



# TEST REPORT

No. 2013TAR217

for

**Sony Mobile Communications (China) Co. Ltd**

**GSM 850/900/1800/1900 quad bands and UMTS 1/2/4/5/8 mobile**

**phone**

**Type: PM-0360-BV**

**FCC ID: PY7PM-0360**

with

**Hardware Version: A**

**Software Version: 12.0.A.1.18**

**Issued Date: May.17<sup>th</sup>, 2013**

**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:**

**DAkks 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.6629A-1**

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

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191.

Tel:+86(0) 10-62304633-2561, Fax:+86(0)10-62304633-2504 Email:welcome@emcite.com. 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. GENERAL DESCRIPTION .....</b>	<b>6</b>
<b>3.5. EUT SET-UPS .....</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>6.1. SUMMARY OF TEST RESULTS .....</b>	<b>9</b>
<b>6.2. STATEMENTS.....</b>	<b>9</b>
<b>7. TEST EQUIPMENTS UTILIZED.....</b>	<b>10</b>
<b>ANNEX A: MEASUREMENT RESULTS .....</b>	<b>11</b>
<b>A.1 OUTPUT POWER .....</b>	<b>11</b>
<b>A.2 EMISSION LIMIT .....</b>	<b>16</b>
<b>A.3 CONDUCTED EMISSION .....</b>	<b>20</b>
<b>A.4 FREQUENCY STABILITY .....</b>	<b>23</b>
<b>A.5 OCCUPIED BANDWIDTH.....</b>	<b>26</b>
<b>A.6 EMISSION BANDWIDTH .....</b>	<b>38</b>
<b>A.7 BAND EDGE COMPLIANCE.....</b>	<b>50</b>
<b>A.8 CONDUCTED SPURIOUS EMISSION .....</b>	<b>57</b>
<b>ANNEX B: TEST LAYOUT .....</b>	<b>79</b>
<b>ANNEX C: EUT PHOTOGRAPH.....</b>	<b>80</b>

## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: No 52, Huayuan Bei Road, Haidian District, Beijing, P.R.China  
Postal Code: 100191  
Telephone: +86-10-62304633-2561  
Fax: +86-10-62304633-2504

### 1.2. Testing Environment

Normal Temperature: 15-35°C  
Relative Humidity: 20-75%  
Air pressure 980 - 1040 hPa

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

### 1.3. Project data

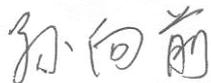
Receipt of Sample Jan. 31<sup>st</sup>, 2013  
Testing Start Date: Feb. 2<sup>nd</sup>, 2013  
Testing End Date: Feb. 25<sup>th</sup>, 2013

### 1.4. Signature



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Qu Pengfei  
(Prepared this test report)



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Sun Xiangqian  
(Reviewed this test report)



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Song Chongwen  
(Approved this test report)

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: Sony Mobile Communications (China) Co. Ltd  
Address /Post: Sony Mobile R&D Center, No. 16, Guangshun South Street,  
Chaoyang District  
City: Beijing  
Postal Code: 100102  
Country: China  
Contact Person: Ma, Gang  
Telephone: +86-10-58656312  
Fax: +86-10-58659049

### **2.2. Manufacturer Information**

Company Name: Sony Mobile Communications (China) Co. Ltd  
Address /Post: Sony Mobile R&D Center, No. 16, Guangshun South Street,  
Chaoyang District  
City: Beijing  
Postal Code: 100102  
Country: China  
Contact Person: Ma, Gang  
Telephone: +86-10-58656312  
Fax: +86-10-58659049

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

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

Description	GSM 850/900/1800/1900, GPRS, EDGE, WCDMA FDD Band 1/2/4/5/8, HSDPA, HSUPA Bluetooth EDR & BLE, WLAN ( 802.11 a/b/g/n), FM, NFC, GPS receiver mobile phone
Type	PM-0360-BV
FCC ID	PY7PM-0360
Frequency range	GSM 850: 824.2 MHz - 848.8 MHz PCS 1900: 1850.2 MHz -1909.8 MHz WCDMA 850:824 MHz - 849 MHz WCDMA 1700: 1710MHz-1755MHz WCDMA 1900:1850 MHz -1910 MHz
Antenna	Internal
Power supply	Battery, which is charged by the charger (travel adapter / vehicle adapter ) attached to the phone
Output power	32.66 dBm maximum ERP measured for GSM850 32.87dBm maximum EIRP measured for PCS1900
Extreme vol. Limits	3.5VDC to 4.1VDC (nominal: 3.7VDC)
Extreme temp. Tolerance	-30°C to +50°C

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

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

<b>EUT ID*</b>	<b>SN</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
#23602	CB5123CGZJ	004402450757285	A	12.0.A.1.18
#23600	CB5123CH6L	004402450757269	A	12.0.A.1.18

\*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>	<b>SN</b>	<b>Revision</b>
#22972	Travel Charger	8512W19100199	1
#22533	USB Cable	121607D20003CD2	SP1

#22972

Commercial name	EP880
Type	AC-0400-EU
Manufacturer	Salcomp

#22533

Commercial name	EC801
Type	AI-0401
Manufacturer	Sony Mobile
Length of cable	96.5cm

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

### **3.4. General Description**

The Equipment Under Test (EUT) is a model of GSM 850/900/1800/1900 quad bands and UMTS 1/2/4/5/8 mobile with integrated antenna and inbuilt Li-Polymer battery.

The EUT supports GSM 850/900/1800/1900MHz bands and WCDMA FDD bands 1/2/4/5/8. It also supports GPRS service with multi-slots class 33 and EGPRS service with multi-slots class 33 too. The HSDPA and HSUPA features are also supported.

It has MP3, camera, FM radio, USB memory, GPS receiver, NFC, Mobile High-Definition Link (MHL), Bluetooth (EDR and Bluetooth 4.0), WLAN (802.11 a/b/g/n) and Wi-Fi hotspot functions.

It consists of normal option: travel charger and USB cable.

Manual and specifications of the EUT were provided to fulfil the test.

Samples undergoing test were selected by the client.

### **3.5. EUT set-ups**

<b>EUT Set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
Set. 1	#23602 + #22972+ #22533	Tests with travel charger
Set. 2	#23602	ERP/EIRP/RSE tests
Set. 3	#23600	Conducted RF tests

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	10-1-12 Edition
FCC Part 22	PUBLIC MOBILE SERVICES	10-1-12 Edition
ANSI/TIA-603-C	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2004
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2003

## 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

### 6.1. Summary of test results

**Abbreviations used in this clause:**

P	Pass
NA	Not applicable
F	Fail

#### **GSM 850**

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	22.913(a)	A.1	P
2	Emission Limit	22.917, 2.1051	A.2	P
3	Conducted Emission	15.107/207	A.3	P
4	Frequency Stability	22.355, 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	15.107/207	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

### 6.2. Statements

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the GSM/GPRS/EGPRS functions among the features described in section 3.

## 7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE
1	Test Receiver	ESCI	100344	R&S	2013-03-28
3	Test Receiver	ESU26	100376	R&S	2013-11-07
4	EMI Antenna	VULB 9163	514	Schwarzbeck	2014-11-10
5	EMI Antenna	3117	00139065	ETS-Lindgren	2014-07-31
6	LISN	ESH2-Z5	829991/012	R&S	2013-04-16
7	Universal Radio Communication Tester	CMU200	102228	R&S	2013-07-07
8	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2013-03-16
9	Spectrum Analyzer	E4440A	MY48250642	Agilent	2014-03-04
10	EMI Antenna	9117	177	Schwarzbeck	2014-06-29
11	EMI Antenna	VULB 9163	482	Schwarzbeck	2014-02-17
12	EMI Antenna	3117	00119024	ETS-Lindgren	2014-02-02
13	EMI Antenna	3117	00058889	ETS-Lindgren	2014-02-02
14	Signal Generator	N5183A	MY49060052	Agilent	2013-03-19
15	Climatic chamber	PL-2G	343074	ESPEC	2013-05-12

## ANNEX A: MEASUREMENT RESULTS

### A.1 OUTPUT POWER

#### Reference

FCC: CFR Part 22.913(a), 24.232(b)

#### 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 spectrum analyzer's peak detector.

These measurements were done at 3 frequencies (bottom, middle and top of operational frequency range) for each band: 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.2MHz, 836.6MHz and 848.8MHz for GSM850 band.

#### GSM850

##### Limit

	Power step	Nominal Peak output power (dBm)	Tolerance (dB)	Target (dBm)
GSM	5	33dBm(2W)	± 2	33±1
GPRS	3	33dBm(2W)	± 2	33±1
EGPRS	6	33dBm(2W)	± 2	33±1

#### Measurement result

##### GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	33.09
836.6	5	<b>33.38</b>
848.8	5	33.11

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

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	3	33.10
836.6	3	33.40
848.8	3	<b>33.45</b>

**EGPRS (8PSK, Time Slot 1)**

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	6	<b>26.52</b>
836.6	6	26.33
848.8	6	26.13

Note: Expanded measurement uncertainty for GSM850 is  $U = 0.52\text{dB}$ ,  $k=2$ .

**PCS1900**

**Limit**

	Power step	Nominal Peak output power (dBm)	Tolerance (dB)	Target (dBm)
GSM	0	30dBm(1W)	$\pm 2$	$30\pm 1$
GPRS	3	30dBm(1W)	$\pm 2$	$30\pm 1$
EGPRS	5	30dBm(1W)	$\pm 2$	$30\pm 1$

**Measurement result**

**GSM (GMSK)**

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	0	30.39
1880.0	0	30.50
1909.8	0	<b>30.75</b>

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

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	30.46
1880.0	3	30.52
1909.8	3	<b>30.55</b>

**EGPRS (8PSK, Time Slot 1)**

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	<b>26.43</b>
1880.0	5	26.42
1909.8	5	26.40

Note: Expanded measurement uncertainty for PCS1900 is  $U = 0.83\text{dB}$ ,  $k=2$ .

### A.1.3 Radiated

#### A.1.3.1 Description

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

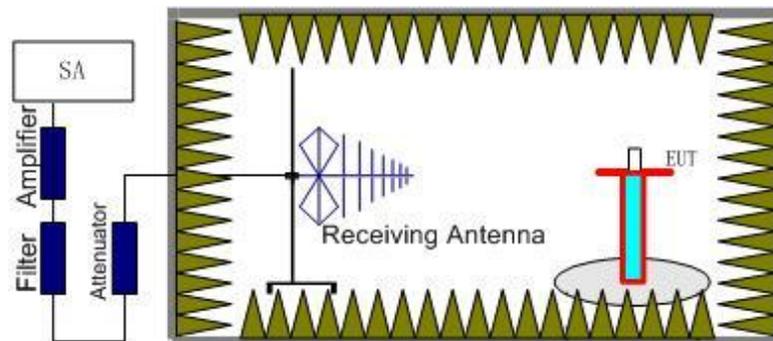
Rule Part 24.232(c) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(e) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies "Maximum ERP. The effective radiated power (ERP) of base transmitters and cellular repeaters must not exceed 500 Watts. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

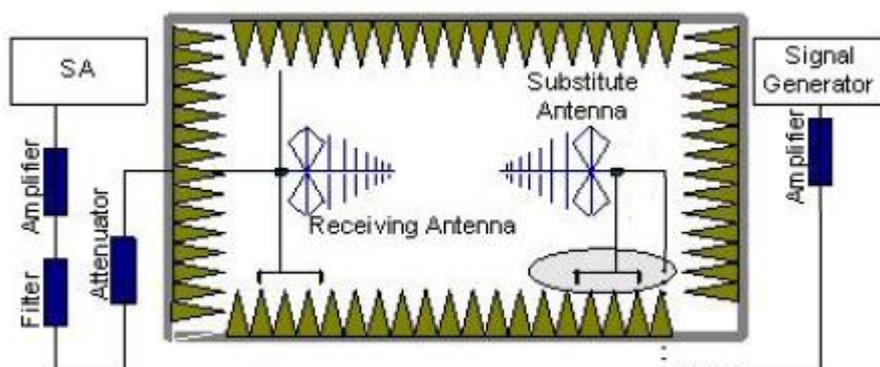
#### A.1.3.2 Method of Measurement

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

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



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



In the chamber, a 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. Adjust the level of the signal generator output until the value of the receiver reaches 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.

- An amplifier should be connected to the Signal Source output port. And the cable should be connected 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:

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

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

For test layout photo, please refer to Pic.1 in Annex B.

### GSM 850- ERP 22.913(a)

#### Limits

	Power Step	Burst Peak ERP (dBm)
GSM	5	≤38.45dBm (7W)
GPRS	3	≤38.45dBm (7W)
EGPRS	6	≤38.45dBm (7W)

#### Measurement result

##### GSM (GMSK)

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-15.63	2.07	-53.00	0.84	2.15	32.31	Vertical
836.60	-15.30	2.08	-53.00	0.90	2.15	32.57	Vertical
848.80	-15.52	2.09	-53.00	0.95	2.15	32.29	Vertical

##### GPRS (GMSK)

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-15.28	2.07	-53.00	0.84	2.15	32.66	Vertical
836.60	-15.32	2.08	-53.00	0.90	2.15	32.55	Vertical
848.80	-15.47	2.09	-53.00	0.95	2.15	32.34	Vertical

##### EGPRS (8PSK)

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-19.79	2.07	-53.00	0.84	2.15	28.15	Vertical
836.60	-19.62	2.08	-53.00	0.90	2.15	28.25	Vertical
848.80	-19.71	2.09	-53.00	0.95	2.15	28.10	Vertical

Sample calculation: GSM, 836.6 MHz

$$\text{Peak ERP(dBm)} = P_{\text{Mea}}(-14.54 \text{ dBm}) - G_a(0.90 \text{ dBi}) - P_{\text{Ag}}(-53.00 \text{ dB}) - P_{\text{cl}}(2.26 \text{ dB}) - 2.15 \text{ dB}$$

$$= 33.15 \text{ dBm}$$

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

Note: Expanded measurement uncertainty for GSM850 is  $U = 0.96\text{dB}$ ,  $k=2$ .

### PCS1900- EIRP 24.232(b)

#### Limits

	Power Step	Burst Peak EIRP (dBm)
GSM	0	≤33dBm (2W)
GPRS	3	≤33dBm (2W)
EGPRS	5	≤33dBm (2W)

#### Measurement result

##### GSM (GMSK)

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-20.39	3.19	-50.00	-5.60	32.02	Horizontal
1880.00	-17.31	3.11	-50.00	-3.25	<b>32.83</b>	Horizontal
1909.80	-17.95	3.18	-50.00	-3.73	32.60	Horizontal

##### GPRS (GMSK)

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-19.99	3.19	-50.00	-5.60	32.42	Horizontal
1880.00	-17.27	3.11	-50.00	-3.25	<b>32.87</b>	Horizontal
1909.80	-17.92	3.18	-50.00	-3.73	32.63	Horizontal

##### EGPRS (8PSK)

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-23.96	3.19	-50.00	-5.60	28.45	Horizontal
1880.00	-21.49	3.11	-50.00	-3.25	28.65	Horizontal
1909.80	-21.33	3.18	-50.00	-3.73	<b>29.22</b>	Horizontal

Sample calculation: GSM, 1909.8 MHz

$$\text{Peak EIRP(dBm)} = P_{\text{Mea}}(-17.95 \text{ dBm}) - G_a(-3.73 \text{ dBi}) - P_{\text{Ag}}(-50.00 \text{ dB}) - P_{\text{cl}}(3.18 \text{ dB}) = 32.60 \text{ dBm}$$

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

Note: Expanded measurement uncertainty for PCS1900 is  $U = 1.07\text{dB}$ ,  $k=2$ .

## **A.2 EMISSION LIMIT**

### **Reference**

FCC: CFR 2.1051, Part 22.917(a), 24.238(b)

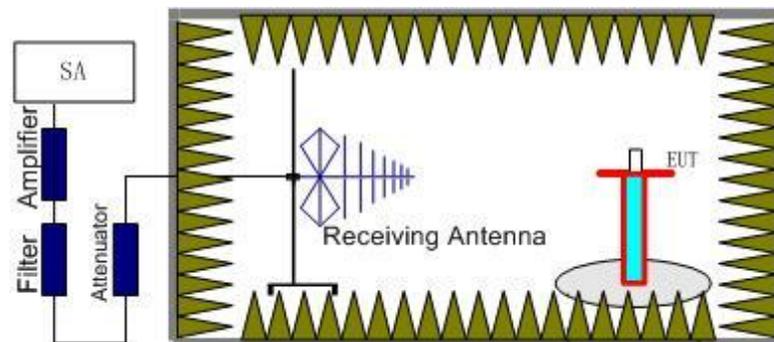
### **A.2.1 Measurement Method**

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber 3.

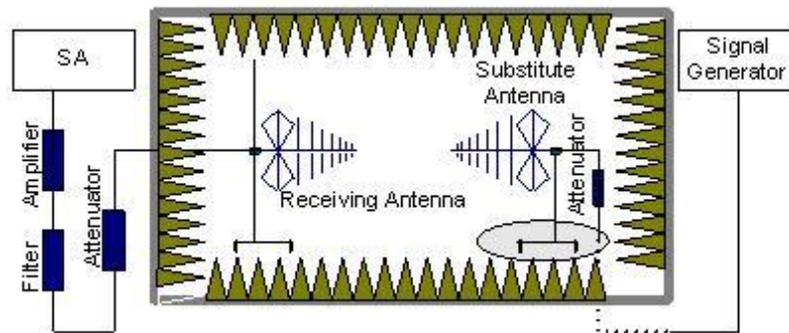
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of the PCS1900 band, GSM850 band.

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

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



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



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power ( $P_{Mea}$ ) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches 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.  
An 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,  $ERP = EIRP - 2.15\text{dB}$ .

### A.2.2 Measurement Limit

Part 24.238 specifies that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power ( $P$ ) by a factor of at least  $43 + 10 \log(P)$  dB. The specification that emissions shall be attenuated below the transmitter power ( $P$ ) by at least  $43 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

### A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the PCS band (1850.2 MHz, 1880 MHz and 1909.8 MHz), GSM850 band (824.2MHz, 836.6MHz and 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 GSM850 or PCS1900 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.

**GSM Mode Channel 128/824.2MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1648.51	-40.00	2.91	-5.45	2.15	-39.61	-13.00	Horizontal
2472.62	-40.59	3.56	-5.32	2.15	-40.98	-13.00	Horizontal
3785.44	-65.48	4.55	-8.24	2.15	-63.94	-13.00	Vertical
4944.92	-62.31	5.11	-9.60	2.15	-59.97	-13.00	Vertical
6171.67	-67.62	5.80	-10.34	2.15	-65.23	-13.00	Vertical
7740.61	-68.73	6.60	-11.64	2.15	-65.84	-13.00	Horizontal

**GSM Mode Channel 190/836.6MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1673.07	-40.14	2.97	-5.34	2.15	-39.92	-13.00	Horizontal
2509.88	-39.98	3.59	-5.43	2.15	-40.29	-13.00	Horizontal
3873.38	-69.76	4.52	-8.35	2.15	-68.08	-13.00	Vertical
4272.28	-58.63	4.79	-8.66	2.15	-56.91	-13.00	Horizontal
6887.47	-69.28	6.08	-10.99	2.15	-66.52	-13.00	Vertical
8110.64	-65.65	6.85	-11.97	2.15	-62.68	-13.00	Vertical

**GSM Mode Channel 251/848.8MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1697.67	-41.75	2.95	-5.23	2.15	-41.62	-13.00	Horizontal
2546.27	-42.07	3.63	-5.52	2.15	-42.33	-13.00	Horizontal
3395.56	-61.64	4.22	-7.65	2.15	-60.36	-13.00	Vertical
4243.90	-58.98	4.76	-8.65	2.15	-57.24	-13.00	Vertical
6430.52	-65.83	5.84	-10.54	2.15	-63.28	-13.00	Horizontal
8173.39	-65.53	6.83	-12.00	2.15	-62.51	-13.00	Vertical

**GSM Mode Channel 512/1850.2MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>pl</sub> (dB)	G <sub>a</sub> (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3700.41	-42.16	4.44	-8.14	-38.46	-13.00	Vertical
5550.68	-47.80	5.46	-10.02	-43.24	-13.00	Vertical
7400.74	-53.27	6.42	-11.34	-48.35	-13.00	Vertical
9250.94	-63.00	7.65	-12.60	-58.05	-13.00	Vertical
11101.30	-45.42	8.40	-12.40	-41.42	-13.00	Horizontal
12951.09	-41.06	8.86	-13.24	-36.68	-13.00	Vertical

**GSM Mode Channel 661/1880.0MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>pl</sub> (dB)	G <sub>a</sub> (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3760.14	-39.67	4.52	-8.21	-35.98	-13.00	Vertical
5639.84	-49.50	5.45	-10.06	-44.89	-13.00	Horizontal
7519.72	-52.68	6.81	-11.42	-48.07	-13.00	Vertical
9236.86	-67.04	7.67	-12.60	-62.11	-13.00	Horizontal
11280.40	-45.76	8.55	-12.40	-41.91	-13.00	Horizontal
13160.10	-38.44	9.14	-13.46	-34.12	-13.00	Vertical

**GSM Mode Channel 810/1909.8MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>pl</sub> (dB)	G <sub>a</sub> (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3819.52	-38.60	4.49	-8.28	-34.81	-13.00	Vertical
5732.01	-49.64	5.56	-10.09	-45.11	-13.00	Horizontal
7824.77	-64.79	6.90	-11.72	-59.97	-13.00	Vertical
11458.63	-45.11	8.64	-12.40	-41.35	-13.00	Horizontal
13368.43	-35.52	9.07	-13.67	-30.92	-13.00	Vertical
16248.67	-59.84	10.14	-12.70	-57.28	-13.00	Vertical

Note: Expanded measurement uncertainty for this test item is  $U = 4.21\text{dB}$ ,  $k=2$ .

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

#### **Reference**

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2003 is used. Conducted Emission is measured with travel charger. EUT is under transmitting mode. For test layout photo, please refer to Pic.2 in Annex B.

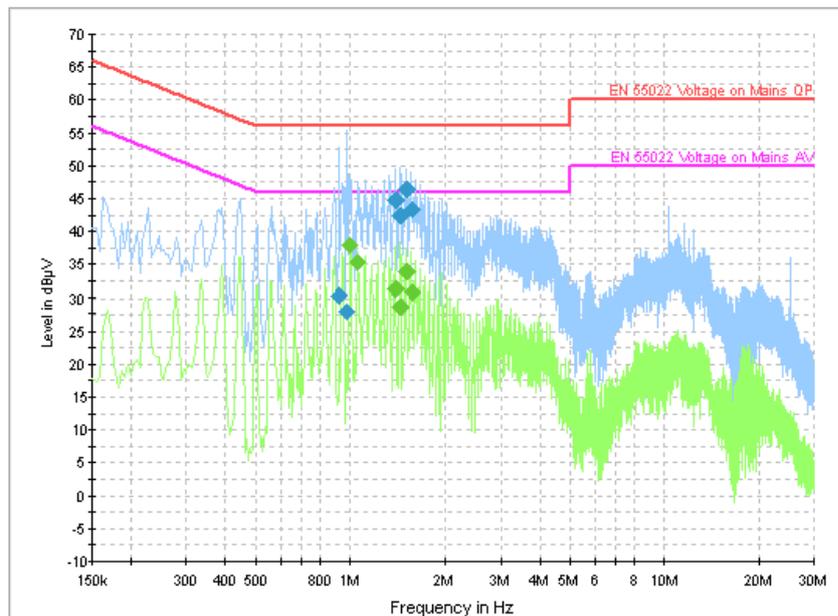
#### **A.3.1 Limit**

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**



IF bandwidth 9 kHz

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

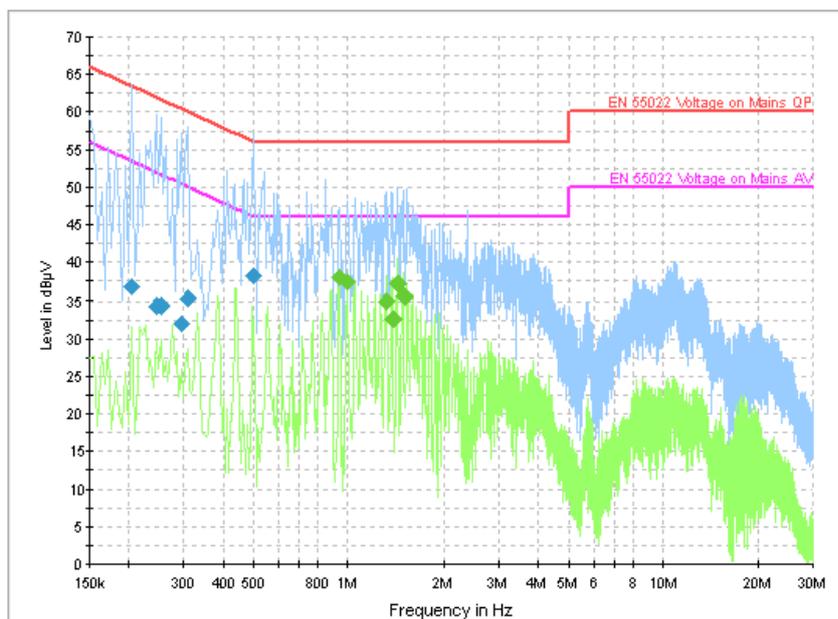
**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.924000	30.3	GND	L1	10.0	25.7	56.0
0.973500	28.0	GND	L1	10.0	28.0	56.0
1.392000	44.7	GND	L1	10.0	11.3	56.0
1.450500	42.4	GND	L1	10.0	13.6	56.0
1.504500	46.3	GND	L1	10.0	9.7	56.0
1.563000	43.3	GND	L1	10.0	12.7	56.0

**Final Result 2**

Frequency (MHz)	Average (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
1.000500	37.8	GND	L1	10.0	8.2	46.0
1.059000	35.4	GND	L1	10.0	10.6	46.0
1.392000	31.3	GND	L1	10.0	14.7	46.0
1.450500	28.7	GND	L1	10.0	17.3	46.0
1.504500	33.9	GND	L1	10.0	12.1	46.0
1.563000	30.8	GND	L1	10.0	15.2	46.0

**PCS 1900MHz**



IF bandwidth 9 kHz

Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

**Final Result 1**

Frequency (MHz)	QuasiPeak (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.204000	36.8	GND	L1	10.0	26.7	63.4
0.244500	34.3	GND	L1	10.0	27.6	61.9
0.253500	34.3	GND	L1	10.0	27.4	61.6
0.294000	32.0	GND	L1	10.0	28.4	60.4
0.307500	35.3	GND	L1	10.0	24.7	60.0
0.501000	38.3	GND	L1	10.0	17.7	56.0

**Final Result 2**

Frequency (MHz)	Average (dB $\mu$ V)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB $\mu$ V)
0.937500	37.9	GND	L1	10.0	8.1	46.0
0.996000	37.4	GND	L1	10.0	8.6	46.0
1.324500	34.9	GND	L1	10.0	11.1	46.0
1.383000	32.6	GND	L1	10.0	13.4	46.0
1.437000	37.3	GND	L1	10.0	8.7	46.0
1.495500	35.6	GND	L1	10.0	10.4	46.0

Note: Expanded measurement uncertainty for this test item is  $U = 3.2\text{dB}$ ,  $k=2$ .

## **A.4 FREQUENCY STABILITY**

### **Reference**

FCC: CFR Part 2.1055, 22.355, 24.235

### **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, 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. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring 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 4.1VDC, with a nominal voltage of 3.7VDC. 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 -5.4 % and +10.8 %. For the purposes of measuring frequency stability these voltage limits are to be used.

#### A.4.3 Measurement results

##### GSM 850

Room Temperature: 24 °C

##### Frequency Error vs Voltage

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-15	0.018
3.7	39	0.047
4.1	-25	0.030

##### Frequency Error vs Temperature

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
50	-17	0.021
40	-10	0.012
30	-13	0.016
20	-16	0.019
10	-14	0.017
0	-15	0.017
- 10	-28	0.033
- 20	-16	0.019
- 30	-15	0.018

Expanded measurement uncertainty for this test item is 10 Hz, k=2

**PCS 1900**

**Room Temperature: 24°C**

**Frequency Error vs Voltage**

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.5	-46	0.024
3.7	-19	0.010
4.1	-23	0.012

**Frequency Error vs Temperature**

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
50	-16	0.009
40	-26	0.014
30	-25	0.013
20	-22	0.012
10	-25	0.013
0	-23	0.012
- 10	-21	0.011
- 20	-21	0.011
- 30	-19	0.010

Expanded measurement uncertainty for this test item is 10 Hz, k=2

## A.5 OCCUPIED BANDWIDTH

### Reference

FCC: CFR Part 2.1049(h)(i)

### A.5.1 Occupied Bandwidth Results

Occupied bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the US Cellular/PCS frequency bands. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

### Measurement Parameters:

**RBW = 5 kHz, VBW = 10 kHz**

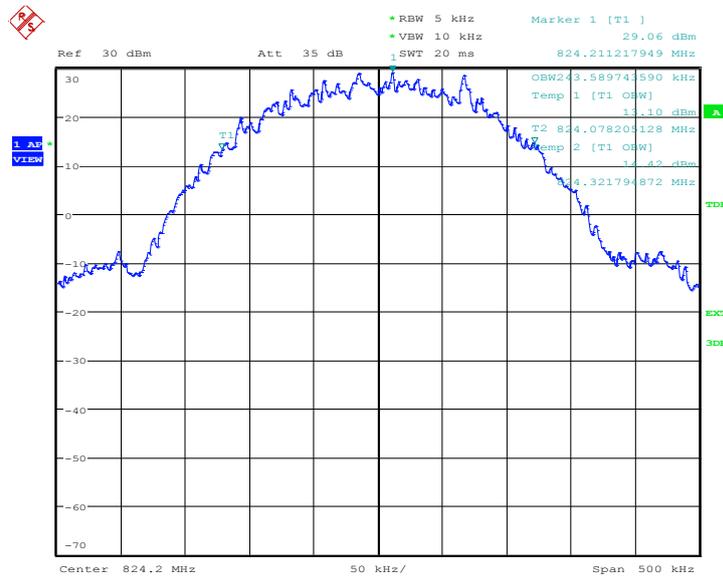
### GSM 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
824.2	243.590
836.6	245.192
848.8	243.590

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

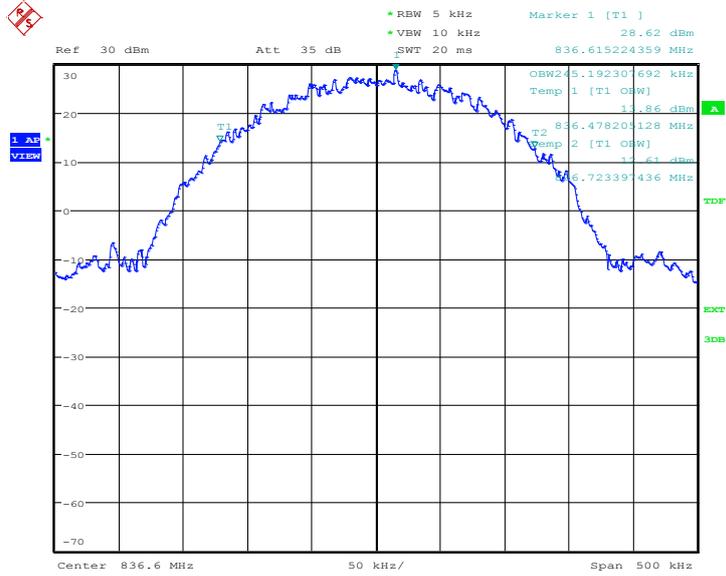
### GSM 850

### Channel 128-Occupied Bandwidth (-20dBc BW)



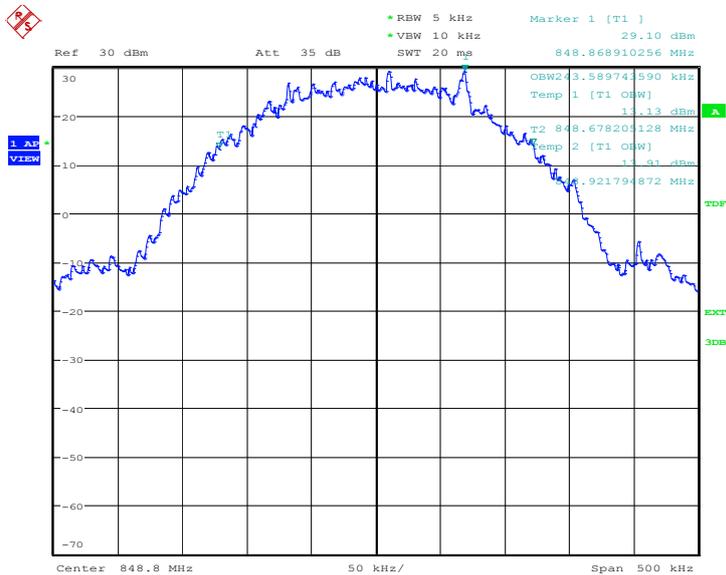
Date: 27.FEB.2013 23:48:00

### Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 27.FEB.2013 23:48:32

### Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 27.FEB.2013 23:49:04

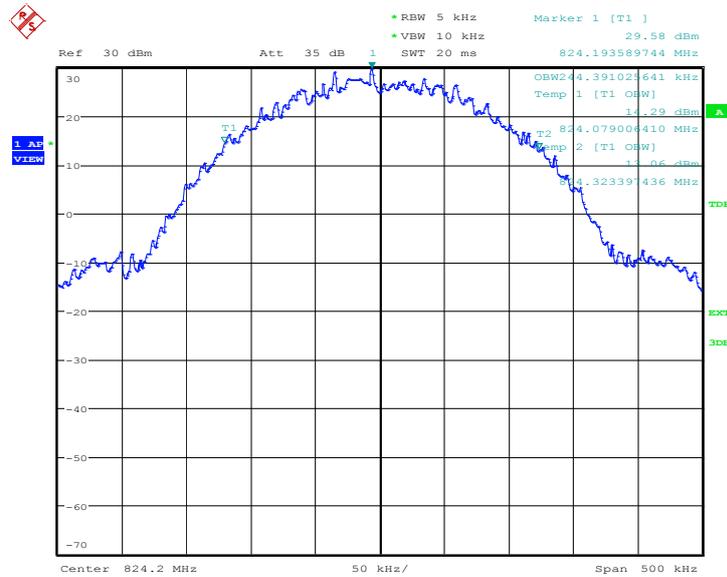
**GPRS 850(99%)**

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

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

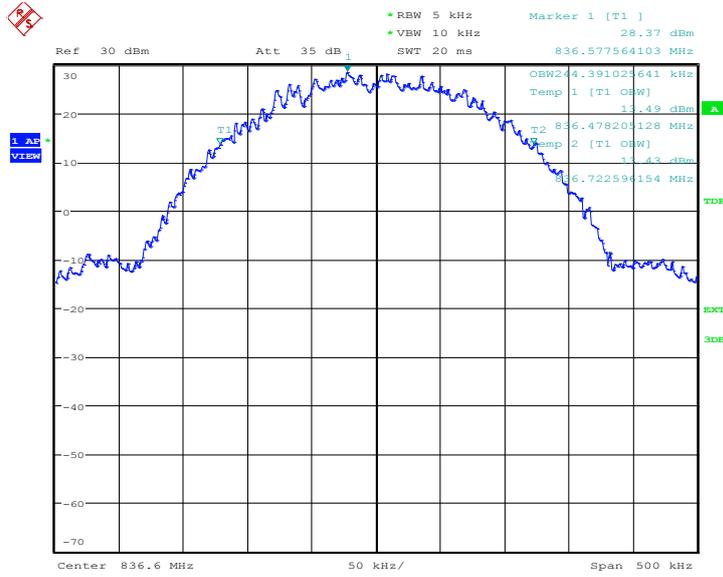
**GPRS 850**

**Channel 128-Occupied Bandwidth (-20dBc BW)**



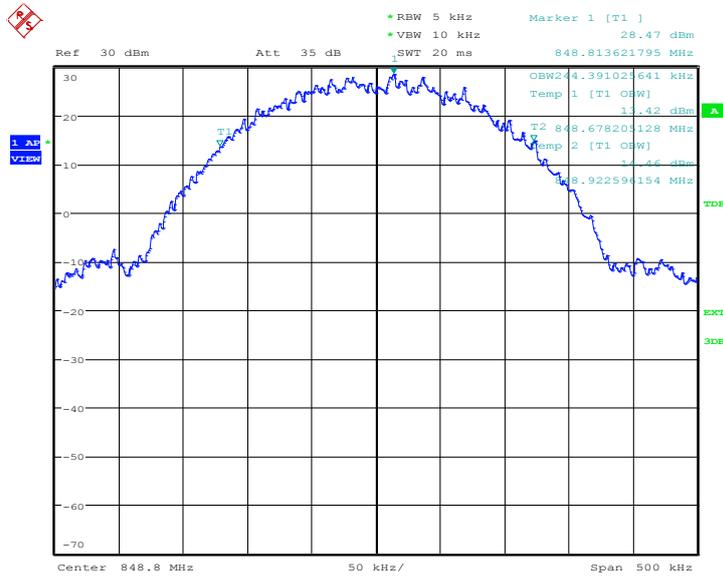
Date: 28.FEB.2013 00:20:11

### Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:20:44

### Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:21:16

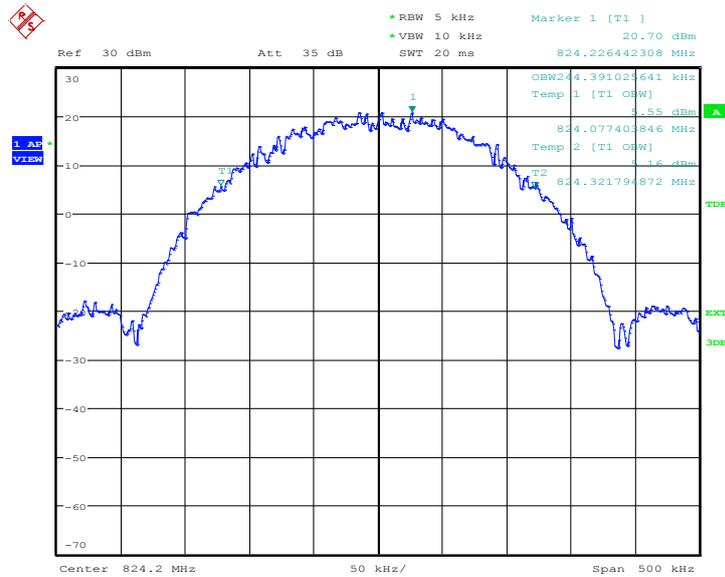
**EGPRS 850(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
824.2	244.391
836.6	246.795
848.8	244.391

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

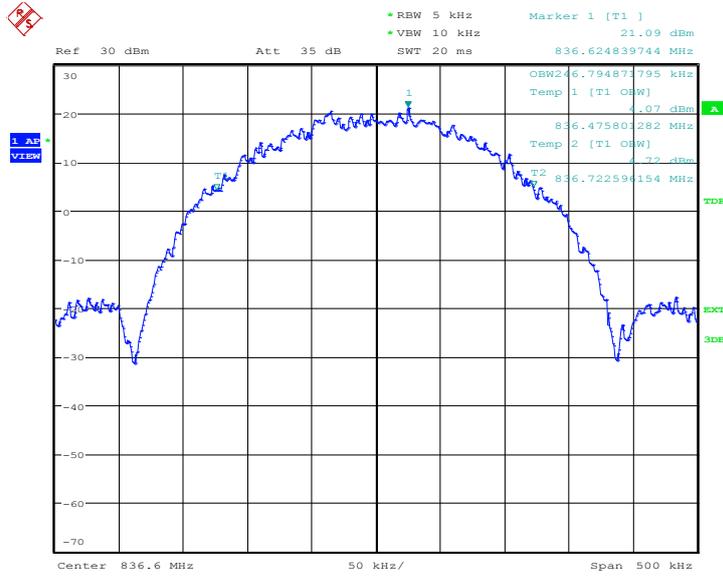
**EGPRS 850**

**Channel 128-Occupied Bandwidth (-20dBc BW)**



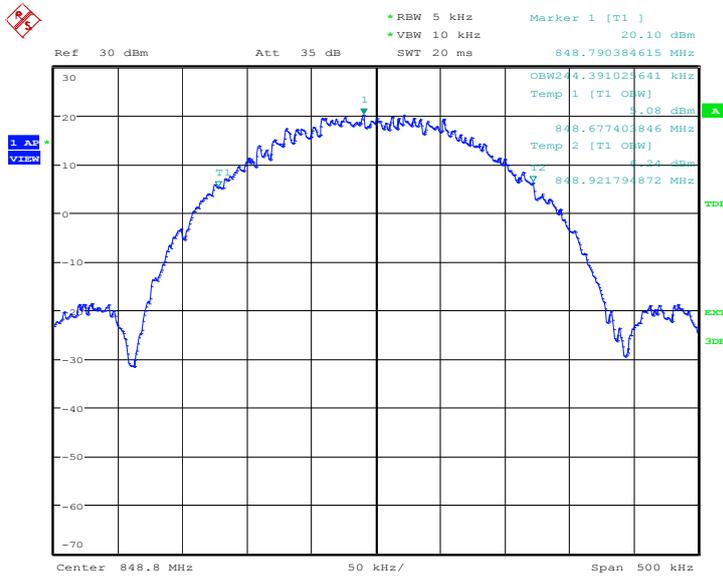
Date: 28.FEB.2013 00:30:32

### Channel 190-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:31:04

### Channel 251-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:31:36

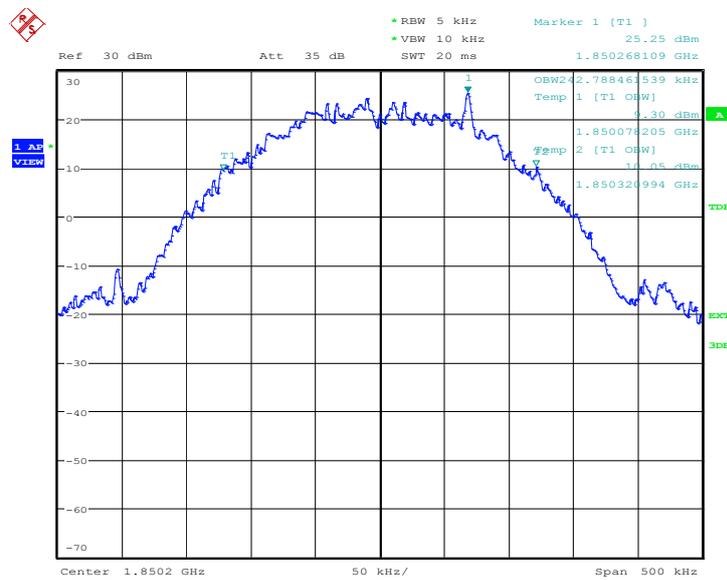
**PCS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	242.788
1880.0	245.192
1909.8	246.795

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

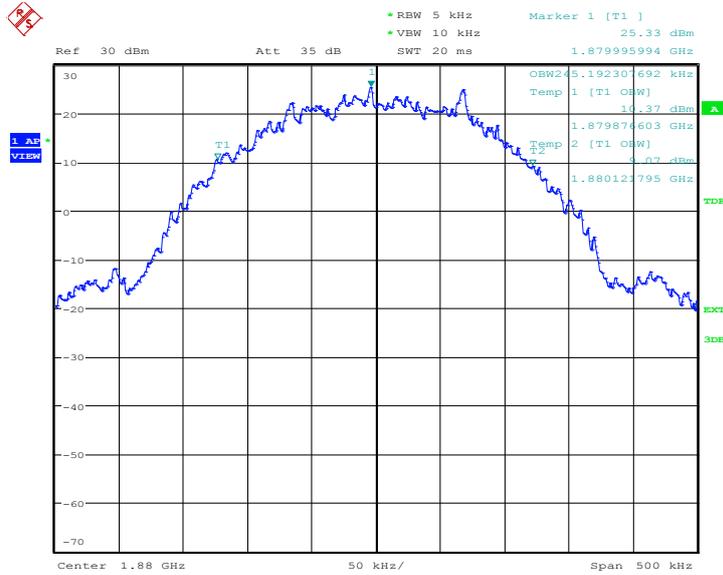
**PCS 1900**

**Channel 512-Occupied Bandwidth (-20dBc BW)**



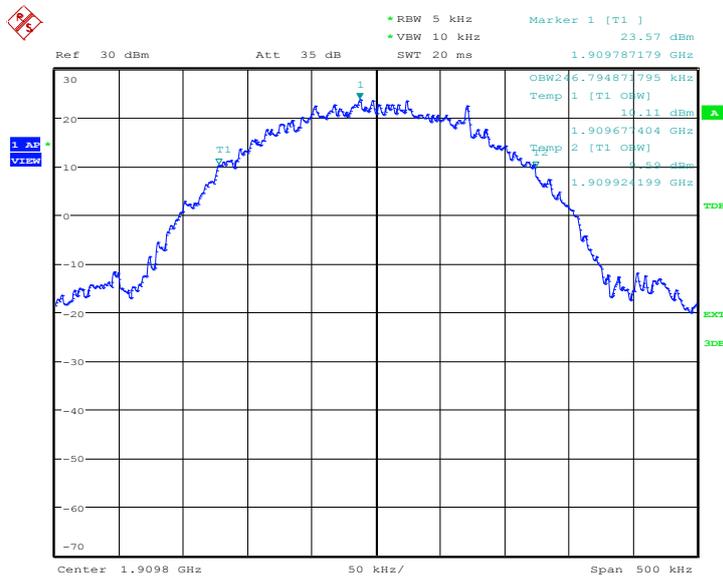
Date: 28.FEB.2013 00:02:34

### Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:03:06

### Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:03:38

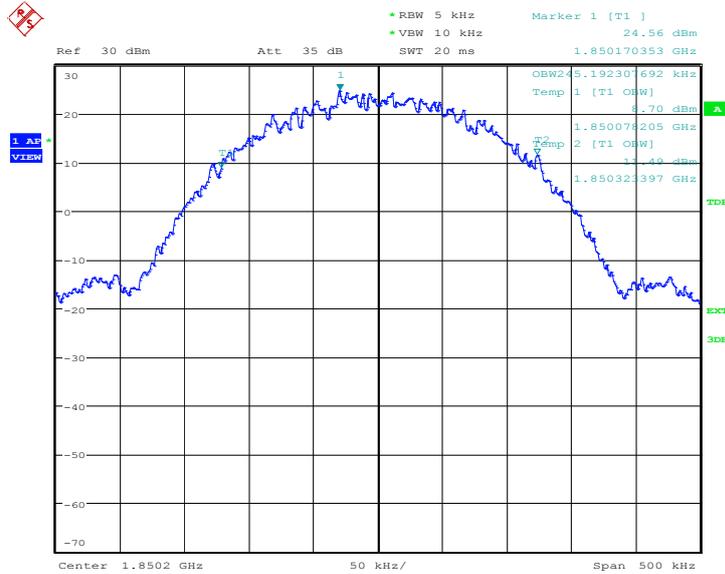
**GPRS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	245.192
1880.0	245.192
1909.8	244.391

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

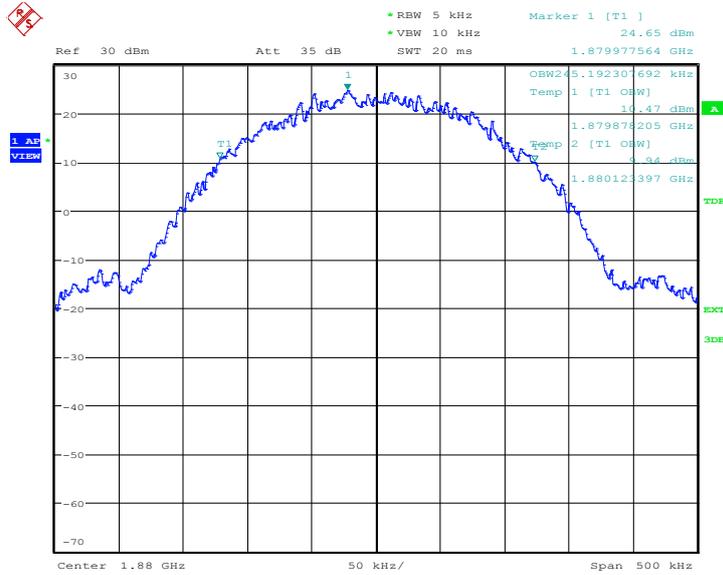
**GPRS 1900**

**Channel 512-Occupied Bandwidth -20dBc BW)**



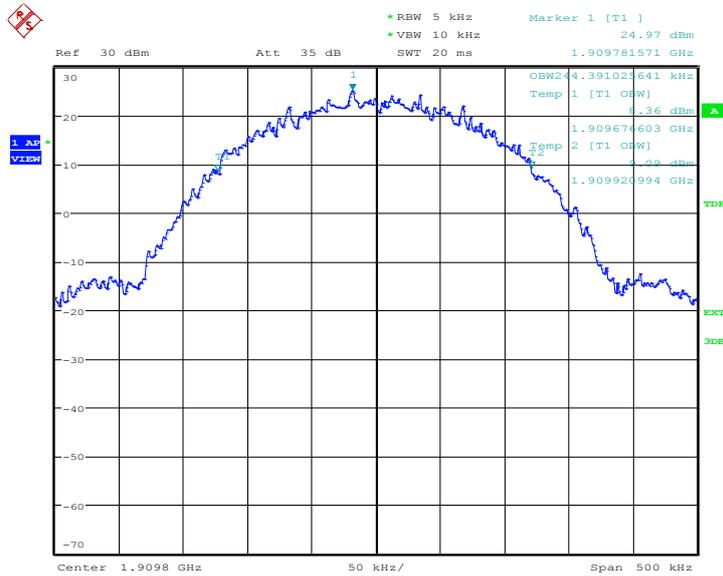
Date: 28.FEB.2013 00:25:06

### Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:25:38

### Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:26:10

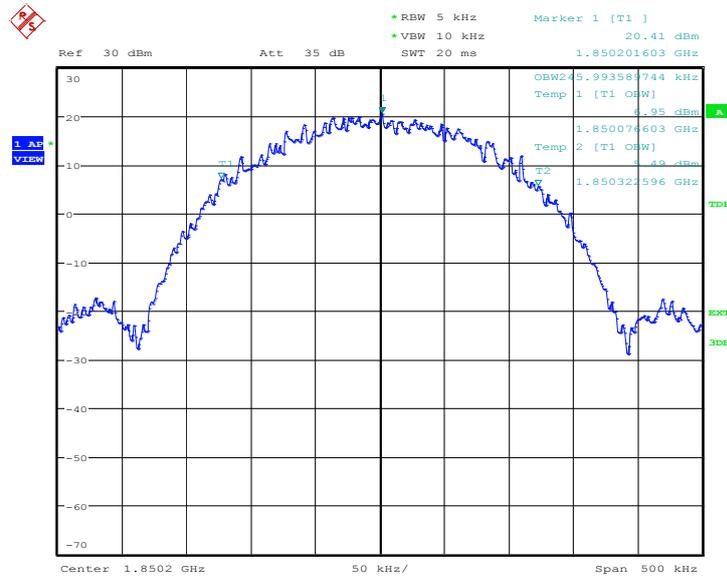
**EGPRS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	245.994
1880.0	244.391
1909.8	245.192

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

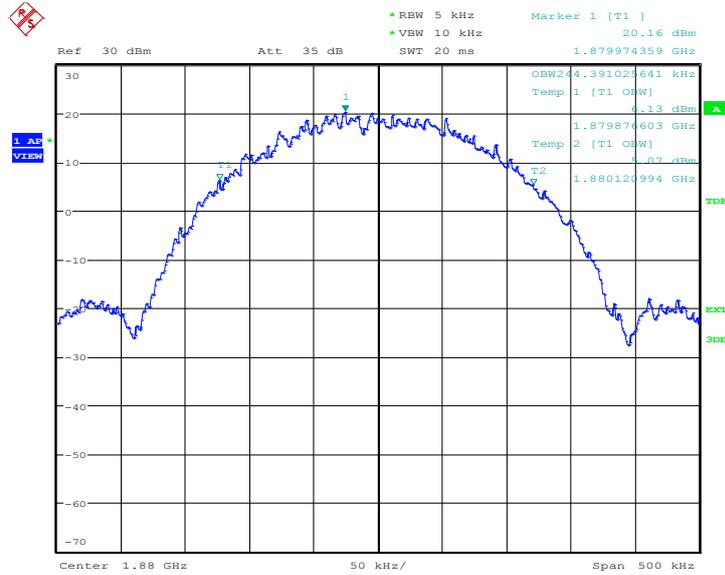
**EGPRS 1900**

**Channel 512-Occupied Bandwidth (-20dBc BW)**



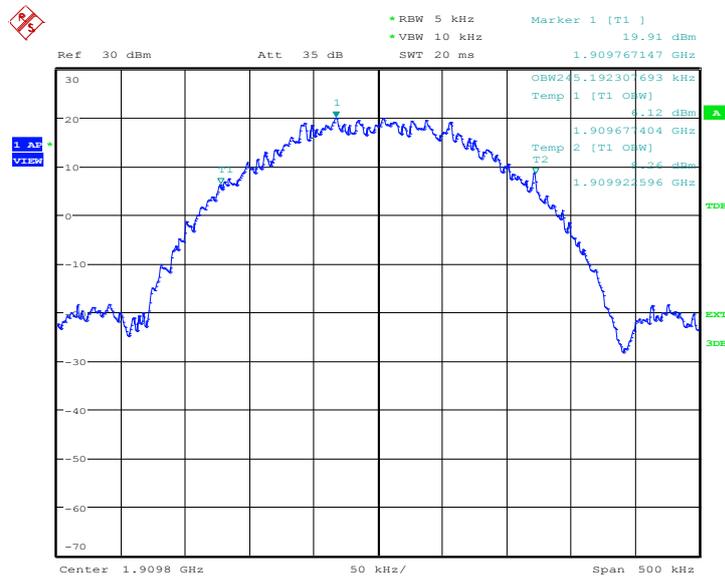
Date: 28.FEB.2013 00:38:36

### Channel 661-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:39:08

### Channel 810-Occupied Bandwidth (-20dBc BW)



Date: 28.FEB.2013 00:39:41

## A.6 EMISSION BANDWIDTH

### Reference

FCC: CFR Part 22.917(b), 24.238(b)

### A.6.1 Emission Bandwidth Results

Emission bandwidth measurements are only provided for selected frequencies in order to reduce the amount of submitted data. Data were taken at the extreme and mid frequencies of the PCS1900 band and GSM850 band. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

### Measurement Parameters:

RBW = 5 kHz, VBW = 10 kHz

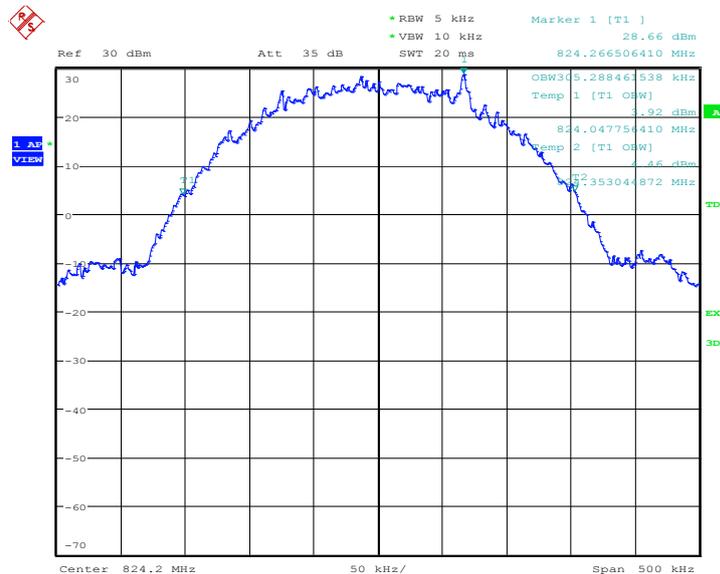
### GSM 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	305.288
836.6	306.891
848.8	305.288

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

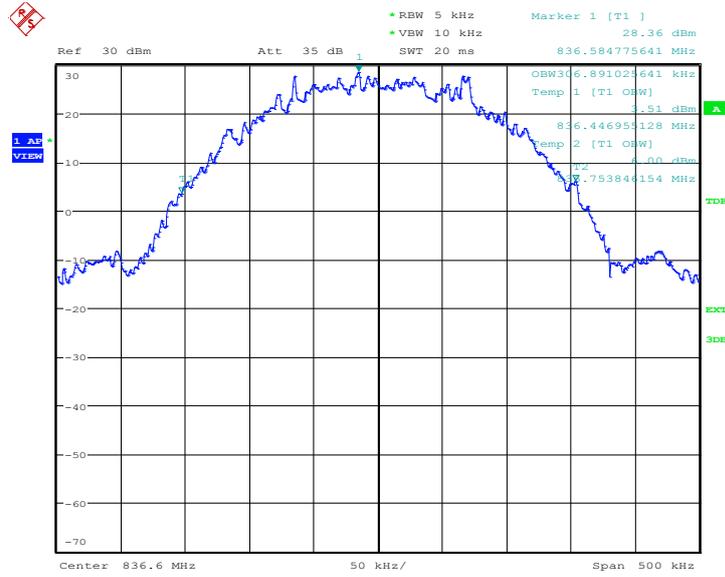
### GSM 850

### Channel 128-Occupied Bandwidth (-26dBc BW)



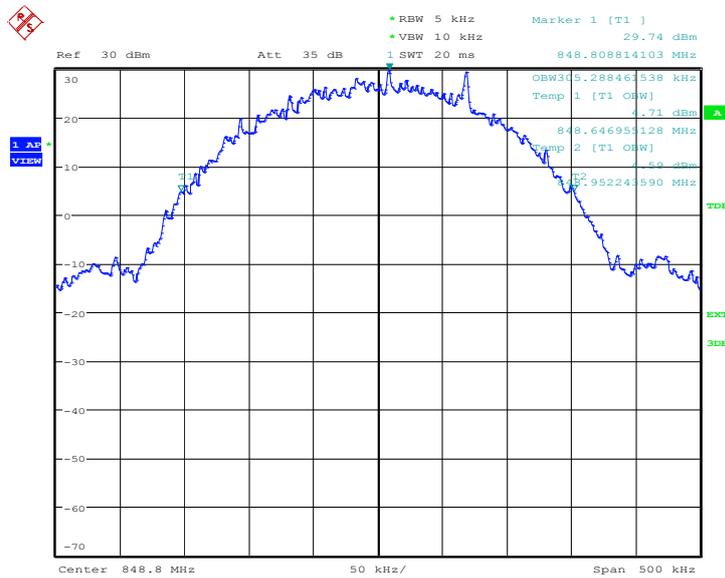
Date: 27.FEB.2013 23:49:38

### Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 27.FEB.2013 23:50:10

### Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 27.FEB.2013 23:50:43

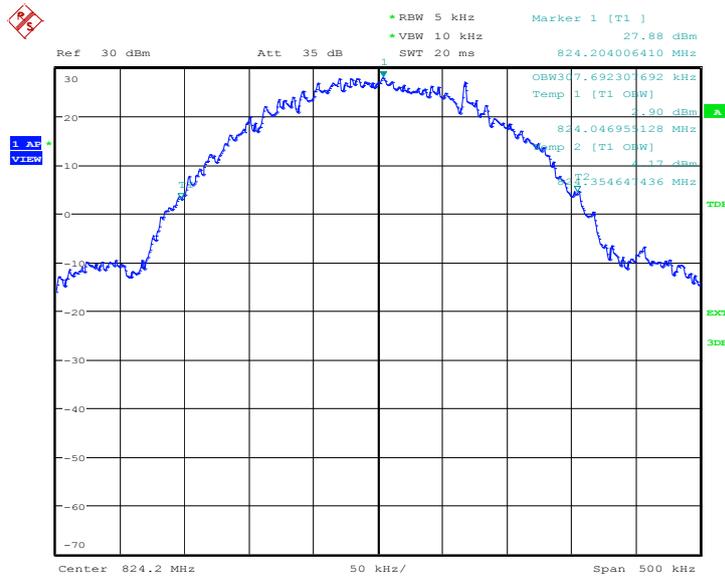
**GPRS 850(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	307.692
836.6	304.487
848.8	306.891

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

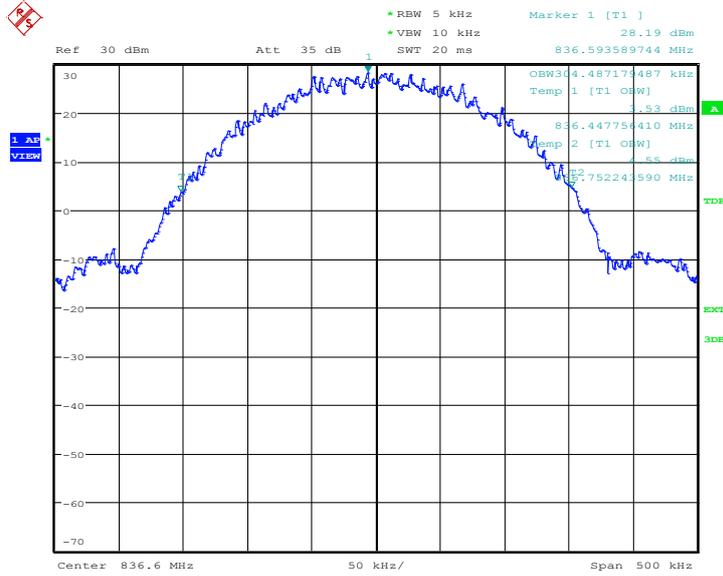
**GPRS 850**

**Channel 128-Occupied Bandwidth (-26dBc BW)**



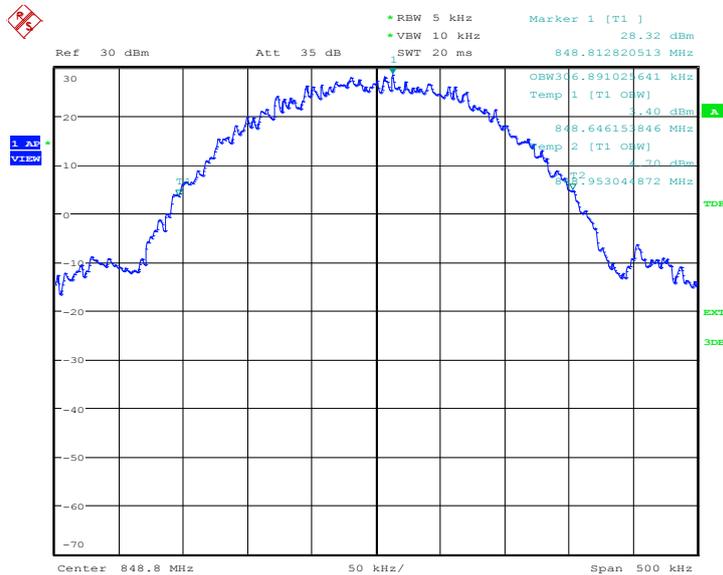
Date: 28.FEB.2013 00:21:49

### Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:22:22

### Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:22:54

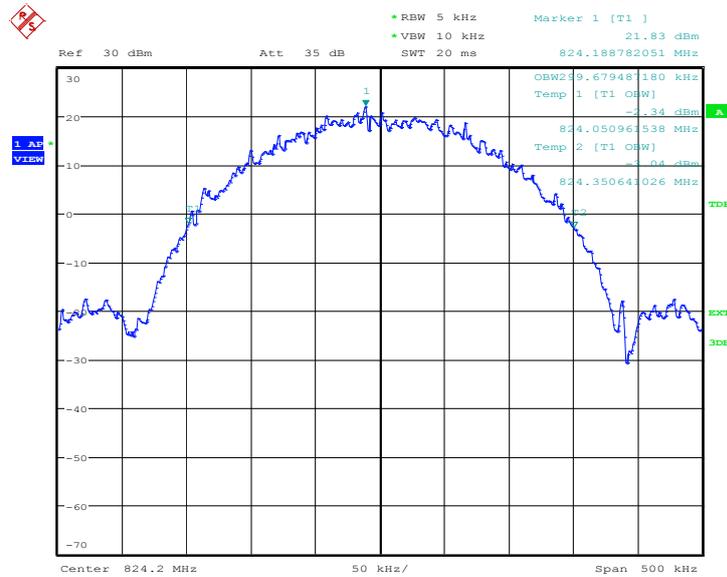
**EGPRS 850(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	299.679
836.6	298.077
848.8	298.878

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

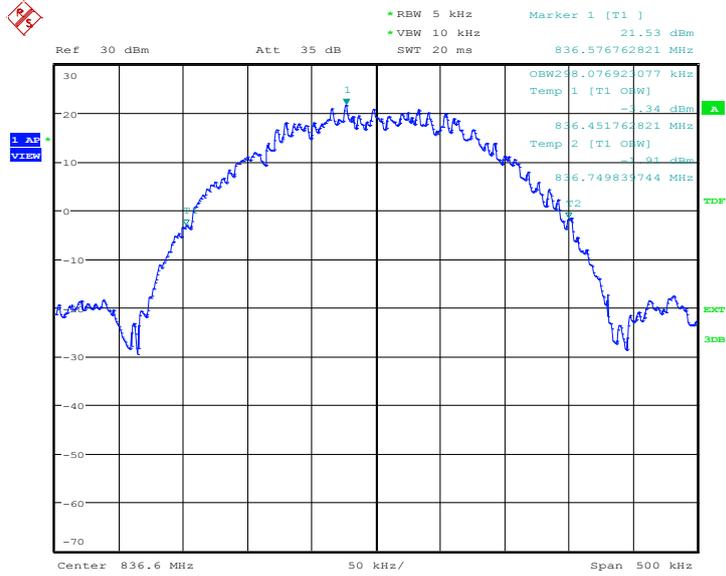
**EGPRS 850**

**Channel 128-Occupied Bandwidth (-26dBc BW)**



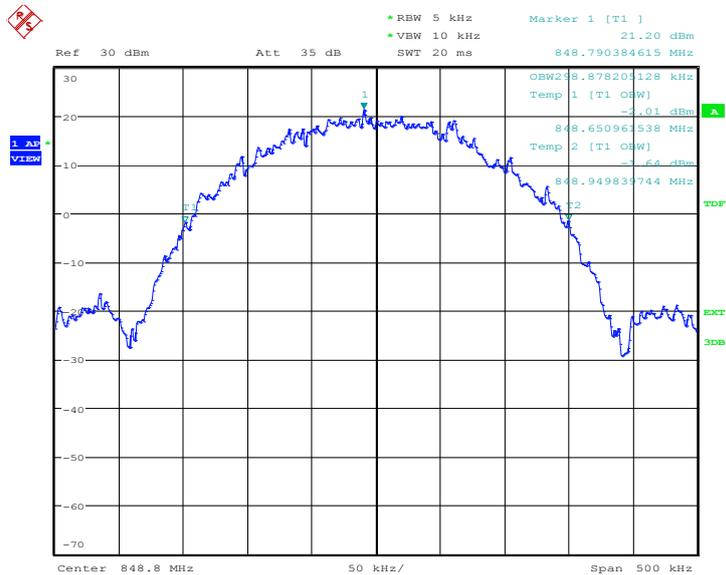
Date: 28.FEB.2013 00:32:10

### Channel 190-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:32:42

### Channel 251-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:33:14

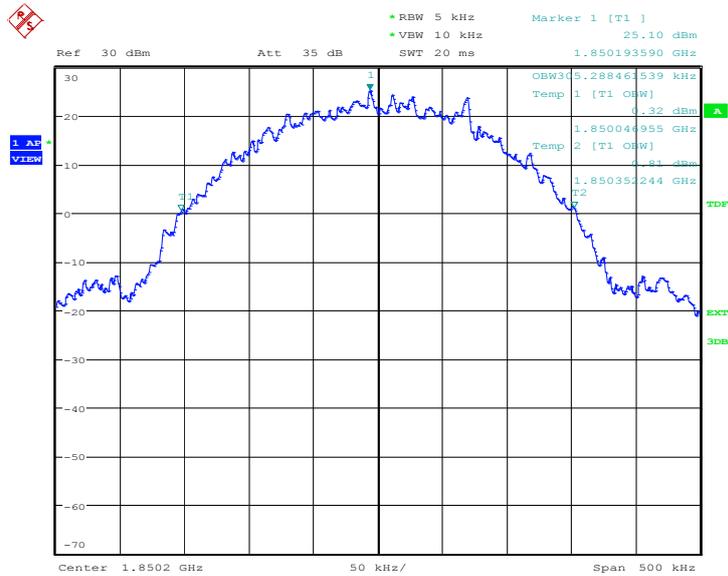
**PCS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	305.288
1880.0	306.090
1909.8	306.891

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

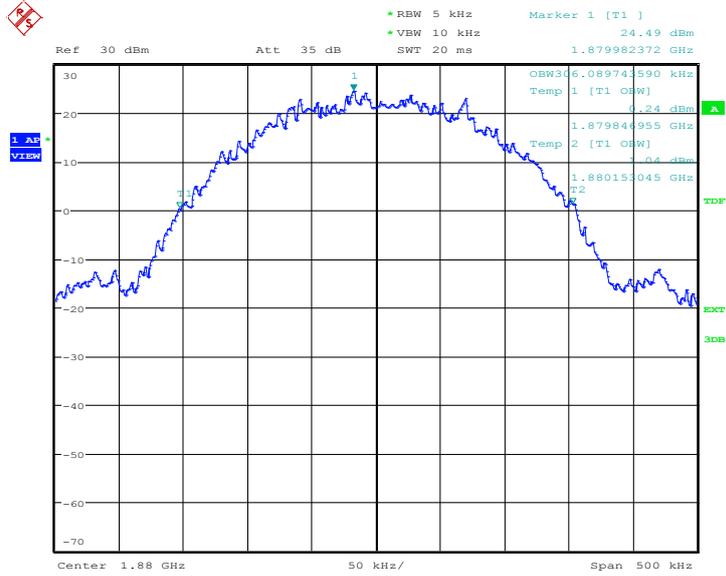
**PCS 1900**

**Channel 512-Occupied Bandwidth (-26dBc BW)**



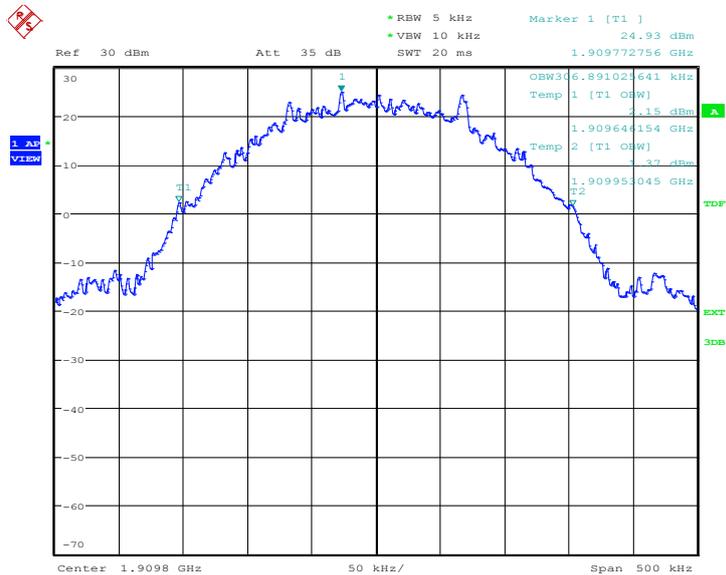
Date: 28.FEB.2013 00:04:12

### Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:04:44

### Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:05:16

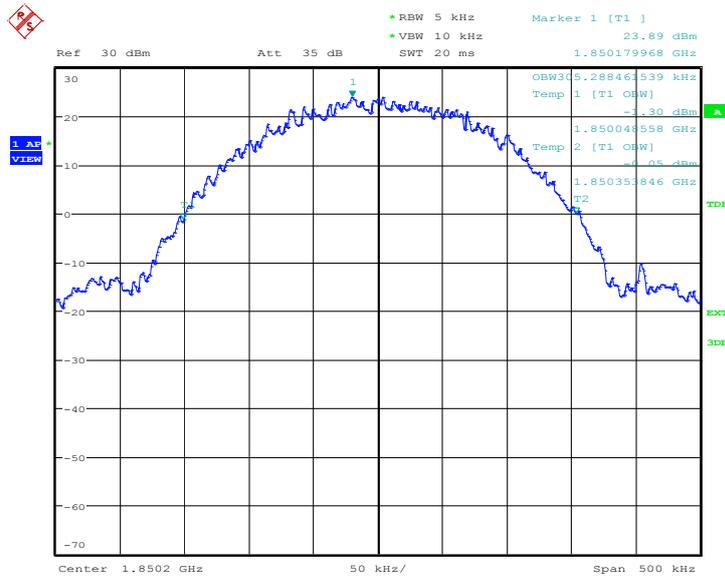
**GPRS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	305.288
1880.0	306.090
1909.8	305.288

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

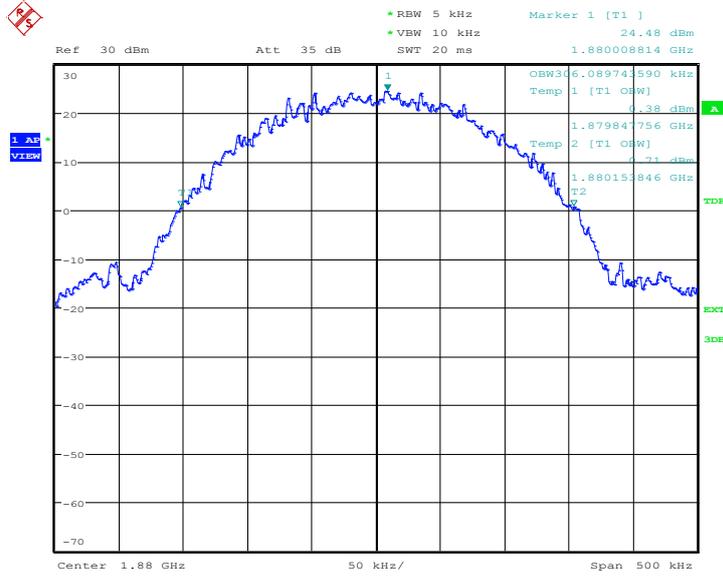
**GPRS 1900**

**Channel 512-Occupied Bandwidth (-26dBc BW)**



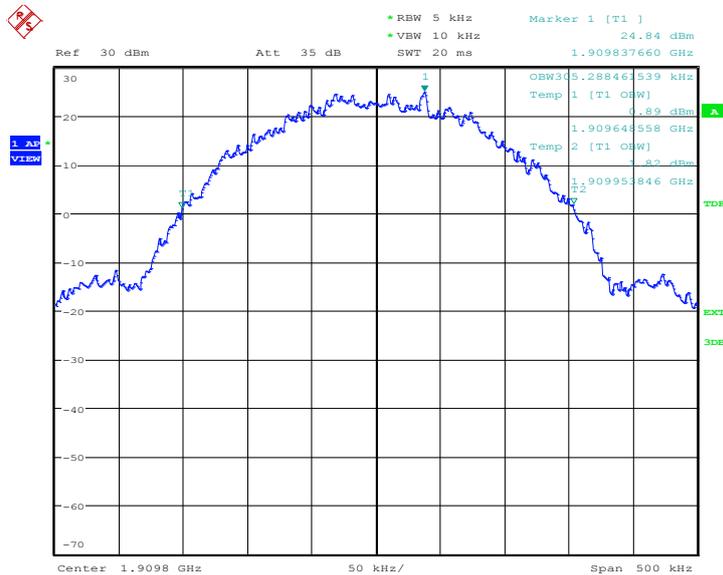
Date: 28.FEB.2013 00:26:44

### Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:27:16

### Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:27:48

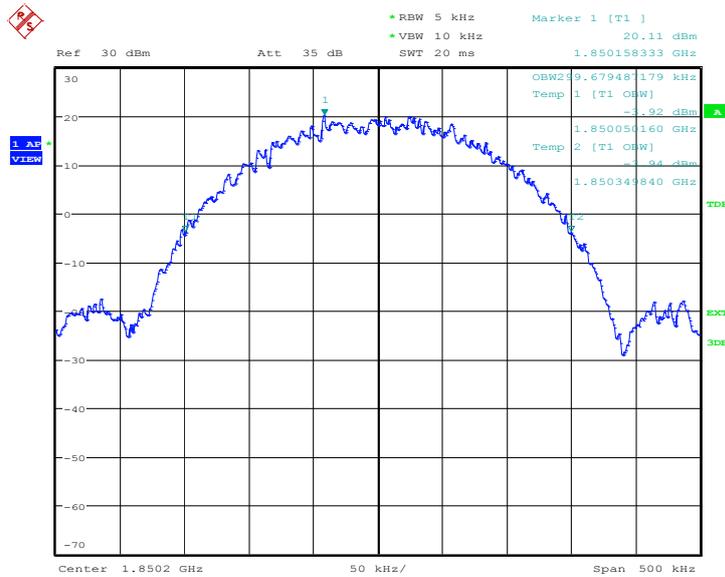
**EGPRS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	299.679
1880.0	298.077
1909.8	302.083

Expanded measurement uncertainty for this test item is 1.1 kHz, k=2

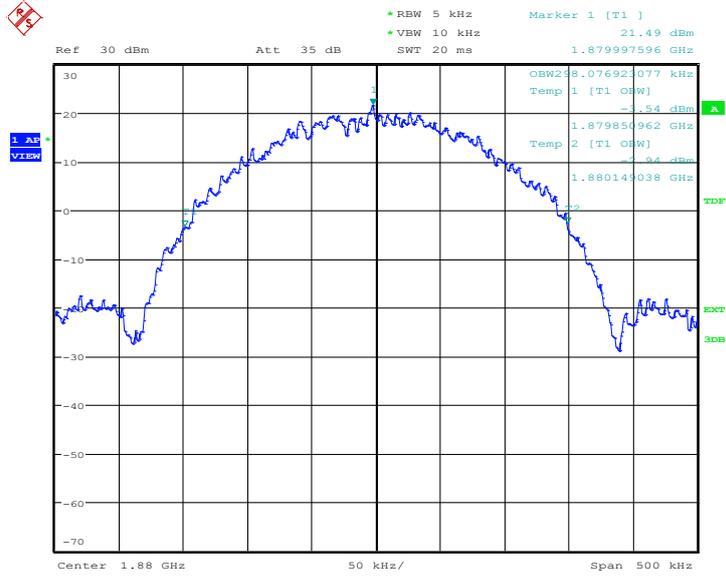
**EGPRS 1900**

**Channel 512-Occupied Bandwidth (-26dBc BW)**



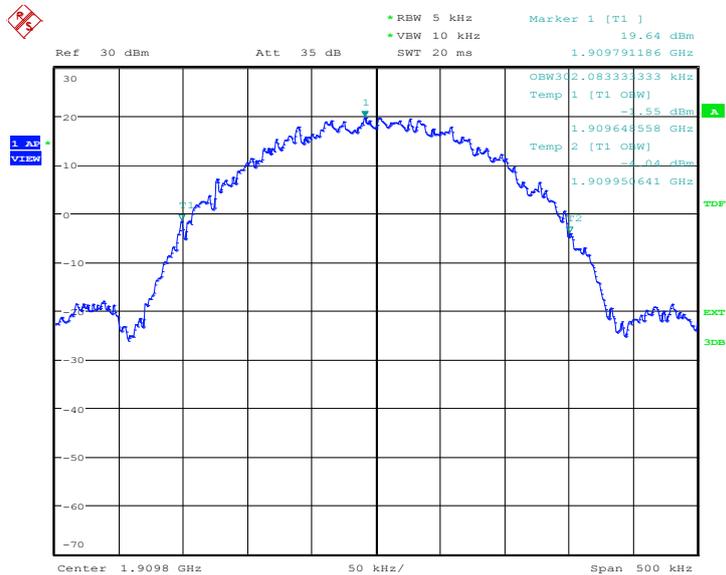
Date: 28.FEB.2013 00:40:14

### Channel 661-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:40:46

### Channel 810-Occupied Bandwidth (-26dBc BW)



Date: 28.FEB.2013 00:41:19

## A.7 BAND EDGE COMPLIANCE

### Reference

FCC: CFR Part 22.917(b), 24.238(b)

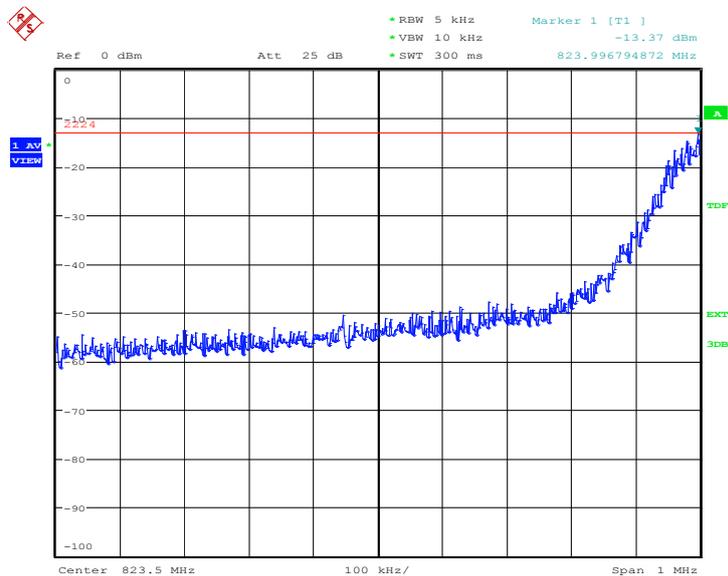
#### A.7.1 Measurement limit

On any frequency outside frequency band of the US Cellular/PCS spectrum, the power of any emission shall be attenuated below the transmitter power (P, in Watts) by at least  $43+10\log(P)$  dB. For all power levels +30 dBm to 0 dBm, this becomes a constant specification limit of -13 dBm.

#### A.7.2 Measurement result

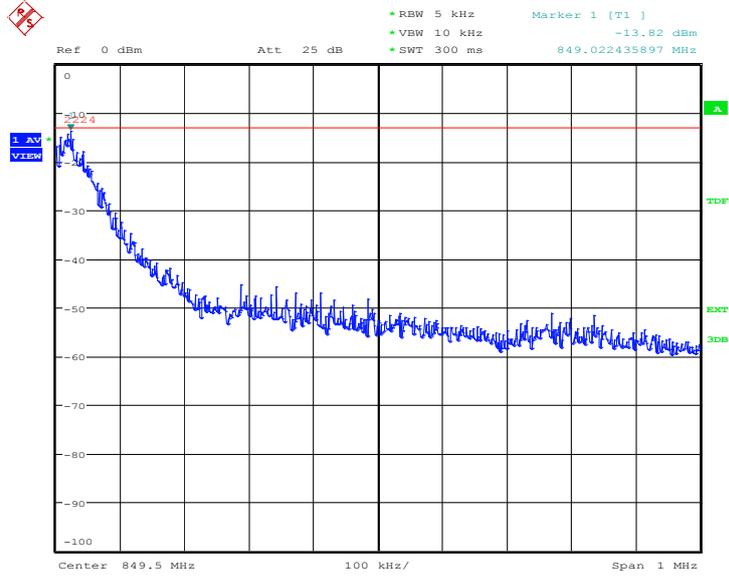
##### GSM 850

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



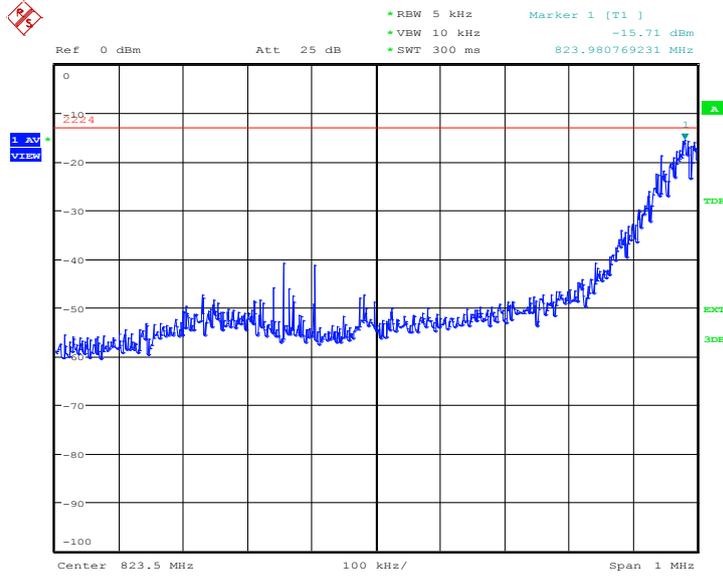
Date: 28.FEB.2013 04:35:49

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



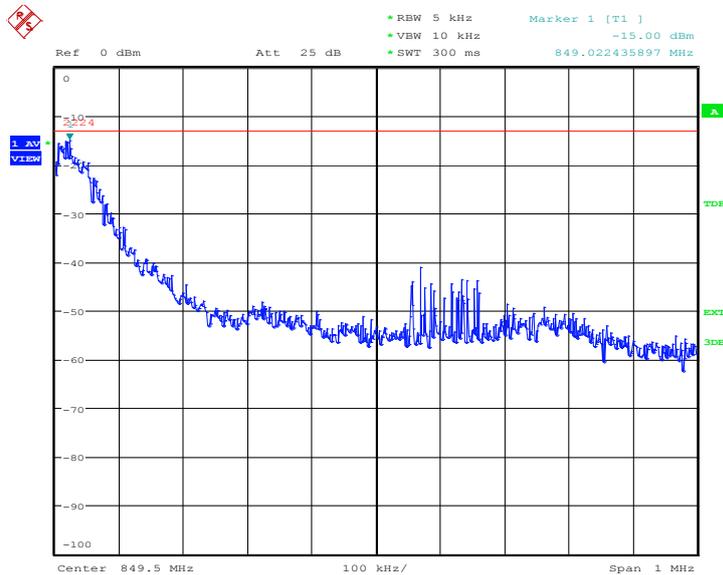
Date: 28.FEB.2013 04:36:03

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



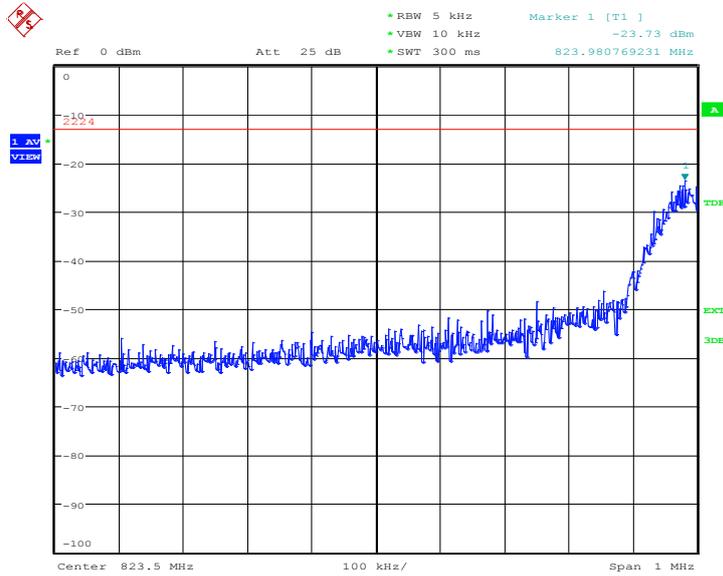
Date: 28.FEB.2013 00:23:08

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



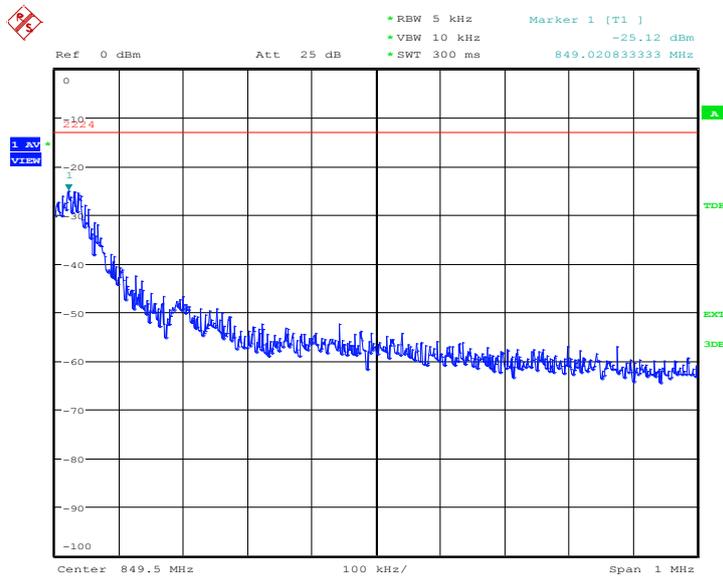
Date: 28.FEB.2013 00:23:22

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



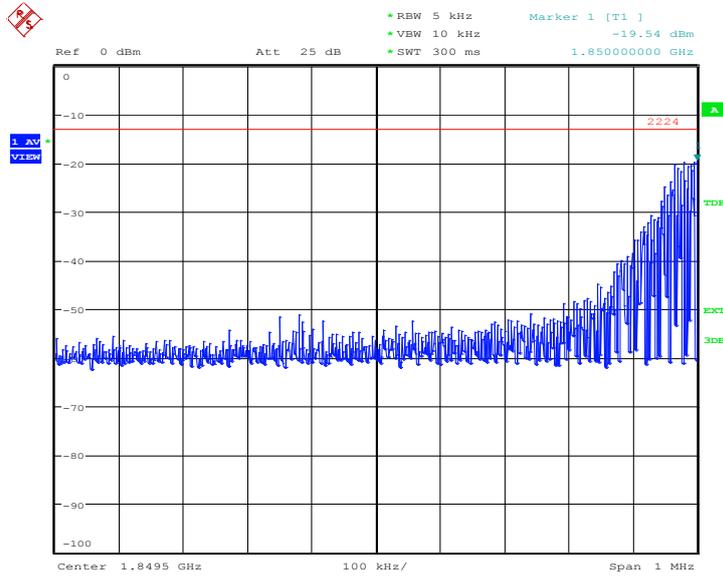
Date: 28.FEB.2013 00:33:28

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



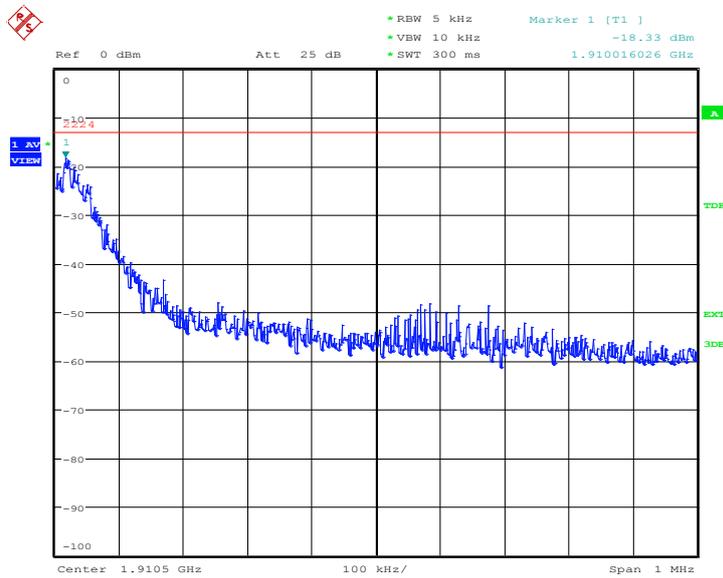
Date: 28.FEB.2013 00:33:42

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



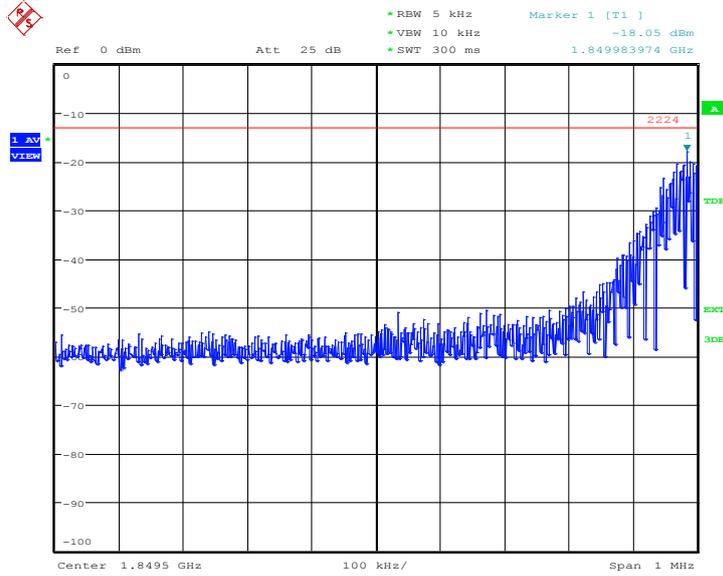
Date: 28.FEB.2013 00:05:30

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



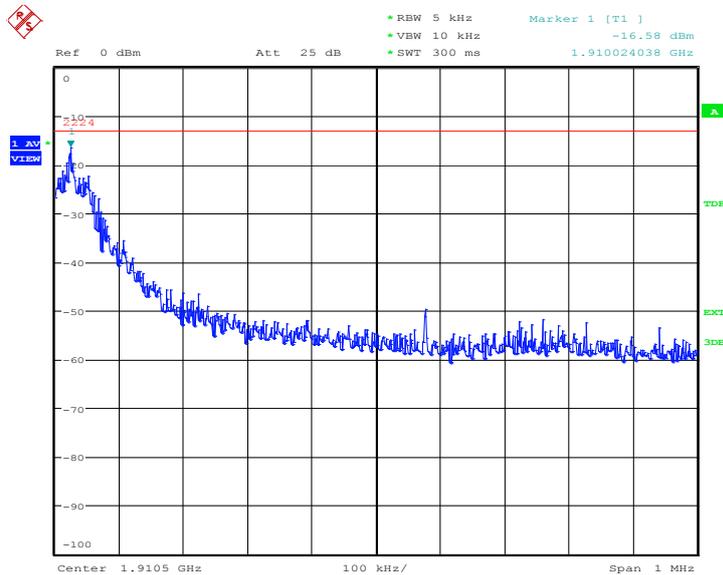
Date: 28.FEB.2013 00:05:44

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



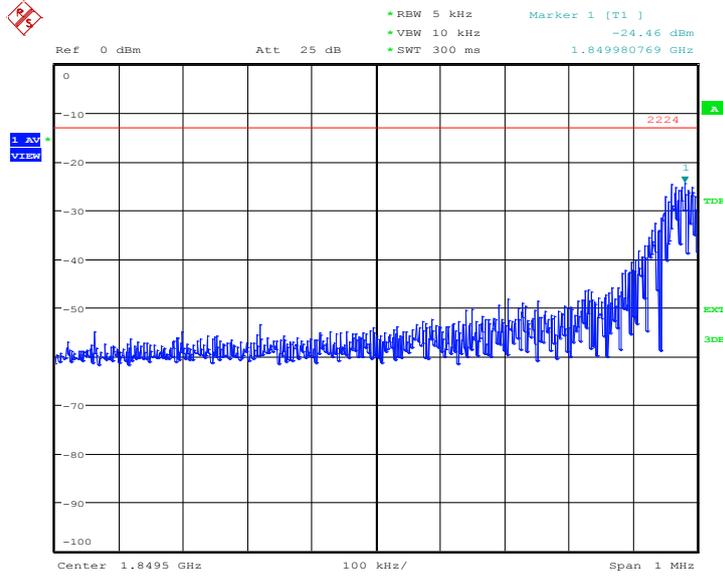
Date: 28.FEB.2013 00:28:02

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



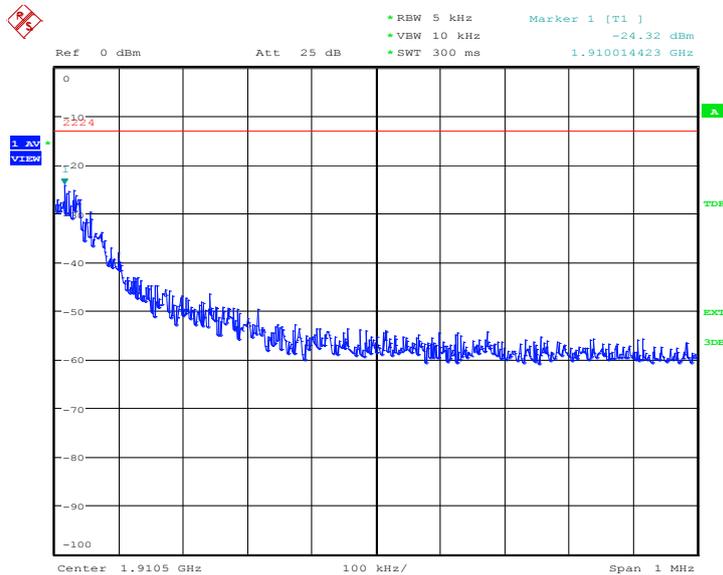
Date: 28.FEB.2013 00:28:16

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



Date: 28.FEB.2013 00:41:33

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



Date: 28.FEB.2013 00:41:46

## A.8 CONDUCTED SPURIOUS EMISSION

### Reference

FCC: CFR Part 2.1057, 22.917, 24.238

### 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 are taken from 30 MHz to 20 GHz. For GSM850, data are taken from 30 MHz to 10 GHz.
2. 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**

**Measurement Uncertainty: 0.3dB**

**GSM850**

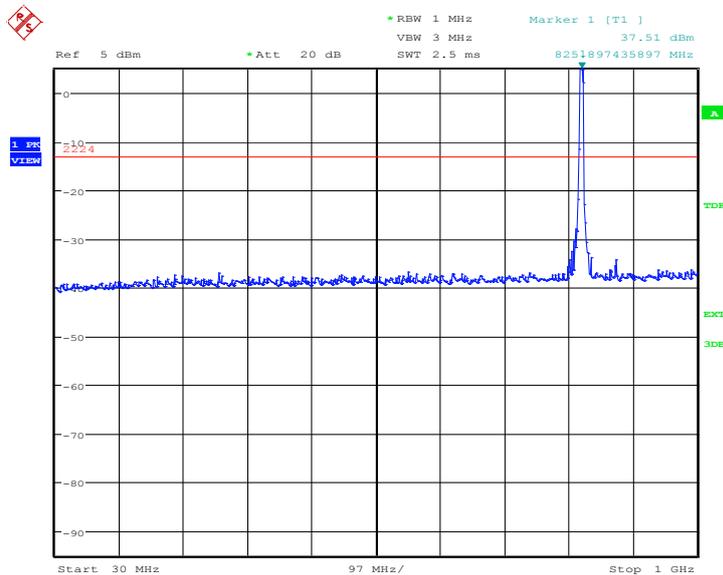
Harmonic	Tx ch. 128 Freq. (MHz)	Level (dBm)	Tx ch. 190 Freq. (MHz)	Level (dBm)	Tx ch. Freq. (MHz) 251	Level (dBm)
2	1648.4	nf	1673.2	nf	1697.6	nf
3	2472.6	nf	2509.8	nf	2546.4	nf
4	3296.8	nf	3346.4	nf	3395.2	nf
5	4121	nf	4183	nf	4244	nf
6	4945.2	nf	5019.6	nf	5092.8	nf
7	5769.4	nf	5856.2	nf	5941.6	nf
8	6593.6	nf	6692.8	nf	6790.4	nf
9	7417.8	nf	7529.4	nf	7639.2	nf
10	8242	nf	8366	nf	8488	nf

nf: Noise floor

**A.8.3.1 Channel 128: 30MHz – 1GHz**

Spurious emission limit –13dBm.

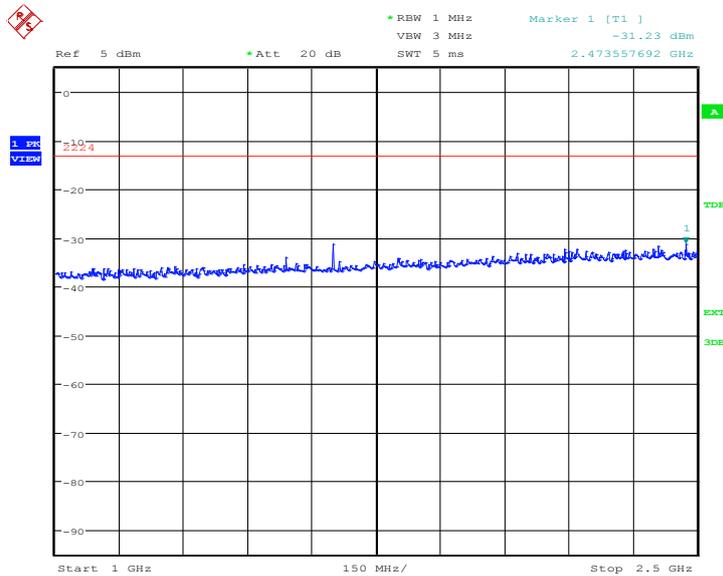
**NOTE: peak above the limit line is the carrier frequency.**



Date: 27.FEB.2013 23:51:40

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

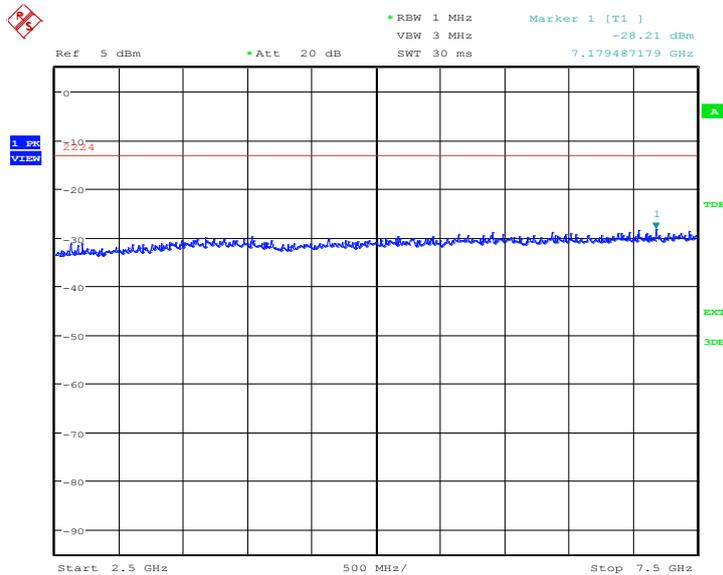
Spurious emission limit -13dBm.



Date: 27.FEB.2013 23:52:08

### A.8.3.3 Channel 128: 2.5GHz – 7.5GHz

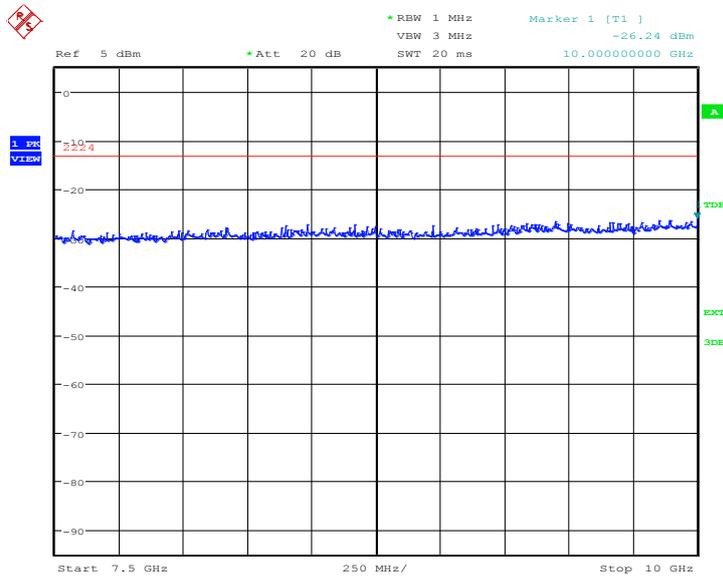
Spurious emission limit -13dBm.



Date: 27.FEB.2013 23:52:36

### A.8.3.4 Channel 128: 7.5GHz –10GHz

Spurious emission limit –13dBm.

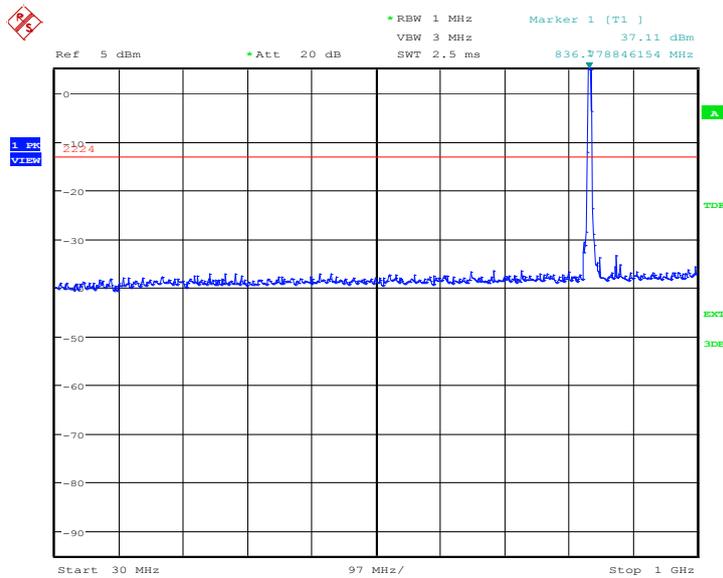


Date: 27.FEB.2013 23:53:05

### A.8.3.5 Channel 190: 30MHz – 1GHz

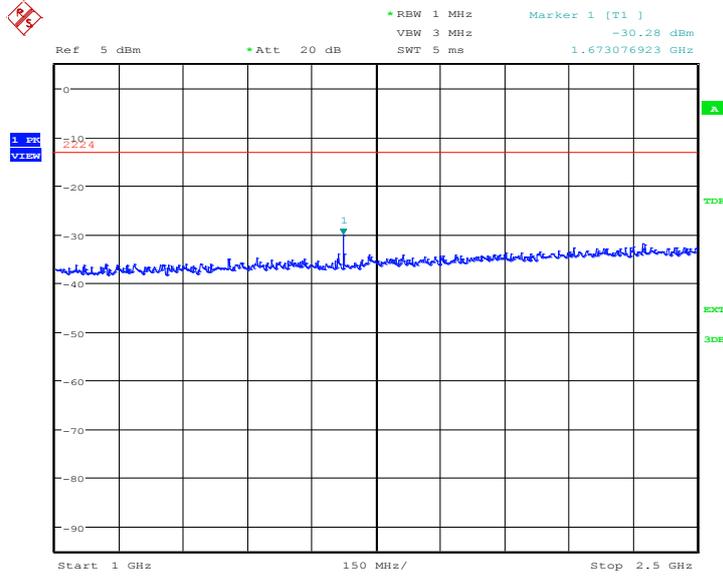
Spurious emission limit –13dBm

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



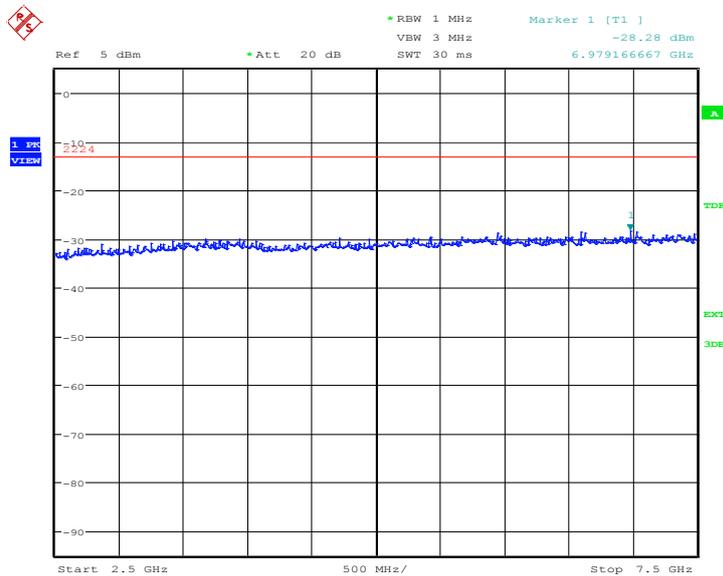
Date: 27.FEB.2013 23:53:34

**A.8.3.6 Channel 190: 1GHz –2.5GHz**  
Spurious emission limit –13dBm



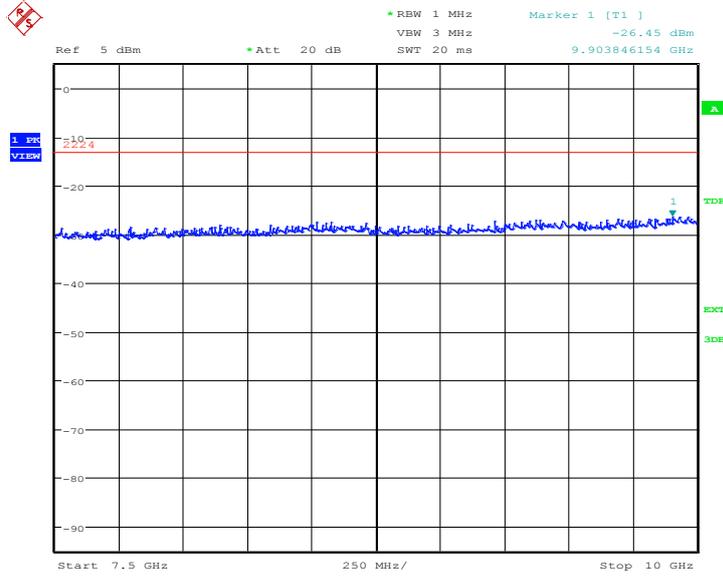
Date: 27.FEB.2013 23:54:02

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



Date: 27.FEB.2013 23:54:31

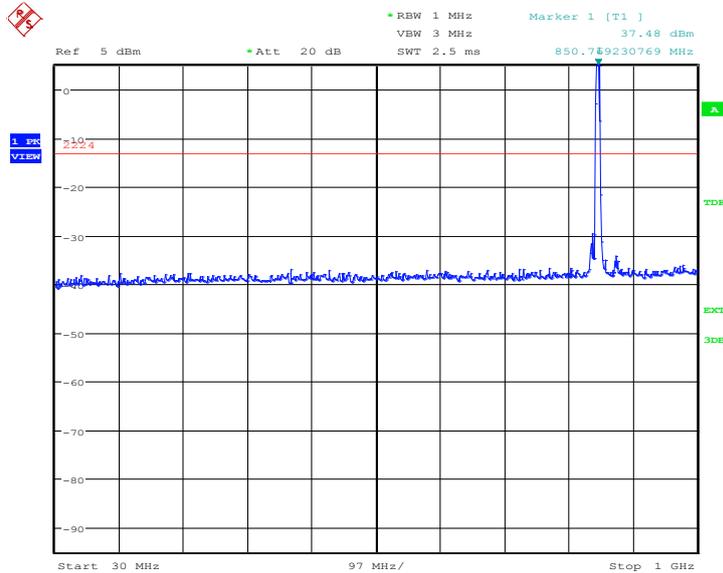
**A.8.3.8 Channel 190: 7.5GHz –10GHz**  
Spurious emission limit –13dBm



Date: 27.FEB.2013 23:54:59

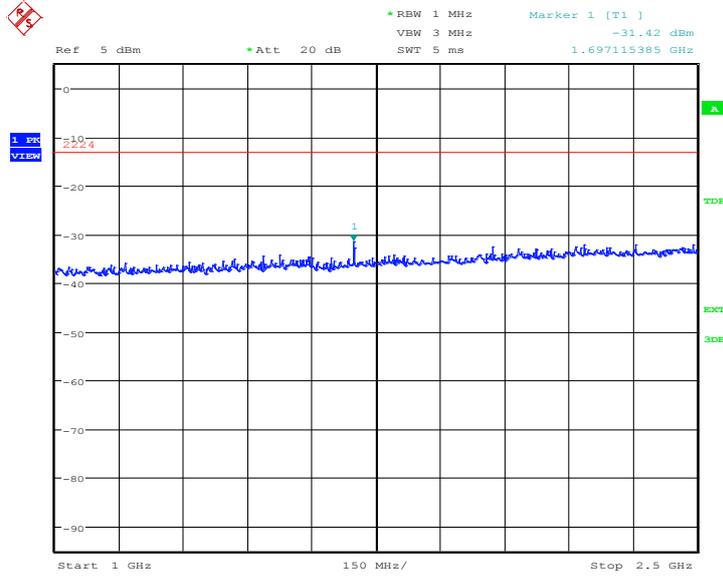
**A.8.3.9 Channel 251: 30MHz – 1GHz**  
Spurious emission limit –13dBm.

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



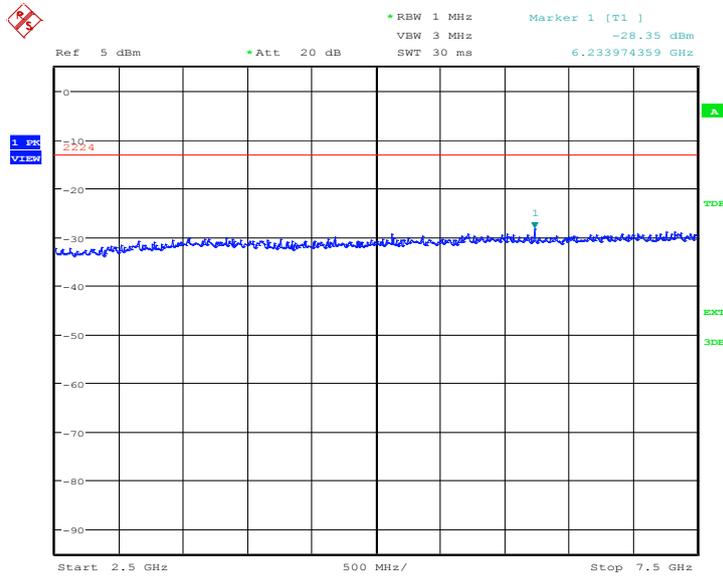
Date: 27.FEB.2013 23:55:28

**A.8.3.10 Channel 251: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.



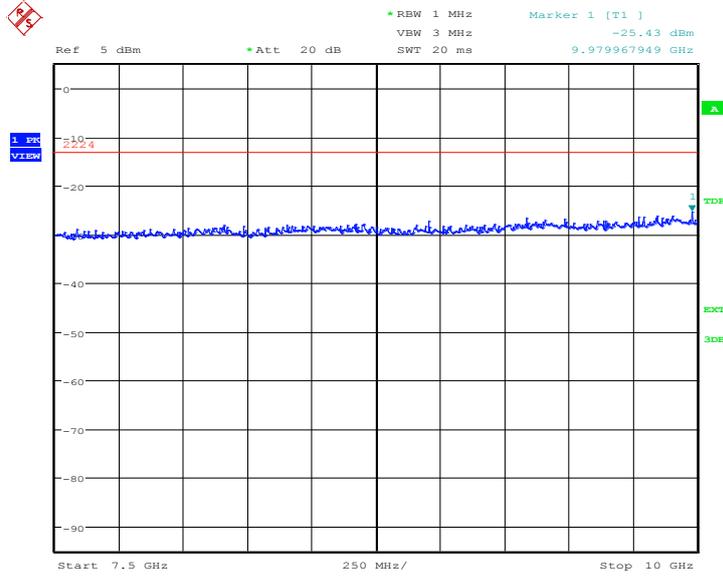
Date: 27.FEB.2013 23:55:56

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



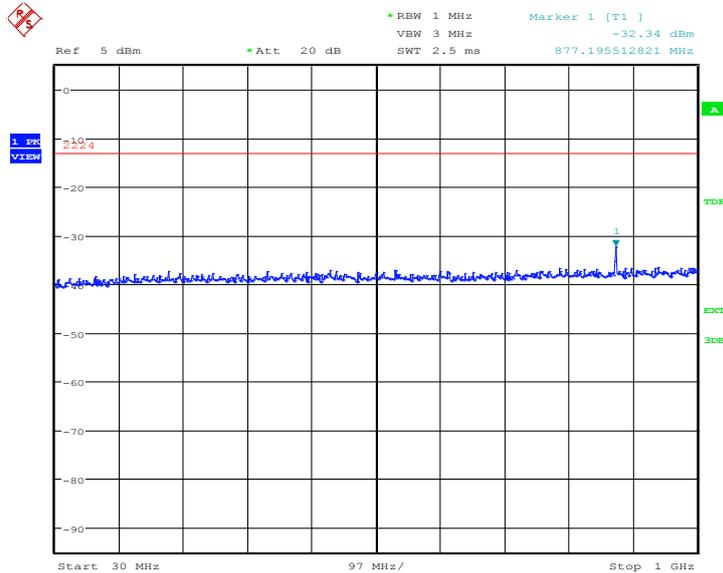
Date: 27.FEB.2013 23:56:25

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



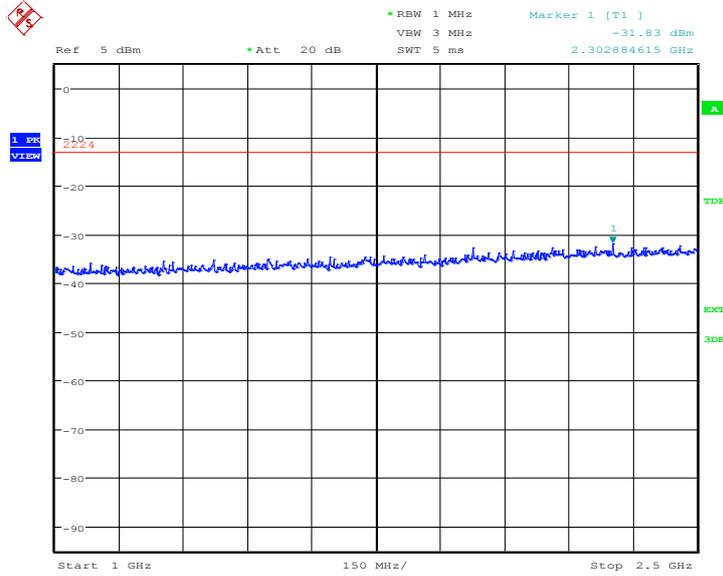
Date: 27.FEB.2013 23:56:53

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



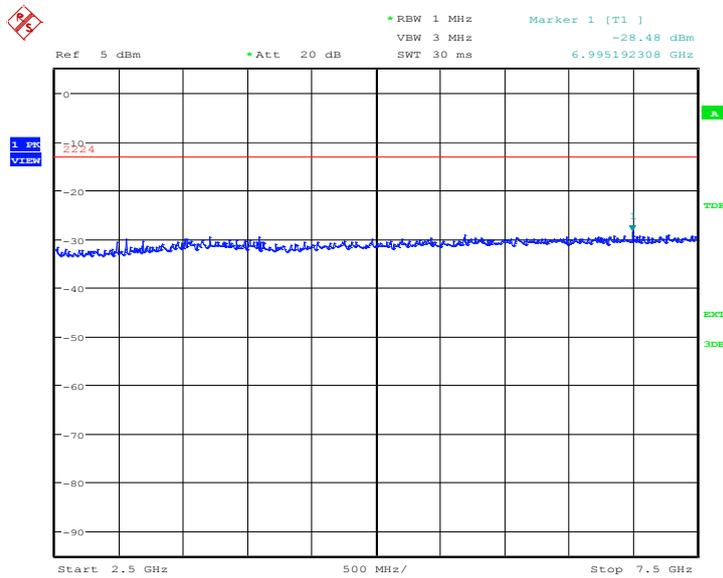
Date: 27.FEB.2013 23:57:22

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



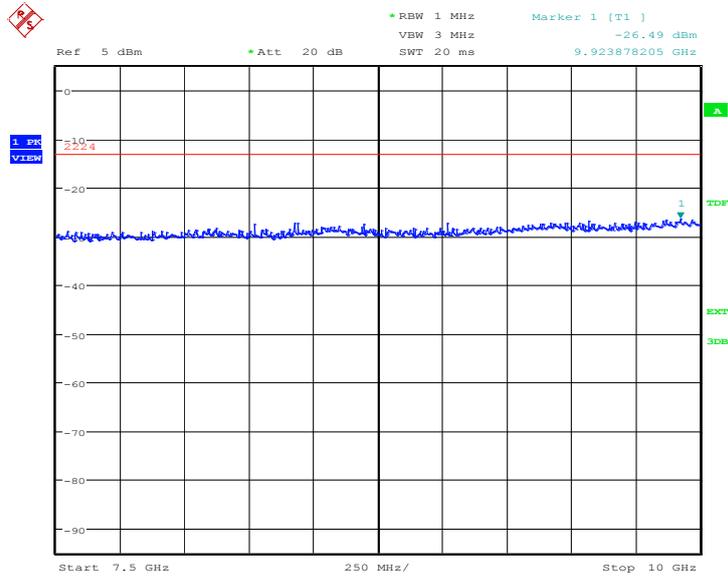
Date: 27.FEB.2013 23:57:50

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



Date: 27.FEB.2013 23:58:18

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



Date: 27.FEB.2013 23:58:47

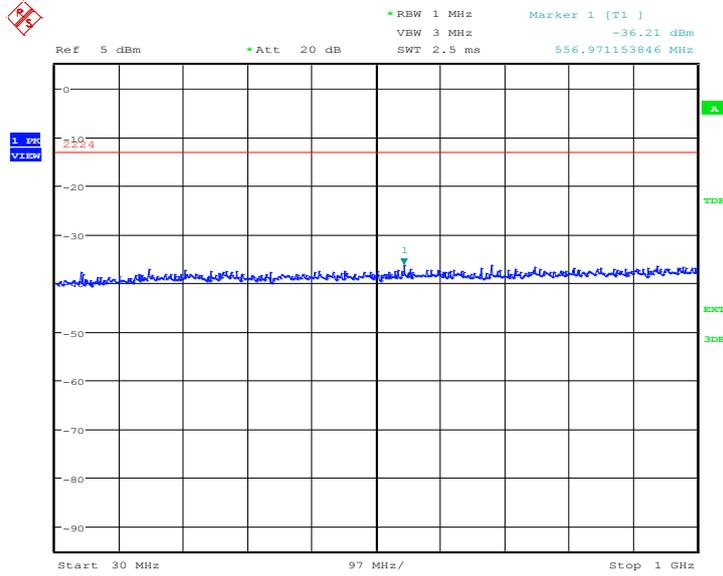
**PCS1900**

Harmonic	Tx ch. 512 Freq. (MHz)	Level (dBm)	Tx ch. 661 Freq. (MHz)	Level (dBm)	Tx ch. 810 Freq. (MHz)	Level (dBm)
2	3700.4	nf	3760	nf	3819.6	nf
3	5550.6	nf	5640	nf	5729.4	nf
4	7400.8	nf	7520	nf	7639.2	nf
5	9251.0	nf	9400	nf	9549.0	nf
6	11101.2	nf	11280	nf	11458.8	nf
7	12951.4	nf	13160	nf	13368.6	nf
8	14801.6	nf	15040	nf	15278.4	nf
9	16651.8	nf	16920	nf	17188.2	nf
10	18502.0	nf	18800	nf	19098.0	nf
nf: Noise floor						

**PCS1900**

**A.8.3.17 Channel 512: 30MHz – 1GHz**

Spurious emission limit –13dBm.

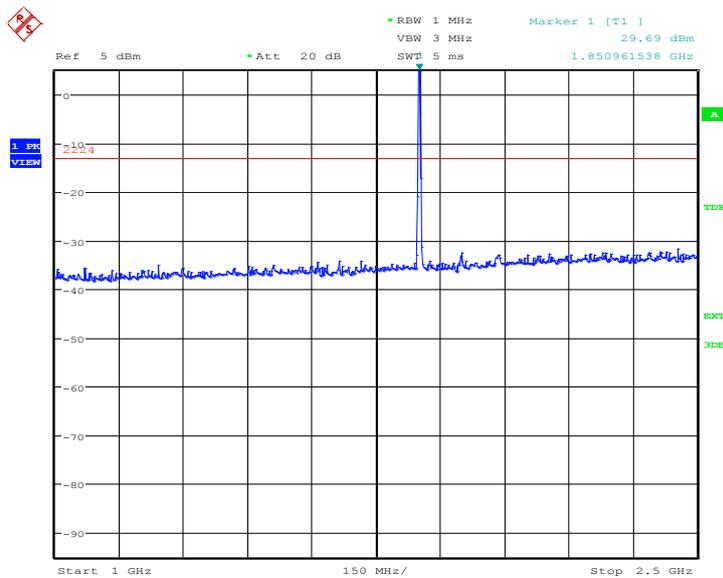


Date: 28.FEB.2013 00:06:13

**A.8.3.18 Channel 512: 1GHz – 2.5GHz**

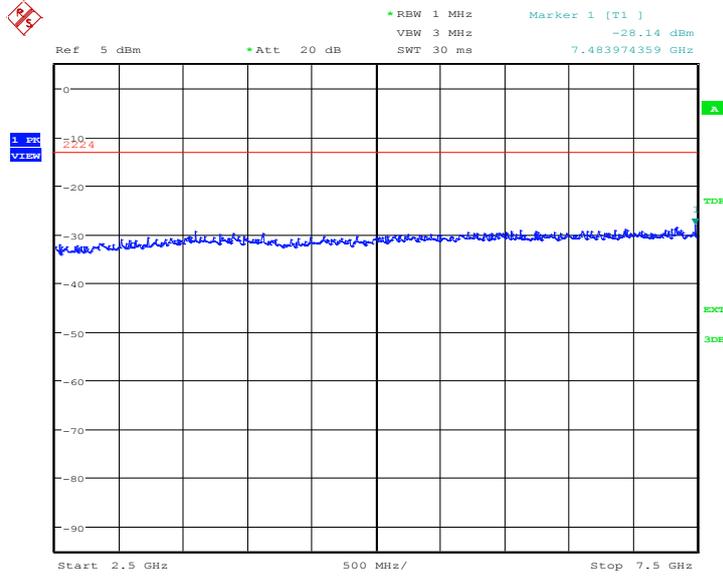
Spurious emission limit –13dBm.

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



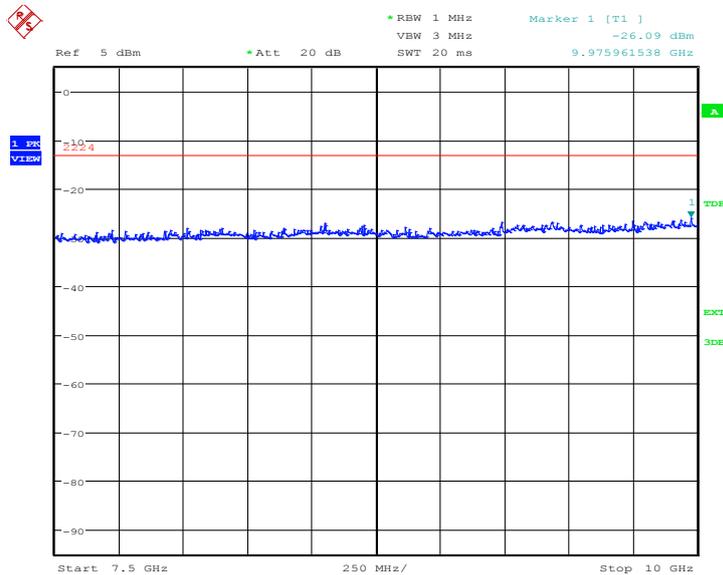
Date: 28.FEB.2013 00:06:41

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



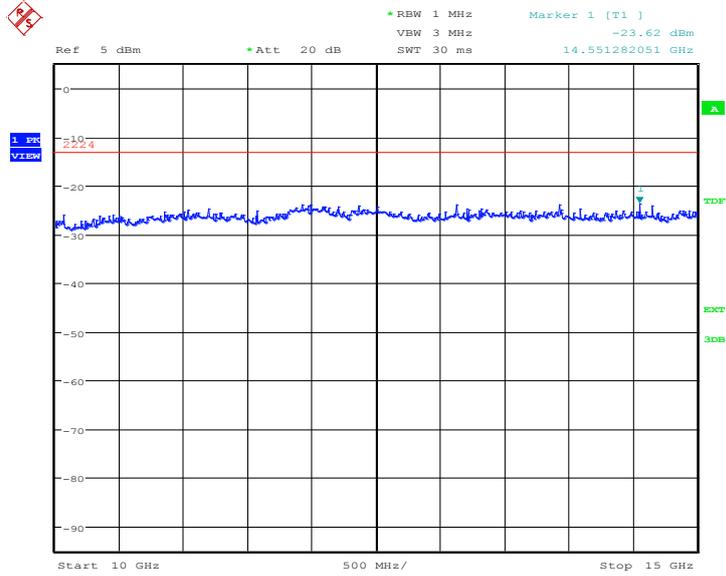
Date: 28.FEB.2013 00:07:09

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



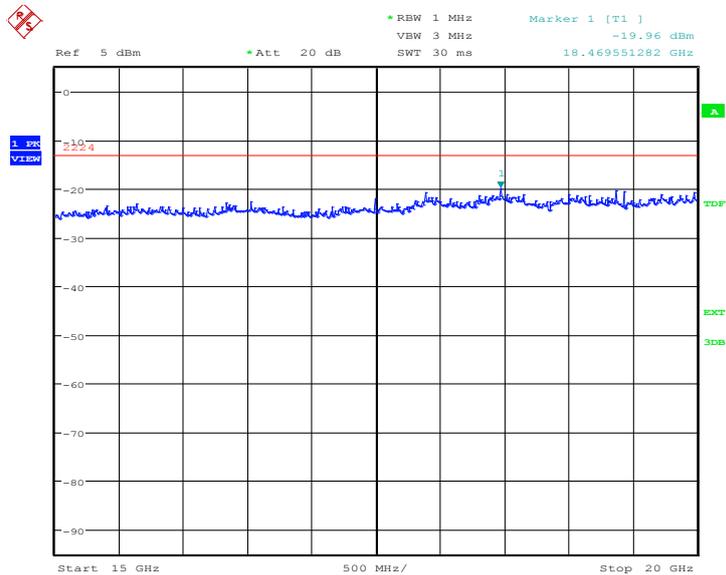
Date: 28.FEB.2013 00:07:37

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



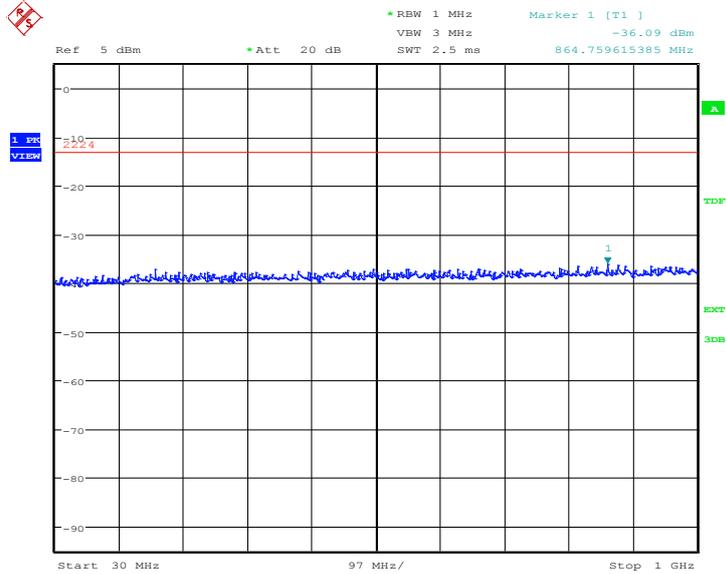
Date: 28.FEB.2013 00:08:06

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



Date: 28.FEB.2013 00:08:34

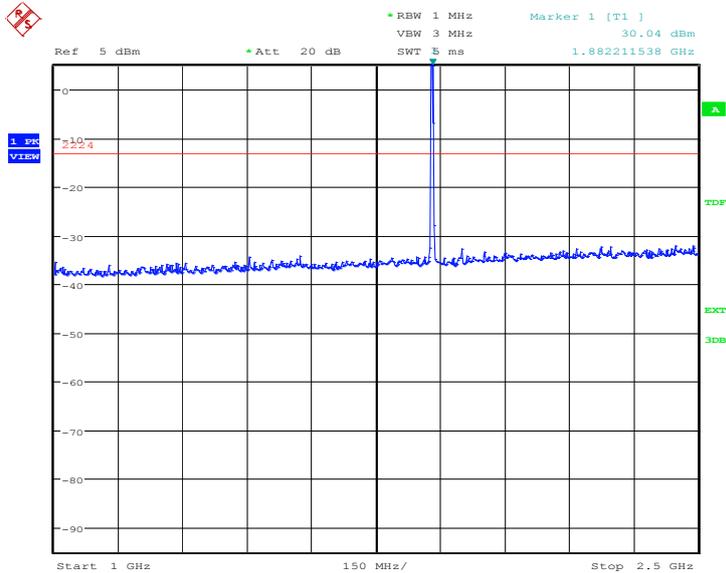
**A.8.3.23 Channel 661: 30MHz – 1GHz**  
Spurious emission limit –13dBm



Date: 28.FEB.2013 00:09:02

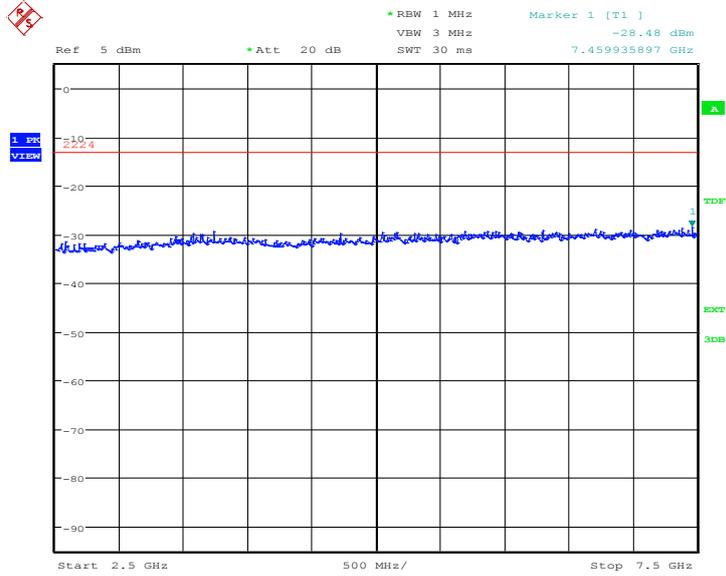
**A.8.3.24 Channel 661: 1GHz –2.5GHz**  
Spurious emission limit –13dBm

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



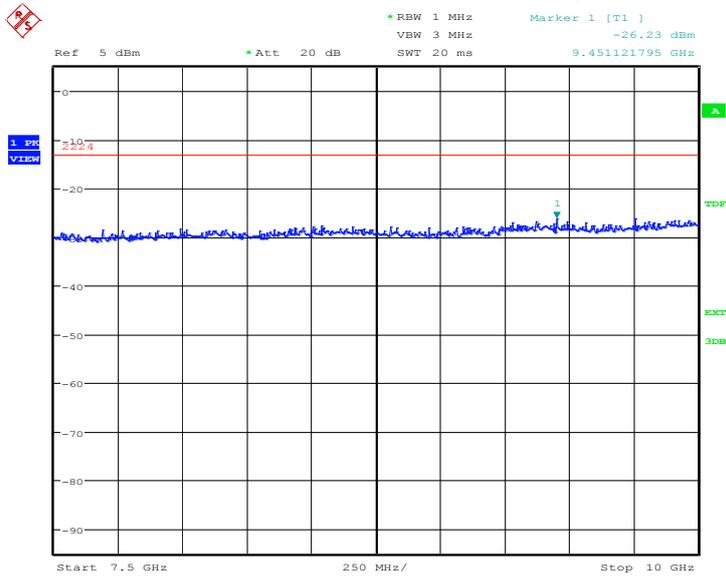
Date: 28.FEB.2013 00:09:31

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



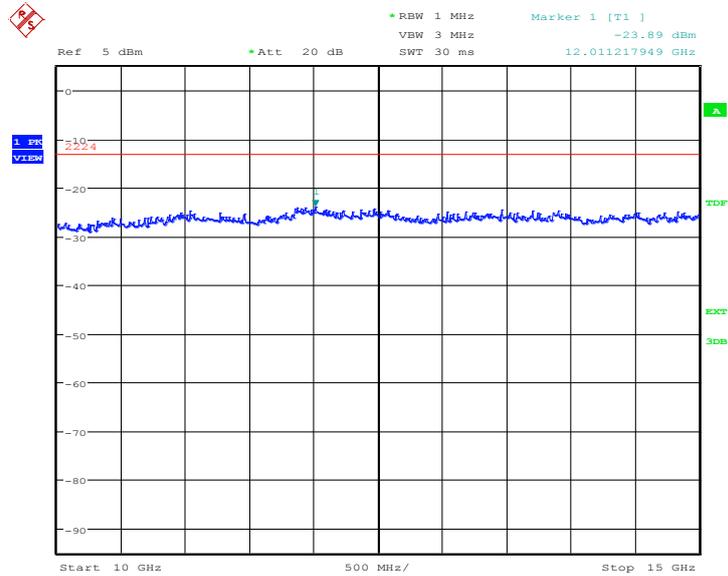
Date: 28.FEB.2013 00:09:59

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



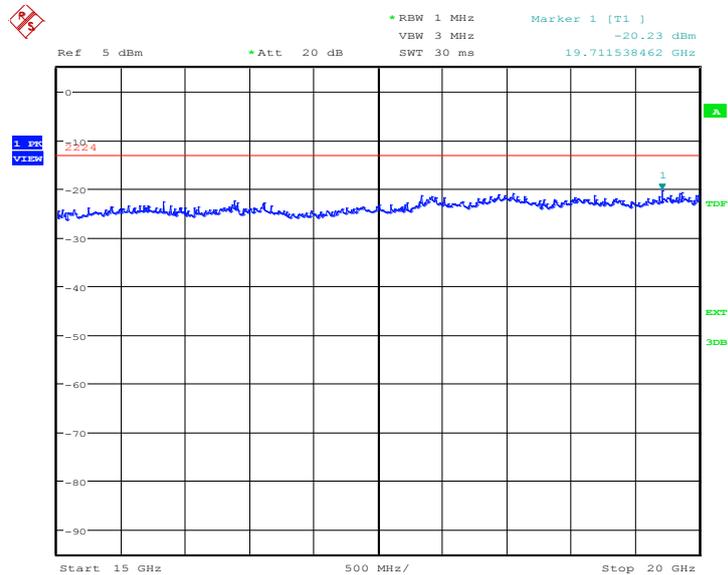
Date: 28.FEB.2013 00:10:27

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



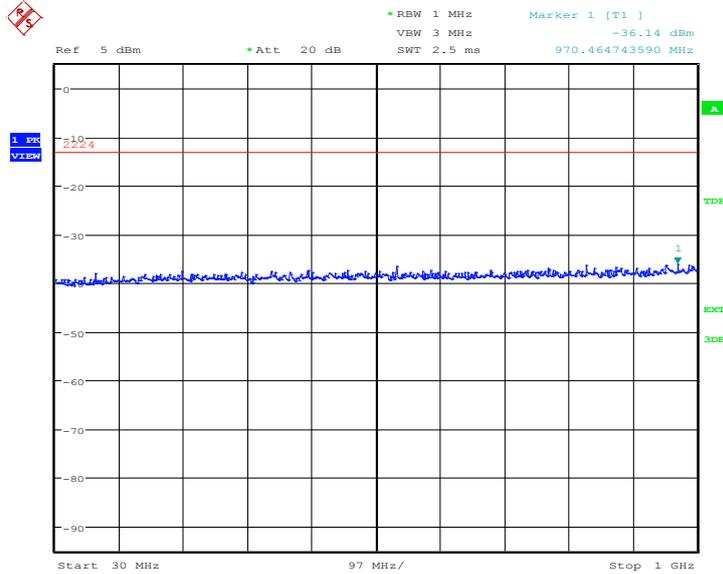
Date: 28.FEB.2013 00:10:55

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



Date: 28.FEB.2013 00:11:23

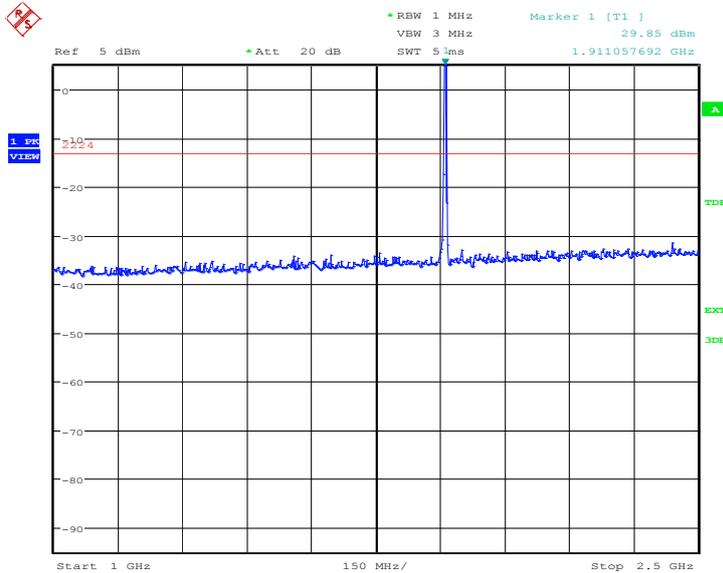
**A.8.3.29 Channel 810: 30MHz – 1GHz**  
Spurious emission limit –13dBm.



Date: 28.FEB.2013 00:11:52

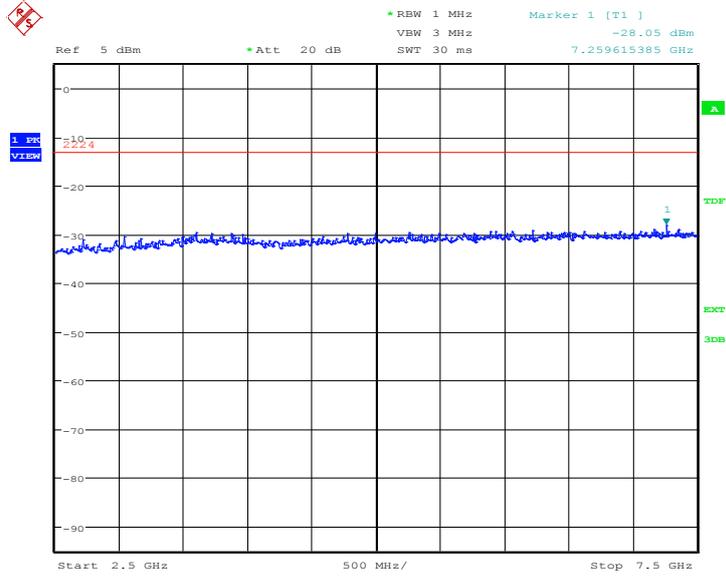
**A.8.3.30 Channel 810: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.

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



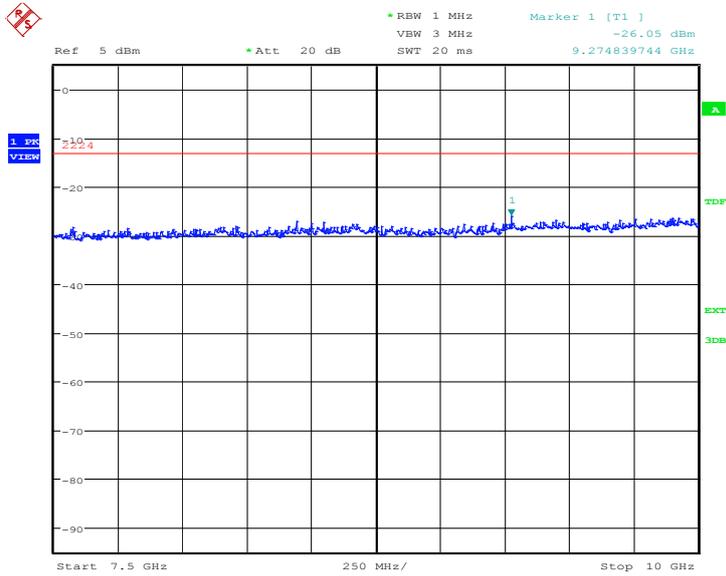
Date: 28.FEB.2013 00:12:20

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



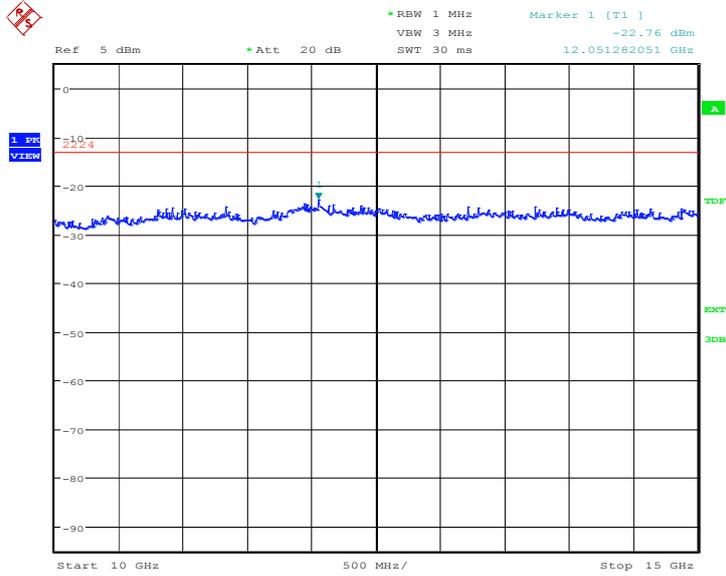
Date: 28.FEB.2013 00:12:48

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



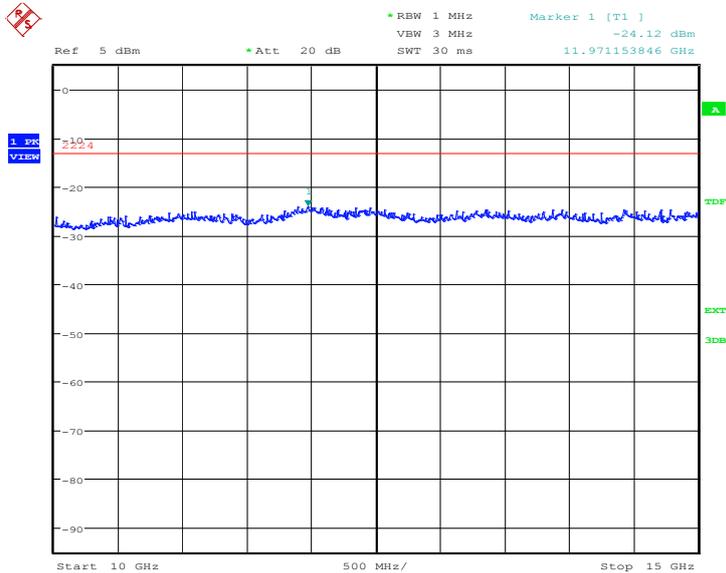
Date: 28.FEB.2013 00:13:17

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



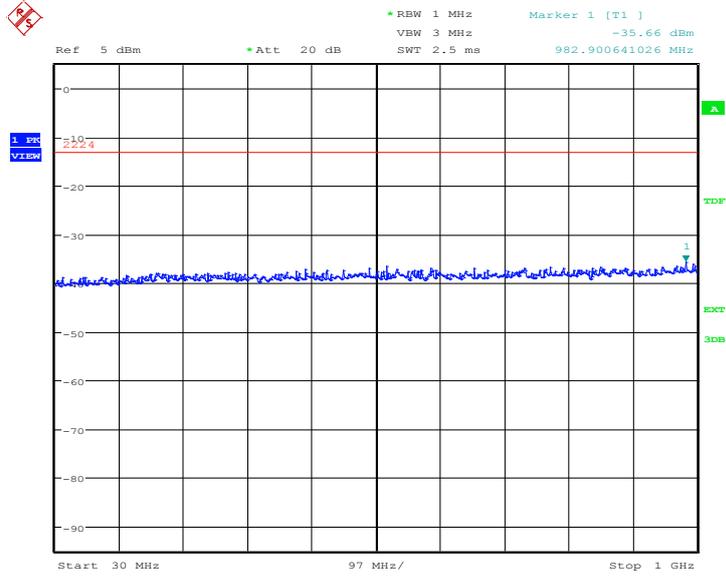
Date: 26.FEB.2013 00:36:57

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



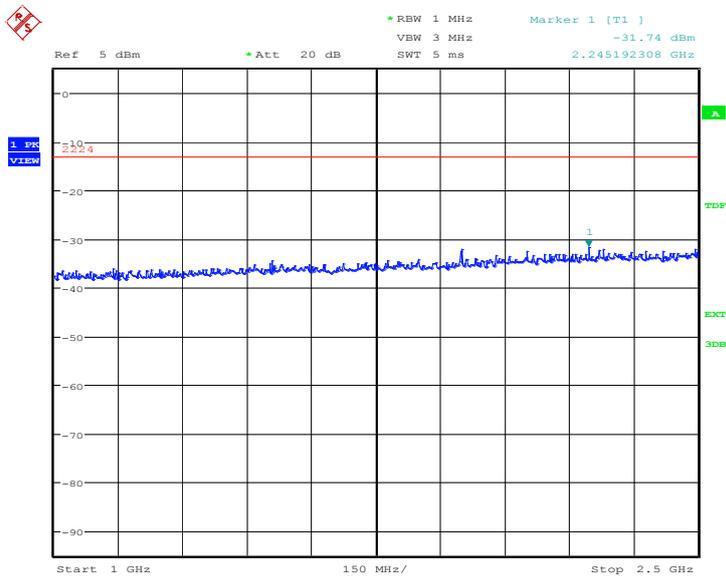
Date: 28.FEB.2013 00:13:45

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



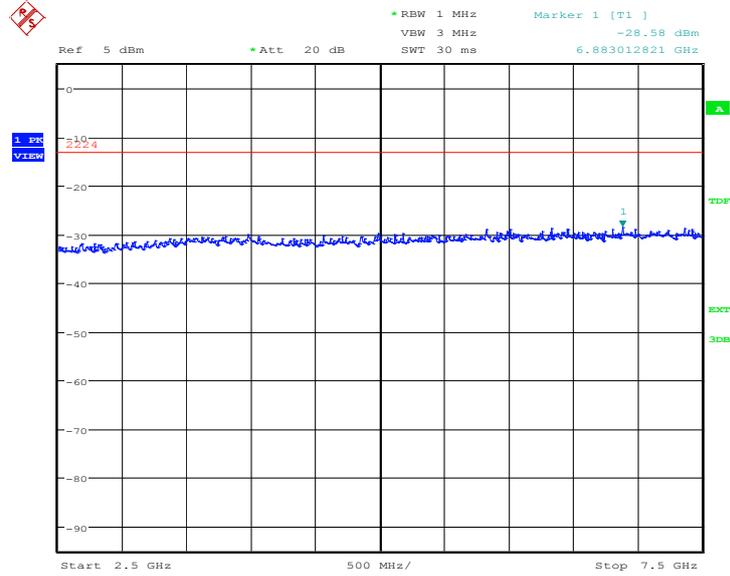
Date: 28.FEB.2013 00:14:41

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



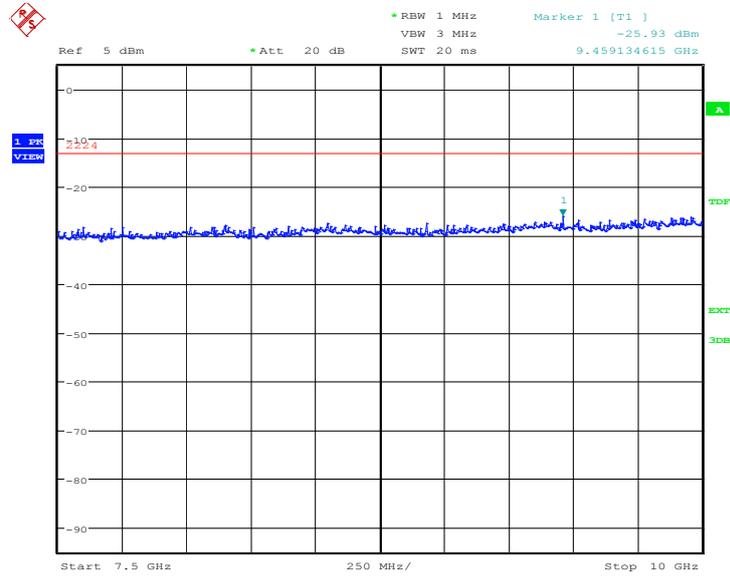
Date: 28.FEB.2013 00:15:10

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



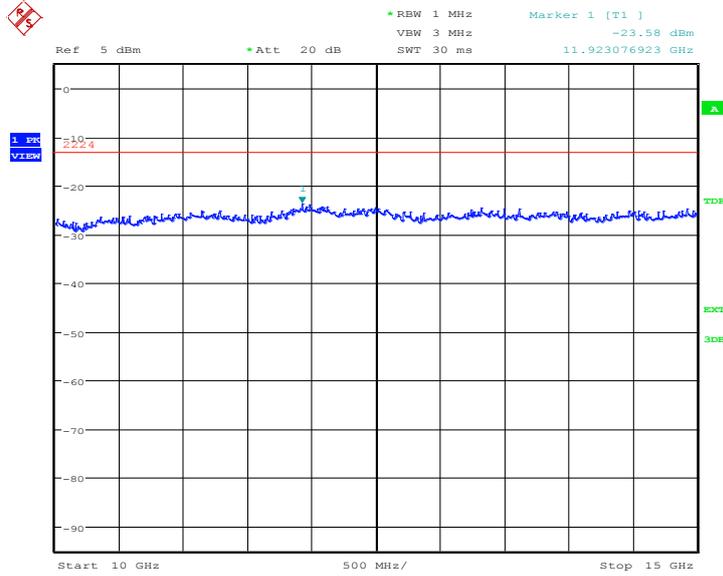
Date: 28.FEB.2013 00:15:38

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



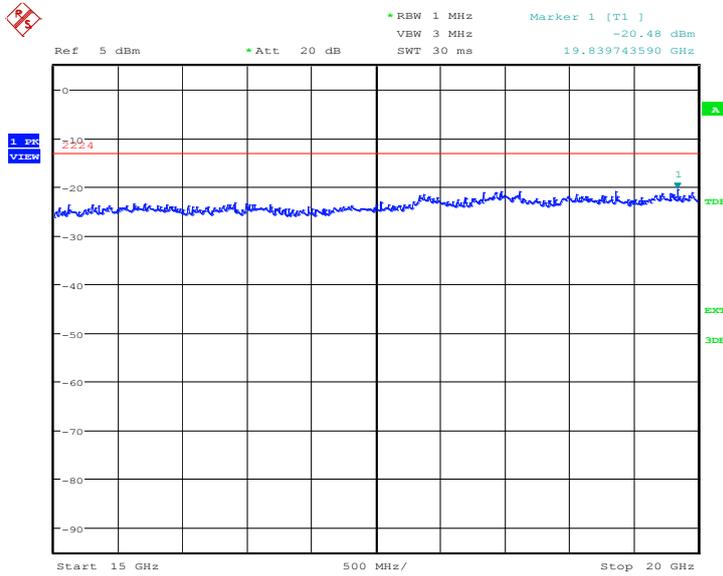
Date: 28.FEB.2013 00:16:06

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

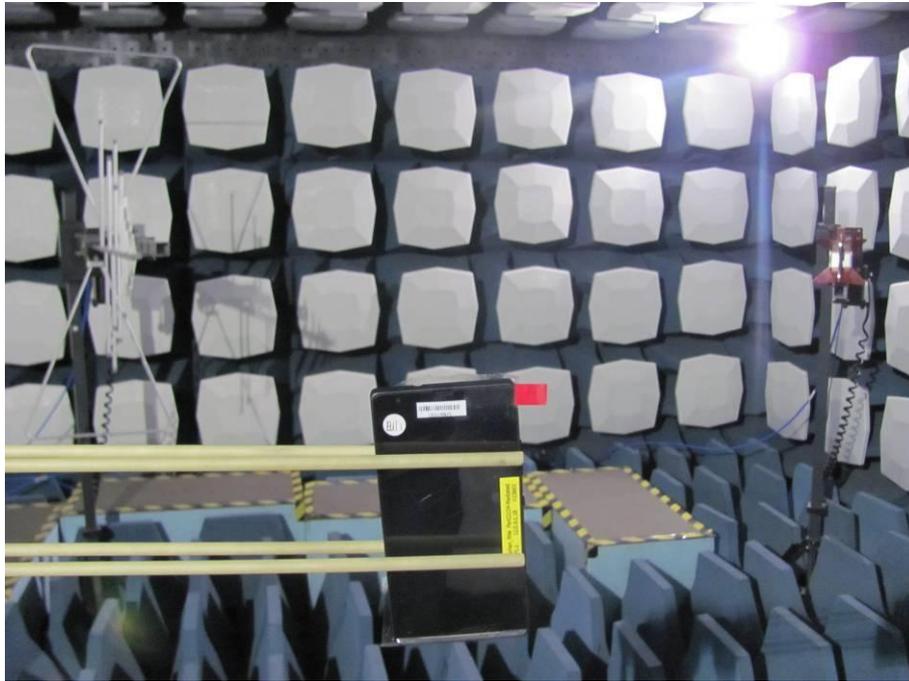


Date: 28.FEB.2013 00:16:34

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



Date: 28.FEB.2013 00:17:02

**ANNEX B: TEST LAYOUT**

**Pic.1 Radiated spurious emission**



**Pic.2 Conducted emission**

**ANNEX C: EUT photograph**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Mobile Phone**



**Label of Mobile Phone**



**Mobile Phone Disassembly**



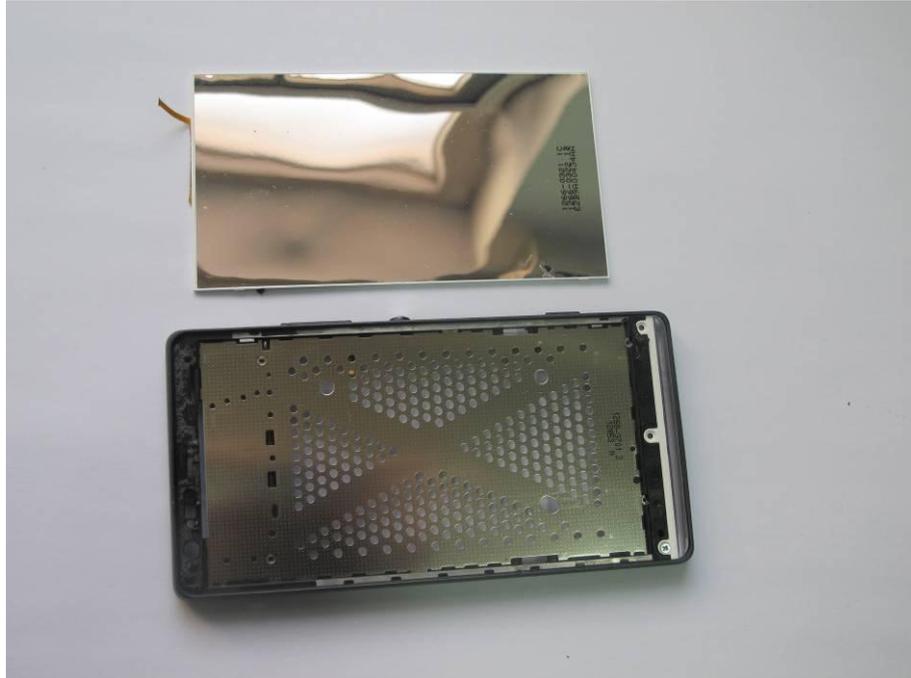
**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Mobile Phone Disassembly**



**Li-Polymer Battery**



**Travel Charger**



**Label of Travel Charger**



**USB Cable**

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