



# TEST REPORT

## No. 2013TAR881

for

**TCT Mobile Limited**

**HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands  
mobile phone**

**Model Name: Diablo HD LTE EMEA 1.2GHz**

**Marketing Name: ONE TOUCH 6034R**

**FCC ID: RAD468**

with

**Hardware Version: PIO1**

**Software Version: v1B28**

**Issued Date: 2014-01-16**

**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-1***

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

3/F Shou Xiang Technology Building, No.51 Xueyuan Road, Hai Dian District, Beijing, P. R. China,100191.

Tel:+86(0)10-62304633, Fax:+86(0)10-62304633-2504, Email:welcome@emcite.com, web: [www.emcite.com](http://www.emcite.com)

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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: 00861062304633

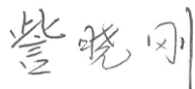
### 1.2. Testing Environment

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

### 1.3. Project data

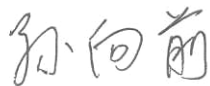
Testing Start Date: 2014-01-09  
Testing End Date: 2014-01-13

### 1.4. Signature



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



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



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

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCT Mobile Limited  
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Contact Person: Gong Zhizhou  
Contact Email: zhizhou.gong@jrdcom.com  
Telephone: 0086-21-61460890  
Fax: 0086-21-61460602

### **2.2. Manufacturer Information**

Company Name: TCT Mobile Limited  
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,  
Pudong Area Shanghai, P.R. China.  
City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: 0086-21-61460890  
Fax: 0086-21-61460602

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

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

Description	HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands mobile phone
Model Name	Diablo HD LTE EMEA 1.2GHz
Marketing Name	ONE TOUCH 6034R
FCC ID	RAD468
Frequency	GSM 850MHz; PCS 1900MHz; WCDMA Band V;LTE BAND 7
HSDPA category	14
HSUPA category	6
Antenna	Integrated
Power supply	Battery or Charger (AC Adaptor)
Output power	21.75dBm maximum ERP measured for Band V
Extreme vol. Limits	3.5VDC to 4.35VDC (nominal: 3.9VDC)
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.  
Note: The EUT is a variant model of ONE TOUCH 6034M. All the result is coming from the ONE TOUCH 6034M.

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

<b>EUT ID*</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
N04	862780020000208	PIO1	v1B28
N03	862780020000083	PIO1	v1B28

\*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	Battery	/
AE3	Travel charger	/
AE4	Travel charger	/

AE1	Model	CAC2000005C2
	Manufacturer	SCUD
	Nominal voltage	3.8V
AE2	Model	CAC2000008C1

Manufacturer	BYD
Nominal voltage	3.8V
AE3	
Model	CBA3000AG0C1
Manufacturer	Tenpao
Length of cable	/
AE4	
Model	CBA3000AG0C2
Manufacturer	BYD
Length of cable	/

\*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 HSDPA/HSUPA/UMTS Tri bands / GSM quad bands/LTE 5 bands mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test. Samples undergoing test were selected by the Client.

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

Reference	Title	Version
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
FCC Part 2	FREQUENCY ALLOCATIONS AND RADIO TREATY MATTERS; GENERAL RULES AND REGULATIONS	10-1-12 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-12 Edition
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

### WCDMA Band V

Items	Test Name	Section in this report	Verdict
1	Output Power	A.1	P
2	Emission Limit	A.2	P
3	CONDUCTED EMISSION	A.3	P
4	Frequency Stability	A.4	P
5	Occupied Bandwidth	A.5	P
6	Emission Bandwidth	A.6	P
7	Band Edge Compliance	A.7	P
8	Conducted Spurious Emission	A.8	P
9	PEAK-TO-AVERAGE POWER RATIO	A.9	P

## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2014-03-28
2	Test Receiver	ESU26	100376	R&S	2014-11-05
3	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10
4	EMI Antenna	3117	00139065	ETS-Lindgren	2014-07-31
5	LISN	ESH2-Z5	829991/012	R&S	2014-04-15
6	Universal Radio Communication Tester	CMU200	102228	R&S	2014-06-23
7	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2014-03-16
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
9	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
10	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
11	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
12	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
13	Signal Generator	N5183A	MY49060052	Agilent	2014-03-18
14	Climatic chamber	PL-2G	343074	ESPEC	2014-05-11

## **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 Digital Radio Communication tester (CMU-200). These measurements were done at 3 frequencies, 826.4MHz, 836.6MHz and 846.6MHz for WCDMA Band V (bottom, middle and top of operational frequency range).

#### **Limit**

##### **A.1.2.2 Test Condition**

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

#### **WCDMA Band V**

##### **Measurement result**

	CH	Frequency(MHz)	output power(dBm)
WCDMA (Band V)	4132	826.4	23.72
	4183	836.6	23.88
	4233	846.6	23.64

### A.1.3 Radiated

#### A.1.3.1 Description

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

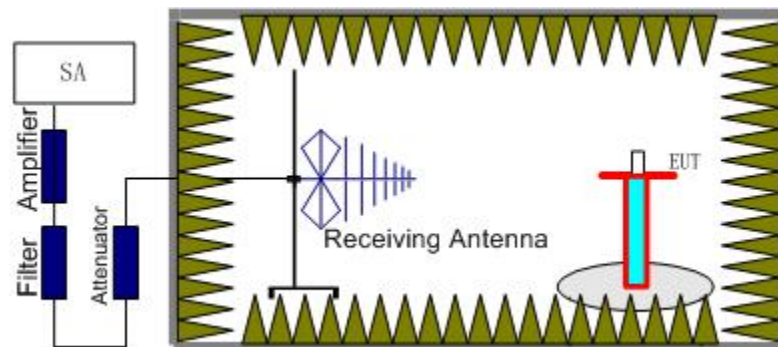
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts." Rule Part 27.50(d)(2) specifies, "Fixed, mobile, and portable (handheld) stations operating in the 1710–1755 MHz band are limited to a peak EIRP of 1 watt."

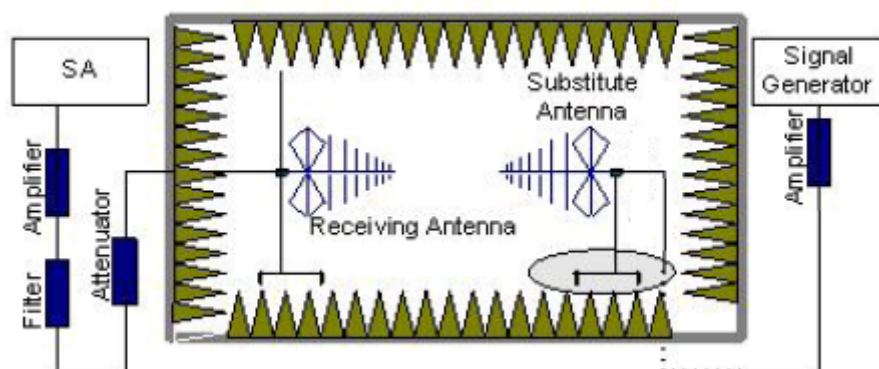
#### A.1.3.2 Method of Measurement

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:

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

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

**WCDMA Band V-ERP**

**Limits**

	Burst Peak ERP (dBm)
WCDMA Band V	38.45dBm (7W)

**Measurement result**

Frequency (MHz)	P <sub>mea</sub> (dBm)	Cable Loss(dB)	P <sub>Ag</sub> (dB)	Antenna Gain(dBi)	Correction(dB)	RMS ERP (dBm)	Limit (dBm)	Margin (dB)	Polarization
826.40	-28.31	2.07	-53.00	0.85	2.15	19.62	38.45	18.83	H
836.60	-26.99	2.08	-53.00	0.90	2.15	20.88	38.45	17.57	H
846.60	-26.07	2.09	-53.00	0.94	2.15	21.75	38.45	16.70	H

Frequency: 846.6MHz

Peak ERP(dBm)= P<sub>Mea</sub>(-26.07dBm)- P<sub>cl</sub>(2.09dB)- P<sub>Ag</sub>(-53.00dB)-G<sub>a</sub> (0.94dB)-2.15dB=21.75dBm

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

## A.2 EMISSION LIMIT

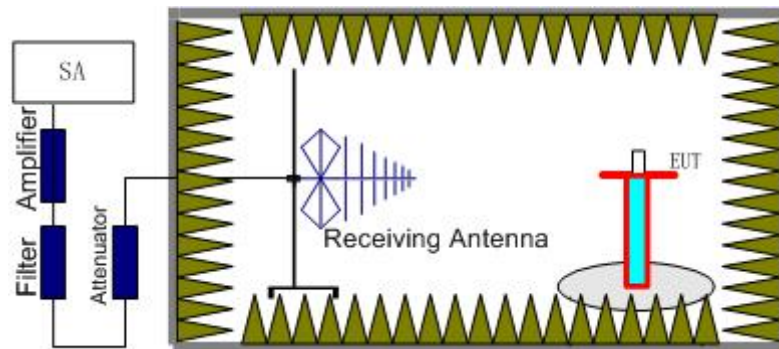
### A.2.1 Measurement Method

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

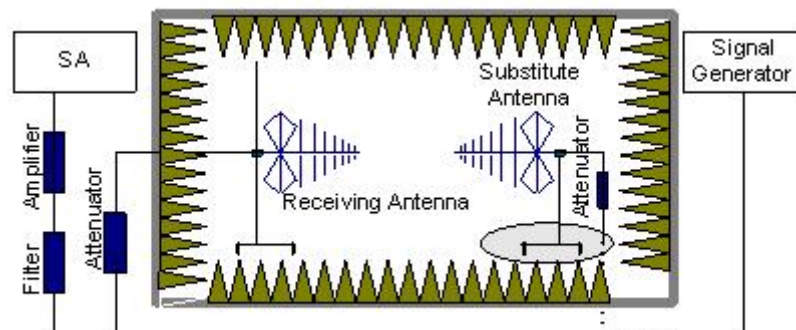
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment. The resolution bandwidth is set as outlined in Part 24.238, Part 22.917. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of 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 ( $P_r$ ).
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. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole,  $ERP = EIRP - 2.15\text{dBi}$ .



### **A.2.2 Measurement Limit**

Part 24.238 , Part 22.917 and Part 27.53 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 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 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.

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

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Margin (dB)	Polarization
1650.42	-51.27	2.91	-5.44	2.15	-50.89	-13.00	37.89	V
3277.55	-65.00	4.19	-7.37	2.15	-63.97	-13.00	50.97	V
4133.14	-59.47	4.68	-8.58	2.15	-57.72	-13.00	44.72	H
5166.08	-63.34	5.21	-9.80	2.15	-60.90	-13.00	47.90	H
5890.05	-61.82	5.58	-10.16	2.15	-59.39	-13.00	46.39	V
7727.90	-62.41	6.49	-11.63	2.15	-59.42	-13.00	46.42	H

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

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Margin (dB)	Polarization
1671.48	-47.59	2.98	-5.35	2.15	-47.37	-13.00	34.37	V
3284.27	-65.61	4.23	-7.38	2.15	-64.61	-13.00	51.61	H
4186.85	-60.45	4.67	-8.61	2.15	-58.66	-13.00	45.66	H
5132.58	-63.55	5.25	-9.78	2.15	-61.17	-13.00	48.17	V
6078.38	-60.55	5.81	-10.26	2.15	-58.25	-13.00	45.25	H
7429.83	-63.01	6.38	-11.36	2.15	-60.18	-13.00	47.18	V

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

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Margin (dB)	Polarization
1691.68	-52.02	2.95	-5.26	2.15	-51.86	-13.00	38.86	V
3397.37	-63.76	4.22	-7.65	2.15	-62.48	-13.00	49.48	H
4615.04	-62.47	4.96	-9.01	2.15	-60.57	-13.00	47.57	H
5417.61	-63.51	5.40	-9.95	2.15	-61.11	-13.00	48.11	V
6464.46	-60.72	5.90	-10.57	2.15	-58.20	-13.00	45.20	H
7479.66	-62.94	6.58	-11.39	2.15	-60.28	-13.00	47.28	V

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

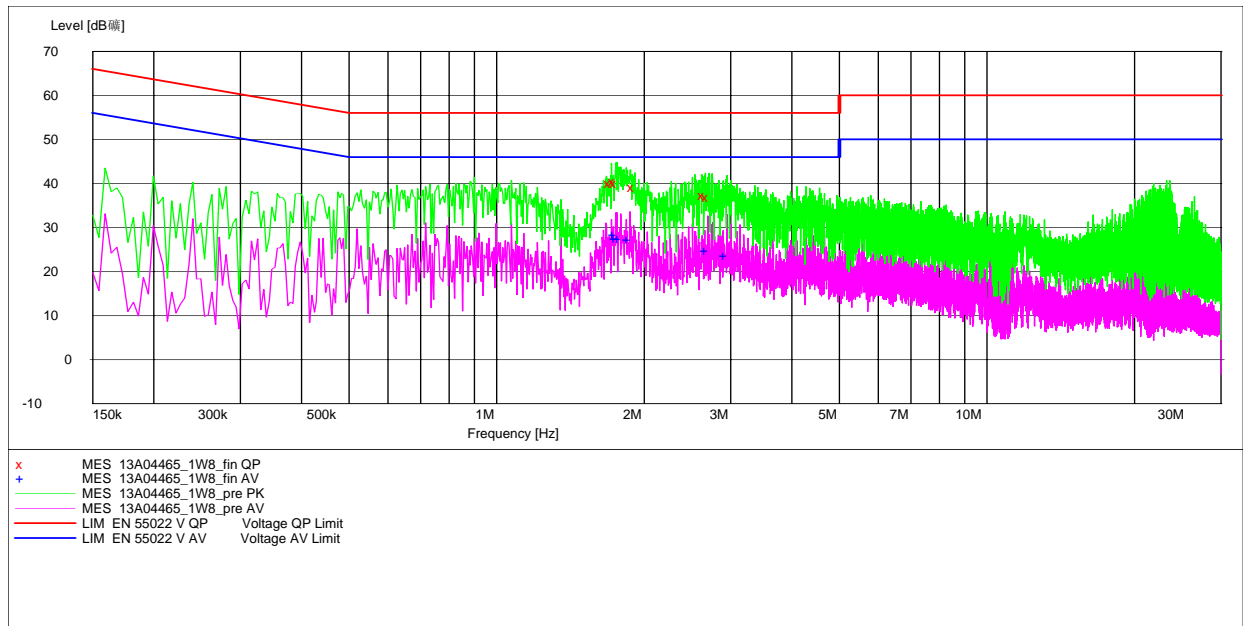
The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger.

#### **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

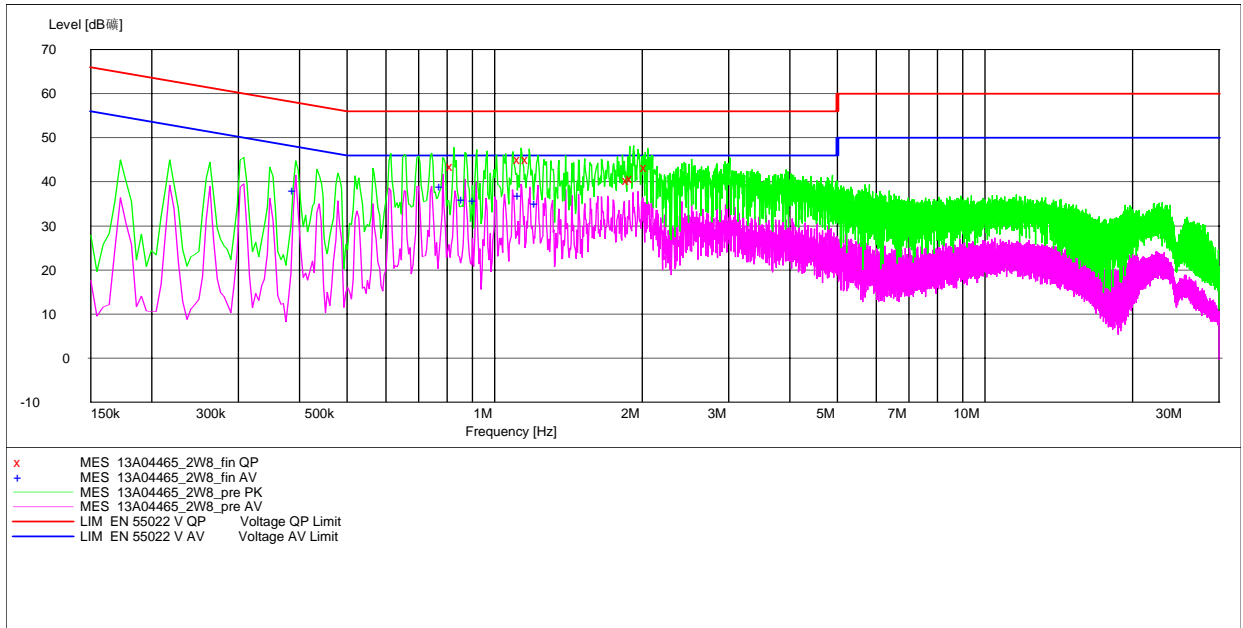
### A.3.2 Measurement result WCDMA Band V



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.716000	39.90	9.7	56	16.1	L1	GND
1.747500	40.40	9.7	56	15.6	N	GND
1.761000	40.00	9.7	56	16.0	N	GND
1.914000	39.00	9.7	56	17.0	N	GND
2.661500	37.40	9.7	56	18.6	N	GND
2.706500	36.80	9.7	56	19.2	L1	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.747500	28.40	9.7	46	17.6	L1	GND
1.761000	27.50	9.7	46	18.5	N	GND
1.792500	27.60	9.7	46	18.4	N	GND
1.869000	27.40	9.7	46	18.6	L1	GND
2.697500	24.90	9.7	46	21.1	L1	GND
2.945000	23.70	9.7	46	22.3	L1	GND

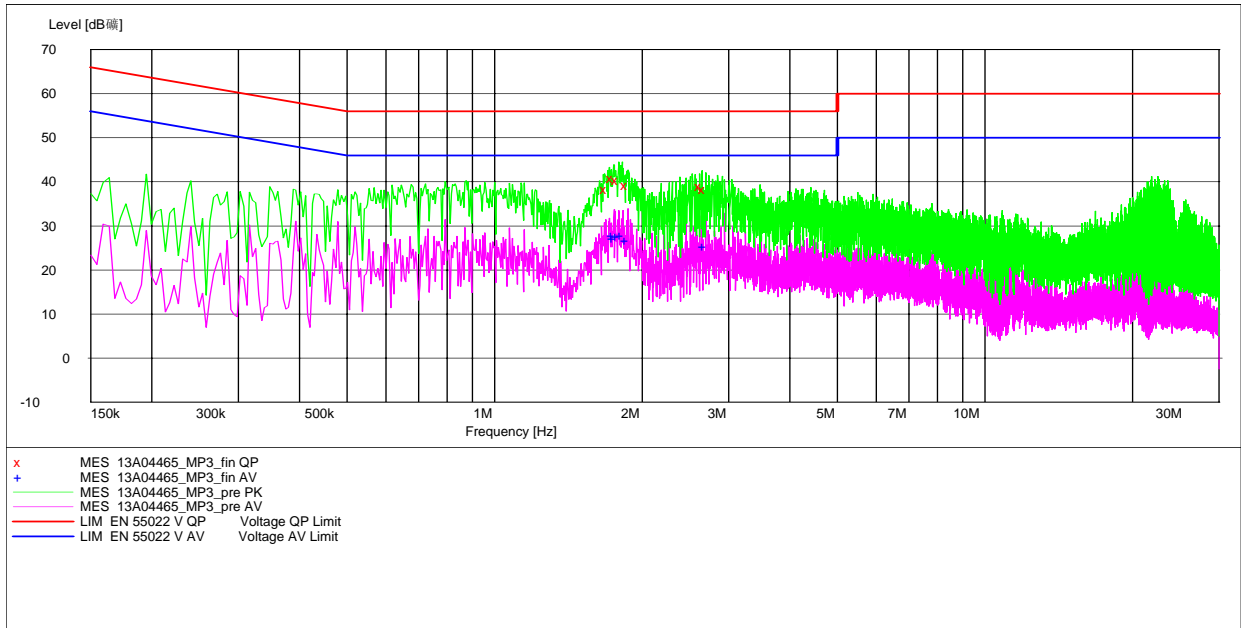
WCDMA Band V



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line dB	PE
0.825000	43.60	9.8	56	12.4	L1	GND
1.131000	45.10	9.7	56	10.9	L1	GND
1.176000	45.10	9.7	56	10.9	L1	GND
1.887000	40.30	9.7	56	15.7	L1	GND
1.918500	40.80	9.7	56	15.2	N	GND
2.054000	43.20	9.7	56	12.8	L1	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line dB	PE
0.393000	38.10	9.8	48	9.9	L1	GND
0.784500	38.90	9.8	46	7.1	L1	GND
0.870000	36.00	9.8	46	10.0	L1	GND
0.915000	35.80	9.7	46	10.2	L1	GND
1.131000	36.80	9.7	46	9.2	L1	GND
1.225500	35.00	9.7	46	11.0	L1	GND

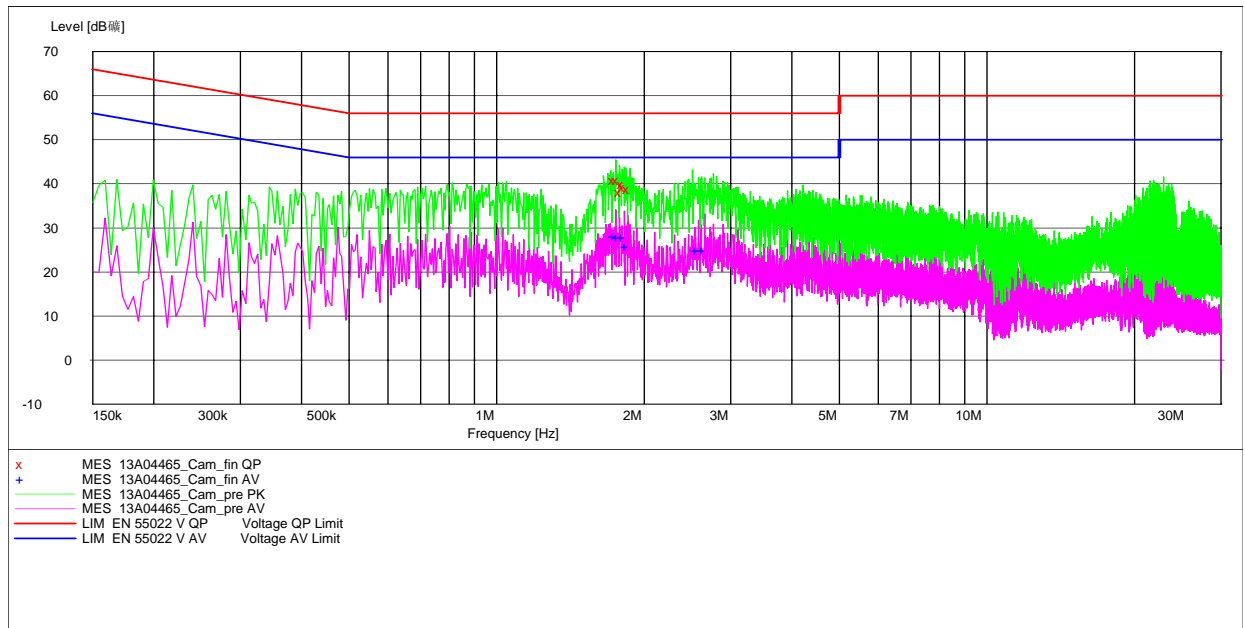
MP3



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.698000	38.30	9.7	56	17.7	L1	GND
1.747500	40.70	9.7	56	15.3	L1	GND
1.792500	40.30	9.7	56	15.7	N	GND
1.869000	39.30	9.7	56	16.7	N	GND
2.648000	39.10	9.7	56	16.9	L1	GND
2.693000	38.30	9.7	56	17.7	L1	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.752000	27.90	9.7	46	18.1	N	GND
1.761000	27.10	9.7	46	18.9	L1	GND
1.792500	27.60	9.7	46	18.4	L1	GND
1.828500	27.80	9.7	46	18.2	L1	GND
1.869000	26.80	9.7	46	19.2	N	GND
2.693000	25.30	9.7	46	20.7	L1	GND

Camera



Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.747500	40.70	9.7	56	15.3	L1	GND
1.779000	40.70	9.7	56	15.3	L1	GND
1.801500	38.00	9.7	56	18.0	L1	GND
1.824000	39.90	9.7	56	16.1	N	GND
1.833000	39.30	9.7	56	16.7	N	GND
1.869000	38.70	9.7	56	17.3	N	GND

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Line	PE
1.747500	28.00	9.7	46	18.0	N	GND
1.779000	27.80	9.7	46	18.2	L1	GND
1.824000	27.90	9.7	46	18.1	L1	GND
1.855500	25.90	9.7	46	20.1	L1	GND
2.580500	24.80	9.7	46	21.2	L1	GND
2.652500	24.90	9.7	46	21.1	L1	GND

## **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 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 4.35VDC, 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 V

##### Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-6	0.008
3.9	-4	0.005
4.35	-4	0.005

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-9	0.011
-20	5	0.006
-10	3	0.004
0	6	0.008
10	6	0.008
20	-4	0.005
30	5	0.005
40	6	0.007
50	5	0.006

## A.5 OCCUPIED BANDWIDTH

### A.5.1 Occupied Bandwidth Results

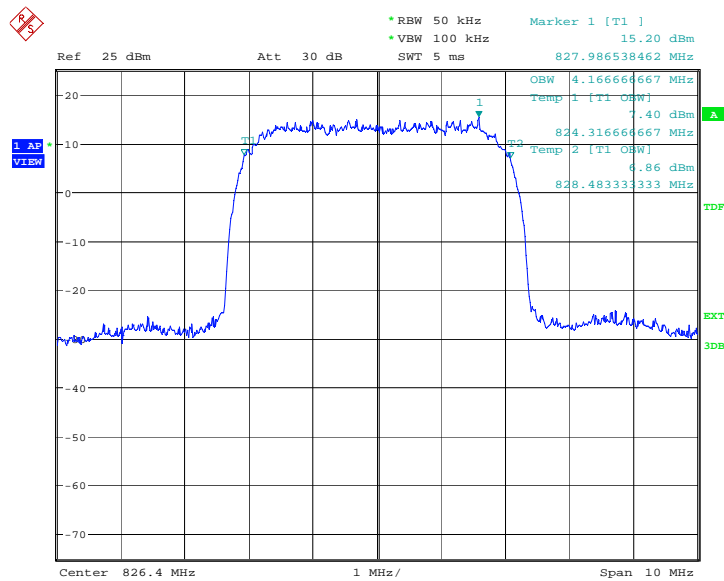
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band V. The table below lists the measured 99% BW. Spectrum analyzer plots are included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

#### WCDMA Band V(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)( MHz)
826.4	4.167
836.6	4.167
846.6	4.167

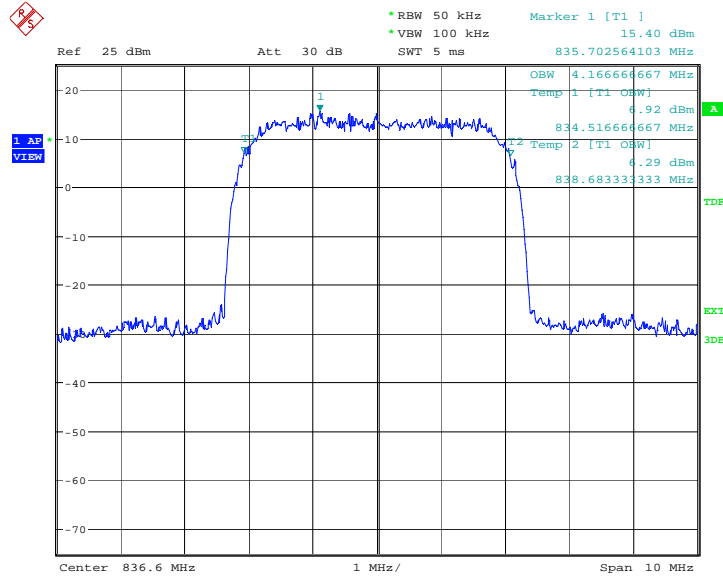
#### WCDMA Band V

#### Channel 4132-Occupied Bandwidth (99% BW)



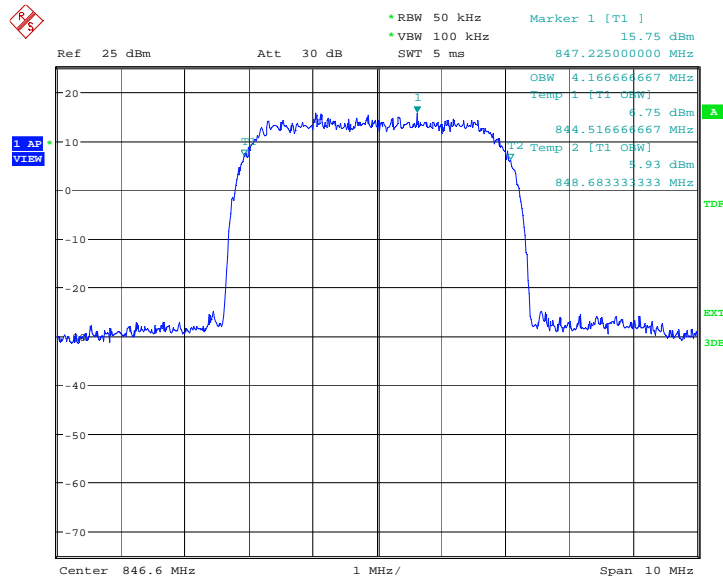
Date: 28.SEP.2013 12:03:39

### Channel 4183-Occupied Bandwidth (99% BW)



Date: 28.SEP.2013 12:04:13

### Channel 4233-Occupied Bandwidth (99% BW)



Date: 28.SEP.2013 12:04:48

## A.6 EMISSION BANDWIDTH

### A.6.1 Emission Bandwidth Results

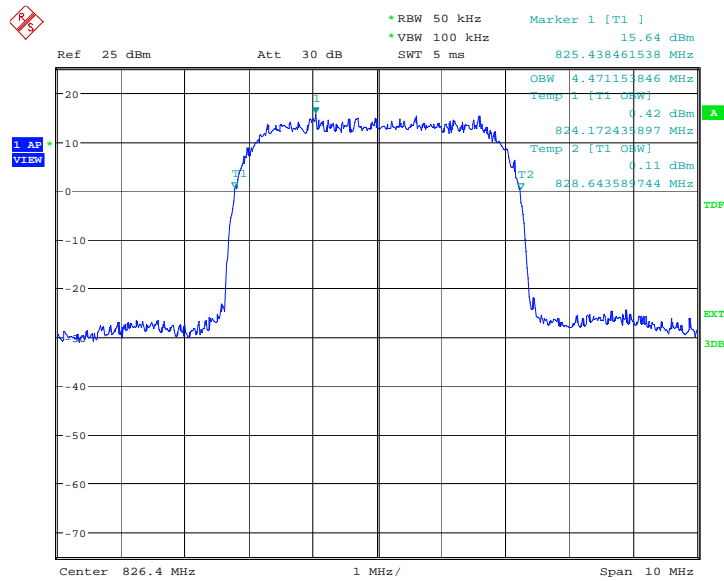
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of WCDMA Band V. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

#### WCDMA Band V(100% BW)

Frequency(MHz)	Emission Bandwidth (100% BW)( MHz)
826.40	4.471
836.60	4.487
846.60	4.471

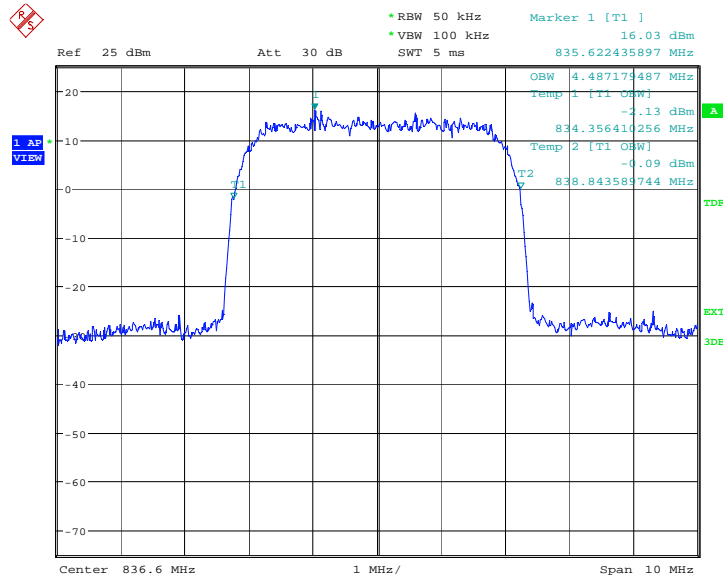
#### WCDMA Band V

#### Channel 4132-Emission Bandwidth (100% BW)



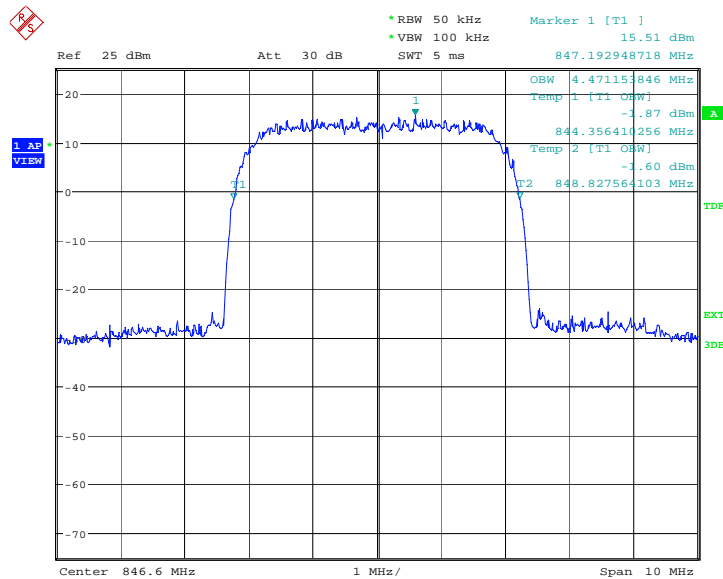
Date: 28.SEP.2013 12:05:24

### Channel 4183-Emission Bandwidth (100% BW)



Date: 28.SEP.2013 12:05:59

### Channel 4233-Emission Bandwidth (100% BW)

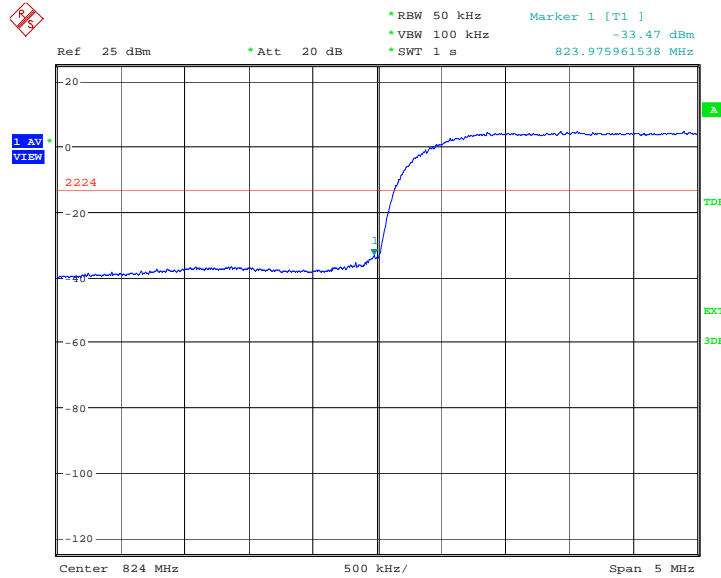


Date: 28.SEP.2013 12:06:33

## A.7 BAND EDGE COMPLIANCE

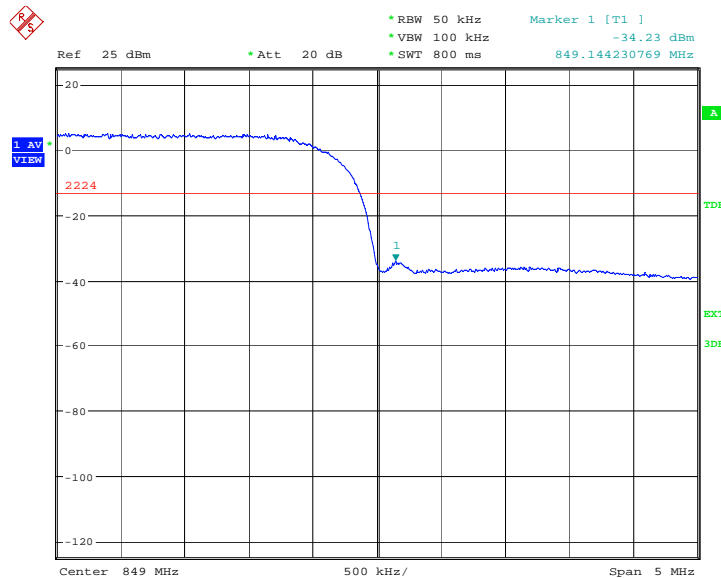
### WCDMA Band V

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



Date: 28.SEP.2013 12:06:50

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



Date: 28.SEP.2013 12:07:06

## **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 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 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.

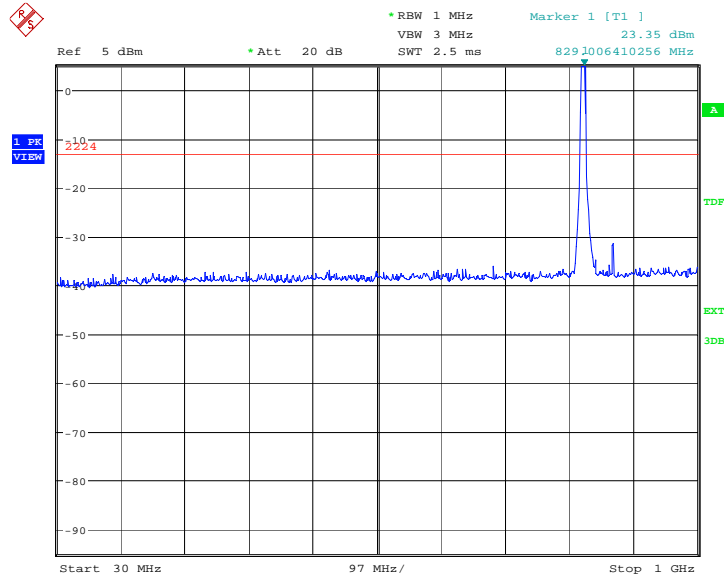
### A.8.3 Measurement result

#### WCDMA Band V

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

Spurious emission limit –13dBm.

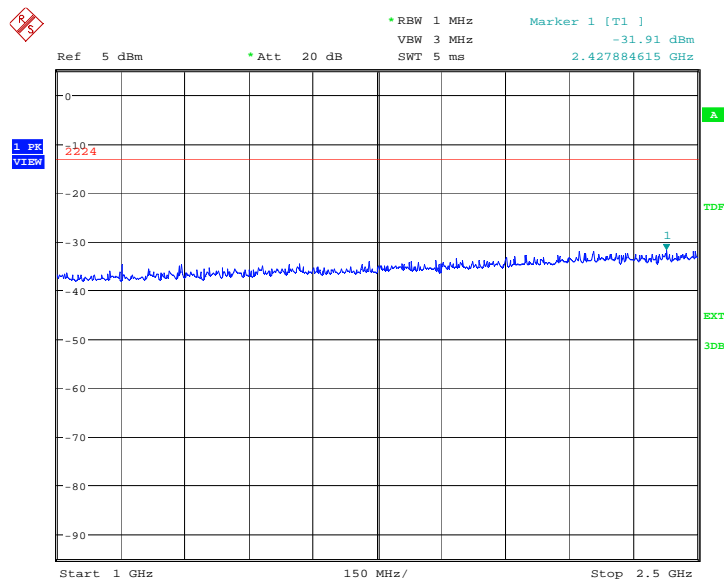
**NOTE: peak above the limit line is the carrier frequency.**



Date: 28.SEP.2013 12:07:37

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

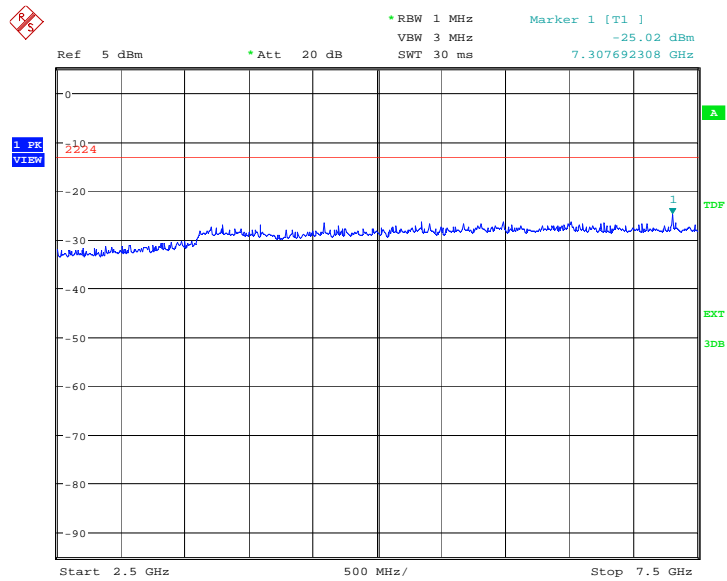
Spurious emission limit –13dBm.



Date: 28.SEP.2013 12:08:05

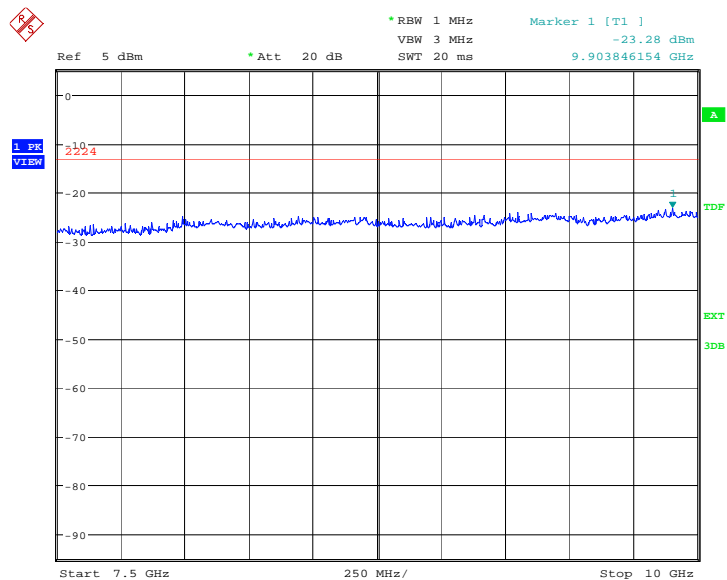


**A. 8.3.27 Channel 4132: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm.



Date: 28.SEP.2013 12:08:33

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

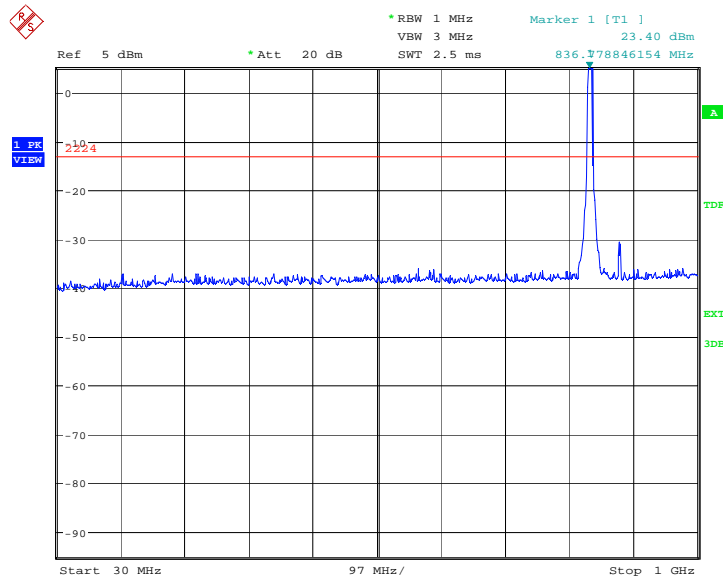


Date: 28.SEP.2013 12:09:01

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

Spurious emission limit –13dBm.

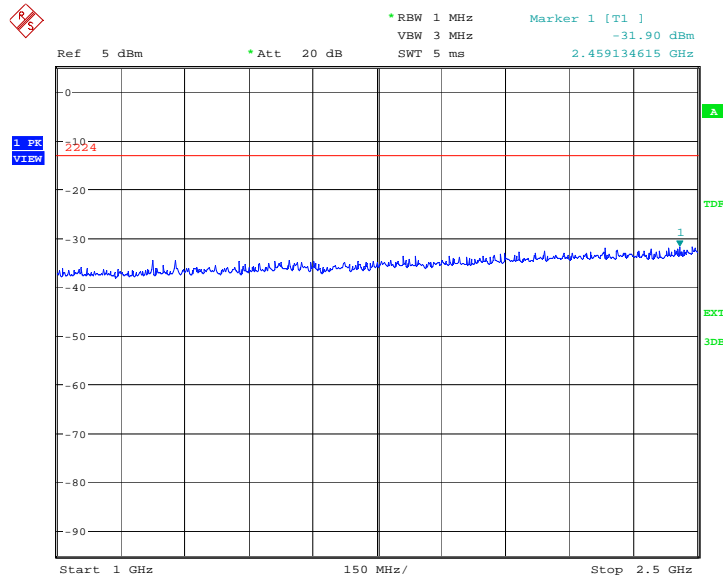
**NOTE: peak above the limit line is the carrier frequency.**



Date: 28.SEP.2013 12:09:32

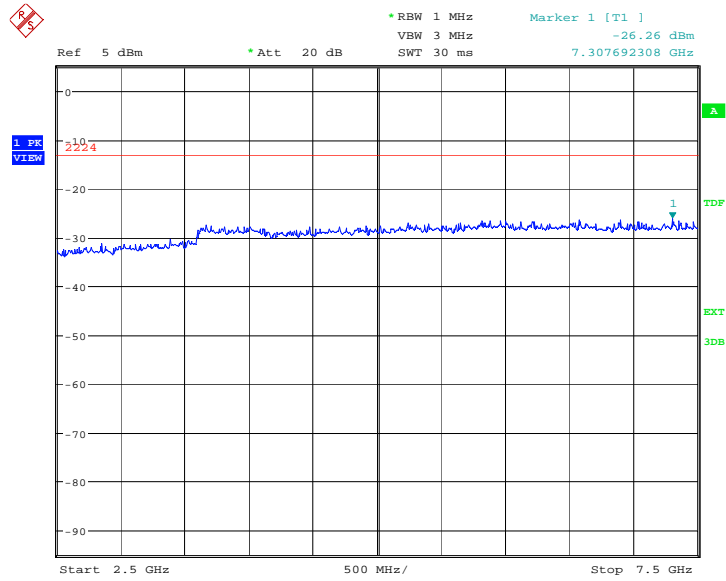
**A.8.3.30 Channel 4183: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.



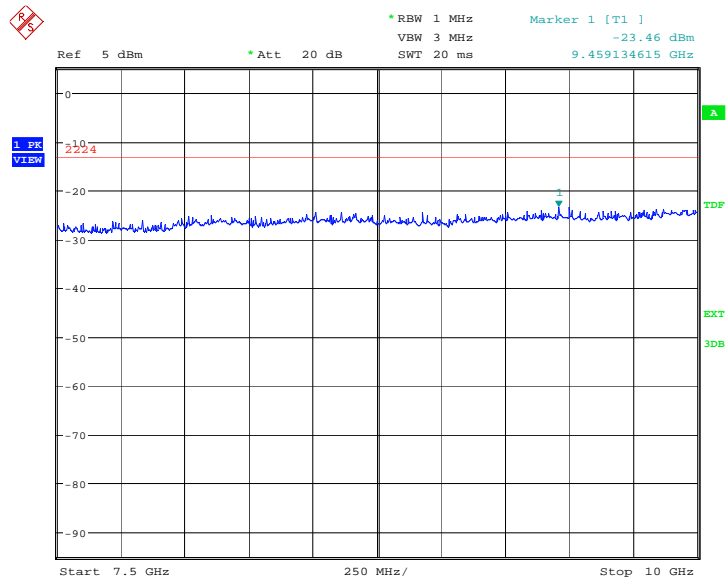
Date: 28.SEP.2013 12:10:00

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



Date: 28.SEP.2013 12:10:29

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

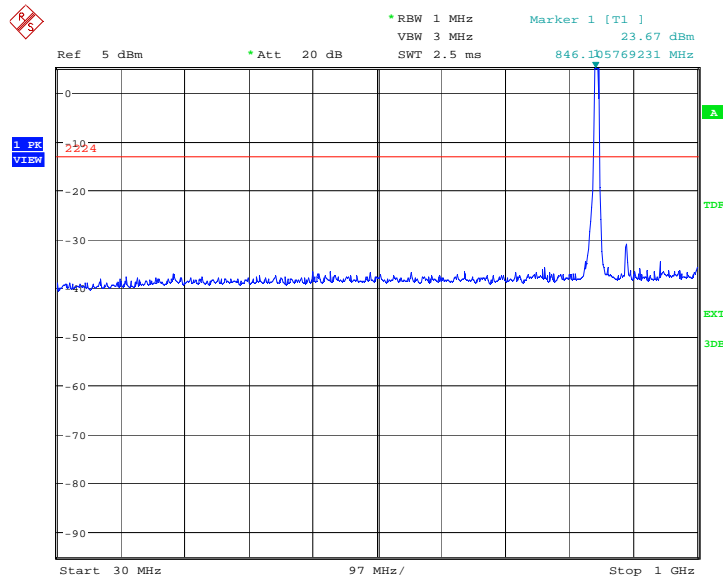


Date: 28.SEP.2013 12:10:57

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

Spurious emission limit –13dBm.

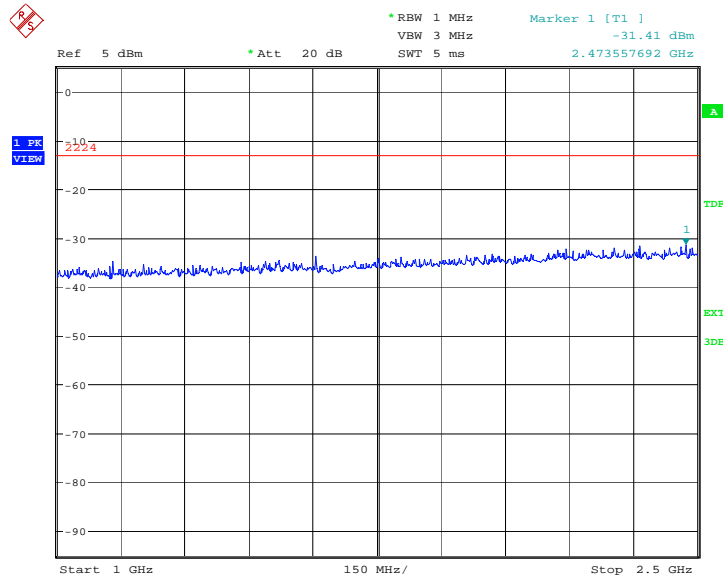
**NOTE: peak above the limit line is the carrier frequency.**



Date: 28.SEP.2013 12:11:28

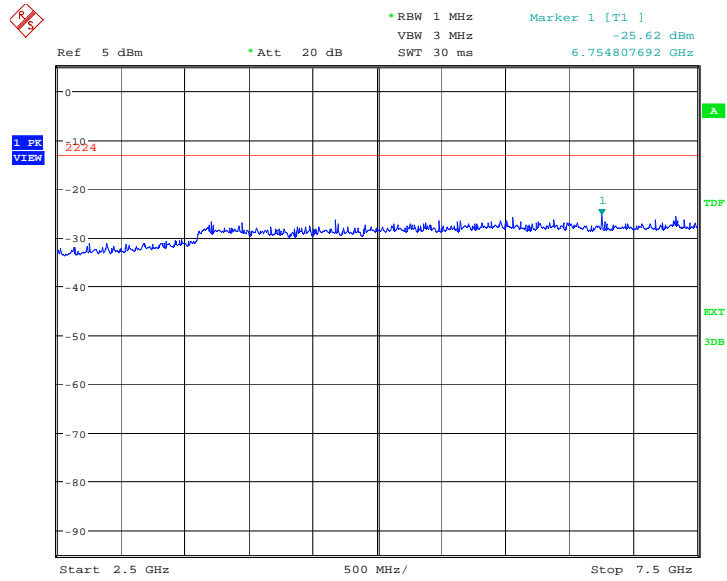
**A. 8.3.34 Channel 4233: 1GHz – 2.5GHz**

Spurious emission limit –13dBm.



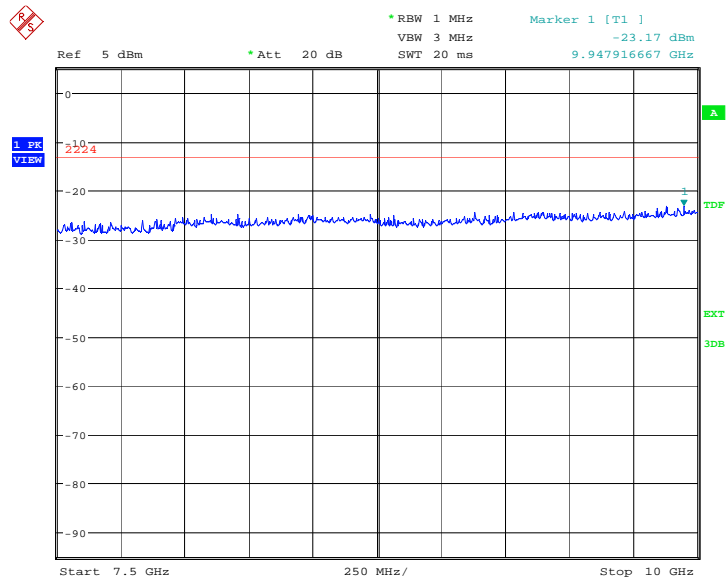
Date: 28.SEP.2013 12:11:56

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



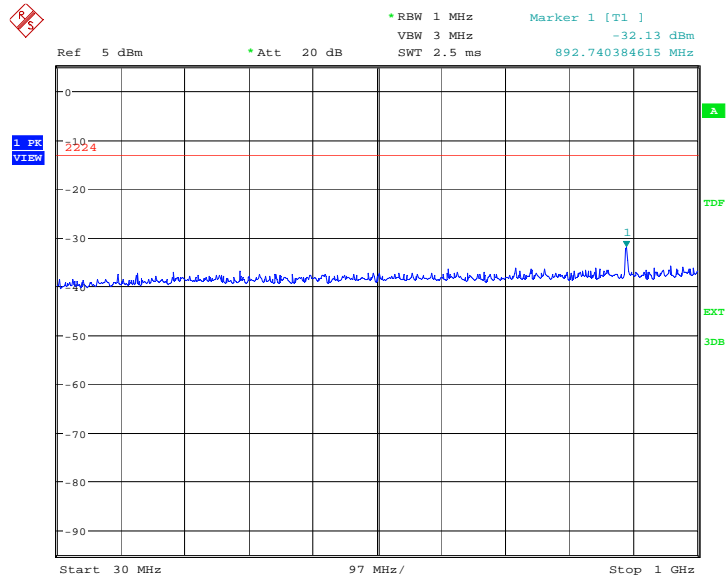
Date: 28.SEP.2013 12:12:24

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



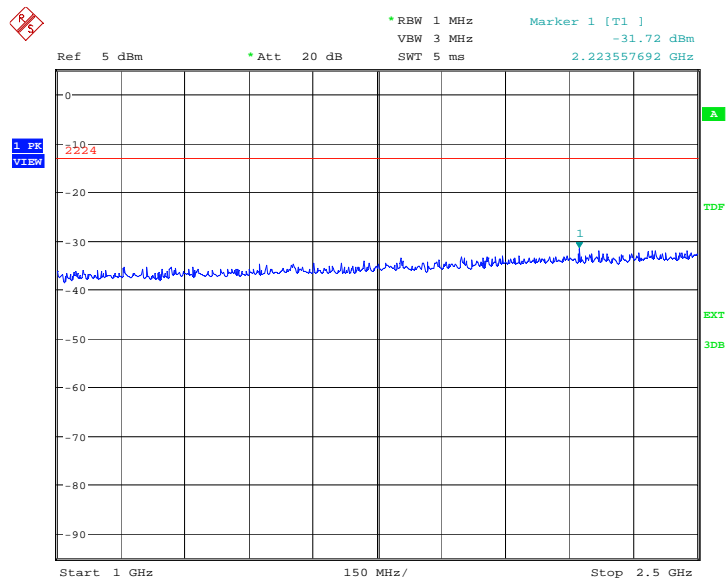
Date: 28.SEP.2013 12:12:52

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



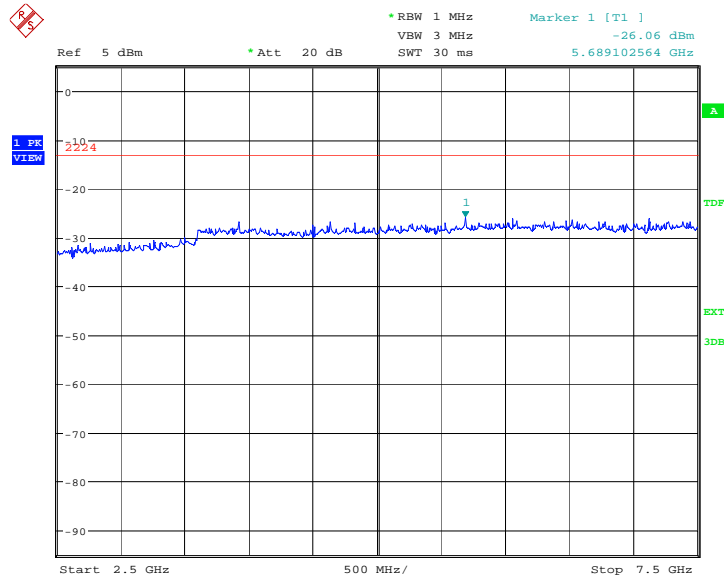
Date: 28.SEP.2013 12:13:21

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



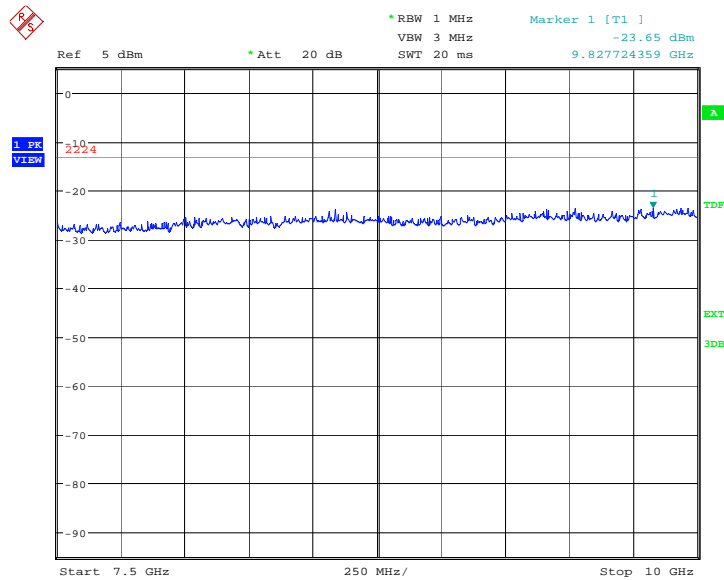
Date: 28.SEP.2013 12:13:50

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



Date: 28.SEP.2013 12:14:18

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



Date: 28.SEP.2013 12:14:46

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