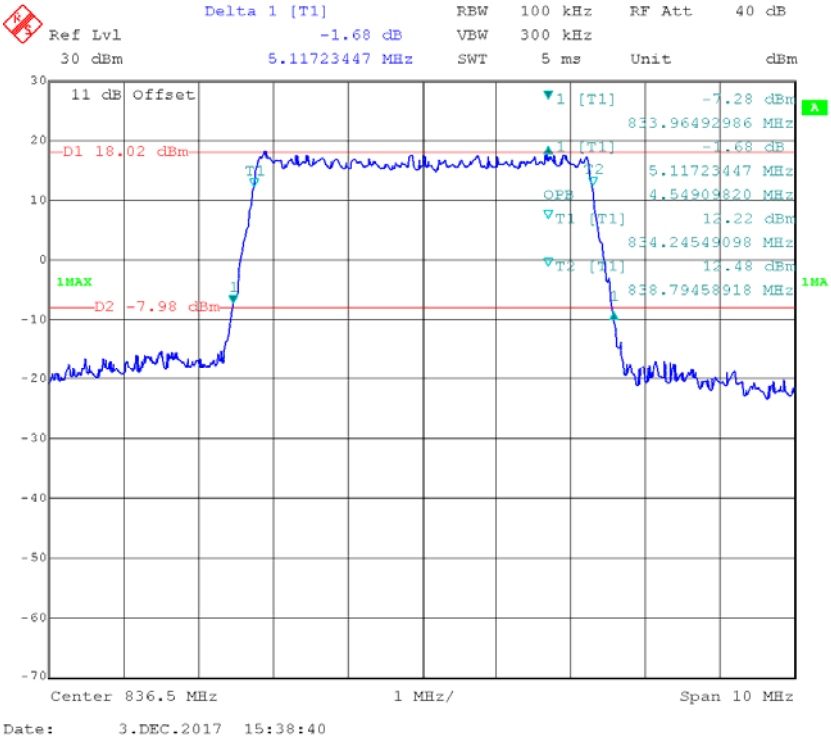
**16QAM_1.4 MHz**



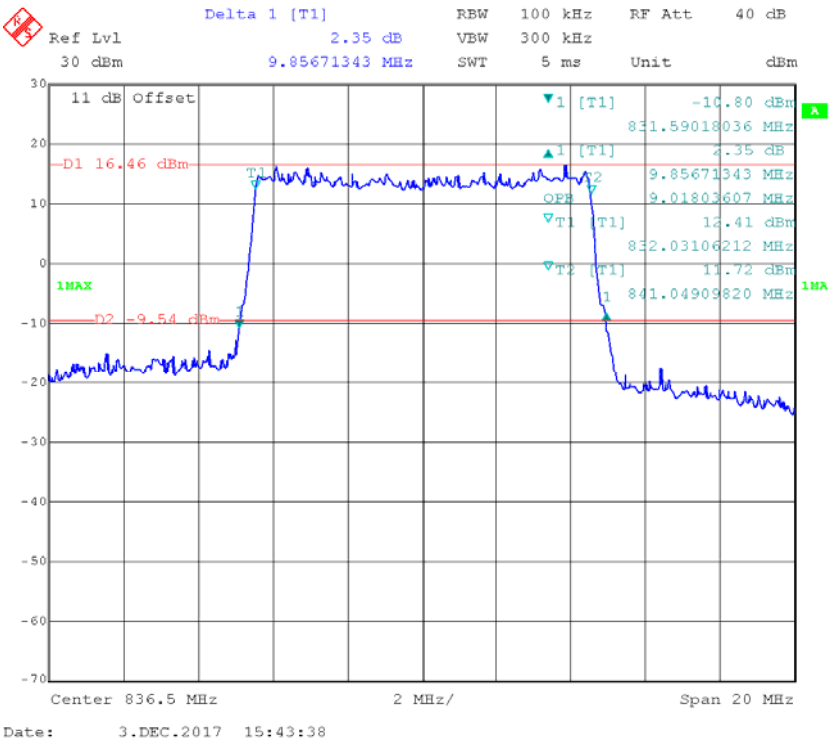

**16QAM_3 MHz**



**16QAM_5 MHz**

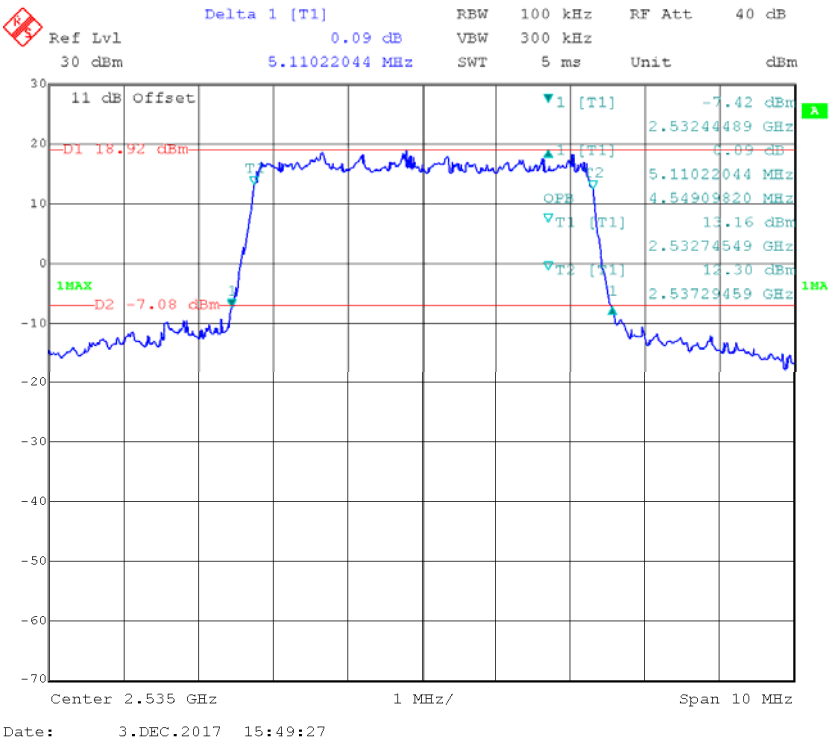



**16QAM_10 MHz**

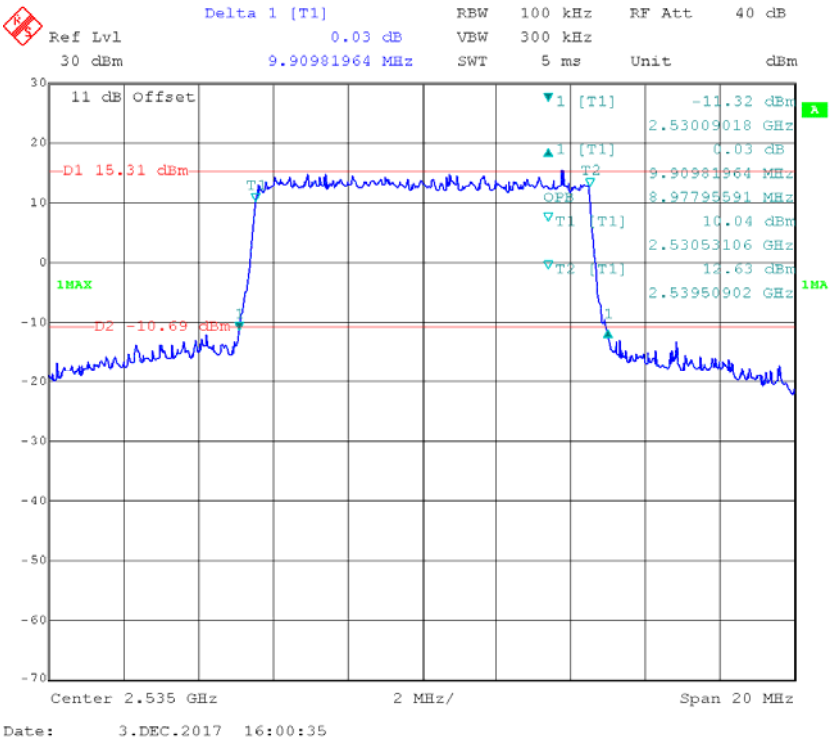


**LTE Band 7:**

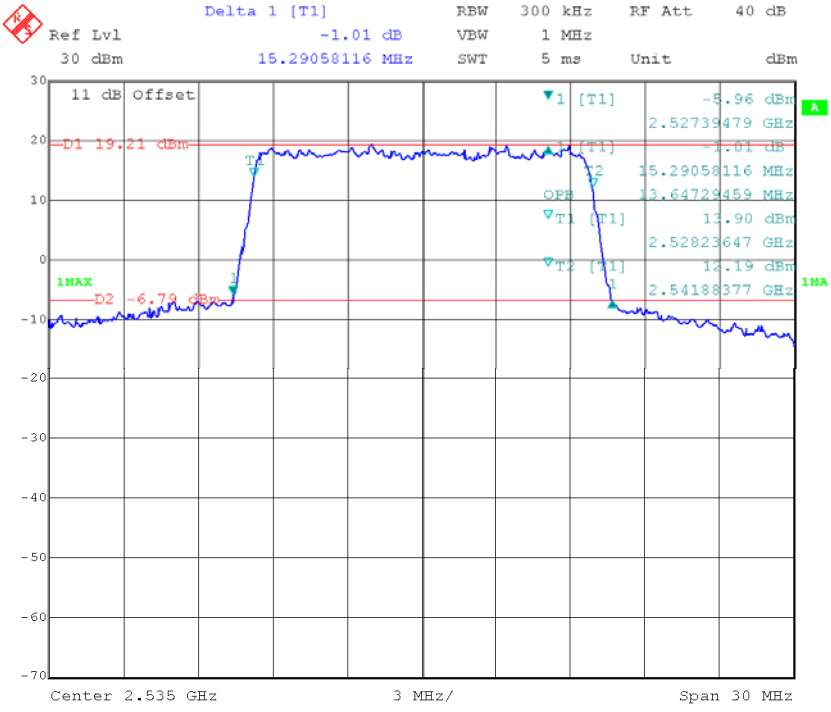
**QPSK_5 MHz**



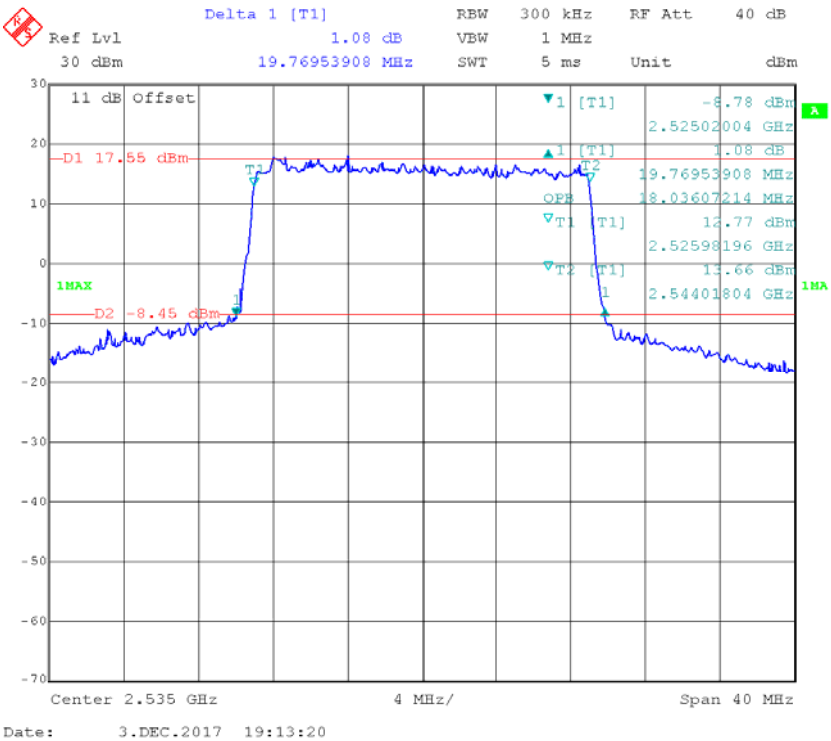

**QPSK_10 MHz**



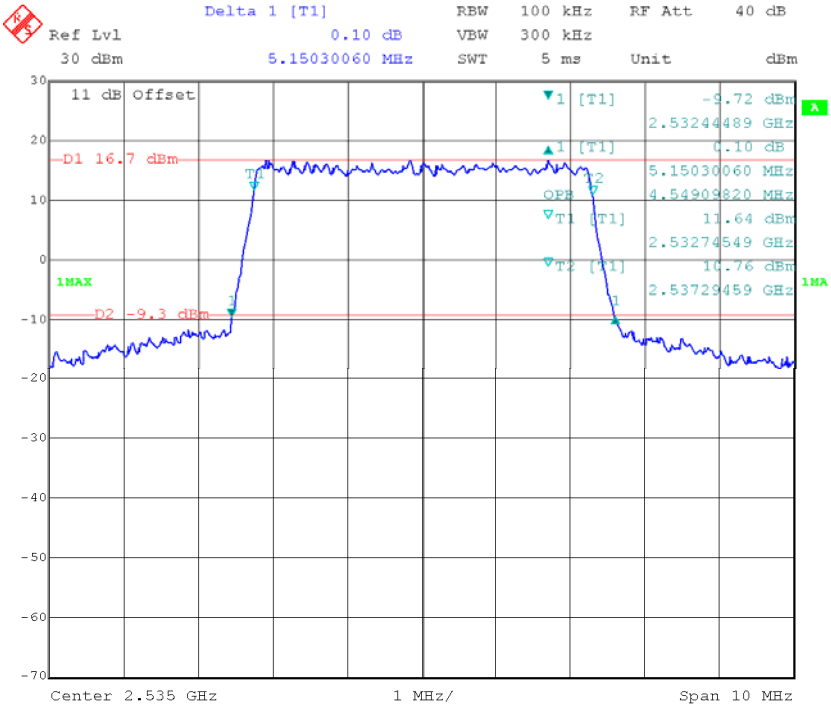
**QPSK_15 MHz**



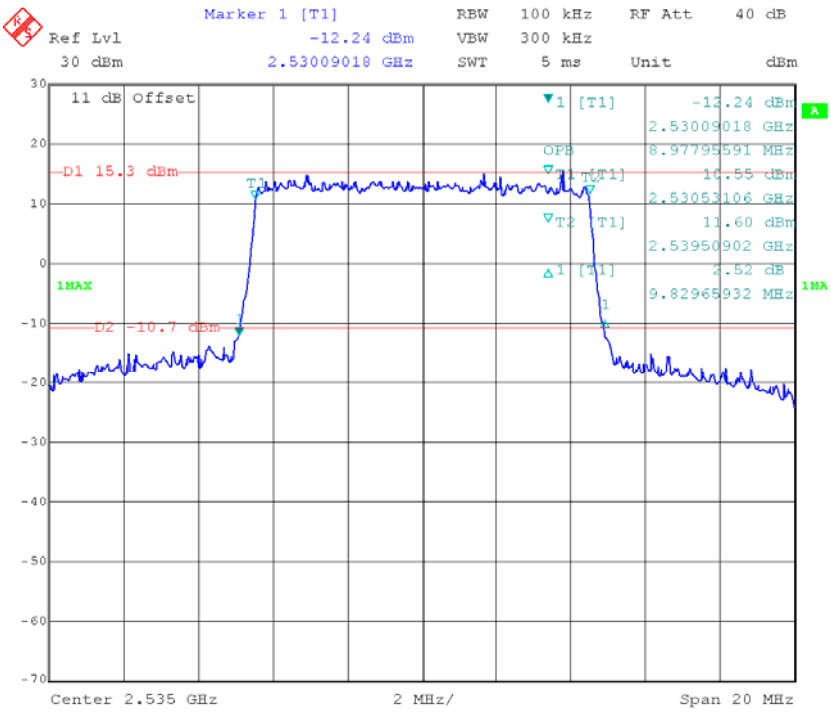

**QPSK_20 MHz**



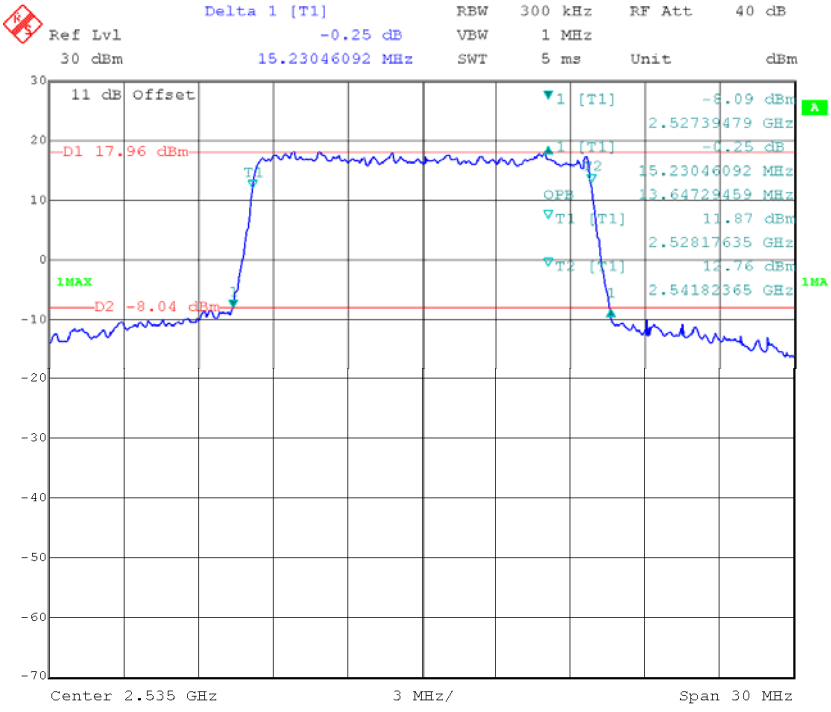
**16QAM_5 MHz**



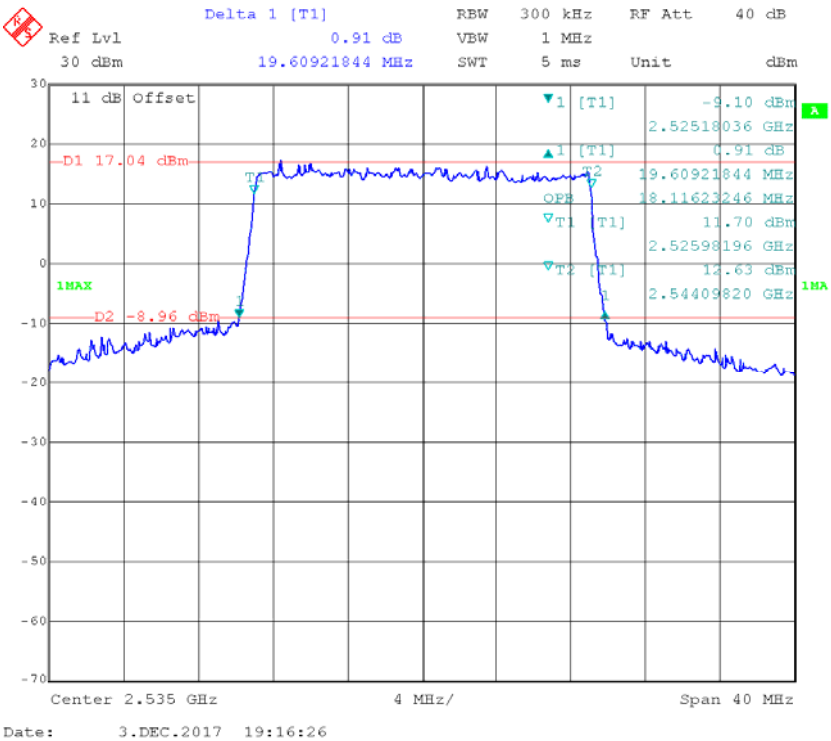

**16QAM_10 MHz**



**16QAM_15 MHz**

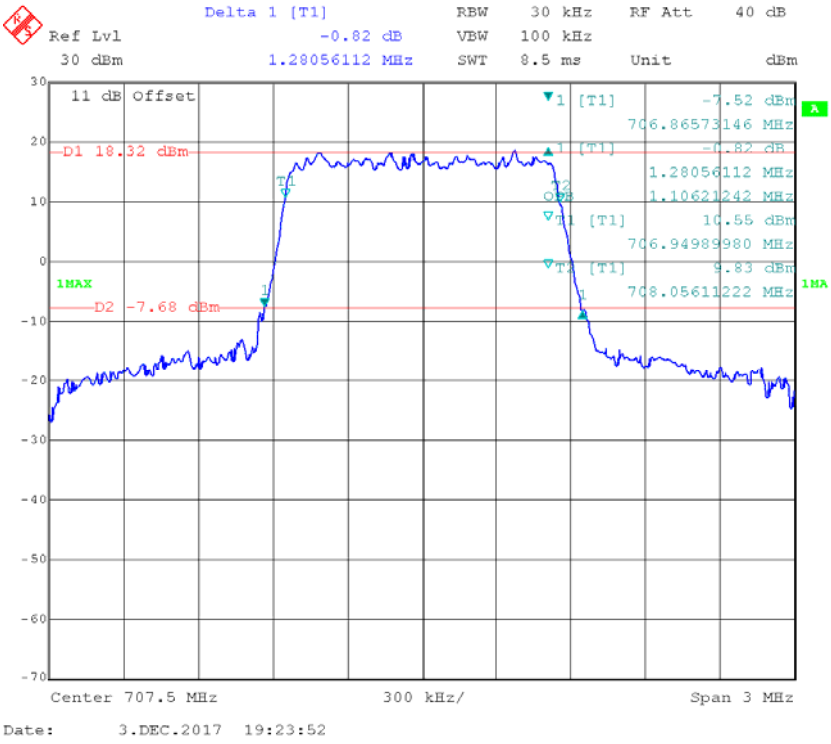



**16QAM_20 MHz**

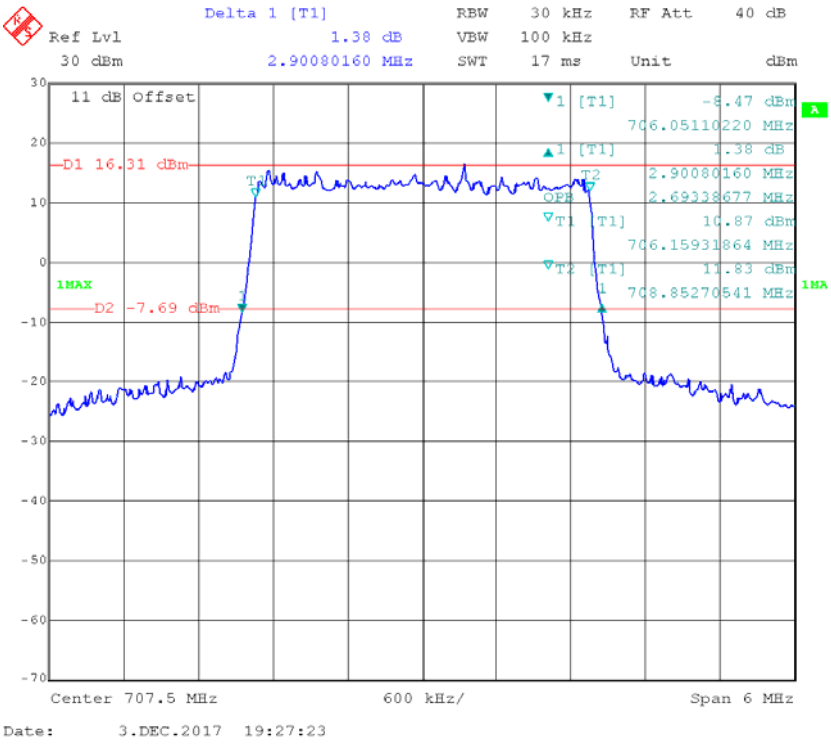


**LTE Band 12:**

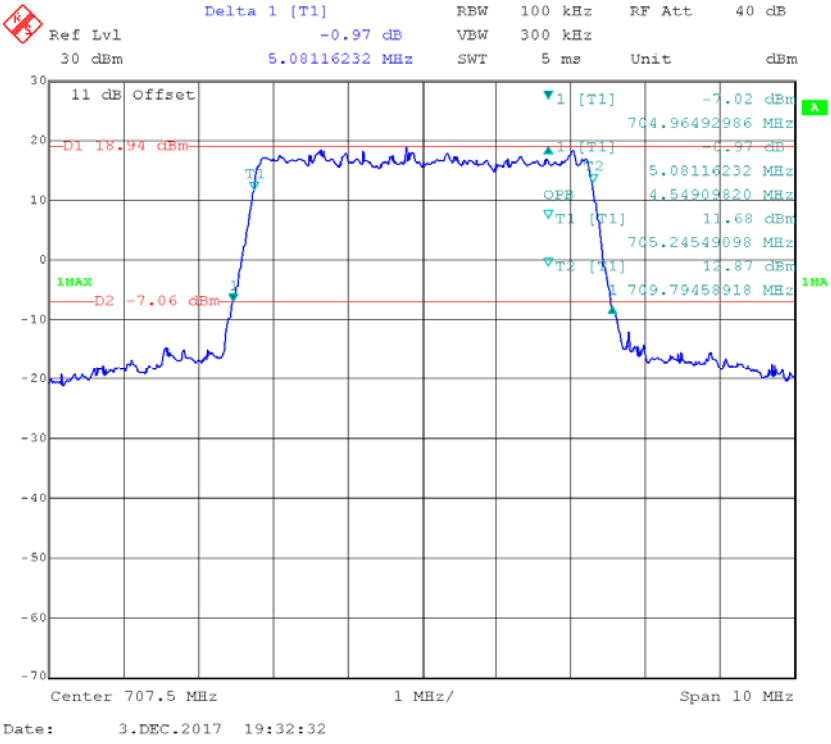
**QPSK_1.4 MHz**



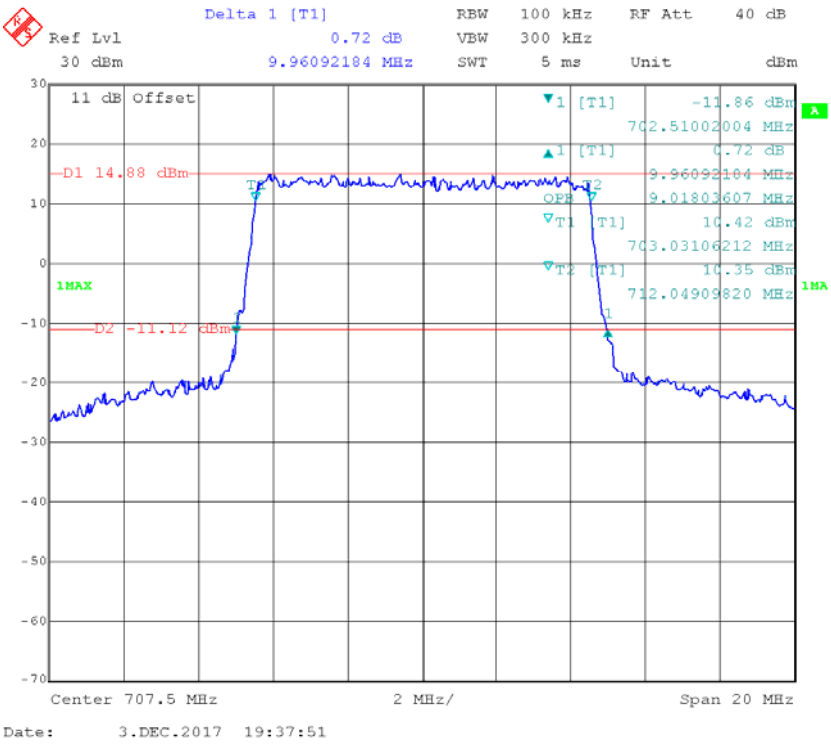

**QPSK_3 MHz**



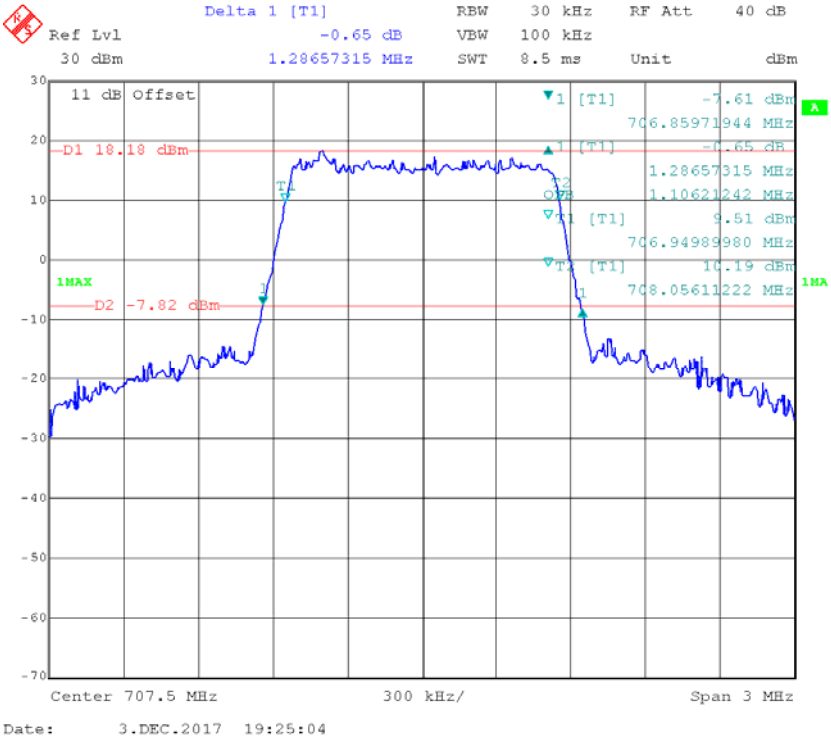
**QPSK_5 MHz**



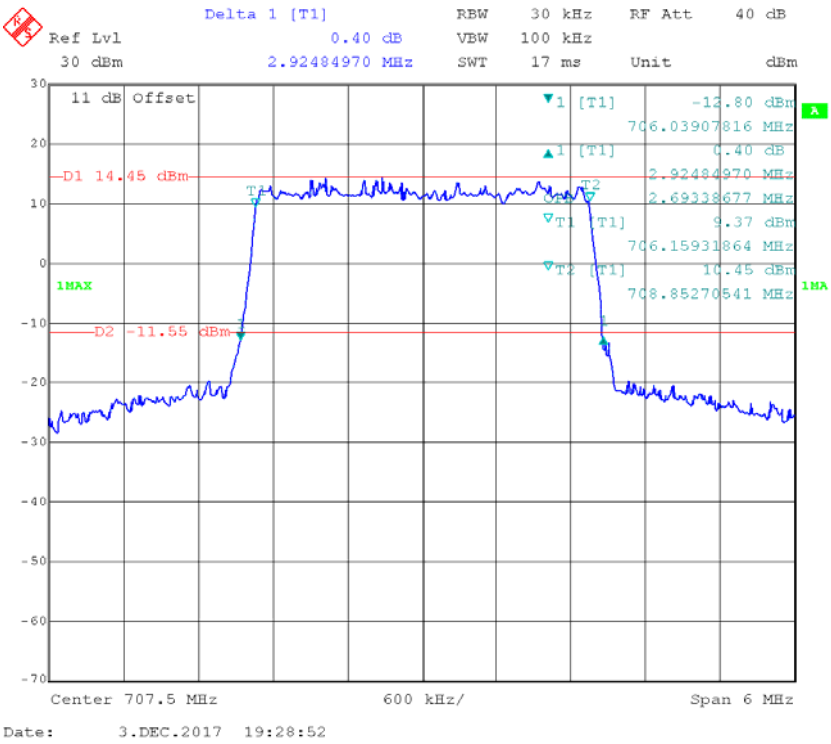

**QPSK_10 MHz**



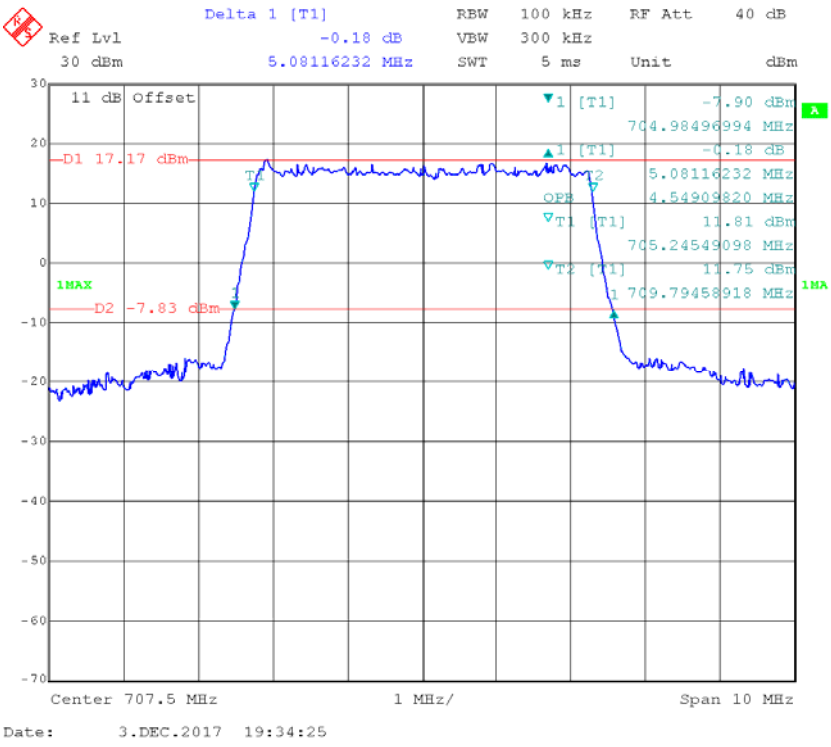
**16QAM_1.4 MHz**



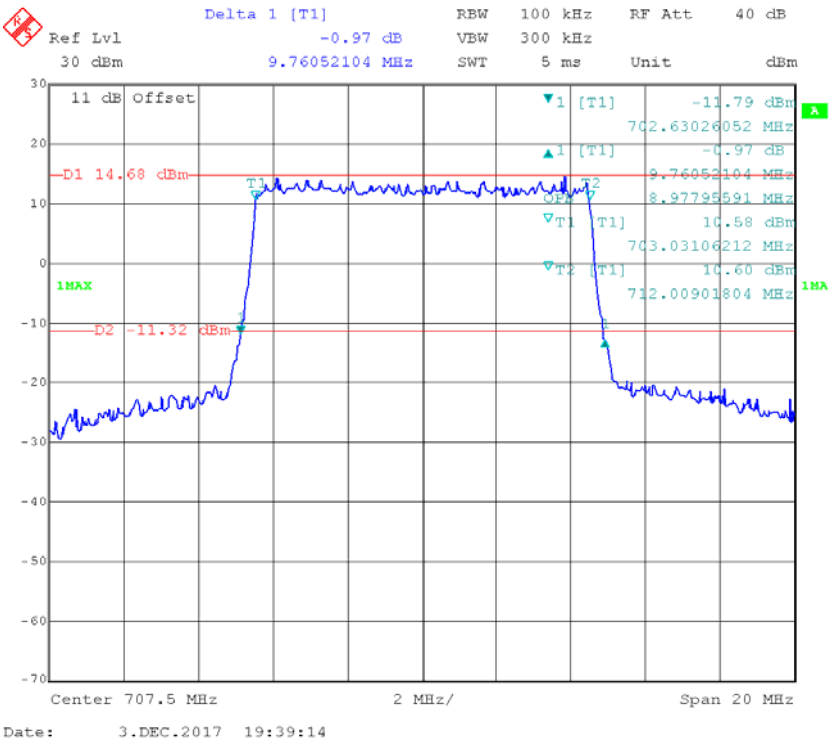

**16QAM_3 MHz**



**16QAM_5 MHz**

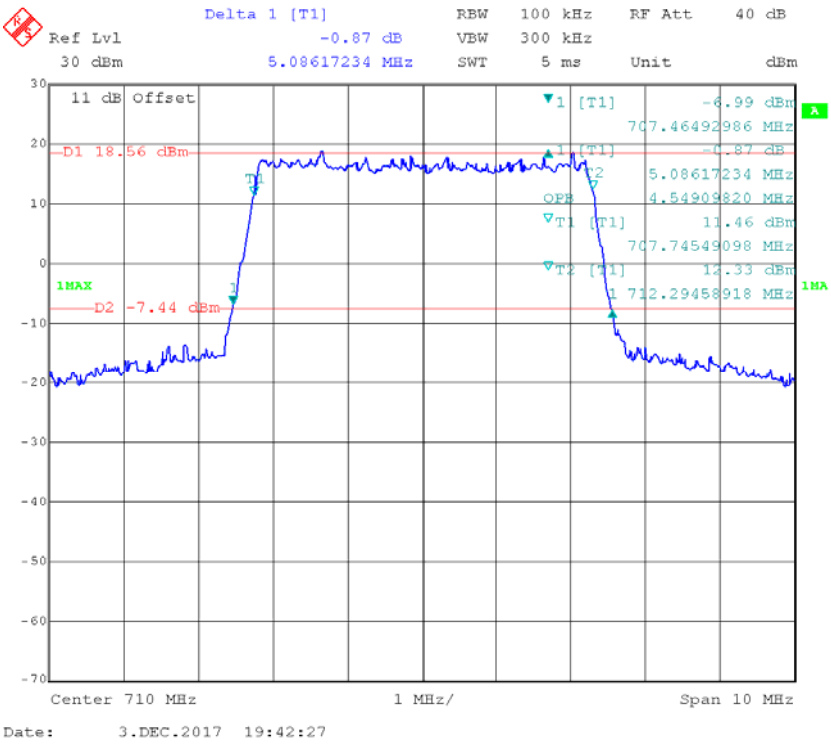



**16QAM_10 MHz**

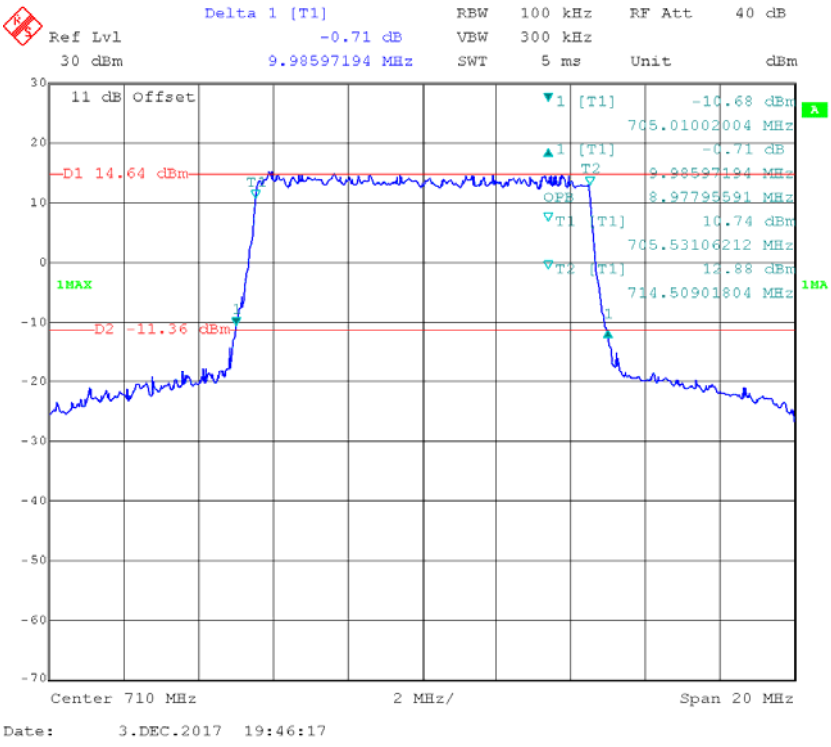


**LTE Band 17:**

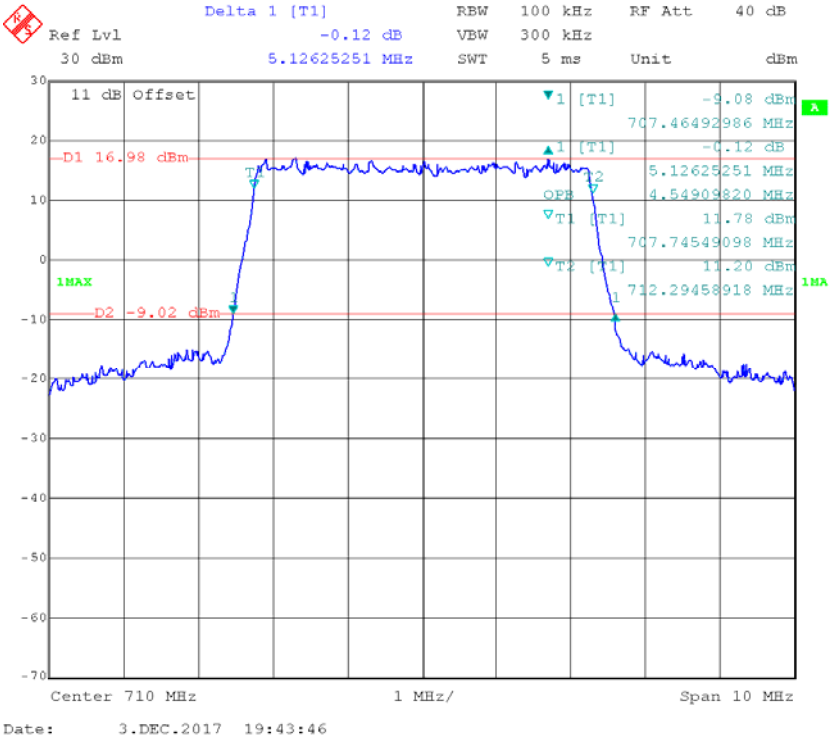
**QPSK_5 MHz**



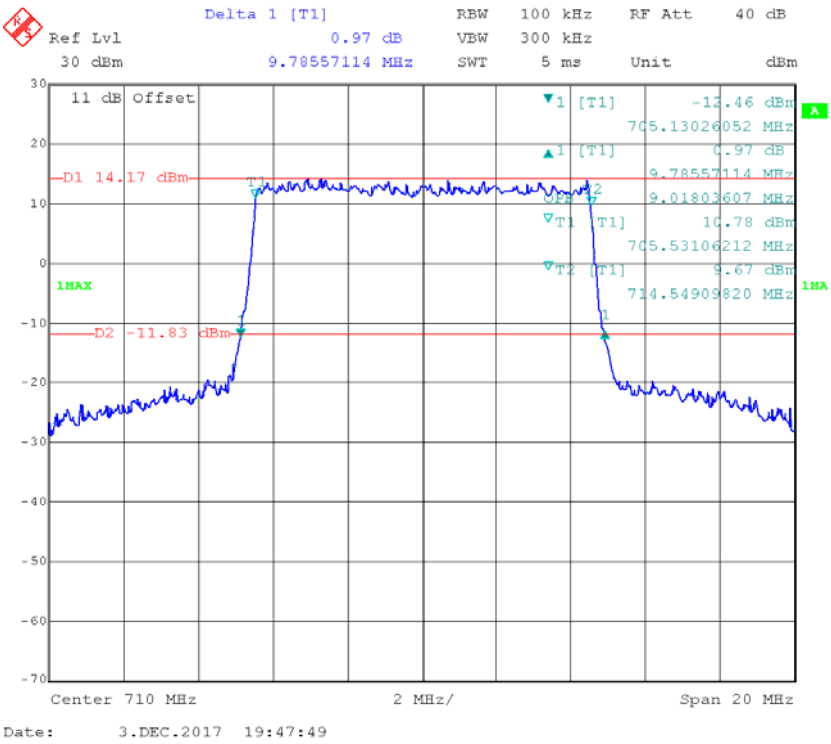

**QPSK_10 MHz**



**16QAM_5 MHz**




**16QAM_10 MHz**



# FCC §2.1051, §22.917(a) & §24.238(a) & §27.53 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

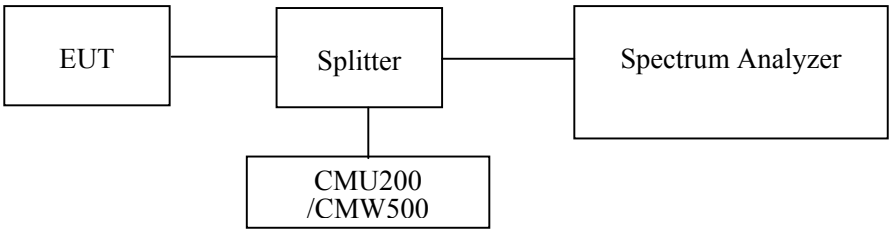
## Applicable Standard

FCC §2.1051, §22.917(a) , §24.238(a) and §27.53.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

## Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | Universal Radio Communication Tester | CMU200 | 109 038 | 2017-07-18 | 2018-07-18 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 | 2017-08-31 | 2018-08-31 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |
| Pasternack | RF Coaxial Cable | 0.5m | C-5 | Each Time | / |
| Unknown | RF Attenuator | 10dB | 10dB-1 | Each Time | / |
| E-Microwave | Two-way Spliter | ODP-1-6-2S | OE0120142 | Each Time | / |
| R&S | Spectrum Analyzer | FSIQ 26 | 831929/005 | 2017-08-31 | 2018-08-31 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

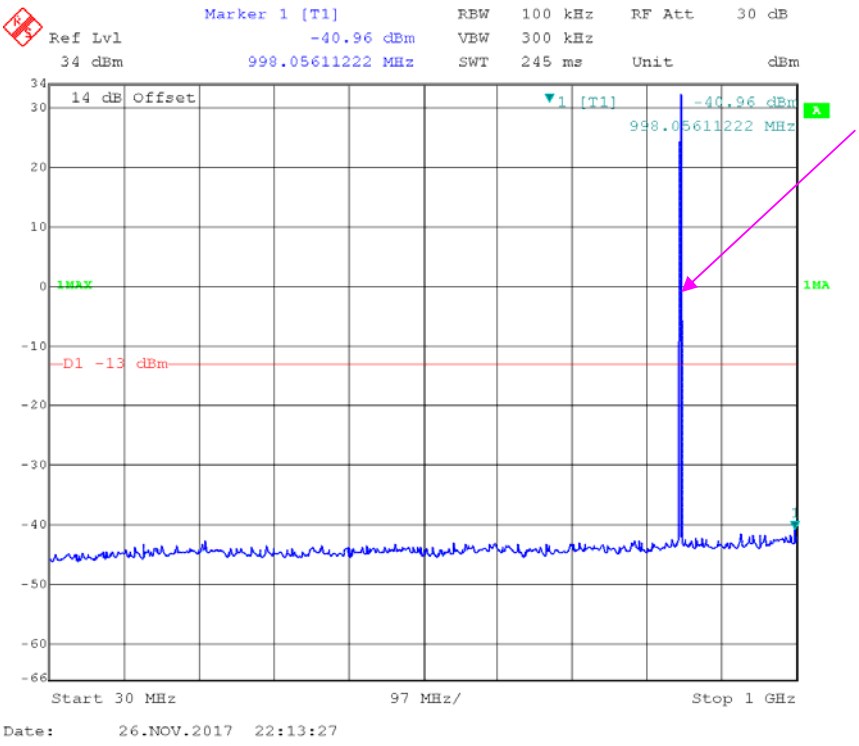
### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 23.5~24.6°C |
| **Relative Humidity:** | 42~50 % |
| **ATM Pressure:** | 101.4 kPa |

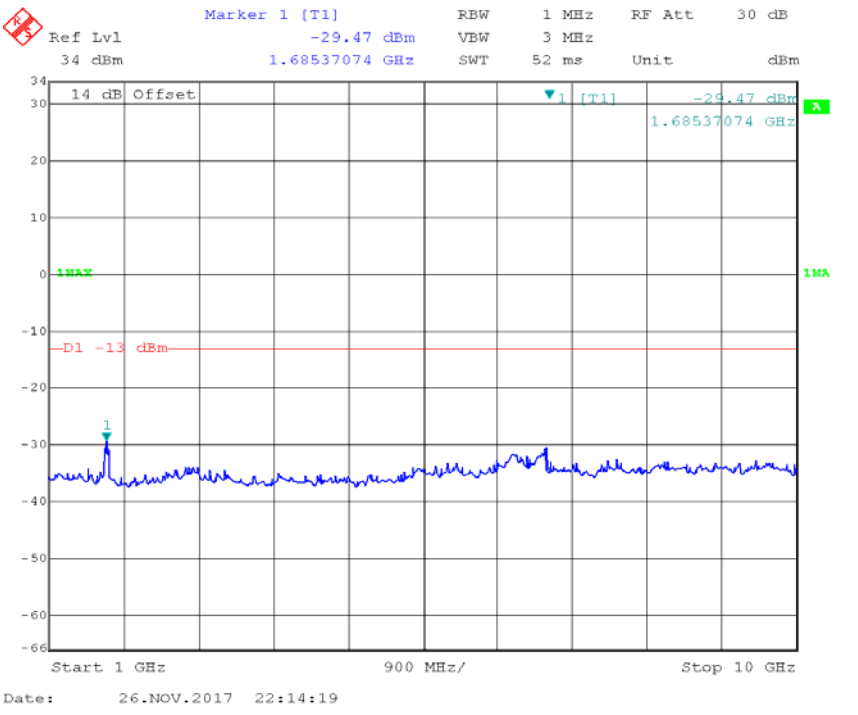
*The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-03.*

Please refer to the following plots.

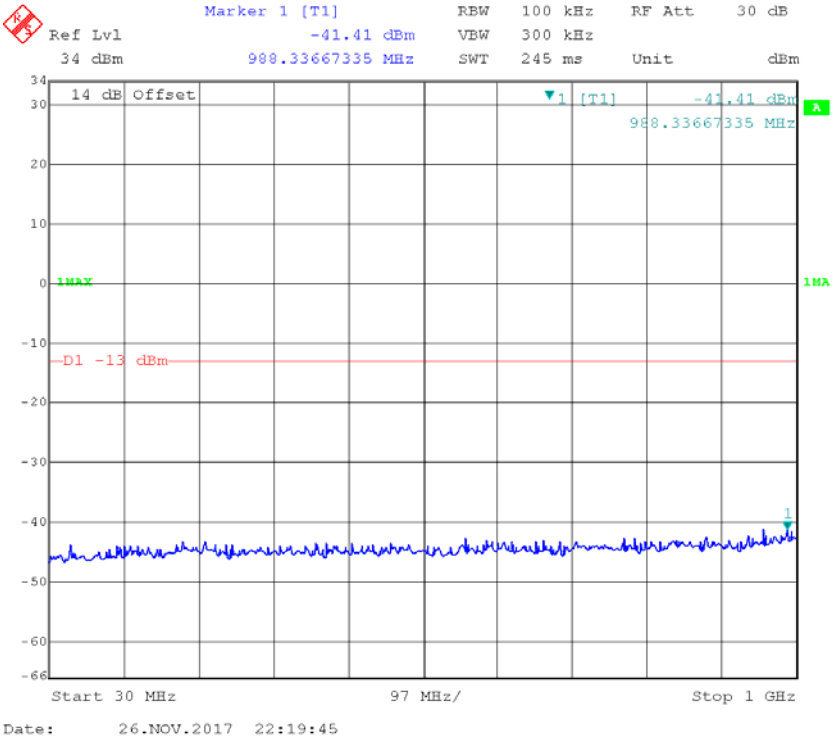
**GSM850_Middle Channel**

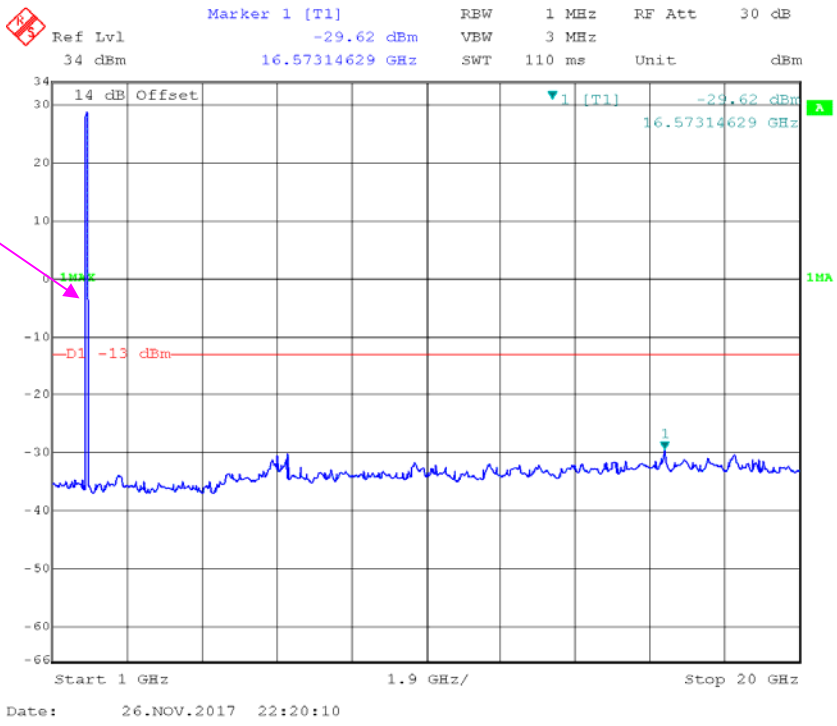



Fundamental



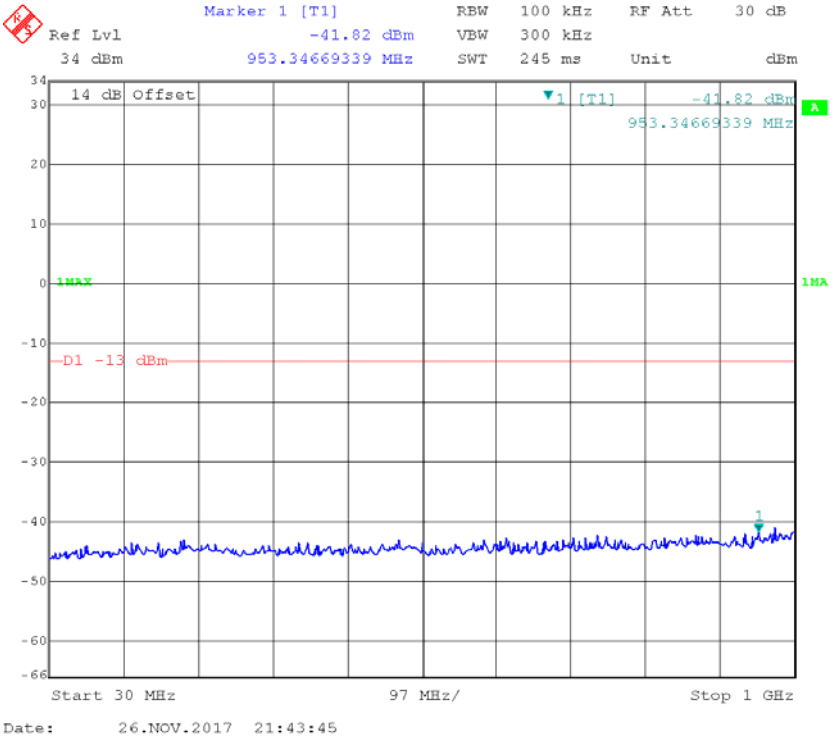
**PCS 1900_ Middle Channel**

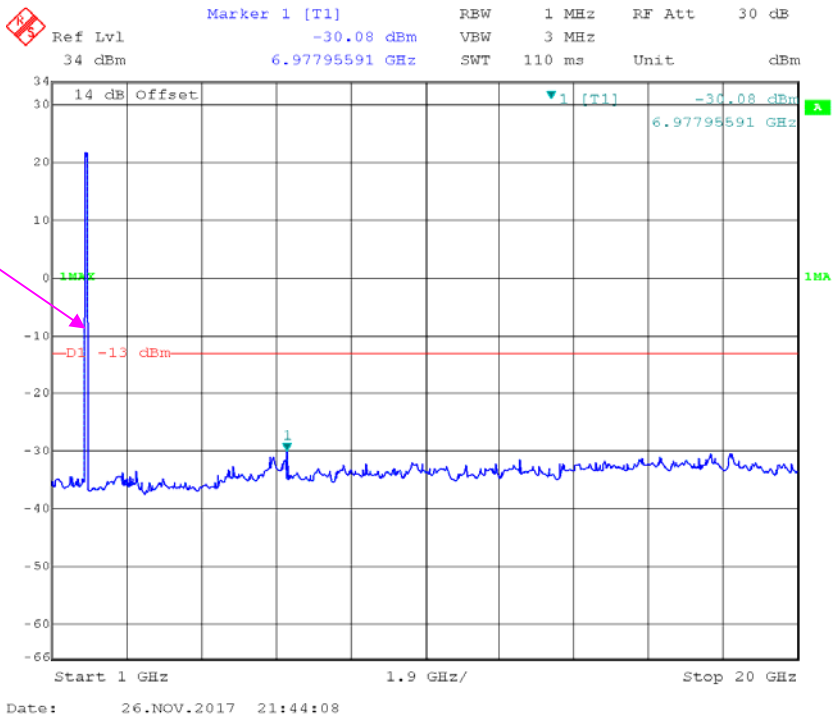



Fundamental

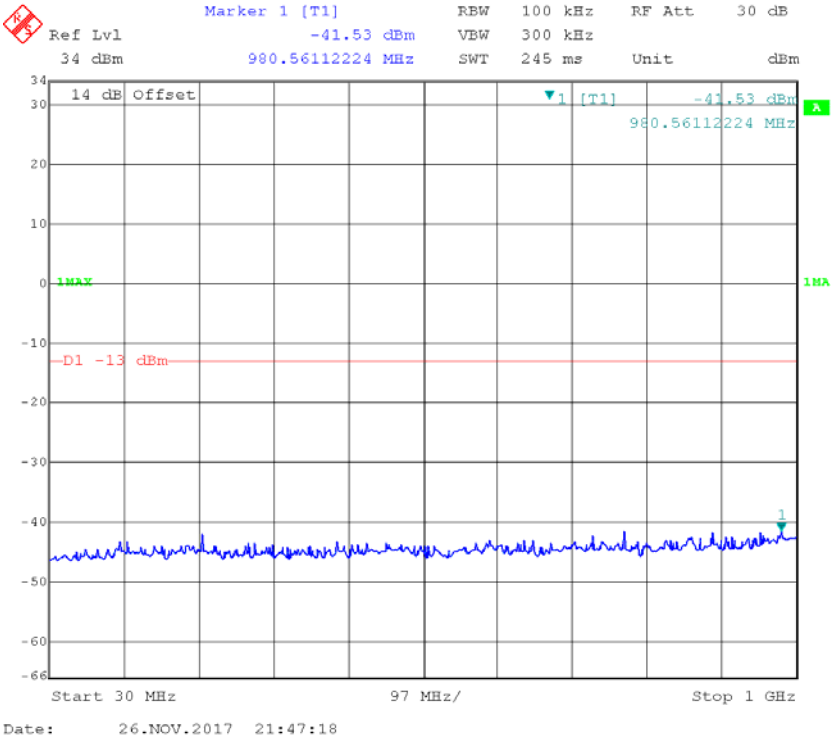
**WCDMA Band II,Rel99**

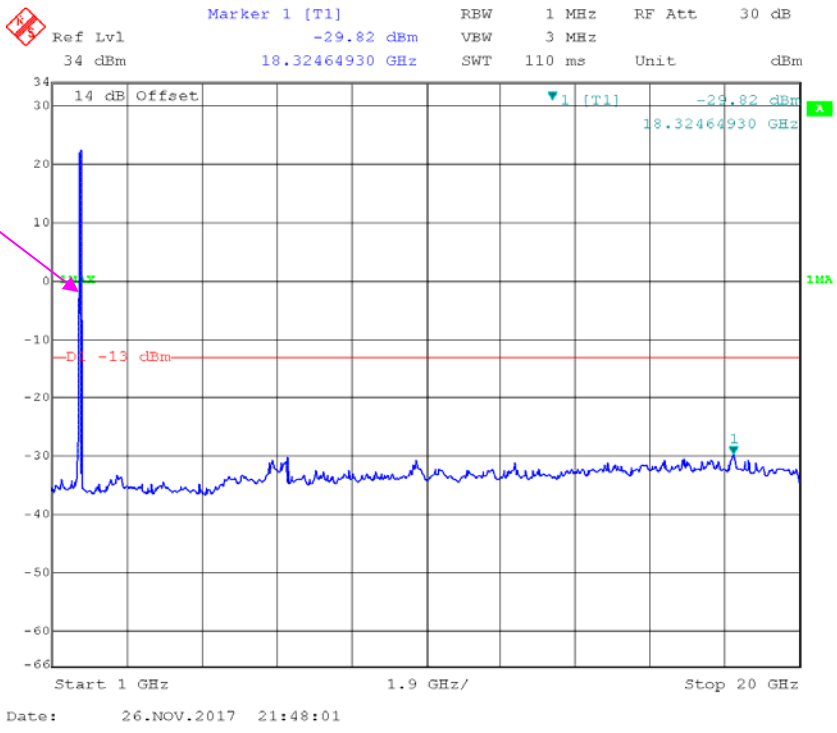



Fundamental

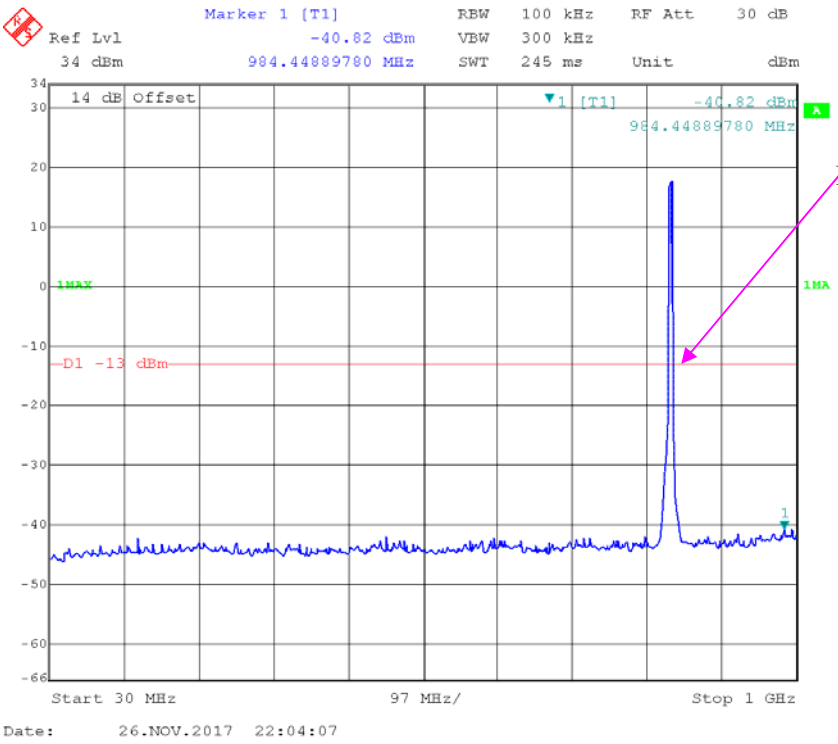
**WCDMA Band IV,Rel99**

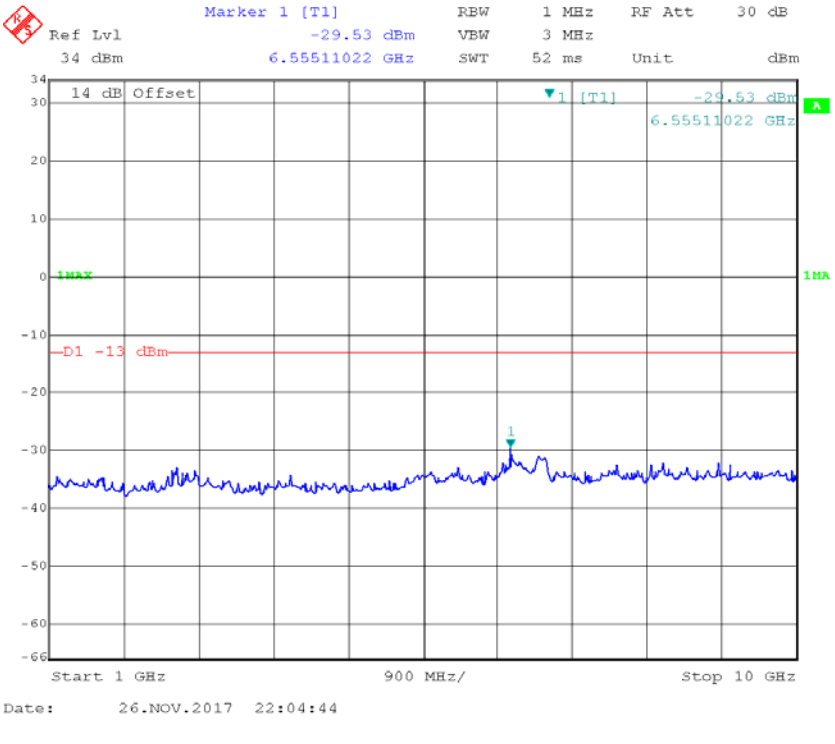



Fundamental

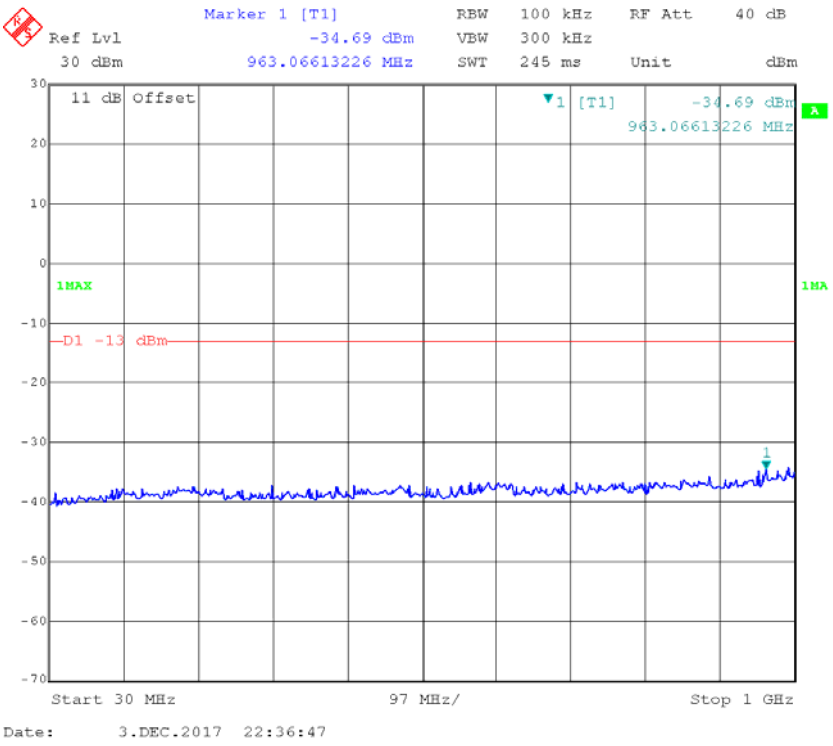
**WCDMA Band V,Rel99**

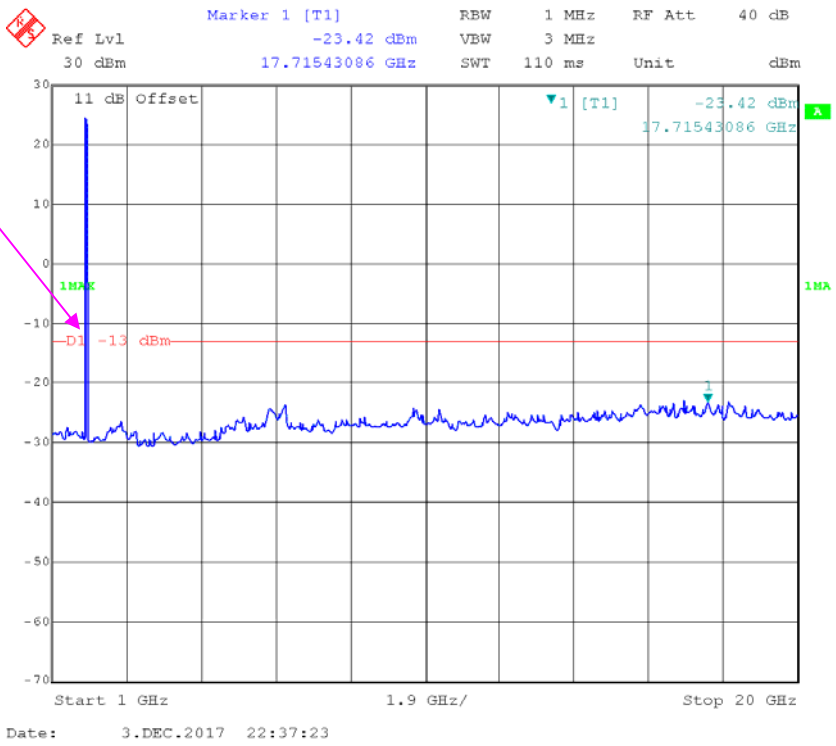


**LTE Band 2 (Middle Channel)**

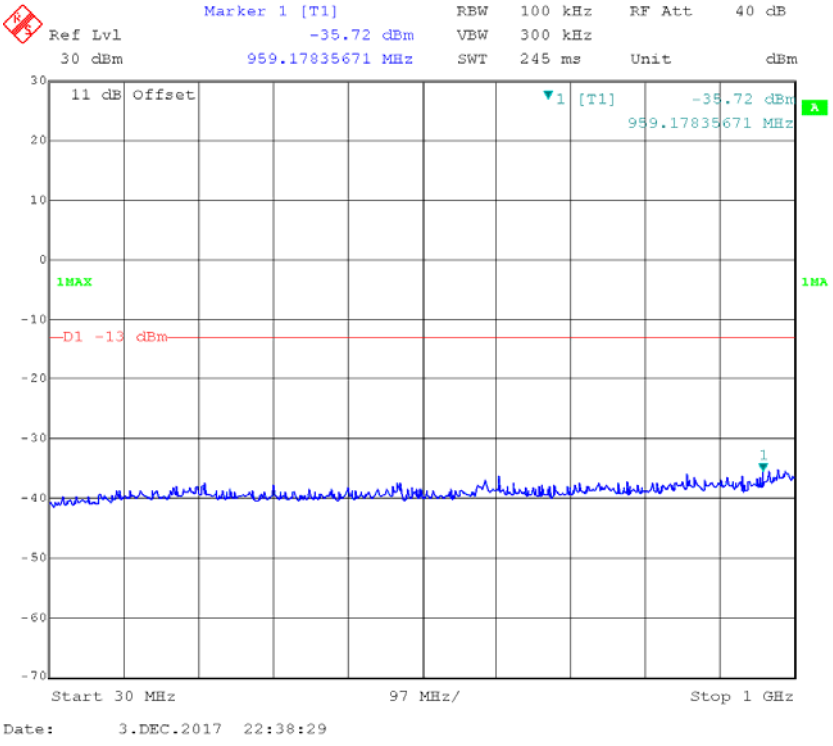
**QPSK_1.4 MHz**

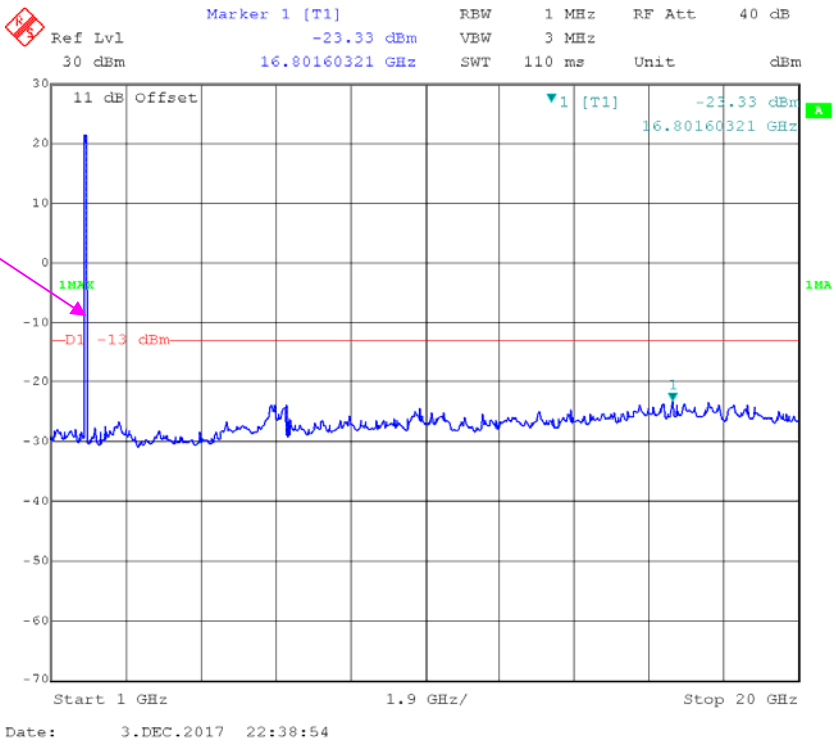



Fundamental

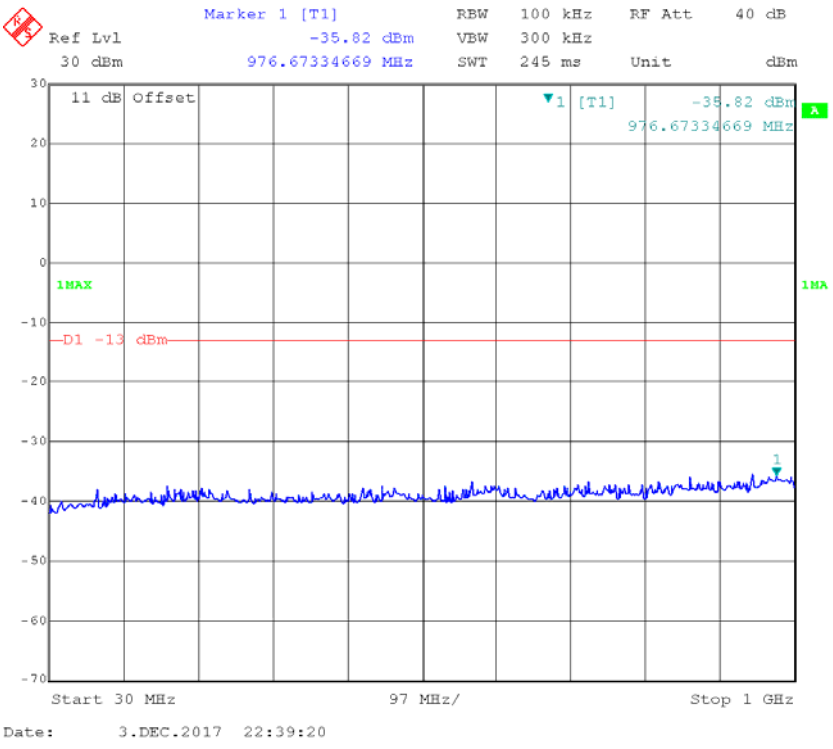
**QPSK_3 MHz**

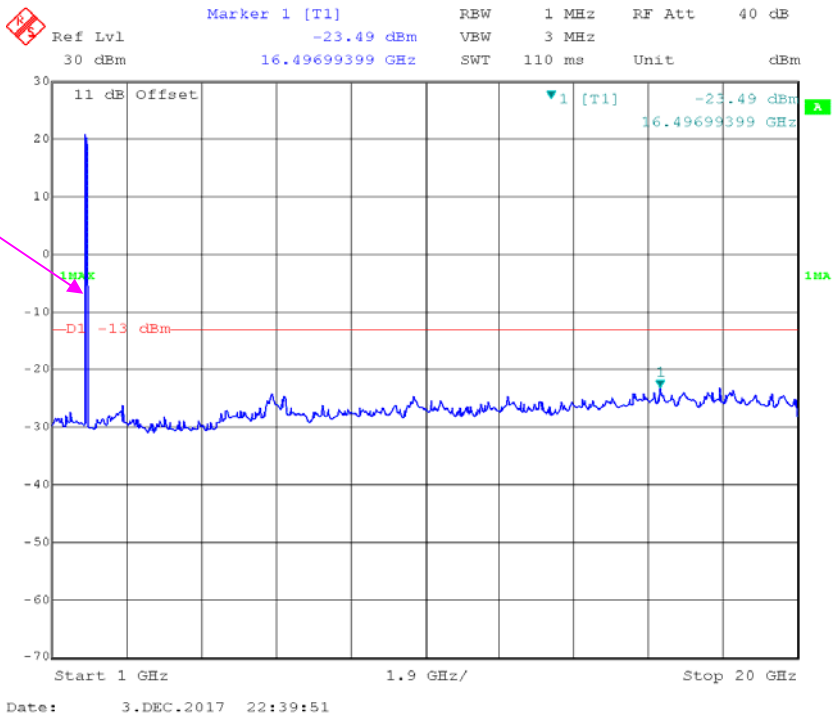



Fundamental

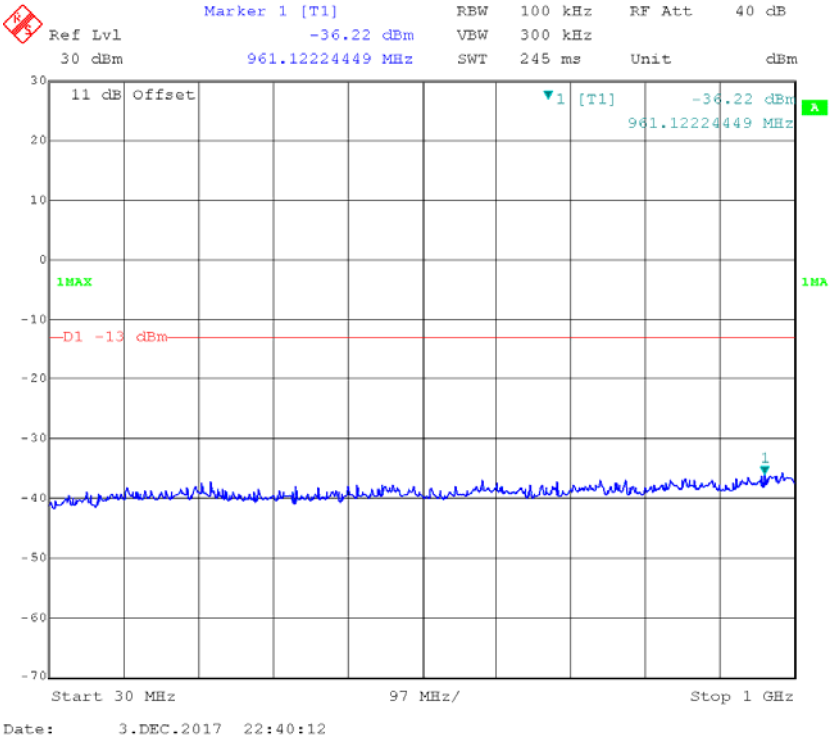
**QPSK_5 MHz**

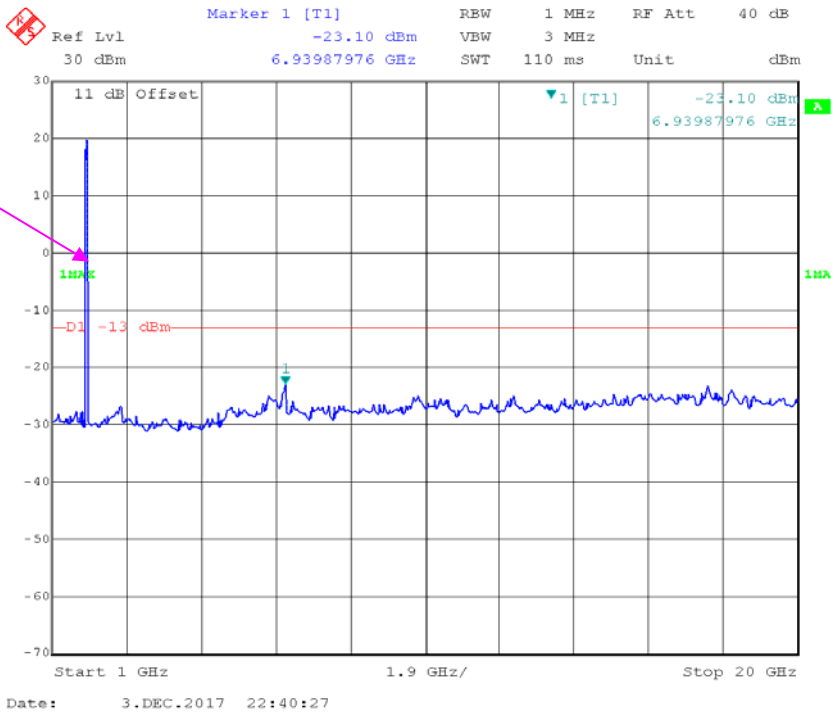



Fundamental

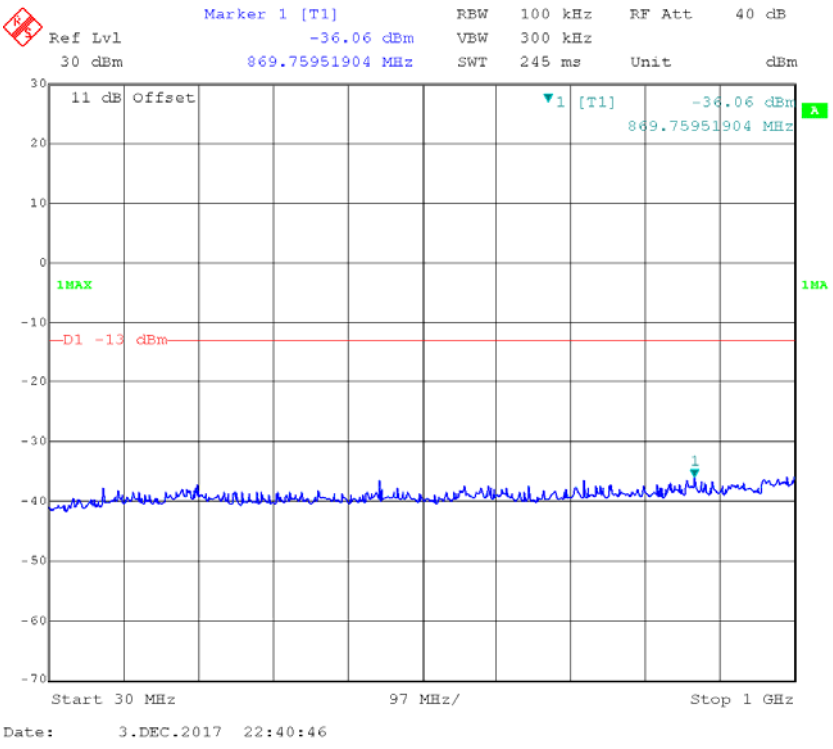
**QPSK_10 MHz**

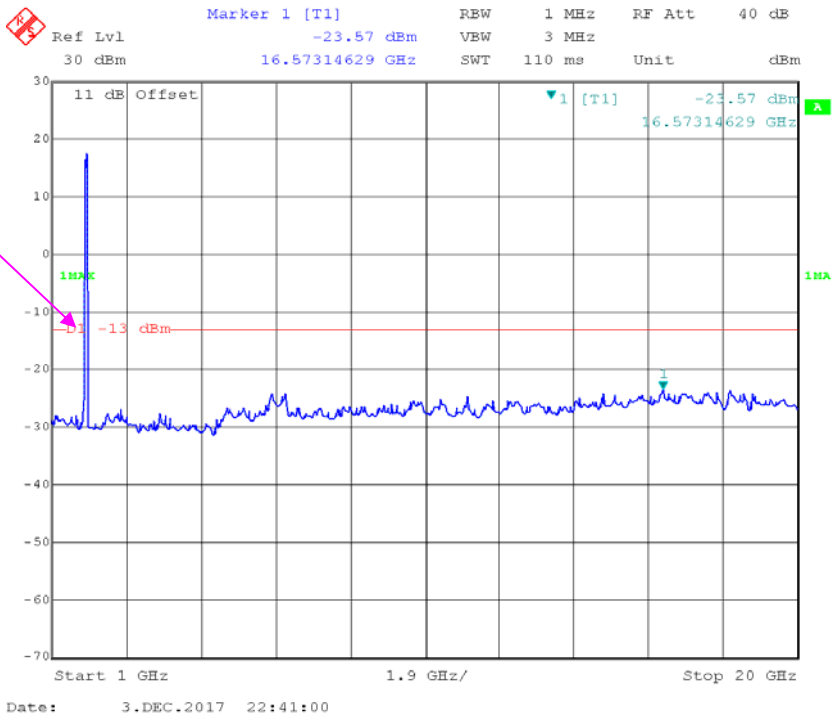



Fundamental

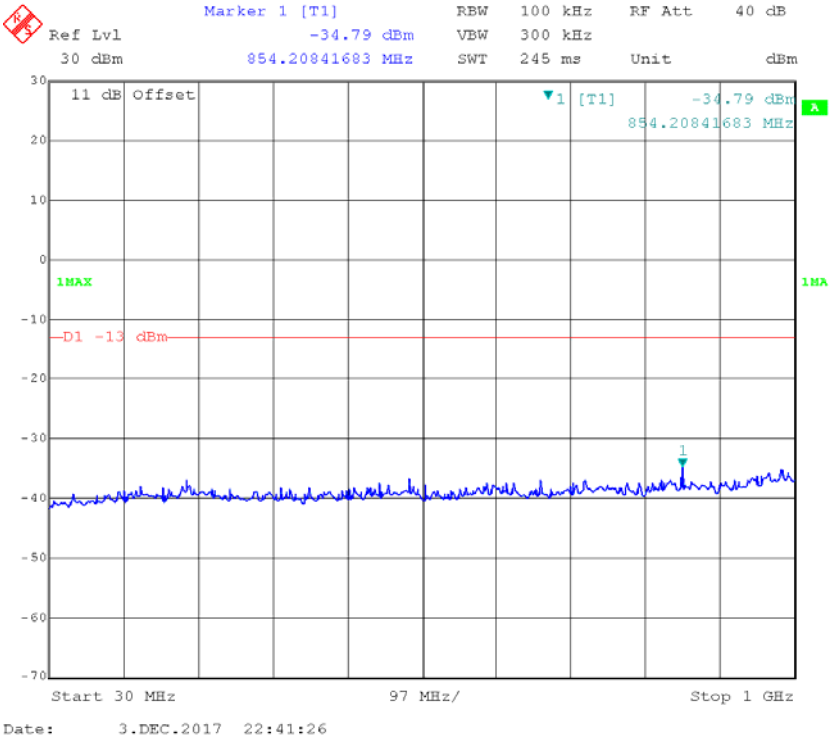
**QPSK_15 MHz**

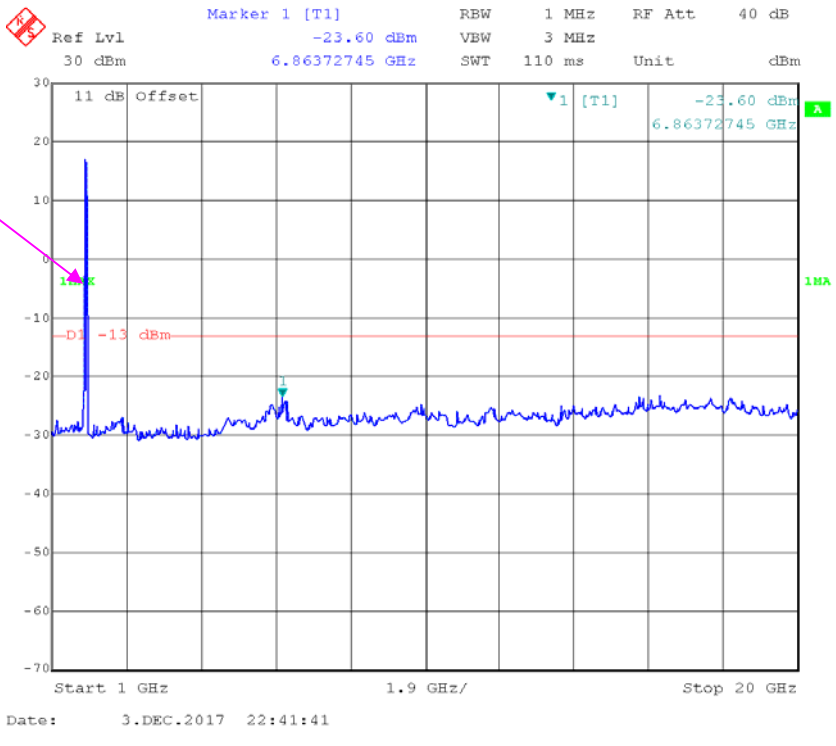



Fundamental

**QPSK_20 MHz**

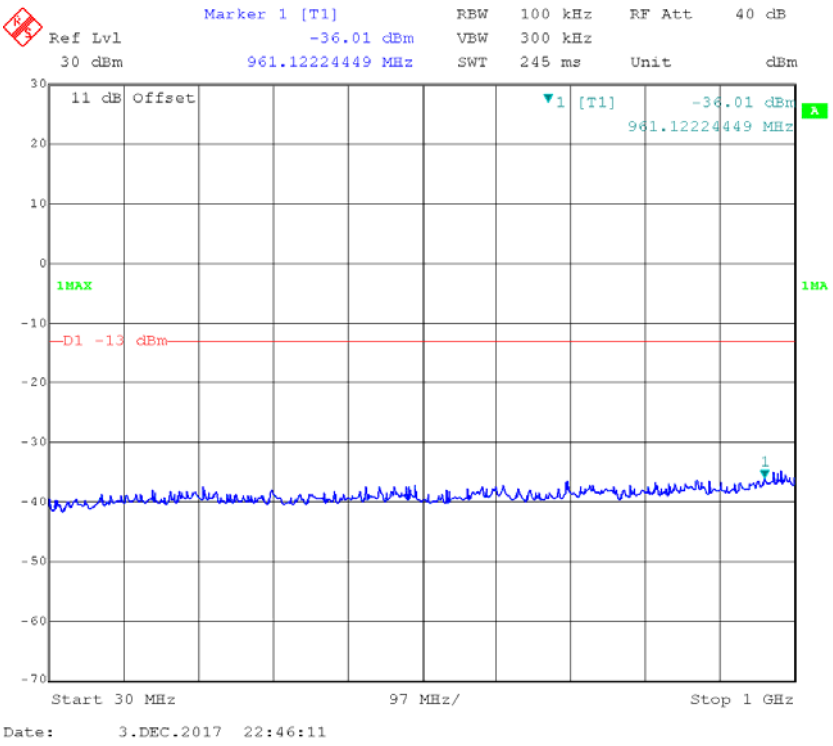


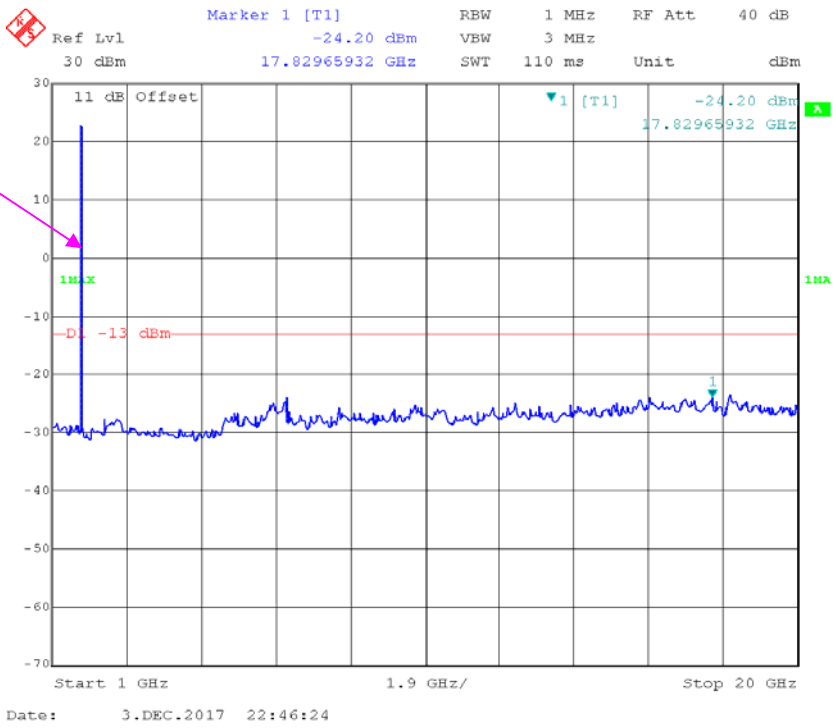




Fundamental

**LTE Band 4 (Middle Channel)**

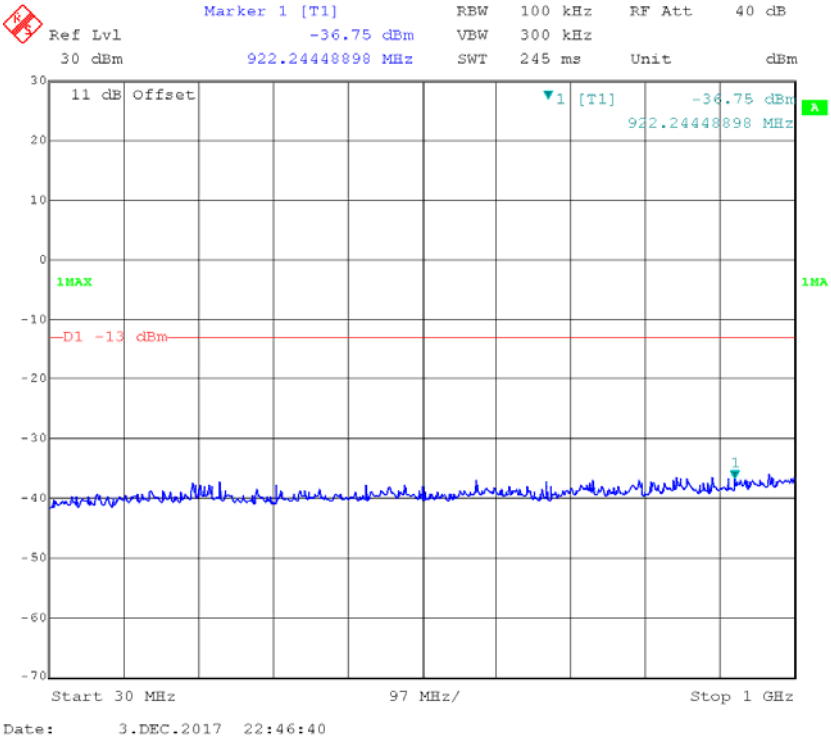
**QPSK_1.4 MHz**

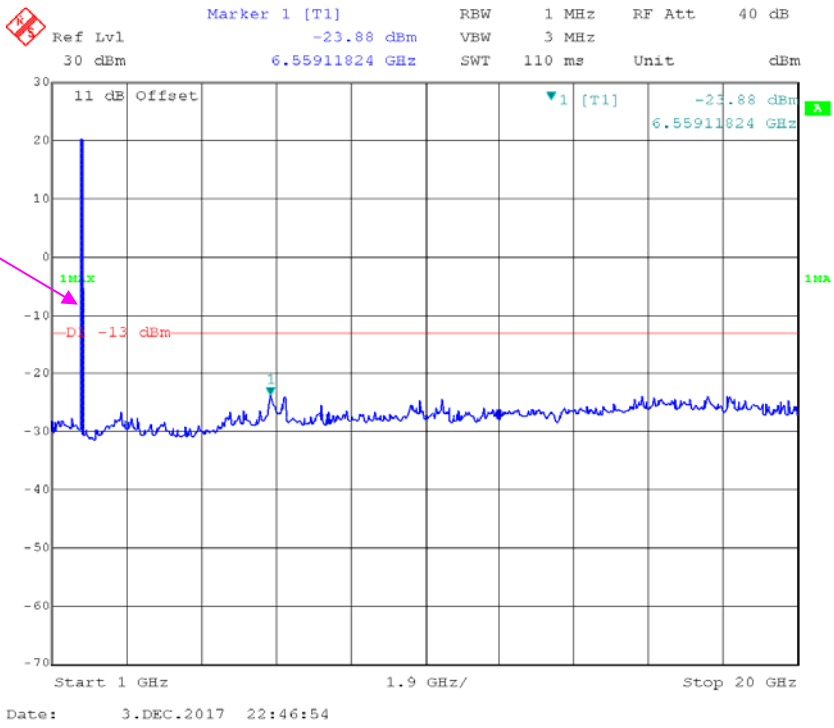



Fundamental

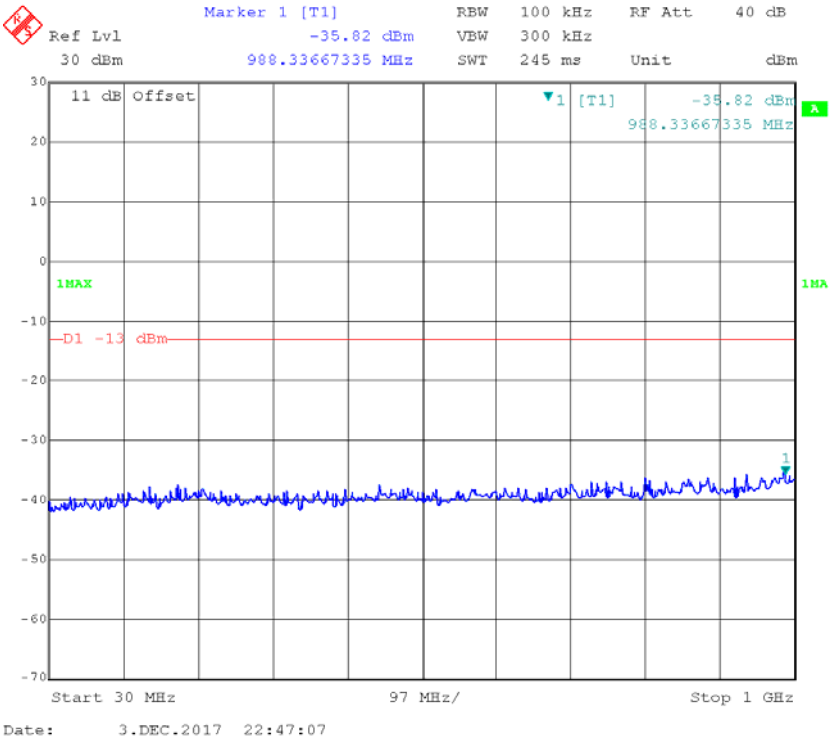
**QPSK_3 MHz**

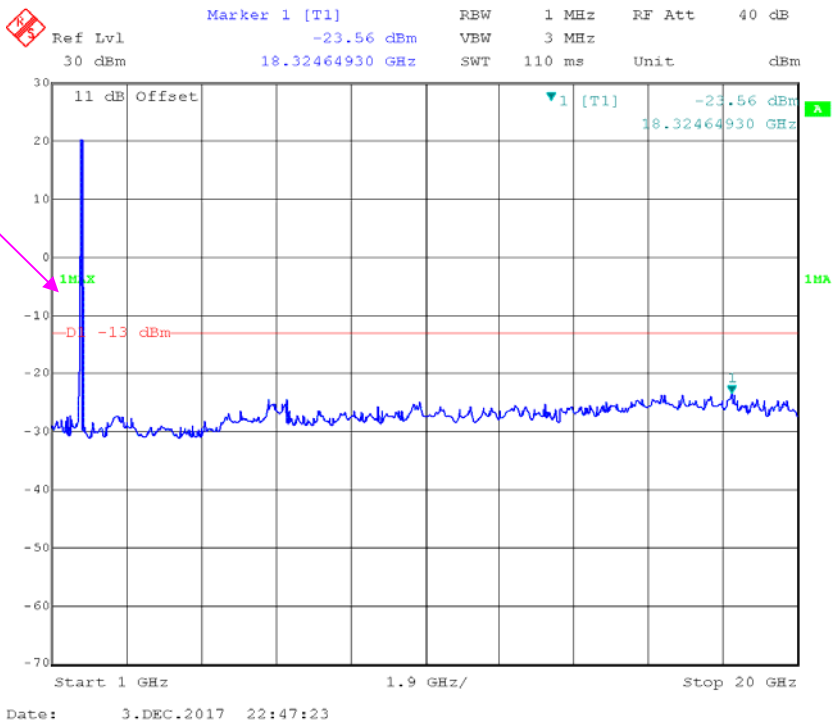



Fundamental

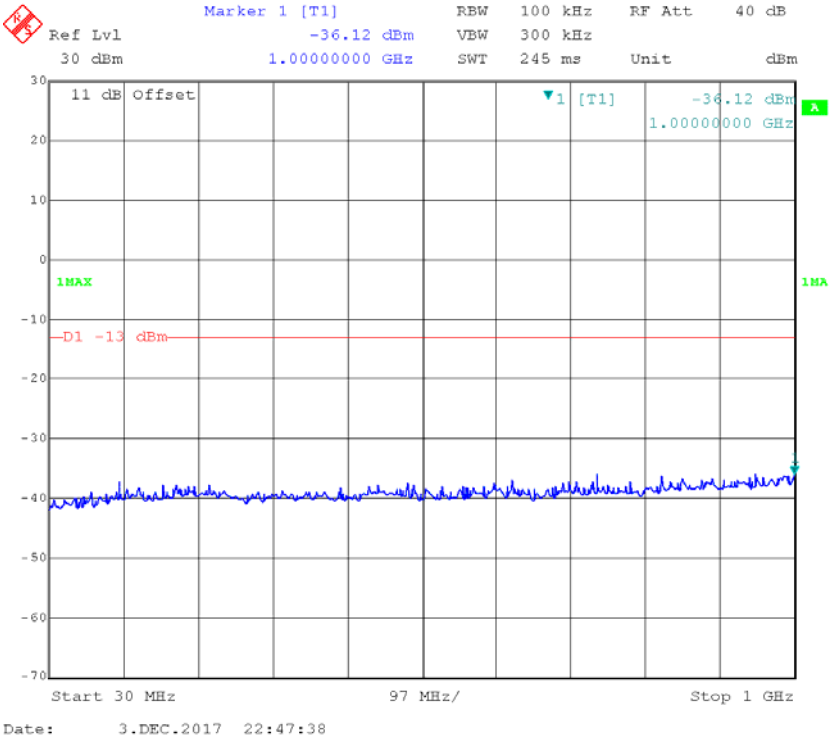
**QPSK_5 MHz**

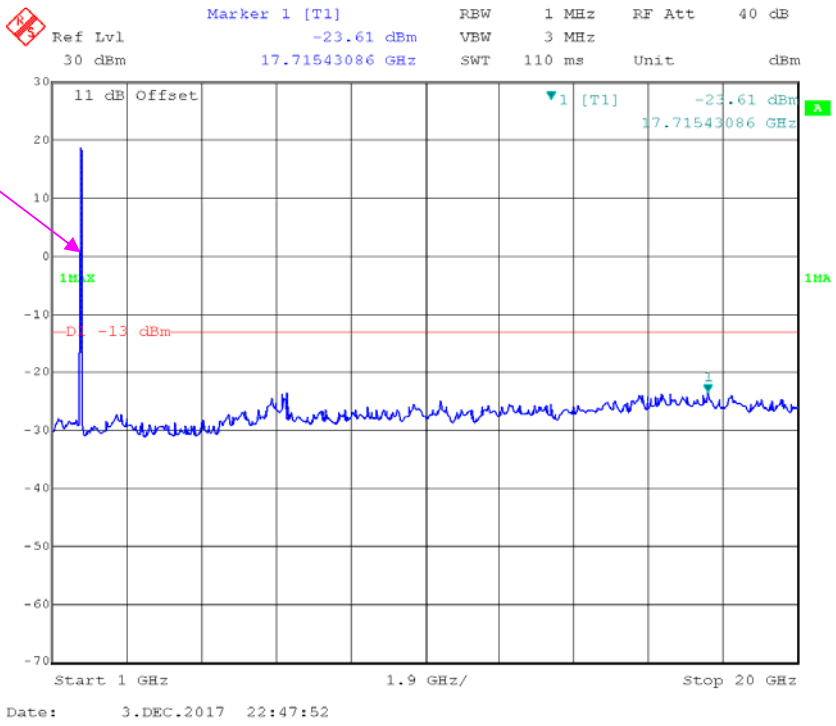



Fundamental

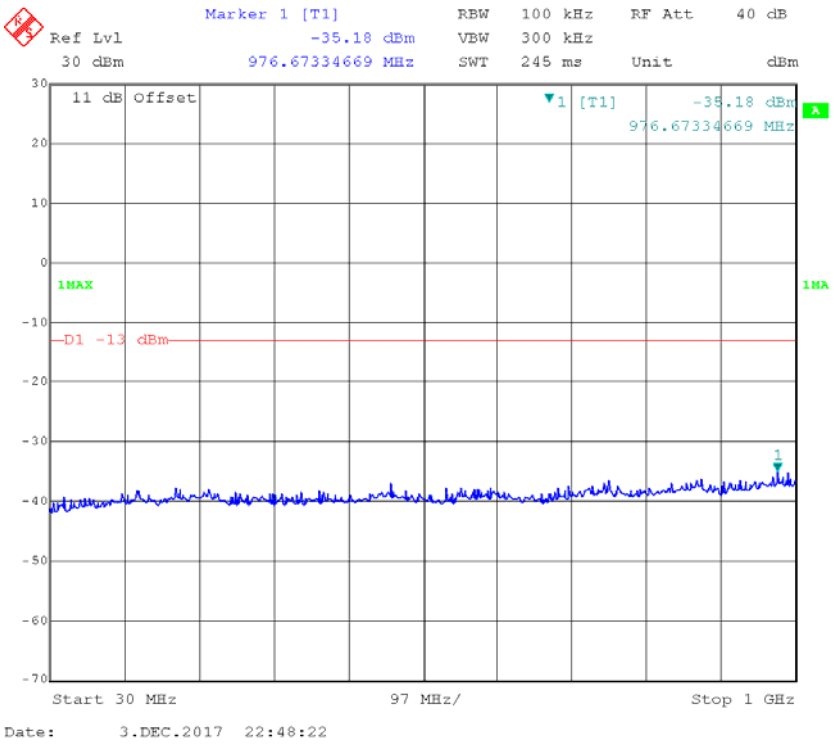
**QPSK_10 MHz**

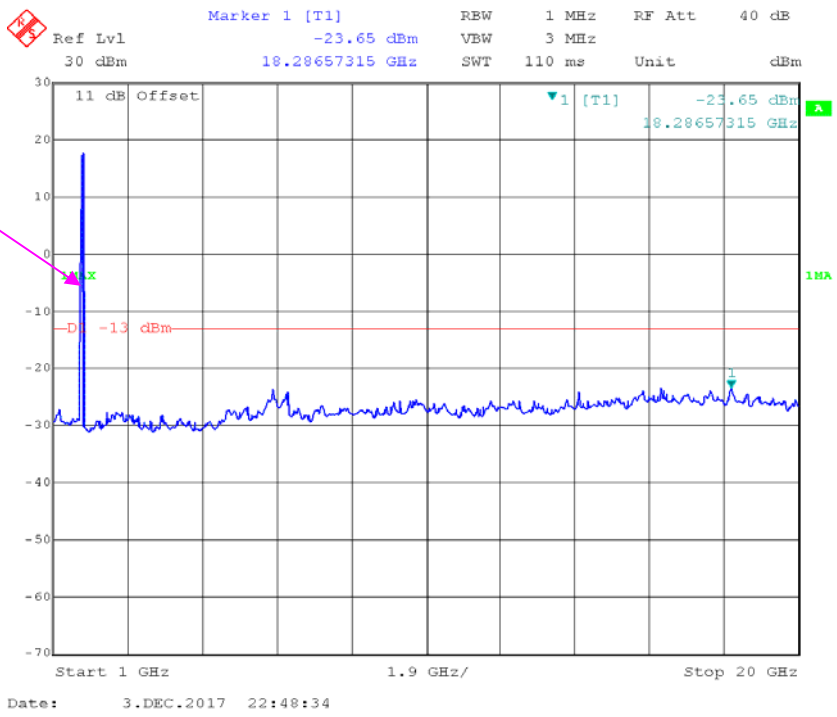



Fundamental

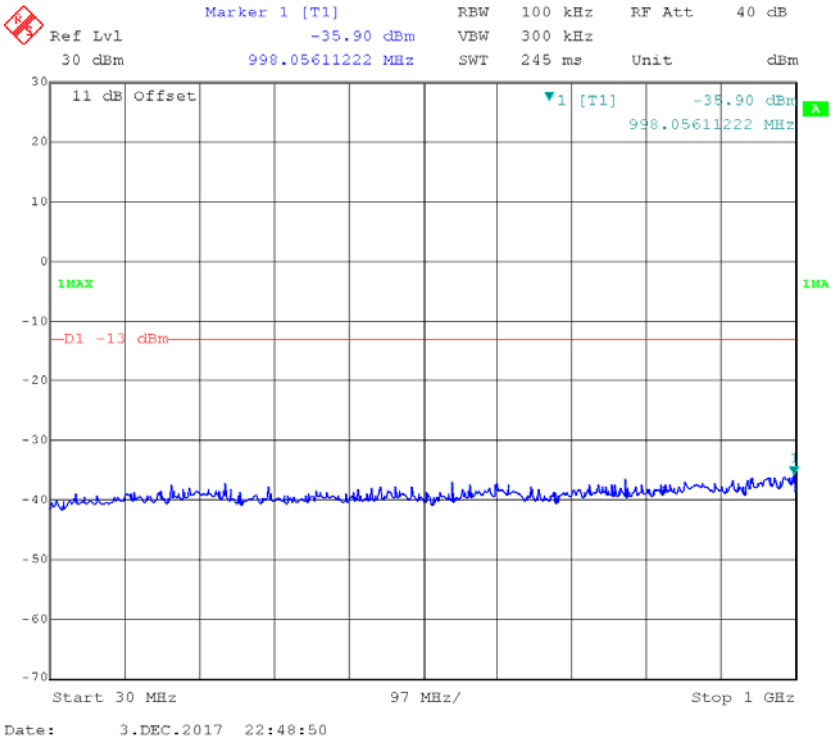
**QPSK_15 MHz**

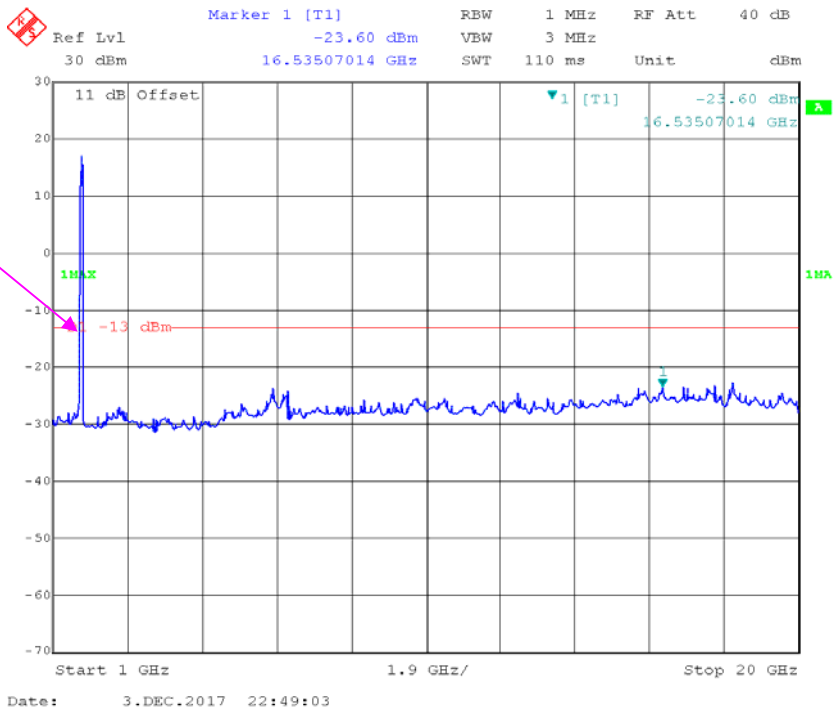



Fundamental

**QPSK_20 MHz**

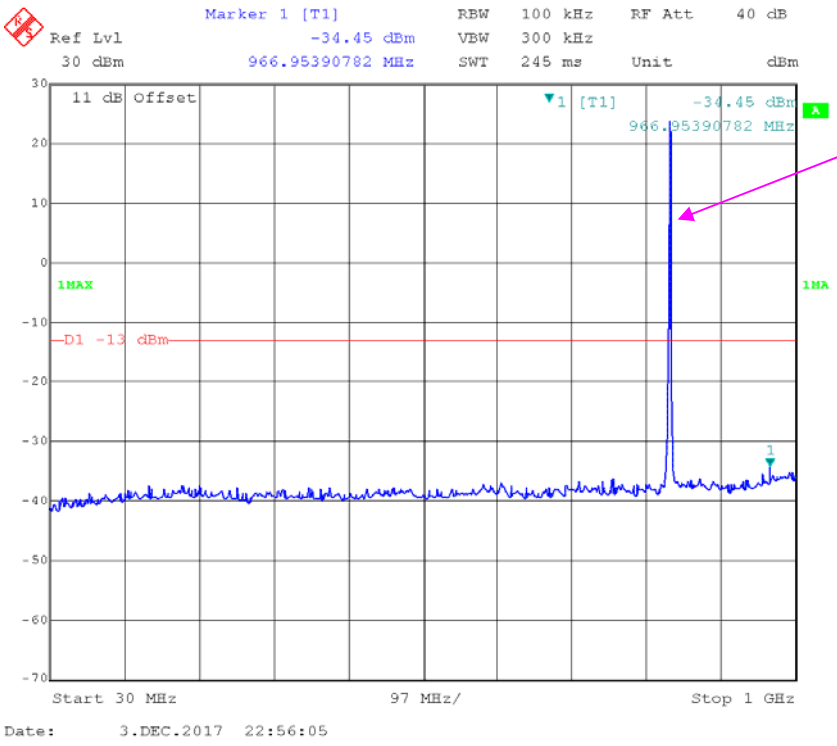


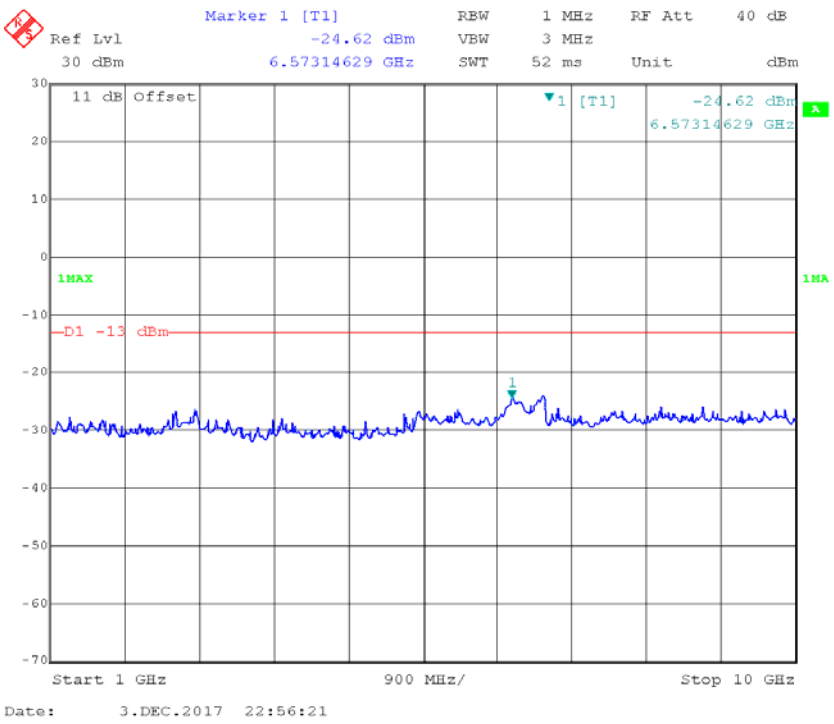

Fundamental

**LTE Band 5 (Middle Channel)**

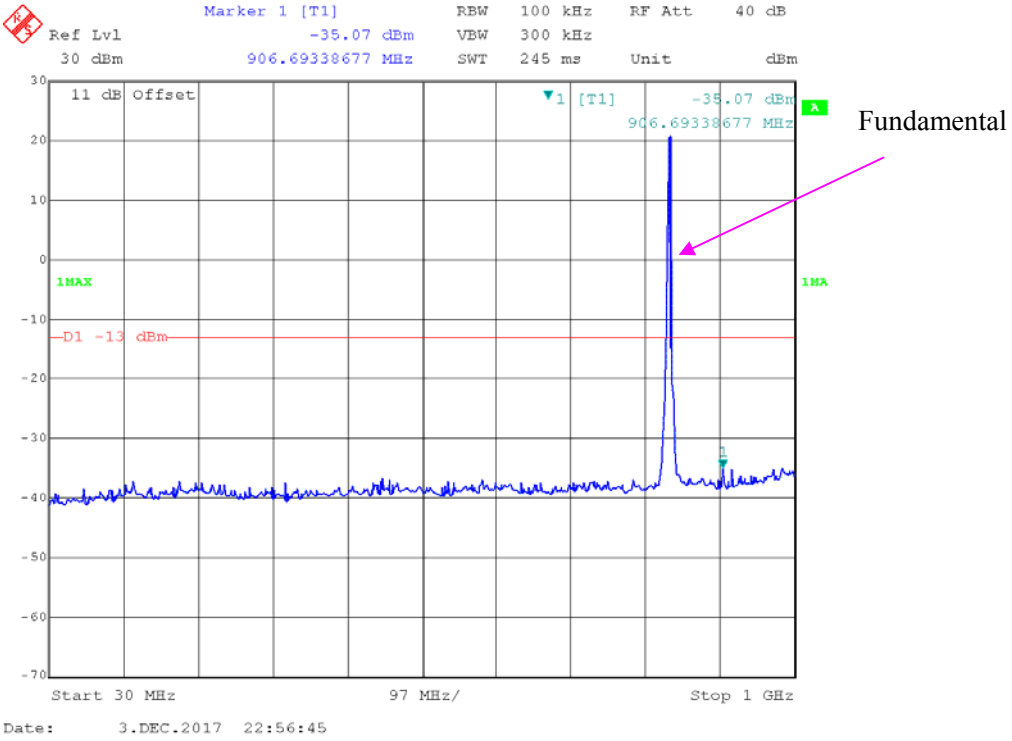
**QPSK_1.4 MHz**

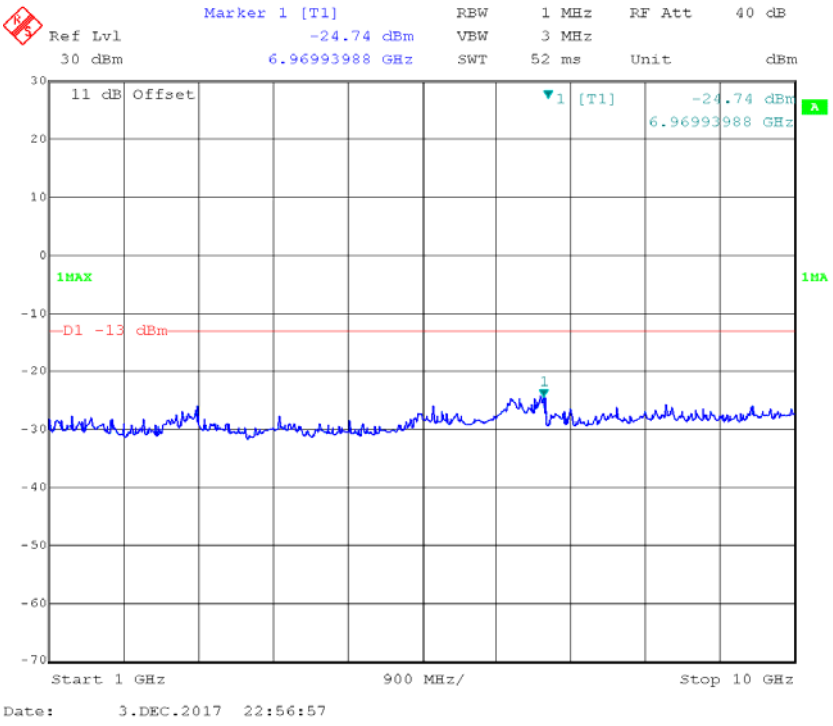



Fundamental

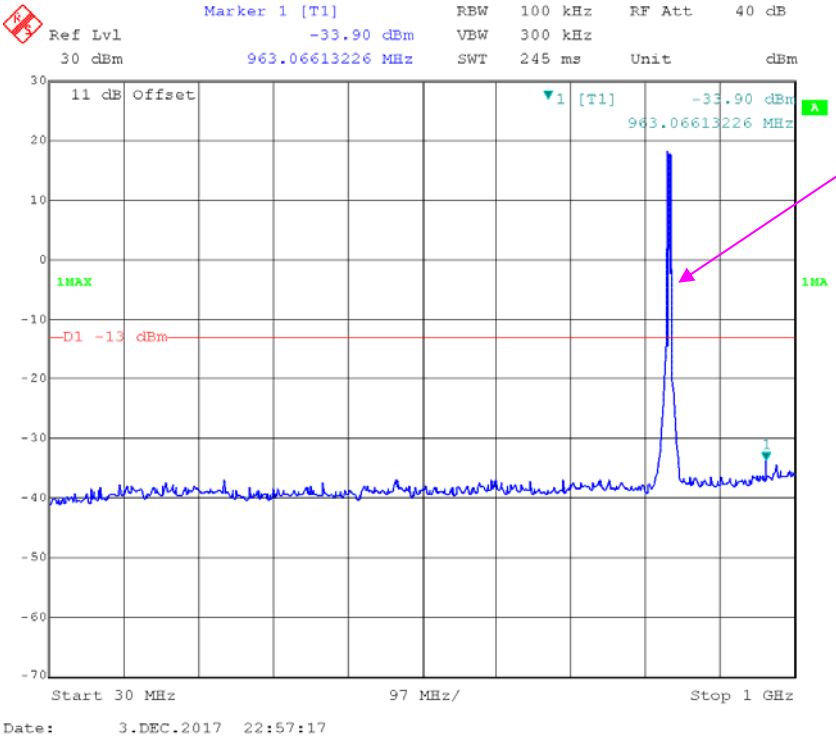


**QPSK_3 MHz**


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-35.07 dBm
VBW 300 kHz
30 dBm
906.69338677 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1]
-35.07 dBm
906.69338677 MHz
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 22:56:45
Fundamental

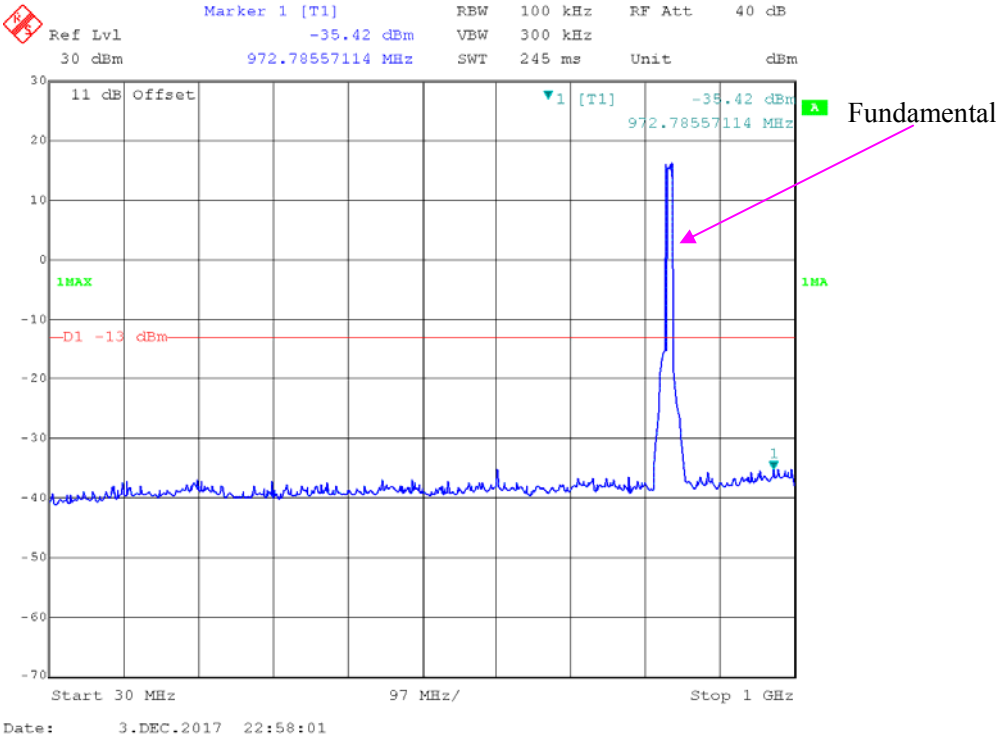

Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-24.74 dBm
VBW 3 MHz
30 dBm
6.96993988 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1]
-24.74 dBm
6.96993988 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 22:56:57

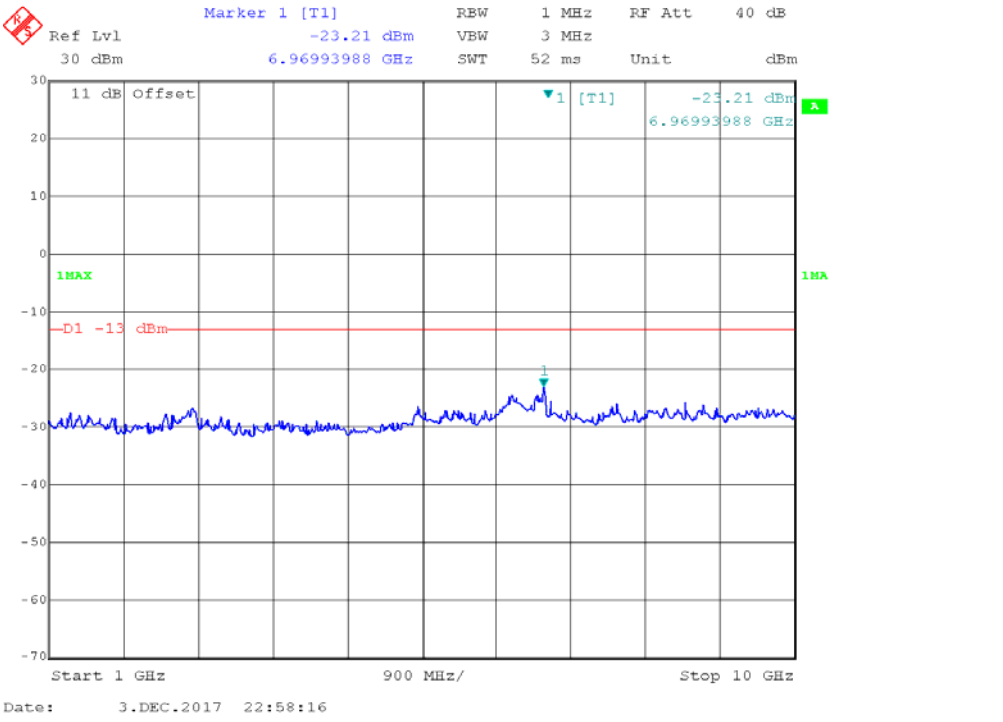
**QPSK_5 MHz**


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-33.90 dBm
VBW 300 kHz
30 dBm
963.06613226 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1]
-33.90 dBm
963.06613226 MHz
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 22:57:17
Fundamental


Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-23.74 dBm
VBW 3 MHz
30 dBm
6.57314629 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1]
-23.74 dBm
6.57314629 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 22:57:36

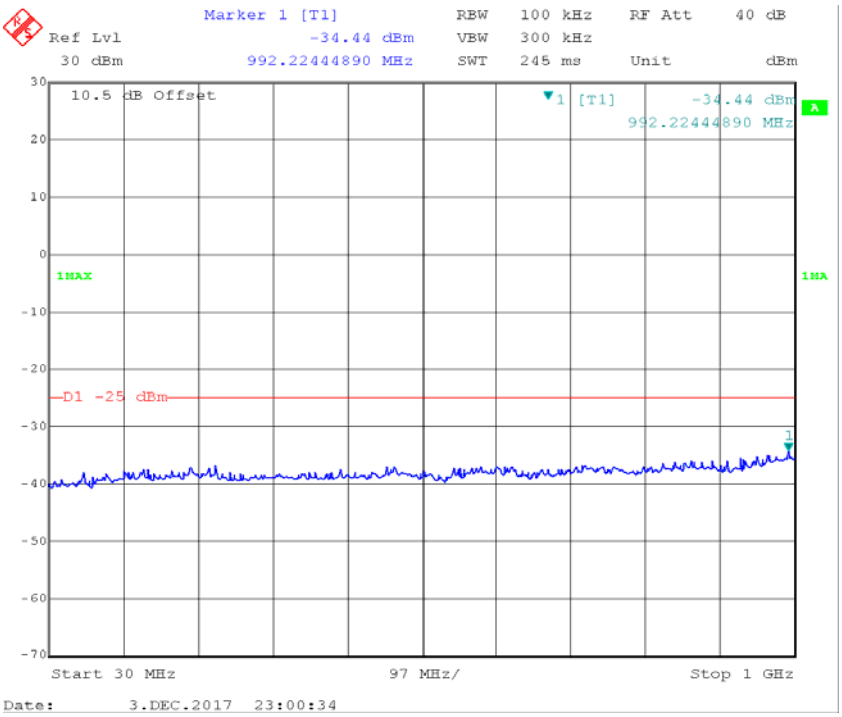
**QPSK_10 MHz**


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-35.42 dBm
VBW 300 kHz
30 dBm
972.78557114 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1]
-35.42 dBm
972.78557114 MHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 22:58:01

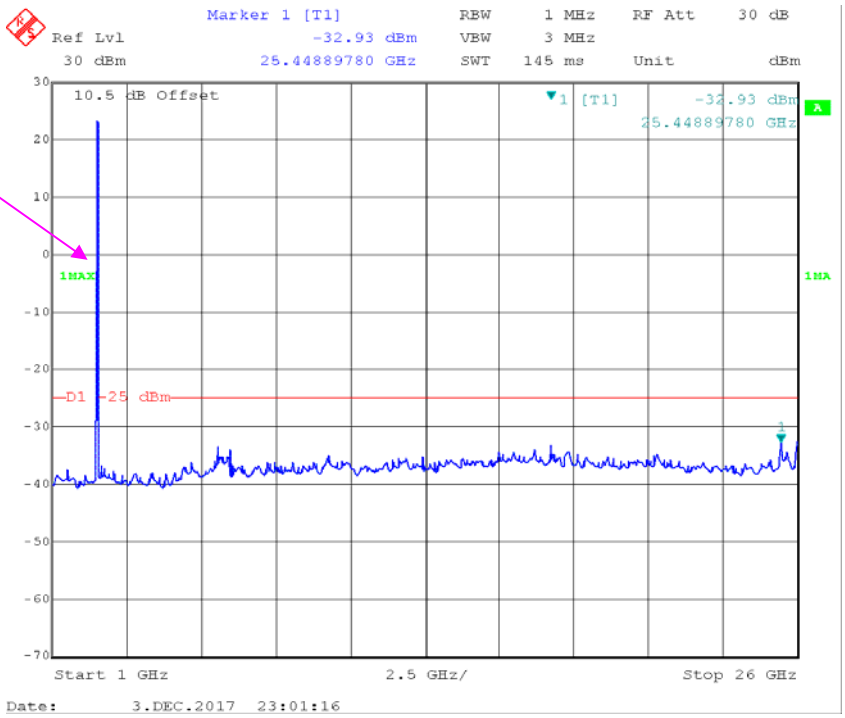

Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-23.21 dBm
VBW 3 MHz
30 dBm
6.96993988 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1]
-23.21 dBm
6.96993988 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 22:58:16

**LTE Band 7**

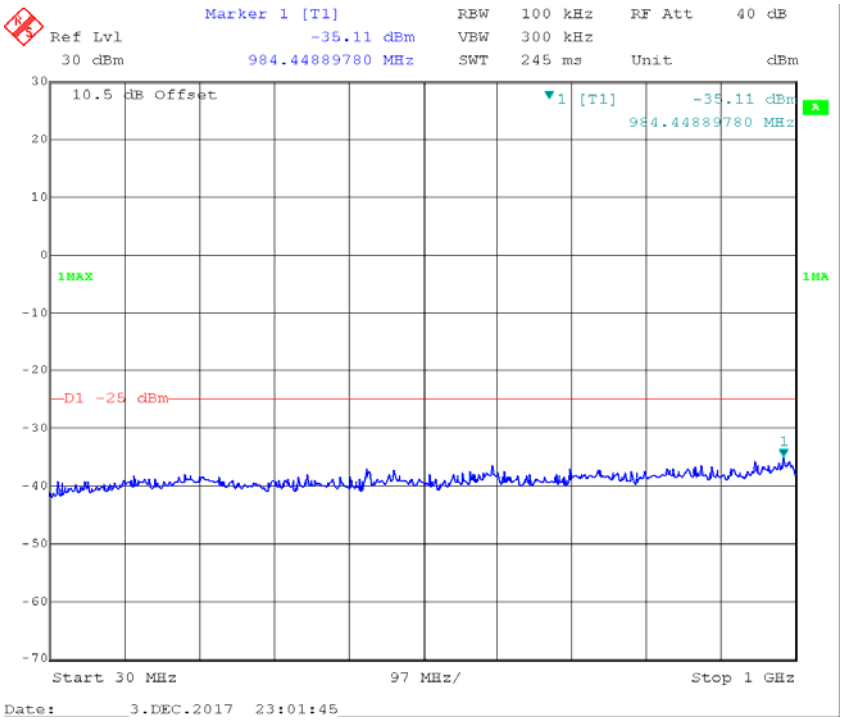
**QPSK_5 MHz**



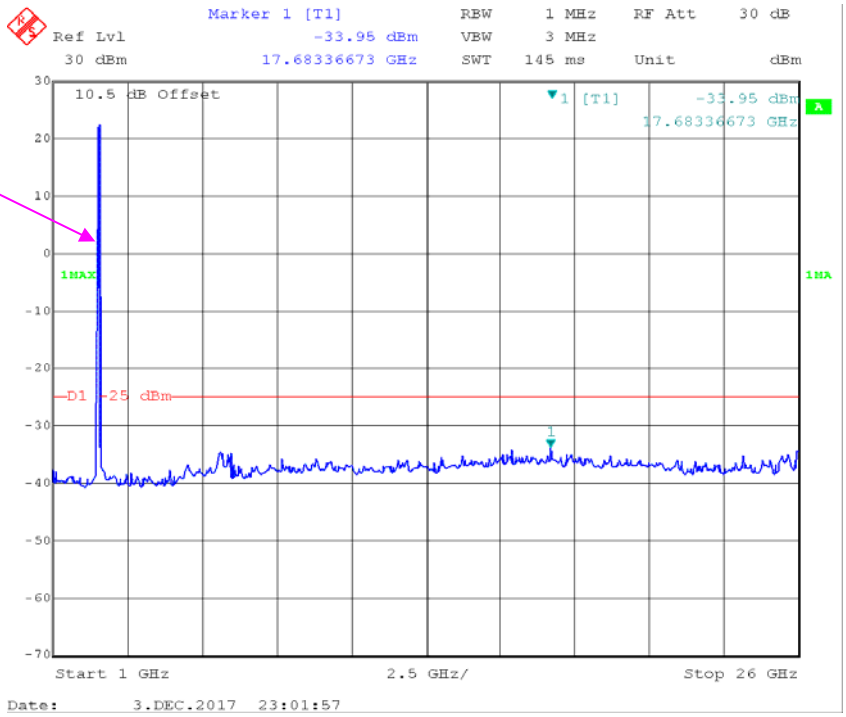

Fundamental



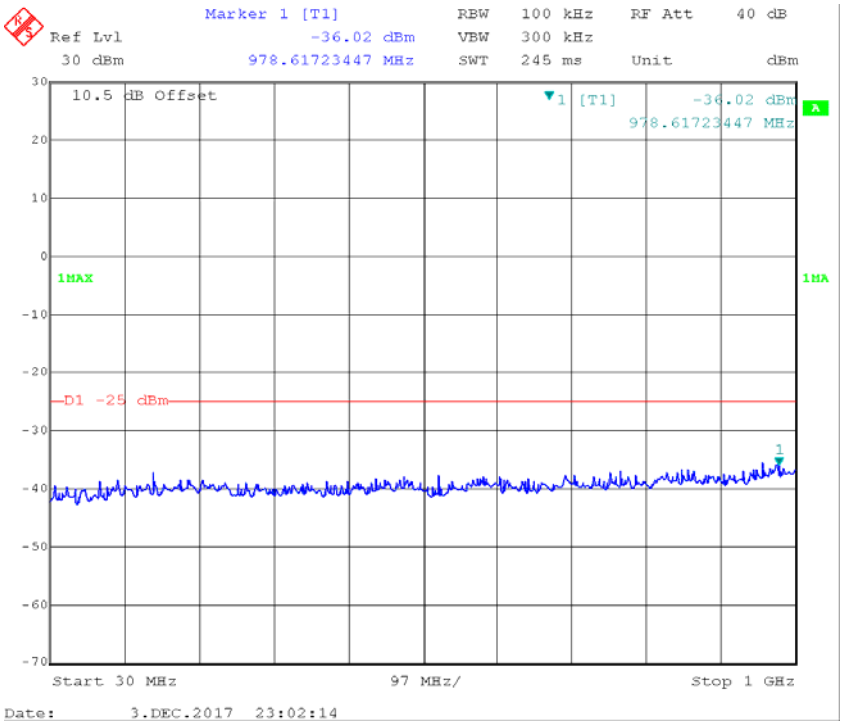
**QPSK_10 MHz**



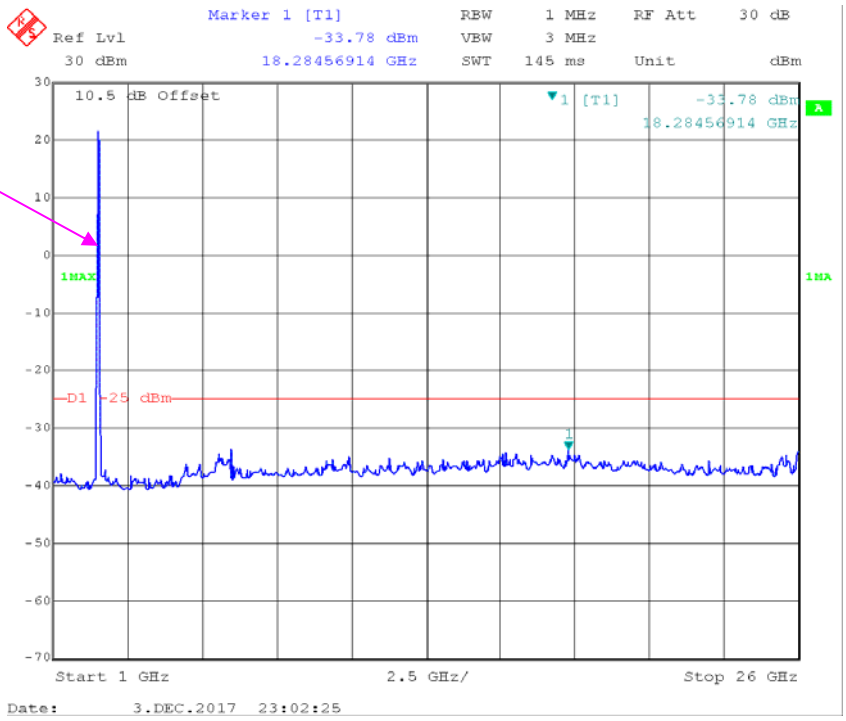

Fundamental



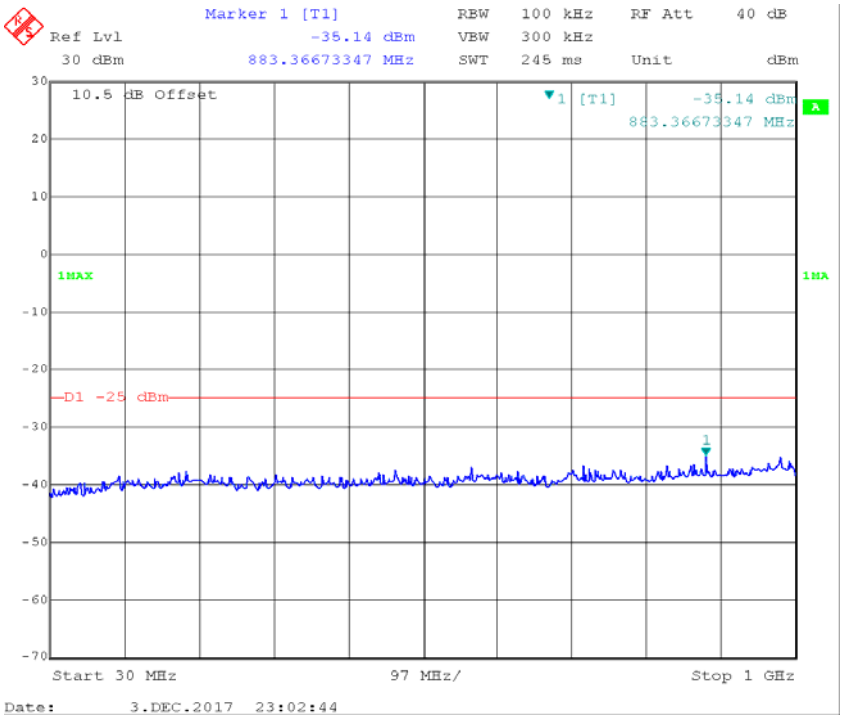
**QPSK_15 MHz**

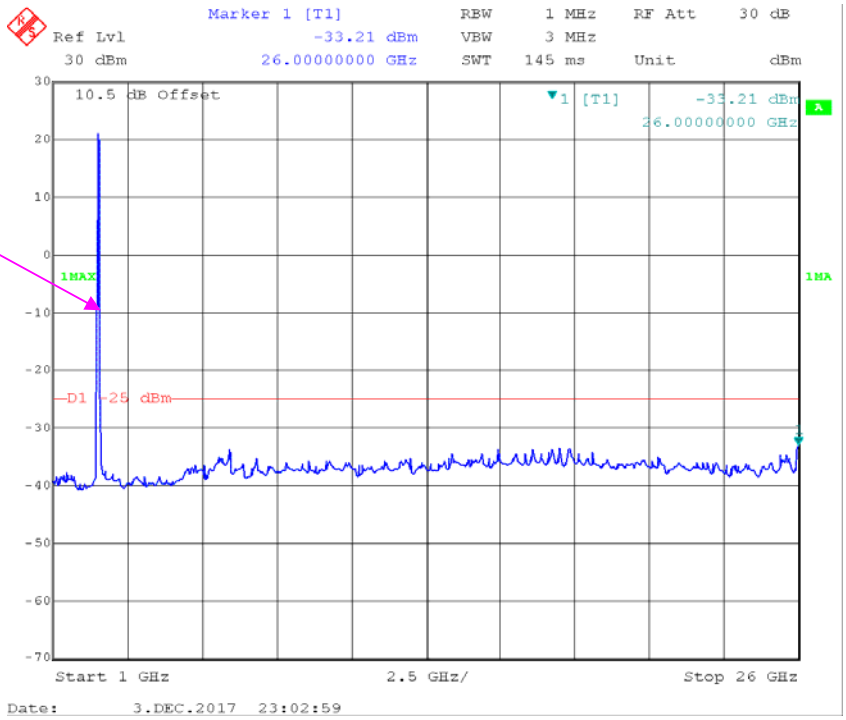



Fundamental



**QPSK_20 MHz**

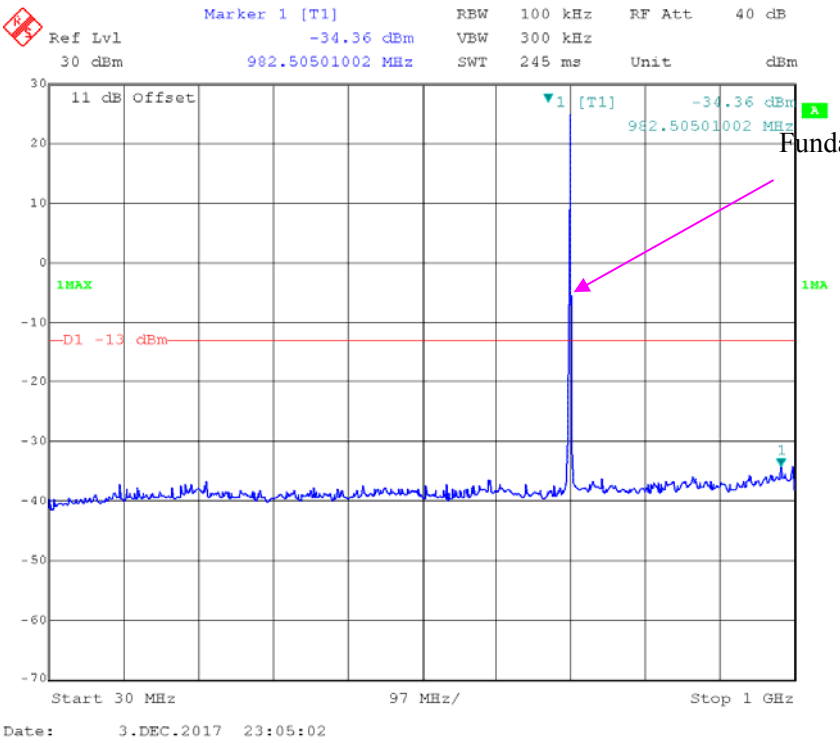


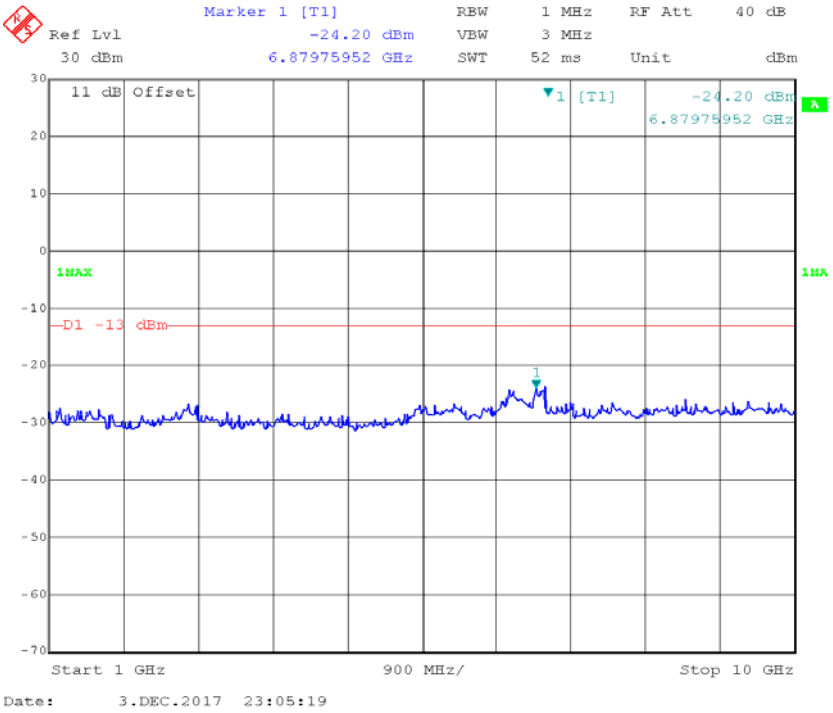

Fundamental

**LTE Band 12 (Middle Channel)**

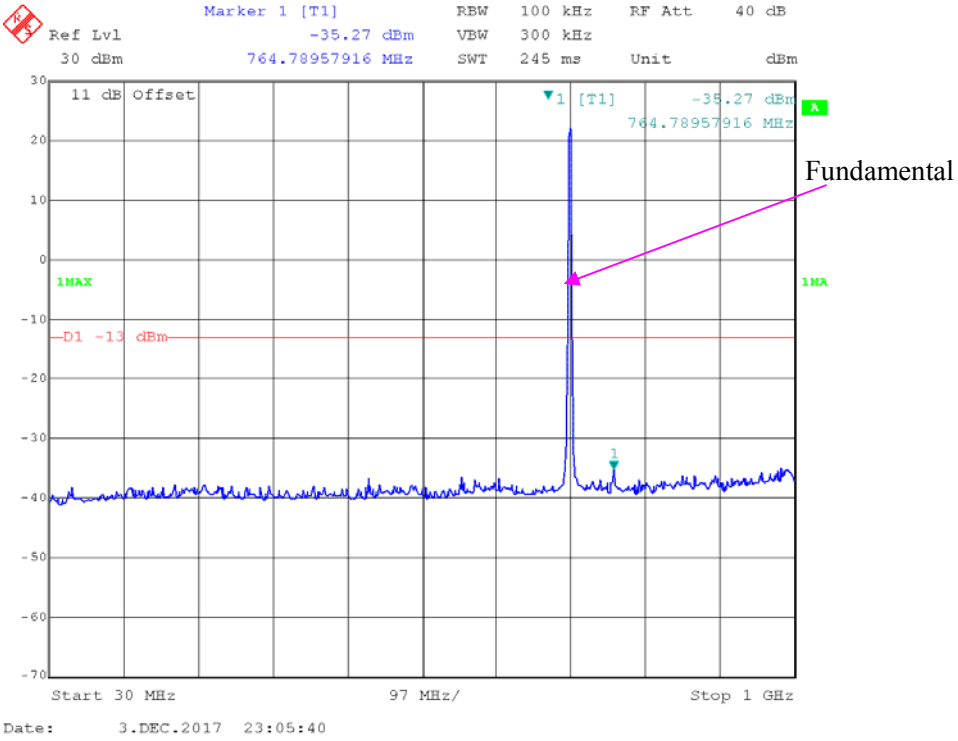
**QPSK_1.4 MHz**

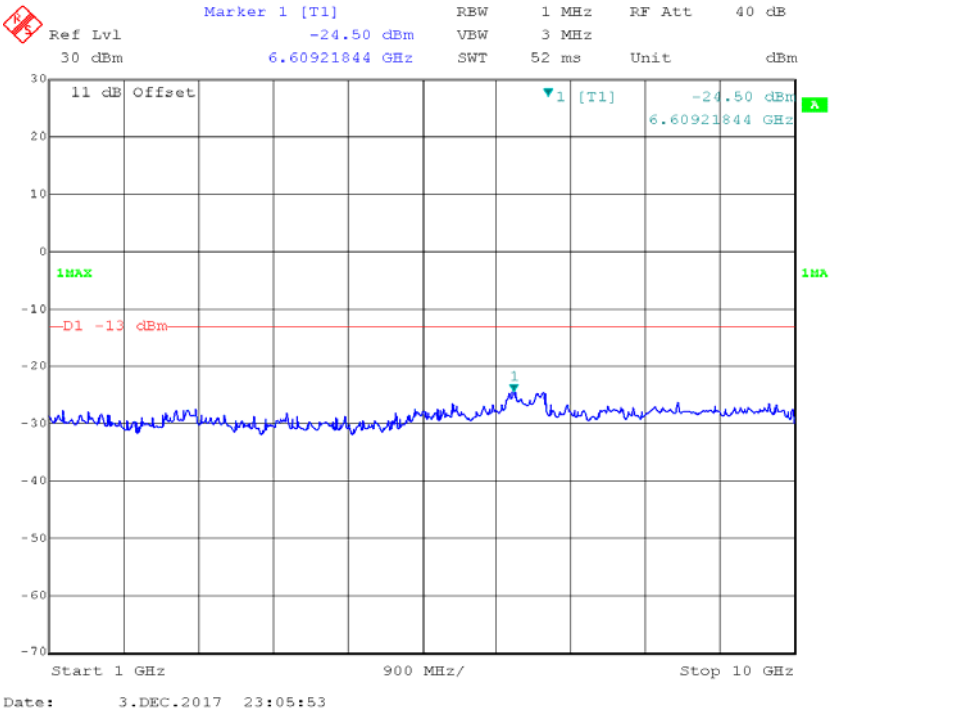



Fundamental

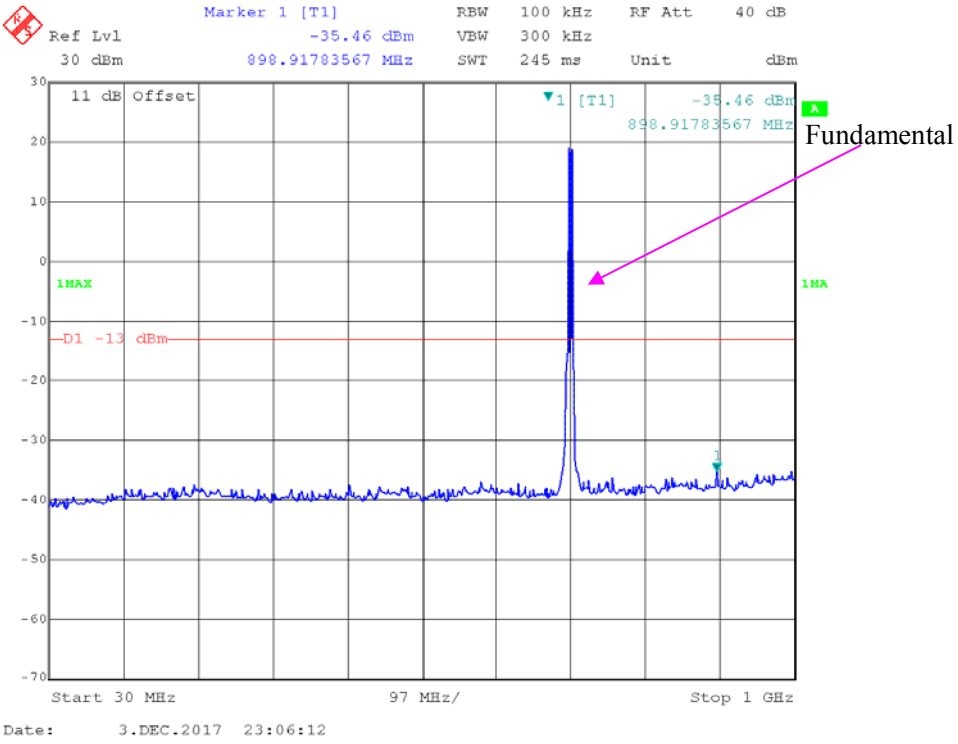


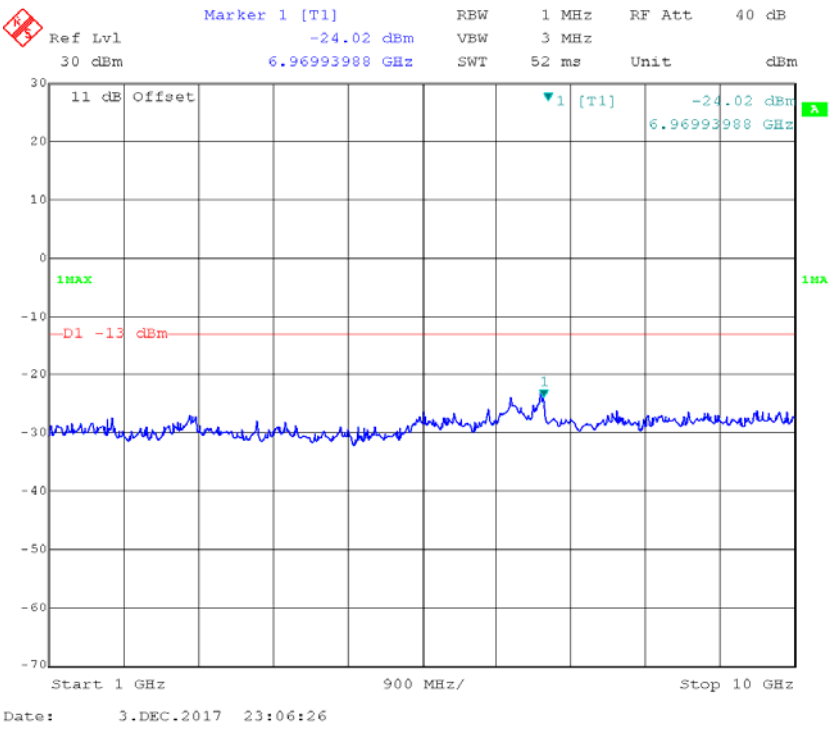
**QPSK_3 MHz**


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-35.27 dBm
VBW 300 kHz
30 dBm
764.78957916 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1] -35.27 dBm
764.78957916 MHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 23:05:40

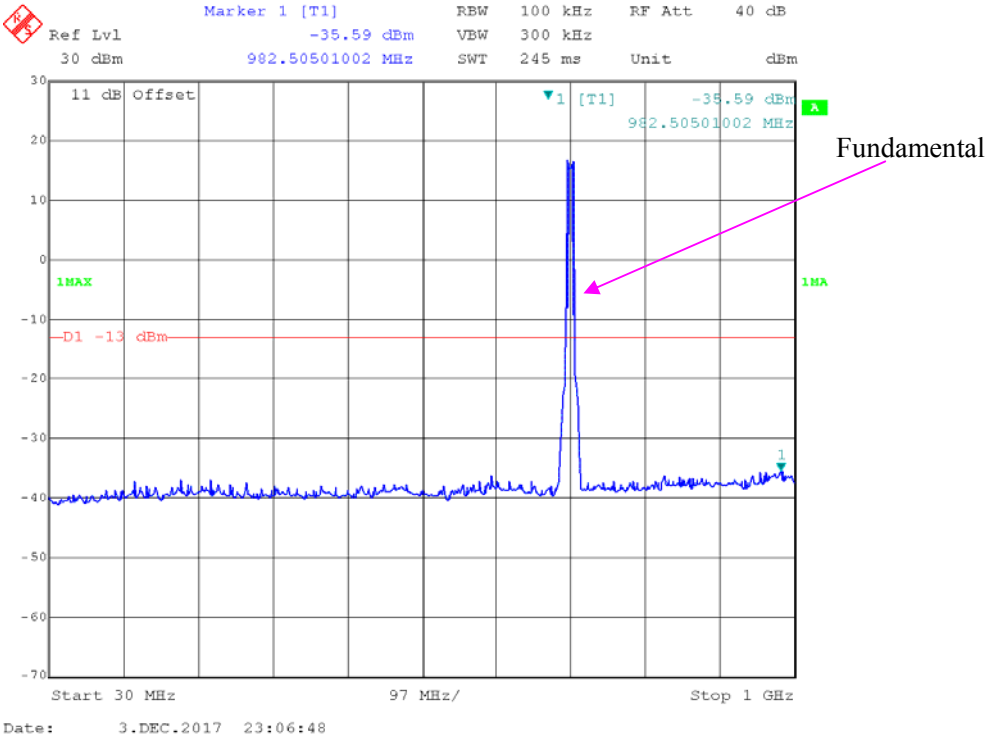

Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-24.50 dBm
VBW 3 MHz
30 dBm
6.60921844 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1] -24.50 dBm
6.60921844 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 23:05:53

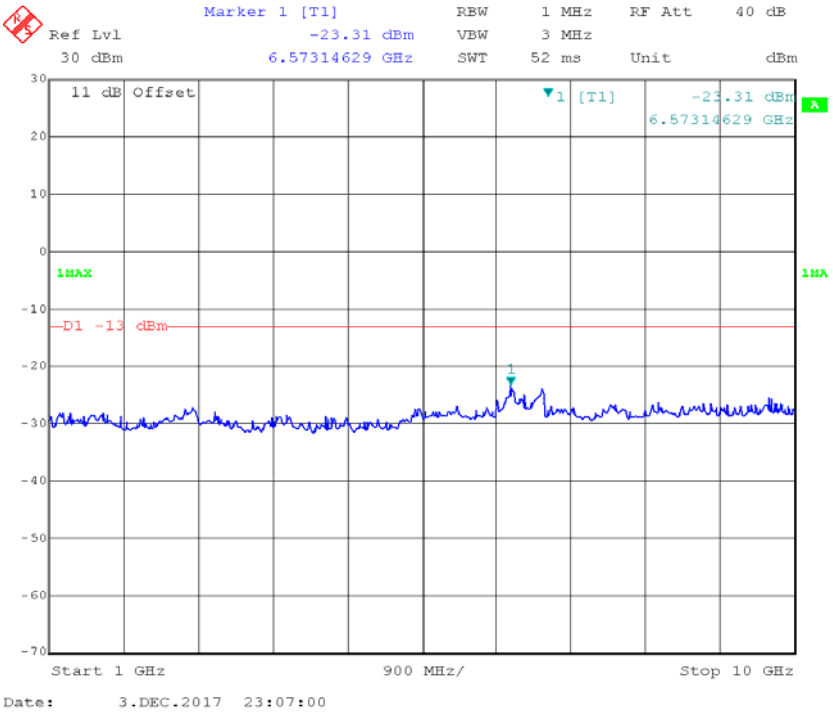
**QPSK_5 MHz**


Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-35.46 dBm
VBW 300 kHz
30 dBm
898.91783567 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1]
-35.46 dBm
898.91783567 MHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 23:06:12


Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-24.02 dBm
VBW 3 MHz
30 dBm
6.96993988 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1]
-24.02 dBm
6.96993988 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 23:06:26

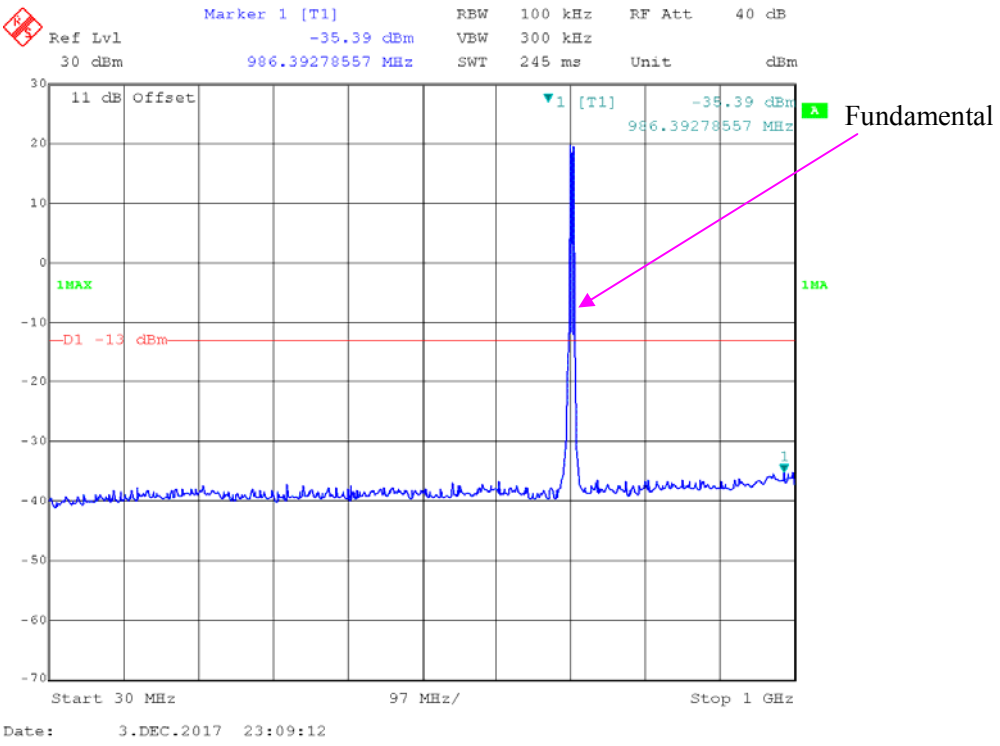
**QPSK_10 MHz**

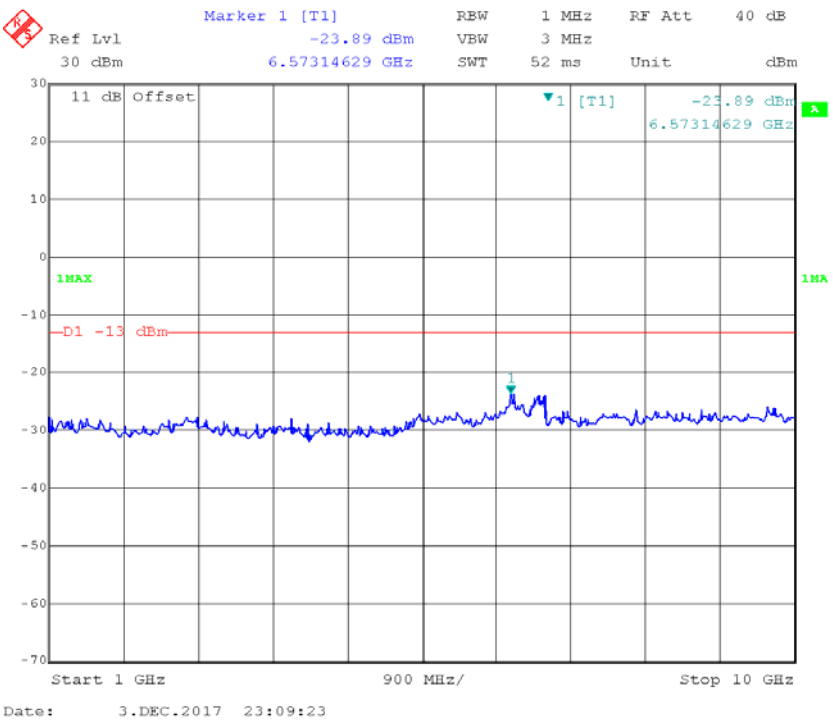

Marker 1 [T1]
RBW 100 kHz
RF Att 40 dB
Ref Lvl
-35.59 dBm
VBW 300 kHz
30 dBm
982.50501002 MHz
SWT 245 ms
Unit dBm
11 dB Offset
1 [T1]
-35.59 dBm
982.50501002 MHz
Fundamental
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 23:06:48


Marker 1 [T1]
RBW 1 MHz
RF Att 40 dB
Ref Lvl
-23.31 dBm
VBW 3 MHz
30 dBm
6.57314629 GHz
SWT 52 ms
Unit dBm
11 dB Offset
1 [T1]
-23.31 dBm
6.57314629 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 23:07:00

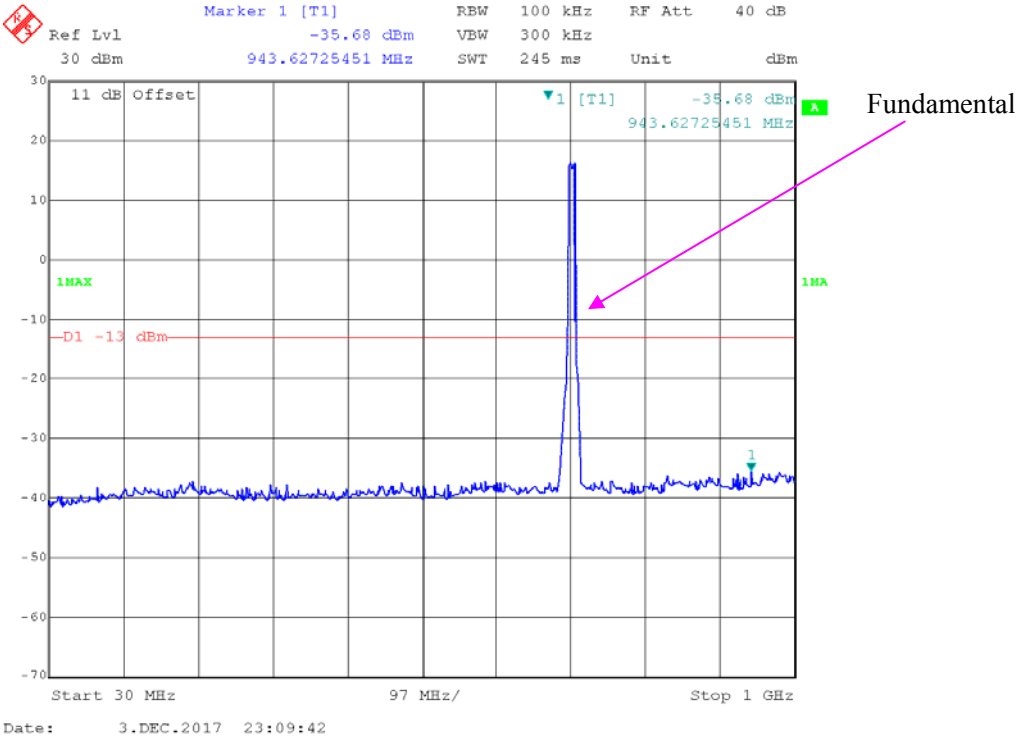
**LTE Band 17 (Middle Channel)**

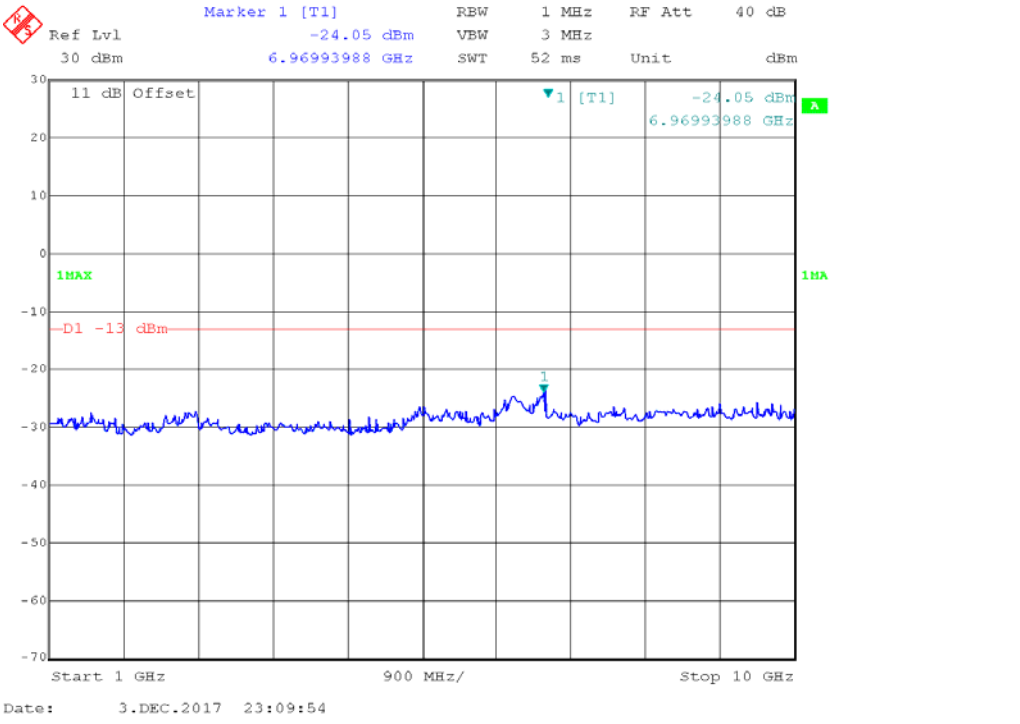
**QPSK_5 MHz**



**QPSK_10 MHz**


Marker 1 [T1]
Ref Lvl
-35.68 dBm
30 dBm
943.62725451 MHz
RBW 100 kHz
VBW 300 kHz
SWT 245 ms
RF Att 40 dB
Unit dBm
11 dB Offset
1 [T1]
-35.68 dBm
943.62725451 MHz
1MAX
1MA
D1 -13 dBm
Start 30 MHz
97 MHz/
Stop 1 GHz
Date: 3.DEC.2017 23:09:42
Fundamental


Marker 1 [T1]
Ref Lvl
-24.05 dBm
30 dBm
6.96993988 GHz
RBW 1 MHz
VBW 3 MHz
SWT 52 ms
RF Att 40 dB
Unit dBm
11 dB Offset
1 [T1]
-24.05 dBm
6.96993988 GHz
1MAX
1MA
D1 -13 dBm
Start 1 GHz
900 MHz/
Stop 10 GHz
Date: 3.DEC.2017 23:09:54

# FCC §2.1053, §22.917 & §24.238 & §27.53 - SPURIOUS RADIATED EMISSIONS

## Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

## Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB = 10 lg (TXpwr in Watts/0.001) – the absolute level

Spurious attenuation limit in dB = 43 + 10 $Log_{10}$ (power out in Watts)

## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | EMI Test Receiver | ESCI | 100224 | 2017-09-01 | 2018-09-01 |
| Sunol Sciences | Antenna | JB3 | A060611-1 | 2017-11-10 | 2020-11-10 |
| HP | Amplifier | 8447D | 2727A05902 | 2017-09-05 | 2018-09-05 |
| R&S | Spectrum Analyzer | FSIQ 26 | 831929/005 | 2017-08-31 | 2018-08-31 |
| ETS LINDGREN | Horn Antenna | 3115 | 000 527 35 | 2016-01-05 | 2019-01-04 |
| Mini-Circuit | Amplifier | AFS42-00101800-25-S-42 | 2001271 | 2017-09-05 | 2018-09-05 |
| HP | Signal Generator | 1026 | 320408 | 2016-12-08 | 2017-12-08 |
| HP | Signal Generator | 1026 | 320408 | 2017-12-08 | 2018-12-08 |
| EMCO | Adjustable Dipole Antenna | 3121C | 9109-753 | N/A | N/A |
| TDK RF | Horn Antenna | HRN-0118 | 130 084 | 2016-01-05 | 2019-01-04 |
| Ducommun Technolagies | Horn Antenna | ARH-4223-02 | 1007726-02 1304 | 2017-06-16 | 2020-06-15 |
| Ducommun Technolagies | Horn Antenna | ARH-4223-02 | 1007726-01 1304 | 2016-11-18 | 2019-11-18 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0400-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-0075-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-NJNJ-50 | C-1000-01 | 2017-09-05 | 2018-09-05 |
| Unknown | Coaxial Cable | C-SJSJ-50 | C-0800-01 | 2017-09-05 | 2018-09-05 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 27.9~29°C |
| **Relative Humidity:** | 48~52 % |
| **ATM Pressure:** | 100.2~100.4 kPa |

** The testing was performed by Blake Yang & Steven Zuo from 2017-11-28 to 2017-12-14.*

*EUT Operation Mode: Transmitting*

**Cellular Band (PART 22H)**

**30 MHz-10 GHz:**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| GSM850, Frequency:836.600 MHz | | | | | | | | |
| 1673.200 | H | 59.48 | -54.7 | 10.6 | 0.7 | -44.8 | -13.0 | 31.8 |
| 1673.200 | V | 61.69 | -53.1 | 10.6 | 0.7 | -43.2 | -13.0 | 30.2 |
| 2509.800 | H | 54.49 | -58.5 | 13.1 | 1.2 | -46.6 | -13.0 | 33.6 |
| 2509.800 | V | 55.55 | -57.5 | 13.1 | 1.2 | -45.6 | -13.0 | 32.6 |
| 3346.400 | H | 48.15 | -62.5 | 13.8 | 1.6 | -50.3 | -13.0 | 37.3 |
| 3346.400 | V | 48.51 | -62.2 | 13.8 | 1.6 | -50.0 | -13.0 | 37.0 |
| 2004.000 | H | 45.46 | -68.2 | 12.0 | 1.1 | -57.3 | -13.0 | 44.3 |
| 2004.000 | V | 46.25 | -67.8 | 12.0 | 1.1 | -56.9 | -13.0 | 43.9 |
| 198.000 | H | 46.79 | -62 | 0.0 | 0.5 | -62.5 | -13.0 | 49.5 |
| 42.000 | V | 50.40 | -39.1 | -23.8 | 0.2 | -63.1 | -13.0 | 50.1 |

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| WCDMA Band V R99,Frequency:836.600 MHz | | | | | | | | |
| 1673.200 | H | 59.64 | -54.6 | 10.6 | 0.7 | -44.7 | -13.0 | 31.7 |
| 1673.200 | V | 61.57 | -53.2 | 10.6 | 0.7 | -43.3 | -13.0 | 30.3 |
| 2509.800 | H | 54.22 | -58.8 | 13.1 | 1.2 | -46.9 | -13.0 | 33.9 |
| 2509.800 | V | 55.52 | -57.5 | 13.1 | 1.2 | -45.6 | -13.0 | 32.6 |
| 3346.400 | H | 47.86 | -62.8 | 13.8 | 1.6 | -50.6 | -13.0 | 37.6 |
| 3346.400 | V | 48.53 | -62.2 | 13.8 | 1.6 | -50.0 | -13.0 | 37.0 |
| 2095.000 | H | 45.07 | -67.9 | 11.4 | 1.1 | -57.6 | -13.0 | 44.6 |
| 2095.000 | V | 45.98 | -67 | 11.4 | 1.1 | -56.7 | -13.0 | 43.7 |
| 531.000 | H | 46.13 | -57.4 | 0.0 | 0.7 | -58.1 | -13.0 | 45.1 |
| 197.000 | V | 47.52 | -63.2 | 0.0 | 0.5 | -63.7 | -13.0 | 50.7 |

**PCS Band (PART 24E)**

**30 MHz-20 GHz:**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| GSM1900, Frequency:1880.000 MHz | | | | | | | | |
| 3760.000 | H | 51.46 | -57.3 | 13.8 | 1.6 | -45.1 | -13.0 | 32.1 |
| 3760.000 | V | 50.42 | -58.2 | 13.8 | 1.6 | -46.0 | -13.0 | 33.0 |
| 5640.000 | H | 59.97 | -46.1 | 14.0 | 1.3 | -33.4 | -13.0 | 20.4 |
| 5640.000 | V | 58.18 | -47.7 | 14.0 | 1.3 | -35.0 | -13.0 | 22.0 |
| 4586.000 | H | 49.44 | -59 | 14.2 | 1.8 | -46.6 | -13.0 | 33.6 |
| 4586.000 | V | 48.58 | -59.9 | 14.2 | 1.8 | -47.5 | -13.0 | 34.5 |
| 212.000 | H | 45.84 | -62.9 | 0.0 | 0.5 | -63.4 | -13.0 | 50.4 |
| 377.000 | V | 48.52 | -60.1 | 0.0 | 0.6 | -60.7 | -13.0 | 47.7 |
| WCDMA Band II, R99, Frequency:1880.000 MHz | | | | | | | | |
| 3760.000 | H | 51.58 | -57.2 | 13.8 | 1.6 | -45.0 | -13.0 | 32.0 |
| 3760.000 | V | 50.42 | -58.2 | 13.8 | 1.6 | -46.0 | -13.0 | 33.0 |
| 5640.000 | H | 58.83 | -47.2 | 14.0 | 1.3 | -34.5 | -13.0 | 21.5 |
| 5640.000 | V | 57.35 | -48.6 | 14.0 | 1.3 | -35.9 | -13.0 | 22.9 |
| 4427.000 | H | 47.38 | -61.4 | 14.0 | 1.8 | -49.2 | -13.0 | 36.2 |
| 4427.000 | V | 47.68 | -60.9 | 14.0 | 1.8 | -48.7 | -13.0 | 35.7 |
| 287.000 | H | 46.52 | -62.3 | 0.0 | 0.5 | -62.8 | -13.0 | 49.8 |
| 376.000 | V | 47.83 | -60.8 | 0.0 | 0.6 | -61.4 | -13.0 | 48.4 |

**Part 27**

**30 MHz-20 GHz:**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| WCDMA Band IV ,Frequency:1732.600 MHz | | | | | | | | |
| 3465.200 | H | 54.18 | -56.1 | 13.9 | 1.6 | -43.8 | -13.0 | 30.8 |
| 3465.200 | V | 53.85 | -56.4 | 13.9 | 1.6 | -44.1 | -13.0 | 31.1 |
| 5197.800 | H | 58.86 | -47.6 | 14.0 | 1.5 | -35.1 | -13.0 | 22.1 |
| 5197.800 | V | 57.33 | -49.2 | 14.0 | 1.5 | -36.7 | -13.0 | 23.7 |
| 4425.000 | H | 47.60 | -61.1 | 14.0 | 1.8 | -48.9 | -13.0 | 35.9 |
| 4425.000 | V | 47.76 | -60.8 | 14.0 | 1.8 | -48.6 | -13.0 | 35.6 |
| 352.000 | H | 46.02 | -60.6 | 0.0 | 0.6 | -61.2 | -13.0 | 48.2 |
| 176.000 | V | 48.31 | -63.9 | 0.0 | 0.4 | -64.3 | -13.0 | 51.3 |

**LTE Band 2 (30MHz-20GHz):**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency:1880.000 MHz | | | | | | | | |
| 3760.000 | H | 61.71 | -47.1 | 13.8 | 1.6 | -34.9 | -13.0 | 21.9 |
| 3760.000 | V | 68.56 | -40.1 | 13.8 | 1.6 | -27.9 | -13.0 | 14.9 |
| 5640.000 | H | 58.81 | -47.2 | 14.0 | 1.3 | -34.5 | -13.0 | 21.5 |
| 5640.000 | V | 62.31 | -43.6 | 14.0 | 1.3 | -30.9 | -13.0 | 17.9 |
| 4125.000 | H | 46.06 | -63 | 13.8 | 1.4 | -50.6 | -13.0 | 37.6 |
| 4125.000 | V | 45.38 | -63.8 | 13.8 | 1.4 | -51.4 | -13.0 | 38.4 |
| 545.000 | H | 44.56 | -58.7 | 0.0 | 0.7 | -59.4 | -13.0 | 46.4 |
| 545.000 | V | 46.25 | -60.2 | 0.0 | 0.7 | -60.9 | -13.0 | 47.9 |

**LTE Band 4 (30MHz-20GHz):**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency:1732.500 MHz | | | | | | | | |
| 3465.000 | H | 60.64 | -49.6 | 13.9 | 1.6 | -37.3 | -13.0 | 24.3 |
| 3465.000 | V | 66.72 | -43.6 | 13.9 | 1.6 | -31.3 | -13.0 | 18.3 |
| 5197.500 | H | 58.86 | -47.6 | 14.0 | 1.5 | -35.1 | -13.0 | 22.1 |
| 5197.500 | V | 62.35 | -44.1 | 14.0 | 1.5 | -31.6 | -13.0 | 18.6 |
| 4155.000 | H | 46.05 | -63 | 13.9 | 1.5 | -50.6 | -13.0 | 37.6 |
| 4155.000 | V | 45.28 | -63.8 | 13.9 | 1.5 | -51.4 | -13.0 | 38.4 |
| 371.000 | H | 45.31 | -60.6 | 0.0 | 0.6 | -61.2 | -13.0 | 48.2 |
| 371.000 | V | 47.02 | -61.7 | 0.0 | 0.6 | -62.3 | -13.0 | 49.3 |

**LTE Band 5 (30MHz-10GHz):**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency: 836.500 MHz | | | | | | | | |
| 1673.000 | H | 56.78 | -57.4 | 10.6 | 0.7 | -47.5 | -13.0 | 34.5 |
| 1673.000 | V | 50.77 | -64 | 10.6 | 0.7 | -54.1 | -13.0 | 41.1 |
| 2509.500 | H | 51.56 | -61.5 | 13.1 | 1.2 | -49.6 | -13.0 | 36.6 |
| 2509.500 | V | 50.62 | -62.4 | 13.1 | 1.2 | -50.5 | -13.0 | 37.5 |
| 3346.000 | H | 52.48 | -58.2 | 13.8 | 1.6 | -46.0 | -13.0 | 33.0 |
| 3346.000 | V | 49.38 | -61.3 | 13.8 | 1.6 | -49.1 | -13.0 | 36.1 |
| 2144.000 | H | 45.49 | -67.2 | 11.1 | 1.1 | -57.2 | -13.0 | 44.2 |
| 2144.000 | V | 45.64 | -67 | 11.1 | 1.1 | -57.0 | -13.0 | 44.0 |
| 351.000 | H | 45.17 | -61.5 | 0.0 | 0.6 | -62.1 | -13.0 | 49.1 |
| 351.000 | V | 47.13 | -61.9 | 0.0 | 0.6 | -62.5 | -13.0 | 49.5 |

**LTE Band 7 (30MHz-26GHz)**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency:2535.000 MHz | | | | | | | | |
| 5070.000 | H | 52.79 | -54 | 13.9 | 1.3 | -41.4 | -25.0 | 16.4 |
| 5070.000 | V | 57.84 | -48.8 | 13.9 | 1.3 | -36.2 | -25.0 | 11.2 |
| 7605.000 | H | 51.71 | -48.6 | 13.2 | 1.4 | -36.8 | -25.0 | 11.8 |
| 7605.000 | V | 56.44 | -44.3 | 13.2 | 1.4 | -32.5 | -25.0 | 7.5 |
| 4655.000 | H | 46.18 | -62.3 | 14.3 | 1.8 | -49.8 | -25.0 | 24.8 |
| 4655.000 | V | 45.31 | -63.3 | 14.3 | 1.8 | -50.8 | -25.0 | 25.8 |
| 665.000 | H | 45.32 | -56.4 | 0.0 | 0.9 | -57.3 | -25.0 | 32.3 |
| 665.000 | V | 46.62 | -57.8 | 0.0 | 0.9 | -58.7 | -25.0 | 33.7 |

**LTE Band 12 (30MHz-10GHz)**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency:707.5MHz | | | | | | | | |
| 1415.000 | H | 55.65 | -57.9 | 9.0 | 1.2 | -50.1 | -13.0 | 37.1 |
| 1415.000 | V | 51.78 | -62.2 | 9.0 | 1.2 | -54.4 | -13.0 | 41.4 |
| 2122.500 | H | 51.69 | -61.1 | 11.2 | 1.1 | -51.0 | -13.0 | 38.0 |
| 2122.500 | V | 50.48 | -62.3 | 11.2 | 1.1 | -52.2 | -13.0 | 39.2 |
| 2830.000 | H | 52.44 | -59.6 | 13.4 | 1.4 | -47.6 | -13.0 | 34.6 |
| 2830.000 | V | 49.31 | -63 | 13.4 | 1.4 | -51.0 | -13.0 | 38.0 |
| 3537.500 | H | 48.49 | -61.6 | 13.9 | 1.6 | -49.3 | -13.0 | 36.3 |
| 3537.500 | V | 47.84 | -62.3 | 13.9 | 1.6 | -50.0 | -13.0 | 37.0 |
| 2615.000 | H | 44.68 | -68.4 | 13.2 | 1.3 | -56.5 | -13.0 | 43.5 |
| 2615.000 | V | 44.37 | -69 | 13.2 | 1.3 | -57.1 | -13.0 | 44.1 |
| 347.000 | H | 46.03 | -60.8 | 0.0 | 0.6 | -61.4 | -13.0 | 48.4 |
| 347.000 | V | 47.52 | -61.6 | 0.0 | 0.6 | -62.2 | -13.0 | 49.2 |

**LTE Band 17 (30MHz-10GHz)**

| Frequency (MHz) | Polar (H/V) | Receiver Reading (dBμV) | Substituted Method | | | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---|---|---|---|---|---|---|---|---|
| | | | Substituted Level (dBm) | Antenna Gain (dBd/dBi) | Cable Loss (dB) | | | |
| QPSK,Frequency:710.000 MHz | | | | | | | | |
| 1420.000 | H | 58.74 | -54.9 | 9.1 | 1.2 | -47.0 | -13.0 | 34.0 |
| 1420.000 | V | 54.94 | -59.2 | 9.1 | 1.2 | -51.3 | -13.0 | 38.3 |
| 2130.000 | H | 51.79 | -61 | 11.2 | 1.1 | -50.9 | -13.0 | 37.9 |
| 2130.000 | V | 50.66 | -62.1 | 11.2 | 1.1 | -52.0 | -13.0 | 39.0 |
| 2840.000 | H | 52.46 | -59.6 | 13.4 | 1.4 | -47.6 | -13.0 | 34.6 |
| 2840.000 | V | 49.36 | -62.9 | 13.4 | 1.4 | -50.9 | -13.0 | 37.9 |
| 3550.000 | H | 48.31 | -61.8 | 14.0 | 1.6 | -49.4 | -13.0 | 36.4 |
| 3550.000 | V | 47.78 | -62.4 | 14.0 | 1.6 | -50.0 | -13.0 | 37.0 |
| 2615.000 | H | 44.84 | -68.2 | 13.2 | 1.3 | -56.3 | -13.0 | 43.3 |
| 2615.000 | V | 44.61 | -68.7 | 13.2 | 1.3 | -56.8 | -13.0 | 43.8 |
| 455.000 | H | 46.53 | -58 | 0.0 | 0.7 | -58.7 | -13.0 | 45.7 |
| 455.000 | V | 47.17 | -60.5 | 0.0 | 0.7 | -61.2 | -13.0 | 48.2 |

Note:
1) The unit of Antenna Gain is dBd for frequency below 1GHz, and the unit of Antenna Gain is dBi for frequency above 1GHz.
2) Absolute Level = Substituted Level - Cable loss + Antenna Gain
3) Margin = Limit-Absolute Level

# FCC §22.917(a) & §24.238(a) & §27.53 - BAND EDGES

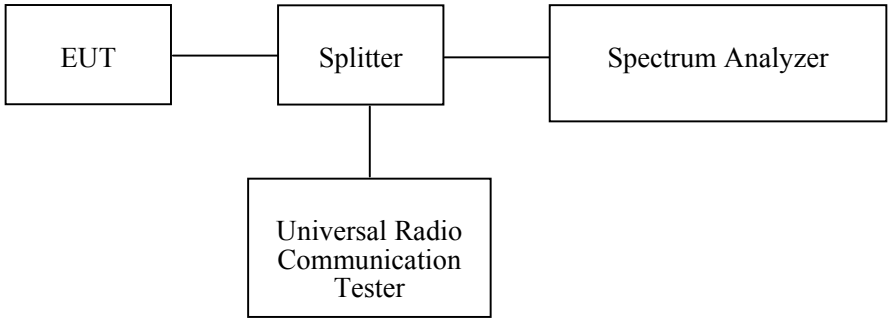
## Applicable Standard

FCC § 2.1053, §22.917, § 24.238 and § 27.53.

## Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency.




## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| R&S | Universal Radio Communication Tester | CMU200 | 109 038 | 2017-07-18 | 2018-07-18 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 | 2017-08-31 | 2018-08-31 |
| Unknown | Coaxial Cable | C-SJ00-0010 | C0010/03 | Each Time | / |
| Pasternack | RF Coaxial Cable | 0.5m | C-5 | Each Time | / |
| E-Microwave | Two-way Spliter | ODP-1-6-2S | OE0120142 | Each Time | / |
| Unknown | RF Attenuator | 6dB | 6dB-1 | Each Time | / |
| R&S | Spectrum Analyzer | FSIQ 26 | 831929/005 | 2017-08-31 | 2018-08-31 |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

# Test Data

## Environmental Conditions

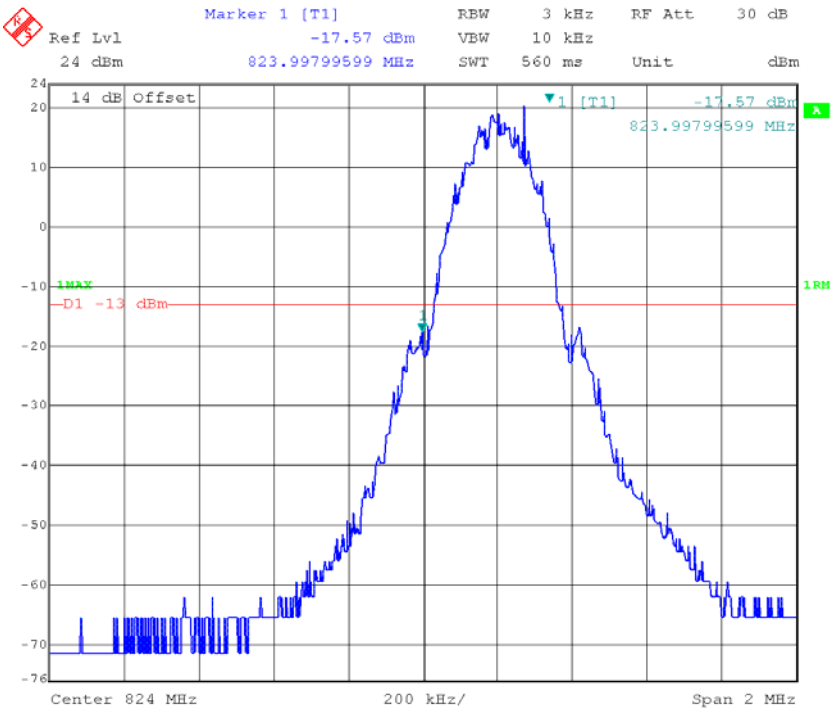
| | |
|---|---|
| **Temperature:** | 22.1~24.6°C |
| **Relative Humidity:** | 30~50 % |
| **ATM Pressure:** | 101.4~101.5 kPa |

*The testing was performed by Pean Zhu from 2017-11-26 to 2017-12-19.*

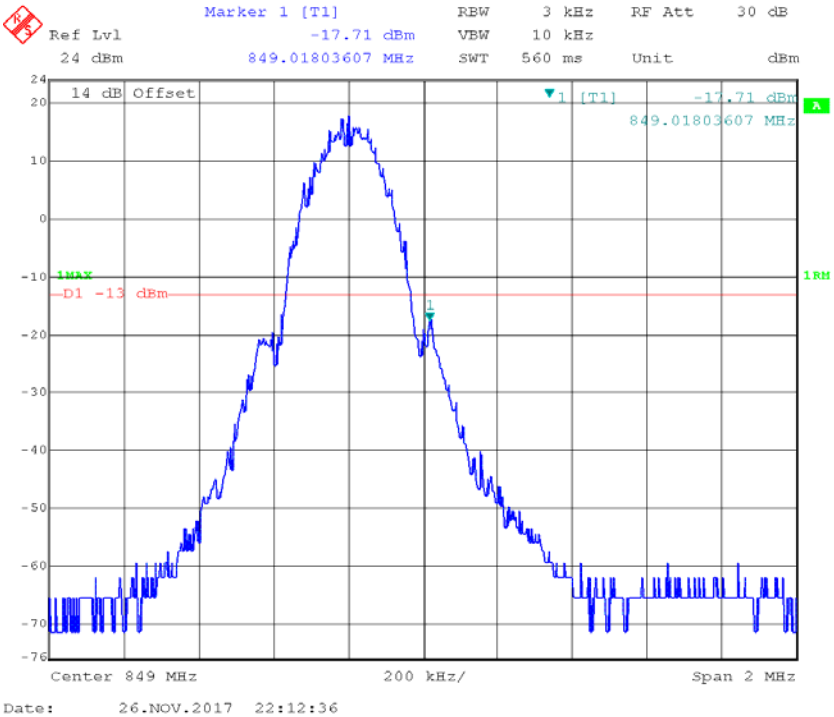
*Test Mode: Transmitting*

*Test Result: Compliant. Please refer to the following plots.*

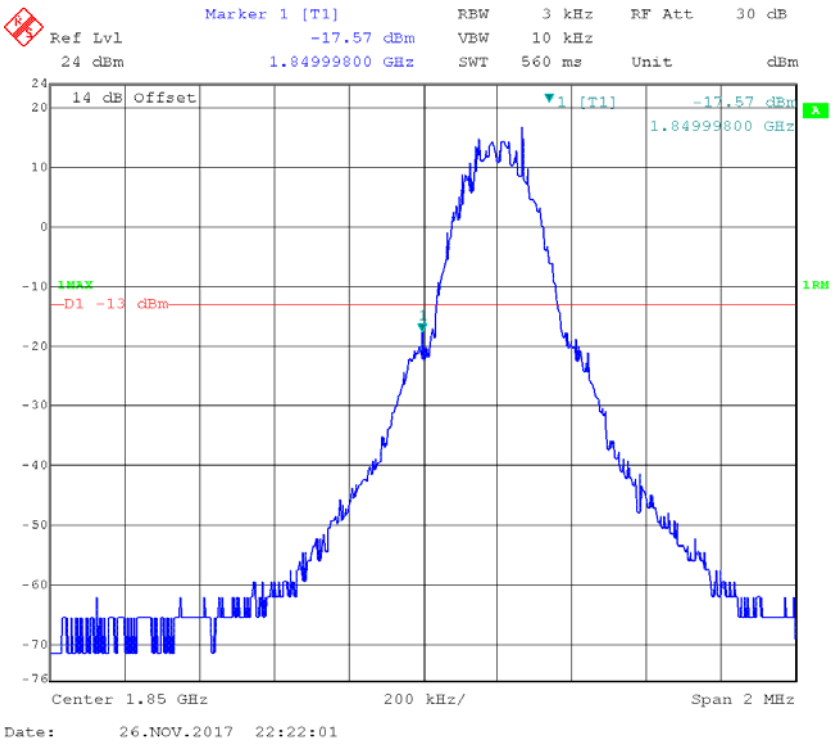
**GSM 850, Left Band Edge**



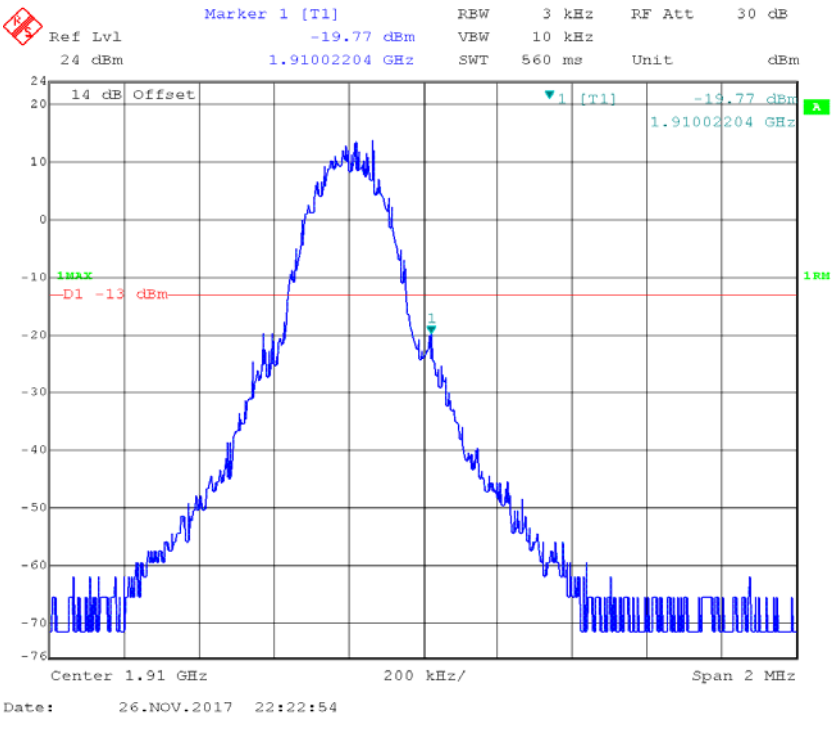

**GSM 850, Right Band Edge**



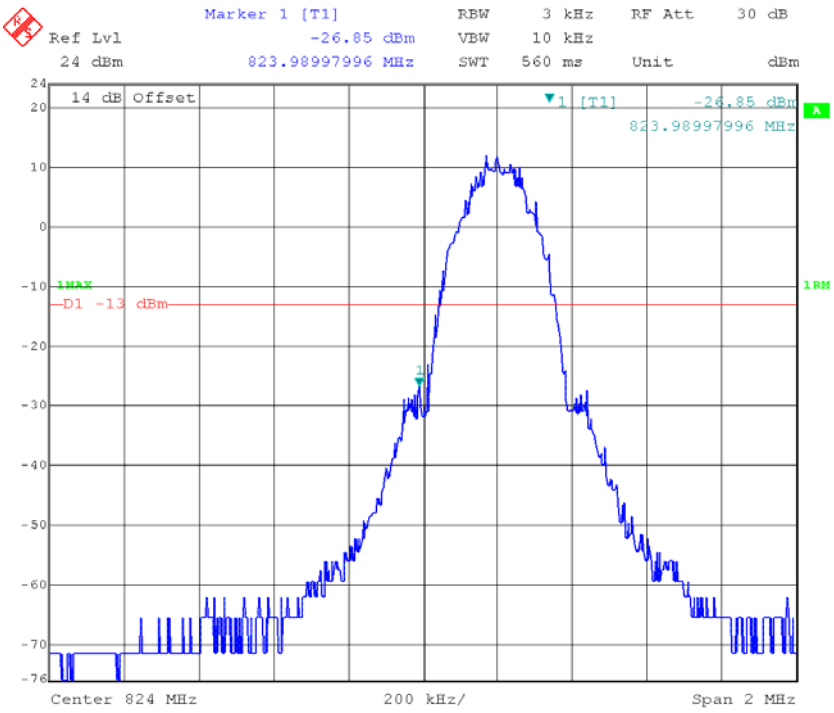
**GSM 1900, Left Band Edge**



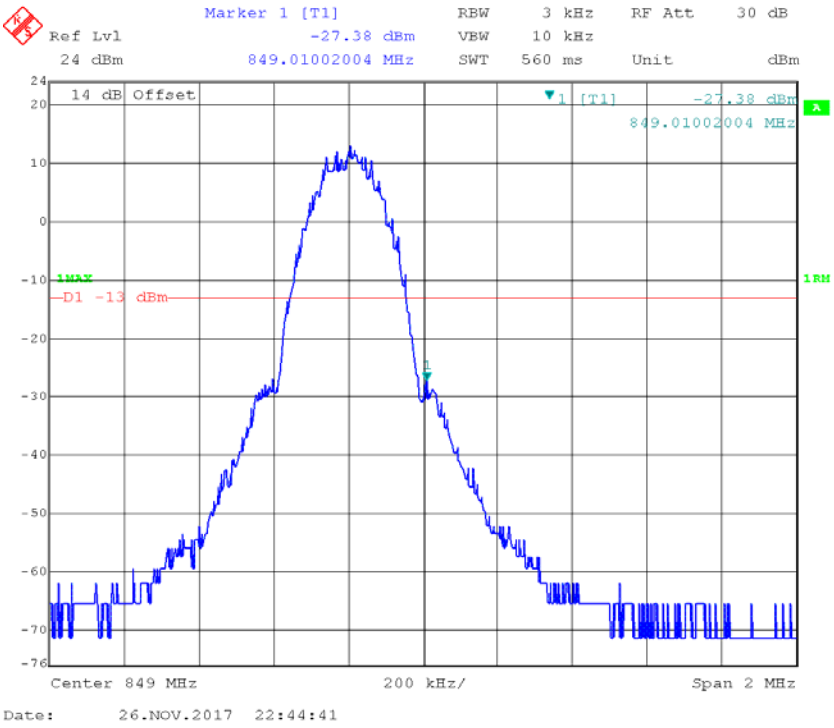

**GSM 1900, Right Band Edge**



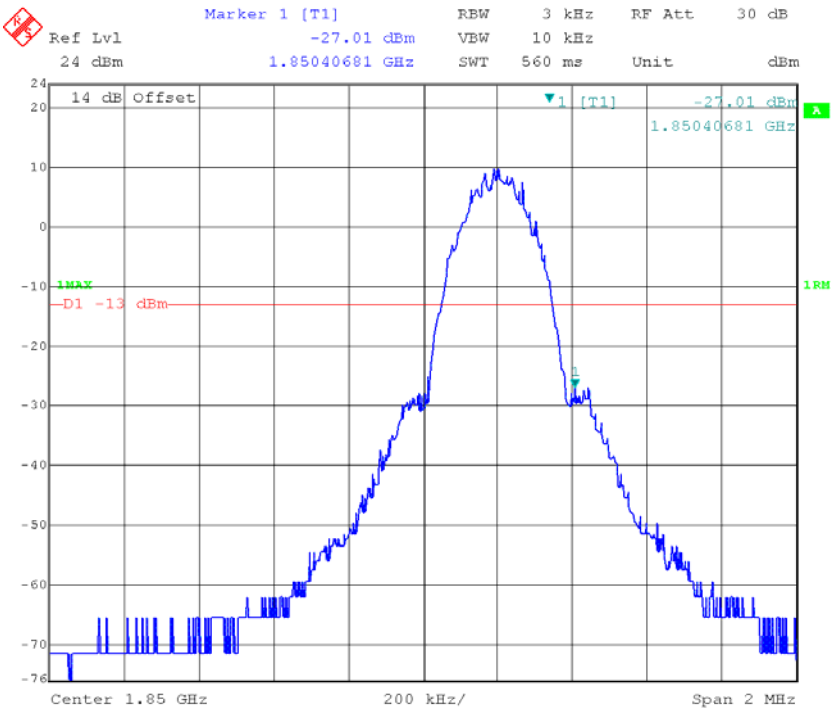
**EDGE 850, Left Band Edge**



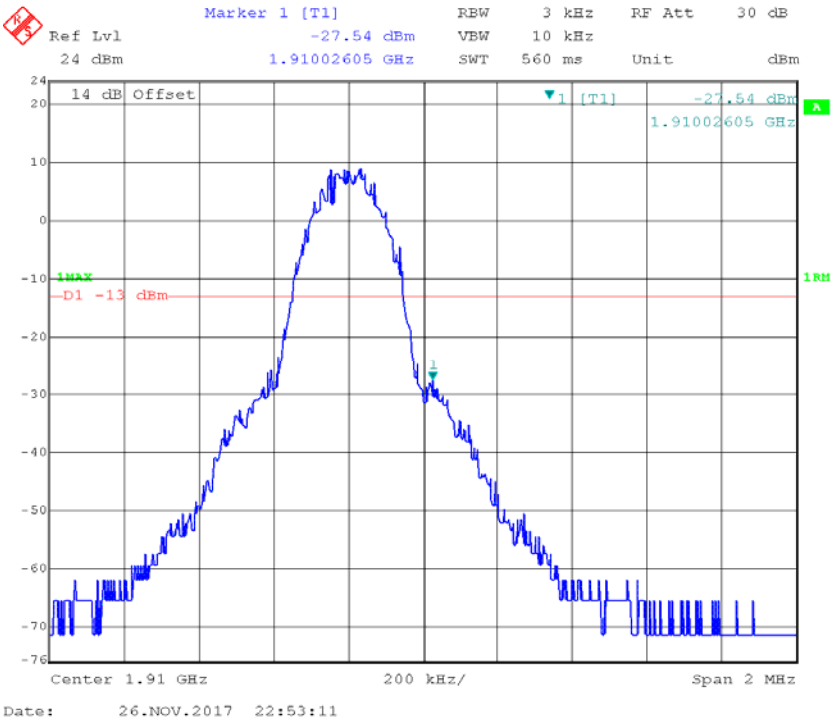

**EDGE 850, Right Band Edge**



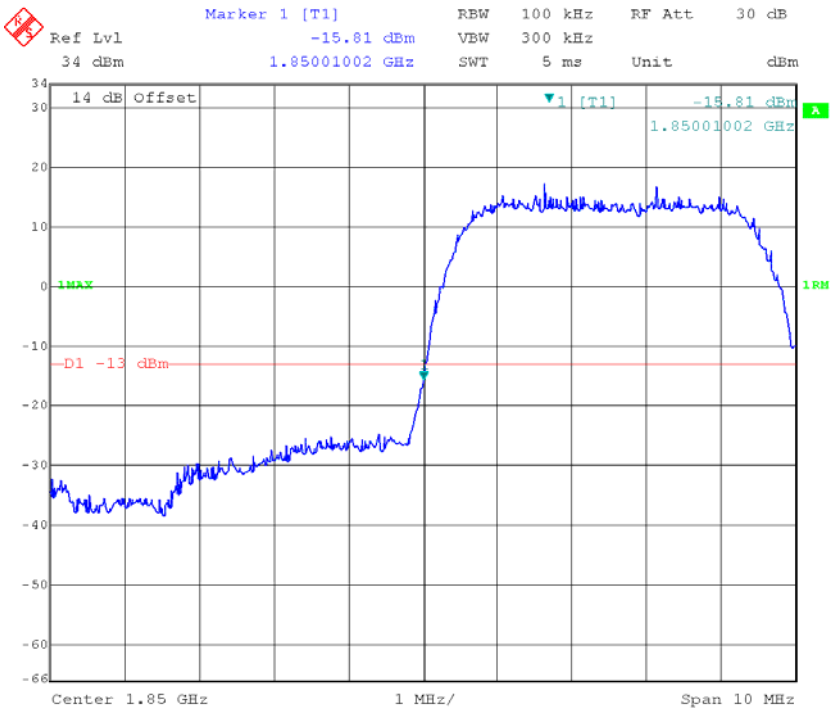
**EDGE 1900, Left Band Edge**



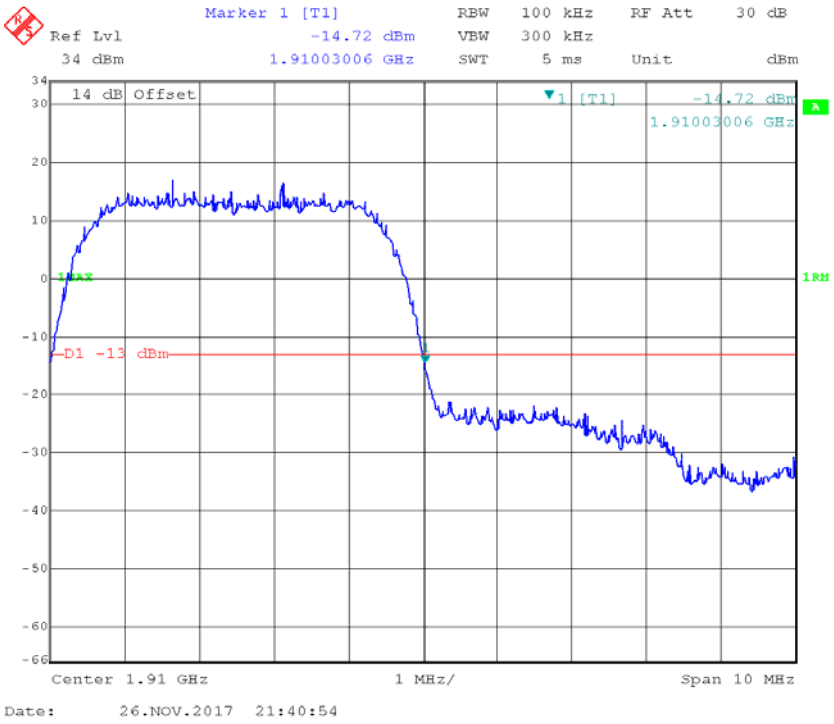

**EDGE 1900, Right Band Edge**



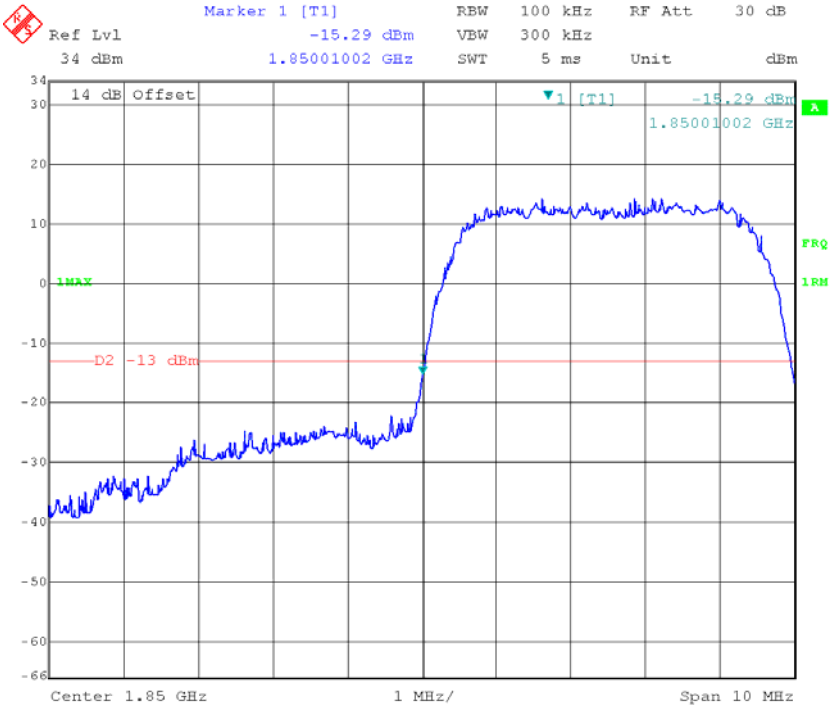
**WCDMA Band II Rel 99, Left Band Edge**



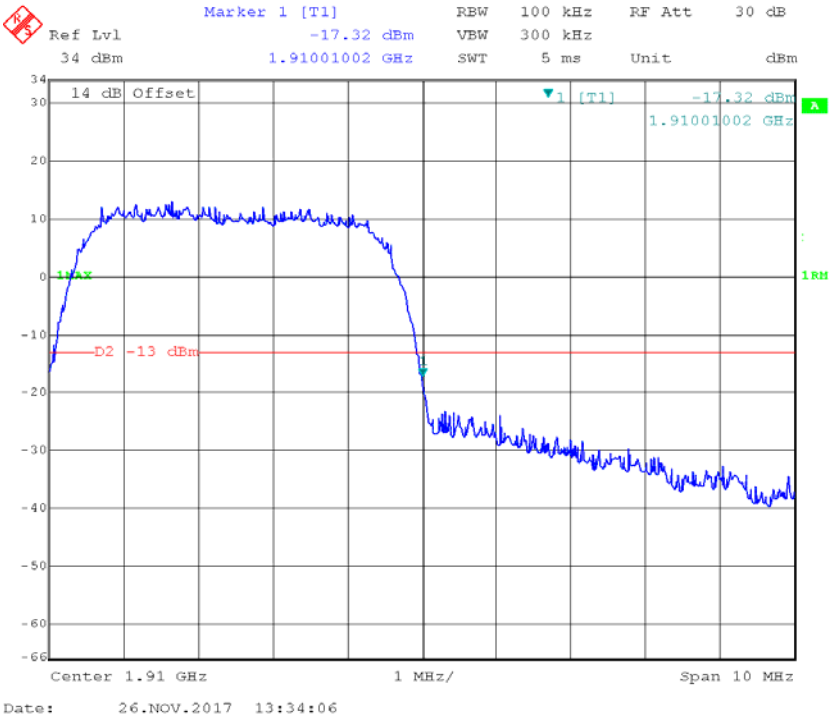

**WCDMA Band II Rel 99, Right Band Edge**



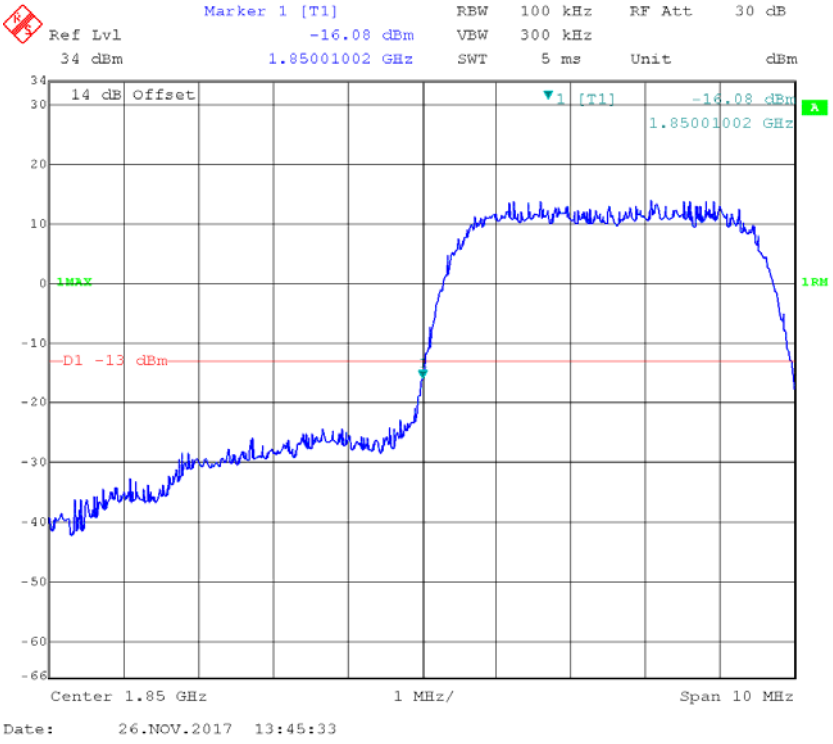
**WCDMA Band II HSUPA, Left Band Edge**



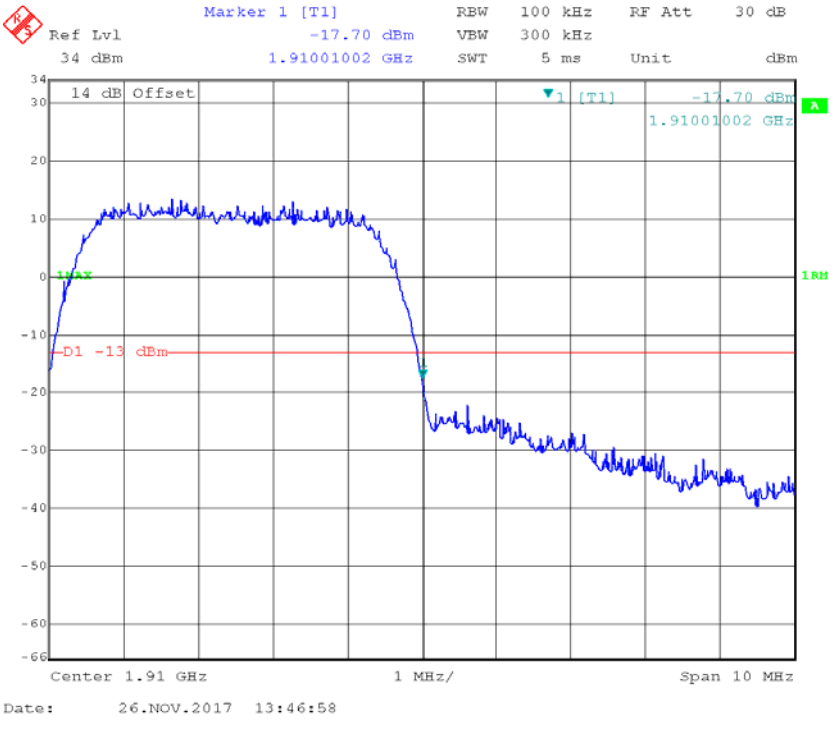

**WCDMA Band II HSUPA, Right Band Edge**



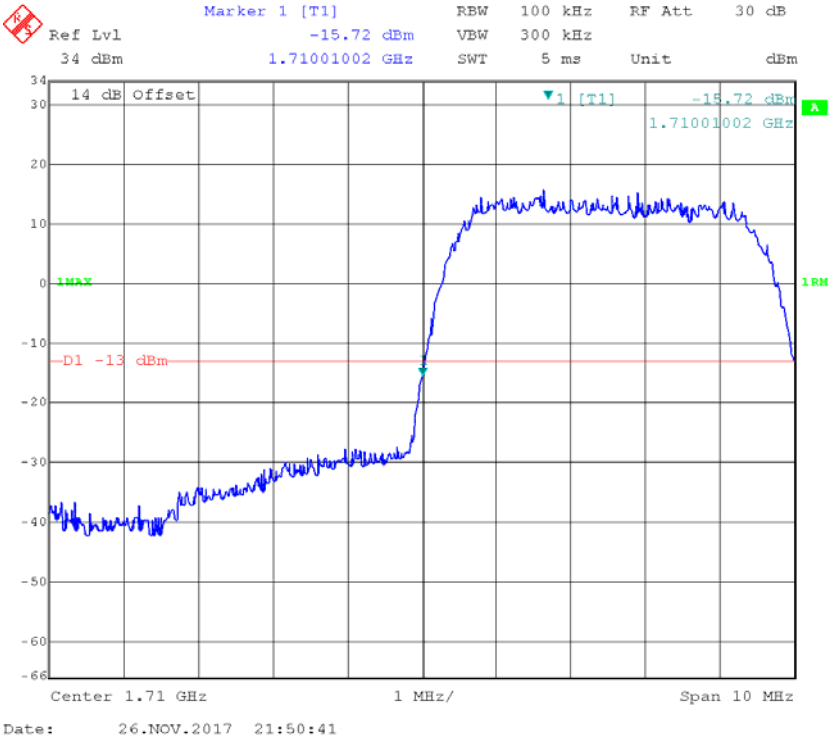
**WCDMA Band II HSDPA, Left Band Edge**



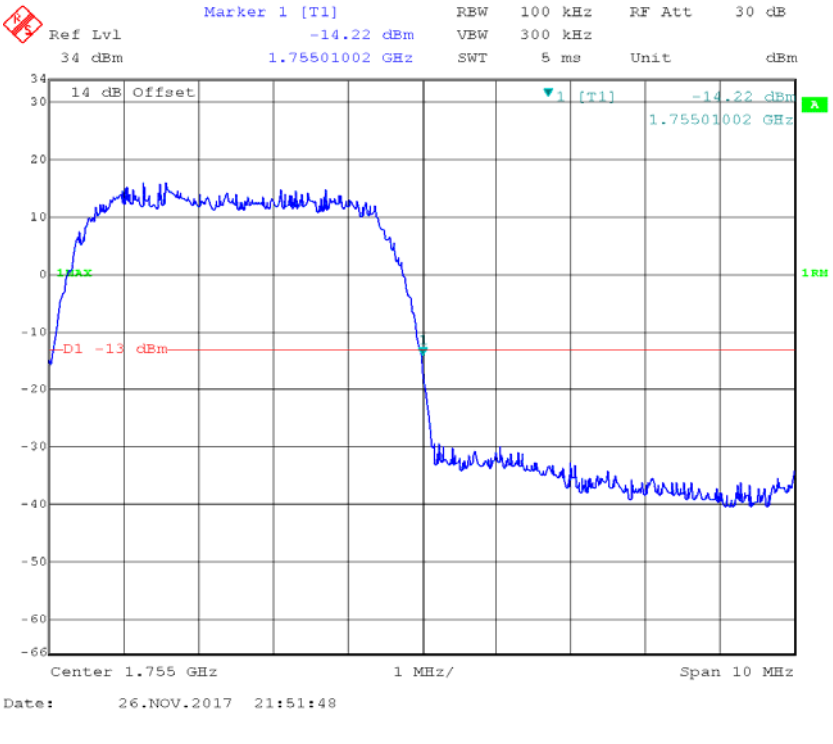

**WCDMA Band II HSDPA, Right Band Edge**



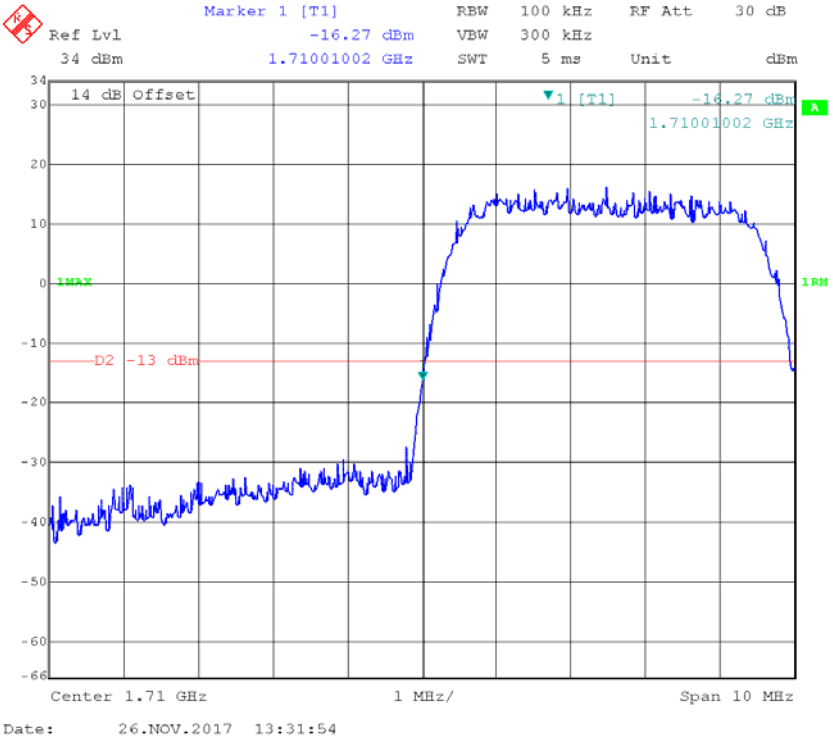
**WCDMA Band IV Rel 99, Left Band Edge**



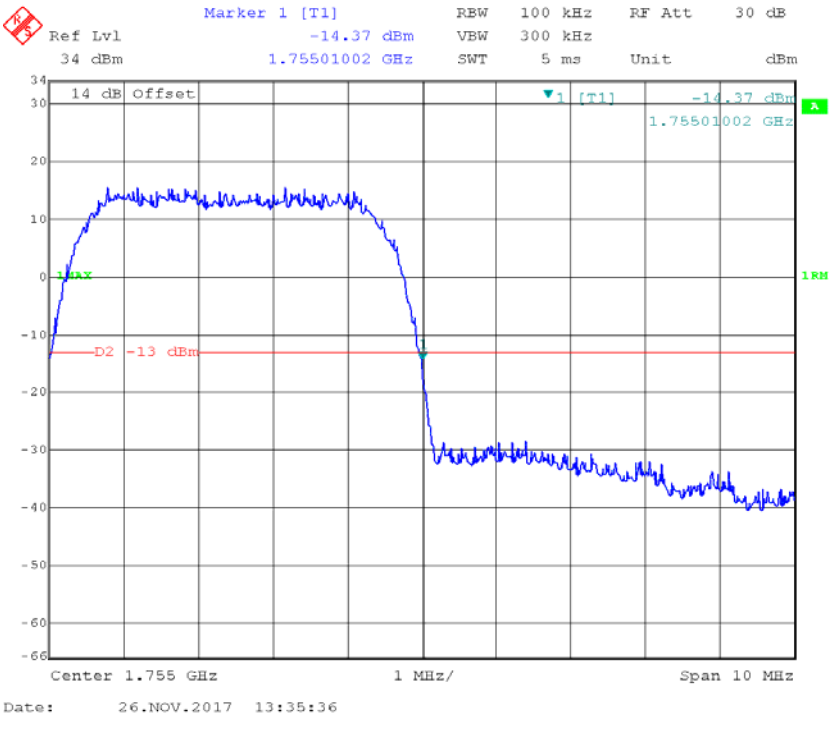

**WCDMA Band IV Rel 99, Right Band Edge**



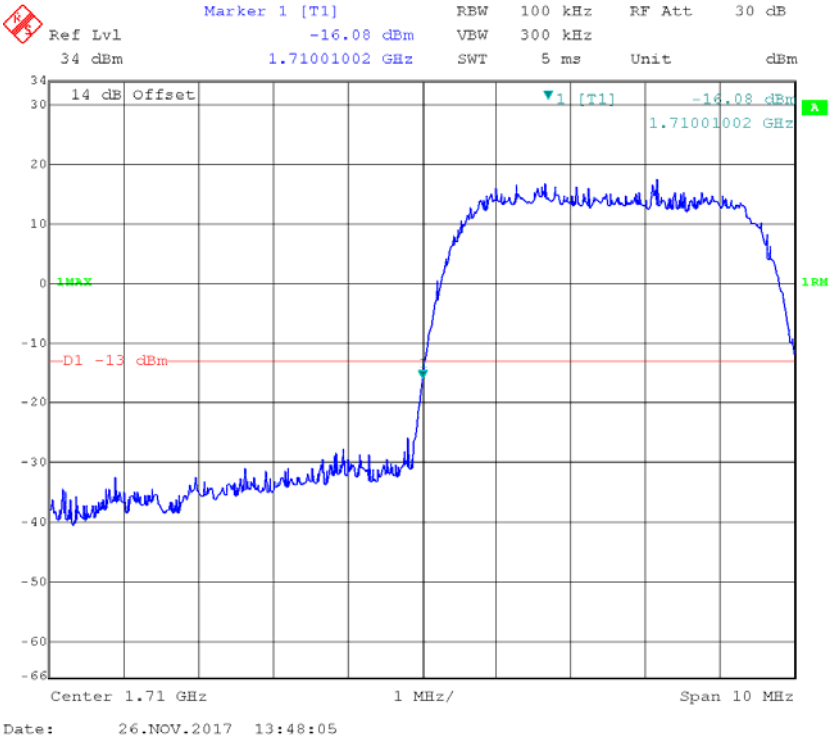
**WCDMA Band IV HSUPA, Left Band Edge**



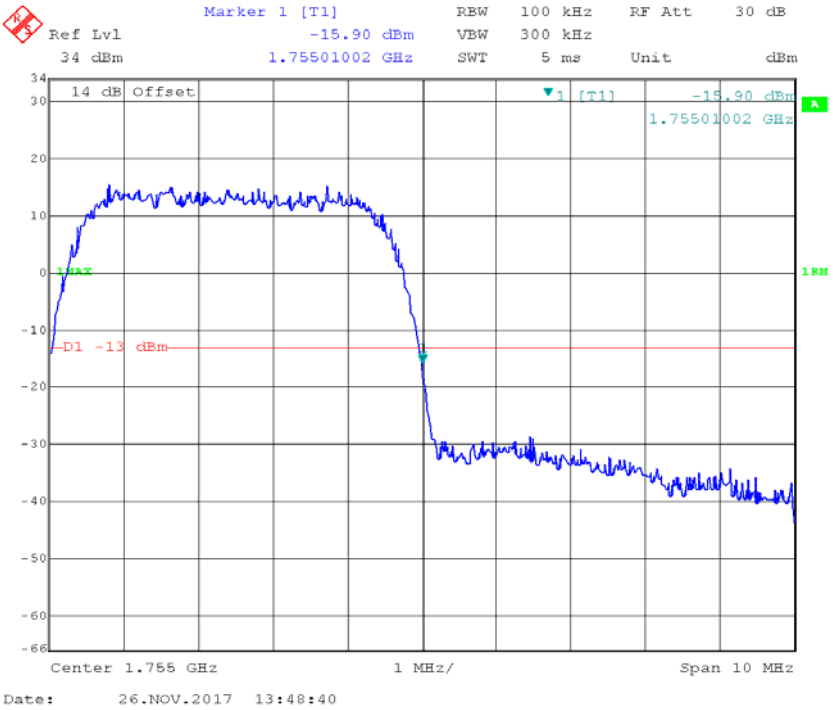

**WCDMA Band IV HSUPA, Right Band Edge**



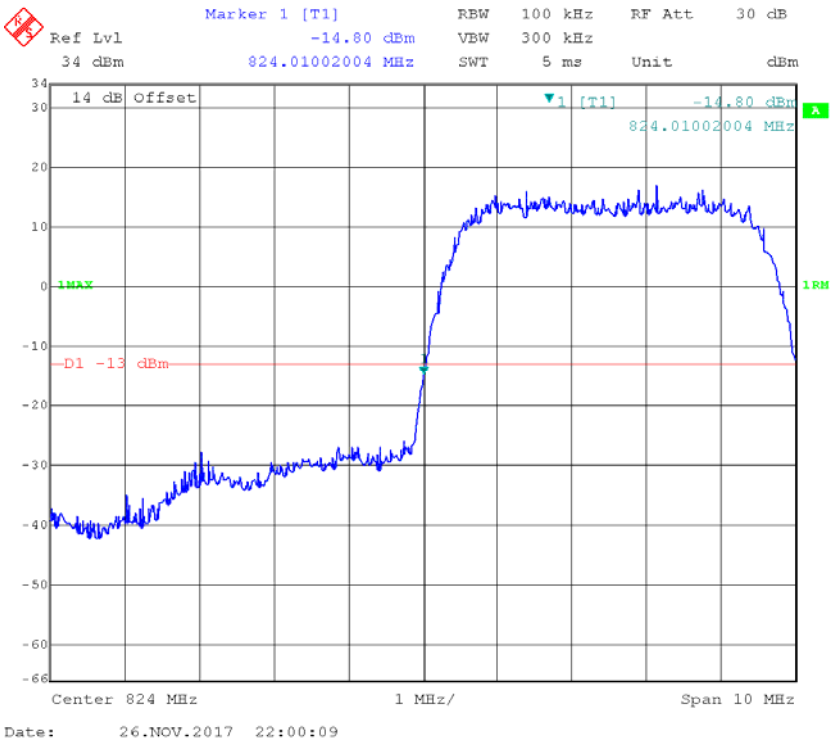
**WCDMA Band IV HSDPA, Left Band Edge**



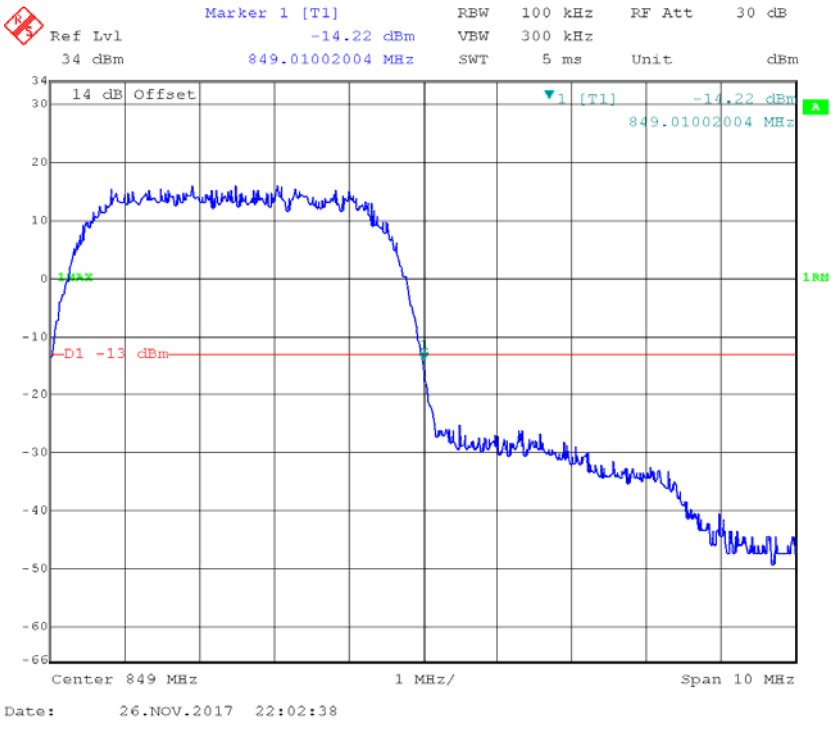

**WCDMA Band IV HSDPA, Right Band Edge**



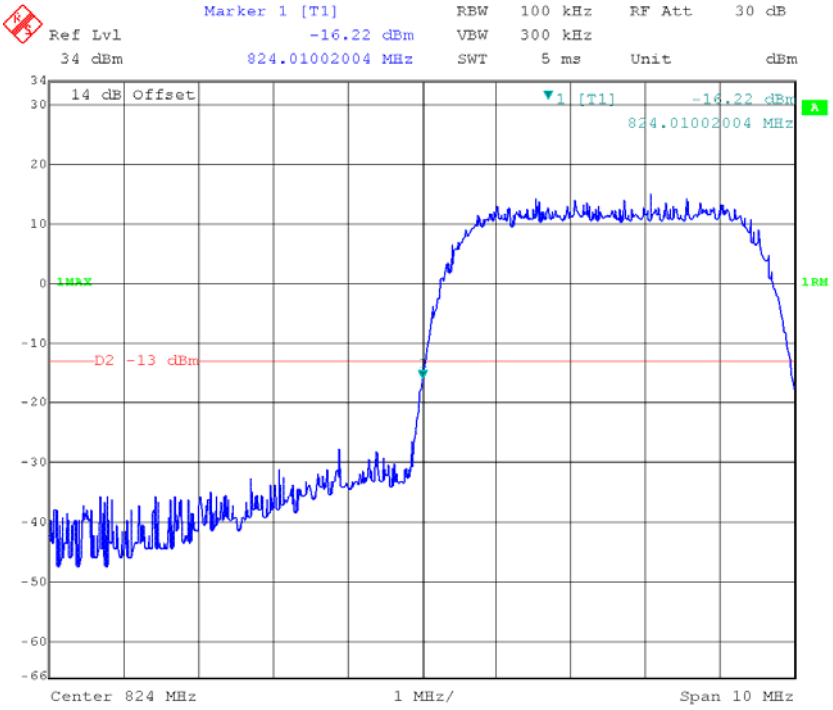
**WCDMA Band V Rel 99, Left Band Edge**




**WCDMA Band V Rel 99, Right Band Edge**

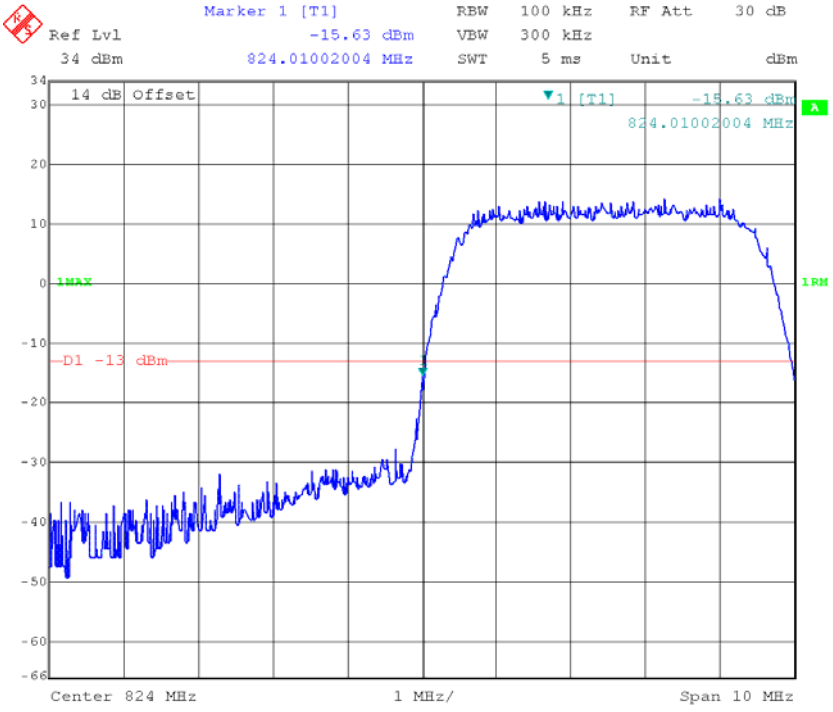


**WCDMA Band V HSUPA, Left Band Edge**

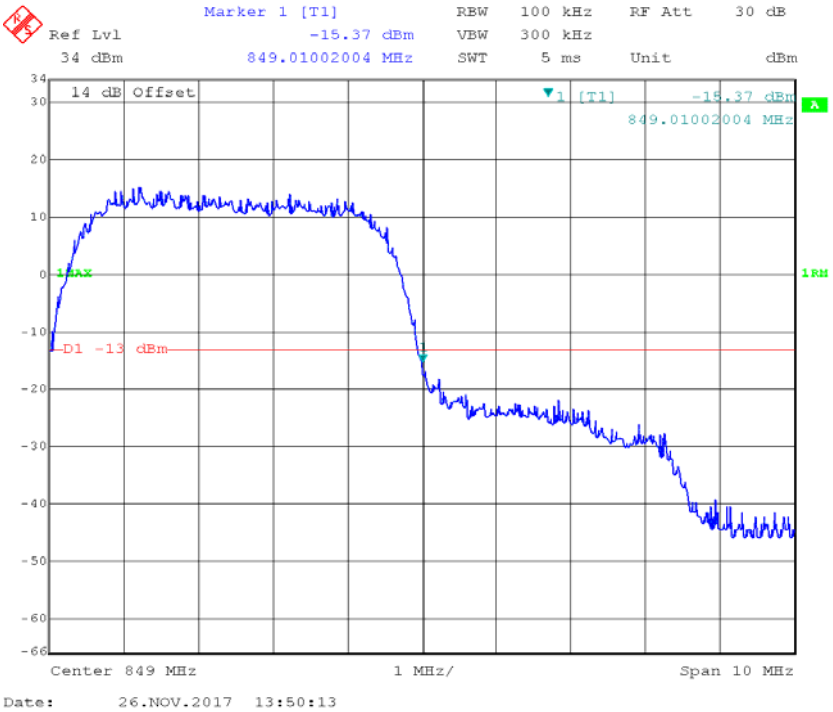



**WCDMA Band V HSUPA, Right Band Edge**

**WCDMA Band V HSDPA, Left Band Edge**

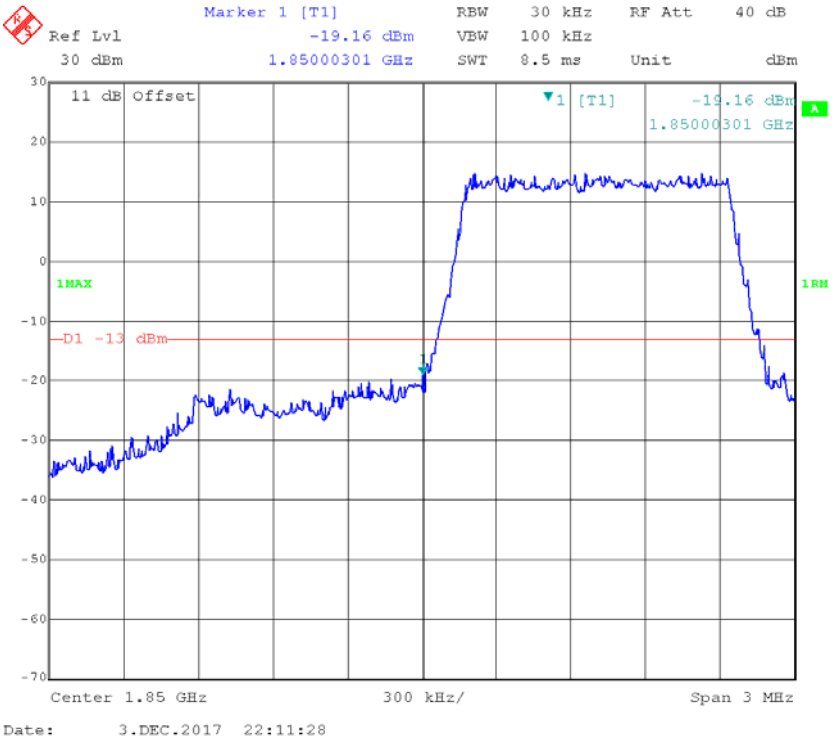



**WCDMA Band V HSDPA, Right Band Edge**

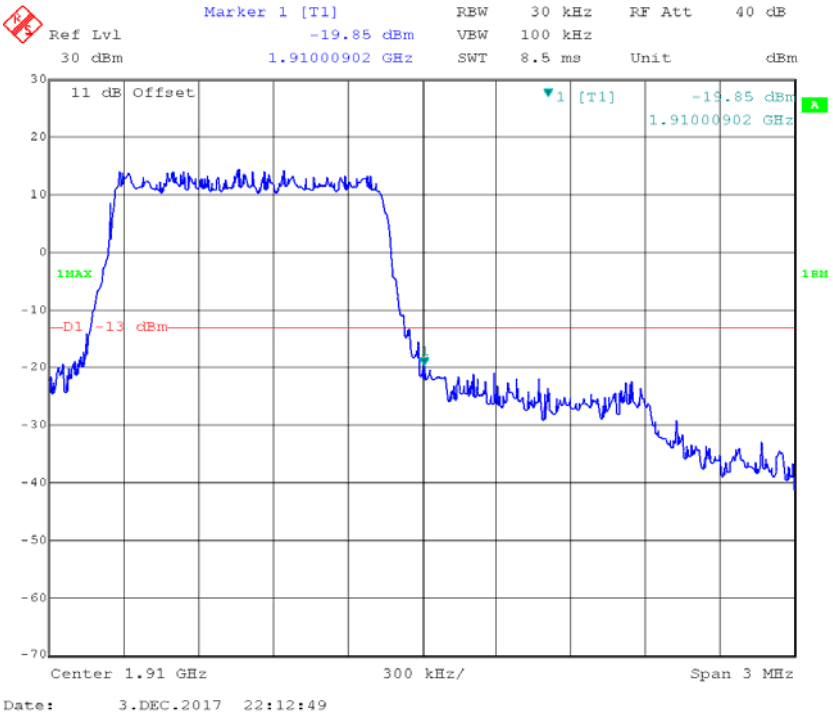


**LTE Band II**

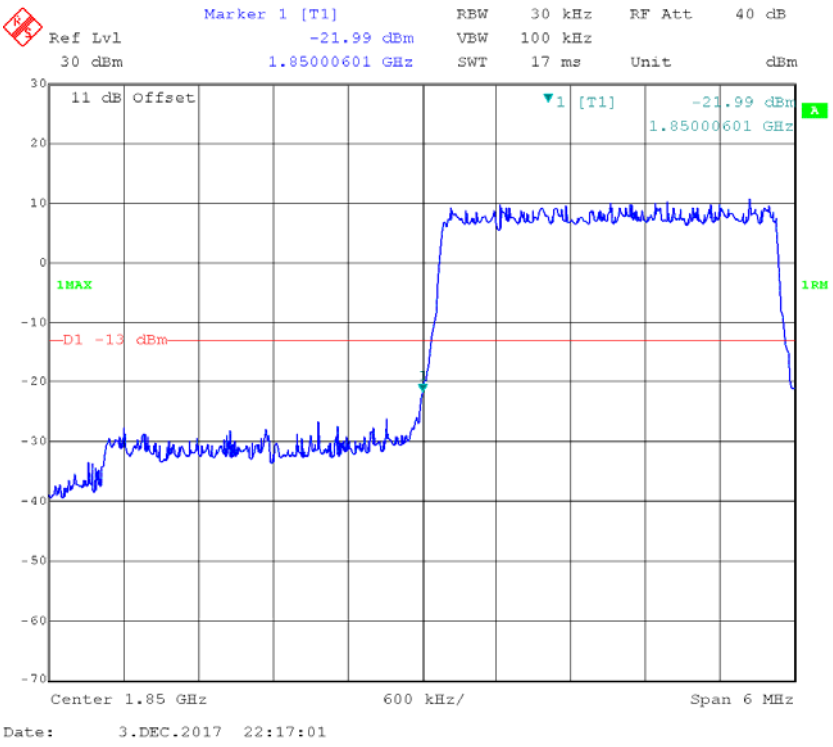
**QPSK_1.4MHz_ 6 RB_ Left**



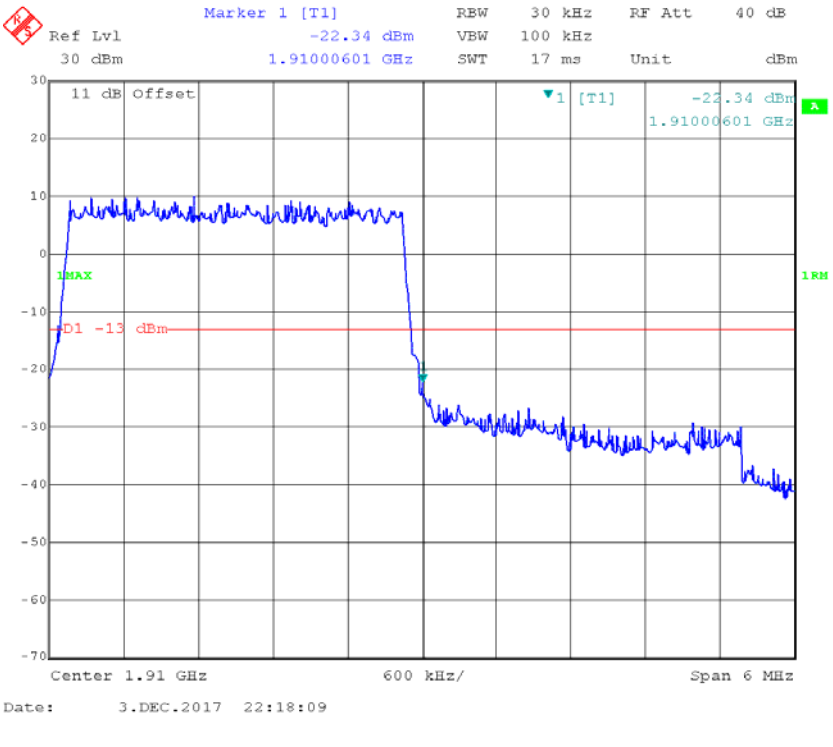

**QPSK_1.4MHz_ 6 RB_ Right**



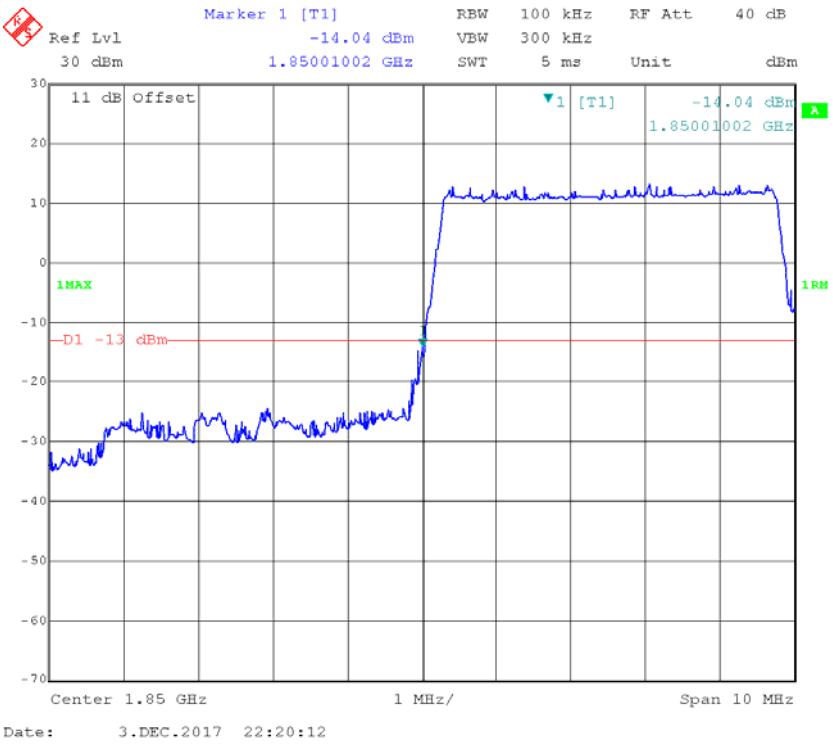
**QPSK_3MHz_ 15 RB_ Left**



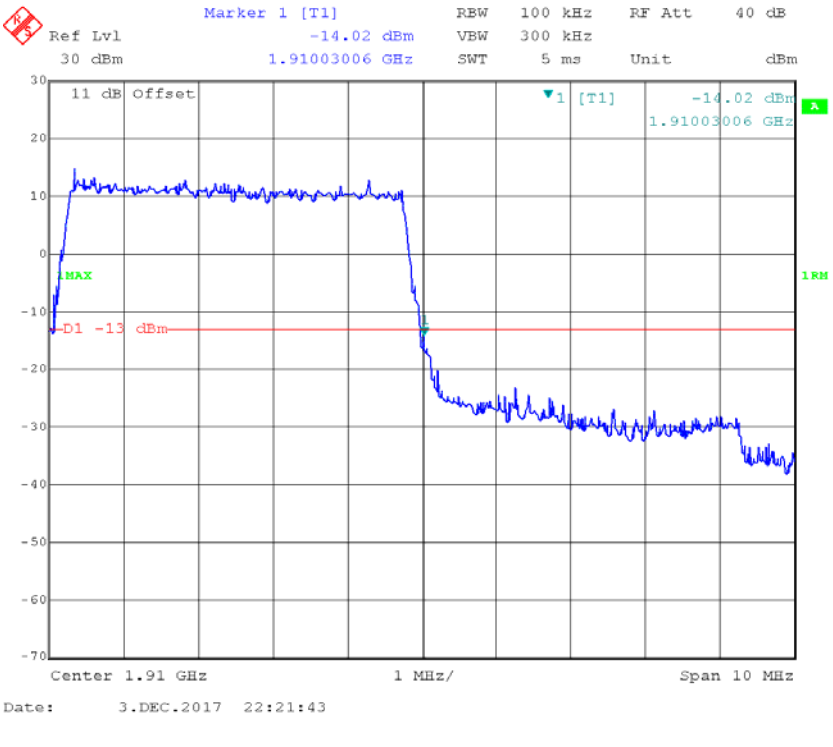

**QPSK_3MHz_ 15 RB_ Right**



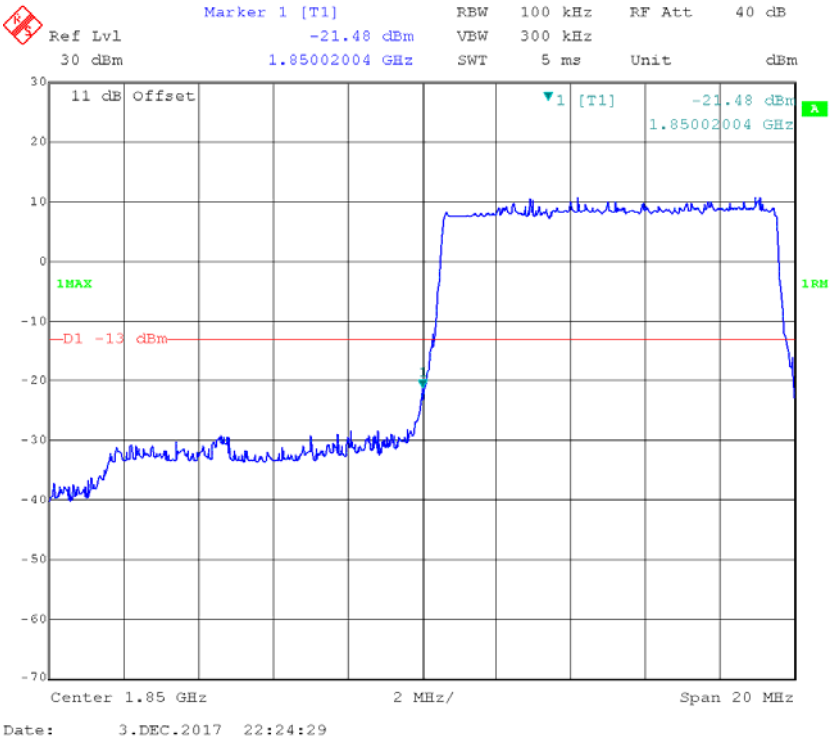
**QPSK_5MHz_ 25 RB_ Left**



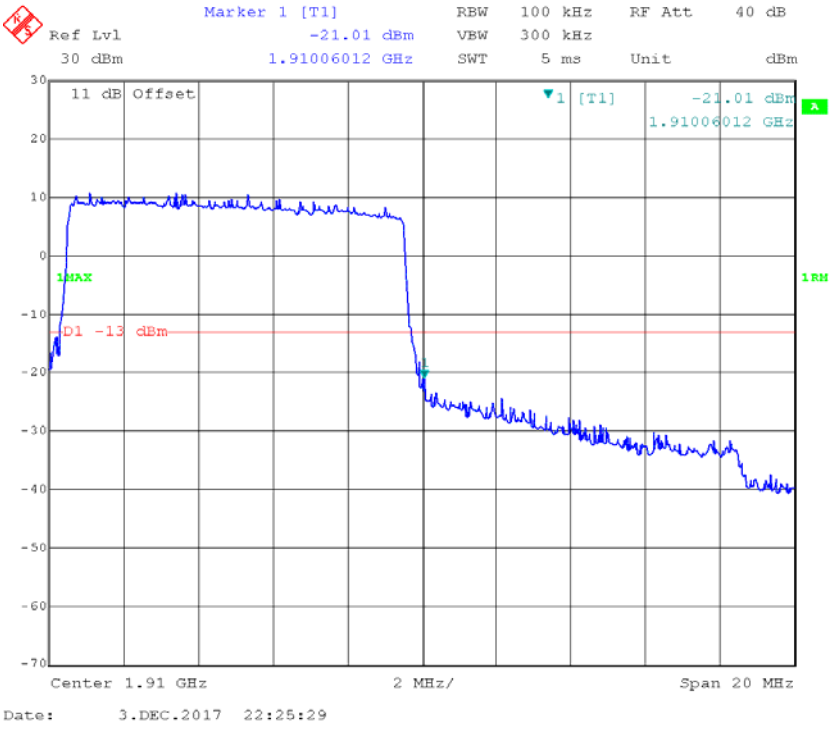

**QPSK_5MHz_ 25 RB_ Right**



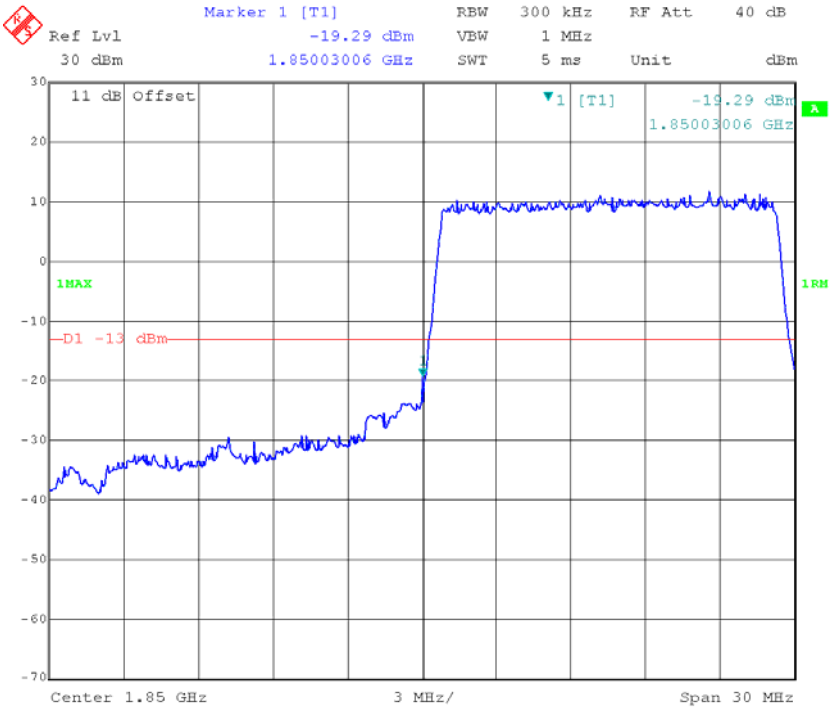
**QPSK_10MHz_ 50 RB_ Left**




**QPSK_10MHz_ 50 RB_ Right**

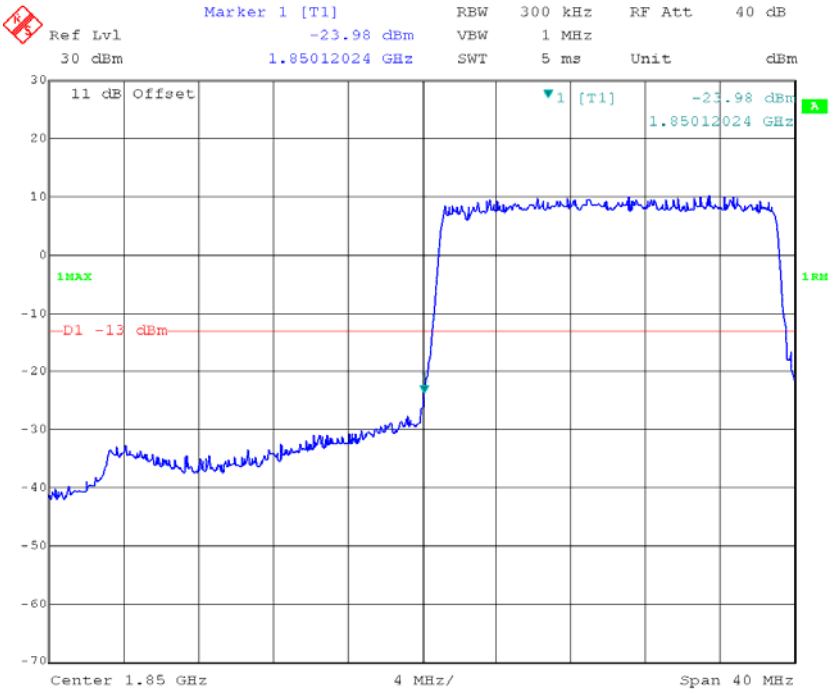


**QPSK_15MHz_ 75 RB_ Left**

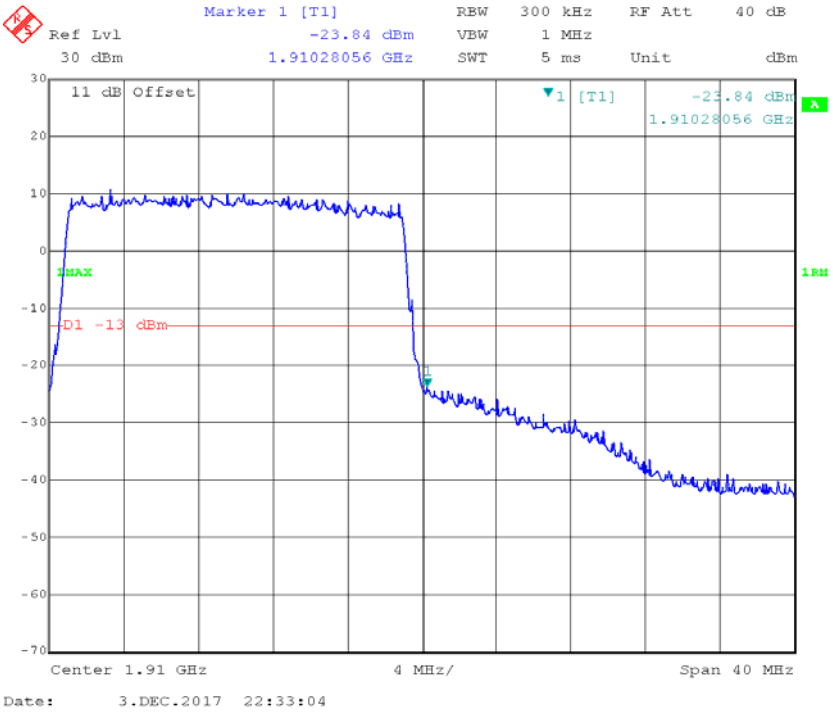



**QPSK_15MHz_ 75 RB_ Right**

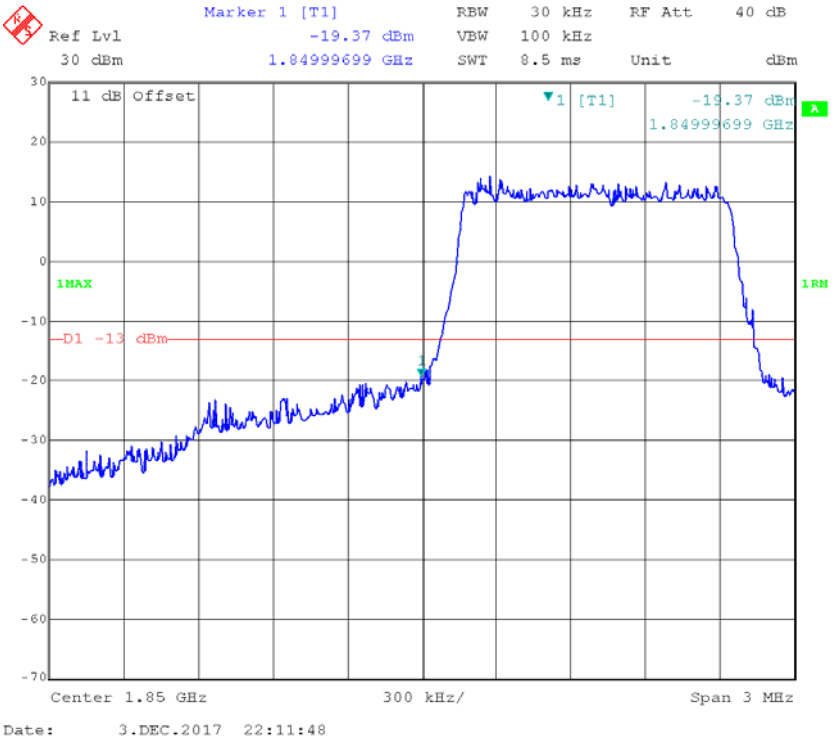
**QPSK_20MHz_ FULL RB_ Left**



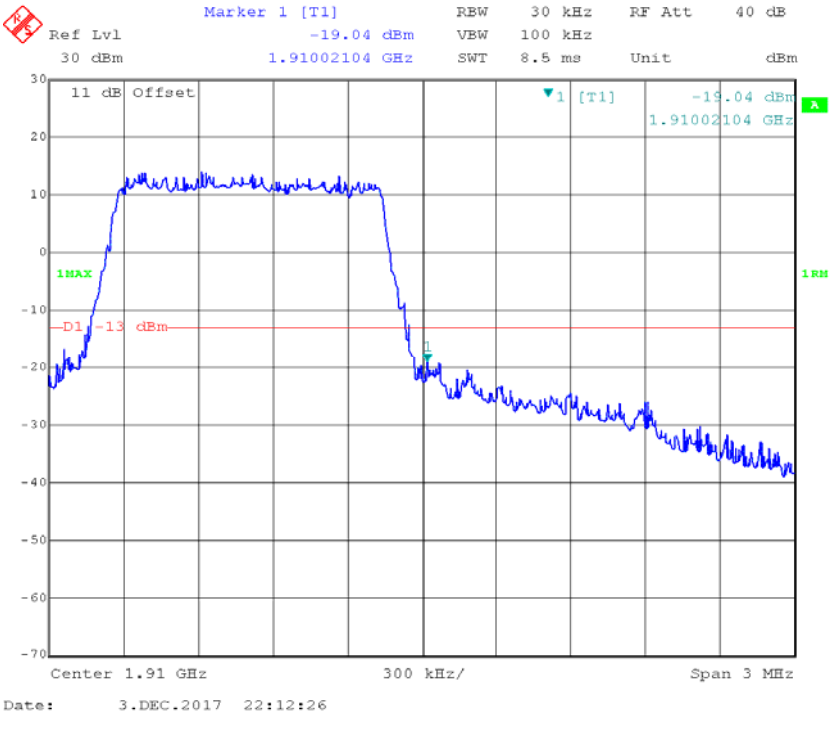

**QPSK_20MHz_ FULL RB_ Right**



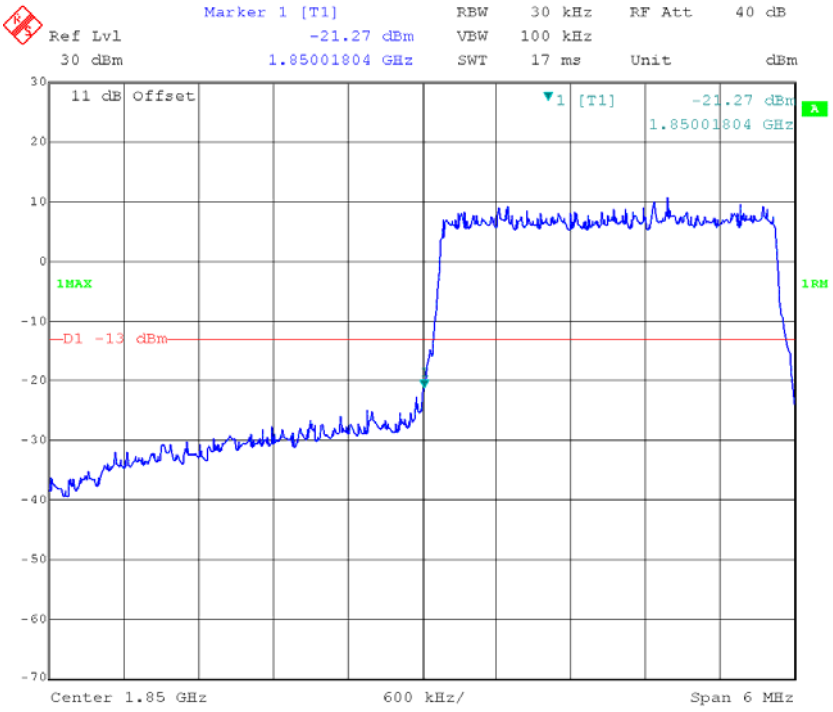
**16QAM_1.4MHz_ 6 RB_ Left**



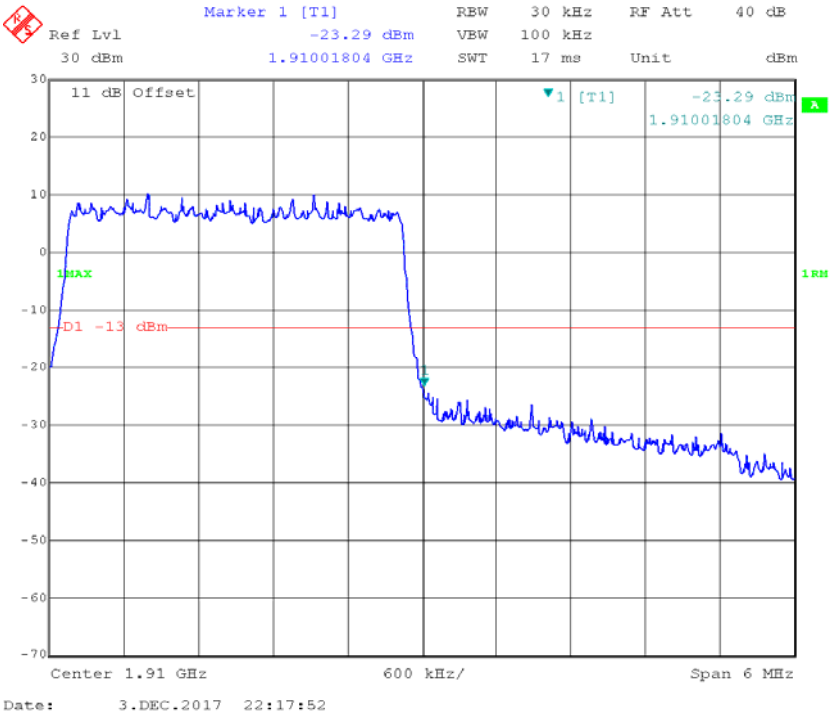

**16QAM_1.4MHz_ 6 RB_ Right**



**16QAM_3MHz_ 15 RB_ Left**

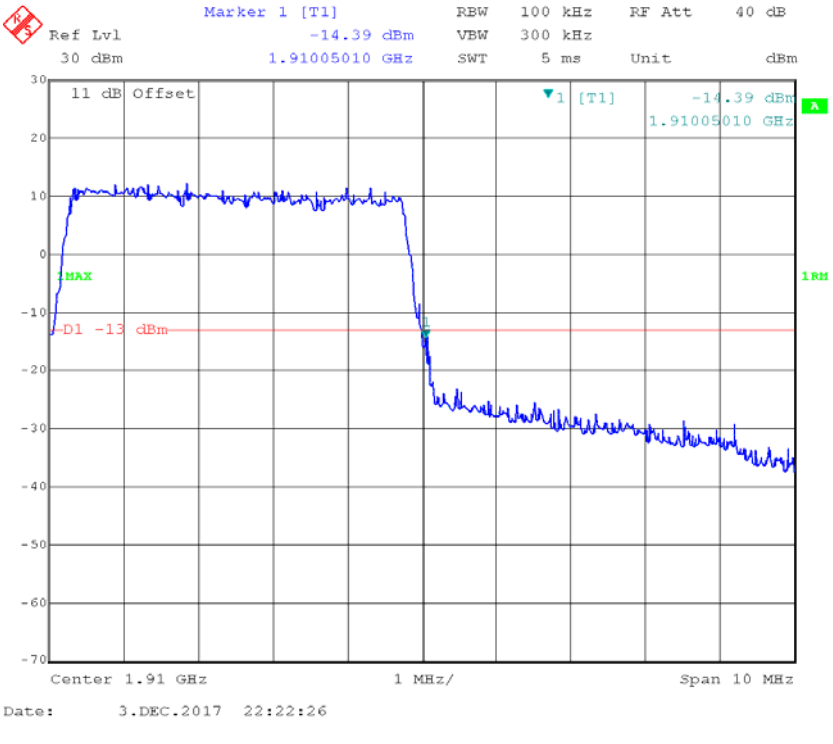



**16QAM_3MHz_ 15 RB_ Right**

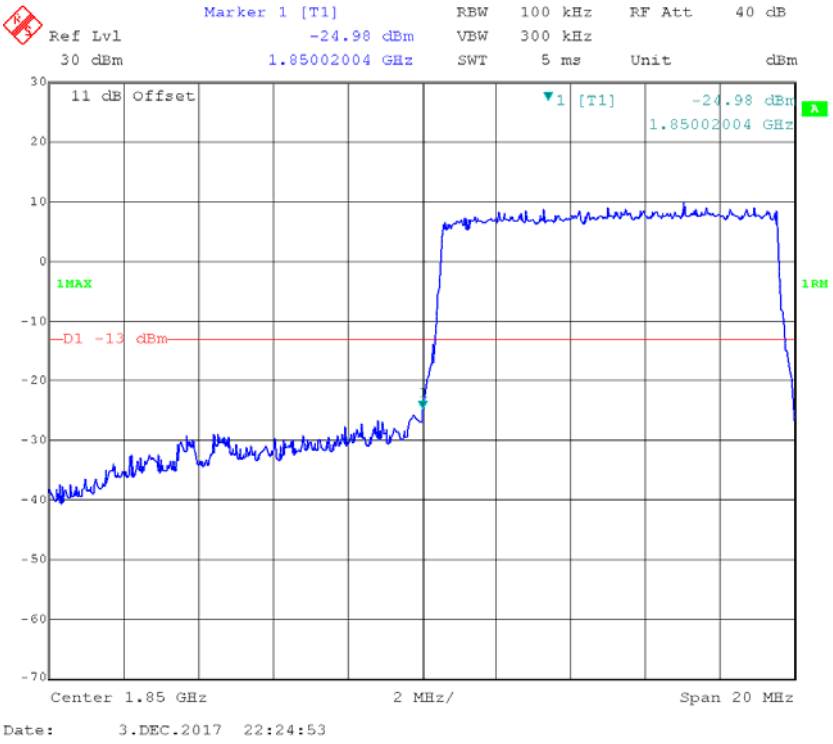


**16QAM_5MHz_ 25 RB_ Left**

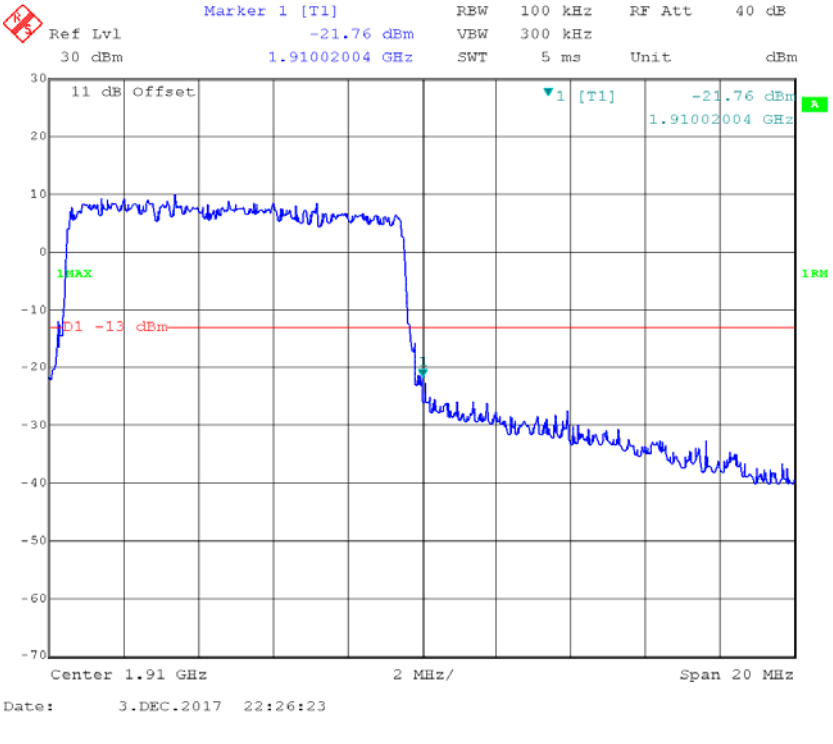

**16QAM_5MHz_ 25 RB_ Right**



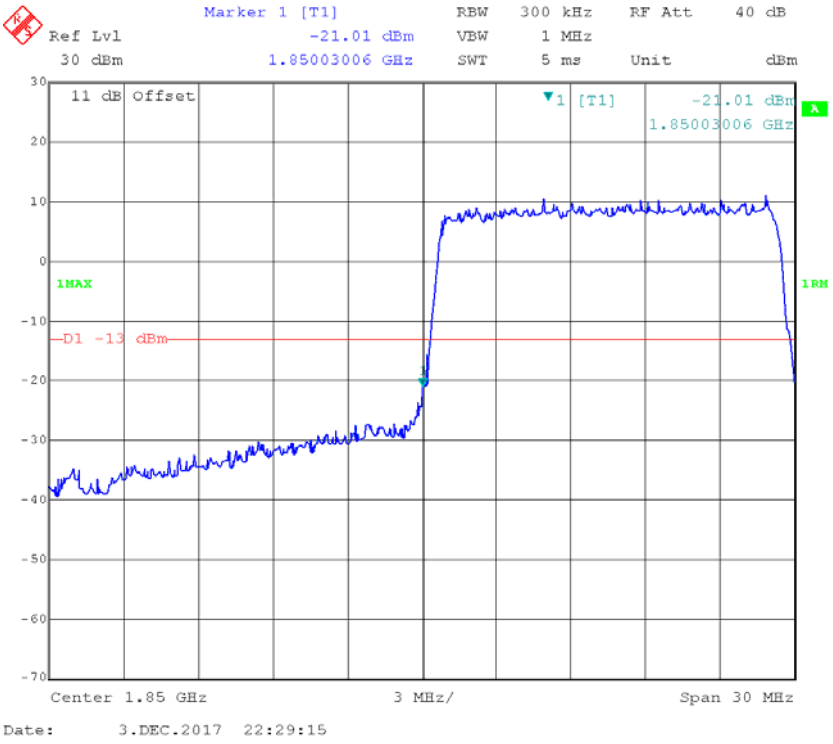
**16QAM_10MHz_ 50 RB_ Left**



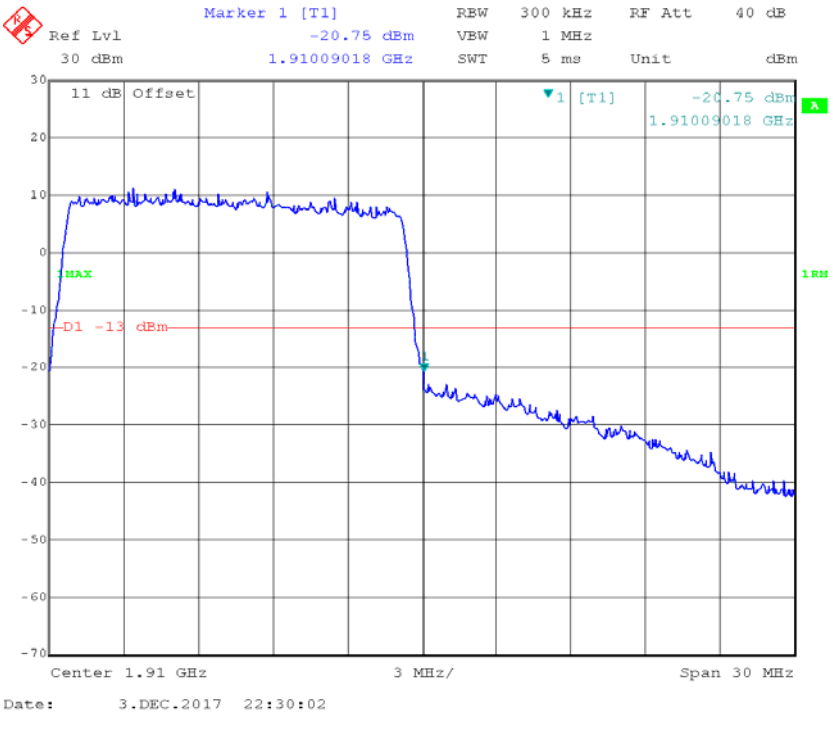

**16QAM_10MHz_ 50 RB_ Right**



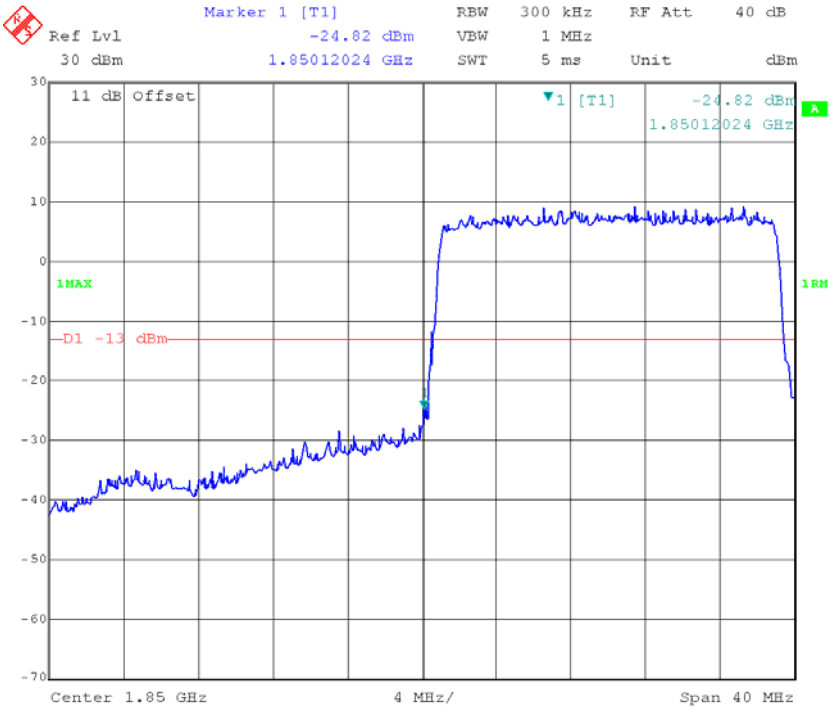
**16QAM_15MHz_ 75 RB_ Left**




**16QAM_15MHz_ 75 RB_ Right**



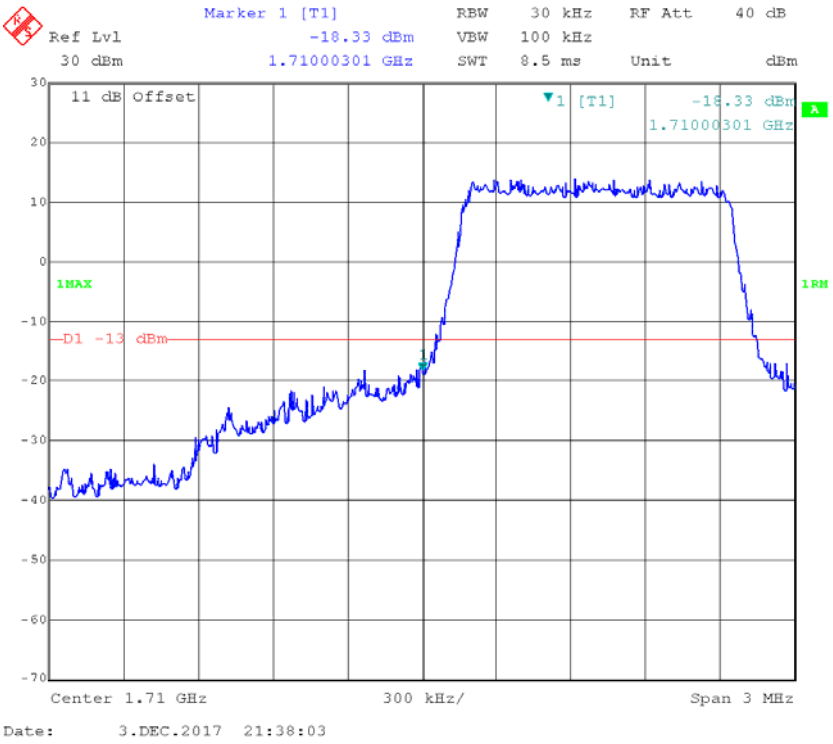
**16QAM_20MHz_ FULL RB_ Left**




**16QAM_20MHz_ FULL RB_ Right**

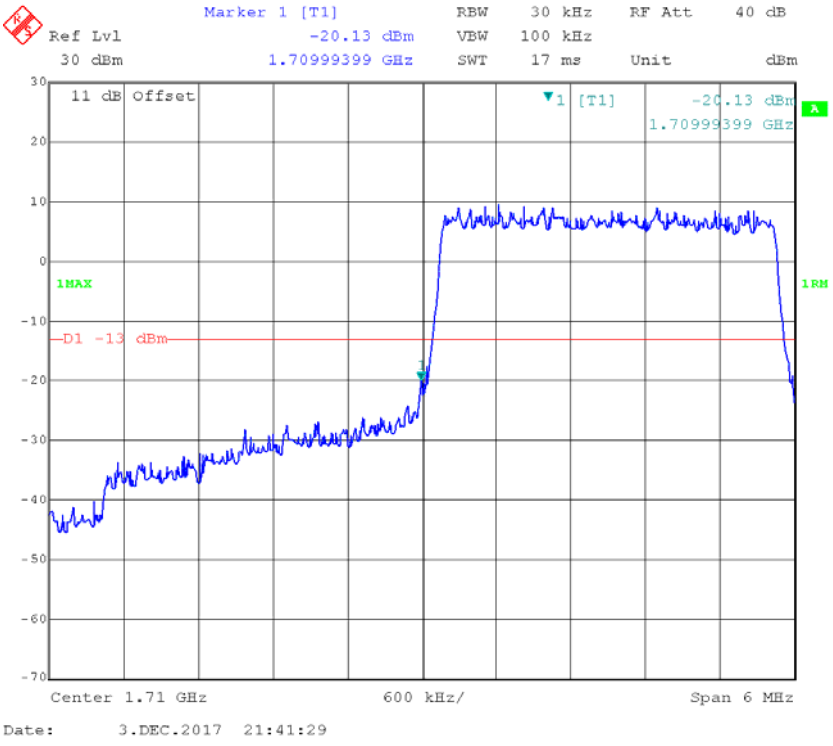
**LTE Band IV**

**QPSK_1.4MHz_ 6 RB_ Left**



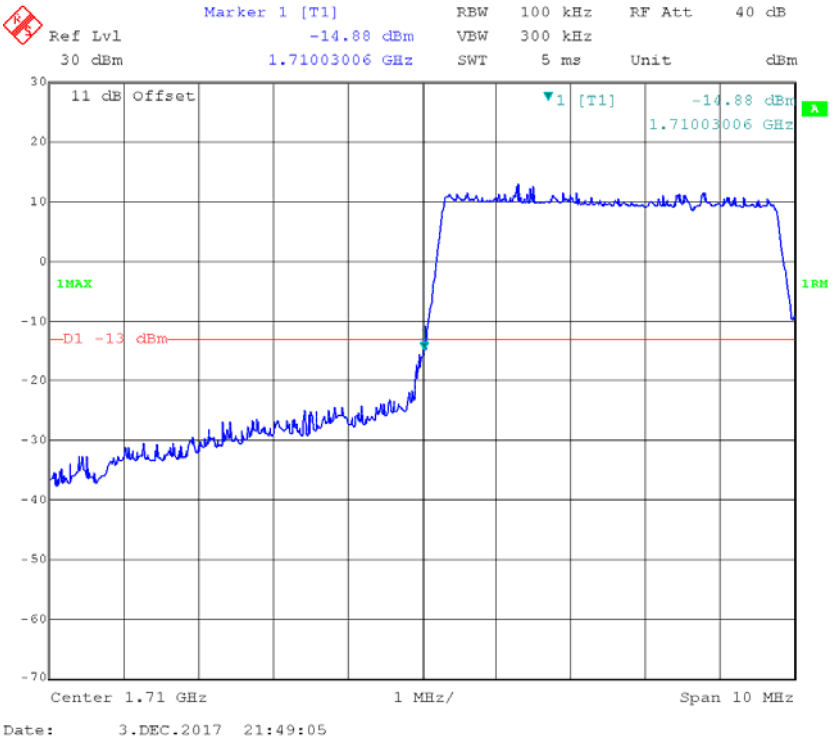

**QPSK_1.4MHz_ 6 RB_ Right**

**QPSK_3MHz_ 15 RB_ Left**

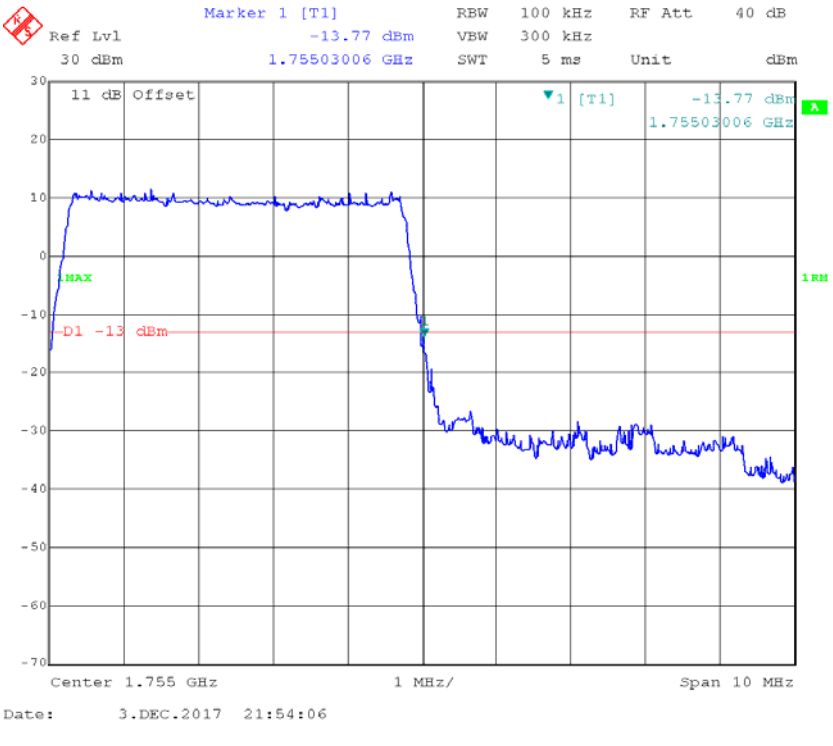



**QPSK_3MHz_ 15 RB_ Right**

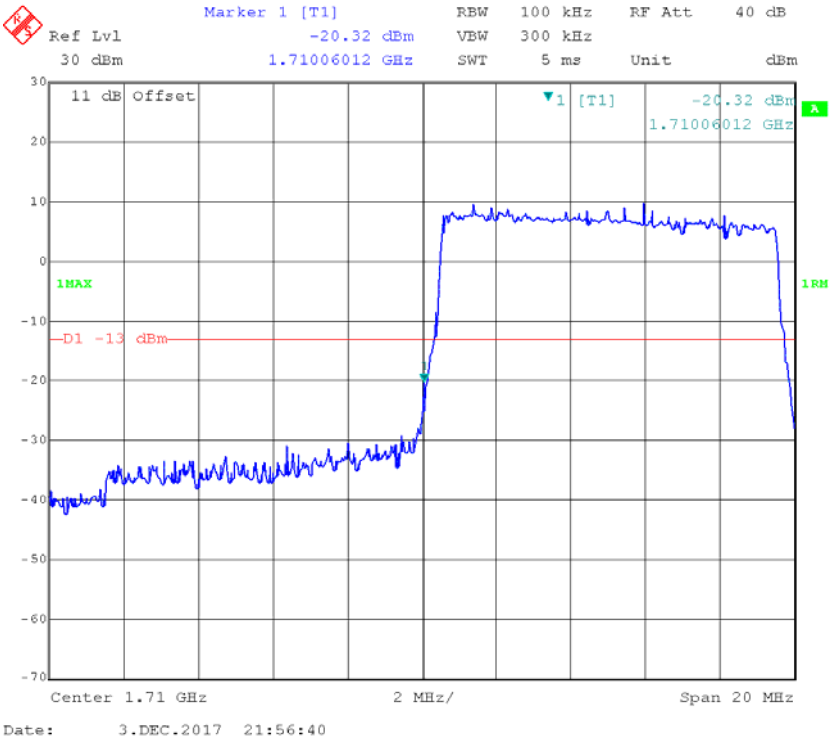
**QPSK_5MHz_ 25 RB_ Left**



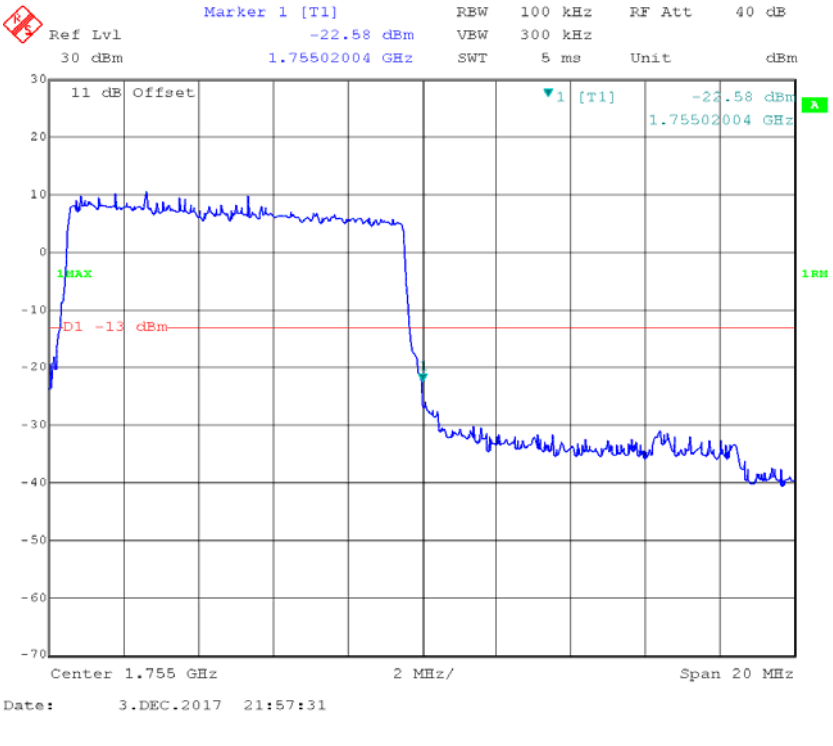

**QPSK_5MHz_ 25 RB_ Right**



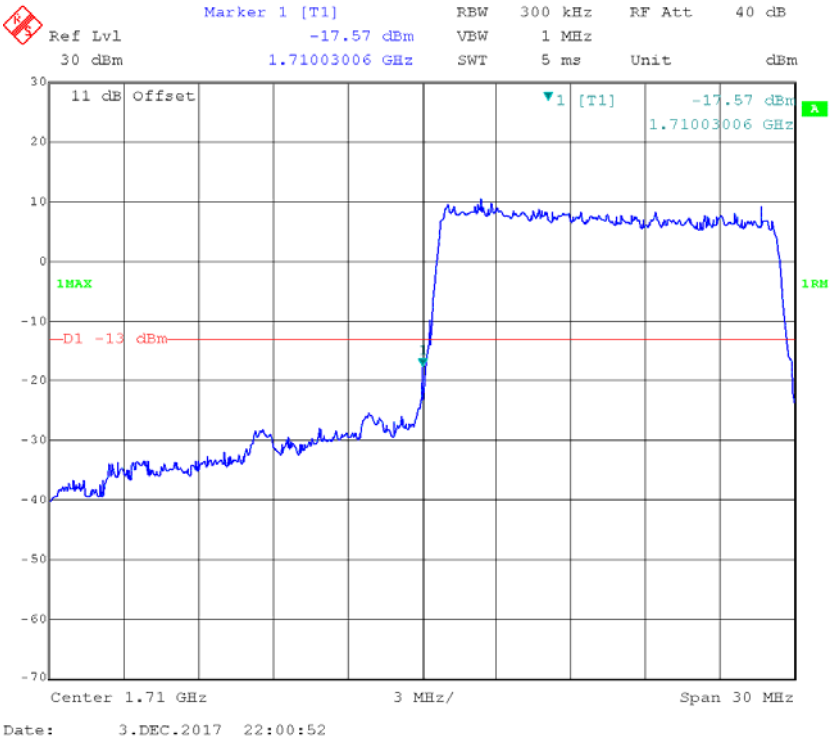
**QPSK_10MHz_ 50 RB_ Left**



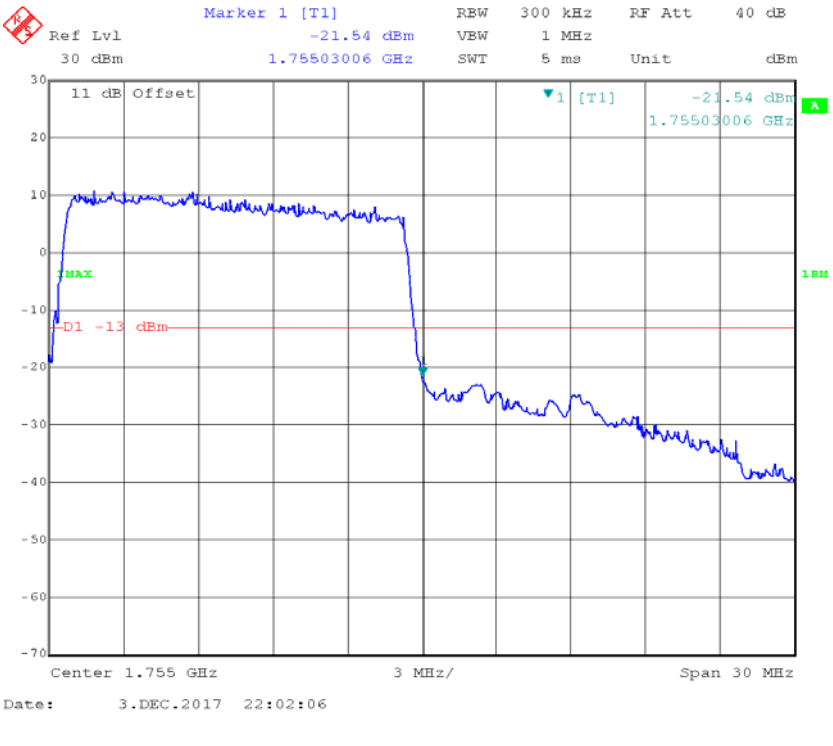

**QPSK_10MHz_ 50 RB_ Right**



**QPSK_15MHz_ 75 RB_ Left**

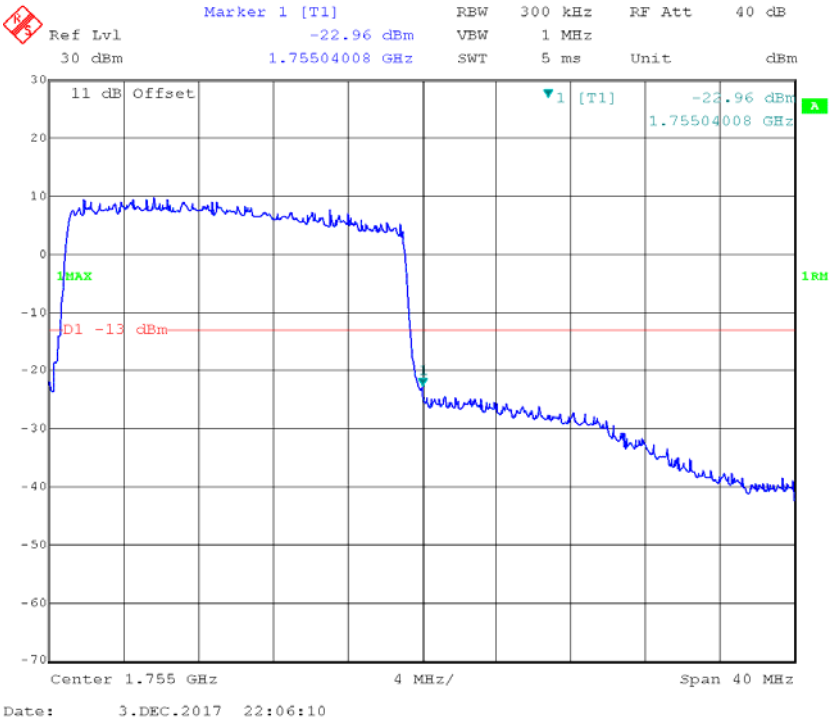



**QPSK_15MHz_ 75 RB_ Right**

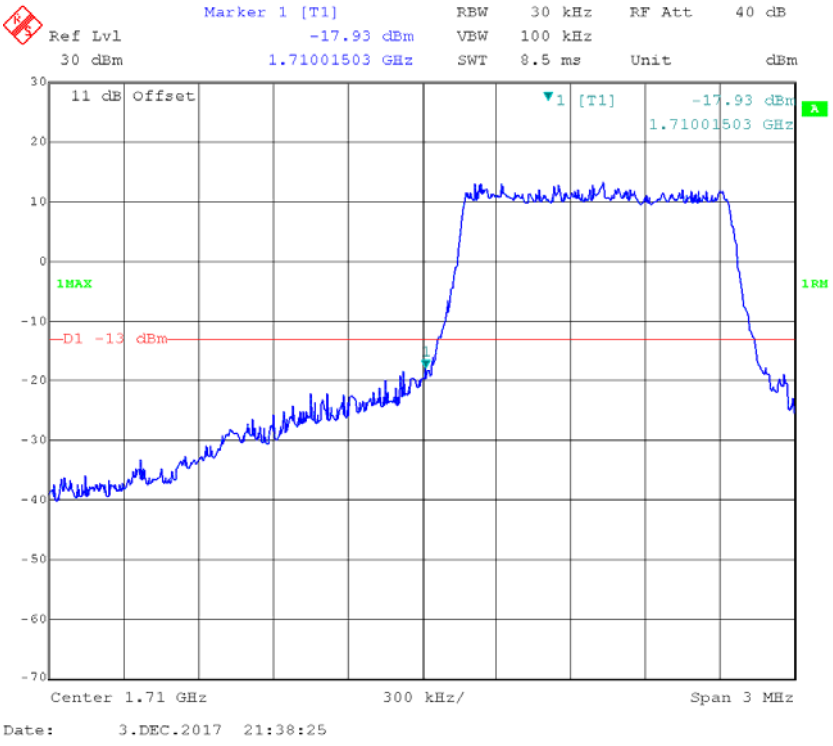


**QPSK_20MHz_ FULL RB_ Left**

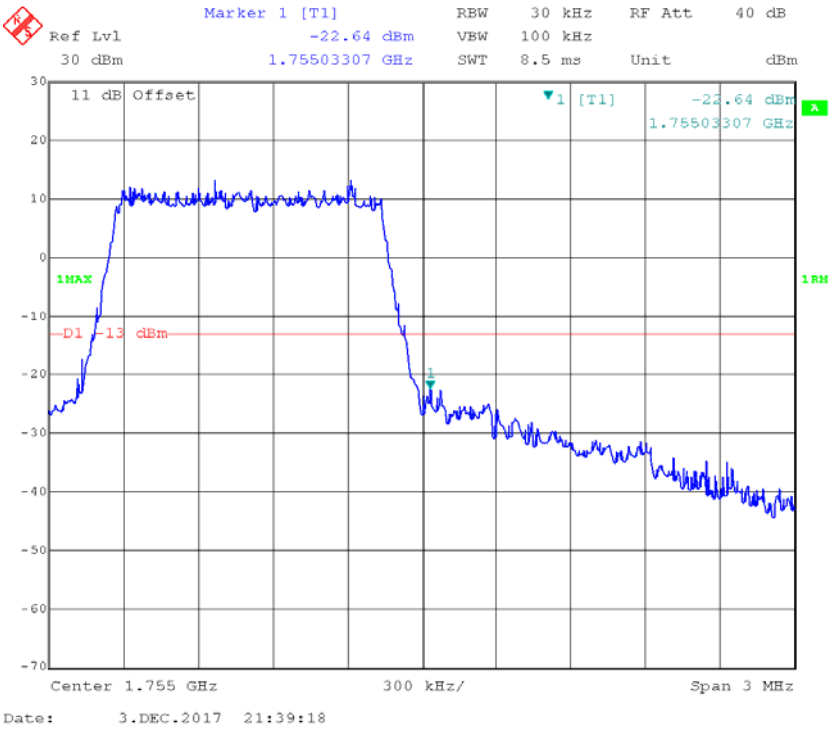

**QPSK_20MHz_ FULL RB_ Right**



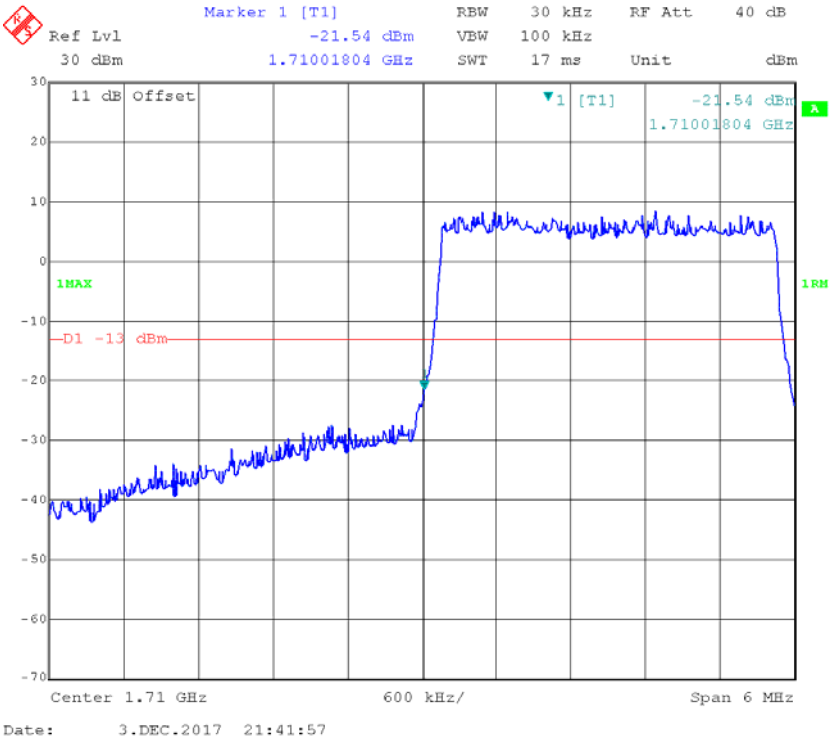
**16QAM_1.4MHz_ 6 RB_ Left**



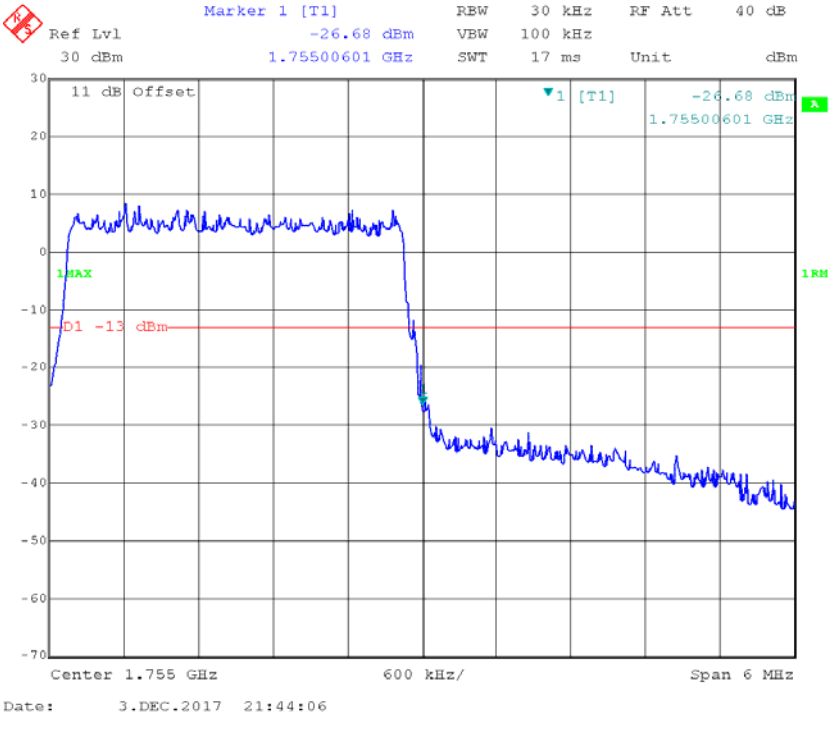

**16QAM_1.4MHz_ 6 RB_ Right**



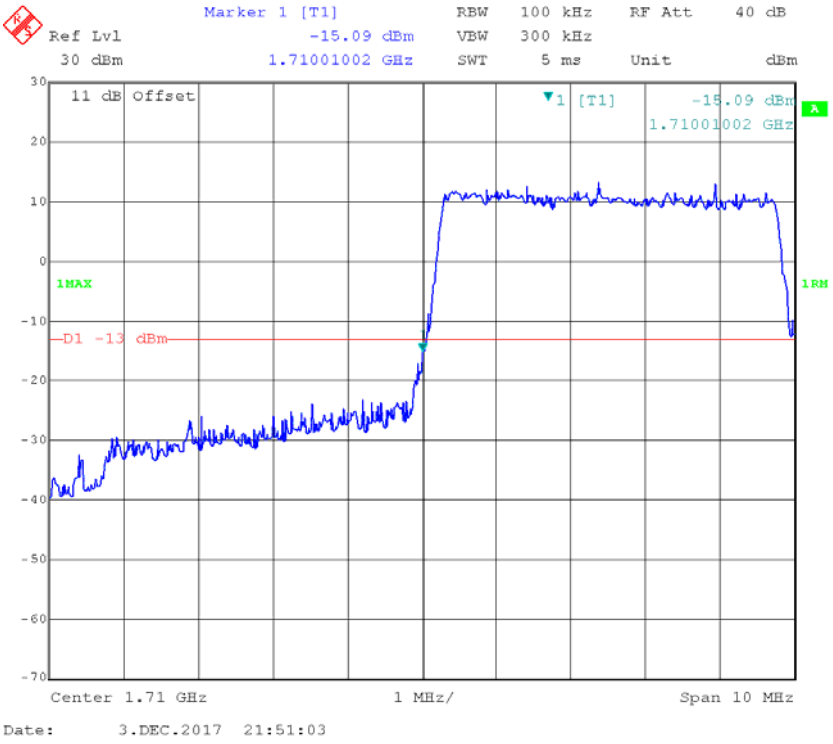
**16QAM_3MHz_ 15 RB_ Left**



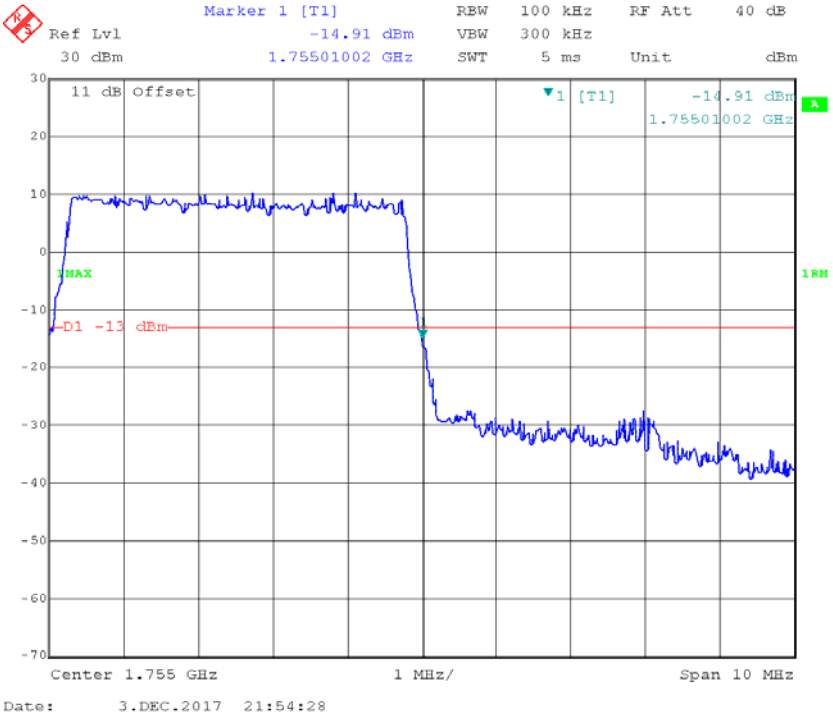

**16QAM_3MHz_ 15 RB_ Right**



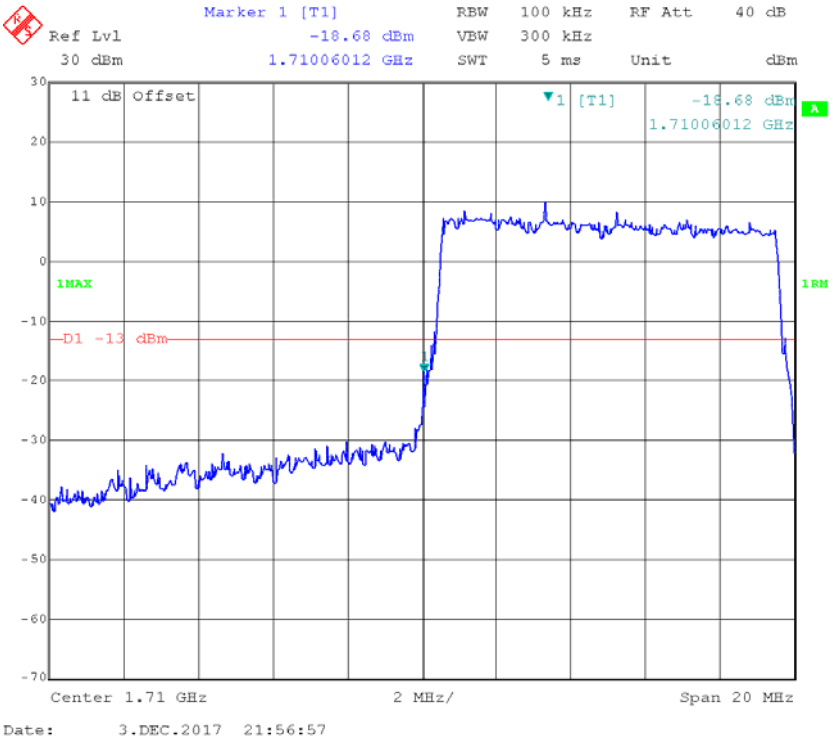
**16QAM_5MHz_ 25 RB_ Left**



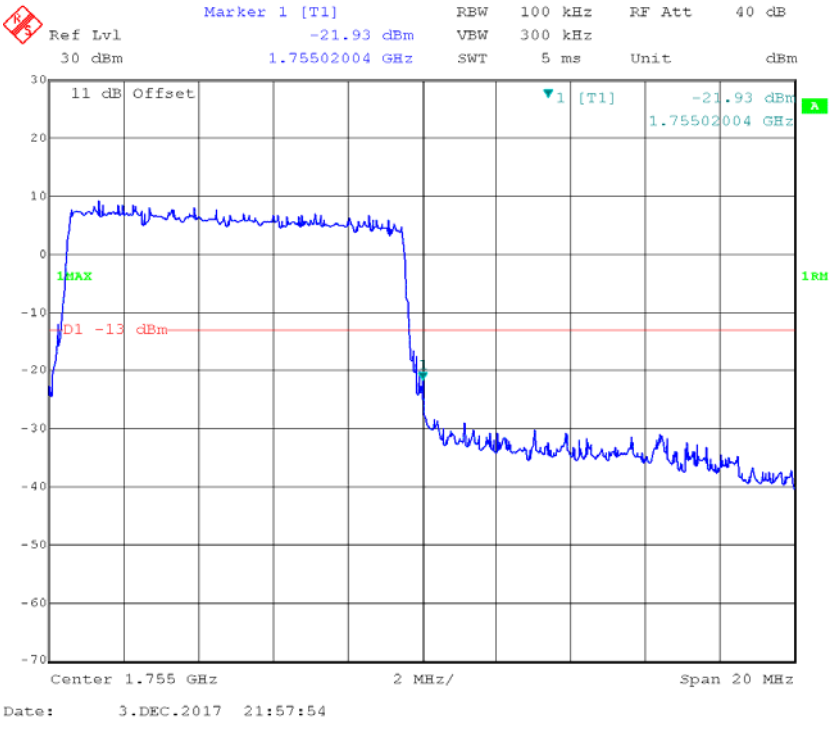

**16QAM_5MHz_ 25 RB_ Right**



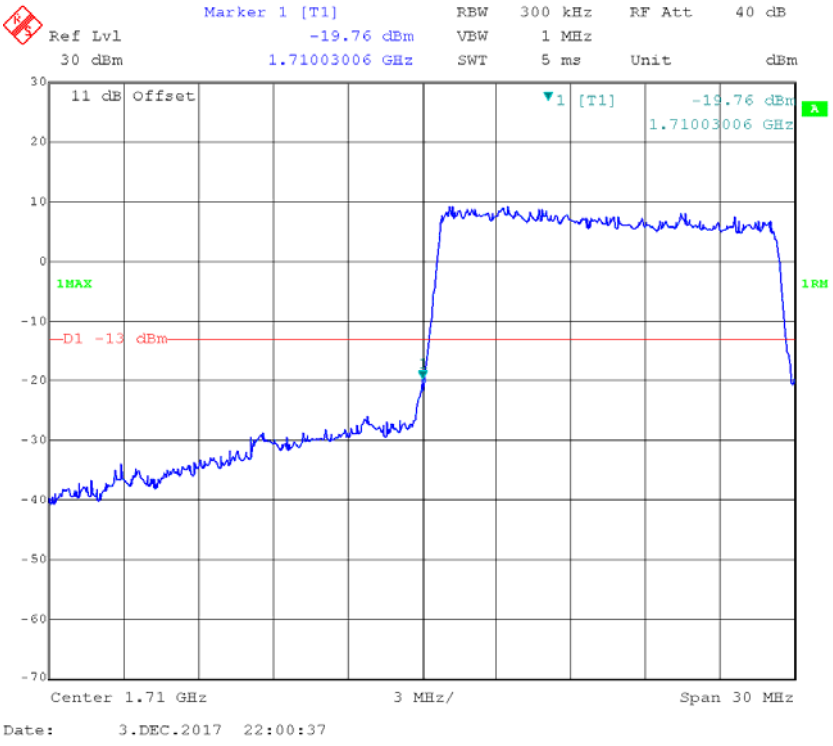
**16QAM_10MHz_ 50 RB_ Left**



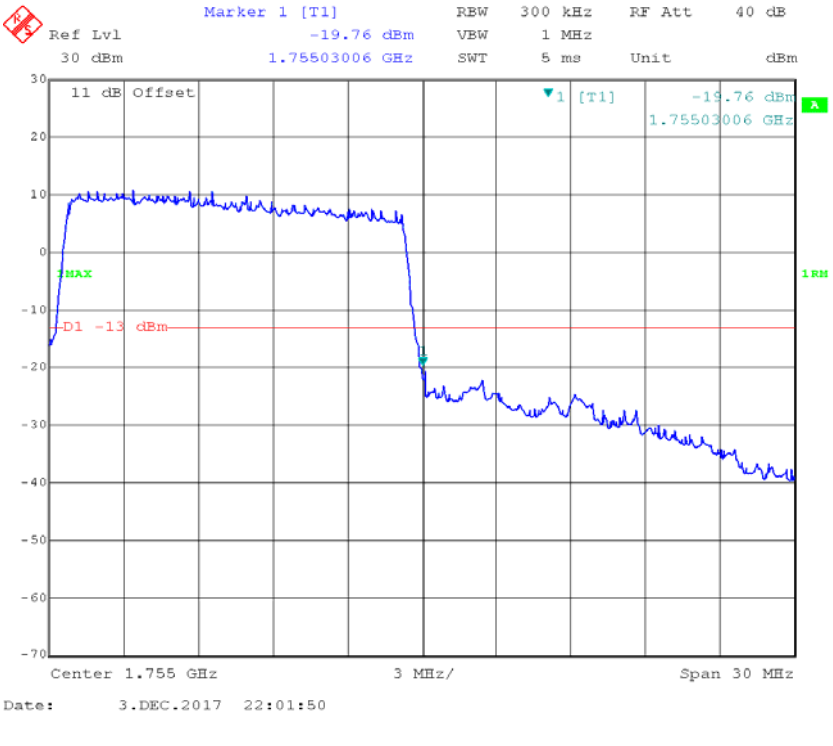

**16QAM_10MHz_ 50 RB_ Right**



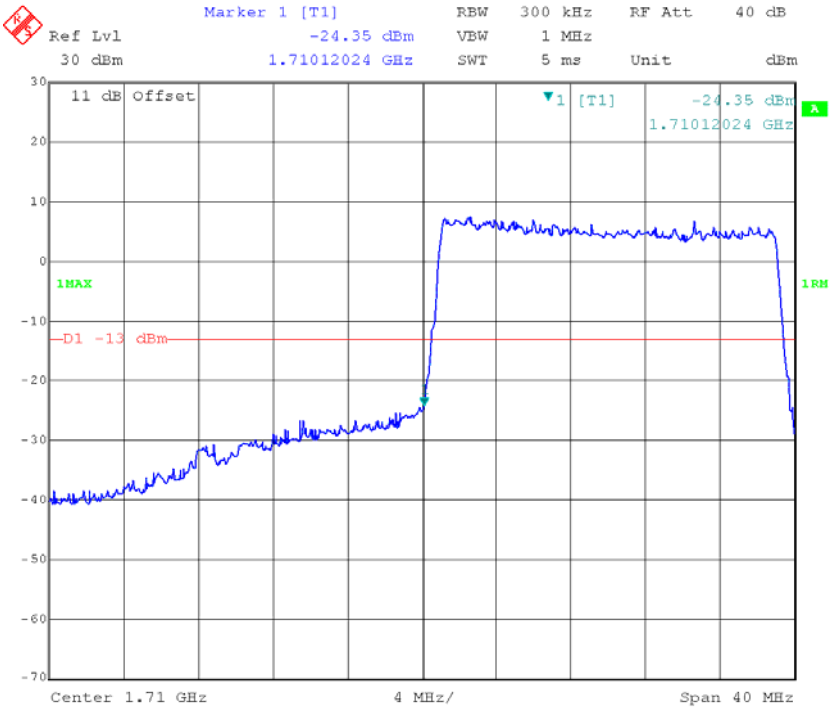
**16QAM_15MHz_ 75 RB_ Left**



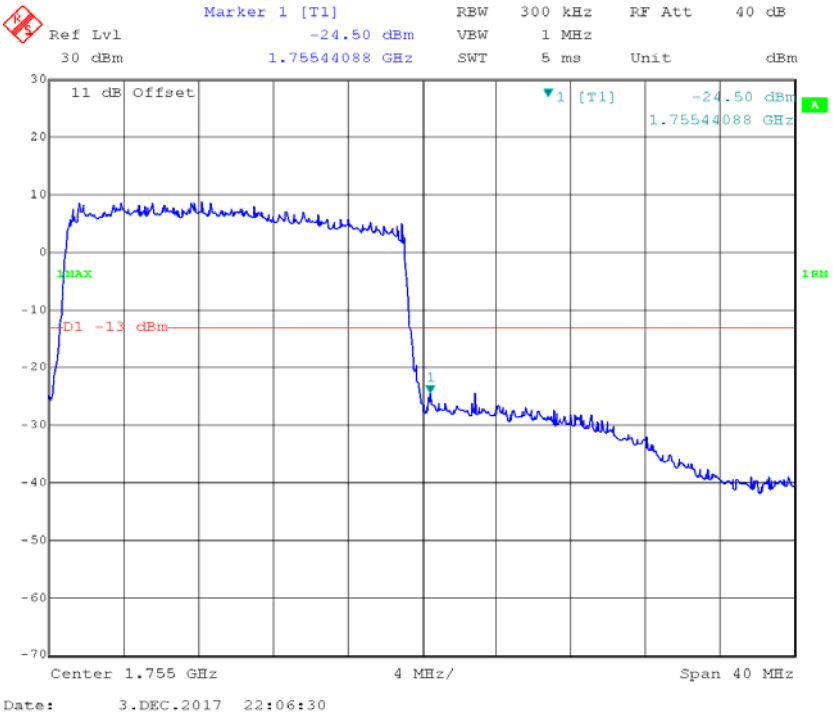

**16QAM_15MHz_ 75 RB_ Right**



**16QAM_20MHz_ FULL RB_ Left**

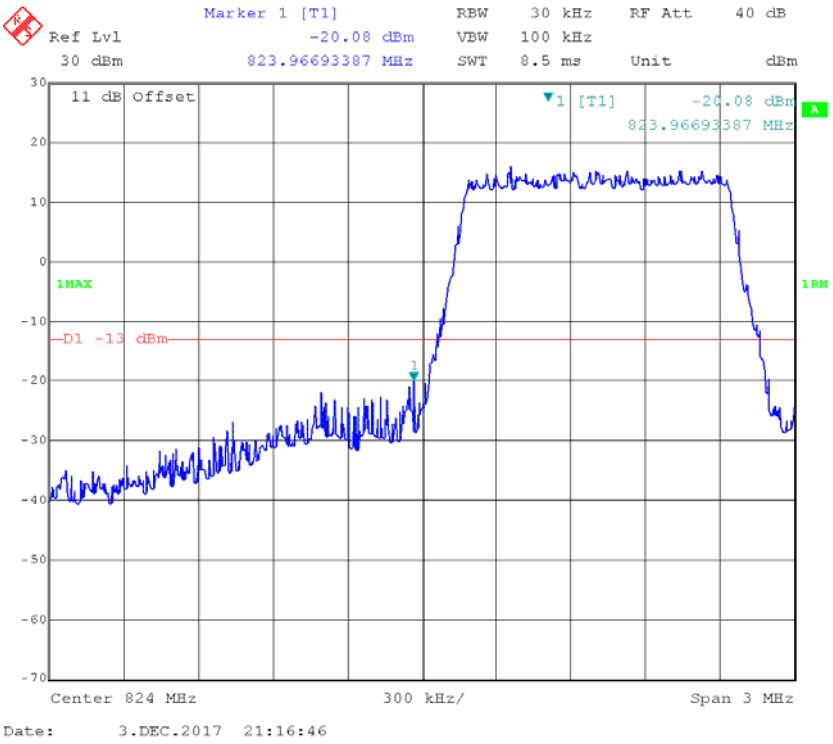



**16QAM_20MHz_ FULL RB_ Right**



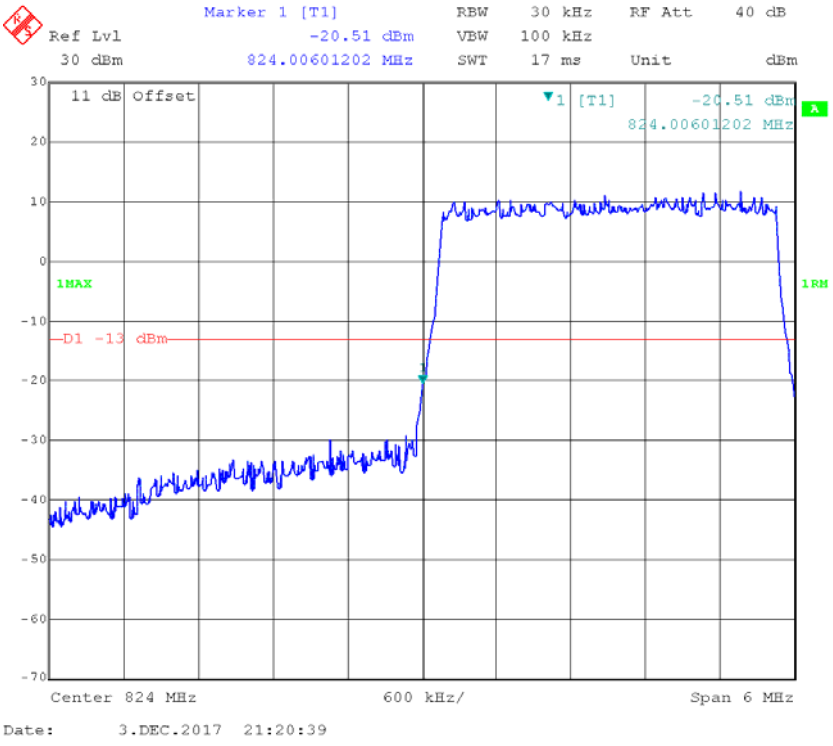
**LTE Band V**

**QPSK_1.4MHz_ 6 RB_ Left**

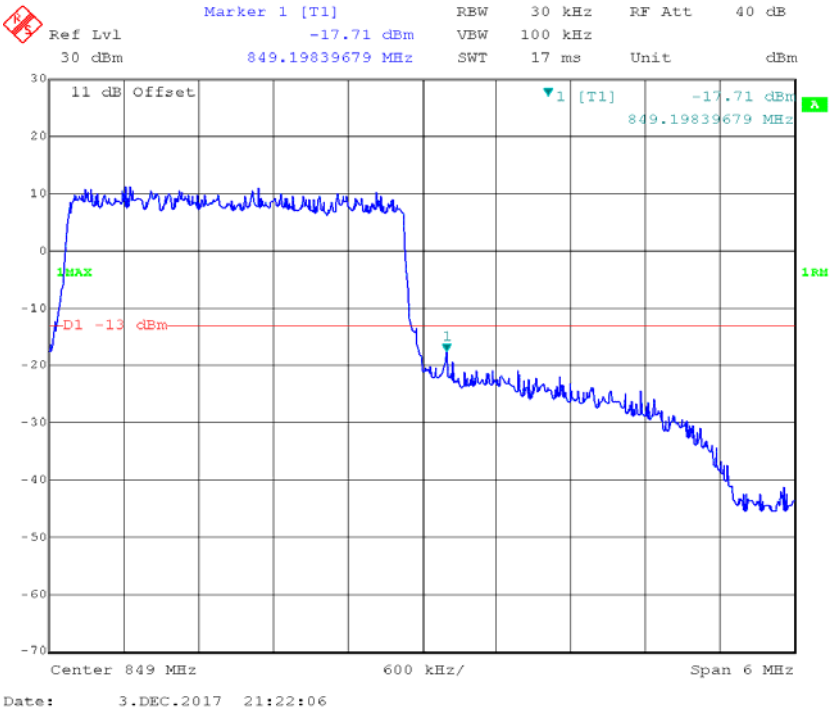



**QPSK_1.4MHz_ 6 RB_ Right**

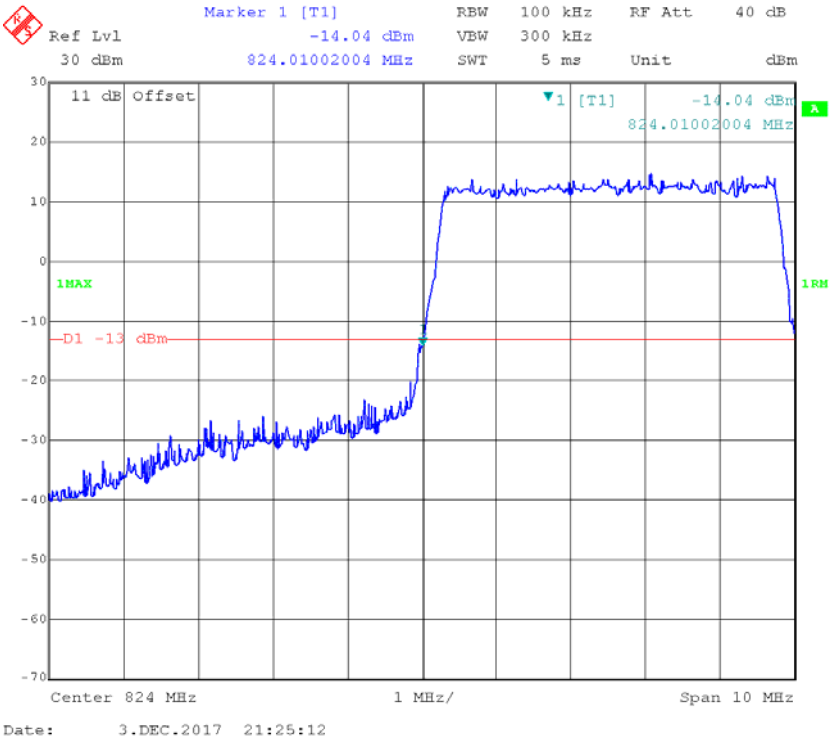
**QPSK_3MHz_ 15 RB_ Left**



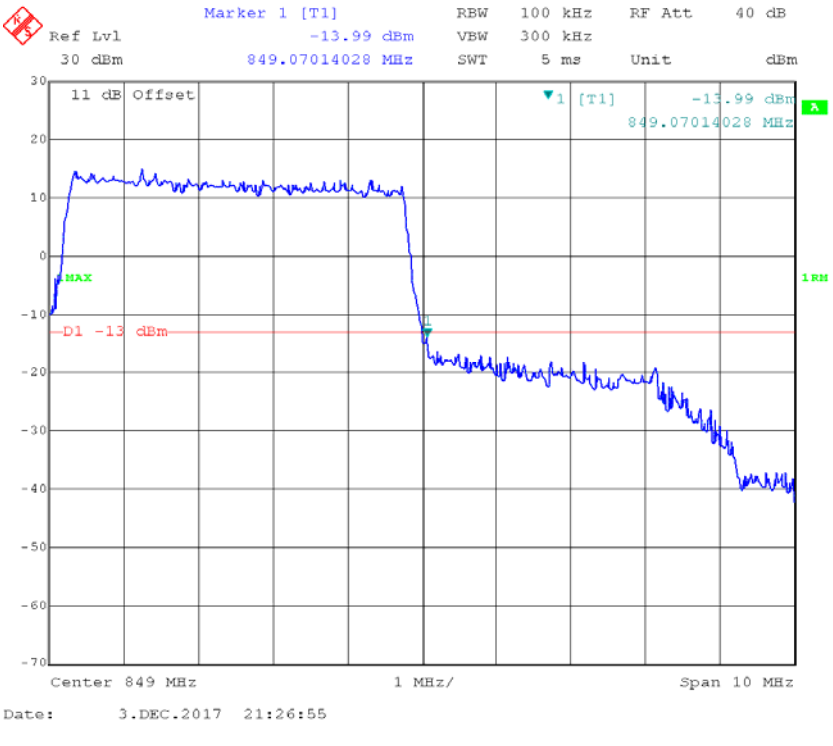

**QPSK_3MHz_ 15 RB_ Right**



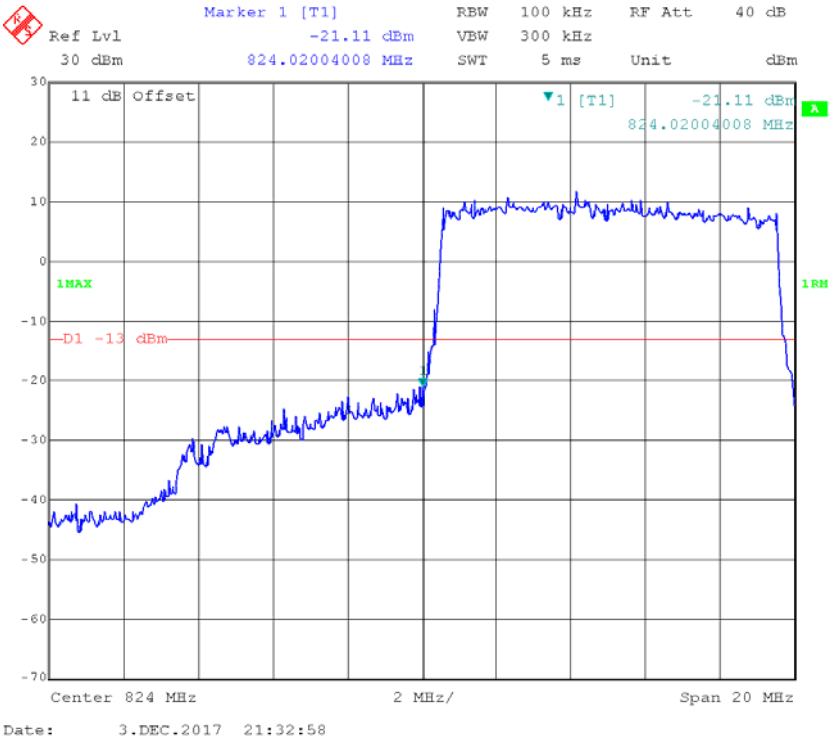
**QPSK_5MHz_ 25 RB_ Left**



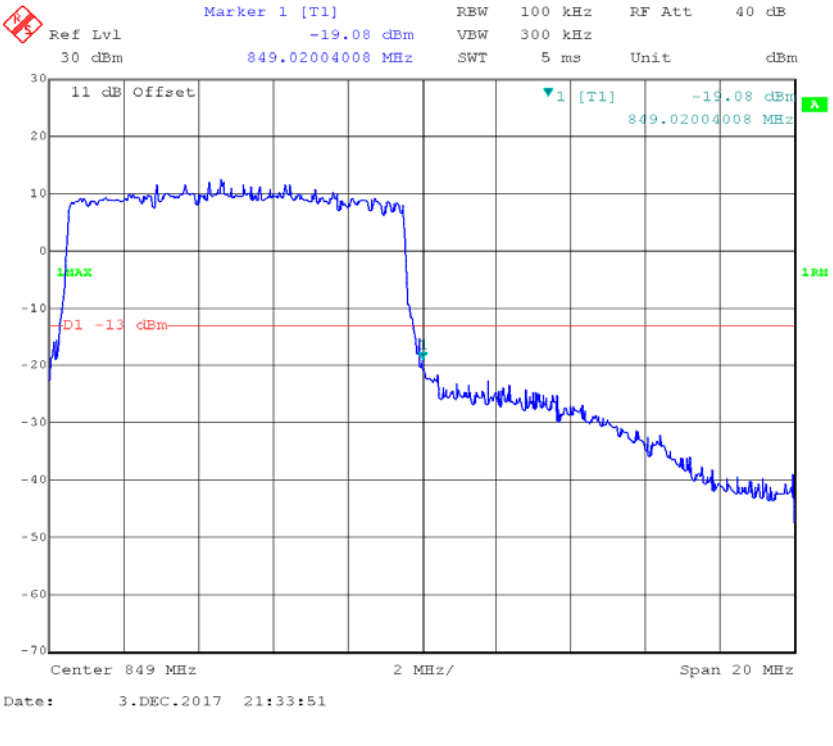

**QPSK_5MHz_ 25 RB_ Right**



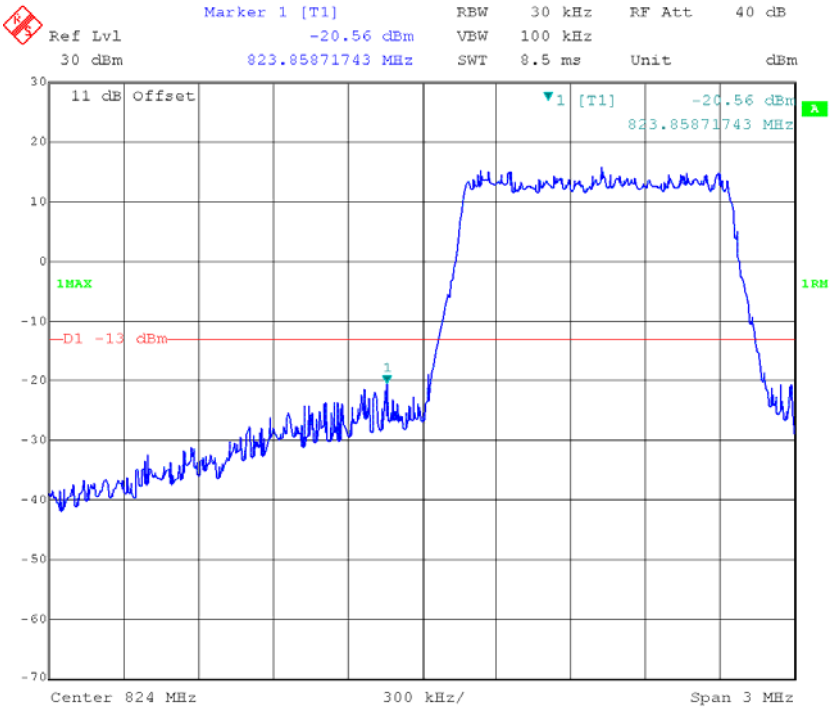
**QPSK_10MHz_ 50 RB_ Left**



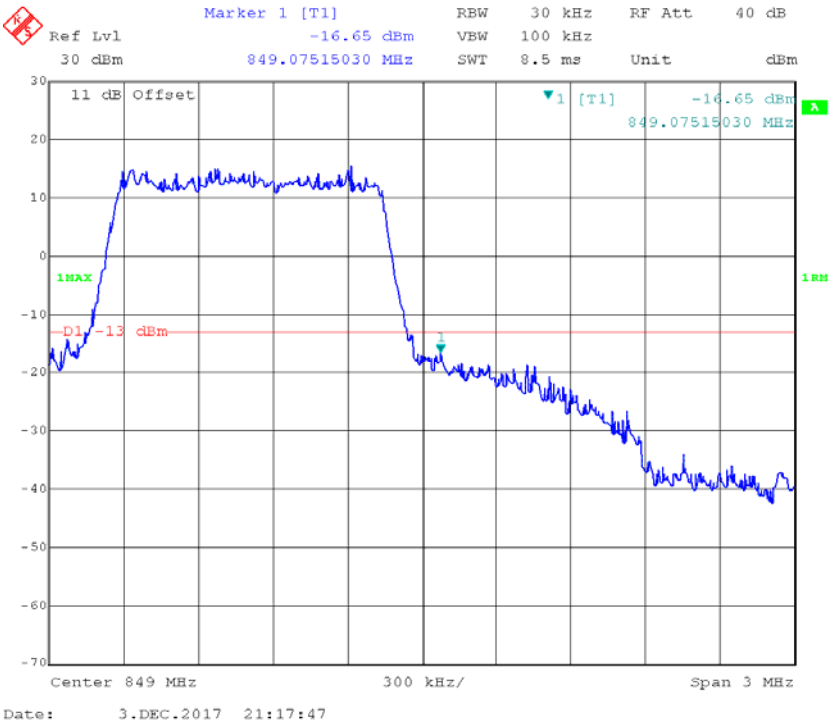

**QPSK_10MHz_ 50 RB_ Right**



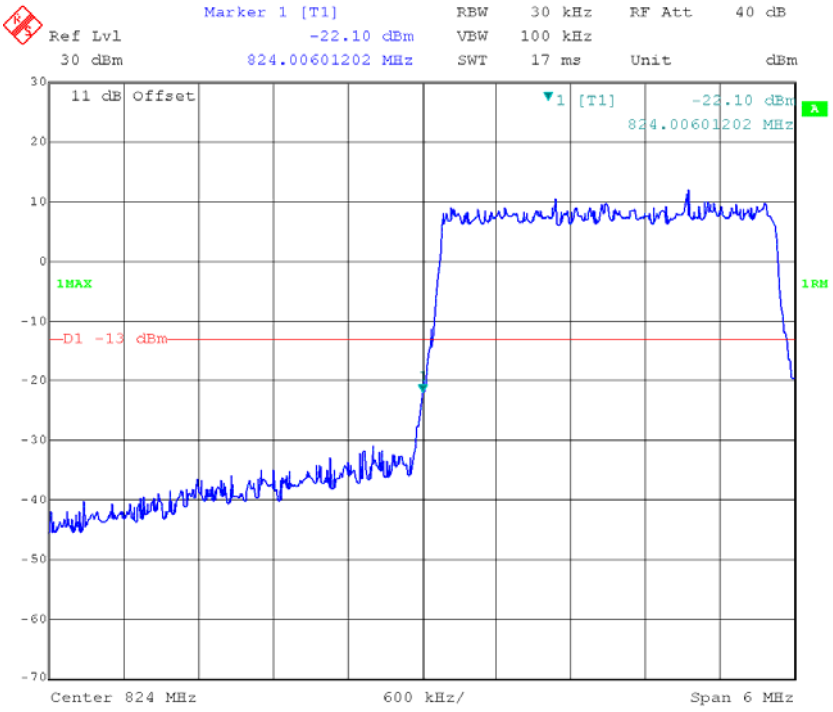
**16QAM_1.4MHz_ 6 RB_ Left**




**16QAM_1.4MHz_ 6 RB_ Right**

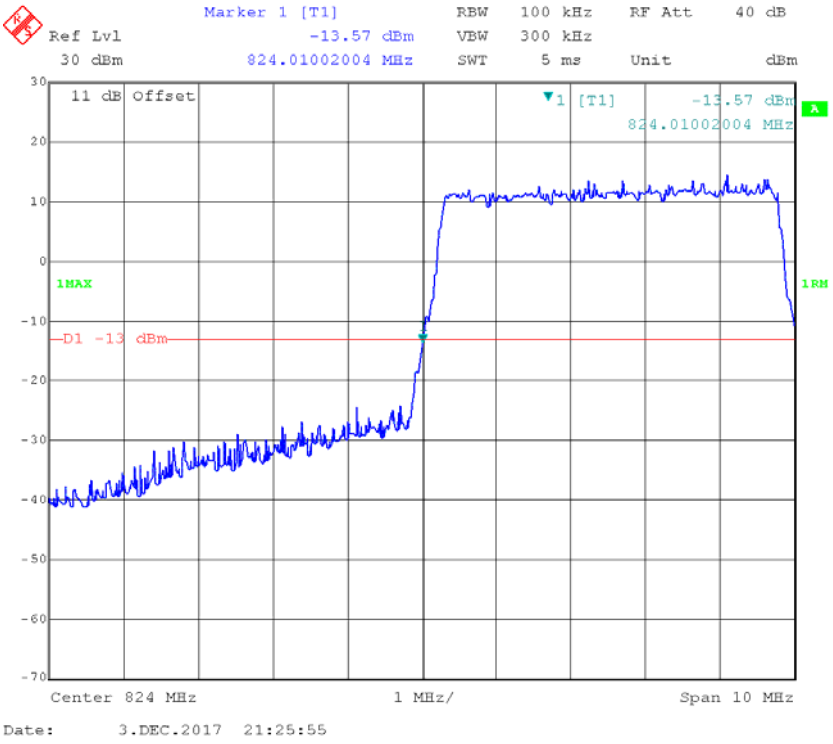


**16QAM_3MHz_ 15 RB_ Left**

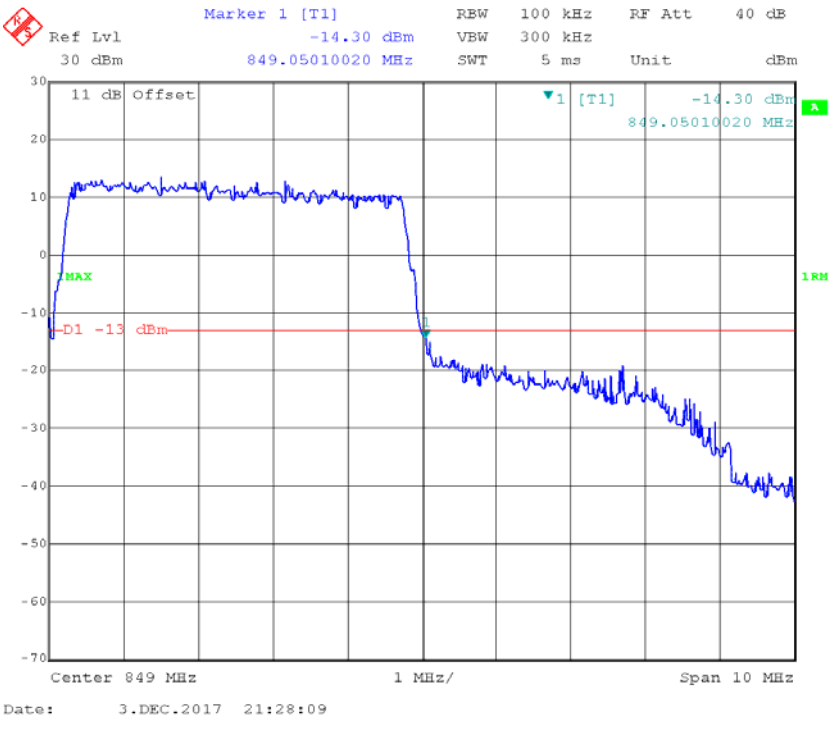



**16QAM_3MHz_ 15 RB_ Right**

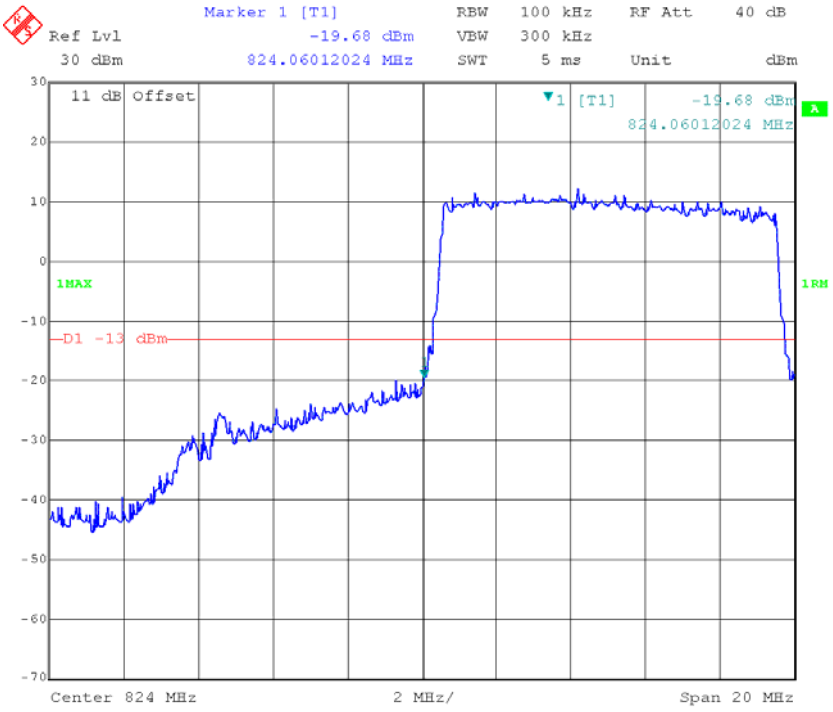
**16QAM_5MHz_ 25 RB_ Left**



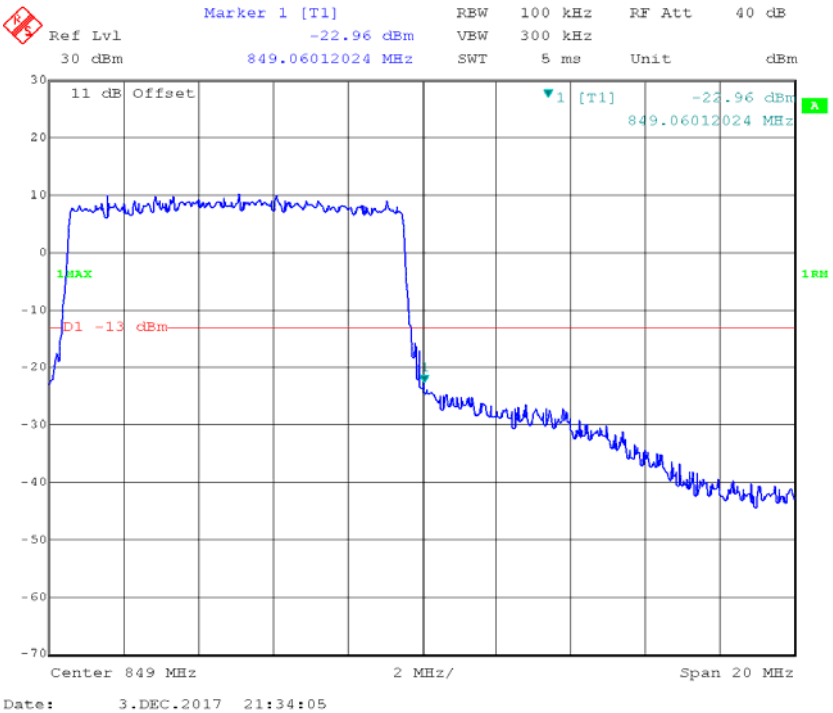

**16QAM_5MHz_ 25 RB_ Right**



**16QAM_10MHz_ 50 RB_ Left**

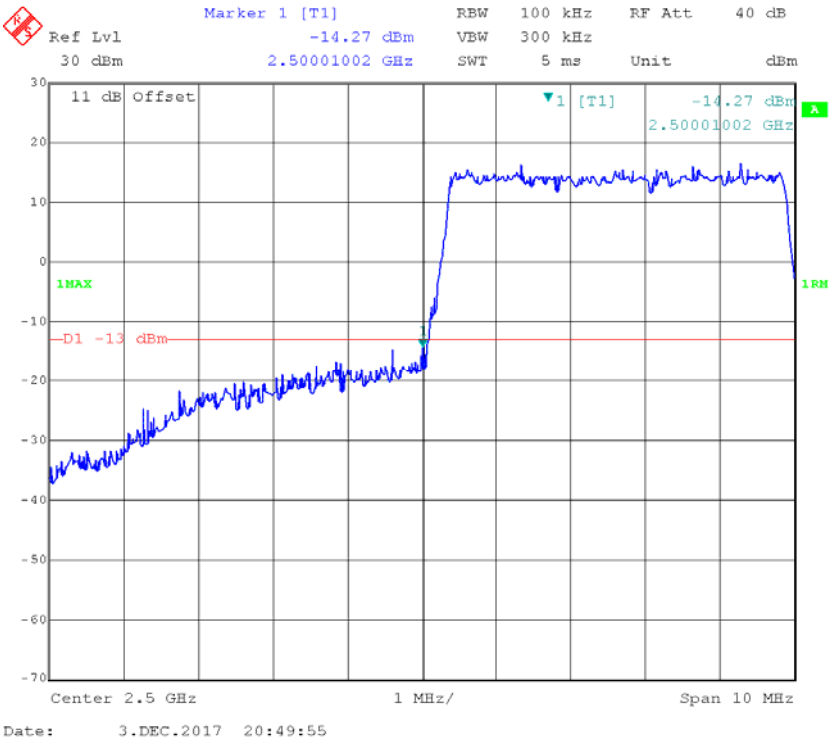



**16QAM_10MHz_ 50 RB_ Right**

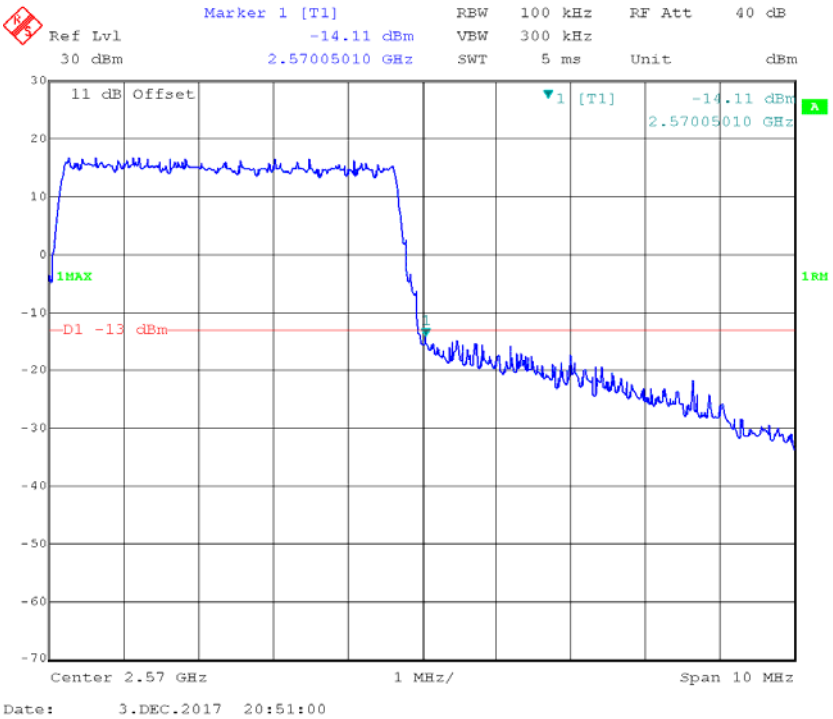


**LTE Band VII**

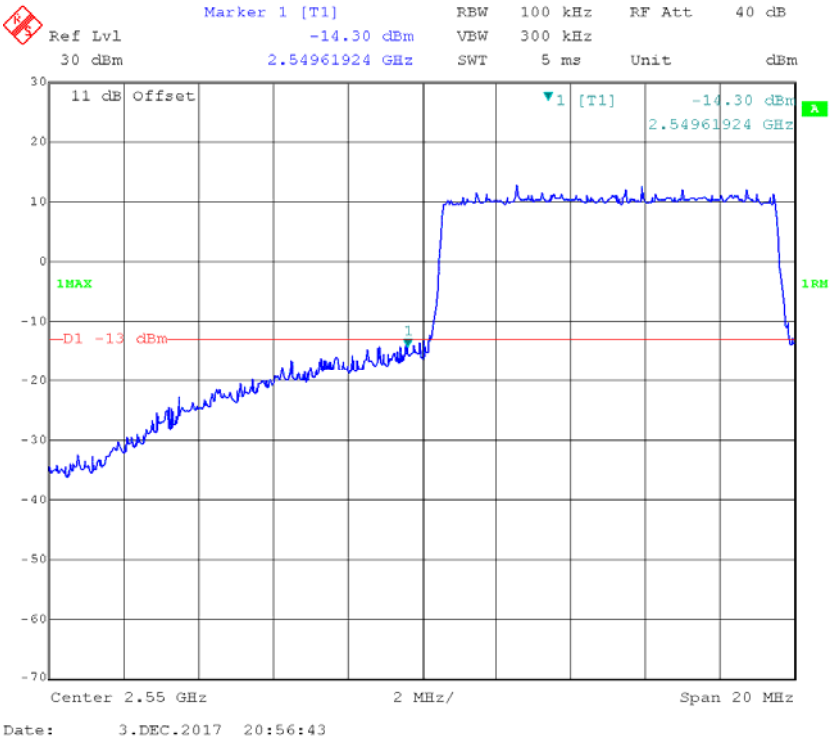
**QPSK_5MHz_ 25 RB_ Left**



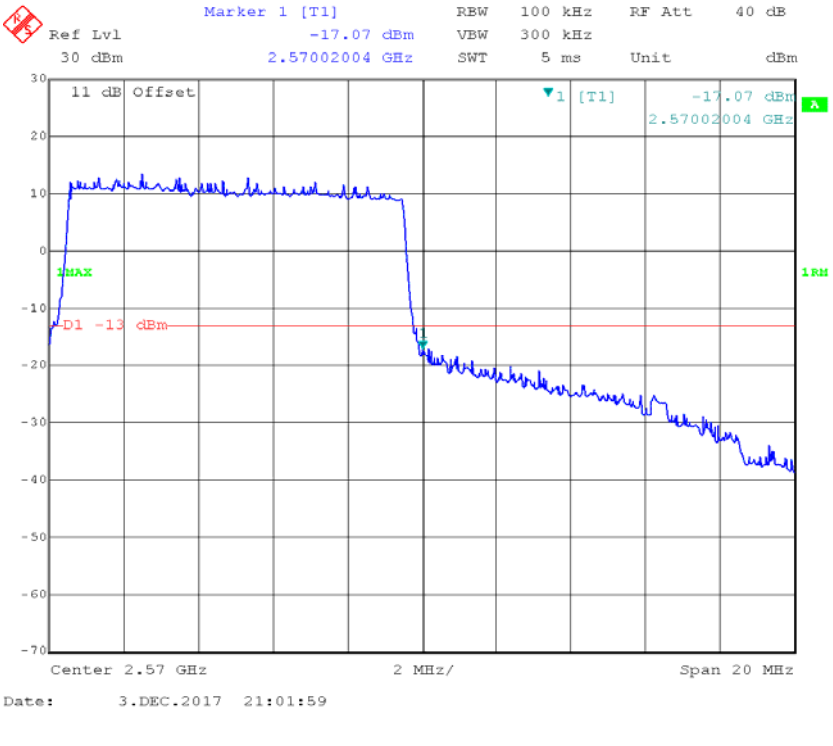

**QPSK_5MHz_ 25 RB_ Right**



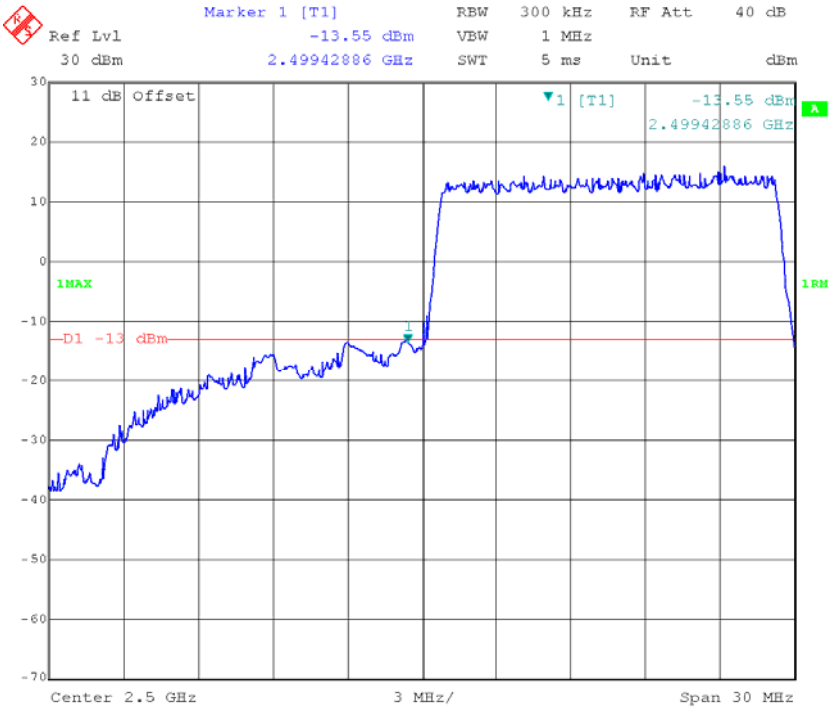
**QPSK_10MHz_ 50 RB_ Left**



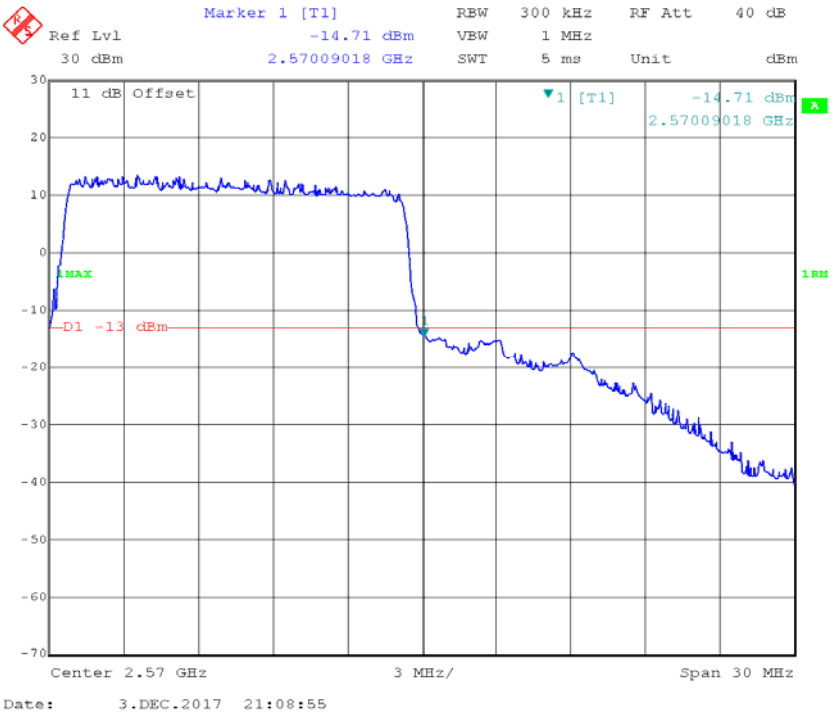

**QPSK_10MHz_ 50 RB_ Right**



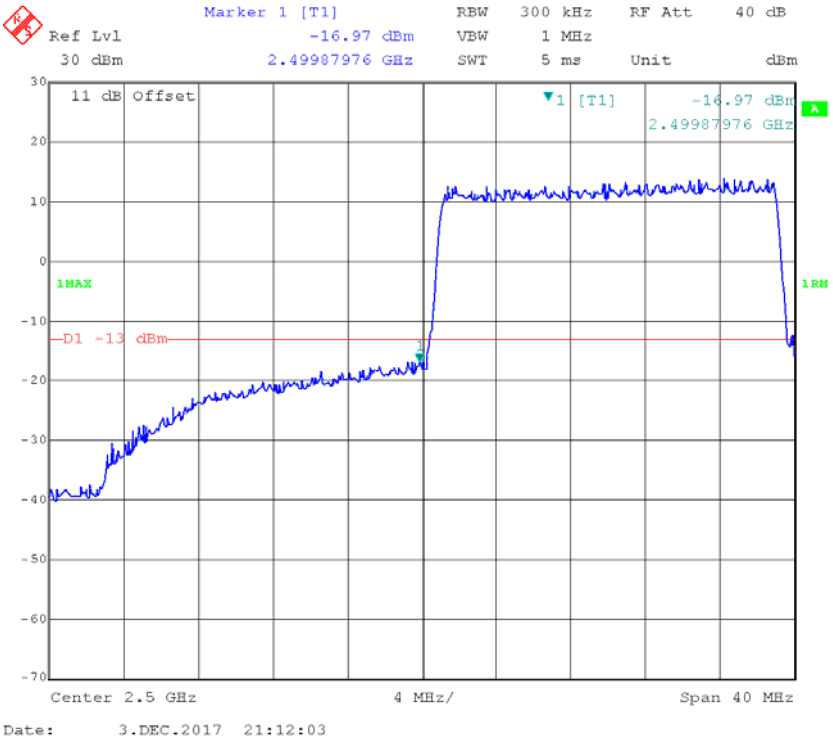
**QPSK_15MHz_ 75 RB_ Left**



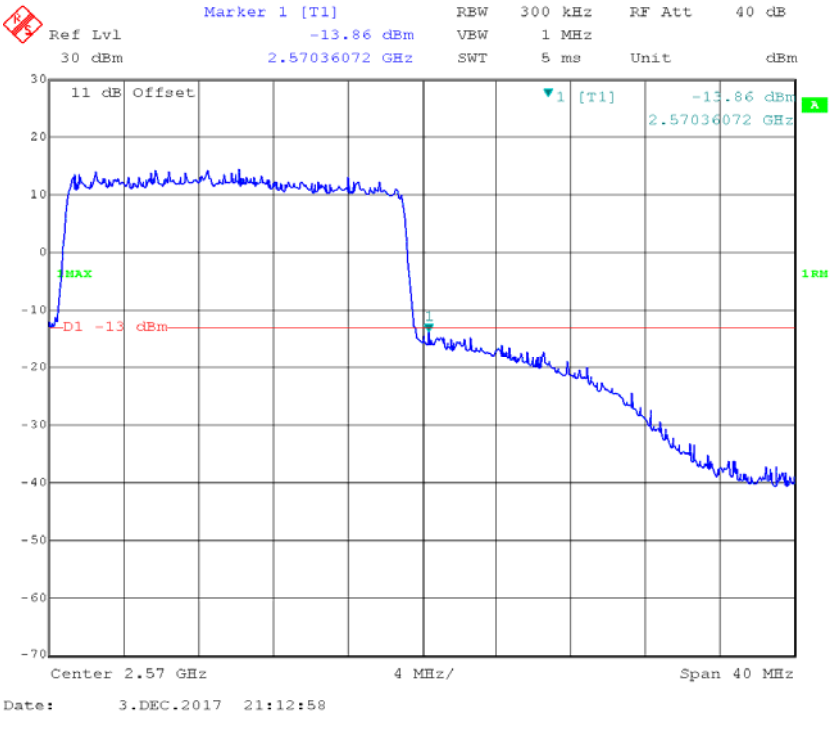

**QPSK_15MHz_ 75 RB_ Right**



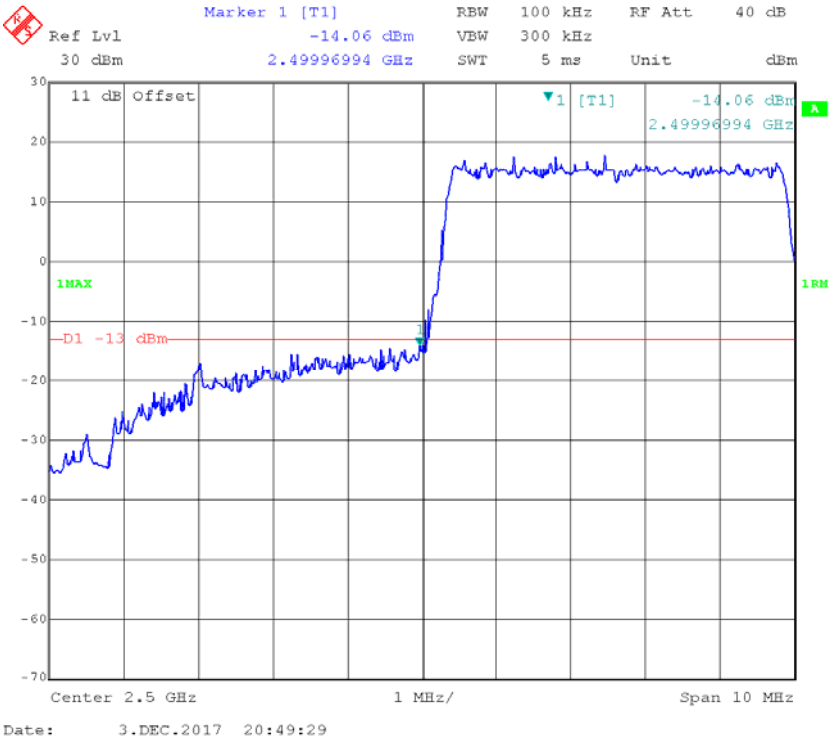
**QPSK_20MHz_ FULL RB_ Left**



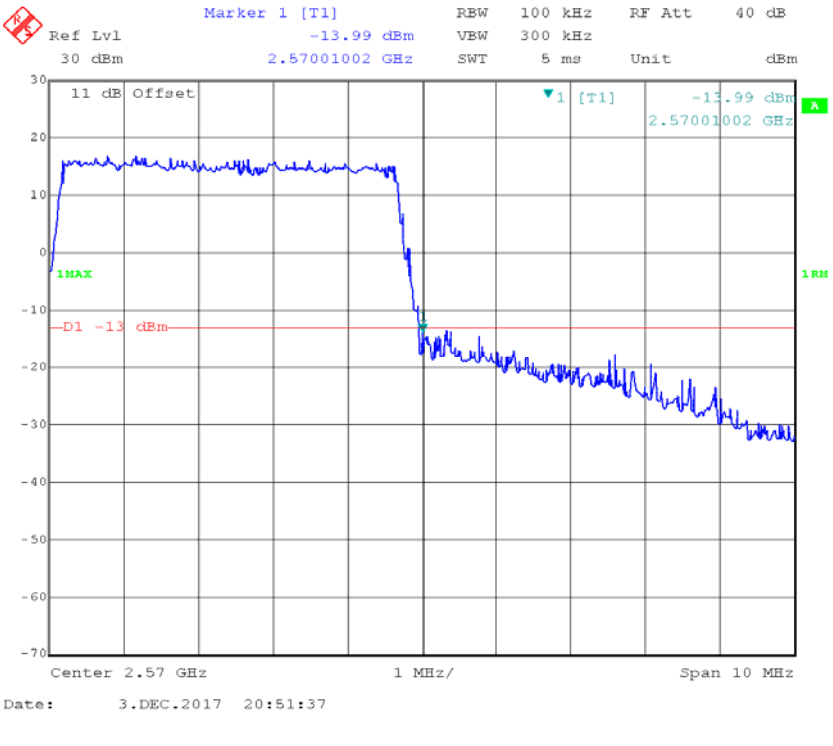

**QPSK_20MHz_ FULL RB_ Right**



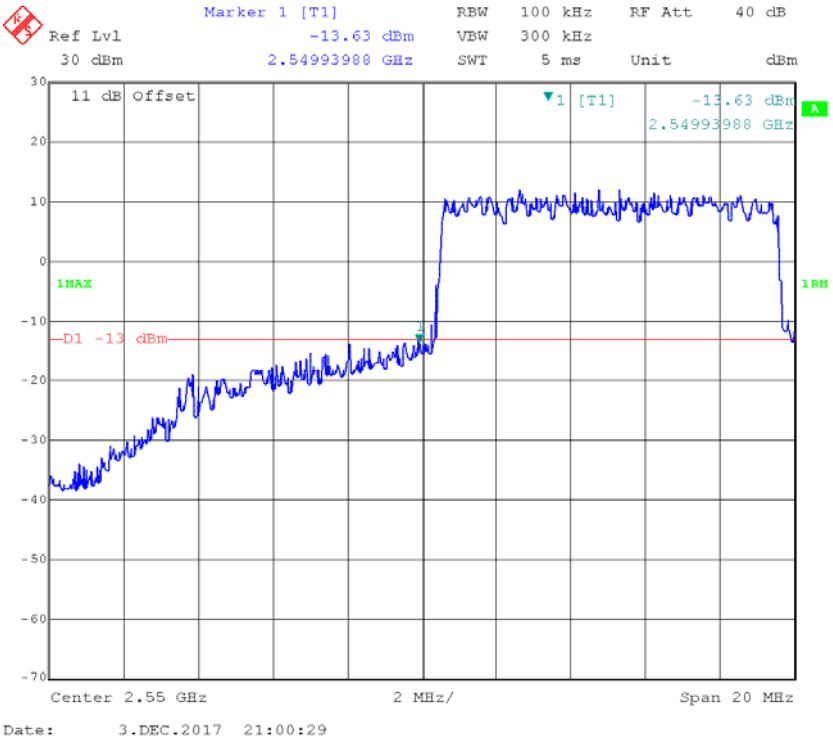
**16QAM_5MHz_ 25 RB_ Left**



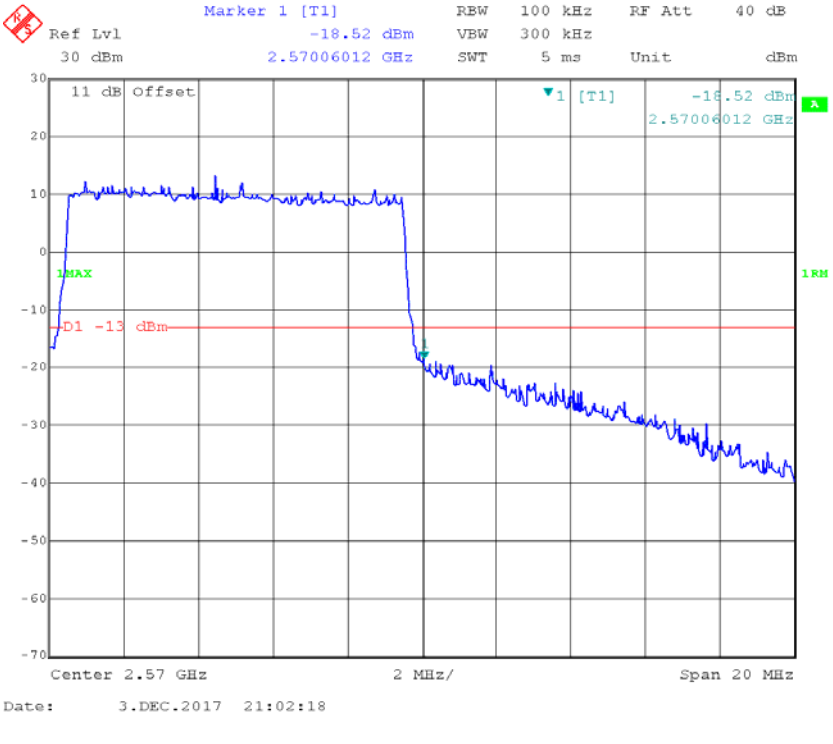

**16QAM_5MHz_ 25 RB_ Right**



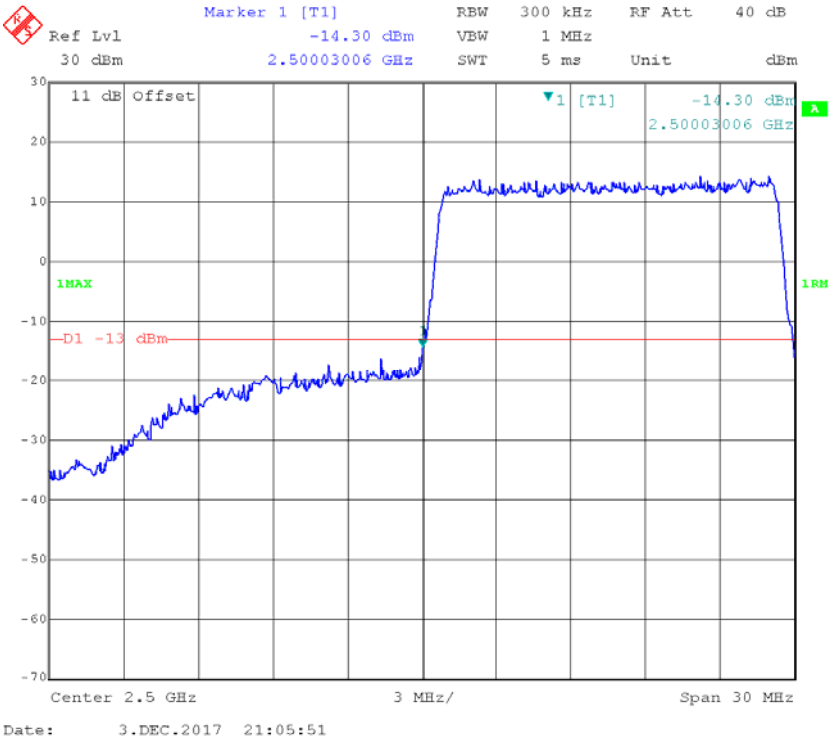
**16QAM_10MHz_ 50 RB_ Left**



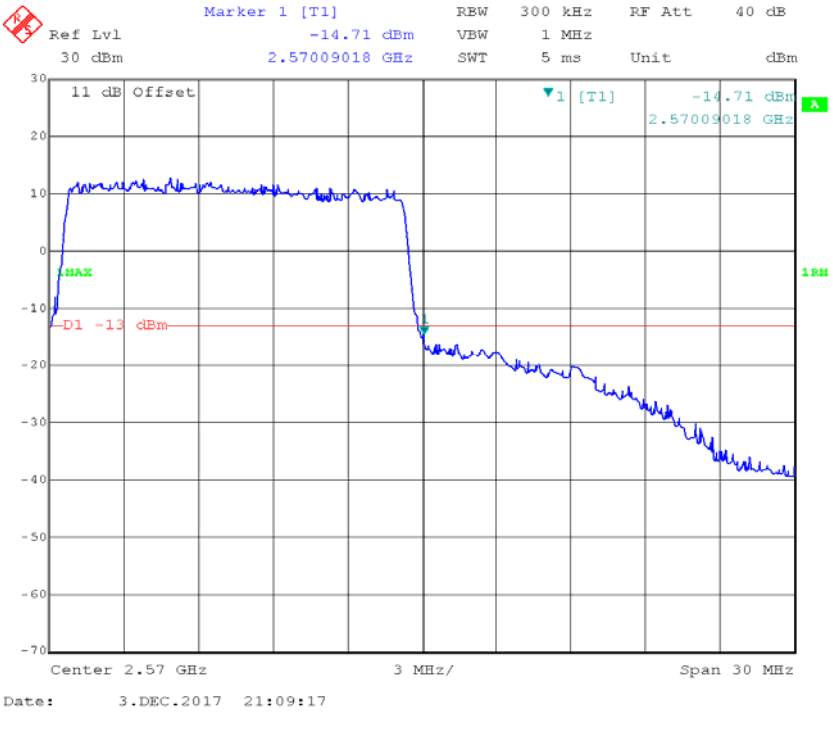

**16QAM_10MHz_ 50 RB_ Right**



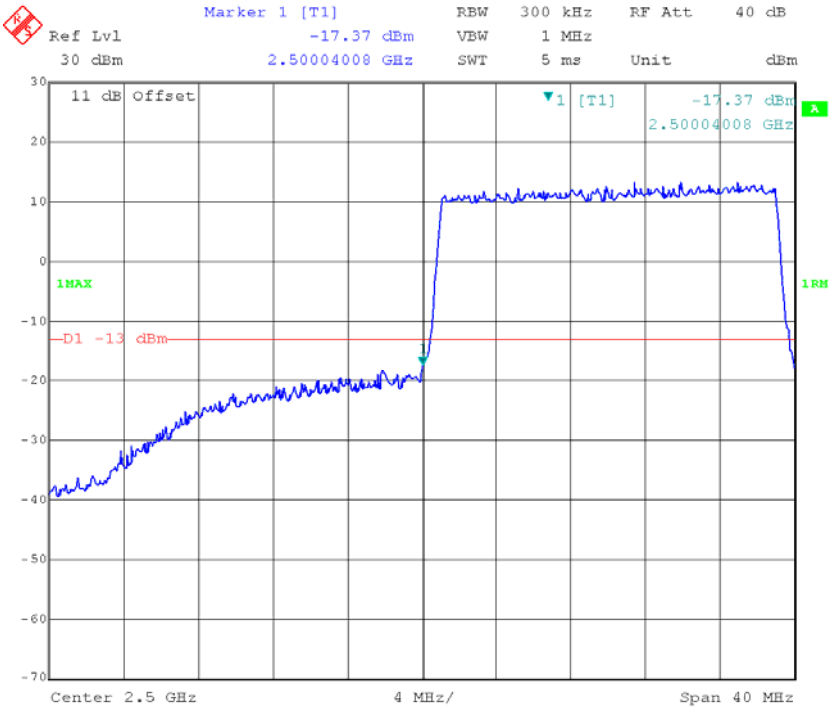
**16QAM_15MHz_ 75 RB_ Left**



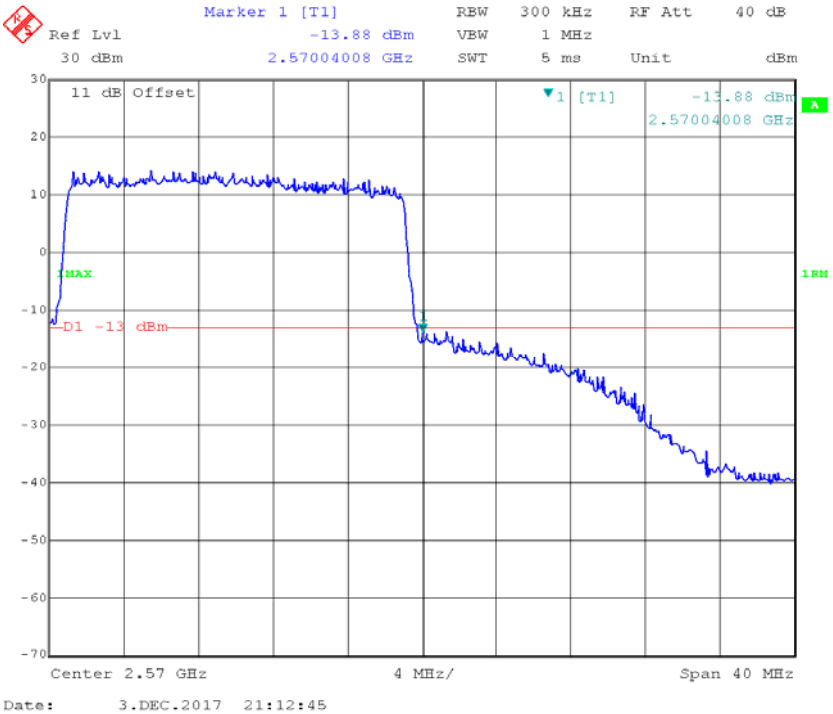

**16QAM_15MHz_ 75 RB_ Right**



**16QAM_20MHz_ FULL RB_ Left**

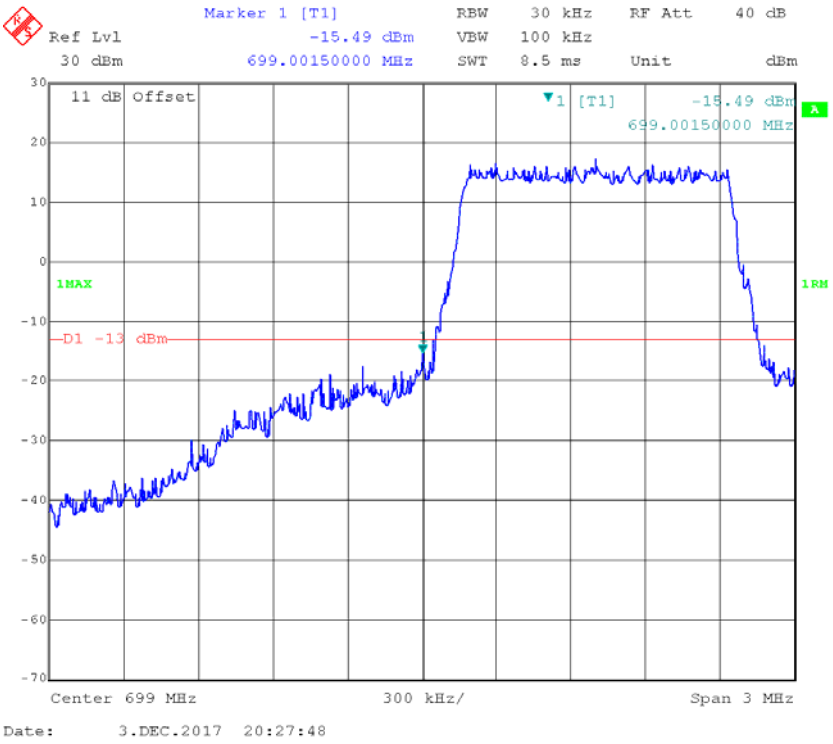



**16QAM_20MHz_ FULL RB_ Right**

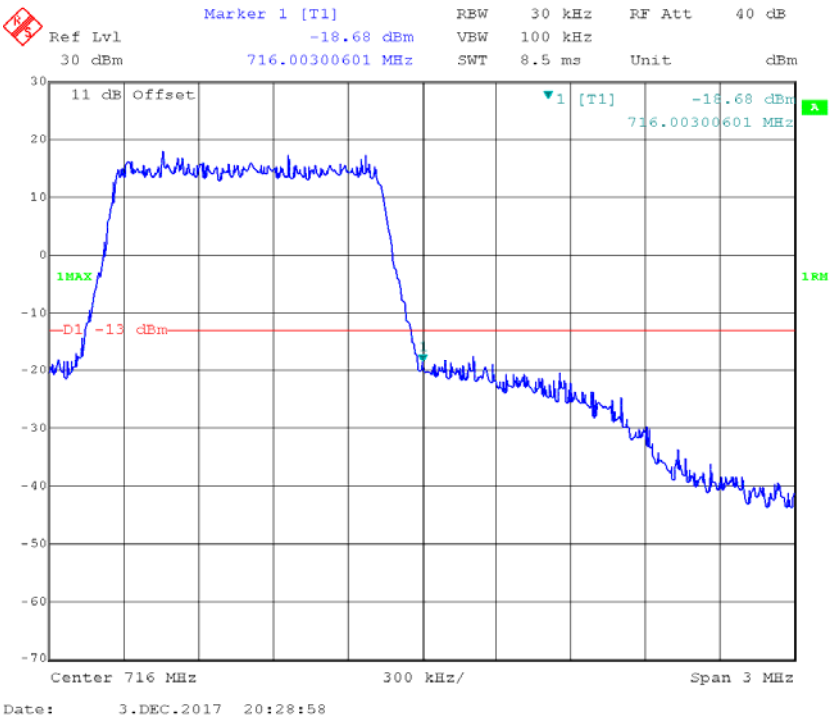


**LTE Band XII**

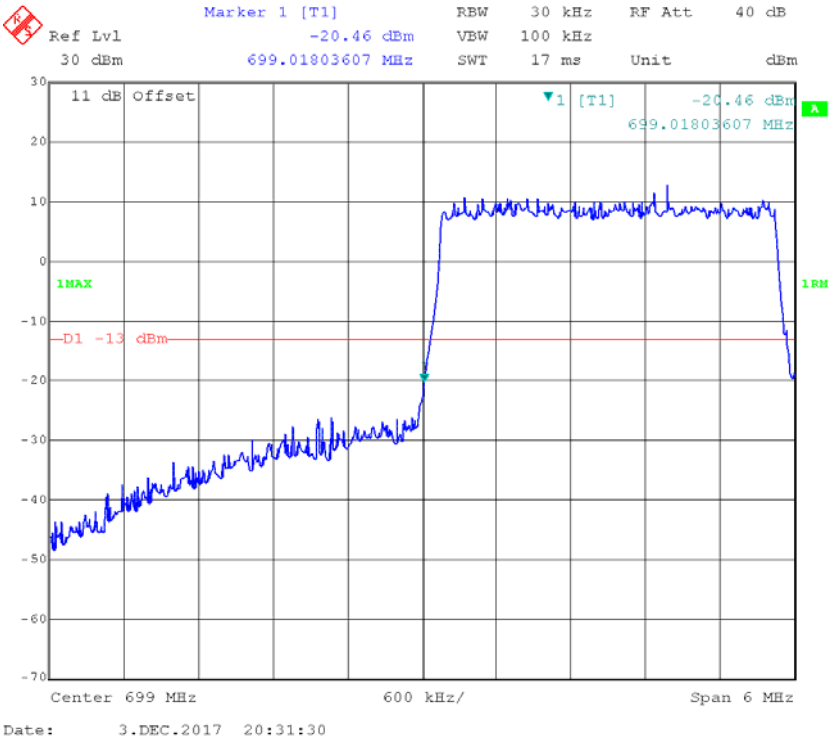
**QPSK_1.4MHz_ 6 RB_ Left**



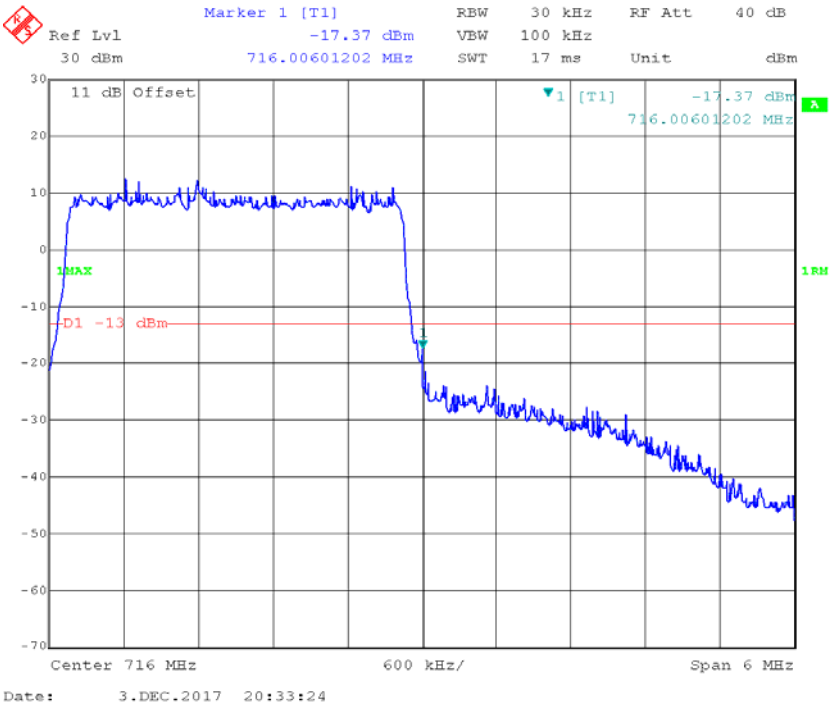

**QPSK_1.4MHz_ 6 RB_ Right**



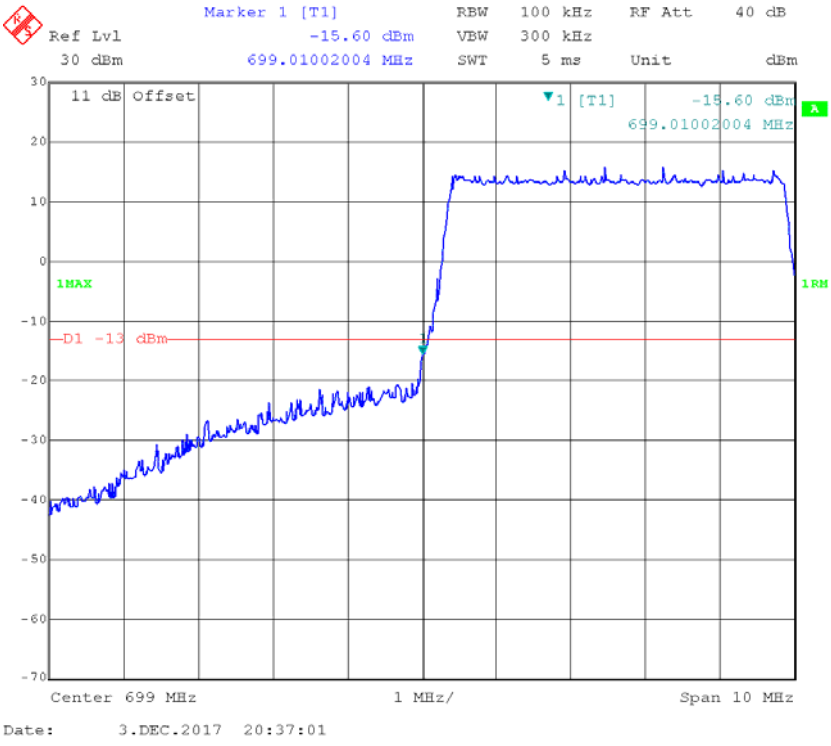
**QPSK_3MHz_ 15 RB_ Left**



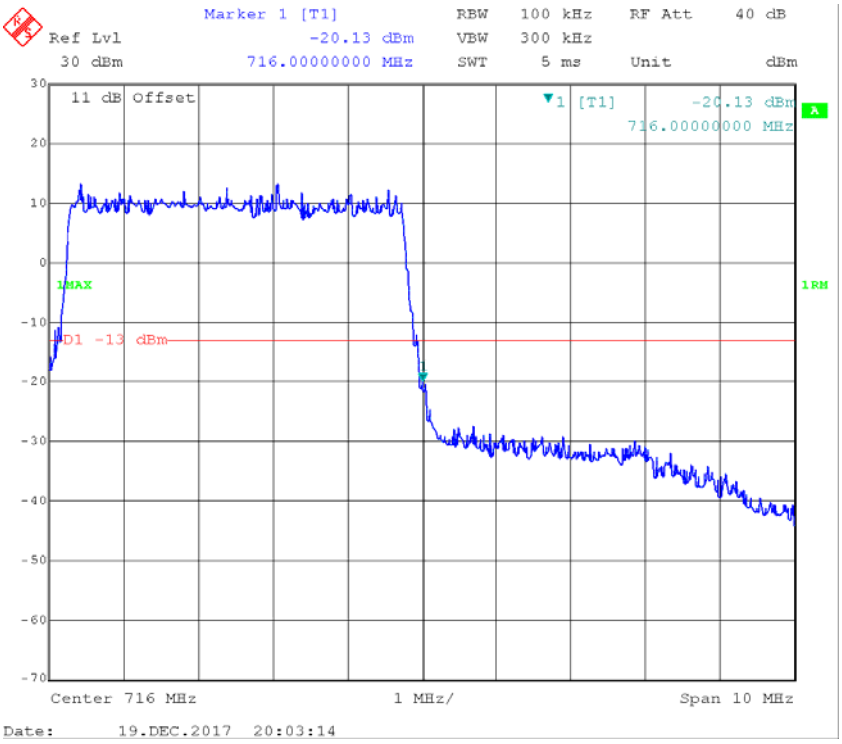

**QPSK_3MHz_ 15 RB_ Right**



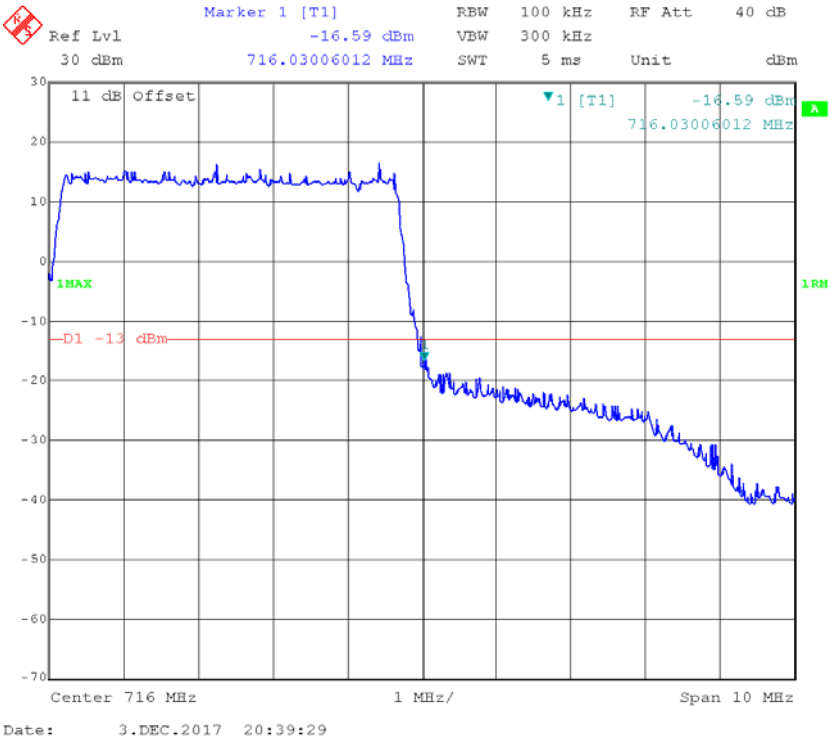
**QPSK_5MHz_ 25 RB_ Left**



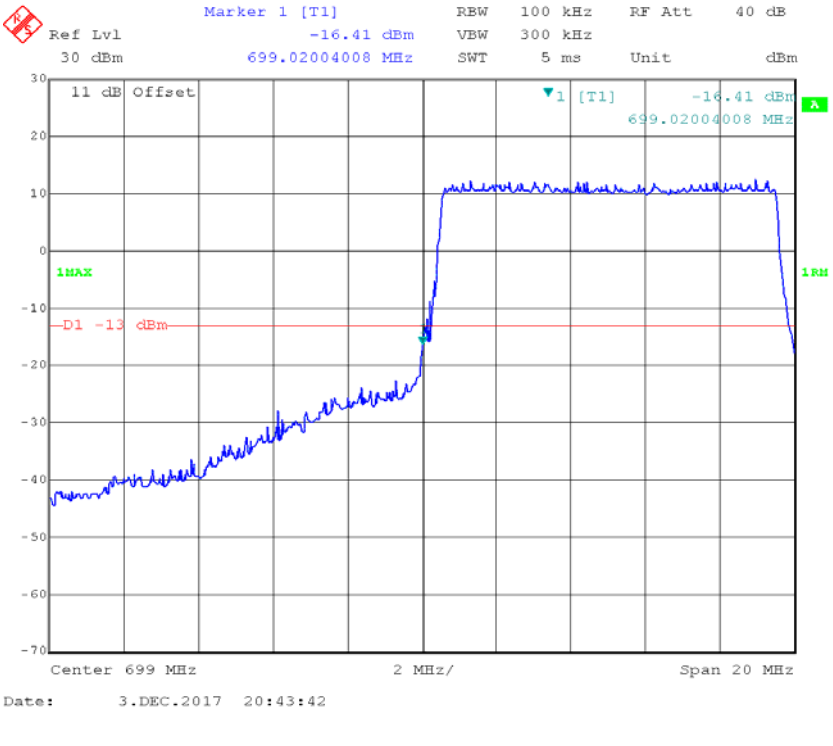

**QPSK_5MHz_ 25 RB_ Right**



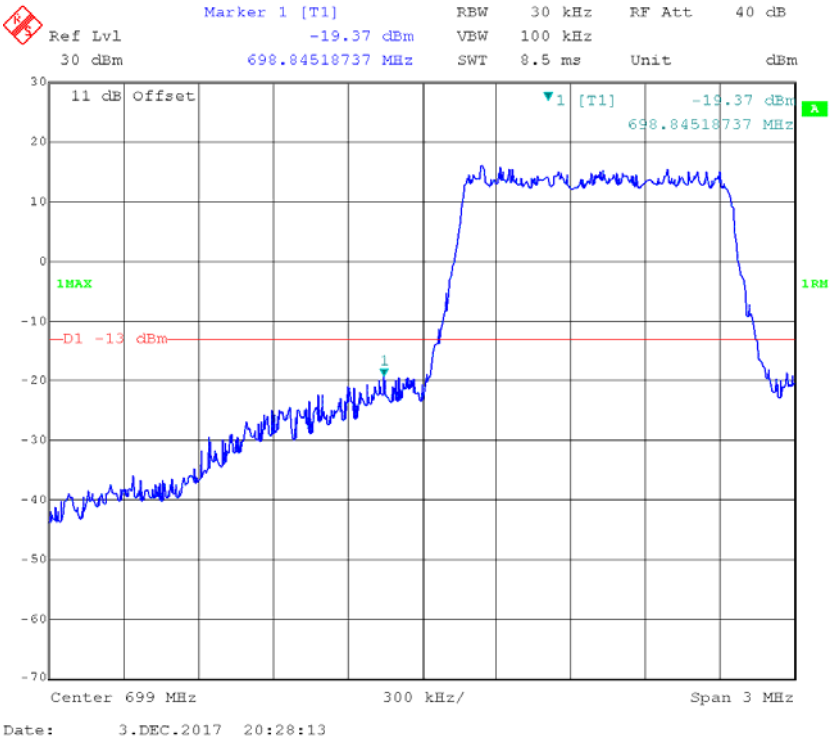
**QPSK_10MHz_ 50 RB_ Left**



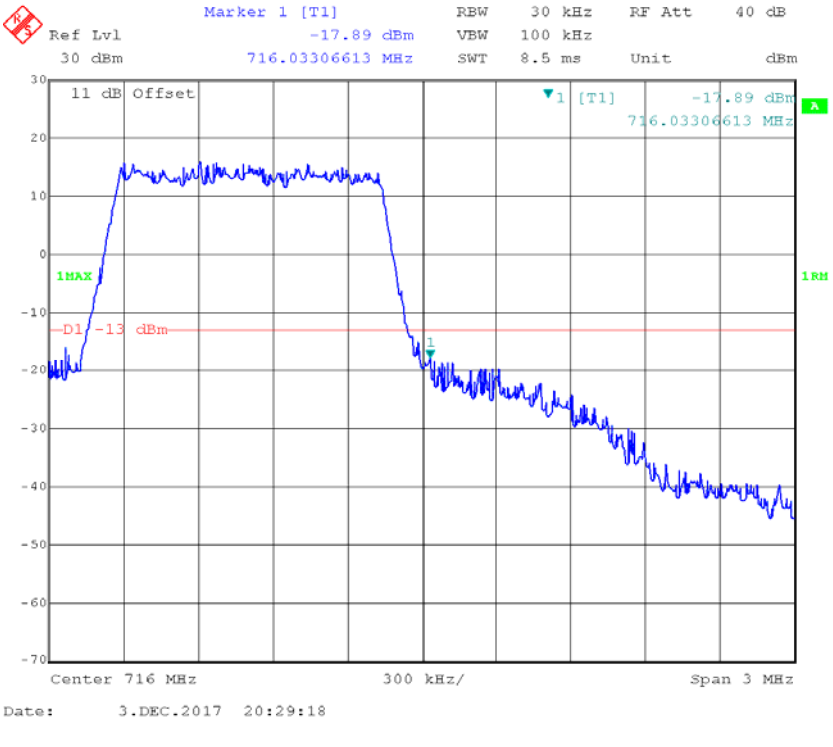

**QPSK_10MHz_ 50 RB_ Right**



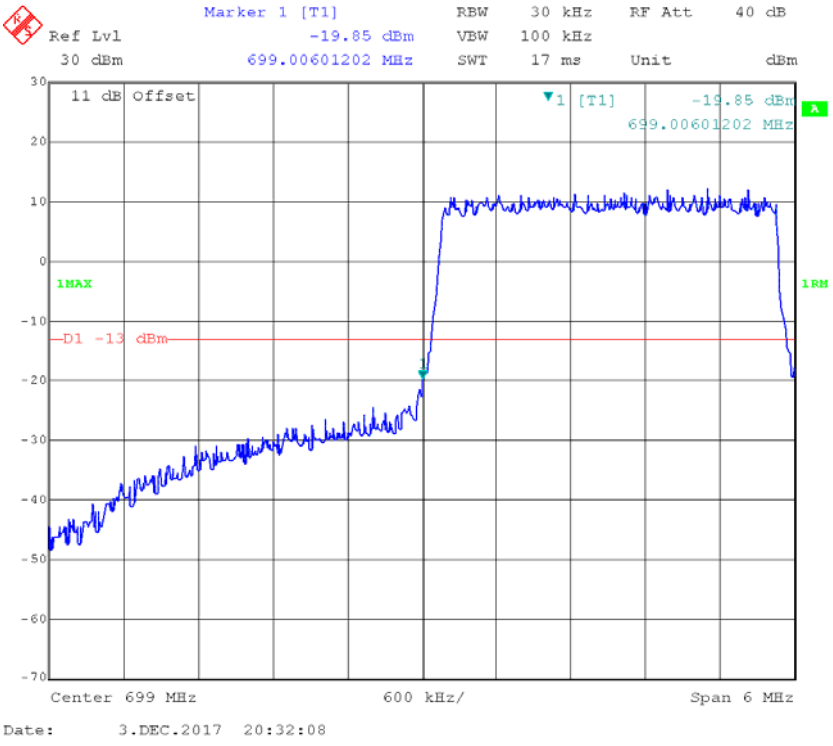
**16QAM_1.4MHz_ 6 RB_ Left**



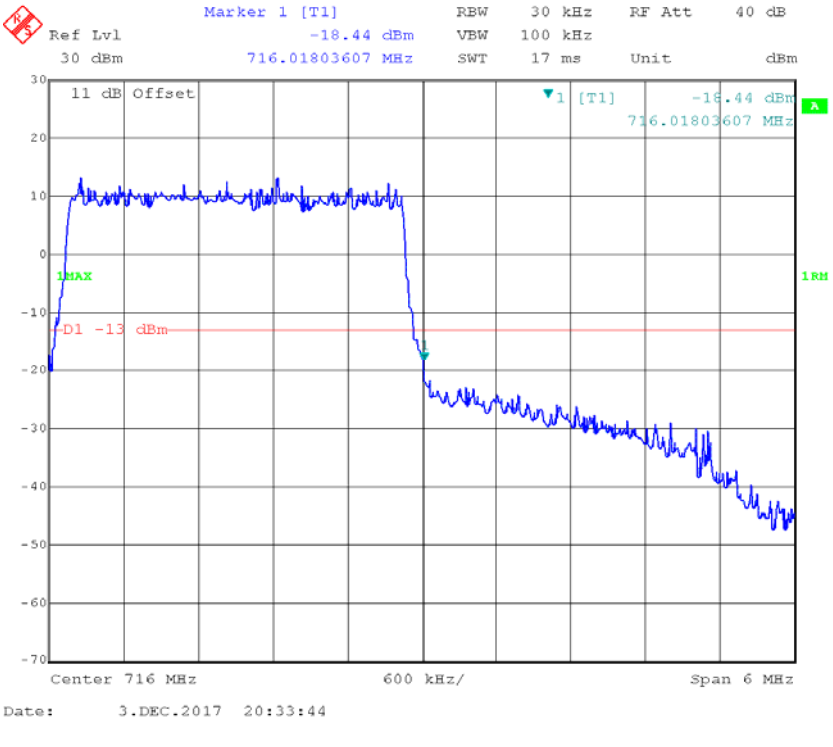

**16QAM_1.4MHz_ 6 RB_ Right**



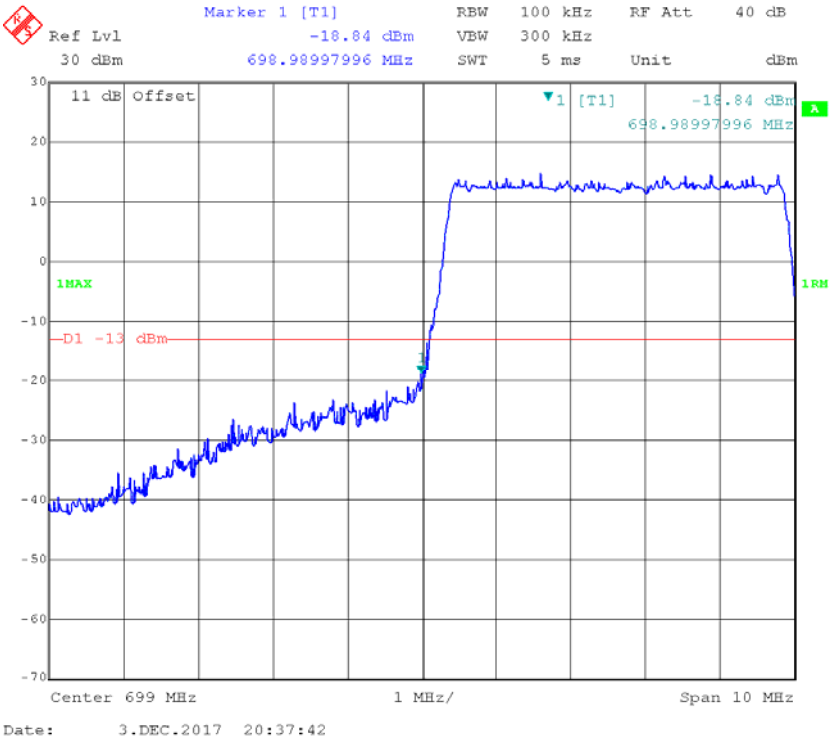
**16QAM_3MHz_ 15 RB_ Left**



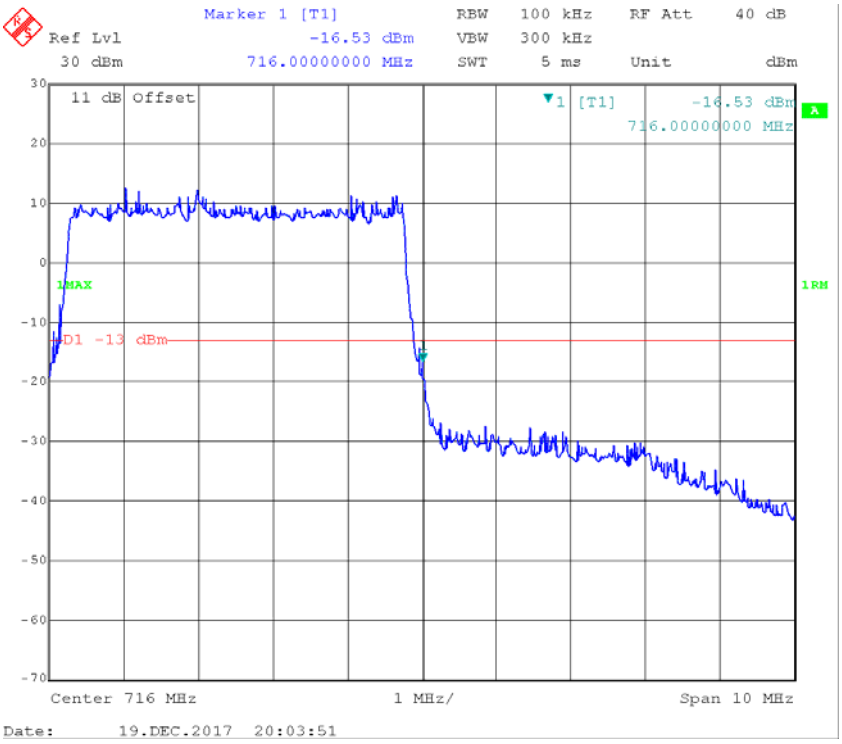

**16QAM_3MHz_ 15 RB_ Right**



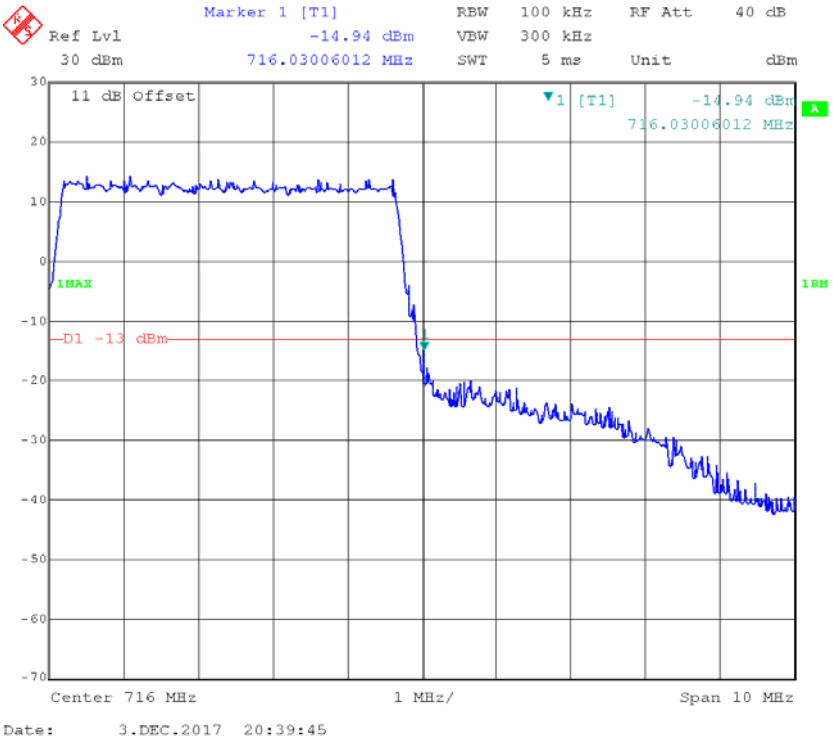
**16QAM_5MHz_ 25 RB_ Left**



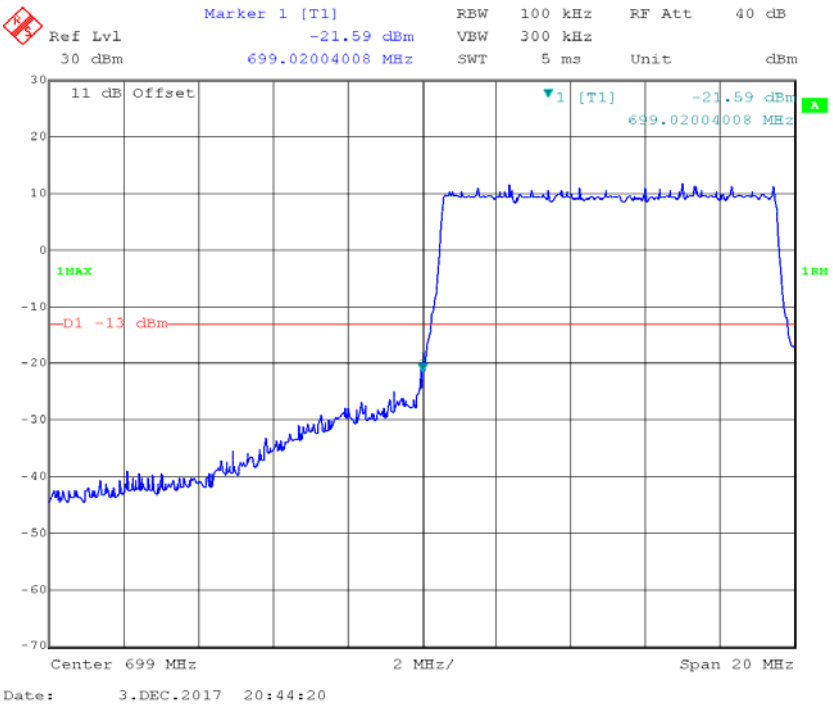

**16QAM_5MHz_ 25 RB_ Right**



**16QAM_10MHz_ 50 RB_ Left**

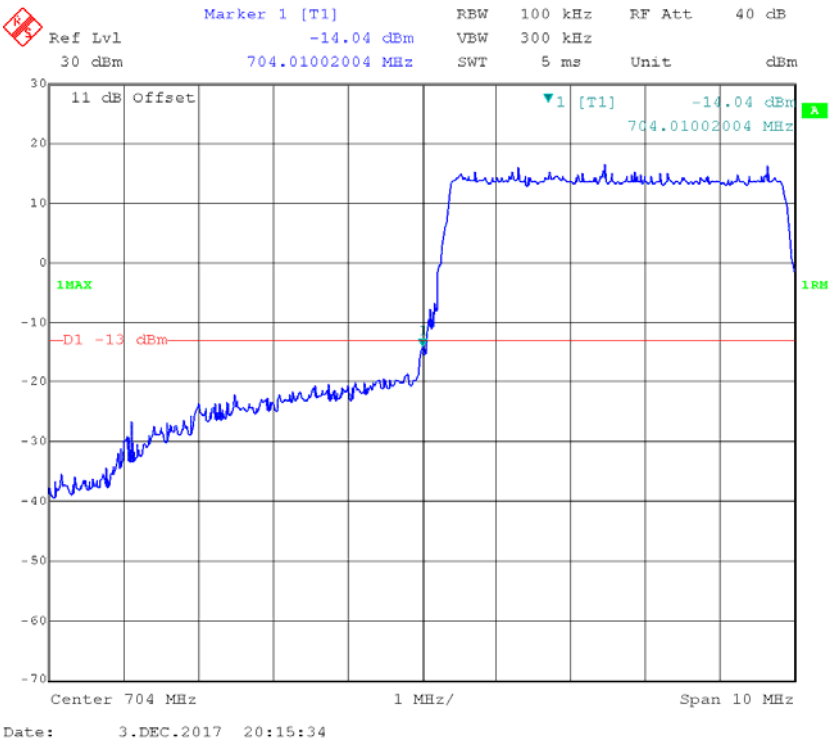



**16QAM_10MHz_ 50 RB_ Right**



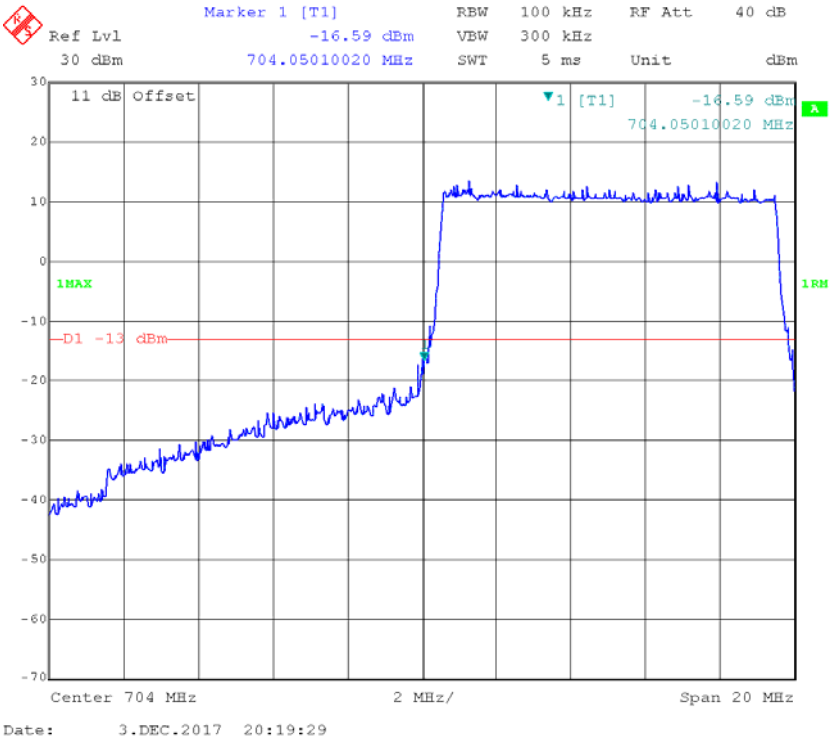
**LTE Band XVII**

**QPSK_5MHz_ 25 RB_ Left**

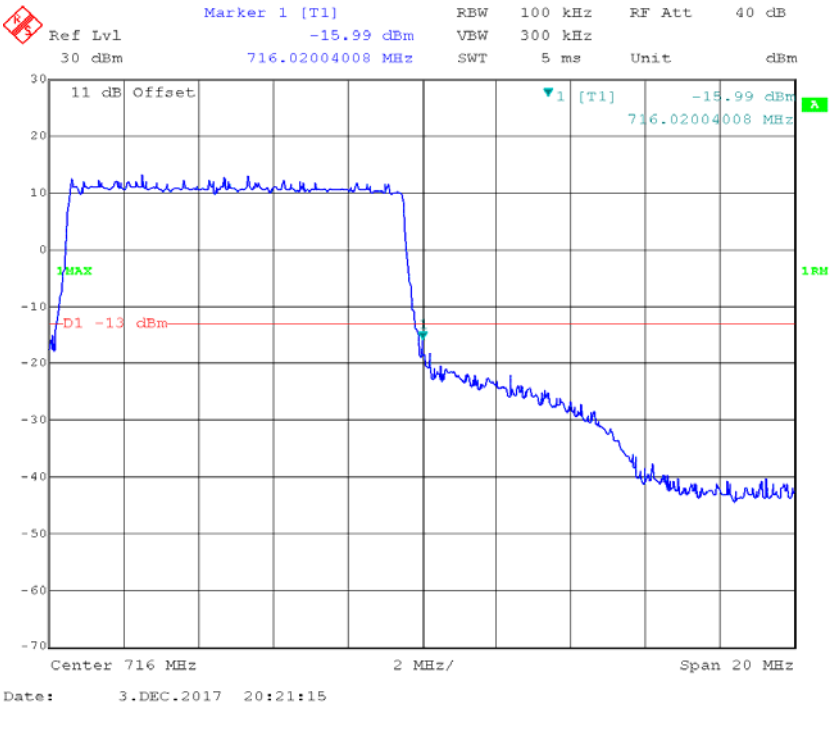



**QPSK_5MHz_ 25 RB_ Right**

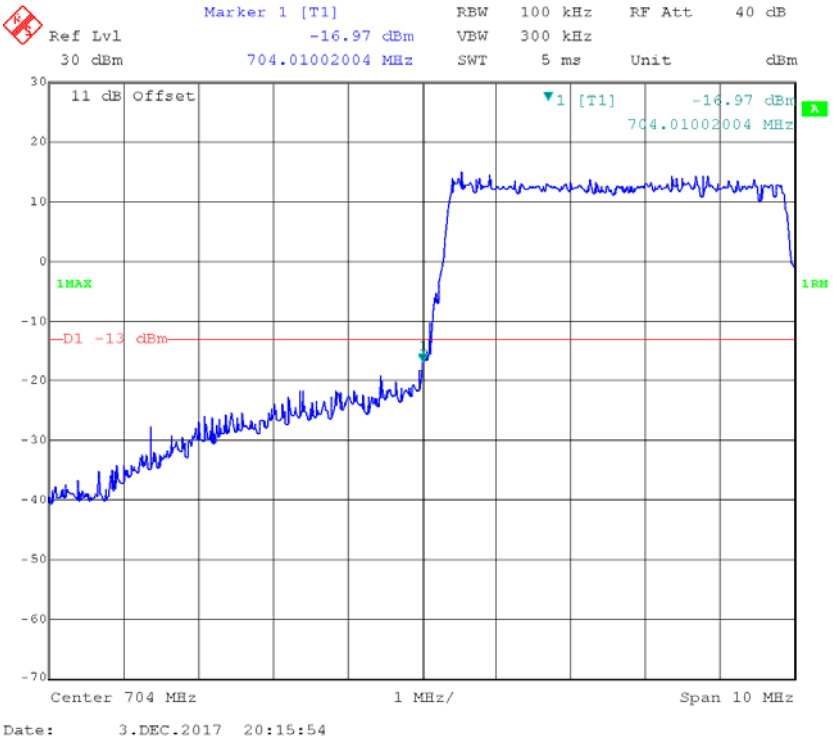
**QPSK_10MHz_ 50 RB_ Left**



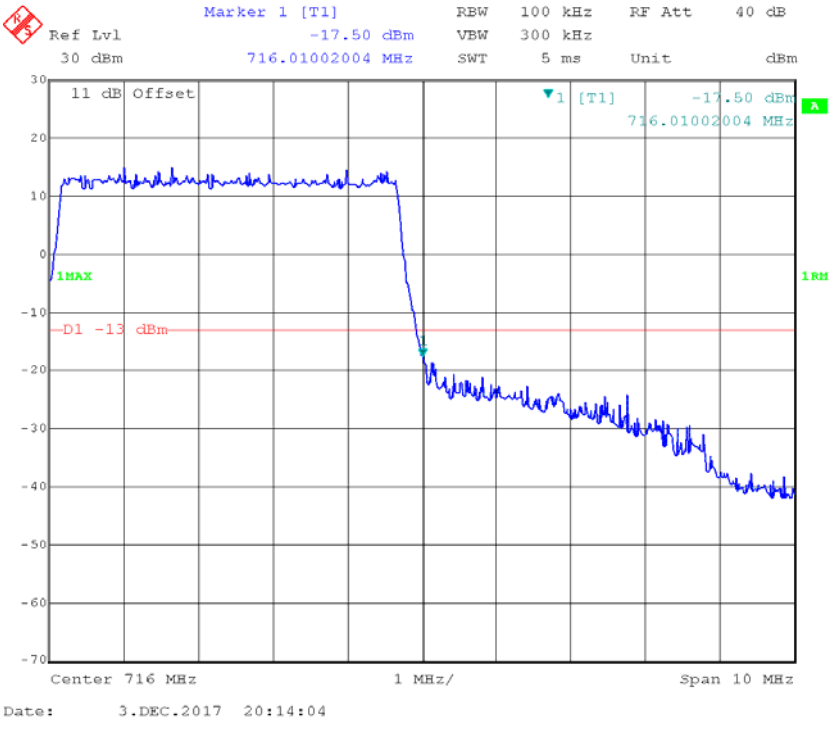

**QPSK_10MHz_ 50 RB_ Right**



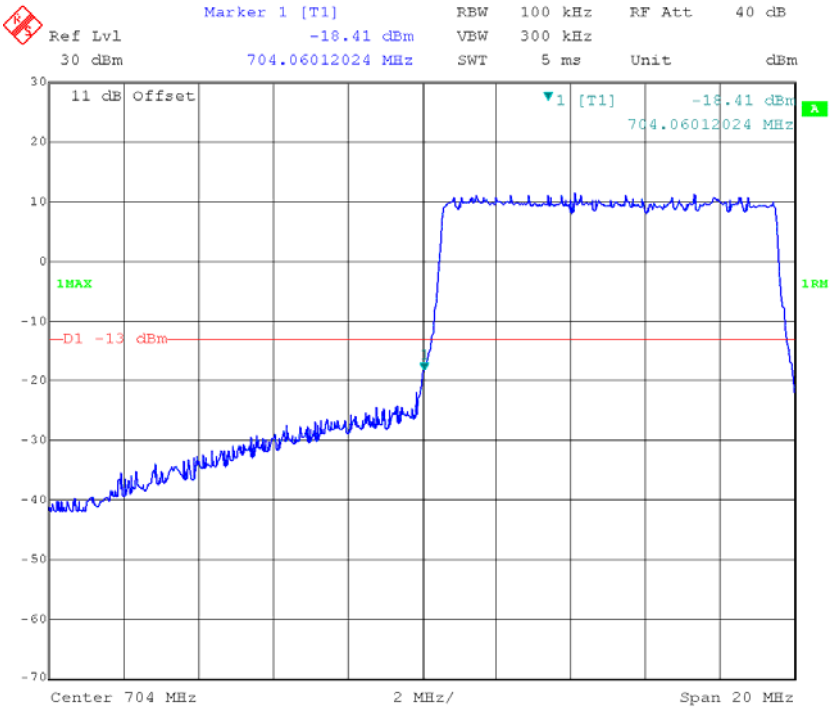
**16QAM_5MHz_ 25 RB_ Left**



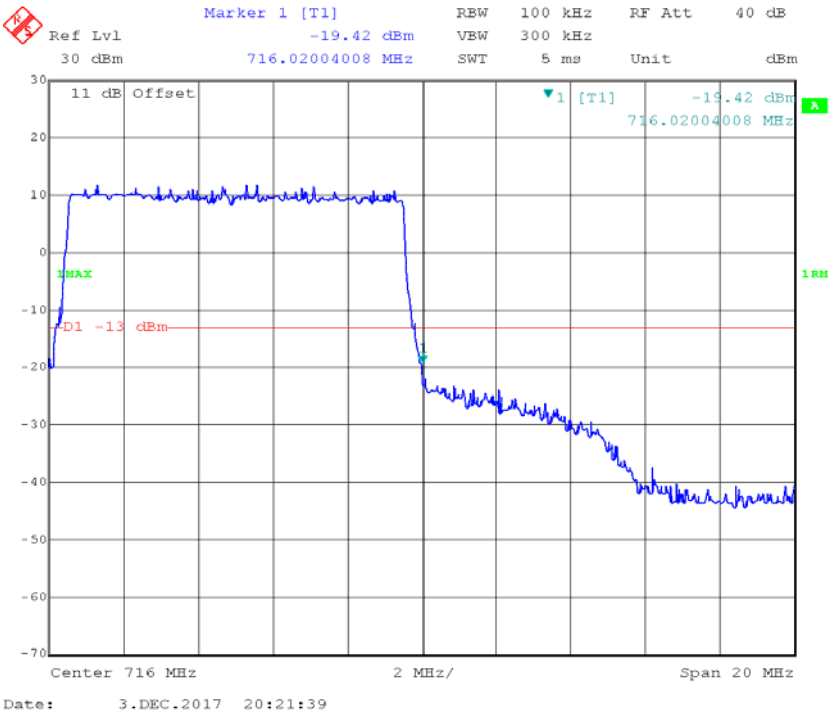

**16QAM_5MHz_ 25 RB_ Right**



**16QAM_10MHz_ 50 RB_ Left**




**16QAM_10MHz_ 50 RB_ Right**



# FCC §2.1055, §22.355 & §24.235 & §27.54 - FREQUENCY STABILITY

## Applicable Standard

FCC § 2.1055 (a), § 2.1055 (d), §22.355, §24.235，§27.54

According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below:

Frequency Tolerance for Transmitters in the Public Mobile Services

| Frequency Range (MHz) | Base, fixed (ppm) | Mobile > 3 watts (ppm) | Mobile ≤ 3 watts (ppm) |
|---|---|---|---|
| 25 to 50 | 20.0 | 20.0 | 50.0 |
| 50 to 450 | 5.0 | 5.0 | 50.0 |
| 450 to 512 | 2.5 | 5.0 | 5.0 |
| 821 to 896 | 1.5 | 2.5 | 2.5 |
| 928 to 929. | 5.0 | N/A | N/A |
| 929 to 960. | 1.5 | N/A | N/A |
| 2110 to 2220 | 10.0 | N/A | N/A |

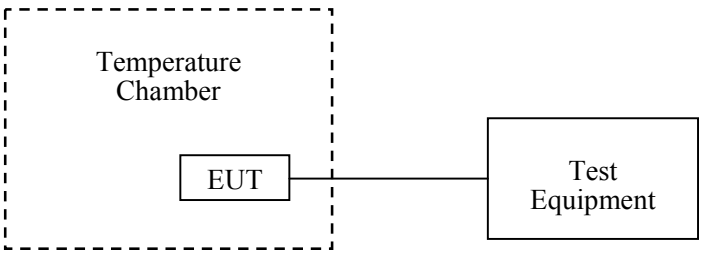
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

## Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: An external variable DC power supply was connected to the battery terminals of the equipment under test. The voltage was set from 85% to 115% of the nominal value and was then decreased until the transmitter light no longer illuminated; i.e., the battery end point. The output frequency was recorded for each battery voltage.



## Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Calibration Date | Calibration Due Date |
|---|---|---|---|---|---|
| Dongzhixu | High Temperature Test Chamber | DP1000 | 201105083-4 | 2017-09-10 | 2018-09-09 |
| R&S | Universal Radio Communication Tester | CMU200 | 109 038 | 2017-07-18 | 2018-07-18 |
| R&S | Wideband Radio Communication Tester | CMW500 | 147473 | 2017-08-31 | 2018-08-31 |
| UNI-T | Multimeter | UT39A | M130199938 | 2017-04-02 | 2018-04-02 |
| Unknown | Coaxial Cable | 0.1m | C-1 | Each Time | / |
| Unknown | RF Attenuator | 10dB | 10dB-1 | Each Time | / |
| Pro instrument | DC Power Supply | pps3300 | N/A | N/A | N/A |

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

## Test Data

### Environmental Conditions

| | |
|---|---|
| **Temperature:** | 25.9 °C |
| **Relative Humidity:** | 47 % |
| **ATM Pressure:** | 101.4 kPa |

*The testing was performed by Pean Zhu on 2017-12-01.*

**Cellular Band (Part 22H)**

| GMSK, Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.8 | -5 | -0.006 | 2.5 |
| -20 | | -8 | -0.010 | |
| -10 | | -9 | -0.011 | |
| 0 | | -5 | -0.006 | |
| 10 | | -11 | -0.013 | |
| 20 | | -8 | -0.010 | |
| 30 | | -10 | -0.012 | |
| 40 | | -5 | -0.006 | |
| 50 | | -6 | -0.007 | |
| 25 | 3.6 | -8 | -0.010 | |
| 25 | 4.35 | -9 | -0.011 | |

| 8PSK, Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Limit** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | **ppm** |
| -30 | 3.8 | -10 | -0.012 | 2.5 |
| -20 | | -7 | -0.008 | |
| -10 | | -7 | -0.008 | |
| 0 | | -10 | -0.012 | |
| 10 | | -8 | -0.010 | |
| 20 | | -5 | -0.006 | |
| 30 | | -12 | -0.014 | |
| 40 | | -4 | -0.005 | |
| 50 | | -4 | -0.005 | |
| 25 | 3.6 | -3 | -0.004 | |
| 25 | 4.35 | -5 | -0.006 | |

**PCS Band (Part 24E)**

| GMSK, Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Results** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | -9 | -0.005 | Pass |
| -20 | | -5 | -0.003 | |
| -10 | | -7 | -0.004 | |
| 0 | | -4 | -0.002 | |
| 10 | | -5 | -0.003 | |
| 20 | | -9 | -0.005 | |
| 30 | | -14 | -0.007 | |
| 40 | | -6 | -0.003 | |
| 50 | | -8 | -0.004 | |
| 25 | 3.6 | -9 | -0.005 | |
| 25 | 4.35 | -6 | -0.003 | |

| 8PSK, Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Results** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | -6 | -0.003 | Pass |
| -20 | | -5 | -0.003 | |
| -10 | | -6 | -0.003 | |
| 0 | | -1 | -0.001 | |
| 10 | | -4 | -0.002 | |
| 20 | | -11 | -0.006 | |
| 30 | | -6 | -0.003 | |
| 40 | | -11 | -0.006 | |
| 50 | | -5 | -0.003 | |
| 25 | 3.6 | -3 | -0.002 | |
| 25 | 4.35 | -11 | -0.006 | |

**WCDMA Band II: R99**

| Middle Channel, $f_c$ = 1880.0 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Results** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | -6 | -0.003 | Pass |
| -20 | | -7 | -0.004 | |
| -10 | | -4 | -0.002 | |
| 0 | | -10 | -0.005 | |
| 10 | | -5 | -0.003 | |
| 20 | | -7 | -0.004 | |
| 30 | | 0 | 0.000 | |
| 40 | | -7 | -0.004 | |
| 50 | | -5 | -0.003 | |
| 25 | 3.6 | -8 | -0.004 | |
| 25 | 4.35 | -6 | -0.003 | |

**WCDMA Band IV: R99**

| Middle Channel, $f_c$ = 1732.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Results** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | -4 | -0.002 | Pass |
| -20 | | -8 | -0.005 | |
| -10 | | -1 | -0.001 | |
| 0 | | -7 | -0.004 | |
| 10 | | -13 | -0.008 | |
| 20 | | -5 | -0.003 | |
| 30 | | -5 | -0.003 | |
| 40 | | -10 | -0.006 | |
| 50 | | -4 | -0.002 | |
| 25 | 3.6 | -8 | -0.005 | |
| 25 | 4.35 | -3 | -0.002 | |

**WCDMA Band Ⅴ: R99**

| Middle Channel, $f_c$ = 836.6 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Results** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | -10 | -0.012 | Pass |
| -20 | | -10 | -0.012 | |
| -10 | | -5 | -0.006 | |
| 0 | | -11 | -0.013 | |
| 10 | | -8 | -0.010 | |
| 20 | | -10 | -0.012 | |
| 30 | | -8 | -0.010 | |
| 40 | | -8 | -0.010 | |
| 50 | | -5 | -0.006 | |
| 25 | 3.6 | -7 | -0.008 | |
| 25 | 4.35 | -12 | -0.014 | |

**LTE Band 2:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 1880 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 16.77 | 0.0089 | Pass |
| -20 | | 16.04 | 0.0085 | Pass |
| -10 | | 15.57 | 0.0083 | Pass |
| 0 | | 16.62 | 0.0088 | Pass |
| 10 | | 16.08 | 0.0086 | Pass |
| 20 | | 15.75 | 0.0084 | Pass |
| 30 | | 15.65 | 0.0083 | Pass |
| 40 | | 16.13 | 0.0086 | Pass |
| 50 | | 15.84 | 0.0084 | Pass |
| 25 | 3.6 | 16.36 | 0.0087 | Pass |
| 25 | 4.35 | 15.64 | 0.0083 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ =1880 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 16.80 | 0.0089 | Pass |
| -20 | | 17.28 | 0.0092 | Pass |
| -10 | | 16.90 | 0.0090 | Pass |
| 0 | | 16.37 | 0.0087 | Pass |
| 10 | | 16.35 | 0.0087 | Pass |
| 20 | | 15.99 | 0.0085 | Pass |
| 30 | | 17.42 | 0.0093 | Pass |
| 40 | | 16.76 | 0.0089 | Pass |
| 50 | | 15.99 | 0.0085 | Pass |
| 25 | 3.6 | 17.65 | 0.0094 | Pass |
| 25 | 4.35 | 16.55 | 0.0088 | Pass |

**LTE Band 4:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 1732.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 18.77 | 0.0108 | Pass |
| -20 | | 17.28 | 0.0100 | Pass |
| -10 | | 18.03 | 0.0104 | Pass |
| 0 | | 18.79 | 0.0108 | Pass |
| 10 | | 18.63 | 0.0108 | Pass |
| 20 | | 18.22 | 0.0105 | Pass |
| 30 | | 19.10 | 0.0110 | Pass |
| 40 | | 18.83 | 0.0109 | Pass |
| 50 | | 17.73 | 0.0102 | Pass |
| 25 | 3.6 | 17.26 | 0.0100 | Pass |
| 25 | 4.35 | 18.33 | 0.0106 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ =1732.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 16.55 | 0.0096 | Pass |
| -20 | | 17.31 | 0.0100 | Pass |
| -10 | | 17.05 | 0.0098 | Pass |
| 0 | | 16.81 | 0.0097 | Pass |
| 10 | | 16.57 | 0.0096 | Pass |
| 20 | | 16.44 | 0.0095 | Pass |
| 30 | | 17.71 | 0.0102 | Pass |
| 40 | | 17.20 | 0.0099 | Pass |
| 50 | | 15.91 | 0.0092 | Pass |
| 25 | 3.6 | 18.22 | 0.0105 | Pass |
| 25 | 4.35 | 17.27 | 0.0100 | Pass |

**LTE Band 5:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 836.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 21.84 | 0.0261 | Pass |
| -20 | | 21.45 | 0.0256 | Pass |
| -10 | | 21.05 | 0.0252 | Pass |
| 0 | | 20.63 | 0.0247 | Pass |
| 10 | | 21.42 | 0.0256 | Pass |
| 20 | | 21.43 | 0.0256 | Pass |
| 30 | | 20.89 | 0.0250 | Pass |
| 40 | | 21.05 | 0.0252 | Pass |
| 50 | | 20.57 | 0.0246 | Pass |
| 25 | 3.6 | 20.29 | 0.0243 | Pass |
| 25 | 4.35 | 21.21 | 0.0254 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ =836.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 18.32 | 0.0219 | Pass |
| -20 | | 19.30 | 0.0231 | Pass |
| -10 | | 18.97 | 0.0227 | Pass |
| 0 | | 19.70 | 0.0236 | Pass |
| 10 | | 18.14 | 0.0217 | Pass |
| 20 | | 18.79 | 0.0225 | Pass |
| 30 | | 18.54 | 0.0222 | Pass |
| 40 | | 19.04 | 0.0228 | Pass |
| 50 | | 19.13 | 0.0229 | Pass |
| 25 | 3.6 | 17.98 | 0.0215 | Pass |
| 25 | 4.35 | 18.66 | 0.0223 | Pass |

**LTE Band 7:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 2535 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 24.10 | 0.0095 | Pass |
| -20 | | 24.11 | 0.0095 | Pass |
| -10 | | 24.72 | 0.0098 | Pass |
| 0 | | 24.07 | 0.0095 | Pass |
| 10 | | 23.20 | 0.0092 | Pass |
| 20 | | 25.39 | 0.0100 | Pass |
| 30 | | 23.62 | 0.0093 | Pass |
| 40 | | 24.70 | 0.0097 | Pass |
| 50 | | 23.00 | 0.0091 | Pass |
| 25 | 3.6 | 24.51 | 0.0097 | Pass |
| 25 | 4.35 | 25.65 | 0.0101 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ =2535 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 21.85 | 0.0086 | Pass |
| -20 | | 21.52 | 0.0085 | Pass |
| -10 | | 21.61 | 0.0085 | Pass |
| 0 | | 21.49 | 0.0085 | Pass |
| 10 | | 22.79 | 0.0090 | Pass |
| 20 | | 23.24 | 0.0092 | Pass |
| 30 | | 22.73 | 0.0090 | Pass |
| 40 | | 22.55 | 0.0089 | Pass |
| 50 | | 22.57 | 0.0089 | Pass |
| 25 | 3.6 | 21.61 | 0.0085 | Pass |
| 25 | 4.35 | 21.96 | 0.0087 | Pass |

**LTE Band 12:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 707.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 19.25 | 0.0272 | Pass |
| -20 | | 19.24 | 0.0272 | Pass |
| -10 | | 18.70 | 0.0264 | Pass |
| 0 | | 18.39 | 0.0260 | Pass |
| 10 | | 19.03 | 0.0269 | Pass |
| 20 | | 19.48 | 0.0275 | Pass |
| 30 | | 18.36 | 0.0260 | Pass |
| 40 | | 19.05 | 0.0269 | Pass |
| 50 | | 17.89 | 0.0253 | Pass |
| 25 | 3.6 | 17.90 | 0.0253 | Pass |
| 25 | 4.35 | 18.99 | 0.0268 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ =707.5 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 15.85 | 0.0224 | Pass |
| -20 | | 16.61 | 0.0235 | Pass |
| -10 | | 16.52 | 0.0233 | Pass |
| 0 | | 17.44 | 0.0247 | Pass |
| 10 | | 15.79 | 0.0223 | Pass |
| 20 | | 16.38 | 0.0232 | Pass |
| 30 | | 16.12 | 0.0228 | Pass |
| 40 | | 16.49 | 0.0233 | Pass |
| 50 | | 16.53 | 0.0234 | Pass |
| 25 | 3.6 | 15.92 | 0.0225 | Pass |
| 25 | 4.35 | 16.18 | 0.0229 | Pass |

**LTE Band 17:**

| QPSK, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 710 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 18.21 | 0.0256 | Pass |
| -20 | | 17.23 | 0.0243 | Pass |
| -10 | | 17.18 | 0.0242 | Pass |
| 0 | | 17.10 | 0.0241 | Pass |
| 10 | | 17.05 | 0.0240 | Pass |
| 20 | | 17.47 | 0.0246 | Pass |
| 30 | | 17.39 | 0.0245 | Pass |
| 40 | | 17.36 | 0.0245 | Pass |
| 50 | | 17.13 | 0.0241 | Pass |
| 25 | 3.6 | 17.15 | 0.0242 | Pass |
| 25 | 4.35 | 16.97 | 0.0239 | Pass |

| 16QAM, Channel Bandwidth:10MHz Middle Channel, $f_c$ = 710 MHz | | | | |
|---|---|---|---|---|
| **Temperature** | **Voltage** | **Frequency Error** | **Frequency Error** | **Result** |
| **℃** | **$V_{DC}$** | **Hz** | **ppm** | |
| -30 | 3.8 | 18.04 | 0.0254 | Pass |
| -20 | | 18.55 | 0.0261 | Pass |
| -10 | | 19.63 | 0.0276 | Pass |
| 0 | | 18.47 | 0.0260 | Pass |
| 10 | | 18.58 | 0.0262 | Pass |
| 20 | | 18.87 | 0.0266 | Pass |
| 30 | | 18.85 | 0.0265 | Pass |
| 40 | | 18.43 | 0.0260 | Pass |
| 50 | | 18.84 | 0.0265 | Pass |
| 25 | 3.6 | 19.00 | 0.0268 | Pass |
| 25 | 4.35 | 17.88 | 0.0252 | Pass |

Note: The fundamental emissions stay within the authorized bands of operation based on the frequency deviation measured is small, the extreme voltage was declared by applicant.

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