



*Full*

# TEST REPORT

**No. I18D00082-SRD04**

*For*

**Client : Shanghai Sunmi Technology Co.,Ltd.**

**Production : Smart POS system**

**Model Name : W6900**

**FCC ID : 2AH25W6900**

**Hardware Version: V1.1**

**Software Version: B0451\_C1BOM\_SMT\_V1.0.1\_20171225**

**Issued date: 2018-06-06**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of ECIT Shanghai.

**Test Laboratory:**

ECIT Shanghai, East China Institute of Telecommunications

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**Revision Version**

| Report Number   | Revision | Date       | Memo                            |
|-----------------|----------|------------|---------------------------------|
| I18D00082-SRD04 | 00       | 2018-06-06 | Initial creation of test report |

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## 1. Test Laboratory

### 1.1. Testing Location

|               |   |
|---------------|---|
| Company Name: | ECIT Shanghai, East China Institute of Telecommunications                         |
| Address:      | 7-8F, G Area, No. 668, Beijing East Road, Huangpu District, Shanghai, P. R. China |
| Postal Code:  | 200001  |
| Telephone:    | (+86)-021-63843300  |
| Fax:          | (+86)-021-63843301  |

### 1.2. Testing Environment

|                      |          |
|----------------------|----------|
| Normal Temperature:  | 15-35℃   |
| Extreme Temperature: | -10/+55℃ |
| Relative Humidity:   | 20-75%   |

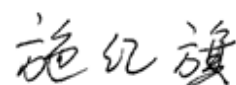
### 1.3. Project data

|                     |            |
|---------------------|------------|
| Project Leader:     | Yu Anlu    |
| Testing Start Date: | 2018-05-10 |
| Testing End Date:   | 2018-05-14 |


### 1.4. Signature



Yang Dejun  
(Prepared this test report)



Shi Hongqi  
(Reviewed this test report)



Zheng Zhongbin  
Director of the laboratory  
(Approved this test report)

## 2. Client Information

### 2.1. Applicant Information

Company Name: Shanghai Sunmi Technology Co.,Ltd.  
Address: Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai,  
China  
Postcode: 200433  
Telephone: 18721763396

### 2.2. Manufacturer Information

Company Name: Shanghai Sunmi Technology Co.,Ltd.  
Address: Room 505, KIC Plaza, No.388 Song Hu Road, Yang Pu District, Shanghai,  
China  
Postcode: 200433  
Telephone: 18721763396

### 3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

#### 3.1. About EUT

|                      |   |
|----------------------|---|
| EUT Description      | Smart POS system                                |
| Model name           | W6900   |
| FCC ID               | 2AH25W6900                                      |
| Frequency            | GSM850/900/1800/1900;<br>WCDMA Band I/II/V/VIII |
| Extreme Temperature  | -10/+55℃  |
| Nominal Voltage      | 3.8V  |
| Extreme High Voltage | 4.2V  |
| Extreme Low Voltage  | 3.5V  |

Note: Photographs of EUT are shown in ANNEX A of this test report.

#### 3.2. Internal Identification of EUT used during the test

| EUT ID* | Model Name | SN or IMEI | HW Version | SW Version                                  | Date of receipt |
|---------|------------|------------|------------|---|-----------------|
| N03     | W6900      | N/A        | V1.1       | B0451_C1B<br>OM_SMT_V<br>1.0.1_20171<br>225 | 2018-05-07      |
| N04     | W6900      | N/A        | V1.1       | B0451_C1B<br>OM_SMT_V<br>1.0.1_20171<br>225 | 2018-05-07      |

\*EUT ID: is used to identify the test sample in the lab internally.

#### 3.3. Internal Identification of AE used during the test

| AE ID* | Description   | SN  |
|--------|---------------|-----|
| AE1    | RF cable      | --- |
| AE2    | Dummy Battery | --- |

\*AE ID: is used to identify the test sample in the lab internally.

#### 3.4. Statements

The W6900, supporting GPRS/EDGE/WCDMA/CDMA/LTE/BT/BLE/WLAN/NFC, manufactured by Shanghai Sunmi Technology Co.,Ltd., which is a new product for testing.

ECIT has verified that the compliance of the tested device specified in section 5 of this test report is successfully evaluated according to the procedure and test methods as defined in type certification requirement listed in section 5 of this test report.

## 4. Reference Documents

### 4.1. Reference Documents for testing

The following documents listed in this section are referred for testing.

| Reference      | Title  | Version |
|----------------|--|---------|
| FCC Part 24    | PERSONAL COMMUNICATIONS SERVICES   | 2014    |
| FCC Part 22    | PUBLIC MOBILE SERVICES   | 2014    |
| ANSI-TIA-603-E | Land Mobile FM or PM Communications Equipment<br>Measurement and Performance Standards   | 2016    |
| ANSI C63.4     | Methods of Measurement of Radio-Noise Emissions from<br>Low-Voltage Electrical and Electronic Equipment in the<br>Range of 9 kHz to 40 GHz | 2014    |



**5. SUMMARY OF TEST RESULTS**

| Item | Test items                     | FCC rules                          | result |
|------|--------------------------------|------------------------------------|--------|
| 1    | Output Power                   | 2.1046/22.913(a)/24.232(c)         | Pass   |
| 2    | Peak-to-Average Ratio          | 24.232(d)                          | Pass   |
| 3    | 99%Occupied Bandwidth          | 2.1049(h)(i)/ 22.917(b)            | Pass   |
| 4    | -26dB Emission Bandwidth       | 22.917(b)/§24.238(b)               | Pass   |
| 5    | Band Edge at antenna terminals | 22.917(a)/24.238(a)                | Pass   |
| 6    | Frequency stability            | 2.1055/24.235                      | Pass   |
| 7    | Conducted Spurious mission     | 2.1053/22.917(a)/24.238(a)         | Pass   |
| 8    | Emission Limit                 | 2.1051/22.917/24.238/22.913/24.232 | Pass   |

## 6. Test Equipment Utilized

### Climate chamber

| No. | Equipment       | Model  | Serial Number | Manufacturer | Calibration date | Cal.interval |
|-----|-----------------|--------|---------------|--------------|------------------|--------------|
| 1   | Climate chamber | SH-641 | 92012011      | ESPEC        | 2017-12-25       | 2 Year       |

### Radiated emission test system

The test equipment and ancillaries used are as follows.

| No. | Equipment                            | Model    | Serial Number | Manufacturer | Calibration date | Cal.interval |
|-----|--------------------------------------|----------|---------------|--------------|------------------|--------------|
| 1   | Universal Radio Communication Tester | CMU200   | 123123        | R&S          | 2018-05-11       | 1 Year       |
| 2   | EMI Test Receiver                    | ESU40    | 100307        | R&S          | 2018-05-11       | 1 Year       |
| 3   | TRILOG Broadband Antenna             | VULB9163 | VULB9163-515  | Schwarzbeck  | 2017-02-25       | 3 Year       |
| 4   | Double-ridged Waveguide Antenna      | ETS-3117 | 00135890      | ETS          | 2017-01-11       | 3 Year       |
| 5   | 2-Line V-Network                     | ENV216   | 101380        | R&S          | 2018-05-11       | 1 Year       |
| 6   | Substitution Antenna                 | ETS-3117 | 00135890      | ETS          | 2017-01-11       | 3 Year       |
| 7   | RF Signal Generator                  | SMF100A  | 102314        | R&S          | 2018-05-11       | 1 Year       |
| 8   | Substitution Antenna                 | VUBA9117 | 9117-266      | Schwarzbeck  | 2017-11-18       | 3 Year       |
| 9   | Amplifier                            | SCU08    | 10146         | R&S          | 2018-05-11       | 1 Year       |

**Conducted test system**

| No. | Name                       | Type         | SN                   | Manufacture | Calibration date | Cal.interval |
|-----|----------------------------|--------------|----------------------|-------------|------------------|--------------|
| 1   | Spectrum Analyzer          | FSQ26        | 101096               | R&S         | 2018-05-11       | 1 Year       |
| 2   | Universal Radio Communicat | CMU200       | 123124               | R&S         | 2018-05-11       | 1 Year       |
| 3   | DC Power Supply            | ZUP60-1<br>4 | LOC-220Z006<br>-0007 | TDL-Lambda  | 2018-05-11       | 1 Year       |

## 7. Test Environment

**Shielding Room1** (6.0 meters×3.0 meters×2.7 meters) did not exceed following limits along the conducted RF performance testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 20 %, Max. = 75 %   |
| Shielding effectiveness  | > 100 dB                   |
| Ground system resistance | < 0.5 Ω                    |

**Control room** did not exceed following limits along the EMC testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. = 25 %, Max. = 75 %   |
| Shielding effectiveness  | > 100 dB                   |
| Electrical insulation    | > 10 kΩ                    |
| Ground system resistance | < 0.5 Ω                    |

**Fully-anechoic chamber1** (6.9 meters×10.9 meters×5.4 meters) did not exceed following limits along the EMC testing:

|                              |  |
|------------------------------|--|
| Temperature                  | Min. = 15 °C, Max. = 35 °C                 |
| Relative humidity            | Min. = 25 %, Max. = 75 %                   |
| Shielding effectiveness      | > 100 dB                                   |
| Electrical insulation        | > 10 kΩ                                    |
| Ground system resistance     | < 0.5 Ω                                    |
| VSWR                         | Between 0 and 6 dB, from 1GHz to 18GHz     |
| Site Attenuation Deviation   | Between -4 and 4 dB, 30MHz to 1GHz         |
| Uniformity of field strength | Between 0 and 6 dB, from 80MHz to 3000 MHz |

## **ANNEX A. MEASUREMENT RESULTS**

### **ANNEX A.1. OUTPUT POWER**

#### **A.1.1. Summary**

During the process of testing, the EUT was controlled Rhode & Schwarz Digital Radio. Communication tester (CMU-200) to ensure max power transmission and proper modulation. This result contains peak output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

#### **A.1.2. Conducted**

##### **A.1.2.1. Method of Measurements**

Method of measurements please refer to KDB971168 D01 v03 clause 5.

The EUT was set up for the max output power with pseudo random data modulation.

The power was measured with Rhode & Schwarz Spectrum Analyzer FSQ(peak).

These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

These measurements were done at 3 frequencies, 1852.4 MHz, 1880.0MHz and 1907.6MHz for WCDMA Band II; 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V. (bottom, middle and top of operational frequency range).

##### **A.1.2.2 Test procedures:**

1. The transmitter output port was connected to base station.
2. Set the EUT at maximum power through base station.
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.

##### **A.1.2.3 Limit:**

22.913(a) Mobile stations are limited to 7watts.

24.232(c) Mobile and portable stations are limited to 2 watts.

##### **A.1.2.4 Test Procedure:**

The transmitter output power was connected to calibrated attenuator, the other end of which was connected to signal analyzer. Transmitter output power was read off the power in dBm. The power outputs at the transmitter antenna port was determined by adding the value of attenuator to the signal analyzer reading.

##### **A.1.2.5 GSM Test Condition:**

| RBW | VBW | Sweep time | Span |
|-----|-----|------------|------|
|-----|-----|------------|------|

|      |      |       |       |
|------|------|-------|-------|
| 1MHz | 1MHz | 300ms | 10MHz |
|------|------|-------|-------|

## A.1.2.6 WCDMA Test Condition:

|       |       |            |       |
|-------|-------|------------|-------|
| RBW   | VBW   | Sweep time | Span  |
| 10MHz | 10MHz | 800ms      | 50MHz |

## A.1.2.7 Measurement results:

| GPRS 850 (GMSK 1 Slot) |  |                  |                |
|------------------------|--|------------------|----------------|
| Channel/fc(MHz)        |  | Peak power (dBm) | AV power (dBm) |
| Mid 189/836.4          |  | 32.77            | 32.63          |
| Low 128/824.2          |  | 32.95            | 32.81          |
| High 251/848.8         |  | 32.48            | 32.34          |
| EDGE 850 (8PSK 1 Slot) |  |                  |                |
| Channel/fc(MHz)        |  | Peak power (dBm) | AV power (dBm) |
| Mid 189/836.4          |  | 30.22            | 27.54          |
| Low 128/824.2          |  | 30.2             | 27.51          |
| High 251/848.8         |  | 30.12            | 27.41          |

| GPRS 1900 (GMSK 1 Slot) |  |                  |                |
|-------------------------|--|------------------|----------------|
| Channel/fc(MHz)         |  | Peak power (dBm) | AV power (dBm) |
| Mid 661/1880            |  | 28.09            | 27.87          |
| Low 512/1850.2          |  | 29.05            | 28.85          |
| High 810/1909.8         |  | 28.15            | 27.98          |
| EDGE 1900 (8PSK 1 Slot) |  |                  |                |
| Channel/fc(MHz)         |  | Peak power (dBm) | AV power (dBm) |
| Mid 661/1880            |  | 26.01            | 23.32          |
| Low 512/1850.2          |  | 25.88            | 23.16          |
| High 810/1909.8         |  | 27.4             | 24.73          |

| WCDMA II         |                  |                 |
|------------------|------------------|-----------------|
| Channel/fc(MHz)  | Peak power (dBm) | AV power (dBm)  |
| Mid 9400 /1880   | 24.22            | 21.44           |
| Low 9262/1852.4  | 24.34            | 21.53           |
| High 9538/1907.6 | 24.15            | 21.4            |
| WCDMA BAND IV    |                  |                 |
| Channel/fc(MHz)  | Peak power (dBm) | AV power (dBm)  |
| Mid 1413 /1732.6 | 24.93            | 22.14           |
| Low 1312/1712.4  | 24.85            | 22.31           |
| High 1513/1752.6 | 24.94            | 22.52           |
| WCDMA BAND V     |                  |                 |
| Channel/fc(MHz)  | Channel/fc(MHz)  | Channel/fc(MHz) |
| Mid 4183/836.6   | 25.22            | 22.28           |
| Low 4132/826.4   | 25.49            | 22.49           |
| High 4233/846.6  | 25.47            | 22.43           |

**Conclusion: PASS**

## **ANNEX A.2. Peak-to-Average Power Ratio**

Method of test measurements please refer to KDB971168 D01 v03 clause 5.7.

### **A.2.1 PAPR Limit**

The peak-to-average power ratio (PAPR) of the transmission may not exceed 13dB

### **A.2.2 Test procedures**

1. The EUT was connected to the spectrum analyzer and system simulator via a power divider.
2.
  - 1) Select the spectrum analyzer CCDF function.
  - 2) Set RBW  $\geq$  signal's occupied bandwidth.
  - 3) Set the number of counts to a value that stabilizes the measured CCDF curve;
  - 4) Sweep time  $\geq$  1s.
3. Record the maximum PAPR level associated with a probability of 0.1%.

### **A.2.3 Test results:**

| <b>GPRS850</b>  |       |       |       |
|-----------------|-------|-------|-------|
| Channel         | 128   | 189   | 251   |
| Frequency (MHz) | 824.2 | 836.4 | 848.8 |
| PAPR(dB)        | 8.53  | 11.47 | 8.53  |
| <b>EDGE850</b>  |       |       |       |
| Channel         | 128   | 189   | 251   |
| Frequency (MHz) | 824.2 | 836.4 | 848.8 |
| PAPR(dB)        | 8.43  | 10.71 | 8.53  |

| <b>GPRS1900</b> |        |       |        |
|-----------------|--------|-------|--------|
| Channel         | 512    | 661   | 810    |
| Frequency (MHz) | 1850.2 | 1880  | 1909.8 |
| PAPR(dB)        | 8.46   | 8.4   | 8.3    |
| <b>EDGE1900</b> |        |       |        |
| Channel         | 128    | 189   | 251    |
| Frequency (MHz) | 824.2  | 836.4 | 848.8  |
| PAPR(dB)        | 8.55   | 8.54  | 8.41   |

| <b>WCDMA Band II</b> |        |        |        |
|----------------------|--------|--------|--------|
| Channel              | 9262   | 9400   | 9538   |
| Frequency (MHz)      | 1852.4 | 1880   | 1907.6 |
| PAPR(dB)             | 2.72   | 2.66   | 2.72   |
| <b>WCDMA Band IV</b> |        |        |        |
| Channel              | 1312   | 1413   | 1513   |
| Frequency (MHz)      | 1712.4 | 1732.6 | 1752.6 |
| PAPR(dB)             | 2.85   | 2.85   | 2.95   |



| WCDMA Band V    |       |       |       |
|-----------------|-------|-------|-------|
| Channel         | 4132  | 4183  | 4233  |
| Frequency (MHz) | 826.4 | 836.4 | 846.6 |
| PAPR(dB)        | 2.98  | 3.69  | 2.95  |

**Conclusion: PASS**

### **ANNEX A.3. Occupied Bandwidth**

Method of test please refer to KDB971168 D01 v03 clause 4.0.

#### **A.3.1. Occupied Bandwidth**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

#### **A.3.2 Test Procedure:**

1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW  $\geq$  3 times RBW,.
3. 99% bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

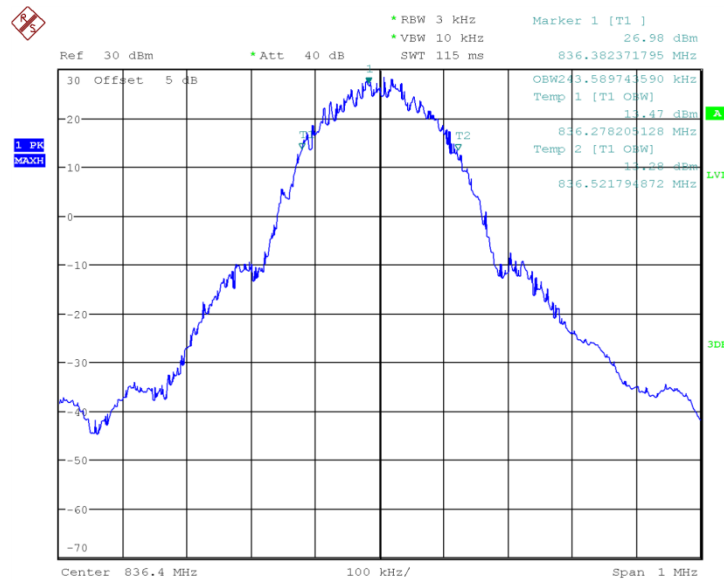
#### **A.3.3 Test result:**

| GPRS850      |                 |                             |
|--------------|-----------------|-----------------------------|
| Test channel | Frequency (MHz) | 99% Occupied Bandwidth(KHz) |
| Mid 189      | 836.4           | 243.59                      |
| Low 128      | 824.2           | 245.192                     |
| High 251     | 848.8           | 245.192                     |
| EDGE850      |                 |                             |
| Test channel | Frequency (MHz) | 99% Occupied Bandwidth(KHz) |
| Mid 189      | 836.4           | 256.41                      |

|          |       |         |
|----------|-------|---------|
| Low 128  | 824.2 | 259.615 |
| High 251 | 848.8 | 258.013 |

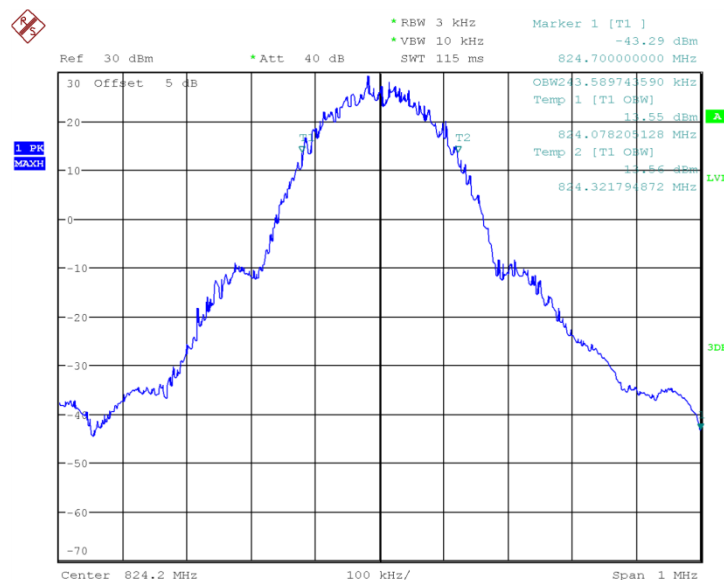
**Conclusion: PASS**

## GPRS 850



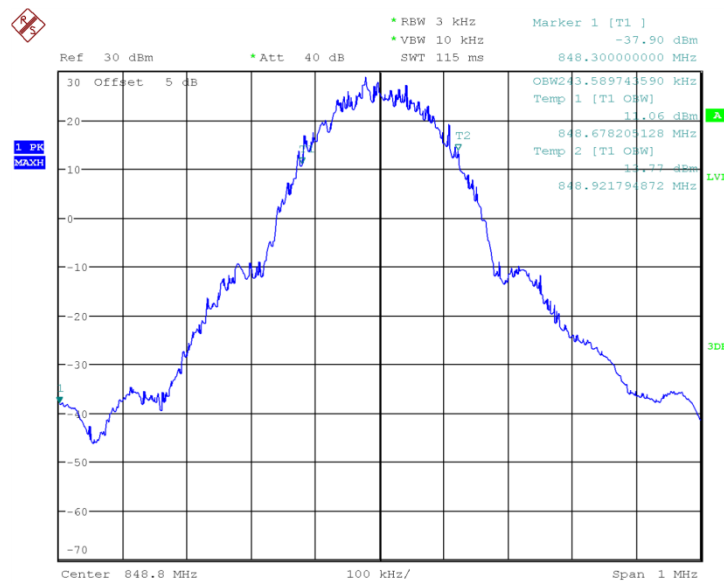
Date: 14.MAY.2018 05:05:35

## Channel 189-Occupied Bandwidth (99%)



Date: 14.MAY.2018 05:06:22

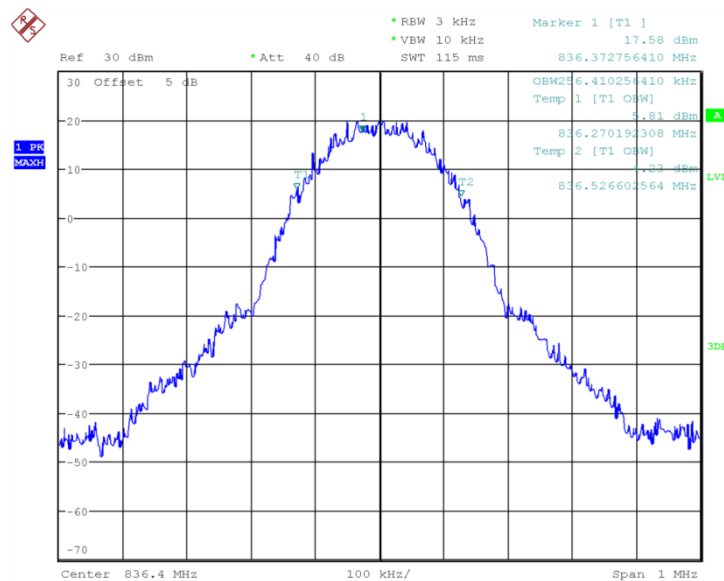
## Channel 128-Occupied Bandwidth (99%)



Date: 14.MAY.2018 05:07:10

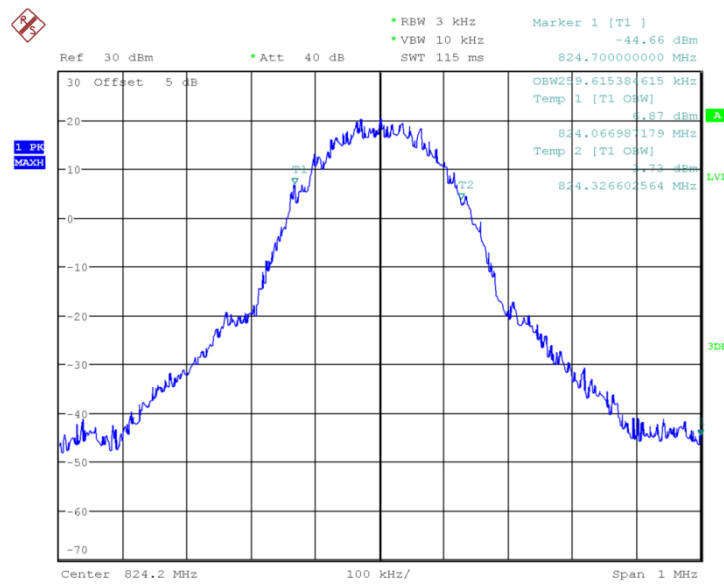
## Channel 251-Occupied Bandwidth (99%)

EDGE 850



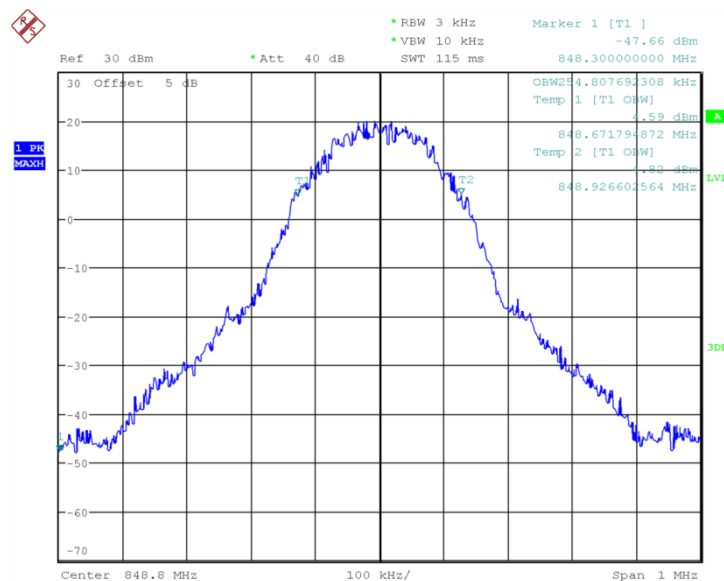
Date: 14.MAY.2018 05:10:04

## Channel 189-Occupied Bandwidth (99%)



Date: 14.MAY.2018 05:10:52

## Channel 128-Occupied Bandwidth (99%)



Date: 14.MAY.2018 05:11:39

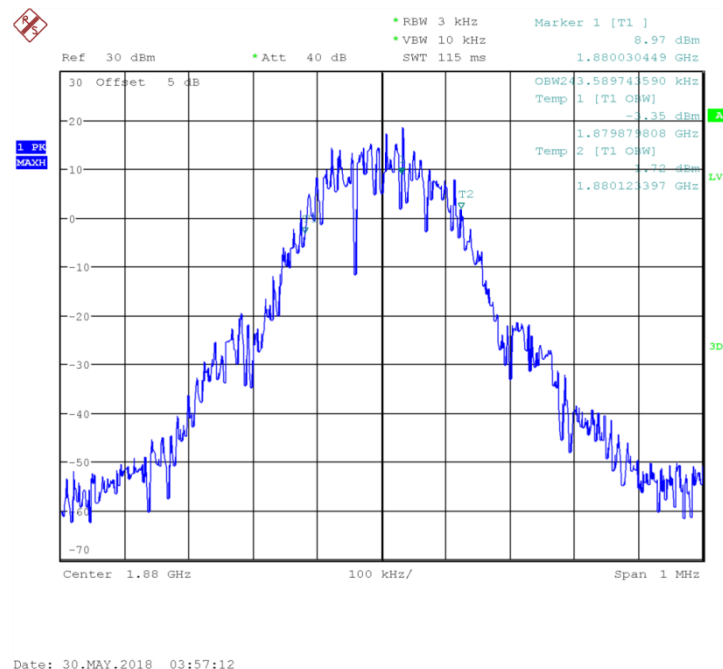
## Channel 251-Occupied Bandwidth (99%)

| GPRS1900     |                 |                             |
|--------------|-----------------|-----------------------------|
| Test channel | Frequency (MHz) | 99% Occupied Bandwidth(KHz) |
| Mid 661      | 1880            | 221.154                     |
| Low 512      | 1850.2          | 246.795                     |

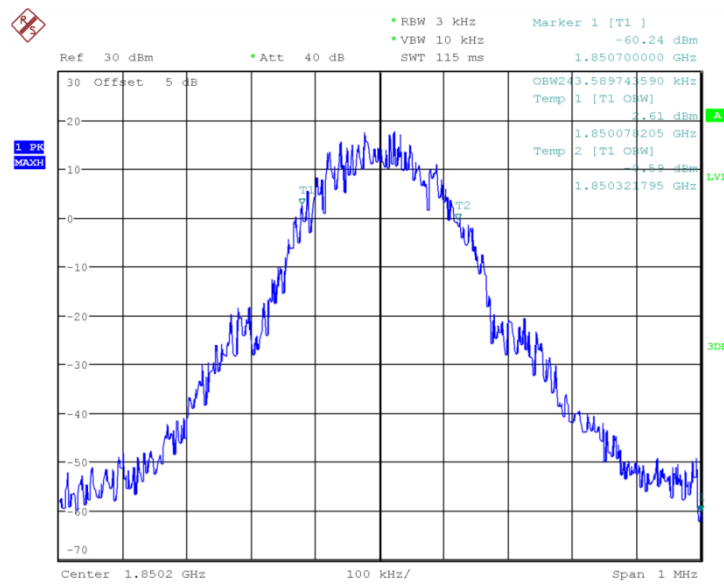
|              |                 |                             |
|--------------|-----------------|-----------------------------|
| High 810     | 1909.8          | 243.59                      |
| EDGE1900     |                 |                             |
| Test channel | Frequency (MHz) | 99% Occupied Bandwidth(KHz) |
| Mid 661      | 1880            | 243.59                      |
| Low 512      | 1850.2          | 246.795                     |
| High 810     | 1909.8          | 250                         |

**Conclusion: PASS**

## GPRS 1900

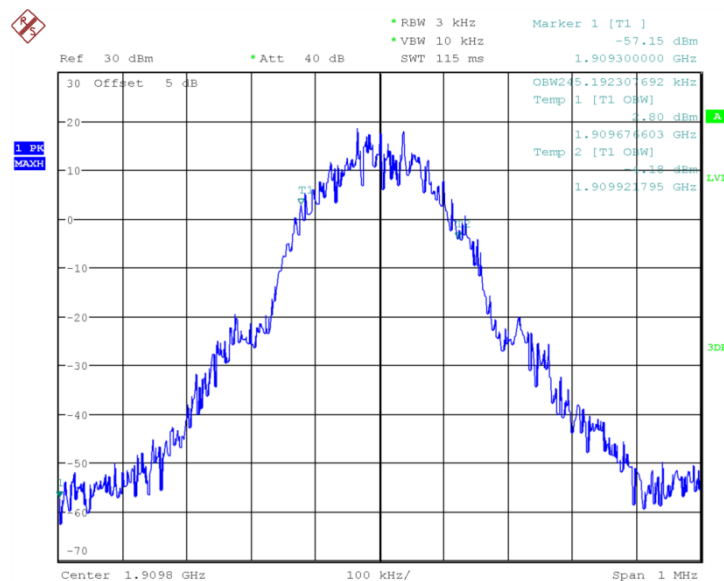


## Channel 661-Occupied Bandwidth



Date: 30.MAY.2018 03:57:31

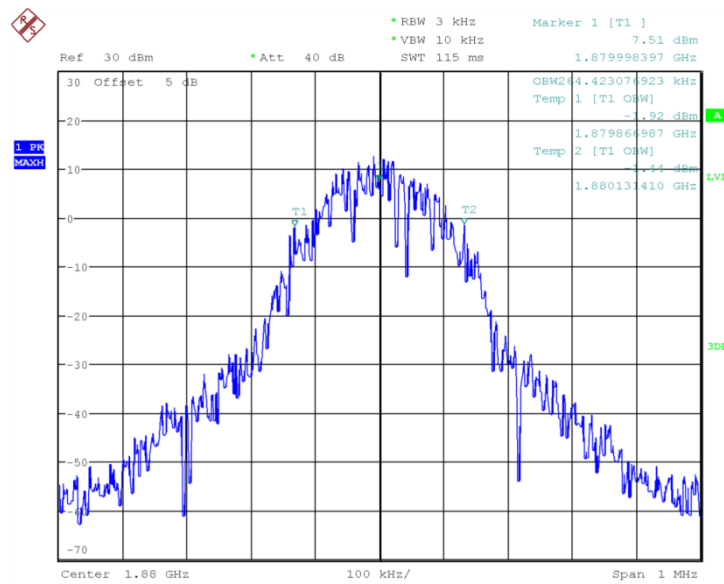
## Channel 512-Occupied Bandwidth



Date: 30.MAY.2018 03:57:50

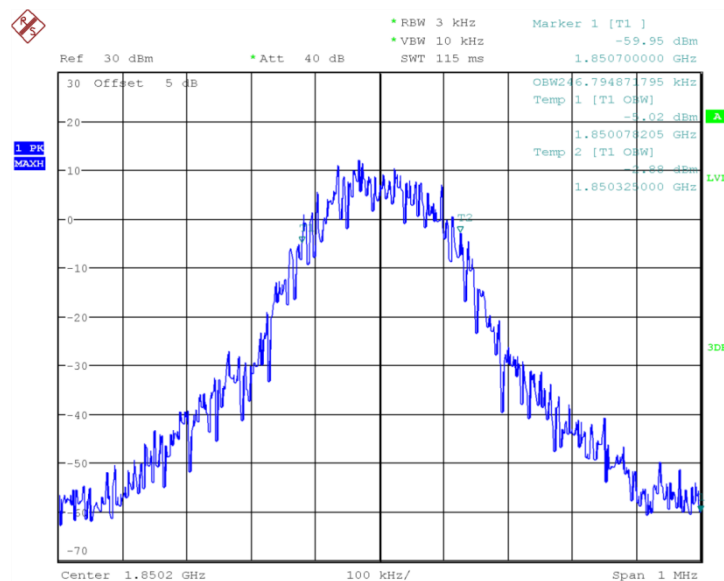
## Channel 810-Occupied Bandwidth

EDGE 1900



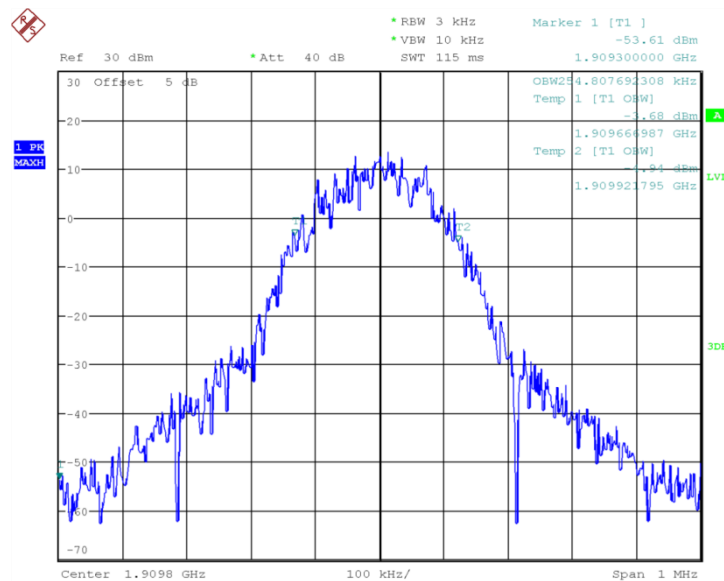
Date: 30.MAY.2018 04:00:07

## Channel 661-Occupied Bandwidth



Date: 30.MAY.2018 04:00:26

## Channel 512-Occupied Bandwidth



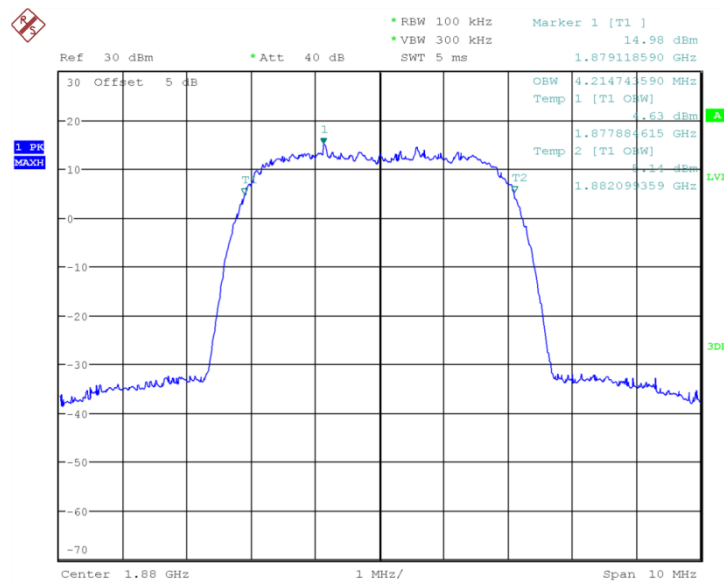
Date: 30.MAY.2018 04:00:45

## Channel 810-Occupied Bandwidth

| WCDMA BAND II |                 |                             |
|---------------|-----------------|-----------------------------|
| Test channel  | Frequency (MHz) | 99% Occupied Bandwidth(MHz) |
| Mid 9400      | 1880            | 4.21                        |
| Low 9262      | 1852.4          | 4.20                        |
| High 9538     | 1907.6          | 4.23                        |

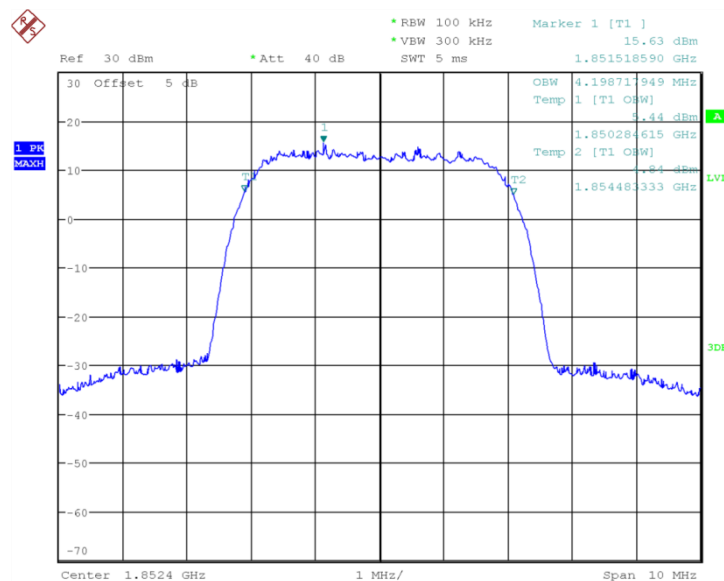
**Conclusion: PASS**
**WCDMA BAND II**





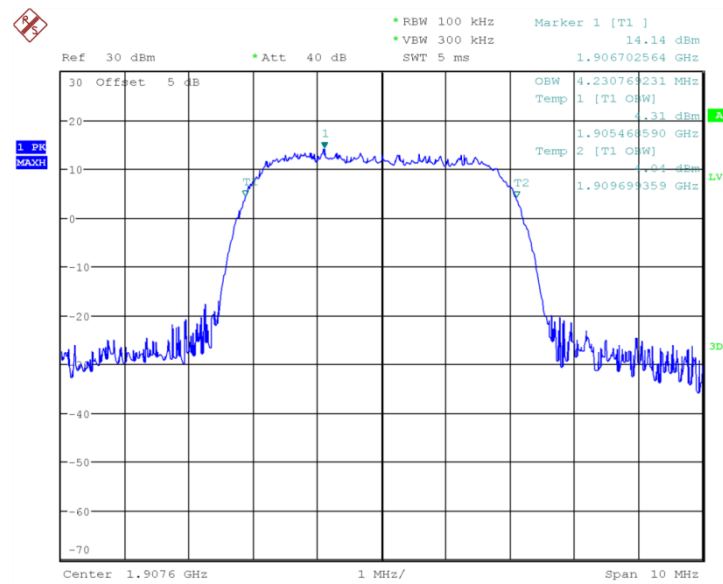
Date: 15.MAY.2018 03:37:14

## Channel 9400-Occupied Bandwidth



Date: 15.MAY.2018 03:38:16

## Channel 1852-Occupied Bandwidth



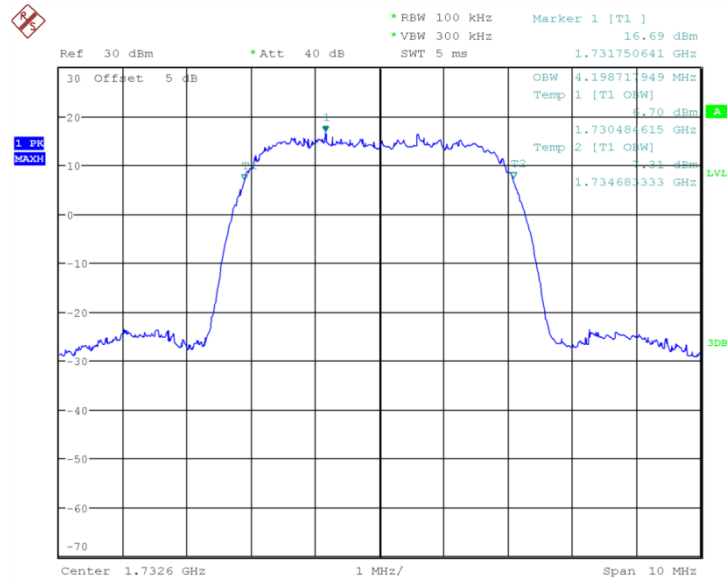
Date: 15.MAY.2018 03:39:18

## Channel 1907-Occupied Bandwidth

| WCDMA BAND IV |                 |                             |
|---------------|-----------------|-----------------------------|
| Test channel  | Frequency (MHz) | 99% Occupied Bandwidth(MHz) |
| Mid 1413      | 1732.6          | 4.20                        |
| Low 1312      | 1712.4          | 4.23                        |
| High 1513     | 1752.6          | 4.23                        |

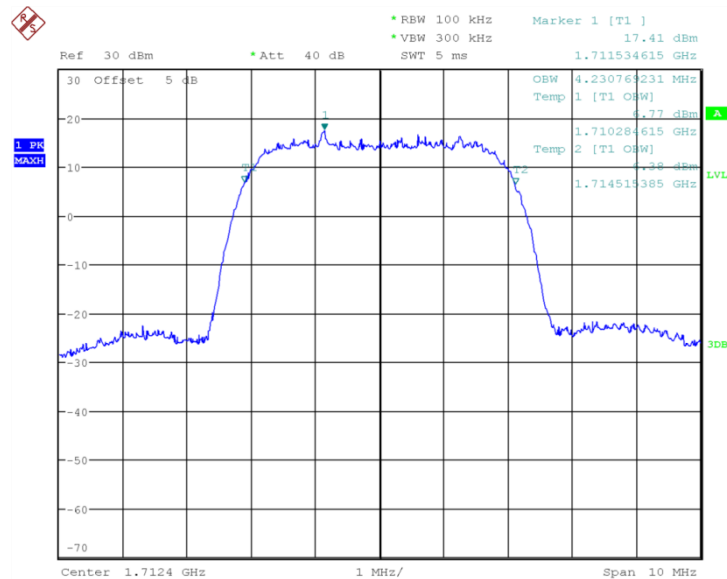
**Conclusion: PASS**

## WCDMA BAND IV



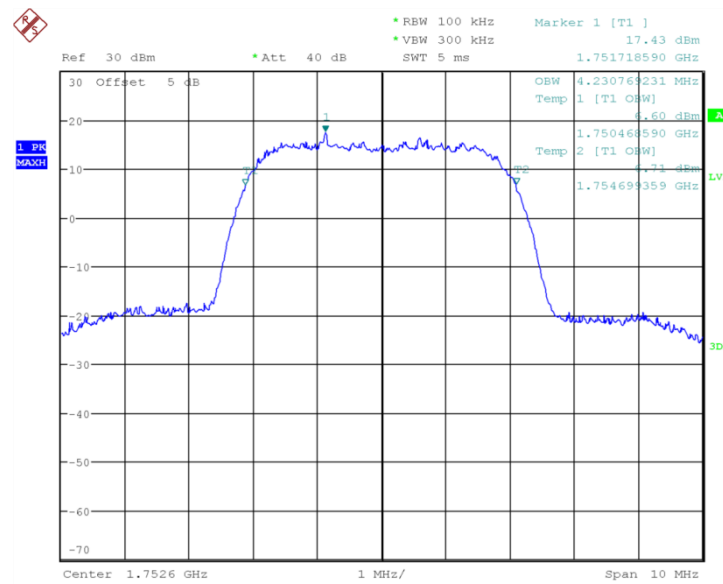
Date: 15.MAY.2018 03:40:30

## Channel 1413-Occupied Bandwidth



Date: 15.MAY.2018 03:41:34

## Channel 1312-Occupied Bandwidth



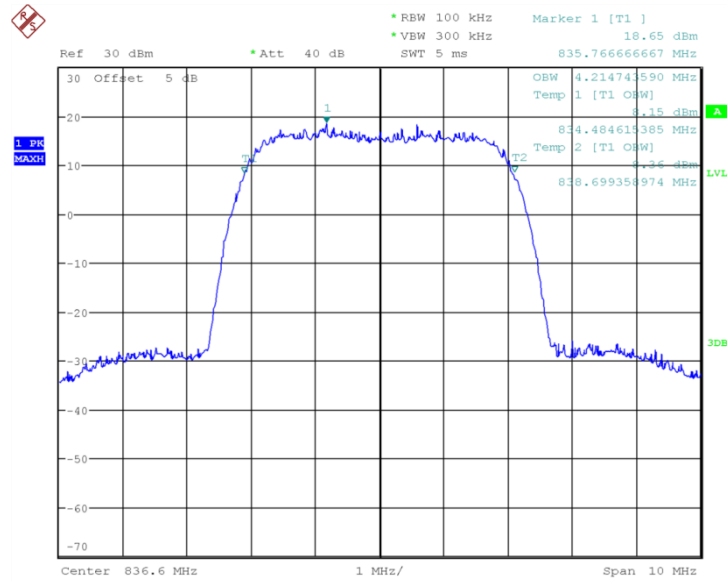
Date: 15.MAY.2018 03:42:38

## Channel 1513-Occupied Bandwidth

| WCDMA BAND V |                 |                             |
|--------------|-----------------|-----------------------------|
| Test channel | Frequency (MHz) | 99% Occupied Bandwidth(MHz) |
| Mid 4183     | 836.6           | 4.21                        |
| Low 4132     | 826.4           | 4.20                        |
| High 4233    | 846.6           | 4.21                        |

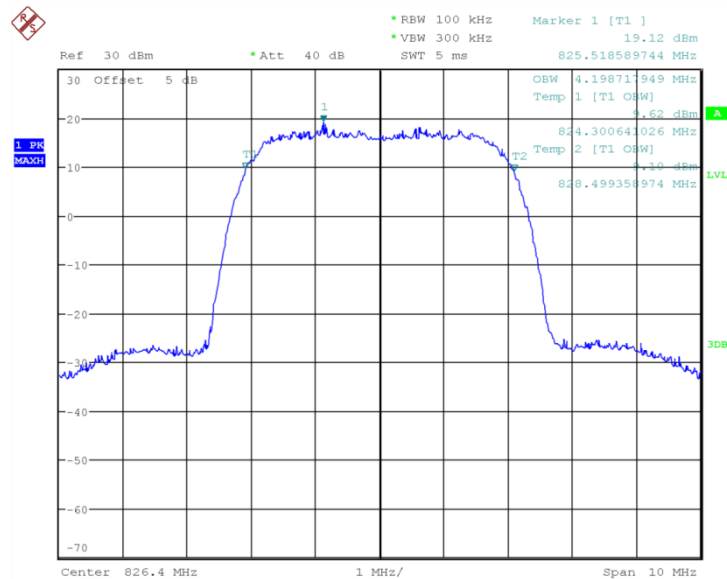
**Conclusion: PASS**

## WCDMA BAND V



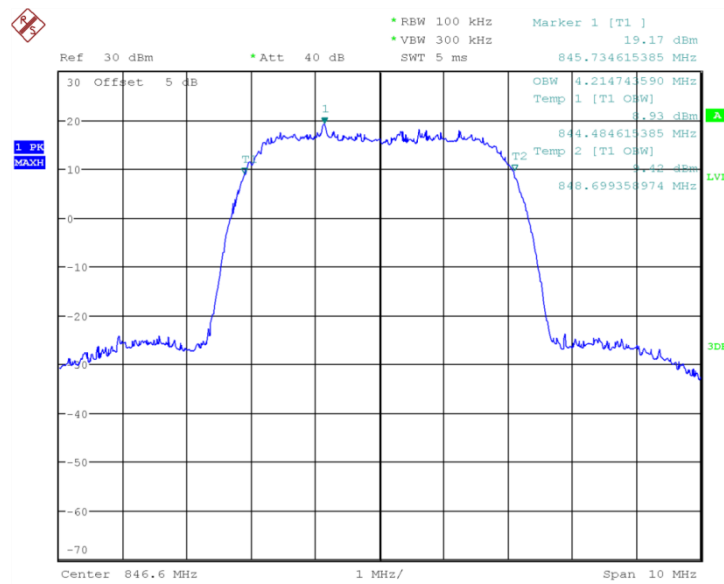
Date: 15.MAY.2018 03:43:50

## Channel 4183-Occupied Bandwidth



Date: 15.MAY.2018 03:44:54

## Channel 4132-Occupied Bandwidth



Date: 15.MAY.2018 03:45:57

## Channel 4233-Occupied Bandwidth

**ANNEX A.4. -26dB Emission Bandwidth**

Method of test please refer to KDB971168 D01 v03 clause 4.0.

**A.4.1. -26dB Emission Bandwidth**

Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV.

**A.4.2 Test Procedure:**

1. The EUT output RF connector was connected with a short cable to the signal analyzer.
2. RBW was set to about 1% of emission BW, VBW  $\geq$  3 times RBW,.
3. 26dB bandwidth were measured, the occupied bandwidth is delta frequency between the two points where the display line intersects the signal trace.

**A.4.3 Measurement methods:**

For GSM: signal analyzer setting as: RBW=3KHz;VBW=10KHz;Span=1MHz.

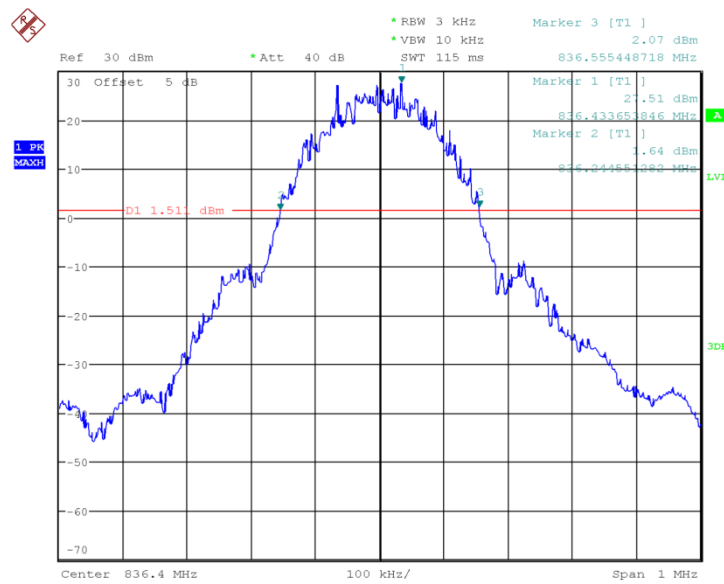
For WCDMA: signal analyzer setting as: RBW=50KHz;VBW=200KHz;Span=10MHz.

**A.4.4 Test results:**

| GPRS 850     |                 |                                |
|--------------|-----------------|--------------------------------|
| Test channel | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 189      | 836.4           | 310.897                        |
| Low 128      | 824.2           | 314.103                        |
| High 251     | 848.8           | 307.692                        |
| EDGE 850     |                 |                                |
| Test channel | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 189      | 836.4           | 331.731                        |
| Low 128      | 824.2           | 309.295                        |
| High 251     | 848.8           | 322.115                        |

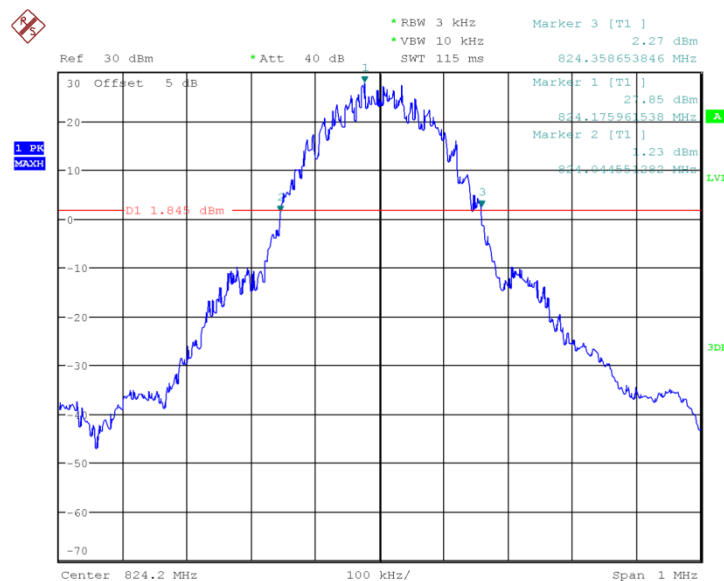
**Conclusion: PASS**

**GPRS 850**



Date: 14.MAY.2018 05:14:54

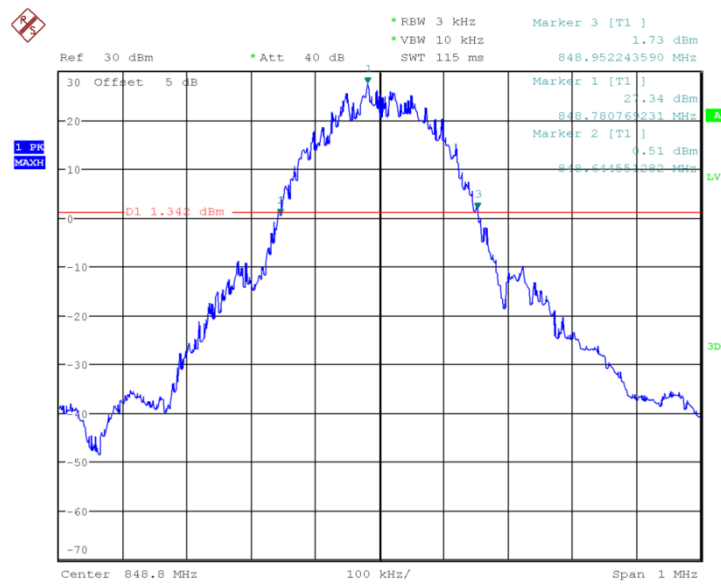
## Channel 189- Emission Bandwidth (-26dBc BW)



Date: 14.MAY.2018 05:15:23

## Channel 128- Emission Bandwidth (-26dBc BW)

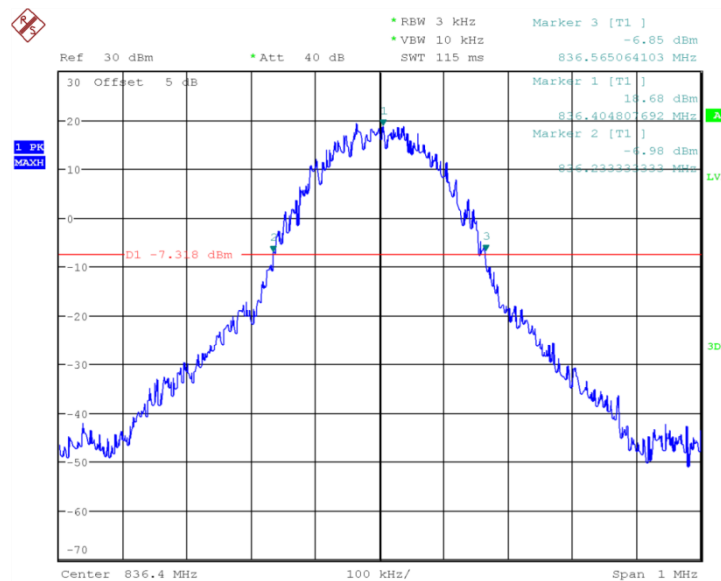




Date: 14.MAY.2018 05:15:53

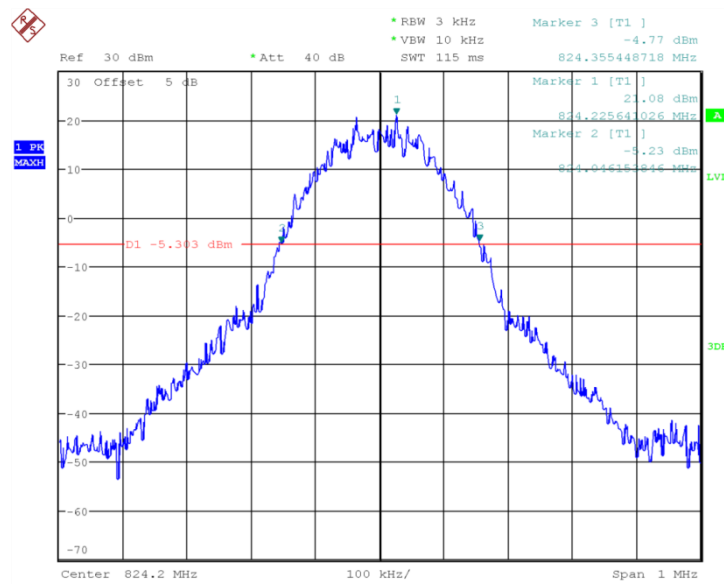
## Channel 251- Emission Bandwidth (-26dBc BW)

EDGE 850



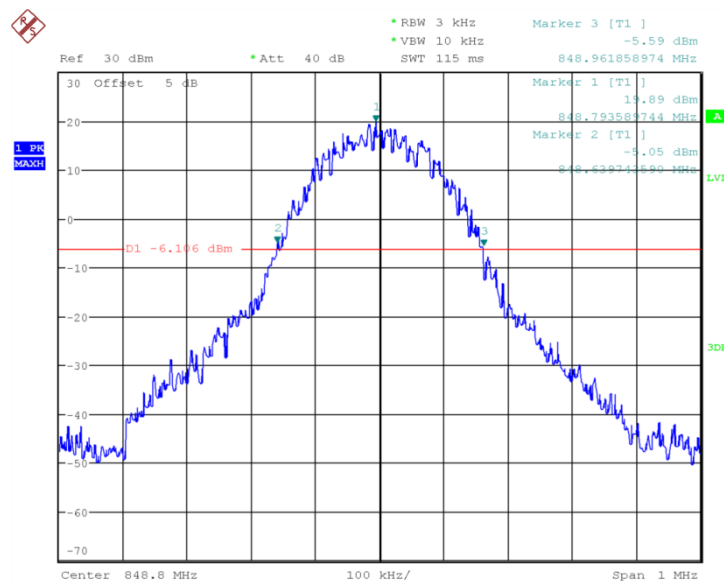
Date: 14.MAY.2018 05:17:35

## Channel 189- Emission Bandwidth (-26dBc BW)



Date: 14.MAY.2018 05:18:05

## Channel 128- Emission Bandwidth (-26dBc BW)



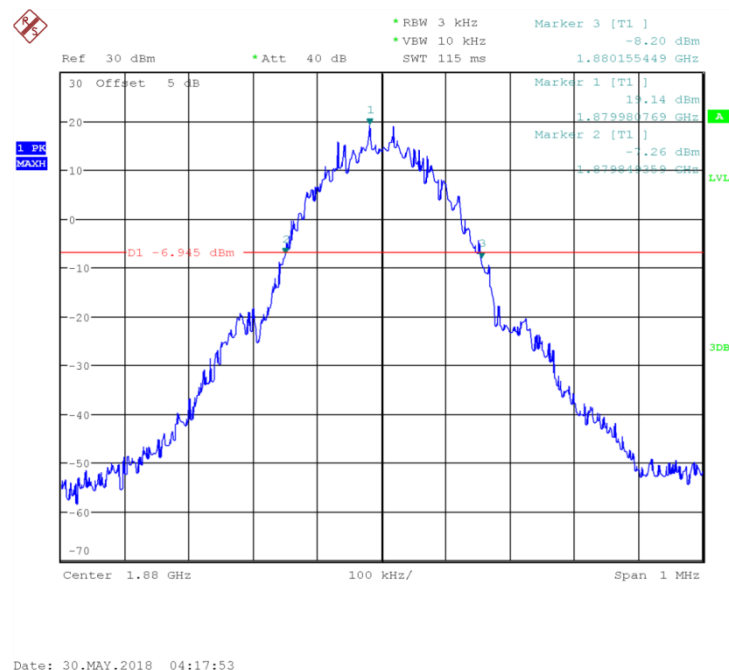
Date: 14.MAY.2018 05:18:34

## Channel 251- Emission Bandwidth (-26dBc BW)

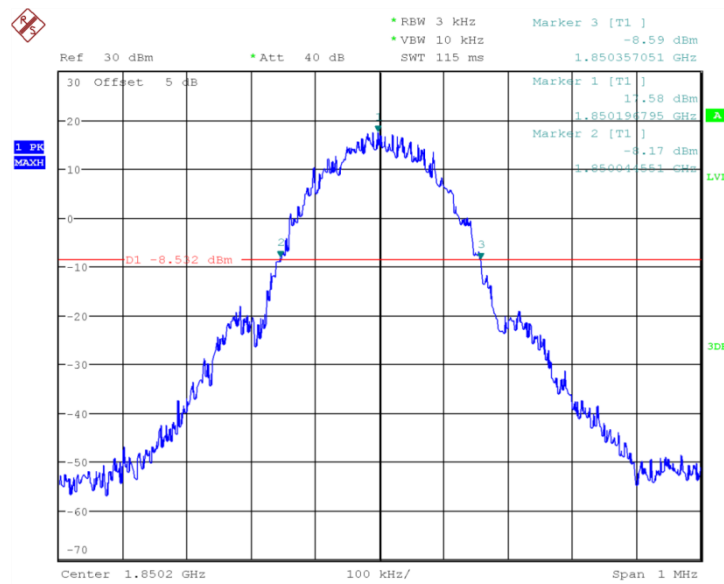
| GPRS1900     |                 |                                |
|--------------|-----------------|--------------------------------|
| Test channel | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 661      | 1880            | 306.09                         |
| Low 512      | 1850.2          | 312.5                          |
| High 810     | 1909.8          | 317.308                        |
| EDGE1900     |                 |                                |
| Test channel | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 661      | 1880            | 323.718                        |
| Low 512      | 1850.2          | 317.308                        |
| High 810     | 1909.8          | 326.923                        |

**Conclusion: PASS**

## GPRS 1900

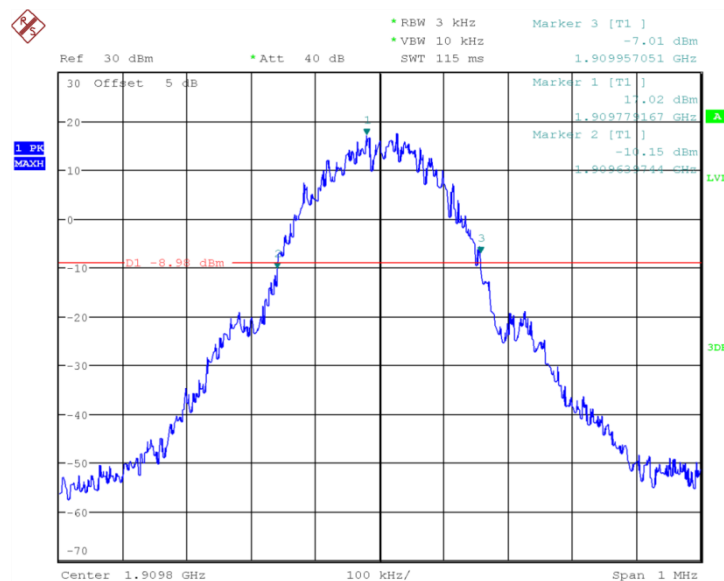


**Channel 661- Emission Bandwidth (-26dBc BW)**



Date: 30.MAY.2018 04:18:21

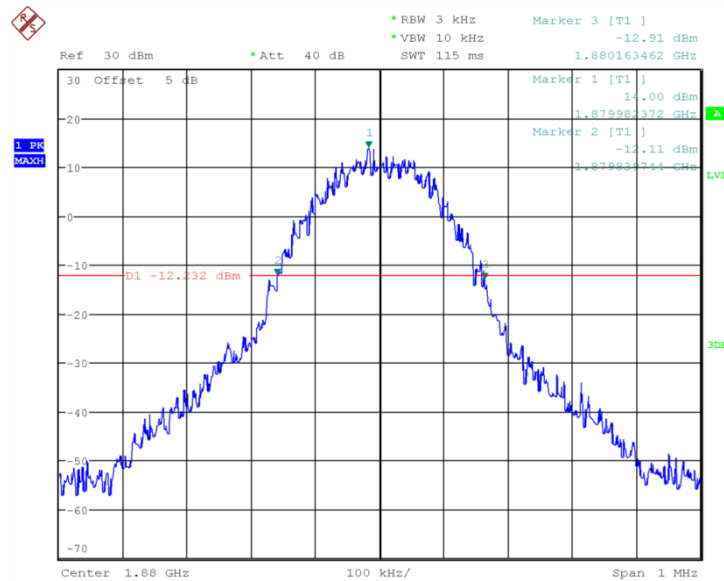
## Channel 512- Emission Bandwidth (-26dBc BW)



Date: 30.MAY.2018 04:18:49

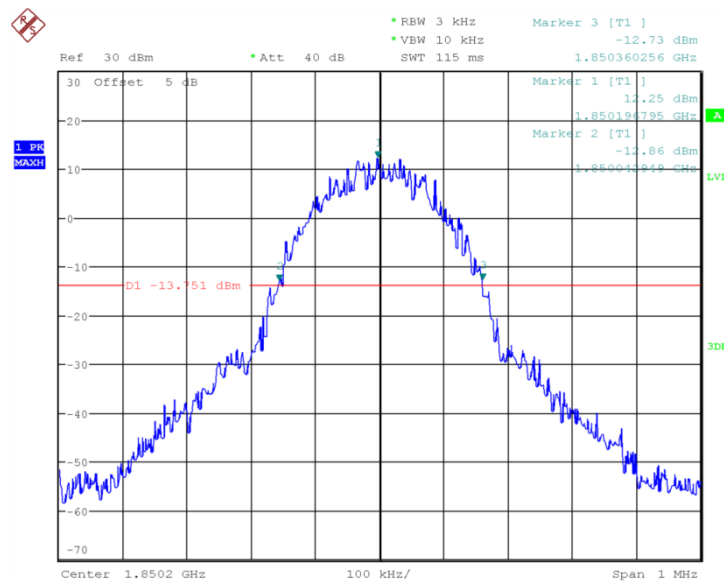
## Channel 810- Emission Bandwidth (-26dBc BW)

## EDGE 1900



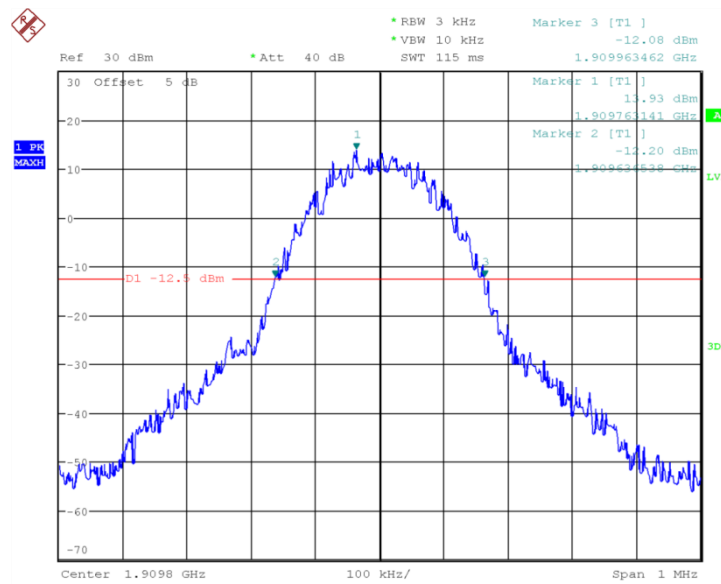
Date: 30.MAY.2018 04:27:55

## Channel 661- Emission Bandwidth (-26dBc BW)



Date: 30.MAY.2018 04:28:23

## Channel 512- Emission Bandwidth (-26dBc BW)



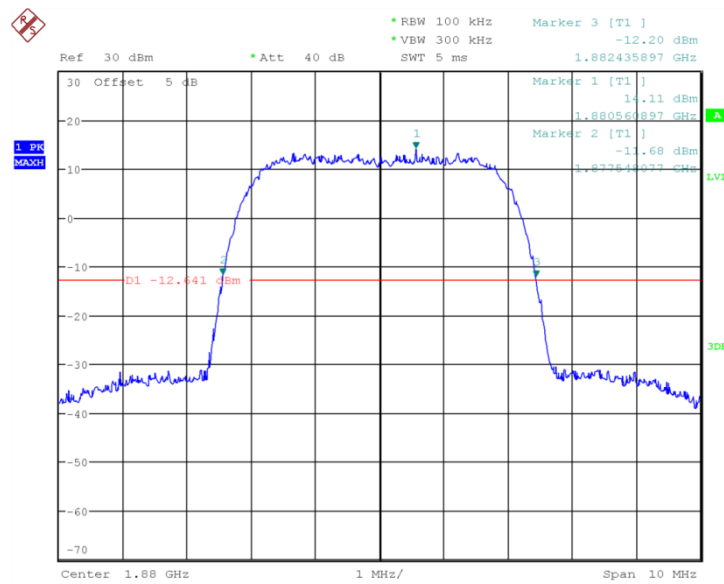
Date: 30.MAY.2018 04:28:51

## Channel 810- Emission Bandwidth (-26dBc BW)

| WCDMA BAND II |                 |                                |
|---------------|-----------------|--------------------------------|
| Test channel  | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 9400      | 1880            | 4.89                           |
| Low 9262      | 1852.4          | 4.89                           |
| High 9538     | 1907.6          | 4.92                           |

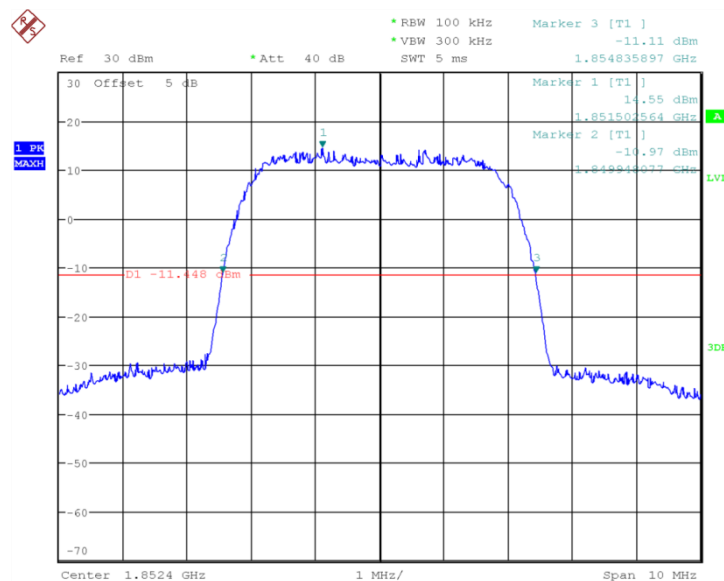
**Conclusion: PASS**

**WCDMA BAND II**



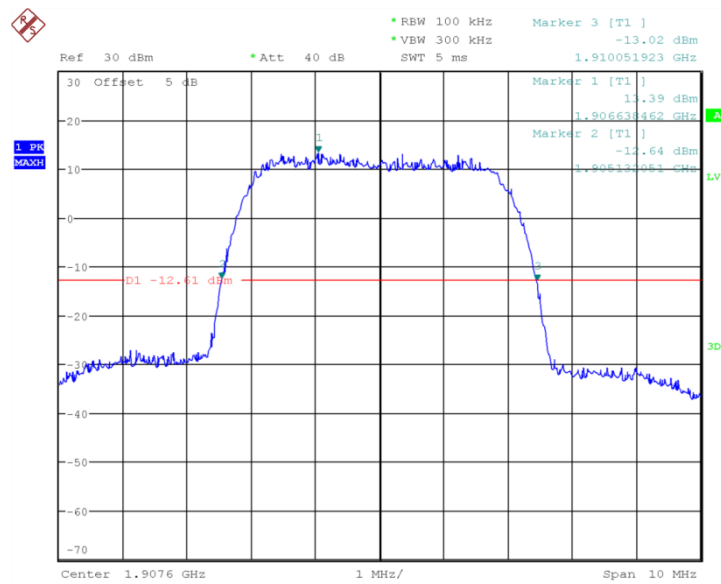
Date: 15.MAY.2018 05:02:20

## Channel 9400- Emission Bandwidth (-26dBc BW)



Date: 15.MAY.2018 05:02:51

## Channel 9262- Emission Bandwidth (-26dBc BW)



Date: 15.MAY.2018 05:03:22

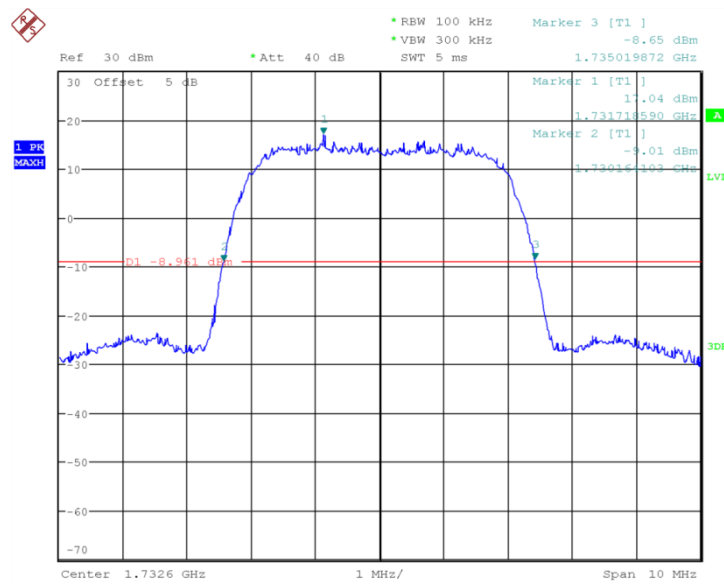
## Channel 9538- Emission Bandwidth (-26dBc BW)

| WCDMA BAND IV |                 |                                |
|---------------|-----------------|--------------------------------|
| Test channel  | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 1413      | 1732.6          | 4.86                           |
| Low 1312      | 1712.4          | 4.90                           |
| High 1513     | 1752.6          | 4.98                           |

**Conclusion: PASS**

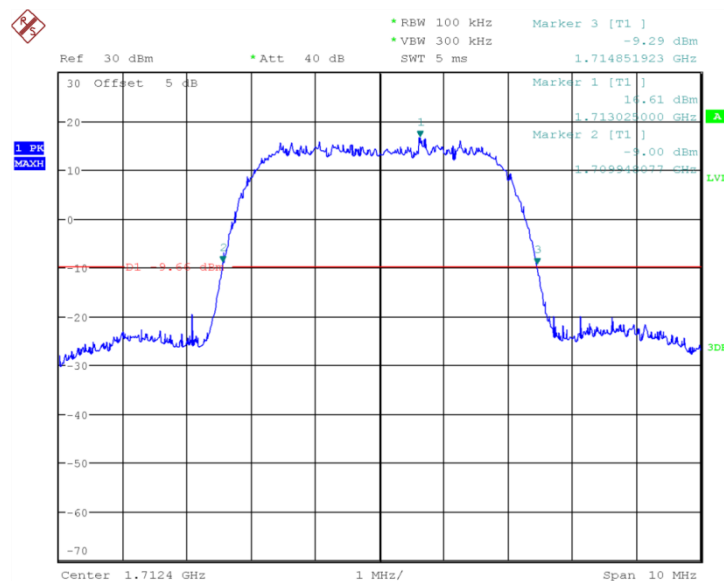
**WCDMA BAND IV**





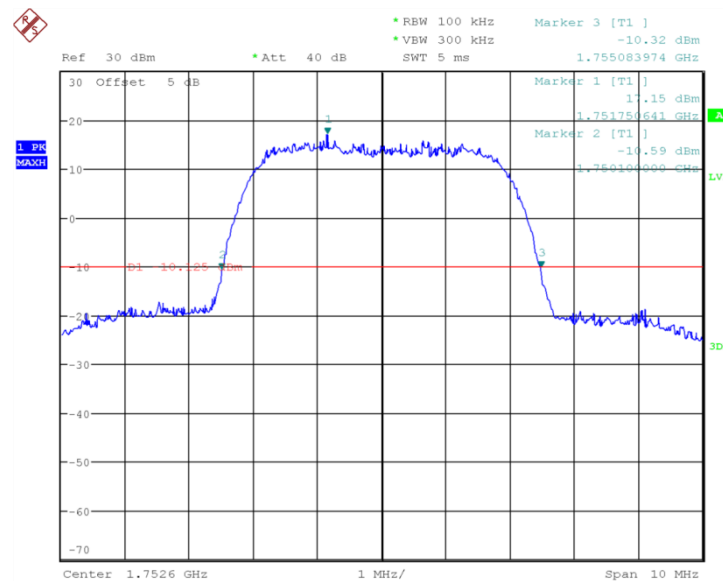
Date: 15.MAY.2018 05:04:02

## Channel 1413- Emission Bandwidth (-26dBc BW)



Date: 15.MAY.2018 05:04:35

## Channel 1312- Emission Bandwidth (-26dBc BW)



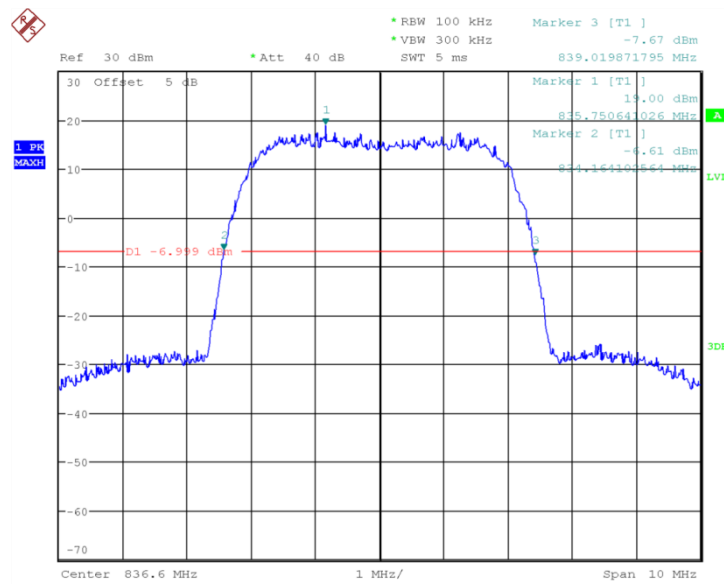
Date: 15.MAY.2018 05:05:07

## Channel 1513- Emission Bandwidth (-26dBc BW)

| WCDMA BAND V |                 |                                |
|--------------|-----------------|--------------------------------|
| Test channel | Frequency (MHz) | -26dBc Emission Bandwidth(MHz) |
| Mid 4183     | 836.6           | 4.86                           |
| Low 4132     | 826.4           | 4.87                           |
| High 4233    | 846.6           | 4.87                           |

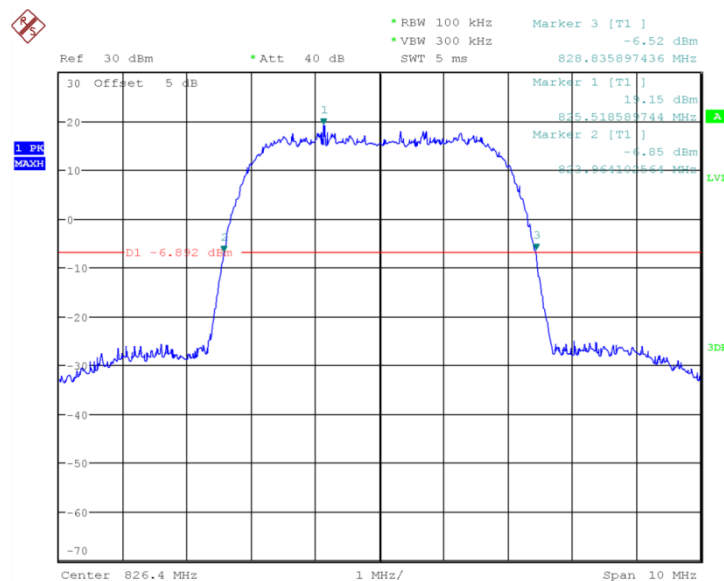
**Conclusion: PASS**

**WCDMA BAND V**



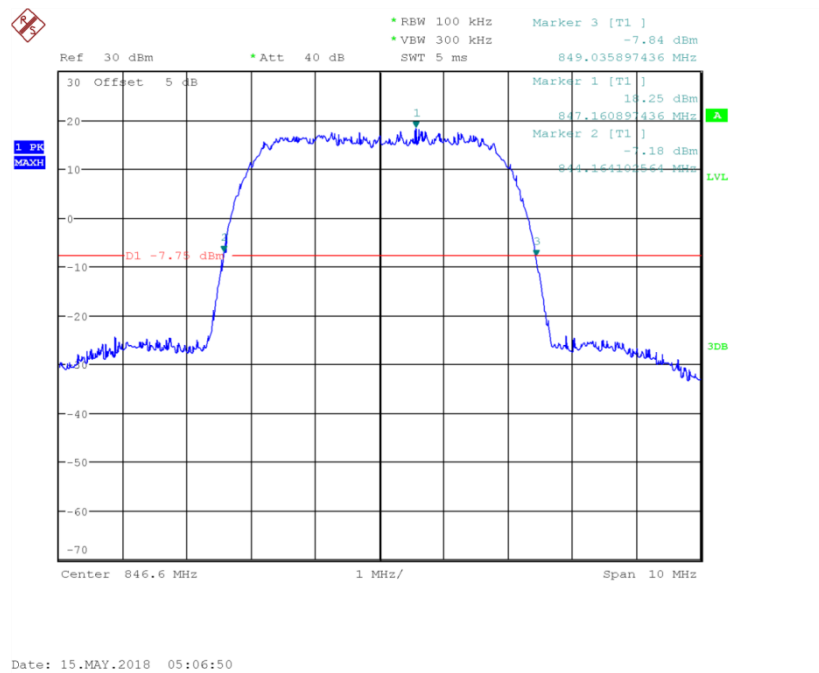
Date: 15.MAY.2018 05:05:46

## Channel 4183- Emission Bandwidth (-26dBc BW)



Date: 15.MAY.2018 05:06:18

## Channel4132- Emission Bandwidth (-26dBc BW)



## Channel 4233- Emission Bandwidth (-26dBc BW)

## ANNEX A.5. Band Edge at antenna terminals

Method of test measurements please refer to KDB971168 D01 v03 clause 6

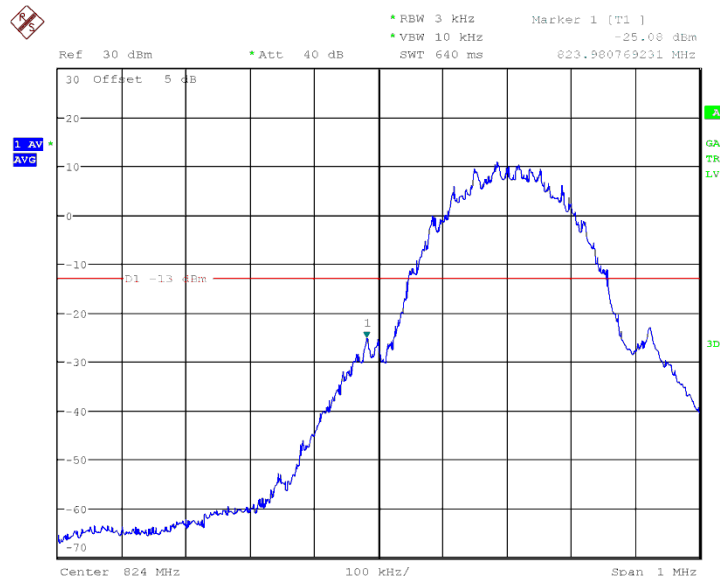
### A.5.1 Limit:

The magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specification in the instruction manual and/or alignment procedure, shall not be less than  $43+10\log$  (Mean power in watts) dBc below the mean power output outside a license's frequency block(-13dBm).

### A.5.2 Test procedure:

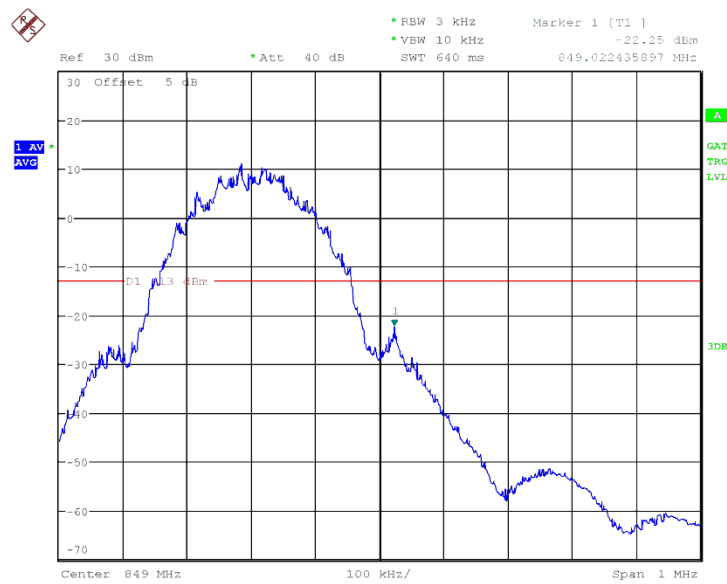
1. The RF output of the transceiver was connected to a signal analyzer through appropriate attenuation.
2. In the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.
3. The RF fundamental frequency should be excluded against the limit line in the operating frequency band
4. The limit line is derived from  $43+10\log(P)$  Db below the transmitter power P(Watts)  
 $=P(W)-[43+10\log(P)](Db)$   
 $=[30+10\log(P)](dBm)-[43+10\log(P)](Db)$   
 $=-13dBm$

### GPRS 850



Date: 16.MAY.2018 03:54:02

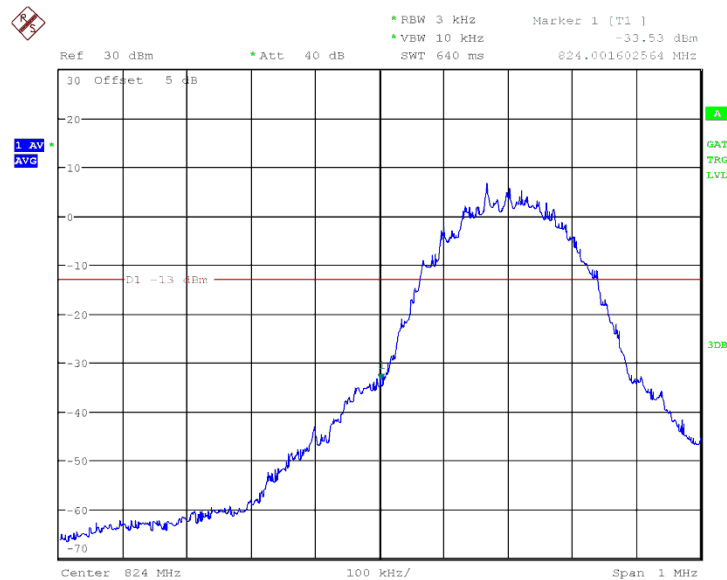
### Channel 128- LOW BAND EDGE BLOCK



Date: 16.MAY.2018 03:56:41

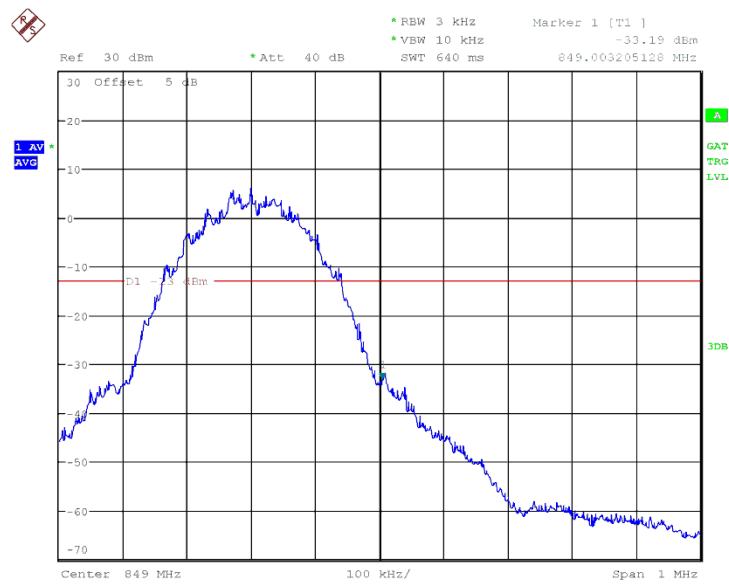
## Channel 251- HIGH BAND EDGE BLOCK

### EDGE 850



Date: 16.MAY.2018 04:02:41

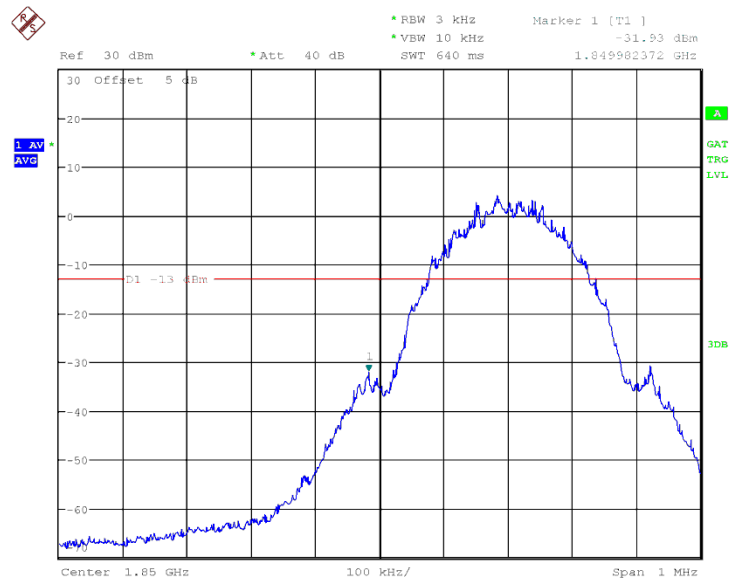
## Channel 128- LOW BAND EDGE BLOCK



Date: 16.MAY.2018 04:06:09

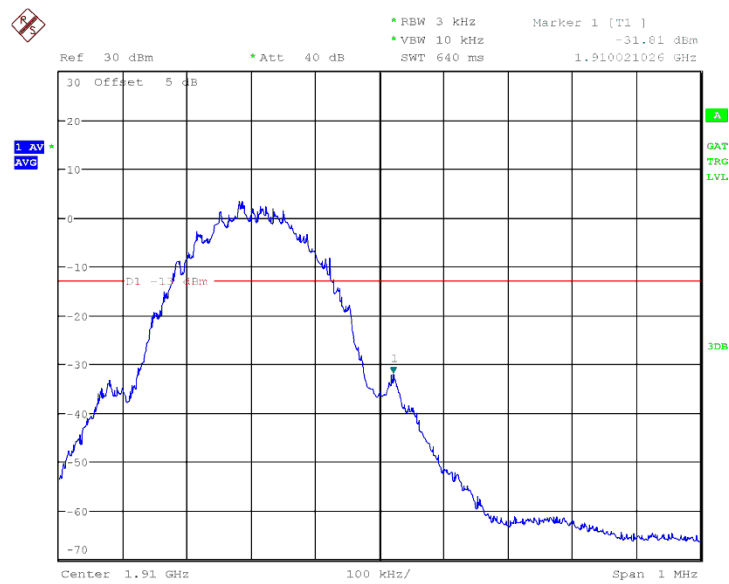
## Channel 251- HIGH BAND EDGE BLOCK

### GPRS 1900



Date: 16.MAY.2018 04:15:51

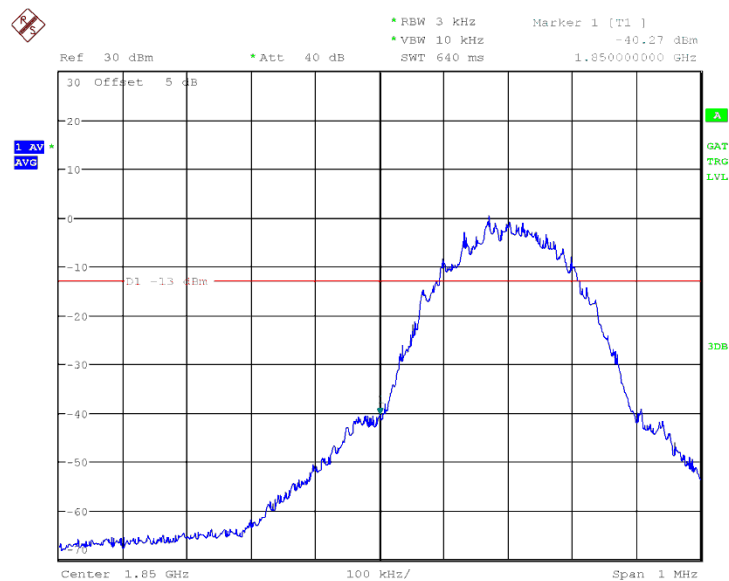
## Channel 512- LOW BAND EDGE BLOCK



Date: 16.MAY.2018 04:34:33

## Channel 810- HIGH BAND EDGE BLOCK

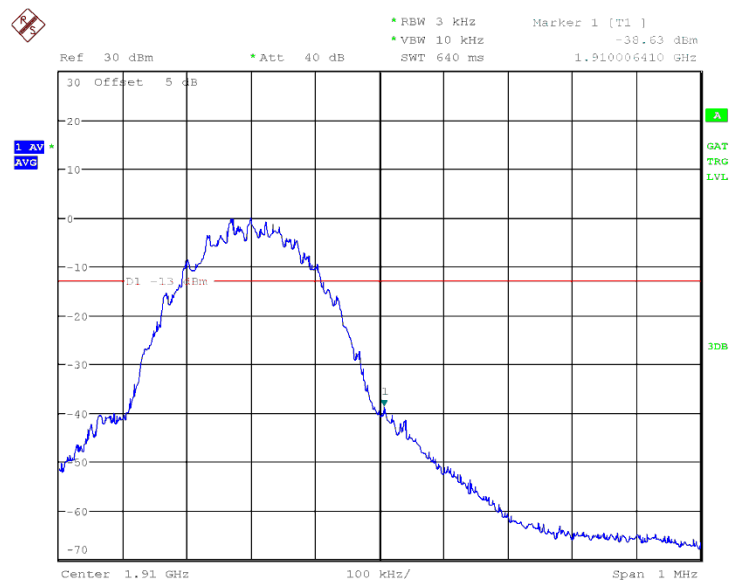
### EDGE 1900



Date: 16.MAY.2018 04:39:45

## Channel 512- LOW BAND EDGE BLOCK

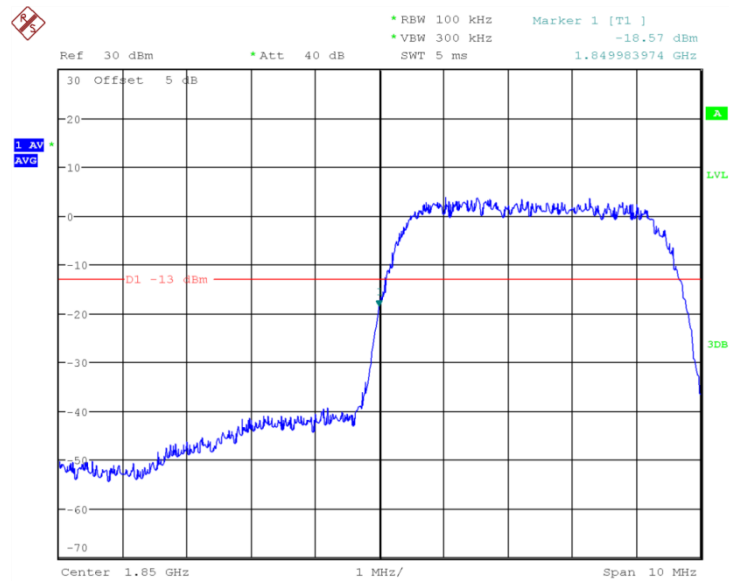




Date: 16.MAY.2018 04:41:37

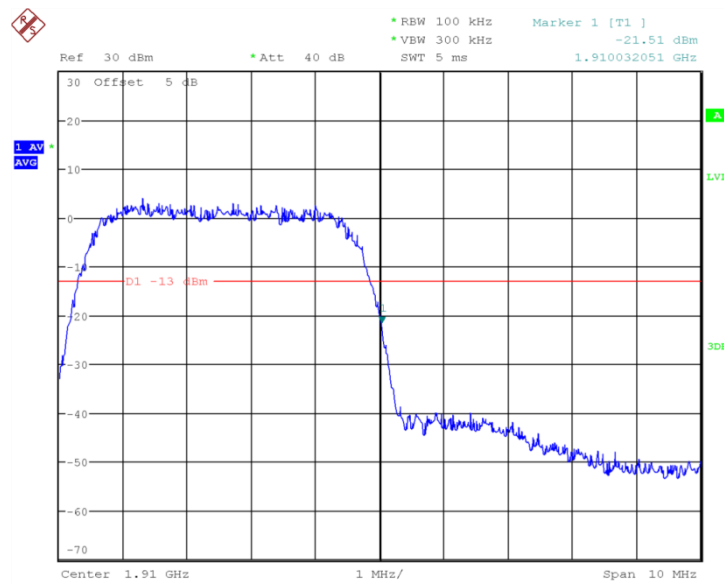
## Channel 810- HIGH BAND EDGE BLOCK

### WCDMA BAND II



Date: 15.MAY.2018 05:12:23

## Channel 9262- LOW BAND EDGE BLOCK

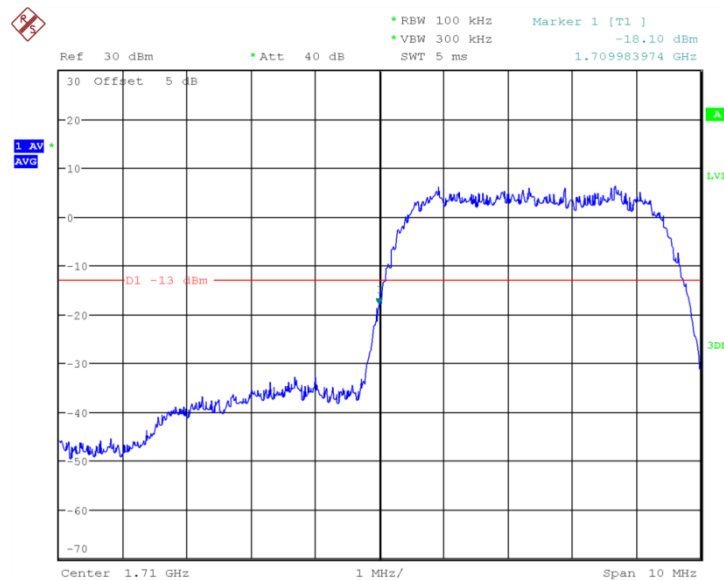


Date: 15.MAY.2018 05:13:18

## Channel 9538- HIGH BAND EDGE BLOCK

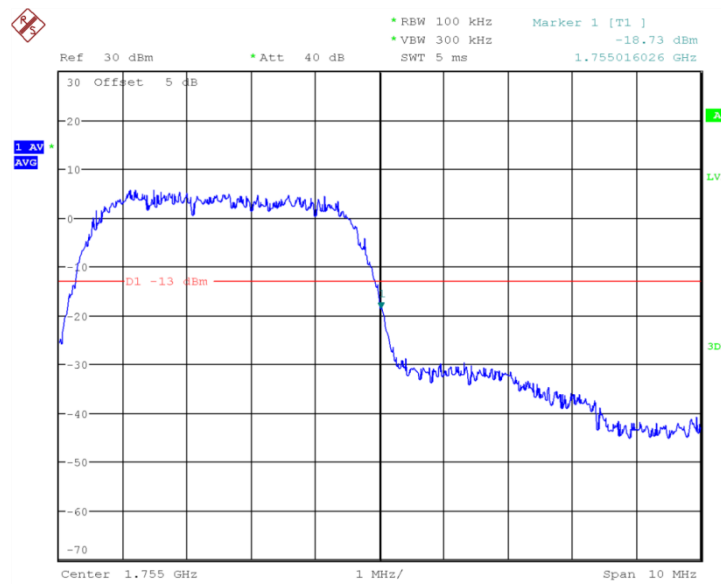
**Conclusion: PASS**

## WCDMA BAND IV



Date: 15.MAY.2018 05:14:20

## Channel 1312- LOW BAND EDGE BLOCK

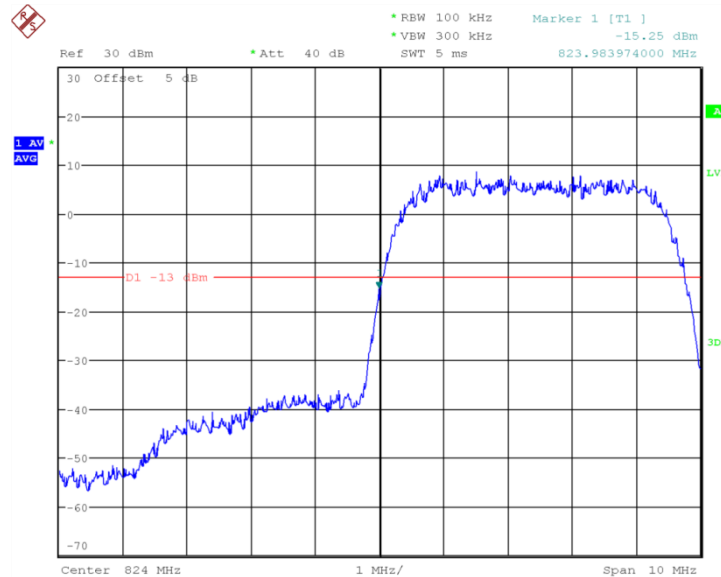


Date: 15.MAY.2018 05:15:15

## Channel 1513- HIGH BAND EDGE BLOCK

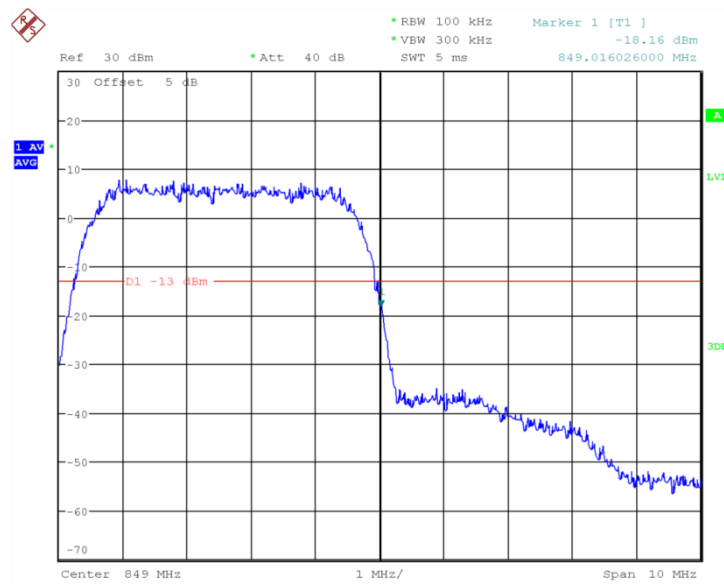
**Conclusion: PASS**

## WCDMA BAND V



Date: 15.MAY.2018 05:16:17

## Channel 4132- LOW BAND EDGE BLOCK



Date: 15.MAY.2018 05:17:12

## Channel 4233- HIGH BAND EDGE BLOCK

**Conclusion: PASS**

**ANNEX A.6. FREQUENCY STABILITY**

Method of test measurements please refer to KDB971168 D01 v03 clause 9

**A.5.1. Method of Measurement and test procedures**

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMU200 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of GSM850, PCS1900, WCDMA BANDII and WCDMA BANDV, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50°C to -30°C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

**A.5.2. Measurement Limit****A.5.2.1. For Hand carried battery powered equipment**

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.2VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages was varied from 85% to 115%.

**A.5.2.2. For equipment powered by primary supply voltage**

According to the JTC standard the GSM frequency stability of the carrier shall be accurate to within 0.1ppm of the received frequency from the base station. And the WCDMA is 2.5ppm. This accuracy is sufficient to meet Sec.24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. For this EUT section 2.1055(d)(1) applies. This requires varying primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

**A.5.3 Test results****GSM850Mid Channel/fc(MHz) 189/836.4****Frequency Error VS Temperature**

| Power Supply (VDC) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.8                | -30                         | 1.46                | 2091       |
| 3.8                | -20                         | -0.38               | 2091       |
| 3.8                | -10                         | -0.45               | 2091       |
| 3.8                | 0                           | 2.3                 | 2091       |
| 3.8                | 10                          | -0.47               | 2091       |
| 3.8                | 20                          | -0.18               | 2091       |
| 3.8                | 30                          | -0.56               | 2091       |
| 3.8                | 40                          | 0.34                | 2091       |
| 3.8                | 50                          | -1.23               | 2091       |

**Frequency Error VS Voltage**

| Power Supply (VDC) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.5                | 25                          | -1.67               | 2091       |
| 3.8                | 25                          | 0.12                | 2091       |
| 4.2                | 25                          | 3.32                | 2091       |

**PCS1900 Mid Channel/fc(MHz) 661/1880****Frequency Error VS Temperature**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.8                | -30                         | -2.12               | 4700       |
| 3.8                | -20                         | 0.45                | 4700       |
| 3.8                | -10                         | -0.32               | 4700       |
| 3.8                | 0                           | 0.34                | 4700       |
| 3.8                | 10                          | -1.56               | 4700       |
| 3.8                | 20                          | -2.23               | 4700       |
| 3.8                | 30                          | -0.78               | 4700       |
| 3.8                | 40                          | -0.56               | 4700       |
| 3.8                | 50                          | --0.56              | 4700       |

**Frequency Error VS Voltage**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.5                | 25                          | -5.22               | 4700       |
| 3.8                | 25                          | 0.78                | 4700       |
| 4.2                | 25                          | 0.52                | 4700       |

**WCDMA BAND II Mid Channel/fc(MHz) 9400 /1880****Frequency Error VS Temperature**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.8                | -30                         | 0.82                | 4700       |
| 3.8                | -20                         | 0.18                | 4700       |
| 3.8                | -10                         | -0.23               | 4700       |
| 3.8                | 0                           | -0.03               | 4700       |
| 3.8                | 10                          | -1.21               | 4700       |
| 3.8                | 20                          | -0.02               | 4700       |
| 3.8                | 30                          | 1.34                | 4700       |
| 3.8                | 40                          | -0.85               | 4700       |
| 3.8                | 50                          | -0.96               | 4700       |

**Frequency Error VS Voltage**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.5                | 25                          | -1.79               | 4700       |
| 3.8                | 25                          | -1.19               | 4700       |
| 4.2                | 25                          | 0.2                 | 4700       |



**WCDMA BAND IV Mid Channel/fc(MHz) 1413/1732.6****Frequency Error VS Temperature**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.8                | -30                         | -1.72               | 4331.5     |
| 3.8                | -20                         | -1.89               | 4331.5     |
| 3.8                | -10                         | -1.89               | 4331.5     |
| 3.8                | 0                           | -2.66               | 4331.5     |
| 3.8                | 10                          | -2.09               | 4331.5     |
| 3.8                | 20                          | -2.47               | 4331.5     |
| 3.8                | 30                          | -2.9                | 4331.5     |
| 3.8                | 40                          | -1.79               | 4331.5     |
| 3.8                | 50                          | -2.35               | 4331.5     |

**Frequency Error VS Voltage**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.5                | 25                          | 1.25                | 4331.5     |
| 3.8                | 25                          | -0.73               | 4331.5     |
| 4.2                | 25                          | -1.16               | 4331.5     |

**WCDMA BAND V Mid Channel/fc(MHz) 4183/836.6****Frequency Error VS Temperature**

| Power Supply (VDc) | Environment Temperature(°C) | Frequency error(Hz) | Limit (Hz) |
|--------------------|-----------------------------|---------------------|------------|
| 3.8                | -30                         | -1.11               | 2091.5     |
| 3.8                | -20                         | -1.11               | 2091.5     |
| 3.8                | -10                         | 0                   | 2091.5     |
| 3.8                | 0                           | 0.31                | 2091.5     |
| 3.8                | 10                          | -0.93               | 2091.5     |
| 3.8                | 20                          | -0.23               | 2091.5     |
| 3.8                | 30                          | 0.92                | 2091.5     |

|     |    |       |        |
|-----|----|-------|--------|
| 3.8 | 40 | -0.32 | 2091.5 |
| 3.8 | 50 | 1.01  | 2091.5 |

**Frequency Error VS Voltage**

| Power Supply<br>(VDc) | Environment<br>Temperature(°C) | Frequency error(Hz) | Limit<br>(Hz) |
|-----------------------|--------------------------------|---------------------|---------------|
| 3.5                   | 25                             | 8.21                | 2091.5        |
| 3.8                   | 25                             | 2.46                | 2091.5        |
| 4.2                   | 25                             | 1.01                | 2091.5        |

**Conclusion: PASS**

**ANNEX A.7. CONDUCTED SPURIOUS EMISSION****A.7.1. GSM Measurement Method and test procedures**

The following steps outline the procedure used to measure the conducted emissions from the EUT.

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 10 GHz.

2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.

3. The procedure to get the conducted spurious emission is as follows:

The trace mode is set to MaxHold to get the highest signal at each frequency;

Wait 25 seconds;Get the result.

4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

**GSM 850 Transmitter**

| Channel | Frequency(MHz) |
|---------|----------------|
| 128     | 824.2          |
| 189     | 836.4          |
| 251     | 848.8          |

**PCS 1900 Transmitter**

| Channel | Frequency(MHz) |
|---------|----------------|
| 512     | 1850.2         |
| 661     | 1880.0         |
| 810     | 1909.8         |

## A.7.1.1. Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission 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.

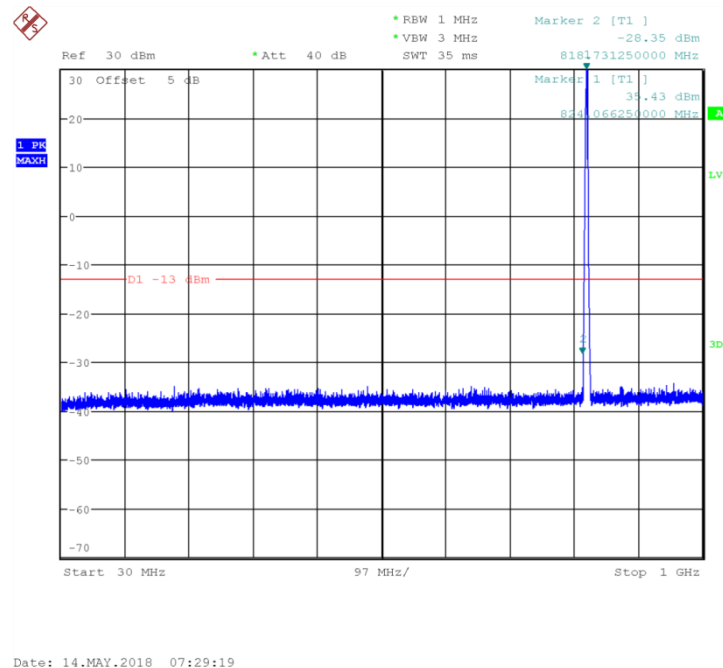
The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

## A7.1.2. Measurement result

**Spurious emission limit -13dBm.**

**Note: peak above the limit line is the carrier frequency.**

### A7.1.2.1. GSM850



**Channel 128: 30MHz~1GHz**