



FCC RF Test Report

**Product Name: HUAWEI IDEOS X3;
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with
Bluetooth; IDEOS X3**

Model Number: HUAWEI U8510-5,U8510-5

**Report No: SYBH(Z-RF)005092011-2001
FCC ID: QISU8510-5**

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

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Notice 2

Modification Information:

Modification Information

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



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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.

Table 1 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 Terminal | 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

HUAWEI U8510-5,U8510-5 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band II and Band V. The GSM/GPRS/EDGE frequency band includes GSM850 and DCS1800 and PCS1900, but only GSM850 and Band V test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface. 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:

Service and Test mode List

| Service Name | Characteristic | Corresponding Test Mode | Note |
|--------------|------------------|-------------------------|----------|
| Data | Modulation: GMSK | TM1 | GPRS/GSM |
| Data | Modulation: 8PSK | TM2 | EDGE |
| Data | Modulation: QPSK | TM3 | WCDMA |
| Data | Modulation: QPSK | TM4 | HSDPA |

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0.The WCDMA test condition & settings are defined in 3GPP TS 34.121 V8.7.0:2009.

2.2 Modification Information

For original equipment, following table is not application.

Table 2 Modification Information

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

Sep.04, 2011 –Sep.06, 2011

3.2 General Set up Description

TM1: GSM/GPRS Mode with GMSK Modulation

TM2: EDGE Mode with 8PSK Modulation

TM3: WCDMA Mode with QPSK Modulation

TM4: HSDPA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 3 Frequency Range

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

4.1.2 Channel Spacing / Separation

Table 4 Channel Spacing / Separation

| | EDGE/GPRS/GSM | UMTS/HSDPA |
|------------------|---------------|------------|
| Channel Raster | 200kHz | 200kHz |
| Channel Spacing: | 200kHz | 5MHz |

4.1.3 Type of Emission

Table 5 Type of Emission

| | GPRS/GSM | EDGE | UMTS/HSDPA |
|-----------------------|----------|---------|------------|
| Emission Designation: | 300KGXW | 300KG7W | 5M00F9W |

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

4.1.4 Environmental Requirements

Table 6 Environmental Requirements

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

4.1.5 Power Source

Table 7 Power Source

| | |
|---------------------|--------------------|
| AC voltage nominal: | ~ 120 V |
| AC voltage range | ~ 100 V to ~ 240 V |
| AC current maximal: | 0.2A |

4.1.6 Tune-up Procedure

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

The voltage and current in the final RF stage is:

Table 8 Applied RF module DC Voltages and Currents

| | |
|----------|---|
| Voltage: | ≡ +3.7V |
| Current: | 100mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8) |

4.2 EUT Identification List

4.2.1 Board Information

Board Information

| | | |
|---|------------------------|------------------|
| HUAWEI IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3 | | |
| HUAWEI U8510-5,U8510-5 | | |
| Main board | | |
| Hardware Version | Software Version | Serial Number |
| HD2U851M | U8510-5V100R001C32B831 | E5M7NB1180200071 |

4.2.2 Adapter Technical Data

| | |
|--------------------|---|
| 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 Technical Data

| Name | Manufacture | Description |
|------------------------|----------------------------------|---|
| Rechargeable Li-ion | Huawei Technologies Co., Ltd. | Battery Model: HB4J1H Rated capacity: 1200mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V |

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: U8510-5
FCC Identification: QISU8510-5

5 Main Test Instruments

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.07,2012 |
| 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 9 Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2/TM3 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 subpart H

6.1.2.2 Supporting Standards

Table 10 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.1.2.3 Limits

Compliance with part 22.913, mobile/portable stations are limited to 7 watts ERP peak power.
 $W \text{ (dBm)} = 10 \cdot \log(W_{\text{in mW}})$.

Table 11 Limits

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

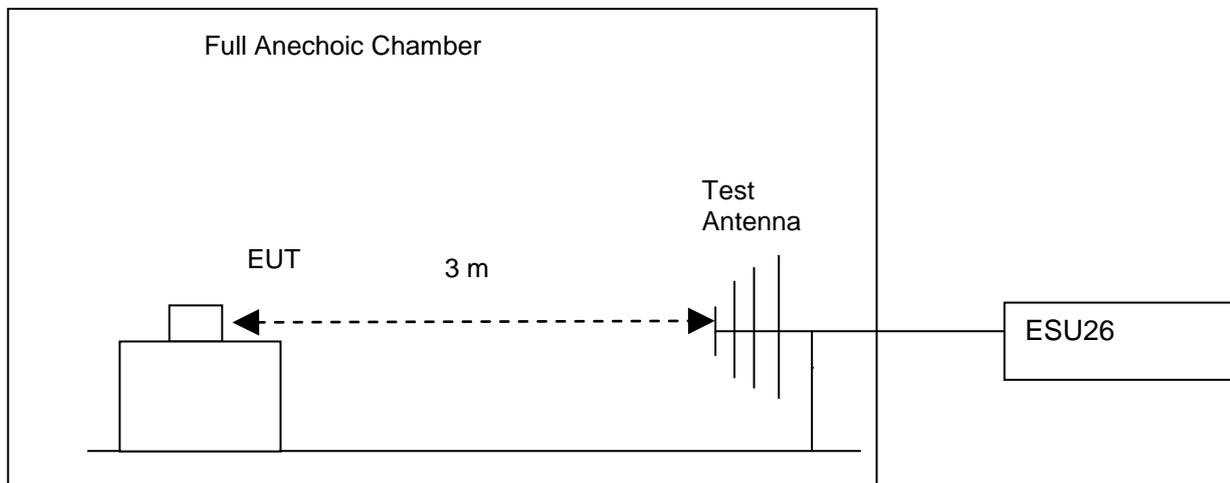
6.1.3 Test Method and Setup

- (a) 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 via the air interface. The band is set as 850M.
- (b) Test the Radiated maximum output power by the CMU200 received from test antenna.

- (c) 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

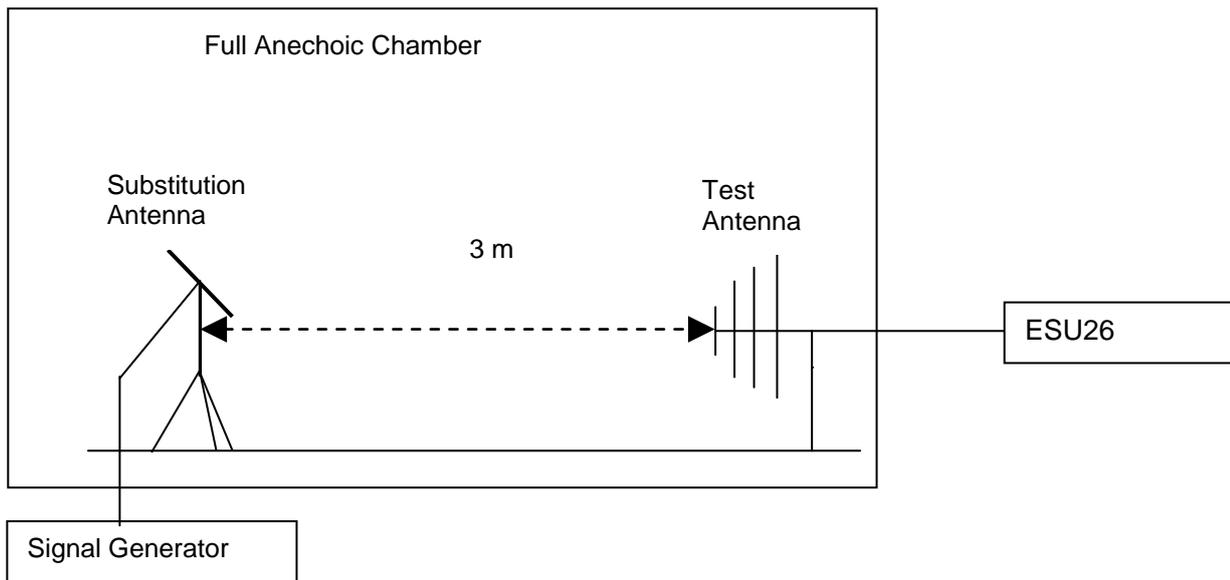


Figure 1. Test Set-up

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

6.1.4.1 Pre-test Results

| | RF Output Power (ERP) | | | | | |
|--------------------------------------|-----------------------|-------|-----------------|-------|-----------------|-------|
| TEST CONDITIONS | Channel 128(B) | | Channel 192(M) | | Channel 251(T) | |
| | 824.2MHz | | 837.0MHz | | 848.8MHz | |
| | dBm | | dBm | | dBm | |
| T_{nom} (25 °C)/ V_{nom} (3.7 V) | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | 28.87 | 38.5 | 28.81 | 38.5 | 28.76 | 38.5 |
| TM2 | 23.51 | 38.5 | 23.46 | 38.5 | 23.42 | 38.5 |
| | | | | | | |
| TEST CONDITIONS | Channel 4132(B) | | Channel 4182(M) | | Channel 4233(T) | |
| | 826.4MHz | | 836.4MHz | | 846.6MHz | |
| | dBm | | dBm | | dBm | |
| T_{nom} (25 °C)/ V_{nom} (3.7 V) | Measured | Limit | Measured | Limit | Measured | Limit |
| TM3 | 19.32 | 38.5 | 19.39 | 38.5 | 19.38 | 38.5 |

6.1.4.2 Substitution Results

Table 12 Substitution Results

| Test Mode | Freq. [MHz] | Meas. Level [dBm] | Substitution Antenna Type | SGP [dBm] | Substitution Gain [dBd] | Cable Loss [dB] | Substitution Level (ERP) [dBm] | FCC limit [dBm] | Result |
|-----------|-------------|-------------------|---------------------------|-----------|-------------------------|-----------------|--------------------------------|-----------------|--------|
| TM1 | 824.2 | 28.87 | Dipole Ant. | 32.20 | -2.75 | 0.6 | 28.85 | 38.5 | Pass |
| TM1 | 837.0 | 28.81 | Dipole Ant. | 32.30 | -2.87 | 0.6 | 28.83 | 38.5 | Pass |
| TM1 | 848.8 | 28.76 | Dipole Ant. | 32.17 | -2.85 | 0.6 | 28.72 | 38.5 | Pass |
| TM2 | 824.2 | 23.51 | Dipole Ant. | 26.91 | -2.75 | 0.6 | 23.56 | 38.5 | Pass |
| TM2 | 837.0 | 23.46 | Dipole Ant. | 26.96 | -2.87 | 0.6 | 23.49 | 38.5 | Pass |
| TM2 | 848.8 | 23.42 | Dipole Ant. | 26.92 | -2.85 | 0.6 | 23.47 | 38.5 | Pass |
| TM3 | 826.4 | 19.32 | Dipole Ant. | 22.71 | -2.75 | 0.6 | 19.36 | 38.5 | Pass |
| TM3 | 836.4 | 19.39 | Dipole Ant. | 22.80 | -2.87 | 0.6 | 19.33 | 38.5 | Pass |
| TM3 | 846.6 | 19.38 | Dipole Ant. | 22.79 | -2.85 | 0.6 | 19.34 | 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, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 250kHz for TM1 and TM2 and 5M for TM3.

6.1.5 Conclusion

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

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 13 Test Conditions

| | |
|----------------------|------------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3/TM4 at Channel B, M, T |

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

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

6.2.2.2 Supporting Standards

Table 14 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

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:

$$ERP(\text{dBm}) = 10 \cdot \log(ERP_{\text{in watts}}).$$

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

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

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

Table 15 Limits

| | |
|--------------------------------------|--------------------|
| Maximum Output Power (Watts) | < 7 Watts(38.5dBm) |
| Antenna Gain(dBi): | -1.25 |
| Antenna Gain(dBd): | -3.4 |
| Maximum Conducted Output Power (dBm) | <41.9 |

For HSDPA test mode, there are 4 sub-tests for different configuration.

HSDPA conducted max power pre-scan

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | HS | CM (dB) | MPR (dB) |
|----------|-----------|-----------|----------------|-------------------|-------|---------|----------|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0 | 0 |
| 2 | 12/15 | 15/15 | 64 | 12/15 | 24/15 | 1 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

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 EUT 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

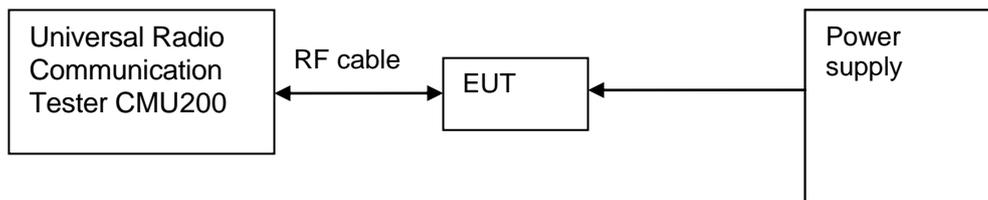


Figure 2. Test Set-up

6.2.4 Measurement Results

Measurement Results

| TEST CONDITIONS | RF Output Power (Conducted) | | | | | |
|---------------------------|-----------------------------|-------|-----------------|-------|-----------------|-------|
| | Channel 128(B) | | Channel 192(M) | | Channel 251(T) | |
| | 824.2MHz | | 837.0MHz | | 848.8MHz | |
| | dBm | | dBm | | dBm | |
| Tnom (25 °C)/ Vnom (3.7V) | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | 32.27 | 41.9 | 32.21 | 41.9 | 32.16 | 41.9 |
| TM2 | 26.91 | 41.9 | 26.86 | 41.9 | 26.82 | 41.9 |
| TEST CONDITIONS | Channel 4132(B) | | Channel 4182(M) | | Channel 4233(T) | |

| | | 826.4MHz | | 836.4MHz | | 846.6MHz | |
|---|-------|----------|-------|----------|-------|----------|-------|
| | | dBm | | dBm | | dBm | |
| T _{nom} (25 °C)/ V _{nom} (3.7V) | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM3 | | 22.72 | 41.9 | 22.79 | 41.9 | 22.78 | 41.9 |
| TM4 | Case1 | 22.75 | 41.9 | 22.86 | 41.9 | 22.73 | 41.9 |
| | Case2 | 22.38 | 41.9 | 22.65 | 41.9 | 22.41 | 41.9 |
| | Case3 | 21.77 | 41.9 | 22.11 | 41.9 | 21.76 | 41.9 |
| | Case4 | 21.73 | 41.9 | 21.91 | 41.9 | 21.75 | 41.9 |

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 16 Test Conditions

| | |
|----------------------|----------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 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 17 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.3.2.3 Limits

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

Table 18 Limits

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

6.3.3 Test Method and Setup

Connect the EUT to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as 850M; the EUT's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. The waveform quality and constellation of the EUT was tested.

Test setup

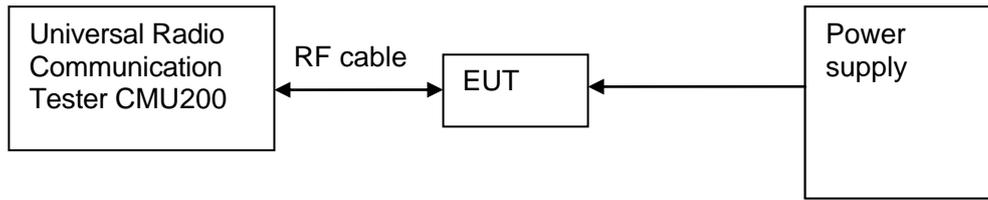


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 19 Measurement Results

| | | | |
|--------------------------|-------------------------|-----------------------------|---------------------|
| | | Modulation Characteristic | |
| TEST CONDITIONS | | Channel 192(M) | |
| | | Measured | |
| | | TM1 | TM2 |
| T _{nom} (25 °C) | V _{nom} (3.7V) | Refer to Appendix A | Refer to Appendix A |
| | | | |
| | | Modulation Characteristic | |
| TEST CONDITIONS | | Channel 4182(M) 836.4MHz | |
| | | Measured | |
| | | TM3 | |
| T _{nom} (25 °C) | V _{nom} (3.7V) | 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 20 Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 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 21 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

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 22 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 R&S FSQ31 via the one RF connector. The band class is set as 850M; the EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT by the R&S 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 part2.1049 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.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)

Video bandwidth (VBW): 10 kHz

For TM3 following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 500 kHz

Test Set-up

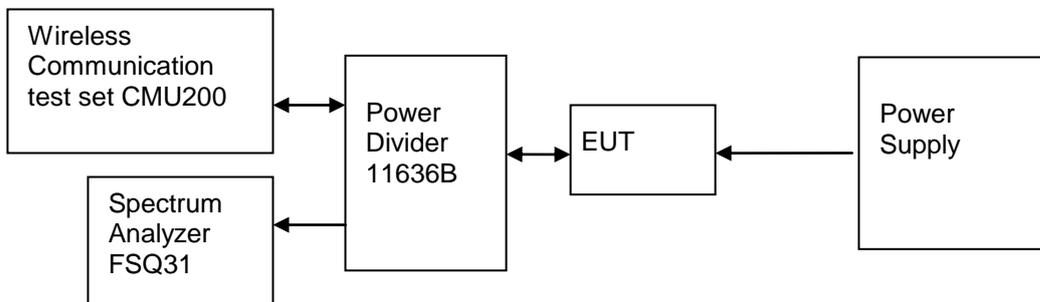


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 23 Measurement Results

| TEST CONDITIONS | | Occupied Bandwidth | | | | | |
|---|-----|----------------------------|--------|----------------------------|--------|----------------------------|--------|
| Center Frequency | | Channel 128(B) 824.2MHz | | Channel 192(M) 837.0MHz | | Channel 251(T) 848.8MHz | |
| | | Measured (kHz) | | Measured (kHz) | | Measured (kHz) | |
| | | TM1 | TM2 | TM1 | TM2 | TM1 | TM2 |
| T _{nom} (25 °C) V _{nom} (3.7V) | 99% | 241.99 | 243.59 | 245.19 | 248.40 | 246.79 | 240.38 |
| Center Frequency | | Channel4132(B) 826.4MHz | | Channel4182(M) 836.4MHz | | Channel4233(T) 846.6MHz | |



| | | Measured (MHz) | Measured (MHz) | Measured (MHz) |
|---------------------------------------|-----|-------------------|-------------------|-------------------|
| | | TM3 | TM3 | TM3 |
| T_{nom} (25 °C) V_{nom} (3.7V) | 99% | 4.18 | 4.20 | 4.20 |

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 24 Test Conditions

| | |
|----------------------|-------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency B, T |

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part22 Subpart H

6.5.2.2 Supporting Standards

Table 25 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.5.2.3 Limits

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

Table 26 Limits

| | TM1 | TM2 | TM3 |
|-----------------------|--|--|---|
| Rated Power: | 33 dBm | 27 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(2) = 46$, 33 dBm - 46 dB | $43 + 10 \log(0.5) = 40$, 27 dBm - 40 dB | $43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.5.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the band class is set as 850M. The EUT was controlled to transmit maximum power. Measure and record

band edges compliance of the EUT by the R&S FSQ31.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)

Video bandwidth (VBW): 10 kHz

For TM3 following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 200 kHz

Test Set-up

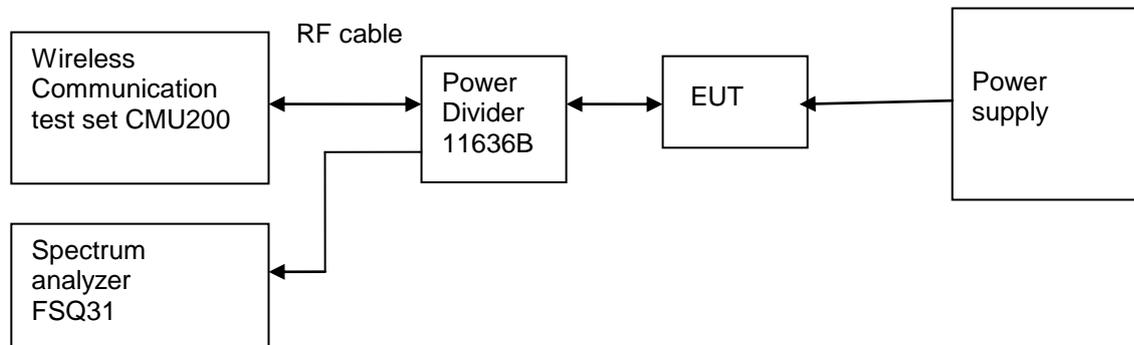


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 27 Measurement Results outside Band Edges-- Single Carrier

| Band | Frequency of Band edges [MHz] | Channel Number | Test Mode | Spurious Level measured [dBm] | FCC limit | Result |
|---|-------------------------------|----------------|-----------|-------------------------------|-----------|--------|
| $T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (3.7\text{V})$ | | | | | | |
| Cellular | 824.2 | 128 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 848.8 | 251 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 824.2 | 128 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |
| | 848.8 | 251 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |
| | 826.4 | 4132 | TM3 | <-13(See appendix C) | - 13 dBm | Pass |
| | 846.6 | 4233 | TM3 | <-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 28 Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency B, M, T |

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part22 Subpart H

6.6.2.2 Supporting Standards

Table 29 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

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).

Table 30 Limits

| | TM1 | TM2 | TM3 |
|-----------------------|---|---|--|
| Rated Power: | 33dBm | 27 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(2) = 46$, 33 dBm - 46 dB | $43 + 10 \log(0.5) = 40$, 27 dBm - 40 dB | $43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the

band class is set as 850M. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the R&S FSQ31.

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

22.917 (b) Measurement procedure: Compliance with these provisions 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 1 GHz up to 12.75 GHz: 1 MHz;

Test Set-up

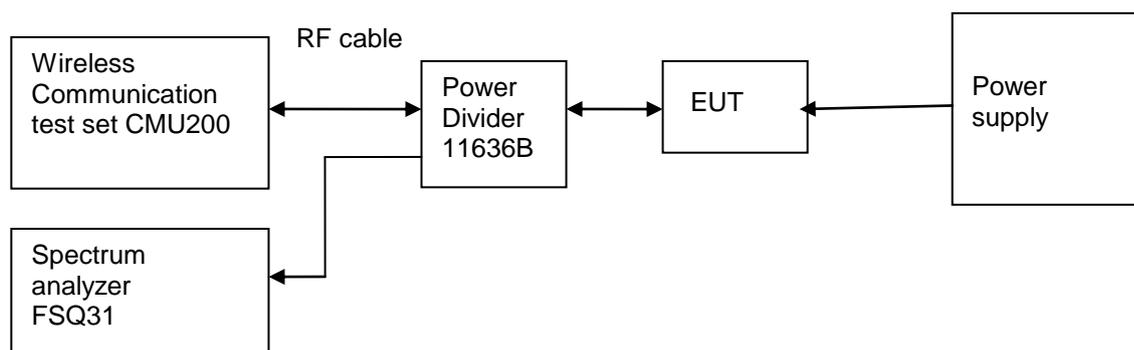


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 31 Measurement Results

| Channel Number | Test Mode | Test Range (Frequency) | Output Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|-----------------|-----------|------------------------|--------------------|-------------------------------|-----------|--------|
| Channel 128(B) | TM1 | 9 kHz ~12.75GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz ~12.75GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 4132(B) | TM3 | 9 kHz ~12.75GHz | 24 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 192(M) | TM1 | 9 kHz ~12.75GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz ~12.75GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 4182(M) | TM3 | 9 kHz ~12.75GHz | 24 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |

| | | | | | | |
|--------------------|-----|--------------------|----|-------------------------------|-------------|------|
| Channel 251(T) | TM1 | 9 kHz ~12.75GHz | 33 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz ~12.75GHz | 27 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 4233(T) | TM3 | 9 kHz ~12.75GHz | 24 | <- 13 dBm (See appendix D) | - 13 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 32 Test Conditions

| | |
|----------------------|--------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2/TM3/TM4 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 33 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

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 34 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.

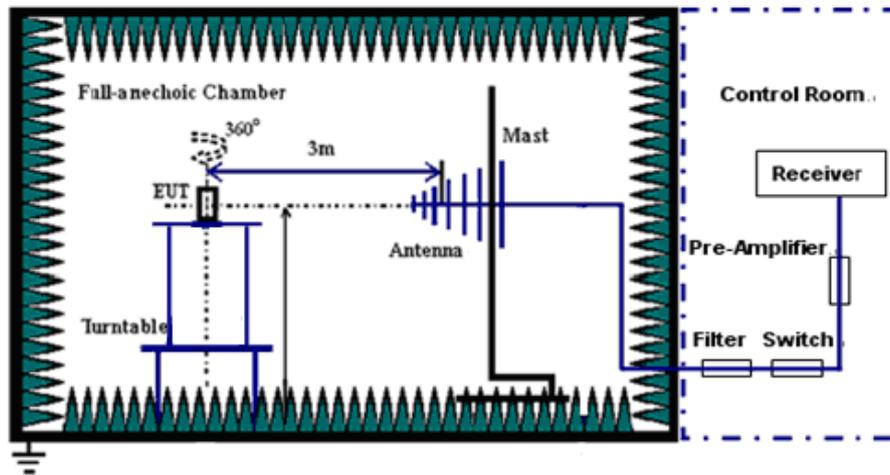
Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
Measurement bandwidth (RBW) for 30MHz up to 1GHz: 100k Hz;
Measurement bandwidth (RBW) for 1GHz up to 18GHz: 1MHz;

Test Set-up

Step 1:

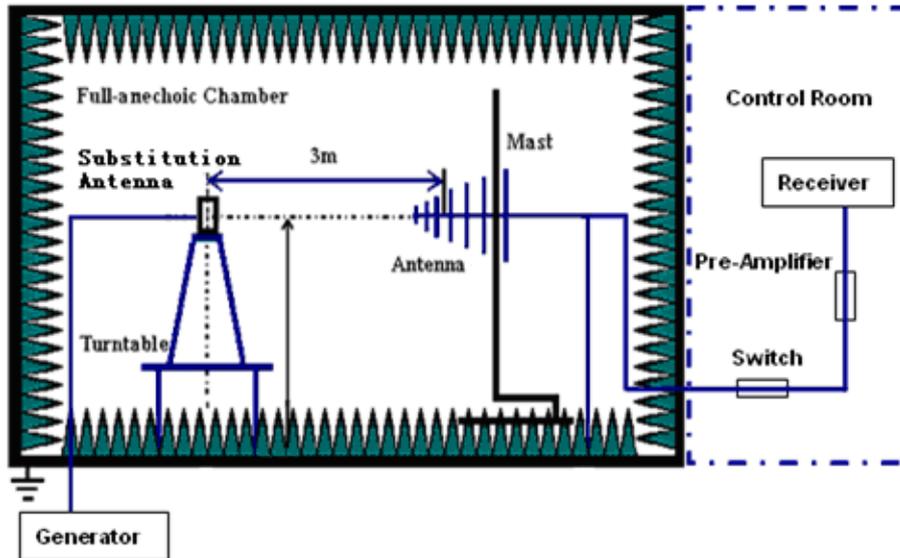
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect 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 35 Substitution Results

| Freq. [MHz] | Measurement Value [dBm] | Substitution Antenna Type | Gain [dBd] | Cable Loss [dB] | Signal Generator Level [dBm] | Substitution Level [dBm] | FCC limit [dBm] | Result |
|-------------|-------------------------|---------------------------|------------|-----------------|------------------------------|--------------------------|-----------------|--------|
| | | | | | | | | |

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

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

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 36 Test Conditions

| | |
|----------------------|----------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | See below |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency M |

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and Part22 Subpart H

6.8.2.2 Supporting Standards

Table 37 Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

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 ° to +50 ° 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° 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.)

Note: 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 Ω load.

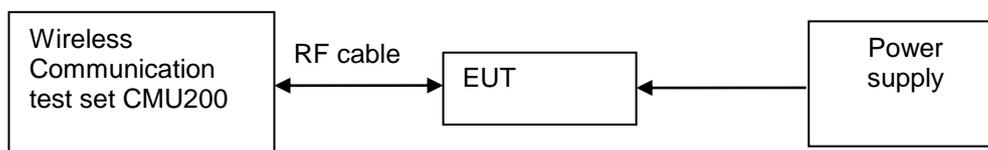


Figure 7. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.7V DC Channel No.192(837.0MHz)**

Table 38 Measurement Results vs. Variation of Temperature—TM1

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|------------------------------|--------|
| -30 °C | 837.0 | -11 | Pass |
| -20 °C | 837.0 | -12 | Pass |
| -10 °C | 837.0 | -14 | Pass |
| 0 °C | 837.0 | 10 | Pass |
| +10 °C | 837.0 | 8 | Pass |
| +20 °C | 837.0 | -15 | Pass |
| +30 °C | 837.0 | 10 | Pass |

| | | | |
|--------|-------|-----|------|
| +40 °C | 837.0 | 12 | Pass |
| +50 °C | 837.0 | -13 | Pass |

● **TM2, 3.7V DC Channel No.192(837.0MHz)**

Table 39 Measurement Results vs. Variation of Temperature—TM2

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|---------------------------------|--------|
| -30 °C | 837.0 | -12 | Pass |
| -20 °C | 837.0 | 14 | Pass |
| -10 °C | 837.0 | -11 | Pass |
| 0 °C | 837.0 | 17 | Pass |
| +10 °C | 837.0 | 19 | Pass |
| +20 °C | 837.0 | 12 | Pass |
| +30 °C | 837.0 | -15 | Pass |
| +40 °C | 837.0 | -11 | Pass |
| +50 °C | 837.0 | 9 | Pass |

● **TM3, 3.7V DC Channel No.4182(836.4MHz)**

Table 40 Measurement Results vs. Variation of Temperature—TM3

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|---------------------------------|--------|
| -30 °C | 836.4 | 17 | Pass |
| -20 °C | 836.4 | -10 | Pass |
| -10 °C | 836.4 | -15 | Pass |
| 0 °C | 836.4 | 18 | Pass |
| +10 °C | 836.4 | -9 | Pass |
| +20 °C | 836.4 | -11 | Pass |
| +30 °C | 836.4 | -16 | Pass |
| +40 °C | 836.4 | 18 | Pass |
| +50 °C | 836.4 | -15 | Pass |

6.8.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 192(837.0MHz)**

Table 41 Measurement Results vs. Variation of Voltage—TM1

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2 V | 837.0 | -11 | Pass |
| 3.7 V | 837.0 | 14 | Pass |
| 3.6V | 837.0 | -10 | Pass |

- **TM2, 25 °C ,Channel No. 192(837.0MHz)**

Table 42 Measurement Results vs. Variation of Voltage—TM2

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2 V | 837.0 | -12 | Pass |
| 3.7V | 837.0 | 16 | Pass |
| 3.6V | 837.0 | -10 | Pass |

- **TM3, 25 °C ,Channel No. 4182(836.4MHz)**

Table 43 Measurement Results vs. Variation of Voltage—TM3

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2 V | 836.4 | -19 | Pass |
| 3.7V | 836.4 | -11 | Pass |
| 3.6V | 836.4 | 12 | 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 44 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 |

8 Appendices

| | |
|------------|---|
| 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 |

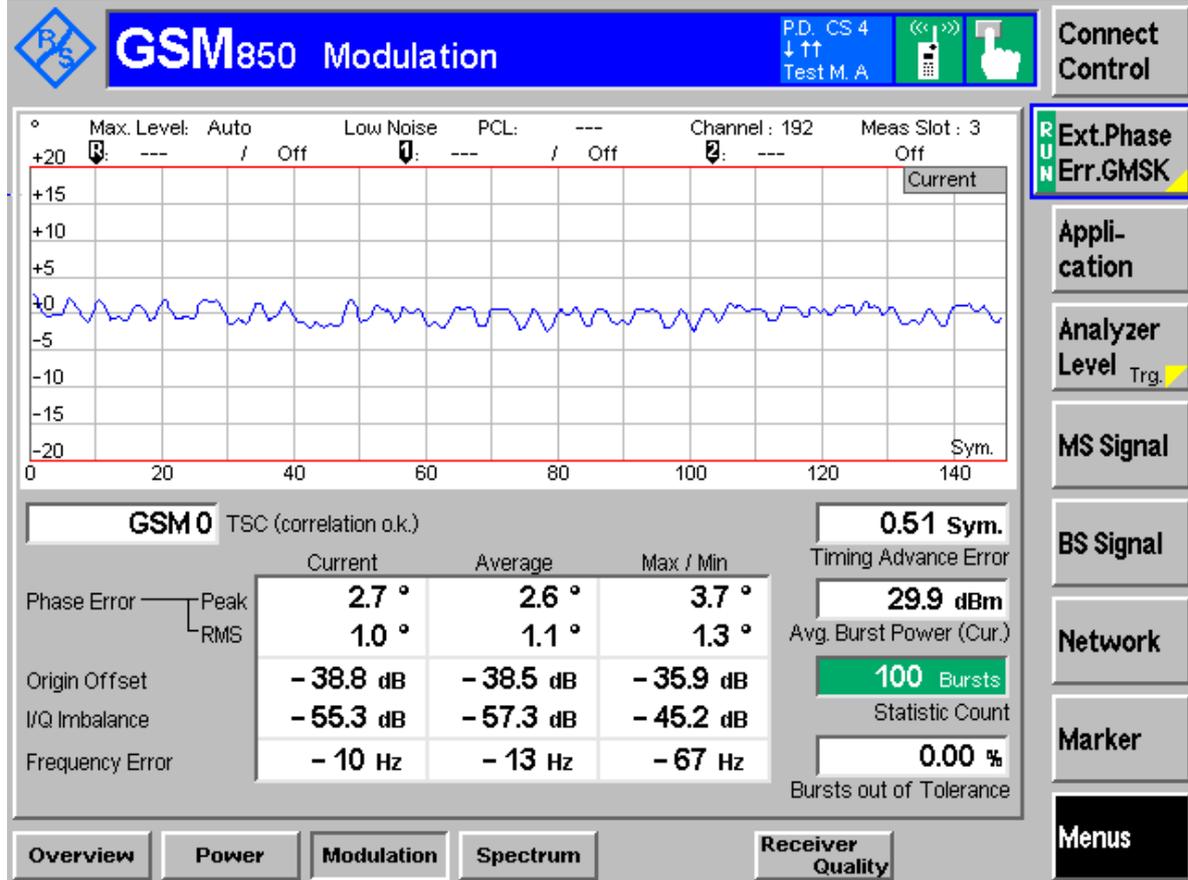


Appendix A

Modulation Characteristics According to FCC Part 2.1047 & Part22 Subpart H

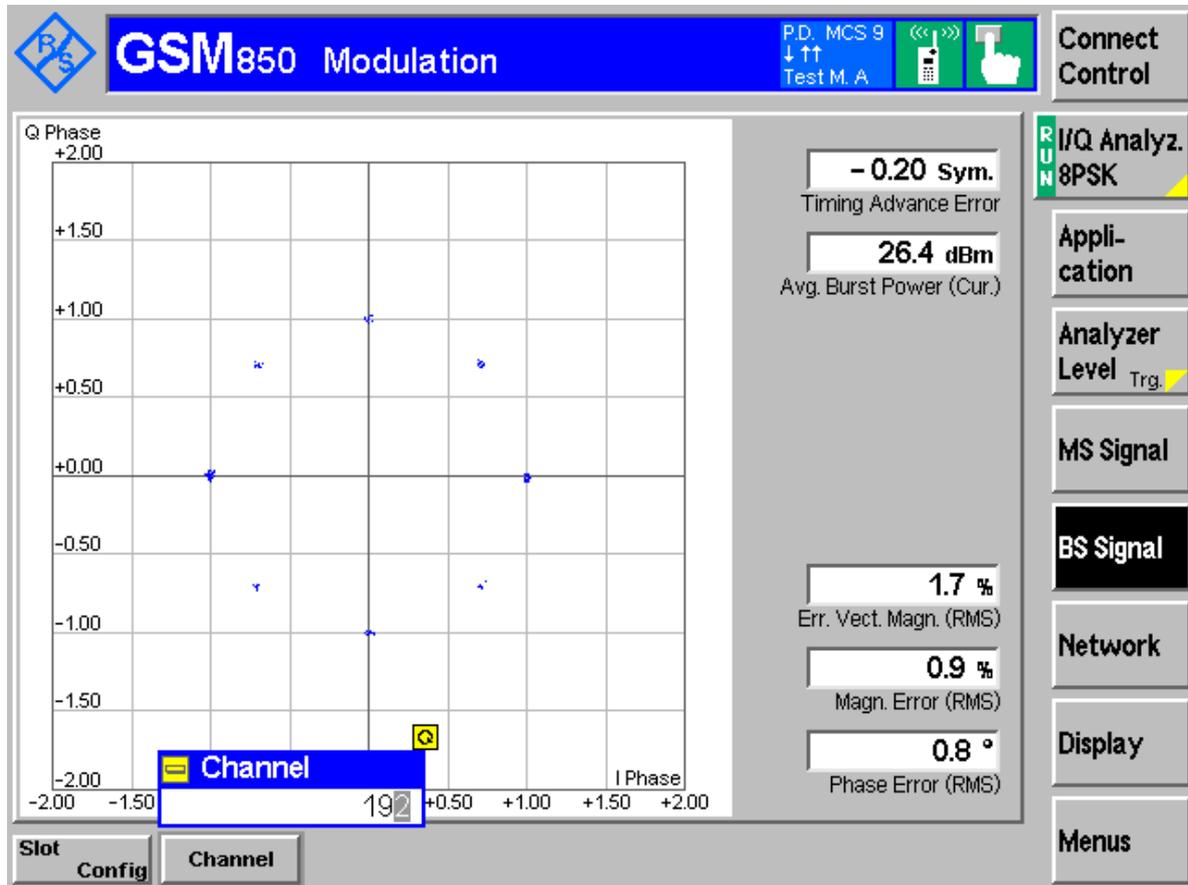


Channel 192 (TM1:GPRS/GSM)



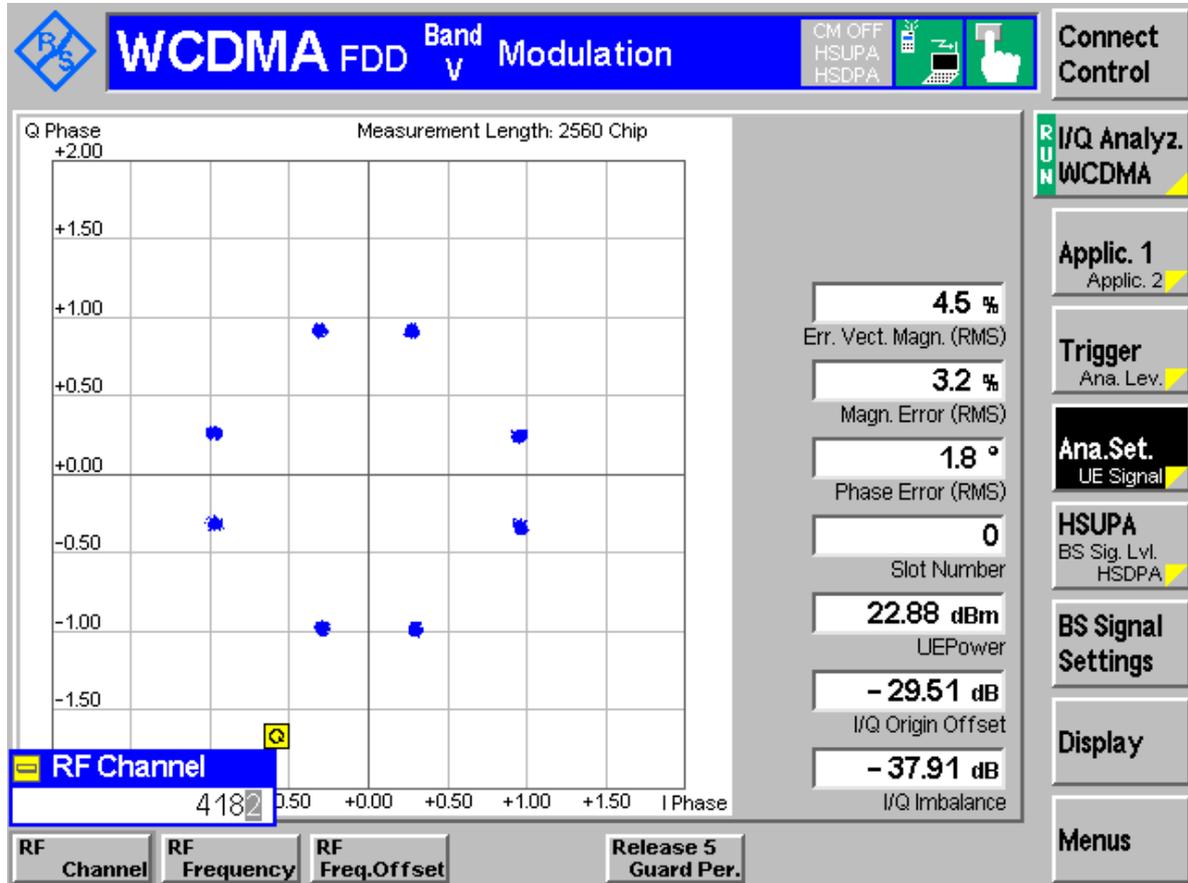


Channel 192 (TM2:EDGE)





Channel 4182 (TM3: WCDMA)





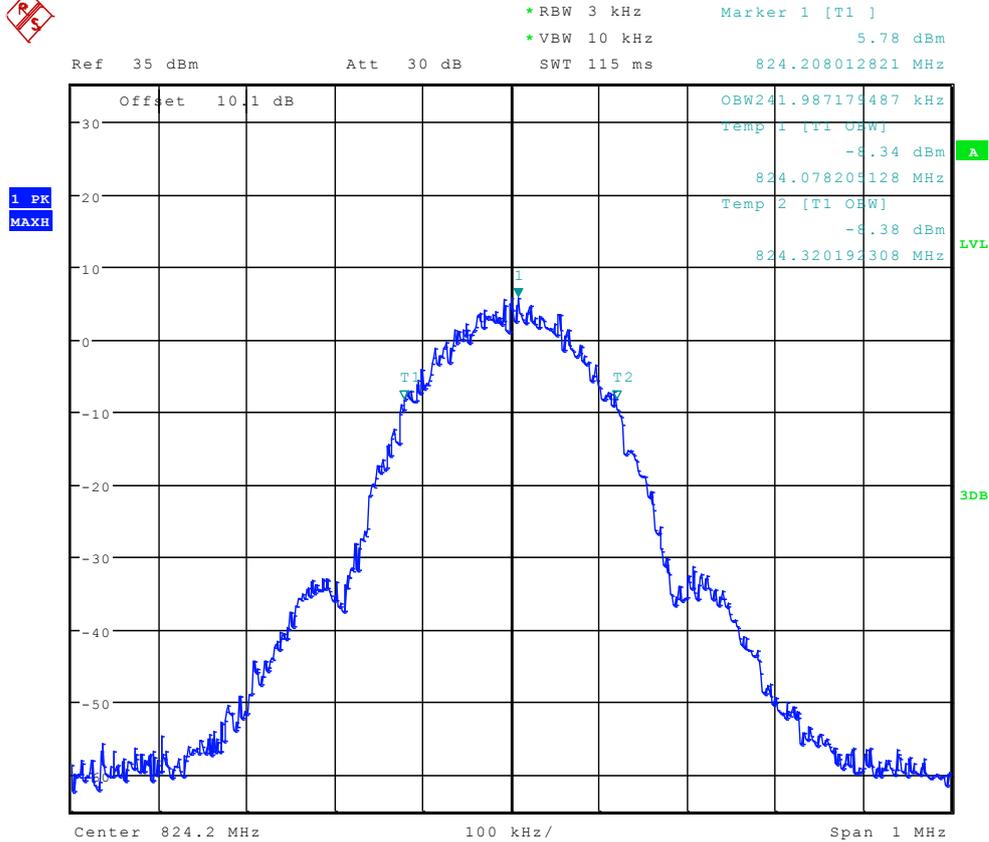
Appendix B

Occupied Bandwidth

According to FCC Part 2.1049 & Part 22 Subpart H

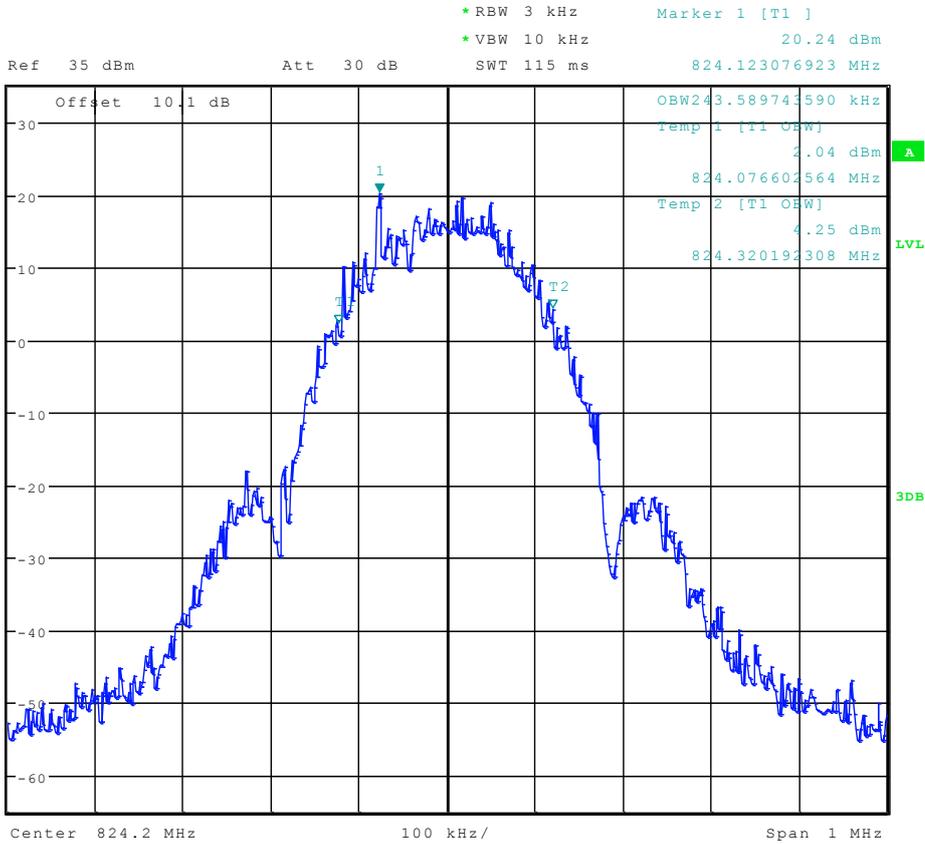


Channel 128 (TM1:GPRS/GSM)



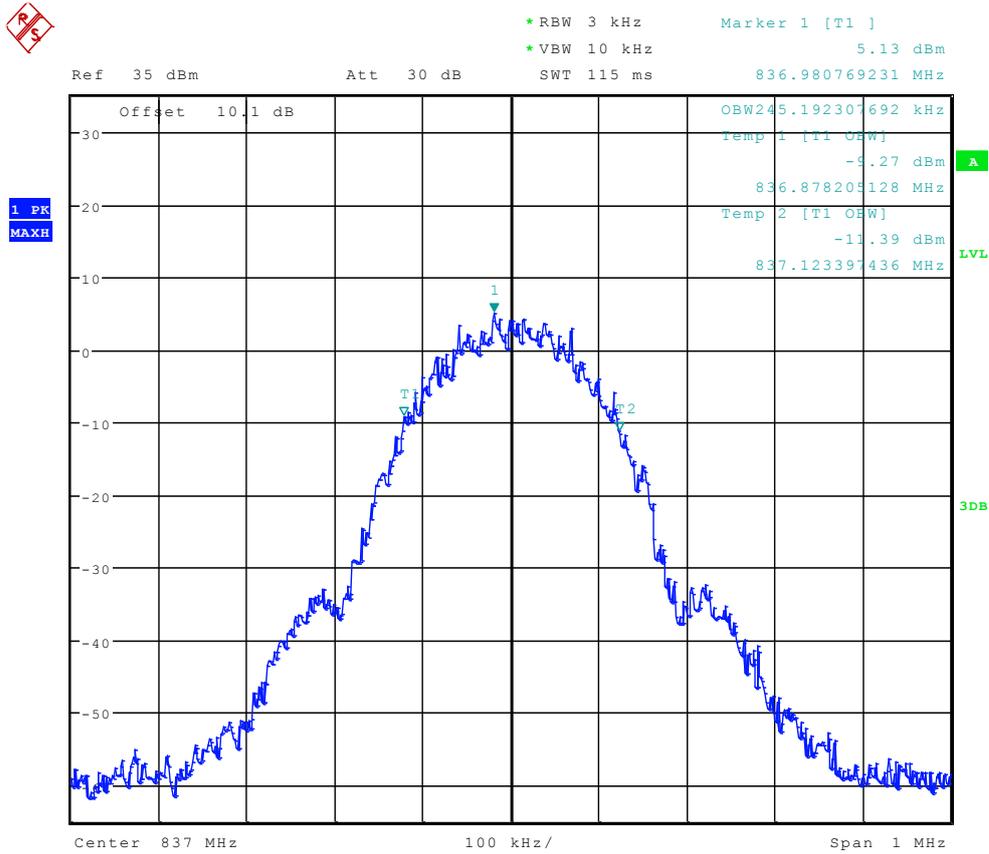


Channel 128 (TM2:EDGE)



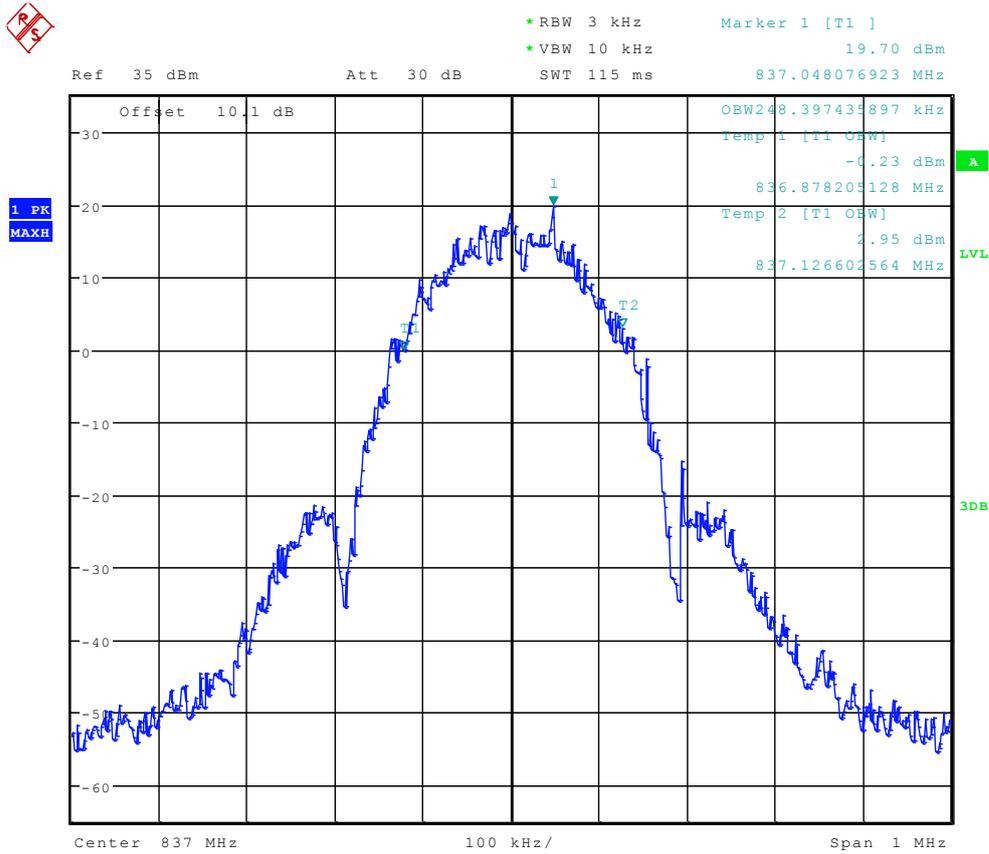


Channel 192 (TM1:GPRS/GSM)





Channel 192 (TM2:EDGE)



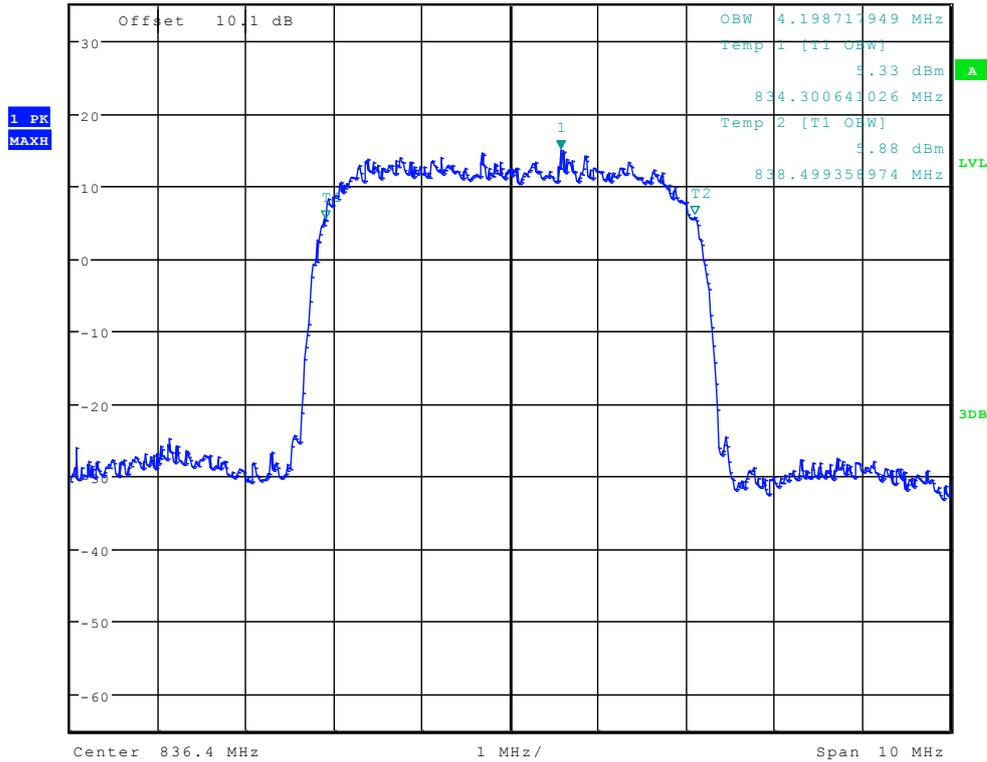


Channel 4182 (TM3: WCDMA)



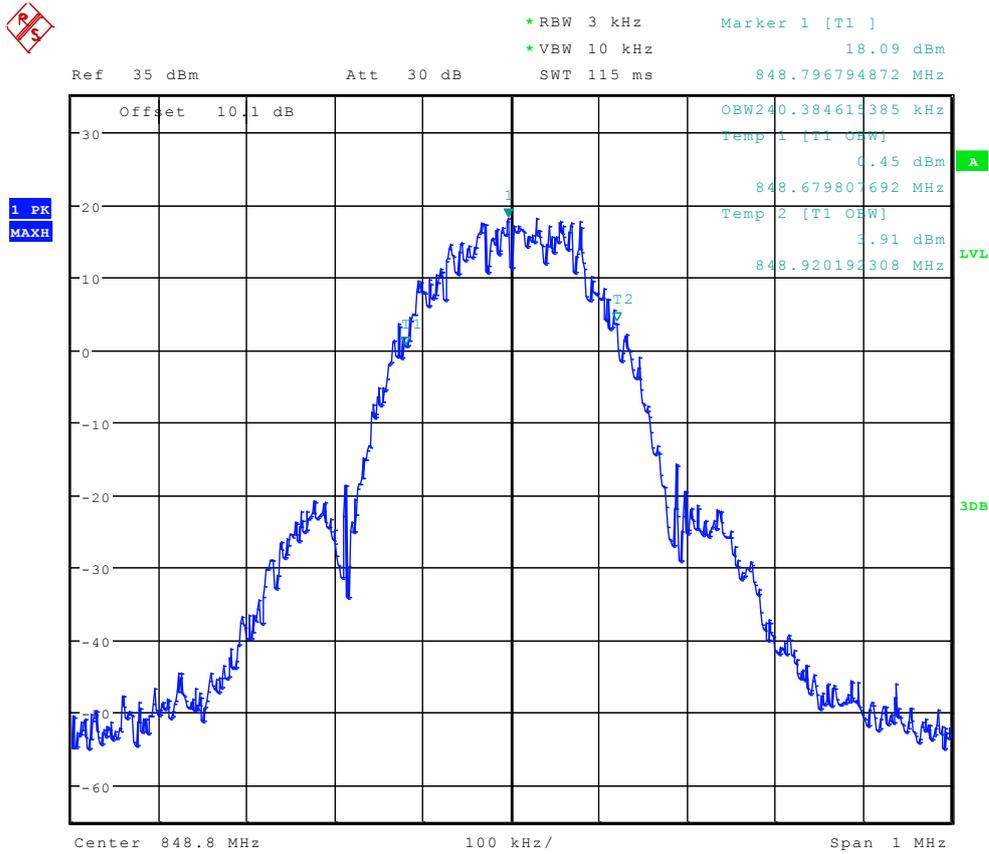
*RBW 50 kHz
*VBW 500 kHz
Marker 1 [T1] 14.85 dBm
836.976923077 MHz

Ref 35 dBm Att 30 dB SWT 5 ms



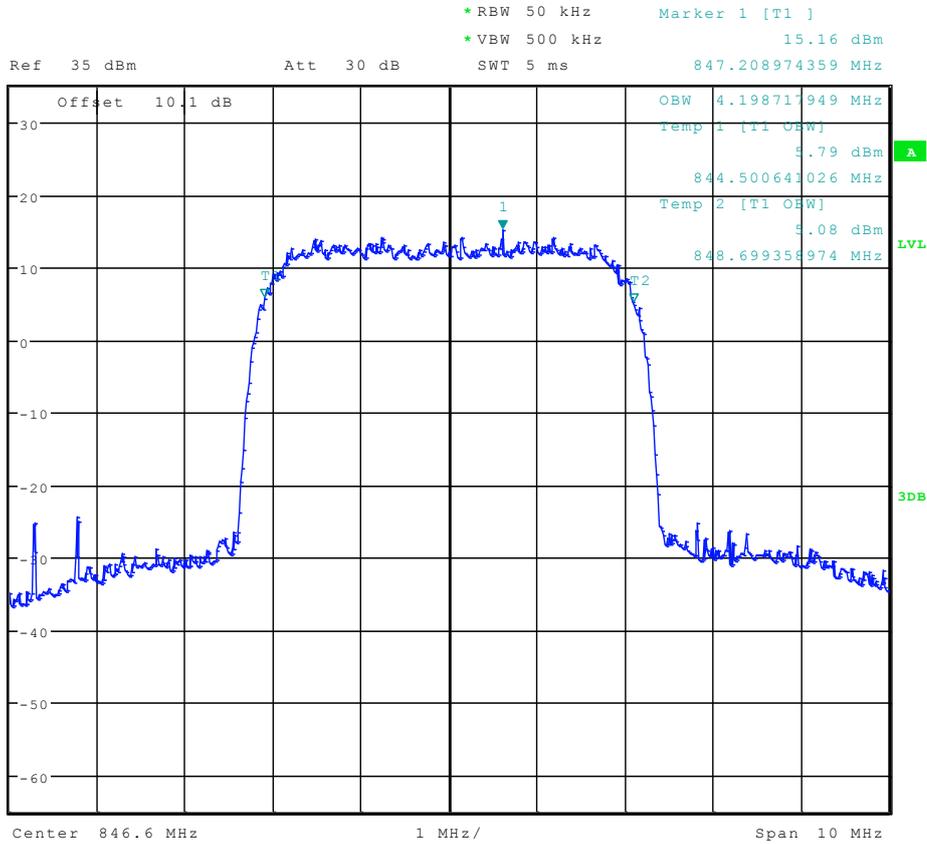


Channel 251 (TM2:EDGE)





Channel 4233 (TM3: WCDMA)





Appendix C

Band Edges Compliance

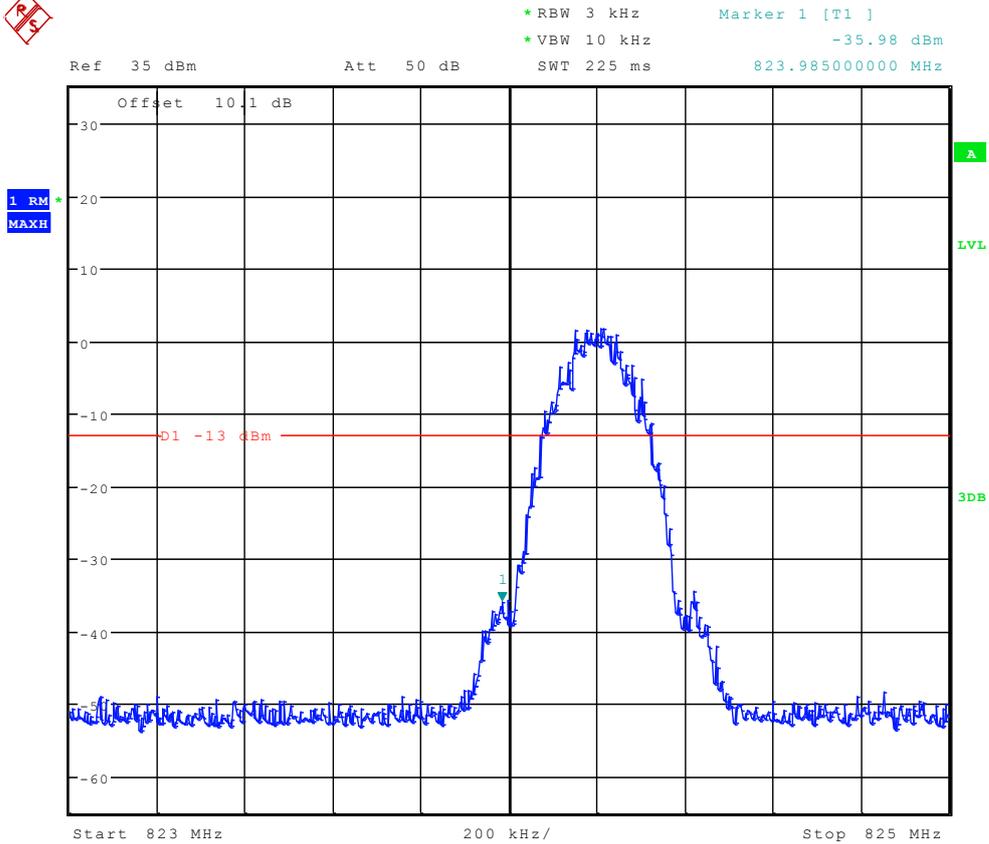
According to FCC Part 2.1051 & Part 22 Subpart H



TM1:GPRS/GSM

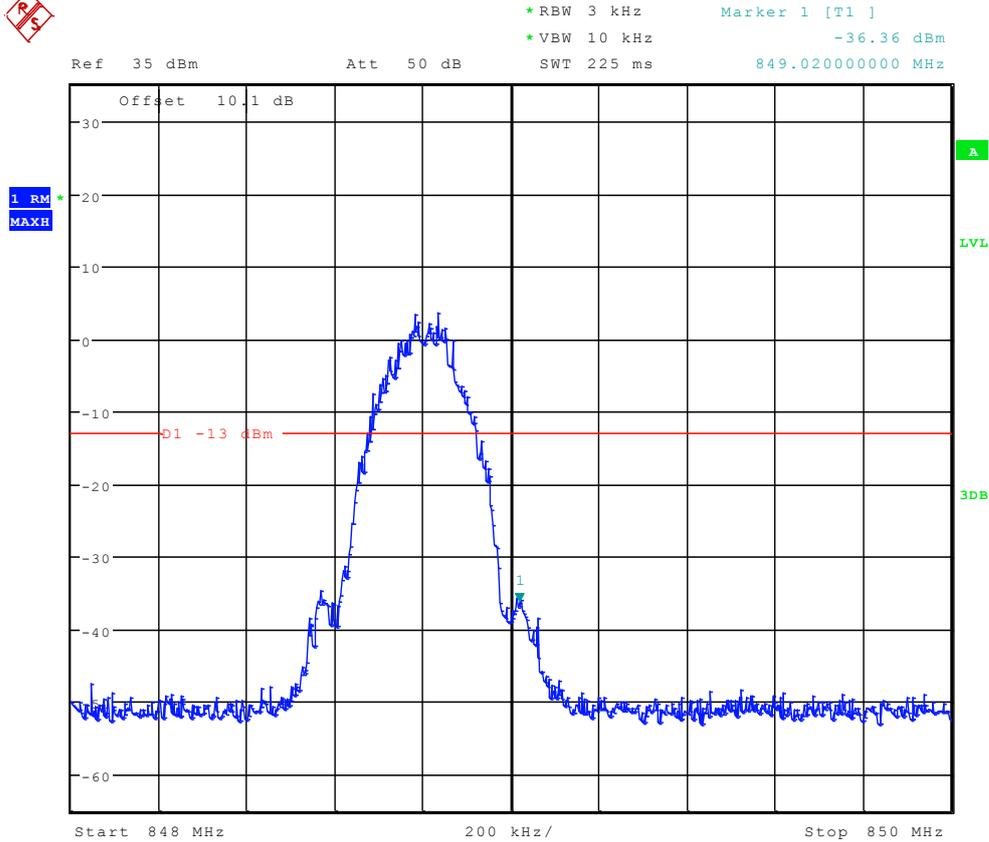
Left Edge

Channel 128





Right Edge Channel 251

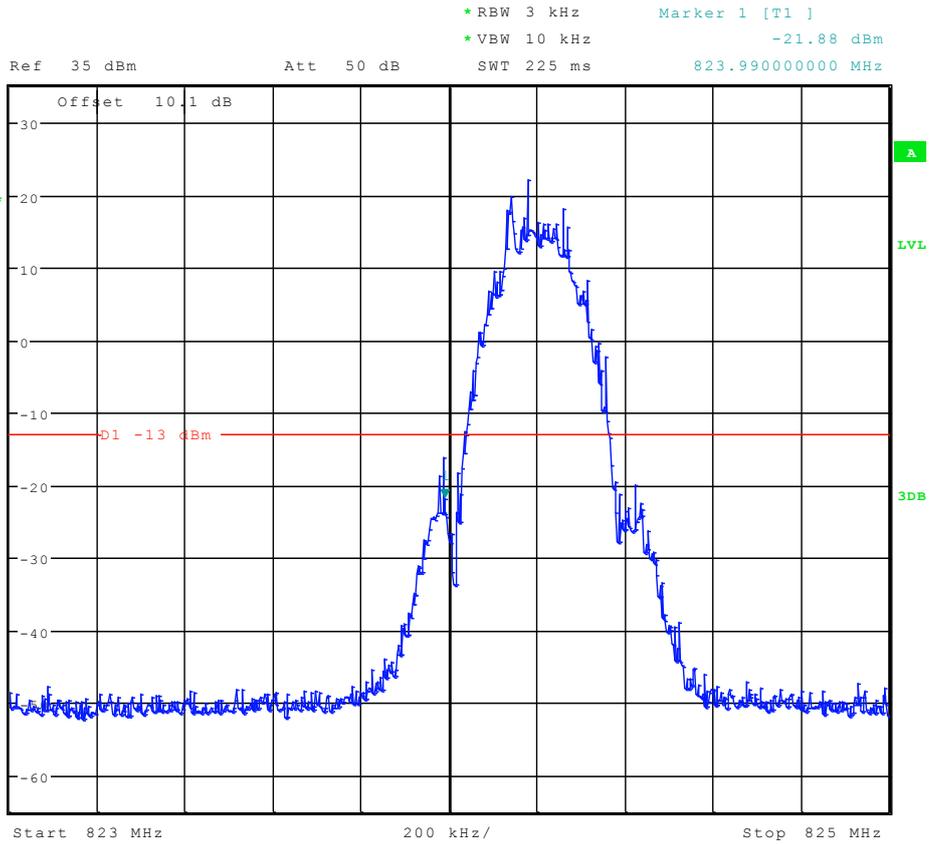




TM2:EDGE

Left Edge

Channel 128

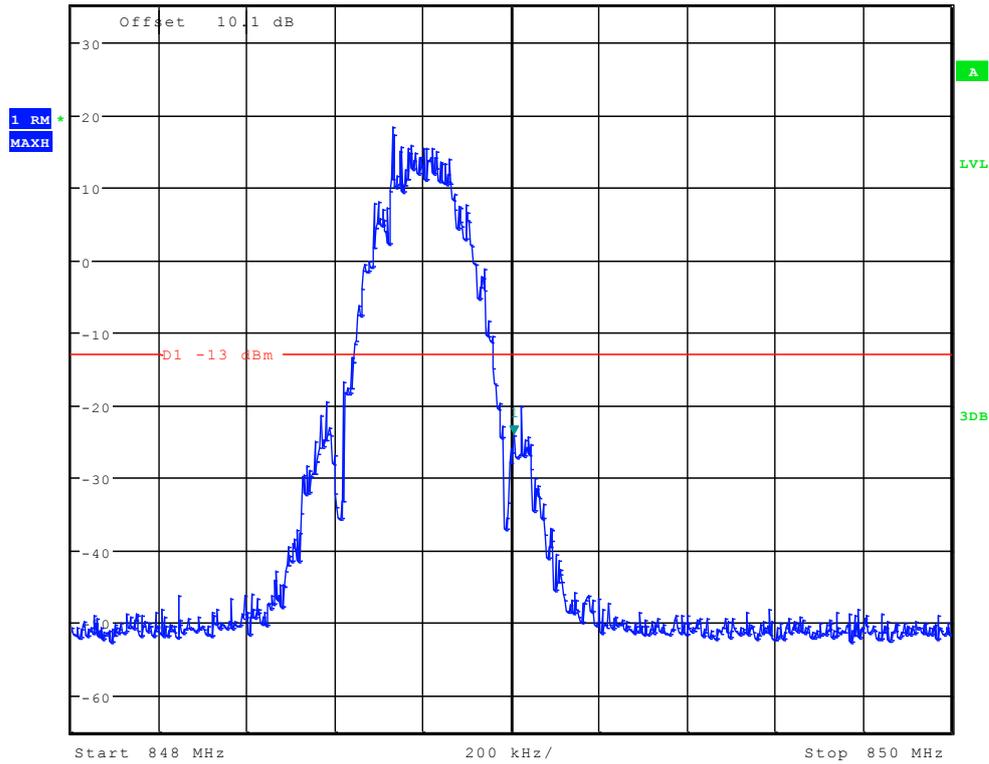




Right Edge Channel 251



Ref 35 dBm Att 50 dB SWT 225 ms Marker 1 [T1] 849.005000000 MHz
* RBW 3 kHz -24.20 dBm
* VBW 10 kHz

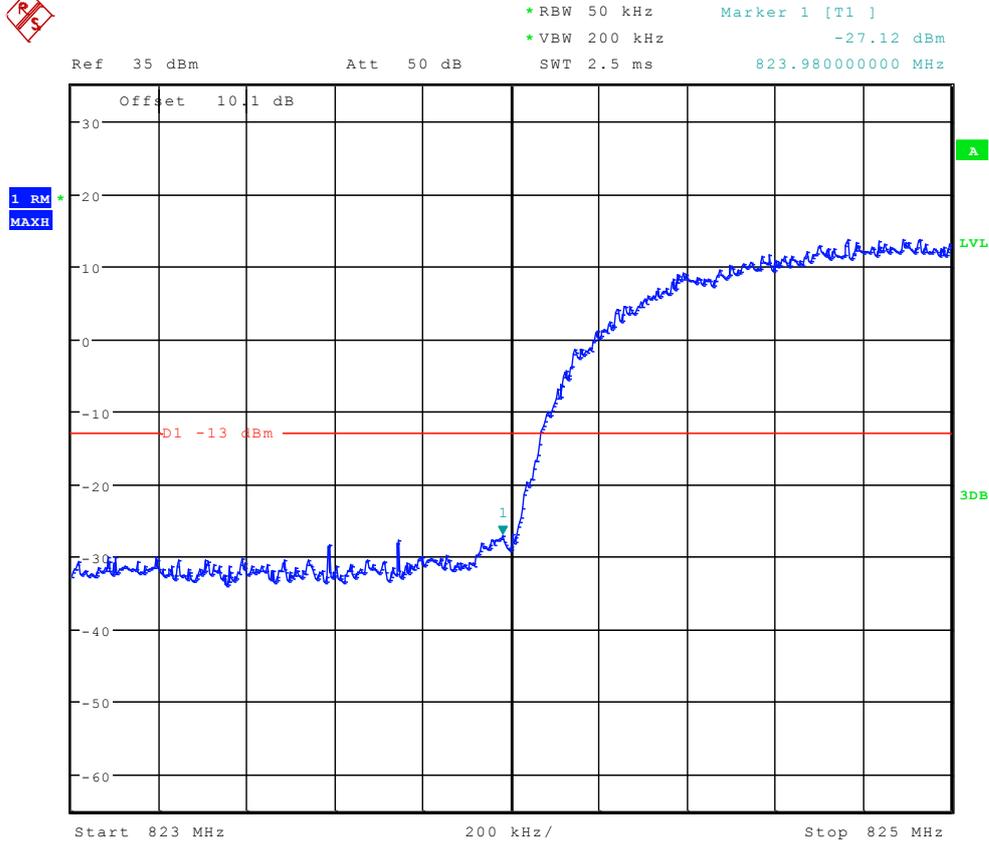




TM3: WCDMA

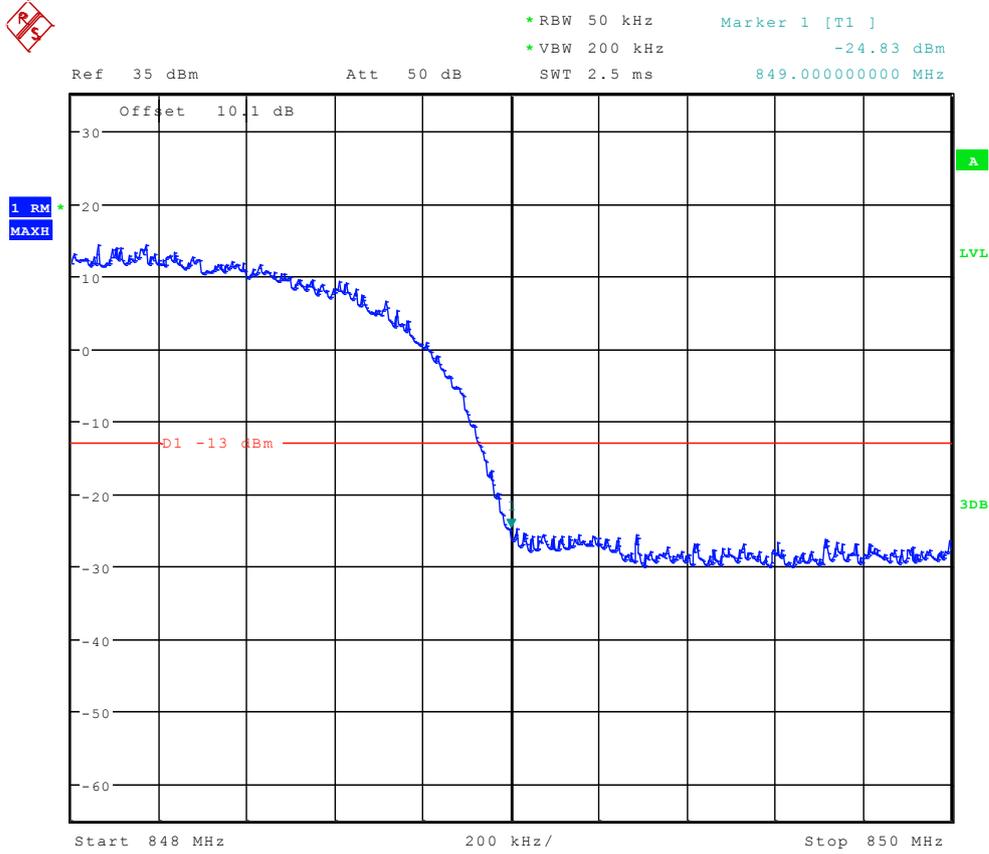
Left Edge

Channel 4132





Right Edge Channel 4233





Appendix D

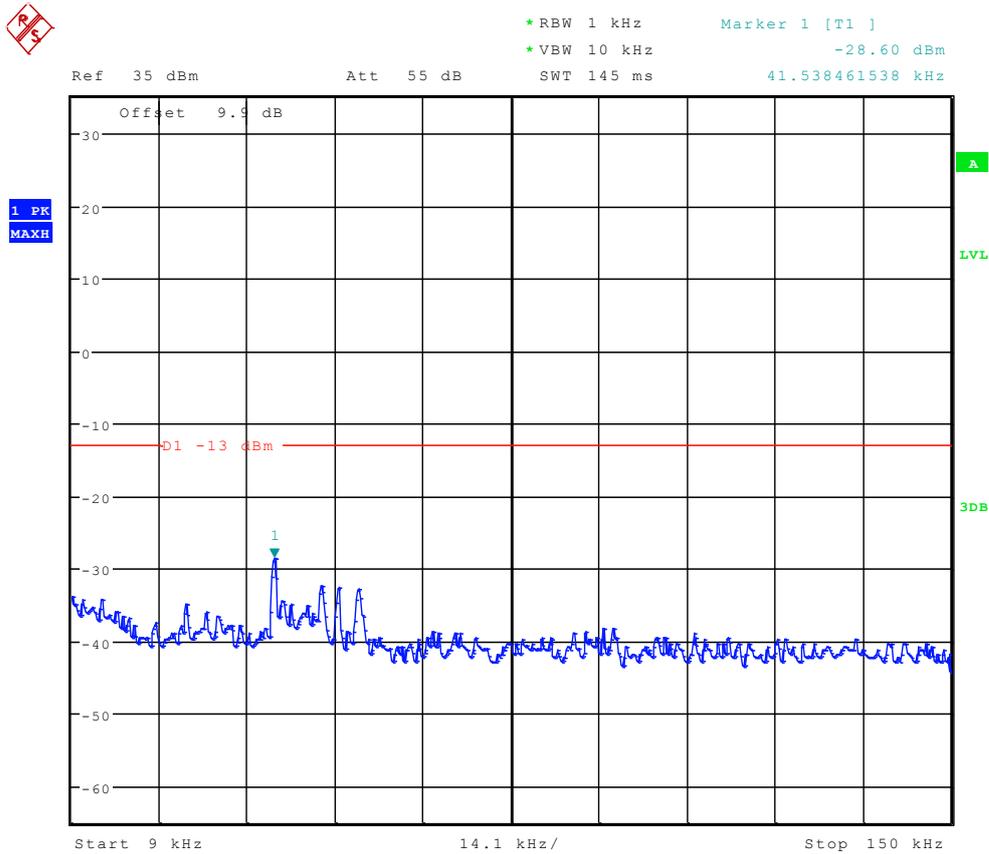
Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & Part 22 Subpart H



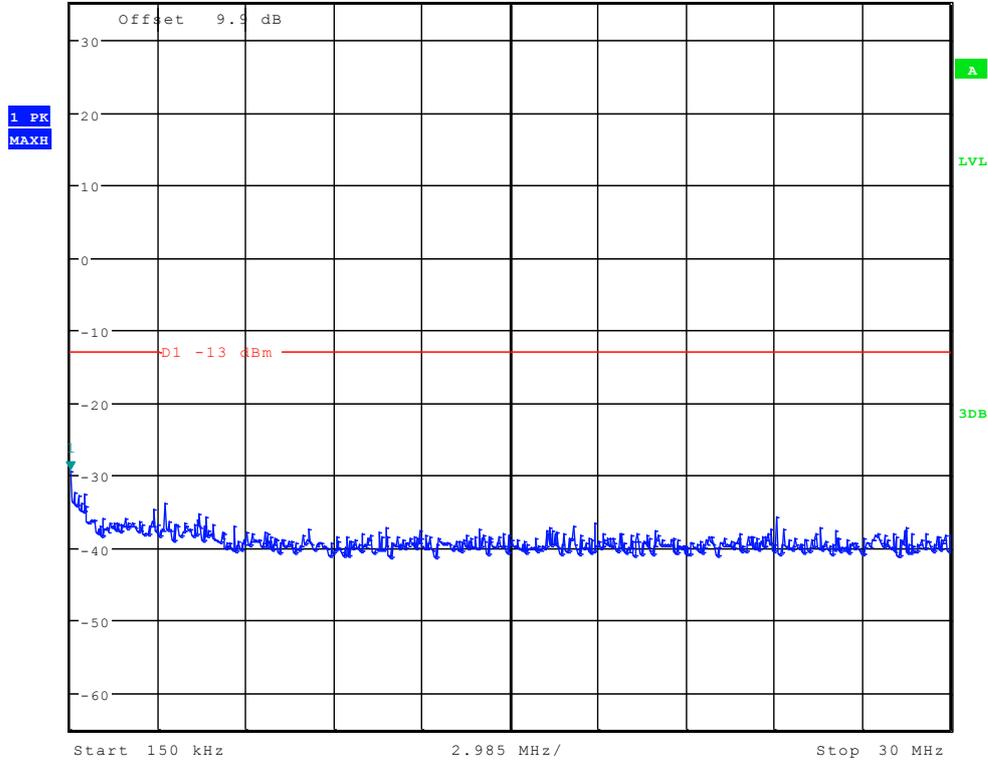
TM1: GPRS/GSM

Channel 128



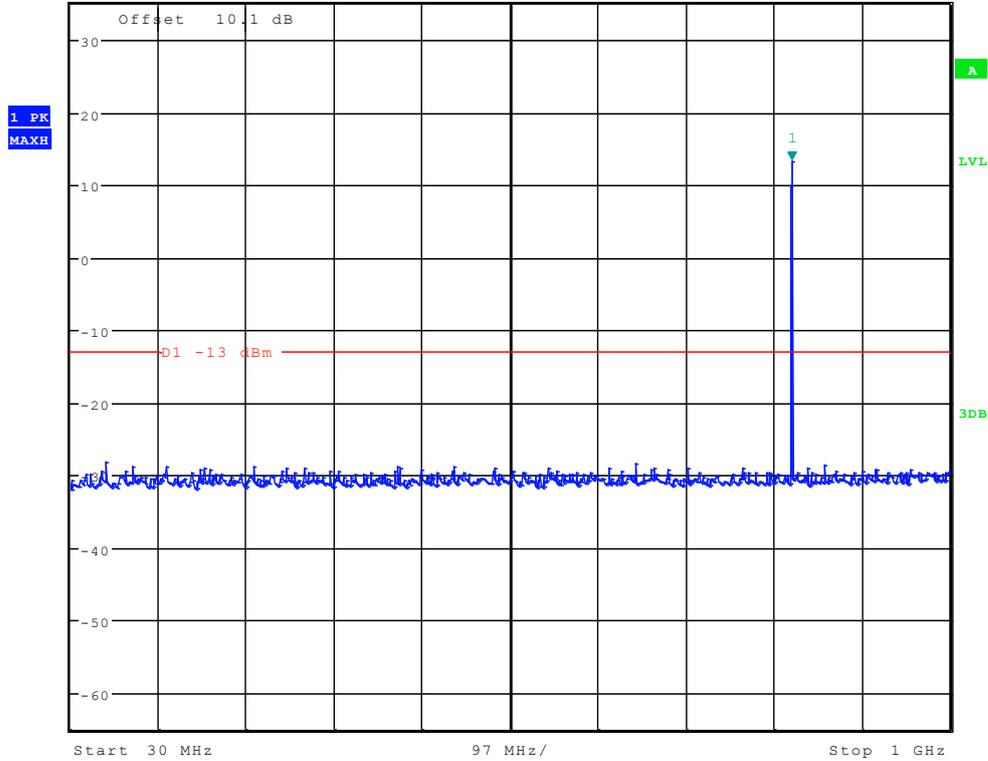


Ref 35 dBm Att 55 dB SWT 300 ms 150.000000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -29.37 dBm



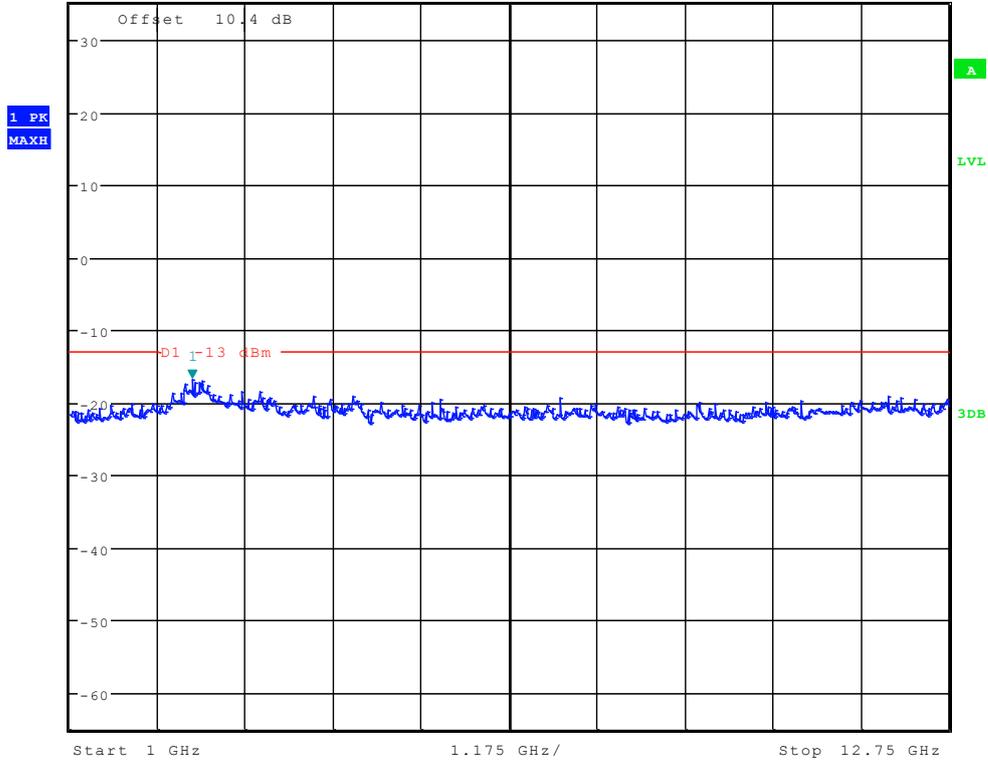


Ref 35 dBm Att 50 dB SWT 100 ms
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 13.22 dBm
825.897435897 MHz





*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz -16.78 dBm
Ref 35 dBm Att 50 dB SWT 70 ms 2.638221154 GHz

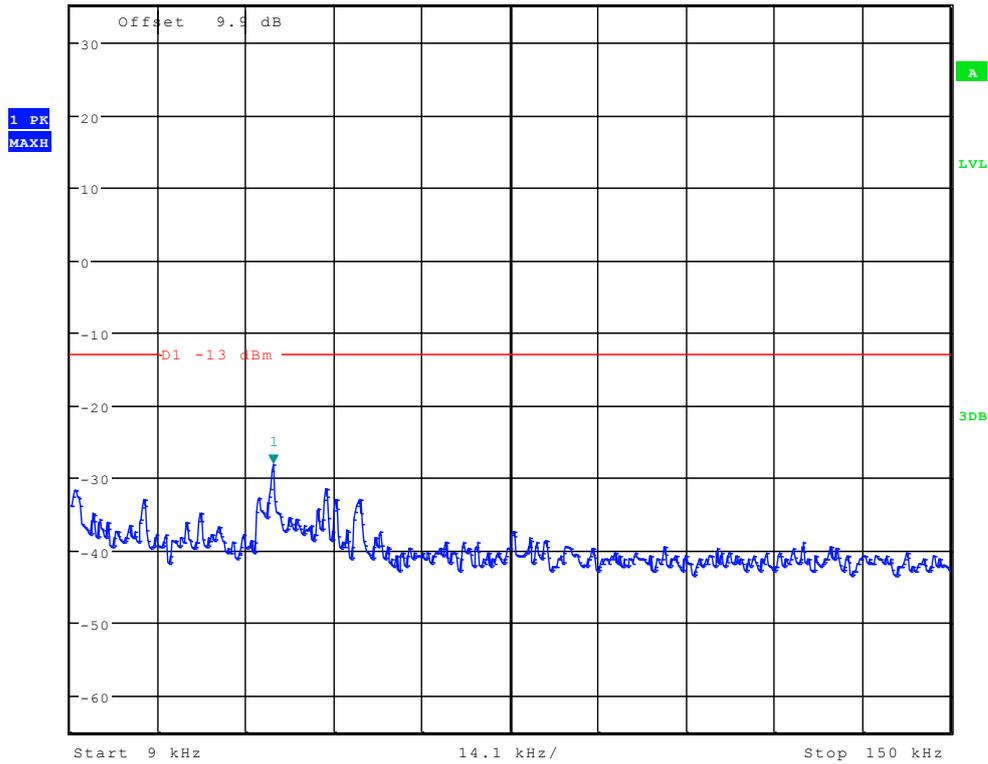




Channel 192

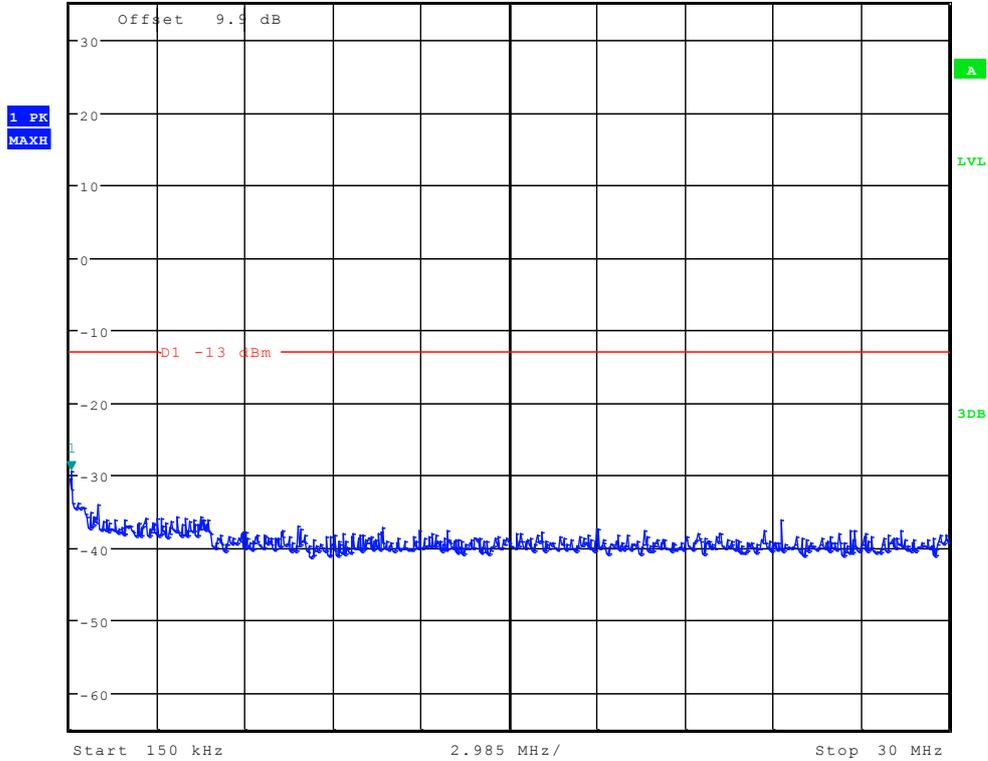


Ref 35 dBm Att 55 dB SWT 145 ms
*RBW 1 kHz *VBW 10 kHz
Marker 1 [T1] -28.22 dBm
41.538461538 kHz



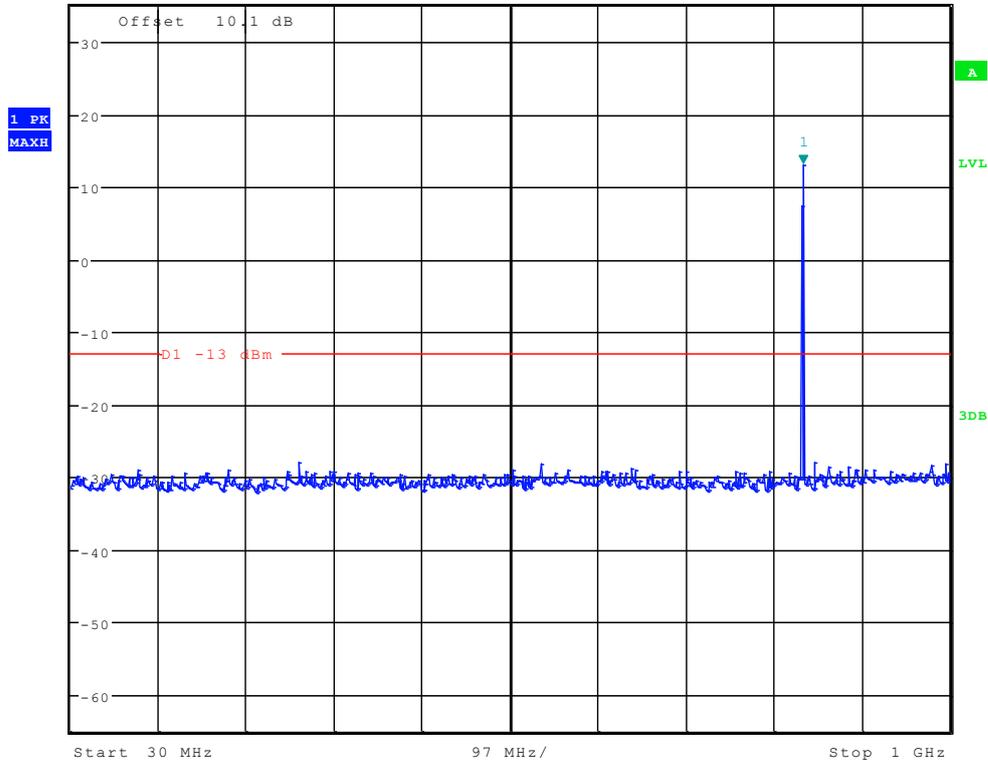


*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -29.32 dBm
Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz



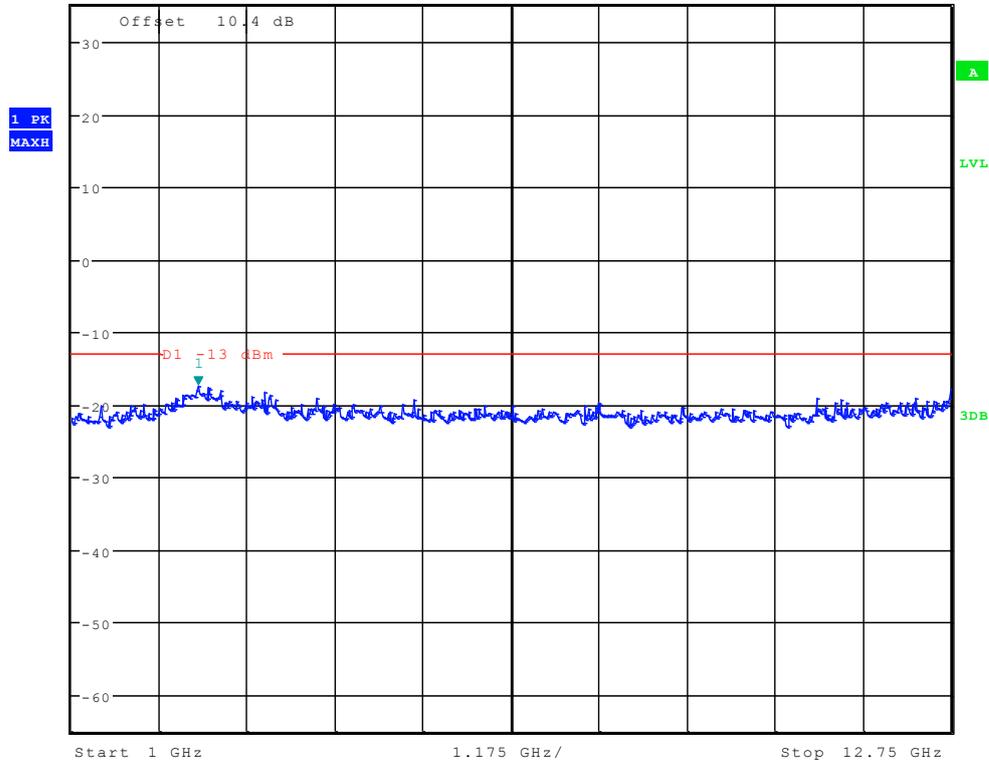


Ref 35 dBm Att 50 dB SWT 100 ms 838.333333333 MHz
*RBW 100 kHz Marker 1 [T1] 13.09 dBm
*VBW 300 kHz



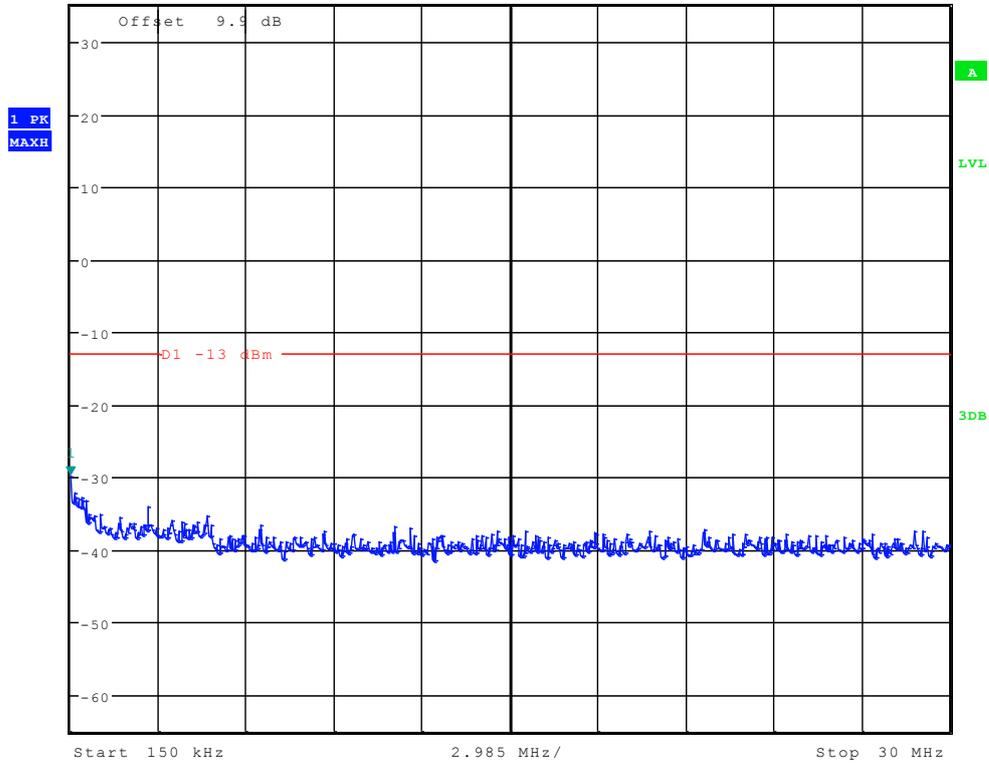


Ref 35 dBm Att 50 dB SWT 70 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz -17.43 dBm
2.694711538 GHz



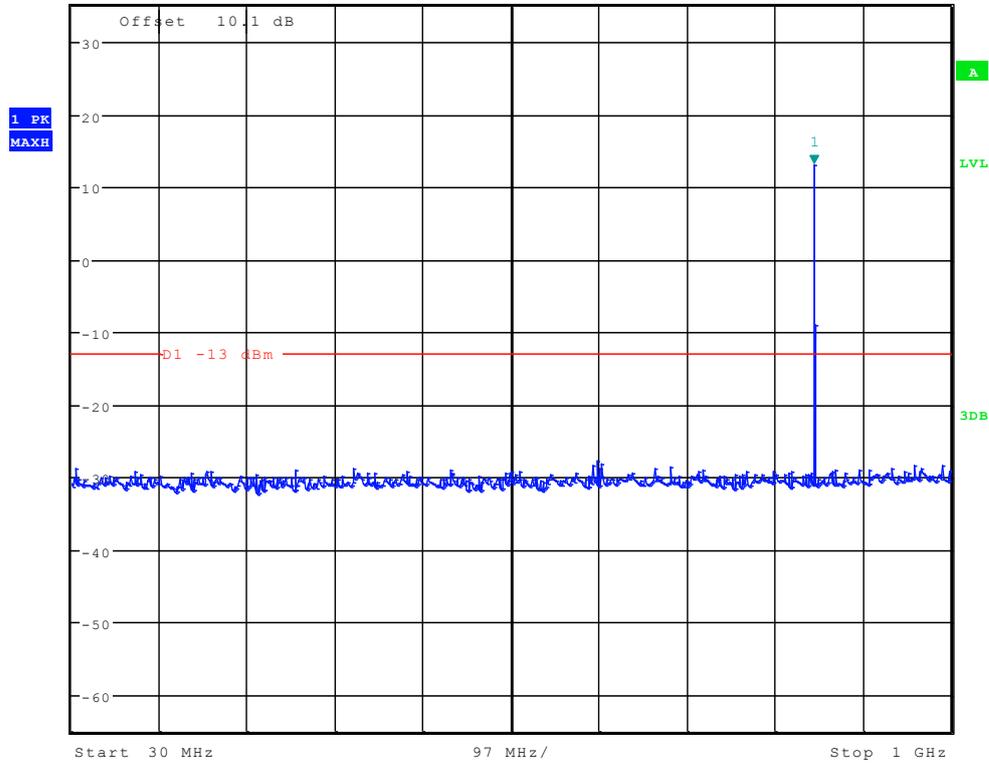


*RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz -29.87 dBm
 Ref 35 dBm Att 55 dB SWT 300 ms 150.000000000 kHz



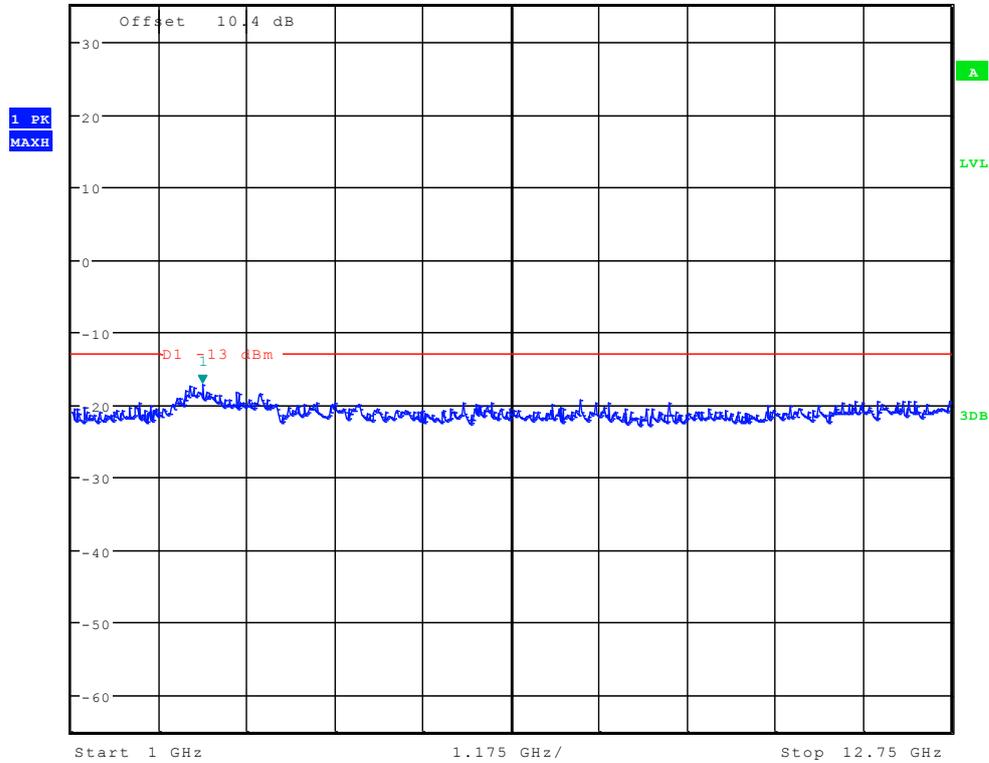


Ref 35 dBm Att 50 dB SWT 100 ms
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 13.05 dBm
849.214743590 MHz



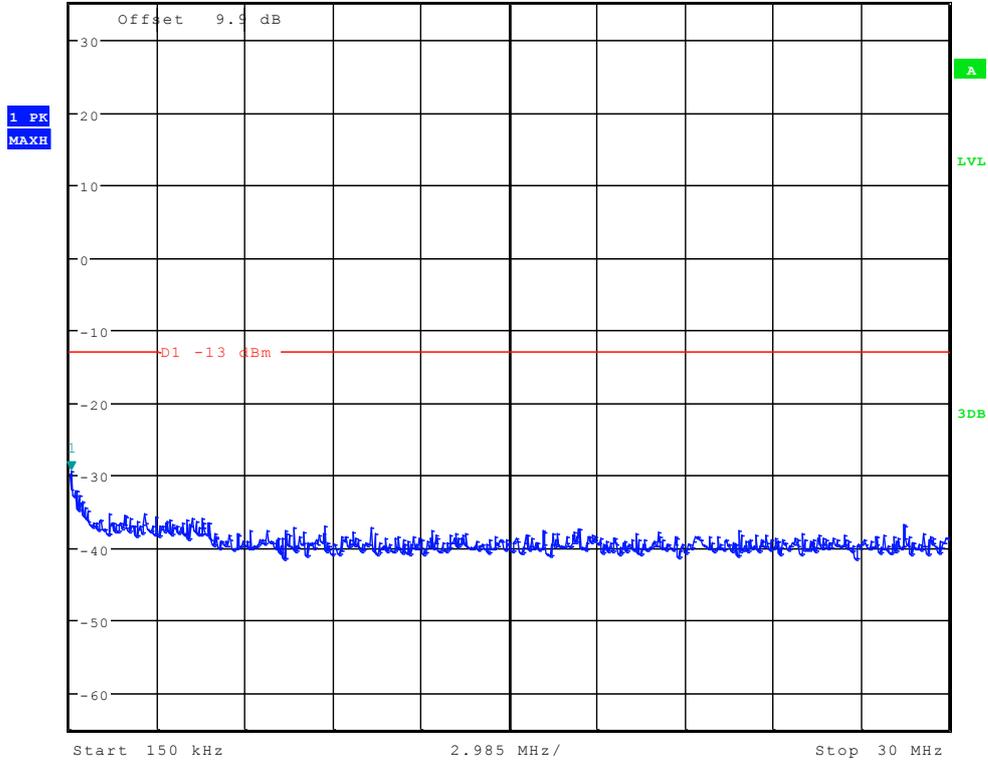


*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -17.11 dBm
 Ref 35 dBm Att 50 dB SWT 70 ms 2.751201923 GHz



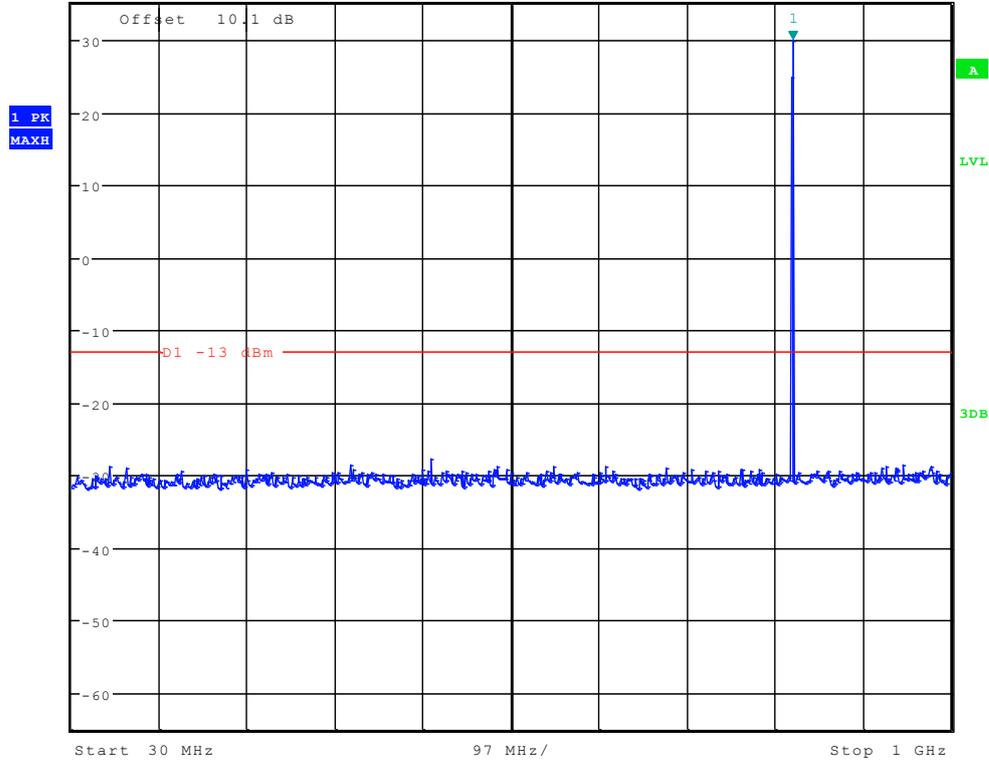


*RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz -29.43 dBm
 Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz



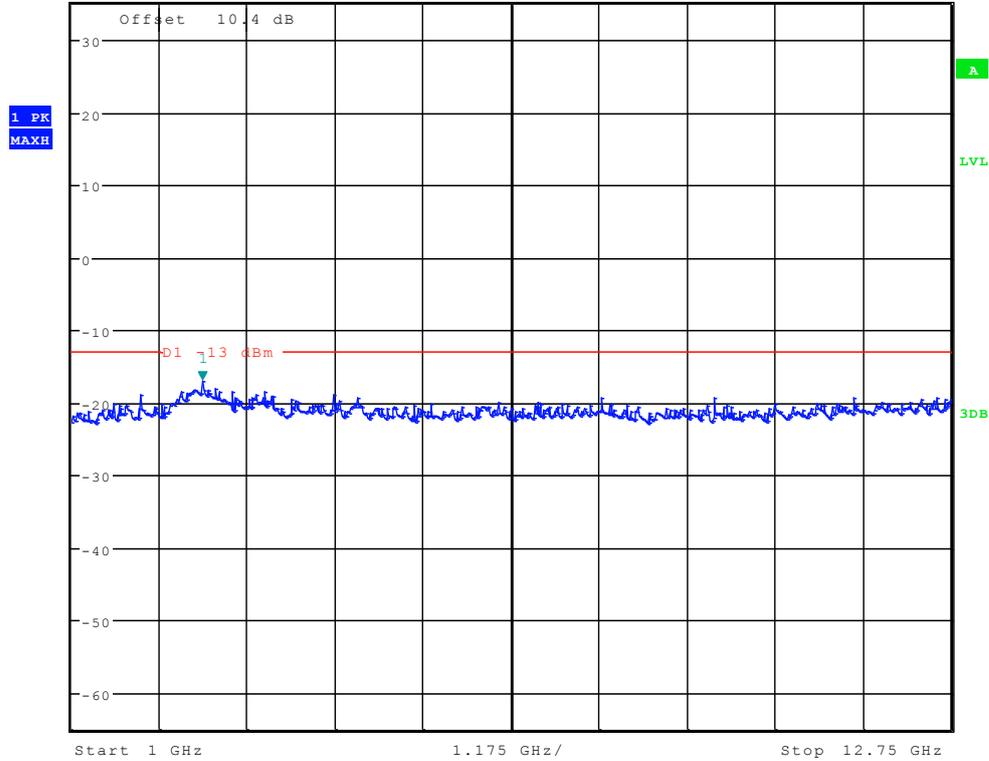


Ref 35 dBm Att 50 dB SWT 100 ms
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 29.80 dBm
825.897435897 MHz



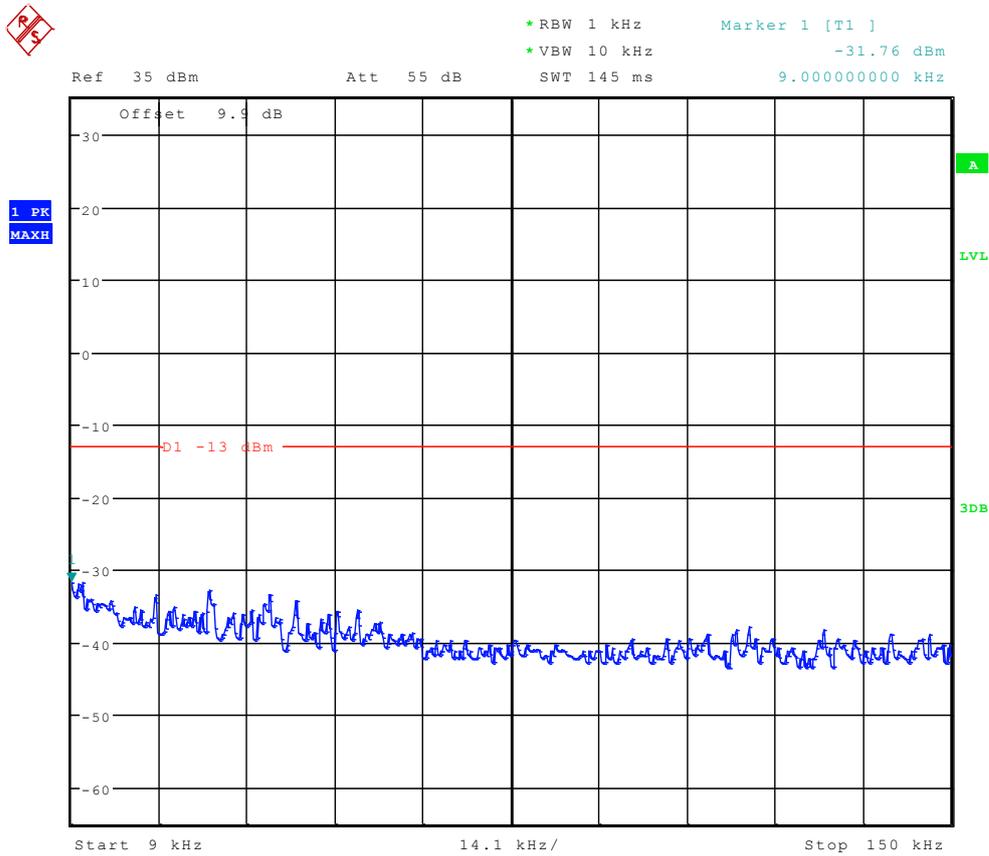


*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -17.09 dBm
 Ref 35 dBm Att 50 dB SWT 70 ms 2.751201923 GHz



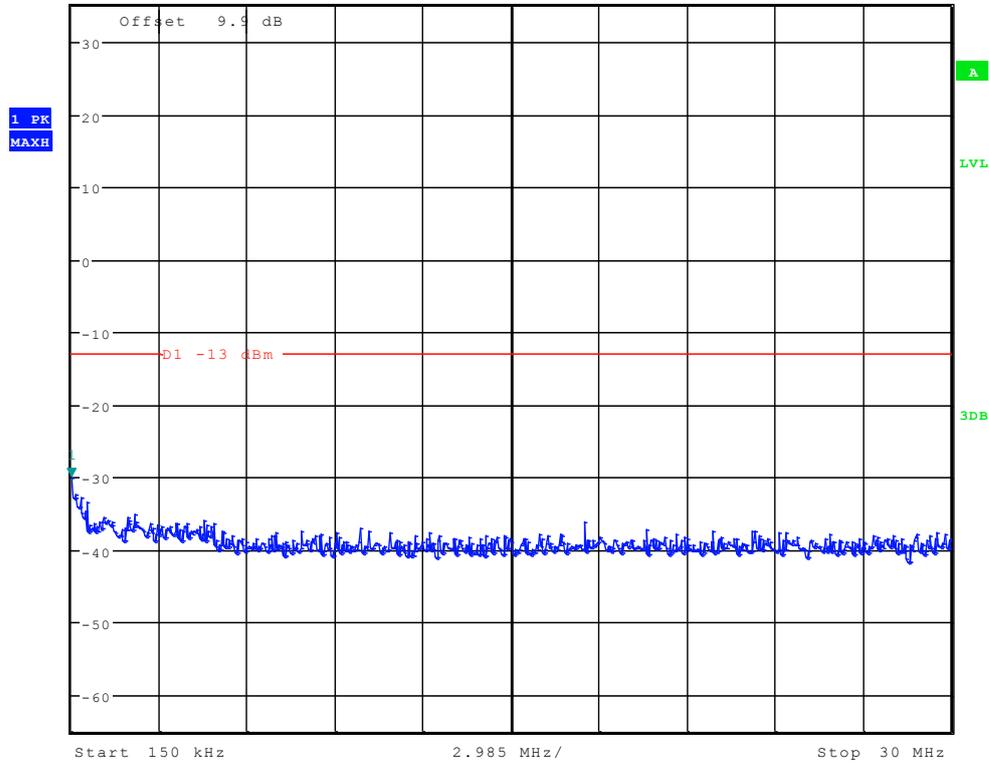


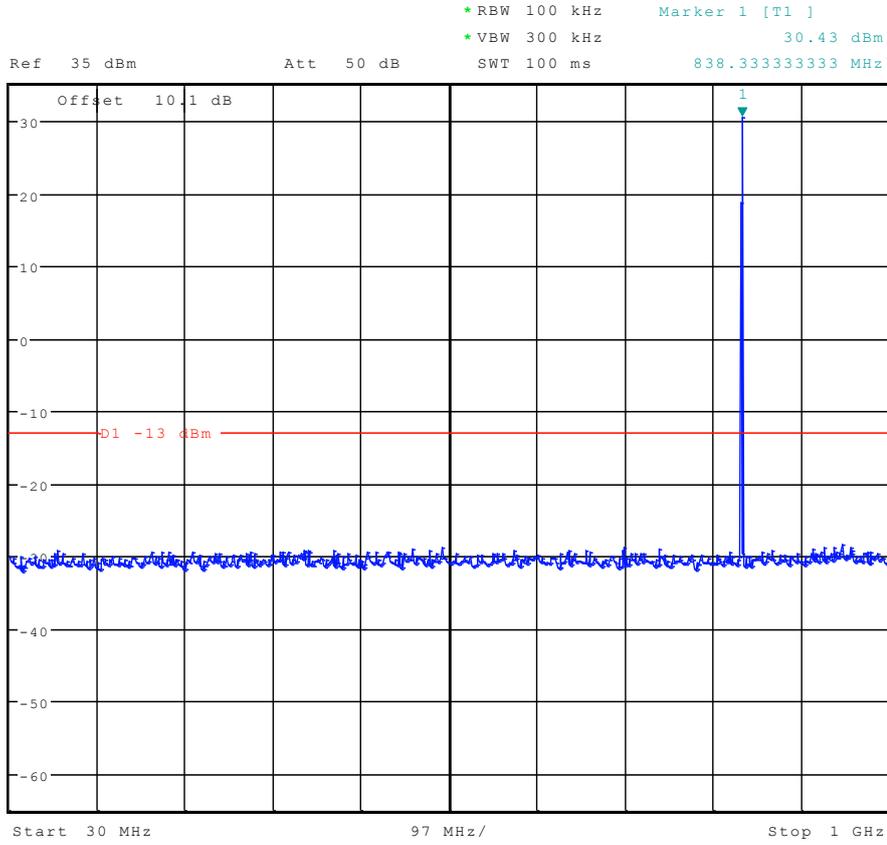
Channel 192





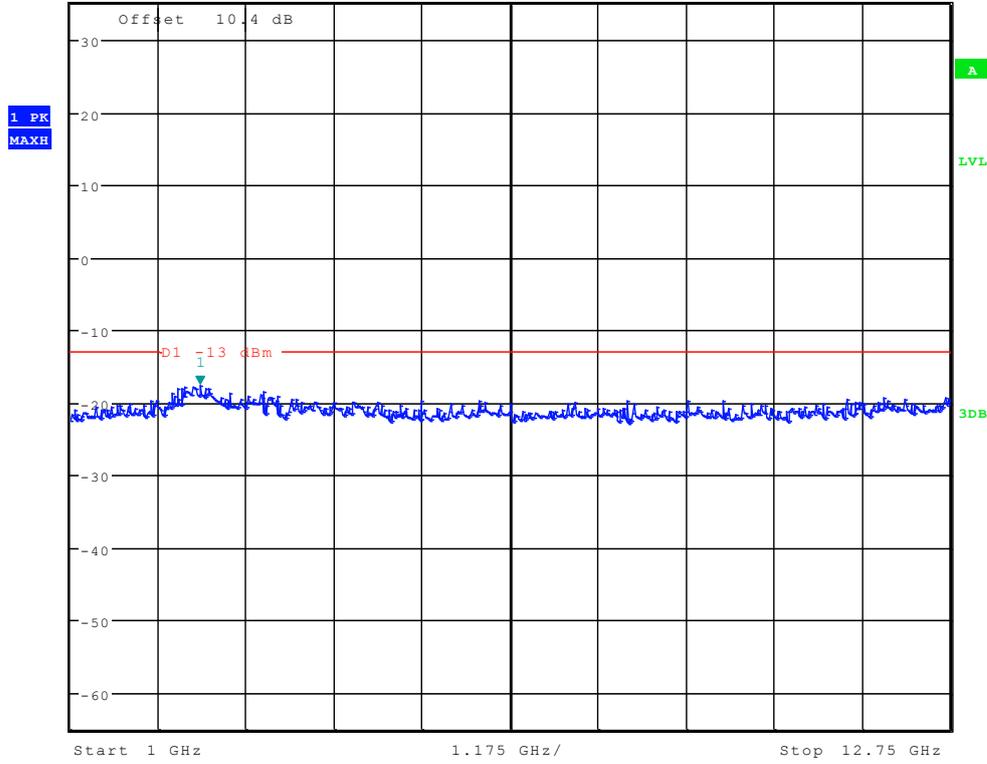
Ref 35 dBm Att 55 dB SWT 300 ms
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.04 dBm
150.000000000 kHz





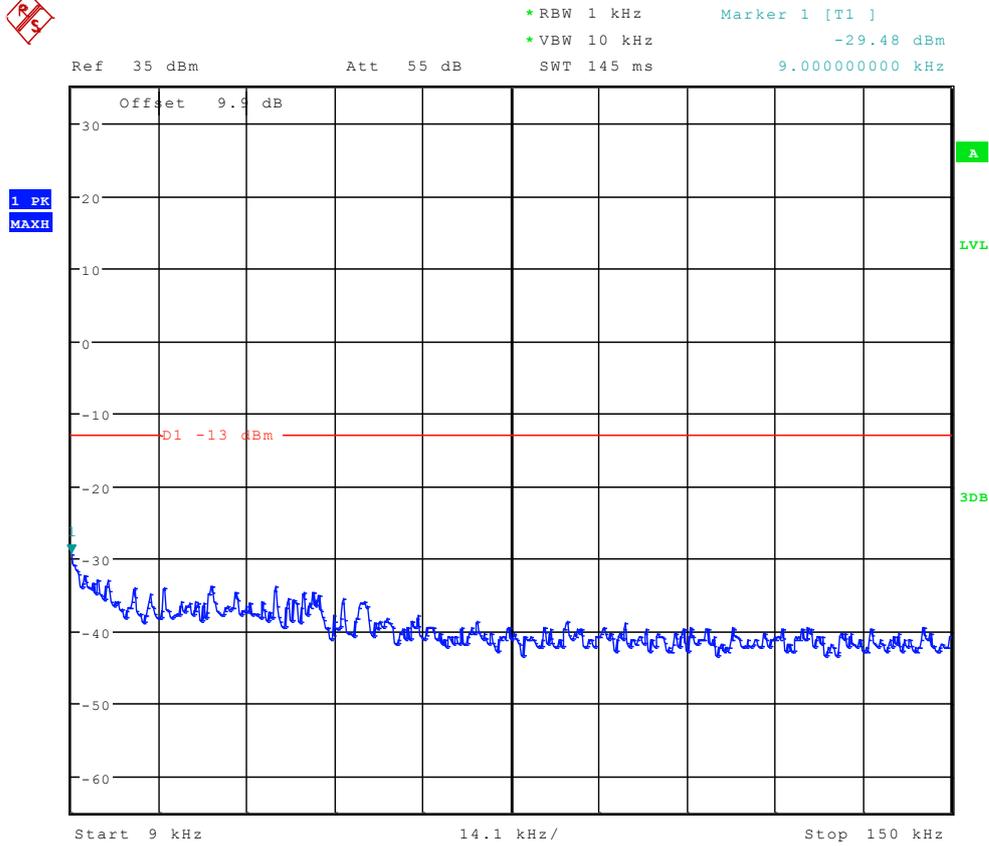


Ref 35 dBm Att 50 dB SWT 70 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz -17.73 dBm
2.732371795 GHz



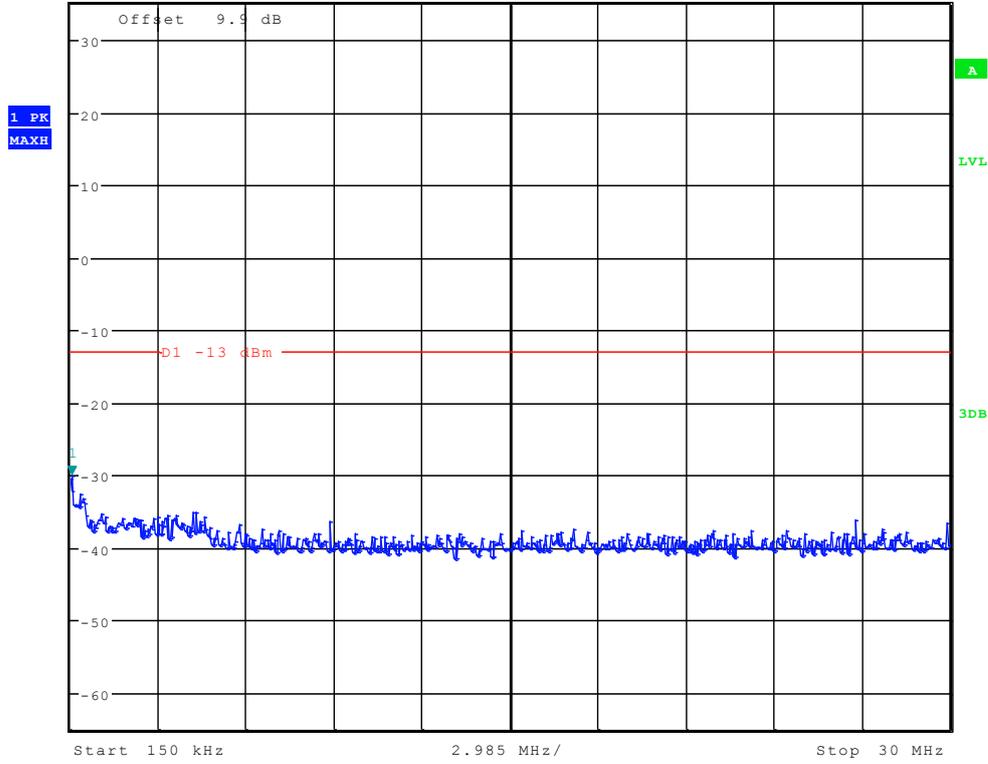


Channel 251



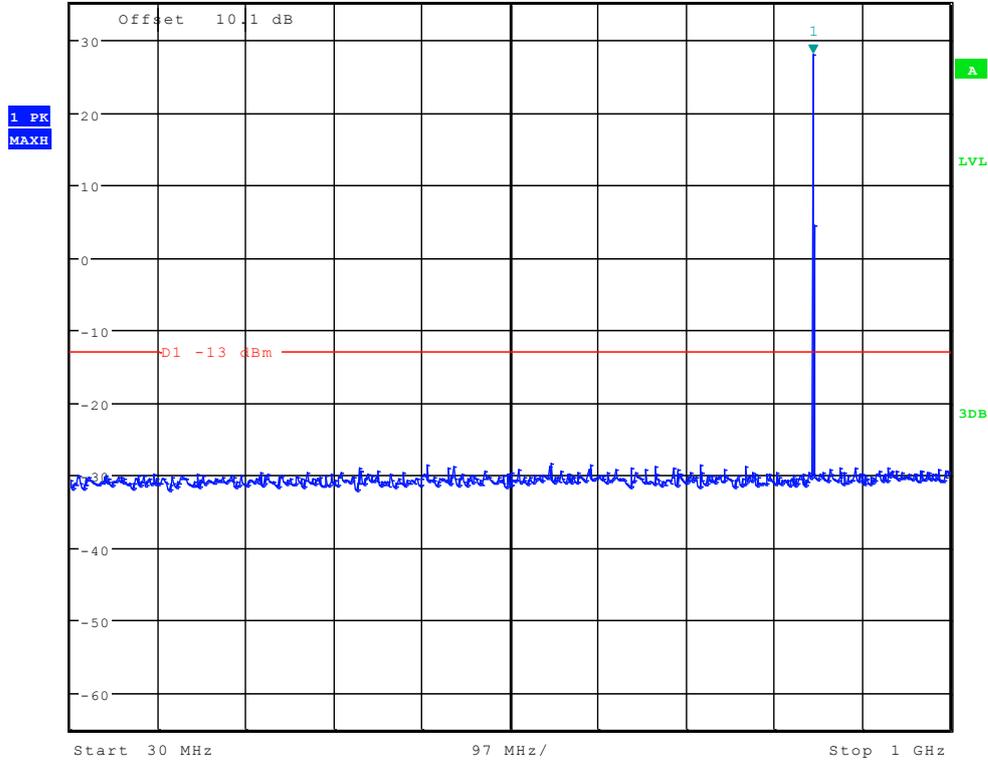


Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.04 dBm



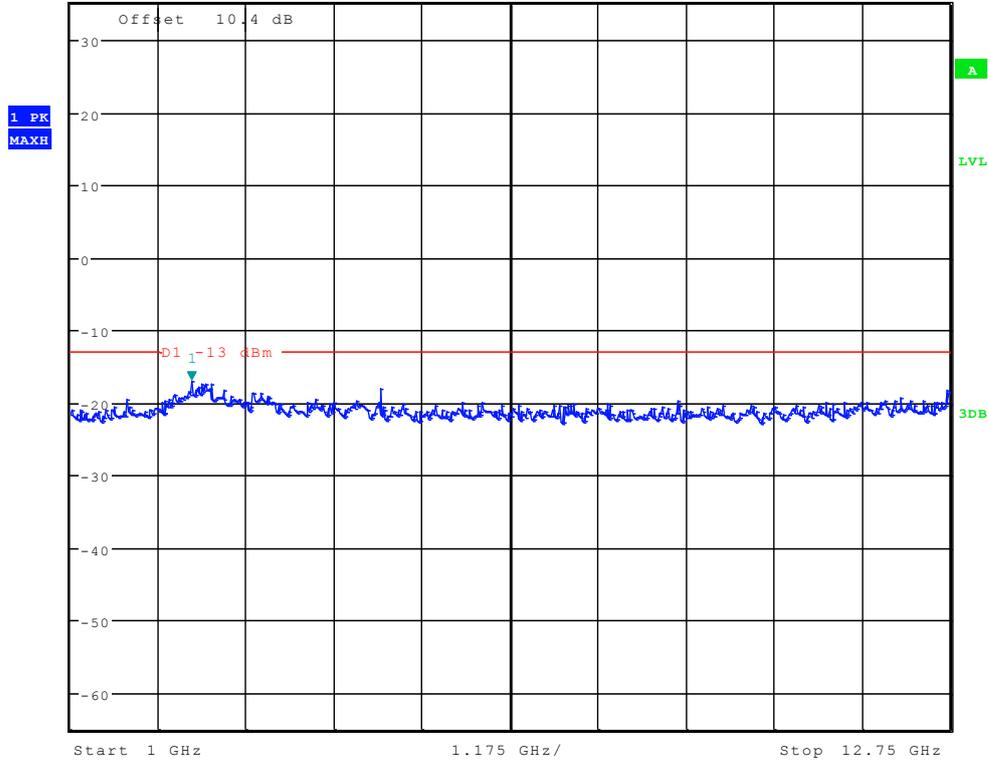


Ref 35 dBm Att 50 dB SWT 100 ms
*RBW 100 kHz Marker 1 [T1] 27.99 dBm
*VBW 300 kHz 849.214743590 MHz





*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz -17.08 dBm
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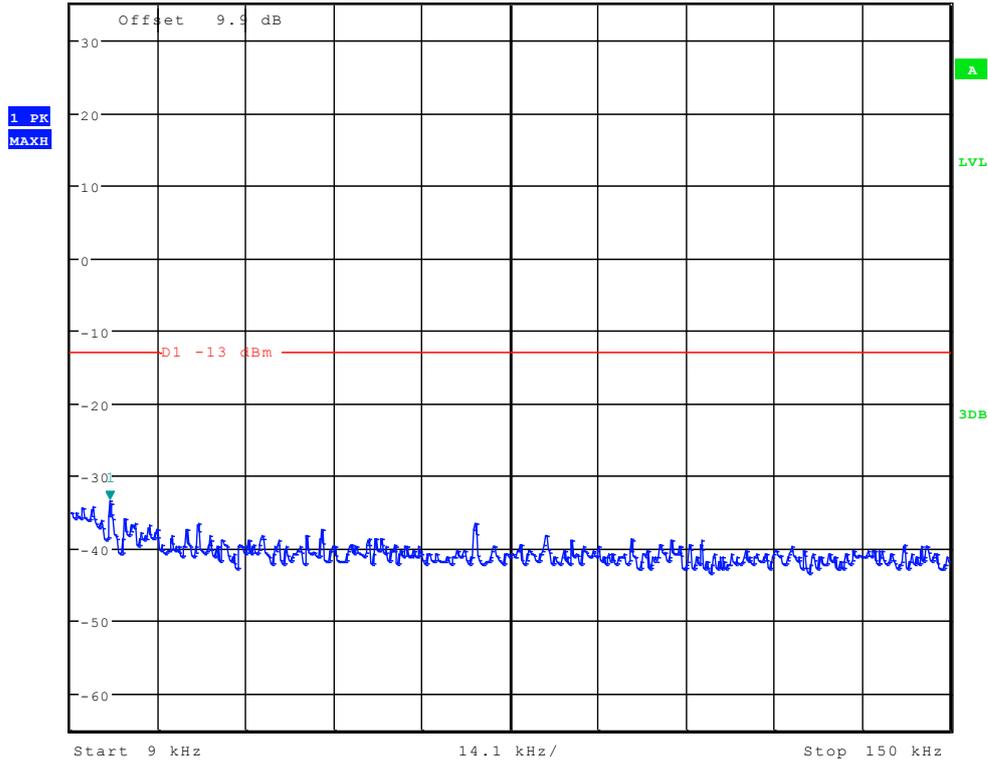




TM3: WCDMA Channel 4132

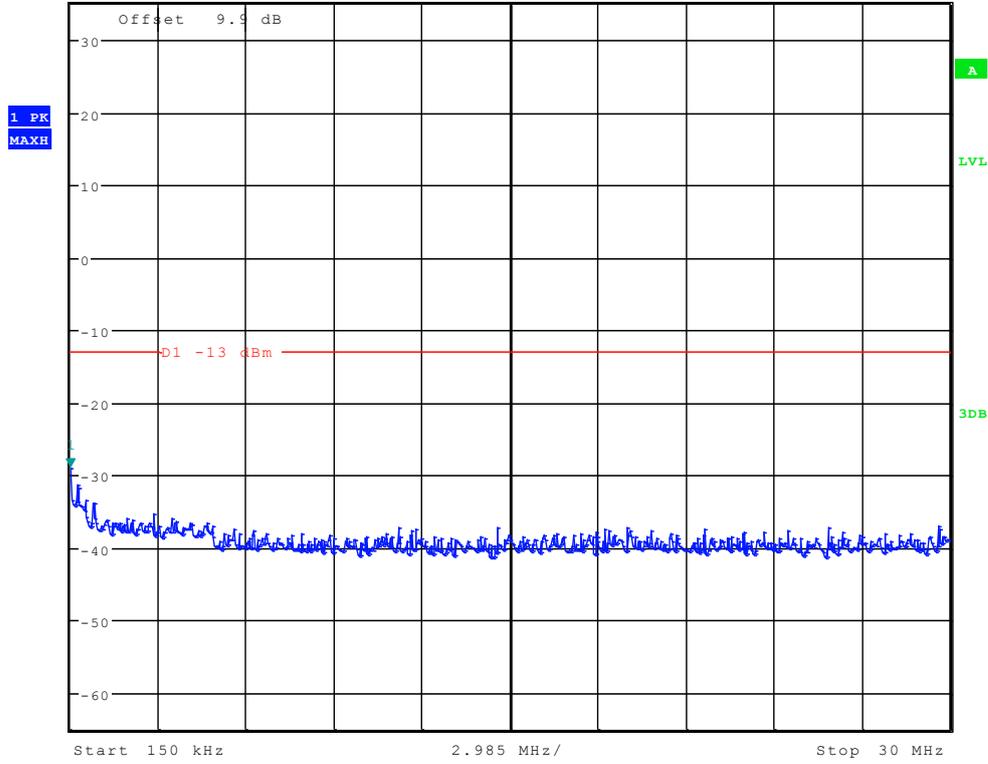


*RBW 1 kHz Marker 1 [T1]
 *VBW 10 kHz -33.48 dBm
 Ref 35 dBm Att 55 dB SWT 145 ms 15.326923077 kHz



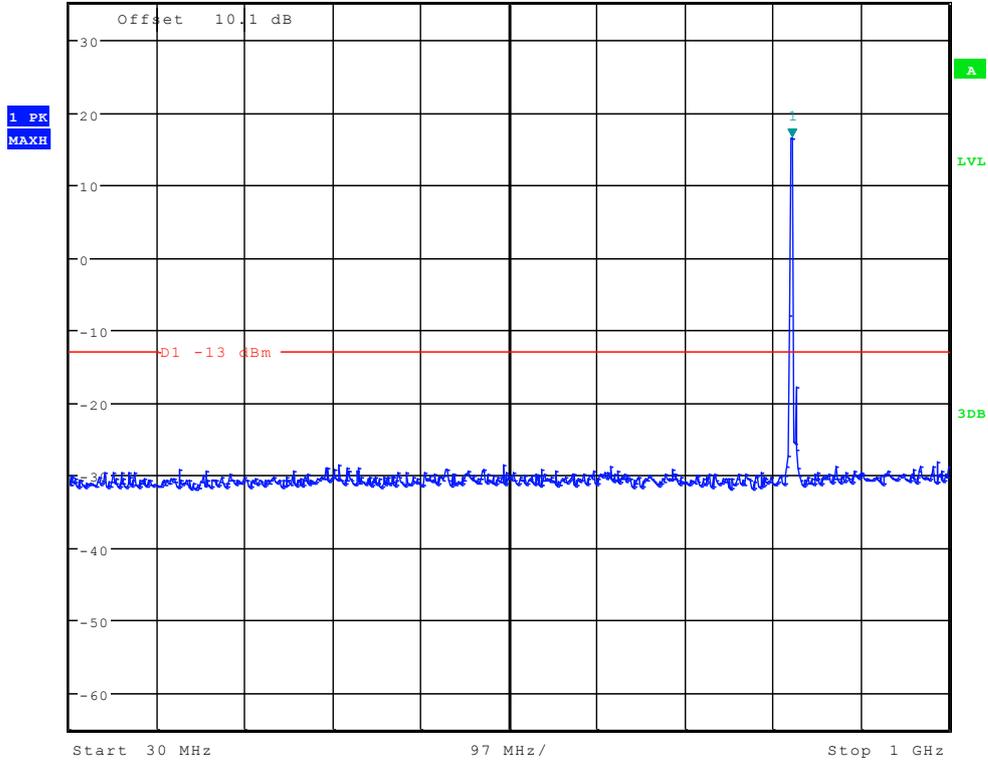


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -29.06 dBm



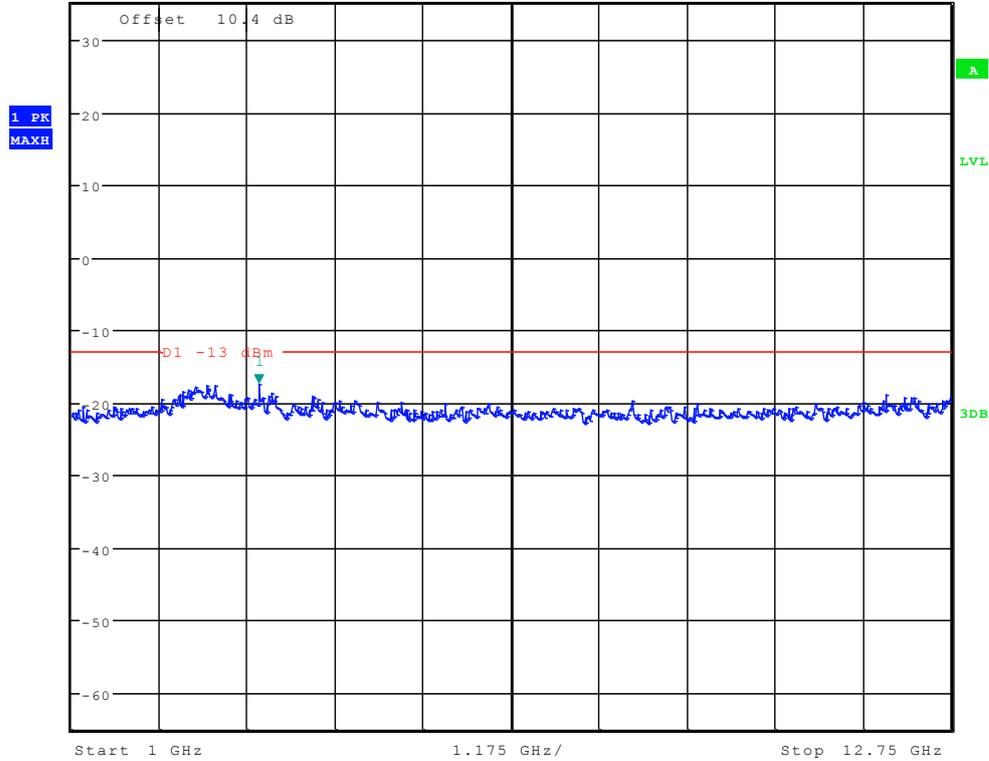


*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 16.40 dBm
Ref 35 dBm Att 50 dB SWT 100 ms 827.451923077 MHz





*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -17.50 dBm
 Ref 35 dBm Att 50 dB SWT 70 ms 3.504407051 GHz

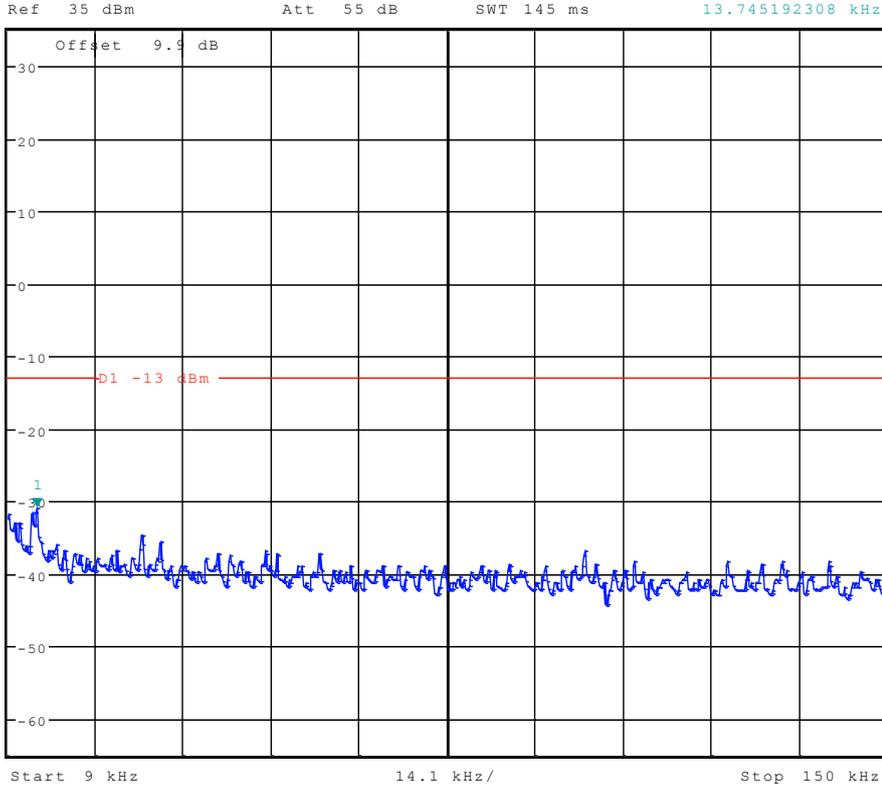




Channel 4182

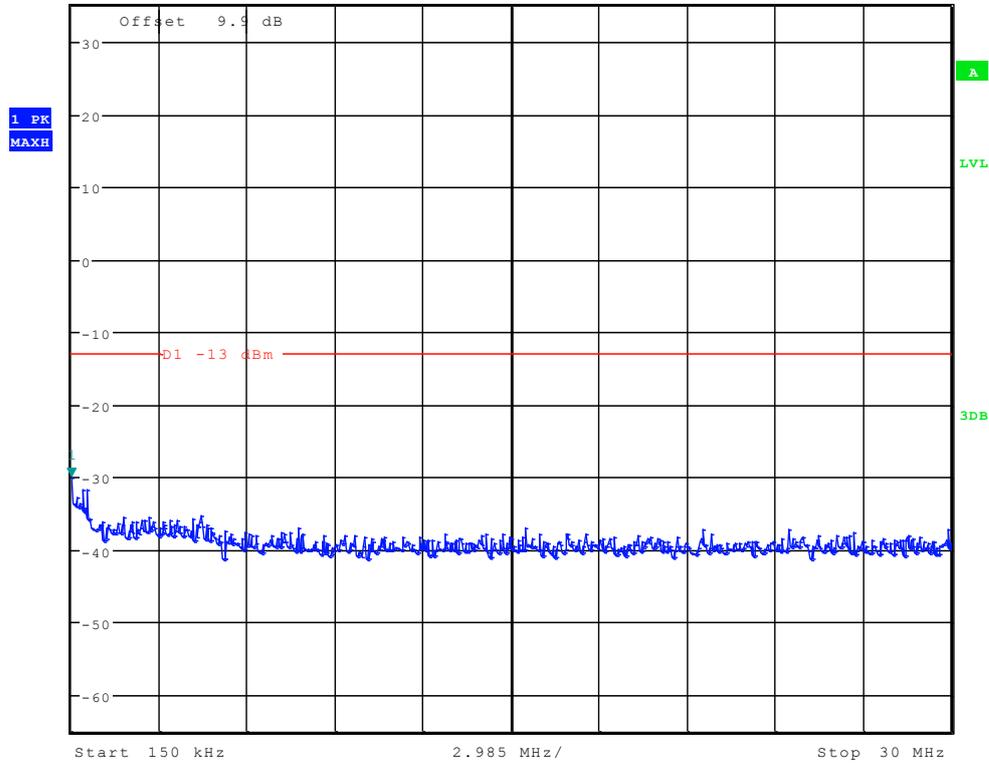


*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -30.76 dBm
SWT 145 ms 13.745192308 kHz



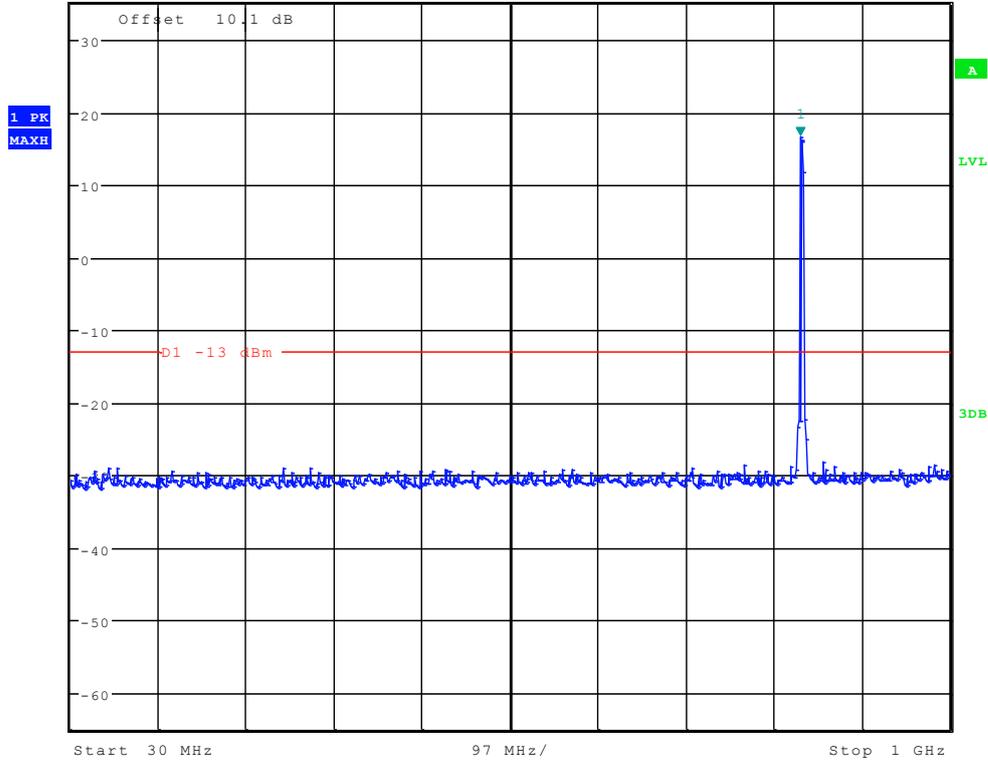


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.04 dBm



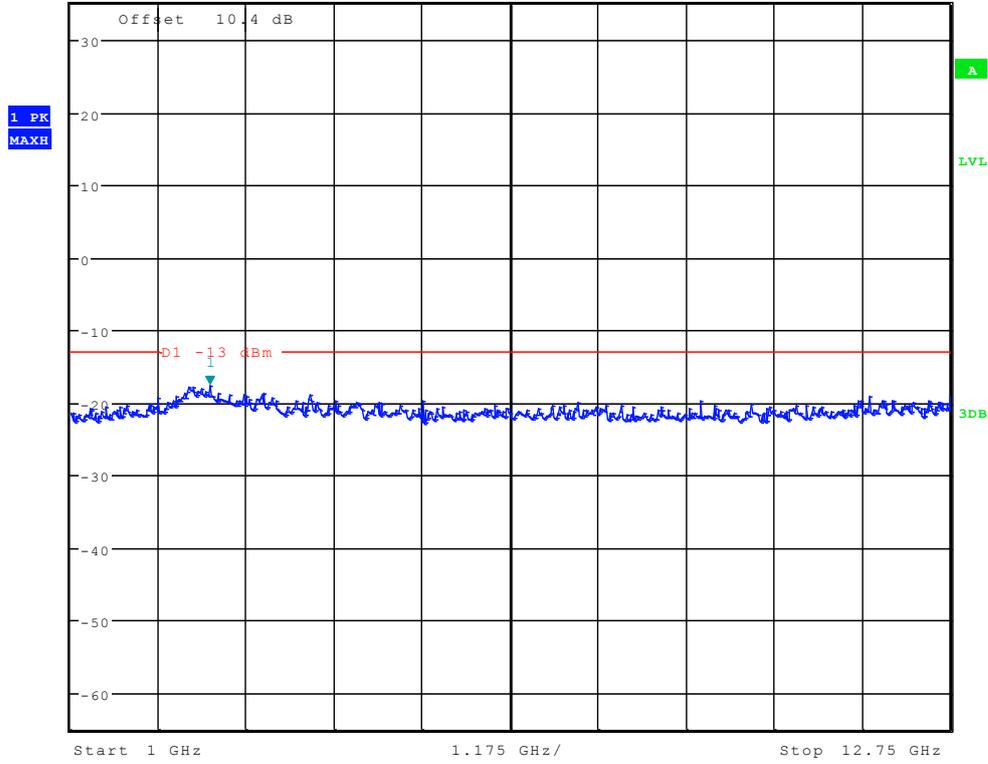


Ref 35 dBm Att 50 dB SWT 100 ms
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz 16.67 dBm
835.224358974 MHz





*RBW 1 MHz Marker 1 [T1]
 *VBW 3 MHz -17.67 dBm
 Ref 35 dBm Att 50 dB SWT 70 ms 2.864182692 GHz

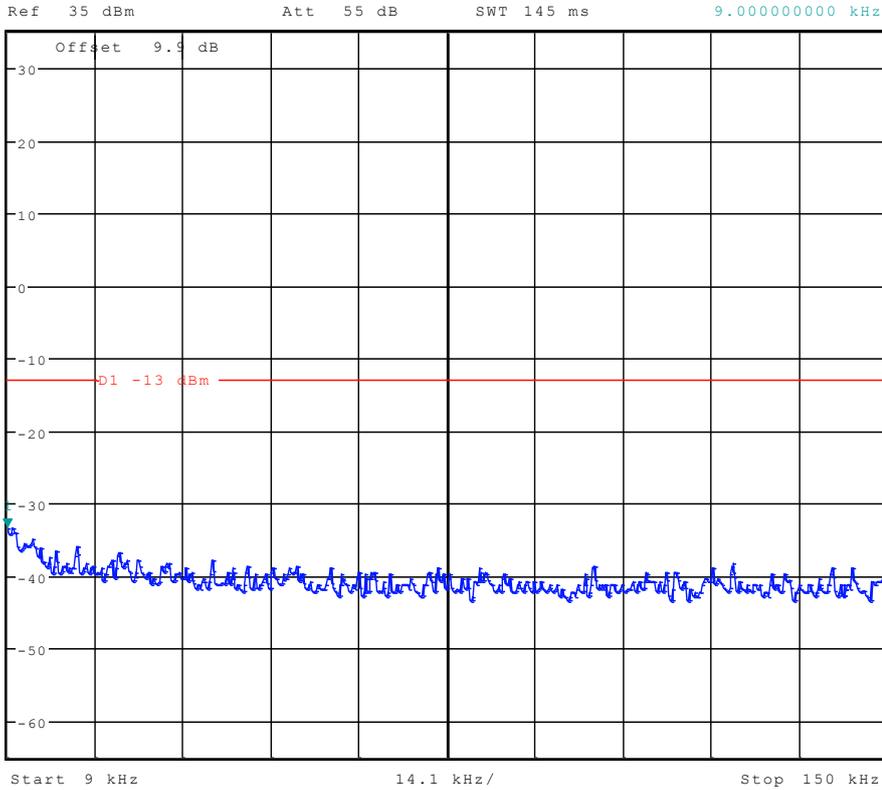




Channel 4233

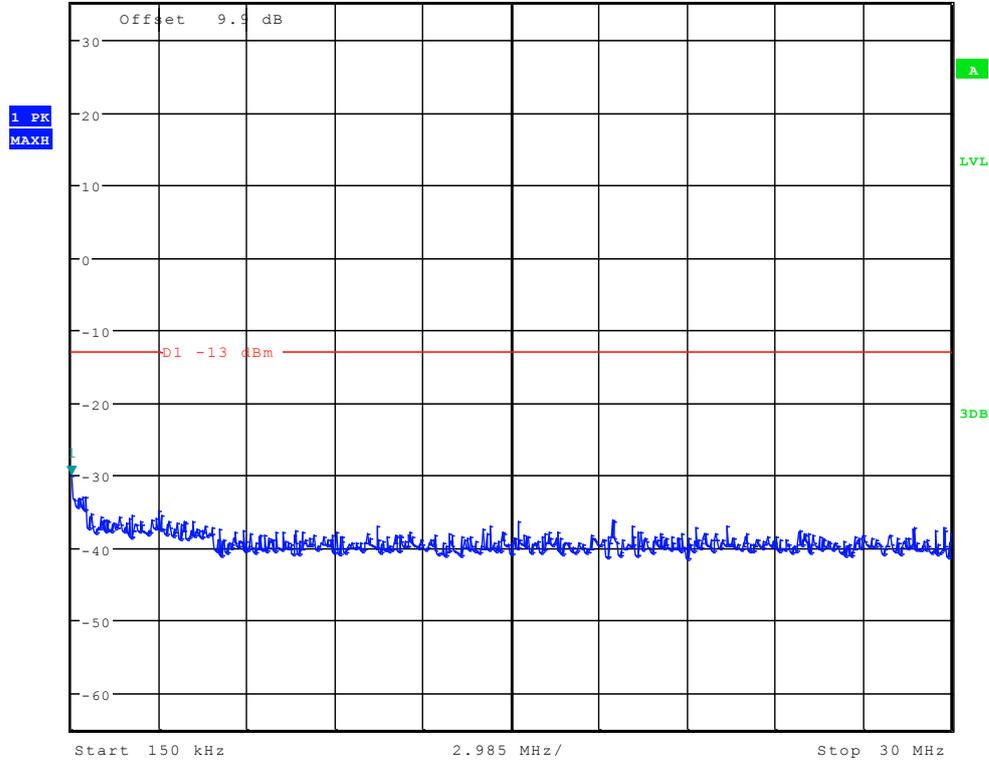


*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -33.31 dBm
SWT 145 ms 9.000000000 kHz



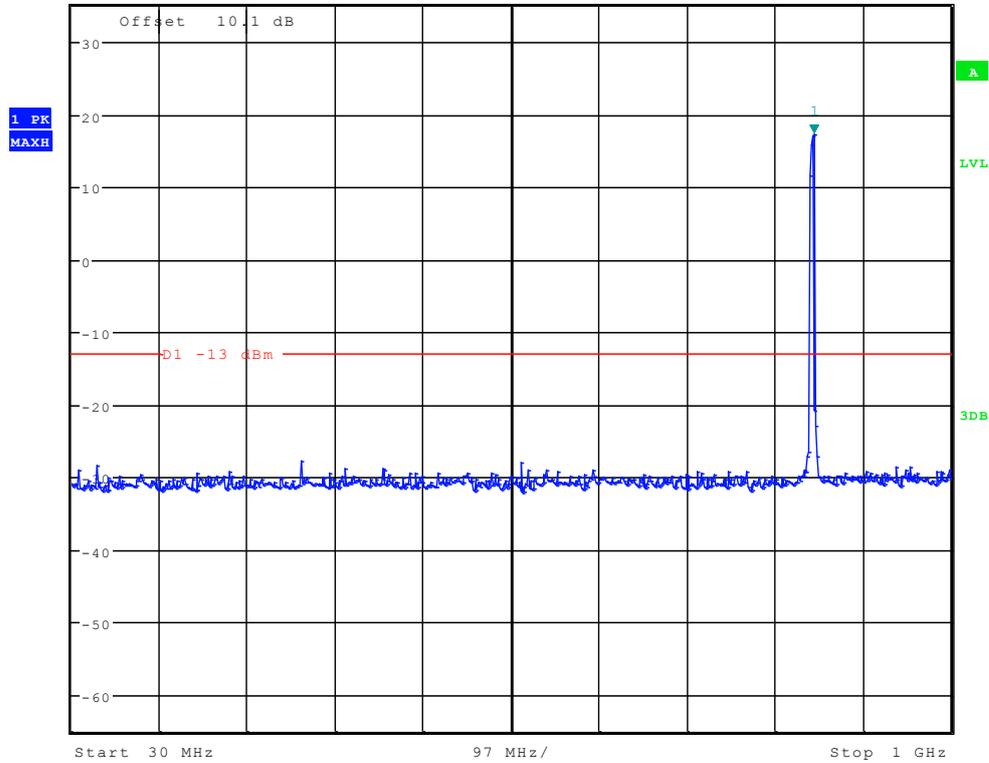


*RBW 10 kHz Marker 1 [T1]
 *VBW 30 kHz -29.93 dBm
 Ref 35 dBm Att 55 dB SWT 300 ms 150.000000000 kHz



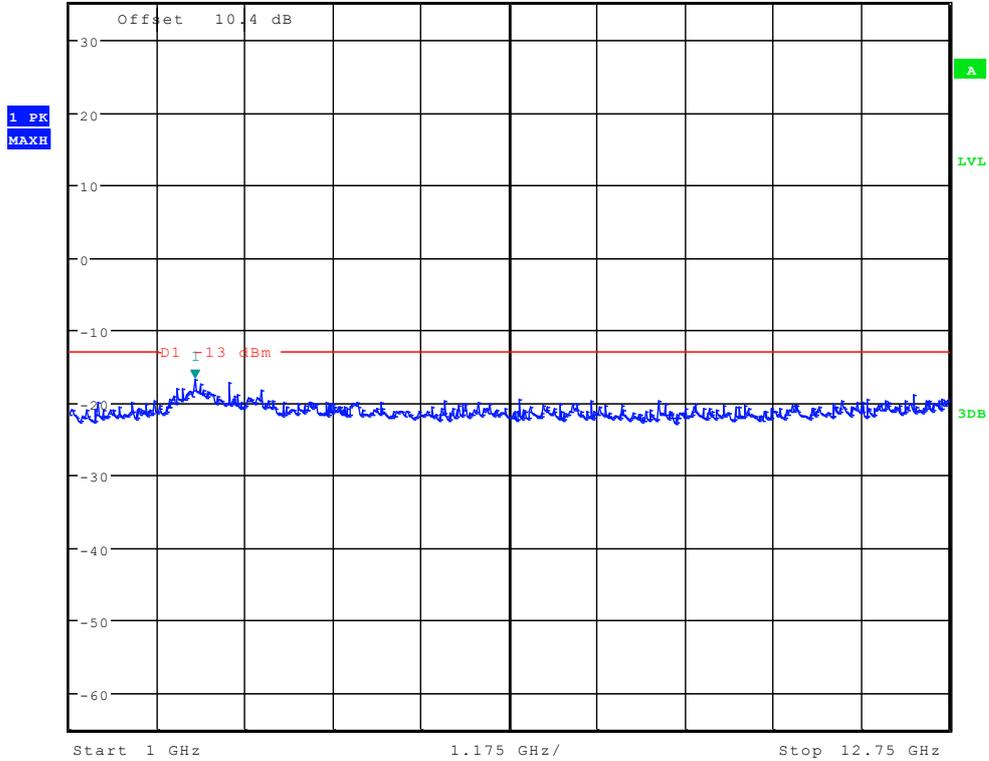


*RBW 100 kHz Marker 1 [T1]
 *VBW 300 kHz 17.15 dBm
 Ref 35 dBm Att 50 dB SWT 100 ms 849.214743590 MHz





* RBW 1 MHz Marker 1 [T1]
* VBW 3 MHz -16.83 dBm
Ref 35 dBm Att 50 dB SWT 70 ms 2.675881410 GHz





Appendix E

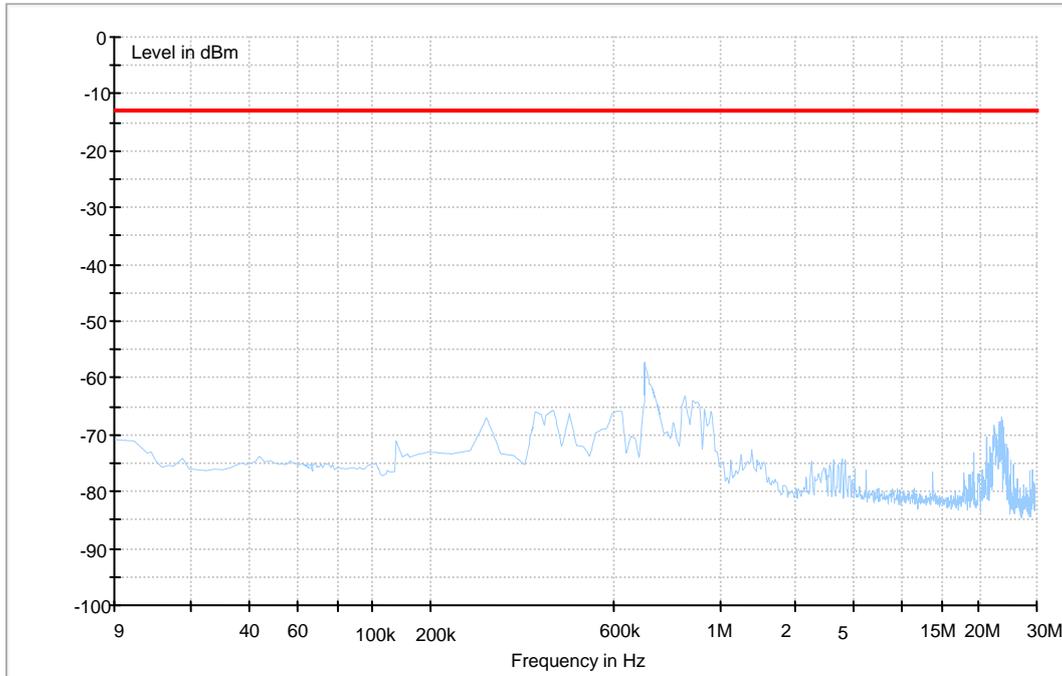
Field Strength of Spurious Emissions

According to FCC Part 2.1053 & Part22.917



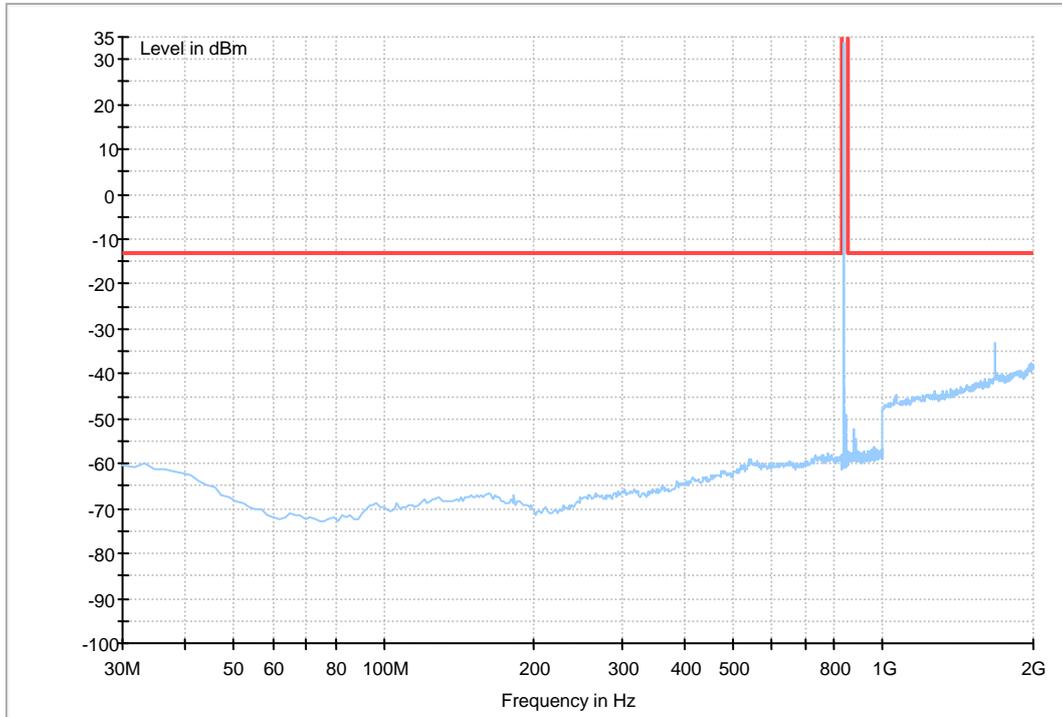
GSM 850

Traffic Mode (9kHz-30MHz)



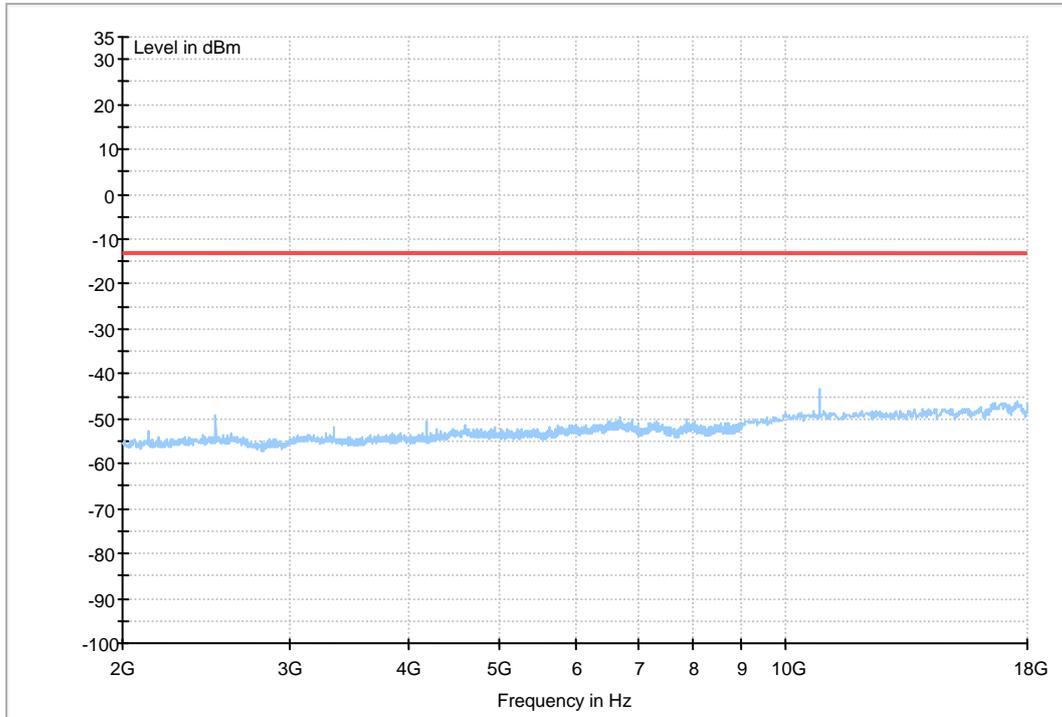


Traffic Mode (30MHz-2GHz)





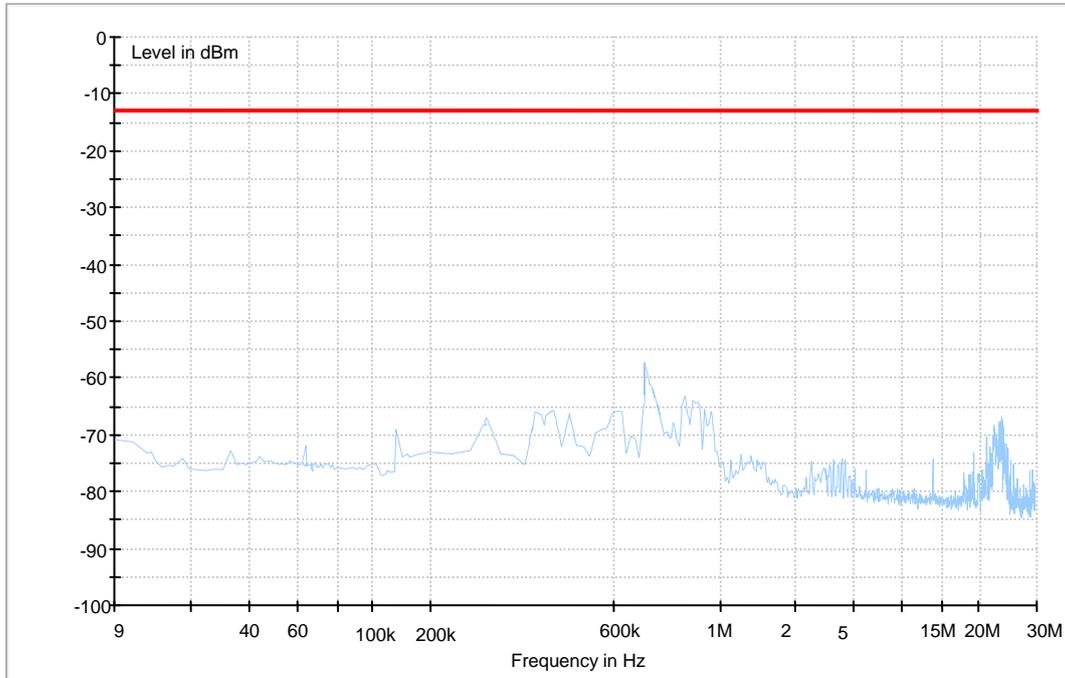
Traffic Mode (2GHz-18GHz)





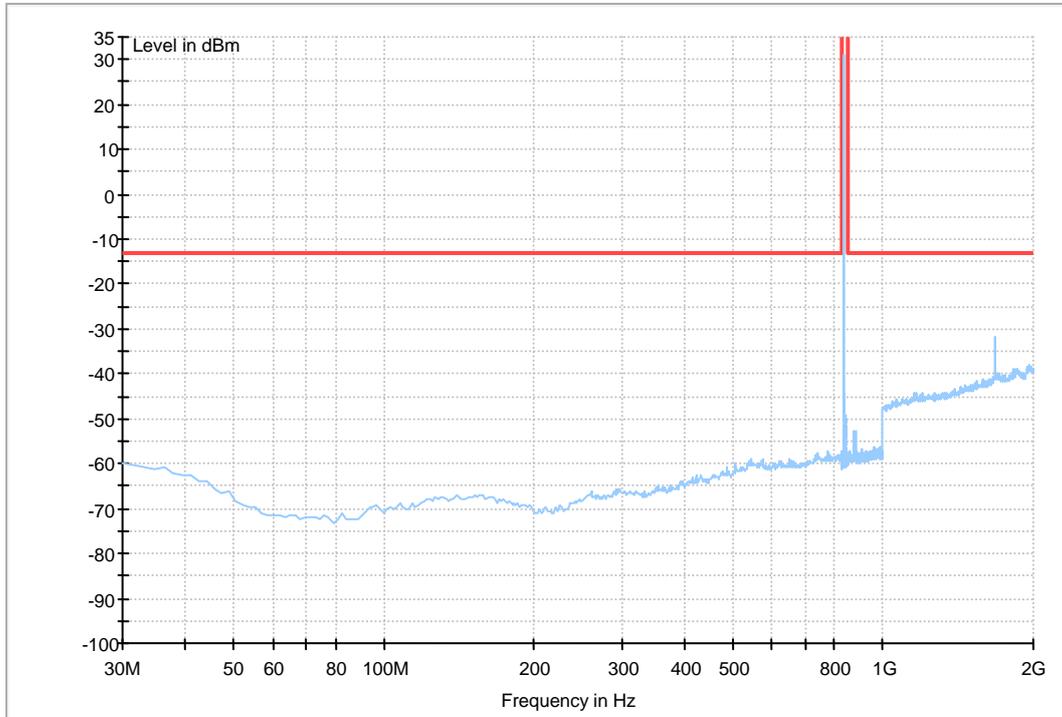
GPRS 850

Traffic Mode (9kHz-30MHz)



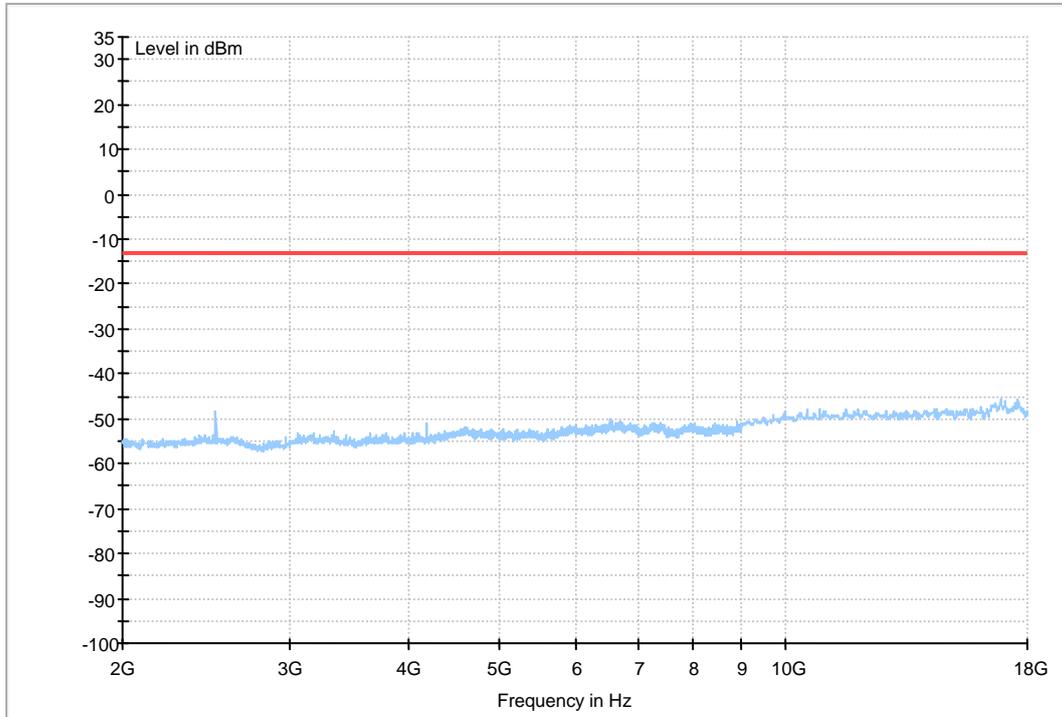


Traffic Mode (30MHz-2GHz)





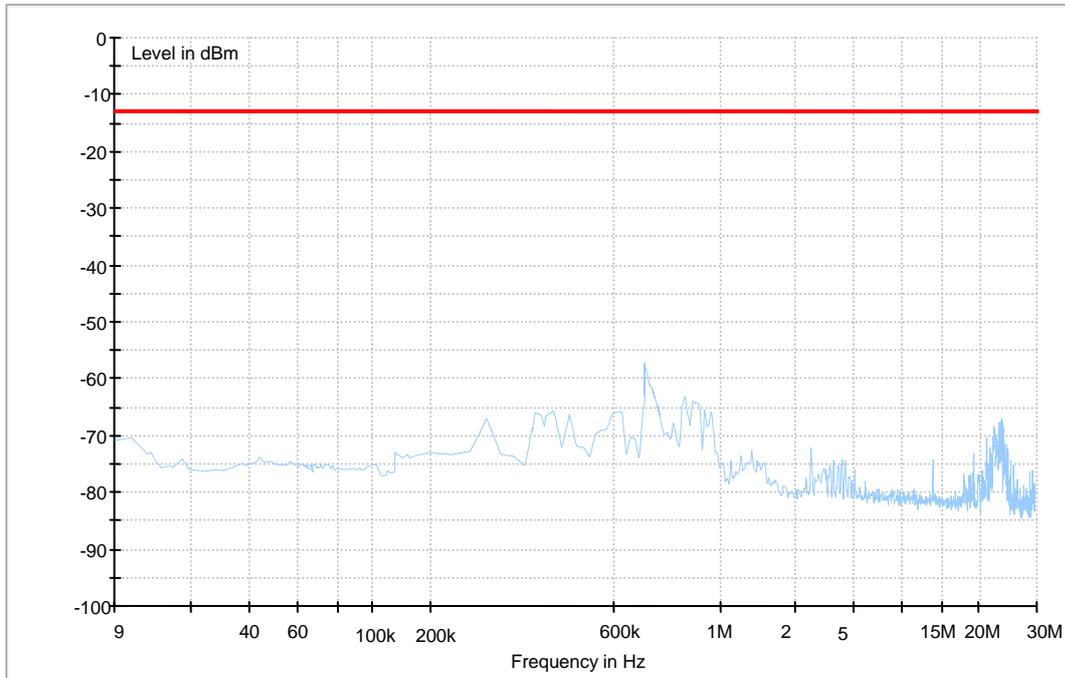
Traffic Mode (2GHz-18GHz)





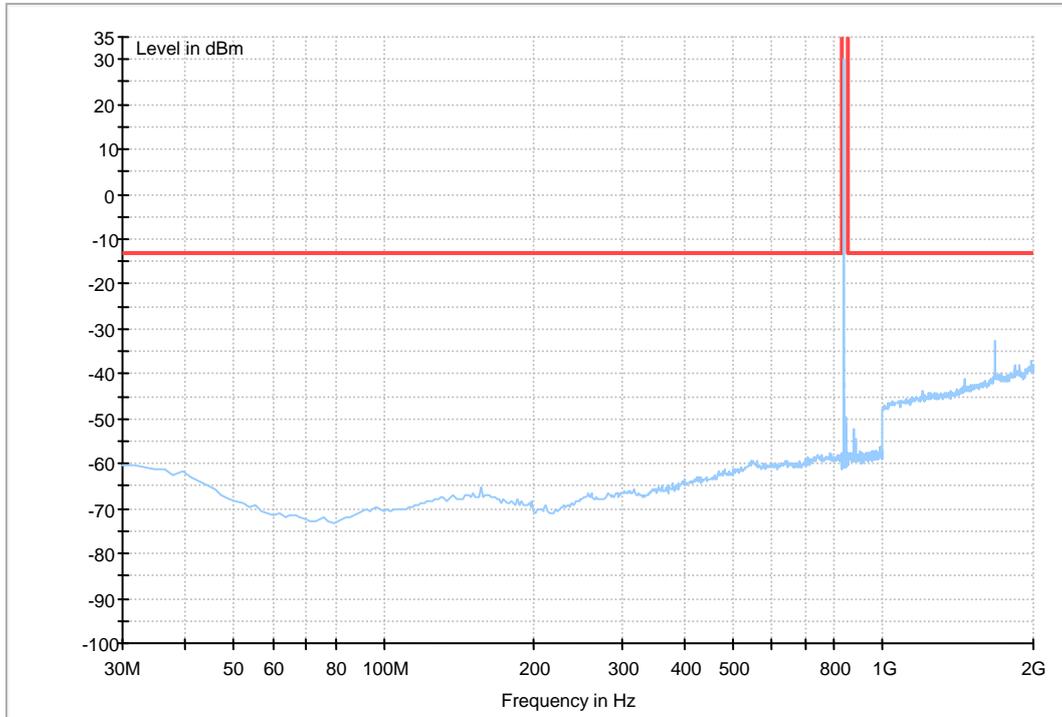
EDGE 850

Traffic Mode (9kHz-30MHz)



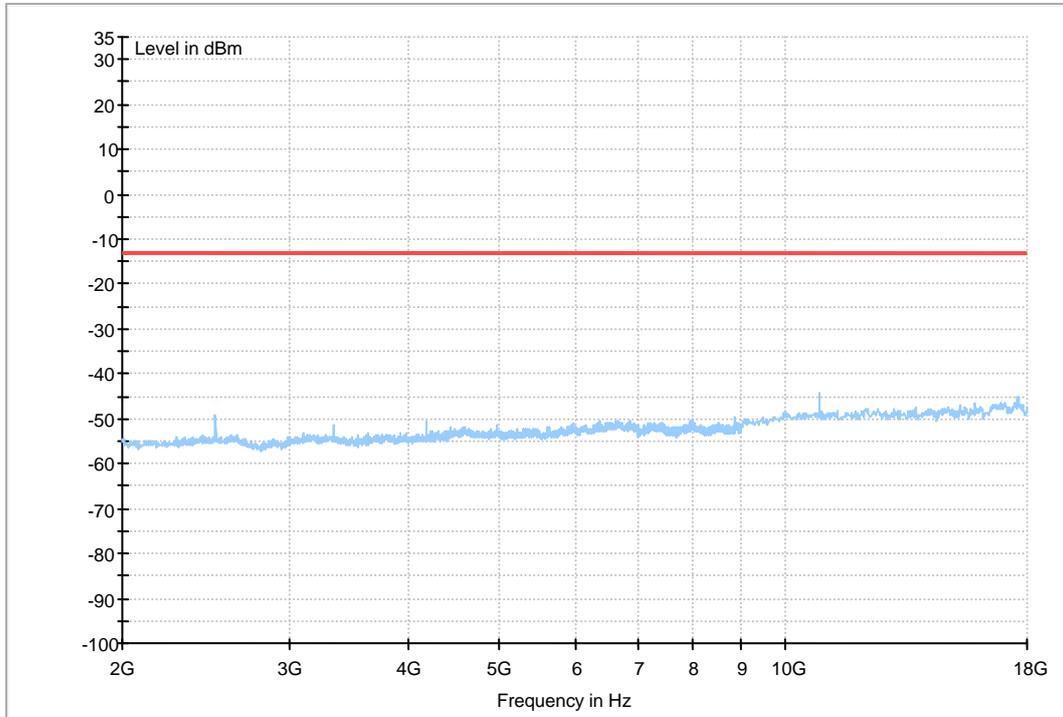


Traffic Mode (30MHz-2GHz)





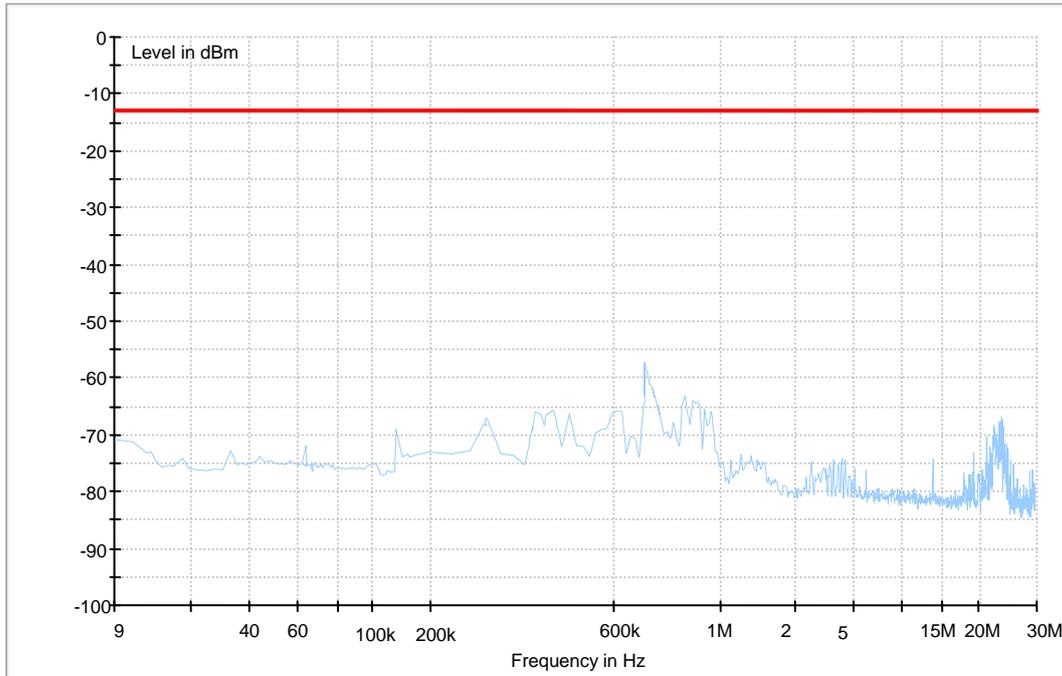
Traffic Mode (2GHz-18GHz)





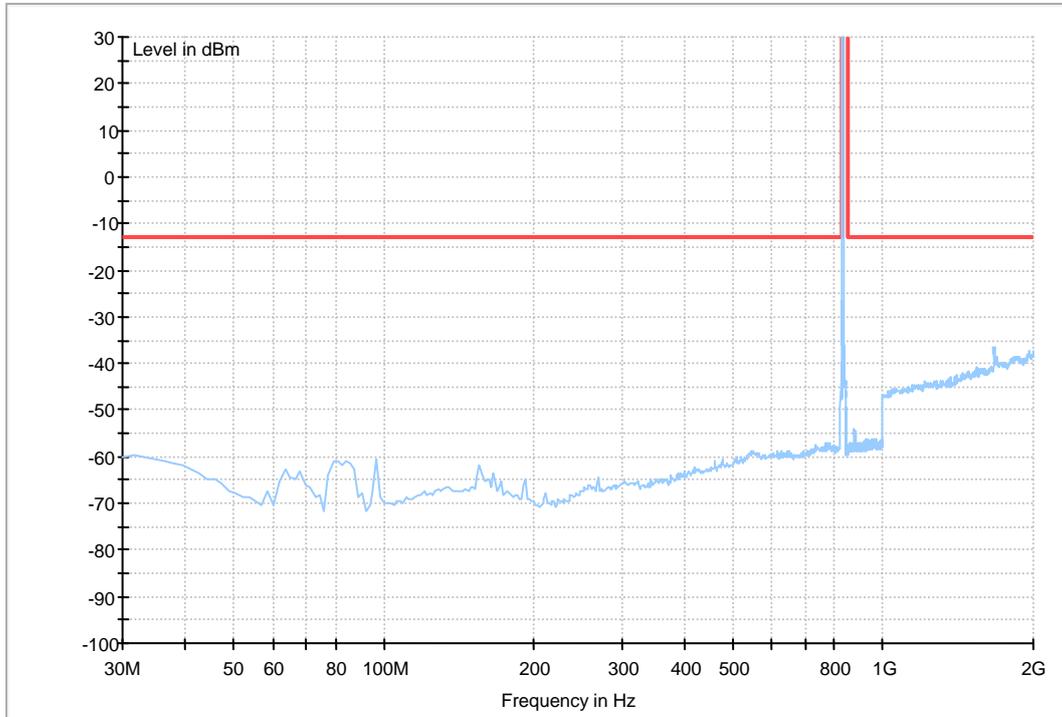
WCDMA 850

Traffic Mode (9kHz-30MHz)



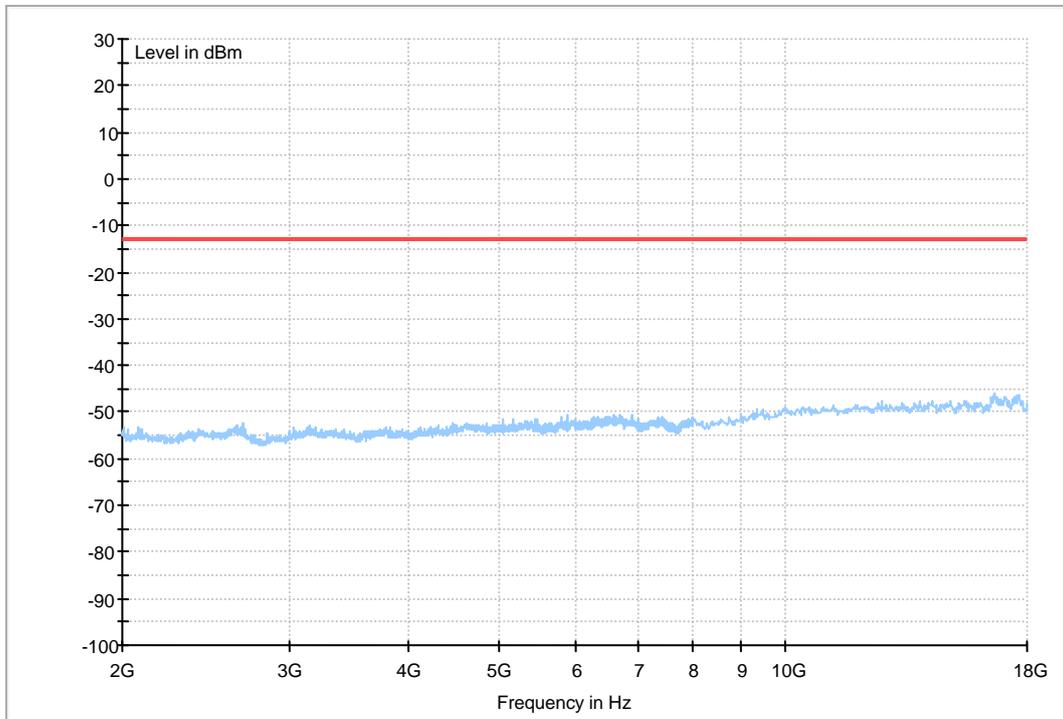


Traffic Mode (30MHz-2GHz)





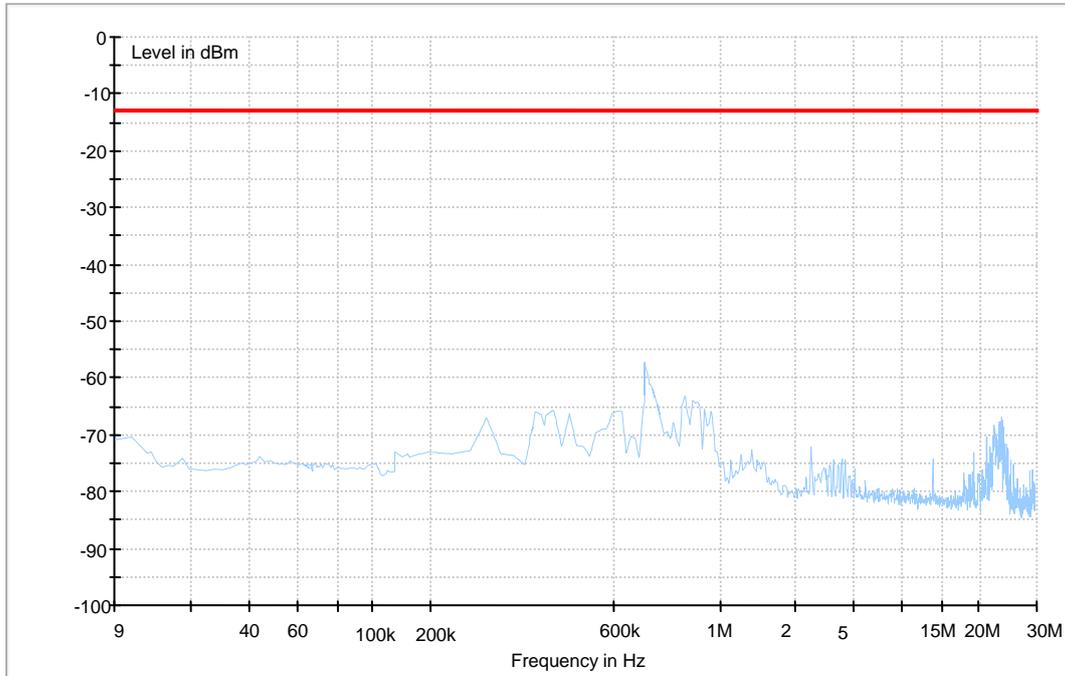
Traffic Mode (2GHz-18GHz)





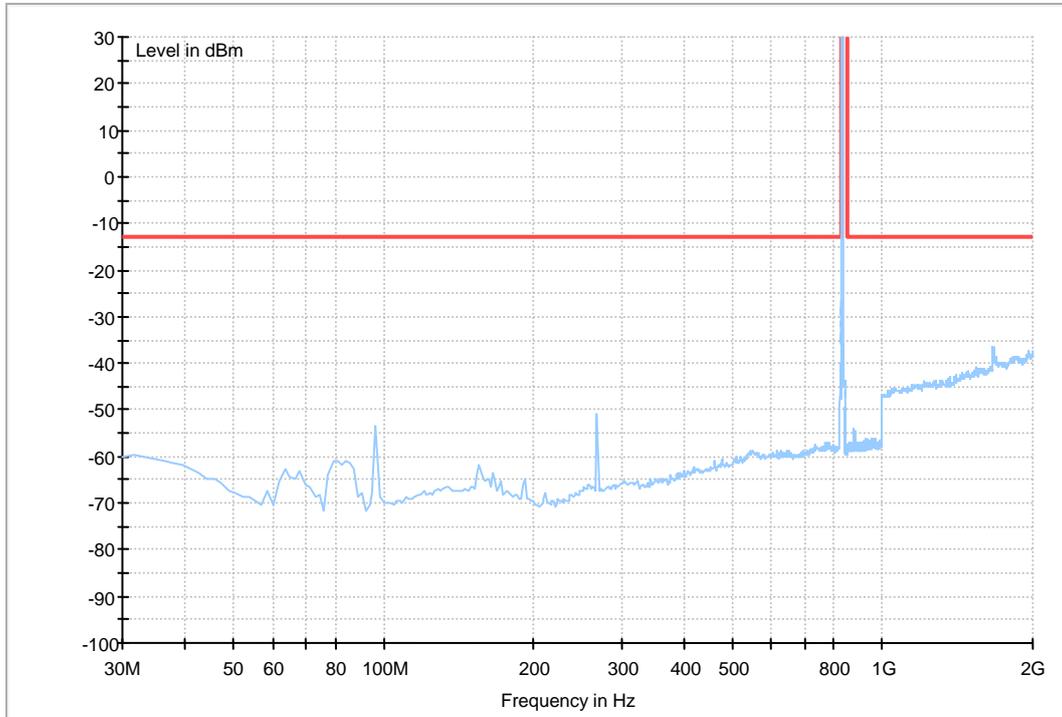
HSDPA 850

Traffic Mode (9kHz-30MHz)



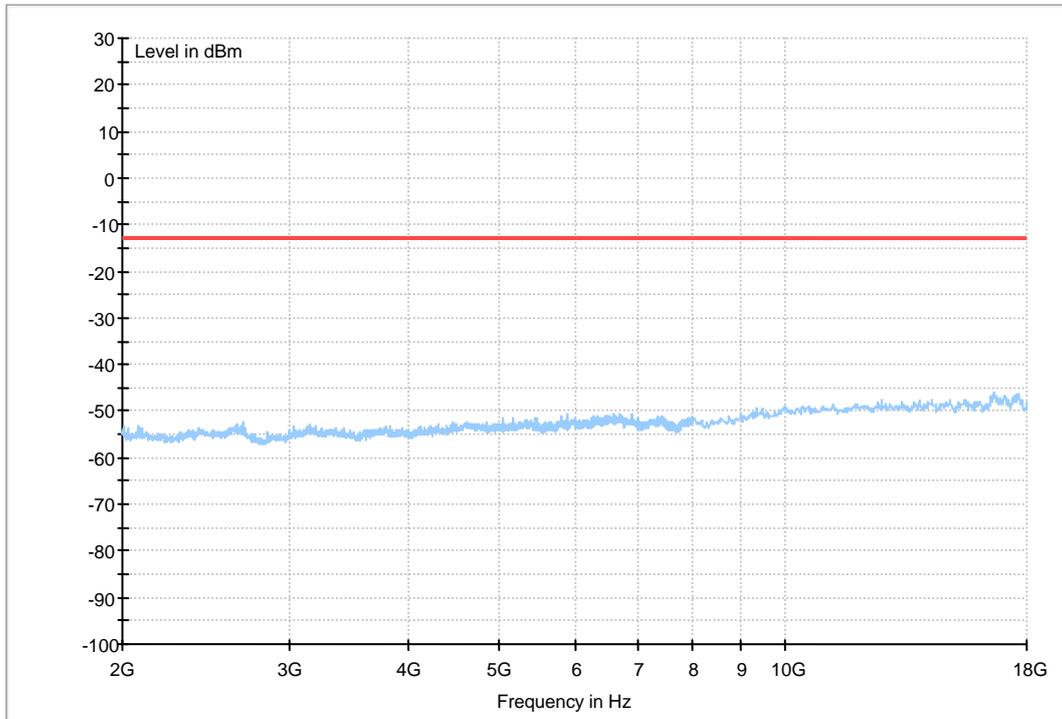


Traffic Mode (30MHz-2GHz)





Traffic Mode (2GHz-18GHz)





FCC RF Test Report

**Product Name: HUAWEI IDEOS X3;
HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with
Bluetooth; IDEOS X3**

Model Number: HUAWEI U8510-5,U8510-5

**Report No: SYBH(Z-RF)005092011-2002
FCC ID: QISU8510-5**

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.



Notice 2

Modification Information:

Modification Information

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

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1 Summary

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

Summary of results

| FCC Measurement Specification | FCC Limits Part(s) | Description | Result |
|-------------------------------|--------------------|---|--------|
| 2.1046 | 24.232 | Effective Isotropic radiated power of Transmitter | PASS |
| 2.1046 | 24.232 | Conducted Power of Transmitter | PASS |
| 2.1047 | | Modulation Characteristics | PASS |
| 2.1049 | | Occupied Bandwidth | PASS |
| 2.1051 | 24.238 | Band Edges Compliance | PASS |
| 2.1051 | 24.238 | Spurious Emission at Antenna Terminal | PASS |
| 2.1053 | 24.238 | Radiated Spurious Emissions | PASS |
| 2.1055 | 24.235 | Frequency Stability | PASS |

2 Product Description

2.1 Production Information

2.1.1 General Description

HUAWEI U8510-5,U8510-5 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band II and Band V. The GSM/GPRS/EDGE frequency band includes GSM850 and DCS1800 and PCS1900, but only PCS1900 and Band II test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port(to provide voice service) and USIM card interface. 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:

Service and Test mode List

| Service Name | Characteristic | Corresponding Test Mode | Note |
|--------------|------------------|-------------------------|----------|
| Data | Modulation: GMSK | TM1 | GPRS/GSM |
| Data | Modulation: 8PSK | TM2 | EDGE |
| Data | Modulation: QPSK | TM3 | WCDMA |
| Data | Modulation: QPSK | TM4 | HSDPA |

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0. The WCDMA test condition & settings are defined in 3GPP TS 34.121 V8.7.0:2009.

2.2 Modification Information

For original equipment, following table is not application.

Modification Information

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

Sep.04, 2011 –Sep.06, 2011

3.2 General Set up Description

TM1: GSM/GPRS Mode with GMSK Modulation

TM2: EDGE Mode with 8PSK Modulation

TM3: WCDMA Mode with QPSK Modulation

TM4: HSDPA Mode with QPSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Frequency Range

| | |
|----------------|------------------|
| Uplink band: | 1850 to 1910 MHz |
| Downlink band: | 1930 to 1990 MHz |

4.1.2 Channel Spacing / Separation

Channel Spacing / Separation

| | EDGE/GPRS/GSM | UMTS/HSDPA |
|------------------|---------------|------------|
| Channel raster | 200k Hz | 200k Hz |
| Channel spacing: | 200k Hz | 5MHz |

4.1.3 Type of Emission

Type of Emission

| | GPRS/GSM | EDGE | UMTS/HSDPA |
|-----------------------|----------|---------|------------|
| Emission Designation: | 300KGXW | 300KG7W | 5M00F9W |

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

4.1.4 Environmental Requirements

Environmental Requirements

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

4.1.5 Power Source

Power Source

| | |
|---------------------|--------------------|
| AC voltage nominal: | ~ 120 V |
| AC voltage range | ~ 100 V to ~ 240 V |
| AC current maximal: | 0.2A |

4.1.6 Tune-up Procedure

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

The voltage and current in the final RF stage is:

Applied RF Module Voltages and Currents

| | |
|----------|---|
| Voltage: | == +3.7V |
| Current: | 100mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8) |

4.2 EUT Identification List

4.2.1 Board Information

Board Information

| | | |
|---|------------------------|------------------|
| HUAWEI IDEOS X3; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth; IDEOS X3 | | |
| HUAWEI U8510-5,U8510-5 | | |
| Main board | | |
| Hardware Version | Software Version | Serial Number |
| HD2U851M | U8510-5V100R001C32B831 | E5M7NB1180200071 |

4.2.1 Adapter Technical Data

| | |
|--------------------|---|
| 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 |

4.2.2 Battery Technical Data

| Name | Manufacture | Description |
|------------------------|----------------------------------|---|
| Rechargeable Li-ion | Huawei Technologies Co., Ltd. | Battery Model: HB4J1H Rated capacity: 1200mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V |

4.2.3 FCC Identification

Grantee Code: QIS
Product Code: U8510-5
FCC Identification: QISU8510-5

5 Main Test Instruments

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.07,2012 |
| 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 Isotropic radiated power of Transmitter (EIRP)

6.1.1 Test Conditions

Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2/TM3 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 24 subpart E

6.1.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.
 $W(\text{dBm}) = 10 \cdot \log(W_{\text{In mW}})$.

Limits

| | |
|------------------------------|-----------|
| Maximum Output Power (Watts) | < 2 Watts |
| Maximum Output Power (dBm) | < 33 dBm |

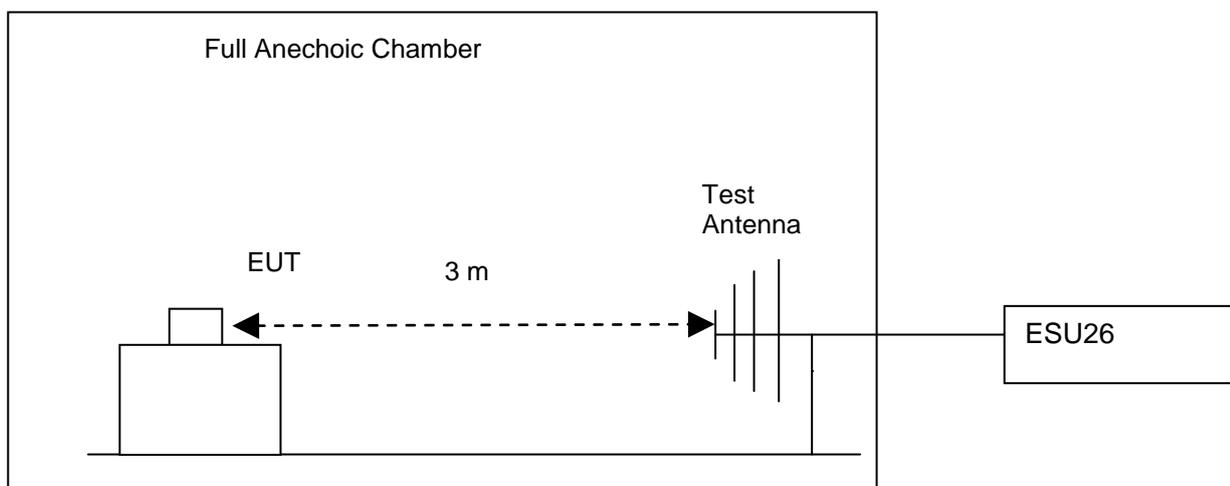
6.1.3 Test Method and Setup

- (a) 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 Mobile Phone to the wireless communication tester CMU200 via the air interface. The band is set as PCS.
- (b) Test the Radiated maximum output power by the CMU200 received from test antenna.

- (c) Use substitution method to verify the maximum output power. The EUT is substituted by a horn antenna. The horn 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 EIRP

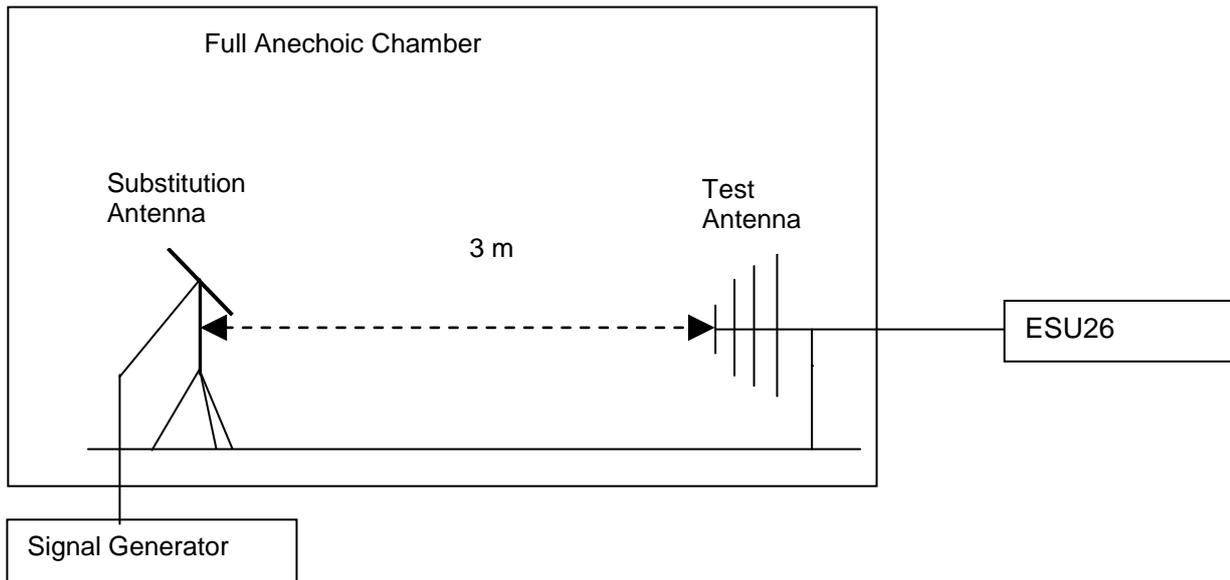


Figure 1. Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave horn antennas. There is a constant difference of 2.15 dB between EIRP and ERP.
 $EIRP \text{ (dBm)} = ERP \text{ (dBm)} + 2.15$ (ITU-R Recommendation SM.329-10).

6.1.4 Measurement Results

6.1.4.1 Pre-test Results

Measurement Results

| | | RF Output Power (EIRP) | | | | | |
|---|--|------------------------|-------|----------------|-------|----------------|-------|
| TEST CONDITIONS | | Channel512(B) | | Channel661(M) | | Channel810(T) | |
| | | 1850.2MHz | | 1880.0MHz | | 1909.8MHz | |
| | | dBm | | dBm | | dBm | |
| T _{nom} (25 °C)/ V _{nom} (3.7V) | | Measure d | Limit | Measure d | Limit | Measure d | Limit |
| TM1 | | 30.86 | 33 | 30.82 | 33 | 30.92 | 33 |
| TM2 | | 27.56 | 33 | 27.51 | 33 | 27.61 | 33 |
| | | | | | | | |
| TEST CONDITIONS | | Channel9262(B) | | Channel9400(M) | | Channel9538(T) | |
| | | 1852.4MHz | | 1880.0MHz | | 1907.6MHz | |
| | | dBm | | dBm | | dBm | |
| T _{nom} (25 °C)/ V _{nom} (3.7V) | | Measure d | Limit | Measure d | Limit | Measure d | Limit |
| TM3 | | 24.09 | 33 | 24.18 | 33 | 24.15 | 33 |

6.1.4.2 Substitution Results

Substitution Results

| 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 | 30.86 | Horn Ant. | 27.36 | 4.5 | 1 | 30.83 | 33 | Pass |
| TM1 | 1880.0 | 30.82 | Horn Ant. | 27.32 | 4.5 | 1 | 30.85 | 33 | Pass |
| TM1 | 1909.8 | 30.92 | Horn Ant. | 27.12 | 4.8 | 1 | 30.95 | 33 | Pass |
| TM2 | 1850.2 | 27.56 | Horn Ant. | 24.06 | 4.5 | 1 | 27.51 | 33 | Pass |
| TM2 | 1880.0 | 27.51 | Horn Ant. | 24.01 | 4.5 | 1 | 27.54 | 33 | Pass |
| TM2 | 1909.8 | 27.61 | Horn Ant. | 23.81 | 4.8 | 1 | 27.67 | 33 | Pass |
| TM3 | 1852.4 | 24.09 | Horn Ant. | 20.59 | 4.5 | 1 | 24.08 | 33 | Pass |
| TM3 | 1880.0 | 24.18 | Horn Ant. | 20.68 | 4.5 | 1 | 24.13 | 33 | Pass |
| TM3 | 1907.6 | 24.15 | Horn Ant. | 20.35 | 4.8 | 1 | 24.14 | 33 | Pass |

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

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

NOTE: SGP- Signal Generator Level

b, Measurement the EIRP with RMS detector.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 250kHz for TM1 and TM2 and 5M for TM3.

6.1.5 Conclusion

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

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Test Conditions

| | |
|----------------------|---------------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 /TM4 at frequency B, M, T |

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.2.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

$$EIRP(dBm) = 10 \cdot \log(EIRP_{in\ mW}).$$

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

$$P_{cod.}(dBm) = EIRP(dBm) - Gain(dBi).$$

and $Gain(dBi) = Gain(dBd) + 2.15dB$

Limits

| | |
|--------------------------------------|--------------------|
| Maximum Output Power (Watts) | < 2 Watts (33 dBm) |
| Antenna Gain(dBi): | 1.24 |
| Antenna Gain(dBd): | -0.91 |
| Maximum Conducted Output Power (dBm) | < 31.76 |

For HSDPA test mode, there are 4 sub-tests for different configuration.

HSDPA conducted max power pre-scan

| Sub-test | β_c | β_d | β_d (SF) | β_c/β_d | HS | CM (dB) | MPR (dB) |
|----------|-----------|-----------|-------------------|-------------------|-------|------------|-------------|
| 1 | 2/15 | 15/15 | 64 | 2/15 | 4/15 | 0 | 0 |
| 2 | 12/15 | 15/15 | 64 | 12/15 | 24/15 | 1 | 0 |
| 3 | 15/15 | 8/15 | 64 | 15/8 | 30/15 | 1.5 | 0.5 |
| 4 | 15/15 | 4/15 | 64 | 15/4 | 30/15 | 1.5 | 0.5 |

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 Phone to the wireless communication tester CMU200 via the antenna connector. The band class is set as PCS.

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

Test setup

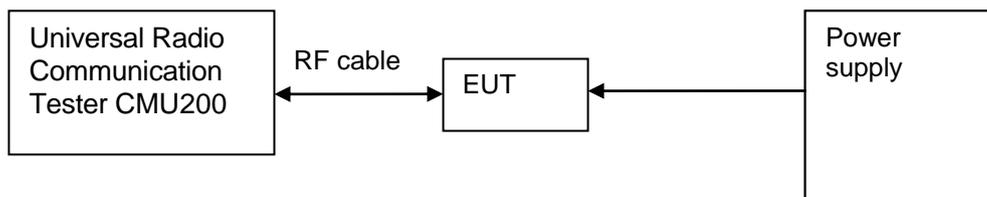


Figure 2. Test Set-up

6.2.4 Measurement Results

Measurement Results

| TEST CONDITIONS | RF Output Power (Conducted) | | | | | |
|---------------------------|-----------------------------|-------|----------------|-------|----------------|-------|
| | Channel512(B) | | Channel661(M) | | Channel810(T) | |
| | 1850.2MHz | | 1880.0MHz | | 1909.8MHz | |
| | dBm | | dBm | | dBm | |
| Tnom (25 °C)/ Vnom (3.7V) | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | 29.62 | 31.76 | 29.58 | 31.76 | 29.68 | 31.76 |
| TM2 | 26.32 | 31.76 | 26.27 | 31.76 | 26.37 | 31.76 |
| TEST CONDITIONS | Channel9262(B) | | Channel9400(M) | | Channel9538(T) | |

| | | 1852.4MHz | | 1880.0MHz | | 1907.6MHz | |
|---|-------|-----------|-------|-----------|-------|-----------|-------|
| | | dBm | | dBm | | dBm | |
| T _{nom} (25 °C)/ V _{nom} (3.7V) | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM3 | | 22.85 | 31.76 | 22.94 | 31.76 | 22.91 | 31.76 |
| TM4 | Case1 | 22.87 | 31.76 | 22.96 | 31.76 | 22.94 | 31.76 |
| | Case2 | 22.43 | 31.76 | 22.67 | 31.76 | 22.48 | 31.76 |
| | Case3 | 21.95 | 31.76 | 22.16 | 31.76 | 21.98 | 31.76 |
| | Case4 | 21.85 | 31.76 | 22.07 | 31.76 | 22.11 | 31.76 |

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

Test Conditions

| | |
|----------------------|----------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency M |

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 subpart E

6.3.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Limits

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

6.3.3 Test Method and Setup

Connect the Mobile Phone to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the Mobile Phone's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010 and 3GPP TS 34.121. The waveform quality and constellation of the Mobile Phone was tested.

Test setup

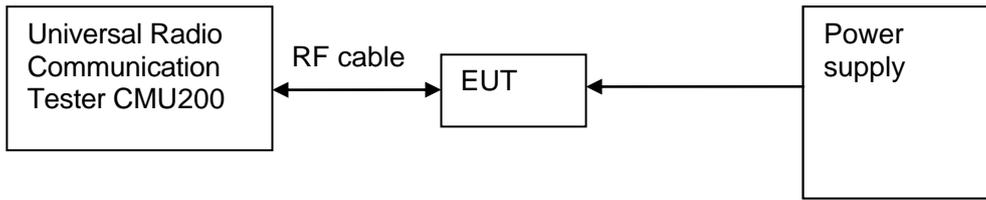


Figure 3. Test Set-up

6.3.4 Measurement Results

Measurement Results

| | | Modulation Characteristic | |
|--------------------------|-------------------------|------------------------------|---------------------|
| TEST CONDITIONS | | Channel 661(M) 1880.0MHz | |
| | | Measured | |
| | | TM1 | TM2 |
| T _{nom} (25 °C) | V _{nom} (3.7V) | Refer to Appendix A | Refer to Appendix A |
| TEST CONDITIONS | | Channel 9400(M) 1880.0MHz | |
| | | Measured | |
| | | TM3 | |
| T _{nom} (25 °C) | V _{nom} (3.7V) | 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

Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 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 24 subpart E

6.4.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 subpart E, 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.

Limits

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

6.4.3 Test Method and Setup

Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector. The band class is set as PCS; Mobile Phone was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Mobile Phone by the R&S 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 part2.1049 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.

For TM1/TM2 following RBW and VBW are employed:

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)

Video bandwidth (VBW): 10 kHz

For TM3 following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 500 kHz

Test Set-up

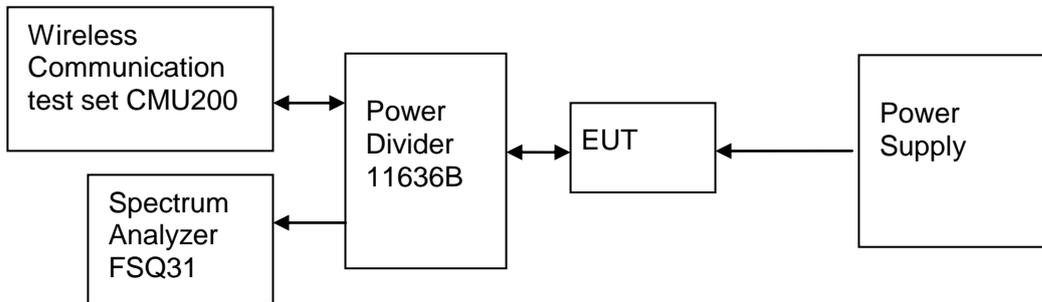


Figure 4. Test Set-up

6.4.4 Measurement Results

Measurement Results

| TEST CONDITIONS | | Occupied Bandwidth | | | | | |
|-------------------|-----|-----------------------------|--------|-----------------------------|--------|-----------------------------|--------|
| | | Channel512(B) 1850.2MHz | | Channel661(M) 1880.0MHz | | Channel810(T) 1909.8MHz | |
| | | Measured (kHz) | | Measured (kHz) | | Measured (kHz) | |
| | | TM1 | TM2 | TM1 | TM2 | TM1 | TM2 |
| T_{nom} (25 °C) | 99% | 250.00 | 243.59 | 245.19 | 245.19 | 246.79 | 241.99 |
| V_{nom} (3.7V) | | | | | | | |
| Center Frequency | | Channel9262(B) 1852.4MHz | | Channel9400(M) 1880.0MHz | | Channel9538(T) 1907.6MHz | |

| | | Measured (MHz) | Measured (MHz) | Measured (MHz) |
|---------------------------------------|-----|-------------------|-------------------|-------------------|
| | | TM3 | TM3 | TM3 |
| T_{nom} (25 °C) V_{nom} (3.7V) | 99% | 4.18 | 4.18 | 4.20 |

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

Test Conditions

| | |
|----------------------|-------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency B, T |

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part24 Subpart E

6.5.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least $43 + 10 \log_{10} P(W)$. (Whereas P is the rated power of the EUT).

Limits for GPRS

| | TM1 | TM2 | TM3 |
|-----------------------|---|---|--|
| Rated Power: | 30 dBm | 26 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log(1) = 43$, 30 dBm - 43 dB | $43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB | $43 + 10 \log(0.25) = 37$, 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.5.3 Test Method and Setup

Mobile Phone was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the band class is set as PCS. Mobile Phone was controlled to transmit maximum power. Measure and record band edges compliance of the Mobile Phone by the R&S FSQ31.

For TM1/TM2 following RBW and VBW are employed:
 Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
 Video bandwidth (VBW): 10 kHz
 For TM3 following RBW and VBW are employed:
 Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)
 Video bandwidth (VBW): 200 kHz

Test Set-up

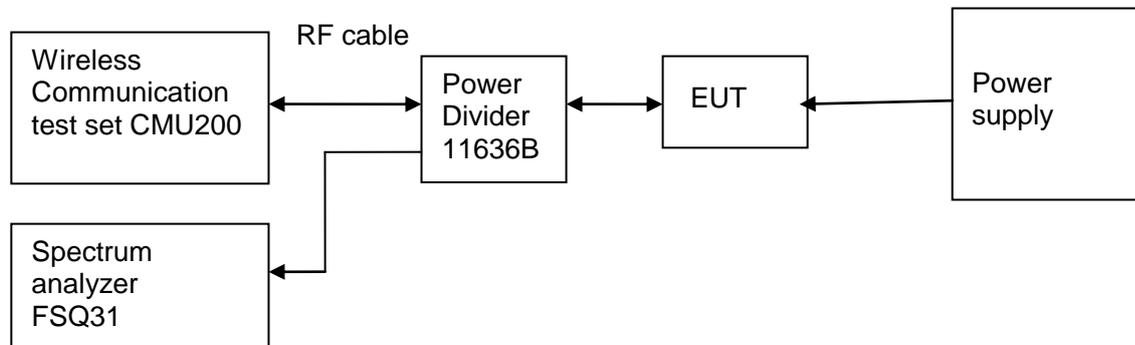


Figure 5. Test Set-up

6.5.4 Measurement Results

Measurement Results outside Band Edges-- Single Carrier

| Band | Frequency of Band edges [MHz] | Channel Number | Test Mode | Spurious Level measured [dBm] | FCC limit | Result |
|---|-------------------------------|----------------|-----------|-------------------------------|-----------|--------|
| $T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (3.7\text{V})$ | | | | | | |
| PCS | 1850.2 | 512 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1909.8 | 810 | TM1 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1850.2 | 512 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1909.8 | 810 | TM2 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1852.4 | 9262 | TM3 | <-13(See appendix C) | - 13 dBm | Pass |
| | 1907.6 | 9538 | TM3 | <-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

Test Conditions

| | |
|----------------------|----------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency B, M ,T |

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part24 Subpart E

6.6.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.6.2.3 Limits

Compliance with part 24.238, 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).

Limits for GPRS Mode

| | TM1 | TM2 | TM3 |
|-----------------------|---|---|--|
| Rated Power: | 30 dBm | 26 dBm | 24 dBm |
| Required attenuation: | $43 + 10 \log (1) = 43$, 30 dBm - 43 dB | $43 + 10 \log (0.4) = 39$, 26 dBm - 39 dB | $43 + 10 \log (0.25) = 37$, 24 dBm - 37 dB |
| Absolute level | - 13 dBm | - 13 dBm | - 13 dBm |

6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ31 via the one RF connector, the

band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the R&S FSQ31.

According to part 24.238, the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;
Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

Test Set-up

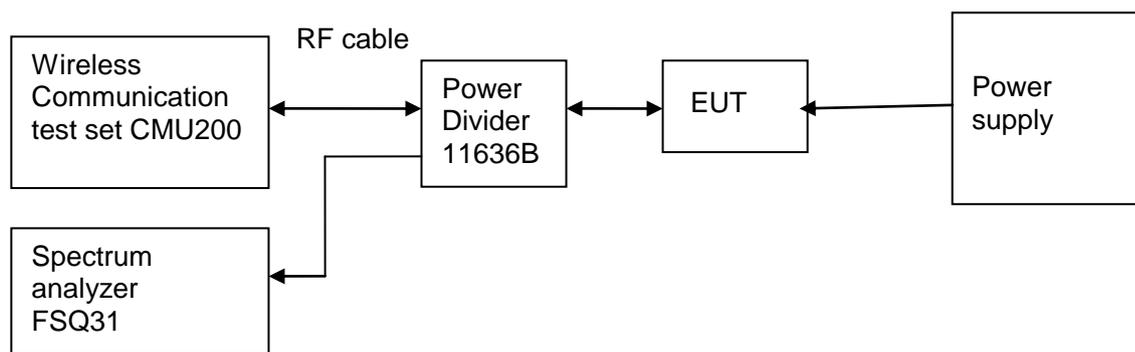


Figure 6. Test Set-up

6.6.4 Measurement Results

Measurement Results

| Channel Number | Test Mode | Test Range (Frequency) | Output Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|-----------------|-----------|------------------------|--------------------|-------------------------------|-----------|--------|
| Channel 512(B) | TM1 | 9 kHz~20GHz | 30 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 26 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 9262(B) | TM3 | 9 kHz~20GHz | 24 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 661(M) | TM1 | 9 kHz~20GHz | 30 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 26 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 9400(M) | TM3 | 9 kHz~20GHz | 24 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |

| | | | | | | |
|--------------------|-----|-------------|----|-------------------------------|-------------|------|
| Channel 810(T) | TM1 | 9 kHz~20GHz | 30 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| | TM2 | 9 kHz~20GHz | 26 | <- 13 dBm (See appendix D) | - 13 dBm | Pass |
| Channel 9538(T) | TM3 | 9 kHz~20GHz | 24 | <- 13 dBm (See appendix D) | - 13 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

Test Conditions

| | |
|----------------------|--------------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25°C |
| Relative humidity: | 55% |
| Test Configurations: | TM1/TM2/TM3/TM4 at frequency M |

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 24.238

6.7.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.7.2.3 Limits

Compliance with part 24.238, 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).

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 24.238, the defined measurement bandwidth as following:

24.238(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1MHz or greater.

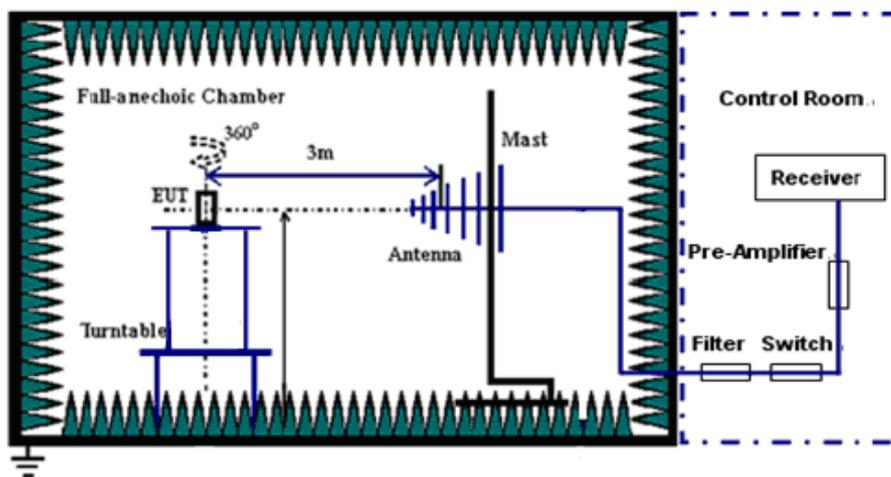
Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;
 Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;
 Measurement bandwidth (RBW) for 30MHz up to 26.5GHz: 1MHz;

Test Set-up

Step 1:

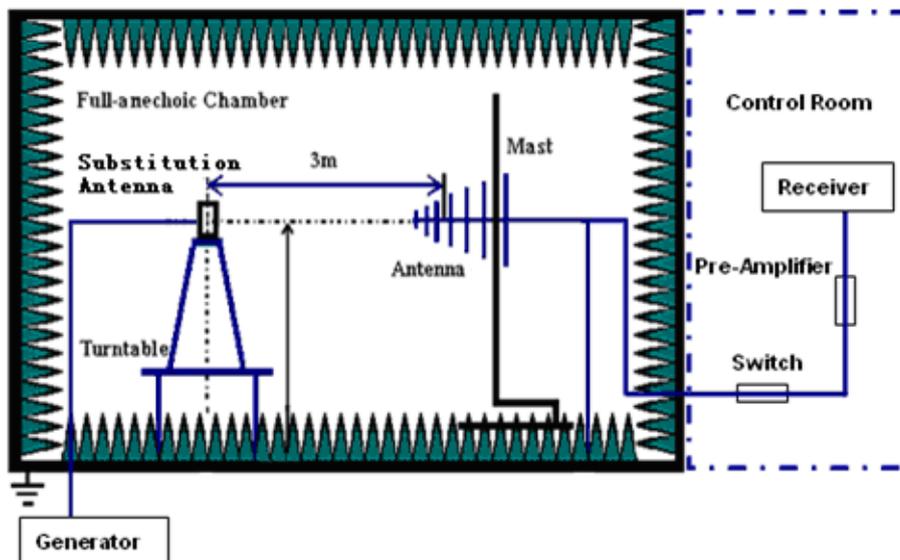
For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect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

Substitution Results

| Freq. [MHz] | Measurement Value [dBm] | Substitution Antenna Type | Gain [dBd] | Cable Loss [dB] | Signal Generator Level [dBm] | Substitution Level [dBm] | FCC limit [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

Test Conditions

| | |
|----------------------|----------------------------|
| Preconditioning: | 0.5 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | See below |
| Relative humidity: | 55 % |
| Test Configurations: | TM1/TM2/TM3 at frequency M |

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and Part24 Subpart E

6.8.2.2 Supporting Standards

Supporting Standards:

| | |
|-----------------------------|--|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| 3GPP TS51.010 V5.4.0.0:2005 | Digital cellular telecommunications system Mobile Station (MS) conformance specification; |
| 3GPP TS 34.121 V8.7.0:2009 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

6.8.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.8.3 Test Method and Setup

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

- (1) From -30 ° to +50 ° 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° 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.)

Note: 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 Ω load.

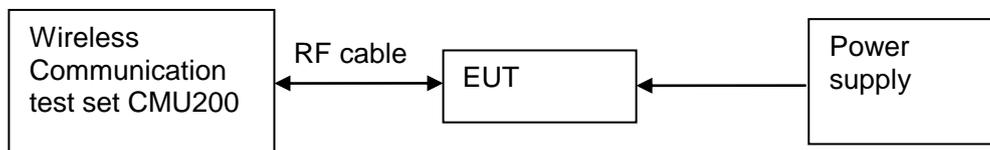


Figure 7. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.7V DC Channel No.661(1880.0MHz)**

Measurement Results vs. Variation of Temperature—TM1

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|------------------------------|--------|
| -30 °C | 1880.0 | -13 | Pass |
| -20 °C | 1880.0 | -9 | Pass |
| -10 °C | 1880.0 | -15 | Pass |
| 0 °C | 1880.0 | 11 | Pass |
| +10 °C | 1880.0 | 19 | Pass |
| +20 °C | 1880.0 | -15 | Pass |
| +30 °C | 1880.0 | 11 | Pass |
| +40 °C | 1880.0 | -7 | Pass |

| | | | |
|--------|--------|----|------|
| +50 °C | 1880.0 | 15 | Pass |
|--------|--------|----|------|

● **TM2, 3.7V DC Channel No.661(1880.0MHz)**

Measurement Results vs. Variation of Temperature – TM2

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|------------------------------|--------|
| -30 °C | 1880.0 | -18 | Pass |
| -20 °C | 1880.0 | -15 | Pass |
| -10 °C | 1880.0 | -11 | Pass |
| 0 °C | 1880.0 | -15 | Pass |
| +10 °C | 1880.0 | -11 | Pass |
| +20 °C | 1880.0 | -9 | Pass |
| +30 °C | 1880.0 | -12 | Pass |
| +40 °C | 1880.0 | -7 | Pass |
| +50 °C | 1880.0 | -10 | Pass |

● **TM3, 3.7V DC Channel No.9400(1880.0MHz)**

Measurement Results vs. Variation of Temperature – TM3

| Temperature | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|------------------------------|--------|
| -30 °C | 1880.0 | -14 | Pass |
| -20 °C | 1880.0 | -12 | Pass |
| -10 °C | 1880.0 | 16 | Pass |
| 0 °C | 1880.0 | -11 | Pass |
| +10 °C | 1880.0 | -10 | Pass |
| +20 °C | 1880.0 | -15 | Pass |
| +30 °C | 1880.0 | -9 | Pass |
| +40 °C | 1880.0 | -16 | Pass |
| +50 °C | 1880.0 | -8 | Pass |

6.8.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 661(1880.0MHz)**

Measurement Results vs. Variation of Voltage – TM1

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2V | 1880.0 | -17 | Pass |
| 3.7V | 1880.0 | -12 | Pass |
| 3.6 V | 1880.0 | -13 | Pass |

- **TM2, 25 °C ,Channel No. 661(1880.0MHz)**

Measurement Results vs. Variation of Voltage – TM2

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2V | 1880.0 | -14 | Pass |
| 3.7 V | 1880.0 | -15 | Pass |
| 3.6 V | 1880.0 | -13 | Pass |

- **TM3, 25 °C ,Channel No. 9400(1880.0MHz)**

Measurement Results vs. Variation of Voltage – TM3

| Voltage | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---------|----------------------------|------------------------------|--------|
| 4.2V | 1880.0 | -6 | Pass |
| 3.7V | 1880.0 | -17 | Pass |
| 3.6 V | 1880.0 | 11 | 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:

System Measurement Uncertainty

| Items | | Extended Uncertainty |
|---|-------------------------|----------------------|
| Effective Isotropic radiated power of Transmitter | EIRP (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 |

8 Appendices

| | |
|------------|---|
| 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 |



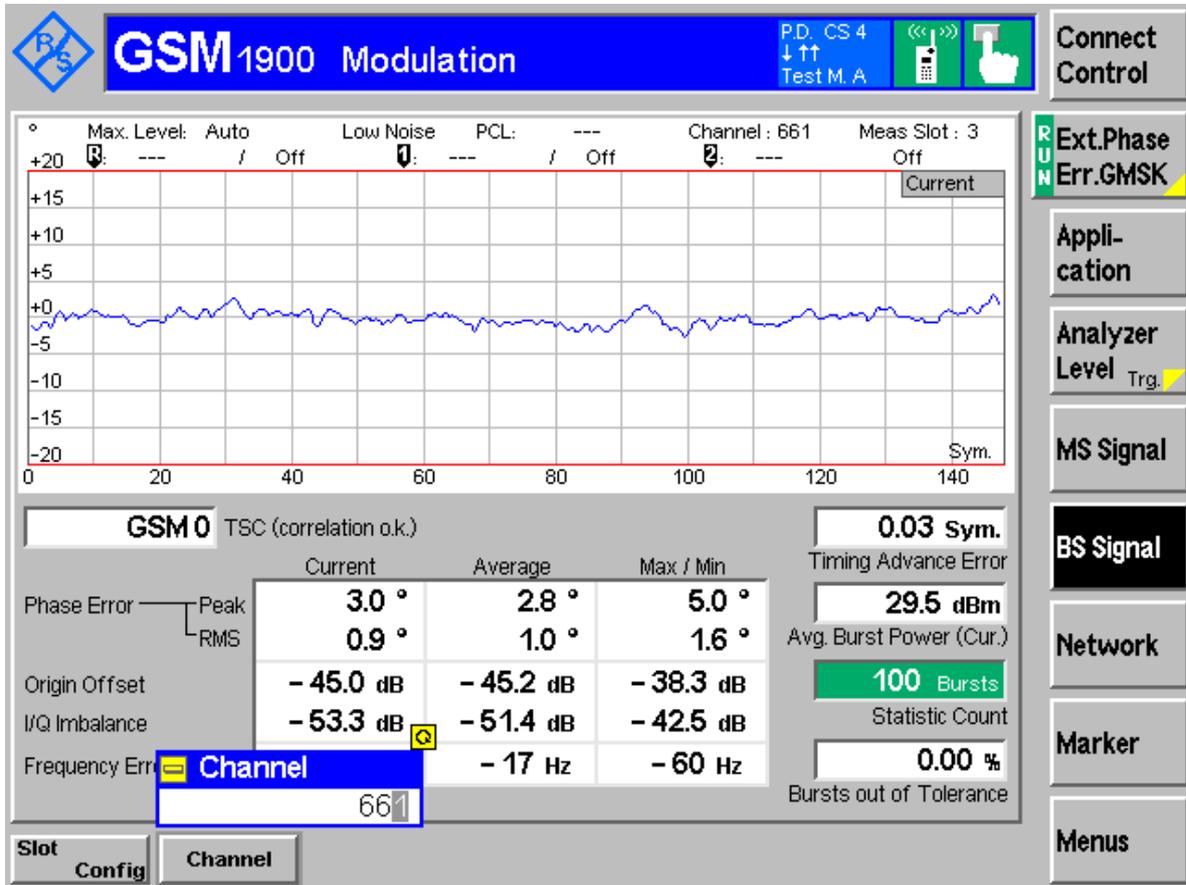
Appendix A

Modulation Characteristics

According to FCC Part 2.1047 & Part24 Subpart E

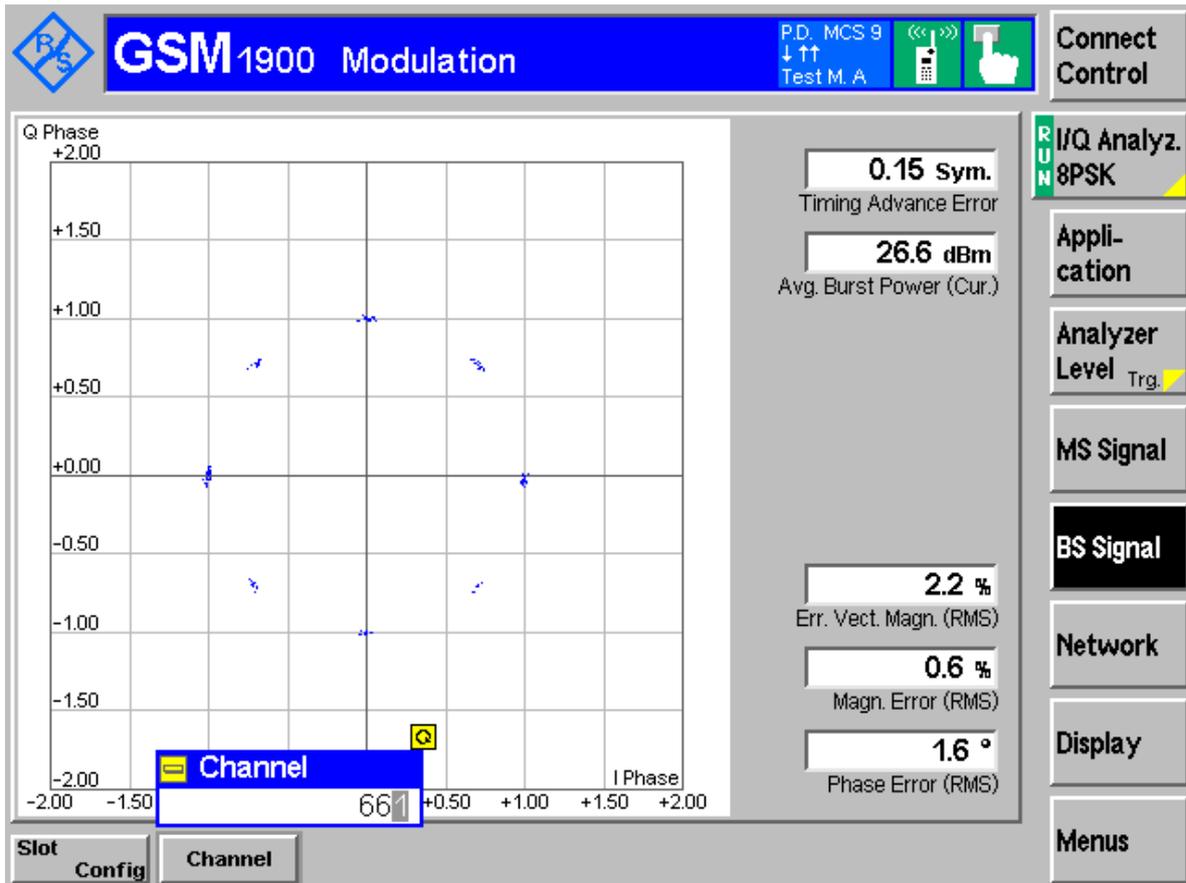


TM1:GPRS/GSM Channel 661



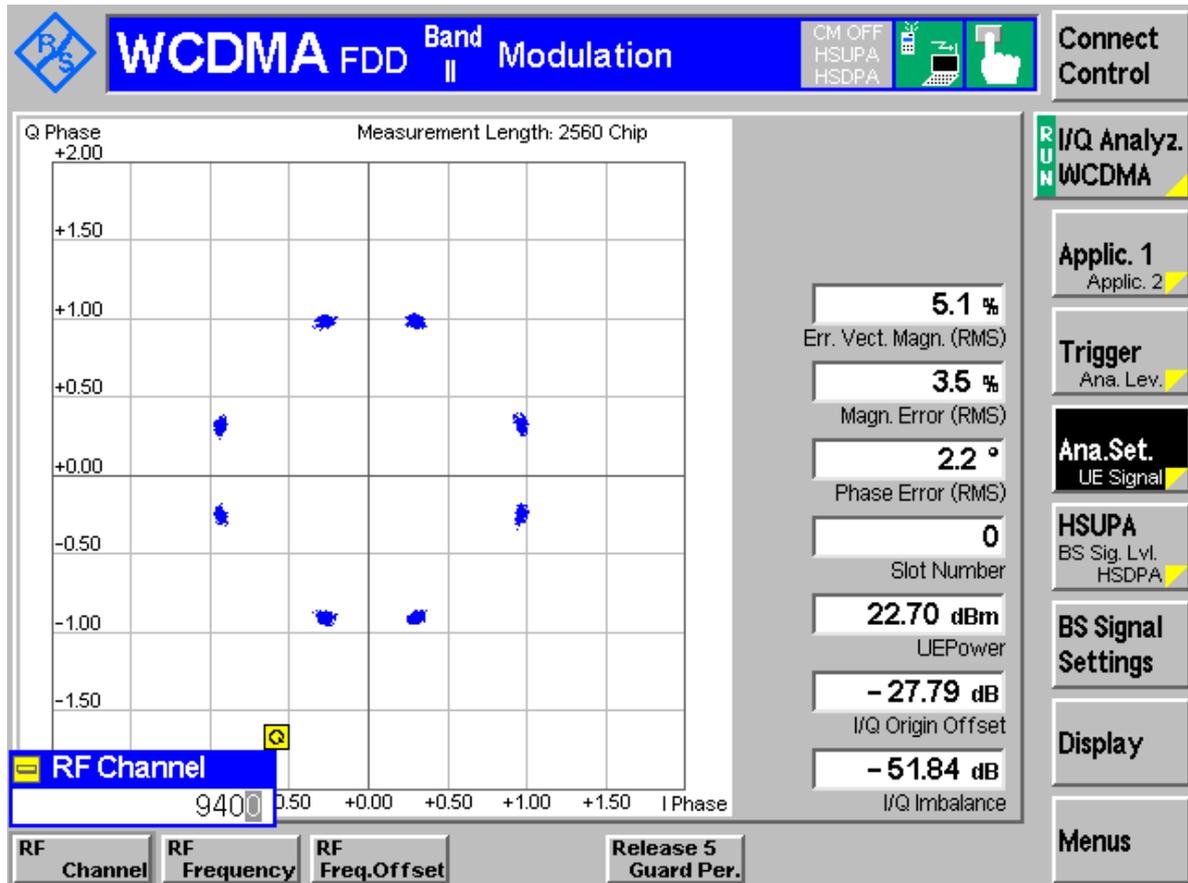


TM2:EDGE Channel 661





TM3: WCDMA Channel 9400





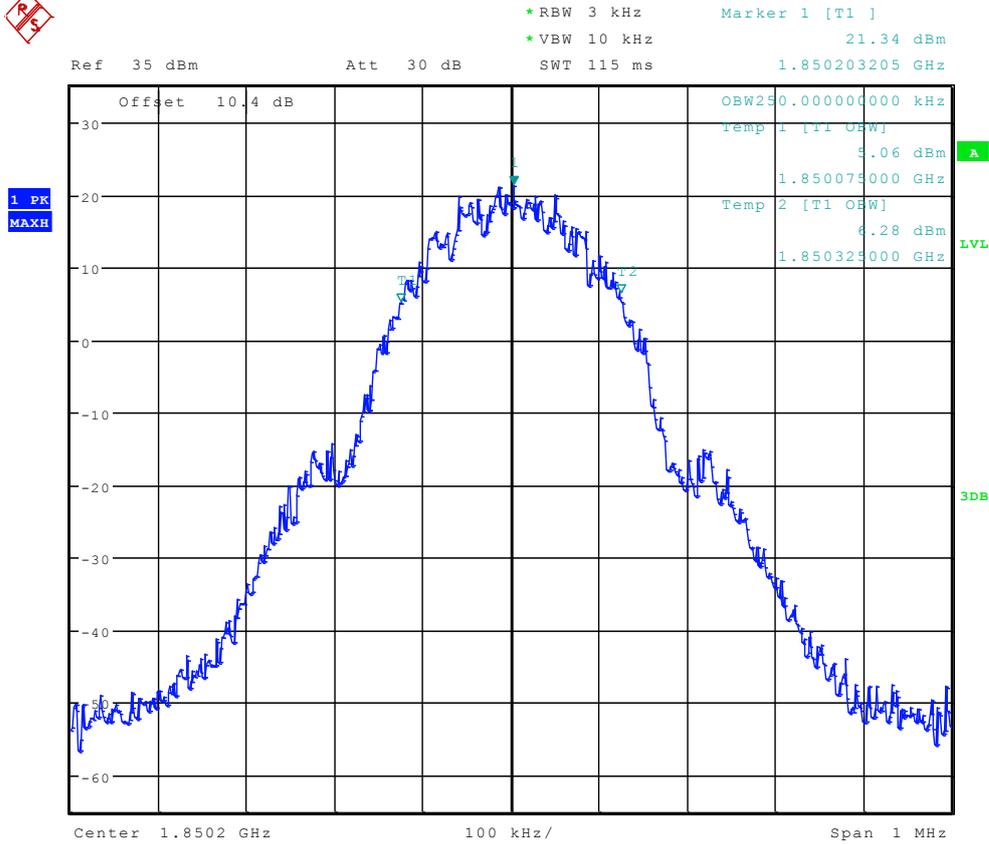
Appendix B

Occupied Bandwidth

According to FCC Part 2.1049 & Part 24 Subpart E

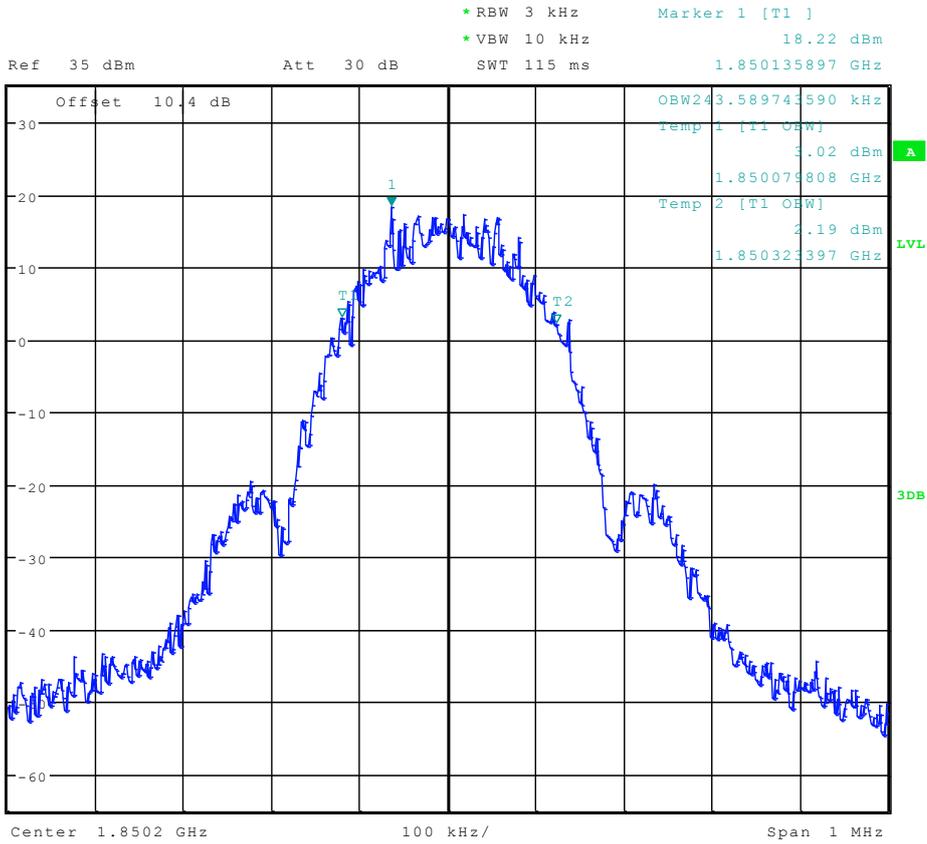


TM1:GPRS/GSM Channel 512



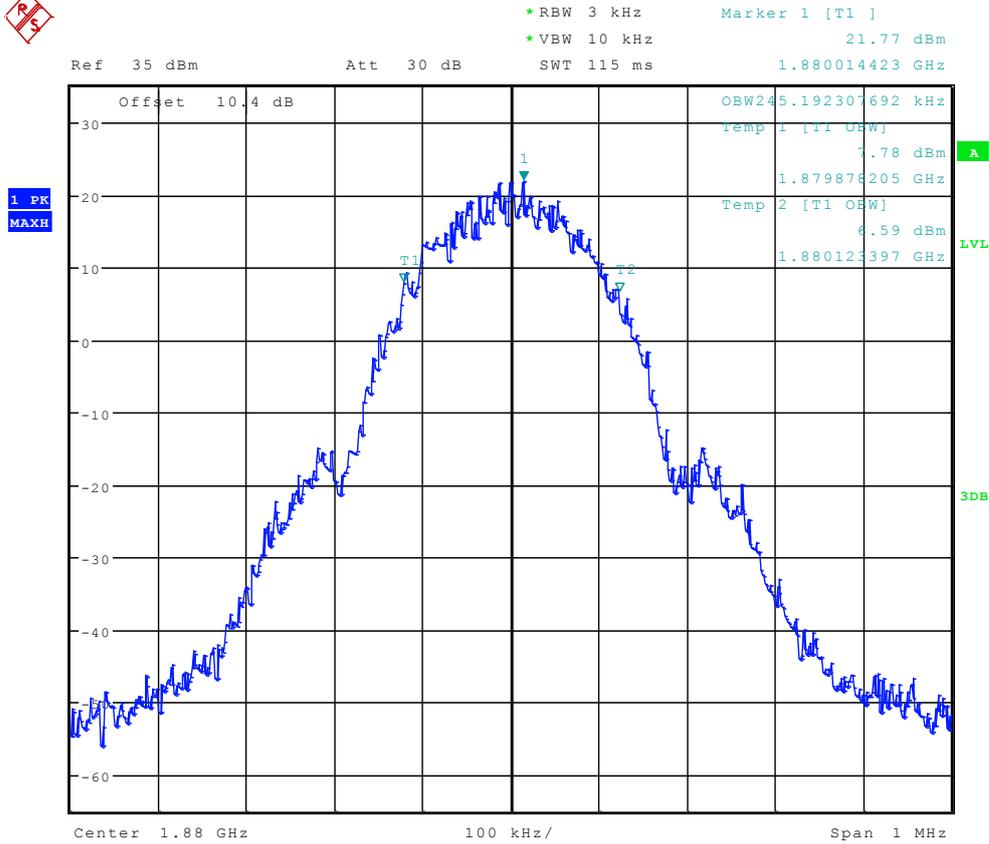


TM2:EDGE Channel 512



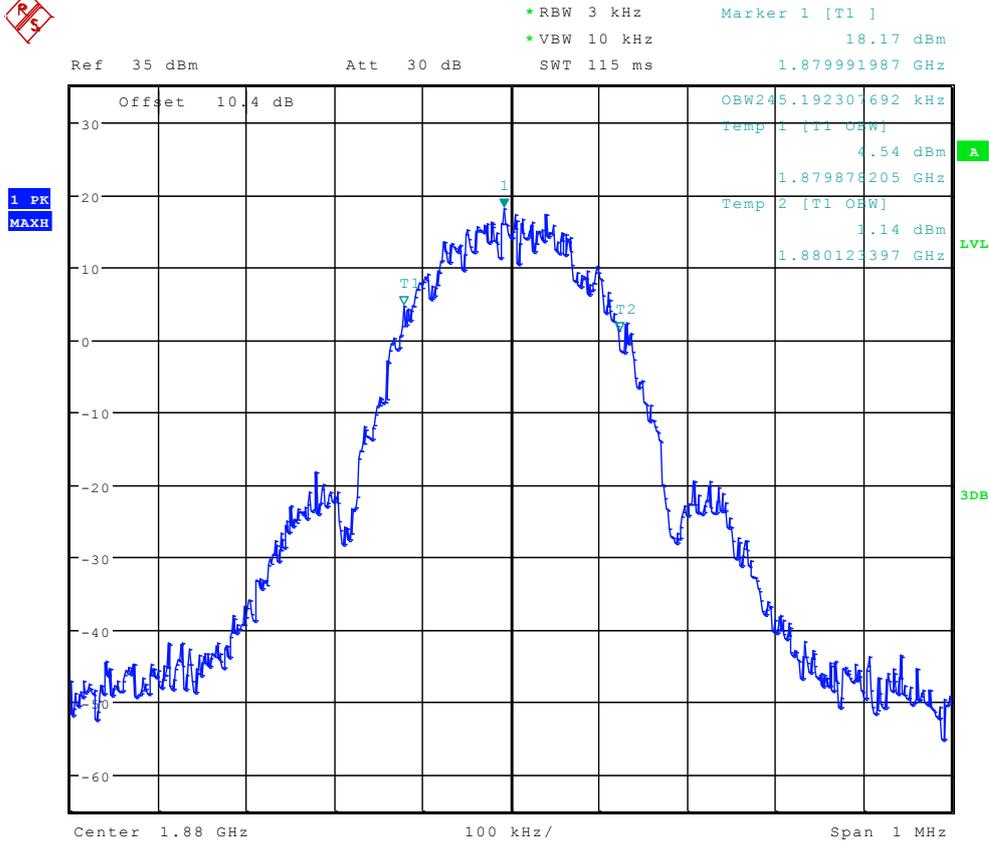


TM1:GPRS/GSM Channel 661





TM2:EDGE Channel 661

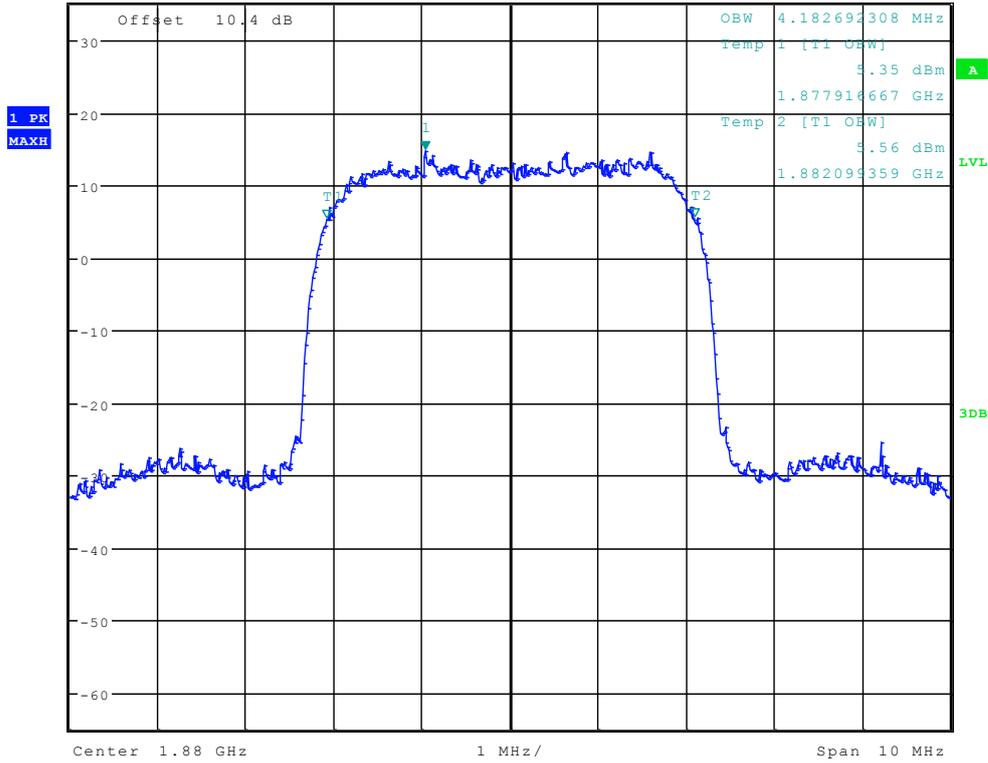




TM3: WCDMA Channel 9400

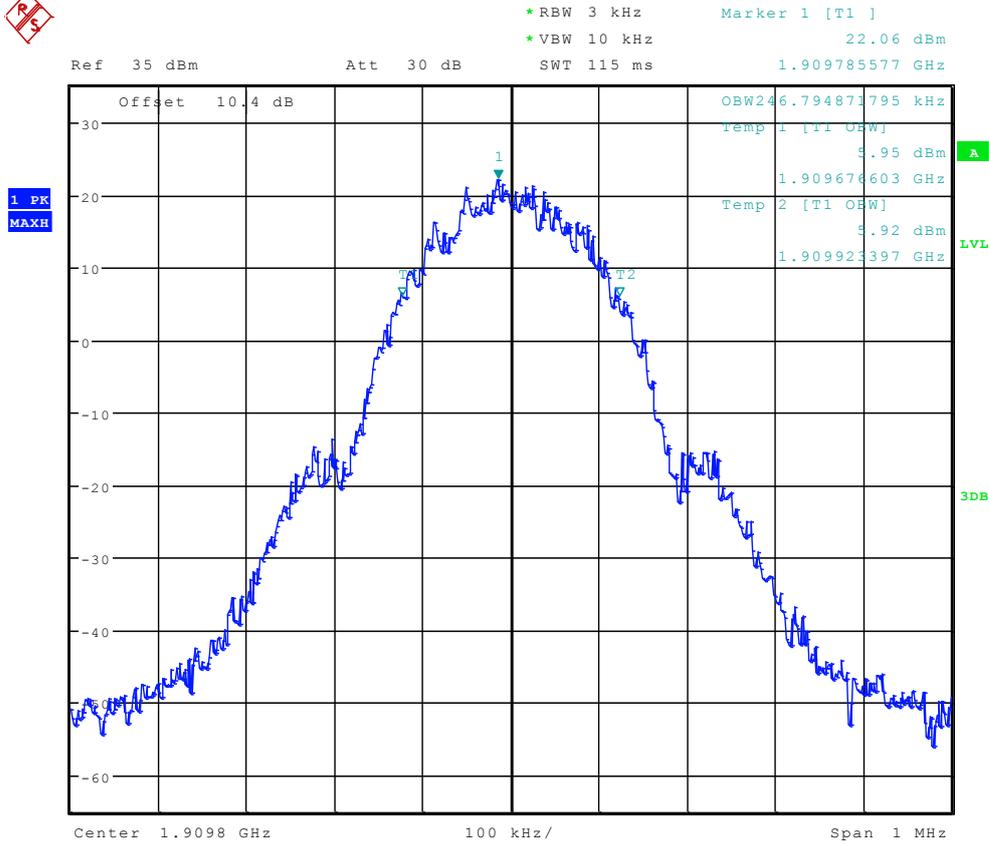


*RBW 50 kHz Marker 1 [T1]
 *VBW 500 kHz 14.62 dBm
 Ref 35 dBm Att 30 dB SWT 5 ms 1.879038462 GHz



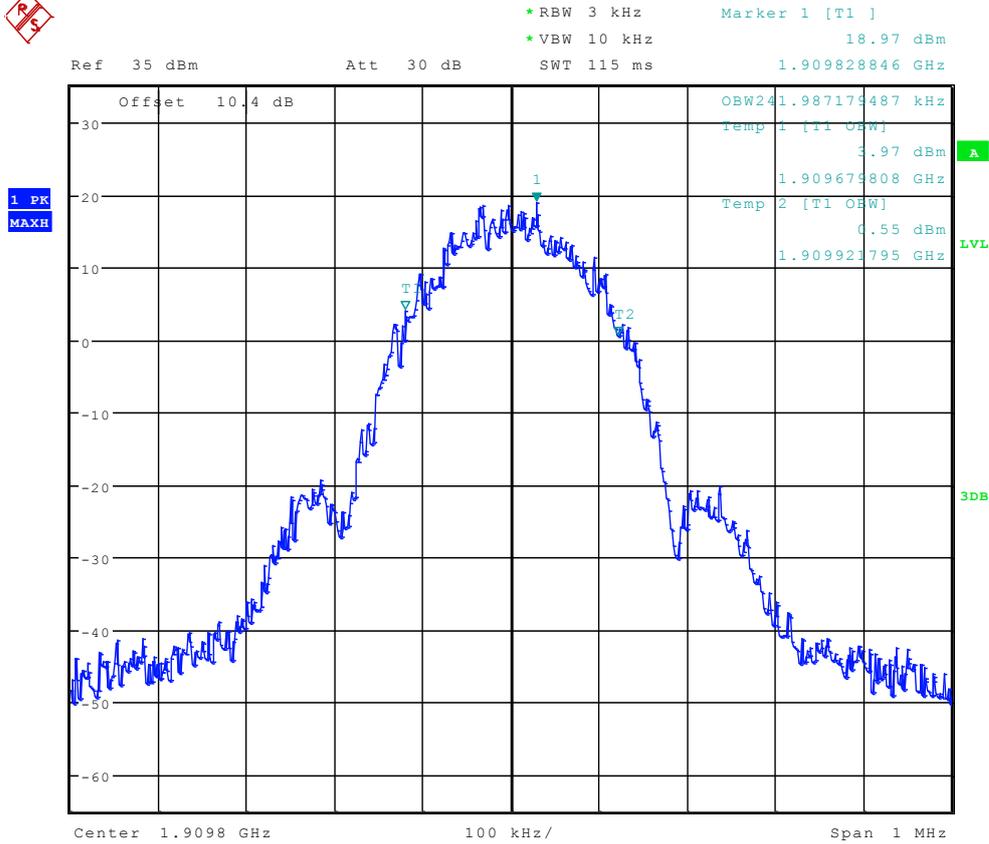


TM1:GPRS/GSM Channel 810





TM2:EDGE Channel 810



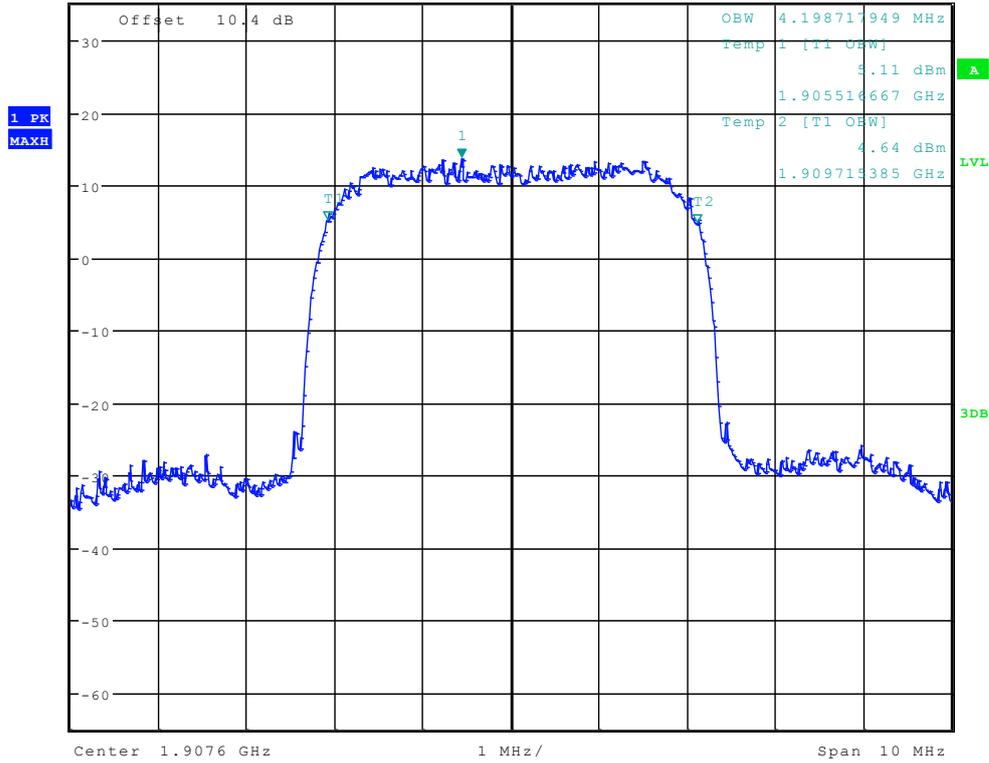


TM3: WCDMA Channel 9538



*RBW 50 kHz
 *VBW 500 kHz
 Ref 35 dBm Att 30 dB SWT 5 ms

Marker 1 [T1]
 13.74 dBm
 1.907039103 GHz





Appendix C

Band Edges Compliance

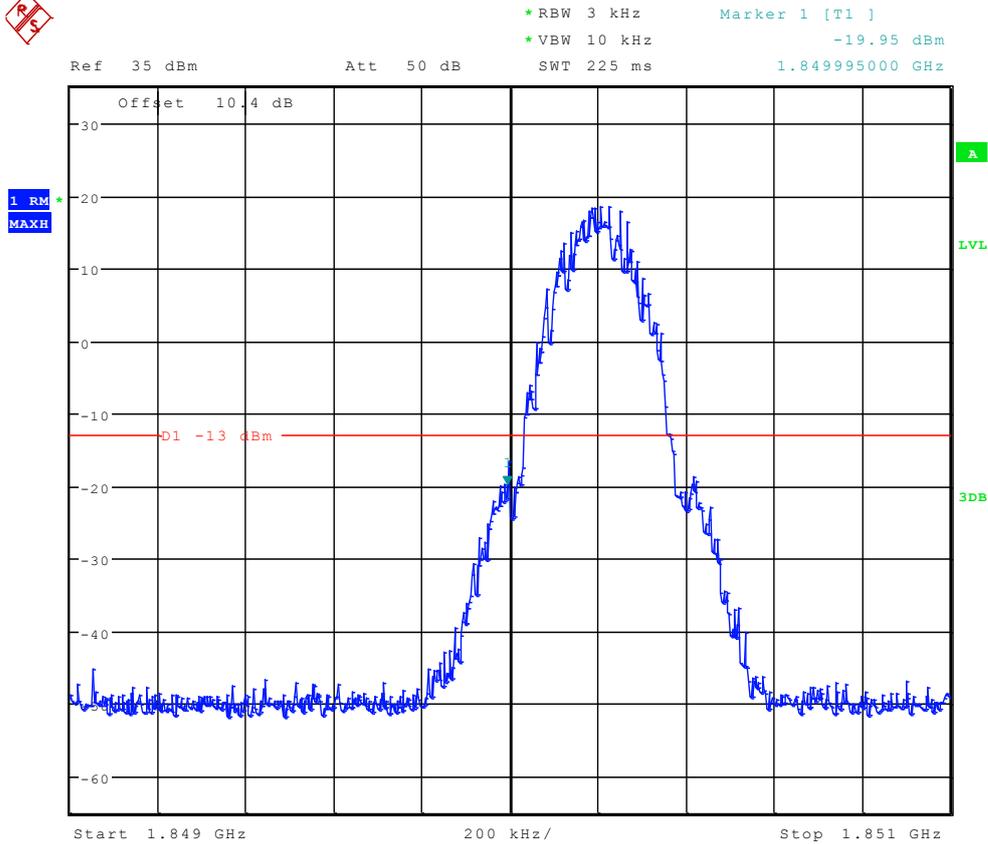
According to FCC Part 2.1051 & 24.238



TM1:GPRS/GSM

Left Edge

Channel 512

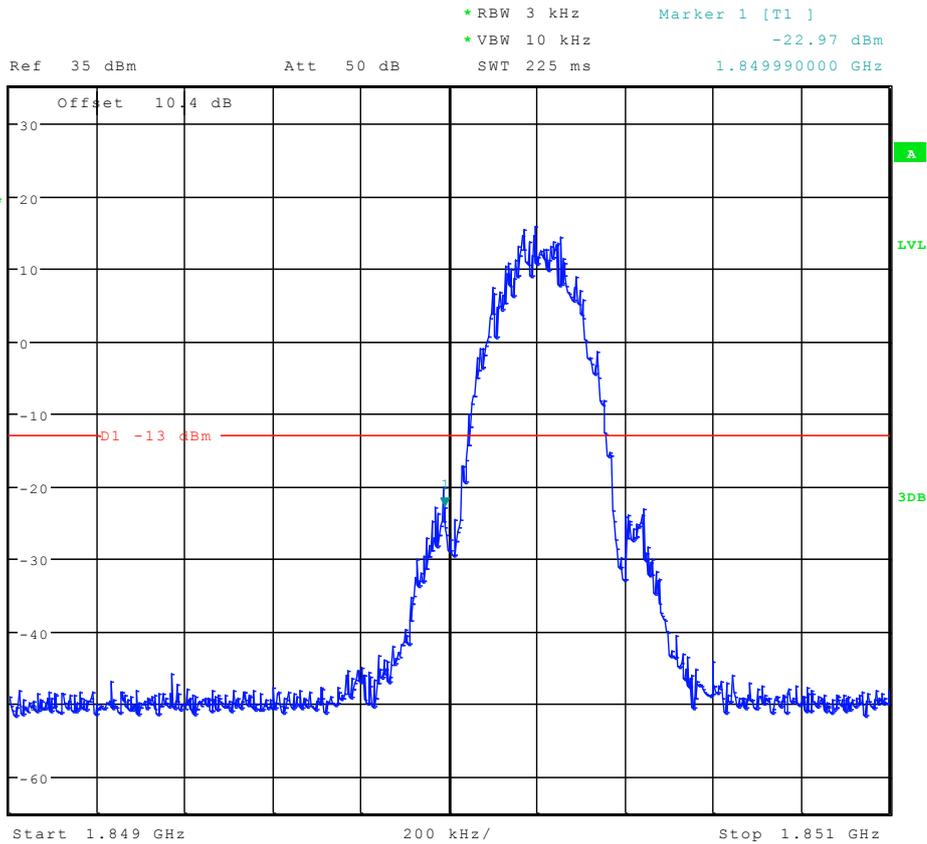




TM2:EDGE

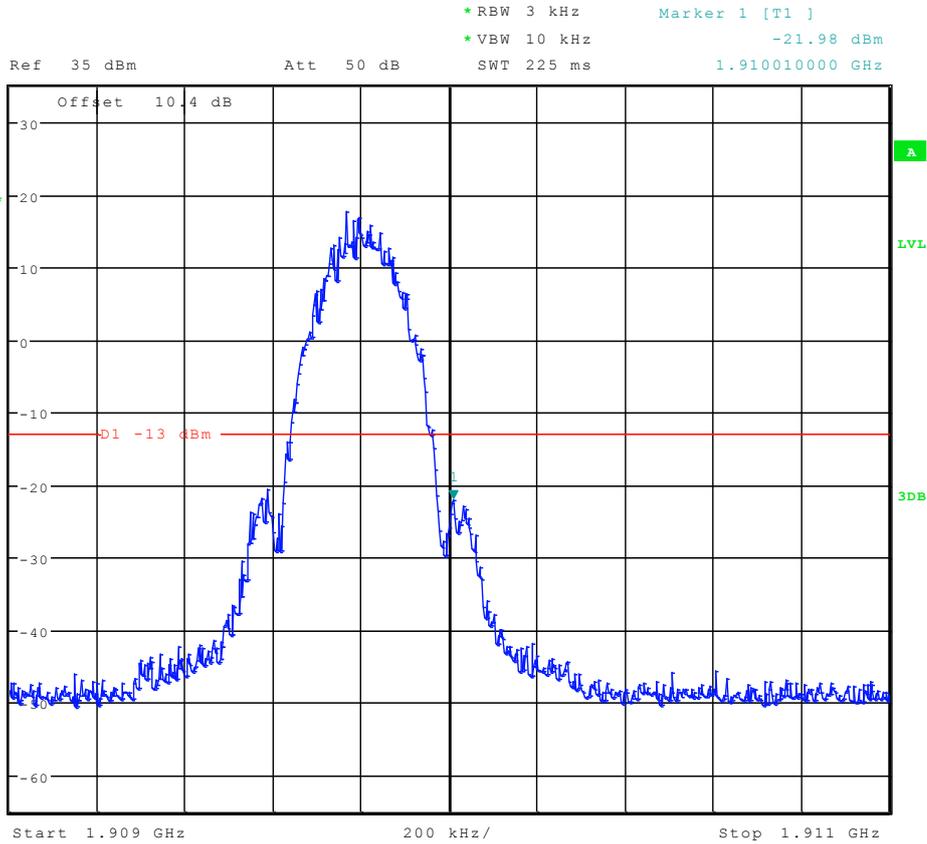
Left Edge

Channel 512





Right Edge Channel 810

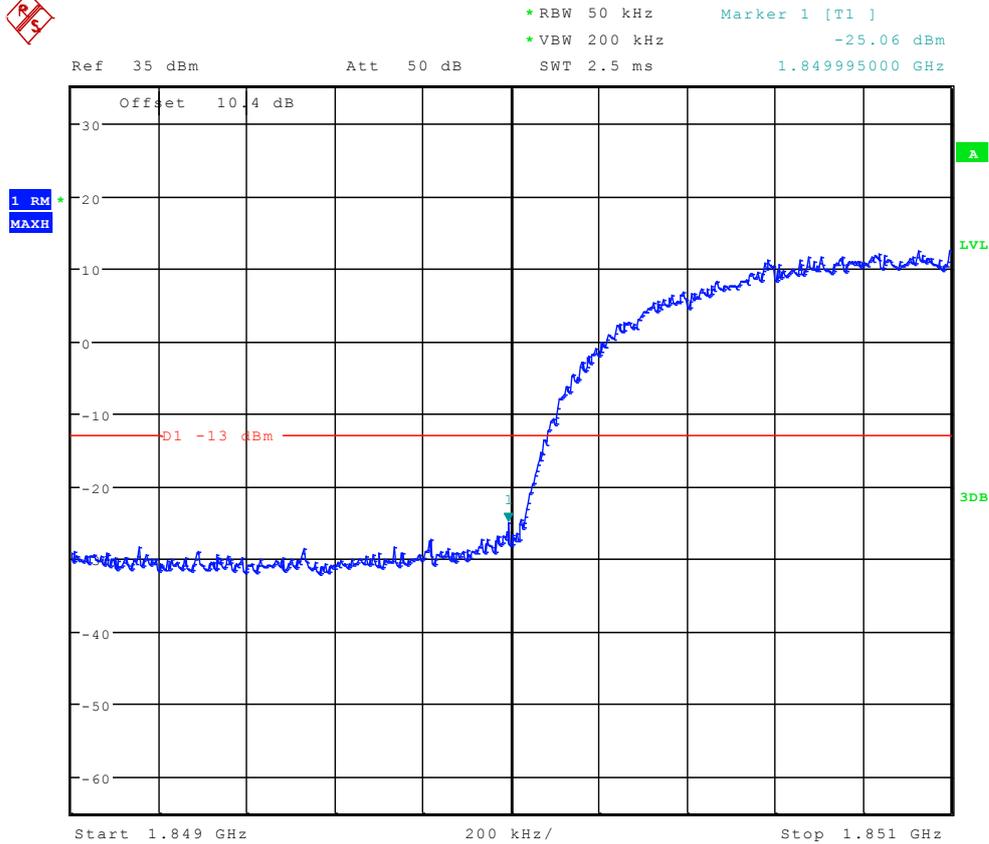




TM3: WCDMA

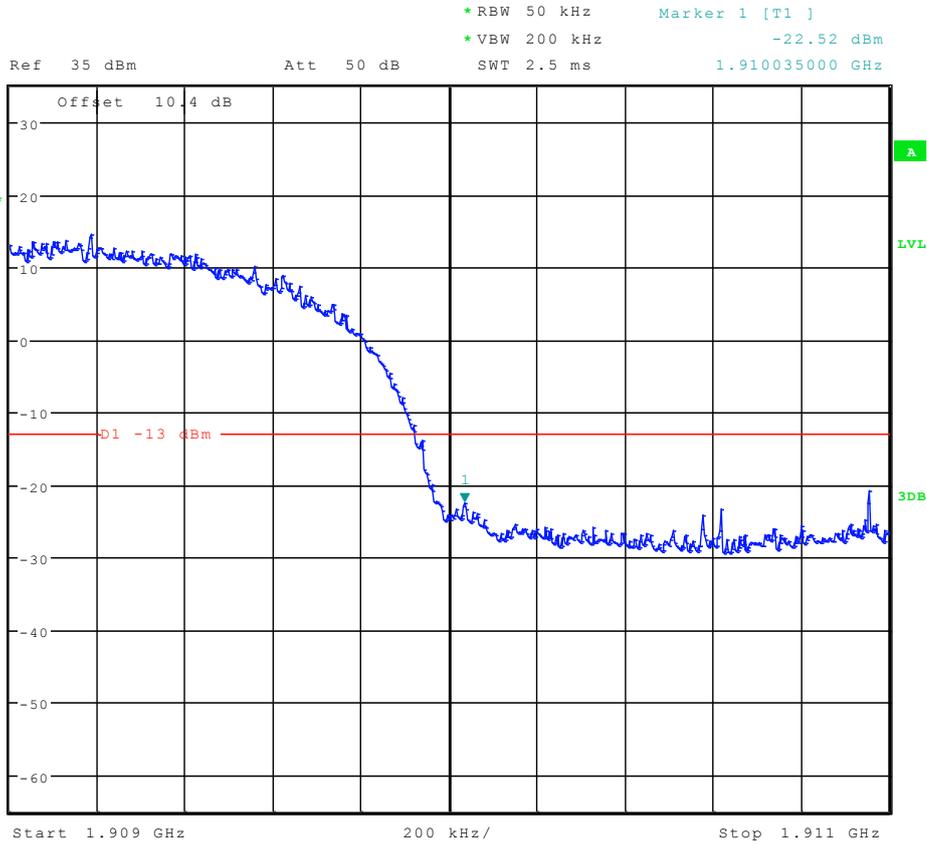
Left Edge

Channel 9262





Right Edge Channel 9538





Appendix D

Spurious Emission at Antenna Terminal

According to FCC Part 2.1051 & 24.238



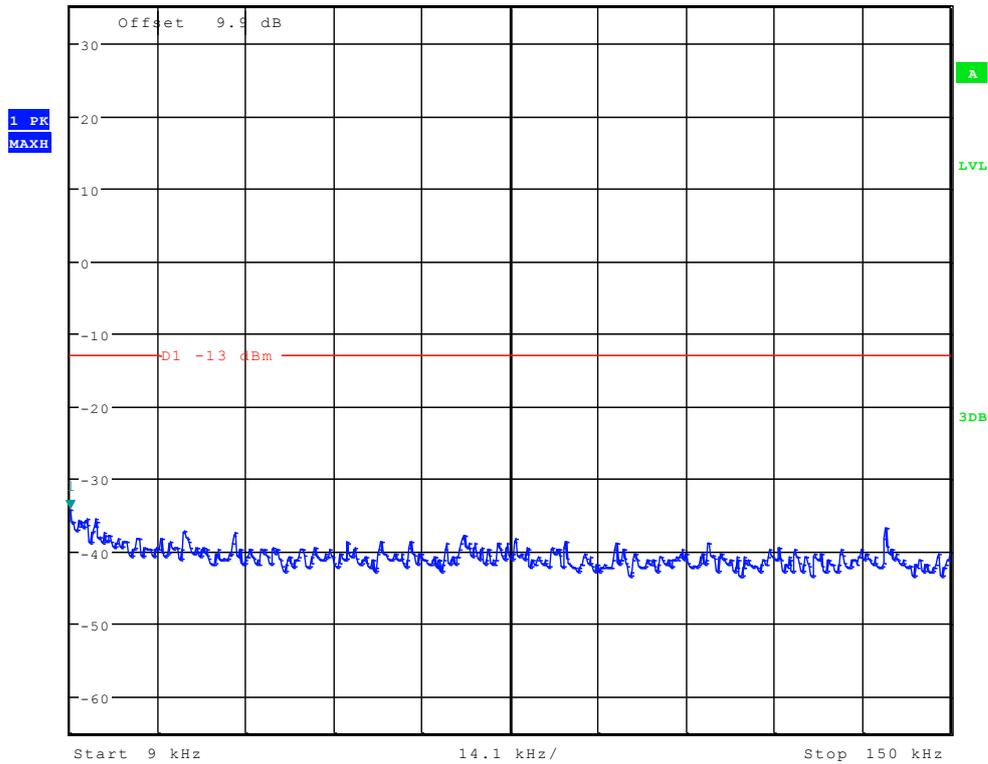
TM1:GPRS/GSM

Channel 512



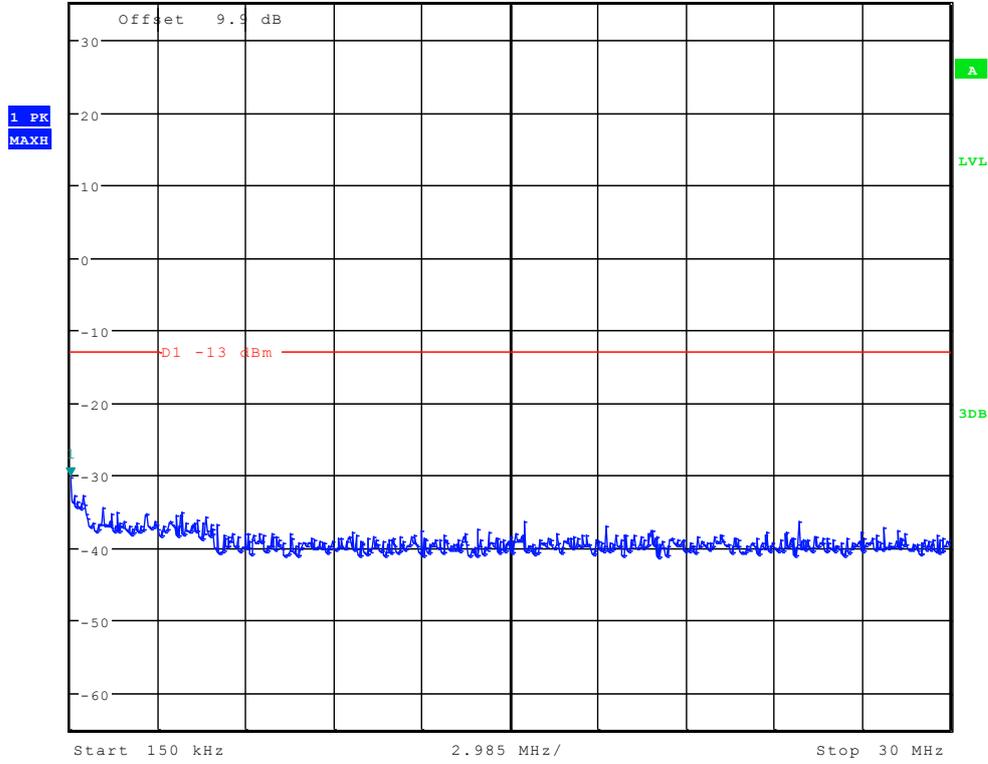
*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -34.19 dBm

Ref 35 dBm Att 55 dB SWT 145 ms 9.000000000 kHz



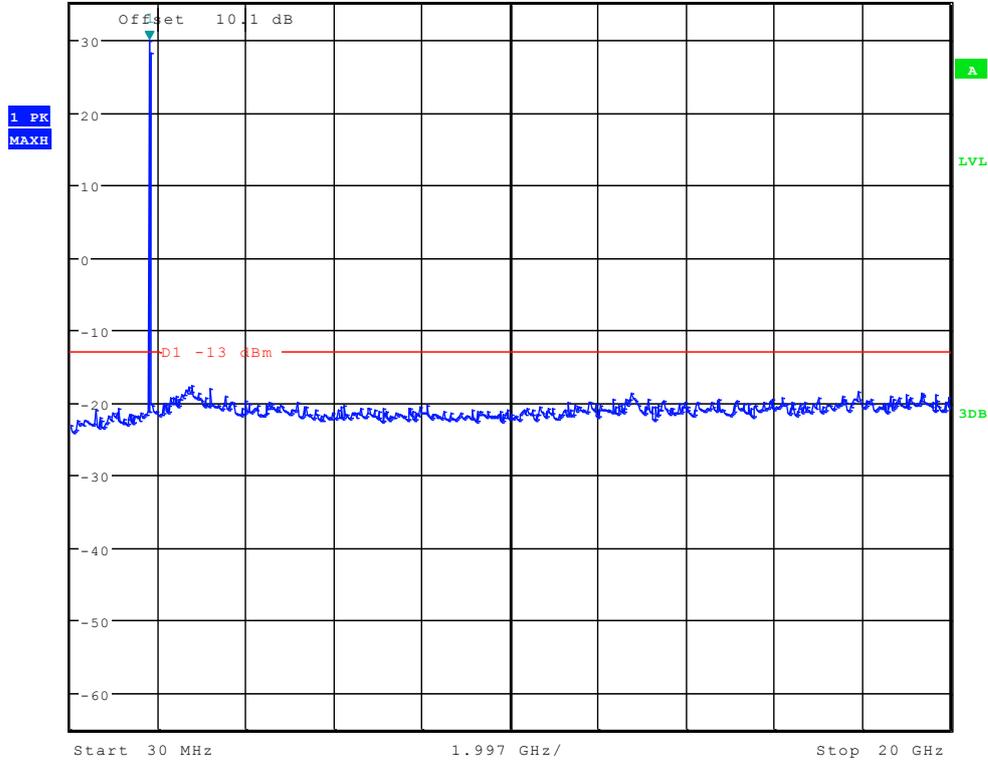


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.22 dBm



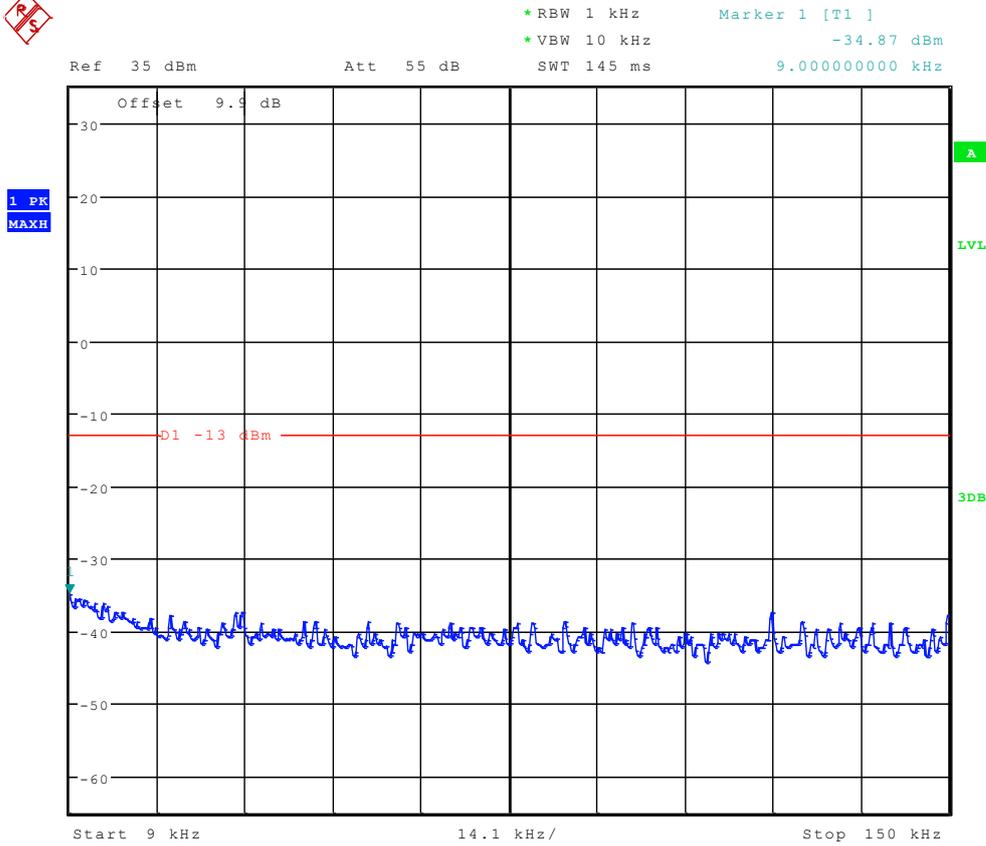


Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 29.76 dBm
*VBW 3 MHz 1.822179487 GHz



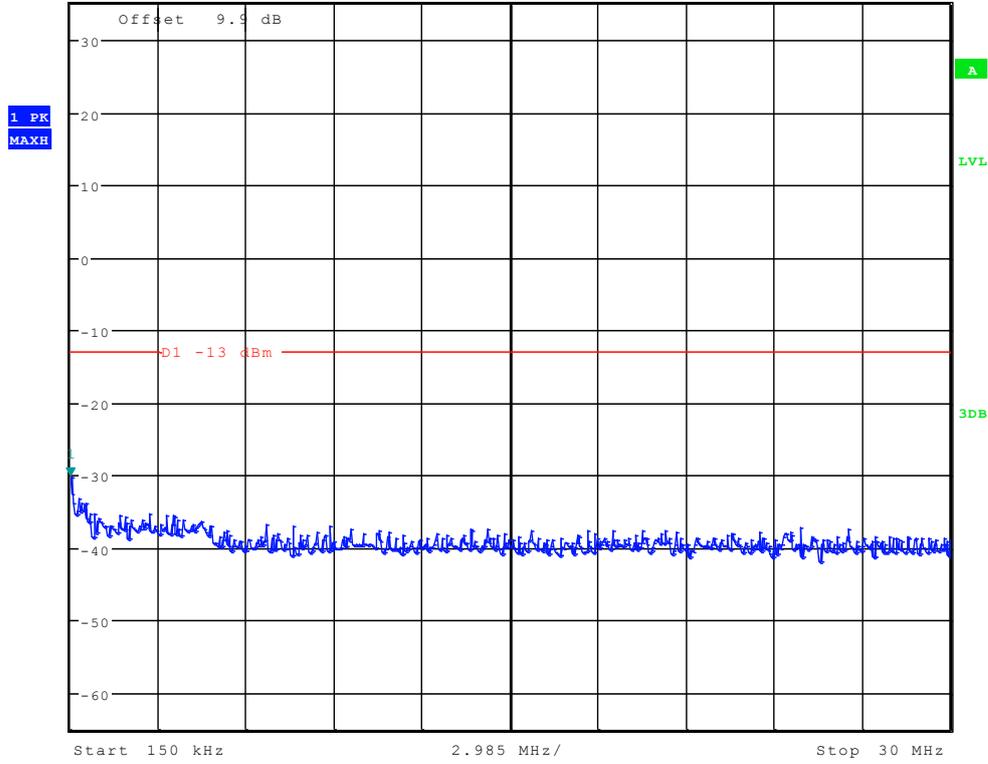


Channel 661



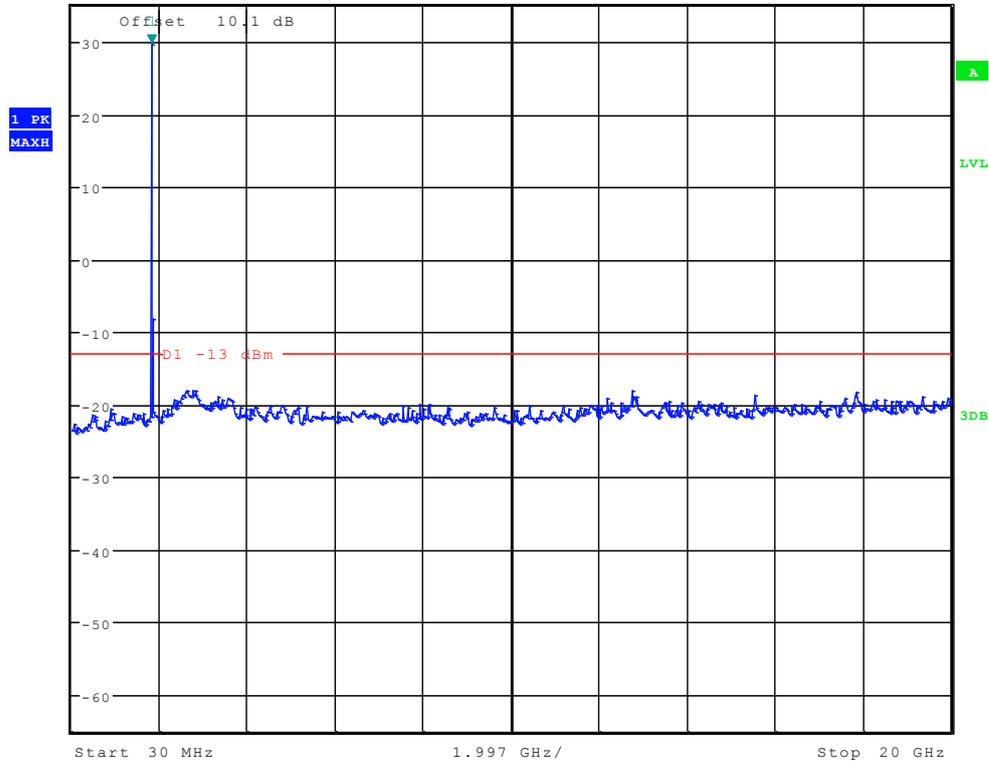


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.22 dBm



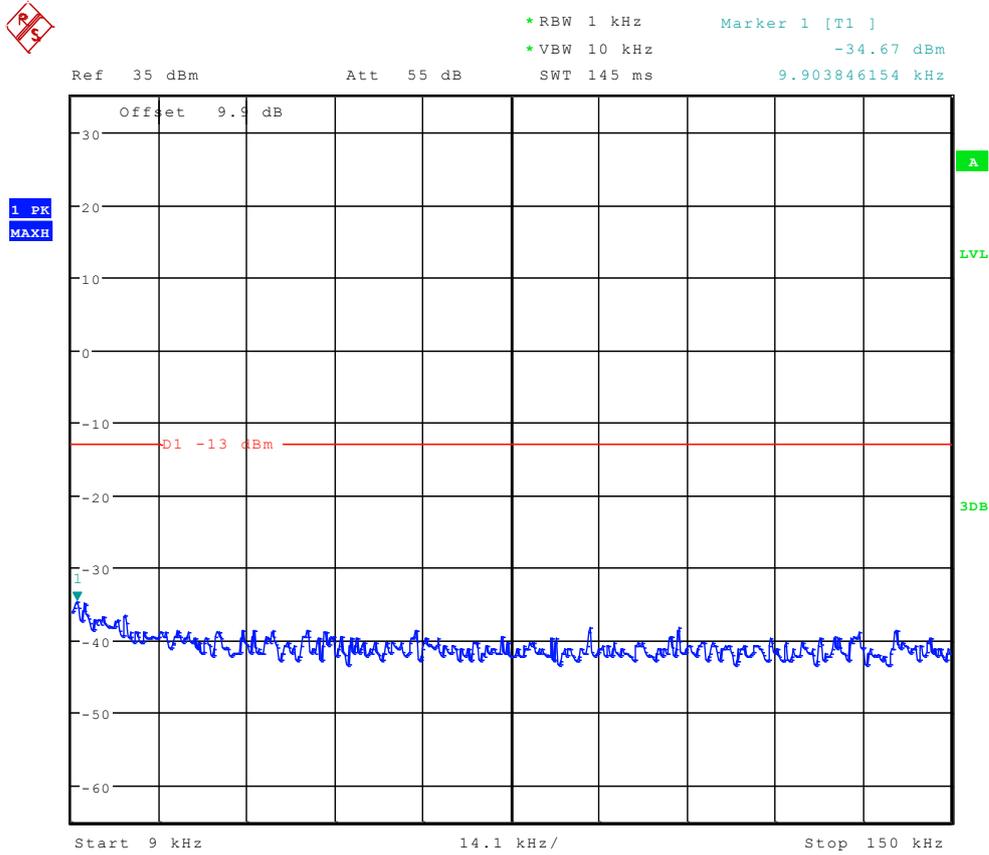


Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 29.74 dBm
*VBW 3 MHz 1.854182692 GHz



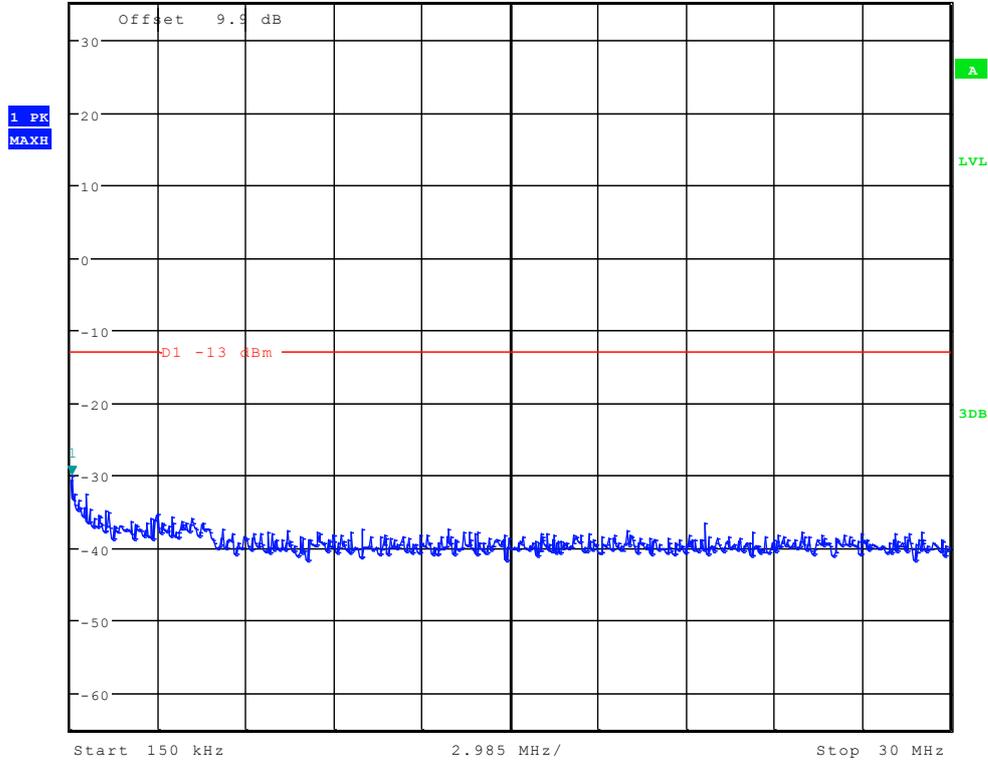


Channel 810



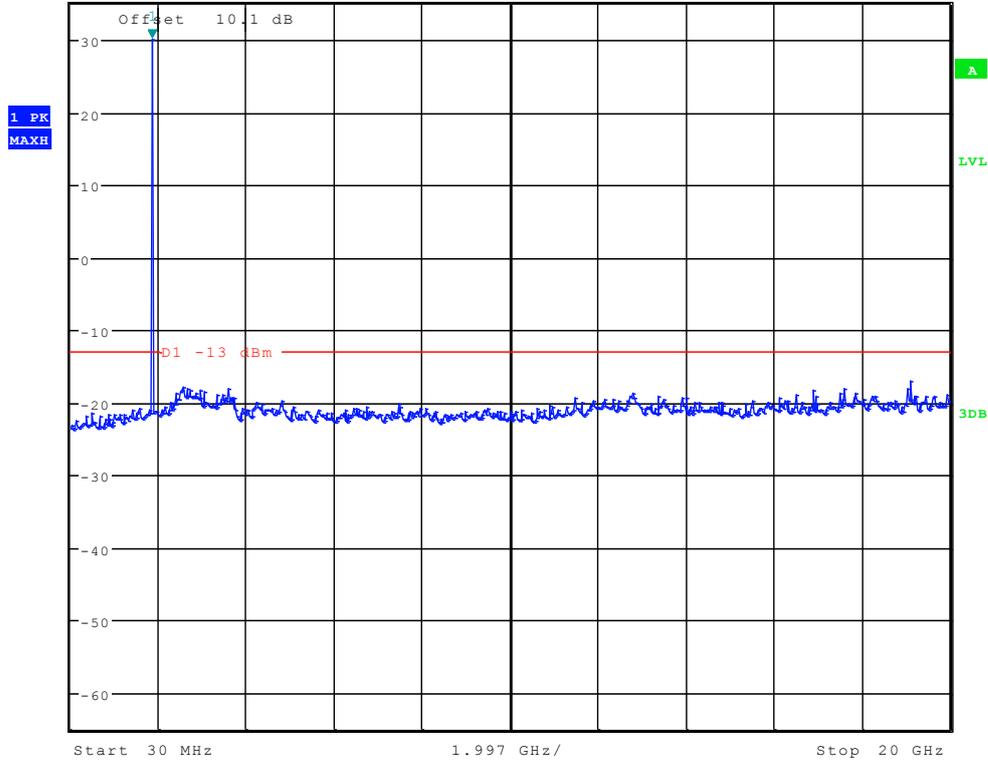


*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.04 dBm
Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 30.03 dBm
*VBW 3 MHz 1.886185897 GHz

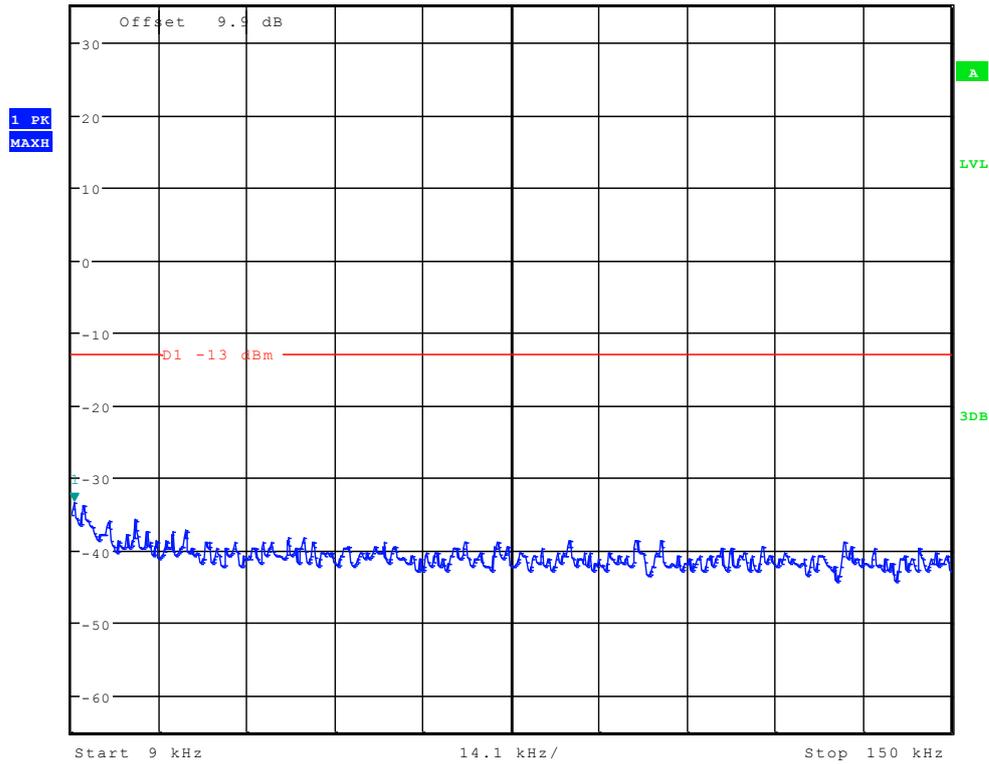




TM2:EDGE Channel 512

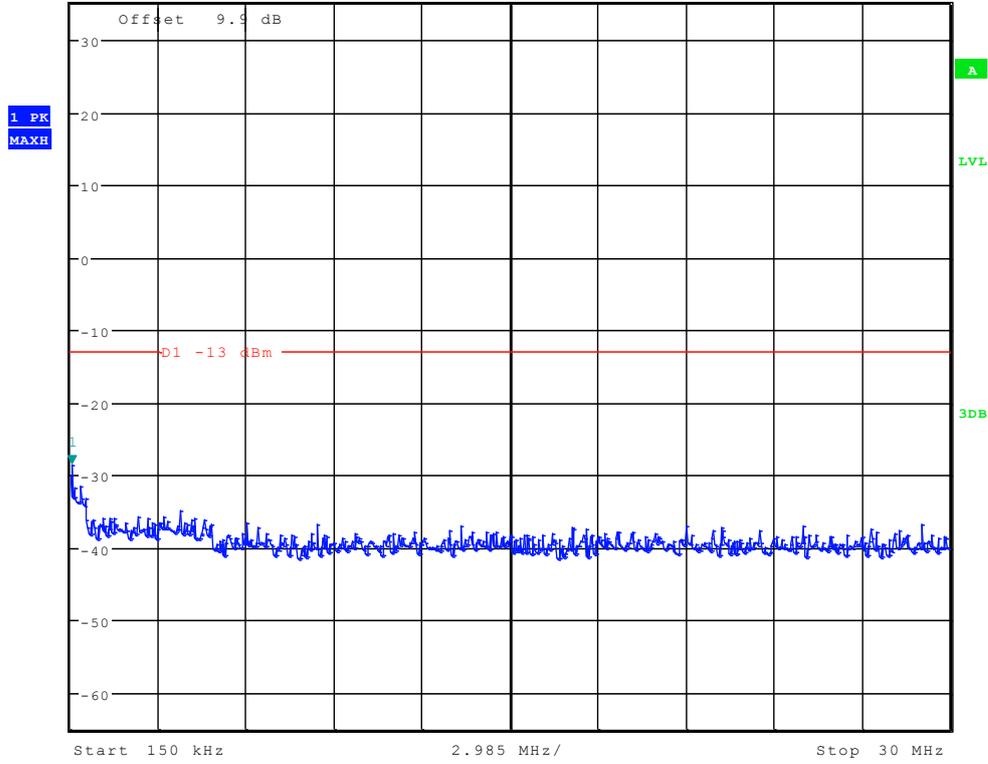


*RBW 1 kHz Marker 1 [T1]
 *VBW 10 kHz -33.48 dBm
 Ref 35 dBm Att 55 dB SWT 145 ms 9.451923077 kHz



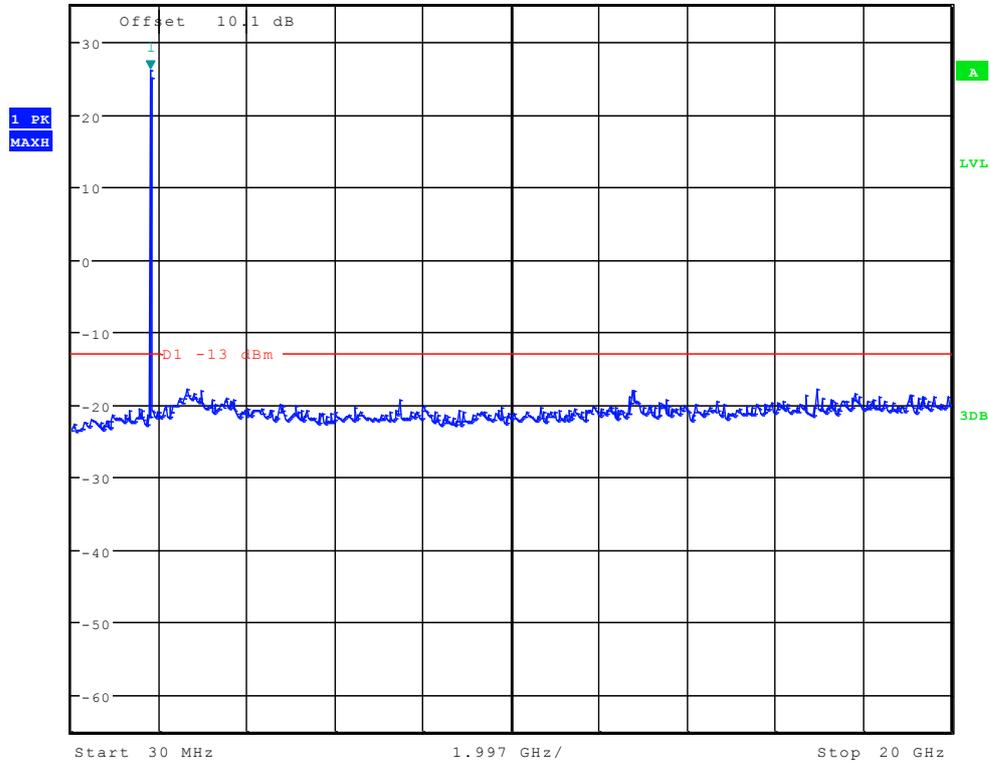


Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -28.65 dBm





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 26.14 dBm
*VBW 3 MHz 1.822179487 GHz



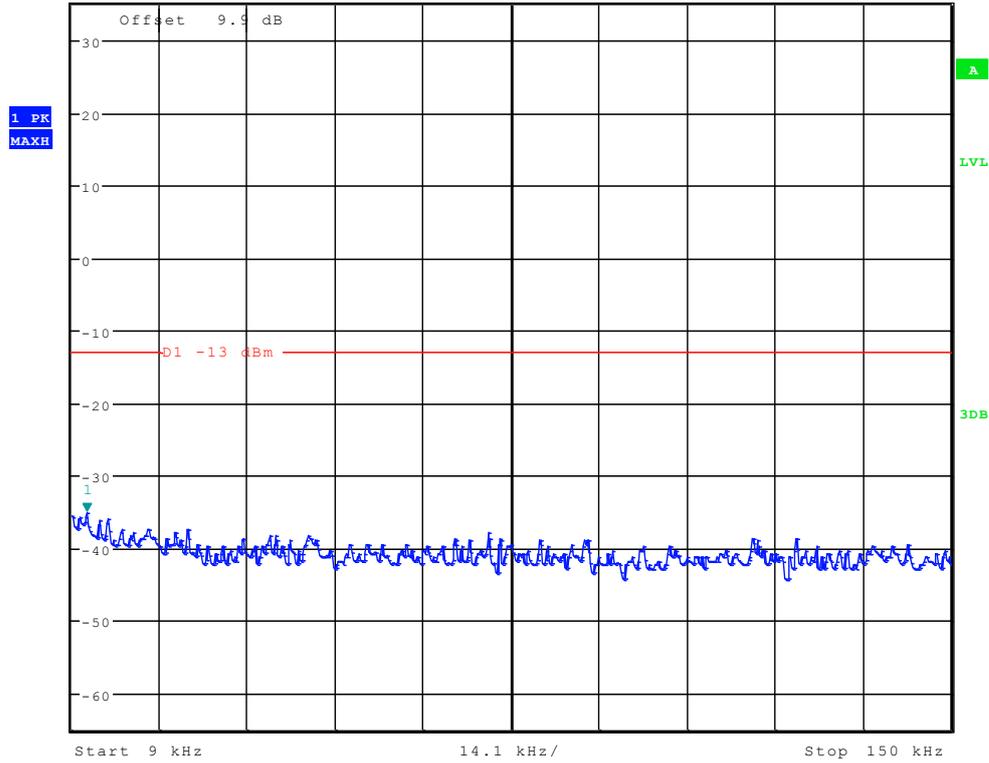


Channel 661



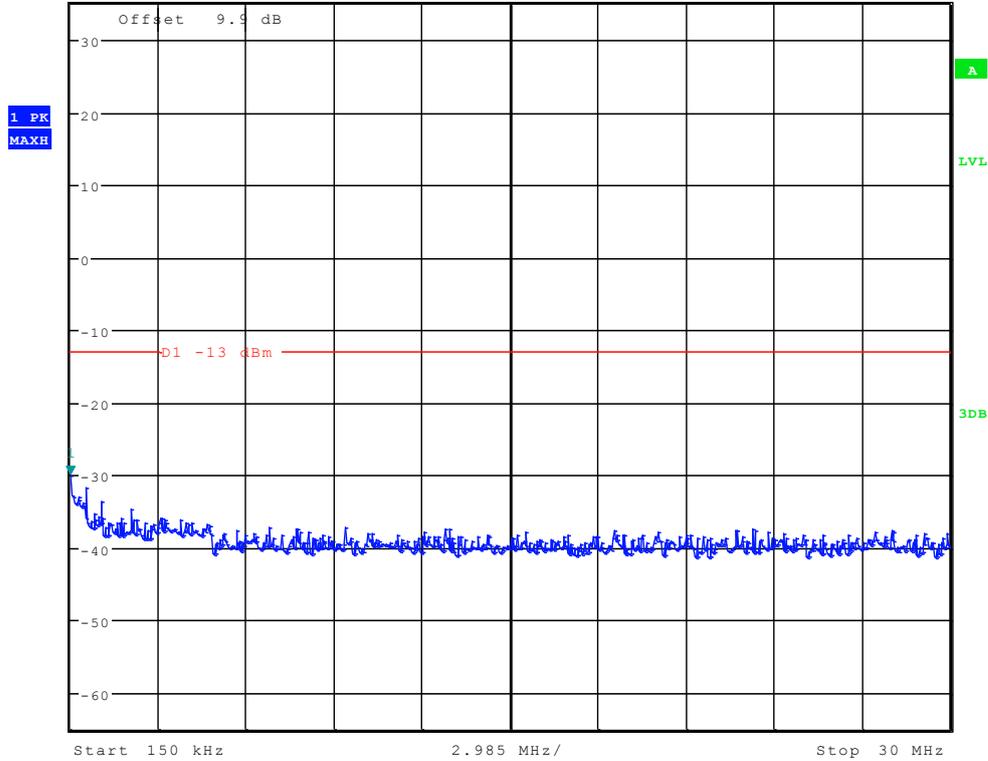
*RBW 1 kHz
*VBW 10 kHz
Marker 1 [T1]
-35.08 dBm
11.485576923 kHz

Ref 35 dBm Att 55 dB SWT 145 ms



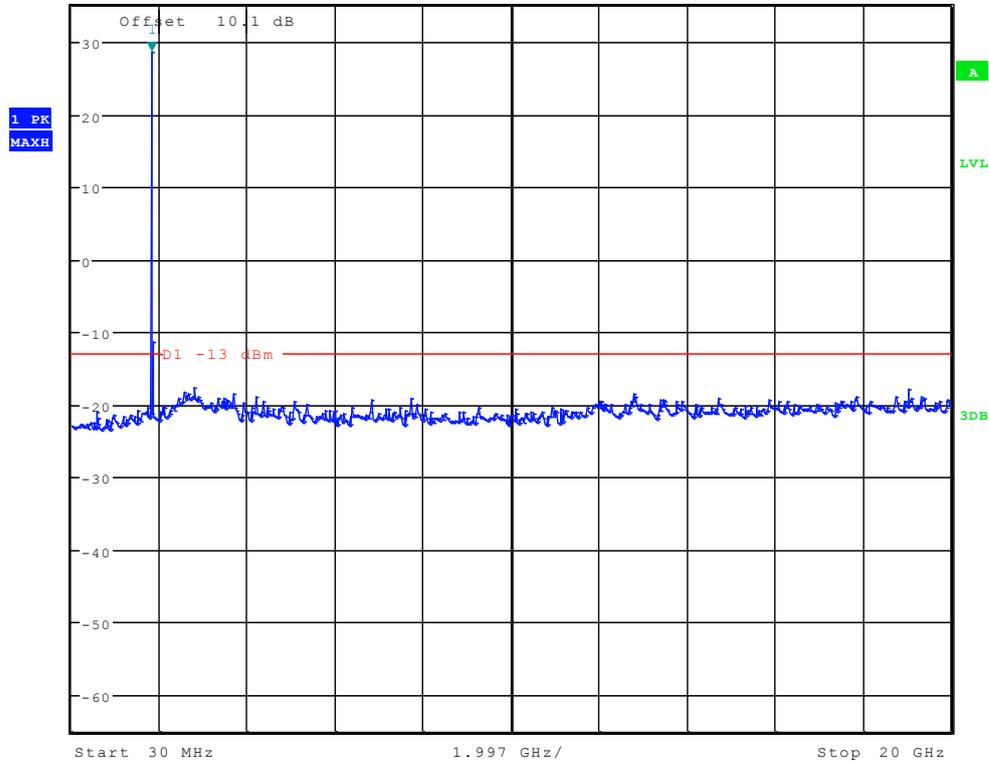


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -30.04 dBm



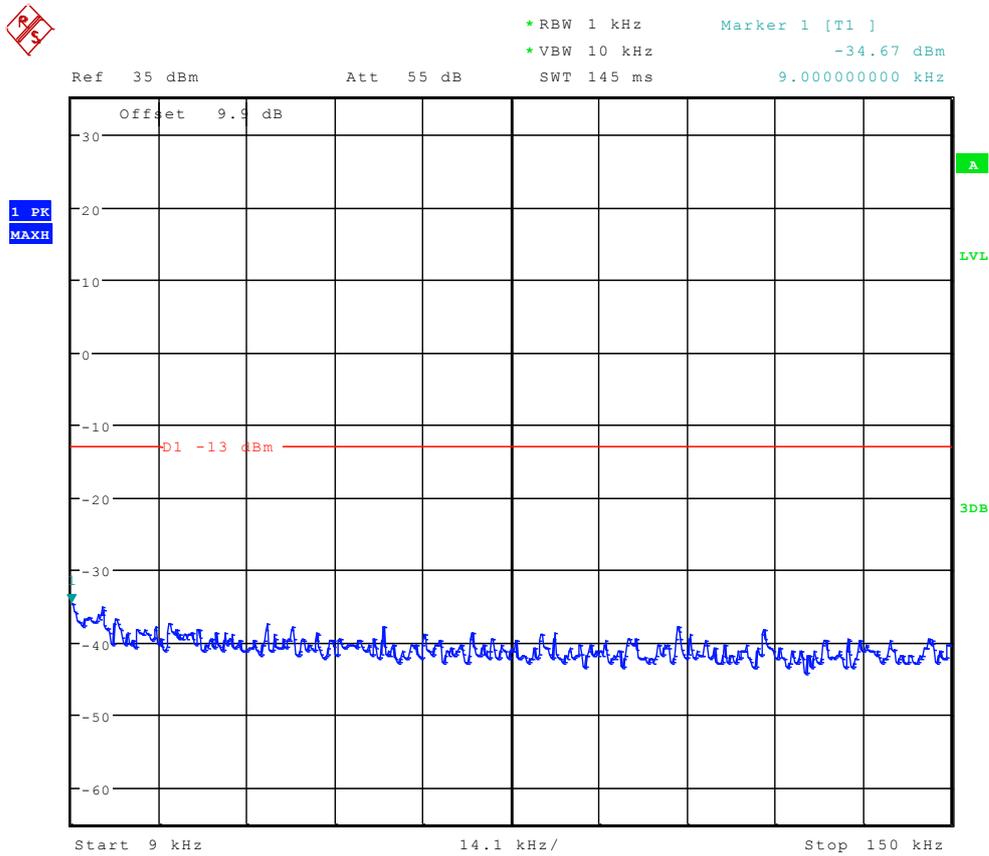


Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 28.50 dBm
*VBW 3 MHz 1.854182692 GHz



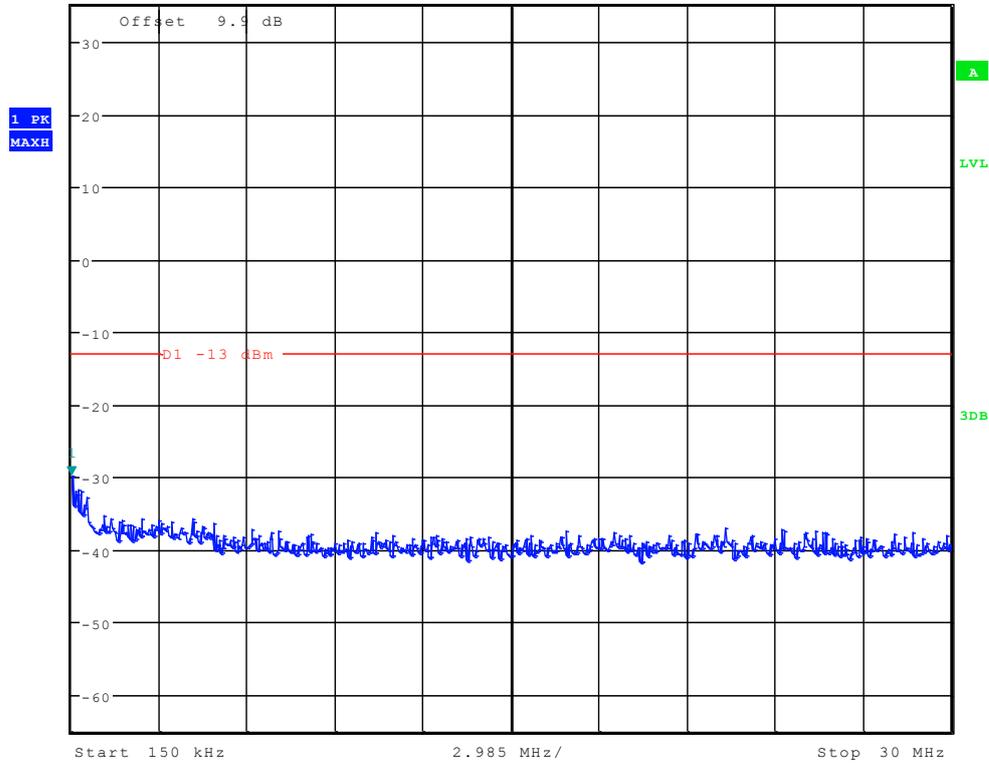


Channel 810



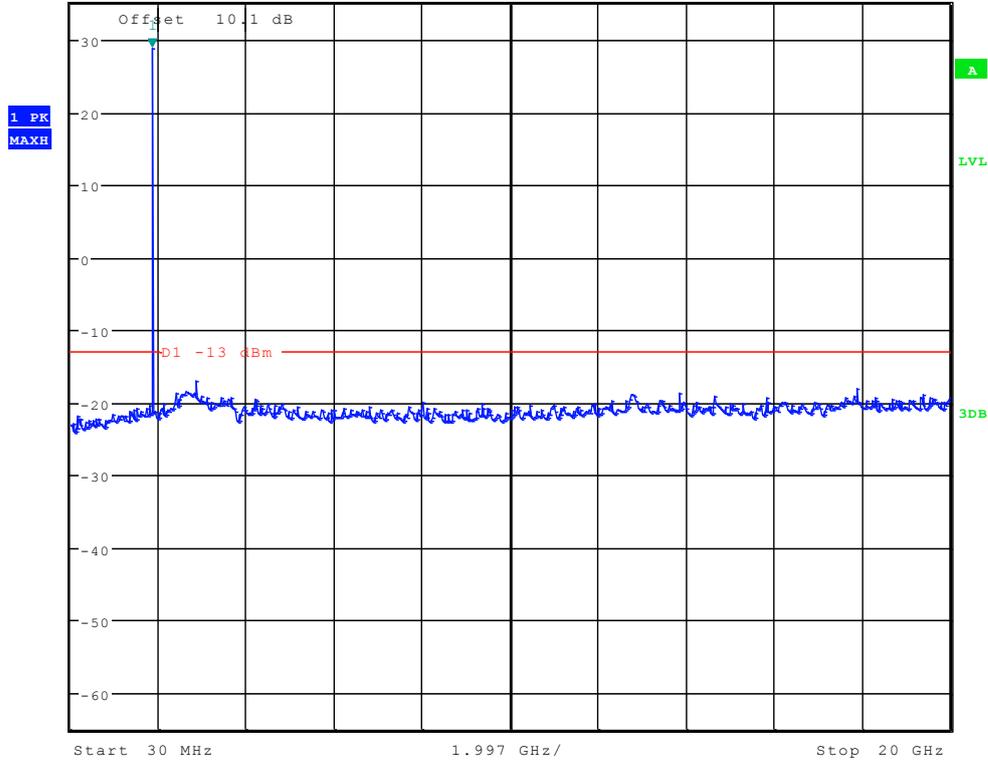


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -29.87 dBm





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1] 28.84 dBm
*VBW 3 MHz 1.886185897 GHz



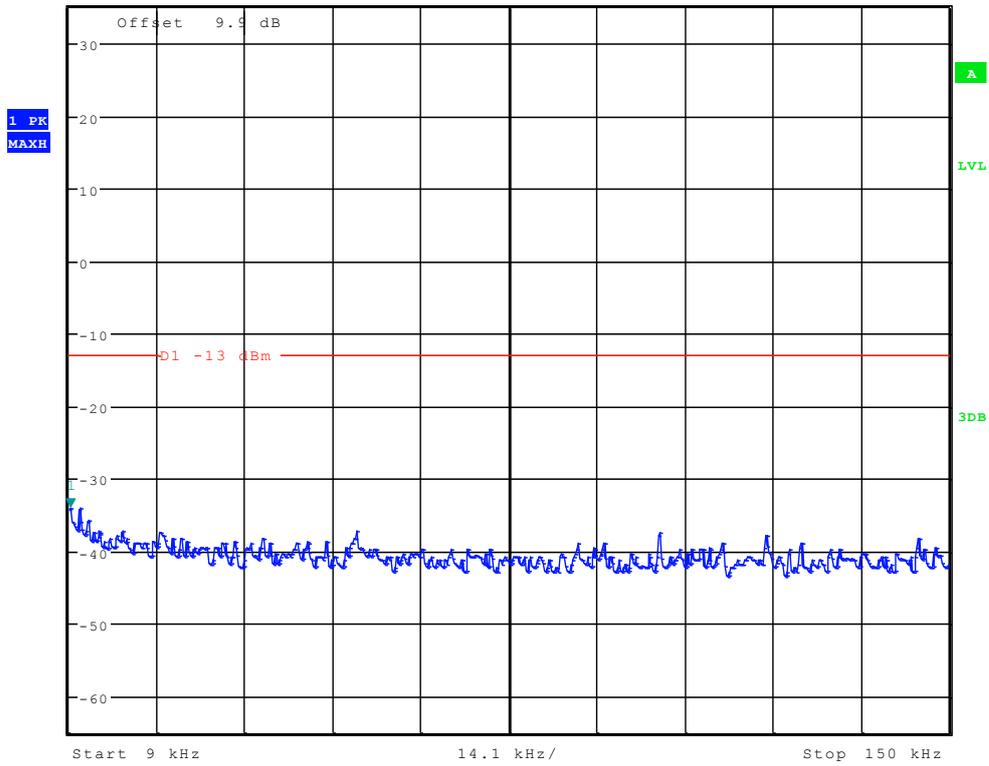


TM3: WCDMA

Channel 9262

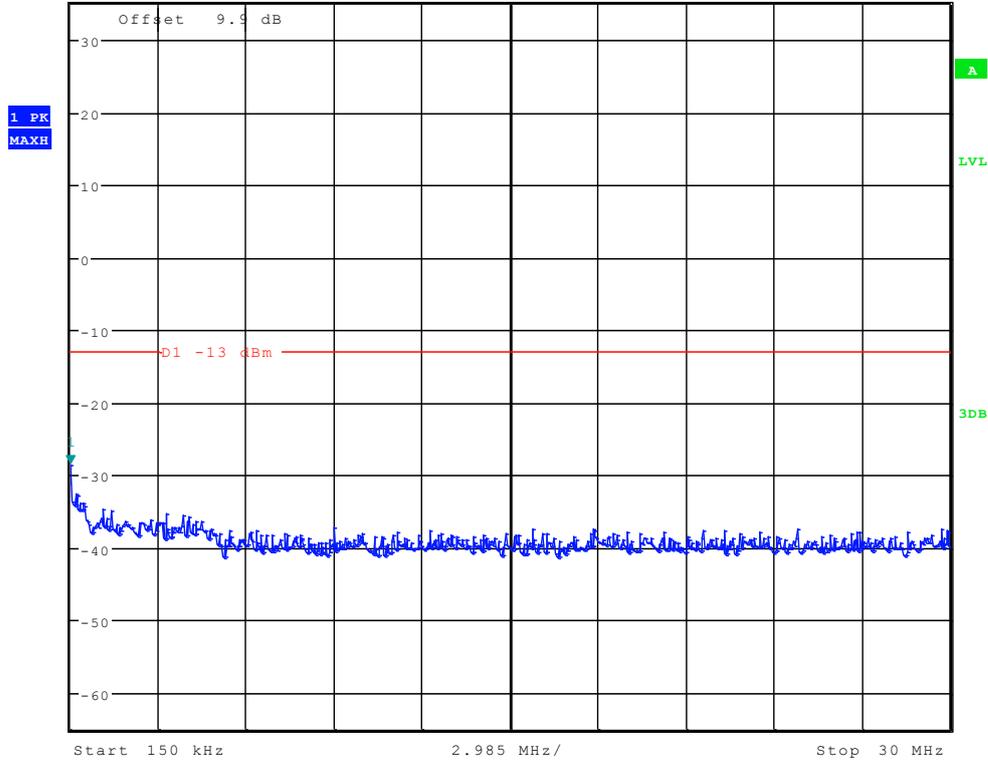


*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -33.92 dBm
Ref 35 dBm Att 55 dB SWT 145 ms 9.225961538 kHz



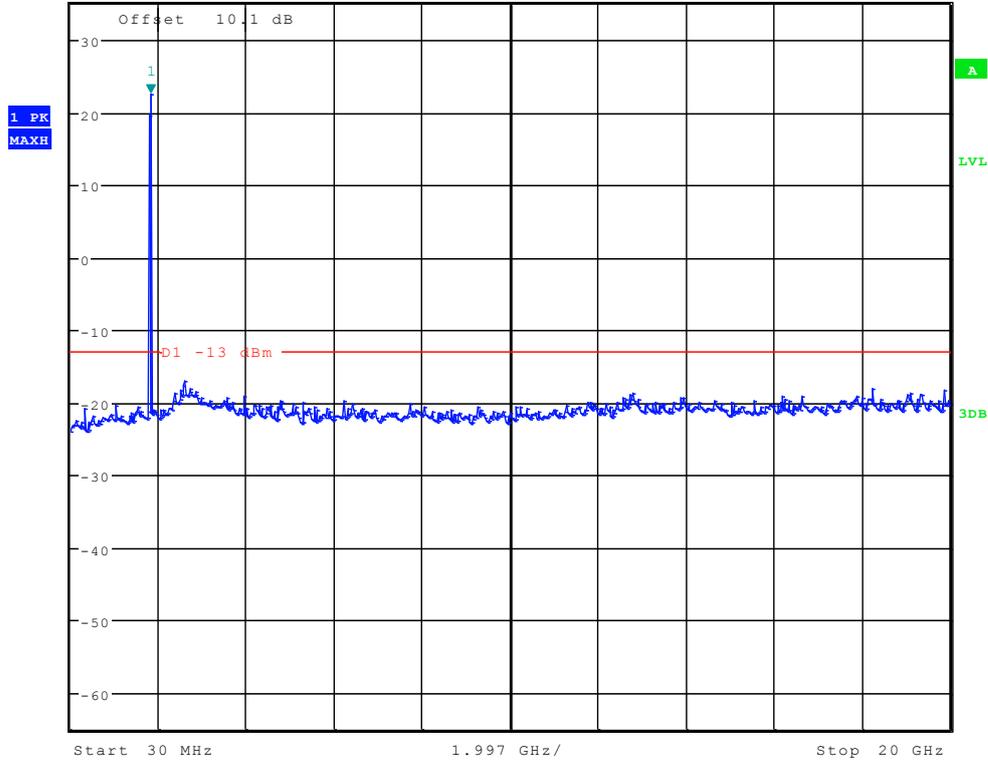


Ref 35 dBm Att 55 dB SWT 300 ms 150.00000000 kHz
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -28.51 dBm





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 22.40 dBm
1.854182692 GHz

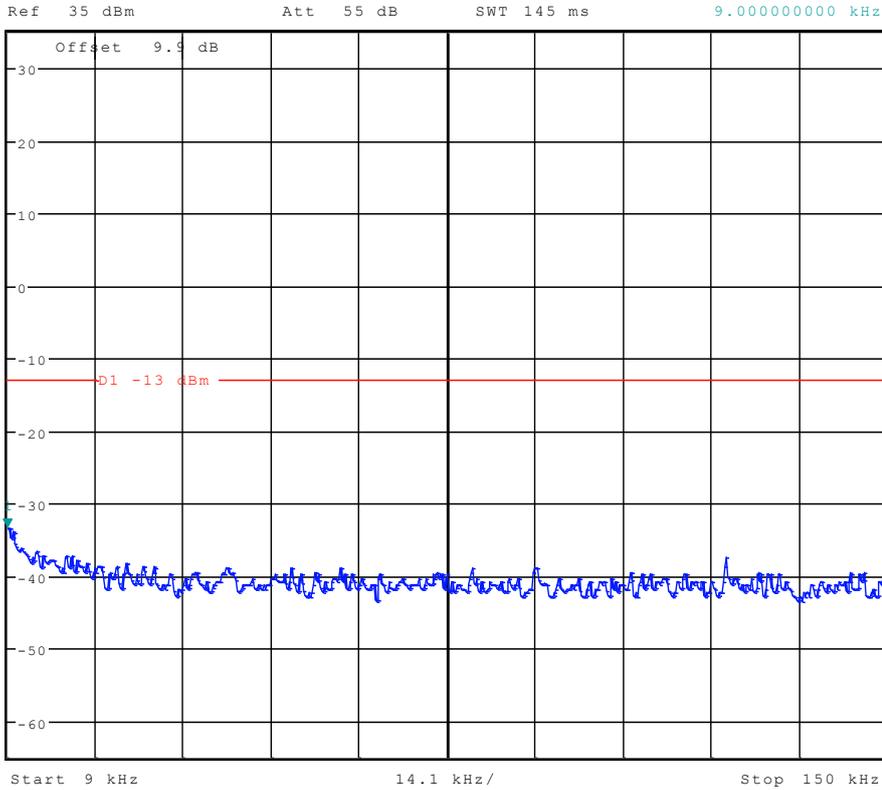




Channel 9400

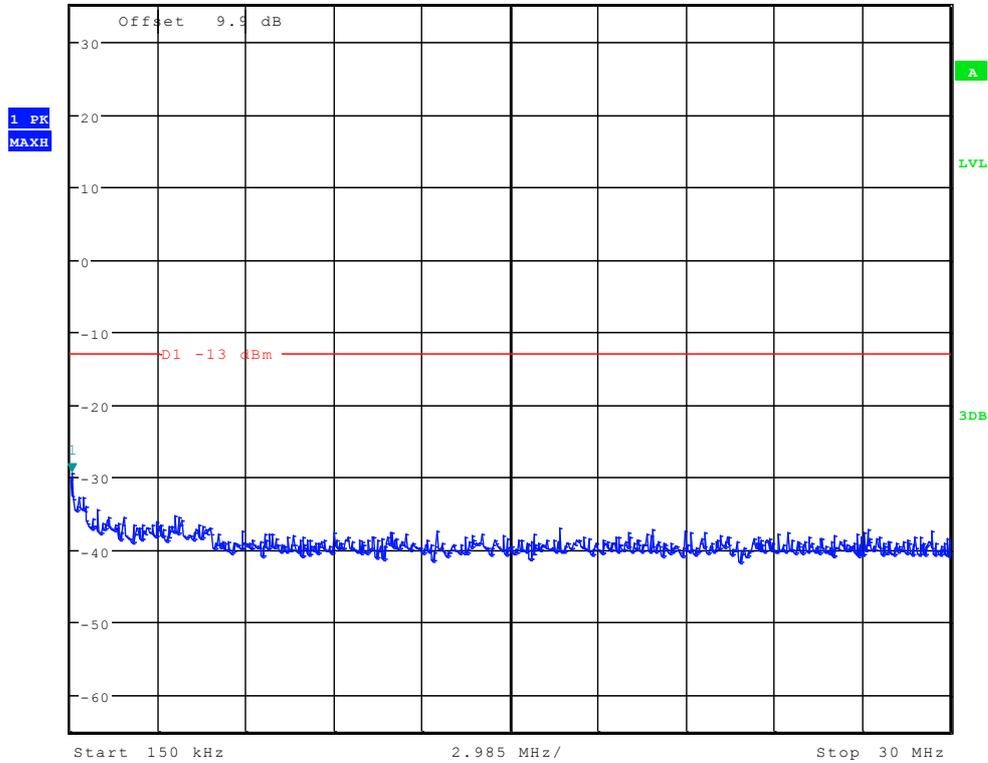


*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -33.31 dBm
SWT 145 ms 9.000000000 kHz



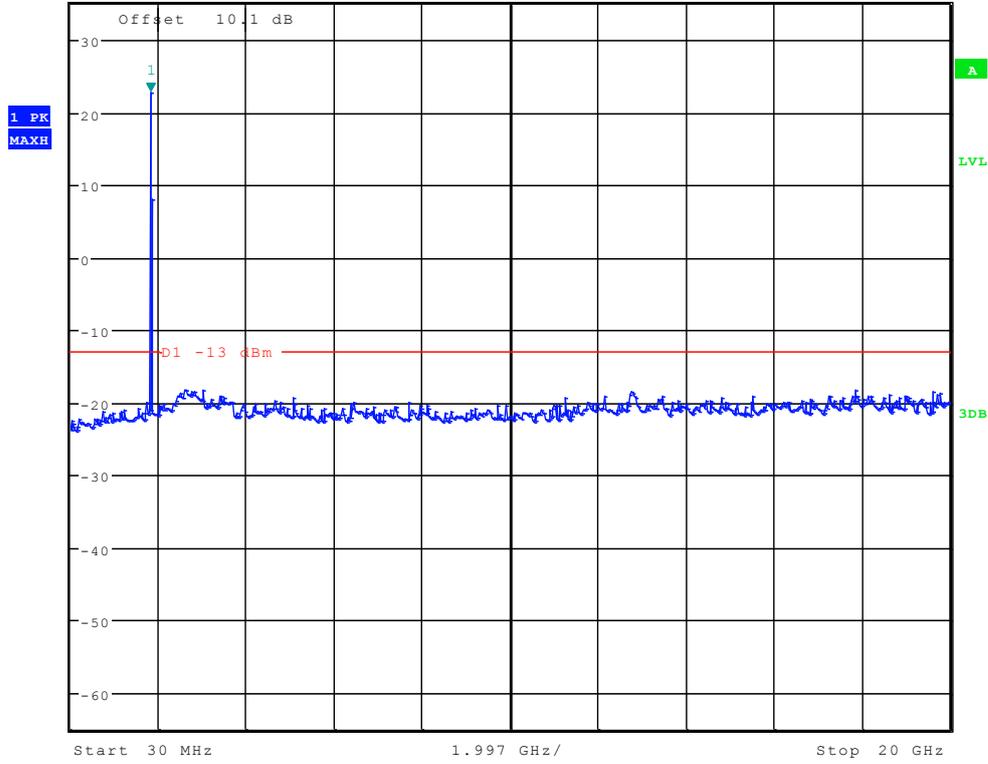


*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -29.32 dBm
Ref 35 dBm Att 55 dB SWT 300 ms 197.836538462 kHz





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 22.62 dBm
1.854182692 GHz

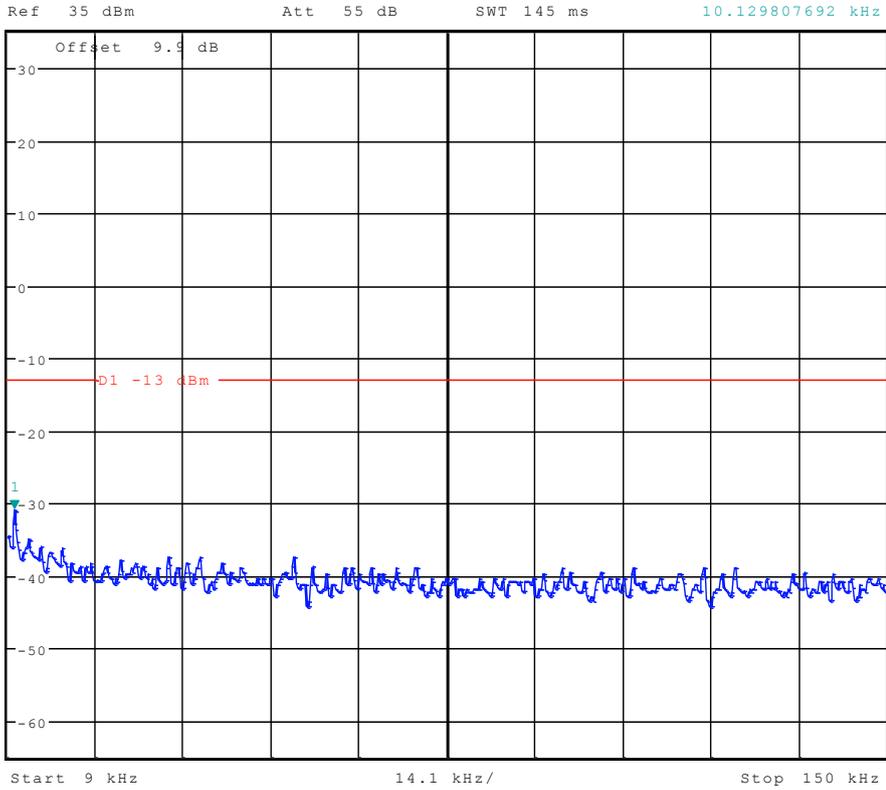




Channel 9538



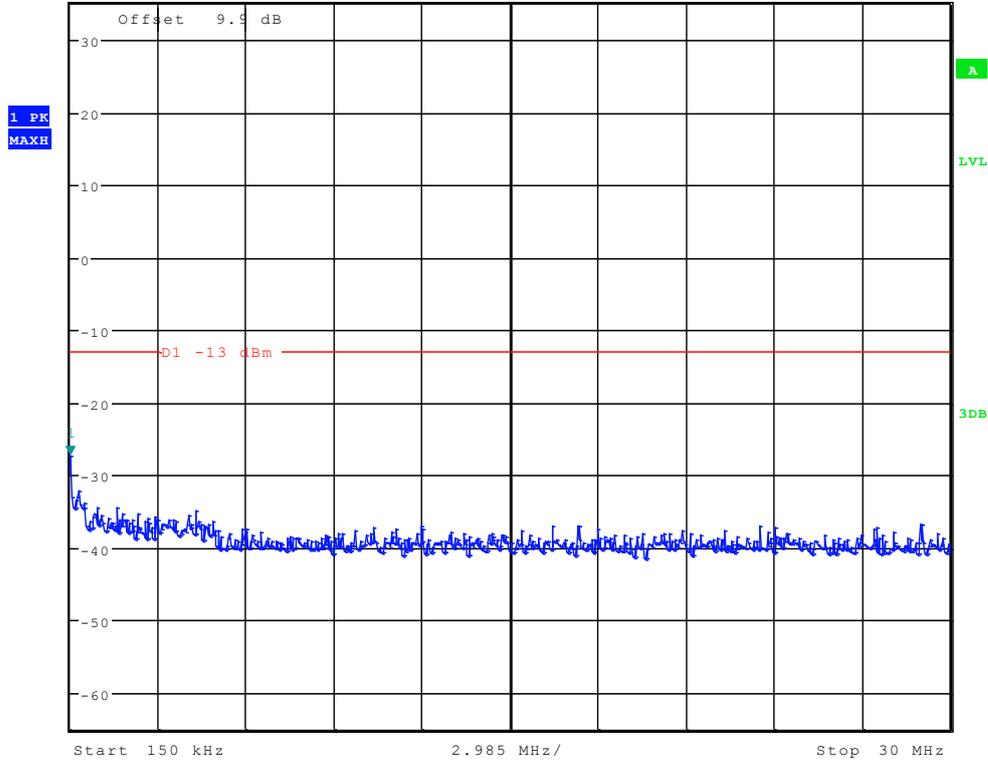
*RBW 1 kHz Marker 1 [T1]
*VBW 10 kHz -30.96 dBm
SWT 145 ms 10.129807692 kHz





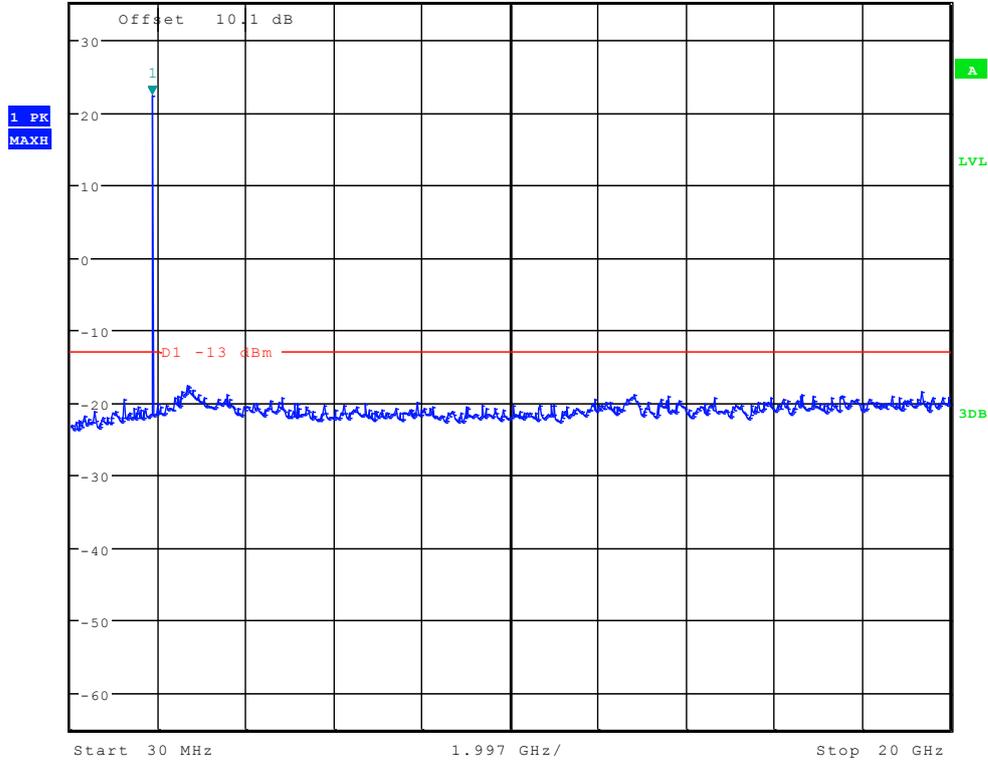
*RBW 10 kHz Marker 1 [T1]
*VBW 30 kHz -27.24 dBm

Ref 35 dBm Att 55 dB SWT 300 ms 150.000000000 kHz





Ref 35 dBm Att 50 dB SWT 115 ms
*RBW 1 MHz Marker 1 [T1]
*VBW 3 MHz 22.19 dBm
1.886185897 GHz





AppendixE

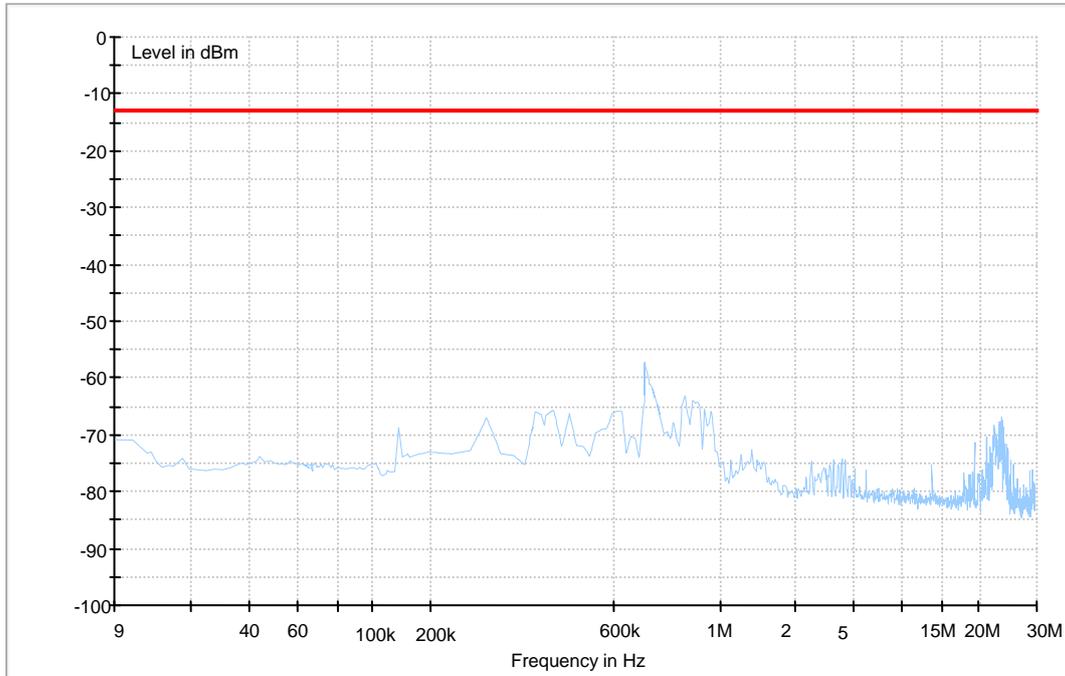
Field Strength of Spurious Emissions

According to FCC Part 2.1053 & Part24.238



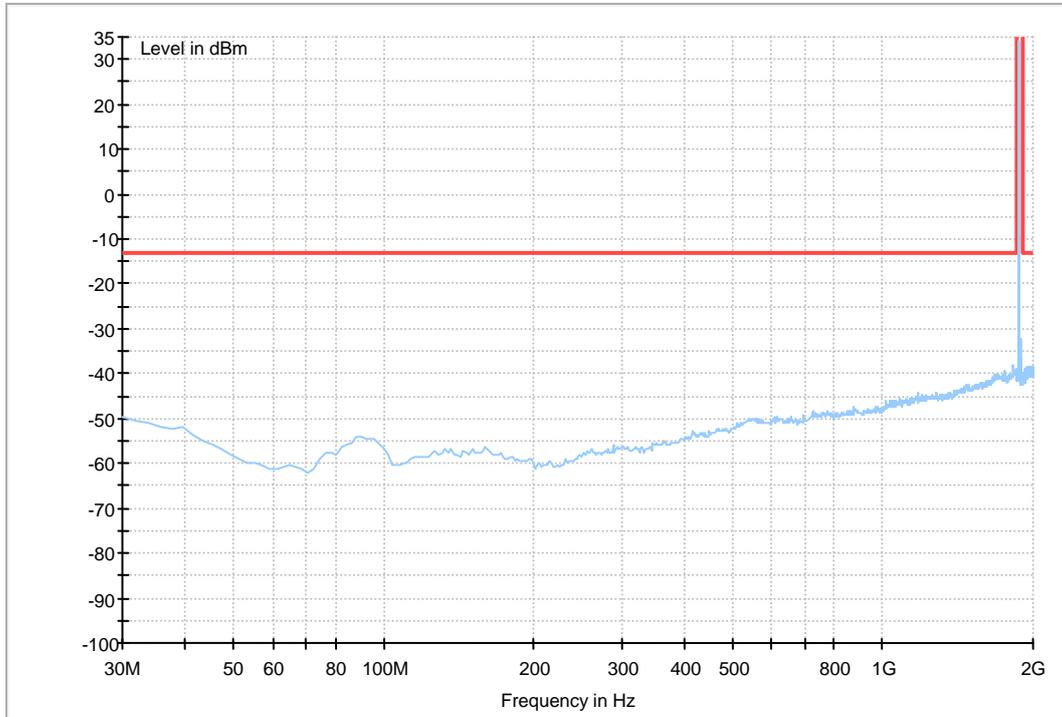
GSM 1900

Traffic Mode (9kHz-30MHz)



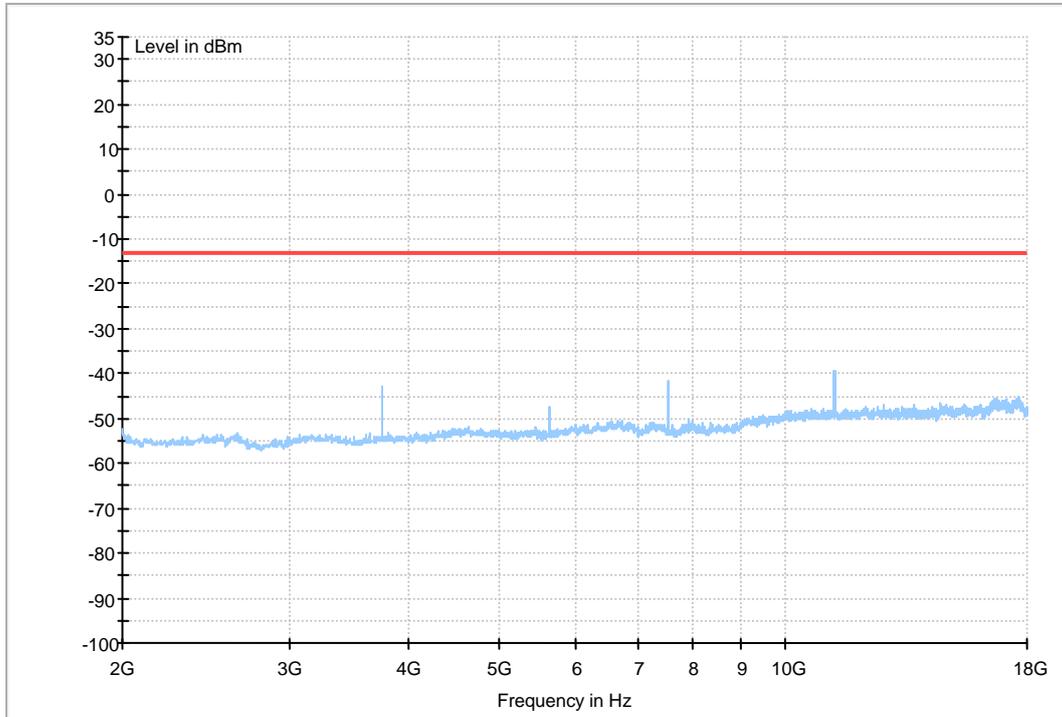


Traffic Mode (30MHz-2GHz)



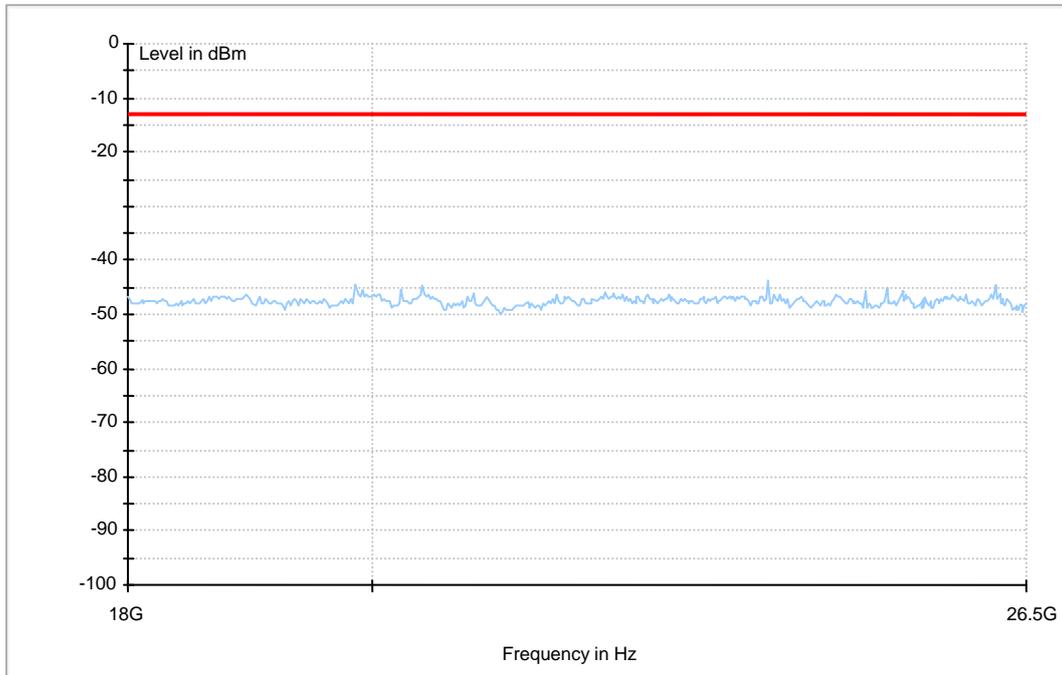


Traffic Mode (2GHz-18GHz)





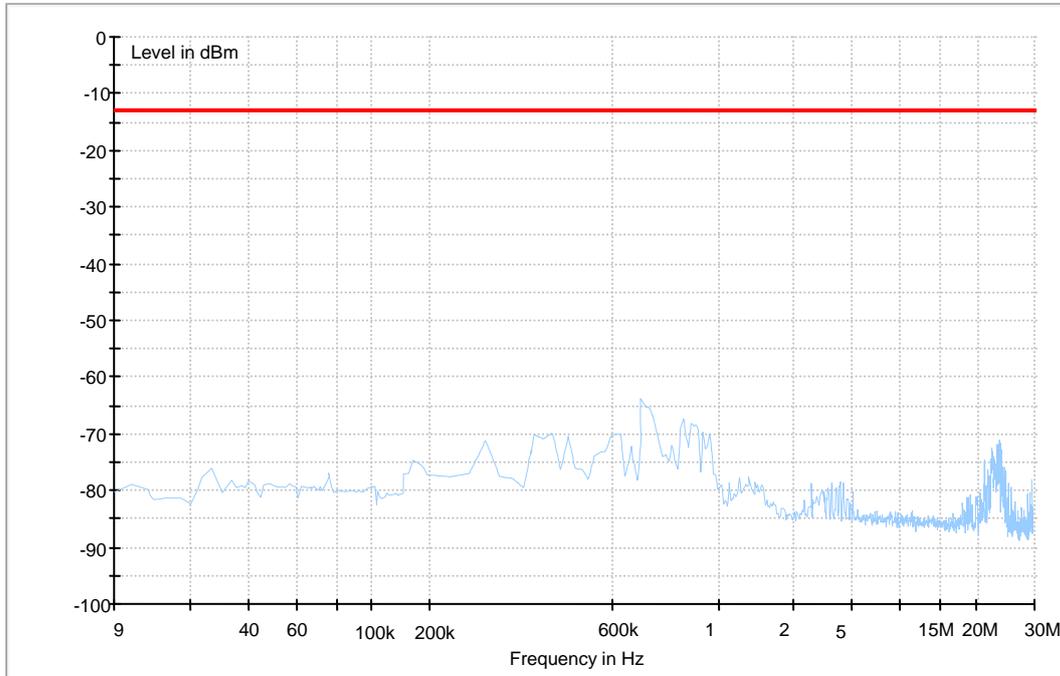
Traffic Mode (18GHz-26.5GHz)





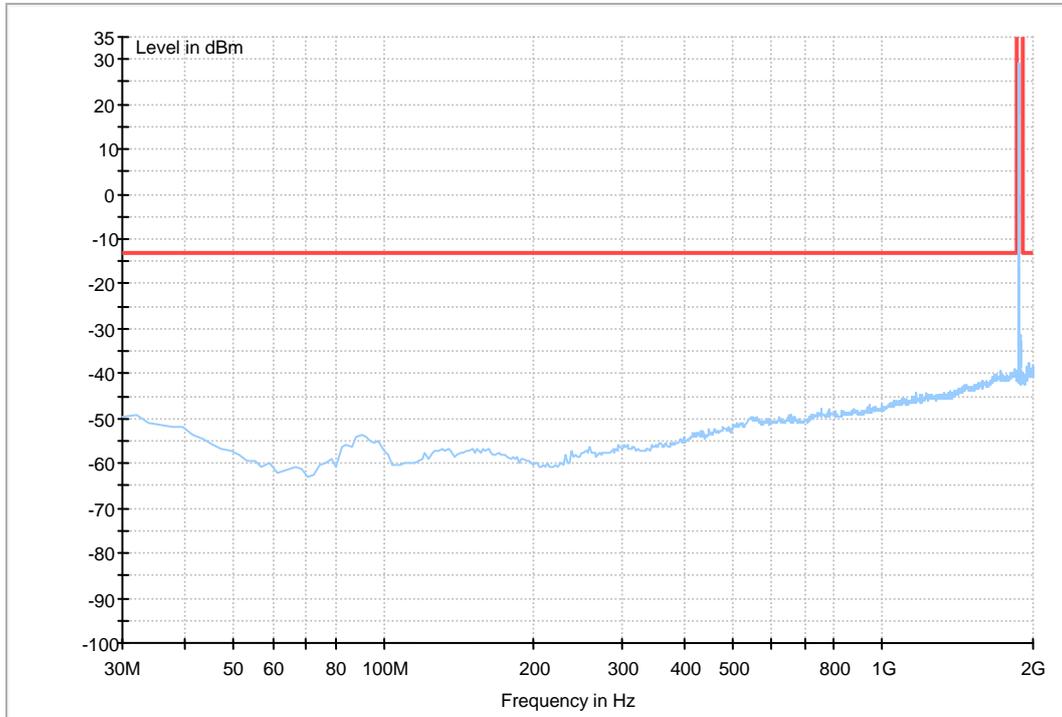
GPRS1900

Traffic Mode (9kHz-30MHz)



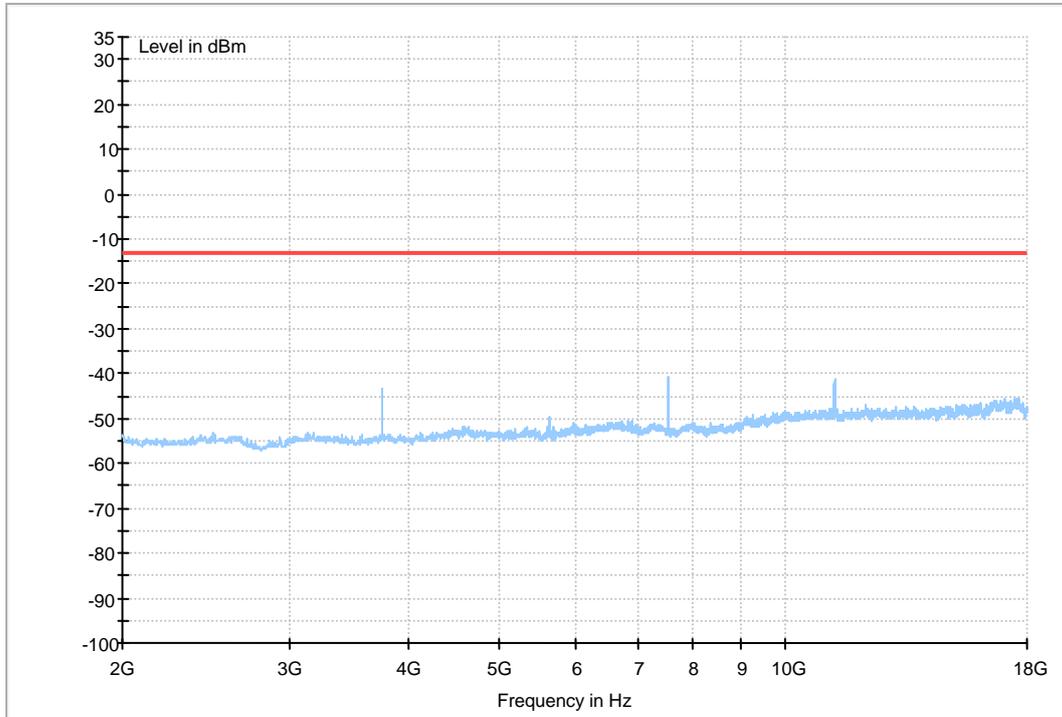


Traffic Mode (30MHz-2GHz)



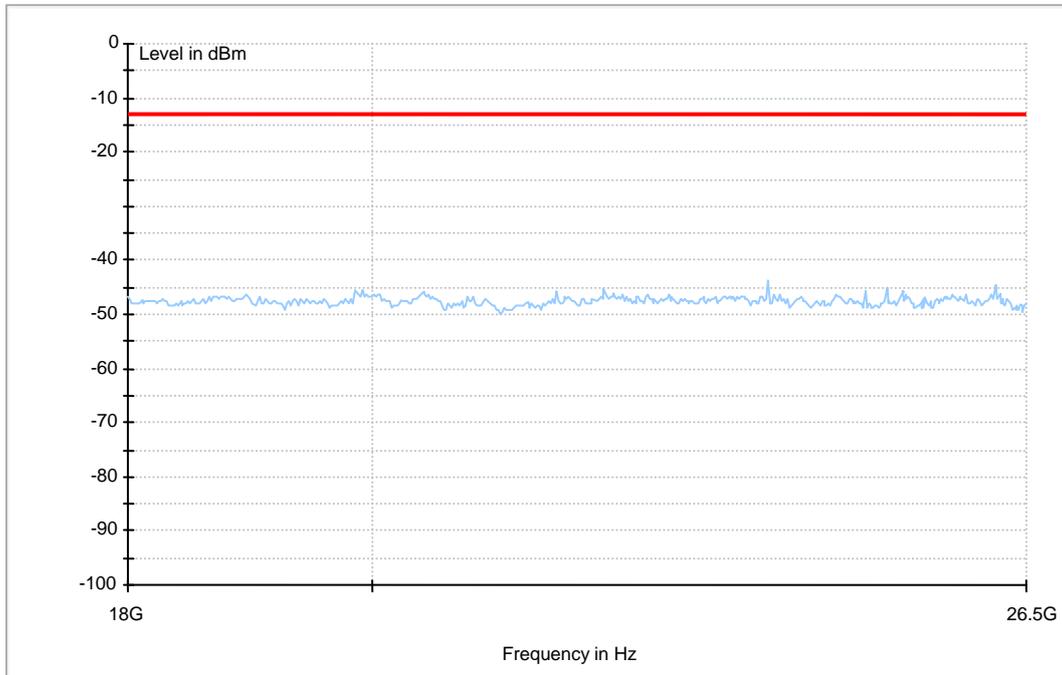


Traffic Mode (2GHz-18GHz)





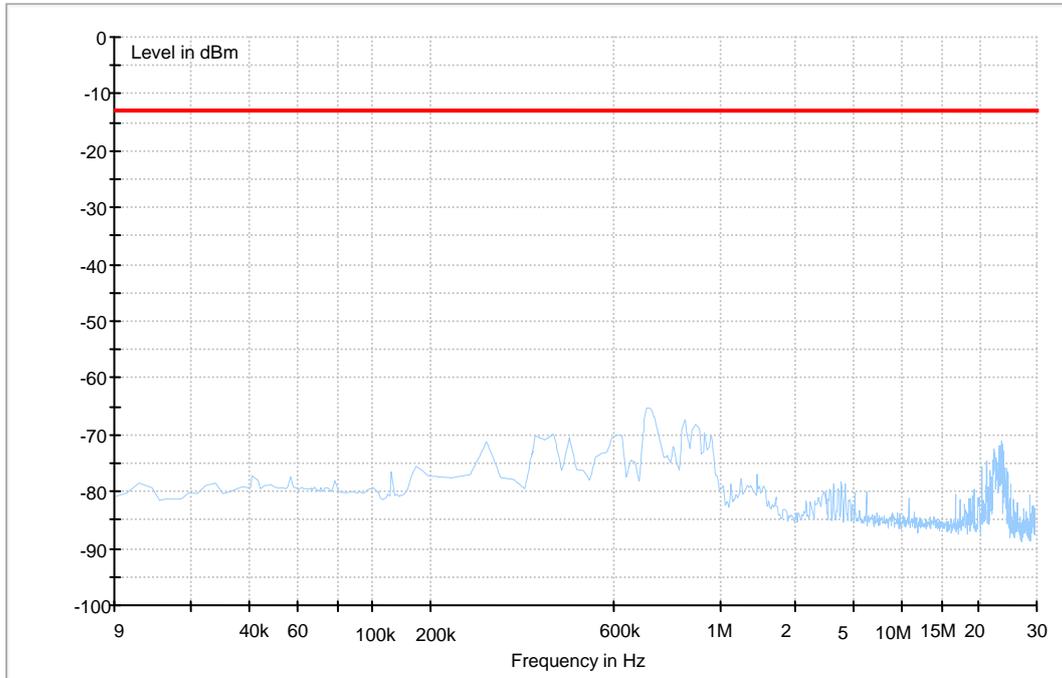
Traffic Mode (18GHz-26.5GHz)





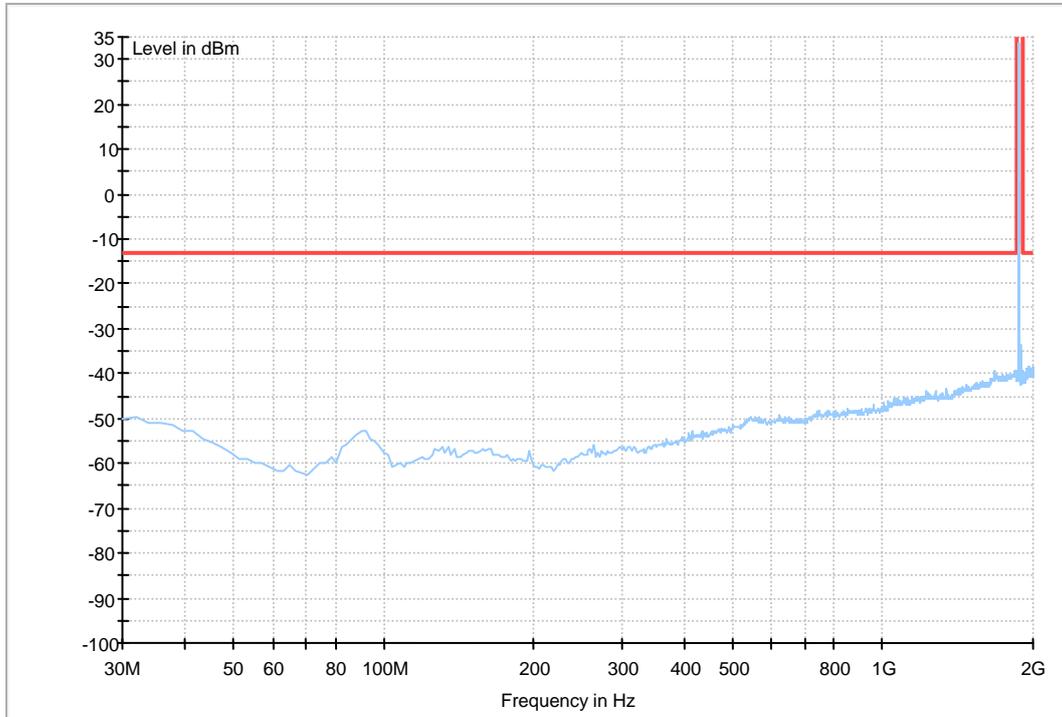
EDGE 1900

Traffic Mode (9kHz-30MHz)



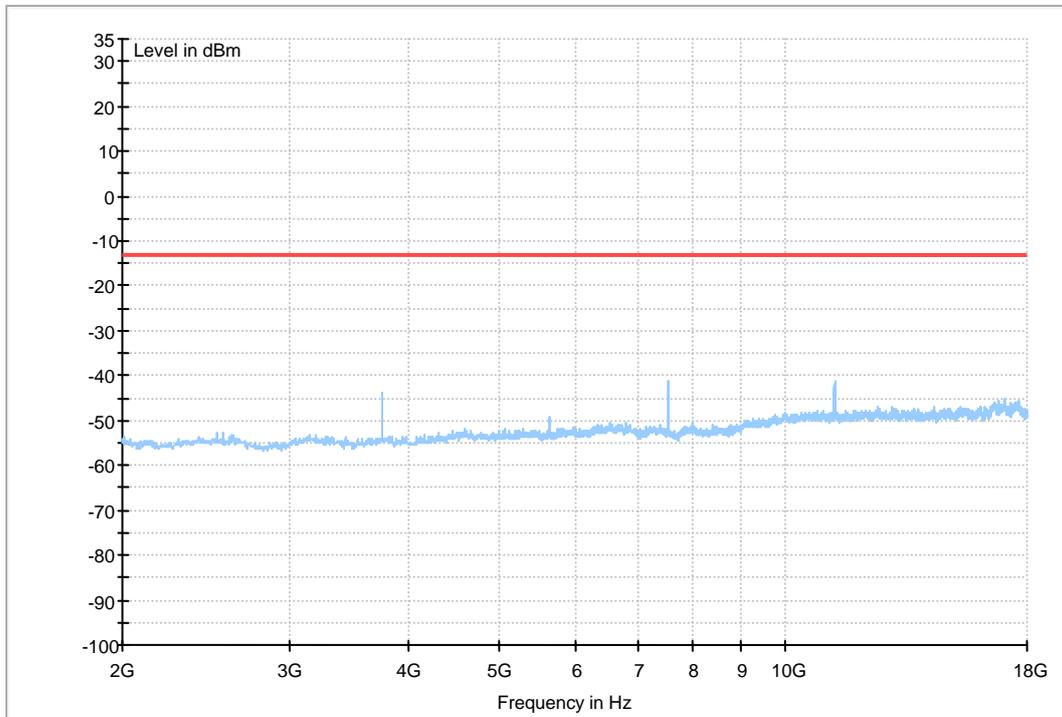


Traffic Mode (30MHz-2GHz)



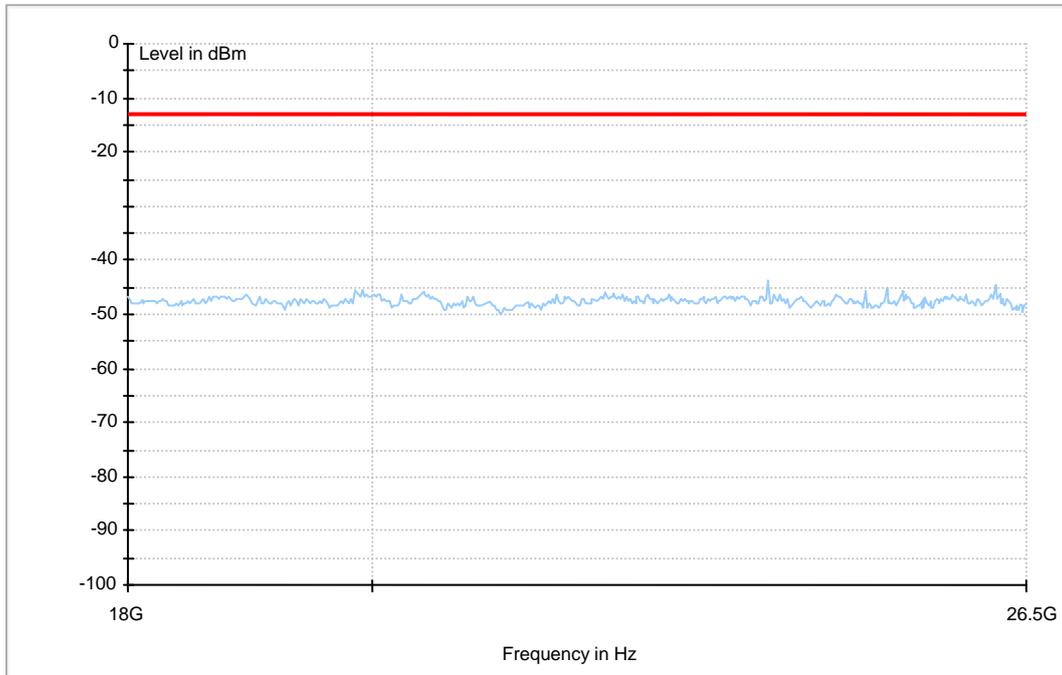


Traffic Mode (2GHz-18GHz)





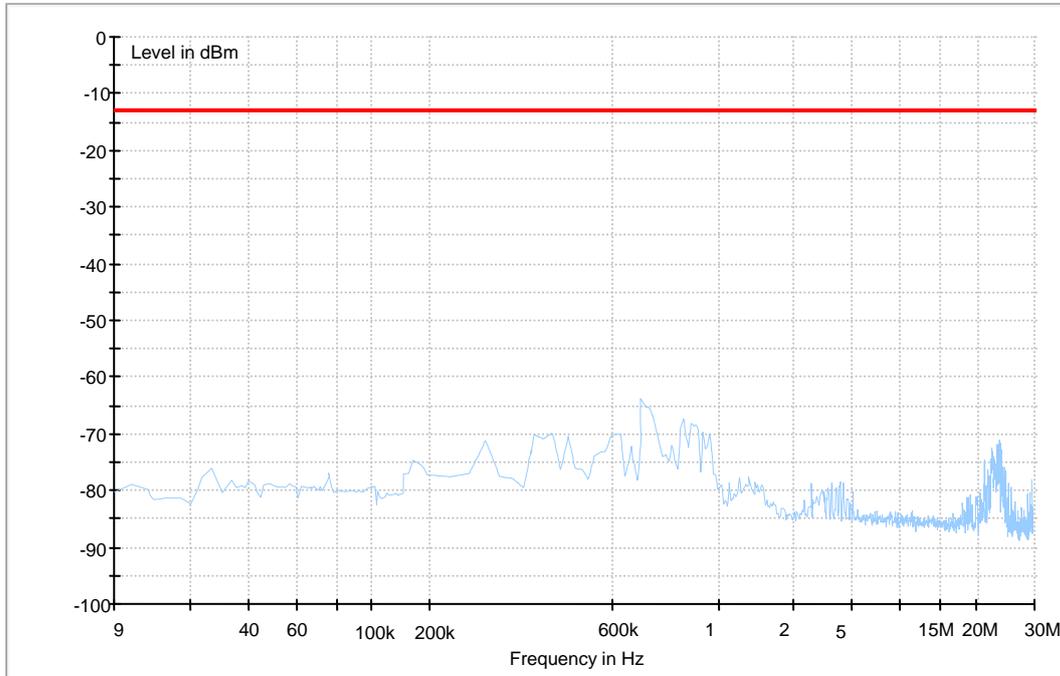
Traffic Mode (18GHz-26.5GHz)





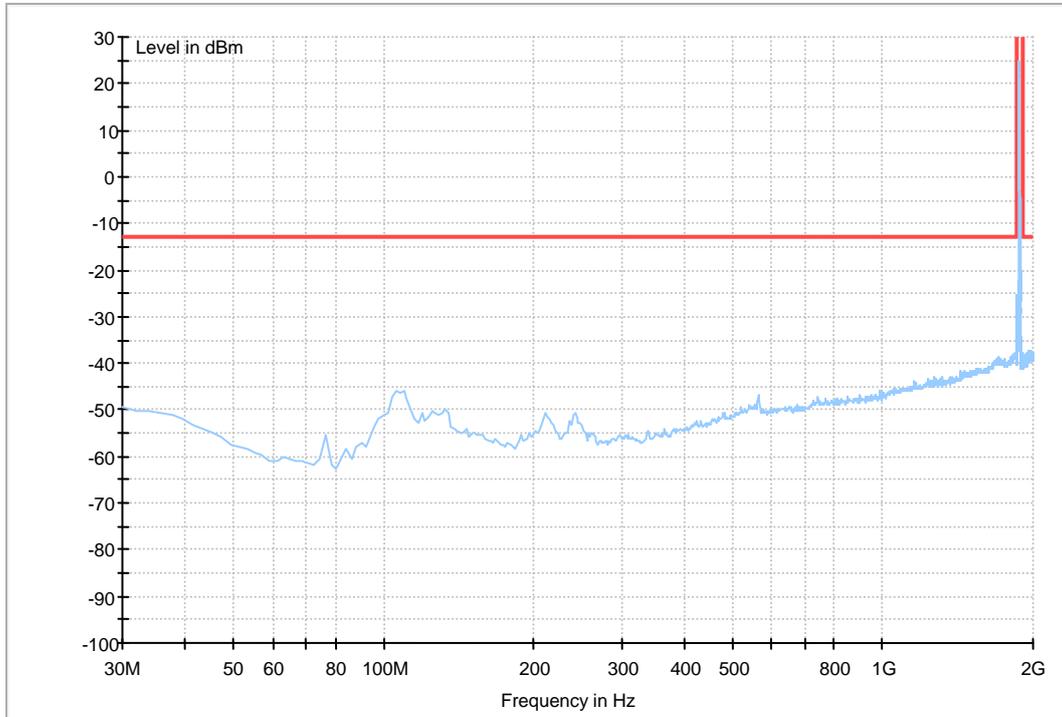
WCDMA1900

Traffic Mode (9kHz-30MHz)



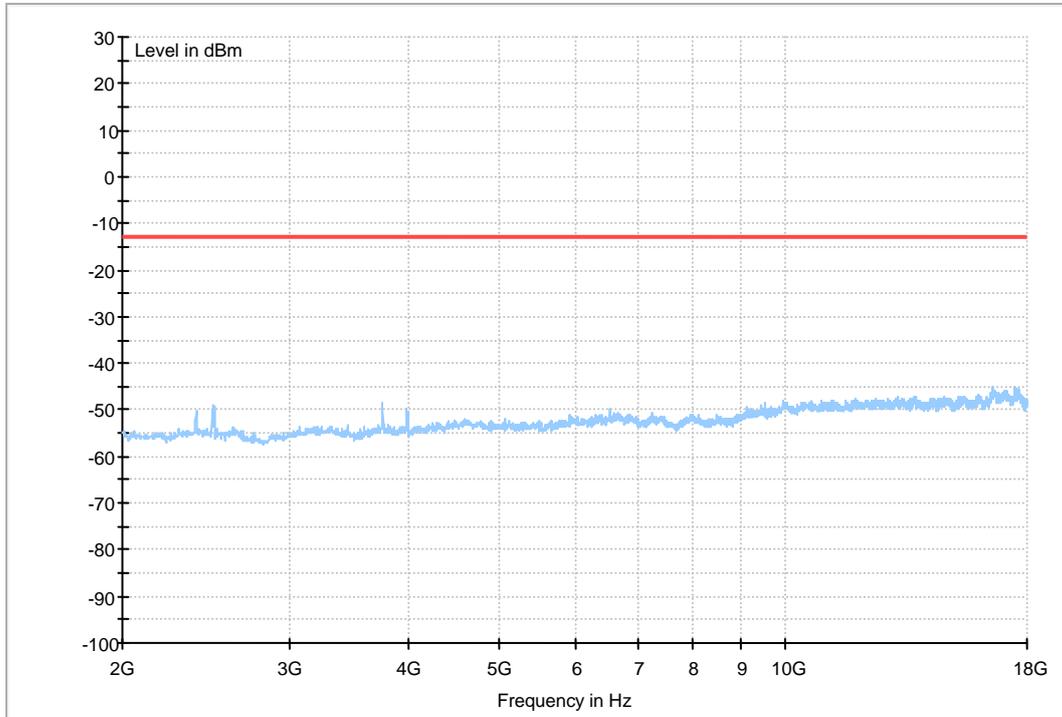


Traffic Mode (30MHz-2GHz)



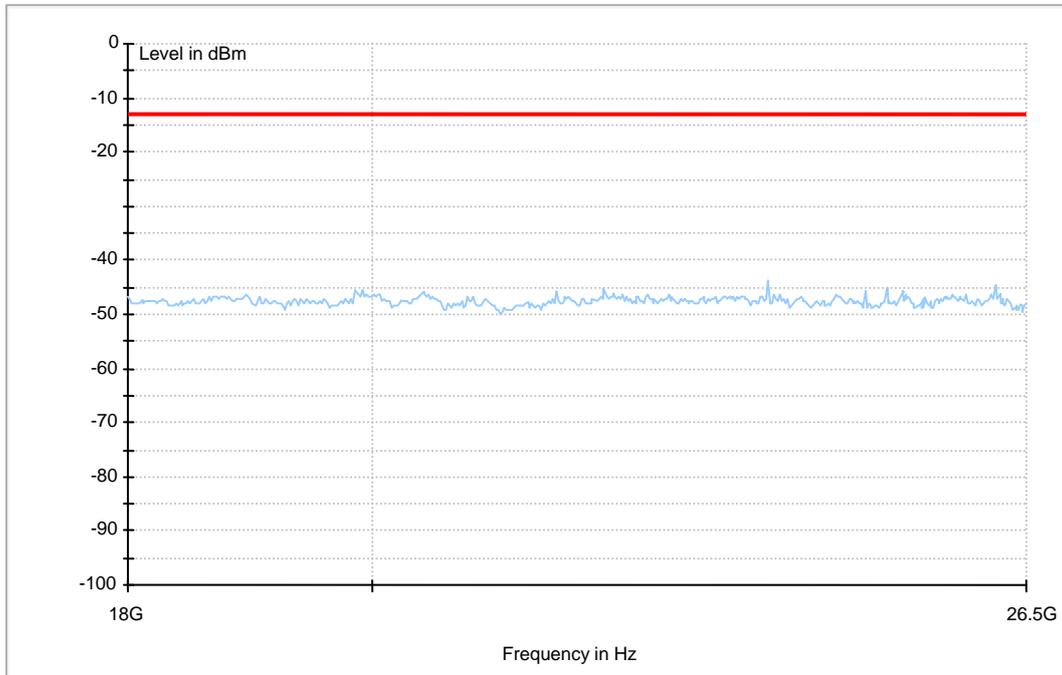


Traffic Mode (2GHz-18GHz)





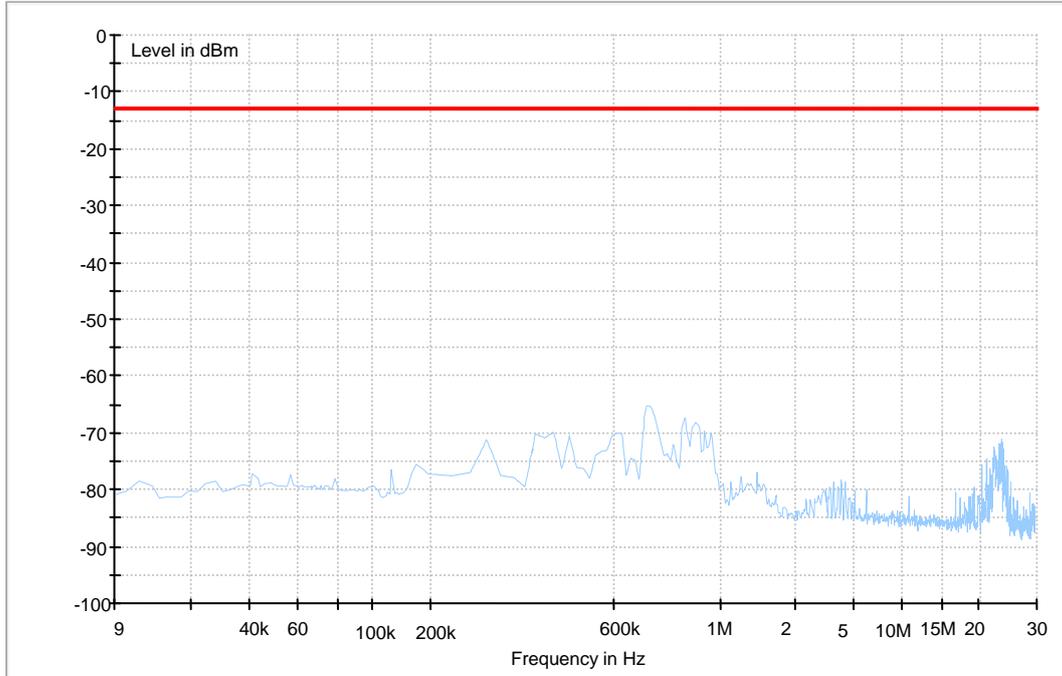
Traffic Mode (18GHz-26.5GHz)





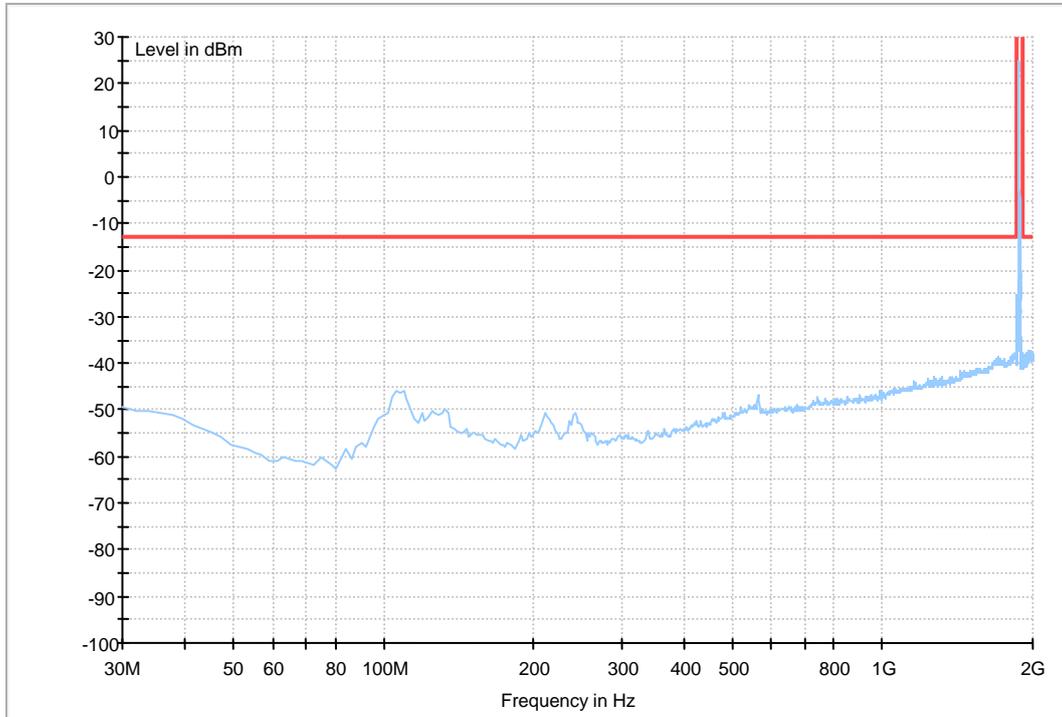
HSDPA 1900

Traffic Mode (9kHz-30MHz)



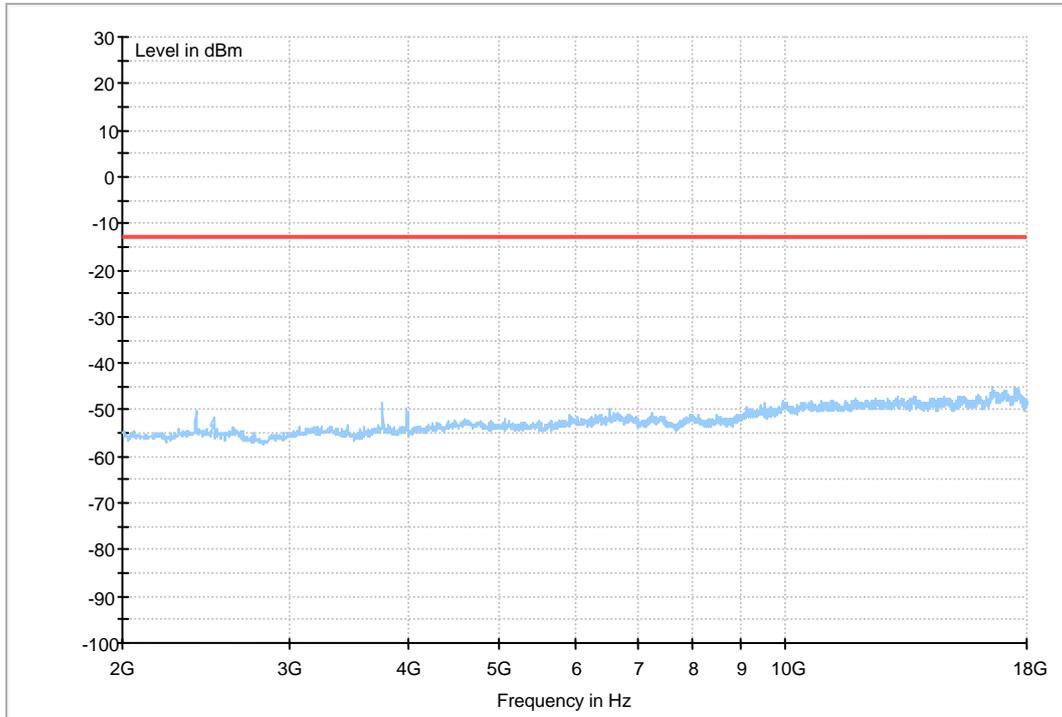


Traffic Mode (30MHz-2GHz)





Traffic Mode (2GHz-18GHz)





Traffic Mode (18GHz-26.5GHz)

