# TEST REPORT

## No. 2013TAR162

**for**

**ZTE Corporation**

**HSPA+ Wireless Router**

**Type: MF25A**

**FCC ID: Q78-ZTEMF25A**

**with**

**Hardware Version: PCBMF25AV1.0.0**

**Software Version: EN_ZTE_MF25AV1.0.0B03**

**Issued Date: 2013-3-11**

**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. D-PL-12123-01-01***

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

***IC O.A.T.S listed: No.6629B***

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

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# 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 |
| Telephone: | 00861062304633 |
| Fax: | 00861062304793 |

## 1.2. Testing Environment

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

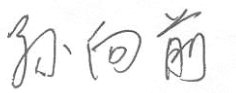
## 1.3. Project data

| | |
|---|---|
| Testing Start Date: | Feb. 21, 2012 |
| Testing End Date: | Mar. 11, 2013 |

## 1.4. Signature

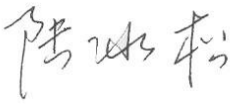
**Zi Xiaogang**

**(Prepared this test report)**



**Sun Xiangqian**

**(Reviewed this test report)**



**Lu Bingsong**

**Deputy Director of the laboratory**

**(Approved this test report)**

# 2. Client Information

## 2.1. Applicant Information

| | |
|---|---|
| Company Name: | ZTE Corporation |
| Address /Post: | ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China |
| City: | Shenzhen |
| Postal Code: | 518057 |
| Country: | China |
| Telephone: | 0086 21 68897541 |
| Fax: | 0086 21 61460600 |

## 2.2. Manufacturer Information

| | |
|---|---|
| Company Name: | ZTE Corporation |
| Address /Post: | ZTE Plaza, Keji Road South, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China |
| City: | Shenzhen |
| Postal Code: | 518057 |
| Country: | China |
| Telephone: | 0086 21 68897541 |
| Fax: | 0086 21 61460600 |

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

## 3.1. About EUT

| | |
|---|---|
| Description | HSPA+ Wireless Router |
| Model Name | MF25A |
| FCC ID | Q78-ZTEMF25A |
| Frequency | GSM 850MHz; PCS 1900MHz; WCDMA Band II; WCDMA Band V |
| HSDPA category | 7 |
| HSUPA category | 7 |
| Antenna | Integrated |
| Power supply | DC power supply |
| Output power | 25.22dBm maximum EIRP measured for WCDMA Band II |
| Extreme vol. Limits | 4.8VDC to 5.2VDC (nominal: 5.0VDC) |
| Extreme temp. Tolerance | -30°C to +50°C |

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 |
|---|---|---|---|
| N05 | 869842010003577 | PCBMF25AV1.0.0 | EN_ZTE_MF25AV1.0.0B03 |
| N13 | 869842010003593 | PCBMF25AV1.0.0 | EN_ZTE_MF25AV1.0.0B03 |

*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 |
|---|---|
| AE1 | DC power supply |

AE1

| | |
|---|---|
| Model | STC-A2O12015c55-A |
| Manufacturer | ZTE |

*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 HSPA+ Wireless Router with integrated antenna with integrated antenna. It consists of normal option: DC power supply. 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 24 | PERSONAL COMMUNICATIONS SERVICES | V 10.1.09 |
| FCC Part 22 | PUBLIC MOBILE SERVICES | V 10.1.09 |
| 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 |
| KDB971168 D01 | Procedures for Compliance Measurement of the Fundamental Emission Power of Licensed Wideband (> 1 MHz) Digital Transmission Systems | 2011 |

## 5. LABORATORY ENVIRONMENT

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

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 35 ˚C |
| Relative humidity | Min. =20 %, Max. = 80 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 0.5 Ω |

**Fully-anechoic chamber 2** (8.6 meters×6.1 meters×3.85 meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 30 ˚C |
| Relative humidity | Min. = 35 %, Max. = 60 % |
| Shielding effectiveness | > 110 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 1 Ω |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1GHz to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 4000 MHz |

**Semi-anechoic chamber 2 / Fully-anechoic chamber 3** (10 meters×6.7 meters×6.15 meters) did not exceed following limits along the EMC testing:

| | |
|---|---|
| Temperature | Min. = 15 ˚C, Max. = 30 ˚C |
| Relative humidity | Min. = 35 %, Max. = 60 % |
| Shielding effectiveness | > 100 dB |
| Electrical insulation | > 2 MΩ |
| Ground system resistance | < 0.5 Ω |
| Normalised site attenuation (NSA) | < ±3.5 dB, 3 m distance |
| Site voltage standing-wave ratio ($S_{VSWR}$) | Between 0 and 6 dB, from 1GHz to 18GHz |
| Uniformity of field strength | Between 0 and 6 dB, from 80 to 3000 MHz |

## 6. SUMMARY OF TEST RESULTS

| Items | List | Clause in FCC rules | Verdict |
|---|---|---|---|
| 1 | Output Power | 22.913(a)/24.232(c) | P |
| 2 | Emission Limit | 2.1051/22.917/24.238 | P |
| 3 | CONDUCTED EMISSION | 15.107/15.207 | P |
| 4 | Frequency Stability | 2.1055/24.235 | P |
| 5 | Occupied Bandwidth | 2.1049(h)(i) | P |
| 6 | Emission Bandwidth | 22.917(b)/24.238(b) | P |
| 7 | Band Edge Compliance | 22.917(b)/24.238(b) | P |
| 8 | Conducted Spurious Emission | 2.1057/22.917/24.238 | P |

## 7. Test Equipments Utilized

| NO. | NAME | TYPE | SERIES NUMBER | PRODUCER | CAL DUE DATE |
|---|---|---|---|---|---|
| 1 | Test Receiver | ESCI | 100344 | R&S | 2013-03-28 |
| 2 | Test Receiver | ESU26 | 100376 | R&S | 2013-11-08 |
| 3 | BiLog Antenna | VULB 9163 | 514 | Schwarzbeck | 2014-11-10 |
| 4 | BiLog Antenna | 3117 | 00139065 | ETS-Lindgren | 2014-07-31 |
| 5 | Signal Generator | SMB100A | 102063 | R&S | 2013-04-05 |
| 6 | LISN | ESH2-Z5 | 829991/012 | R&S | 2013-04-16 |
| 7 | Universal Radio Communication Tester | CMU200 | 102228 | R&S | 2013-07-06 |
| 8 | Universal Radio Communication Tester | E5515C | MY48361083 | Agilent | 2013-03-16 |
| 9 | Spectrum Analyzer | E4440A | MY48250642 | Agilent | 2014-03-03 |
| 10 | EMI Antenna | 9117 | 177 | Schwarzbeck | 2013-06-28 |
| 11 | EMI Antenna | VULB 9163 | 482 | Schwarzbeck | 2014-02-17 |
| 12 | EMI Antenna | 3117 | 00119024 | ETS-Lindgren | 2014-02-02 |
| 13 | EMI Antenna | 3117 | 00058889 | ETS-Lindgren | 2014-02-02 |
| 14 | Signal Generator | N5183A | MY49060052 | Agilent | 2013-03-19 |
| 15 | Climatic chamber | PL-2G | 343074 | ESPEC | 2013-05-12 |
| 16 | Spectrum Analyzer | FSU26 | 200030 | R&S | 2013-06-19 |

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

**Limit**

According to FCC§2.1046.

#### A.1.2.2 Test Condition

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

**WCDMA Band II**

**Measurement result**

| | CH | Frequency(MHz) | output power(dBm) |
|---|---|---|---|
| WCDMA (Band II) | 9262 | 1852.4 | 22.65 |
| | 9400 | 1880.0 | **22.81** |
| | 9538 | 1907.6 | 22.67 |

**WCDMA Band V**

**Measurement result**

| | CH | Frequency(MHz) | output power(dBm) |
|---|---|---|---|
| WCDMA (Band V) | 4132 | 826.4 | **22.70** |
| | 4183 | 836.6 | 22.54 |
| | 4233 | 846.6 | 22.58 |

### A.1.3 Radiated

#### A.1.3.1 Description

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

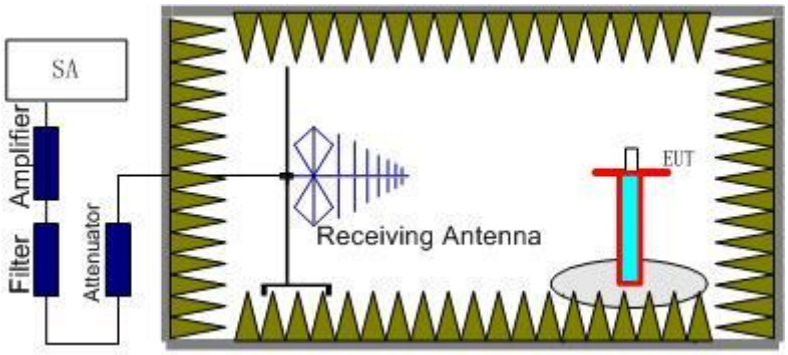
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies " The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

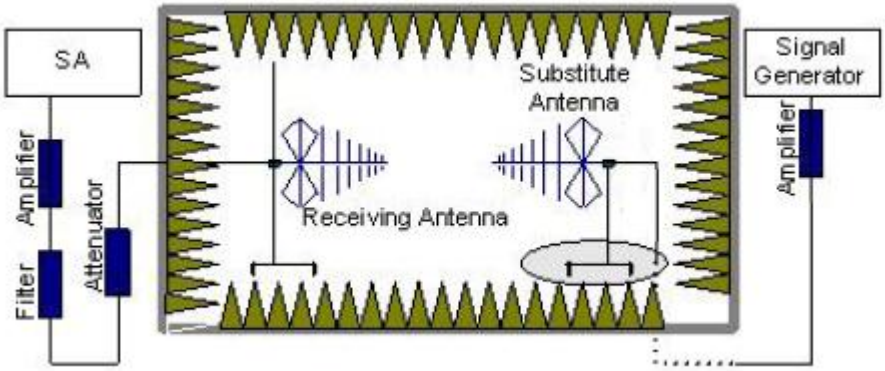
#### A.1.3.2 Method of Measurement

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 amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna.
   The cable loss ($P_{cl}$) ,the Substitution Antenna Gain ($G_a$) and the Amplifier Gain ($P_{Ag}$) should be recorded after test.
   The measurement results are obtained as described below:
   Power(EIRP)=$P_{Mea}$ - $P_{Ag}$ - $P_{cl}$ - $G_a$
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 -2.15dBi.

**WCDMA Band II-EIRP**

**Limits**

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

**Measurement result**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | EIRP(dBm) | Polarization |
|---|---|---|---|---|---|---|
| 1852.40 | -27.85 | 3.18 | -50.00 | -5.58 | 24.55 | H |
| 1880.00 | -24.92 | 3.11 | -50.00 | -3.25 | **25.22** | H |
| 1907.60 | -24.46 | 3.18 | -50.00 | -2.08 | 24.44 | H |

Frequency**:** 1880.00MHz

Peak EIRP(dBm)= $P_{Mea}$(-24.92dBm)- $P_{cl}$(3.11dB)- $P_{Ag}$(-50.00dB)-$G_a$ (-3.25dB) =25.22dBm

**ANALYZER SETTINGS: RBW = VBW = 5MHz**

**WCDMA Band V-ERP**

**Limits**

| | Burst Peak EIRP (dBm) |
|---|---|
| WCDMA Band V | ≤38.45dBm |

**Measurement result**

| Frequency(MHz) | $P_{Mea}$(dBm) | $P_{cl}$(dB) | $P_{Ag}$(dB) | $G_a$ Antenna Gain(dB) | Correction (dB) | ERP(dBm) | Polarization |
|---|---|---|---|---|---|---|---|
| 826.40 | -26.28 | 2.07 | -53.00 | 0.85 | 2.15 | 21.65 | 38.45 |
| 836.60 | -25.67 | 2.08 | -53.00 | 0.90 | 2.15 | **22.20** | 38.45 |
| 846.60 | -26.82 | 2.09 | -53.00 | 0.94 | 2.15 | 21.00 | 38.45 |

Frequency**:** 836.60MHz

Peak ERP(dBm)= $P_{Mea}$(-25.67dBm)- $P_{cl}$(2.08dB)- $P_{Ag}$(-53.00dB)-$G_a$ (0.90dB)-2.15dB=22.20dBm

**ANALYZER SETTINGS: RBW = VBW = 5MHz**

## A.2 EMISSION LIMIT

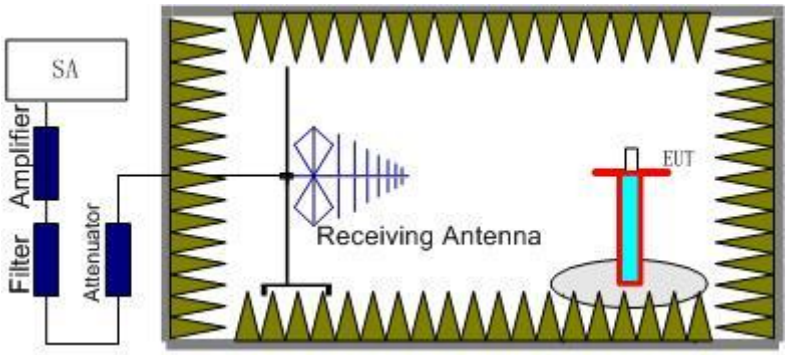
### A.2.1 Measurement Method

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

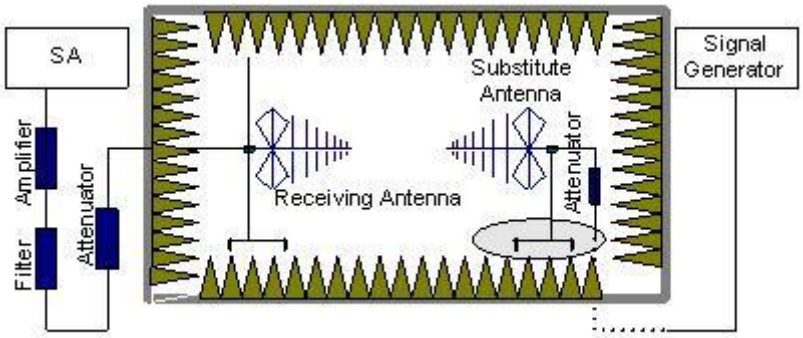
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238 and Part 24.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of WCDMA Band II and WCDMA Band V.

**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. The Path loss ($P_{pl}$) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain ($G_a$) should be recorded after test.
   A amplifier should be connected in for the test.
   The Path loss ($P_{pl}$) is the summation of the cable loss and the gain of the amplifier.
   The measurement results are obtained as described below:
   Power(EIRP)=$P_{Mea}$ - $P_{pl}$ - $G_a$
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 -2.15dBi.

### A.2.2 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

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

### A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the WCDMA Band II (1852.4 MHz, 1880.0MHz and 1907.6MHz) and WCDMA Band V (826.4MHz, 836.6MHz and 846.6MHz) . 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 WCDMA Band II and WCDMA Band V 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 V | Low | 30MHz-10GHz | Pass |
| | Middle | 30MHz-10GHz | Pass |
| | High | 30MHz-10GHz | Pass |
| WCDMA Band II | Low | 30MHz-20GHz | Pass |
| | Middle | 30MHz-20GHz | Pass |
| | High | 30MHz-20GHz | Pass |

**A.2.5 Sweep Table**

| Working Frequency | Subrange (GHz) | RBW | VBW | Sweep time (s) |
|---|---|---|---|---|
| WCDMA Band V | 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 |
| | 8~10 | 1 MHz | 3 MHz | 3 |
| WCDMA Band II | 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 II Mode Channel 9262/1852.4MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|
| 3702.45 | -55.33 | 4.44 | -8.14 | -51.63 | -13.00 | V |
| 5554.75 | -61.14 | 5.45 | -10.02 | -56.57 | -13.00 | H |
| 7767.75 | -70.01 | 6.64 | -11.67 | -64.98 | -13.00 | H |
| 9256.80 | -58.51 | 7.66 | -12.60 | -53.57 | -13.00 | V |
| 12268.81 | -63.80 | 8.89 | -12.61 | -60.08 | -13.00 | V |
| 13898.52 | -63.44 | 9.15 | -13.96 | -58.63 | -13.00 | V |

**WCDMA BAND II Mode Channel 9400/1880MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|
| 3758.34 | -48.12 | 4.53 | -8.21 | -44.44 | -13.00 | V |
| 5638.23 | -63.30 | 5.45 | -10.06 | -58.69 | -13.00 | V |
| 7839.82 | -59.79 | 6.97 | -11.74 | -55.02 | -13.00 | H |
| 10309.60 | -66.75 | 7.73 | -12.46 | -62.02 | -13.00 | H |
| 13173.87 | -62.04 | 9.25 | -13.47 | -57.82 | -13.00 | V |
| 14654.42 | -59.70 | 9.49 | -13.57 | -55.62 | -13.00 | V |

**WCDMA BAND II Mode Channel 9538/1907.6MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Peak EIRP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|
| 3817.14 | -51.14 | 4.49 | -8.28 | -47.35 | -13.00 | V |
| 5133.63 | -69.32 | 5.25 | -9.78 | -64.79 | -13.00 | H |
| 7950.43 | -58.54 | 6.83 | -11.85 | -53.52 | -13.00 | V |
| 10102.81 | -67.22 | 8.20 | -12.42 | -63.00 | -13.00 | H |
| 12783.50 | -63.25 | 9.01 | -13.04 | -59.22 | -13.00 | H |
| 16348.04 | -60.55 | 10.48 | -12.58 | -58.45 | -13.00 | H |

**WCDMA BAND V Mode Channel 4132/826.4MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|---|
| 3661.35 | -70.98 | 4.42 | -8.09 | 2.15 | -69.46 | -13.00 | V |
| 4375.14 | -70.21 | 4.87 | -8.73 | 2.15 | -68.50 | -13.00 | V |
| 5200.74 | -71.71 | 5.24 | -9.82 | 2.15 | -69.28 | -13.00 | V |
| 6850.95 | -64.62 | 6.15 | -10.95 | 2.15 | -61.97 | -13.00 | H |
| 7797.01 | -60.65 | 6.73 | -11.70 | 2.15 | -57.83 | -13.00 | V |
| 8634.78 | -60.20 | 7.39 | -12.31 | 2.15 | -57.43 | -13.00 | V |

**WCDMA BAND V Mode Channel 4183/836.6MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|---|
| 3201.54 | -70.03 | 4.10 | -7.18 | 2.15 | -69.10 | -13.00 | H |
| 3916.11 | -79.28 | 4.51 | -8.40 | 2.15 | -77.54 | -13.00 | H |
| 4790.66 | -70.40 | 5.04 | -9.32 | 2.15 | -68.27 | -13.00 | H |
| 6003.64 | -63.77 | 5.62 | -10.20 | 2.15 | -61.34 | -13.00 | V |
| 6887.41 | -65.69 | 6.08 | -10.99 | 2.15 | -62.93 | -13.00 | V |
| 7814.89 | -61.01 | 6.91 | -11.71 | 2.15 | -58.36 | -13.00 | V |

**WCDMA BAND V Mode Channel 4233/846.6MHz**

| Frequency(MHz) | $P_{Mea}$(dBm) | Path Loss | Antenna Gain | Correction (dB) | Peak ERP(dBm) | Limit （dBm） | Polarization |
|---|---|---|---|---|---|---|---|
| 3162.33 | -60.42 | 4.03 | -7.09 | 2.15 | -59.51 | -13.00 | V |
| 4158.70 | -75.36 | 4.67 | -8.60 | 2.15 | -73.58 | -13.00 | V |
| 4943.43 | -65.33 | 5.11 | -9.60 | 2.15 | -62.99 | -13.00 | H |
| 6286.67 | -62.60 | 5.88 | -10.43 | 2.15 | -60.20 | -13.00 | H |
| 7524.45 | -56.91 | 6.89 | -11.42 | 2.15 | -54.53 | -13.00 | H |
| 8319.74 | -61.47 | 7.35 | -12.09 | 2.15 | -58.88 | -13.00 | H |

## A.3 CONDUCTED EMISSION

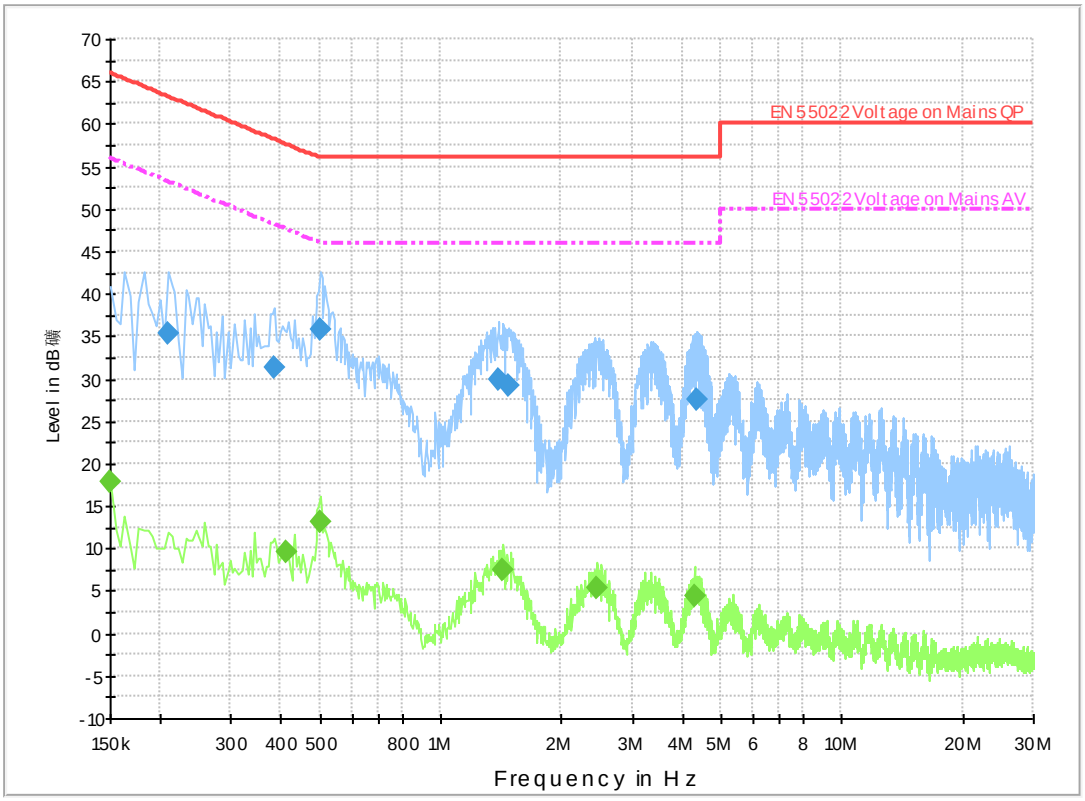
The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with DC power supply.

**A.3.1 Limit**

| Frequency of Emission (MHz) | Conducted Limit (dBµV) | |
|---|---|---|
| | 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 II**



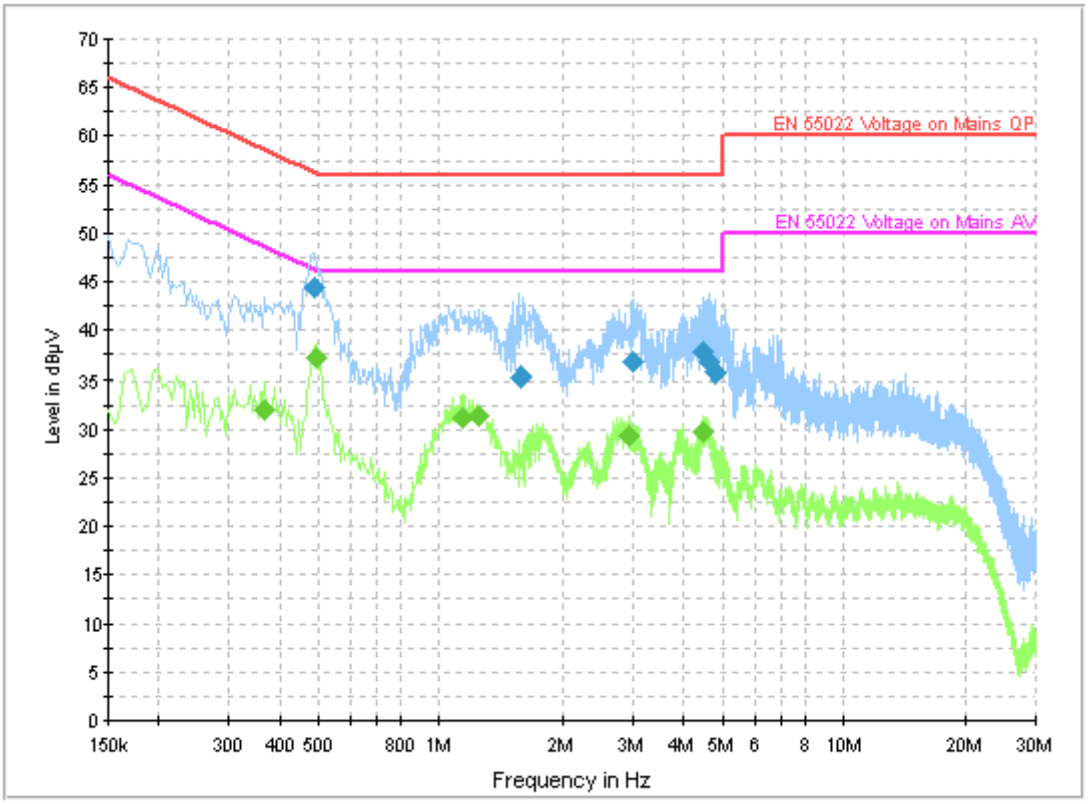

## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.208500 | 35.3 | GND | N | 10.0 | 28.0 | 63.3 |
| 0.384000 | 31.3 | GND | N | 10.0 | 26.9 | 58.2 |
| 0.501000 | 35.7 | GND | N | 10.0 | 20.3 | 56.0 |
| 1.392000 | 29.8 | GND | N | 10.0 | 26.2 | 56.0 |
| 1.473000 | 29.1 | GND | N | 10.0 | 26.9 | 56.0 |
| 4.348500 | 27.4 | GND | N | 10.0 | 28.6 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.150000 | 17.8 | GND | L1 | 10.0 | 38.2 | 56.0 |
| 0.411000 | 9.6 | GND | N | 10.0 | 38.1 | 47.6 |
| 0.501000 | 13.0 | GND | N | 10.0 | 33.0 | 46.0 |
| 1.432500 | 7.4 | GND | L1 | 10.0 | 38.6 | 46.0 |
| 2.463000 | 5.3 | GND | L1 | 10.0 | 40.7 | 46.0 |
| 4.276500 | 4.3 | GND | N | 10.0 | 41.7 | 46.0 |

**WCDMA Band V**




## Final Result 1

| Frequency (MHz) | QuasiPeak (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.487500 | 44.5 | GND | N | 10.0 | 11.7 | 56.2 |
| 1.567500 | 35.3 | GND | L1 | 10.0 | 20.7 | 56.0 |
| 2.980500 | 36.9 | GND | N | 10.0 | 19.1 | 56.0 |
| 4.465500 | 37.9 | GND | N | 10.0 | 18.1 | 56.0 |
| 4.627500 | 36.8 | GND | L1 | 10.0 | 19.2 | 56.0 |
| 4.780500 | 35.8 | GND | N | 10.0 | 20.2 | 56.0 |

## Final Result 2

| Frequency (MHz) | Average (dBµV) | PE | Line | Corr. (dB) | Margin (dB) | Limit (dBµV) |
|---|---|---|---|---|---|---|
| 0.366000 | 32.1 | GND | N | 10.0 | 16.5 | 48.6 |
| 0.492000 | 37.2 | GND | N | 10.0 | 8.9 | 46.1 |
| 1.144500 | 31.3 | GND | N | 10.0 | 14.7 | 46.0 |
| 1.252500 | 31.3 | GND | N | 10.0 | 14.7 | 46.0 |
| 2.908500 | 29.4 | GND | N | 10.0 | 16.6 | 46.0 |
| 4.492500 | 29.7 | GND | N | 10.0 | 16.3 | 46.0 |

## 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℃.
3. With the EUT, powered via nominal voltage, connected to the CMU200 and in a simulated call on mid channel of WCDMA Band II and WCDMA Band V, 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℃ increments from -30℃ to +50℃. 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℃.
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℃ to -30℃. 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℃ during the measurement procedure.

### A.4.2 Measurement Limit

#### A.4.2.1 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 4.8VDCand 5.2VDC with a nominal voltage of 5.0VDC. 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.4.2.2 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.4.3 Measurement results**

**WCDMA Band Ⅱ**

**Frequency Error vs Voltage**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 4.8 | -7 | 0.004 |
| 5.0 | 9 | 0.005 |
| 5.2 | 16 | 0.008 |

**Frequency Error vs Temperature**

| temperature(℃) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -30 | 9 | 0.005 |
| -20 | -9 | 0.005 |
| -10 | 10 | 0.005 |
| 0 | 7 | 0.004 |
| 10 | 9 | 0.005 |
| 20 | -10 | 0.005 |
| 30 | 8 | 0.004 |
| 40 | 6 | 0.003 |
| 50 | 9 | 0.005 |

**WCDMA Band Ⅴ**

**Frequency Error vs Voltage**

| Voltage(V) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| 4.8 | -3 | 0.004 |
| 5.0 | -5 | 0.006 |
| 5.2 | -4 | 0.005 |

**Frequency Error vs Temperature**

| temperature(℃) | Frequency error(Hz) | Frequency error(ppm) |
|---|---|---|
| -30 | -6 | 0.007 |
| -20 | 4 | 0.004 |
| -10 | -5 | 0.006 |
| 0 | -3 | 0.003 |
| 10 | -5 | 0.006 |
| 20 | -4 | 0.004 |
| 30 | 4 | 0.004 |
| 40 | -6 | 0.007 |
| 50 | -4 | 0.005 |

## A.5 OCCUPIED BANDWIDTH

### A.5.1 Occupied Bandwidth Results

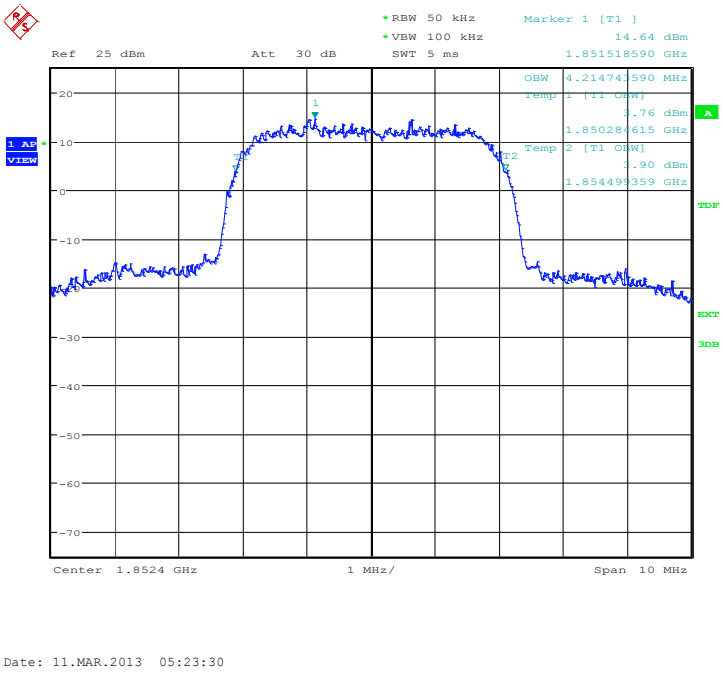
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band II and WCDMA Band V. The table below lists the measured -20dBc BW. Spectrum analyzer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

**WCDMA Band II(-20dBc)**

| Frequency(MHz) | Occupied Bandwidth (-20dBc BW)( MHz) |
|---|---|
| 1852.4 | 4.215 |
| 1880.0 | 4.151 |
| 1907.6 | 4.167 |

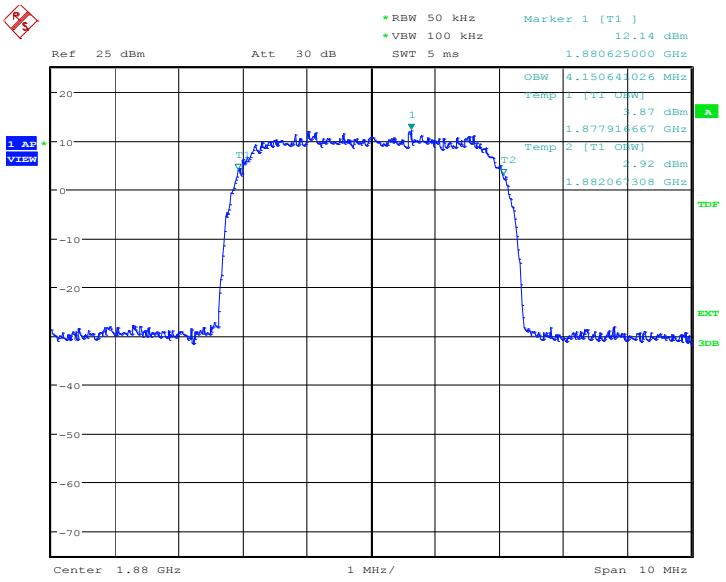
**WCDMA Band Ⅱ**

**Channel 9262-Occupied Bandwidth (-20dBc BW)**



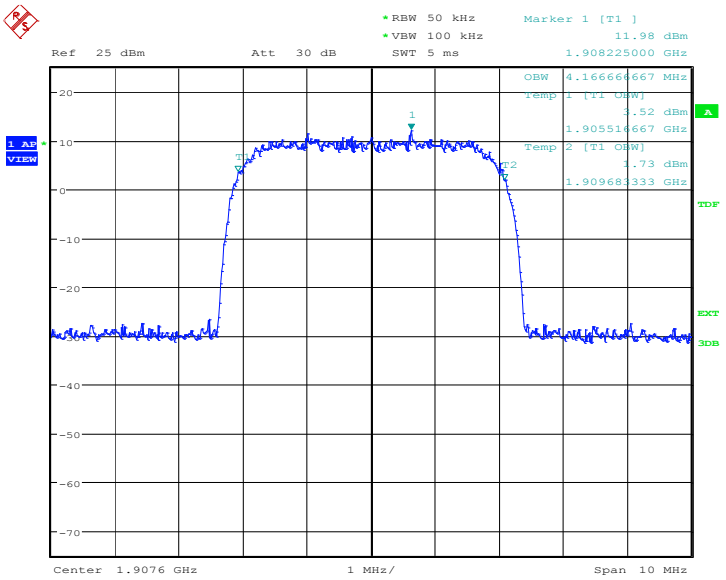

Date: 11.MAR.2013 05:23:30

## Channel 9400-Occupied Bandwidth (-20dBc BW)




Date: 11.MAR.2013 05:24:04

## Channel 9538-Occupied Bandwidth (-20dBc BW)



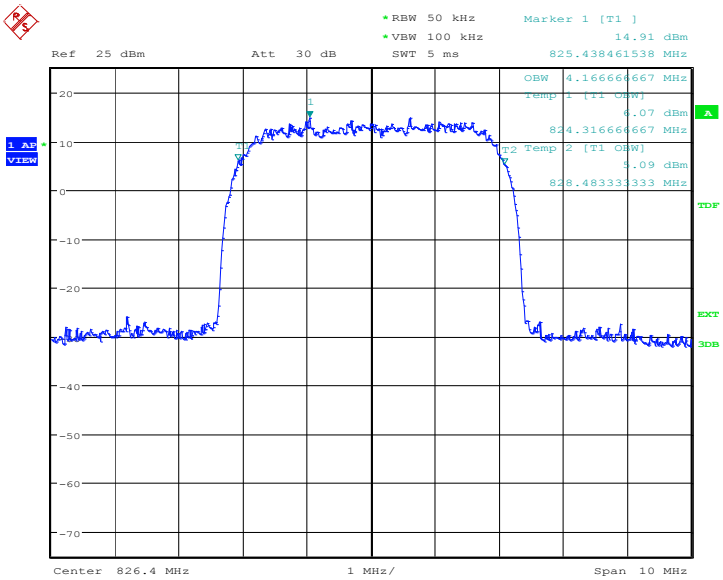

Date: 11.MAR.2013 05:24:39

**WCDMA Band V(-20dBc)**

| Frequency(MHz) | Occupied Bandwidth (-20dBc BW)( MHz) |
|---|---|
| 826.4 | 4.167 |
| 836.6 | 4.167 |
| 846.6 | 4.151 |

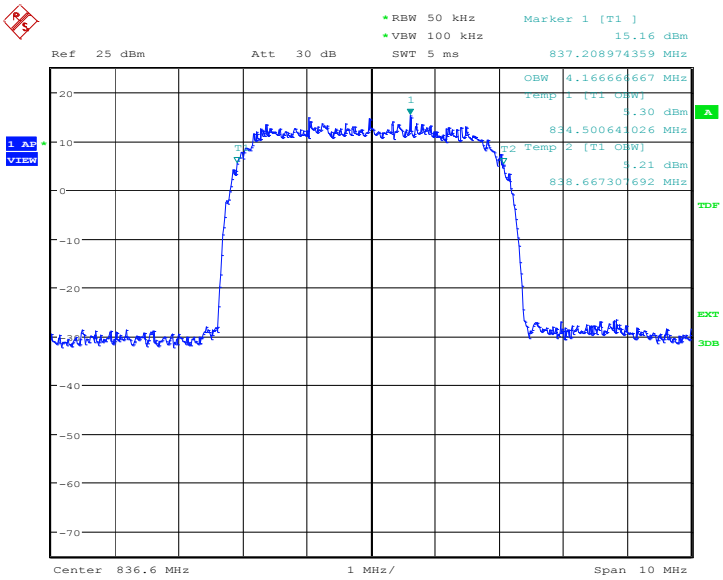
**WCDMA Band V**

**Channel 4132-Occupied Bandwidth (-20dBc BW)**



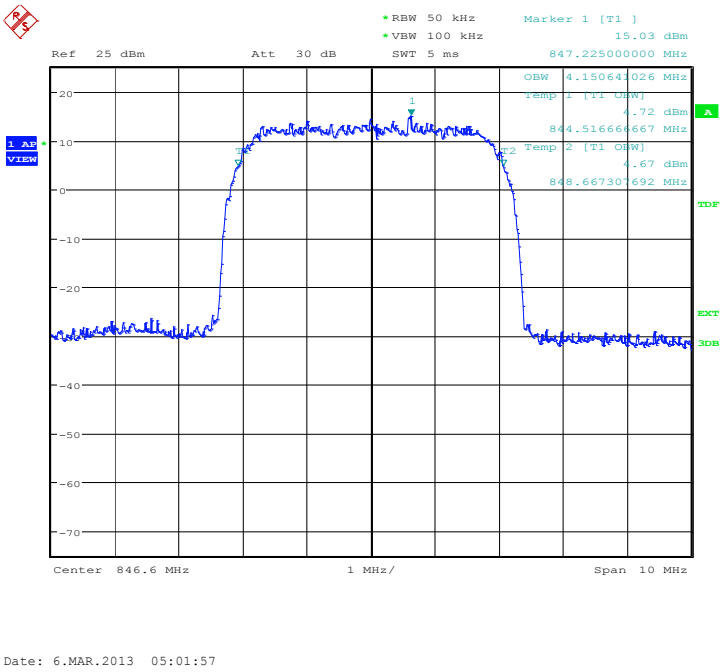

Date: 6.MAR.2013 05:00:48

**Channel 4183-Occupied Bandwidth (-20dBc BW)**




Date: 6.MAR.2013 05:01:23

## Channel 4233-Occupied Bandwidth (-20dBc BW)



## A.6 EMISSION BANDWIDTH

### A.6.1Emission Bandwidth Results

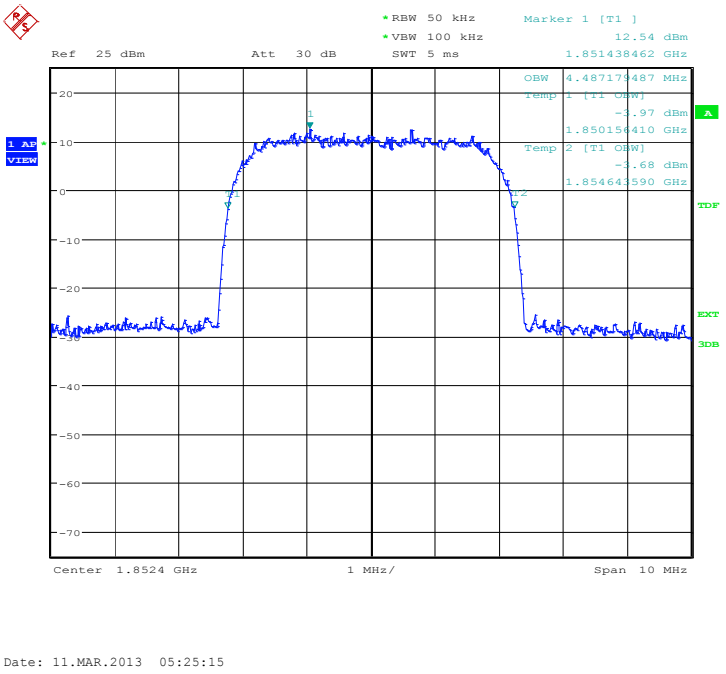
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band II and WCDMA Band V. Table below lists the measured -26dBc BW. Spectrum analyzer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

**WCDMA Band II(-26dBc)**

| Frequency(MHz) | Occupied Bandwidth (–26dBc BW)( MHz) |
|---|---|
| 1852.4 | 4.487 |
| 1880.0 | 4.471 |
| 1907.6 | 4.471 |

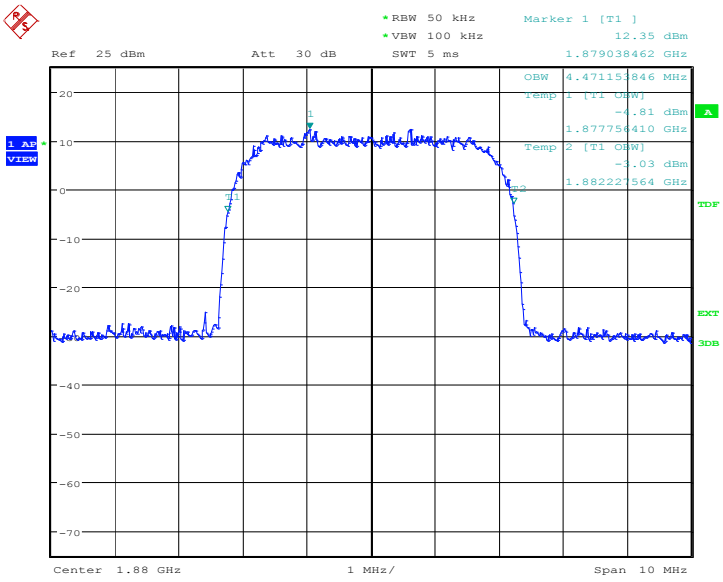
**WCDMA Band II**

**Channel 9262-Occupied Bandwidth (-26dBc BW)**



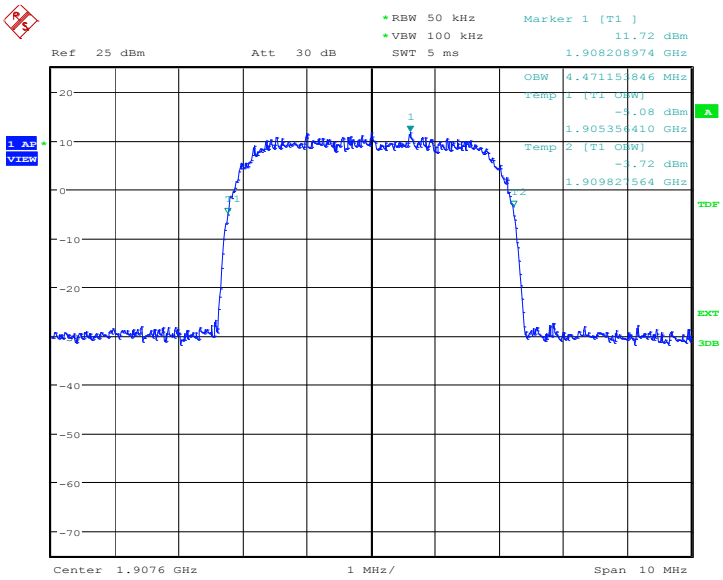

Date: 11.MAR.2013 05:25:15

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




Date: 11.MAR.2013 05:25:49

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



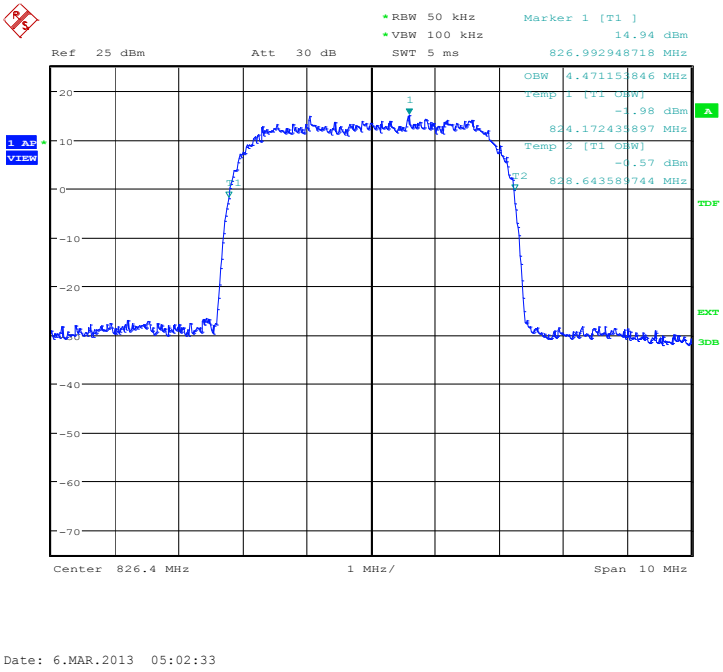

Date: 11.MAR.2013 05:26:24

**WCDMA Band V(-26dBc)**

| Frequency(MHz) | Occupied Bandwidth (–26dBc BW)( MHz) |
|---|---|
| 826.40 | 4.471 |
| 836.60 | 4.455 |
| 846.60 | 4.455 |

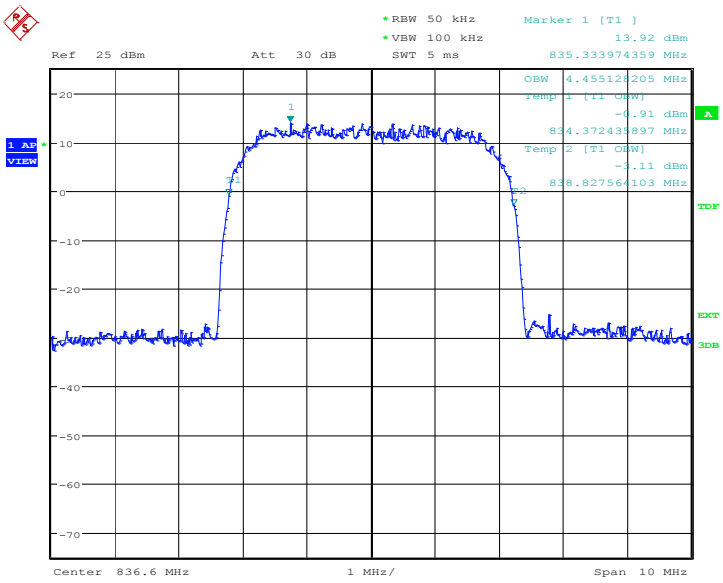
**WCDMA Band V**

**Channel 4132-Occupied Bandwidth (-26dBc BW)**



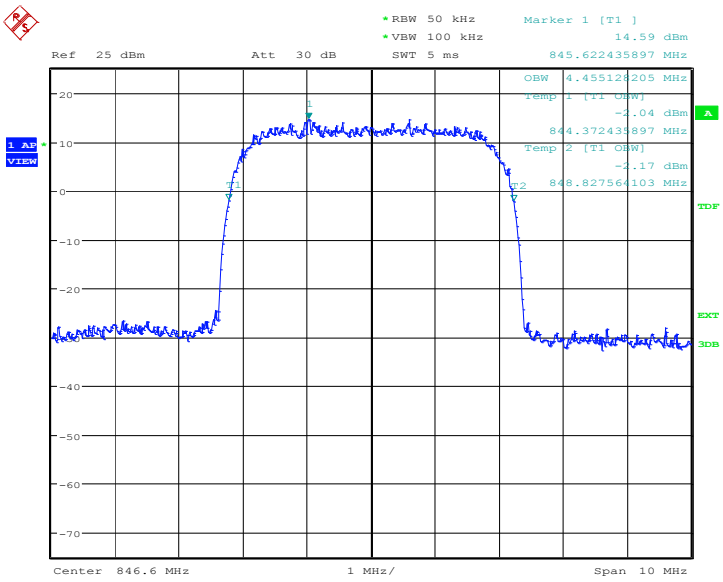

Date: 6.MAR.2013 05:02:33

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




Date: 6.MAR.2013 05:03:08

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

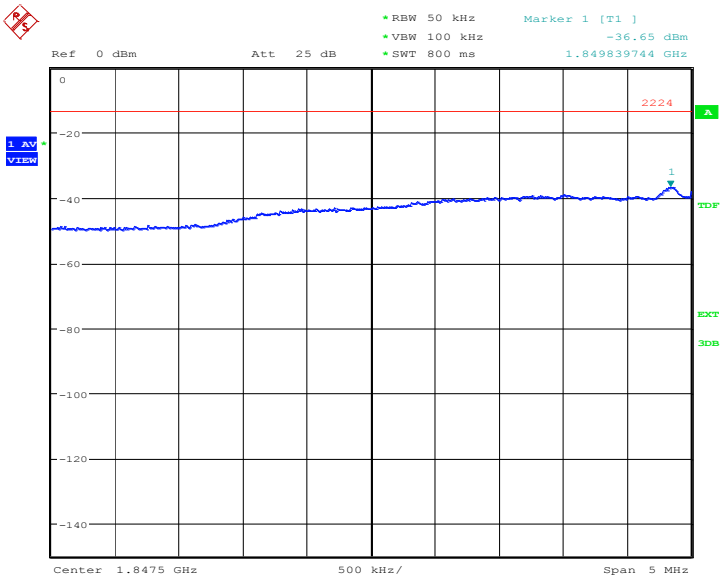



Date: 6.MAR.2013 05:03:43

## A.7 BAND EDGE COMPLIANCE

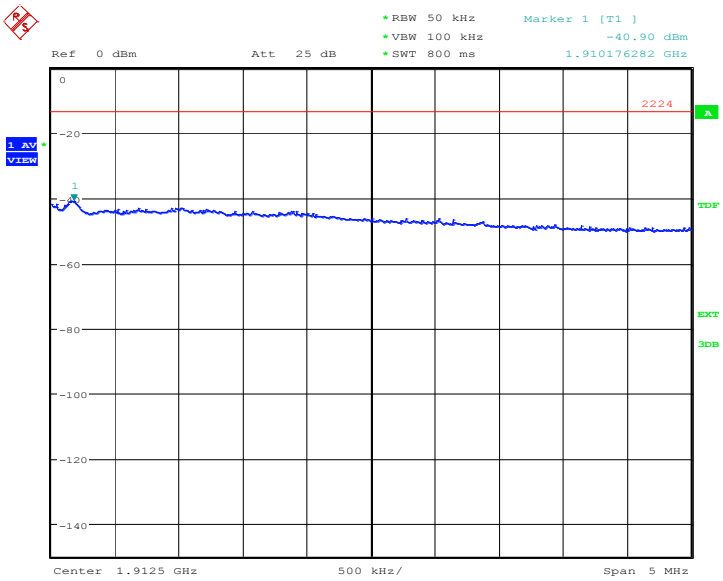
**WCDMA Band Ⅱ**

**LOW BAND EDGE BLOCK-A (WCDMA Band Ⅱ)-Channel 9262**




Date: 11.MAR.2013 05:26:40

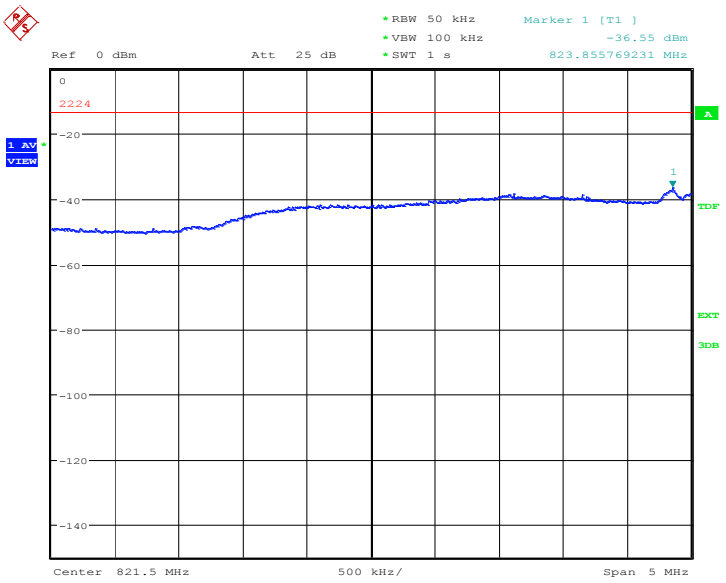
**HIGH BAND EDGE BLOCK-C (WCDMA Band Ⅱ) –Channel 9538**




Date: 11.MAR.2013 05:26:56

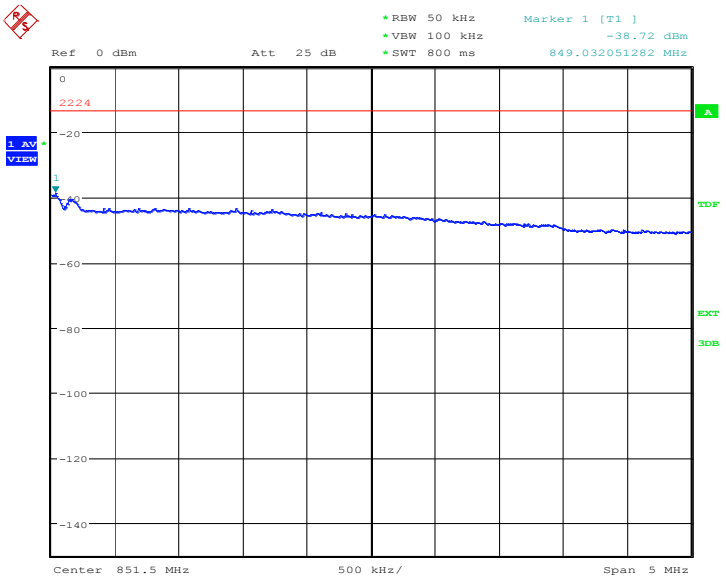
**WCDMA Band Ⅴ**

**LOW BAND EDGE BLOCK-A (WCDMA Band Ⅴ)-Channel 4132**




Date: 6.MAR.2013 05:03:59

**HIGH BAND EDGE BLOCK-C (WCDMA Band Ⅴ) –Channel 4233**




Date: 6.MAR.2013 05:04:15

## 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. For the equipment of WCDMA Band II, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For WCDMA Band V, data taken from 30 MHz to 10GHz.
2. The sweep time is set automatically by instrument itself. That should be the optimal sweep time for the span and the RBW. If the sweep time is too short, that is sweep is too fast, the sweep result is not accurate; If the sweep time is too long, that is sweep is too low, some frequency components may be lost. The instrument will give a optimal sweep time according the selected span and RBW.
3. The procedure to get the conducted spurious emission is as follows:
   The trace mode is set to MaxHold to get the highest signal at each frequency;
   Wait 25 seconds;
   Get the result.
4. Determine EUT transmit frequencies: below outlines the band edge frequencies pertinent to conducted emissions testing.

**WCDMA Band Ⅱ Transmitter**

| Channel | Frequency (MHz) |
|---|---|
| 9262 | 1852.40 |
| 9400 | 1880.00 |
| 9538 | 1907.60 |

**WCDMA Band Ⅴ Transmitter**

| Channel | Frequency (MHz) |
|---|---|
| 4132 | 826.40 |
| 4183 | 836.60 |
| 4233 | 846.60 |

### A. 8.2 Measurement Limit

Part 24.238 and Part 22.917 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

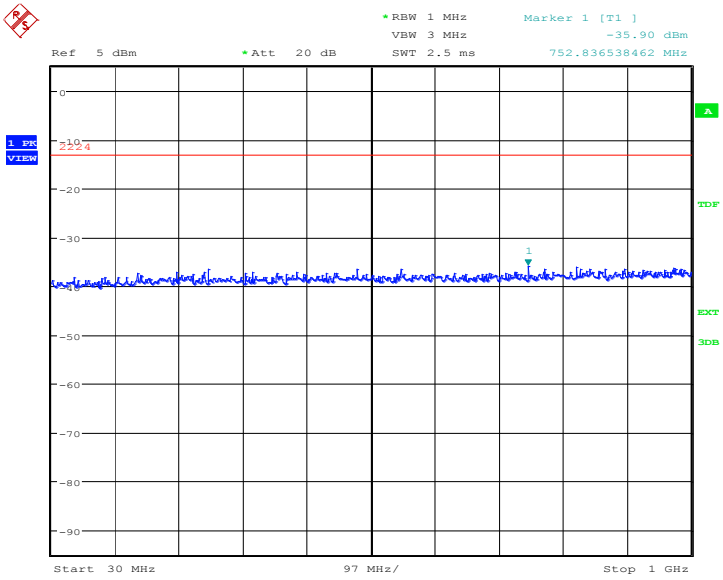
The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm.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

### A.8.3 Measurement result

**WCDMA Band Ⅱ**

**A. 8.3.1 Channel 9262: 30MHz –1GHz**

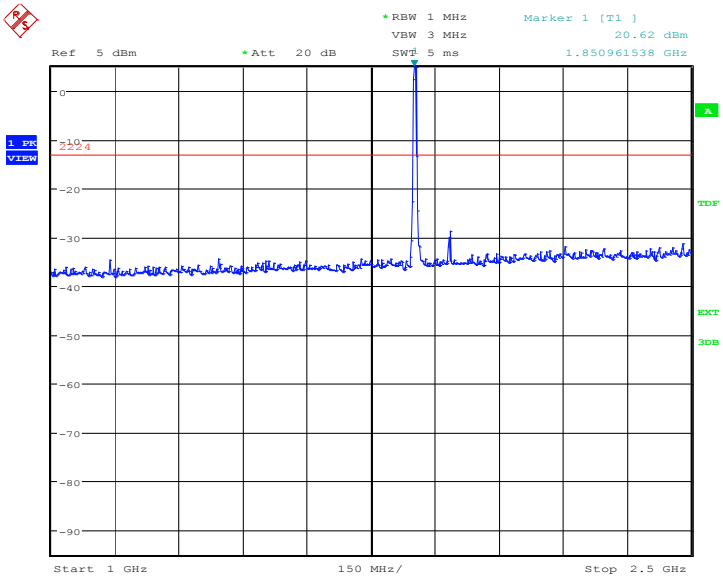
Spurious emission limit –13dBm.




**A.8.3.2 Channel 9262: 1GHz –2.5GHz**

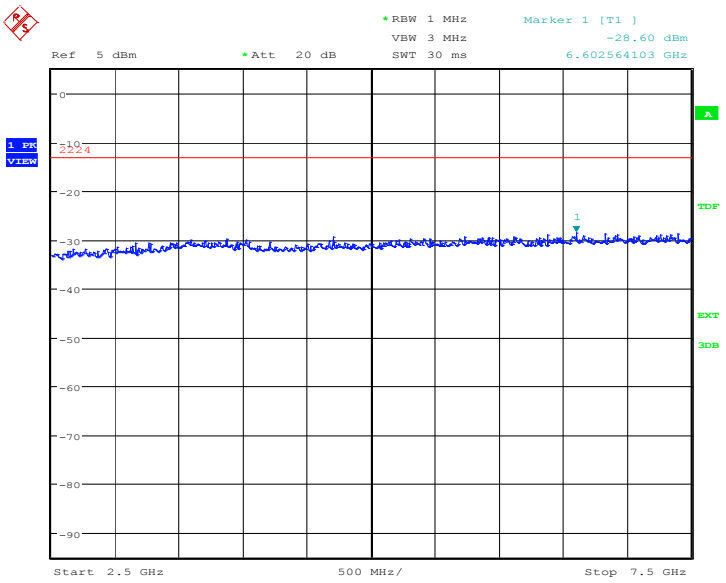
Spurious emission limit –13dBm.

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



### A.8.3.3 Channel 9262: 2.5GHz –7.5GHz

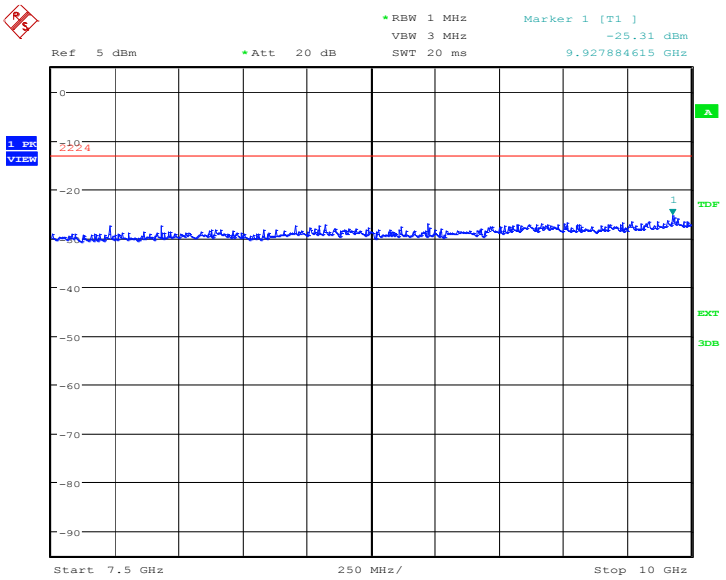
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:28:24

### A.8.3.4 Channel 9262: 7.5GHz –10GHz

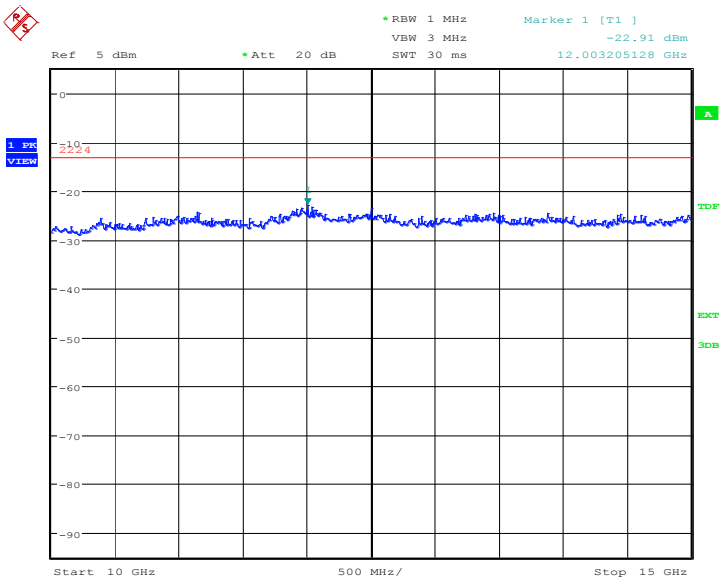
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:28:52

### A.8.3.5 Channel 9262: 10GHz –15GHz

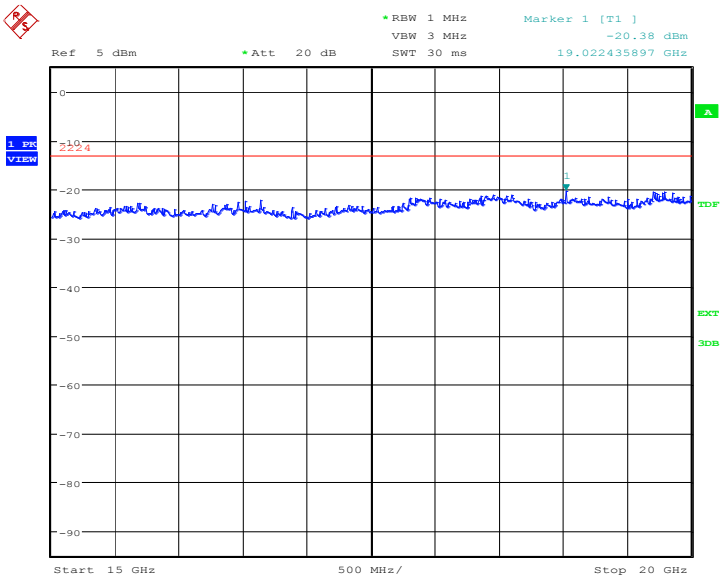
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:29:20

### A.8.3.6 Channel 9262: 15GHz –20GHz

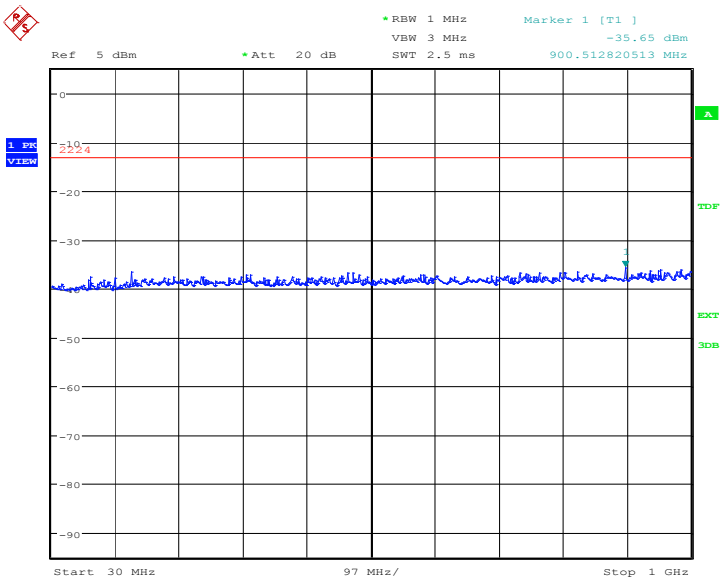
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:29:48

### A. 8.3.7 Channel 9400: 30MHz –1GHz

Spurious emission limit –13dBm.

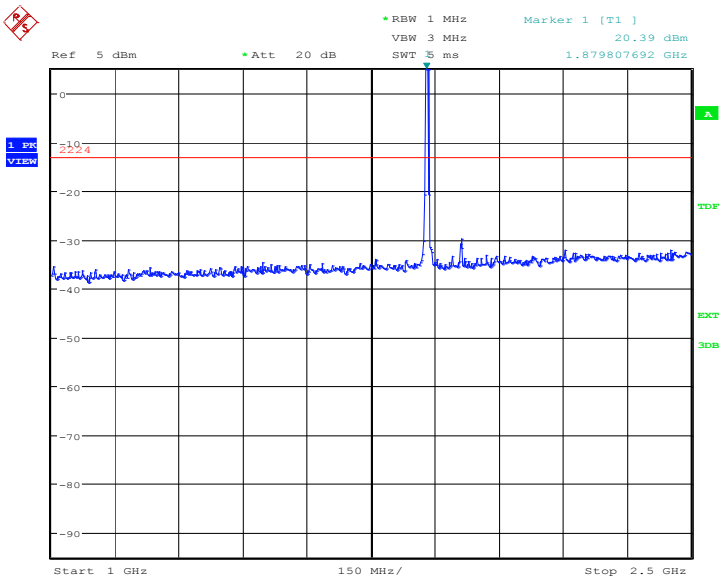



Date: 11.MAR.2013 05:30:19

### A.8.3.8 Channel 9400: 1GHz –2.5GHz

Spurious emission limit –13dBm.

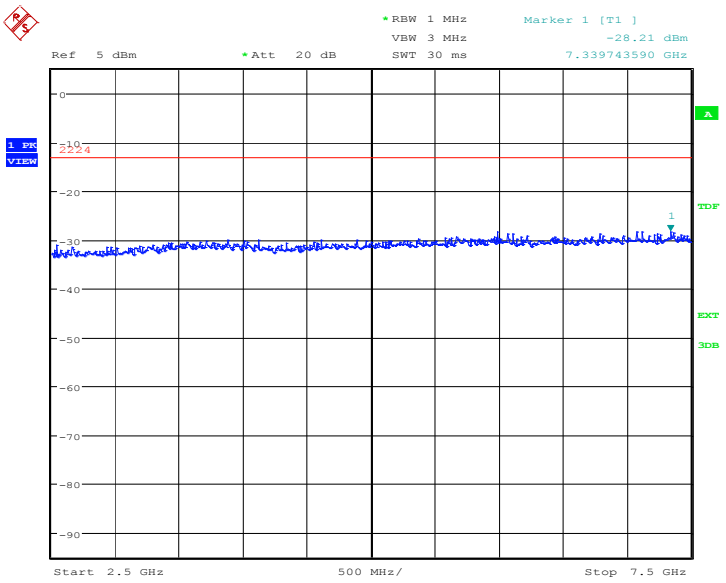
**NOTE: peak above the limit line is the carrier frequency.**




Date: 11.MAR.2013 05:30:48

### A.8.3.9 Channel 9400: 2.5GHz –7.5GHz

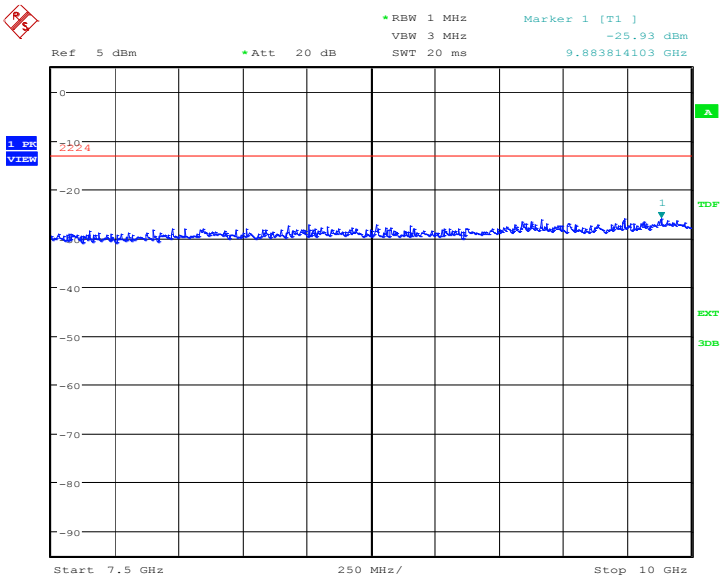
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:31:16

### A.8.3.10 Channel 9400: 7.5GHz –10GHz

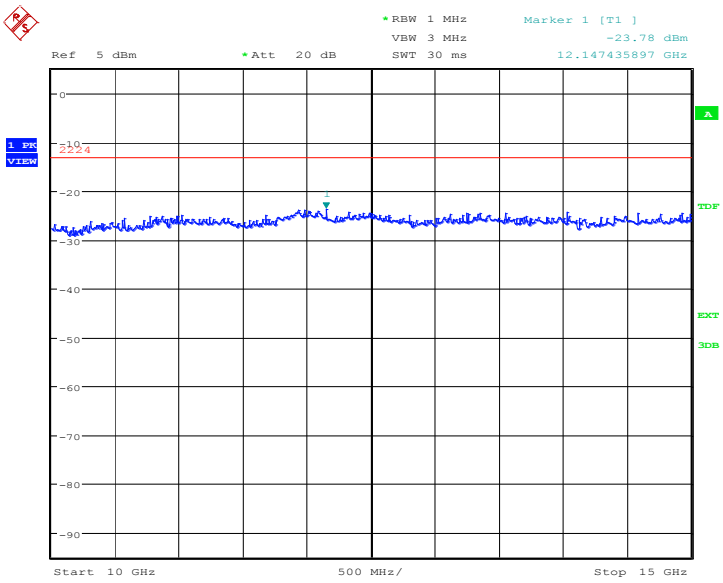
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:31:44

### A.8.3.11 Channel 9400: 10GHz –15GHz

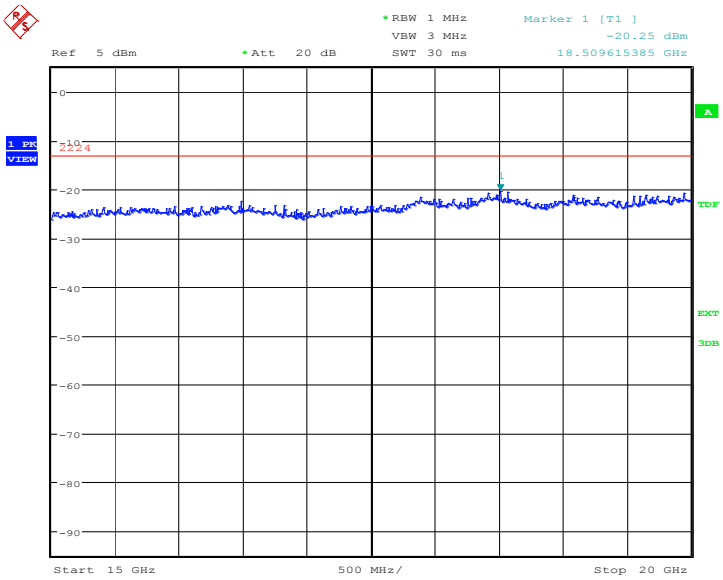
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:32:12

### A.8.3.12 Channel 9400: 15GHz –20GHz

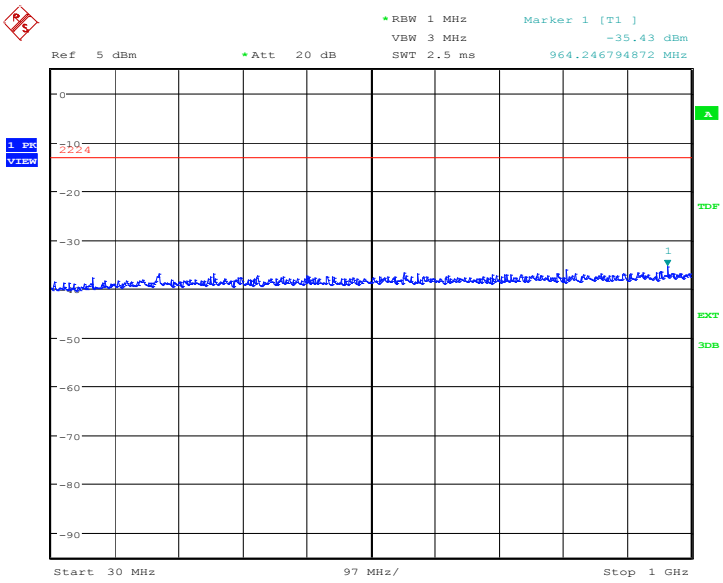
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:32:40

### A. 8.3.13 Channel 9538: 30MHz –1GHz

Spurious emission limit –13dBm.

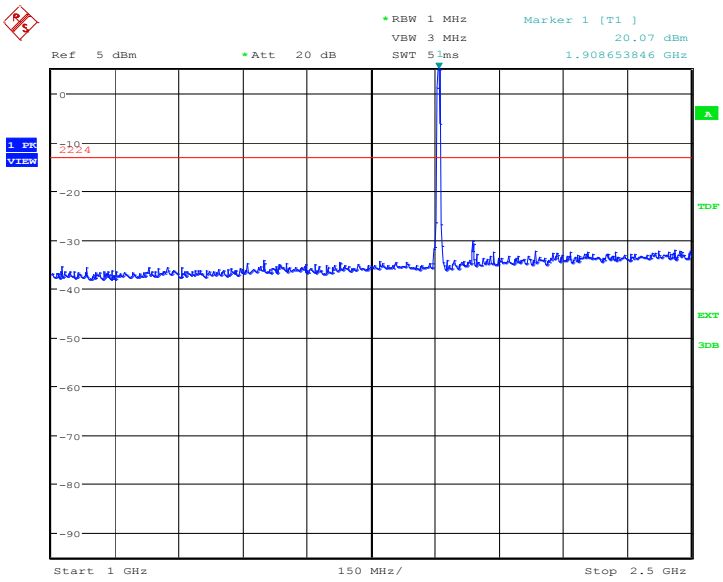



Date: 11.MAR.2013 05:33:11

### A.8.3.14 Channel 9538: 1GHz –2.5GHz

Spurious emission limit –13dBm.

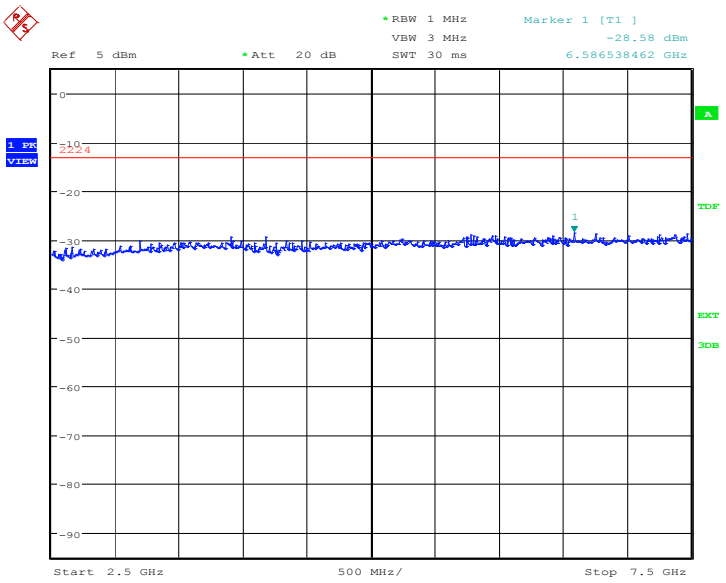
**NOTE: peak above the limit line is the carrier frequency.**




Date: 11.MAR.2013 05:33:40

### A.8.3.15 Channel 9538: 2.5GHz –7.5GHz

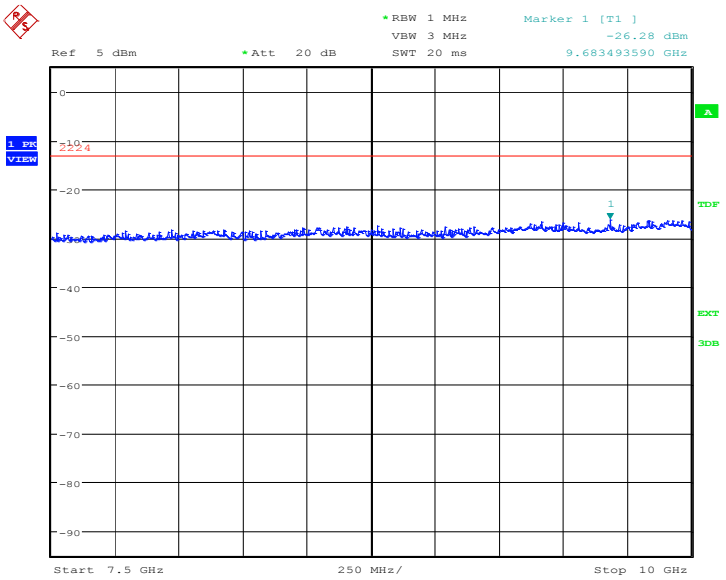
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:34:08

### A.8.3.16 Channel 9538: 7.5GHz –10GHz

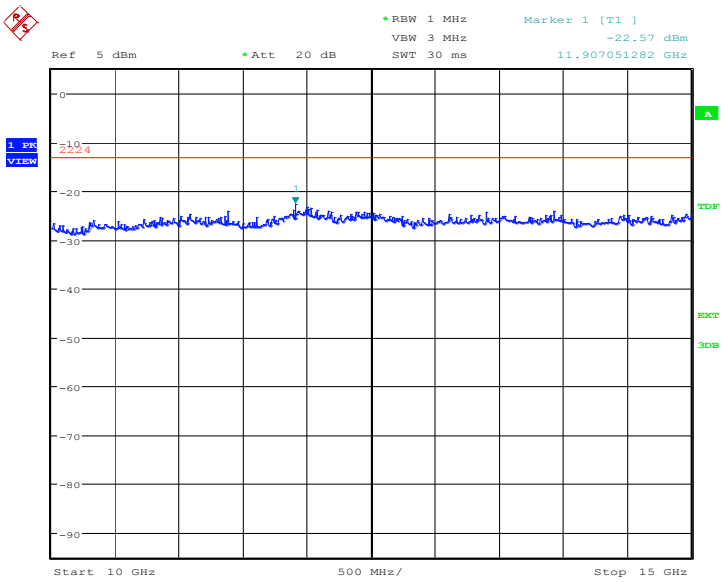
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:34:36

### A.8.3.17 Channel 9538: 10GHz –15GHz

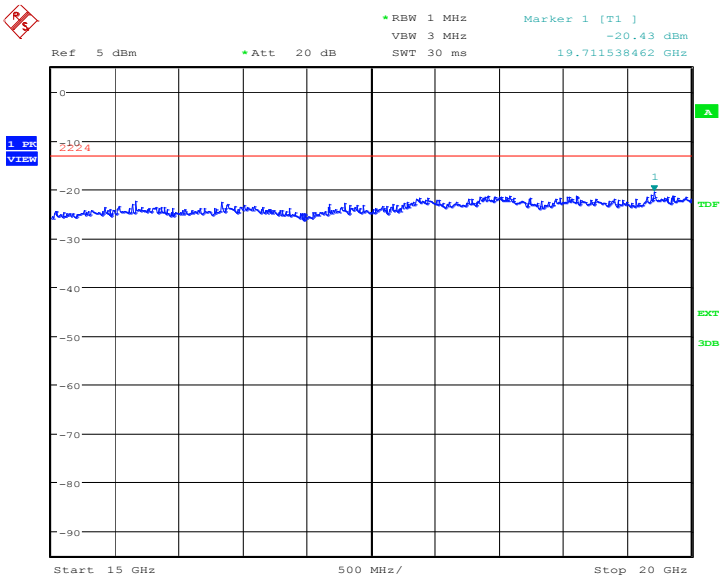
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:35:04

### A.8.3.18 Channel 9538: 15GHz –20GHz

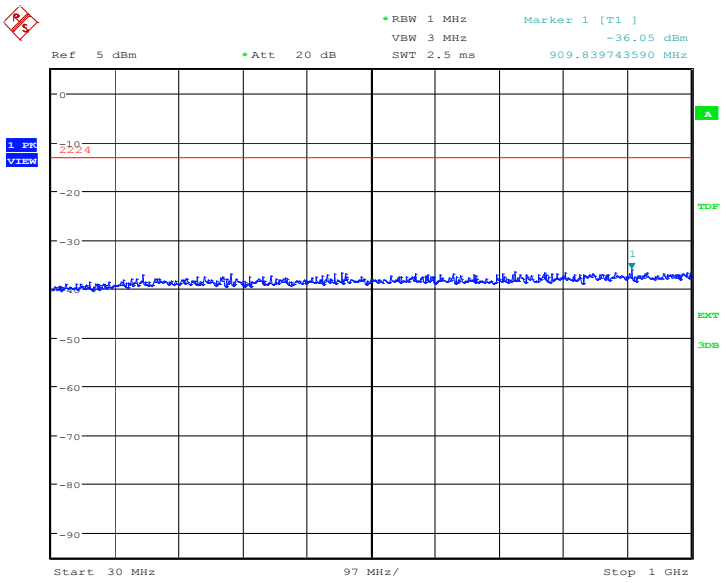
Spurious emission limit –13dBm.




Date: 11.MAR.2013 05:35:32

### A. 8.3.19 Idle mode: 30MHz –1GHz

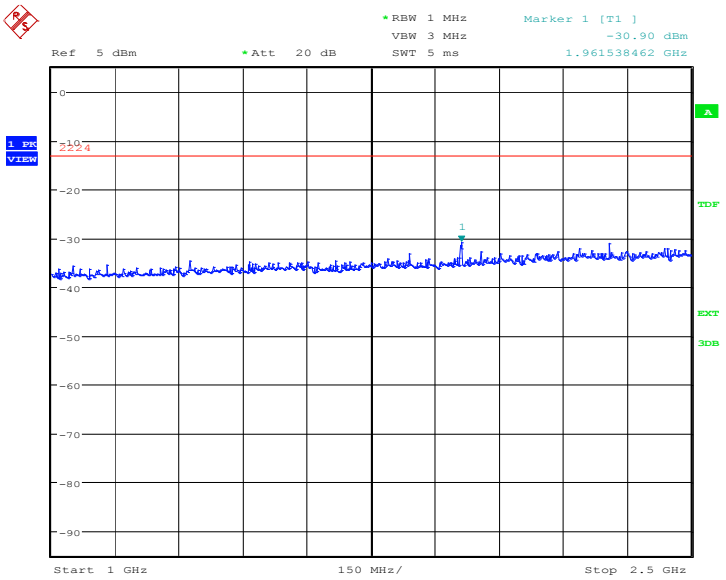
Spurious emission limit –13dBm.




Date: 11.MAR.2013 06:31:48

### A.8.3.20 Idle mode: 1GHz –2.5GHz

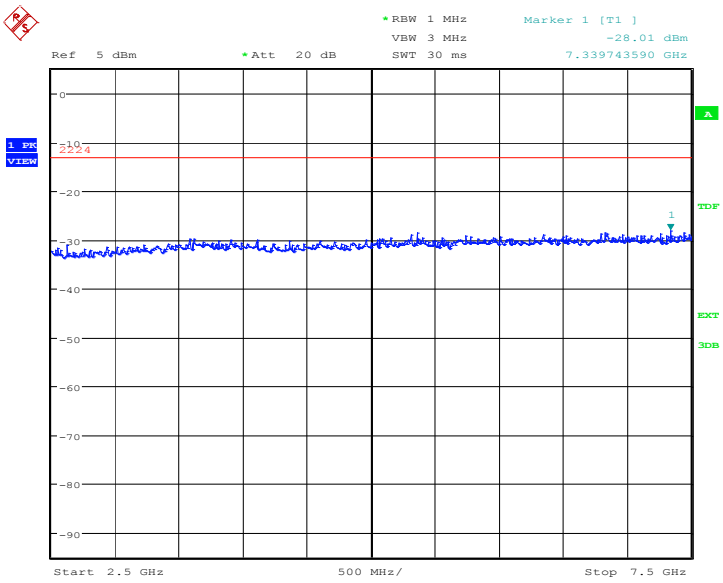
Spurious emission limit –13dBm.




Date: 11.MAR.2013 06:32:16

### A.8.3.21 Idle mode: 2.5GHz –7.5GHz

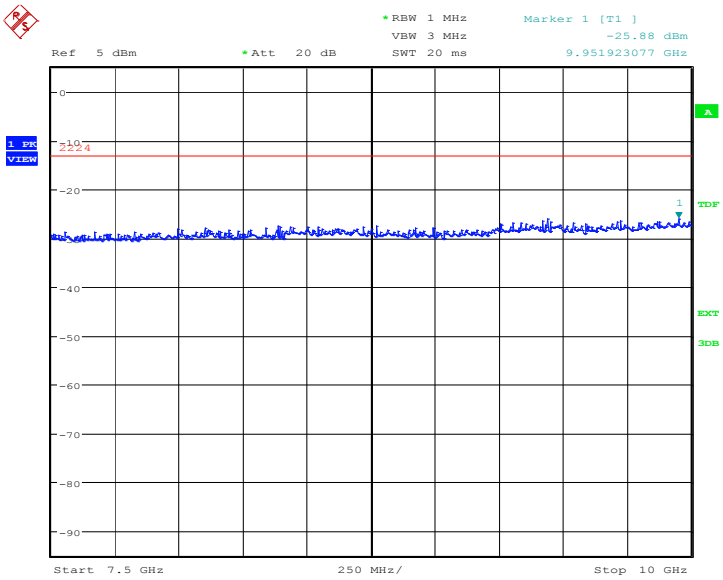
Spurious emission limit –13dBm.




Date: 11.MAR.2013 06:32:44

### A.8.3.22 Idle mode: 7.5GHz –10GHz

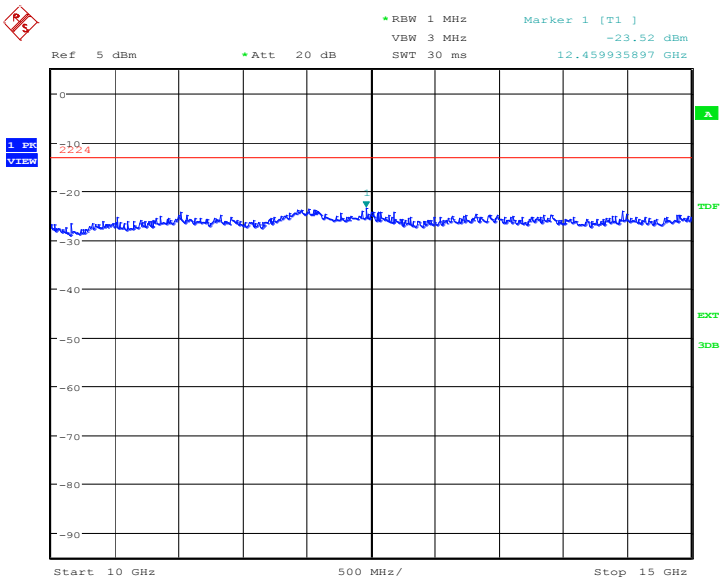
Spurious emission limit –13dBm.




Date: 11.MAR.2013 06:33:12

### A.8.3.23 Idle mode: 10GHz –15GHz

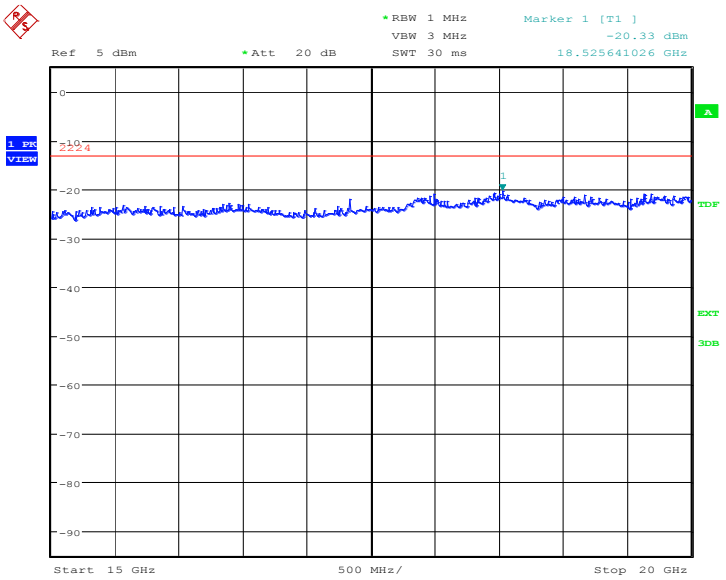
Spurious emission limit –13dBm.




Date: 11.MAR.2013 06:33:41

### A.8.3.24 Idle mode: 15GHz –20GHz

Spurious emission limit –13dBm.



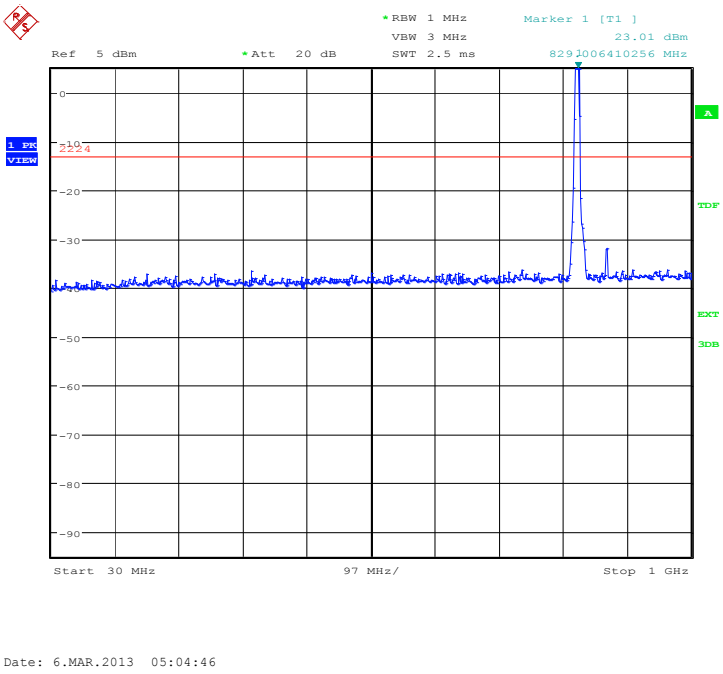

Date: 11.MAR.2013 06:34:09

**WCDMA Band Ⅴ**

**A. 8.3.25 Channel 4132: 30MHz –1GHz**

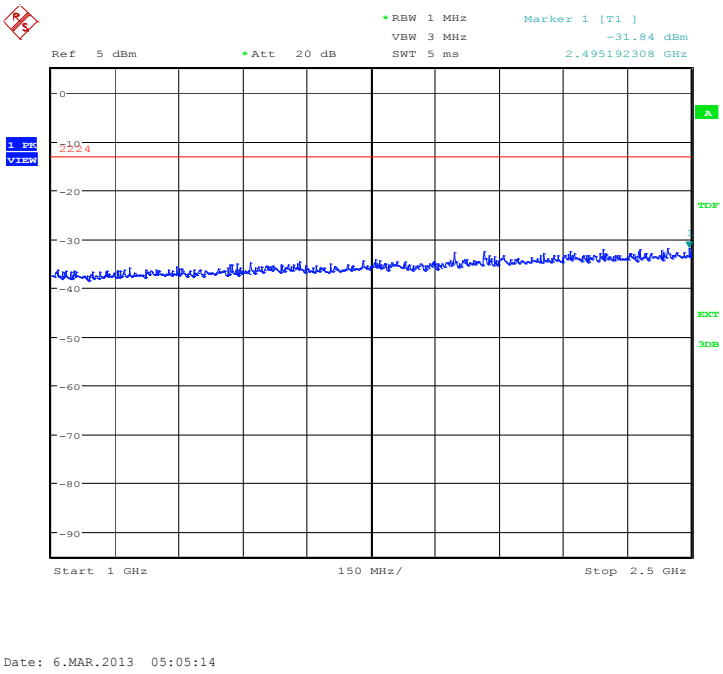
Spurious emission limit –13dBm.

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



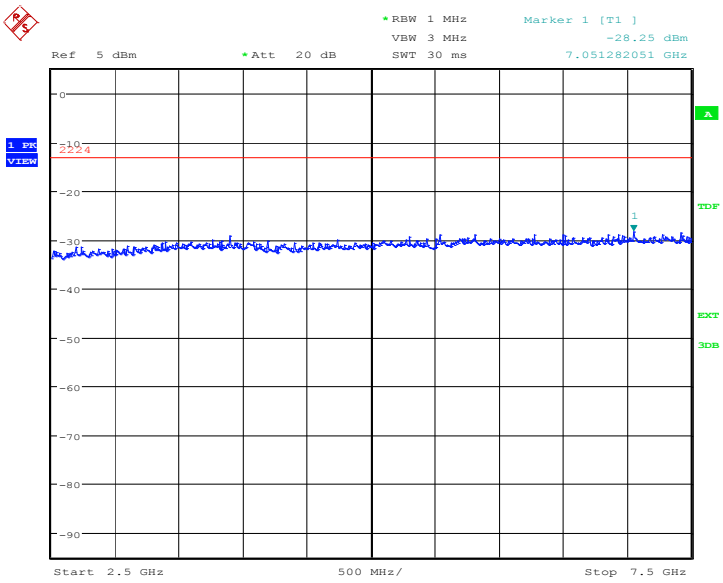

**A. 8.3.26 Channel 4132: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.



### A. 8.3.27 Channel 4132: 2.5GHz –7.5GHz

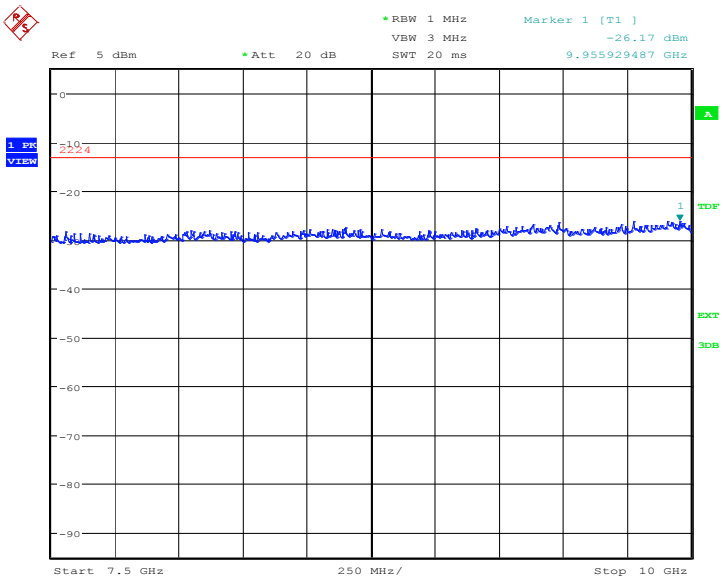
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:05:42

### A. 8.3.28 Channel 4132: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

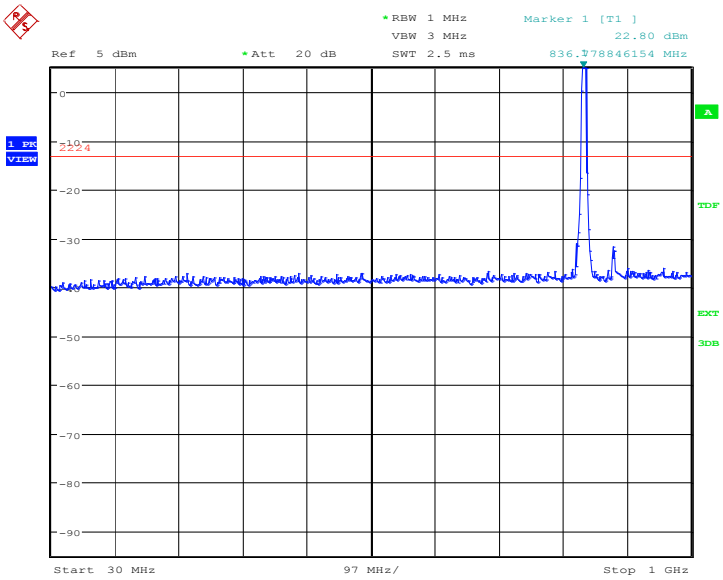



Date: 6.MAR.2013 05:06:11

### A. 8.3.29 Channel 4183: 30MHz –1GHz

Spurious emission limit –13dBm.

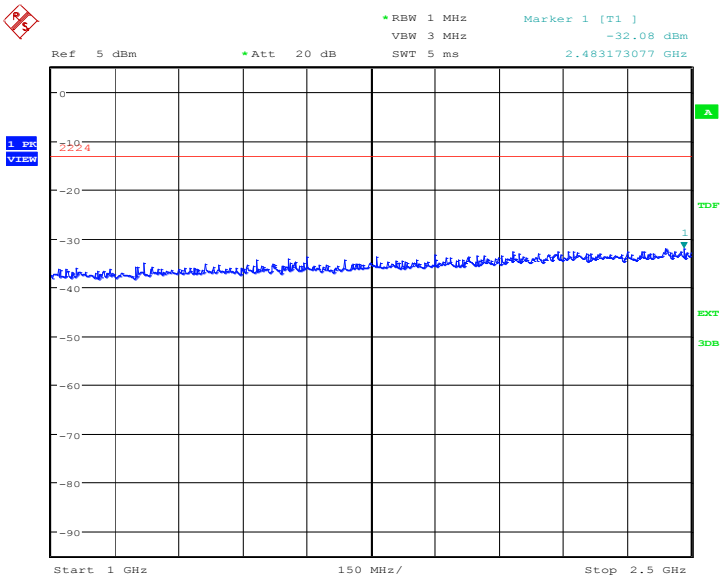
**NOTE: peak above the limit line is the carrier frequency.**




Date: 6.MAR.2013 05:06:42

### A.8.3.30 Channel 4183: 1GHz – 2.5GHz

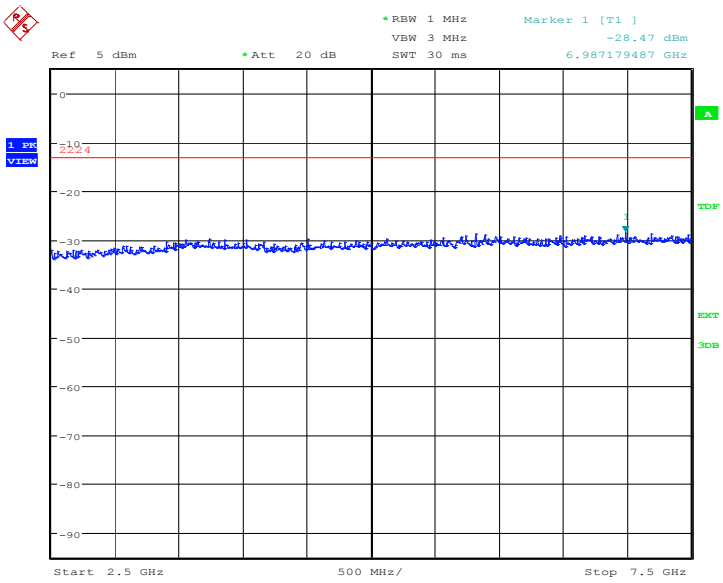
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:07:10

### A. 8.3.31 Channel 4183: 2.5GHz –7.5GHz

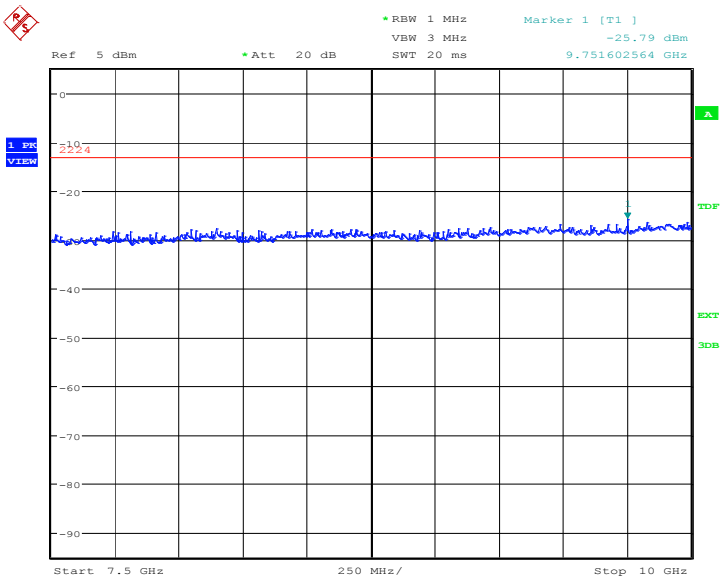
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:07:38

### A. 8.3.32 Channel 4183: 7.5GHz – 10GHz

Spurious emission limit –13dBm.

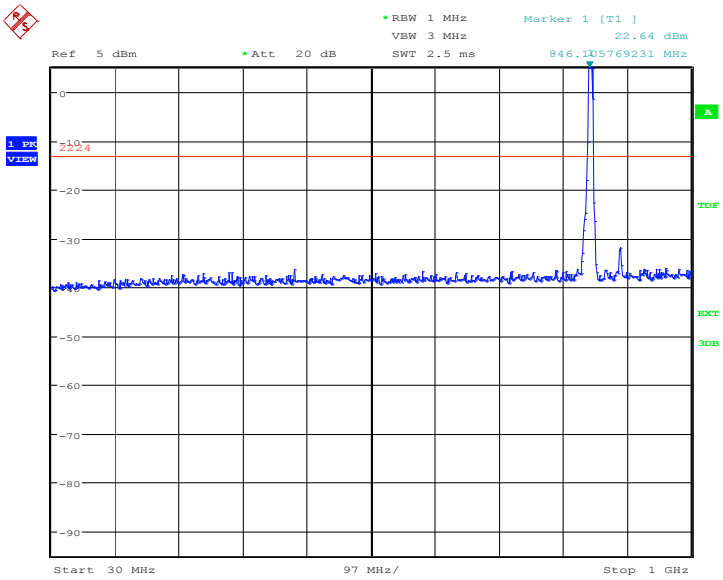



Date: 6.MAR.2013 05:08:06

### A. 8.3.33 Channel 4233: 30MHz –1GHz

Spurious emission limit –13dBm.

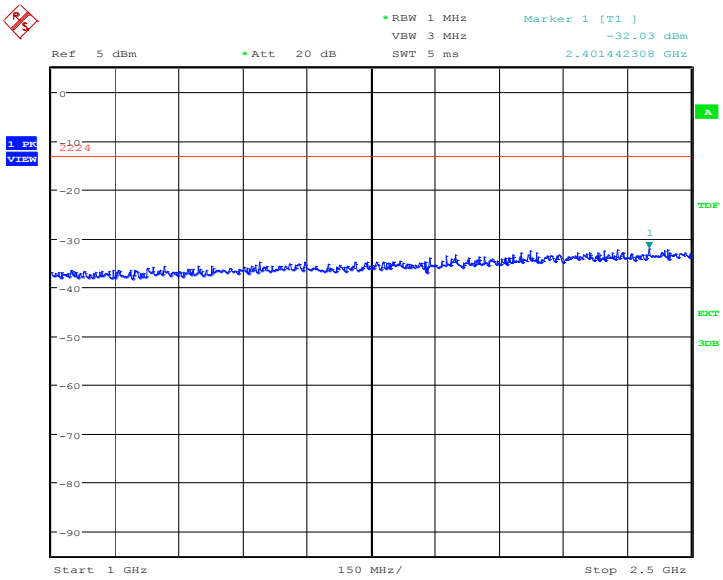
**NOTE: peak above the limit line is the carrier frequency.**




Date: 6.MAR.2013 05:08:37

### A. 8.3.34 Channel 4233: 1GHz – 2.5GHz

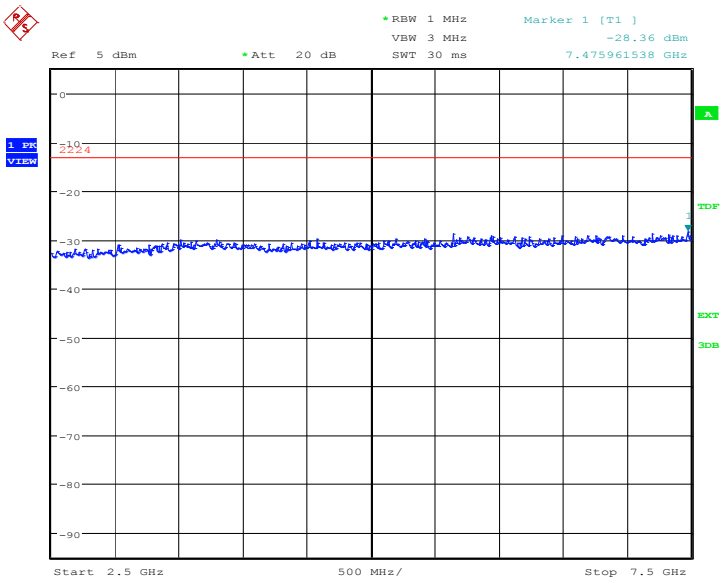
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:09:05

### A. 8.3.35 Channel 4233: 2.5GHz –7.5GHz

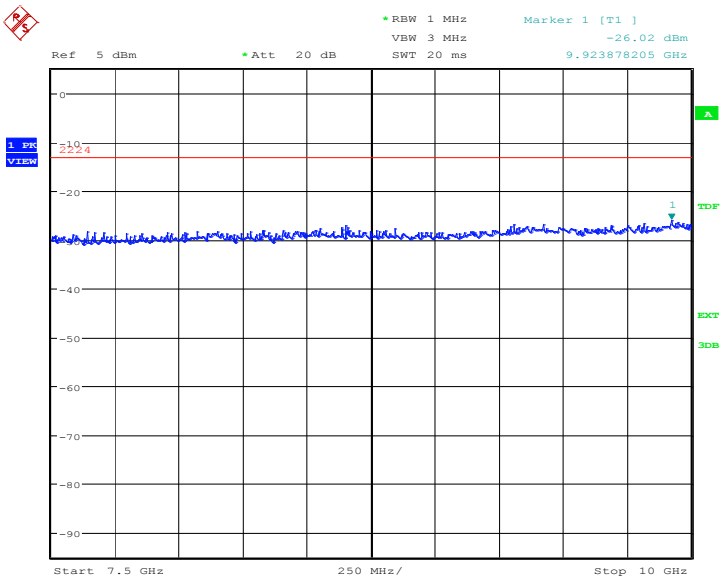
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:09:33

### A. 8.3.36 Channel 4233: 7.5GHz – 10GHz

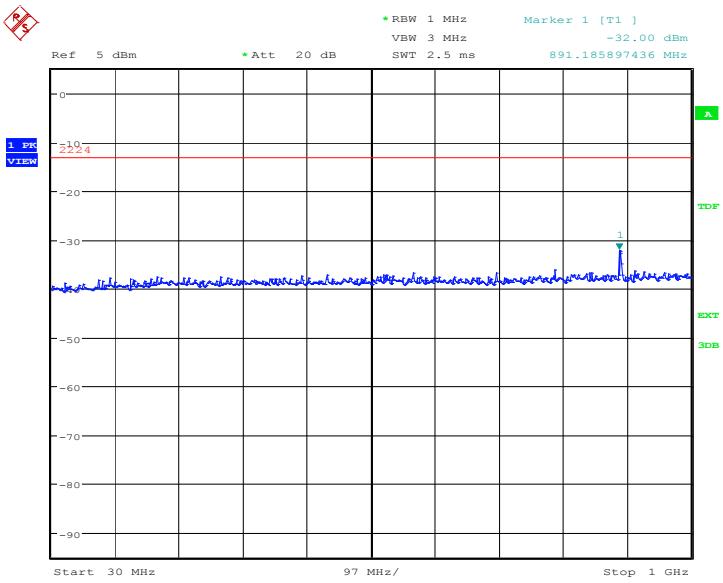
Spurious emission limit –13dBm.




Date: 6.MAR.2013 05:10:01

### A. 8.3.37 Idle mode: 30MHz – 1GHz

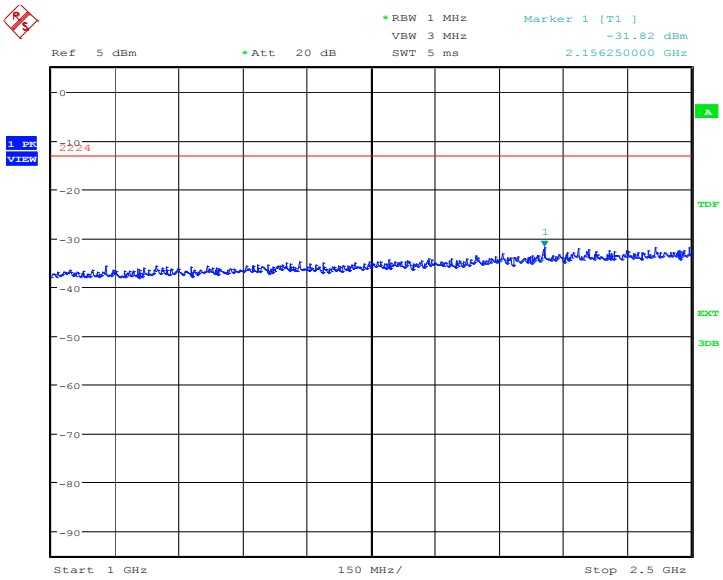
Spurious emission limit -13dBm.




Date: 6.MAR.2013 05:10:30

### A.8.3.38 Idle mode: 1GHz – 2.5GHz

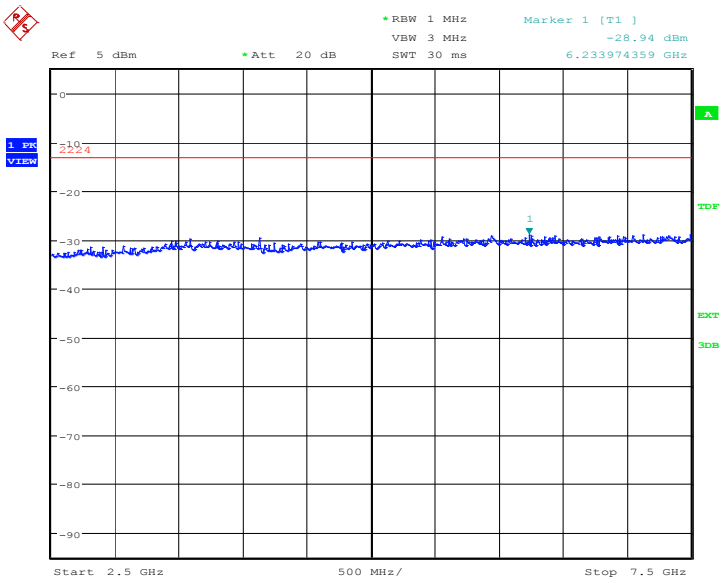
Spurious emission limit -13dBm.




Date: 6.MAR.2013 05:10:58

### A.8.3.39 Idle mode: 2.5GHz – 7.5GHz

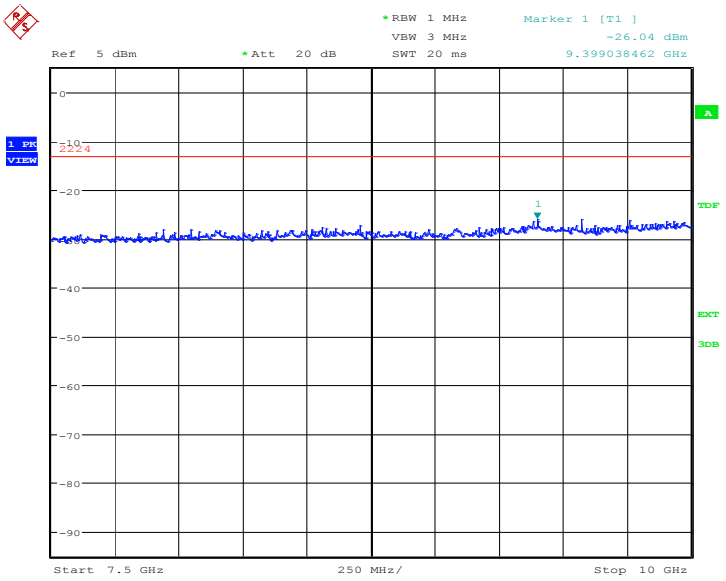
Spurious emission limit -13dBm.




Date: 6.MAR.2013 05:11:27

### A.8.3.40 Idle mode: 7.5GHz – 10GHz

Spurious emission limit -13dBm.




Date: 6.MAR.2013 05:11:55

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