



# TEST REPORT

No. 2010TAR406

for

**TCT Mobile Limited**

**HSDPA/HSUPA/UMTS dual band / GSM four bands mobile phone**

**Model Name: Opal AWS**

**Marketing Name : OT-981A**

**FCC ID: RAD149**

**IC ID: 9238A-0001**

with

**Hardware Version: PIO**

**Software Version: V263**

**Issued Date: Oct 28, 2010**

**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 TMC Beijing.

**Test Laboratory:**

***DAR accreditation (DIN EN ISO/IEC 17025): No. DGA-PL-114/01-02***

***FCC 2.948 Listed: No.733176***

***IC O.A.T.S listed: No.6629A-1***

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## **CONTENTS**

|                                                                         |           |
|-------------------------------------------------------------------------|-----------|
| <b>1. TEST LABORATORY .....</b>                                         | <b>3</b>  |
| 1.1. TESTING LOCATION .....                                             | 3         |
| 1.2. TESTING ENVIRONMENT .....                                          | 3         |
| 1.3. PROJECT DATA .....                                                 | 3         |
| 1.4. SIGNATURE .....                                                    | 3         |
| <b>2. CLIENT INFORMATION .....</b>                                      | <b>4</b>  |
| 2.1. APPLICANT INFORMATION .....                                        | 4         |
| 2.2. MANUFACTURER INFORMATION .....                                     | 4         |
| <b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b> | <b>5</b>  |
| 3.1. ABOUT EUT .....                                                    | 5         |
| 3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....          | 5         |
| 3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....           | 5         |
| 3.4. GENERAL DESCRIPTION .....                                          | 6         |
| <b>4. REFERENCE DOCUMENTS .....</b>                                     | <b>6</b>  |
| 4.1. REFERENCE DOCUMENTS FOR TESTING .....                              | 6         |
| <b>5. LABORATORY ENVIRONMENT .....</b>                                  | <b>7</b>  |
| <b>6. SUMMARY OF TEST RESULTS .....</b>                                 | <b>8</b>  |
| <b>7. TEST EQUIPMENTS UTILIZED .....</b>                                | <b>9</b>  |
| <b>ANNEX A: MEASUREMENT RESULTS.....</b>                                | <b>10</b> |
| A.1 OUTPUT POWER.....                                                   | 10        |
| A.2 EMISSION LIMIT .....                                                | 13        |
| A.3 CONDUCTED EMISSION .....                                            | 18        |
| A.4 FREQUENCY STABILITY .....                                           | 20        |
| A.5 OCCUPIED BANDWIDTH (§2.1049(H)(I)) .....                            | 22        |
| A.6 EMISSION BANDWIDTH.....                                             | 24        |
| A.7 BAND EDGE COMPLIANCE .....                                          | 26        |
| A.8 CONDUCTED SPURIOUS EMISSION.....                                    | 27        |

## **1. Test Laboratory**

### **1.1. Testing Location**

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: 3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai  
Dian District, Beijing, P. R. China  
Postal Code: 100191  
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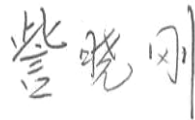
### **1.2. Testing Environment**

Normal Temperature: 15-35℃  
Relative Humidity: 20-75%

### **1.3. Project data**

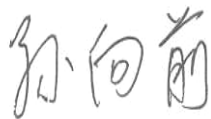
Testing Start Date: Sep 16, 2010  
Testing End Date: Oct 28, 2010

### **1.4. Signature**



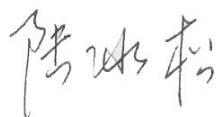
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**Zi Xiaogang**  
**(Prepared this test report)**



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**Sun Xiangqian**  
**(Reviewed this test report)**



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**Lu Bingsong**  
**Deputy Director of the laboratory**  
**(Approved this test report)**

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area  
City: Shanghai  
Postal Code: 201203  
Country: P.R.China  
Telephone: 0086 2161460890  
Fax: 0086 2161460602

### **2.2. Manufacturer Information**

Company Name: TCT Mobile Limited  
Address: 5F, E building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area  
City: Shanghai  
Postal Code: 201203  
Country: P.R.China  
Telephone: 0086 2161460890  
Fax: 0086 2161460602

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

#### 3.1. About EUT

|                     |                                                                                |
|---------------------|--------------------------------------------------------------------------------|
| Description         | HSDPA/HSUPA/UMTS dual band / GSM four bands mobile phone                       |
| Model Name          | Opal AWS                                                                       |
| Marketing Name      | OT-981A                                                                        |
| FCC ID              | RAD149                                                                         |
| IC ID               | 9238A-0001                                                                     |
| Frequency           | GSM 850MHz; GSM900MHz; DCS1800MHz; PCS 1900MHz;<br>WCDMA BAND I; WCDMA BAND IV |
| Antenna             | Internal                                                                       |
| Power supply        | Battery or Charger (AC Adaptor)                                                |
| Output power        | 22.45 dBm maximum EIRP measured for WCDMA BAND IV                              |
| Extreme vol. Limits | 3.4VDC to 4.2VDC (nominal: 3.8VDC)                                             |

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Telecommunication Metrology Center of MIIT of People's Republic of China.

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

| EUT ID* | SN or IMEI      | HW Version | SW Version |
|---------|-----------------|------------|------------|
| N11     | 012432000011016 | PIO        | V263       |
| N12     | 012432000011479 | PIO        | V263       |

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

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

| AE ID* | Description    | SN |
|--------|----------------|----|
| AE1    | Battery        | /  |
| AE2    | Travel Charger | /  |
| AE3    | Travel Charger | /  |

##### AE1

|                 |              |
|-----------------|--------------|
| Model           | CAB3170000C1 |
| Manufacturer    | BYD          |
| Capacitance     | 1150mAh      |
| Nominal Voltage | 3.7V         |

##### AE2

|                   |              |
|-------------------|--------------|
| Model             | CBA3170AG0C1 |
| Manufacturer      | BYD          |
| Length of DC line | 120cm        |

##### AE3

|                   |              |
|-------------------|--------------|
| Model             | CBA3170AG0C2 |
| Manufacturer      | Tenpao       |
| Length of DC line | 120cm        |

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

### 3.4. General Description

The Equipment Under Test (EUT) is a model of HSDPA/HSUPA/UMTS dual band / GSM four bands mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

| Reference      | Title                                                                                                                                | Version   |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------|-----------|
| FCC Part 27    | MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES                                                                                       | V 10.1.07 |
| RSS139         | Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz                                          | 2009      |
| ANSI/TIA-603-C | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                  | 2004      |
| ANSI C63.4     | Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz | 2003      |

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber** (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

|                                   |                                               |
|-----------------------------------|-----------------------------------------------|
| Temperature                       | Min. = 15 °C, Max. = 30 °C                    |
| Relative humidity                 | Min. = 30 %, Max. = 60 %                      |
| Shielding effectiveness           | > 110 dB                                      |
| Electrical insulation             | > 10 kΩ                                       |
| Ground system resistance          | < 0.5 Ω                                       |
| Normalised site attenuation (NSA) | < ±3.2 dB, 10 m distance, from 30 to 1000 MHz |
| Uniformity of field strength      | Between 0 and 6 dB, from 80 to 2000 MHz       |

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

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 35 °C |
| Relative humidity        | Min. =30 %, Max. = 60 %    |
| Shielding effectiveness  | > 110 dB                   |
| Electrical insulation    | > 10 kΩ                    |
| Ground system resistance | < 0.5 Ω                    |

**Conducted chamber** did not exceed following limits along the EMC testing:

|                          |                            |
|--------------------------|----------------------------|
| Temperature              | Min. = 15 °C, Max. = 30 °C |
| Relative humidity        | Min. = 30 %, Max. = 60 %   |
| Shielding effectiveness  | > 110 dB                   |
| Electrical insulation    | > 10 kΩ                    |
| Ground system resistance | < 0.5 Ω                    |

**Fully-anechoic chamber** (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

|                              |                                         |
|------------------------------|-----------------------------------------|
| Temperature                  | Min. = 15 °C, Max. = 30 °C              |
| Relative humidity            | Min. = 30 %, Max. = 60 %                |
| Shielding effectiveness      | > 110 dB                                |
| Electrical insulation        | > 10 kΩ                                 |
| Ground system resistance     | < 0.5 Ω                                 |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 2000 MHz |

## 6. SUMMARY OF TEST RESULTS

| Items | List                        | Clause in FCC rules | Clause in IC rules | Verdict |
|-------|-----------------------------|---------------------|--------------------|---------|
| 1     | Output Power                | 27.50               | 4.4                | P       |
| 2     | Emission Limit              | 27.53               | 4.4                | P       |
| 3     | Conducted Emission          | 15.107/207          | /                  | P       |
| 4     | Frequency Stability         | 2.1055/27.54        | 4.3                | P       |
| 5     | Occupied Bandwidth          | 2.1049              | 4.1.1              | P       |
| 6     | Emission Bandwidth          | 27.53               | 4.1.1              | P       |
| 7     | Band Edge Compliance        | 27.53               | 4.5                | P       |
| 8     | Conducted Spurious Emission | 2.1057/ 27.53       | 4.5                | P       |

## 7. Test Equipments Utilized

| NO. | NAME                                    | TYPE    | SERIES<br>NUMBER | PRODUCER | CAL DUE<br>DATE |
|-----|-----------------------------------------|---------|------------------|----------|-----------------|
| 1   | Test Receiver                           | ESS     | 847151/015       | R&S      | 2010-12-30      |
| 2   | Test Receiver                           | ESI40   | 831564/002       | R&S      | 2011-2-10       |
| 3   | BiLog Antenna                           | 3142B   | 9908-1403        | EMCO     | 2011-1-15       |
| 4   | BiLog Antenna                           | 3142B   | 9908-1405        | EMCO     | 2010-12-19      |
| 5   | Signal Generator                        | SMT06   | 831285/005       | R&S      | 2010-12-25      |
| 6   | Signal Generator                        | SMP04   | 100070           | R&S      | 2011-4-19       |
| 7   | LISN                                    | ESH2-Z5 | 829991/012       | R&S      | 2010-12         |
| 8   | Spectrum Analyzer                       | FSU26   | 200030           | R&S      | 2010-12-18      |
| 9   | Universal Radio<br>Communication Tester | CMU200  | 100680           | R&S      | 2010-12-23      |
| 10  | Dual-Ridge Waveguide<br>Horn Antenna    | 3115    | 9906-5827        | EMCO     | 2011-3          |
| 11  | Dual-Ridge Waveguide<br>Horn Antenna    | 3115    | 9906-5831        | EMCO     | 2011-3          |
| 12  | Dual-Ridge Waveguide<br>Horn Antenna    | 3116    | 2663             | EMCO     | 2011-3          |
| 13  | Dual-Ridge Waveguide<br>Horn Antenna    | 3116    | 2661             | EMCO     | 2011-3          |
| 14  | Climatic chamber                        | PL-2G   | 343074           | ESPEC    | 2010-12-15      |

## **ANNEX A: MEASUREMENT RESULTS**

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

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

During the process of testing, the EUT was controlled via Rhode & Schwarz Digital Radio Communication tester (CMU-200) to ensure max power transmission and proper modulation.

This result contains peak output power and EIRP measurements for the EUT.

In all cases, output power is within the specified limits.

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

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

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

The power was measured with Rhode & Schwarz Spectrum Analyzer FSU (RMS)

These measurements were done at 3 frequencies, 1712.4MHz, 1740.0MHz and 1752.6MHz for WCDMA Band IV. (bottom, middle and top of operational frequency range).

##### **Limit**

According to FCC§2.1046.

#### **WCDMA Band IV**

##### **Measurement result**

| WCDMA<br>(Band IV) | CH   | Frequency(MHz) | Peak output<br>power(dBm) | Target<br>(dB) |
|--------------------|------|----------------|---------------------------|----------------|
|                    | 1312 | 1712.4         | 23.33                     | 21±3           |
|                    | 1450 | 1740           | 22.88                     | 21±3           |
|                    | 1513 | 1752.6         | 22.74                     | 21±3           |

### A.1.3 Radiated

#### A.1.3.1 Description

This is the test for the maximum radiated power from the EUT.

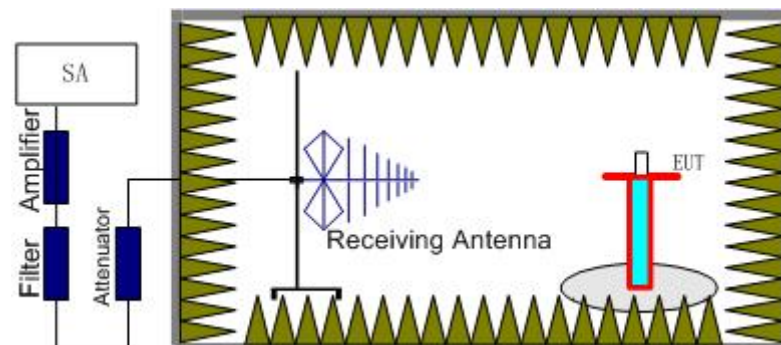
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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."

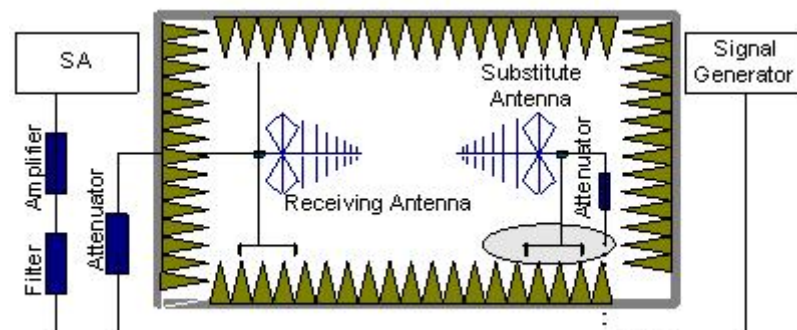
#### A.1.3.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.5 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 is 1.5m. The test setup refers to figure below. 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. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



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 ( $P_{Mea}$ ) 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.

4. A "reference path loss" should be calculated after test. The  $A_{Rpl}$  is the attenuation of "reference path loss" including the cable loss between the Signal Source with the Substitution Antenna ( $P_{cl}$ ) and the Substitution Antenna Gain ( $G_a$ ).

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{cl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

#### WCDMA Band IV-EIRP

##### Limits

|               | Burst Peak EIRP (dBm) |
|---------------|-----------------------|
| WCDMA Band IV | 33dBm (2W)            |

##### Measurement result

##### WCDMA Band IV

| Frequency(MHz) | Peak EIRP(dBm) | $P_{cl}$ Cable Loss(dB) | $G_a$ Antenna Gain(dB) | $P_{Mea}$ (dBm) | Polarization |
|----------------|----------------|-------------------------|------------------------|-----------------|--------------|
| 1712.4         | 22.45          | -10.9                   | 27.5                   | 5.85            | Horizontal   |
| 1740           | 22.09          | -10.8                   | 27.5                   | 5.39            | Horizontal   |
| 1752.6         | 21.57          | -10.8                   | 27.5                   | 4.87            | Horizontal   |

Frequency: 1712.4MHz

$$\text{Peak EIRP(dBm)} = P_{Mea}(5.85\text{dBm}) + P_{cl}(-10.9\text{dB}) + G_a(27.5\text{dB}) = 22.45\text{ dBm}$$

**ANALYZER SETTINGS: RBW = VBW = 3MHz**

## A.2 EMISSION LIMIT

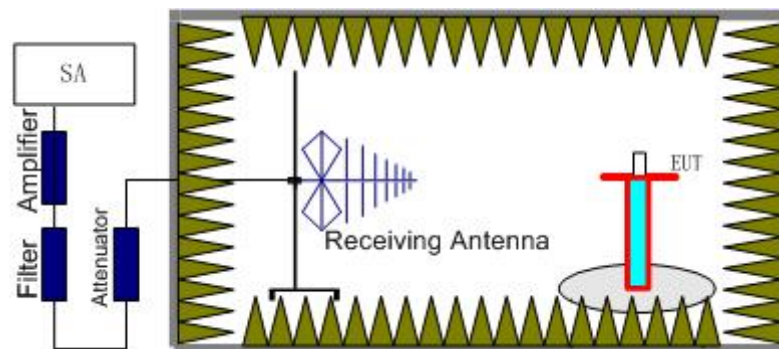
### A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used.

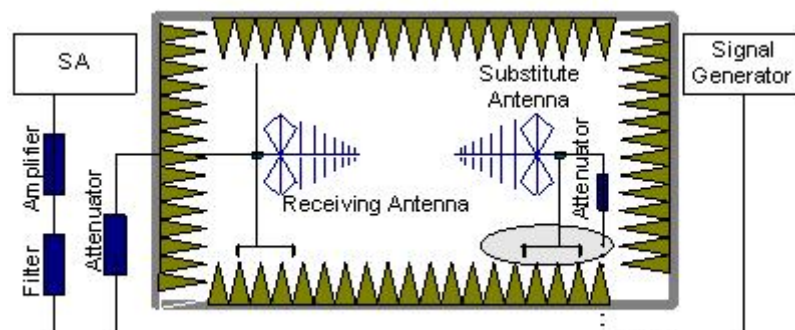
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the WCDMA Band IV

**The procedure of radiated spurious emissions is as follows:**

1. EUT was placed on a 1.5 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 is 1.5m. The test setup refers to figure below. 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 non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



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 ( $P_{Mea}$ ) 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.

4. A "reference path loss" should be calculated after test. The  $A_{Rpl}$  is the attenuation of "reference path loss" including the cable loss between the Signal Source with the Substitution Antenna ( $P_{cl}$ ) and the Substitution Antenna Gain ( $G_a$ ).

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{Mea} + P_{cl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .

### A.2.2 Measurement Limit

Sec. 24.238 Emission Limits.

(a) On any frequency outside a licensee's frequency block (e.g. A, D, B, etc.) within the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power ( $P$ , in Watts) by 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.

### A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz) ,GSM850 band (824.2MHz, 836.6MHz, 848.8MHz) . It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the PCS1900 ,GSM850 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

**A.2.4 Measurement Results Table**

| Frequency              | Channel   | Frequency Range | Result |
|------------------------|-----------|-----------------|--------|
| WCDMA Band IV          | Low       | 30MHz-10GHz     | Pass   |
|                        | Middle    | 30MHz-10GHz     | Pass   |
|                        | High      | 30MHz-10GHz     | Pass   |
| WCDMA Band IV          | Low       | 9KHz-30MHz      | Pass   |
|                        | Middle    | 9KHz-30MHz      | Pass   |
|                        | High      | 9KHz-30MHz      | Pass   |
| Received WCDMA Band IV | Idle Mode | 9KHz-10GHz      | Pass   |

**A.2.5 Sweep Table**

| Working Frequency | Subrange (GHz) | RBW    | VBW    | Sweep time (s) |
|-------------------|----------------|--------|--------|----------------|
| WCDMA Band IV     | 0.03~1         | 100KHz | 300KHz | 10             |
|                   | 1-2            | 1 MHz  | 3 MHz  | 2              |
|                   | 2~5            | 1 MHz  | 3 MHz  | 3              |
|                   | 5~8            | 1 MHz  | 3 MHz  | 3              |
|                   | 8~11           | 1 MHz  | 3 MHz  | 3              |
|                   | 11~14          | 1 MHz  | 3 MHz  | 3              |
|                   | 14~18          | 1 MHz  | 3 MHz  | 3              |
|                   | 18~20          | 1 MHz  | 3 MHz  | 2              |

**WCDMA BAND IV Mode Channel 1312/1712.4MHz**

| Frequency (MHz) | Power (dBm) | P <sub>cl</sub> Cable Loss(dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Mea</sub> (dBm) | Limit (dBm) | Polarity   |
|-----------------|-------------|--------------------------------|---------------------------------|------------------------|-------------|------------|
| 2000            | -42.34      | -41.2                          | 27.5                            | -28.64                 | -13         | Vertical   |
| 2113.1          | -46.28      | -41.8                          | 27.5                            | -31.98                 | -13         | Vertical   |
| 3423.6          | -31.04      | -41.7                          | 31.2                            | -20.54                 | -13         | Vertical   |
| 6854            | -40.98      | -43.6                          | 35.7                            | -33.08                 | -13         | Horizontal |
| 9883.1          | -41.23      | -45.3                          | 38.7                            | -34.63                 | -13         | Vertical   |
| 12557.3         | -36.89      | -47                            | 39.5                            | -29.39                 | -13         | Horizontal |

**WCDMA BAND IV Mode Channel 1450/1740MHz**

| Frequency (MHz) | Power (dBm) | P <sub>cl</sub> Cable Loss(dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Mea</sub> (dBm) | Limit (dBm) | Polarity   |
|-----------------|-------------|--------------------------------|---------------------------------|------------------------|-------------|------------|
| 2002.2          | -42.45      | -41.2                          | 27.5                            | -28.75                 | -13         | Horizontal |
| 2140.7          | -45.12      | -41.6                          | 27.5                            | -31.02                 | -13         | Vertical   |
| 3482.8          | -35.12      | -42                            | 31.2                            | -24.32                 | -13         | Vertical   |
| 6959            | -37.45      | -43.7                          | 35.7                            | -29.45                 | -13         | Vertical   |
| 9943.1          | -40.82      | -45.3                          | 38.7                            | -34.22                 | -13         | Vertical   |
| 17761.2         | -26.52      | -51.6                          | 44.7                            | -19.62                 | -13         | Horizontal |

**WCDMA BAND IV Mode Channel 1513/1752.6MHz**

| Frequency (MHz) | Power (dBm) | P <sub>cl</sub> Cable Loss(dB) | G <sub>a</sub> Antenna Gain(dB) | P <sub>Mea</sub> (dBm) | Limit (dBm) | Polarity   |
|-----------------|-------------|--------------------------------|---------------------------------|------------------------|-------------|------------|
| 2001.7          | -42.78      | -41.2                          | 27.5                            | -29.08                 | -13         | Horizontal |
| 2154.3          | -46.89      | -41.7                          | 27.5                            | -32.69                 | -13         | Horizontal |
| 3502.4          | -35.78      | -42.1                          | 33.4                            | -27.08                 | -13         | Vertical   |
| 7008.8          | -40.34      | -44.8                          | 36.3                            | -31.84                 | -13         | Vertical   |
| 9670.7          | -42.9       | -45.5                          | 38.7                            | -36.1                  | -13         | Vertical   |
| 15780           | -35.67      | -50.8                          | 38.2                            | -23.07                 | -13         | Vertical   |

**WCDMA BAND IV Receiver Mode**

| Frequency<br>(MHz) | Power<br>(dBm) | P <sub>cl</sub><br>Cable<br>Loss(dB) | G <sub>a</sub> Antenna<br>Gain(dB) | P <sub>Mea</sub><br>(dBm) | Limit (dBm) | Polarity   |
|--------------------|----------------|--------------------------------------|------------------------------------|---------------------------|-------------|------------|
| 2154.3             | -46.89         | -41.7                                | 27.5                               | -32.69                    | -13         | Horizontal |
| 3502.4             | -41.57         | -42.1                                | 33.4                               | -32.87                    | -13         | Vertical   |
| 6959               | -43.32         | -43.7                                | 35.7                               | -35.32                    | -13         | Vertical   |
| 7008.8             | -40.34         | -44.8                                | 36.3                               | -31.84                    | -13         | Vertical   |
| 9670.7             | -42.9          | -45.5                                | 38.7                               | -36.1                     | -13         | Vertical   |
| 12557.3            | -38.05         | -47                                  | 39.5                               | -30.55                    | -13         | Horizontal |

### A.3 CONDUCTED EMISSION

The measurement procedure in ANSI C63.4-1003 is used. Conducted Emission is measured with travel charger.

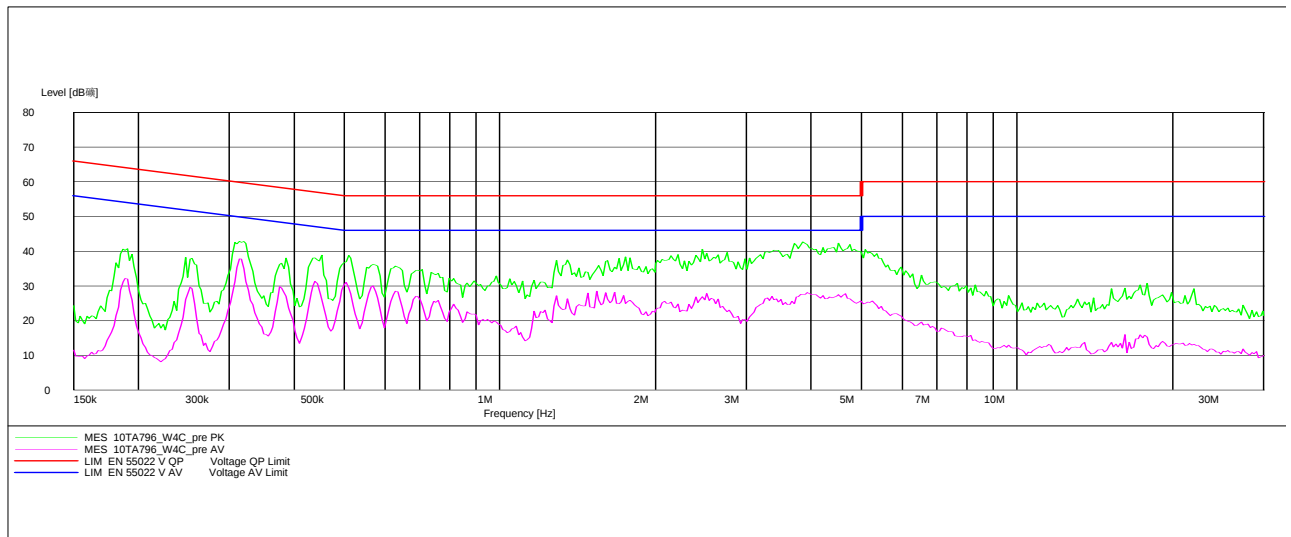
#### A.3.1 Limit

| Frequency of Emission (MHz) | Conducted Limit (dB $\mu$ V) |           |
|-----------------------------|------------------------------|-----------|
|                             | Quasi -Peak                  | Average   |
| 0.15 – 0.5                  | 66 to 56*                    | 56 to 46* |
| 0.5 – 5                     | 56                           | 46        |
| 5 – 30                      | 60                           | 50        |

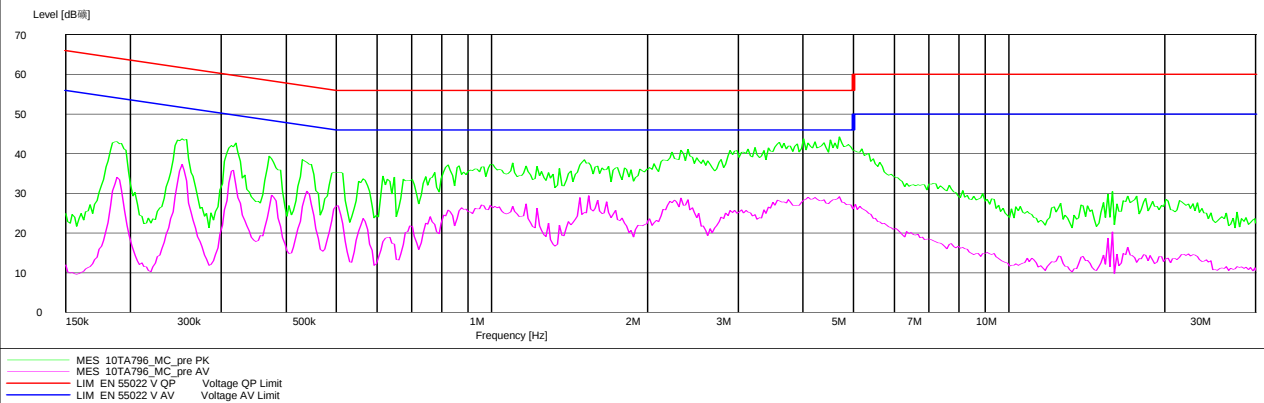
\* Decreases with logarithm of the frequency

#### A.3.2 Measurement result

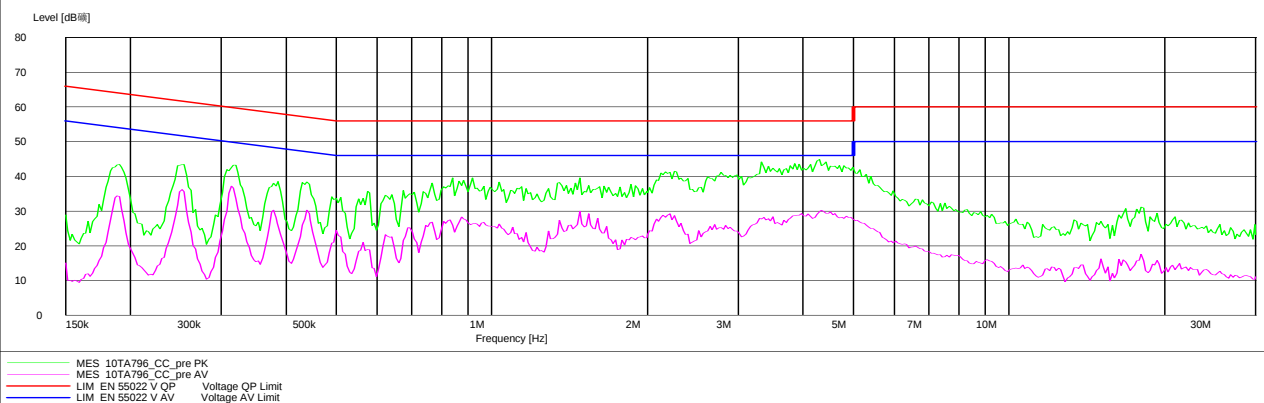
##### WCDMA BAND IV AE2



## MP3



## Camera



## **A.4 FREQUENCY STABILITY**

### **A.4.1 Method of Measurement**

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

1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30°C.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on channel 1450 for WCDMA Band IV measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10°C increments from -30°C to +50°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
5. Remeasure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments remeasuring carrier frequency at each voltage. Pause at nominal voltage for 1 1/2 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50°C.
7. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 C increments from +50°C to -30°C. Allow at least 1 1/2 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5°C during the measurement procedure.

### **A.3.2 Measurement Limit**

#### **A.3.2.1 For Hand carried battery powered equipment**

According to the JTC standard the frequency stability of the carrier shall be accurate to within 0.1 ppm of the received frequency from the base station. This accuracy is sufficient to meet Sec. 24.235, Frequency Stability. The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d)(2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.4VDC and 4.2VDC, with a nominal voltage of 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

#### **A.3.2.2 For equipment powered by primary supply voltage**

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

nominal value for other than hand carried battery equipment.

### A.3.3 Measurement results

#### WCDMA Band IV

##### Frequency Error vs Voltage

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|------------|---------------------|----------------------|
| 3.4        | 15                  | 0.009                |
| 3.8        | 12                  | 0.007                |
| 4.2        | 17                  | 0.010                |

##### Frequency Error vs Temperature

| temperature(°C) | Frequency error(Hz) | Frequency error(ppm) |
|-----------------|---------------------|----------------------|
| -30             | 22                  | 0.013                |
| -20             | 20                  | 0.011                |
| -10             | 20                  | 0.011                |
| 0               | 12                  | 0.007                |
| 10              | 12                  | 0.007                |
| 20              | 12                  | 0.007                |
| 30              | 12                  | 0.007                |
| 40              | 20                  | 0.011                |
| 50              | 20                  | 0.011                |

## **A.5 OCCUPIED BANDWIDTH (§2.1049(h)(i))**

### **A.5.1 Occupied Bandwidth Results**

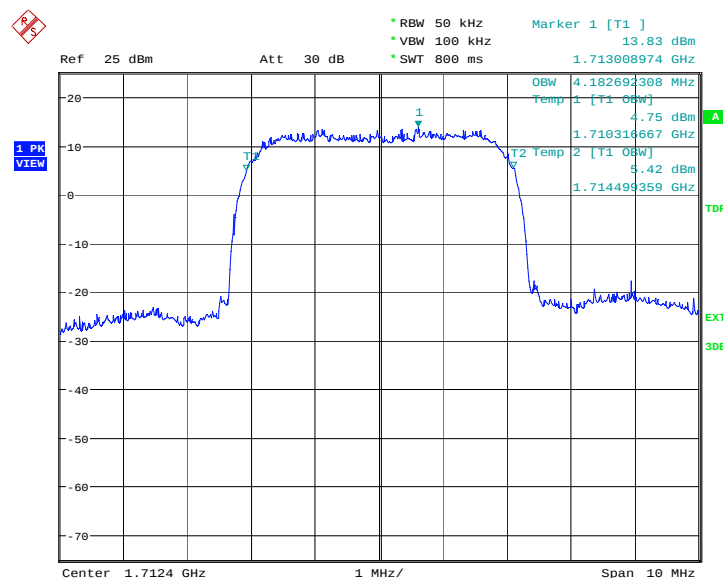
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the USPCS frequency band. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

#### **WCDMA Band IV(99%)**

| Frequency(MHz) | Occupied Bandwidth (99%)( MHz) |
|----------------|--------------------------------|
| 1712.4         | 4.183                          |
| 1740           | 4.183                          |
| 1752.6         | 4.183                          |

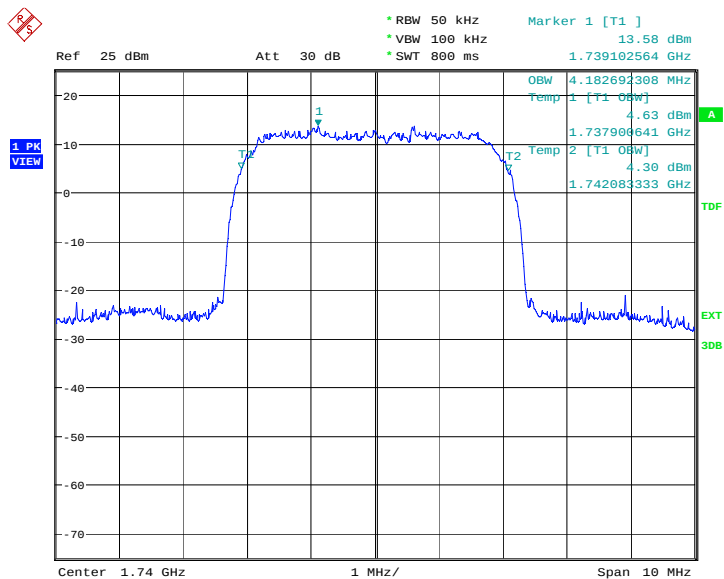
#### **WCDMA Band IV**

#### **Channel 1312-Occupied Bandwidth (99%)**



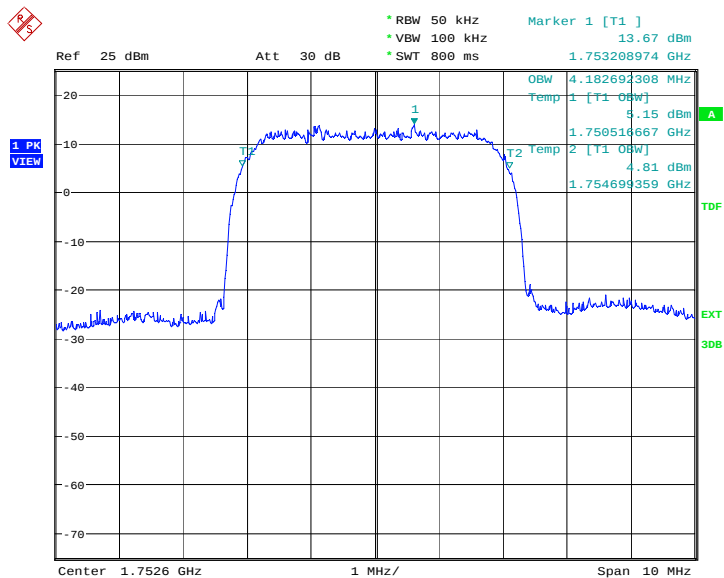
Date: 28.SEP.2010 04:01:12

### Channel 1450-Occupied Bandwidth (99%)



Date: 28.SEP.2010 04:01:42

### Channel 1513-Occupied Bandwidth (99%)



Date: 28.SEP.2010 04:02:12

## A.6 EMISSION BANDWIDTH

### A.5.1 Emission Bandwidth Results

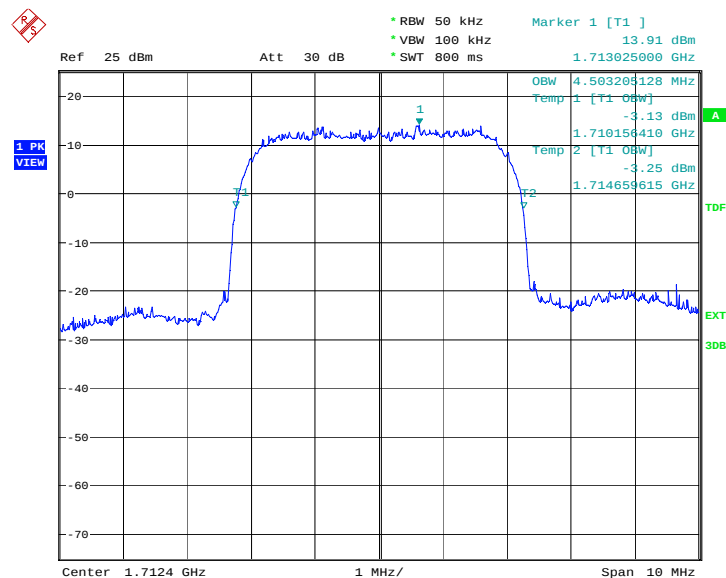
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the WCDMA Band IV. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

#### WCDMA Band IV(-26dBc)

| Frequency(MHz) | Occupied Bandwidth (-26dBc BW)( MHz) |
|----------------|--------------------------------------|
| 1712.4         | 4.503                                |
| 1740           | 4.503                                |
| 1752.6         | 4.487                                |

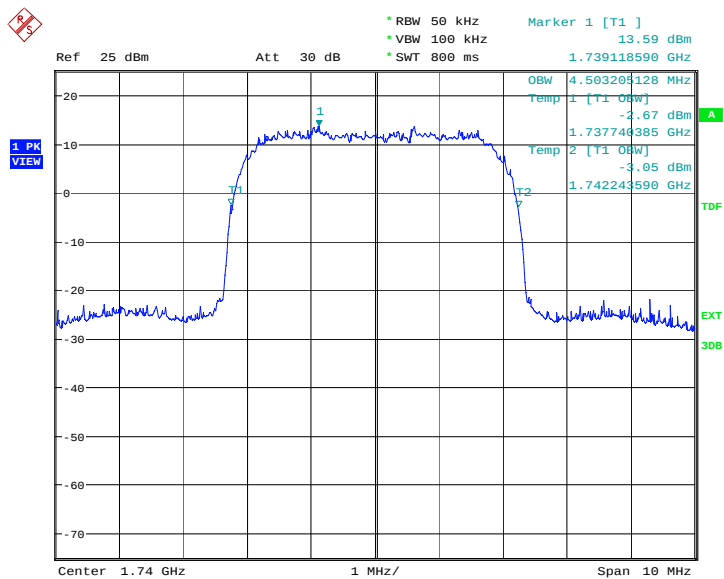
#### WCDMA Band IV

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



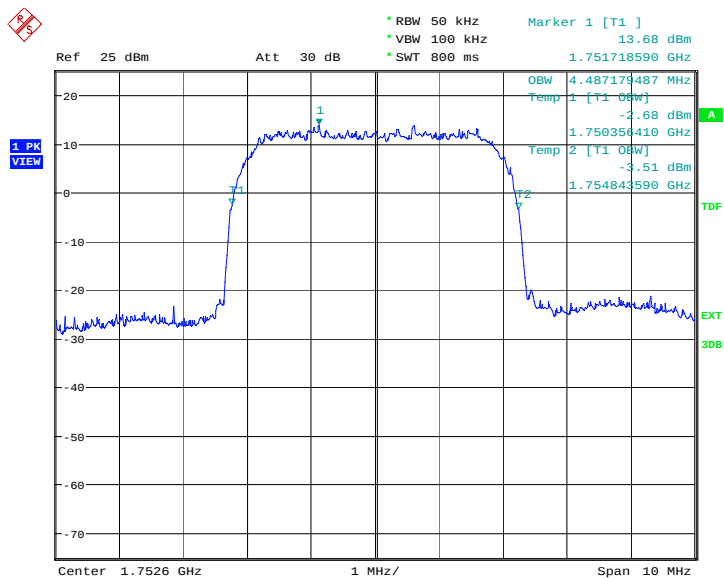
Date: 28.SEP.2010 04:02:43

### Channel 1450-Occupied Bandwidth (-26dBc BW)



Date: 28.SEP.2010 04:03:13

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

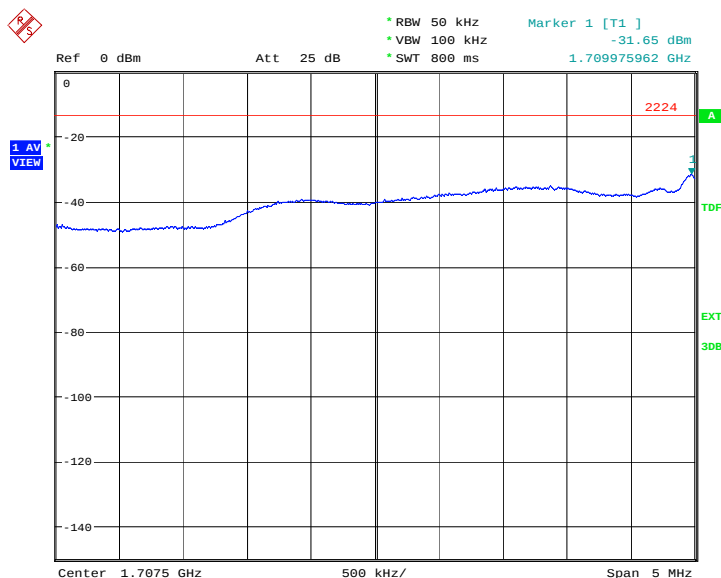


Date: 28.SEP.2010 04:03:42

## A.7 BAND EDGE COMPLIANCE

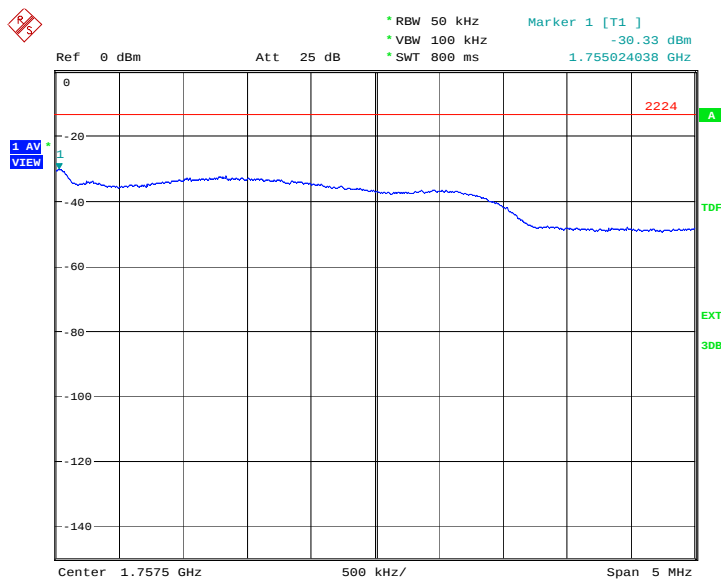
### WCDMA Band IV

#### LOW BAND EDGE BLOCK-A (WCDMA Band IV)-Channel 1312



Date: 28.SEP.2010 04:04:13

#### HIGH BAND EDGE BLOCK-C (WCDMA Band IV) -Channel 1513



Date: 28.SEP.2010 04:04:45

## A.8 CONDUCTED SPURIOUS EMISSION

### A.8.1 Measurement Method

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

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency.
2. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

#### WCDMA Band IV Transmitter

| Channel | Frequency (MHz) |
|---------|-----------------|
| 1312    | 1712.40         |
| 1450    | 1740.00         |
| 1513    | 1752.60         |

### A. 8.2 Measurement Limit

Sec. 24.238 Emission Limits.

(a) On any frequency outside frequency band of the USPCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by 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.

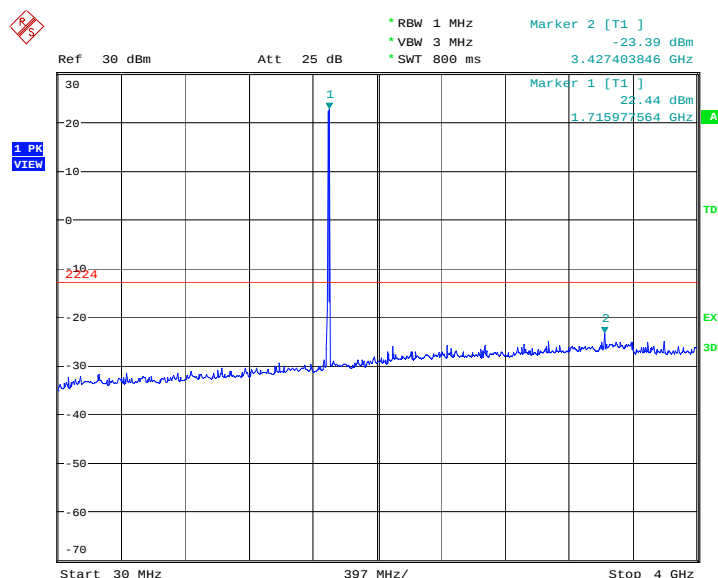
### A.8.3 Measurement result

#### WCDMA Band IV

##### A. 8.3.1 Channel 1312: 30MHz –4GHz

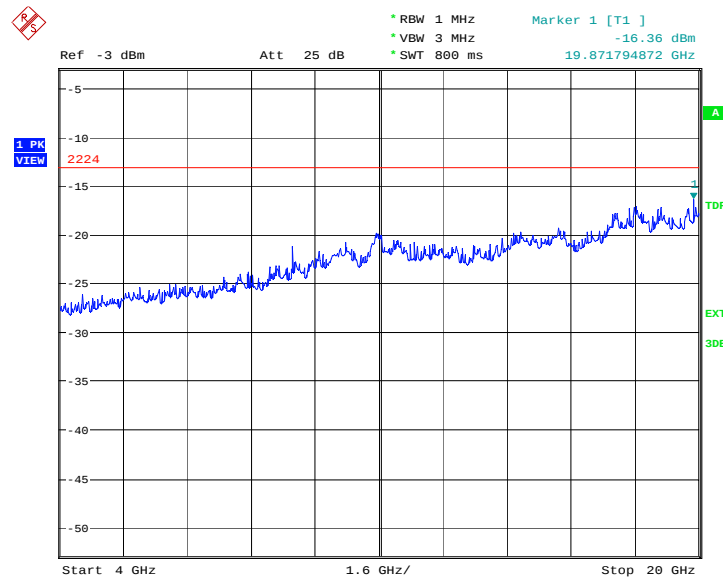
Spurious emission limit –13dBm.

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



### A. 8.3.2 Channel 1312: 4GHz –20GHz

Spurious emission limit –13dBm.

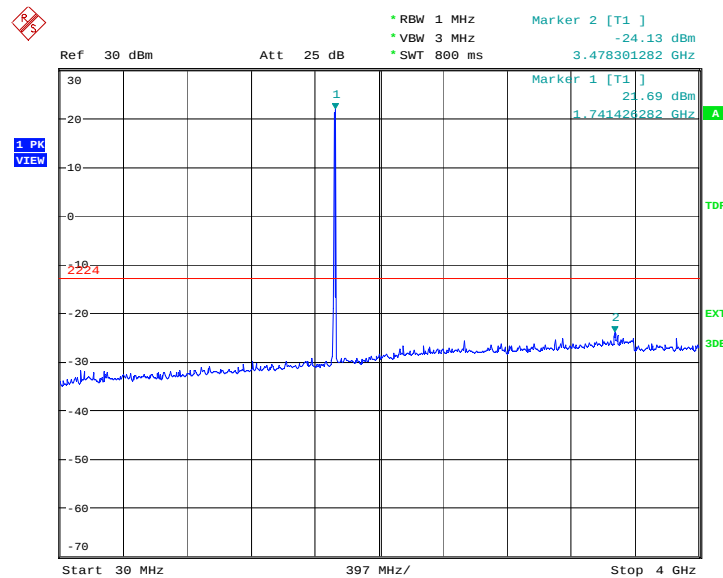


Date: 28.SEP.2010 04:05:44

### A. 8.3.3 Channel 1450: 30MHz – 4GHz

Spurious emission limit –13dBm.

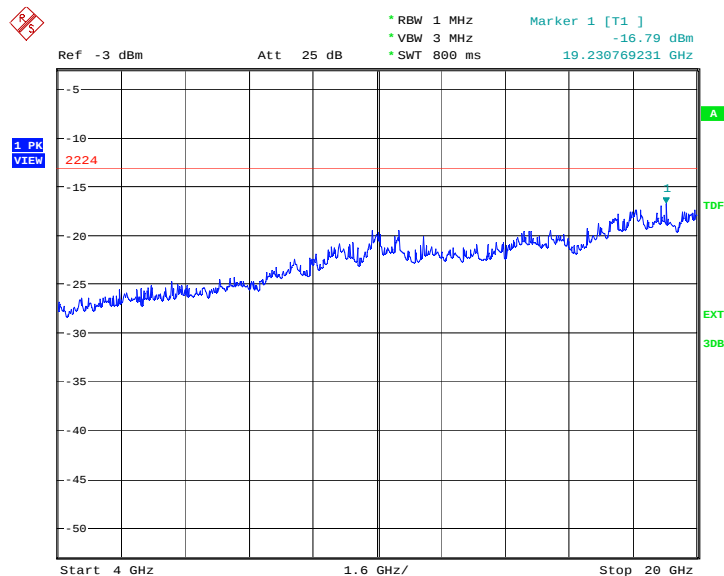
**NOTE: peak above the limit line is the carrier frequency.**



Date: 28.SEP.2010 04:06:15

#### A. 8.3.4 Channel 1450: 4GHz – 20GHz

Spurious emission limit –13dBm.

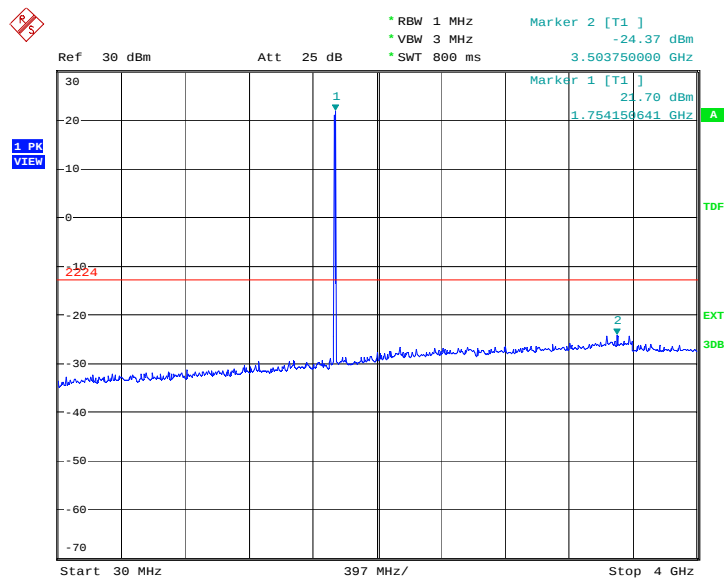


Date: 28.SEP.2010 04:06:44

#### A. 8.3.5 Channel 1513: 30MHz – 4GHz

Spurious emission limit –13dBm.

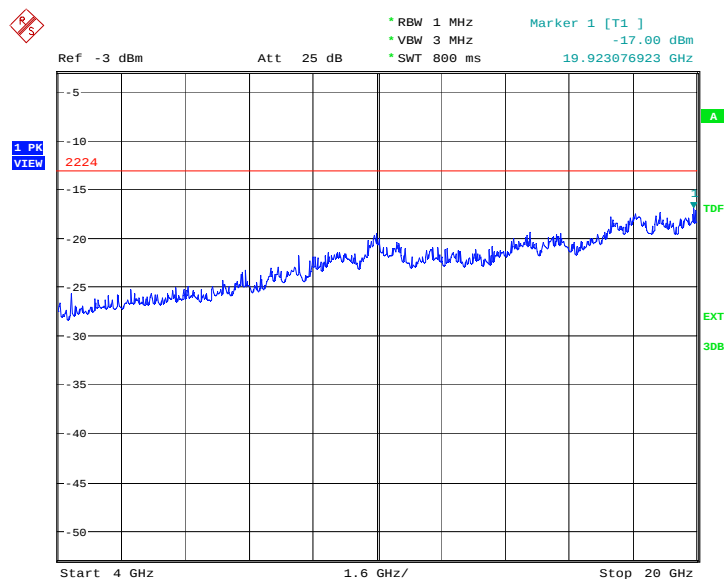
**NOTE: peak above the limit line is the carrier frequency.**



Date: 28.SEP.2010 04:07:15

### A. 8.3.6 Channel 1513: 4GHz – 20GHz

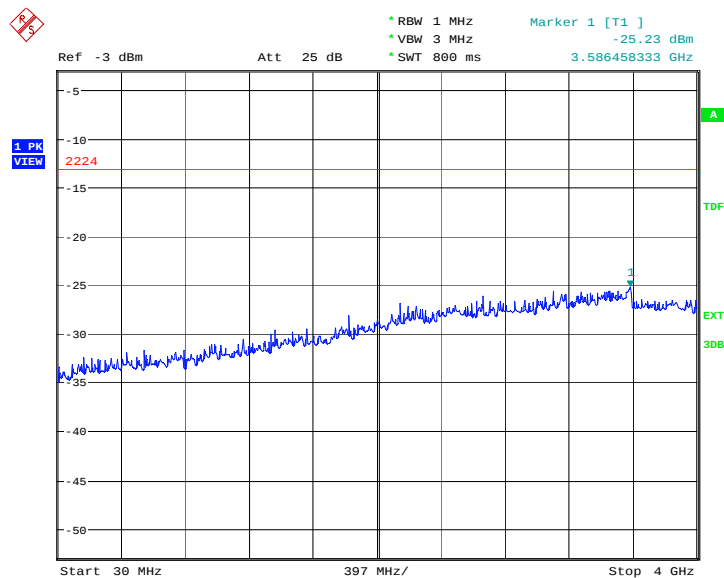
Spurious emission limit –13dBm.



Date: 28.SEP.2010 04:07:43

### A.8.3.7 Idle mode: 30MHz – 4GHz

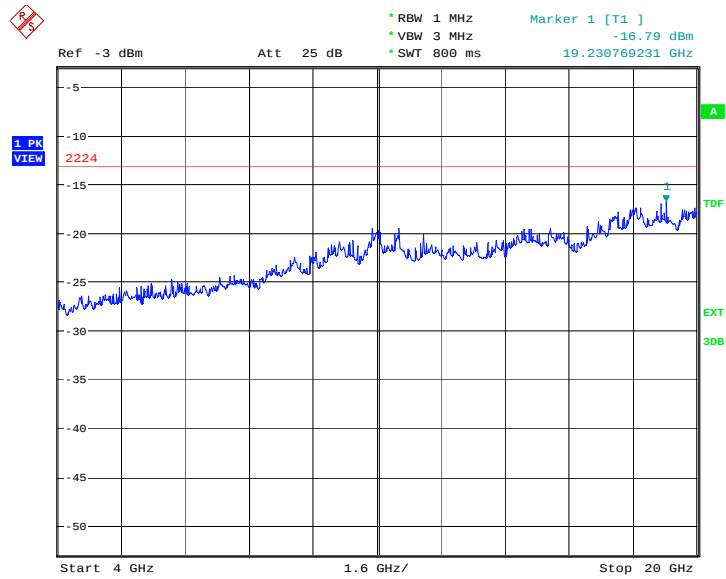
Spurious emission limit -13dBm.



Date: 28.SEP.2010 04:08:13

### A. 8.3.8 Idle mode: 4GHz – 20GHz

Spurious emission limit -13dBm.



Date: 28.SEP.2010 04:06:44

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