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## 1. General information's

### 1-1 Test Performed

Company name : LTA Co., Ltd.  
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822  
 Web site : <http://www.ltalab.com>  
 E-mail : [chahn@ltalab.com](mailto:chahn@ltalab.com)  
 Telephone : +82-31-323-6008  
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

### 1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

| Agency | Country | Accreditation No. | Validity   | Reference           |
|--------|---------|-------------------|------------|---------------------|
| NVLAP  | U.S.A   | 200723-0          | 2010-09-30 | ECT accredited Lab. |
| RRL    | KOREA   | KR0049            | 2011-06-20 | EMC accredited Lab. |
| FCC    | U.S.A   | 610755            | 2011-04-22 | FCC filing          |
| VCCI   | JAPAN   | R2133, C2307      | 2011-06-21 | VCCI registration   |
| IC     | CANADA  | IC5799            | 2012-05-14 | IC filing           |

## 2. Information's about test item

### **2-1 Client**

Company name : Public Wireless, Inc  
Address : 1325A McCandless Dr. BLDG. A, Milpitas, CA 95035, USA  
Telephone : +408-263-4600

### **2-2 Manufacturer**

Company name : Kisan Telecom Co., Ltd.  
Address : 2F, Segi Bldg., 66-2 Bangyi-Dong Songpa-Gu, Seoul, 138-828, Korea  
Telephone : +82 2-3433-8341

### **2-3 Equipment Under Test (EUT)**

Classification : PCS Licensed Transmitter  
Trade name : Dual Optical DAS Repeater  
Model name : CM200D01  
Serial number : Identification  
Date of receipt : July 26, 2010  
EUT condition : Pre-production, not damaged  
Downlink : 869~894MHz (GSM 850 / WCDMA 850)  
1930~1990MHz (GSM 1900 / WCDMA 1900)  
Uplink : N/A (Optical)  
Max gain : 50dB  
Frequency Tolerance :  $\pm 0.0002$  ppm  
Emission Designators : GSM(GXW), WCDMA(F9W)  
Power Input : 120Vac

**2-4 Tested frequency**

| Mode       | Frequency (CH) | TX (MHz) |
|------------|----------------|----------|
| GSM 850    | Low (129)      | 869.4    |
|            | Mid (190)      | 881.6    |
|            | High (250)     | 893.6    |
| GSM 1900   | Low (513)      | 1930.4   |
|            | Mid (661)      | 1960     |
|            | High (809)     | 1989.6   |
| WCDMA 850  | Low (4357)     | 871.4    |
|            | Mid (4407)     | 881.4    |
|            | High (4458)    | 891.6    |
| WCDMA 1900 | Low (9662)     | 1932.4   |
|            | Mid (9800)     | 1960     |
|            | High (9938)    | 1987.6   |

**2.5 Mode of Operation**

The EUT was powered by 120VAC. The EUT was configured for maximum gain, 50dB. Repeater simulators were used to provide the input signals to the EUT. Tests were performed with GSM and WCDMA modulations. The input power was the maximum declared by the manufacturer.

### 3. Test Report

#### 3.1 Summary of tests

| Parameter                                   | Status |
|---------------------------------------------|--------|
| <b>Transmitter Requirements</b>             |        |
| RF Power Output                             | C      |
| Occupied Bandwidth, Input/Output Comparison | C      |
| Out-of-Band Emissions at antenna terminal   | C      |
| Intermodulation Test                        | C      |
| Transmitter Spurious Radiation              | C      |
| Out of Band Rejection                       | -      |
| Frequency Stability                         | C      |

Note 1: C=Complies    NC=Not Complies    NT=Not Tested    NA=Not Applicable

Note 2: The data in this test report are to be tested to the ANSI/TIA-603-C-2004 standard

## 3.2 Results Of Tests

### 3.2.1 RF Power Output

#### 1. Test Procedure

The EUT RF output was connected to Powermeter. The EUT was setup to transmit continuously with maximum power. A spectrum analyzer was setup to measure peak power. Measurements were performed at three frequencies (low, middle, and high channels) with all modulations.

#### 2. Test Results

##### Modulation : GSM 850

|        | Freq. Tuned<br>(MHz) | Power Input<br>(dBm) | Power output<br>(dBm) | Power Output<br>(W) |
|--------|----------------------|----------------------|-----------------------|---------------------|
| Low    | 869.4                | -10.24               | 39.44                 | 8.79                |
| Middlw | 881.6                | -10.09               | 40.08                 | 10.18               |
| High   | 893.6                | -9.78                | 39.35                 | 8.61                |

##### Modulation : GSM 1900

|        | Freq. Tuned<br>(MHz) | Power Input<br>(dBm) | Power output<br>(dBm) | Power Output<br>(W) |
|--------|----------------------|----------------------|-----------------------|---------------------|
| Low    | 1930.4               | -10.23               | 40.37                 | 10.89               |
| Middlw | 1960                 | -10.12               | 40.44                 | 11.06               |
| High   | 1989.6               | -10.54               | 39.64                 | 9.20                |

##### Modulation : WCDMA 850

|        | Freq. Tuned<br>(MHz) | Power Input<br>(dBm) | Power output<br>(dBm) | Power Output<br>(W) |
|--------|----------------------|----------------------|-----------------------|---------------------|
| Low    | 871.4                | -10.31               | 38.80                 | 7.59                |
| Middlw | 881.6                | -10.13               | 39.30                 | 8.51                |
| High   | 891.6                | -10.41               | 38.24                 | 6.67                |

##### Modulation : WCDMA 1900

|        | Freq. Tuned<br>(MHz) | Power Input<br>(dBm) | Power output<br>(dBm) | Power Output<br>(W) |
|--------|----------------------|----------------------|-----------------------|---------------------|
| Low    | 1932.4               | -10.43               | 39.02                 | 7.98                |
| Middlw | 1960                 | -10.41               | 40.13                 | 10.3                |
| High   | 1987.4               | -10.13               | 39.32                 | 8.56                |

### 3.2.2 Occupied Bandwidth, Input/Output Comparison

#### 1. Test Procedure

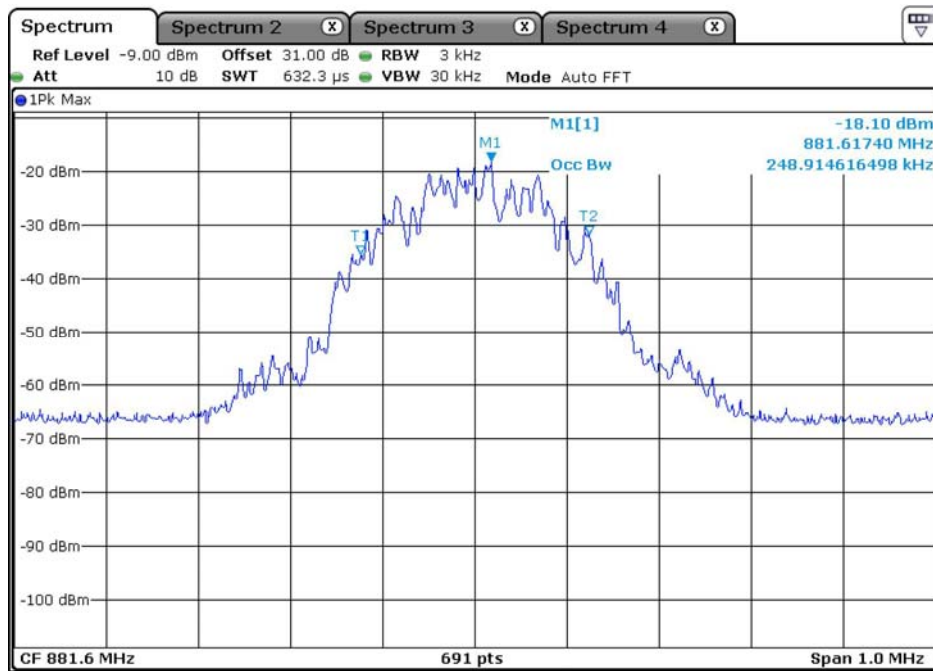
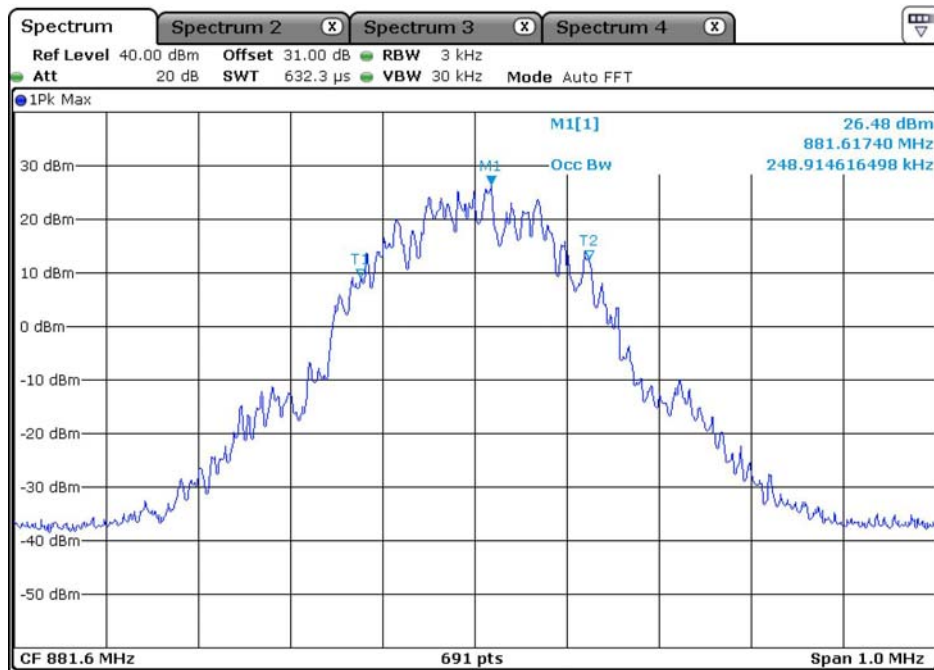
The EUT RF ports were connected to Spectrum analyzer. The EUT was setup to transmit maximum power. The spectrum analyzer was setup to measure the Occupied Bandwidth (defined as the 99% Power Bandwidth). The Occupied Bandwidth was measured at the input and output ports of the EUT at the middle channels for each type of modulation

#### 2. Test Results : Complies

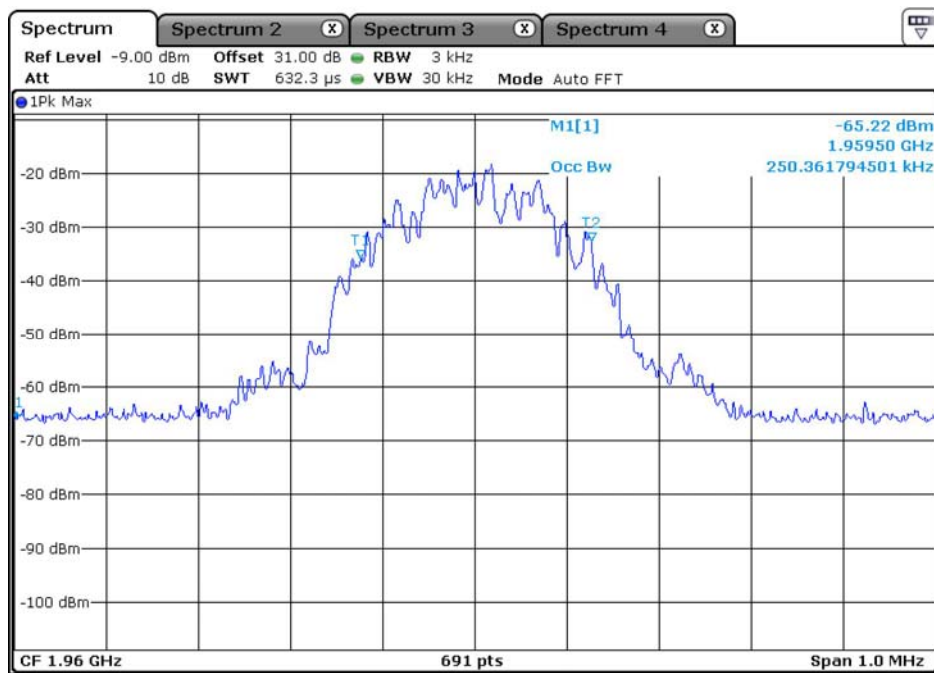
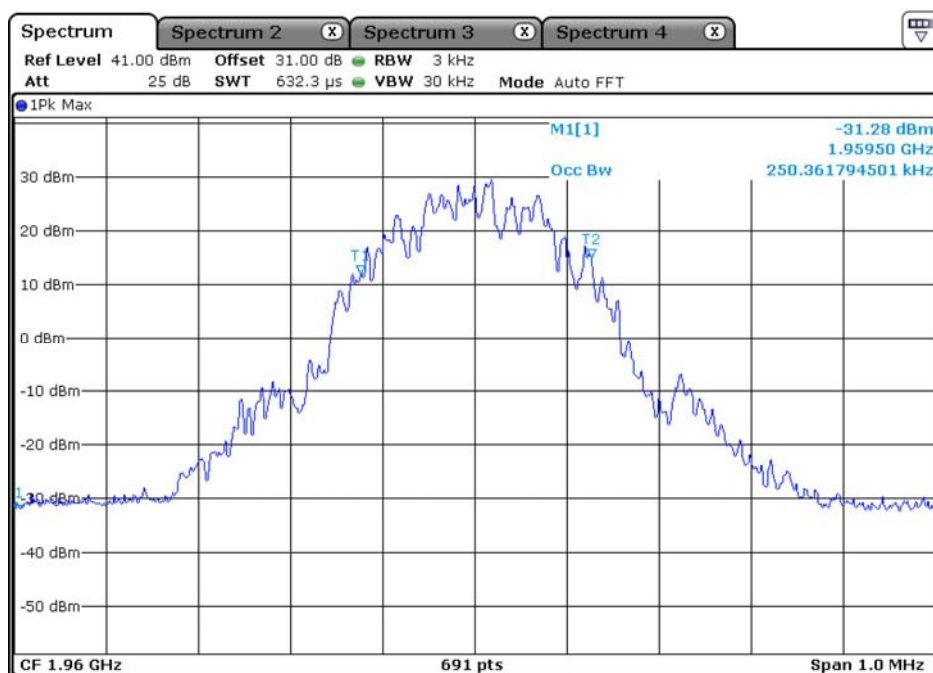
Refer to the following Graphs.



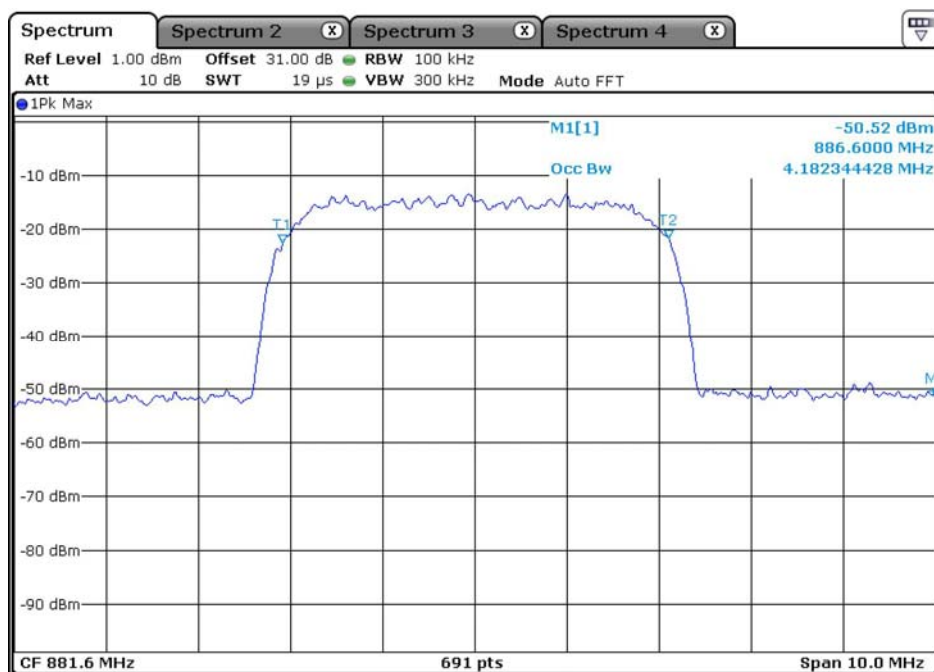
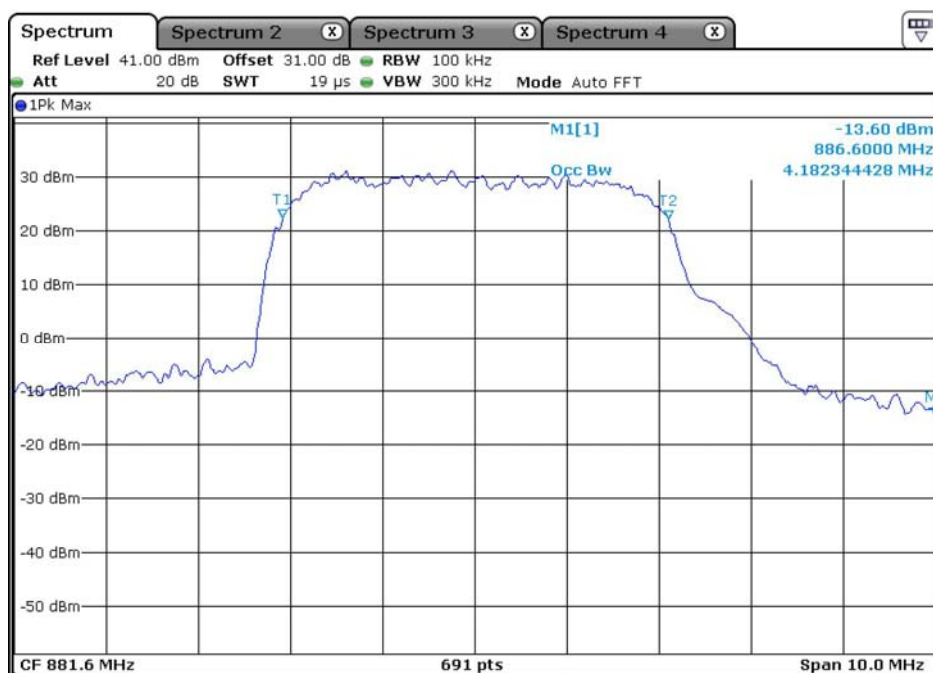
## Input/Output Bandwidth Comparison – GSM 850



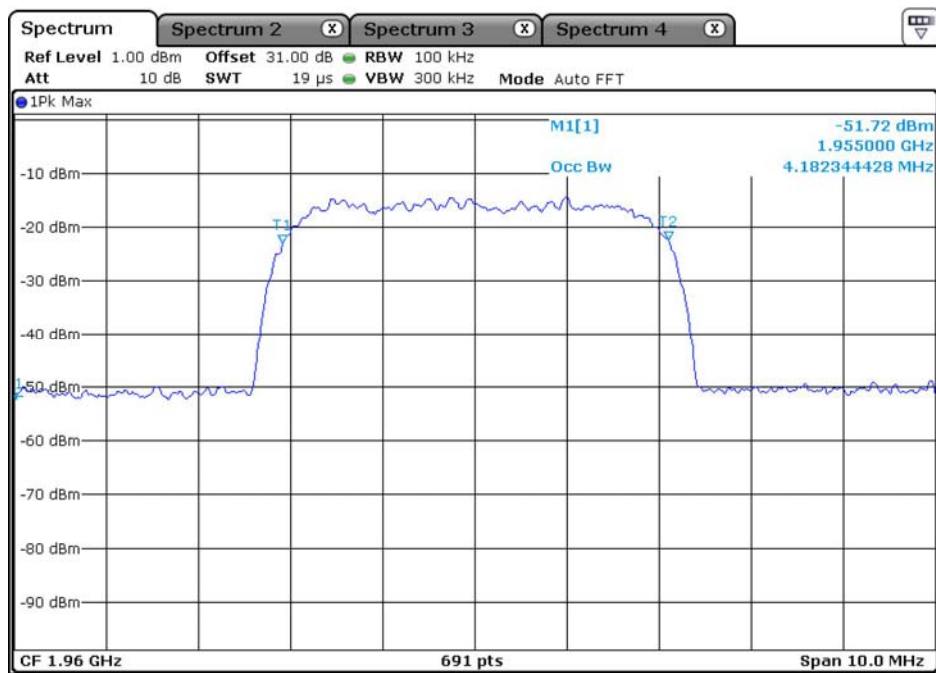
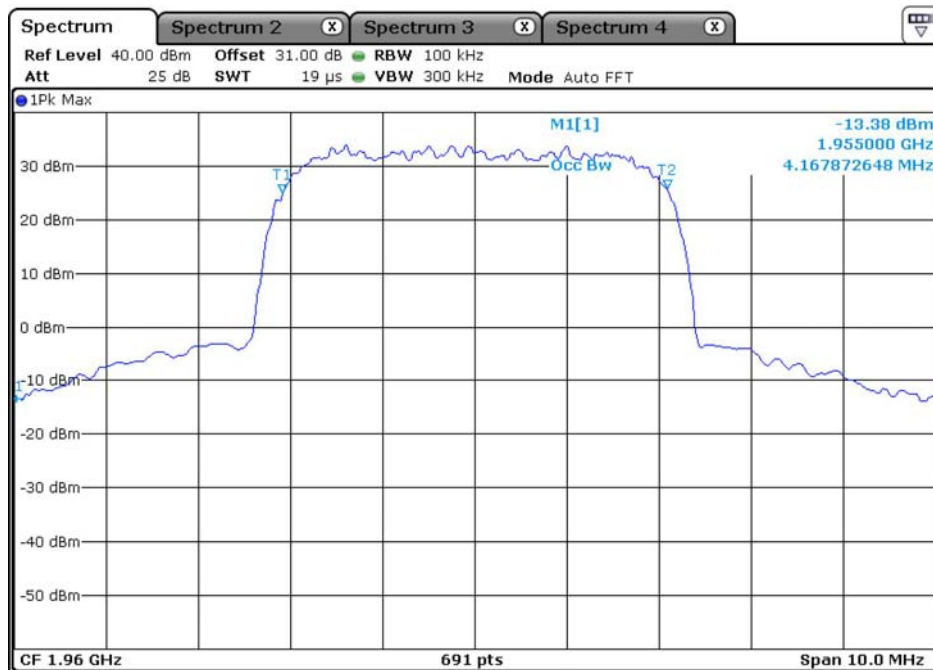
## Input/Output Bandwidth Comparison – GSM 1900



# Input/Output Bandwidth Comparison – WCDMA 850



# Input/Output Bandwidth Comparison – WCDMA 1900



### 3.2.3 Out-of-Band Emissions at antenna terminal

#### 1. Requirement

The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $(43 + 10 \log P)$  dB. Note: That corresponds to the level of -13 dBm for any out-of-band and spurious emissions.

#### 2. Test Procedure

The EUT RF output was connected to spectrum analyzer. The EUT was setup to transmit the maximum power. The spectrum analyzer resolution bandwidth (RBW) was set to 1 MHz in the PCS band and 100 kHz in the Cell band. For measurements at the band edges, the resolution bandwidth (RBW) was set to 100 kHz. Measurements were performed at three frequencies at the low, middle, and high channels for all modulations types. Intermodulation was performed by injecting two modulated signals into the EUT. One signal was set at the bandedge of either the Up Link or Down Link band and the other signal was set 6 MHz away.

#### 3. Test Results : Complies

Refer to the following Graphs.

**GSM 850 (Spurious Emission : Out of Band)**

|        | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b><br>(W) |
|--------|-----------------------------|------------------------|-----------------------|----------------------|
| Low    | 869.4                       | -                      | -13.00                | -                    |
| Middlw | 881.6                       | -                      | -13.00                | -                    |
| High   | 893.6                       | -                      | -13.00                | -                    |

\*note : No other emissions were detected at a level greater than 20dB below limit.

**GSM 1900 (Spurious Emission : Out of Band)**

|        | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b><br>(W) |
|--------|-----------------------------|------------------------|-----------------------|----------------------|
| Low    | 1930.4                      | -                      | -13.00                | -                    |
| Middlw | 1960                        | -                      | -13.00                | -                    |
| High   | 1989.6                      | -                      | -13.00                | -                    |

\*note : No other emissions were detected at a level greater than 20dB below limit.

**WCDMA 850 (Spurious Emission : Out of Band)**

|        | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b><br>(W) |
|--------|-----------------------------|------------------------|-----------------------|----------------------|
| Low    | 871.4                       | -                      | -13.00                | -                    |
| Middlw | 881.6                       | -                      | -13.00                | -                    |
| High   | 891.6                       | -                      | -13.00                | -                    |

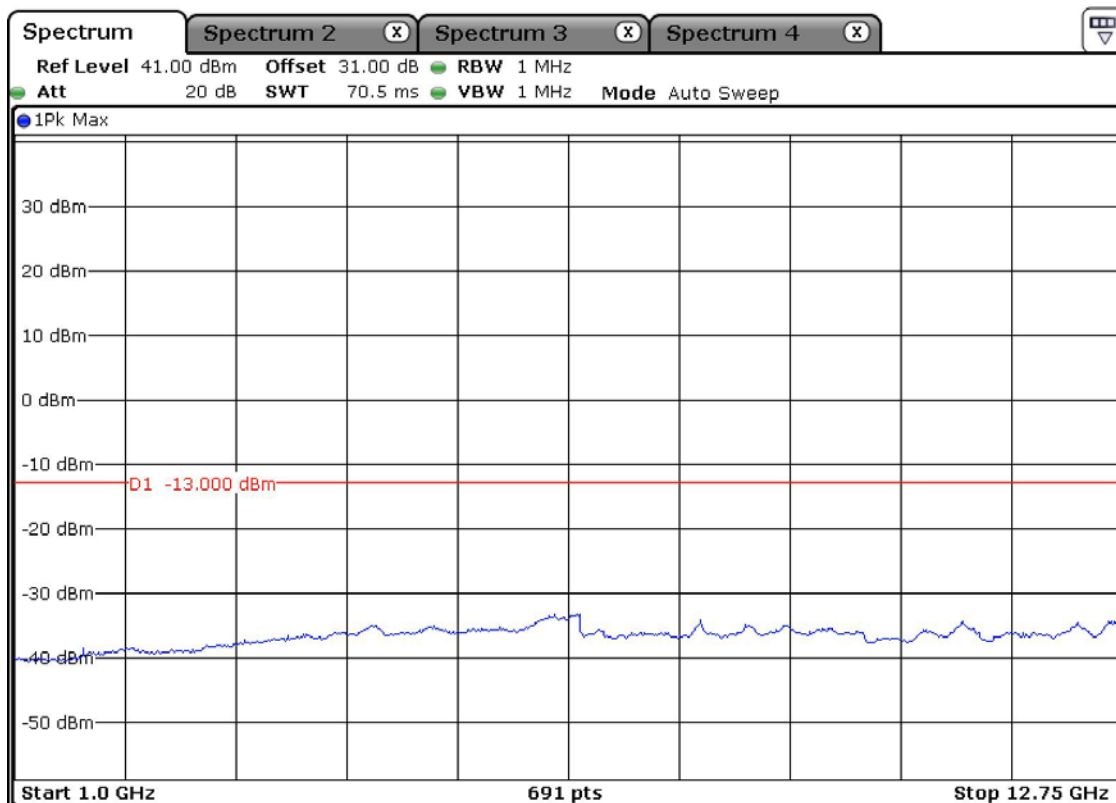
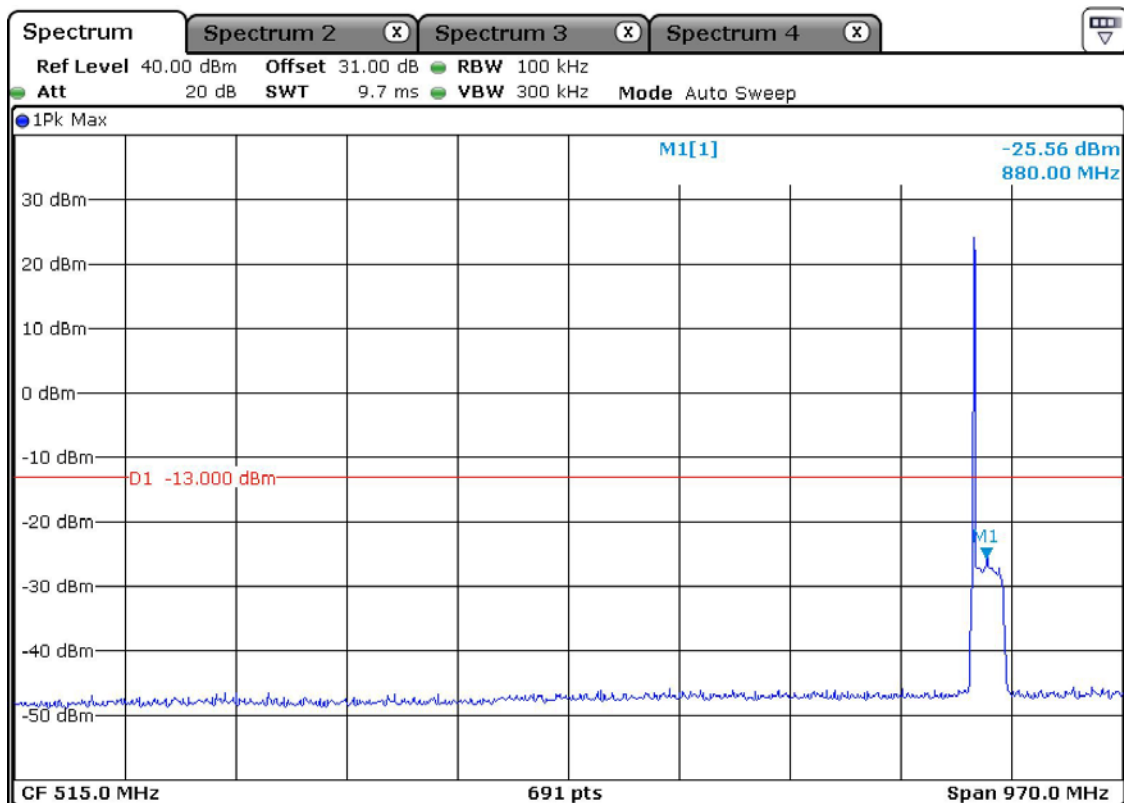
\*note : No other emissions were detected at a level greater than 20dB below limit.

**WCDMA 1900 (Spurious Emission : Out of Band)**

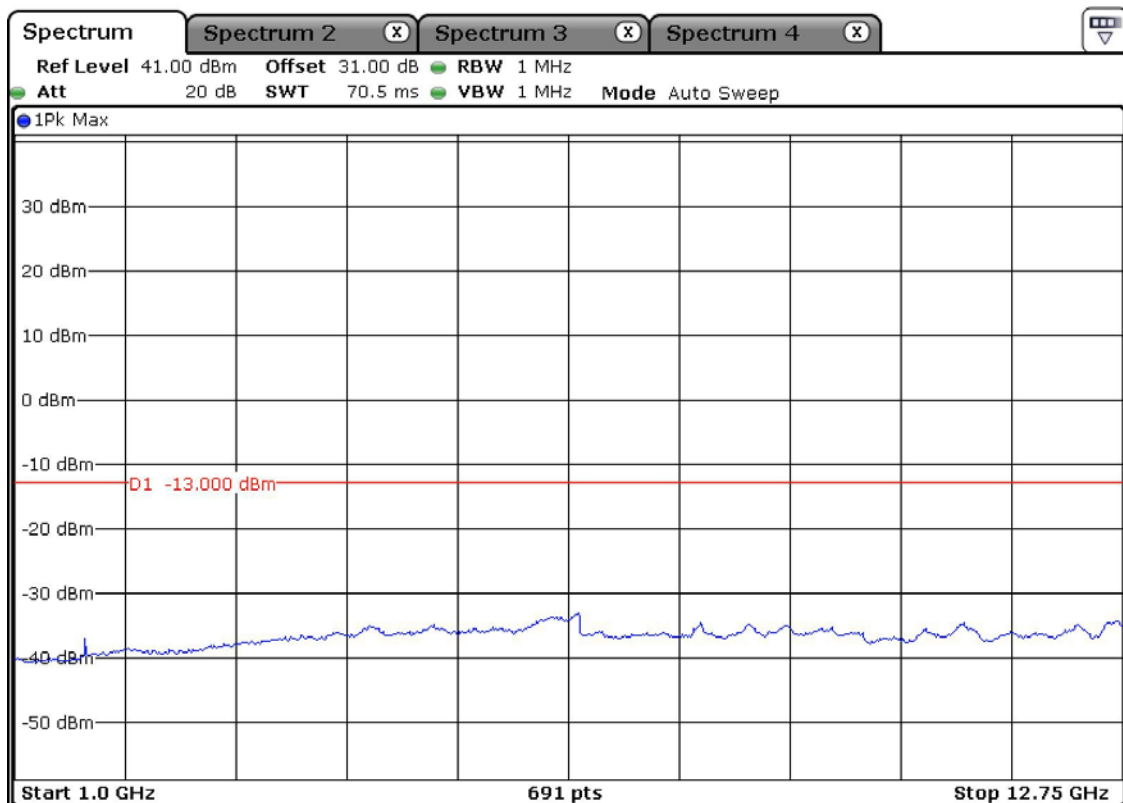
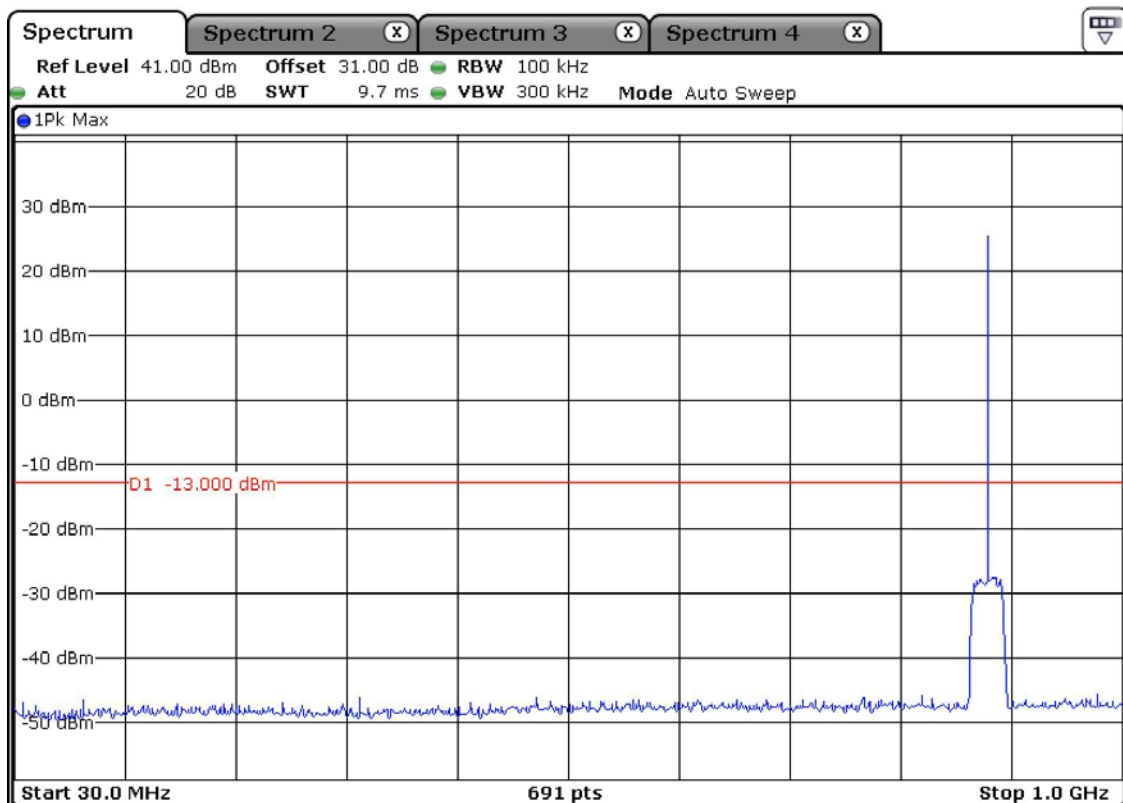
|        | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b><br>(W) |
|--------|-----------------------------|------------------------|-----------------------|----------------------|
| Low    | 1932.4                      | -                      | -13.00                | -                    |
| Middlw | 1960                        | -                      | -13.00                | -                    |
| High   | 1987.4                      | -                      | -13.00                | -                    |

\*note : No other emissions were detected at a level greater than 20dB below limit.

## Antenna Terminal Spurious Emissions, GSM 850, Low

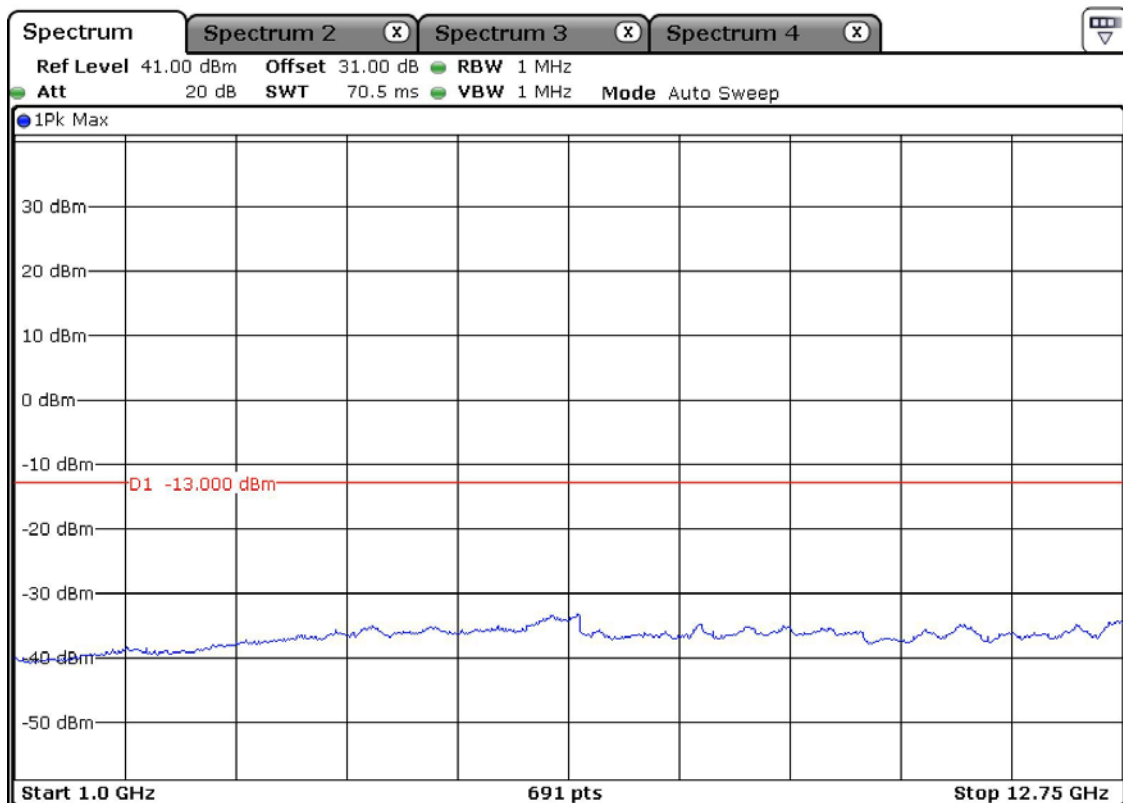
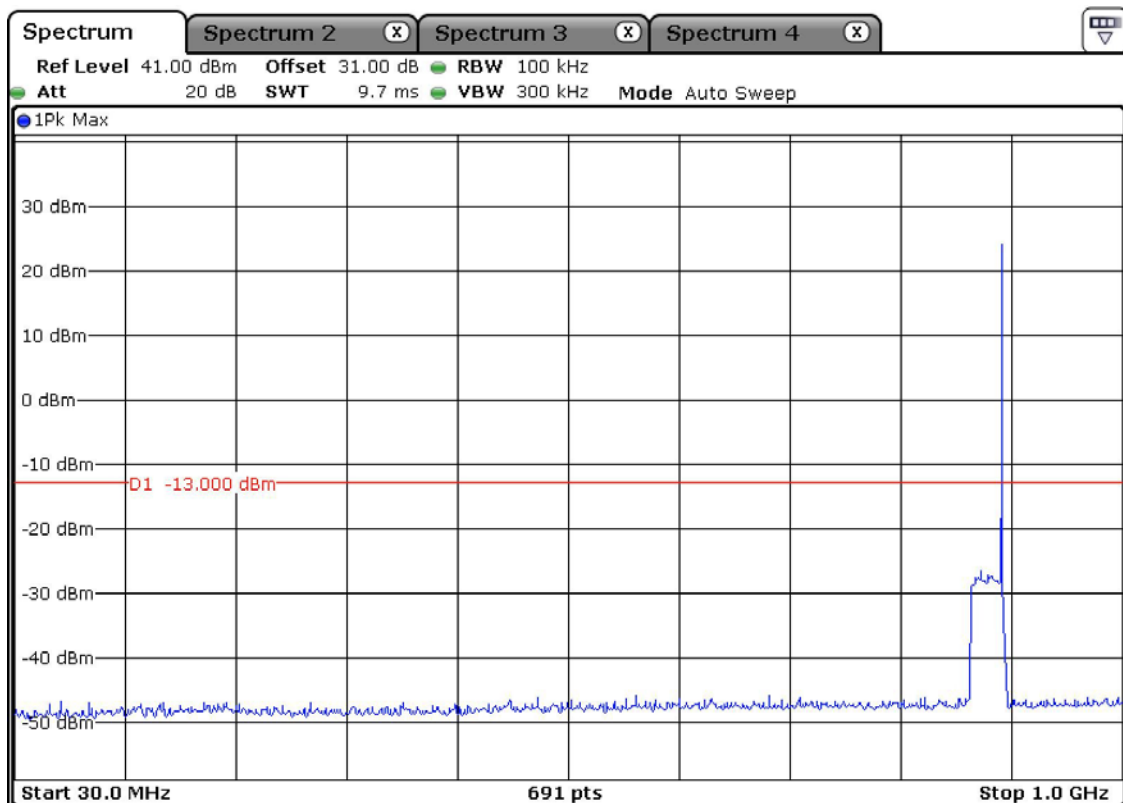


## Antenna Terminal Spurious Emissions, GSM 850, Middle

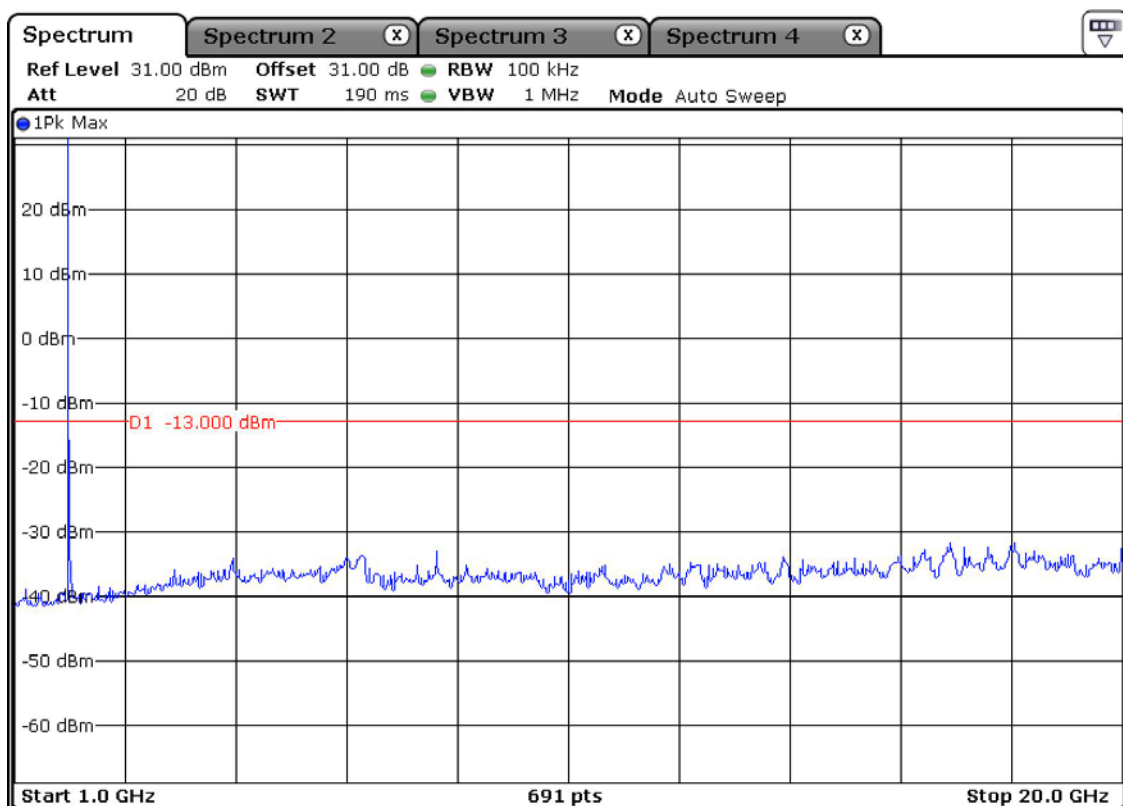
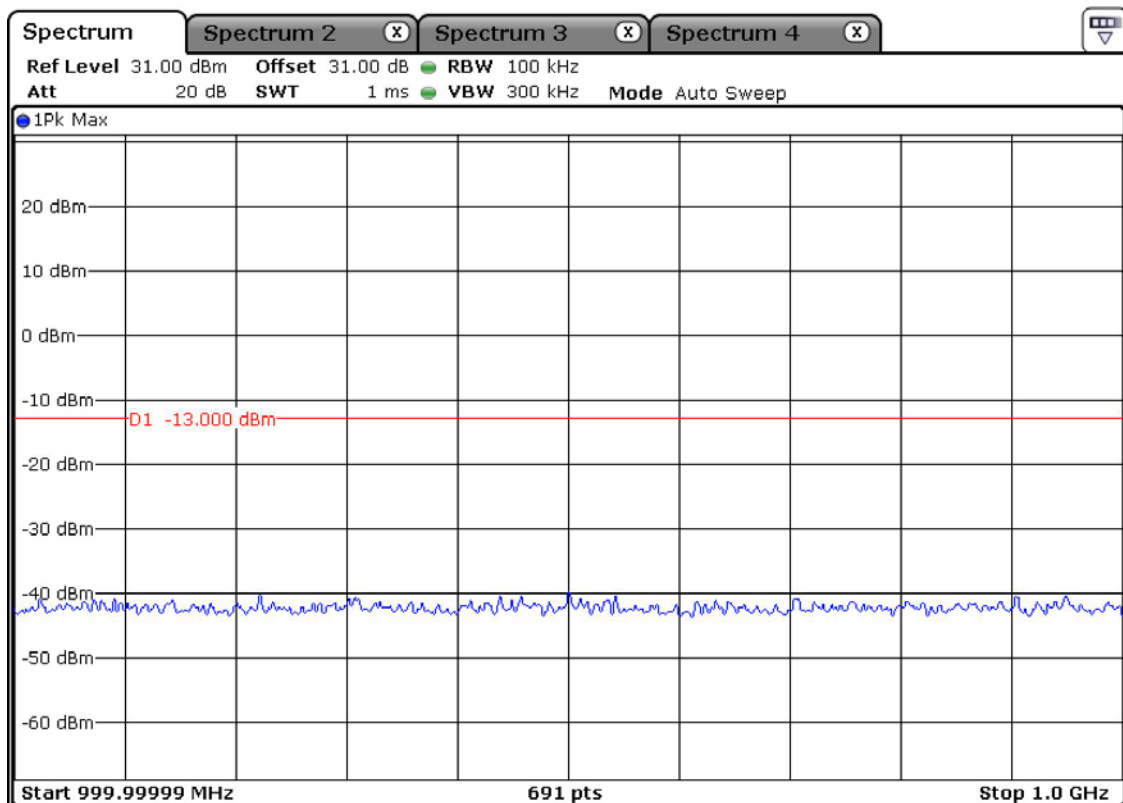




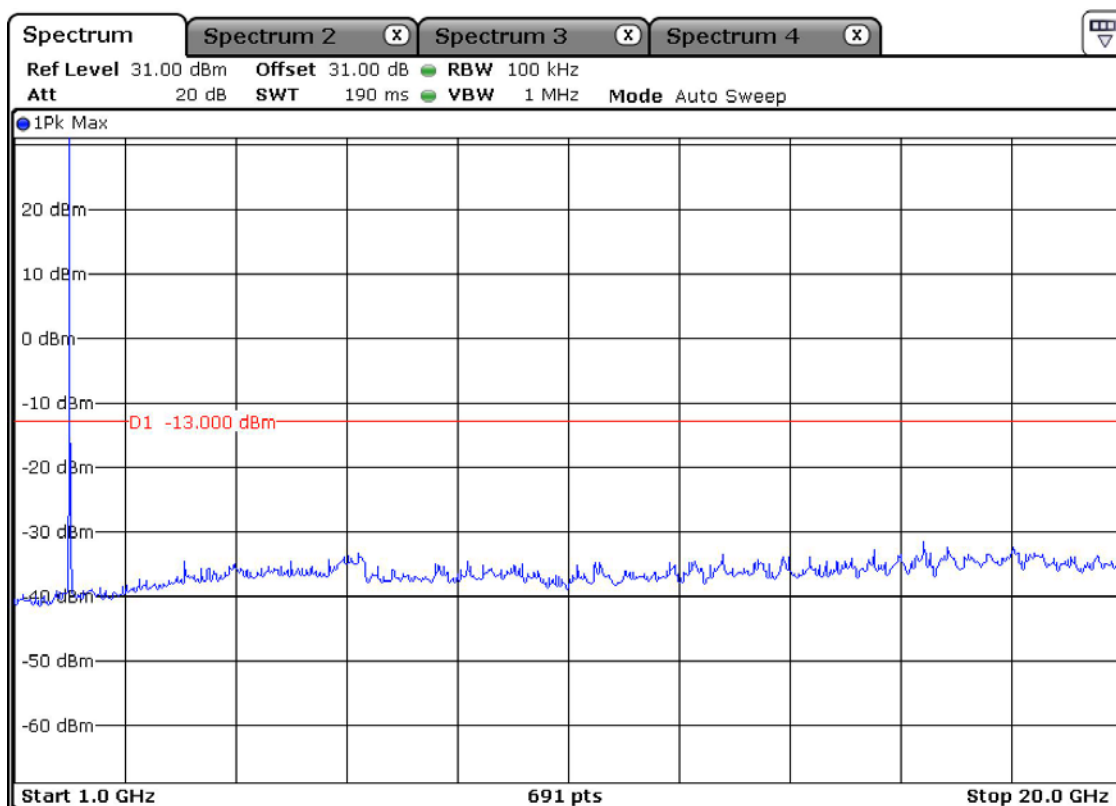
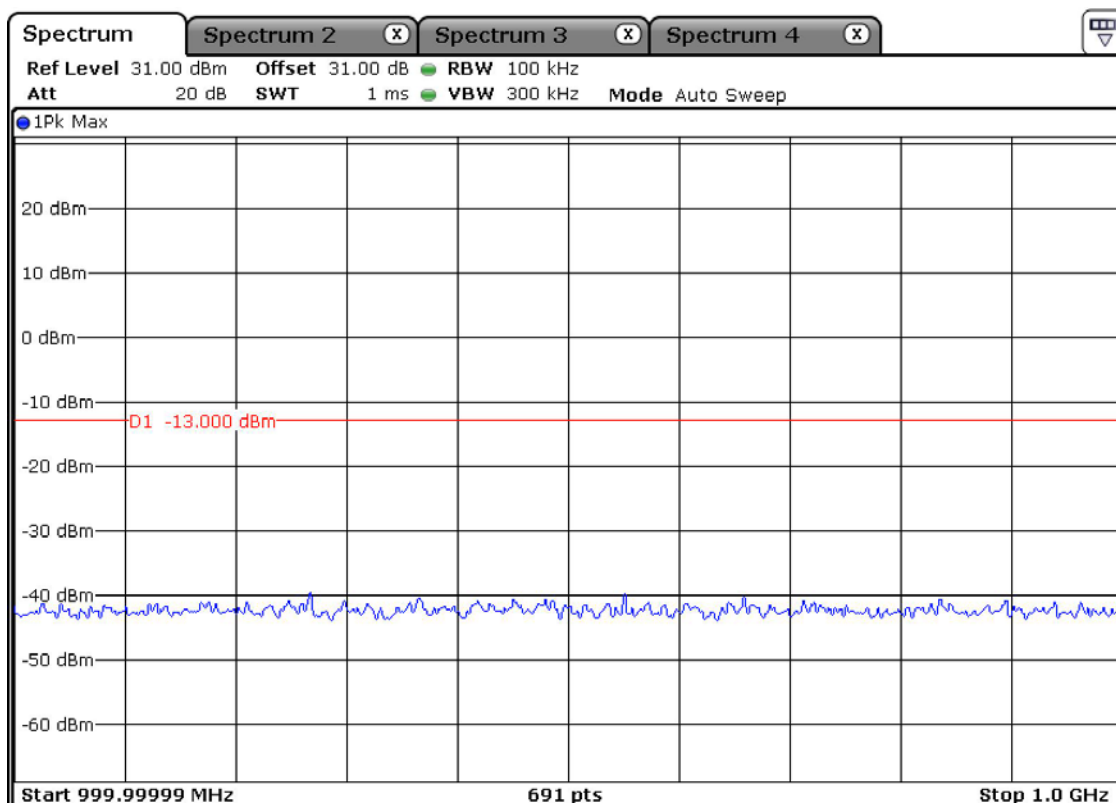
## Antenna Terminal Spurious Emissions, GSM 850, High



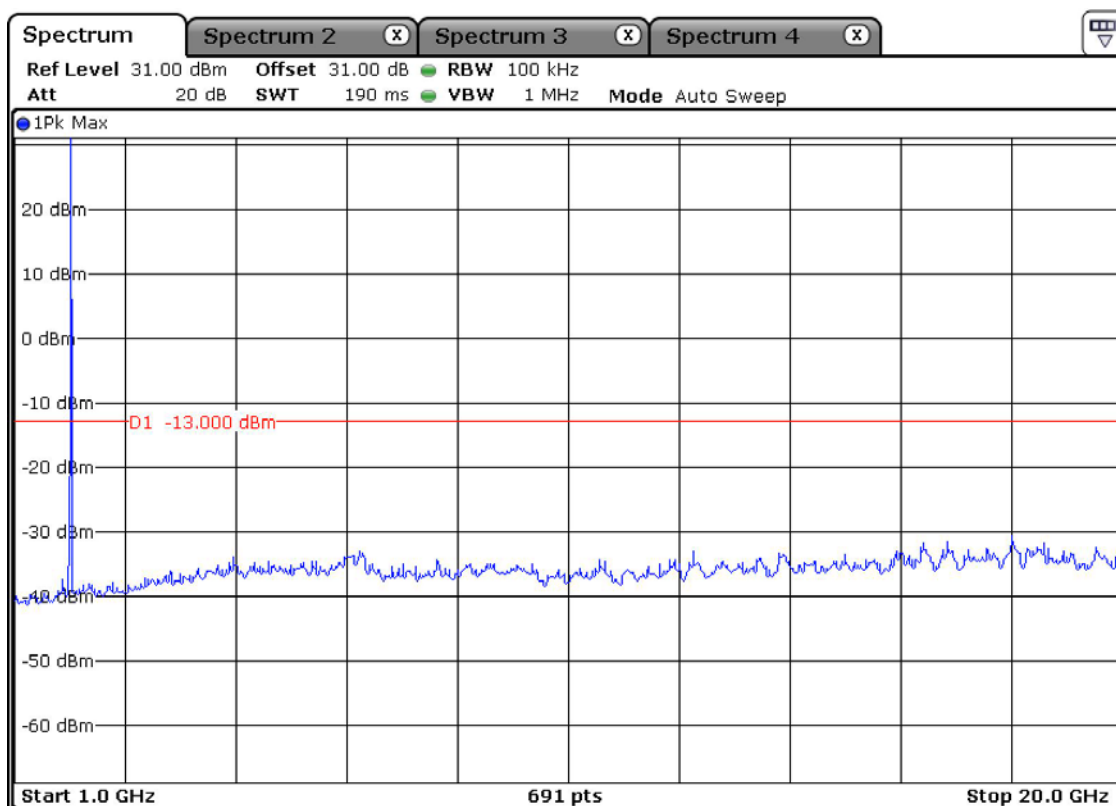
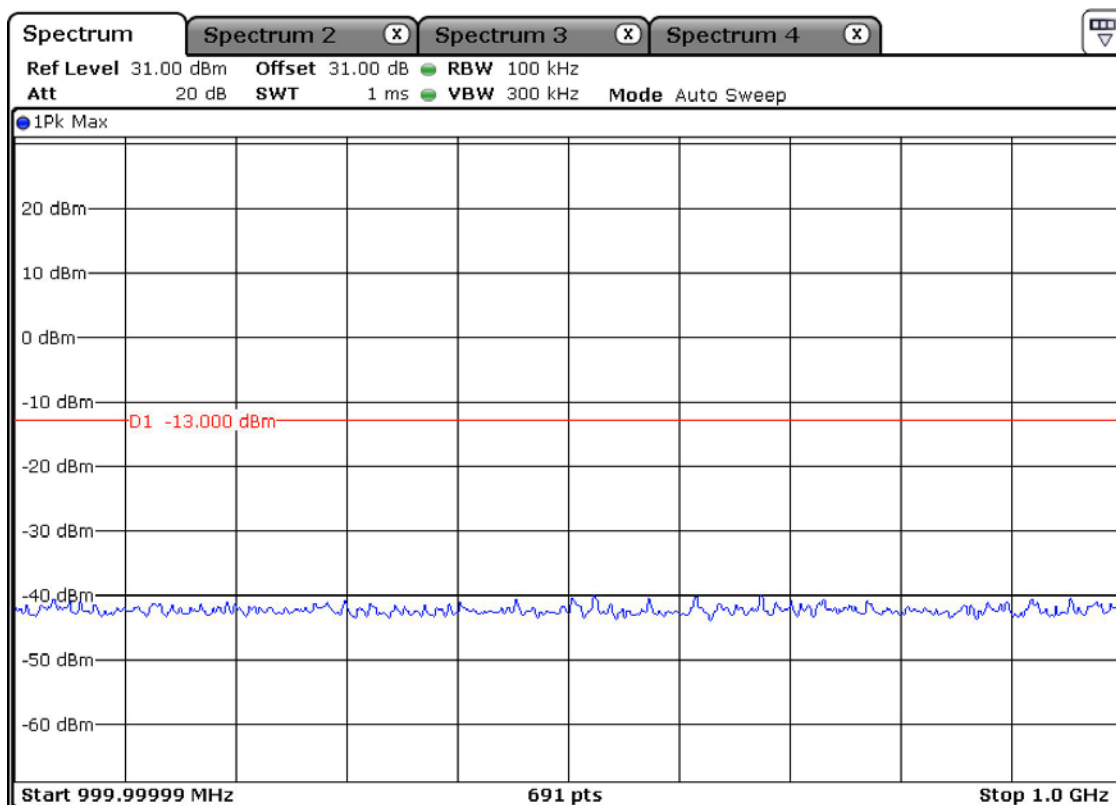
## Antenna Terminal Spurious Emissions, GSM 1900, Low



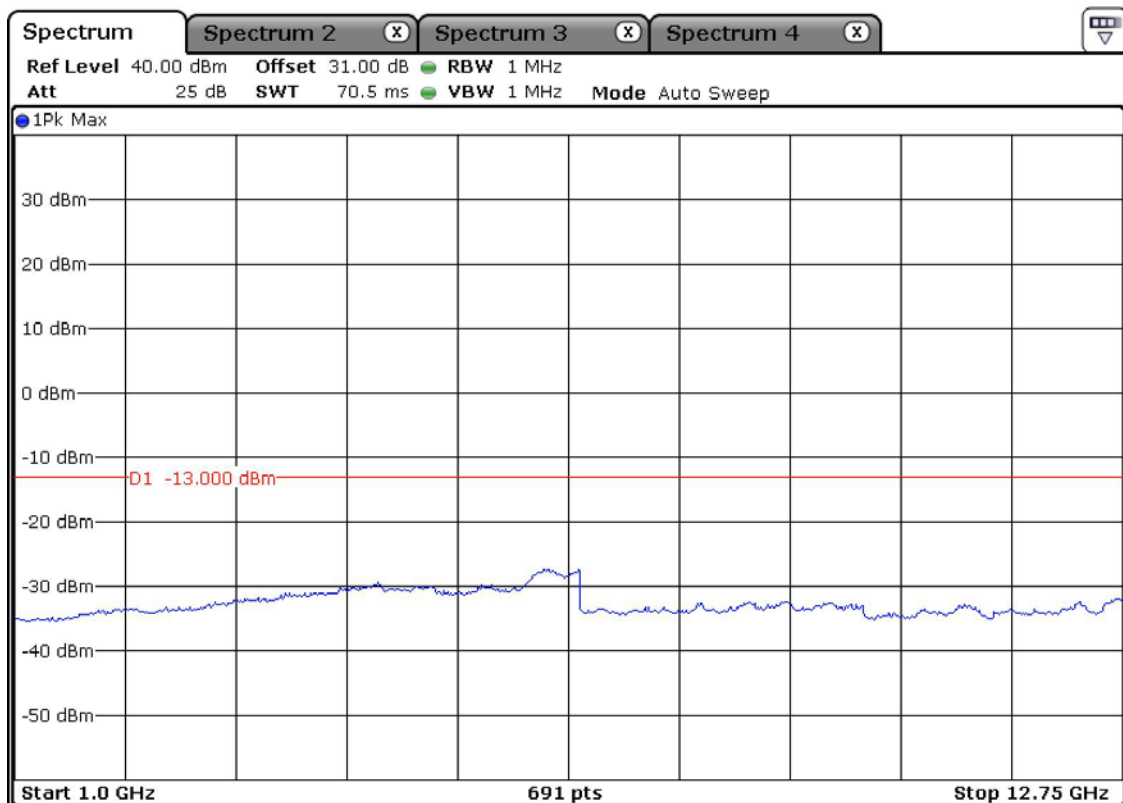
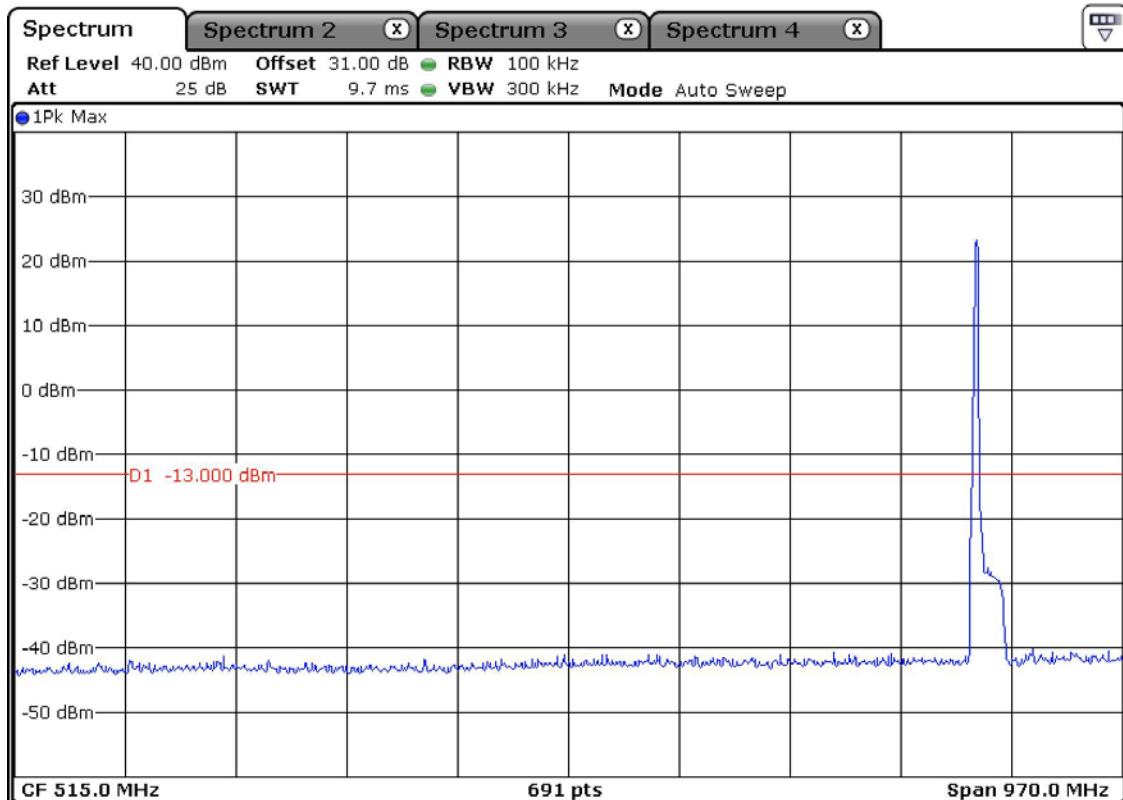
## Antenna Terminal Spurious Emissions, GSM 1900, Middle



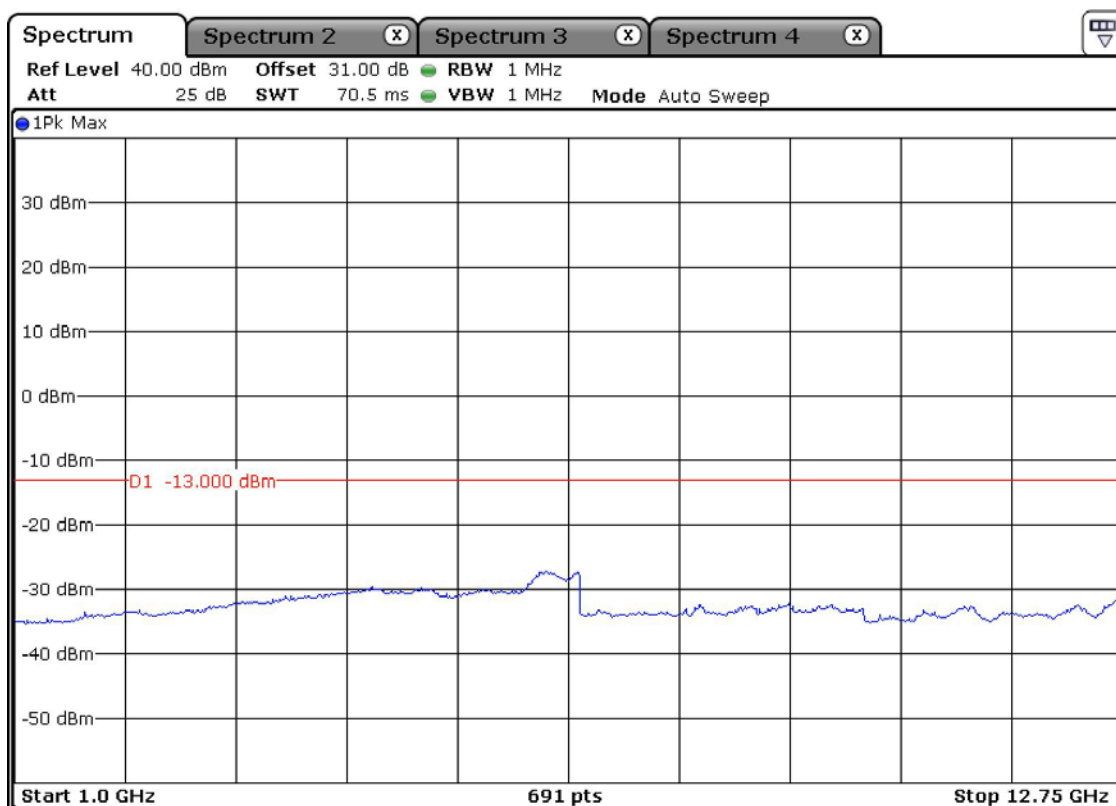
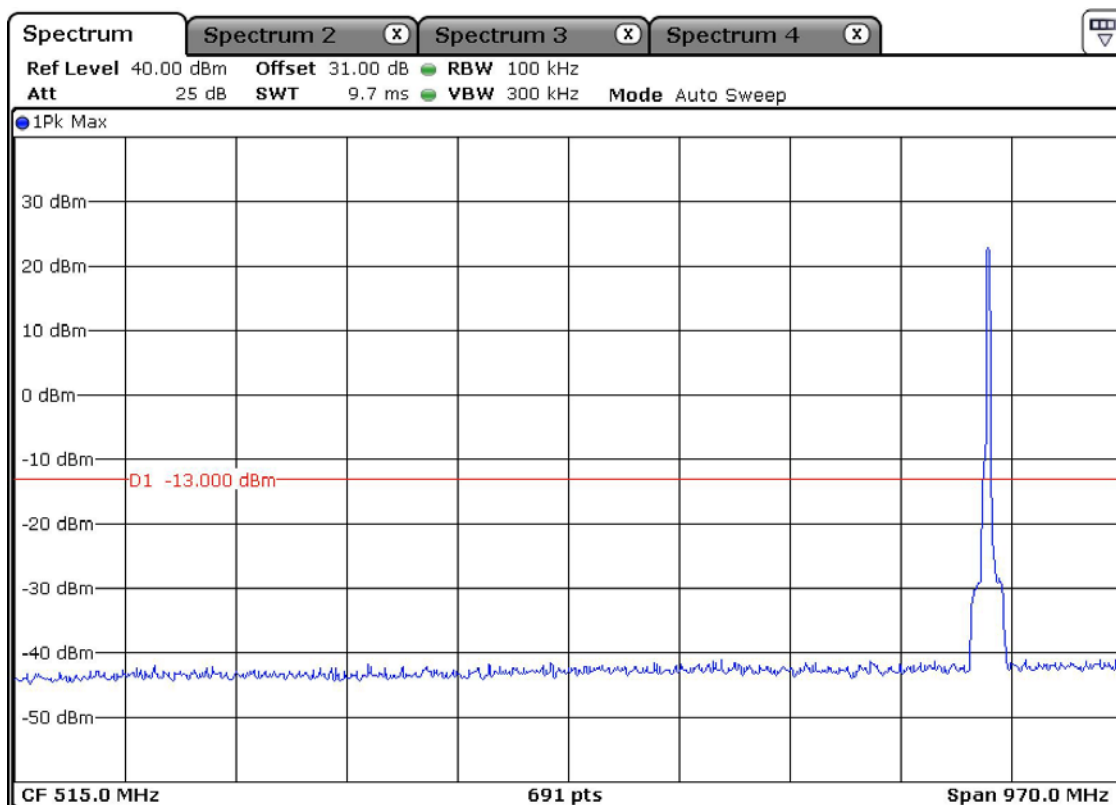
## Antenna Terminal Spurious Emissions, GSM 1900, High



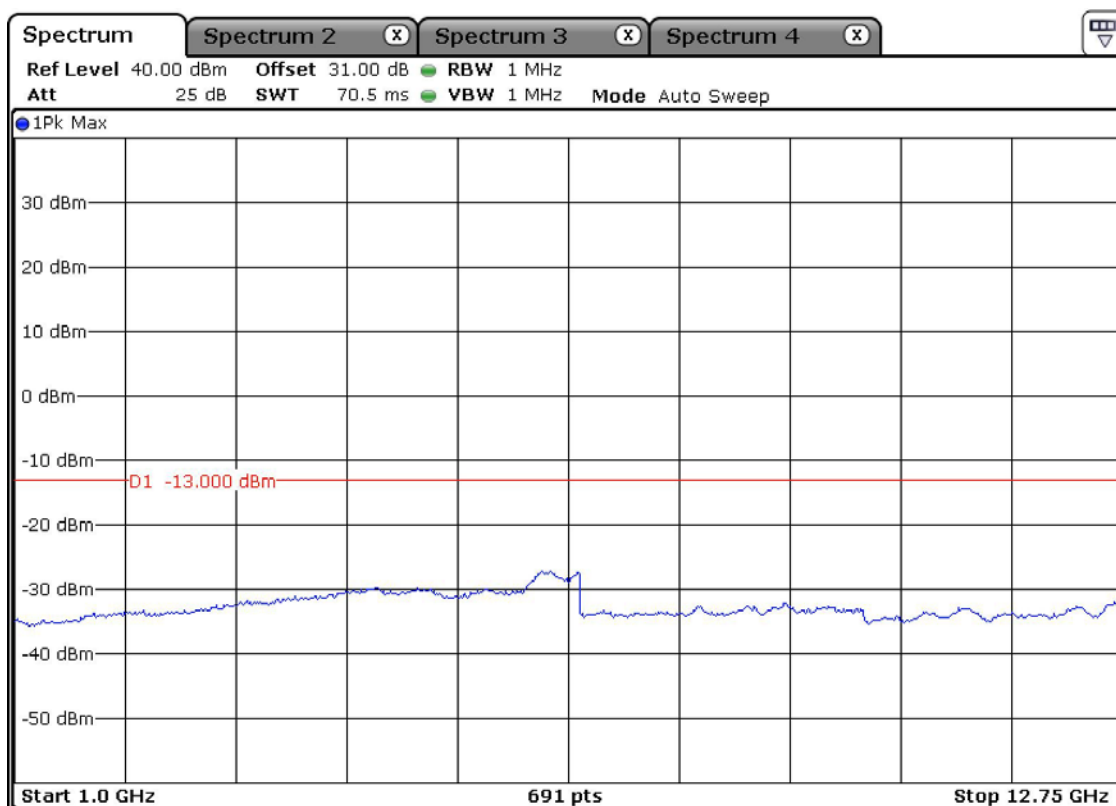
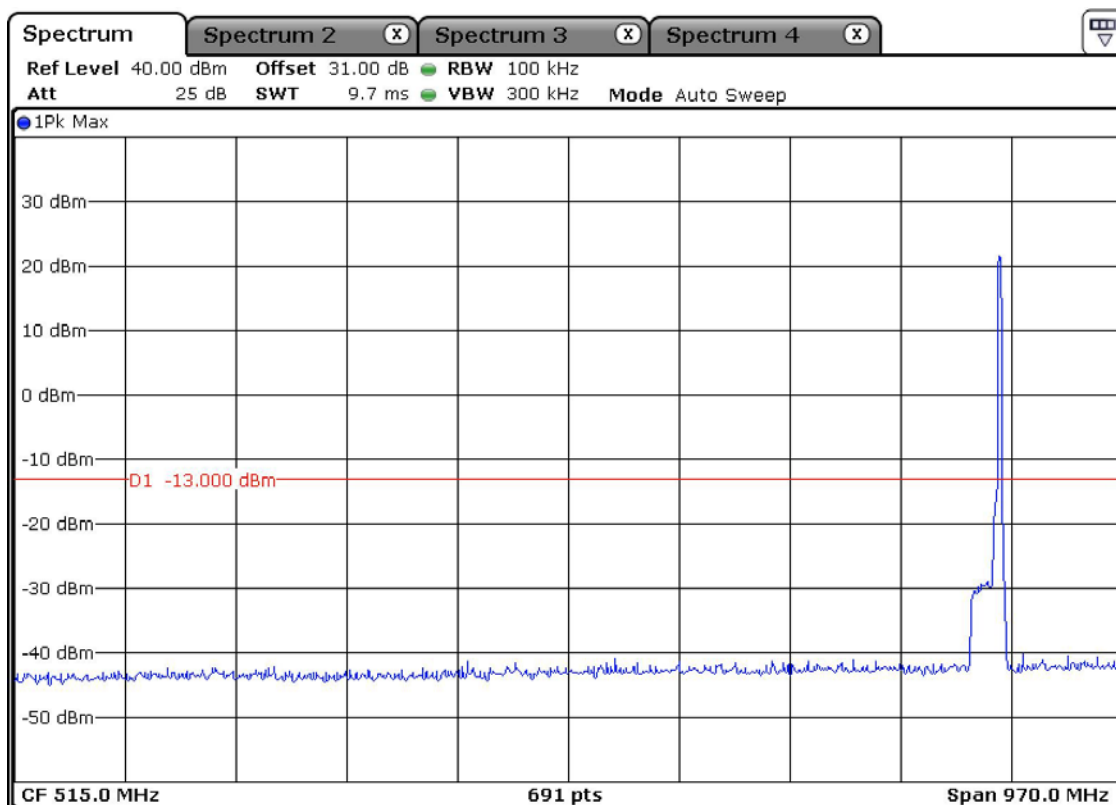
## Antenna Terminal Spurious Emissions, WCDMA 850, Low



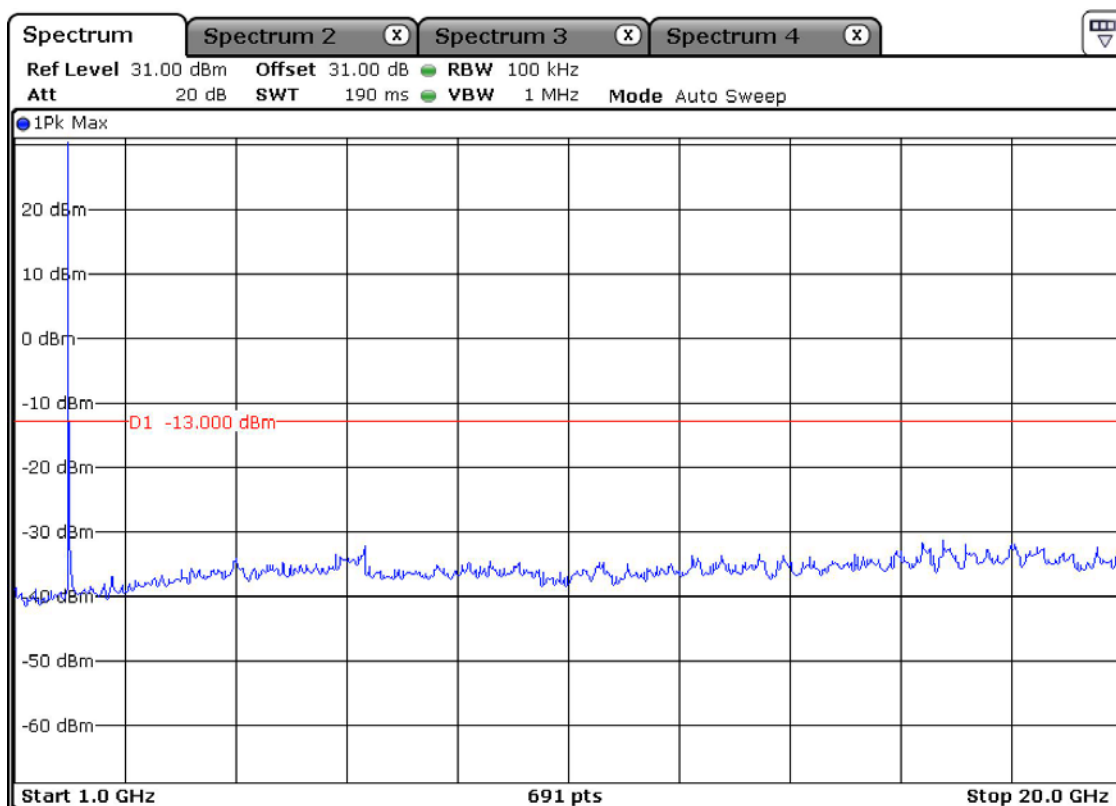
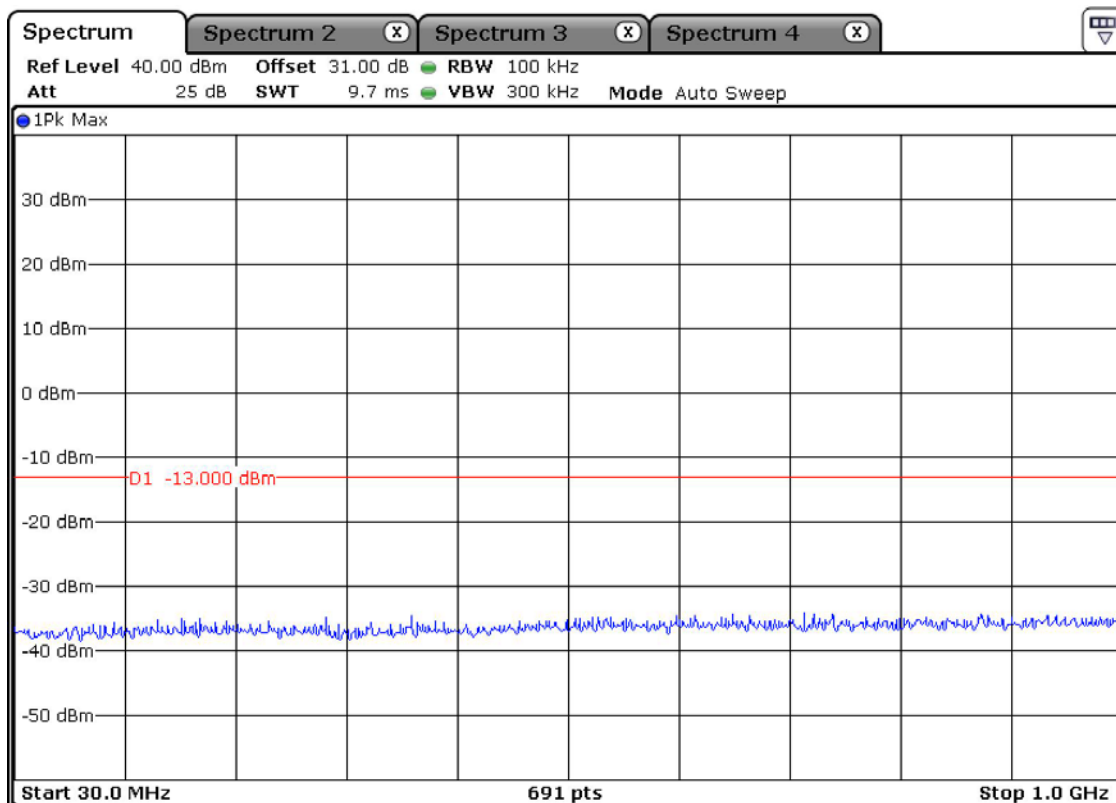
## Antenna Terminal Spurious Emissions, WCDMA 850, Middle



## Antenna Terminal Spurious Emissions, WCDMA 850, High

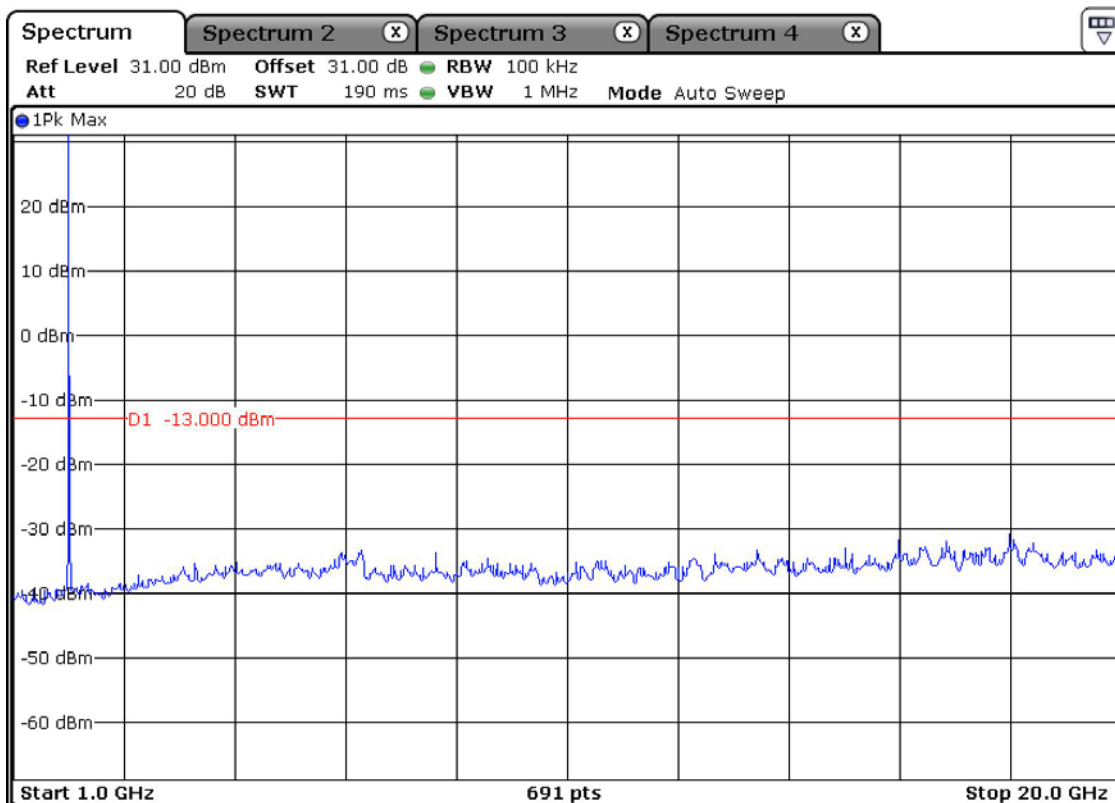
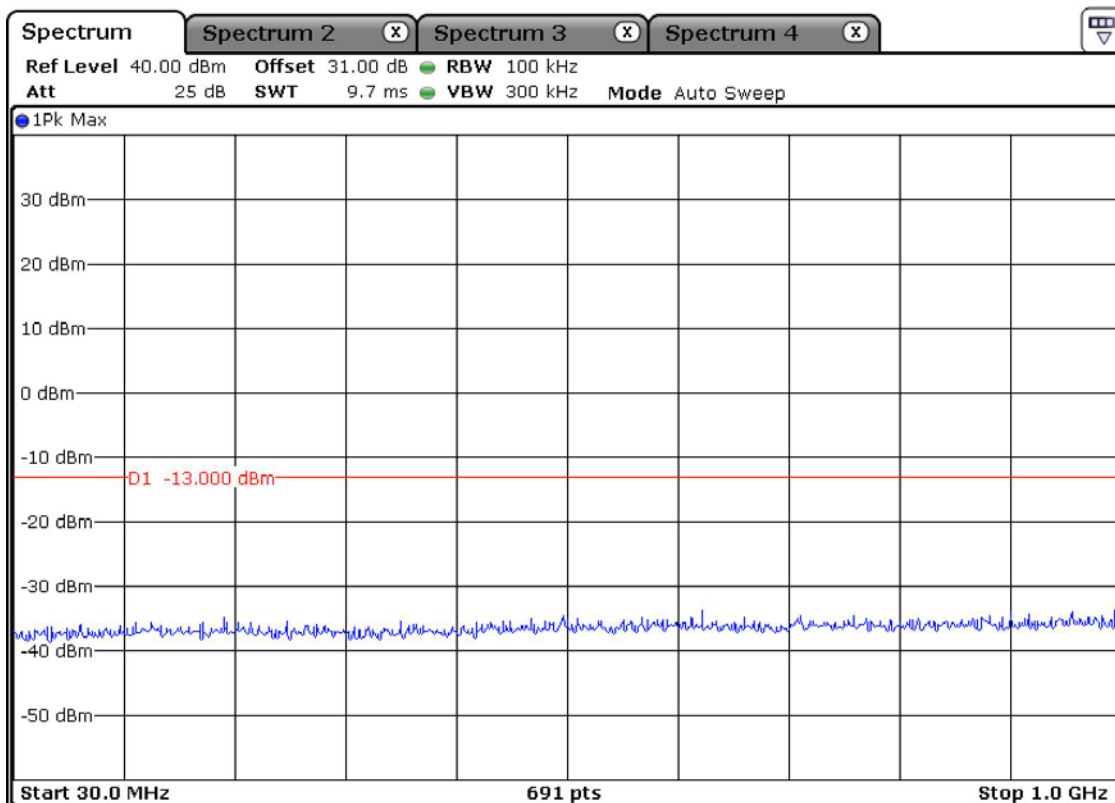


## Antenna Terminal Spurious Emissions, WCDMA 1900, Low

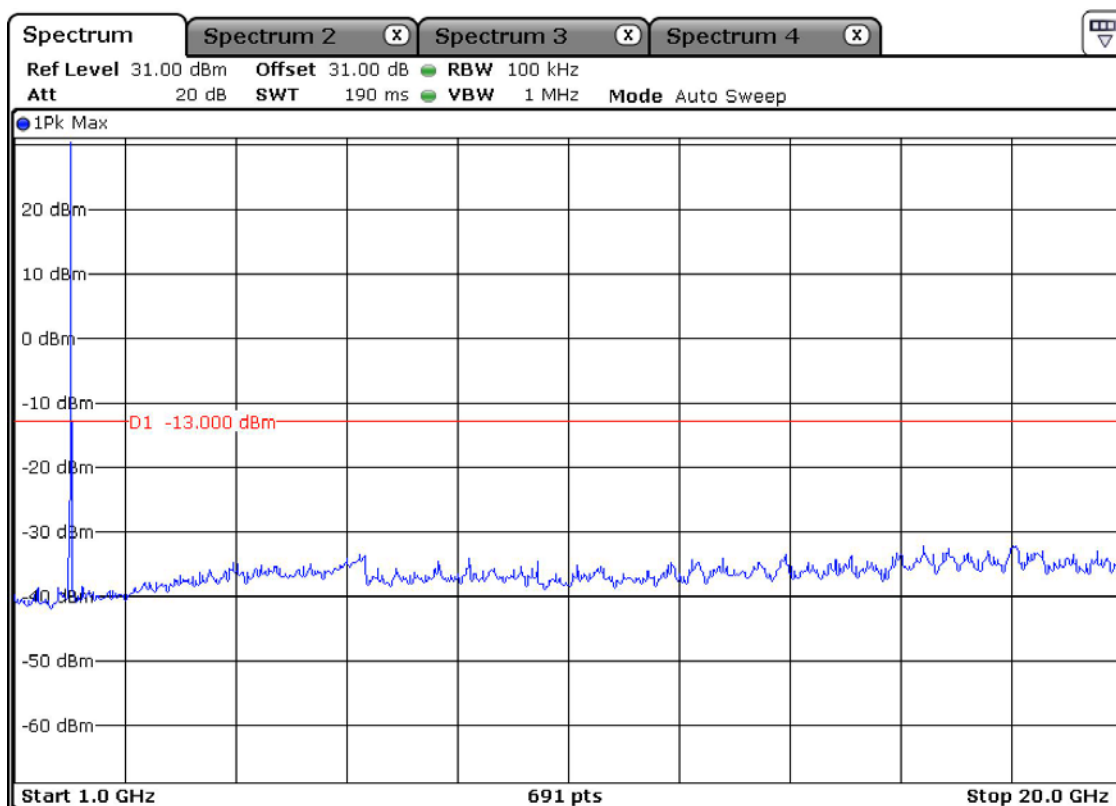
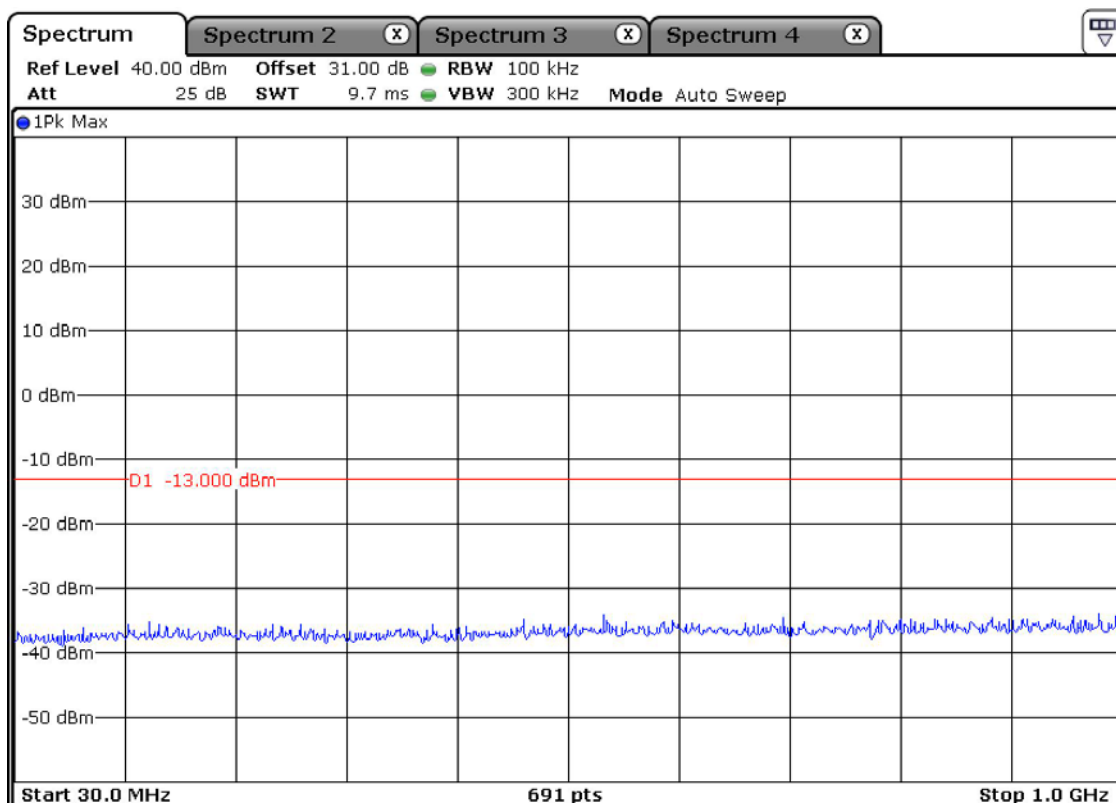




## Antenna Terminal Spurious Emissions, WCDMA 1900, Middle



## Antenna Terminal Spurious Emissions, WCDMA 1900, High



**GSM 850 (Spurious Emission : Band Edge)**

|      | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b> |
|------|-----------------------------|------------------------|-----------------------|---------------|
| Low  | 869.4                       | -37.86                 | -13.00                | 24.86         |
| High | 893.6                       | -38.66                 | -13.00                | 25.66         |

**GSM 1900 (Spurious Emission : Band Edge)**

|      | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b> |
|------|-----------------------------|------------------------|-----------------------|---------------|
| Low  | 1930.4                      | -33.61                 | -13.00                | 20.61         |
| High | 1989.6                      | -32.07                 | -13.00                | 19.07         |

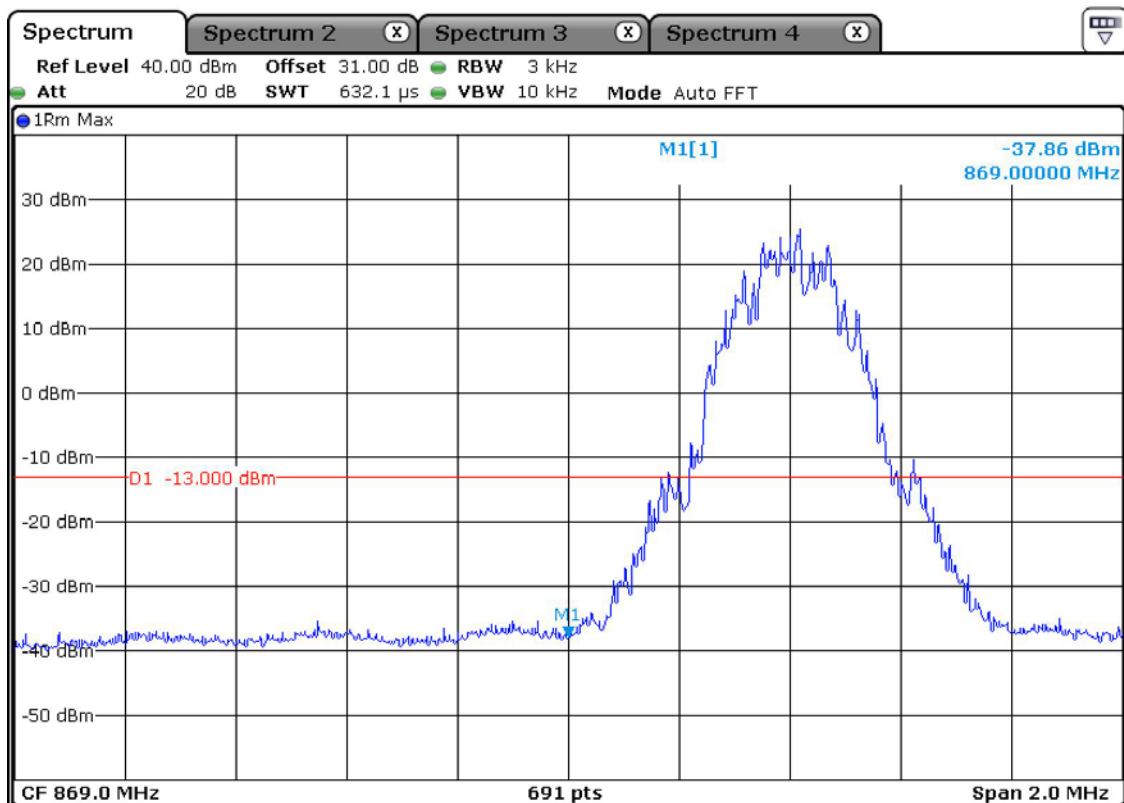
**WCDMA 850 (Spurious Emission : Band Edge)**

|      | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b> |
|------|-----------------------------|------------------------|-----------------------|---------------|
| Low  | 871.4                       | -19.58                 | -13.00                | 6.58          |
| High | 891.6                       | -20.77                 | -13.00                | 7.77          |

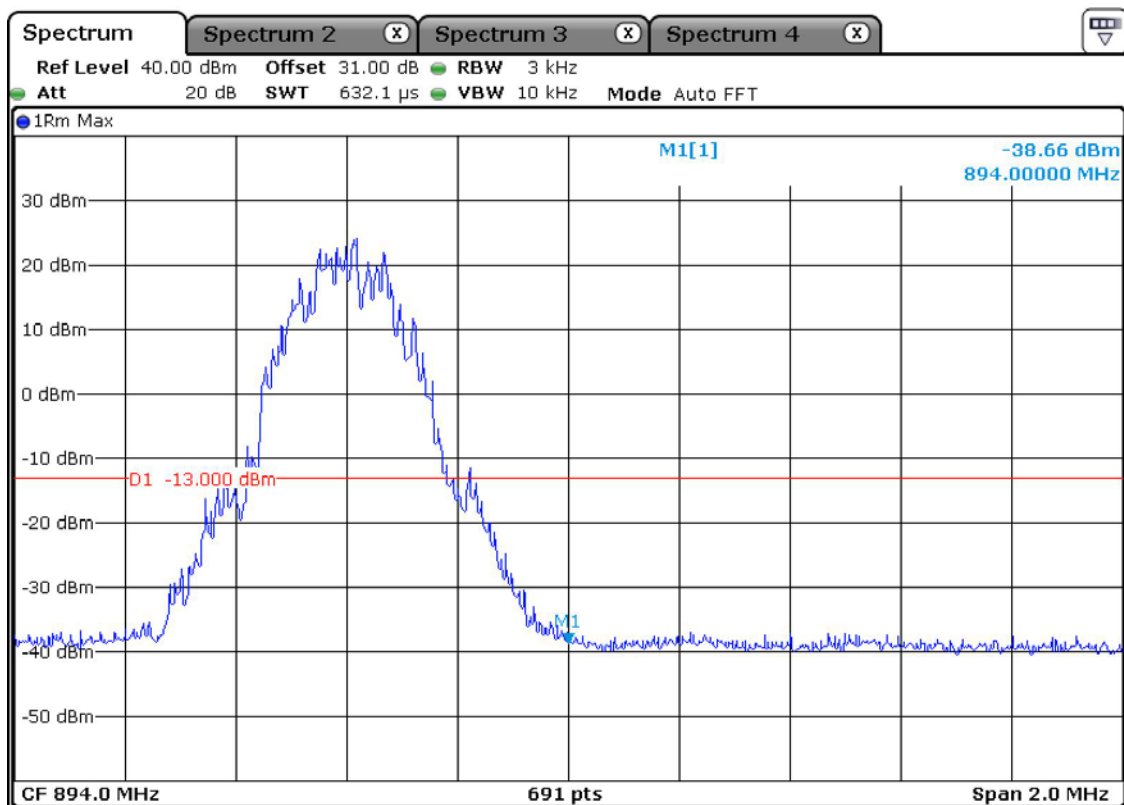
**WCDMA 1900 (Spurious Emission : Band Edge)**

|      | <b>Freq. Tuned</b><br>(MHz) | <b>Result</b><br>(dBm) | <b>Limit</b><br>(dBm) | <b>Margin</b> |
|------|-----------------------------|------------------------|-----------------------|---------------|
| Low  | 1932.4                      | -20.23                 | -13.00                | 7.23          |
| High | 1987.4                      | -21.95                 | -13.00                | 8.95          |

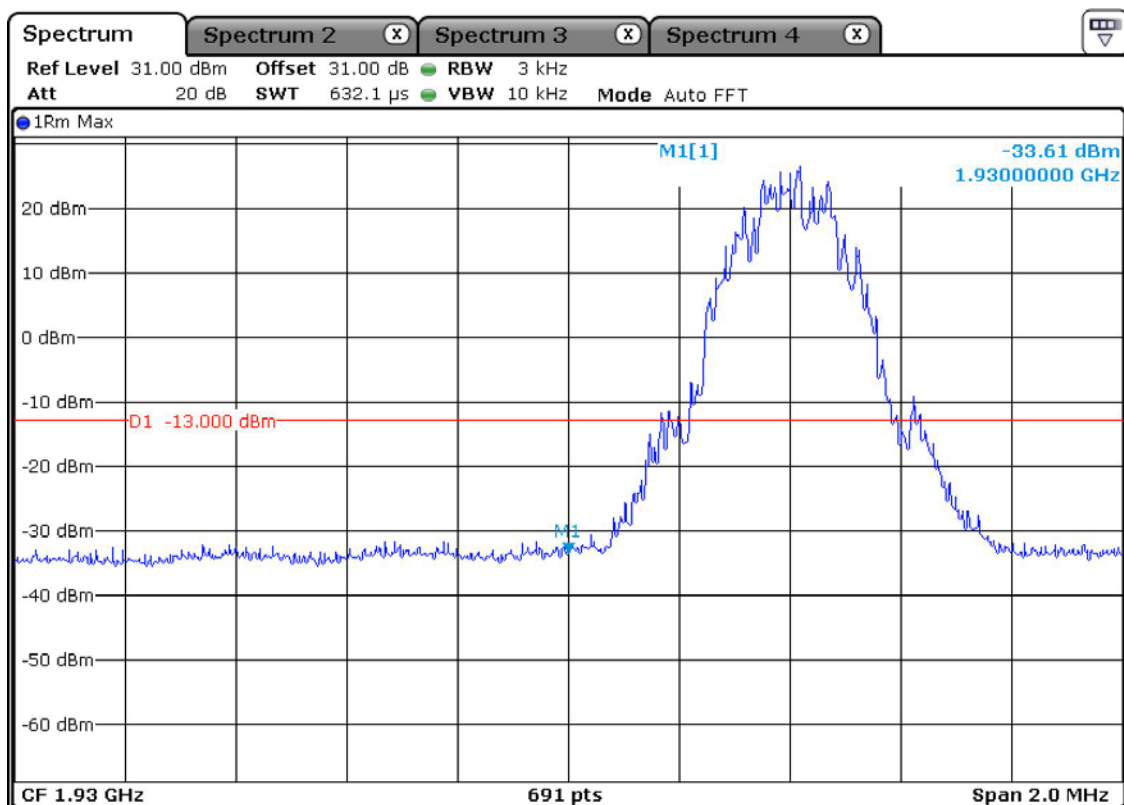
### Band Edge Emissions, GSM 850, Low



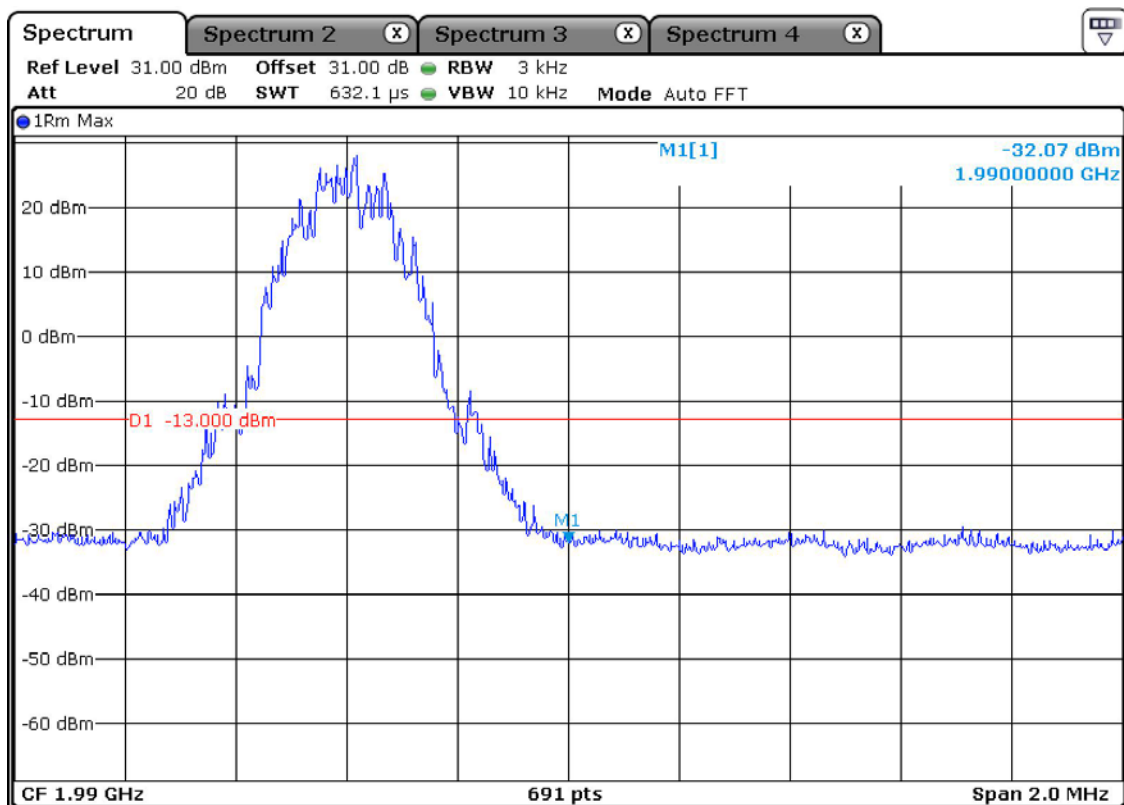
### Band Edge Emissions, GSM 850, High



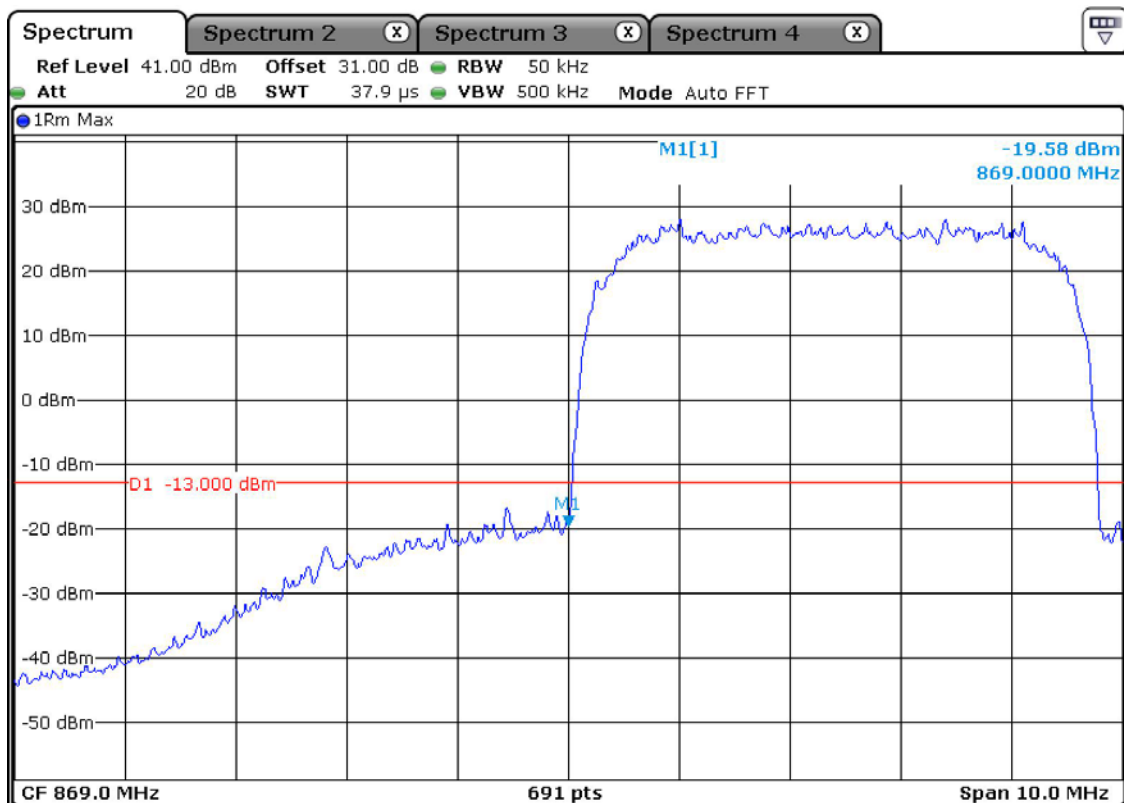
## Band Edge Emissions, GSM 1900, Low



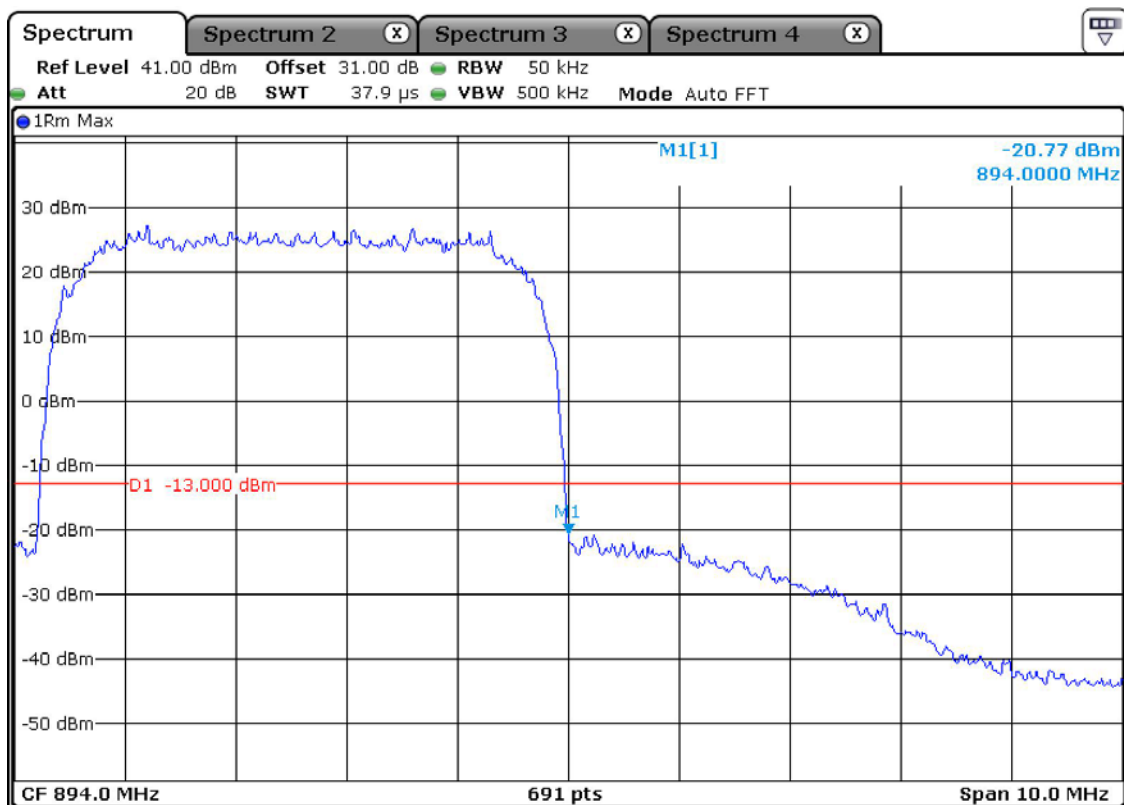
## Band Edge Emissions, GSM 1900, High



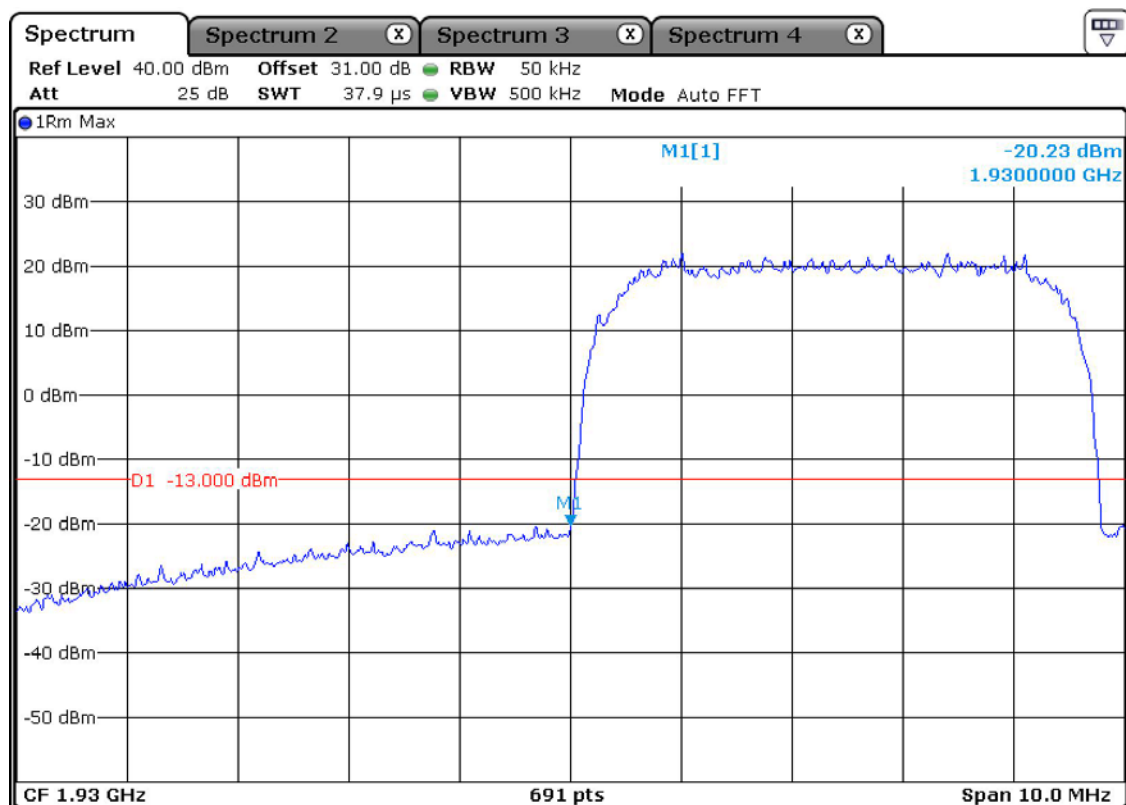
## Band Edge Emissions, WCDMA 850, Low



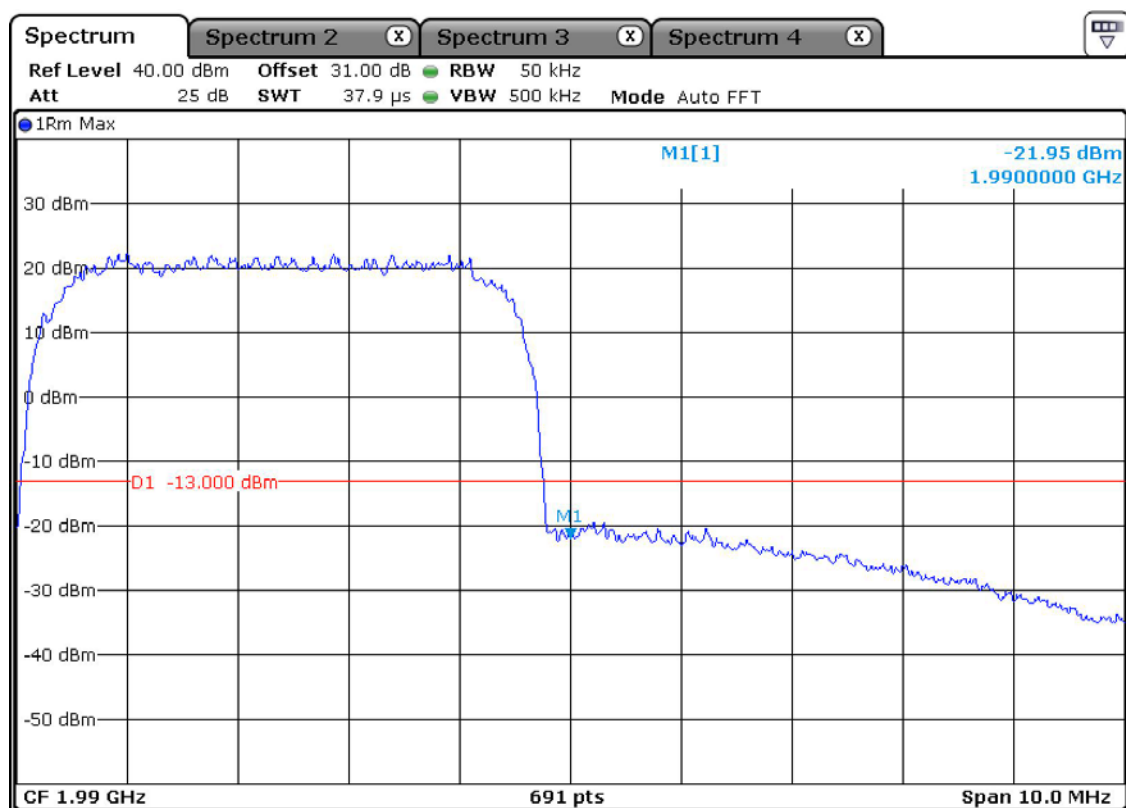
## Band Edge Emissions, WCDMA 850, High



### Band Edge Emissions, WCDMA 1900, Low



### Band Edge Emissions, WCDMA 1900, High



### 3.2.4 Intermodulation

#### 1. Requirement

the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The limit of emission equal to  $-13\text{dBm}$ .

#### 2. Test Procedure

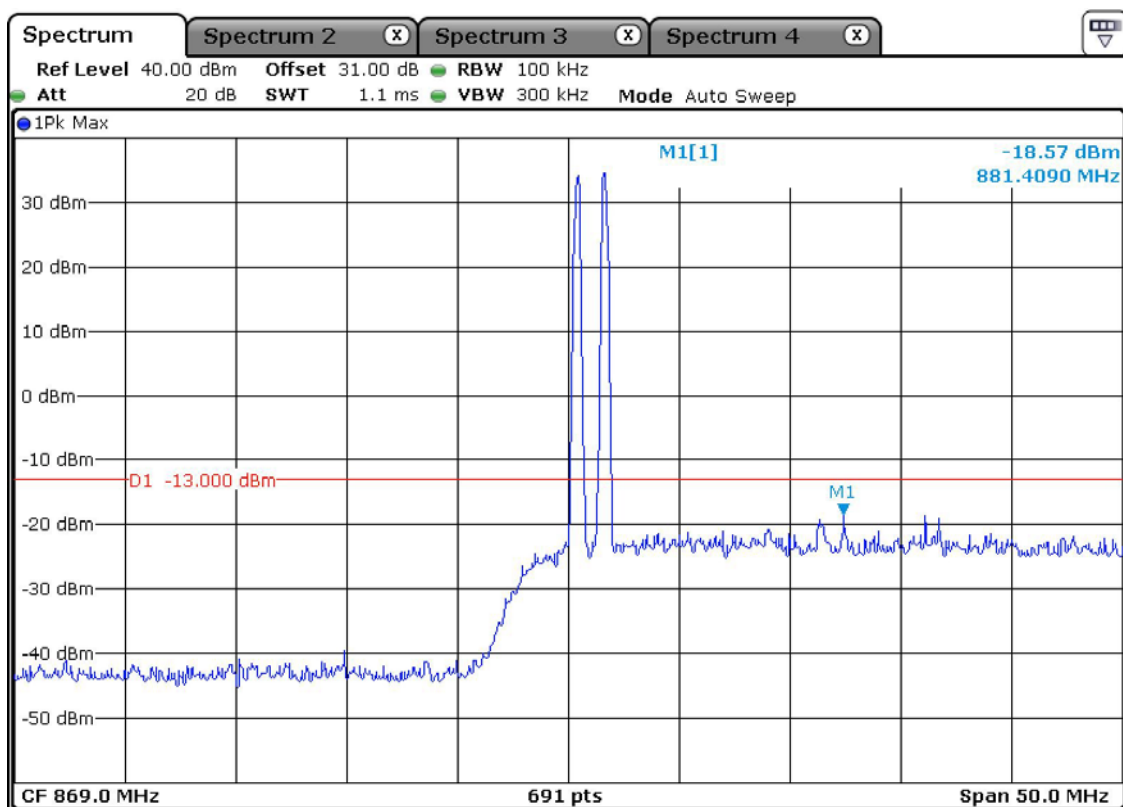
Two RF signals set as inputs. The frequencies of both RF signals shall be within the repeater's operating band. The spacing between both RF signals shall be the minimum possible spacing applied in a network. The level of both RF input signals shall be increased, until the maximum rated output power per channel, as declared by the manufacturer, is reached.

#### 3. Test Results : Complies

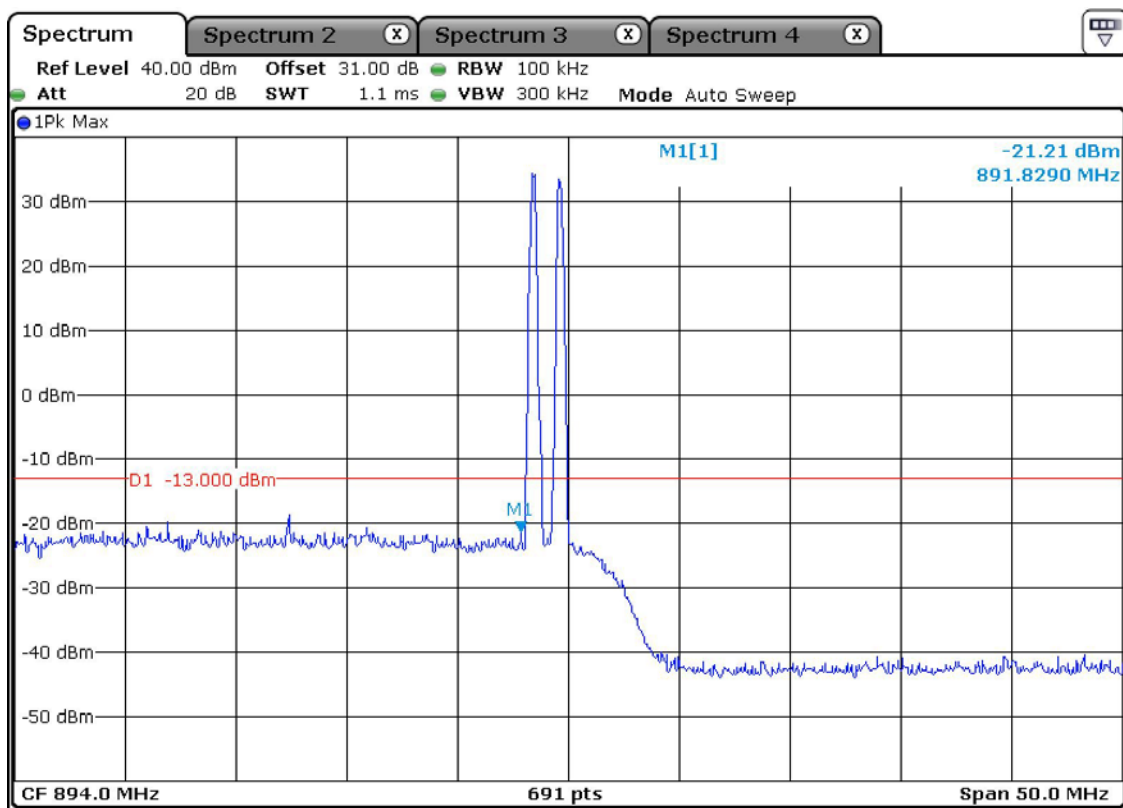
Refer to the following Graphs.



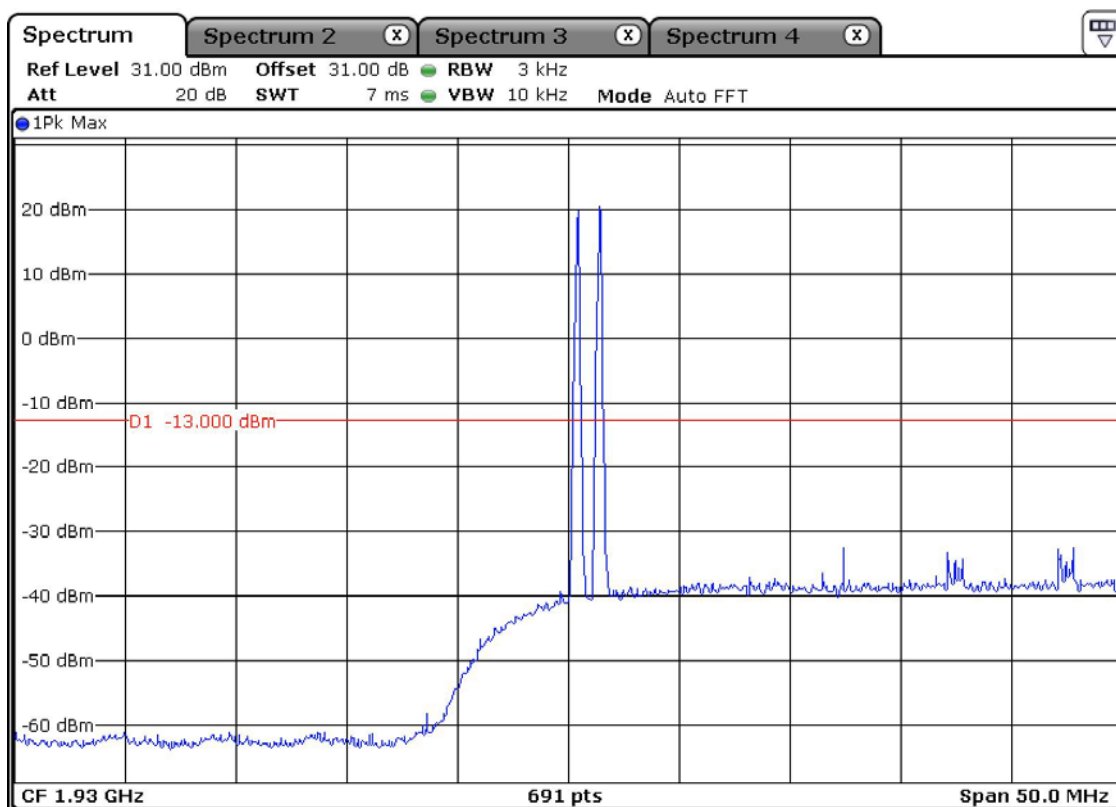
### GSM 850 Low



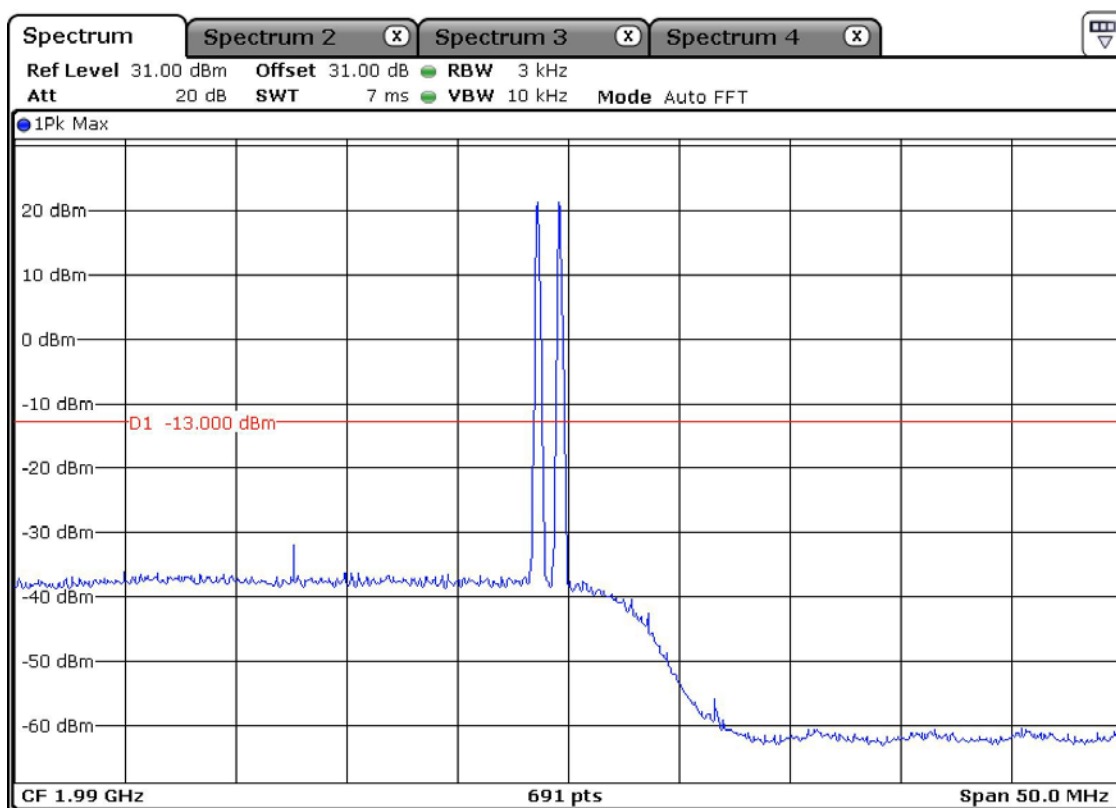
### GSM 850 High



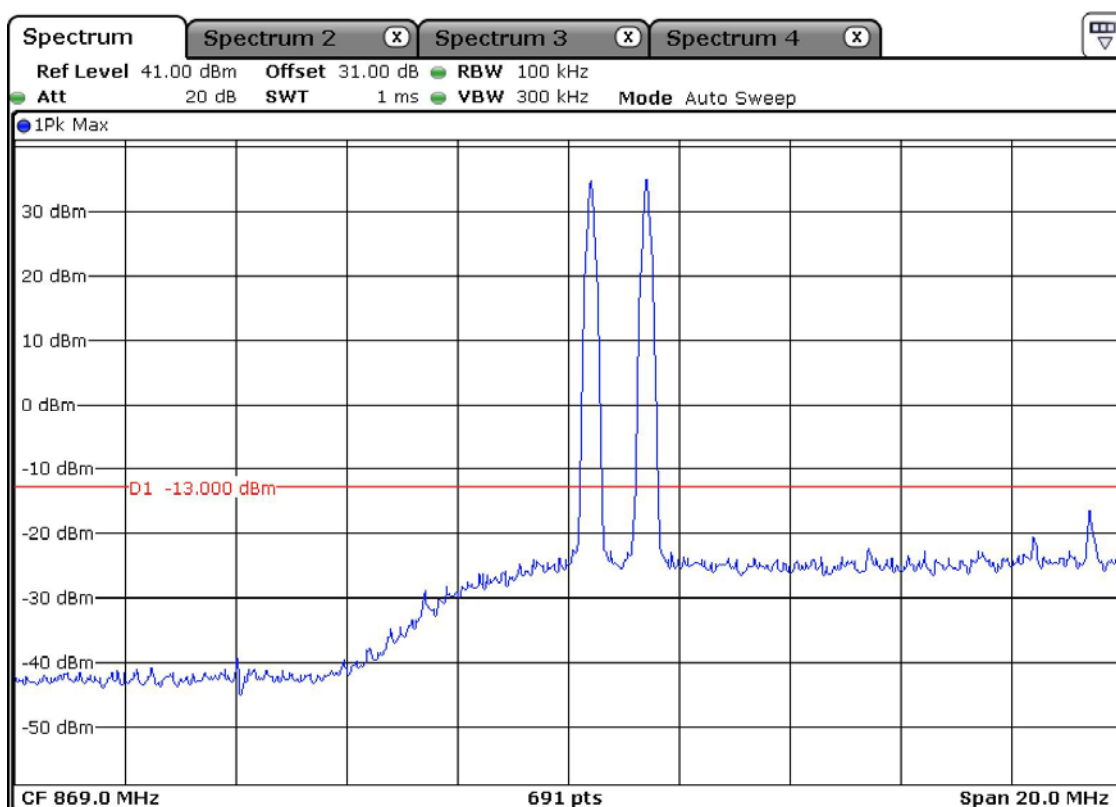
### GSM 1900 Low



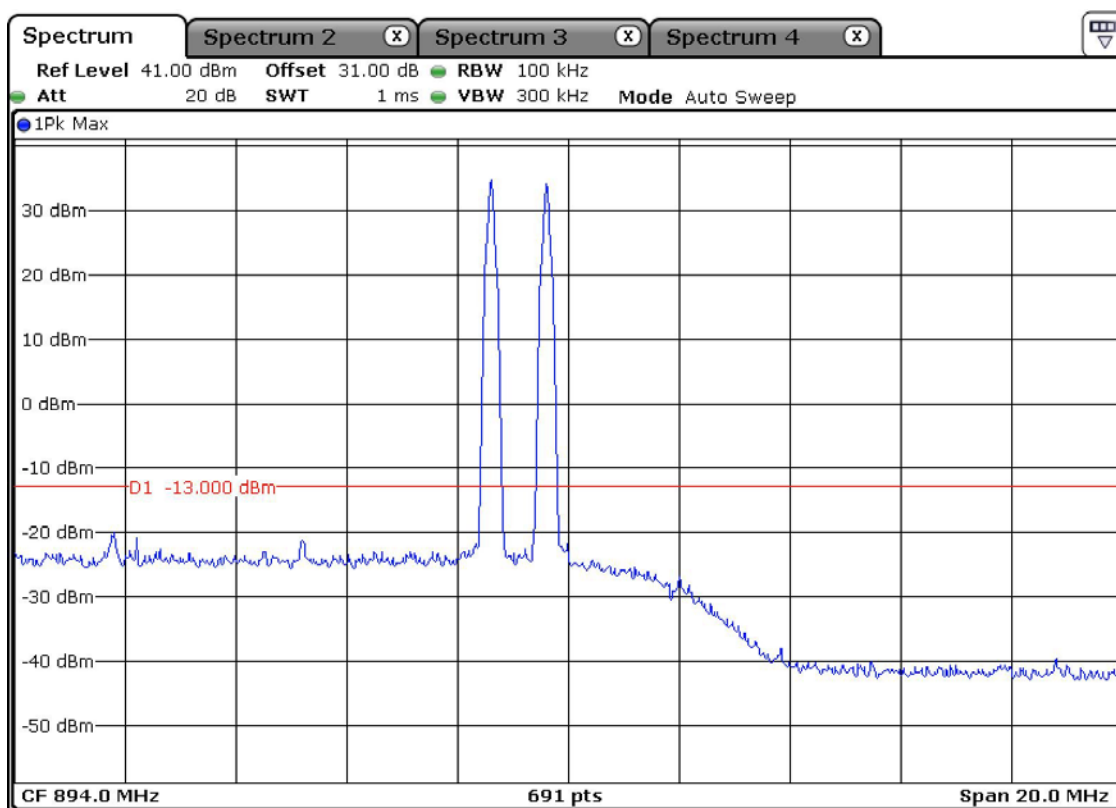
### GSM 1900 High

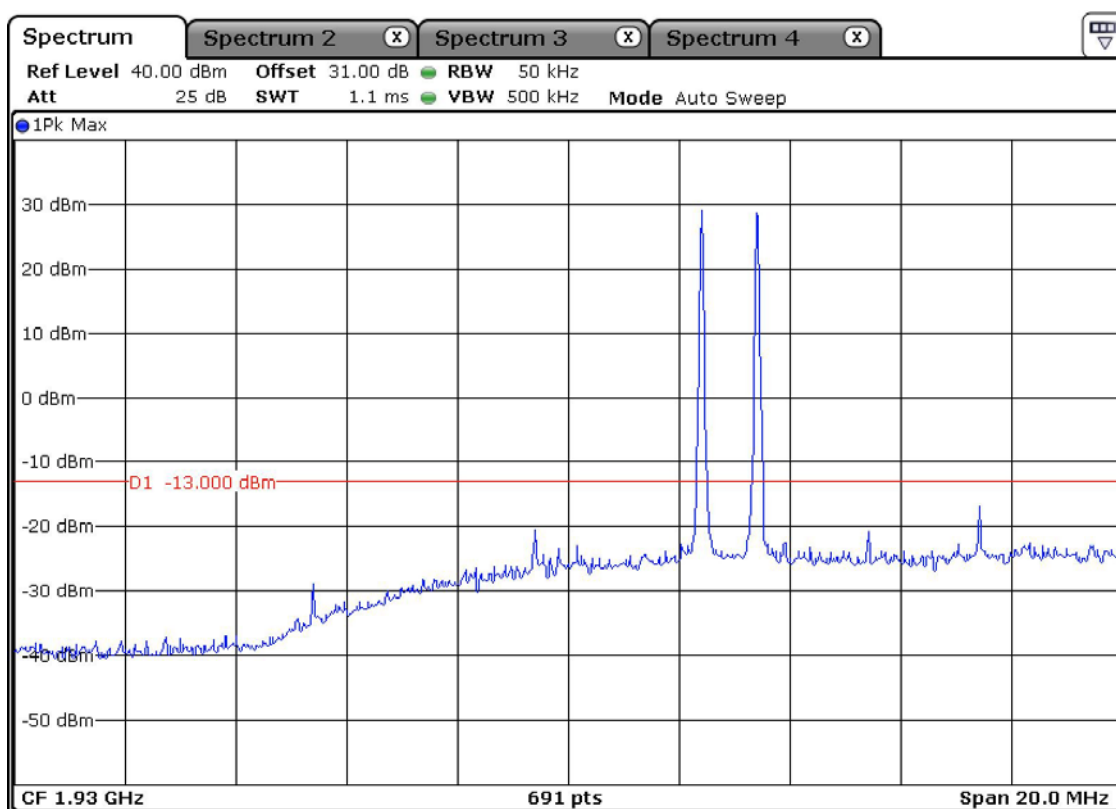
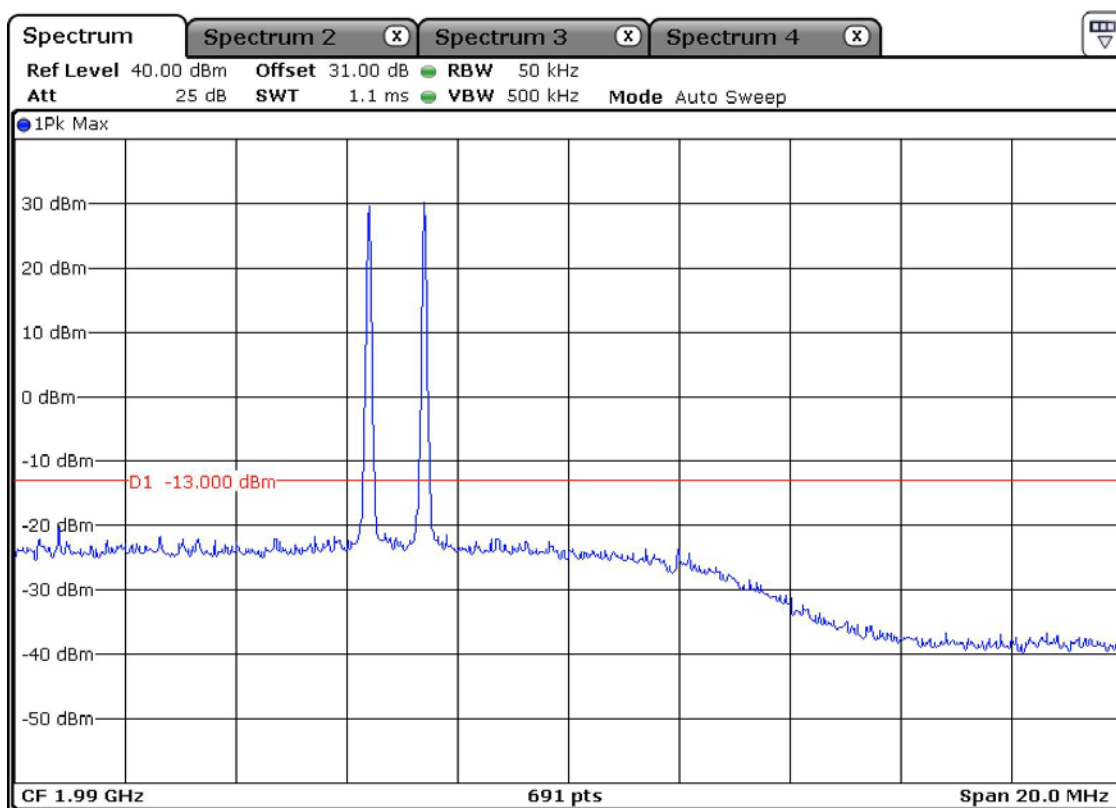


### WCDMA 850 Low



### WCDMA 850 High



**WCDMA 1900 Low****WCDMA 1900 High**

### 3.2.5 Transmitter Spurious Radiation

#### 4. Requirement

The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $(43 + 10 \log P)$  dB. Note: That corresponds to the level of -13 dBm for any radiated out-of-band and spurious emissions.

#### 5. Test Procedure

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The frequency range up to 10-th harmonic of each of the three fundamental frequencies (low, middle, and high channels) was investigated. The worst case of emissions are reported. For spurious emissions attenuation, the substitution method was used. The EUT was substituted by a reference antenna (half-wave dipole - below 1 GHz, or Horn antenna - above 1GHz), connected to a signal generator. The signal generator output level ( $V_g$  in dBm) was adjusted to obtain the same reading as from EUT. The EIRP at the spurious emissions frequency was calculated as follows.

$$\text{EIRP(dBm)} = V_g + G(\text{dBi})$$

The EUT output port was connected to a 50  $\Omega$  termination load.

#### 6. Test Results : Complies

\* EIRP is calculated as:  $\text{EIRP(dBm)} = V_g(\text{dBm}) + G(\text{dBi})$

All other emissions not reported are more than 20 dB below the limit.

**Transmitter Spurious Radiated Emissions – GSM 850**

| Frequency<br>[MHz]                                                    | SA Reading<br>[dBuV / m] | Signal Generator Output required<br>to have the same SA Reading as<br>from EUT<br>[dBm] | EIRP<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|---------------|----------------|----------------|
|                                                                       |                          |                                                                                         |               |                |                |
| All other emissions not reported are more than 20 dB below the limit. |                          |                                                                                         |               |                |                |
|                                                                       |                          |                                                                                         |               |                |                |

**Transmitter Spurious Radiated Emissions – GSM 1900**

| Frequency<br>[MHz]                                                    | SA Reading<br>[dBuV / m] | Signal Generator Output required<br>to have the same SA Reading as<br>from EUT<br>[dBm] | EIRP<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|---------------|----------------|----------------|
|                                                                       |                          |                                                                                         |               |                |                |
| All other emissions not reported are more than 20 dB below the limit. |                          |                                                                                         |               |                |                |
|                                                                       |                          |                                                                                         |               |                |                |

**Transmitter Spurious Radiated Emissions – WCDMA 850**

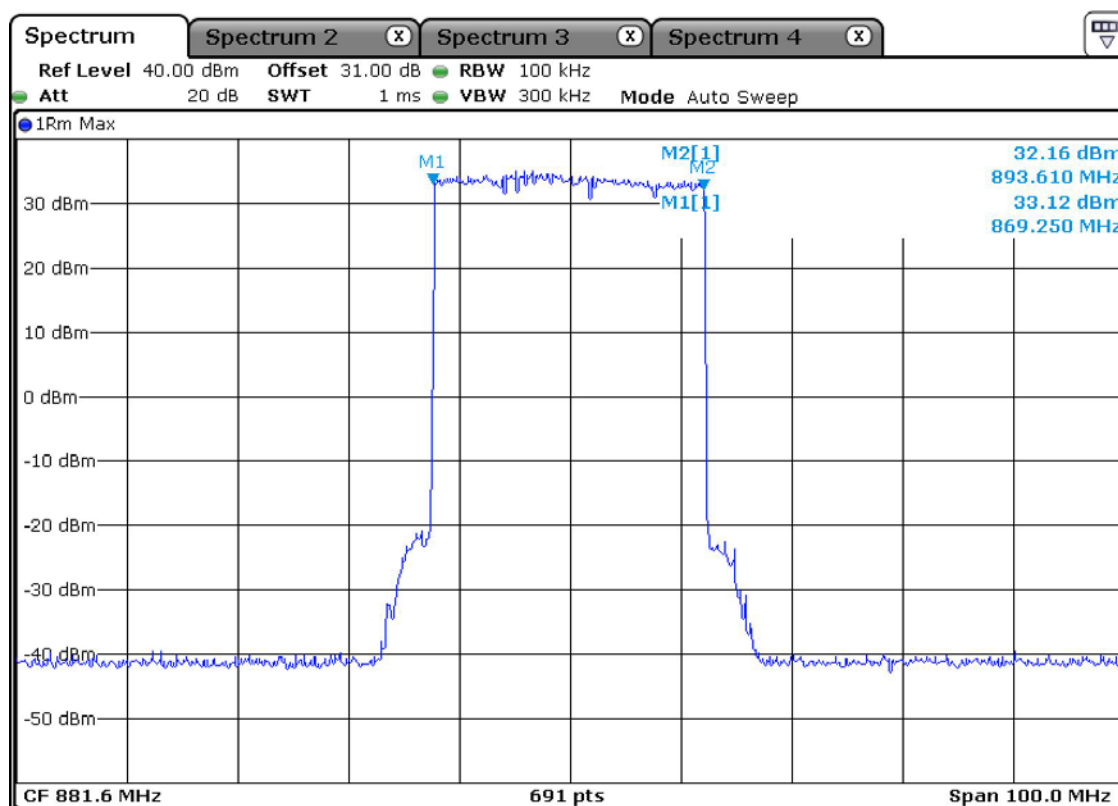
| Frequency<br>[MHz]                                                    | SA Reading<br>[dBuV / m] | Signal Generator Output required<br>to have the same SA Reading as<br>from EUT<br>[dBm] | EIRP<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|---------------|----------------|----------------|
|                                                                       |                          |                                                                                         |               |                |                |
| All other emissions not reported are more than 20 dB below the limit. |                          |                                                                                         |               |                |                |
|                                                                       |                          |                                                                                         |               |                |                |

**Transmitter Spurious Radiated Emissions – WCDMA 1900**

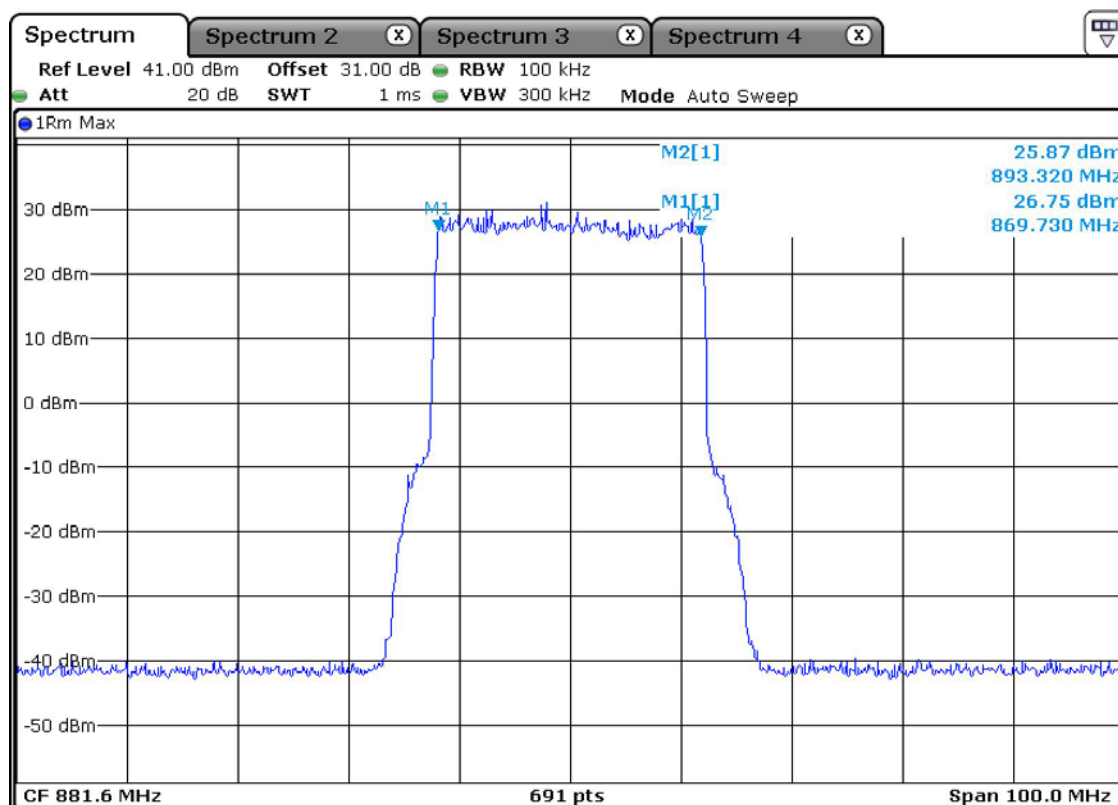
| Frequency<br>[MHz]                                                    | SA Reading<br>[dBuV / m] | Signal Generator Output required<br>to have the same SA Reading as<br>from EUT<br>[dBm] | EIRP<br>[dBm] | Limit<br>[dBm] | Margin<br>[dB] |
|-----------------------------------------------------------------------|--------------------------|-----------------------------------------------------------------------------------------|---------------|----------------|----------------|
|                                                                       |                          |                                                                                         |               |                |                |
| All other emissions not reported are more than 20 dB below the limit. |                          |                                                                                         |               |                |                |
|                                                                       |                          |                                                                                         |               |                |                |

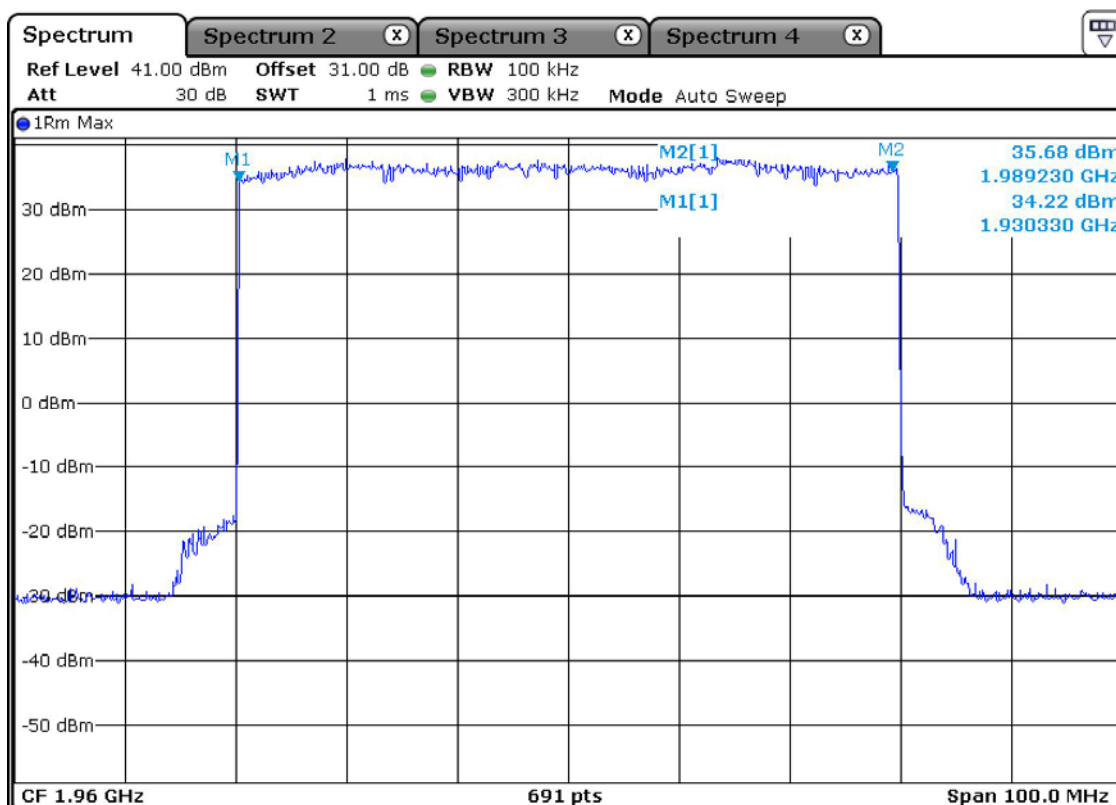
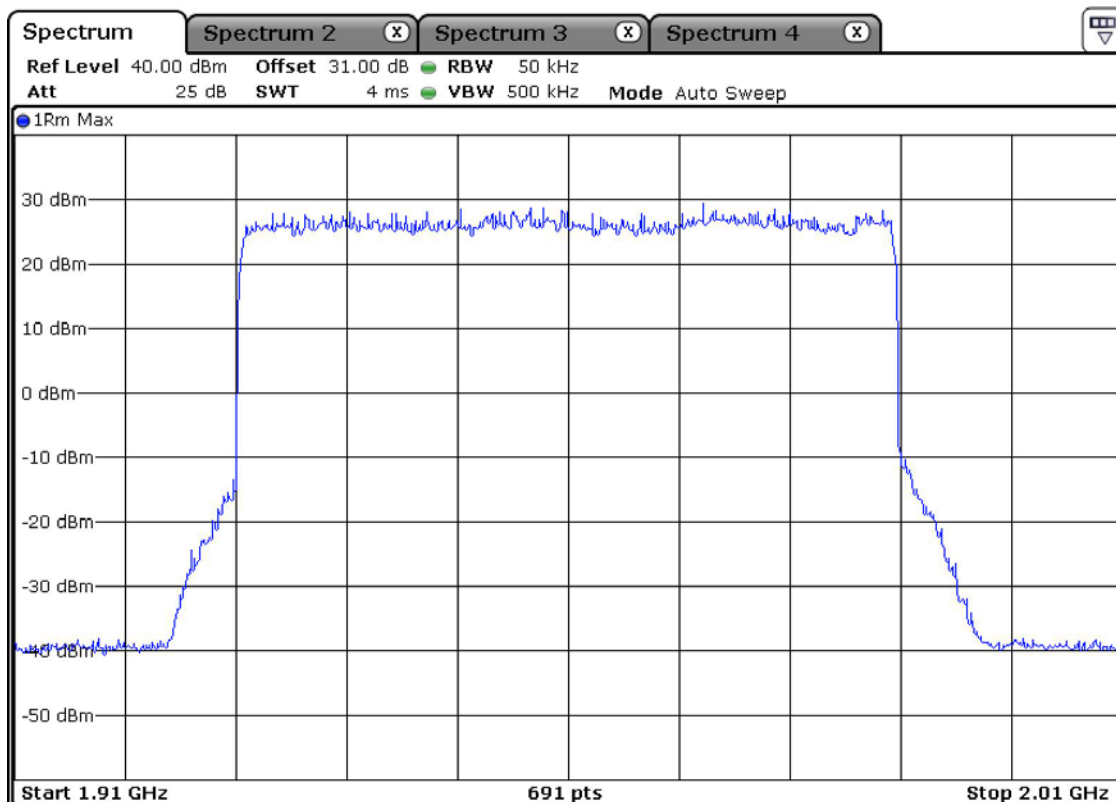
### 3.2.6 Out-of-Band Rejection

#### Downlink Band Pass – GSM 850 mode



#### Downlink Band Pass – WCDMA 850 mode



**Downlink Band Pass – GSM 1900 mode****Downlink Band Pass – WCDMA 1900 mode**



### **3.2.7 Frequency Stability**

#### **1. Requirement**

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

#### **2. Test Procedure**

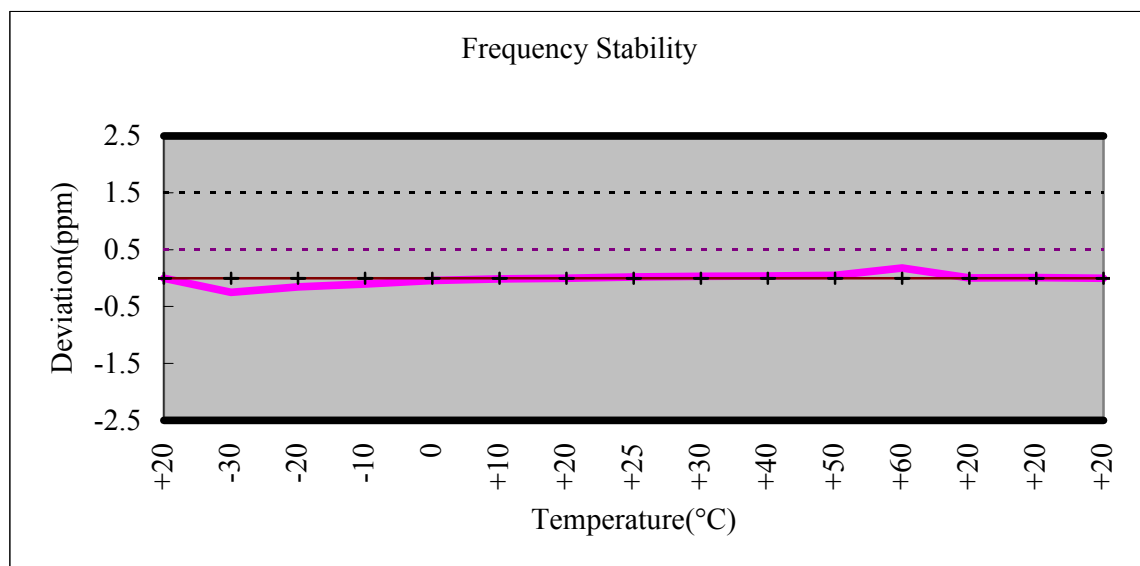
The EUT was placed inside the temperature chamber. The RF output port was connected to a spectrum analyzer. The EUT was setup to transmit the maximum power. After the temperature stabilized for approximately 20 minutes, the transmitting frequency was measured by the spectrum analyzer and recorded. At room temperature, the frequency was measured when the EUT was powered with the nominal voltage and with 85% and 115% of the nominal voltage.

#### **3. Test Results : Complies**

**-refer to the next page**

OPERATING FREQUENCY : 1,960,001,038 Hz  
 CHANNEL : 661(Mid)  
 REFERENCE VOLTAGE : 120 VAC  
 DEVIATION LIMIT :  $\pm 0.00010$  % or 1 ppm

| VOLTAGE<br>(%) | POWER<br>(VAC) | TEMP<br>(dB) | FREQ<br>(Hz)  | Deviation<br>(%) |
|----------------|----------------|--------------|---------------|------------------|
| 100%           | 120            | +20(Ref)     | 1,960,001,038 | Ref              |
| 100%           |                | -30          | 1,960,000,545 | -0.000025        |
| 100%           |                | -20          | 1,960,000,734 | -0.000016        |
| 100%           |                | -10          | 1,960,000,834 | -0.000010        |
| 100%           |                | 0            | 1,960,000,956 | -0.000004        |
| 100%           |                | +10          | 1,960,001,011 | -0.000001        |
| 100%           |                | +20          | 1,960,001,038 | 0.000000         |
| 100%           |                | +25          | 1,960,001,078 | 0.000002         |
| 100%           |                | +30          | 1,960,001,098 | 0.000003         |
| 100%           |                | +40          | 1,960,001,113 | 0.000004         |
| 100%           |                | +50          | 1,960,001,134 | 0.000005         |
| 100%           |                | +60          | 1,960,001,384 | 0.000018         |
| 85%            | 102            | +20          | 1,960,001,045 | 0.000000         |
| 115%           | 138            | +20          | 1,960,001,058 | 0.000001         |



### **3.3 CONCLUSION**

The data collected shows that the **Public Wireless, Inc Dual Band Optical DAS Repeater FCC ID: V7DCM200D01** complies with all the requirements of Parts 2,22, 24 of the FCC Rules.

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APPENDIX 1

**TEST EQUIPMENT USED FOR TESTS**

|    | Description                          | Model No.   | Serial No.    | Manufacturer  | Next Cal. Date |
|----|--------------------------------------|-------------|---------------|---------------|----------------|
| 1  | Spectrum Analyzer                    | FSV-30      | 100757        | R&S           | Feb-11         |
| 2  | Spectrum Analyzer                    | 8563E       | 3425A02505    | HP            | Mar-11         |
| 3  | Spectrum Analyzer                    | 8594E       | 3710A04074    | HP            | Oct-10         |
| 4  | VECTOR SIGNAL GENERATOR              | SMBV100A    | 255081        | R&S           | May-11         |
| 5  | Signal Generator                     | 83711B      | US34490456    | HP            | Mar-11         |
| 6  | Attenuator (3dB)                     | 8491A       | 37822         | HP            | Oct-10         |
| 7  | Attenuator (10dB)                    | 8491A       | 63196         | HP            | Oct-10         |
| 8  | Attenuator (30dB)                    | 8498A       | 1801A06689    | HP            | Oct-10         |
| 9  | EMI Test Receiver                    | ESVD        | 843748/001    | R&S           | Mar-11         |
| 10 | Horn Antenna(18 ~ 40GHz)             | SAS-574     | 154           | Schwarzbeck   | Nov-10         |
| 11 | Horn Antenna(18 ~ 40GHz)             | SAS-574     | 155           | Schwarzbeck   | Nov-10         |
| 12 | RF Amplifier                         | 8447D       | 2949A02670    | HP            | Oct-10         |
| 13 | RF Amplifier                         | 8449B       | 3008A02126    | HP            | Mar-11         |
| 14 | Test Receiver                        | ESHS10      | 828404/009    | R&S           | Mar-11         |
| 15 | TRILOG Antenna                       | VULB 9160   | 9160-3212     | SCHWARZBECK   | Apr-11         |
| 16 | Log.-Per. Antenna                    | VULP 9118   | 9118 A 401    | SCHWARZBECK   | Apr-11         |
| 17 | Biconical Antenna                    | BBA 9106    | VHA 9103-2315 | SCHWARZBECK   | Apr-11         |
| 18 | Horn Antenna                         | 3115        | 00055005      | ETS LINDGREN  | Mar-11         |
| 19 | Horn Antenna                         | BBHA 9120D  | 9120D122      | SCHWARZBECK   | Dec-11         |
| 20 | Dipole Antenna                       | VHA9103     | 2116          | SCHWARZBECK   | Nov-10         |
| 21 | Dipole Antenna                       | VHA9103     | 2117          | SCHWARZBECK   | Nov-10         |
| 22 | Dipole Antenna                       | VHA9105     | 2261          | SCHWARZBECK   | Nov-10         |
| 23 | Dipole Antenna                       | VHA9105     | 2262          | SCHWARZBECK   | Nov-10         |
| 24 | Hygro-Thermograph                    | THB-36      | 0041557-01    | ISUZU         | Mar-11         |
| 25 | Splitter (SMA)                       | ZFSC-2-2500 | SF617800326   | Mini-Circuits | -              |
| 26 | RF Switch                            | MP59B       | 6200414971    | ANRITSU       | -              |
| 27 | Power Divider                        | 11636A      | 6243          | HP            | Oct-10         |
| 28 | DC Power Supply                      | 6622A       | 3448A03079    | HP            | Oct-10         |
| 29 | Frequency Counter                    | 5342A       | 2826A12411    | HP            | Mar-11         |
| 30 | Power Meter                          | EPM-441A    | GB32481702    | HP            | Mar-11         |
| 31 | Power Sensor                         | 8481A       | 2702A64048    | HP            | Mar-11         |
| 32 | Audio Analyzer                       | 8903B       | 3729A18901    | HP            | Oct-10         |
| 33 | Modulation Analyzer                  | 8901B       | 3749A05878    | HP            | Oct-10         |
| 34 | TEMP & HUMIDITY Chamber              | YJ-500      | LTAS06041     | JinYoung Tech | Oct-10         |
| 36 | Stop Watch                           | HS-3        | 601Q09R       | CASIO         | Mar-11         |
| 37 | LISN                                 | ENV216      | 100408        | R&S           | Oct-10         |
| 38 | UNIVERSAL RADIO COMMUNICATION TESTER | CMU200      | 106243        | R&S           | May-12         |