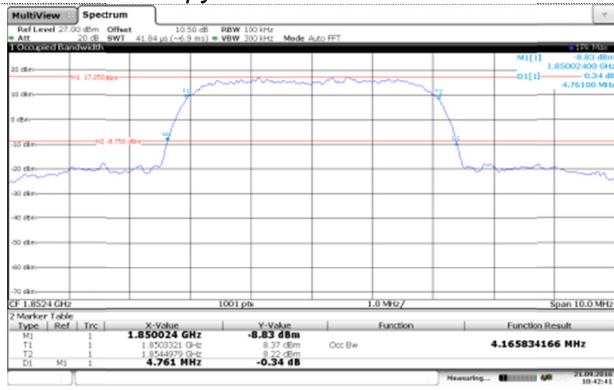




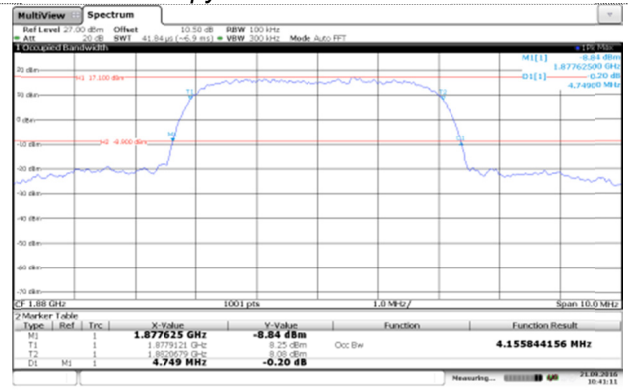
## WCDMA Band II

## 99% Occupy bandwidth&amp;-26dB bandwidth

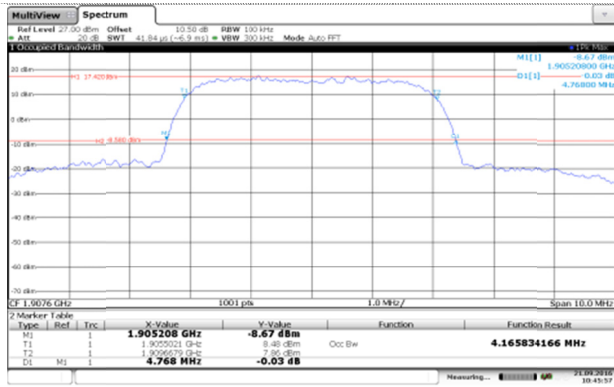


Channel 9262

## 99% Occupy bandwidth&amp;-26dB bandwidth



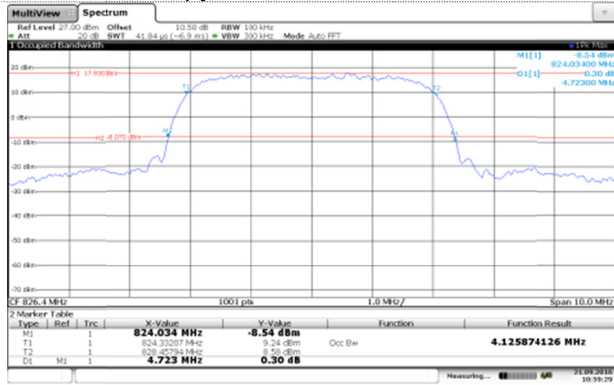
Channel 9400



Channel 9538

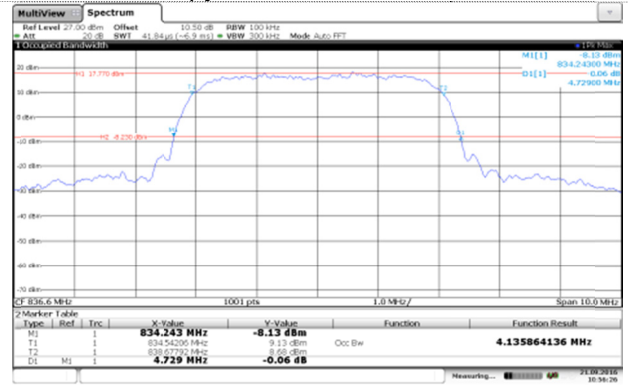
## WCDMA Band V

## 99% Occupy bandwidth&amp;-26dB bandwidth

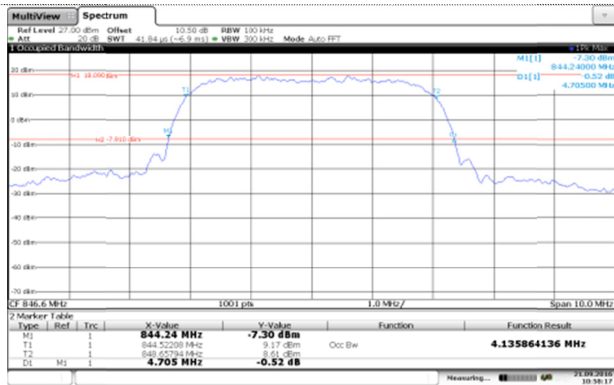


Channel 4132

## 99% Occupy bandwidth&amp;-26dB bandwidth



Channel 4183



Channel 4233

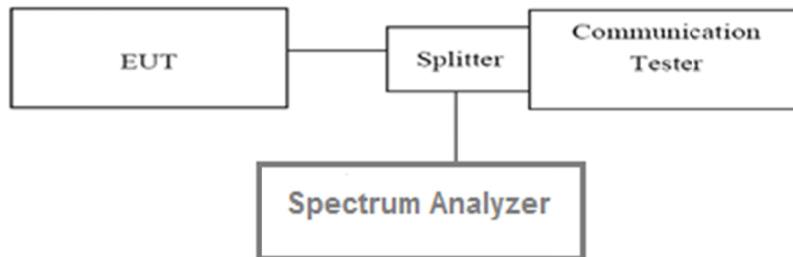
### 4.3. Out of band emission at antenna terminals

#### 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.

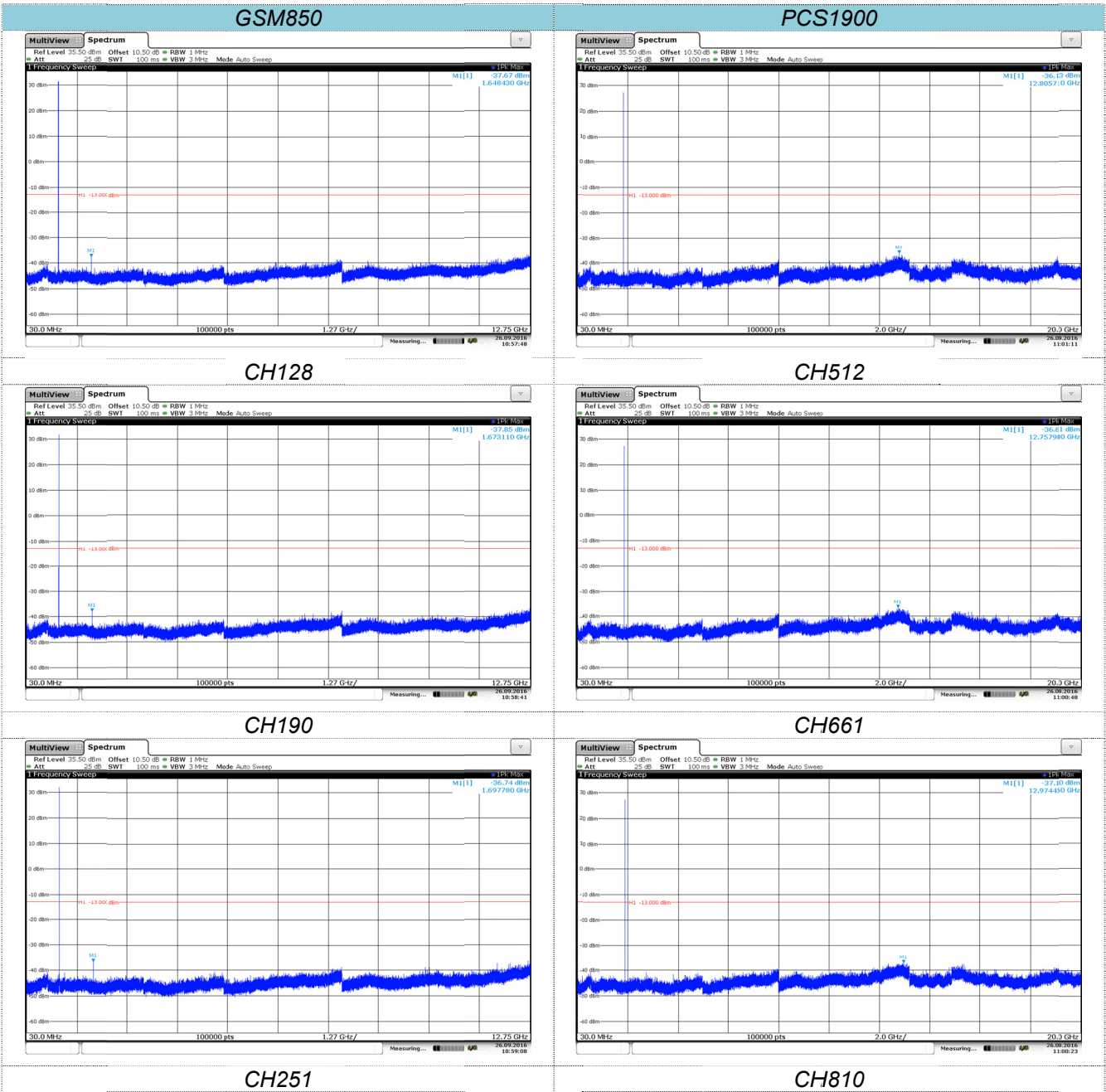
#### TEST CONFIGURATION

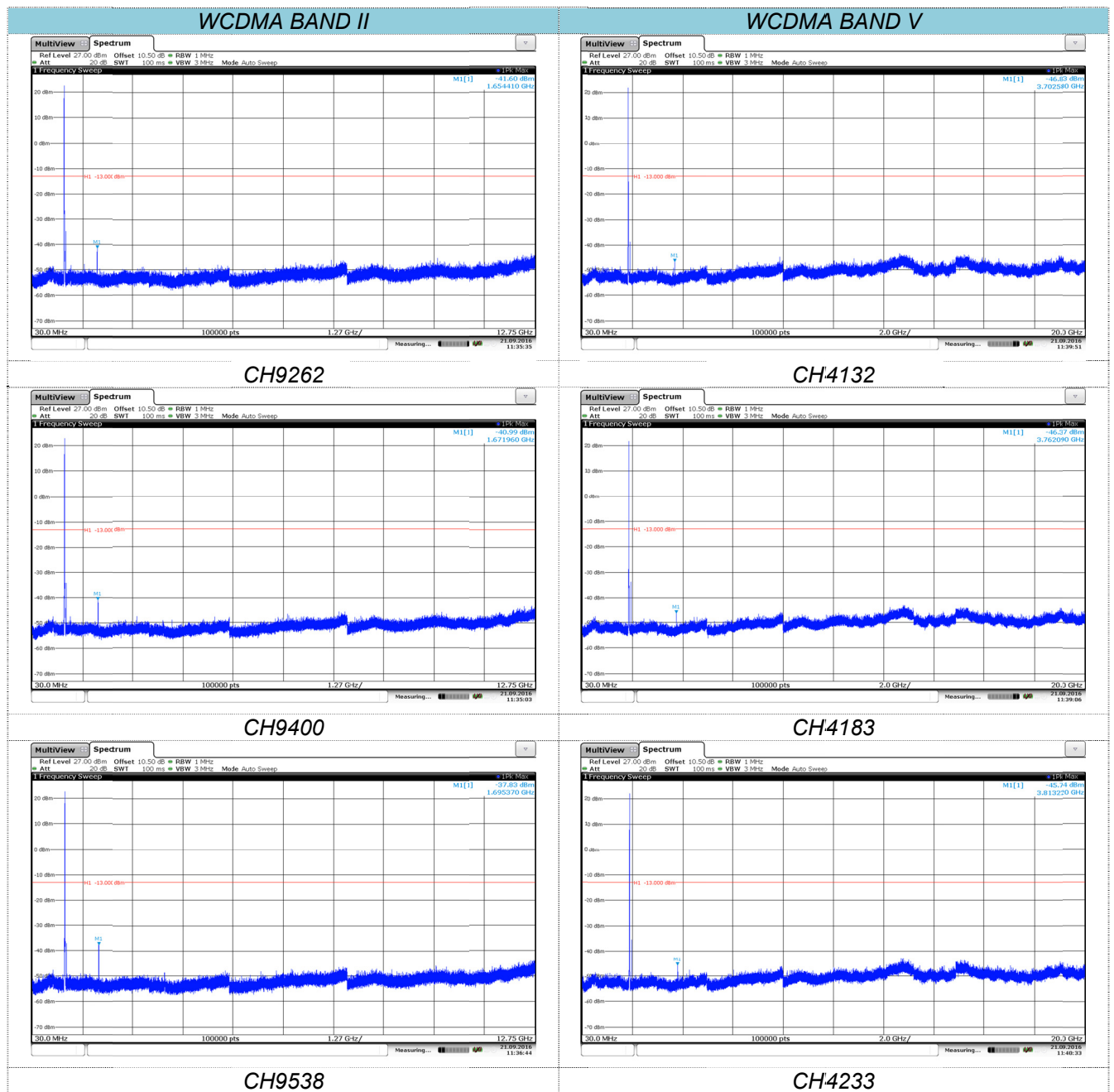


#### TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW= 1MHz, VBW = 3MHz, Start=30MHz, Stop= 10th harmonic.

#### TEST RESULTS





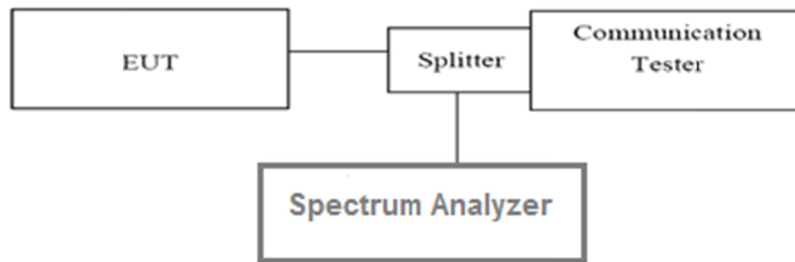
#### 4.4. Band Edge compliance

##### 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.

##### TEST CONFIGURATION



##### TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. For the bandedge: 2G: Set the RBW=3KHz, VBW = 10KHz, Sweep time= Auto  
3G: Set the RBW=100KHz, VBW = 300KHz, Sweep time= Auto

##### TEST RESULTS

| GSM850         |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 128            | 824.20          | 823.8               | -13.87       | -13.00      | Pass    |
| 251            | 848.80          | 849                 | -14.95       | -13.00      | Pass    |

| GPRS850        |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 128            | 824.20          | 824                 | -14.95       | -13.00      | Pass    |
| 251            | 848.80          | 849                 | -14.03       | -13.00      | Pass    |

| EGPRS850       |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 128            | 824.20          | 824                 | -13.79       | -13.00      | Pass    |
| 251            | 848.80          | 849                 | -15.09       | -13.00      | Pass    |

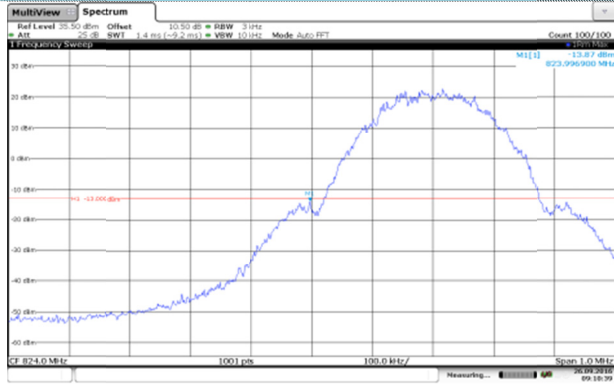
| PCS1900        |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 512            | 1850.20         | 1850                | -15.45       | -13.00      | Pass    |
| 810            | 1909.80         | 1910                | -15.94       | -13.00      | Pass    |

| GPRS1900       |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 512            | 1850.20         | 1850                | -14.03       | -13.00      | Pass    |
| 810            | 1909.80         | 1910                | -17.07       | -13.00      | Pass    |

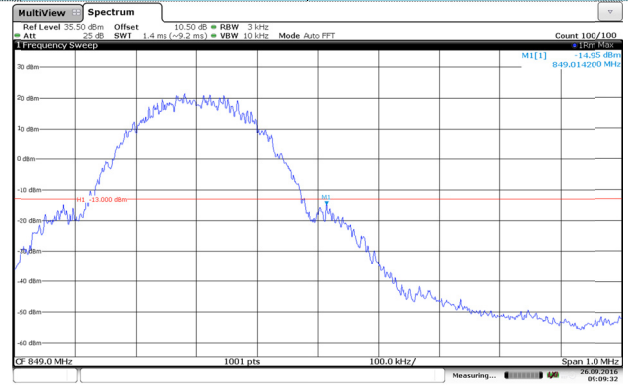
| EGPRS1900      |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 512            | 1850.20         | 1850                | -15.72       | -13.00      | Pass    |
| 810            | 1909.80         | 1910                | -16.61       | -13.00      | Pass    |

| WCDMA Band II  |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 9262           | 1852.4          | 1850                | -19.56       | -13.00      | Pass    |
| 9538           | 1907.6          | 1910                | -18.11       | -13.00      | Pass    |

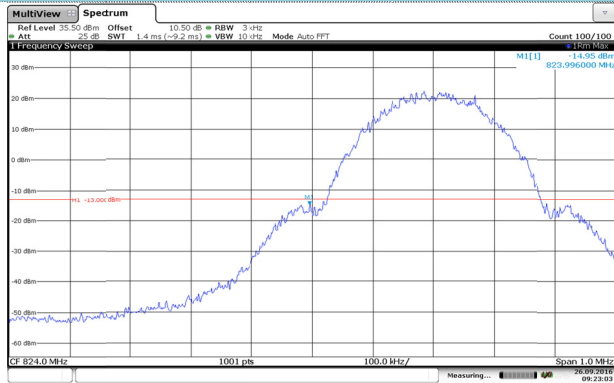
| WCDMA Band V   |                 |                     |              |             |         |
|----------------|-----------------|---------------------|--------------|-------------|---------|
| Channel Number | Frequency (MHz) | Measurement Results |              | Limit (dBm) | Verdict |
|                |                 | Frequency (MHz)     | Values (dBm) |             |         |
| 4132           | 826.4           | 824                 | -19.39       | -13.00      | Pass    |
| 4233           | 846.6           | 849                 | -22.43       | -13.00      | Pass    |

**GSM850 For GMSK Moudlation**

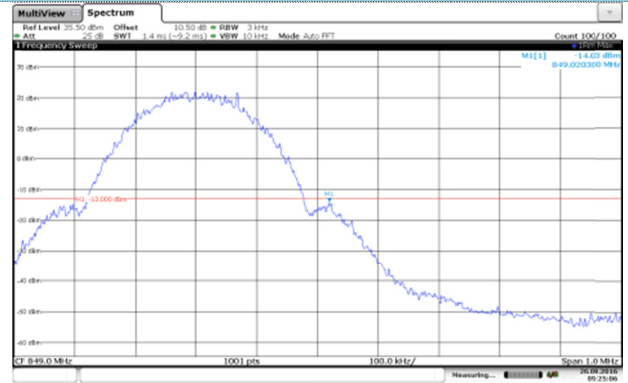
Channel 128



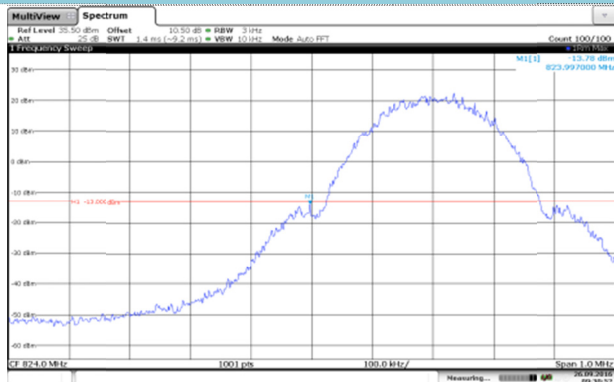
Channel 251

**GPRS850 For GMSK Moudlation**

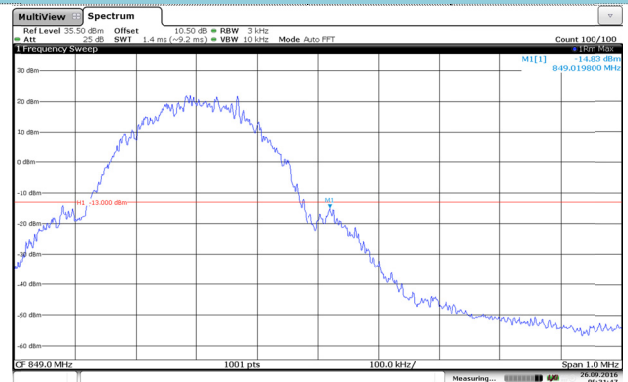
Channel 128



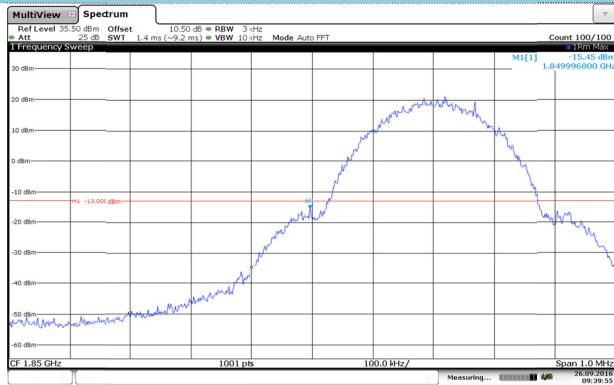
Channel 251

**EGPRS850 For 8PSK Moudlation**

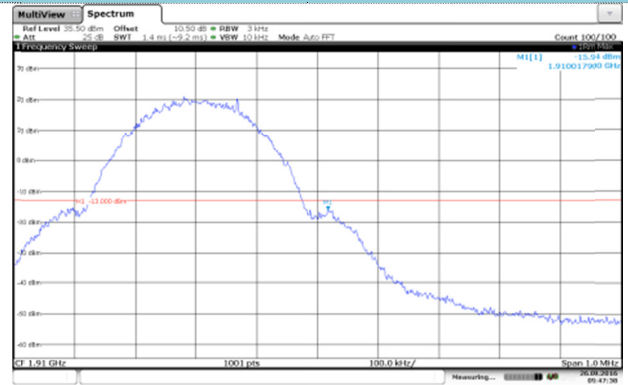
Channel 128



Channel 251

**PCS1900 For GMSK Moudlation**

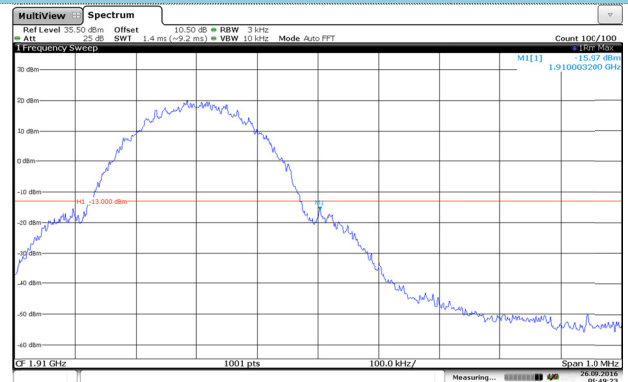
Channel 512



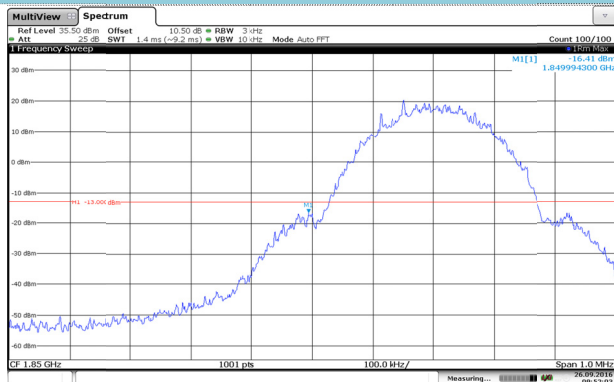
Channel 810

**GPRS1900 For GMSK Moudlation**

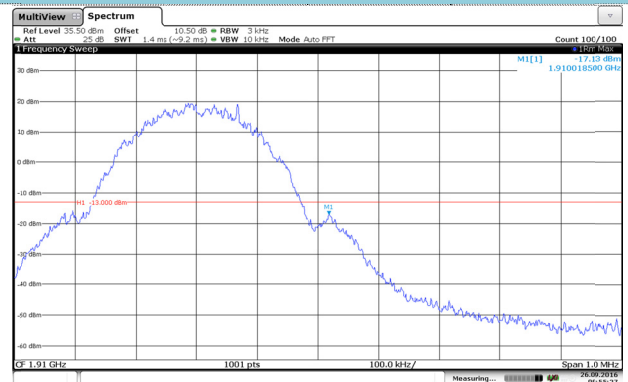
Channel 512



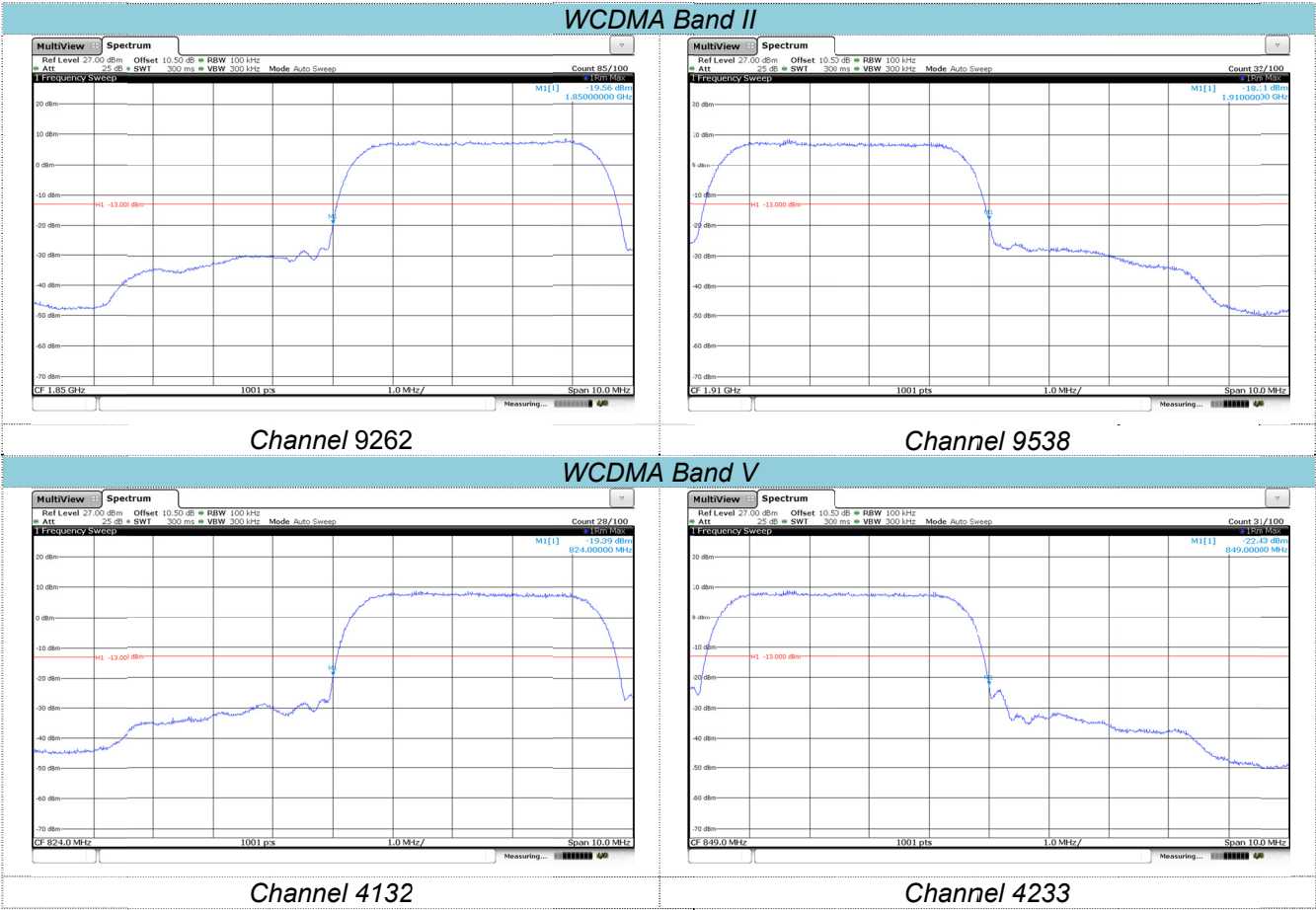
Channel 810

**EGPRS1900 For 8PSK Moudlation**

Channel 512



Channel 810



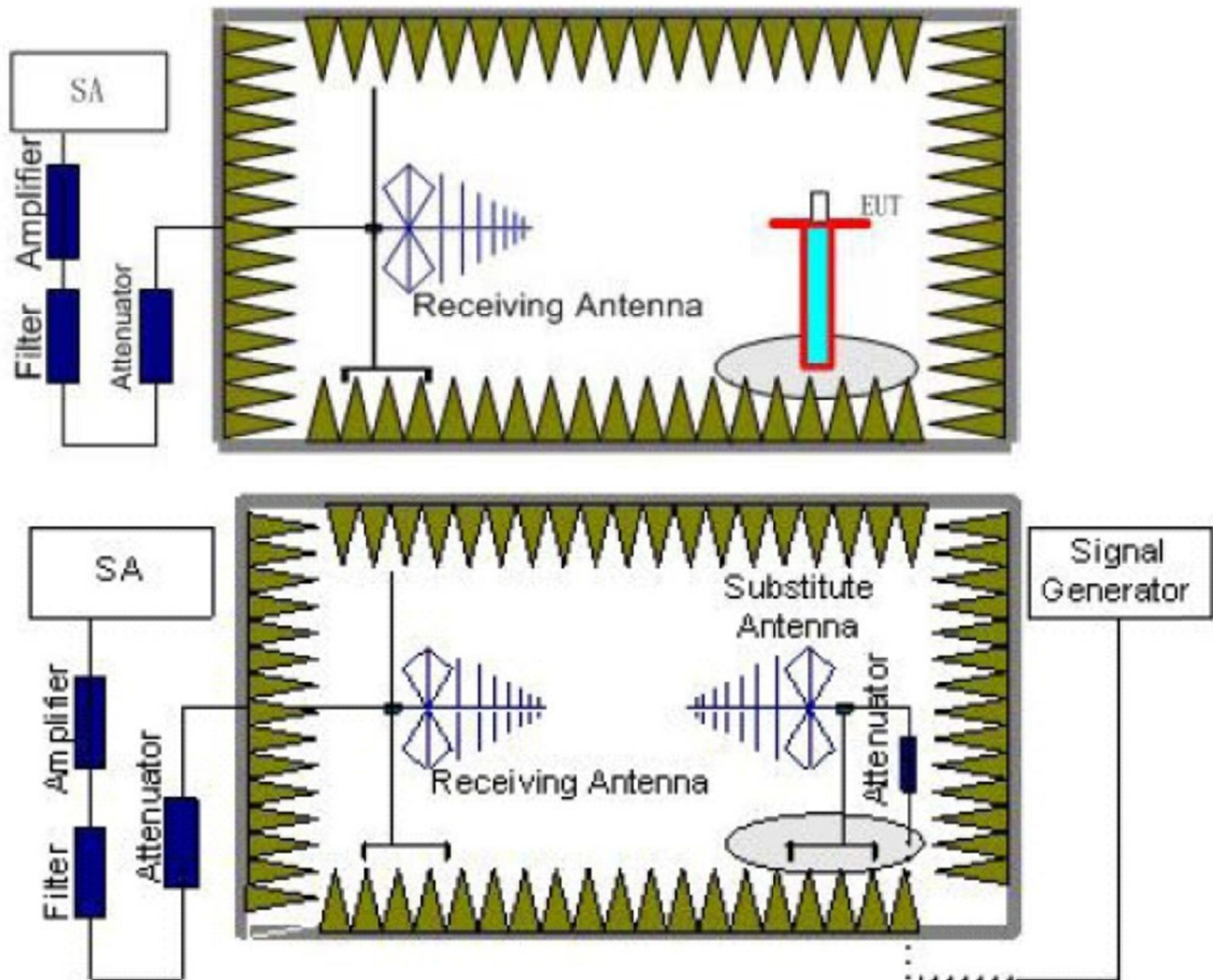
## 4.5. Radiated Power Measurement

### LIMIT

GSM850/WCDMA Band V: 7W ERP

PCS1900/WCDMA Band II: 2W EIRP

### TEST CONFIGURATION



### TEST PROCEDURE

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna shall be moved from 1m to 4m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the

substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:  
 $\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$   
 We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
 $\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
 ERP can be calculated from EIRP by subtracting the gain of the dipole,  $\text{ERP} = \text{EIRP} - 2.15\text{dBi}$ .

## **TEST RESULTS**

GSM:

| Mode     | Channel | Antenna Pol. | ERP   | Limit (dBm) | Result |
|----------|---------|--------------|-------|-------------|--------|
| GSM850   | 128     | V            | 31.38 | 38.45       | Pass   |
|          |         | H            | 28.45 |             |        |
|          | 190     | V            | 31.45 |             |        |
|          |         | H            | 27.63 |             |        |
|          | 251     | V            | 30.48 |             |        |
|          |         | H            | 27.84 |             |        |
| GPRS850  | 128     | V            | 31.36 | 38.45       | Pass   |
|          |         | H            | 28.20 |             |        |
|          | 190     | V            | 31.47 |             |        |
|          |         | H            | 27.48 |             |        |
|          | 251     | V            | 30.34 |             |        |
|          |         | H            | 27.49 |             |        |
| EGPRS850 | 128     | V            | 26.52 | 38.45       | Pass   |
|          |         | H            | 24.38 |             |        |
|          | 190     | V            | 26.35 |             |        |
|          |         | H            | 24.47 |             |        |
|          | 251     | V            | 26.75 |             |        |
|          |         | H            | 24.28 |             |        |

| Mode       | Channel | Antenna Pol. | EIRP  | Limit (dBm) | Result |
|------------|---------|--------------|-------|-------------|--------|
| PCS1900    | 512     | V            | 29.48 | 33.01       | Pass   |
|            |         | H            | 26.08 |             |        |
|            | 661     | V            | 29.44 |             |        |
|            |         | H            | 26.25 |             |        |
|            | 810     | V            | 29.34 |             |        |
|            |         | H            | 26.52 |             |        |
| GPRS1900   | 512     | V            | 29.06 | 33.01       | Pass   |
|            |         | H            | 26.47 |             |        |
|            | 661     | V            | 29.38 |             |        |
|            |         | H            | 26.52 |             |        |
|            | 810     | V            | 29.88 |             |        |
|            |         | H            | 26.45 |             |        |
| EGPRS 1900 | 512     | V            | 25.44 | 33.01       | Pass   |
|            |         | H            | 23.25 |             |        |
|            | 661     | V            | 25.38 |             |        |
|            |         | H            | 24.85 |             |        |
|            | 810     | V            | 25.23 |             |        |
|            |         | H            | 24.16 |             |        |

## WCDMA:

| Mode          | Channel | Antenna Pol. | EIRP  | Limit (dBm) | Result |
|---------------|---------|--------------|-------|-------------|--------|
| WCDMA Band II | 9262    | V            | 23.86 | 33.01       | Pass   |
|               |         | H            | 19.48 |             |        |
|               | 9400    | V            | 23.15 |             |        |
|               |         | H            | 19.64 |             |        |
|               | 9538    | V            | 23.37 |             |        |
|               |         | H            | 19.52 |             |        |

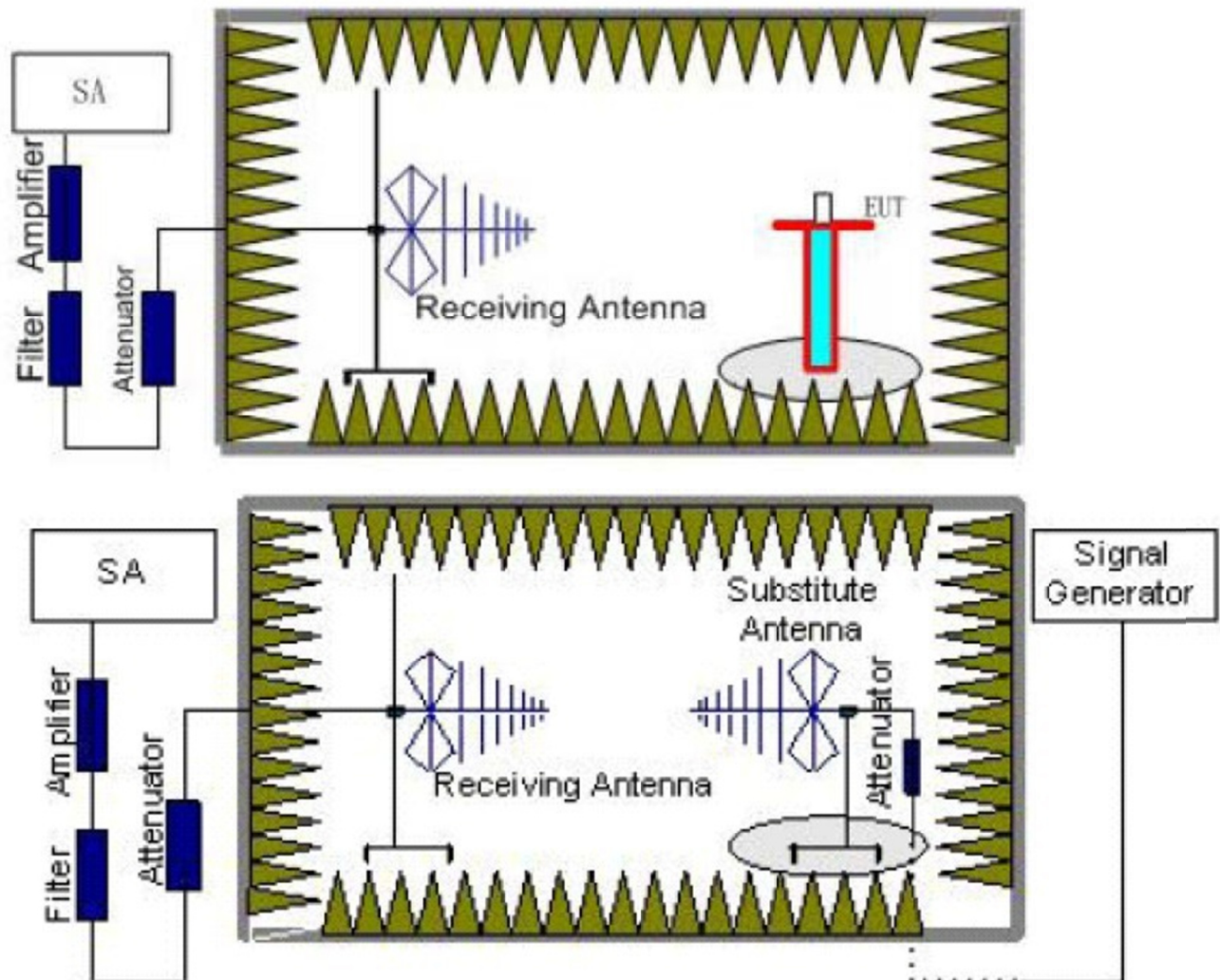
| Mode         | Channel | Antenna Pol. | ERP   | Limit (dBm) | Result |
|--------------|---------|--------------|-------|-------------|--------|
| WCDMA Band V | 4132    | V            | 23.08 | 38.45       | Pass   |
|              |         | H            | 19.44 |             |        |
|              | 4183    | V            | 23.14 |             |        |
|              |         | H            | 19.85 |             |        |
|              | 4233    | V            | 23.65 |             |        |
|              |         | H            | 19.87 |             |        |

## 4.6. Radiated Spurious Emssion

### LIMIT

-13dBm

### TEST CONFIGURATION



### TEST RESULTS

1. EUT was placed on a 0.8 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna shall be moved from 1m to 4m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz for above 1GHz and RBW=100kHz, VBW=300kHz for 30MHz to 1GHz, And the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver

reach the previously recorded ( $P_r$ ). The power of signal source ( $P_{Mea}$ ) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

5. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss ( $P_{cl}$ ), the Substitution Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.
6. The measurement results are obtained as described below:  
 $Power(EIRP) = P_{Mea} - P_{Ag} - P_{cl} + G_a$   
We used SMF100A microwave signal generator which signal level can up to 33dBm, so we not used power Amplifier for substitution test; The measurement results are amend as described below:  
 $Power(EIRP) = P_{Mea} - P_{cl} + G_a$
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.  
ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15dBi$ .

## **TEST RESULTS**