

# FCC RADIO TEST REPORT

No. 150106-RF

for

Bullitt Group

Mobile Phone

Model IM5

Trade Name: Kodak

Issued Date: 2015-02-06

**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 GCCT.

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**GENERAL SUMMARY**

|                            |   |
|----------------------------|---|
| <b>Product Name</b>        | Mobile Phone  |
| <b>Model Name</b>          | IM5   |
| <b>Applicant</b>           | Bullitt Group   |
| <b>Manufacturer</b>        | CK Telecom Limited  |
| <b>Test Laboratory</b>     | GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center   |
| <b>Reference Standards</b> | FCC CFR 47 Part 22(H):“FCC CFR 47 Part 22:Public Mobile Services”<br>FCC CFR 47 Part 24(E):“FCC CFR 47 Part 24:Radio Frequency Devices”   |
| <b>Test Conclusion</b>     | This portable wireless equipment has been measured in all cases requested by the relevant standards. Test results in annex B of this test report are below limits specified in the relevant standards.<br><br>General Judgment: <b>Pass</b><br>Date of issue:2015.02.06 |
| <b>Comment</b>             | The test results in this report apply only to the tested sample of the stated device/equipment.   |

*Approved by:*

LuoJian  
Manager

*Reviewed by:*

Wen Xiaoyong  
Deputy Manager

*Tested by:*

Wu Xuan  
Test Engineer

## 1. Test Laboratory

### 1.1 Testing Location

|                              |   |
|------------------------------|---|
| <b>Company Name:</b>         | GCCT, Guangdong Telecommunications Terminal Products Quality Supervision and Testing Center |
| <b>Address:</b>              | Technology Road, High-tech Zone, Heyuan, Guangdong Province, PR.China                       |
| <b>CNAS Registration No.</b> | L4992   |
| <b>FCC Registration No.</b>  | 303878  |
| <b>Postal Code:</b>          | 517001  |
| <b>Telephone:</b>            | +86-762-3607181   |
| <b>Fax:</b>                  | +86-762-3603336   |

### 1.2 Testing Environment

| Environment Data       | Temperature(°C) | Humidity(%) |
|------------------------|-----------------|-------------|
| <b>Maximum Ambient</b> | 26.9            | 45          |
| <b>Minimum Ambient</b> | 20.9            | 27          |

EUT is under testing environment.

### 1.3 Project Data

|                            |              |
|----------------------------|--------------|
| <b>Project Leader:</b>     | Wen Xiaoyong |
| <b>Testing Start Date:</b> | 2015-01-26   |
| <b>Testing End Date:</b>   | 2015-02-06   |

## 2. Client Information

### 2.1 Applicant Information

|                      |   |
|----------------------|---|
| <b>Company Name:</b> | Bullitt Group   |
| <b>Address:</b>      | 4 The Aquarium, 1-7 King Street, Reading, RG1 2AN, UK |
| <b>City:</b>         | /   |
| <b>Postal Code:</b>  | /   |
| <b>Country:</b>      | /   |
| <b>Telephone:</b>    | +44 1189 580 449                                      |
| <b>Fax:</b>          | /   |

### 2.2 Manufacturer Information

|                      |                    |
|----------------------|--------------------|
| <b>Company Name:</b> | CK Telecom Limited |
|----------------------|--------------------|

|                     |  |
|---------------------|--|
| <b>Address:</b>     | Technology Road.High-Tech Development Zone. Heyuan |
| <b>City:</b>        | Heyuan   |
| <b>Postal Code:</b> | /  |
| <b>Country:</b>     | China  |
| <b>Telephone:</b>   | 0755-26738515                                      |
| <b>Fax:</b>         | 0755-26739500                                      |

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

#### **3.1 About EUT**

|                           |   |
|---------------------------|---|
| <b>Model Name</b>         | IM5   |
| <b>FCC ID</b>             | ZL5IM5  |
| <b>Tx Frequency</b>       | GSM850 Tx: 824.2~848.8 MHz<br>UMTS Band V Tx: 826.4~846.6 MHz<br>PCS1900 Tx: 1850.2~1909.8 MHz<br>UMTS Band II Tx: 1852.4~1907.6 MHz<br>Bluetooth & BLE: 2402~ 2480 MHz<br>WIFI(b/g/n-20): 2412 ~ 2462 MHz<br>WIFI(n-40): 2422 ~ 2452 MHz |
| <b>Rx Frequency</b>       | GSM850Rx: 869.2~893.8 MHz<br>UMTS Band V Rx: 871.4~891.6 MHz<br>PCS1900 Rx: 1930.2~1989.8 MHz<br>UMTS Band II Rx: 1932.4~1987.6 MHz<br>Bluetooth & BLE: 2402~ 2480 MHz<br>WIFI(b/g/n-20): 2412 ~ 2462 MHz<br>WIFI(n-40): 2422 ~ 2452 MHz  |
| <b>Number of Channels</b> | GSM850&WCDMA Band V:25<br>PCS1900&WCDMA Band II: 60<br>Bluetooth:79<br>WIFI(802.11b/g/n-20):11<br>WIFI(802.11 n-40):7<br>BLE:40   |
| <b>Modulation</b>         | GSM&DCS:GMSK<br>WCDMA:BPSK/QPSK<br>Bluetooth: GFSK& $\pi$ /4-DQPSK&8DPSK<br>WIFI:CCK/OFDM<br>BLE:GFSK   |
| <b>Antenna Type</b>       | PIFA(GSM/DCS/WCDMA);<br>MONOPOLE (Bluetooth/wifi)   |

|                                 |  |
|---------------------------------|--|
| <b>Antenna Gain</b>             | GSM850:-1dBi<br>DCS1900: 1dBi<br>WCDMA850: -1dBi<br>WCDMA1900: 1dBi<br>Bluetooth/wifi: -2dBi |
| <b>Normal Voltage</b>           | 3.7V   |
| <b>Extreme Low Voltage</b>      | 3.6V   |
| <b>Extreme High Voltage</b>     | 4.2V   |
| <b>Extreme Low Temperature</b>  | 0°C  |
| <b>Extreme High Temperature</b> | 40°C   |
| <b>Equipment Category</b>       | PCE  |
| <b>Emission Designator</b>      | GSM850:245KGXW<br>DCS1900:246KGXW<br>WCDMA850:4M16F9W<br>WCDMA1900:4M17F9W                   |

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

Note: high and low voltage values in extreme condition test are given by manufacturer

### 3.2 Internal Identification of EUT

| <b>EUT ID *</b> | <b>IMEI</b>     | <b>HW Version</b> | <b>SW Version</b>                  |
|-----------------|-----------------|-------------------|------------------------------------|
| 150106-M01      | 355616029939281 | XL-V2.0           | XL01D-S13A_BULLITT_L7EN_202_141230 |
|                 | 355616029940735 | XL-V2.0           | XL01D-S13A_BULLITT_L7EN_202_141230 |
| 150106-M04      | 355616029939216 | XL-V2.0           | XL01D-S13A_BULLITT_L7EN_202_141230 |
|                 | 355616029940699 | XL-V2.0           | XL01D-S13A_BULLITT_L7EN_202_141230 |

\*EUT ID: is used to identify the test sample in the lab internally. 150106-M01 and 150106-M04 are the same mobile phone.

### 3.3 Internal Identification of AE

| <b>AE ID *</b> | <b>Description</b> | <b>Type</b> | <b>SN</b> |
|----------------|--------------------|-------------|-----------|
| 150106-C01     | Charger            | A8-501000   | /         |
| 150106-B01     | Battery            | CA366069HV  | /         |
| 150106-C04     | Charger            | A8-501000   | /         |
| 150106-B04     | Battery            | CA366069HV  | /         |

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

## 4. Test Results

### 4.1 Summary of Test Results

| Items | List                        | Clause in FCC        | Verdict |
|-------|-----------------------------|----------------------|---------|
| 1     | Output Power                | 22.913(a)/24.232(b)  | Pass    |
| 2     | Frequency Stability         | 22.355/24.235        | Pass    |
| 3     | Occupied Bandwidth          | 22.917(a)/24.238(b)  | Pass    |
| 4     | Emission Limit              | 22.917(b)/ 24.238(b) | Pass    |
| 5     | Band Edge Compliance        | 22.917(b)/ 24.238    | Pass    |
| 6     | Conducted Spurious Emission | 22.917(a)/24.238(a)  | Pass    |
| 7     | Peak-to-average ratio       | 24.232(d))           | Pass    |

Note: please refer to Annex B in this test report for the detailed test results.

### 4.2 Statements

GCCT has evaluated the test cases requested by the applicant/manufacturer as listed in section 4.1 of this report, for the EUT specified in section 3, according to the standards or reference documents listed in general summary.

## 5. Test Equipments Utilized

### 5.1 List of Measuring Equipment

**Table 1.RF Test Equipments**

| No. | Name              | Type   | SN      | Manufacturer | Cal Date   | Cal Due Date |
|-----|-------------------|--------|---------|--------------|------------|--------------|
| 1   | Signaling Tester  | E5515E | E0111-8 | Agilent      | 2014.08.13 | 2015.08.13   |
| 2   | Spectrum Analyzer | N9020A | E0111-9 | Agilent      | 2014.08.13 | 2015.08.13   |
| 3   | Switching Unit    | /      | E0112   | /            | /          |              |

**Table 2. EMC Test Equipments**

| Hardware |                |        |            |              |            |              |
|----------|----------------|--------|------------|--------------|------------|--------------|
| No.      | Name           | Type   | SN         | Manufacturer | Cal Date   | Cal Due Date |
| 1        | Spectrum       | E4440A | MY48250641 | Agilent      | 2014.08.13 | 2015.08.13   |
| 2        | RF Preselector | N9039A | MY48260024 | Agilent      | 2014.08.13 | 2015.08.13   |
| 3        | BiCoNilog      | 3142E  | 00142015   | ETS-Lindgren | 2014.08.13 | 2015.08.13   |
| 4        | Horn Antenna   | 3117   | 00129169   | ETS-Lindgren | 2014.08.13 | 2015.08.13   |

|                 |                                      |         |            |              |            |            |
|-----------------|--------------------------------------|---------|------------|--------------|------------|------------|
| 5               | RF Notch filter                      | /       | /          | ETS-Lindgren | 2014.08.13 | 2015.08.13 |
| 6               | Power Meter                          | N1913A  | MY50000213 | Agilent      | 2014.08.13 | 2015.08.13 |
| 7               | Universal Radio Communication Tester | 8960    | MY48367105 | Agilent      | 2014.08.13 | 2015.08.13 |
| <b>Software</b> |                                      |         |            |              |            |            |
| 1               | Software                             | TILE4.5 | /          | ETS-Lindgren | /          |            |

**Table 3. OTA Test Equipments**

| <b>Hardware</b> |                          |          |            |              |            |              |
|-----------------|--------------------------|----------|------------|--------------|------------|--------------|
| No.             | Name                     | Type     | SN         | Manufacturer | Cal Date   | Cal Due Date |
| 1               | Spectrum                 | N9020A   | MY49101012 | Agilent      | 2014.08.13 | 2015.08.13   |
| 2               | Universal Radio          | E5515C   | MY48367103 | Agilent      | 2014.08.13 | 2015.08.13   |
| 3               | Switch/Control Mainframe | 3499C    | MY42000534 | Agilent      | 2014.08.13 | 2015.08.13   |
| 4               | Positioning              | 2090     | 00119389   | ETS-Lindgren | 2014.08.13 | 2015.08.13   |
| <b>Software</b> |                          |          |            |              |            |              |
| 1               | Software                 | EMQuest™ | /          | ETS-Lindgren | /          |              |
| 2               | Software                 | EMQ-108  | /          | ETS-Lindgren | /          |              |

## 5.2 Climate Chamber

| No. | Name            | Type   | SN       | Manufacturer | Cal Date   | Cal Due Date |
|-----|-----------------|--------|----------|--------------|------------|--------------|
| 1   | Climate Chamber | SH-241 | 92003546 | ESPEC        | 2014.08.13 | 2015.08.13   |

**ANNEX A: EUT Photograph****EUT Front View****EUT behind View**

EUT Left View



EUT Right View



EUT Top View



EUT Rear View



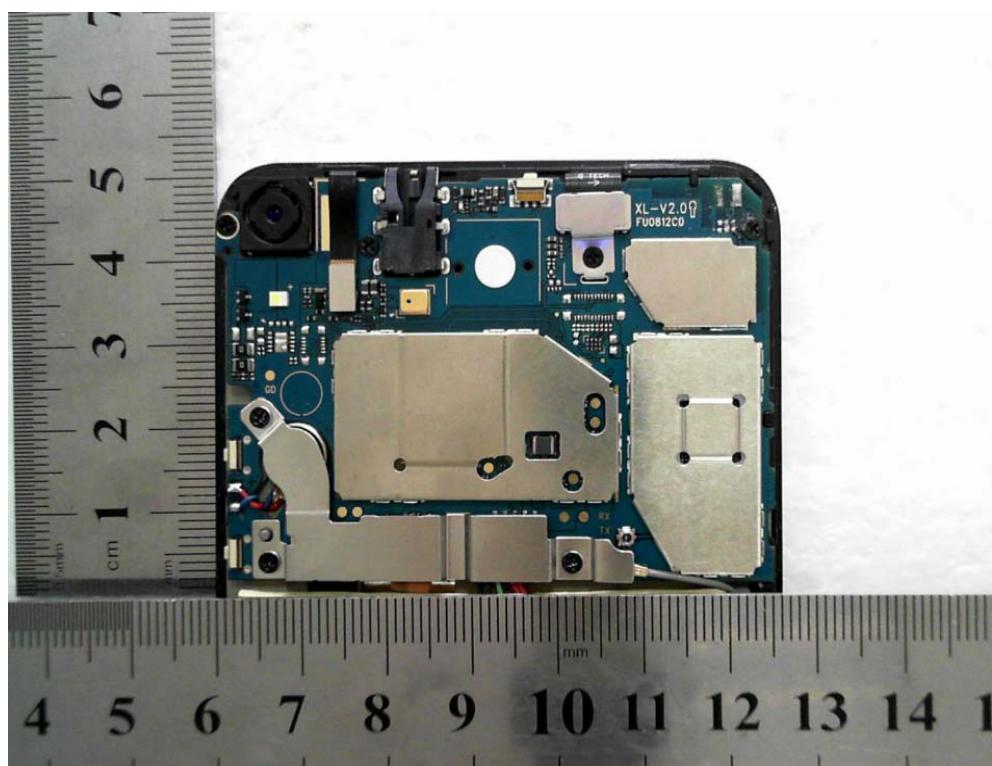
All



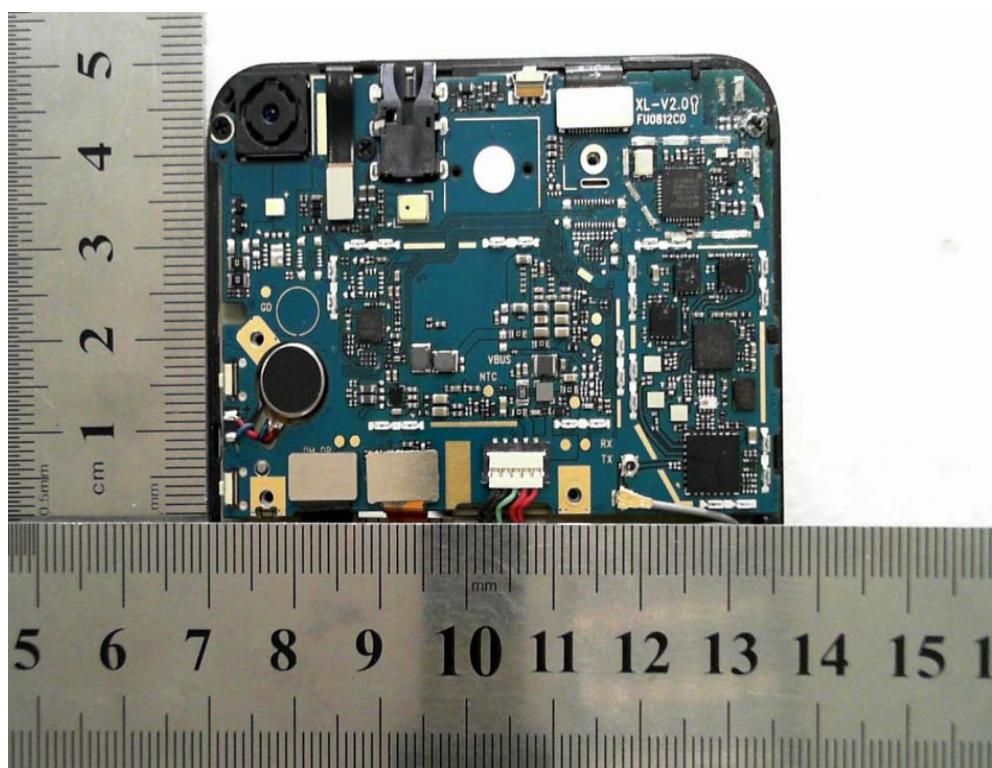
cover off



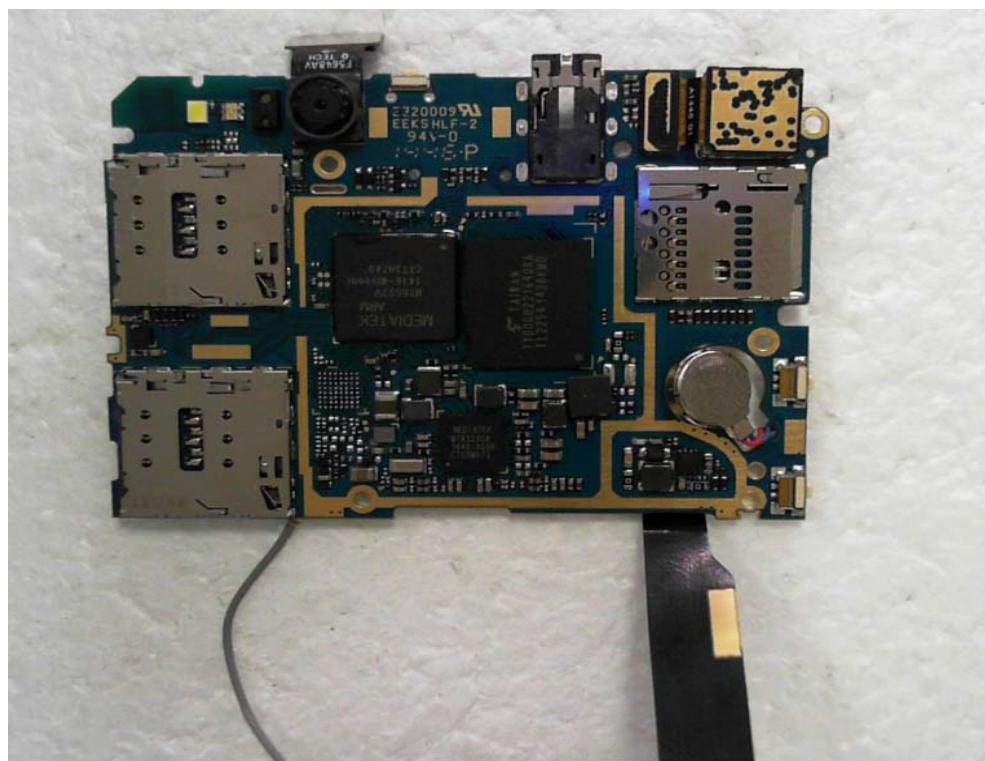
Main board With shielding Front View



Main board Without shielding Front View



## Main board Rear



## Battery



Type: Li-ion 3.8V / 2180mAh 8.28Wh  
Limited charge voltage: 4.35V

S/N: GY1501000001

### CAUTION

- USE ONLY ORIGINAL BATTERIES AND CHARGERS.
- DO NOT DISASSEMBLE OR SHORT-CIRCUIT THE BATTERY.
- DO NOT CHARGE OR EXPOSE THE BATTERY BEYOND THE TEMPERATURE RANGE (0°C - 55°C).
- BATTERY MAY EXPLODE IF DISPOSED OF INTO FIRE.
- KEEP THE BATTERY OUT OF THE REACH OF CHILDREN.



Made in China

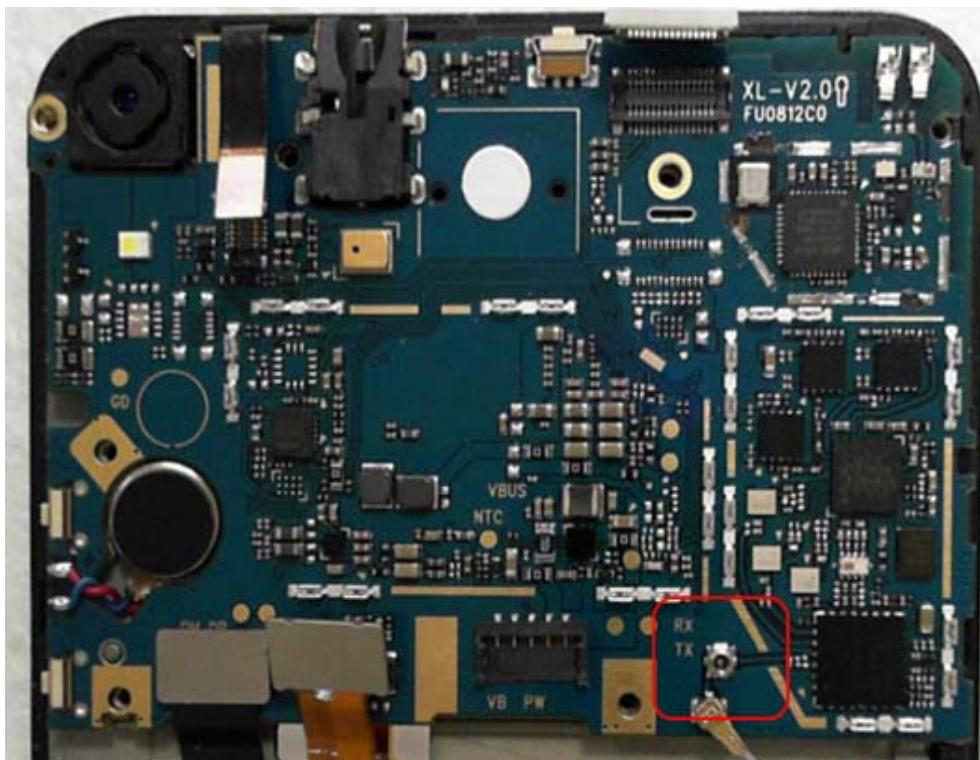
**USB Cable**



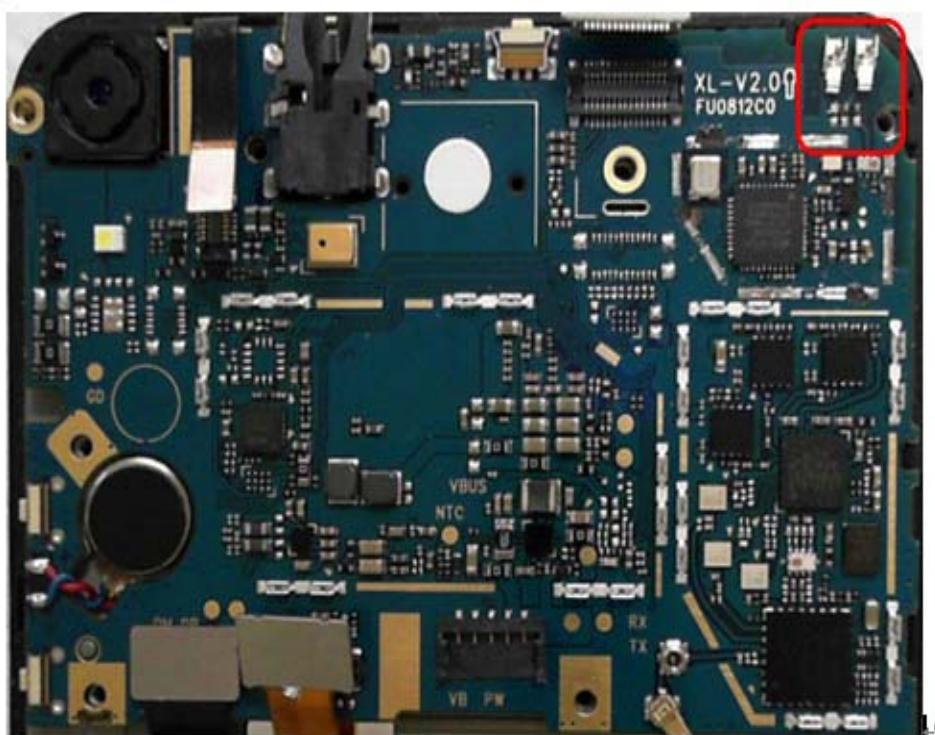
**Headset**



GSM/DCS/UMTS Antenna View



BT/WIFI Antenna View



## Adapter



## ANNEX B: Detailed Test Results

### B.1 Output Power (22.913(a)/24.232(b))

#### B.1.1 Conducted Output Power Measurement

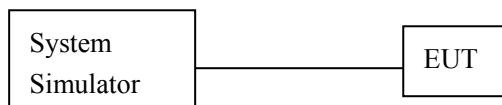
##### B.1.1.1 Description

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

##### B.1.1.2 Test Procedures

1. The transmitter output port was connected to base station.
2. Set EUT as maximum power through base station.
3. There measurements were done at 3 frequencies, 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band; 1850.2MHz, 1880.0MHz and 1909.8MHz for PCS1900 band.

##### B.1.1.3 Test Setup



##### B.1.1.4 Test Results

###### GSM850

###### Limit

| Power step | Peak output power(dBm) | Tolerance(dB) |
|------------|------------------------|---------------|
| 5          | ≤33dBm(2W)             | ±2            |

###### Measurement result

###### GSM

| Frequency(MHz) | Channel No. | Power Step | Peak output power(dBm) | Verdict |
|----------------|-------------|------------|------------------------|---------|
| 824.2          | 128         | 5          | 32.13                  | Pass    |
| 836.6          | 190         |            | 32.05                  | Pass    |
| 848.8          | 251         |            | 32.09                  | Pass    |

###### GPRS

| Frequency(MHz) | Channel No. | Power Step | Peak output power(dBm) | Verdict |
|----------------|-------------|------------|------------------------|---------|
| 824.2          | 128         | 5          | 32.19                  | Pass    |
| 836.6          | 190         |            | 32.15                  | Pass    |
| 848.8          | 251         |            | 32.17                  | Pass    |

###### PCS1900

###### Limit

| Power step | Peak output power(dBm) | Tolerance(dB) |
|------------|------------------------|---------------|
| 0          | ≤30dBm(1W)             | ±2            |

###### Measurement result

###### GSM

| Frequency(MHz) | Channel No. | Power Step | Peak output power(dBm) | Verdict |
|----------------|-------------|------------|------------------------|---------|
| 1850.2         | 512         | 0          | 29.72                  | Pass    |
| 1880.0         | 661         | 0          | 29.67                  | Pass    |
| 1909.8         | 810         | 0          | 29.56                  | Pass    |

## GPRS

| Frequency(MHz) | Channel No. | Power Step | Peak output power(dBm) | Verdict |
|----------------|-------------|------------|------------------------|---------|
| 1850.2         | 512         | 5          | 29.70                  | Pass    |
| 1880.0         | 661         |            | 29.62                  | Pass    |
| 1909.8         | 810         |            | 29.51                  | Pass    |

## WCDMA Band V and Band II

### Limit

| Band | Power step | Peak output power(dBm) | Tolerance(dB) |
|------|------------|------------------------|---------------|
| II,V | 3          | ≤24dBm(1W)             | +1.7/-3.7     |

### Band II

| Band/Time slot configuration | Frequency(MHz) | Channel | Power Class | Peak output power(dBm) | Verdict |
|------------------------------|----------------|---------|-------------|------------------------|---------|
| RMC (12.2kbps)               | 1852.6         | 9263    | 3           | 21.48                  | Pass    |
|                              | 1880.0         | 9400    |             | 21.42                  |         |
|                              | 1907.6         | 9538    |             | 21.17                  |         |
| HSDPA Subtest 1              | 1852.6         | 9263    | 3           | 21.37                  | Pass    |
|                              | 1880.0         | 9400    |             | 21.12                  |         |
|                              | 1907.6         | 9538    |             | 21.12                  |         |
| HSDPA Subtest 2              | 1852.6         | 9263    | 3           | 21.36                  | Pass    |
|                              | 1880.0         | 9400    |             | 21.11                  |         |
|                              | 1907.6         | 9538    |             | 21.12                  |         |
| HSDPA Subtest 3              | 1852.6         | 9263    | 3           | 20.90                  | Pass    |
|                              | 1880.0         | 9400    |             | 20.66                  |         |
|                              | 1907.6         | 9538    |             | 20.66                  |         |
| HSDPA Subtest 4              | 1852.6         | 9263    | 3           | 20.87                  | Pass    |
|                              | 1880.0         | 9400    |             | 20.63                  |         |
|                              | 1907.6         | 9538    |             | 20.63                  |         |
| HSUPA Subtest 1              | 1852.6         | 9263    | 3           | 19.34                  | Pass    |
|                              | 1880.0         | 9400    |             | 19.31                  |         |
|                              | 1907.6         | 9538    |             | 19.14                  |         |
| HSUPA Subtest 2              | 1852.6         | 9263    | 3           | 19.32                  | Pass    |
|                              | 1880.0         | 9400    |             | 19.29                  |         |
|                              | 1907.6         | 9538    |             | 19.10                  |         |
| HSUPA Subtest 3              | 1852.6         | 9263    | 3           | 20.33                  | Pass    |
|                              | 1880.0         | 9400    |             | 20.28                  |         |

|                    |        |      |  |       |      |
|--------------------|--------|------|--|-------|------|
|                    | 1907.6 | 9538 |  | 20.1  |      |
| HSUPA<br>Subtest 4 | 1852.6 | 9263 |  | 18.8  | Pass |
|                    | 1880.0 | 9400 |  | 18.79 |      |
|                    | 1907.6 | 9538 |  | 18.58 |      |
| HSUPA<br>Subtest 5 | 1852.6 | 9263 |  | 21.33 | Pass |
|                    | 1880.0 | 9400 |  | 21.28 |      |
|                    | 1907.6 | 9538 |  | 21.10 |      |

## Band V

| Band/Time slot configuration | Frequency(MHz) | Channel | Power Class | Peak output power(dBm) | Verdict |
|------------------------------|----------------|---------|-------------|------------------------|---------|
| RMC<br>(12.2kbps)            | 826.6          | 4133    |             | 23.96                  | Pass    |
|                              | 835.0          | 4175    |             | 24.04                  |         |
|                              | 846.4          | 4232    |             | 23.89                  |         |
| HSDPA<br>Subtest 1           | 826.6          | 4133    |             | 22.5                   | Pass    |
|                              | 835.0          | 4175    |             | 22.3                   |         |
|                              | 846.4          | 4232    |             | 22.44                  |         |
| HSDPA<br>Subtest 2           | 826.6          | 4133    |             | 22.5                   | Pass    |
|                              | 835.0          | 4175    |             | 22.31                  |         |
|                              | 846.4          | 4232    |             | 22.45                  |         |
| HSDPA<br>Subtest 3           | 826.6          | 4133    |             | 22.04                  | Pass    |
|                              | 835.0          | 4175    |             | 21.84                  |         |
|                              | 846.4          | 4232    |             | 21.78                  |         |
| HSDPA<br>Subtest 4           | 826.6          | 4133    |             | 22.02                  | Pass    |
|                              | 835.0          | 4175    |             | 21.82                  |         |
|                              | 846.4          | 4232    |             | 21.95                  |         |
| HSUPA<br>Subtest 1           | 826.6          | 4133    |             | 20.83                  | Pass    |
|                              | 835.0          | 4175    |             | 19.82                  |         |
|                              | 846.4          | 4232    |             | 20.06                  |         |
| HSUPA<br>Subtest 2           | 826.6          | 4133    |             | 20.84                  | Pass    |
|                              | 835.0          | 4175    |             | 19.82                  |         |
|                              | 846.4          | 4232    |             | 20.04                  |         |
| HSUPA<br>Subtest 3           | 826.6          | 4133    |             | 21.83                  | Pass    |
|                              | 835.0          | 4175    |             | 20.81                  |         |
|                              | 846.4          | 4232    |             | 21.02                  |         |
| HSUPA<br>Subtest 4           | 826.6          | 4133    |             | 20.31                  | Pass    |
|                              | 835.0          | 4175    |             | 19.28                  |         |
|                              | 846.4          | 4232    |             | 19.5                   |         |
| HSUPA<br>Subtest 5           | 826.6          | 4133    |             | 22.82                  | Pass    |
|                              | 835.0          | 4175    |             | 21.79                  |         |
|                              | 846.4          | 4232    |             | 22.02                  |         |

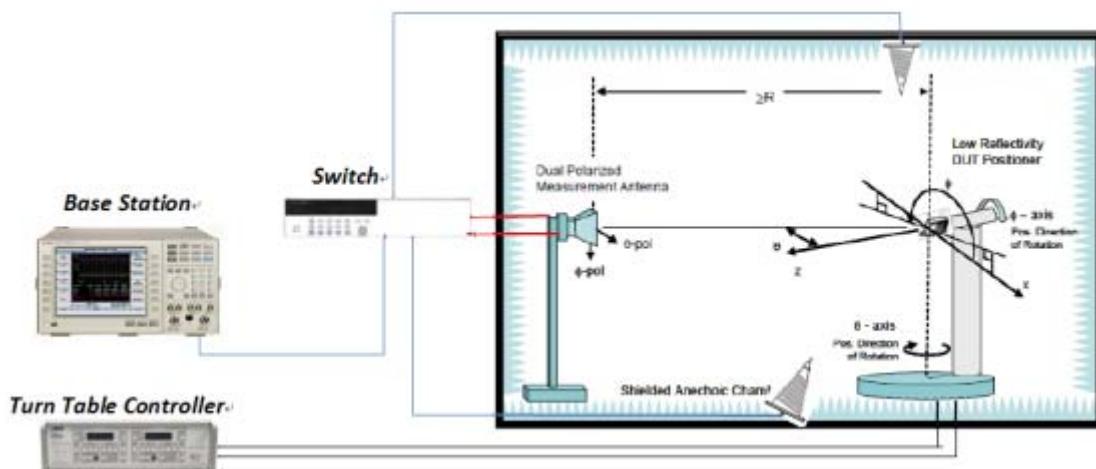
### B.1.2 Radiated Power

**B.1.2.1 Description**

This is the test for the maximum radiated power from the EUT. Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage." Rule Part 22.913(a) specifies "Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

**B.1.2.2 Test Procedures**

1. In an anechoic antenna test chamber, a half-wave dipole antenna for the frequency band of interest is placed at the reference centre of the chamber. An RF Signal source for the frequency band of interest is connected to the dipole with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A known (measured) power ( $P_{in}$ ) is applied to the input of the dipole, and the power received ( $P_r$ ) at the chamber's probe antenna is recorded.
2. A "reference path loss" is established as  $P_{in} + 2.15 - P_r$ .
3. The EUT is substituted for the dipole at the reference centre of the chamber and a scan is performed to obtain the radiation pattern.
4. From the radiation pattern, the co-ordinates where the maximum antenna gain occurs are identified.
5. The EUT is then put into pulse mode at its maximum power level (Power Step 0 for PCS1900.5 for GSM 850).
6. "Gated mode" power measurements are performed with the receiving antenna placed at the coordinates determined in Step 3 to determine the output power as defined in Rule 24.232 (b) and (c). The "reference path loss" from Step 1 is added to this result.
7. This value is EIRP since the measurement is calibrated using a half-wave dipole antenna of known gain (2.15 dBi) and known input power ( $P_{in}$ ).
8. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

**B.1.2.3 Test Setup****B.1.2.4 Test Result of ERP****GSM850**

| Frequency(MHz) | Channel No. | Power Step | ERP(dBm) | Verdict |
|----------------|-------------|------------|----------|---------|
| 824.2          | 128         | 5          | 29.25    | Pass    |

|       |     |   |       |      |
|-------|-----|---|-------|------|
| 836.6 | 190 | 5 | 30.34 | Pass |
| 848.8 | 251 | 5 | 30.74 | Pass |

**WCDMA Band V**

| Frequency(MHz) | Channel No. | Power Step | ERP(dBm) | Verdict |
|----------------|-------------|------------|----------|---------|
| 826.6          | 4133        | 3          | 19.55    | Pass    |
| 835            | 4175        | 3          | 21.56    | Pass    |
| 846.4          | 4232        | 3          | 21.44    | Pass    |

**B1.2.4 Test Result of EIRP****GSM1900**

| Frequency(MHz) | Channel | Power Step | EIRP(dBm) | Verdict |
|----------------|---------|------------|-----------|---------|
| 1850.2         | 512     | 0          | 31.18     | Pass    |
| 1880.0         | 661     | 0          | 32.14     | Pass    |
| 1909.8         | 810     | 0          | 31.68     | Pass    |

**WCDMA Band II**

| Frequency(MHz) | Channel | Power Class | EIRP(dBm) | Verdict |
|----------------|---------|-------------|-----------|---------|
| 1852.6         | 9263    | 3           | 22.34     | Pass    |
| 1880.0         | 9400    | 3           | 23.81     | Pass    |
| 1907.6         | 9538    | 3           | 21.14     | Pass    |

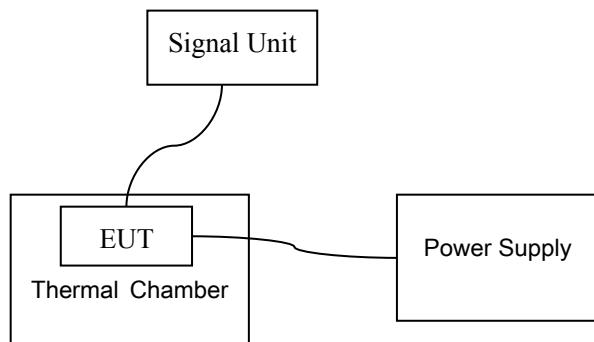
**B.2 Frequency Stability (22.355/24.235)****B.2.1 Description**

The frequency stability shall be measured by variation of ambient temperature and variation of primary supply voltage to ensure that fundamental emission stays within the authorized frequency block. The frequency stability of transmitter shall be maintained within  $\pm 0.00023\%$  ( $\pm 2.5\text{ppm}$ ) of the center frequency.

**B.2.2 Test Procedure for Temperature Variation**

1. The EUT was set up in the thermal chamber and connected with the base station.
2. With power OFF, the temperature was decreased to  $-20^\circ\text{C}$  and the EUT was stabilized for three hours. Power was applied and maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in  $10^\circ\text{C}$  step to  $50^\circ\text{C}$ . The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.
4. if the EUT cannot be turned on at  $-30^\circ\text{C}$ , the testing lowest temperature will be raised in  $10^\circ\text{C}$  step until the EUT can be turned on.

**B.2.2.1 Test Setup**

**B.2.2.2 Test Results****GSM850**

| Temperature (°C) | Frequency Error (Hz) | ppm  | Limit                  | Verdict |
|------------------|----------------------|------|------------------------|---------|
| -20              | /                    | /    | $\leq\pm2.5\text{ppm}$ | Pass    |
| -10              | /                    | /    |                        | Pass    |
| 0                | -1.83                | 0.00 |                        | Pass    |
| 10               | 6.16                 | 0.01 |                        | Pass    |
| 20               | 5.05                 | 0.01 |                        | Pass    |
| 30               | 6.32                 | 0.01 |                        | Pass    |
| 40               | 1.23                 | 0.00 |                        | Pass    |
| 50               | /                    | /    |                        | Pass    |
| 55               | /                    | /    |                        | Pass    |

**GSM1900**

| Temperature (°C) | Frequency Error (Hz) | ppm  | Limit                  | Verdict |
|------------------|----------------------|------|------------------------|---------|
| -20              | /                    | /    | $\leq\pm2.5\text{ppm}$ | Pass    |
| -10              | /                    | /    |                        | Pass    |
| 0                | 19.29                | 0.01 |                        | Pass    |
| 10               | 23.43                | 0.01 |                        | Pass    |
| 20               | 14.50                | 0.01 |                        | Pass    |
| 30               | 3.83                 | 0.00 |                        | Pass    |
| 40               | 8.07                 | 0.00 |                        | Pass    |
| 50               | /                    | /    |                        | Pass    |
| 55               | /                    | /    |                        | Pass    |

**WCDMA Band II**

| Temperature (°C) | Frequency Error (Hz) | ppm  | Limit                  | Verdict |
|------------------|----------------------|------|------------------------|---------|
| -20              | /                    | /    | $\leq\pm2.5\text{ppm}$ | Pass    |
| -10              | /                    | /    |                        | Pass    |
| 0                | 3.20                 | 0.00 |                        | Pass    |
| 10               | 2.50                 | 0.00 |                        | Pass    |
| 20               | 2.80                 | 0.00 |                        | Pass    |
| 30               | 3.30                 | 0.00 |                        | Pass    |

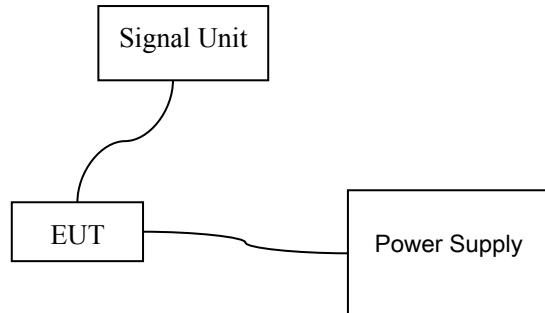
|    |      |      |  |      |
|----|------|------|--|------|
| 40 | 3.80 | 0.00 |  | Pass |
| 50 | /    | /    |  | Pass |
| 55 | /    | /    |  | Pass |

**WCDMA Band V**

| Temperature (°C) | Frequency Error (Hz) | ppm  | Limit                    | Verdict |
|------------------|----------------------|------|--------------------------|---------|
| -20              | /                    | /    | $\leq \pm 2.5\text{ppm}$ | Pass    |
| -10              | /                    | /    |                          | Pass    |
| 0                | 1.80                 | 0.00 |                          | Pass    |
| 10               | -0.80                | 0.00 |                          | Pass    |
| 20               | 1.60                 | 0.00 |                          | Pass    |
| 30               | -1.40                | 0.00 |                          | Pass    |
| 40               | 1.20                 | 0.00 |                          | Pass    |
| 50               | /                    | /    |                          | Pass    |
| 55               | /                    | /    |                          | Pass    |

**B.2.3 Test Procedure for Voltage Variation**

1. The EUT was placed in a temperature chamber at  $25 \pm 5^\circ\text{C}$  and connected with the base station.
2. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.
3. The variation in frequency was measured.

**B.2.3.1 Test Setup****B.2.3.2 Test Results:**

| Band             | Voltage (V) | Freq.Dev.(Hz) | Dev.(ppm) | Limit(ppm)               | Verdict |
|------------------|-------------|---------------|-----------|--------------------------|---------|
| GSM850           | 3.6         | 5.64          | 0.01      | $\leq \pm 2.5\text{ppm}$ | Pass    |
|                  | 3.7         | 6.38          | 0.01      |                          | Pass    |
|                  | 4.2         | -2.06         | 0.00      |                          | Pass    |
| GSM1900          | 3.6         | 13.82         | 0.01      |                          | Pass    |
|                  | 3.7         | 15.78         | 0.01      |                          | Pass    |
|                  | 4.2         | 7.80          | 0.00      |                          | Pass    |
| WCDMA<br>Band II | 3.6         | 3.10          | 0.00      |                          | Pass    |
|                  | 3.7         | 2.90          | 0.00      |                          | Pass    |

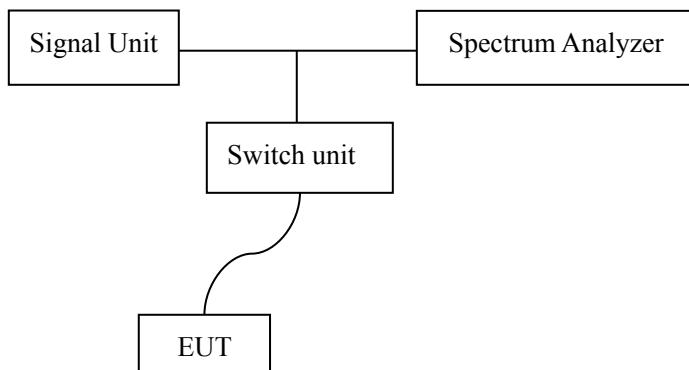
|              |     |      |      |  |      |
|--------------|-----|------|------|--|------|
|              | 4.2 | 2.60 | 0.00 |  | Pass |
| WCDMA Band V | 3.6 | 1.30 | 0.00 |  | Pass |
|              | 3.7 | 1.50 | 0.00 |  | Pass |
|              | 4.2 | 1.70 | 0.00 |  | Pass |

### B.3 Occupied Bandwidth (22.917(a)/24.238(b))

#### B.3.1 Description

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 the USPCS frequency band. The table below lists the measured -20dBc BW(99%). Spectrum analyzer plots are included on the following pages.

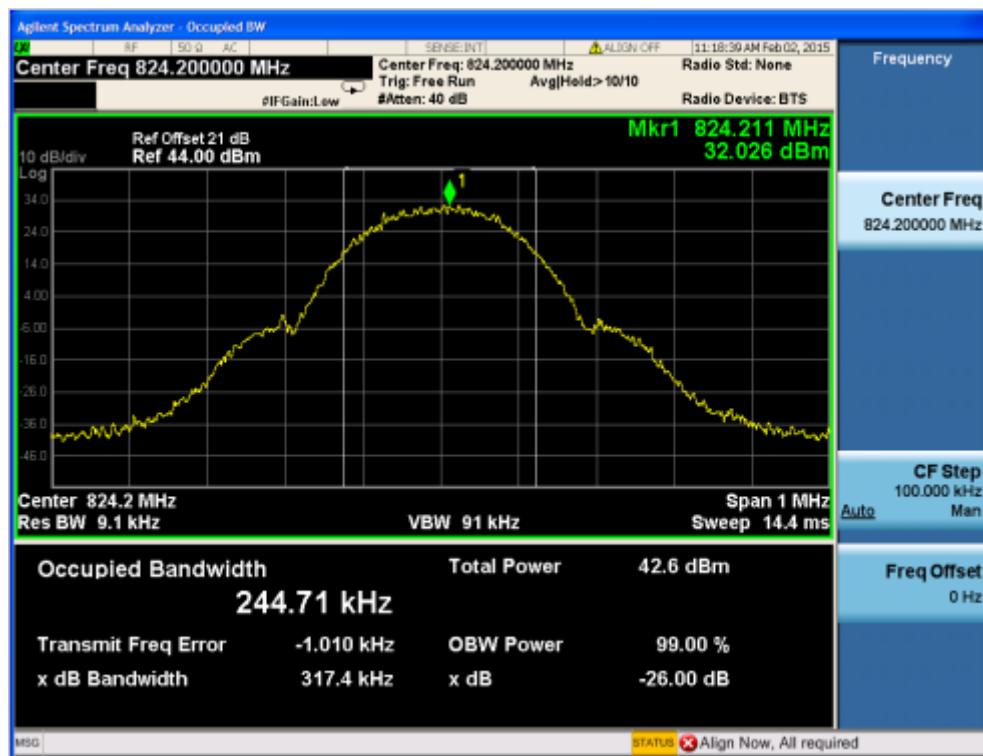
#### B.3.2 Test Setup



#### B.3.3 Test Results

| Band                         | CH   | Frequency(MHz) | Result | Verdict |
|------------------------------|------|----------------|--------|---------|
| GSM850                       | 128  | 824.2          | Fig.1  | Pass    |
|                              | 189  | 836.6          | Fig.2  | Pass    |
|                              | 251  | 848.8          | Fig.3  | Pass    |
| GSM1900                      | 512  | 1850.2         | Fig.4  | Pass    |
|                              | 661  | 1880.0         | Fig.5  | Pass    |
|                              | 810  | 1909.8         | Fig.6  | Pass    |
| WCDMA Band V                 | 4132 | 824.2          | Fig.7  | Pass    |
|                              | 4175 | 835            | Fig.8  | Pass    |
|                              | 4233 | 848.8          | Fig.9  | Pass    |
| WCDMA Band V HSDPA Subtest 1 | 4132 | 824.2          | Fig.10 | Pass    |
|                              | 4175 | 835            | Fig.11 | Pass    |
|                              | 4233 | 848.8          | Fig.12 | Pass    |
| WCDMA Band V HSUPA Subtest 5 | 4132 | 824.2          | Fig.13 | Pass    |
|                              | 4175 | 835            | Fig.14 | Pass    |
|                              | 4233 | 848.8          | Fig.15 | Pass    |
| WCDMA Band II                | 9263 | 1850.2         | Fig.16 | Pass    |

|                                     |      |        |        |      |
|-------------------------------------|------|--------|--------|------|
|                                     | 9400 | 1880.0 | Fig.17 | Pass |
|                                     | 9538 | 1909.8 | Fig.18 | Pass |
| WCDMA Band II<br>HSDPA<br>Subtest 1 | 9263 | 1850.2 | Fig.19 | Pass |
|                                     | 9400 | 1880.0 | Fig.20 | Pass |
|                                     | 9538 | 1909.8 | Fig.21 | Pass |
| WCDMA Band II<br>HSUPA<br>Subtest 5 | 9263 | 1850.2 | Fig.22 | Pass |
|                                     | 9400 | 1880.0 | Fig.23 | Pass |
|                                     | 9538 | 1909.8 | Fig.24 | Pass |

**Fig.1 GSM850-CH128 Occupied Bandwidth****Fig.2 GSM850-CH189 Occupied Bandwidth**

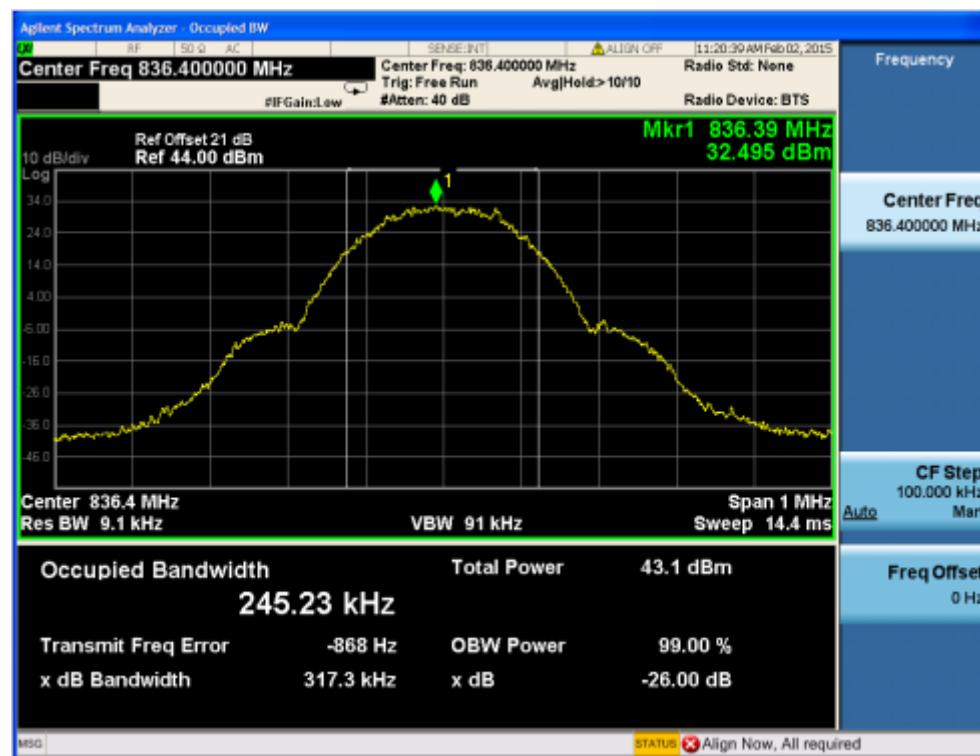


Fig.3 GSM850-CH251 Occupied Bandwidth

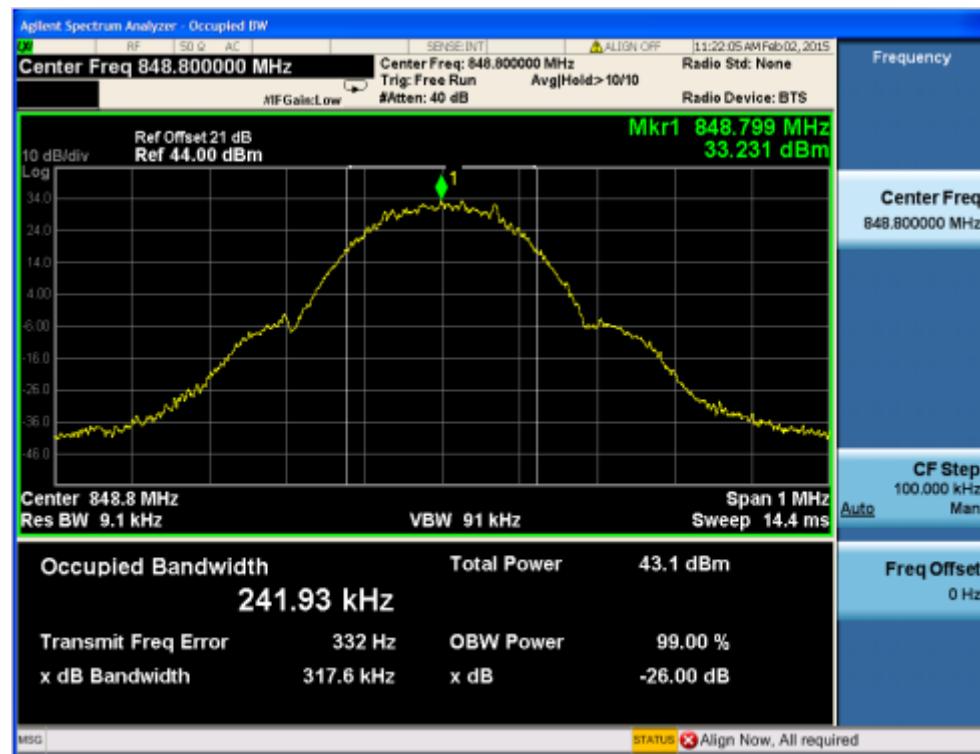


Fig.4 GSM1900-CH512 Occupied Bandwidth

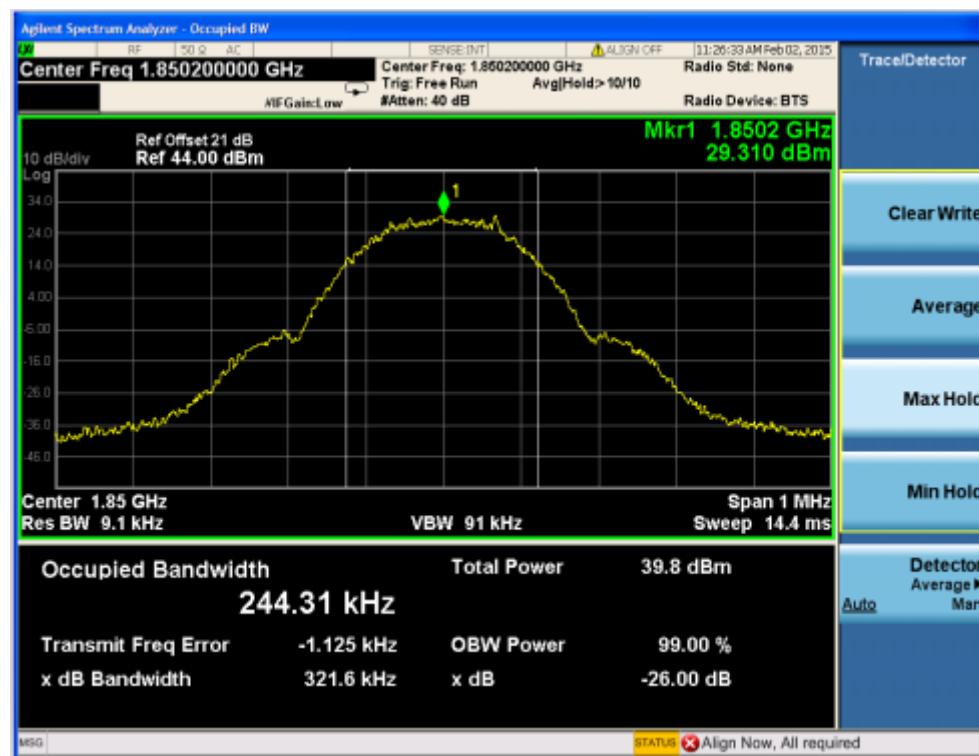


Fig.5 GSM1900-CH661 Occupied Bandwidth



Fig.6 GSM1900-CH810 Occupied Bandwidth

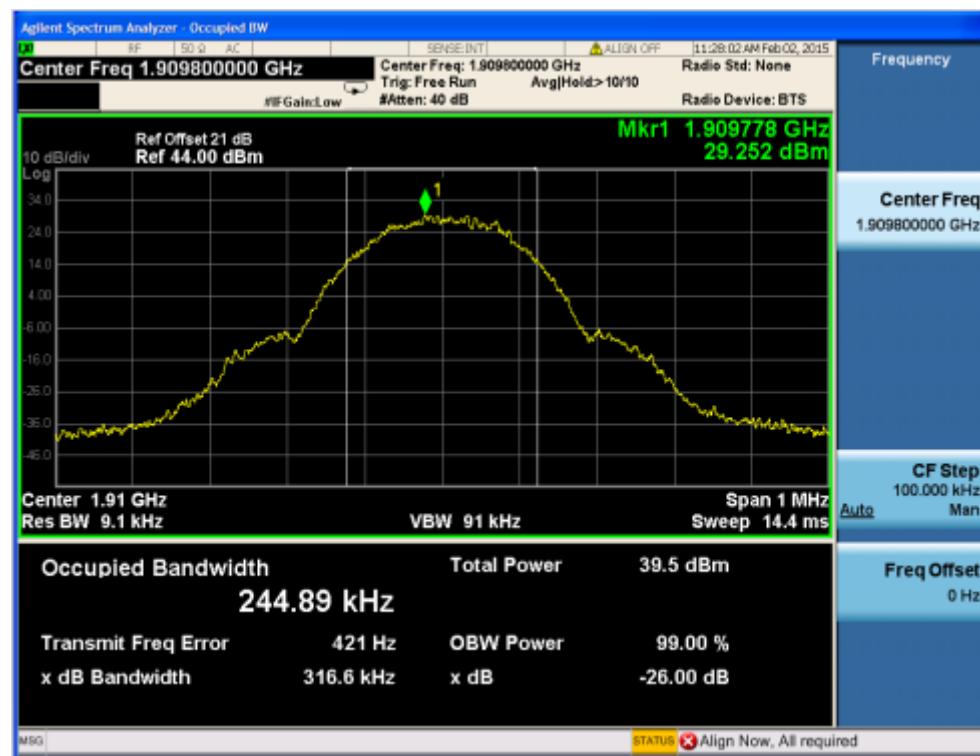


Fig.7 WCDMA Band V-CH4132 Occupied Bandwidth

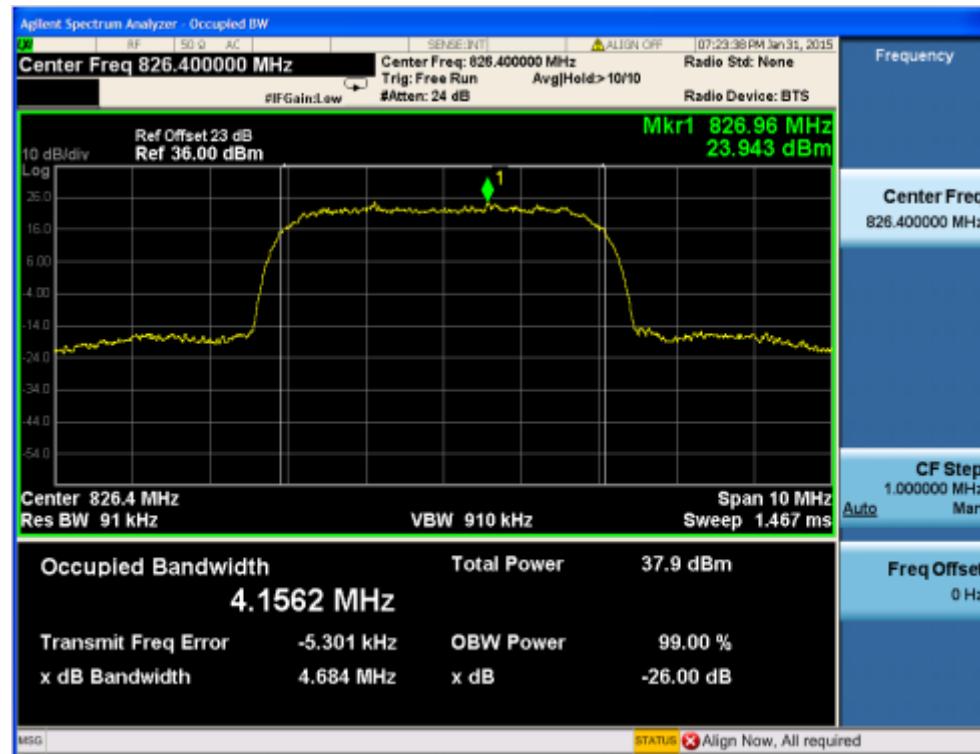


Fig.8 WCDMA Band V-CH4175 Occupied Bandwidth

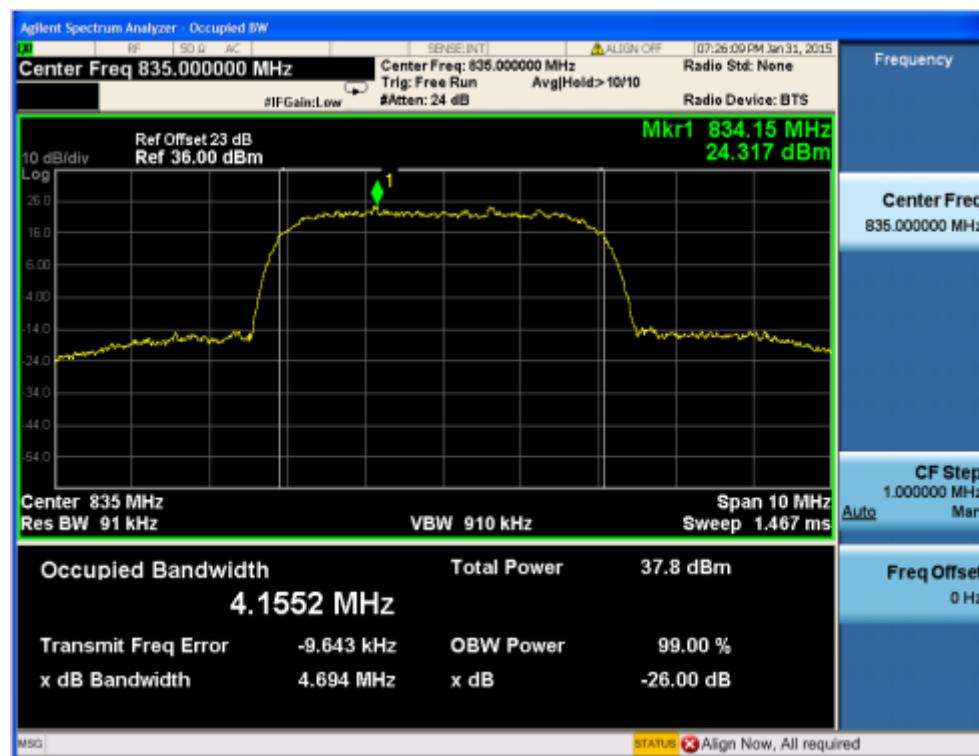


Fig.9 WCDMA Band V-CH4232 Occupied Bandwidth

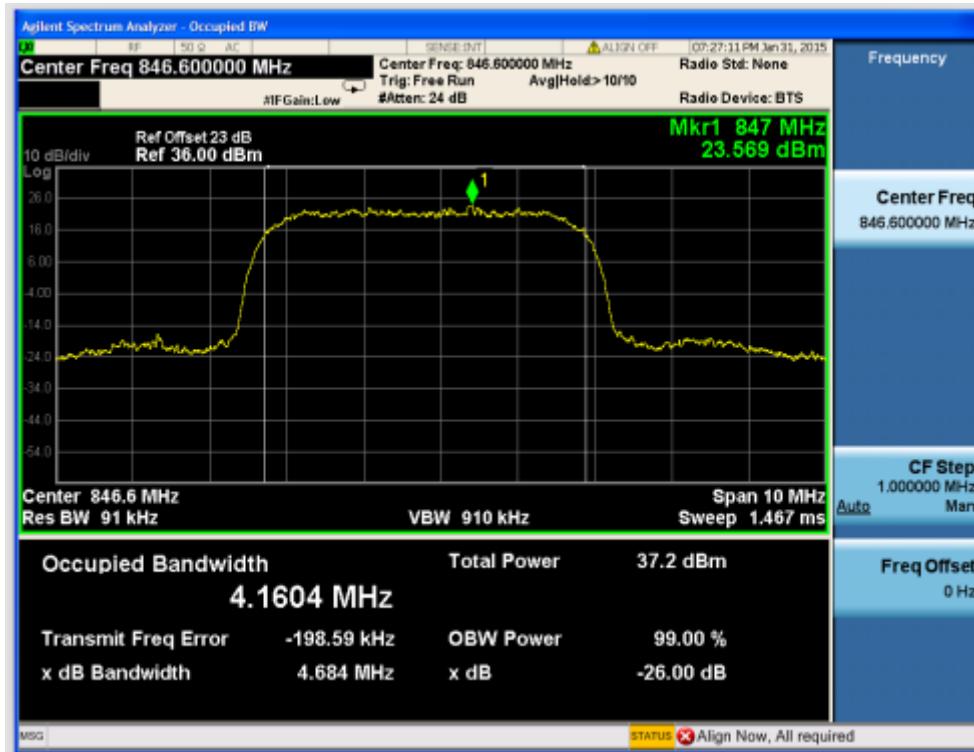


Fig.10 WCDMA Band V-CH4132 Occupied Bandwidth(HSDPA Subtes1)

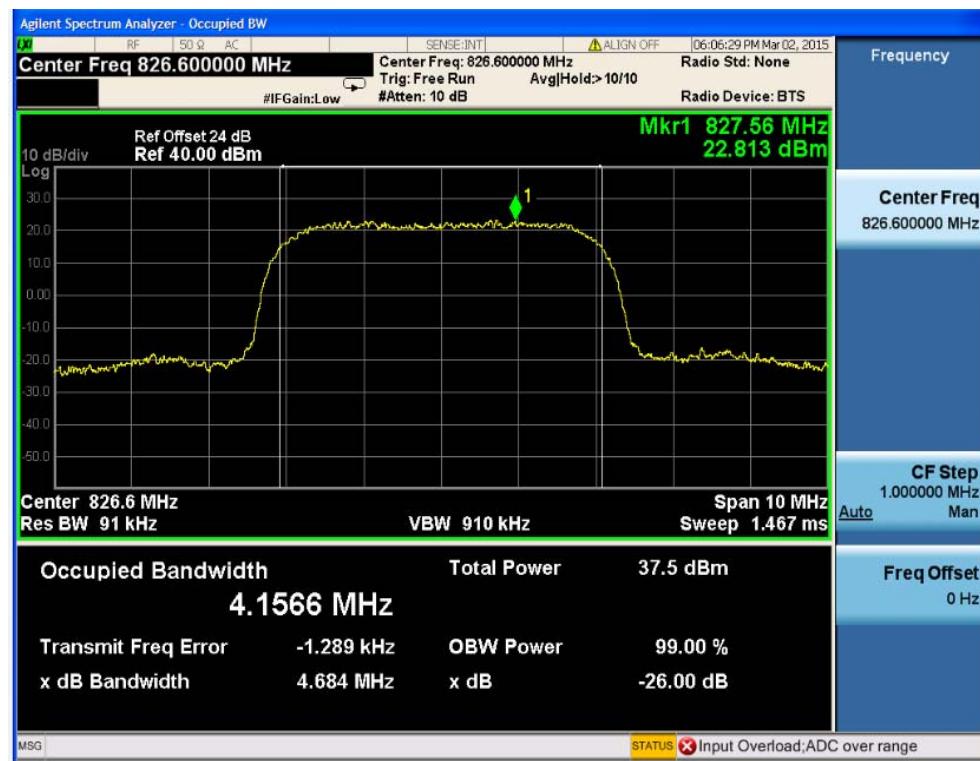


Fig.11 WCDMA Band V-CH4175 Occupied Bandwidth(HSDPA Subtes1)

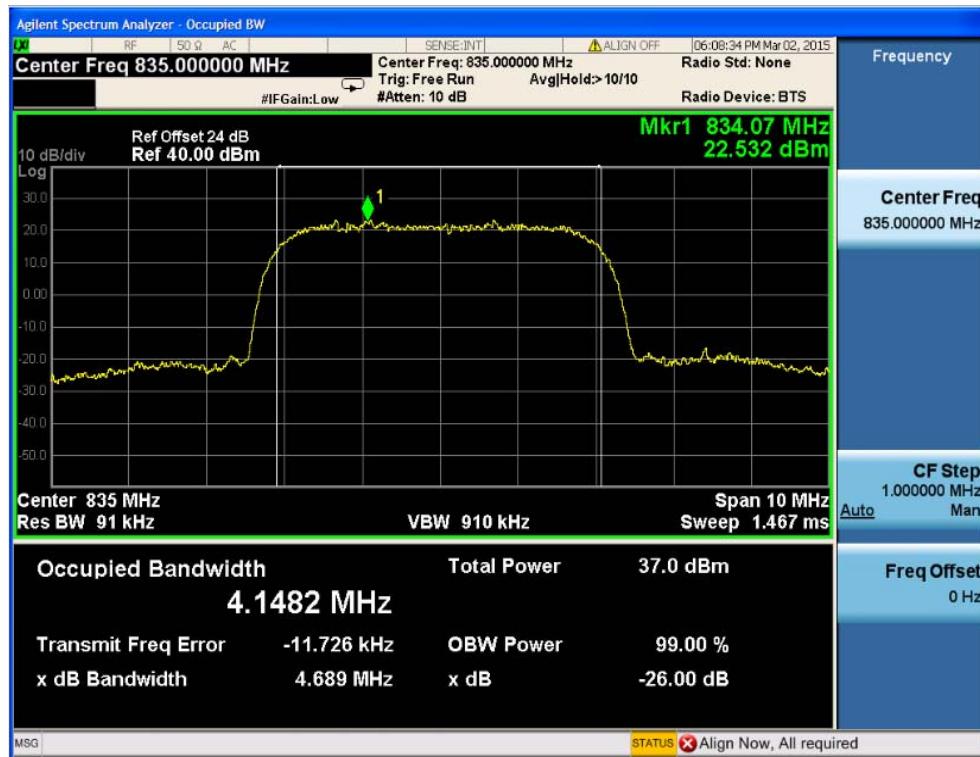


Fig.12 WCDMA Band V-CH4233 Occupied Bandwidth(HSDPA Subtes1)

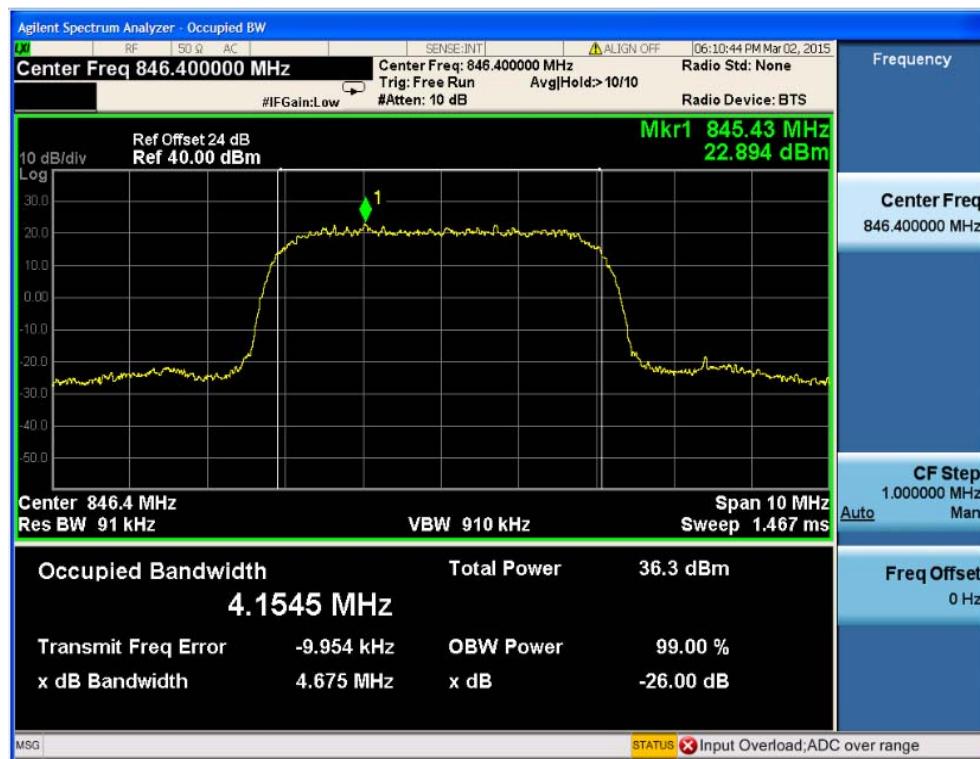


Fig.13 WCDMA Band V-CH4132 Occupied Bandwidth(HSUPA Subtes5)

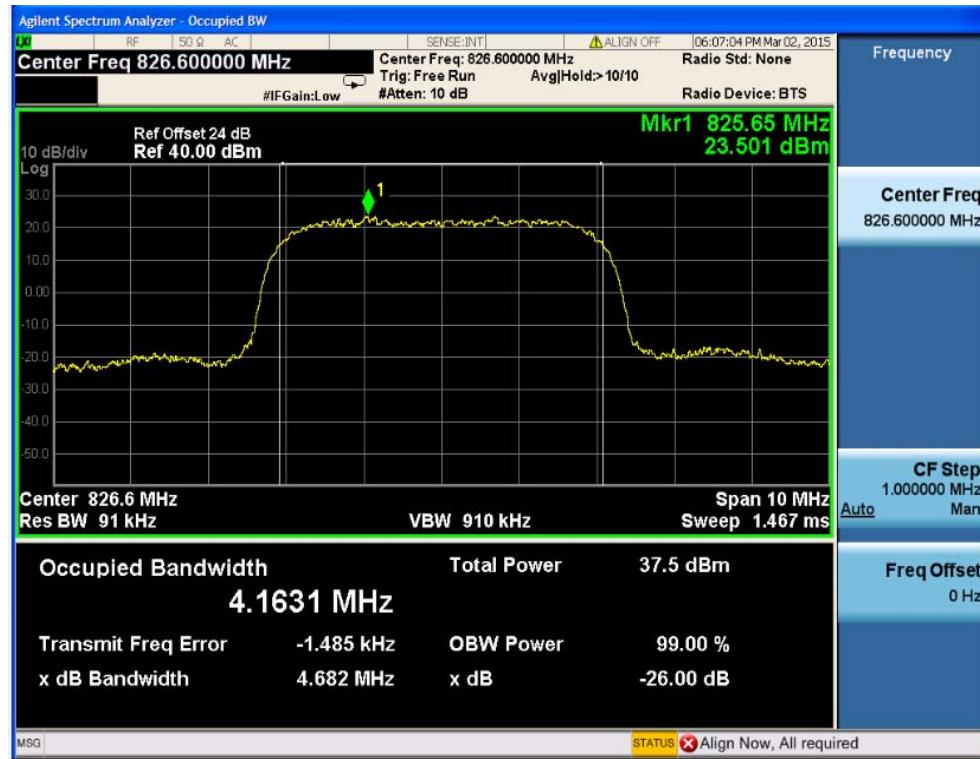


Fig.14 WCDMA Band V-CH4175 Occupied Bandwidth(HSUPA Subtes5)

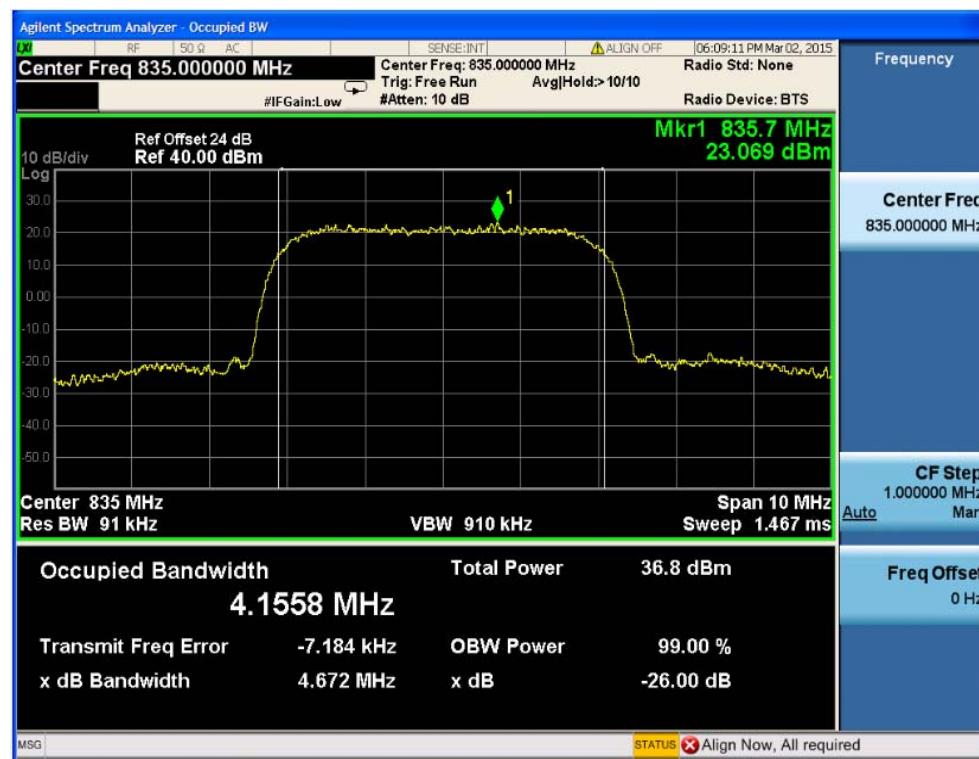


Fig.15 WCDMA Band V-CH4233 Occupied Bandwidth(HSUPA Subtes5)

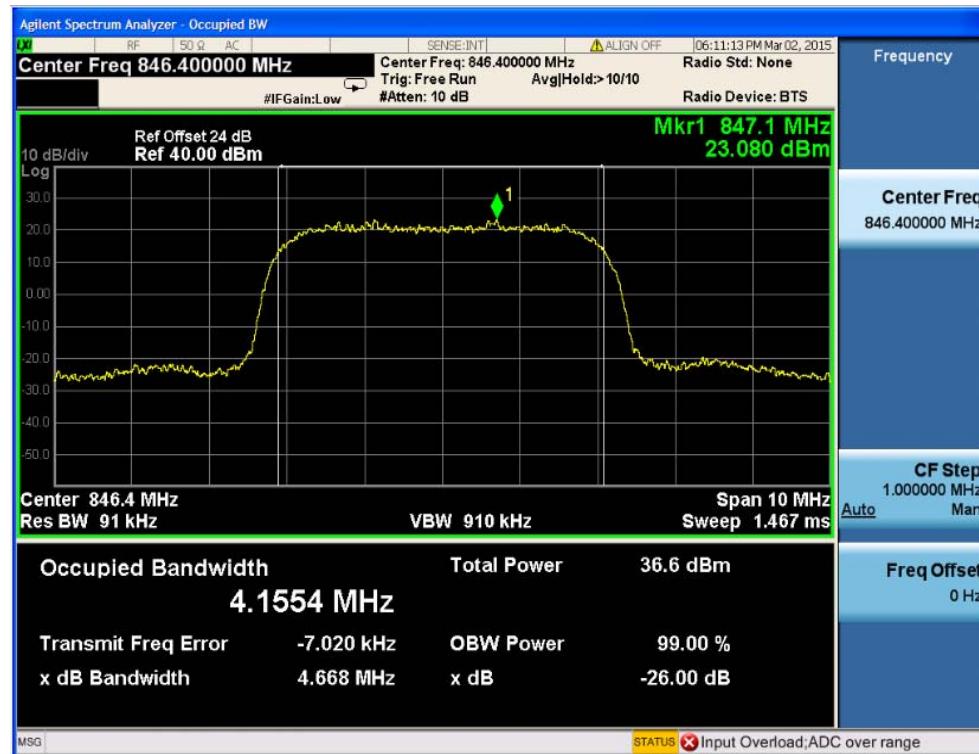


Fig.16 WCDMA Band II-CH4132 Occupied Bandwidth

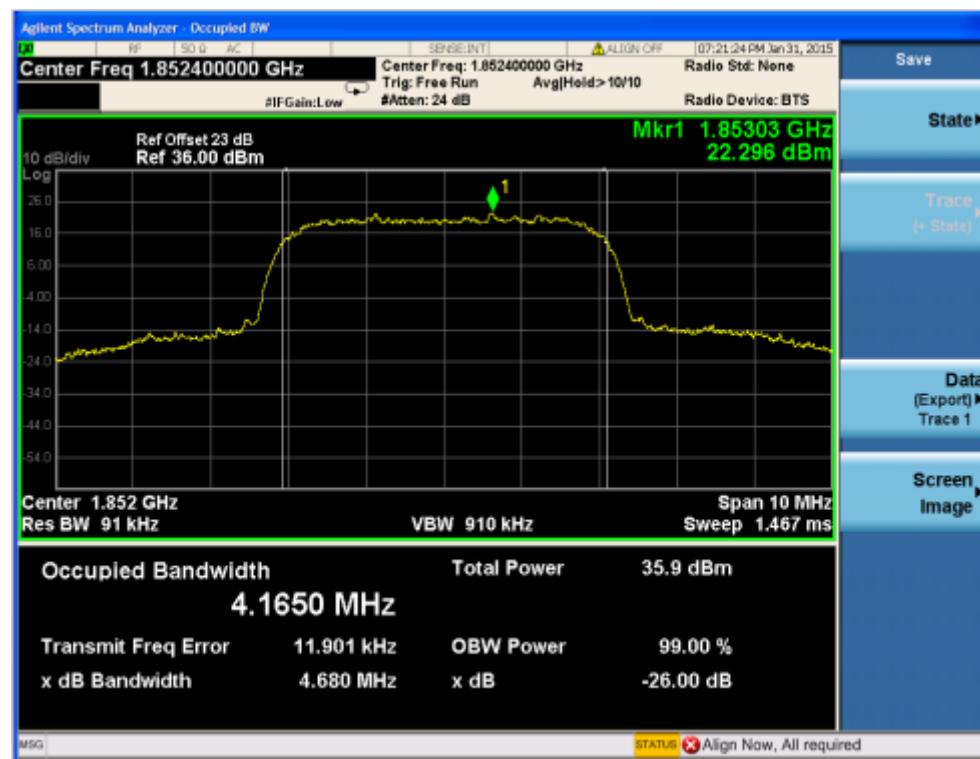


Fig.17 WCDMA Band II-CH4182 Occupied Bandwidth

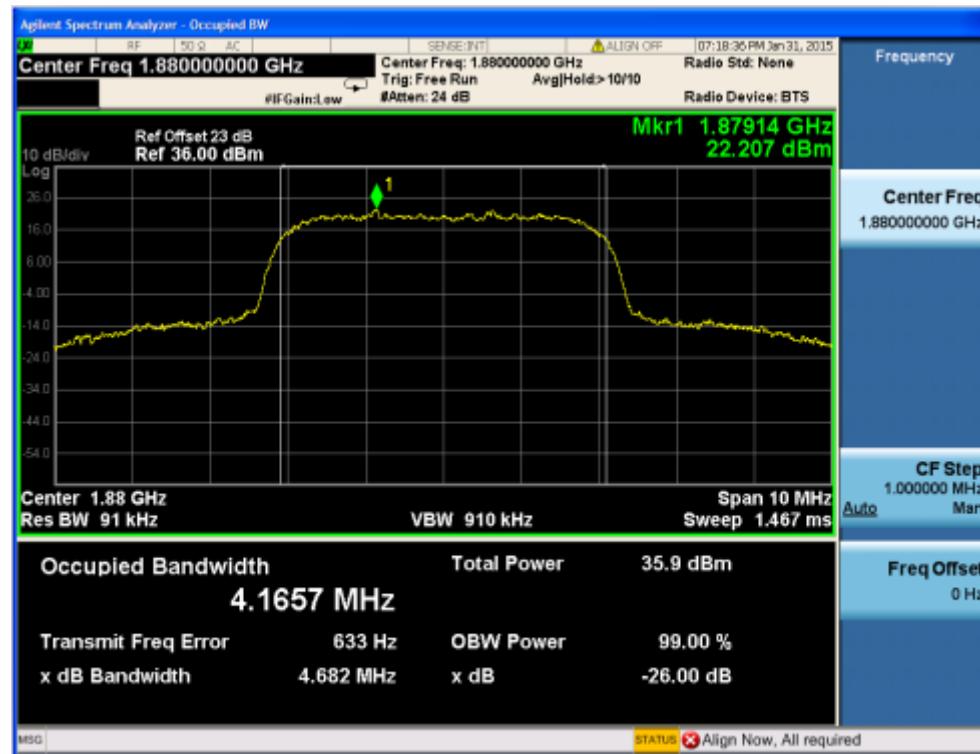


Fig.18 WCDMA Band II-CH4233 Occupied Bandwidth

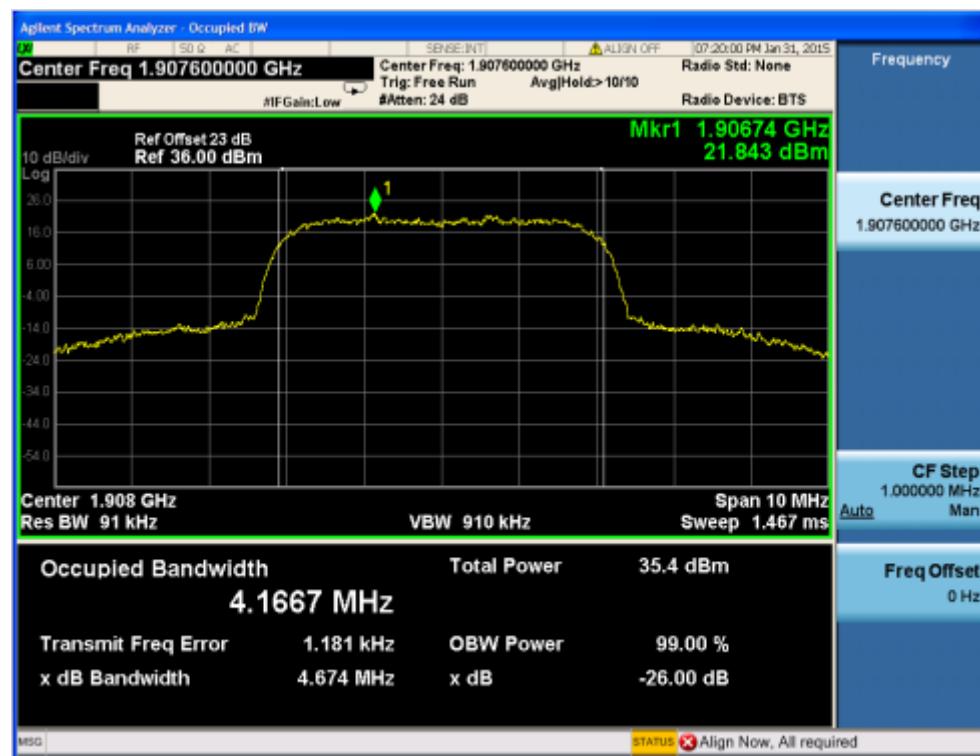


Fig.19 WCDMA Band II-CH9263 Occupied Bandwidth(HSDPA Subtest1)

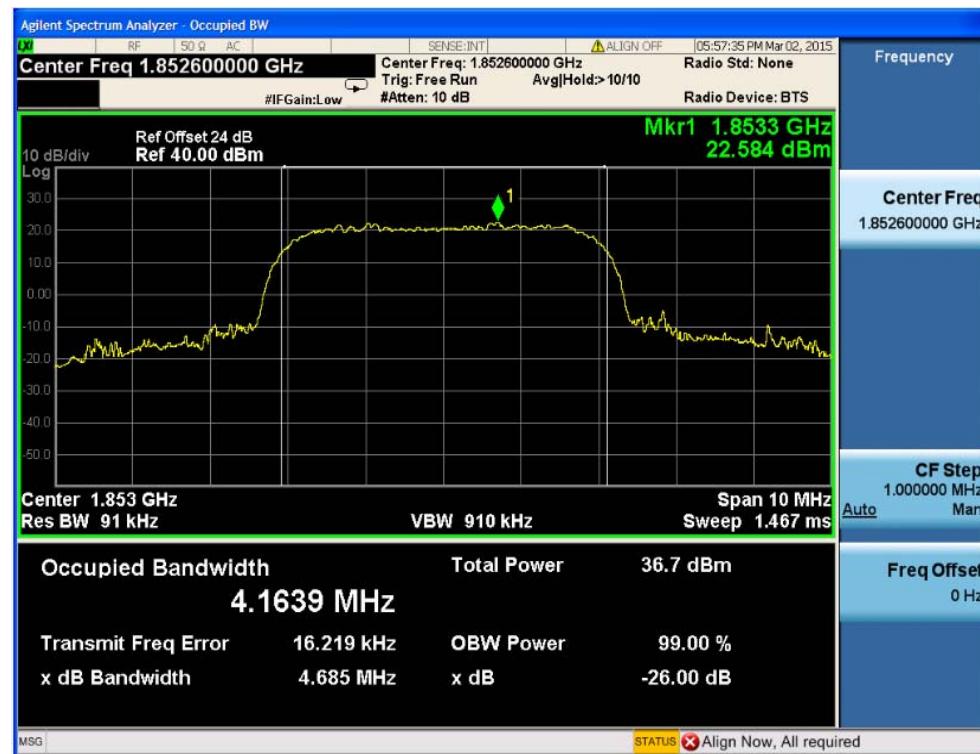


Fig.20 WCDMA Band II-CH9400 Occupied Bandwidth(HSDPA Subtest1)



Fig.21 WCDMA Band II-CH9538 Occupied Bandwidth(HSDPA Subtes1)

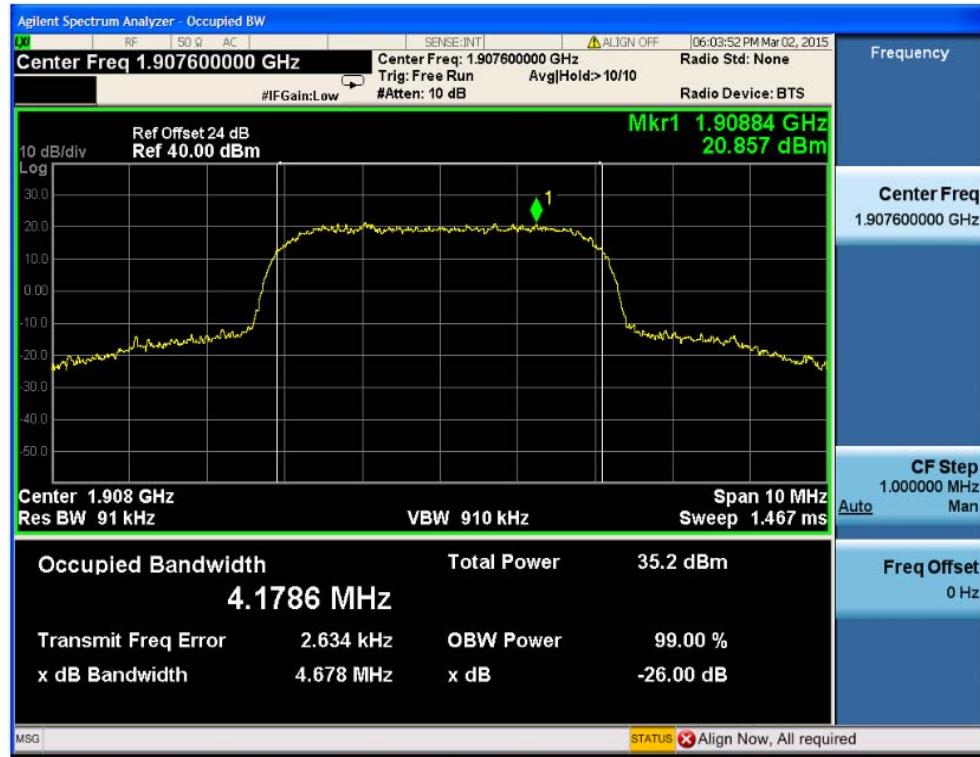


Fig.22 WCDMA Band II-CH9263 Occupied Bandwidth(HSUPA Subtes5)

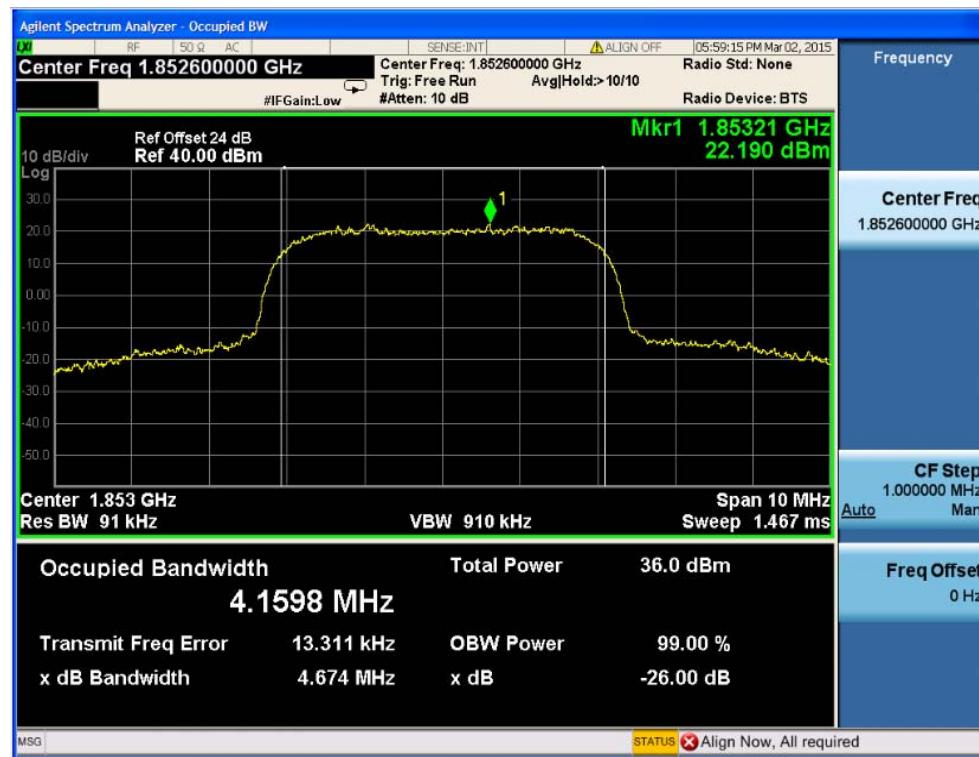
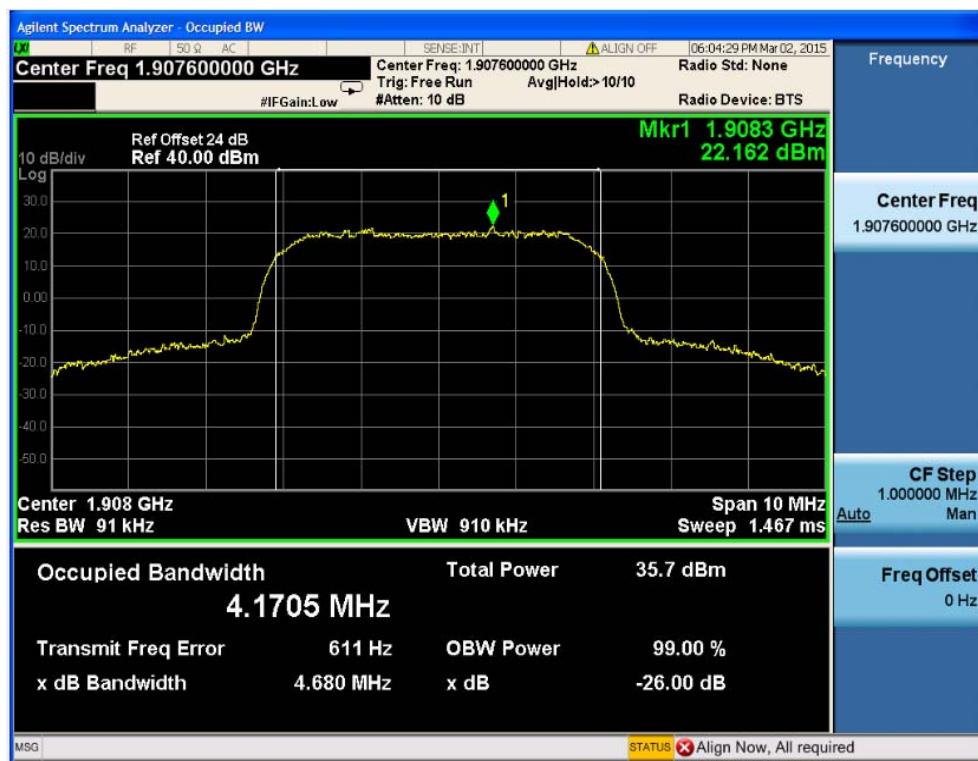


Fig.23 WCDMA Band II-CH9400 Occupied Bandwidth(HSUPA Subtes5)



Fig.24 WCDMA Band II-CH9538 Occupied Bandwidth(HSUPA Subtes5)



## B.4 Emission Limit (22.917(b)/ 24.238(b))

### B.4.1 Description

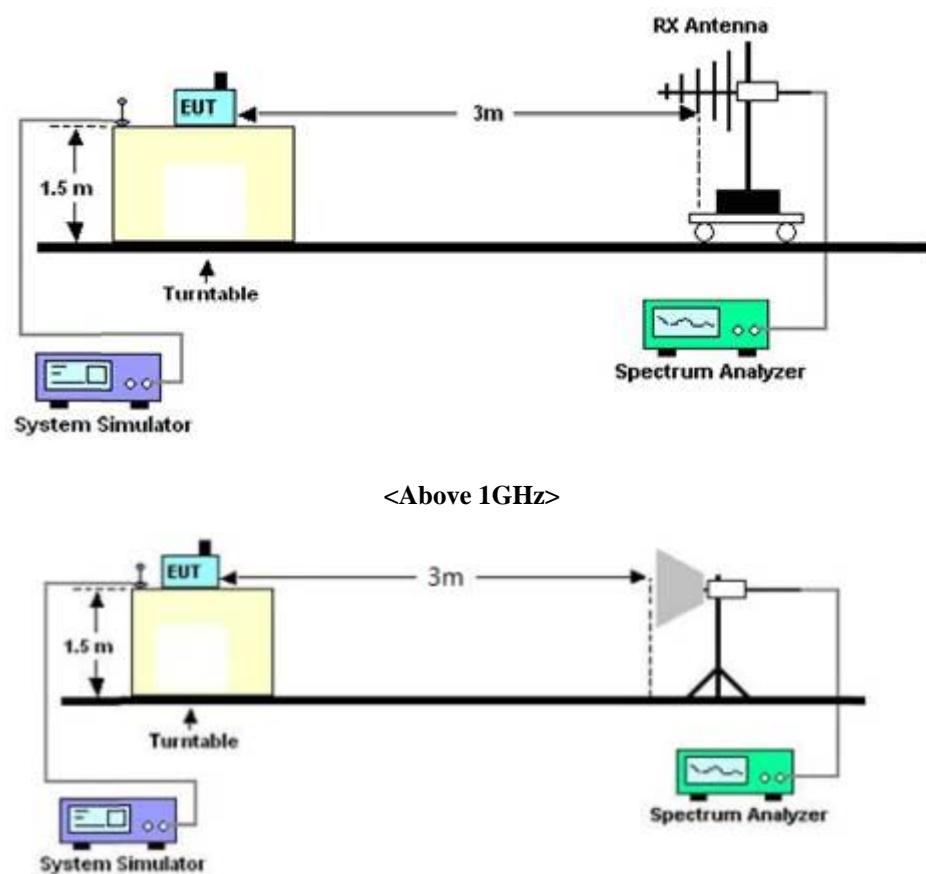
The radiated spurious emission was measured by substitution method according to TIA-603C-2004. The power of any emission outside of the authorized operating frequency ranges must be lower than transmitter power by a factor of at least  $43+10\log(P)$  dB. The spectrum is scanned from 30MHz up to a frequency including its 10th harmonic.

### B.4.2 Test Procedure

1. The EUT was placed on a 0.8 meter high rotatable wooden table.
2. The EUT was set 3 meters test distance from the receive antenna.
3. The table was rotated 360 degrees to determine the position of the highest spurious emission.
4. The height of the receiving antenna is varied between one meter and four meters to search maximum spurious emission for both horizontal and vertical polarizations.

### B.4.3 Test Setup

<Below 1GHz>



#### B.4.4 Measurement Uncertainty

| RSE Uncertainty Evaluation (30MHz~1000MHz) |       |
|--|-------|
| Uncertainty for 95% Confidence             | 3.4dB |
| RSE Uncertainty Evaluation (1GHz~13GHz)    |       |
| Uncertainty for 95% Confidence             | 3.4dB |

**B.4.5 Test Results**

| <b>Band</b>   | <b>CH</b> | <b>Frequency(MHz)</b> | <b>Result</b> | <b>Verdict</b> |
|---------------|-----------|-----------------------|---------------|----------------|
| GSM850        | 189       | 836.6                 | Fig.25        | Pass           |
|               |           |                       | Fig.26        | Pass           |
| GSM1900       | 661       | 1880.0                | Fig.27        | Pass           |
|               |           |                       | Fig.28        | Pass           |
| WCDMA Band V  | 4175      | 835                   | Fig.29        | Pass           |
|               |           |                       | Fig.30        | Pass           |
| WCDMA Band II | 9400      | 1880.0                | Fig.31        | Pass           |
|               |           |                       | Fig.32        | Pass           |

Fig.25GSM850 on Channel 189 30MHz~3GH

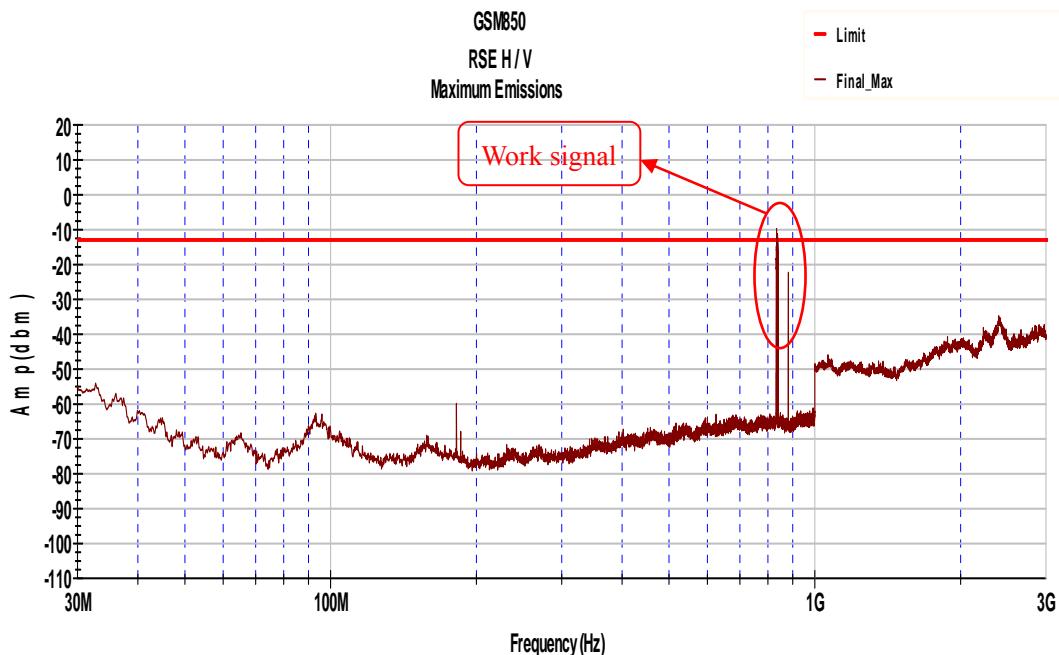
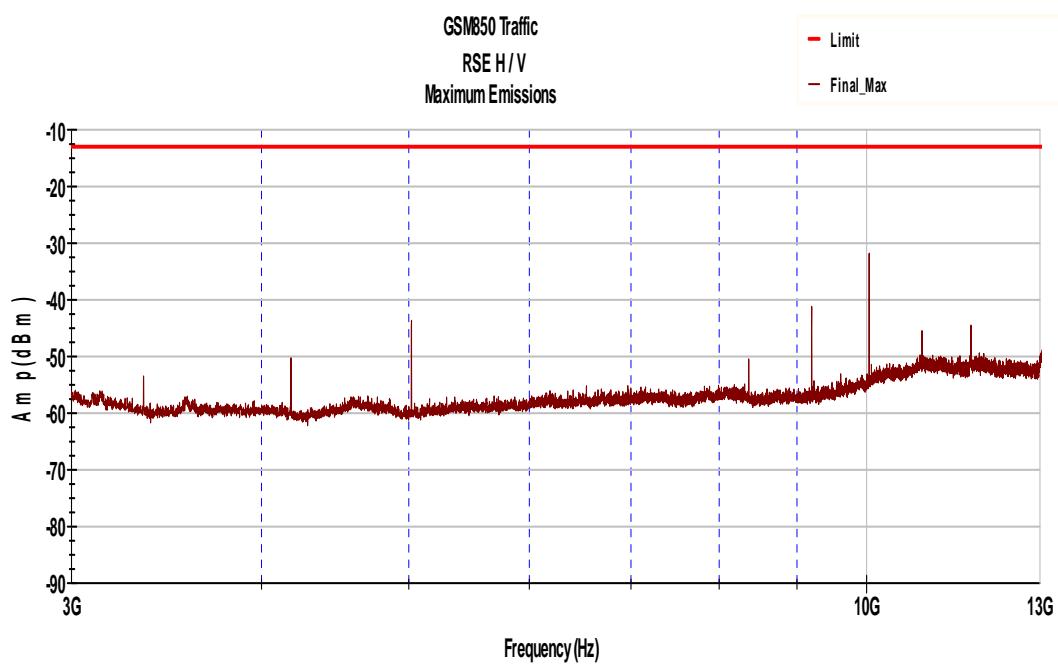
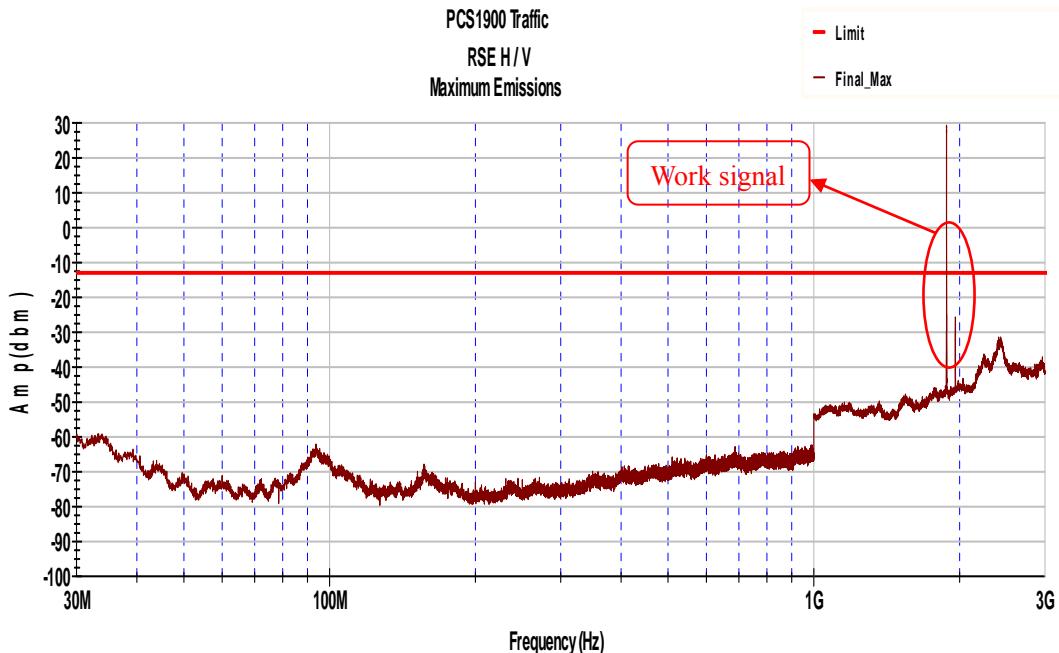
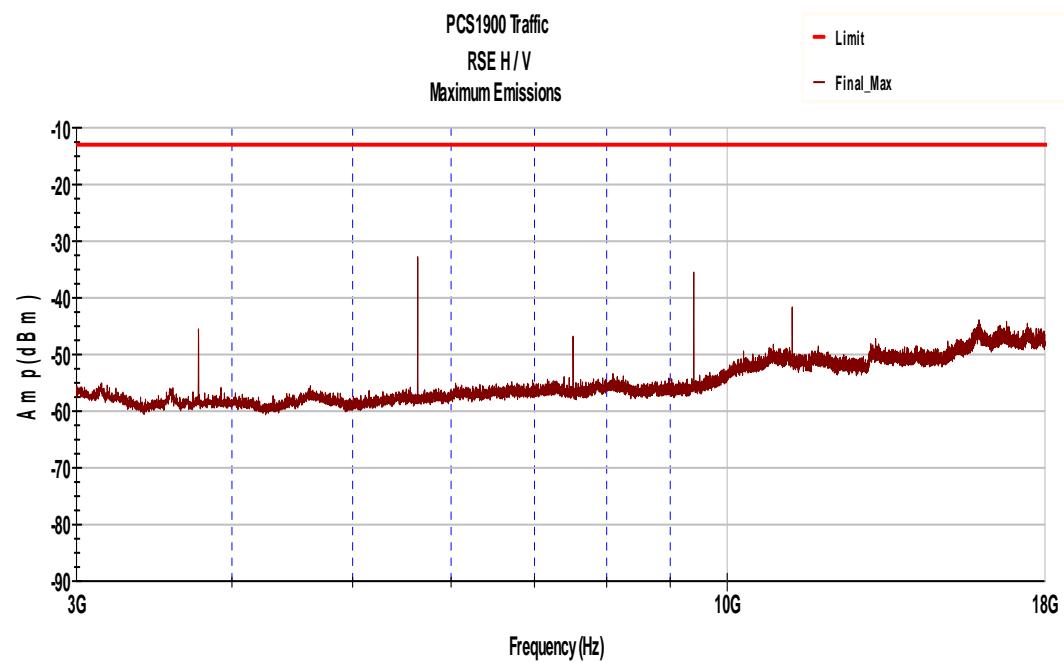


Fig.26GSM850 on Channel 189 3GHz~9GHz



**Fig.27GSM1900 on Channel 661 30MHz~3GHz****Fig.28GSM1900 on Channel 661 3GHz~19.1GHz**

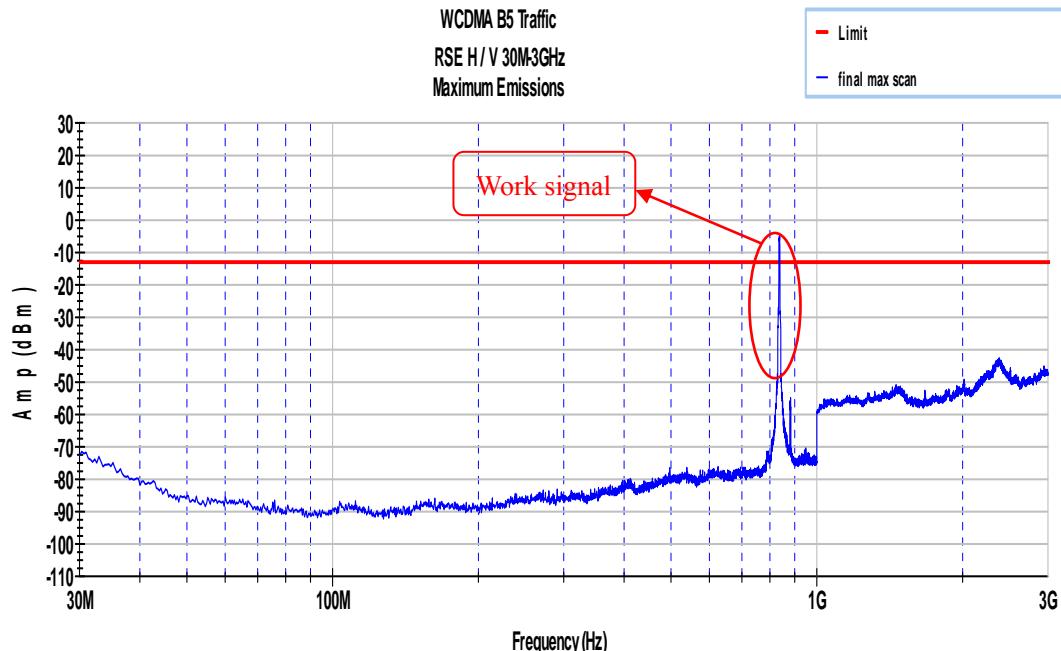
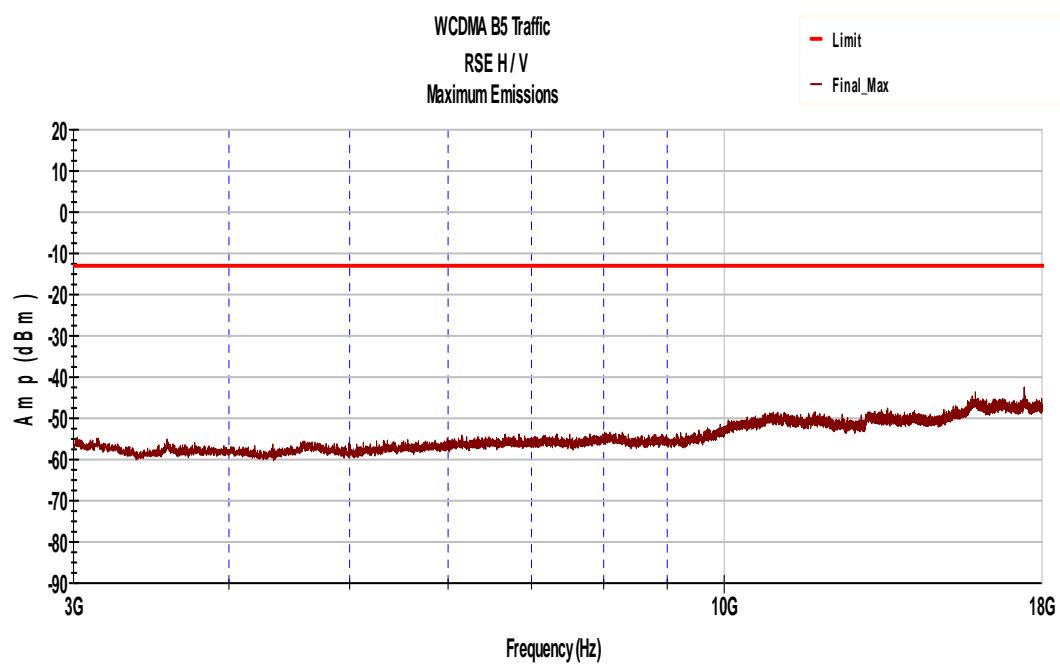
**Fig.29WCDMA Band V on Channel 4175 30MHz~3GHz****Fig.30WCDMA Band V on Channel 4175 3GHz~9GHz**

Fig.31 WCDMA Band II Channel 9400 30MHz~3GHz

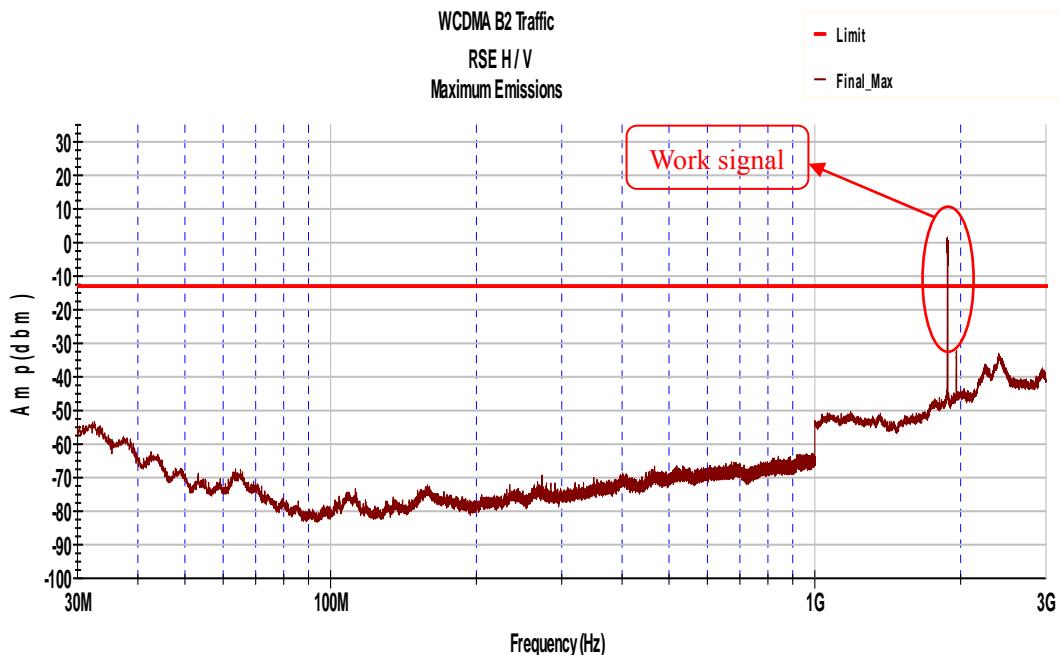
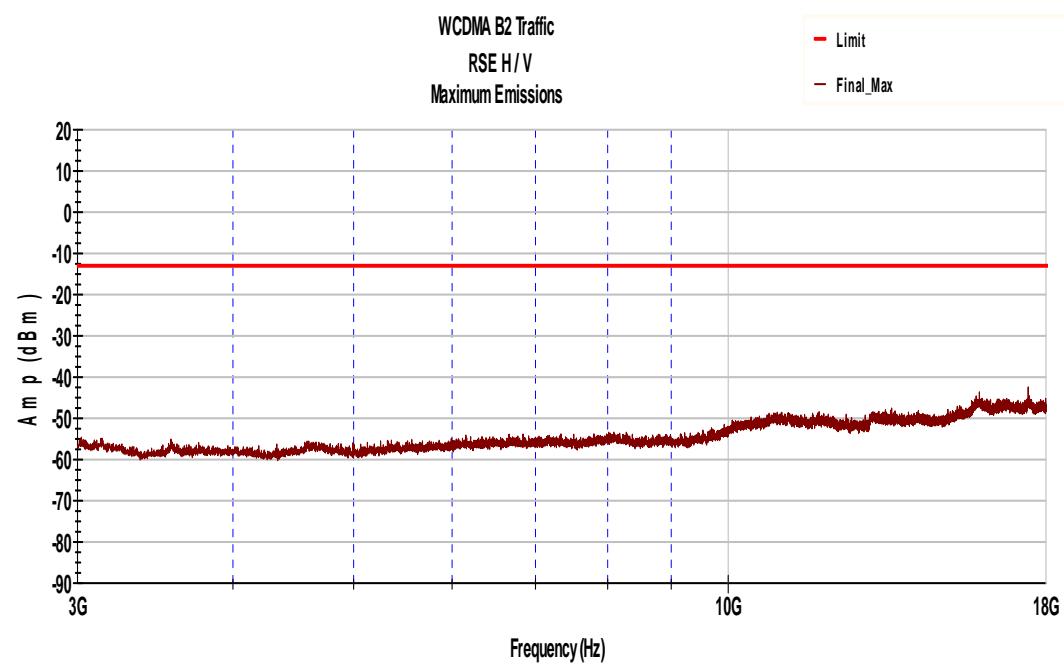


Fig.32 WCDMA Band II Channel 9400 3GHz~19.1GHz



## B.5 Band Edge Compliance (22.917(b)/ 24.238)

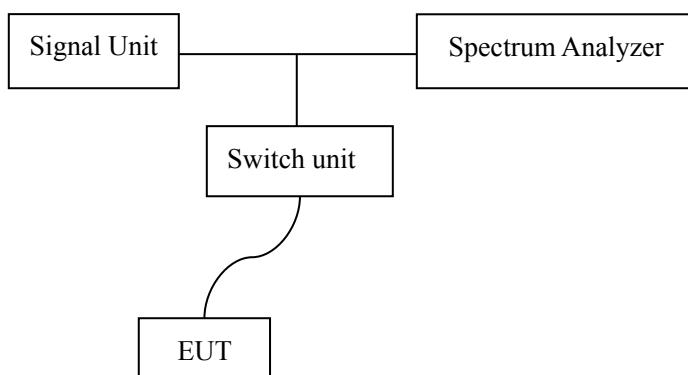
### B.5.1 Description

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

### B.5.2 Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station.
2. The band edge of low and high channel for maximum RF power was measured. Setting RBW is as roughly BW/100.

### B.5.3 Test Setup



### B.5.4 Test Results

| Band                         | CH   | Frequency(MHz) | Result | Verdict |
|------------------------------|------|----------------|--------|---------|
| GSM850                       | 128  | 824.2          | Fig.33 | Pass    |
|                              | 251  | 848.8          | Fig.34 | Pass    |
| GSM1900                      | 512  | 1850.2         | Fig.35 | Pass    |
|                              | 810  | 1909.8         | Fig.36 | Pass    |
| WCDMA Band V                 | 4132 | 824.2          | Fig.37 | Pass    |
|                              | 4233 | 848.8          | Fig.38 | Pass    |
| WCDMA Band VHSDPA Subtest 1  | 4132 | 824.2          | Fig.39 | Pass    |
|                              | 4233 | 848.8          | Fig.40 | Pass    |
| WCDMA Band VHSUPA Subtest 5  | 4132 | 824.2          | Fig.41 | Pass    |
|                              | 4233 | 848.8          | Fig.42 | Pass    |
| WCDMA Band II                | 9263 | 1850.2         | Fig.43 | Pass    |
|                              | 9538 | 1909.8         | Fig.44 | Pass    |
| WCDMA Band IIHSDPA Subtest 1 | 9263 | 1850.2         | Fig.45 | Pass    |
|                              | 9538 | 1909.8         | Fig.46 | Pass    |
| WCDMA Band IIHSUPA Subtest 5 | 9263 | 1850.2         | Fig.47 | Pass    |
|                              | 9538 | 1909.8         | Fig.48 | Pass    |

Fig.33 GSM850-CH128 Band Edge Compliance

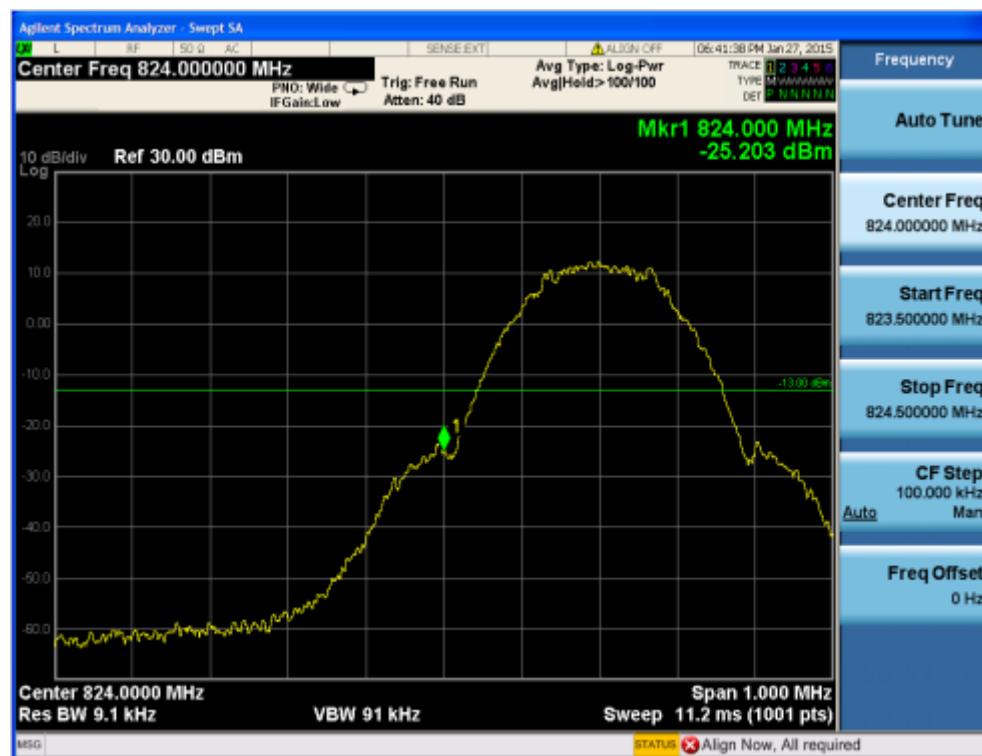


Fig.34 GSM850-CH251 Band Edge Compliance



Fig.35 GSM1900-CH512 Band Edge Compliance

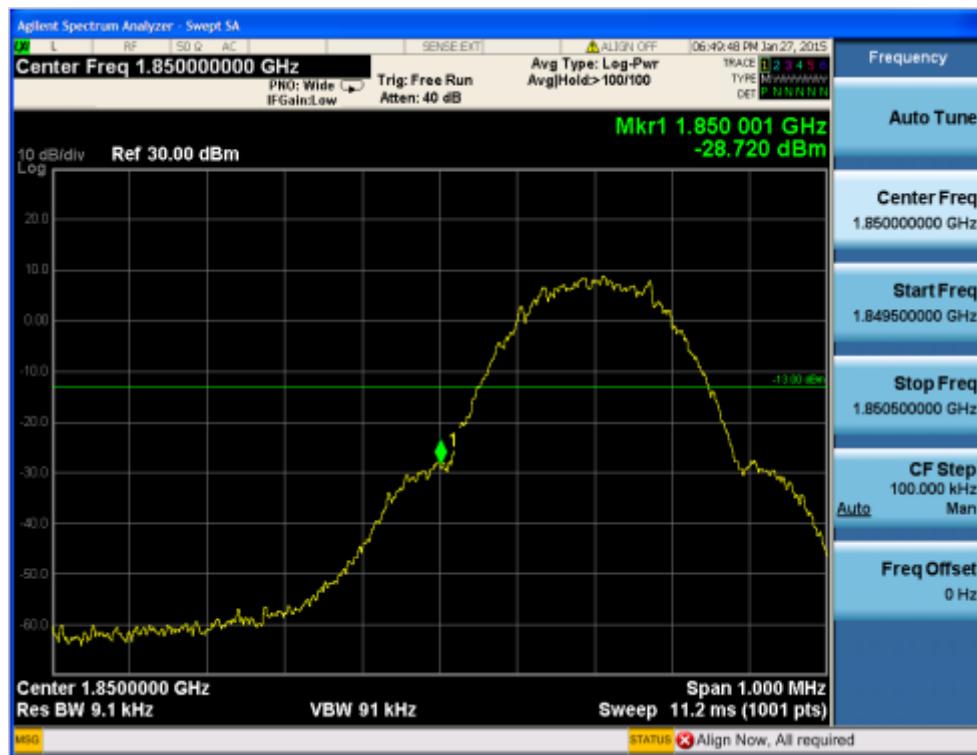


Fig.36 GSM1900-CH810 Band Edge Compliance



Fig.37 WCDMA Band V-CH4132Band Edge Compliance



Fig.38 WCDMA Band V-CH4232Band Edge Compliance

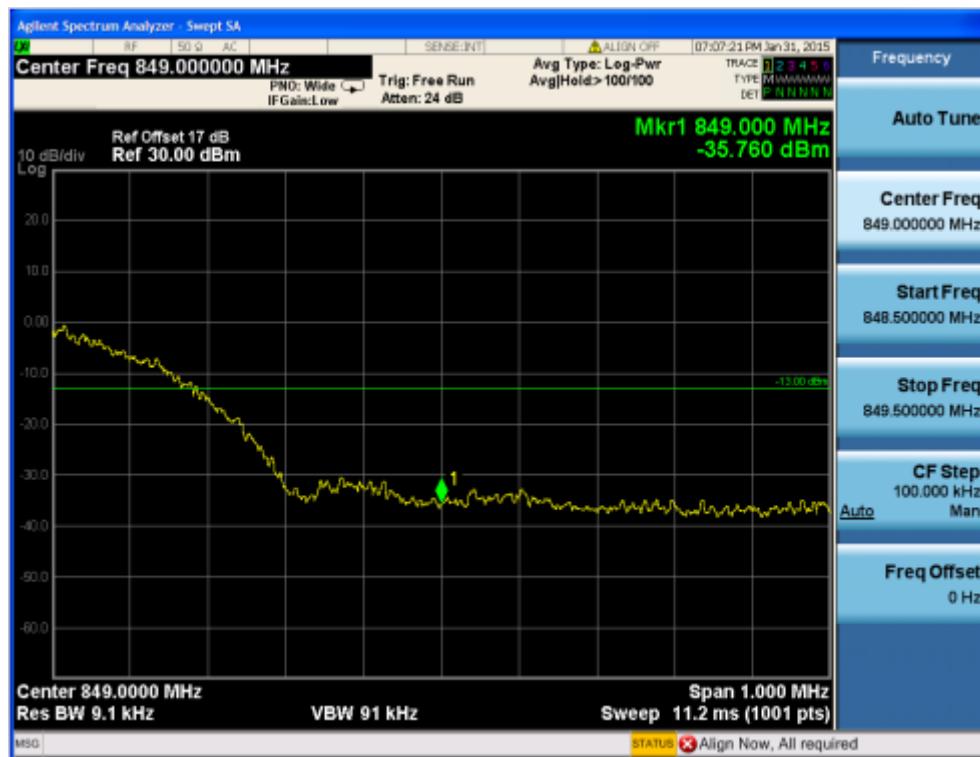


Fig.39 WCDMA Band V-CH4132Band Edge Compliance(HSDPA Subtest1)



Fig.40 WCDMA Band V-CH4232Band Edge Compliance(HSDPA Subtest1)



Fig.41 WCDMA Band V-CH4232Band Edge Compliance(HSUPA Subtest5)



Fig.42 WCDMA Band V-CH4232 Band Edge Compliance(HSUPA Subtest5)



Fig.43 WCDMA Band II-CH9263 Band Edge Compliance

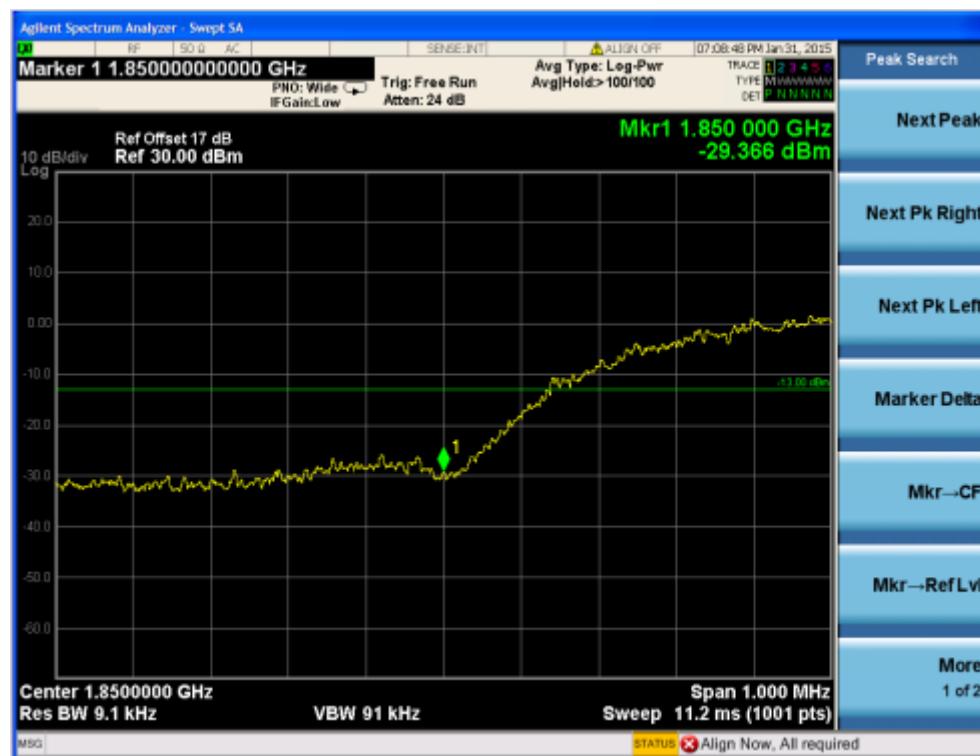


Fig.44 WCDMA Band II-CH9538Band Edge Compliance



Fig.45 WCDMA Band II-CH9263 Band Edge Compliance(HSDPA Subtest1)



Fig.46 WCDMA Band II-CH9538 Band Edge Compliance(HSDPA Subtest1)



Fig.47 WCDMA Band II-CH9263 Band Edge Compliance(HSUPA Subtest5)



Fig.48 WCDMA Band II-CH9538 Band Edge Compliance(HSUPA Subtest5)



## B.6 Conducted Spurious Emission (22.917(a)/24.238(a))

### B.6.1 Description

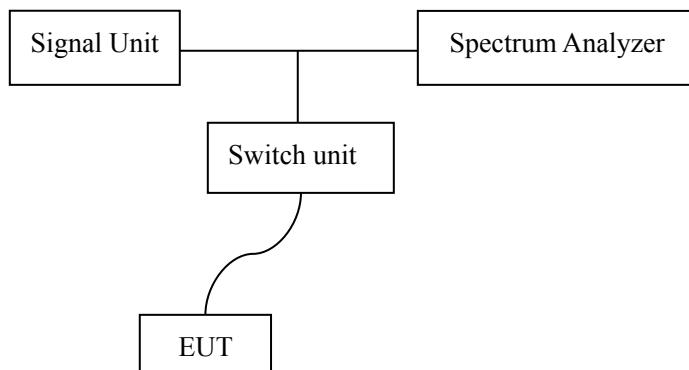
The power of any emission outside of the authorized operating frequency ranges must be lower than transmitter power by a factor of at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm. It is measured by means of spectrum analyzer and scanned from 30MHz up to a frequency including its 10<sup>th</sup> harmonic.

For the equipment of PCS1900 band, this equates to a frequency range of 30MHz to 19.1GHz, data is taken from 30 MHz to 20 GHz. For GSM 850, data is taken from 30 MHz to 9 GHz.

#### B.6.2 Test Procedures

1. The EUT was connected to Spectrum Analyzer and Base Station.
2. The middle channel for maximum RF power within the transmitting frequency was measured.
3. The conducted spurious emission for the whole frequency range was taken.

#### B.6.3 Test Setup



#### B.6.4 Test Results

| Band          | CH   | Frequency(MHz) | Result | Verdict |
|---------------|------|----------------|--------|---------|
| GSM850        | 189  | 836.6          | Fig.49 | Pass    |
|               |      |                | Fig.50 | Pass    |
| GSM1900       | 661  | 1880.0         | Fig.51 | Pass    |
|               |      |                | Fig.52 | Pass    |
| WCDMA Band V  | 4175 | 835            | Fig.53 | Pass    |
|               |      |                | Fig.54 | Pass    |
| WCDMA Band II | 9400 | 1880.0         | Fig.55 | Pass    |
|               |      |                | Fig.56 | Pass    |

Fig.49 GSM850 on Channel 189 30MHz~3GHz

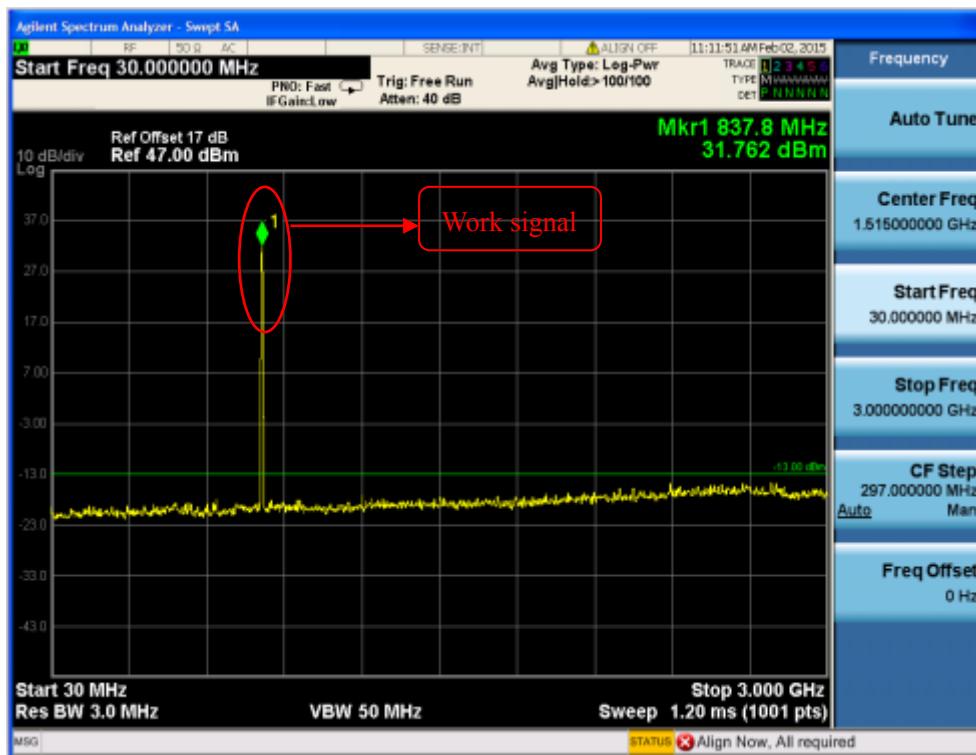


Fig.50 GSM850 on Channel 189 3GHz~9GHz

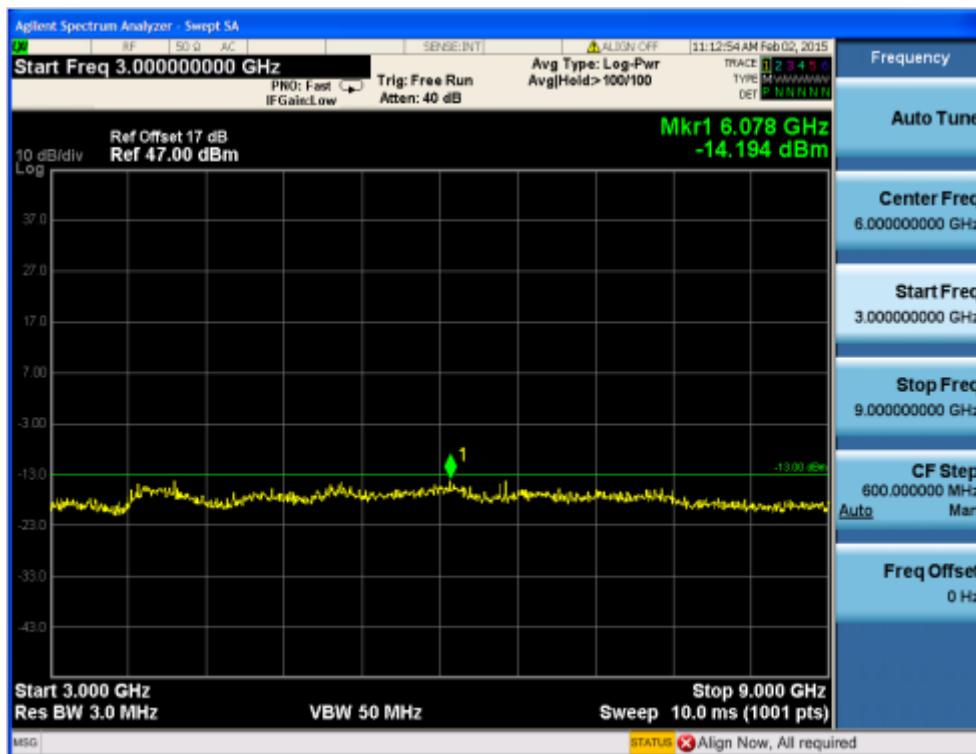


Fig.51 GSM1900 on Channel 661 30MHz~3GHz

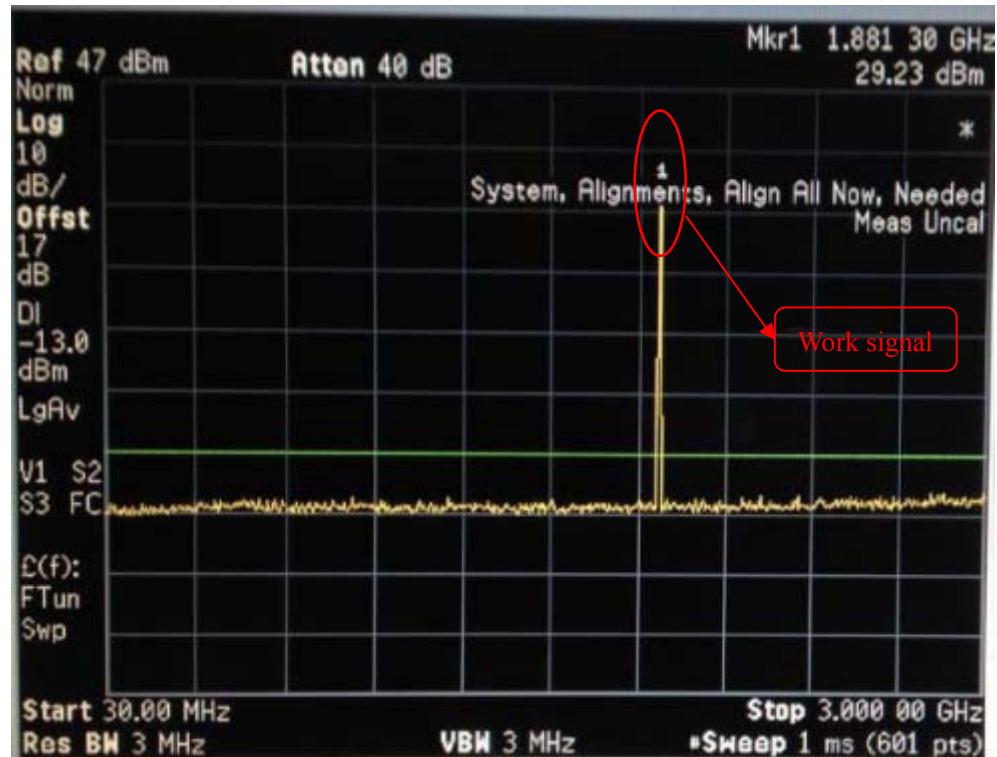


Fig.52 GSM1900 on Channel 661 3GHz~19.1GHz

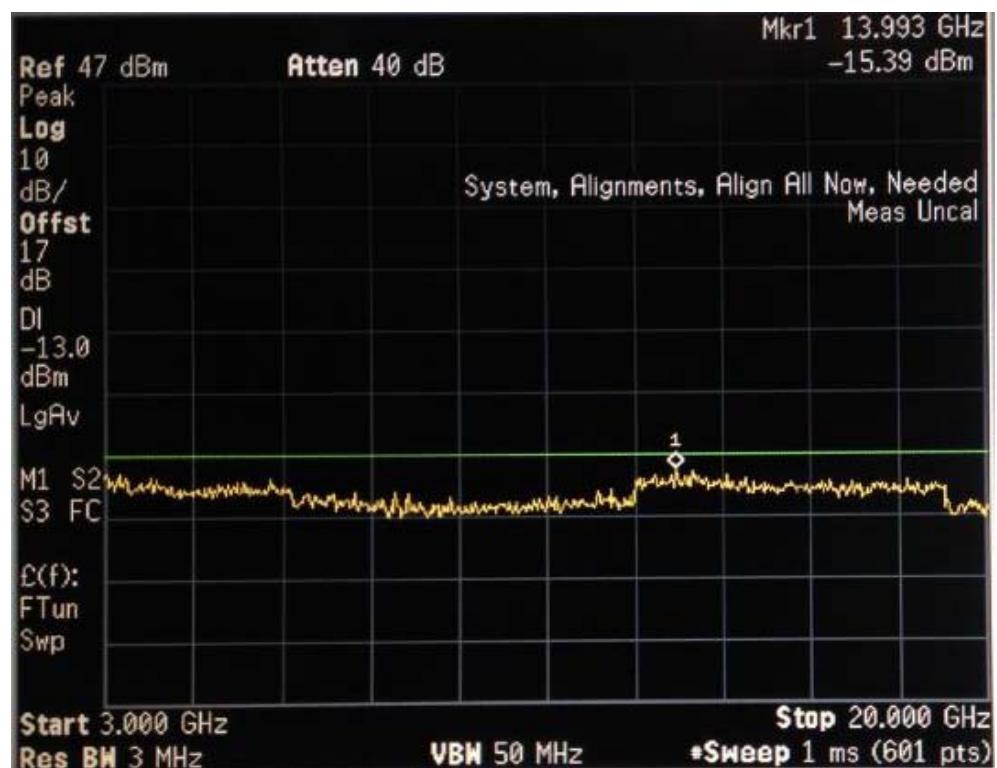


Fig.53 WCDMA Band V on Channel 4175 30MHz~3GHz

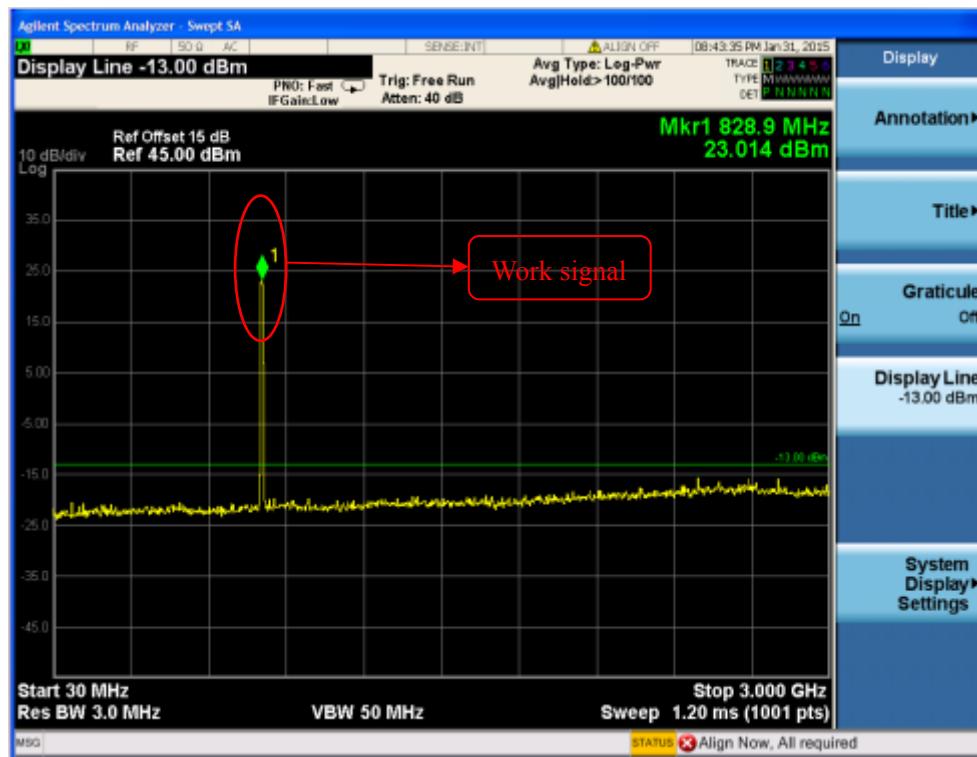


Fig.54 WCDMA Band V on Channel 4175 3GHz~9GHz



Fig.55 WCDMA Band II Channel 9400 30MHz~3GHz

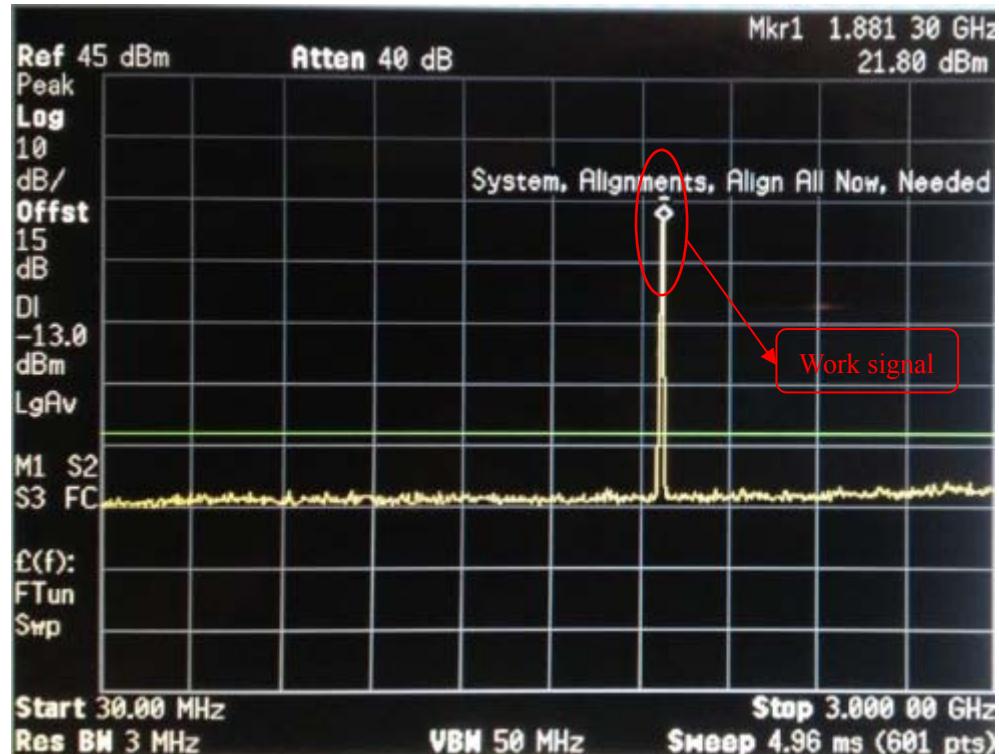
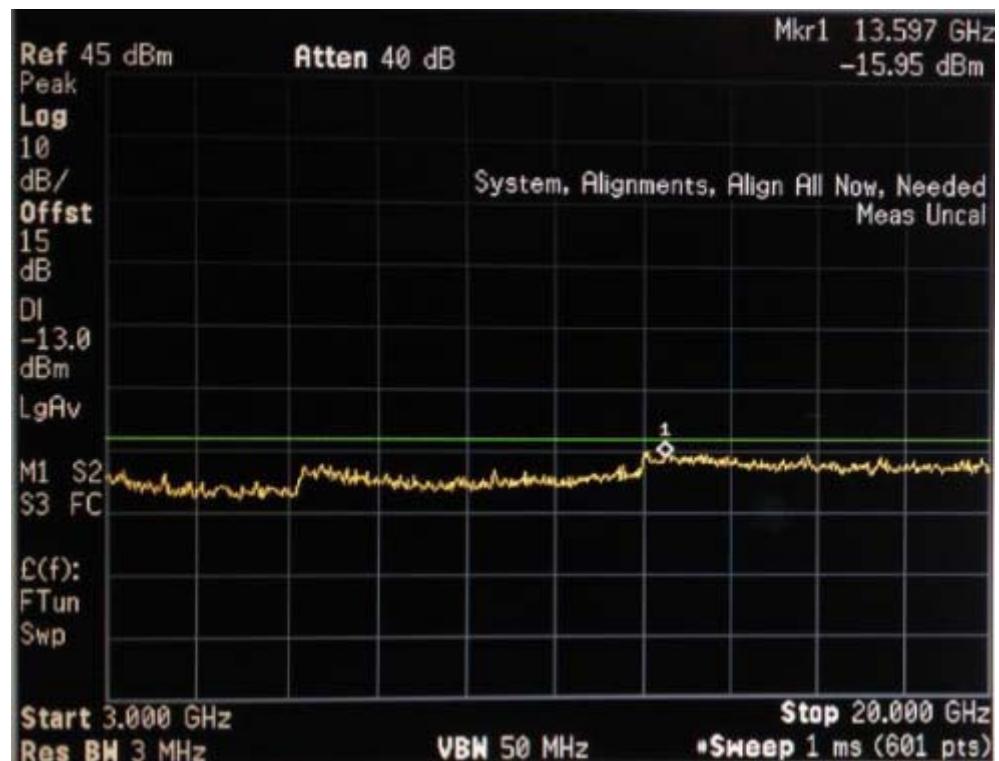


Fig.56 WCDMA Band II on Channel 9400 3GHz~19.1GHz



## B.7 Peak-to-average ratio 24.232(d))

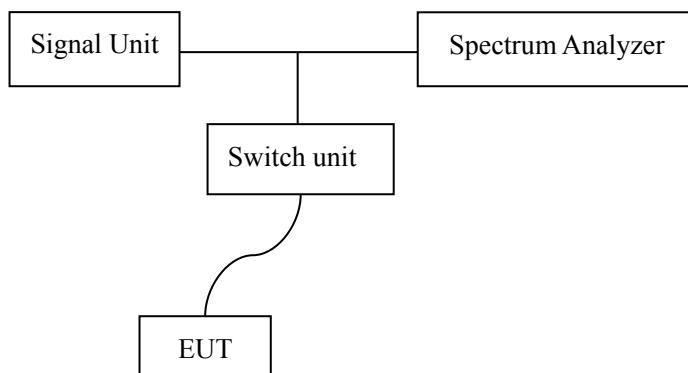
### B.7.1 Description

Power Complementary Cumulative Distribution Function (CCDF) curves provide a means for characterizing the power peaks of a digitally modulated signal on a statistical basis. A CCDF curve depicts the probability of the peak signal amplitude exceeding the average power level.

### B.7.2 Test Procedure

1. The EUT was connected to Spectrum Analyzer and Base Station.
2. The CCDF of middle channel for the highest powers were measured.

### B.7.3 Test Setup



### B.7.4 Test Results

#### Limit

| Peak-to-average ratio |
|-----------------------|
| $\leq 13 \text{ dBm}$ |

| Band         |      | CH   | Frequency(MHz) | Result(dBm) | Verdict |  |
|--------------|------|------|----------------|-------------|---------|--|
| GSM850       | GSM  | 128  | 824.2          | 0.11        | Pass    |  |
|              |      | 189  | 836.6          | 0.09        | Pass    |  |
|              |      | 251  | 848.8          | 0.08        | Pass    |  |
|              | GPRS | 128  | 824.2          | 0.12        | Pass    |  |
|              |      | 189  | 836.6          | 0.11        | Pass    |  |
|              |      | 251  | 848.8          | 0.13        | Pass    |  |
| GSM1900      | GSM  | 512  | 1850.2         | 0.12        | Pass    |  |
|              |      | 661  | 1880.0         | 0.09        | Pass    |  |
|              |      | 810  | 1909.8         | 0.08        | Pass    |  |
|              | GPRS | 512  | 1850.2         | 0.07        | Pass    |  |
|              |      | 661  | 1880.0         | 0.10        | Pass    |  |
|              |      | 810  | 1909.8         | 0.11        | Pass    |  |
| WCDMA Band V |      | 4132 | 824.2          | 0.10        | Pass    |  |
|              |      | 4175 | 835            | 0.10        | Pass    |  |
|              |      | 4233 | 848.8          | 0.11        | Pass    |  |

|                                     |      |        |      |      |
|-------------------------------------|------|--------|------|------|
| WCDMA Band V<br>HSDPA<br>Subtest 1  | 4132 | 824.2  | 0.12 | Pass |
|                                     | 4175 | 835    | 0.09 | Pass |
|                                     | 4233 | 848.8  | 0.11 | Pass |
| WCDMA Band V<br>HSUPA<br>Subtest 5  | 4132 | 824.2  | 0.12 | Pass |
|                                     | 4175 | 835    | 0.10 | Pass |
|                                     | 4233 | 848.8  | 0.09 | Pass |
| WCDMA Band II                       | 9263 | 1850.2 | 0.10 | Pass |
|                                     | 9400 | 1880.0 | 0.12 | Pass |
|                                     | 9538 | 1909.8 | 0.11 | Pass |
| WCDMA Band II<br>HSDPA<br>Subtest 1 | 9263 | 1850.2 | 0.10 | Pass |
|                                     | 9400 | 1880.0 | 0.09 | Pass |
|                                     | 9538 | 1909.8 | 0.10 | Pass |
| WCDMA Band II<br>HSUPA<br>Subtest 5 | 9263 | 1850.2 | 0.11 | Pass |
|                                     | 9400 | 1880.0 | 0.10 | Pass |
|                                     | 9538 | 1909.8 | 0.12 | Pass |

**\*\*\* END OF REPORT\*\*\***