



# TEST REPORT

No. 2011TAR365

for

**Sony Ericsson Mobile Communications AB**

**GSM 850/900/1800/1900 quad bands mobile phone**

**Type: AAB-1880033-BV**

**FCC ID: PY7A1880033**

**IC No.: 4170B- A1880033**

with

**Hardware Version: A**

**Software Version: P5AB206**

**Issued Date: Jul. 14<sup>th</sup>, 2011**

**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. DGA-PL-114/01-02***

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

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

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## 1. Test Laboratory

### 1.1. Testing Location

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT  
Address: No 52, Huayuan beilu, Haidian District, Beijing, P.R.China  
Postal Code: 100191  
Telephone: +86-10-62304633-2678  
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

Testing Start Date: Jun. 21<sup>st</sup>, 2011  
Testing End Date: Jul. 11<sup>th</sup>, 2011

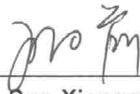
### 1.4. Signature



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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 Ericsson Mobile Communications(China) Co., Ltd.  
 Address /Post: Sony Ericsson Building, No.16, Guangshun South Street, Chaoyang District, Beijing  
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 Country: China  
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 Fax: +86-10-58656750

### **2.2. Manufacturer Information**

Company Name: Sony Ericsson Mobile Communications AB  
 Address /Post: Nya Vattentorget, 22188 Lund, Sweden  
 City: Lund  
 Postal Code: 22188  
 Country: Sweden  
 Contact Person: Nordlof, Anders  
 Telephone: +46-46-193919  
 Fax: +46-46-193295

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

### **3.1. About EUT**

Description	GSM 850/900/1800/1900, GPRS, EDGE, BT EDR2.0, WLAN, FM-receiver mobile phone
Type	AAB-1880033-BV
FCC ID	PY7A1880033
IC No	4170B-A1880033
Frequency range	GSM 850: 824.2MHz-848.8MHz PCS 1900: 1850.2MHz-1909.8MHz
Antenna	Internal
Power supply	Battery or Charger (AC Adaptor)
Output power	29.11 dBm maximum ERP measured for GSM850 31.03 dBm maximum EIRP measured for PCS1900
Extreme vol. Limits	3.6VDC to 4.2VDC (nominal: 3.8VDC)
Extreme temp. Tolerance	-30°C to +50°C

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

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

<b>EUT ID*</b>	<b>SN</b>	<b>IMEI</b>	<b>HW Version</b>	<b>SW Version</b>
N08	WUJ0298689	004402142983896	A	P5AB206
N09	WUJ0298765	004402142987654	A	P5AB206
N19	WUJ0298686	004402142986862	A	P5AB206

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

#N19 is for radiated test. N08 and N09 are for conducted test.

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

<b>AE ID*</b>	<b>Description</b>	<b>SN</b>	<b>Revision</b>
AE1	Battery	108809PTNKLS	2
AE2	Battery	102895PTNKLS	2
#19866	Travel Adapter	1109W50500931	1

AE1, AE2

Type Number	CBA-0002017
Manufacturer	SonyEricsson
Capacitance	1000mAh
Nominal Voltage	3.7V

#19866

Type Number	CAA-0004001-BV
Manufacturer	Emerson
Length of cable	151cm

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

### **3.4. General Description**

Equipment Under Test (EUT) is a model of GSM 850/900/1800/1900 quad bands mobile phone with integrated antenna.

It has MP3, Camera, FM radio, USB memory, Bluetooth and WLAN (802.11 b/g) functions. It also supports GPRS function with multi-slots class 10 and EGPRS function with multi-slots class 10 too.

It consists of normal options: lithium battery, travel charger. Since subscribers often use MS during charging, EUT is to be test in accordance with "Base Station and ancillary equipment for fixed use" besides in accordance with "Portable and ancillary equipment for portable use".

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

Samples undergoing test were selected by the client.

## 4. Reference Documents

### 4.1. Reference Documents for testing

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

<b>Reference</b>	<b>Title</b>	<b>Version</b>
FCC Part 24	PERSONAL COMMUNICATIONS SERVICES	V 10.1.09
FCC Part 22	PUBLIC MOBILE SERVICES	V 10.1.09
RSS-132	Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz	Issue 2, 2005
RSS-133	2 GHz Personal Communications Services	Issue 5, 2009
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	2009

## 5. LABORATORY ENVIRONMENT

**Semi-anechoic chamber** (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Normalised site attenuation (NSA)	< ±3.2 dB, 10 m distance, from 30 to 1000 MHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 2000 MHz

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

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. =30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Conducted chamber** did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω

**Fully-anechoic chamber 1** (6.8 meters×3.08 meters×3.53 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 0.5 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

**Fully-anechoic chamber 3** (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. = 30 %, Max. = 60 %
Shielding effectiveness	> 110 dB
Electrical insulation	> 10 kΩ
Ground system resistance	< 1 Ω
Uniformity of field strength	Between 0 and 6 dB, from 80 to 4000 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	Clause in IC rules	Section in this report	Verdict
1	Output Power	22.913(a)	4.4	A.1	P
2	Emission Limit	22.917, 2.1051	4.4	A.2	P
3	Conducted Emission	15.107/207	/	A.3	P
4	Frequency Stability	22.235, 2.1055	4.3	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	4.1.1	A.5	P
6	Emission Bandwidth	22.917(b)	4.1.1	A.6	P
7	Band Edge Compliance	22.917(b)	4.5	A.7	P
8	Conducted Spurious Emission	22.917, 2.1057	4.5	A.8	P

#### **PCS 1900**

Items	Test Name	Clause in FCC rules	Clause in IC rules	Section in this report	Verdict
1	Output Power	24.232(b)	6.2	A.1	P
2	Emission Limit	24.238, 2.1051	6.2	A.2	P
3	Conducted Emission	15.107/207	/	A.3	P
4	Frequency Stability	24.235, 2.1055	6.3	A.4	P
5	Occupied Bandwidth	2.1049(h)(i)	5.6	A.5	P
6	Emission Bandwidth	24.238(b)	5.6	A.6	P
7	Band Edge Compliance	24.238(b)	6.3	A.7	P
8	Conducted Spurious Emission	24.238, 2.1057	6.5	A.8	P

#### **Receiver Radiated Emission**

Items	Test Name	Clause in FCC rules	Clause in IC rules	Section in this report	Verdict
1	Receiver Radiated Emissions	15.109 , 2.1053	4.6, 6.6	A.9	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.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL DUE DATE
1.	Test Receiver	ESCI	100344	R&S	2012-03-12
2	Test Receiver	ESI40	831564/002	R&S	2012-02-11
4	BiLog Antenna	VULB 9163	9163-302	Schwarzbeck	2012-02-10
5	BiLog Antenna	VULB 9163	9163-301	Schwarzbeck	2012-01-04
6	Biconical Antenna	9117	9117-177	Schwarzbeck	2012-07-03
7	Signal Generator	SMP04	100070	R&S	2012-04-18
8	LISN	ESH2-Z5	829991/012	R&S	2012-04-17
9	Universal Radio Communication Tester	CMU200	116455	R&S	2012-05-20
10	Universal Radio Communication Tester	E5515C	MY48361083	Agilent	2012-07-08
11	Dual-Ridge Waveguide Horn Antenna	3115	5827	ETS-Lindgren	2013-08-13
12	Dual-Ridge Waveguide Horn Antenna	3115	6914	ETS-Lindgren	2012-01-18
13	Dual-Ridge Waveguide Horn Antenna	3117	00119024	ETS-Lindgren	2012-01-18
14	Dual-Ridge Waveguide Horn Antenna	3117	00058889	ETS-Lindgren	2012-01-28
15	Climatic chamber	PL-2G	343074	ESPEC	2012-05-12

## ANNEX A: MEASUREMENT RESULTS

### A.1 OUTPUT POWER

#### Reference

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

IC: RSS 132, Issue 2, Section 4.4. RSS 133, Issue 5, Section 6.2

#### 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, 1850.2 MHz, 1880.0MHz and 1909.8MHz for PCS1900 band; 824.4MHz, 836.6MHz and 848.8MHz for GSM850 band. (bottom, middle and top of operational frequency range)

#### 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(GMSK)	6	33dBm(2W)	± 2	33±1

#### Measurement result

##### GSM (GMSK)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	5	32.35
836.6	5	32.33
848.8	5	<b>32.40</b>

##### GPRS (GMSK, Time Slot 2)

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	3	32.32
836.6	3	32.34
848.8	3	<b>32.38</b>

**EGPRS (8PSK, Time Slot 2)**

Frequency(MHz)	Power Step	Peak output power(dBm)
824.2	6	26.08
836.6	6	26.18
848.8	6	<b>26.32</b>

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	<b>29.26</b>
1880.0	0	29.11
1909.8	0	28.96

**GPRS (GMSK, Time Slot 2)**

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	3	<b>29.31</b>
1880.0	3	29.17
1909.8	3	28.97

**EGPRS (8PSK, Time Slot 2)**

Frequency(MHz)	Power Step	Peak output power(dBm)
1850.2	5	<b>25.53</b>
1880.0	5	25.41
1909.8	5	25.22

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.

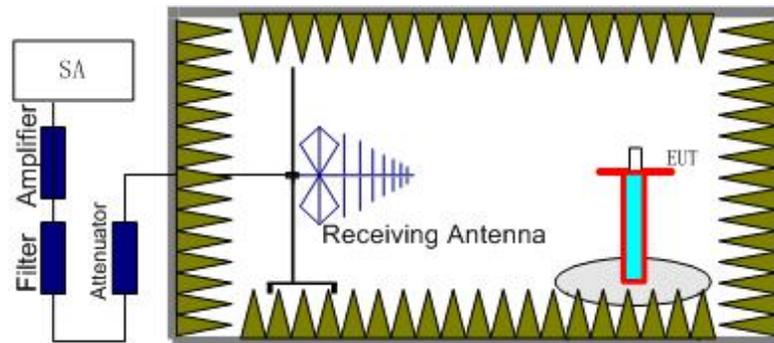
Rule Part 24.232(b) specifies, "Mobile/portable stations are limited to 2 watts e.i.r.p. Peak power" and 24.232(c) specifies that "Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an rms-equivalent voltage."

Rule Part 22.913(a) specifies "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."

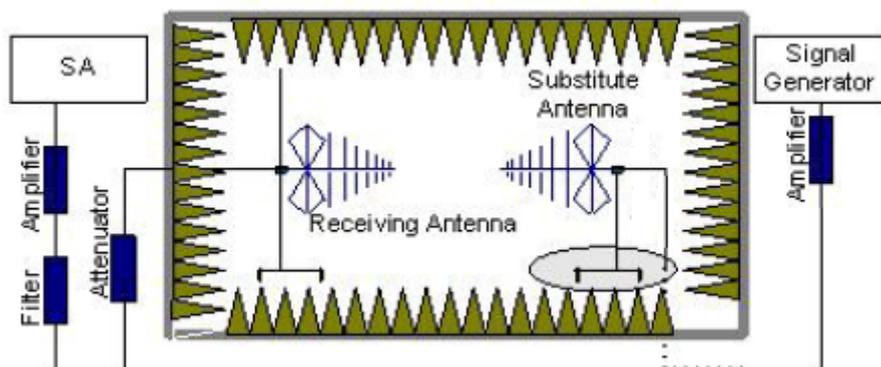
#### A.1.3.2 Method of Measurement

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, 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.

- An 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:

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

- 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

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-19.26	2.27	-53.00	0.84	2.15	28.48	Vertical
836.60	-18.58	2.26	-53.00	0.90	2.15	29.11	Horizontal
848.80	-18.59	2.32	-53.00	0.95	2.15	28.99	Vertical

##### GPRS

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-21.35	2.27	-53.00	0.84	2.15	26.39	Vertical
836.60	-20.20	2.26	-53.00	0.90	2.15	27.49	Horizontal
848.80	-20.09	2.32	-53.00	0.95	2.15	27.49	Vertical

##### EGPRS

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
824.20	-22.69	2.27	-53.00	0.84	2.15	25.05	Horizontal
836.60	-20.03	2.26	-53.00	0.90	2.15	27.66	Horizontal
848.80	-20.62	2.32	-53.00	0.95	2.15	26.96	Vertical

Sample calculation: GSM, 836.6MHz

$$\text{Peak EIRP(dBm)} = P_{\text{Mea}}(-18.58\text{dBm}) - G_a (0.90\text{dBi}) - P_{\text{Ag}} (-53.00\text{dB}) - P_{\text{cl}} (2.26\text{dB}) - 2.15\text{dB}$$

$$= 29.11 \text{ dBm}$$

**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**

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.2	-19.81	3.92	-50.00	-4.56	<b>30.83</b>	Vertical
1880.0	-20.00	3.64	-50.00	-4.43	30.79	Vertical
1909.8	-21.23	3.61	-50.00	-4.30	29.46	Vertical

**GPRS**

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-21.19	3.92	-50.00	-4.56	29.45	Vertical
1880.00	-19.76	3.64	-50.00	-4.43	<b>31.03</b>	Vertical
1909.80	-21.36	3.61	-50.00	-4.30	29.33	Vertical

**EGPRS**

Frequency (MHz)	$P_{\text{Mea}}$ (dBm)	$P_{\text{cl}}$ (dB)	$P_{\text{Ag}}$ (dB)	$G_a$ (dBi)	Peak EIRP(dBm)	Polarization
1850.20	-29.56	3.92	-50.00	-4.56	<b>21.08</b>	Vertical
1880.00	-29.84	3.64	-50.00	-4.43	20.95	Vertical
1909.80	-30.01	3.61	-50.00	-4.30	20.68	Vertical

Sample calculation: GPRS, 1880MHz

$$\text{Peak EIRP(dBm)} = P_{\text{Mea}}(-19.76\text{dBm}) - G_a (-4.43\text{dBi}) - P_{\text{Ag}} (-50.00\text{dB}) - P_{\text{cl}} (3.64\text{dB}) = 31.03 \text{ dBm}$$

**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 Part 22.917(a), 2.1051, 24.238(b)

IC: RSS 132, Issue 2, Section 4.4. RSS 133, Issue 5, Section 6.2

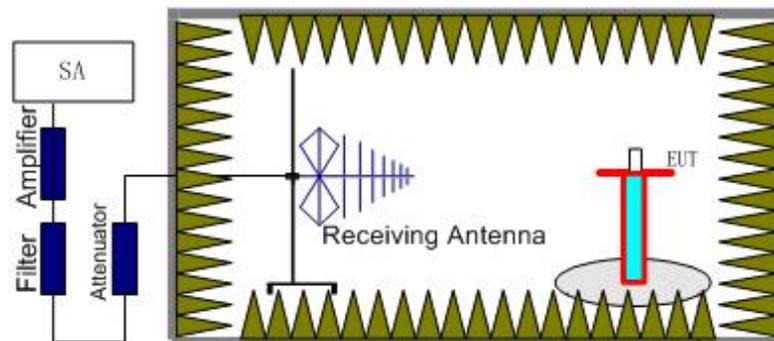
### **A.2.1 Measurement Method**

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

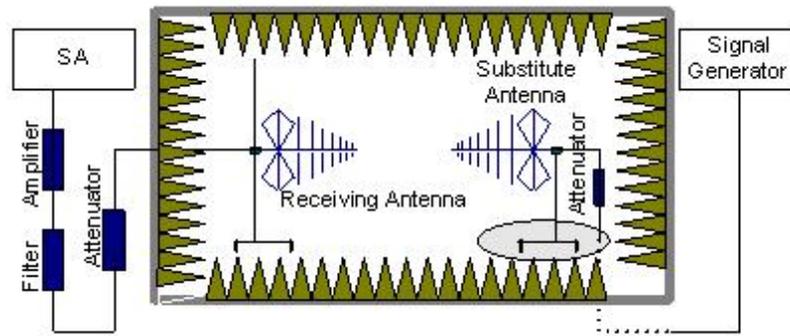
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 24.238. The spectrum was scanned with the mobile station transmitting 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, 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,  $ERP = EIRP - 2.15\text{dB}$ .

### 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 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
1648.61	-40.00	3.40	-5.45	2.15	-40.10	-13.00	Horizontal
2472.54	-39.35	4.21	-5.32	2.15	-40.39	-13.00	Horizontal
3296.97	-47.53	5.41	-7.41	2.15	-47.68	-13.00	Horizontal
4121.44	-47.82	6.76	-8.57	2.15	-48.16	-13.00	Horizontal
4944.92	-51.24	6.67	-9.60	2.15	-50.46	-13.00	Horizontal
5769.69	-53.04	6.88	-10.11	2.15	-51.96	-13.00	Vertical

**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
1672.99	-40.32	3.35	-5.34	2.15	-40.48	-13.00	Horizontal
2509.81	-35.26	4.32	-5.43	2.15	-36.30	-13.00	Horizontal
3346.59	-48.48	5.59	-7.53	2.15	-48.69	-13.00	Horizontal
4182.81	-44.76	6.72	-8.61	2.15	-45.02	-13.00	Horizontal
5019.27	-48.70	6.55	-9.71	2.15	-47.69	-13.00	Horizontal
5856.97	-50.77	6.77	-10.14	2.15	-49.55	-13.00	Horizontal

**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
1697.79	-41.33	3.36	-5.23	2.15	-41.61	-13.00	Horizontal
2546.32	-36.15	4.37	-5.52	2.15	-37.15	-13.00	Horizontal
3384.25	-50.91	5.47	-7.62	2.15	-50.91	-13.00	Horizontal
4243.65	-42.51	6.62	-8.65	2.15	-42.63	-13.00	Vertical
5941.95	-47.99	6.79	-10.18	2.15	-46.75	-13.00	Horizontal
6789.75	-51.86	8.84	-10.89	2.15	-51.96	-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
3700.51	-47.54	5.78	-8.14	-45.18	-13.00	Vertical
5550.81	-40.00	6.75	-10.02	-36.73	-13.00	Horizontal
7400.86	-46.24	8.67	-11.34	-43.57	-13.00	Vertical
9251.15	-43.14	8.54	-12.60	-39.08	-13.00	Vertical
14801.10	-47.40	8.90	-13.54	-42.76	-13.00	Horizontal
16652.43	-34.93	10.34	-12.40	-32.87	-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	-44.08	6.47	-8.21	-42.34	-13.00	Vertical
5640.03	-41.03	6.79	-10.06	-37.76	-13.00	Horizontal
7519.64	-46.96	9.02	-11.42	-44.56	-13.00	Vertical
9399.86	-43.71	8.22	-12.60	-39.33	-13.00	Horizontal
13160.38	-49.52	8.57	-13.46	-44.63	-13.00	Vertical
15039.68	-48.41	9.10	-13.49	-44.02	-13.00	Horizontal

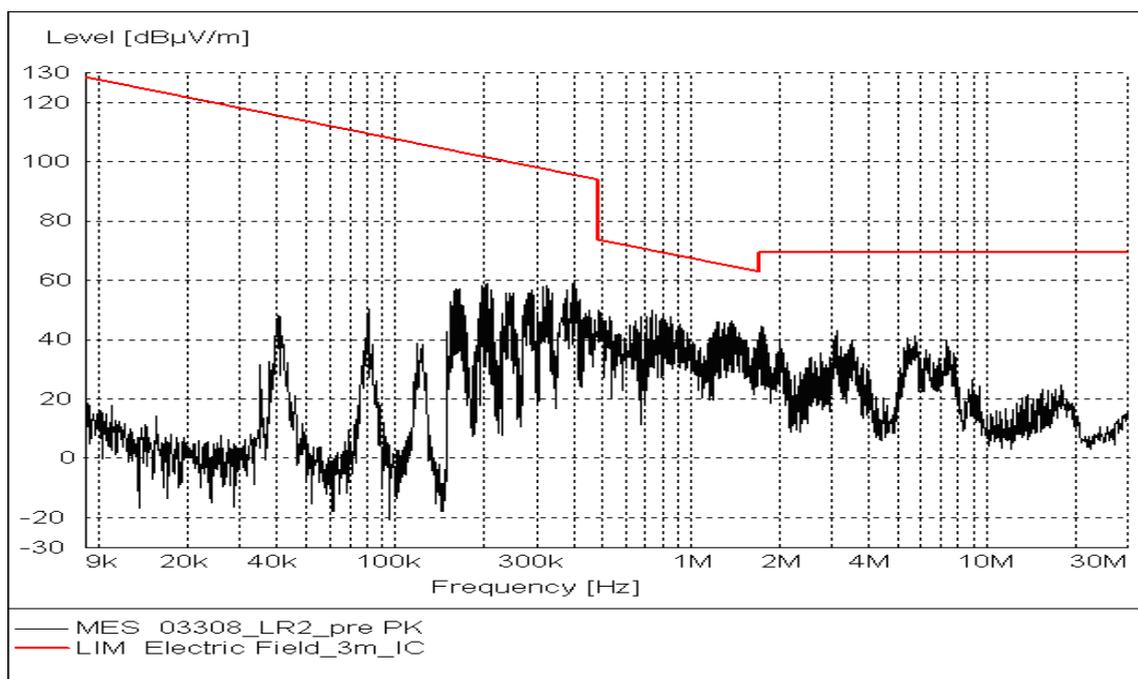
**GSM Mode Channel 810/1909.8MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>pl</sub> (dB)	G <sub>a</sub> (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarity
3819.58	-42.77	6.22	-8.28	-40.71	-13.00	Horizontal
5729.72	-41.63	6.84	-10.09	-38.38	-13.00	Vertical
7639.31	-49.08	9.36	-11.54	-46.90	-13.00	Horizontal
9549.35	-42.21	8.57	-12.58	-38.20	-13.00	Horizontal
11459.03	-51.21	8.26	-12.40	-47.07	-13.00	Vertical
17188.83	-40.61	10.31	-12.74	-38.18	-13.00	Vertical

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

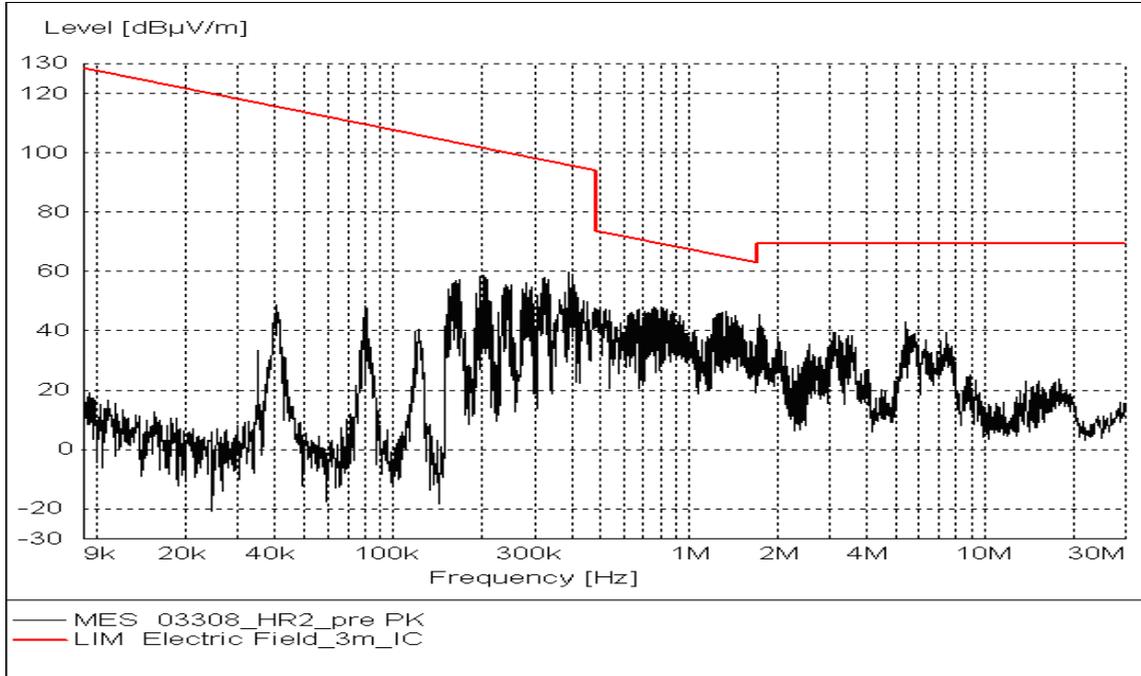
**GSM 850**

**A.2.3.1 RADIATED SPURIOUS EMISSIONS-EUT in Traffic Mode: 9 kHz – 30 MHz (Valid for 3 channels)**



PCS 1900

A.2.3.2 RADIATED SPURIOUS EMISSIONS-EUT in Traffic Mode: 9 kHz – 30 MHz (Valid for 3 channels)



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

#### **Reference**

FCC: CFR Part 15.107/207

The measurement procedure in ANSI C63.4-2009 is used. Conducted Emission is measured with travel charger. For test layout photo, please refer to Pic.2 in Annex B.

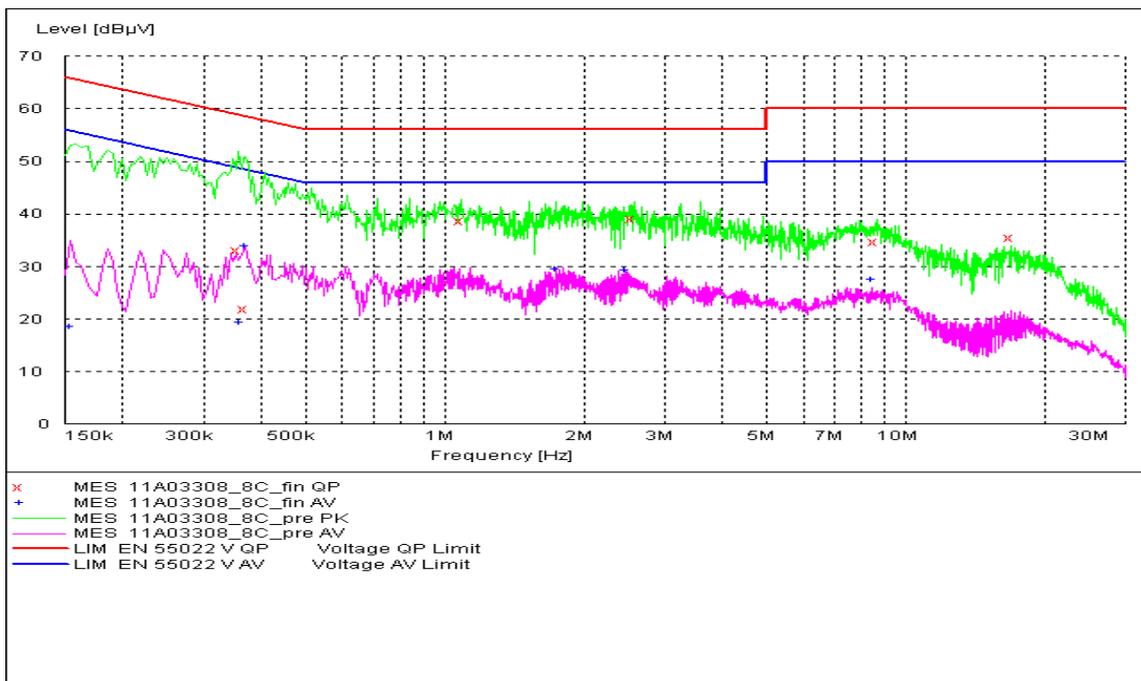
#### **A.3.1 Limit**

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.

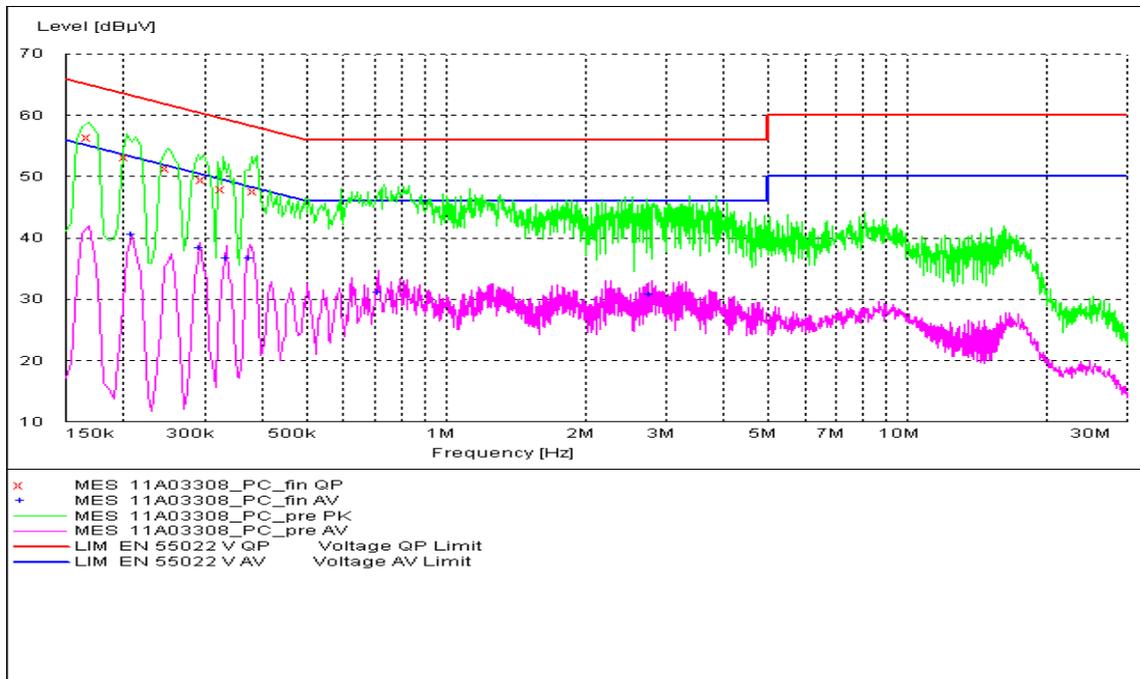
**MEASUREMENT RESULT: "11A03308\_8C\_fin QP"**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.357000	33.10	10.1	59	25.7	N	GND
0.370500	21.90	10.1	59	36.6	L1	GND
1.090500	38.60	10.1	56	17.4	L1	GND
2.572222	39.00	10.1	56	17.0	L1	GND
8.653389	34.70	10.2	60	25.3	N	GND
16.927594	35.50	10.3	60	24.5	L1	GND

**MEASUREMENT RESULT: "11A03308\_8C\_fin AV"**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.154500	18.50	10.1	56	37.2	L1	GND
0.361500	19.40	10.1	49	29.3	L1	GND
0.370500	34.00	10.1	49	14.5	L1	GND
1.752000	29.50	10.1	46	16.5	L1	GND
2.473980	29.20	10.1	46	16.8	L1	GND
8.423214	27.50	10.2	50	22.5	L1	GND

**PCS 1900MHz**



IF bandwidth 9 kHz

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

**MEASUREMENT RESULT: "11A03308\_PC\_fin QP"**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.168000	56.30	10.1	65	8.8	L1	GND
0.204000	53.20	10.1	63	10.2	N	GND
0.249000	51.30	10.1	62	10.5	L1	GND
0.298500	49.50	10.1	60	10.8	N	GND
0.330000	48.00	10.1	60	11.4	L1	GND
0.388500	47.60	10.1	58	10.5	N	GND

**MEASUREMENT RESULT: "11A03308\_PC\_fin AV"**

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.208500	40.50	10.1	53	12.7	L1	GND
0.294000	38.30	10.1	50	12.1	L1	GND
0.334500	36.60	10.1	49	12.7	L1	GND
0.375000	36.60	10.1	48	11.8	N	GND
0.717000	31.10	10.1	46	14.9	L1	GND
2.780562	30.70	10.1	46	15.3	L1	GND

## **A.4 FREQUENCY STABILITY**

### **Reference**

FCC: CFR Part 22.235, 2.1055, 24.235

IC: RSS 132, Issue 2, Section 4.3. RSS 133, Issue 5, Section 6.3

### **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 3.4VDC 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)
3.6	-20	0.024
3.8	-19	0.023
4.2	-22	0.026

**Frequency Error vs Temperature**

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-21	0.025
-20	-21	0.025
-10	-20	0.024
0	-20	0.024
10	-19	0.023
20	-19	0.023
30	-20	0.024
40	-21	0.025
50	-22	0.026

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

**PCS 1900**

**Frequency Error vs Voltage**

Voltage(V)	Frequency error(Hz)	Frequency error(ppm)
3.6	-18	0.010
3.8	-20	0.011
4.2	-21	0.011

**Frequency Error vs Temperature**

temperature(°C)	Frequency error(Hz)	Frequency error(ppm)
-30	-20	0.011
-20	-20	0.011
-10	-20	0.011
0	-19	0.010
10	-19	0.010
20	-19	0.010
30	-20	0.011
40	-21	0.011
50	-22	0.012

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

## A.5 OCCUPIED BANDWIDTH

### Reference

FCC: CFR Part 2.1049(h)(i)

IC: RSS 132, Issue 2, Section 4.1.1. RSS 133, Issue 5, Section 5.6.

### 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 the US PCS frequency band. The table below lists the measured -20dBc BW (99%). Spectrum analyzer plots are included on the following pages.

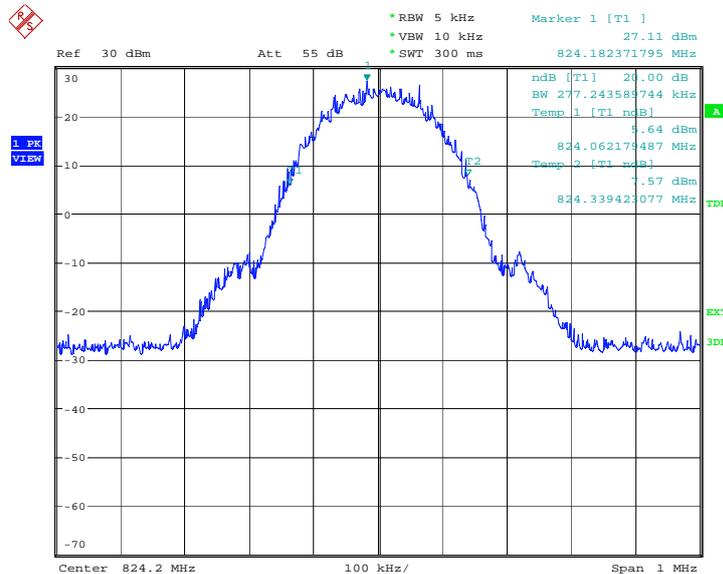
#### GSM 850(99%)

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
824.2	277.244
836.6	275.641
848.8	266.026

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

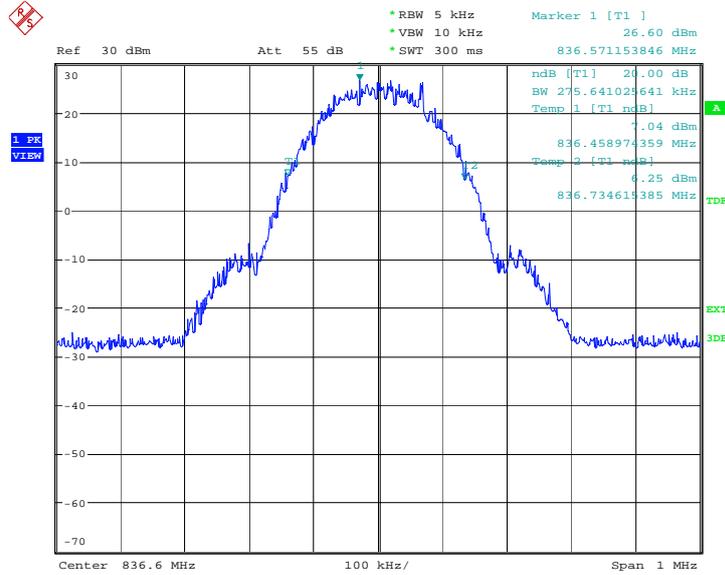
#### GSM 850

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



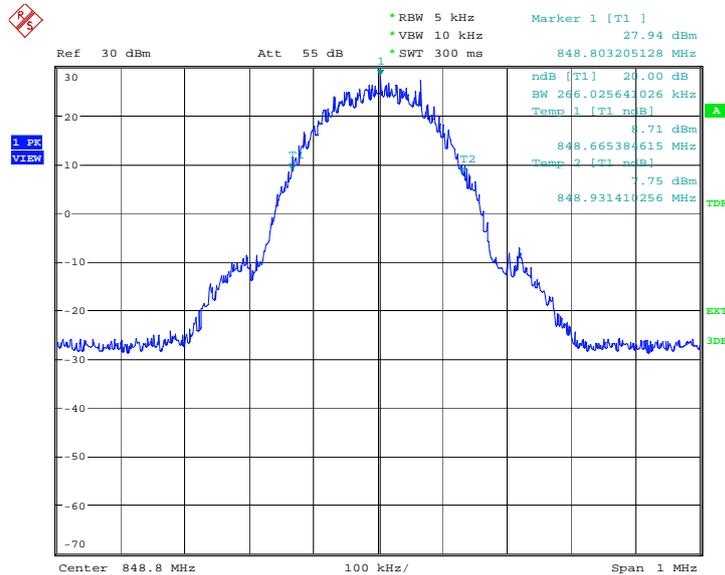
Date: 8 JUN. 2011 03:04:12

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



Date: 8.JUN.2011 03:04:39

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



Date: 8.JUN.2011 03:05:07

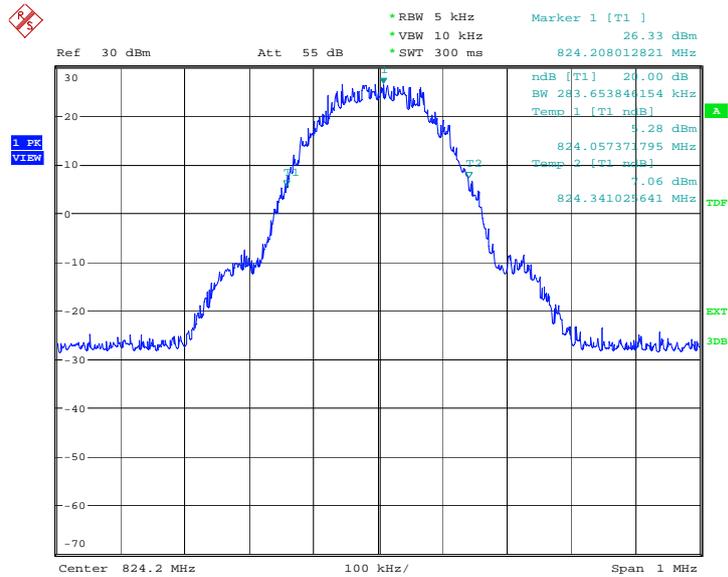
**GPRS 850(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
824.2	283.654
836.6	277.244
848.8	278.846

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

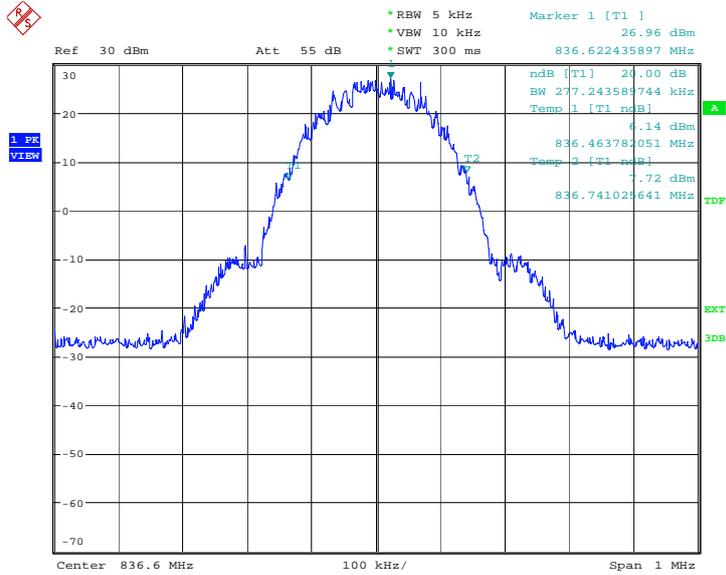
**GPRS 850**

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



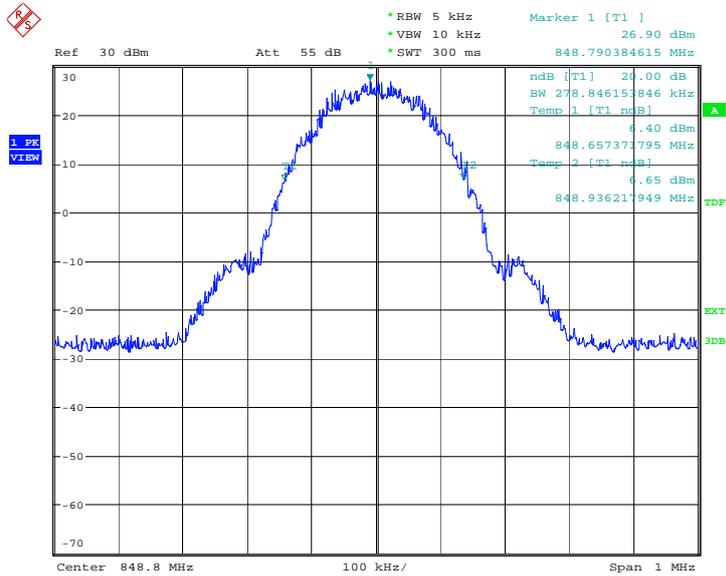
Date: 8.JUN.2011 04:34:36

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



Date: 8.JUN.2011 04:35:03

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



Date: 8.JUN.2011 04:35:30

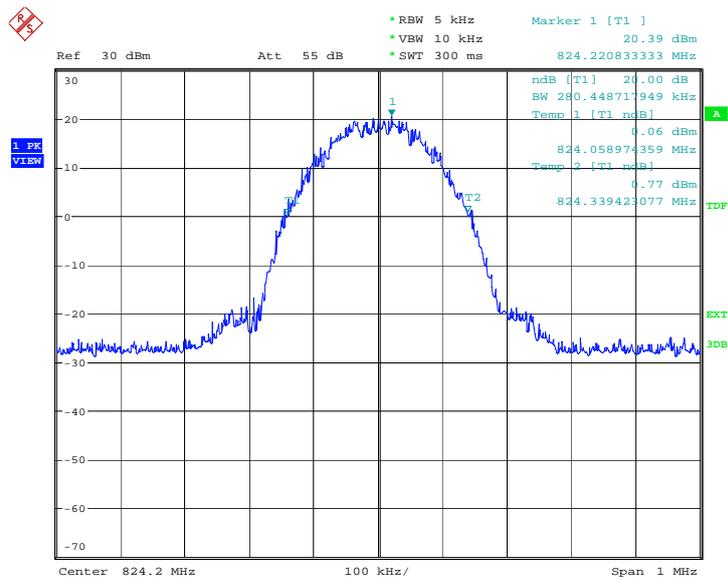
**EGPRS 850(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
824.2	280.449
836.6	275.641
848.8	269.231

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

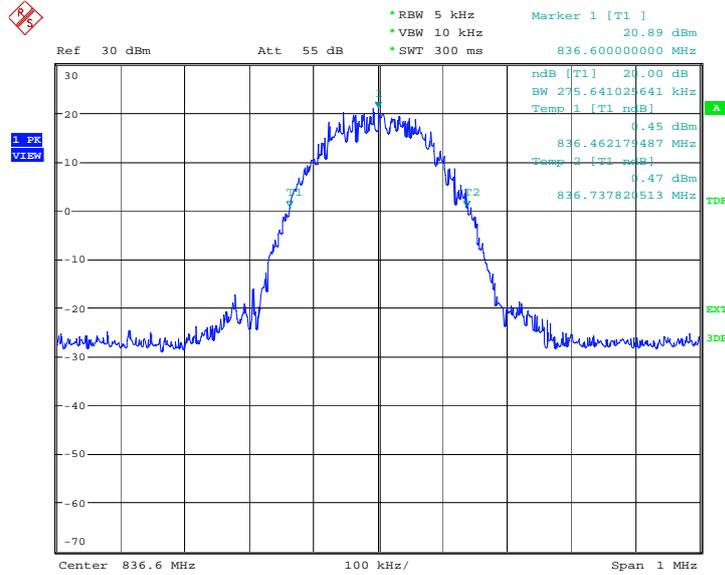
**EGPRS 850**

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



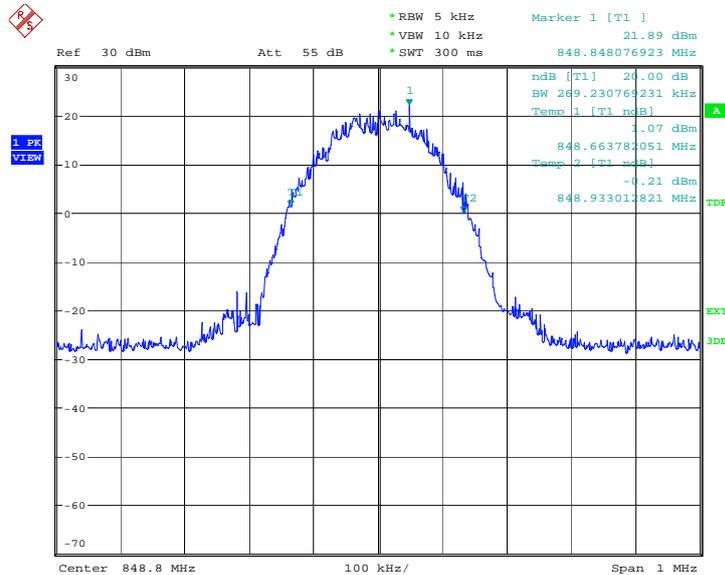
Date: 8.JUN.2011 04:54:08

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



Date: 8.JUN.2011 04:54:36

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



Date: 8.JUN.2011 04:55:03

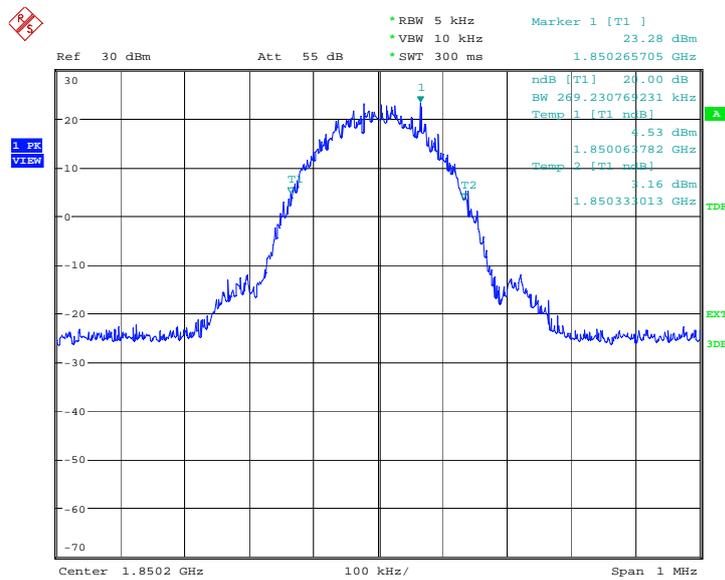
**PCS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	269.231
1880.0	278.846
1909.8	278.846

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

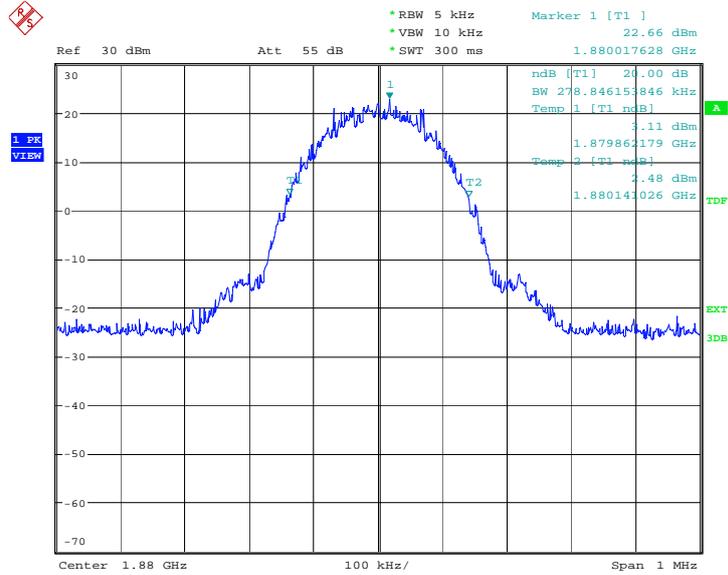
**PCS 1900**

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



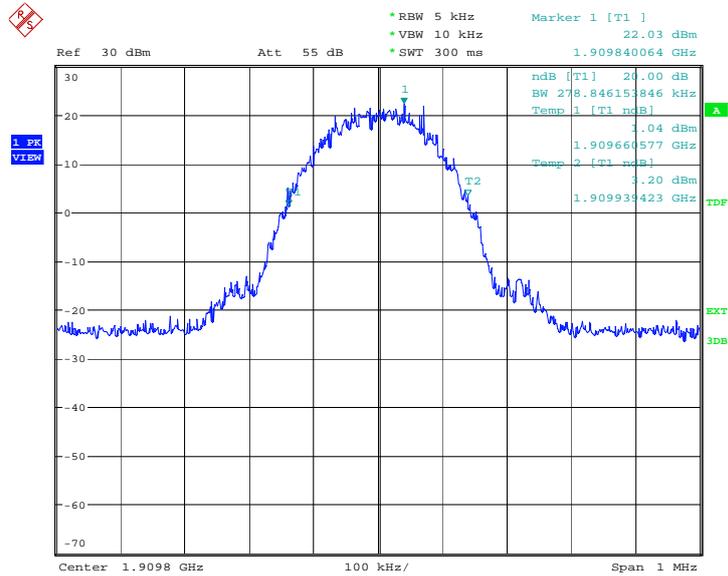
Date: 8.JUN.2011 03:34:41

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



Date: 8.JUN.2011 03:35:08

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



Date: 8.JUN.2011 03:35:35

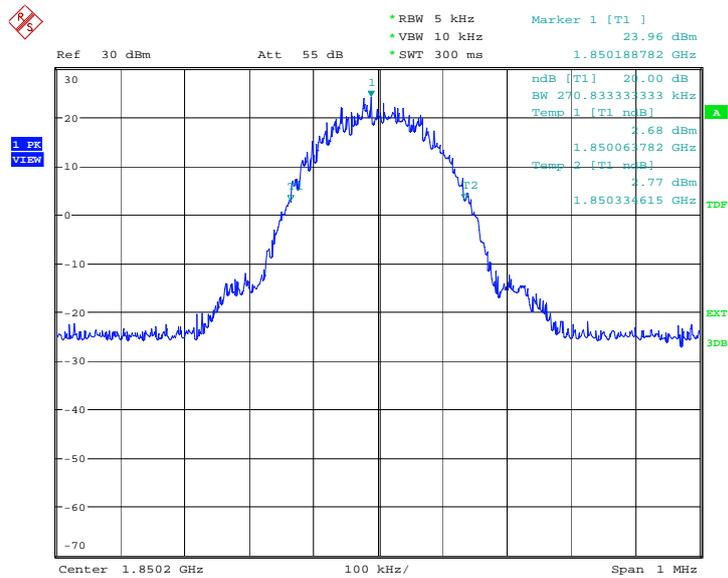
**GPRS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	270.833
1880.0	275.641
1909.8	264.423

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

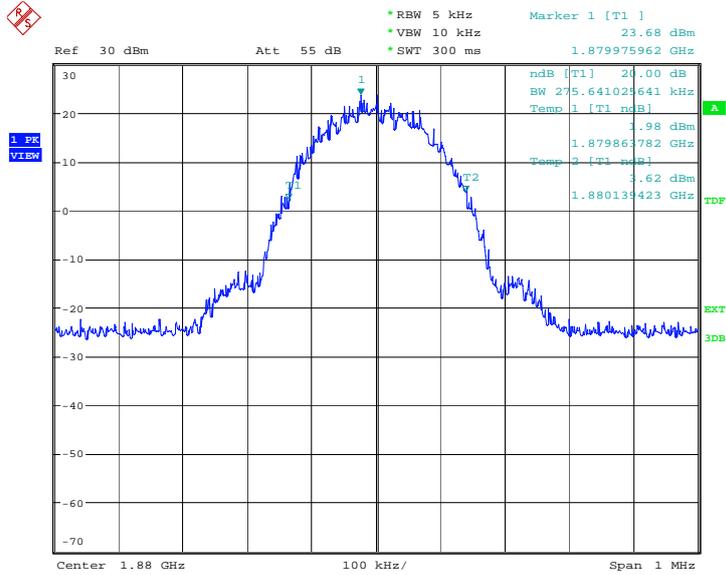
**GPRS 1900**

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



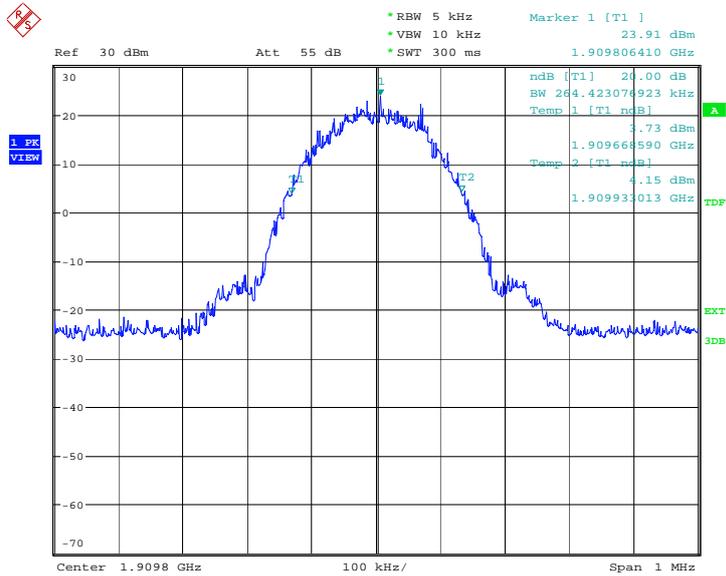
Date: 8.JUN.2011 04:44:55

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



Date: 8.JUN.2011 04:45:22

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



Date: 8.JUN.2011 04:45:49

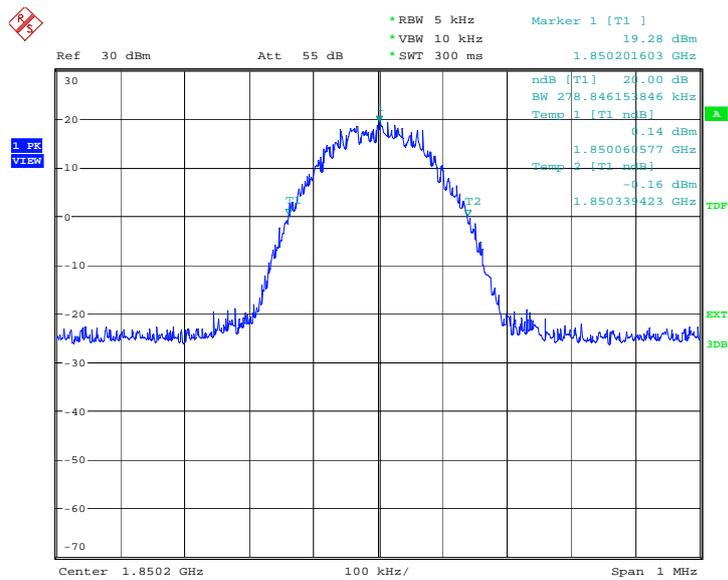
**EGPRS 1900(99%)**

Frequency(MHz)	Occupied Bandwidth (99%)( kHz)
1850.2	278.846
1880.0	277.244
1909.8	282.051

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

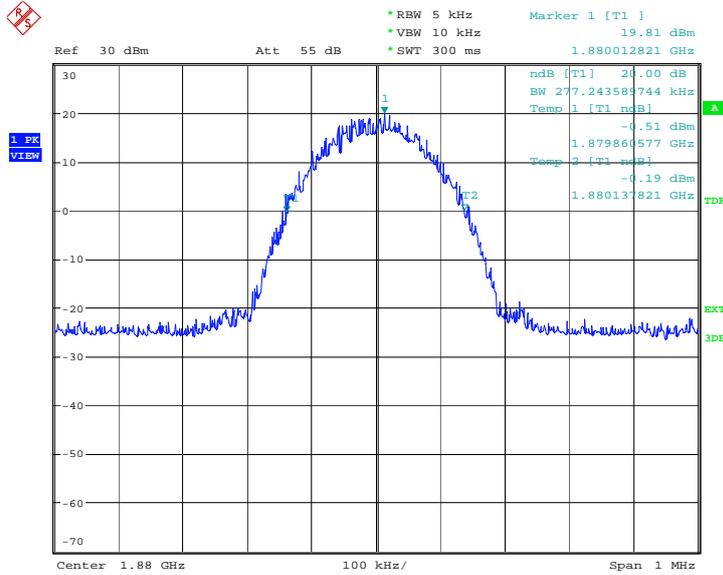
**EGPRS 1900**

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



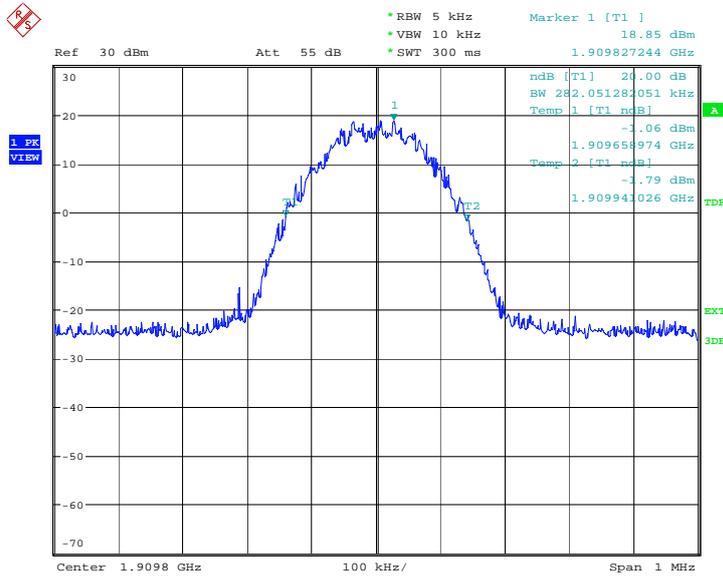
Date: 8.JUN.2011 05:03:57

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



Date: 8.JUN.2011 05:04:24

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



Date: 8.JUN.2011 05:04:51

## A.6 EMISSION BANDWIDTH

### Reference

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

IC: RSS 132, Issue 2, Section 4.1.1. RSS 133, Issue 5, Section 5.6

### 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 the PCS1900 band and GSM850 band. Table below lists the measured -26dBc BW. Spectrum analyzer plots are included on the following pages.

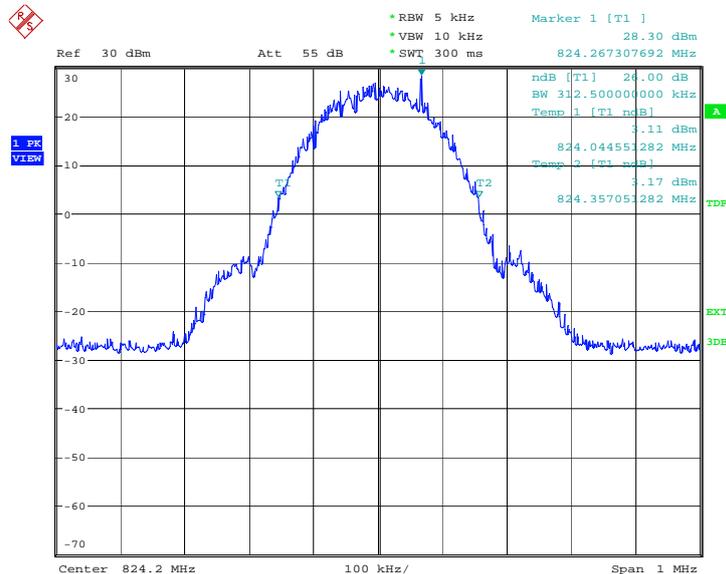
#### GSM 850(-26dBc)

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	312.500
836.6	322.115
848.8	312.500

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

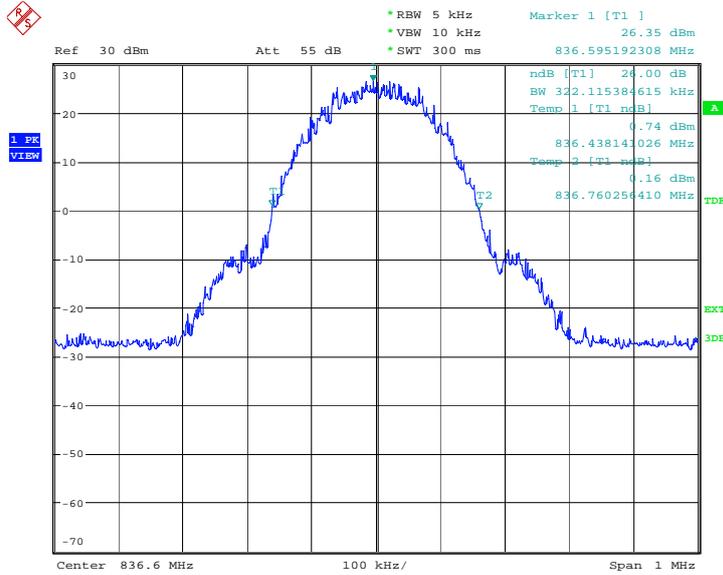
#### GSM 850

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



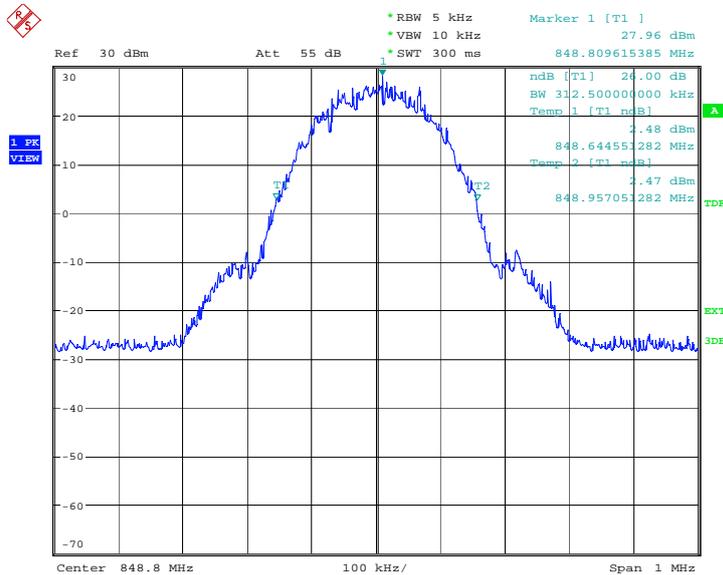
Date: 8 JUN 2011 03:05:35

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



Date: 8.JUN.2011 03:06:03

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



Date: 8.JUN.2011 03:06:30

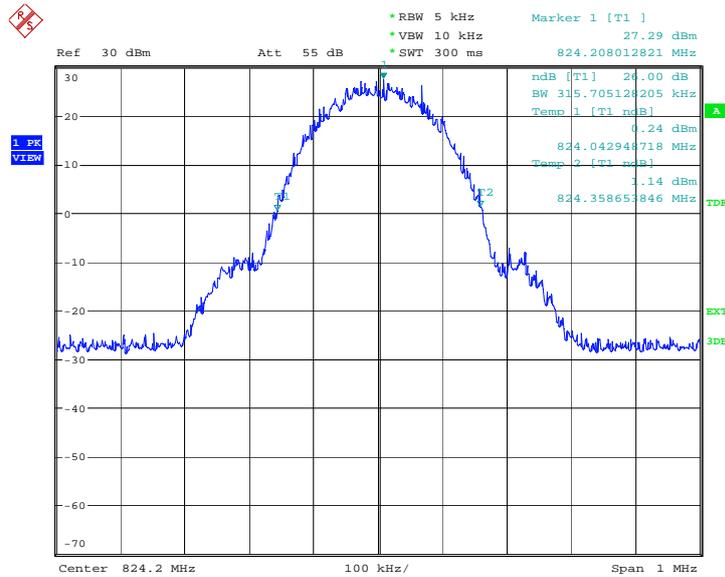
**GPRS 850(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	315.705
836.6	307.692
848.8	315.705

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

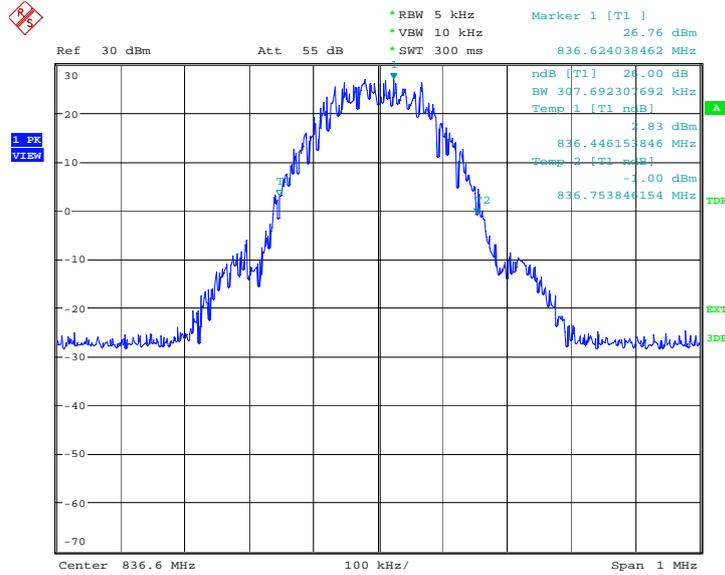
**GPRS 850**

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



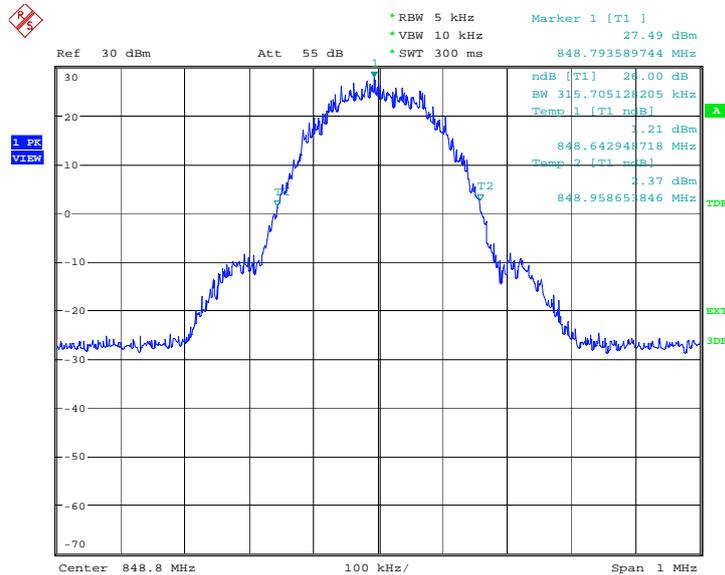
Date: 8.JUN.2011 04:35:59

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



Date: 8.JUN.2011 04:36:26

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



Date: 8.JUN.2011 04:36:54

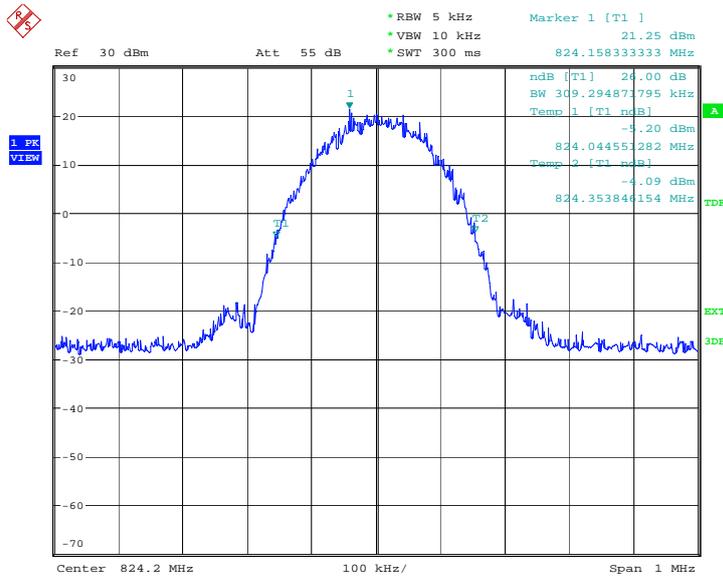
**EGPRS 850(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
824.2	309.295
836.6	312.500
848.8	304.487

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

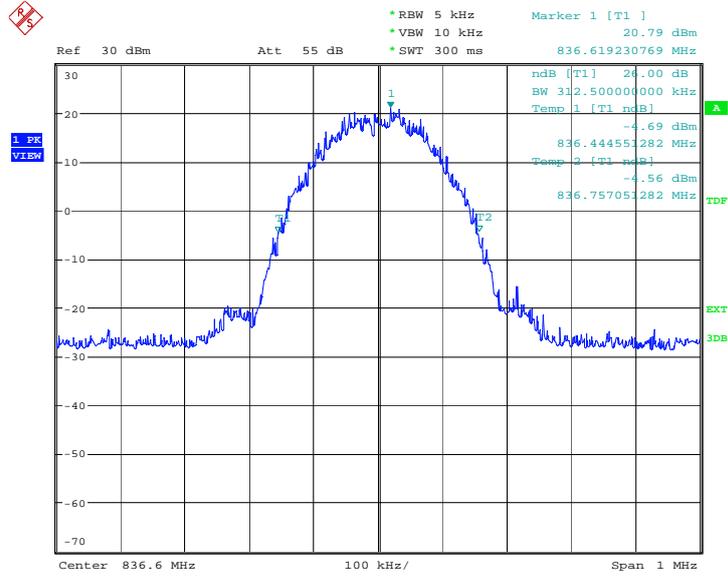
**EGPRS 850**

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



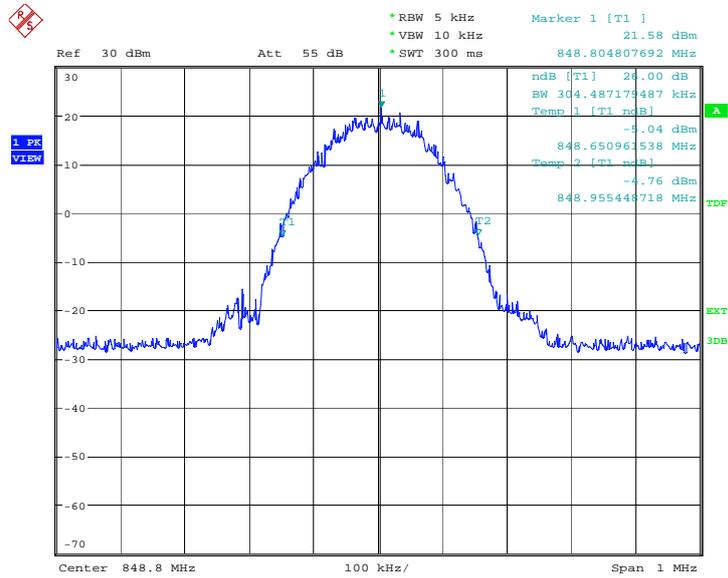
Date: 8.JUN.2011 04:55:32

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



Date: 8.JUN.2011 04:55:59

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



Date: 8.JUN.2011 04:56:26

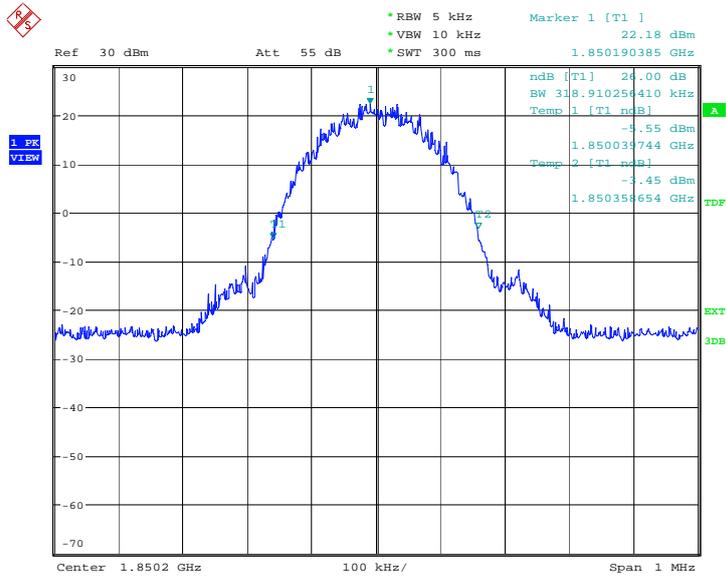
**PCS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	318.910
1880.0	317.308
1909.8	317.308

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

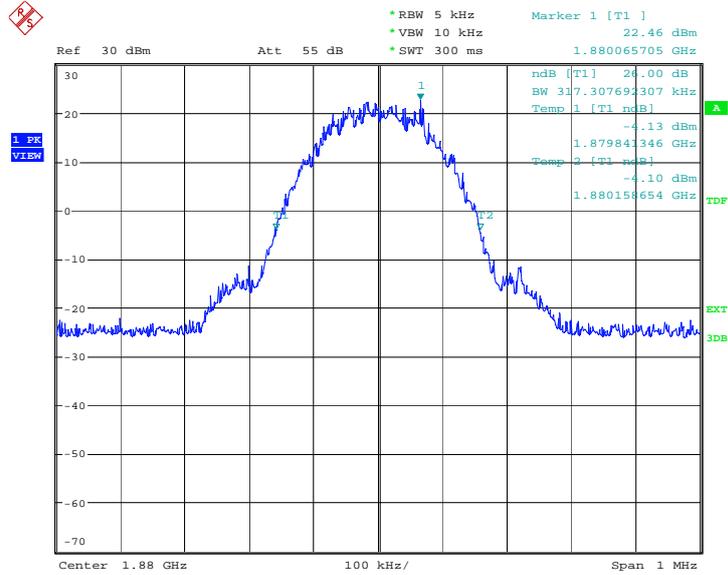
**PCS 1900**

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



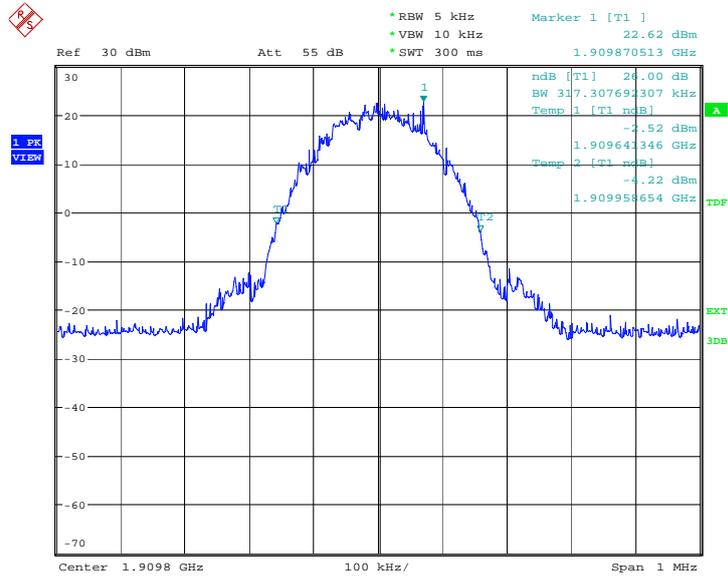
Date: 8.JUN.2011 03:36:04

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



Date: 8.JUN.2011 03:36:32

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



Date: 8.JUN.2011 03:36:59

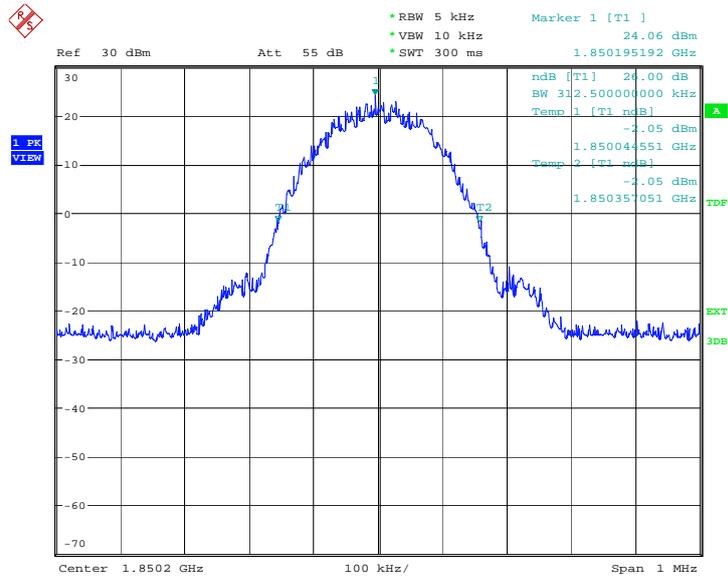
**GPRS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	312.500
1880.0	315.705
1909.8	312.500

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

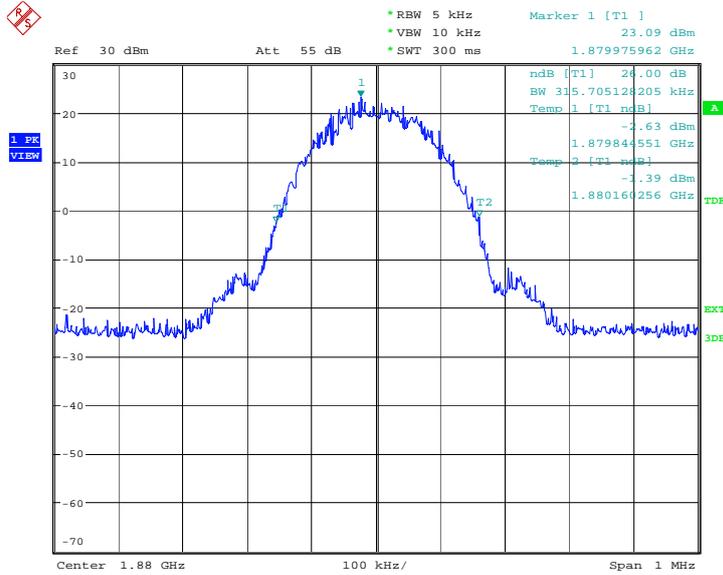
**GPRS 1900**

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



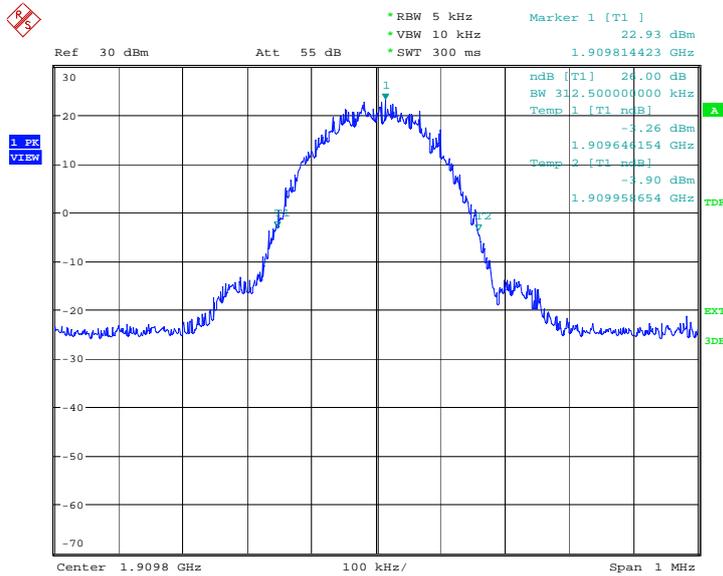
Date: 8.JUN.2011 04:46:18

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



Date: 8.JUN.2011 04:46:45

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



Date: 8.JUN.2011 04:47:13

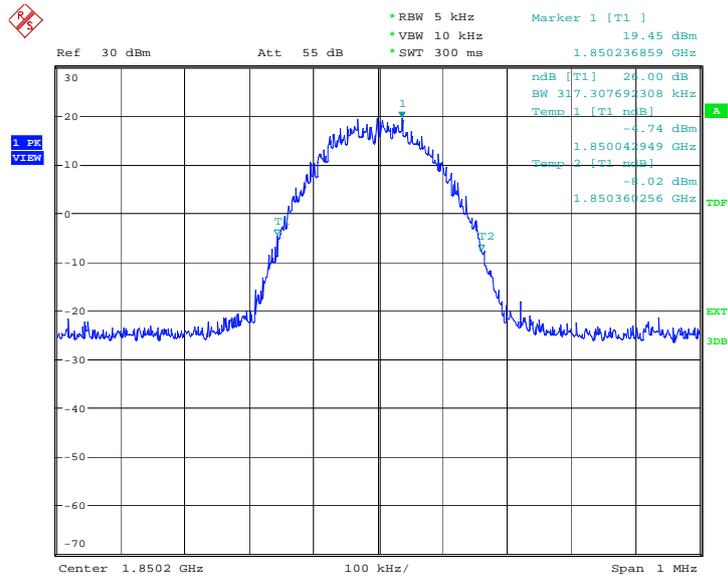
**EGPRS 1900(-26dBc)**

Frequency(MHz)	Occupied Bandwidth (-26dBc BW)( kHz)
1850.2	317.308
1880.0	320.513
1909.8	317.308

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

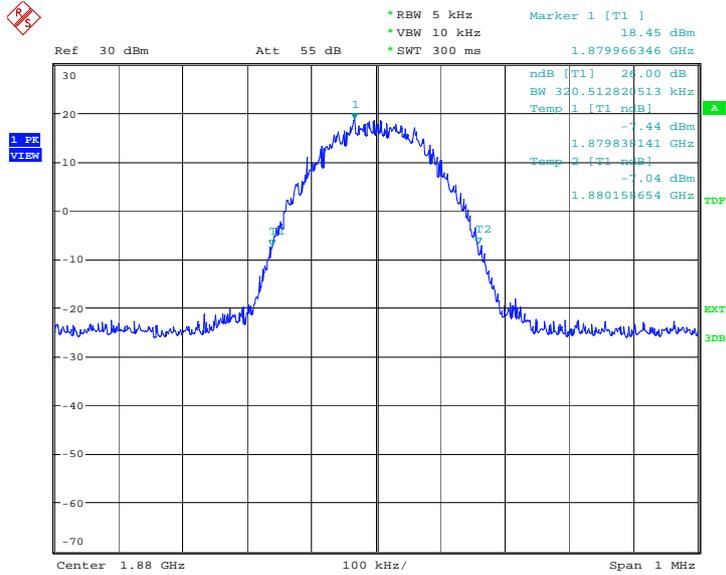
**EGPRS 1900**

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



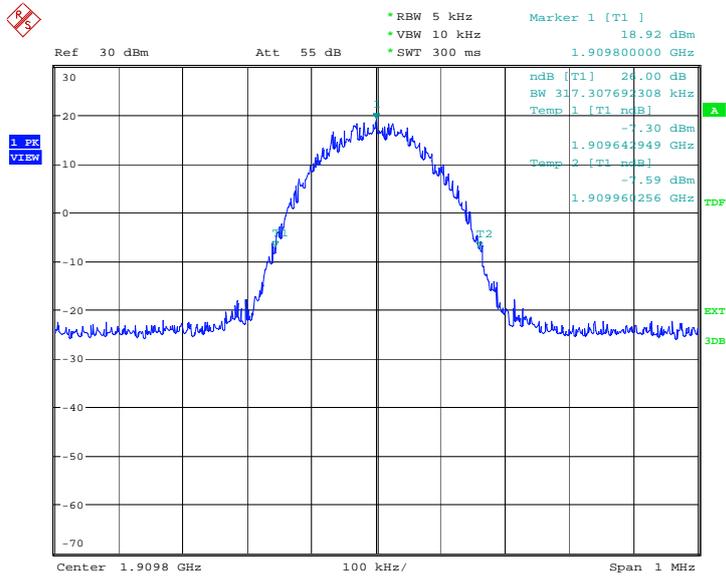
Date: 8.JUN.2011 05:05:20

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



Date: 8.JUN.2011 05:05:47

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



Date: 8.JUN.2011 05:06:15

## A.7 BAND EDGE COMPLIANCE

### Reference

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

IC: RSS 132, Issue 2, Section 4.5. RSS 133, Issue 5, Section 6.3

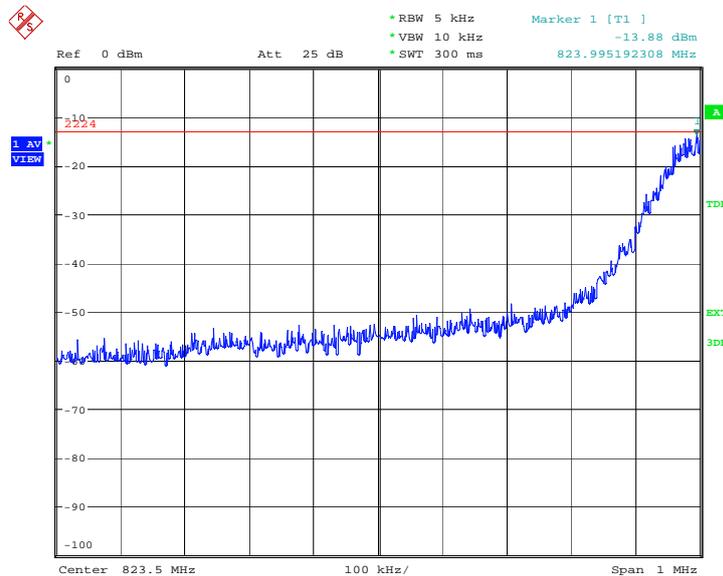
### A.7.1 Measurement limit

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

### A.7.2 Measurement result

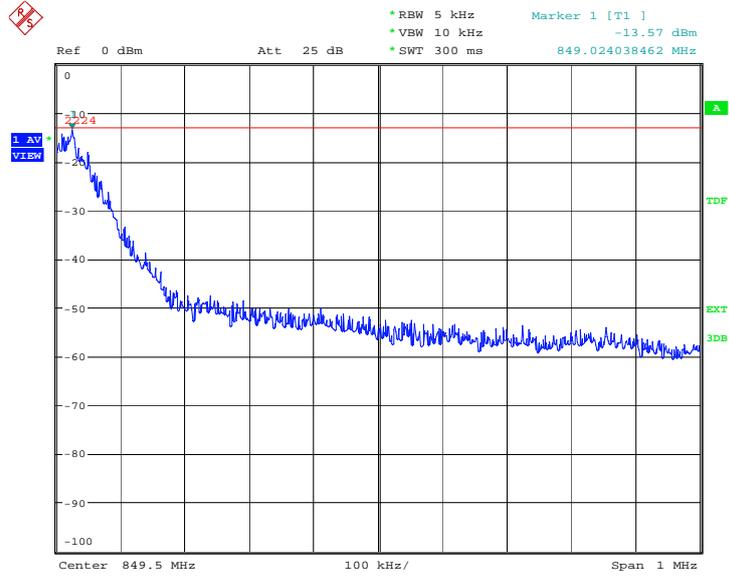
#### GSM 850

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



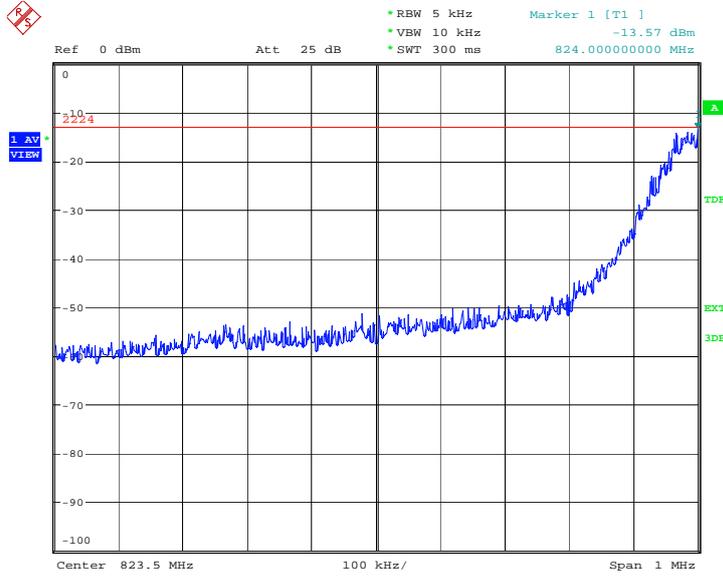
Date: 8.JUN.2011 03:06:59

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



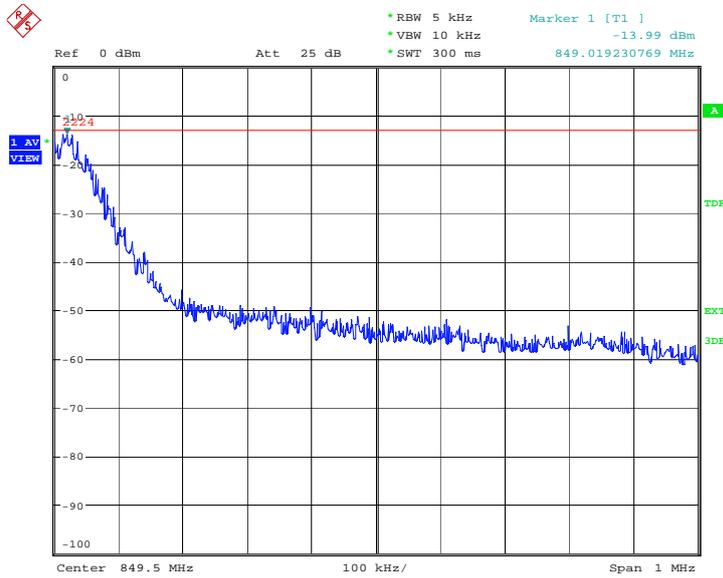
Date: 8.JUN.2011 04:37:52

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



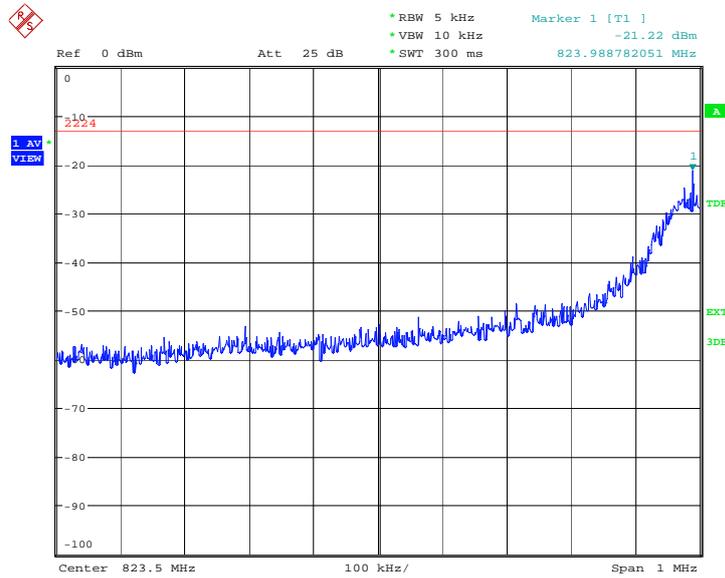
Date: 8.JUN.2011 23:27:05

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



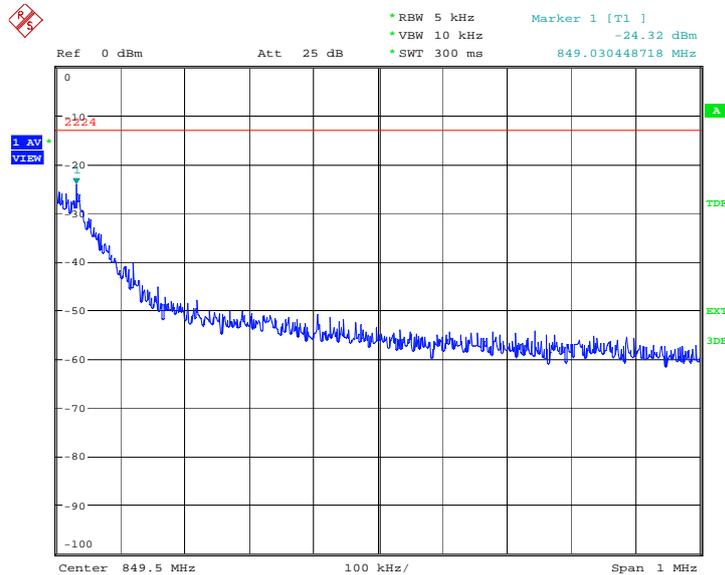
Date: 8.JUN.2011 23:27:34

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



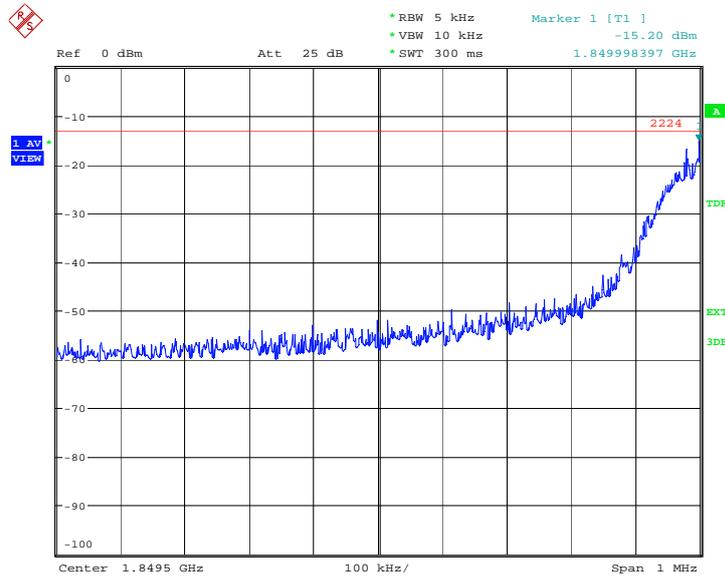
Date: 8.JUN.2011 04:56:55

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



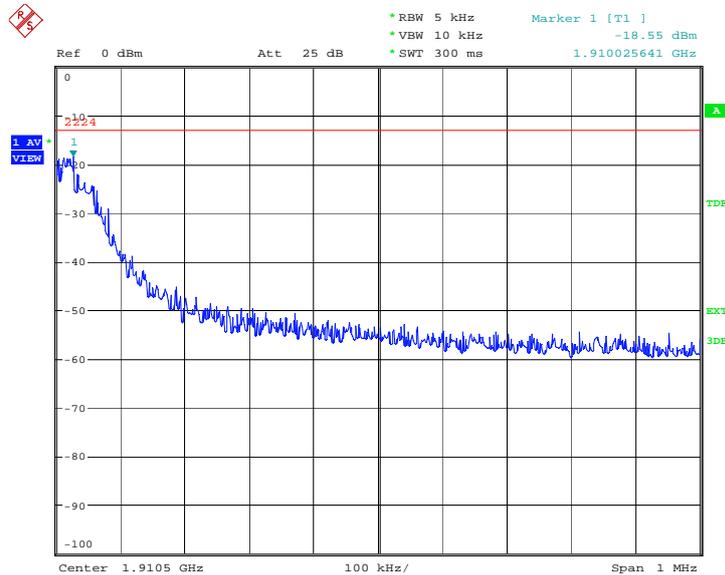
Date: 8.JUN.2011 04:57:24

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



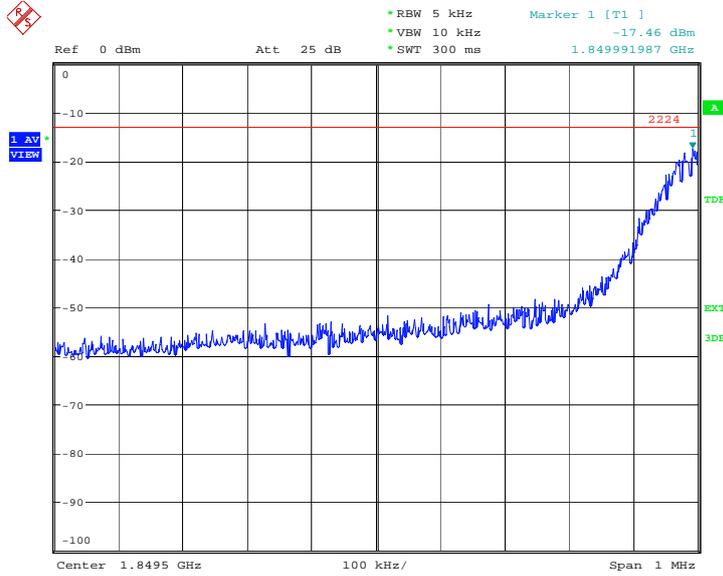
Date: 8.JUN.2011 03:37:28

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



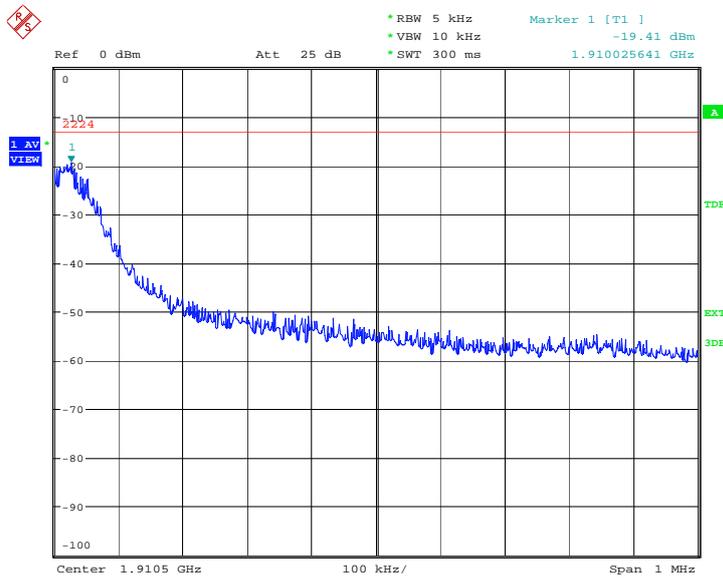
Date: 8.JUN.2011 03:37:57

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



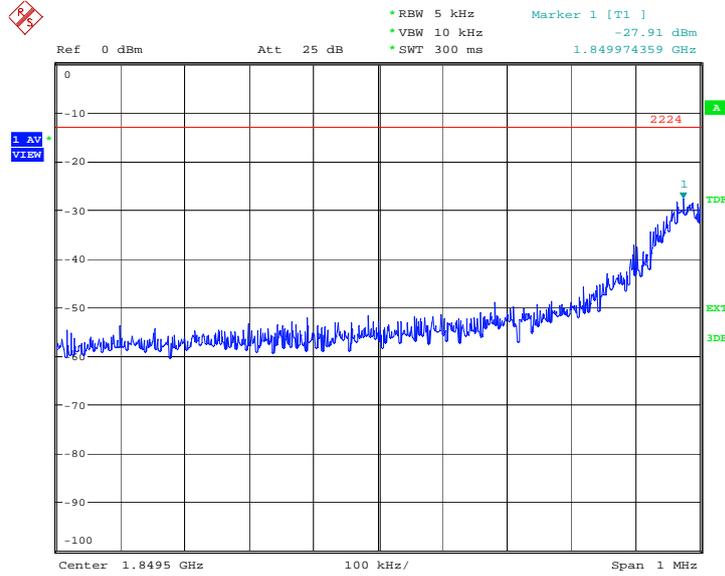
Date: 8.JUN.2011 04:47:42

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



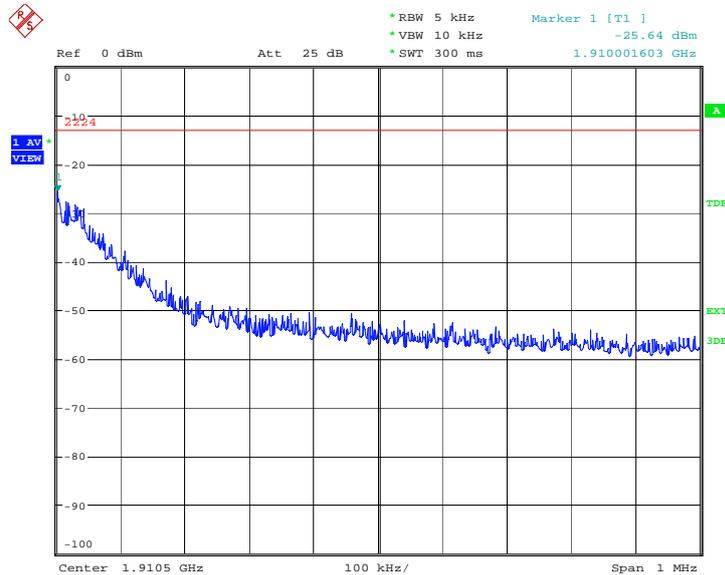
Date: 8.JUN.2011 04:48:11

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



Date: 8.JUN.2011 05:06:43

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



Date: 8.JUN.2011 05:07:12

## **A.8 CONDUCTED SPURIOUS EMISSION**

### **Reference**

FCC: CFR Part 22.917, 2.1057, 24.238

IC: RSS 132, Issue 2, Section 4.5. RSS 133, Issue 5, Section 6.5

### **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 9 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

#### GSM850

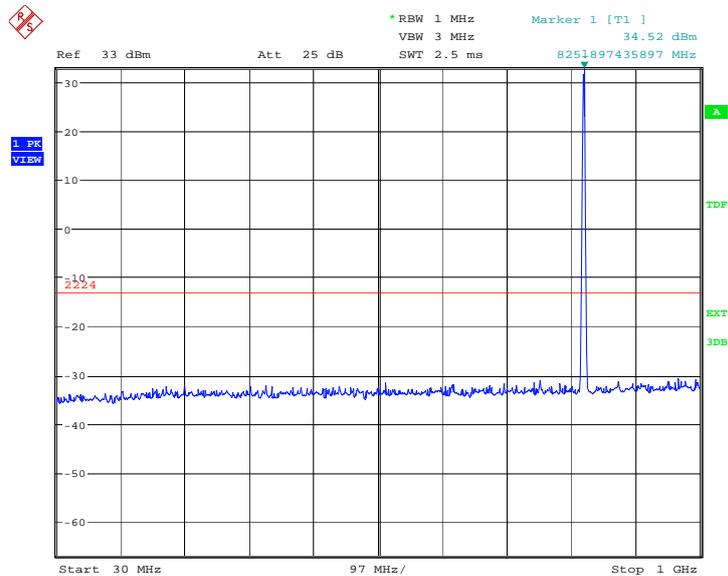
Harmonic	Tx ch. 128 Freq. (MHz)	Level (dBm)	Tx ch. 190 Freq. (MHz)	Level (dBm)	Tx ch. Freq. (MHz) 251	Level (dBm)
2	1648.4	nf	1673.2	nf	1697.6	nf
3	2472.6	nf	2509.8	nf	2546.4	nf
4	3296.8	nf	3346.4	nf	3395.2	nf
5	4121	nf	4183	nf	4244	nf
6	4945.2	nf	5019.6	nf	5092.8	nf
7	5769.4	nf	5856.2	nf	5941.6	nf
8	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

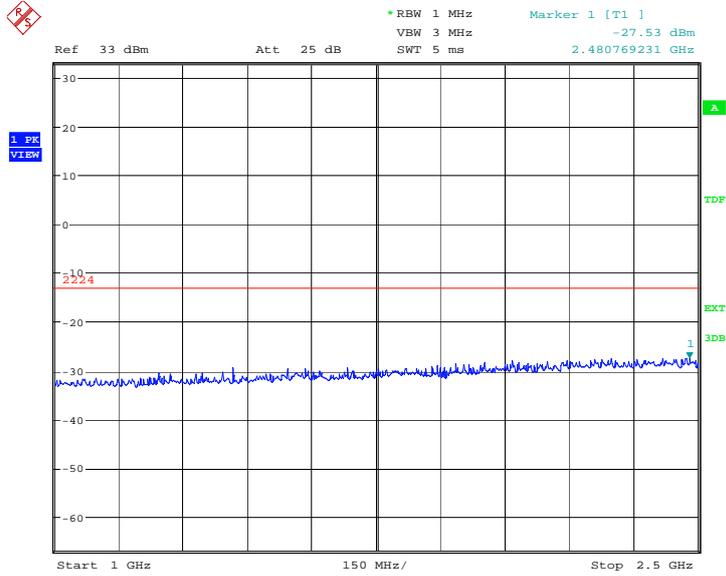
Spurious emission limit –13dBm.

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



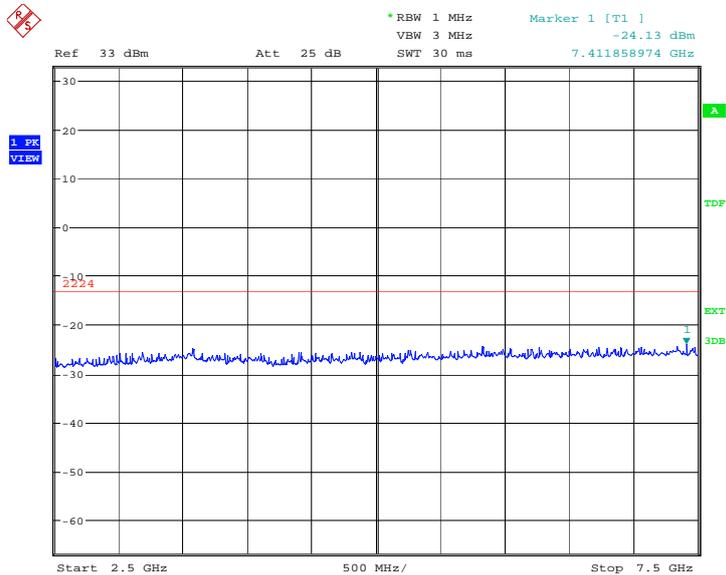
Date: 8.JUN.2011 03:07:57

**A.8.3.2 Channel 128: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.



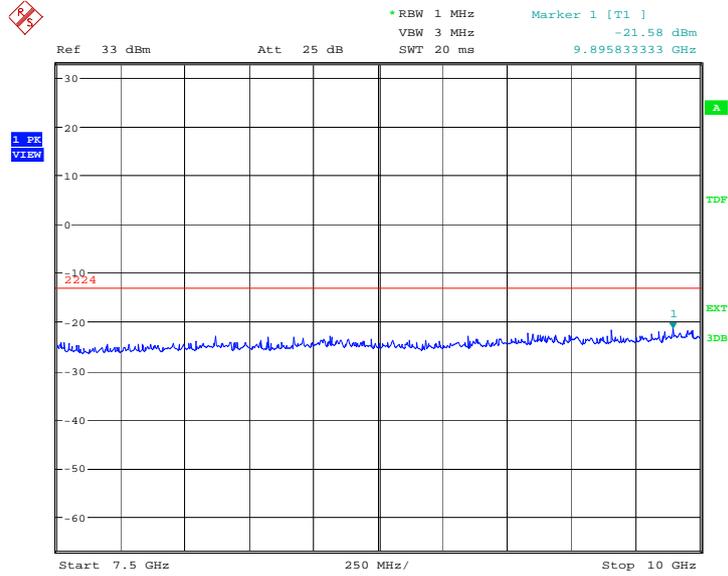
Date: 8.JUN.2011 03:08:25

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



Date: 8.JUN.2011 03:08:53

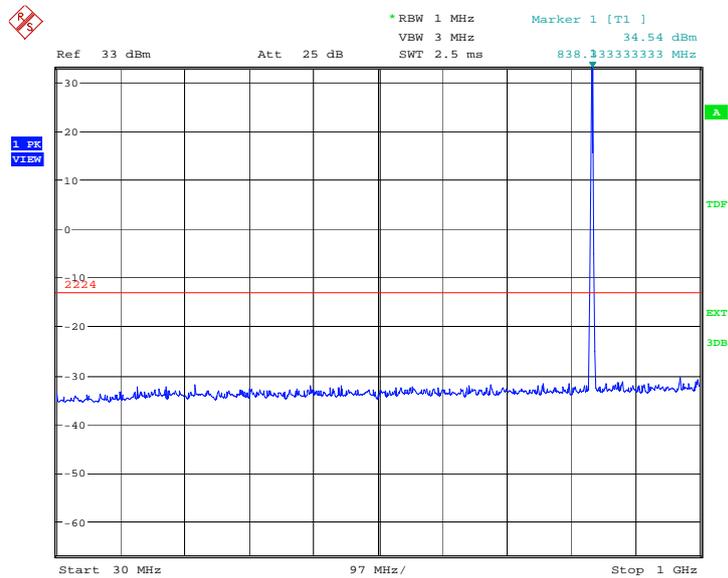
**A.8.3.4 Channel 128: 7.5GHz –10GHz**  
Spurious emission limit –13dBm.



Date: 8.JUN.2011 03:09:22

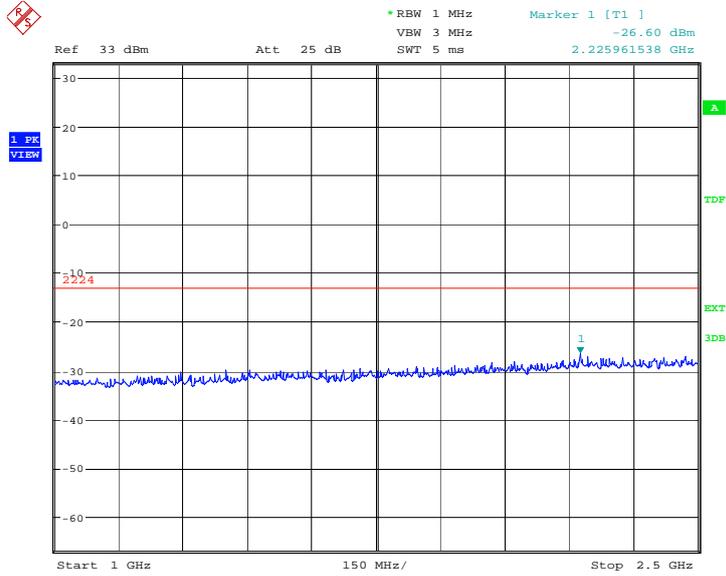
**A.8.3.5 Channel 190: 30MHz – 1GHz**  
Spurious emission limit –13dBm

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



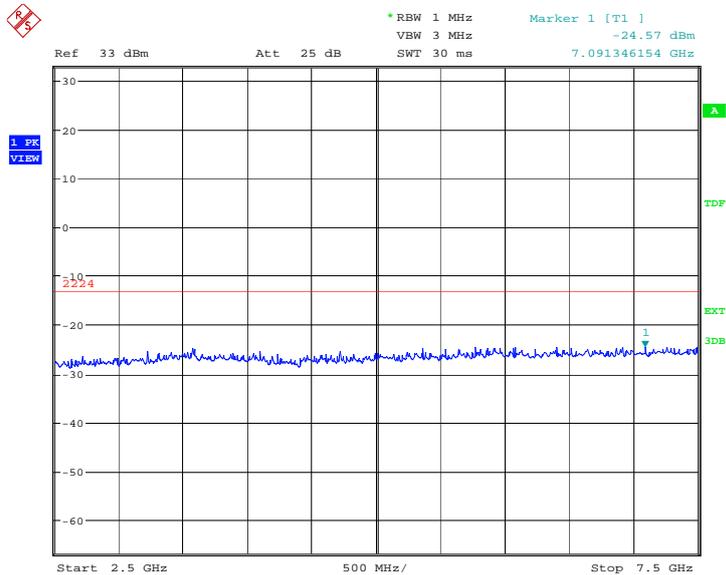
Date: 8.JUN.2011 03:09:50

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



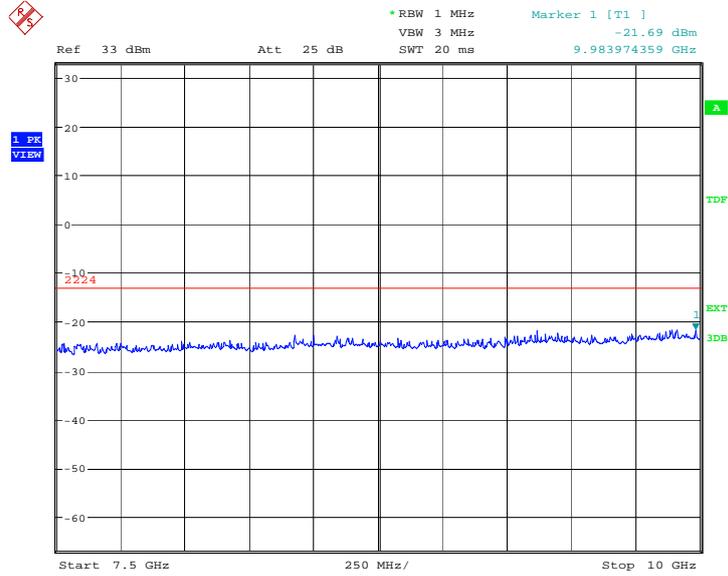
Date: 8.JUN.2011 03:10:19

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



Date: 8.JUN.2011 03:10:47

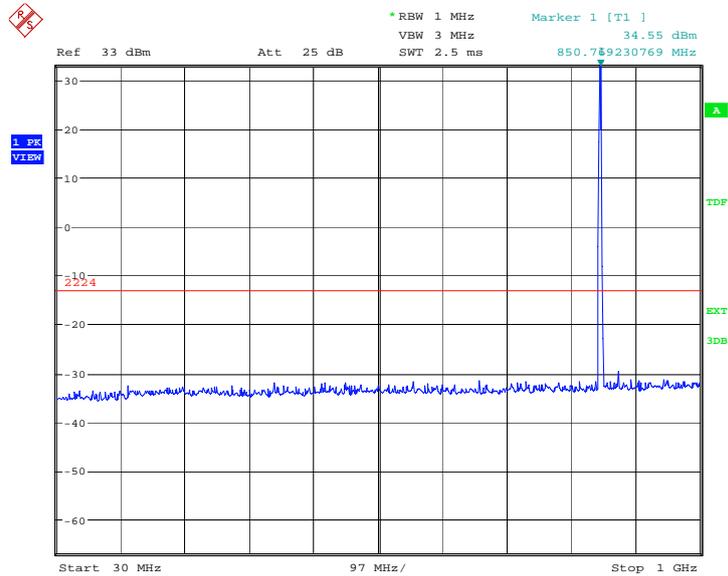
**A.8.3.8 Channel 190: 7.5GHz –10GHz**  
Spurious emission limit –13dBm



Date: 8.JUN.2011 03:11:15

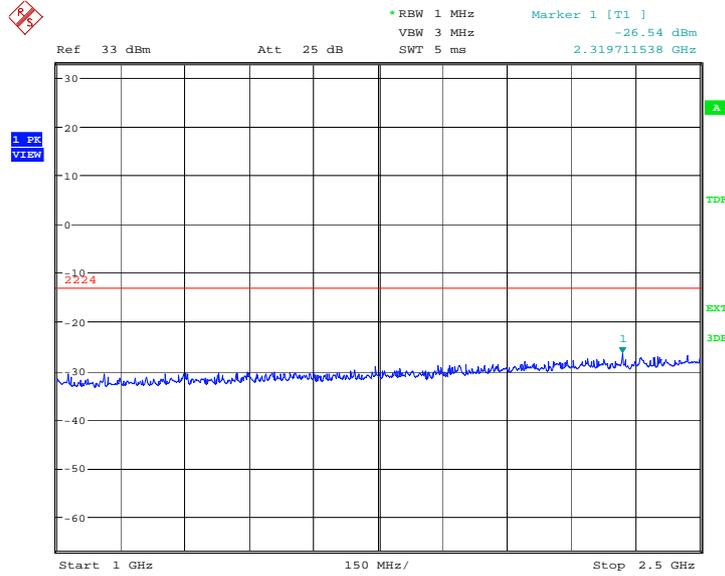
**A.8.3.9 Channel 251: 30MHz – 1GHz**  
Spurious emission limit –13dBm.

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



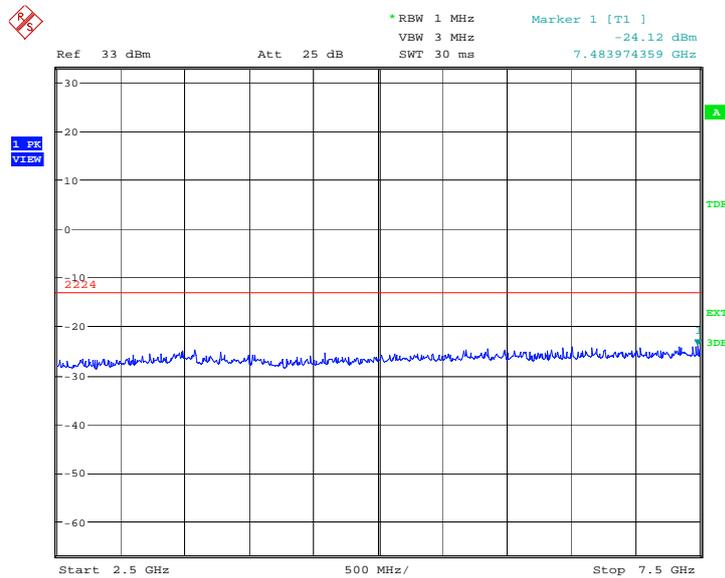
Date: 8.JUN.2011 03:11:44

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



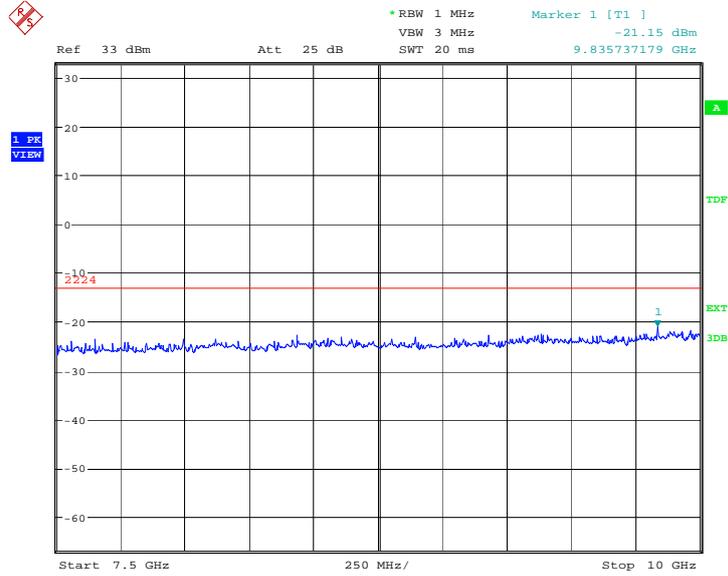
Date: 8.JUN.2011 03:12:12

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



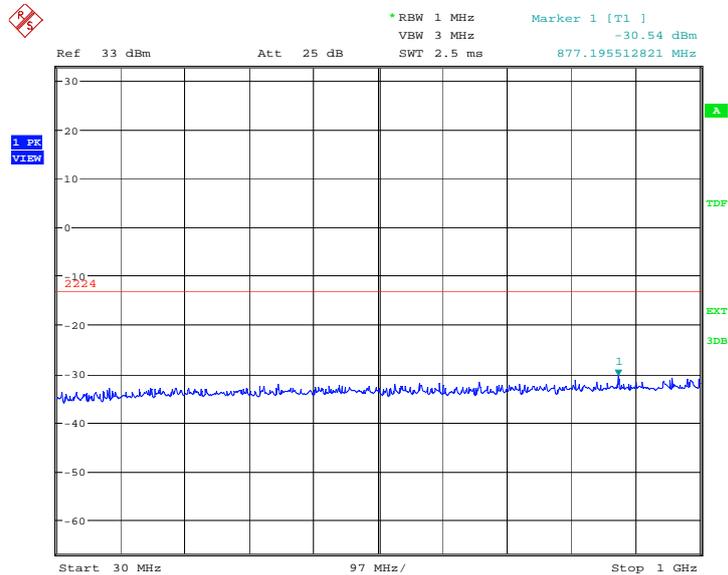
Date: 8.JUN.2011 03:12:40

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



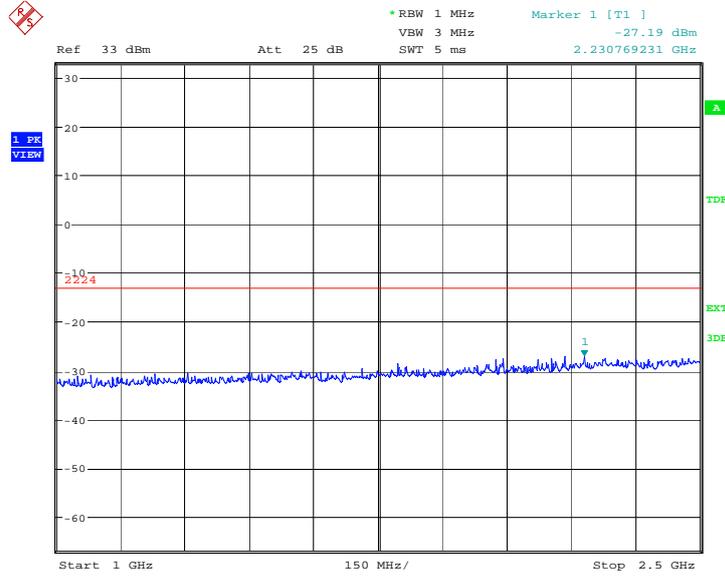
Date: 8.JUN.2011 03:13:09

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



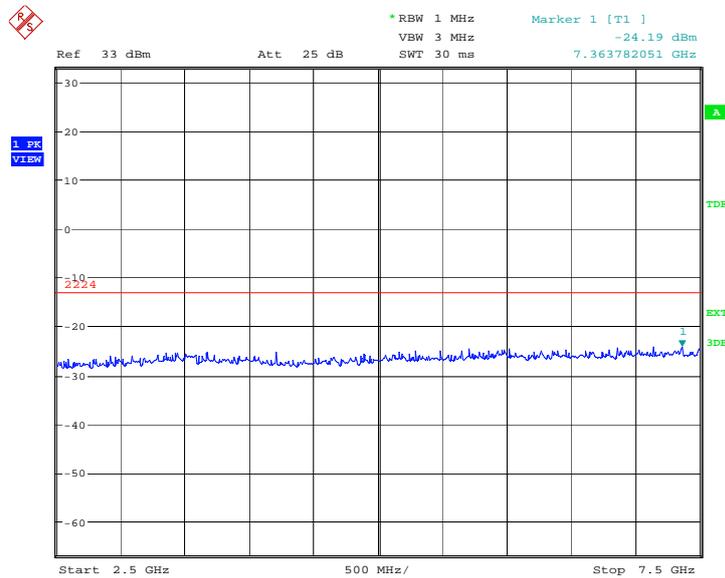
Date: 8.JUN.2011 03:13:37

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



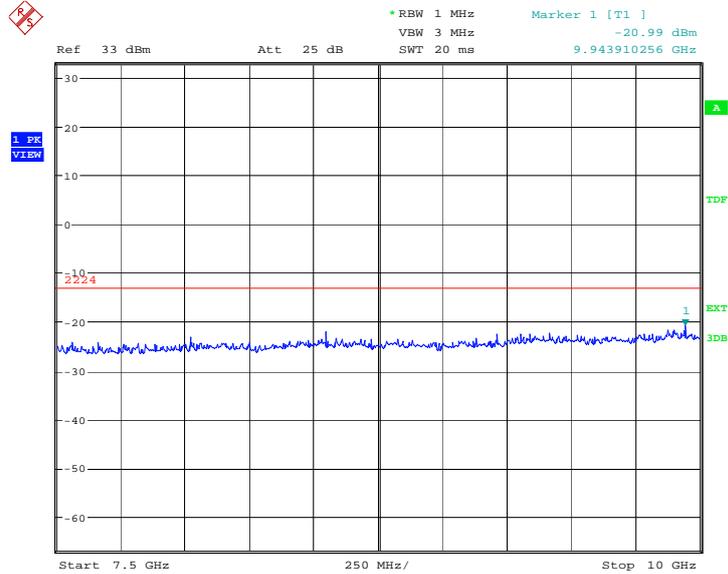
Date: 8.JUN.2011 03:14:05

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



Date: 8.JUN.2011 03:14:34

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



Date: 8.JUN.2011 03:15:02

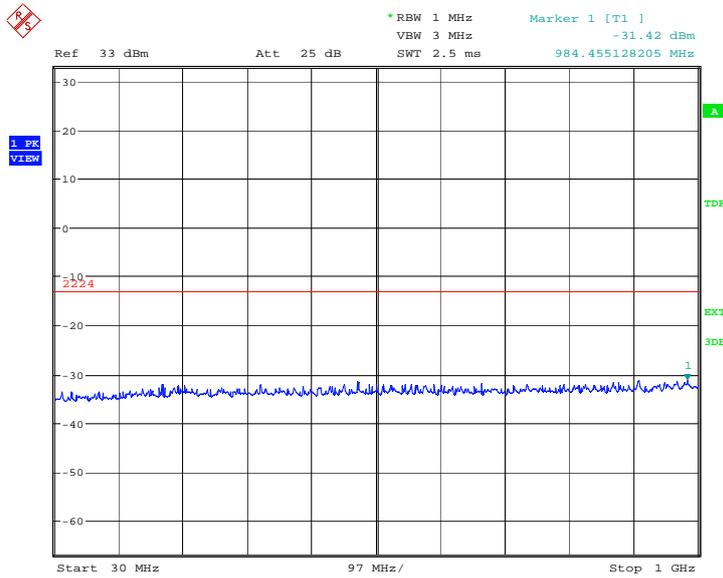
**PCS1900**

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.

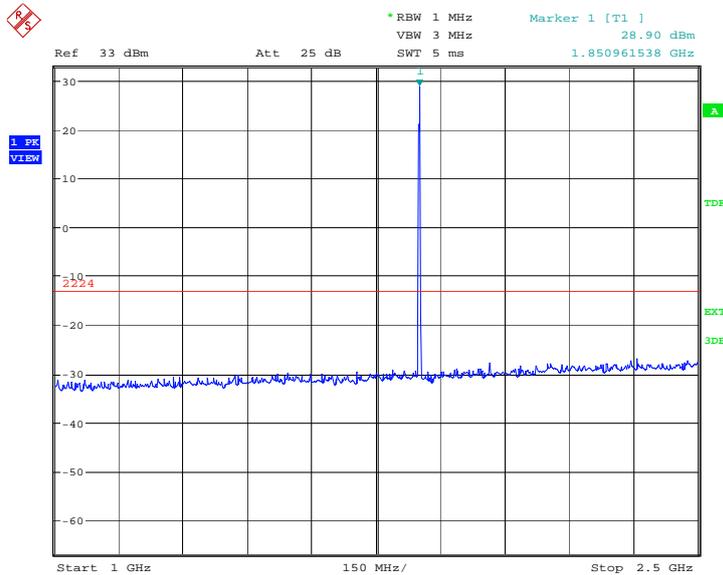


Date: 8.JUN.2011 03:38:26

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

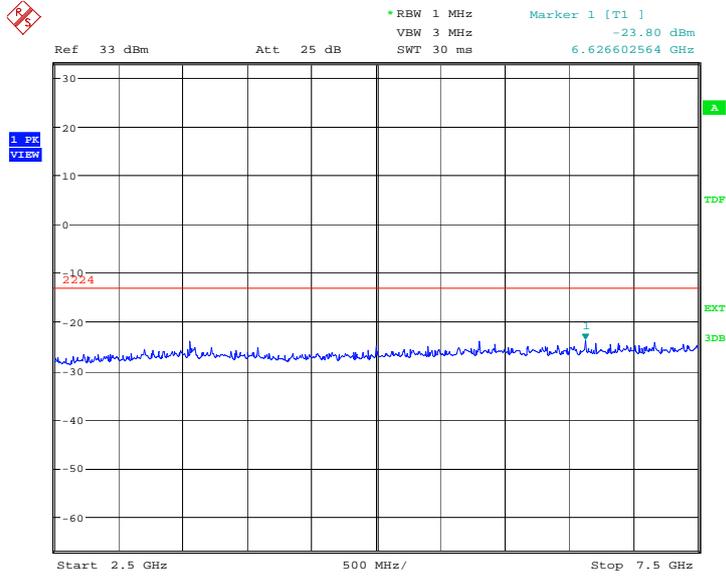
Spurious emission limit –13dBm.

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



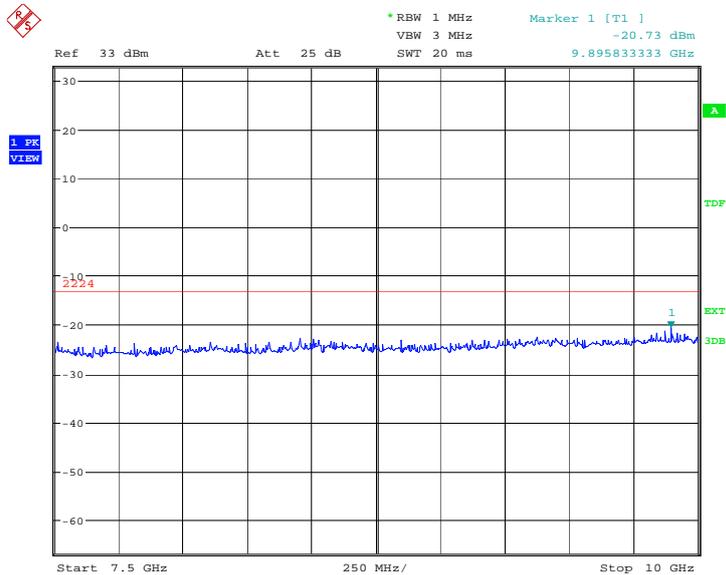
Date: 8.JUN.2011 03:38:55

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



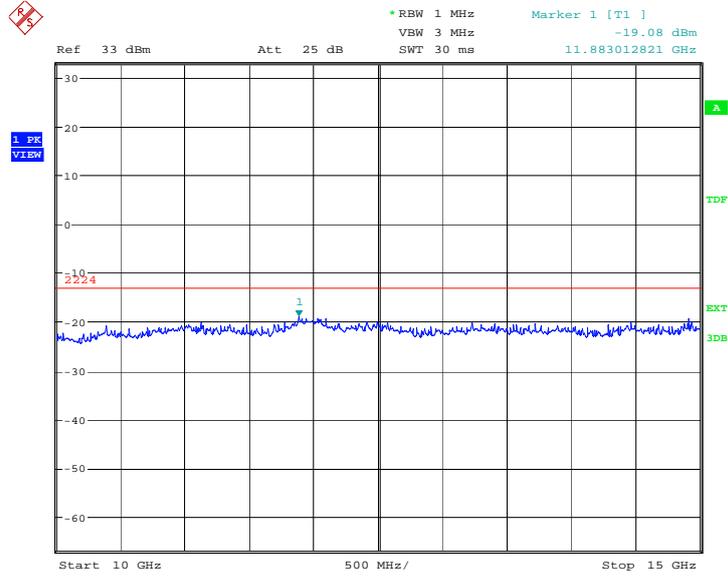
Date: 8.JUN.2011 03:39:23

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



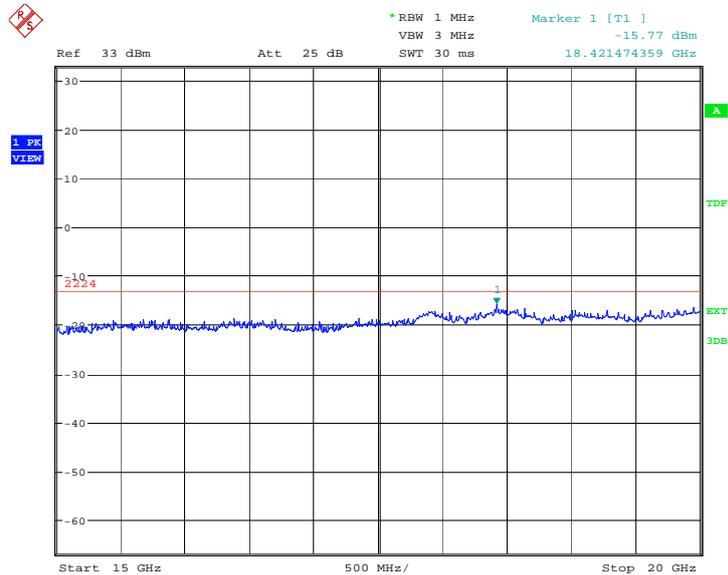
Date: 8.JUN.2011 03:39:51

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



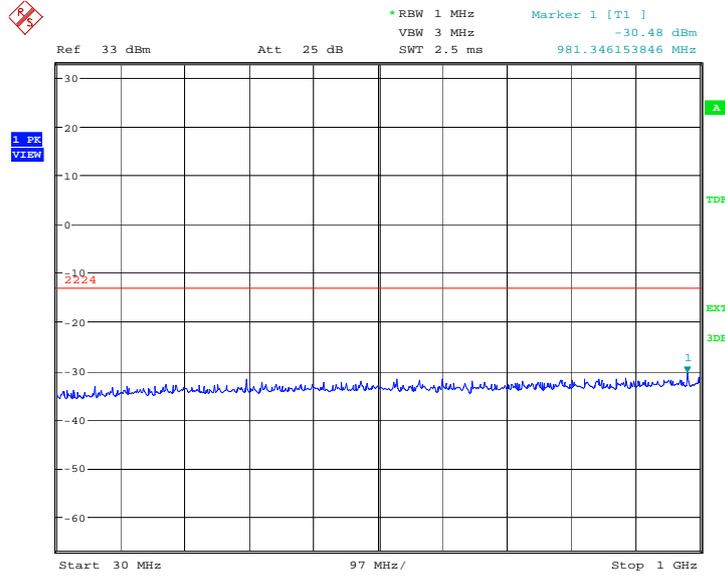
Date: 8.JUN.2011 03:40:19

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



Date: 8.JUN.2011 03:40:47

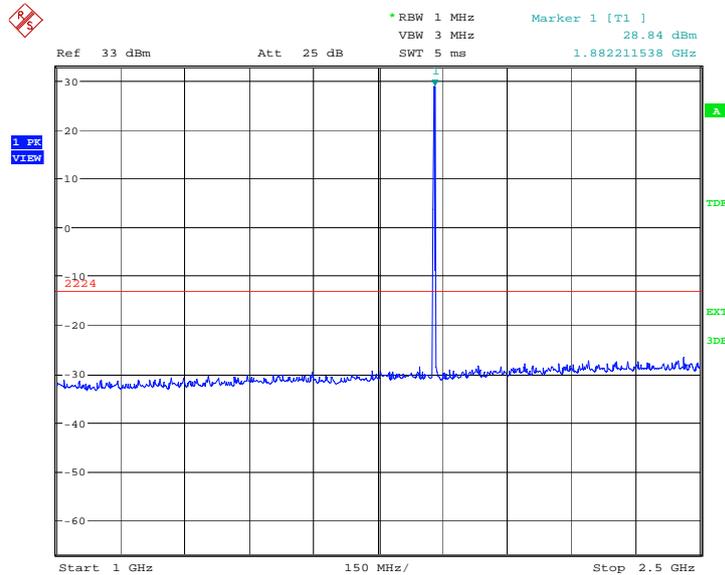
**A.8.3.23 Channel 661: 30MHz – 1GHz**  
Spurious emission limit –13dBm



Date: 8.JUN.2011 03:41:17

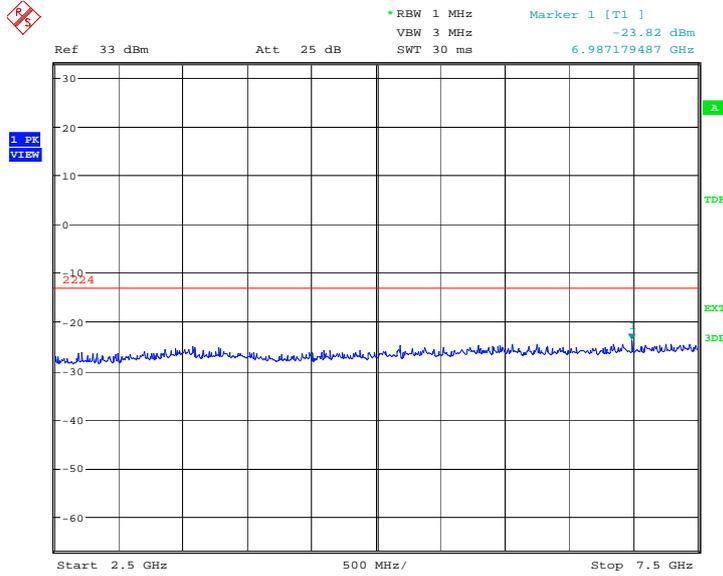
**A.8.3.24 Channel 661: 1GHz –2.5GHz**  
Spurious emission limit –13dBm

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



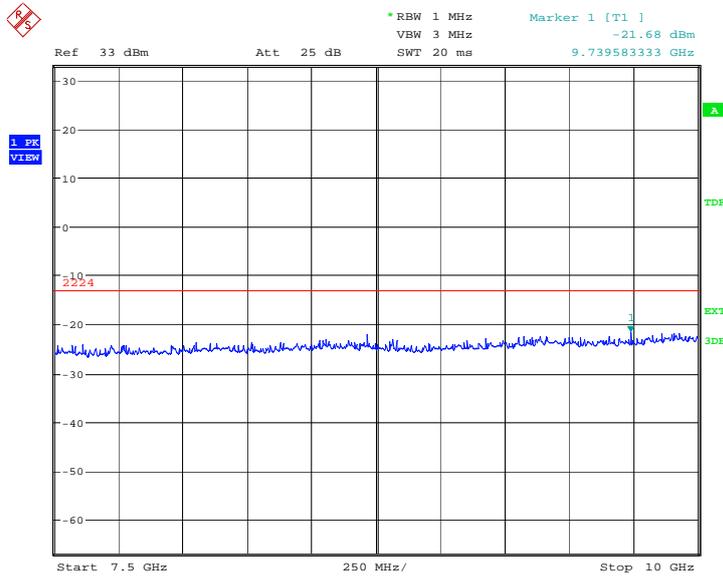
Date: 8.JUN.2011 03:41:45

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



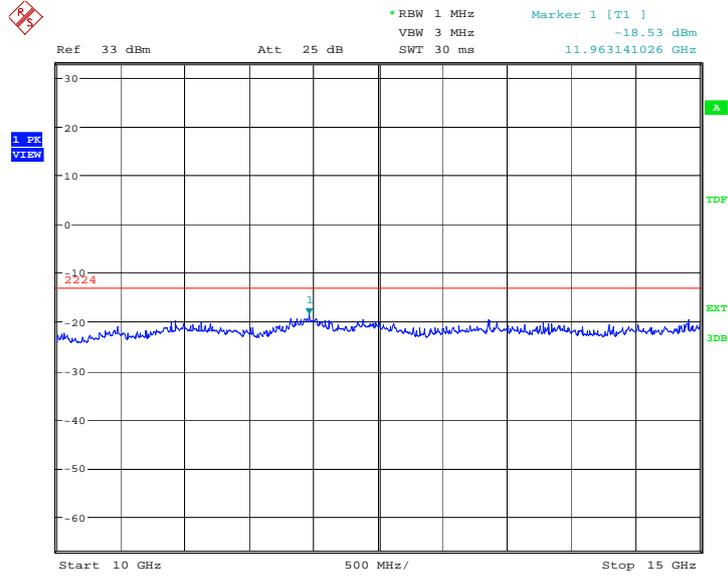
Date: 8.JUN.2011 03:42:13

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



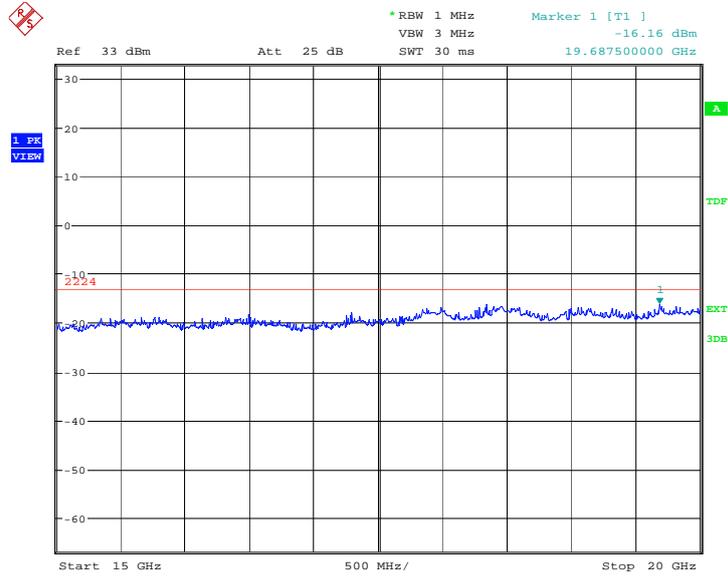
Date: 8.JUN.2011 03:42:41

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



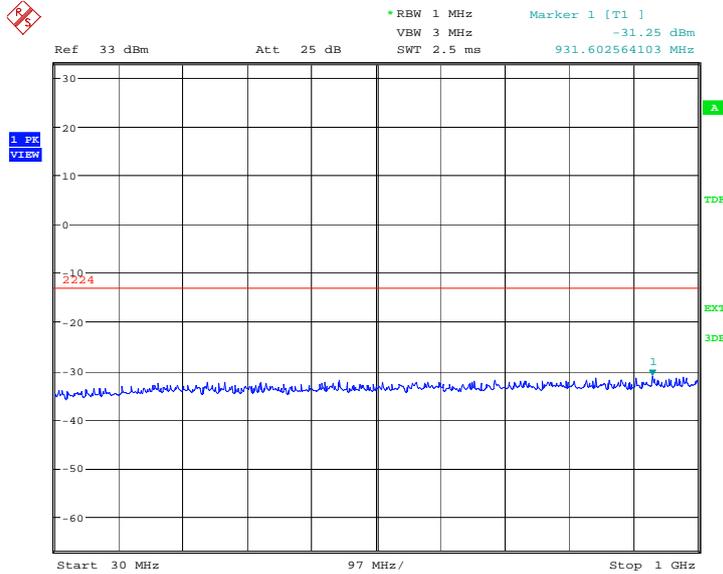
Date: 8.JUN.2011 03:43:09

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



Date: 8.JUN.2011 03:43:38

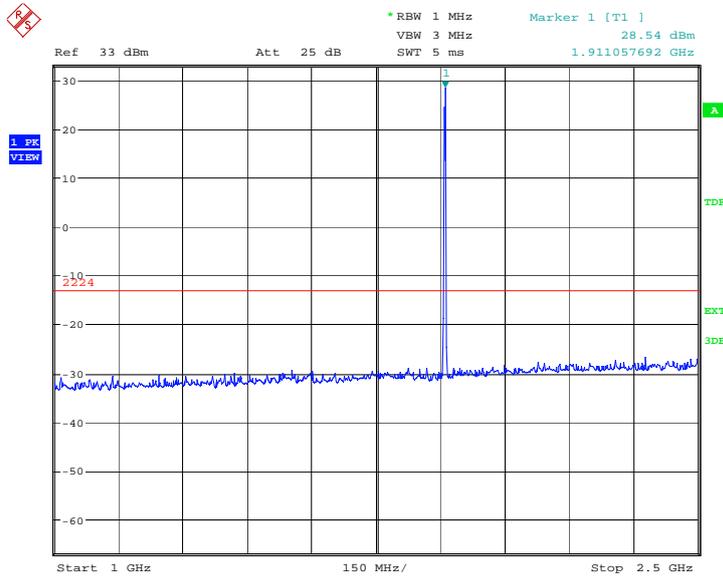
**A.8.3.29 Channel 810: 30MHz – 1GHz**  
Spurious emission limit –13dBm.



Date: 8.JUN.2011 03:44:06

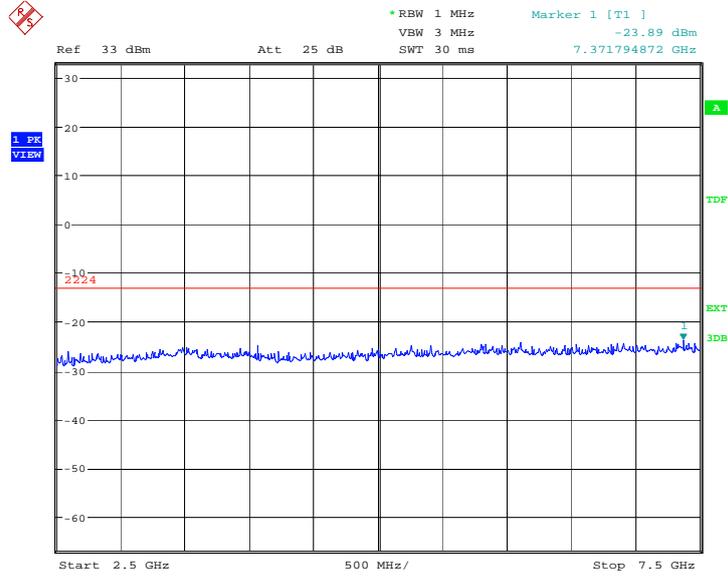
**A.8.3.30 Channel 810: 1GHz – 2.5GHz**  
Spurious emission limit –13dBm.

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



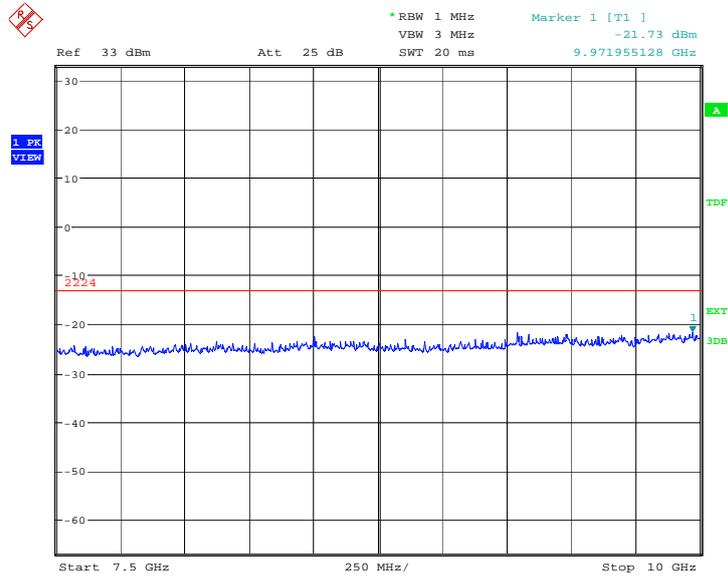
Date: 8.JUN.2011 03:44:34

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



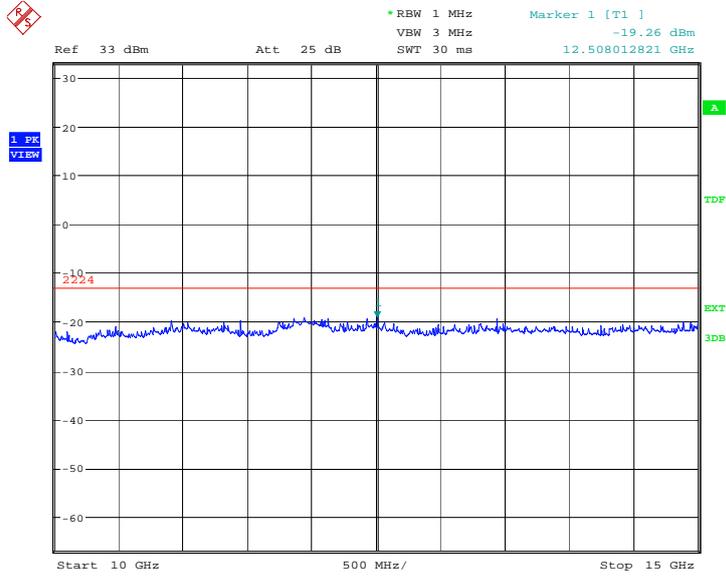
Date: 8.JUN.2011 03:45:03

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



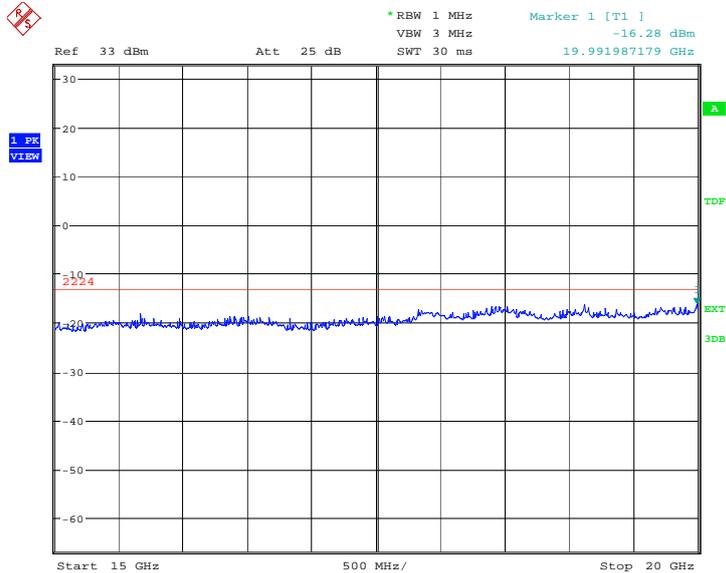
Date: 8.JUN.2011 03:45:31

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



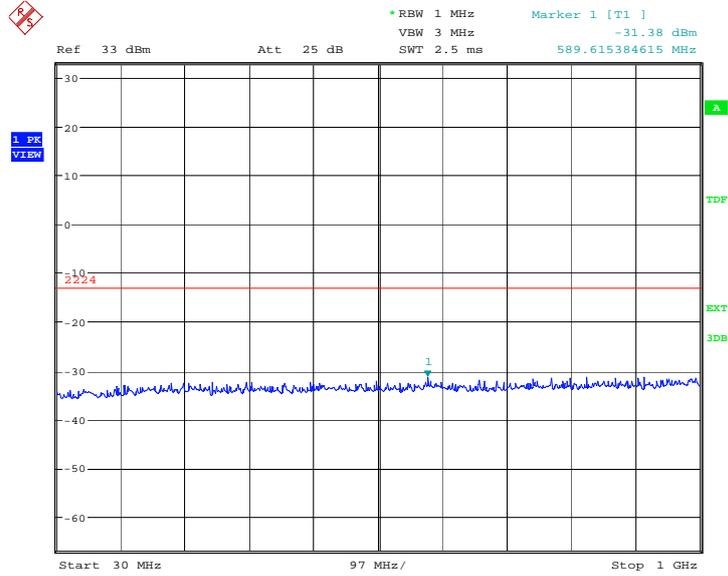
Date: 8.JUN.2011 03:45:59

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



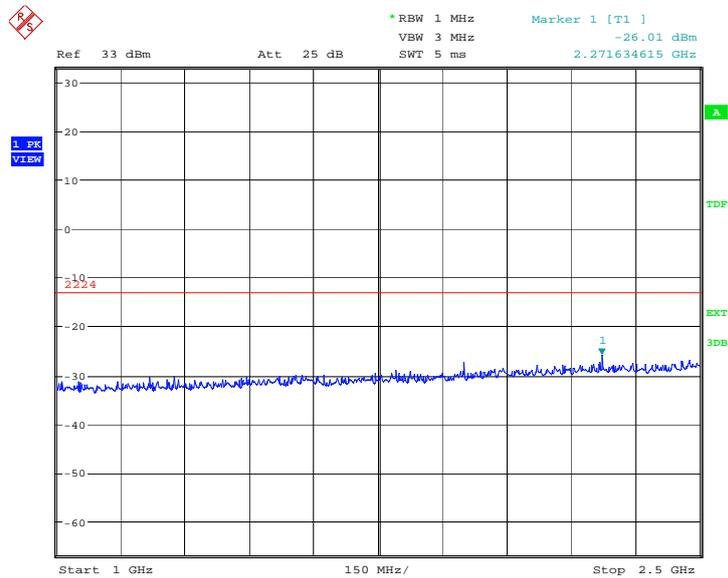
Date: 8.JUN.2011 03:46:27

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



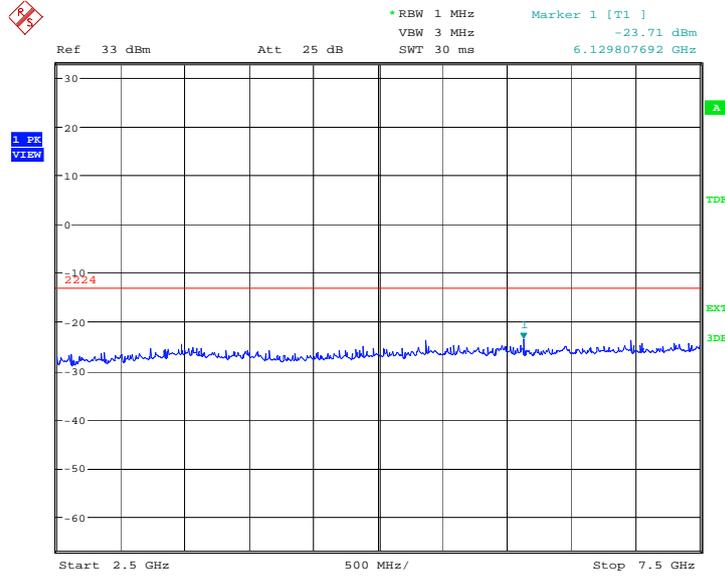
Date: 8.JUN.2011 03:46:56

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



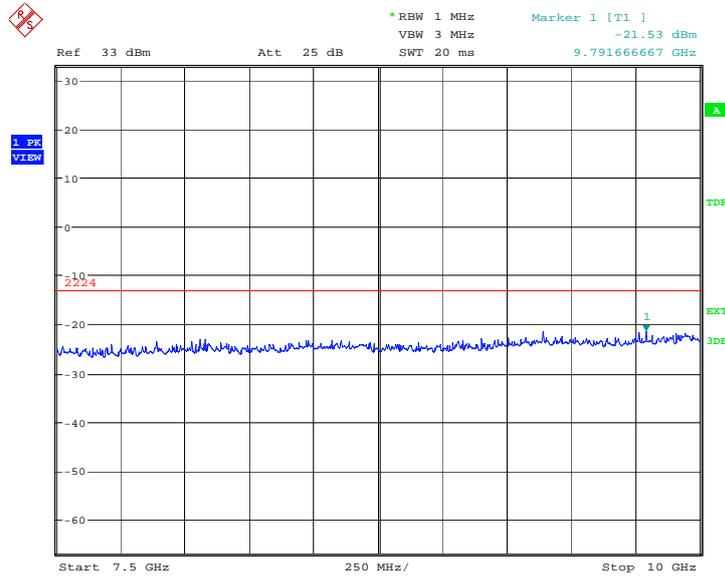
Date: 8.JUN.2011 03:47:24

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



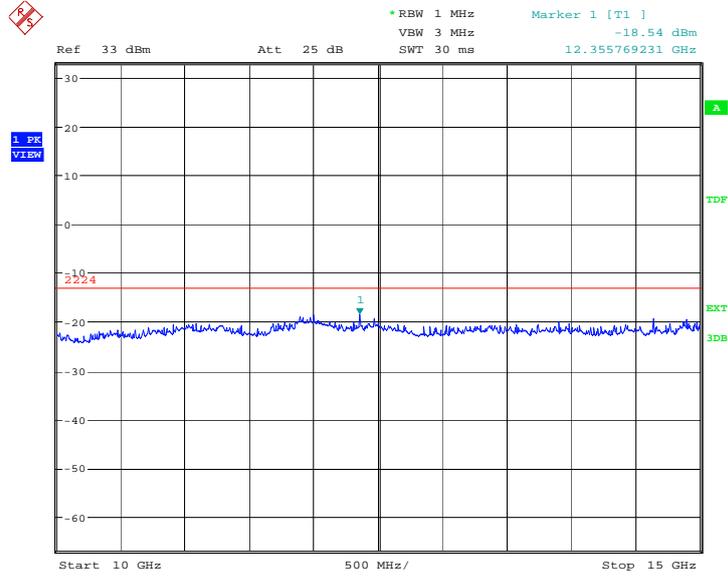
Date: 8.JUN.2011 03:47:52

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



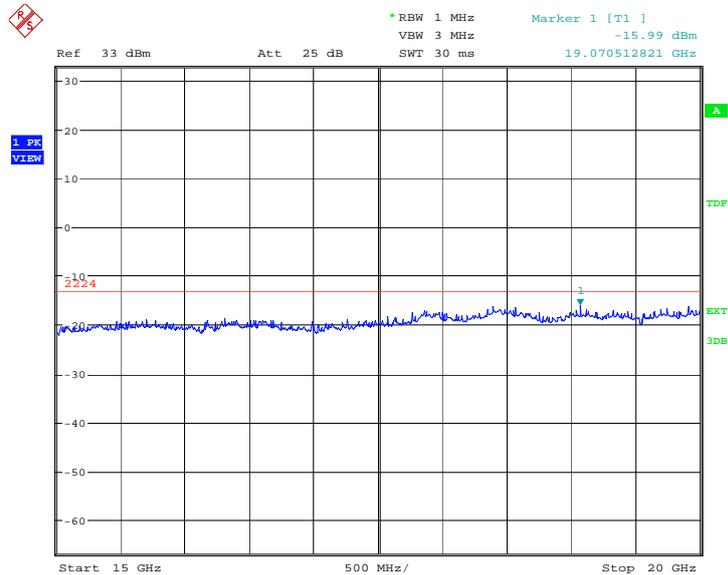
Date: 8.JUN.2011 03:48:21

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



Date: 8.JUN.2011 03:48:49

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



Date: 8.JUN.2011 03:49:17

## A.9 RECEIVER RADIATION EMISSION

### Reference

FCC: CFR Part 15.109, 2.1053

IC: RSS 132, Issue 2, Section 4.6. RSS 133, Issue 5, Section 6.6

### A.9.1 Method of Measurement

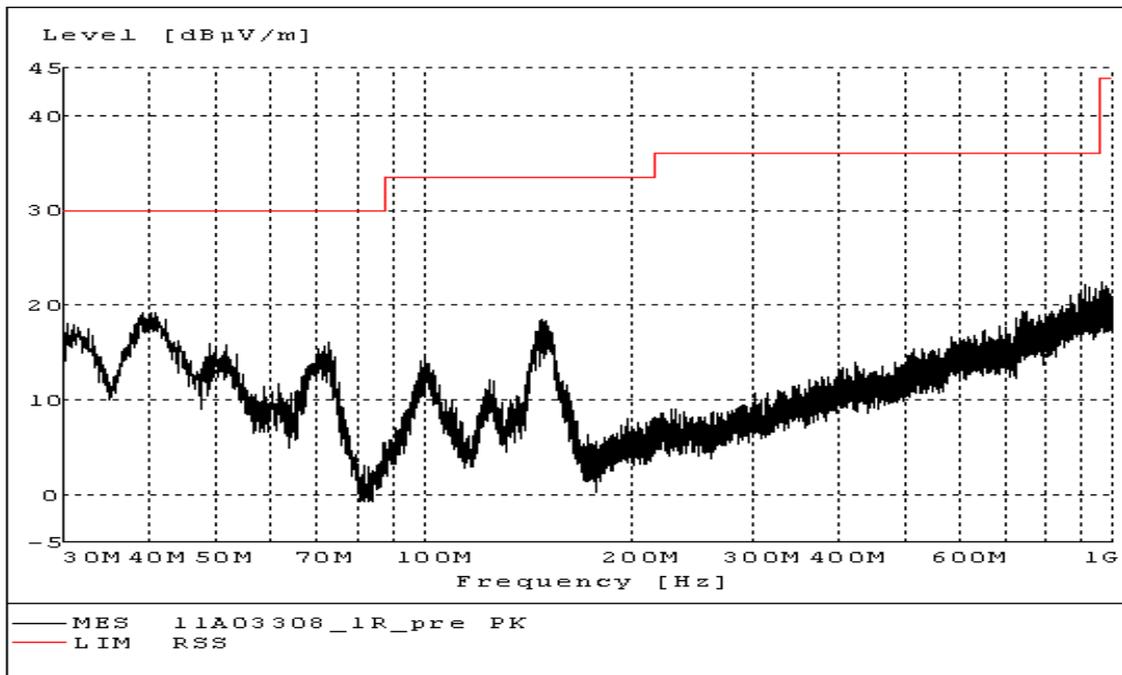
The measurement procedure in ANSI C64.4-2003 is used. The EUT is placed on a 80cm height non-conductive table locating on the center of turntable. From 30MHz-1GHz, the measurement distance is 10m. For frequency range above 1GHz, the measurement distance is 3m.

The EUT is measured with travel charger and the operating mode is idle without CMU200's signaling.

### A.9.2 Method of Measurement

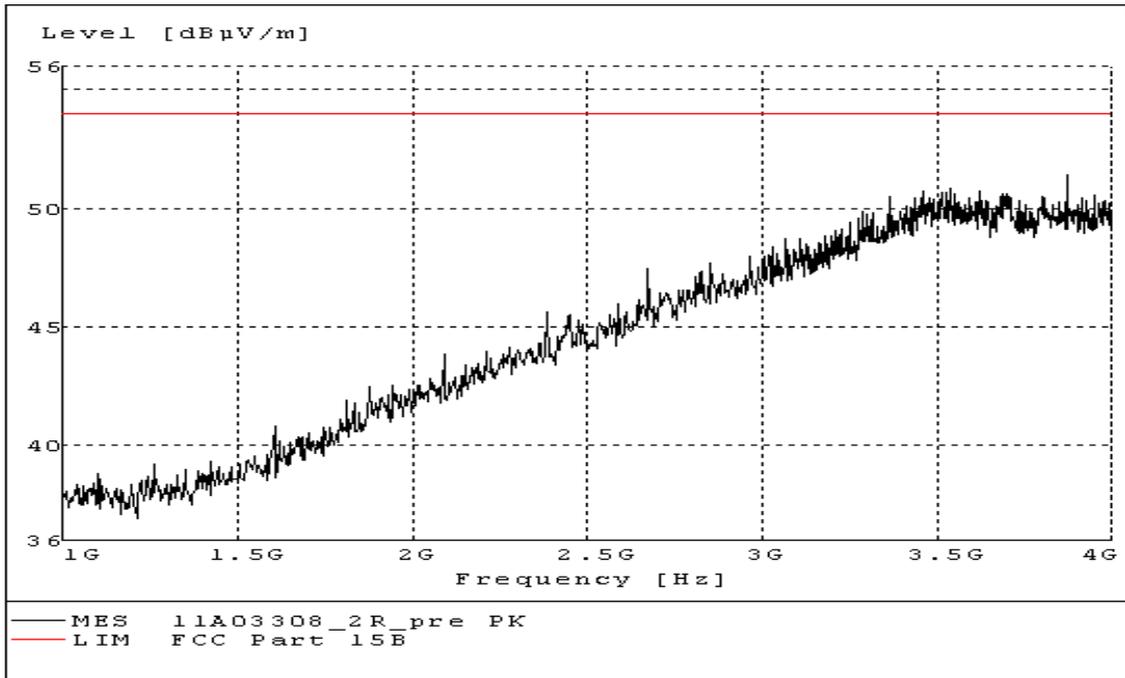
Frequency of Emission (MHz)	Limit (dB $\mu$ V/m)	Measurement Distance (m)
30-88	30	10
88-216	33.5	10
216-960	36	10
960-1000	44	10
>1000	54	3

### A. 9.3 Measurement results



IF bandwidth: 120 kHz

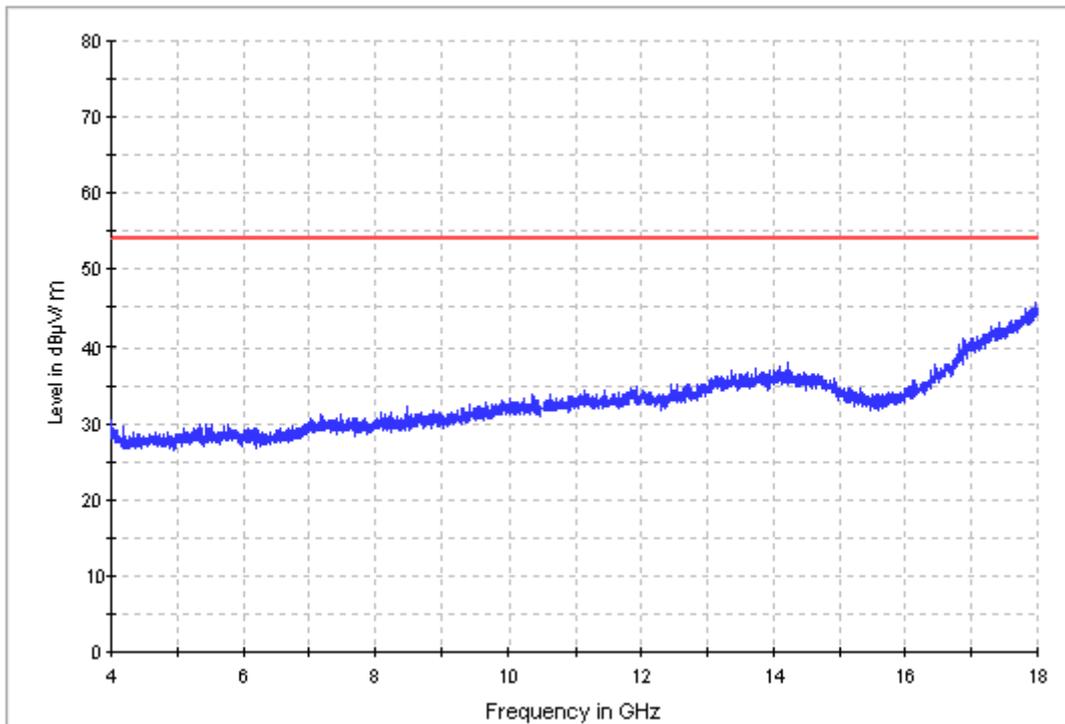
Idle Mode: 30MHz-1GHz



RBW / VBW 1 MHz

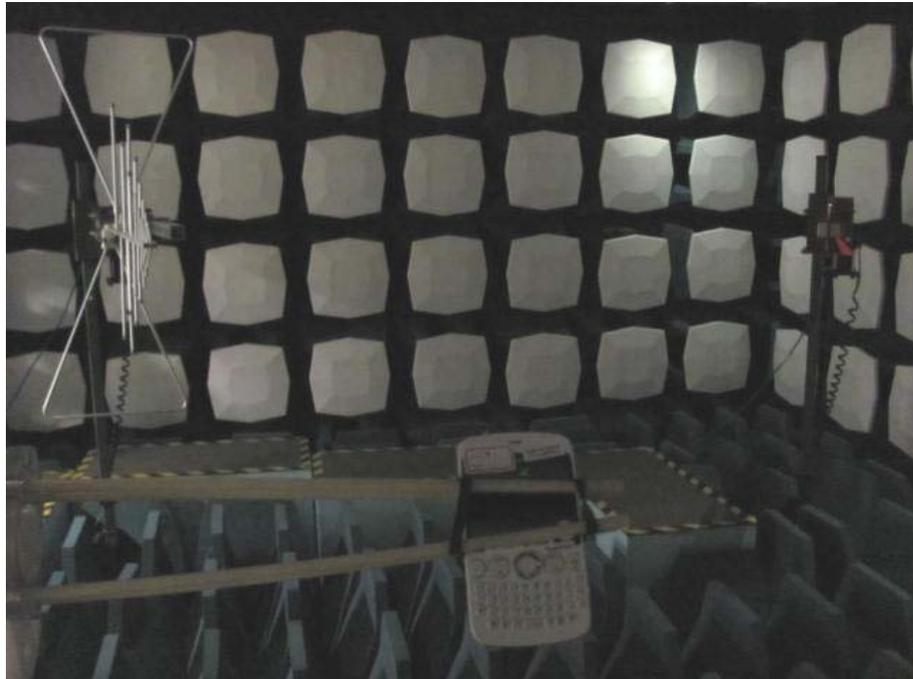
Idle Mode: 1GHz-4GHz

FCC 4-18G



RBW / VBW 1 MHz

Idle Mode: 4GHz-18GHz

**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**



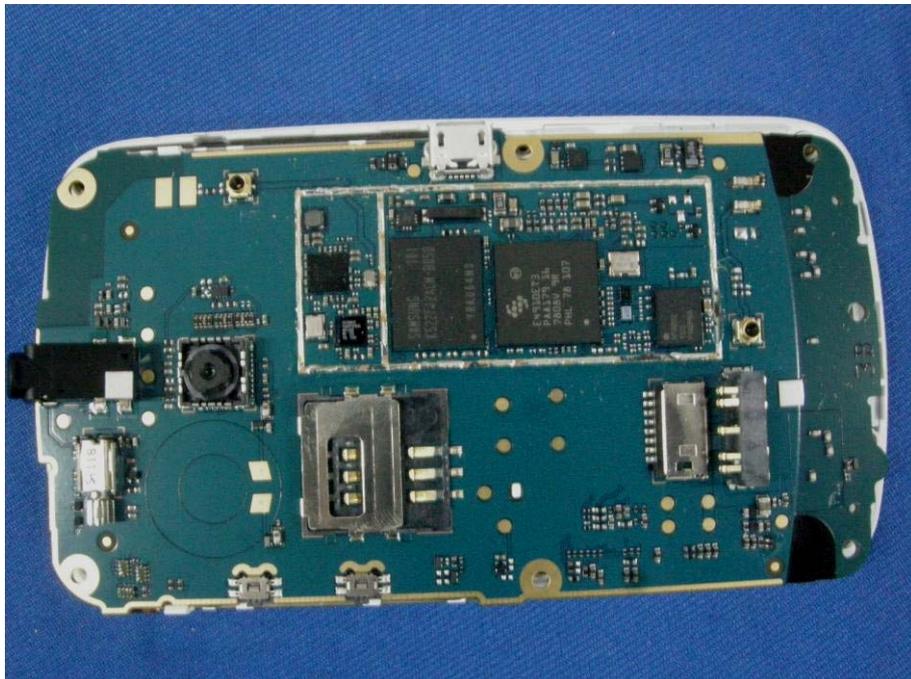
Mobile Phone



Mobile Phone



Mobile phone Disassembly



Mobile phone Disassembly



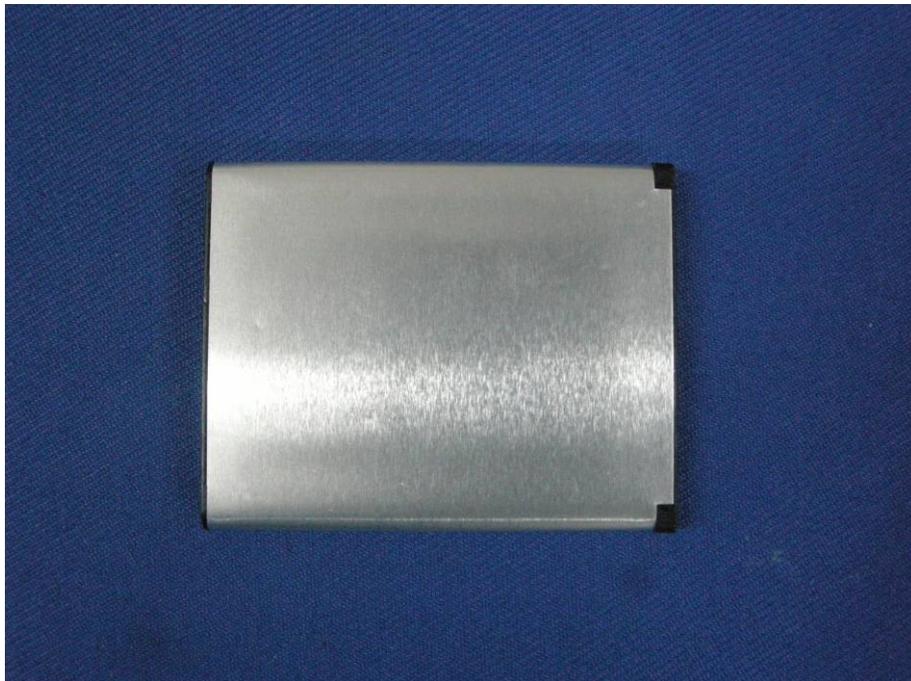
Mobile phone Disassembly



Mobile phone Disassembly



Battery



Battery



**Travel Charger**



**Label of Travel Charger**

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