



# **FCC RF Test Report**

**Product Name: Vodafone Mobile Wi-Fi**

**Model Number: R205**

**Report No: SYBH(Z-RF)003122011-2002**

**FCC ID: QISR205**

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

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808 Fax: +86 755 89652518

## Notice

1. The laboratory has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS), and accreditation number: L0310.
2. The laboratory has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements. The site recognition number is 97456.
3. The laboratory has been listed by industry Canada to perform electromagnetic emission measurement. The site recognition number is 6369A-2.
4. The test report is invalid if not marked with "exclusive stamp for the test report".
5. The test report is invalid if not marked with the stamps or the signatures of the persons responsible for performing, revising and approving the test report.
6. The test report is invalid if there is any evidence of erasure and/or falsification.
7. If there is any dissidence for the test report, please file objection to the test centre within 15 days from the date of receiving the test report.
8. Normally, the test report is only responsible for the samples that have undergone the test.
9. Context of the test report cannot be used partially or in full for publicity and/or promotional purposes without previous written approval of the laboratory.



**Applicant:** Huawei Technologies Co., Ltd.  
**Address:** Huawei Base, Bantian, Longgang District, Shenzhen  
518129, P.R. China  
**Date of Receipt Test Item:** Dec.01, 2011  
**Start Date of Test:** Dec.02, 2011  
**End Date of Test:** Dec.07, 2011  
  
**Test Result:** Pass

Approved By

Dec.08, 2011  
Date

Dai Linjun  
Name

Dai Linjun  
Signature

Reviewed By

Dec.08, 2011  
Date

Cousy Xu  
Name

Cousy XU  
Signature

Operator

Dec.08, 2011  
Date

Huang Qiuliang  
Name

Huang Qiuliang  
Signature

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## 1 General Information

### 1.1 Applied Standard

Applied Rules: 47 CFR FCC Part 2, Subpart J  
47 CFR FCC Part 24, Subpart E

### 1.2 Test Location

Test Location 1: Reliability Laboratory of Huawei Technologies Co., Ltd.  
Address: Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R.  
China

### 1.3 Test Environment Condition

Ambient Temperature: 20 – 25 °C  
Ambient Relative Humidity: 45 – 55 %  
Atmospheric Pressure: 101 kPa

## 2 Test Summary

Table 1 Summary of results

| PCS Band                               |                 |                                                                                                                                               |        |
|----------------------------------------|-----------------|-----------------------------------------------------------------------------------------------------------------------------------------------|--------|
| Test Case                              | FCC Part No.    | Requirements                                                                                                                                  | Result |
| Transmitter Output Power               | 2.1046 & 24.232 | Peak EIRP not exceed 2 W                                                                                                                      | Pass   |
| Modulation Characteristics             | 2.1047          | Digital modulation                                                                                                                            | Pass   |
| Occupied Bandwidth                     | 2.1049          | (Not specified)                                                                                                                               | Pass   |
| Band Edges Compliance                  | 2.1051 & 24.238 | Below -13 dBm/1%*EBW, in 1 MHz range                                                                                                          | Pass   |
| Spurious Emission at Antenna Terminals | 2.1051 & 24.238 | Below -13 dBm/1 kHz, 9 kHz to 150 kHz<br>Below -13 dBm/10 kHz, 150 kHz to 30 MHz<br>Below -13 dBm/1 MHz, 30 MHz to 10 <sup>th</sup> harmonics | Pass   |
| Field Strength of Spurious Radiation   | 2.1053 & 24.238 | Below -13 dBm/1 MHz                                                                                                                           | Pass   |
| Frequency Stability                    | 2.1055 & 24.235 | Stay within the authorized frequency block                                                                                                    | Pass   |

## 3 Product Description

### 3.1 Production Information

#### 3.1.1 General Description

R205 HSPA+/2100M/900M/850M/EDGE Quad Band is subscriber equipment in the UMTS/GSM system. R205 implement such functions as RF signal receiving/ transmitting, HSPA/WCDMA protocol processing, data service etc, and it can act as a Wi-Fi hot-point for user accessing to internet. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface and Micro SD card interface. R205 has 3 internal antennas as default Wi-Fi ,diversity, and main antenna.

#### 3.1.2 Board

Table 1 Board Information

| Vodafone Mobile Wi-Fi |                  |                  |
|-----------------------|------------------|------------------|
| R205                  |                  |                  |
| Board and Module      |                  |                  |
| Hardware Version      | Software Version | Serial Number    |
| CH1E586M              | 21.341.00.04.11  | A7B01A11B0500443 |

#### 3.1.3 Sub-Assembly

| Sub-Assembly Name | Manufacturer | Description                                                                           |
|-------------------|--------------|---------------------------------------------------------------------------------------|
| Adapter           | HUAWEI       | AC/DC adapter,0degC-45degC,100V-240V,5.0V/1.0A,CE 2PIN/DC USB2.0,CE,HUAWEI LOGO,ERP V |

#### 3.1.4 Battery Technical Data

| Name           | Manufacture | Description                                                                                |
|----------------|-------------|--------------------------------------------------------------------------------------------|
| Li-ion Battery | FMT         | Rated capacity: 1500mAh<br>Nominal Voltage:<br>=== +3.7V<br>Charging Voltage:<br>=== +4.2V |

## 3.2 Test Description

### 3.2.1 Supported Frequency Range

| Characteristics | Description      |
|-----------------|------------------|
| Downlink        | 1930 to 1990 MHz |
| Uplink          | 1850 to 1910MHz  |

### 3.2.2 Transmitter / Receiver Characteristics

| Characteristics                    | Description                                                          |
|------------------------------------|----------------------------------------------------------------------|
| System Type                        | GSM                                                                  |
| TX Output Power (per Antenna Port) | 1 W (= 30 dBm)                                                       |
| Channel Spacing(s) / Bandwidth(s)  | GSM system: 200 kHz                                                  |
| Designation of Emissions           | GSM system: 248KGXW (GMSK modulation),<br>253KG7W (8PSK modulation)) |

### 3.2.3 Antenna Gain

|                    |     |
|--------------------|-----|
| Antenna Gain(dBi): | 2.2 |
|--------------------|-----|

### 3.2.4 Power Supply

|                         | Description                                                                      |
|-------------------------|----------------------------------------------------------------------------------|
| Power Supply Type       | Directly Connected to DC                                                         |
| Input to EUT (DC power) | DC Voltage Nominal: $\equiv$ +5V<br>DC Voltage Range: $\equiv$ +4.75 V to +5.25V |
| Input to EUT (AC power) | AC Voltage Nominal: ~ 220V (50/60 Hz)<br>AC Voltage Range: ~ 100V-240V           |

## 4 General Test Conditions / Configurations

### 4.1 RF Channels under Test

| Test Mode | TX / RX | RF Channel  |             |             |
|-----------|---------|-------------|-------------|-------------|
|           |         | Bottom (B)  | Middle (M)  | Top (T)     |
| TM1/TM2   | TX      | Channel 512 | Channel 661 | Channel 810 |
|           |         | 1850.2MHz   | 1880.0MHz   | 1909.8MHz   |
|           | RX      | Channel 512 | Channel 661 | Channel 810 |
|           |         | 1930.2 MHz  | 1960.0 MHz  | 1989.8 MHz  |

### 4.2 Test Modes

| Test Mode | Test Modes Description    |
|-----------|---------------------------|
| TM1       | GSM/GPRS, GMSK modulation |
| TM2       | EDGE, 8PSK modulation     |

### 4.3 Test Environments

| Environment Parameter | Selected Values During Tests |         |
|-----------------------|------------------------------|---------|
| Relative Humidity     | Ambient                      |         |
| Temperature           | TN                           | Ambient |
| Voltage               | VL                           | 3.6V    |
|                       | VN                           | 3.7V    |
|                       | VH                           | 4.2V    |

NOTE: VL= lower extreme test voltages

VN= nominal voltage

VH= upper extreme test voltage

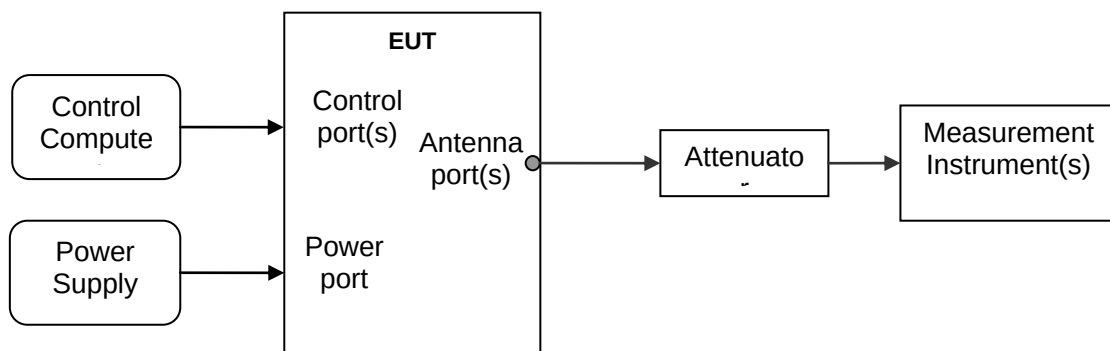
TN= nominal temperature

## 4.4 Test Setups

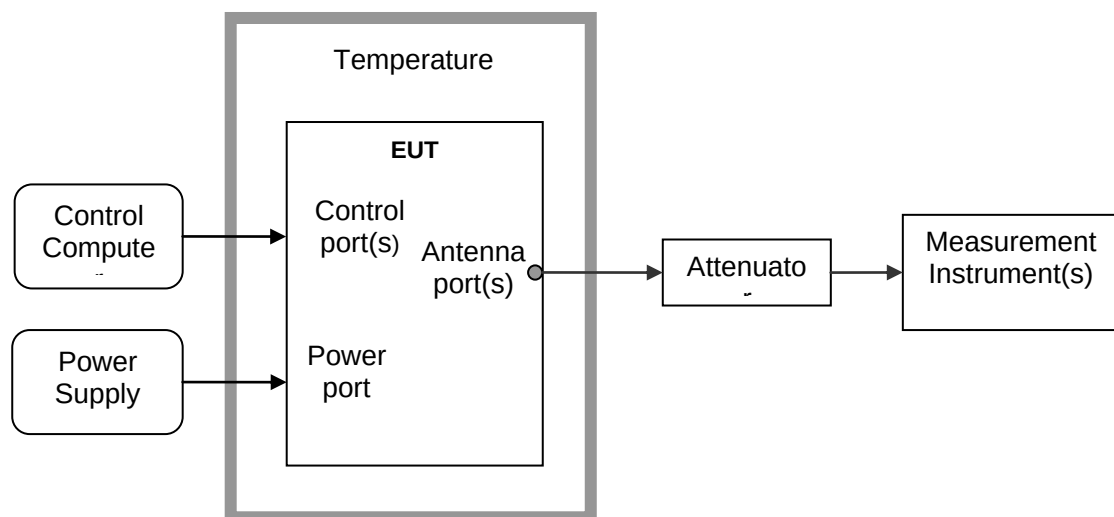
### 4.4.1 General Test Setup Configurations

| Configuration       | Description                                                                                                                                                                                                                                        |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Antenna Ports  | Until otherwise declared, all TX tests are ONLY performed at the main Transmitter antenna port (e.g. TRXA, TXA and so on) of the EUT, and all RX tests are ONLY performed at the main Receiver antenna port (e.g. TRXA, RXA and so on) of the EUT. |
| Multiple RF Sources | Other than the tested RF source of the EUT, other RF source(s) are disabled or shutdown during measurements.                                                                                                                                       |

### 4.4.2 Test Setup 1



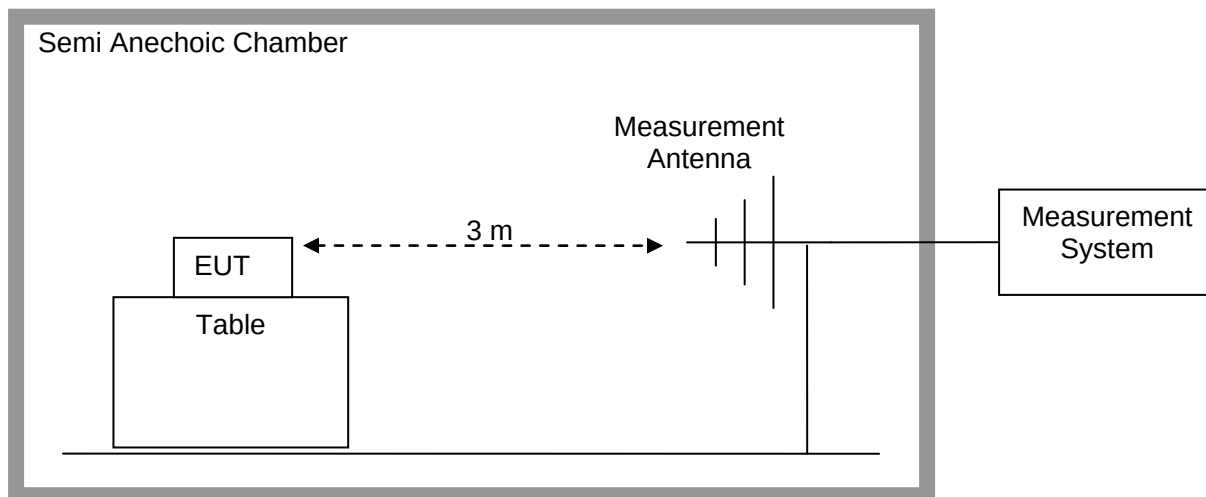
### 4.4.3 Test Setup 2



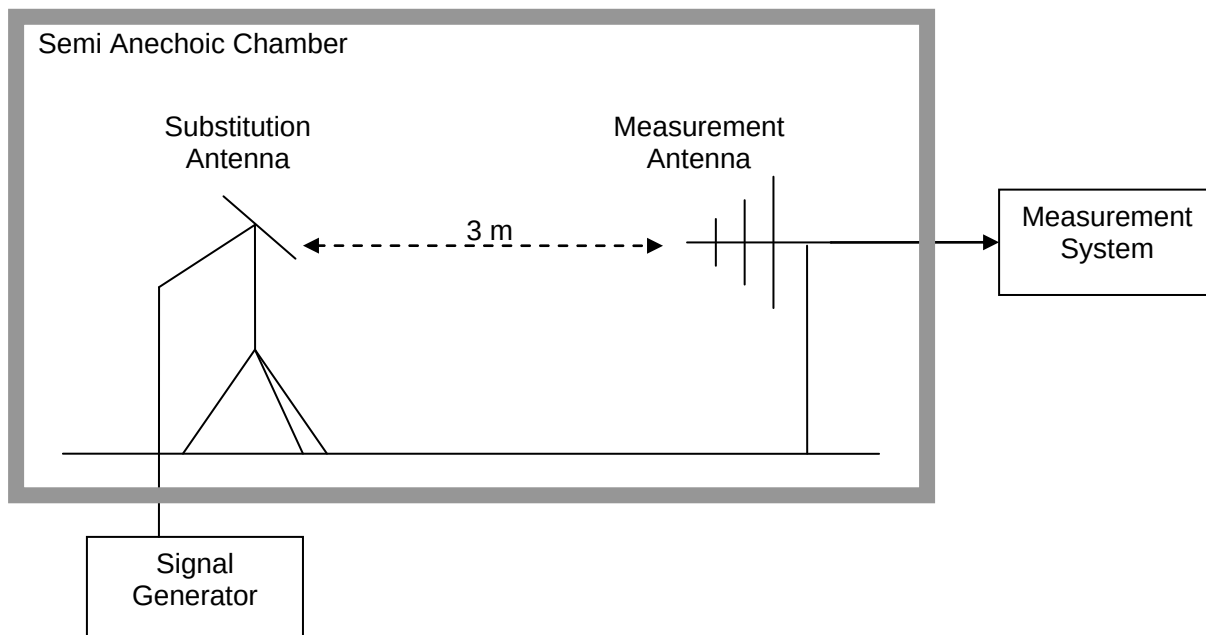
#### 4.4.4 Test Setup 3

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

##### Step 1: Pre-test



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



## 4.5 Test Conditions

| Test Case                              | Test Conditions    |                                                                                                                           |
|----------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------|
| Transmitter Output Power               | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1/ Test Setup 3                                                                                                |
|                                        | Detector           | RMS                                                                                                                       |
|                                        | RF Channels (TX)   | B, M, T                                                                                                                   |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Modulation Characteristics             | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | RF Channels (TX)   | M                                                                                                                         |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Occupied Bandwidth                     | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | B, M, T                                                                                                                   |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Band Edges Compliance                  | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | RMS                                                                                                                       |
|                                        | RF Channels (TX)   | B, T                                                                                                                      |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Spurious Emission at Antenna Terminals | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 1                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | B, M, T                                                                                                                   |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Field Strength of Spurious Radiation   | Test Configuration | Ambient Temperature & Rated Voltage                                                                                       |
|                                        | Test Setup         | Test Setup 3                                                                                                              |
|                                        | Detector           | PK                                                                                                                        |
|                                        | RF Channels (TX)   | M                                                                                                                         |
|                                        | Test Mode          | TM1/TM2                                                                                                                   |
| Frequency Stability                    | Test Configuration | (1) -30 °C to +50 °C with step 10 °C at Rated Voltage;<br>(2) 85%, 100% and 115% of Rated Voltage at Ambient Temperature. |
|                                        | Test Setup         | Test Setup 2                                                                                                              |



| Test Case | Test Conditions  |         |
|-----------|------------------|---------|
|           | RF Channels (TX) | M       |
|           | Test Mode        | TM1/TM2 |

## 5 Main Test Instruments

Table 2 Main Test Equipments

| Equipment Description                | Manufacturer | Model                   | Serial Number | Calibrated until |
|--------------------------------------|--------------|-------------------------|---------------|------------------|
| Power supply                         | KEITHLEY     | 2303                    | 1288003       | Sep.27,2012      |
| Universal Radio Communication Tester | R&S          | CMU200                  | 117341        | Jan.13.2012      |
| Universal Radio Communication Tester | Agilent      | E5515C                  | MY50260239    | Aug.31,2012      |
| Spectrum Analyzer                    | Agilent      | E4440A                  | MY49420179    | Apr.20,2012      |
| Signal Analyzer                      | R&S          | FSQ31                   | 200021        | Sep.27,2012      |
| Temperature Chamber                  | WEISS        | WKL64                   | 24600294      | Jan.03,2012      |
| Signal generator                     | Agilent      | E8257D                  | MY49281095    | Jul.9.2012       |
| Test receiver                        | R&S          | ESU26                   | 100150        | May.29.2012      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 919/1009      | Jan.29.2012      |
| Tunable Dipole                       | Schwarzbeck  | D69250-UHAP/D69250-VHAP | 979/917       | Jan.29.2012      |
| Horn Antenna                         | R & S        | HF906                   | 100683        | May.15, 2012     |
| Horn Antenna                         | R & S        | HF906                   | 100684        | Jul.01, 2012     |
| Broadband Antenna                    | Schwarzbeck  | VULB 9163               | 9163-357      | May.15, 2012     |
| Broadband Antenna                    | Schwarzbeck  | VULB 9163               | 9163-356      | May.15, 2012     |

## 6 Test Results

| No. | Test Item                              | Test Result |
|-----|----------------------------------------|-------------|
| 1   | Transmitter Output Power               | Appendix A  |
| 2   | Modulation Characteristics             | Appendix B  |
| 3   | Occupied Bandwidth                     | Appendix C  |
| 4   | Band Edges Compliance                  | Appendix D  |
| 5   | Spurious Emission at Antenna Terminals | Appendix E  |
| 6   | Field Strength of Spurious Radiation   | Appendix F  |
| 7   | Frequency Stability                    | Appendix G  |
| 8   | Photos of Radiated Spurious Emissions  | Appendix H  |

NOTE: The Appendix H only photos of Radiated Spurious Emissions, no test data.

## 7 Measurement Uncertainty

For a 95% confidence level ( $k=2$ ), the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

| Test Item                            |                          | Extended Uncertainty                               |
|--------------------------------------|--------------------------|----------------------------------------------------|
| Transmitter Output Power             | Power (dBm)              | U =0.39 dB                                         |
| Occupied Bandwidth                   | Magnitude (%)            | U=0.2%                                             |
| Band Edge Compliance                 | Disturbance Power (dBm)  | U=2.0 dB                                           |
| Conducted Spurious Emissions         | Disturbance Power (dBm)  | U=2.0 dB                                           |
| Field Strength of Spurious Radiation | ERP (dBm)                | U=4.6 dB (30 MHz – 1GHz)<br>U=3.0 dB (above 1 GHz) |
| Frequency Stability                  | Frequency Accuracy (ppm) | U=0.21 ppm                                         |



## **Appendix A**

# Transmitter Output Power

According to FCC Part 2.1046 & Part 24.235



## Conducted Power of Transmitter

| TEST CONDITIONS     | RF Output Power (Conducted) |       |               |       |               |       |
|---------------------|-----------------------------|-------|---------------|-------|---------------|-------|
|                     | Channel512(B)               |       | Channel661(M) |       | Channel810(T) |       |
|                     | 1850.2MHz                   |       | 1880MHz       |       | 1909.8MHz     |       |
|                     | dBm                         |       | dBm           |       | dBm           |       |
| $T_{nom} / V_{nom}$ | Measured                    | Limit | Measured      | Limit | Measured      | Limit |
| TM1                 | 29.63                       | 30.8  | 29.57         | 30.8  | 29.35         | 30.8  |
| TM2                 | 24.87                       | 30.8  | 24.75         | 30.8  | 24.55         | 30.8  |



## Effective Isotropic Radiated Power of Transmitter (EIRP)

| Test Mode | Freq. [MHz] | Meas Level [dBm] | Substitution Antenna Type | SGP [dBm] | Substitution Gain [dBi] | Cable Loss [dB] | Substitution Level (EIRP) [dBm] | FCC limit [dBm] | Result |
|-----------|-------------|------------------|---------------------------|-----------|-------------------------|-----------------|---------------------------------|-----------------|--------|
| TM1       | 1850.2      | 31.83            | Horn Ant.                 | 28.38     | 4.5                     | 1               | 31.88                           | 33              | Pass   |
| TM1       | 1880        | 31.77            | Horn Ant.                 | 28.25     | 4.5                     | 1               | 31.75                           | 33              | Pass   |
| TM1       | 1909.8      | 31.55            | Horn Ant.                 | 27.71     | 4.8                     | 1               | 31.51                           | 33              | Pass   |
| TM2       | 1850.2      | 27.07            | Horn Ant.                 | 23.52     | 4.5                     | 1               | 27.02                           | 33              | Pass   |
| TM2       | 1880        | 26.95            | Horn Ant.                 | 23.43     | 4.5                     | 1               | 26.93                           | 33              | Pass   |
| TM2       | 1909.8      | 26.75            | Horn Ant.                 | 22.98     | 4.8                     | 1               | 26.78                           | 33              | Pass   |

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

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

b, SGP=Signal Generator Level



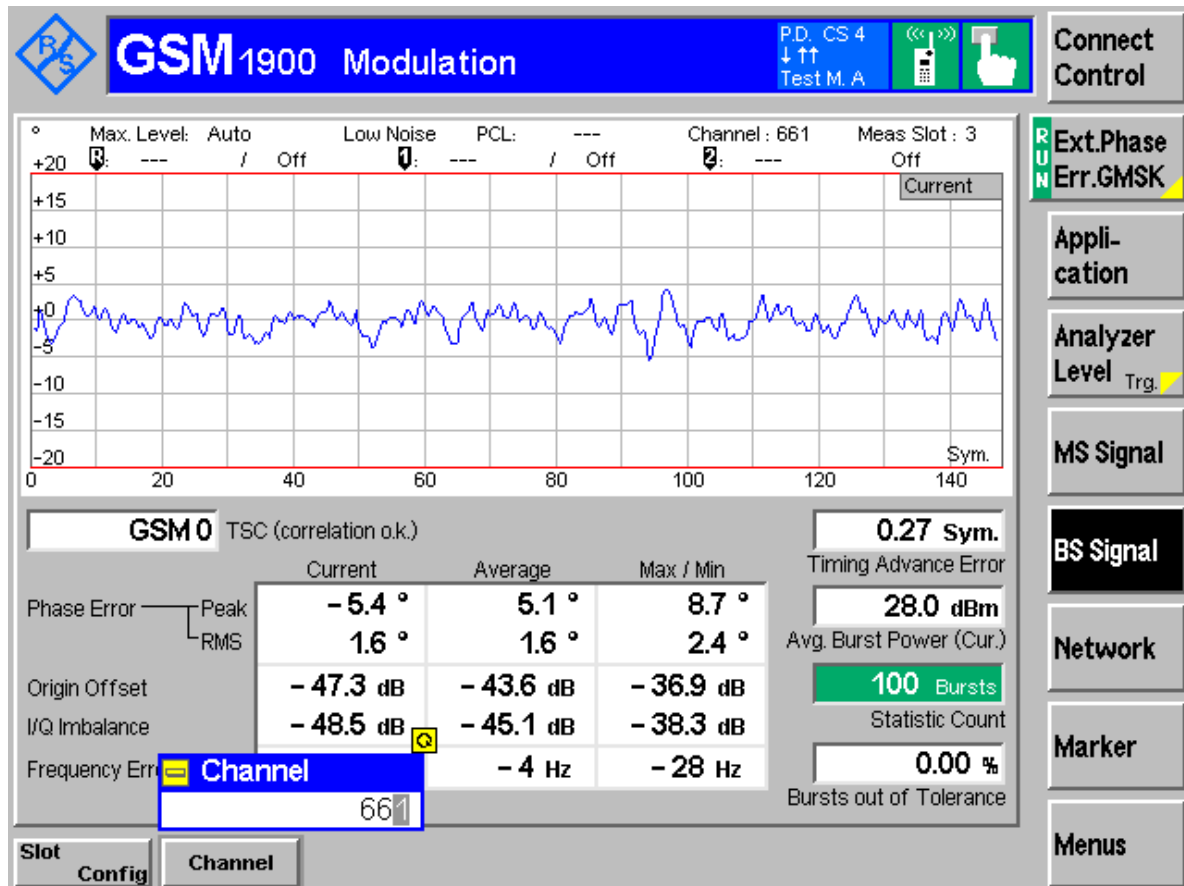
## **Appendix B**

### **Modulation Characteristics**

According to FCC Part 2.1047 & Part24 Subpart E

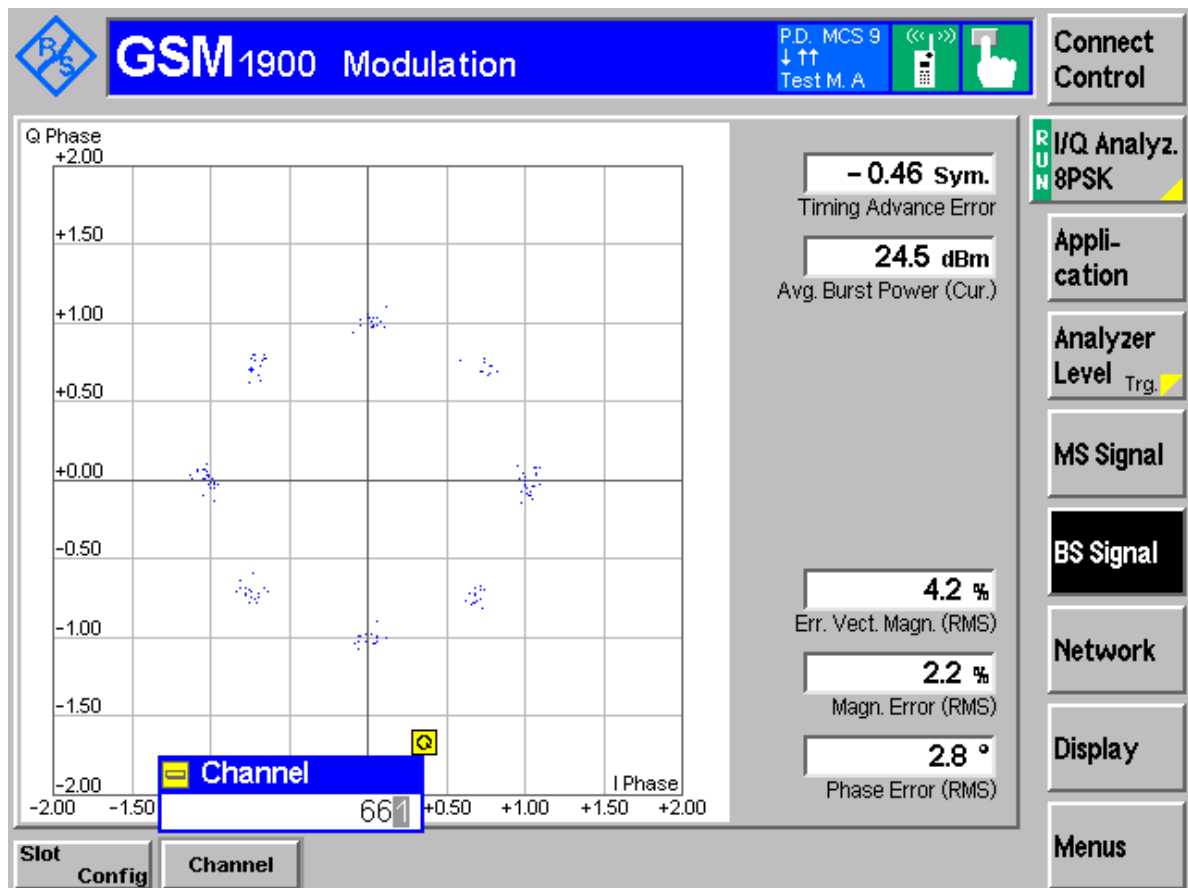


## TM1:GPRS/GSM Channel 661





## TM2:EDGE Channel 661





## **Appendix C**

### **Occupied Bandwidth** According to FCC Part 2.1049 & Part 24 Subpart E

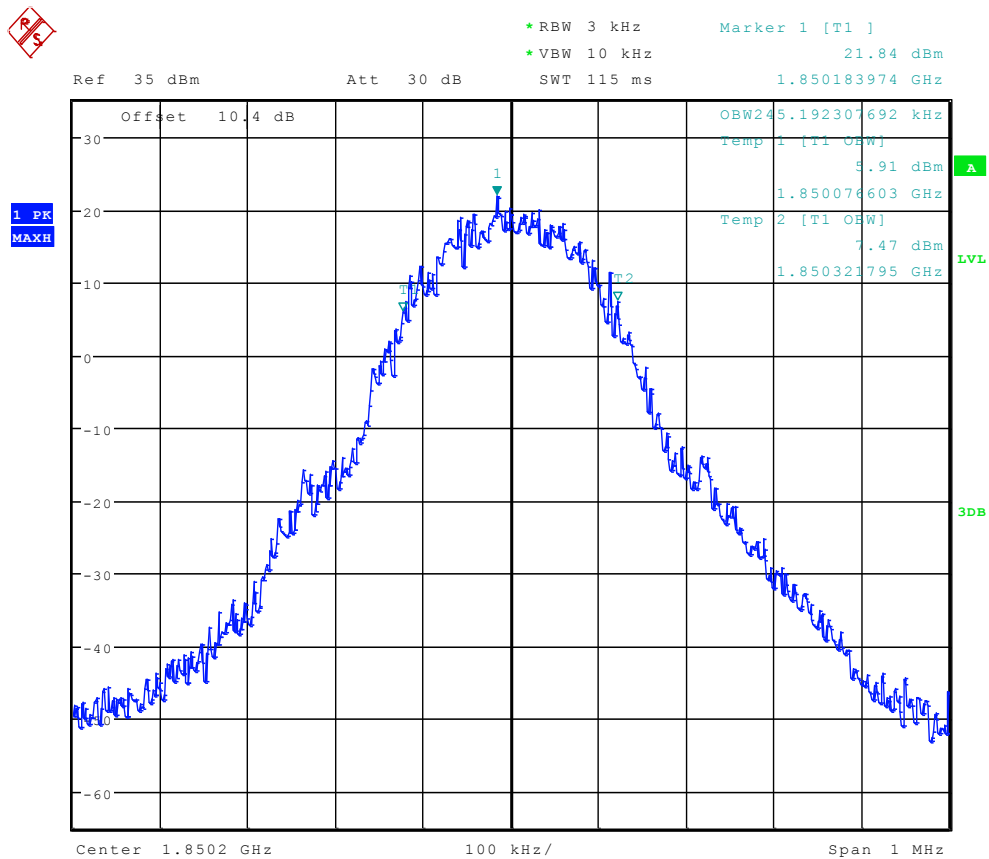


## **Result Table**

| Test Mode | RF Ch. | Occupied Bandwidth [KHz] | Verdict |
|-----------|--------|--------------------------|---------|
| TM 1      | B      | 245.19                   | Pass    |
|           | M      | 245.19                   | Pass    |
|           | T      | 248.40                   | Pass    |
| TM 2      | B      | 248.40                   | Pass    |
|           | M      | 248.40                   | Pass    |
|           | T      | 253.21                   | Pass    |



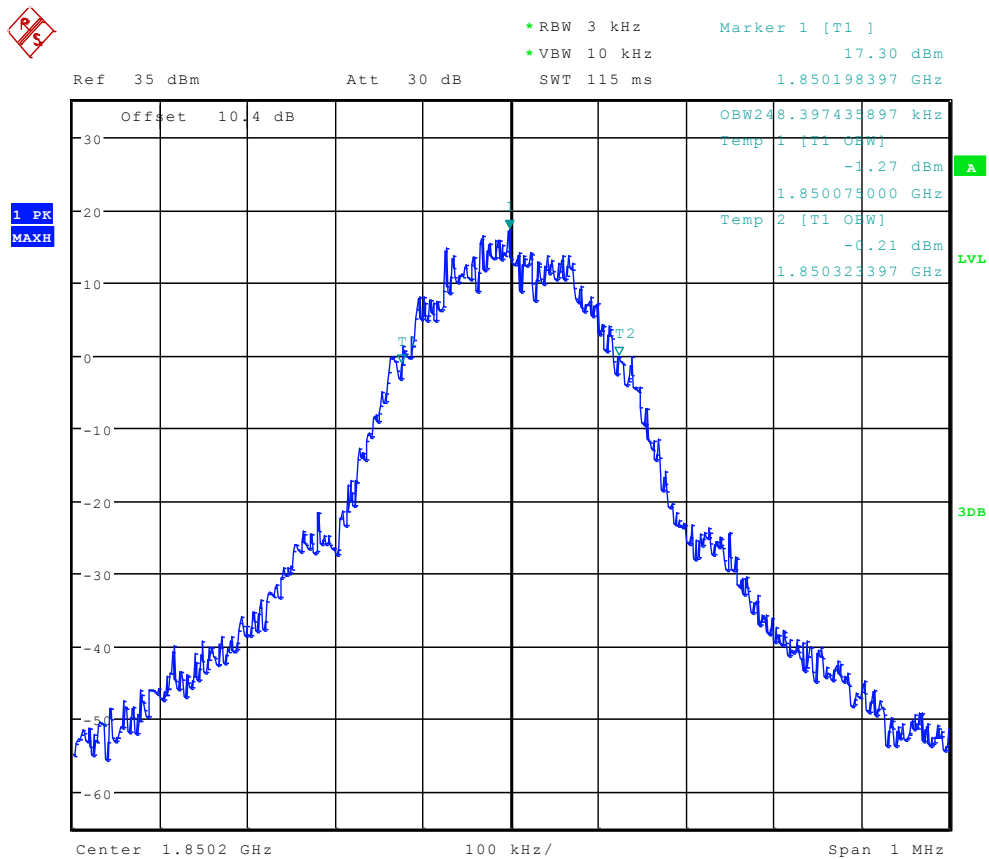
## TM1:GPRS/GSM Channel 512



Date: 2.DEC.2011 03:02:04



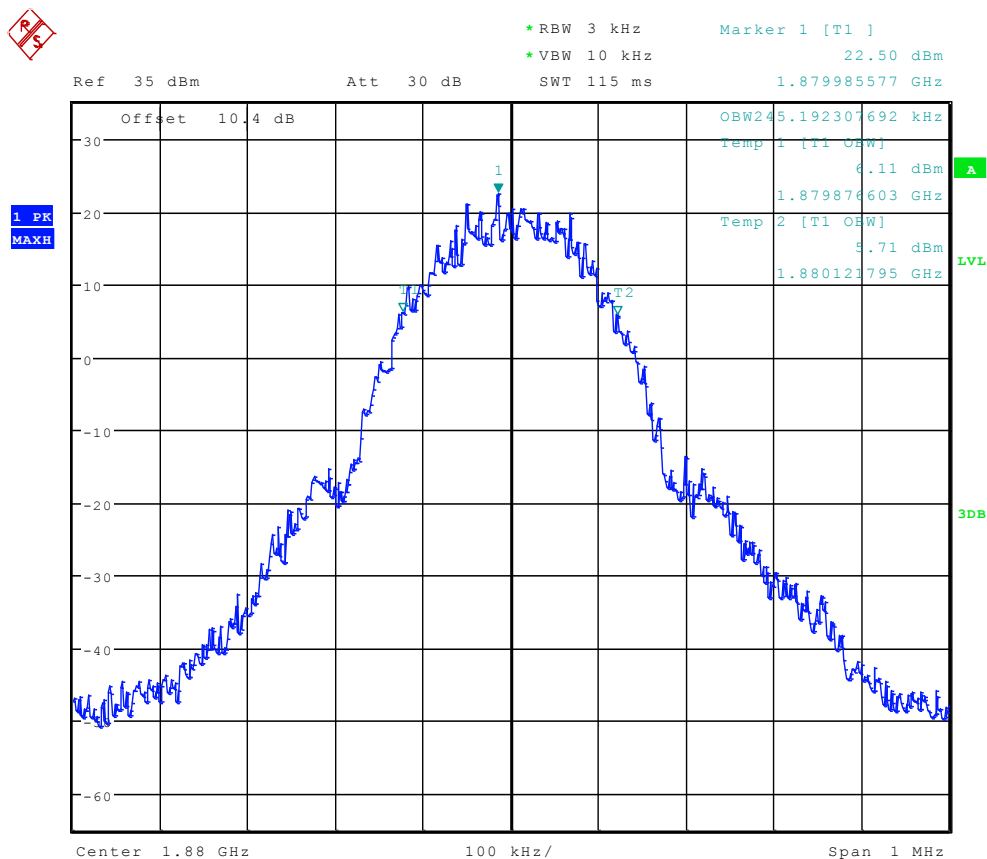
## TM2:EDGE Channel 512



Date: 2.DEC.2011 03:09:05



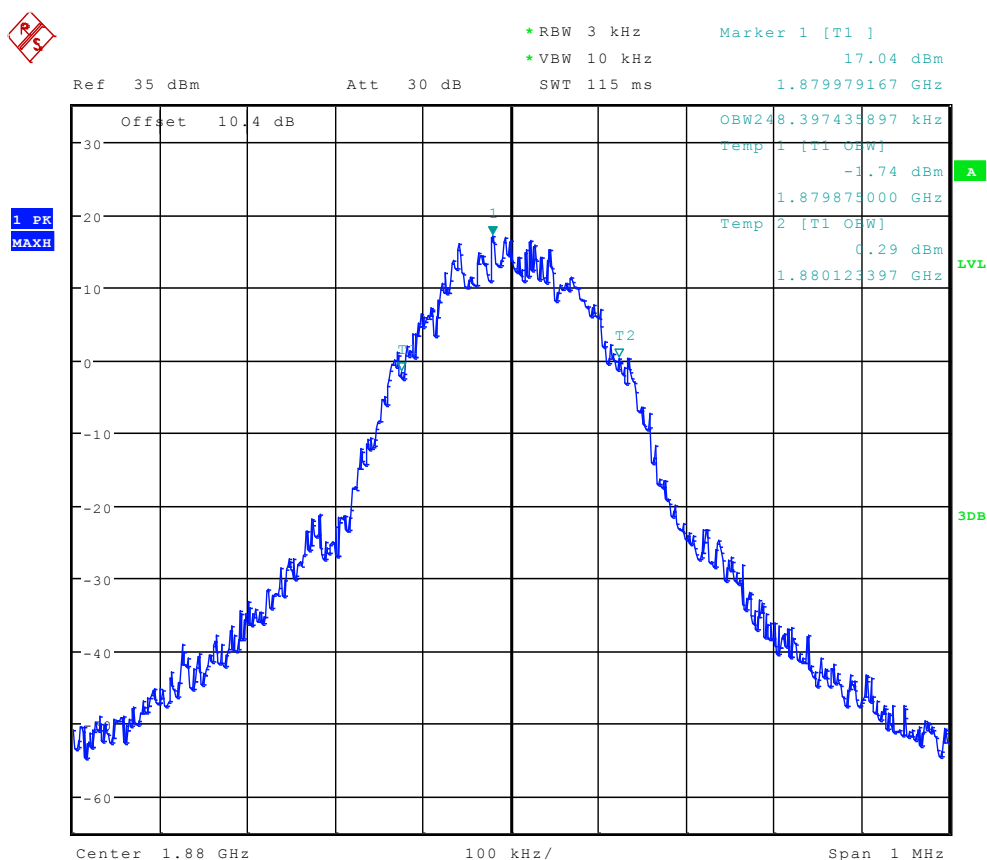
## TM1:GPRS/GSM Channel 661



Date: 2.DEC.2011 03:02:17



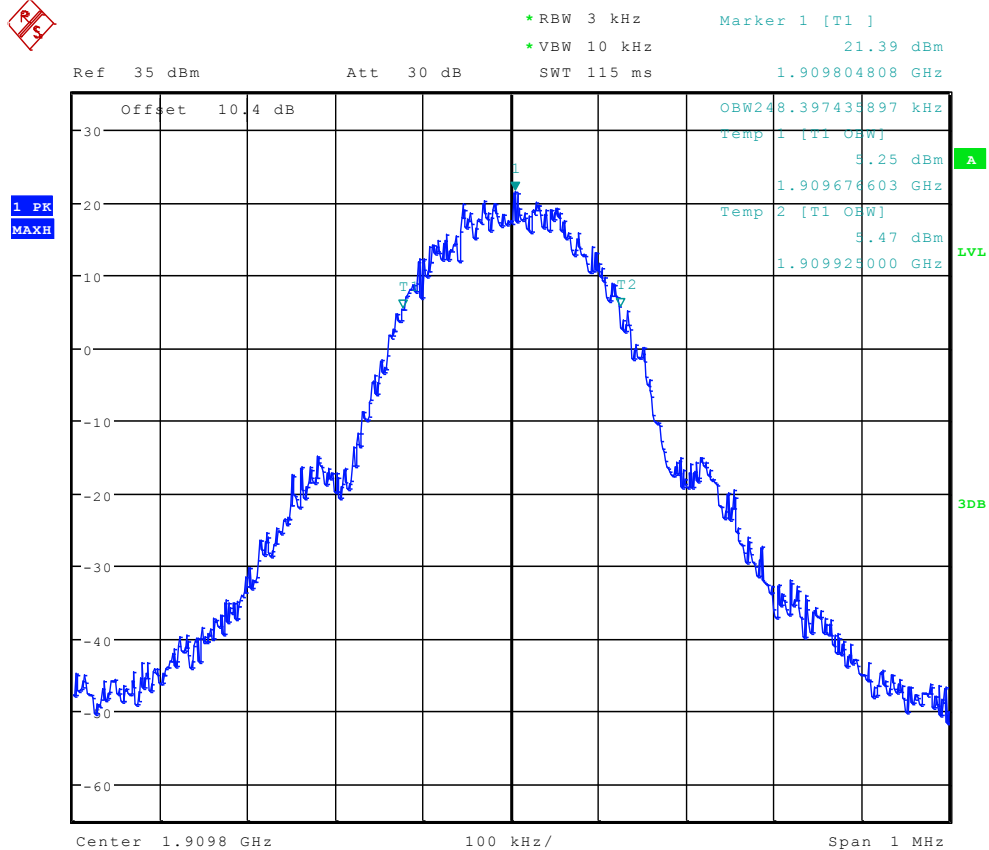
## TM2:EDGE Channel 661



Date: 2.DEC.2011 03:09:19



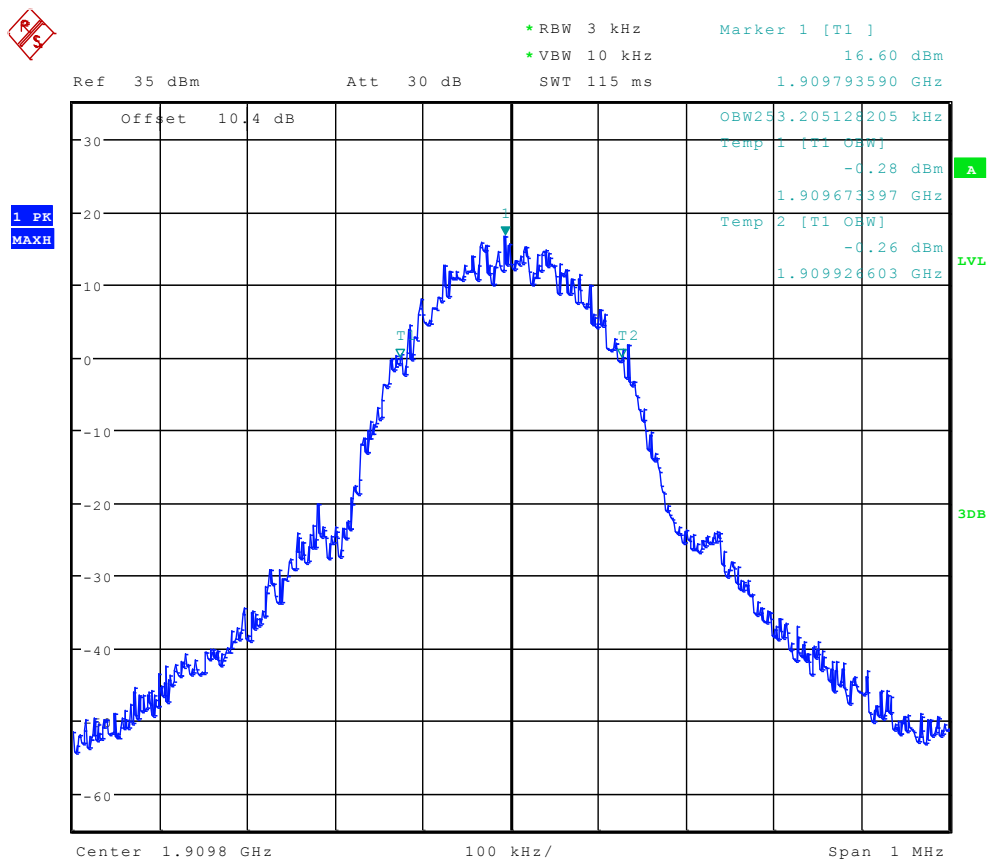
## TM1:GPRS/GSM Channel 810



Date: 2.DEC.2011 03:02:31



## TM2:EDGE Channel 810



Date: 2.DEC.2011 03:09:32

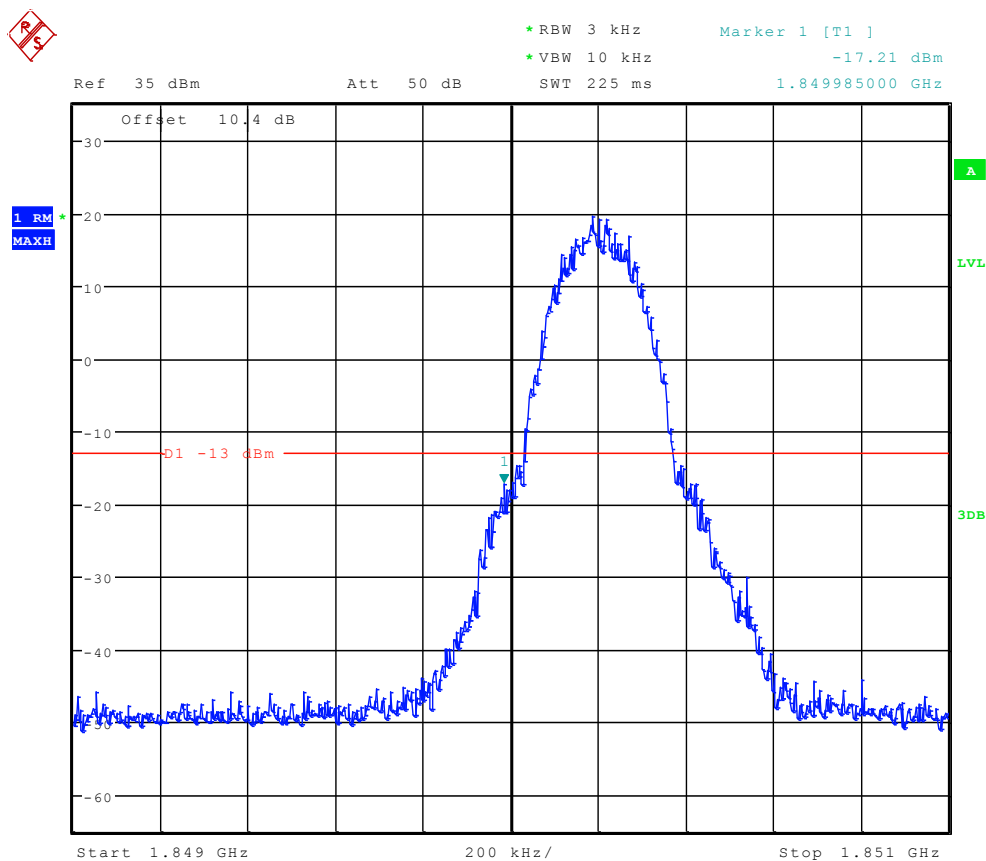


## **Appendix D**

### **Band Edges Compliance** According to FCC Part 2.1051 & 24.238



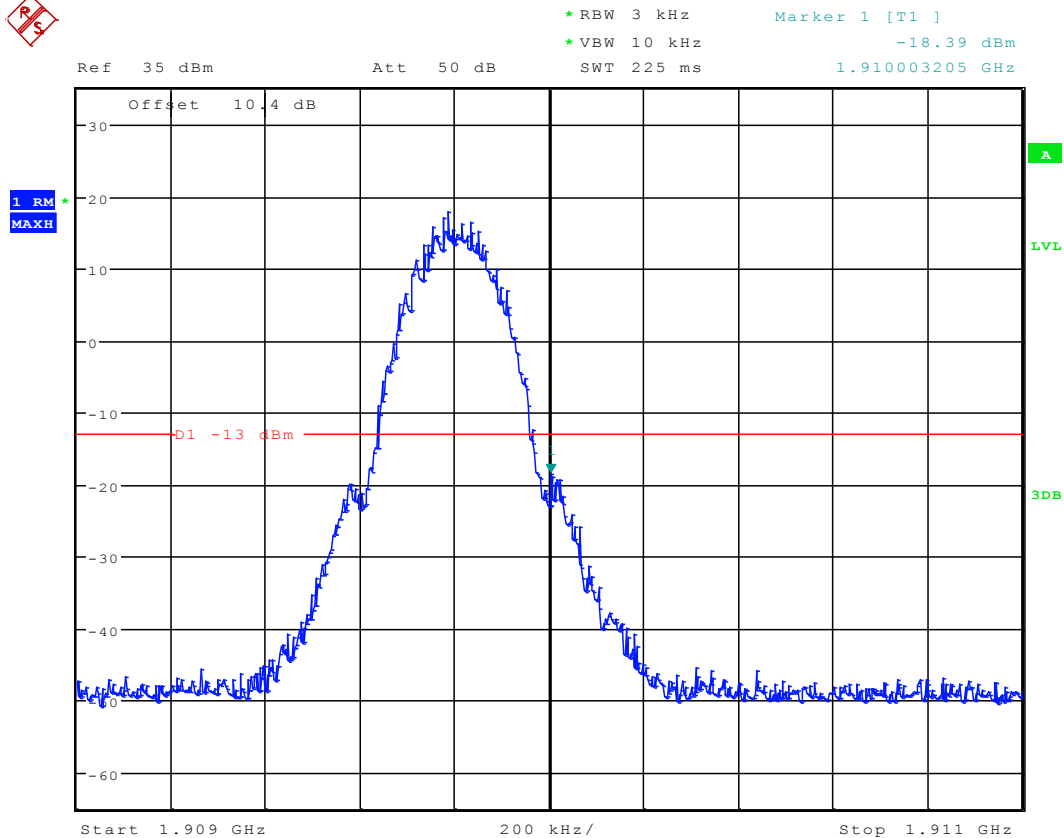
## TM1:GPRS/GSM Left Edge Channel 512



Date: 2.DEC.2011 03:05:23



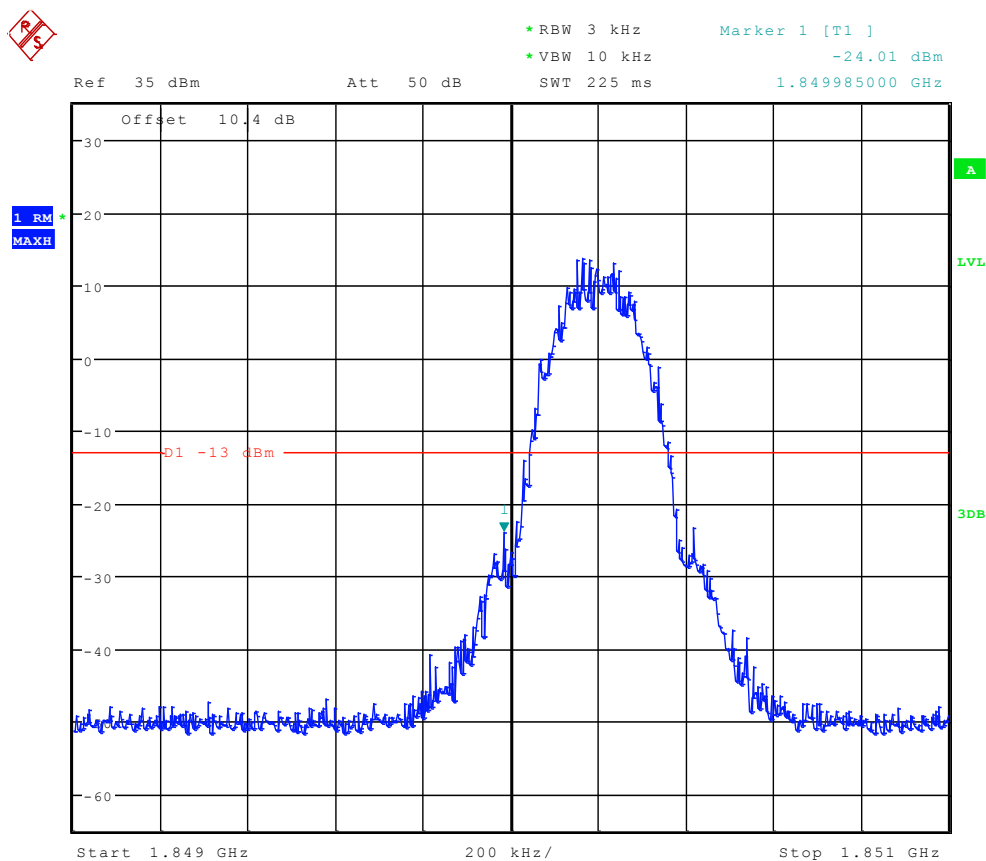
## Right Edge Channel 810



Date: 7.DEC.2011 02:41:52



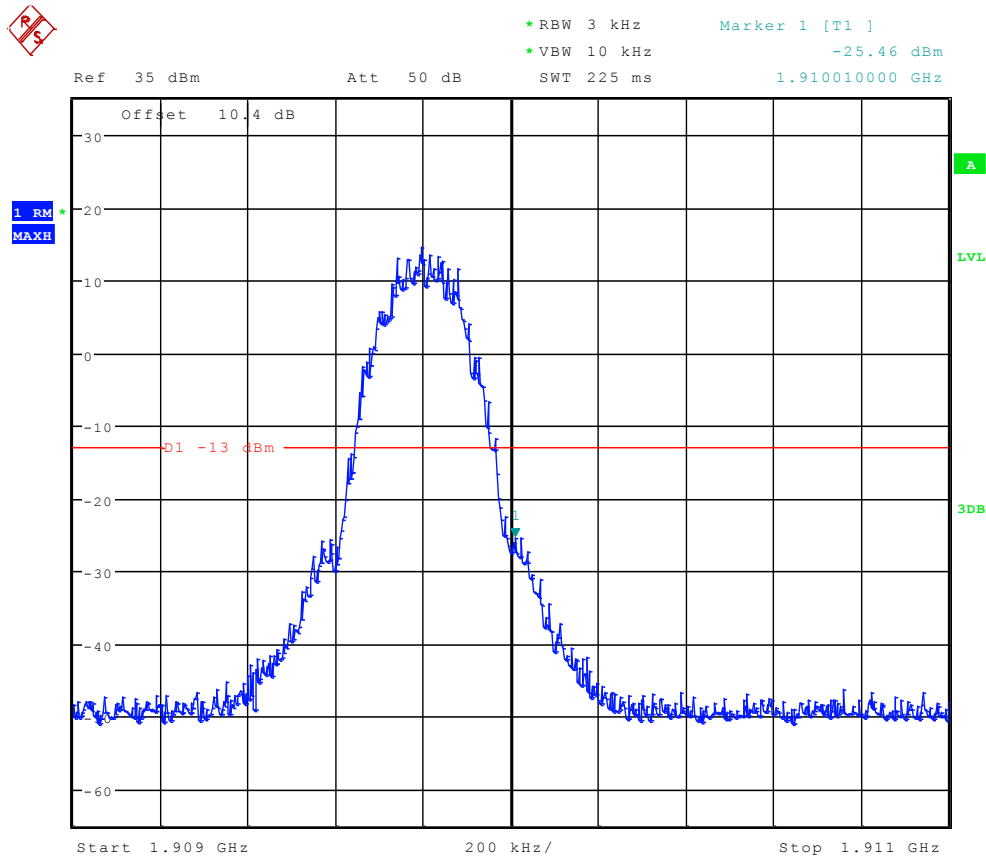
## EDGE Left Edge Channel 512



Date: 2.DEC.2011 03:08:18



## Right Edge Channel 810



Date: 2.DEC.2011 03:08:51



## **Appendix E**

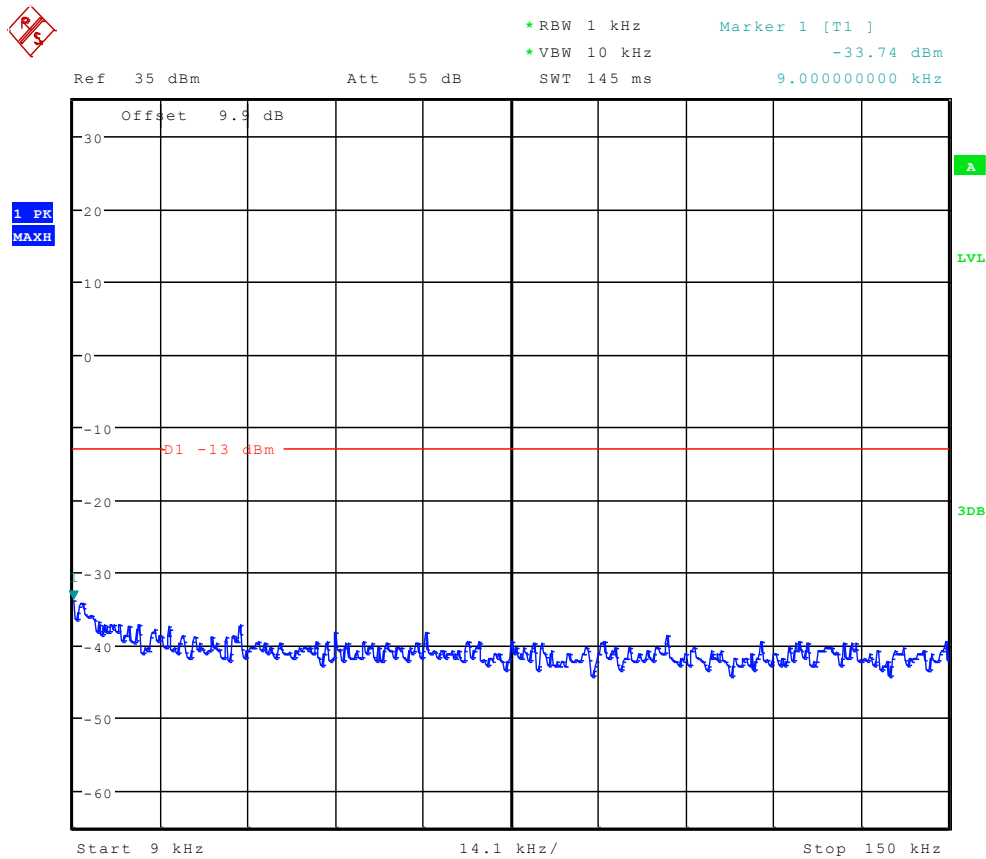
# Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & 24.238

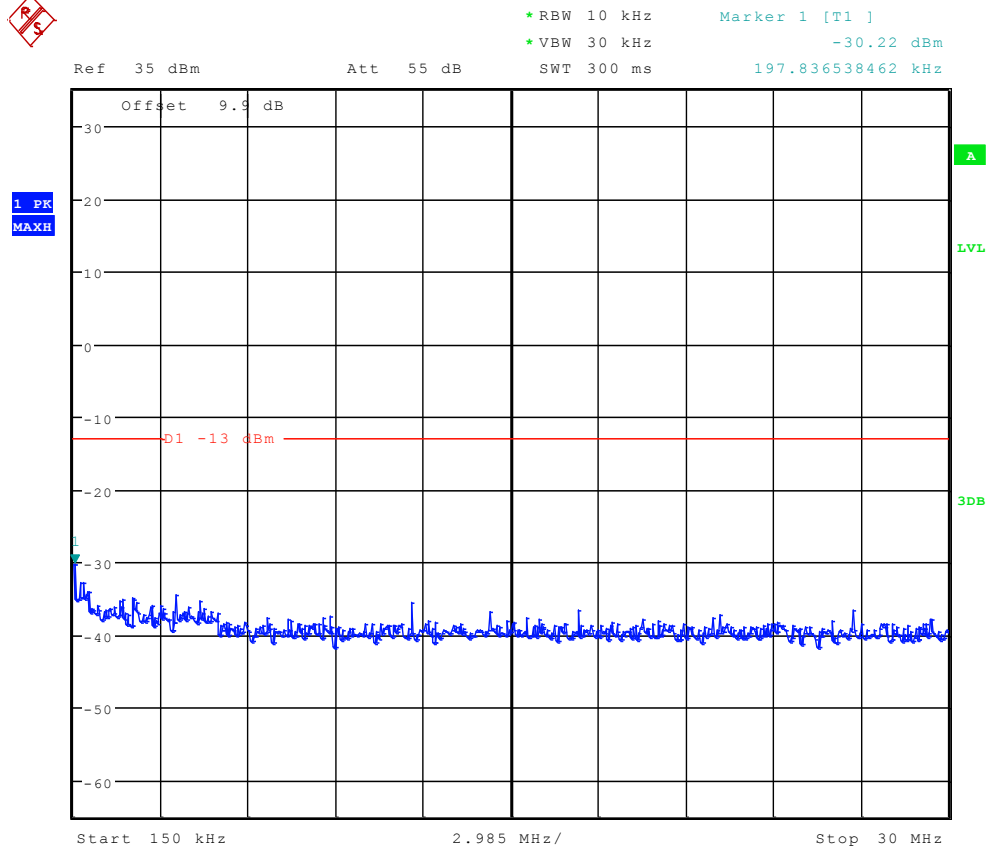


## TM1:GPRS/GSM

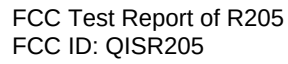
### Channel 512



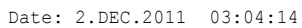
Date: 2.DEC.2011 03:02:46



Date: 2.DEC.2011 03:03:30

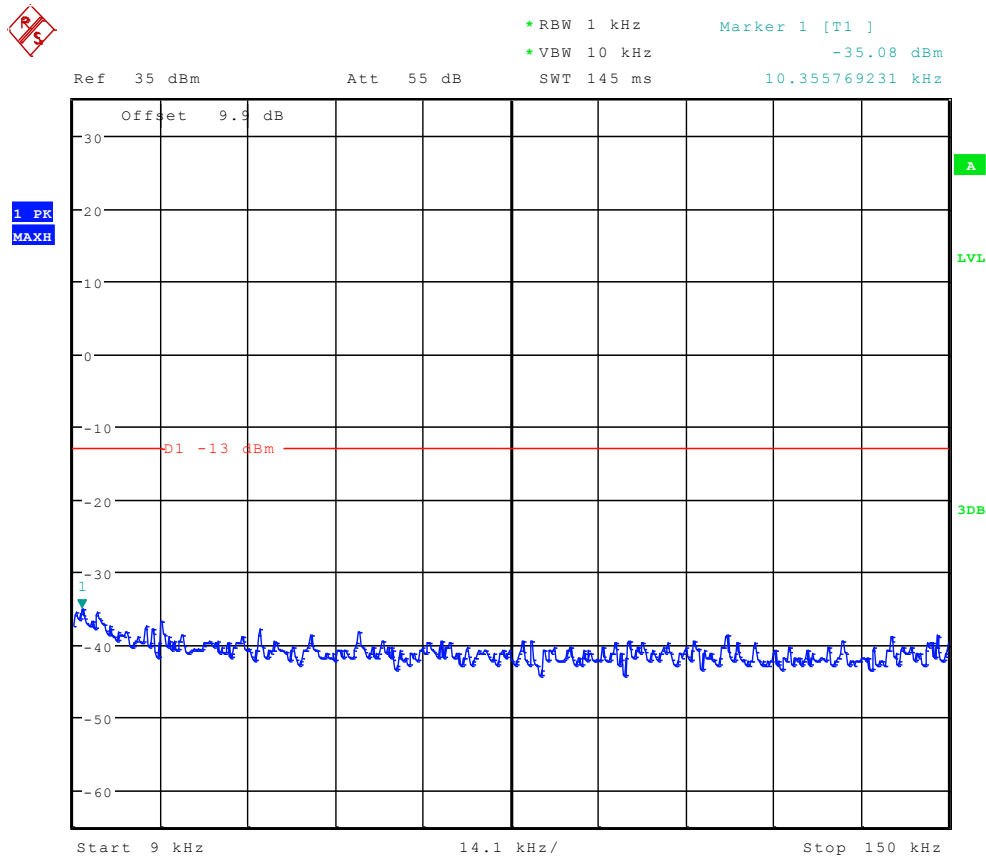


|     |        |     |       |     |        |                 |
|-----|--------|-----|-------|-----|--------|-----------------|
| Ref | 35 dBm | Att | 50 dB | SWT | 115 ms | 1.822179487 GHz |
|-----|--------|-----|-------|-----|--------|-----------------|

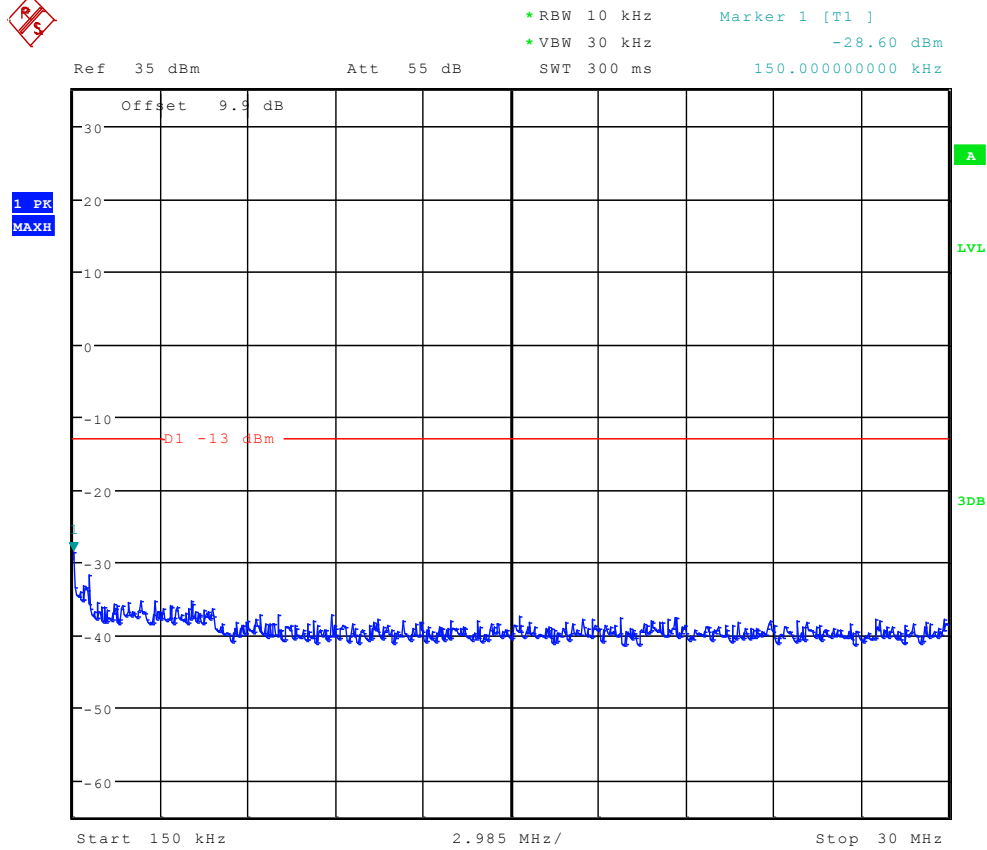




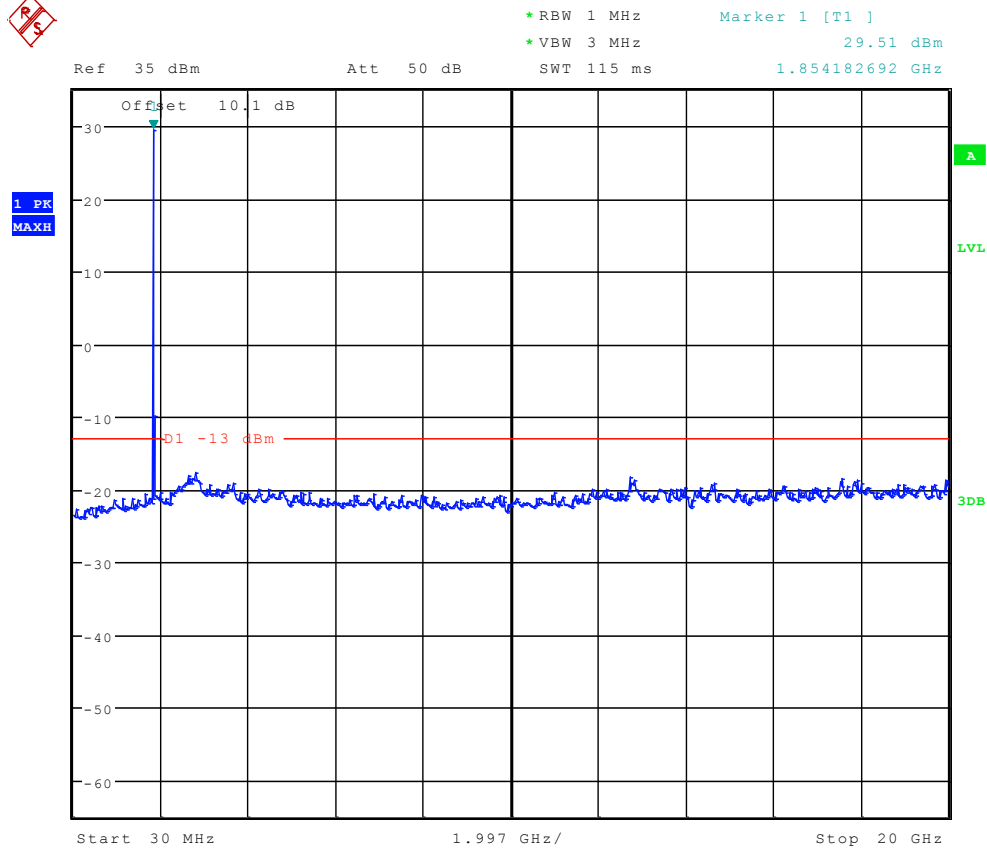
## Channel 661



Date: 2.DEC.2011 03:03:01



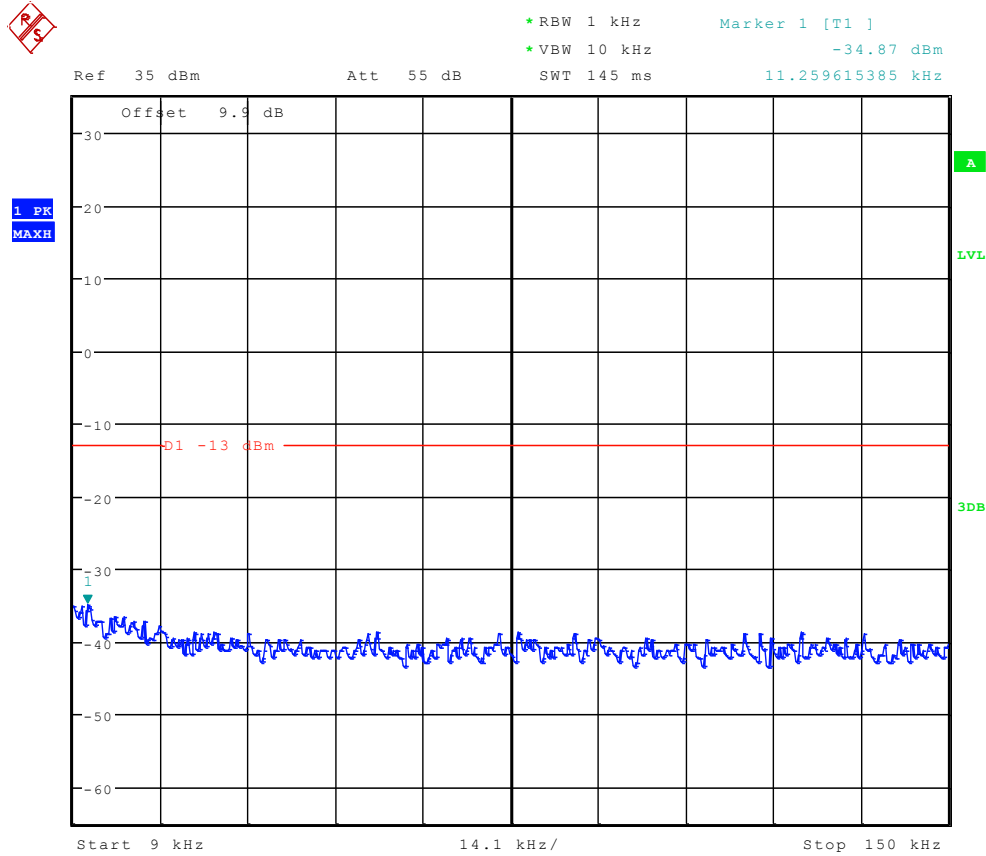
Date: 2.DEC.2011 03:03:44



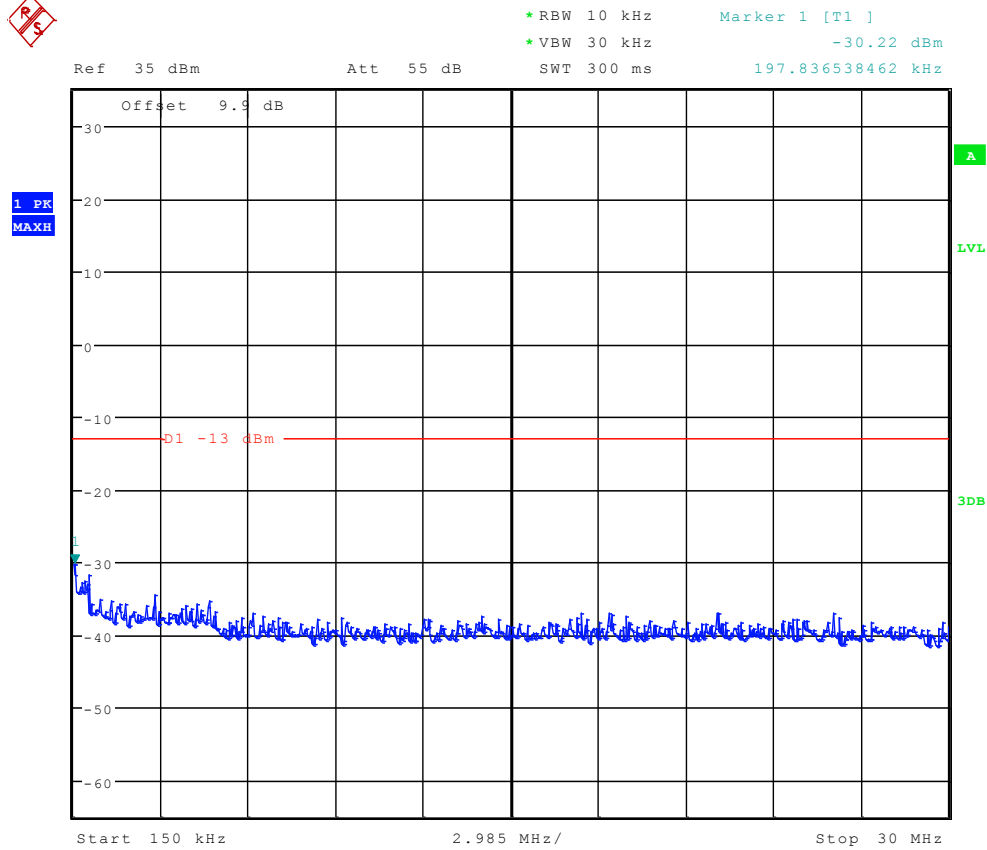
Date: 2.DEC.2011 03:04:28



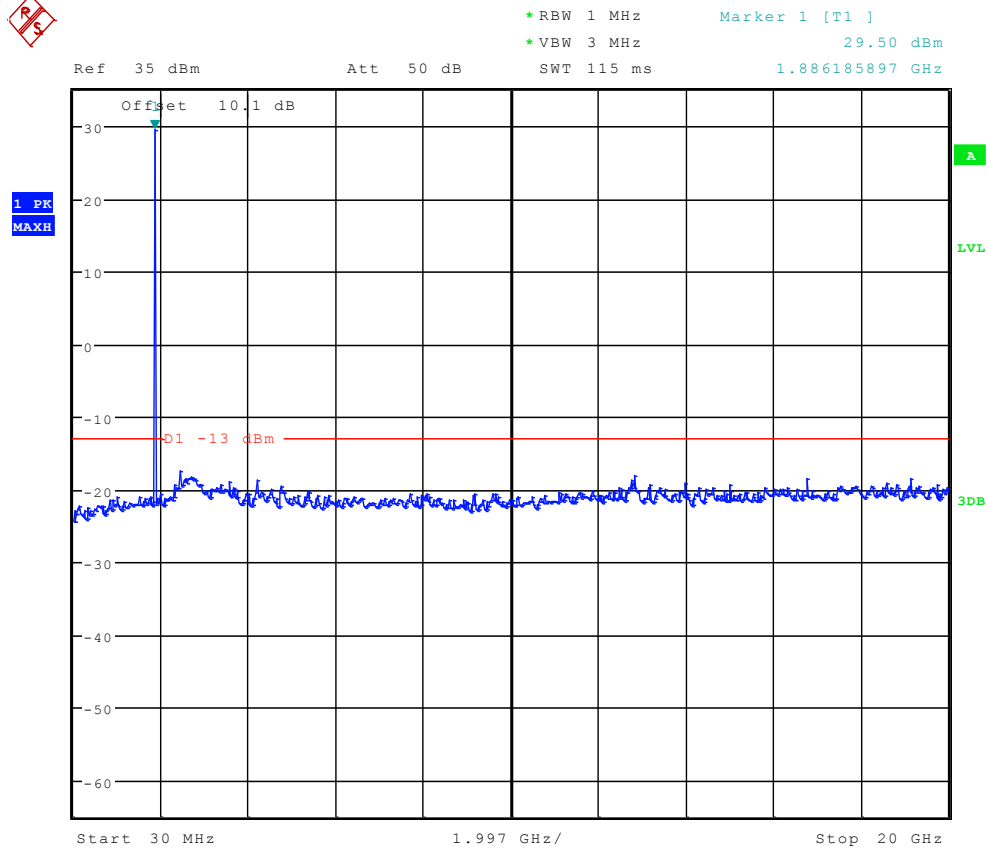
## Channel 810



Date: 2.DEC.2011 03:03:15

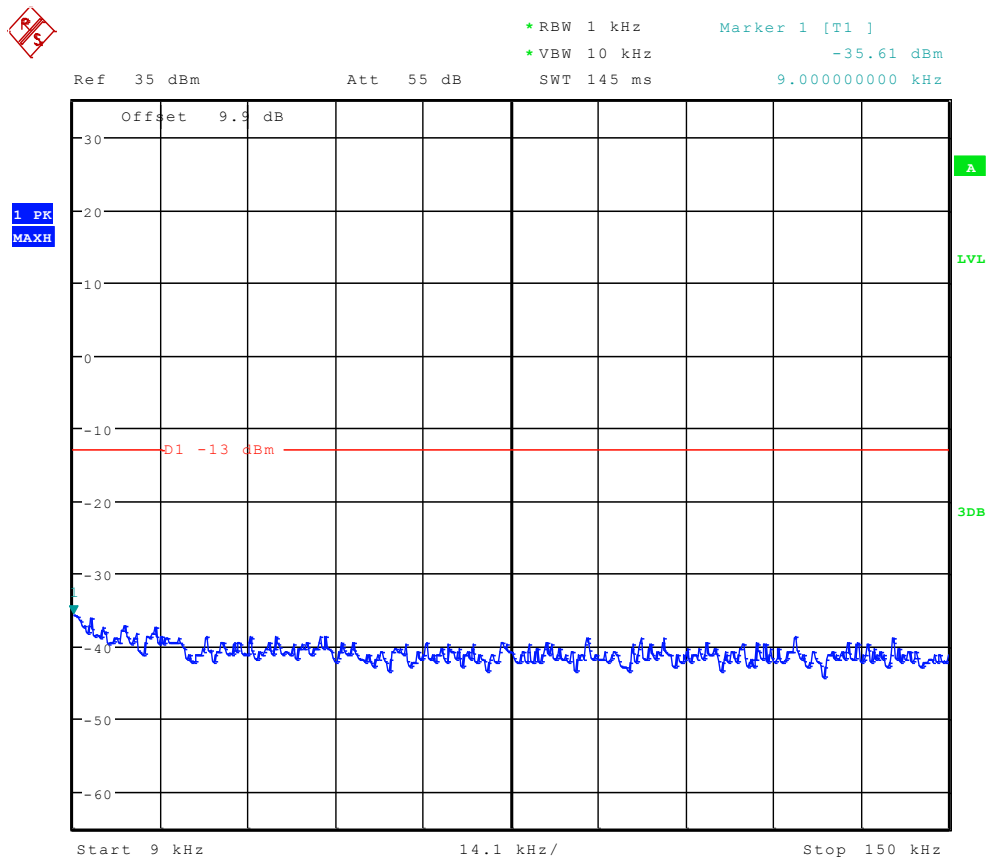


Date: 2.DEC.2011 03:03:59

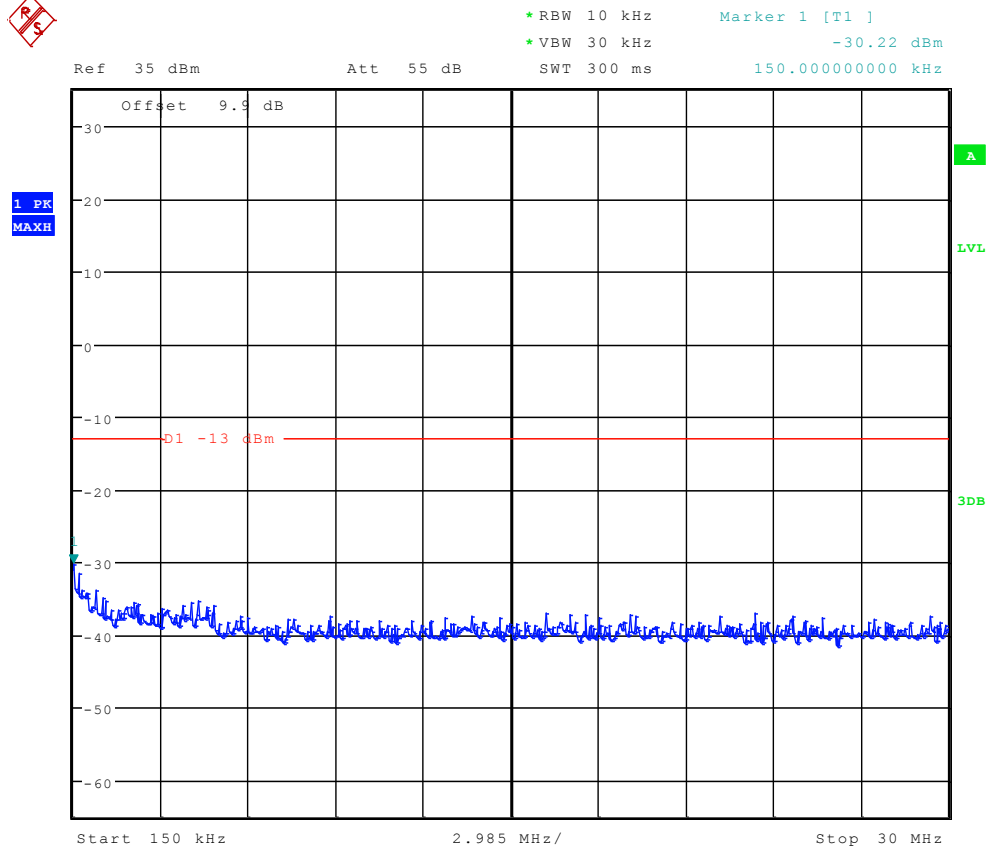


Date: 2.DEC.2011 03:04:43

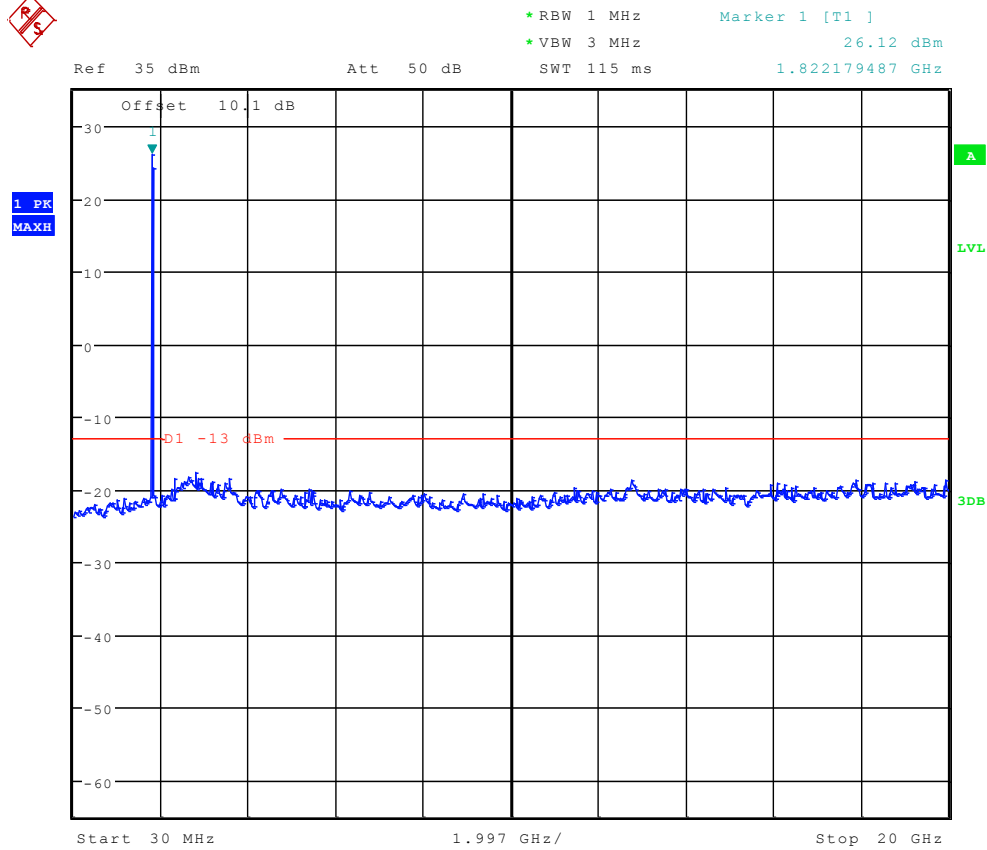
TM2:EDGE  
Channel 512



Date: 2.DEC.2011 03:09:47



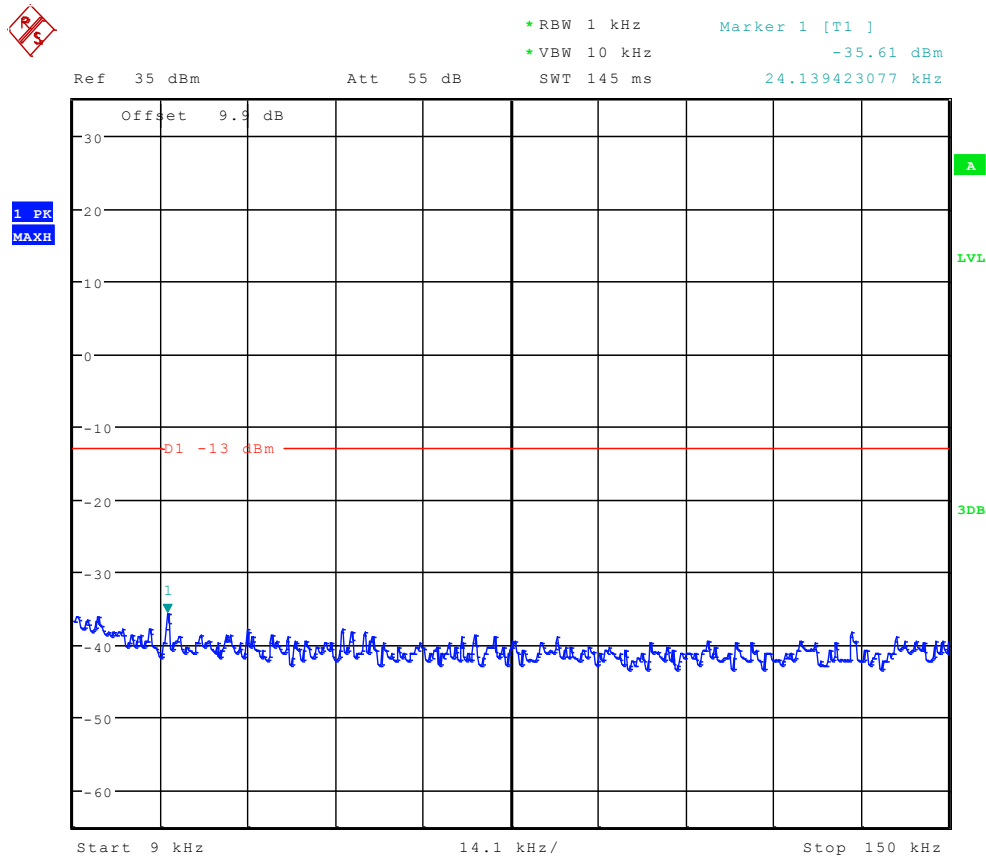
Date: 2.DEC.2011 03:10:31



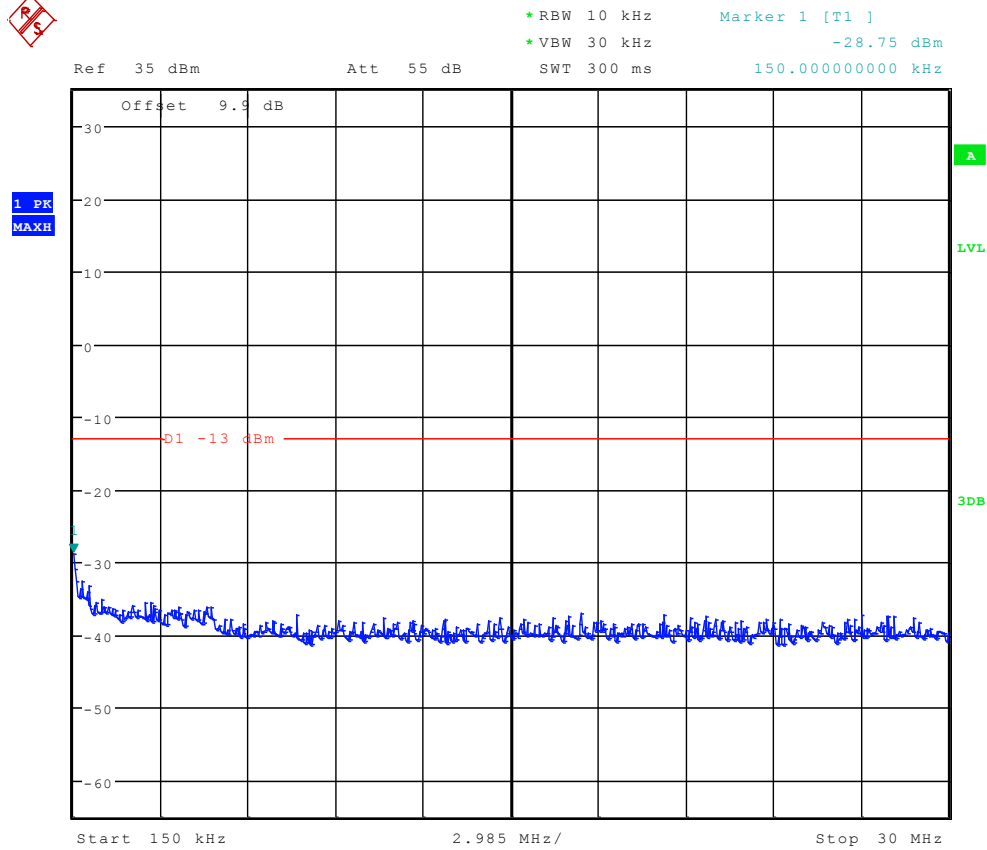
Date: 2.DEC.2011 03:11:15



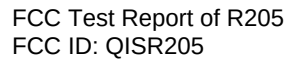
## Channel 661



Date: 2.DEC.2011 03:10:02



Date: 2.DEC.2011 03:10:46

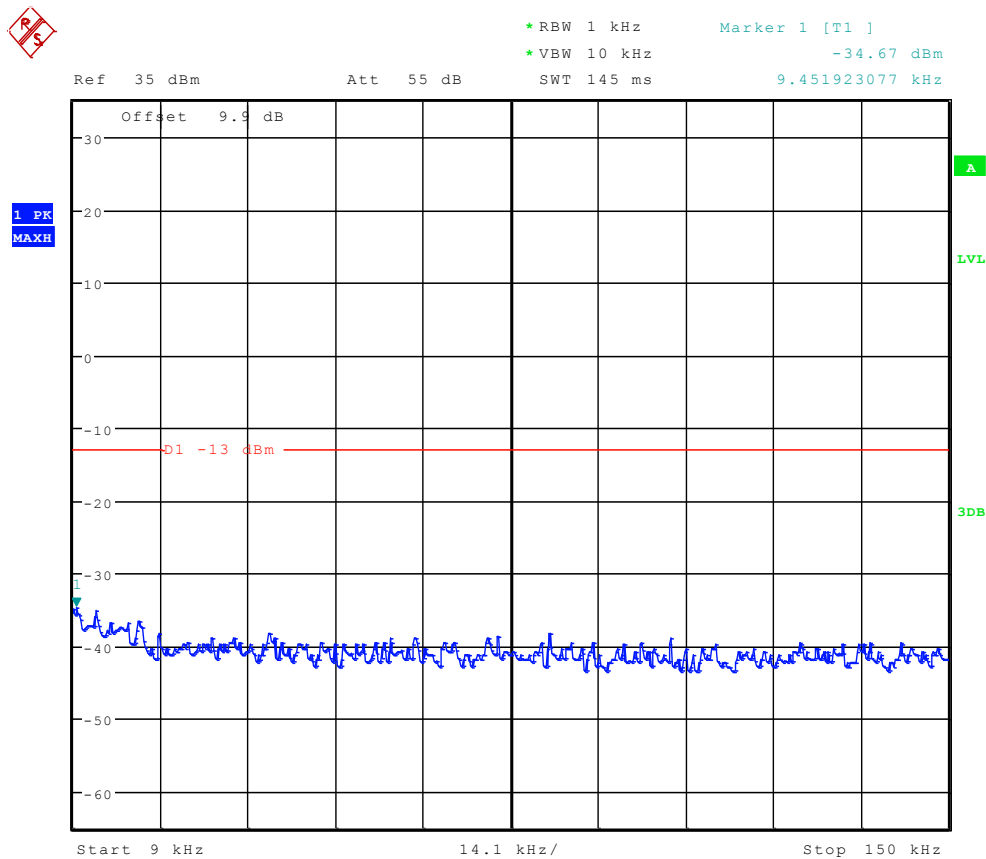


```
Ref  35 dBm      Att  50 dB      SWT 115 ms      1.854182692 GHz
```

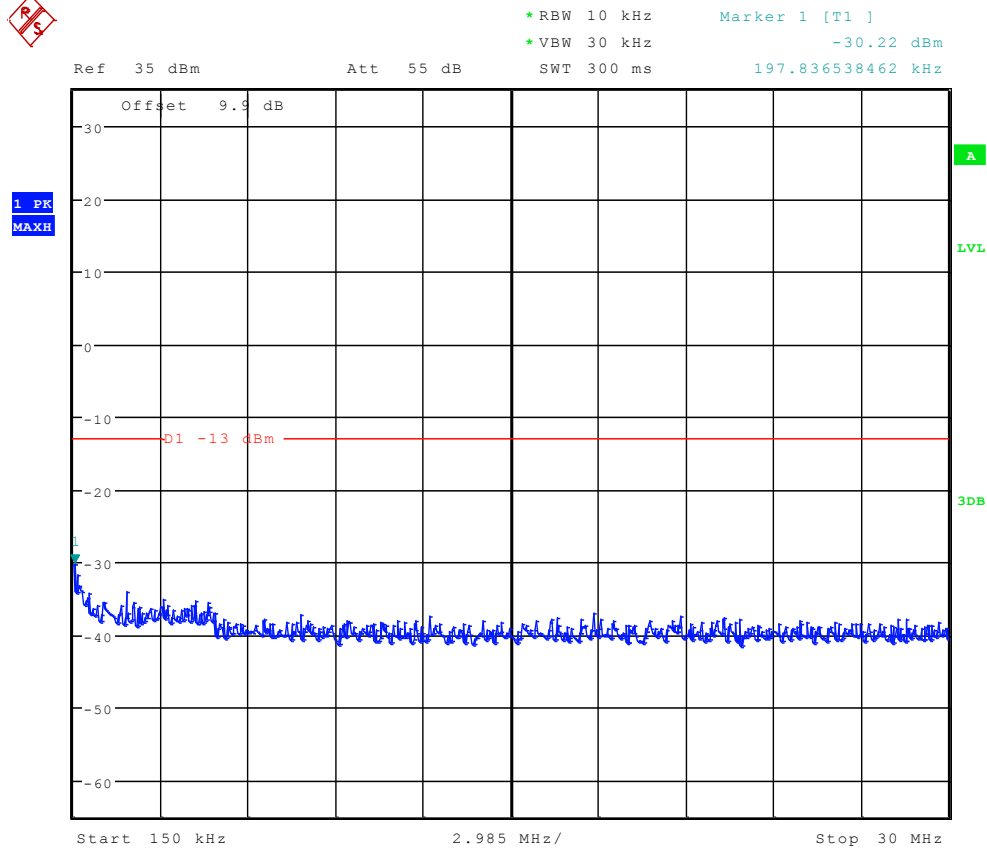




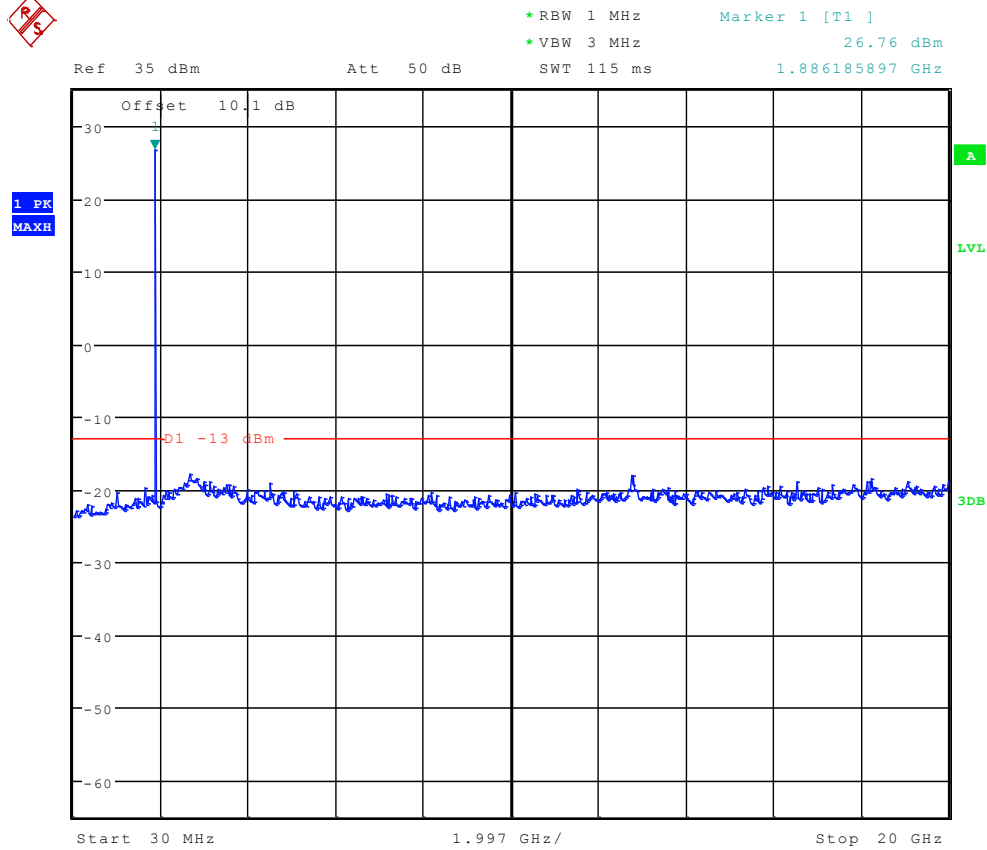
## Channel 810



Date: 2.DEC.2011 03:10:16



Date: 2.DEC.2011 03:11:00



Date: 2.DEC.2011 03:11:44



# **Appendix E**

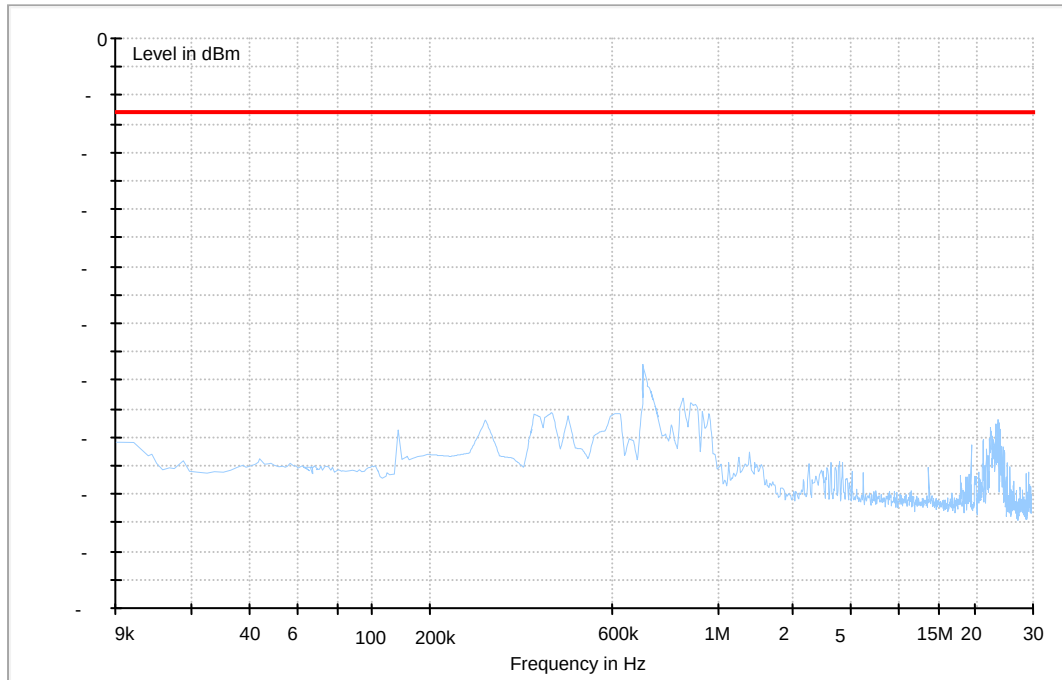
## **Radiated spurious emission**

According to FCC Part 2.1053& Part 24.238



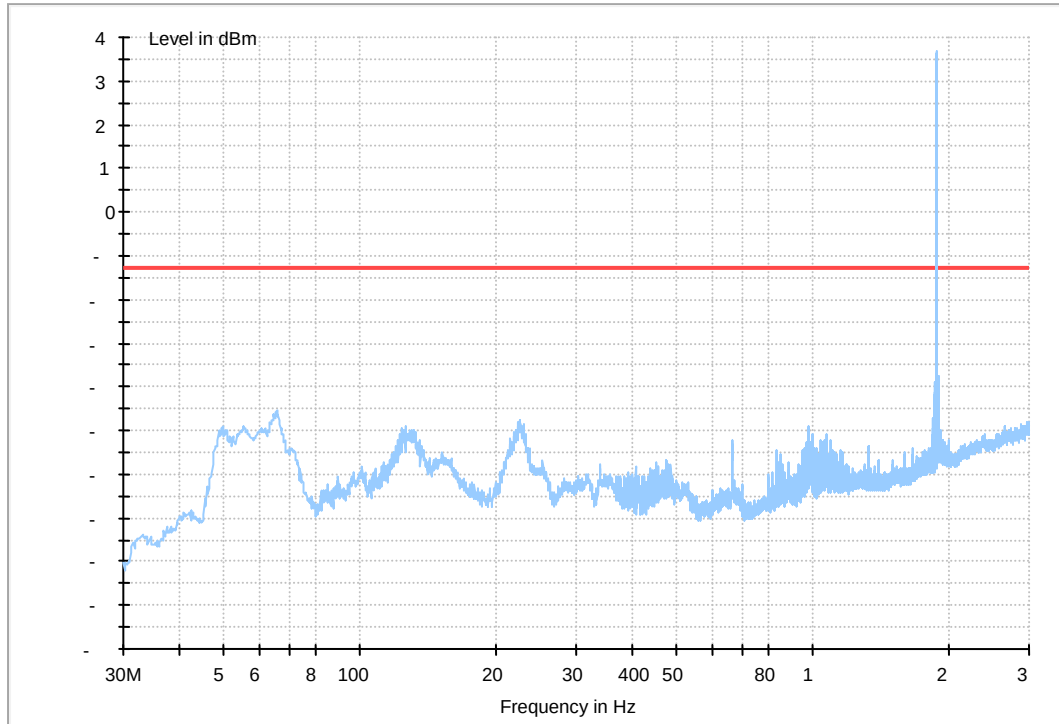
## GPRS 1900

Traffic Mode (9kHz-30MHz)



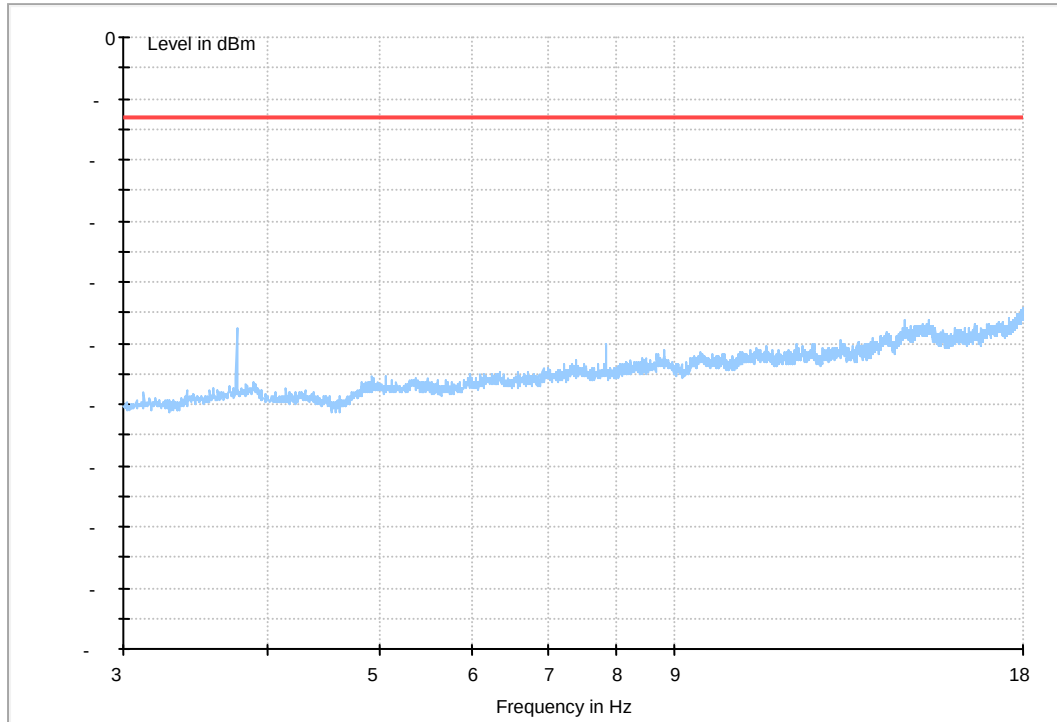


## Traffic Mode (30MHz-3GHz)



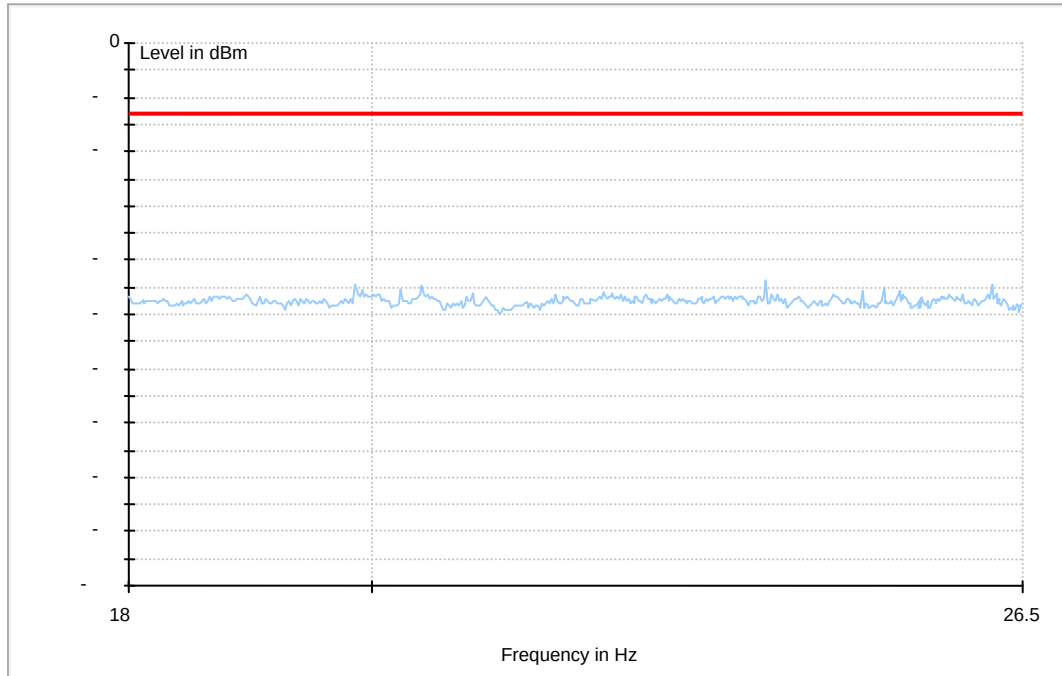


## Traffic Mode (3GHz-18GHz)





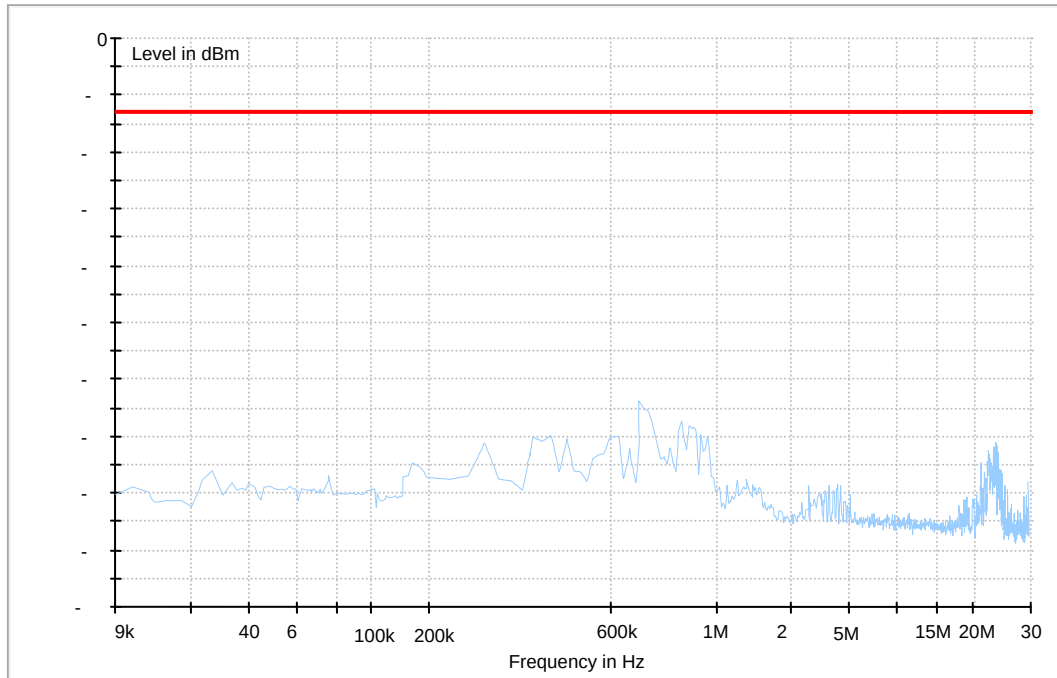
## Traffic Mode (18GHz-26.5GHz)





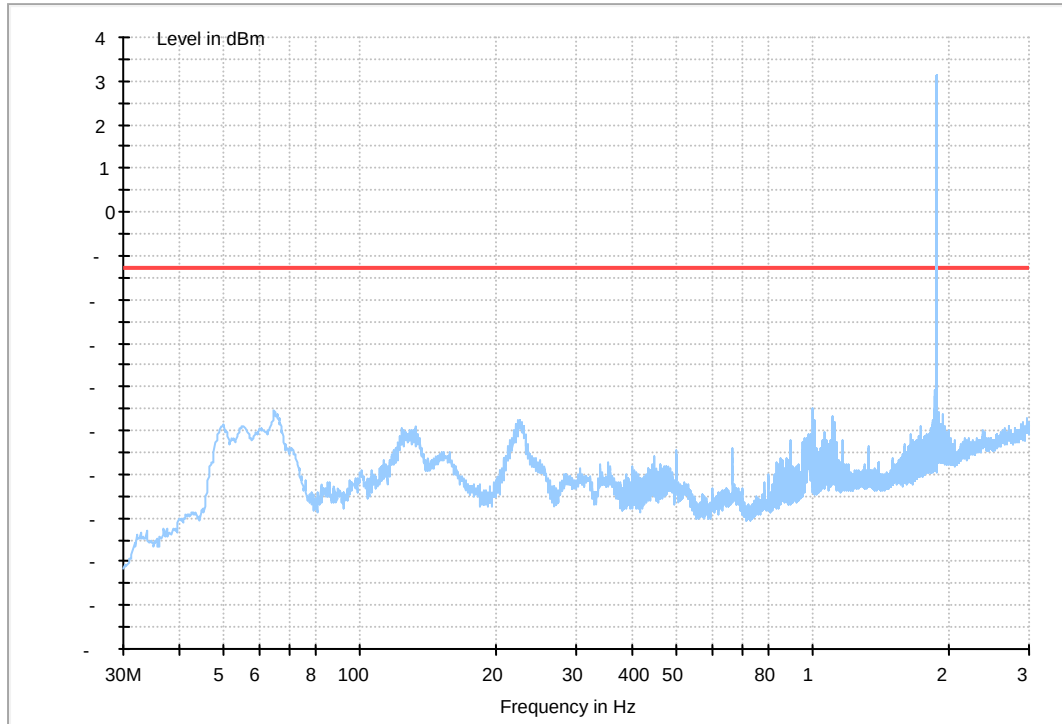
## EDGE1900

Traffic Mode (9kHz-30MHz)



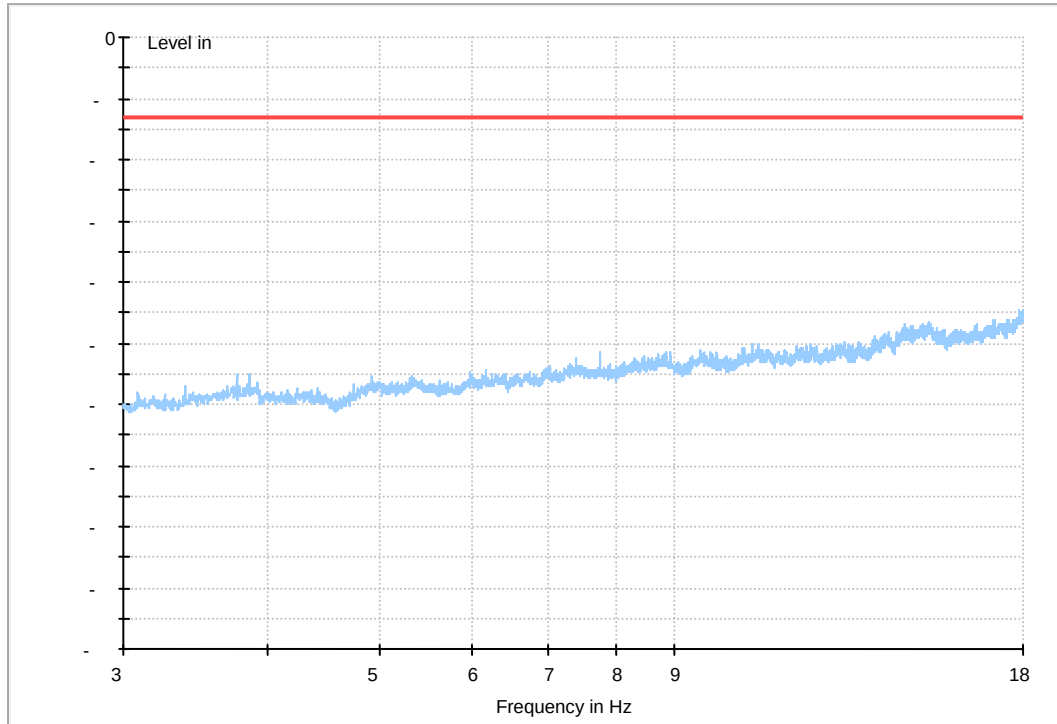


## Traffic Mode (30MHz-3GHz)



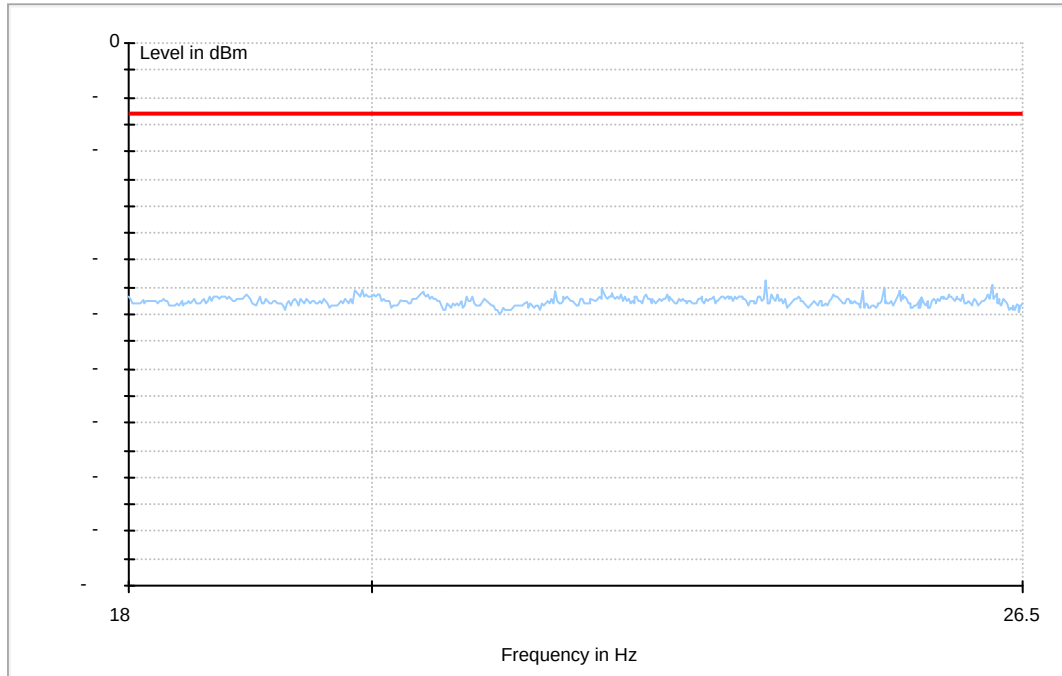


## Traffic Mode (3GHz-18GHz)





## Traffic Mode (18GHz-26.5GHz)





# **Appendix G**

## **Frequency Stability**

According to FCC Part 2.1055& Part 24.235



## **Frequency Error vs. Temperature:**

| Test Mode | RF Ch. | Volt. | Temp.  | Freq. Error [Hz] | Freq. vs. rated [ppm] | Freq. vs. 20 °C [ppm] | Limit [ppm] | Verdict |
|-----------|--------|-------|--------|------------------|-----------------------|-----------------------|-------------|---------|
| TM 1      | M      | 100%  | -30 °C | 15               | 0.0080                | ---                   | ±2.5        | Pass    |
|           |        |       | -20 °C | -14              | -0.0074               | ---                   | ±2.5        | Pass    |
|           |        |       | -10 °C | 12               | 0.0064                | ---                   | ±2.5        | Pass    |
|           |        |       | 0 °C   | -14              | -0.0074               | ---                   | ±2.5        | Pass    |
|           |        |       | 10 °C  | -12              | -0.0064               | ---                   | ±2.5        | Pass    |
|           |        |       | 20 °C  | 9                | 0.0048                | ---                   | ±2.5        | Pass    |
|           |        |       | 30 °C  | 14               | 0.0074                | ---                   | ±2.5        | Pass    |
|           |        |       | 40 °C  | -9               | -0.0048               | ---                   | ±2.5        | Pass    |
|           |        |       | 50 °C  | -18              | -0.0096               | ---                   | ±2.5        | Pass    |
| TM 2      | M      | 100%  | -30 °C | 15               | 0.0080                | ---                   | ±2.5        | Pass    |
|           |        |       | -20 °C | -9               | -0.0048               | ---                   | ±2.5        | Pass    |
|           |        |       | -10 °C | -11              | -0.0059               | ---                   | ±2.5        | Pass    |
|           |        |       | 0 °C   | 12               | 0.0064                | ---                   | ±2.5        | Pass    |
|           |        |       | 10 °C  | 17               | 0.0090                | ---                   | ±2.5        | Pass    |
|           |        |       | 20 °C  | 9                | 0.0048                | ---                   | ±2.5        | Pass    |
|           |        |       | 30 °C  | -18              | -0.0096               | ---                   | ±2.5        | Pass    |
|           |        |       | 40 °C  | 7                | 0.0037                | ---                   | ±2.5        | Pass    |
|           |        |       | 50 °C  | -12              | -0.0064               | ---                   | ±2.5        | Pass    |
|           |        |       | 40 °C  | 14               | 0.0074                | ---                   | ±2.5        | Pass    |
|           |        |       | 50 °C  | -16              | -0.0085               | ---                   | ±2.5        | Pass    |



## Frequency Error vs. Voltage:

| Test Mode | RF Ch. | Temp. | Volt. | Freq. Error [Hz] | Freq. vs. rated [ppm] | Freq. vs. 20 °C [ppm] | Limit [ppm] | Verdict |
|-----------|--------|-------|-------|------------------|-----------------------|-----------------------|-------------|---------|
| TM 1      | M      | 20 °C | VL    | 14               | 0.0074                | ---                   | ± 2.5       | Pass    |
|           |        |       | VN    | 15               | 0.0080                | ---                   | ± 2.5       | Pass    |
|           |        |       | VH    | 17               | 0.0090                | ---                   | ± 2.5       | Pass    |
| TM 2      | M      | 20 °C | VL    | -19              | -0.0101               | ---                   | ± 2.5       | Pass    |
|           |        |       | VN    | 12               | 0.0064                | ---                   | ± 2.5       | Pass    |
|           |        |       | VH    | 13               | 0.0069                | ---                   | ± 2.5       | Pass    |