



FCC PART 27  
FCC PART 22H, PART 24E  
MEASUREMENT AND TEST REPORT

For

**DDM Brands LLC**

2323 NW, 82ND Ave. Doral, Florida, U.S.A 33122

**FCC ID: A4J45ELTE**

|                                        |                                                                                                                                                                                                                                                   |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Report Type:</b><br>Original Report | <b>Product Type:</b><br>4G Mobile Phone                                                                                                                                                                                                           |
| <b>Report Number:</b> RSZ161009002-00D |                                                                                                                                                                                                                                                   |
| <b>Report Date:</b> 2016-11-29         |                                                                                                                                                                                                                                                   |
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

## **TABLE OF CONTENTS**

|                                                                                                     |            |
|-----------------------------------------------------------------------------------------------------|------------|
| <b>GENERAL INFORMATION.....</b>                                                                     | <b>3</b>   |
| PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT) .....                                            | 3          |
| OBJECTIVE .....                                                                                     | 3          |
| RELATED SUBMITTAL(S)/GRANT(S).....                                                                  | 3          |
| TEST METHODOLOGY .....                                                                              | 3          |
| MEASUREMENT UNCERTAINTY .....                                                                       | 4          |
| TEST FACILITY .....                                                                                 | 4          |
| <b>SYSTEM TEST CONFIGURATION .....</b>                                                              | <b>5</b>   |
| JUSTIFICATION .....                                                                                 | 5          |
| EQUIPMENT MODIFICATIONS .....                                                                       | 5          |
| SUPPORT EQUIPMENT LIST AND DETAILS .....                                                            | 5          |
| BLOCK DIAGRAM OF TEST SETUP .....                                                                   | 5          |
| <b>SUMMARY OF TEST RESULTS .....</b>                                                                | <b>6</b>   |
| <b>TEST EQUIPMENT LIST .....</b>                                                                    | <b>7</b>   |
| <b>FCC §1.1307(B) &amp; §2.1093 - RF EXPOSURE INFORMATION.....</b>                                  | <b>8</b>   |
| APPLICABLE STANDARD .....                                                                           | 8          |
| TEST RESULT .....                                                                                   | 8          |
| <b>FCC §2.1047 - MODULATION CHARACTERISTIC .....</b>                                                | <b>9</b>   |
| <b>§2.1046; § 22.913 (A); § 24.232 (C); §27.50 (C) (D) (H) - RF OUTPUT POWER.....</b>               | <b>10</b>  |
| APPLICABLE STANDARDS.....                                                                           | 10         |
| TEST PROCEDURE .....                                                                                | 10         |
| TEST DATA .....                                                                                     | 10         |
| <b>FCC §2.1049, §22.917, §22.905 &amp; §24.238 &amp; §27.53 - OCCUPIED BANDWIDTH .....</b>          | <b>27</b>  |
| APPLICABLE STANDARDS.....                                                                           | 27         |
| TEST PROCEDURE .....                                                                                | 27         |
| TEST DATA .....                                                                                     | 27         |
| <b>§ 2.1051; § 22.917 (A); § 24.238 (A); §27.53 (H) (M) SPURIOUS EMISSIONS AT ANTENNA TERMINALS</b> | <b>61</b>  |
| APPLICABLE STANDARDS.....                                                                           | 61         |
| TEST PROCEDURE .....                                                                                | 61         |
| TEST DATA .....                                                                                     | 61         |
| <b>FCC § 2.1053; § 22.917 (A); § 24.238 (A); §27.53 (H) (M) SPURIOUS RADIATED EMISSIONS.....</b>    | <b>84</b>  |
| APPLICABLE STANDARDS.....                                                                           | 84         |
| TEST PROCEDURE .....                                                                                | 84         |
| TEST DATA .....                                                                                     | 84         |
| <b>FCC § 22.917 (A);§ 24.238 (A); §27.53 (H)(M) - BAND EDGES .....</b>                              | <b>87</b>  |
| APPLICABLE STANDARDS.....                                                                           | 87         |
| TEST PROCEDURE .....                                                                                | 87         |
| TEST DATA .....                                                                                     | 87         |
| <b>FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY .....</b>                        | <b>122</b> |
| APPLICABLE STANDARDS.....                                                                           | 122        |
| TEST PROCEDURE .....                                                                                | 122        |
| TEST DATA .....                                                                                     | 123        |

## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *DDM Brands LLC's* product, model number: *4.5E LTE (FCC ID: A4J45ELTE)* or the "EUT" in this report was a *4G Mobile phone*, which was measured approximately: 13.3 cm (L) × 6.7 cm (W) × 0.9 cm (H), rated with input voltage: DC 3.7 V battery or DC 5.0 V from adapter.

Adapter Information:

Model: TPA-90C050050UU

Input: AC 100-240V, 50-60Hz, 0.2A

Output: DC 5.0V, 0.7A

*Notes: For the product, series model AM45EL133, AC45EL133 and 4.5E LTE are identical schematics, the differences between them is just the model number due to marketing purpose and different shell (front appearance). 4.5E LTE was selected for fully testing, which was explained in the attached product similarity declaration letter.*

*\*All measurement and test data in this report was gathered from production sample serial number: 1603368. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-10-09.*

### Objective

This type approval report is prepared on behalf of *DDM Brands LLC* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

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

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

FCC Part 15B JBP, Part 15.247 DSS & DTS submissions with FCC ID: A4J45ELTE.

### 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.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Measurement Uncertainty**

| Item                               |            | Uncertainty   |
|------------------------------------|------------|---------------|
| AC Power Lines Conducted Emissions |            | $\pm 3.26$ dB |
| RF conducted test with spectrum    |            | $\pm 0.9$ dB  |
| RF Output Power with Power meter   |            | $\pm 0.5$ dB  |
| Radiated emission                  | 30MHz~1GHz | $\pm 5.91$ dB |
|                                    | Above 1G   | $\pm 4.92$ dB |
| Occupied Bandwidth                 |            | $\pm 0.5$ kHz |
| Temperature                        |            | $\pm 1.0$ °C  |
| Humidity                           |            | $\pm 6\%$     |

**Test Facility**

The test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the Chenghu Lake Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2013.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

## SYSTEM TEST CONFIGURATION

### Justification

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

The final qualification test was performed with the EUT operating at normal mode.

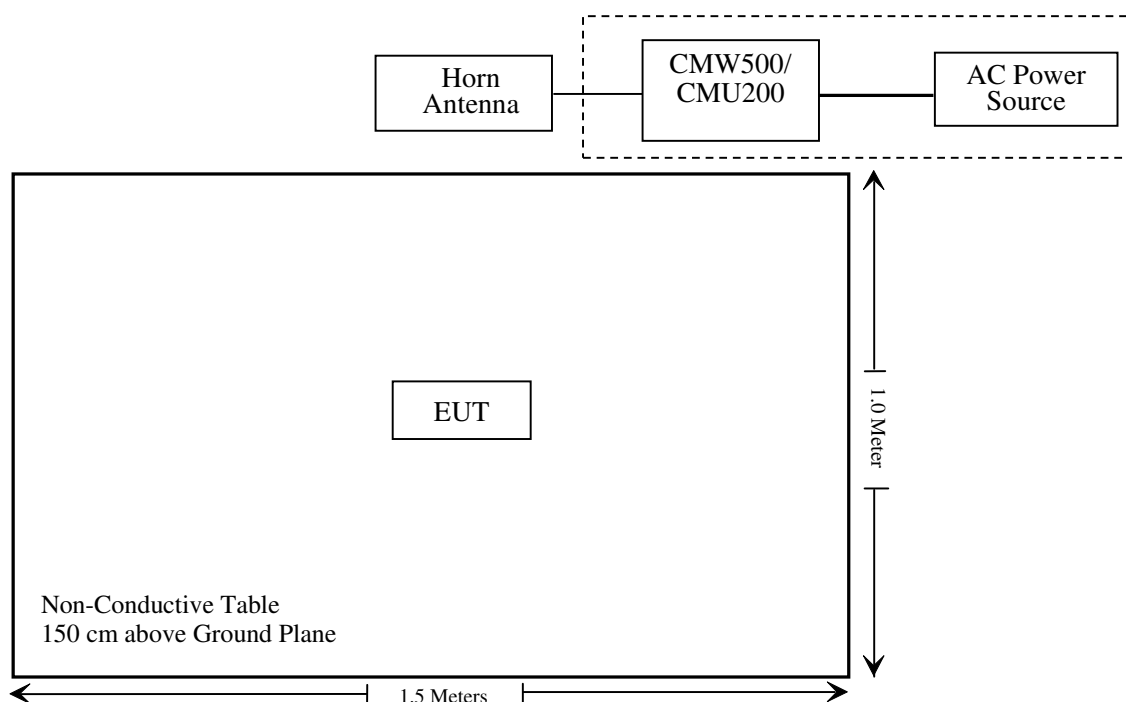
### Equipment Modifications

No modifications were made to the EUT.

### Support Equipment List and Details

| Manufacturer    | Description                          | Model  | Serial Number          |
|-----------------|--------------------------------------|--------|------------------------|
| Rohde & Schwarz | Universal Radio Communication Tester | CMU200 | 110605                 |
| Rohde & Schwarz | Wideband Radio Communication Tester  | CMW500 | 1201.0002K50-116218-UY |

### Block Diagram of Test Setup



**SUMMARY OF TEST RESULTS**

| FCC Rules                                              | Description of Test                    | Result         |
|--------------------------------------------------------|----------------------------------------|----------------|
| §1.1307 (b)(1), §2.1093                                | RF Exposure Information                | Compliance*    |
| §2.1046; § 22.913 (a);<br>§ 24.232 (c); §27.50 (d) (h) | 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; § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m) | Spurious Emissions at Antenna Terminal | Compliance     |
| § 2.1053; § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m) | Spurious Radiated Emissions            | Compliance     |
| § 22.917 (a);<br>§ 24.238 (a); §27.53 (h)(m)           | Band Edge                              | Compliance     |
| § 2.1055; § 22.355;<br>§ 24.235; §27.54;               | Frequency stability                    | Compliance     |

Compliance\*: Please refer to SAR report released by BACL, report number: RSZ161009002-20.

**TEST EQUIPMENT LIST**

| Manufacturer                  | Description                          | Model          | Serial Number         | Calibration Date | Calibration Due Date |
|-------------------------------|--------------------------------------|----------------|-----------------------|------------------|----------------------|
| <b>Radiated Emission Test</b> |                                      |                |                       |                  |                      |
| Sonoma Instrument             | Amplifier                            | 330            | 171377                | 2016-10-21       | 2017-10-21           |
| Rohde & Schwarz               | EMI Test Receiver                    | ESCI           | 100195                | 2016-11-11       | 2017-11-10           |
| Sunol Sciences                | Broadband Antenna                    | JB3            | A090314-2             | 2016-01-09       | 2019-01-08           |
| Sunol Sciences                | Broadband Antenna                    | JB3            | A090314-1             | 2016-01-09       | 2019-01-08           |
| Narda                         | Pre-amplifier                        | AFS42-00101800 | 2001270               | 2016-09-08       | 2017-09-08           |
| EMCO                          | Horn Antenna                         | 3116           | 9510-2384             | 2015-11-07       | 2018-11-06           |
| Rohde & Schwarz               | Signal Analyzer                      | FSIQ26         | 100048                | 2016-11-11       | 2017-11-10           |
| ETS                           | Horn Antenna                         | 3115           | 6229                  | 2016-01-11       | 2017-01-10           |
| ETS                           | Horn Antenna                         | 3115           | 9311-4159             | 2016-01-11       | 2017-01-10           |
| R&S                           | Auto test Software                   | EMC32          | V 09.10.0             | NCR              | NCR                  |
| BACL                          | RF cable                             | KS-LAB-012     | KS-LAB-012            | 2015-12-15       | 2016-12-15           |
| Ducommun technologies         | RF Cable                             | 104PEA         | 218124002             | 2016-04-22       | 2017-04-22           |
| HP                            | Signal Generator                     | E4421B         | US38440505            | 2016-11-11       | 2017-11-10           |
| <b>RF Conducted test</b>      |                                      |                |                       |                  |                      |
| BACL                          | TS 8997 Cable-01                     | T-KS-EMC086    | T-KS-EMC086           | 2015-12-10       | 2016-12-09           |
| BACL                          | RF cable                             | KS-LAB-012     | KS-LAB-012            | 2015-12-16       | 2016-12-15           |
| WEINSCHL                      | 3dB Attenuator                       | 5326           | N/A                   | 2016-06-18       | 2017-06-18           |
| Rohde & Schwarz               | OSP120 BASE UNIT                     | OSP120         | 101247                | 2016-07-04       | 2017-07-03           |
| Rohde & Schwarz               | Signal Analyzer                      | FSIQ26         | 836131                | 2016-09-21       | 2017-09-21           |
| Rohde & Schwarz               | Signal Analyzer                      | FSIQ26         | 100048                | 2016-11-11       | 2017-11-10           |
| Rohde & Schwarz               | Universal Radio Communication Tester | CMU200         | 110605                | 2016-11-11       | 2017-11-10           |
| R&S                           | Wideband Radio Communication tester  | CMW500         | 1201.002K50-116218-UY | 2016-10-08       | 2017-10-07           |
| HONOVA                        | Power Splitter                       | ZFRSC-14-S+    | 019411452             | 2016-06-12       | 2017-06-12           |
| WEINSCHL                      | 10dB Attenuator                      | 5328           | N/A                   | 2016-06-18       | 2017-06-18           |

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

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## **FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION**

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### **Applicable Standard**

FCC§1.1307, §2.1093.

### **Test Result**

Compliance, please refer to the SAR report: RSZ161009002-20.

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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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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.

**§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (c) (d) (h) - RF OUTPUT POWER****Applicable Standards**

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..

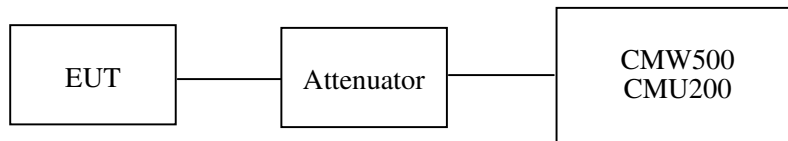
According to §27.50(c), Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz. The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

**Test Procedure***Conducted method:*

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.

*Radiated method:*

TIA603-D section 2.2.17

**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 55 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Peter Jiang on 2016-11-15.*

**Conducted Power****Cellular Band (Part 22H)**

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | Limit (dBm) |
|------|---------|-----------------|----------------------------|-------------|
| GSM  | 128     | 824.2           | 31.96                      | 38.45       |
|      | 190     | 836.6           | 31.86                      | 38.45       |
|      | 251     | 848.8           | 31.85                      | 38.45       |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) |         |         |         | Limit (dBm) |
|------|---------|-----------------|----------------------------|---------|---------|---------|-------------|
|      |         |                 | 1 slot                     | 2 slots | 3 slots | 4 slots |             |
| GPRS | 128     | 824.2           | 32.03                      | 31.26   | 29.35   | 28.23   | 38.45       |
|      | 190     | 836.6           | 31.94                      | 31.13   | 29.18   | 28.01   | 38.45       |
|      | 251     | 848.8           | 31.93                      | 31.09   | 29.11   | 27.94   | 38.45       |

| Mode  | Channel | Frequency (MHz) | Average Output Power (dBm) |         |         |         | Limit (dBm) |
|-------|---------|-----------------|----------------------------|---------|---------|---------|-------------|
|       |         |                 | 1 slot                     | 2 slots | 3 slots | 4 slots |             |
| EGPRS | 128     | 824.2           | 25.12                      | 24.05   | 21.84   | 20.78   | 38.45       |
|       | 190     | 836.6           | 25.00                      | 23.94   | 21.72   | 20.54   | 38.45       |
|       | 251     | 848.8           | 24.84                      | 23.80   | 21.55   | 20.36   | 38.45       |

| Mode           | Test Condition | Test Mode   | 3GPP Sub Test | Average Output Power (dBm) |                  |                |
|----------------|----------------|-------------|---------------|----------------------------|------------------|----------------|
|                |                |             |               | Low Frequency              | Middle Frequency | High Frequency |
| WCDMA (Band 5) | Normal         | RMC         |               | 22.21                      | 22.33            | 22.40          |
|                |                | Rel 6 HSDPA | 1             | 21.53                      | 21.62            | 21.67          |
|                |                |             | 2             | 21.58                      | 21.68            | 21.71          |
|                |                |             | 3             | 21.54                      | 21.69            | 21.73          |
|                |                |             | 4             | 21.61                      | 21.71            | 21.68          |
|                |                | Rel 6 HSUPA | 1             | 21.56                      | 21.62            | 21.69          |
|                |                |             | 2             | 21.59                      | 21.65            | 21.72          |
|                |                |             | 3             | 21.51                      | 21.62            | 21.73          |
|                |                |             | 4             | 21.49                      | 21.58            | 21.74          |
|                |                |             | 5             | 21.63                      | 21.66            | 21.67          |
|                |                | DC-HSDPA    | 1             | 21.35                      | 21.25            | 21.01          |
|                |                |             | 2             | 21.31                      | 21.37            | 21.12          |
|                |                |             | 3             | 21.26                      | 21.21            | 21.15          |
|                |                |             | 4             | 21.14                      | 21.32            | 21.16          |
|                |                | HSPA+       | 1             | 21.22                      | 21.30            | 21.31          |

**PCS Band (Part 24E)**

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) | Limit (dBm) |
|------|---------|-----------------|----------------------------|-------------|
| GSM  | 512     | 1850.2          | 28.20                      | 33          |
|      | 661     | 1880.0          | 28.48                      | 33          |
|      | 810     | 1909.8          | 28.69                      | 33          |

| Mode | Channel | Frequency (MHz) | Average Output Power (dBm) |         |         |         | Limit (dBm) |
|------|---------|-----------------|----------------------------|---------|---------|---------|-------------|
|      |         |                 | 1 slot                     | 2 slots | 3 slots | 4 slots |             |
| GPRS | 512     | 1850.2          | 28.14                      | 27.36   | 25.37   | 24.29   | 33          |
|      | 661     | 1880.0          | 28.59                      | 27.66   | 25.74   | 24.67   | 33          |
|      | 810     | 1909.8          | 28.72                      | 27.97   | 26.13   | 25.08   | 33          |

| Mode  | Channel | Frequency (MHz) | Average Output Power (dBm) |         |         |         | Limit (dBm) |
|-------|---------|-----------------|----------------------------|---------|---------|---------|-------------|
|       |         |                 | 1 slot                     | 2 slots | 3 slots | 4 slots |             |
| EGPRS | 512     | 1850.2          | 24.82                      | 23.72   | 21.54   | 20.18   | 33          |
|       | 661     | 1880.0          | 25.32                      | 24.21   | 22.00   | 20.63   | 33          |
|       | 810     | 1909.8          | 25.58                      | 24.54   | 22.27   | 20.85   | 33          |

| Mode           | Test Condition | Test Mode   | 3GPP Sub Test | Average Output Power (dBm) |                  |                |
|----------------|----------------|-------------|---------------|----------------------------|------------------|----------------|
|                |                |             |               | Low Frequency              | Middle Frequency | High Frequency |
| WCDMA (Band 2) | Normal         | RMC         |               | 21.50                      | 22.03            | 21.87          |
|                |                | Rel 6 HSDPA | 1             | 20.89                      | 21.46            | 21.22          |
|                |                |             | 2             | 20.85                      | 21.49            | 21.19          |
|                |                |             | 3             | 20.93                      | 21.52            | 21.15          |
|                |                |             | 4             | 20.89                      | 21.47            | 21.22          |
|                |                | Rel 6 HSUPA | 1             | 20.96                      | 21.39            | 21.27          |
|                |                |             | 2             | 20.89                      | 21.52            | 21.21          |
|                |                |             | 3             | 20.85                      | 21.48            | 21.09          |
|                |                |             | 4             | 20.87                      | 21.61            | 21.13          |
|                |                |             | 5             | 20.96                      | 21.57            | 21.29          |
|                |                | DC-HSDPA    | 1             | 20.91                      | 20.83            | 20.75          |
|                |                |             | 2             | 20.72                      | 20.79            | 20.82          |
|                |                |             | 3             | 20.86                      | 20.88            | 20.79          |
|                |                |             | 4             | 20.89                      | 20.85            | 20.81          |
|                |                | HSPA+       | 1             | 20.79                      | 20.83            | 20.77          |

**Peak-to-average ratio (PAR)****Cellular Band**

| Mode       | Channel | PAR (dB) | Limit (dB) |
|------------|---------|----------|------------|
| GSM (GMSK) | Low     | 0.16     | 13         |
|            | Middle  | 0.22     | 13         |
|            | High    | 0.38     | 13         |

| Mode         | Channel | PAR (dB) | Limit (dBm) |
|--------------|---------|----------|-------------|
| EGPRS (8PSK) | Low     | 0.16     | 13          |
|              | Middle  | 0.29     | 13          |
|              | High    | 0.37     | 13          |

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| RMC (BPSK)    | Low     | 2.01     | 13         |
|               | Middle  | 2.21     | 13         |
|               | High    | 2.78     | 13         |
| HSDPA (16QAM) | Low     | 1.96     | 13         |
|               | Middle  | 2.13     | 13         |
|               | High    | 2.36     | 13         |
| HSUPA (BPSK)  | Low     | 1.97     | 13         |
|               | Middle  | 2.18     | 13         |
|               | High    | 2.49     | 13         |

**PCS Band**

| Mode          | Channel | PAR (dB) | Limit (dB) |
|---------------|---------|----------|------------|
| GSM<br>(GMSK) | Low     | 0.12     | 13         |
|               | Middle  | 0.29     | 13         |
|               | High    | 0.41     | 13         |

| Mode            | Channel | PAR (dB) | Limit (dBm) |
|-----------------|---------|----------|-------------|
| EGPRS<br>(8PSK) | Low     | 0.22     | 13          |
|                 | Middle  | 0.31     | 13          |
|                 | High    | 0.41     | 13          |

| Mode             | Channel | PAR (dB) | Limit (dB) |
|------------------|---------|----------|------------|
| RMC<br>(BPSK)    | Low     | 2.12     | 13         |
|                  | Middle  | 2.37     | 13         |
|                  | High    | 2.68     | 13         |
| HSDPA<br>(16QAM) | Low     | 2.32     | 13         |
|                  | Middle  | 2.69     | 13         |
|                  | High    | 3.01     | 13         |
| HSUPA<br>(BPSK)  | Low     | 2.41     | 13         |
|                  | Middle  | 2.76     | 13         |
|                  | High    | 3.12     | 13         |

**Radiated Power****GSM Mode:**

| Frequency<br>(MHz)                            | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted            |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-----------------------------------------------|-------------------------------|------------------------------|---------------|----------------|------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                                               |                               |                              | Height<br>(m) | Polar<br>(H/V) | S.G.<br>Level<br>(dBm) | Cable<br>loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| ERP, Cellular Band (Part 22H), Middle Channel |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 836.6                                         | 96.46                         | 235                          | 1.1           | H              | 25.5                   | 0.46                  | 4.75                    | 29.79                      | 38.45          | 8.66           |
| 836.6                                         | 89.63                         | 336                          | 1.0           | V              | 18.6                   | 0.46                  | 4.75                    | 22.89                      | 38.45          | 15.56          |
| EIRP, PCS Band (Part 24E), Middle Channel     |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 1880.00                                       | 78.04                         | 124                          | 2.3           | H              | 17.2                   | 0.31                  | 10.4                    | 27.29                      | 33             | 5.71           |
| 1880.00                                       | 75.67                         | 171                          | 1.6           | V              | 11.4                   | 0.31                  | 10.4                    | 21.49                      | 33             | 11.51          |

**EGRPS Mode:**

| Frequency<br>(MHz)                            | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted            |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|-----------------------------------------------|-------------------------------|------------------------------|---------------|----------------|------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                                               |                               |                              | Height<br>(m) | Polar<br>(H/V) | S.G.<br>Level<br>(dBm) | Cable<br>loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| ERP, Cellular Band (Part 22H), Middle Channel |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 836.6                                         | 90.51                         | 123                          | 1.3           | H              | 19.5                   | 0.46                  | 4.75                    | 23.79                      | 38.45          | 14.66          |
| 836.6                                         | 84.81                         | 273                          | 1.6           | V              | 13.8                   | 0.46                  | 4.75                    | 18.09                      | 38.45          | 20.36          |
| EIRP, PCS Band (Part 24E), Middle Channel     |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 1880.00                                       | 73.64                         | 120                          | 2.3           | H              | 12.8                   | 0.31                  | 10.4                    | 22.89                      | 33             | 10.11          |
| 1880.00                                       | 74.67                         | 203                          | 1.2           | V              | 10.4                   | 0.31                  | 10.4                    | 20.49                      | 33             | 12.51          |

**WCDMA Mode:**

| Frequency<br>(MHz)                             | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted            |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|------------------------------------------------|-------------------------------|------------------------------|---------------|----------------|------------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                                                |                               |                              | Height<br>(m) | Polar<br>(H/V) | S.G.<br>Level<br>(dBm) | Cable<br>loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| ERP, WCDMA Band V (Part 22H), Middle Channel   |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 836.6                                          | 86.78                         | 313                          | 1.5           | H              | 15.8                   | 0.46                  | 4.75                    | 20.09                      | 38.45          | 18.36          |
| 836.6                                          | 79.89                         | 238                          | 1.1           | V              | 8.9                    | 0.46                  | 4.75                    | 13.19                      | 38.45          | 25.26          |
| EIRP, WCDMA Band II (Part 24E), Middle Channel |                               |                              |               |                |                        |                       |                         |                            |                |                |
| 1880.00                                        | 70.64                         | 261                          | 2.5           | H              | 9.8                    | 0.31                  | 10.4                    | 19.89                      | 33             | 13.11          |
| 1880.00                                        | 72.97                         | 103                          | 1.2           | V              | 8.7                    | 0.31                  | 10.4                    | 18.79                      | 33             | 14.21          |

**Note:**

All above data were tested with no amplifier.

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

**LTE Band 4:****Maximum Output Power**

| Bandwidth (MHz) | Modulation | RB size/RB Offset       | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|-----------------|------------|-------------------------|-------------------|----------------------|--------------------|
| 1.4             | QPSK       | RB Size=1, RB Offset=0  | 22.08             | 22.06                | 22.00              |
|                 |            | RB Size=1, RB Offset=2  | 22.15             | 22.14                | 22.01              |
|                 |            | RB Size=1, RB Offset=5  | 22.24             | 22.20                | 22.10              |
|                 |            | RB Size=3, RB Offset=0  | 22.11             | 22.14                | 22.22              |
|                 |            | RB Size=3, RB Offset=1  | 22.16             | 22.28                | 22.35              |
|                 |            | RB Size=3, RB Offset=2  | 22.25             | 22.33                | 22.46              |
|                 |            | RB Size=6, RB Offset=0  | 21.00             | 21.06                | 20.93              |
|                 | 16QAM      | RB Size=1, RB Offset=0  | 20.99             | 21.05                | 21.04              |
|                 |            | RB Size=1, RB Offset=2  | 21.10             | 21.05                | 21.04              |
|                 |            | RB Size=1, RB Offset=5  | 21.10             | 21.13                | 21.09              |
|                 |            | RB Size=3, RB Offset=0  | 21.11             | 21.12                | 21.22              |
|                 |            | RB Size=3, RB Offset=1  | 21.14             | 21.25                | 21.24              |
|                 |            | RB Size=3, RB Offset=2  | 21.27             | 21.38                | 21.38              |
|                 |            | RB Size=6, RB Offset=0  | 20.14             | 20.05                | 20.14              |
| 3.0             | QPSK       | RB Size=1, RB Offset=0  | 22.05             | 22.07                | 21.99              |
|                 |            | RB Size=1, RB Offset=7  | 22.22             | 22.24                | 22.19              |
|                 |            | RB Size=1, RB Offset=14 | 22.28             | 22.41                | 22.21              |
|                 |            | RB Size=8, RB Offset=0  | 21.32             | 21.13                | 21.10              |
|                 |            | RB Size=8, RB Offset=4  | 21.36             | 21.16                | 21.15              |
|                 |            | RB Size=8, RB Offset=7  | 21.55             | 21.22                | 21.34              |
|                 |            | RB Size=15, RB Offset=0 | 21.06             | 21.06                | 20.91              |
|                 | 16QAM      | RB Size=1, RB Offset=0  | 21.02             | 21.07                | 21.09              |
|                 |            | RB Size=1, RB Offset=7  | 21.08             | 21.15                | 21.19              |
|                 |            | RB Size=1, RB Offset=14 | 21.15             | 21.19                | 21.35              |
|                 |            | RB Size=8, RB Offset=0  | 20.14             | 20.22                | 20.27              |
|                 |            | RB Size=8, RB Offset=4  | 20.18             | 20.22                | 20.30              |
|                 |            | RB Size=8, RB Offset=7  | 20.19             | 20.26                | 20.34              |
|                 |            | RB Size=15, RB Offset=0 | 20.02             | 20.07                | 20.12              |

| Bandwidth (MHz) | Modulation | RB size/RB Offset        | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|-----------------|------------|--------------------------|-------------------|----------------------|--------------------|
| 5.0             | QPSK       | RB Size=1, RB Offset=0   | 22.05             | 22.12                | 22.08              |
|                 |            | RB Size=1, RB Offset=12  | 22.22             | 22.13                | 22.19              |
|                 |            | RB Size=1, RB Offset=24  | 22.29             | 22.24                | 22.34              |
|                 |            | RB Size=12, RB Offset=0  | 21.13             | 21.09                | 20.97              |
|                 |            | RB Size=12, RB Offset=6  | 21.31             | 21.23                | 21.11              |
|                 |            | RB Size=12, RB Offset=11 | 21.34             | 21.24                | 21.12              |
|                 |            | RB Size=25, RB Offset=0  | 21.17             | 21.05                | 21.06              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 20.98             | 20.99                | 21.04              |
|                 |            | RB Size=1, RB Offset=12  | 21.06             | 21.10                | 21.14              |
|                 |            | RB Size=1, RB Offset=24  | 21.08             | 21.21                | 21.20              |
|                 |            | RB Size=12, RB Offset=0  | 20.15             | 20.20                | 20.31              |
|                 |            | RB Size=12, RB Offset=6  | 20.17             | 20.22                | 20.37              |
|                 |            | RB Size=12, RB Offset=11 | 20.31             | 20.37                | 20.48              |
|                 |            | RB Size=25, RB Offset=0  | 20.17             | 20.13                | 20.06              |
| 10.0            | QPSK       | RB Size=1, RB Offset=0   | 22.02             | 22.11                | 22.26              |
|                 |            | RB Size=1, RB Offset=24  | 22.08             | 22.20                | 22.37              |
|                 |            | RB Size=1, RB Offset=49  | 22.17             | 22.30                | 22.44              |
|                 |            | RB Size=25, RB Offset=0  | 21.14             | 21.13                | 21.14              |
|                 |            | RB Size=25, RB Offset=12 | 21.17             | 21.15                | 21.20              |
|                 |            | RB Size=25, RB Offset=24 | 21.30             | 21.22                | 21.21              |
|                 |            | RB Size=50, RB Offset=0  | 21.01             | 21.11                | 21.12              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 21.67             | 21.66                | 21.63              |
|                 |            | RB Size=1, RB Offset=24  | 21.84             | 21.61                | 21.77              |
|                 |            | RB Size=1, RB Offset=49  | 21.85             | 21.70                | 21.90              |
|                 |            | RB Size=25, RB Offset=0  | 20.60             | 20.70                | 20.75              |
|                 |            | RB Size=25, RB Offset=12 | 20.63             | 20.83                | 20.89              |
|                 |            | RB Size=25, RB Offset=24 | 20.70             | 20.87                | 20.95              |
|                 |            | RB Size=50, RB Offset=0  | 20.18             | 20.12                | 20.17              |

| Bandwidth (MHz) | Modulation | RB size/RB Offset        | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|-----------------|------------|--------------------------|-------------------|----------------------|--------------------|
| 15.0            | QPSK       | RB Size=1, RB Offset=0   | 22.08             | 22.23                | 22.35              |
|                 |            | RB Size=1, RB Offset=37  | 22.14             | 22.34                | 22.52              |
|                 |            | RB Size=1, RB Offset=74  | 22.24             | 22.53                | 22.64              |
|                 |            | RB Size=36, RB Offset=0  | 21.28             | 21.20                | 21.14              |
|                 |            | RB Size=36, RB Offset=18 | 21.39             | 21.26                | 21.21              |
|                 |            | RB Size=36, RB Offset=37 | 21.54             | 21.39                | 21.34              |
|                 |            | RB Size=75, RB Offset=0  | 21.08             | 21.22                | 21.33              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 21.66             | 21.75                | 21.83              |
|                 |            | RB Size=1, RB Offset=37  | 21.86             | 21.62                | 21.94              |
|                 |            | RB Size=1, RB Offset=74  | 22.05             | 21.66                | 22.14              |
|                 |            | RB Size=36, RB Offset=0  | 20.78             | 20.83                | 20.84              |
|                 |            | RB Size=36, RB Offset=18 | 20.90             | 20.98                | 20.87              |
|                 |            | RB Size=36, RB Offset=37 | 21.02             | 21.02                | 21.05              |
|                 |            | RB Size=75, RB Offset=0  | 20.21             | 20.23                | 20.14              |
| 20.0            | QPSK       | RB Size=1, RB Offset=0   | 22.12             | 22.16                | 22.11              |
|                 |            | RB Size=1, RB Offset=49  | 22.16             | 22.34                | 22.14              |
|                 |            | RB Size=1, RB Offset=99  | 22.30             | 22.53                | 22.21              |
|                 |            | RB Size=50, RB Offset=0  | 21.31             | 21.14                | 21.12              |
|                 |            | RB Size=50, RB Offset=24 | 21.41             | 21.19                | 21.19              |
|                 |            | RB Size=50, RB Offset=49 | 21.46             | 21.32                | 21.29              |
|                 |            | RB Size=100, RB Offset=0 | 21.16             | 21.10                | 21.14              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 21.80             | 21.79                | 21.64              |
|                 |            | RB Size=1, RB Offset=49  | 21.96             | 21.76                | 21.81              |
|                 |            | RB Size=1, RB Offset=99  | 22.02             | 21.79                | 21.89              |
|                 |            | RB Size=50, RB Offset=0  | 20.95             | 20.87                | 20.87              |
|                 |            | RB Size=50, RB Offset=24 | 21.04             | 20.94                | 20.93              |
|                 |            | RB Size=50, RB Offset=49 | 21.05             | 21.10                | 20.95              |
|                 |            | RB Size=100, RB Offset=0 | 20.22             | 20.23                | 20.24              |

**Peak-to-average ratio (PAR)**

| Modulation          | Middle Channel (dB) | PAR Limit (dB) | Result |
|---------------------|---------------------|----------------|--------|
| QPSK (1RB Size)     | 4.66                | 13             | Pass   |
| QPSK (100%RB Size)  | 5.31                | 13             | Pass   |
| 16QAM (1RB Size)    | 4.78                | 13             | Pass   |
| 16QAM (100%RB Size) | 5.85                | 13             | Pass   |

**QPSK:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1.4 MHz Bandwidth  |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 73.88                         | 236                              | 1.9           | H              | 11.5                 | 0.30                  | 9.90                    | 21.10                      | 30             |
| 1732.50            | 74.24                         | 118                              | 1.9           | V              | 9.4                  | 0.30                  | 9.90                    | 19.00                      | 30             |
| 3 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 73.45                         | 25                               | 1.5           | H              | 11.1                 | 0.30                  | 9.90                    | 20.70                      | 30             |
| 1732.50            | 74.31                         | 308                              | 2.3           | V              | 9.5                  | 0.30                  | 9.90                    | 19.10                      | 30             |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 73.28                         | 34                               | 1.7           | H              | 10.9                 | 0.30                  | 9.90                    | 20.50                      | 30             |
| 1732.50            | 74.02                         | 178                              | 2.3           | V              | 9.2                  | 0.30                  | 9.90                    | 18.80                      | 30             |
| 10MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 73.07                         | 359                              | 1.2           | H              | 10.7                 | 0.30                  | 9.90                    | 20.30                      | 30             |
| 1732.50            | 73.81                         | 192                              | 1.6           | V              | 9.0                  | 0.30                  | 9.90                    | 18.60                      | 30             |
| 15 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.86                         | 283                              | 1.4           | H              | 10.5                 | 0.30                  | 9.90                    | 20.10                      | 30             |
| 1732.50            | 73.71                         | 323                              | 1.1           | V              | 8.9                  | 0.30                  | 9.90                    | 18.50                      | 30             |
| 20 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.46                         | 142                              | 2.5           | H              | 10.1                 | 0.30                  | 9.90                    | 19.70                      | 30             |
| 1732.50            | 73.63                         | 300                              | 1.0           | V              | 8.8                  | 0.30                  | 9.90                    | 18.40                      | 30             |

**16QAM:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1.4 MHz Bandwidth  |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 73.18                         | 342                              | 1.6           | H              | 10.8                 | 0.30                  | 9.90                    | 20.40                      | 30             |
| 1732.50            | 73.34                         | 199                              | 1.5           | V              | 8.5                  | 0.30                  | 9.90                    | 18.10                      | 30             |
| 3 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.97                         | 244                              | 1.3           | H              | 10.6                 | 0.30                  | 9.90                    | 20.20                      | 30             |
| 1732.50            | 73.12                         | 295                              | 1.8           | V              | 8.3                  | 0.30                  | 9.90                    | 17.90                      | 30             |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.61                         | 359                              | 2.0           | H              | 10.3                 | 0.30                  | 9.90                    | 19.90                      | 30             |
| 1732.50            | 72.85                         | 316                              | 2.5           | V              | 8.0                  | 0.30                  | 9.90                    | 17.60                      | 30             |
| 10 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.42                         | 291                              | 1.3           | H              | 10.1                 | 0.30                  | 9.90                    | 19.70                      | 30             |
| 1732.50            | 72.97                         | 111                              | 1.9           | V              | 8.1                  | 0.30                  | 9.90                    | 17.70                      | 30             |
| 15 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 72.28                         | 84                               | 1.0           | H              | 9.9                  | 0.30                  | 9.90                    | 19.50                      | 30             |
| 1732.50            | 72.63                         | 236                              | 2.3           | V              | 7.8                  | 0.30                  | 9.90                    | 17.40                      | 30             |
| 20 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 1732.50            | 71.93                         | 125                              | 1.4           | H              | 9.6                  | 0.30                  | 9.90                    | 19.20                      | 30             |
| 1732.50            | 72.49                         | 249                              | 1.4           | V              | 7.6                  | 0.30                  | 9.90                    | 17.20                      | 30             |

**LTE Band 7:****Maximum Output Power**

| <b>Bandwidth<br/>(MHz)</b> | <b>Modulation</b> | <b>RB size/RB Offset</b> | <b>Low<br/>Channel<br/>(dBm)</b> | <b>Middle<br/>Channel<br/>(dBm)</b> | <b>High<br/>Channel<br/>(dBm)</b> |
|----------------------------|-------------------|--------------------------|----------------------------------|-------------------------------------|-----------------------------------|
| 5.0                        | QPSK              | RB Size=1, RB Offset=0   | 22.75                            | 22.78                               | 22.95                             |
|                            |                   | RB Size=1, RB Offset=12  | 22.63                            | 22.81                               | 22.72                             |
|                            |                   | RB Size=1, RB Offset=24  | 22.92                            | 22.86                               | 22.87                             |
|                            |                   | RB Size=12, RB Offset=0  | 21.59                            | 21.61                               | 21.56                             |
|                            |                   | RB Size=12, RB Offset=6  | 21.64                            | 21.63                               | 21.60                             |
|                            |                   | RB Size=12, RB Offset=11 | 21.65                            | 21.62                               | 21.73                             |
|                            |                   | RB Size=25, RB Offset=0  | 21.60                            | 21.55                               | 21.49                             |
|                            | 16QAM             | RB Size=1, RB Offset=0   | 21.35                            | 21.42                               | 21.48                             |
|                            |                   | RB Size=1, RB Offset=12  | 21.36                            | 21.44                               | 21.50                             |
|                            |                   | RB Size=1, RB Offset=24  | 21.36                            | 21.42                               | 21.41                             |
|                            |                   | RB Size=12, RB Offset=0  | 20.76                            | 20.68                               | 20.70                             |
|                            |                   | RB Size=12, RB Offset=6  | 20.72                            | 20.69                               | 20.73                             |
|                            |                   | RB Size=12, RB Offset=11 | 20.75                            | 20.73                               | 20.78                             |
|                            |                   | RB Size=25, RB Offset=0  | 20.60                            | 20.56                               | 20.56                             |
| 10.0                       | QPSK              | RB Size=1, RB Offset=0   | 22.92                            | 22.84                               | 22.99                             |
|                            |                   | RB Size=1, RB Offset=24  | 22.95                            | 22.87                               | 22.89                             |
|                            |                   | RB Size=1, RB Offset=49  | 22.95                            | 22.91                               | 23.00                             |
|                            |                   | RB Size=25, RB Offset=0  | 21.64                            | 21.59                               | 21.46                             |
|                            |                   | RB Size=25, RB Offset=12 | 21.73                            | 21.63                               | 21.75                             |
|                            |                   | RB Size=25, RB Offset=24 | 21.55                            | 21.65                               | 21.66                             |
|                            |                   | RB Size=50, RB Offset=0  | 21.62                            | 21.56                               | 21.55                             |
|                            | 16QAM             | RB Size=1, RB Offset=0   | 21.93                            | 21.95                               | 22.13                             |
|                            |                   | RB Size=1, RB Offset=24  | 21.88                            | 21.98                               | 22.09                             |
|                            |                   | RB Size=1, RB Offset=49  | 21.93                            | 21.96                               | 21.79                             |
|                            |                   | RB Size=25, RB Offset=0  | 20.81                            | 20.68                               | 20.58                             |
|                            |                   | RB Size=25, RB Offset=12 | 20.74                            | 20.71                               | 20.59                             |
|                            |                   | RB Size=25, RB Offset=24 | 20.77                            | 20.73                               | 20.76                             |
|                            |                   | RB Size=50, RB Offset=0  | 20.35                            | 20.54                               | 20.40                             |

| Bandwidth (MHz) | Modulation | RB size/RB Offset        | Low Channel (dBm) | Middle Channel (dBm) | High Channel (dBm) |
|-----------------|------------|--------------------------|-------------------|----------------------|--------------------|
| 15.0            | QPSK       | RB Size=1, RB Offset=0   | 22.90             | 22.93                | 22.96              |
|                 |            | RB Size=1, RB Offset=37  | 23.07             | 22.96                | 22.77              |
|                 |            | RB Size=1, RB Offset=74  | 22.81             | 22.95                | 23.04              |
|                 |            | RB Size=36, RB Offset=0  | 21.78             | 21.81                | 21.67              |
|                 |            | RB Size=36, RB Offset=18 | 21.68             | 21.86                | 22.01              |
|                 |            | RB Size=36, RB Offset=37 | 21.92             | 21.84                | 21.79              |
|                 |            | RB Size=75, RB Offset=0  | 21.63             | 21.81                | 21.76              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 22.07             | 21.97                | 22.11              |
|                 |            | RB Size=1, RB Offset=37  | 22.07             | 21.95                | 21.88              |
|                 |            | RB Size=1, RB Offset=74  | 22.01             | 21.98                | 22.17              |
|                 |            | RB Size=36, RB Offset=0  | 20.84             | 20.84                | 20.90              |
|                 |            | RB Size=36, RB Offset=18 | 20.98             | 20.87                | 20.92              |
|                 |            | RB Size=36, RB Offset=37 | 20.92             | 20.86                | 20.84              |
|                 |            | RB Size=75, RB Offset=0  | 20.61             | 20.69                | 20.67              |
| 20.0            | QPSK       | RB Size=1, RB Offset=0   | 22.93             | 22.96                | 22.98              |
|                 |            | RB Size=1, RB Offset=49  | 22.95             | 22.93                | 22.80              |
|                 |            | RB Size=1, RB Offset=99  | 23.06             | 22.95                | 22.88              |
|                 |            | RB Size=50, RB Offset=0  | 21.46             | 21.61                | 21.52              |
|                 |            | RB Size=50, RB Offset=24 | 21.68             | 21.64                | 21.55              |
|                 |            | RB Size=50, RB Offset=49 | 21.64             | 21.68                | 21.68              |
|                 |            | RB Size=100, RB Offset=0 | 21.41             | 21.57                | 21.56              |
|                 | 16QAM      | RB Size=1, RB Offset=0   | 21.74             | 21.85                | 21.92              |
|                 |            | RB Size=1, RB Offset=49  | 22.01             | 21.88                | 21.84              |
|                 |            | RB Size=1, RB Offset=99  | 21.75             | 21.86                | 21.94              |
|                 |            | RB Size=50, RB Offset=0  | 20.72             | 20.79                | 20.76              |
|                 |            | RB Size=50, RB Offset=24 | 20.81             | 20.77                | 20.76              |
|                 |            | RB Size=50, RB Offset=49 | 20.78             | 20.78                | 20.71              |
|                 |            | RB Size=100, RB Offset=0 | 20.60             | 20.58                | 20.49              |

**Peak-to-average ratio (PAR)**

| Modulation          | Middle Channel (dB) | PAR Limit (dB) | Result |
|---------------------|---------------------|----------------|--------|
| QPSK (1RB Size)     | 3.79                | 13             | Pass   |
| QPSK (100%RB Size)  | 4.61                | 13             | Pass   |
| 16QAM (1RB Size)    | 3.95                | 13             | Pass   |
| 16QAM (100%RB Size) | 4.82                | 13             | Pass   |

**EIRP:****QPSK:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 67.82                         | 273                              | 2.0           | H              | 10.4                 | 0.43                  | 10.60                   | 20.57                      | 33             |
| 2535.00            | 65.12                         | 319                              | 2.0           | V              | 6.0                  | 0.43                  | 10.60                   | 16.17                      | 33             |
| 10 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 66.72                         | 84                               | 1.3           | H              | 9.3                  | 0.43                  | 10.60                   | 19.47                      | 33             |
| 2535.00            | 65.02                         | 215                              | 1.9           | V              | 5.9                  | 0.43                  | 10.60                   | 16.07                      | 33             |
| 15 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 66.22                         | 152                              | 2.2           | H              | 8.8                  | 0.43                  | 10.60                   | 18.97                      | 33             |
| 2535.00            | 64.62                         | 221                              | 2.3           | V              | 5.5                  | 0.43                  | 10.60                   | 15.67                      | 33             |
| 20 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 66.02                         | 225                              | 1.8           | H              | 8.6                  | 0.43                  | 10.60                   | 18.77                      | 33             |
| 2535.00            | 64.32                         | 280                              | 1.4           | V              | 5.2                  | 0.43                  | 10.60                   | 15.37                      | 33             |

**16QAM:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 67.31                         | 298                              | 2.2           | H              | 9.9                  | 0.43                  | 10.60                   | 20.07                      | 33             |
| 2535.00            | 64.39                         | 122                              | 2.0           | V              | 5.2                  | 0.43                  | 10.60                   | 15.37                      | 33             |
| 10 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 66.01                         | 28                               | 1.3           | H              | 8.6                  | 0.43                  | 10.60                   | 18.77                      | 33             |
| 2535.00            | 64.03                         | 270                              | 2.3           | V              | 4.9                  | 0.43                  | 10.60                   | 15.07                      | 33             |
| 15 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 65.62                         | 20                               | 1.7           | H              | 8.2                  | 0.43                  | 10.60                   | 18.37                      | 33             |
| 2535.00            | 63.61                         | 120                              | 1.9           | V              | 4.5                  | 0.43                  | 10.60                   | 14.67                      | 33             |
| 20 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 2535.00            | 65.41                         | 34                               | 2.1           | H              | 8.0                  | 0.43                  | 10.60                   | 18.17                      | 33             |
| 2535.00            | 63.36                         | 334                              | 1.1           | V              | 4.2                  | 0.43                  | 10.60                   | 14.37                      | 33             |

**LTE Band 17:****Maximum Output Power**

| <b>Bandwidth<br/>(MHz)</b> | <b>Modulation</b> | <b>RB size/RB Offset</b> | <b>Low<br/>Channel<br/>(dBm)</b> | <b>Middle<br/>Channel<br/>(dBm)</b> | <b>High<br/>Channel<br/>(dBm)</b> |
|----------------------------|-------------------|--------------------------|----------------------------------|-------------------------------------|-----------------------------------|
| 5.0                        | QPSK              | RB Size=1, RB Offset=0   | 22.18                            | 22.13                               | 22.41                             |
|                            |                   | RB Size=1, RB Offset=12  | 22.36                            | 22.21                               | 22.58                             |
|                            |                   | RB Size=1, RB Offset=24  | 22.46                            | 22.61                               | 22.70                             |
|                            |                   | RB Size=12, RB Offset=0  | 21.21                            | 21.18                               | 21.33                             |
|                            |                   | RB Size=12, RB Offset=6  | 21.31                            | 21.29                               | 21.48                             |
|                            |                   | RB Size=12, RB Offset=11 | 21.48                            | 21.64                               | 21.59                             |
|                            |                   | RB Size=25, RB Offset=0  | 21.35                            | 21.49                               | 21.44                             |
|                            | 16QAM             | RB Size=1, RB Offset=0   | 21.42                            | 21.78                               | 21.30                             |
|                            |                   | RB Size=1, RB Offset=12  | 21.57                            | 21.73                               | 21.32                             |
|                            |                   | RB Size=1, RB Offset=24  | 21.59                            | 21.76                               | 21.36                             |
|                            |                   | RB Size=12, RB Offset=0  | 20.68                            | 20.71                               | 20.68                             |
|                            |                   | RB Size=12, RB Offset=6  | 20.77                            | 20.74                               | 20.73                             |
|                            |                   | RB Size=12, RB Offset=11 | 20.80                            | 20.86                               | 20.85                             |
|                            |                   | RB Size=25, RB Offset=0  | 20.28                            | 20.48                               | 20.41                             |
| 10.0                       | QPSK              | RB Size=1, RB Offset=0   | 22.35                            | 22.38                               | 22.41                             |
|                            |                   | RB Size=1, RB Offset=24  | 22.28                            | 22.43                               | 22.46                             |
|                            |                   | RB Size=1, RB Offset=49  | 22.43                            | 22.51                               | 22.42                             |
|                            |                   | RB Size=25, RB Offset=0  | 21.54                            | 21.67                               | 21.63                             |
|                            |                   | RB Size=25, RB Offset=12 | 21.79                            | 21.79                               | 21.88                             |
|                            |                   | RB Size=25, RB Offset=24 | 21.83                            | 21.86                               | 21.74                             |
|                            |                   | RB Size=50, RB Offset=0  | 21.75                            | 21.81                               | 21.69                             |
|                            | 16QAM             | RB Size=1, RB Offset=0   | 21.80                            | 21.64                               | 21.76                             |
|                            |                   | RB Size=1, RB Offset=24  | 21.65                            | 21.68                               | 21.69                             |
|                            |                   | RB Size=1, RB Offset=49  | 21.72                            | 21.72                               | 21.85                             |
|                            |                   | RB Size=25, RB Offset=0  | 20.74                            | 20.59                               | 20.60                             |
|                            |                   | RB Size=25, RB Offset=12 | 20.61                            | 20.66                               | 20.72                             |
|                            |                   | RB Size=25, RB Offset=24 | 20.69                            | 20.71                               | 20.77                             |
|                            |                   | RB Size=50, RB Offset=0  | 20.80                            | 20.74                               | 20.82                             |

**Peak-to-average ratio (PAR)**

| Modulation          | Middle Channel (dB) | PAR Limit (dB) | Result |
|---------------------|---------------------|----------------|--------|
| QPSK (1RB Size)     | 3.48                | 13             | Pass   |
| QPSK (100%RB Size)  | 4.23                | 13             | Pass   |
| 16QAM (1RB Size)    | 4.12                | 13             | Pass   |
| 16QAM (100%RB Size) | 4.96                | 13             | Pass   |

**QPSK:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 710                | 88.38                         | 73                               | 2.0           | H              | 17.4                 | 0.46                  | 4.75                    | 21.69                      | 34.77          |
| 710                | 84.76                         | 266                              | 2.4           | V              | 13.8                 | 0.46                  | 4.75                    | 18.09                      | 34.77          |
| 10 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 710                | 87.51                         | 61                               | 1.0           | H              | 16.5                 | 0.46                  | 4.75                    | 20.79                      | 34.77          |
| 710                | 84.29                         | 260                              | 1.9           | V              | 13.3                 | 0.46                  | 4.75                    | 17.59                      | 34.77          |

**16QAM:**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turn<br>table<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) |
|--------------------|-------------------------------|----------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|
|                    |                               |                                  | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |
| Middle Channel     |                               |                                  |               |                |                      |                       |                         |                            |                |
| 5 MHz Bandwidth    |                               |                                  |               |                |                      |                       |                         |                            |                |
| 710                | 87.56                         | 83                               | 2.1           | H              | 16.6                 | 0.46                  | 4.75                    | 20.89                      | 34.77          |
| 710                | 85.21                         | 30                               | 2.2           | V              | 14.2                 | 0.46                  | 4.75                    | 18.49                      | 34.77          |
| 10 MHz Bandwidth   |                               |                                  |               |                |                      |                       |                         |                            |                |
| 710                | 86.34                         | 212                              | 1.5           | H              | 15.3                 | 0.46                  | 4.75                    | 19.59                      | 34.77          |
| 710                | 84.01                         | 194                              | 1.0           | V              | 13.0                 | 0.46                  | 4.75                    | 17.29                      | 34.77          |

**Note:**

All above data were tested with no amplifier

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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

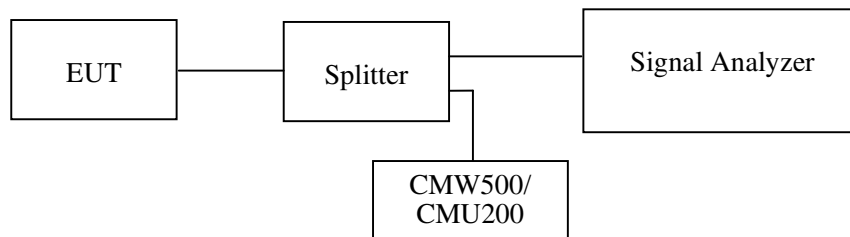
### Applicable Standards

FCC 47 §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 resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



### Test Data

#### Environmental Conditions

|                    |                 |
|--------------------|-----------------|
| Temperature:       | 20~25℃          |
| Relative Humidity: | 50~55%          |
| ATM Pressure:      | 100.0~101.0 kPa |

*The testing was performed by Peter Jiang from 2016-11-14 to 2016-11-29.*

*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to the following tables and plots.*

**Cellular Band (Part 22H)**

| Mode        | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|-------------|-----------------|------------------------------|--------------------------------|
| GSM(GMSK)   | 836.6           | 244.5                        | 320.6                          |
| EGPRS(8PSK) | 836.6           | 244.5                        | 318.6                          |

| Mode          | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------------|-----------------|------------------------------|--------------------------------|
| RMC (BPSK)    | 836.6           | 4.208                        | 4.890                          |
| HSUPA (BPSK)  | 836.6           | 4.208                        | 4.830                          |
| HSDPA (16QAM) | 836.6           | 4.208                        | 4.950                          |

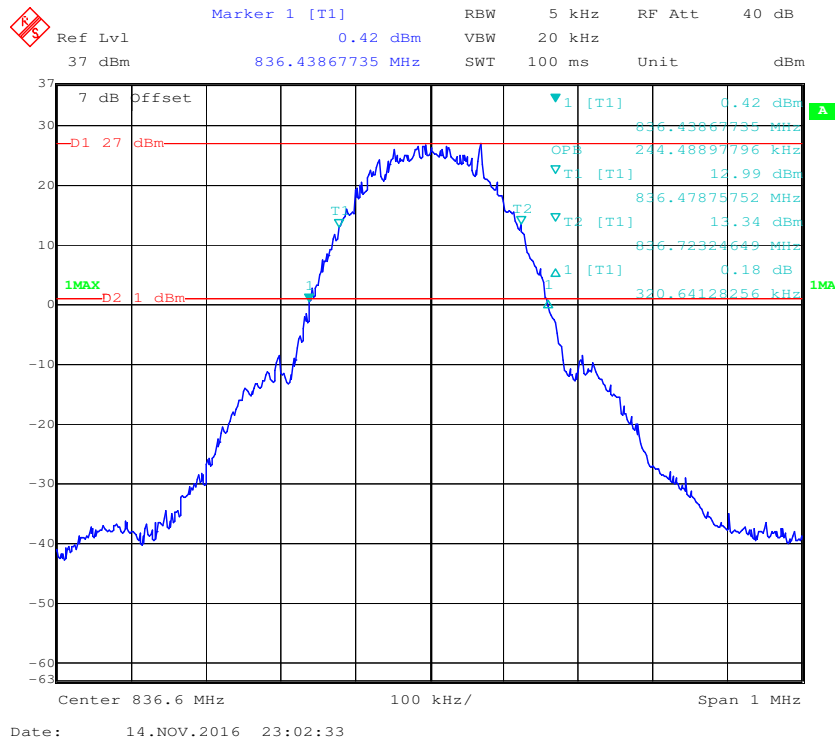
**PCS Band (Part 24E)**

| Mode        | Frequency (MHz) | 99% Occupied Bandwidth (kHz) | 26 dB Emission Bandwidth (kHz) |
|-------------|-----------------|------------------------------|--------------------------------|
| GSM(GMSK)   | 1880.0          | 244.5                        | 322.6                          |
| EGPRS(8PSK) | 1880.0          | 252.5                        | 320.6                          |

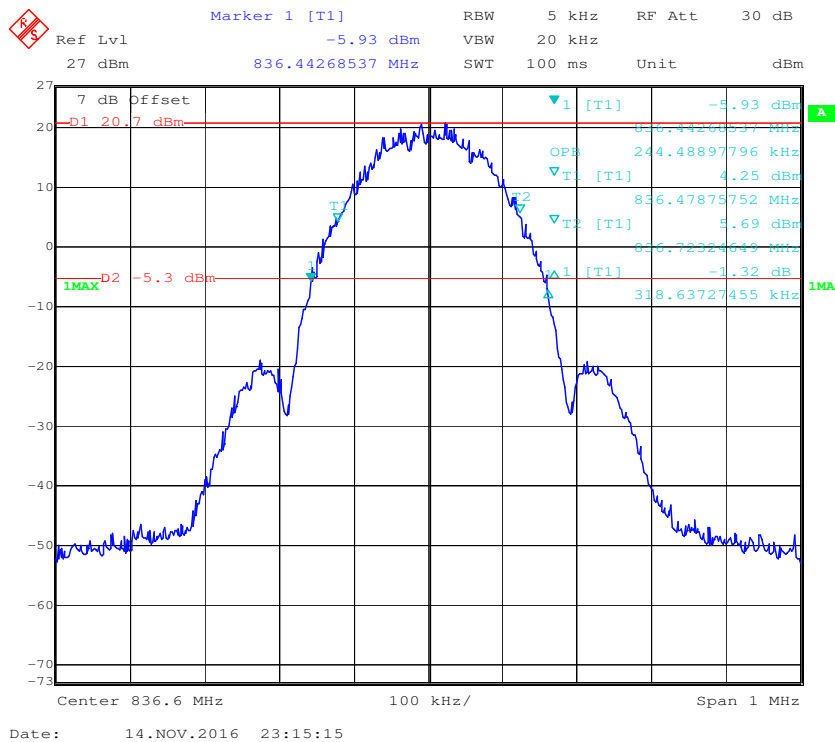
| Mode          | Frequency (MHz) | 99% Occupied Bandwidth (MHz) | 26 dB Emission Bandwidth (MHz) |
|---------------|-----------------|------------------------------|--------------------------------|
| RMC (BPSK)    | 1880.0          | 4.228                        | 4.950                          |
| HSUPA (BPSK)  | 1880.0          | 4.208                        | 4.890                          |
| HSDPA (16QAM) | 1880.0          | 4.208                        | 4.890                          |

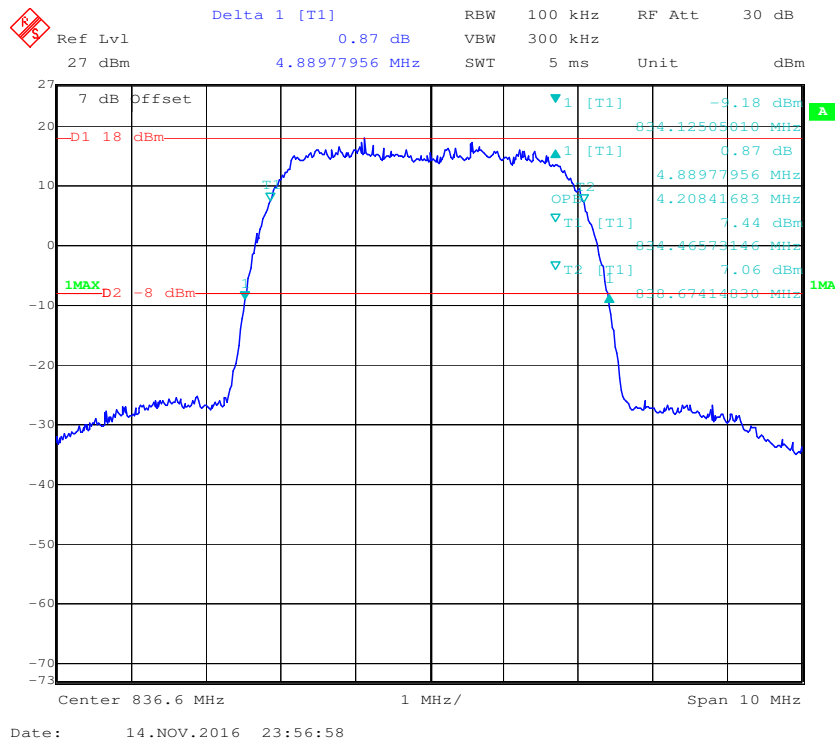
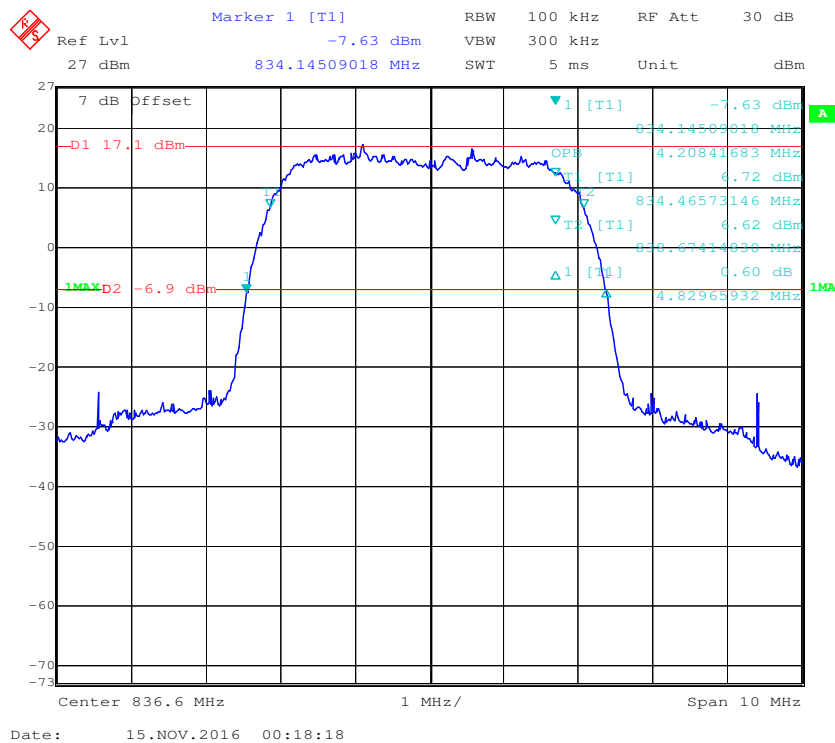
## Cellular Band (Part 22H)

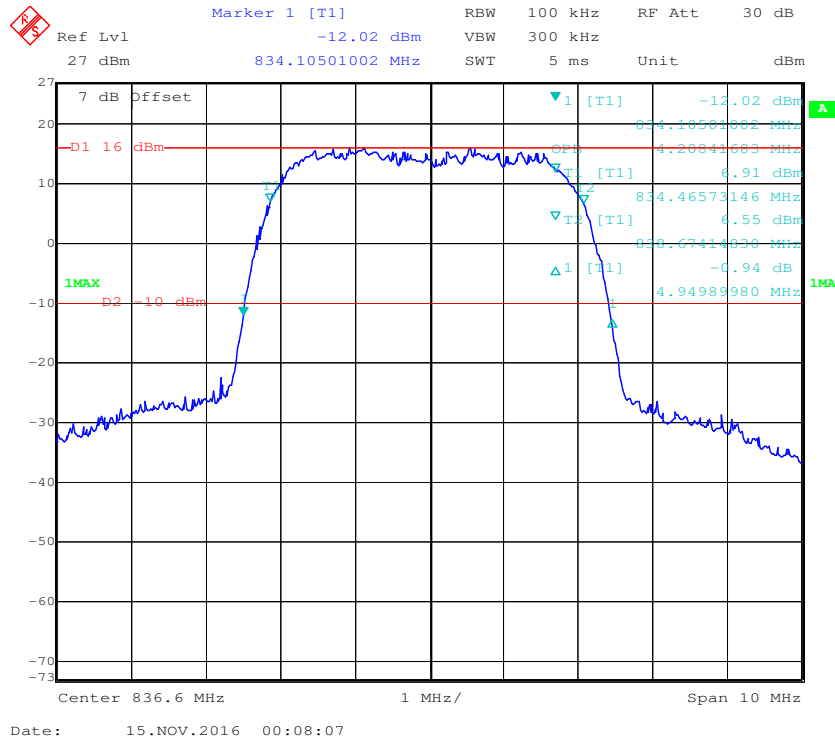
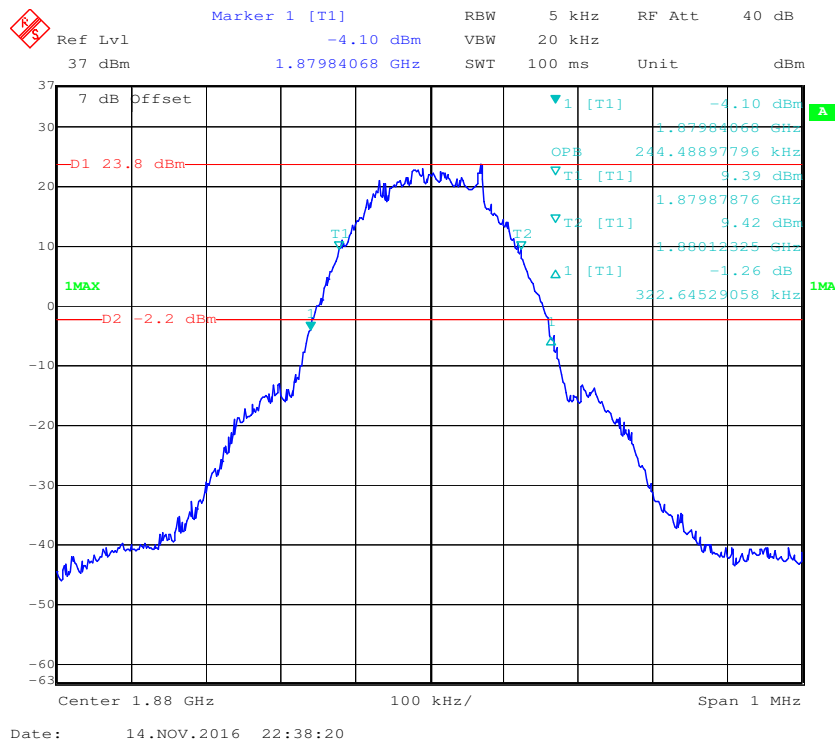
## 26 dB Emissions Bandwidth &amp; 99% Occupied Bandwidth for GSM (GMSK) Mode

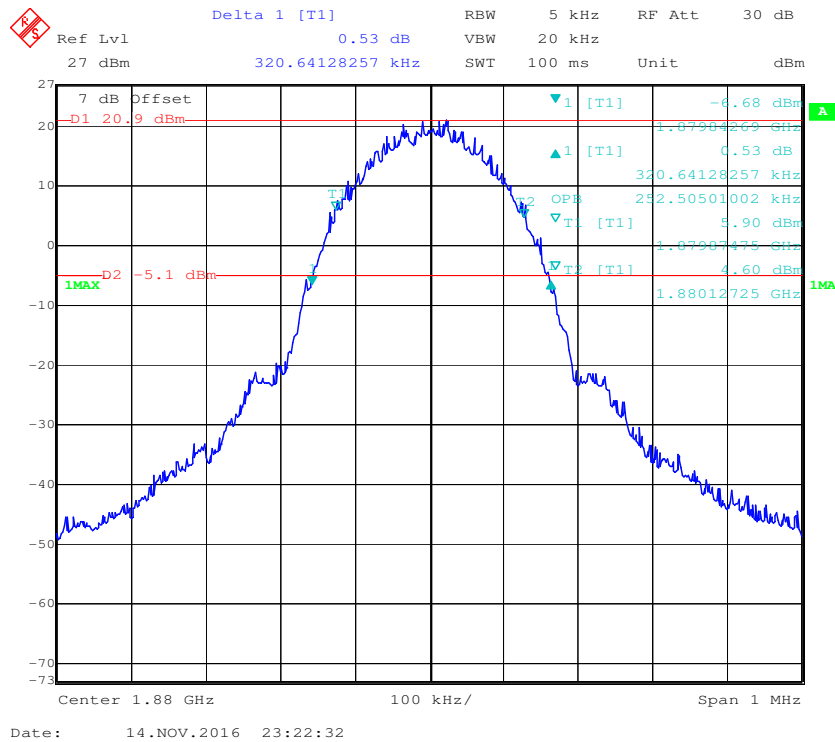
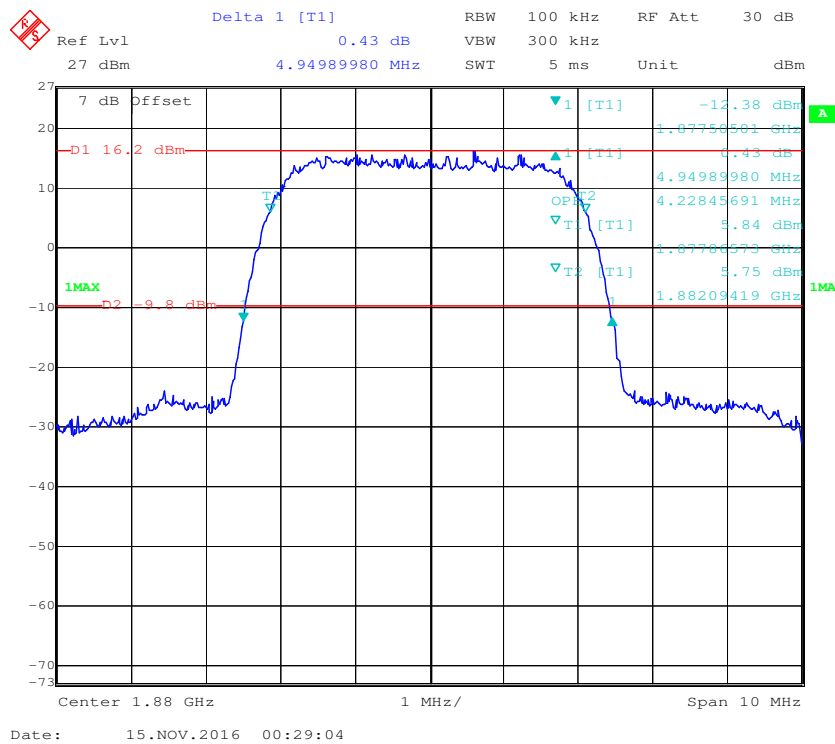


## 26 dB Emissions Bandwidth &amp; 99% Occupied Bandwidth for EGPRS (8PSK) Mode



**26 dB Emissions Bandwidth & 99% Occupied Bandwidth for RMC (BPSK) Mode****26 dB Emissions Bandwidth & 99% Occupied Bandwidth for HSUPA (BPSK) Mode**

**26 dB Emissions Bandwidth & 99% Occupied Bandwidth for HSDPA (16QAM) Mode****PCS Band (Part 24E)****26 dB Emissions Bandwidth & 99% Occupied Bandwidth for GSM (GMSK) Mode**

**26 dB Emissions Bandwidth & 99% Occupied Bandwidth for EGPRS (8PSK) Mode****26 dB Emissions Bandwidth & 99% Occupied Bandwidth for RMC (BPSK) Mode**

Ref Lvl 27 dBm  
 Marker 1 [T1] -12.60 dBm  
 RBW 100 kHz  
 VBW 300 kHz  
 SWT 5 ms  
 RF Att 30 dB  
 Unit dBm

7 dB Offset  
 -D1 16.1 dBm  
 1MAX  
 B2 -9.9 dBm  
 1 [T1] -12.60 dBm  
 1.87752505 GHz  
 4.20841603 MHz  
 5.85 dBm  
 1.87786573 GHz  
 6.61 dBm  
 1.00267415 GHz  
 1.33 dB  
 4.88977956 MHz  
 1MAX

Center 1.88 GHz  
 1 MHz/  
 Span 10 MHz

Date: 15.NOV.2016 00:43:06

Delta 1 [T1] 1.73 dB

Ref Lvl 27 dBm

RBW 100 kHz

VBW 300 kHz

RF Att 30 dB

SWT 5 ms

Unit dBm

7 dB Offset

D1 14.9 dBm

D2 -11.1 dBm

1MAX

1 [T1] -12.74 dBm

1.87752565 GHz

1.73 dB

4.88977956 MHz

4.20841683 MHz

5.89 dBm

1.87786573 GHz

6.01 dBm

1.88207415 GHz

Center 1.88 GHz

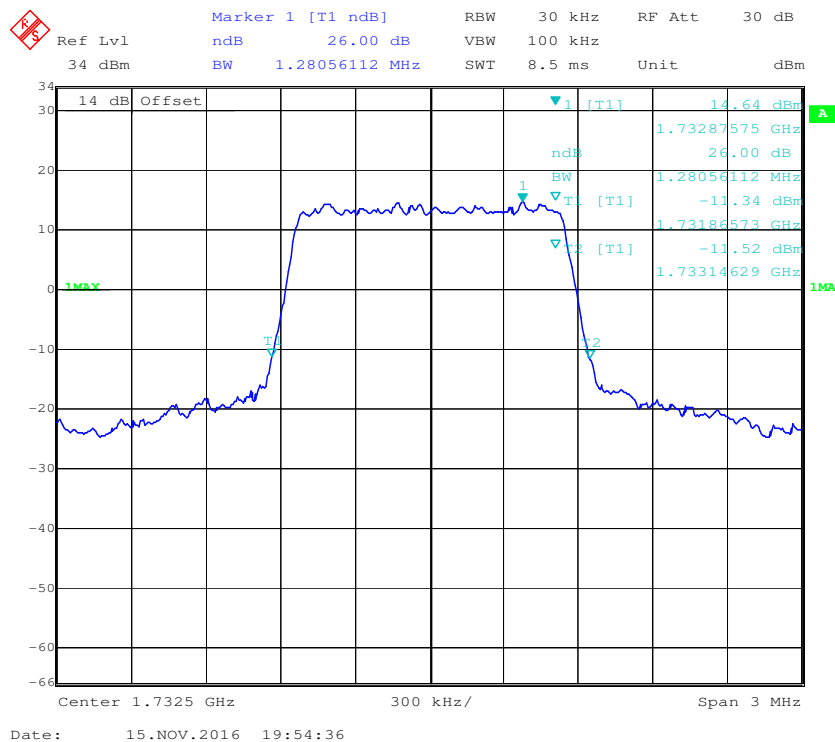
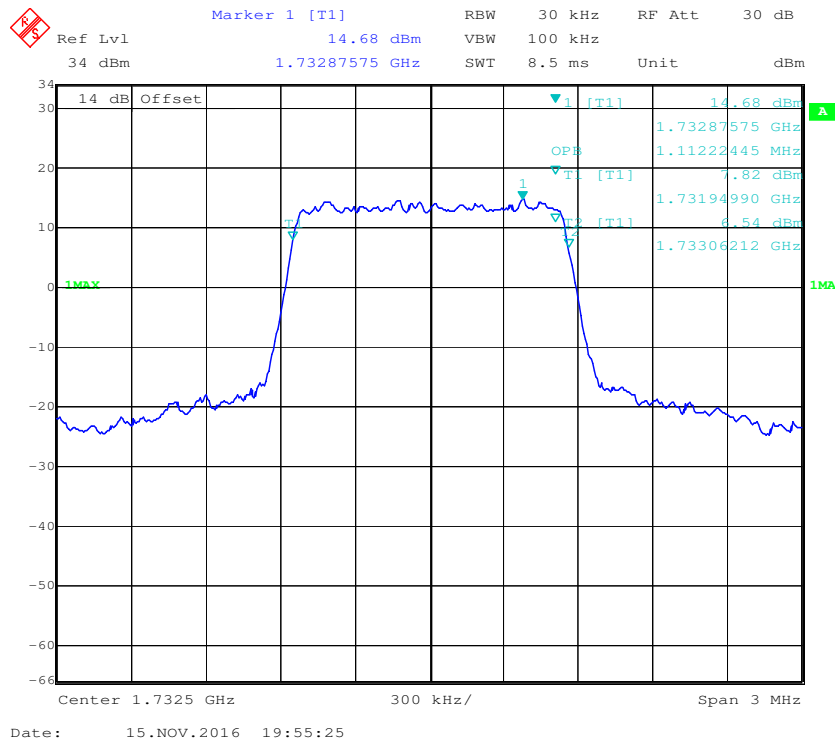
1 MHz/

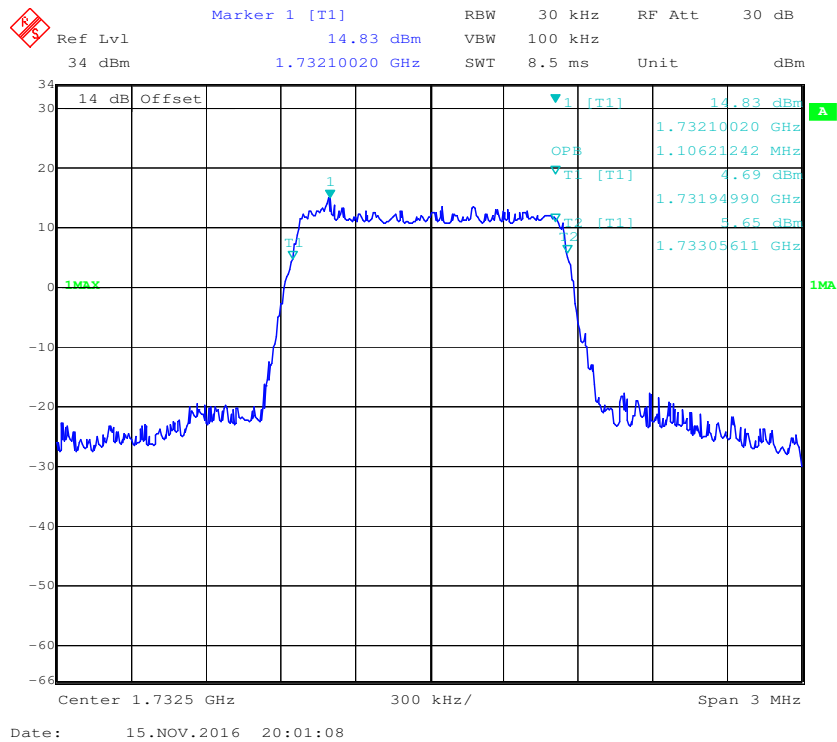
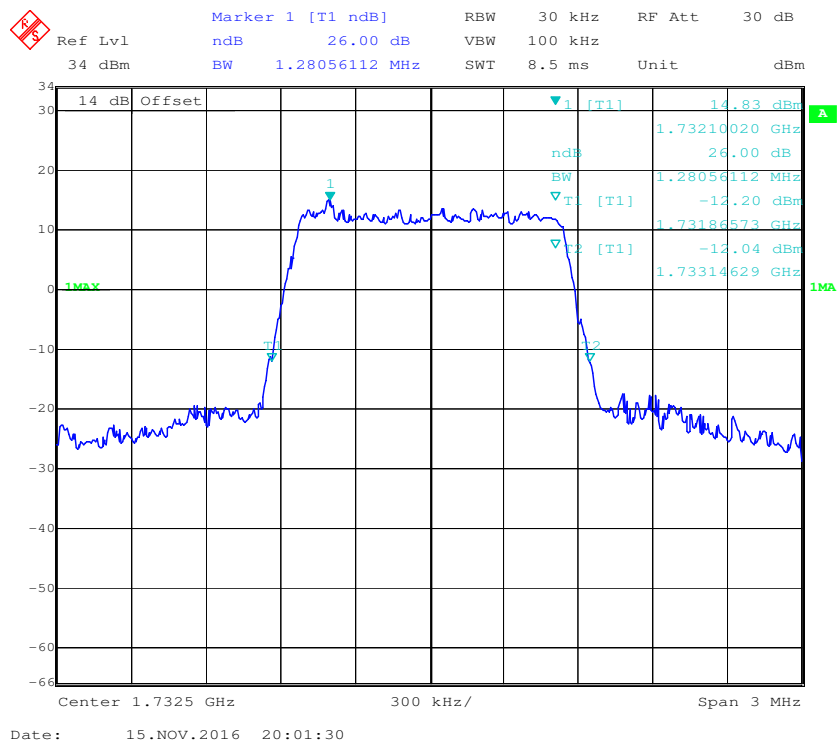
Span 10 MHz

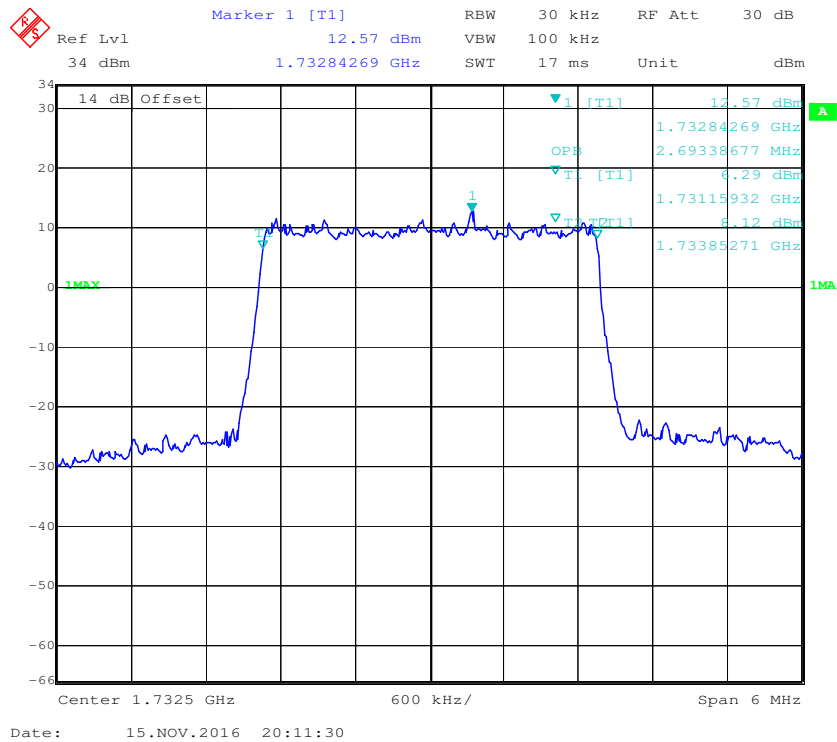
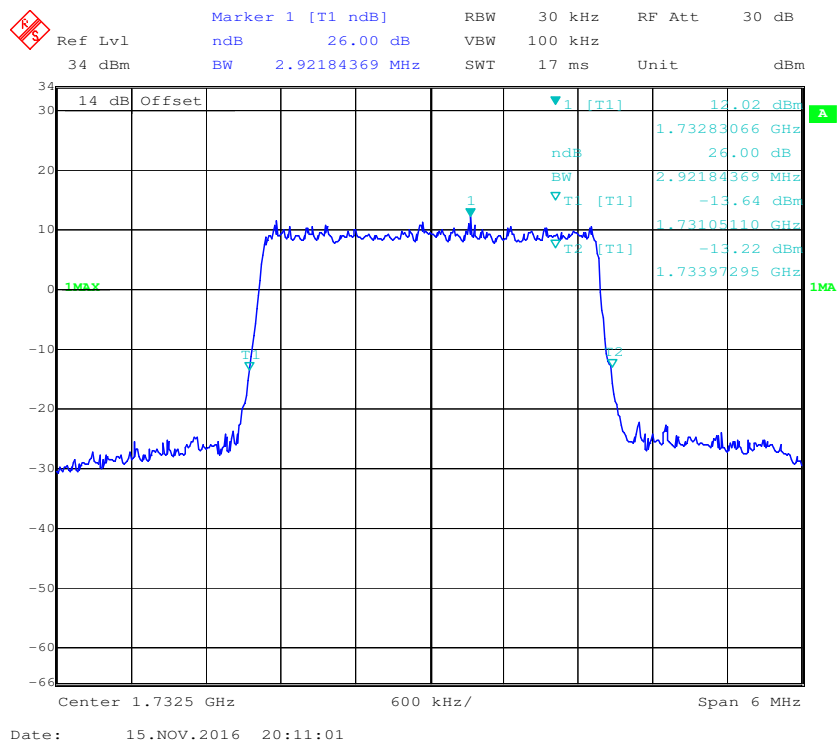
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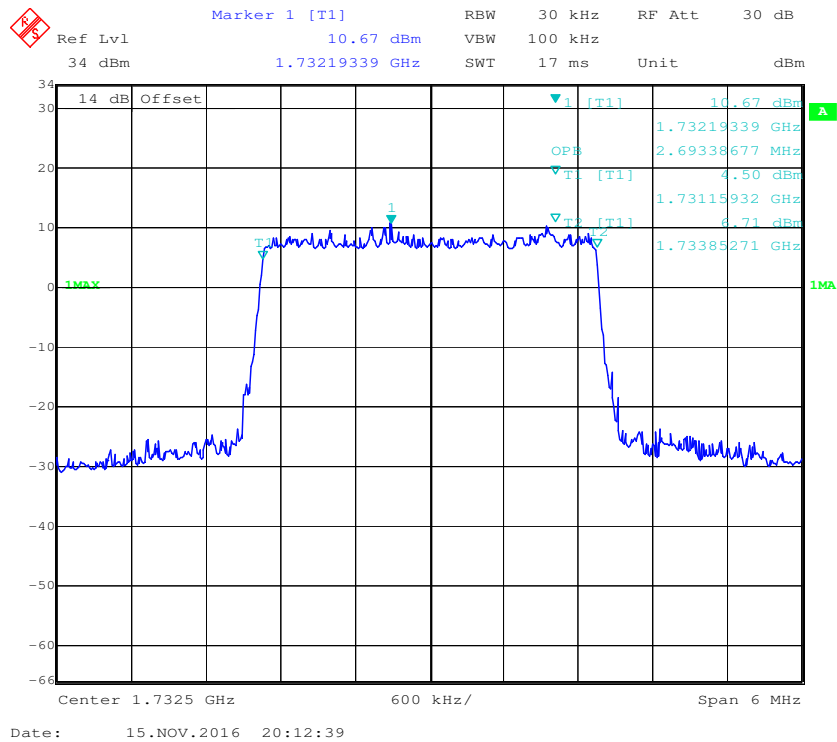
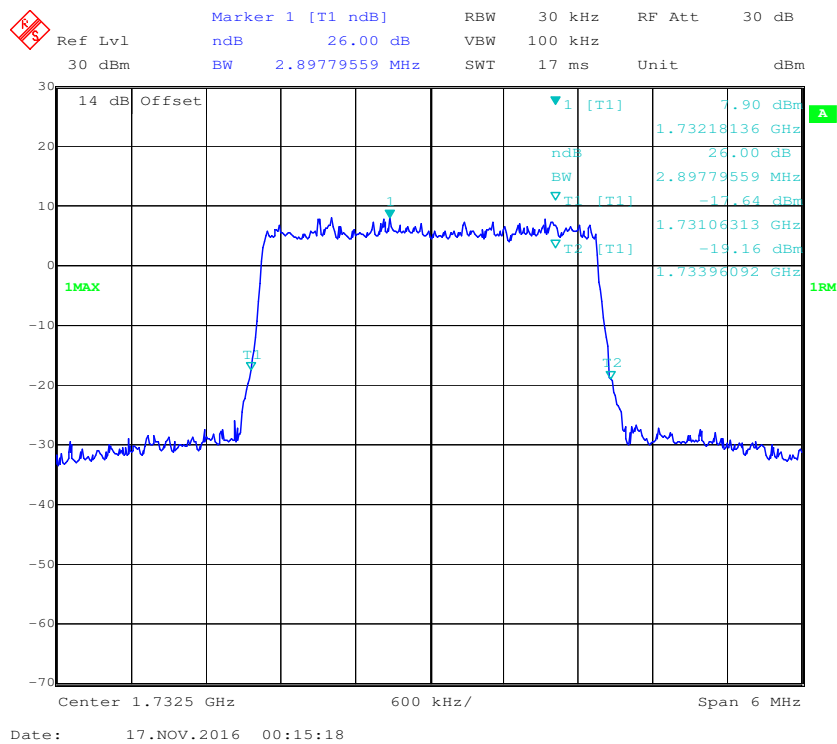
**LTE Band 4: (Middle Channel)**

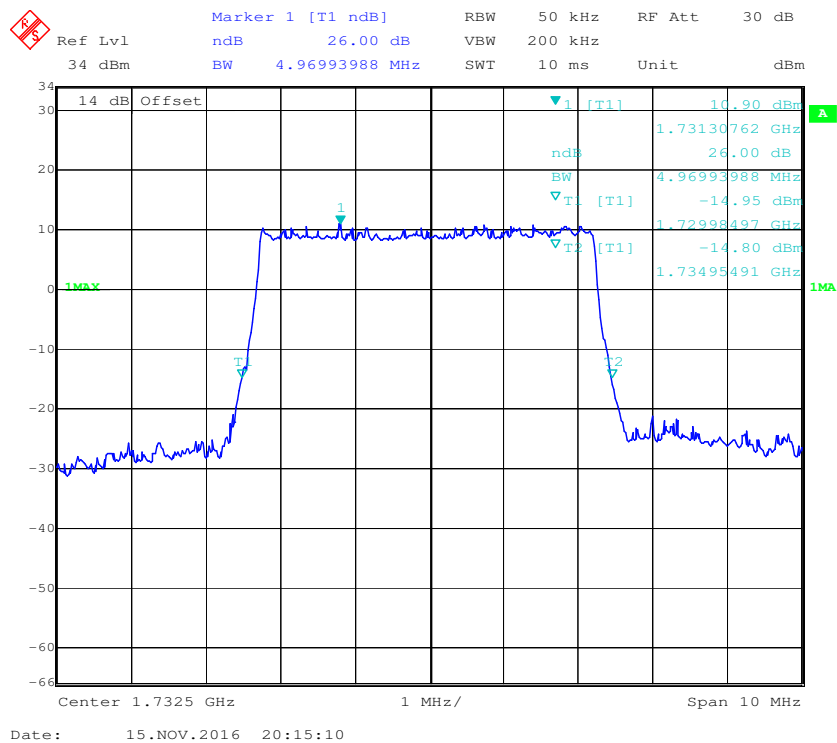
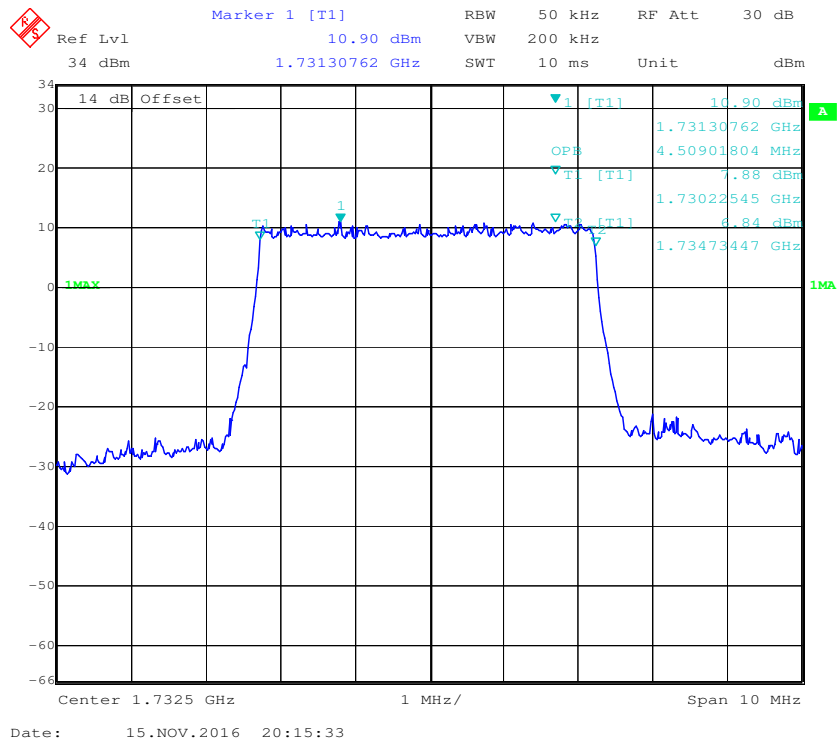
| <b>Bandwidth<br/>(MHz)</b> | <b>Modulation</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> |
|----------------------------|-------------------|---------------------------------------------|-----------------------------------------------|
| 1.4                        | QPSK              | 1.112                                       | 1.281                                         |
|                            | 16QAM             | 1.106                                       | 1.281                                         |
| 3.0                        | QPSK              | 2.693                                       | 2.922                                         |
|                            | 16QAM             | 2.693                                       | 2.898                                         |
| 5.0                        | QPSK              | 4.509                                       | 4.970                                         |
|                            | 16QAM             | 4.489                                       | 4.950                                         |
| 10.0                       | QPSK              | 8.938                                       | 9.780                                         |
|                            | 16QAM             | 8.938                                       | 9.659                                         |
| 15.0                       | QPSK              | 13.467                                      | 14.790                                        |
|                            | 16QAM             | 13.467                                      | 14.729                                        |
| 20.0                       | QPSK              | 17.876                                      | 19.158                                        |
|                            | 16QAM             | 17.876                                      | 19.158                                        |



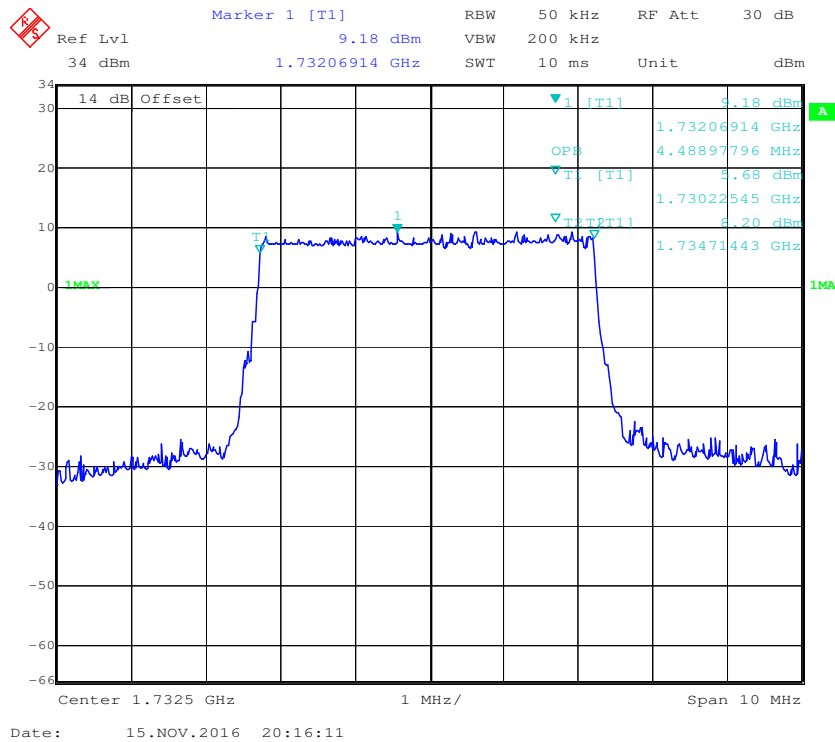
**16-QAM (1.4 MHz) - 99% Occupied Bandwidth, Middle channel****16-QAM (1.4 MHz) - 26 dB Emissions Bandwidth, Middle channel**

**QPSK (3.0 MHz) - 99% Occupied Bandwidth, Middle channel****QPSK (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

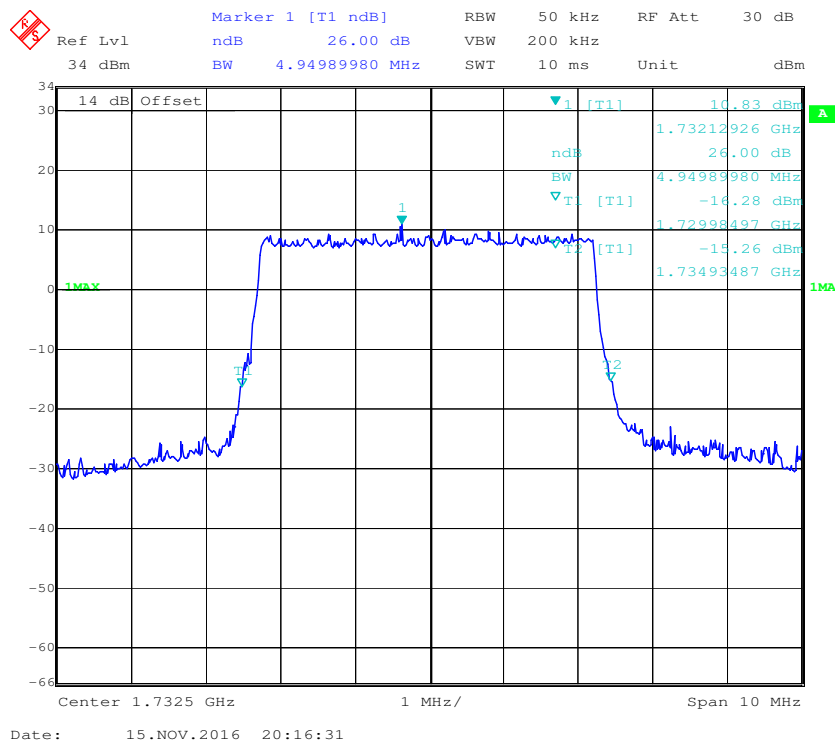
**16-QAM (3.0 MHz) - 99% Occupied Bandwidth, Middle channel****16-QAM (3.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**



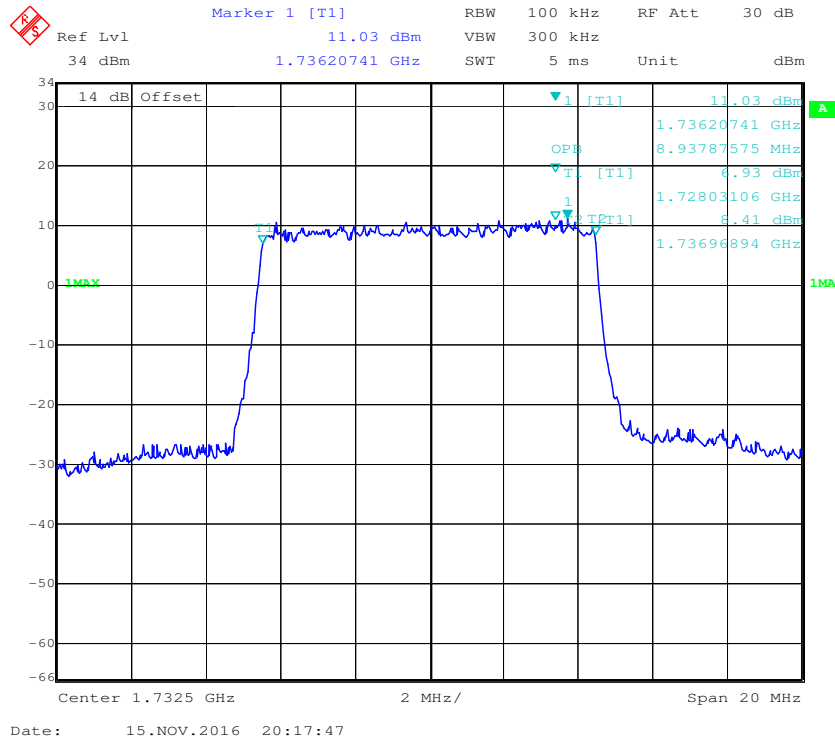
### 16-QAM (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



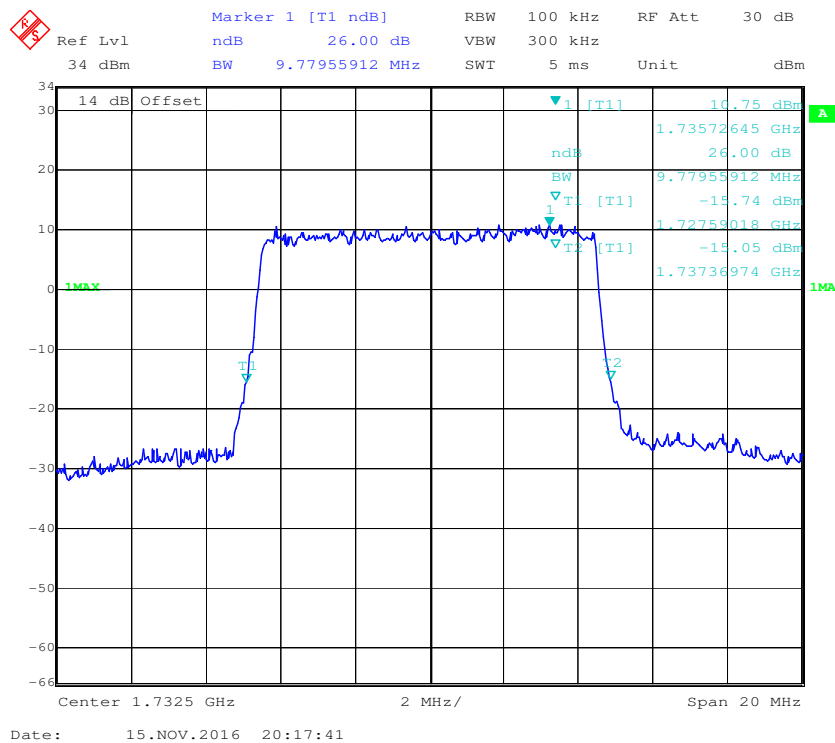
### 16-QAM (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



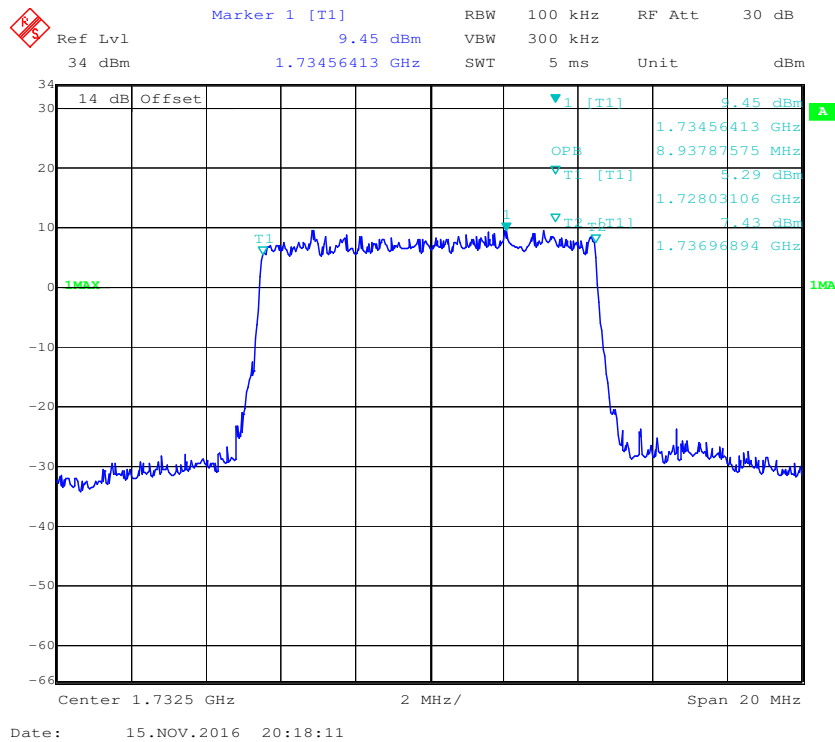
### QPSK (10.0 MHz) - 99% Occupied Bandwidth, Middle channel



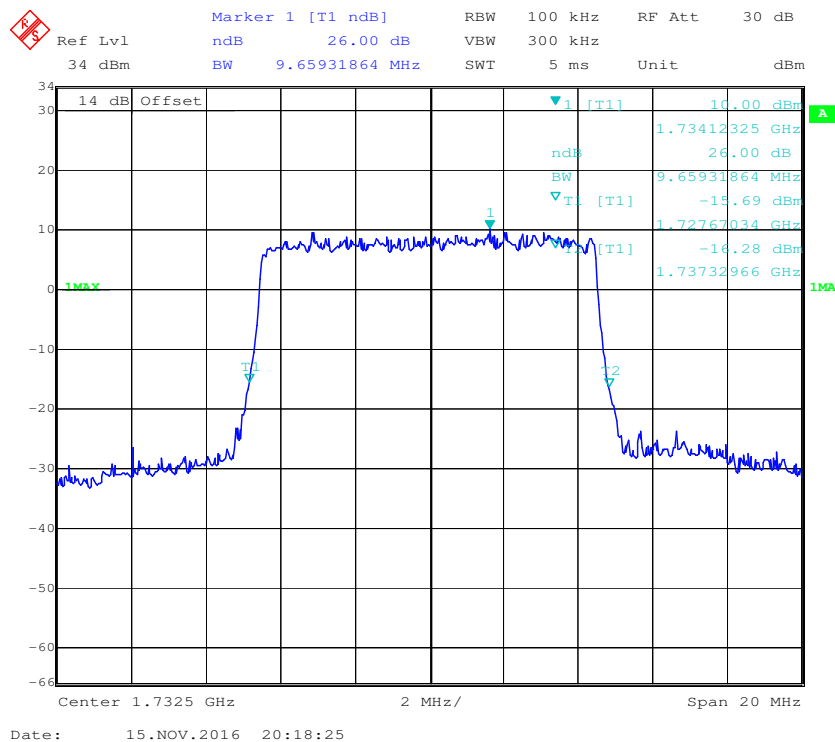
### QPSK (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel

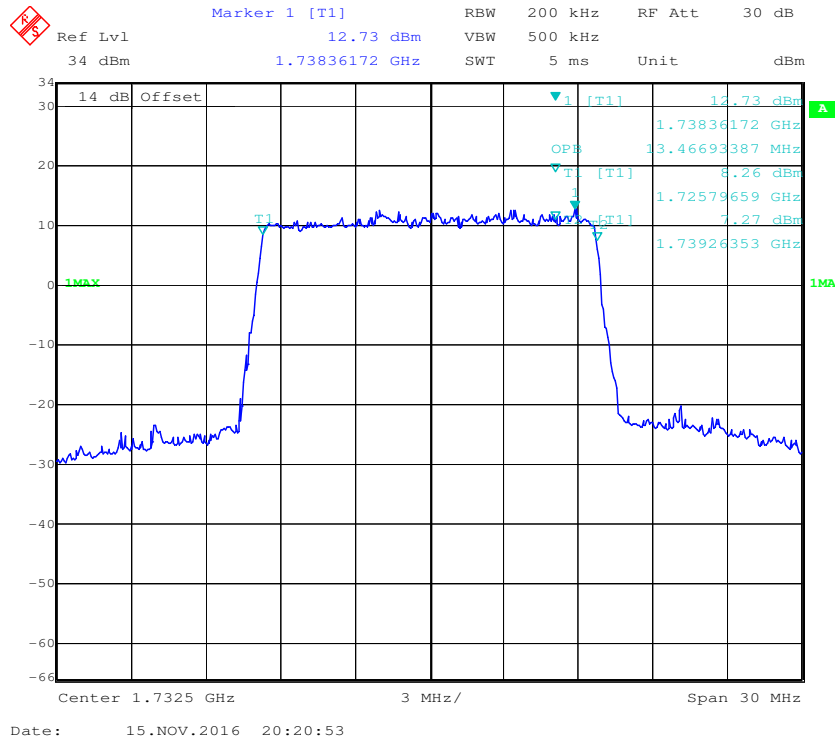
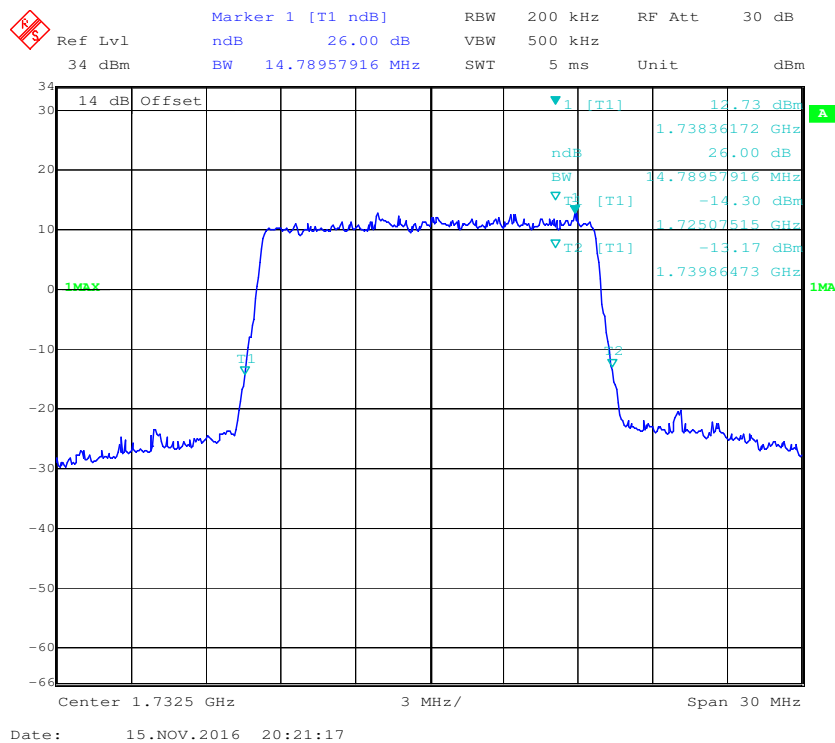


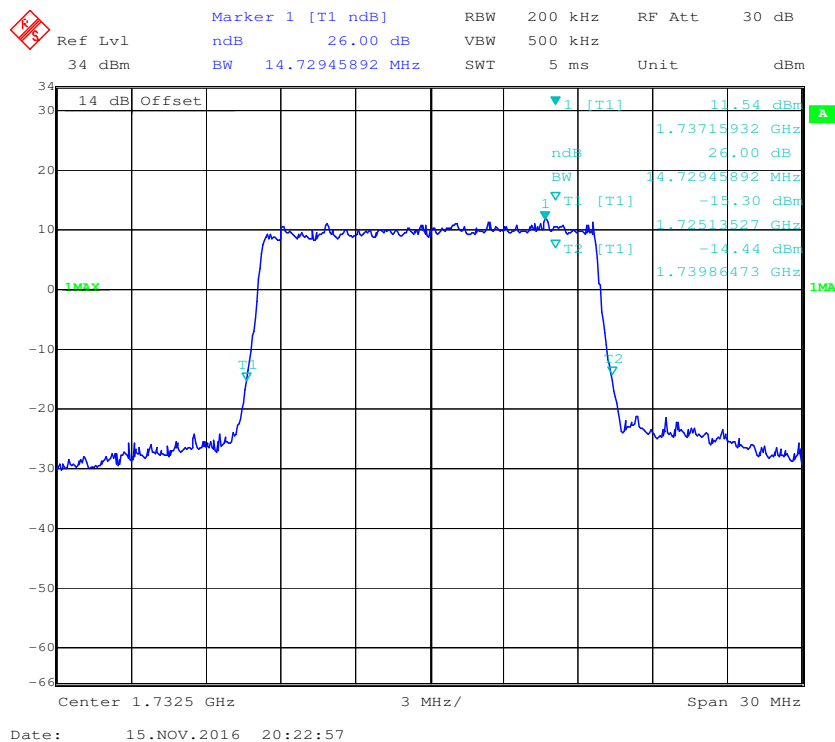
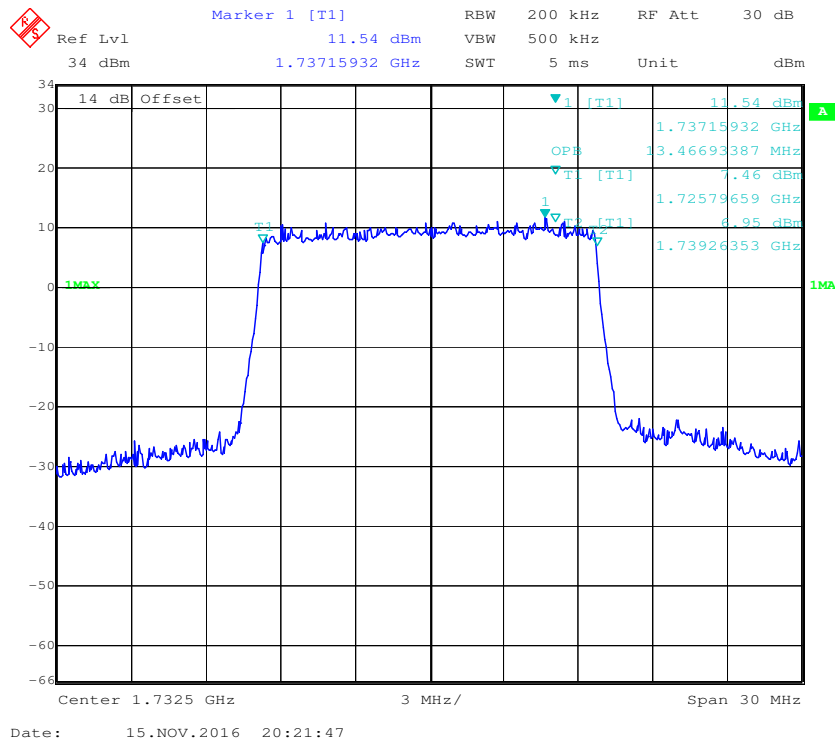
### 16-QAM (10.0 MHz) - 99% Occupied Bandwidth, Middle channel

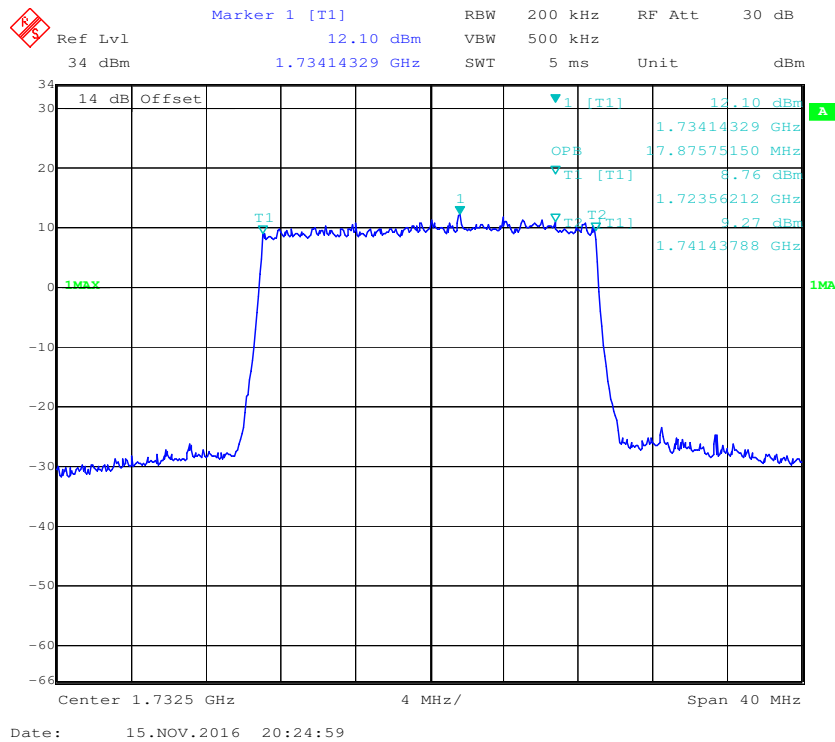
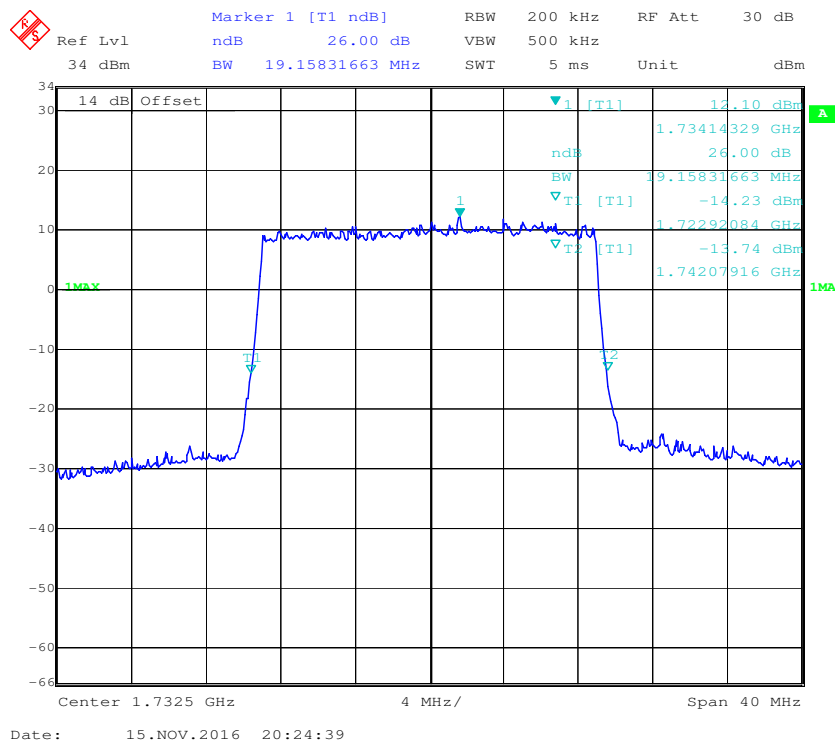


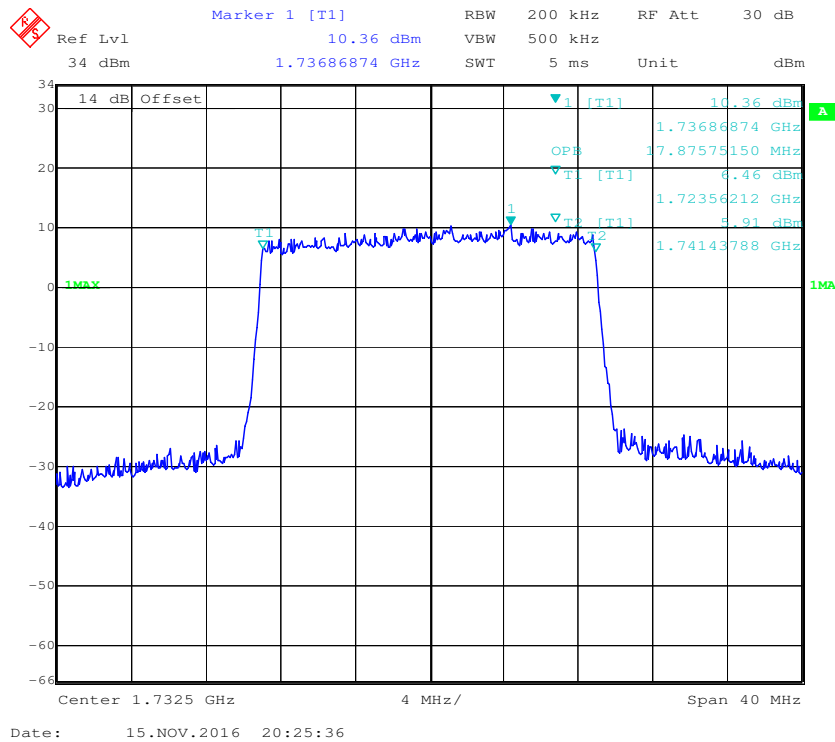
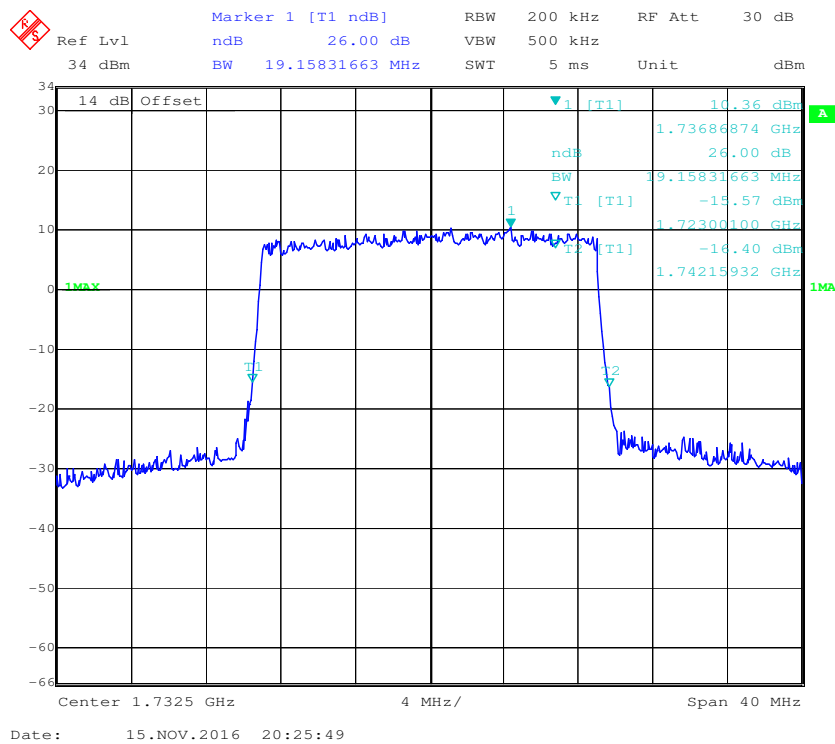
### 16-QAM (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



**QPSK (15.0 MHz) - 99% Occupied, Middle channel****QPSK (15.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**



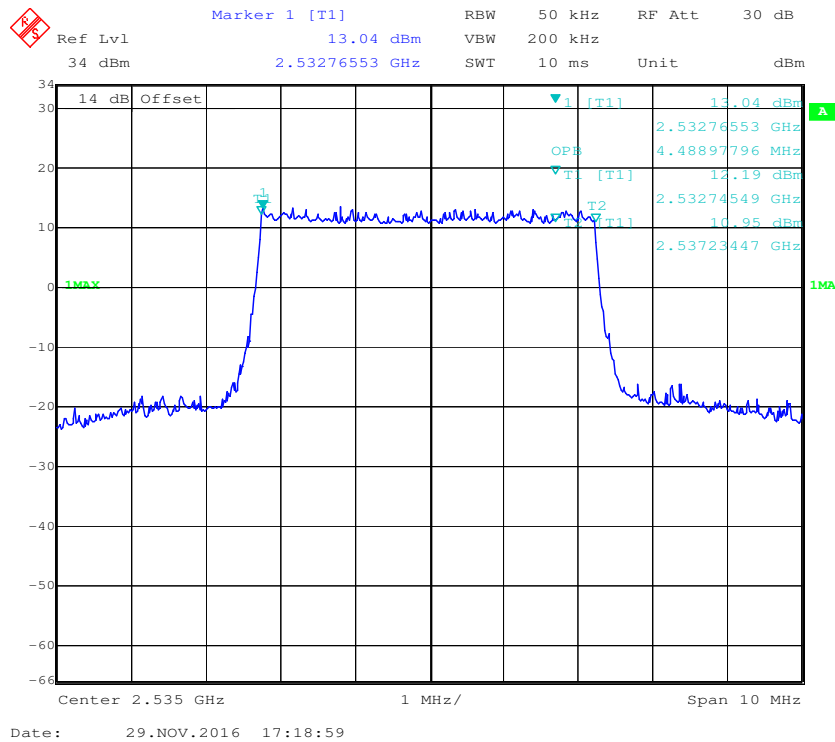
**QPSK (20.0 MHz) - 99% Occupied Middle channel****QPSK (20.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

**16-QAM (20.0 MHz) - 99% Occupied Bandwidth Middle channel****16-QAM (20.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

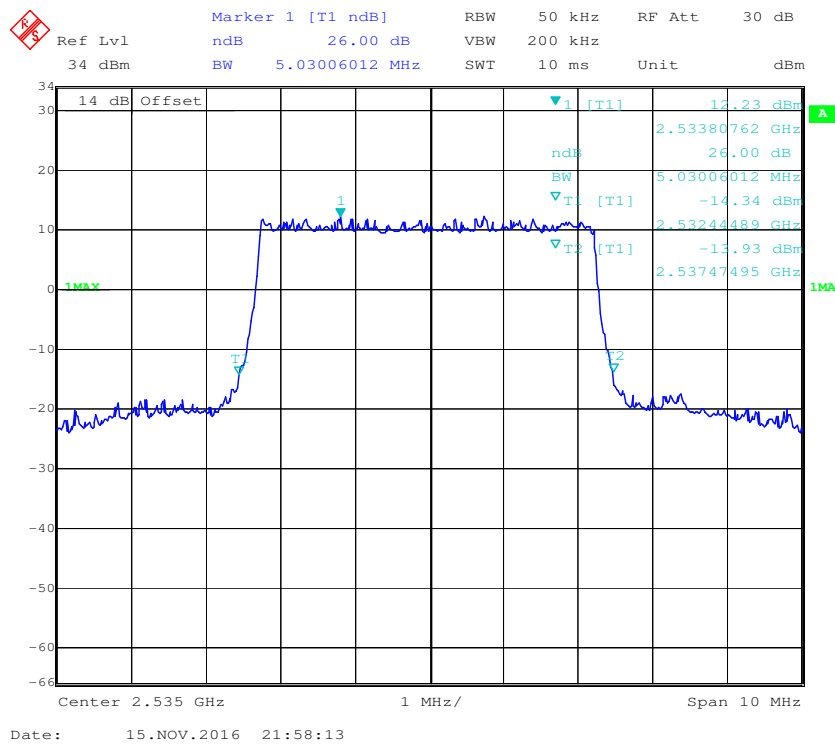
**LTE Band 7: (Middle Channel)**

| <b>Bandwidth<br/>(MHz)</b> | <b>Modulation</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> |
|----------------------------|-------------------|---------------------------------------------|-----------------------------------------------|
| 5.0                        | QPSK              | 4.489                                       | 5.030                                         |
|                            | 16QAM             | 4.489                                       | 4.990                                         |
| 10.0                       | QPSK              | 8.978                                       | 9.900                                         |
|                            | 16QAM             | 8.938                                       | 9.699                                         |
| 15.0                       | QPSK              | 13.527                                      | 14.910                                        |
|                            | 16QAM             | 13.407                                      | 14.669                                        |
| 20.0                       | QPSK              | 17.956                                      | 19.158                                        |
|                            | 16QAM             | 17.956                                      | 19.399                                        |

### QPSK (5.0 MHz) - 99% Occupied Bandwidth, Middle channel



**QPSK (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**



Marker 1 [T1] RBW 50 kHz RF Att 30 dB

Ref Lvl 12.92 dBm VBW 200 kHz

34 dBm 2.53460922 GHz SWT 10 ms Unit dBm

14 dB Offset

12.92 dBm

2.53460922 GHz

4.48897796 MHz

12.22 dBm

2.53272545 GHz

5.90 dBm

2.53721443 GHz

Center 2.535 GHz 1 MHz/ Span 10 MHz

Date: 15.NOV.2016 21:55:20

Ref Lvl 34 dBm  
 Marker 1 [T1 ndB] 26.00 dB  
 BW 4.98997996 MHz  
 RBW 50 kHz  
 VBW 200 kHz  
 RF Att 30 dBm  
 Unit dBm  
 14 dB Offset  
 10.38 dBm  
 2.53428858 GHz  
 ndB 26.00 dB  
 BW 4.98997996 MHz  
 T1 [T1] -14.63 dBm  
 T2 [T1] -15.15 dBm  
 2.53250501 GHz  
 2.53749499 GHz  
 Center 2.535 GHz  
 1 MHz/  
 Span 10 MHz  
 Date: 15.NOV.2016 21:56:37

Marker 1 [T1] RBW 100 kHz RF Att 30 dB  
 Ref Lvl 11.60 dBm VBW 300 kHz  
 34 dBm 2.53161323 GHz SWT 5 ms Unit dBm

| Label    | Value          |
|----------|----------------|
| 1 [T1]   | 11.60 dBm      |
| OPB      | 2.53161323 GHz |
| T1 [T1]  | 8.97795591 MHz |
| REF TPT1 | 4.12 dBm       |
|          | 2.53049098 GHz |
|          | 7.85 dBm       |
|          | 2.53946894 GHz |

Center 2.535 GHz 2 MHz/ Span 20 MHz

Date: 15.NOV.2016 21:53:51

Ref Lvl 34 dBm  
Marker 1 [T1 ndB] 26.00 dB  
BW 9.89979960 MHz  
RBW 100 kHz  
VBW 300 kHz  
RF Att 30 dB  
SWT 5 ms  
Unit dBm

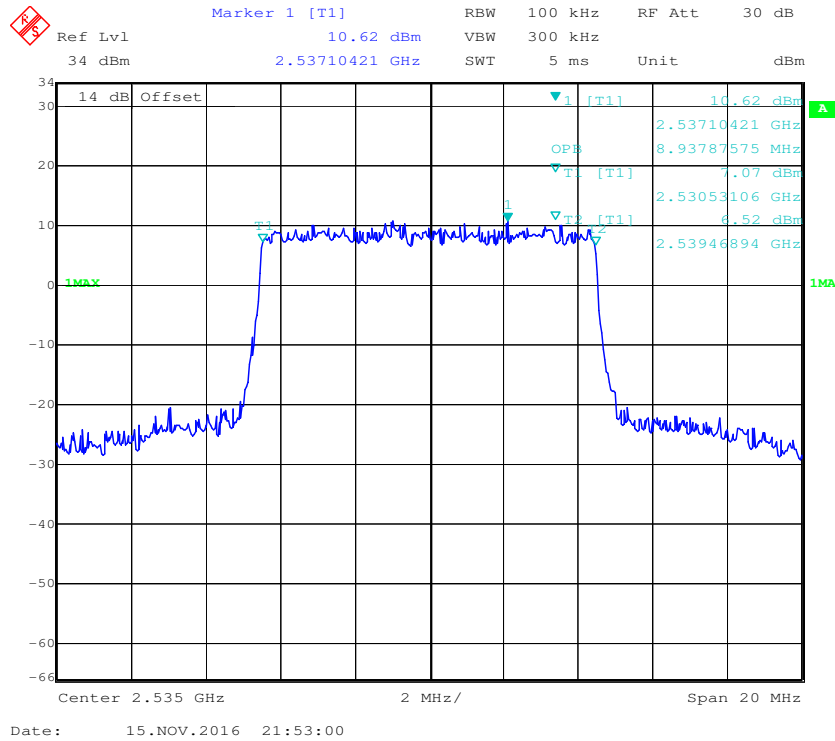
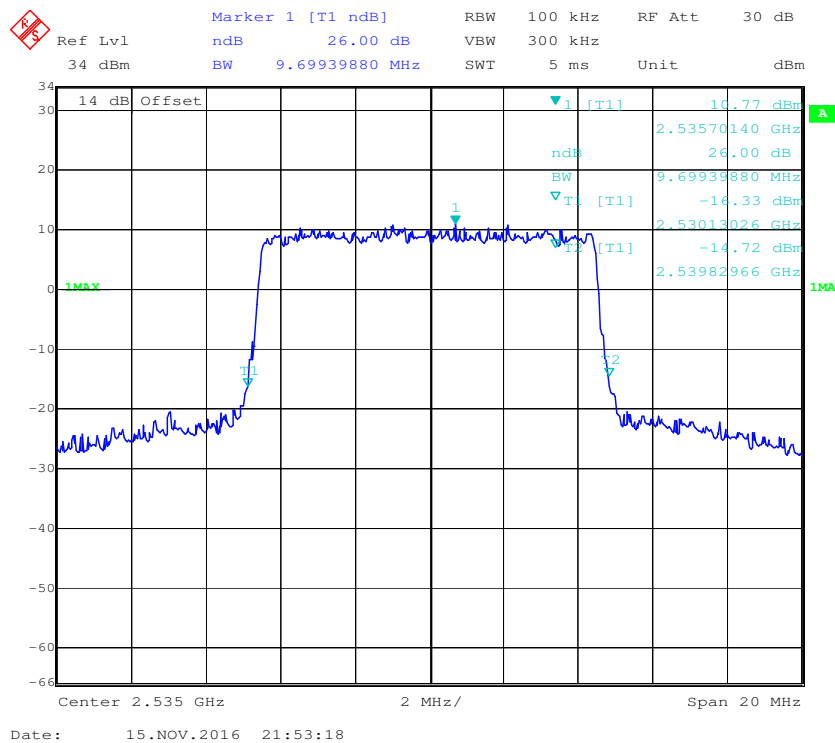
14 dB Offset

11.68 dBm  
2.53437876 GHz  
26.00 dB  
9.89979960 MHz  
-11.83 dBm  
2.53001002 GHz  
-14.26 dBm  
2.53990982 GHz

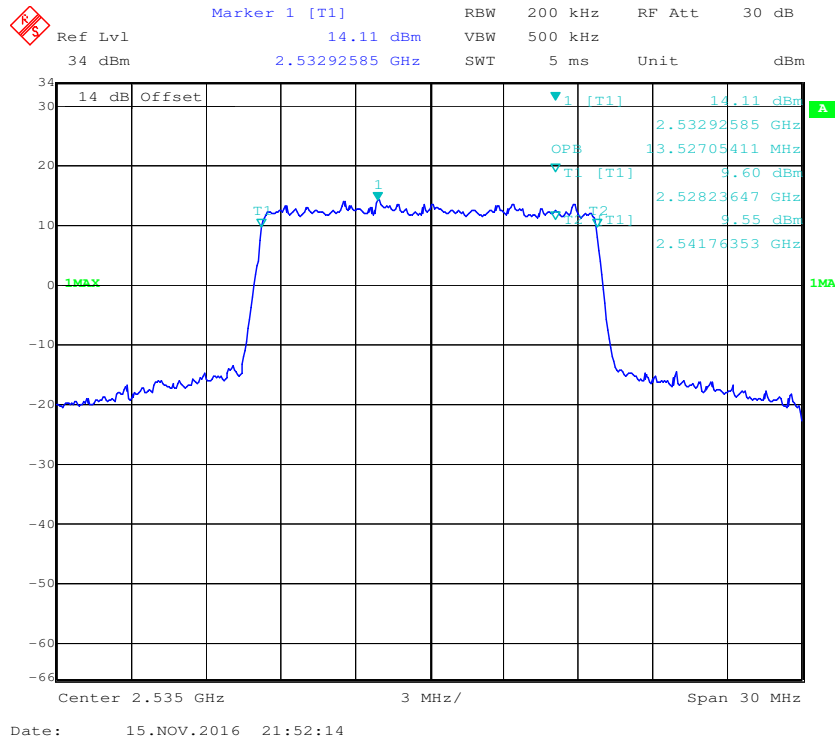
11.68 dBm  
2.53437876 GHz  
26.00 dB  
9.89979960 MHz  
-11.83 dBm  
2.53001002 GHz  
-14.26 dBm  
2.53990982 GHz

Center 2.535 GHz  
2 MHz/  
Span 20 MHz

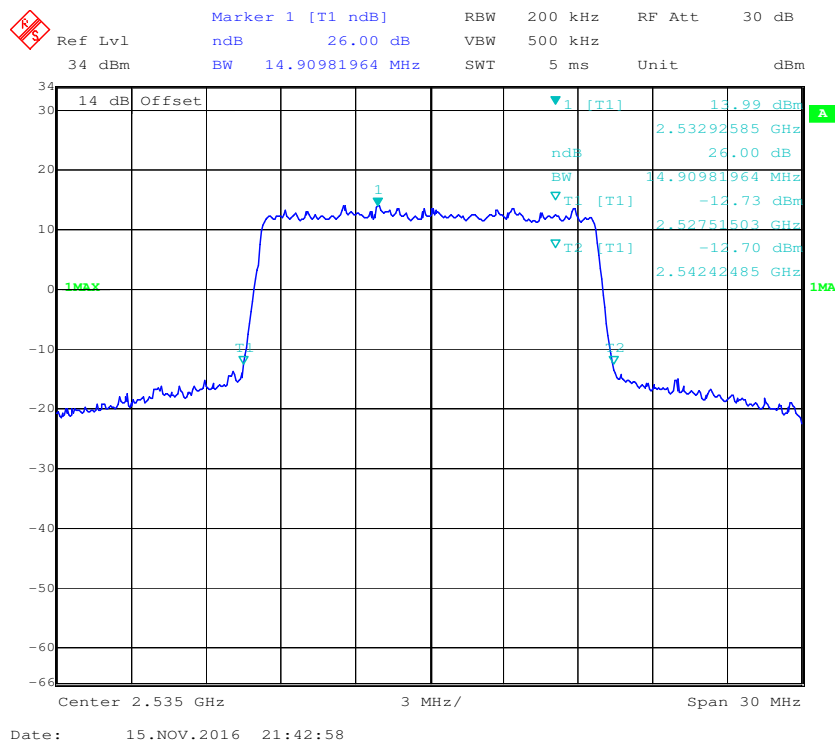
Date: 15.NOV.2016 21:54:13

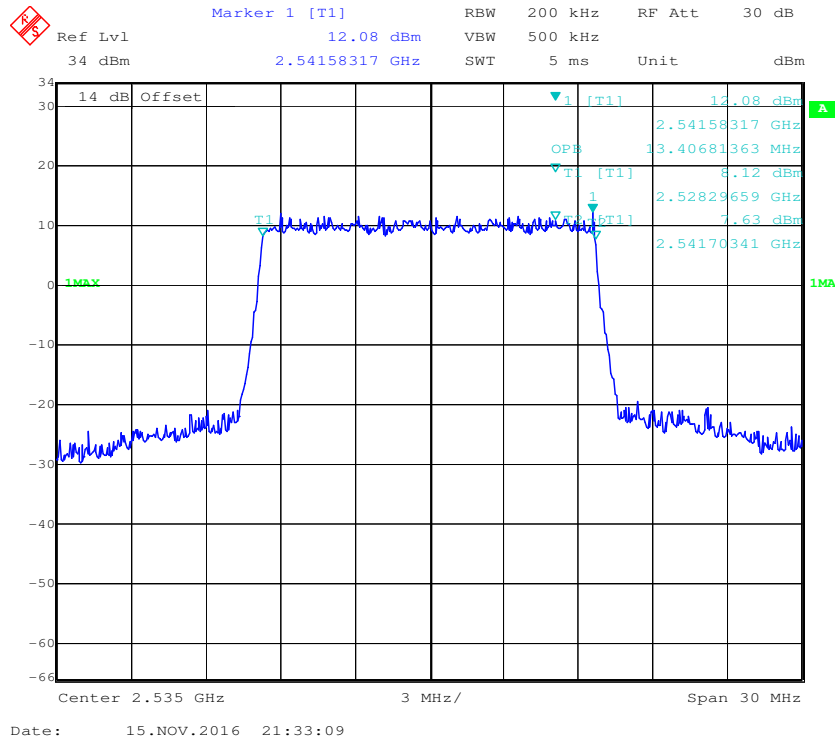
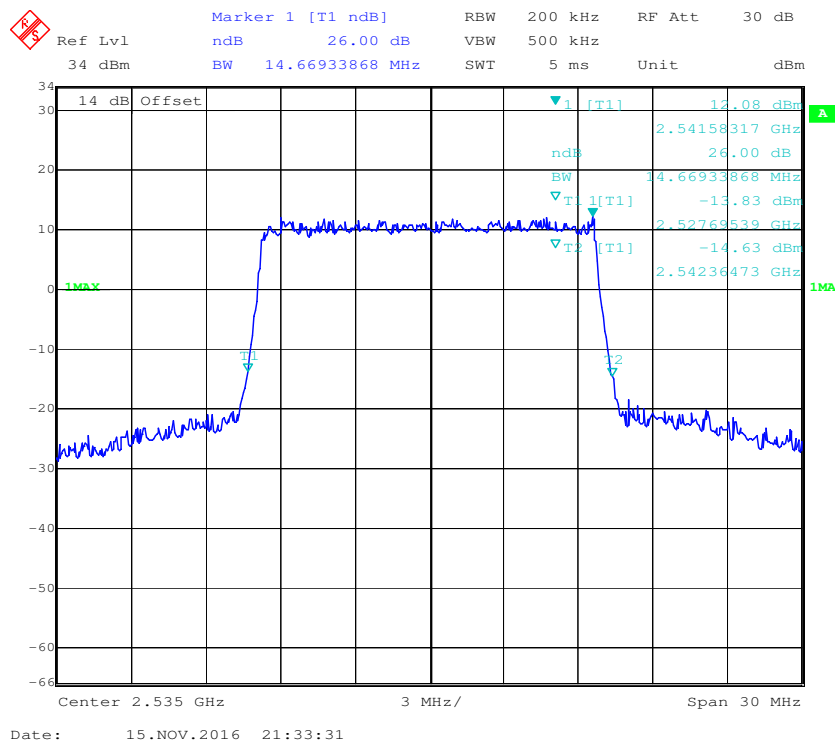
**16-QAM (10.0 MHz) - 99% Occupied Bandwidth, Middle channel****16-QAM (10.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

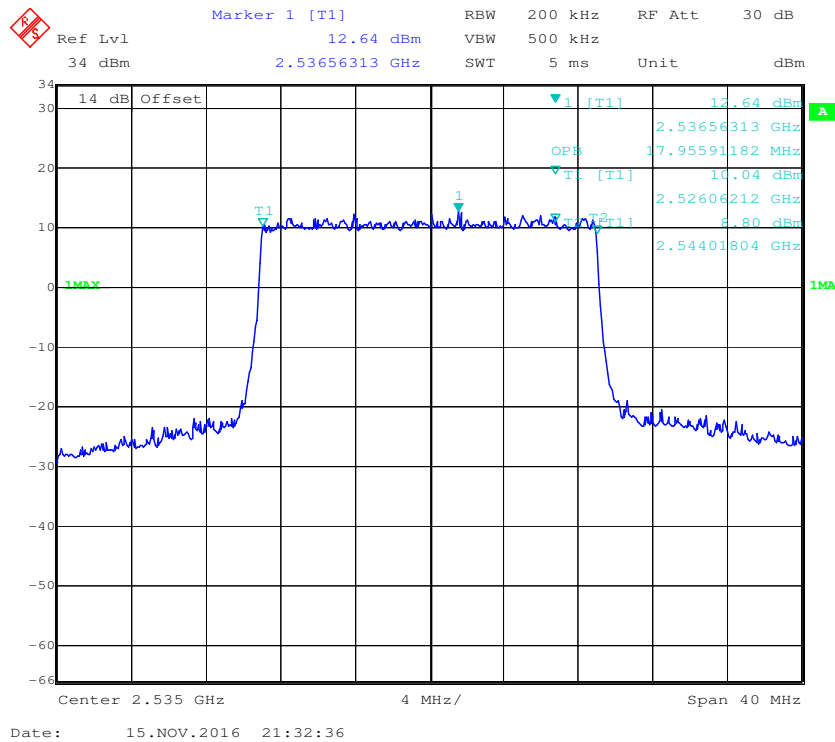
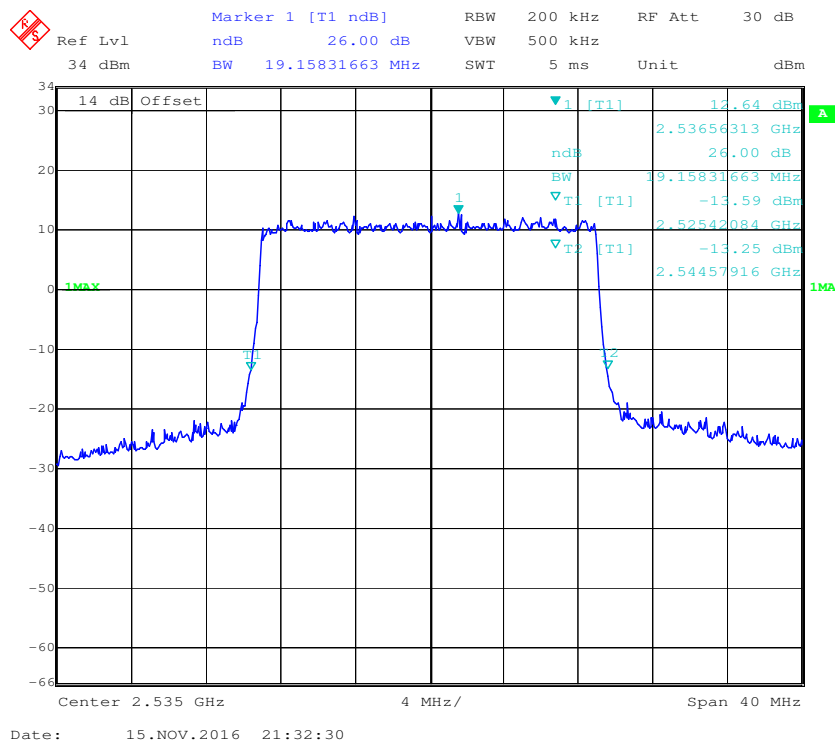
## QPSK (15.0 MHz) - 99% Occupied, Middle channel

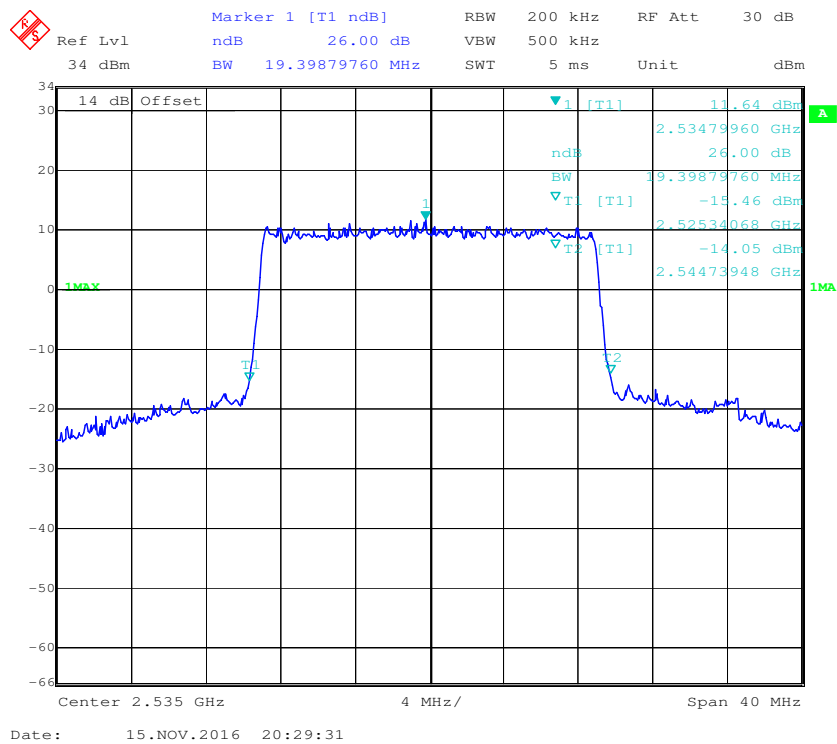
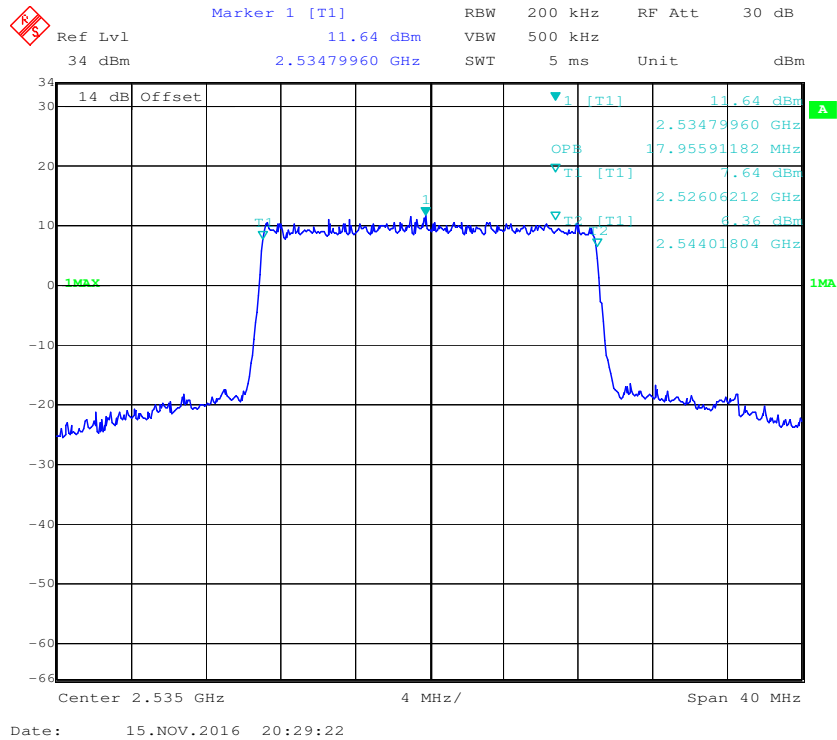


## QPSK (15.0 MHz) - 26 dB Emissions Bandwidth, Middle channel



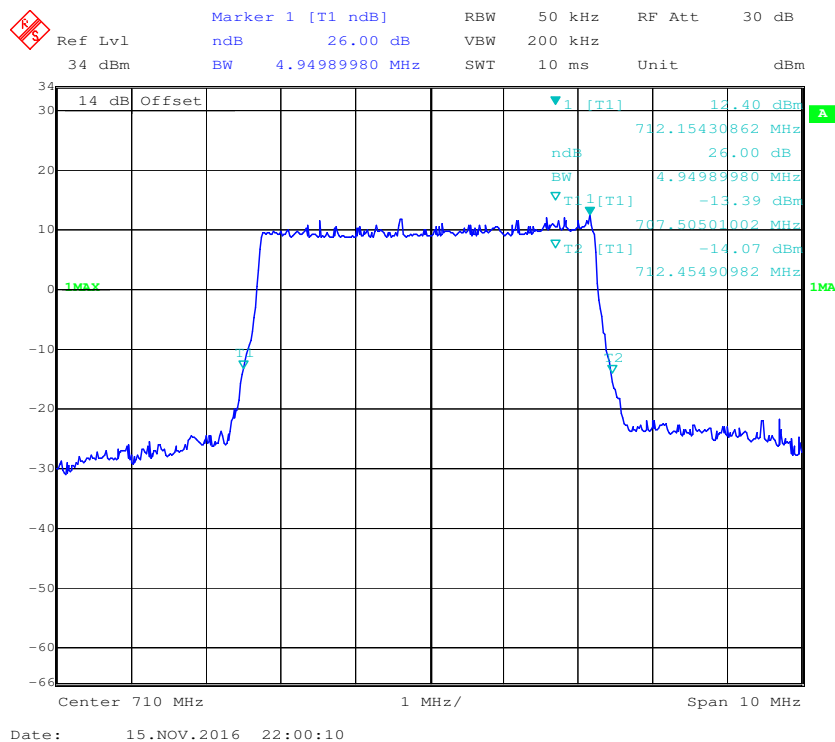
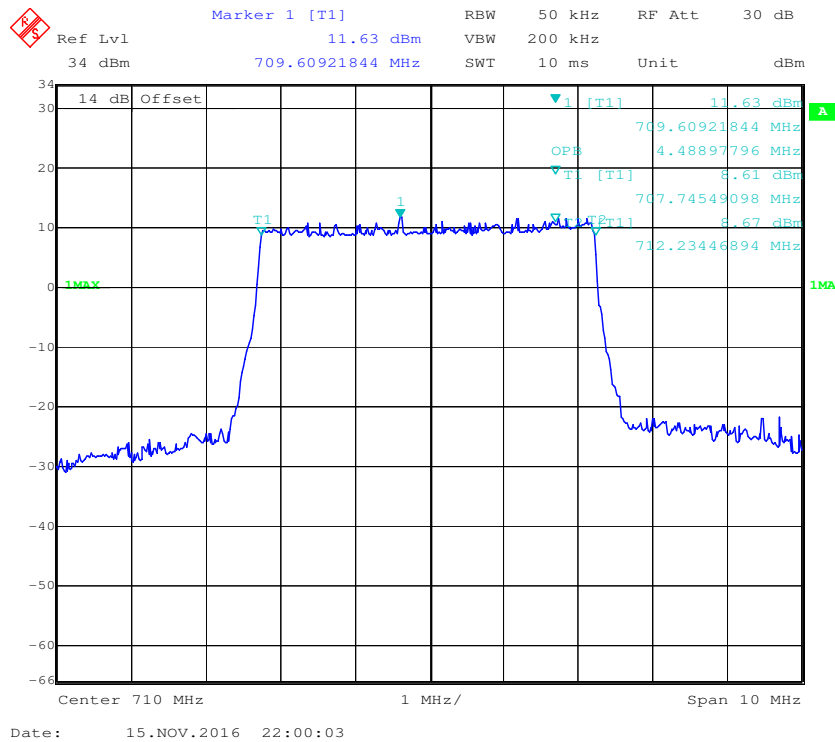
**16-QAM (15.0 MHz) - 99% Occupied Middle channel****16-QAM (15.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

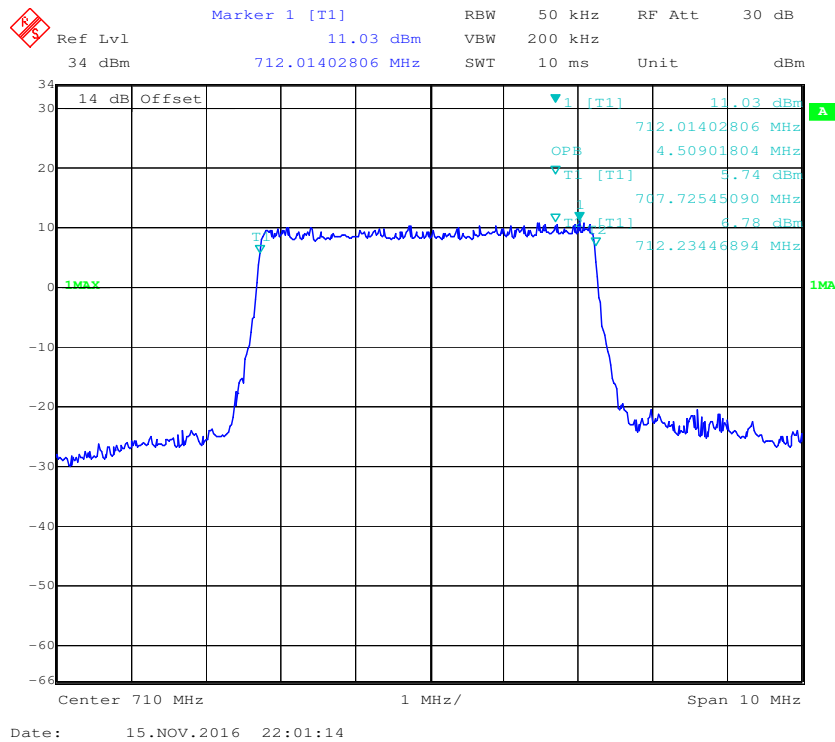
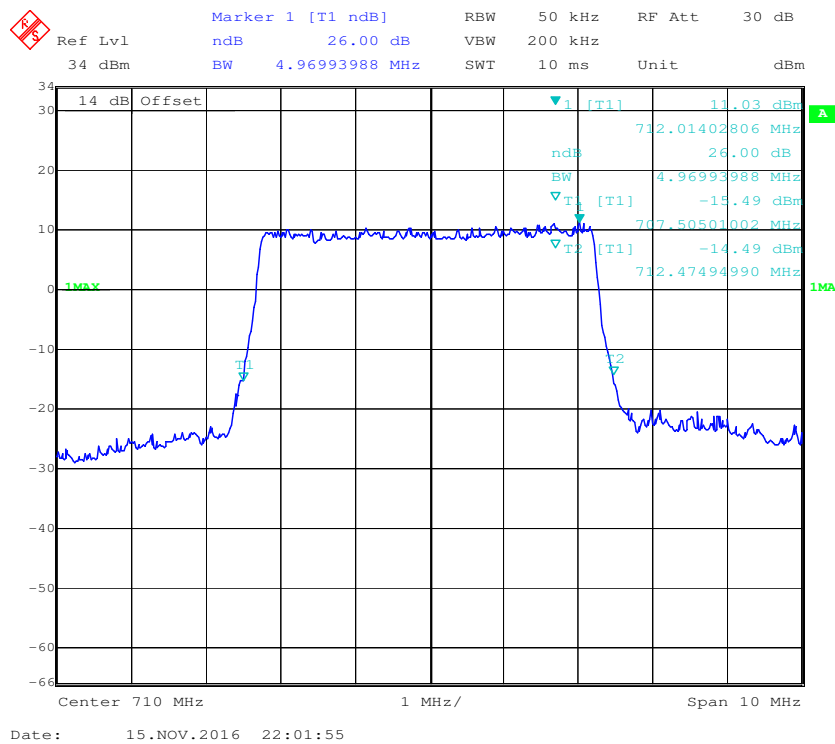
**QPSK (20.0 MHz) - 99% Occupied Middle channel****QPSK (20.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**



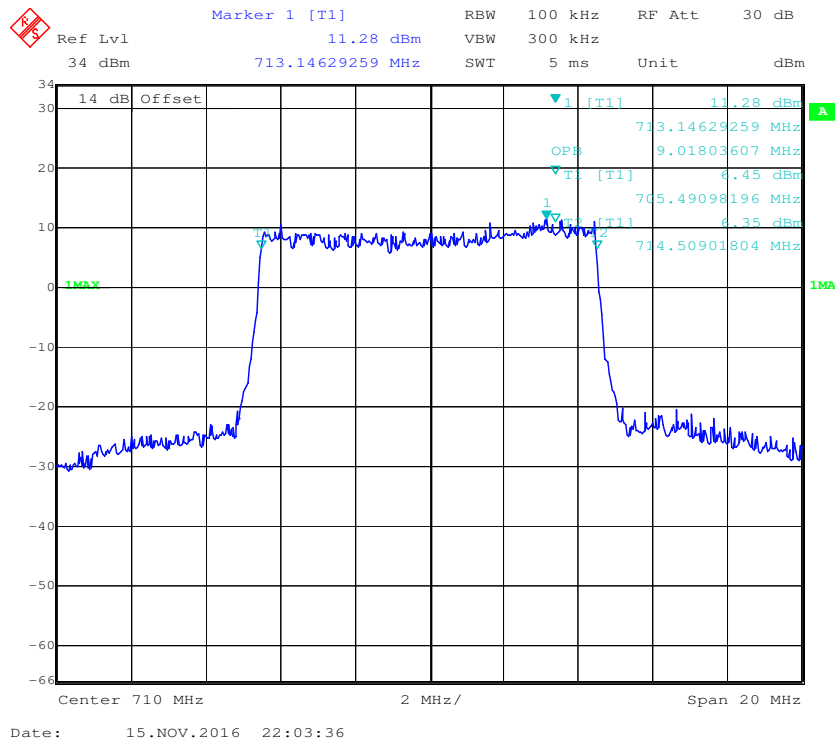
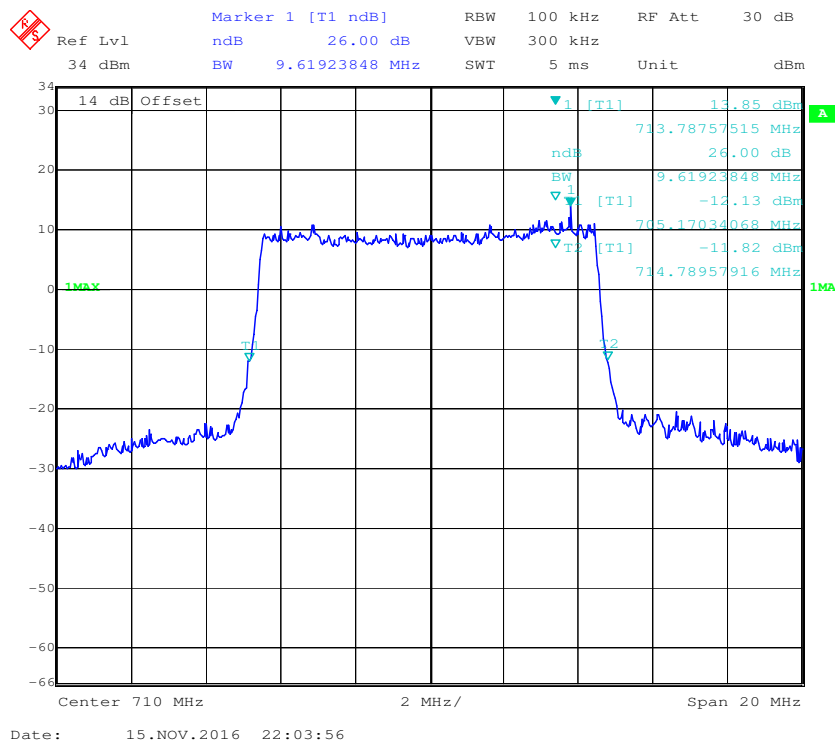
**LTE Band 17: (Middle Channel)**

| <b>Bandwidth<br/>(MHz)</b> | <b>Modulation</b> | <b>99% Occupied<br/>Bandwidth<br/>(MHz)</b> | <b>26 dB Emission<br/>Bandwidth<br/>(MHz)</b> |
|----------------------------|-------------------|---------------------------------------------|-----------------------------------------------|
| 5.0                        | QPSK              | 4.489                                       | 4.950                                         |
|                            | 16QAM             | 4.509                                       | 4.970                                         |
| 10.0                       | QPSK              | 9.018                                       | 9.780                                         |
|                            | 16QAM             | 9.018                                       | 9.619                                         |



**16-QAM (5.0 MHz) - 99% Occupied Bandwidth, Middle channel****16-QAM (5.0 MHz) - 26 dB Emissions Bandwidth, Middle channel**

[illegible][illegible]

**QPSK (10.0 MHz) - 99% Occupied & 26 dB Emissions, Middle channel****16-QAM (10.0MHz) - 99% Occupied & 26 dB Emissions, Middle channel**

## § 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h) (m) SPURIOUS EMISSIONS AT ANTENNA TERMINALS

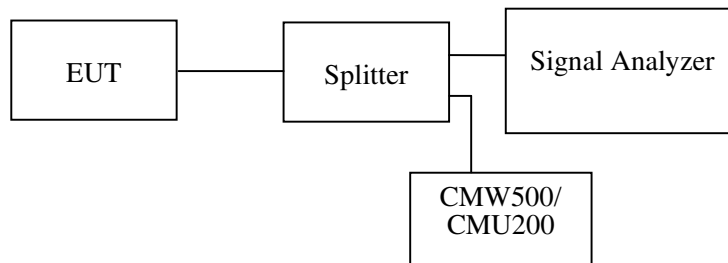
### Applicable Standards

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

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. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10<sup>th</sup> harmonic.



### Test Data

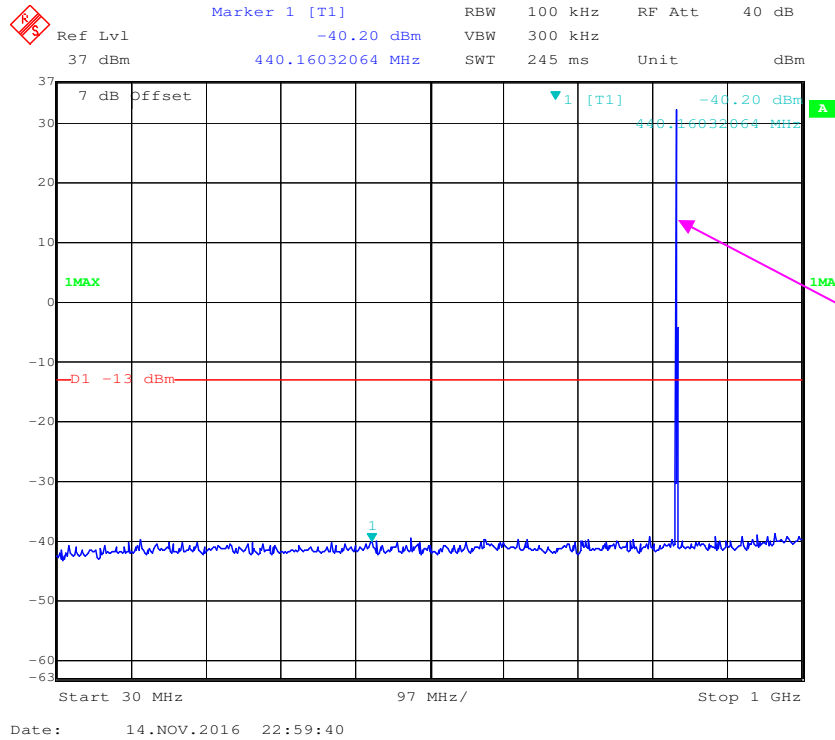
#### Environmental Conditions

|                    |                 |
|--------------------|-----------------|
| Temperature:       | 23~25℃          |
| Relative Humidity: | 53~55 %         |
| ATM Pressure:      | 100.0~101.0 kPa |

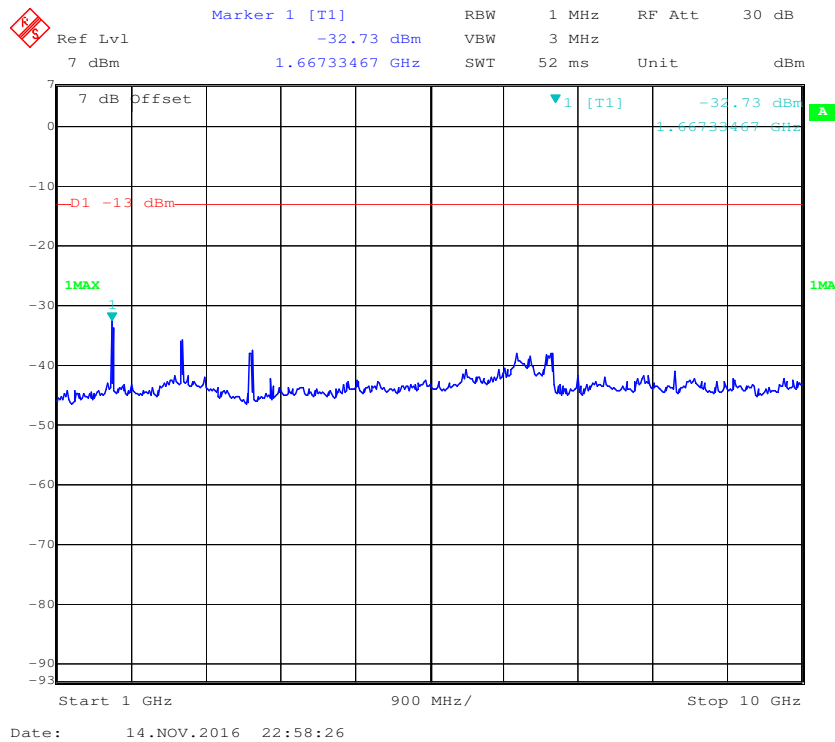
*The testing was performed by Bin Mei on 2016-11-14 to 2016-11-15.*

Cellular Band (Part 22H)

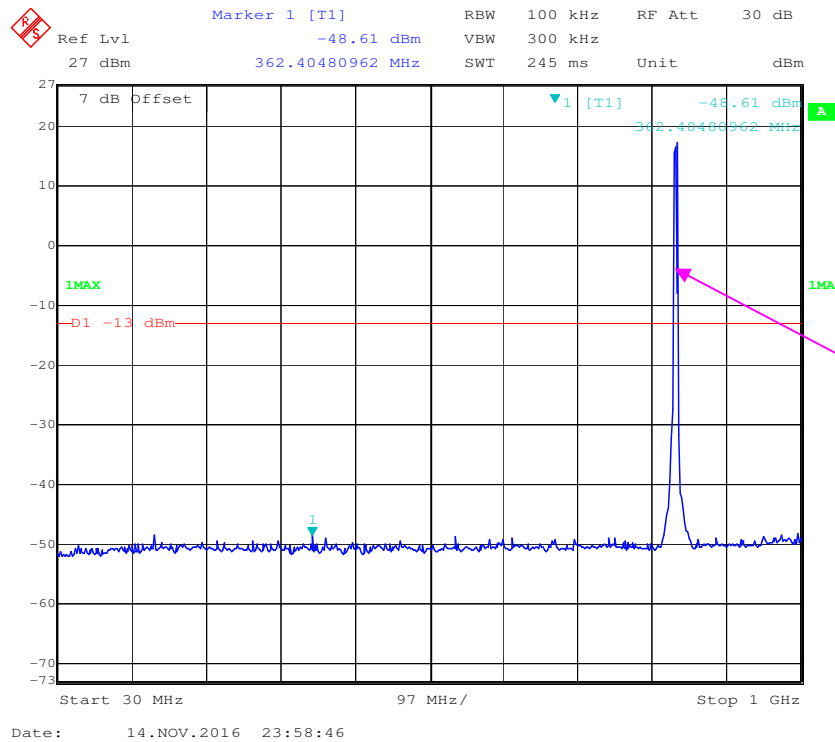
30 MHz – 1 GHz (GSM Mode)



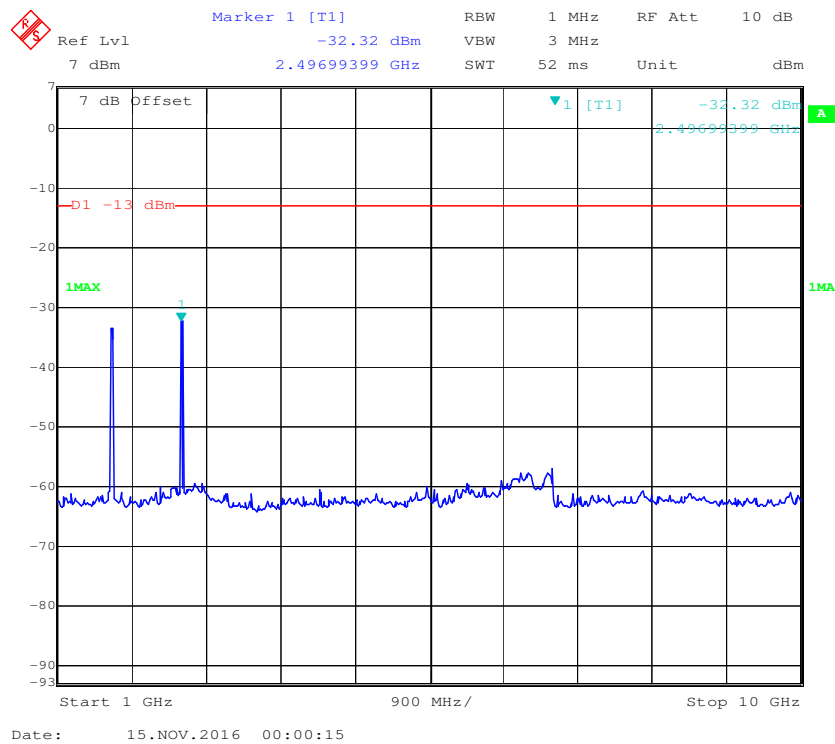
1 GHz – 10 GHz (GSM Mode)



### 30 MHz – 1 GHz (WCDMA Mode)

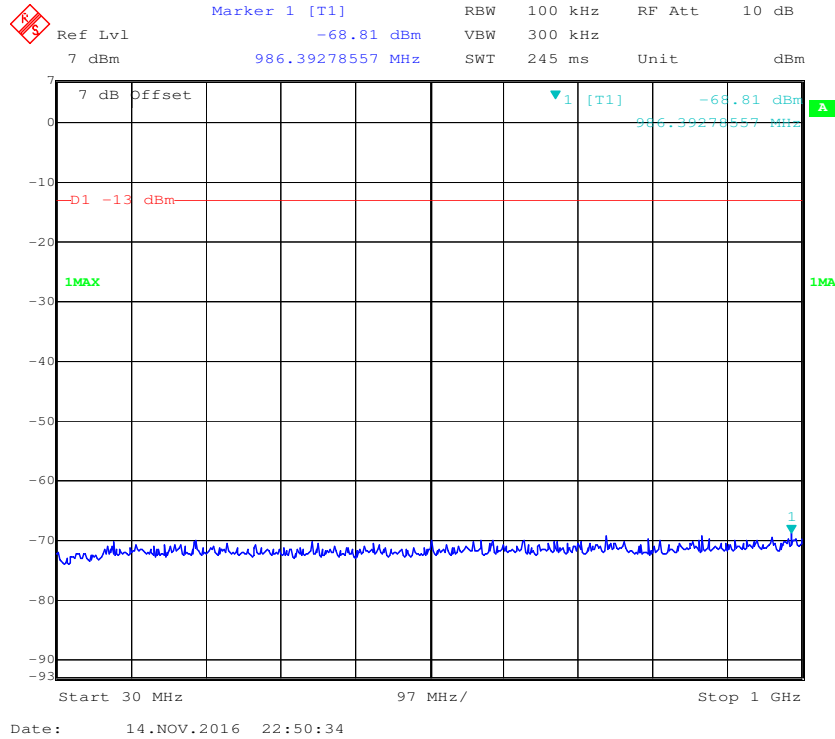


### 1 GHz – 10 GHz (WCDMA Mode)

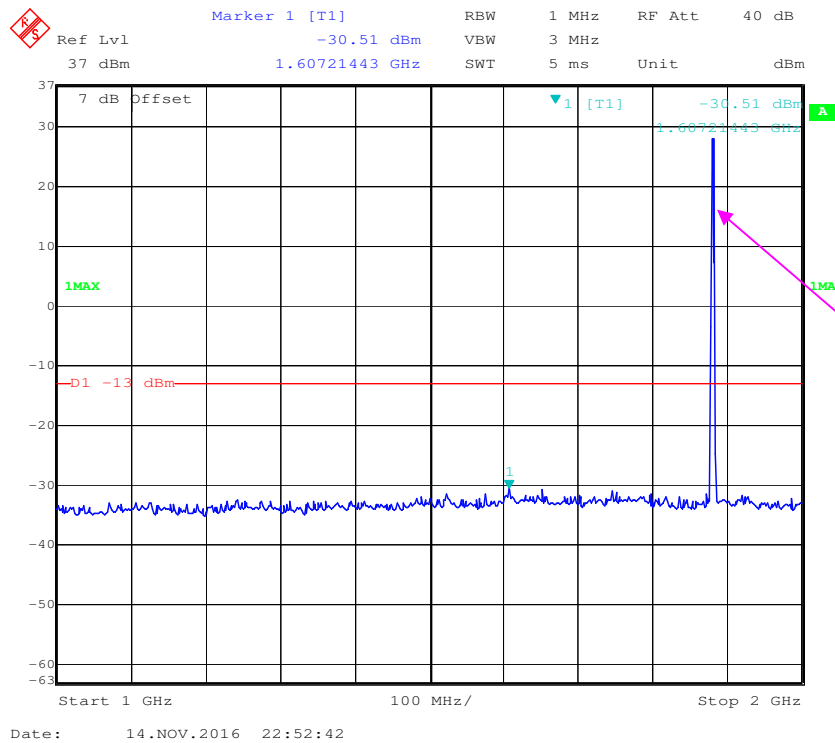


PCS Band (Part 24E)

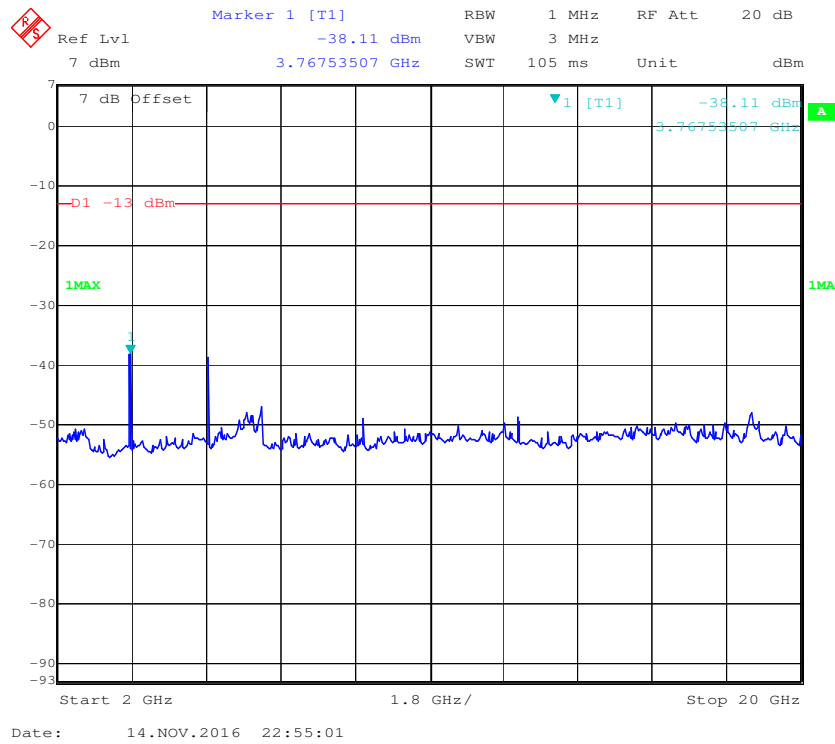
30 MHz – 1 GHz (GSM Mode)



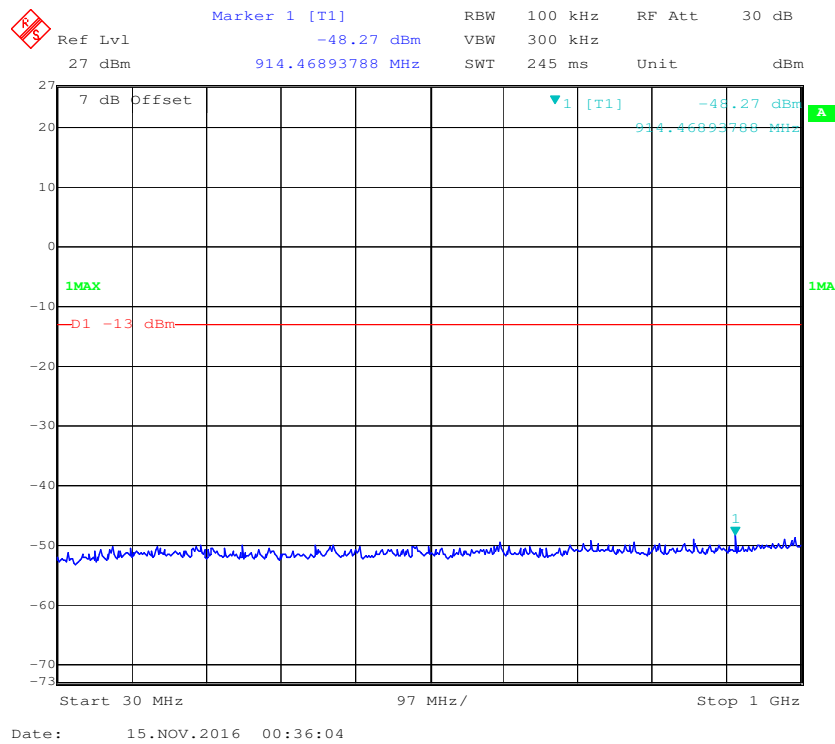
1 GHz – 2 GHz (GSM Mode)



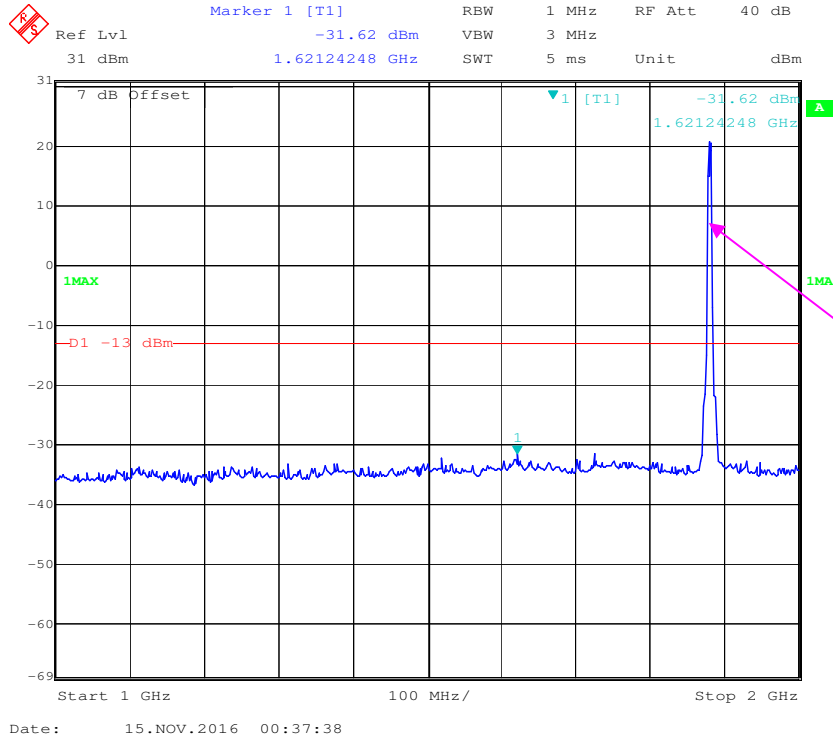
### 2 GHz – 20 GHz (GSM Mode)



### 30 MHz – 1 GHz (WCDMA Mode)

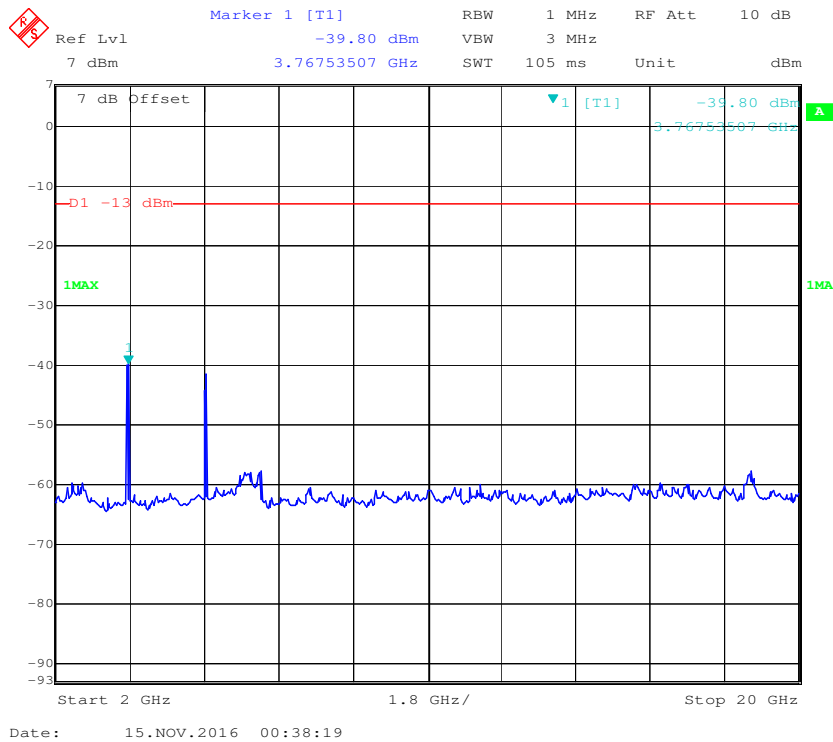


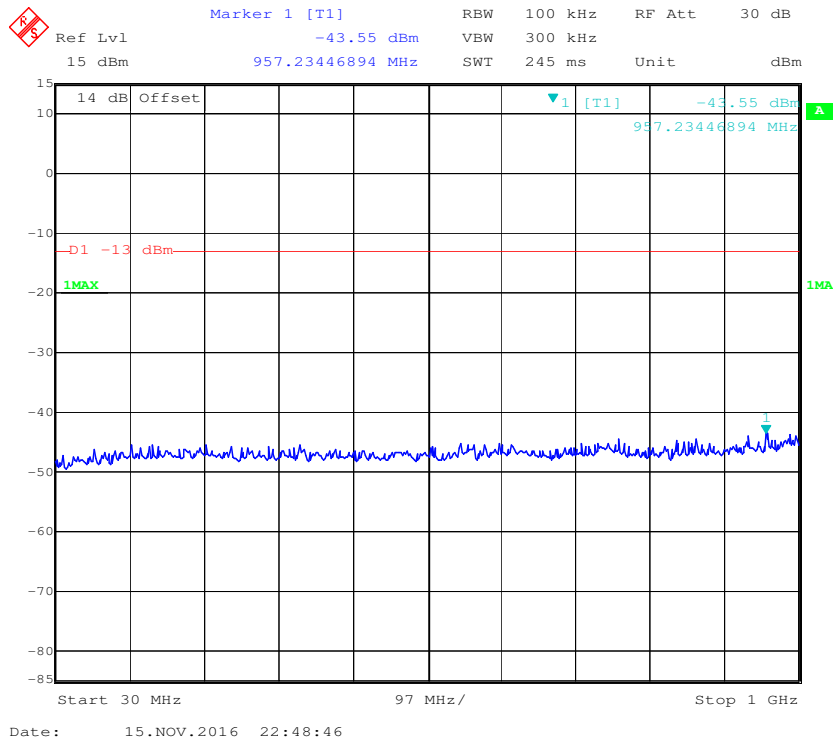
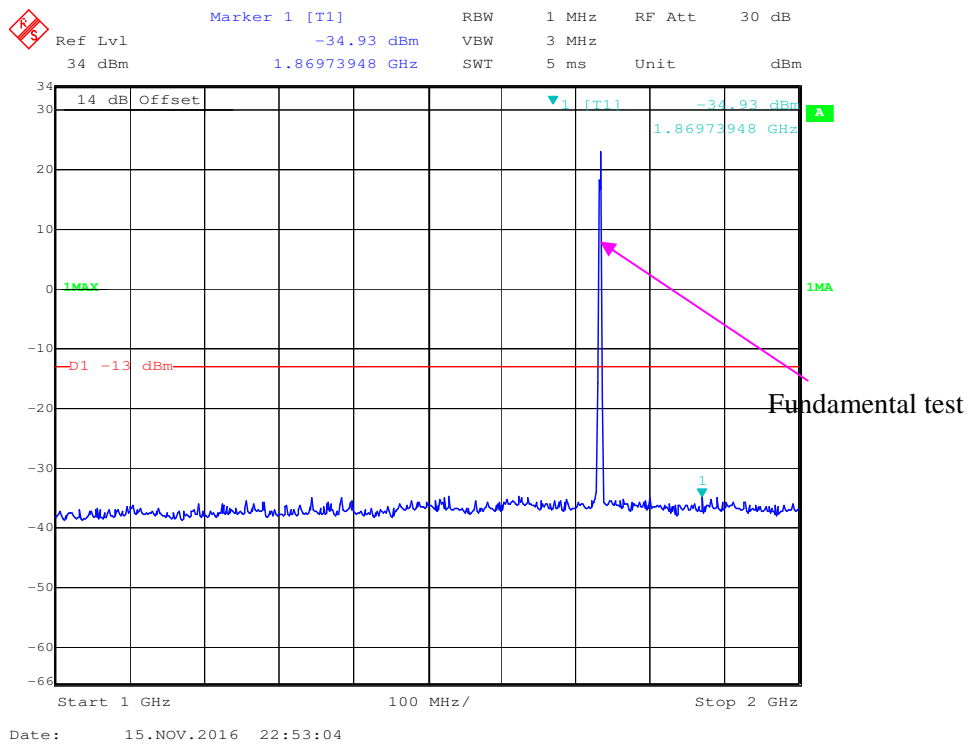
### 1 GHz – 2 GHz (WCDMA Mode)



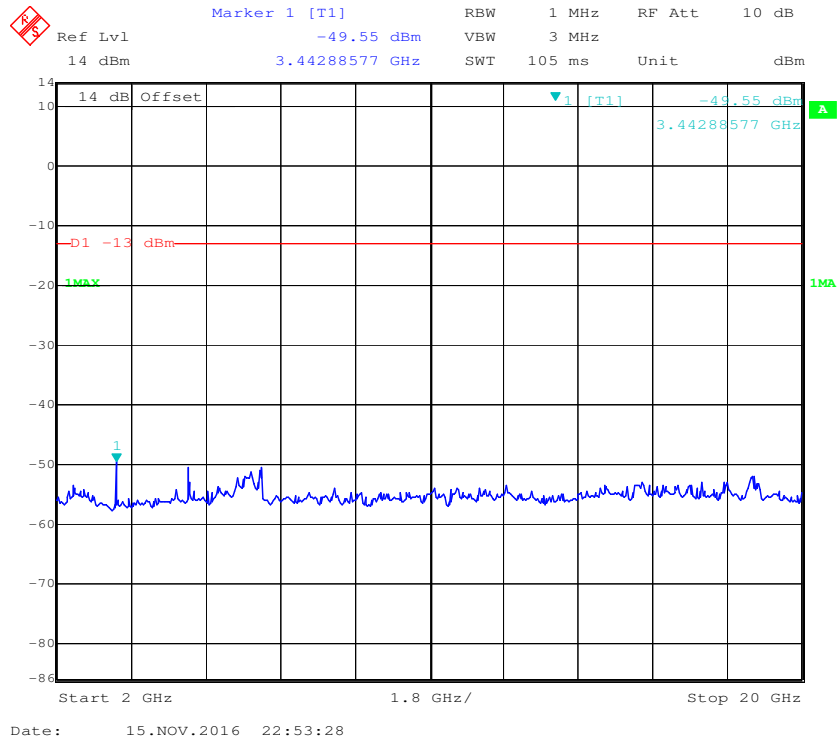
Fundamental test

### 2 GHz – 20 GHz (WCDMA Mode)

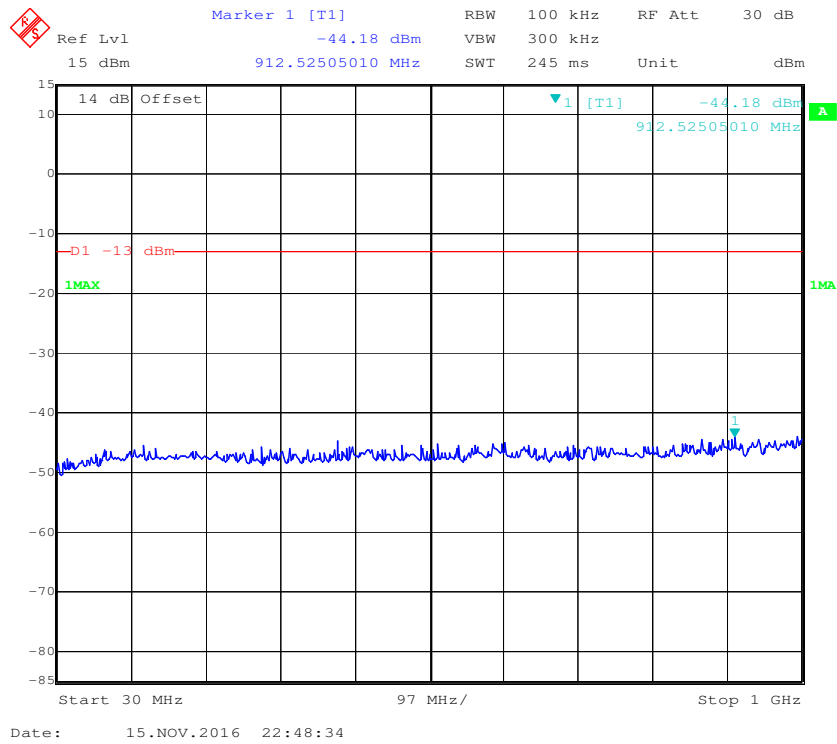


**LTE Band 4:****30 MHz - 1 GHz (1.4 MHz, Middle Channel)****1 GHz - 2 GHz (1.4 MHz, Middle Channel)**

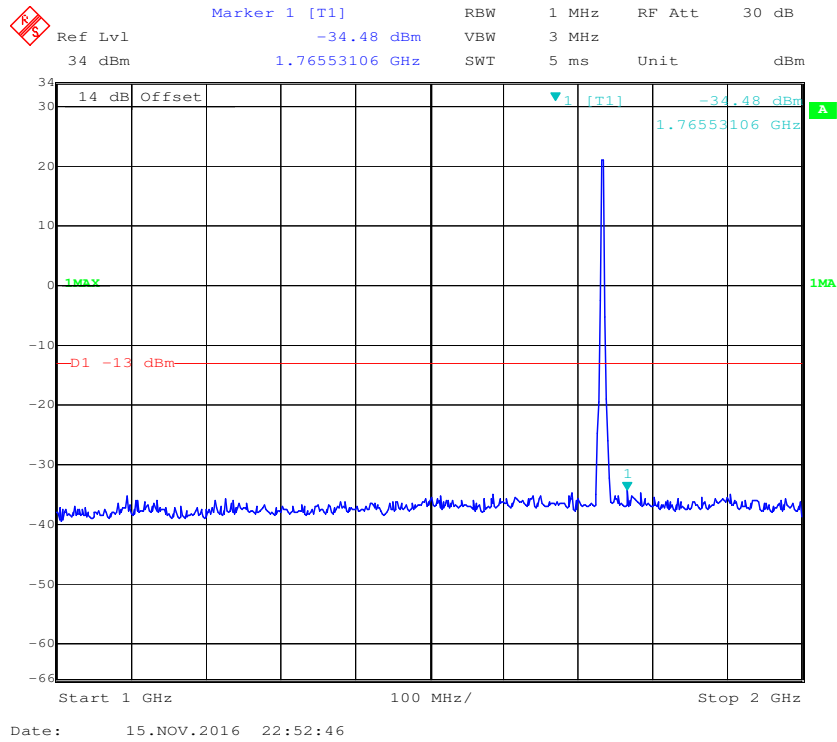
### 2 GHz – 20 GHz (1.4 MHz, Middle Channel)



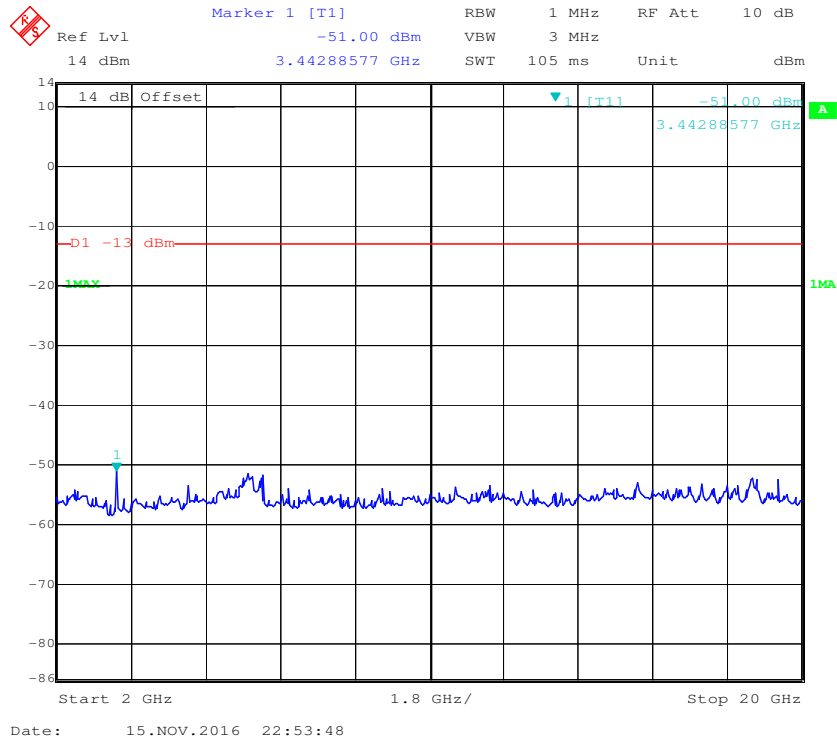
### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)



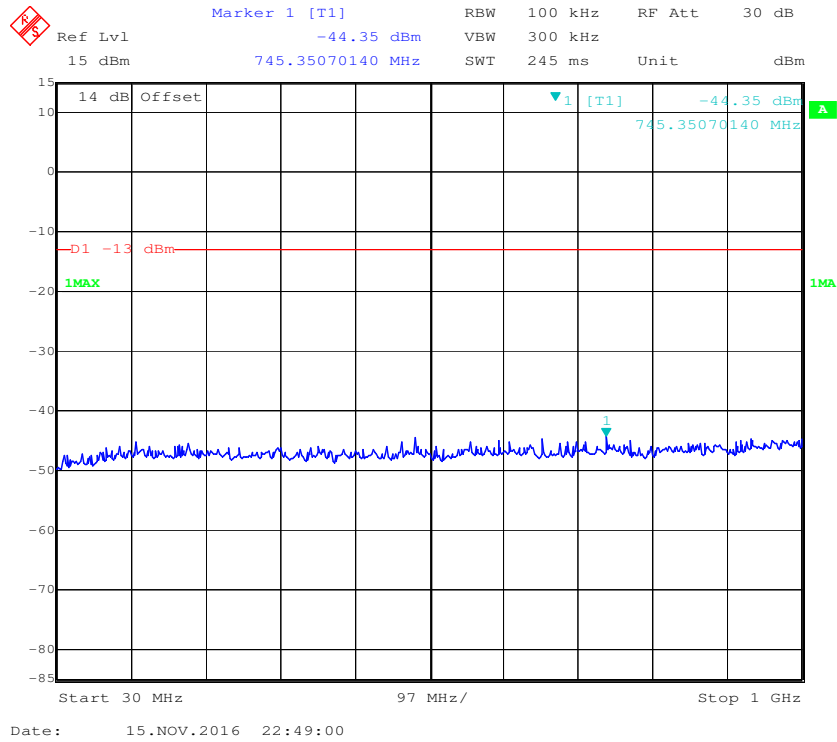
**1 GHz – 2 GHz (3.0 MHz, Middle Channel)**



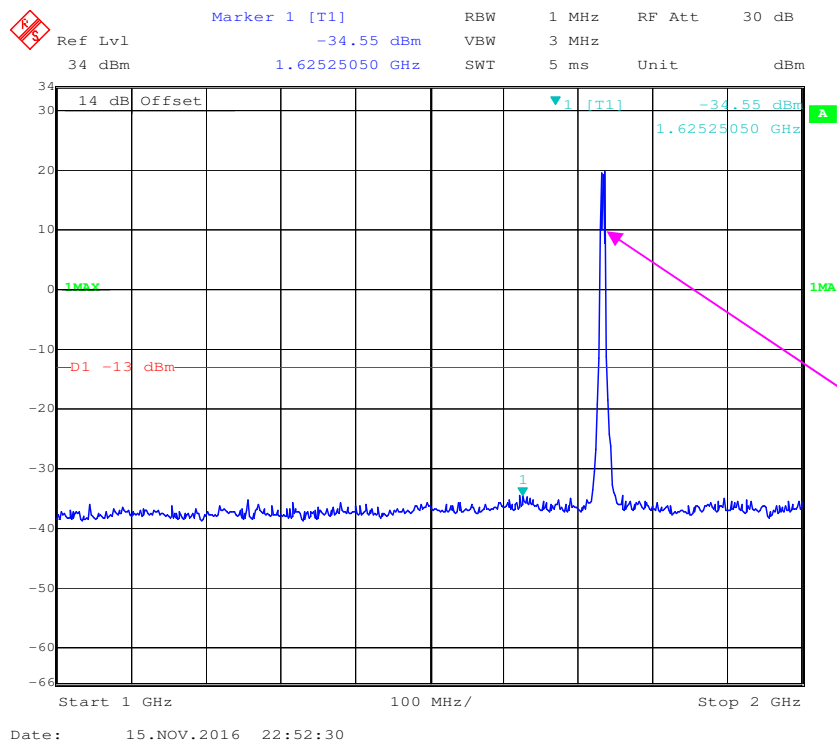
**2 GHz – 20 GHz (3.0 MHz, Middle Channel)**



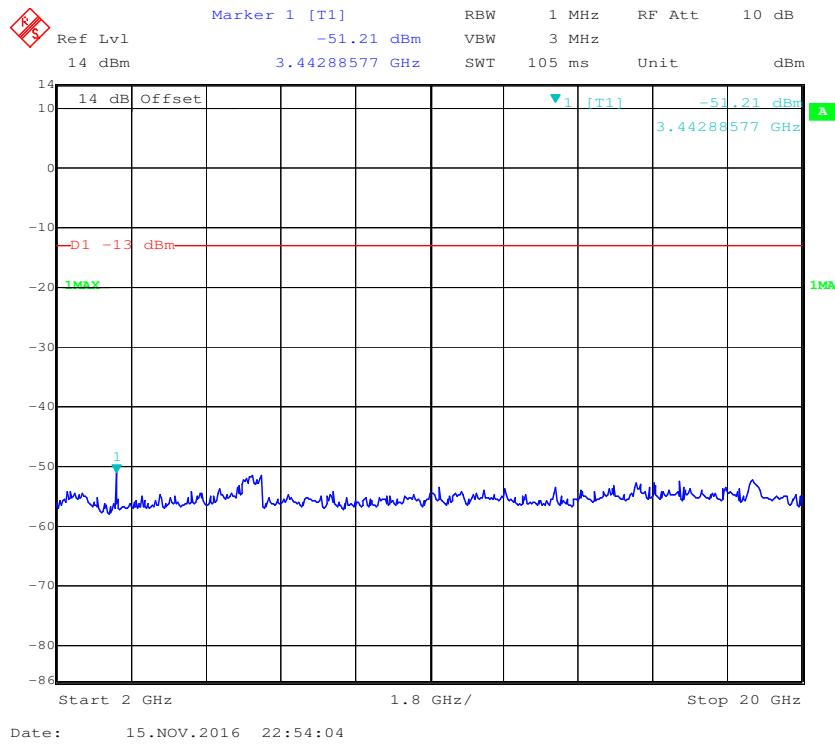
### 30 MHz - 1 GHz (5.0 MHz, Middle Channel)



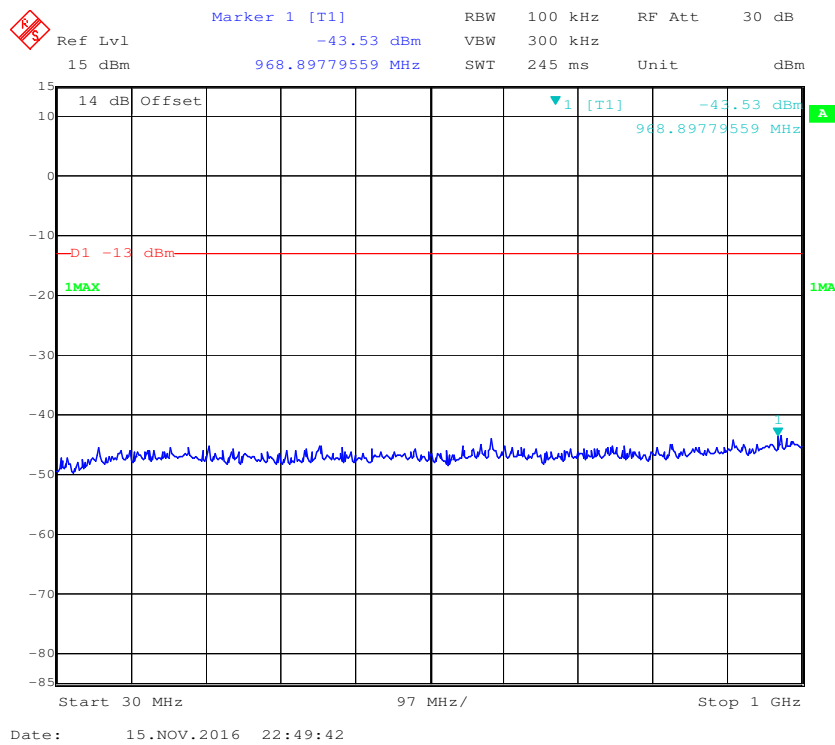
### 1 GHz - 2 GHz (5.0 MHz, Middle Channel)



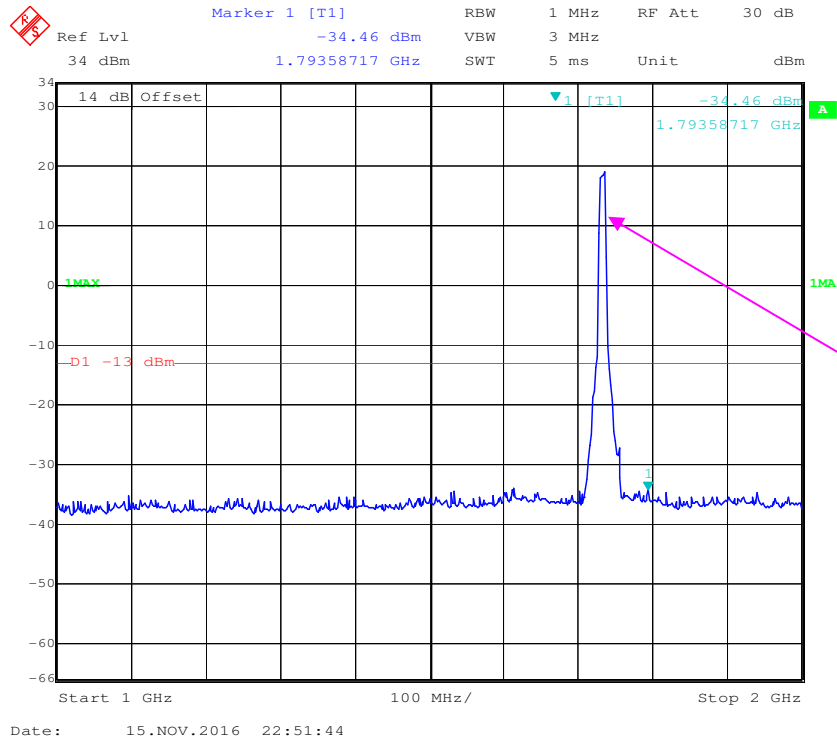
### 2 GHz – 20 GHz (5.0 MHz, Middle Channel)



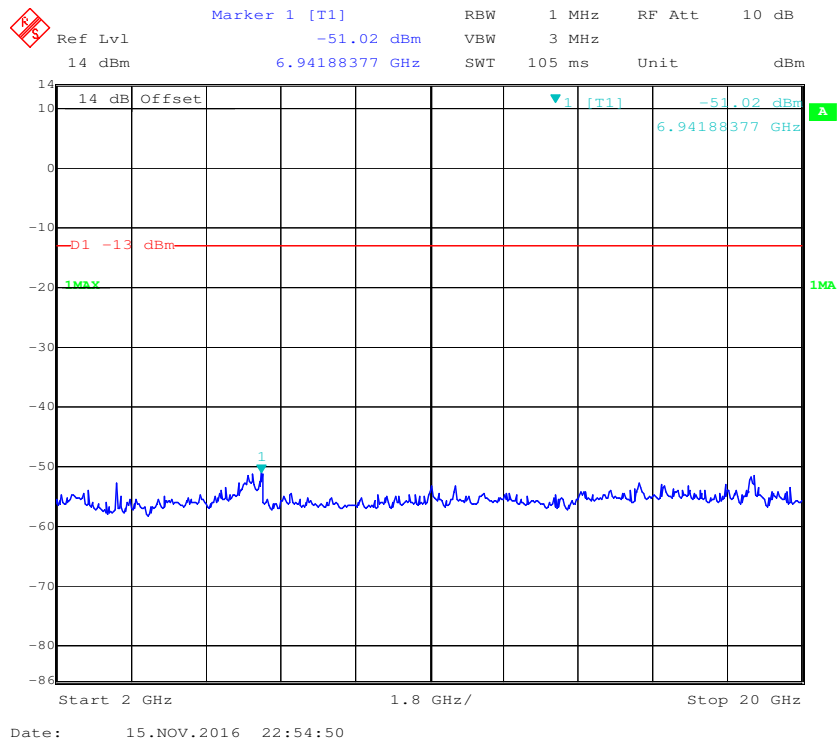
### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)



### 1 GHz – 2 GHz (10.0 MHz, Middle Channel)



### 2 GHz – 20 GHz (10.0 MHz, Middle Channel)



Ref Lvl 15 dBm Marker 1 [T1] -44.23 dBm RBW 100 kHz VBW 300 kHz RF Att 30 dB Unit dBm

15 dBm 957.23446894 MHz SWT 245 ms

14 dB Offset

1 [T1] -44.23 dBm 957.23446894 MHz

-10 dBm

-1MAX

1

Start 30 MHz 97 MHz/ Stop 1 GHz

Date: 15.NOV.2016 22:50:01

Ref Lvl 34 dBm

Marker 1 [T1] -34.03 dBm

RBW 1 MHz

VBW 3 MHz

SWT 5 ms

RF Att 30 dB

Unit dBm

14 dB Offset

1.90380762 GHz

Start 1 GHz

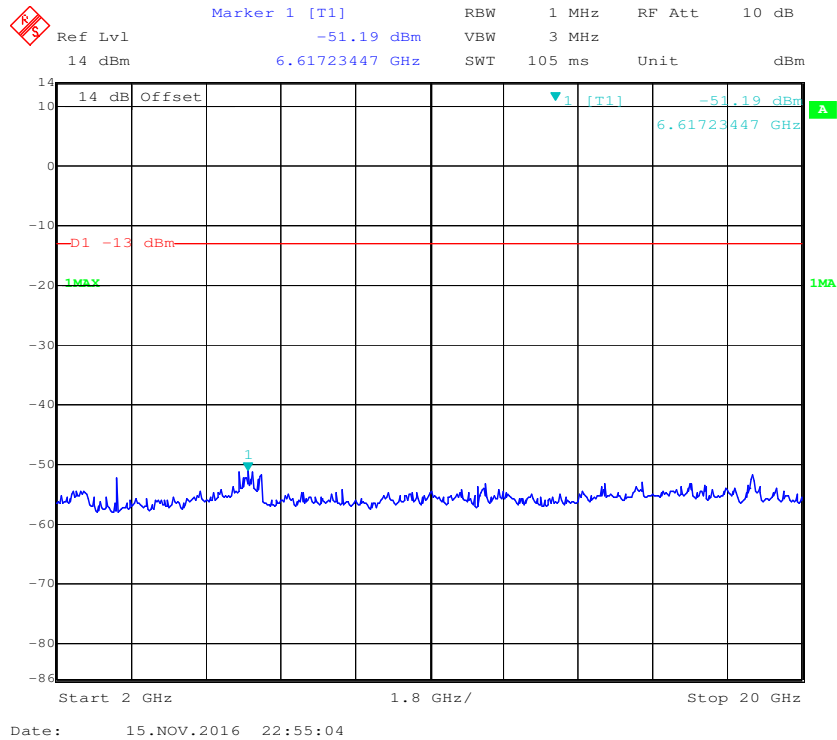
100 MHz/

Stop 2 GHz

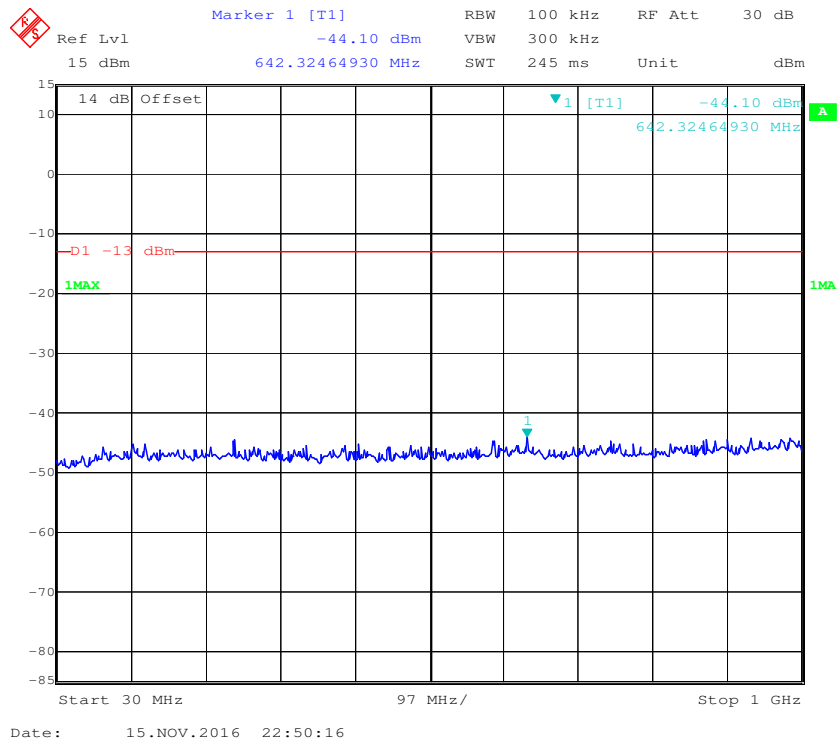
Date: 15.NOV.2016 22:51:20

### Fundamental test

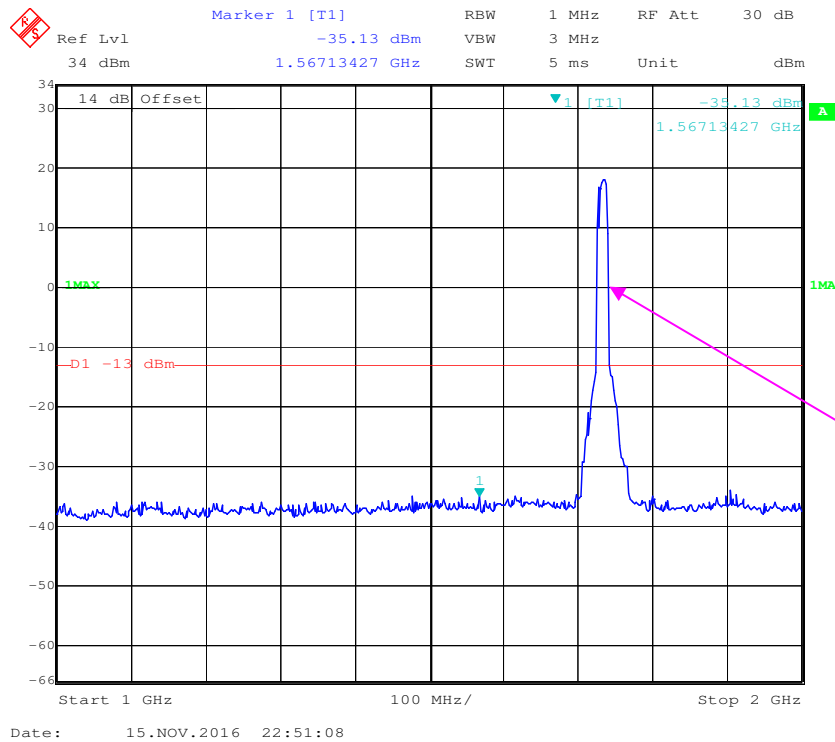
### 2 GHz –20 GHz (15.0 MHz, Middle Channel)



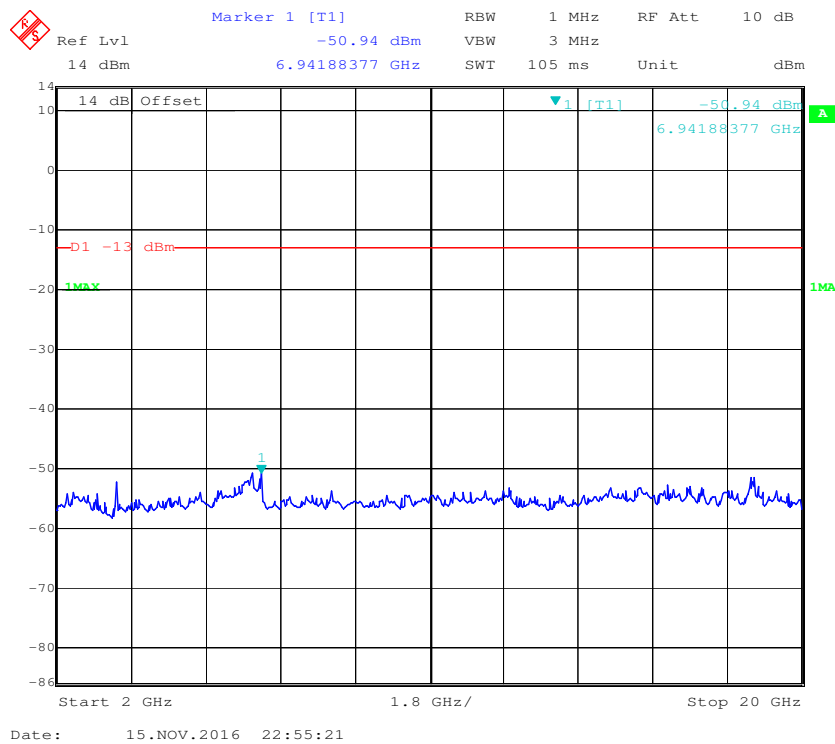
### 30 MHz - 1 GHz (20.0 MHz, Middle Channel)



### 1 GHz –2 GHz (20.0 MHz, Middle Channel)

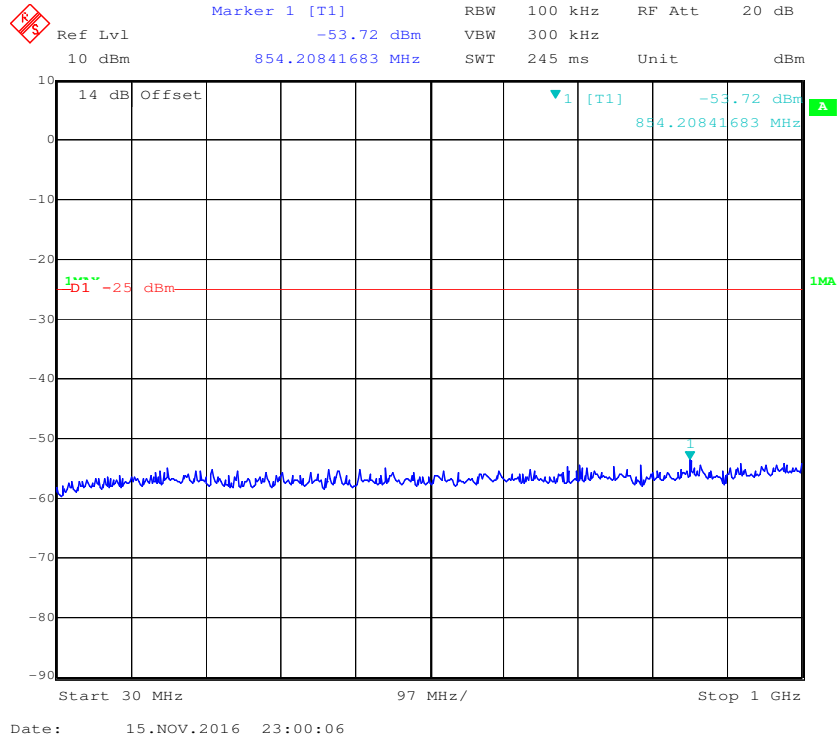


### 2 GHz –20 GHz (20.0 MHz, Middle Channel)

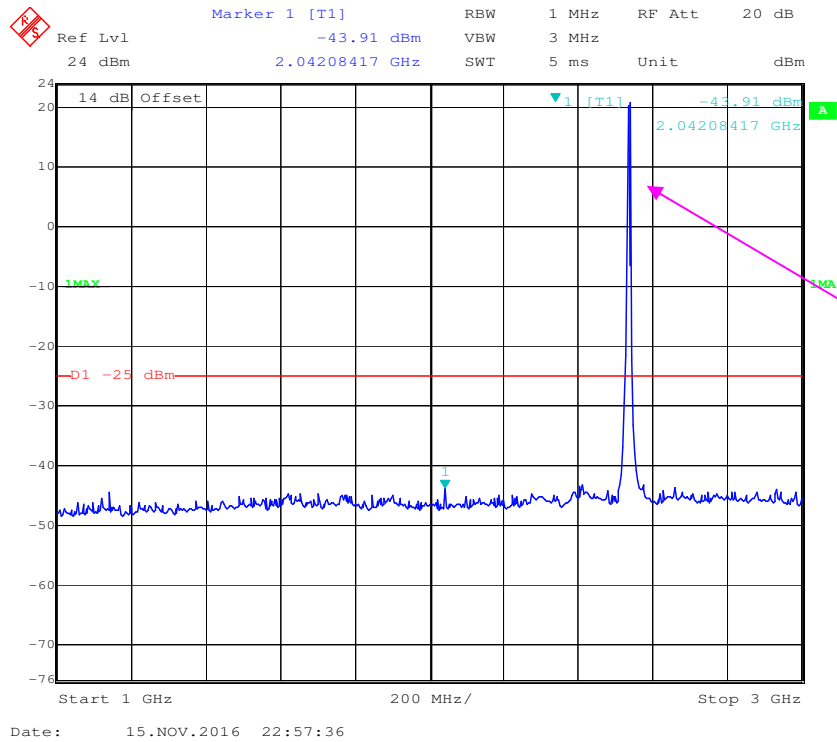


**LTE Band 7:**

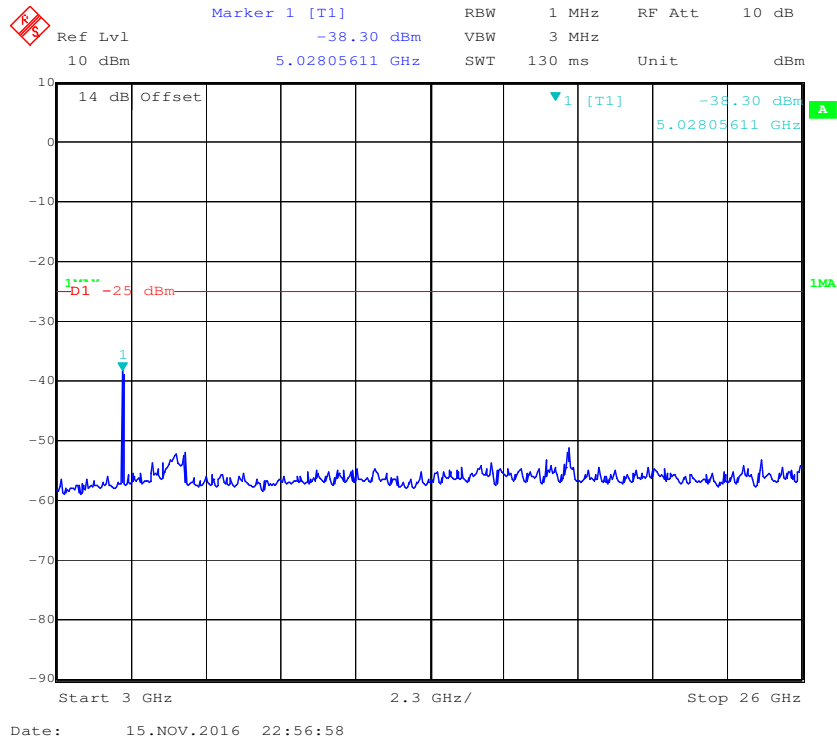
**30 MHz - 1 GHz (5.0 MHz, Middle Channel)**



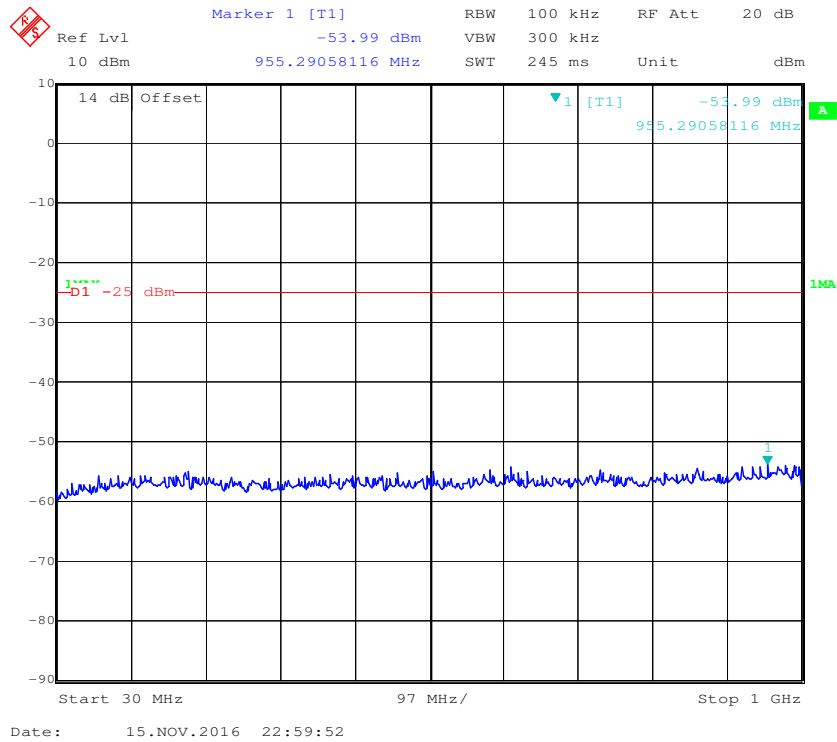
**1 GHz - 3 GHz (5.0 MHz, Middle Channel)**



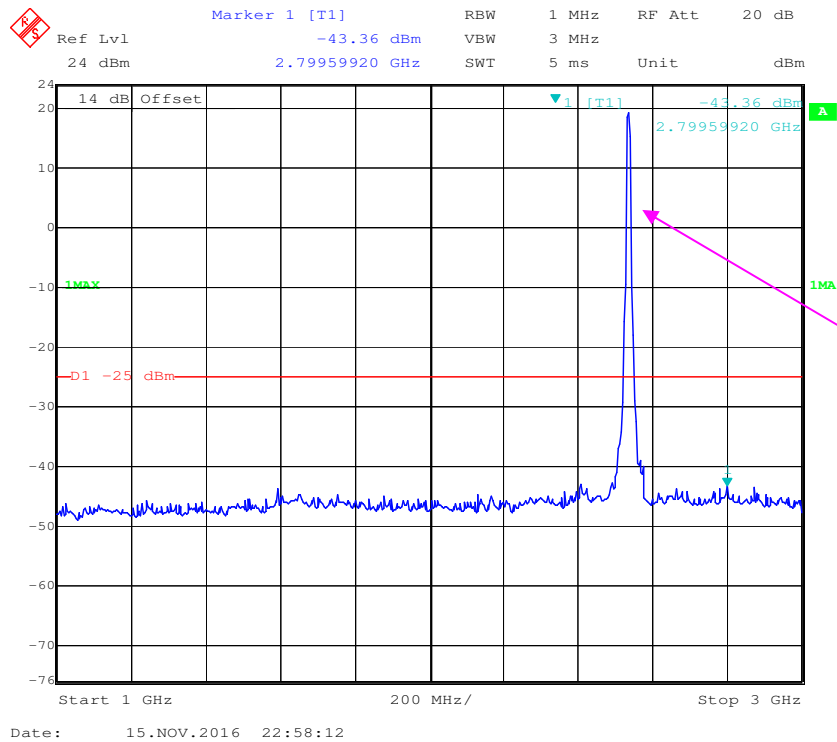
### 3 GHz – 26 GHz (5.0 MHz, Middle Channel)



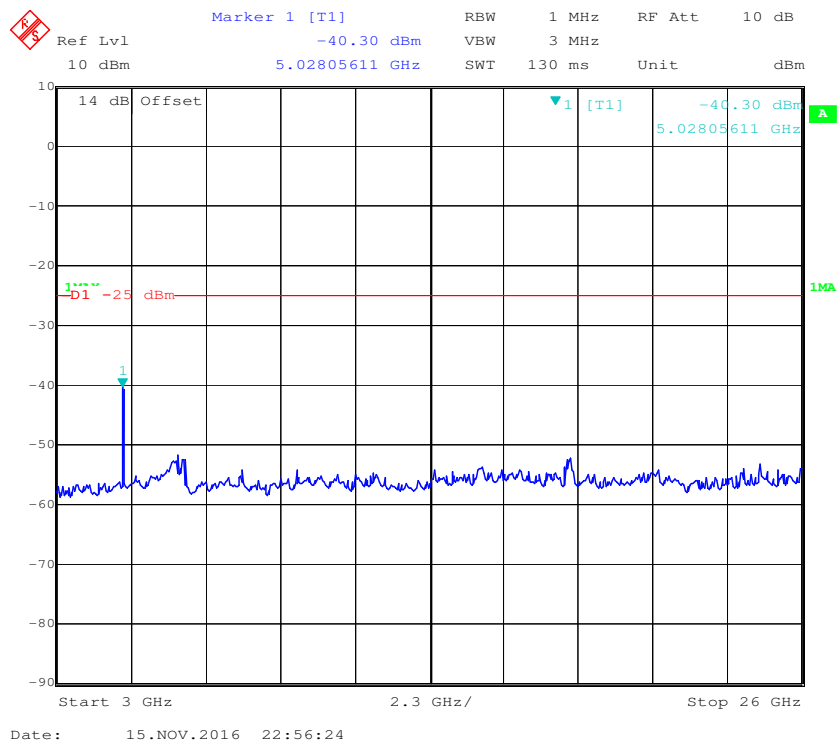
### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)



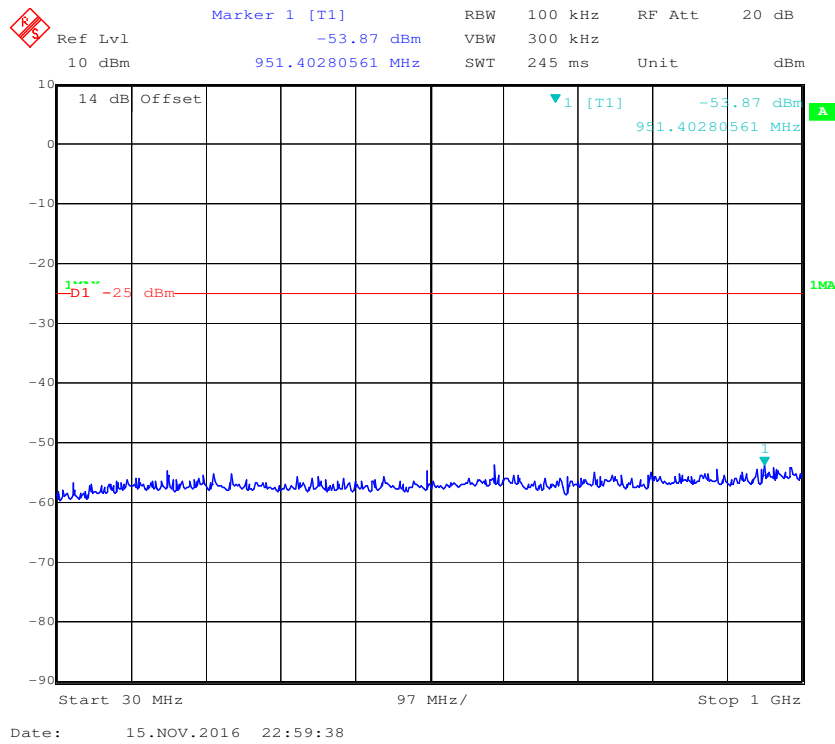
### 1 GHz – 3 GHz (10.0 MHz, Middle Channel)



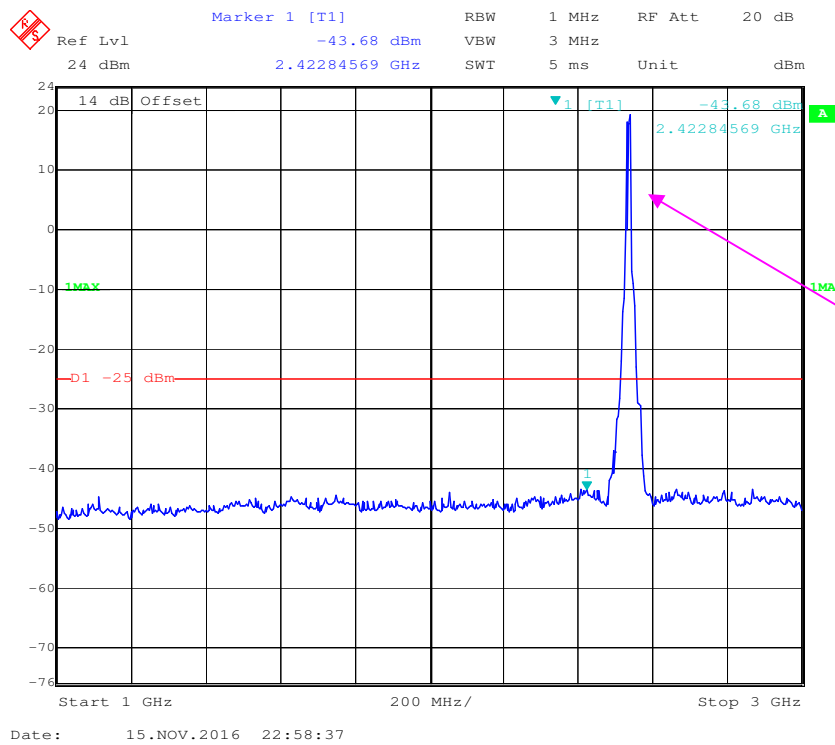
### 3 GHz – 26 GHz (10.0 MHz, Middle Channel)



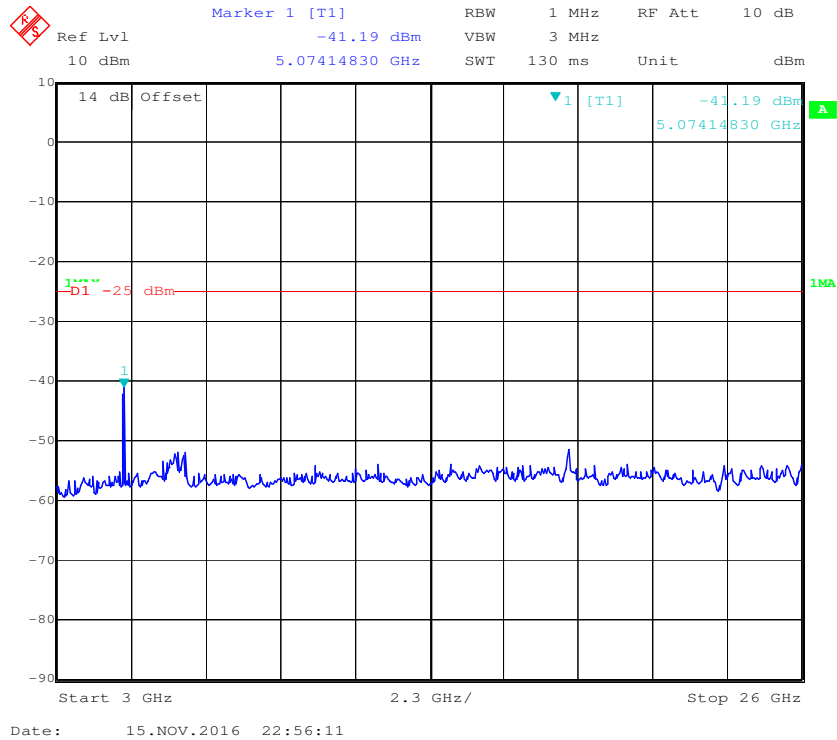
### 30 MHz - 1 GHz (15.0 MHz, Middle Channel)



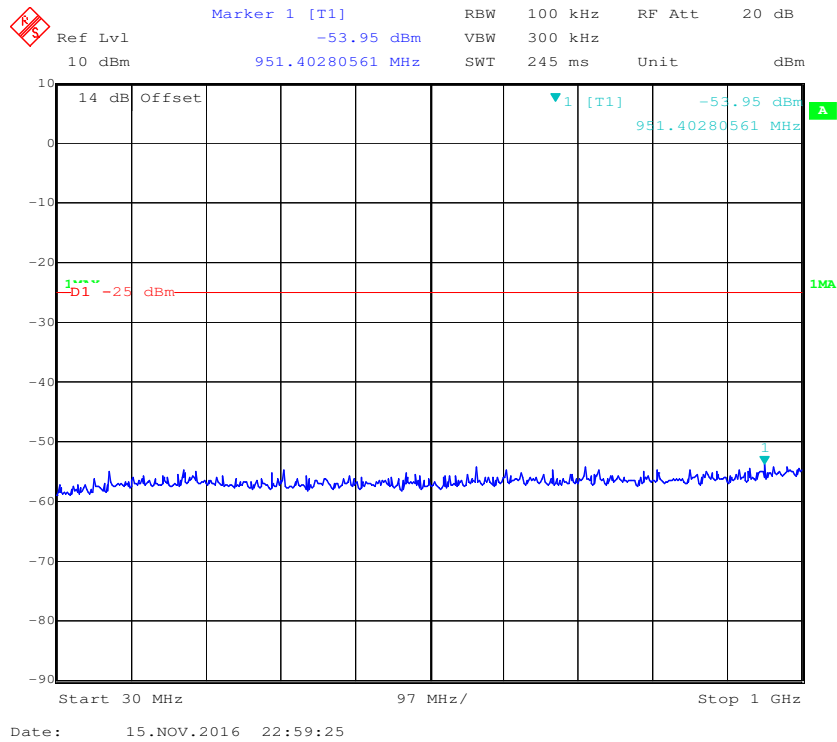
### 1 GHz – 3 GHz (15.0 MHz, Middle Channel)



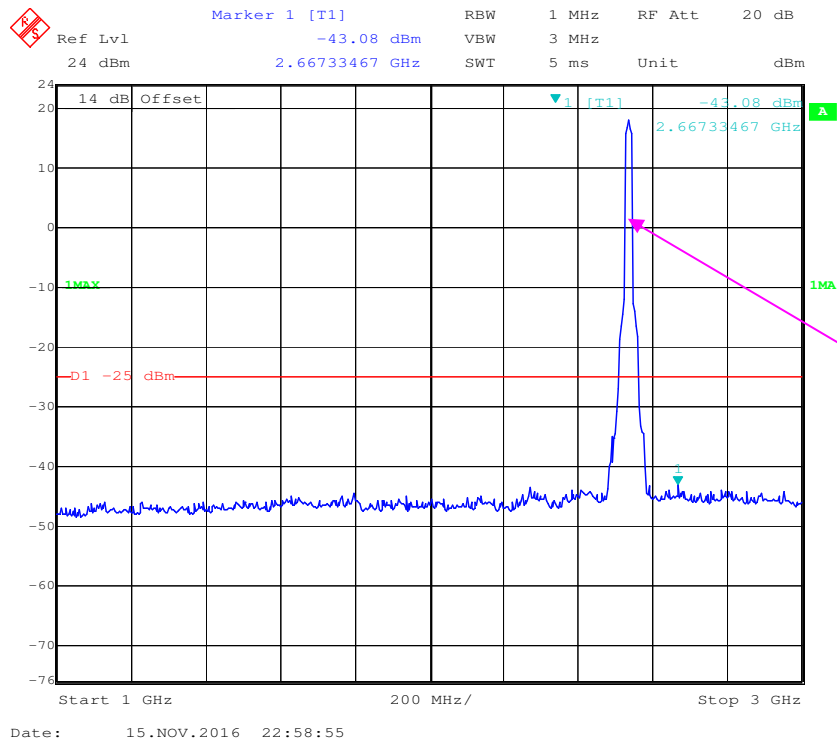
### 3 GHz –26 GHz (15.0 MHz, Middle Channel)



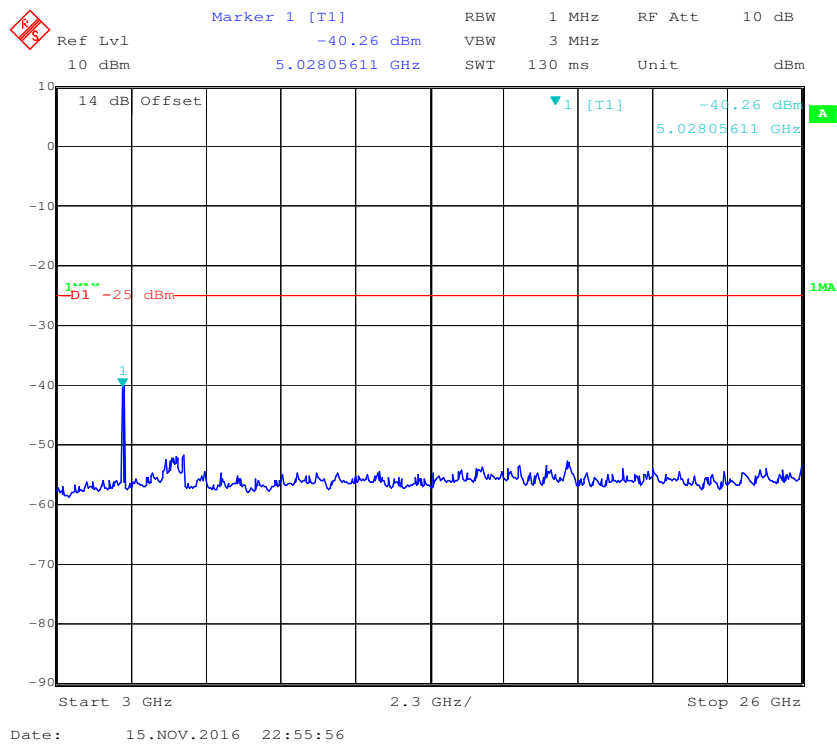
### 30 MHz - 1 GHz (20.0 MHz, Middle Channel)



### 1 GHz –3 GHz (20.0 MHz, Middle Channel)

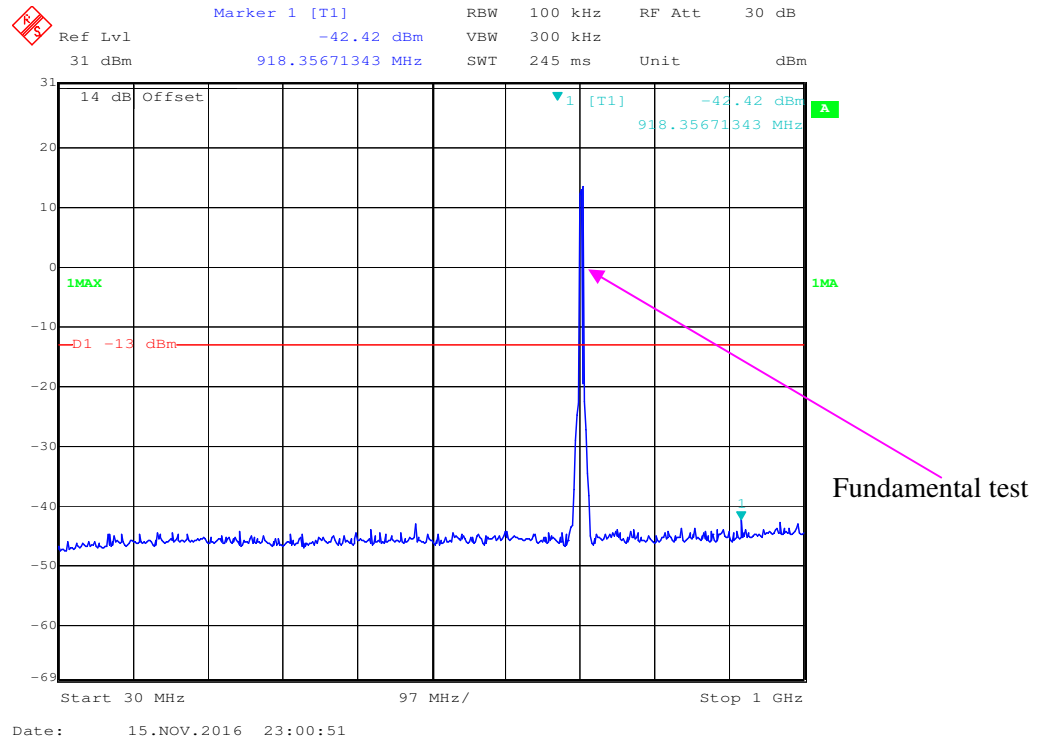


### 3 GHz –26 GHz (20.0 MHz, Middle Channel)

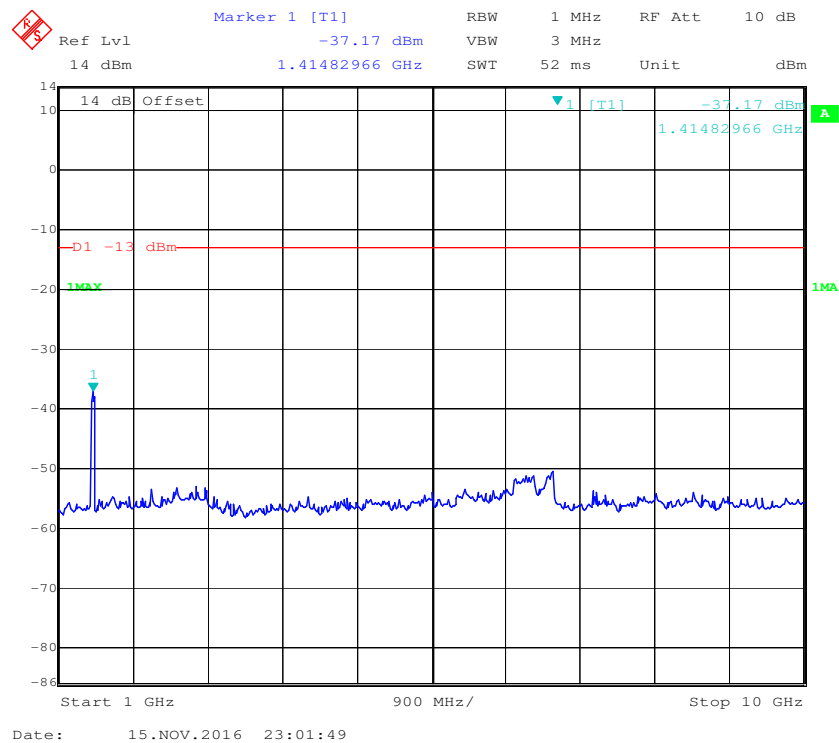


### LTE Band 17:

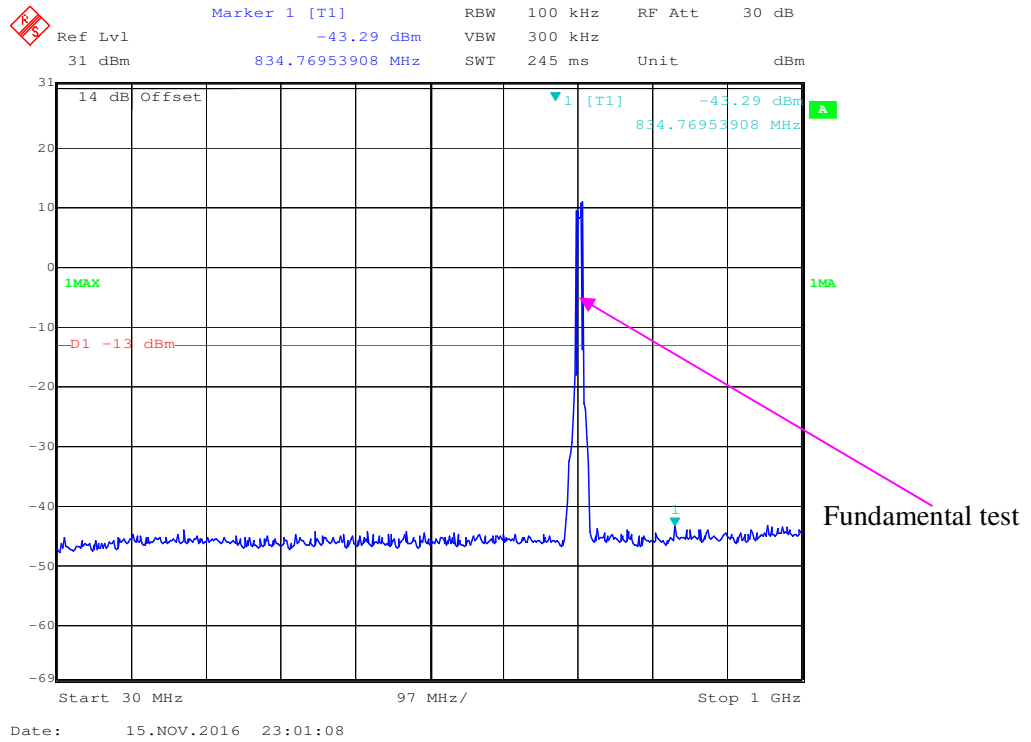
### 30 MHz–1 GHz (5.0 MHz, Middle Channel)



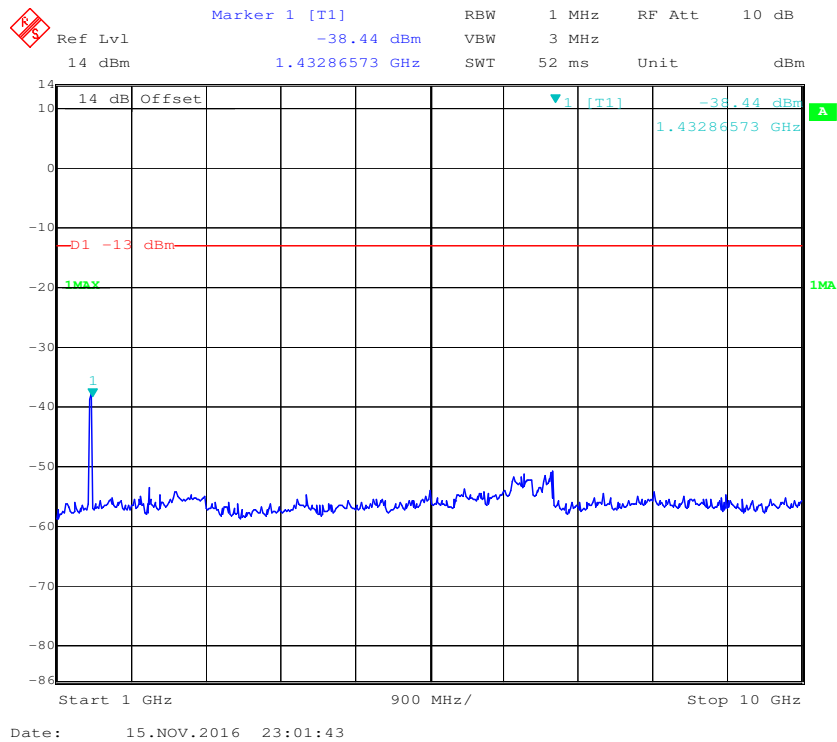
**1 GHz – 10 GHz (5.0 MHz, Middle Channel)**



### 30 MHz –1 GHz (10.0 MHz, Middle Channel)



### 1 GHz – 10 GHz (10.0 MHz, Middle Channel)



## FCC § 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h) (m) SPURIOUS RADIATED EMISSIONS

### Applicable Standards

FCC § 2.1053, §22.917(a) and § 24.238(a) and § 27.53(h)(m)

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

### 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 =  $10 \lg (\text{TX pwr in Watts}/0.001)$  – the absolute level

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

### Test Data

#### Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 25 °C     |
| Relative Humidity: | 55 %      |
| ATM Pressure:      | 101.0 kPa |

*The testing was performed by Layne Li on 2016-11-15.*

*Test mode: Transmitting*

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

**30 MHz ~ 10 GHz:**

**Cellular Band (Part 22H)**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                    |                               |                              | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| GSM 850 Mode       |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 165.7              | 30.43                         | 145                          | 2.4           | H              | -66.6                | 0.28                  | 0                       | -66.88                     | -13            | 53.88          |
| 165.7              | 33.05                         | 175                          | 1.9           | V              | -63.9                | 0.28                  | 0                       | -64.18                     | -13            | 51.18          |
| 1673.20            | 67.23                         | 266                          | 2.1           | H              | -36.7                | 0.30                  | 9.40                    | -27.60                     | -13            | 14.60          |
| 1673.20            | 61.72                         | 284                          | 1.3           | V              | -43.7                | 0.30                  | 9.40                    | -34.60                     | -13            | 21.60          |
| WCDMA 850 Mode     |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 165.7              | 30.33                         | 48                           | 2.1           | H              | -66.7                | 0.28                  | 0                       | -66.98                     | -13            | 53.98          |
| 165.7              | 33.17                         | 263                          | 1.3           | V              | -63.8                | 0.28                  | 0                       | -64.08                     | -13            | 51.08          |
| 1673.20            | 71.33                         | 320                          | 1.1           | H              | -32.6                | 0.30                  | 9.40                    | -23.50                     | -13            | 10.50          |
| 1673.20            | 68.42                         | 76                           | 1.3           | V              | -37.0                | 0.30                  | 9.40                    | -27.90                     | -13            | 14.90          |

**30 MHz ~ 20 GHz:**

**PCS Band (Part 24E)**

| Frequency<br>(MHz) | Receiver<br>Reading<br>(dBμV) | Turntable<br>Angle<br>Degree | Rx Antenna    |                | Substituted          |                       |                         | Absolute<br>Level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-------------------------------|------------------------------|---------------|----------------|----------------------|-----------------------|-------------------------|----------------------------|----------------|----------------|
|                    |                               |                              | Height<br>(m) | Polar<br>(H/V) | SG<br>Level<br>(dBm) | Cable<br>Loss<br>(dB) | Antenna<br>Gain<br>(dB) |                            |                |                |
| GSM 1900 Mode      |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 165.7              | 31.11                         | 45                           | 2.3           | H              | -65.9                | 0.28                  | 0                       | -66.18                     | -13            | 53.18          |
| 165.7              | 33.39                         | 22                           | 2.2           | V              | -63.6                | 0.28                  | 0                       | -63.88                     | -13            | 50.88          |
| 3760.00            | 59.03                         | 320                          | 1.6           | H              | -34.7                | 2.42                  | 12.60                   | -24.52                     | -13            | 11.52          |
| 3760.00            | 58.53                         | 272                          | 2.0           | V              | -34.2                | 2.42                  | 12.60                   | -24.02                     | -13            | 11.02          |
| WCDMA 1900 Mode    |                               |                              |               |                |                      |                       |                         |                            |                |                |
| 165.7              | 31.19                         | 39                           | 2.2           | H              | -65.8                | 0.28                  | 0                       | -66.08                     | -13            | 53.08          |
| 165.7              | 32.19                         | 131                          | 1.4           | V              | -64.8                | 0.28                  | 0                       | -65.08                     | -13            | 52.08          |
| 3760.00            | 43.33                         | 191                          | 1.2           | H              | -50.4                | 2.42                  | 12.60                   | -40.22                     | -13            | 27.22          |
| 3760.00            | 42.03                         | 227                          | 2.1           | V              | -50.7                | 2.42                  | 12.60                   | -40.52                     | -13            | 27.52          |

Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)

| Frequency                                   | Receiver       | Turntable    | Rx Antenna |             | Substituted    |                 |                   | Absolute Level (dBm) | Limit (dBm) | Margin (dB) |
|---------------------------------------------|----------------|--------------|------------|-------------|----------------|-----------------|-------------------|----------------------|-------------|-------------|
| (MHz)                                       | Reading (dBμV) | Angle Degree | Height (m) | Polar (H/V) | SG Level (dBm) | Cable Loss (dB) | Antenna Gain (dB) |                      |             |             |
| <b>Band 4</b>                               |                |              |            |             |                |                 |                   |                      |             |             |
| <b>Test frequency range:30 MHz ~ 18 GHz</b> |                |              |            |             |                |                 |                   |                      |             |             |
| 165.7                                       | 32.52          | 228          | 1.3        | H           | -64.5          | 0.28            | 0                 | -64.78               | -13         | 51.78       |
| 165.7                                       | 31.45          | 177          | 1.3        | V           | -65.6          | 0.28            | 0                 | -65.88               | -13         | 52.88       |
| 3465.00                                     | 41.27          | 160          | 1.3        | H           | -53.3          | 2.34            | 12.40             | -43.24               | -13         | 30.24       |
| 3465.00                                     | 40.01          | 279          | 1.4        | V           | -52.5          | 2.34            | 12.40             | -42.44               | -13         | 29.44       |
| <b>Band 7</b>                               |                |              |            |             |                |                 |                   |                      |             |             |
| <b>Test frequency range:30 MHz ~ 26 GHz</b> |                |              |            |             |                |                 |                   |                      |             |             |
| 165.7                                       | 31.8           | 7            | 1.2        | H           | -65.2          | 0.28            | 0                 | -65.48               | -25         | 40.48       |
| 165.7                                       | 31.33          | 122          | 1.8        | V           | -65.7          | 0.28            | 0                 | -65.98               | -25         | 40.98       |
| 5070.00                                     | 39.16          | 193          | 1.7        | H           | -49.5          | 2.57            | 12.70             | -39.37               | -25         | 14.37       |
| 5070.00                                     | 39.87          | 8            | 1.6        | V           | -49.6          | 2.57            | 12.70             | -39.47               | -25         | 14.47       |
| <b>Band 17</b>                              |                |              |            |             |                |                 |                   |                      |             |             |
| <b>Test frequency range:30 MHz ~10 GHz</b>  |                |              |            |             |                |                 |                   |                      |             |             |
| 165.7                                       | 31.86          | 57           | 1.9        | H           | -65.1          | 0.28            | 0                 | -65.38               | -13         | 52.38       |
| 165.7                                       | 32.29          | 76           | 1.6        | V           | -64.7          | 0.28            | 0                 | -64.98               | -13         | 51.98       |
| 1420.00                                     | 59.76          | 305          | 2.4        | H           | -43.0          | 0.28            | 8.00              | -35.28               | -13         | 22.28       |
| 1420.00                                     | 62.92          | 69           | 2.3        | V           | -43.9          | 0.28            | 8.00              | -36.18               | -13         | 23.18       |

**Note:**

- 1) Absolute Level = SG Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

## FCC § 22.917 (a); § 24.238 (a); § 27.53 (h)(m) - BAND EDGES

### Applicable Standards

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

According to § 24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

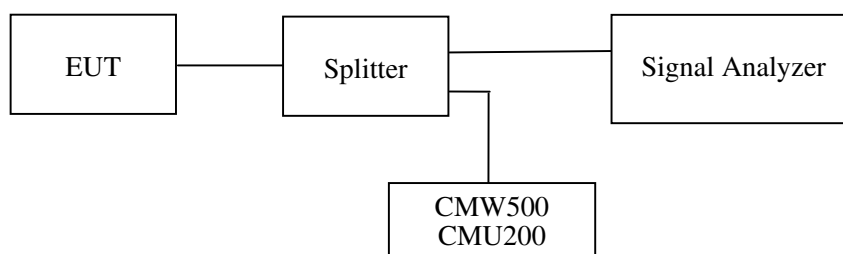
According to FCC § 27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

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

### 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 Data

#### Environmental Conditions

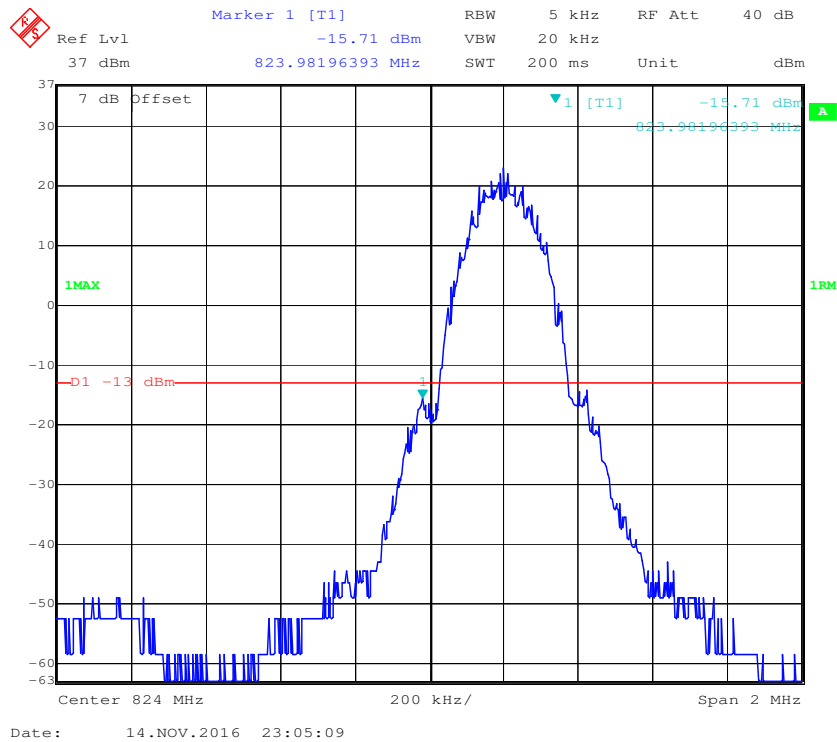
|                    |                 |
|--------------------|-----------------|
| Temperature:       | 20~25°C         |
| Relative Humidity: | 50~55 %         |
| ATM Pressure:      | 100.0~101.0 kPa |

The testing was performed by Bin Mei on 2016-11-14 and 2016-11-15.

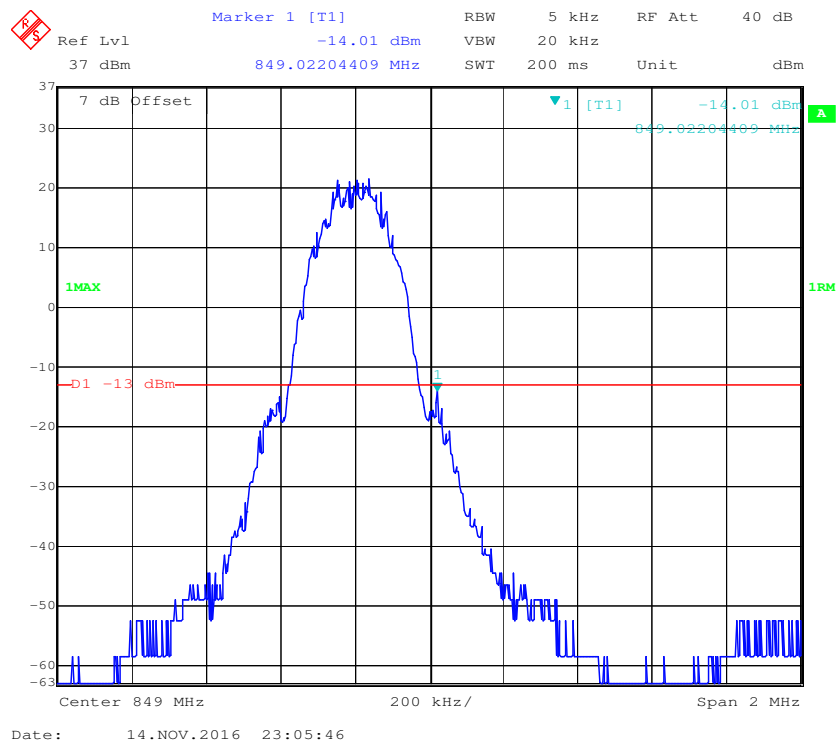
EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following plots.

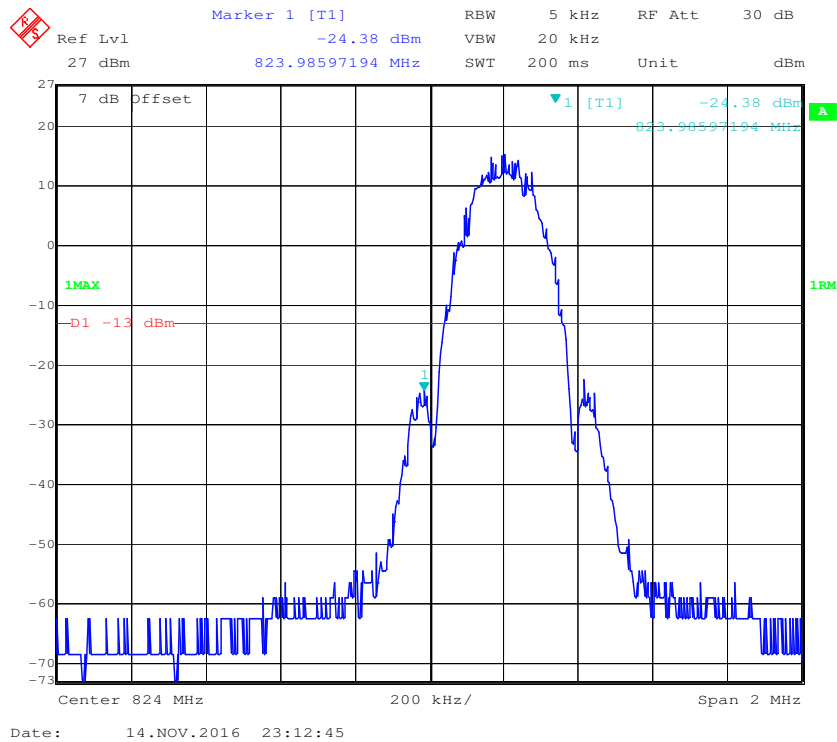
### Cellular Band, Left Band Edge for GSM (GMSK) Mode



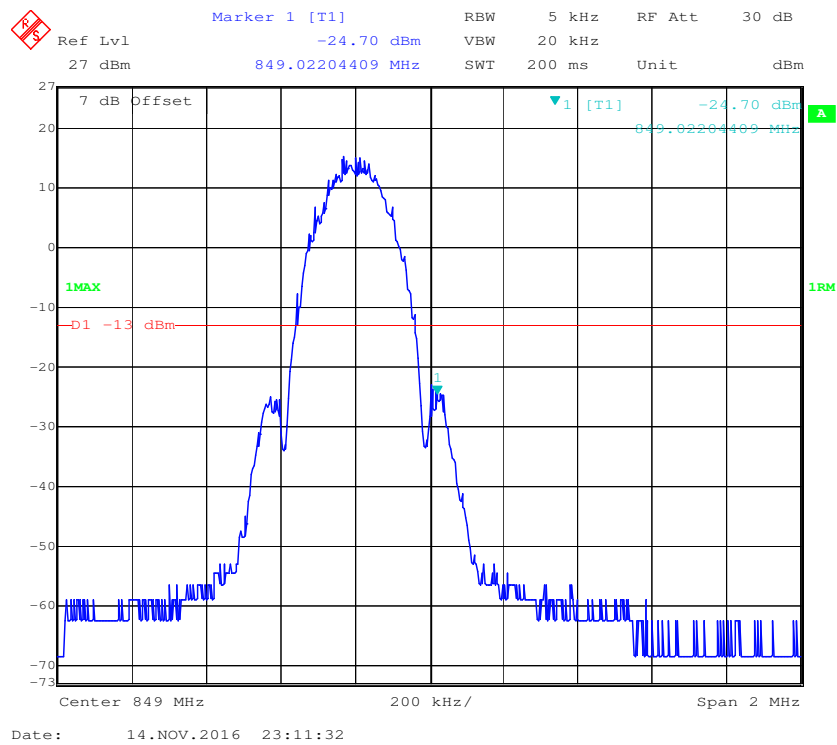
### Cellular Band, Right Band Edge for GSM (GMSK) Mode



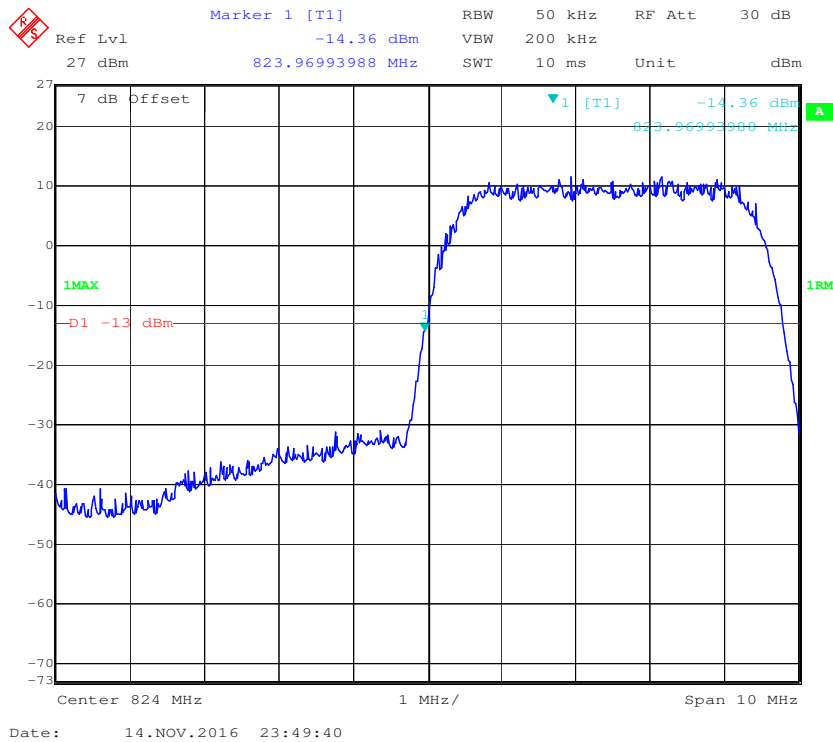
### Cellular Band, Left Band Edge for EGPRS (8PSK) Mode



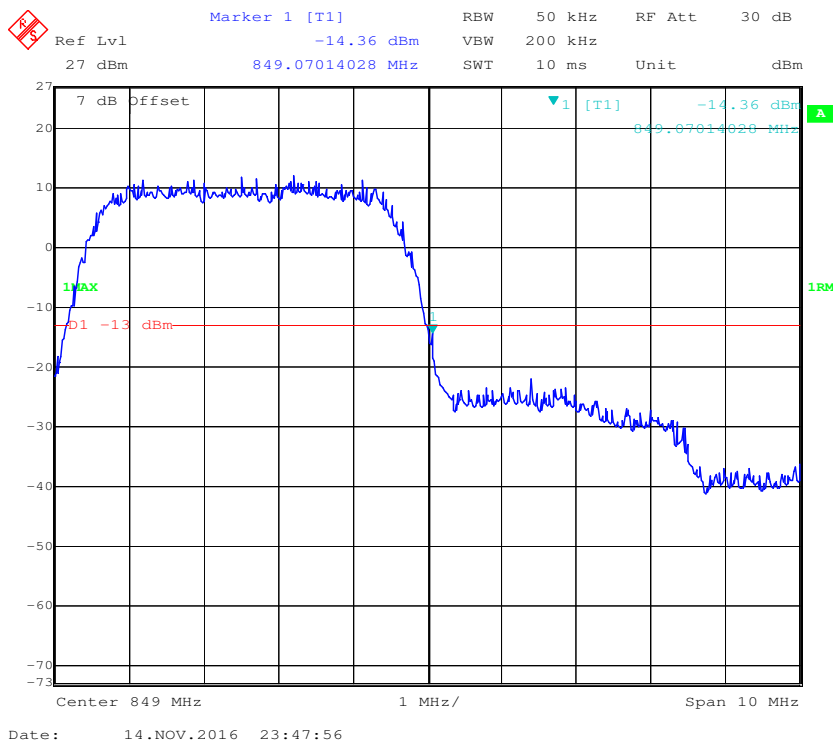
### Cellular Band, Right Band Edge for EGPRS (8PSK) Mode



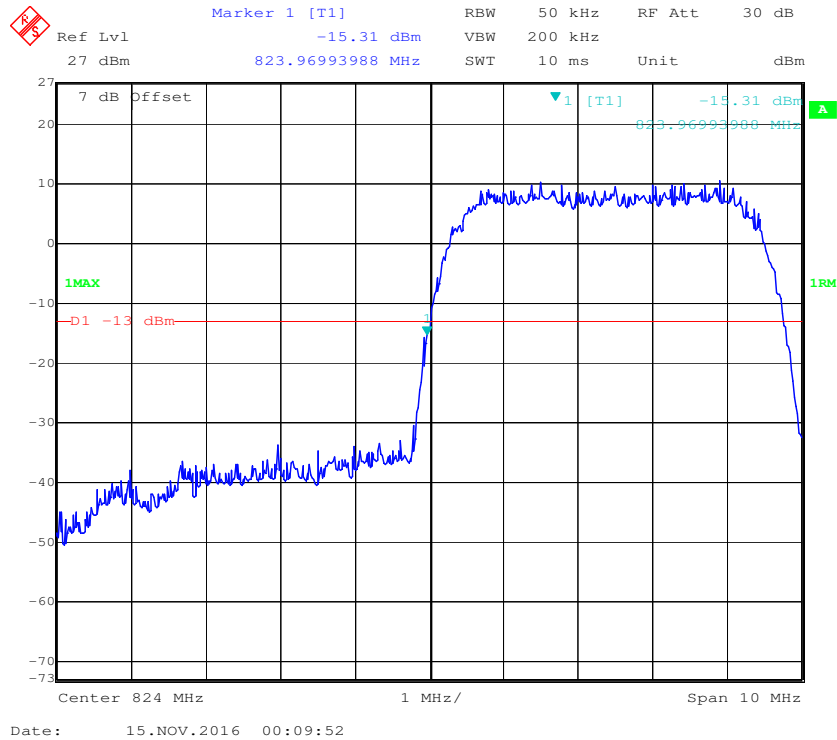
### Cellular Band, Left Band Edge for RMC (BPSK) Mode



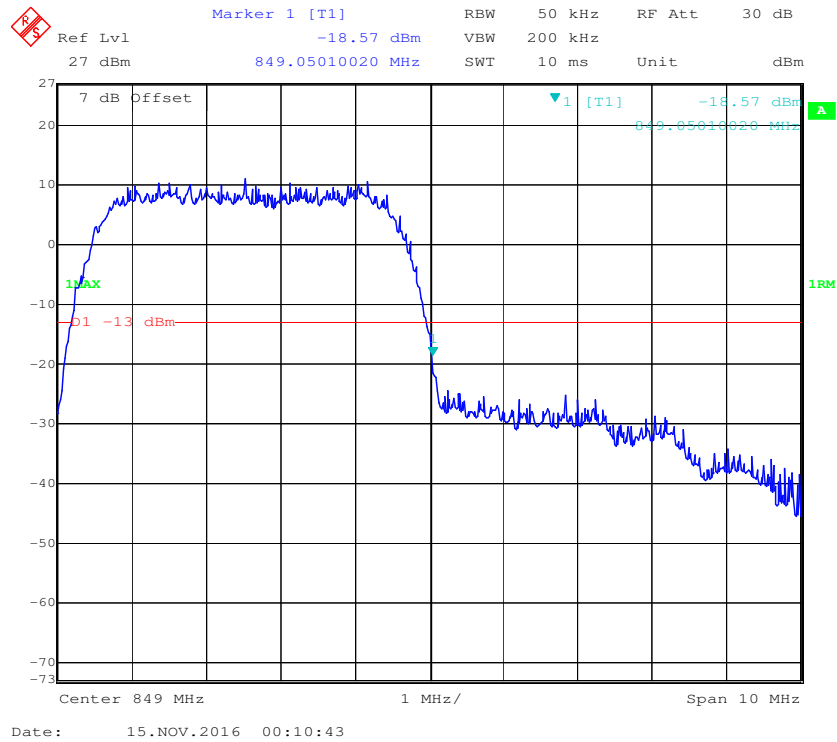
### Cellular Band, Right Band Edge for RMC (BPSK) Mode



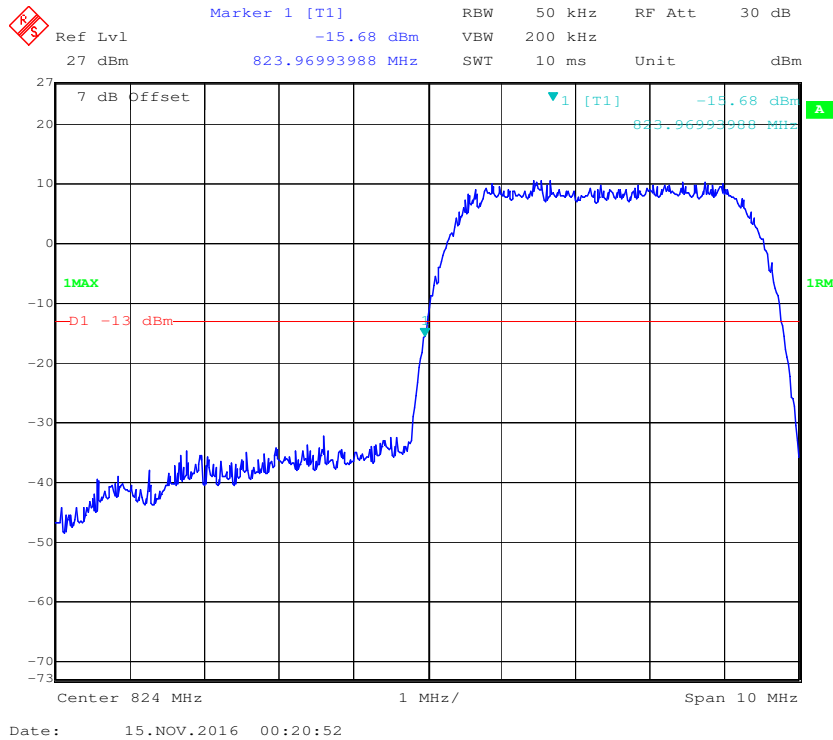
### Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



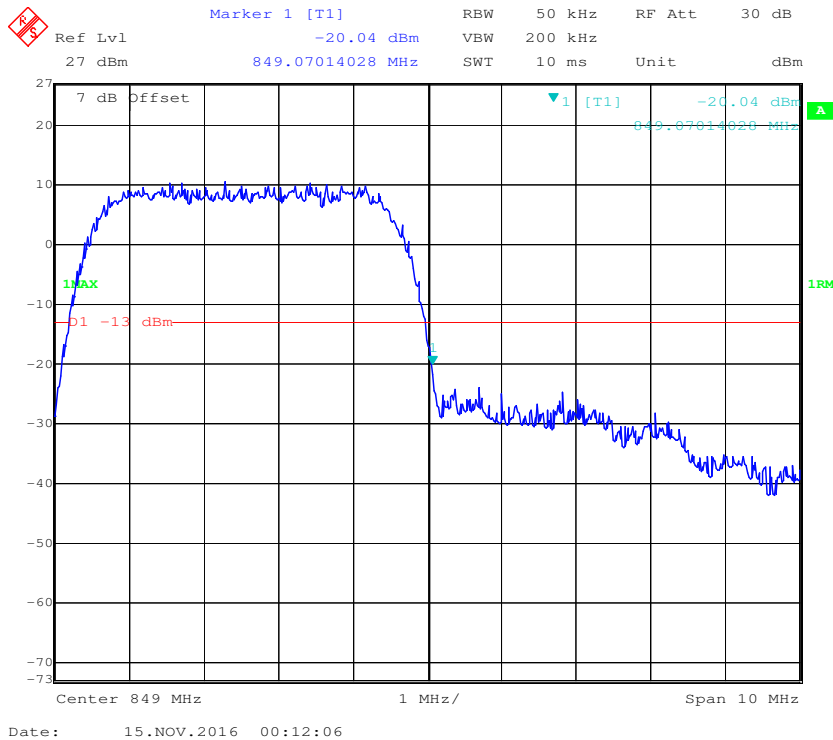
### Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



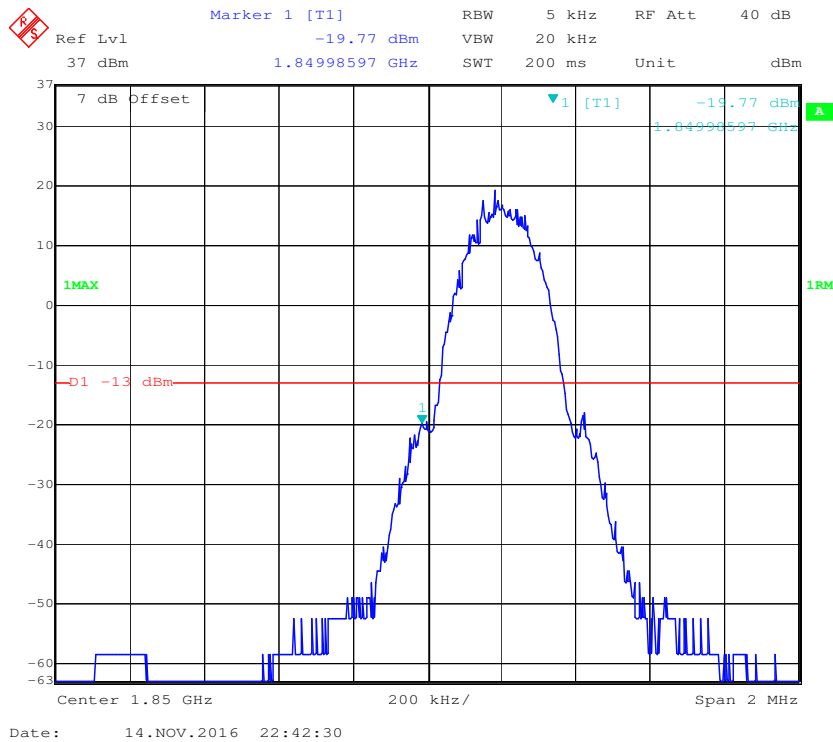
### Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



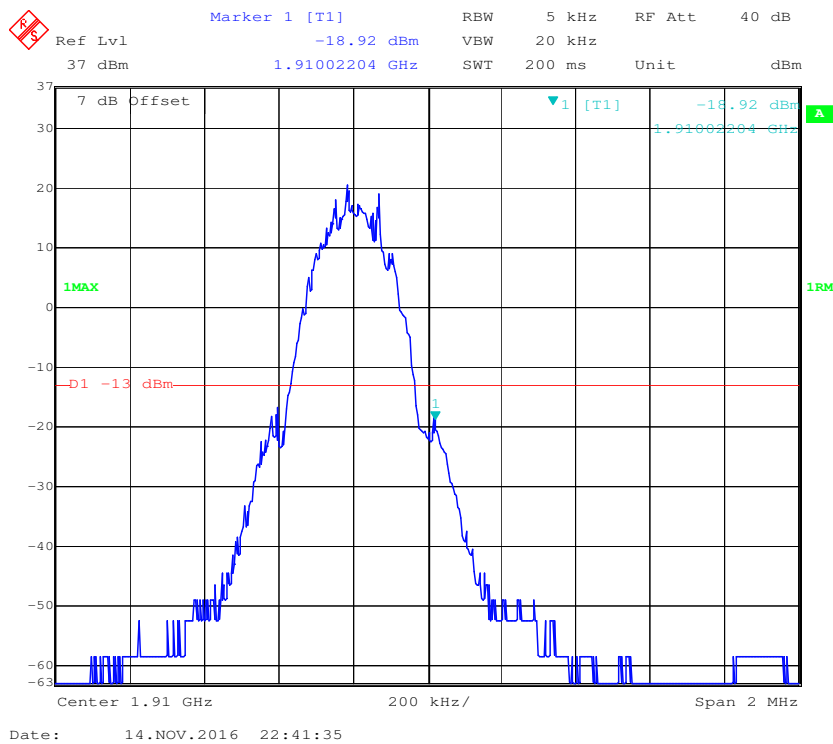
### Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



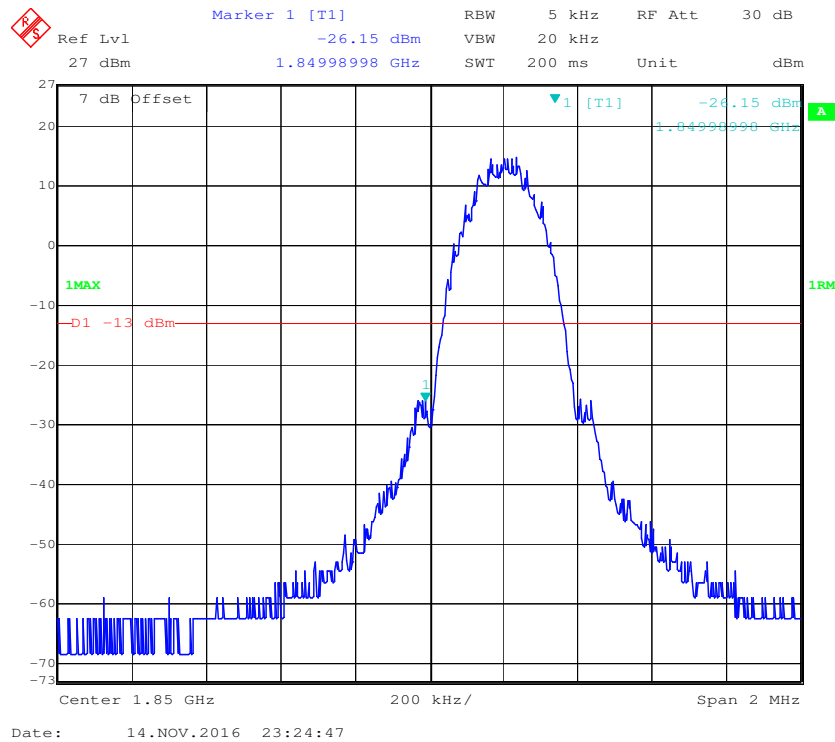
### PCS Band, Left Band Edge for GSM (GMSK) Mode



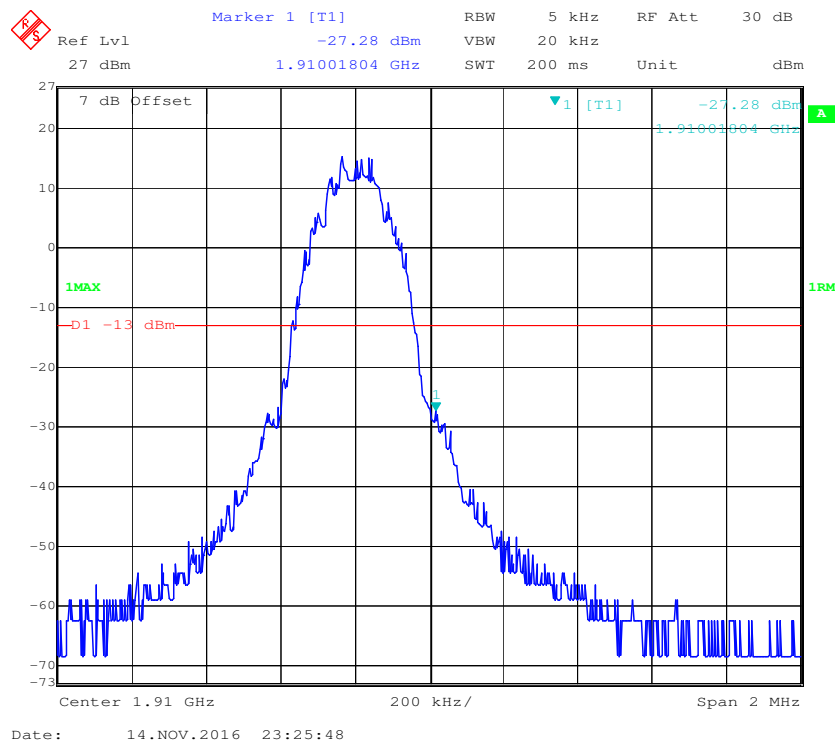
### PCS Band, Right Band Edge for GSM (GMSK) Mode



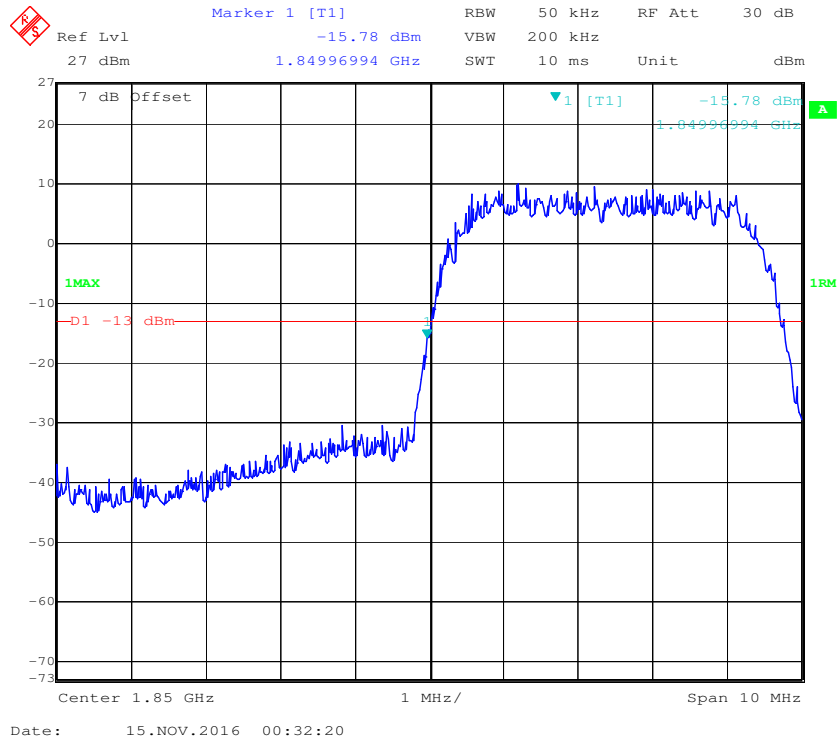
### PCS Band, Left Band Edge for EGPRS (8PSK) Mode



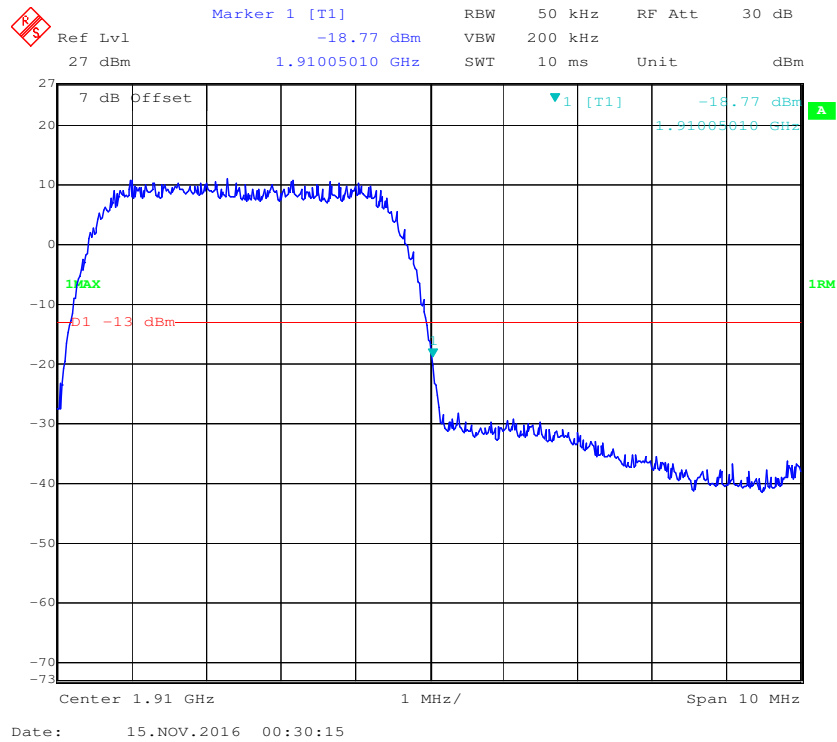
### PCS Band, Right Band Edge for EGPRS (8PSK) Mode



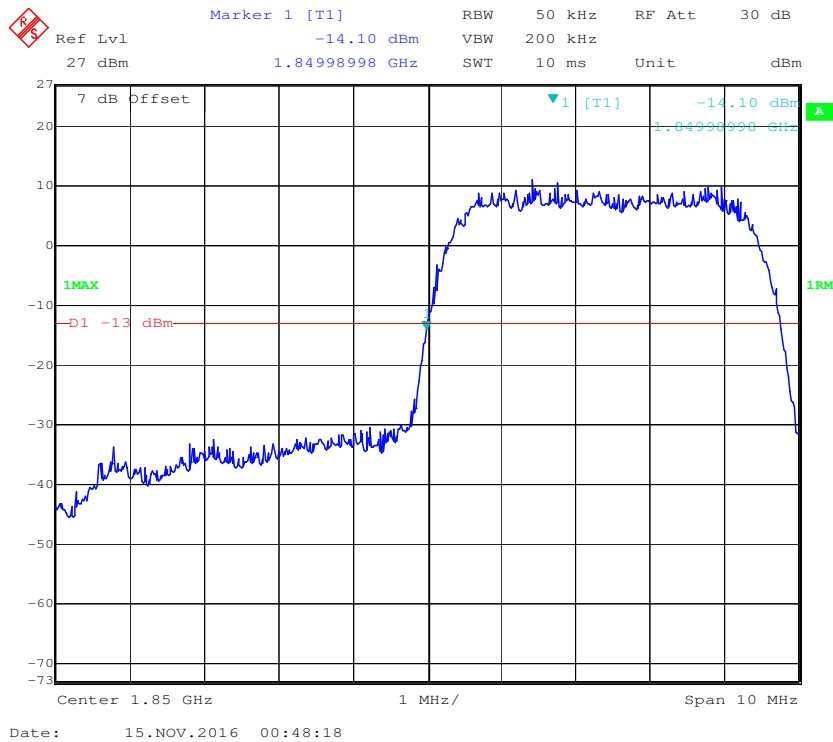
### PCS Band, Left Band Edge for RMC (BPSK) Mode



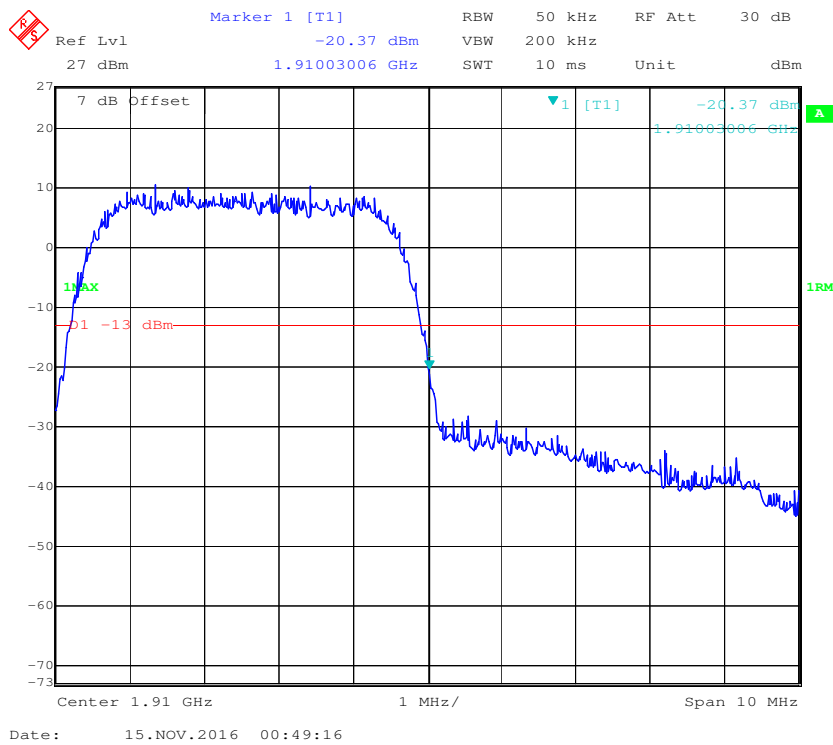
### PCS Band, Right Band Edge for RMC (BPSK) Mode



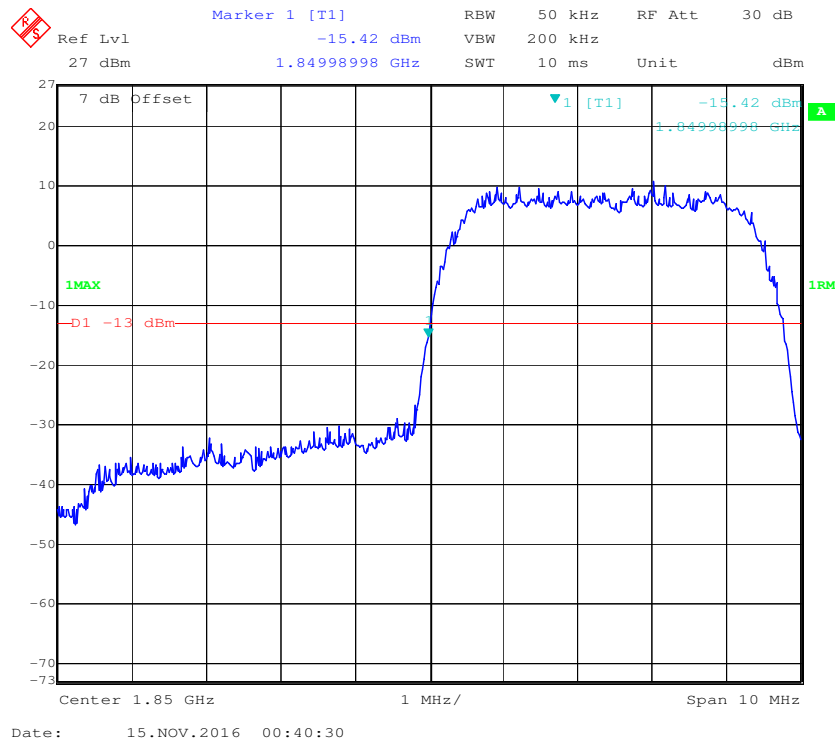
## PCS Band, Left Band Edge for HSDPA (16QAM) Mode



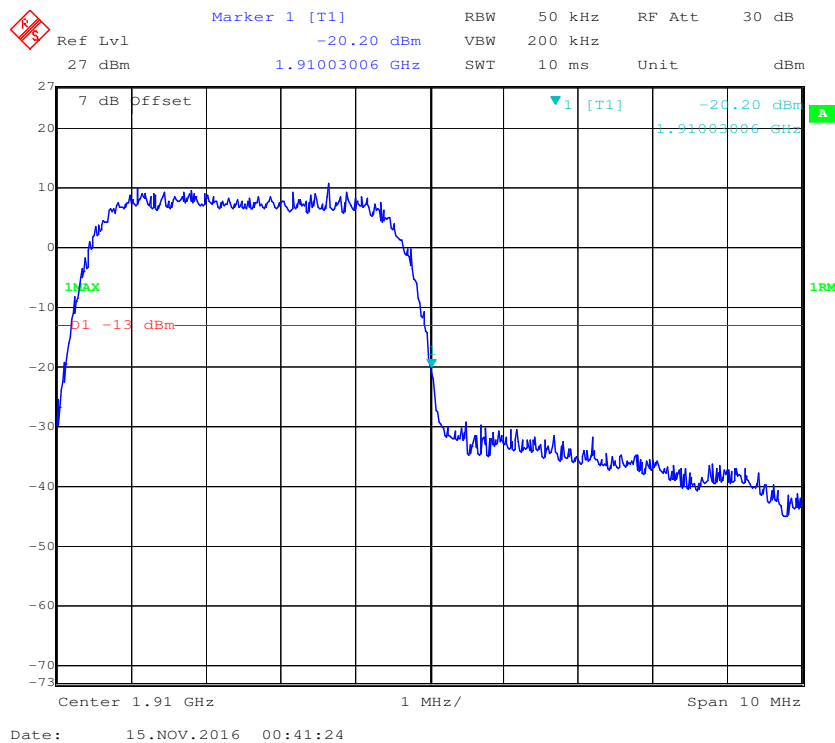
## PCS Band, Right Band Edge for HSDPA (16QAM) Mode



### PCS Band, Left Band Edge for HSUPA (BPSK) Mode

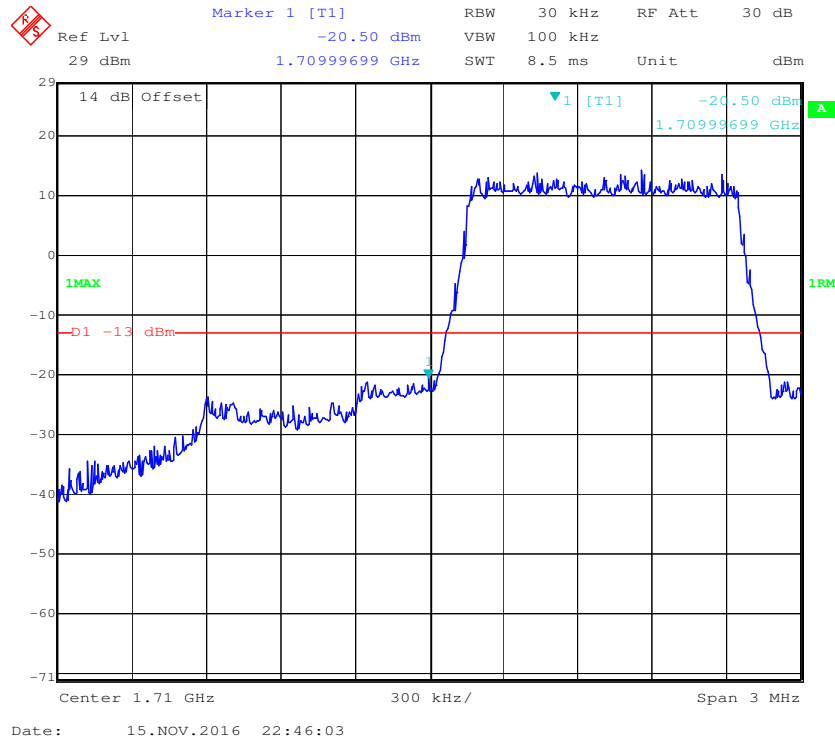


### PCS Band, Right Band Edge for HSUPA (BPSK) Mode

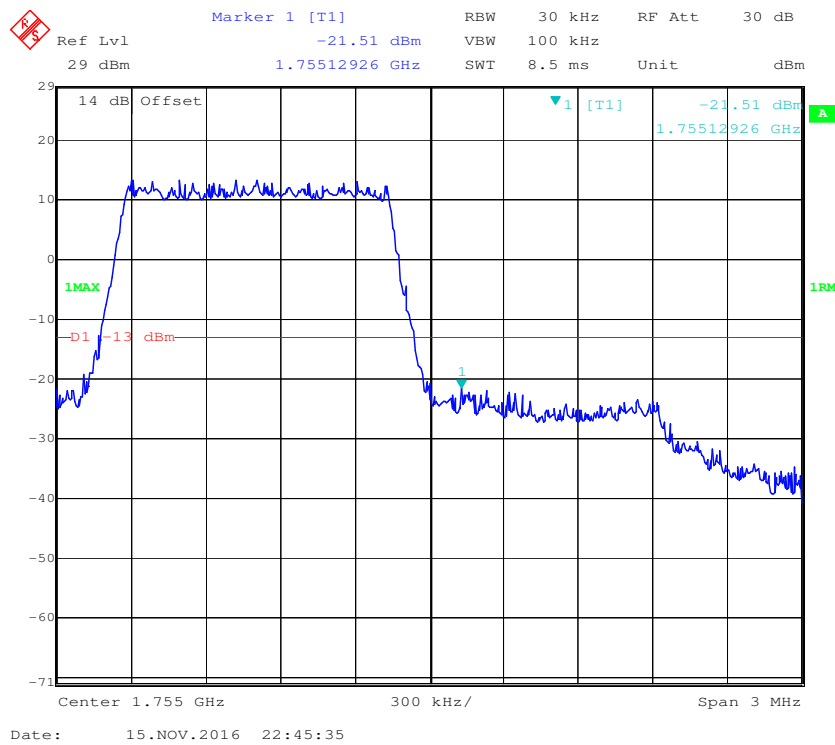


**Band 4:**

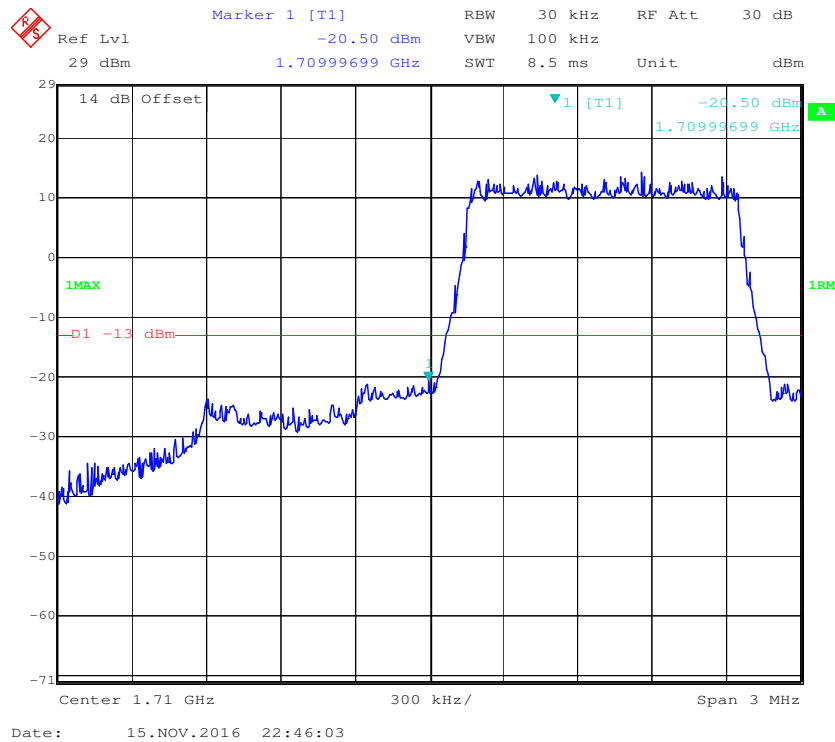
**QPSK (1.4 MHz, FULL RB) - Left Band Edge**



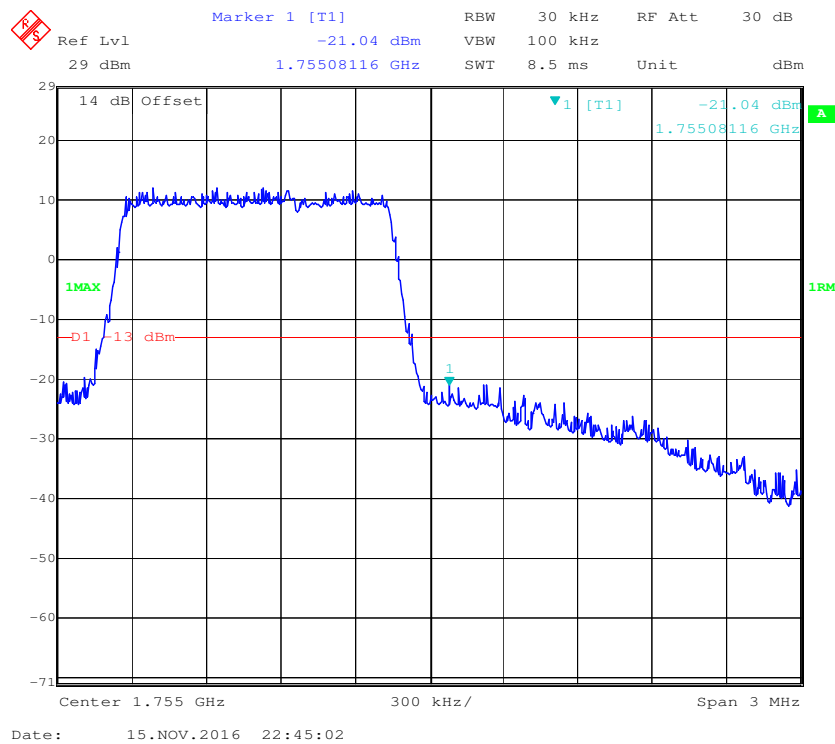
**QPSK (1.4 MHz, FULL RB) - Right Band Edge**



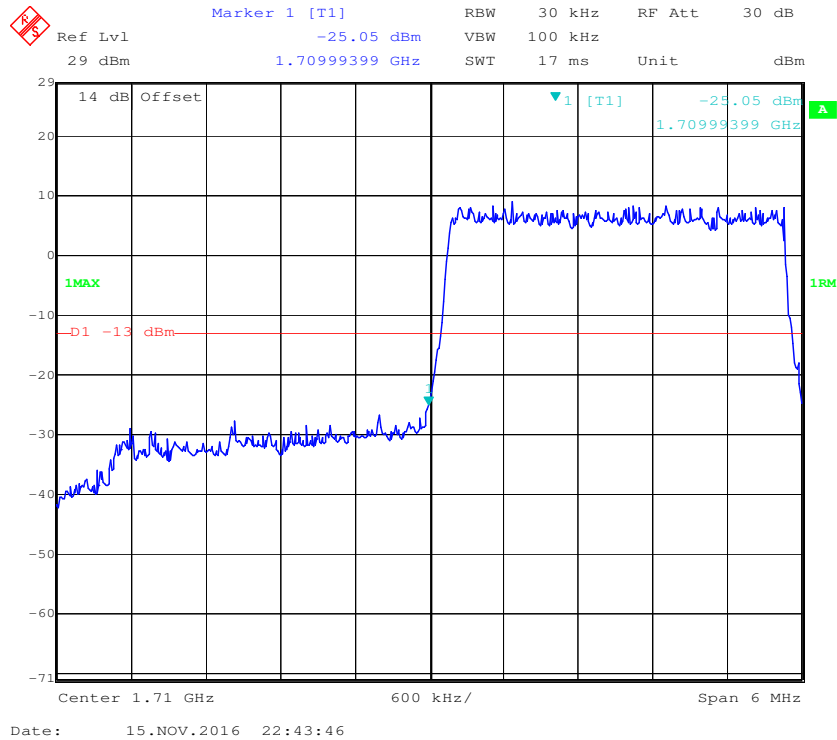
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



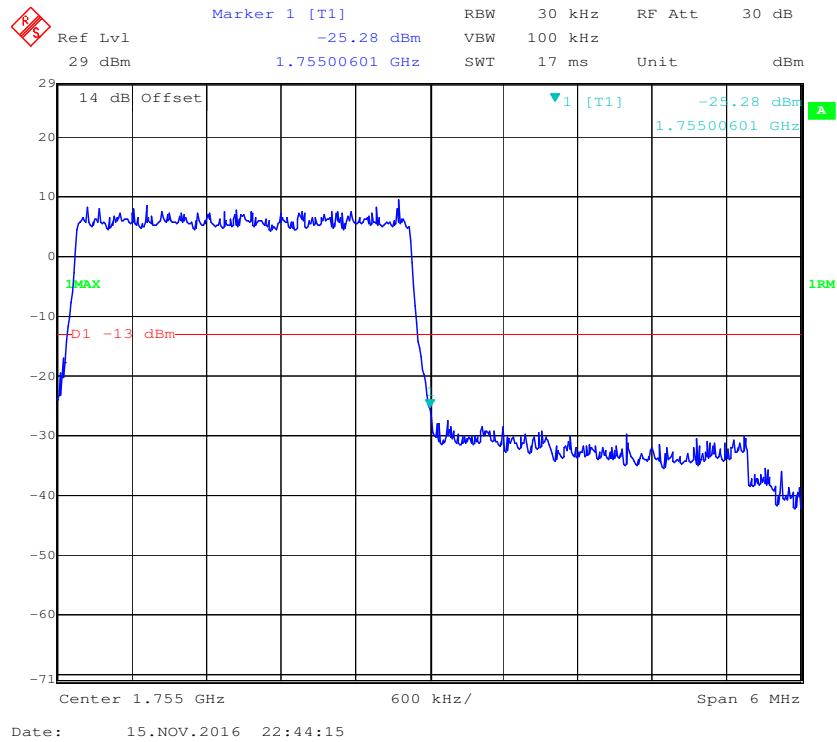
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



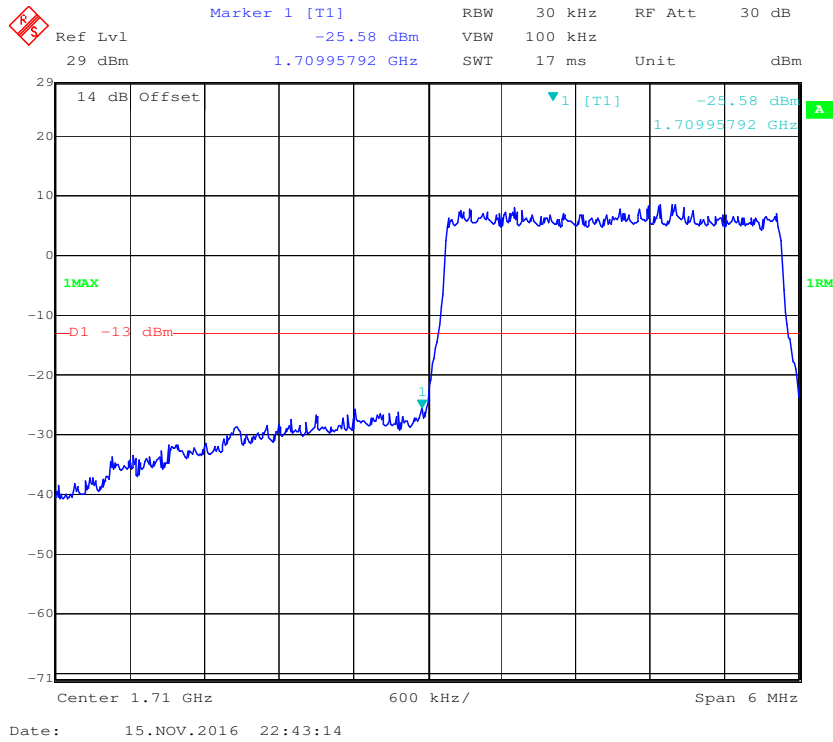
### QPSK (3.0 MHz, FULL RB) - Left Band Edge



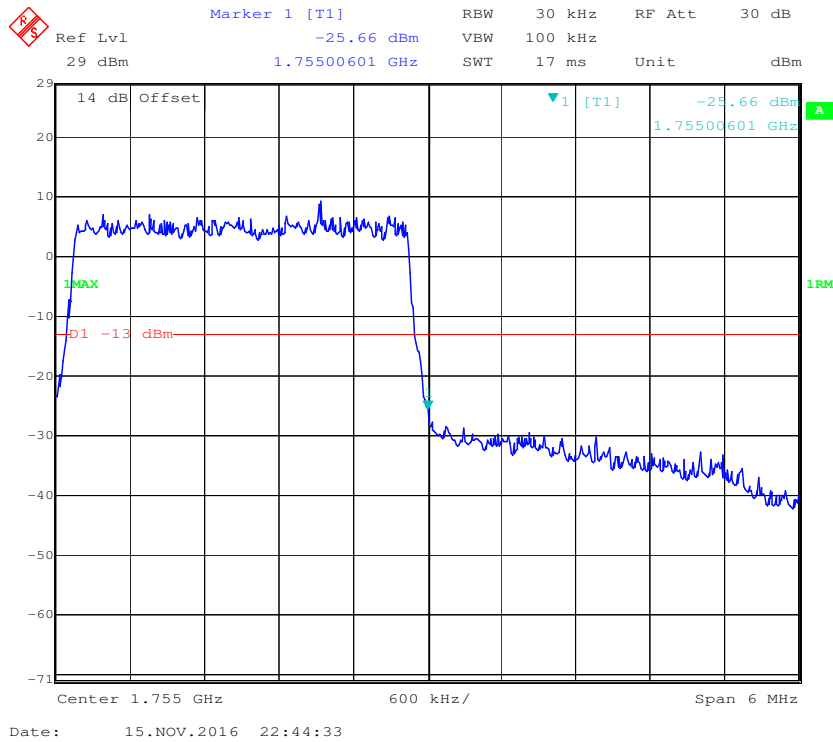
### QPSK (3.0 MHz, FULL RB) - Right Band Edge



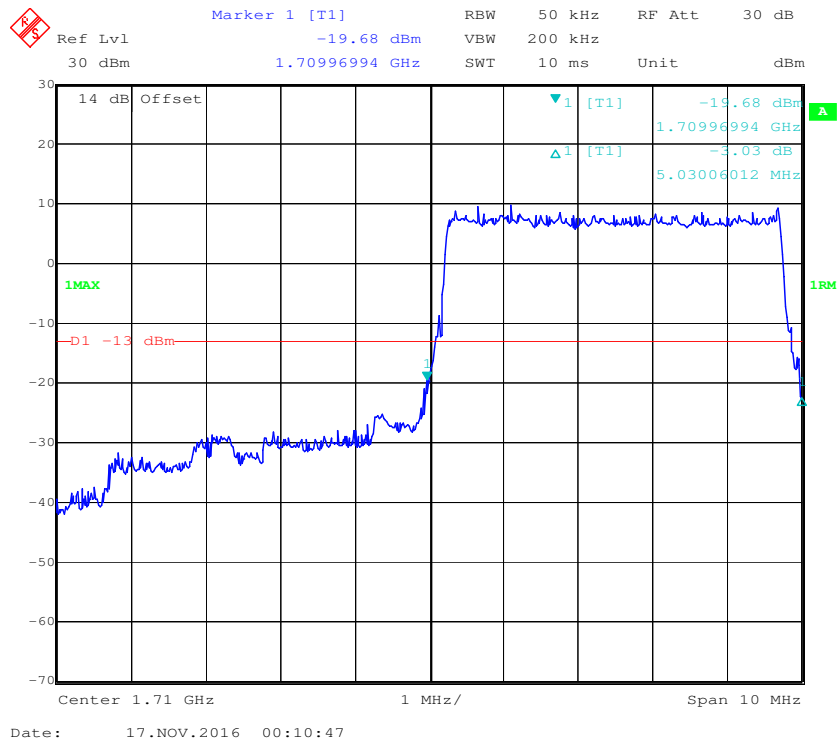
### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



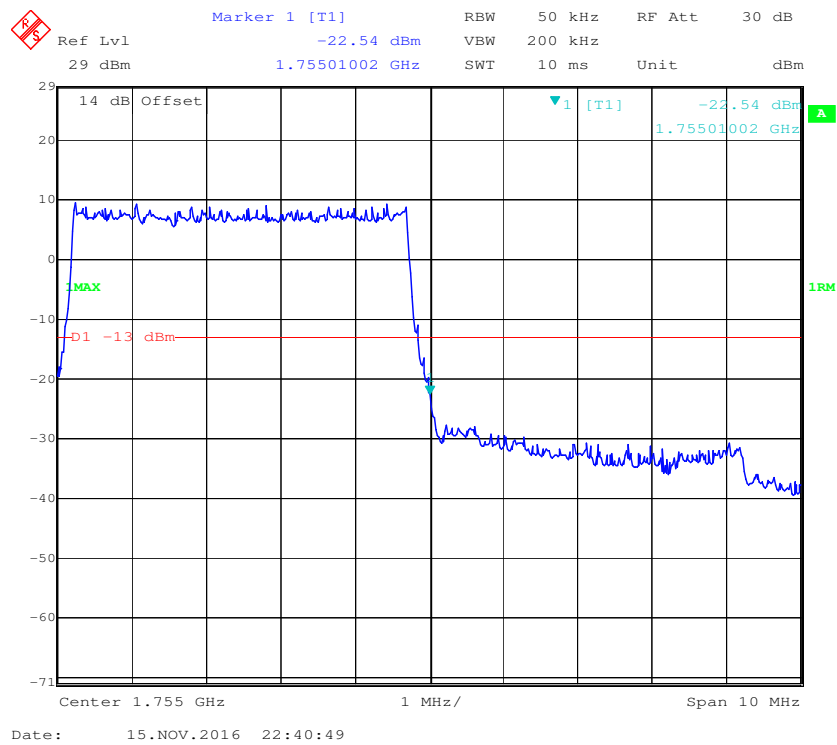
### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



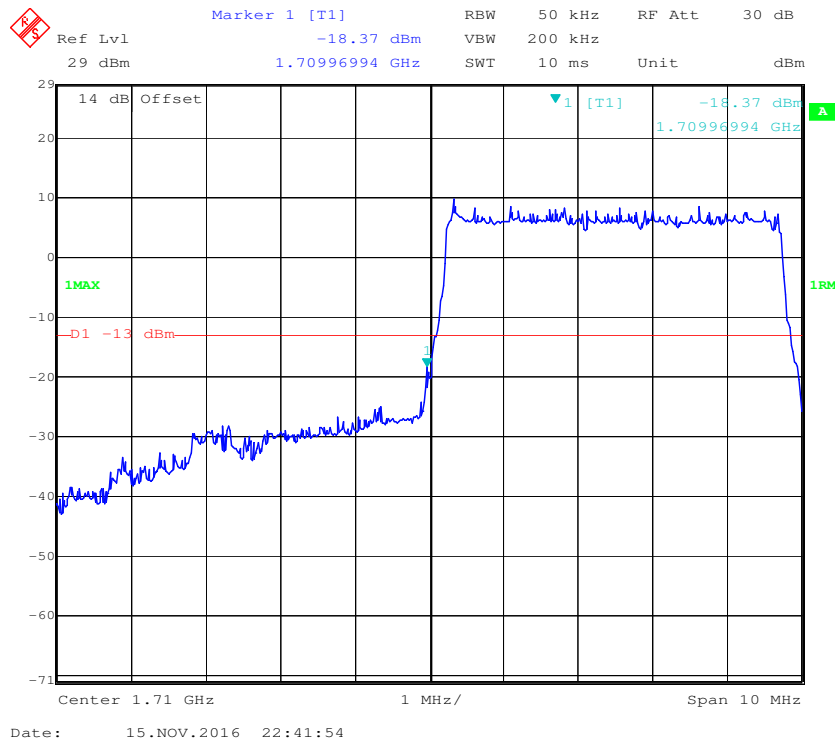
### QPSK (5.0 MHz, FULL RB) - Left Band Edge



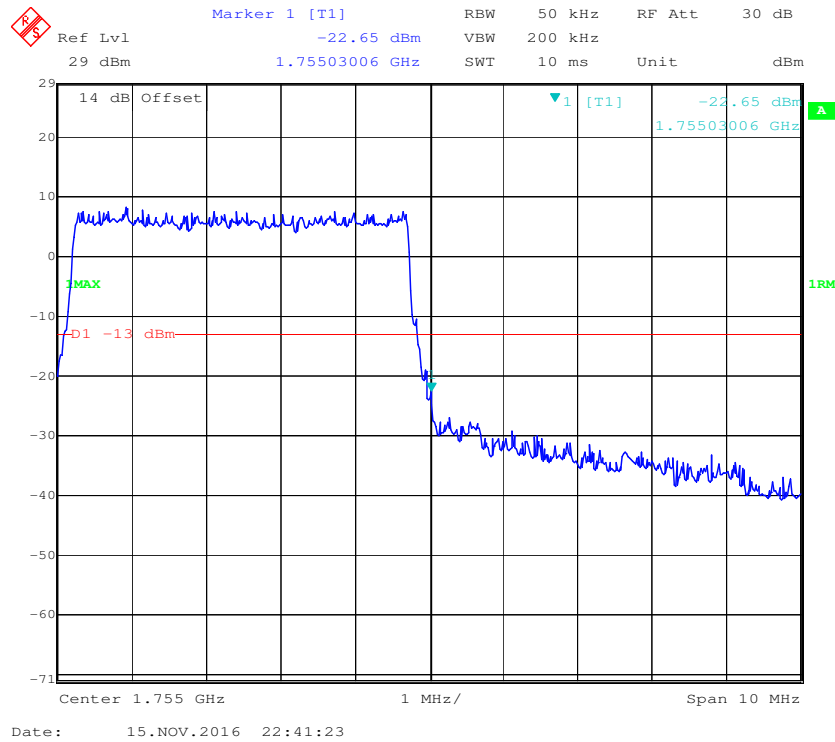
### QPSK (5.0 MHz, FULL RB) - Right Band Edge



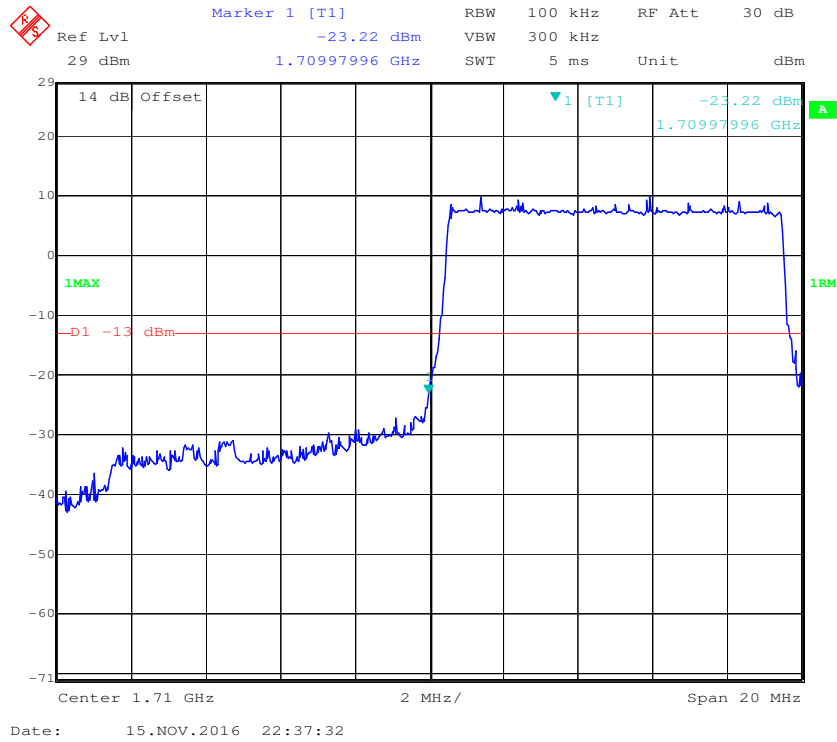
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



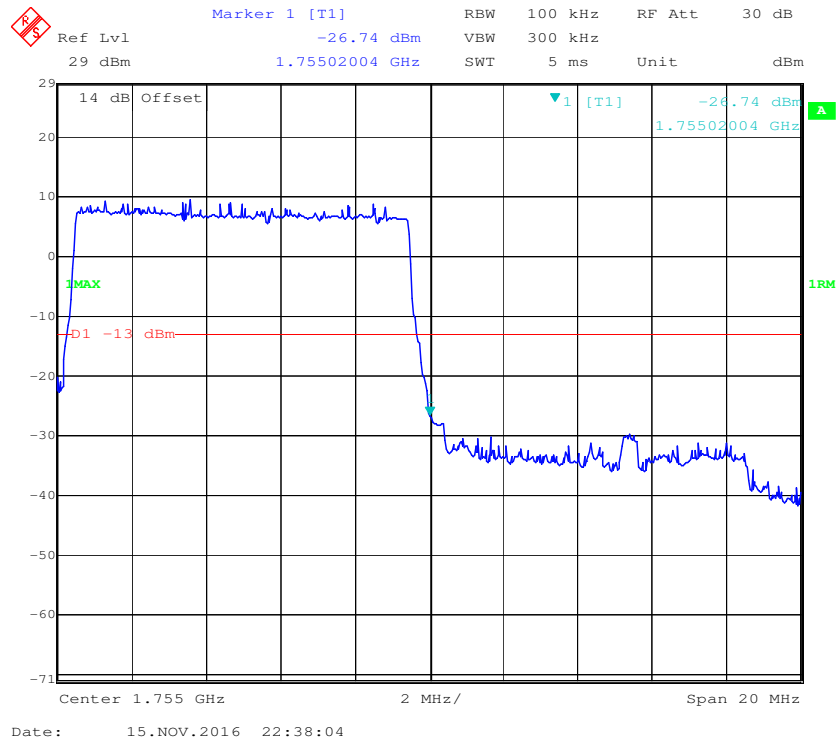
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



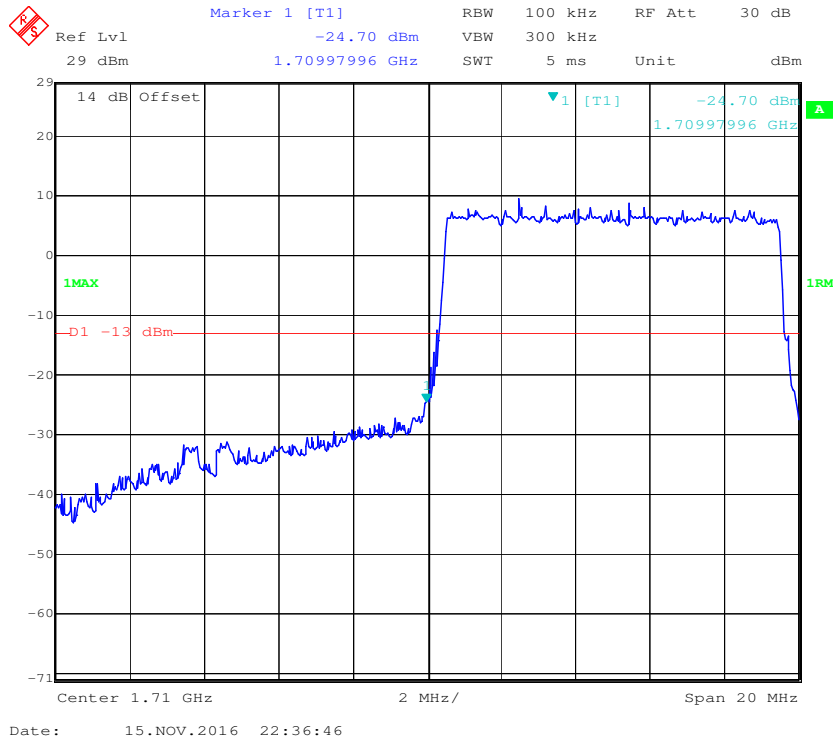
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



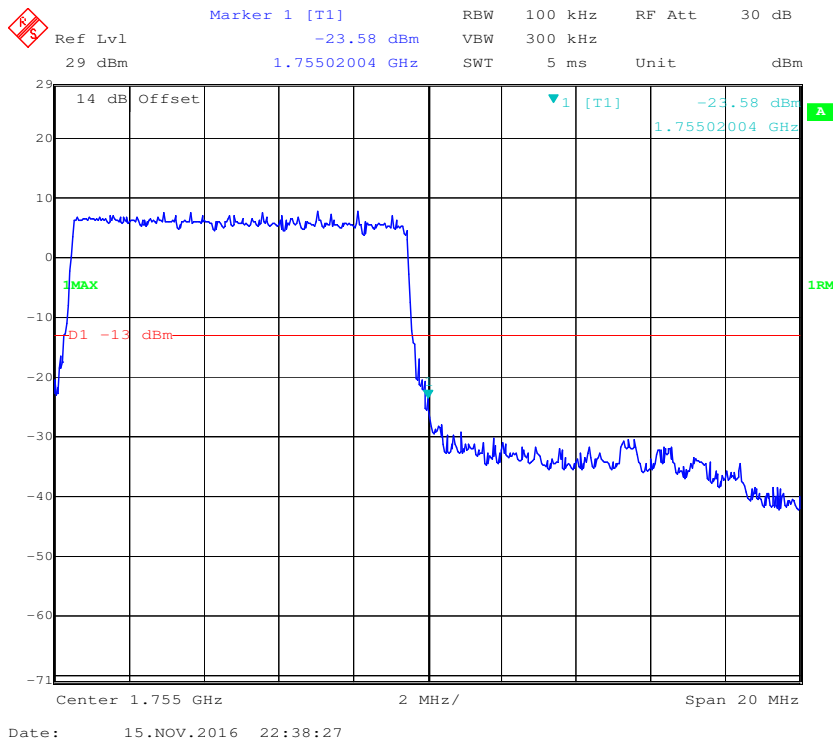
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



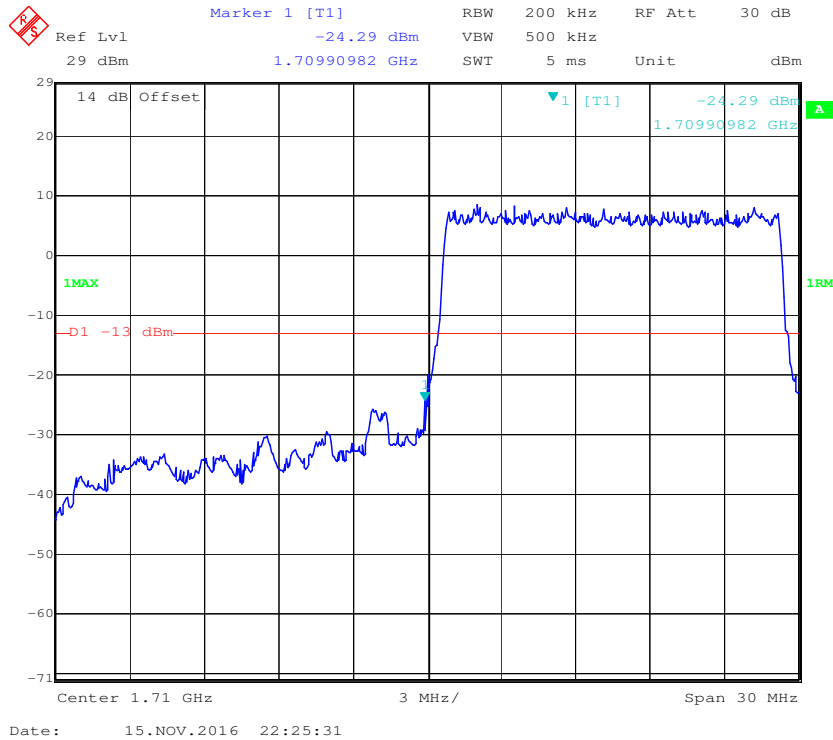
### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



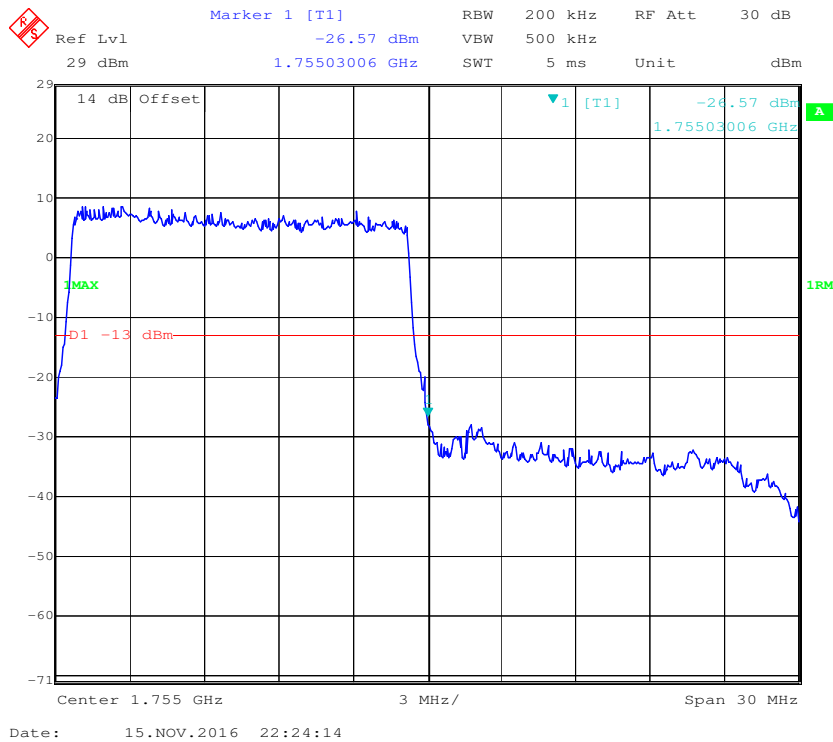
### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge

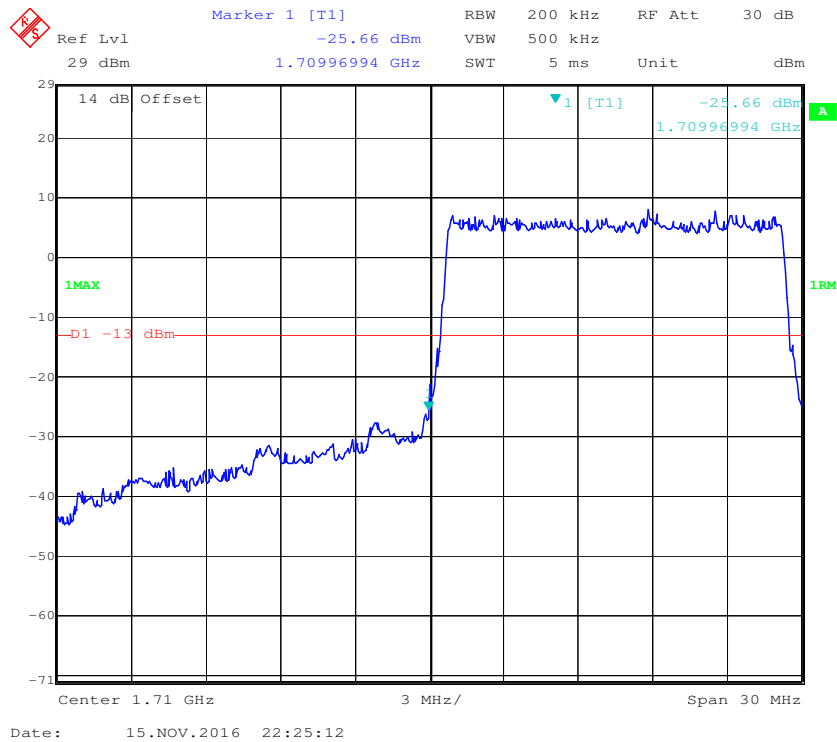
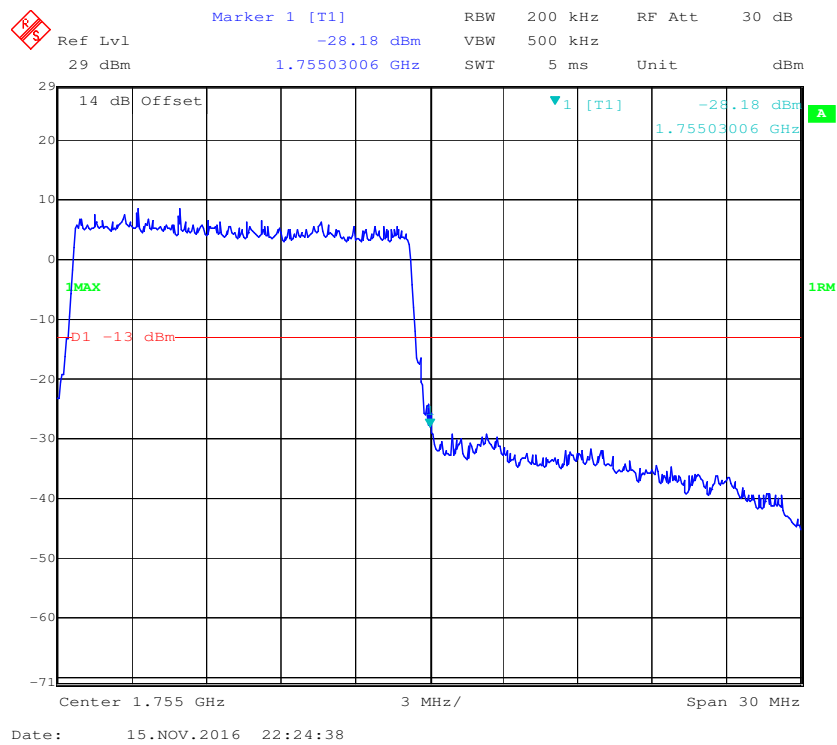


### QPSK (15.0 MHz, FULL RB) - Left Band Edge

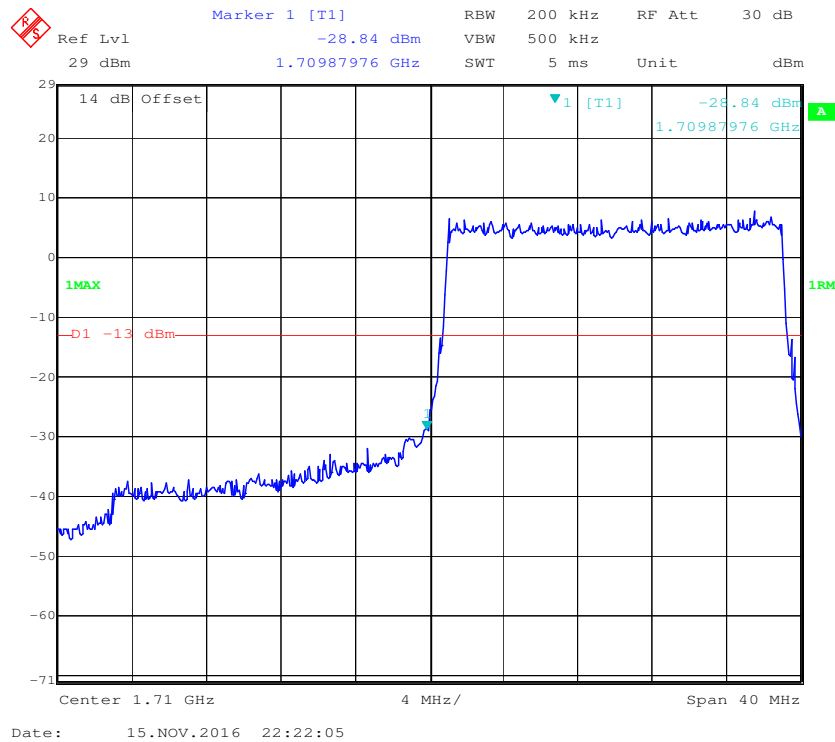


### QPSK (15.0 MHz, FULL RB) - Right Band Edge

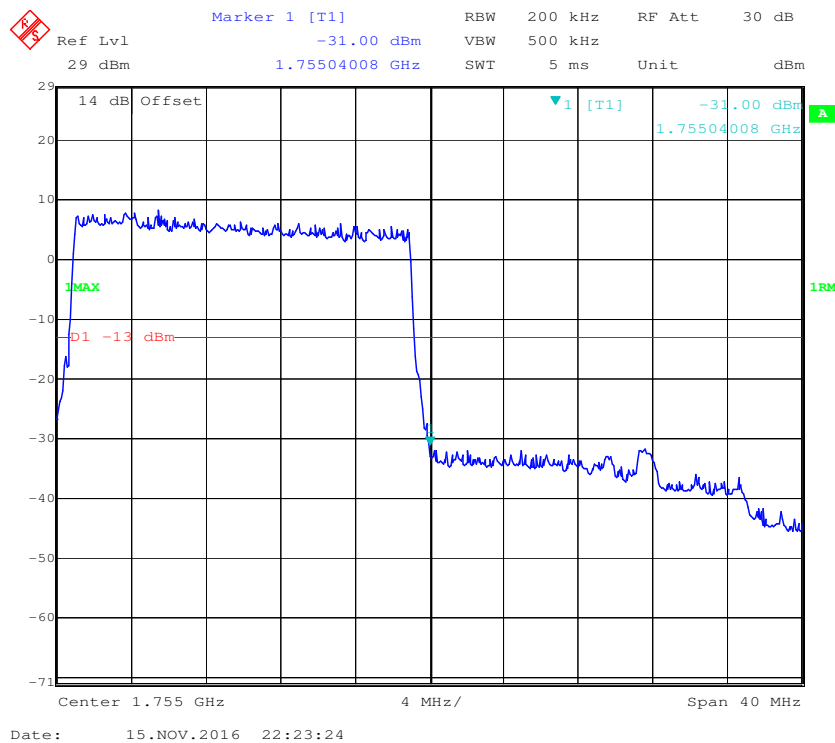


**16-QAM (15.0 MHz, FULL RB) - Left Band Edge****16-QAM (15.0 MHz, FULL RB) - Right Band Edge**

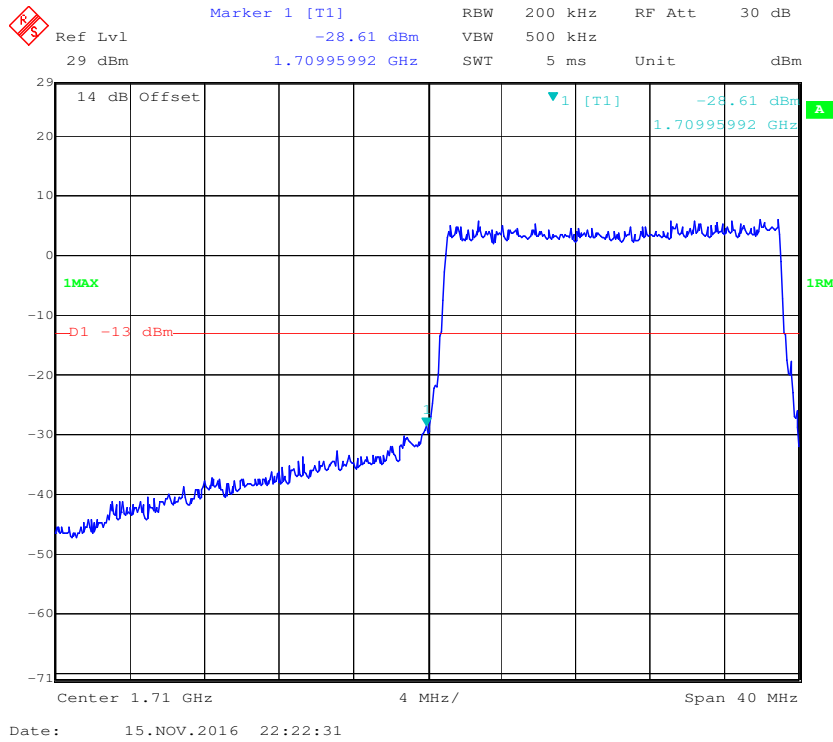
### QPSK (20.0 MHz, FULL RB) - Left Band Edge



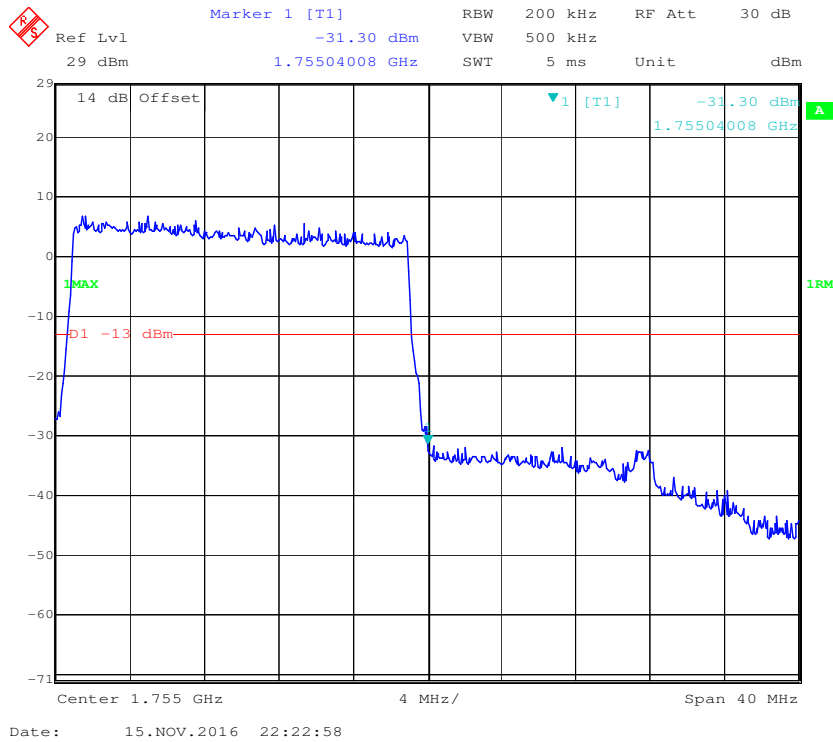
### QPSK (20.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (20.0 MHz, FULL RB) - Left Band Edge

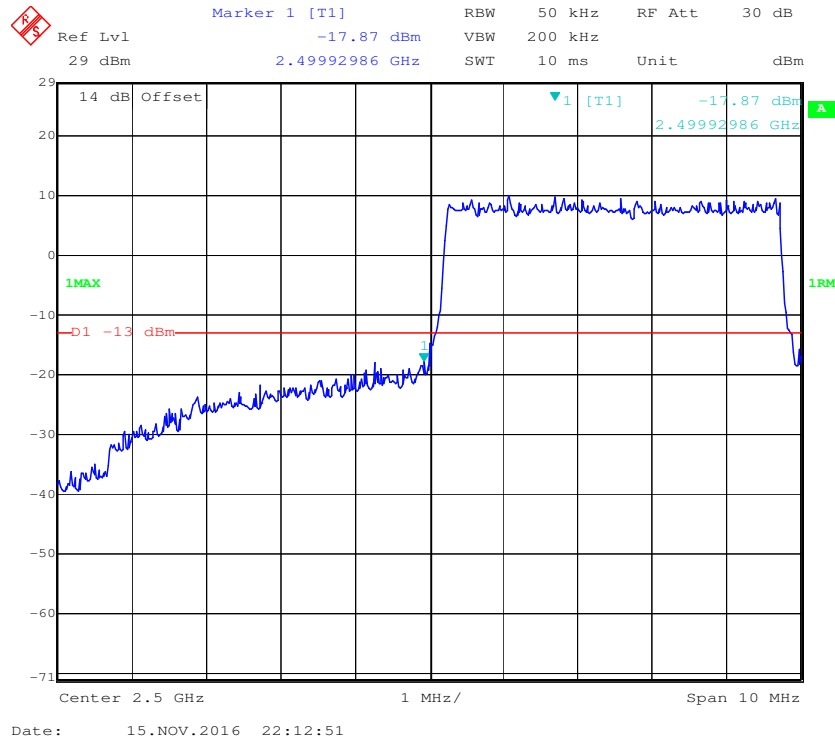


### 16-QAM (20.0 MHz, FULL RB) - Right Band Edge

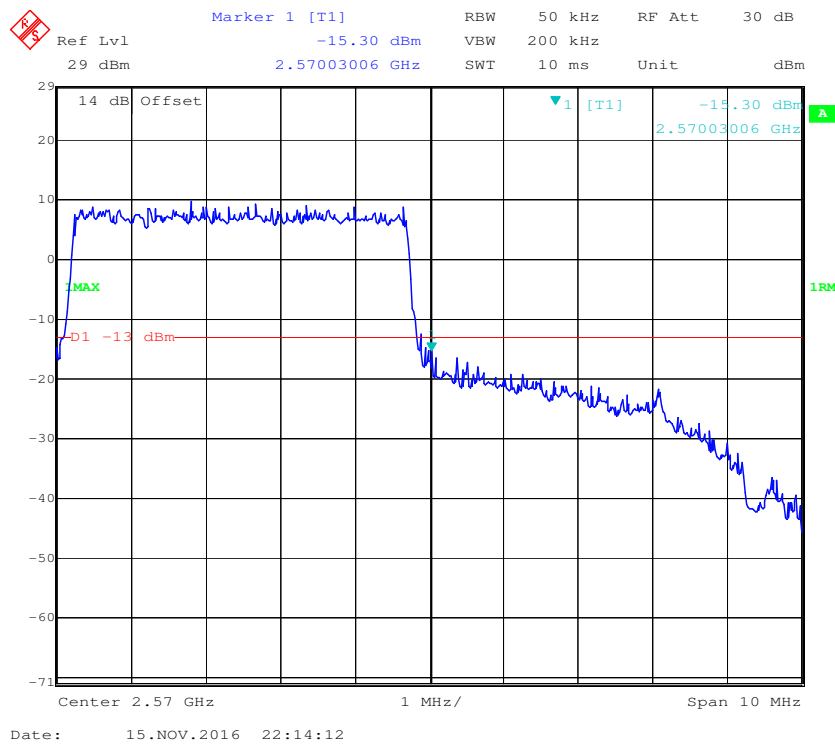


**Band 7:**

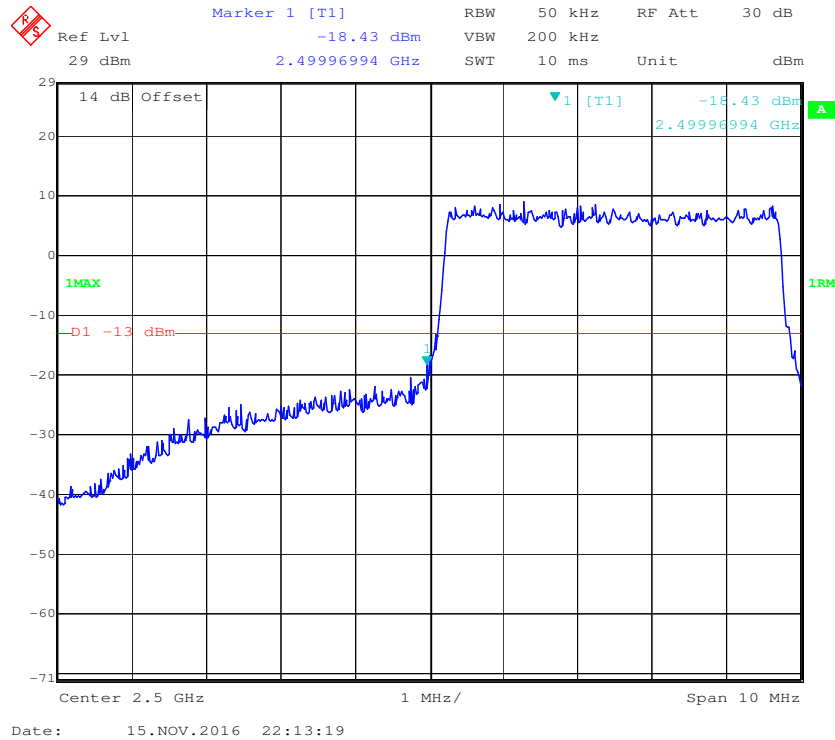
**QPSK (5.0 MHz, FULL RB) - Left Band Edge**



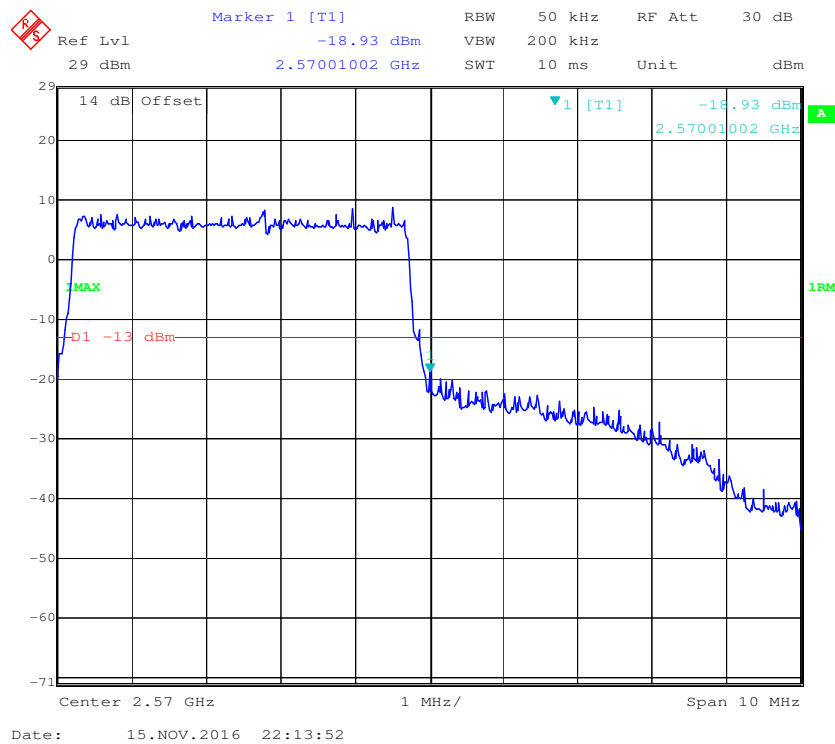
**QPSK (5.0 MHz, FULL RB) - Right Band Edge**



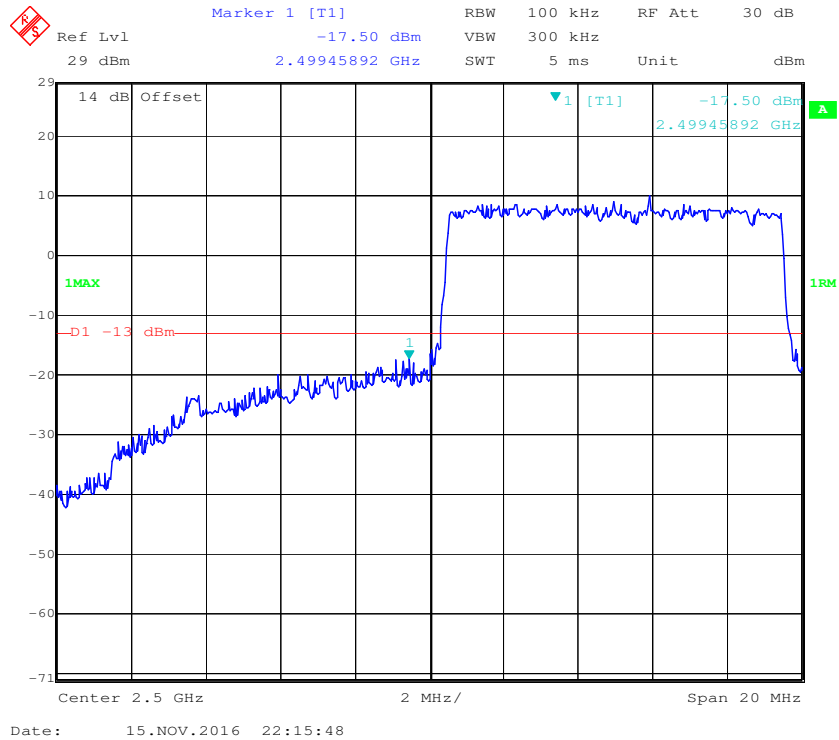
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



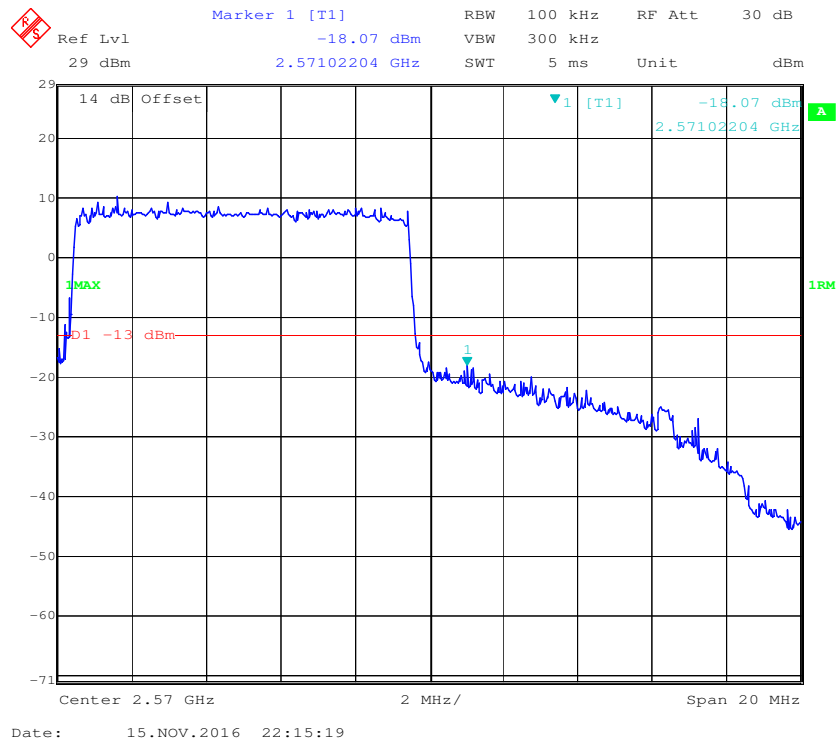
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



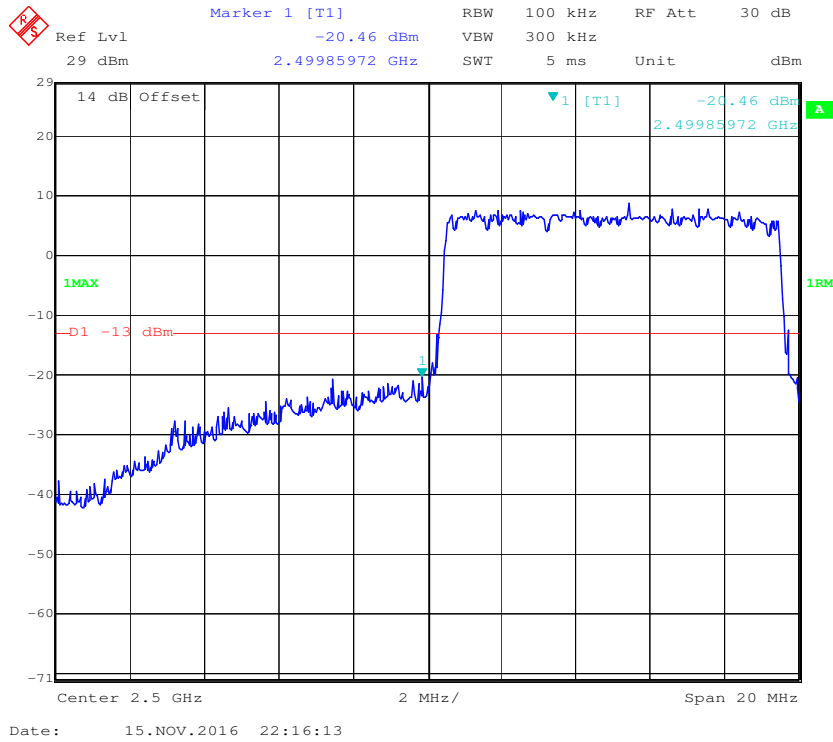
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



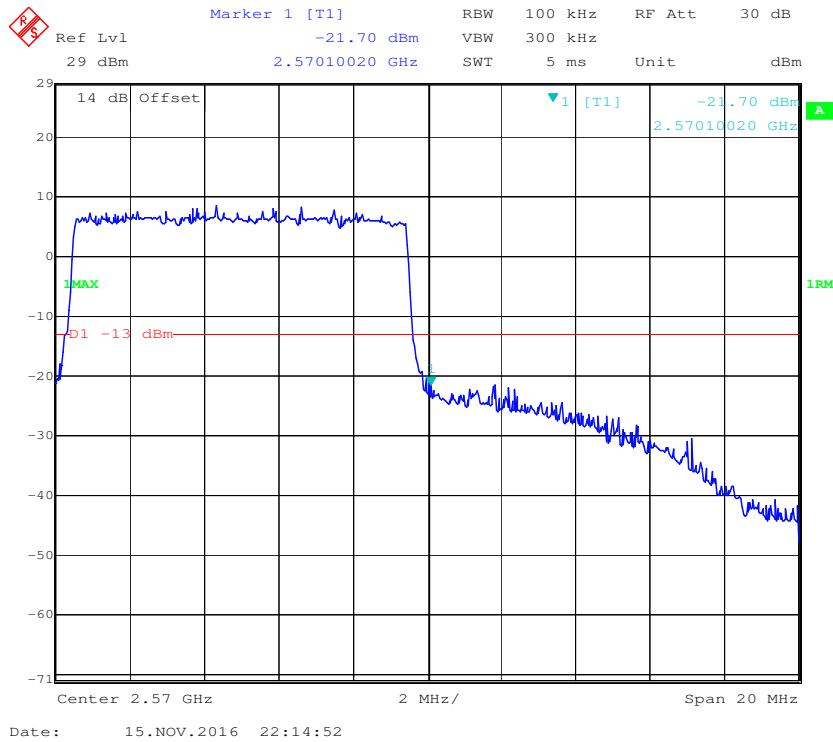
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



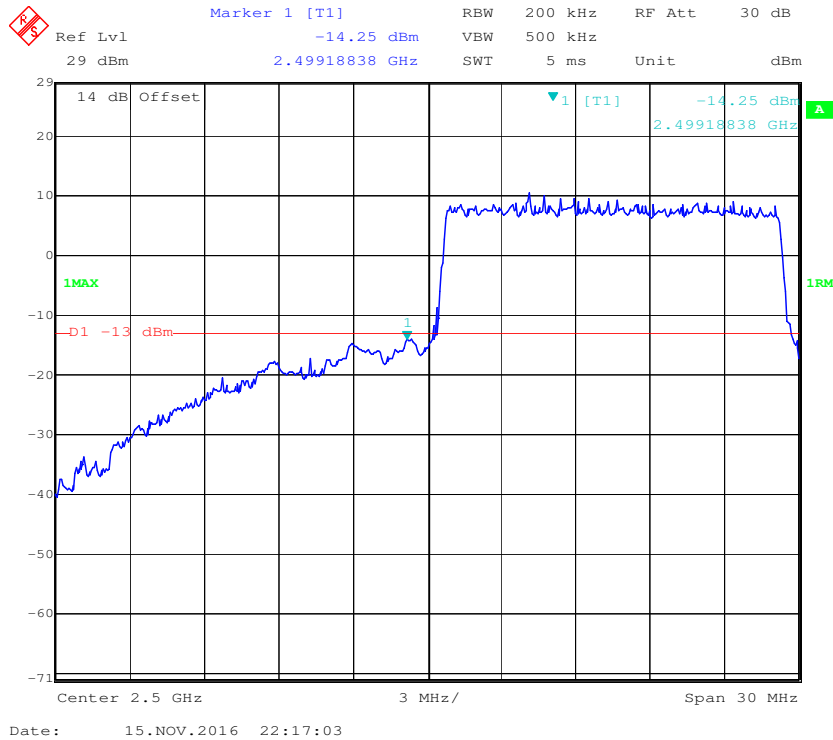
### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



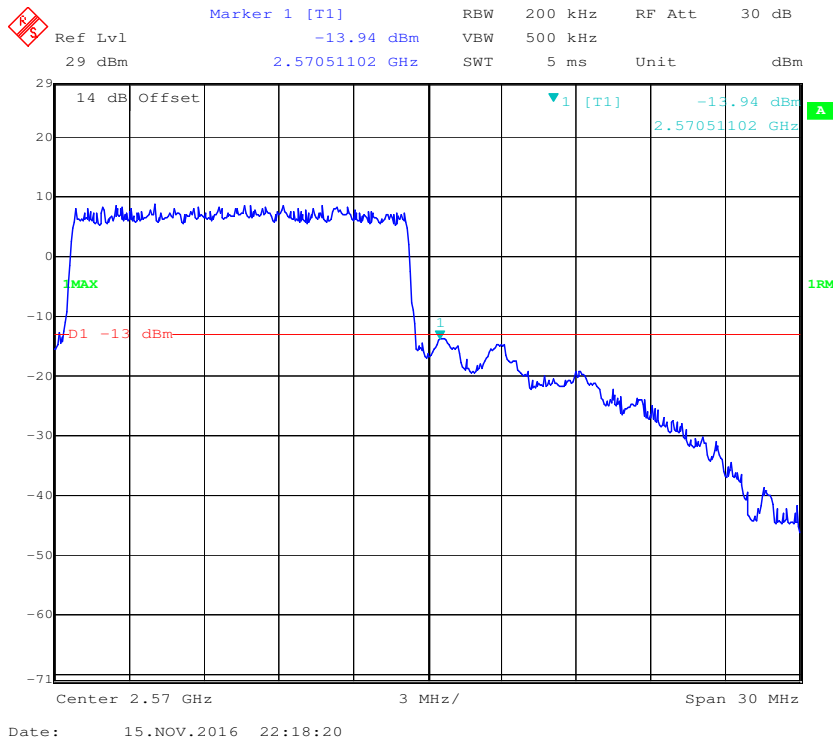
### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



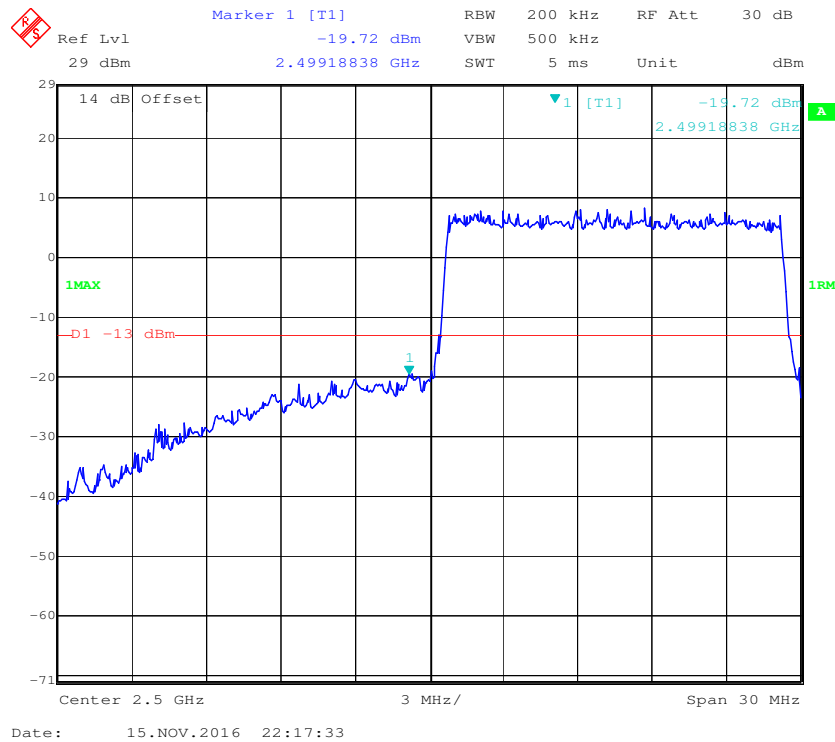
### QPSK (15 MHz, FULL RB) - Left Band Edge



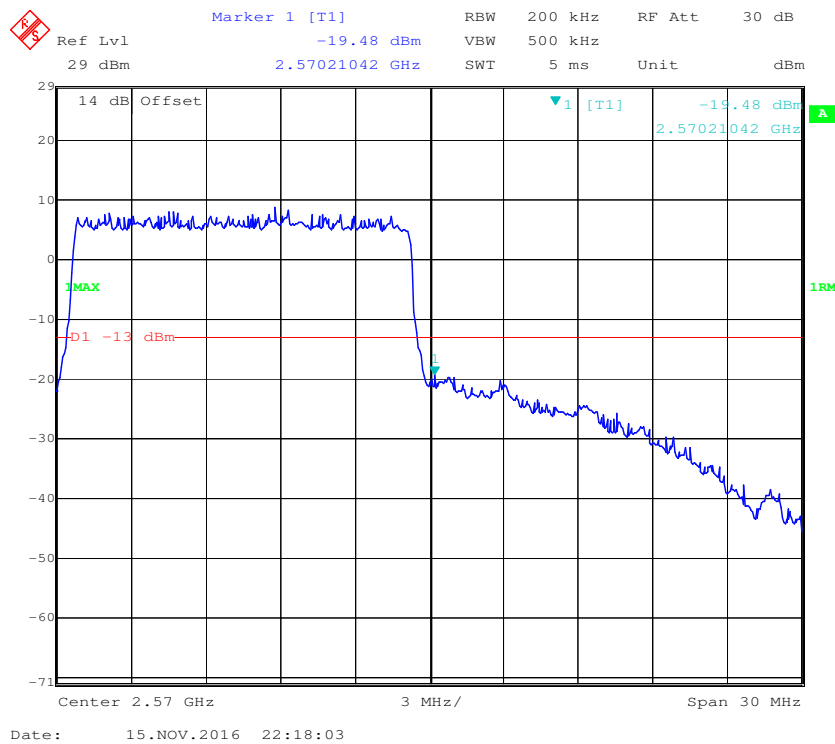
### QPSK (15 MHz, FULL RB) - Right Band Edge



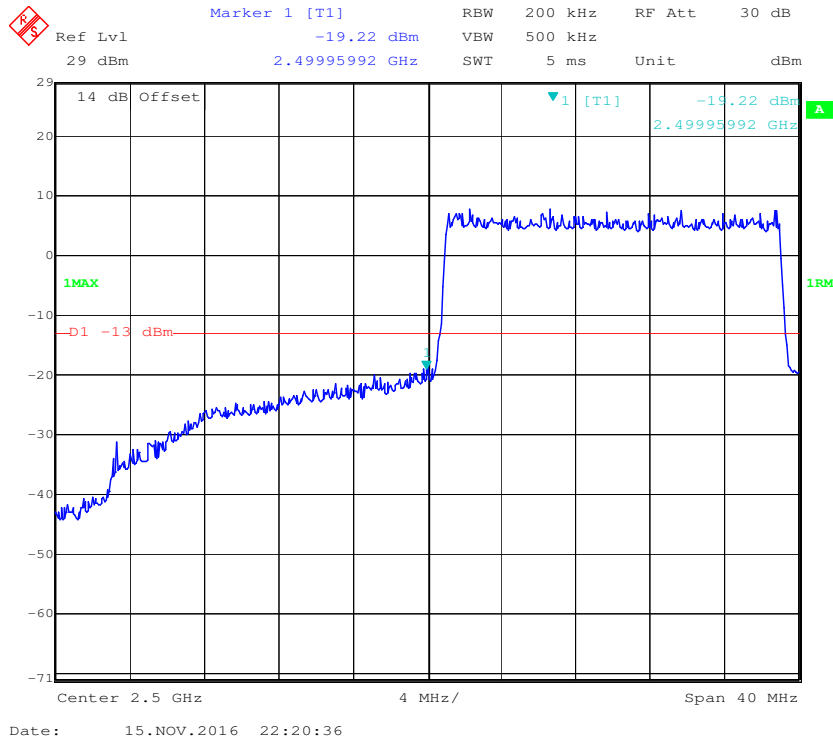
### 16-QAM (15 MHz, FULL RB) - Left Band Edge



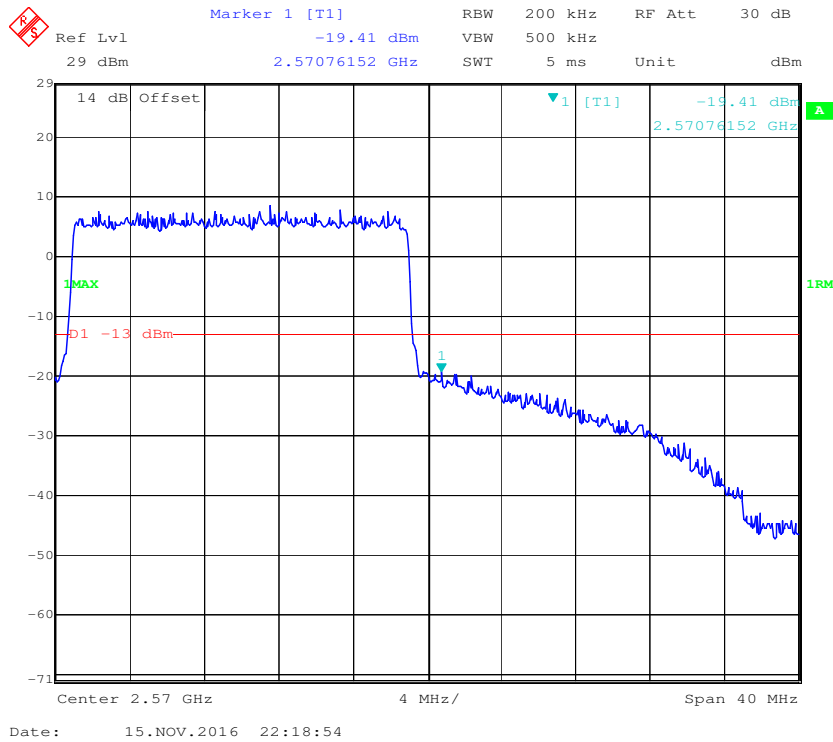
### 16-QAM (15 MHz, FULL RB) - Right Band Edge



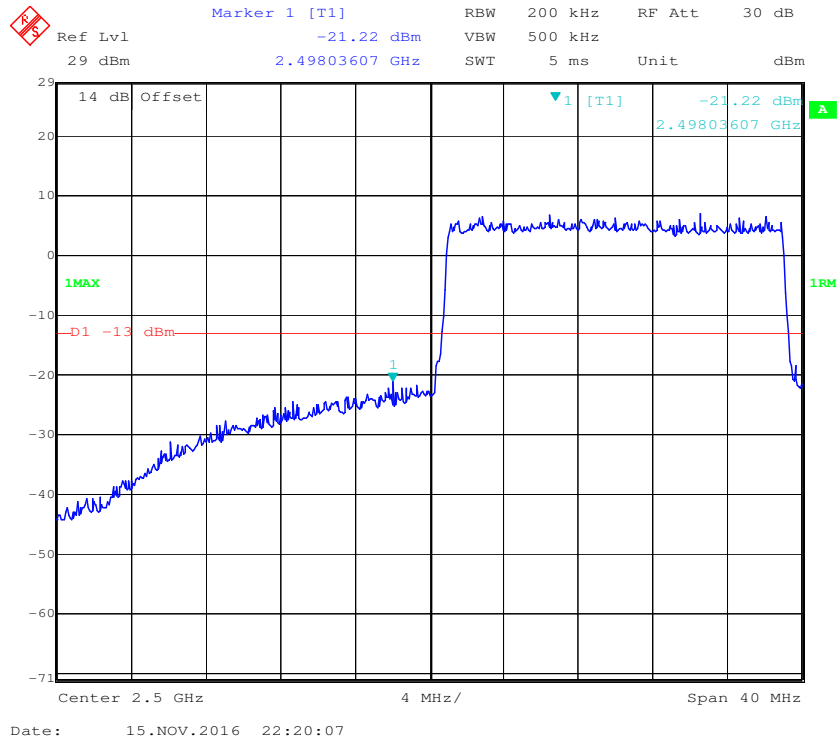
### QPSK (20 MHz, FULL RB) - Left Band Edge



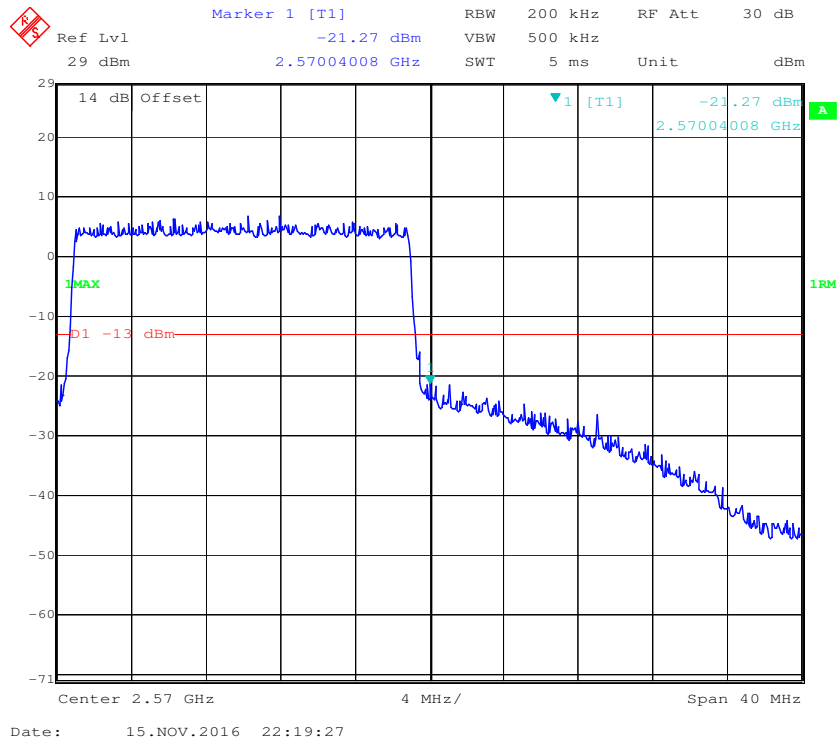
### QPSK (20 MHz, FULL RB) - Right Band Edge



### 16-QAM (20 MHz, FULL RB) - Left Band Edge

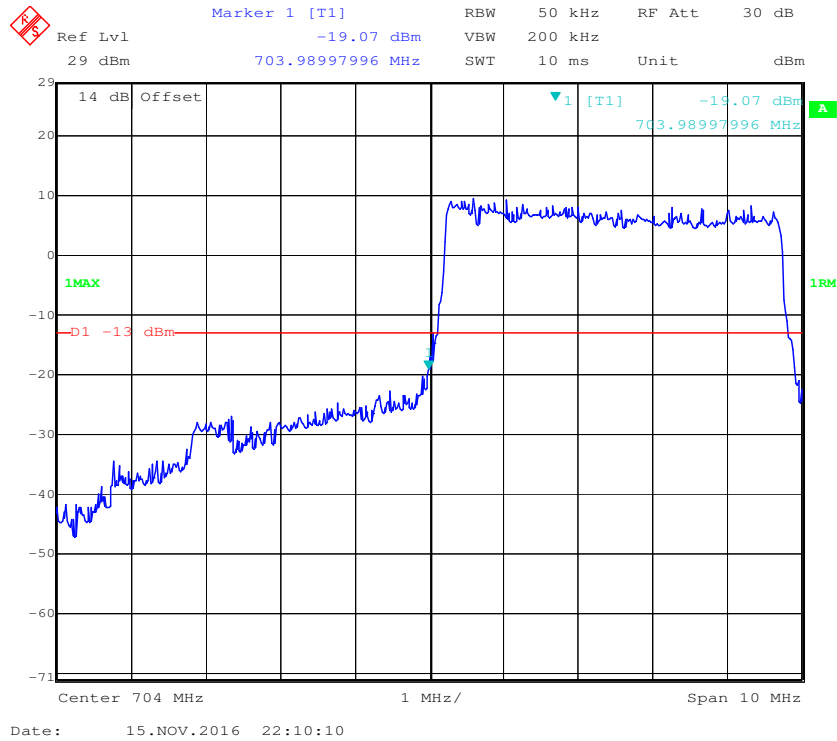


### 16-QAM (20 MHz, FULL RB) - Right Band Edge

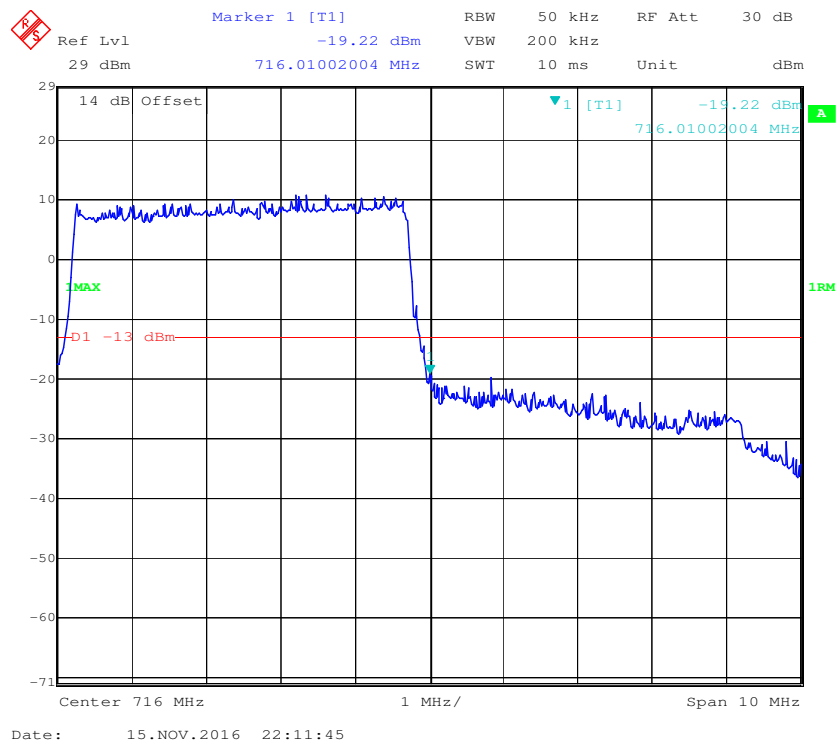


**Band 17:**

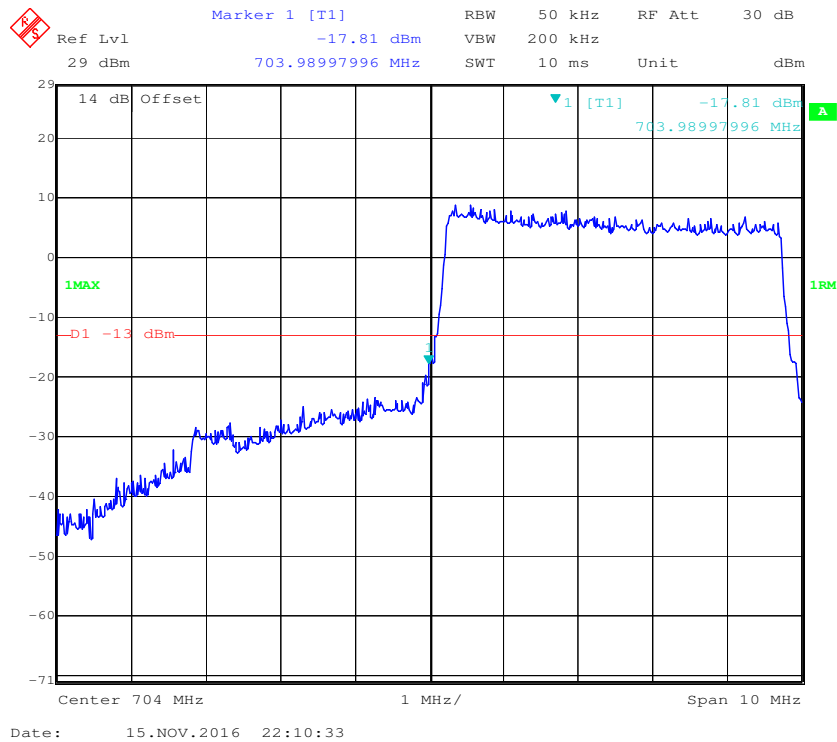
**QPSK (5.0 MHz, FULL RB) - Left Band Edge**



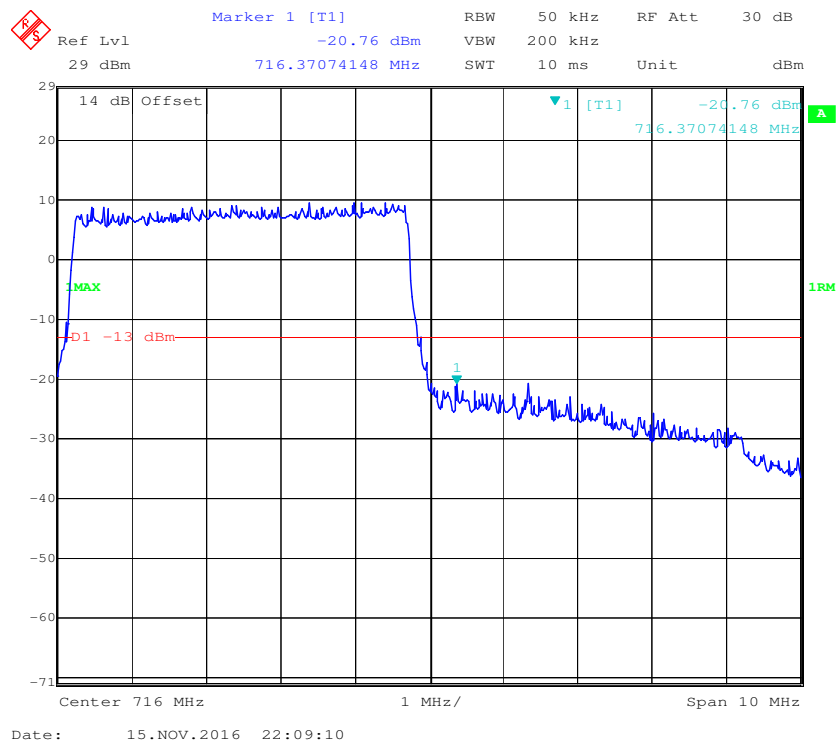
**QPSK (5.0 MHz, FULL RB) - Right Band Edge**



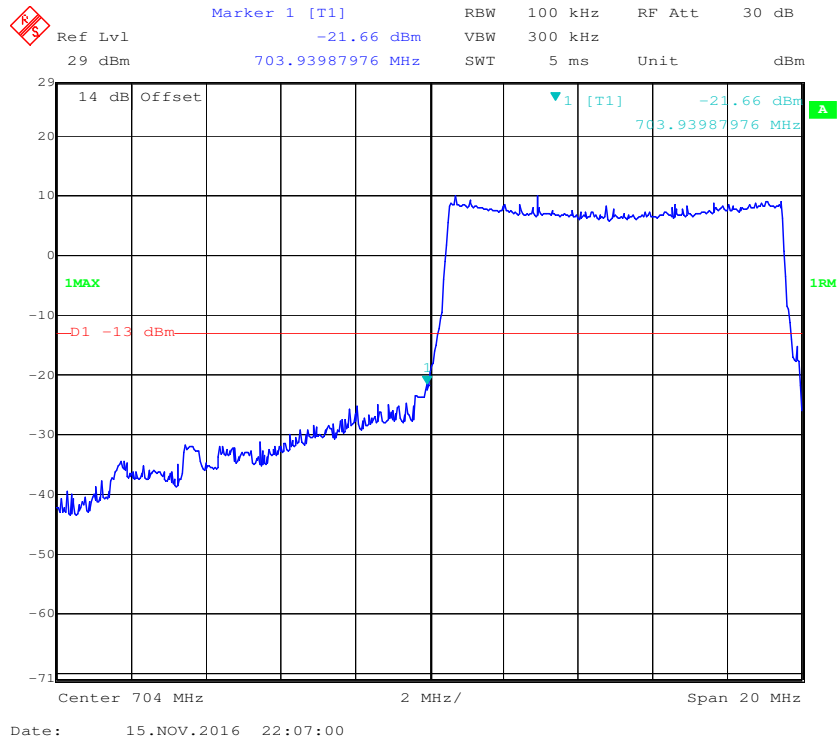
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



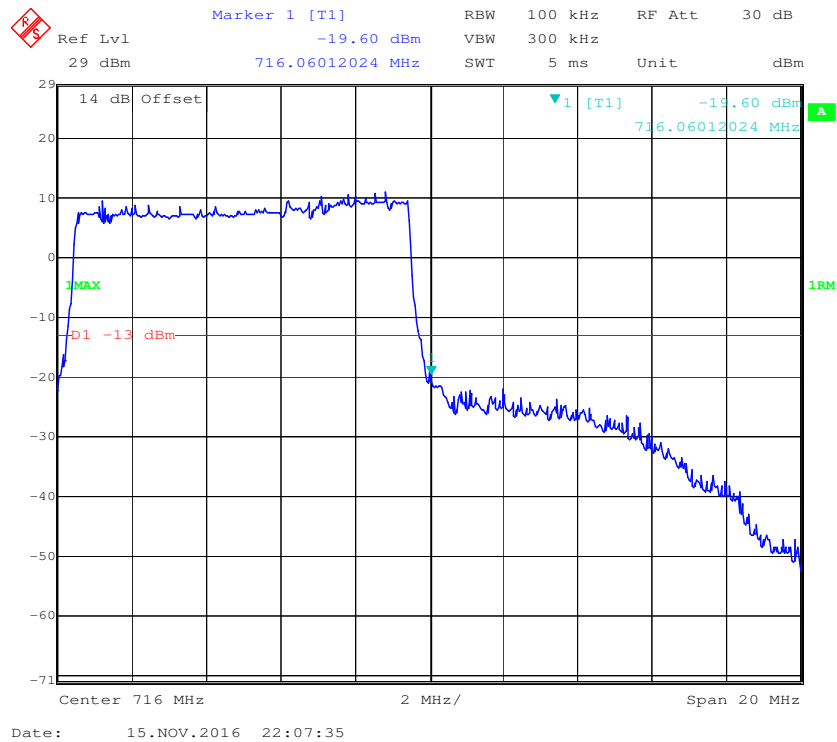
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



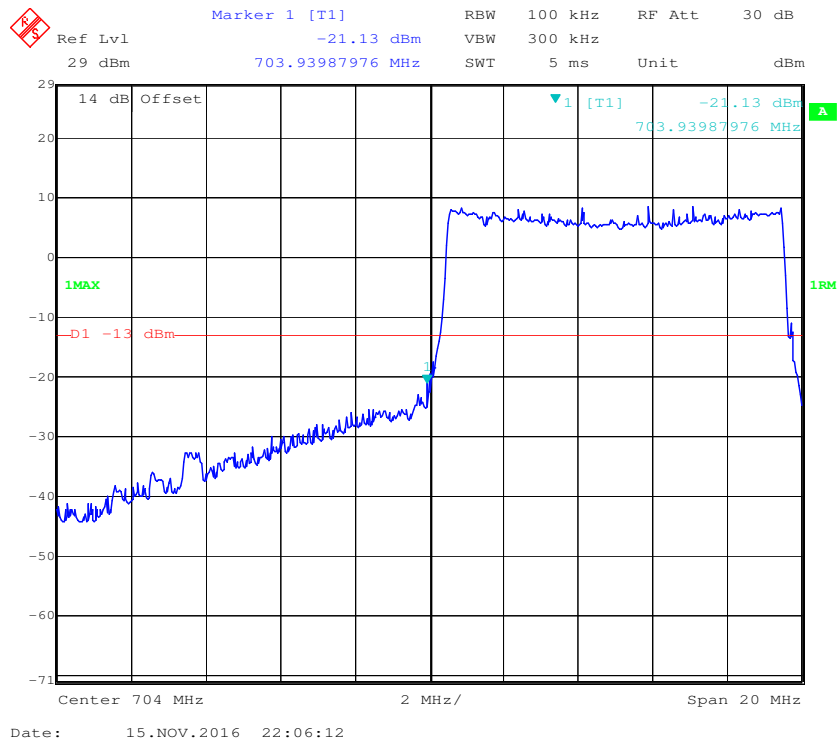
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



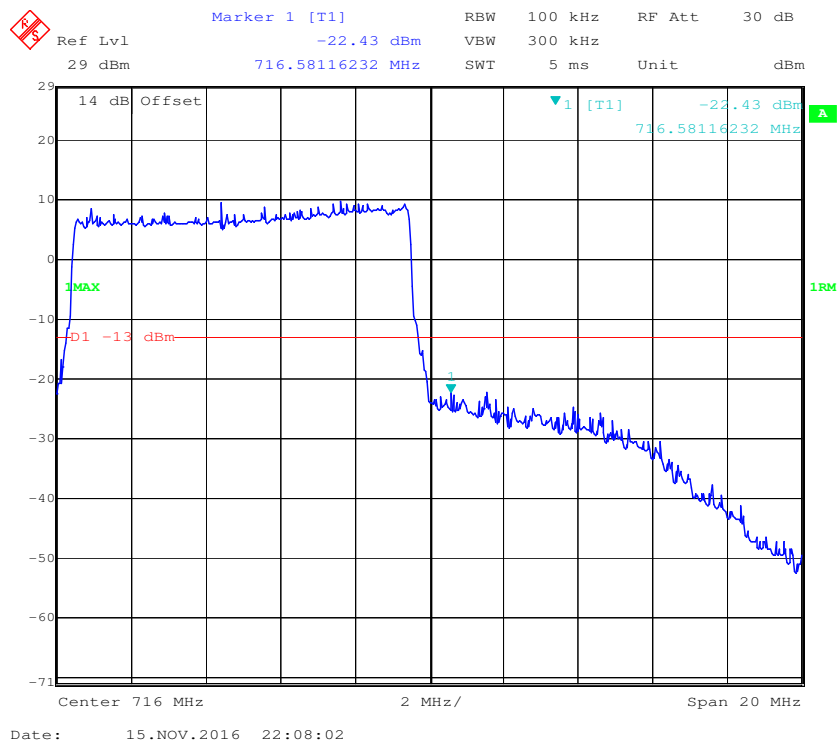
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



## **FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY**

### **Applicable Standards**

FCC § 2.1055, §22.355, §24.235 and & §27.54.

According to FCC §2.1055, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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**

| <b>Frequency Range (MHz)</b> | <b>Base, fixed (ppm)</b> | <b>Mobile &gt; 3 watts (ppm)</b> | <b>Mobile ≤ 3 watts (ppm)</b> |
|------------------------------|--------------------------|----------------------------------|-------------------------------|
| 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                           |

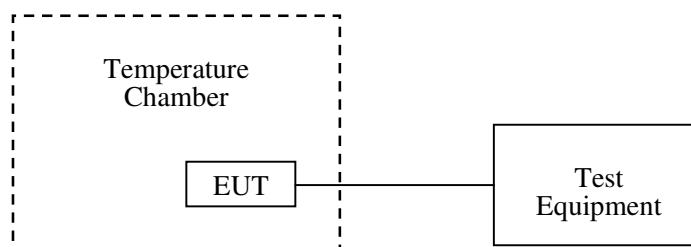
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **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: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



**Test Data****Environmental Conditions**

|                           |           |
|---------------------------|-----------|
| <b>Temperature:</b>       | 25 °C     |
| <b>Relative Humidity:</b> | 55 %      |
| <b>ATM Pressure:</b>      | 101.0 kPa |

*The testing was performed by Peter Jiang on 2016-11-15.*

*EUT operation mode: Transmitting*

*Test Result: Compliance. Please refer to the following tables.*

**Cellular Band (Part 22H)****GSM Mode**

| Middle Channel, $f_0=836.6$ MHz |                                   |                      |                       |             |
|---------------------------------|-----------------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                             | 3.7                               | 9                    | 0.010758              | 2.5         |
| -20                             |                                   | 2                    | 0.002391              | 2.5         |
| -10                             |                                   | 6                    | 0.007172              | 2.5         |
| 0                               |                                   | 5                    | 0.005977              | 2.5         |
| 10                              |                                   | 3                    | 0.003586              | 2.5         |
| 20                              |                                   | 1                    | 0.001195              | 2.5         |
| 30                              |                                   | 9                    | 0.010758              | 2.5         |
| 40                              |                                   | 1                    | 0.001195              | 2.5         |
| 50                              |                                   | 8                    | 0.009563              | 2.5         |
| 20                              | V min.= 3.5                       | 6                    | 0.007172              | 2.5         |
|                                 | V max.= 4.2                       | 3                    | 0.003586              | 2.5         |

**EDGE Mode**

| Middle Channel, $f_0=836.6$ MHz |                                   |                      |                       |             |
|---------------------------------|-----------------------------------|----------------------|-----------------------|-------------|
| Temperature (°C)                | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Limit (ppm) |
| -30                             | 3.7                               | 8                    | 0.009563              | 2.5         |
| -20                             |                                   | 3                    | 0.003586              | 2.5         |
| -10                             |                                   | 2                    | 0.002391              | 2.5         |
| 0                               |                                   | 7                    | 0.008367              | 2.5         |
| 10                              |                                   | 3                    | 0.003586              | 2.5         |
| 20                              |                                   | -1                   | -0.001195             | 2.5         |
| 30                              |                                   | 3                    | 0.003586              | 2.5         |
| 40                              |                                   | 9                    | 0.010758              | 2.5         |
| 50                              |                                   | 0                    | 0.000000              | 2.5         |
| 20                              | V min.= 3.5                       | 9                    | 0.010758              | 2.5         |
|                                 | V max.= 4.2                       | 6                    | 0.007172              | 2.5         |

**WCDMA Mode**

| <b>Middle Channel, <math>f_0 = 836.6</math> MHz</b> |                                            |                                     |                                      |                        |
|-----------------------------------------------------|--------------------------------------------|-------------------------------------|--------------------------------------|------------------------|
| <b>Temperature<br/>(°C)</b>                         | <b>Power Supplied<br/>(V<sub>DC</sub>)</b> | <b>Frequency<br/>Error<br/>(Hz)</b> | <b>Frequency<br/>Error<br/>(ppm)</b> | <b>Limit<br/>(ppm)</b> |
| -30                                                 | 3.7                                        | 7                                   | 0.008367                             | 2.5                    |
| -20                                                 |                                            | 4                                   | 0.004781                             | 2.5                    |
| -10                                                 |                                            | 9                                   | 0.010758                             | 2.5                    |
| 0                                                   |                                            | 3                                   | 0.003586                             | 2.5                    |
| 10                                                  |                                            | -1                                  | -0.001195                            | 2.5                    |
| 20                                                  |                                            | -5                                  | -0.005977                            | 2.5                    |
| 30                                                  |                                            | 0                                   | 0.000000                             | 2.5                    |
| 40                                                  |                                            | 3                                   | 0.003586                             | 2.5                    |
| 50                                                  |                                            | 6                                   | 0.007172                             | 2.5                    |
| 20                                                  | V min.= 3.5                                | 2                                   | 0.002391                             | 2.5                    |
|                                                     | V max.= 4.2                                | 0                                   | 0.000000                             | 2.5                    |

**PCS Band (Part 24E)****GSM Mode**

| Middle Channel, $f_0 = 1880.0$ MHz |                                   |                      |                       |        |
|------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                   | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                | 3.7                               | 12                   | 0.006383              | pass   |
| -20                                |                                   | 16                   | 0.008511              | pass   |
| -10                                |                                   | 5                    | 0.002660              | pass   |
| 0                                  |                                   | 9                    | 0.004787              | pass   |
| 10                                 |                                   | 13                   | 0.006915              | pass   |
| 20                                 |                                   | 1                    | 0.000532              | pass   |
| 30                                 |                                   | 9                    | 0.004787              | pass   |
| 40                                 |                                   | 10                   | 0.005319              | pass   |
| 50                                 |                                   | 8                    | 0.004255              | pass   |
| 20                                 | V min.= 3.5                       | 11                   | 0.005851              | pass   |
|                                    | V max.= 4.2                       | 6                    | 0.003191              | pass   |

**EDGE Mode**

| Middle Channel, $f_0 = 1880.0$ MHz |                                   |                      |                       |        |
|------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                   | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                | 3.7                               | 8                    | 0.004255              | pass   |
| -20                                |                                   | 6                    | 0.003191              | pass   |
| -10                                |                                   | 12                   | 0.006383              | pass   |
| 0                                  |                                   | 9                    | 0.004787              | pass   |
| 10                                 |                                   | 6                    | 0.003191              | pass   |
| 20                                 |                                   | -3                   | -0.001596             | pass   |
| 30                                 |                                   | 9                    | 0.004787              | pass   |
| 40                                 |                                   | 5                    | 0.002660              | pass   |
| 50                                 |                                   | 8                    | 0.004255              | pass   |
| 20                                 | V min.= 3.5                       | 11                   | 0.005851              | pass   |
|                                    | V max.= 4.2                       | 6                    | 0.003191              | pass   |

**WCDMA Mode**

| Middle Channel, $f_0$ =1880.0 MHz |                             |                      |                       |        |
|-----------------------------------|-----------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                  | Power Supplied ( $V_{DC}$ ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                               | 3.7                         | 9                    | 0.004787              | pass   |
| -20                               |                             | 5                    | 0.002660              | pass   |
| -10                               |                             | 1                    | 0.000532              | pass   |
| 0                                 |                             | 4                    | 0.002128              | pass   |
| 10                                |                             | -1                   | -0.000532             | pass   |
| 20                                |                             | -3                   | -0.001596             | pass   |
| 30                                |                             | 4                    | 0.002128              | pass   |
| 40                                |                             | -2                   | -0.001064             | pass   |
| 50                                |                             | 2                    | 0.001064              | pass   |
| 20                                | V min.= 3.5                 | 7                    | 0.003723              | pass   |
|                                   | V max.= 4.2                 | 9                    | 0.004787              | pass   |

**Band 4:**

| 20.0 MHz Middle Channel, $f_0$ =1732.5 MHz (QPSK) |                             |                      |                       |        |
|---------------------------------------------------|-----------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                                  | Power Supplied ( $V_{DC}$ ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                               | 3.7                         | -2                   | -0.00115              | pass   |
| -20                                               |                             | 1                    | 0.00058               | pass   |
| -10                                               |                             | 4                    | 0.00231               | pass   |
| 0                                                 |                             | -3                   | -0.00173              | pass   |
| 10                                                |                             | -6                   | -0.00346              | pass   |
| 20                                                |                             | 5                    | 0.00289               | pass   |
| 30                                                |                             | 2                    | 0.00115               | pass   |
| 40                                                |                             | -3                   | -0.00173              | pass   |
| 50                                                |                             | 4                    | 0.00231               | pass   |
| 25                                                | V min.= 3.5                 | 2                    | 0.00115               | pass   |
| 25                                                | V max.= 4.2                 | 1                    | 0.00058               | pass   |

**Band 7:**

| 20.0 MHz Middle Channel, $f_0=2535$ MHz (QPSK) |                                   |                      |                       |        |
|------------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                               | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                            | 3.7                               | 5                    | 0.00197               | pass   |
| -20                                            |                                   | 2                    | 0.00079               | pass   |
| -10                                            |                                   | 5                    | 0.00197               | pass   |
| 0                                              |                                   | 7                    | 0.00276               | pass   |
| 10                                             |                                   | 4                    | 0.00158               | pass   |
| 20                                             |                                   | 6                    | 0.00237               | pass   |
| 30                                             |                                   | 1                    | 0.00039               | pass   |
| 40                                             |                                   | 5                    | 0.00197               | pass   |
| 50                                             |                                   | 3                    | 0.00118               | pass   |
| 25                                             | V min.= 3.5                       | 5                    | 0.00197               | pass   |
| 25                                             | V max.= 4.2                       | 6                    | 0.00237               | pass   |

**Band 17:**

| 10.0 MHz Middle Channel, $f_0=710$ MHz (QPSK) |                                   |                      |                       |        |
|-----------------------------------------------|-----------------------------------|----------------------|-----------------------|--------|
| Temperature (°C)                              | Power Supplied (V <sub>DC</sub> ) | Frequency Error (Hz) | Frequency Error (ppm) | Result |
| -30                                           | 3.7                               | -1                   | -0.00141              | pass   |
| -20                                           |                                   | 2                    | 0.00282               | pass   |
| -10                                           |                                   | -7                   | -0.00986              | pass   |
| 0                                             |                                   | -7                   | -0.00986              | pass   |
| 10                                            |                                   | -4                   | -0.00563              | pass   |
| 20                                            |                                   | 1                    | 0.00141               | pass   |
| 30                                            |                                   | -5                   | -0.00704              | pass   |
| 40                                            |                                   | -2                   | -0.00282              | pass   |
| 50                                            |                                   | -6                   | -0.00845              | pass   |
| 25                                            | V min.= 3.5                       | -1                   | -0.00141              | pass   |
| 25                                            | V max.= 4.2                       | -3                   | -0.00423              | pass   |

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