



# RF TEST REPORT

**Report No.:** SET2015-09875

**Product:** Mobile phone

**FCC ID:** SG720150715G30

**Model No.:** G30

**Applicant:** Haier Telecom (Qingdao) Co.,Ltd.

**Address:** No.1 Haier Road, Hi-tech Zone, Qingdao, China

**Issued by:** CCIC-SET

**Lab Location:** Electronic Testing Building, Shahe Road, Xili, Nanshan District,  
Shenzhen, 518055, P. R. China

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## Test Report

**Product.....:** Mobile phone

**Brand Name.....:** Haier

**Trade Name.....:** Haier

**Applicant.....:** Haier Telecom (Qingdao) Co.,Ltd.

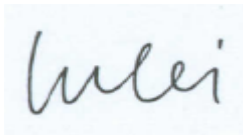
**Applicant Address.....:** No.1 Haier Road, Hi-tech Zone, Qingdao, China

**Manufacturer.....:** Haier Telecom (Qingdao) Co.,Ltd.

**Manufacturer Address.....:** No.1 Haier Road, Hi-tech Zone, Qingdao, China

**Test Standards.....:** 47 CFR FCC Part 2: 2013  
47 CFR FCC Part 22(H): 2013  
47 CFR FCC Part 24(E): 2013

**Test Result.....:** PASS

**Tested by.....:**   
2015.07.15  
\_\_\_\_\_  
Lu Lei, Test Engineer

**Reviewed by.....:**   
2015.07.15  
\_\_\_\_\_  
Zhu Qi, Senior Engineer

**Approved by.....:**   
2015.07.15  
\_\_\_\_\_  
Wu Li'an, Manager



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| Change History |            |                   |
|----------------|------------|-------------------|
| Issue          | Date       | Reason for change |
| 1.0            | 2015.07.15 | First edition     |
|                |            |                   |
|                |            |                   |

## 1. GENERAL INFORMATION

### 1.1 EUT Description

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EUT Type                        | Mobile phone                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Serial No.                      | 568014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| IMEI No.                        | 353919025680145                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Hardware Version                | M11_V1.01_PCB                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| Software Version                | HW-W816-H01-S006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| EUT supports Radios application | GSM/GPRS/WCDMA/HSDPA/HSUPA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Frequency Range                 | <p>GSM 850MHz:<br/>Tx: 824.2 - 848.8MHz (at intervals of 200kHz);<br/>Rx: 869.2 - 893.8MHz (at intervals of 200kHz)</p> <p>GSM 1900MHz:<br/>Tx: 1850.2 - 1909.8MHz (at intervals of 200kHz);<br/>Rx: 1930.2 - 1989.8MHz (at intervals of 200kHz)</p> <p>WCDMA 850MHz<br/>Tx: 826.4 - 846.6MHz (at intervals of 200kHz);<br/>Rx: 871.4 - 891.6MHz (at intervals of 200kHz)</p> <p>WCDMA 1900MHz<br/>Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);<br/>Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)</p> |
| Multislot Class                 | GPRS: Multislot Class12,EGPRS: Multislot Class12                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Maximum Output Power to Antenna | <p>GSM850: 33.51dBm<br/>GSM1900: 30.78dBm<br/>WCDMA850: 23.32dBm<br/>WCDMA1900: 23.26dBm</p>                                                                                                                                                                                                                                                                                                                                                                                                                |
| Antenna Type                    | FPC Antenna                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Type of Modulation              | <p>GSM / GPRSK:GMSK<br/>EDGE:GMSK / 8PSK<br/>WCDMA: QPSK(Uplink)<br/>HSDPA:QPSK(Downlink)<br/>HSUPA:QPSK(Uplink)</p>                                                                                                                                                                                                                                                                                                                                                                                        |

## 1.2 Maximum ERP/EIRP Power, Frequency Tolerance, and Emission Designator

| System     | Emission Designator | Frequency Tolerance (ppm) | Maximum ERP/EIRP |
|------------|---------------------|---------------------------|------------------|
| GSM 850    | 252KGXW             | 0.07                      | 2.118W           |
| GSM 1900   | 248KGXW             | 0.03                      | 1.084W           |
| EDGE 850   | 248KG7W             | 0.05                      | 2.084W           |
| EDGE 1900  | 244KG7W             | 0.03                      | 0.989W           |
| WCDMA 850  | 4M18F9W             | 0.07                      | 0.379W           |
| WCDMA 1900 | 4M18F9W             | 0.03                      | 0.366W           |

## 1.3 Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22, Part 24 for the EUT FCC ID Certification:

1. 47 CFR Part 2, 22(H), 24(E)
2. ANSI / TIA / EIA-603-D-2010
3. FCC KDB 971168 D01 Power Meas. License Digital Systems v02r02

Test detailed items/section required by FCC rules and results are as below:

| No. | Section                           | Description                                  | Limit                               | Result |
|-----|-----------------------------------|----------------------------------------------|-------------------------------------|--------|
| 1   | 2.1046                            | Conducted RF Output Power                    | Reporting Only                      | PASS   |
| 2   | 24.232(d)                         | Peak to Average Ratio                        | <13dBm                              | PASS   |
| 3   | 2.1049,<br>22.917(b)<br>24.238(b) | 99% Occupied Bandwidth and<br>26dB Bandwidth | Reporting Only                      | PASS   |
| 4   | 2.1055,<br>22.355<br>24.235       | Frequency Stability                          | <2.5ppm                             | PASS   |
| 5   | 2.1051<br>22.917(a)<br>24.238(a)  | Conducted Out of Band<br>Emissions           | < 43+10log <sub>10</sub> (P[Watts]) | PASS   |
| 6   | 2.1051<br>22.917(a)<br>24.238(a)  | Band Edge                                    | < 43+10log <sub>10</sub> (P[Watts]) | PASS   |

|   |                                  |                                      |                        |      |
|---|----------------------------------|--------------------------------------|------------------------|------|
| 7 | 22.913(a)(2)                     | Effective Radiated Power             | <7Watts                | PASS |
|   | 24.232(c)                        | Equivalent Isotropic Radiated Power  | <2Watts                | PASS |
| 8 | 2.1053<br>22.917(a)<br>24.238(a) | Field Strength of Spurious Radiation | < 43+10log10(P[Watts]) | PASS |

Remark:

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.

#### 1.4 Test Configuration of Equipment under Test

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas. License Digital Systems v02r02 with maximum output power.

Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission.

Radiated emissions were investigated as following frequency range:

1. 30 MHz to 9000 MHz for GSM850 and WCDMA Band V.
2. 30 MHz to 20000 MHz for GSM1900 and WCDMA Band II.

All modes and data rates and positions were investigated.

Test modes are chosen to be reported as the worst case configuration below:

| Test Modes    |                       |                       |
|---------------|-----------------------|-----------------------|
| Band          | Radiated TCs          | Conducted TCs         |
| GSM 850       | GSM Link<br>EDGE Link | GSM Link<br>EDGE Link |
| GSM 1900      | GSM Link<br>EDGE Link | GSM Link<br>EDGE Link |
| WCDMA Band V  | RMC 12.2Kbps Link     | RMC 12.2Kbps Link     |
| WCDMA Band II | RMC 12.2Kbps Link     | RMC 12.2Kbps Link     |

Note: The maximum power levels are chosen to test as the worst case configuration as follows:  
GSM mode for GMSK modulation, EDGE multi-slot class 8 mode for 8PSK modulation,  
RMC 12.2Kbps mode for WCDMA band V, RMC 12.2Kbps mode for WCDMA band II,  
only these modes were used for all tests.



## 1.5 Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level.

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Offset = RF cable loss + attenuator factor.

The following shows an offset computation example with RF cable loss 7 dB and a 10dB attenuator.

Example:

$$\begin{aligned}\text{Offset (dB)} &= \text{RF cable loss (dB)} + \text{attenuator factor (dB)} \\ &= 7 + 10 = 17 \text{ (dB)}\end{aligned}$$

## 1.6 Facilities and Accreditations

### 1.6.1 Test Facilities

#### **CNAS-Lab Code: L1659**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. CCIC is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L1659. A 12.8\*6.8\*6.4 (m) fully anechoic chamber was used for the radiated spurious emissions test.

#### **FCC-Registration No.: 406086**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 406086, valid time is until October 28, 2017.

#### **IC-Registration No.: 11185A-1**

CCIC Southern Electronic Product Testing (Shenzhen) Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A-1 on July. 15, 2013, valid time is until July. 15, 2016.

### 1.6.2 Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

|                             |              |
|-----------------------------|--------------|
| Temperature (°C):           | 15°C - 35°C  |
| Relative Humidity (%):      | 30% - 60%    |
| Atmospheric Pressure (kPa): | 86KPa-106KPa |

## 2. 47 CFR PART 2, PART 22H & 24E REQUIREMENTS

### 2.1 Conducted RF Output Power

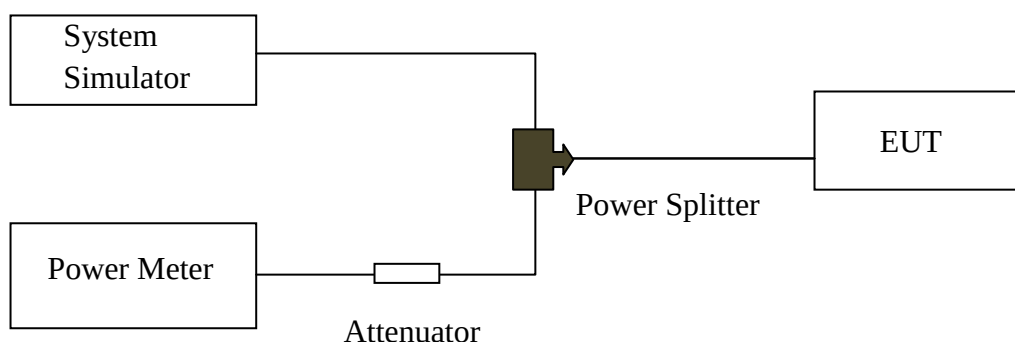
#### 2.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals 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 FCC section 2.1033(c)(8).

#### 2.1.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

#### 2.1.3 Test Setup



#### 2.1.4 Test Procedures

1. The EUT, which is powered by the Battery, is coupled to the Power meter and system simulator with Attenuators through the Power Splitter;.
2. Set EUT at maximum power through system simulator.
3. Select lowest, middle, and highest channels for each band and different modulation.
4. Measure the maximum burst average power for GSM and maximum average power for other modulation signal.

## 2.1.5 Test Results

### 1. GSM Model Test Verdict:

| Band         | Channel | Frequency (MHz) | Measured Output Power dBm | Verdict |
|--------------|---------|-----------------|---------------------------|---------|
| GSM 850MHz   | 128     | 824.2           | 33.41                     | PASS    |
|              | 190     | 836.6           | 33.51                     | PASS    |
|              | 251     | 848.8           | 33.42                     | PASS    |
| GSM 1900MHz  | 512     | 1850.2          | 30.72                     | PASS    |
|              | 661     | 1880.0          | 30.78                     | PASS    |
|              | 810     | 1909.8          | 30.68                     | PASS    |
| GPRS 850MHz  | 128     | 824.2           | 33.02                     | PASS    |
|              | 190     | 836.6           | 33.22                     | PASS    |
|              | 251     | 848.8           | 33.14                     | PASS    |
| GPRS 1900MHz | 512     | 1850.2          | 30.60                     | PASS    |
|              | 661     | 1880.0          | 30.64                     | PASS    |
|              | 810     | 1909.8          | 30.63                     | PASS    |
| EDGE 850MHz  | 128     | 824.2           | 30.32                     | PASS    |
|              | 190     | 836.6           | 30.29                     | PASS    |
|              | 251     | 848.8           | 30.30                     | PASS    |
| EDGE 1900MHz | 512     | 1850.2          | 30.28                     | PASS    |
|              | 661     | 1880.0          | 30.36                     | PASS    |
|              | 810     | 1909.8          | 30.27                     | PASS    |

Note 1: For the GPRS and EDGE model, all the slots were tested and just the worst data was record in this report.

## 2. WCDMA Model Test Verdict:

| Item       | band    | WCDMA 850 |       |       | WCDMA 1900 |       |       |
|------------|---------|-----------|-------|-------|------------|-------|-------|
|            | ARFCN   | 4132      | 4183  | 4233  | 9262       | 9400  | 9538  |
|            | subtest | dBm       |       |       | dBm        |       |       |
| 5.2(WCDMA) | non     | 23.24     | 23.32 | 23.22 | 23.23      | 23.26 | 23.12 |
| HSDPA      | 1       | 22.72     | 22.53 | 22.82 | 22.68      | 22.80 | 22.60 |
|            | 2       | 22.28     | 22.72 | 22.25 | 22.45      | 22.08 | 22.52 |
|            | 3       | 21.7      | 21.92 | 21.74 | 21.84      | 21.92 | 21.9  |
|            | 4       | 21.69     | 21.74 | 21.71 | 21.68      | 21.86 | 21.82 |
| HSUPA      | 1       | 22.28     | 22.38 | 22.37 | 22.54      | 22.57 | 22.42 |
|            | 2       | 22.22     | 22.18 | 22.2  | 22.04      | 21.90 | 21.94 |
|            | 3       | 21.96     | 22.09 | 22.02 | 22.07      | 22.12 | 22.06 |
|            | 4       | 22.04     | 22.14 | 22.23 | 21.92      | 21.81 | 21.79 |
|            | 5       | 22.24     | 22.26 | 22.31 | 22.04      | 22.25 | 22.18 |

## 2.2 Peak to Average Ratio

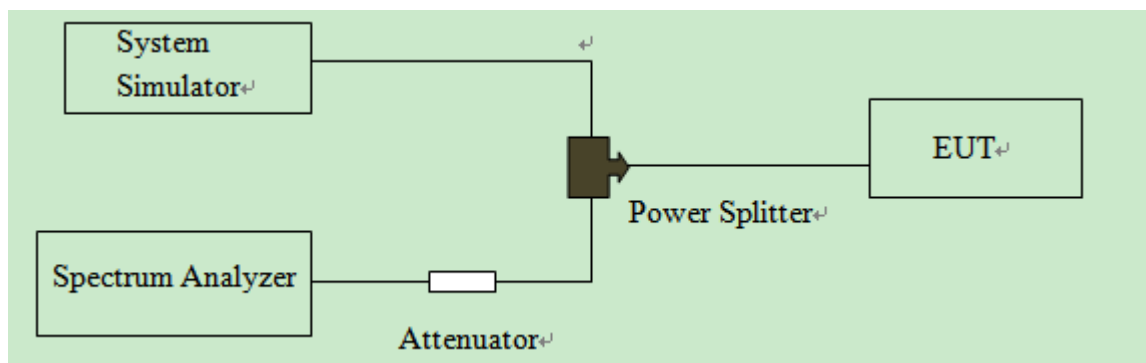
### 2.2.1 Definition

According to FCC section 2.1049 and FCC 24.232(d), the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

### 2.2.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.2.3 Test Setup



### 2.2.4 Test Procedures

1. The testing follows FCC KDB 971168 v02r01 Section 5.7.1.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. For GSM/EGPRS operating modes:
  - a. Set EUT in maximum power output.
  - b. Set the RBW = 1MHz, VBW = 3MHz, Peak detector on spectrum analyzer for first trace.
  - c. Set the RBW = 1MHz, VBW = 3MHz, RMS detector on spectrum analyzer for second trace.
  - d. The wanted burst signal is triggered by spectrum analyzer, and measured respectively the peak level and Mean level without burst-off time, after system simulator has synchronized with the spectrum analyzer.
4. For UMTS operating modes:
  - a. Set the CCDF (Complementary Cumulative Distribution Function) option on the spectrum analyzer.
  - b. The highest RF powers were measured and recorded the maximum PAPR level associated

with a probability of 0.1 %.

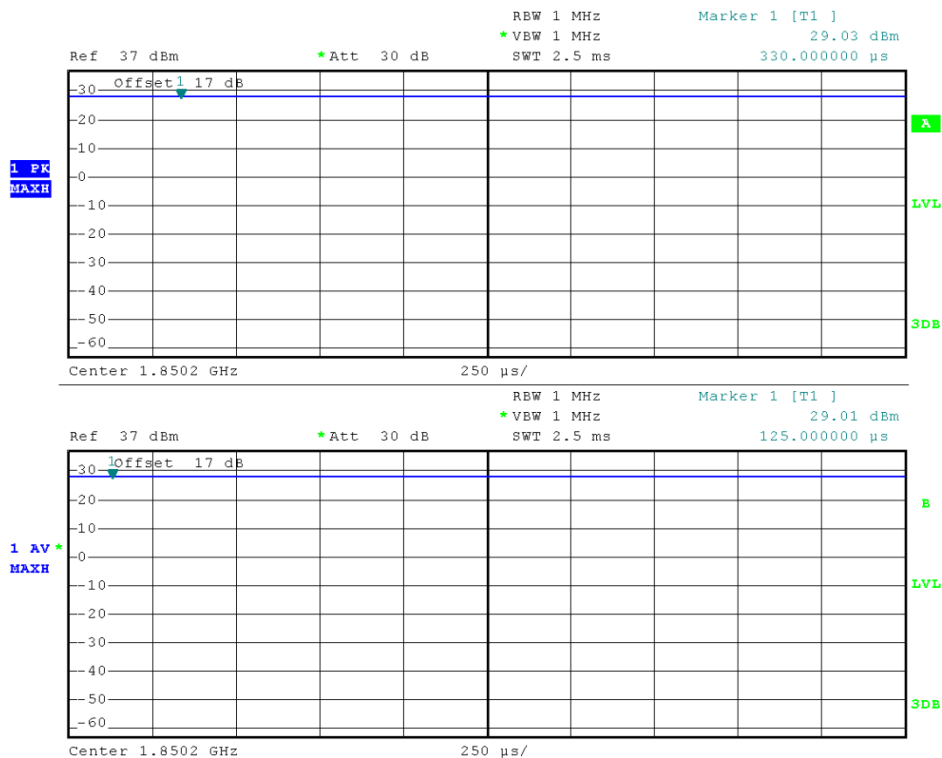
5. Record the deviation as Peak to Average Ratio.

## 2.2.5 Test Results

1. Test Verdict:

| Band          | Channel | Frequency (MHz) | Peak to Average ratio |               | Limit | Verdict |
|---------------|---------|-----------------|-----------------------|---------------|-------|---------|
|               |         |                 | dB                    | Refer to Plot | dB    |         |
| GSM 1900MHz   | 512     | 1850.2          | 0.02                  | Plot A1 to A3 | 13    | PASS    |
|               | 661     | 1880.0          | 0.07                  |               |       | PASS    |
|               | 810     | 1909.8          | 0.04                  |               |       | PASS    |
| EDGE 1900MHz  | 512     | 1850.2          | 0.04                  | Plot B1 to B3 | 13    | PASS    |
|               | 661     | 1880.0          | 0.07                  |               |       | PASS    |
|               | 810     | 1909.8          | 0.06                  |               |       | PASS    |
| WCDMA 1900MHz | 9262    | 1852.4          | 5.88                  | Plot C1 to C3 | 13    | PASS    |
|               | 9400    | 1880.0          | 5.92                  |               |       | PASS    |
|               | 9538    | 1907.6          | 5.88                  |               |       | PASS    |

2. GSM Model Test Plots:



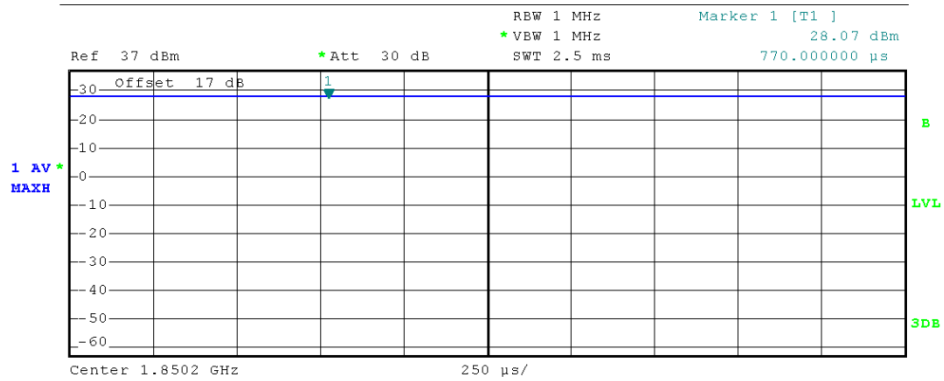
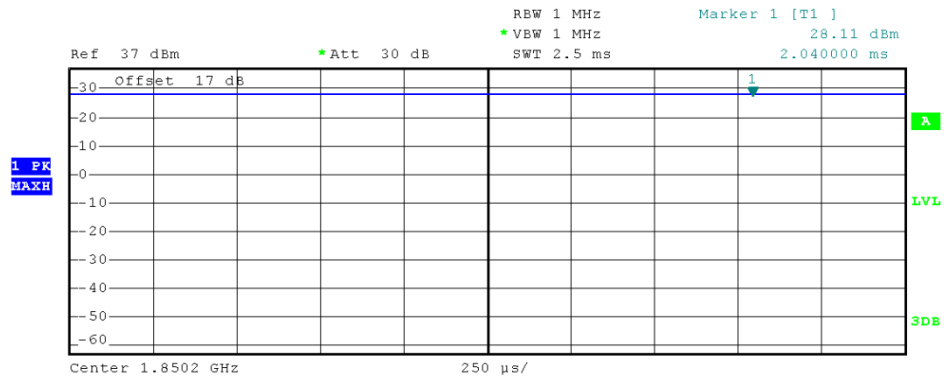
(Plot A1: GSM 1900 MHz Channel = 512)



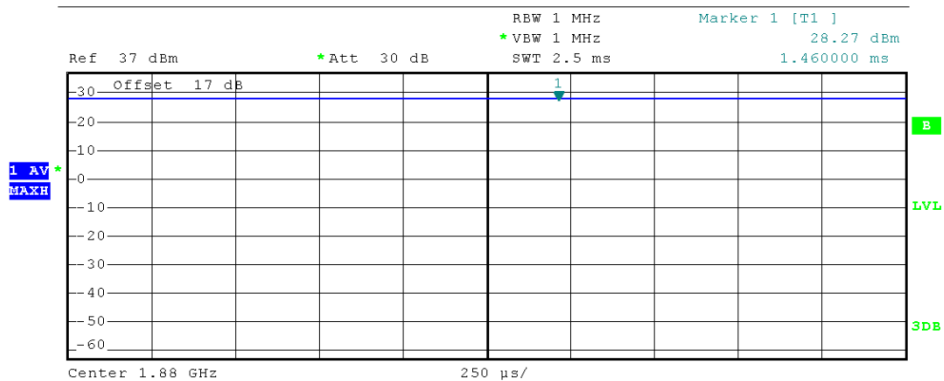
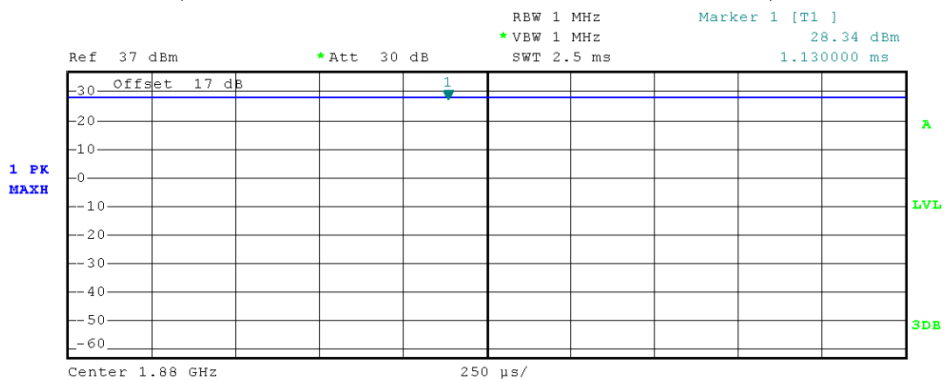
(Plot A2: GSM 1900 MHz Channel = 661)



(Plot A3: GSM 1900MHz Channel = 810)



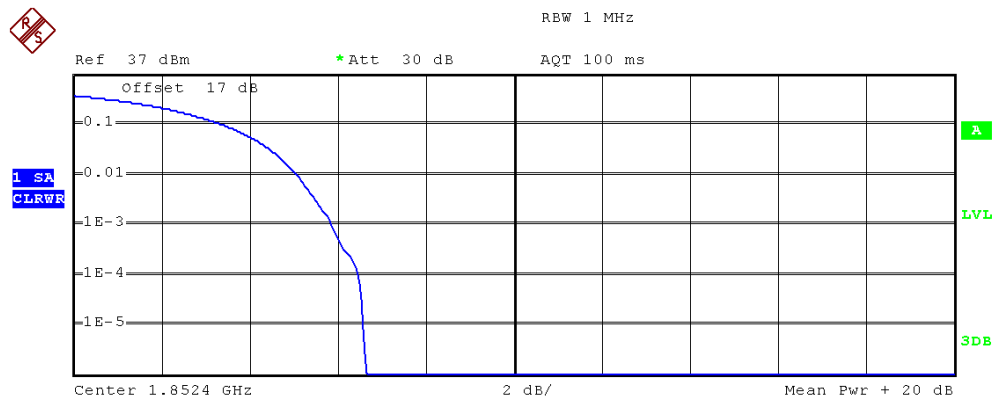
(Plot B1: EDGE 1900 MHz Channel = 512)



(Plot B2: EDGE 1900 MHz Channel = 661)



(Plot B3: EDGE 1900 MHz Channel = 810)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 16.44 dBm

Peak 23.09 dBm

Crest 6.65 dB

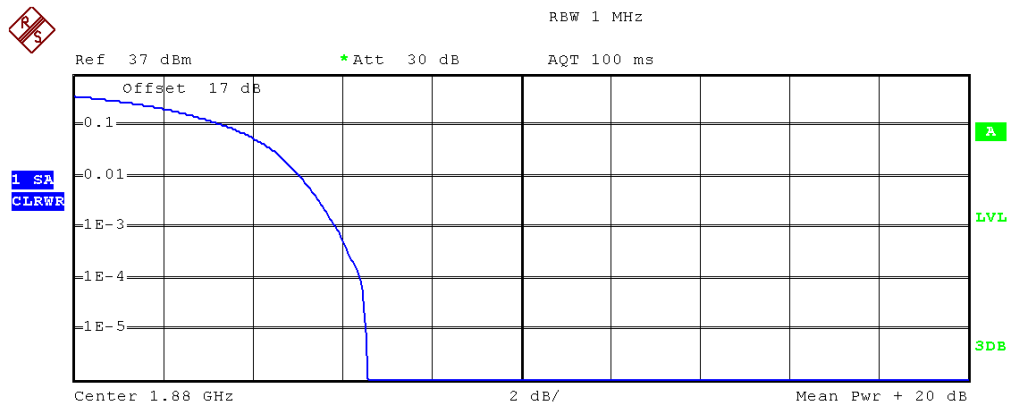
10 % 3.48 dB

1 % 5.12 dB

.1 % 5.88 dB

.01 % 6.48 dB

(Plot C1: WCDMA 1900MHz Channel = 9262)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 16.30 dBm

Peak 22.88 dBm

Crest 6.58 dB

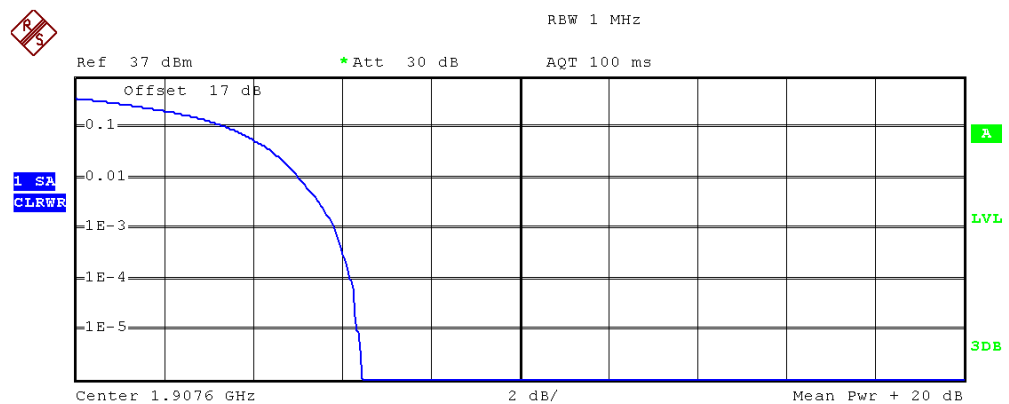
10 % 3.48 dB

1 % 5.12 dB

.1 % 5.92 dB

.01 % 6.44 dB

(Plot C2: WCDMA 1900MHz Channel = 9400)



Complementary Cumulative Distribution Function (100000 samples)

Trace 1

Mean 15.51 dBm

Peak 21.96 dBm

Crest 6.46 dB

10 % 3.52 dB

1 % 5.08 dB

.1 % 5.88 dB

.01 % 6.24 dB

(Plot C3: WCDMA 1900MHz Channel = 9538)

## 2.3 Occupied Bandwidth

### 2.3.1 Definition

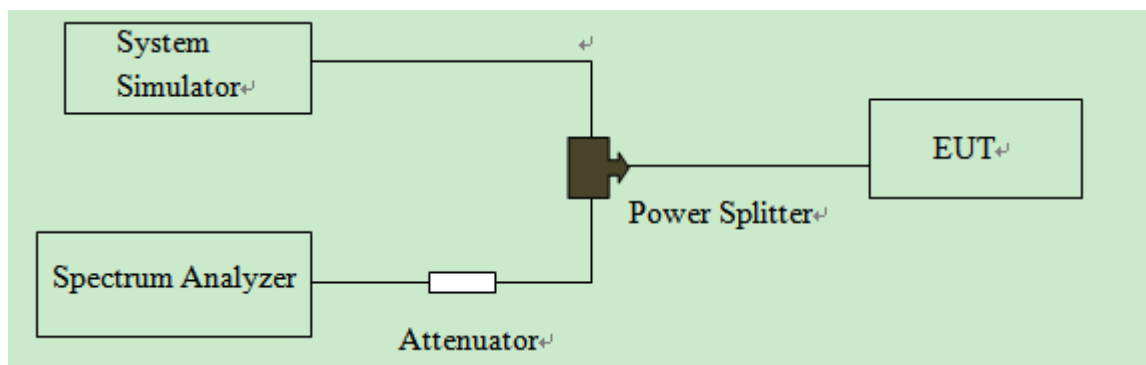
The 99% occupied bandwidth is the width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5% of the total mean transmitted power.

The emission bandwidth is defined as the width of the signal between two points, located at the 2 sides of the carrier frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 2.3.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.3.3 Test Setup



### 2.3.4 Test Procedures

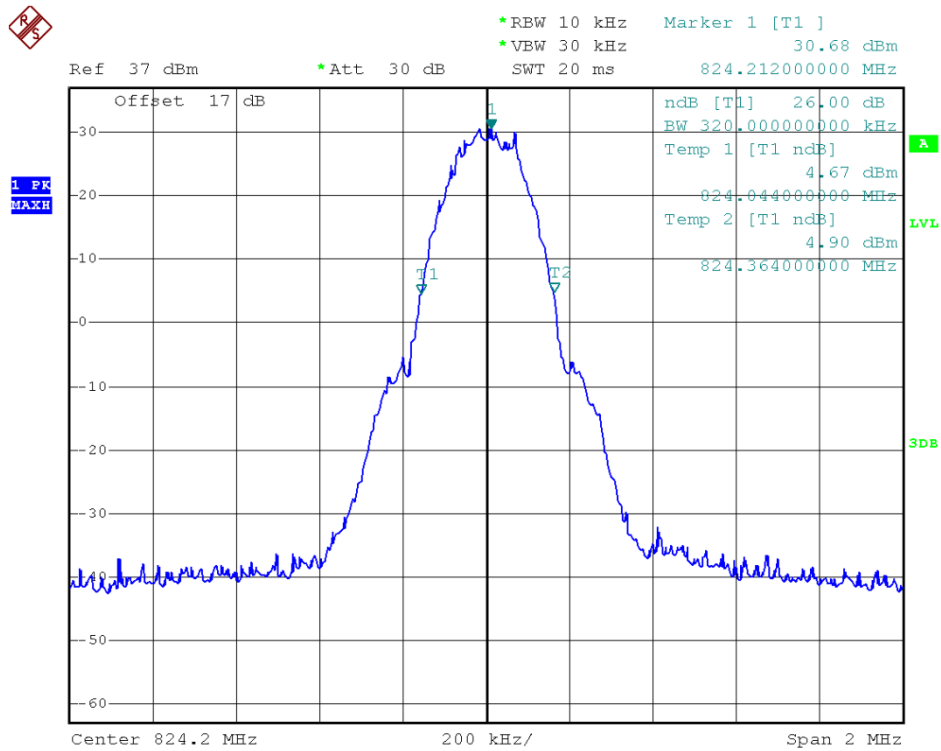
1. The testing follows FCC KDB 971168 v02r02 Section 4.2.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
4. The 99% occupied bandwidth were measured, set RBW= 1% of span, VBW= 3\*RBW, sample detector, trace maximum hold.
5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3\*RBW, peak detector, trace maximum hold.

### 2.3.5 Test Results

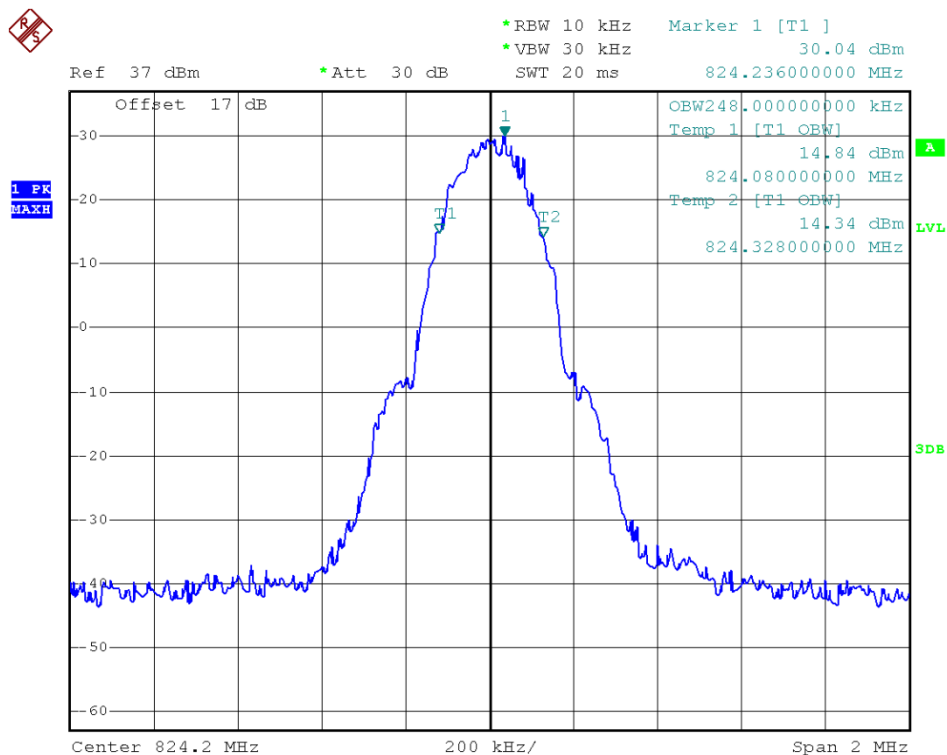
#### 1. Test Verdict:

| Band          | Channel | Frequency (MHz) | 26dB bandwidth | 99% Occupied Bandwidth | Refer to Plot |
|---------------|---------|-----------------|----------------|------------------------|---------------|
| GSM 850MHz    | 128     | 824.2           | 320KHz         | 248KHz                 | Plot A1-A2    |
|               | 190     | 836.6           | 316KHz         | 244KHz                 | Plot A3-A4    |
|               | 251     | 848.8           | 324KHz         | 252KHz                 | Plot A5-A6    |
| GSM 1900MHz   | 512     | 1850.2          | 316KHz         | 244KHz                 | Plot B1-B2    |
|               | 661     | 1880.0          | 320KHz         | 248KHz                 | Plot B3-B4    |
|               | 810     | 1909.8          | 324KHz         | 240KHz                 | Plot B5-B6    |
| EDGE 850MHz   | 128     | 824.2           | 324KHz         | 248KHz                 | Plot C1-C2    |
|               | 190     | 836.6           | 324KHz         | 244KHz                 | Plot C3-C4    |
|               | 251     | 848.8           | 320KHz         | 244KHz                 | Plot C5-C6    |
| EDGE 1900MHz  | 512     | 1850.2          | 316KHz         | 240KHz                 | Plot D1-D2    |
|               | 661     | 1880.0          | 320KHz         | 244KHz                 | Plot D3-D4    |
|               | 810     | 1909.8          | 328KHz         | 244KHz                 | Plot D5-D6    |
| WCDMA Band V  | 4132    | 826.4           | 4.72MHz        | 4.16MHz                | Plot E1-E2    |
|               | 4183    | 836.6           | 4.68MHz        | 4.16MHz                | Plot E3-E4    |
|               | 4233    | 846.6           | 4.68MHz        | 4.18MHz                | Plot E5-E6    |
| WCDMA Band II | 9262    | 1852.4          | 4.72MHz        | 4.16MHz                | Plot F1-F2    |
|               | 9400    | 1880            | 4.72MHz        | 4.18MHz                | Plot F3-F4    |
|               | 9538    | 1907.6          | 4.74MHz        | 4.18MHz                | Plot F5-F6    |

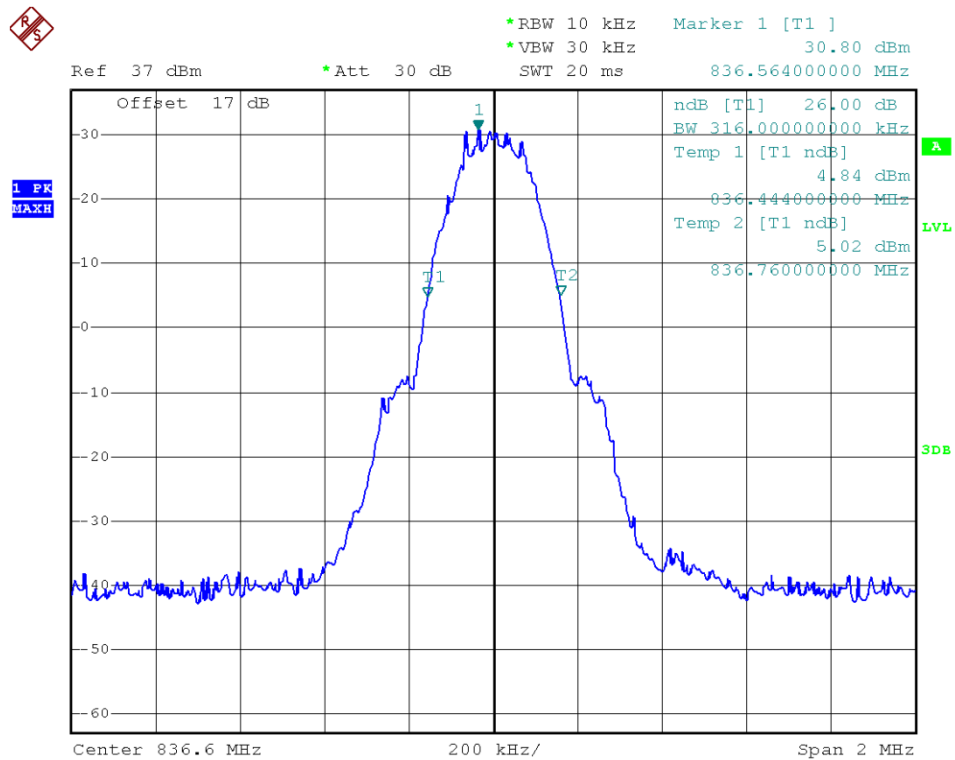
## 2. Test Plots:



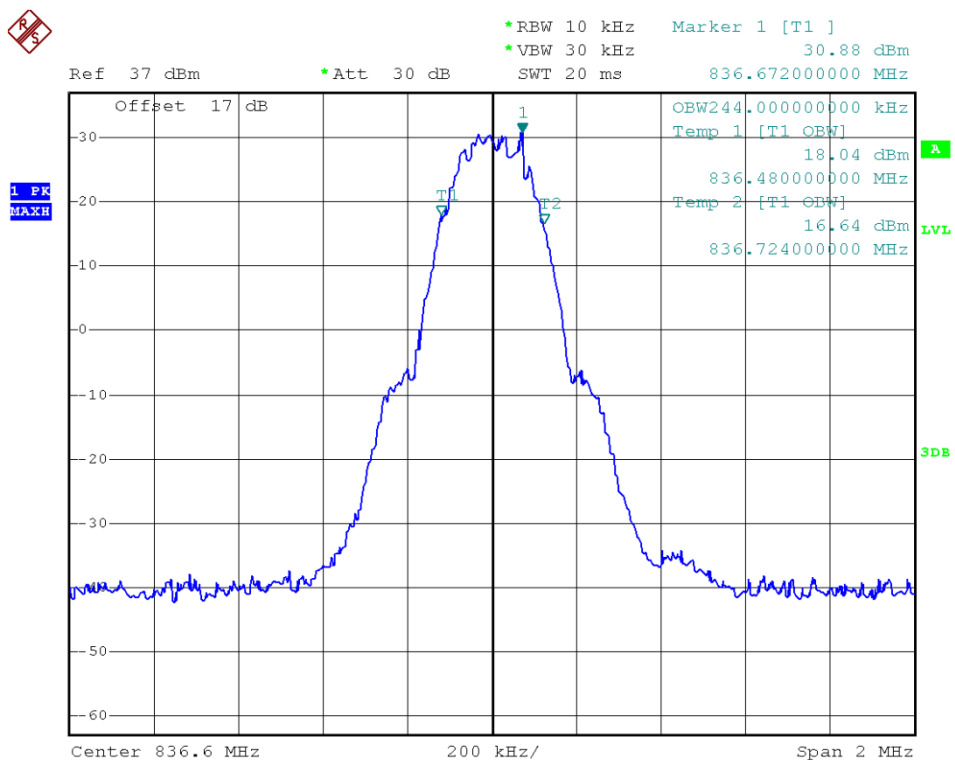
(Plot A1: GSM 850MHz Channel = 128)



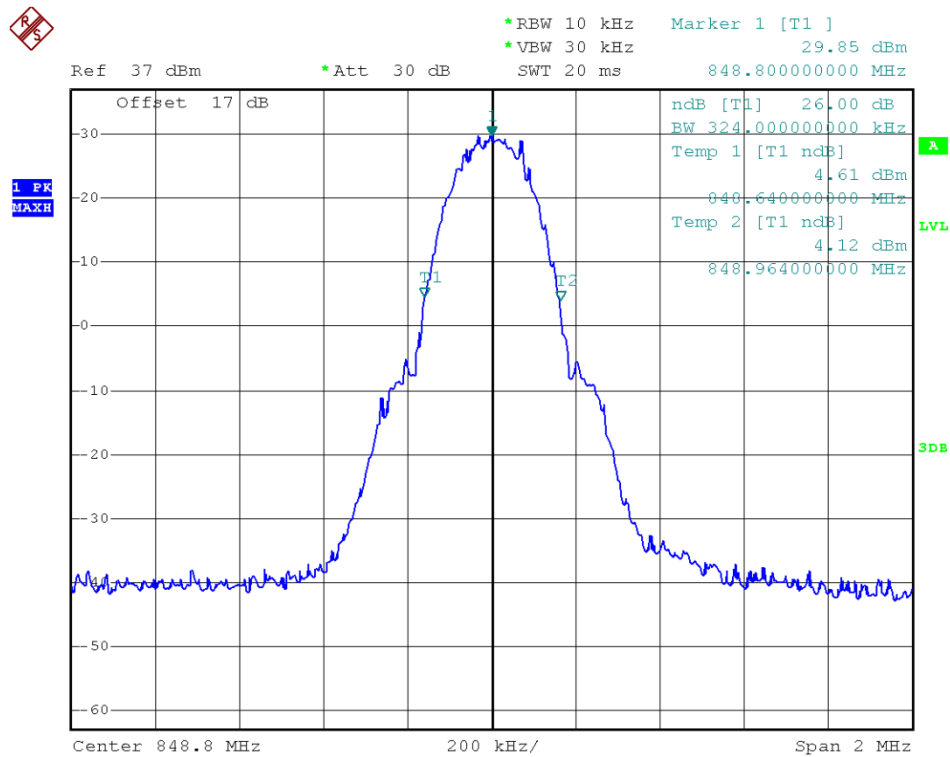
(Plot A2: GSM 850MHz Channel = 128)



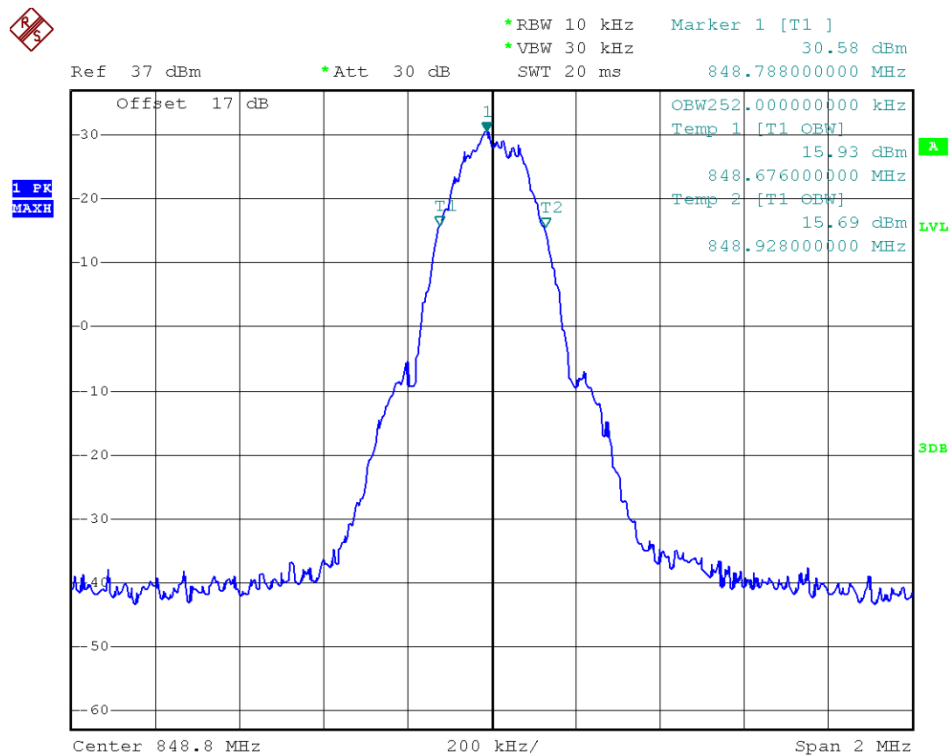
(Plot A3: GSM 850MHz Channel = 190)



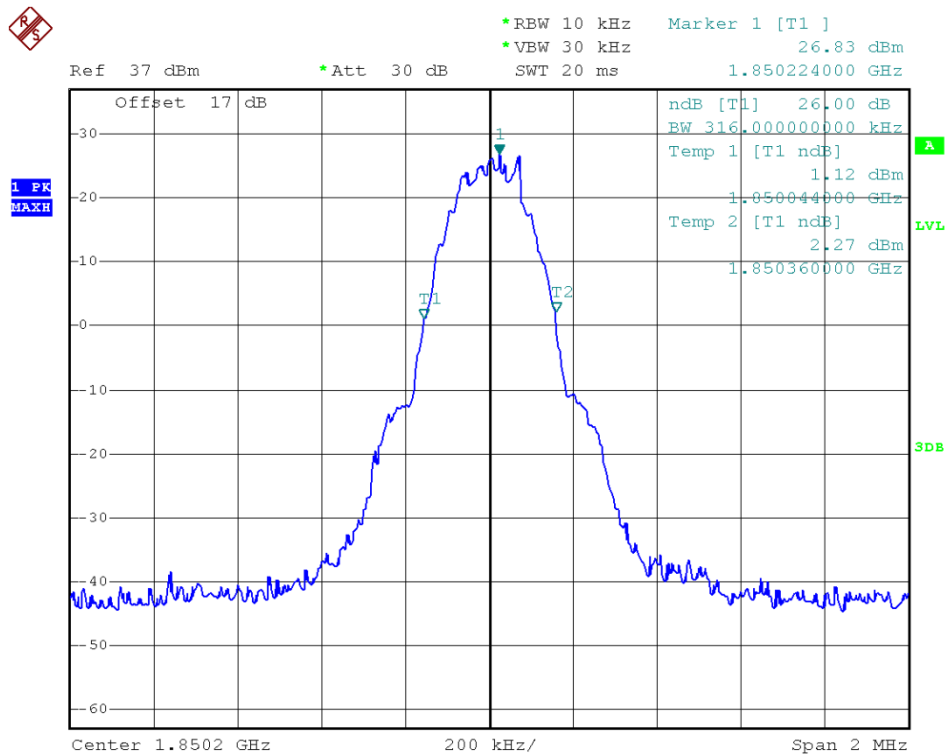
(Plot A4: GSM 850MHz Channel = 190)



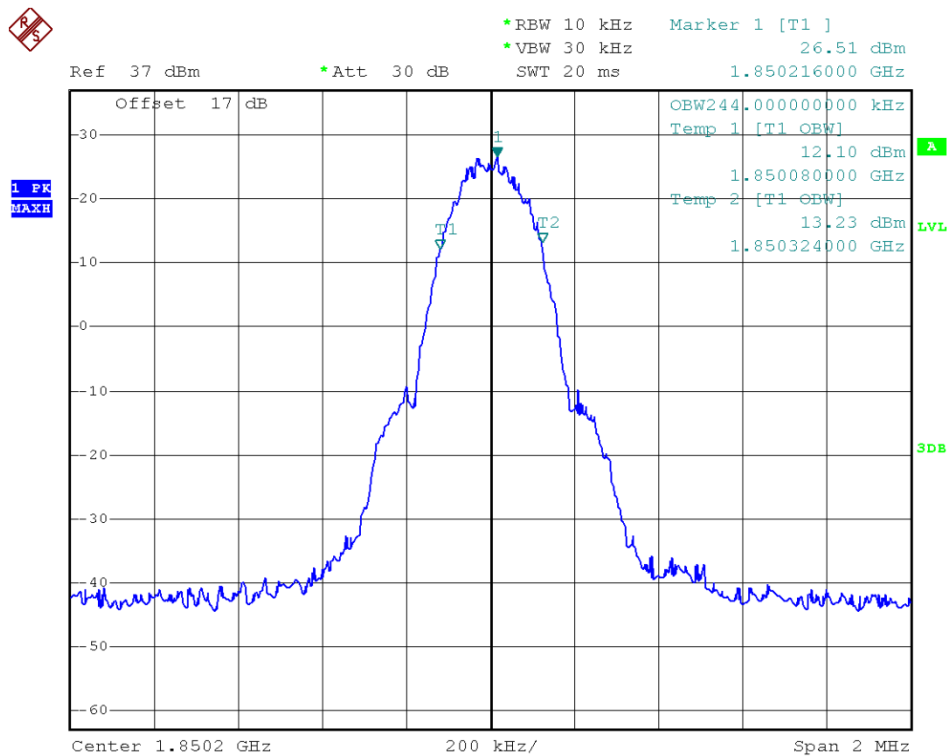
(Plot A5: GSM 850MHz Channel = 251)



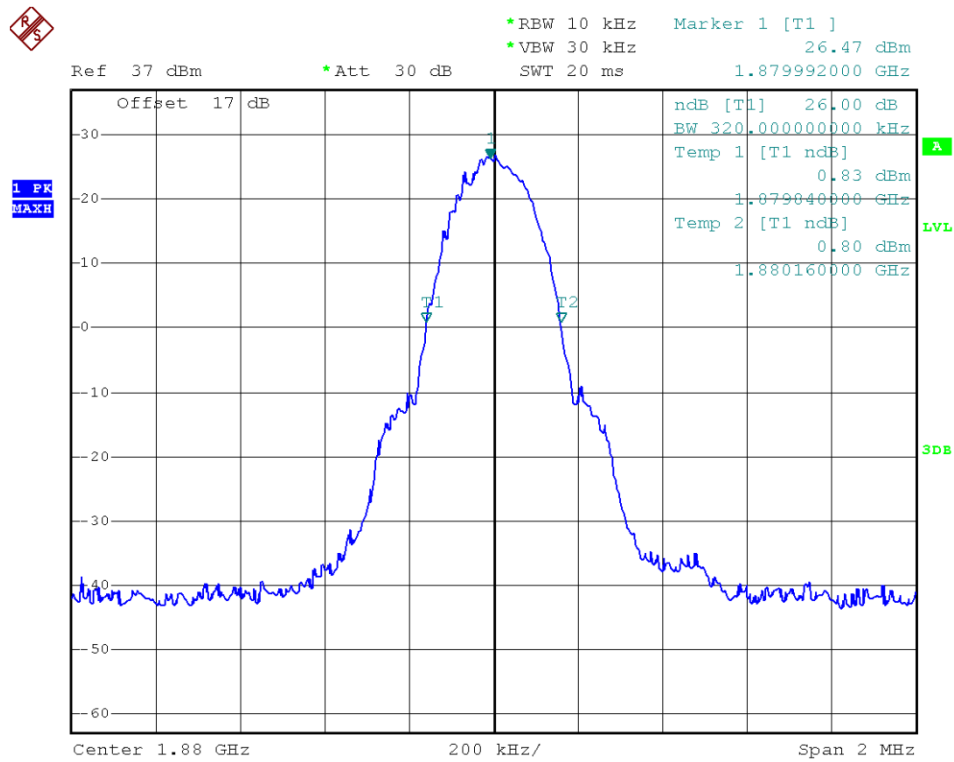
(Plot A6: GSM 850MHz Channel = 251)



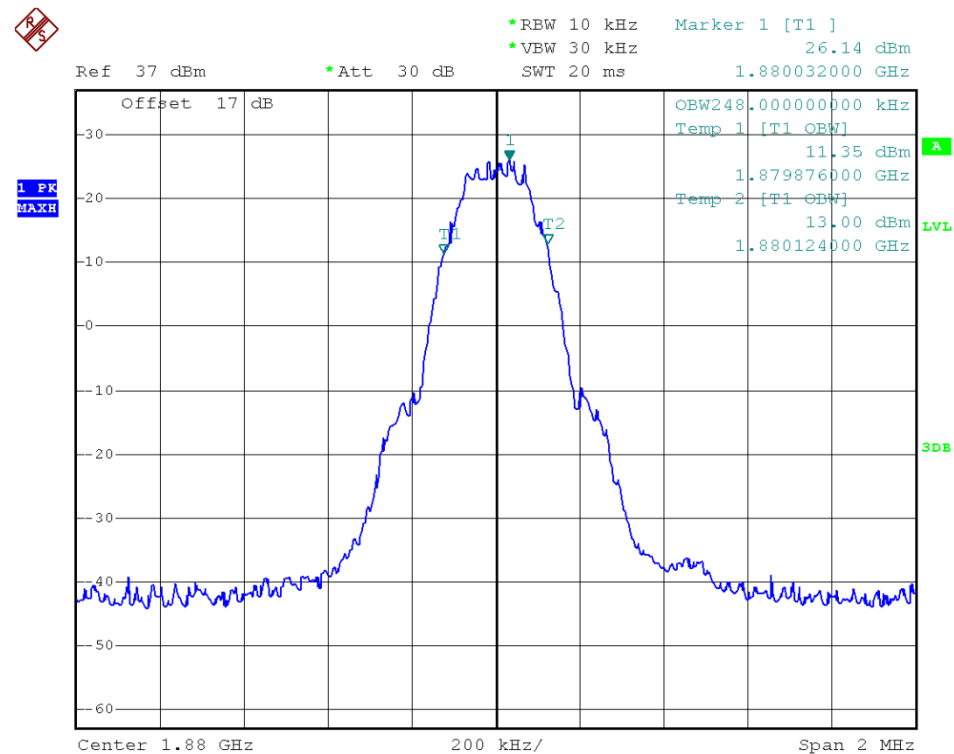
(Plot B1: GSM 1900MHz Channel = 512)



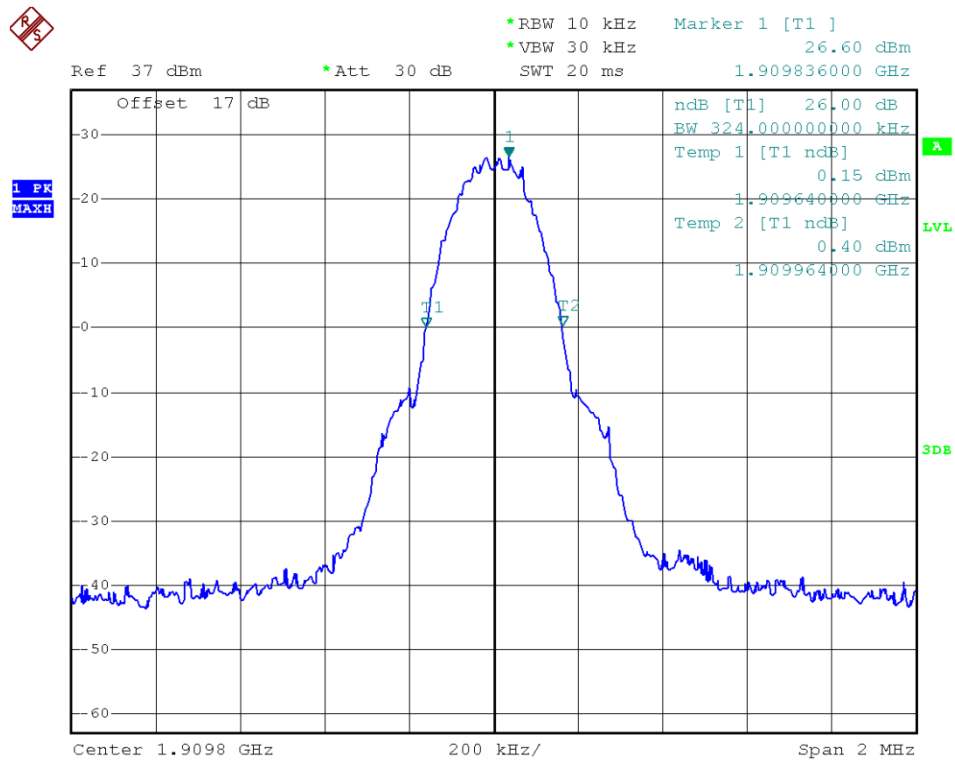
(Plot B2: GSM 1900MHz Channel = 512)



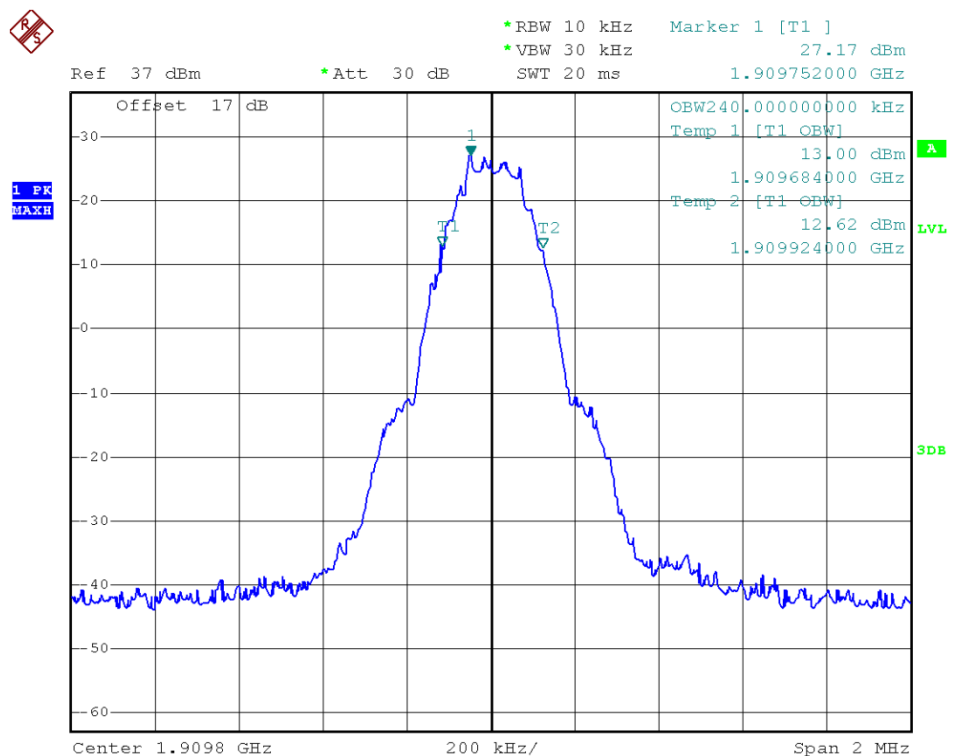
(Plot B3: GSM 1900MHz Channel = 661)



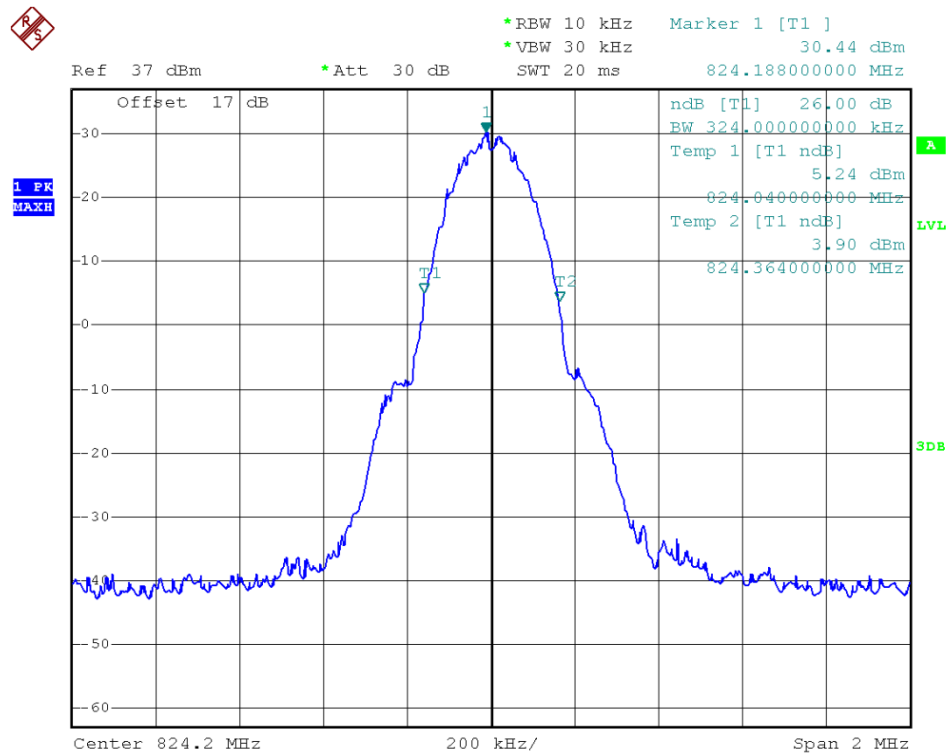
(Plot B4: GSM 1900MHz Channel = 661)



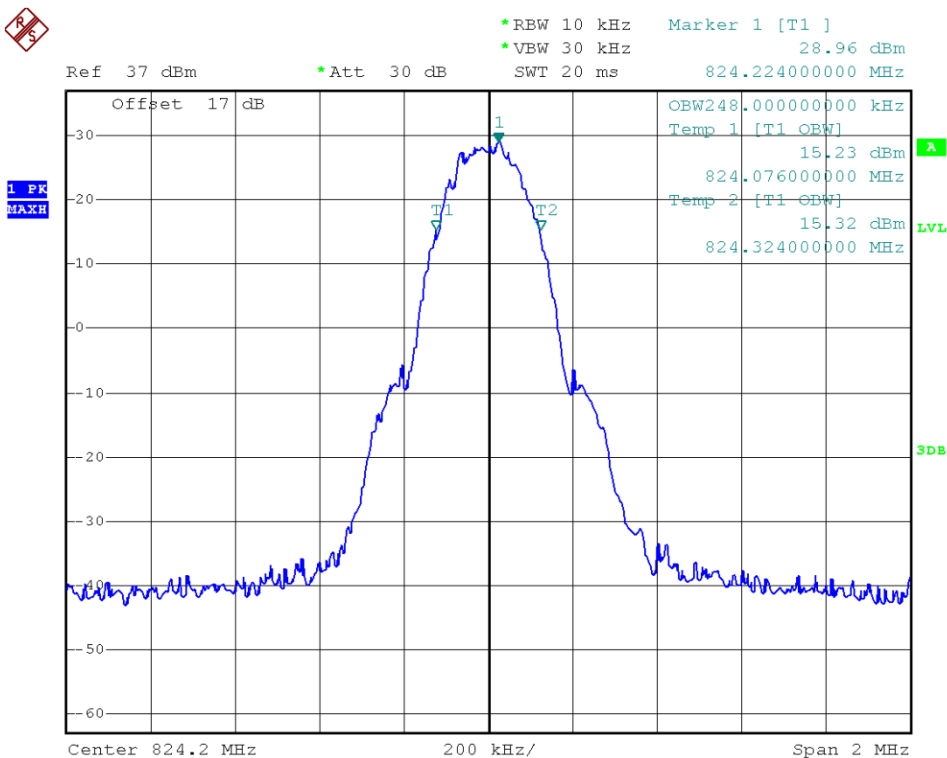
(Plot B5: GSM 1900MHz Channel = 810)



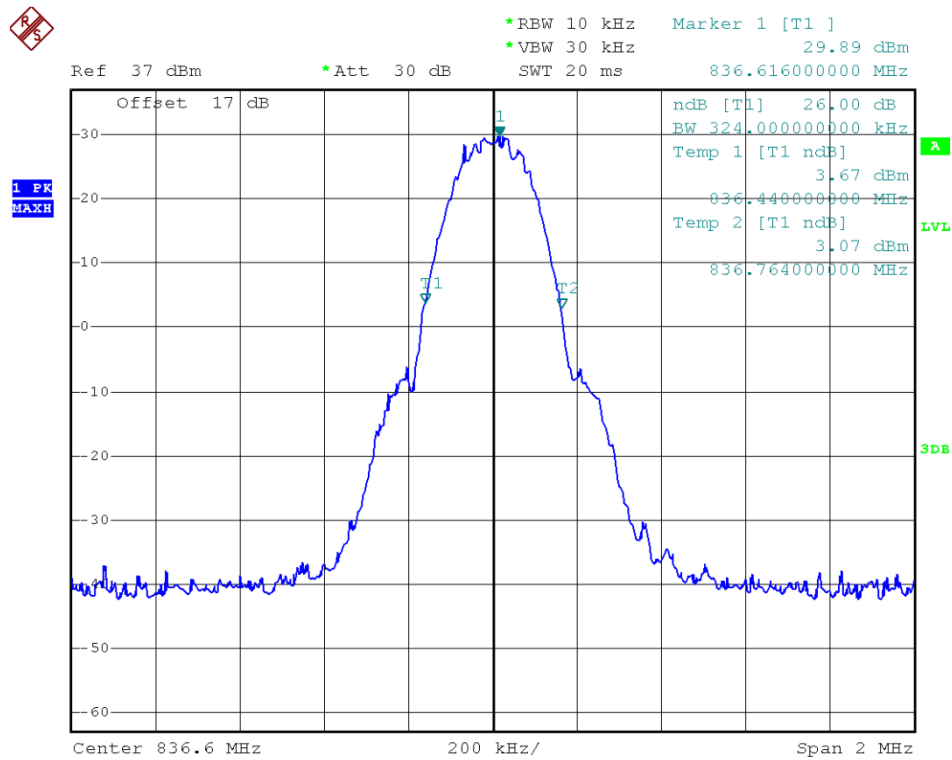
(Plot B6: GSM 1900MHz Channel = 810)



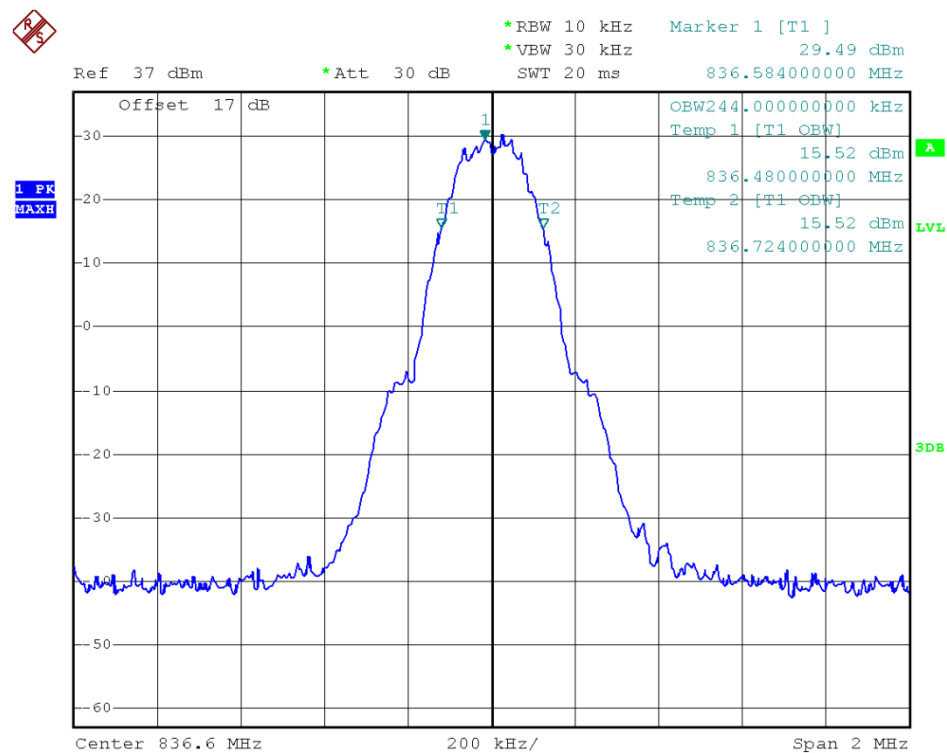
(Plot C1: EDGE 850MHz Channel = 128)



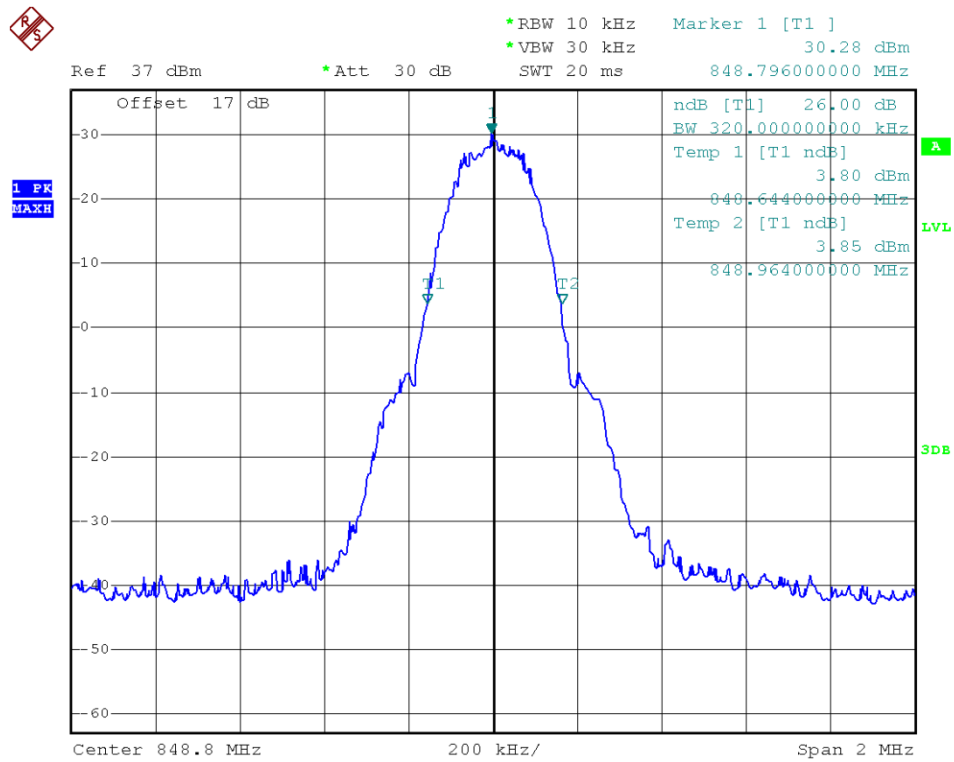
(Plot C2: EDGE 850MHz Channel = 128)



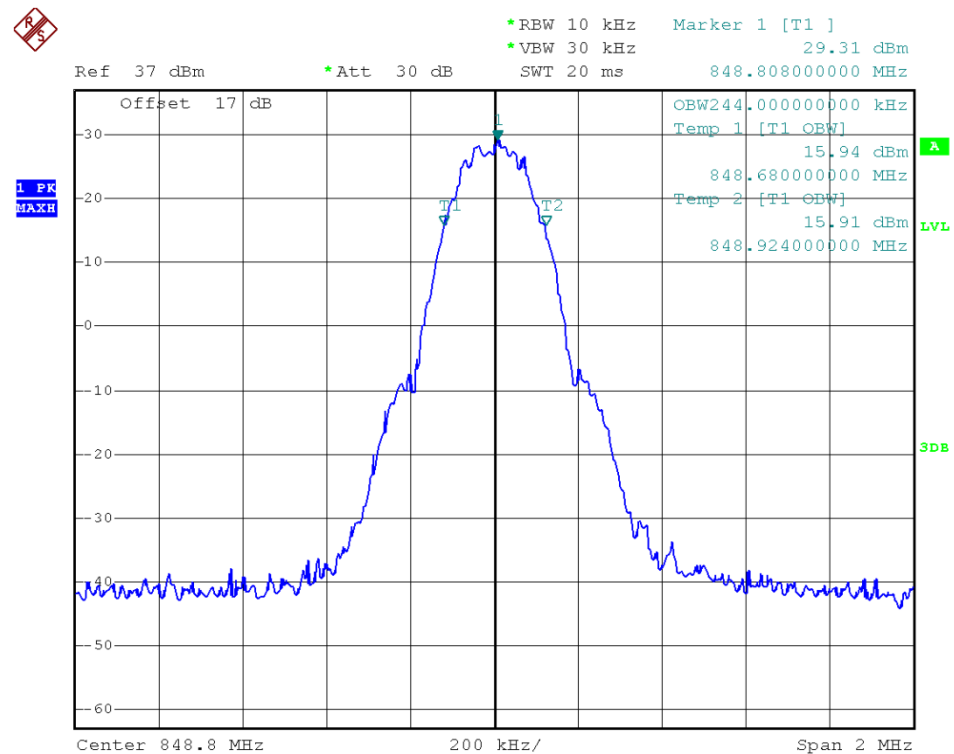
(Plot C3: EDGE 850MHz Channel = 190)



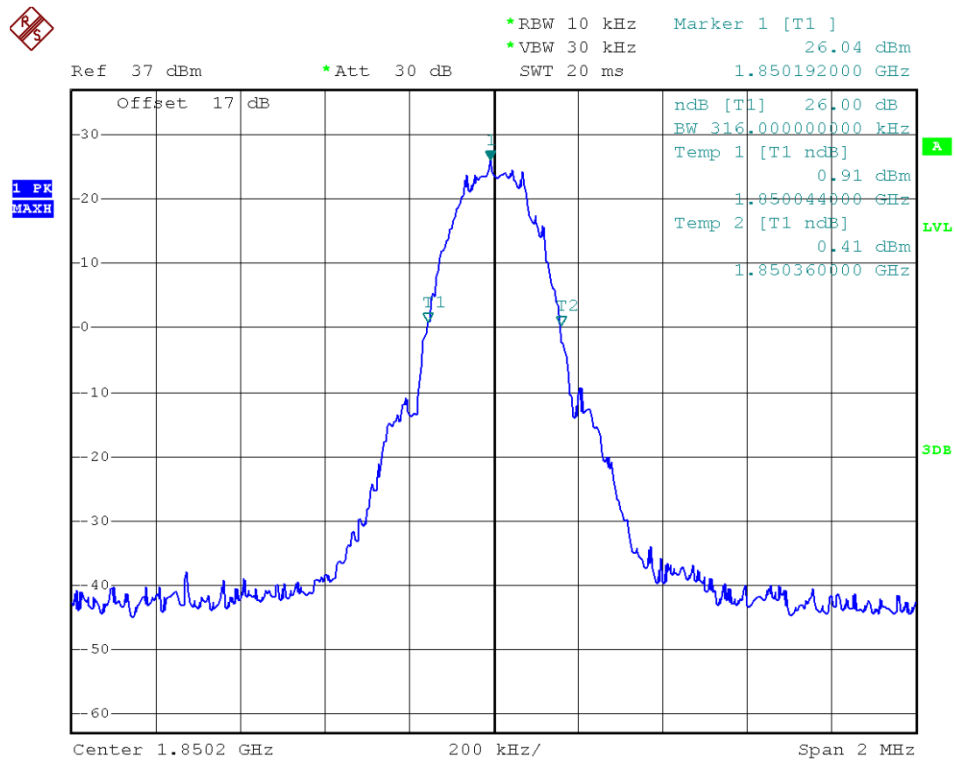
(Plot C4: EDGE 850MHz Channel = 190)



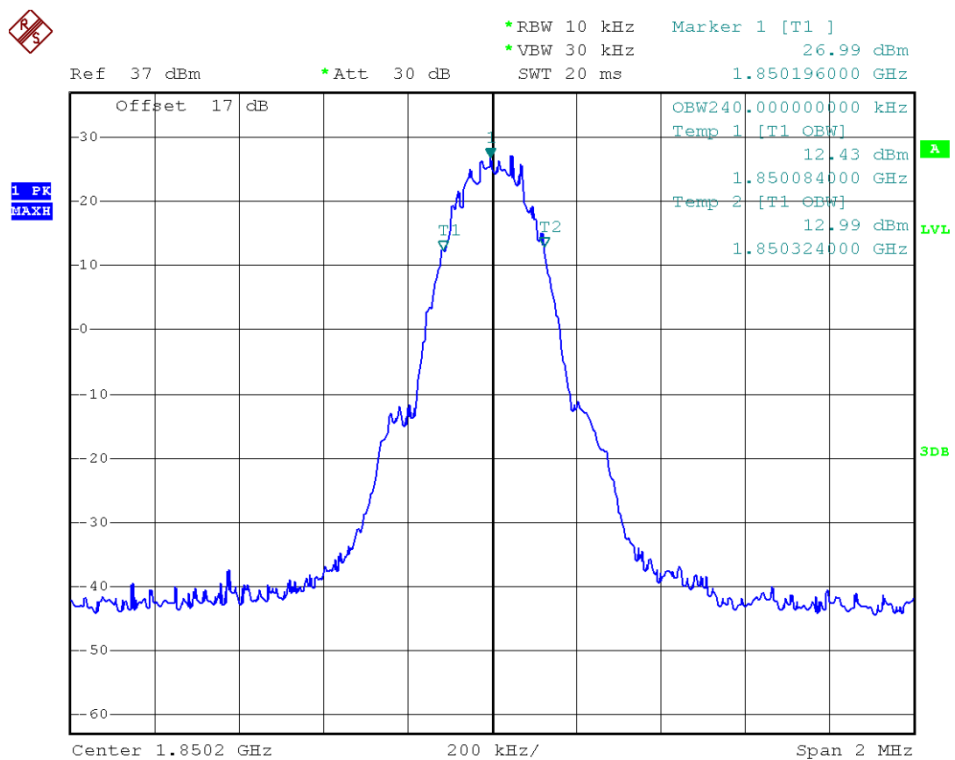
(Plot C5: EDGE 850MHz Channel = 251)



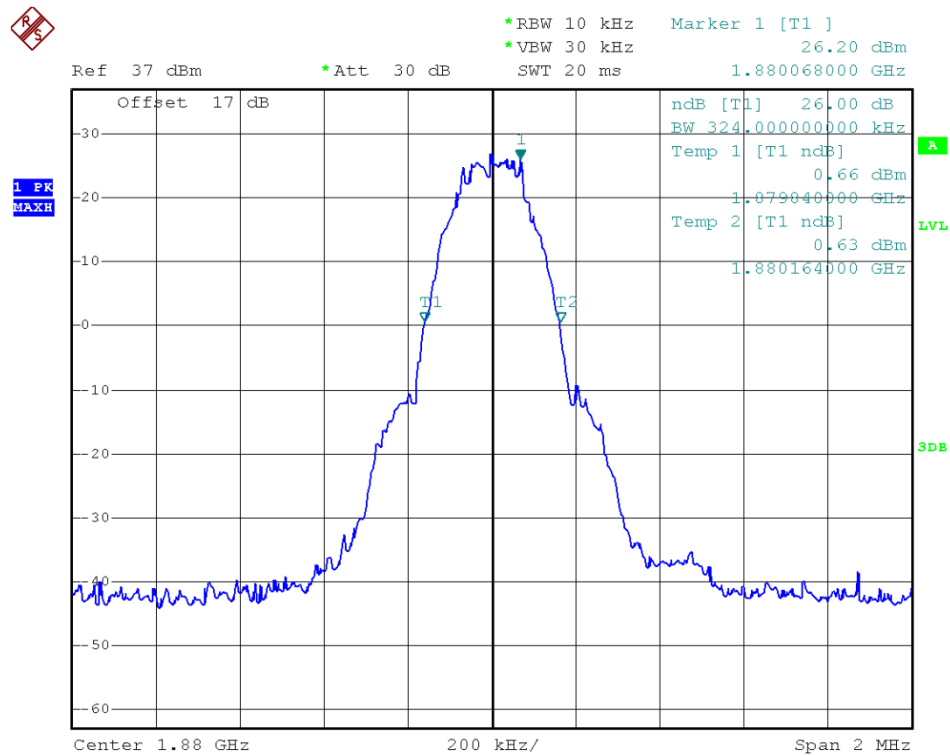
(Plot C6: EDGE 850MHz Channel = 251)



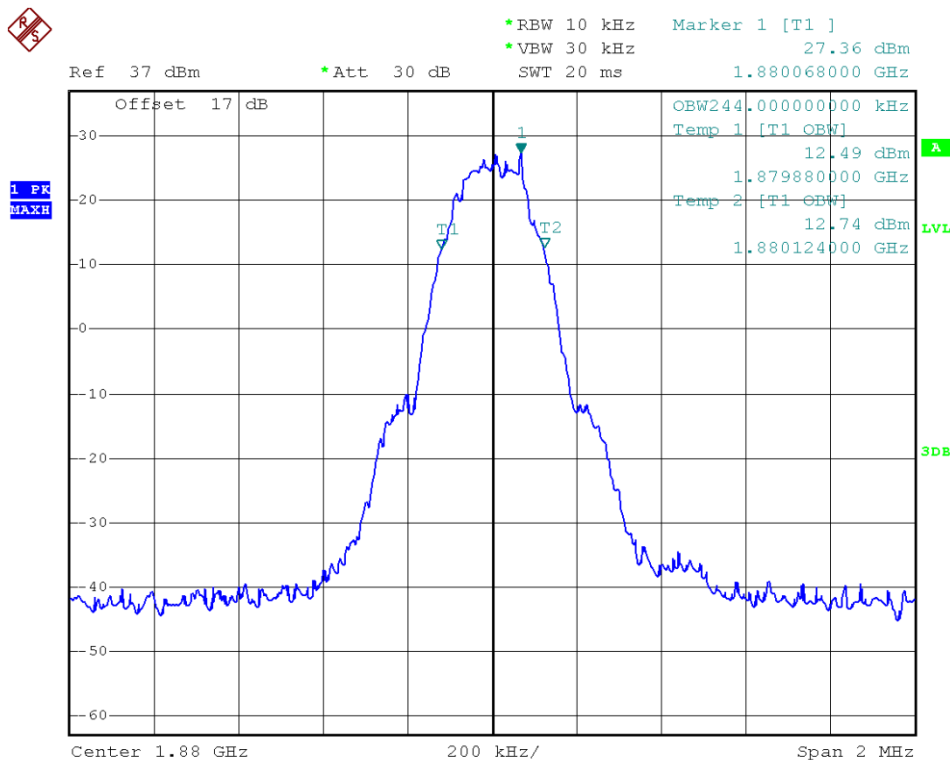
(Plot D1: EDGE 1900MHz Channel = 512)



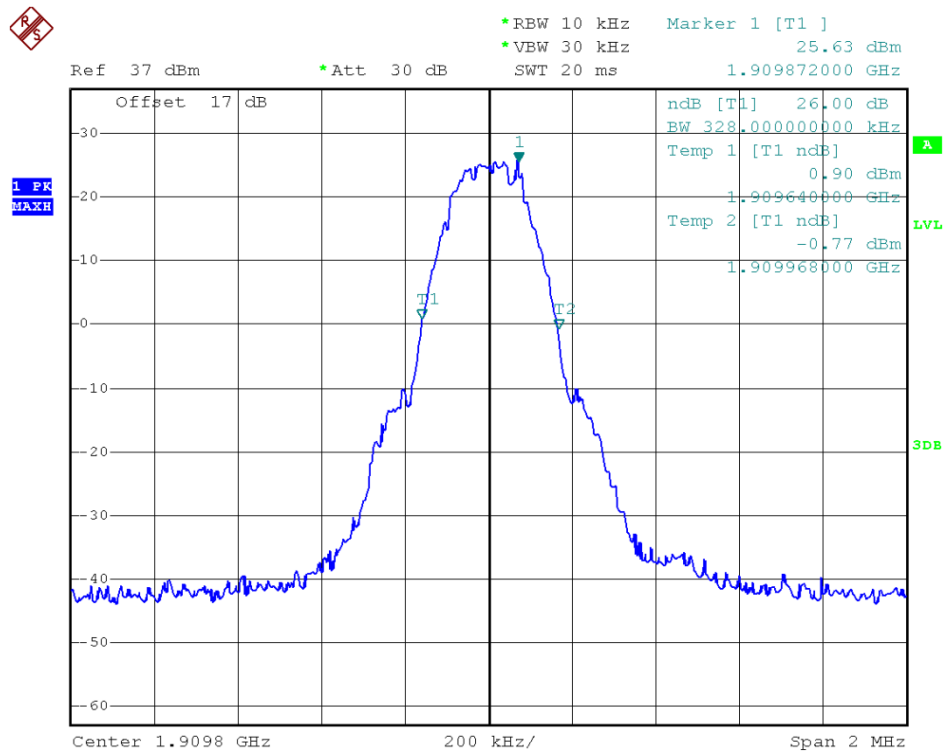
(Plot D2: EDGE 1900MHz Channel = 512)



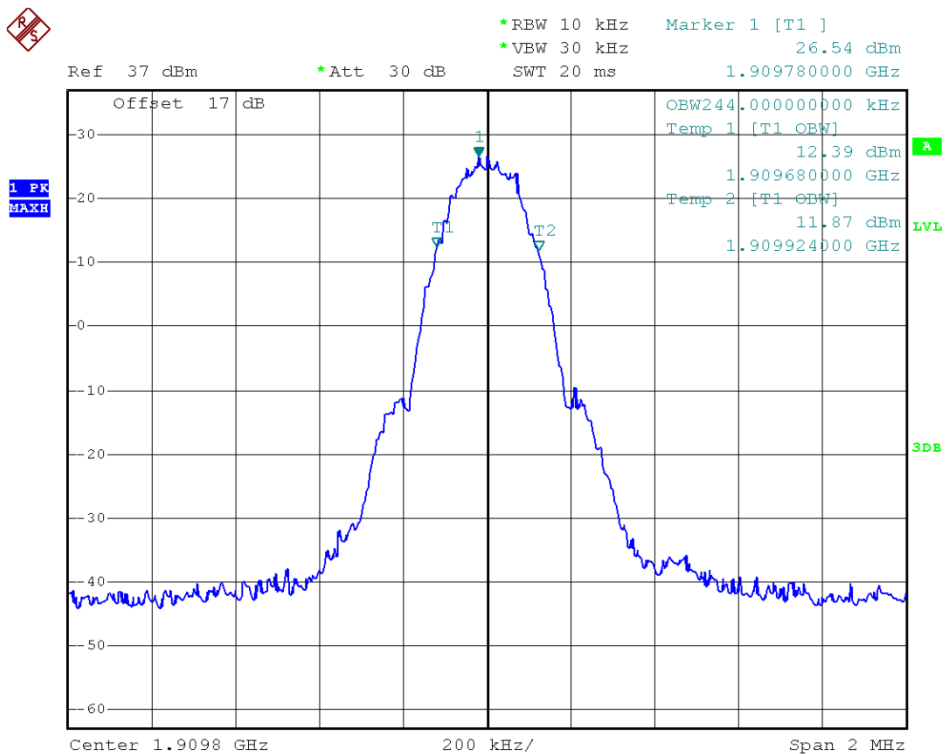
(Plot D3: EDGE 1900MHz Channel = 661)



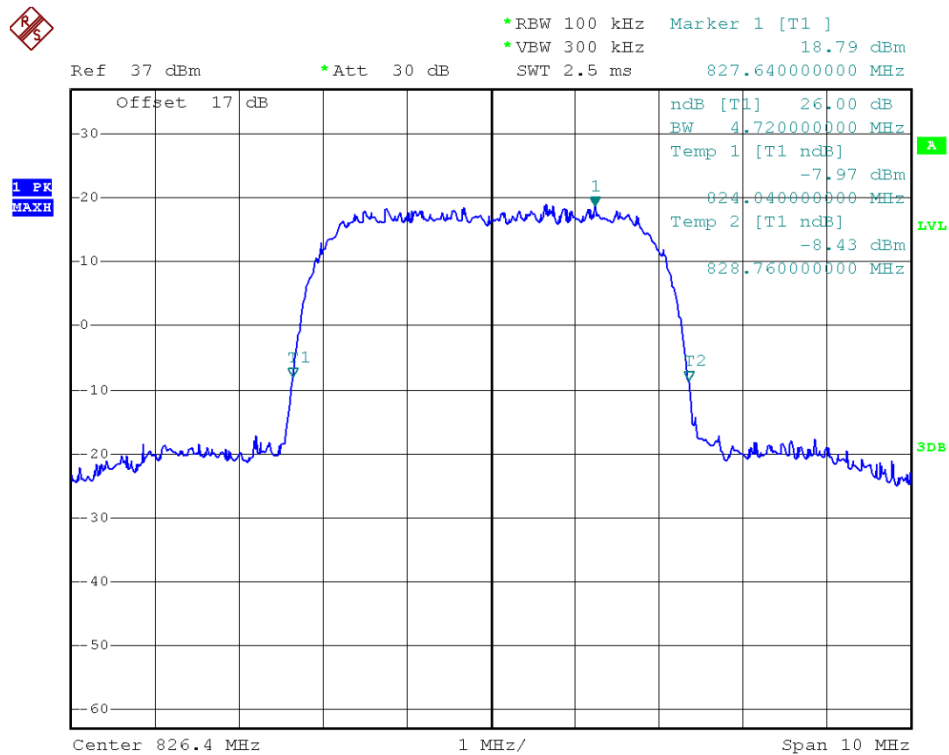
(Plot D4: EDGE 1900MHz Channel = 661)



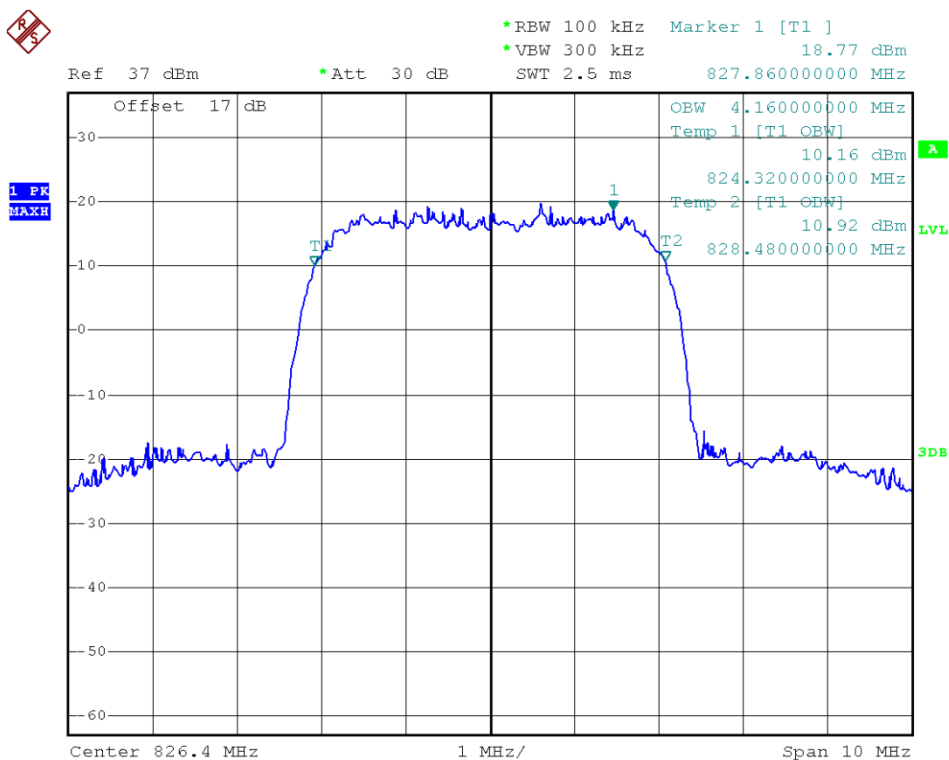
(Plot D5: EDGE 1900MHz Channel = 810)



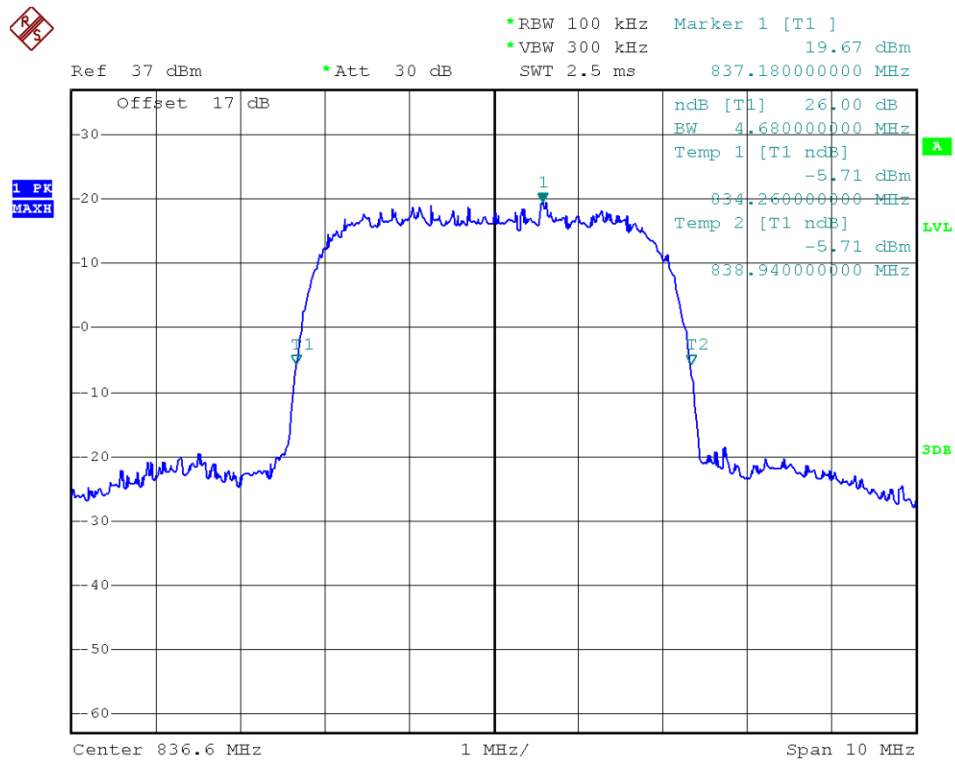
(Plot D6: EDGE 1900MHz Channel = 810)



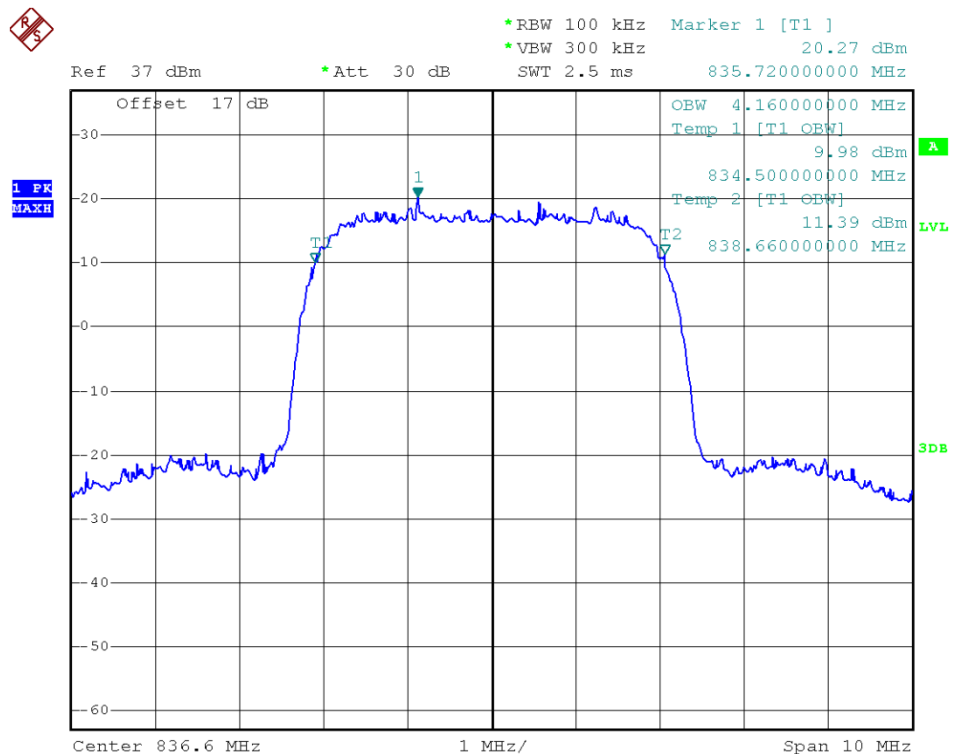
(Plot E1: WCDMA 850MHz Channel = 4132)



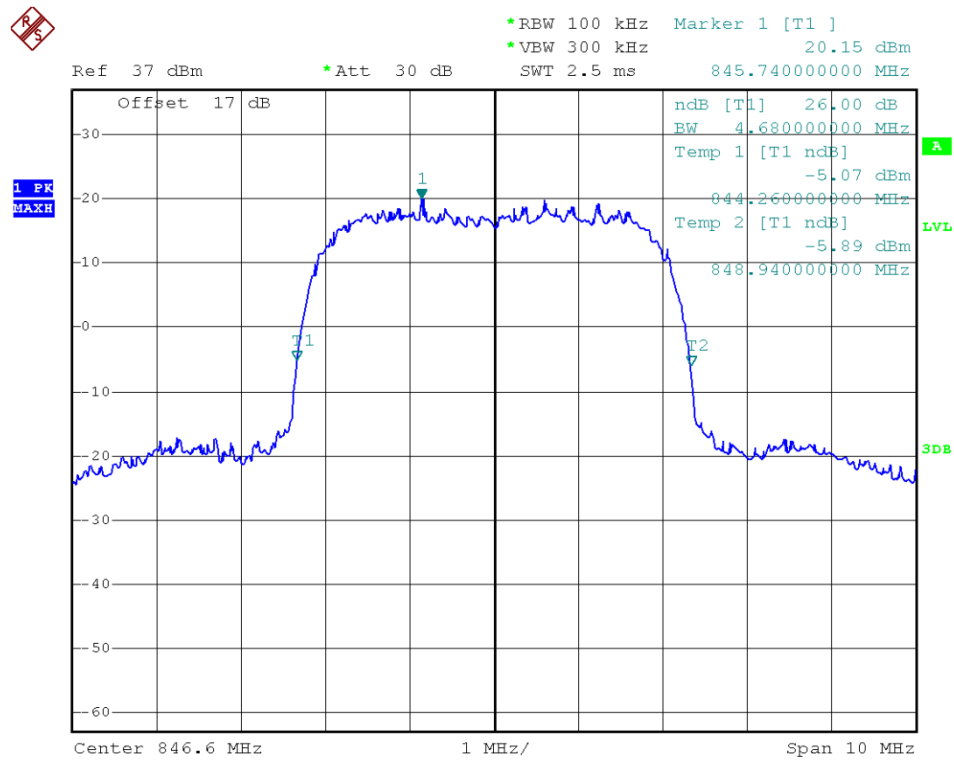
(Plot E2: WCDMA 850MHz Channel = 4132)



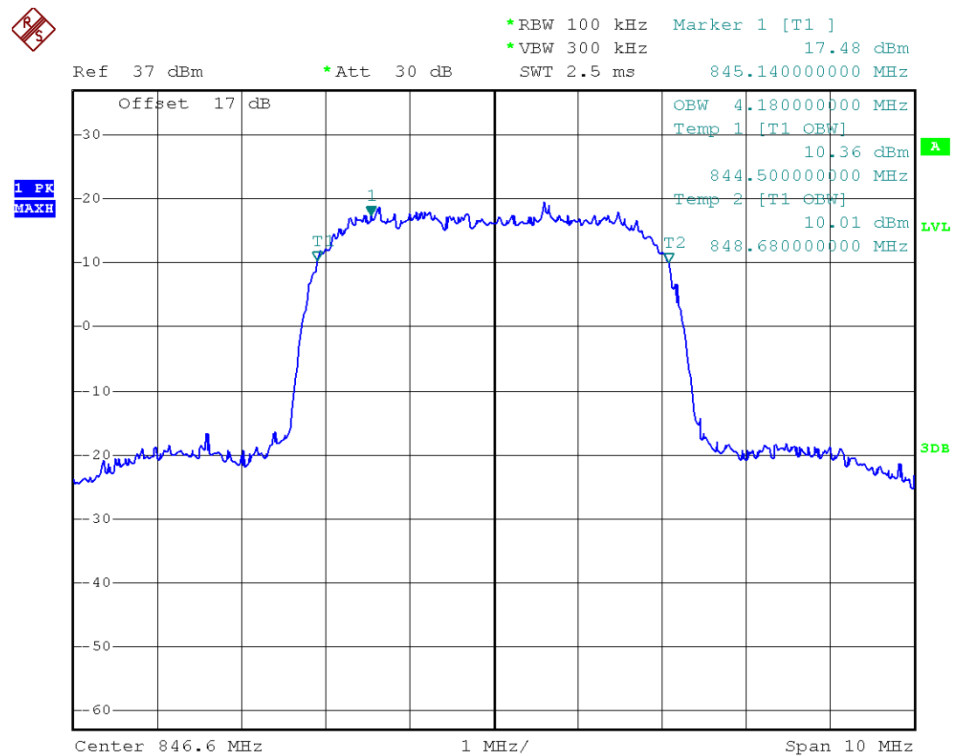
(Plot E3: WCDMA 850 MHz Channel = 4183)



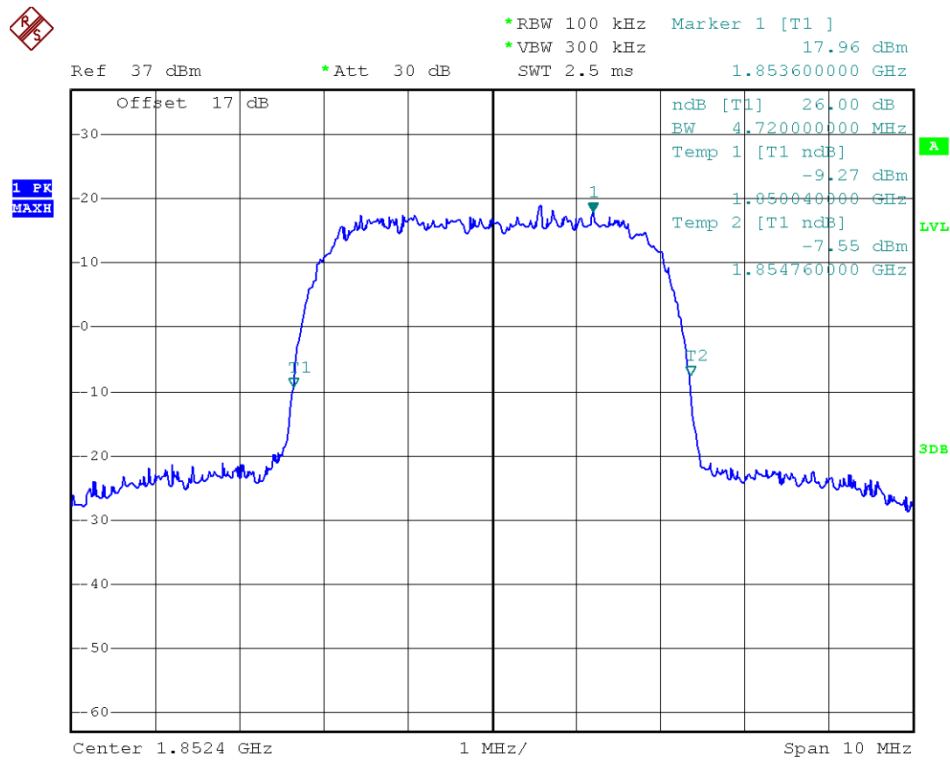
(Plot E4: WCDMA 850 MHz Channel = 4183)



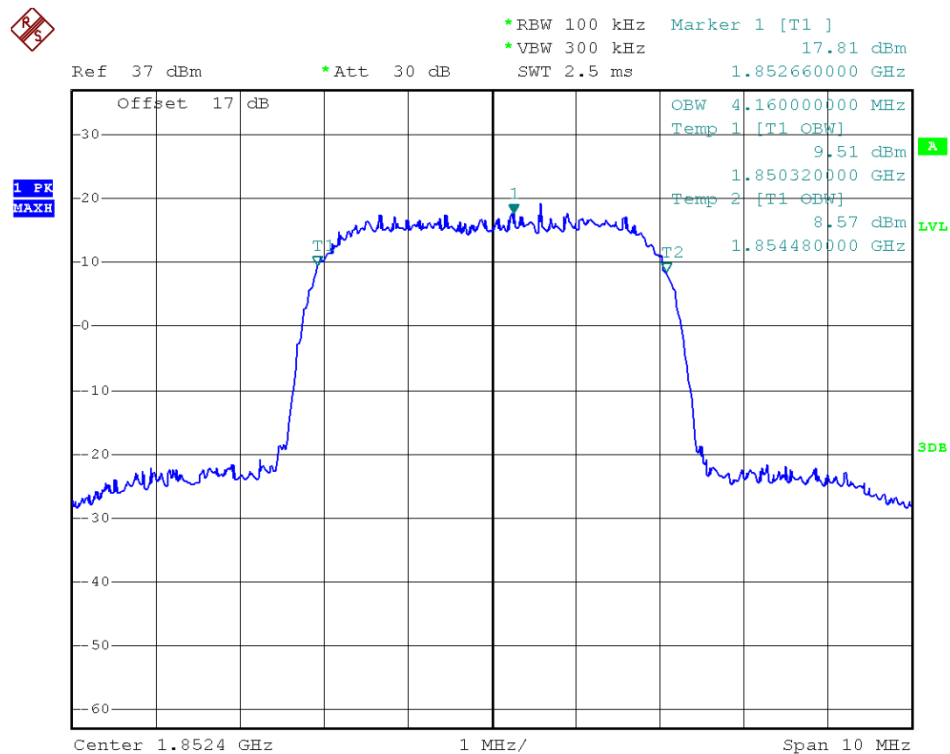
(Plot E5: WCDMA 850MHz Channel = 4233)



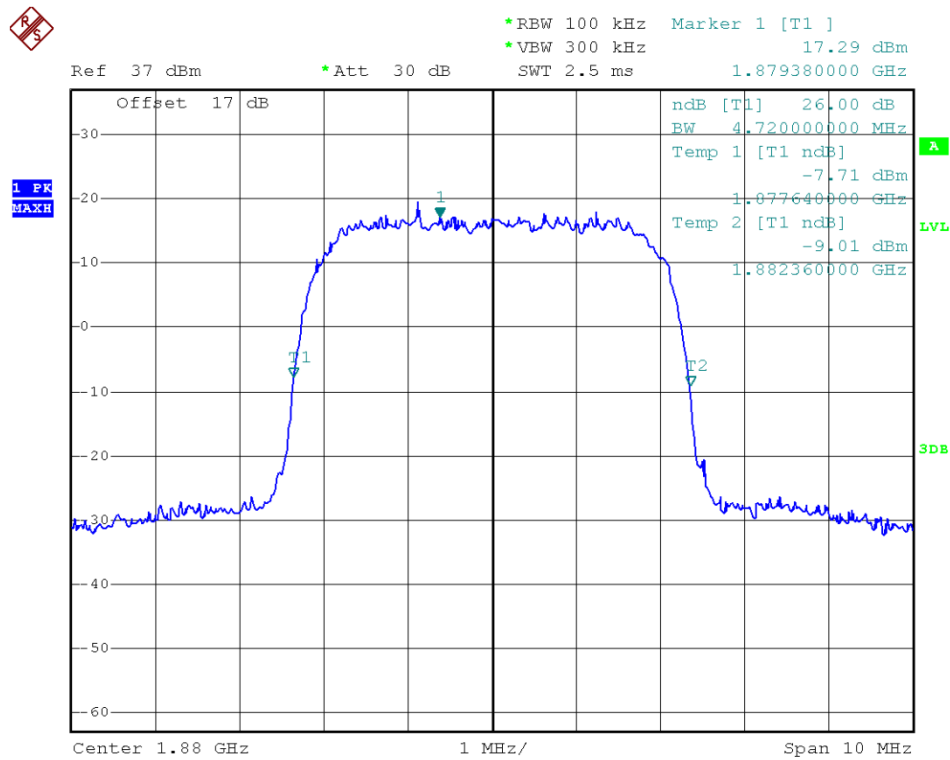
(Plot E6: WCDMA 850MHz Channel = 4233)



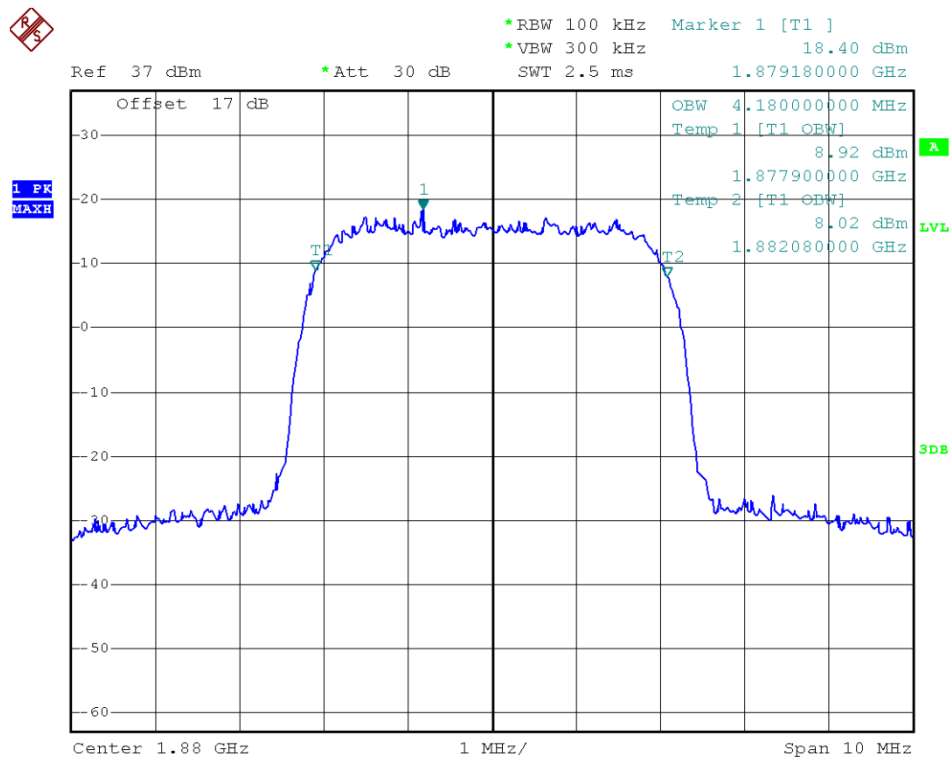
(Plot F1: WCDMA 1900MHz Channel = 9262)



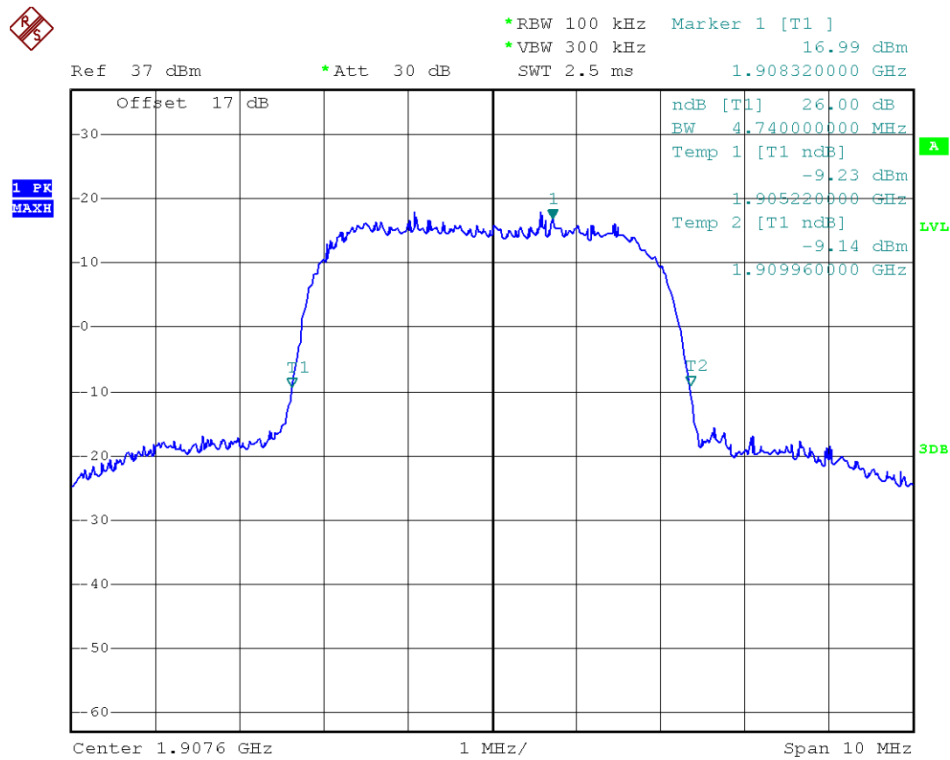
(Plot F2: WCDMA 1900MHz Channel = 9262)



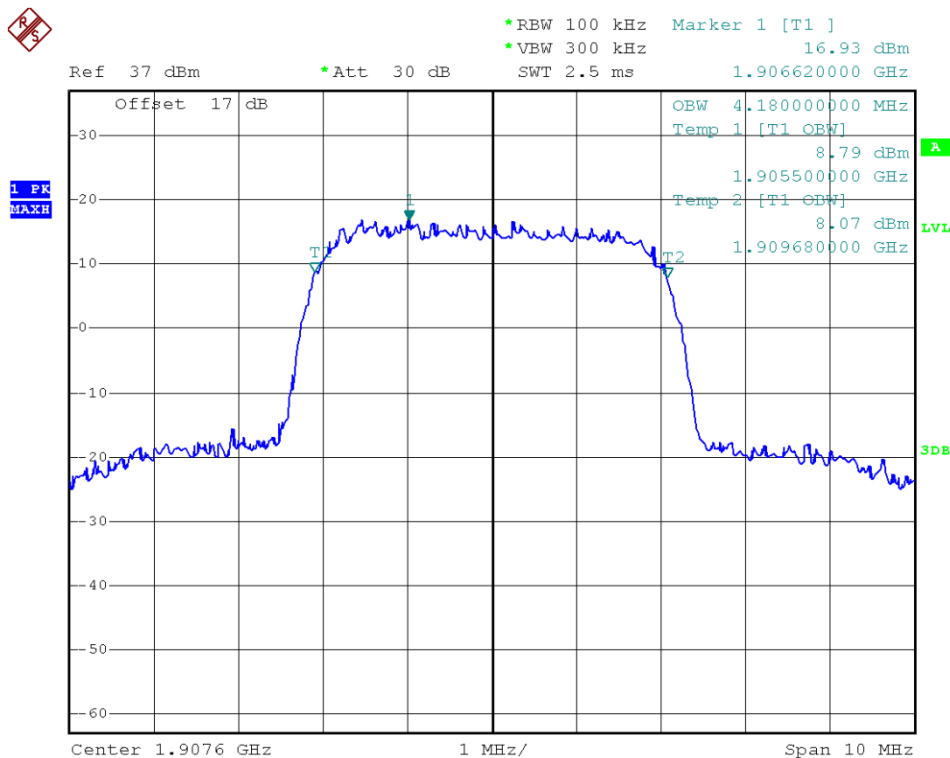
(Plot F3: WCDMA 1900 MHz Channel = 9400)



(Plot F4: WCDMA 1900 MHz Channel = 9400)



(Plot F5: WCDMA1900MHz Channel = 9538)



(Plot F6: WCDMA1900MHz Channel = 9538)

## 2.4 Frequency Stability

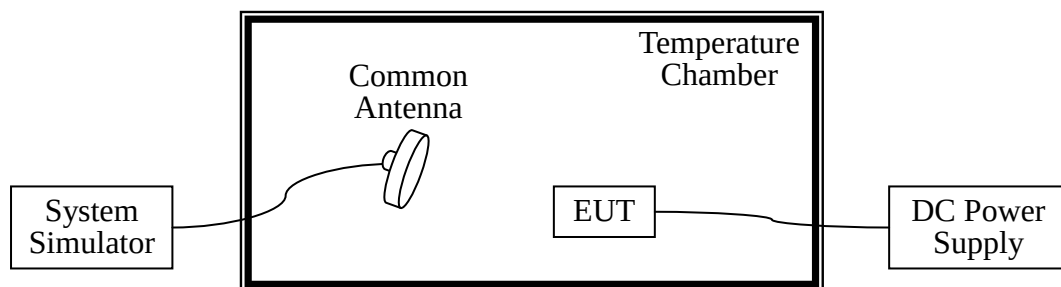
### 2.4.1 Requirement

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that the fundamental emission stays within the authorized frequency block. The frequency stability of the transmitter shall be maintained within  $\pm 0.00025\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

### 2.4.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.4.3 Test Setup



### 2.4.4 Test Procedures for Temperature Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was set up in the thermal chamber and connected with the system simulator.
3. With power OFF, the temperature was decreased to  $-30^{\circ}\text{C}$  and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
4. With power OFF, the temperature was raised in  $10^{\circ}\text{C}$  steps up to  $50^{\circ}\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

### 2.4.5 Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at  $25 \pm 5^{\circ}\text{C}$  and connected with the system simulator.
3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

## 2.4.6 Test Results

### 1. GSM 850MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 836.6MHz |                    |       |
|-----------------|---------------------|------------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                             | Frequency<br>Error | Limit |
|                 |                     | Hz                                             | ppm                | ppm   |
| 3.8             | -30                 | 15.30                                          | 0.02               | 2.5   |
|                 | -20                 | 37.67                                          | 0.05               |       |
|                 | -10                 | -12.80                                         | 0.02               |       |
|                 | 0                   | 39.77                                          | 0.05               |       |
|                 | +10                 | 41.48                                          | 0.05               |       |
|                 | +20                 | 19.68                                          | 0.02               |       |
|                 | +30                 | -12.23                                         | 0.02               |       |
|                 | +40                 | 15.04                                          | 0.02               |       |
|                 | +50                 | 12.61                                          | 0.02               |       |
| 4.2             | +25                 | 22.18                                          | 0.03               |       |
| 3.6             | +25                 | 38.27                                          | 0.05               |       |

### 2. GSM 1900MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 1880MHz |                    |       |
|-----------------|---------------------|-----------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                            | Frequency<br>Error | Limit |
|                 |                     | Hz                                            | ppm                | ppm   |
| 3.8             | -30                 | -15.19                                        | 0.01               | 2.5   |
|                 | -20                 | 19.00                                         | 0.01               |       |
|                 | -10                 | 38.22                                         | 0.02               |       |
|                 | 0                   | 25.23                                         | 0.01               |       |
|                 | +10                 | -11.45                                        | 0.01               |       |
|                 | +20                 | 16.94                                         | 0.01               |       |
|                 | +30                 | 21.13                                         | 0.01               |       |
|                 | +40                 | 41.23                                         | 0.02               |       |
|                 | +50                 | -25.19                                        | 0.01               |       |
| 4.2             | +25                 | 49.00                                         | 0.03               |       |
| 3.6             | +25                 | 48.22                                         | 0.03               |       |

### 3. EDGE 850MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 836.6MHz |                    |       |
|-----------------|---------------------|------------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                             | Frequency<br>Error | Limit |
|                 |                     | Hz                                             | ppm                | ppm   |
| 3.8             | -30                 | 26.32                                          | 0.03               | 2.5   |
|                 | -20                 | 39.22                                          | 0.05               |       |
|                 | -10                 | 10.87                                          | 0.01               |       |
|                 | 0                   | 34.76                                          | 0.04               |       |
|                 | +10                 | 41.21                                          | 0.05               |       |
|                 | +20                 | 43.40                                          | 0.05               |       |
|                 | +30                 | 33.93                                          | 0.04               |       |
|                 | +40                 | 16.43                                          | 0.02               |       |
|                 | +50                 | 10.68                                          | 0.01               |       |
| 4.2             | +25                 | 25.06                                          | 0.03               | 2.5   |
| 3.6             | +25                 | 34.97                                          | 0.04               |       |

### 4. EDGE 1900MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 1880MHz |                    |       |
|-----------------|---------------------|-----------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                            | Frequency<br>Error | Limit |
|                 |                     | Hz                                            | ppm                | ppm   |
| 3.8             | -30                 | 39.43                                         | 0.02               | 2.5   |
|                 | -20                 | 39.04                                         | 0.02               |       |
|                 | -10                 | 37.00                                         | 0.02               |       |
|                 | 0                   | 17.81                                         | 0.01               |       |
|                 | +10                 | 42.53                                         | 0.02               |       |
|                 | +20                 | 38.33                                         | 0.02               |       |
|                 | +30                 | 19.75                                         | 0.01               |       |
|                 | +40                 | 32.86                                         | 0.02               |       |
|                 | +50                 | 14.44                                         | 0.01               |       |
| 4.2             | +25                 | 52.20                                         | 0.03               | 2.5   |
| 3.6             | +25                 | 53.04                                         | 0.03               |       |

## 5. WCDMA 850MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 835MHz |                    |       |
|-----------------|---------------------|----------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                           | Frequency<br>Error | Limit |
|                 |                     | Hz                                           | ppm                | ppm   |
| 3.8             | -30                 | 27.18                                        | 0.03               | 2.5   |
|                 | -20                 | 30.07                                        | 0.03               |       |
|                 | -10                 | 15.48                                        | 0.02               |       |
|                 | 0                   | -11.82                                       | 0.01               |       |
|                 | +10                 | 19.02                                        | 0.02               |       |
|                 | +20                 | 44.78                                        | 0.05               |       |
|                 | +30                 | 21.99                                        | 0.03               |       |
|                 | +40                 | 17.67                                        | 0.02               |       |
|                 | +50                 | -19.44                                       | 0.02               |       |
| 4.2             | +25                 | -16.76                                       | 0.02               |       |
| 3.6             | +25                 | 14.09                                        | 0.02               |       |

## 6. WCDMA 1900MHz Band

| Test Conditions |                     | Frequency Deviation<br>Middle Channel 1880MHz |                    |       |
|-----------------|---------------------|-----------------------------------------------|--------------------|-------|
| Power<br>(VDC)  | Temperature<br>(°C) | Frequency<br>Error                            | Frequency<br>Error | Limit |
|                 |                     | Hz                                            | ppm                | ppm   |
| 3.8             | -30                 | 21.12                                         | 0.01               | 2.5   |
|                 | -20                 | 18.81                                         | 0.01               |       |
|                 | -10                 | 22.21                                         | 0.01               |       |
|                 | 0                   | 47.37                                         | 0.03               |       |
|                 | +10                 | 14.85                                         | 0.01               |       |
|                 | +20                 | 33.63                                         | 0.02               |       |
|                 | +30                 | 38.27                                         | 0.02               |       |
|                 | +40                 | 57.38                                         | 0.03               |       |
|                 | +50                 | 21.22                                         | 0.01               |       |
| 4.2             | +25                 | 50.98                                         | 0.03               |       |
| 3.6             | +25                 | 10.95                                         | 0.01               |       |

## 2.5 Conducted Out of Band Emissions

### 2.5.1 Requirement

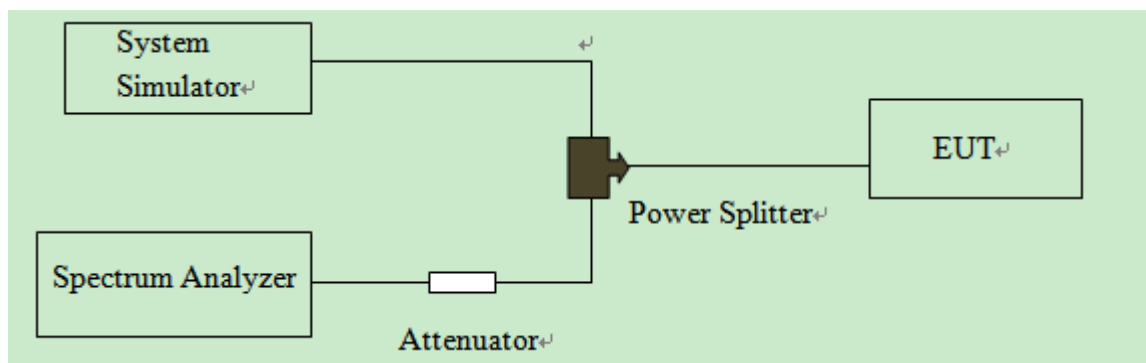
The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

It is measured by means of a calibrated spectrum analyzer and scanned from 30 MHz up to a frequency including its 10th harmonic.

### 2.5.2 Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

### 2.5.3 Test Setup



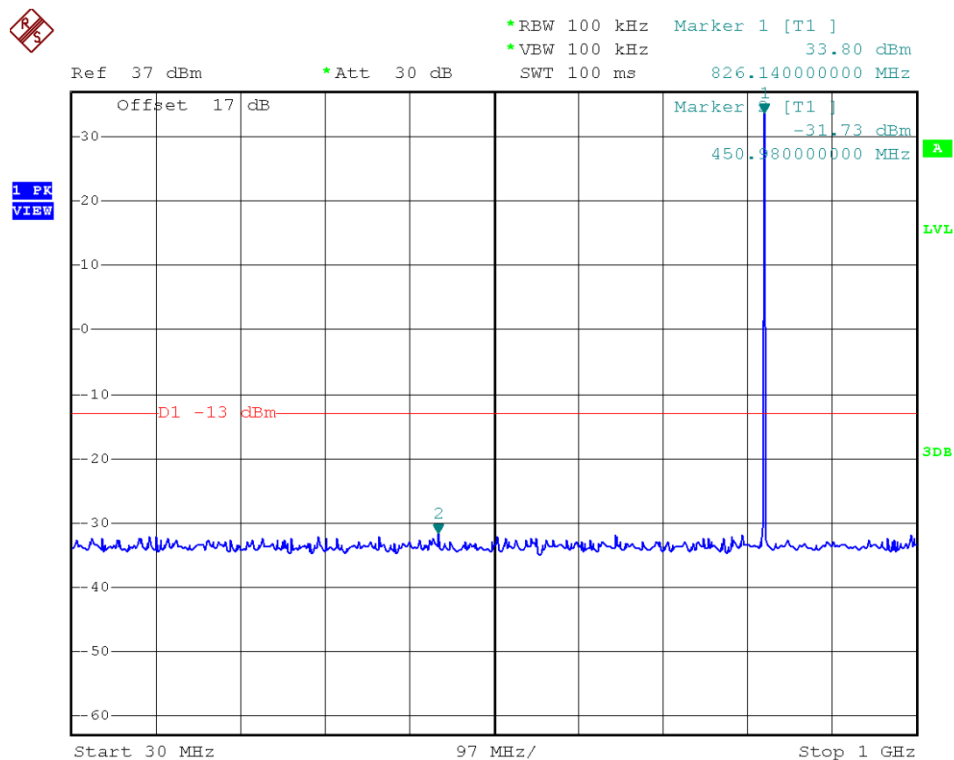
### 2.5.4 Test Procedures

1. The testing follows FCC KDB 971168 v02r02 Section 6.0.
2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator.  
The path loss was compensated to the results for each measurement.
4. The middle channel for the highest RF power within the transmitting frequency was measured.
5. The conducted spurious emission for the whole frequency range was taken.
6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
7. The limit line is derived from  $43 + 10 \log(P)$  dB below the transmitter power P(Watts)
 
$$= P(W) - [43 + 10 \log(P)] \text{ (dB)}$$

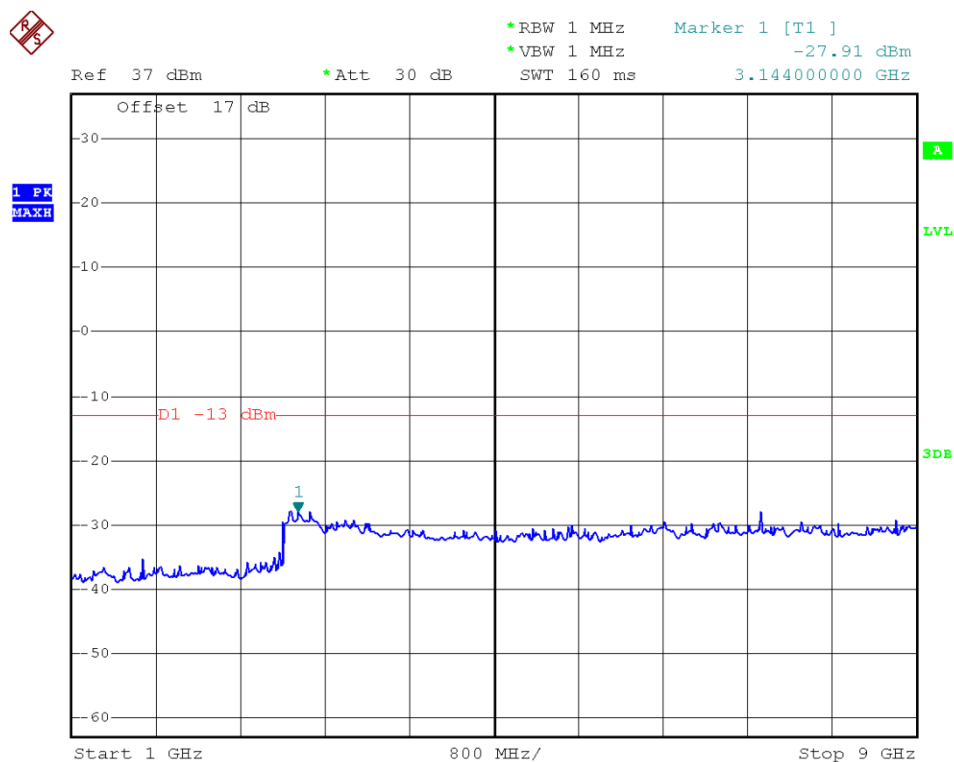
$$= [30 + 10 \log(P)] \text{ (dBm)} - [43 + 10 \log(P)] \text{ (dB)}$$

$$= -13 \text{ dBm.}$$

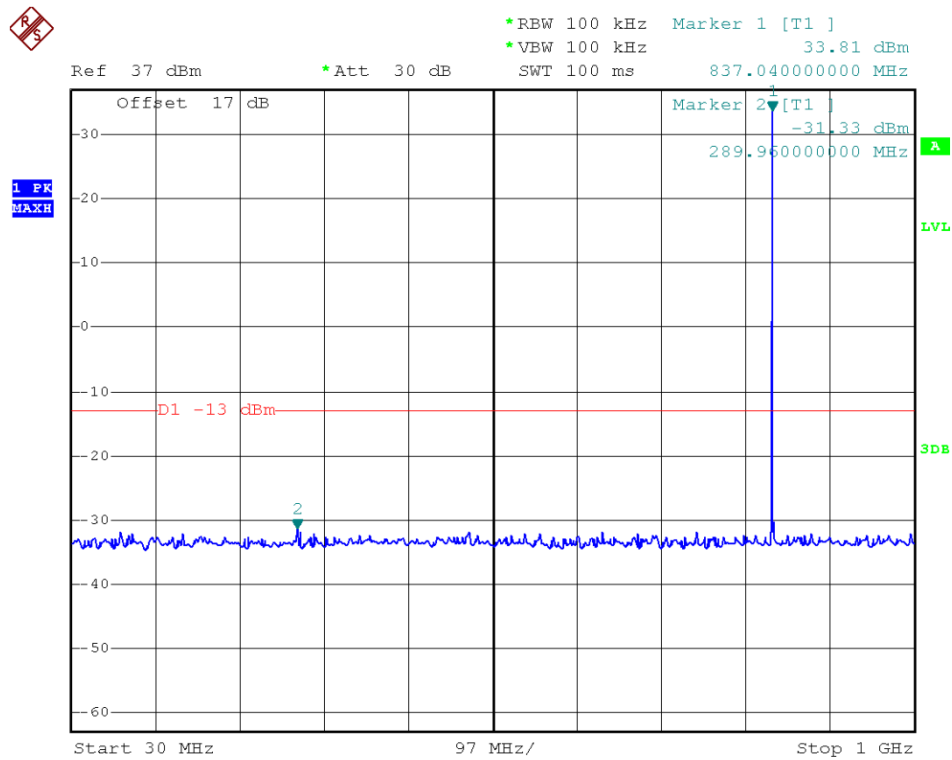
## 2.5.5 Test Result



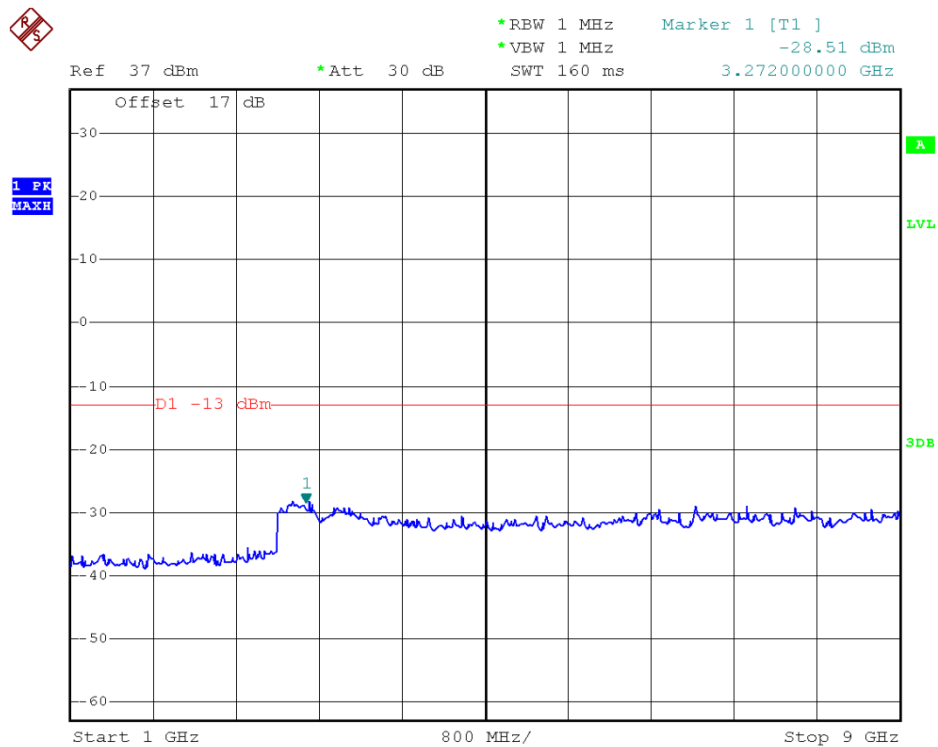
GSM 850MHz Channel = 128, 30MHz to 1GHz



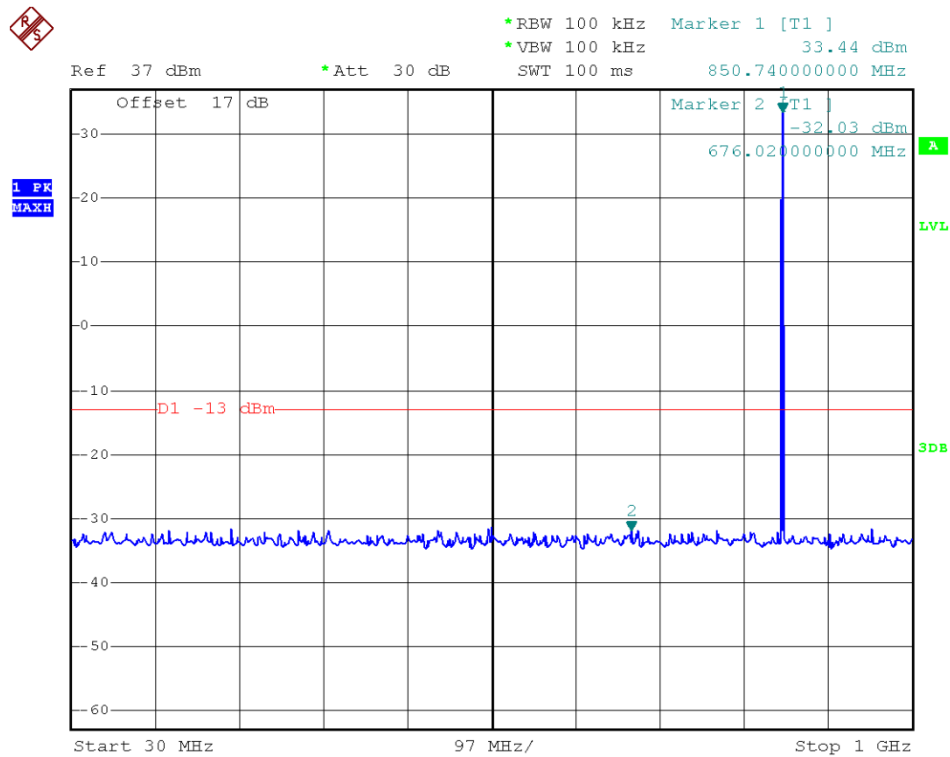
GSM 850MHz Channel = 128, 1GHz to 9GHz



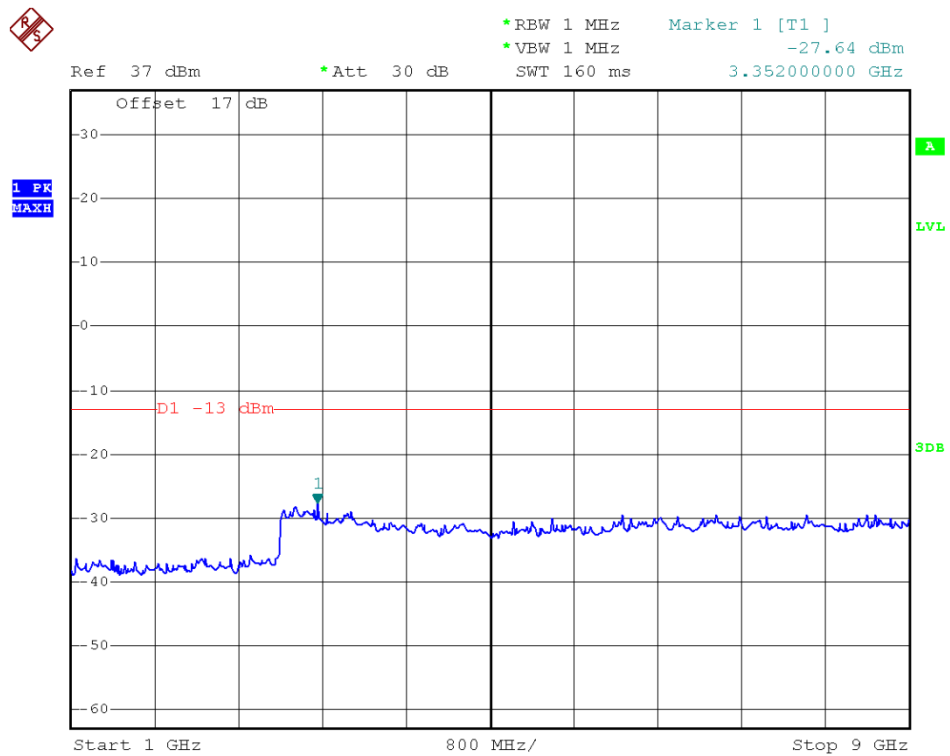
GSM 850MHz Channel = 190, 30MHz to 1GHz



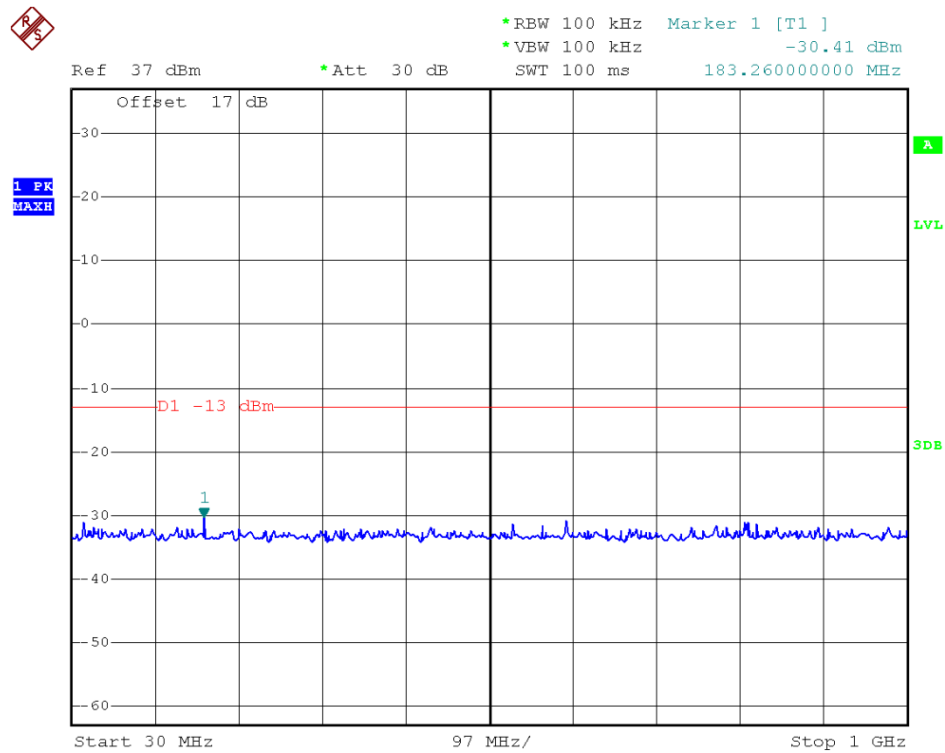
GSM 850MHz Channel = 190, 1GHz to 9GHz



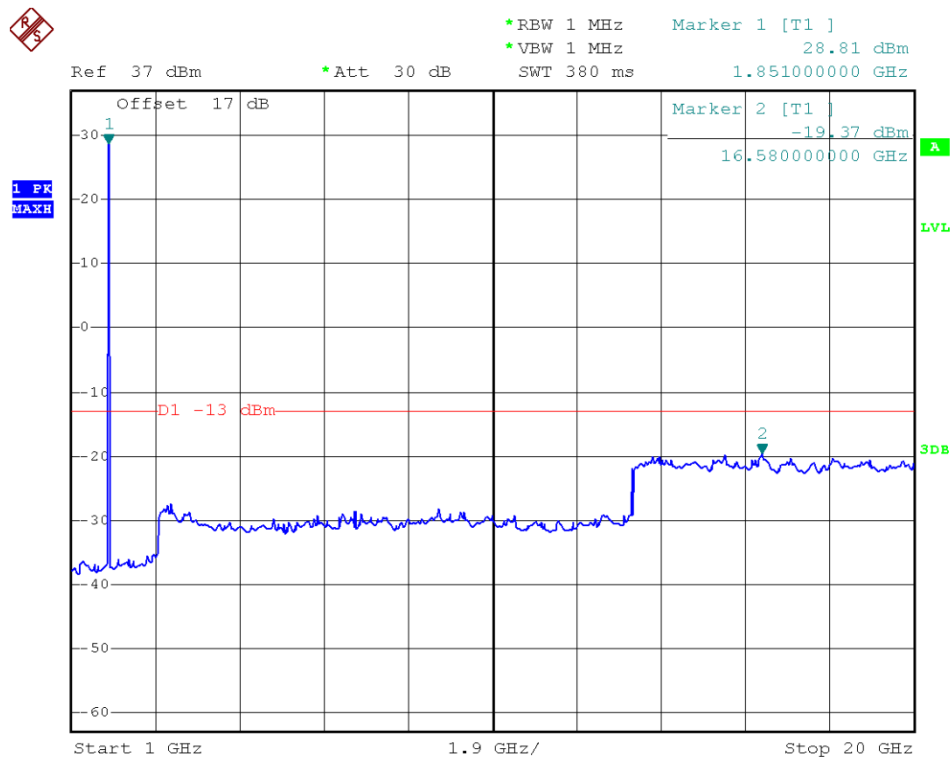
GSM 850MHz Channel = 251, 30MHz to 1GHz



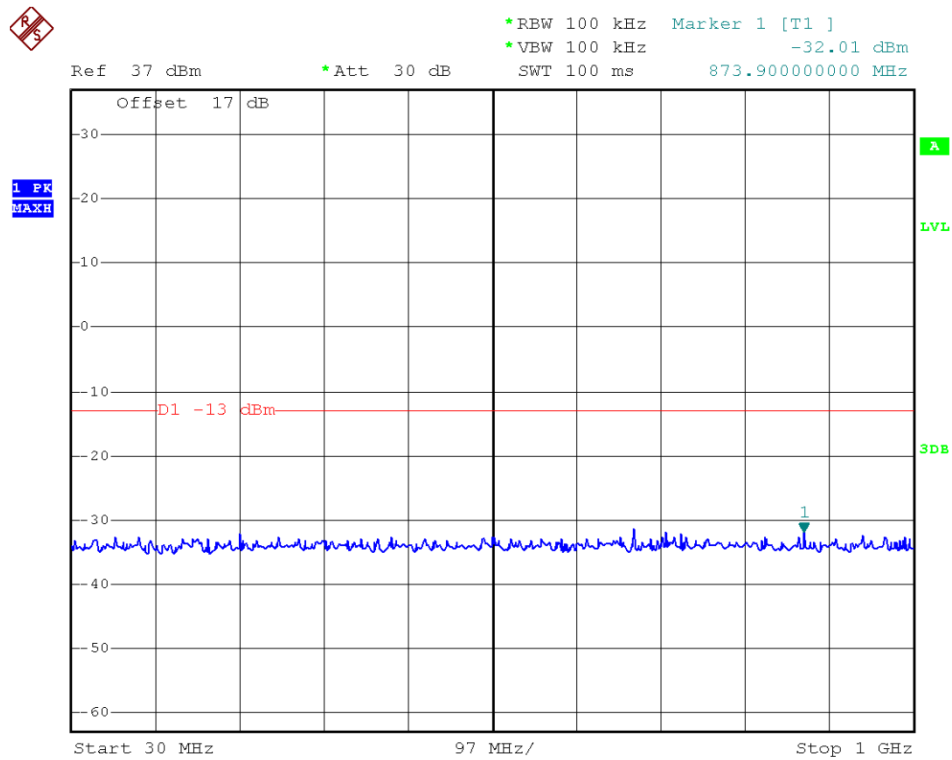
GSM 850MHz Channel = 251, 1GHz to 9GHz



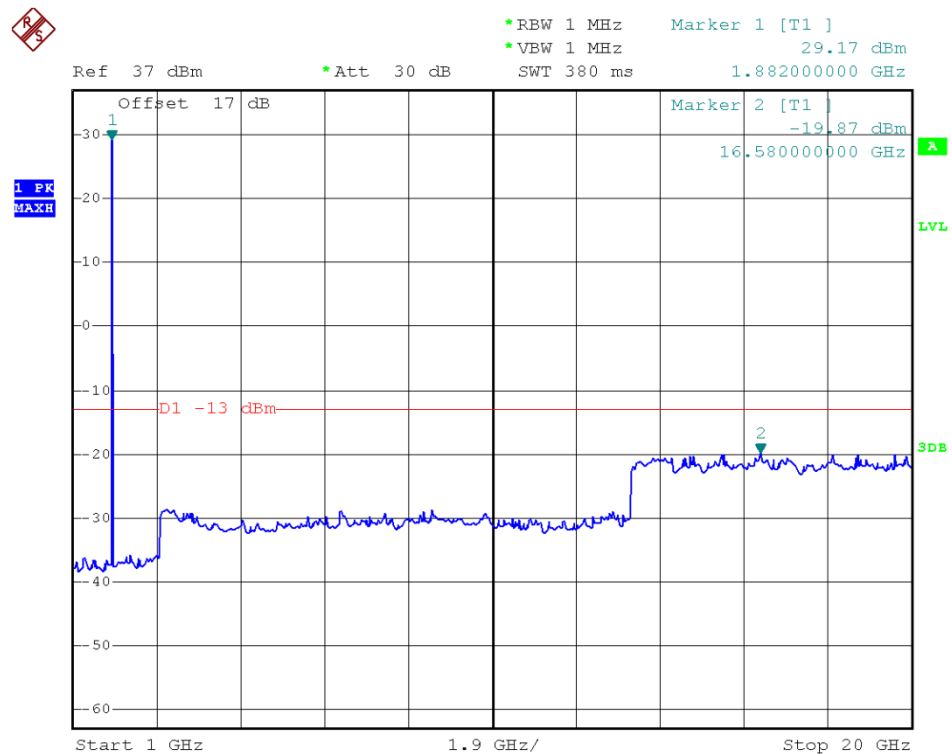
GSM 1900MHz Channel = 512, 30MHz to 1GHz



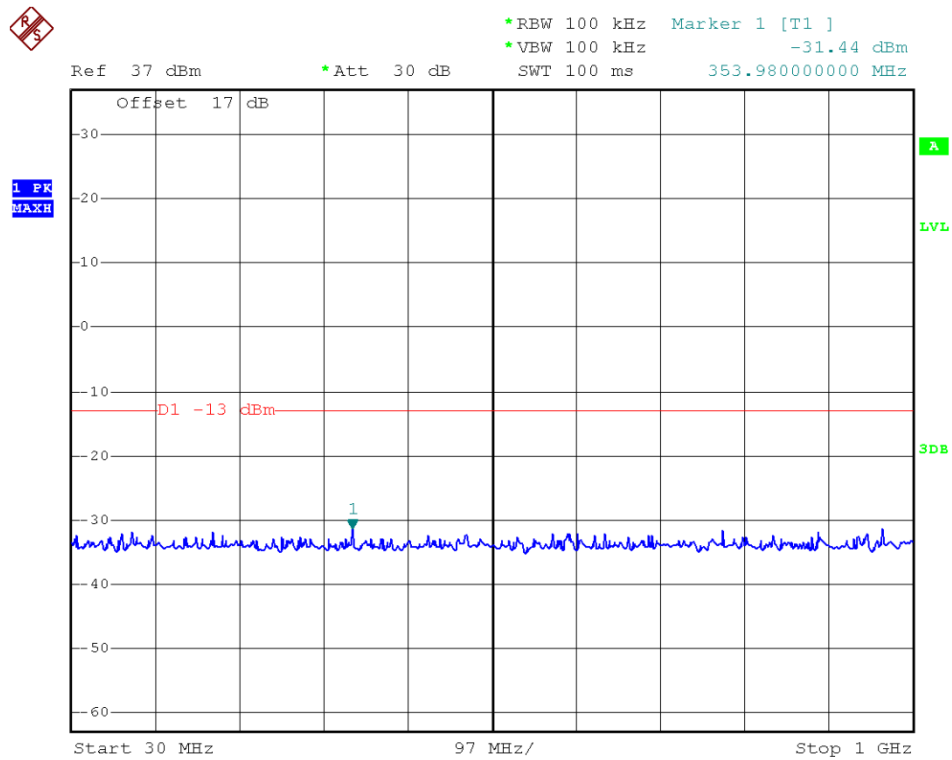
GSM 1900MHz Channel = 512, 1GHz to 20GHz



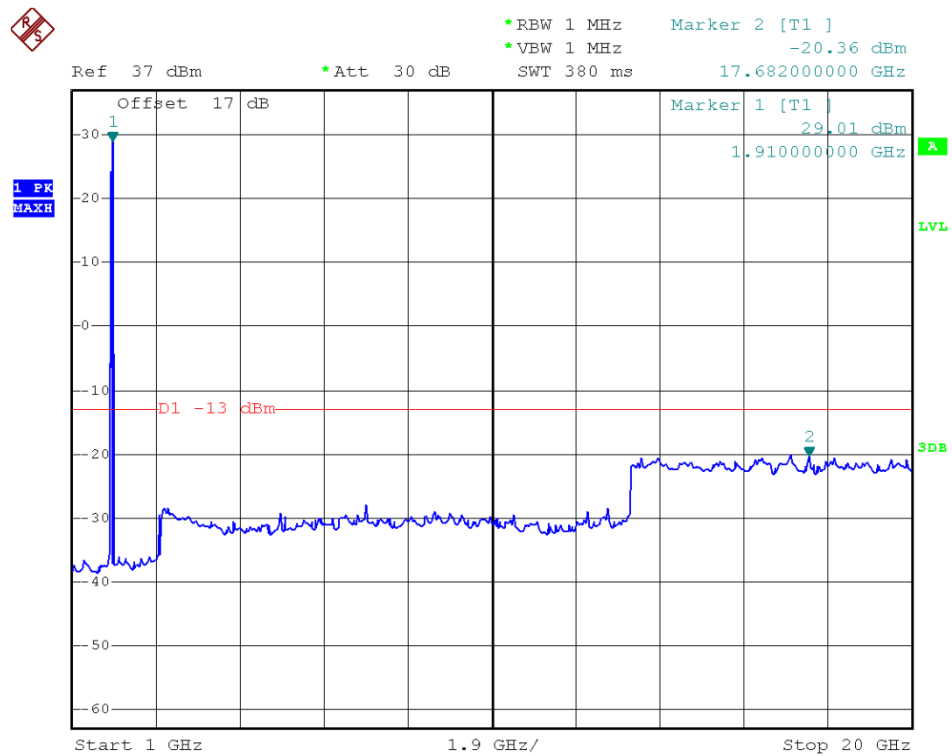
GSM 1900MHz Channel = 661, 30MHz to 1GHz



GSM 1900MHz Channel = 661, 1GHz to 20GHz



GSM 1900MHz Channel = 810, 30MHz to 1GHz



GSM 1900MHz Channel = 810, 1GHz to 20GHz