



# TEST REPORT

No. I14Z45690-GTE01

for

**TCT Mobile Limited**

**HSUPA/HSDPA+/UMTS triband/GSM quad-band mobile phone**

**Model Name: Yaris 4 ULC**

**Marketing Name: 4032E**

**FCC ID : RAD498**

with

**Hardware Version: PIO**

**Software Version: vE71**

**Issued Date: 2014-04-10**

**Note:**

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

**Test Laboratory:**

***DAR accreditation (DIN EN ISO/IEC 17025): No. D-PL-12123-01-01***

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

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

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

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

Tel:+86(0)10-62304633-2604, Fax:+86(0)10-62304633, Email:welcome@emcite.com, web: [www.emcite.com](http://www.emcite.com)

## **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>17</b>
<b>A.3 CONDUCTED EMISSION .....</b>	<b>23</b>
<b>A.4 FREQUENCY STABILITY .....</b>	<b>31</b>
<b>A.5 OCCUPIED BANDWIDTH .....</b>	<b>33</b>
<b>A.6 EMISSION BANDWIDTH.....</b>	<b>45</b>
<b>A.7 BAND EDGE COMPLIANCE .....</b>	<b>57</b>
<b>A.8 CONDUCTED SPURIOUS EMISSION.....</b>	<b>63</b>

## 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

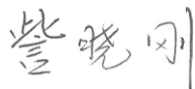
### 1.2. Testing Environment

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

### 1.3. Project data

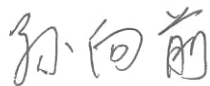
Testing Start Date: 2013-06-24  
Testing End Date: 2014-04-09

### 1.4. Signature



---

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



---

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



---

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

## **2. Client Information**

### **2.1. Applicant Information**

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

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

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

Description	HSUPA/HSDPA+/UMTS triband/GSM quad-band mobile phone
Model name	Yaris 4 ULC
Marketing name	4032E
FCC ID	RAD498
Frequency	GSM 850MHz; PCS 1900MHz; WCDMA Band II; WCDMA Band V
GPRS operation mode	Class B
GPRS Class	Class 12
EGPRS Class	Class 12
Antenna	Integrated
Power supply	Battery or Charger (AC Adaptor)
Output power	32.31dBm maximum ERP measured for GSM850
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.

Note: The EUT is a variant model of ONE TOUCH 4033E. Only CONDUCTED EMISSION has been tested. The other result is coming from ONE TOUCH 4033E.

#### **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>
UT03a	864748020000054	PIO	vE71

\*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	Battery
AE4	Battery
AE5	Travel charger
AE6	Travel charger
AE7	Travel charger
AE8	Travel charger

AE1

Model	CAB31P0000C1
Manufacturer	BYD
Capacitance	1300mAh

Nominal voltage	3.7V
AE2	
Model	CAB31P0000C3
Manufacturer	SCUD
Capacitance	1300mAh
Nominal voltage	3.7V
AE3	
Model	CAB60B0000C1
Manufacturer	BYD
Capacitance	1400mAh
Nominal voltage	3.7V
AE4	
Model	CAB60B0000C2
Manufacturer	BAK
Capacitance	1400mAh
Nominal voltage	3.7V
AE5	
Model	CBA3007AG0C1
Manufacturer	BYD
AE6	
Model	CBA3007AG0C2
Manufacturer	tenpao
AE7	
Model	CBA3002AG0C2
Manufacturer	Tenpao
AE8	
Model	CBA3002AG0C3
Manufacturer	Yingju

\*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 HSUPA/HSDPA+/UMTS triband/GSM quad-band mobile phone with integrated antenna. Manual and specifications of the EUT were provided to fulfil the test.

## 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	10-1-13 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-13 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

**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

### GSM 850

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	§2.1046(a), 22.913(a)	A.1	P
2	Emission Limit	22.917, 2.1051	A.2	P
3	CONDUCTED EMISSION	15.107/15.207	A.3	P
4	Frequency Stability	22.235, 2.1055	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P
6	Emission Bandwidth	22.917(b)	A.6	P
7	Band Edge Compliance	22.917(b)	A.7	P
8	Conducted Spurious Emission	22.917, 2.1057	A.8	P

### PCS 1900

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	24.232(b)	A.1	P
2	Emission Limit	24.238, 2.1051	A.2	P
3	CONDUCTED EMISSION	15.107/15.207	A.3	P
4	Frequency Stability	24.235, 2.1055	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	A.5	P
6	Emission Bandwidth	24.238(b)	A.6	P
7	Band Edge Compliance	24.238(b)	A.7	P
8	Conducted Spurious Emission	24.238, 2.1057	A.8	P

## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2015-03-03
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	2014-04-14
6	Universal Radio Communication Tester	CMU200	102228	R&S	2014-06-23
7	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2015-02-27
8	Spectrum Analyzer	E4440A	MY48250642	Agilent	2015-02-27
9	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
10	EMI Antenna	VULB 9163	9163 175	Schwarzbeck	2014-07-13
11	EMI Antenna	3117	00119021	ETS-Lindgren	2014-04-19
12	Signal Generator	N5183A	MY49060052	Agilent	2015-03-02
13	Climate chamber	SH-241	92003546	ESPEC	2014-05-11
14	Loop Antenna	HFH2-Z2	829324/007	R&S	2014-12-12

## **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 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 Communication tester (CMU-200). These measurements were done at 3 frequencies, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range).

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

RBW	VBW	Sweep Time	Span
1MHz	1MHz	300ms	10MHz

#### **GSM850**

##### **Limit**

	Power step	Nominal Peak output power (dBm)	Power & Multislot class	Operation class
GSM	5	33dBm(2W)	4	/
GPRS	3	33dBm(2W)	12	B
EGPRS	3	33dBm(2W)	12	B

#### **Measurement result**

##### **GSM (GMSK)**

Frequency(MHz)	Power Step	Output power(dBm)
824.2	5	31.75
836.6	5	31.78
848.8	5	31.85

##### **GPRS (GMSK, 1Slot)**

Frequency(MHz)	Power Step	Output power(dBm)
824.2	3	31.79
836.6	3	31.84
848.8	3	31.88

**EGPRS (GMSK, 1Slot)**

Frequency(MHz)	Power Step	Output power(dBm)
824.2	3	31.76
836.6	3	31.77
848.8	3	31.79

**PCS1900**

**Limit**

	Power step	Nominal Peak output power (dBm)	Power & Multislot class	Operation class
GSM	0	30dBm(1W)	1	/
GPRS	3	30dBm(1W)	12	B
EGPRS	3	30dBm(1W)	12	B

**Measurement result**

**GSM (GMSK)**

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	0	29.15
1880.0	0	29.17
1909.8	0	29.21

**GPRS (GMSK, 1Slot)**

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	3	29.19
1880.0	3	29.12
1909.8	3	29.20

**EGPRS (GMSK, 1Slot)**

Frequency(MHz)	Power Step	Output power(dBm)
1850.2	3	29.18
1880.0	3	29.10
1909.8	3	29.21

### A.1.3 Radiated

#### A.1.3.1 Description

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

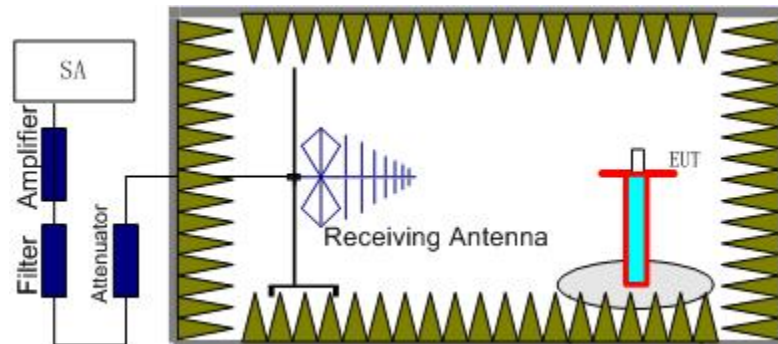
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

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

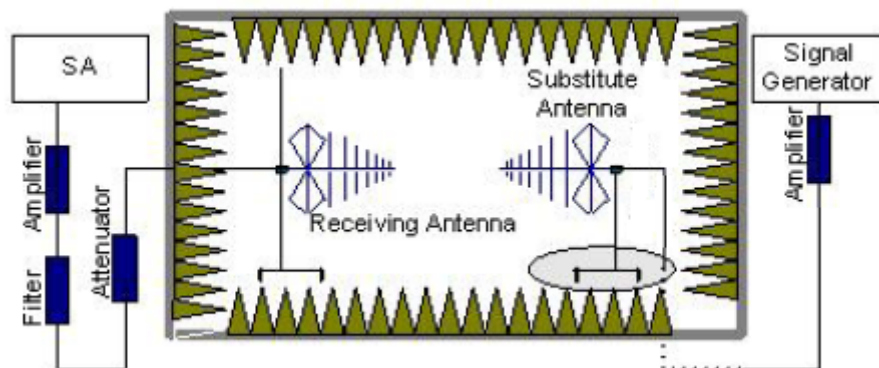
#### A.1.3.2 Method of Measurement

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

**GSM 850-ERP 22.913(a)**

**Limits**

	Power Step	Burst Peak ERP (dBm)
GSM	5	≤38.45dBm (7W)
GPRS	3	≤38.45dBm (7W)
EGPRS	3	≤38.45dBm (7W)

**Measurement result**

**GSM**

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
824.20	-16.89	2.07	-53.00	0.84	2.15	31.05	V
836.60	-15.56	2.08	-53.00	0.90	2.15	32.31	H
848.80	-15.93	2.09	-53.00	0.95	2.15	31.88	H

**GPRS**

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
824.20	-16.84	2.07	-53.00	0.84	2.15	31.10	H
836.60	-16.11	2.08	-53.00	0.90	2.15	31.76	H
848.80	-16.03	2.09	-53.00	0.95	2.15	31.78	H

**EGPRS (GMSK)**

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
824.20	-17.27	2.07	-53.00	0.84	2.15	30.67	H
836.60	-16.18	2.08	-53.00	0.90	2.15	31.69	H
848.80	-16.17	2.09	-53.00	0.95	2.15	31.64	H

Frequency: 836.60MHz

Peak ERP(dBm)= P<sub>Mea</sub>(-15.56dBm)- P<sub>cl</sub>(2.08dB) - P<sub>Ag</sub>(-53.00dB) - G<sub>a</sub> (0.90dB)-2.15dB=32.31dBm

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

**PCS1900-EIRP 24.232(b)**

**Limits**

	Power Step	Burst Peak EIRP (dBm)
GSM	0	≤33dBm (2W)
GPRS	3	≤33dBm (2W)
EGPRS	3	≤33dBm (2W)

**Measurement result**

**GSM**

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
1850.20	-22.57	3.19	-50.00	-4.56	28.80	V
1880.00	-20.92	3.11	-50.00	-4.43	30.40	V
1909.80	-21.22	3.18	-50.00	-4.30	29.90	V

**GPRS**

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
1850.20	-22.48	3.19	-50.00	-4.56	28.89	V
1880.00	-20.89	3.11	-50.00	-4.43	30.43	V
1909.80	-21.32	3.18	-50.00	-4.30	29.80	V

**EGPRS(GMSK)**

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
1850.20	-22.72	3.19	-50.00	-4.56	28.65	V
1880.00	-20.85	3.11	-50.00	-4.43	30.47	V
1909.80	-20.34	3.18	-50.00	-4.30	30.78	V

Frequency: 1880.00MHz

Peak EIRP(dBm)= P<sub>Mea</sub>(-20.85dBm) - P<sub>cl</sub>(3.11dB) - P<sub>Ag</sub>(-50.00dB) - G<sub>a</sub> (-4.43dB) =30.47dBm

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



## A.2 EMISSION LIMIT

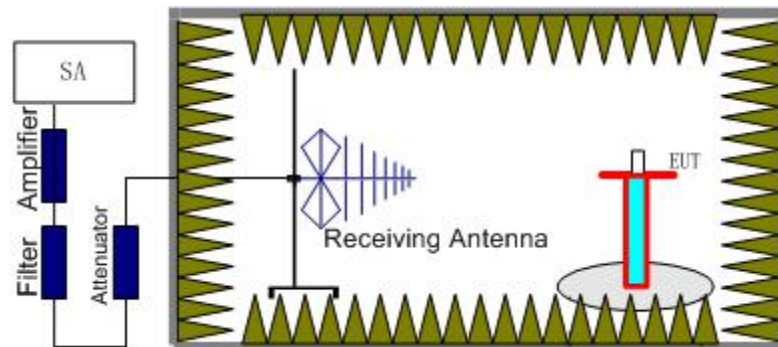
### A.2.1 Measurement Method

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

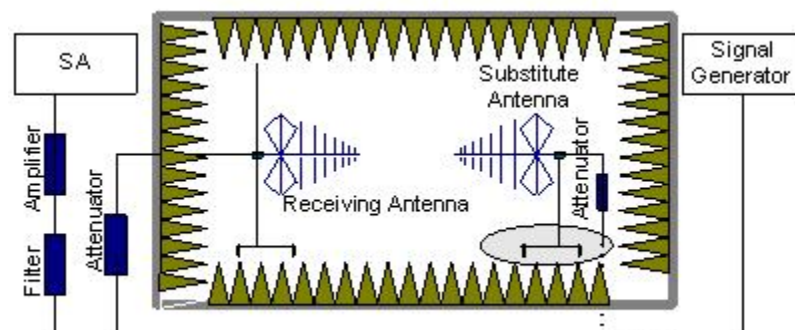
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set as outlined in Part 24.238 and Part 22.917. The spectrum is scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of PCS1900 and GSM850

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

**A.2.4 Measurement Results Table**

Frequency	Channel	Frequency Range	Result
GSM 850MHz	Low	30MHz-10GHz	Pass
	Middle	30MHz-10GHz	Pass
	High	30MHz-10GHz	Pass
GSM 1900MHz	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)
850MHz	0.03~1	1 MHz	3 MHz	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
1900MHz	0.03~1	1 MHz	3 MHz	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

**GSM Mode Channel 128/824.2MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1648.22	-42.46	2.91	-5.45	2.15	-42.07	-13.00	H
3625.75	-63.92	4.38	-8.05	2.15	-62.40	-13.00	V
5769.75	-55.20	5.69	-10.11	2.15	-52.93	-13.00	H
7417.09	-53.91	6.40	-11.35	2.15	-51.11	-13.00	H
8093.36	-63.62	6.96	-11.96	2.15	-60.77	-13.00	V
9066.71	-61.16	7.53	-12.60	2.15	-58.24	-13.00	V

**GSM Mode Channel 190/836.6MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1673.24	-39.45	2.97	-5.34	2.15	-39.23	-13.00	V
3694.34	-66.52	4.46	-8.13	2.15	-65.00	-13.00	V
4352.67	-67.90	4.87	-8.71	2.15	-66.21	-13.00	V
5107.33	-65.50	5.23	-9.76	2.15	-63.12	-13.00	V
5856.72	-53.34	5.67	-10.14	2.15	-51.02	-13.00	H
7123.07	-65.88	6.41	-11.17	2.15	-63.27	-13.00	H

**GSM Mode Channel 251/848.8MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1697.39	-42.90	2.95	-5.23	2.15	-42.77	-13.00	V
3395.00	-57.60	4.22	-7.65	2.15	-56.32	-13.00	H
4484.40	-67.37	4.90	-8.79	2.15	-65.63	-13.00	V
5941.95	-53.17	5.52	-10.18	2.15	-50.66	-13.00	H
7639.41	-53.51	6.72	-11.54	2.15	-50.84	-13.00	H
8711.35	-63.76	7.47	-12.37	2.15	-61.01	-13.00	V

**GSM Mode Channel 512/1850.2MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
3868.46	-67.14	4.53	-8.34	-63.33	-13.00	H
4997.97	-65.98	5.17	-9.70	-61.45	-13.00	H
9251.03	-50.78	7.65	-12.60	-45.83	-13.00	V
10050.39	-63.94	8.27	-12.41	-59.80	-13.00	V
12950.61	-56.76	8.85	-13.24	-52.37	-13.00	H
17586.06	-58.34	10.68	-13.35	-55.67	-13.00	V

**GSM Mode Channel 661/1880.0MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
3760.05	-59.95	4.52	-8.21	-56.26	-13.00	H
5006.53	-64.63	5.17	-9.70	-60.10	-13.00	V
5640.25	-55.99	5.45	-10.06	-51.38	-13.00	H
9400.12	-50.77	7.45	-12.60	-45.62	-13.00	H
10102.31	-64.70	8.20	-12.42	-60.48	-13.00	H
15039.52	-54.52	9.65	-13.49	-50.68	-13.00	H

**GSM Mode Channel 810/1909.8MHz**

Frequency(MHz)	P <sub>Mea</sub> (dBm)	Path Loss	Antenna Gain	Peak EIRP(dBm)	Limit (dBm)	Polarization
4555.03	-65.74	4.95	-8.90	-61.79	-13.00	V
5095.56	-67.89	5.21	-9.76	-63.34	-13.00	V
7139.38	-68.66	6.40	-11.18	-63.88	-13.00	V
9548.59	-49.09	7.78	-12.58	-44.29	-13.00	H
10080.71	-64.82	8.20	-12.42	-60.60	-13.00	V
13368.18	-54.81	9.07	-13.67	-50.21	-13.00	V

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

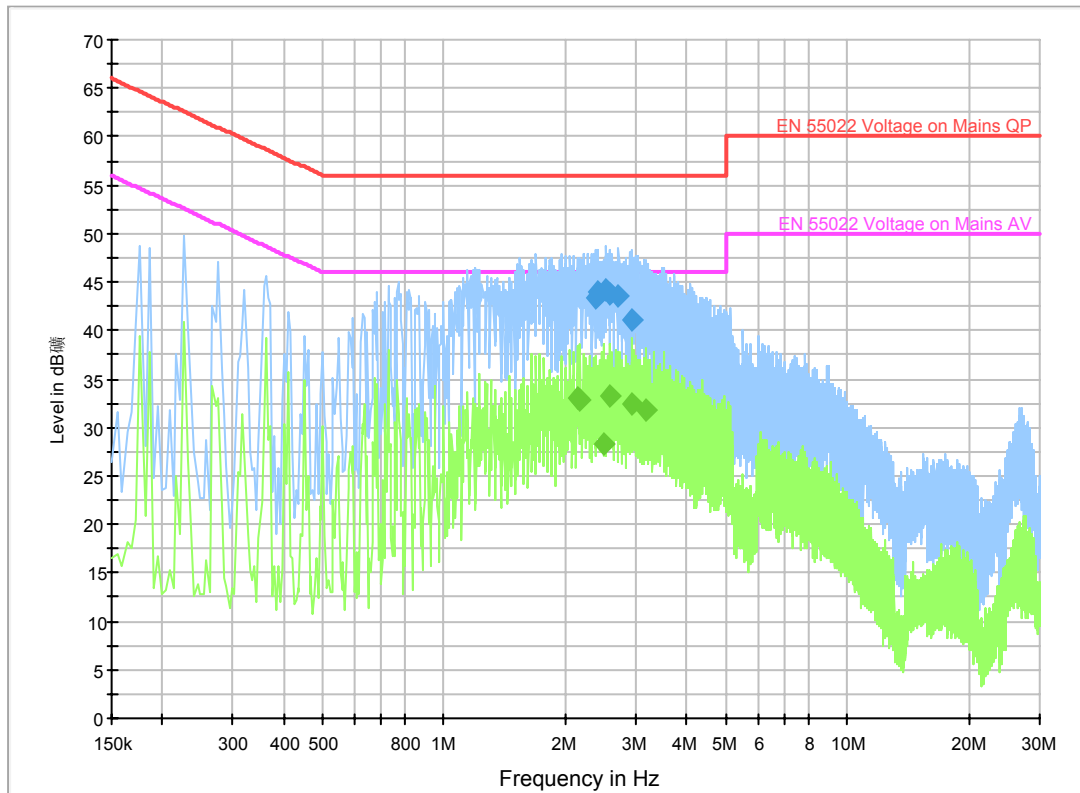
The measurement procedure in ANSI C63.4-1003 is used. Conducted Emission is measured with travel charger.

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

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

\* Decreases with logarithm of the frequency

**A.3.2 Measurement result**  
**GSM850MHz**



**Final Result 1**

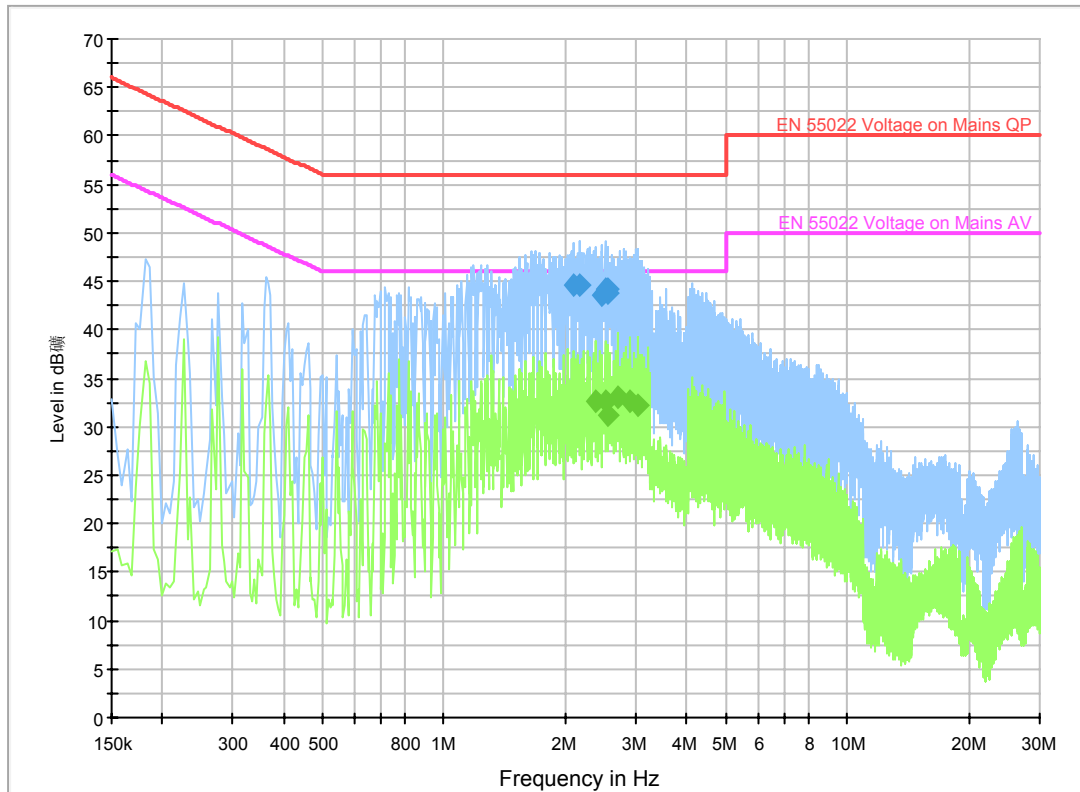
Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.377501	43.3	GND	N	9.9	12.7	56.0
2.409001	44.0	GND	N	9.9	12.0	56.0
2.530501	44.1	GND	N	9.9	11.9	56.0
2.575501	43.8	GND	N	9.9	12.2	56.0
2.710501	43.6	GND	N	9.9	12.4	56.0
2.908501	41.0	GND	N	9.9	15.0	56.0

**Final Result 2**

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.134501	33.0	GND	N	9.9	13.0	46.0
2.179501	32.9	GND	N	9.9	13.1	46.0
2.499001	28.4	GND	N	9.9	17.6	46.0
2.575501	33.2	GND	N	9.9	12.8	46.0
2.940001	32.5	GND	N	9.9	13.5	46.0
3.183001	31.7	GND	N	9.9	14.3	46.0



PCS1900MHz



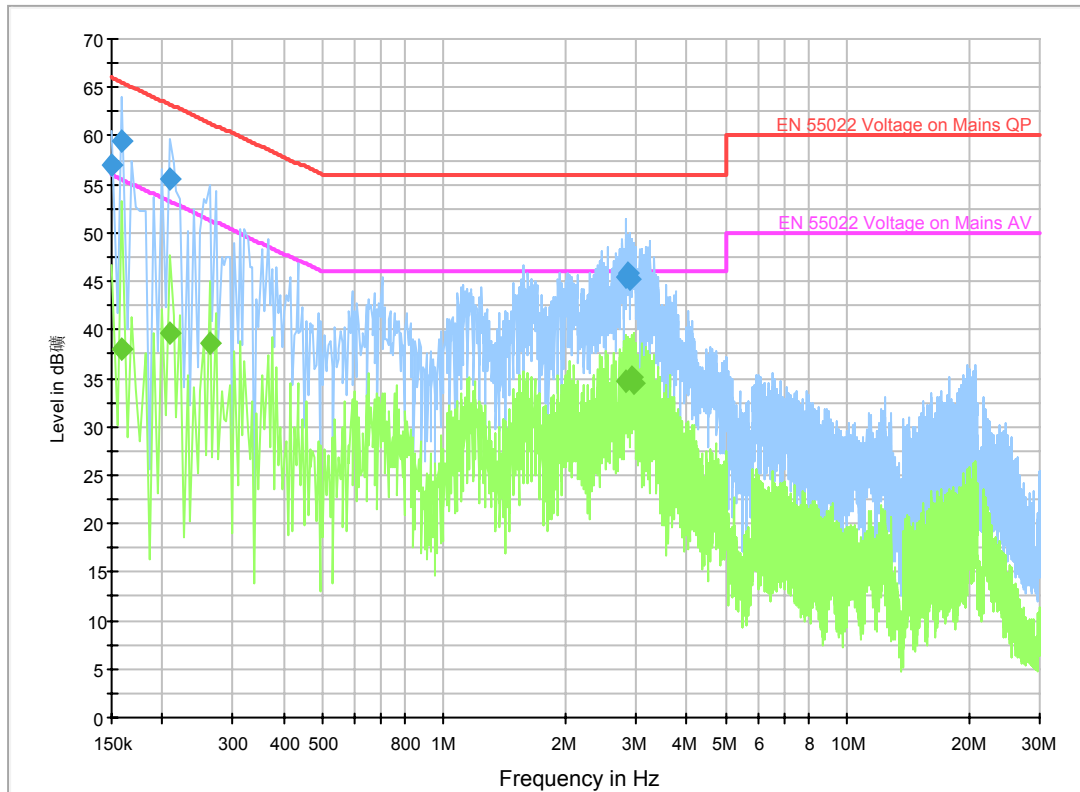
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.098501	44.6	GND	N	9.9	11.4	56.0
2.175001	44.5	GND	N	9.9	11.5	56.0
2.463001	43.6	GND	N	9.9	12.4	56.0
2.508001	44.1	GND	N	9.9	11.9	56.0
2.539501	44.2	GND	N	9.9	11.8	56.0
2.553001	43.8	GND	N	9.9	12.2	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.386501	32.6	GND	N	9.9	13.4	46.0
2.508001	32.7	GND	N	9.9	13.3	46.0
2.539501	31.2	GND	N	9.9	14.8	46.0
2.706001	32.9	GND	N	9.9	13.1	46.0
2.904001	32.5	GND	N	9.9	13.5	46.0
3.025501	32.2	GND	N	9.9	13.8	46.0

PCS1900MHz



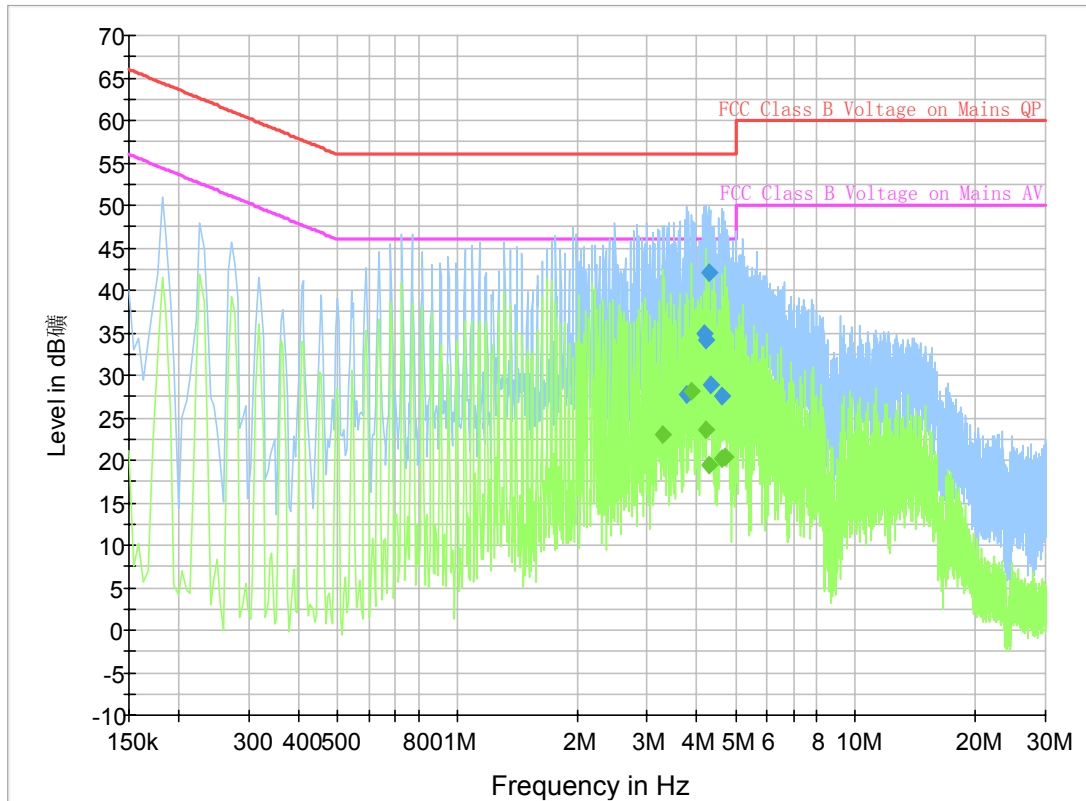
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150001	56.9	GND	N	9.9	9.1	66.0
0.159001	59.4	GND	N	9.9	6.1	65.5
0.208501	55.6	GND	N	9.9	7.7	63.3
2.818501	45.4	GND	N	9.9	10.6	56.0
2.850001	45.8	GND	N	9.9	10.2	56.0
2.881501	45.1	GND	N	9.9	10.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.159001	38.1	GND	N	9.9	17.4	55.5
0.208501	39.6	GND	N	9.9	13.7	53.3
0.262501	38.6	GND	N	9.9	12.7	51.4
2.836501	34.8	GND	N	9.9	11.2	46.0
2.913001	35.1	GND	N	9.9	10.9	46.0
2.958001	34.4	GND	N	9.9	11.6	46.0

PCS1900MHz



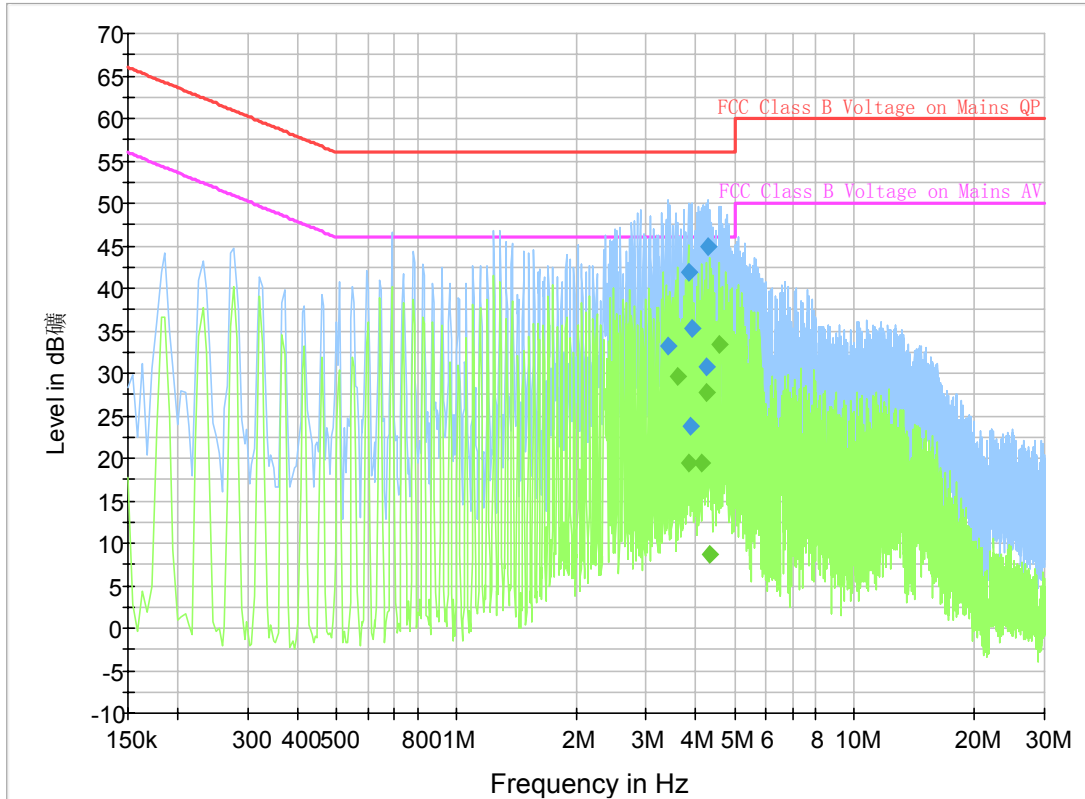
**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
3.763500	27.8	GND	L1	9.7	28.2	56.0
4.182000	35.0	GND	L1	9.7	21.0	56.0
4.227000	34.2	GND	L1	9.7	21.8	56.0
4.272000	42.1	GND	L1	9.7	13.9	56.0
4.312500	28.8	GND	L1	9.7	27.2	56.0
4.636500	27.6	GND	L1	9.8	28.4	56.0

**Final Result 2**

Frequency (MHz)	Average (dBμV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
3.268500	23.0	GND	L1	9.7	23.0	46.0
3.862500	28.2	GND	L1	9.7	17.8	46.0
4.227000	23.5	GND	L1	9.7	22.5	46.0
4.272000	19.5	GND	L1	9.7	26.5	46.0
4.636500	20.1	GND	L1	9.8	25.9	46.0
4.722000	20.3	GND	L1	9.8	25.7	46.0

PCS1900MHz



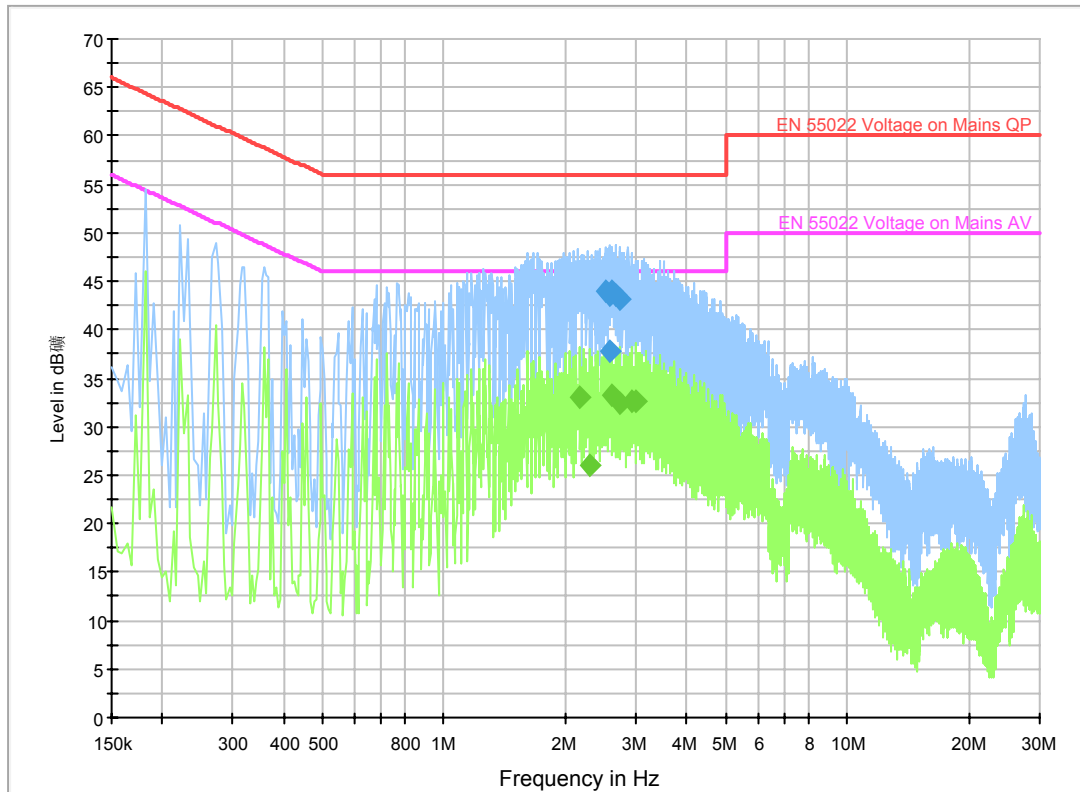
**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
3.403500	33.1	GND	L1	9.7	22.9	56.0
3.822000	41.9	GND	L1	9.7	14.1	56.0
3.862500	23.8	GND	N	9.7	32.2	56.0
3.907500	35.2	GND	N	9.7	20.8	56.0
4.231500	30.8	GND	L1	9.7	25.2	56.0
4.285500	44.8	GND	L1	9.7	11.2	56.0

**Final Result 2**

Frequency (MHz)	Average (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
3.592500	29.6	GND	L1	9.7	16.4	46.0
3.822000	19.5	GND	L1	9.7	26.5	46.0
4.141500	19.5	GND	L1	9.7	26.5	46.0
4.236000	27.7	GND	L1	9.7	18.3	46.0
4.330500	8.6	GND	L1	9.7	37.4	46.0
4.564500	33.4	GND	L1	9.7	12.6	46.0

MP3



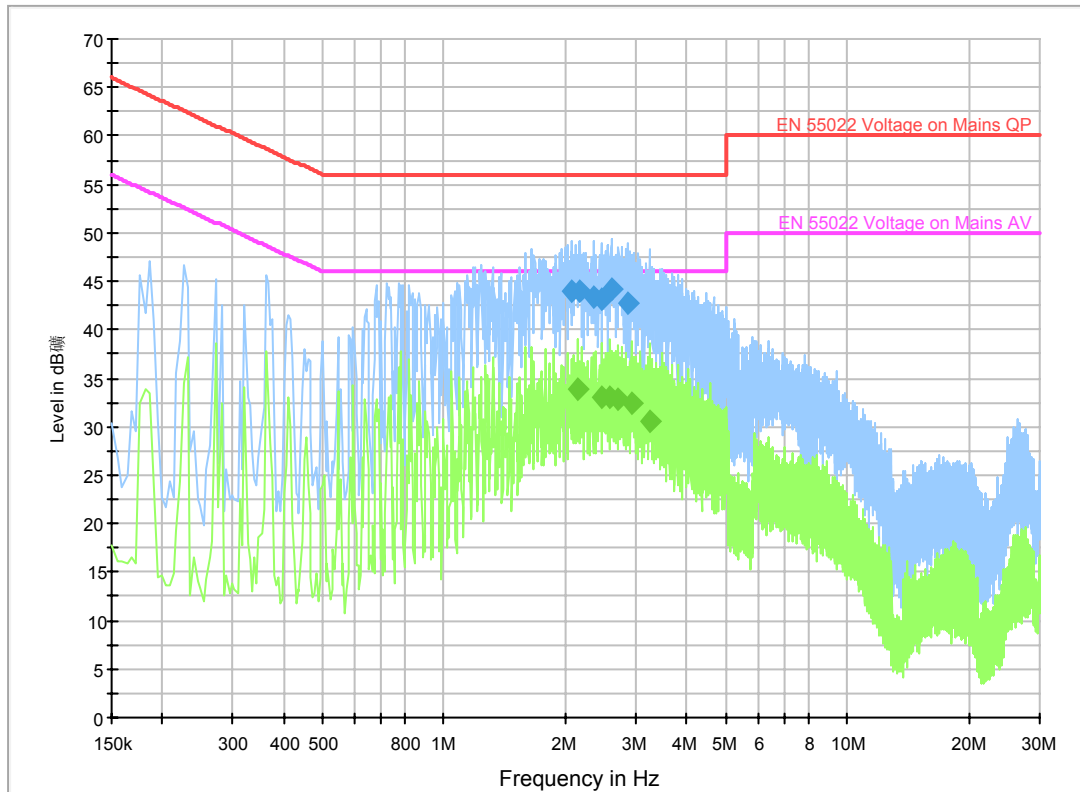
Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.508001	44.0	GND	N	9.9	12.0	56.0
2.566501	37.8	GND	L1	9.9	18.2	56.0
2.584501	43.7	GND	N	9.9	12.3	56.0
2.616001	44.0	GND	N	9.9	12.0	56.0
2.661001	43.5	GND	N	9.9	12.5	56.0
2.737501	43.2	GND	N	9.9	12.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.175001	33.0	GND	N	9.9	13.0	46.0
2.296501	26.1	GND	N	9.9	19.9	46.0
2.616001	33.1	GND	N	9.9	12.9	46.0
2.737501	32.5	GND	N	9.9	13.5	46.0
2.935501	32.6	GND	N	9.9	13.4	46.0
2.980501	32.6	GND	N	9.9	13.4	46.0

CAMERA



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.071501	44.0	GND	N	9.9	12.0	56.0
2.161501	44.1	GND	N	9.9	11.9	56.0
2.359501	43.3	GND	N	9.9	12.7	56.0
2.449501	43.3	GND	N	9.9	12.7	56.0
2.602501	44.1	GND	N	9.9	11.9	56.0
2.845501	42.7	GND	N	9.9	13.3	56.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
2.148001	33.9	GND	N	9.9	12.1	46.0
2.467501	33.0	GND	N	9.9	13.0	46.0
2.589001	33.1	GND	N	9.9	12.9	46.0
2.710501	32.8	GND	N	9.9	13.2	46.0
2.908501	32.4	GND	N	9.9	13.6	46.0
3.228001	30.6	GND	N	9.9	15.4	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 channel 661 for PCS 1900 and channel 190 for GSM850 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 3.8VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from overstress. These voltages represent a tolerance of -10 % and +12.5 %. For the purposes of measuring frequency stability these voltage limits are to be used.

#### **A.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

##### GSM 850

##### Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	16	0.019
3.8	52	0.062
4.2	15	0.018

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	22	0.026
-20	16	0.019
-10	14	0.017
0	16	0.020
10	20	0.024
20	22	0.026
30	14	0.017
40	19	0.023
50	23	0.028

##### PCS 1900

##### Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	34	0.018
3.8	23	0.012
4.2	26	0.014

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	39	0.021
-20	23	0.012
-10	24	0.013
0	41	0.022
10	39	0.021
20	26	0.014
30	32	0.017
40	33	0.017
50	32	0.017



## A.5 OCCUPIED BANDWIDTH

### A.5.1 Occupied Bandwidth Results

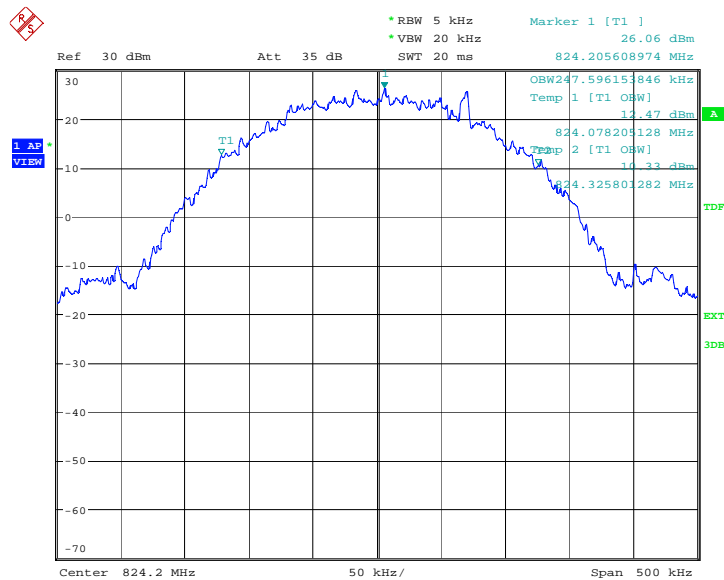
Similar to conducted emissions; occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. The table below lists the measured 99% BW. Spectrum analyzer plots are included on the following pages.

#### GSM 850(99% BW)

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
824.2	247.596
836.6	244.391
848.8	241.987

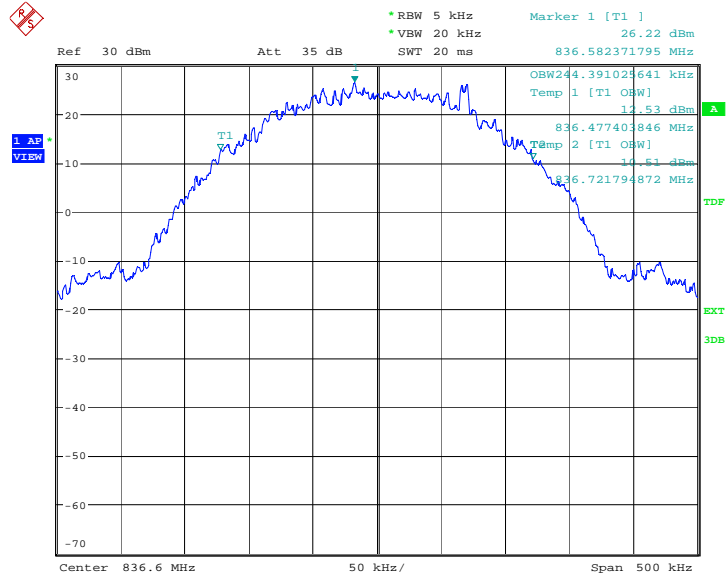
#### GSM 850

#### Channel 128-Occupied Bandwidth (99% BW)



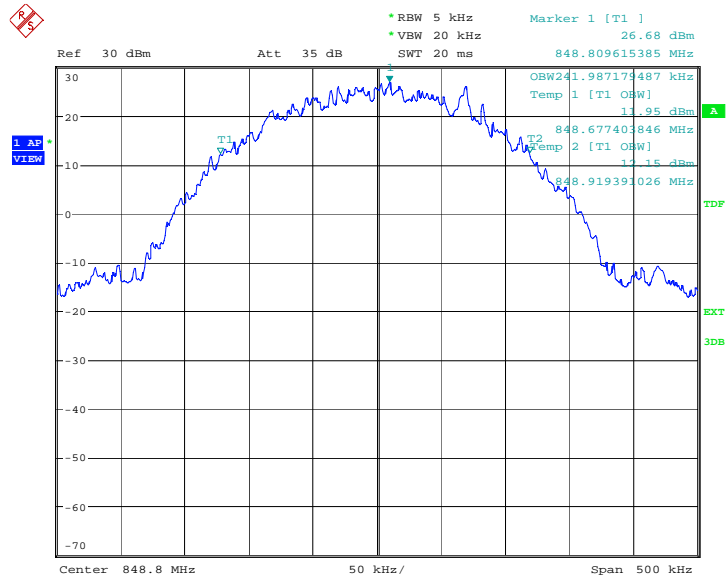
Date: 5.JUL.2013 09:03:10

### Channel 190-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 09:03:42

### Channel 251-Occupied Bandwidth (99% BW)



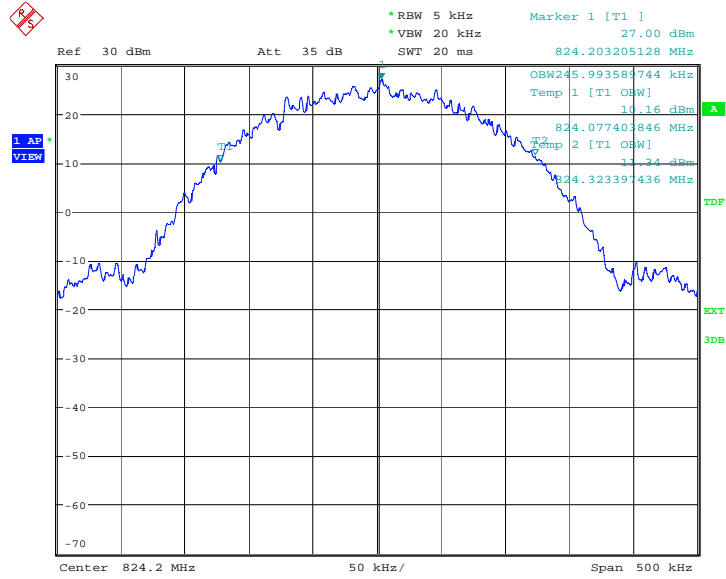
Date: 5.JUL.2013 09:04:14

**GPRS 850(99% BW)**

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
824.2	245.994
836.6	242.788
848.8	243.590

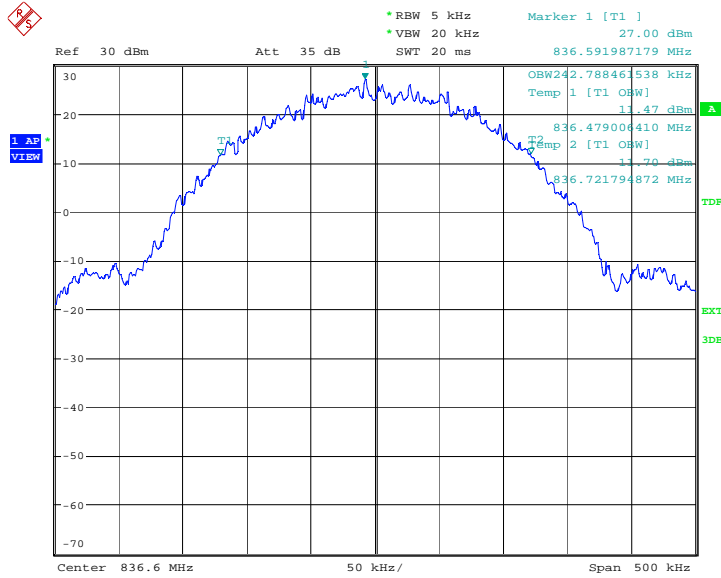
**GPRS 850**

**Channel 128-Occupied Bandwidth (99% BW)**



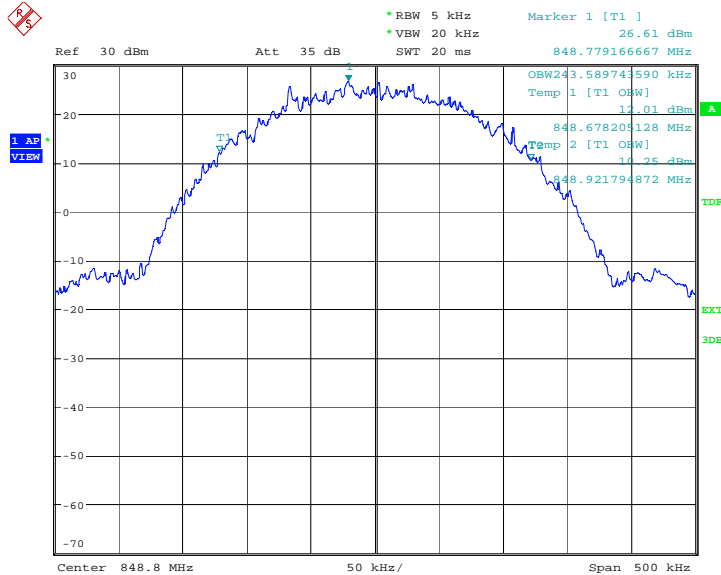
Date: 5.JUL.2013 08:33:29

### Channel 190-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 08:34:01

### Channel 251-Occupied Bandwidth (99% BW)



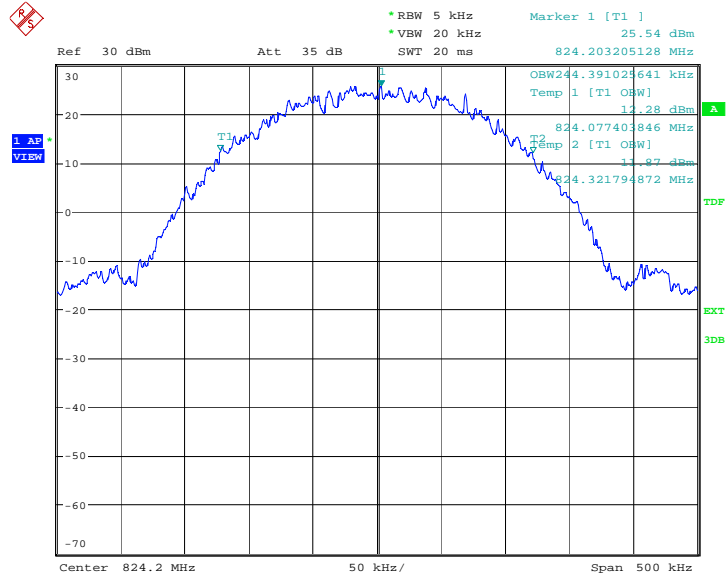
Date: 5.JUL.2013 08:34:33

**EGPRS 850(99% BW)**

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
824.2	244.391
836.6	244.391
848.8	243.590

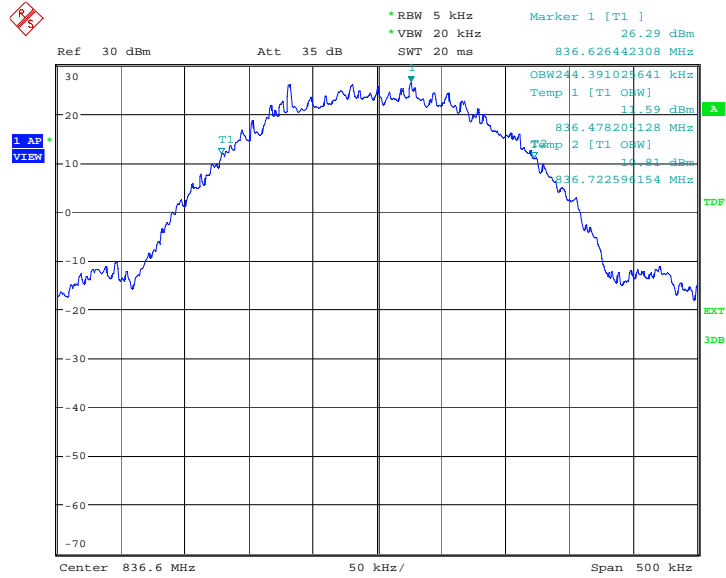
**EGPRS 850**

**Channel 128-Occupied Bandwidth (99% BW)**



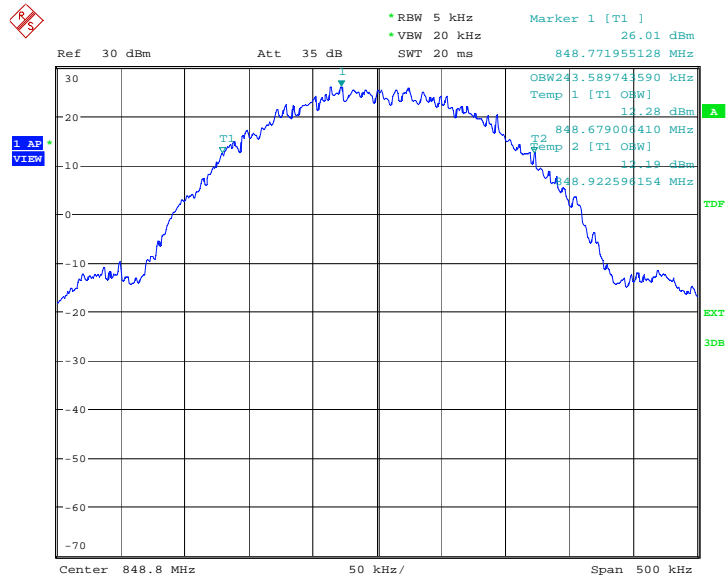
Date: 5.JUL.2013 08:51:19

### Channel 190-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 08:51:52

### Channel 251-Occupied Bandwidth (99% BW)



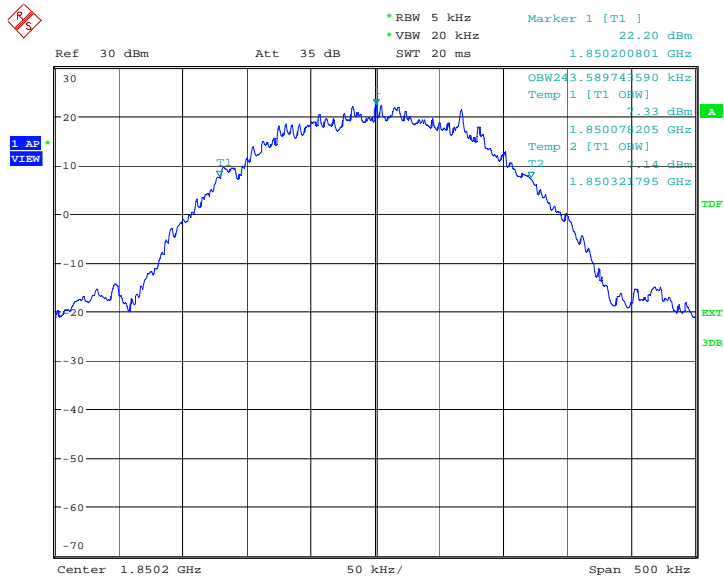
Date: 5.JUL.2013 08:52:24

**PCS 1900(99% BW)**

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
1850.2	243.590
1880.0	245.994
1909.8	245.192

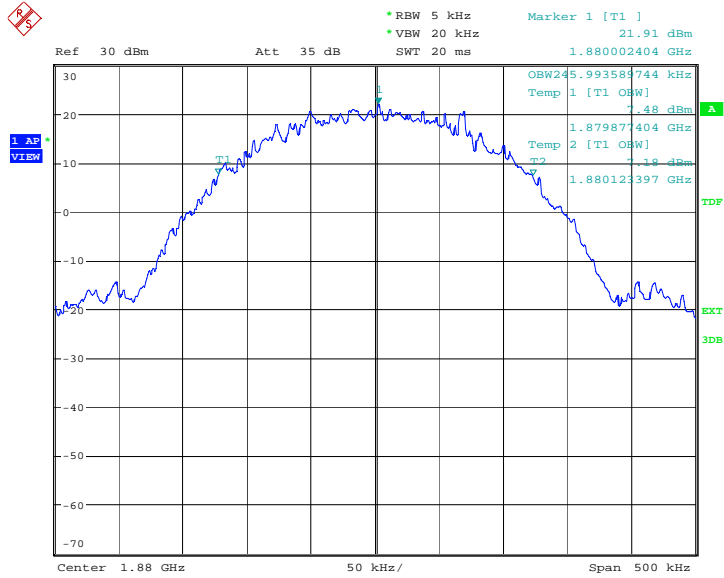
**PCS 1900**

**Channel 512-Occupied Bandwidth (99% BW)**



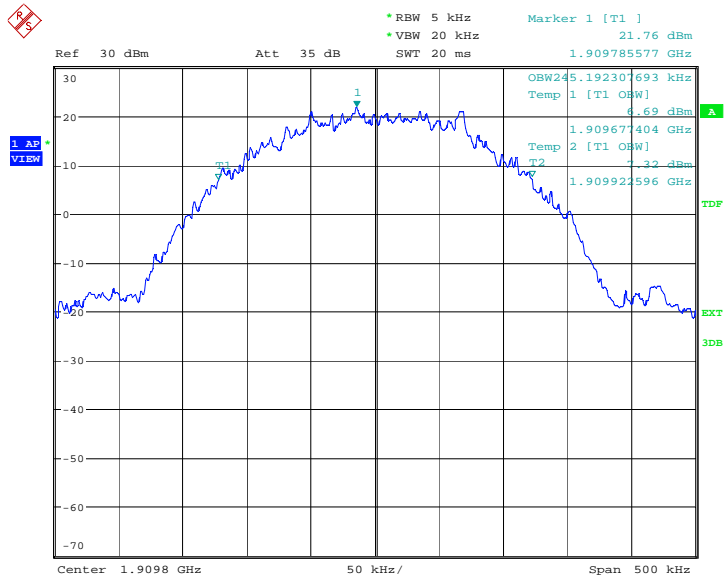
Date: 5.JUL.2013 09:16:57

### Channel 661-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 09:17:29

### Channel 810-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 09:18:01

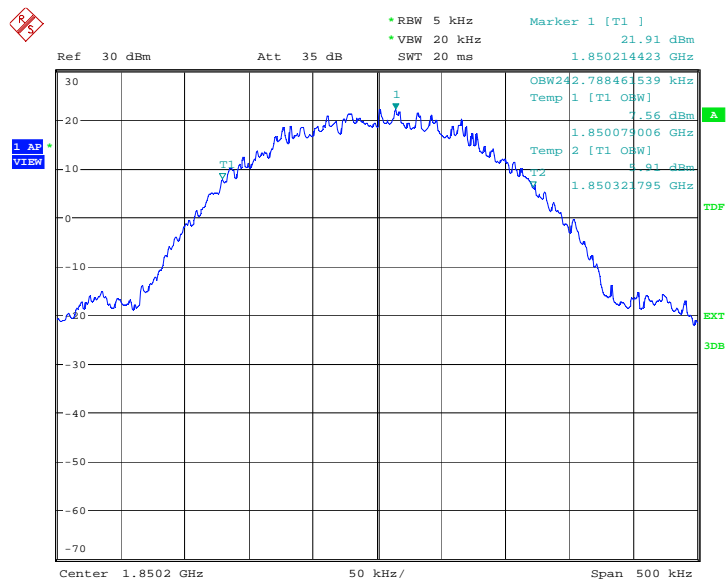


**GPRS 1900(99% BW)**

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
1850.2	242.788
1880.0	243.590
1909.8	247.596

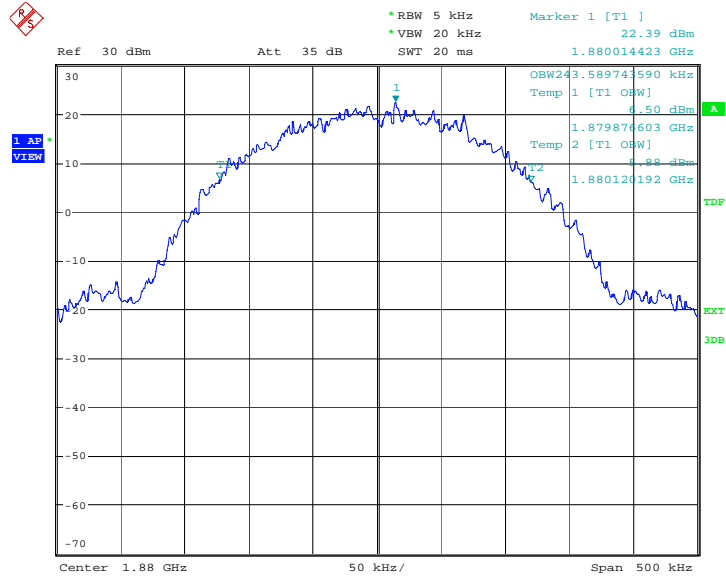
**GPRS 1900**

**Channel 512-Occupied Bandwidth (99% BW)**



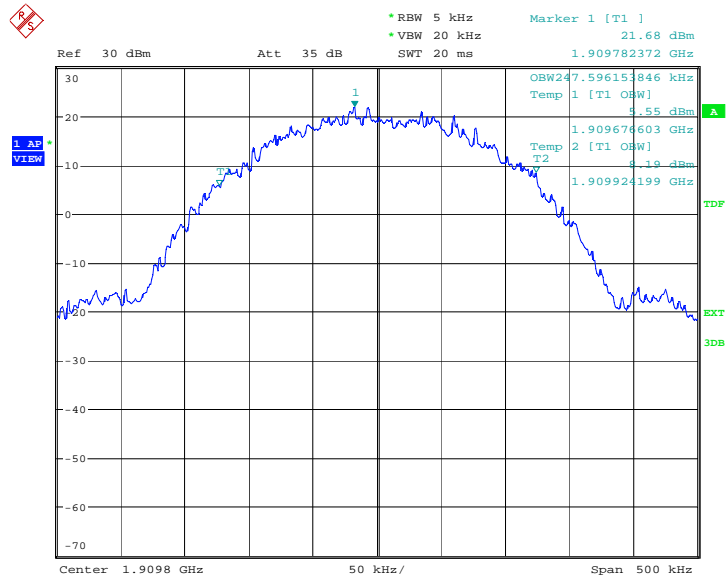
Date: 5.JUL.2013 08:40:46

### Channel 661-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 08:41:18

### Channel 810-Occupied Bandwidth (99% BW)



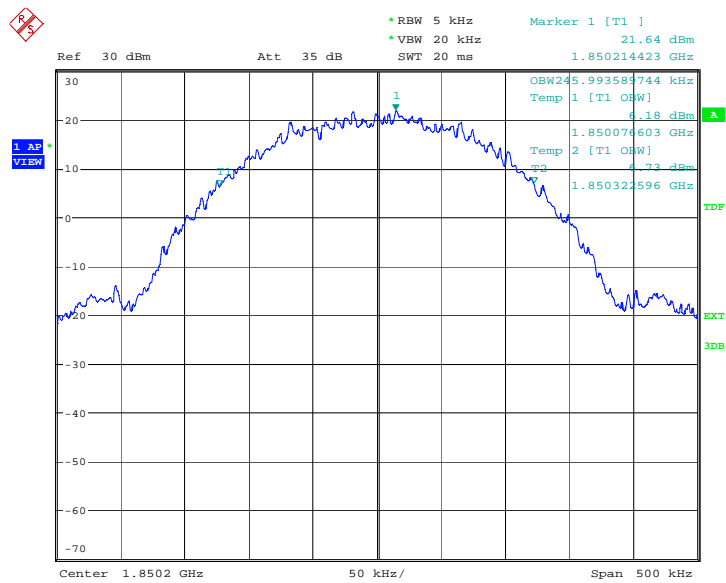
Date: 5.JUL.2013 08:41:50

**EGPRS 1900(99% BW)**

Frequency(MHz)	Occupied Bandwidth (99% BW)( kHz)
1850.2	245.994
1880.0	243.590
1909.8	242.788

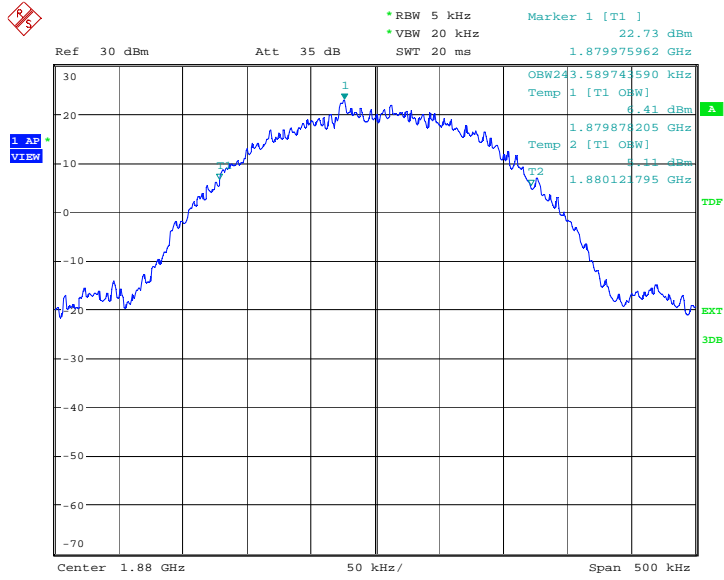
**EGPRS 1900**

**Channel 512-Occupied Bandwidth (99% BW)**



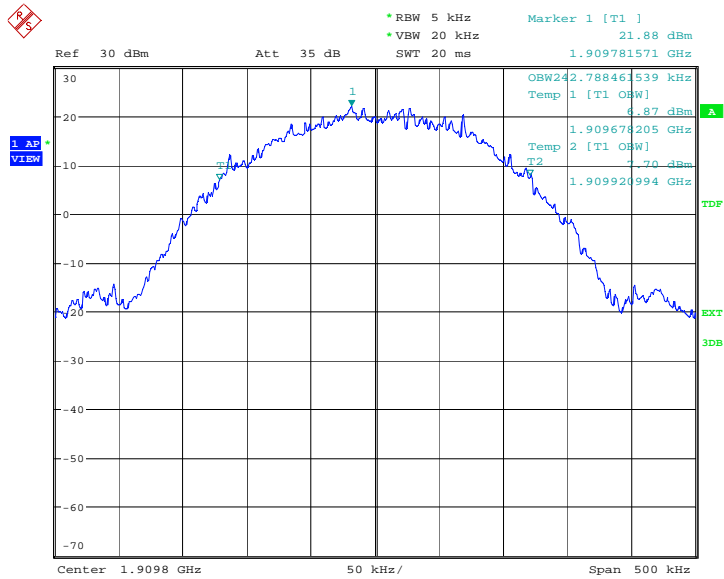
Date: 5.JUL.2013 08:57:05

### Channel 661-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 08:57:38

### Channel 810-Occupied Bandwidth (99% BW)



Date: 5.JUL.2013 08:58:10

## A.6 EMISSION BANDWIDTH

### A.6.1 Emission Bandwidth Results

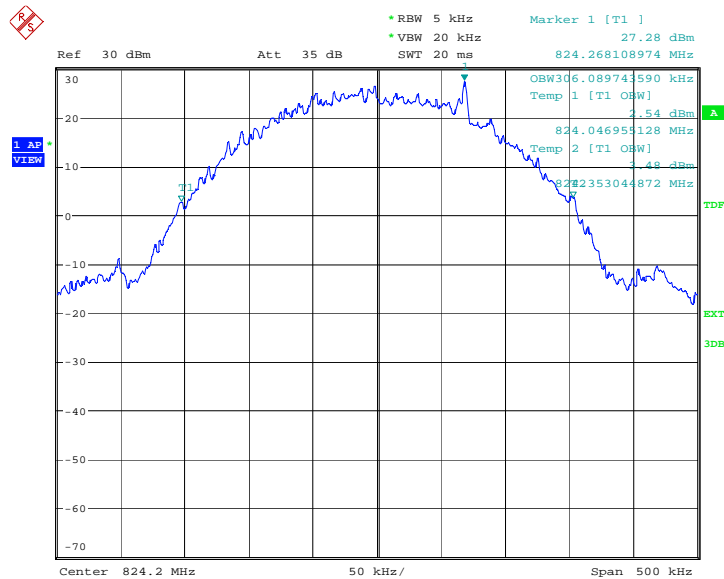
Similar to conducted emissions; Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of PCS1900 band and GSM850 band. Table below lists the measured 100% BW. Spectrum analyzer plots are included on the following pages.

#### GSM 850(100% BW)

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
824.2	306.090
836.6	306.090
848.8	306.891

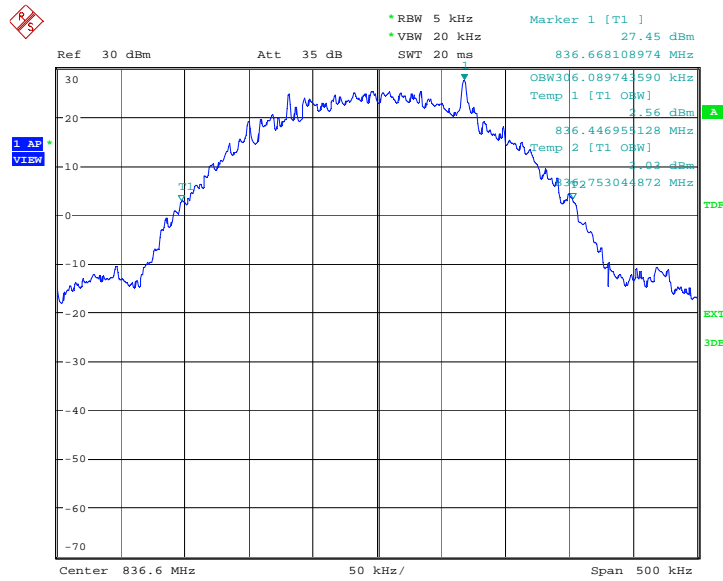
#### GSM 850

#### Channel 128-Emission Bandwidth (100% BW)



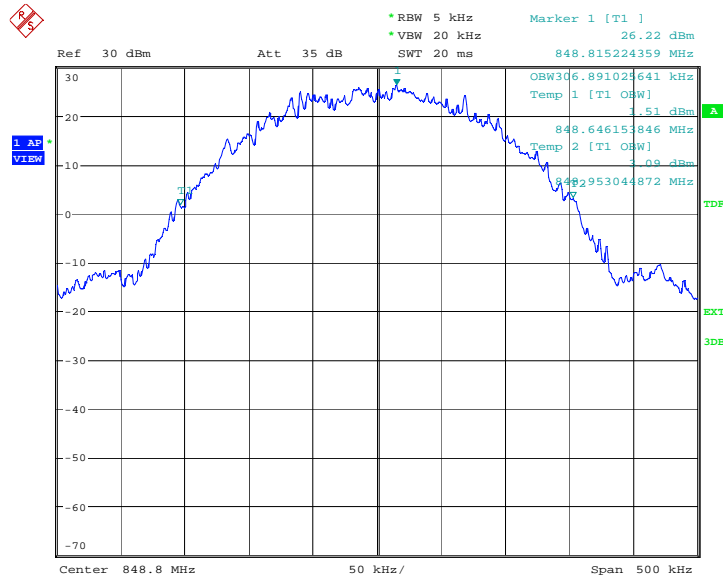
Date: 5.JUL.2013 09:04:48

### Channel 190-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 09:05:20

### Channel 251-Emission Bandwidth (100% BW)



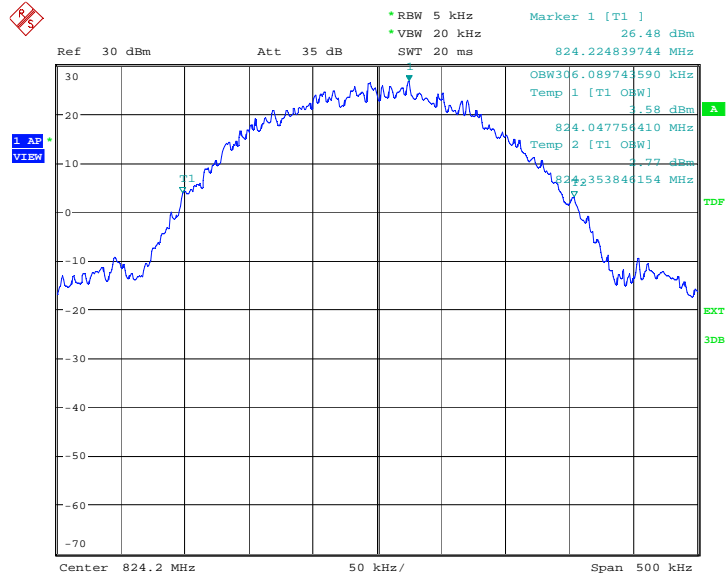
Date: 5.JUL.2013 09:05:52

**GPRS 850(100% BW)**

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
824.2	306.090
836.6	306.090
848.8	308.494

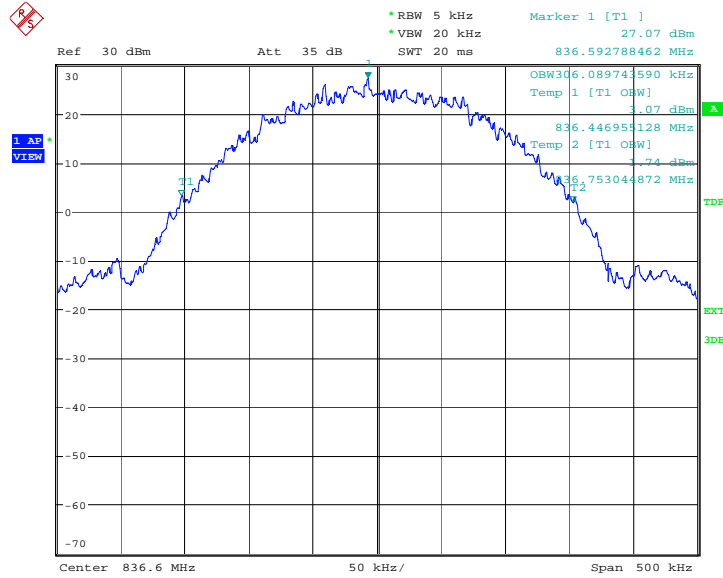
**GPRS 850**

**Channel 128-Emission Bandwidth (100% BW)**



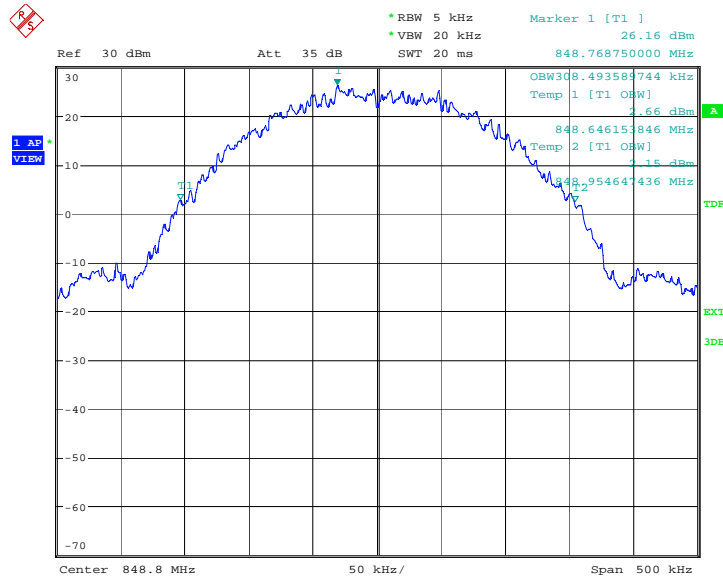
Date: 5.JUL.2013 08:35:07

### Channel 190-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 08:35:39

### Channel 251-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 08:36:11

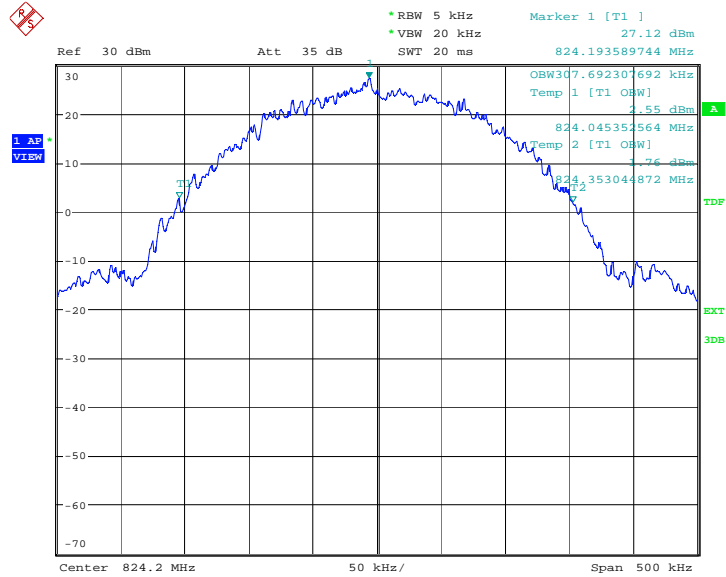


**EGPRS 850(100% BW)**

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
824.2	307.692
836.6	306.891
848.8	306.090

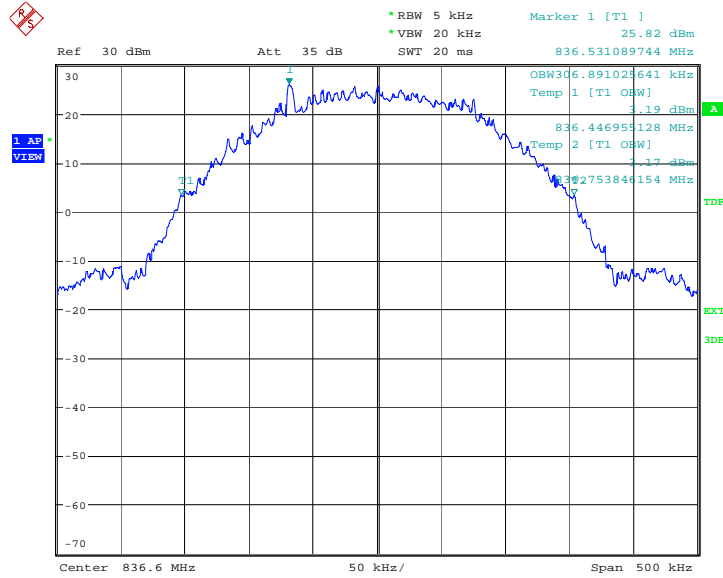
**EGPRS 850**

**Channel 128-Emission Bandwidth (100% BW)**



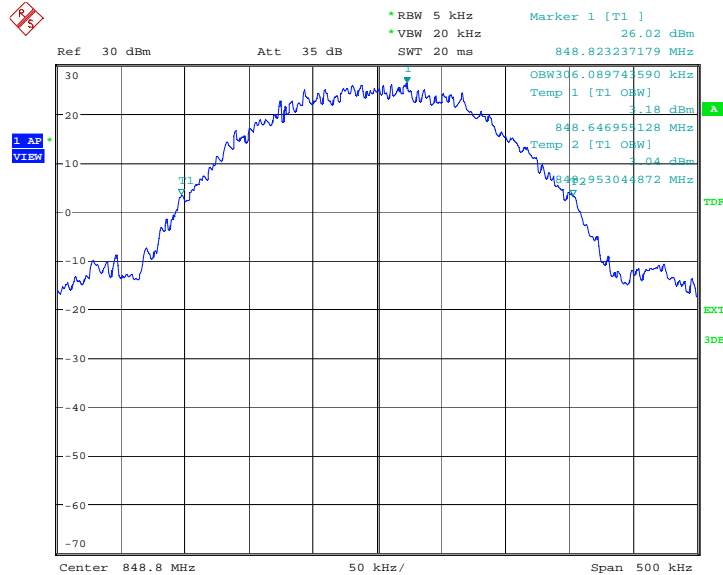
Date: 5.JUL.2013 08:52:57

### Channel 190-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 08:53:30

### Channel 251-Emission Bandwidth (100% BW)



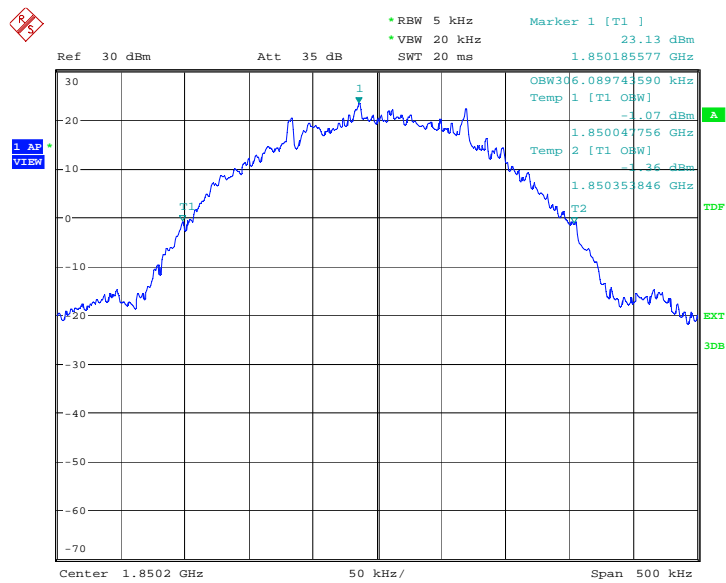
Date: 5.JUL.2013 08:54:02

**PCS 1900(100% BW)**

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
1850.2	306.090
1880.0	306.090
1909.8	309.295

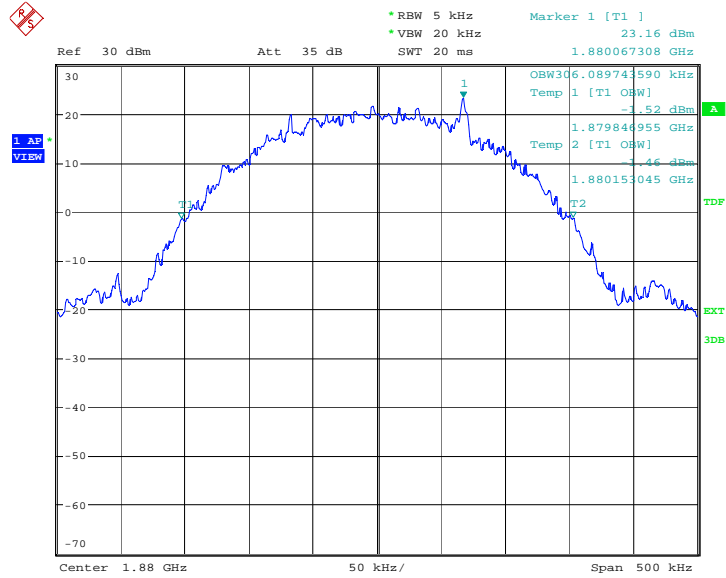
**PCS 1900**

**Channel 512-Emission Bandwidth (100% BW)**



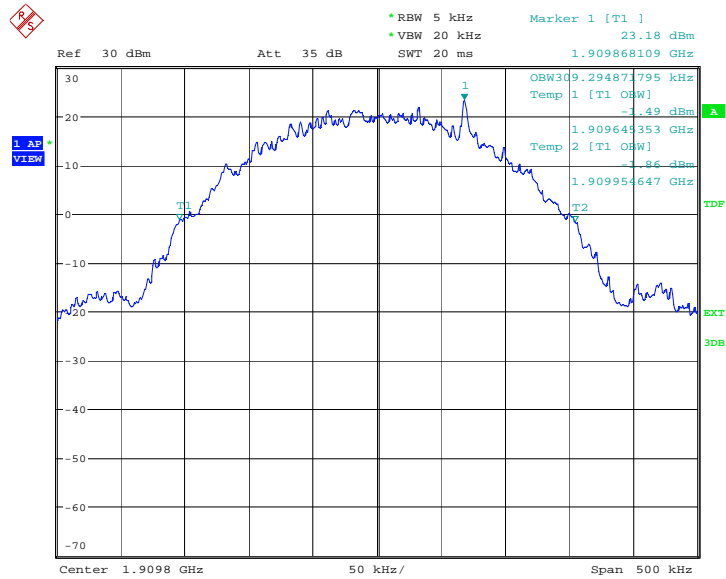
Date: 5.JUL.2013 09:18:35

### Channel 661-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 09:19:07

### Channel 810-Emission Bandwidth (100% BW)



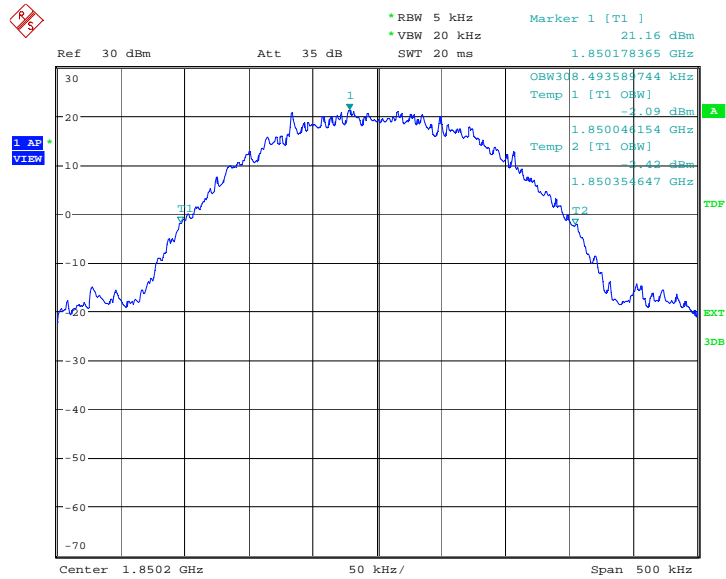
Date: 5.JUL.2013 09:19:39

**GPRS 1900(100% BW)**

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
1850.2	308.494
1880.0	306.090
1909.8	306.891

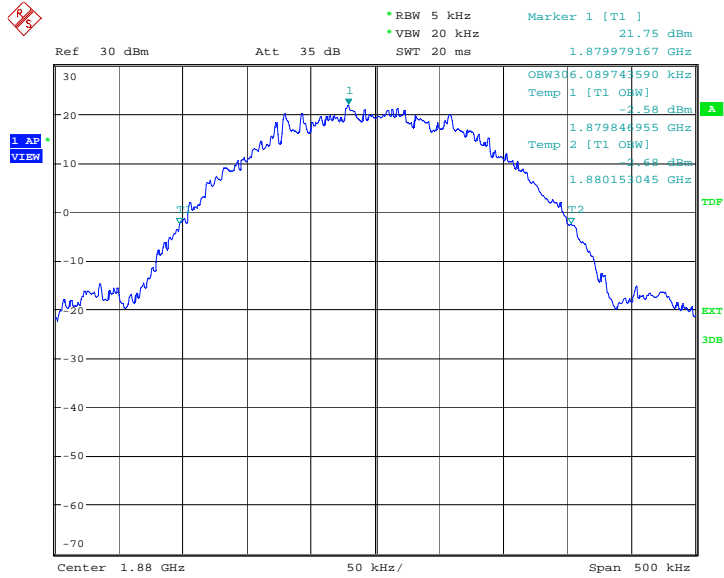
**GPRS 1900**

**Channel 512-Emission Bandwidth (100% BW)**



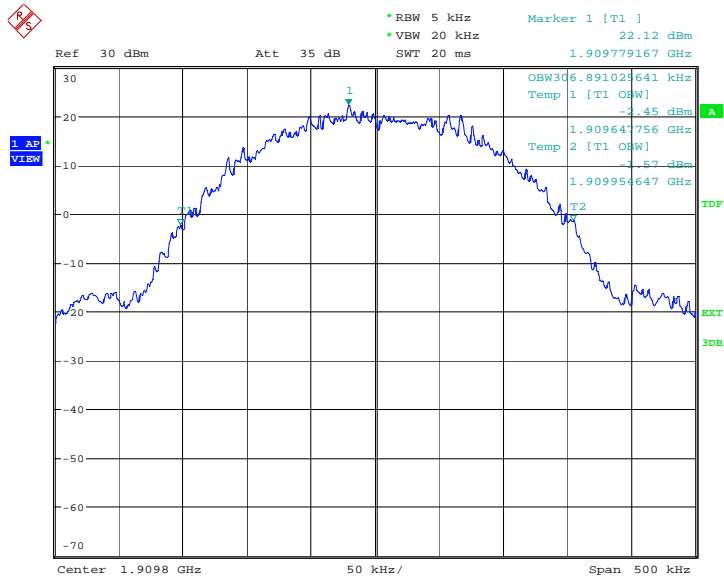
Date: 5.JUL.2013 08:42:24

### Channel 661-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 08:42:56

### Channel 810-Emission Bandwidth (100% BW)



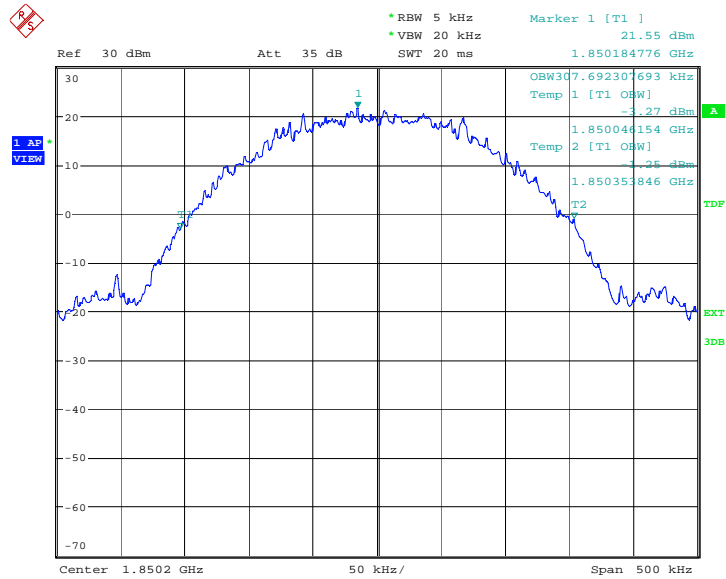
Date: 5.JUL.2013 08:43:28

**EGPRS 1900(100% BW)**

Frequency(MHz)	Emission Bandwidth (100% BW)( kHz)
1850.2	307.692
1880.0	307.692
1909.8	307.692

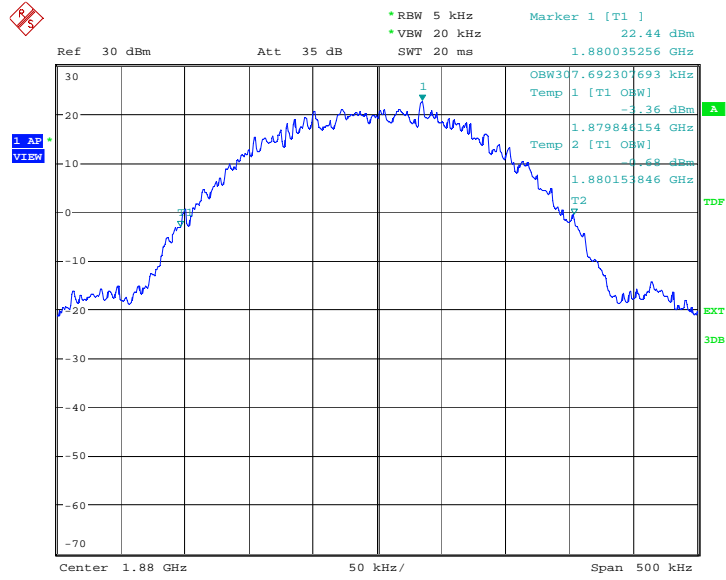
**EGPRS 1900**

**Channel 512-Emission Bandwidth (100% BW)**



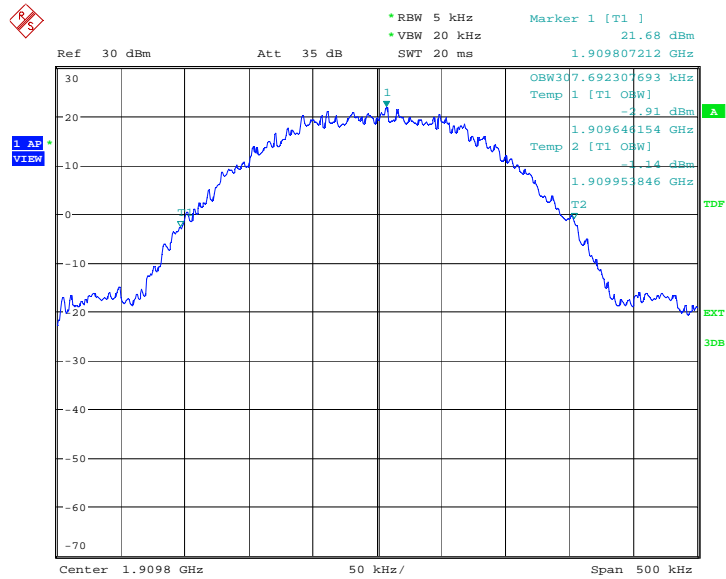
Date: 5.JUL.2013 08:58:43

### Channel 661-Emission Bandwidth (100% BW)



Date: 5.JUL.2013 08:59:15

### Channel 810-Emission Bandwidth (100% BW)



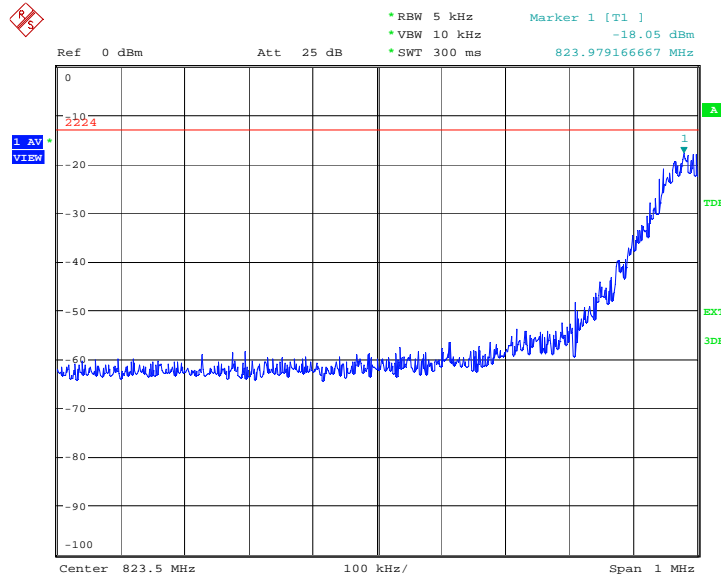
Date: 5.JUL.2013 08:59:48



## A.7 BAND EDGE COMPLIANCE

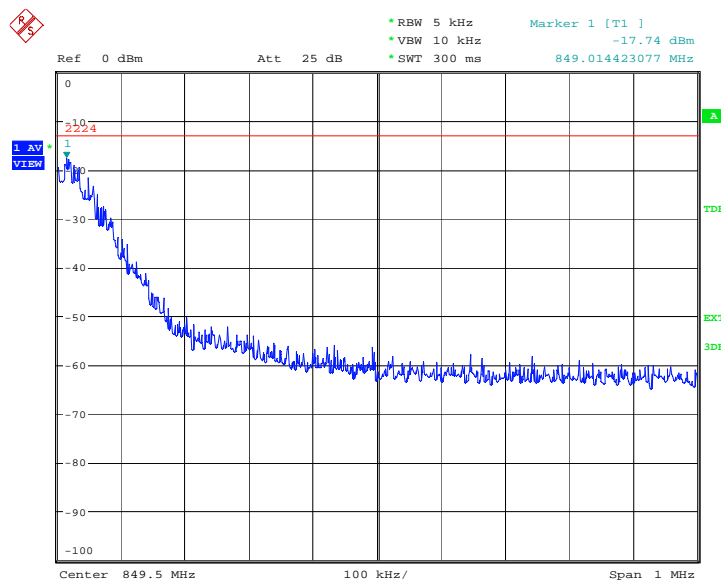
### GSM 850

#### LOW BAND EDGE BLOCK-A (GSM850)-Channel 128



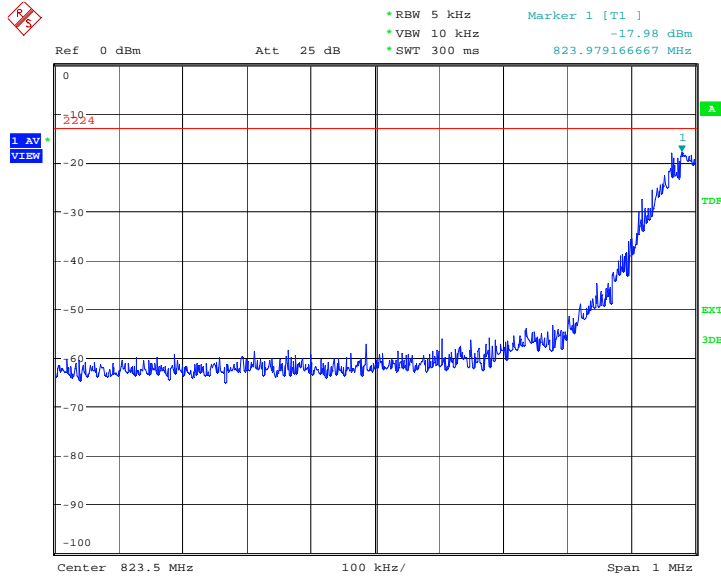
Date: 5.JUL.2013 09:06:06

#### HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251



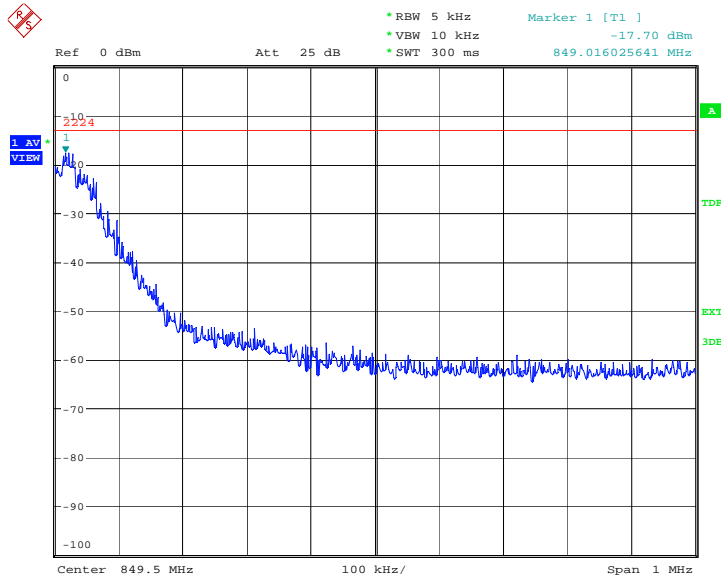
Date: 5.JUL.2013 09:06:20

**GPRS 850**  
**LOW BAND EDGE BLOCK-A (GSM850)-Channel 128**



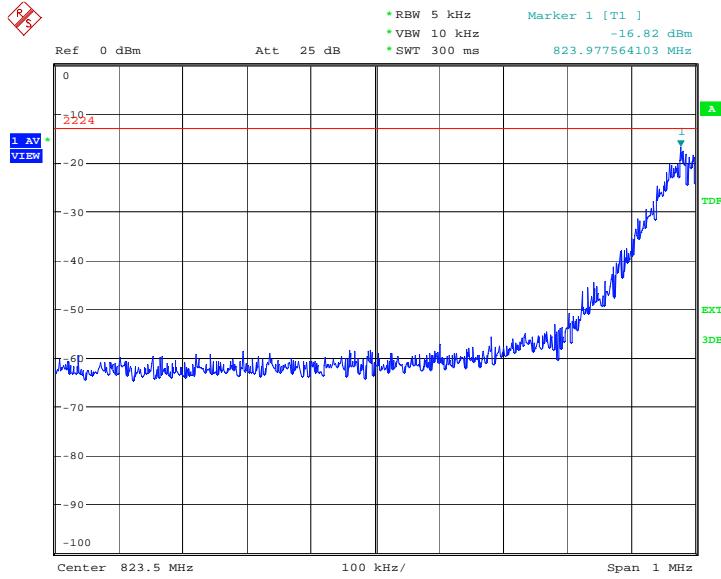
Date: 5.JUL.2013 08:36:25

**HIGH BAND EDGE BLOCK-C (GSM850) -Channel 251**



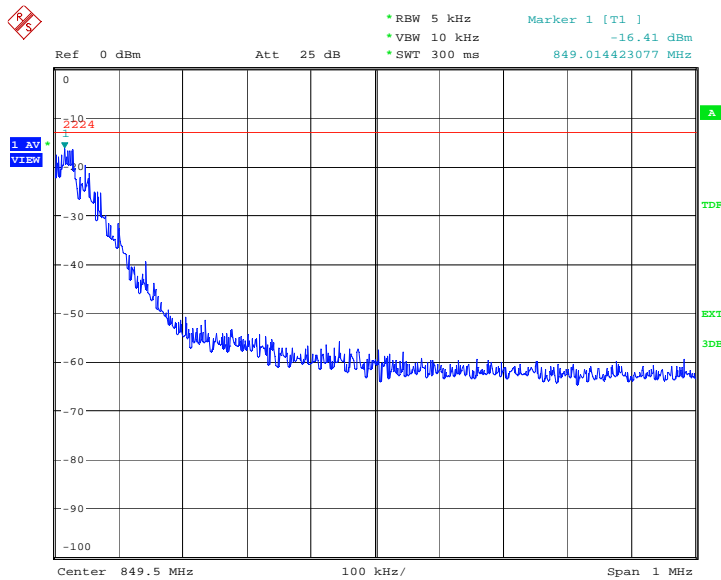
Date: 5.JUL.2013 08:36:39

**EGPRS 850**  
**LOW BAND EDGE BLOCK-A (GSM850)-Channel 128**



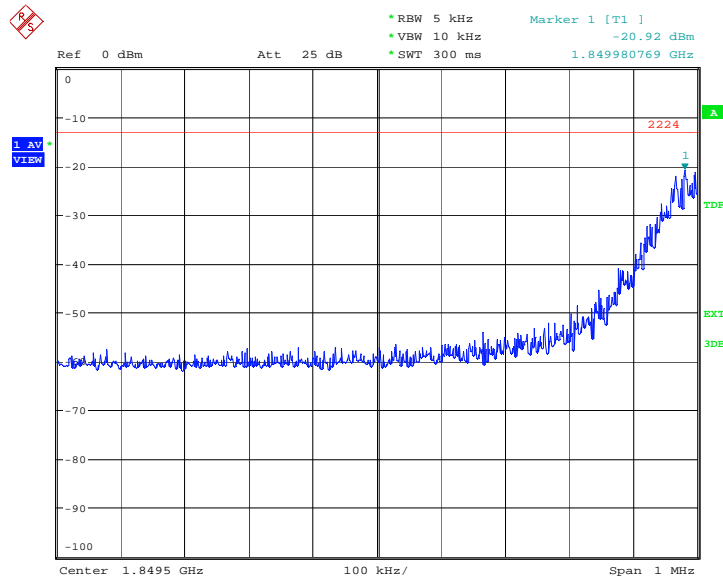
Date: 5.JUL.2013 08:54:16

**HIGH BAND EDGE BLOCK-C (GSM850) –Channel 251**



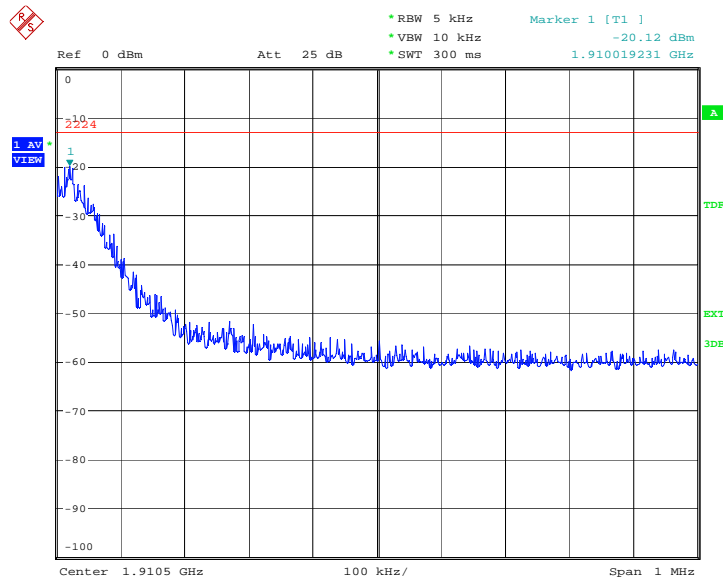
Date: 5.JUL.2013 08:54:29

**PCS 1900**  
**LOW BAND EDGE BLOCK-A (PCS-1900)-Channel 512**



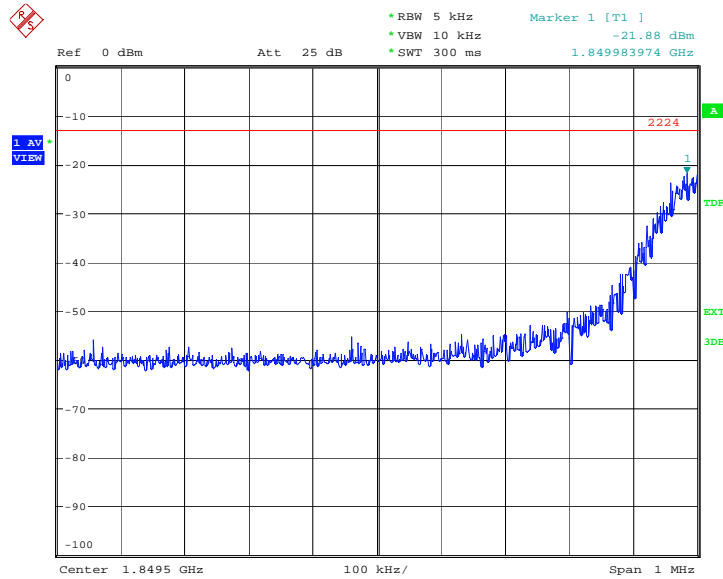
Date: 5.JUL.2013 09:19:53

**HIGH BAND EDGE BLOCK-C (PCS-1900) -Channel 810**



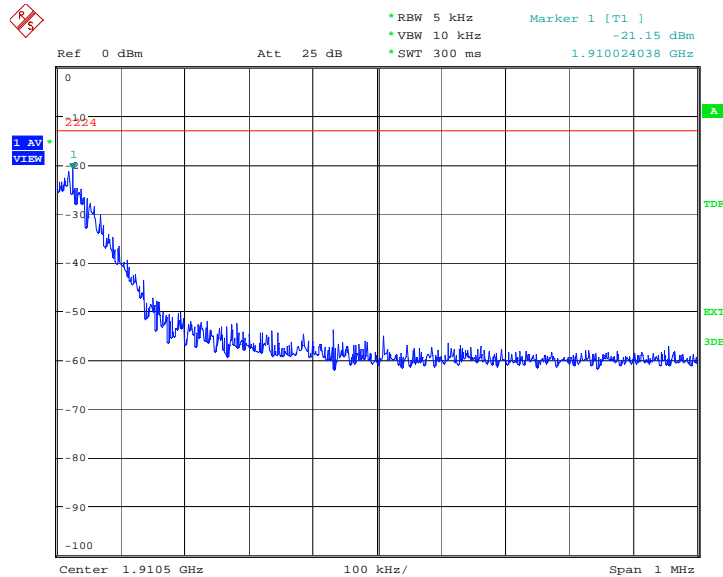
Date: 5.JUL.2013 09:20:07

**GPRS 1900**  
**LOW BAND EDGE BLOCK-A (PCS-1900)-Channel 512**



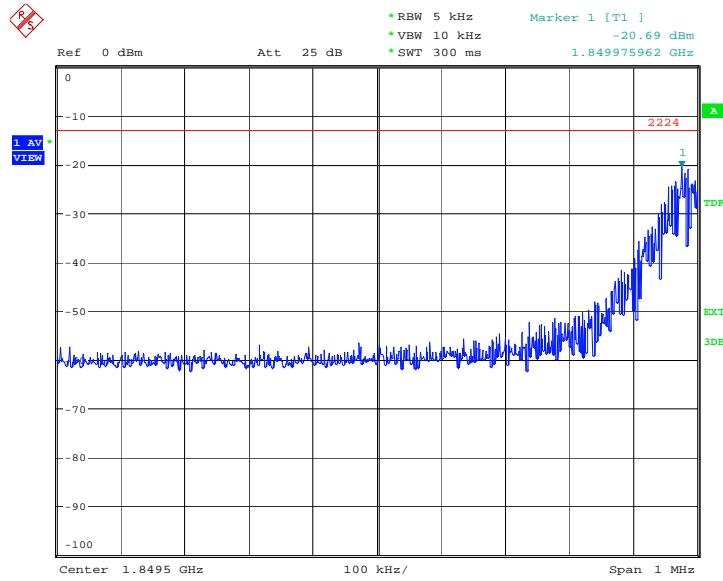
Date: 5.JUL.2013 08:43:42

**HIGH BAND EDGE BLOCK-C (PCS-1900) -Channel 810**



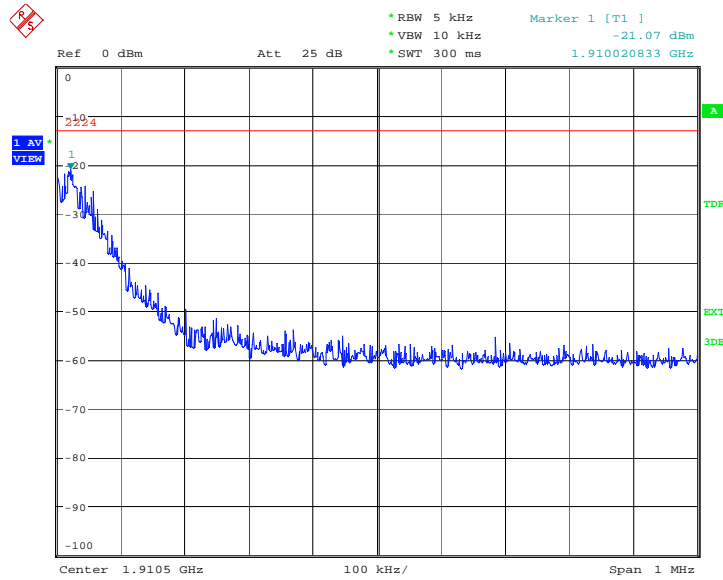
Date: 5.JUL.2013 08:43:56

**EGPRS 1900**  
**LOW BAND EDGE BLOCK-A (PCS-1900)-Channel 512**



Date: 5.JUL.2013 09:00:01

**HIGH BAND EDGE BLOCK-C (PCS-1900) –Channel 810**



Date: 5.JUL.2013 09:00:15

## A.8 CONDUCTED SPURIOUS EMISSION

### A.8.1 Measurement Method

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

1. Determine frequency range for measurements: From CFR 2.1057 the spectrum should be investigated from the lowest radio frequency generated in the equipment up to at least the 10th harmonic of the carrier frequency. For the equipment of PCS1900 band, this equates to a frequency range of 30 MHz to 19.1 GHz, data taken from 30 MHz to 20 GHz. For GSM850, data taken from 30 MHz to 10 GHz.
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.

#### **GSM850 Transmitter**

Channel	Frequency (MHz)
128	824.2
190	836.6
251	848.8

#### **PCS1900 Transmitter**

Channel	Frequency (MHz)
512	1850.2
661	1880.0
810	1909.8

### 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.

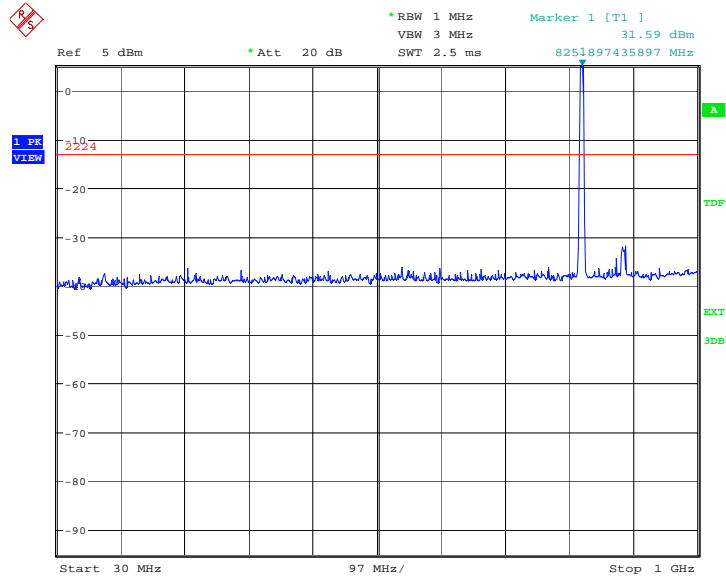
### A. 8.3 Measurement result

#### GSM850

##### A.8.3.1 Channel 128: 30MHz – 1GHz

Spurious emission limit –13dBm.

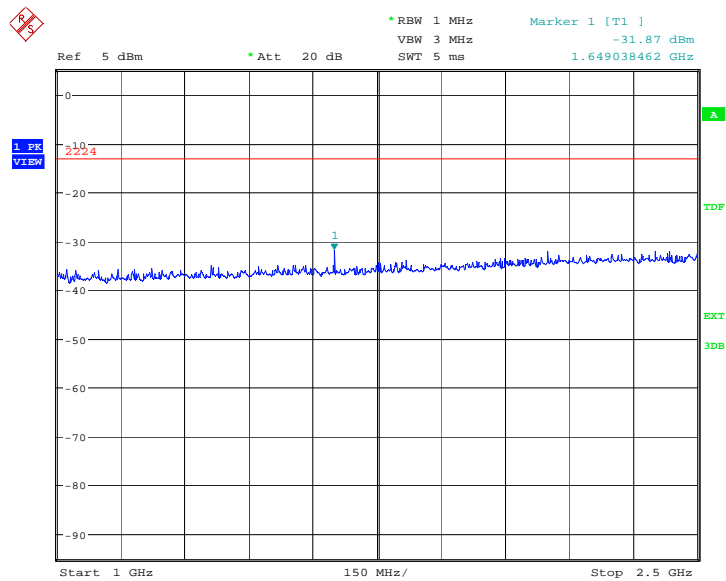
**NOTE: peak above the limit line is the carrier frequency.**



Date: 5.JUL.2013 09:06:49

##### A.8.3.2 Channel 128: 1GHz – 2.5GHz

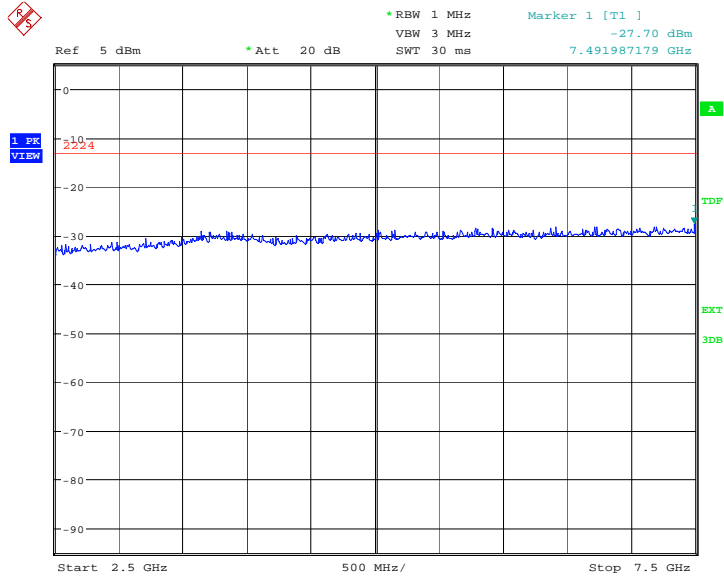
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:07:17

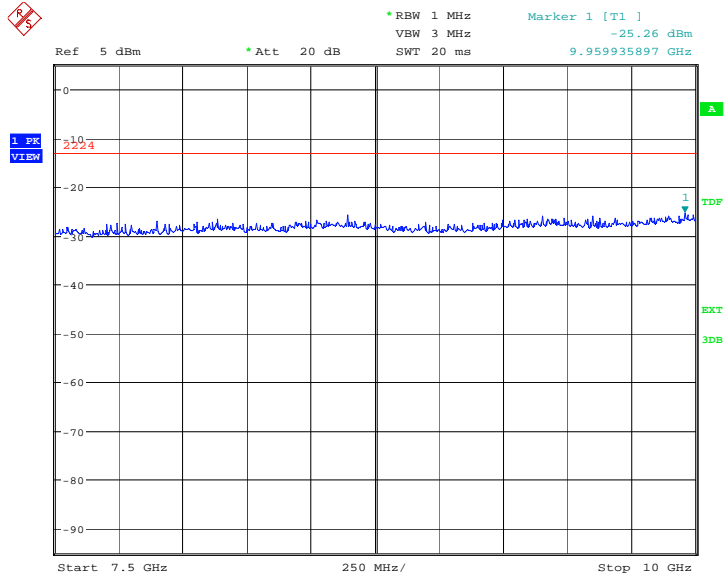


**A.8.3.3 Channel 128: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:07:45

**A.8.3.4 Channel 128: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.

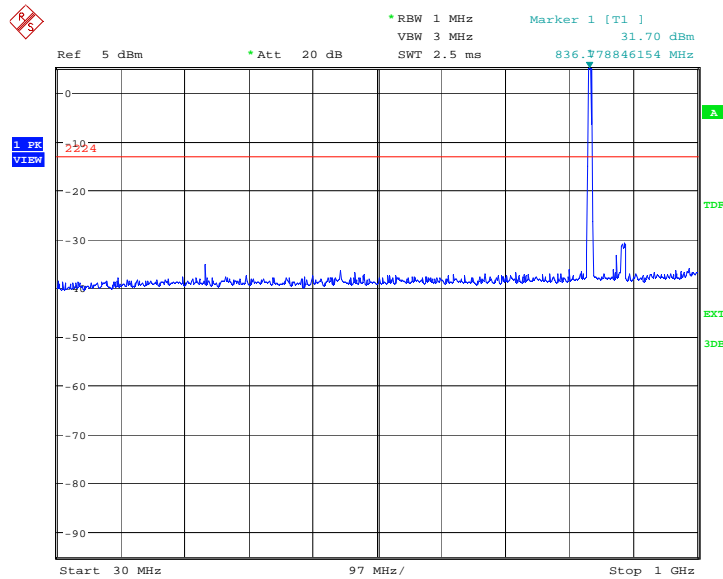


Date: 5.JUL.2013 09:08:13

### A.8.3.5 Channel 190: 30MHz – 1GHz

Spurious emission limit –13dBm

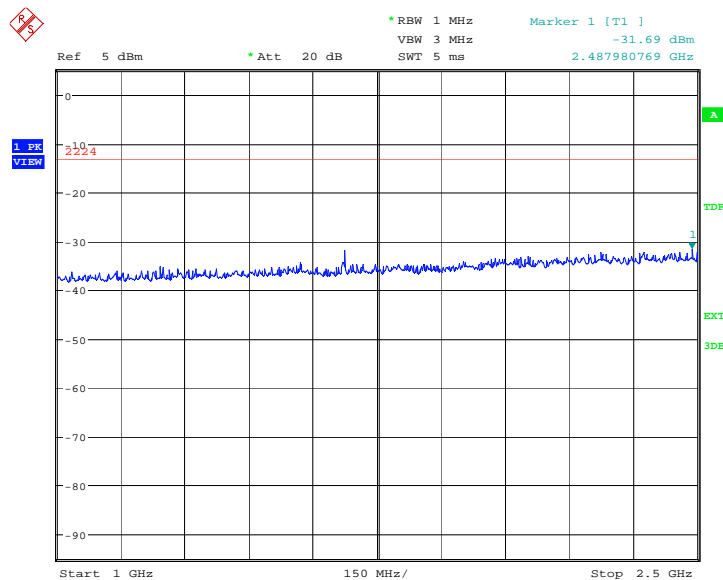
**NOTE: peak above the limit line is the carrier frequency.**



Date: 5.JUL.2013 09:08:42

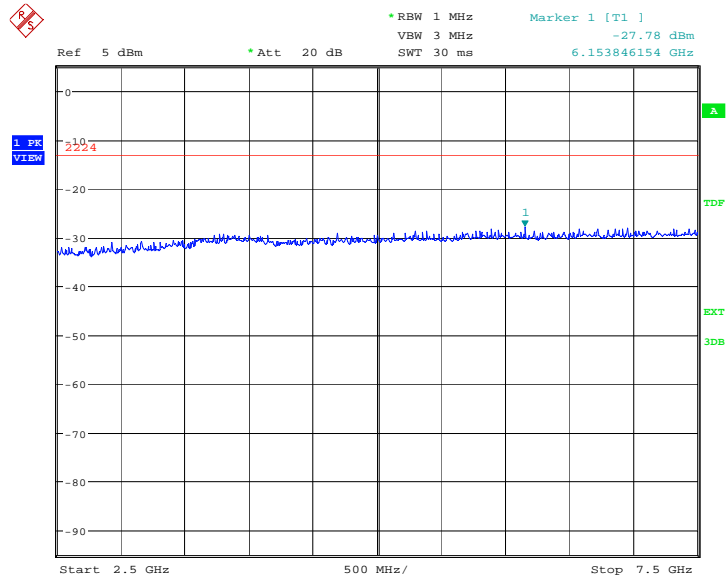
### A.8.3.6 Channel 190: 1GHz –2.5GHz

Spurious emission limit –13dBm



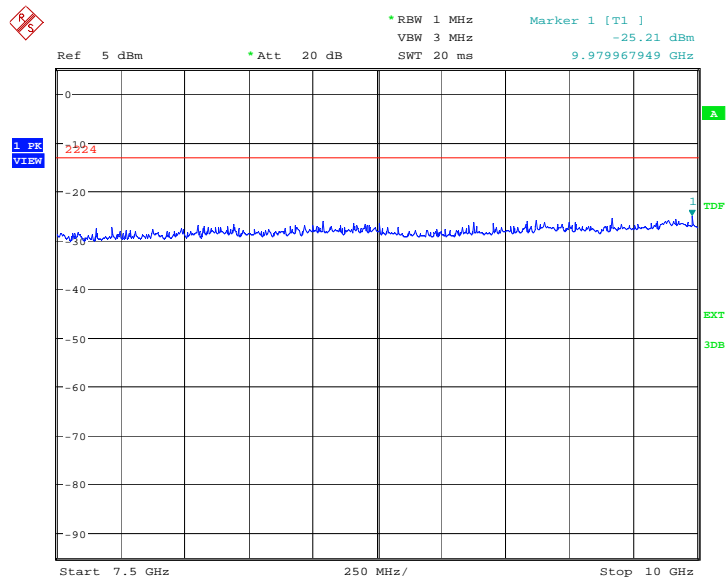
Date: 5.JUL.2013 09:09:10

**A.8.3.7 Channel 190: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm



Date: 5.JUL.2013 09:09:38

**A.8.3.8 Channel 190: 7.5GHz –10GHz**  
Spurious emission limit –13dBm

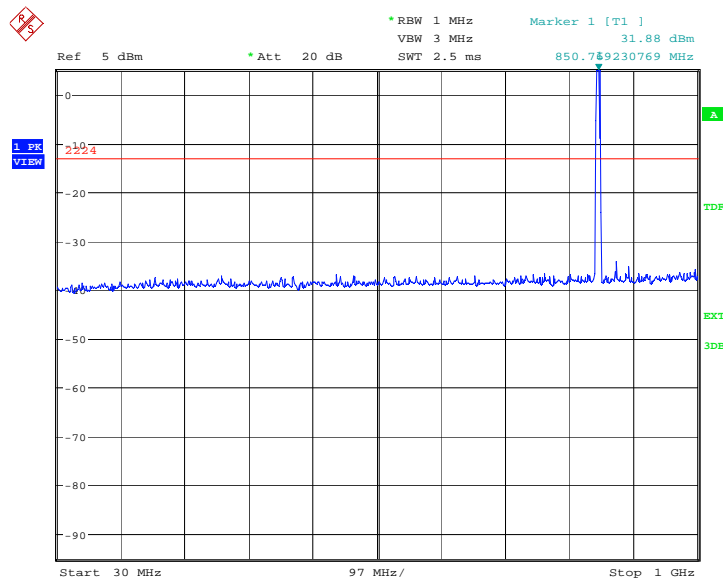


Date: 5.JUL.2013 09:10:06

### A.8.3.9 Channel 251: 30MHz – 1GHz

Spurious emission limit –13dBm.

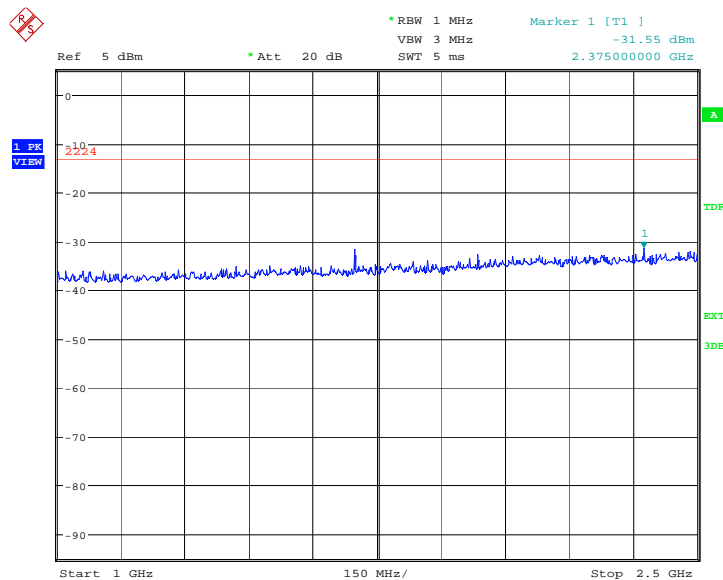
**NOTE: peak above the limit line is the carrier frequency.**



Date: 5.JUL.2013 09:10:35

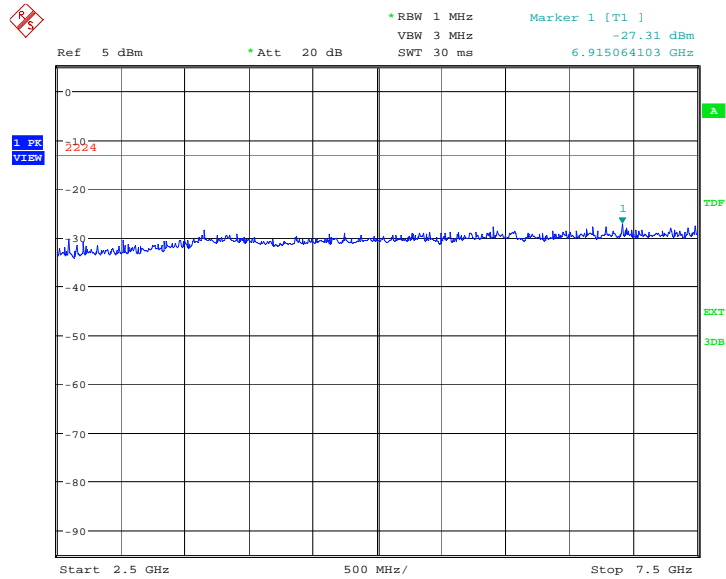
### A.8.3.10 Channel 251: 1GHz – 2.5GHz

Spurious emission limit –13dBm.



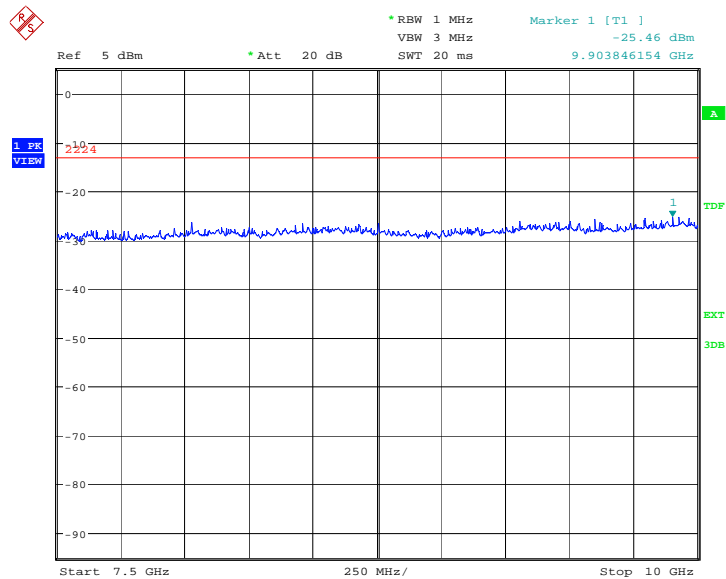
Date: 5.JUL.2013 09:11:03

**A.8.3.11 Channel 251:2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



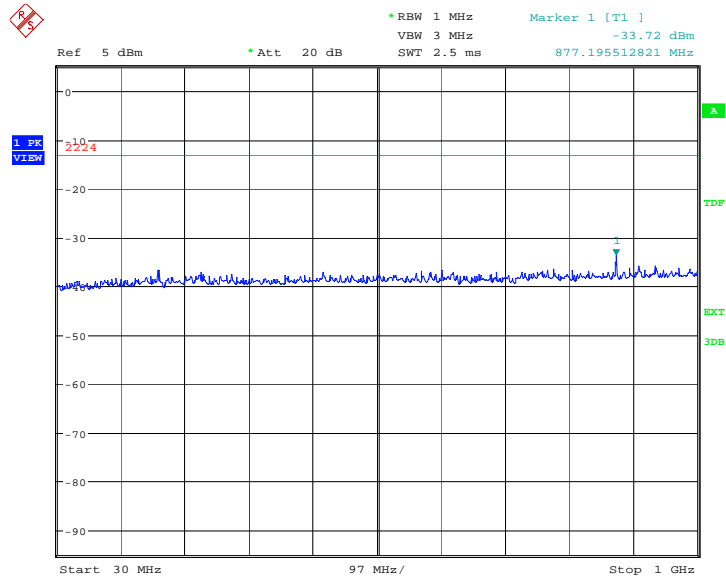
Date: 5.JUL.2013 09:11:31

**A.8.3.12 Channel 251: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.



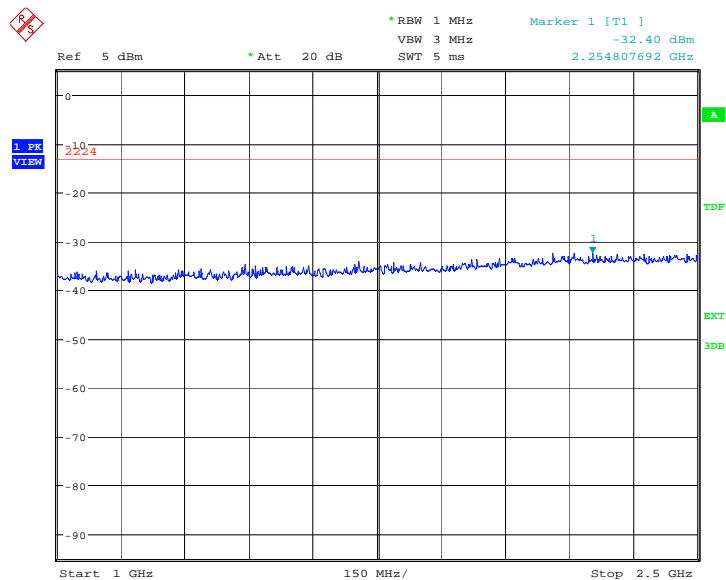
Date: 5.JUL.2013 09:11:59

**A.8.3.13 Idle mode: 30MHz – 1GHz**  
Spurious emission limit –13dBm.



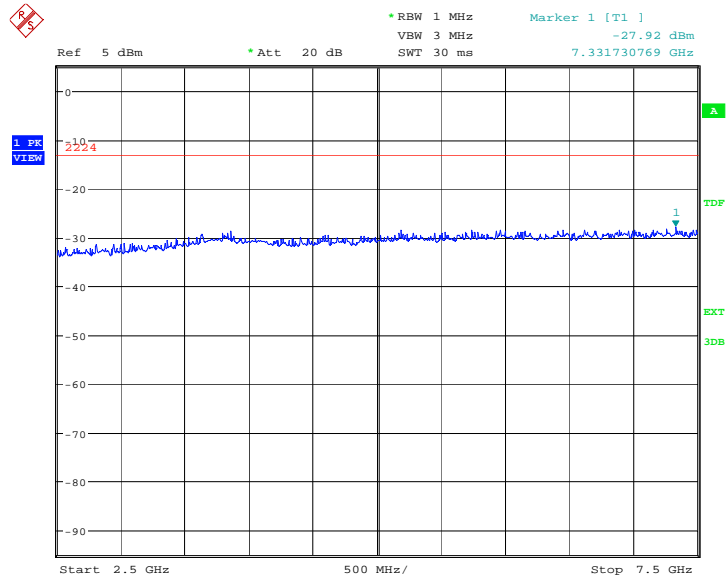
Date: 5.JUL.2013 09:12:28

**A.8.3.14 Idle mode: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.



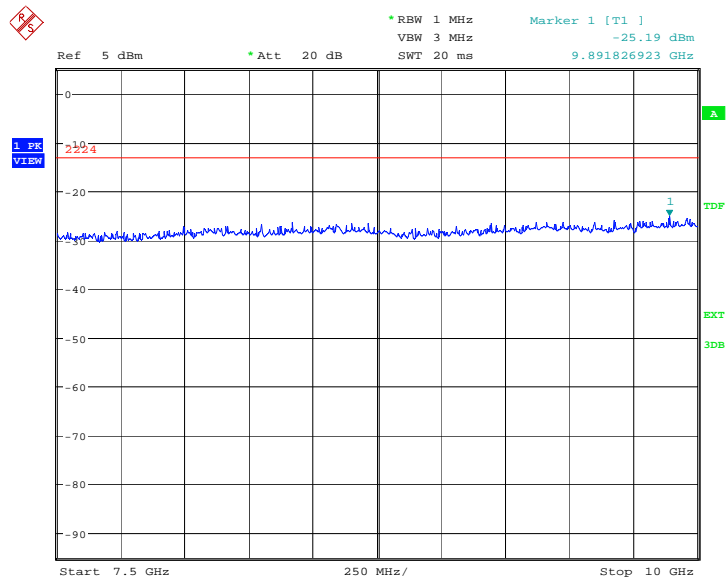
Date: 5.JUL.2013 09:12:56

**A.8.3.15 Idle mode: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:13:24

**A.8.3.16 Idle mode: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.

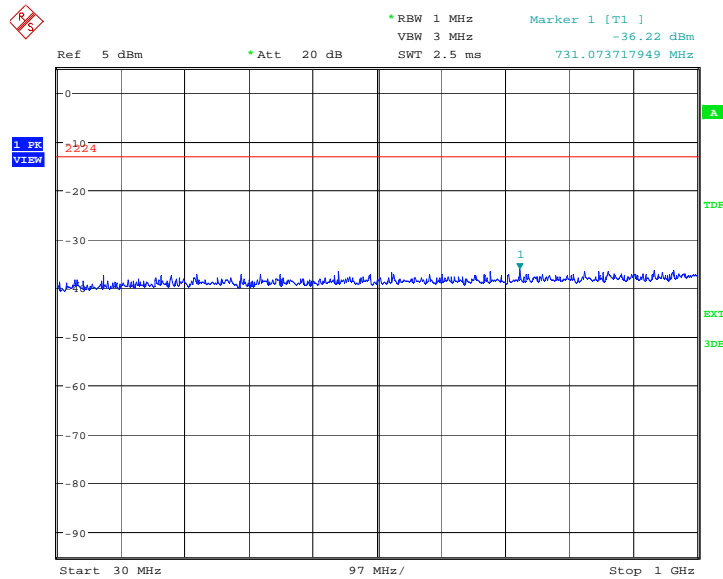


Date: 5.JUL.2013 09:13:52

PCS1900

A.8.3.17 Channel 512: 30MHz – 1GHz

Spurious emission limit –13dBm.

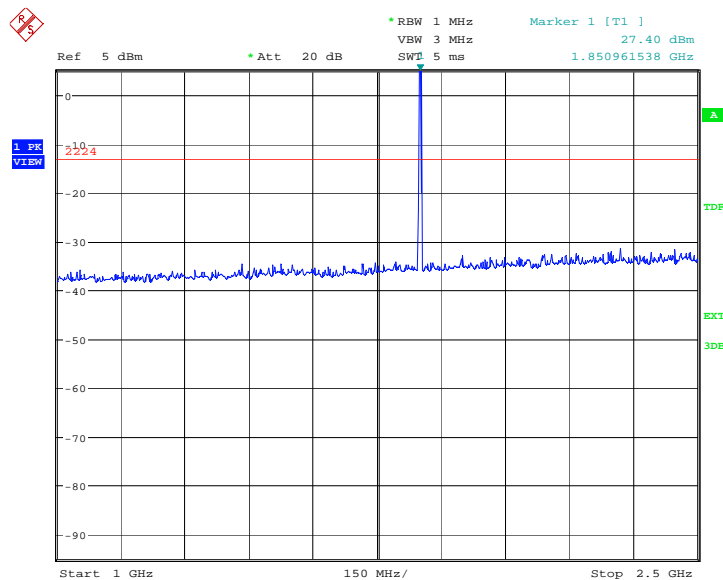


Date: 5.JUL.2013 09:20:35

A.8.3.18 Channel 512: 1GHz – 2.5GHz

Spurious emission limit –13dBm.

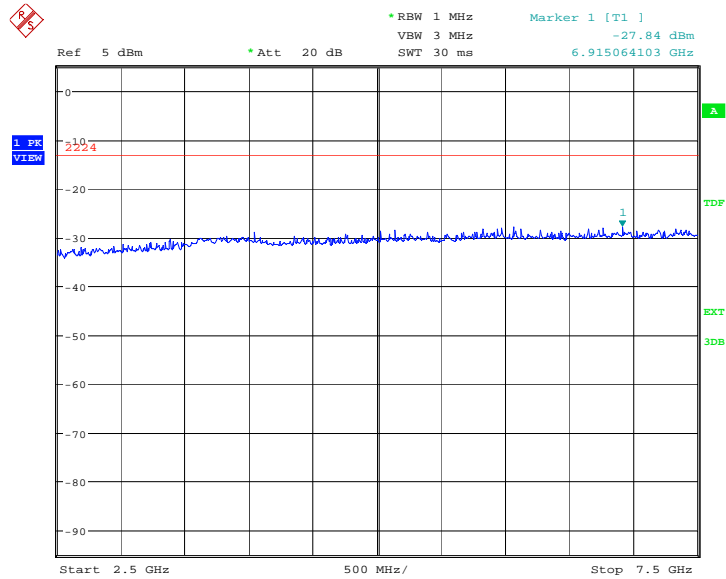
**NOTE: peak above the limit line is the carrier frequency.**



Date: 5.JUL.2013 09:21:03

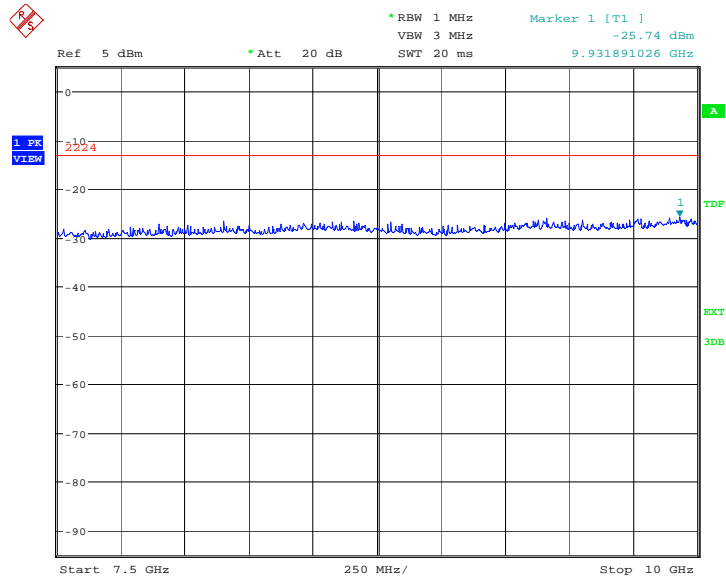


**A.8.3.19 Channel 512: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



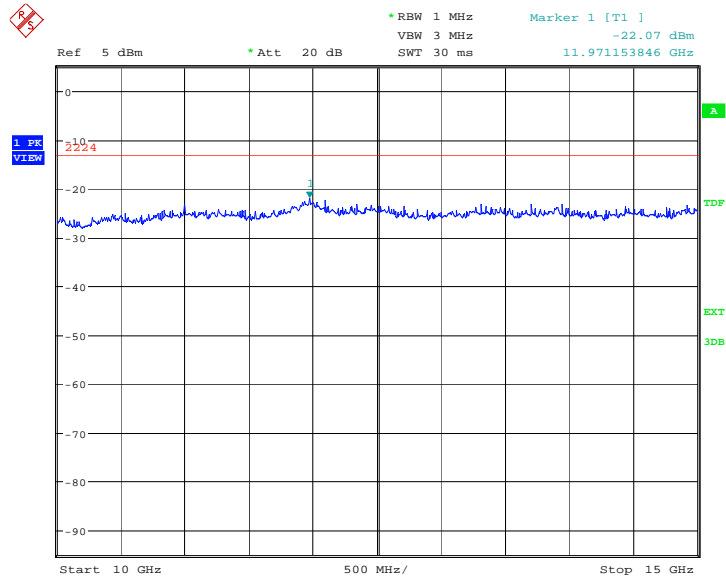
Date: 5.JUL.2013 09:21:31

**A.8.3.20 Channel 512: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



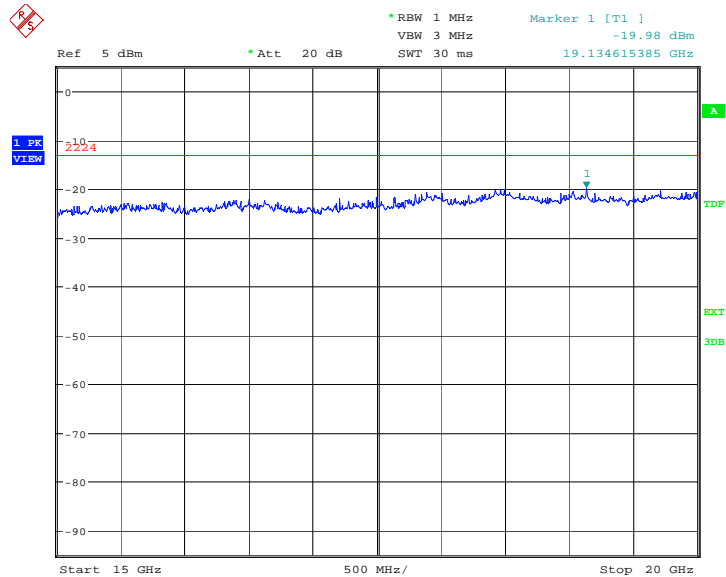
Date: 5.JUL.2013 09:21:59

**A.8.3.21 Channel 512: 10GHz –15GHz**  
Spurious emission limit –13dBm.



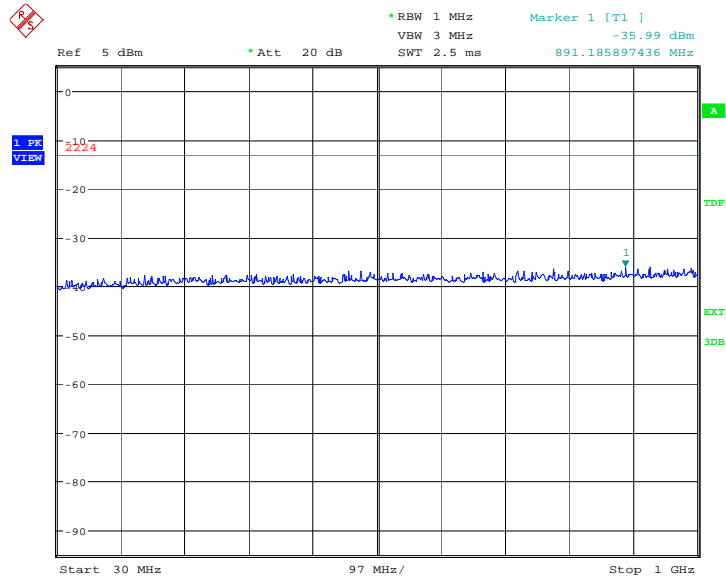
Date: 5.JUL.2013 09:22:27

**A.8.3.22 Channel 512: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:22:56

**A.8.3.23 Channel 661: 30MHz – 1GHz**  
Spurious emission limit –13dBm

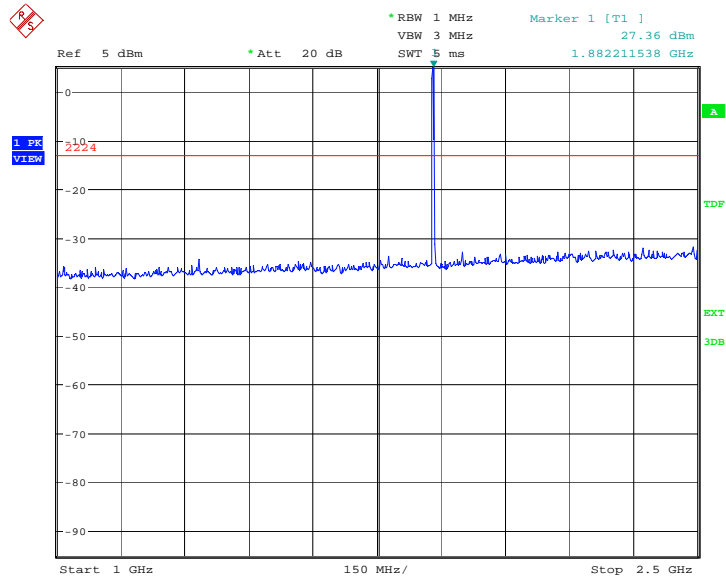


Date: 5.JUL.2013 09:23:24

**A.8.3.24 Channel 661: 1GHz –2.5GHz**

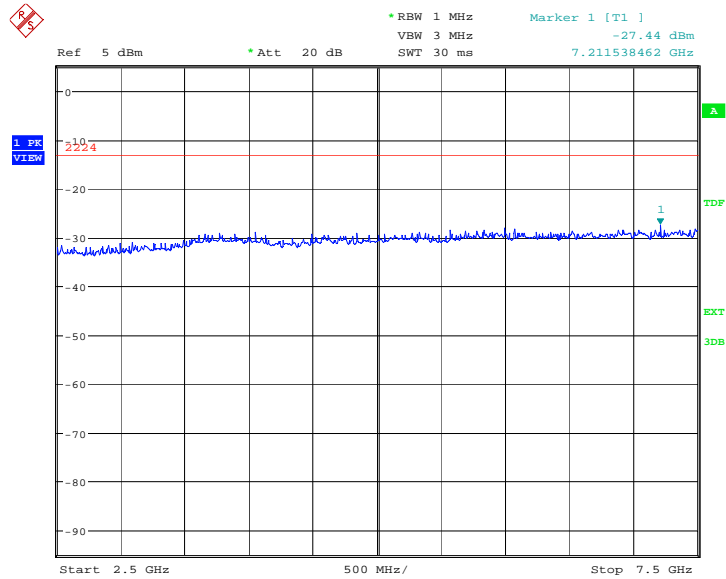
Spurious emission limit –13dBm

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



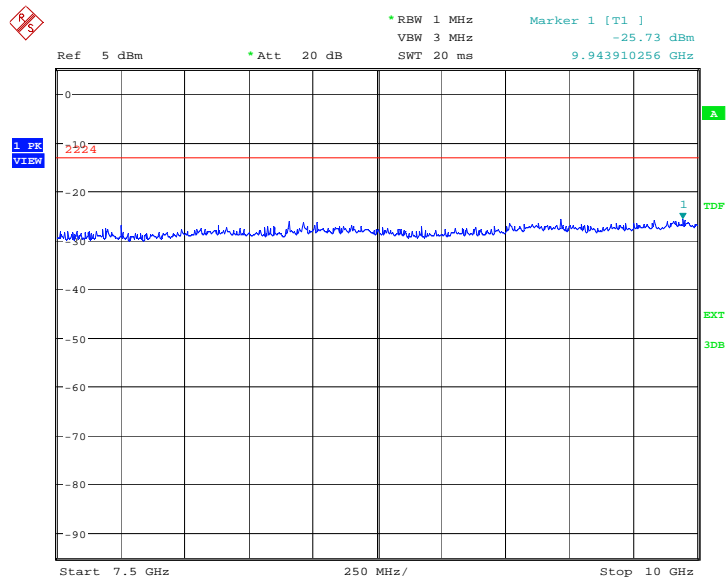
Date: 5.JUL.2013 09:23:52

**A.8.3.25 Channel 661: 2.5GHz –7.5GHz**  
Spurious emission limit –13dBm



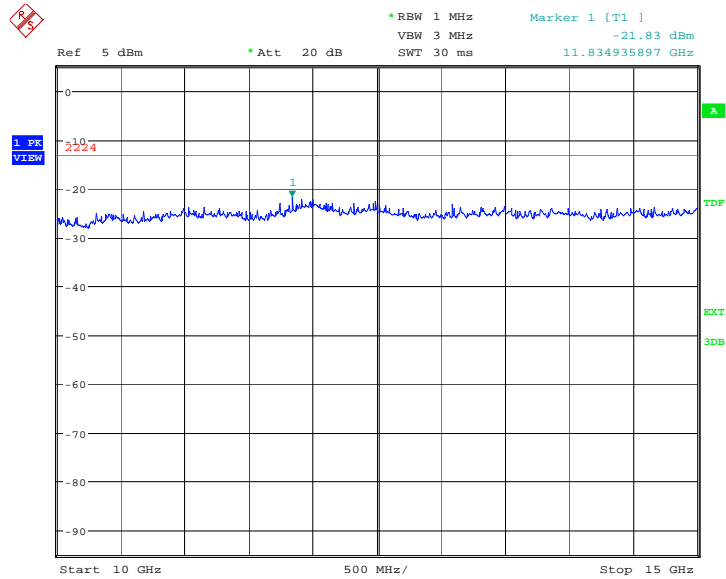
Date: 5.JUL.2013 09:24:20

**A.8.3.26 Channel 661: 7.5GHz –10GHz**  
Spurious emission limit –13dBm



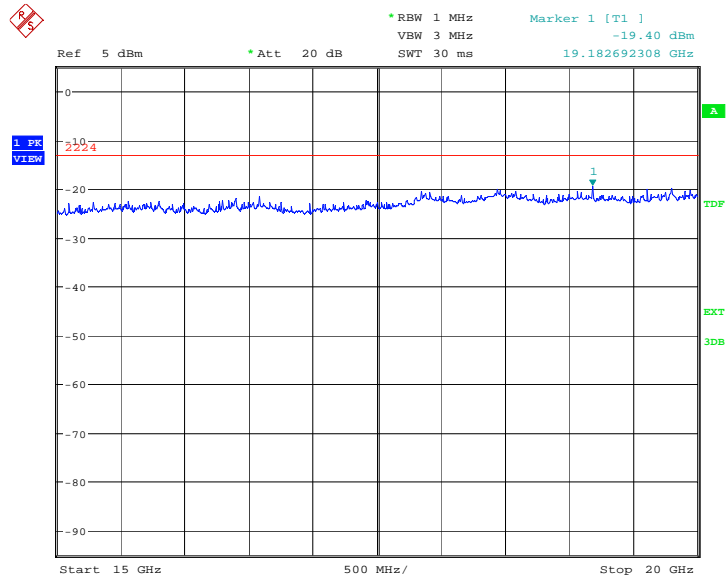
Date: 5.JUL.2013 09:24:49

**A.8.3.27 Channel 661: 10GHz –15GHz**  
Spurious emission limit –13dBm.



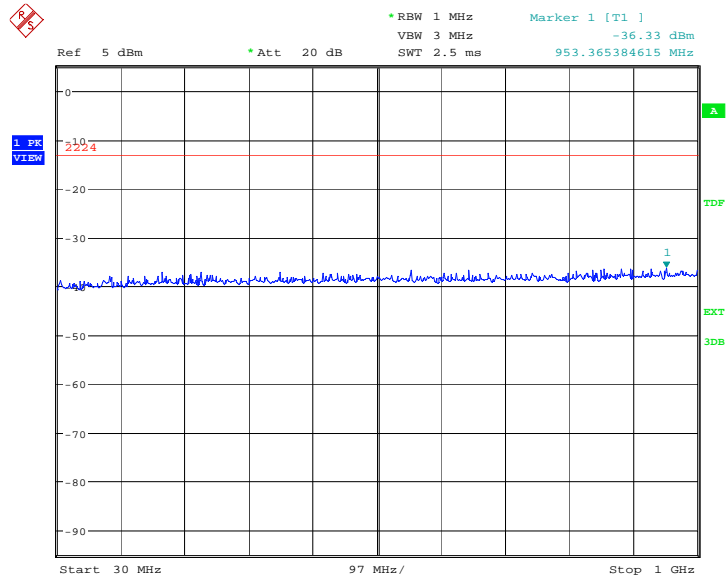
Date: 5.JUL.2013 09:25:17

**A.8.3.28 Channel 661: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:25:45

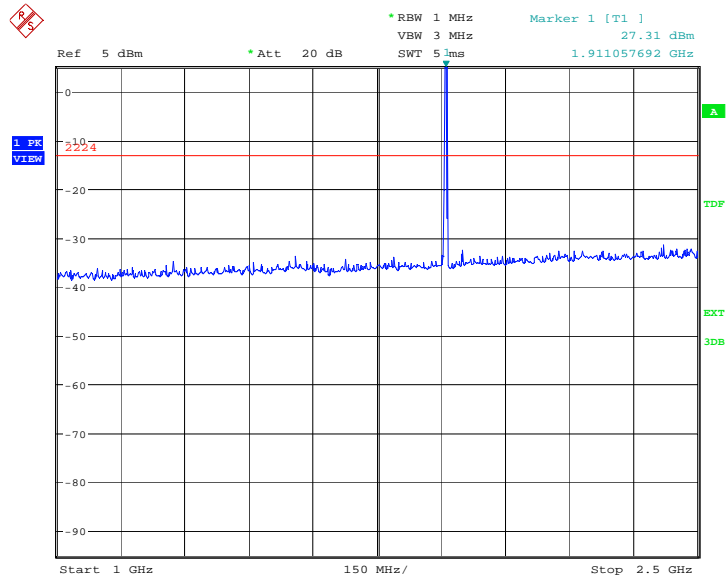
**A.8.3.29 Channel 810: 30MHz – 1GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:26:13

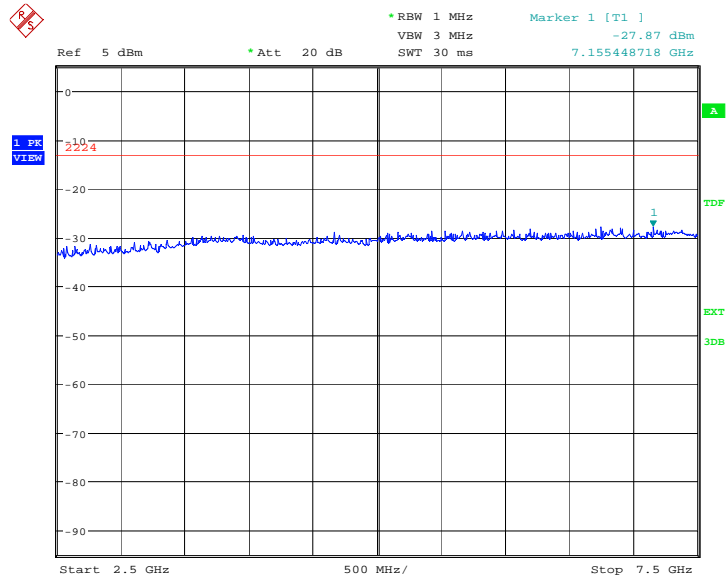
**A.8.3.30 Channel 810: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.

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



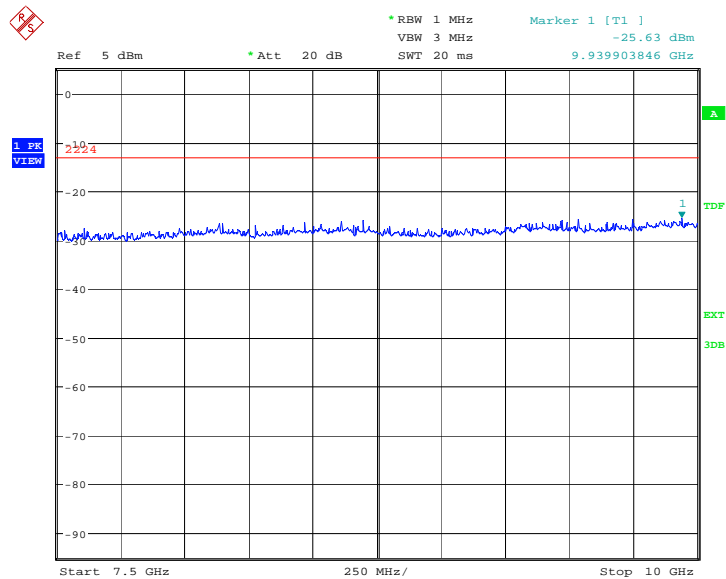
Date: 5.JUL.2013 09:26:42

**A.8.3.31 Channel 810:2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



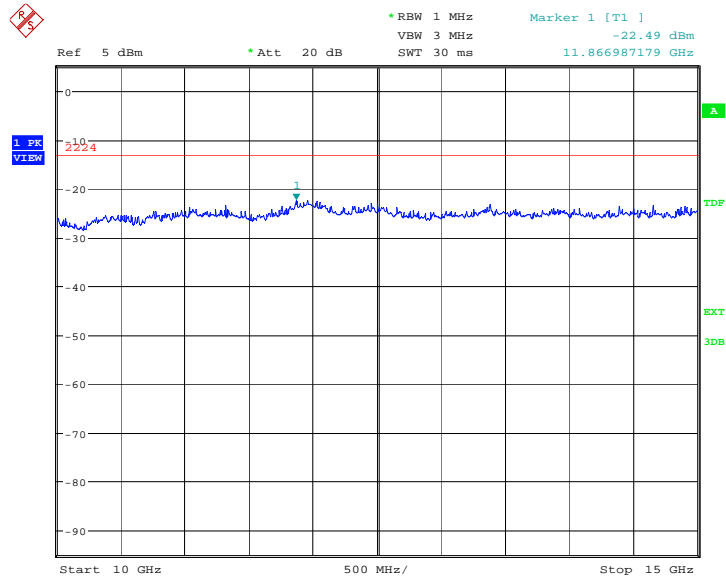
Date: 5.JUL.2013 09:27:10

**A.8.3.32 Channel 810: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.



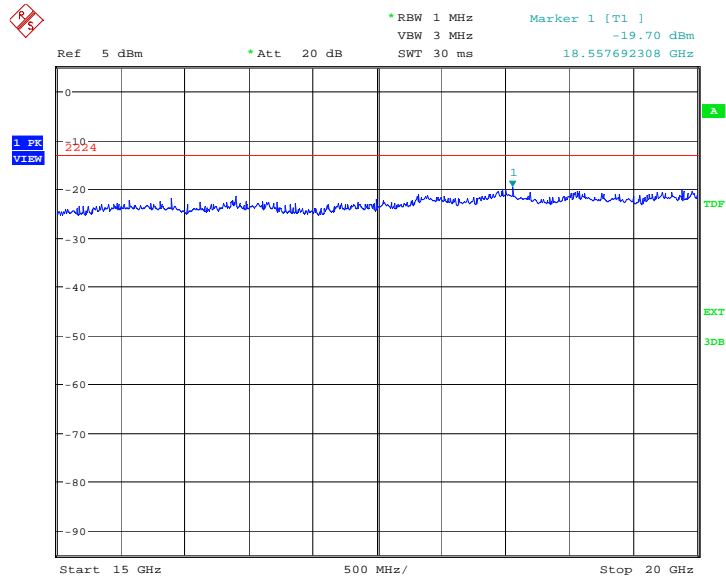
Date: 5.JUL.2013 09:27:38

**A.8.3.33 Channel 810: 10GHz –15GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:28:06

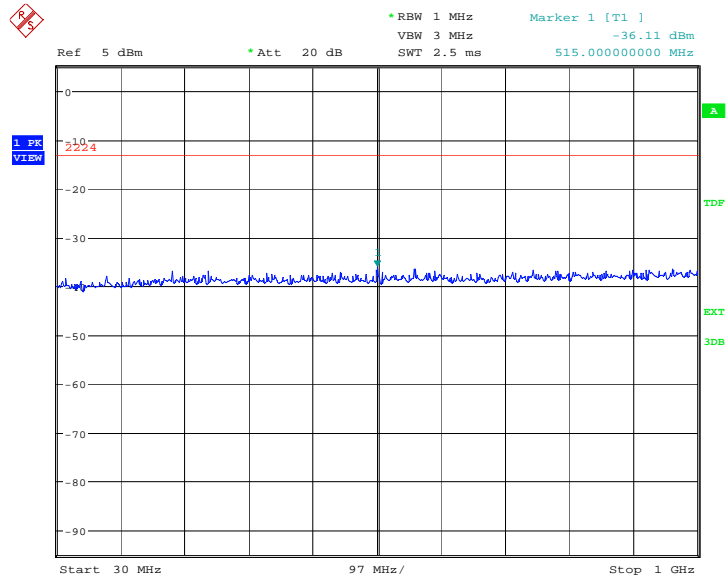
**A.8.3.34 Channel 810: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:28:34

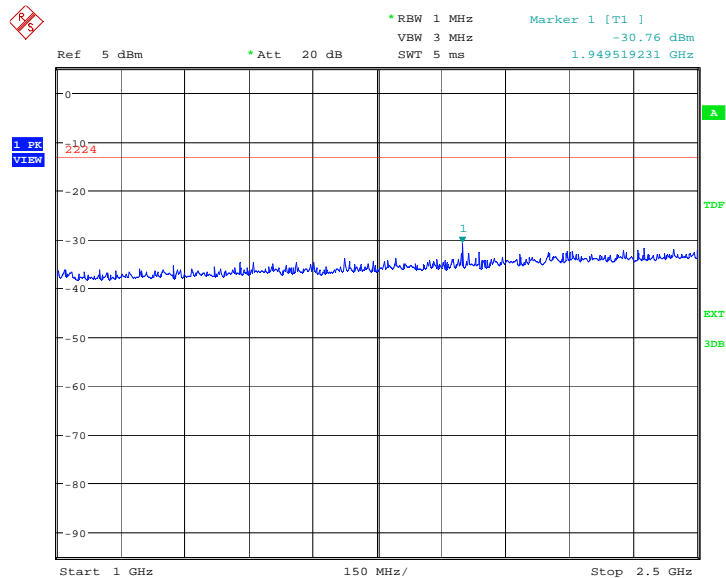


**A.8.3.35 Idle mode: 30MHz – 1GHz**  
Spurious emission limit –13dBm.



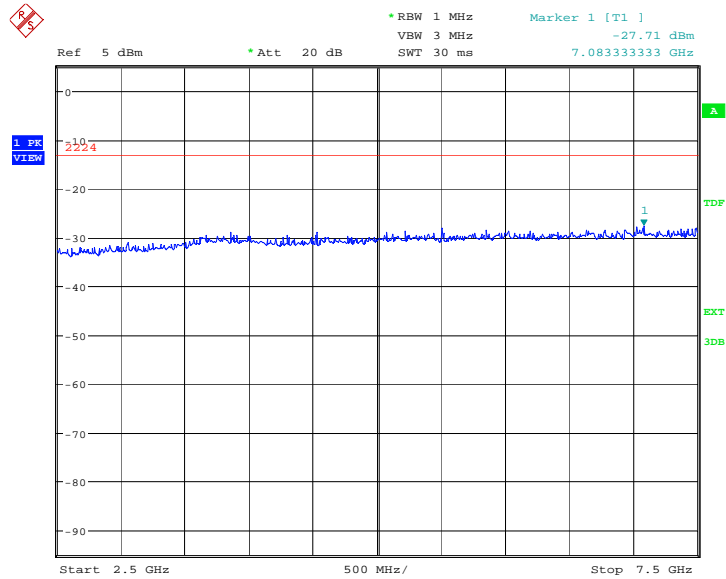
Date: 5.JUL.2013 09:29:03

**A.8.3.36 Idle mode: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.



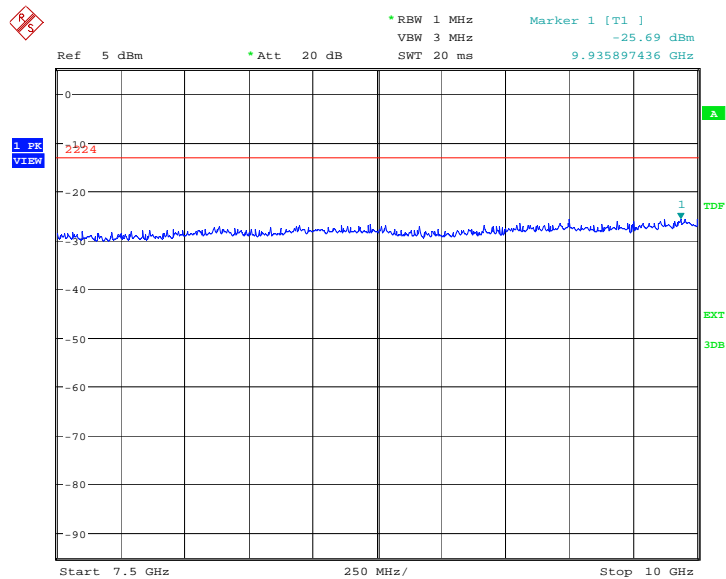
Date: 5.JUL.2013 09:29:31

**A.8.3.37 Idle mode: 2.5GHz – 7.5GHz**  
Spurious emission limit –13dBm.



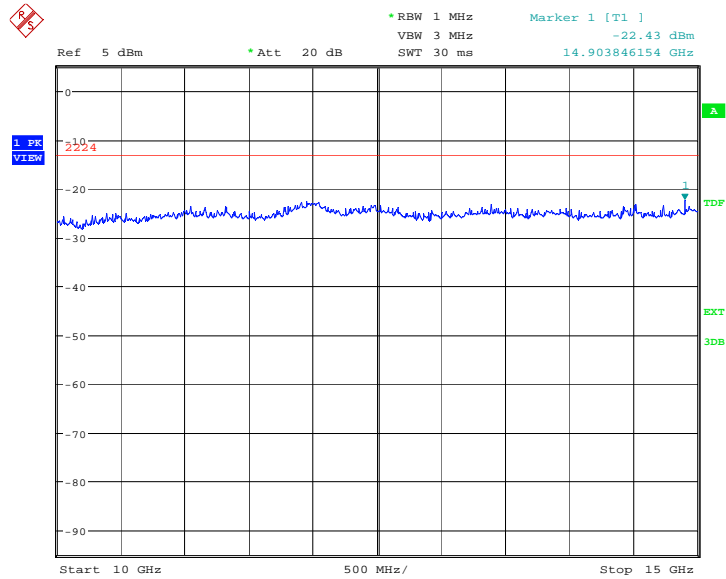
Date: 5.JUL.2013 09:29:59

**A.8.3.38 Idle mode: 7.5GHz – 10GHz**  
Spurious emission limit –13dBm.



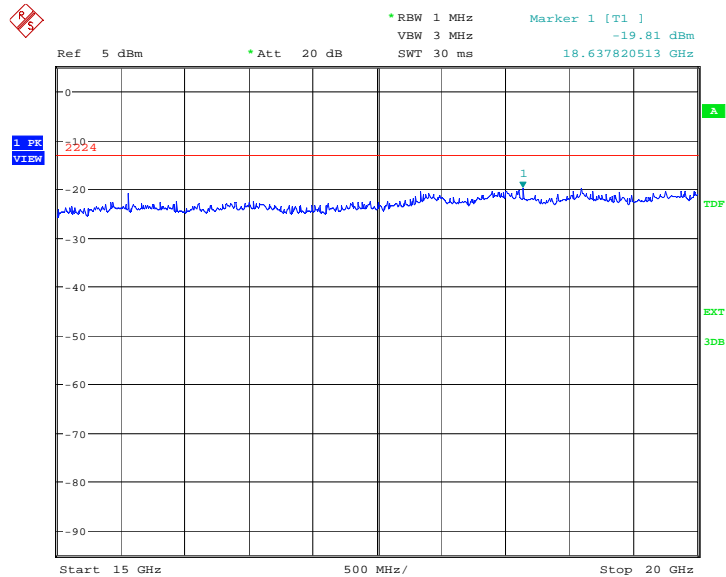
Date: 5.JUL.2013 09:30:27

**A.8.3.39 Idle mode: 10GHz –15GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:30:55

**A.8.3.40 IDLE mode: 15GHz –20GHz**  
Spurious emission limit –13dBm.



Date: 5.JUL.2013 09:31:23

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