



# TEST REPORT

No. 2013EEB00530-3G

for

**Shenzhen Sang Fei Consumer Communications Co., Ltd**

**WG-Raptor**

**Model Name: Philips W3500**

**Marketing Name: W3500**

**FCC ID: VQRCTW3500**

with

**Hardware Version: TMAO**

**Software Version: Philips\_T3500\_WCDMA\_4+8\_GPS\_V1.0\_20131031**

**Issued Date: 2013-12-06**

**Note:**

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Shenzhen.

**Test Laboratory:**

**FCC 2.948 Listed: No.310359**

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

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## **CONTENTS**

<b>1. TEST LABORATORY .....</b>	<b>3</b>
<b>1.1. TESTING LOCATION .....</b>	<b>3</b>
<b>1.2. TESTING ENVIRONMENT .....</b>	<b>3</b>
<b>1.3. PROJECT DATA .....</b>	<b>3</b>
<b>1.4. SIGNATURE .....</b>	<b>3</b>
<b>2. CLIENT INFORMATION.....</b>	<b>4</b>
<b>2.1. APPLICANT INFORMATION.....</b>	<b>4</b>
<b>2.2. MANUFACTURER INFORMATION.....</b>	<b>4</b>
<b>3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE) .....</b>	<b>5</b>
<b>3.1. ABOUT EUT .....</b>	<b>5</b>
<b>3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST .....</b>	<b>5</b>
<b>3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST .....</b>	<b>5</b>
<b>3.4. NORMAL ACCESSORY SETTING.....</b>	<b>6</b>
<b>3.5. GENERAL DESCRIPTION .....</b>	<b>6</b>
<b>4. REFERENCE DOCUMENTS .....</b>	<b>7</b>
<b>4.1. REFERENCE DOCUMENTS FOR TESTING.....</b>	<b>7</b>
<b>5. LABORATORY ENVIRONMENT.....</b>	<b>8</b>
<b>6. SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
<b>7. TEST EQUIPMENTS UTILIZED .....</b>	<b>10</b>
<b>ANNEX A: MEASUREMENT RESULTS.....</b>	<b>11</b>
<b>A.1 OUTPUT POWER.....</b>	<b>11</b>
<b>A.2 EMISSION LIMIT.....</b>	<b>16</b>
<b>A.3 CONDUCTED EMISSION .....</b>	<b>22</b>
<b>A.4 FREQUENCY STABILITY .....</b>	<b>27</b>
<b>A.5 OCCUPIED BANDWIDTH .....</b>	<b>29</b>
<b>A.6 EMISSION BANDWIDTH .....</b>	<b>33</b>
<b>A.7 BAND EDGE COMPLIANCE.....</b>	<b>37</b>
<b>A.8 CONDUCTED SPURIOUS EMISSION .....</b>	<b>39</b>
<b>A.9 PEAK-TO-AVERAGE POWER RATIO .....</b>	<b>60</b>

## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Shenzhen, Telecommunication Metrology Center of MIIT  
Address: No. 12 Building, Shangsha Innovation and Technology Park, Futian District  
Postal Code: 518048  
Telephone: +86(0)755-33322000  
Fax: +86(0)755-33322001

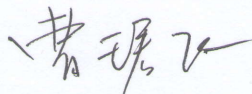
### 1.2. Testing Environment

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%

### 1.3. Project data

Testing Start Date: 2013-11-11  
Testing End Date: 2013-12-05

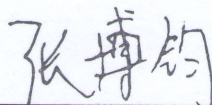
### 1.4. Signature



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Cao Junfei

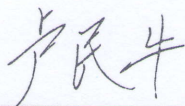
(Prepared this test report)



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Zhang Bojun

(Reviewed this test report)



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Lu Minniu

Deputy Director of the laboratory

(Approved this test report)

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Shenzhen Sang Fei Consumer Communications Co., Ltd  
Address /Post: 11 Science and Technology Road, Shenzhen  
Hi-tech Industrial Park, Nanshan District, Shenzhen, PRC  
City: Shenzhen  
Postal Code: 518057  
Country: China  
Telephone: 0755-86138466  
Fax: 0755-26503914

### **2.2. Manufacturer Information**

Company Name: Shenzhen Sang Fei Consumer Communications Co., Ltd  
Address /Post: 11 Science and Technology Road, Shenzhen  
Hi-tech Industrial Park, Nanshan District, Shenzhen, PRC  
City: Shenzhen  
Postal Code: 518057  
Country: China  
Telephone: 0755-86138466  
Fax: 0755-26503914

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

#### **3.1. About EUT**

Description	WG-Raptor
Model Name	Philips W3500
Marketing Name	W3500
FCC ID	VQRCTW3500
Frequency	GSM850; PCS1900; WCDMA Band II; WCDMA Band V
Release	R99
HSDPA category	R5
HSUPA category	R6
Antenna	Integrated
Output power	23.42dBm maximum EIRP measured for Band II
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.8VDC)
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**

<b>EUT ID*</b>	<b>SN or IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
N01	862813026600158	TMAO	Philips_T3500_WCDMA_4+8_GPS_V1.0_20131031

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

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

<b>AE ID*</b>	<b>Description</b>
AE1	Battery
AE2	Charger

##### AE1

Model	AB2200AWML
Manufacturer	SHENZHEN CYCLELONG POWER-TECH CO.LTD.
Capacitance	2200mAh
Nominal Voltage	3.7V

##### AE2-1

Model	A31-500650
Manufacturer	dongguan aohai power technology co.Ltd
Length of DC line	80cm

AE2-2

Model	3208SF
Manufacturer	Salcomp Co., Ltd. (Shenzhen)
Length of DC line	80cm

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

### **3.4. Normal Accessory setting**

Fully charged battery was used during the test

### **3.5. General Description**

The Equipment Under Test (EUT) is a model of WCDMA/GSM digital 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.

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-12 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-12 Edition
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

**Semi-anechoic chamber** (11.20 meters×6.10meters×5.60meters) 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	> 2MΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.5 dB, 3 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

**Control room** 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	> 2MΩ
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. =35 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber** (11.20 meters×6.10 meters×6.60 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	> 2MΩ
Ground system resistance	< 0.5 Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 6 GHz, 3 m distance



## **6. SUMMARY OF TEST RESULTS**

<b>Items</b>	<b>List</b>	<b>Clause in FCC rules</b>	<b>Verdict</b>
1	Output Power	22.913(a)/24.232(b)	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
9	PEAK-TO-AVERAGE POWER RATIO	KDB971168	P

## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CAL PERIOD
1	Test Receiver	ESCI	100701	R&S	2014-07-31	1 year
2	EMI Antenna	VULB 9163	9163-330	Schwarzbeck	2014-02-24	3 years
3	EMI Antenna	3164-05	00085724	ETS-Lindgren	2014-02-17	3 years
4	EMI Antenna	3160-09	00118383	ETS-Lindgren	2015-09-05	3 years
5	Signal Generator	N5183A	MY49060052	Agilent	2014-03-19	1 year
6	Climatic chamber	SH-641	92008082	ESPEC	2014-03-08	1 year
7	Spectrum Analyzer	FSP40	100378	R&S	2013-12-21	1 year
8	Universal Radio Communication Tester	CMU200	114544	R&S	2014-02-24	1 year
9	DC Power Source	ZUP60-14	6MY-847Z13-00 02	TDK-Lambda	2014-03-10	1 year
10	LISN	ESH2-Z5	100196	R&S	2014-01-23	1 year

## **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**

WCDMA (Band II)	CH	Frequency(MHz)	output power(dBm)
	9262	1852.4	22.81
	9400	1880.0	22.46
	9538	1907.6	22.26

#### **WCDMA Band V**

##### **Measurement result**

WCDMA (Band V)	CH	Frequency(MHz)	output power(dBm)
	4132	826.4	22.69
	4183	836.6	22.79
	4233	846.6	22.74

**HSUPA**

**WCDMA Band II**

**Measurement result**

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band II)	9262	1852.4	21.60
	9400	1880.0	21.38
	9538	1907.6	21.03

**WCDMA Band V**

**Measurement result**

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	22.17
	4183	836.6	22.14
	4233	846.6	22.17

**HSDPA**

**WCDMA Band II**

**Measurement result**

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band II)	9262	1852.4	21.27
	9400	1880.0	19.81
	9538	1907.6	19.96

**WCDMA Band V**

**Measurement result**

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	21.64
	4183	836.6	21.09
	4233	846.6	20.58

### A.1.3 Radiated

#### A.1.3.1 Description

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

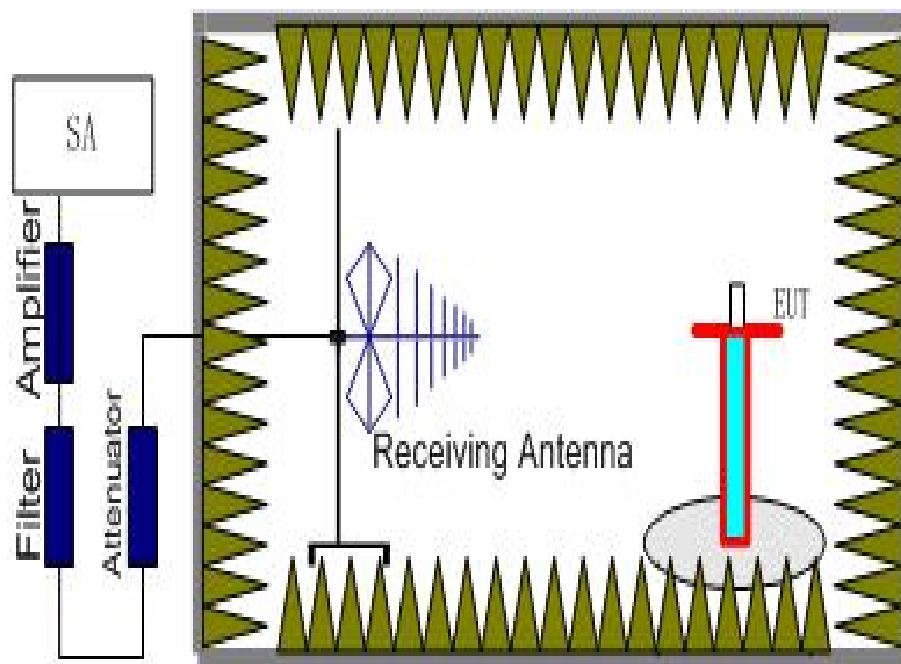
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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

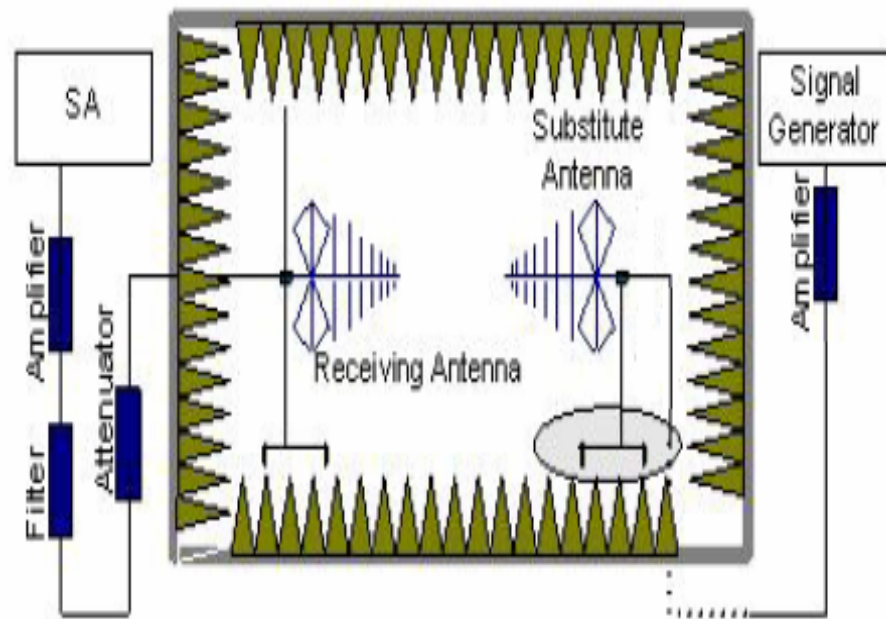
#### A.1.3.2 Method of Measurement

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 Substitute Antenna.  
The cable loss ( $P_{cl}$ ), the Substitute Antenna Gain ( $G_a$ ) and the Amplifier Gain ( $P_{Ag}$ ) should be recorded after test.

The measurement results are obtained as described below:

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

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,  $ERP = EIRP - 2.15\text{dBi}$ .

Note: the results contains vertical part and Horizontal part

**WCDMA Band II-EIRP**

**Limits**

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

**Measurement result**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	P <sub>Ag</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	EIRP(dBm)	Polarization
1852.4	-1.63	3.13	-35.70	7.81	23.13	H
1880	-1.86	3.15	-35.60	7.80	22.79	H
1907.6	-2.27	3.18	-35.50	7.77	22.28	H

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

**WCDMA Band V-ERP**

**Limits**

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

**Measurement result**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	P <sub>Ag</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	Correction (dB)	ERP(dBm)	Polarization
826.4	-1.01	2.07	-36.20	8.22	2.15	22.75	H
836.6	-0.13	2.08	-36.00	8.22	2.15	23.42	H
846.6	-0.13	2.09	-35.90	8.21	2.15	23.32	H

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

## A.2 EMISSION LIMIT

### **A.2.1 Measurement Method**

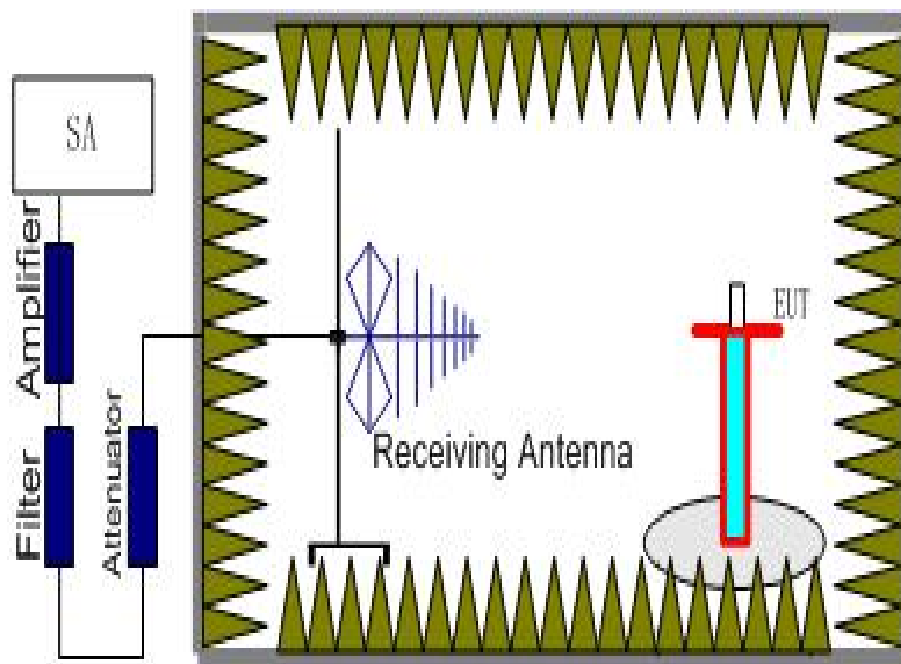
The measurements procedures in TIA-603C-2004 are used.

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.

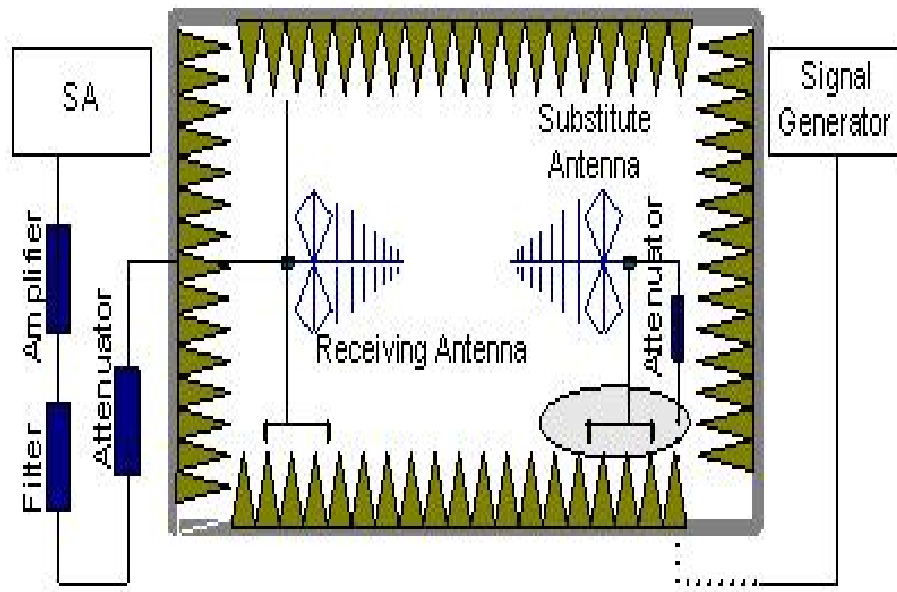
### **The procedure of radiated spurious emissions is as follows:**

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:

$$\text{Power(EIRP)} = P_{Mea} - P_{pl} - G_a$$

5. Use the power meter to measure the result of power in substitute antenna. Record the result of power meter ( $P_{pm}$ ).

The measurement results are obtained as described below:

$$\text{Power(EIRP)} = P_{pm} - G_a$$

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

### **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	

Note: the results contains vertical part and Horizontal part

**WCDMA BAND II Mode Channel 9262/1852.4MHz**

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
7078	-45.60	-11.1	-45.9	-13.00	H
9274.25	-45.60	-12.4	-45.4	-13.00	V
10564	-42.50	-12.4	-45.5	-13.00	V
13663.25	-40.00	-13.6	-41.7	-13.00	H
16148.25	-36.00	-13.6	-38	-13.00	H
19905.5	-34.10	-13.9	-33.6	-13.00	H

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

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
7034.25	-57.40	-11.1	-46.3	-13.00	H
9325	-57.30	-12.3	-45	-13.00	V
9902.5	-59.20	-13.6	-45.6	-13.00	V
13677.25	-54.30	-13.5	-40.8	-13.00	H
16249.75	-50.70	-13.1	-37.6	-13.00	H
19226.5	-46.80	-13.9	-32.9	-13.00	H

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

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
7008	-57.80	-11.1	-46.7	-13.00	V
9262	-57.90	-12.4	-45.5	-13.00	V
9876.25	-57.80	-12.3	-45.5	-13.00	V
13294	-55.30	-13.2	-42.1	-13.00	H
16183.25	-50.70	-13	-37.7	-13.00	H
18969.25	-47.90	-13.9	-34	-13.00	V

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

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
5274.375	-55.30	-9.8	2.15	-47.65	-13.00	V
6034.875	-53.70	-9.9	2.15	-45.95	-13.00	H
6912	-53.70	-11.1	2.15	-44.75	-13.00	V
7057.5	-52.00	-11.1	2.15	-43.05	-13.00	V
8344.875	-53.40	-11.8	2.15	-43.75	-13.00	V
9366.75	-51.70	-12.4	2.15	-41.45	-13.00	V

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

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
5209.5	-55.40	-9.8	2.15	-47.75	-13.00	H
6131.625	-54.70	-10.1	2.15	-46.75	-13.00	H
6813	-53.40	-11	2.15	-44.55	-13.00	V
7065	-52.50	-11.1	2.15	-43.55	-13.00	V
8742.375	-54.20	-12.3	2.15	-44.05	-13.00	H
9254.75	-52.50	-12.3	2.15	-42.35	-13.00	V

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

Frequency(MHz)	P <sub>pm</sub> (dBm)	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
5161.5	-55.40	-9.6	2.15	-47.95	-13.00	H
6125.625	-54.10	-9.9	2.15	-46.35	-13.00	V
6810	-53.60	-10.9	2.15	-44.85	-13.00	V
7595.625	-53.10	-11.4	2.15	-43.85	-13.00	H
8745.375	-54.10	-12.3	2.15	-43.95	-13.00	H
9982.875	-52.40	-12.3	2.15	-42.25	-13.00	V

### **A.3 CONDUCTED EMISSION**

The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger.

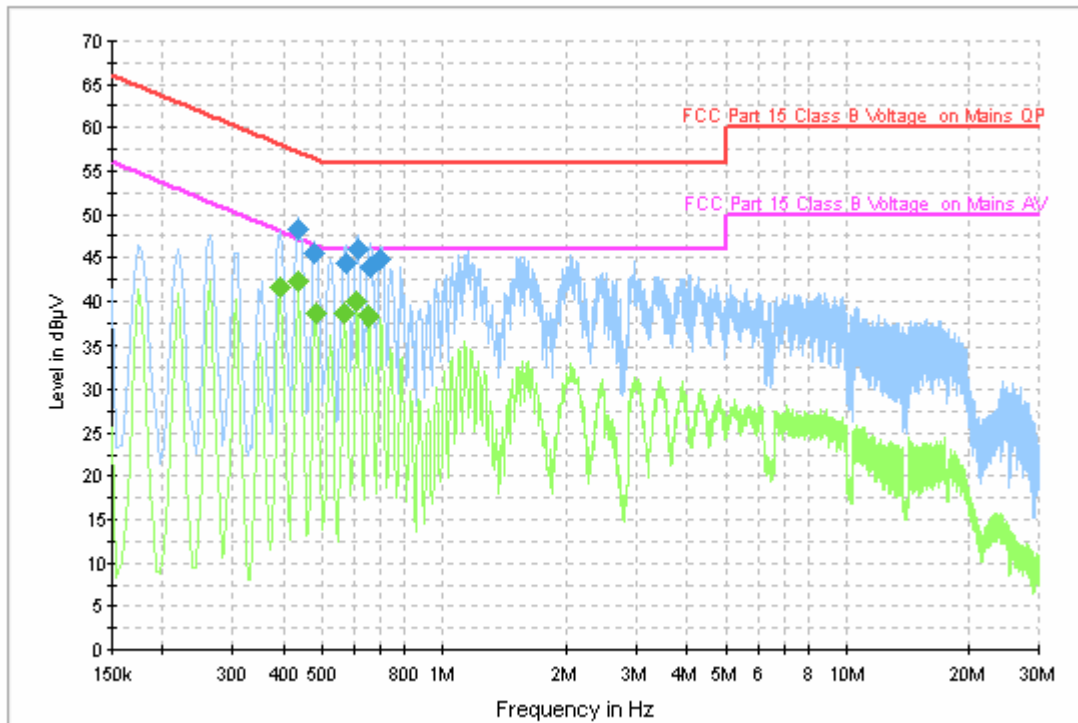
#### **A.3.1 Limit**

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**  
**AE2-1**  
**WCDMA Band II**

ESH2-Z5 Scan-FCC



**Final Measurement Detector 1**

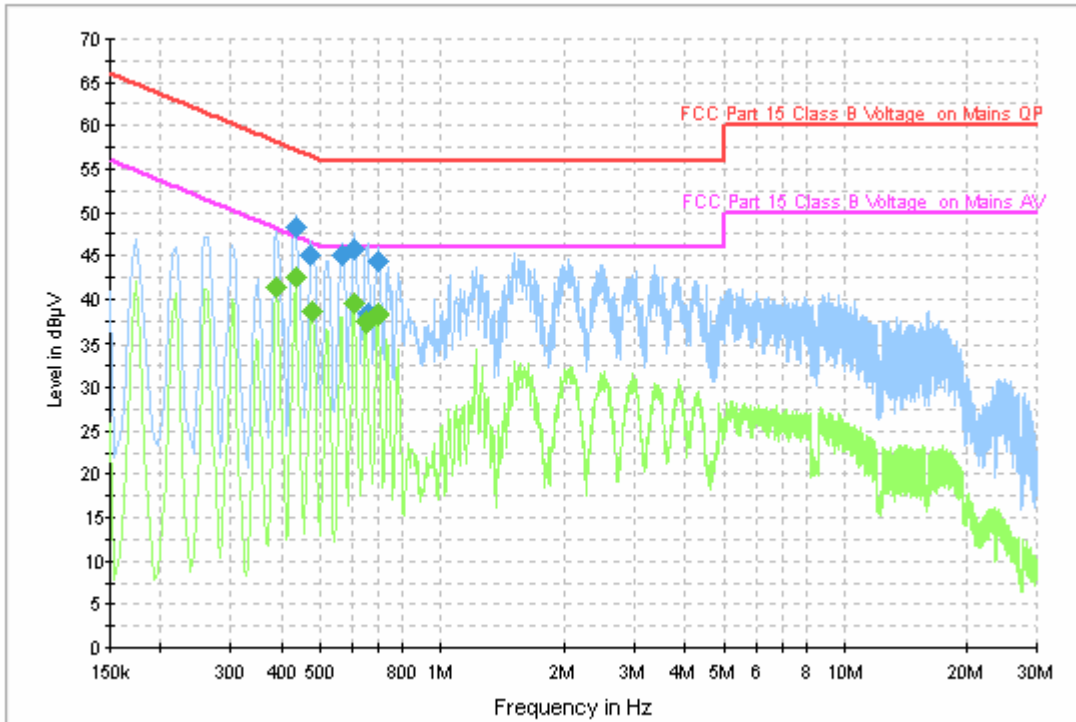
Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.438000	48.2	FLO	L1	10.0	8.9	57.1
0.478000	45.6	FLO	L1	10.0	10.8	56.4
0.574000	44.3	FLO	L1	10.1	11.7	56.0
0.614000	46.0	FLO	L1	10.0	10.0	56.0
0.662000	43.8	FLO	L1	10.0	12.2	56.0
0.698000	44.8	FLO	L1	10.0	11.2	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.394000	41.7	FLO	L1	10.0	6.3	48.0
0.438000	42.3	FLO	L1	10.0	4.8	47.1
0.482000	38.6	FLO	L1	10.0	7.7	46.3
0.566000	38.6	FLO	L1	10.1	7.4	46.0
0.610000	40.0	FLO	L1	10.0	6.0	46.0
0.654000	38.4	FLO	L1	10.0	7.6	46.0

**AE2-1**  
**WCDMA Band V**

ESH2-Z5 Scan-FCC



**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.434000	48.4	FLO	L1	10.0	8.8	57.2
0.474000	45.1	FLO	L1	10.0	11.3	56.4
0.566000	45.1	FLO	L1	10.1	10.9	56.0
0.610000	45.7	FLO	L1	10.0	10.3	56.0
0.662000	38.3	FLO	N	10.0	17.7	56.0
0.694000	44.4	FLO	L1	10.0	11.6	56.0

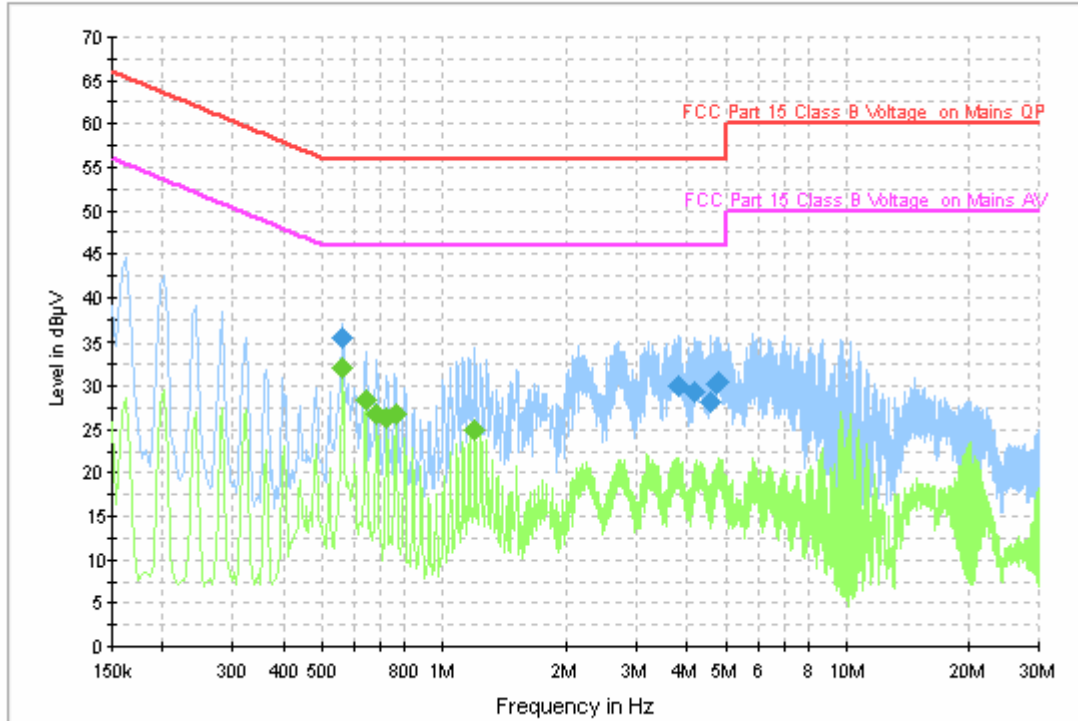
**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.390000	41.4	FLO	L1	10.0	6.6	48.1
0.434000	42.4	FLO	L1	10.0	4.7	47.2
0.478000	38.5	FLO	L1	10.0	7.8	46.4
0.606000	39.4	FLO	L1	10.0	6.6	46.0
0.650000	37.4	FLO	L1	10.0	8.6	46.0
0.694000	38.3	FLO	L1	10.0	7.7	46.0



**AE2-2**  
**WCDMA Band II**

ESH2-Z5 Scan-FCC



**Final Measurement Detector 1**

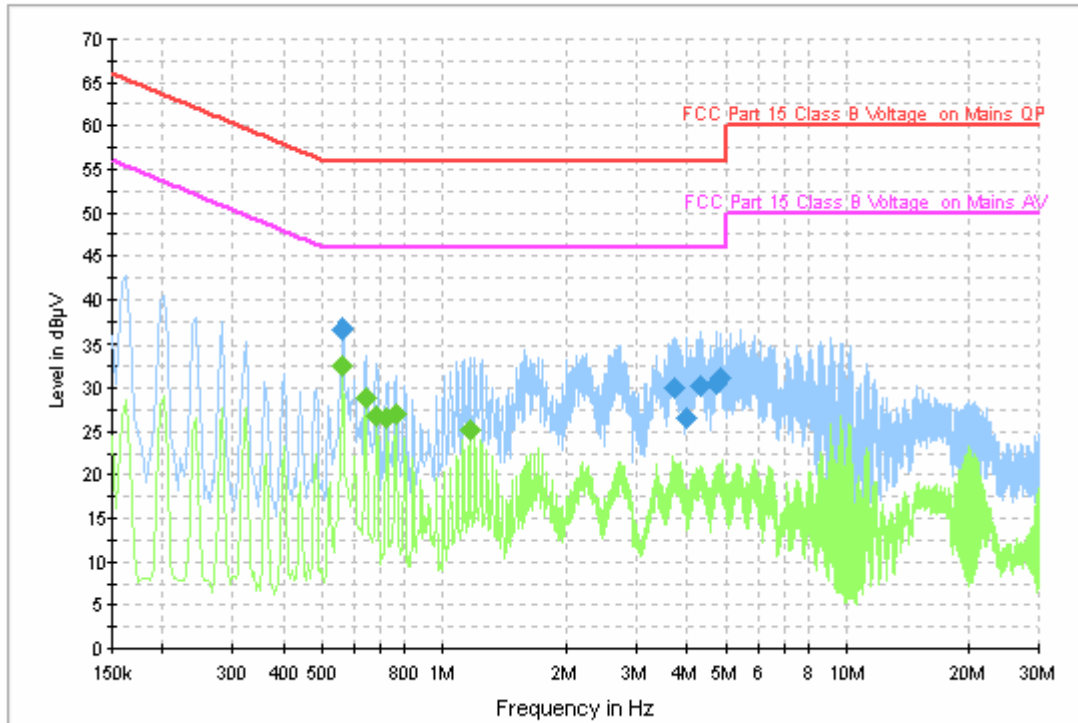
Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.562000	35.6	FLO	L1	10.1	20.4	56.0
3.794000	29.9	FLO	L1	10.2	26.1	56.0
4.150000	29.3	FLO	L1	10.2	26.7	56.0
4.590000	28.1	FLO	L1	10.2	27.9	56.0
4.710000	30.2	FLO	L1	10.2	25.8	56.0
4.806000	30.5	FLO	L1	10.2	25.5	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.562000	32.1	FLO	L1	10.1	13.9	46.0
0.642000	28.5	FLO	L1	10.0	17.5	46.0
0.682000	26.8	FLO	L1	10.0	19.2	46.0
0.722000	26.2	FLO	L1	10.0	19.8	46.0
0.762000	26.8	FLO	L1	10.1	19.2	46.0
1.202000	25.1	FLO	L1	10.1	20.9	46.0

**WCDMA Band V**

ESH2-Z5 Scan-FCC



**Final Measurement Detector 1**

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.562000	36.8	FLO	L1	10.1	19.2	56.0
3.726000	30.0	FLO	L1	10.2	26.0	56.0
3.994000	26.5	FLO	L1	10.2	29.5	56.0
4.330000	30.4	FLO	L1	10.2	25.6	56.0
4.730000	30.6	FLO	L1	10.2	25.4	56.0
4.850000	31.2	FLO	L1	10.2	24.8	56.0

**Final Measurement Detector 2**

Frequency (MHz)	Average (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.562000	32.5	FLO	L1	10.1	13.5	46.0
0.642000	28.9	FLO	L1	10.0	17.1	46.0
0.682000	26.8	FLO	L1	10.0	19.2	46.0
0.722000	26.5	FLO	L1	10.0	19.5	46.0
0.762000	27.1	FLO	L1	10.1	18.9	46.0
1.162000	25.2	FLO	L1	10.1	20.8	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°C.
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°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.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 3.5VDC and 4.2VDC, with a nominal voltage of 3.9VDC. 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)
3.5	-7	0.008
3.8	-8	0.010
4.2	-12	0.014

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-14	0.017
-20	-11	0.013
-10	-9	0.011
0	-13	0.016
10	-11	0.013
20	-8	0.010
30	-9	0.011
40	-10	0.012
50	-11	0.013

##### WCDMA Band V

##### Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-12	0.006
3.8	-5	0.003
4.2	-9	0.005

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-7	0.004
-20	-11	0.006
-10	-16	0.009
0	-12	0.006
10	-13	0.007
20	-8	0.004
30	-11	0.006
40	-16	0.009
50	-9	0.005

## A.5 OCCUPIED BANDWIDTH

### A.5.1 Occupied Bandwidth Results

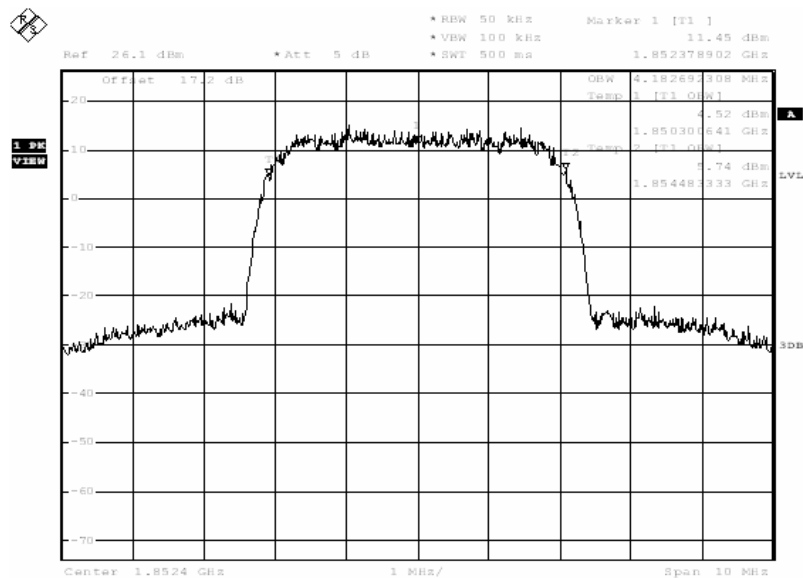
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band II and WCDMA Band V. The table below lists the measured -20dBc BW. Spectrum analyzer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

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

Frequency(MHz)	Occupied Bandwidth ( MHz)
1852.4	4.18
1880.0	4.18
1907.6	4.17

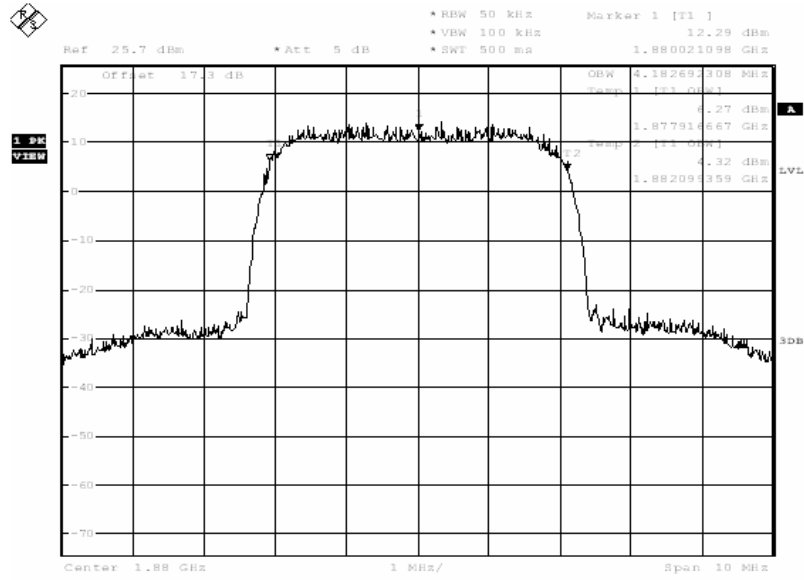
#### WCDMA Band II

##### Channel 9262-Occupied Bandwidth



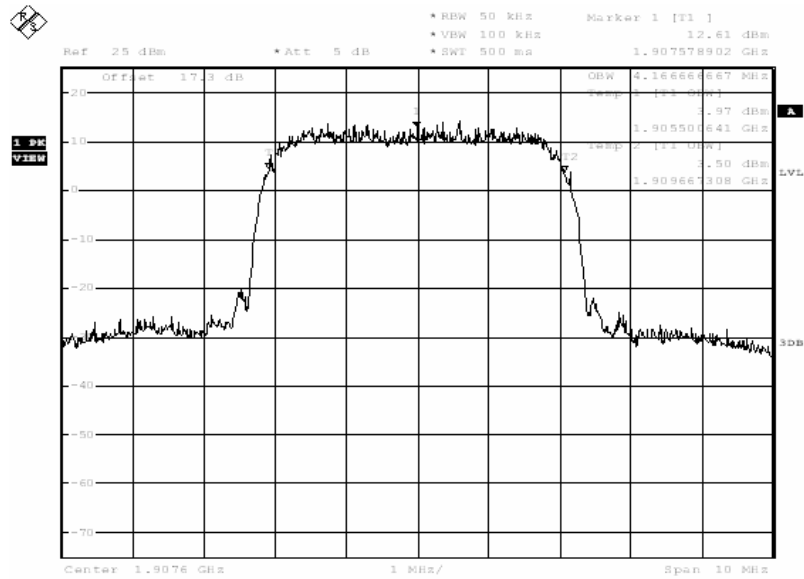
Date: 11.NOV.2013 11:27:06

### Channel 9400-Occupied Bandwidth



Date: 11.NOV.2013 11:27:33

### Channel 9538-Occupied Bandwidth



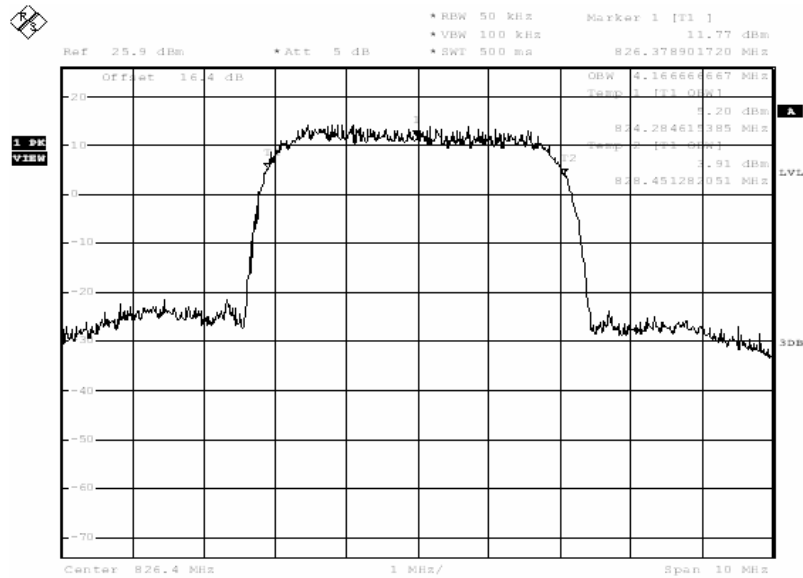
Date: 14.OCT.2013 09:45:16

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

Frequency(MHz)	Occupied Bandwidth ( MHz)
826.4	4.17
836.6	4.15
846.6	4.18

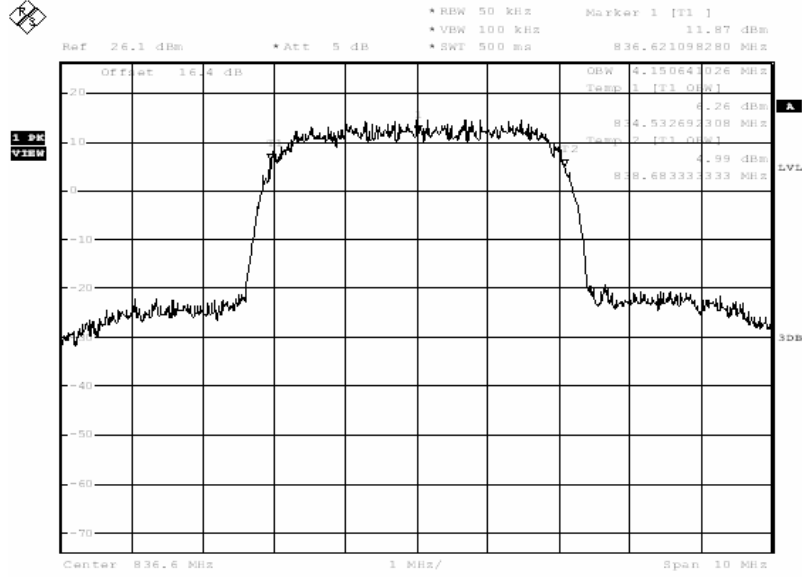
**WCDMA Band V**

**Channel 4132-Occupied Bandwidth**



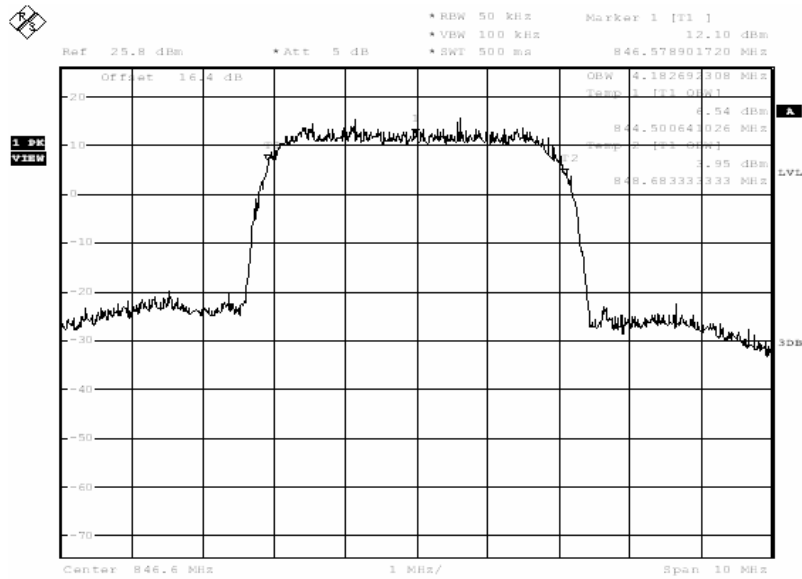
Date: 11.NOV.2013 12:21:14

### Channel 4183-Occupied Bandwidth



Date: 11.NOV.2013 12:21:41

### Channel 4233-Occupied Bandwidth



Date: 11.NOV.2013 12:22:08



## A.6 EMISSION BANDWIDTH

### A.6.1 Emission Bandwidth Results

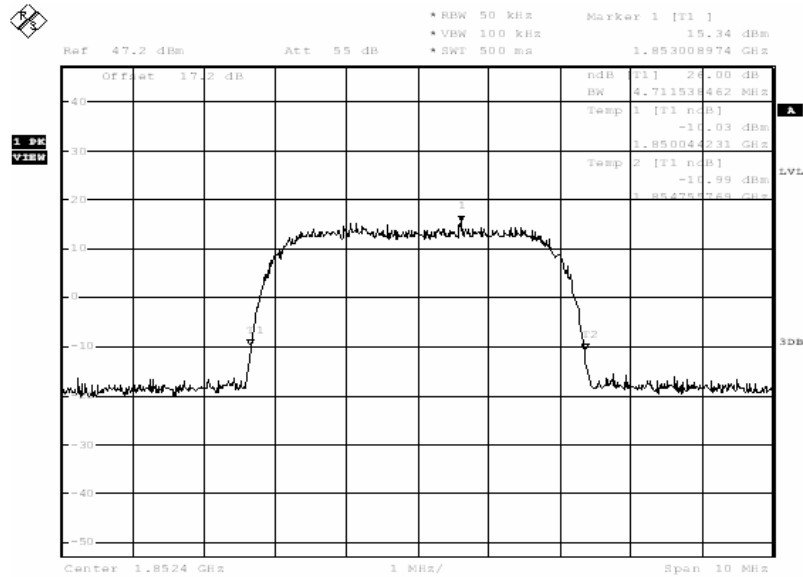
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band II and WCDMA Band V. Table below lists the measured -26dBc BW. Spectrum analyzer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

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

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( MHz)
1852.4	4.71
1880.0	4.66
1907.6	4.68

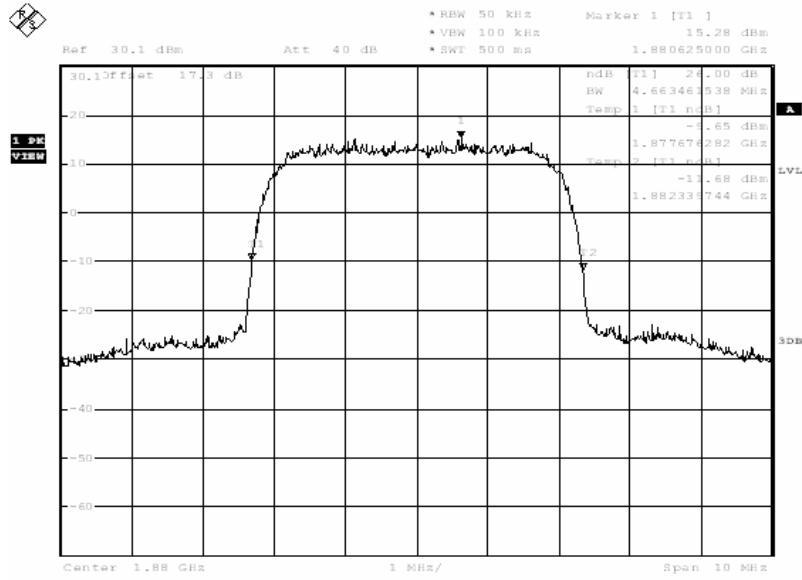
#### WCDMA Band II

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



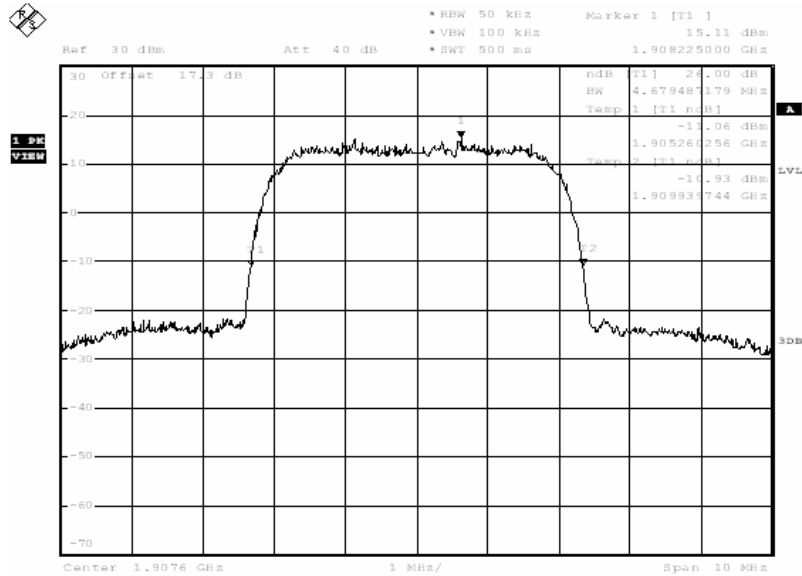
Date: 11.NOV.2013 11:28:57

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



Date: 11.NOV.2013 11:29:21

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



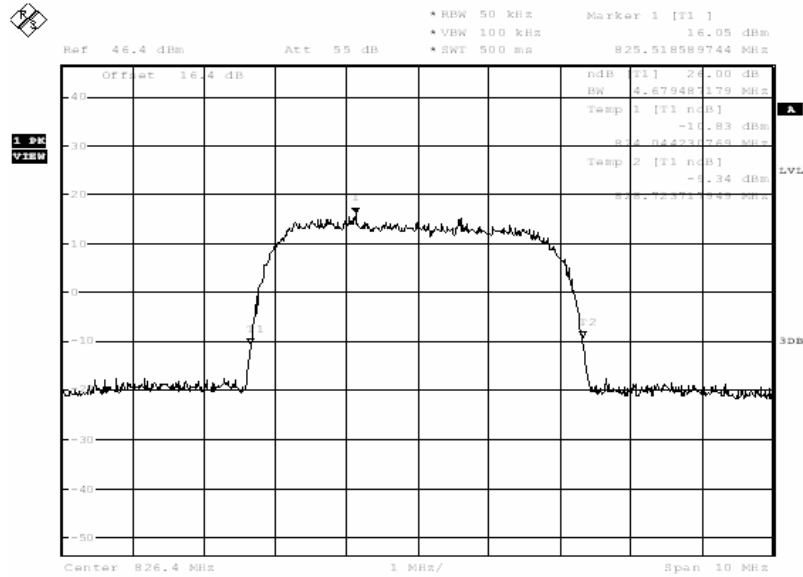
Date: 11.NOV.2013 11:30:05

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

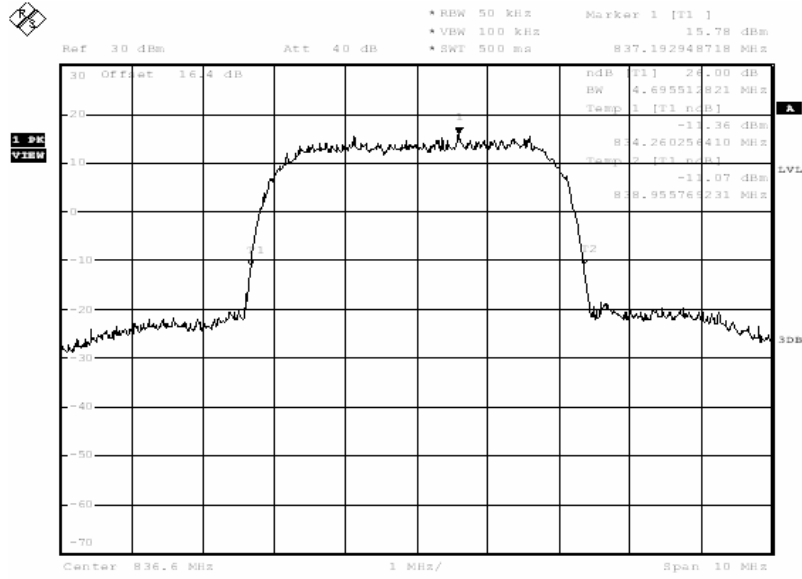
Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( MHz)
826.40	4.68
836.60	4.70
846.60	4.71

**WCDMA Band V**

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

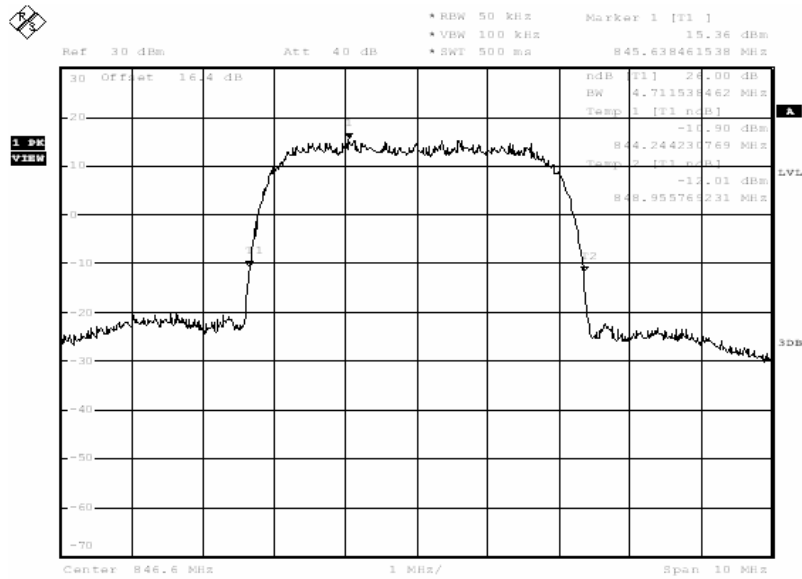


### Channel 4183-Occupied Bandwidth (-26dBc BW)



Date: 11.NOV.2013 12:23:38

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

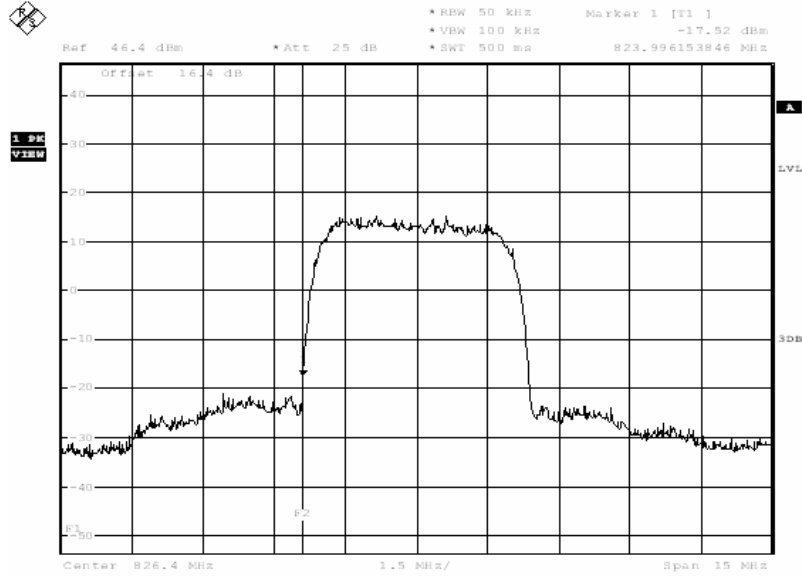


Date: 11.NOV.2013 12:24:12



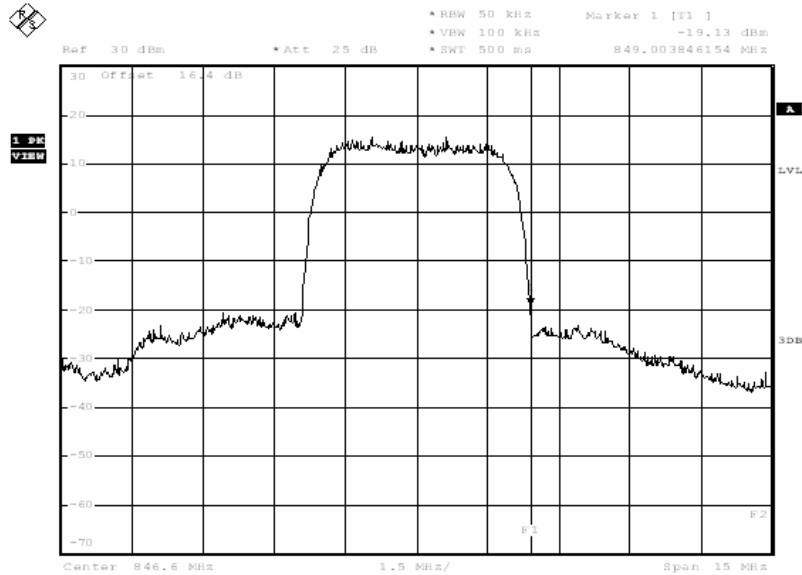
WCDMA Band V

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



Date: 11.NOV.2013 12:24:59

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



Date: 11.NOV.2013 12:25:23

## **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.

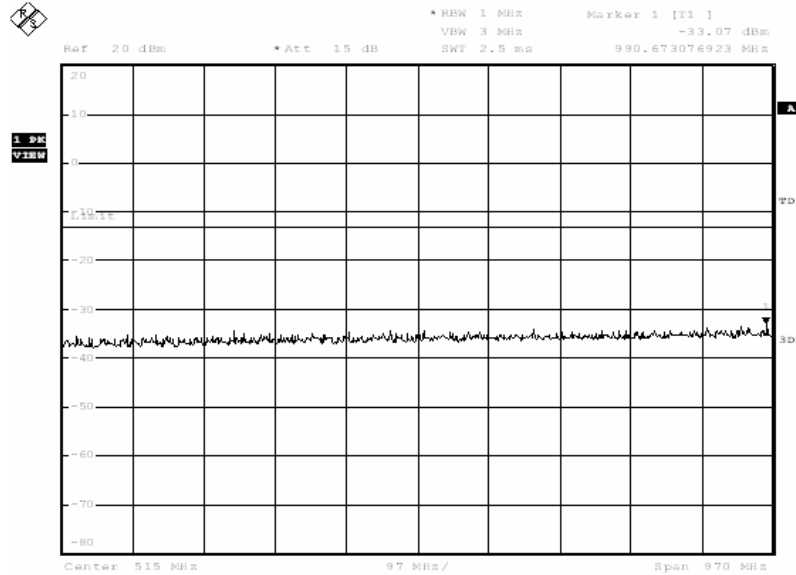
The specification that emissions shall be attenuated below the transmitter power (P) by at least  $43 + 10 \log (P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -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.

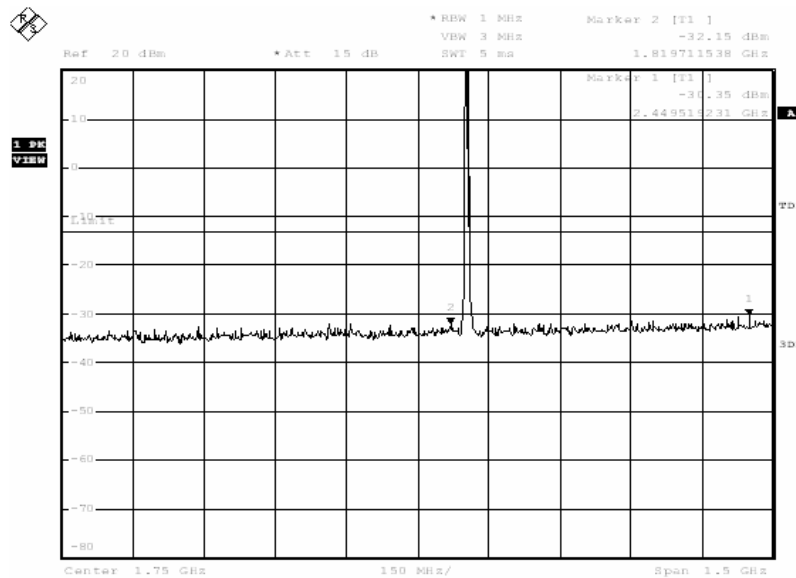


Date: 14.OCT.2013 03:49:31

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

Spurious emission limit –13dBm.

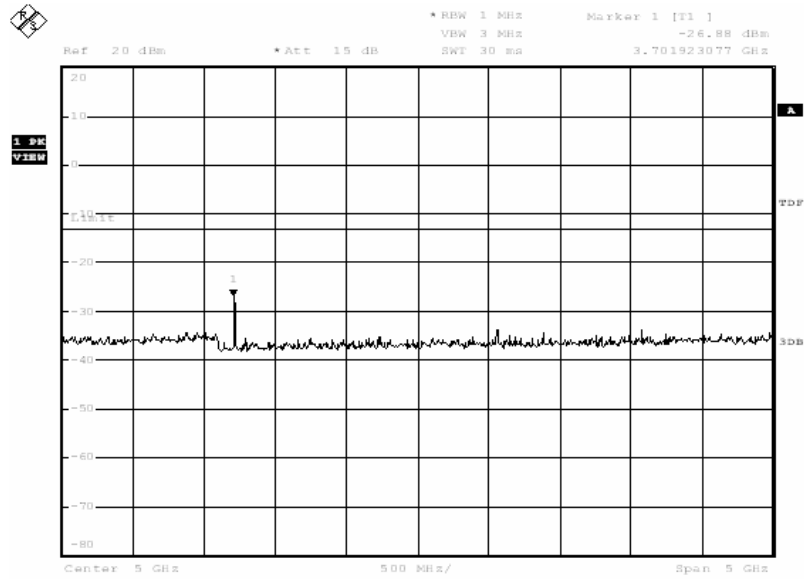
**NOTE: peak above the limit line is the carrier frequency.**



Date: 14.OCT.2013 03:50:03

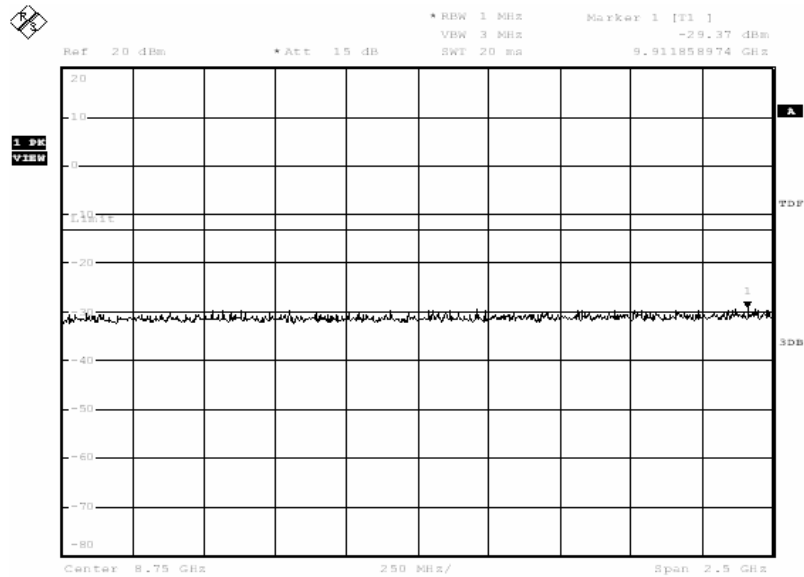


**A.8.3.3 Channel 9262: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



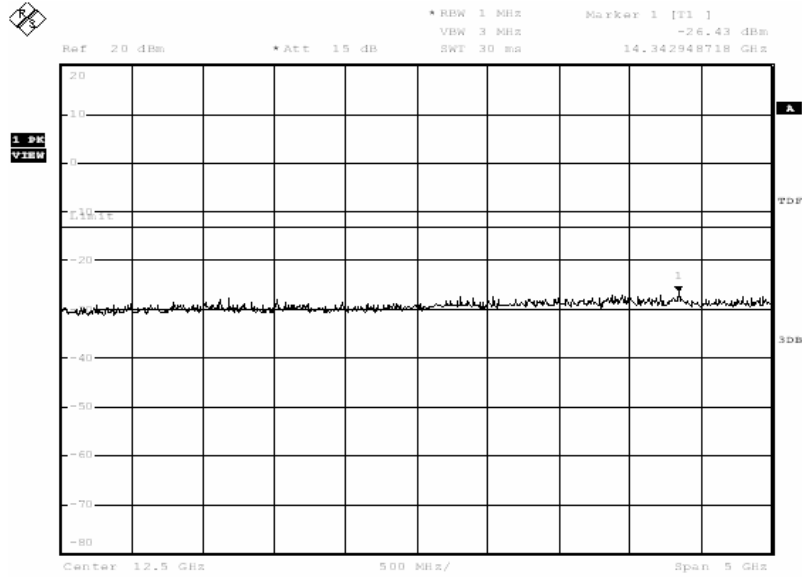
Date: 11. NOV. 2013 11:33:13

**A.8.3.4 Channel 9262: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



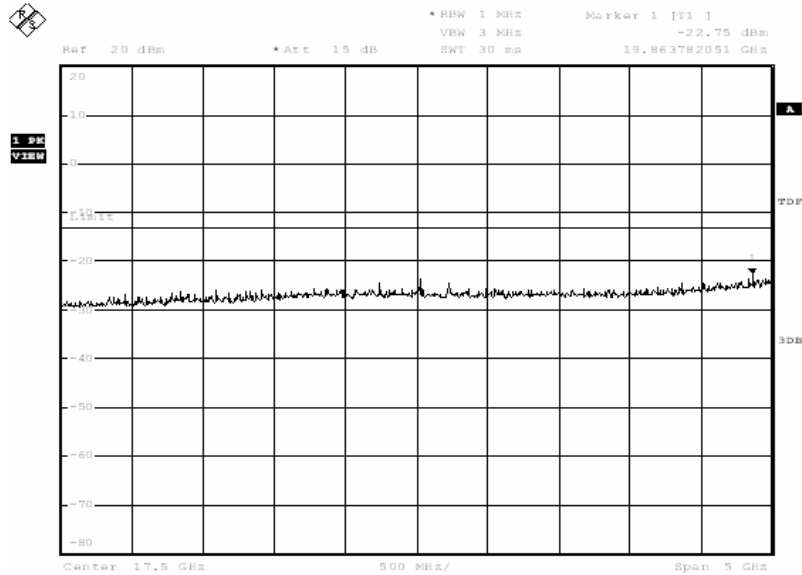
Date: 14. OCT. 2013 03:50:59

**A.8.3.5 Channel 9262: 10GHz –15GHz**  
Spurious emission limit –13dBm.



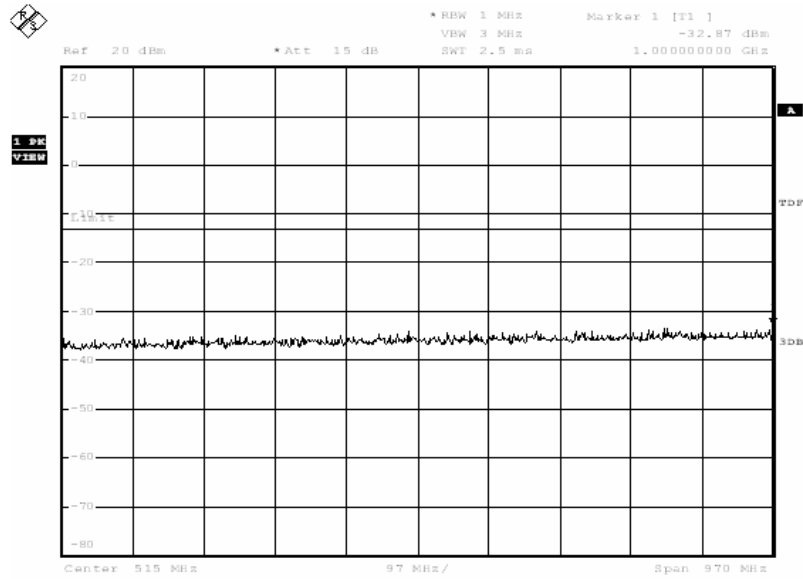
Date: 14.OCT.2013 03:51:26

**A.8.3.6 Channel 9262: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:51:54

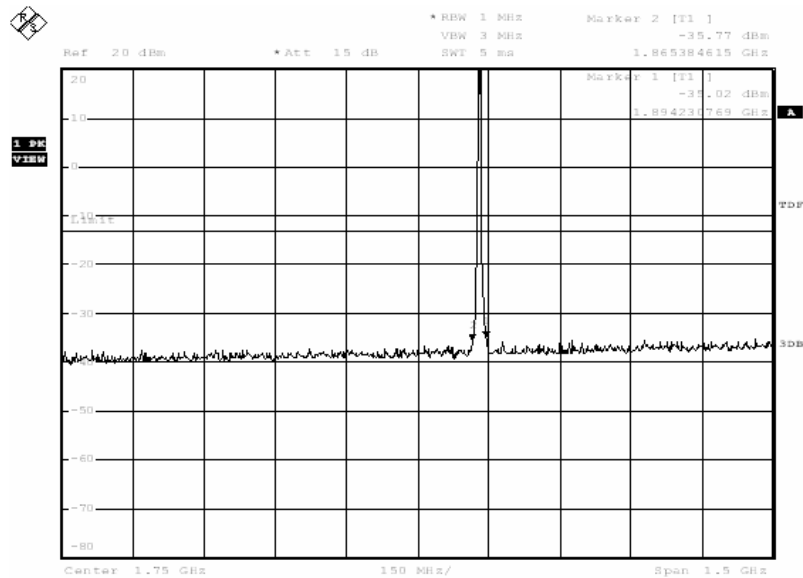
**A. 8.3.7 Channel 9400: 30MHz –1GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:52:33

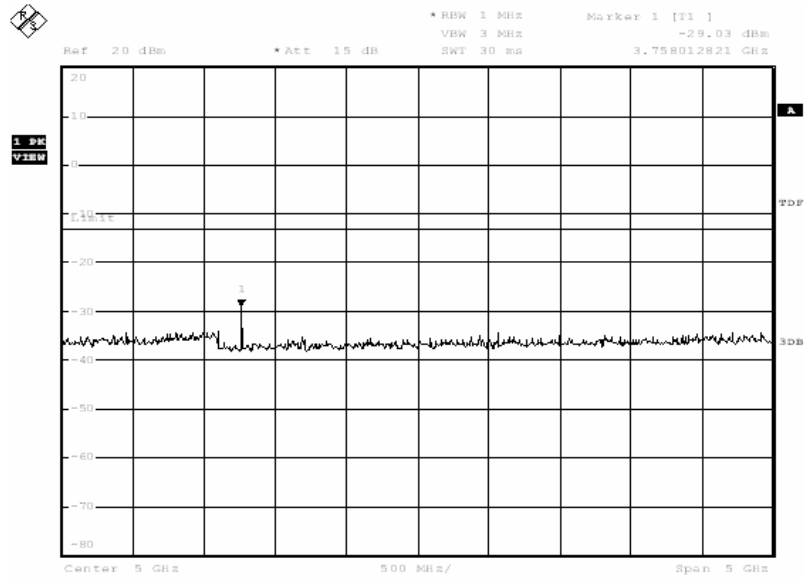
**A.8.3.8 Channel 9400: 1GHz –2.5GHz**  
Spurious emission limit –13dBm.

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



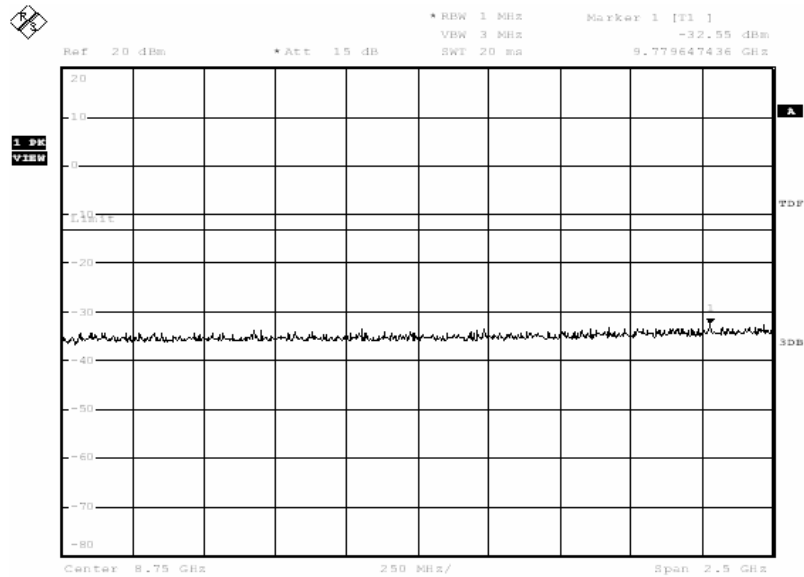
Date: 11.NOV.2013 11:35:47

**A.8.3.9 Channel 9400: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



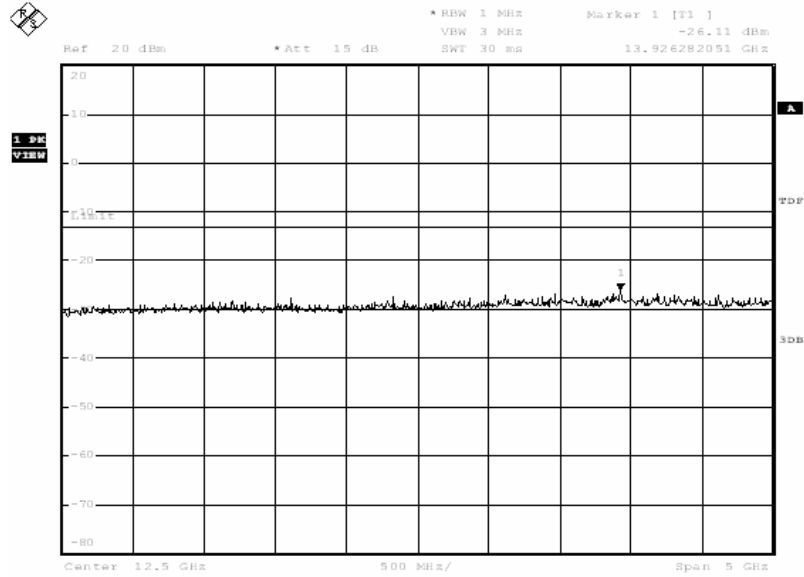
Date: 11.NOV.2013 11:36:15

**A.8.3.10 Channel 9400: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



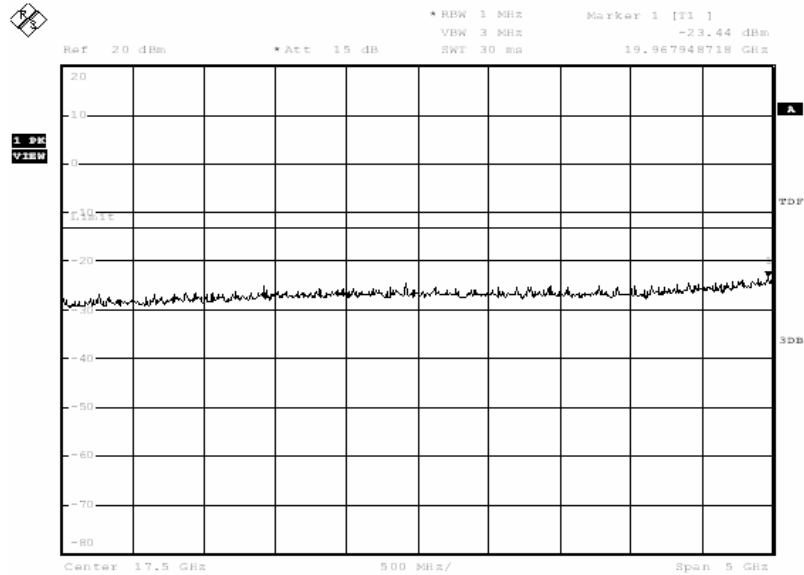
Date: 11.NOV.2013 11:36:43

**A.8.3.11 Channel 9400: 10GHz –15GHz**  
Spurious emission limit –13dBm.



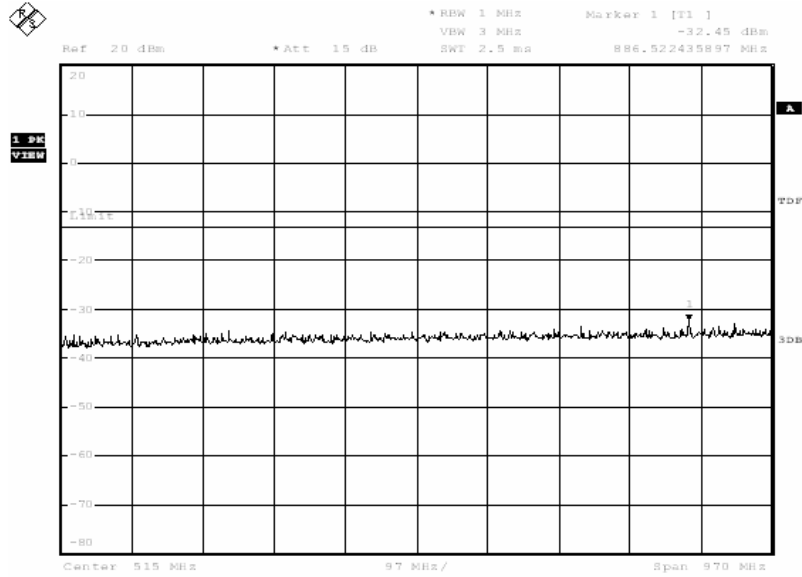
Date: 14.OCT.2013 03:54:28

**A.8.3.12 Channel 9400: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:54:56

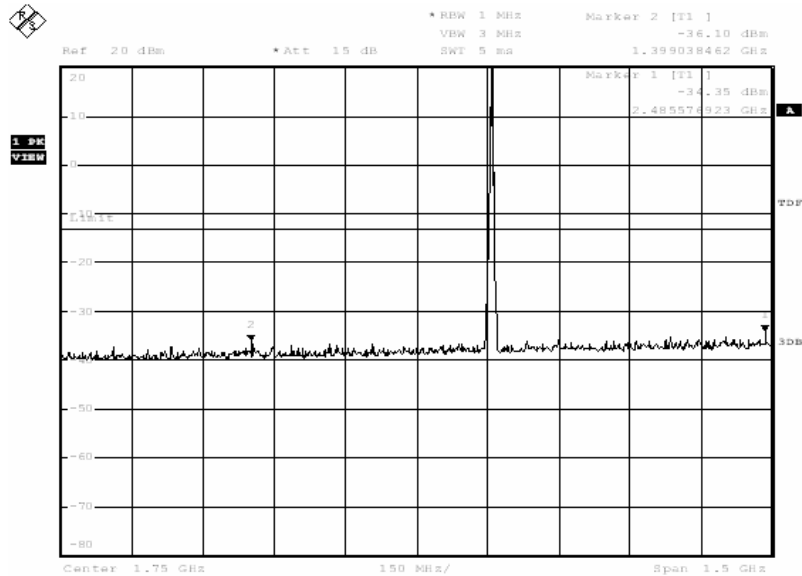
**A. 8.3.13 Channel 9538: 30MHz –1GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:55:38

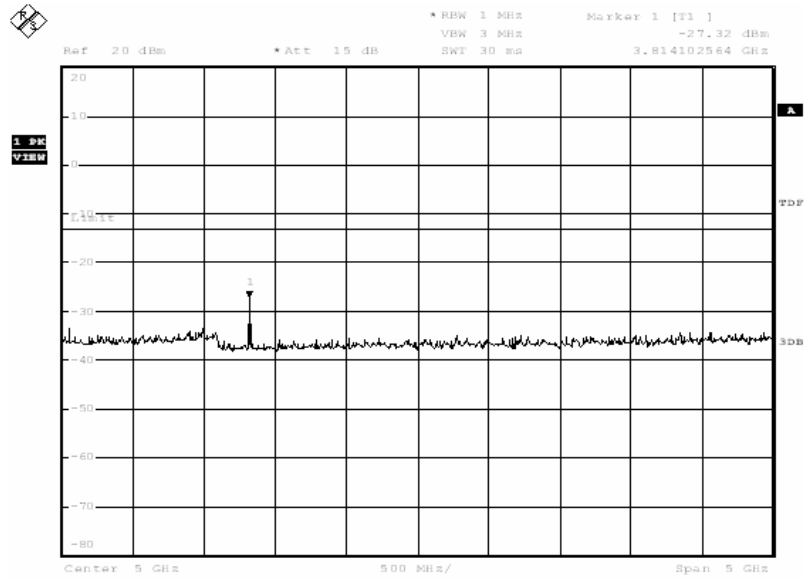
**A.8.3.14 Channel 9538: 1GHz –2.5GHz**  
Spurious emission limit –13dBm.

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



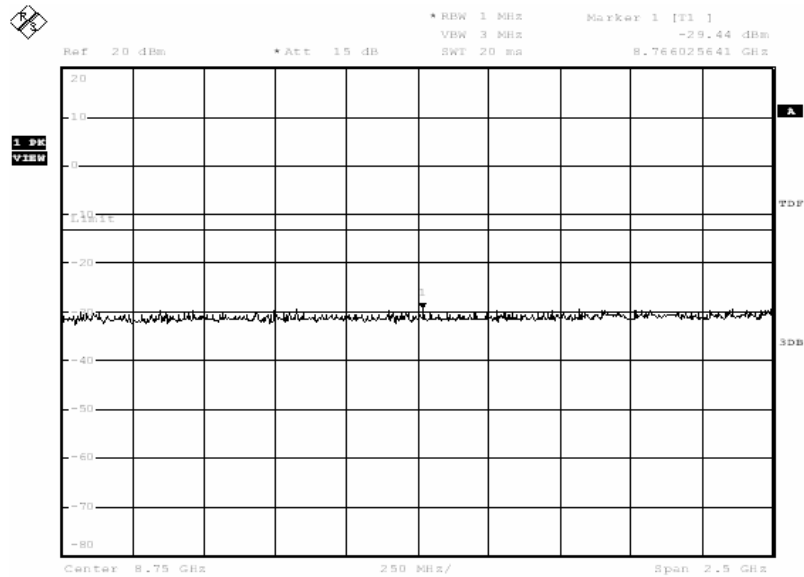
Date: 11.NOV.2013 11:38:49

**A.8.3.15 Channel 9538: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



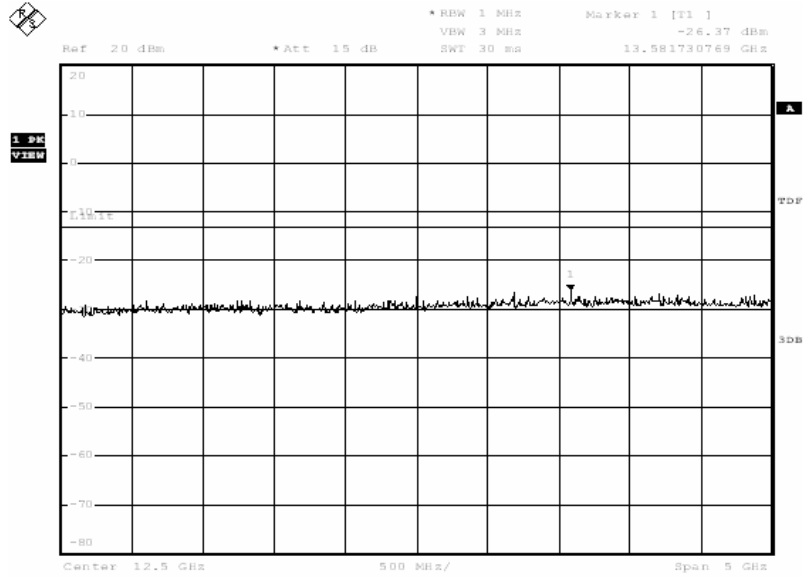
Date: 11. NOV. 2013 11:39:17

**A.8.3.16 Channel 9538: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



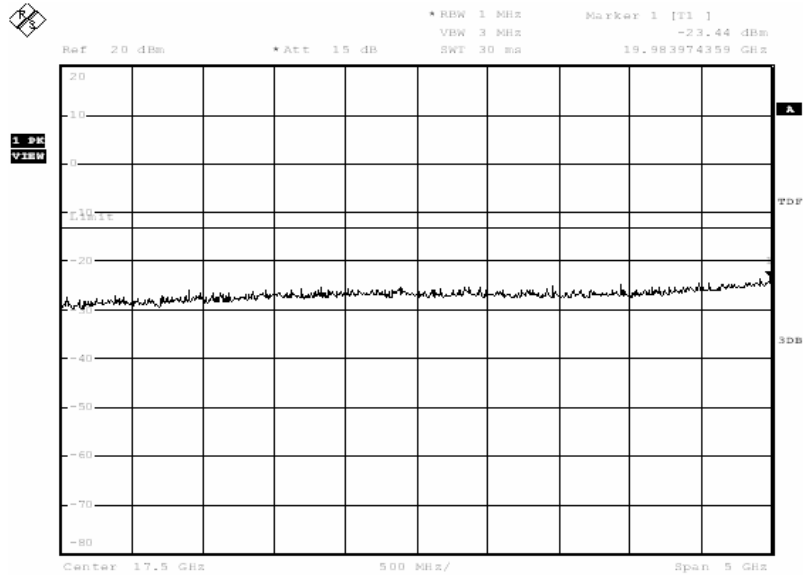
Date: 14. OCT. 2013 03:57:03

**A.8.3.17 Channel 9538: 10GHz –15GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:57:31

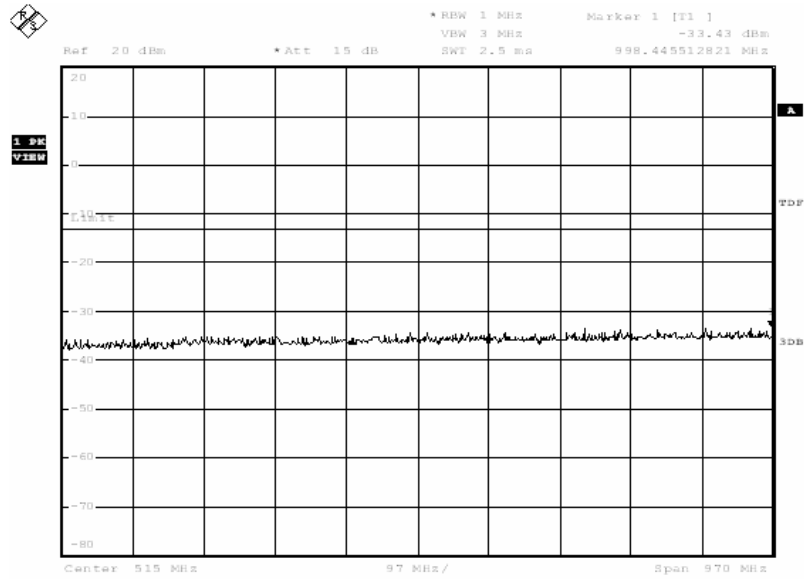
**A.8.3.18 Channel 9538: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 03:57:58

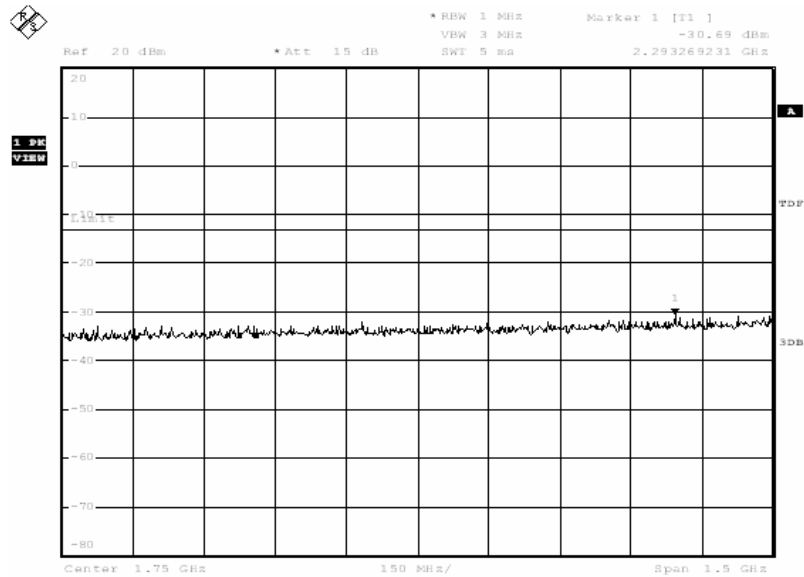


**A. 8.3.19 Idle mode: 30MHz –1GHz**  
Spurious emission limit –13dBm.



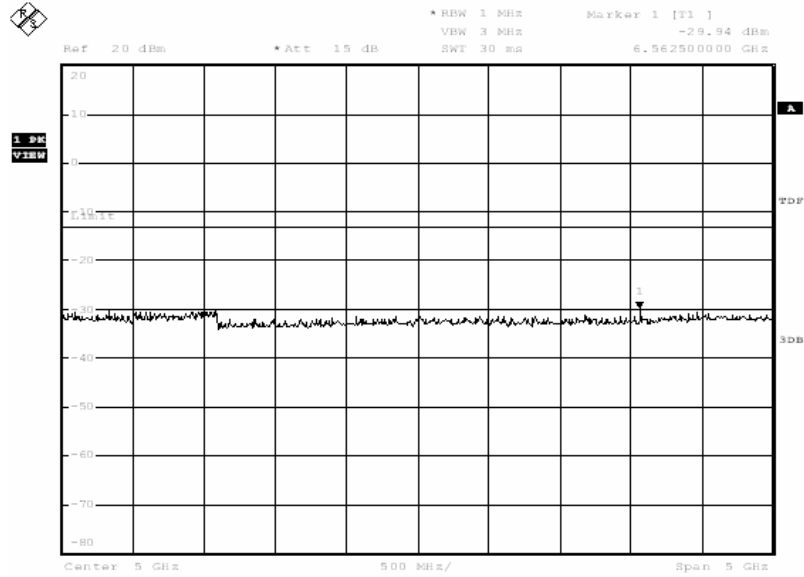
Date: 14.OCT.2013 04:08:51

**A.8.3.20 Idle mode: 1GHz –2.5GHz**  
Spurious emission limit –13dBm.



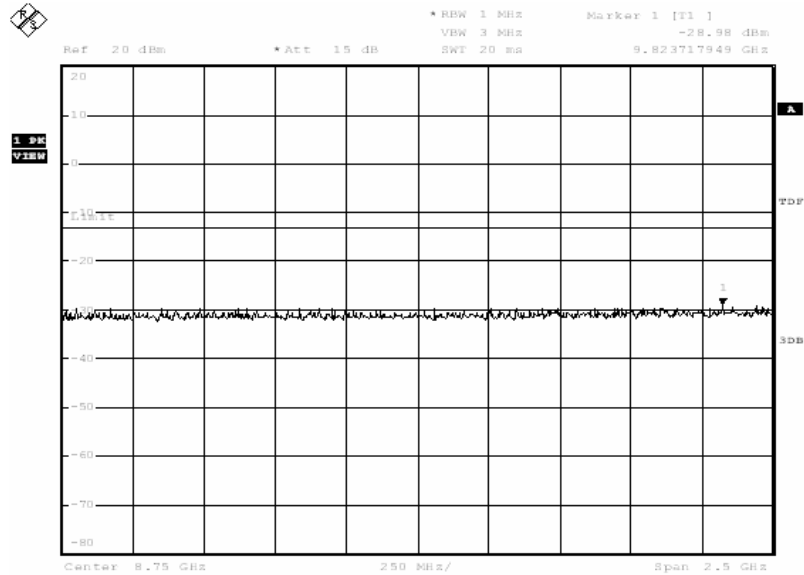
Date: 14.OCT.2013 04:09:19

**A.8.3.21 Idle mode: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



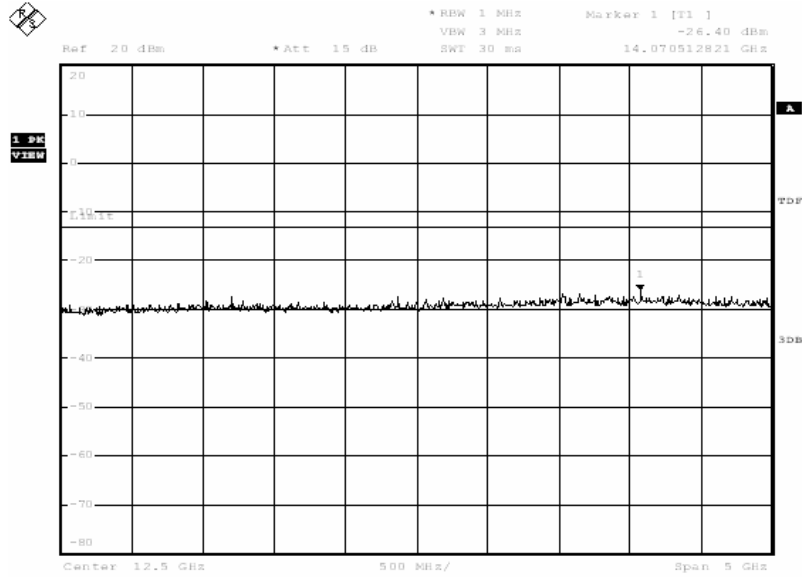
Date: 14.OCT.2013 04:09:47

**A.8.3.22 Idle mode: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



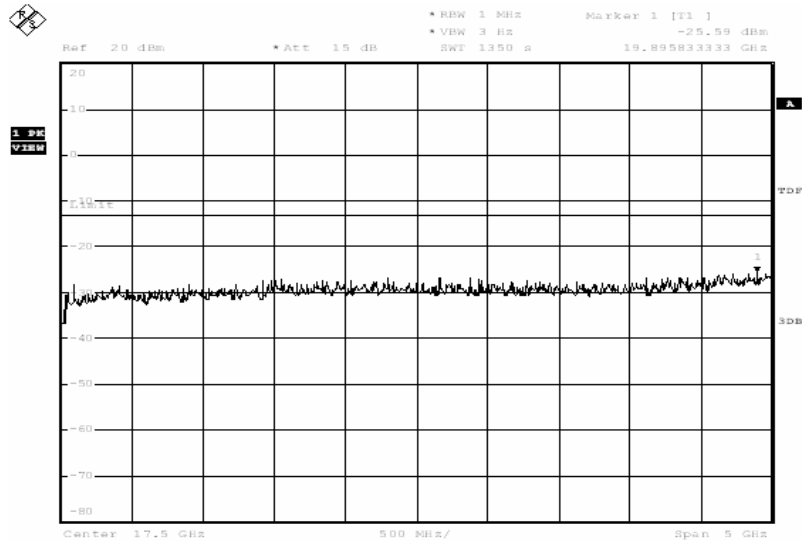
Date: 14.OCT.2013 04:10:15

**A.8.3.23 Idle mode: 10GHz –15GHz**  
Spurious emission limit –13dBm.



Date: 14.OCT.2013 04:10:42

**A.8.3.24 Idle mode: 15GHz –20GHz**  
Spurious emission limit –13dBm.



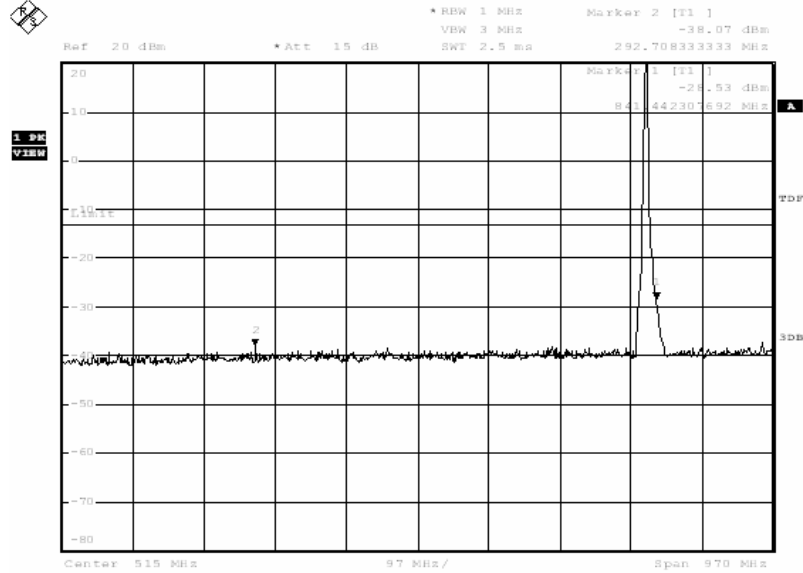
Date: 14.OCT.2013 04:11:11

**WCDMA Band V**

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

Spurious emission limit –13dBm.

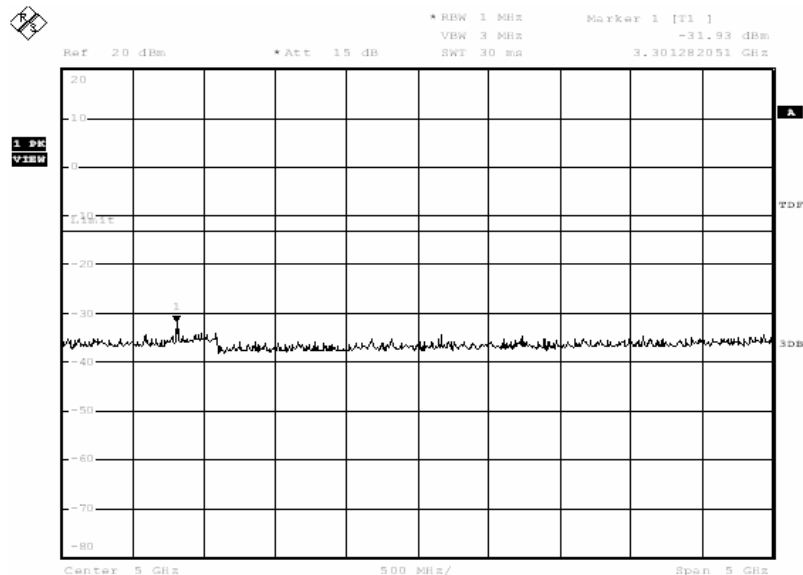
**NOTE: peak above the limit line is the carrier frequency.**



Date: 11.NOV.2013 12:26:24

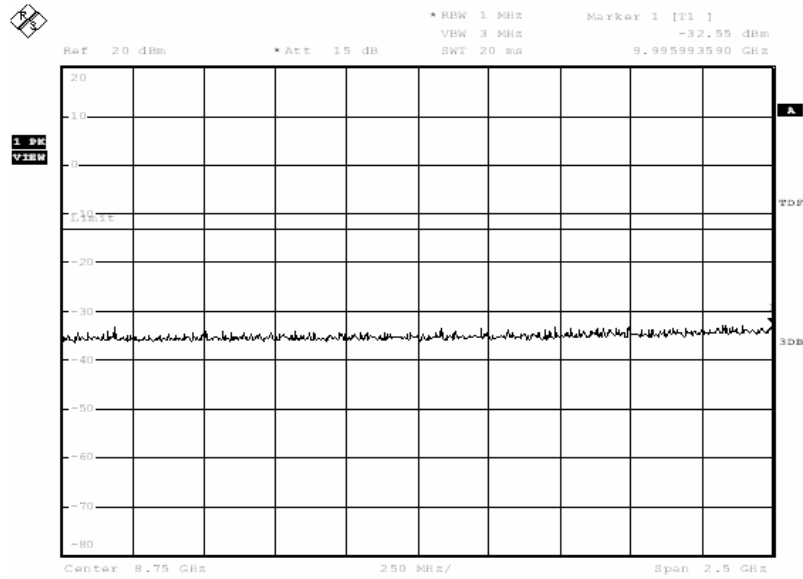
**A. 8.3.26 Channel 4132: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.



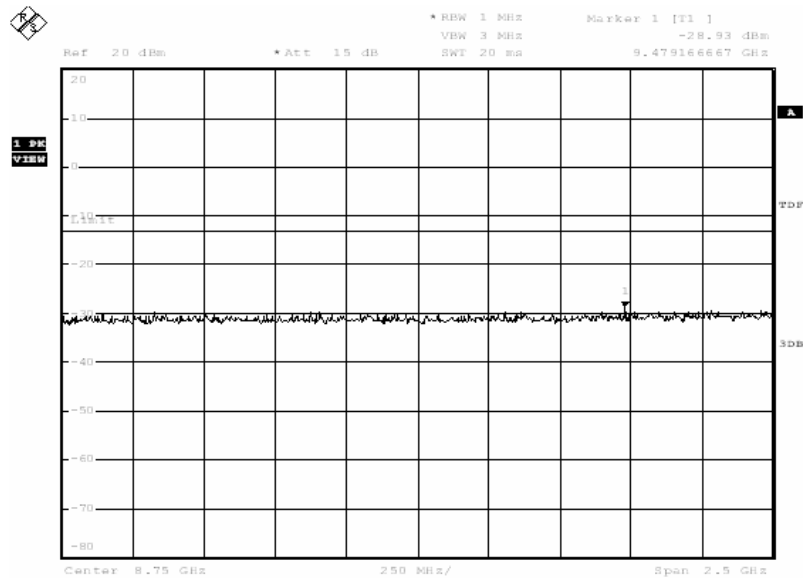
Date: 11.NOV.2013 12:27:20

**A. 8.3.27 Channel 4132: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



Date: 11. NOV. 2013 12:27:48

**A. 8.3.28 Channel 4132: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.

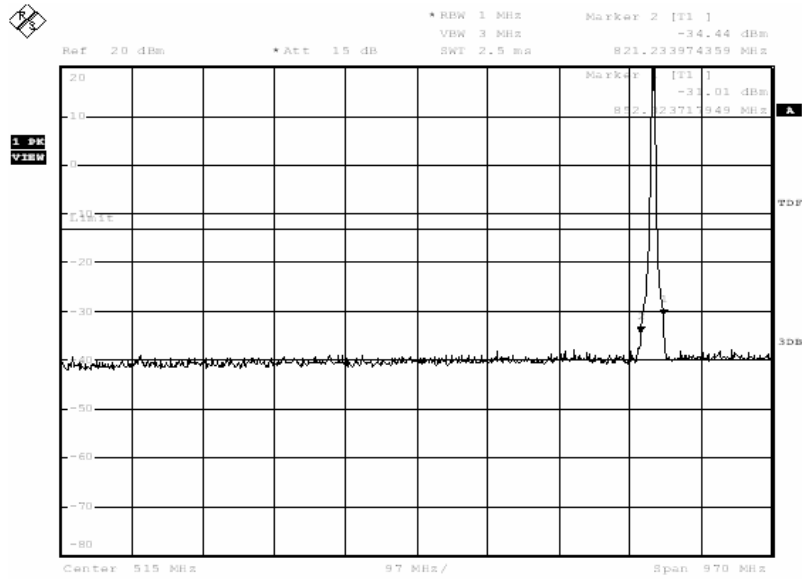


Date: 14. OCT. 2013 04:34:19

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

Spurious emission limit –13dBm.

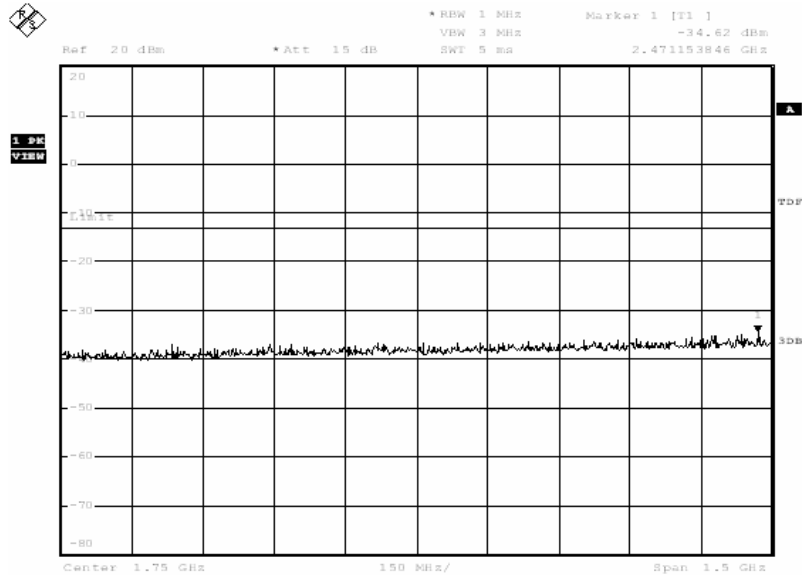
**NOTE: peak above the limit line is the carrier frequency.**



Date: 11.NOV.2013 12:28:31

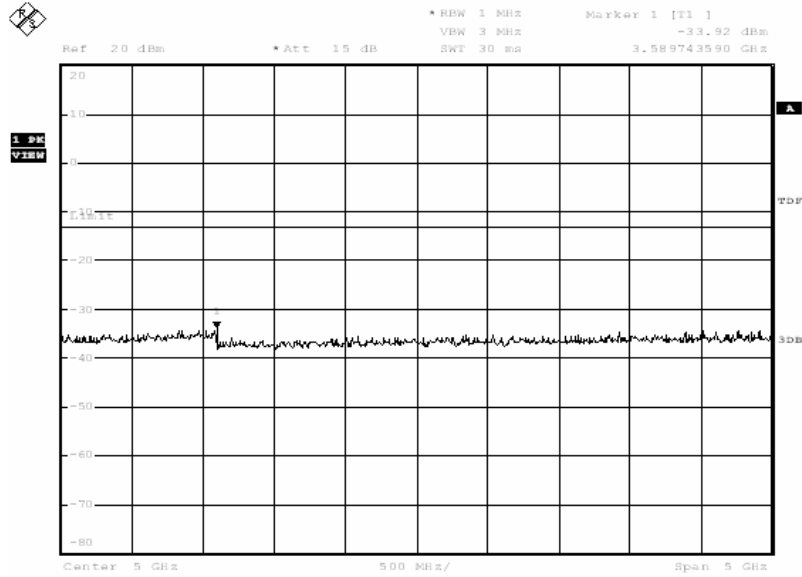
**A.8.3.30 Channel 4183: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.



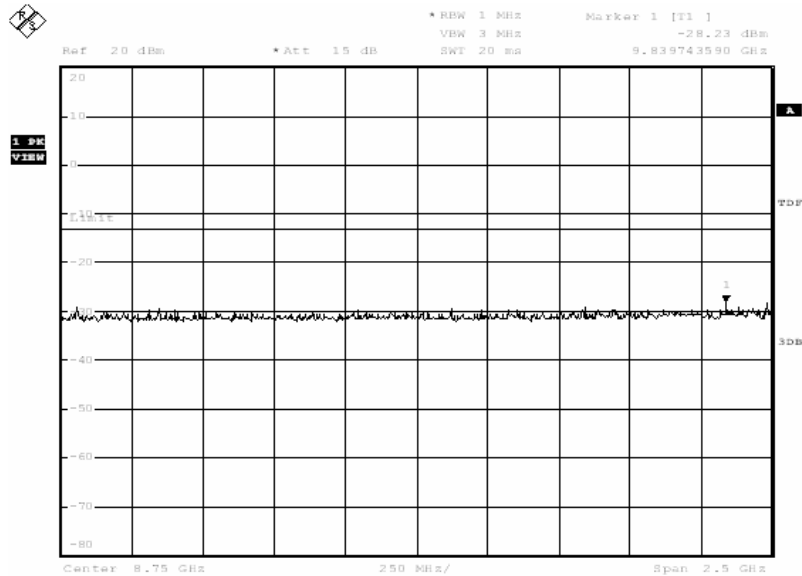
Date: 11.NOV.2013 12:28:59

**A. 8.3.31 Channel 4183: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



Date: 11. NOV. 2013 12:29:26

**A. 8.3.32 Channel 4183: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.

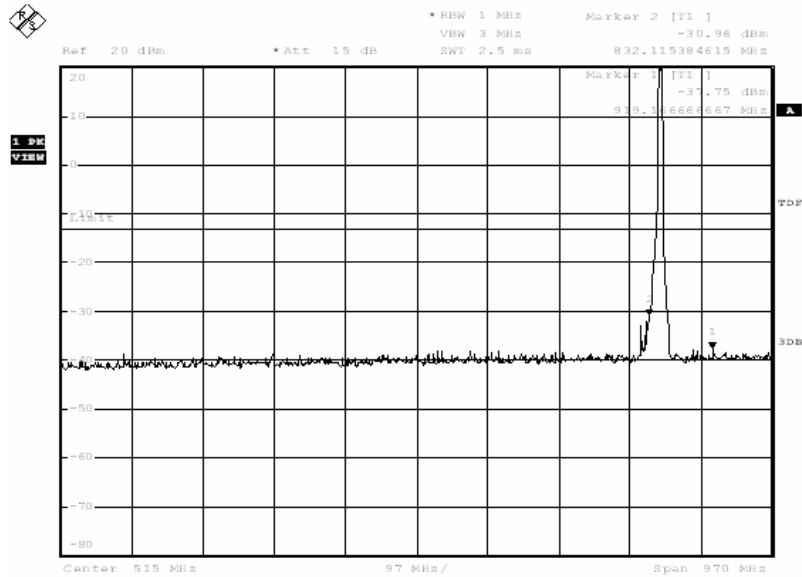


Date: 14. OCT. 2013 04:36:25

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

Spurious emission limit –13dBm.

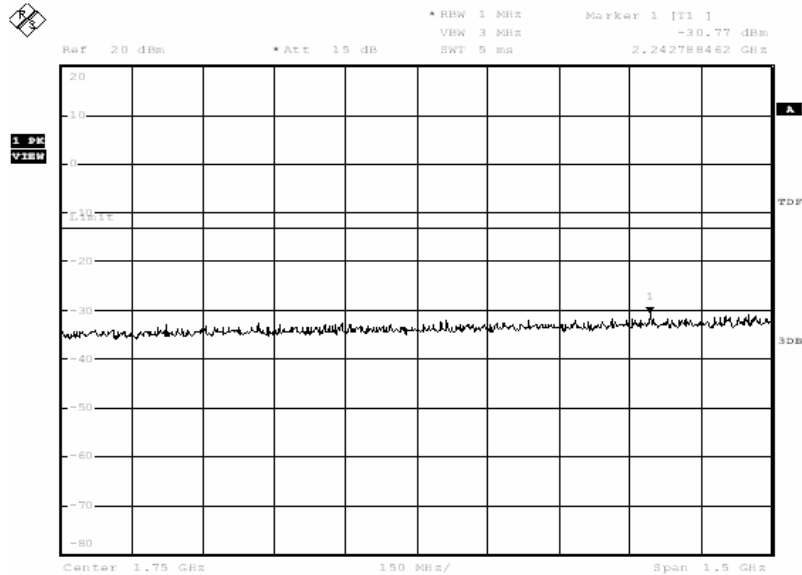
**NOTE: peak above the limit line is the carrier frequency.**



Date: 11.NOV.2013 12:30:37

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

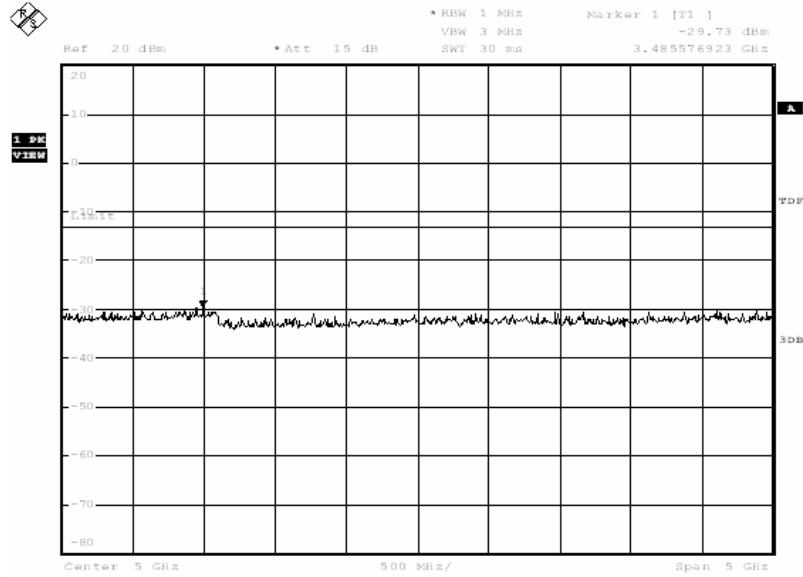
Spurious emission limit –13dBm.



Date: 14.OCT.2013 04:37:36

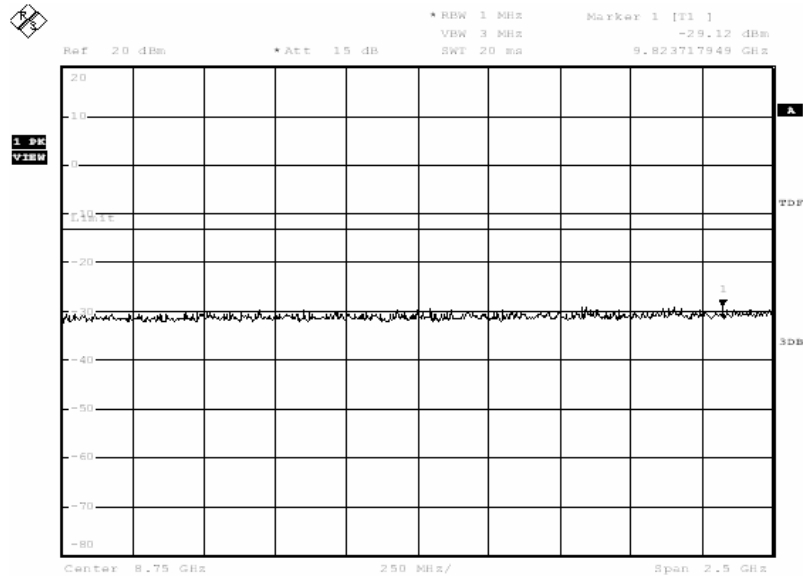


**A. 8.3.35 Channel 4233: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



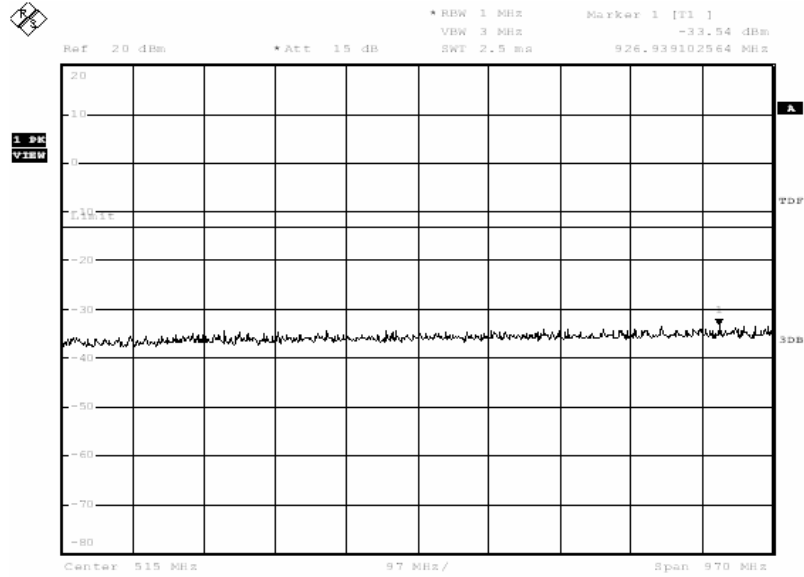
Date: 14.OCT.2013 04:38:04

**A. 8.3.36 Channel 4233: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.



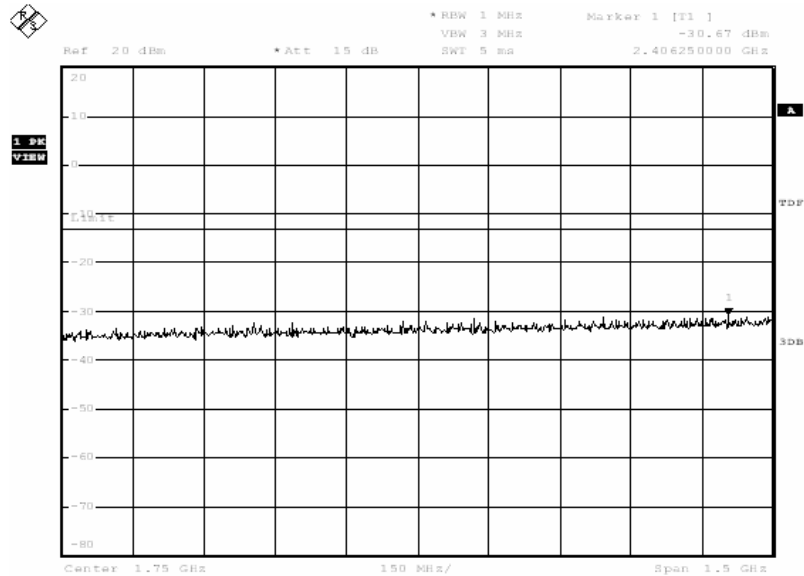
Date: 14.OCT.2013 04:38:32

**A. 8.3.37 Idle mode: 30MHz – 1GHz**  
Spurious emission limit -13dBm.



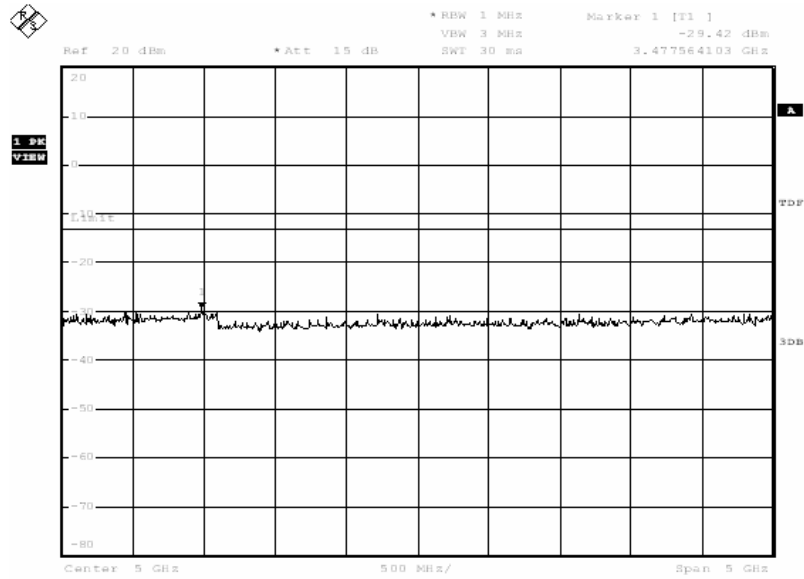
Date: 14.OCT.2013 04:49:41

**A.8.3.38 Idle mode: 1GHz – 2.5GHz**  
Spurious emission limit -13dBm.



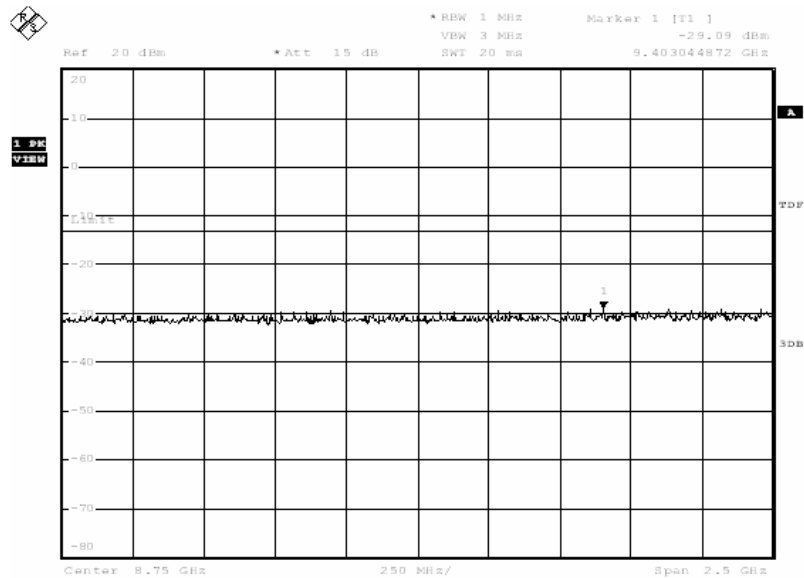
Date: 14.OCT.2013 04:50:09

**A.8.3.39 Idle mode: 2.5GHz – 7.5GHz**  
Spurious emission limit -13dBm.



Date: 14.OCT.2013 04:50:38

**A.8.3.40 Idle mode: 7.5GHz – 10GHz**  
Spurious emission limit -13dBm.



Date: 14.OCT.2013 04:51:04

## **A.9 PEAK-TO-AVERAGE POWER RATIO**

### **A.9.1 Measurement description**

According to KDB971168, the transmitter's peak-to-average power ratio (PAPR) shall not exceed 13 dB for more than 0.1% of the time using a signal corresponding to the highest PAPR during periods of continuous transmission.

The parameter of spectrum analyzer: RBW = 10MHz, detector = sample, No. of sample = 500,000

### **A.9.2 Measurement results**

#### **Frequency Error vs Temperature**

	Frequency(MHz)	PAPR(dB)
BAND V	836.60	1.81
BAND II	1880.00	2.42

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