



# **FCC RF Test Report**

**Product Name: cdma2000 Digital Mobile Phone**

**Model Number: HUAWEI C8651/C8651/C8651+/C8651S/CM980**

**Report No: SYBH(Z-RF)014082011-2001**

**FCC ID: QISC8651**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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## Notice

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## Notice 2

Table 1 Modification Information

|                             |   |                        |
|-----------------------------|---|------------------------|
| Modification<br>Information | 1 |                        |
|                             | 2 |                        |
|                             | 3 | <i>Not Applicable!</i> |
|                             | 4 |                        |
|                             | 5 |                        |
|                             | 6 |                        |
|                             | 7 |                        |



|                  |                                |
|------------------|--------------------------------|
| REGULATION       | FCC CFR47 Part 2: Subpart J;   |
|                  | FCC CFR47 Part 22 : Subpart H; |
|                  |                                |
|                  |                                |
|                  |                                |
|                  |                                |
|                  |                                |
|                  |                                |
| START OF TEST    | Aug.23, 2011                   |
| END OF TEST      | Aug.25, 2011                   |
|                  |                                |
| Final Judgement: | Pass                           |

Approved By

Aug.30, 2011  
Date

Dai Linjun  
Name

Dai Linjun  
Signature

Reviewed By

Aug.30, 2011  
Date

Cousy Xu  
Name

Cousy XU  
Signature

Operator

Aug.30, 2011  
Date

Huang Qiuliang  
Name

Huang Qiuliang  
Signature



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## 1 Summary

The table below summarizes the measurements and results for the EUT. Detailed results and descriptions are shown in the following pages.

Summary of results

| FCC Measurement Specification | FCC Limits Part(s) | Description                             | Result |
|-------------------------------|--------------------|-----------------------------------------|--------|
| 2.1046                        | 22.913             | Effective Radiated Power of Transmitter | PASS   |
| 2.1046                        | 22.913             | Conducted Power of Transmitter          | PASS   |
| 2.1047                        |                    | Modulation Characteristics              | PASS   |
| 2.1049                        |                    | Occupied Bandwidth                      | PASS   |
| 2.1051                        | 22.917             | Band Edges Compliance                   | PASS   |
| 2.1051                        | 22.917             | Spurious Emission at Antenna Terminals  | PASS   |
| 2.1053                        | 22.917             | Radiated Spurious Emissions             | PASS   |
| 2.1055                        | 22.355             | Frequency Stability                     | PASS   |



## 2 Product Description

### 2.1 Production Information

#### 2.1.1 General Description

cdma2000 Digital Mobile Phone-HUAWEI C8651/C8651/C8651+/C8651S/CM980 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular, the band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1XEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service). It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

#### 2.1.2 Support function and Service

The EUT support the function and service as follows:

Table 2 Service and Test mode List

| Service Name | Characteristic              | Corresponding Test Mode | Note (Corresponding coding and transmission rates)                                                                                                                                                                                                                            |
|--------------|-----------------------------|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| data and SMS | Modulation: QPSK            | TM1                     |                                                                                                                                                                                                                                                                               |
| data and SMS | Modulation: HPSK            | TM3                     |                                                                                                                                                                                                                                                                               |
| Data(EV-DO)  | Default Access Channel MAC  | Subtype 0               | Modulation: HPSK                                                                                                                                                                                                                                                              |
| data(EV-DO)  | Enhanced Access Channel MAC | Subtype 2               | The R-Data packet size determines the modulation format,<br>R-Data Packet Size:<br>128, 256, 512, 768 or 1024<br>Modulation: BPSK<br>R-Data Packet Size:<br>1536 ,<br>2048,3072,4096,6144 or<br>8192<br>Modulation: QPSK<br>R-Data Packet Size:<br>12288<br>Modulation: 8-PSK |

Note: \* The test conditions and settings are defined in ANSI/TIA-98-E section 1.3, 3GPP2 c.s0033-0-v2.0 and 3GPP2 C.S0033-A-v1.0.



## 2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

| Model Number    | Board/Module | Original Version | New Version | Modify Information |
|-----------------|--------------|------------------|-------------|--------------------|
| Not applicable! |              |                  |             |                    |
|                 |              |                  |             |                    |
|                 |              |                  |             |                    |



### 3 Test Site Description

The test site of:

**Huawei Technologies Co. Ltd.**  
**P.O. Box 518129**  
**Huawei base, bantian,**  
**Longgang District, Shenzhen, China**

#### 3.1 Testing Period

The test have been performed during the period of

**Aug.23, 2011 to Aug.25, 2011**

#### 3.2 General Set up Description

The EUT can Support Cellular Band, and Support the CDMA2000 1x standard and the CDMA2000 1xEV-DO Rev. A standard. During this measurement, EUT works in CDMA / EV-DO mode and Cellular Band.

##### CDMA MODE:

**TM1:** Forward Traffic Channel Radio Configuration 1, Reverse Traffic Channel Radio Configuration 1

**TM3:** Forward Traffic Channel Radio Configuration 3, Reverse Traffic Channel Radio Configuration 3

| Parameter                   | Units        | Value |
|-----------------------------|--------------|-------|
| $\hat{I}_{or}$              | dBm/1.23 MHz | -104  |
| $\frac{Pilot Ec}{I_{or}}$   | dB           | -7    |
| $\frac{Traffic Ec}{I_{or}}$ | dB           | -7.4  |

##### EVDO MODE:

Current Physical Layer Subtype:

**Subtype 0\*** indicates that the protocol subtype assigned to the Access Channel MAC protocol is Default Access Channel MAC and its Subtype ID number is 0x0000.

**Subtype 2\*** indicates that the protocol subtype assigned to the Access Channel MAC protocol is Enhanced Access Channel MAC and its Subtype ID number is 0x0002

Note: \*The test settings are defined in 3GPP2 C.S0033



## 4 Product Description

### 4.1 Technical Characteristics

#### 4.1.1 Frequency Range

Table 4 Frequency Range

|                |                |
|----------------|----------------|
| Uplink band:   | 824 to 849 MHz |
| Downlink band: | 869 to 894 MHz |

#### 4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

|                     |          |
|---------------------|----------|
| Channel spacing:    | 30 KHz   |
| Channel separation: | 1.23 MHz |

#### 4.1.3 Type of Emission

Table 6 Type of Emission

|                       |         |
|-----------------------|---------|
| Emission Designation: | 1M23F9W |
|-----------------------|---------|

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

#### 4.1.4 Environmental Requirements

Table 7 Environmental Requirements

|                      |          |
|----------------------|----------|
| Minimum temperature: | - 10 °C  |
| Maximum temperature: | + 55 °C  |
| Relative Humidity:   | 5%~95%RH |

#### 4.1.5 Power Source

Table 8 Power Source

|                     |            |
|---------------------|------------|
| AC voltage nominal: | ~120V      |
| AC voltage range    | ~100V-240V |
| AC current maximal: | 1A         |

#### 4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033 (9)

Please reference the document Tune-up Procedure in TCF.

#### 4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033 (8)

The voltage and current in the final RF stage is:

Table 9 Applied DC Voltages and Currents

|          |                                                                                                |
|----------|------------------------------------------------------------------------------------------------|
| Voltage: |  +3.6~4.2 V |
| Current: | 100m A According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)                         |



## 4.2 EUT Identification List

### 4.2.1 Board Information

Table 10 Board Information

| cdma2000 Digital Mobile Phone          |                      |                  |
|----------------------------------------|----------------------|------------------|
| HUAWEI C8651/C8651/C8651+/C8651S/CM980 |                      |                  |
| Hardware Version                       | Software Version     | Serial Number    |
| HC1C8651M                              | C8651V100R001C32B833 | R6X2A11171900223 |

### 4.2.2 Adapter

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| AC/DCAdapter Model | HW-050100U1W                                                                            |
| Manufacturer       | Huawei Technologies Co., Ltd.                                                           |
| Input Voltage      | ~100-240V 50/60Hz 0.2A                                                                  |
| Output Voltage     | 5V  1A |
| Rated Power        | 5W                                                                                      |

### 4.2.3 Battery

| Name                | Manufacture                   | Description                                                                                                                                                                                                                                                                   |
|---------------------|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rechargeable Li-ion | Huawei Technologies Co., Ltd. | Battery Model: HB5K1H<br>Rated capacity: 1400mAh<br>Nominal Voltage:  +3.7V<br>Charging Voltage:  +4.2V |

### 4.2.4 FCC Identification

Grantee Code: QIS  
Product Code: C8651  
FCC Identification: QISC8651

## 5 Main Test Instruments

Table 11 Main Test Equipments

| Equipment Description                | Manufacturer | Model                   | Serial Number | Calibrated until |
|--------------------------------------|--------------|-------------------------|---------------|------------------|
| Power supply                         | KEITHLEY     | 2303                    | 1288003       | Sep.27,2011      |
| Universal Radio Communication Tester | R&S          | CMU200                  | 105822        | Oct.24,2011      |
| Universal Radio Communication Tester | Agilent      | E5515C                  | MY50260239    | Aug.04,2012      |
| Spectrum Analyzer                    | Agilent      | E4440A                  | MY49420179    | Apr.24,2012      |
| Signal Analyzer                      | R&S          | FSQ40                   | 100025        | Oct.09,2011      |
| Signal Analyzer                      | R&S          | FSQ31                   | 200021        | Sep.27,2011      |
| Temperature Chamber                  | ESPEC        | MW3030                  | 611403        | May.12,2012      |
| Signal Generator                     | R&S          | SMR40                   | 100325        | May.12,2012      |
| Vector Signal Generator              | R&S          | SMU200A                 | 104162        | Sep.07,2011      |
| Spectrum Analyzer                    | R&S          | FSU26                   | EG26725       | Mar.07,2012      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 919/1009      | Dec.13.2011      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 979/917       | Dec.13.2011      |
| Horn Antenna                         | R & S        | HF906                   | 359287/005    | May.07, 2012     |
| Horn Antenna                         | R & S        | HF906                   | 359287/006    | April.27, 2012   |
| Broadband Antenna                    | SCHAFFNER    | CBL 6112B               | 2536          | Sep.21, 2011     |
| Broadband Antenna                    | SCHAFFNER    | CBL 6112B               | 2941          | Jun.11, 2012     |
| Test receiver                        | R&S          | ESU26                   | 36090302083   | Jun.17.2012      |
| Horn Antenna                         | ETS-LINDGREN | 3160                    | 60008         | Sep.20.2011      |
| Horn Antenna                         | ETS-LINDGREN | 3160                    | 60006         | Oct.27.2011      |

## 6 Transmitter Measurements

### 6.1 Effective Radiated Power of Transmitter (ERP)

#### 6.1.1 Test Conditions

Table 12 Test Conditions

|                      |                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                    |
| Measured at:         | enclosure                                                                                   |
| Ambient temperature: | 25°C                                                                                        |
| Relative humidity:   | 55%                                                                                         |
| Test Configurations: | CDMA TM1 and TM3 at frequency B,M,T<br>EVDO Mode Subtype 0 and Subtype 2 at frequency B,M,T |

#### 6.1.2 Test Specifications and Limits

##### 6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913

##### 6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

|                     |                                                                                     |
|---------------------|-------------------------------------------------------------------------------------|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum              |

##### 6.1.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of EUT transmitter exceed 7 W. The calculated longitude ERP by following formula:  $ERP(dBm) = 10 \cdot \log(ERP_{in\ mwatts})$ .

Table 14 Limits

|                              |            |
|------------------------------|------------|
| Maximum Output Power (Watts) | < 7 Watts  |
| Maximum Output Power (dBm)   | < 38.5 dBm |

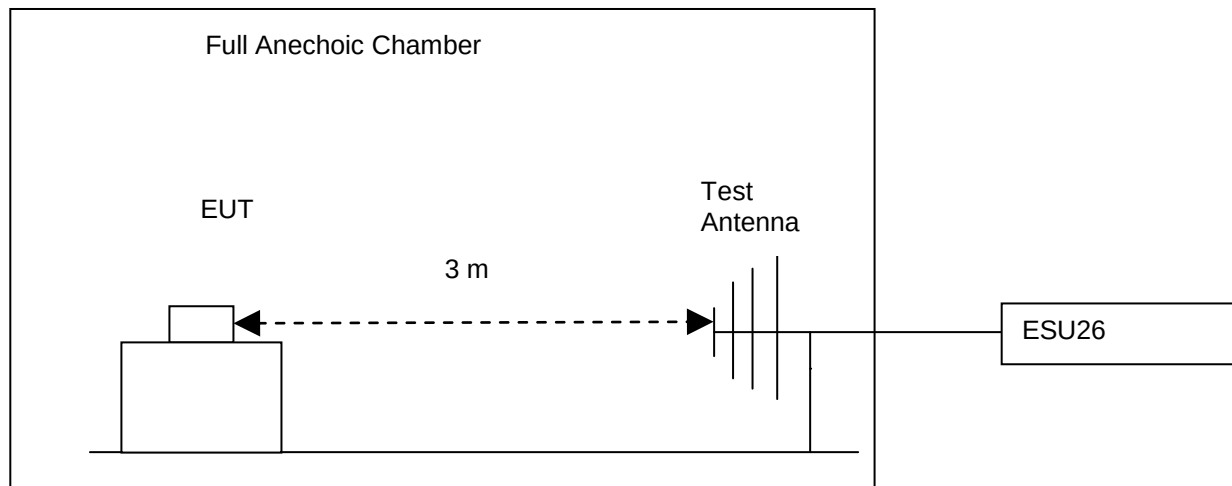
#### 6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the wireless communication tester CMU200 the air interface. The band class is set as US Cellular.
- Test the Radiated maximum output power by the CMU200 received from test antenna.
- Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the

signal generator to get the same received power recorded in step (b) on CMU200, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

## Test setup

### Step 1: Pre-test



### Step 2: Substitution method to verify the maximum ERP

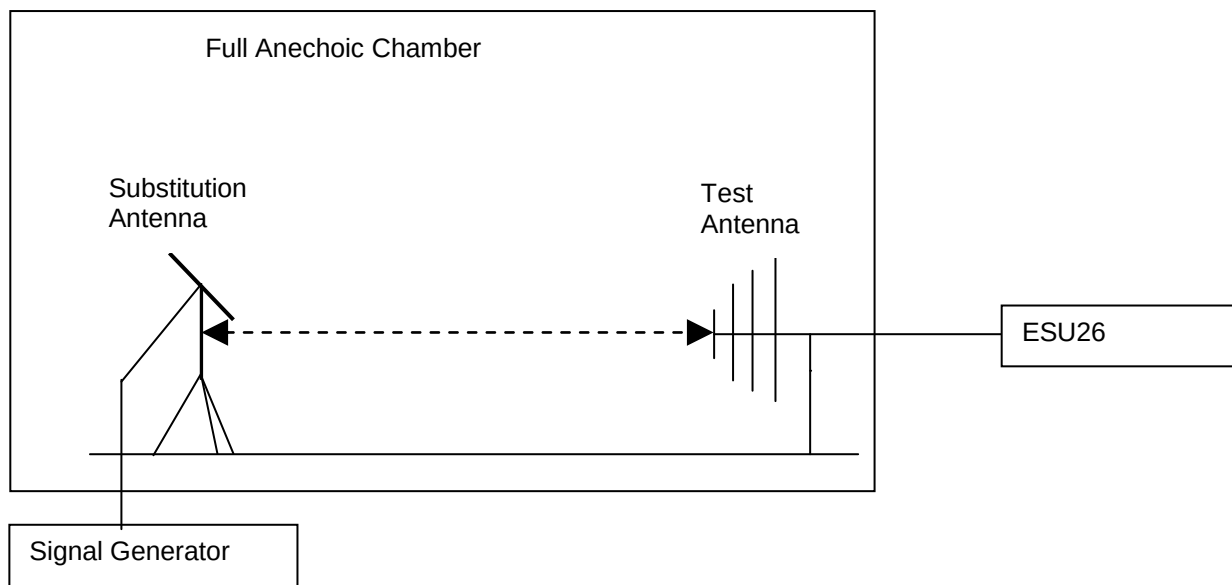


Figure 1. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

## 6.1.4 Measurement Results

Table 15 Measurement Results

| TEST CONDITIONS |                                                     | RF Output Power(ERP)         |       |                             |       |                              |       |
|-----------------|-----------------------------------------------------|------------------------------|-------|-----------------------------|-------|------------------------------|-------|
|                 |                                                     | Channel 1013(B)<br>824.7 MHz |       | Channel 384(M)<br>836.52MHz |       | Channel 777(T)<br>848.31 MHz |       |
|                 |                                                     | dBm                          |       | dBm                         |       | dBm                          |       |
|                 |                                                     | Measured                     | Limit | Measured                    | Limit | Measured                     | Limit |
| TM1             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 21.11                        | 38.5  | 21.17                       | 38.5  | 21.14                        | 38.5  |
| TM3             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 21.23                        | 38.5  | 21.24                       | 38.5  | 20.98                        | 38.5  |
| Subtype 0       | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 21.67                        | 38.5  | 20.86                       | 38.5  | 20.57                        | 38.5  |
| Subtype 2       | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 20.82                        | 38.5  | 21.02                       | 38.5  | 20.70                        | 38.5  |

### 6.1.4.1 Substitution Results

Table 16 Substitution Results

| Test Mode | Freq. [MHz] | Meas. Level [dBm] | Substitution Antenna Type | SGP [dBm] | Substitution Gain [dBd] | Cable Loss [dB] | Substitution Level (ERP) [dBm] | Limit [dBm] | Result |
|-----------|-------------|-------------------|---------------------------|-----------|-------------------------|-----------------|--------------------------------|-------------|--------|
| TM1       | 824.7       | 21.11             | Dipole Ant.               | 24.74     | -2.95                   | 0.6             | 21.19                          | 38.5        | Pass   |
| TM1       | 836.52      | 21.17             | Dipole Ant.               | 24.73     | -3.02                   | 0.6             | 21.11                          | 38.5        | Pass   |
| TM1       | 848.31      | 21.14             | Dipole Ant.               | 24.89     | -3.11                   | 0.6             | 21.18                          | 38.5        | Pass   |
| TM3       | 824.7       | 21.23             | Dipole Ant.               | 24.76     | -2.95                   | 0.6             | 21.21                          | 38.5        | Pass   |
| TM3       | 836.52      | 21.24             | Dipole Ant.               | 24.89     | -3.02                   | 0.6             | 21.27                          | 38.5        | Pass   |
| TM3       | 848.31      | 20.98             | Dipole Ant.               | 24.63     | -3.11                   | 0.6             | 20.92                          | 38.5        | Pass   |
| Subtype e | 824.7       | 21.67             | Dipole Ant.               | 25.19     | -2.95                   | 0.6             | 21.64                          | 38.5        | Pass   |
| Subtype e | 836.52      | 20.86             | Dipole Ant.               | 24.50     | -3.02                   | 0.6             | 20.88                          | 38.5        | Pass   |
| Subtype e | 848.31      | 20.57             | Dipole Ant.               | 24.23     | -3.11                   | 0.6             | 20.52                          | 38.5        | Pass   |



|         |        |       |             |       |       |     |       |      |      |
|---------|--------|-------|-------------|-------|-------|-----|-------|------|------|
| Subtype | 824.7  | 20.82 | Dipole Ant. | 24.41 | -2.95 | 0.6 | 20.86 | 38.5 | Pass |
| Subtype | 836.52 | 21.02 | Dipole Ant. | 24.71 | -3.02 | 0.6 | 21.09 | 38.5 | Pass |
| Subtype | 848.31 | 20.70 | Dipole Ant. | 24.46 | -3.11 | 0.6 | 20.75 | 38.5 | Pass |

Note: a, For get the ERP (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{ERP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

b, Measurement the ERP with RMS detector.

c, A CDMA EVDO signal with bandwidth of 1.23MHz is created by the vector generator R&S SMU200A.

d, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 1.23MHz.

### 6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

## 6.2 Conducted output power

### 6.2.1 Test Conditions

Table 17 Test Conditions

|                      |                                                                                          |
|----------------------|------------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                 |
| Measured at:         | Antenna connector                                                                        |
| Ambient temperature: | 25°C                                                                                     |
| Relative humidity:   | 55%                                                                                      |
| Test Configurations: | CDMA TM1 and TM3 at frequency B,M ,T<br>EVDO Subtype 0 and Subtype 2 at frequency B,M ,T |

### 6.2.2 Test Specifications and Limits

#### 6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913

#### 6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

|                     |                                                                                        |
|---------------------|----------------------------------------------------------------------------------------|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards    |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations |

#### 6.2.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. The calculated longitude ERP by following formula:

$$\text{ERP(dBm)} = 10 \cdot \log (\text{ERP}_{\text{in mwatts}}).$$

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

$$\text{P}_{\text{cod.}}(\text{dBm}) = \text{ERP}(\text{dBm}) - \text{Gain}(\text{dBd}).$$

$$\text{and Gain (dBd)} = \text{Gain(dBi)} - 2.15\text{dB}$$

Table 19 Limits

|                                      |                |
|--------------------------------------|----------------|
| Maximum Output Power                 | < 7 W(38.5dBm) |
| Antenna Gain(dBi):                   | -1.0           |
| Antenna Gain(dBd):                   | -3.15          |
| Maximum Conducted Output Power (dBm) | <41.65         |

### 6.2.3 Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Mobile Station to the wireless communication tester CMU200 via the antenna connector. The band class is set as US Cellular.

(b) Test the Conducted maximum output power by the CMU200.

#### Test setup

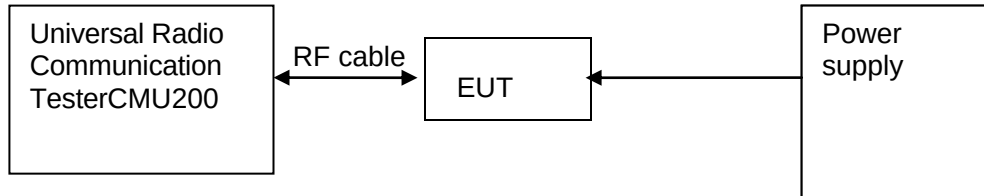


Figure 2. Test Set-up

### 6.2.4 Measurement Results

Table 20 Measurement Results

| TEST CONDITIONS |                                                     | RF Output Power             |       |                             |       |                             |       |
|-----------------|-----------------------------------------------------|-----------------------------|-------|-----------------------------|-------|-----------------------------|-------|
|                 |                                                     | Channel 1013(B)<br>824.7MHz |       | Channel 384(M)<br>836.52MHz |       | Channel 777(T)<br>848.31MHz |       |
|                 |                                                     | dBm                         |       | dBm                         |       | dBm                         |       |
|                 |                                                     | Measured                    | Limit | Measured                    | Limit | Measured                    | Limit |
| TM1             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 24.26                       | 41.65 | 24.32                       | 41.65 | 24.29                       | 41.65 |
| TM3             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 24.38                       | 41.65 | 24.39                       | 41.65 | 24.13                       | 41.65 |
| Subtype 0       | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 24.82                       | 41.65 | 24.01                       | 41.65 | 23.72                       | 41.65 |
| Subtype 2       | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.7V) | 23.97                       | 41.65 | 24.17                       | 41.65 | 23.85                       | 41.65 |

Note: Measurement the Conducted output power with RMS detector.

### 6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

## 6.3 Modulation Characteristics

### 6.3.1 Test Conditions

Table 21 Test Conditions

|                      |                                                                                          |
|----------------------|------------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                 |
| Measured at:         | Antenna connector                                                                        |
| Ambient temperature: | 25 °C                                                                                    |
| Relative humidity:   | 55 %                                                                                     |
| Test Configurations: | CDMA mode TM1 and TM3 at frequency M<br>EVDO mode Subtype 0 and Subtype 2 at frequency M |

### 6.3.2 Test Specifications and Limits

#### 6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H.

#### 6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003  | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum.             |

#### 6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 22 subpart H.

Table 23 Limits

|        |                |
|--------|----------------|
| Limits | Not applicable |
|--------|----------------|

### 6.3.3 Test Method and Setup

Connect the EUT Wireless Module to Universal Radio Communication Tester CMU200 via the antenna connector. The band class is set as US Cellular; the EUT output is matched with 50  $\Omega$  loads, test method was according to ANSI/TIA-98-E. The waveform quality and constellation of the EUT Wireless Module were tested.

#### Test setup

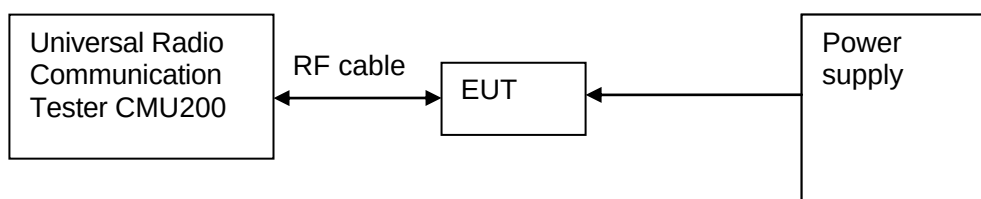


Figure 3. Test Set-up

### 6.3.4 Measurement Results

Table 24 Measurement Results

| TEST CONDITIONS          |                         | Modulation Characteristic |                       |
|--------------------------|-------------------------|---------------------------|-----------------------|
|                          |                         | Channel 384(M)            |                       |
|                          |                         | 836.52MHz                 |                       |
|                          |                         | Measured                  |                       |
|                          |                         | CDMA Mode                 | EVDO Mode             |
|                          |                         | TM1 & TM3                 | Subtype 0 & Subtype 2 |
| T <sub>nom</sub> (25 °C) | V <sub>nom</sub> (3.7V) | Refer to Appendix A       | Refer to Appendix A   |
|                          |                         |                           |                       |

### 6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix A.

## 6.4 Occupied Bandwidth

### 6.4.1 Test Conditions

Table 25 Test Conditions

|                      |                                                                                               |
|----------------------|-----------------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                      |
| Measured at:         | Antenna connector                                                                             |
| Ambient temperature: | 25 °C                                                                                         |
| Relative humidity:   | 55 %                                                                                          |
| Test Configurations: | CDMA TM1 and TM3 at frequency B,M ,T<br>EVDO Mode Subtype 0 and Subtype 2 at frequency B,M ,T |

### 6.4.2 Test Specifications and Limits

#### 6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 22 subpart H.

#### 6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

|                      |                                                                                        |
|----------------------|----------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment<br>Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003  | Recommended Minimum Performance Standards for<br>cdma2000 Spread Spectrum              |

#### 6.4.2.3 Limits

No specific occupied bandwidth requirement in part 22 subpart H, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Table 27 Limits

|                               |                        |
|-------------------------------|------------------------|
| Upper /lower frequency limits | 0.5% of the mean power |
|-------------------------------|------------------------|

### 6.4.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector. The band class is set as US Cellular; EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT by the FSQ31.

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Refer to 47CFR part 2.1049 section (g)&(h).

(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the

services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.

(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

Measurement bandwidth (RBW): 30 kHz (Resolution bandwidth)  
Video bandwidth (VBW): 300 kHz

### Test Set-up

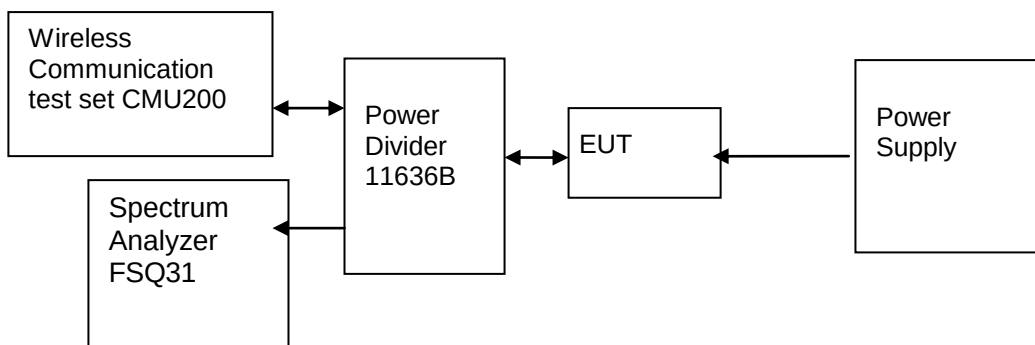


Figure 4. Test Set-up

### 6.4.4 Measurement Results

Table 28 Measurement Results

| TEST CONDITIONS             |                            | Occupied Bandwidth           |      |           |           |                             |      |           |           |                             |      |           |           |
|-----------------------------|----------------------------|------------------------------|------|-----------|-----------|-----------------------------|------|-----------|-----------|-----------------------------|------|-----------|-----------|
|                             |                            | Channel 1013(B)<br>824.70MHz |      |           |           | Channel 384(M)<br>836.52MHz |      |           |           | Channel 777(T)<br>848.31MHz |      |           |           |
|                             |                            | Measured (MHz)               |      |           |           | Measured (MHz)              |      |           |           | Measured (MHz)              |      |           |           |
|                             |                            | CDMA                         |      | EVDO      |           | CDMA                        |      | EVDO      |           | CDMA                        |      | EVDO      |           |
|                             |                            | TM1                          | TM3  | Subtype 0 | Subtype 2 | TM1                         | TM3  | Subtype 0 | Subtype 2 | TM1                         | TM3  | Subtype 0 | Subtype 2 |
| T <sub>nom</sub><br>(25 °C) | V <sub>nom</sub><br>(3.7V) | 1.29                         | 1.28 | 1.29      | 1.28      | 1.28                        | 1.28 | 1.29      | 1.29      | 1.28                        | 1.28 | 1.28      | 1.28      |

### 6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix B.

## 6.5 Band Edges Compliance

### 6.5.1 Test Conditions

Table 29 Test Conditions

|                      |                                                                                         |
|----------------------|-----------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                |
| Measured at:         | Antenna connector                                                                       |
| Ambient temperature: | 25°C                                                                                    |
| Relative humidity:   | 55 %                                                                                    |
| Test Configurations: | CDMA TM1 and TM3 at frequency B,T<br>EVDO Mode Subtype 0 and Subtype 2 at frequency B,T |

### 6.5.2 Test Specifications and Limits

#### 6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003  | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum              |

#### 6.5.2.3 Limits

Compliance with 22.917, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$ . (Whereas P is the rated power of the EUT in Watt).

Table 31 Limits

|                       |                                             |
|-----------------------|---------------------------------------------|
| Rated Power:          | 24 dBm                                      |
| Required attenuation: | $43 + 10 \log (0.25) = 37$ , 24 dBm – 37 dB |
| Absolute level        | - 13 dBm                                    |

### 6.5.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector, the band class is set as US Cellular. EUT was controlled to transmit maximum power. Measure and record Band edge compliance of the EUT by the FSQ31.

Measurement bandwidth (RBW): 20 kHz (Resolution bandwidth)  
Video bandwidth (VBW): 200 kHz

### Test Set-up

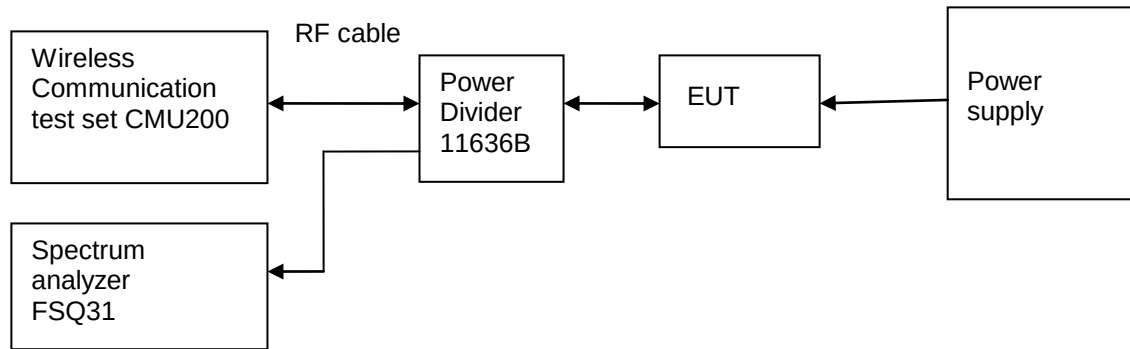


Figure 5. Test Set-up

## 6.5.4 Measurement Results

Table 32 Measurement Results outside Band Edges-- Single Carrier

| Band        | Frequency of Band edges [MHz]       | Channel Number | Test Mode             | Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|-------------|-------------------------------------|----------------|-----------------------|-------------|-------------------------------|-----------|--------|
| US Cellular | $T_{nom}$ (25 °C), $V_{nom}$ (3.7V) |                |                       |             |                               |           |        |
|             | 824.70                              | 1013 (B)       | TM1 & TM3             | 24          | <-13(See appendix C)          | - 13 dBm  | Pass   |
|             | 848.31                              | 777 (T)        | TM1 & TM3             | 24          | <-13(See appendix C)          | - 13 dBm  | Pass   |
| US Cellular | $T_{nom}$ (25 °C), $V_{nom}$ (3.7V) |                |                       |             |                               |           |        |
|             | 824.70                              | 1013 (B)       | Subtype 0 & Subtype 2 | 24          | <-13(See appendix C)          | - 13 dBm  | Pass   |
|             | 848.31                              | 777 (T)        | Subtype 0 & Subtype 2 | 24          | <-13(See appendix C)          | - 13 dBm  | Pass   |

## 6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix C.

## 6.6 Spurious Emission at Antenna Terminal

### 6.6.1 Test Conditions

Table 33 Test Conditions

|                      |                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                                    |
| Measured at:         | Antenna connector                                                                           |
| Ambient temperature: | 25°C                                                                                        |
| Relative humidity:   | 55 %                                                                                        |
| Test Configurations: | CDMA TM1 and TM3 at frequency B,M,T<br>EVDO Mode Subtype 0 and Subtype 2 at frequency B,M,T |

### 6.6.2 Test Specifications and Limits

#### 6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003  | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum.             |

#### 6.6.2.3 Limits

Compliance with part 22.917, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$ . (Whereas P is the rated power of the EUT in Watt).

Table 35 Limits

|                       |                                            |
|-----------------------|--------------------------------------------|
| Rated Power:          | 24 dBm                                     |
| Required attenuation: | $43 + 10 \log(0.25) = 37$ , 24 dBm – 37 dB |
| Absolute level        | - 13 dBm                                   |

### 6.6.3 Test Method and Setup

EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector, the band class is set as US Cellular. EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the FSQ31.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;  
Measurement bandwidth (RBW) for 30 MHz up to 1 GHz: 100 kHz;  
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;

## Test Set-up

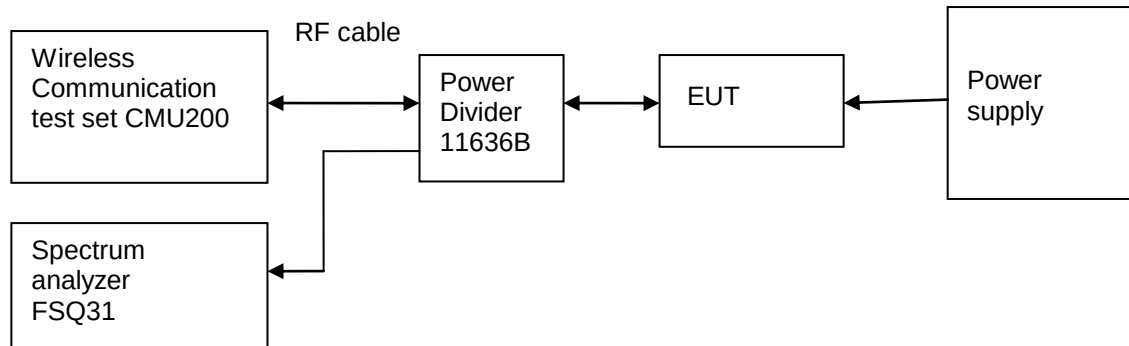


Figure 6. Test Set-up

## 6.6.4 Measurement Results

Table 36 Measurement Results

| Channel Number  | Test Mode | Test Range (Frequency) | Output Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|-----------------|-----------|------------------------|--------------------|-------------------------------|-----------|--------|
| Channel 1013(B) | TM1       | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | TM3       | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | Subtype 0 | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | Subtype 2 | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
| Channel 384 (M) | TM1       | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | TM3       | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | Subtype 0 | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
|                 | Subtype 2 | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
| Channel 777 (T) | TM1       | 9 kHz ~12.75GHz        | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |



|  |              |                    |    |                               |             |      |
|--|--------------|--------------------|----|-------------------------------|-------------|------|
|  | TM3          | 9 kHz<br>~12.75GHz | 24 | <- 13 dBm<br>(See appendix D) | - 13<br>dBm | Pass |
|  | Subtype<br>0 | 9 kHz<br>~12.75GHz | 24 | <- 13 dBm<br>(See appendix D) | - 13<br>dBm | Pass |
|  | Subtype<br>2 | 9 kHz<br>~12.75GHz | 24 | <- 13 dBm<br>(See appendix D) | - 13<br>dBm | Pass |

### 6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix D.

## 6.7 Radiated Spurious Emissions

### 6.7.1 Test Conditions

Table 37 Test Conditions

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                            |
| Measured at:         | enclosure                                                                           |
| Ambient temperature: | 25°C                                                                                |
| Relative humidity:   | 55%                                                                                 |
| Test Configurations: | CDMA TM1 and TM3 at frequency M<br>EVDO Mode Subtype 0 and Subtype 2 at frequency M |

### 6.7.2 Test Specifications and Limits

#### 6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 22.917

#### 6.7.2.2 Supporting Standards

Table 38 Supporting Standards:

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003  | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum.             |

#### 6.7.2.3 Limits

Compliance with part 22.917, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$ . (Whereas P is the rated power of the EUT).

Table 39 Limits

|                       |                                            |
|-----------------------|--------------------------------------------|
| Rated Power:          | 24 dBm                                     |
| Required attenuation: | $43 + 10 \log(0.25) = 37$ , 24 dBm – 37 dB |
| Absolute level        | - 13 dBm                                   |

### 6.7.3 Test Method and Setup

A test site fulfilling the requirements of ITU-R Recommendation SM329-11 was used. The EUT was placed on a non-conducting support in the anechoic chamber and was operated from a power source via an RF filter to avoid radiation from the power leads.

According to part 22.917, the defined measurement bandwidth as following:

22.917 (b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;

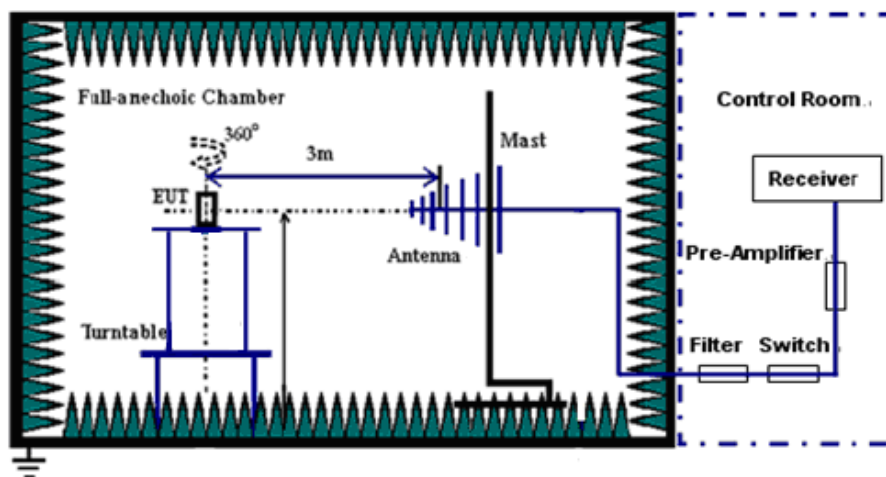
Measurement bandwidth (RBW) for 30MHz up to 1GHz: 100k Hz;  
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

## Test Set-up

### Step 1:

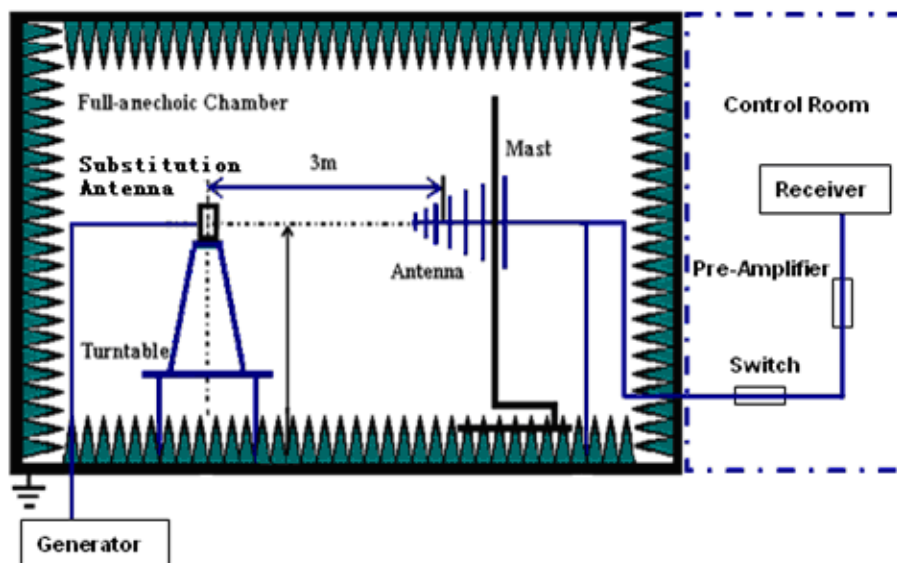
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the BTS simulator via the air interface.

Test the Radiated maximum output power by the Test Receiver from test antenna.



### Step 2:

Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step1 on Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.



Test should be performed in normal voltage condition.

No peak found in pre- test. All frequency points' margin is bigger than 20dB, so the substitution method



isn't used.

Calculation Sample:

Table 40 Substitution Results

| Freq.<br>[MHz] | Measure<br>ment<br>Value<br>[dBm] | Substitution<br>Antenna<br>Type | Gain<br>[dBd] | Cable<br>Loss [dB] | Signal<br>Generator<br>Level [dBm] | Substitution<br>Level<br>[dBm] | FCC<br>limit<br>[dBm] | Result |
|----------------|-----------------------------------|---------------------------------|---------------|--------------------|------------------------------------|--------------------------------|-----------------------|--------|
|                |                                   |                                 |               |                    |                                    |                                |                       |        |

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{E.R.P. [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBd]}$$

NOTE: SGP- Signal Generator Level

#### 6.7.4 Conclusion

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix\_E

## 6.8 Frequency Stability

### 6.8.1 Test Conditions

Table 41 Test Conditions

|                      |                                                                                     |
|----------------------|-------------------------------------------------------------------------------------|
| Preconditioning:     | 0.5 hour                                                                            |
| Measured at:         | Antenna connector                                                                   |
| Ambient temperature: | See below                                                                           |
| Relative humidity:   | 55 %                                                                                |
| Test Configurations: | CDMA TM1 and TM3 at frequency M<br>EVDO Mode Subtype 0 and Subtype 2 at frequency M |

### 6.8.2 Test Specifications and Limits

#### 6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 22.355

#### 6.8.2.2 Supporting Standards

Table 42 Supporting Standards:

|                      |                                                                                        |
|----------------------|----------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment<br>Measurement and Performance Standards |
| ANSI/TIA-98E: 2003   | Recommended Minimum Performance Standards for<br>cdma2000 Spread Spectrum              |

#### 6.8.2.3 Limits

According to part 22.355, from 821MHz to 896MHz, for mobile device, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm.

### 6.8.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in subparagraphs
- (2) and (3) of paragraph 2.1055

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than  $10^{\circ}$  centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.

(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(c) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

The EUT can only work in such extreme voltage 3.6V and 4.2V, so here the EUT is tested in the 3.6V and 4.2V.

## Test Set up

Connect the EUT to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50  $\Omega$  loads.

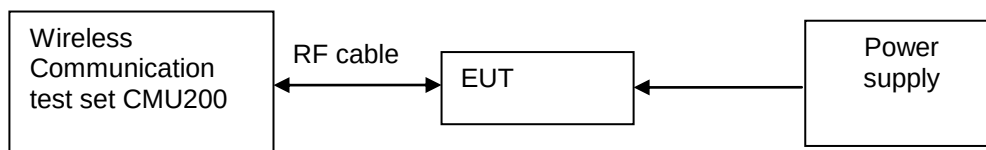


Figure 7. Test Set up

## 6.8.4 Measurement Results

### 6.8.4.1 Measurement Results vs. Variation of Temperature

- TM1, +3.7V DC Channel No.384(836.52MHz)

Table 43 Measurement Results vs. Variation of Temperature—TM1

| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C      | 24          | 836.52                  | -11                          | Pass   |
| -20 °C      | 24          | 836.52                  | -18                          | Pass   |
| -10 °C      | 24          | 836.52                  | 14                           | Pass   |
| 0 °C        | 24          | 836.52                  | 9                            | Pass   |
| +10 °C      | 24          | 836.52                  | -12                          | Pass   |
| +20 °C      | 24          | 836.52                  | 13                           | Pass   |
| +30 °C      | 24          | 836.52                  | -15                          | Pass   |
| +40 °C      | 24          | 836.52                  | -1                           | Pass   |
| +50 °C      | 24          | 836.52                  | 14                           | Pass   |

● TM3, +3.7V DC Channel No.**384(836.52MHz)**

Table 44 Measurement Results vs. Variation of Temperature—TM3

| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C      | 24          | 836.52                  | -15                          | Pass   |
| -20 °C      | 24          | 836.52                  | 13                           | Pass   |
| -10 °C      | 24          | 836.52                  | 15                           | Pass   |
| 0 °C        | 24          | 836.52                  | -18                          | Pass   |
| +10 °C      | 24          | 836.52                  | -14                          | Pass   |
| +20 °C      | 24          | 836.52                  | 11                           | Pass   |
| +30 °C      | 24          | 836.52                  | 14                           | Pass   |
| +40 °C      | 24          | 836.52                  | 13                           | Pass   |
| +50 °C      | 24          | 836.52                  | -19                          | Pass   |

● Subtype 0, +3.7V DC Channel No.**384(836.52MHz)**

Table 45 Measurement Results vs. Variation of Temperature—EVDO

| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C      | 24          | 836.52                  | -18                          | Pass   |
| -20 °C      | 24          | 836.52                  | -11                          | Pass   |
| -10 °C      | 24          | 836.52                  | 15                           | Pass   |
| 0 °C        | 24          | 836.52                  | 14                           | Pass   |
| +10 °C      | 24          | 836.52                  | 12                           | Pass   |
| +20 °C      | 24          | 836.52                  | -18                          | Pass   |
| +30 °C      | 24          | 836.52                  | -11                          | Pass   |
| +40 °C      | 24          | 836.52                  | 15                           | Pass   |
| +50 °C      | 24          | 836.52                  | 14                           | Pass   |

● Subtype 2, +3.7V DC Channel No.**384(836.52MHz)**

Table 46 Measurement Results vs. Variation of Temperature—EVDO

| Temperature | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|-------------|-------------------------|------------------------------|--------|
| -30 °C      | 24          | 836.52                  | 6                            | Pass   |
| -20 °C      | 24          | 836.52                  | 15                           | Pass   |

|        |    |        |     |      |
|--------|----|--------|-----|------|
| -10 °C | 24 | 836.52 | -8  | Pass |
| 0 °C   | 24 | 836.52 | -6  | Pass |
| +10 °C | 24 | 836.52 | 11  | Pass |
| +20 °C | 24 | 836.52 | 14  | Pass |
| +30 °C | 24 | 836.52 | -18 | Pass |
| +40 °C | 24 | 836.52 | -16 | Pass |
| +50 °C | 24 | 836.52 | 12  | Pass |

#### 6.8.4.2 Measurement Results vs. Variation of Voltage

- TM1, 25 °C ,Channel No.**384(836.52MHz)**

Table 47 Measurement Results vs. Variation of Voltage—TM1

| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| +3.6    | 24          | 836.52                  | 7                            | Pass   |
| +3.7    | 24          | 836.52                  | -11                          | Pass   |
| +4.2    | 24          | 836.52                  | -4                           | Pass   |

- TM3, 25 °C ,Channel No.**384(836.52MHz)**

Table 48 Measurement Results vs. Variation of Voltage—TM3

| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| +3.6 V  | 24          | 836.52                  | -13                          | Pass   |
| +3.7 V  | 24          | 836.52                  | 8                            | Pass   |
| +4.2 V  | 24          | 836.52                  | -5                           | Pass   |

- Subtype 0 , 25 °C ,Channel No.**384(836.52MHz)**

Table 49 Measurement Results vs. Variation of Voltage—EVDO

| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| +3.6 V  | 24          | 836.52                  | 19                           | Pass   |
| +3.7 V  | 24          | 836.52                  | -14                          | Pass   |
| +4.2 V  | 24          | 836.52                  | 11                           | Pass   |

- Subtype 2 , 25 °C ,Channel No.**384(836.52MHz)**

Table 50 Measurement Results vs. Variation of Voltage—EVDO



| Voltage | Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|-------------|-------------------------|------------------------------|--------|
| +3.6 V  | 24          | 836.52                  | 12                           | Pass   |
| +3.7 V  | 24          | 836.52                  | -13                          | Pass   |
| +4.2 V  | 24          | 836.52                  | -6                           | Pass   |

### 6.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.

## 7 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Table 51 System Measurement Uncertainty

| Items                                           |                         | Extended Uncertainty |
|-------------------------------------------------|-------------------------|----------------------|
| Effective Radiated Power of Transmitter         | ERP(dBm)                | U=3dB; k=2           |
| Band Width                                      | Magnitude (%)           | U=0.2%; k=2          |
| Band Edge Compliance                            | Disturbance Power (dBm) | U=2.0dB; k=2         |
| Conducted Spurious Emission at Antenna Terminal | Disturbance Power (dBm) | U=2.0dB; k=2         |
| Frequency Stability                             | Frequency Accuracy(ppm) | U=0.21ppm; k=2       |
| Field Strength of Spurious Radiation            | ERP(dBm)                | U=2.2dB; k=2         |
| Conducted Output Power                          | Power(dBm)              | U=0.39dB; k=2        |



## 8 Appendixes

|            |                                                           |
|------------|-----------------------------------------------------------|
| Appendix A | Measurement Results Modulation Characteristics            |
| Appendix B | Measurement Results Occupied Bandwidth                    |
| Appendix C | Measurement Results Band Edges                            |
| Appendix D | Measurement Results Spurious Emission at Antenna Terminal |
| Appendix E | Measurement Results Radiated Spurious Emissions           |
| Appendix F | Photos of Radiated Spurious Emissions                     |

-- END OF REPORT ---



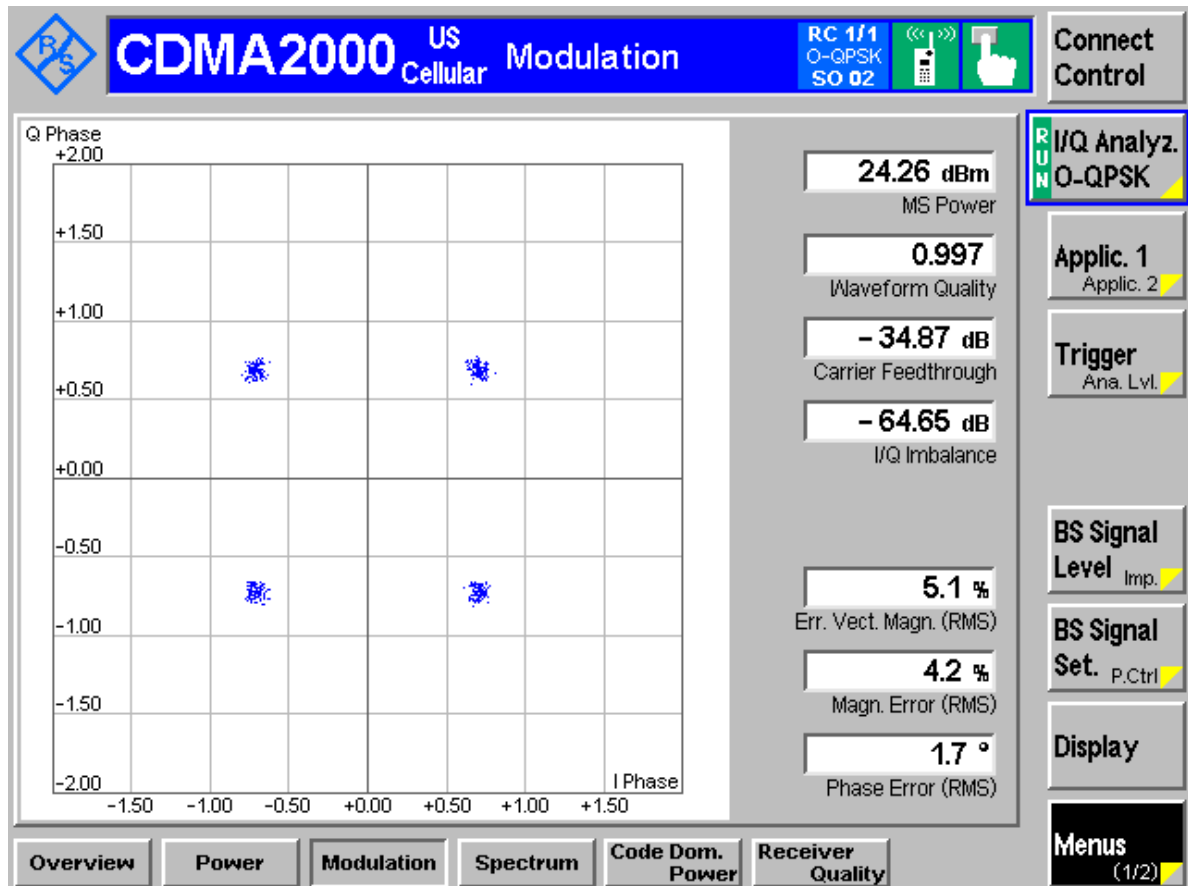
## **Appendix A**

### **Modulation Characteristics**

According to FCC Part 2.1047 & Part 22 Subpart H

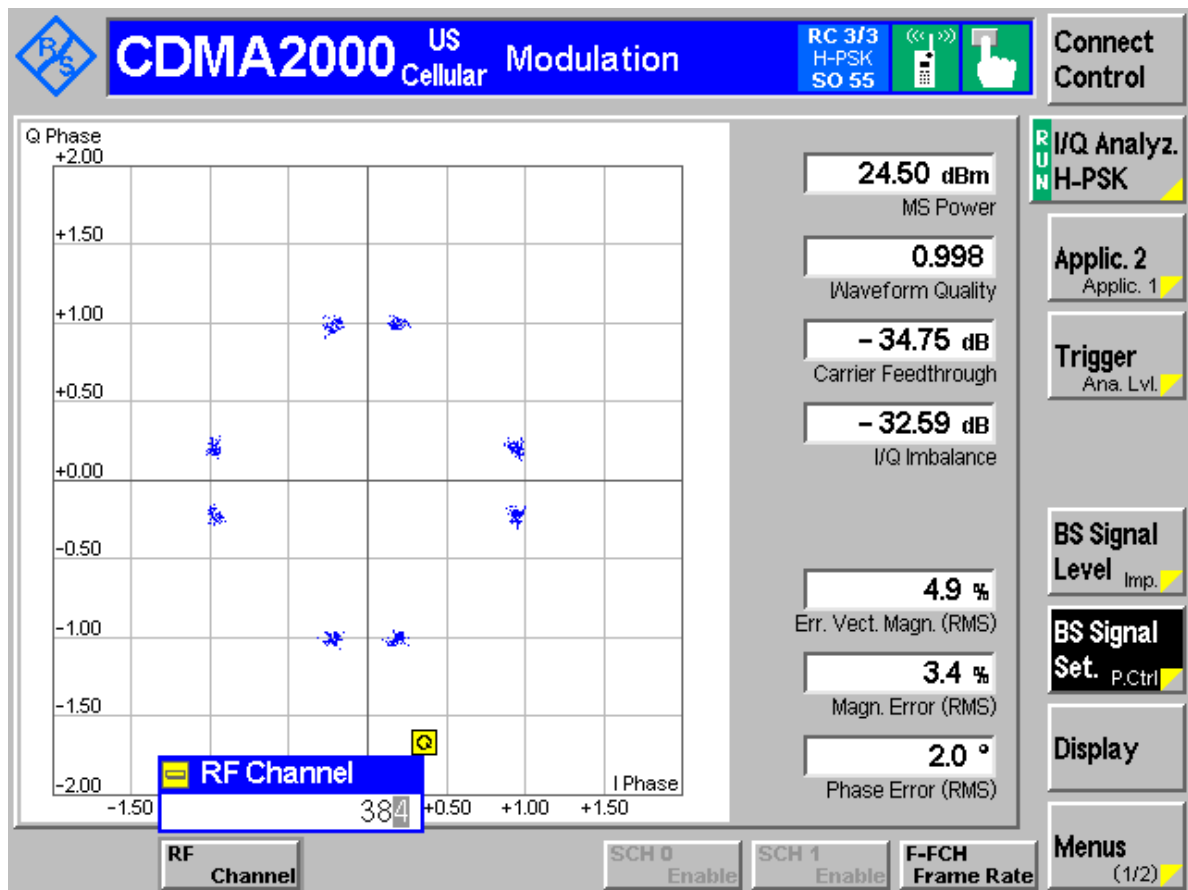


## Channel 384 (TM1)



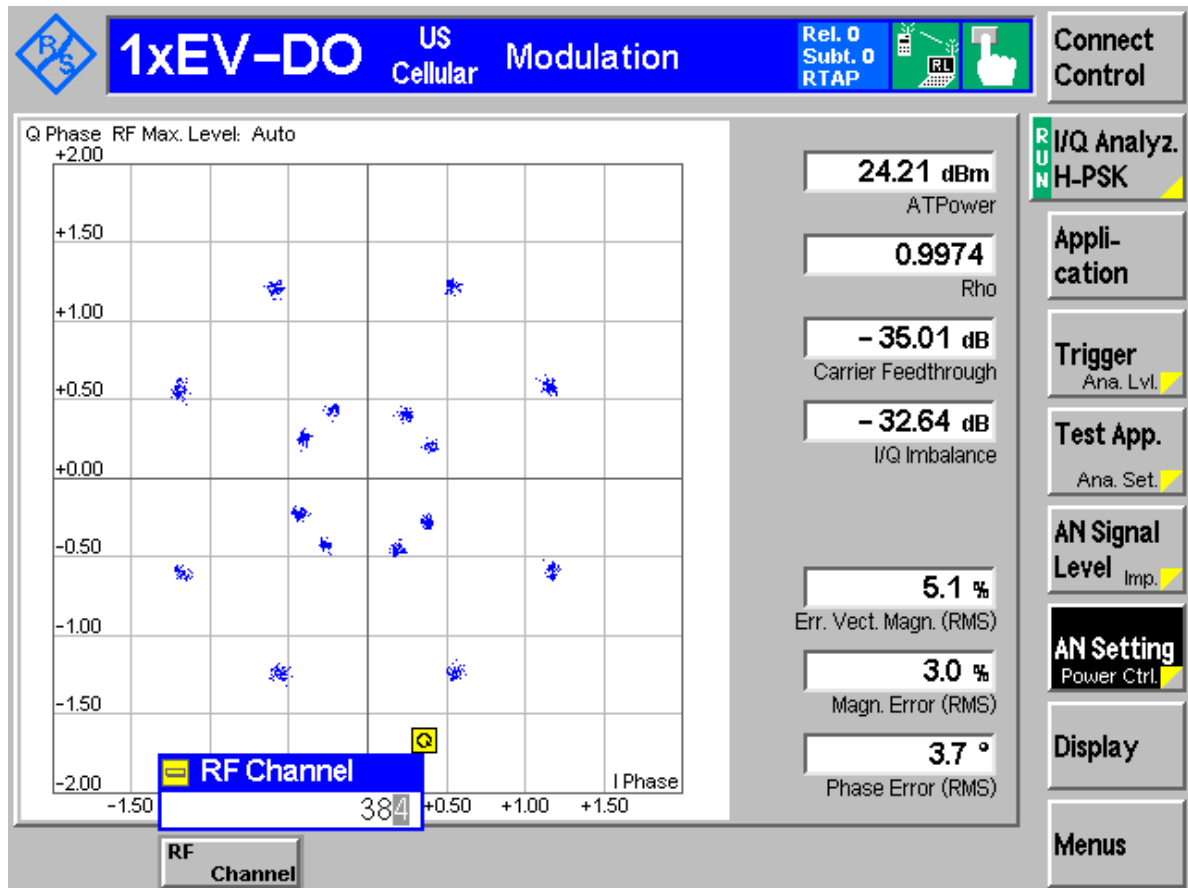


## Channel 384 (TM3)





## Channel 384 (Subtype 0) (HPSK)

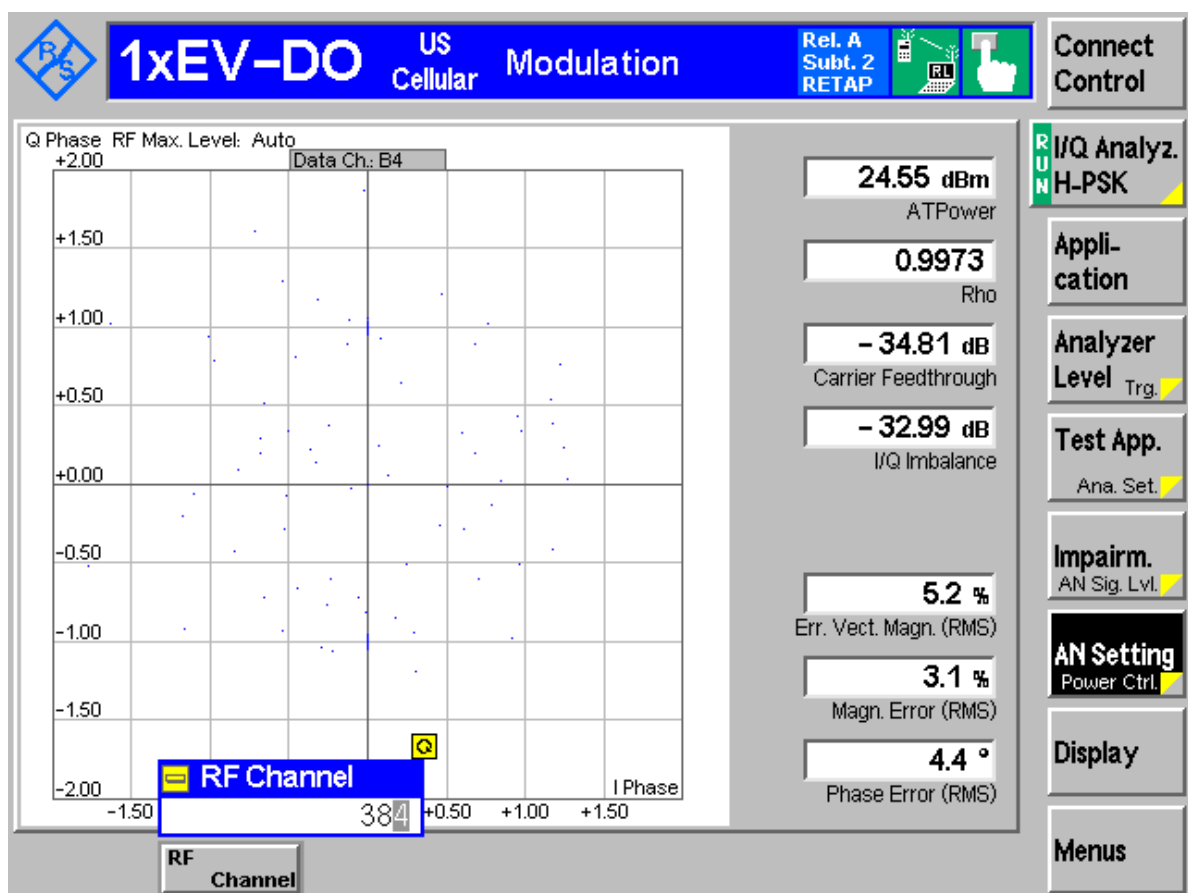




## Channel 384 (Subtype 2)

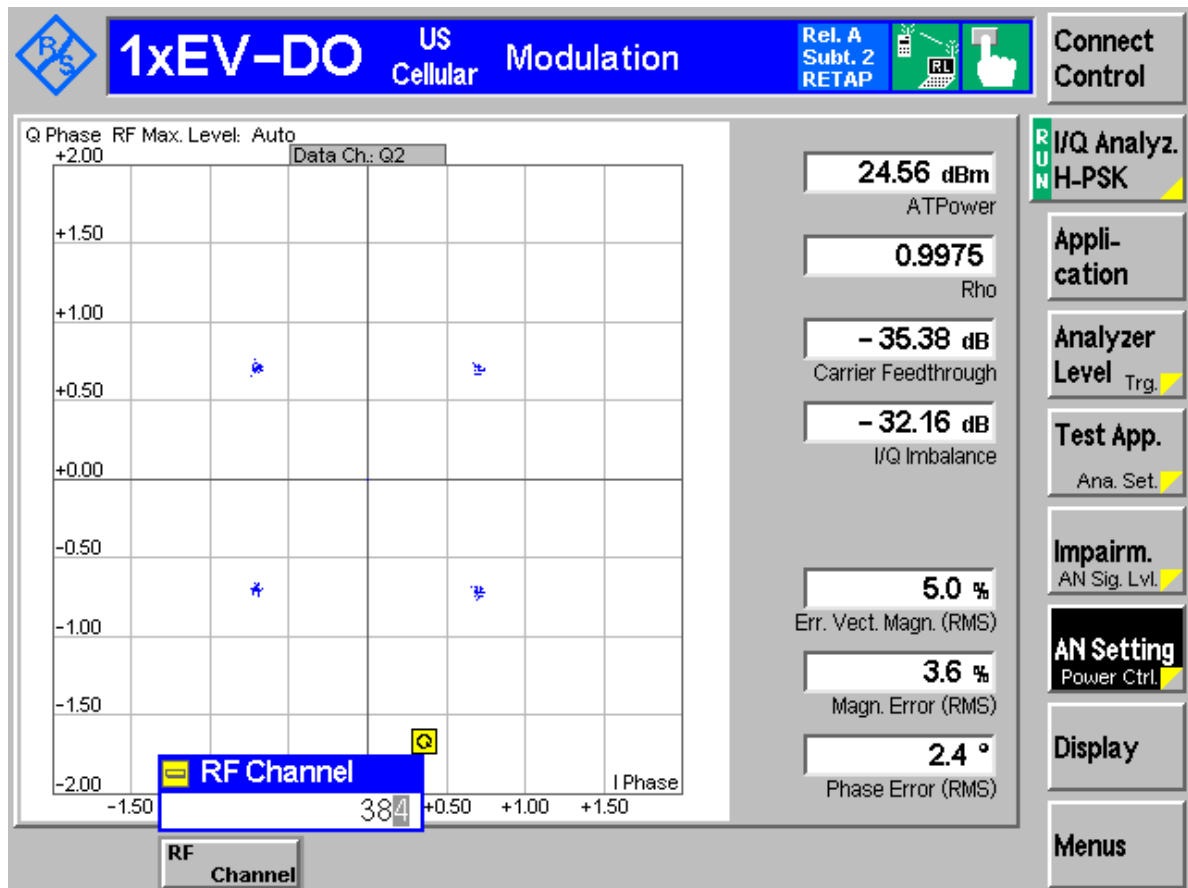
The R-Data packet size determines the modulation format:

R-Data Pkt Size (256 bits) (BPSK)



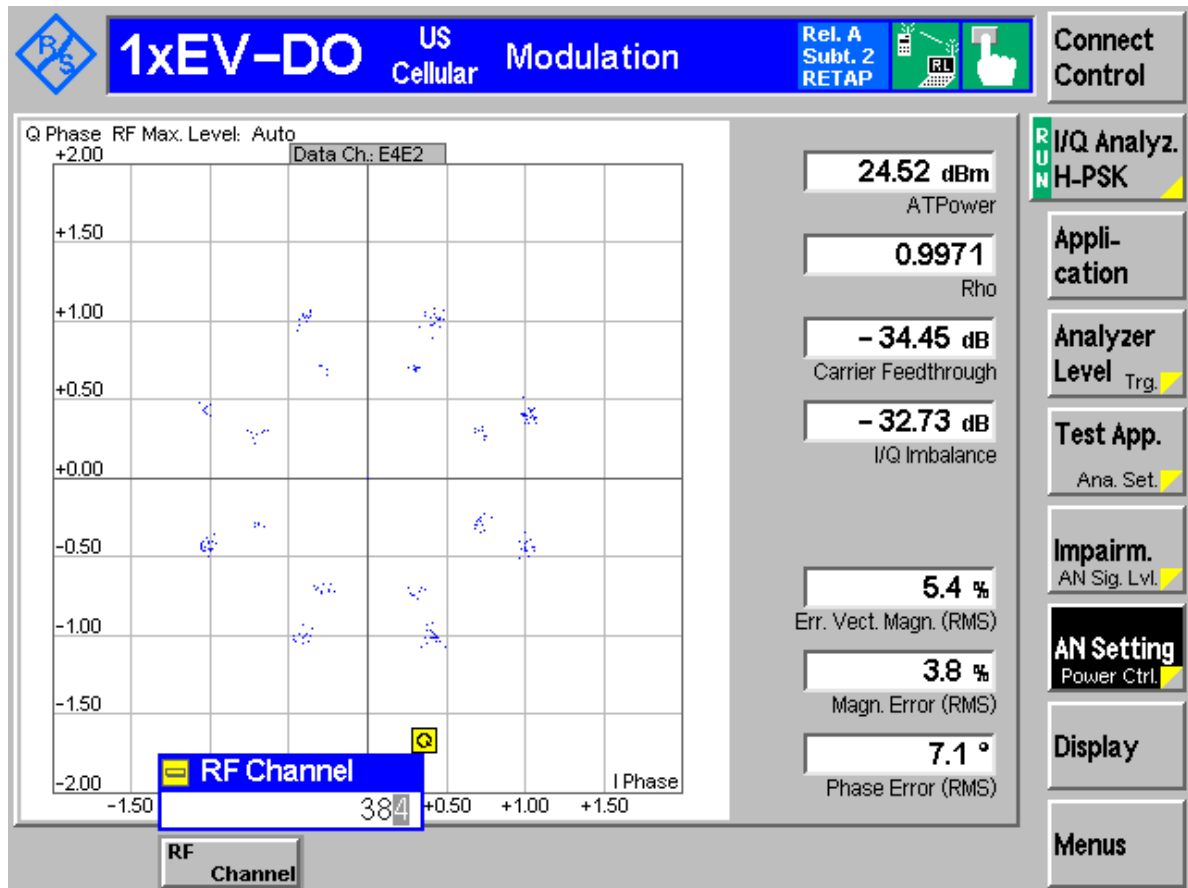


R-Data Pkt Size (4096 bits) (QPSK)





R-Data Pkt Size (12288 bits) (8PSK)





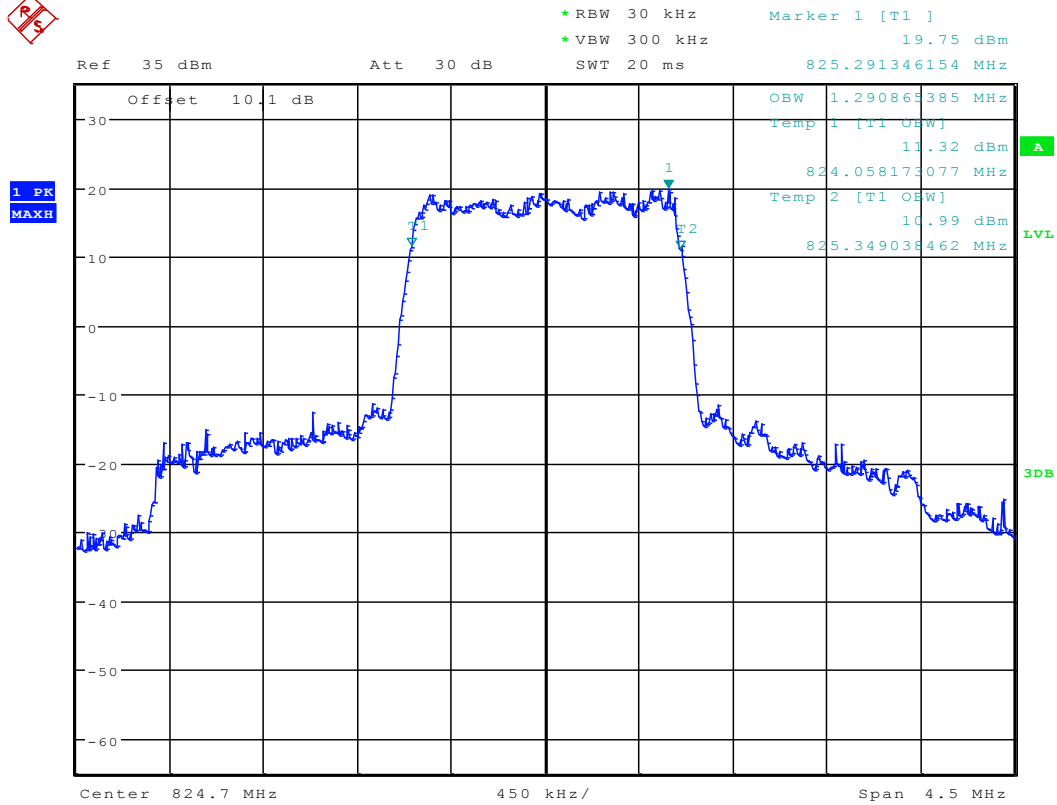
## **Appendix B**

### **Occupied Bandwidth**

According to FCC Part 2.1049 & Part 22 Subpart H



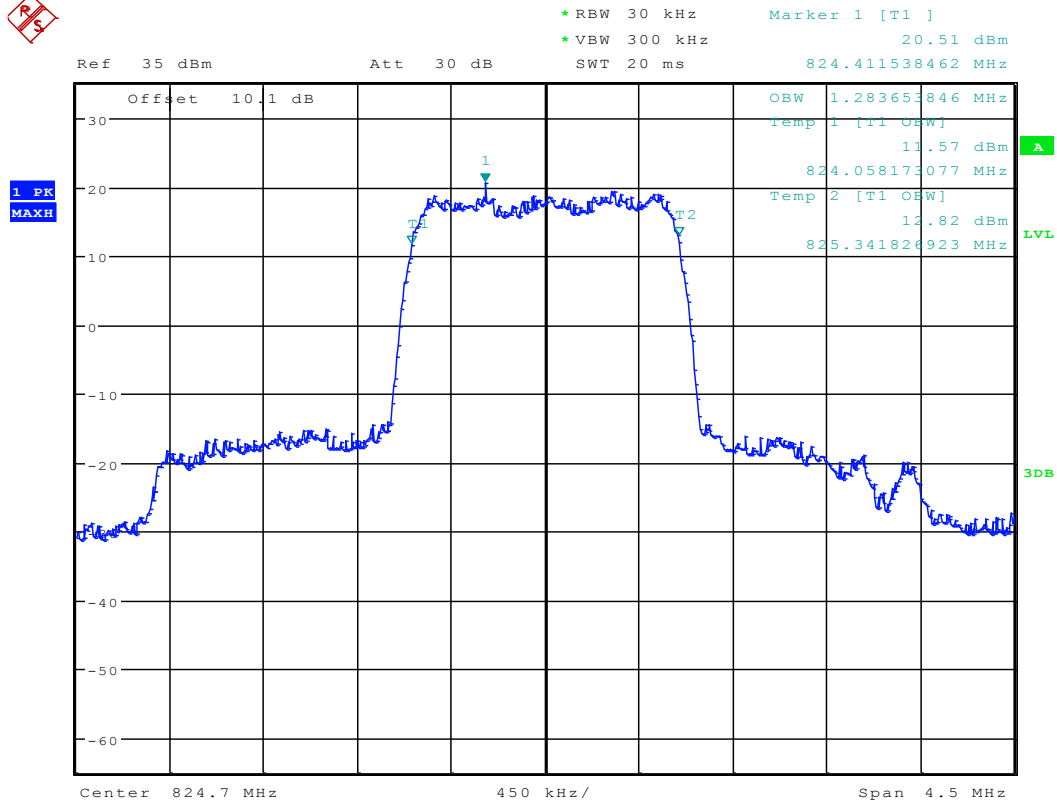
## Channel 1013 (TM1)



Date: 25.AUG.2011 16:47:29



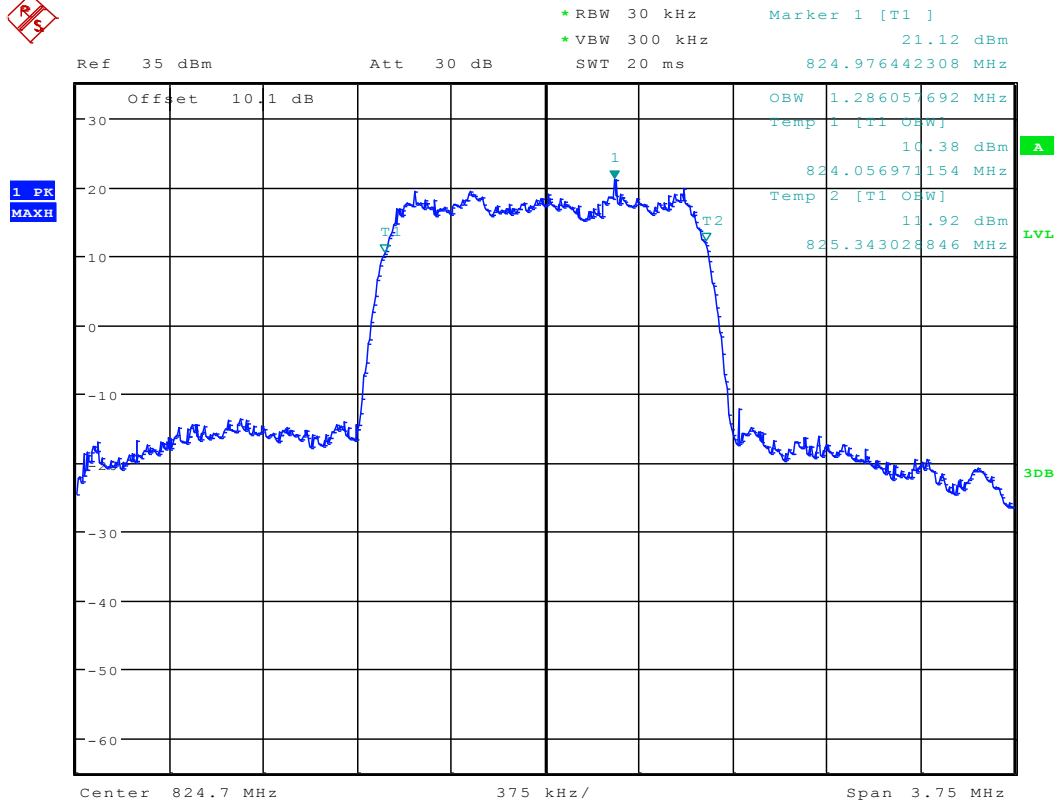
## Channel 1013 (TM3)



Date: 25.AUG.2011 16:48:12



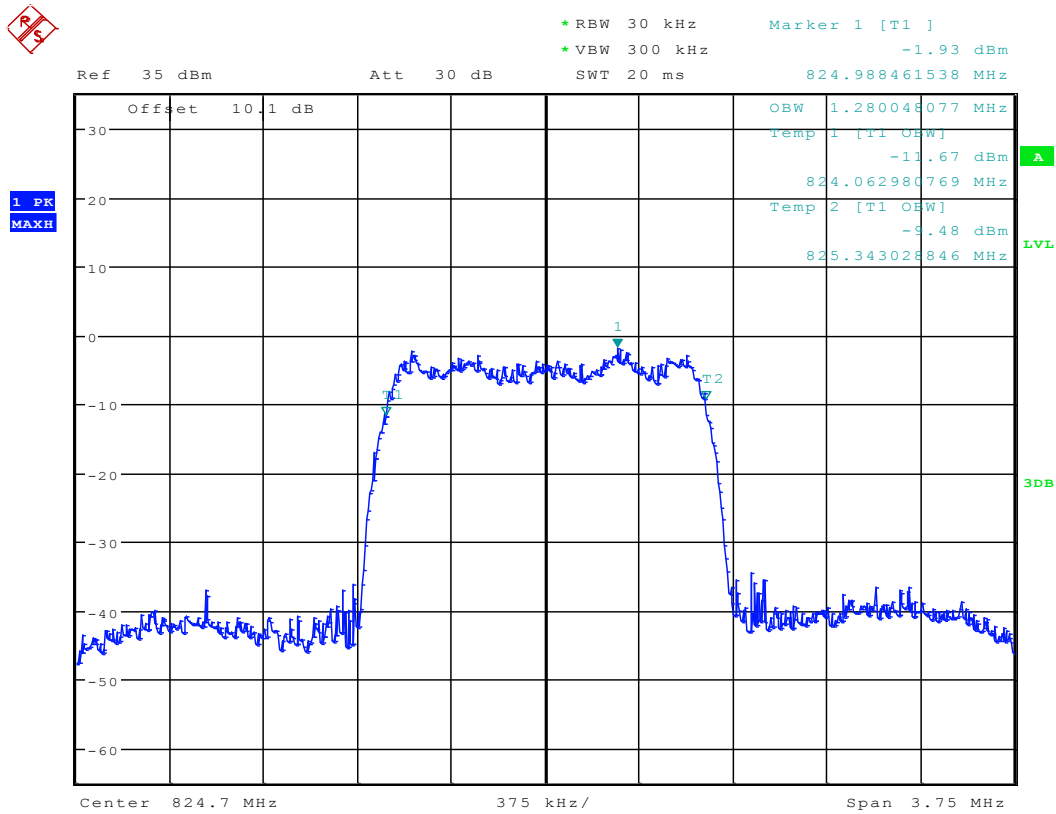
## Channel 1013 (EVDO subtype 0)



Date: 25.AUG.2011 16:53:37



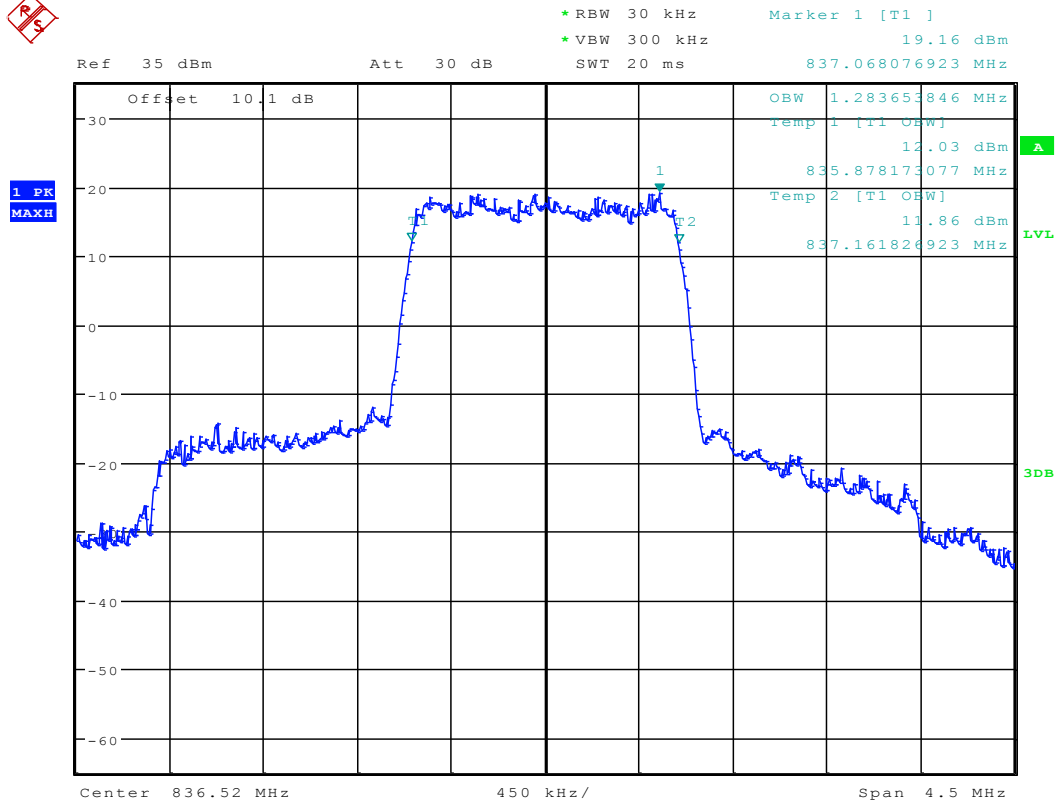
## Channel 1013 (EVDO subtype 2)



Date: 25.AUG.2011 16:59:31



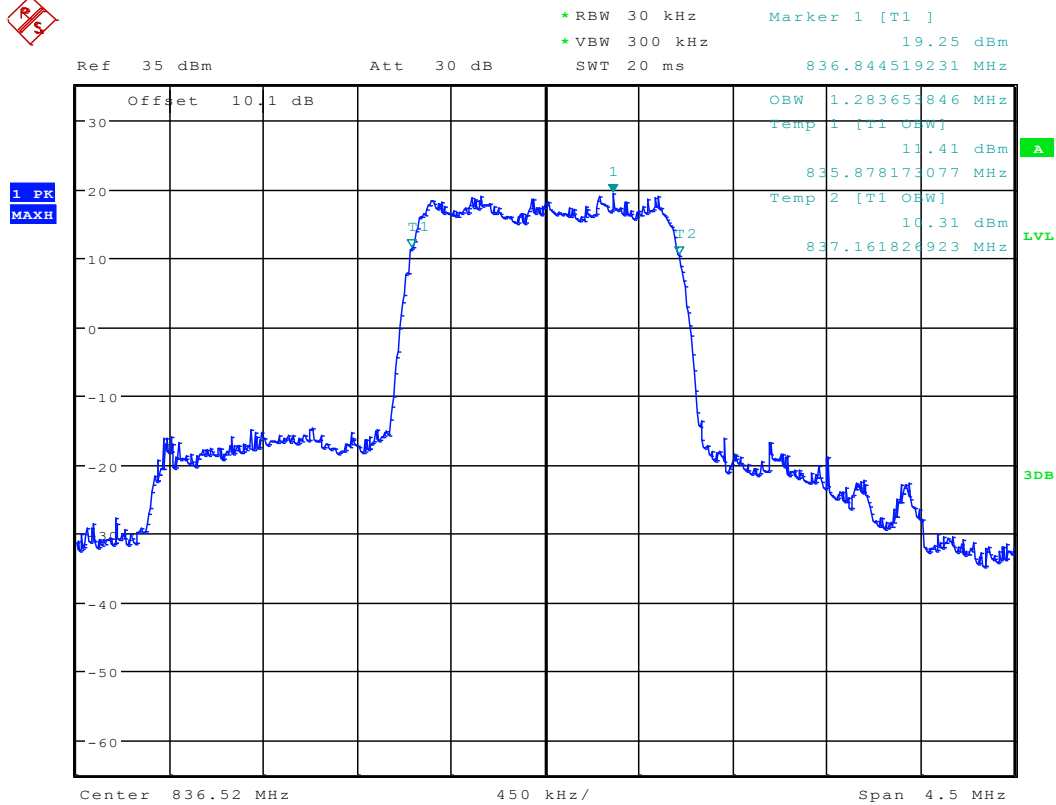
## Channel 384 (TM1)



Date: 25.AUG.2011 16:47:43



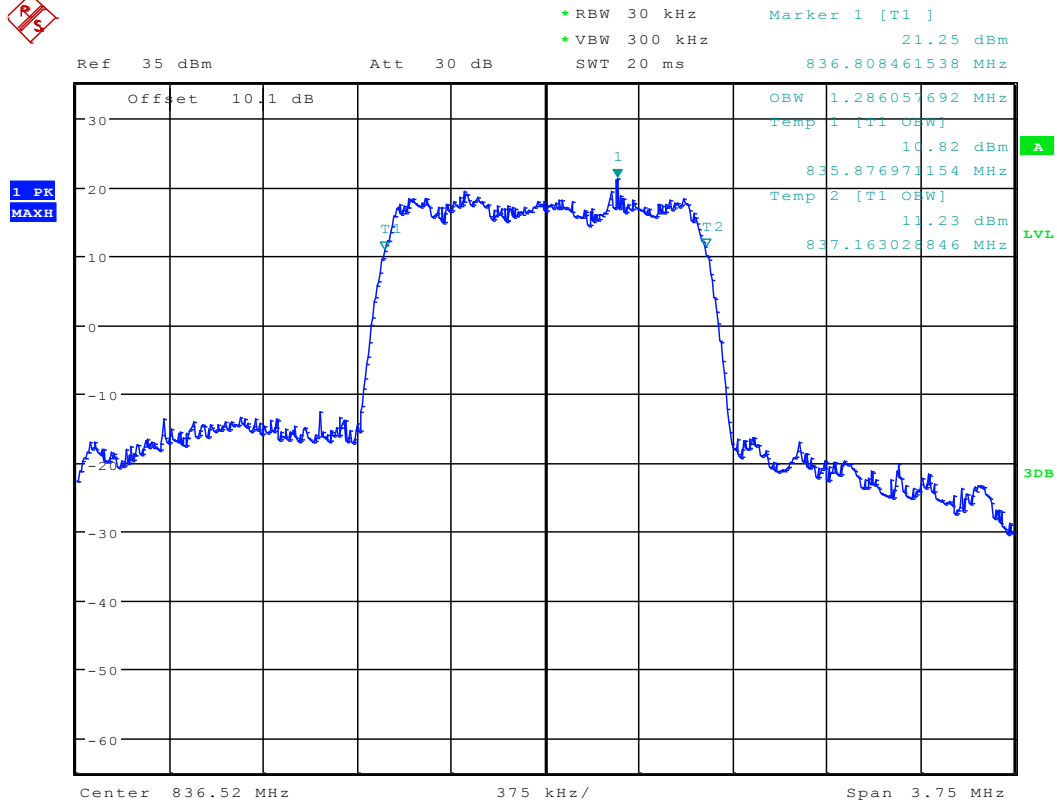
## Channel 384 (TM3)



Date: 25.AUG.2011 16:48:26



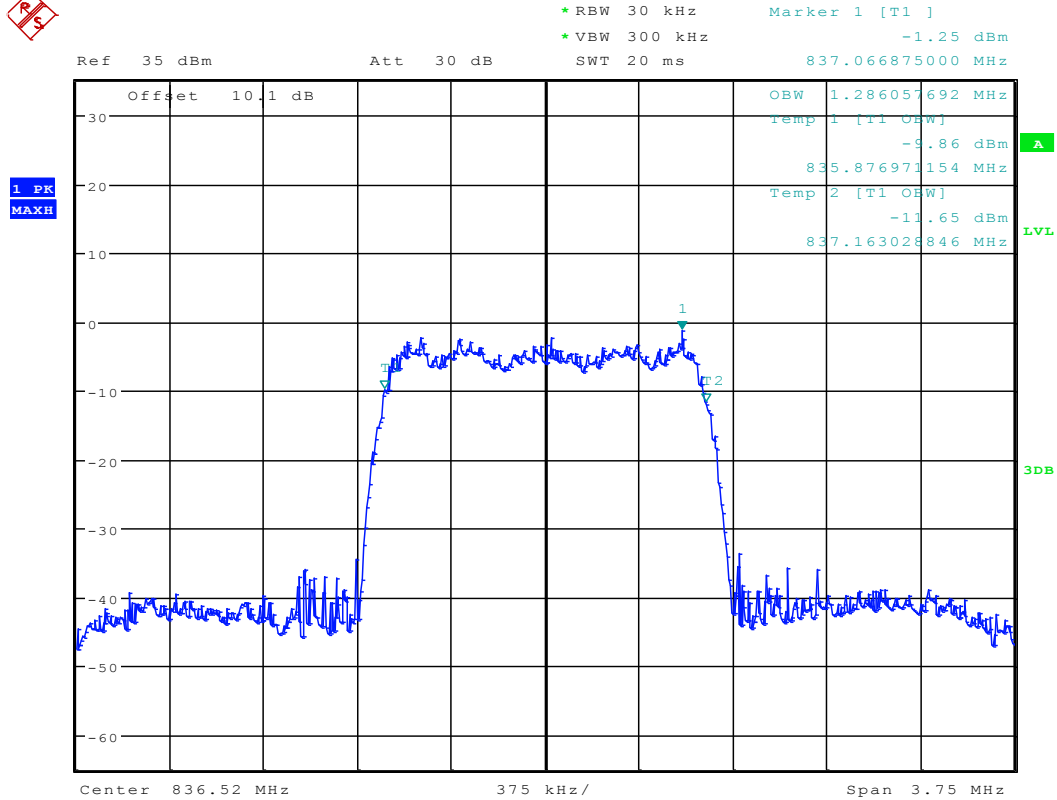
## Channel 384 (EVDO subtype 0)



Date: 25.AUG.2011 16:53:51



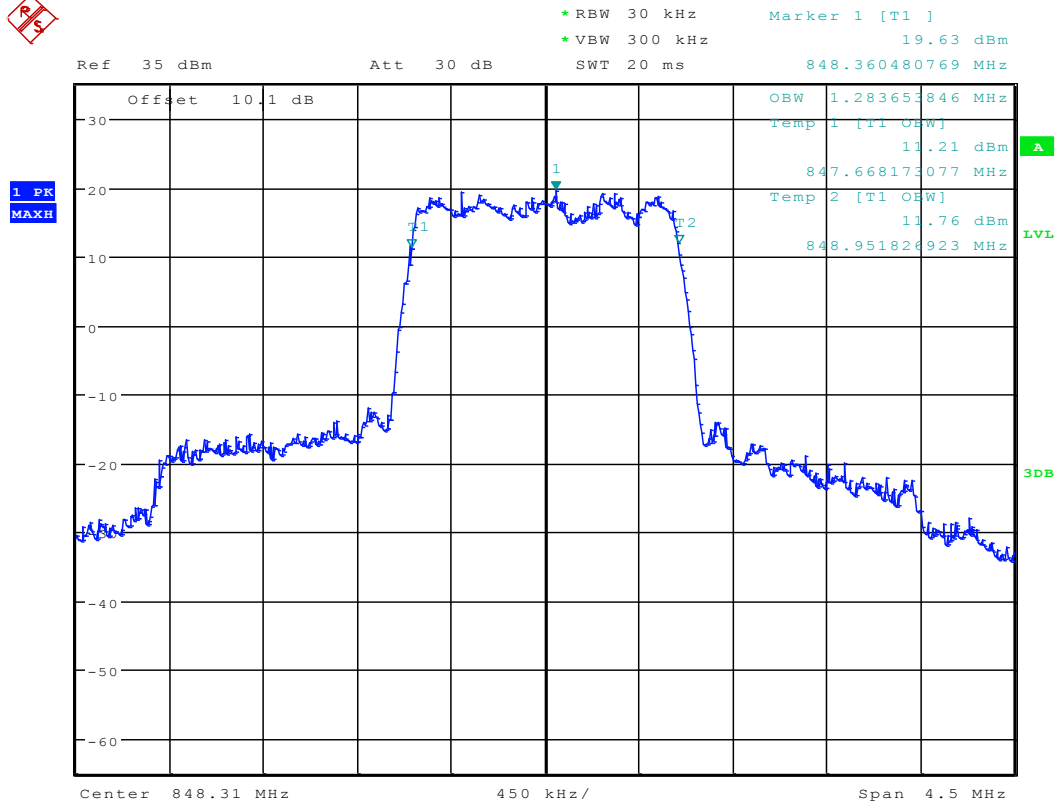
## Channel 384 (EVDO Subtype 2)



Date: 25.AUG.2011 16:59:43



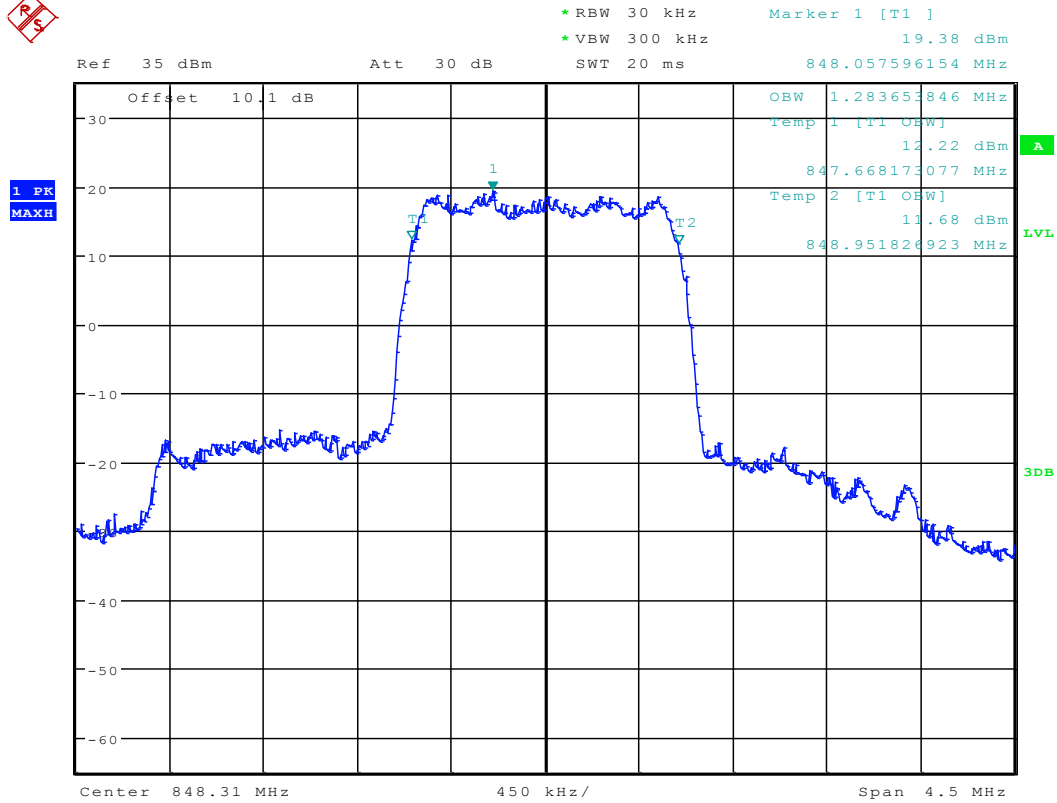
## Channel 777 (TM1)



Date: 25.AUG.2011 16:47:56



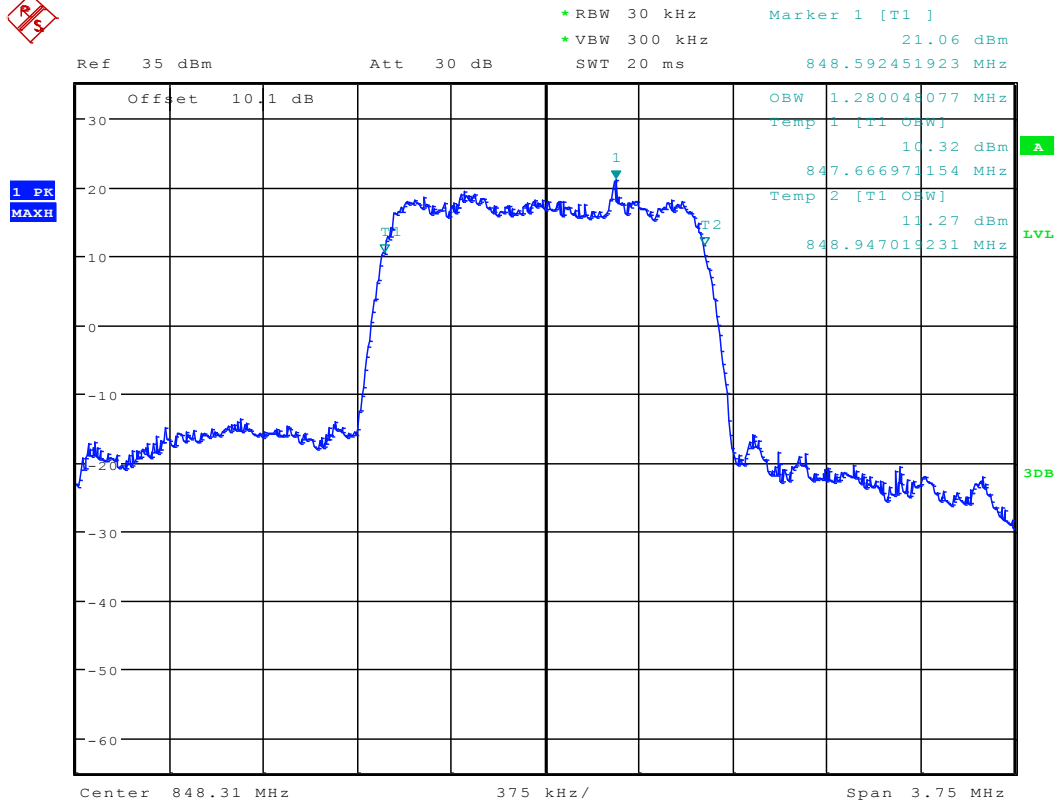
## Channel 777 (TM3)



Date: 25.AUG.2011 16:48:39



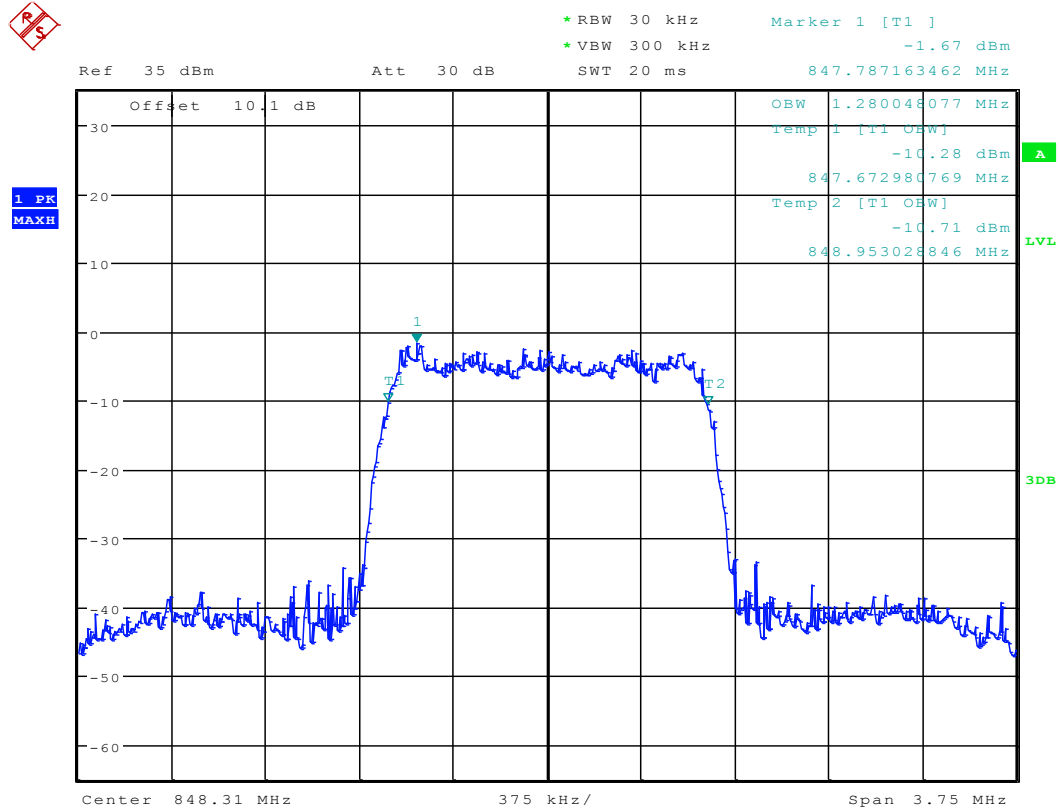
## Channel 777 (EVDO subtype 0)



Date: 25.AUG.2011 16:54:05



## Channel 777 (EVDO Subtype 2)



Date: 25.AUG.2011 16:59:54



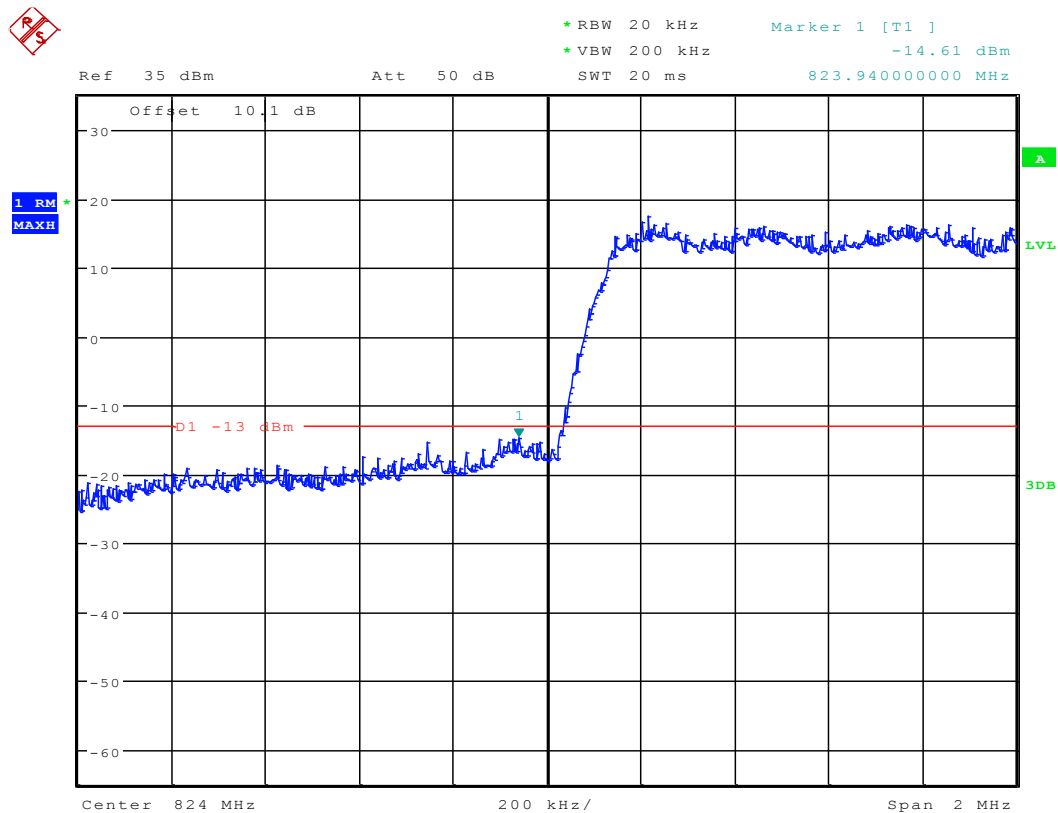
## **Appendix C**

### **Band Edges Compliance** According to FCC Part 2.1051 & 22.917



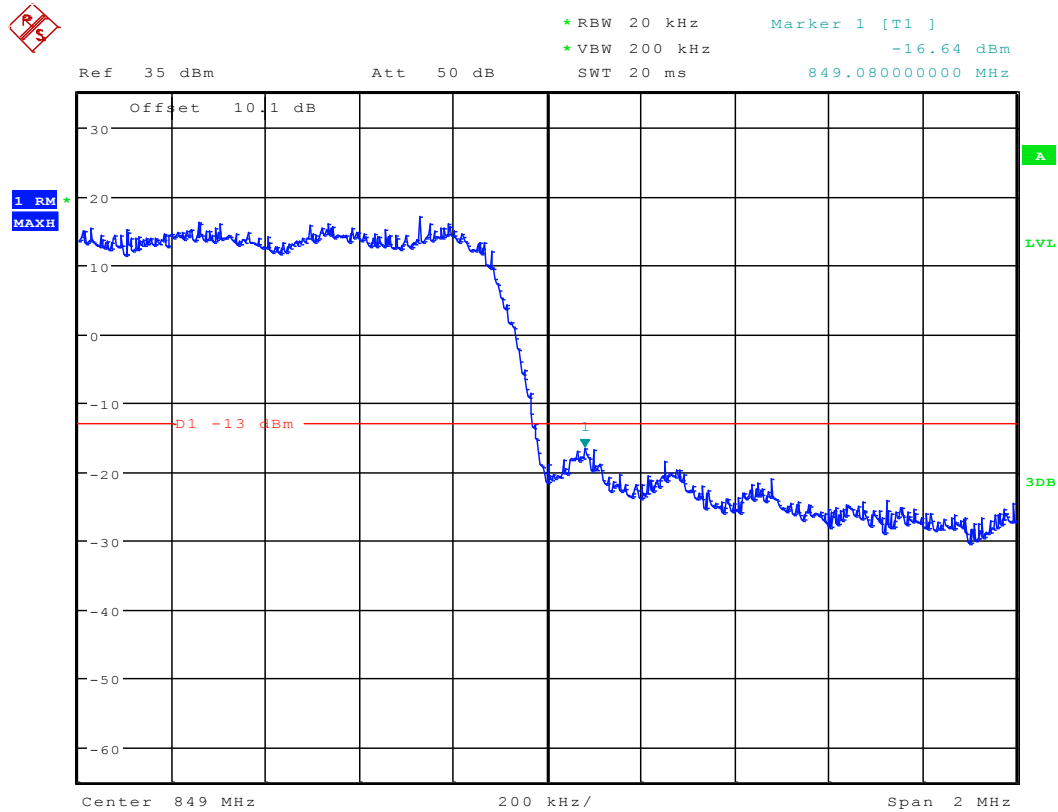
## TM1

### Left Edge (824 MHz) Channel 1013



Date: 25.AUG.2011 16:45:51

## Right Edge (849MHz) Channel 777

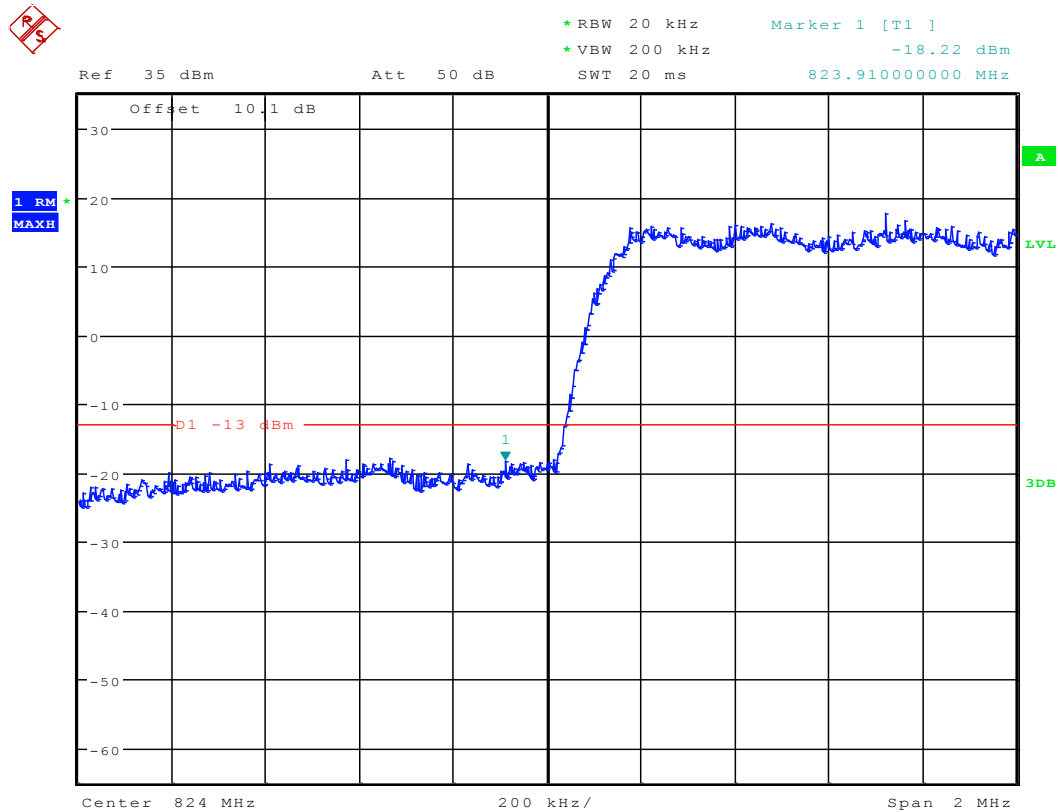


Date: 25.AUG.2011 16:46:05



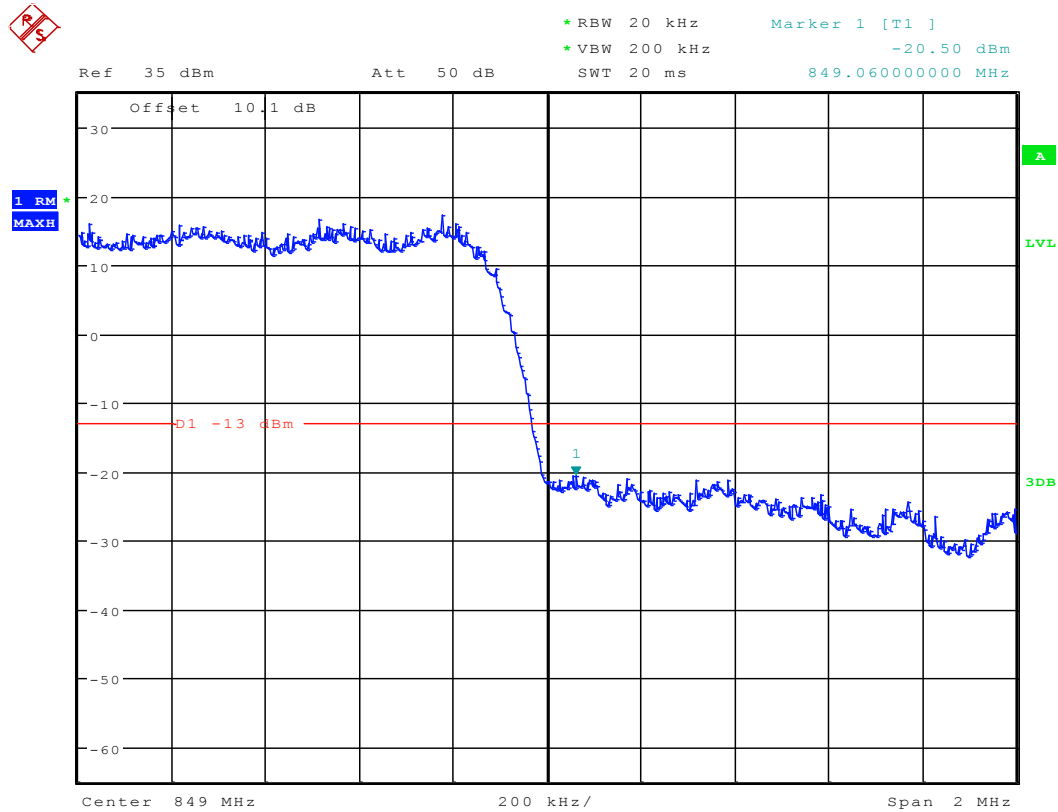
## TM3

### Left Edge (824 MHz) Channel 1013



Date: 25.AUG.2011 16:46:21

## Right Edge (849MHz) Channel 777

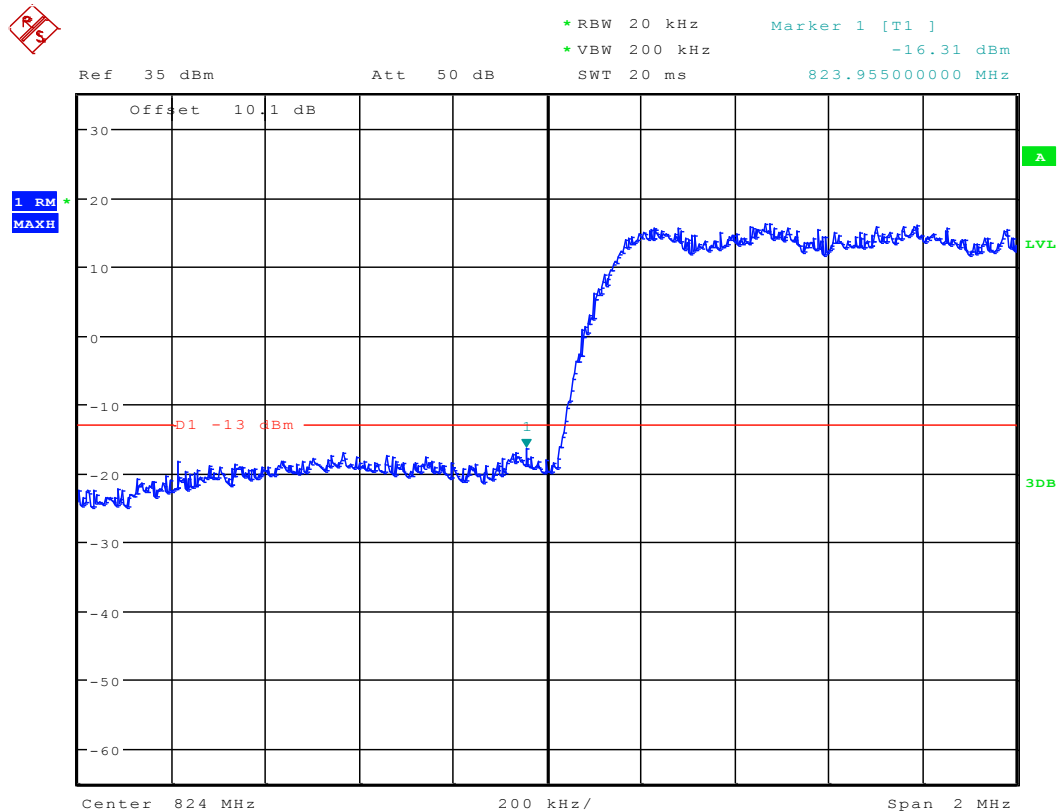


Date: 25.AUG.2011 16:46:35



## EVDO Subtype 0

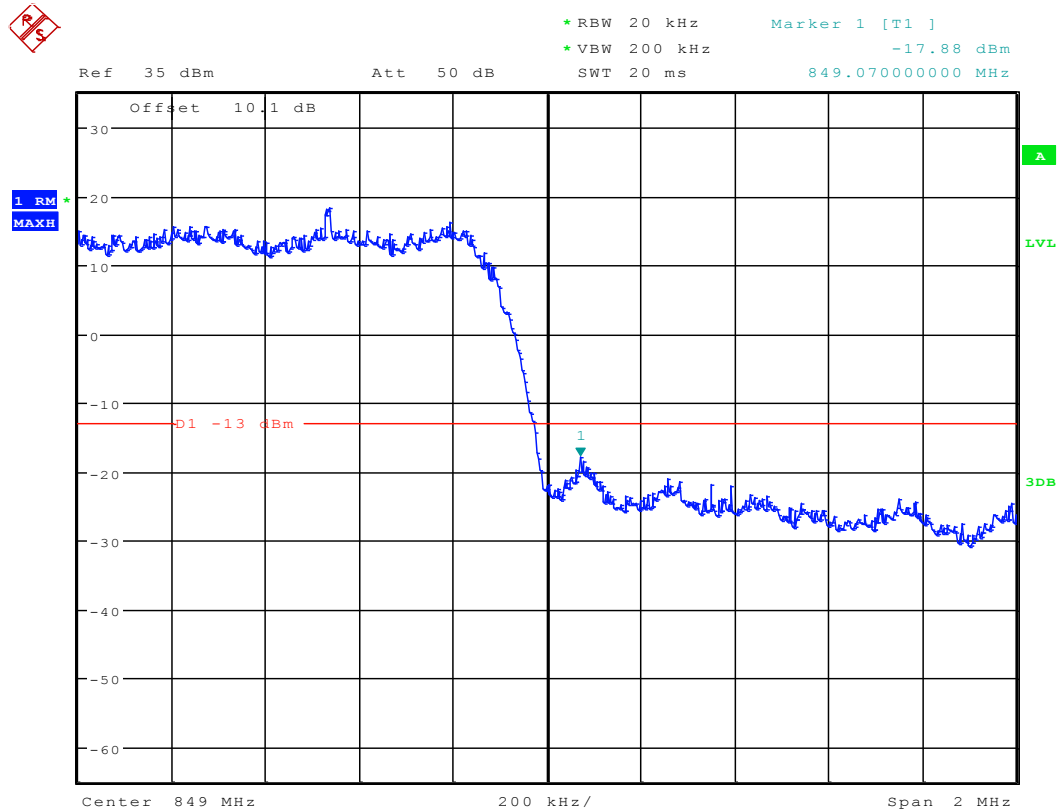
### Left Edge (824 MHz) Channel 1013



Date: 25.AUG.2011 16:53:07



## Right Edge (849MHz) Channel 777

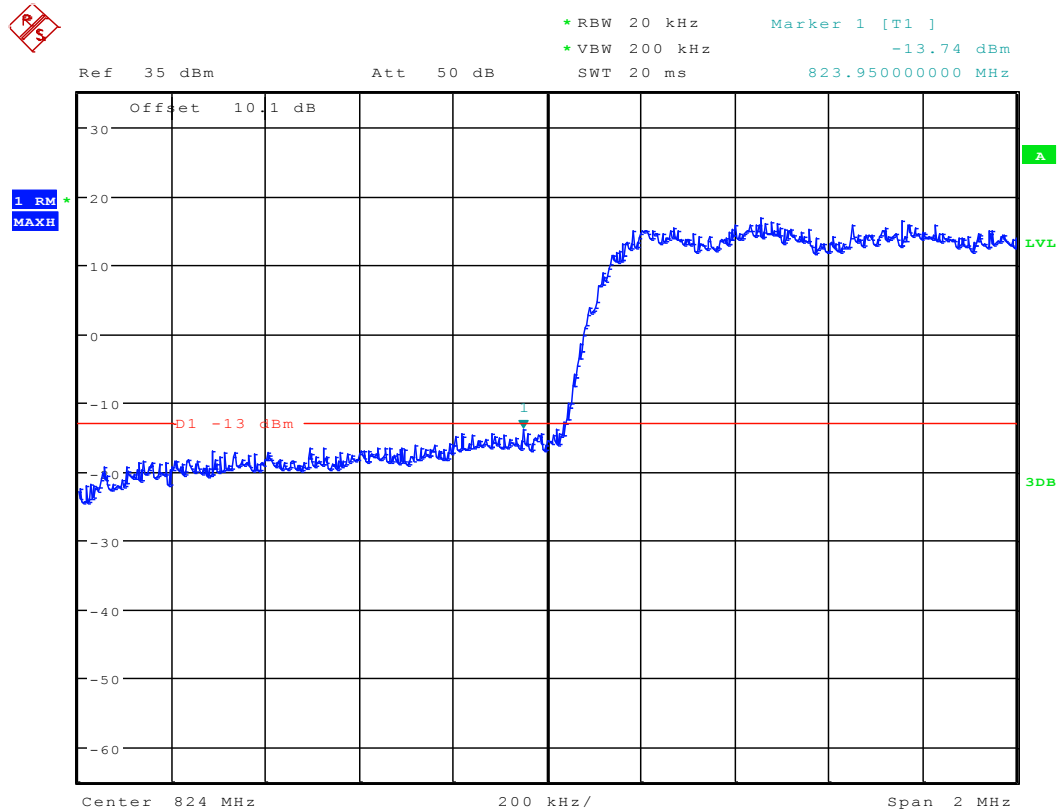


Date: 25.AUG.2011 16:53:21



## EVDO Subtype 2

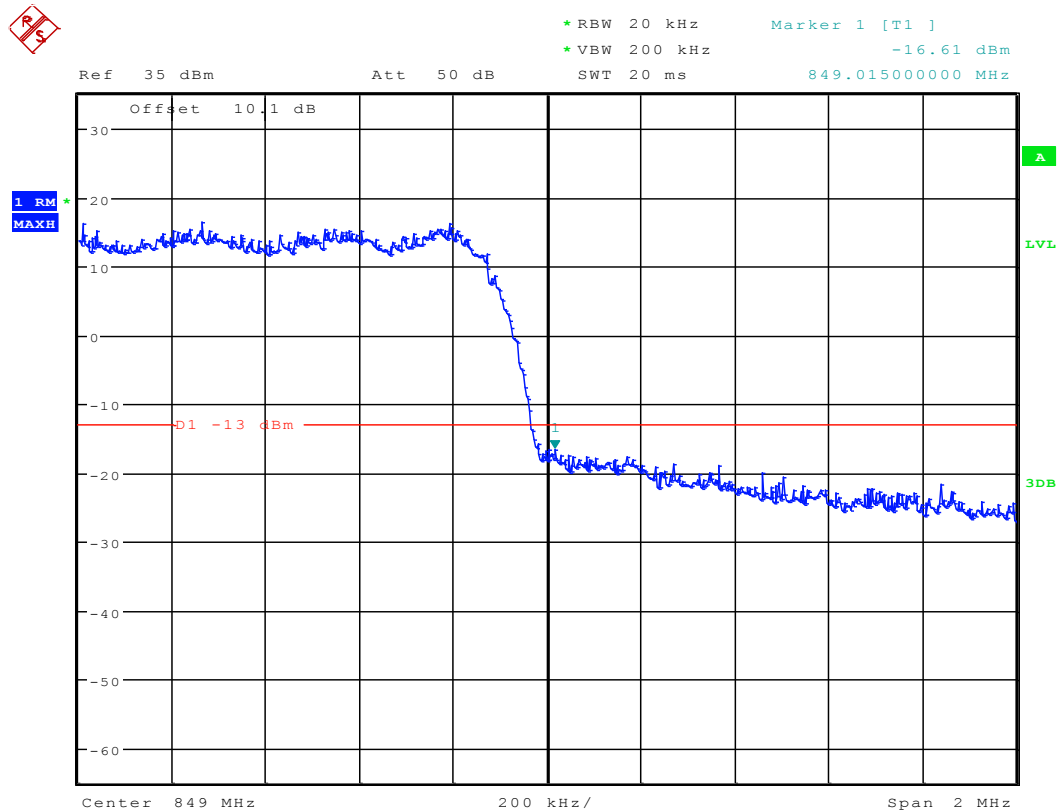
Modulation: BPSK  
Left Edge (824 MHz)  
Channel 1013



Date: 25.AUG.2011 16:58:09



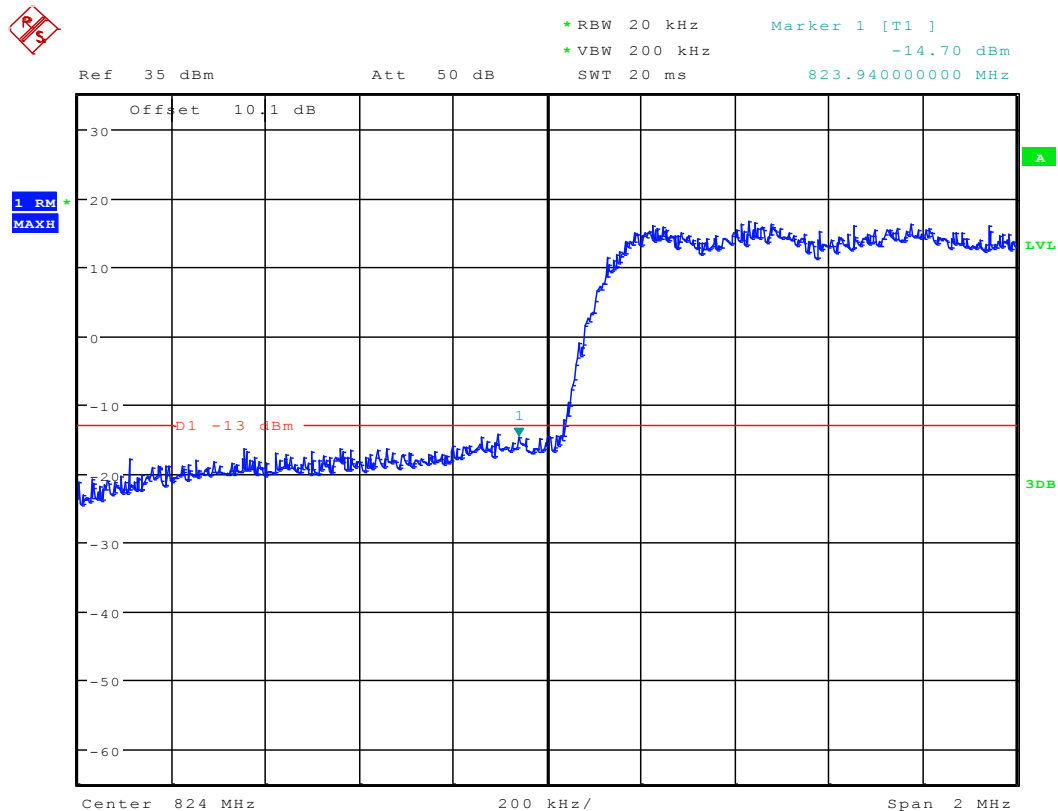
## Right Edge (849MHz) Channel 777



Date: 25.AUG.2011 16:58:23



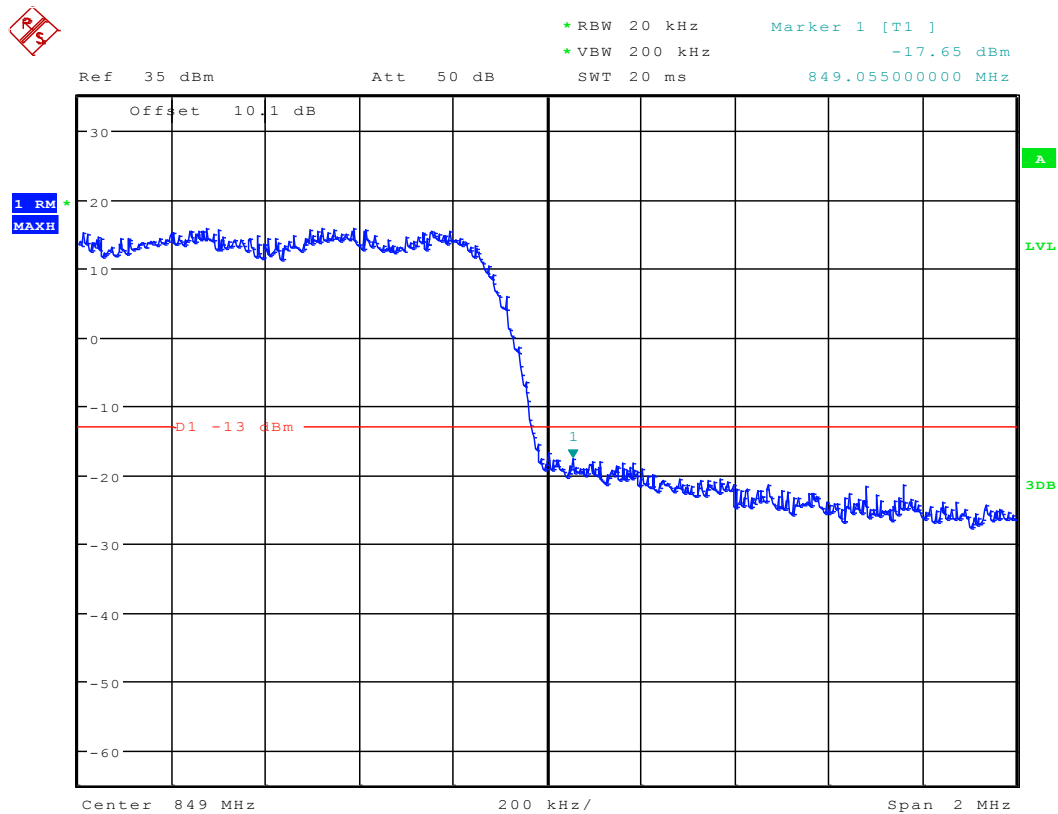
Modulation: QPSK  
Left Edge (824 MHz)  
Channel 1013



Date: 25.AUG.2011 16:58:37

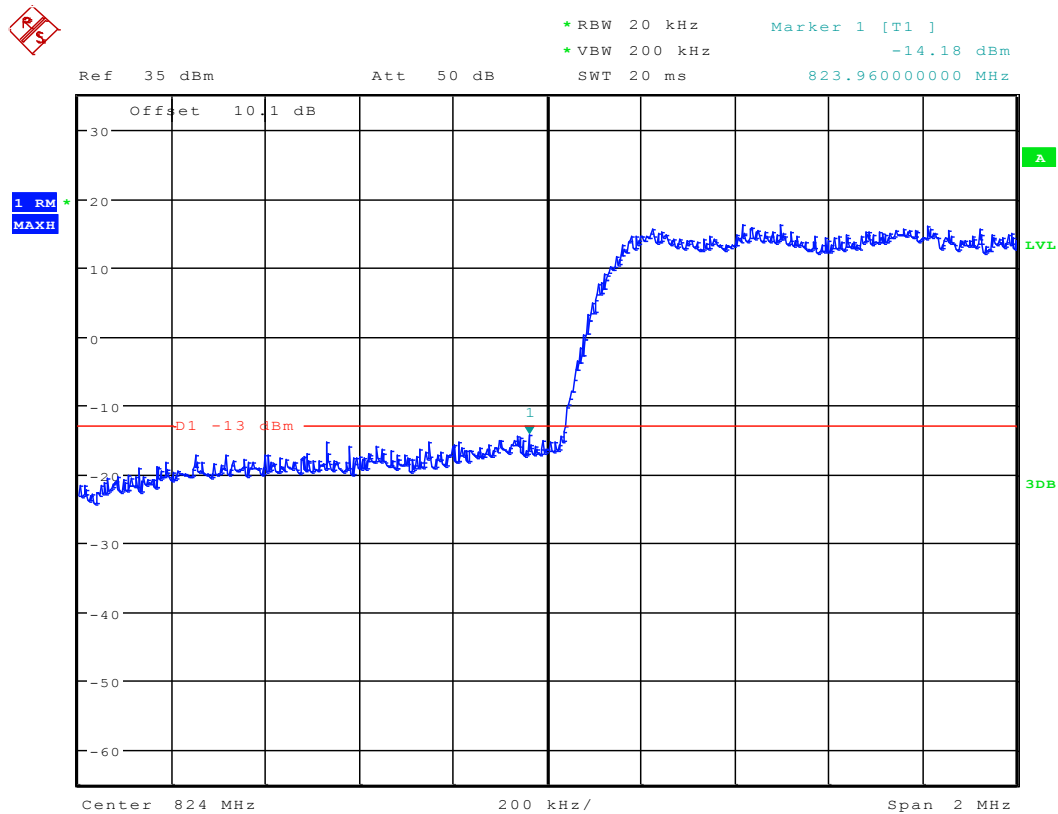


## Right Edge (849MHz) Channel 777



Date: 25.AUG.2011 16:58:50

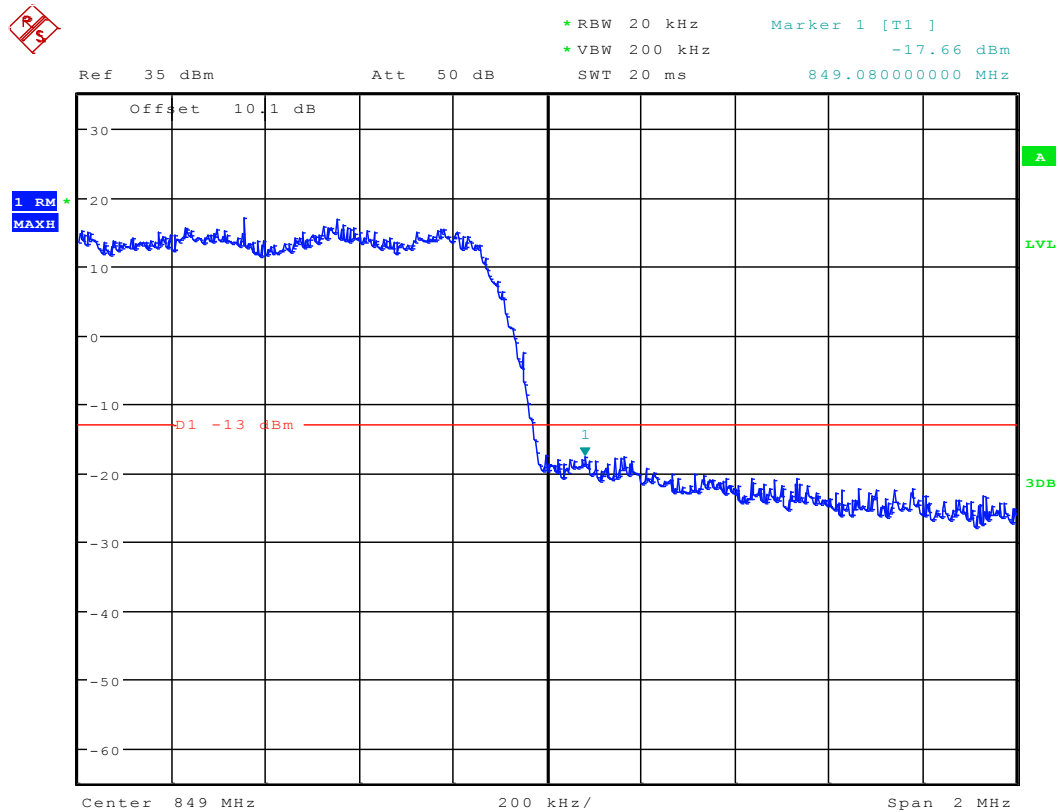
**Modulation: 8PSK**  
Left Edge (824 MHz)  
Channel 1013



Date: 25.AUG.2011 16:59:04



## Right Edge (849MHz) Channel 777



Date: 25.AUG.2011 16:59:18



## **Appendix D**

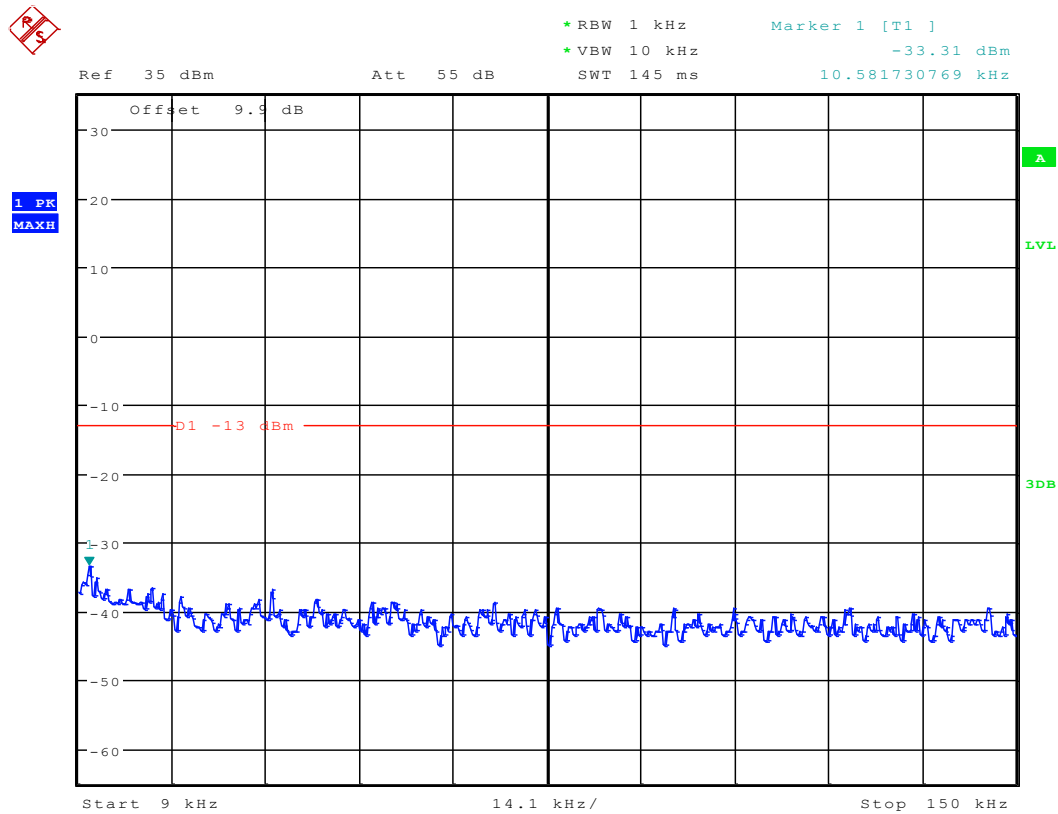
# Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & 22.917

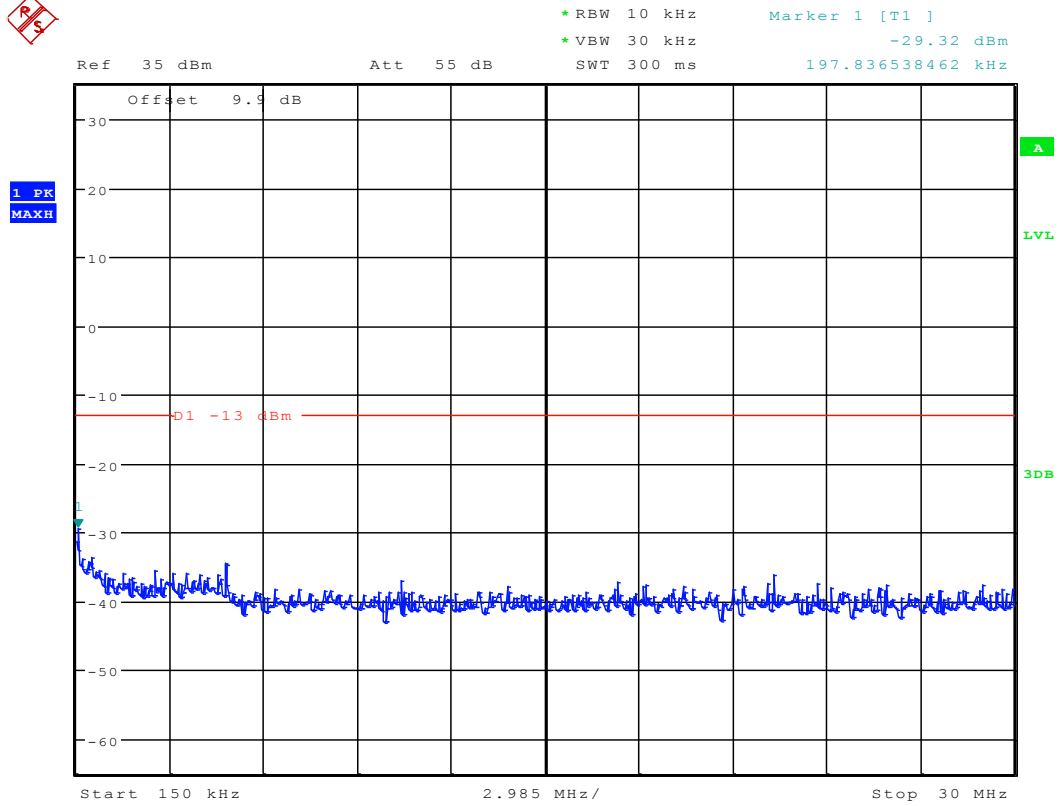


## TM1

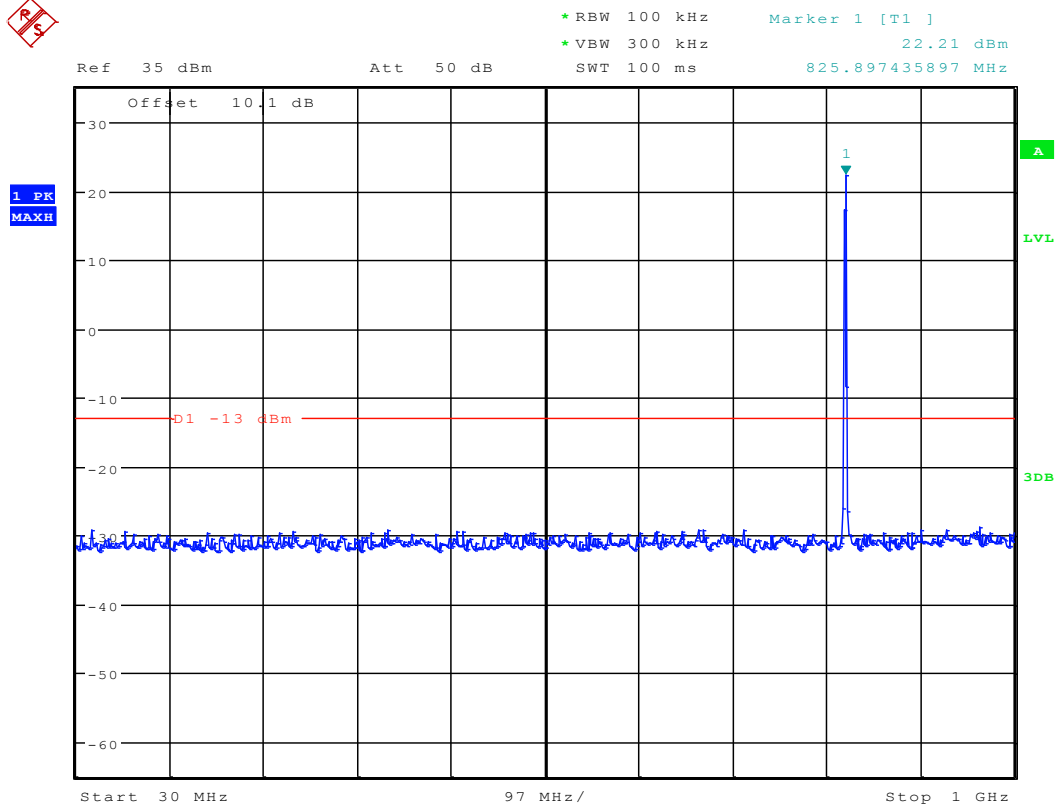
### Channel 1013



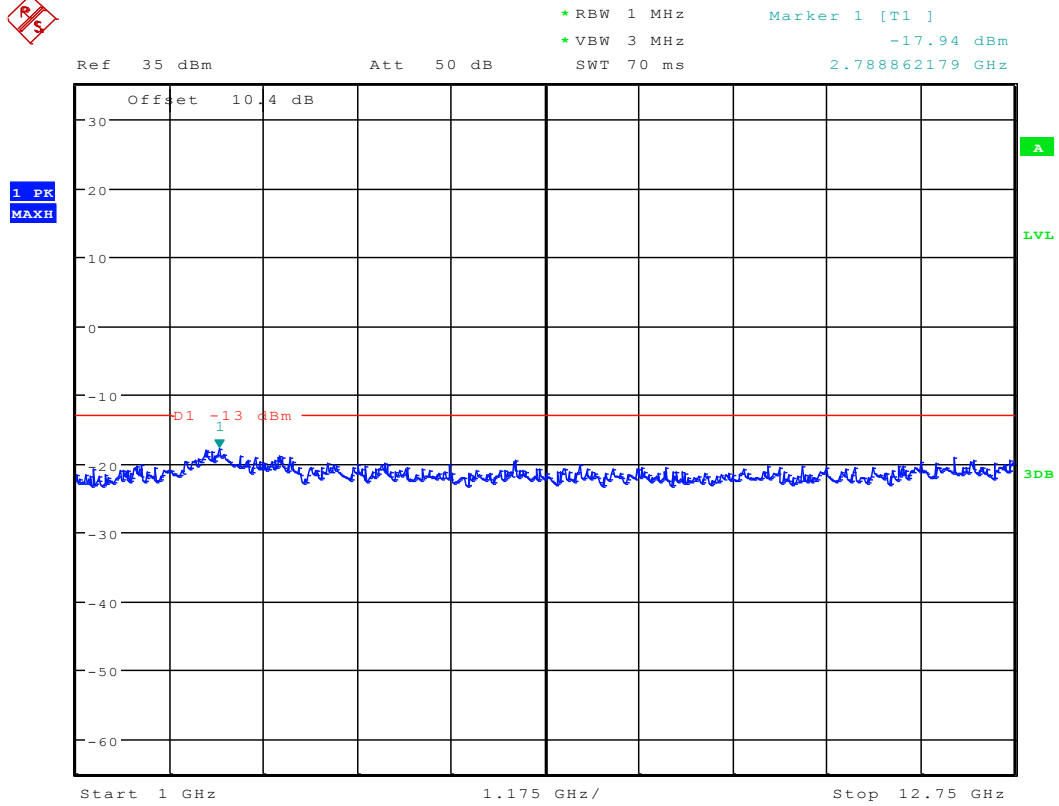
Date: 25.AUG.2011 16:48:50



Date: 25.AUG.2011 16:49:15



Date: 25.AUG.2011 16:49:41



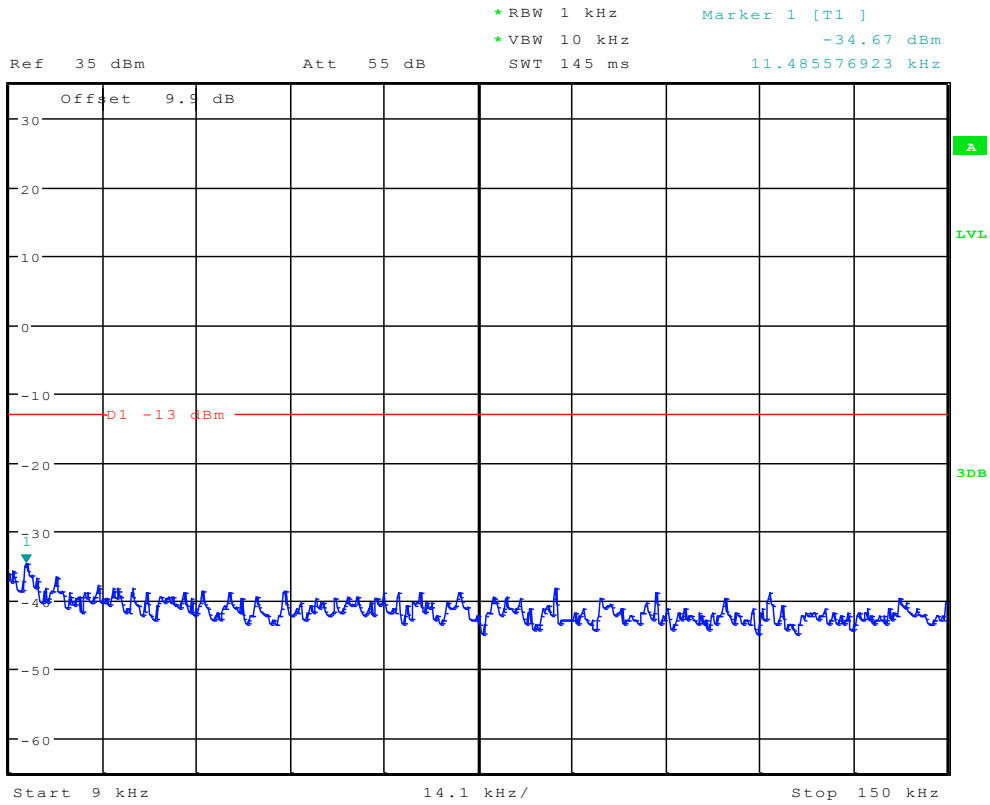
Date: 25.AUG.2011 16:50:07



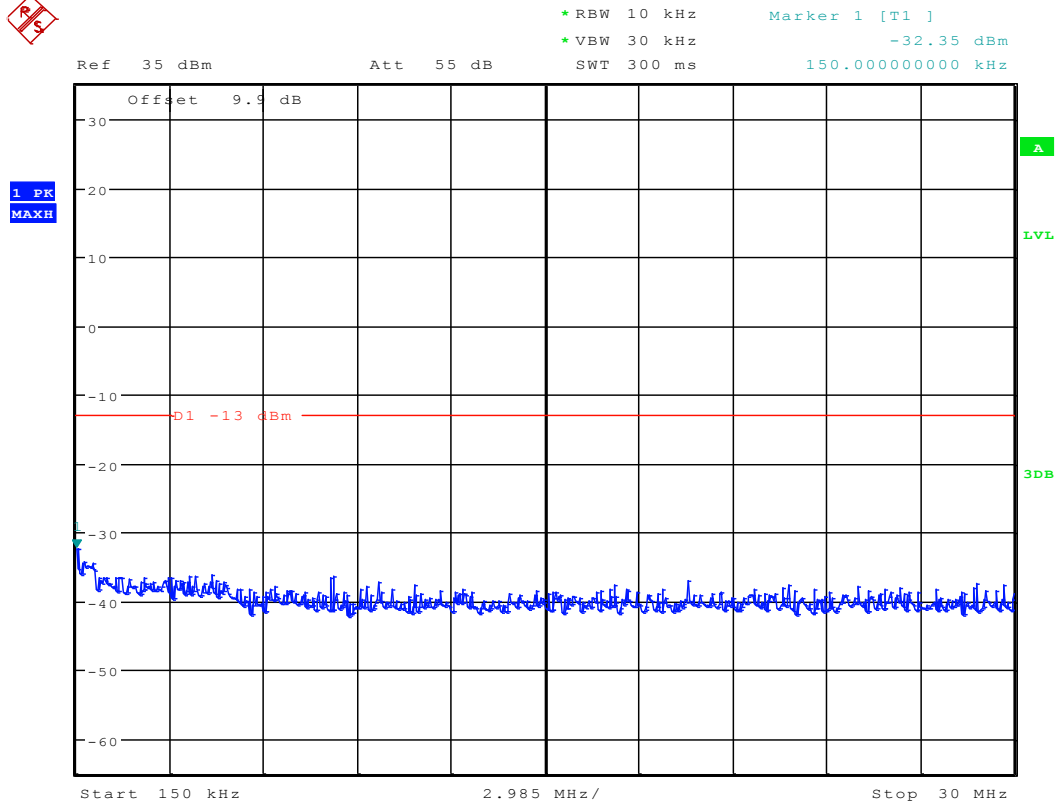
## Channel 384



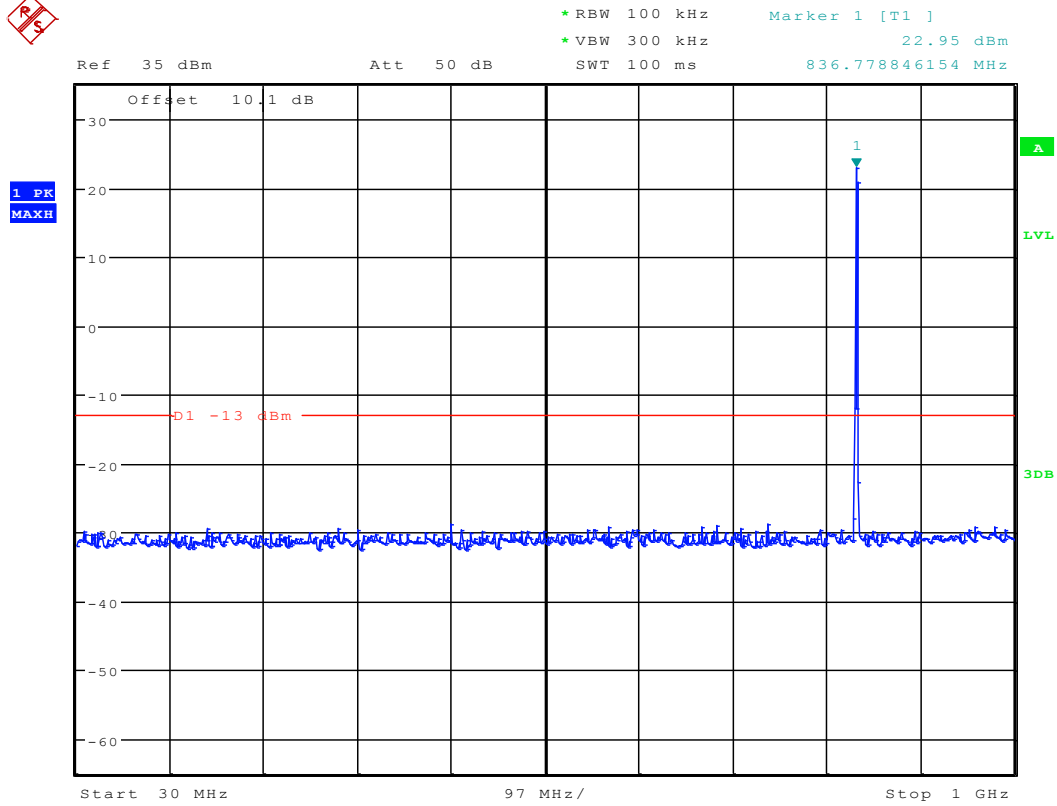
1 PK  
MAXH



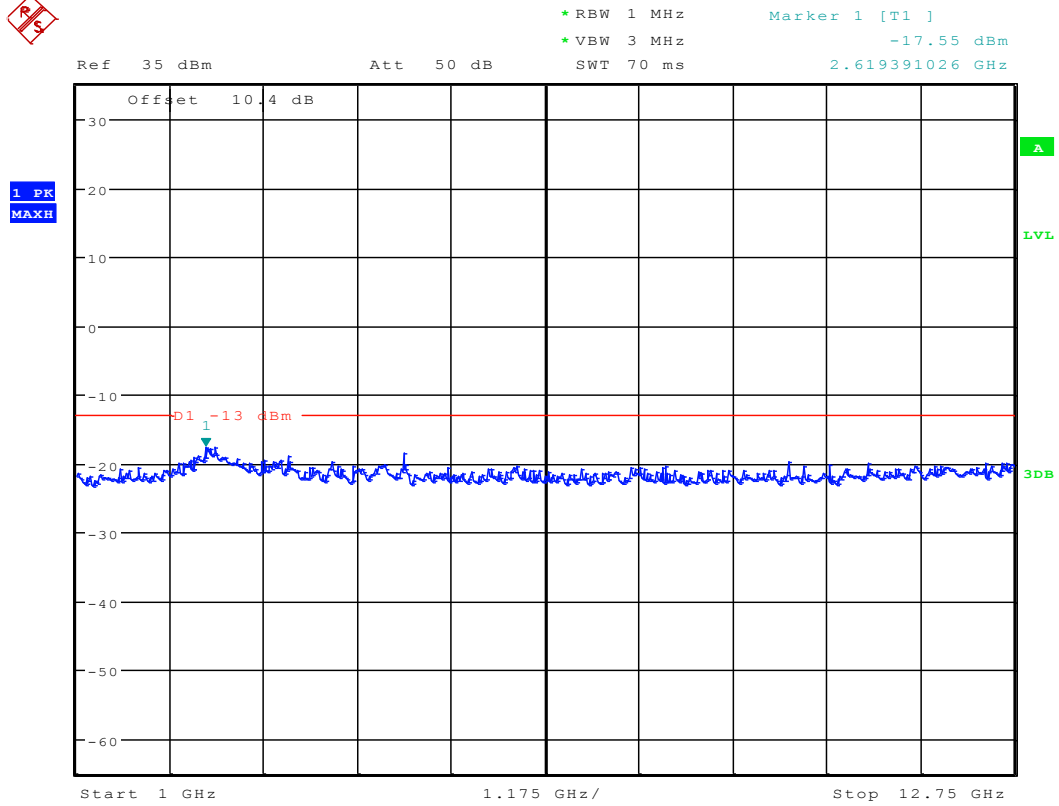
Date: 25.AUG.2011 16:48:58



Date: 25.AUG.2011 16:49:24



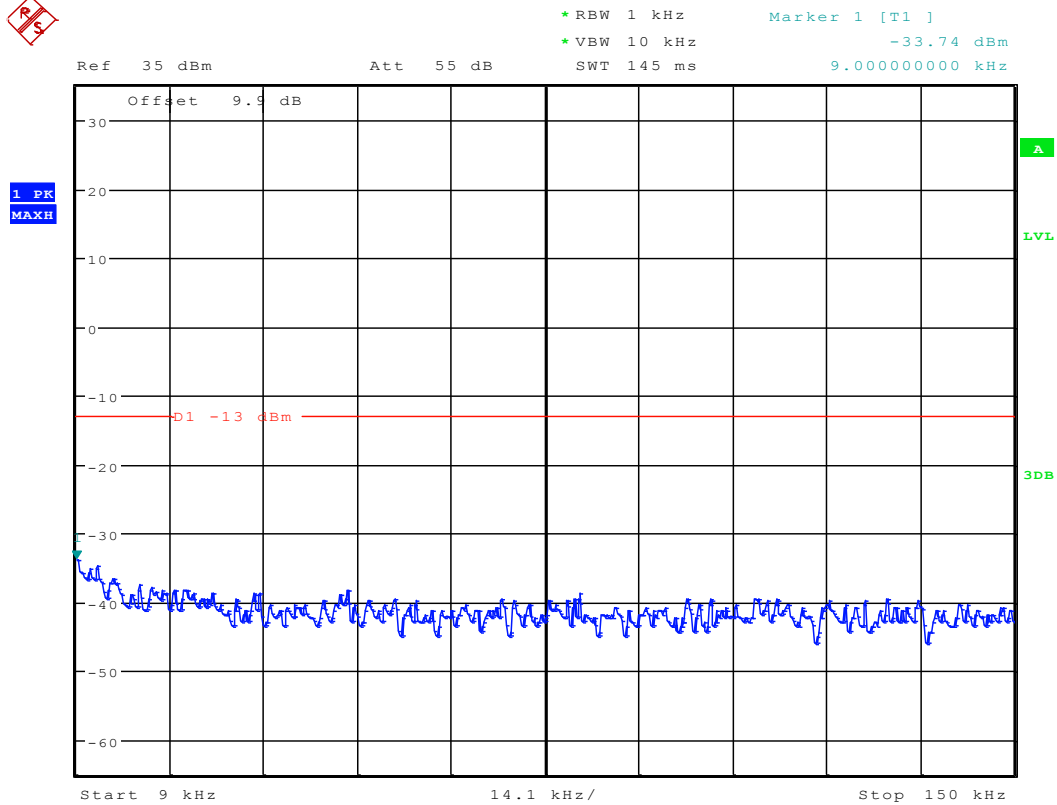
Date: 25.AUG.2011 16:49:49



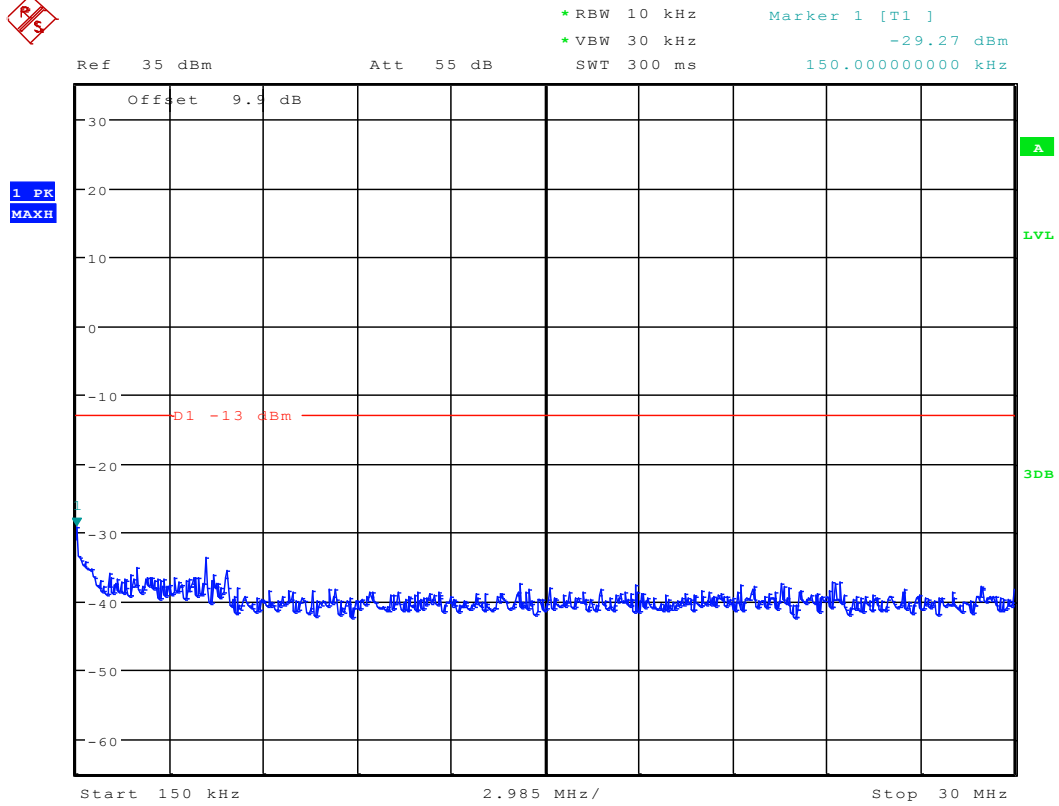
Date: 25.AUG.2011 16:50:15



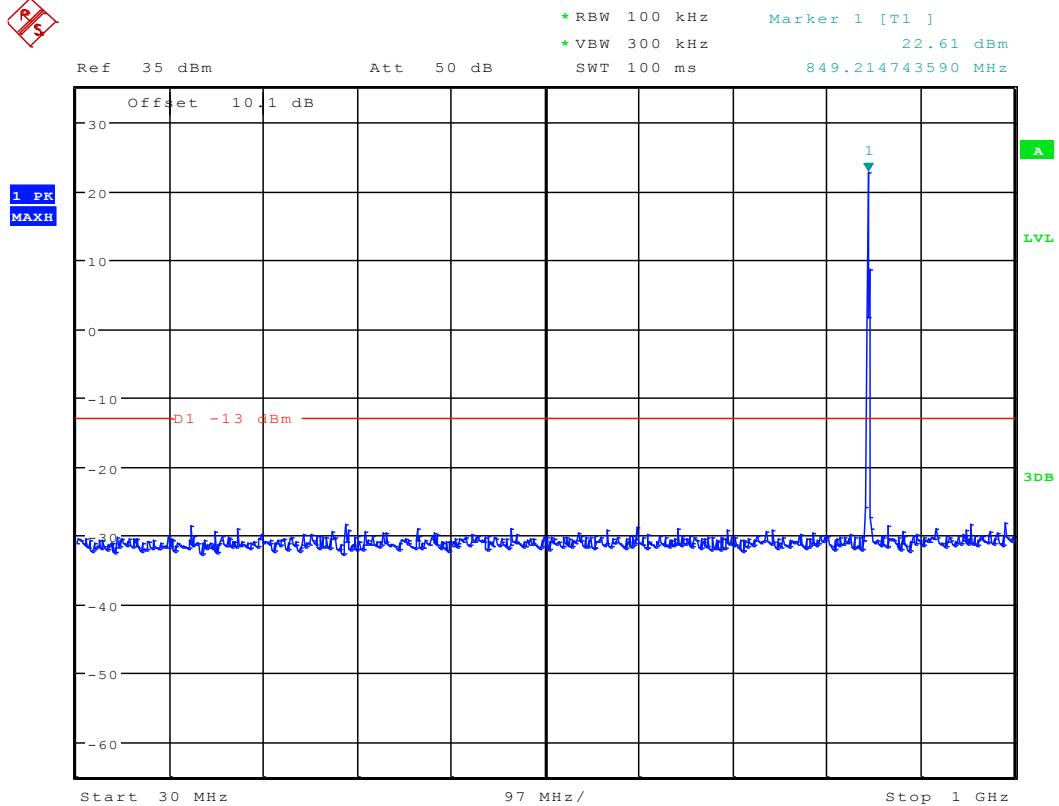
## Channel 777



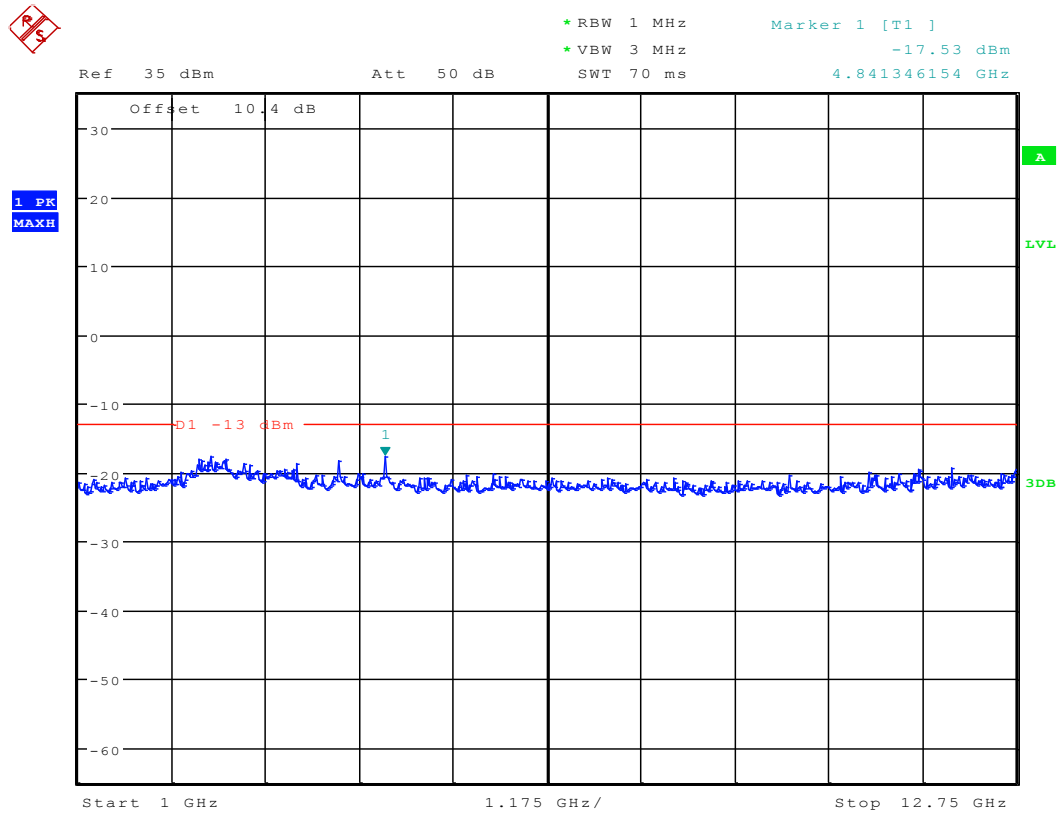
Date: 25.AUG.2011 16:49:07



Date: 25.AUG.2011 16:49:32



Date: 25.AUG.2011 16:49:58

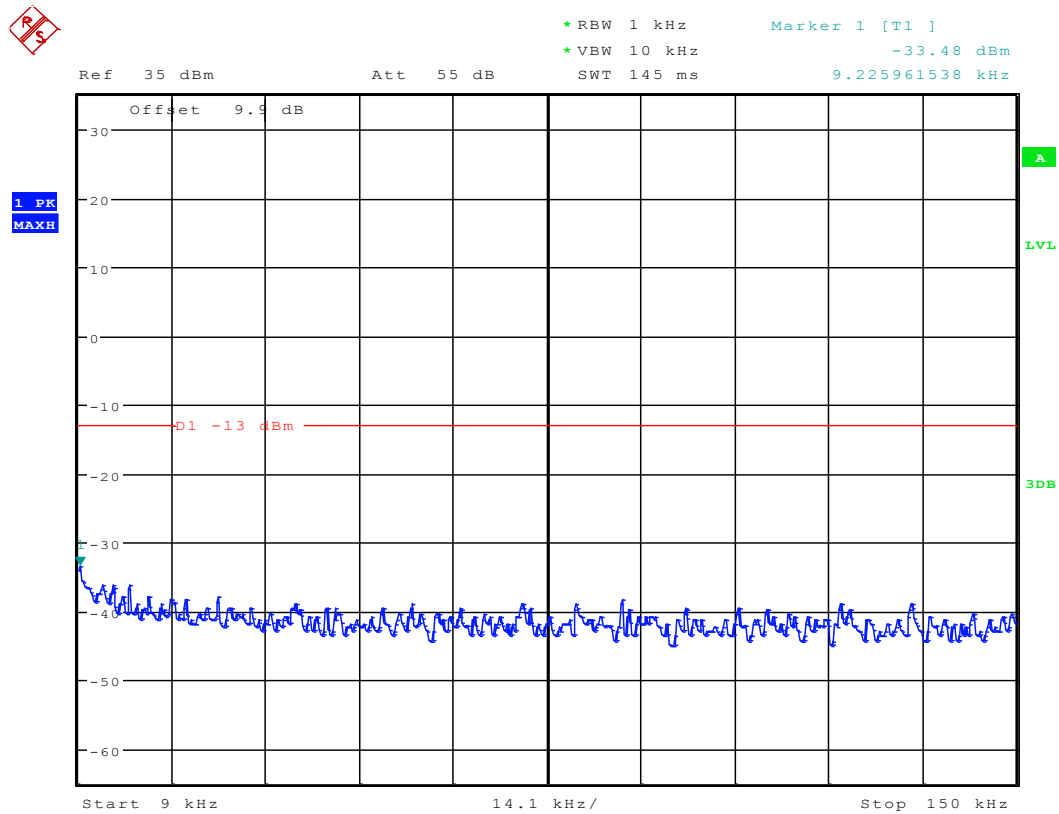


Date: 25.AUG.2011 16:50:24

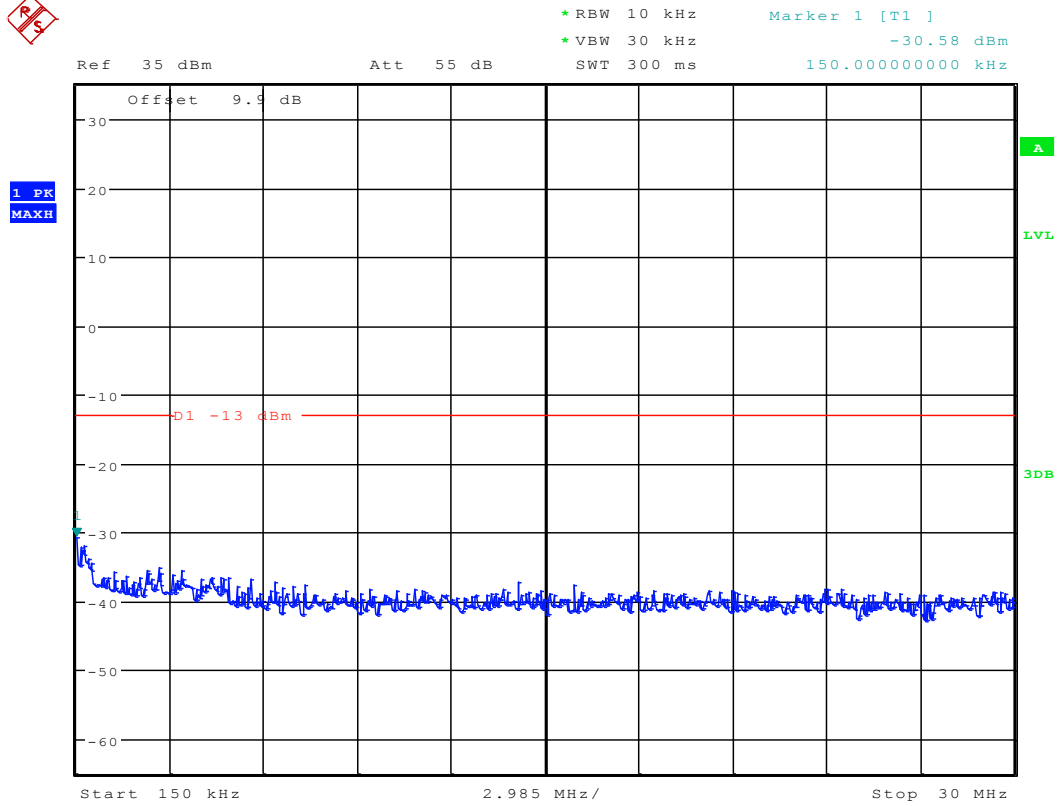


## TM3

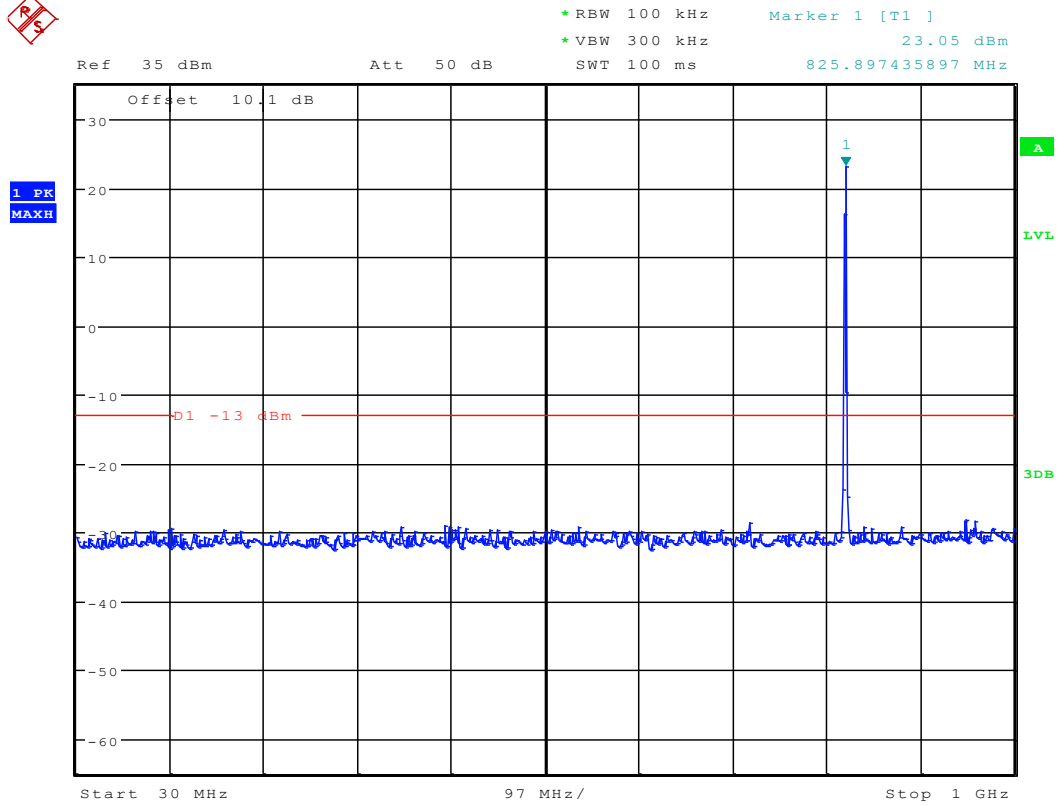
### Channel 1013



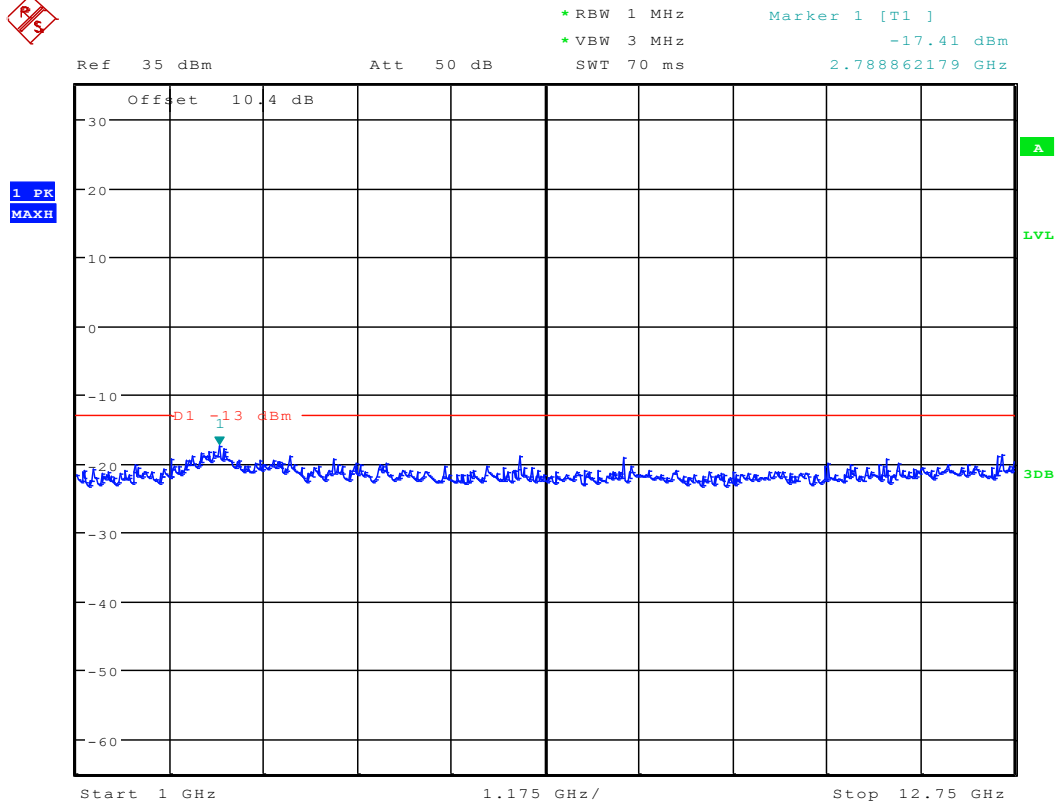
Date: 25.AUG.2011 16:50:34



Date: 25.AUG.2011 16:50:59



Date: 25.AUG.2011 16:51:25



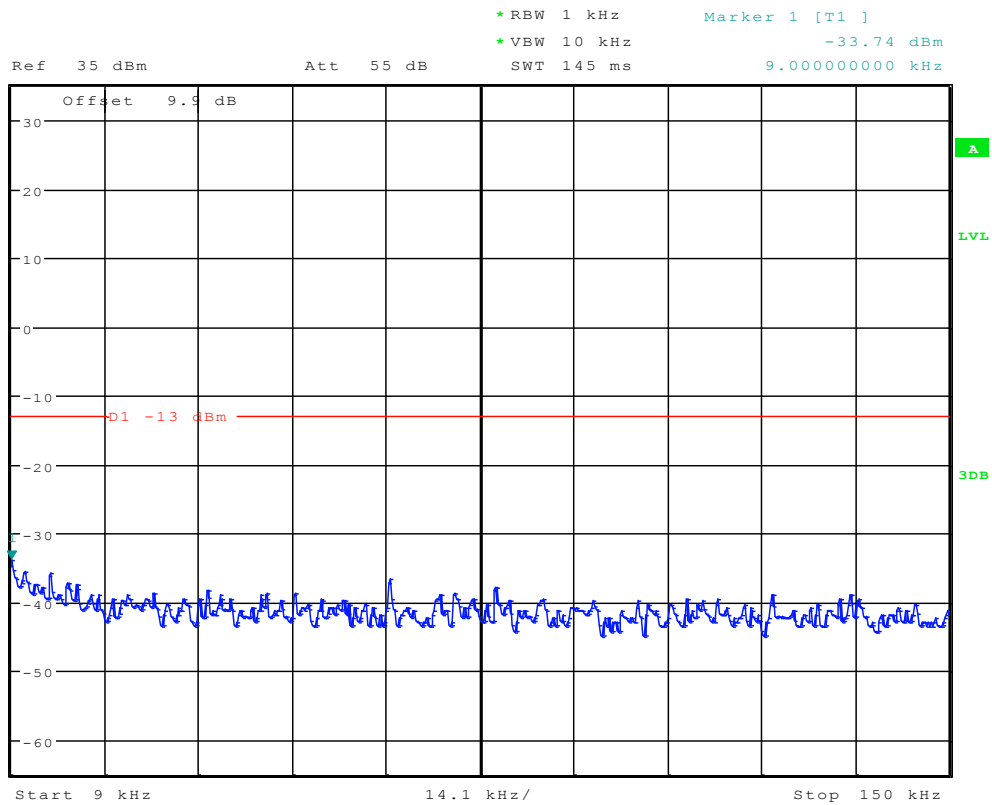
Date: 25.AUG.2011 16:51:51



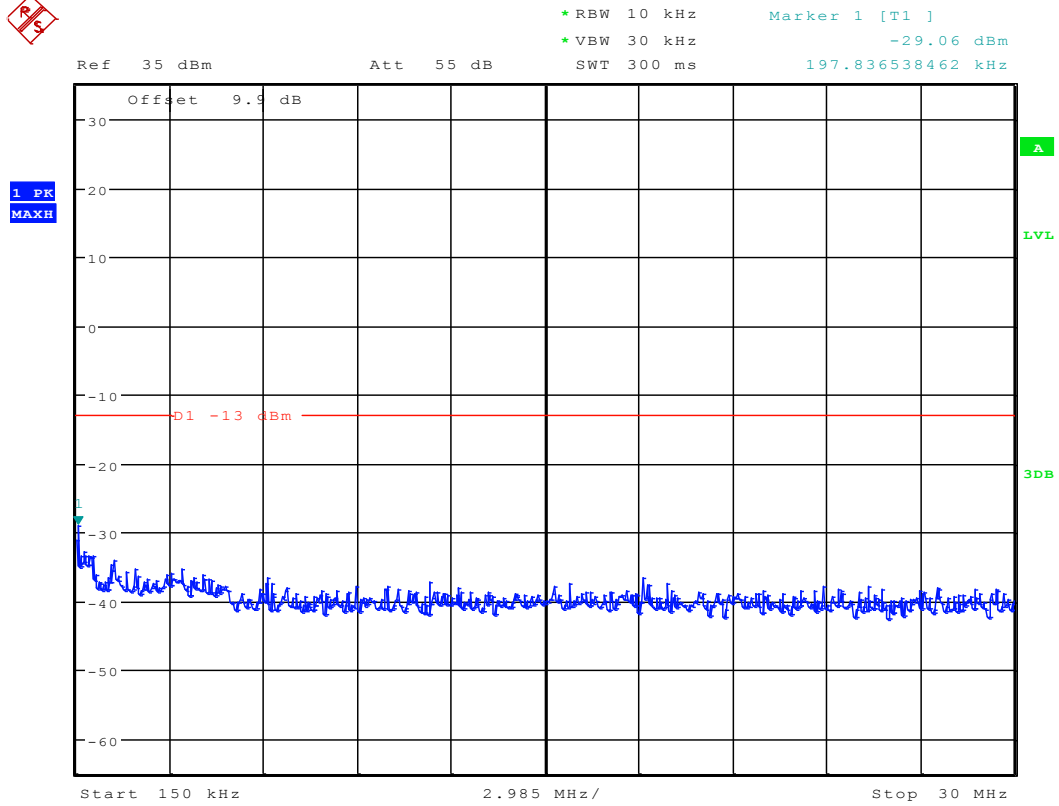
## Channel 384



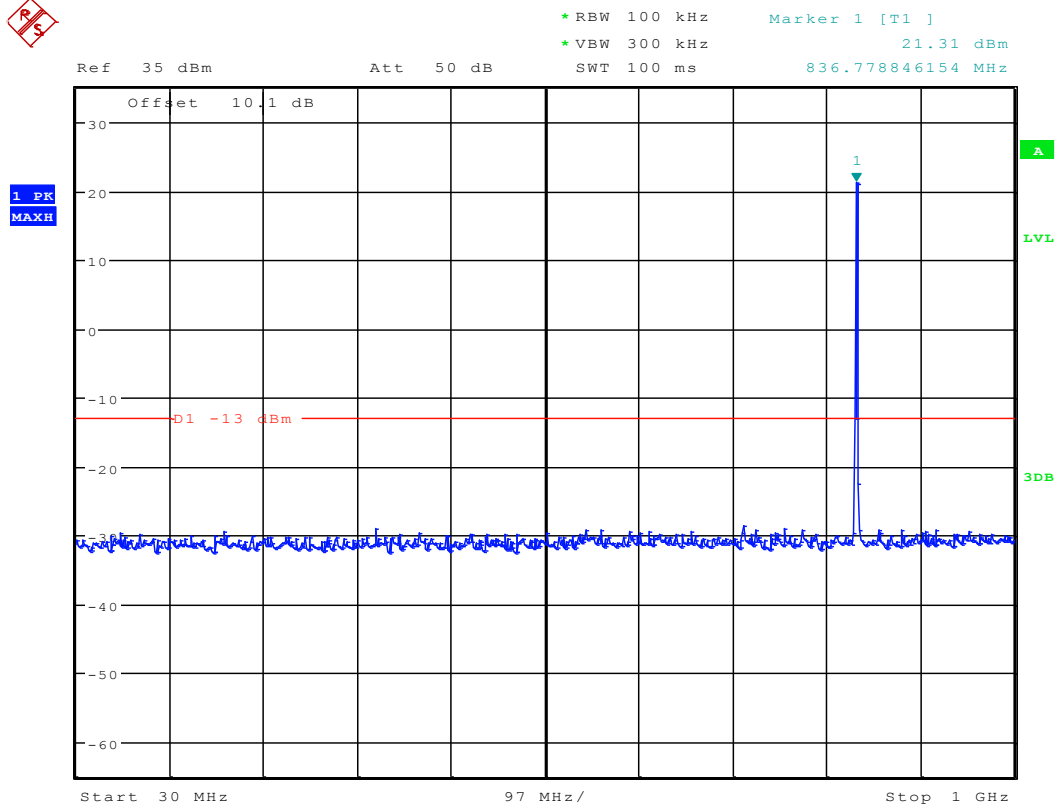
1 PK  
MAXH



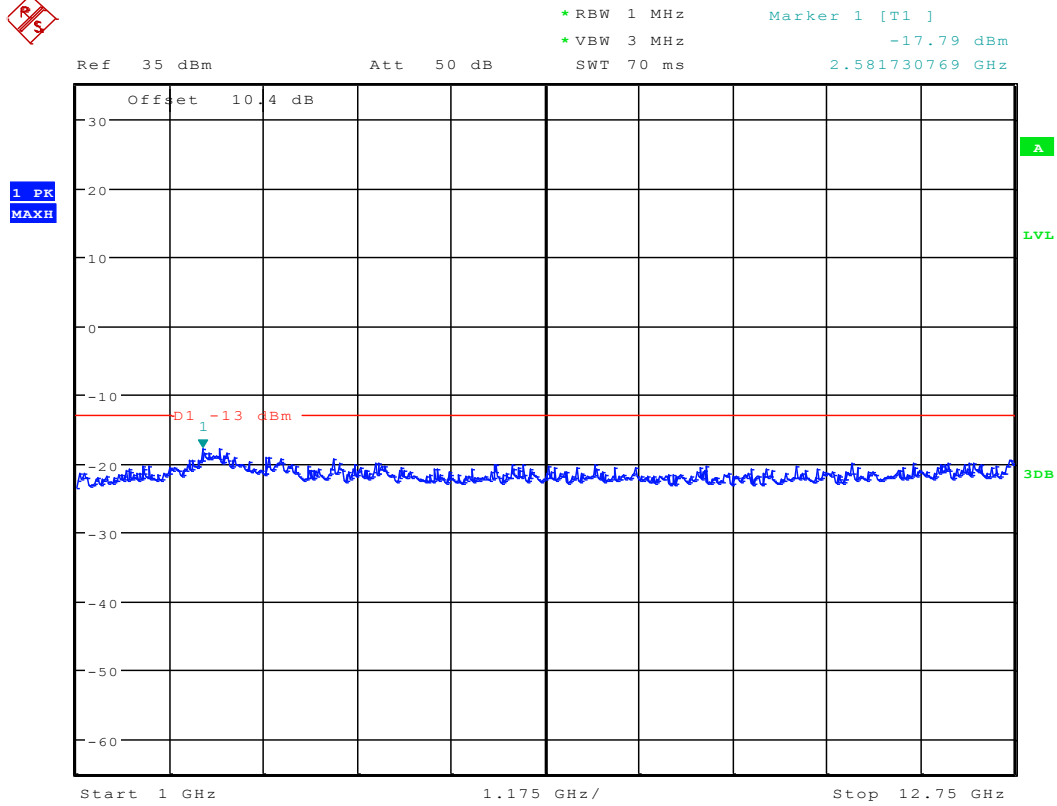
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Date: 25.AUG.2011 16:51:08



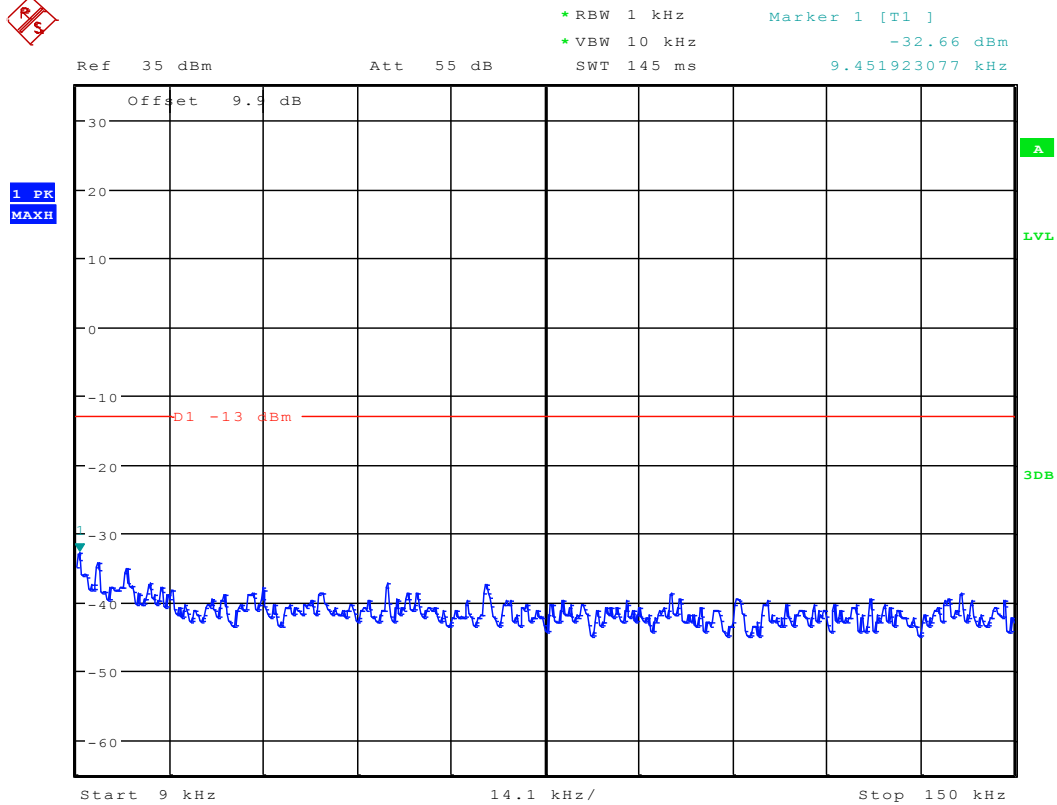
Date: 25.AUG.2011 16:51:33



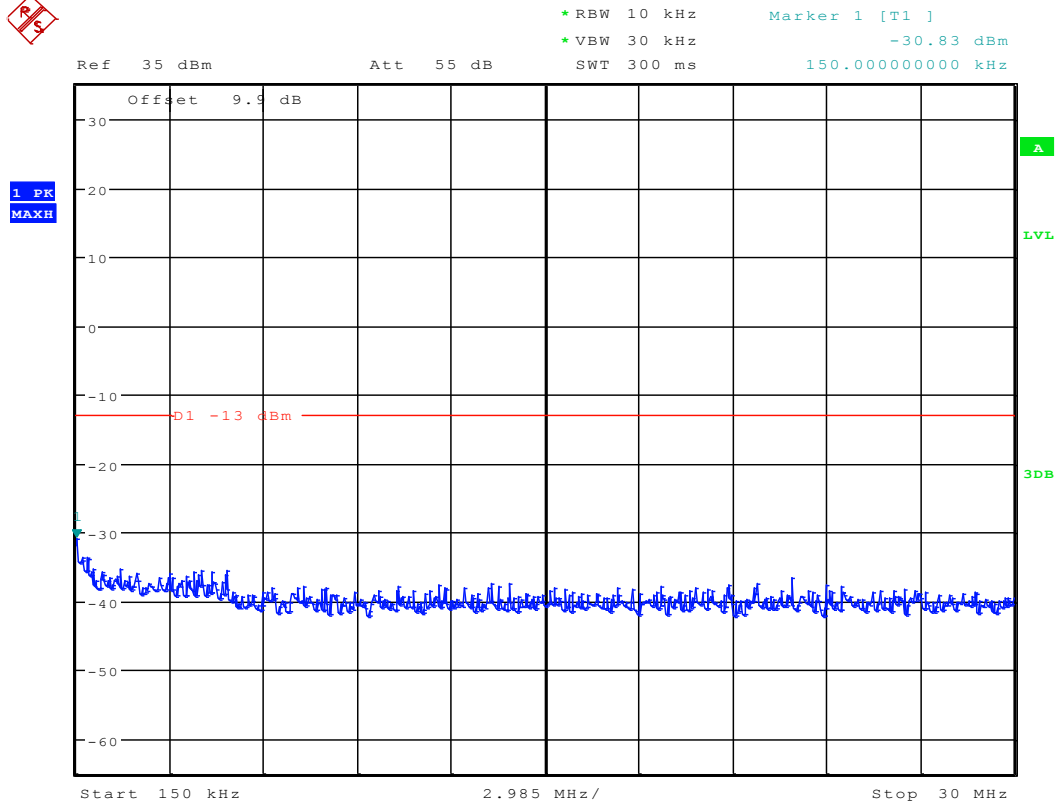
Date: 25.AUG.2011 16:51:59



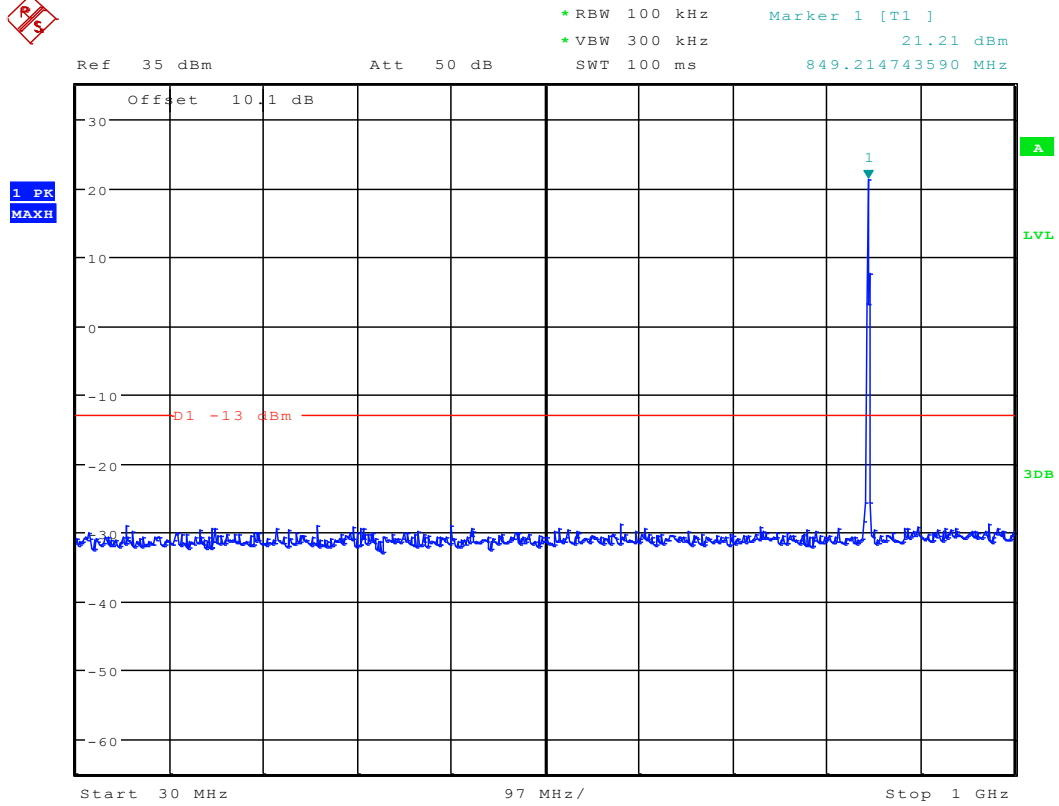
## Channel 777



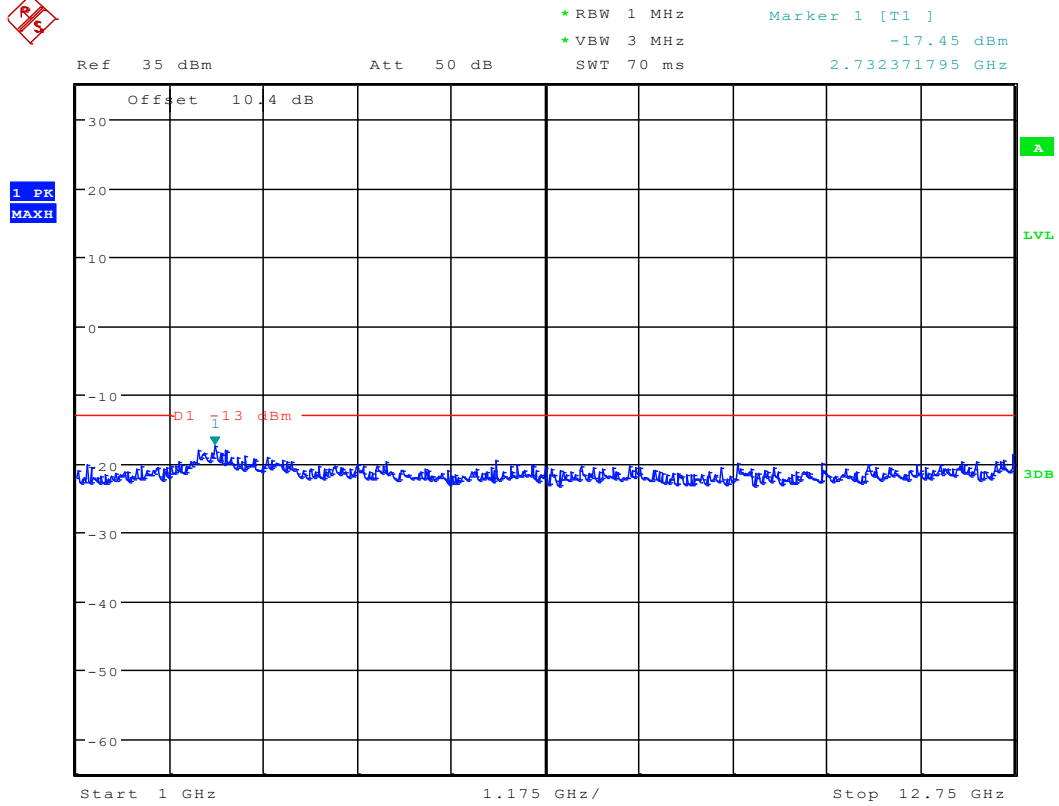
Date: 25.AUG.2011 16:50:51



Date: 25.AUG.2011 16:51:16



Date: 25.AUG.2011 16:51:42

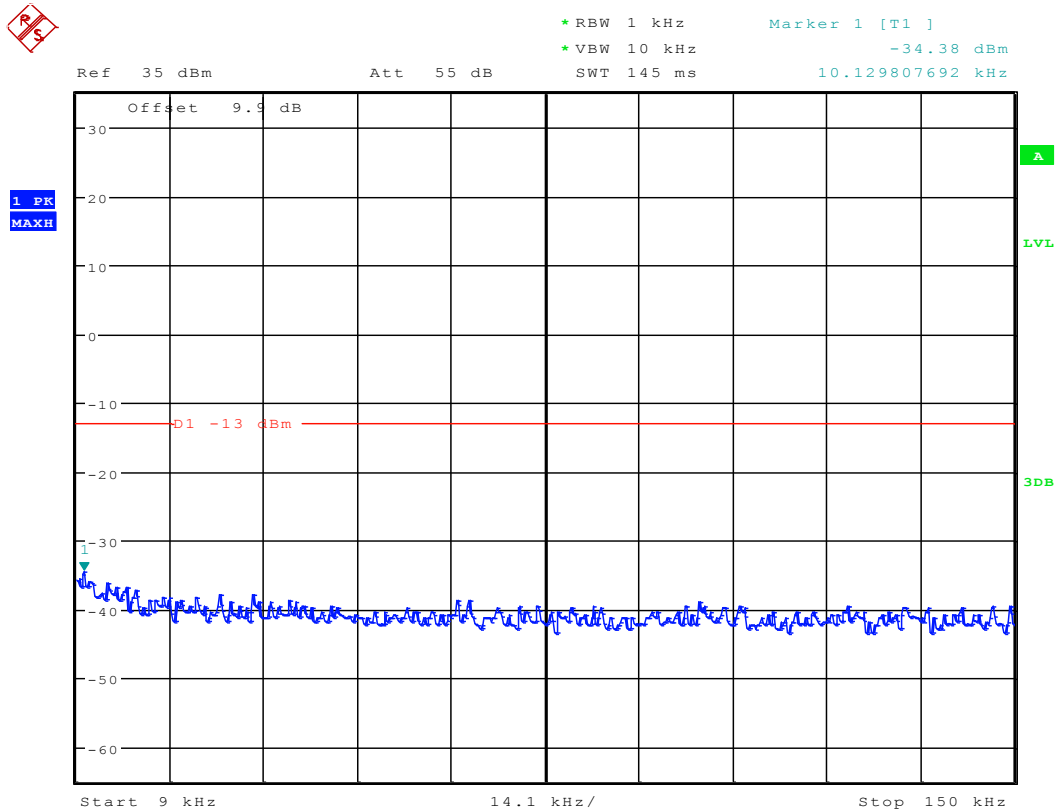


Date: 25.AUG.2011 16:52:08

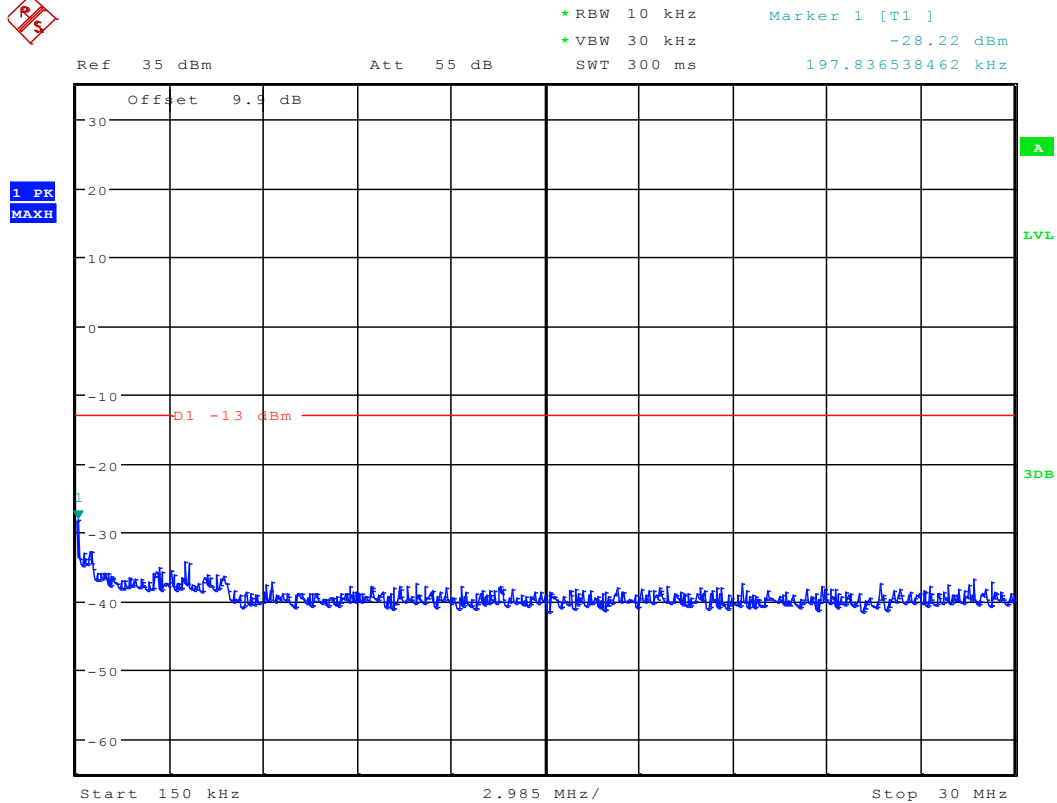


## EVDO subtype 0

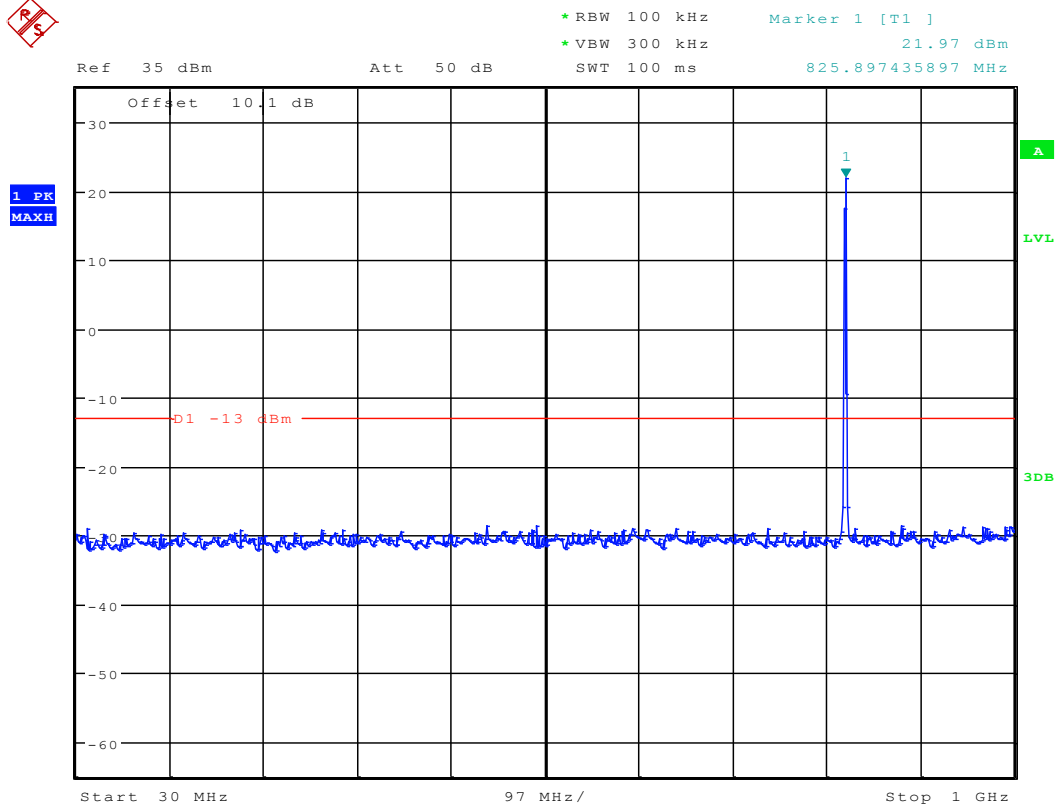
### Channel 1013



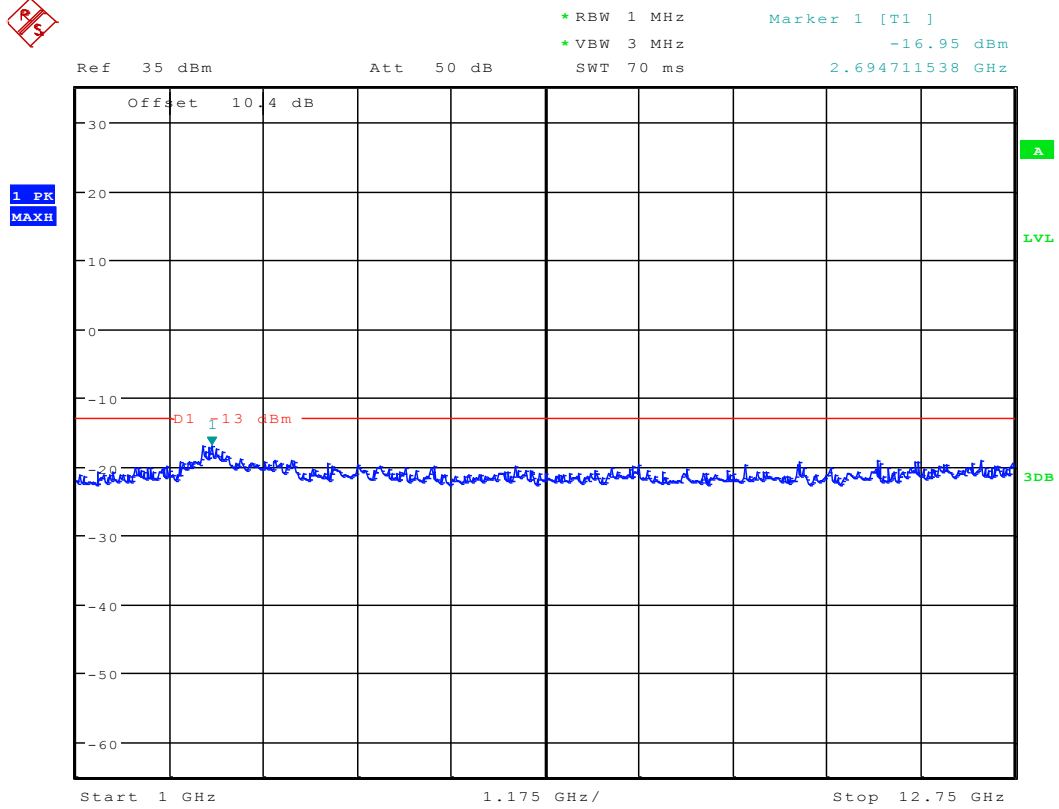
Date: 25.AUG.2011 16:54:22



Date: 25.AUG.2011 16:55:06



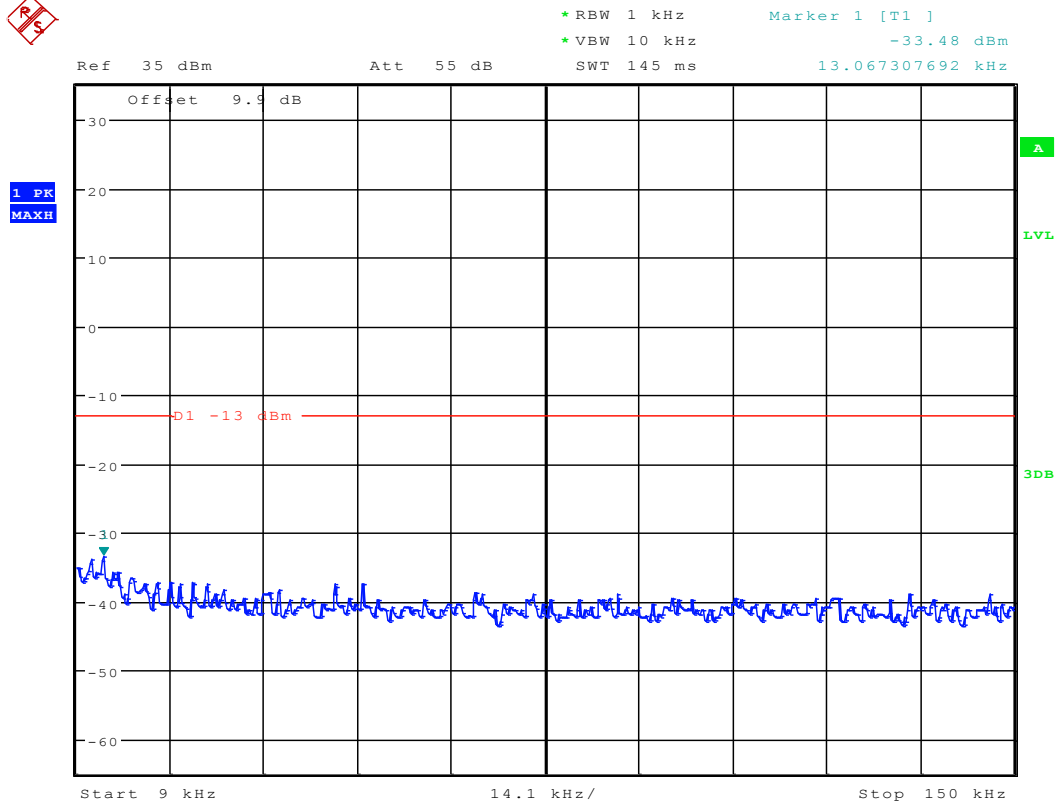
Date: 25.AUG.2011 16:55:49



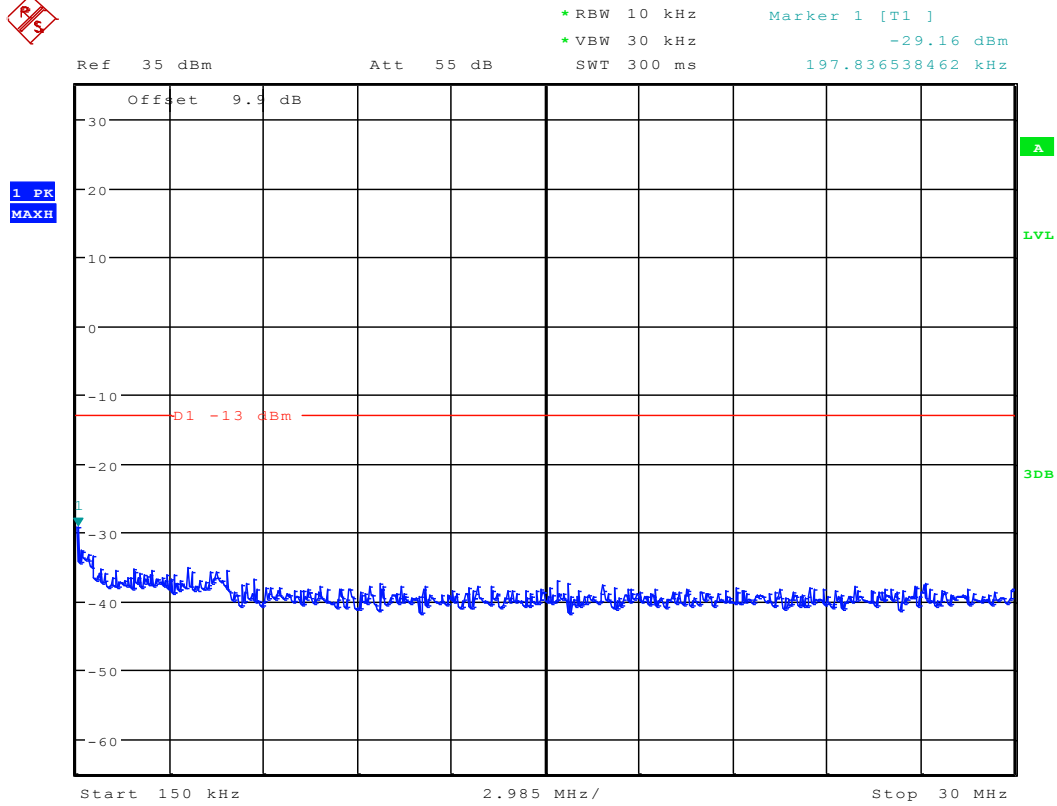
Date: 25.AUG.2011 16:56:33



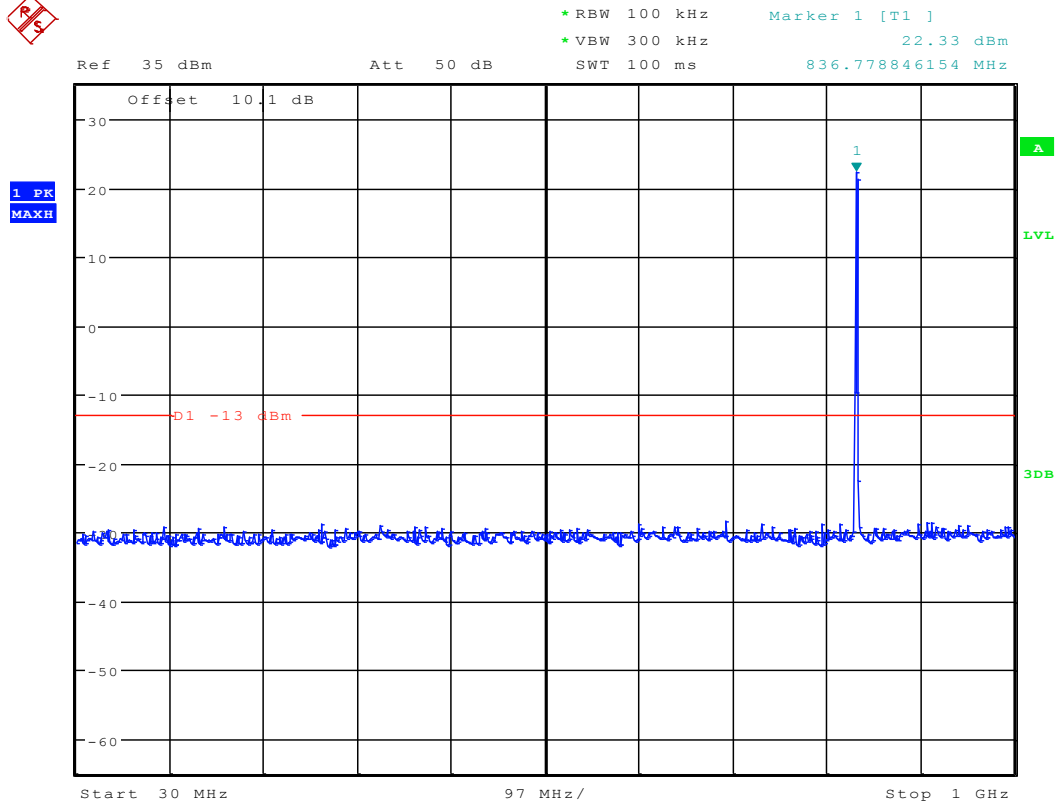
## Channel 384



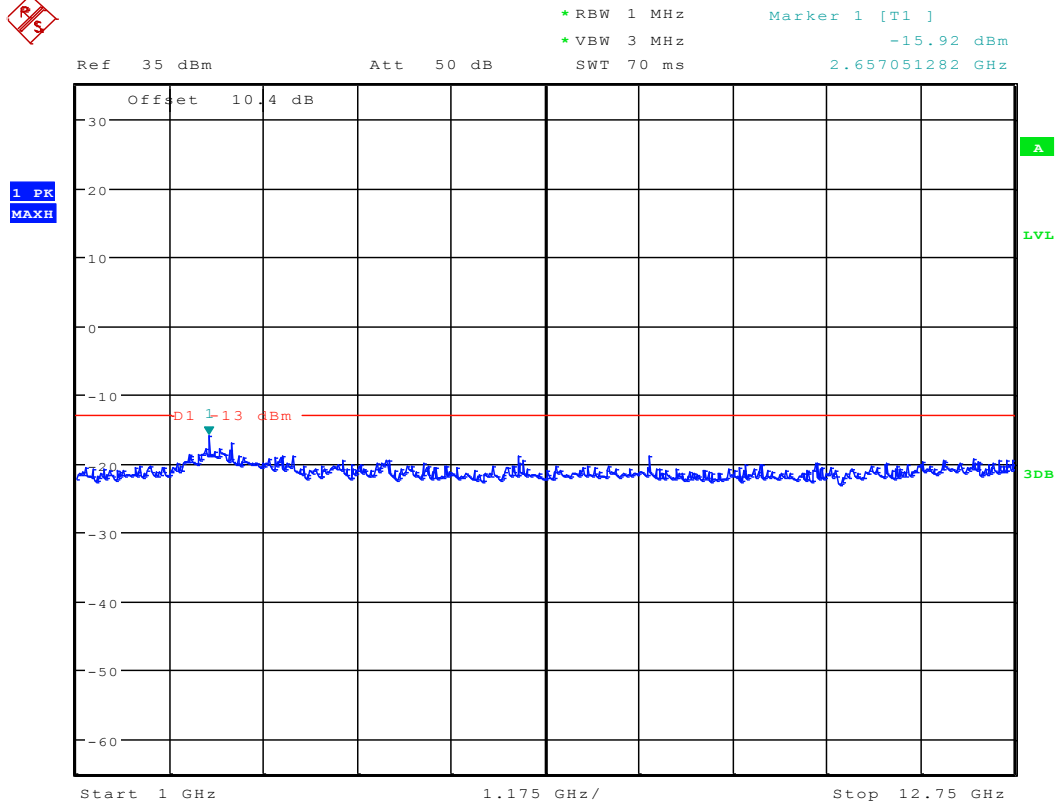
Date: 25.AUG.2011 16:54:36



Date: 25.AUG.2011 16:55:20



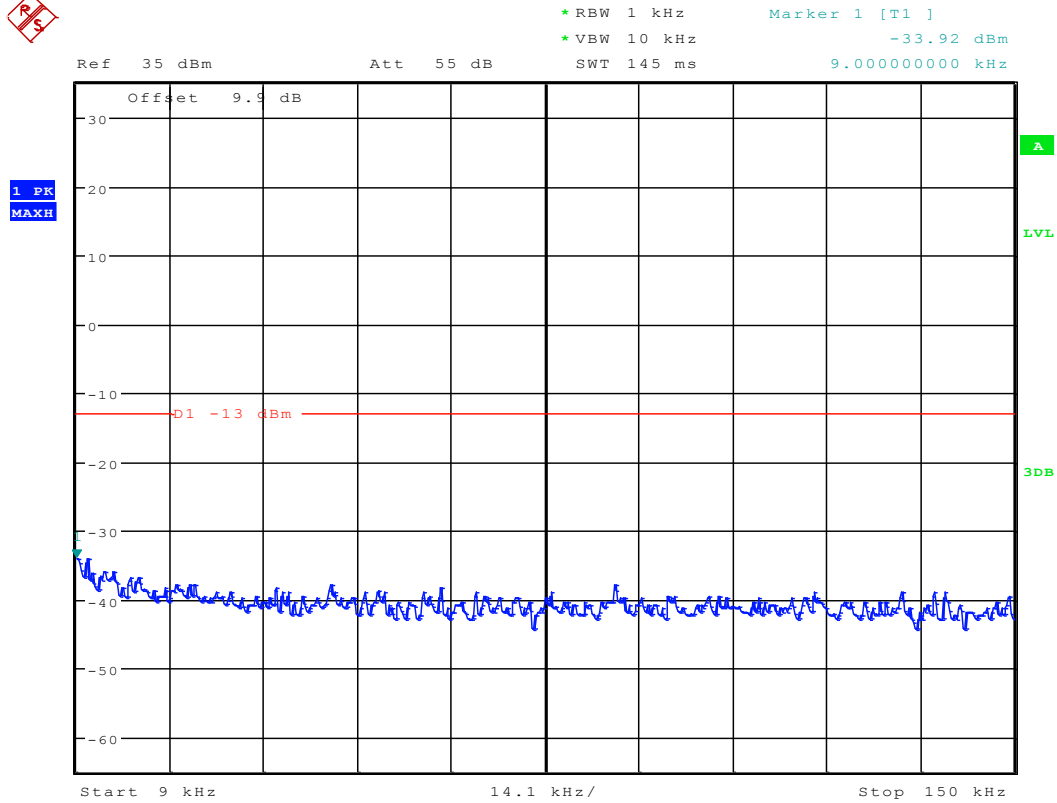
Date: 25.AUG.2011 16:56:04



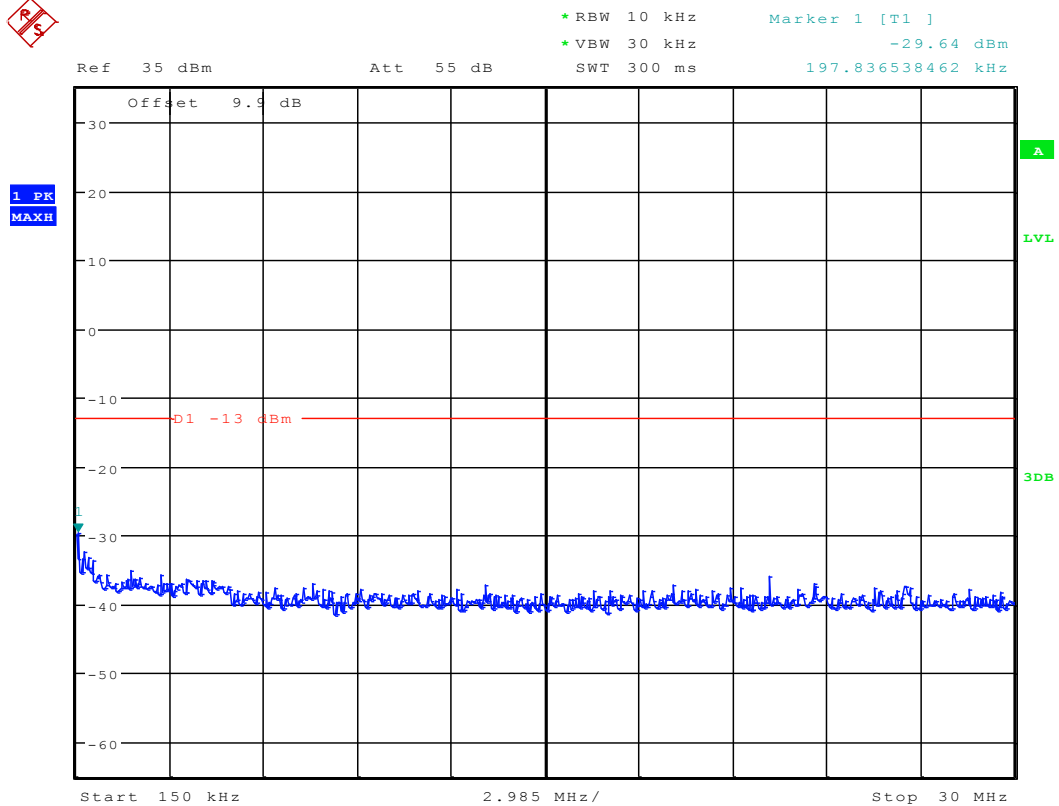
Date: 25.AUG.2011 16:56:48



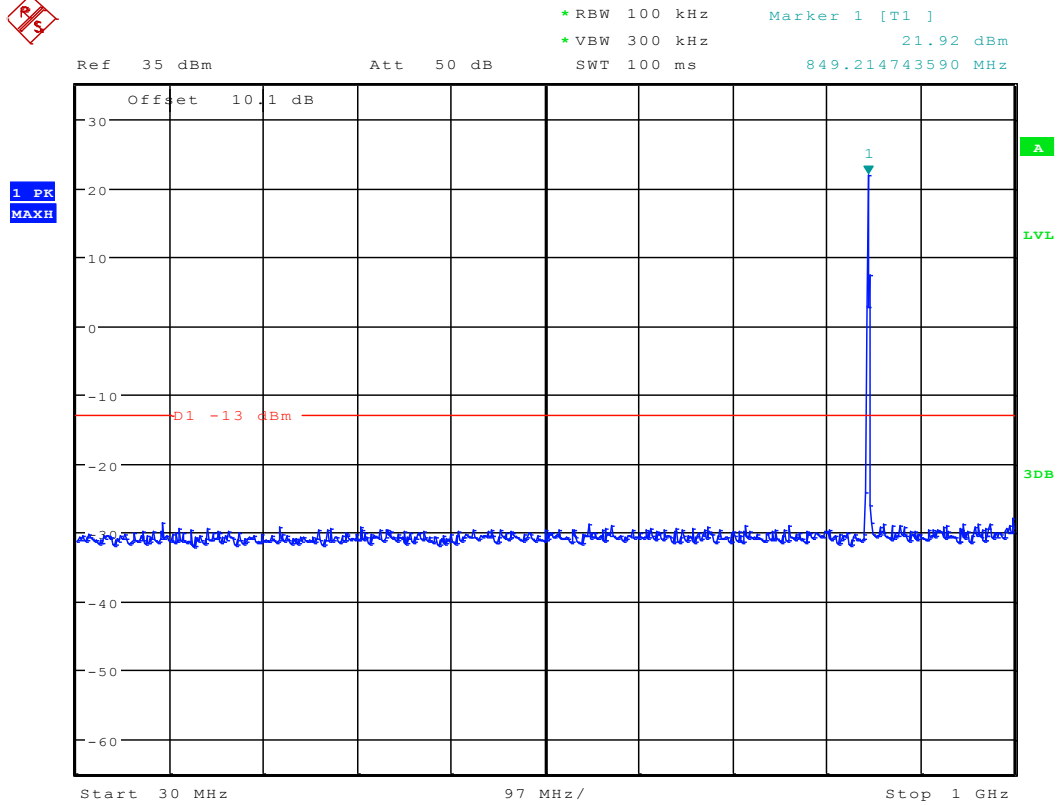
## Channel 777



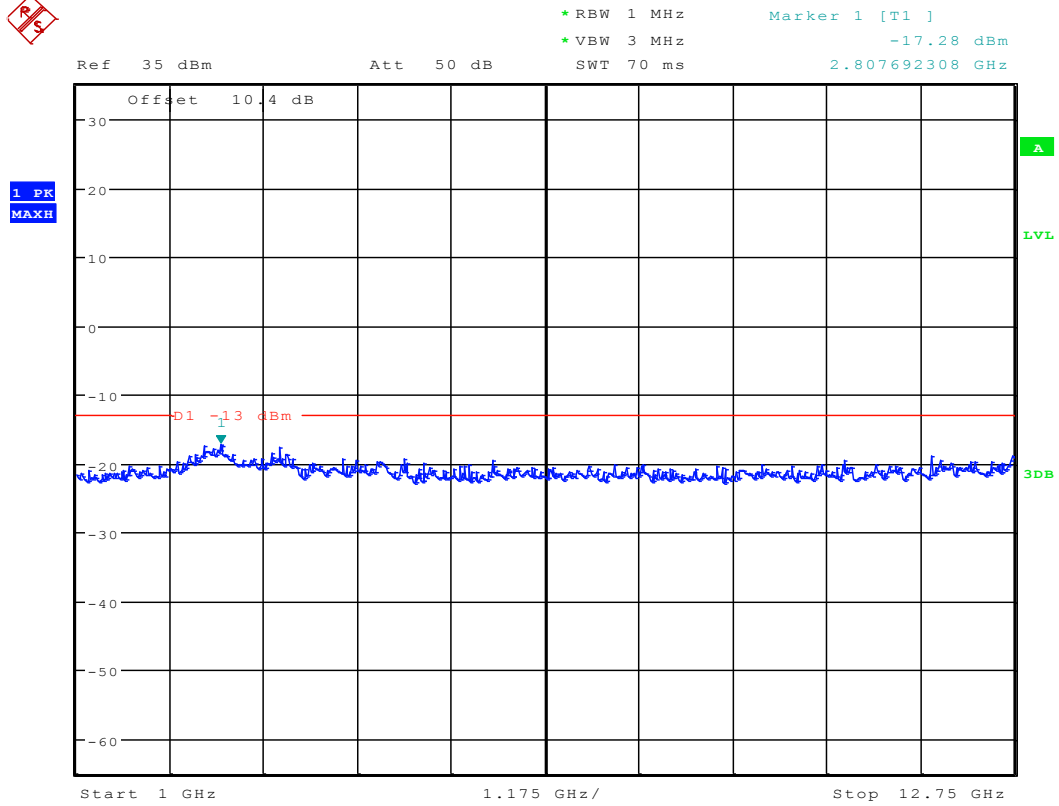
Date: 25.AUG.2011 16:54:51



Date: 25.AUG.2011 16:55:34



Date: 25.AUG.2011 16:56:18



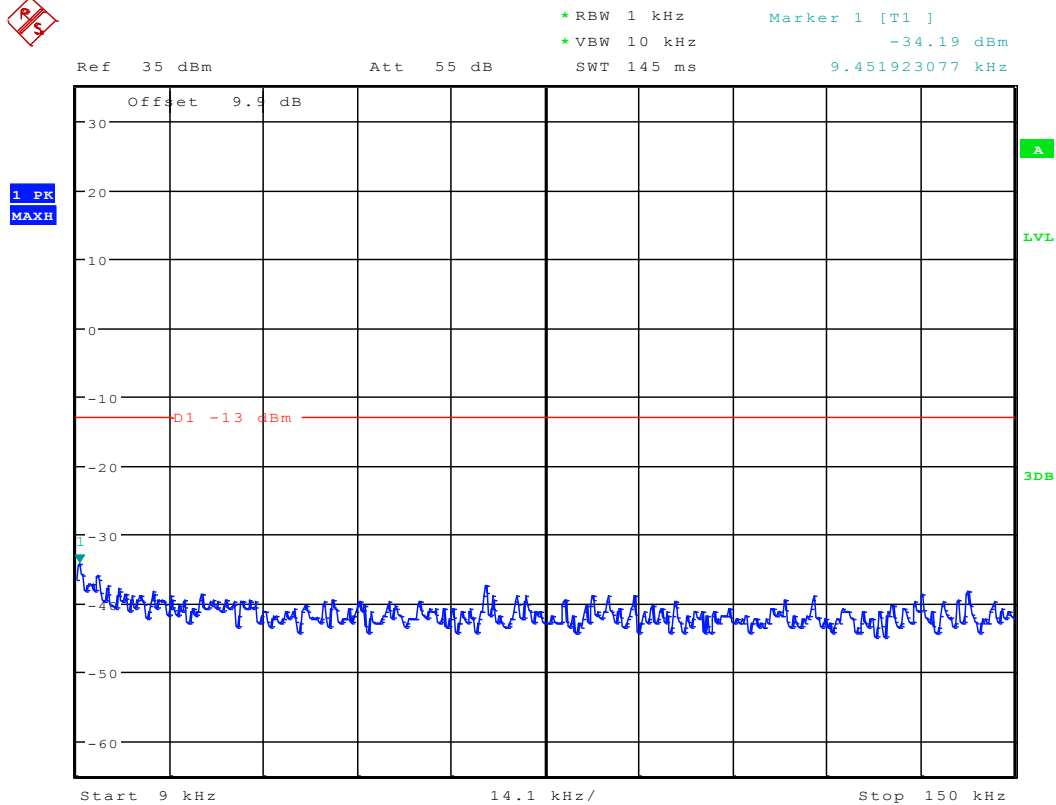
Date: 25.AUG.2011 16:57:02



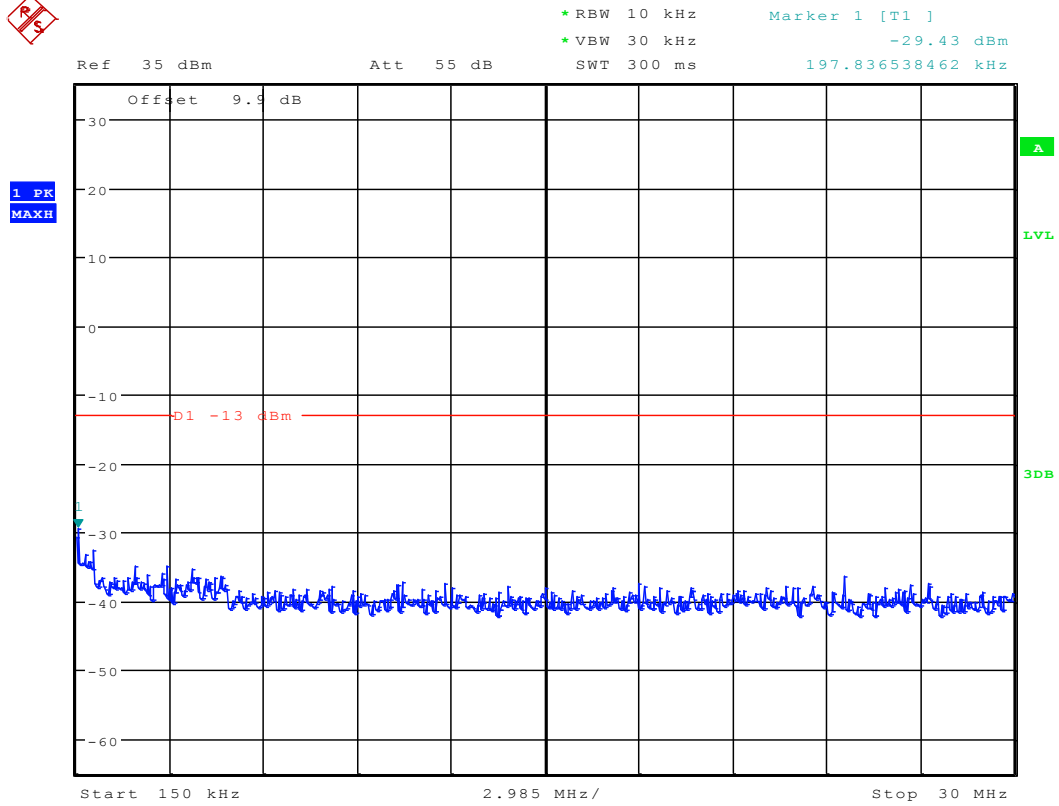
## EVDO subtype 2

Modulation: BPSK

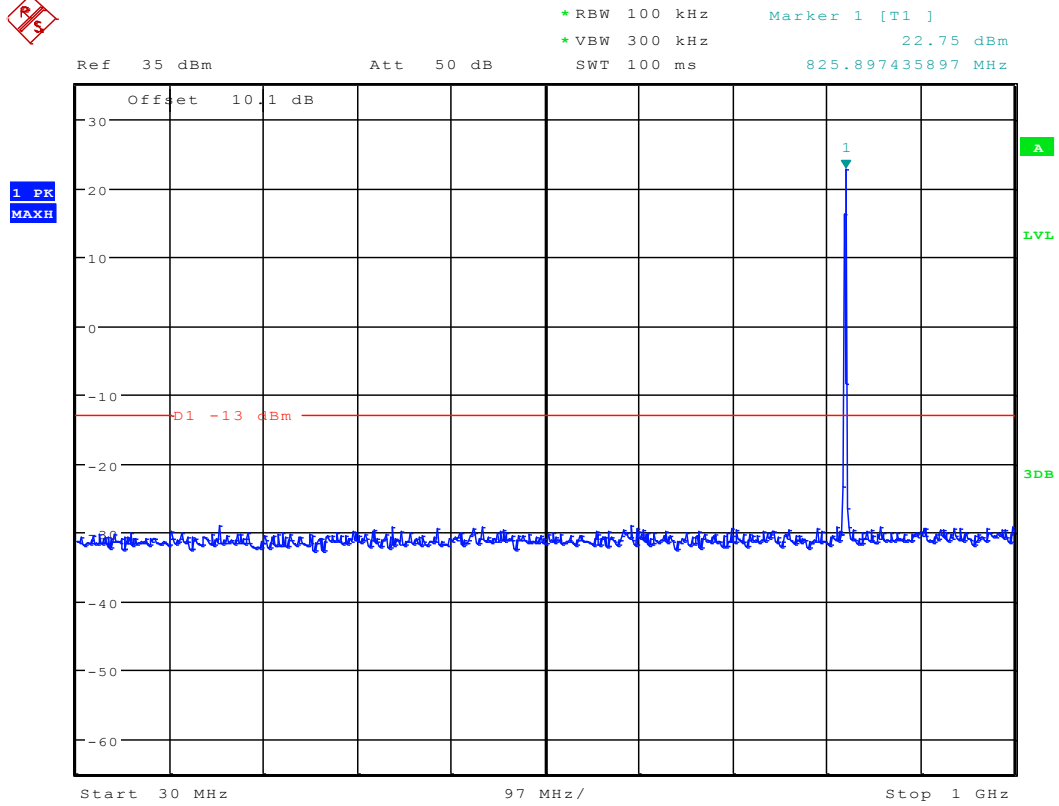
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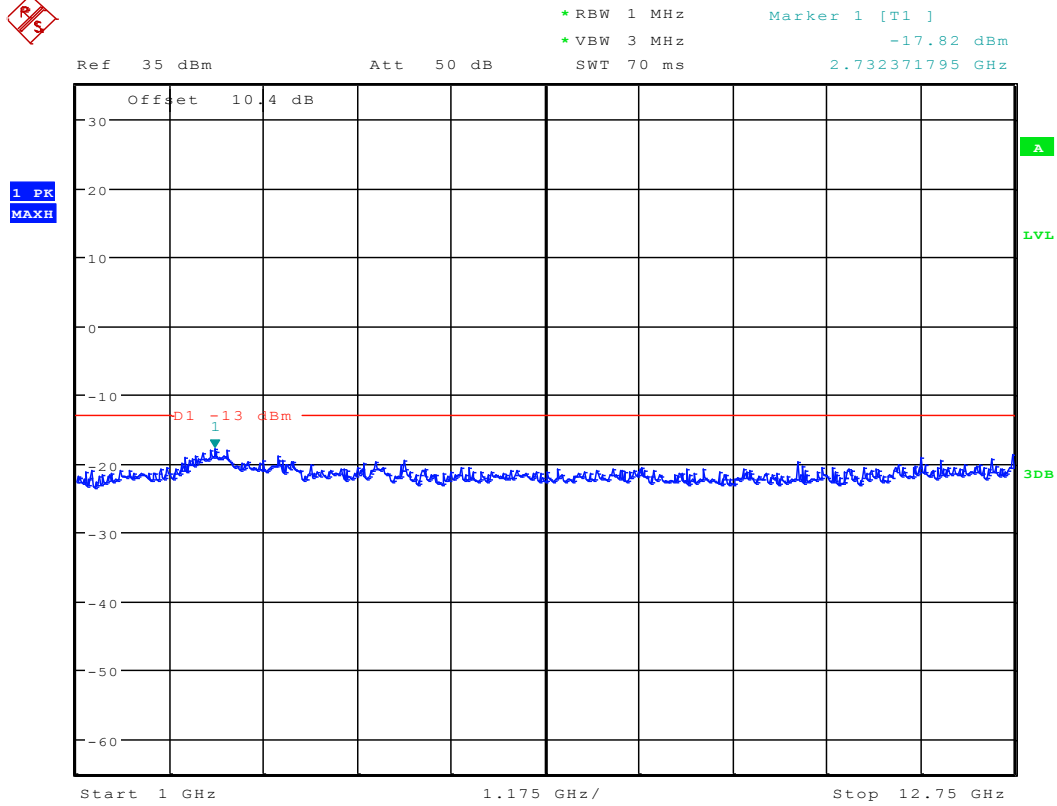
Date: 25.AUG.2011 17:01:15



Date: 25.AUG.2011 17:01:41



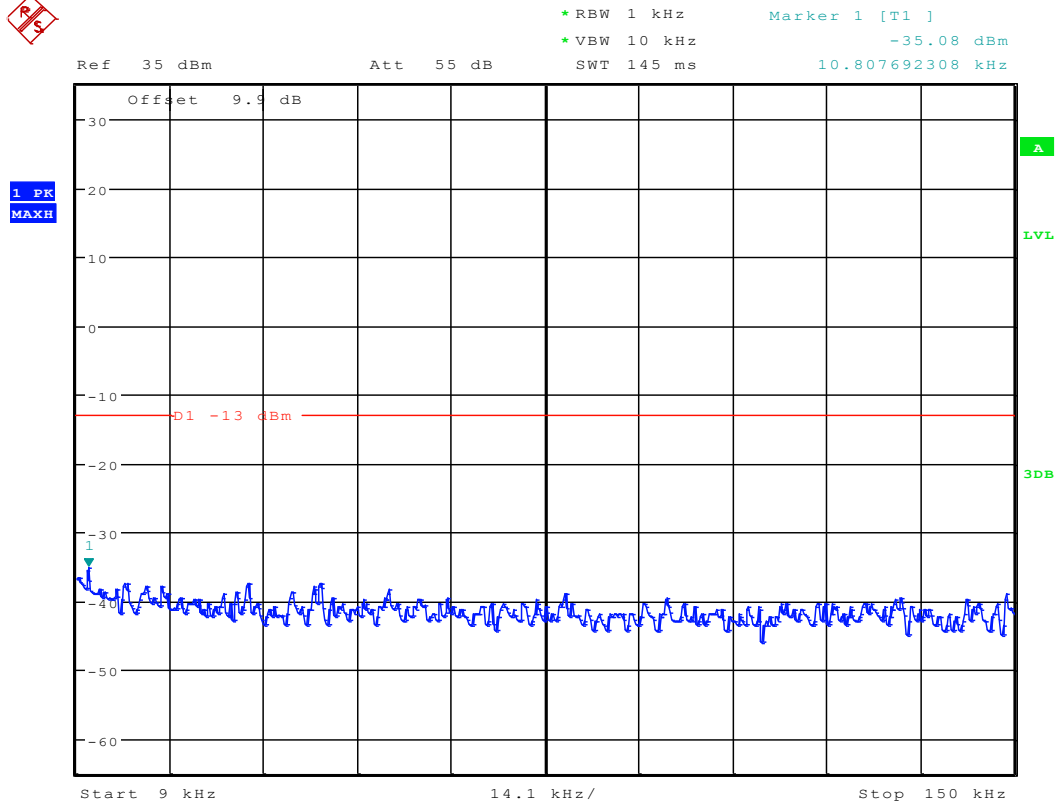
Date: 25.AUG.2011 17:02:07



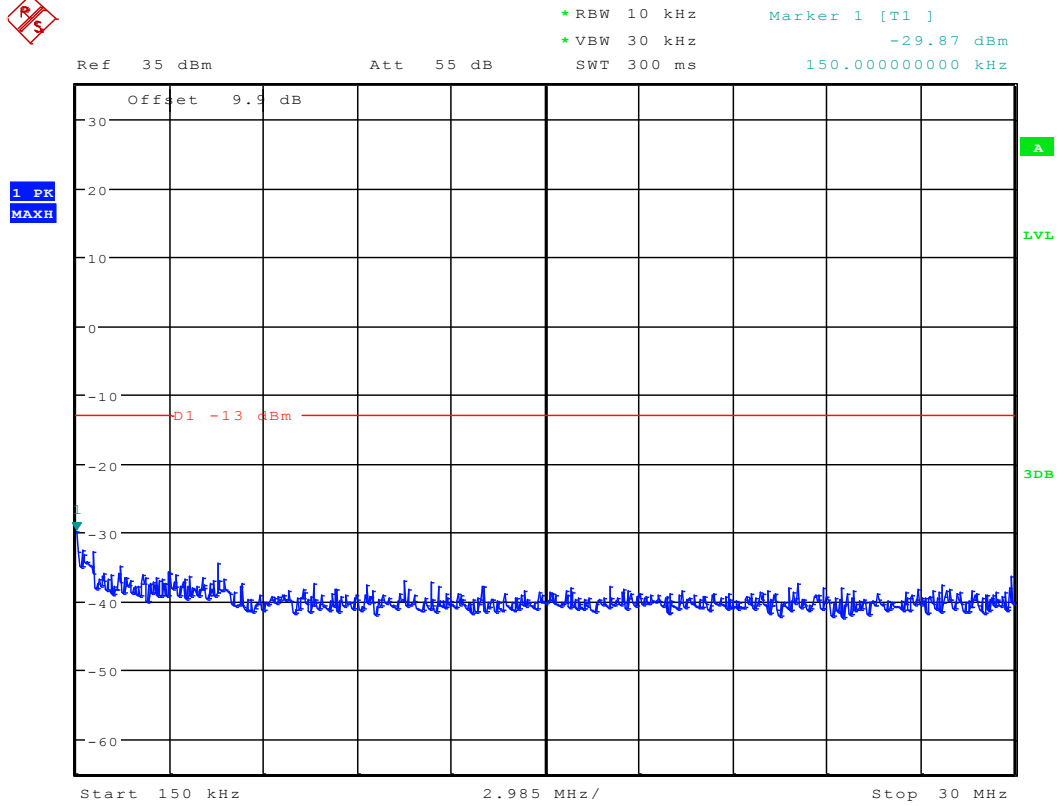
Date: 25.AUG.2011 17:02:32



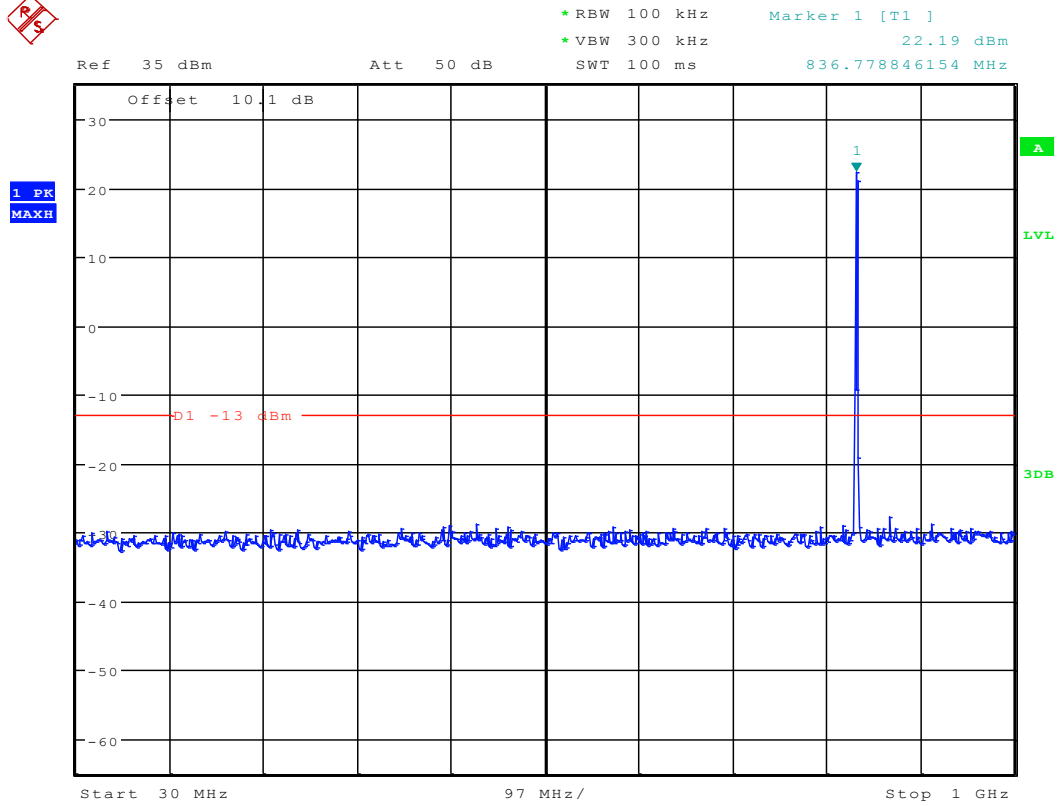
## Channel 384



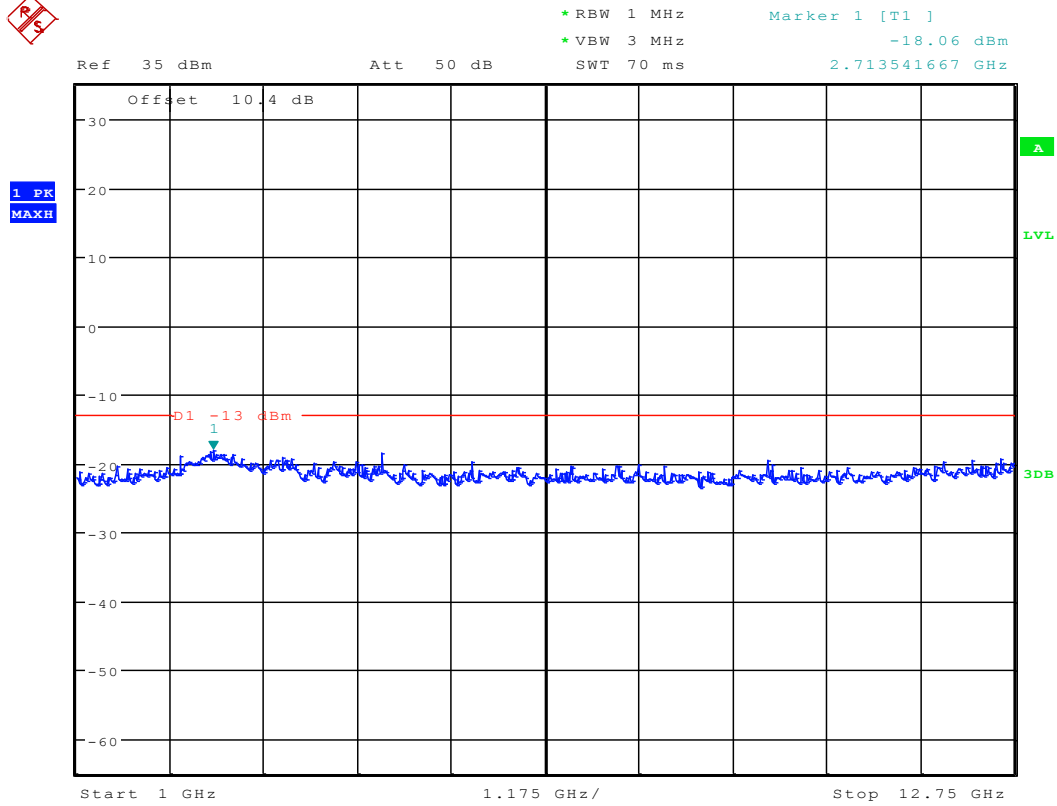
Date: 25.AUG.2011 17:01:24



Date: 25.AUG.2011 17:01:49



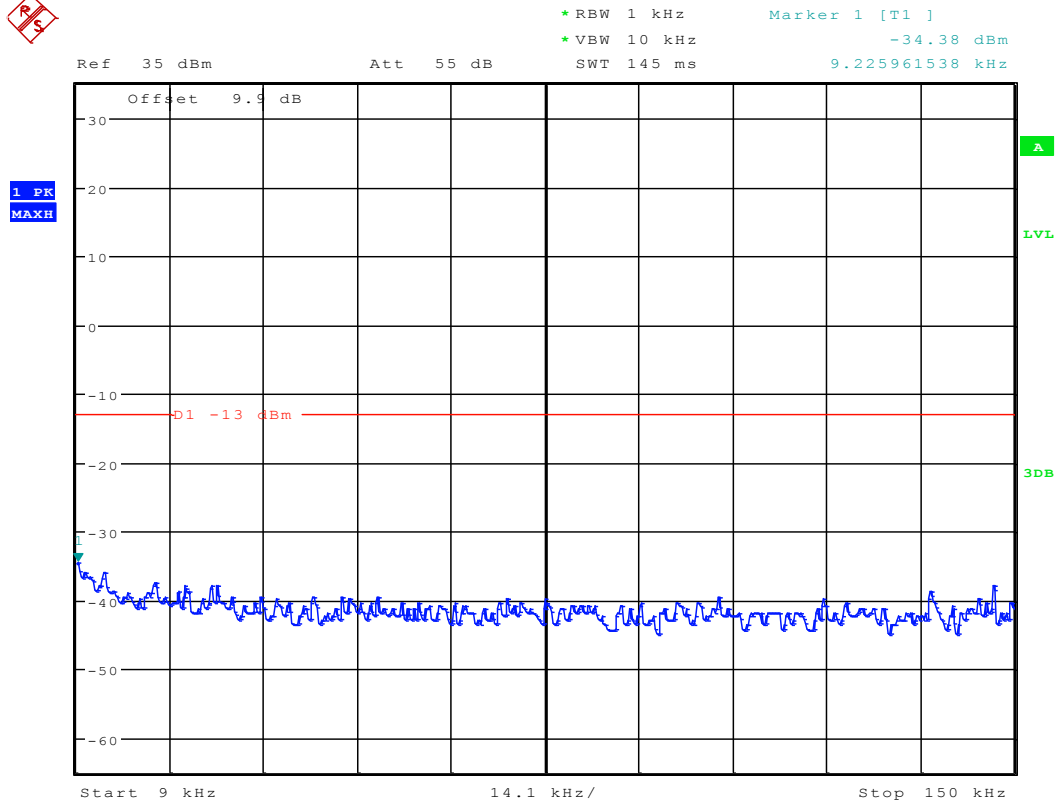
Date: 25.AUG.2011 17:02:15



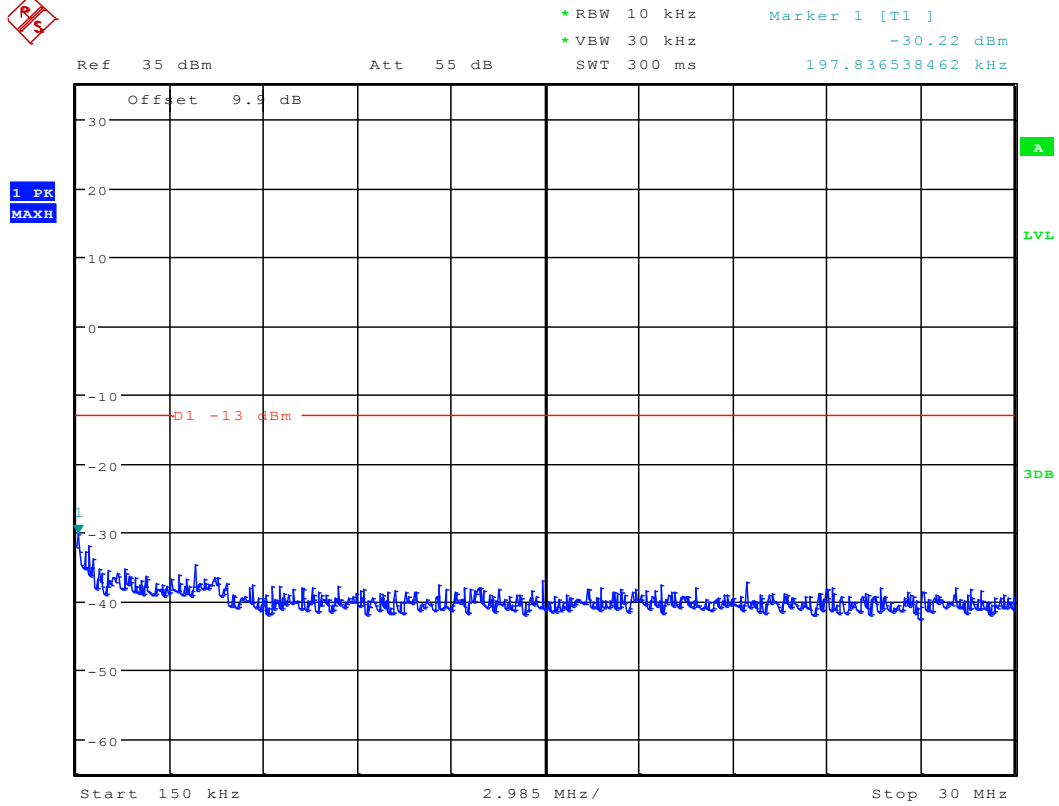
Date: 25.AUG.2011 17:02:41



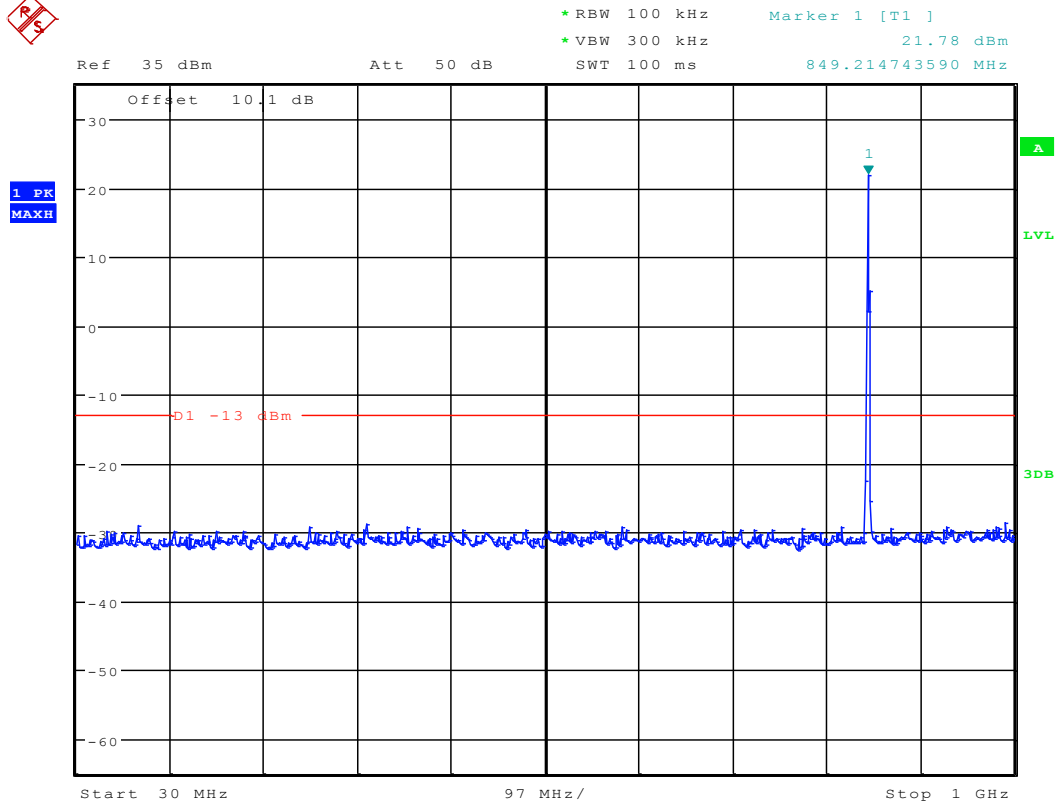
## Channel 777



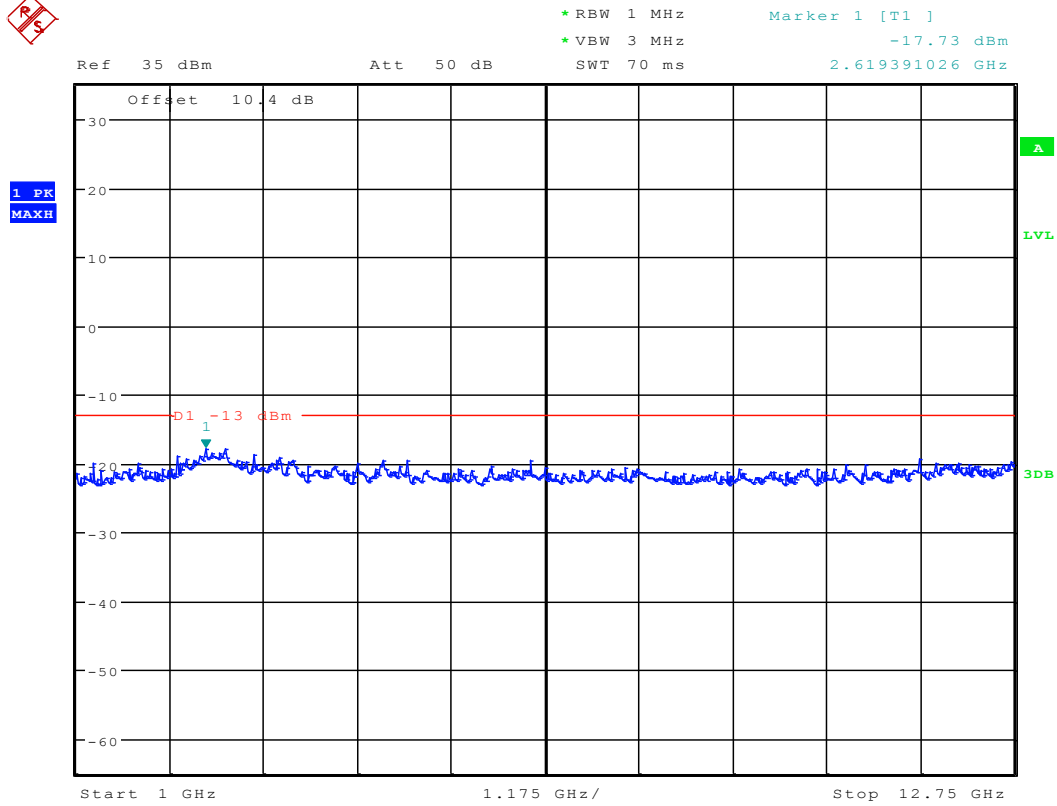
Date: 25.AUG.2011 17:01:32



Date: 25.AUG.2011 17:01:58



Date: 25.AUG.2011 17:02:23

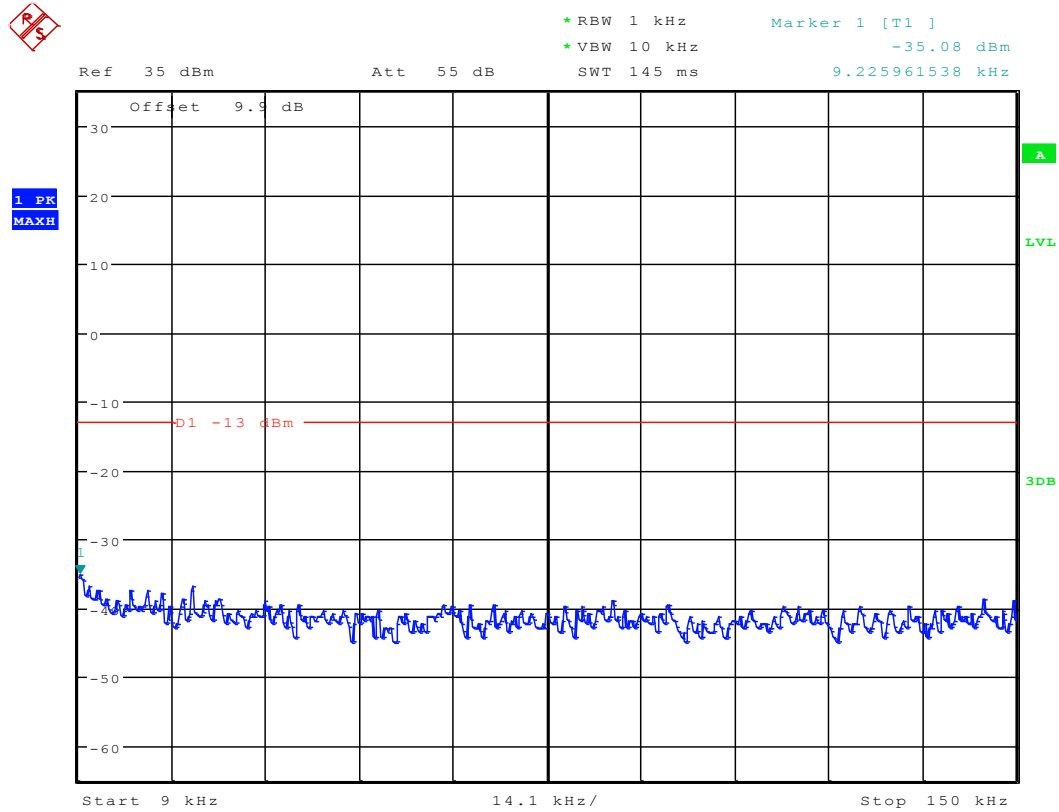


Date: 25.AUG.2011 17:02:49

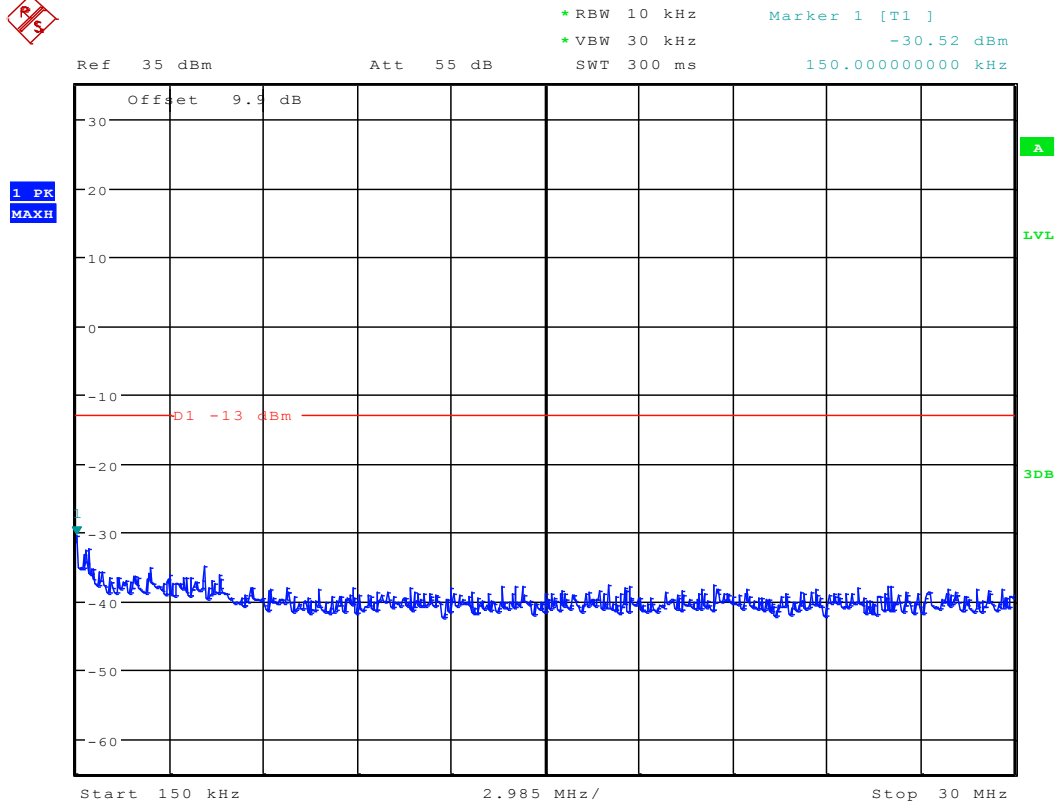


## Modulation: QPSK

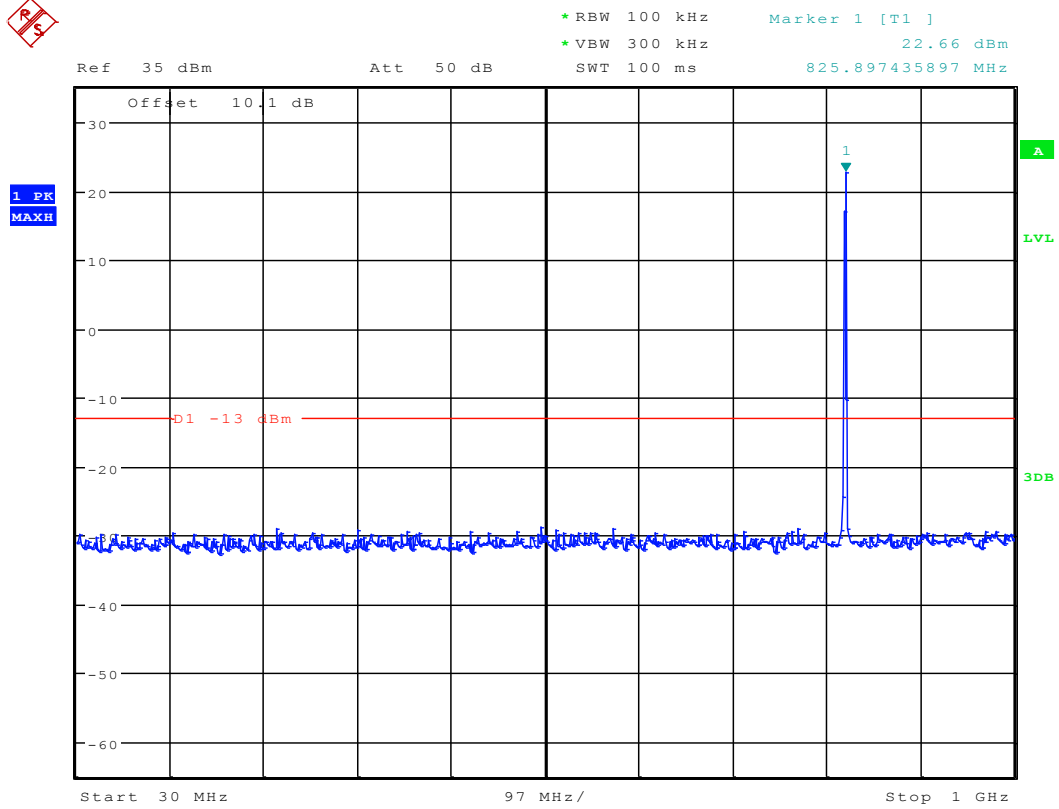
## Channel 1013



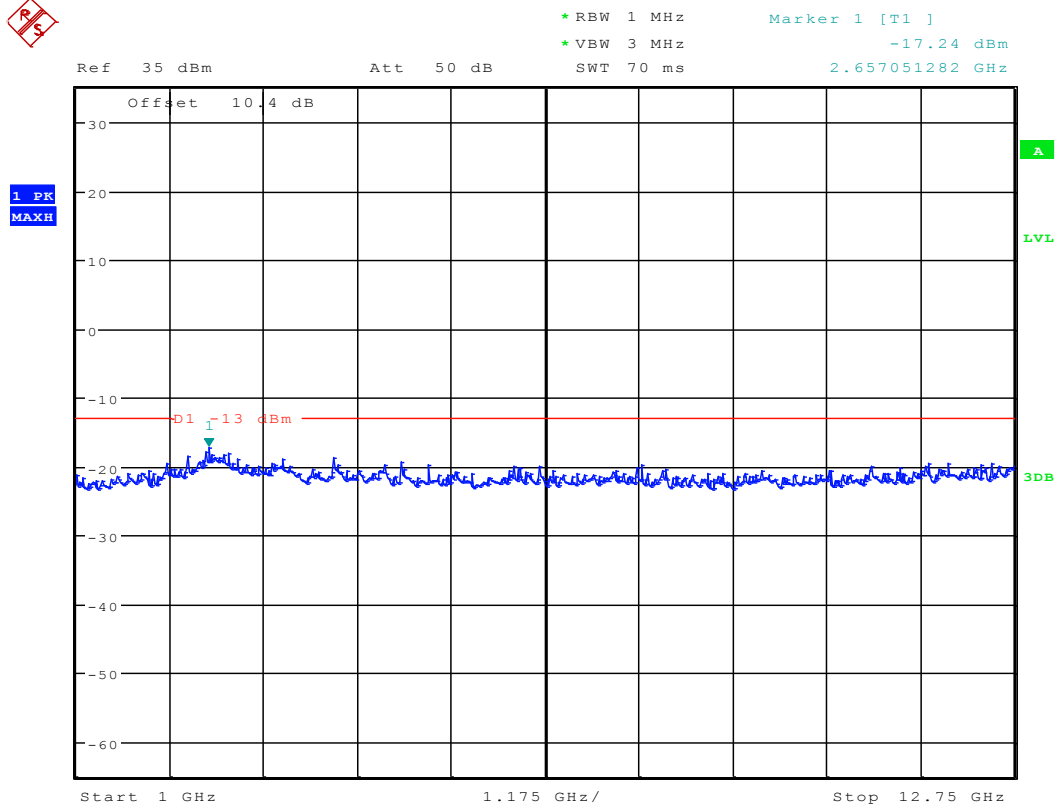
Date: 25.AUG.2011 17:02:58



Date: 25.AUG.2011 17:03:24



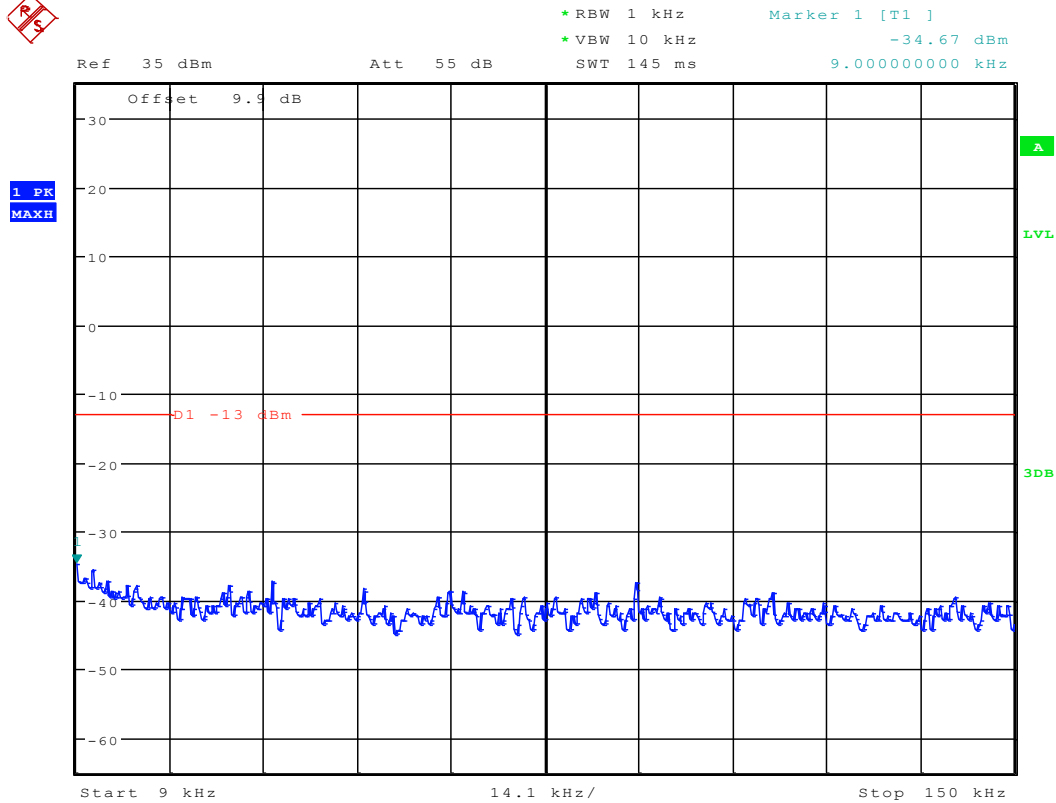
Date: 25.AUG.2011 17:03:49



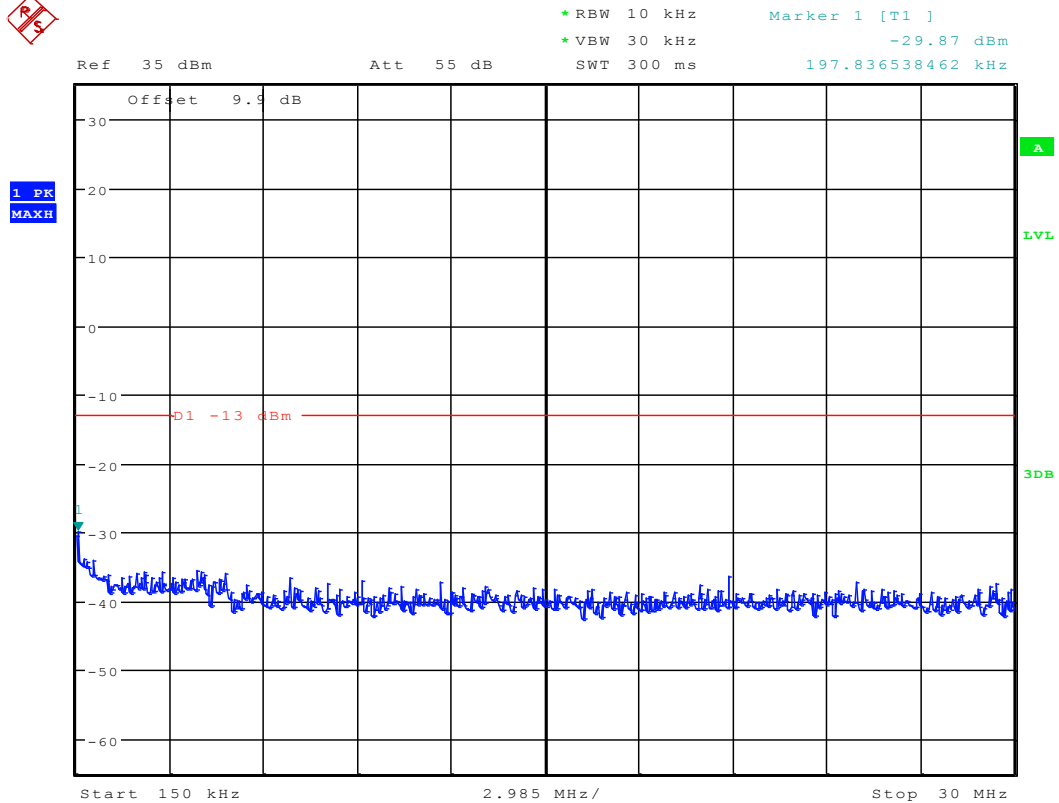
Date: 25.AUG.2011 17:04:15



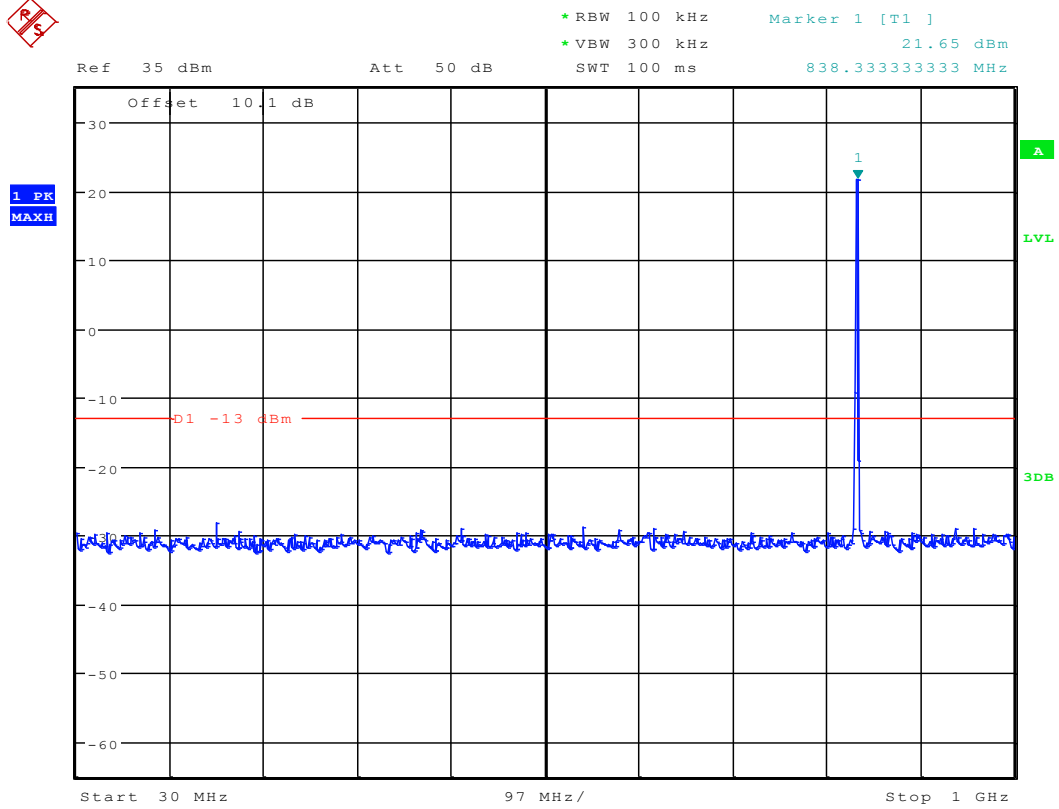
## Channel 384



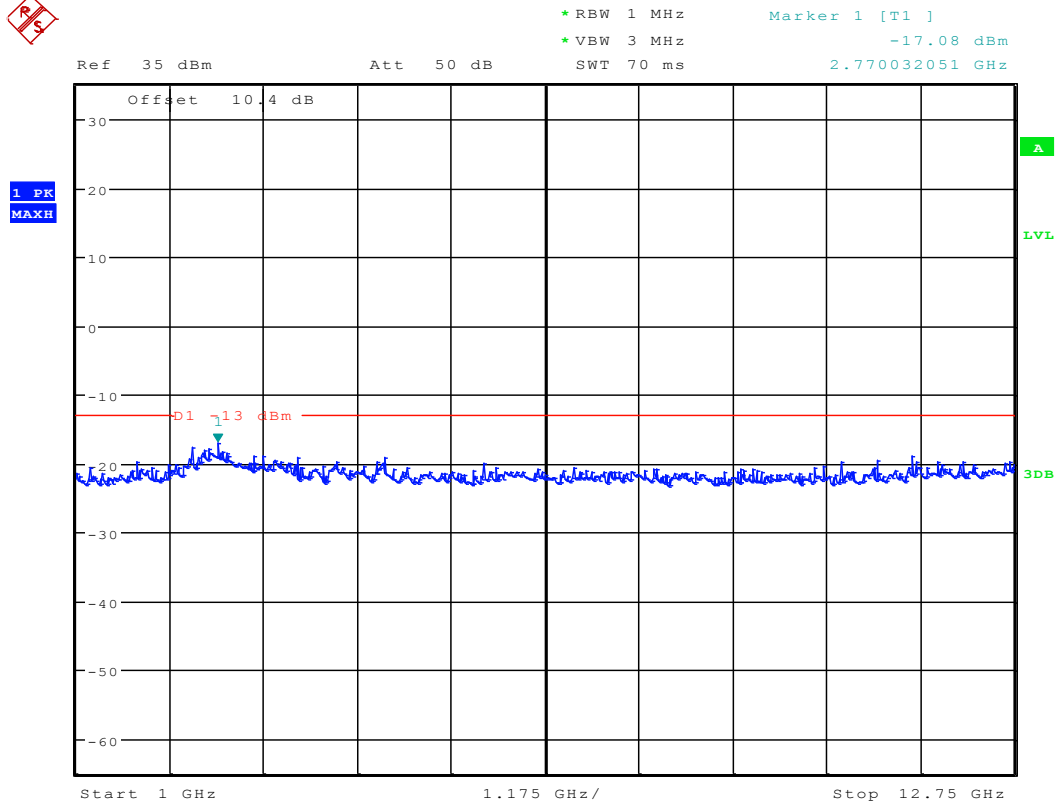
Date: 25.AUG.2011 17:03:06



Date: 25.AUG.2011 17:03:32



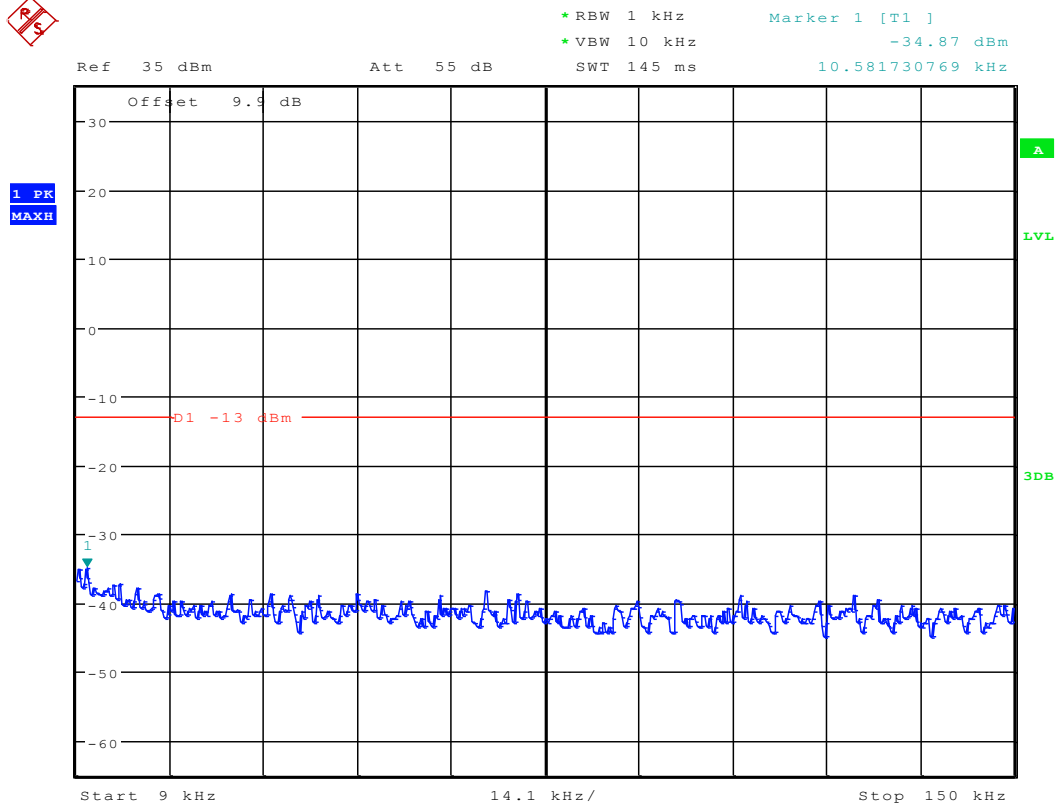
Date: 25.AUG.2011 17:03:58



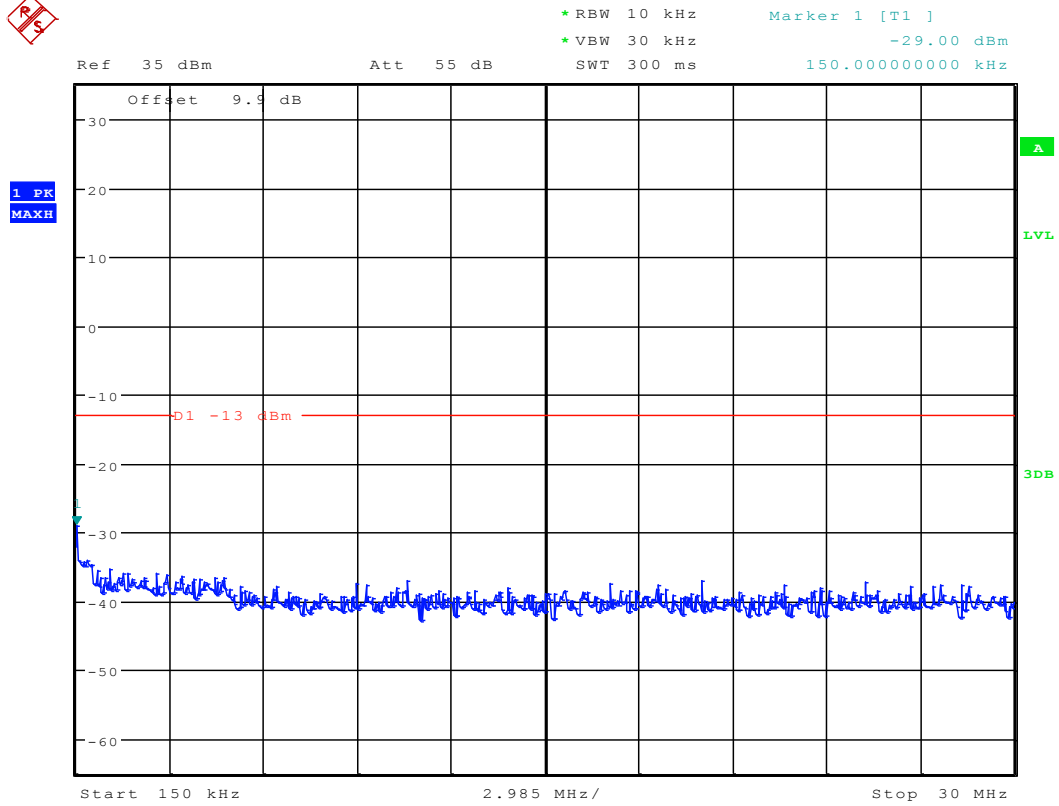
Date: 25.AUG.2011 17:04:23



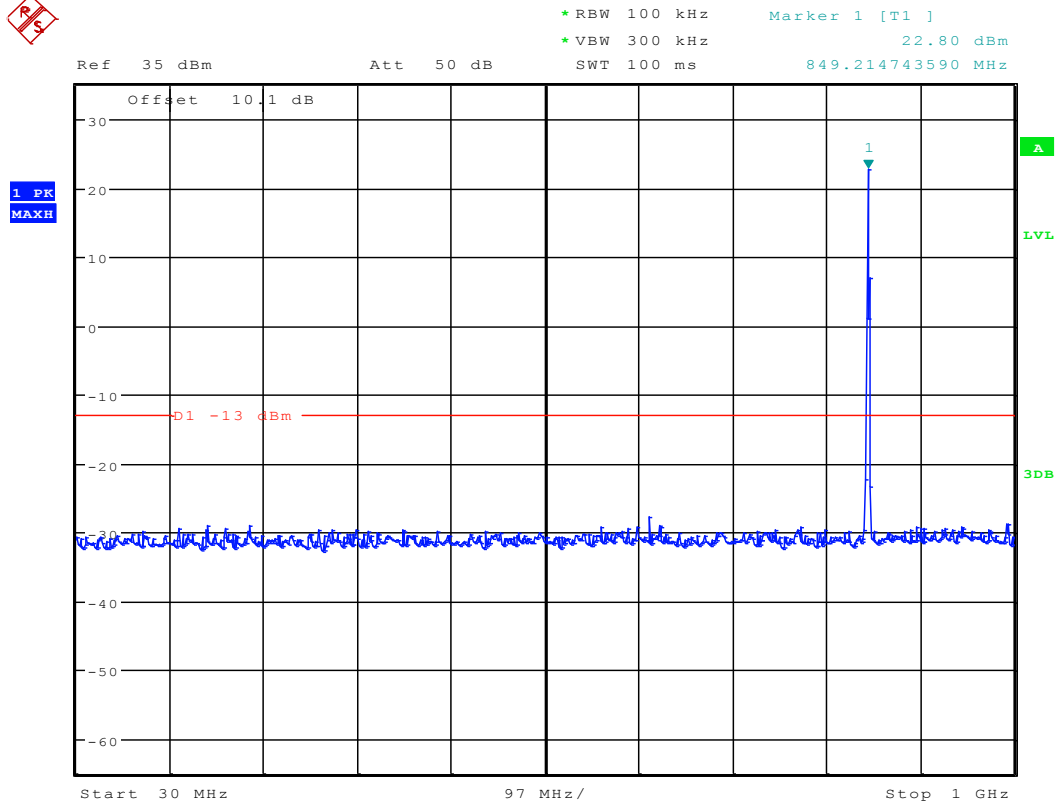
## Channel 777



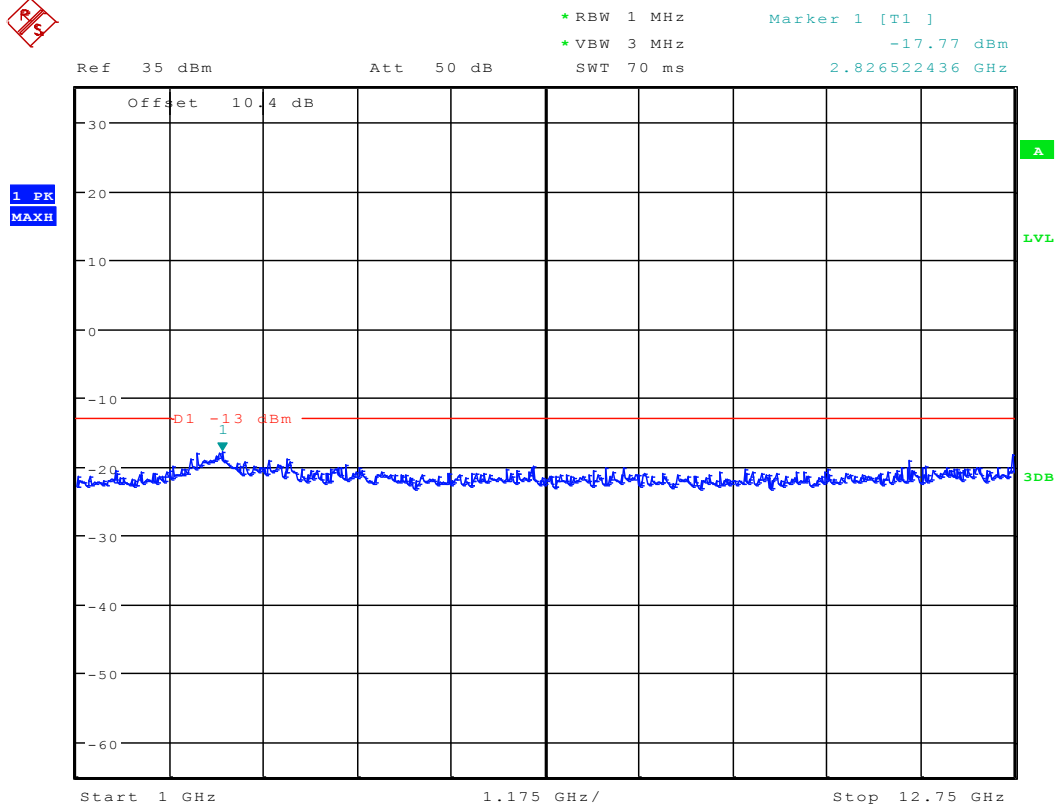
Date: 25.AUG.2011 17:03:15



Date: 25.AUG.2011 17:03:40



Date: 25.AUG.2011 17:04:06

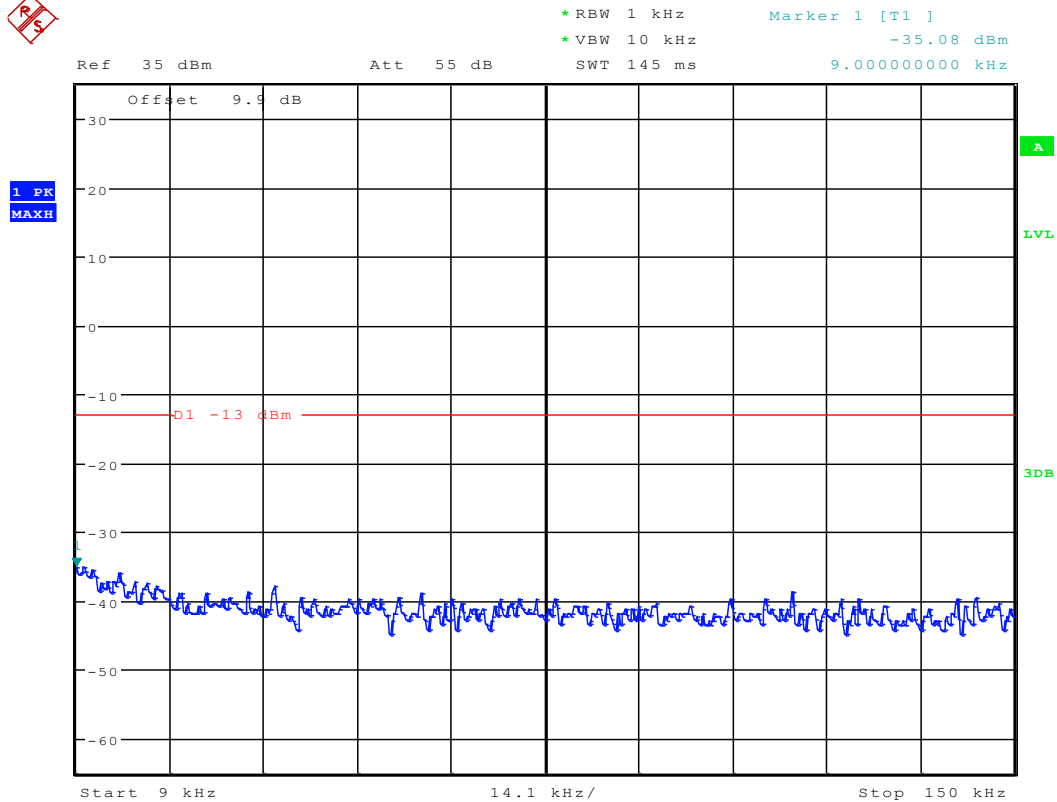


Date: 25.AUG.2011 17:04:32

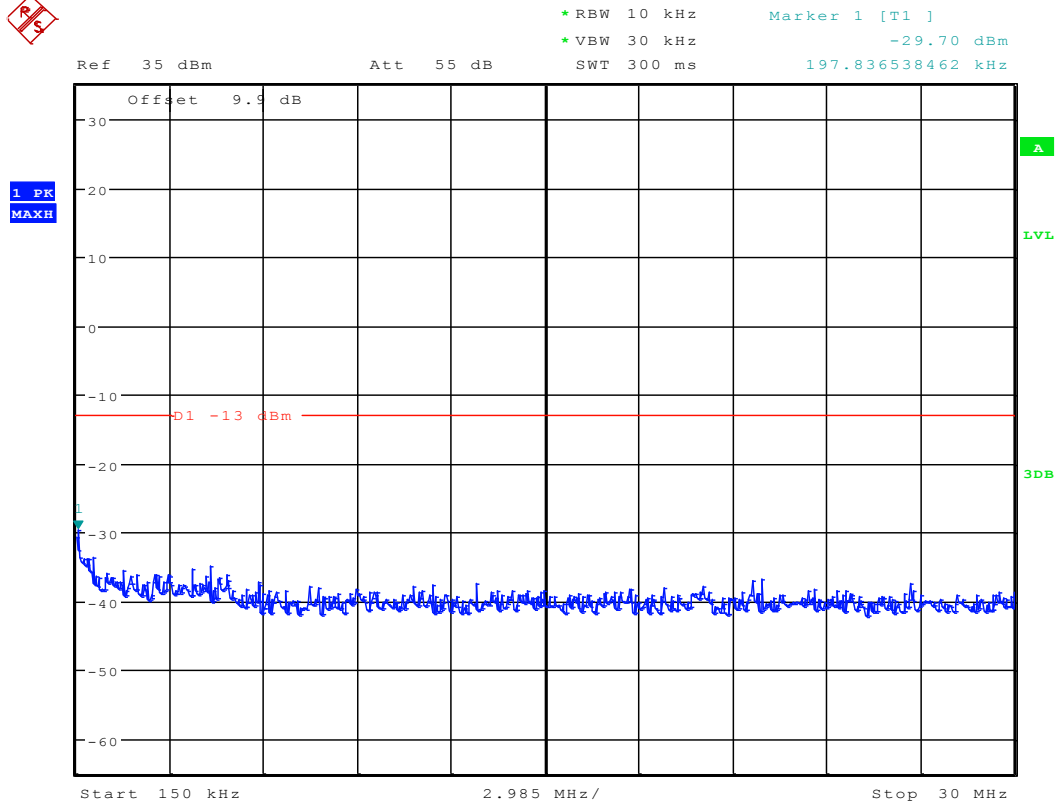


Modulation: 8PSK

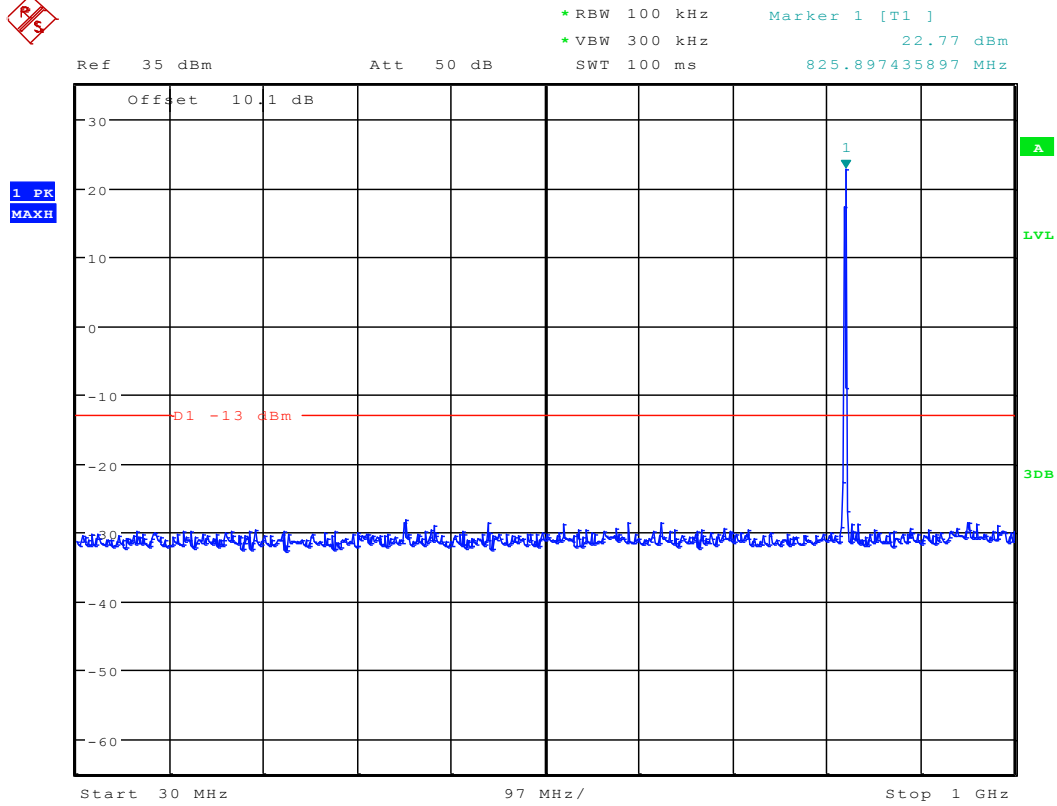
Channel 1013



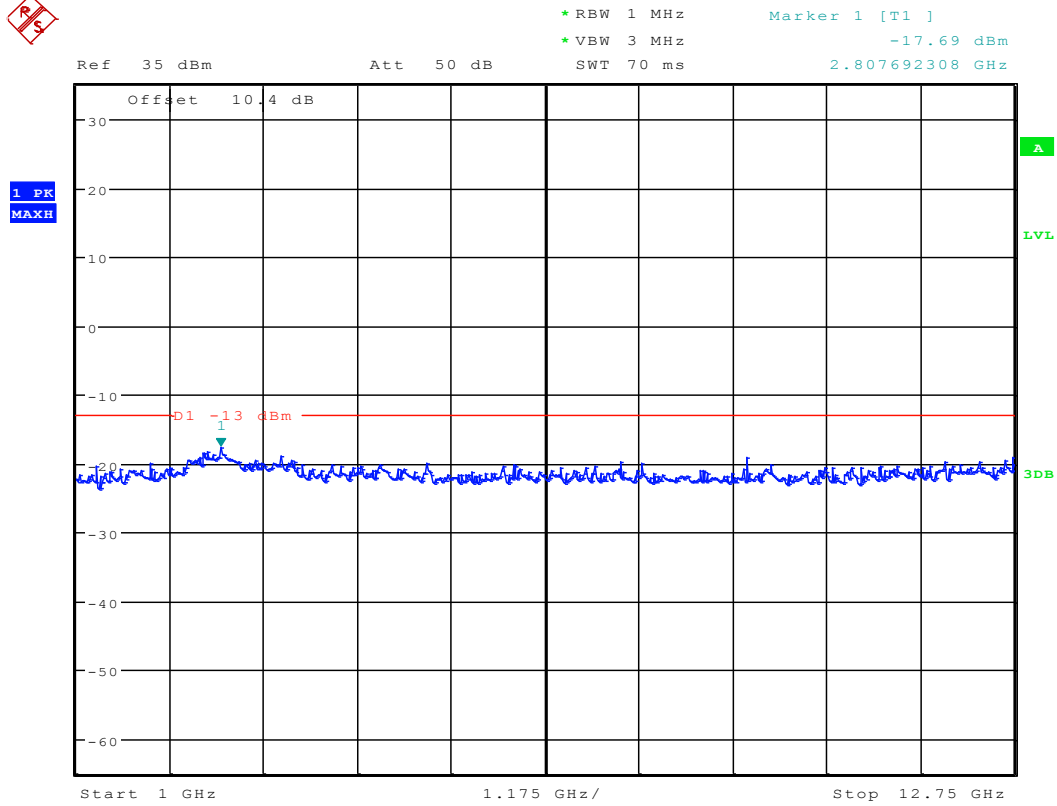
Date: 25.AUG.2011 17:04:40



Date: 25.AUG.2011 17:05:06



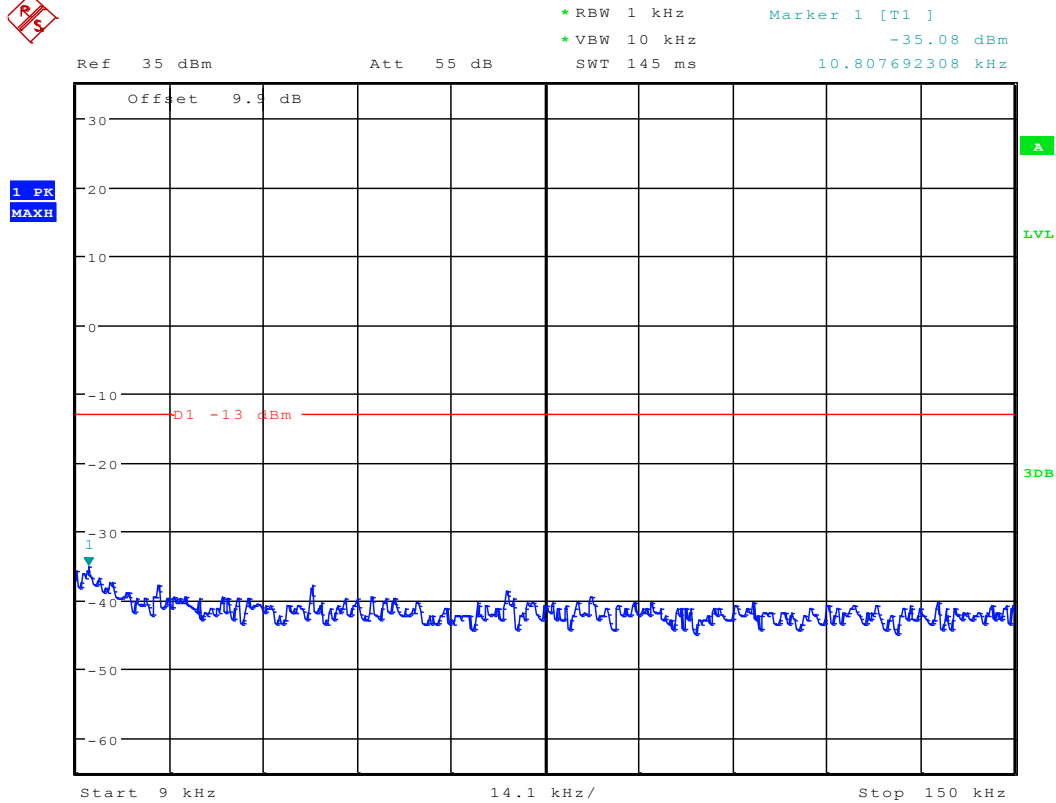
Date: 25.AUG.2011 17:05:32



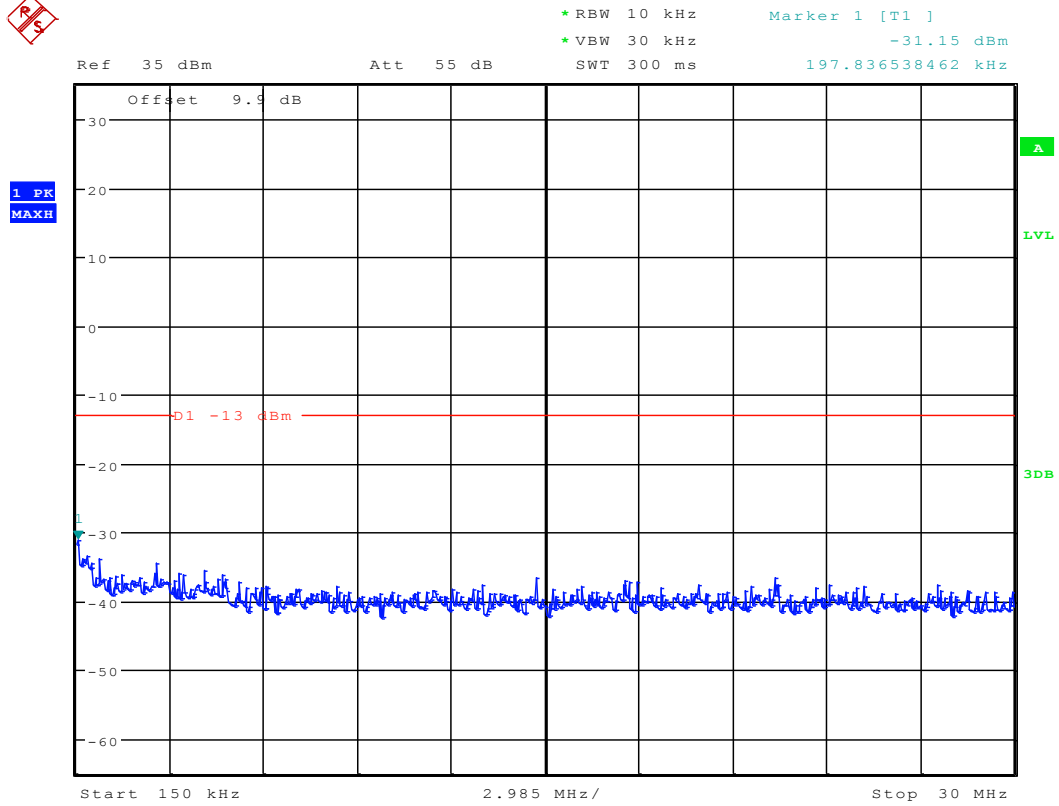
Date: 25.AUG.2011 17:05:57



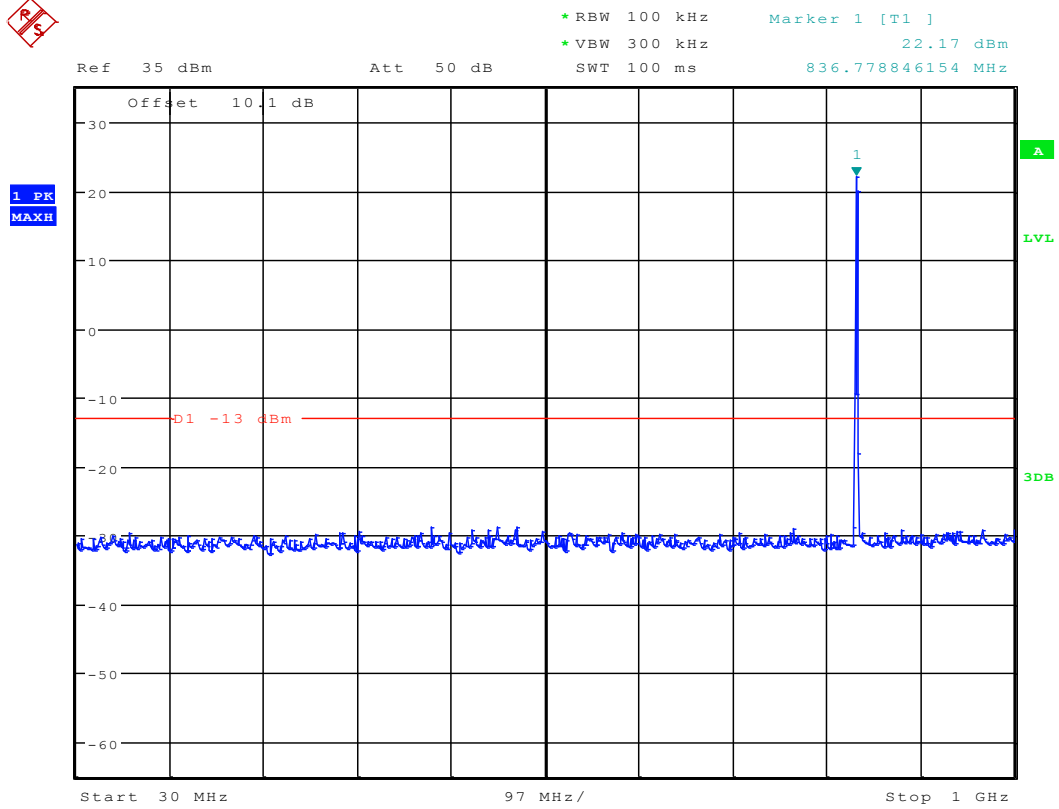
## Channel 384



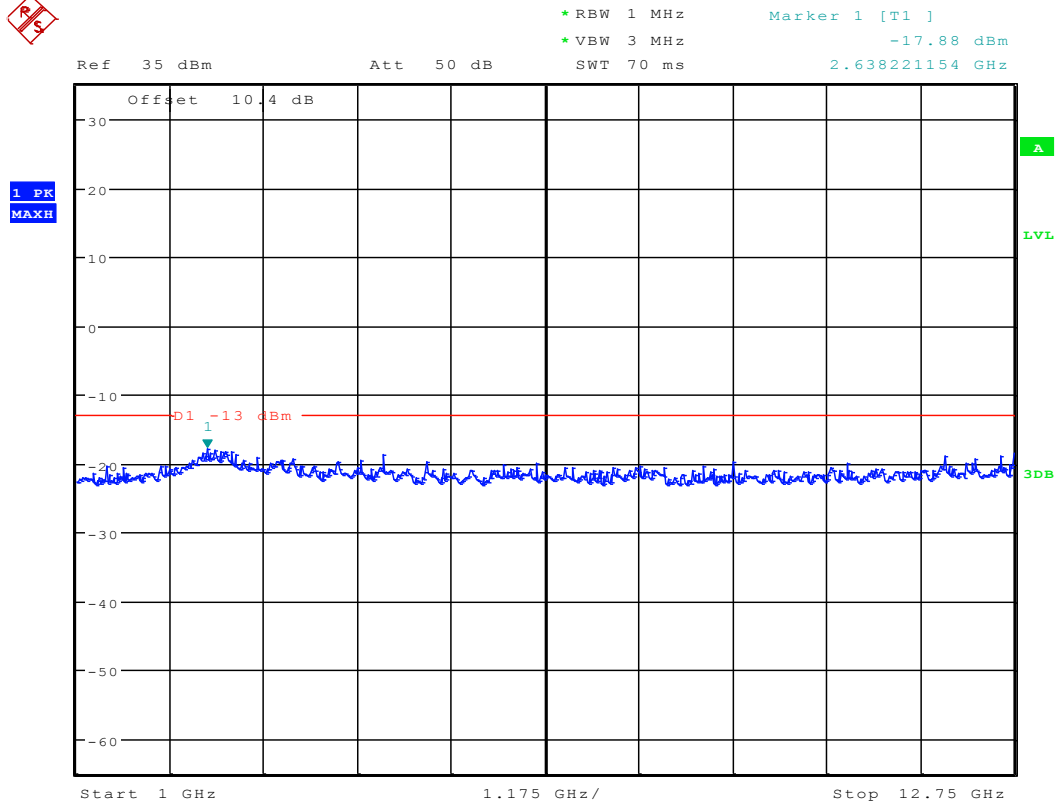
Date: 25.AUG.2011 17:04:49



Date: 25.AUG.2011 17:05:14



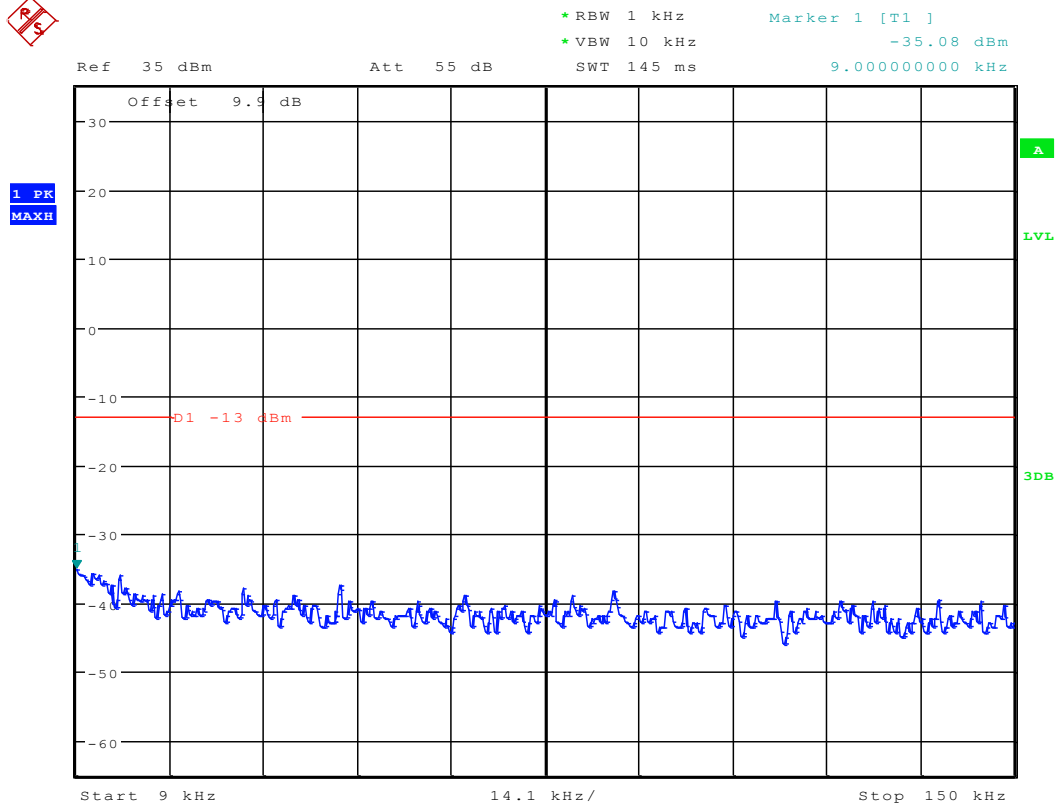
Date: 25.AUG.2011 17:05:40



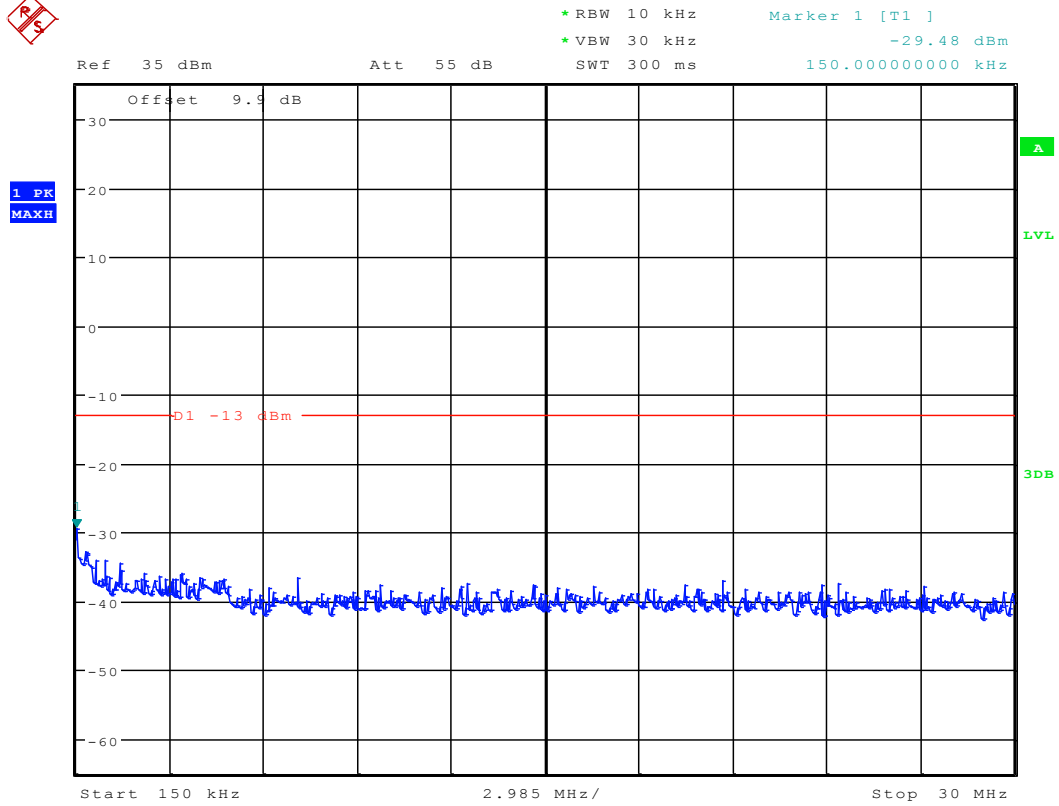
Date: 25.AUG.2011 17:06:06



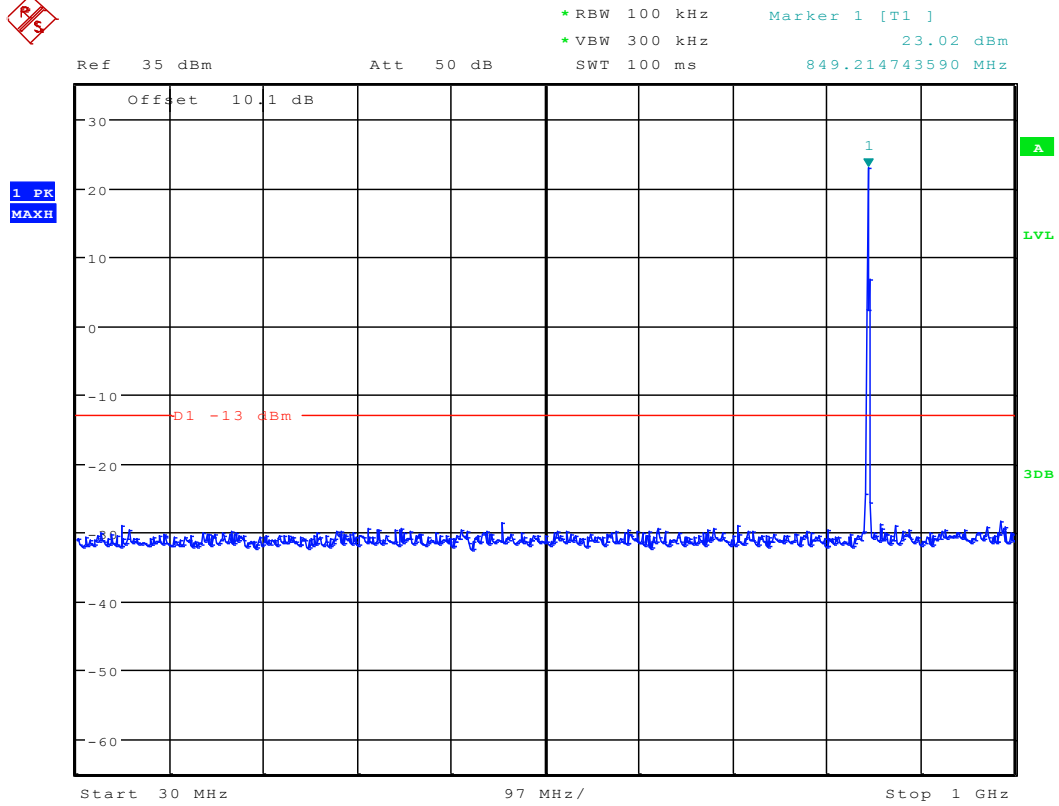
## Channel 777



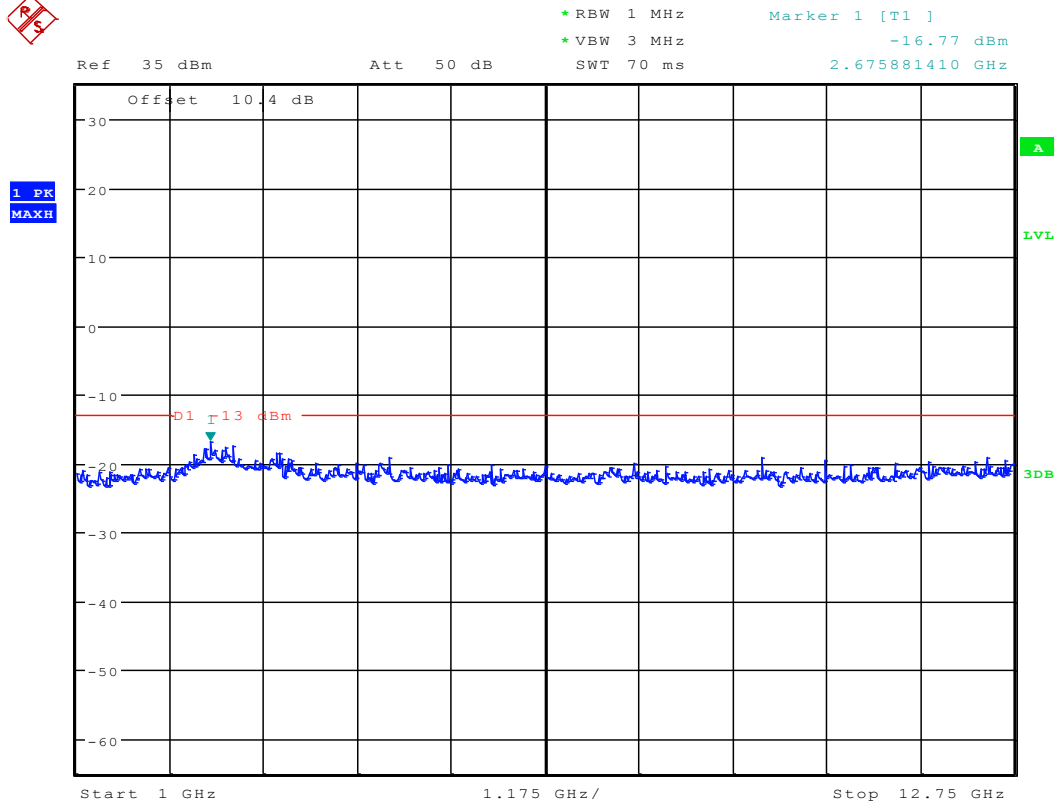
Date: 25.AUG.2011 17:04:57



Date: 25.AUG.2011 17:05:23



Date: 25.AUG.2011 17:05:48



Date: 25.AUG.2011 17:06:15



# **Appendix E**

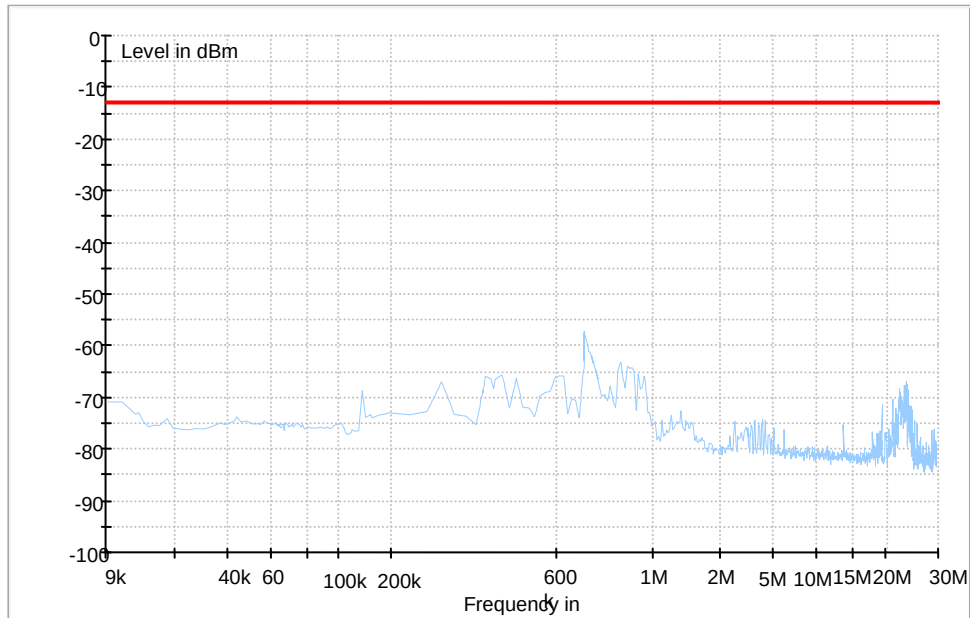
## **Radiated spurious emission**

According to FCC Part 2.1053& Part 22.917



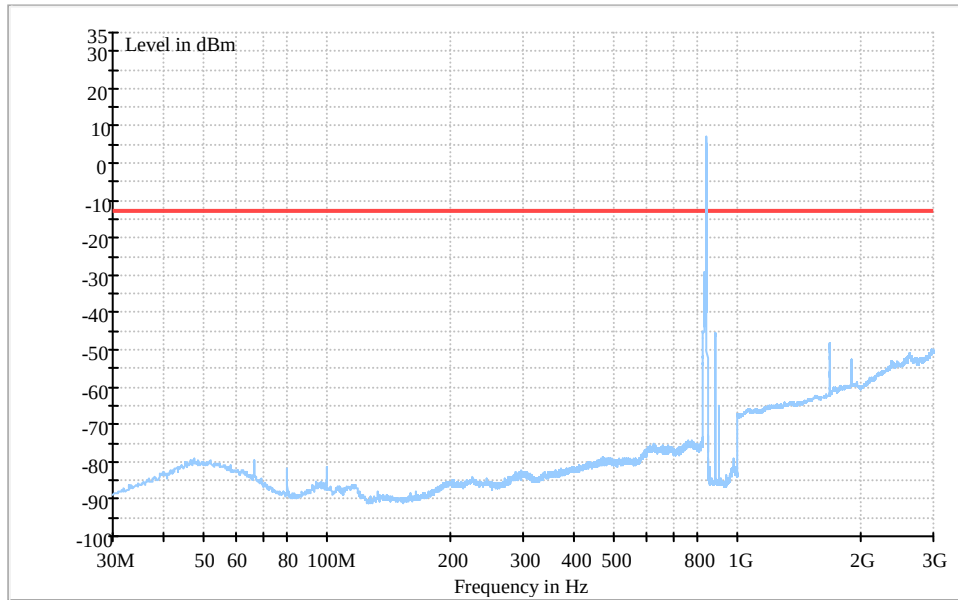
## CDMA 800

Traffic Mode (9kHz-30MHz)



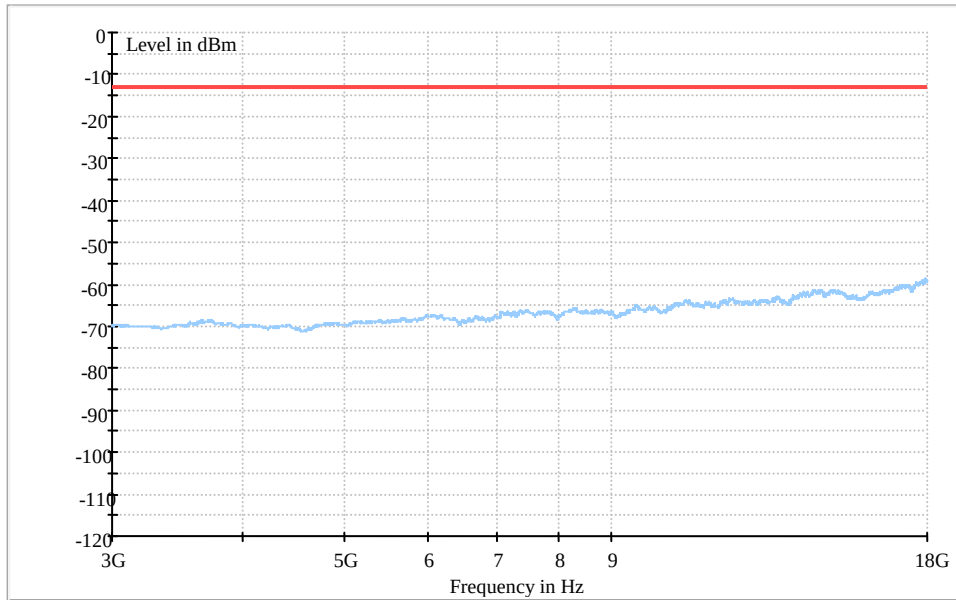


## Traffic Mode (30MHz-3GHz)





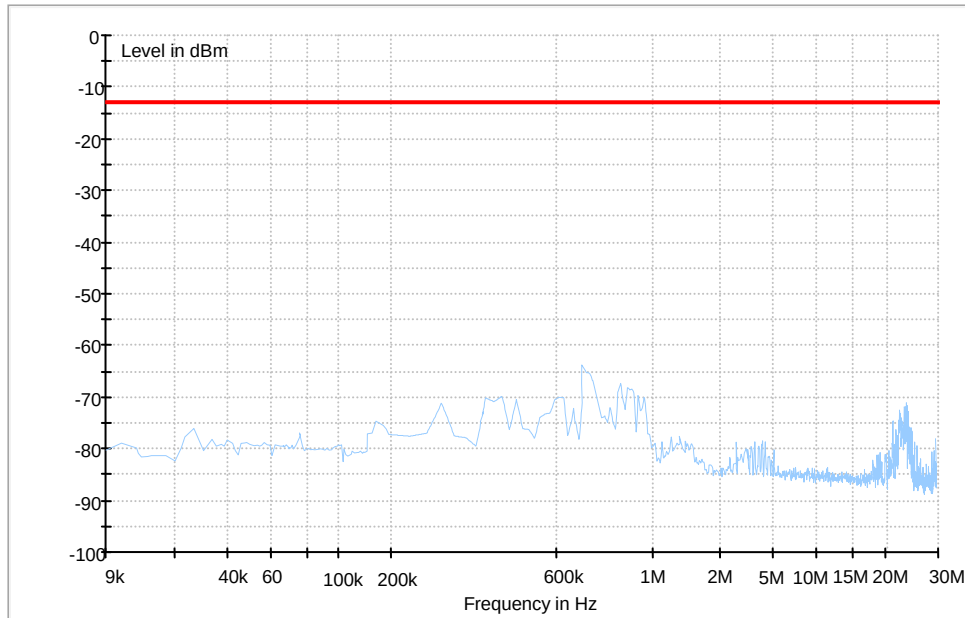
## Traffic Mode (3GHz-18GHz)





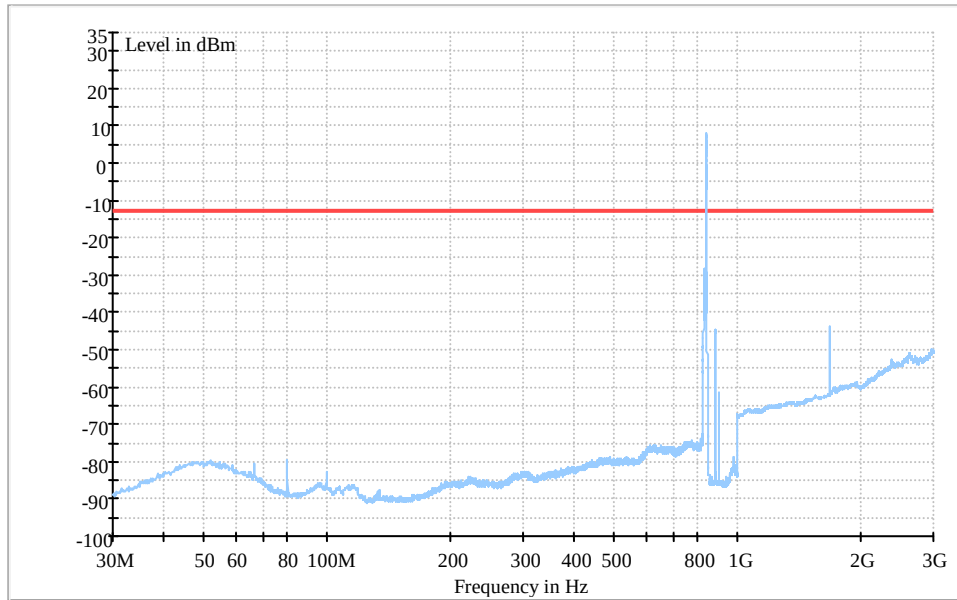
## EVDO 800 R.0

Traffic Mode (9kHz-30MHz)



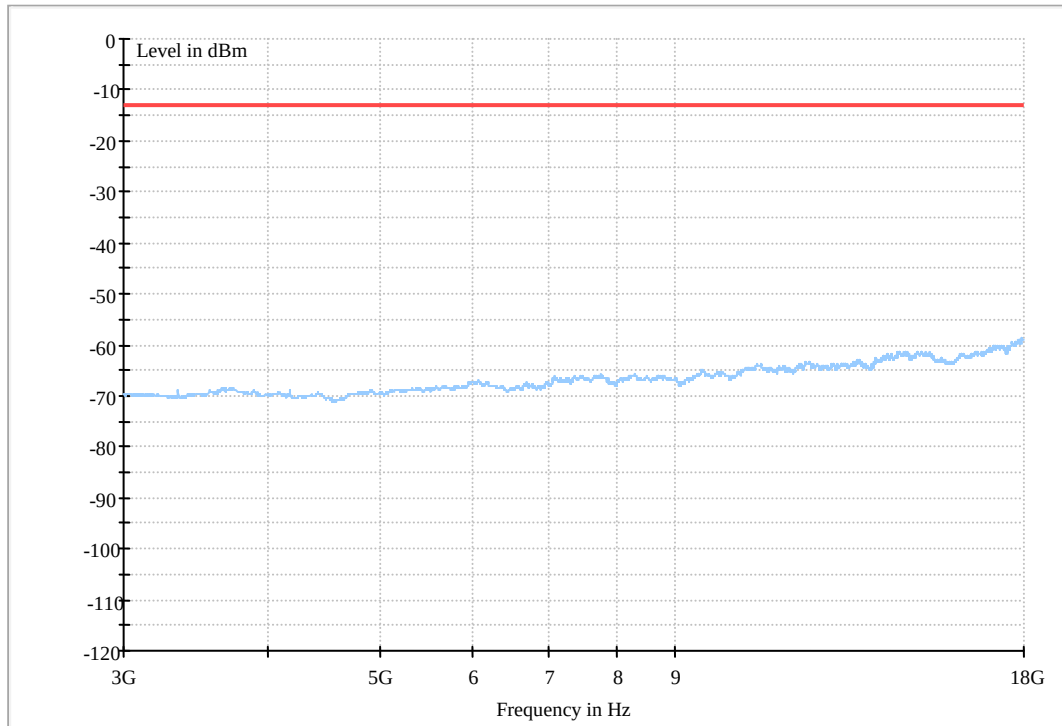


## Traffic Mode (30MHz-3GHz)





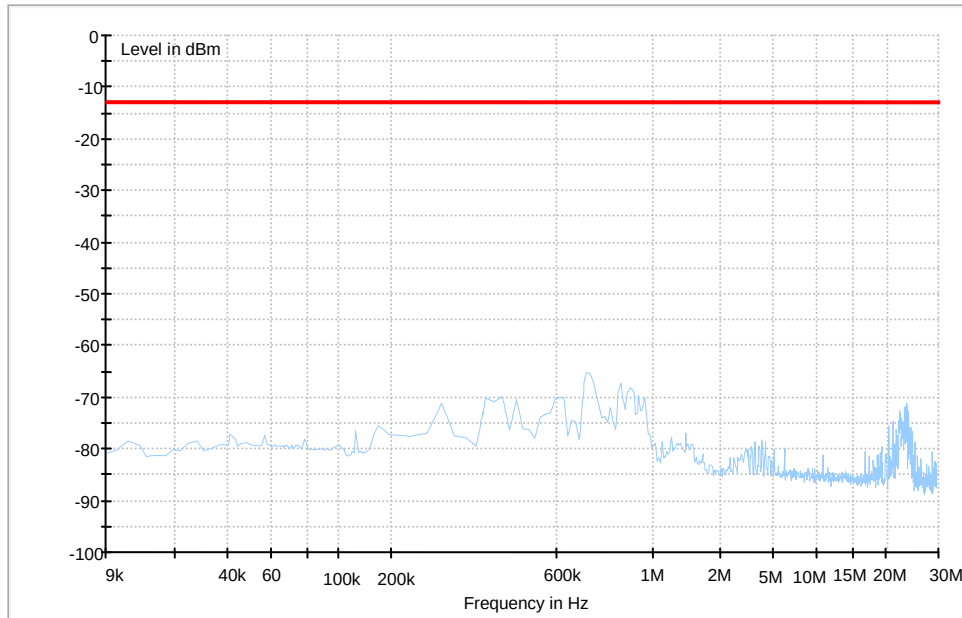
## Traffic Mode (3GHz-18GHz)





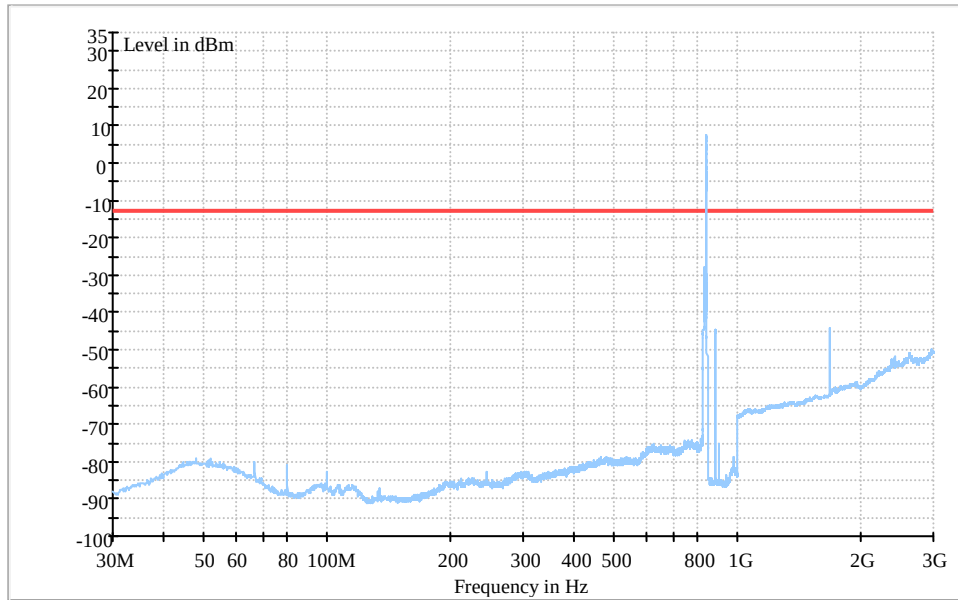
## EVDO 800 R.A

Traffic Mode (9kHz-30MHz)





## Traffic Mode (30MHz-3GHz)





## Traffic Mode (3GHz-18GHz)

