

# FCC Radio Test Report

## FCC ID: QISY560-L23

This report concerns (check one):  Original Grant  Class II Change

**Project No.** : 1505C241  
**Equipment** : Smart Phone  
**Model Name** : HUAWEI Y560-L23, Y560-L23  
**Applicant** : Huawei Technologies Co., Ltd.  
**Address** : Administration Building, Headquarters of Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, 518129, P.R.C

**Date of Receipt** : May 22, 2015  
**Date of Test** : May 22, 2015~Jun.18, 2015  
**Issued Date** : Jun.19, 2015  
**Tested by** : BTL Inc.

**Testing Engineer** : David Mao  
(David Mao)

**Technical Manager** : Leo Hung  
(Leo Hung)

**Authorized Signatory** : Steven Lu  
(Steven Lu)

# **B T L I N C .**

No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan,  
Guangdong, China.

TEL: +86-769-8318-3000 FAX: +86-769-8319-6000

### **Declaration**

**BTL** represents to the client that testing is done in accordance with standard procedures as applicable and that test instruments used has been calibrated with the standards traceable to National Measurement Laboratory (**NML**) of **R.O.C.**, or National Institute of Standards and Technology (**NIST**) of **U.S.A.**

**BTL's** reports apply only to the specific samples tested under conditions. It is manufacture's responsibility to ensure that additional production units of this model are manufactured with the identical electrical and mechanical components. **BTL** shall have no liability for any declarations, inferences or generalizations drawn by the client or others from **BTL** issued reports.

**BTL's** report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

This report is the confidential property of the client. As a mutual protection to the clients, the public and **BTL-self**, extracts from the test report shall not be reproduced except in full with **BTL's** authorized written approval.

**BTL's** laboratory quality assurance procedures are in compliance with the **ISO Guide 17025** requirements, and accredited by the conformity assessment authorities listed in this test report.

### **Limitation**

For the use of the authority's logo is limited unless the Test Standard(s)/Scope(s)/Item(s) mentioned in this test report is (are) included in the conformity assessment authorities acceptance respective.

| <b>Table of Contents</b>                                    | <b>Page</b> |
|---|-------------|
| <b>REPORT ISSUED HISTORY</b>                                | <b>6</b>    |
| <b>1 . CERTIFICATION</b>                                    | <b>7</b>    |
| <b>2 . SUMMARY OF TEST RESULTS</b>                          | <b>8</b>    |
| 2.1 TEST FACILITY   | 9           |
| 2.2 MEASUREMENT UNCERTAINTY                                 | 9           |
| <b>3 . GENERAL INFORMATION</b>                              | <b>10</b>   |
| 3.1 GENERAL DESCRIPTION OF EUT                              | 10          |
| 3.2 DESCRIPTION OF TEST MODES                               | 11          |
| 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED | 12          |
| 3.4 DESCRIPTION OF SUPPORT UNITS                            | 12          |
| <b>4 . TEST RESULT</b>                                      | <b>13</b>   |
| 4.1 RADIATED RF OUTPUT POWER MEASUREMENT                    | 13          |
| 4.1.1 LIMIT   | 13          |
| 4.1.2 MEASURING INSTRUMENTS AND SETTING                     | 13          |
| 4.1.3 TEST PROCEDURE  | 13          |
| 4.1.4 TEST SETUP LAYOUT                                     | 14          |
| 4.1.5 TEST DEVIATION  | 14          |
| 4.1.6 EUT OPERATION DURING TEST                             | 14          |
| 4.1.7 EUT TEST CONDITIONS                                   | 14          |
| 4.1.8 TEST RESULTS  | 14          |
| 4.2 99% OCCUPIED BANDWIDTH MEASUREMENT                      | 15          |
| 4.2.1 LIMIT   | 15          |
| 4.2.2 MEASURING INSTRUMENTS AND SETTING                     | 15          |
| 4.2.3 TEST PROCEDURE  | 15          |
| 4.2.4 TEST SETUP LAYOUT                                     | 15          |
| 4.2.5 TEST DEVIATION  | 15          |
| 4.2.6 EUT OPERATION DURING TEST                             | 15          |
| 4.2.7 EUT TEST CONDITIONS                                   | 15          |
| 4.2.8 TEST RESULTS  | 16          |
| 4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS MEASUREMENT     | 17          |
| 4.3.1 LIMIT   | 17          |
| 4.3.2 MEASURING INSTRUMENTS AND SETTING                     | 17          |
| 4.3.3 TEST PROCEDURES                                       | 17          |
| 4.3.4 TEST SETUP LAYOUT                                     | 17          |
| 4.3.5 TEST DEVIATION  | 17          |
| 4.3.6 EUT OPERATION DURING TEST                             | 17          |
| 4.3.7 EUT TEST CONDITIONS                                   | 18          |

| <b>Table of Contents</b>                               | <b>Page</b> |
|--|-------------|
| 4.3.8 TEST RESULTS                                     | 18          |
| 4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT            | 19          |
| 4.4.1 LIMIT  | 19          |
| 4.4.2 MEASURING INSTRUMENTS AND SETTING                | 19          |
| 4.4.3 TEST PROCEDURES                                  | 19          |
| 4.4.4 TEST SETUP LAYOUT                                | 20          |
| 4.4.5 TEST DEVIATION                                   | 20          |
| 4.4.6 EUT OPERATION DURING TEST                        | 20          |
| 4.4.7 EUT TEST CONDITIONS                              | 20          |
| 4.4.8 TEST RESULTS                                     | 20          |
| 4.5 BAND EDGE MEASUREMENT                              | 21          |
| 4.5.1 LIMIT  | 21          |
| 4.5.2 MEASURING INSTRUMENTS AND SETTING                | 21          |
| 4.5.3 TEST PROCEDURES                                  | 21          |
| 4.5.4 TEST SETUP LAYOUT                                | 21          |
| 4.5.5 TEST DEVIATION                                   | 21          |
| 4.5.6 EUT OPERATION DURING TEST                        | 21          |
| 4.5.7 EUT TEST CONDITIONS                              | 21          |
| 4.5.8 TEST RESULTS                                     | 22          |
| 4.6 FREQUENCY STABILITY MEASUREMENT                    | 23          |
| 4.6.1 LIMIT  | 23          |
| 4.6.2 MEASURING INSTRUMENTS AND SETTING                | 23          |
| 4.6.3 TEST PROCEDURES                                  | 23          |
| 4.6.4 TEST SETUP LAYOUT                                | 23          |
| 4.6.5 TEST DEVIATION                                   | 23          |
| 4.6.6 EUT OPERATION DURING TEST                        | 23          |
| 4.6.7 EUT TEST CONDITIONS                              | 24          |
| 4.6.8 TEST RESULTS                                     | 24          |
| 4.7 PEAK TO AVERAGE RATIO                              | 25          |
| 4.7.1 LIMIT  | 25          |
| 4.7.2 TEST PROCEDURES                                  | 25          |
| 4.7.3 TEST SETUP LAYOUT                                | 25          |
| 4.7.4 TEST DEVIATION                                   | 25          |
| 4.7.5 EUT OPERATION DURING TEST                        | 25          |
| 4.7.6 EUT TEST CONDITIONS                              | 25          |
| 4.7.7 TEST RESULTS                                     | 25          |
| 5. LIST OF MEASUREMENT EQUIPMENTS                      | 26          |
| ATTACHMENT A - RADIATED RF OUTPUT POWER                | 28          |
| ATTACHMENT B - 99% OCCUPIED BANDWIDTH                  | 30          |
| ATTACHMENT C - SPURIOUS EMISSIONS AT ANTENNA TERMINALS | 37          |
| ATTACHMENT D - SPURIOUS RADIATED EMISSION              | 40          |

| <b>Table of Contents</b>                    | <b>Page</b> |
|---|-------------|
| <b>ATTACHMENT E - BAND EDGE</b>             | <b>57</b>   |
| <b>ATTACHMENT F - FREQUENCY STABILITY</b>   | <b>61</b>   |
| <b>ATTACHMENT G - PEAK TO AVERAGE RATIO</b> | <b>64</b>   |

### REPORT ISSUED HISTORY

| Issued No.          | Description     | Issued Date  |
|---------------------|-----------------|--------------|
| BTL-FCCP-5-1505C241 | Original Issue. | Jun.19, 2015 |

## 1. CERTIFICATION

Equipment : Smart Phone  
Brand Name : HUAWEI  
Model Name : HUAWEI Y560-L23, Y560-L23  
Applicant : Huawei Technologies Co., Ltd.  
Manufacturer : Huawei Technologies Co., Ltd  
Address : Administration Building, Headquarters of Huawei Technologies Co., Ltd.,  
Bantian, Longgang District, Shenzhen, 518129, P.R.C  
Date of Test : May 22, 2015~Jun.18, 2015  
Test Sample : ENGINEERING SAMPLE  
Standard(s) : 47 CFR FCC Part 24 Subpart E & ANSI C63.4 : 2009  
47 CFR FCC Part 2 & ANSI/TIA-603-C-2004

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-5-1505C241) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

**Test result included in this report is only for the GSM 1900MHz approval part of the product.**

## 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

| FCC Part 24 Subpart E & Part 2 |   |          |        |
|--------------------------------|---|----------|--------|
| Standard(s)<br>Section         | Test Item                                 | Judgment | Remark |
| FCC                            |   |          |        |
| 2.1047(d)                      | Modulation Characteristics                | PASS     |        |
| 2.1046<br>24.232(c)            | Radiated RF Output                        | PASS     |        |
| 2.1049<br>24.238(a)            | 99% Occupied Bandwidth                    | PASS     |        |
| 2.1051<br>24.238(a)            | Spurious Emissions at Antenna<br>Terminal | PASS     |        |
| 2.1053<br>24.238(a)            | Spurious Radiated Emissions               | PASS     |        |
| 24.238(a)                      | Band Edge Emissions                       | PASS     |        |
| 2.1055<br>24.235               | Frequency Stability                       | PASS     |        |
| 24.232(d)                      | Peak to Average Ratio                     | PASS     |        |

**NOTE:**

(1) "N/A" denotes test is not applicable in this test report

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's test firm number for FCC: 319330

## 2.2 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. The BTL measurement uncertainty is less than the CISPR 16-4-2  $U_{cispr}$  requirement.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately **95 %** ◦

### A. Radiated Measurement :

| Test Site | Parameter               | Uncertainty |
|-----------|-------------------------|-------------|
| DG-CB12   | All emissions, radiated | ±6 dB       |

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

### 3. GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                     |  |  |  |
|---------------------|--|--|--|
| Equipment           | Smart Phone  |  |  |
| Brand Name          | HUAWEI   |  |  |
| Model Name          | HUAWEI Y560-L23, Y560-L23  |  |  |
| Model Difference    | Only differ in model name.   |  |  |
| Product Description | Operation Frequency:   | TX:1850.2MHz~1909.8MHz<br>RX:1930.2MHz~1989.8MHz |  |
|                     | Modulation Type:   | GMSK;8-PSK                                       |  |
|                     | EIRP Output Power  | 29.99 dBm  |  |
| Power Source        | #1 DC Voltage supplied from AC/DC adapter.<br>Brand/Model: HUAWEI / HW-050100U01(US)<br>Brand/Model: HUAWEI / HW-050100E01(EU)<br>#2 Supplied from battery.<br>Brand/Model: HUAWEI / HB474284RBC |  |  |
| Power Rating        | #1 I/P: 100-240V~ 50/60H 0.2A O/P: DC 5V 1A<br>#2 DC 3.8V 2000mAh  |  |  |

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. Channel List:

| Band                | Channel | Frequency |         |
|---------------------|---------|-----------|---------|
|                     |         | (MHz)     |         |
| 1850.2MHz~1909.8MHz | 512     | Low       | 1850.20 |
|                     | 661     | Mid       | 1880.00 |
|                     | 810     | High      | 1909.80 |

3. Table for Filed Antenna @GSM1900:

| Ant. | Manufacture | Model Name | Antenna Type | Connector | Gain (dBi) |
|------|-------------|------------|--------------|-----------|------------|
| 1    | N/A         | N/A        | Internal     | N/A       | -3.5       |

### 3.2 DESCRIPTION OF TEST MODES

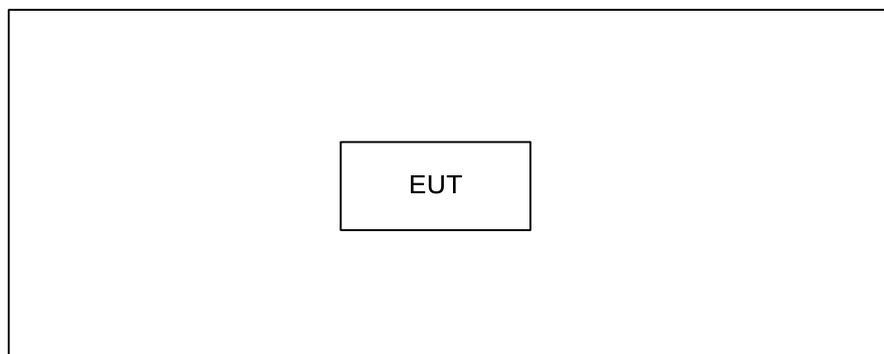
To investigate the maximum EMI emission characteristics generated from EUT, the test system was pre-scanning tested based on the consideration of following EUT operation mode or test configuration mode which possibly have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

| Test Items                             | Worst TX Mode | Channel     |
|--|---------------|-------------|
| Radiated RF Output                     | GSM/EDGE      | 512/661/810 |
| Spurious Radiated Emissions            | GSM/EDGE      | 512/661/810 |
| Band Edge Emissions                    | GSM/GPRS/EDGE | 512/810     |
| Frequency Stability                    | GSM/EDGE      | 661         |
| 99% Occupied Bandwidth                 | GSM/GPRS/EDGE | 512/661/810 |
| Spurious Emissions at Antenna Terminal | GSM           | 512/661/810 |
| Peak to Average Ratio                  | GSM/EDGE      | 661         |

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT is considered a portable unit; it was pre-tested on the positioning of each 3 axis. The worst case was found positioned on X-plane. Therefore only the test data of this X-plane was used for radiated emission measurement test.
- (3) Both adapter and battery are evaluated, operated the battery is the worst and recorded as below test data

### 3.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

| Item | Equipment | Mfr/Brand | Model/Type No. | FCC ID | Series No. | Note |
|------|-----------|-----------|----------------|--------|------------|------|
| -    | -         | -         | -              | -      | -          |      |

| Item | Shielded Type | Ferrite Core | Length | Note |
|------|---------------|--------------|--------|------|
| -    | -             | -            | -      |      |

## 4. TEST RESULT

### 4.1 RADIATED RF OUTPUT POWER MEASUREMENT

#### 4.1.1 LIMIT

The Radiated Peak Output Power shall be according to the specific rule Part 24.232(b) that “Mobile/Portable station are limited to 2 watts e.i.r.p.” and 24.232(c) specified that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.

#### 4.1.2 MEASURING INSTRUMENTS AND SETTING

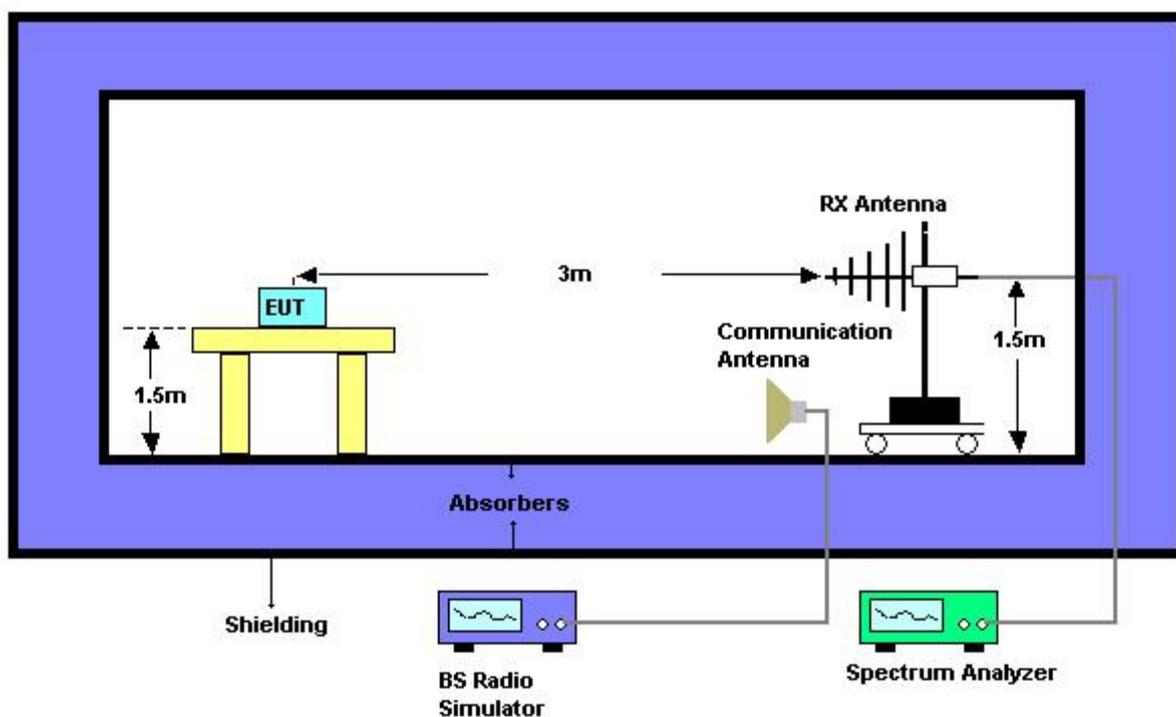
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting                      |
|---------------------|------------------------------|
| Attenuation         | Auto                         |
| Center Frequency    | Low / middle / high channels |
| Span Frequency      | 10MHz                        |
| RB / VB             | 3MHz / 3MHz for Peak         |

#### 4.1.3 TEST PROCEDURE

1. The EUT was set up for the maximum peak power with GSM link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810 (low, middle and high operational frequency range).
2. The conducted peak output power used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The path loss included the splitter loss, cable loss and 20dB pad loss. The spectrum set RB/VB 3MHz, then read peak power value and record to the test. (All transmitted path loss shall be considered in the test report data)
3. E.I.R.P peak power measurement. In the fully anechoic chamber, EUT placed on the 1.5m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
4. The substitution horn antenna is substituted for EUT at the same position, and signal generator export the CW signal to the calibration antenna. Rotated the Turn Table to find the maximum radiation power. “Raw” is the spectrum reading value, “SG” is signal generator export power, “TX Gain” is calibration antenna isotropic gain value, “TX cable” is the transmitted cable loss between the calibration antenna and signal generator. The “Factor” means that the transmission path loss is equal to “SG” - “TX cable” + “TX Gain” – “Raw”.
5. Actually the real E.I.R.P peak power is equal to “Read Value” + “Factor”

#### 4.1.4 TEST SETUP LAYOUT EIRP Power Measurement



#### 4.1.5 TEST DEVIATION

There is no deviation with the original standard.

#### 4.1.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

#### 4.1.7 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: DC 3.8V

#### 4.1.8 TEST RESULTS

Please refer to the Attachment A.

## 4.2 99% OCCUPIED BANDWIDTH MEASUREMENT

### 4.2.1 LIMIT

According to FCC 2.1049(h) specified that emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

### 4.2.2 MEASURING INSTRUMENTS AND SETTING

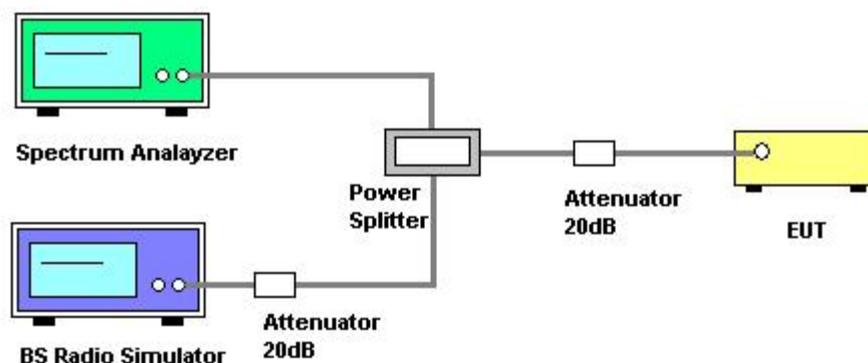
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting  |
|---------------------|--|
| Attenuation         | Auto   |
| Span Frequency      | Encompass the entire emissions bandwidth (EBW) of the signal |
| RB                  | 30 kHz   |
| VB                  | 100 kHz  |
| Trace               | Max Hold   |

### 4.2.3 TEST PROCEDURE

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Used measurement function of spectrum to measure the 99% occupied bandwidth..

### 4.2.4 TEST SETUP LAYOUT



### 4.2.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.2.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### 4.2.7 EUT TEST CONDITIONS

Temperature: 25°C  
 Relative Humidity: 55%  
 Test Voltage: DC 3.8V

#### **4.2.8 TEST RESULTS**

Please refer to the Attachment B.

### 4.3 SPURIOUS EMISSIONS AT ANTENNA TERMINALS MEASUREMENT

#### 4.3.1 LIMIT

In the FCC 22.917(a), on any frequency outside a licensee's frequency block within GSM spectrum, the power of any emission shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB. The limit translates in the relevant power range (2 to 0.003W). At 2W(Power Control Level 5) the specified minimum attenuation becomes 43dB and the limit of emission equal to  $-13\text{dBm}$

#### 4.3.2 MEASURING INSTRUMENTS AND SETTING

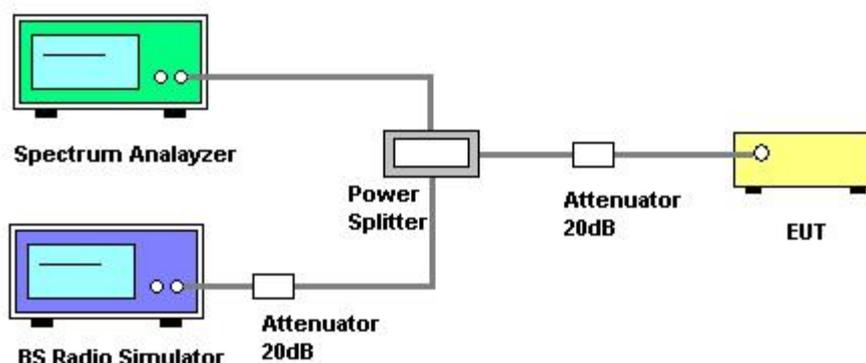
Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting               |
|---------------------|-----------------------|
| Attenuation         | Auto                  |
| Start Frequency     | 30MHz                 |
| Stop Frequency      | 10th carrier harmonic |
| RB / VB             | 1 MHz / 1MHz for Peak |

#### 4.3.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EDGE** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 3 channels, 512, 661 and 810(low, middle and high operational frequency range.)
2. The conducted spurious emission used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. This splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. When the spectrum scanned from 30MHz to 3GHz, it shall be connected to the band reject filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.
4. When the spectrum scanned from 3GHz to 10GHz, it shall be connected to the high pass filter attenuated the carried frequency. The spectrum set RB/VB 1MHz.

#### 4.3.4 TEST SETUP LAYOUT



#### 4.3.5 TEST DEVIATION

There is no deviation with the original standard.

#### 4.3.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

#### **4.3.7 EUT TEST CONDITIONS**

Temperature: 25°C  
Relative Humidity: 55%  
Test Voltage:DC 3.8V

#### **4.3.8 TEST RESULTS**

Please refer to the Attachment C.

## 4.4 SPURIOUS RADIATED EMISSIONS MEASUREMENT

### 4.4.1 LIMIT

Out of band emissions, The power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB. In the 1 MHz bands immediately outside the frequency block. The spurious emissions of limit equal to  $-13\text{dBm}$ .

### 4.4.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting               |
|---------------------|-----------------------|
| Attenuation         | Auto                  |
| Start Frequency     | 30 MHz                |
| Stop Frequency      | 10th carrier harmonic |
| Detector            | Positive Peak         |
| Span                | 100 MHz               |
| Sweep Time          | 1s                    |
| RB / VB             | 1 MHz / 1MHz          |
| Attenuation         | Positive Peak         |

### 4.4.3 TEST PROCEDURES

1. The EUT was placed on the top of the turntable in fully anechoic chamber.
2. The test shall be made in the transmitting mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. This measurement shall be repeated with the transmitter in standby mode where applicable.
4. For 30~1000MHz spurious emissions measurement, the broad band bi-log receiving antenna was placed 3 meters far away from the turntable. For 1~10th carrier harmonic measurement, the receiving Horn antenna was placed 1.5 meters far away from the turntable.
5. The broadband receiving antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization. Each recorded suspected value is indicated as Read Level (Raw).
6. Replace the EUT by standard antenna and feed the RF port by signal generator.
7. Adjust the frequency of the signal generator to the suspected emission and slightly rotate the turntable to locate the position with maximum reading.
8. Adjust the power level of the signal generator to reach the same reading with Read Level (Raw).
9. The level of the spurious emission is the power level of (8) plus the gain of the standard antenna in dBi and minus the loss of the cable used between the signal generator and the standard antenna.

**4.4.4 TEST SETUP LAYOUT**

This test setup layout is the same as that shown in section 4.2.4.

**4.4.5 TEST DEVIATION**

There is no deviation with the original standard.

**4.4.6 EUT OPERATION DURING TEST**

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

**4.4.7 EUT TEST CONDITIONS**

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: DC 3.8V

**4.4.8 TEST RESULTS**

Please refer to the Attachment D.

## 4.5 BAND EDGE MEASUREMENT

### 4.5.1 LIMIT

According to FCC 22.917(a) specified that 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 . In the 1 MHz 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. Then we measure that the bandwidth is about 300kHz and the resolution bandwidth is 3kHz.

### 4.5.2 MEASURING INSTRUMENTS AND SETTING

Please refer to section 5 in this report. The following table is the setting of the Spectrum Analyzer.

| Spectrum Parameters | Setting        |
|---------------------|----------------|
| Attenuation         | Auto           |
| Span Frequency      | 5 MHz          |
| RB / VB             | 10 kHz /30 kHz |
| Trace               | Sample         |
| Sweep Time          | Auto           |

### 4.5.3 TEST PROCEDURES

1. The EUT was set up for the maximum peak power with **GSM/EDGE** link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels, 512 and 810(low and high operational frequency range.)
2. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer. The splitter loss and cable loss are the worst loss 4dB in the transmitted path track.
3. The center frequency of spectrum is the band edge frequency and span is 2 MHz. RB of the spectrum is 10kHz and VB of the spectrum is 30KHz.
4. Record the Sample trace plot into the test report.

### 4.5.4 TEST SETUP LAYOUT

This test setup layout is the same as that shown in section 4.2.4.

### 4.5.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.5.6 EUT OPERATION DURING TEST

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### 4.5.7 EUT TEST CONDITIONS

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: DC 3.8V

#### **4.5.8 TEST RESULTS**

Please refer to the Attachment E.

## 4.6 FREQUENCY STABILITY MEASUREMENT

### 4.6.1 LIMIT

According to the FCC part 22.355 shall be tested the frequency stability. The rule is defined that "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block." The frequency error rate is according to the JTC standard that the frequency error rate shall be accurate to within 2.5 ppm of the received frequency from the base station. The test extreme voltage is according to the 2.1055(d)(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment and the extreme temperature rule is comply with the 2.1055(a)(1)  $-30^{\circ}\text{C} \sim 50^{\circ}\text{C}$ .

### 4.6.2 MEASURING INSTRUMENTS AND SETTING

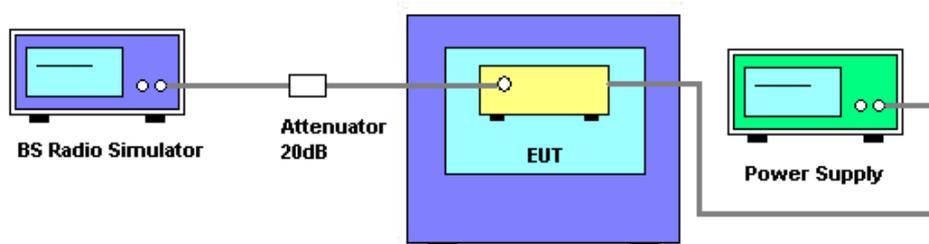
Please refer to section 5 in this report. The following table is the setting of the BS Simulator.

| Spectrum Parameters | Setting                                 |
|---------------------|---|
| Frequency Error     | The maximum of transmit frequency error |

### 4.6.3 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the BS Simulator.
2. The BS simulator was used to set the TX channel and power level and modulate the TX signal with different bit patterns.
3. BS simulator used the frequency error function and measured the peak frequency error. Power must be removed when changing from one temperature to another or one voltage to another voltage. Power warm up is at least 15 min and power applied should perform before recording frequency error. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.
4. EUT is connected the external power supply to control the DC input power. The various Volts from the minimum 3.1 Volts to 4.3 Volts. Each step shall be record the frequency error rate.
5. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value.
6. Extreme temperature rule is  $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$ .

### 4.6.4 TEST SETUP LAYOUT



### 4.6.5 TEST DEVIATION

There is no deviation with the original standard.

### 4.6.6 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

**4.6.7 EUT TEST CONDITIONS**

Temperature: 25°C  
Relative Humidity: 55%  
Test Voltage: DC 3.8V

**4.6.8 TEST RESULTS**

Please refer to the Attachment F.

## **4.7 PEAK TO AVERAGE RATIO**

### **4.7.1 LIMIT**

In the FCC 24.232 (d) & RSS-133 section 6.4

Peak transmit power shall be measured over any interval of continuous transmission using instrumentation calibrated in terms of rms-equivalent voltage.

The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

To measure transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission shall not exceed 13 dB.

### **4.7.2 TEST PROCEDURES**

1. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;

### **4.7.3 TEST SETUP LAYOUT**

Please refer to section 3.4 in this report.

### **4.7.4 TEST DEVIATION**

There is no deviation with the original standard.

### **4.7.5 EUT OPERATION DURING TEST**

The BS simulator was used to set the TX channel and power level and modulate the TX signal.

### **4.7.6 EUT TEST CONDITIONS**

Temperature: 25°C

Relative Humidity: 55%

Test Voltage: DC 3.8V

### **4.7.7 TEST RESULTS**

Please refer to the Attachment G.

## 5. LIST OF MEASUREMENT EQUIPMENTS

| Radiated Emission Measurement |                                     |                             |   |            |                  |
|-------------------------------|-------------------------------------|-----------------------------|---|------------|------------------|
| Item                          | Kind of Equipment                   | Manufacturer                | Type No.                                | Serial No. | Calibrated until |
| 1                             | EXA Spectrum Analyzer               | Agilent                     | N9010A                                  | MY50520044 | Mar. 28, 2016    |
| 2                             | Microwave Preamplifier With Adaptor | EMC INSTRUMENT              | EMC012645B                              | 980221     | Oct. 22, 2015    |
| 3                             | Amplifier                           | Agilent                     | 8449B                                   | 3008A02274 | Nov. 02, 2015    |
| 4                             | Double Ridged Guide Antenna         | ETS-LINDGREN                | 3115                                    | 00075846   | Mar. 28, 2016    |
| 5                             | Antenna                             | SCHWARZBECK                 | VULB 9160                               | 9160-3231  | Mar. 28, 2016    |
| 6                             | Test Cable                          | N/A                         | CL-CB12-001                             | N/A        | Oct. 22, 2015    |
| 7                             | Test Cable                          | N/A                         | CL-CB12-004                             | N/A        | Oct. 22, 2015    |
| 8                             | Test Cable                          | N/A                         | CL-CB12-006                             | N/A        | Oct. 22, 2015    |
| 9                             | Controller                          | CT                          | SC100                                   | N/A        | N/A              |
| 10                            | Wireless Communication Test SET     | (8960 Series )<br>Agilent   | E5515C                                  | MY48364183 | Mar. 15, 2016    |
| 11                            | Band Reject Filter                  | Wairwright Instruments Gmbh | WRCG<br>1710/1785-1690<br>/1805-60/12SS | 38         | Mar. 04, 2016    |
| 12                            | Band Reject Filter                  | Wairwright Instruments Gmbh | WRCG<br>824/849-810/86<br>3-60/9SS      | 7          | Mar. 04, 2016    |
| 13                            | Band Reject Filter                  | Wairwright Instruments Gmbh | WRCG<br>880/915-860/93<br>5-60/9SS      | 14         | Mar. 04, 2016    |
| 14                            | Band Reject Filter                  | Wairwright Instruments Gmbh | WRCG<br>1850/1910-1830<br>/1930-60/10SS | 17         | Mar. 04, 2016    |

| Antenna Conducted Spurious Emission Measurement |                                 |                      |          |            |                  |
|---|---------------------------------|----------------------|----------|------------|------------------|
| Item  | Kind of Equipment               | Manufacturer         | Type No. | Serial No. | Calibrated until |
| 1   | Spectrum Analyzer               | R&S                  | FSP 40   | 100185     | Nov. 02, 2015    |
| 2   | Wireless Communication Test SET | (8960 Series)Agilent | E5515C   | MY48364183 | Mar. 28, 2016    |

| Band Edge Measurement |                                 |                      |          |            |                  |
|-----------------------|---------------------------------|----------------------|----------|------------|------------------|
| Item                  | Kind of Equipment               | Manufacturer         | Type No. | Serial No. | Calibrated until |
| 1                     | Spectrum Analyzer               | R&S                  | FSP 40   | 100185     | Nov. 02, 2015    |
| 2                     | Wireless Communication Test SET | (8960 Series)Agilent | E5515C   | MY48364183 | Mar. 28, 2016    |

| 99% Occupied Bandwidth Measurement |                                 |                      |          |            |                  |
|------------------------------------|---------------------------------|----------------------|----------|------------|------------------|
| Item                               | Kind of Equipment               | Manufacturer         | Type No. | Serial No. | Calibrated until |
| 1                                  | Spectrum Analyzer               | R&S                  | FSP 40   | 100185     | Nov. 02, 2015    |
| 2                                  | Wireless Communication Test SET | (8960 Series)Agilent | E5515C   | MY48364183 | Mar. 28, 2016    |

| Frequency Stability Measurement |                                 |                      |          |            |                  |
|---------------------------------|---------------------------------|----------------------|----------|------------|------------------|
| Item                            | Kind of Equipment               | Manufacturer         | Type No. | Serial No. | Calibrated until |
| 1                               | Spectrum Analyzer               | R&S                  | FSP 40   | 100185     | Nov. 02, 2015    |
| 2                               | Wireless Communication Test SET | (8960 Series)Agilent | E5515C   | MY48364183 | Mar. 28, 2016    |

Remark: "N/A" denotes no model name, serial no. or calibration specified.  
 All calibration period of equipment list is one year.

## **ATTACHMENT A - RADIATED RF OUTPUT POWER**

Test Mode : TX CH 512/661/810-GSM

| GSM 1900 |   | EIRP Power(dBm) |             |             | Max. Limit (dBm) | Result   |
|----------|---|-----------------|-------------|-------------|------------------|----------|
|          |   | Channel 512     | Channel 661 | Channel 810 |                  |          |
| GSM      | V | 21.27           | 20.54       | 19.91       | 33               | Complies |
|          | H | 29.48           | 29.78       | 29.99       | 33               | Complies |
| EDGE     | V | 14.90           | 15.61       | 17.97       | 33               | Complies |
|          | H | 25.70           | 25.34       | 26.48       | 33               | Complies |

| GSM 850     |           | Conducted Power(dBm) |             |             |
|-------------|-----------|----------------------|-------------|-------------|
|             |           | Channel 512          | Channel 661 | Channel 810 |
| GSM (CS)    |           | 30.28                | 30.29       | 30.31       |
| GPRS (GMSK) | 1 Tx Slot | 30.05                | 30.35       | 30.36       |
|             | 2 Tx Slot | 27.48                | 27.61       | 27.64       |
|             | 3 Tx Slot | 26.02                | 26.19       | 26.28       |
|             | 4 Tx Slot | 23.86                | 23.83       | 24.30       |
| EDGE (GMSK) | 1 Tx Slot | 30.09                | 30.27       | 30.30       |
|             | 2 Tx Slot | 27.56                | 27.96       | 27.93       |
|             | 3 Tx Slot | 26.11                | 26.63       | 26.64       |
|             | 4 Tx Slot | 23.85                | 23.92       | 25.05       |
| EDGE (8PSK) | 1 Tx Slot | 27.60                | 27.20       | 27.40       |
|             | 2 Tx Slot | 24.66                | 24.85       | 24.80       |
|             | 3 Tx Slot | 23.10                | 23.27       | 23.32       |
|             | 4 Tx Slot | 21.40                | 21.23       | 21.28       |

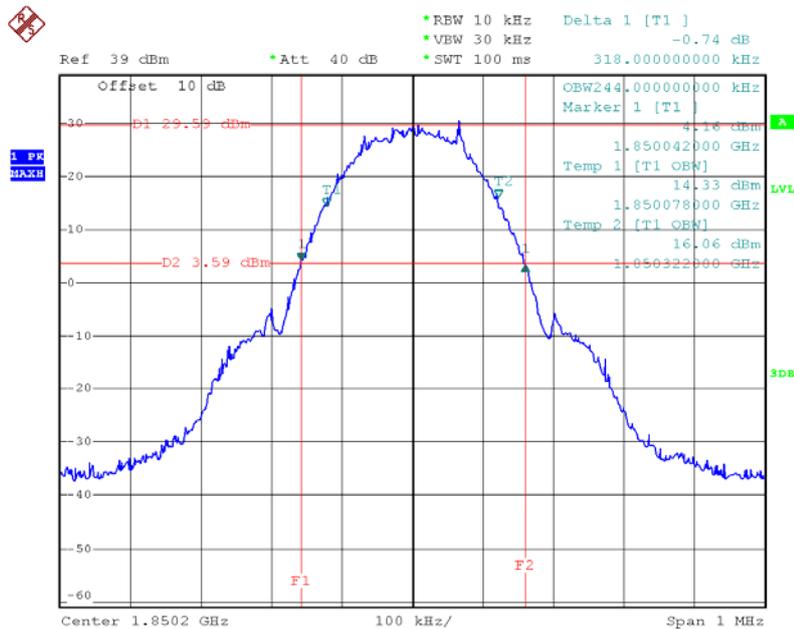
**REMARKS:**

1. Radiated Output Power(dBm)=Raw Value(dBm) + Correction Factor(dB) +Ant Gain(dBi)
2. Correction Factor(dB) = Power Splitter Loss(dB) + Cable Loss(dB)
3. The EUT does employ a power control function by which the output power is controlled from +28dBm to +19dBm (nominal) by 2dB steps. Consequently the EUT meets the requirement of Part24.232(c).
4. The antenna gain is -3.5dBi

## **ATTACHMENT B - 99% OCCUPIED BANDWIDTH**

| Test Mode : TX Mode Configuration GSM |             |               |                       |          |
|---------------------------------------|-------------|---------------|-----------------------|----------|
| Channel                               | Frequency   | 99% OBW (MHz) | -26dBc Bandwidth(MHz) | Result   |
| 512                                   | 1850.20MHz  | 0.244         | 0.318                 | Complies |
| 661                                   | 1880.00 MHz | 0.244         | 0.318                 | Complies |
| 810                                   | 1909.80 MHz | 0.244         | 0.318                 | Complies |

### 99% Occupied Bandwidth channel 512

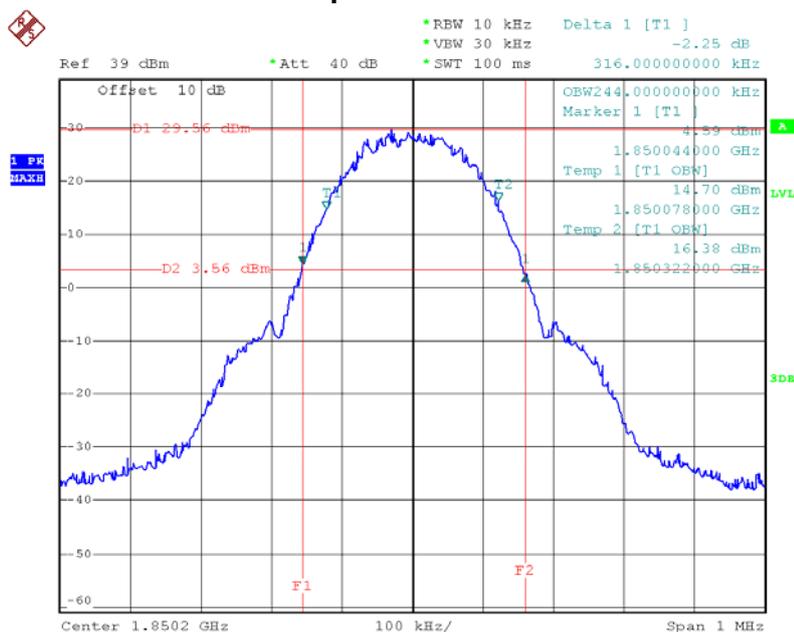


Date: 5.JUN.2015 10:22:31



| Test Mode : TX Mode Configuration GPRS |             |               |                       |          |
|--|-------------|---------------|-----------------------|----------|
| Channel                                | Frequency   | 99% OBW (MHz) | -26dBc Bandwidth(MHz) | Result   |
| 512                                    | 1850.20MHz  | 0.244         | 0.316                 | Complies |
| 661                                    | 1880.00 MHz | 0.246         | 0.318                 | Complies |
| 810                                    | 1909.80 MHz | 0.242         | 0.324                 | Complies |

### 99% Occupied Bandwidth channel 512

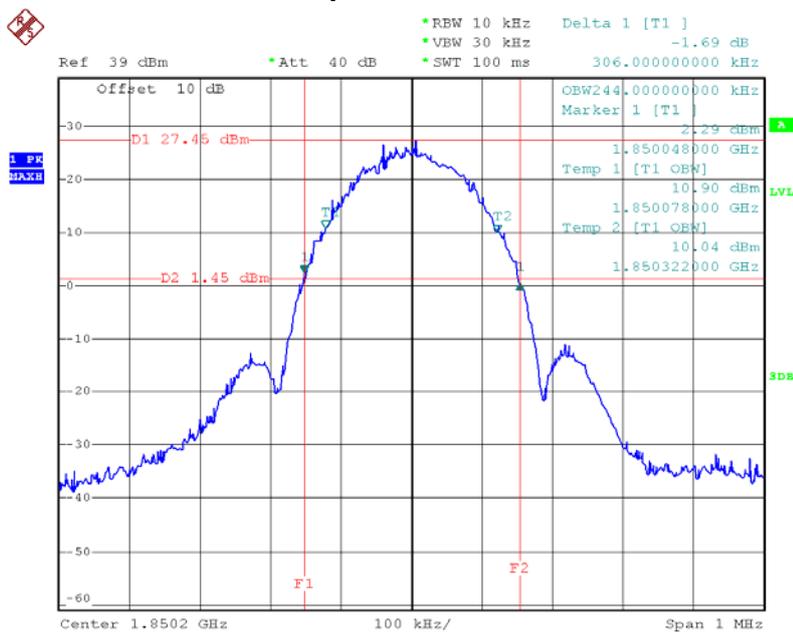


Date: 5.JUN.2015 10:24:45



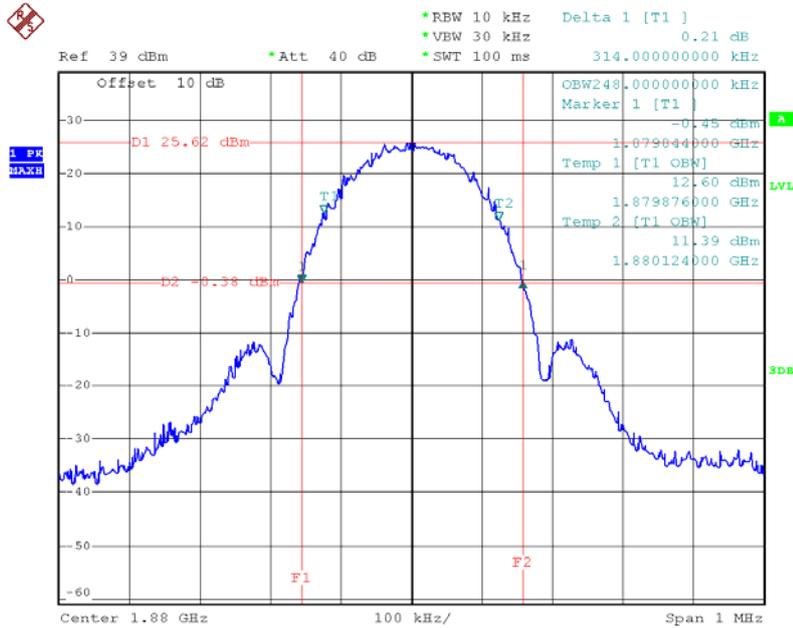
| Test Mode : TX Mode Configuration EDGE |             |               |                       |          |
|--|-------------|---------------|-----------------------|----------|
| Channel                                | Frequency   | 99% OBW (MHz) | -26dBc Bandwidth(MHz) | Result   |
| 512                                    | 1850.20MHz  | 0.244         | 0.306                 | Complies |
| 661                                    | 1880.00 MHz | 0.248         | 0.314                 | Complies |
| 810                                    | 1909.80 MHz | 0.246         | 0.308                 | Complies |

### 99% Occupied Bandwidth channel 512



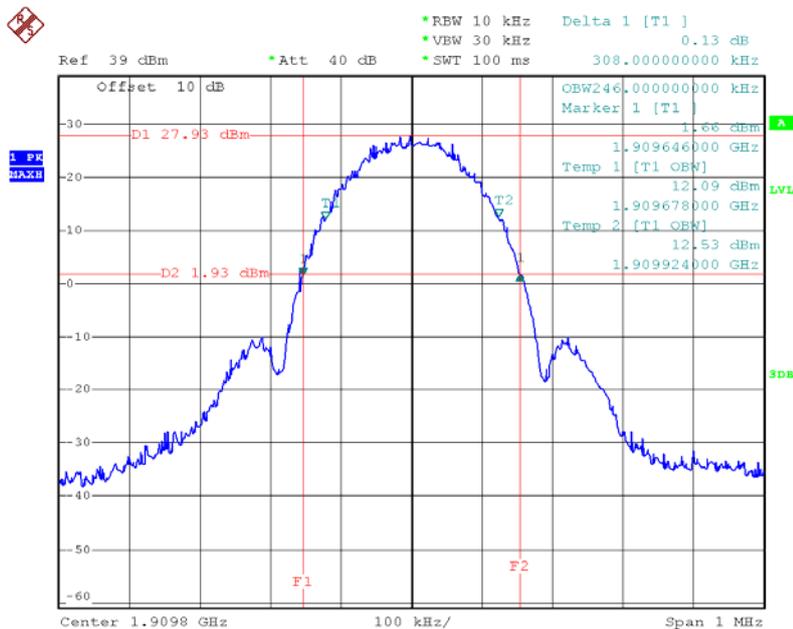
Date: 5.JUN.2015 10:27:03

### 99% Occupied Bandwidth channel 661



Date: 5.JUN.2015 11:53:50

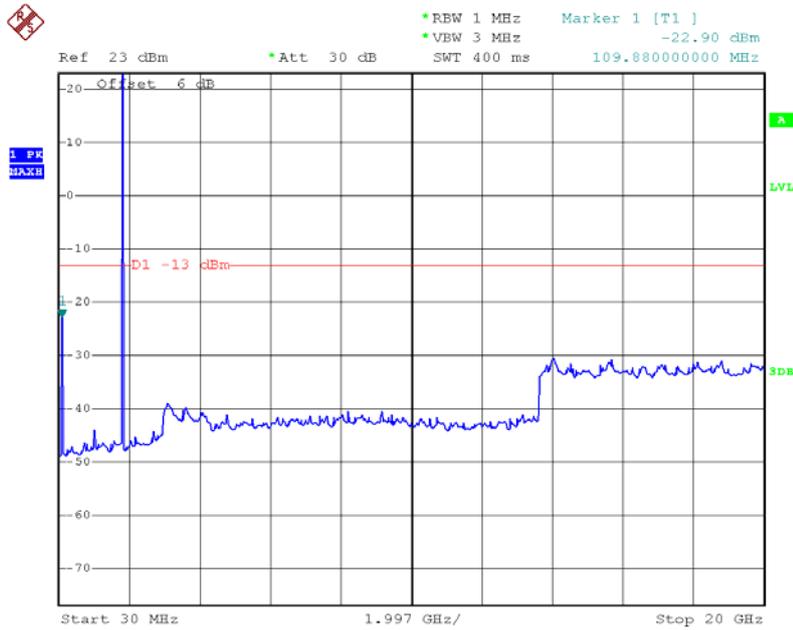
### 99% Occupied Bandwidth channel 810



Date: 5.JUN.2015 12:02:00

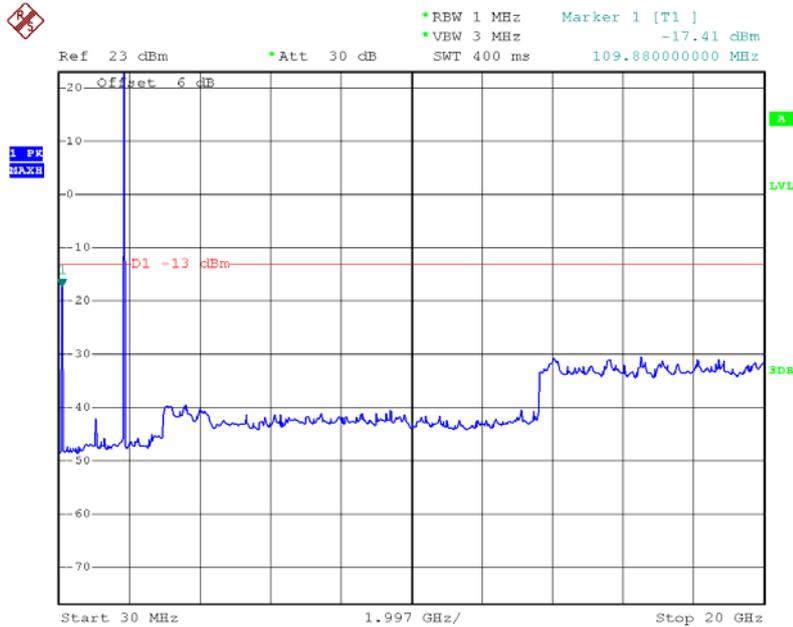
## **ATTACHMENT C - SPURIOUS EMISSIONS AT ANTENNA TERMINALS**

### Conducted Spurious of Configuration- GSM channel 512



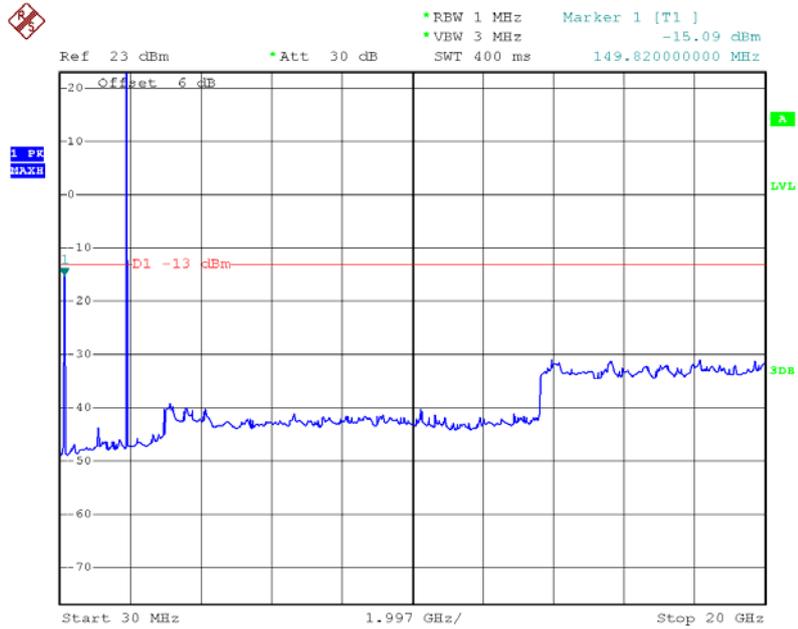
Date: 5.JUN.2015 14:45:28

### Conducted Spurious of Configuration- GSM channel 661



Date: 5.JUN.2015 14:47:01

### Conducted Spurious of Configuration- GSM channel 810

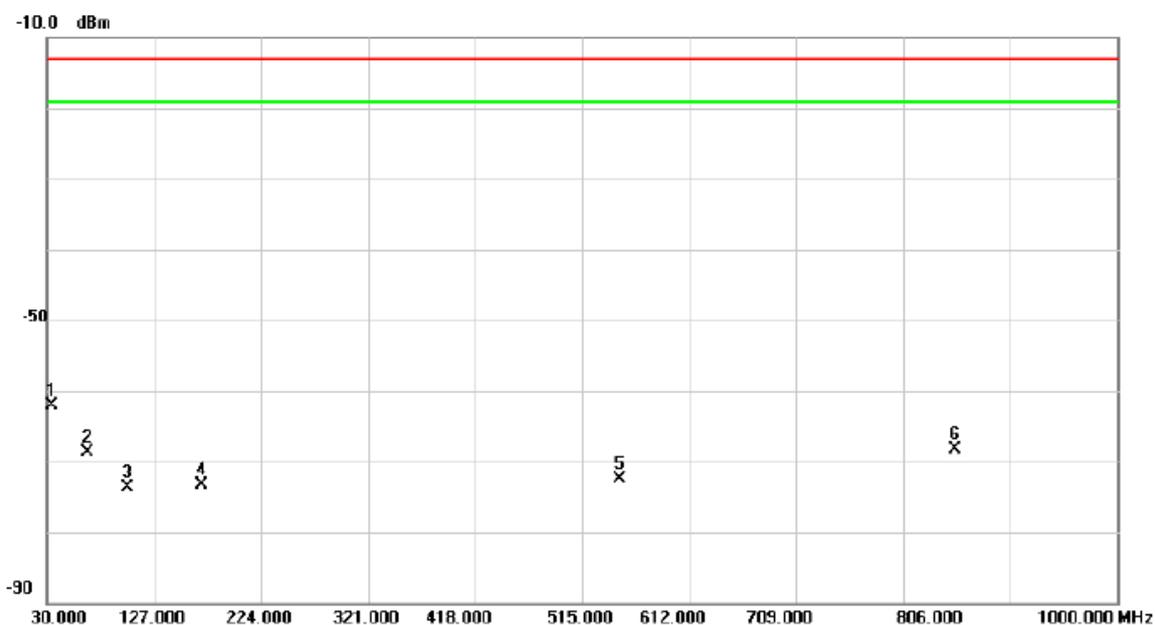


Date: 5.JUN.2015 14:48:41

## **ATTACHMENT D - SPURIOUS RADIATED EMISSION**

Test Mode : TX CH661 GSM

Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 33.8800      | -60.85                  | -1.20                   | -62.05                  | -13.0        | -49.05     | peak     |         |
| 2   |     | 66.8600      | -69.44                  | 0.65                    | -68.79                  | -13.0        | -55.79     | peak     |         |
| 3   |     | 102.7500     | -72.35                  | -1.28                   | -73.63                  | -13.0        | -60.63     | peak     |         |
| 4   |     | 169.6800     | -73.36                  | -0.01                   | -73.37                  | -13.0        | -60.37     | peak     |         |
| 5   |     | 548.9500     | -80.00                  | 7.45                    | -72.55                  | -13.0        | -59.55     | peak     |         |
| 6   |     | 852.5600     | -82.59                  | 14.39                   | -68.20                  | -13.0        | -55.20     | peak     |         |

Test Mode : TX CH661 GSM

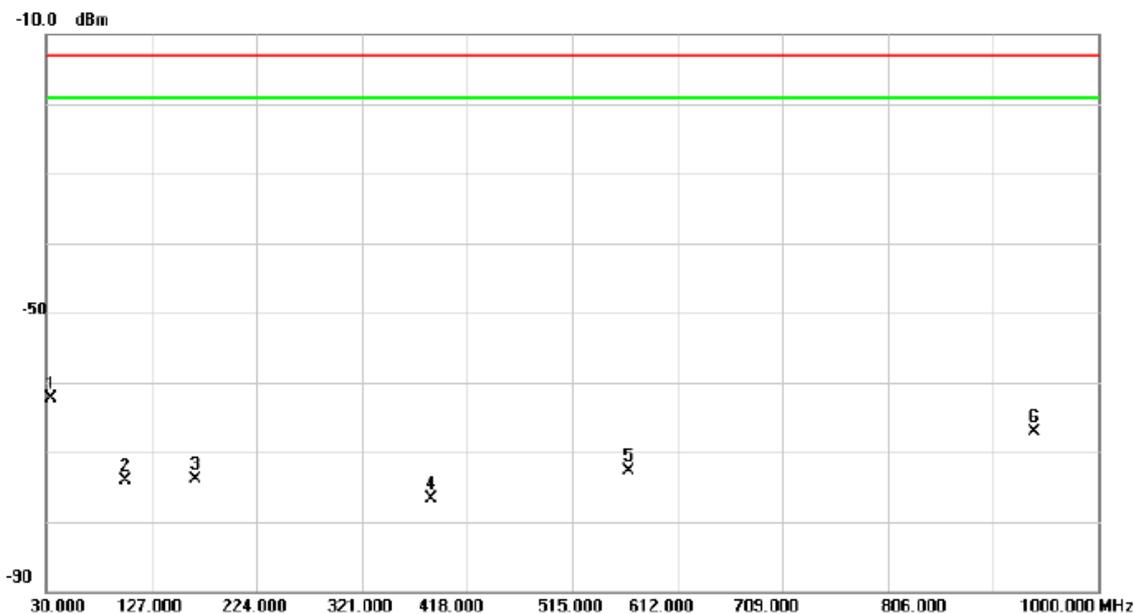
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 32.9100      | -69.23                  | 0.96                    | -68.27                  | -13.0        | -55.27     | peak     |         |
| 2   |     | 103.7200     | -69.86                  | -3.33                   | -73.19                  | -13.0        | -60.19     | peak     |         |
| 3   |     | 169.6800     | -73.12                  | -1.28                   | -74.40                  | -13.0        | -61.40     | peak     |         |
| 4   |     | 420.9100     | -80.85                  | 6.78                    | -74.07                  | -13.0        | -61.07     | peak     |         |
| 5   |     | 588.7200     | -80.37                  | 8.90                    | -71.47                  | -13.0        | -58.47     | peak     |         |
| 6   | *   | 730.3400     | -81.13                  | 13.25                   | -67.88                  | -13.0        | -54.88     | peak     |         |

Test Mode : TX CH661 EDGE

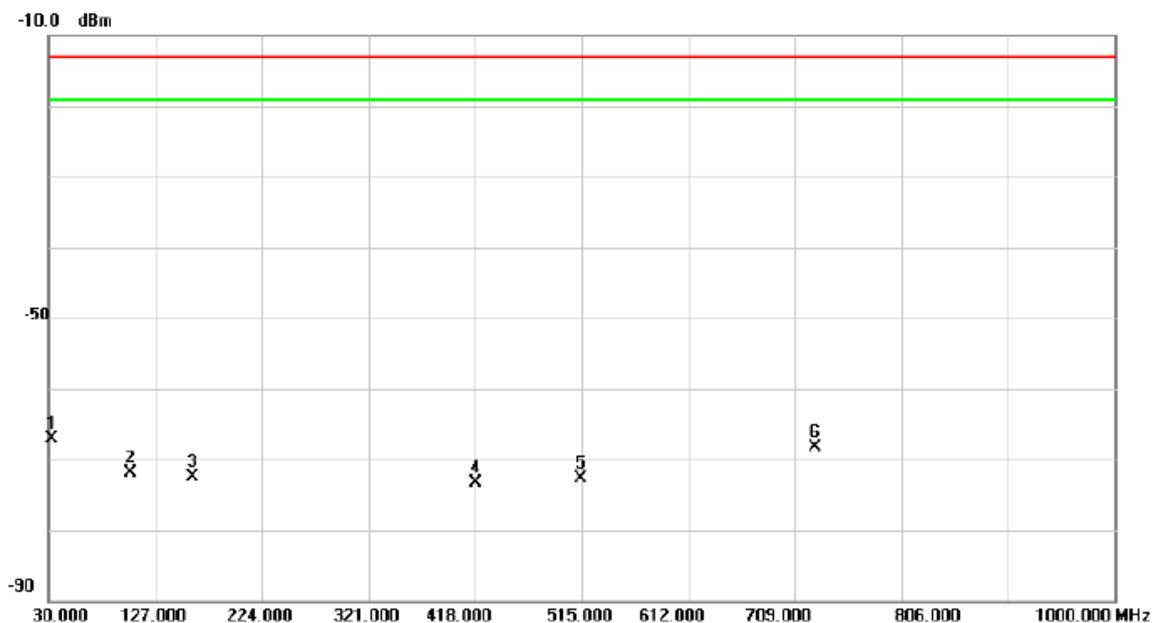
Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 34.8500      | -60.77                  | -1.43                   | -62.20                  | -13.0        | -49.20     | peak     |         |
| 2   |     | 102.7500     | -72.84                  | -1.28                   | -74.12                  | -13.0        | -61.12     | peak     |         |
| 3   |     | 167.7400     | -74.53                  | 0.63                    | -73.90                  | -13.0        | -60.90     | peak     |         |
| 4   |     | 385.0200     | -80.66                  | 3.90                    | -76.76                  | -13.0        | -63.76     | peak     |         |
| 5   |     | 567.3800     | -80.54                  | 7.88                    | -72.66                  | -13.0        | -59.66     | peak     |         |
| 6   |     | 940.8300     | -81.34                  | 14.24                   | -67.10                  | -13.0        | -54.10     | peak     |         |

Test Mode : TX CH661 EDGE

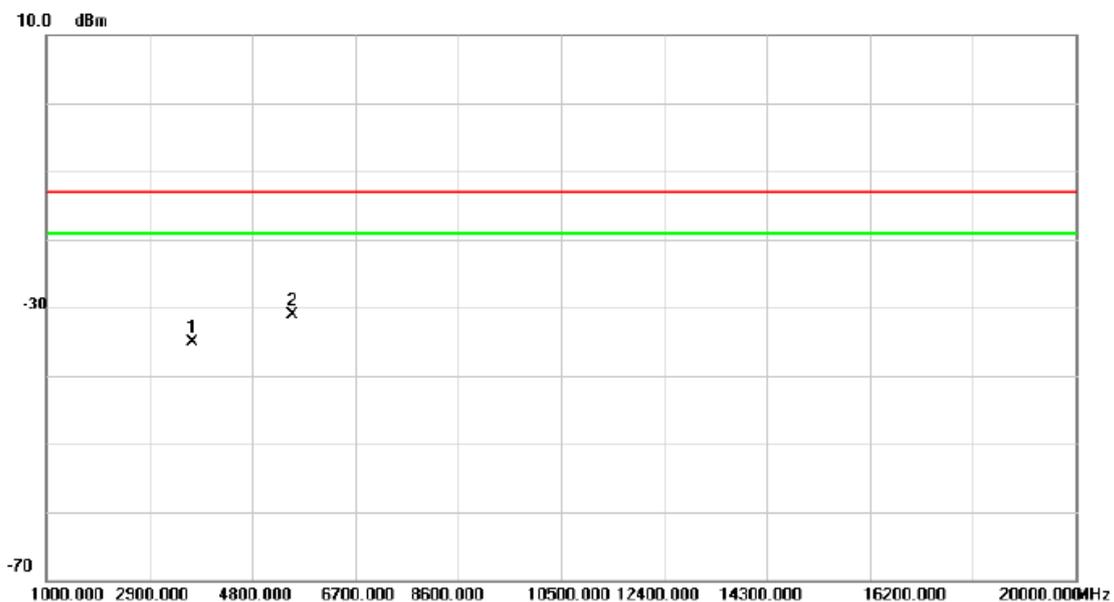
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 32.9100      | -68.14                  | 0.96                    | -67.18                  | -13.0        | -54.18     | peak     |         |
| 2   |     | 103.7200     | -68.65                  | -3.33                   | -71.98                  | -13.0        | -58.98     | peak     |         |
| 3   |     | 160.9500     | -74.92                  | 2.35                    | -72.57                  | -13.0        | -59.57     | peak     |         |
| 4   |     | 418.0000     | -80.17                  | 6.78                    | -73.39                  | -13.0        | -60.39     | peak     |         |
| 5   |     | 514.0300     | -80.68                  | 8.07                    | -72.61                  | -13.0        | -59.61     | peak     |         |
| 6   |     | 727.4300     | -81.53                  | 13.32                   | -68.21                  | -13.0        | -55.21     | peak     |         |

Test Mode : TXCH512 GSM

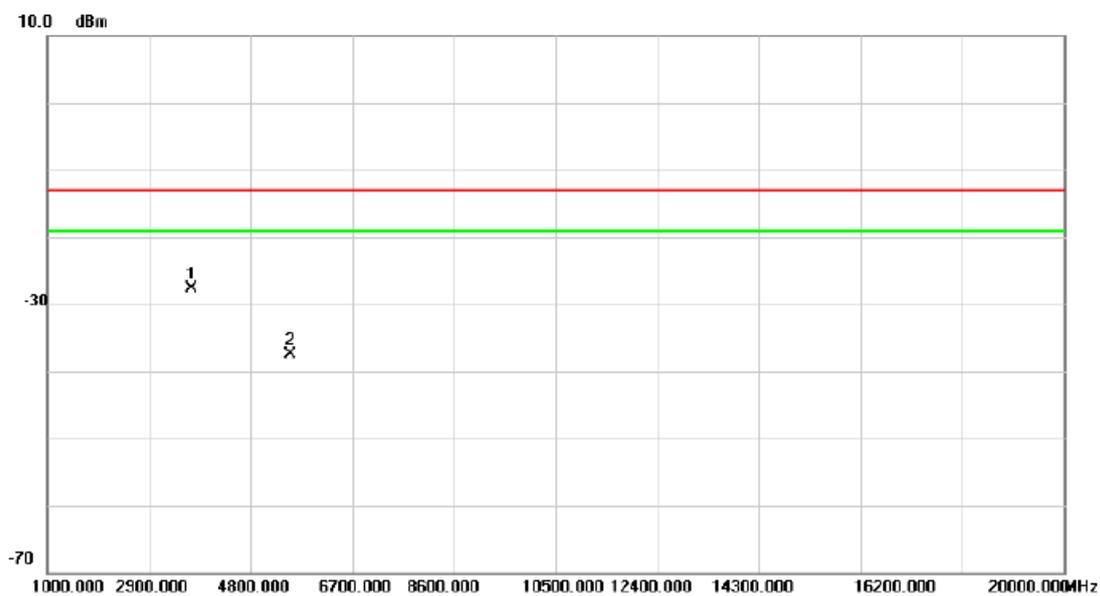
Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3700.120     | -41.01                  | 5.94                    | -35.07                  | -13.0        | -22.07     | peak     |         |
| 2   | *   | 5550.660     | -44.11                  | 13.00                   | -31.11                  | -13.0        | -18.11     | peak     |         |

Test Mode : TXCH512 GSM

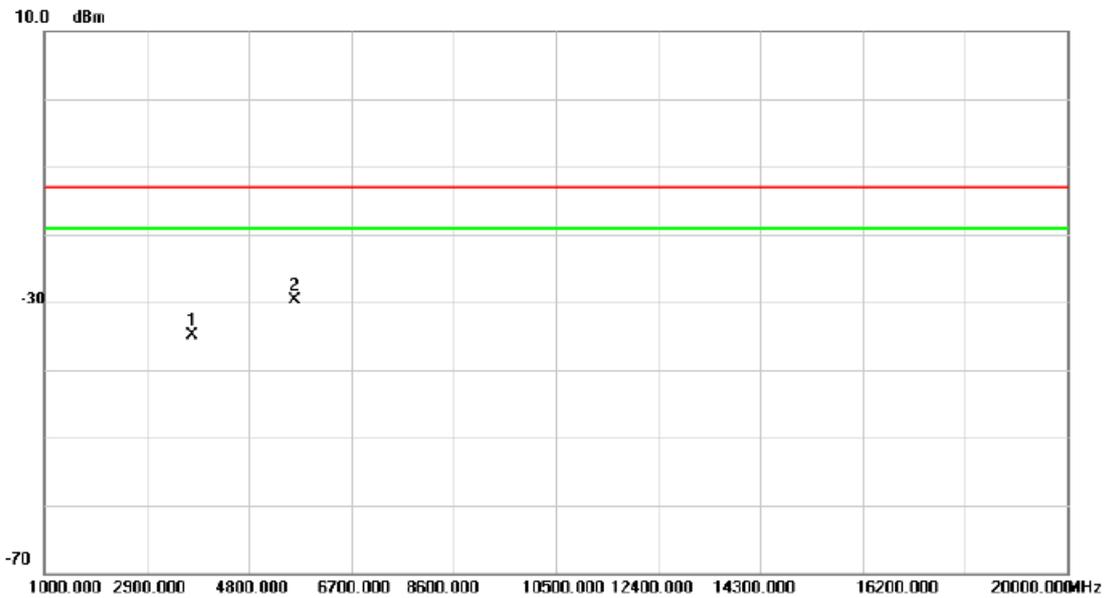
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 3700.460     | -35.16                  | 7.49                    | -27.67                  | -13.0        | -14.67     | peak     |         |
| 2   |     | 5550.640     | -46.18                  | 8.59                    | -37.59                  | -13.0        | -24.59     | peak     |         |

Test Mode : TX CH661 GSM

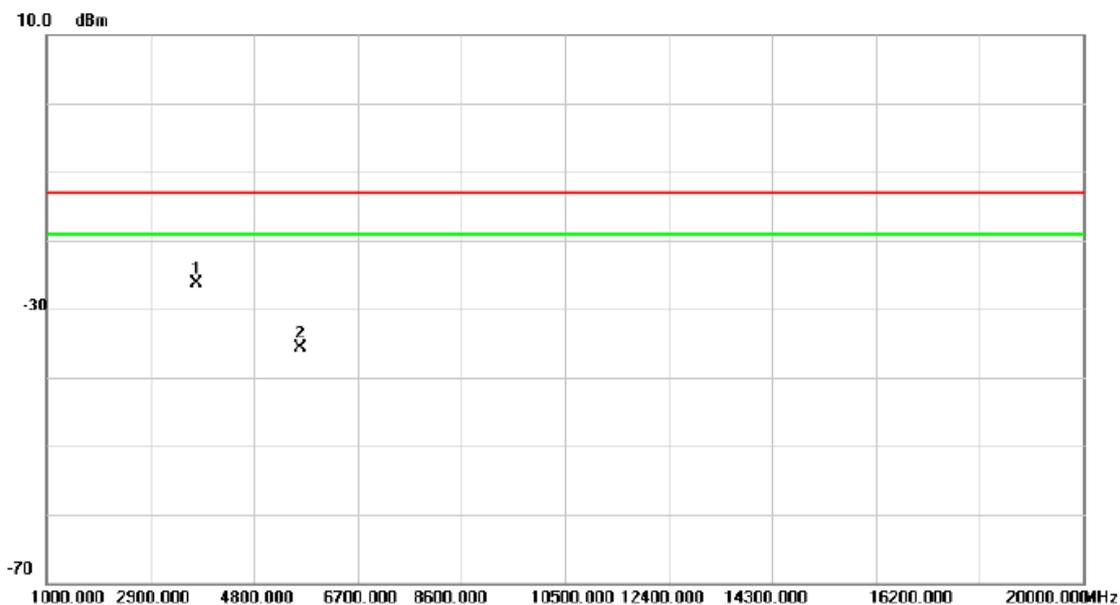
### Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3759.960     | -41.14                  | 6.24                    | -34.90                  | -13.0        | -21.90     | peak     |         |
| 2   | *   | 5639.800     | -42.91                  | 13.22                   | -29.69                  | -13.0        | -16.69     | peak     |         |

Test Mode : TX CH661 GSM

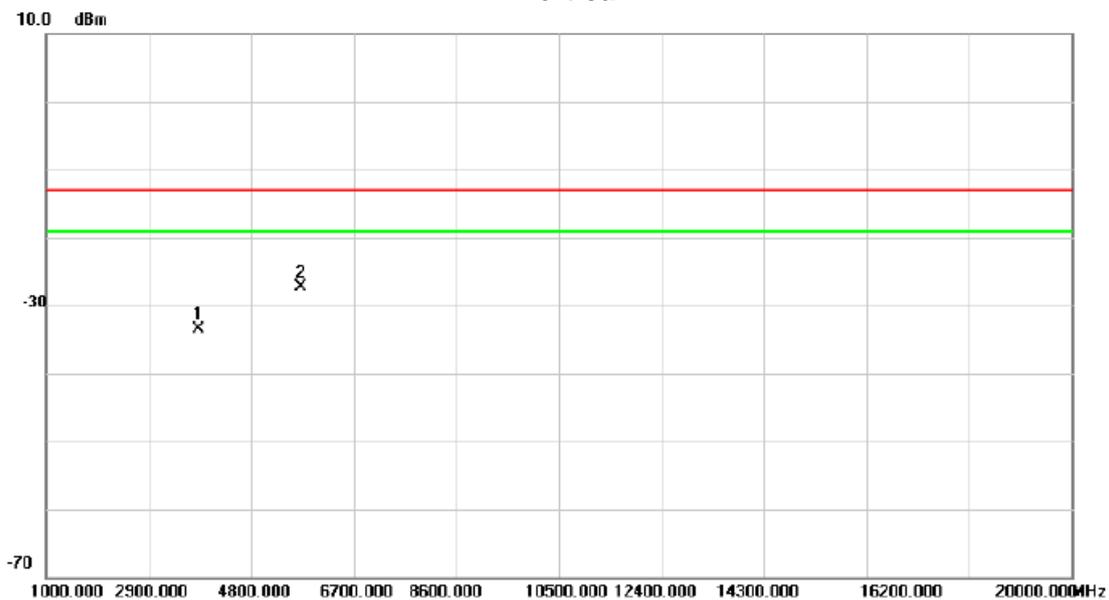
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 3760.120     | -33.86                  | 7.50                    | -26.36                  | -13.0        | -13.36     | peak     |         |
| 2   |     | 5639.840     | -44.45                  | 8.72                    | -35.73                  | -13.0        | -22.73     | peak     |         |

Test Mode : TX CH810 GSM

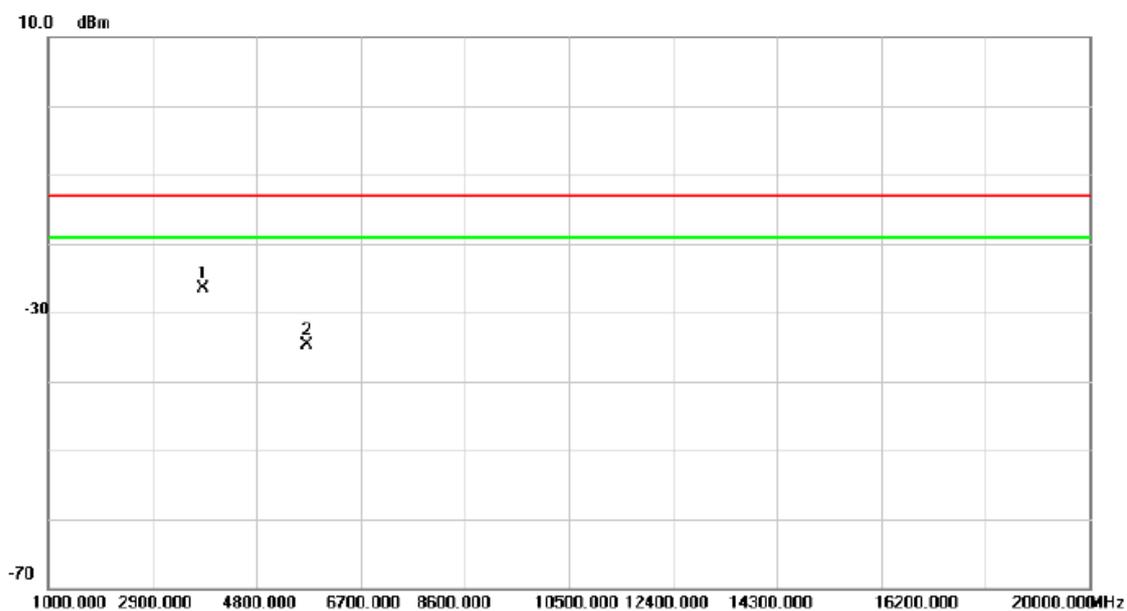
Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3819.740     | -39.98                  | 6.53                    | -33.45                  | -13.0        | -20.45     | peak     |         |
| 2   | *   | 5729.280     | -40.72                  | 13.43                   | -27.29                  | -13.0        | -14.29     | peak     |         |

Test Mode : TX CH810 GSM

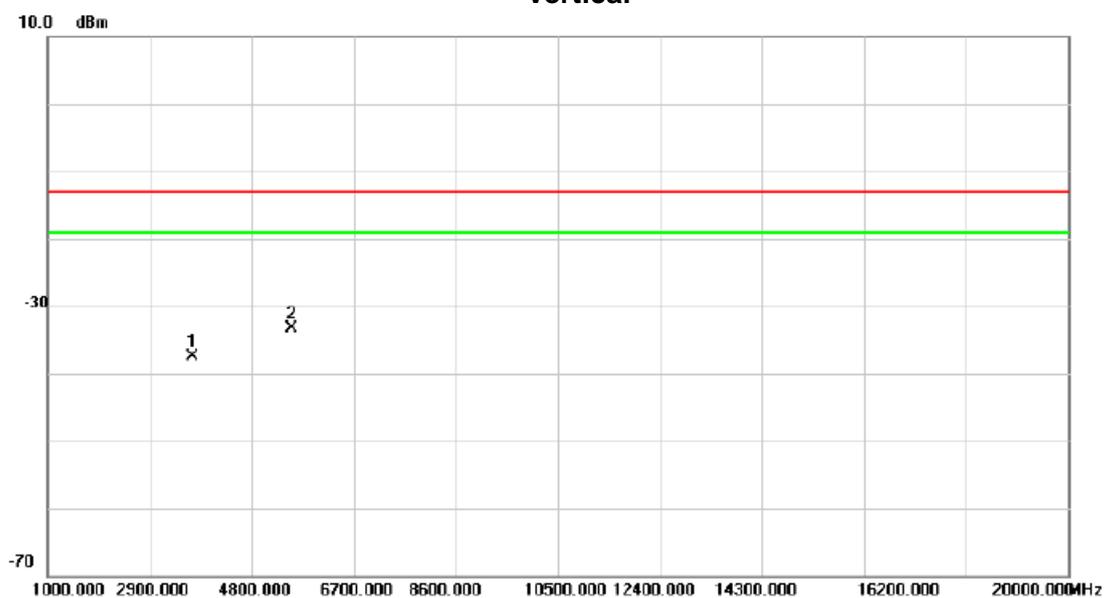
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 3819.560     | -34.10                  | 7.51                    | -26.59                  | -13.0        | -13.59     | peak     |         |
| 2   |     | 5729.500     | -43.55                  | 8.86                    | -34.69                  | -13.0        | -21.69     | peak     |         |

Test Mode : TXCH512 EDGE

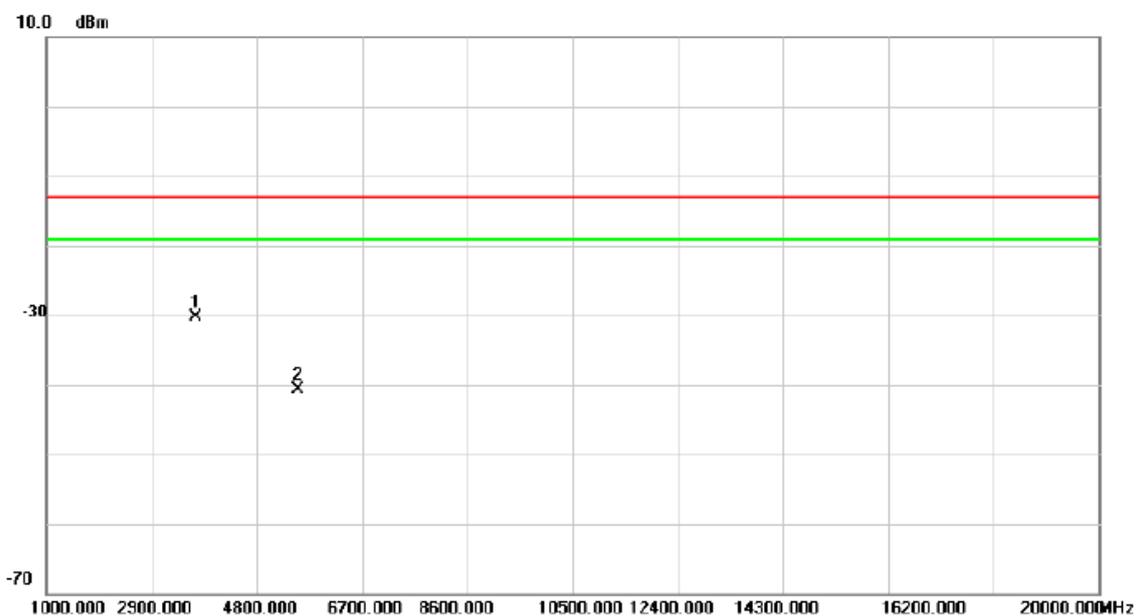
Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3700.460     | -43.41                  | 5.95                    | -37.46                  | -13.0        | -24.46     | peak     |         |
| 2   | *   | 5550.500     | -46.32                  | 13.00                   | -33.32                  | -13.0        | -20.32     | peak     |         |

Test Mode : TXCH512 EDGE

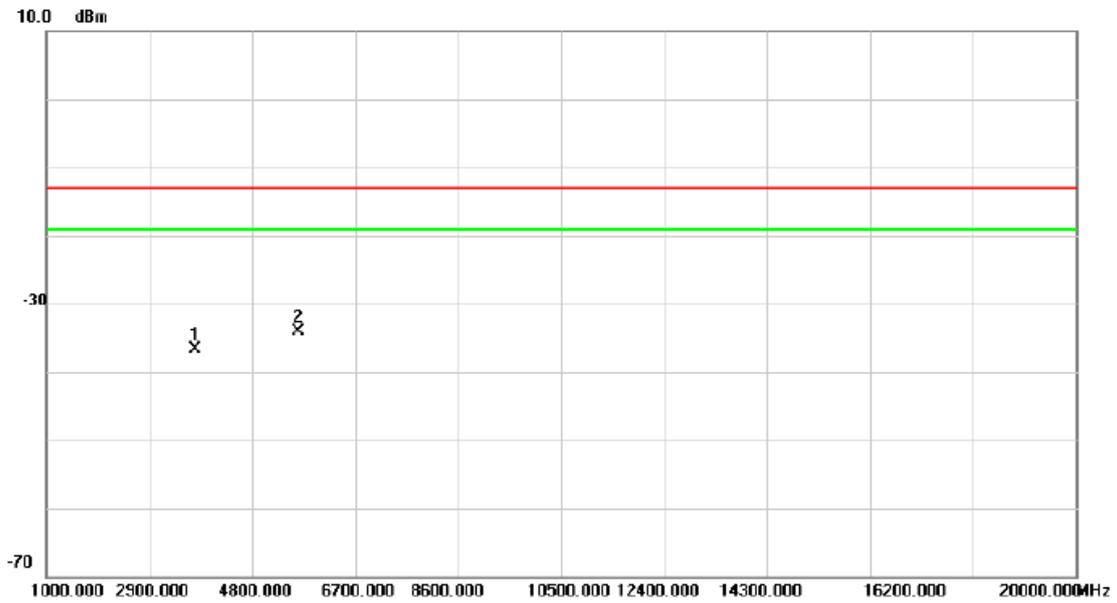
### Horizontal



| No. Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|---------|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1 *     | 3700.360     | -37.79                  | 7.49                    | -30.30                  | -13.0        | -17.30     | peak     |         |
| 2       | 5550.420     | -49.36                  | 8.59                    | -40.77                  | -13.0        | -27.77     | peak     |         |

Test Mode : TX CH661 EDGE

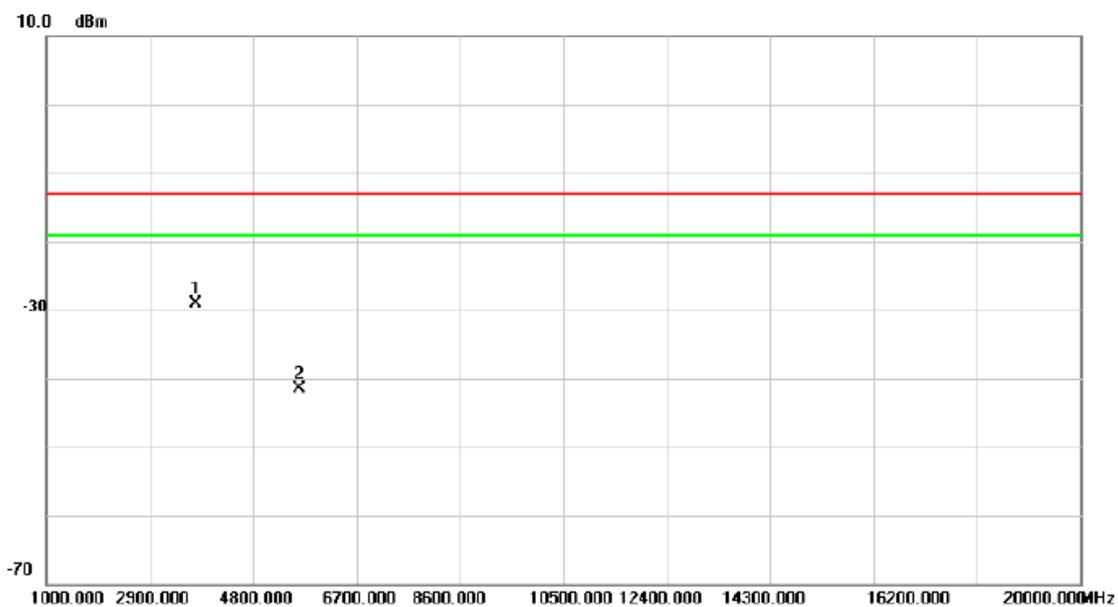
Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3759.960     | -42.95                  | 6.24                    | -36.71                  | -13.0        | -23.71     | peak     |         |
| 2   | *   | 5640.080     | -47.22                  | 13.22                   | -34.00                  | -13.0        | -21.00     | peak     |         |

Test Mode : TX CH661 EDGE

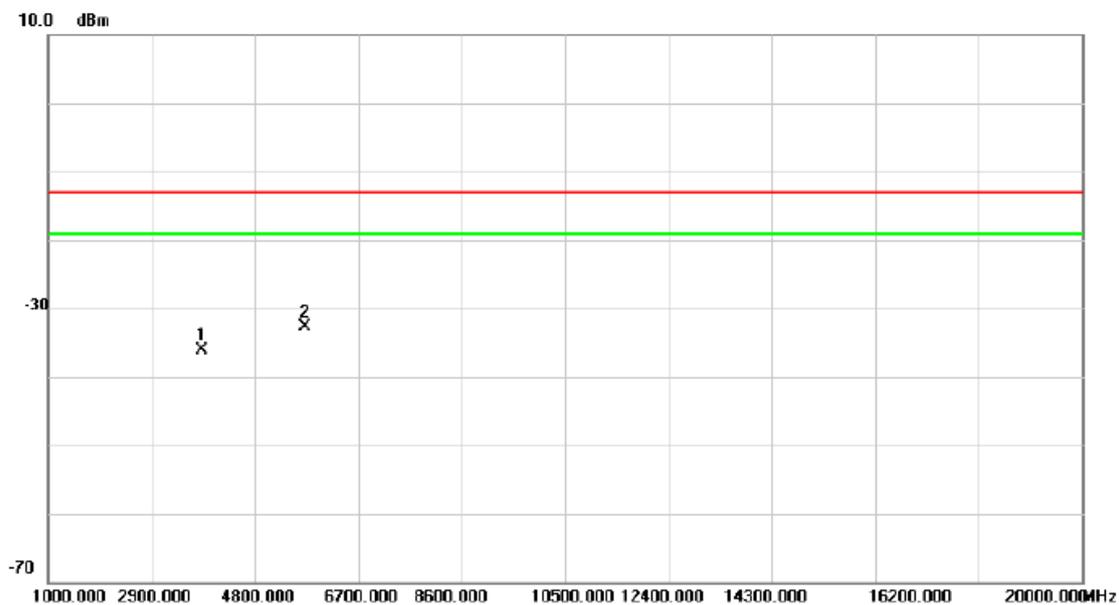
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 3759.940     | -36.61                  | 7.50                    | -29.11                  | -13.0        | -16.11     | peak     |         |
| 2   |     | 5640.160     | -50.27                  | 8.72                    | -41.55                  | -13.0        | -28.55     | peak     |         |

Test Mode : TX CH810 EDGE

Vertical



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   |     | 3819.520     | -42.63                  | 6.53                    | -36.10                  | -13.0        | -23.10     | peak     |         |
| 2   | *   | 5729.480     | -46.03                  | 13.43                   | -32.60                  | -13.0        | -19.60     | peak     |         |

Test Mode : TX CH810 EDGE

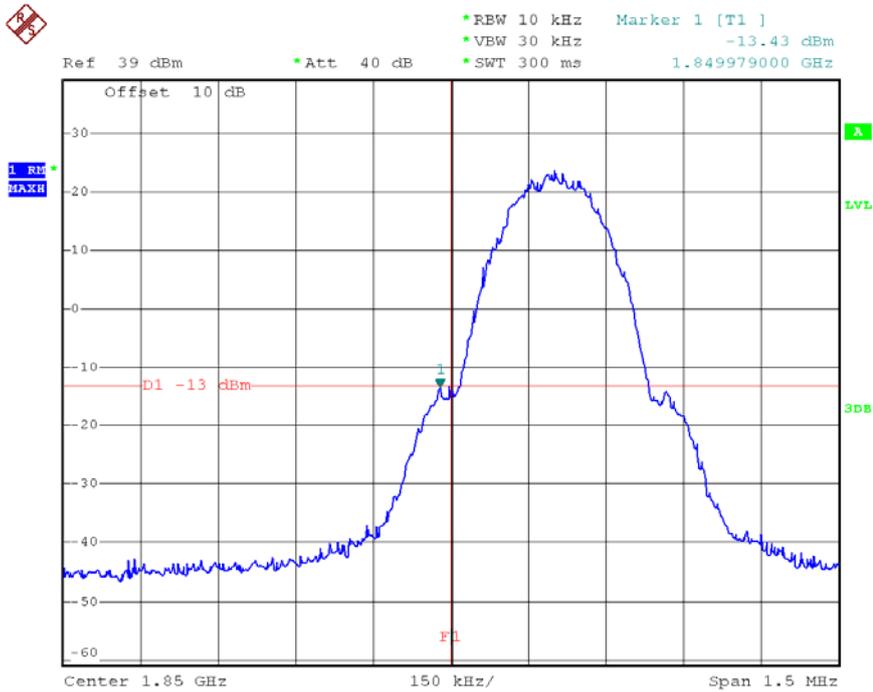
### Horizontal



| No. | Mk. | Freq.<br>MHz | Reading<br>Level<br>dBm | Correct<br>Factor<br>dB | Measure-<br>ment<br>dBm | Limit<br>dBm | Over<br>dB | Detector | Comment |
|-----|-----|--------------|-------------------------|-------------------------|-------------------------|--------------|------------|----------|---------|
| 1   | *   | 3819.440     | -37.51                  | 7.51                    | -30.00                  | -13.0        | -17.00     | peak     |         |
| 2   |     | 5729.160     | -46.48                  | 8.86                    | -37.62                  | -13.0        | -24.62     | peak     |         |

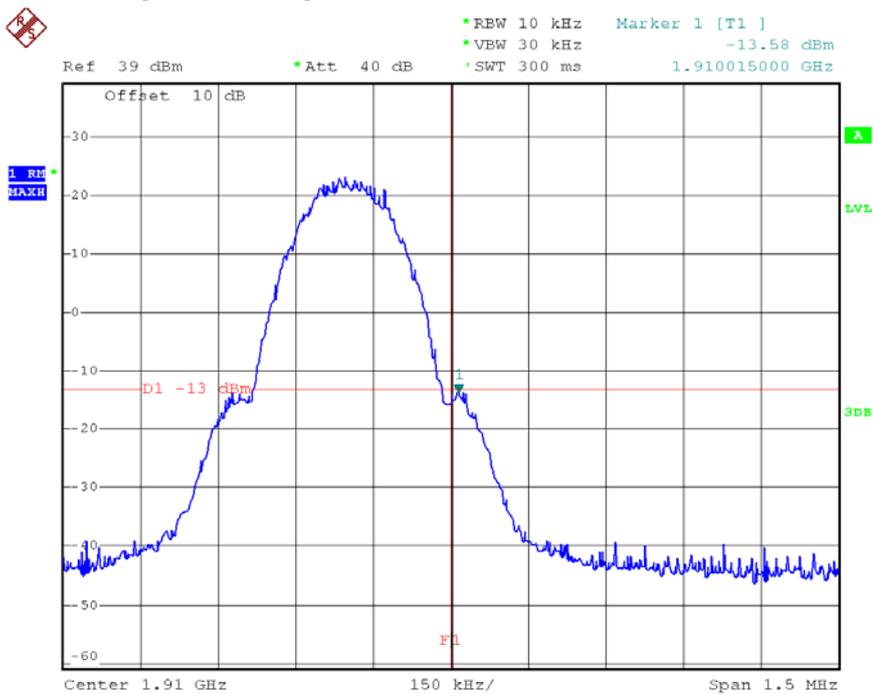
## ATTACHMENT E - BAND EDGE

### Band Edge on Configuration GSM / Channel 512-CONDUCTED MODE



Date: 5.JUN.2015 14:06:15

### Band Edge on Configuration GSM / Channel 810-CONDUCTED MODE



Date: 5.JUN.2015 14:56:13





## ATTACHMENT F - FREQUENCY STABILITY

|             |           |
|-------------|-----------|
| Test Mode : | GSM CH512 |
|-------------|-----------|

### Voltage vs. Frequency Stability

| Voltage(Volts)       | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|----------------------|----------------------|-----------------------|------------|
| 3.5                  | 12                   | 0.006485785           | 2.5        |
| 3.6                  | 11                   | 0.005945303           | 2.5        |
| 3.7                  | 13                   | 0.007026267           | 2.5        |
| 3.8                  | 7                    | 0.003783375           | 2.5        |
| 3.9                  | 8                    | 0.004323857           | 2.5        |
| 4.0                  | 11                   | 0.005945303           | 2.5        |
| 4.1                  | 9                    | 0.004864339           | 2.5        |
| 4.2                  | 13                   | 0.007026267           | 2.5        |
| Max. Deviation (ppm) | <b>13</b>            | <b>0.007026267</b>    | 2.5        |

### Temperature vs. Frequency Stability

| Temperature(°C)      | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|----------------------|----------------------|-----------------------|------------|
| 45                   | 8                    | 0.004323857           | 2.5        |
| 30                   | 9                    | 0.004864339           | 2.5        |
| 20                   | 11                   | 0.005945303           | 2.5        |
| 10                   | 10                   | 0.005404821           | 2.5        |
| 0                    | 14                   | 0.00756675            | 2.5        |
| Max. Deviation (ppm) | <b>14</b>            | <b>0.00756675</b>     | 2.5        |

|             |            |
|-------------|------------|
| Test Mode : | EDGE CH512 |
|-------------|------------|

### Voltage vs. Frequency Stability

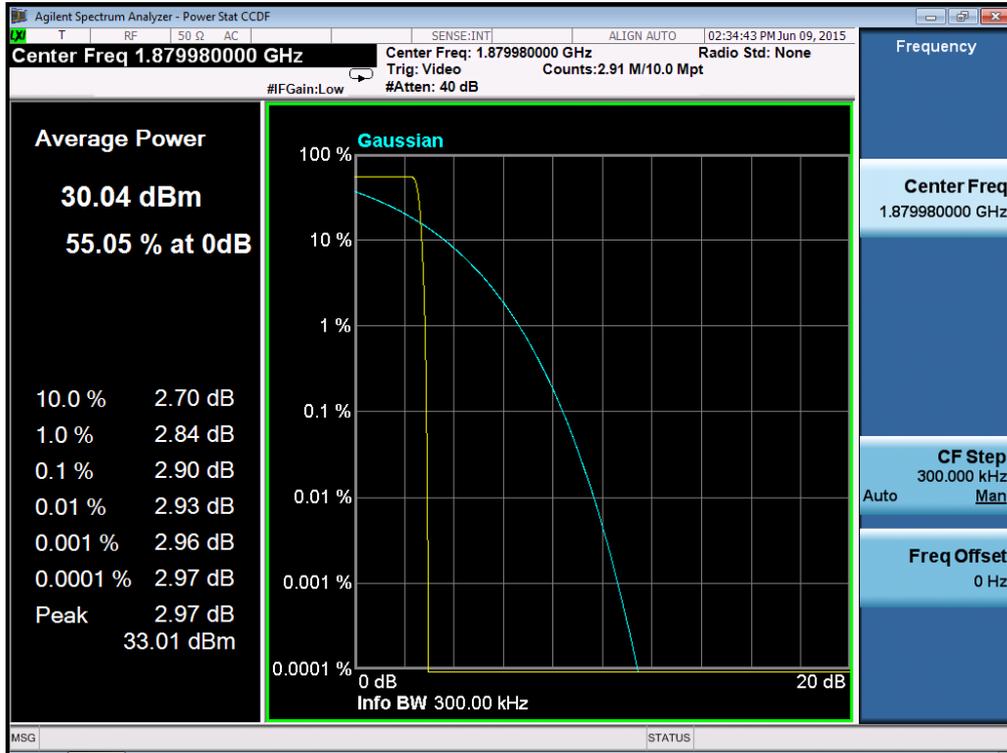
| Voltage(Volts)       | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|----------------------|----------------------|-----------------------|------------|
| 3.5                  | 11                   | 0.005945303           | 2.5        |
| 3.6                  | 14                   | 0.00756675            | 2.5        |
| 3.7                  | 13                   | 0.007026267           | 2.5        |
| 3.8                  | 12                   | 0.006485785           | 2.5        |
| 3.9                  | 11                   | 0.005945303           | 2.5        |
| 4.0                  | 14                   | 0.00756675            | 2.5        |
| 4.1                  | 7                    | 0.003783375           | 2.5        |
| 4.2                  | 9                    | 0.004864339           | 2.5        |
| Max. Deviation (ppm) | <b>14</b>            | <b>0.00756675</b>     | 2.5        |

### Temperature vs. Frequency Stability

| Temperature(°C)      | Frequency Error (Hz) | Frequency Error (ppm) | Limit(ppm) |
|----------------------|----------------------|-----------------------|------------|
| 45                   | 12                   | 0.006485785           | 2.5        |
| 30                   | 11                   | 0.005945303           | 2.5        |
| 20                   | 9                    | 0.004864339           | 2.5        |
| 10                   | 13                   | 0.007026267           | 2.5        |
| 0                    | 12                   | 0.006485785           | 2.5        |
| Max. Deviation (ppm) | <b>13</b>            | <b>0.007026267</b>    | 2.5        |

## ATTACHMENT G - PEAK TO AVERAGE RATIO

### Peak to Average Ratio of Configuration- GSM channel 661



### Peak to Average Ratio of Configuration- EDGE channel 661

